RTI PAST PERFORMANCE		
RTI Tracking Number:	1404457	Date: 4/17/2014
Core Task:	Chemical Analysis, Polymer Analysis	
Analytical Techniques	FTIR/ GCMS	

REPORT OF ANALYTICAL SERVICES

RTI Lab#: 1404457 **Sample Receipt Date: 4/14/2014**

Four samples were chosen from the samples received for analysis and were identified as follows:

Sample 1404457-001: Sample #1 - beige Corobond backing
Sample 1404457-002: Sample #8 - Release agent
Sample 1404457-003A: Corobond exemplar Part A
Sample 1404457-003B: Corobond exemplar Part B

The target of the analysis was to determine the cause of the corobond primer not drying and causing the top coat to fail using techniques of FTIR (Fourier Transform Infrared Spectroscopy) for identification of organic functional groups and GC/MS (gas chromatography mass spectroscopy) for identification of volatile and semi-volatile organic compounds. The results of the analysis are discussed below.

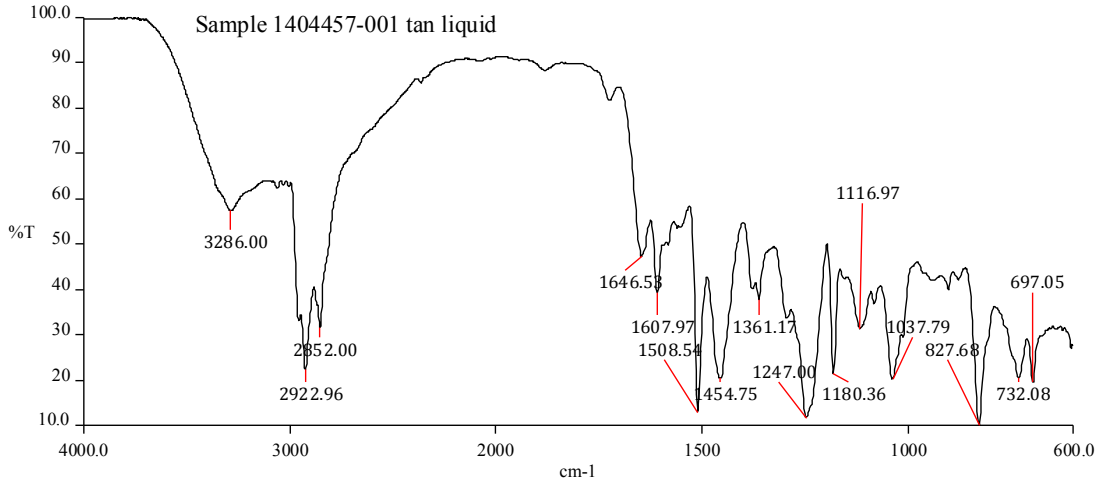

Figure 1: FTIR spectrum of tan liquid portion of Sample 1404457-001

