EA02-025

FORD 10/27/03

APPENDIX N

BOOK 18 OF 61

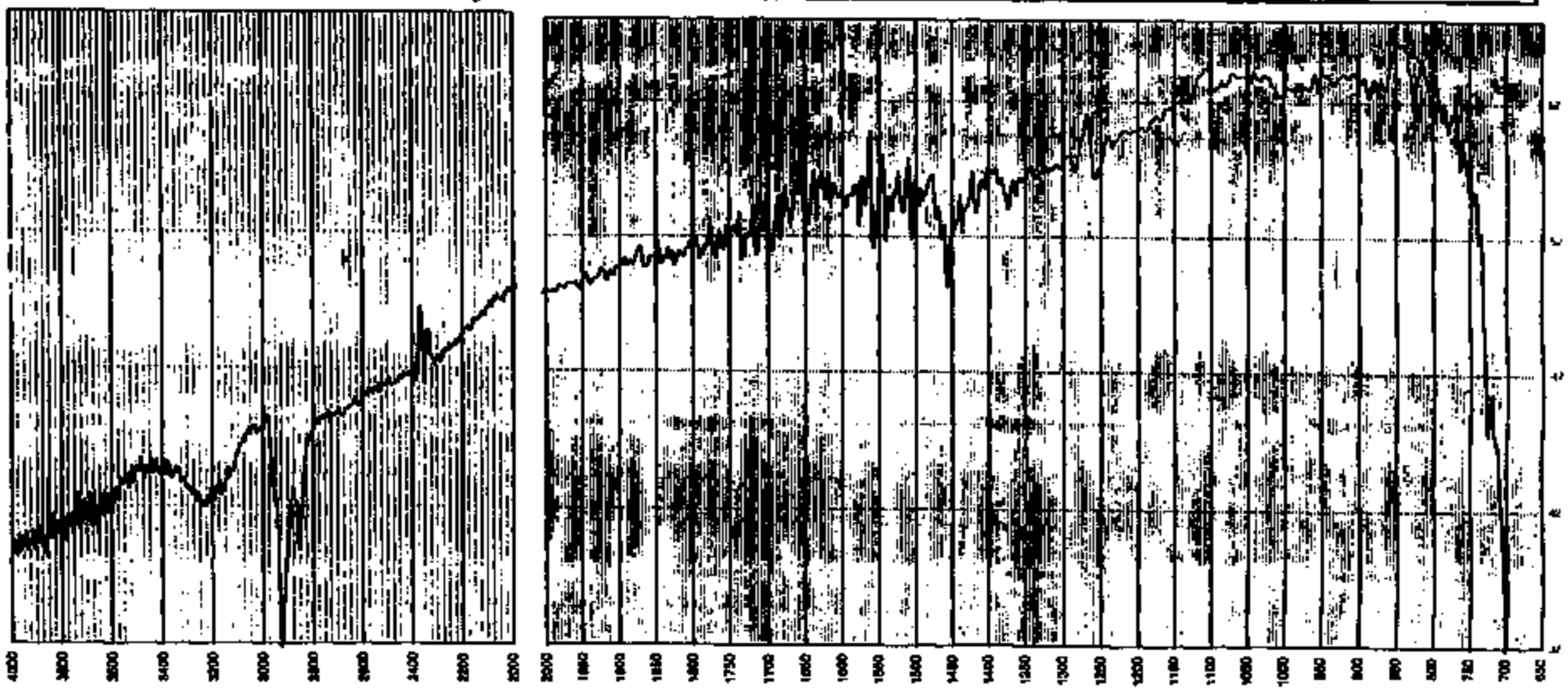
PART 4 OF 4

9900226 "C" HEXPORT, CAVITY, BLACK RESIDUE

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE
Interpretation: trace of hydrocarbon (possibly mineral oil) & trace silicone

Mon Feb 08 14:12:31 1999 Engineer: MCH
Scans: 128 / 256 APOD: Norton-Beer (medium)
Resolution: 4.00 Detector: MCT[15]
Gain: 2R / 2R Y Axis: % Transmittance X Axis: Wavenumber

Engineer:
Concur:



