

B. Exposure Assessment

The petition's emissions inventory provides the basis for a tiered air dispersion modeling analysis as described in "Tiered Modeling Approach for Assessing Risk due to Sources of Hazardous Air Pollutants" (EPA-450/4-92-001). That tiered analysis applies successive refinements in model selection and input data to derive conservative estimates of the maximum annual average ambient concentration of MEK. "Conservative" refers to the selection of models and modeling parameters that are more likely to overestimate, rather than underestimate, the ambient concentrations of a given pollutant when data are limited.

Tier 1 air dispersion modeling requires limited source information and provides the most conservative estimate of maximum concentrations of the tiers. Tier 2 modeling requires additional source information and a simple air dispersion model and results in air concentrations that are more realistic than tier 1 estimates, but which are still considered to be conservative. In the assessment, the petition used EPA's SCREEN3 model for tier 2 analyses. Tier 3 requires extensive data from a source and recommends using EPA's most advanced dispersion modeling techniques to provide even more realistic, though generally still conservative, estimates of maximum concentrations. In the assessment, the petitioner used EPA's Industrial Source Complex Short Term 3 (ISCST3) model for the tier 3 analysis. Because each successive tier provides a less conservative and more realistic estimate of the ambient MEK concentration, the petitioner performed tier 3 modeling only where the tier 2 modeling predicted maximum annual average ambient concentrations of MEK above a designated threshold. Using this approach, the petitioner developed a reasonable worst-case exposure scenario by estimating the maximum annual average ambient concentration expected to result from emissions of MEK from a single facility. The petition also accounts for emissions of MEK from several sources located within close proximity to each other (often called a cluster of sources). The petition does this in order to assess the potential impact to a person who may live close to a cluster of MEK-emitting facilities.

The petition reasoned that the majority of risk would come from facilities that emit large amounts of MEK. The petitioner identified facilities which emitted 200 tpy or more of MEK as large. The petitioner contacted each

of the 27 large facilities to gather data with which to model maximum, off-site ambient concentrations of MEK. That analysis also used information from title V permits. The petitioner was able to obtain the necessary modeling information for 21 of the 27 facilities, including the six highest emitters of MEK, and 13 of the top 15 emitters. The analysis for these facilities applied tier 2 and tier 3 modeling techniques. The maximum annual average concentration estimated from the largest MEK emission source using the tier 3 model was approximately 1.2 milligrams per cubic meter (mg/m^3). However, that concentration was located at the entrance to an adjacent industrial facility where there were no environmental or human receptors. The MEK emissions from the other sources modeled in the tiered approach were all less than $0.9 \text{ mg}/\text{m}^3$. For the seven facilities with the highest predicted fence line concentrations, the maximum annual average ambient levels of MEK decreased to below $0.5 \text{ mg}/\text{m}^3$ within 175 meters from the fence line.

In addition to modeling sources emitting 200 tpy or more, the petition also includes an analysis of sources emitting lesser amounts. The petitioner used a tier 2 analysis to model those MEK sources (approximately 800 in all) which, based on the inventory, emitted more than 10 tpy but less than the 200 tpy. The petitioner divided these emission sources into source categories based on their two digit Standard Industrial Classification (SIC) codes. For each SIC, the petitioner modeled a "worst case" prototype plant using conservative site configurations (e.g., distance to fence lines), the highest reported emissions rate for the individual category, and worst-case dispersion meteorology. The maximum predicted annual average ambient concentration of MEK from the sources emitting less than 200 tpy of MEK was approximately $0.7 \text{ mg}/\text{m}^3$. The remaining MEK emission sources included under this approach were determined to have maximum annual average ambient concentrations less than $0.6 \text{ mg}/\text{m}^3$.

The petition includes estimates of 24-hour average concentrations in addition to estimates of annual average concentrations. The highest 24-hour average concentration as predicted by tier 3 modeling was $12.8 \text{ mg}/\text{m}^3$. That concentration was at the same location where the highest annual concentration was predicted to occur. The petition states that there are no people or environmental receptors at that location. The petition states further that all other modeled 24-hour concentrations are

below $10 \text{ mg}/\text{m}^3$ and concludes that people would not be exposed to 24-hour concentrations greater than this value.

To address the potential impact of MEK sources that are located within close proximity to each other, the petitioner identified, from the 1994 TRI, every facility in the United States with MEK emissions greater than 10 tpy. The petitioner used postal ZIP codes to determine areas in which emission sources were situated near one another. Using this approach, the petition analyzed 91 facilities. Of these facilities, only three ZIP codes contained groups of facilities that collectively emitted more than 200 tpy. The petitioner used results from the previous tiered analysis to evaluate the potential for these facilities to have significant overlapping impacts. Based on the analysis, the petition concluded that the combined impacts from multiple MEK emission sources situated close to one another will not result in maximum annual average ambient MEK concentrations greater than $1 \text{ mg}/\text{m}^3$, or in 24-hour concentrations greater than $10 \text{ mg}/\text{m}^3$. In most cases, the concentrations will be well below these values.

The petitioner reviewed available ambient air monitoring studies to determine the potential contribution of ambient background MEK to the maximum annual average and 24-hour average MEK concentrations. Here, background refers to air concentrations of MEK from sources not modeled in the analysis (e.g., mobile). The review showed that MEK has been monitored in both urban and rural locations. The highest reported MEK concentrations occurred in the Houston ship channel where the yearly averages from 1987–1995 for seven sites ranged from approximately 0.0009 to $0.0018 \text{ mg}/\text{m}^3$. The maximum 24-hour average concentration also occurred in the Houston ship channel over the same time period where the highest reported average was $0.09 \text{ mg}/\text{m}^3$. Based on this review, the petitioner concluded that background MEK is not a significant contributor to the maximum annual average, or maximum 24-hour average concentration of MEK.

The petitioner reviewed MEK's fate in the environment to determine the most probable routes of human exposures to ambient MEK. The petitioner used physical chemical data taken from the literature and a number of EPA databases to conclude that MEK does not persist or bioaccumulate in the environment. The petition also states that due to its high vapor pressure, MEK discharged onto a terrestrial environment is expected to rapidly volatilize to air. Volatilization from