Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

CHEMICAL MANUFACTURERS ASSOCIATION

October 19, 1981

Mr. Edwin J. Vincent
Lead Engineer
Chemical Applications Section
Chemicals and Petroleum Branch
Office of Air Quality Planning and Standards
United States Environmental Protection Agency
Research Triangle Park, North Carolina 27711

RE: CMA Comments on EPA Model Plant Emissions Factors for Polymers/Resins Manufacture

Dear Mr. Vincent:

Our Polymers/Resins Work Group has reviewed the draft document prepared as part of the Agency's effort to develop an NSPS for Polymers/Resins Manufacture. The Group has focused its attention primarily on the accuracy of the emissions factors and their location within individual processes as based upon its collective experience.

As you may know, CMA is a nonprofit trade association made up of approximately 184 member companies in the United States representing more than 90 percent of the domestic production capacity for basic industrial chemicals. CMA member companies have a direct and critical interest in ensuring that EPA develops emission standards when a demonstrated need is presented, that are scientifically and technically sound, reasonable, procedurally workable, cost effective, and clearly authorized by the Clean Air Act. Many of our member companies produce Polymer and Resin products and may be impacted by any regulations which may be based on the subject document.

While our comments provide what we believe are improvements to the model plant emissions factors, we do believe that the high degree of variability between individual processes used to manufacture the same product demonstrates the limited usefulness of the model plant concept. This point will be exemplified in our discussion of the individual emissions factors for the specific products/processes.

I. Polypropylene - continuous slurry, liquid phase process

A. There are two liquid phase processes now in commercial use; the large particle slurry process and the solution process. Most new liquid phase plants employ or will employ the solution process. A sizeable number but not all of these new plants are using or will use the high yield catalyst technology. As a result, there are some solution processes that still require catalyst de-ashing

and removal. Most slurry process units and low yield catalyst plants employ jacketed, continuous stirred-tank reactors rather than loop reactors. The loop reactor is more prevalent in the high yield catalyst plants.

B. Some slurry processes operate at pressures as high as 300 psig which is much higher than the value cited in the draft.

C. The atactic generation rate of 30 percent of capacity cited in the draft would be uneconomic. Most liquid phase processes have average atactic generation rates in the range of 2 percent to 4 percent of nameplate with 5 percent an upper bound.

D. The model plant did not provide for a VOC emissions vent from the extrusion/pelletizing section. Significant quantities of hydrocarbon still remain in the polypropylene powder as it exits the dryer and enters the extruder feed chute. At this point, the powder is in equilibrium with a vapor that can contain up to 25 percent hydrocarbon (wt./wt.). As a result, there is some hydrocarbon loss through the extruder/pelletizer section and the powder/pellet transfer system downstream of the product dryer. One manufacturer has provided an estimate of 2 kg VOC/1000 kg product for this section of the process.

E. Polypropylene units are subject to plugging, especially in the polymer handling sections of the process. For this reason, most units are provided with emergency relief valves, where applicable, throughout the process and not just in the polymerization and atactic recovery sections. In the vast majority of cases, these relief valves are tied to the flare header.

II. <u>Polyethylene</u> - all products/processes

A. There are a considerable number of LDPE and HDPE plants located near or integrated with olefins manufacturing operations. Some of these units do not have recycle treaters since monomer recovery and purification is accomplished by recycle through the olefins manufacturing unit. In these cases, overall process VOC emissions from these units can be expected to be 8-10 percent lower for the LDPE processes and by up to 98 percent lower for the HDPE processes.

III. <u>Low Density Polyethylene</u> - all process

A. The total model plant capacity of 90.7 Gg/yr appears low. Plant capacities of 200-300 Gg/yr with individual process trains capacities of up to 70 Gg/yr are not uncommon.

B. The model plant does not include an emissions factor for the wax blowdown system. This section of the process can be a source of significant ethylene losses. The emissions factor is highly dependent upon the design of the wax blowdown and discharge system.

C. For the liquid phase process, the estimated frequency for emergency reactor conditions is too high. The assumption that two out of four reactors would simultaneously experience an upset is extremely unlikely. Furthermore the estimated 130 reactor upsets per year is atypical of industrial experience.

IV. High Density Polyethylene - all process

A. Many plants use air-fluidized rather than inert gas dryers. In these plants there are some VOC emissions, in the range of 0.2-0.4 kg VOC/1000 kg product. In plants without recycle treaters, these are the major vents. Most of these emissions consist of process diluent.

B. Most plants use separate recycle treaters for each individual hydrocarbon component since they are usually recovered by fractional distillation. Therefore, an HDPE plant recycling ethylene, isobutane and butene would under most circumstances have three treaters and the vent composition of each treater would contain 100 percent of hydrocarbon treated.

V. Polystyrene - batch process

A. The emissions factors cited for the model plant may approximate the average for the industry but may not adequately describe the emissions for the purposes of regulation. Batch plants are well suited for use in the manufacture of a wide variety of products. Emissions factors for the vents for the process also vary widely with the higher emissions factors more likely during the manufacture of lower molecular weight products. Typical emissions factors span the following ranges:

Styrene Condenser Vent	0.25 - 0.75 kg VOC/1000 kg resin
Extruder Quench Vent	0.15 - 0.30 kg VOC/1000 kg resin
Reactor Heading Vent	0.15 - 1.35 kg VOC/1000 kg resin

It is important to note that the emissions factor for any given process train will change with product grade.

VI. Polystyrene - continuous process

A. Like the batch polystyrene plants, industry's experience with continuous polystyrene plants indicates a wide range of emissions factors but for different reasons. Individual continuous process trains tend to run blocked-in on one polymer grade or family of grade with relatively small variations in

emissions factors. However, different process trains dedicated to widely differing polymers may have significant differences in their emissions factors.

B. Recent process improvements have included a shift to the use of vacuum pumps to generate process vacuums. These pumps consume less energy than steam eductors and also have lower emissions factors. Industry's experience with the use of vacuum pumps are substantially different than one would expect when reviewing the model plant emissions factors. Our experience indicates that the following emissions factors are more typical of newer continuous polystyrene process technology:

Tankage	0.01 - 0.02 kg VOC/1000 kg resin
Styrene Condenser Vent	0.05 - 0.06 kg VOC/1000 kg resin
Styrene Recovery Unit Condenser Vent	0.05 - 0.06 kg VOC/1000 kg resin
Extruder Quench Vent	0.009 - 0.01 kg VOC/1000 kg resin

We trust that these comments will be considered as you revise the draft model plant emissions factors. We thank you for giving us the opportunity to review this material and are willing to meet with you to discuss our concerns in greater detail. Rich Symuleski, the Work Group leader will contact you for follow-up in this regard.

Sincerely,

Janet S. Matey

Janet S. Matey
Manager
Air Programs

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