UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

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June 20, 1984

MEMORANDUM

SUBJECT: Review of the Lovett Modeling Protocol

FROM: Joseph A. Tikvart, Chief J. Tikvart
Source Receptor Analysis Branch

TO: William Baker, Chief
Air Programs Branch, Region II

We have reviewed the draft performance evaluation protocol and the quality assurance documents for the Lovett Power Plant. Our comments are attached. In particular, we are concerned by the adequacy of the monitoring network and the scoring scheme to be used in the model comparison. Both are critical to selecting the best model for reliably specifying emission limits. I suggest that the issues identified be discussed at the meeting with the Company, currently scheduled for June 21, 1984.

If you have any questions, please contact me.

Attachment

cc: T. Helms
S. Reinders
R. Rhoads
R. Werner

Comments on Protocol for the Evaluation and Comparison of Air Quality Models for Lovett Generating Station

General

1. It is not clear whether CRSTER might estimate close-in concentrations under A-Stability that exceed concentrations on high terrain estimated by the NYSDEC model. Thus it may be necessary to use a guideline model for areas below stack height.

2. For purposes of comparison with standards, monitored air quality data should be "rolled up" to 100 per cent load.

Chapter 3

1. Instead of using two versions of the NYSDEC model, the Company and State should agree on one version that is acceptable to both.

2. Commitments should be made at this time as to which model will be chosen as the proposed model, rather than using the field data to develop another new model. The model development process will drag out the period of time necessary to set a final emission limit to 1991 or later.

Chapter 4

The preliminary analysis involved overlapping "running" 3-hour concentrations, but "block" 24-hour concentrations. A consistent approach should be used in the performance evaluation for all averaging times.

Chapter 5

1. The proposed placement of monitors is responsive to the preliminary estimates from the contending models. However, based on experience with previous model evaluations, knowledge that has been gained from the EPA complex terrain study and other technical considerations, the proposed monitoring network does not contain acceptable coverage for conducting the performance evaluation. Additional monitors should be placed in the following areas:

a. Two monitors along the ridge line on Dunderhead Mountain.

b. One monitor at the 500-600 foot level near the end of the ridge (near the river) on Dunderhead Mountain.

c. Two monitors on the lee side of Dunderhead Mountain.

d. Two monitors on the windward side of Dunderhead Mountain (near the 500-600 foot level).

e. One monitor in the town of Peekskill.

f. One monitor near the beacon on Anthony's Nose (near the Bear Mountain Toll Bridge).

Suggested approximate locations for the additional monitors are shown on the attached map.

2. The same method for determining mixing depth should be used for all contending models. If the Company wishes to use the Benkley-Schulman scheme, this is acceptable.

Chapter 6

1. The "annual" concentration sets should not be part of the regulatory tests, but included instead in the scientific portion.

2. The point distribution for the 2nd high data set and the 25-highest data set should be closer to 70% of the total points. Major emphasis among the two should be on the 25-highest (20%/50%).

3. Another stability category of data should be added to "balance" the stable category analysis. For example, the stability category corresponding to the highest observed concentrations might be included.

4. Table 16 should be modified with respect to Difference Score and Bias Score by removing the first term involving ratios of absolute residuals. This will result in equal emphasis on factors of under- or over-prediction. If the 1st term is not removed, a model which overpredicts by a factor of 2 would receive only half as many points as another model that underpredicts by the same factor.

5. For purposes of the model evaluation, observed concentrations should be normalized to a common emission level.

6. A more stringent test should be applied to determine whether the better model is to be upward calibrated if that model underpredicts the highest concentrations. This test should not allow the average of the top 10 estimates to underestimate the average of the top 10 observations. In addition, the test should not allow the second highest estimate to underestimate the second highest observation by more than 10 percent. These requirements may also eliminate the need for a "bootstrap" approach.

Comments on Quality Assurance Plan for the Lovett Meteorological Monitoring Network

1. Air intake for the temperature sensors should be oriented towards the north as noted in Section 2.3.4 and not downward as noted in Section 2.2.2.

2. Considering the potentiometer gap around 360°, severe errors will result when the wind direction sensor is aligned with true north as described in Section 2.3.2. An alignment with at least two objects several miles away is necessary. The orientation and distance of these objects from the tower should be established using engineering survey methods.

3. All wind instruments should be factory calibrated in a wind tunnel before installation and then recalibrated in the wind tunnel (with associated translator) at least at semi-annual intervals or after undergoing major repairs.

4. At quarterly intervals, or after major repairs, a complete system calibration (sensor, translator, recorder and cables), not just individual component calibrations is required. Voltage losses in cables and junctions must be accounted for during the on-site calibrations.

5. According to Section 5.2, item 2.1, "If the sensor's vane and bearings are not worn or damaged ....etc." How is this fact periodically determined? The instruments should be physically checked during a tower climb.