9713 2777

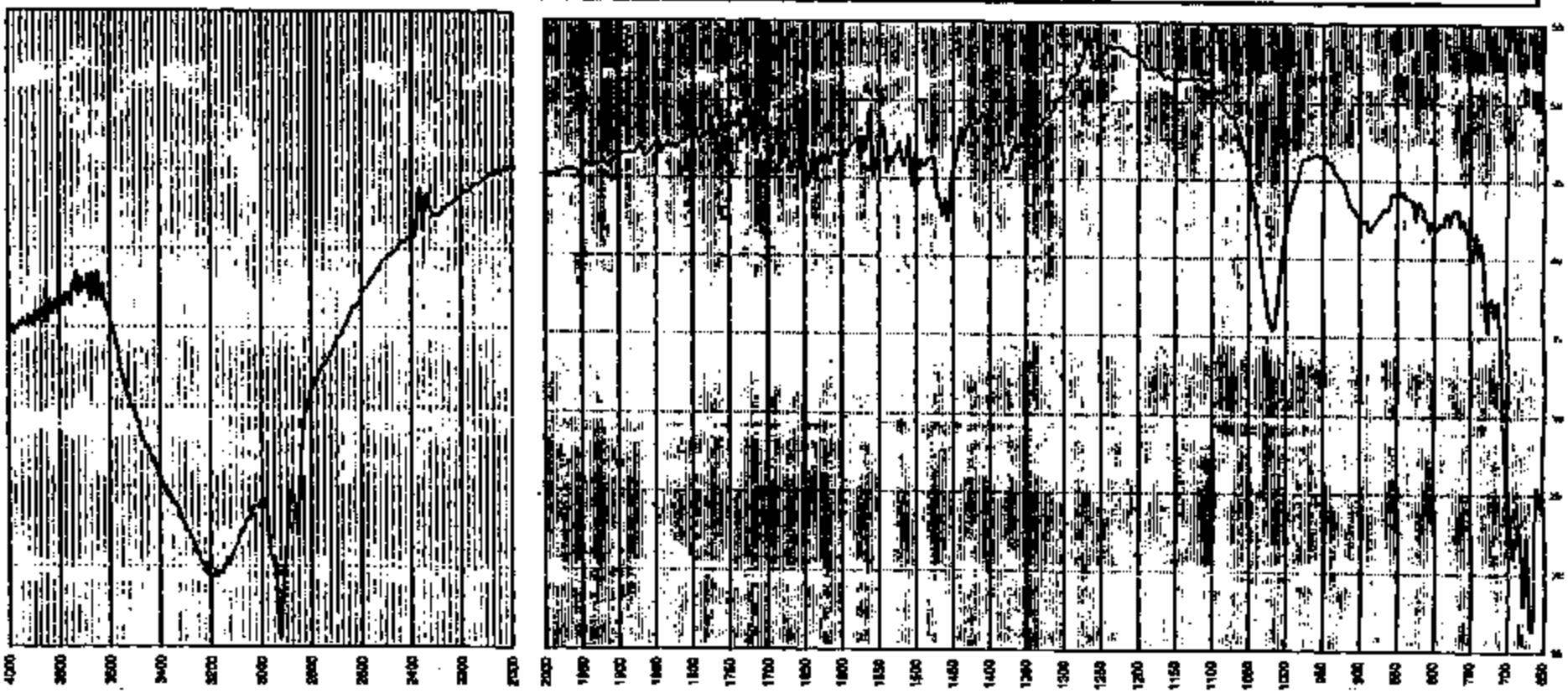
9900226 "C" HEXPORT, CAVITY, BROWN RESIDUE

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE

Mon Feb 08 14:15:58 1999 Engineer: MCH
Scans: 128 / 256 APOD: Norton-Beer (medium)
Resolution: 4.00 Detector: MCT[15]
Gain: 2R / 2R Y Axis: % Transmittance X Axis: Wavenumber

Engineer: MK
Director:

