

Report of Results: MVA1497

**Examination of Micarta
Asbestos Board**

Prepared for:

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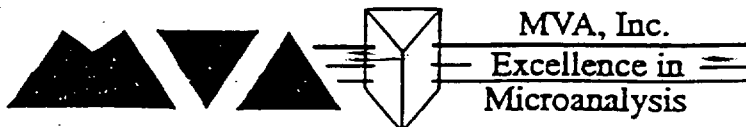
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26 September 1995

EXHIBIT C

D: PROJECTS:1497:RP092695



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Examination of Micarta Asbestos Board

Introduction

Portions of the asbestos board cut during the Micarta experiment (MVA, Inc. Project No. 0607) were examined by several microscopical techniques including stereo-microscopy, polarized light microscopy (PLM), ultraviolet (UV) fluorescence, and fourier transform infrared (FTIR) microscopy.

Analytical Results

The sample, identified as GHP #444 and MVA laboratory sample D1870, was found to be a composite laminate material with an asbestos-containing base covered with non-asbestos layers. The top layer (Layer A) was a thin sheet of clear material composed of cellulose fibers and organic binder (melamine-aldehyde resin). Layer B consisted of a pigmented material with cellulose fibers and organic binder (melamine-aldehyde resin). Layer C was found to be a laminate material of 8 asbestos-containing sheets composed of chrysotile asbestos, cellulose and phenolic resin.

A view of a polished cross-section of the outer portion of sample D1870 clearly shows the Layers A, B and Layer C (Figure 1). The entire thickness of the material was 0.052" - 0.053". Figures 2 and 3 show a closer view of the upper portion of Sample D1870. The reflected darkfield image (Figure 2) clearly shows the three layers and in the reflected light brightfield image (Figure 3) the cellulose is more clearly evident. Figures 4 and 5 show the cellulose fibers in layer B. In Figure 6 the fluorescence microscopy image of a polished cross-section shows that Layer C is composed of layers of thin sheets of asbestos/cellulose sandwiched together to form a single composite material.

Conclusion

The laboratory analyses determined that the material cut in the experiment is a composite laminate material composed of asbestos, cellulose sheets and a phenolic resin with a thin pigmented cellulose and melamine-aldehyde resin top sheet. This material has the same construction as found in the Micarta product patent information.

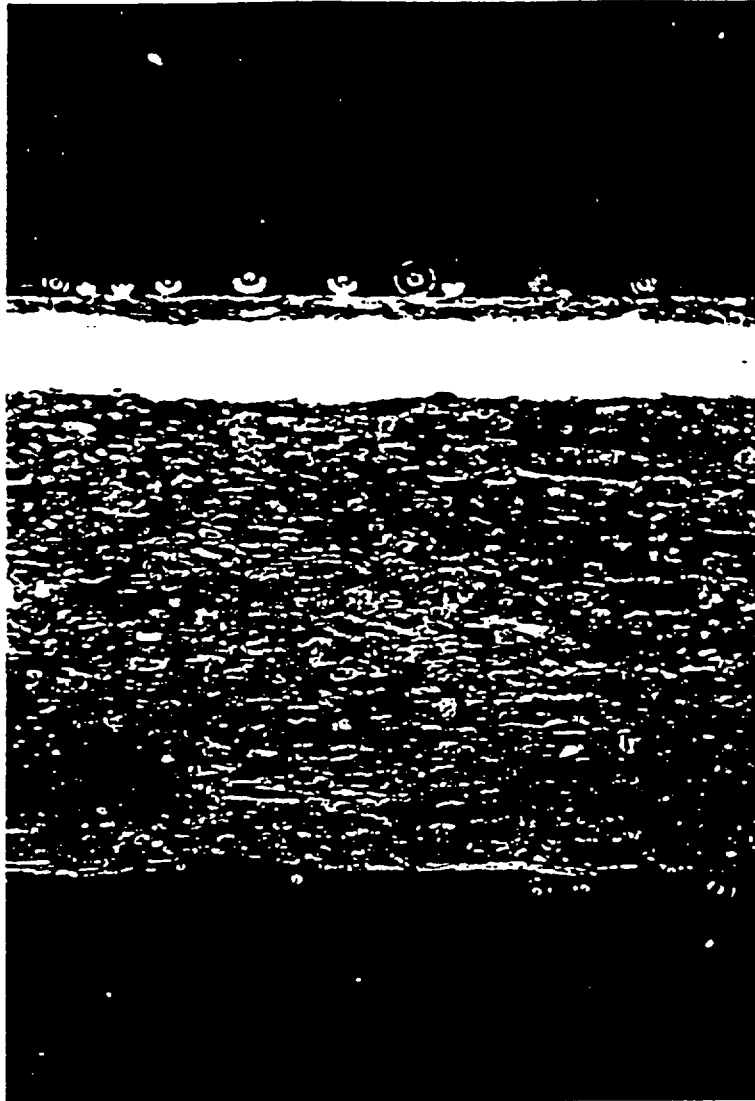


Figure 1. View through a stereo light microscope of a polished cross-section of a portion of an asbestos-containing board material (D1870). Layers A are outside layers which contain no asbestos. Layer C is a chrysotile-containing layer.
Magnification = 68X