6. Methods of minimizing data losses such as lightning, power failures to the site, etc. are not described.

7. In Section 8.2, the manual data reduction from strip charts should specify that the hourly σ_θ values are obtained from 15-minute averages as described in Section 8.1 for digital data reduction.

8. How often are the cross checks between digital and analog values (Section 8.2.3, item 2.2) made? What tolerance limits are used to determine if the comparison is acceptable?

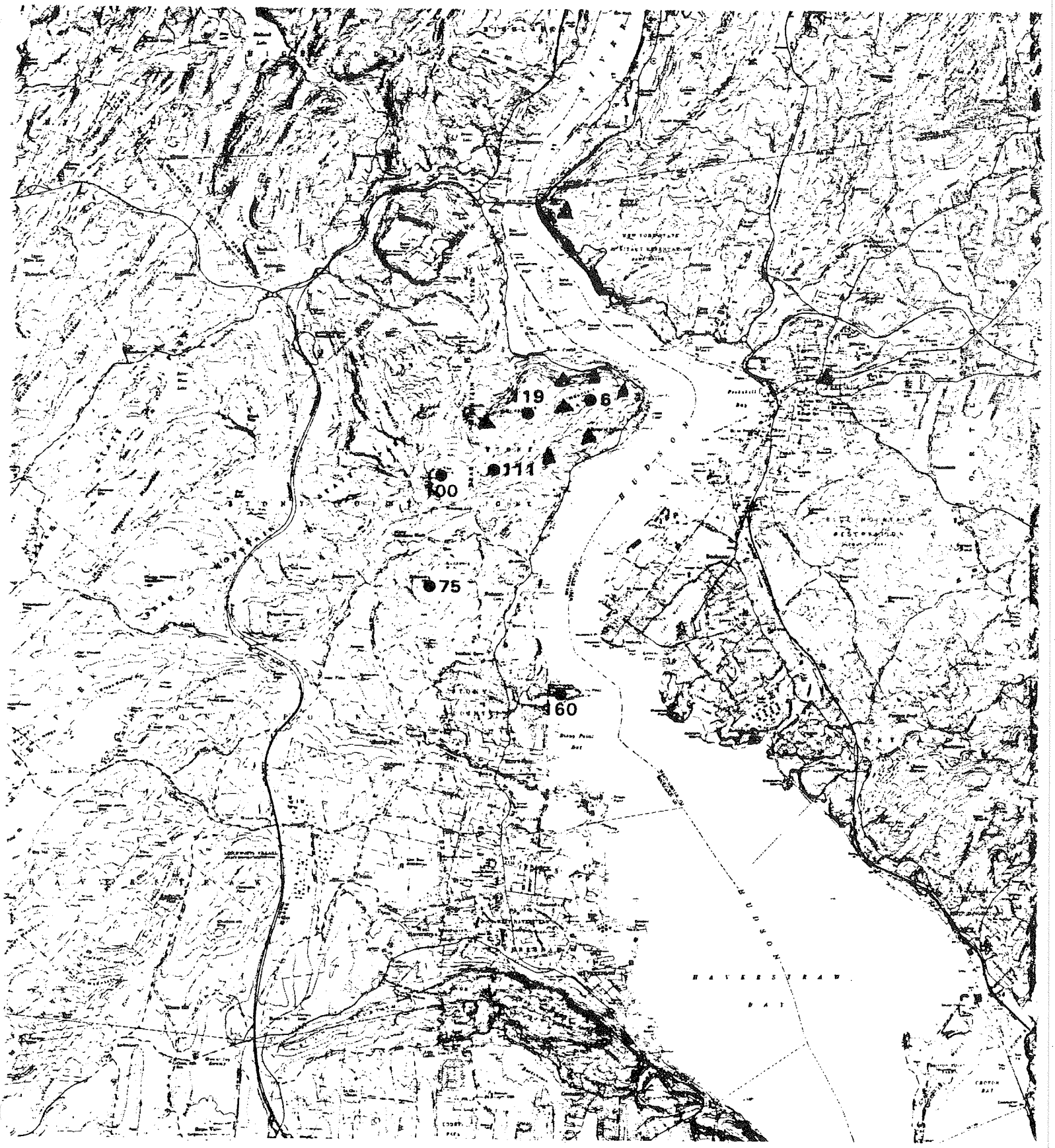
9. In Section 10, the first QA audit should be made within 60 days after the network is in full operation, continue on at least a semi-annual schedule, and the last audit should be conducted no later than 30 days prior to the termination of the measurement program. Written audit evaluations should be provided to the owner and EPA after each audit.

Comments on Quality Assurance Plan for the Lovett Sulfur Dioxide Monitoring Network

1. A regulatory agency should conduct system audits of the ambient air monitoring network.

2. The Enviroplan QA audit should be made within 60 days after the network is in full service similar to criteria in item 9 above.

3. Failure to meet QA audit requirements of the regulatory agency may result in data invalidation.



Monitoring locations for Lovett Performance Evaluation

o Proposed by the Company

▲ Additional monitors proposed by OAQPS