Interpretation: inorganics, plus trace hydrocarbon - possibly mo



3713 2778

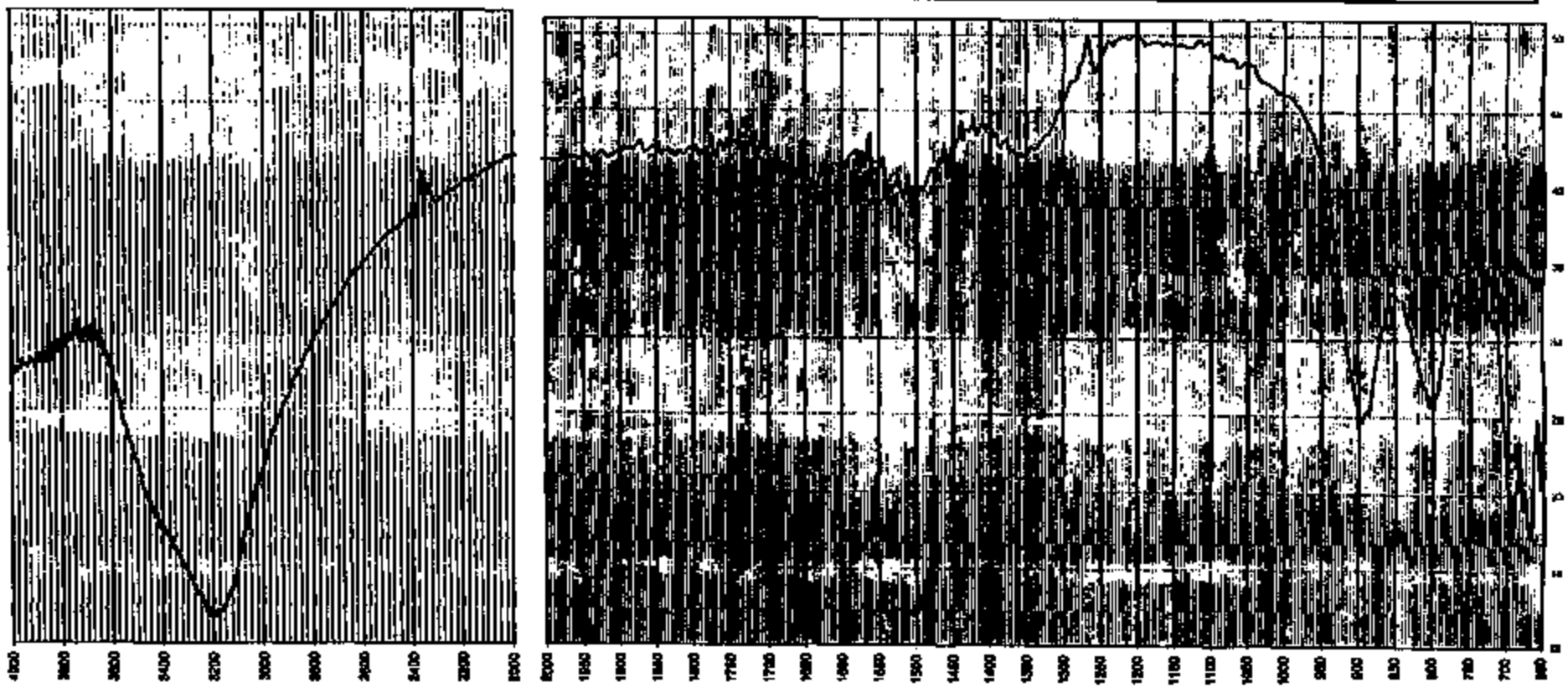
9900226 "C" CUP, INTERIOR

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE

Mon Feb 08 14:35:07 1999 Engineer: MCH
Scans: 128 / 256 APOD: Norton-Beer (medium)
Resolution: 4.00 Detector: MCT[15]
Gain: 2R / 2R Y Axis: % Transmittance X Axis: Wavenumber

Engineer: mH
Cancer:

Interpretation: Inorganic - probably including yellow iron oxide + trace silicates



3713 2779

9900226 "C" CUP, SWITCH SIDE

Specification:

Supplier:

Preparation method: AS RECEIVED

IR Technique: MICROSCOPE

Mon Feb 08 14:41:52 1999

Engineer: MCH

Scans: 128 / 256

APOD: Norton-Beer (medium)

Resolution: 4.00

Detector: MCT[15]