Figure 2. View through a stereo light microscope of a polished cross-section of a portion of the asbestos-containing board material (D1870) as it appears with darkfield illumination. Layers A and B are outside layers which contain no asbestos. Layer C is a chrysotile-containing layer. Magnification = 115X

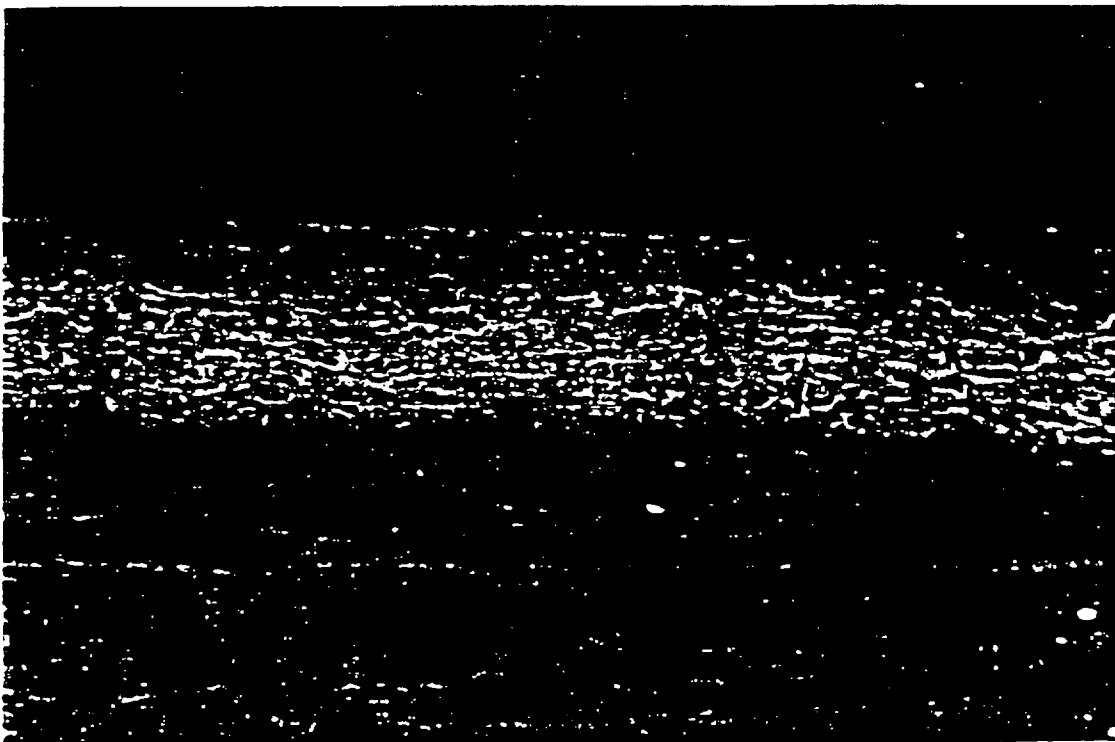


Figure 3. View through a stereo light microscope of a polished cross-section of a portion of the asbestos-containing board material (D1870) as it appears with brightfield illumination. Layers A and B are outside layers which contain no asbestos. Layer C is a chrysotile-containing layer. The cellulose fibers are clearly visible in this image. Magnification = 115X



Figure 4. PLM view of thin-section of a portion of the asbestos-containing board material (D1870) showing the cellulose fibers. Magnification = 250X



Figure 5. PLM view of thin-section of a portion of the asbestos-containing board material (D1870) showing the cellulose fibers. Magnification = 500X

