

MEMORANDUM

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FROM: Michael E. Guski, CCM
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DATE: March 15, 1989

SUBJECT: MASSPOWER Cogeneration Project
Classification of Land Uses Near MMWEC Generation Station
Recommendations for Modeling

Per your request, for the MASSPOWER cogeneration project an analysis was performed of land uses in the area of the nearby MMWEC electric generating station to determine if the MMWEC facility should be modeled using the urban or rural mode of the ISCST model. Recommendations for modeling this source are provided.

The Massachusetts Municipal Wholesale Electric Company (MMWEC) Stony Brook electric generating facility (composed of combustion turbines burning gas/No. 2 oil) is a major existing air emission source which could potentially interact with the MASSPOWER cogeneration facility proposed for the Monsanto chemical manufacturing plant in Springfield, Massachusetts. The Stony Brook facility is located 4.5 kilometers north-northeast of Monsanto in the town of Ludlow, Massachusetts.

The area surrounding the Monsanto plant can be characterized as a mix of urban, industrial, commercial, suburban, and rural land uses. Figure A provides a topographic map of the area showing the location of the Monsanto facility and the MMWEC facility.

Previously, a determination was made of land uses in the Monsanto area following the EPA recommended Auer method. The results indicated that the area out to three kilometers was approximately evenly divided between urban and rural land uses. Figure B indicates the area that was determined to be urban (indicated as shaded area) using the Auer method. A planimeter was used to determine the precise breakdown between urban and rural land areas. Conservatively assuming that some suburban neighborhoods could be classified as "compact residential" (Auer-R2), fifty-two (52) percent of the area out to three kilometers fell in the Auer urban categories. Consequently, preliminary refined modeling of the cogeneration facility in conjunction with other sources in the area was conducted assuming the urban mode of ISCST. It is appropriate to model the proposed MASSPOWER cogeneration plant in the urban mode, especially since a large area to the south and southwest in the City of Springfield is composed of predominantly urban land uses.

