A. T. COLWELL, President JOHN N. COLE, Vice President C. H. VAN HARTESVELDT, Vice President

Thompson Vita-Meter Corporation

A WHOLLY-OWNED SUBSIDIARY OF THOMPSON PRODUCTS, INC.

23555 EUCLID AVENUE

Cleveland 17, Ohio

PLEASE DIRECT REPLY TO
C. H. VAN HARTESVELDT
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CLEVELAND 3, OHIO

November 22, 1948

Robert A. Kehoe, M. D.
University of Cincinnati
Kettering Laboratory of Applied Physiology
Eden Avenue
Cincinnati 19, Ohio

Dear Dr. Kehoe:

Your letter of November 13th and the attached Ethyl Gas reports are certainly helpful in crystalizing our Vitol health problems. Unfortunately, an emergency expansion of our jet turbine engine manufacturing effort took the full time of the company's chemists for a while which delayed our own investigation of the evaporation of Vitol fluid. However, we are employing new people and our experimental work should get under way very soon.

After considering the Ethyl Gas reports and your comments on them, the following thoughts may be useful to you in estimating the magnitude of our problem prior to the compilation of complete field and experimental data.

1. The Ethyl Gas data on evaporation is for equilibrium conditions. The higher latent heat of Vitol would retard the attainment of equilibrium which would make the true hazard less than that indicated by the equilibrium data.

2. In searching for an experience factor which would bear upon the Vitol vapor hazard it occurred to me that experience in handling methanol might be useful. For example, if vapor from pure methanol anti-freeze was an equal hazard or a greater hazard than the lead in such vapors from Vitol, past experience on handling methanol as anti-freeze in bulk and in all types of containers would be significant. In your report on Vitol canning I find that the Ohio State Code sets maximum allowable concentrations at 200 p.p.m. by volume and 1.5 mg. per cu. meters respectively as allowable safe limits. Assuming that these concentrations are equivalent hazards the attached table shows the ratio of danger between methanol and the lead in the air samples tested during the canning operation. In four cases the methanol itself was more dangerous than the lead it contained compared to three cases where the lead was more of a hazard. The greater methanol danger is more pronounced for the higher and more hazardous concentrations. Methanol anti-freeze is considerably more hazardous than Vitol because its boiling point is lower and the fumes

more concentrated.

3. Your suggestion of raising the alcohol content of Vitol fluid to increase the solubility for lead and thereby reduce its concentration in Vitol vapor is well worth investigation. We can increase the methanol content and also replace some of the methanol with isopropanol. Possibly a solution containing 10% water, 70% methanol and 20% of isopropanol would be an improvement. At the moment it appears to me that going to 100% alcohol to reduce lead content in the vapor would give us the problem of having high lead content in the residue from evaporation. Figure 3 of the Ethyl Corporation Monthly Research Memo #48-8 shows that the lead content per cu. ft. of air of gasoline starts at 100 micrograms per cu. ft. of air but ends at over 10,000 with Vitol starting at 10,000 and ending below 100. In the case of spills of any magnitude the high lead content of the residue is a double hazard. First, the vapors from it are high in lead content and secondly, any contact of this residue with skin would be hazardous, particularly where rags had been wet with the solution for cleaning purposes. It occurs to me that Vitol by leaving lead-free residues has an advantage in this respect. Further, increasing the methanol concentration increases the hazard by making the liquid more volatile and the fumes more concentrated in methanol which complete investigation may prove to be the greater hazard.

4. Concerning the separation of the inhibitor phase, we have found that the variations are due to hardness in the water used and we are changing our formula to specify the use of "distilled water" or equivalent. You may have noted in Report LTD 48-50 that a Vitol sample prepared at the Ethyl Laboratories did not separate when subjected to standing or centrifugation. We believe the material which did separate from other samples was hard water soaps.

Very truly yours,

C. H. Van Hartesveldt

C. H. Van Hartesveldt

CHV:sg

cc: A. T. Colwell
J. N. Cole