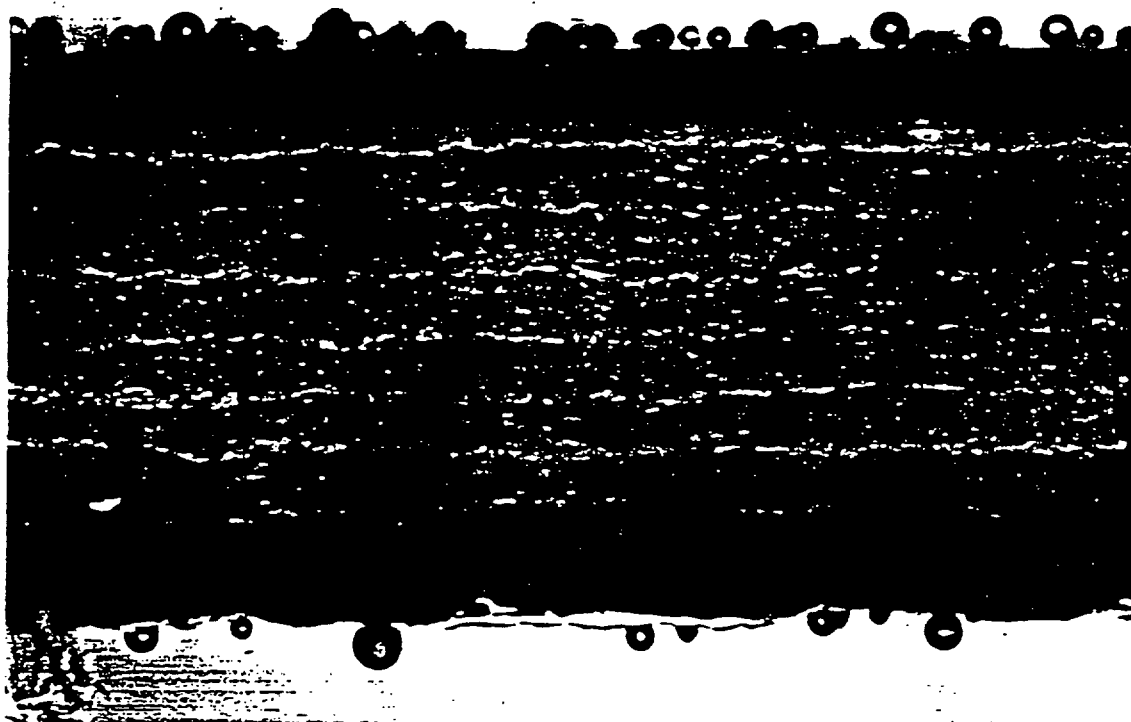


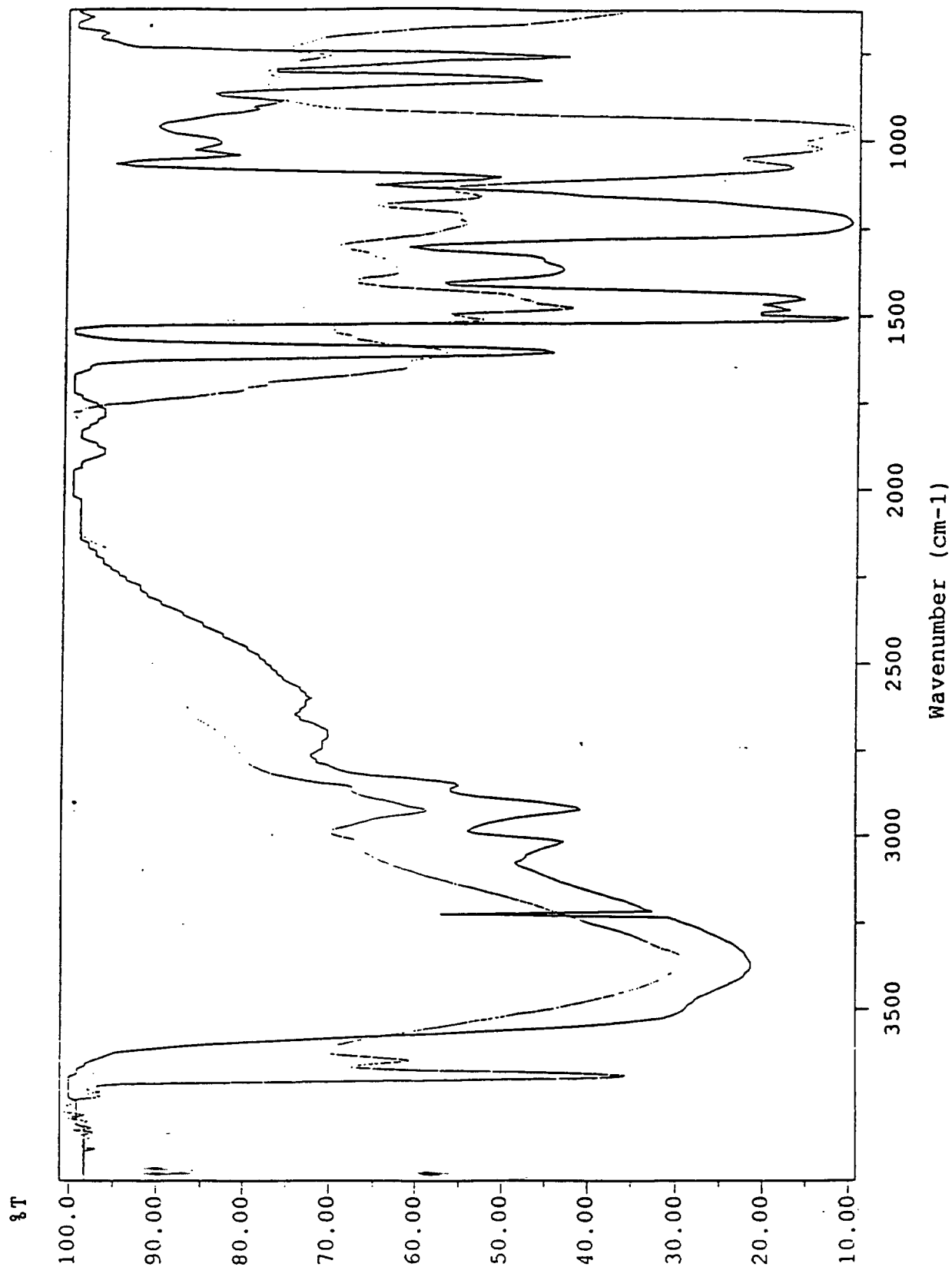
Figure 6. View through a light microscope of a polished cross-section of a portion of the asbestos-containing board material (D1870) as it appears with UV illumination. Layers A and B are outside layers which contain no asbestos. Layer C is a chrysotile-containing layer. The sheets of asbestos/cellulose fibers are clearly visible in this image. Magnification = 68X

