UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
AIR AND RADIATION DIVISION
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SUBJECT: Draft Protocol for Modeling a Sewage Sludge Incinerator

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TO: Dean Wilson, Model Clearinghouse Coordinator
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Last year, John Seitz urged the Regional Air Directors to assist the Water Division in reviewing the air dispersion modeling and control efficiency tests which are required for sewage sludge incinerator permits. See the memorandum entitled, "Assistance to Regional Water Management Divisions in Evaluating Sewage Sludge Incinerator Permits," from J. Seitz, Director, Office of Air Quality Planning and Standards, to the Regional Air Directors, June 3, 1992. In Region 5, the Water Division is now asking for assistance. About 30 to 40 permit applications are expected by mid August of 1993. Prior to the application, the Water Division has requested the submission of a protocol which will discuss air quality modeling among other things. The Air Division will provide comments on the protocols, review the applications, and assist with responses to public comments as necessary.

The air quality modeling plays an integral part in determining the allowable concentrations in the sludge of arsenic, cadmium, chromium, and nickel. These allowable sludge concentrations are based upon the maximum predicted annual air concentration compared to risk specific concentrations provided in the sludge disposal rule. Thus, the modeling results are actually used to set the limits and not to verify that a limit is protective.

As you know, modeling for sewage sludge incineration was the topic of a recent teleconference among the Regional Modelers and Office of Air Quality Planning and Standards staff. It was generally agreed that the Regional Modelers would follow the Guideline on Air Quality Models (GAQM) in our review of the modeling.

I recently received the first protocol, which is attached, and would appreciate Model Clearinghouse comments. The protocol concerns the Jackson Pike and Southerly Incinerators in the Columbus, Ohio, metropolitan area. These existing incinerators are characterized by short stacks (17 meters), nearby buildings, terrain above stack top within 5 kilometers, and no on-site meteorological data.

The protocol cites the GAQM. Urban/rural classification and GEP determination will follow the GQAM recommendations. However, the minimum receptor resolution is only 250 meters. I plan to request 100 meter resolution in the critical areas. The larger problem with the protocol is the selection of models and their use given the absence of on-site meteorological data and terrain above stack top. For example, the applicant proposed to use COMPLEX1 with 5 years of National Weather Service data. I plan to recommend the following:

1) Evaluate the Importance of the Terrain to the Constraining Concentrations

Use the SCREEN model, in the appropriate urban/rural mode, to estimate concentrations at various receptors with elevations above stack height. Look at both the receptors closest to the source and those with the highest elevations. The SCREEN model will provide a 24-hour concentration using the VALLEY methodology. Because, the terrain portion of SCREEN does not include downwash effects, do not compare the SCREEN VALLEY with the corresponding simple terrain 24-hour concentration. Instead, continue in SCREEN and estimate 1-hour concentrations at receptors corresponding to those in the SCREEN VALLEY. Convert the 1-hour concentrations to 24-hour concentrations using a factor of 0.4. If the simple terrain model always predicts a higher concentration than VALLEY, then the Industrial Source Complex (ISC) model should be used for further analyses. If VALLEY predicts a higher concentration, then the applicant must compare the VALLEY results to ISC predictions at critical receptors located in low terrain. If the maximum predicted concentrations near the source, most likely due to downwash, are greater than the concentrations predicted on the terrain, then ISC should be used for further analyses. If the highest concentrations are predicted on terrain, then CTSCREEN should be used for further analyses.

2) Further Analyses When ISC is Constraining

The incinerator stacks should be modeled with the ISC long term model for 5 years of meteorological data. Receptor resolution should be 100 meters in hotspot areas. Receptors should be placed in all areas with the exception of fenced plant property. The dispersion factor is the maximum predicted annual ambient concentration given 1 gram per second of emission.

3) Further Analyses When VALLEY is Constraining

Given the absence of on-site meteorological data, the incinerator stacks should be modeled with CTSCREEN. Receptor resolution in hotspot areas should be 100 meters. The maximum 1-hour concentrations should be converted to annual by multiplying by 0.03 as recommended in the CTSCREEN User's Guide. The dispersion factor is the maximum predicted annual ambient concentration given 1 gram per second of emission. I prefer to require CTSCREEN rather than try to convert a VALLEY 24 hour concentration to an annual.