UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

DATE: FEB 0 2 1994

SUBJECT: Comments on the Air Quality Model Evaluation Protocol for Cyprus Northshore Mining Company, Silver Bay, Minnesota

FROM: Rebecca Calby, Regional Meteorologist Rebecca Calby
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TO: Dean Wilson, Model Clearinghouse Coordinator
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On December 20, 1993, the United States Environmental Protection Agency (USEPA), Region 5, received a final, Minnesota Pollution Control Agency (MPCA) approved, air quality modeling protocol developed for Cyprus Northshore Mining Company, located in Silver Bay, Minnesota. A partial copy of the protocol was forwarded to you in early January, 1994.

The purpose of this letter is to clarify some items in the protocol, and to provide justification for our overall concurrence. The major issues are presented below.

1) Data Collection Period - The protocol proposes to use the time period from March 1, 1992, through August 31, 1993, as the study period for the evaluation. The document entitled "Interim Procedures for Evaluating Air Quality Models (Revised)", September 1984, states that "it is essential that a written protocol be prepared and agreed to by the applicant and appropriate control agency before the data collection and evaluation process is initiated." A written protocol was first submitted to the MPCA and the USEPA on January 28, 1992. Although some revisions, additions, and clarifications have been made to that submittal, the fundamental aspects of the model evaluation (i.e., choice of reference and candidate model, ambient air monitor locations, meteorological tower data, and the statistical evaluation method) have not changed. Additionally, the facility typically switches fuel depending on natural gas prices. However, coal was burned exclusively during the proposed time period which makes available extensive sulfur dioxide emissions and dispersion data for use in the evaluation. Given that a substantial protocol was submitted in January, 1992, we are confident that the evaluation is not compromised, and in fact is enhanced, by use of the proposed March 1992 through August 1993 study time period.

2) Monitoring - The protocol uses air monitoring data collected from four co-located sulfur dioxide and nitrogen oxide monitors.

A monitoring network was initially sited in 1990 according to modeling performed as part of MPCA permitting activities. At Region 5's request, a monitor located southwest of the facility in the town of Silver Bay, was moved and is now identified in the protocol as monitor 11. This new location is better suited for the evaluation because it is in the prevailing wind flow and it is subject to building downwash influences. Figures 5-2 and 5-3, of the protocol, show that the monitor locations 5, 6, and 11 are well sited relative to sulfur dioxide and nitrogen oxide reference model hotspot locations. Monitor 10 is located downwind of the facility during the predominate flow and may be frequently impacted by facility emissions. It also reflects an area of high concentrations as predicted by the candidate model. (Table 1 (attached) summarizes monitor elevations relative to emission sources.)

The number of monitors proposed for use in this evaluation is sufficient based on the quality of their location, the limited emission sources, and because the facility is located adjacent to Lake Superior, and only onshore and parallel flow (35 degrees to 215 degrees) are being evaluated. Also, large differences in predicted concentrations between the reference model and the candidate model are expected given the initial modeling results. Consequently, the monitors recommended in the protocol should provide data which are adequate to evaluate the models.

3) Statistical Evaluation - The protocol appropriately proposes using the Cox method for determining the best performing model. Scientific and operational performance measures have been identified as well as the weighting scheme for use in the composite performance measure. A confidence level of 90% has been proposed for the statistical analysis.

4) Background - A methodology is proposed in the protocol to determine background concentrations in order to distinguish between the contribution of the source under study and the contribution of other sources. The Cyprus facility is the only major source of sulfur dioxide and nitrogen oxide in the area. The proposed background methodology examines minimum recorded values from monitors in directions upwind from the source. This background value is likely to be very low and will be subtracted from the measured concentrations before use in the evaluation. This methodology may produce a background concentration that is biased low. However, use of a low background would serve to bias the results toward the reference model since the reference model predicts the higher concentrations.