Appendix A

Infrared Spectra Comparing Layers of D1870 with Organic Binders.

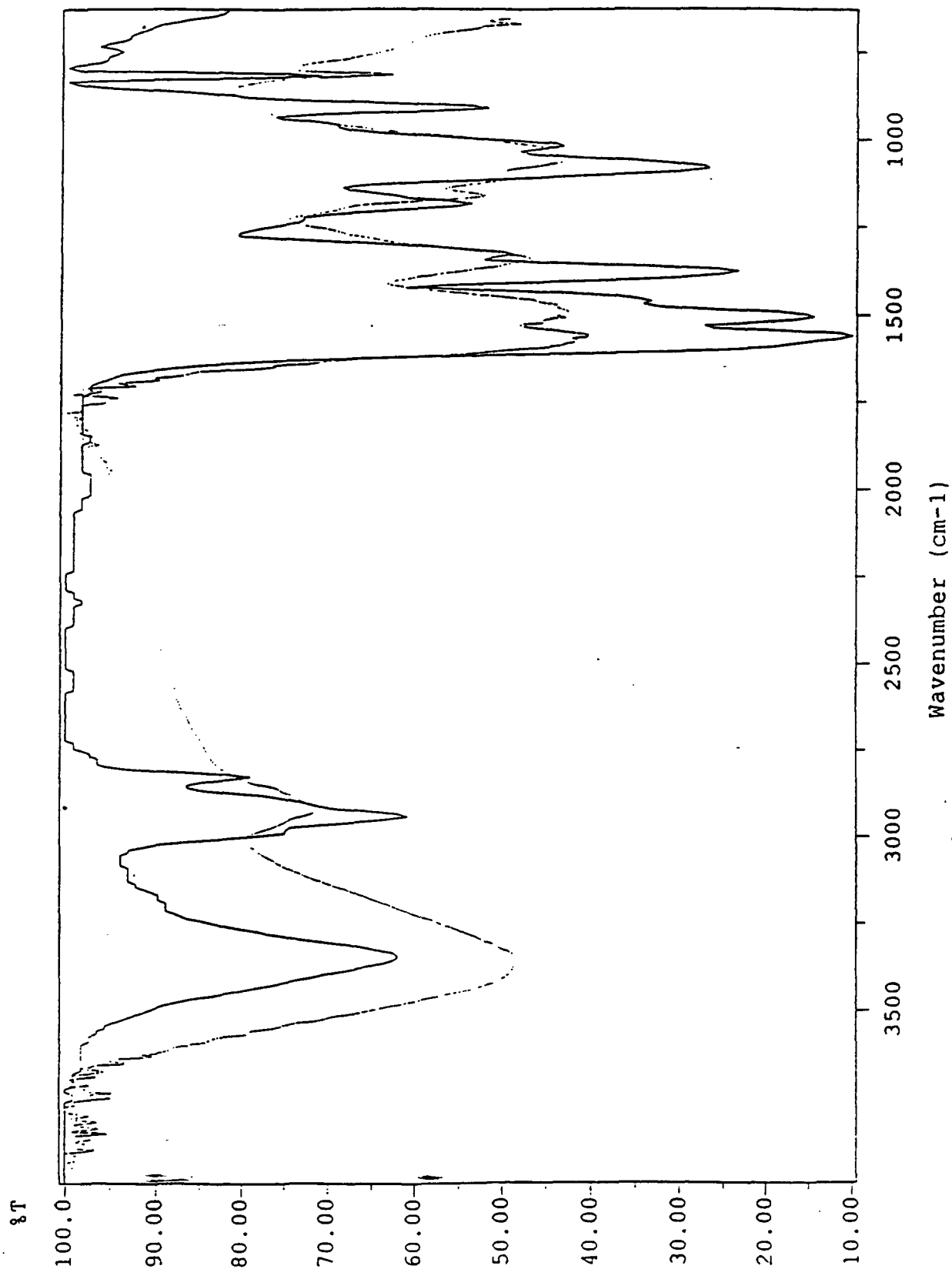
MVA149/

Asbestos Layer (RED)
Phenol-Formaldehyde (BLUE)