Gain: 2R / 2R

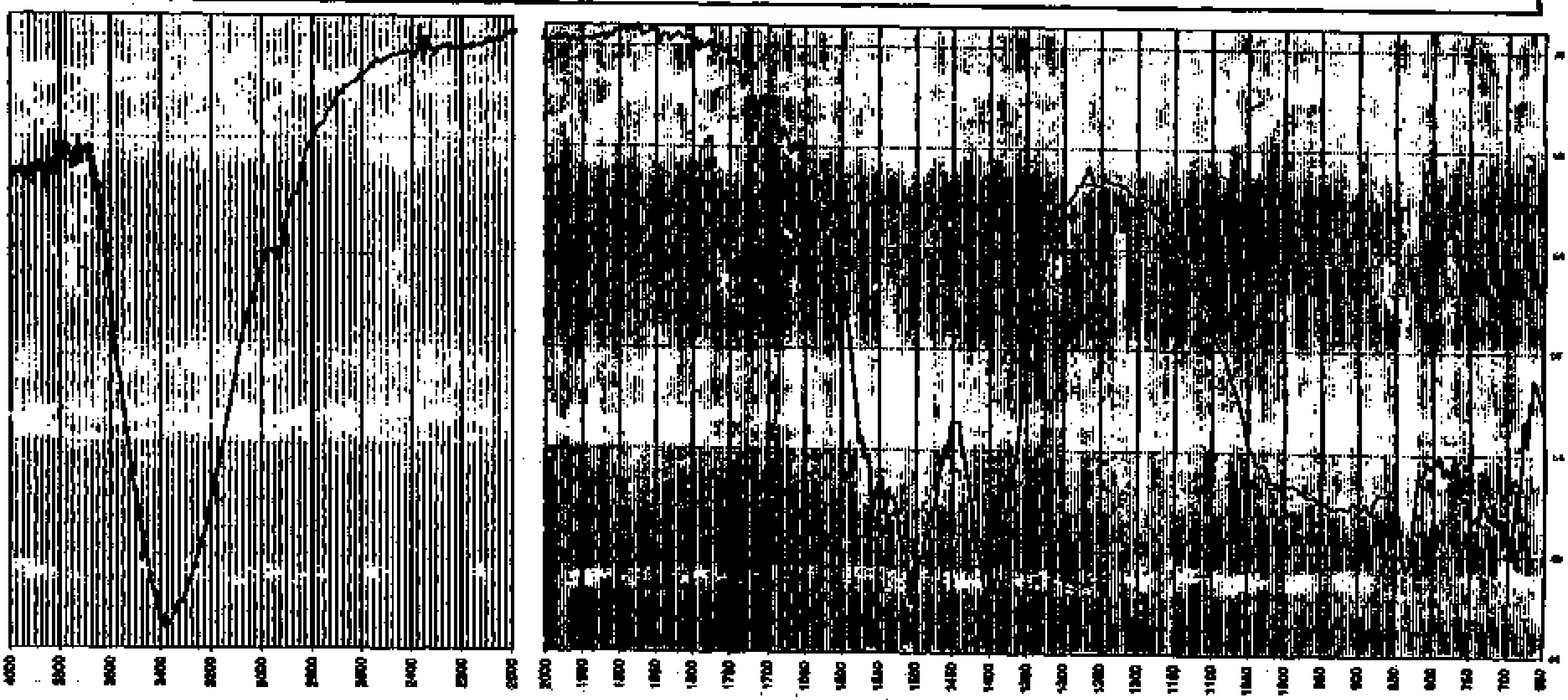
Y Axis: % Transmittance

X Axis: Wavenumber

Engineer: MV

Concur:

Interpretation: [illegible]



3713 2780

9900226 "C", WASHER

Specification:

Supplier:

Preparation method: AS RECEIVED

IR Technique: MICROSCOPE

Wed Feb 10 08:32:37 1999 Engineer: MCH

Scans: 128 / 256 APOD: Norton-Beer (medium)