5) Emissions data - Sulfur dioxide emissions will be determined primarily based on information from hourly Continuous Emission Monitoring (CEM) data from the primary SO_2 source- Power Boiler 2. Sulfur dioxide emissions from Power Boiler 1, which does not have a CEM and only operated approximately 5% of the time when meteorological conditions of interest were occurring,

will be determined using hourly boiler usage information and monthly averaged sulfur and heat content data along with data correlations from Power Boiler 2. Hourly nitrogen oxide emissions are to be determined by applying an emission factor based on engineering tests, CEM's, and furnace fuel rate data from the primary nitrogen oxide source, the pelletizing furnaces. Appendix E describes in detail the sulfur dioxide and nitrogen oxide emission determinations.

6) Reference Model - Due to the complex terrain near the facility, the reference model to be used in the evaluation is a combination of the ISCST2 and COMPLEX I models. This will be implemented through the use of an EPA approved intermediate model (e.g., BEEST-X). Currently, section 5.5 of the protocol does not indicate that the reference model is ISCST2/COMPLEX I. This deficiency has been discussed with the consultant for Cyprus and a revised section 5.5 is being sent to Region 5. The revised section will clearly state that the reference model incorporates the use of COMPLEX I for receptors above plume height, the use of the more conservative concentration estimates from ISCST2 and COMPLEX I for receptors between stack height and plume height, and the use of ISCST2 for receptors at and below stack height.

The protocol submitted by the MPCA on December 20, 1993, has been reviewed by Region 5. Although some minor clarifications may have to be made, the submittal appears to basically conform to the guidance in the "Interim Procedures" document. A complete copy of the protocol is enclosed with this letter. Please review the document and provide any comments you may have, particularly regarding the issues identified above.

Thank you, in advance, for your assistance and we look forward to your response. If you have any questions, please call me or Randy Robinson, at (312) 353-6713.