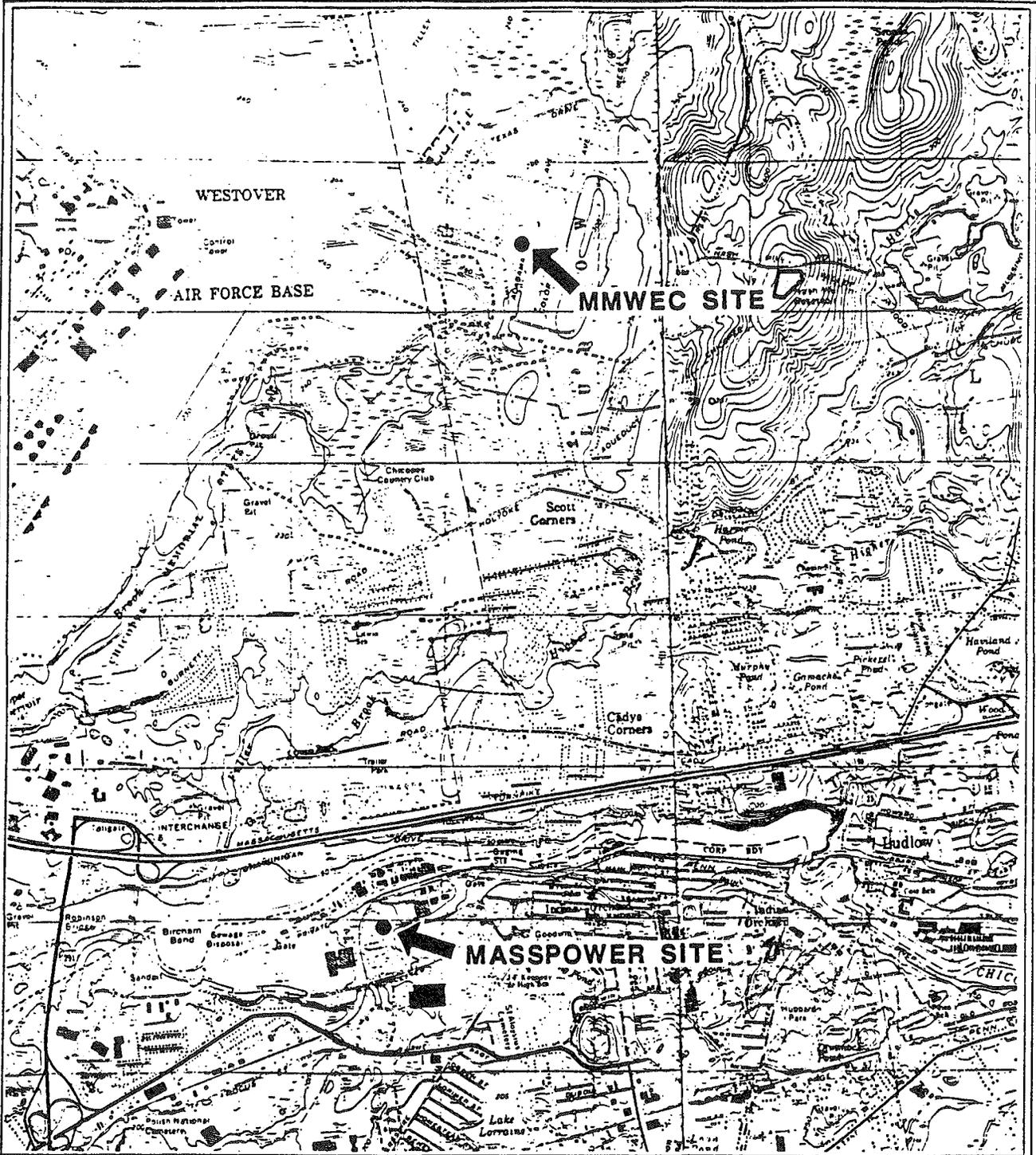
However, the area surrounding MMWEC's nearby Stony Brook facility is not urban in nature. Although the area south of the Massachusetts Turnpike which runs almost due east-west just north of the Monsanto plant is largely urban in nature, the area north of the Turnpike in which the MMWEC facility is located is predominantly rural. This area is composed largely of suburban neighborhoods, open woodlands, wetlands, and grassy fields with some commercial uses, notably the Westover Air Force Base. Although the airbase has several large concrete runways, much of the area is grass covered. Modeling the Stony Brook facility assuming the urban mode is clearly inappropriate. In fact, the area was determined using a planimeter to be 24 percent urban (all of airport area was classed as urban), 76 percent rural. Figure C shows the urban area around the MMWEC facility.

With regard to the potential for interaction between the MASSPOWER facility and the MMWEC facility, land uses along the direct line between the two sources are almost entirely rural, as indicated in Figure C. Winds from the south-southwest that would initially be dominated by urban influences near MASSPOWER, would be dominated by rural influences upon traveling over four kilometers and reaching the MMWEC facility. Since it is the initial turbulence that most influences plume spread, plumes from the MMWEC facility would, therefore, disperse under rural conditions and interact with the plume from the MASSPOWER facility dispersed under urban conditions.

The results of the preliminary refined ISCST model analysis, using the urban mode indicated exceedances of the 24-hour SO₂ increment near the Stony Brook facility due to that facility alone when it was burning No. 2 fuel oil. This modeling was based on the conservative assumption that MMWEC's peaking and cycling units run at full load 24 hours per day. To determine the effect of the urban coefficients on maximum predicted concentrations for the MMWEC facility, the ISCST model was rerun in the rural mode for the MMWEC facility alone. The results indicated maximum predicted concentrations were around two-thirds lower, and well within the 24-hour SO₂ increment.

Clearly, in this situation modeling the MMWEC Stony Brook facility using the rural mode of ISCST, while modeling the MASSPOWER facility (and the other urban sources) using the urban mode is not only justifiable, but appropriate. To obtain maximum concentrations for comparison with increments and standards, maximum concentration estimates from each source at each interaction receptor can be simply added for the appropriate averaging time.