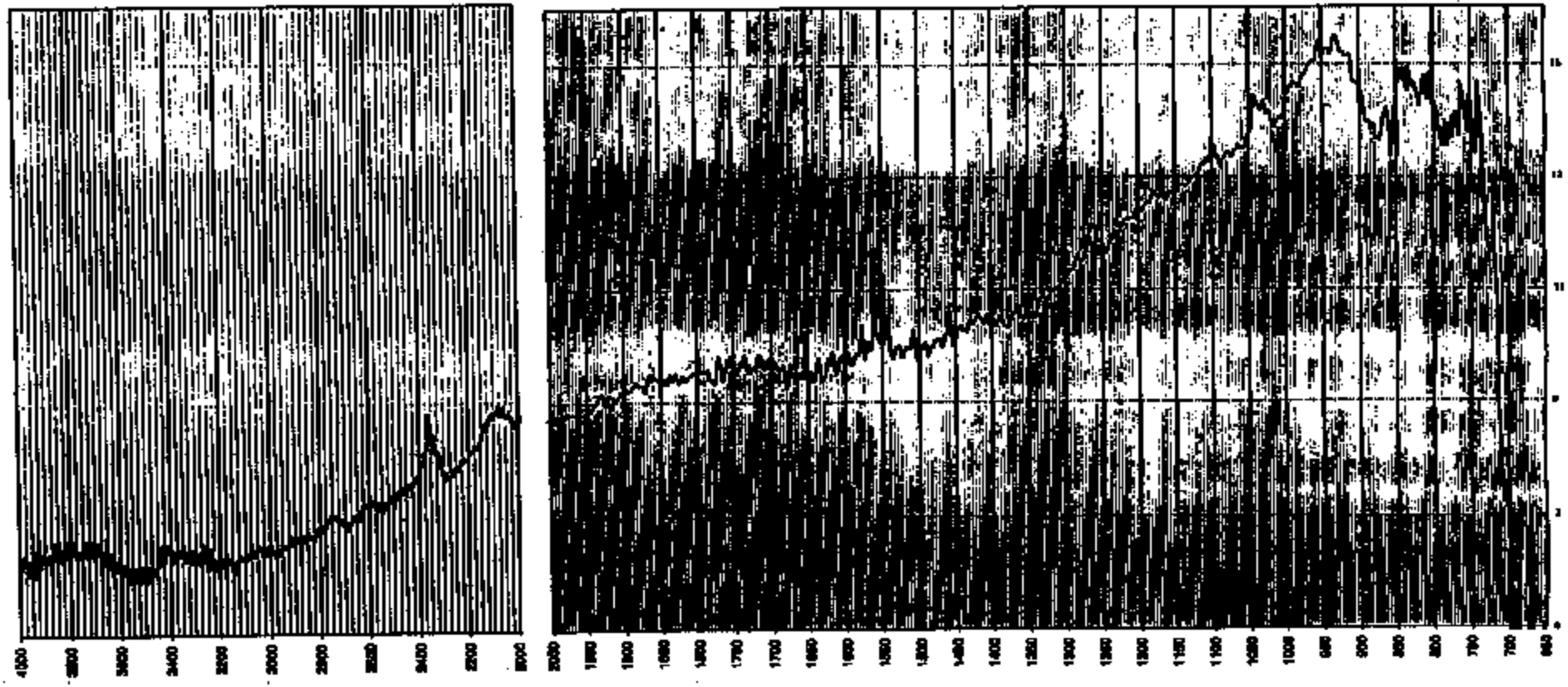
Resolution: 4.00 Detector: MCT[15]

Gain: 4 / 4 Y Axis: % Transmittance X Axis: Wavenumber

Engineer: MH

Comment:

Interpretation: evidence of sulfonic

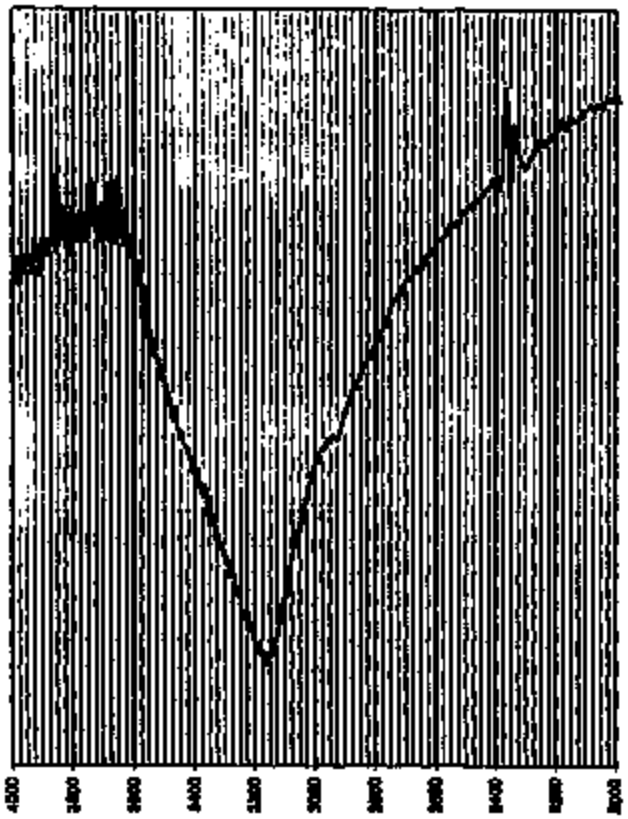


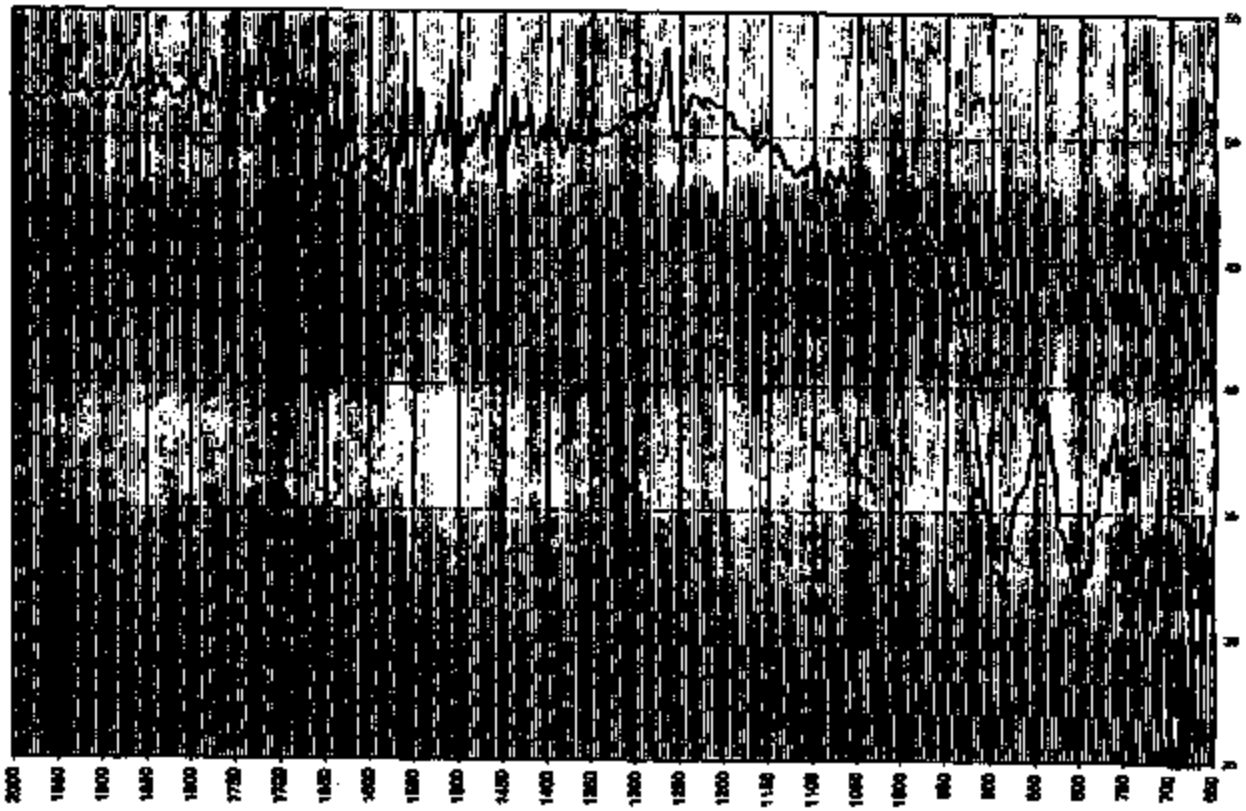
3713 2781

9900226 "C", CONVERTER

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE
Interpretation: inorganic, probably including yellow iron oxide + trace silicates