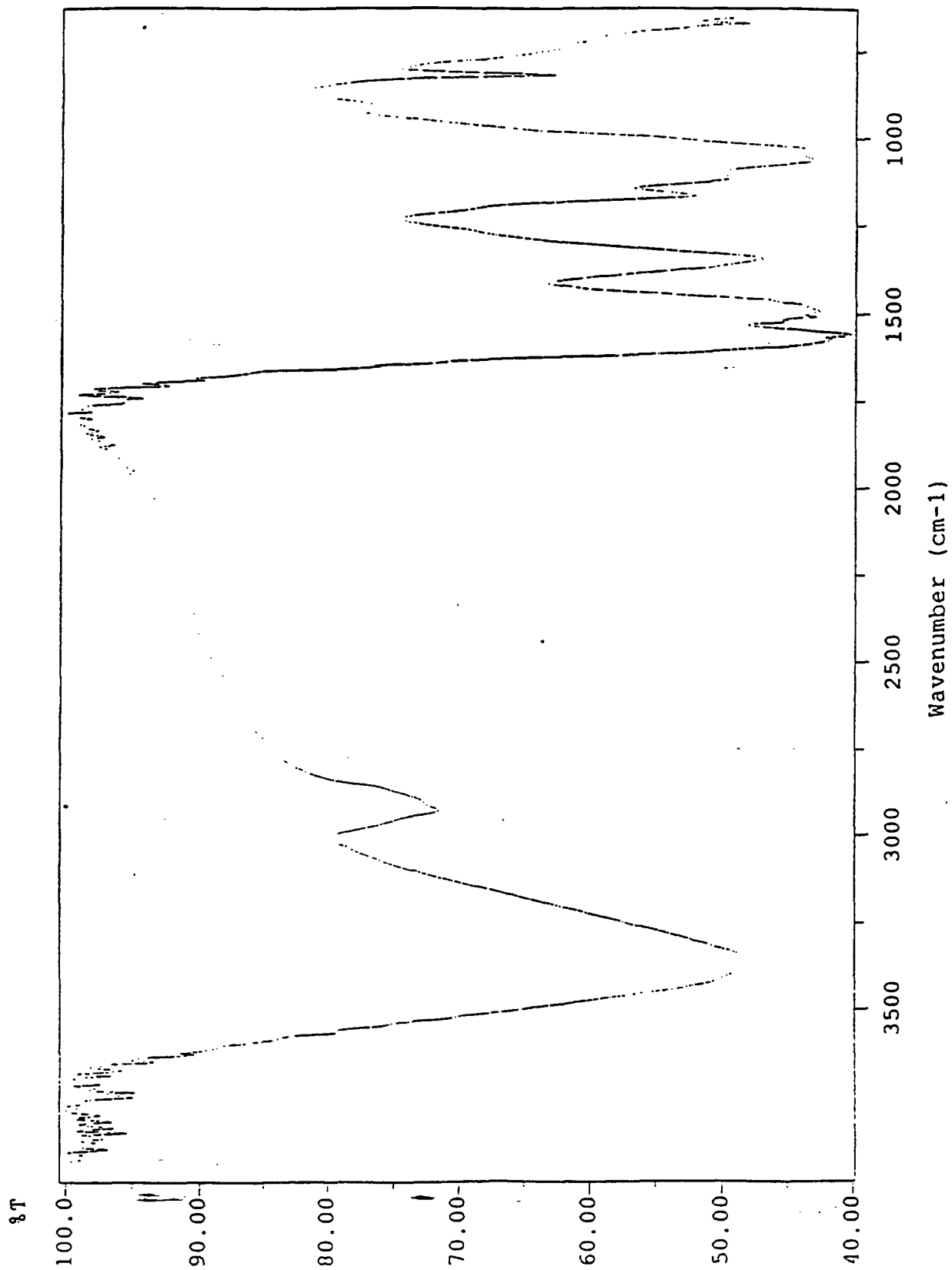
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Clear Top Layer (RED)
Melamine - Formaldehyde (BLUE)