Michael P. Gushki

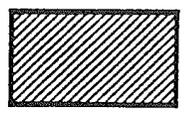
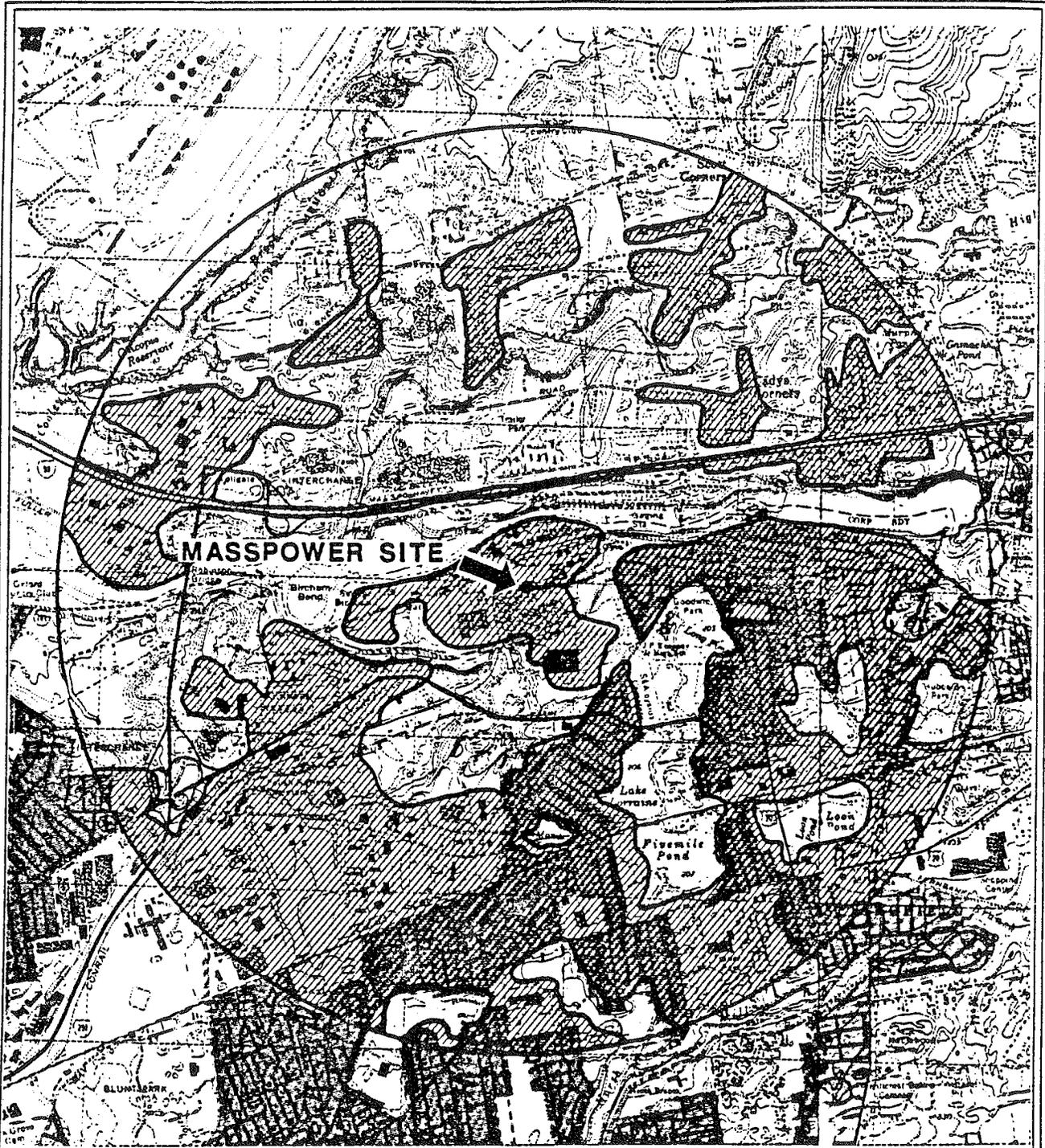


SCALE 1:25 000



FIGURE A
 TOPO OF AREA BETWEEN MASS POWER AND MMWEC SITES





Urban Land Uses

SCALE 1:25 000



FIGURE B

LAND USE CHARACTERIZATION FOR MASSPOWER SITE