Attachments

LOCATIONS OF BUILDINGS, HIGHWAY & MONITOR SITES

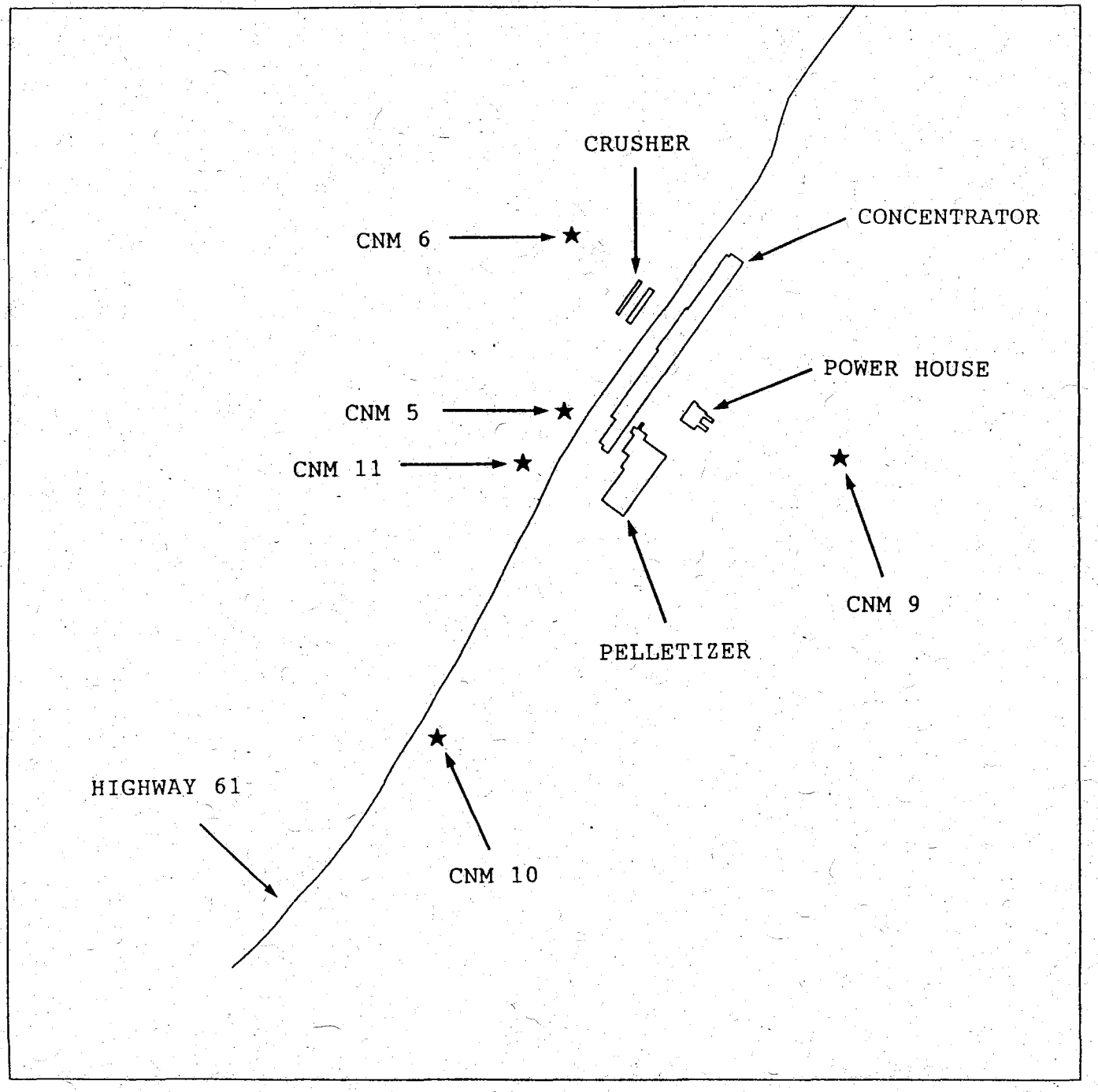

FIGURE 1 - CYPRUS NORTHSHORE

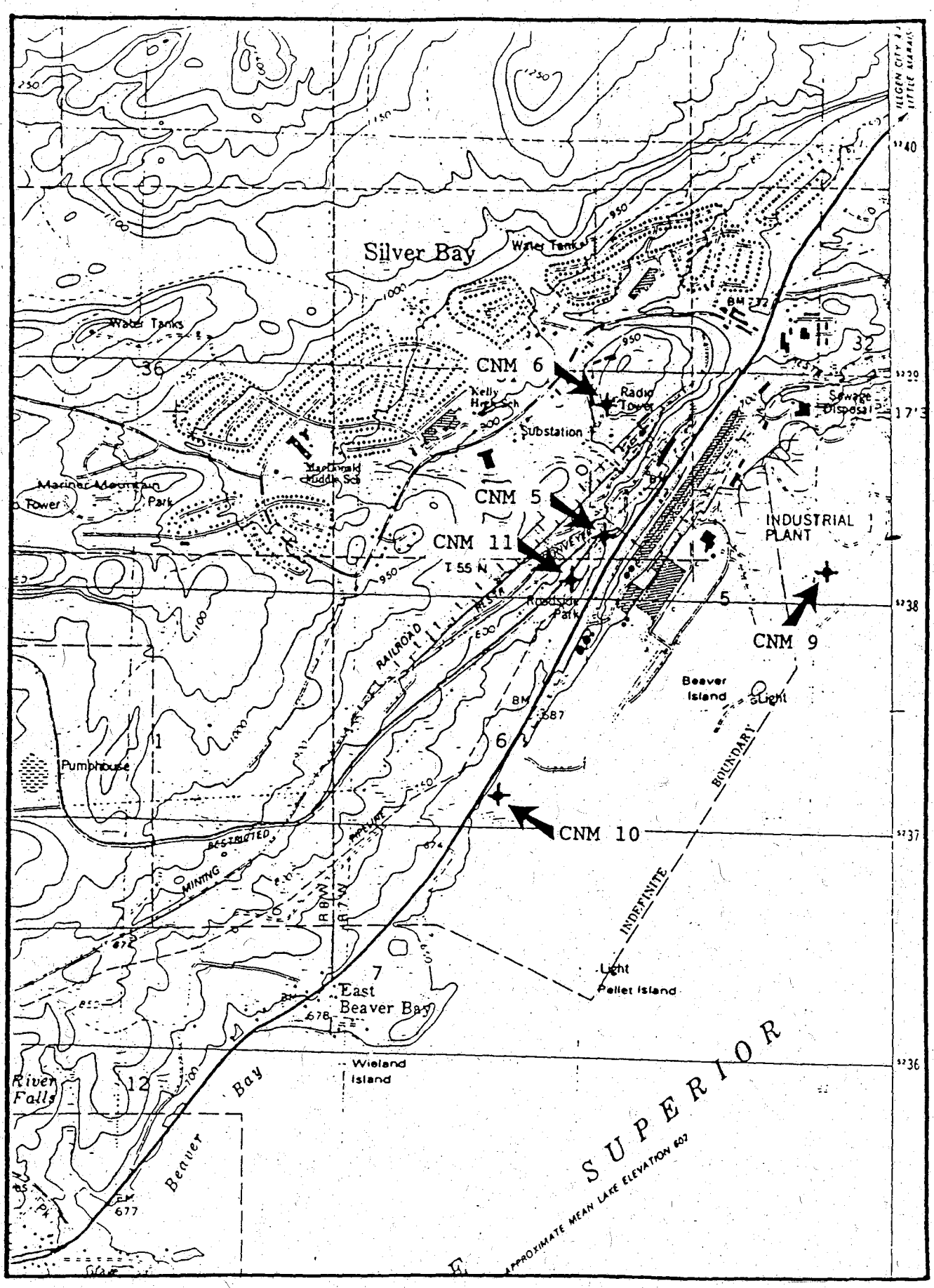

FIGURE 4-1 LOCATION OF MONITORING SITES

TABLE 1
CYPRUS NORTHSHORE - SO2 AND NOX SOURCES
(all values entered in meters)

Source Number	Base Elev	Hgt	Top Elev	(CNM - Source) Difference in relative heights						
	Monitor			CNM5	CNM6	~~CNM7~~ removed	~~CNM8~~ relocated	CNM9	CNM10	CNM11
	Top Elev --->			237.92	305.26	~~279.26~~	~~303.68~~	189.97	196.66	238.72
Power Boilers 1	186.23	65.84	252.07	-14.15	53.19	27.19	51.61	-62.10	-55.41	-13.35
Power Boilers 2	186.23	65.84	252.07	-14.15	53.19	27.19	51.61	-62.10	-55.41	-13.35
Process Boiler 3	186.23	39.93	226.16	11.76	79.10	53.10	77.52	-36.19	-29.50	12.56
Proposed Sources ~~94~~	193.85	37.19	231.04	6.88	74.22	48.22	72.64	-41.07	-34.38	7.68
Proposed Sources ~~95~~	193.85	37.19	231.04	6.88	74.22	48.22	72.64	-41.07	-34.38	7.68