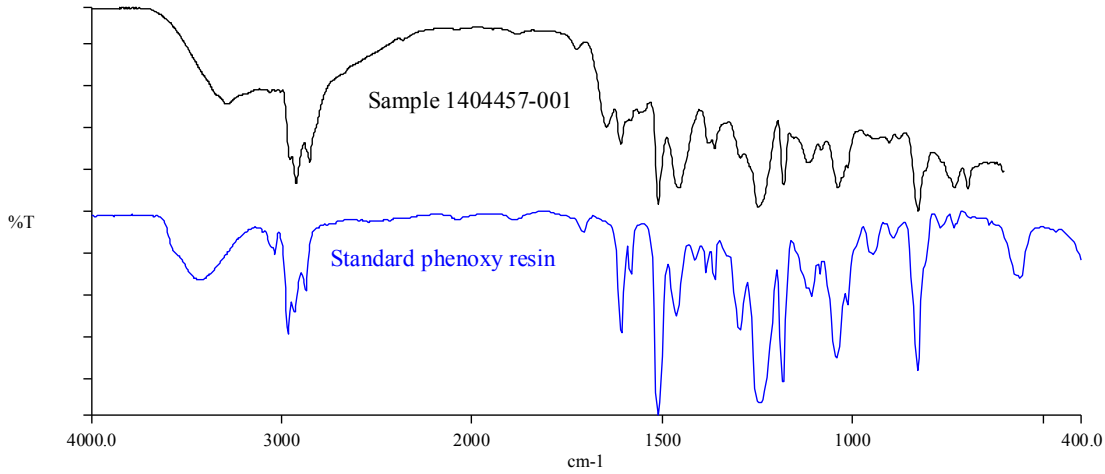

Figure 2: FTIR Library match of tan liquid portion of Sample 1404457-001

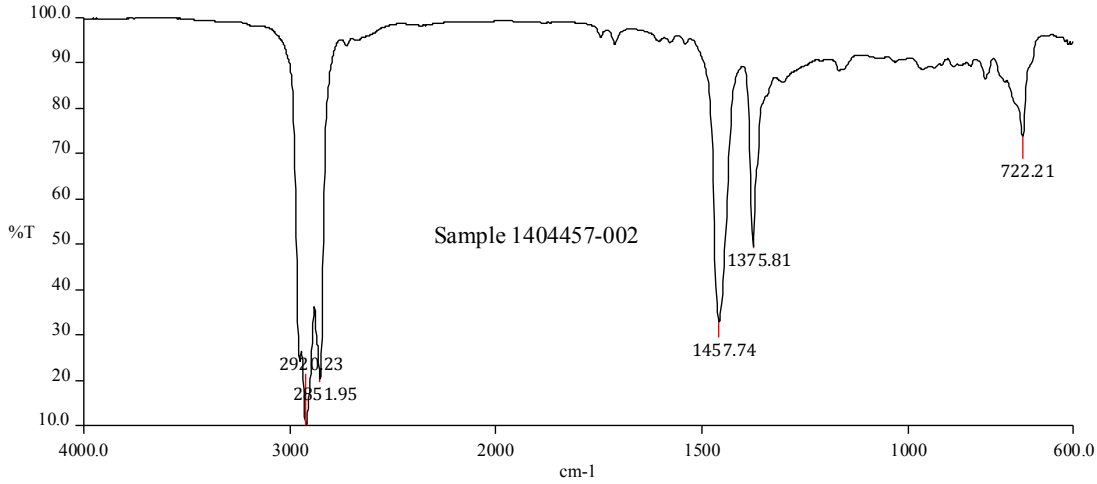

Figure 3: FTIR spectrum of Sample 1404457-002

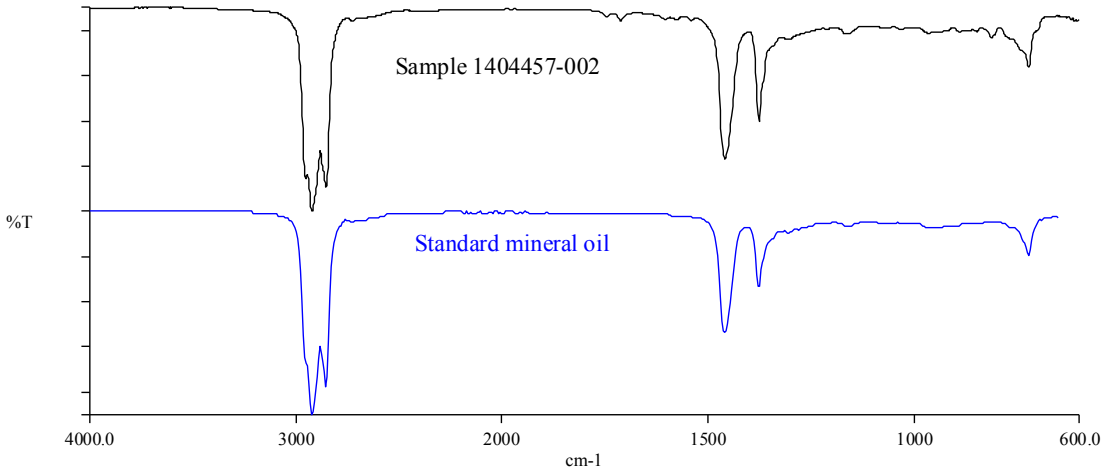

Figure 4: FTIR Library match of Sample 1404457-002

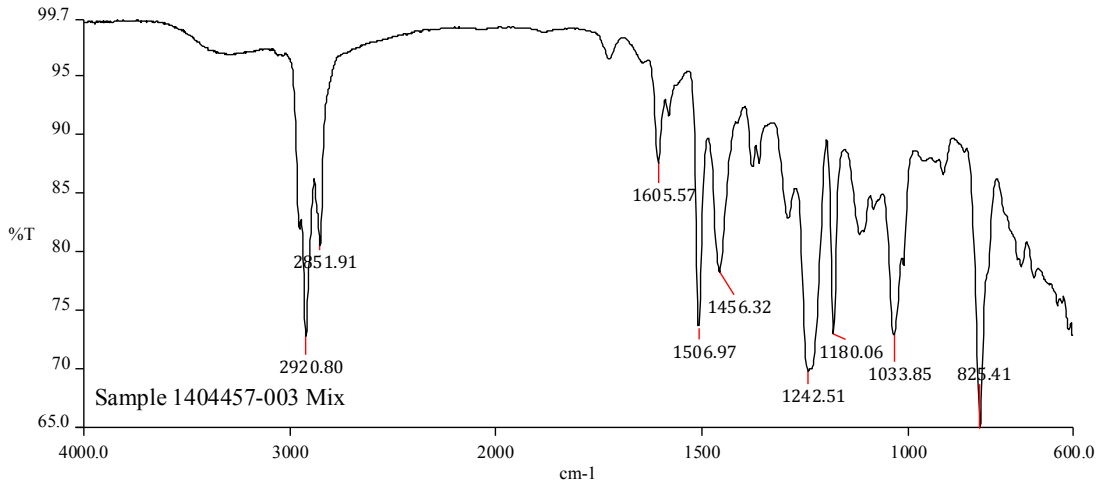

Figure 5: FTIR spectrum of cured mix of Sample 1404457-003A & B

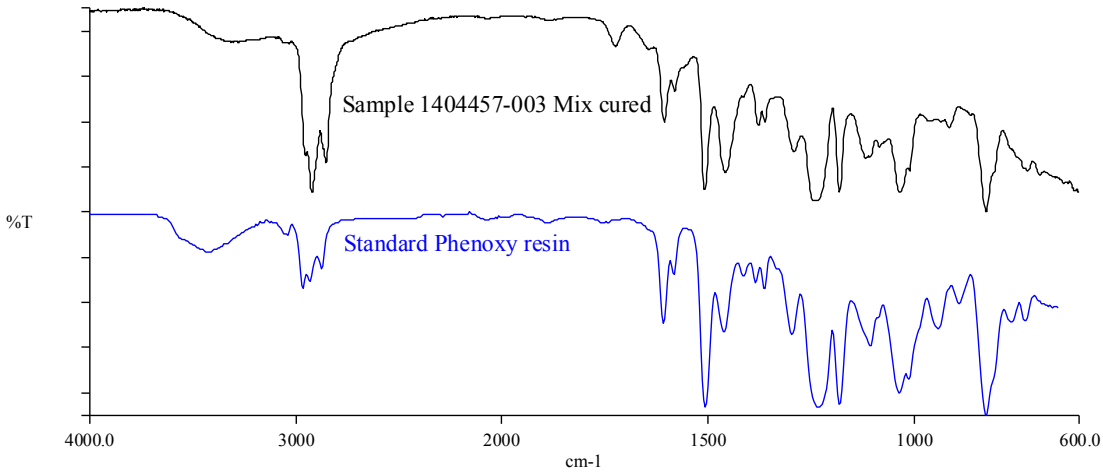

Figure 6: FTIR Library match of cured mix of Sample 1404457-003A & B

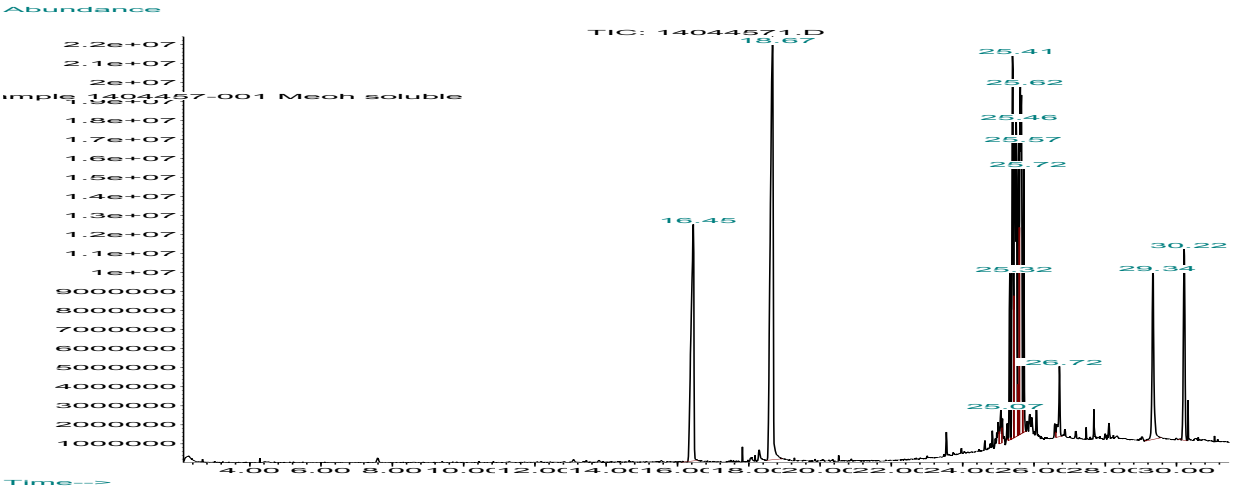

Figure 7: TIC of Sample 1404457-001A

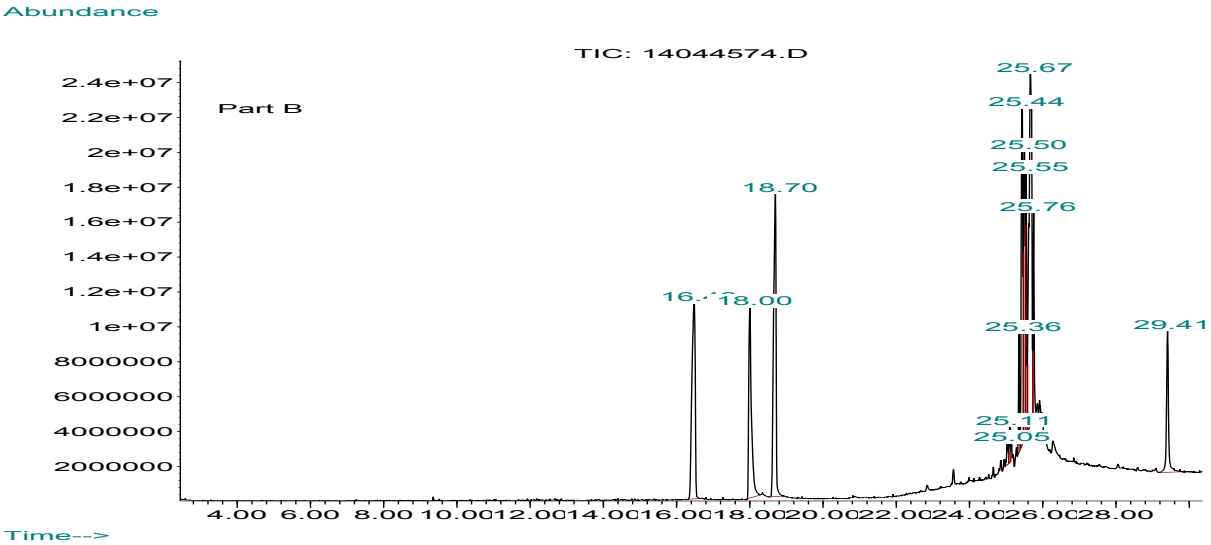

Figure 8: TIC of Sample 1404457-003B

Conclusion:

During our analysis of the tan liquid material in Sample 1404457-001 it was determined that the sample was an epoxy based resin with excess amine. This excess amine could be due to either improper mix ratios or poor mixing techniques or both. Either way it appears that the excess amine allowed for the epoxy to react leading to low molecular epoxy