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SUBMARINE HYDRAULIC FLUID

Data recently obtained by Dr. Treon at Kettering Laboratory on saturated air analysis with Pydraul 150 shows .2 to .3 parts per million of Aroclor in air at 70° to 80°F. For submarine use BuMed has set the air toxicity limit between .1 and .2 parts per million of Aroclor 1242. This is in agreement with data from Kettering laboratories. Under adverse conditions Pydraul 150 would exceed this limit, and unless air scrubbing work going on at Kettering is quite effective Pydraul 150 will not be tried in submarine service. In contrast to the Aroclor difficulty, satisfactory air concentrations for the fluid of the straight phosphate ester type such as OS-70 would be at the limit approximately 10 parts per million according to conservative BuMed judgement. It again looks as though we should submit something without Aroclor which approaches the desired viscosity index of BuOrd 51 F21 if we expect to participate in submarine requirements for safety fluid. Cellanese has been trying to formulate a phosphate ester fluid to approach this specification and I understand Cellulube 1246 is undergoing performance tests similar to those done on Pydraul 150.

Indefinite submergence time achieved by the atomic submarine makes air toxicity the one requirement that would not be sacrificed. Basic requirements for a submarine hydraulic fluid are as follows: 1) non-toxic 2) non slick 3) good lubricity 4) corrosion resistance 5) good shear stability 6) high viscosity index with desired 100 SSU at 160° F. and a maximum of 4000 SSU at 0° F. 7) fire resistance. It is doubtful that Pydraul 150 will pass their first requirement and it's non-slick characteristics are only fair. I believe the specific gravity for Cellulube 1246 is slightly lower than Pydraul 150 and it's performance under item 2 is somewhat inferior. Any improvement over oil toward eliminating oil slicks on water is an improvement over what they currently use, but complete elimination would be sacrificed if necessary. Elimination of viscosity improvers and colorants seems advisable. I would certainly like to hear from you and research concerning what can be done on this development to eliminate Aroclor.

G. Robert Sido

s/s

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