

# TECHNICAL BULLETIN ON MILITEC-1 LUBRICATION IN TWO FULLER 200 HP C150 DUPLEX COMPRESSORS

July 18, 1993

**BACKGROUND:** These compressors are used to pump dry cement powder off of the JB Ford, a 450-ft. vessel docked outside of Chicago. The vessel's hull holds 7,500 tons of cement which is pumped onto shore using two 2-stage compressors, each handling one side of the vessel. The system handles 220 tons per hour and operates 6 hours per day. The hull is replenished with material each week. Each compressor handles two operations; one forward and one aft. The receiving pipe on shore can handle only one side of the vessel at a time. Port and Starboard alternate periodically. The compressor on the waiting side (no load) continues to operate just to keep light pressure in the system.

**TREATMENT:** Militec-1 was added only one time: April 20, 1993. Eight ounces of Militec-1 were added to each of four oilers along with one gallon of Mobil DTE BB oil. The lubricant is fed into the oilers at a rate of one quart every 2 hours. The oilers each have 7 lines that feed onto the bearing surfaces. While the oil proceeds through the bearings, exits the compressor and blends in with the cement powder (there is too little oil to have any significant impact on the powder), Militec-1 is expected to bond with the hot metal and not be part of the oil that is lost. Since the oil containing Militec-1 is only present for about 8 hours, this test should indicate the ability of Militec-1 to remain with the metal and provide benefit over a long period of time.

**MEASUREMENTS:** Temperature and amp readings were first taken before Militec-1 was added. After Militec-1 was applied, readings were taken on May 10th, May 14th and May 29th. The temperature was measured by an infrared gun with a digital readout. The compressors' temperature was measured both during load and no load periods. Each time the compressors were measured for temperature, the infrared gun was used at the hottest points that could be measured from outside, at the points where the air exits from the compressor. Those are recorded as Point No. 1. Point No. 2 was about 8 inches further along the pipe. The bearing temperature was measured by the infrared gun pointed at the end bearing which holds and encircles the shaft that turns the vanes. These end bearings are sealed and therefore were not treated with Militec-1. The end bearings were the only ones accessible to the infrared gun. They provided the control to measure against the treated bearings. The readings were taken at all four operational sites using the two points and the end bearings. The amps were read from three power cables' amp meters. Amp readings were taken at two different times; once just before the safety valve was released when pressure was high and more energy was being consumed, and once after the safety valve was released when pressure was low and less energy was consumed.

## TEST RESULTS:

The amp readings conclusively showed that less energy was consumed by the compressors after Militec-1 was applied. This was true for both before and after the safety valve was released. The graph to the left paints the picture. In terms of percent, **the average reduction in amps for the time just before the safety valve was released was 12% after Militec-1 was applied. For the time just after the safety valve was released the reduction was 13%.** The range, from 6% to 20% , showed a drop for every power cable.

The temperature readings were also very conclusive although points A.1 and A.2 showed a slight increase. For the other points the temperature decrease was very dramatic. The reason the sealed bearings showed an increase was that the readings before Militec-1 was applied were in April when the ambient temperature was lower. As the month of May went by, the ambient temperature rose and this affected the bearing temperature. The decrease in temperature of the points measured, after Militec-1 was applied, was despite the higher ambient temperature. **Under load, the overall average temperature for the treated points showed a 10% drop while the untreated bearings rose 6%. Under no load, the numbers showed a drop of 7% for the treated points and a rise of 9% for the untreated bearings.**