of time solely due to this fact. Many Therminol FR systems operate in the 560-600°F. range for several years before any significant degradation is evidenced.

As to the effects of continued operation with the present charge of Therminol, there are several, none of which is favorable. Once degradation begins, the rate of decomposition increases at an increasing rate, particularly over 10% hi-boiler. Heat transfer surface fouling will worsen and transfer rates will continue to decrease. A further result is that some corrosion may result due to the formation of acidic degradation products.

We would recommend the following steps to correct the present situation and get the system back to normal operation.

1. Drain the present charge of FR-2 with the system operating warm (200-225°F). Keeping the fluid warm will cause a high percentage of the dirt and carbon to stay in solution and be carried out of the system.

2. You may want to chemically clean the entire system in order to remove all carbon deposits although economics may prohibit this step. Certainly cleaning would be desireable, but it is not always practical when needed production is at stake. Products and procedures recommended by Oakite have been found to be very effective in cleaning high temperature systems and we can discuss this further should you decide to carry out this step.

3. As discussed briefly in our meeting, it may be worthwhile to review the cold seal system and eliminate any section which tends to trap moisture and acidic vapors. Therminol FR systems operate most effectively when allowed to breathe from an expansion tank vent.

4. A seal flush system for the Dean Brothers main circulating pumps should definitely be installed. This will eliminate buildup of carbon deposits on the seal faces which causes rapid failure.

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5. The system should be refilled with Therminol FR-1. This change (from FR-2 to FR-1) is recommended due to the lower viscosity of FR-1 and allows more "room for degradation" since this condition is always accompanied by a rise in viscosity.

Concerning recovery of the present charge of FR-2, I would recommend you contact Mr. Milt Tegethoff of Findett Service Company in St. Charles, Missouri. Milt can provide a per pound recovery price and give you an idea on the time needed to renovate a fluid charge of this size. Since Findett have the latest sample of fluid on hand, I do not believe it will be necessary for you to forward a sample to them. As to whether you wish to use the recovery fluid as make-up in the system here or in the Baltimore or Hammond systems is certainly up to you. Therminol FR-1 and FR-2 are compatible in all proportions and there would be no effect on your system other than to raise the viscosity slightly.

Concerning delivery of the new charge of fluid, both bulk (tank car, tank truck) and drum shipments are available. We would like to have 10 to 12 days notice on shipment though we would expect considerably shorter delivery time if no problems are incurred.

We are quite disturbed, Rick, as I know you are, at the rapid rate of degradation of the present charge of Therminol. However, after a year of satisfactory operation, it is obvious that less than ideal conditions were encountered in the past 6 months. We have every reason to believe that the new charge of Therminol FR-1 will give you the long service which you desire in your system. We at Monsanto have long valued Lever Brothers as a customer and look forward to continuing to be of service to you. I will be in touch with you early next week to answer any questions you may have concerning the system or our recommendations.

Best regards,

Jerry

Jerry H. Davidson
Technical Representative
Functional Fluids

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