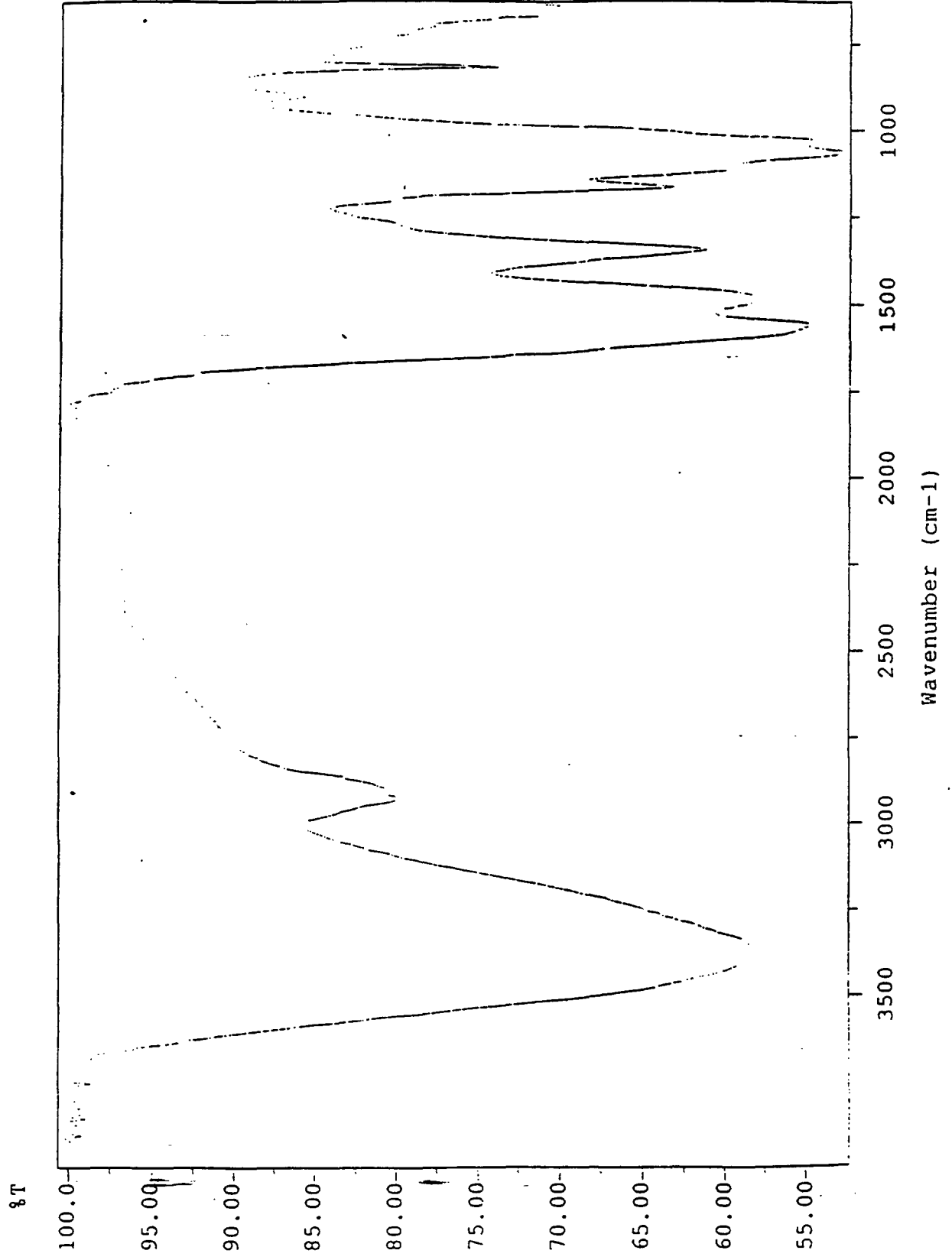
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Clear Top Layer



