UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2466

MAY 11 1994

Ref: 8ART-TO

MEMORANDUM

SUBJECT: GEP Stack Height Credit for Montana Sulfur Company Sulfur Recovery Unit

FROM: Kevin Golden, Regional Meteorologist
Assessment, Modeling and Emissions Section, Region VIII

Larry Svoboda, Chief
Assessment, Modeling and Emissions Section, Region VIII

TO: Dennis Doll, Model Clearinghouse Coordinator
Source Receptor Analysis Branch, OAQPS

This memo seeks your concurrence with Region 8's intent to disapprove a GEP stack height analysis submitted by Montana Sulfur and Chemical Company for a 100 meter stack that was recently constructed in Billings, Montana. I would appreciate it if you would review our position for any inconsistencies with EPA policy.

BACKGROUND

The State of Montana is revising the State Implementation Plan for SO2 in the Billings/Laurel area. Montana Sulfur is one of six major industrial facilities that contributes to modeled violations of the 3-hour and 24-hour SO2 standard in the area. The company recently installed a new 100 meter stack to vent their Sulfur Recovery Unit (SRU), and intends to make the taller stack a condition of the revised SIP. Montana Sulfur is requesting that they be allowed to receive dispersion credit for essentially the entire height of the new stack based on the GEP formula contained in the stack height regulations (GEP=H+1.5L). The Company had previously requested credit for the 100 meter stack based on a November 1977 permit/stipulation issued by the State. As noted in the attached correspondence, EPA did not agree to the companies request, unless stack height credits could be legitimately given based on the 1985 stack height regulations.

A drawing of the new stack is attached. The SRU vents up a 42-inch diameter stainless steel flue inside an 8-foot diameter, 310-foot tall cylindrical steel support structure. The flue is

offset to the side of the support structure to allow access, and projects above the support structure to a final height of 328 feet (100 meters). Based on the BPIP formula height calculation using these dimensions of stack and support structure, the company is requesting GEP stack height credit of 98.15 meters.

SUMMARY OF ISSUE AND PROPOSED RESOLUTION

The issue is whether an appropriate analysis technique has been applied to calculate ground level concentrations due to downwash.

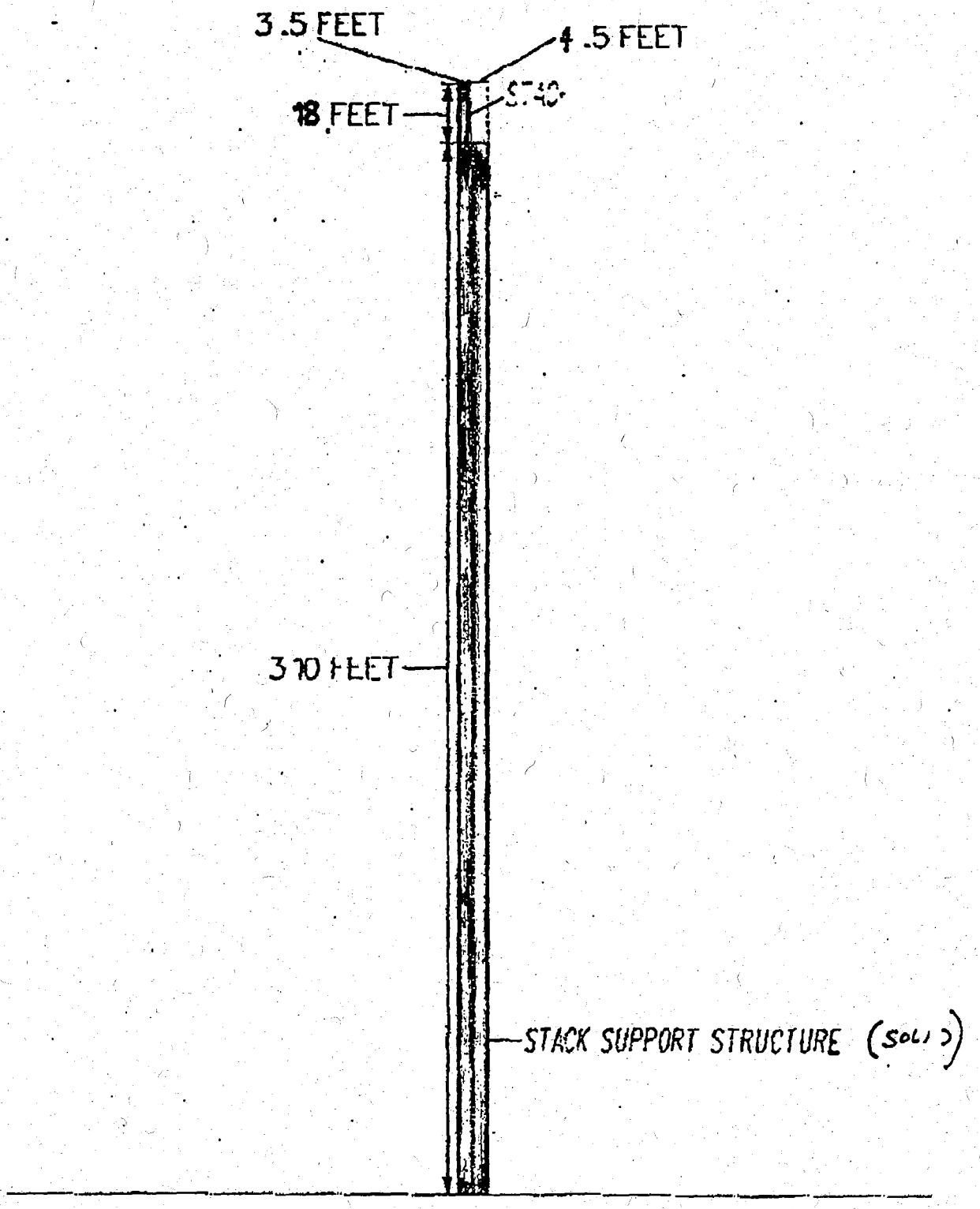
Section 123 defines GEP as "the height necessary to ensure that emissions from the stack do not result in excessive concentrations of any pollutant in the immediate vicinity of the source as a result of atmospheric downwash, eddies, or wakes which may be created by the source itself, nearby structures or nearby terrain obstacles".