resin and free low molecular amine cross linking agent resulting in a very tacky runny mix. The Release agent Sample 1404457-002 was found to be a hydrocarbon mineral oil material. This hydrocarbon oil was not found to be present in the other samples tested and determined to not be of any significance to the liquid nature of the tacky Corobond backing.

Analysis results and discussion:

FTIR analysis was performed on the tan liquid portion of Sample 1404457-001, Sample 1404457-002, and the cured portion of Sample 1404457-003A and 1404457-003B mixed at a volume ratio of 2 parts A and 1 part B and allowing it to cure to a hard film overnight at room temperature. Figure 1 represent the tan liquid portion of Sample 1404457-001. Observation of Figure 2 reveals the tan liquid portion of Sample 1404457-001 is an epoxy material with excess amine functionality as shown by the peaks at 3286 cm-1 and 1646 cm-1. Figure 3 and 4 represent Sample 1404457-002, which indicates it to be a mineral oil as shown in the library match. Figures 5 and 6 represent the properly cured mix of Samples 1404457-003A and B, which indicates the presence of a phenoxy resin with no indications of excess amine functionality.

Samples 1404457-001 Tan liquid portion and 1404457-003B were diluted in methanol and analyzed by direct injection (split injection) using a DB-XLB phase column with a temperature program of 35-300 deg C (10 deg/min ramp) scanning mass range of 30 to 550 m/z. The total ion chromatogram are shown in Figure 7 represents Sample 1404457-001 tan liquid. The mass spectrum for peak at 16.4 minutes indicates the presence of hexylene glycol, the mass spectrum for peak at 18.1 minutes indicates the presence of diethyelentriamine, the mass spectrum for peak at 18.7 minutes indicates the presence of benzyl alcohol, the mass spectrum for peaks around 25 minutes indicates the presence of nonyl phenol, the mass spectrum for peak at 26.7minutes indicates the presence of dimethyl amino hexanol, the mass spectrum for peak at 29.4 minutes indicates the presence of bisphenol A, the mass spectrum for peak at 30.2 minutes indicates the presence of benzyl butyl phthalate. The total ion chromatogram are shown in Figure 8 represents Sample 1404457-003B the mass spectrum for peak at 16.4 minutes indicates the presence of hexylene glycol, the mass spectrum for peak at 18.0 minutes indicates the presence of diethyelentriamine, the mass spectrum for peak at 18.7 minutes indicates the presence of benzyl alcohol, the mass spectrum for peaks around 25 minutes indicates the presence of nonyl phenol, the mass spectrum for peak at 29.4 minutes indicates the presence of bisphenol A.

Sample analysis results indicate the tan liquid material in Sample 1404457-001 is an epoxy-based resin with excess amine. This excess amine could be due to either improper mix ratios or poor mixing techniques or both. Thus it appears that the excess amine allowed for the epoxy to react with many free amines leading to low molecular epoxy resin and free low molecular amine cross linking agents resulting in a very tacky liquidy mix.