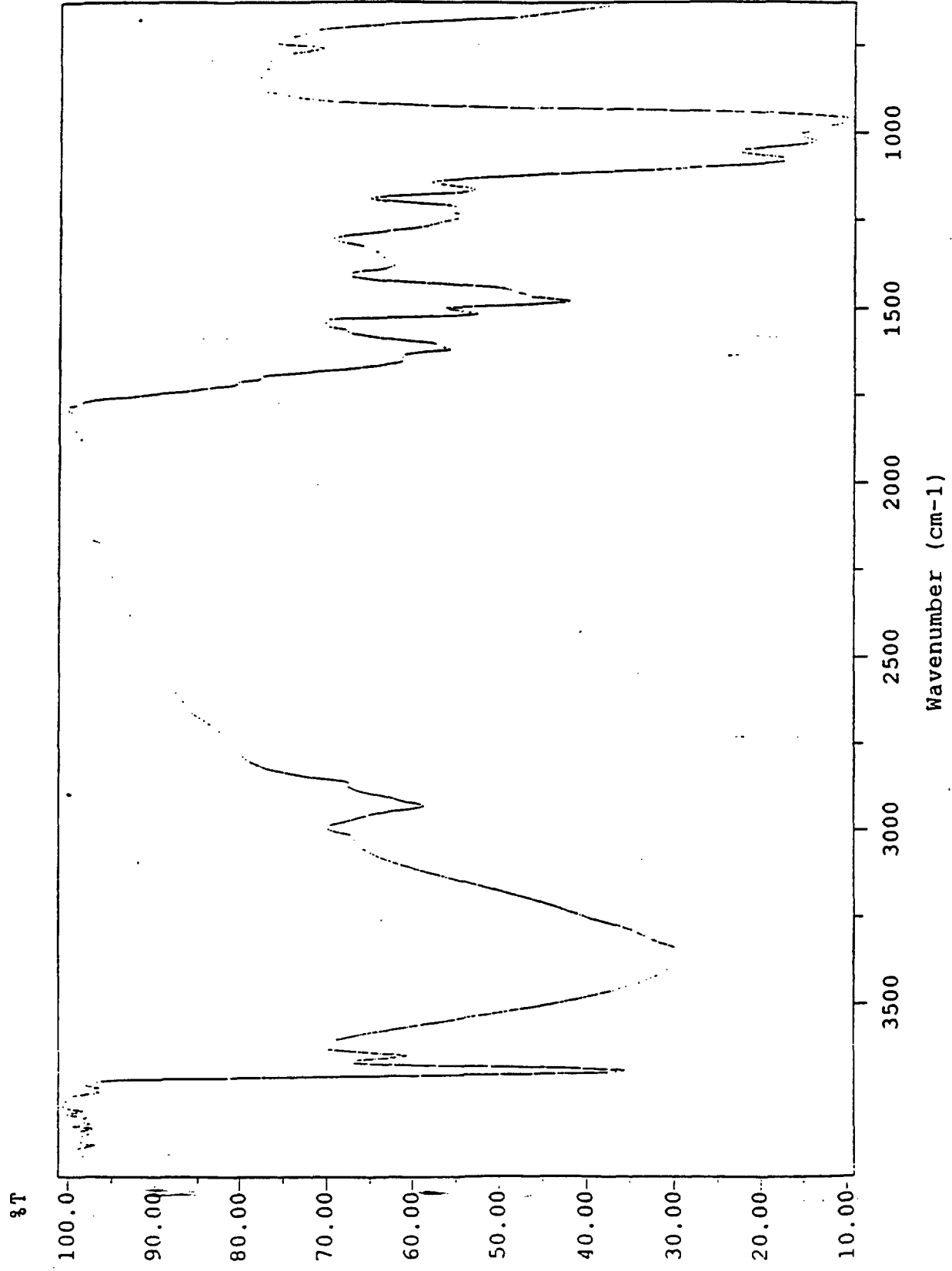
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Top Layer with Pigment