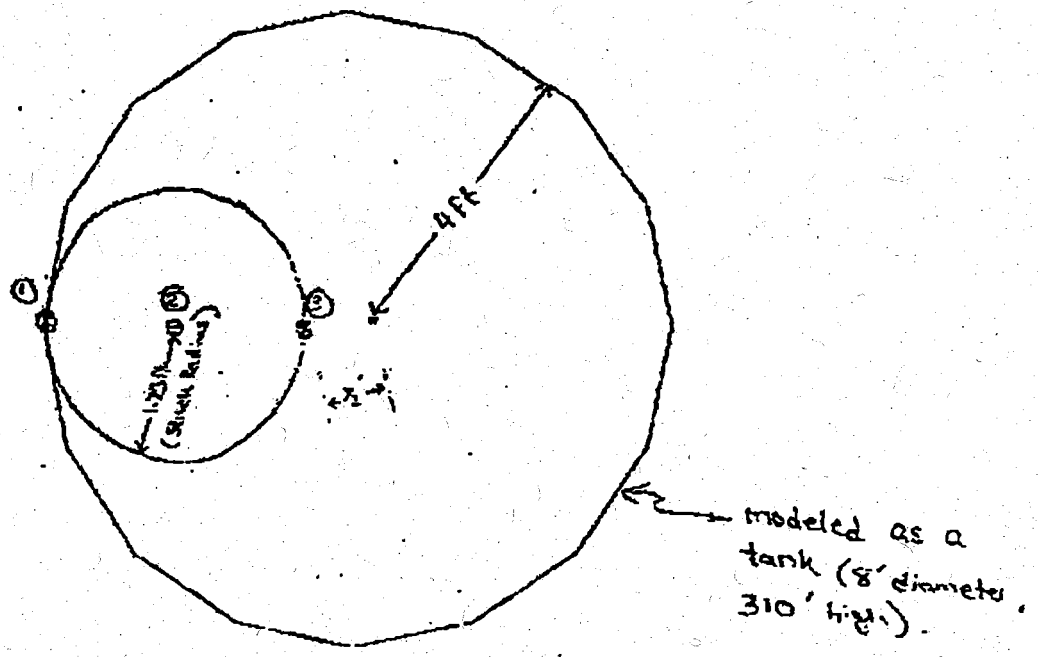
In reviewing the Technical Support Document for the Stack Height Regulations (EPA 450/4-80-023R) we found that maximum ground level concentration depends quite strongly on building width. This is clearly shown in Figures 5, 6, and 7 in the TSD. The data also show that the more elongated a tall thin building becomes, the less effect the building has in increasing maximum ground level concentrations. In developing the GEP formula height, there were only a few data sets available having ground level measurements that could be used to determine the effect of increasing stack heights on ground level concentrations. The most elongated building in the data base was three times taller than it's width (w/h = 0.33). The Montana Sulfur stack structure is 39 times taller than its width (w/h = .026). Given that we would expect such a structure to affect ground level concentrations to a much lessor degree, the GEP formula may not be applicable to the Montana Sulfur facility. Our intuitive feeling is that the GEP formula would tend to overestimate GEP stack height credit.

Fluid modeling is the only reliable technique that we are aware of that can accurately determine GEP stack height for a source of this type. We intend to tell the source that only a valid fluid modeling demonstration would be acceptable for crediting GEP heights greater than 65 meters. Without such a demonstration, the de minimis GEP stack height of 65 meters must be used in the SIP attainment demonstration.

If you have any questions or need further information on this issue please call either Kevin Golden at (303) 293-0955 or Larry Svoboda at (303) 293-0962.

MONTANA SULPHUR & CHEMICAL COMPANY
STACK AND STACK SUPPORT STRUCTURE





Three runs were made with the stack centered at the co-ordinates labeled ①, ②, & ③. Results were GEP = 98.15 m in all cases.

0 2.3 FT
Scale

Center of MSCC Main Stack Relative to It's Support Structure

Figure 1