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BFGOODRICH COMPANY TECHNICAL REPORT

Title: PVC Environmental Pack and Waste Water.

To: M.E. Hopkins

Project: 6FD12B2

From: D.B. Ross

Date: 1-26-88

Brecksville R&D Center, D/8510

SUMMARY The major components identified in the environmental pack were PVC, a styrene-acrylonitrile type impact modifier; calcium carbonate filler; a glycol type lubricant; and probably a Thermolite type tin stabilizer.

The powery residue on the surface of the membrane was a mixture of some type of amide component (possibly aurea-formaldehyde resin) and some type sulfate (possibly sodium sulfate).

The dissolved solids in the waste water were predominately metal salts of carboxylic acids.

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PROBLEM DEFINITION Determine the cause of the failure of the PVC membrane in the BFG environmental pack. The membrane becomes soft and eventually comes apart. Check the membrane for the presence of lead sulfide and identify any contaminants on the surface or in the waste water that could be the cause of the membrane failure.

Doyle Ross
Doyle B. Ross

REFERENCE Order No. 4226

CC: R.S. Hillstrom/J.B. Pausch
R.W. Smith
R.S. Varga
R&D Files 801-004

The BFGoodrich Co.

FEB 25 1988

Brecksville
R & D Files

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SAMPLE IDENTIFICATION PVC environmental pack and waste water.

EXPERIMENTAL Infrared spectroscopy was used to identify the residue on the surface of the membrane and the dissolved solids in the waste water. A compound analysis was also obtained on the PVC membrane to determine if there were any lubricant-type impurities or contaminants that could be the cause of the problem. An SEM-EDX elemental analysis (R. W. Smith) was obtained on the PVC membrane and the dissolved solids in the waste water.

RESULTS The polymer in this membrane was comprised of PVC, styrene and acrylonitrile segments. This could be either a terpolymer, or more likely a PVC polymer with an acrylonitrile-styrene type impact modifier. The level of VCN and styrene was minor (roughly 5%), which is the level generally used as impact modifiers. Calcium carbonate was the only filler identified by IR.

The only other additive found were a low level of what appeared to be some type of glycol (probably diethylene glycol) and a carbonyl-containing component. The latter is probably from a Thermolite type tin stabilizer, but could also be from an esterified glycol, such as polyethylene glycol monolaurate. However, these components would have to be separated for a positive identification. The glycol type of components could be possibly used as internal lubricants. We did not detect the presence of any other type of lubricants (i.e., metallic soaps or waxes) in this compound. Lead sulfide does not appear to be present, since only trace amounts of lead were detected in the membrane.

The powdery residue on the surface of the membrane was a mixture of some type of amide component and inorganic sulfates (possibly sodium sulfate). The amide component appears to be an urea or urea-formaldehyde resin. The major elements found in this powder by SEM-EDX were S, AL, CA, SI, K, P, NA, FE.

The dissolved solids in the waste water were metal salts of carboxylic acids. We did not detect the presence of any other organic components in the waste water. The SEM-EDX elemental analysis found S, CL, NA, FE, CA, K and AL in the waste water solids.

CONCLUSIONS A comparison of these results with a control compound would be useful in determining what causes this membrane to become soft and fail. The glycol type component could possibly act as a plasticizer and be related to the failure. However, this is questionable since the level didn't appear to be abnormally high (1 to 2 part range); and glycol type compounds are often used as internal lubricants in PVC compounds, and are generally considered to be compatible and not the cause of degradation problems.

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