Proposed Sources ~~96~~	193.85	37.19	231.04	6.88	74.22	48.22	72.64	-41.07	-34.38	7.68
~~97~~	193.85	37.19	231.04	6.88	74.22	48.22	72.64	-41.07	-34.38	7.68
Fletizer Heat Exhaust Stacks 98	193.85	24.69	218.54	19.38	86.72	60.72	85.14	-28.57	-21.88	20.18
99	193.85	24.69	218.54	19.38	86.72	60.72	85.14	-28.57	-21.88	20.18
100	193.85	24.69	218.54	19.38	86.72	60.72	85.14	-28.57	-21.88	20.18
101	193.85	24.69	218.54	19.38	86.72	60.72	85.14	-28.57	-21.88	20.18
102	193.85	24.69	218.54	19.38	86.72	60.72	85.14	-28.57	-21.88	20.18
103	193.85	24.69	218.54	19.38	86.72	60.72	85.14	-28.57	-21.88	20.18
Waste Gas Stacks 104	193.85	28.65	222.50	15.42	82.76	56.76	81.18	-32.53	-25.84	16.22
105	193.85	28.65	222.50	15.42	82.76	56.76	81.18	-32.53	-25.84	16.22
106	193.85	28.65	222.50	15.42	82.76	56.76	81.18	-32.53	-25.84	16.22
107	193.85	28.65	222.50	15.42	82.76	56.76	81.18	-32.53	-25.84	16.22

CNM5 - SO2, NOx
CNM6 - SO2, NOx, Met. Tower (10m)
CNM9 - Met. Tower (10m & 60m)
CNM10- SO2, NOx
CNM11- SO2, NOx