Louisville Gas and Electric Company
220 West Main Street
P.O. Box 32010
Louisville, Kentucky 40232

October 26, 1993

Mr. Richard M. Everhart
Chief of Engineering
Air Pollution Control District
of Jefferson County
850 Barret Avenue, Suite 205
Louisville, Kentucky 40204

Dear Mr. Everhart:

Louisville Gas & Electric Company (LG&E) hereby submits the draft **Test Protocol for Wind Tunnel Modeling of Plume Impact Under Stable Stratification for Cane Run Station.** The protocol describes the wind tunnel modeling that is planned to evaluate maximum ground level concentrations on the complex terrain to the west of the LG&E Cane Run Generating Station.

A previous wind tunnel modeling study concluded that the Good Engineering Practice (GEP) stack height, based on building downwash effects for a single stack serving Units 4 & 5, is 410 feet. Based upon the results of the study, LG&E obtained US EPA Region IV approval to construct a 410 foot GEP stack replacing the current Units 4 & 5 stacks. This is one option being considered for the resolution to the NAAQS exceedence.

Preliminary dispersion modeling using the GEP stack in the COMPLEX I (Valley mode), conducted by Black & Veatch, predicted that concentrations in excess of the NAAQS will occur with existing emission rates on elevated terrain to the west-southwest of the Cane Run Station under F stability. The dispersion modeling shows the emission limits on Units 4 & 5 must be reduced to approximately 0.55 lbs. SO2/mmBtu, with the GEP stack in place. Other models were evaluated to determine which model proved to be the best performer for the Cane Run Station. The results of the draft modeling are presented in the attached chart and has been included per your request.

A second wind tunnel study considered the upwind effect of the elevated terrain to the west of Cane Run Station on maximum ground-level concentrations and the GEP stack height determined in the previous study. This second study concluded that under neutral atmospheric conditions, terrain wake effects will not significantly affect the plume from the Units 4 & 5 GEP stack.

LG&E obtained approval (August 17, 1993) from US EPA Region IV and the APCDJC to perform a preliminary model evaluation using the wind tunnel to further evaluate the predicted concentrations on the elevated terrain. The results demonstrated all US EPA models

(Valley, RTDM, and CTDMPLUS) overpredicted the maximum concentration on elevated terrain by a factor of 2 or more.

Thus, LG&E is submitting this draft protocol for your approval to document the results of the preliminary fluid modeling. Per the EPA Guideline on Air Quality Models (EPA, 1986), LG&E will use the results of this modeling to (1) demonstrate the adequacy or inadequacy of the existing EPA models for predicting concentrations due to Cane Run Station on the terrain under stable impact conditions, (2) to provide an estimate of the maximum expected concentrations under stable plume impact, if the EPA models are not determined to be adequate in this case, and (3) to provide a database that can be used to modify, improve and test a suitable EPA model for future emission limit determination at the Cane Run Station.

As you know, LG&E is diligently seeking to find a permanent resolution to the Cane Run Generating Station NAAQS modeled exceedence that is logical, prudent and economically viable. Constructing a GEP stack is not a simple project. Every scenario must be aligned with regulations concerning the Clean Air Act Amendments of 1990 (Titles I,III,IV and V) and the future plans for the station. We are exhausting every means available to us in determining an equitable, full compliance solution to this problem. We hope you will continue to work with us in determining a suitable resolution.

If you have any questions, please call me at (502) 627 -3425.

Sincerely,

Donald L. Spellman
Senior Environmental Scientist

cc: S.R. Wood
C. Hermann
W.G. Gilbert
J.N. Voyles
R.J. Ehrler
J. Cherwak
M.A. Schmitt
A.L. Carlson (B&V)
R.L. Petersen (CPP)

Table 1
Cumulative Source/CRGS Modeling Summary Table
1.2 lbs SO_2/MBtu Emission Level

Averaging Period	Concentration ($\mu g/m^3$)		
	239 ft U4, U5 Stack Height*	385 ft U4, U5 Stack Height*	410 ft U4, U5 Stack Height*
COMPLEX I (VALLEY option)**			
3 hr***	4767.7 (**4257.4**)	2146.5 (**1636.2**)	1616.5 (--)
24 hr***	1324.4 (**1182.6**)	596.3 (454.5)	449.0 (--)
Annual	423.8 (**378.4**)	190.8 (145.4)	143.7 (--)
COMPLEX I (with meteorological data)**			
3 hr	3454.0 (**3194.4**)	1868.1 (**1658.6**)	1438.6 (--)
24 hr	805.3 (**701.4**)	475.8 (**345.0**)	415.3 (--)
Annual	80.2 (**54.8**)	51.9 (25.6)	48.5 (--)
CTSCREEN**			
3 hr***	-- (4921.4)	3410.1 (2998.0)	1950.4 (**1468.8**)
24 hr***	-- (1054.6)	730.7 (642.4)	418.0 (**314.8**)
Annual	-- (210.9)	146.1 (128.5)	83.6 (**63.0**)
RTDM			
1 hr***	-- (--)	-- (--)	-- (1067.5)
3 hr	– (2157.5)	-- (--)	-- (--)
24 hr	-- (427.4)	-- (--)	-- (--)
Annual	-- (28.2)	-- (--)	-- (--)
ISCST2**			
3 hr	1719.2 (**1719.2**)	-- (--)	966.3 (966.1)
24 hr	426.2 (371.2)	-- (--)	399.5 (292.6)
Annual	67.3 (43.3)	-- (--)	64.6 (33.3)

*The CRGS Unit 6 stack height for all modeling runs was 500 ft.

**The concentration outside of parentheses is the result of cumulative source modeling with the CRGS Unit 4, 5, and 6 stack heights as listed; the concentration inside of the parentheses represents the CRGS modeling results for Units 4, 5, and 6 at the listed stack heights only. All CRGS concentrations represent the worse-case concentrations modeled only and may not always correspond to the same time and location as the worse-case cumulative source concentration for the same averaging period. CRGS sources which do correspond to the same time and location as the cumulative source concentration are in bold.

***Concentrations listed are highest concentrations, not highest, second-highest concentrations.