Memo

To:	All X-1R Distributors	From:	Nigel McKenzie
Cc:		Date	
Subject:	Chlorinated Paraffins – Engineering Bulletin		

This is in response to your quest for a more scientific explanation of what a "stabilized chlorinated paraffin" really is. Whilst the name "stabilized chlorinated paraffin" was an accurate description of the earlier generation of chlorinated paraffin based engine treatments, it is not accurate for the X-1R Engine Treatment. The critical Extreme Pressure (EP) component for our product is a "stable chlorinated paraffin." The following historical comments will shed some light on what this difference in wording means.

The first generation of chlorinated paraffin engine (oil) treatments was based on the use of what are defined as Short Chain Chlorinated Paraffins
(SCCP) - you can find the specific definition of SCCP in the attached document (CP_Overview). The SCCP's are more soluble in water than their higher molecular weight counterparts, and are thus more susceptible to undergoing a chemical reaction called "hydrolysis" under very high temperature, high humidity, conditions. The hydrolysis of a SCCP having a molecular formula C10H18Cl4 (51% weight chlorine) can be represented by the reaction scheme shown below:

$$CH3(CHCl)3(CH2)5CH2\text{-}Cl + H2O = CH3(CHCl)3(CH2)5CH2\text{-}OH + HCl$$

The problem with this hydrolysis is the production of HCl, hydrochloric acid, which is extremely corrosive. (Muriatic acid is one of the generic names under which HCl is sold). When it was first recognized that this was a potential problem for the then existing engine (oil) treatments, the formulators responded by adding a highly over-based magnesium, calcium or barium sulfonate to their formulations to neutralize any acid that was formed and thus mitigate its corrosivity. (This type of technology has been practiced for decades in lubricants that are used in the big marine diesel engines that burn high sulfur residual fuel oil.) The formulations using the acid neutralizers were referred to as containing "stabilized chlorinated paraffins."

Although there are many instances in which this solution works satisfactorily, there are some issues. In particular, most passenger car motor oil (PCMO) formulations already contain a blend of neutral and over-based sulfonates (mostly magnesium or calcium) and adding more of this component via an engine treatment can upset the detergent-dispersant balance and actually degrade the overall performance of the oil.

It turns out that a better solution to the problem, the one chosen by X-1R, is to formulate the engine treatment from a Medium Chain Chlorinated Paraffin (MCCP), which is inherently more resistant to hydrolysis than the SCCP's. (The MCCP definition is also shown in the attachment). One reason for this greater stability is the typical order of magnitude lower solubility of MCCP's in water compared to SCCP's. The MCCP's may have somewhat lower oil solubility than the SCCP's so it is important to scientifically formulate the total product, but if this is done well, as in the X-1R case, you have a truly "stable chlorinated paraffin" based engine treatment.

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Please let me know if this is enough "science" for you!

Regards

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