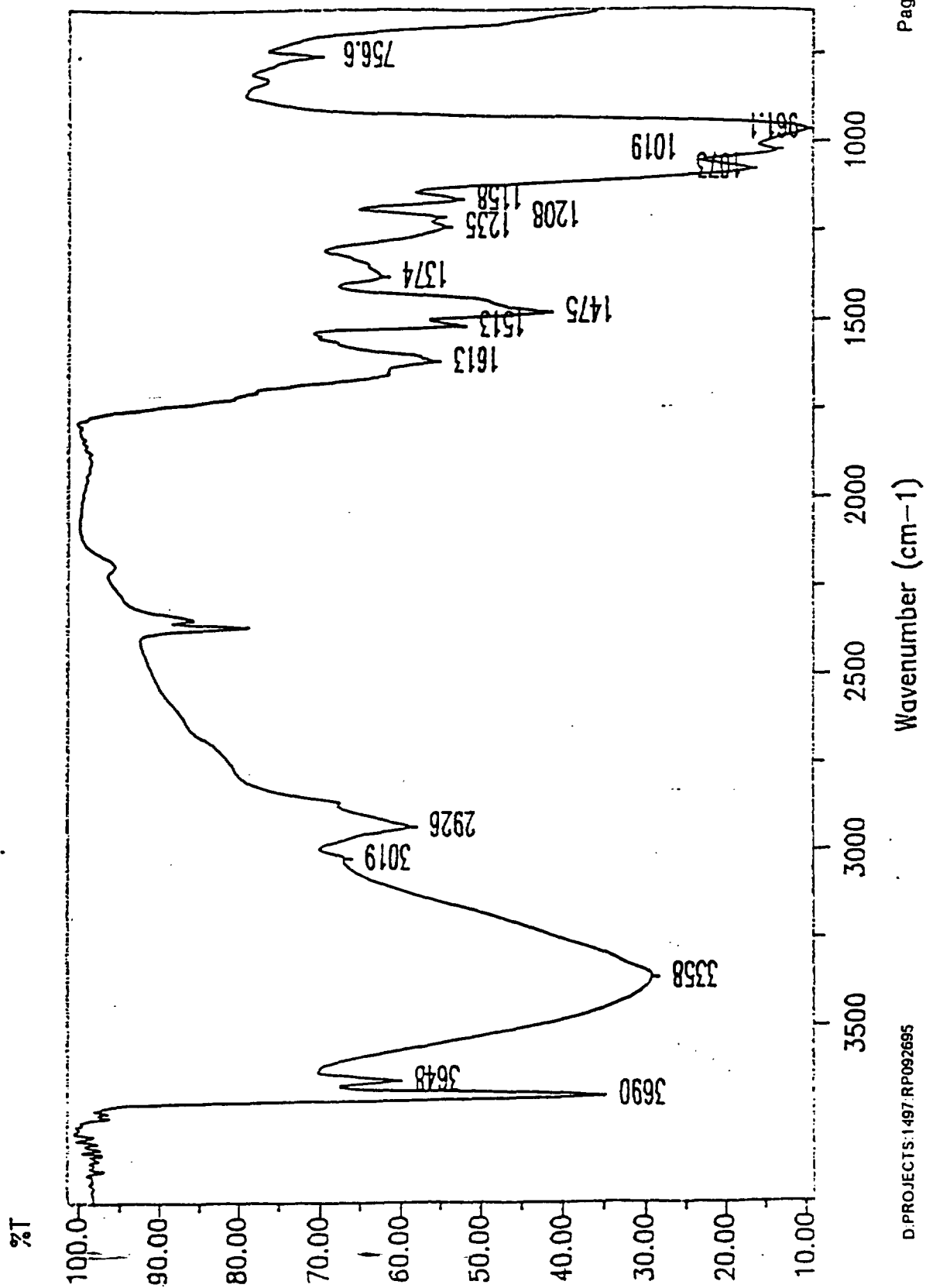


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Asbestos Layer



brown binder



MVA, Inc.

PLM Constituent Analysis

Date: 07/05/93

MVA #: 0607

Location:

Sample I.D. #: D1870

Client Sample I.D. #: 444

Examination using the stereomicroscope: D1870 is a green consolidated material with white fibers and a tan powdery surface layer with a smooth finish.

<u>CONSTITUENT</u>	<u>%</u>	<u>CONSTITUENT</u>	<u>%</u>	<u>CONSTITUENT</u>	<u>%</u>
Fibers:		Pigment:		Fillers:	
Cotton	---	Binders:		Diatoms	*
Fiberglass	---	Kaolinite	---	Iron Chromite	---
Filament	---	Montmorillonite	---	Iron Oxide	---
Wool	---	Gypsum	---	Limestone	---
Mineral Wool	---	Anhydrite	---	Magnetite	< 1
Hair	---	Portland Cement	---	Mica	---
Paper/Wood	---	Lime (hydrated)	---	Perlite	---
Chem. Proc.	~ 35	Precipitated		Synthetic Foam	---
Mech. Proc.	---	Carbonate	---	Pumice	---
Synthetic	---	Starch (+)	~ 2	Quartz	---
		Other	*	Talc	---
				Vermiculite	---

Asbestos Minerals

Chrysotile-	~ 35	Anthophyllite	---	Tremolite/	
Amosite	**	Crocidolite	---	Actinolite	---

Comments: No asbestos was detected in the tan surface layer and it is not included in the above percentages. *The binder is a green resinous material that comprises ~ 28% of the sample. Diatoms and/or radiolaria are included in this percentage. **A trace amount of amosite was found adhering to the back of the sample along with an adhesive material; the amosite therefore appears to be a contaminant.

Analyst: Randy Boltin