Wed Feb 10 08:36:35 1999 Engineer: MCH
Scans: 128 / 256 APOD: Norton-Beer (medium)
Resolution: 4.00 Detector: MCT[15]
Gain: 4 / 4 Y Axis: % Transmittance X Axis: Wavenumber



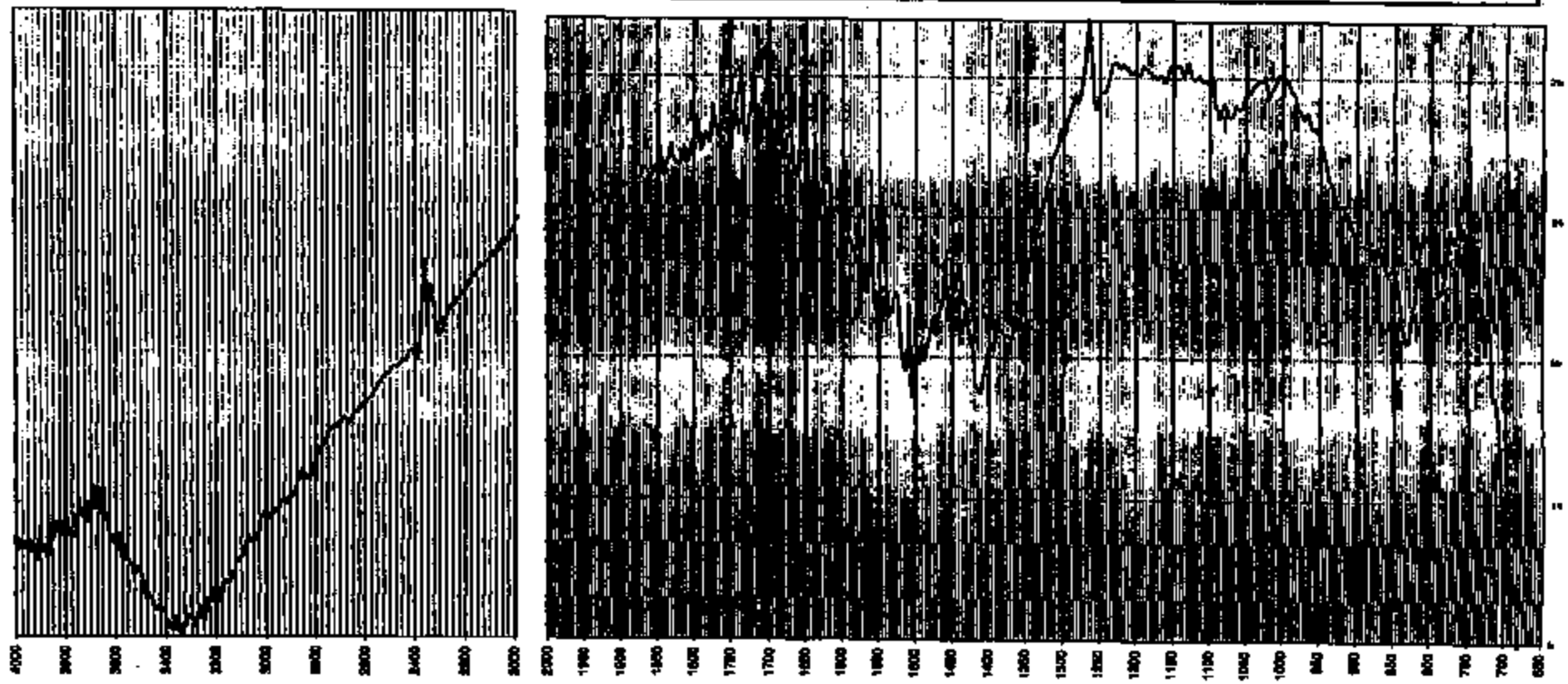


3713 2782

9900226 "C", DISC

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE
Interpretation:

Wed Feb 10 08:50:54 1999 Engineer: MCH
Scans: 128 / 256 APOD: Norton-Beer (medium)
Resolution: 4.00 Detector: MCT[15]
Gain: 4 / 4 Y Axis: % Transmittance X Axis: Wavenumber



3713 2783

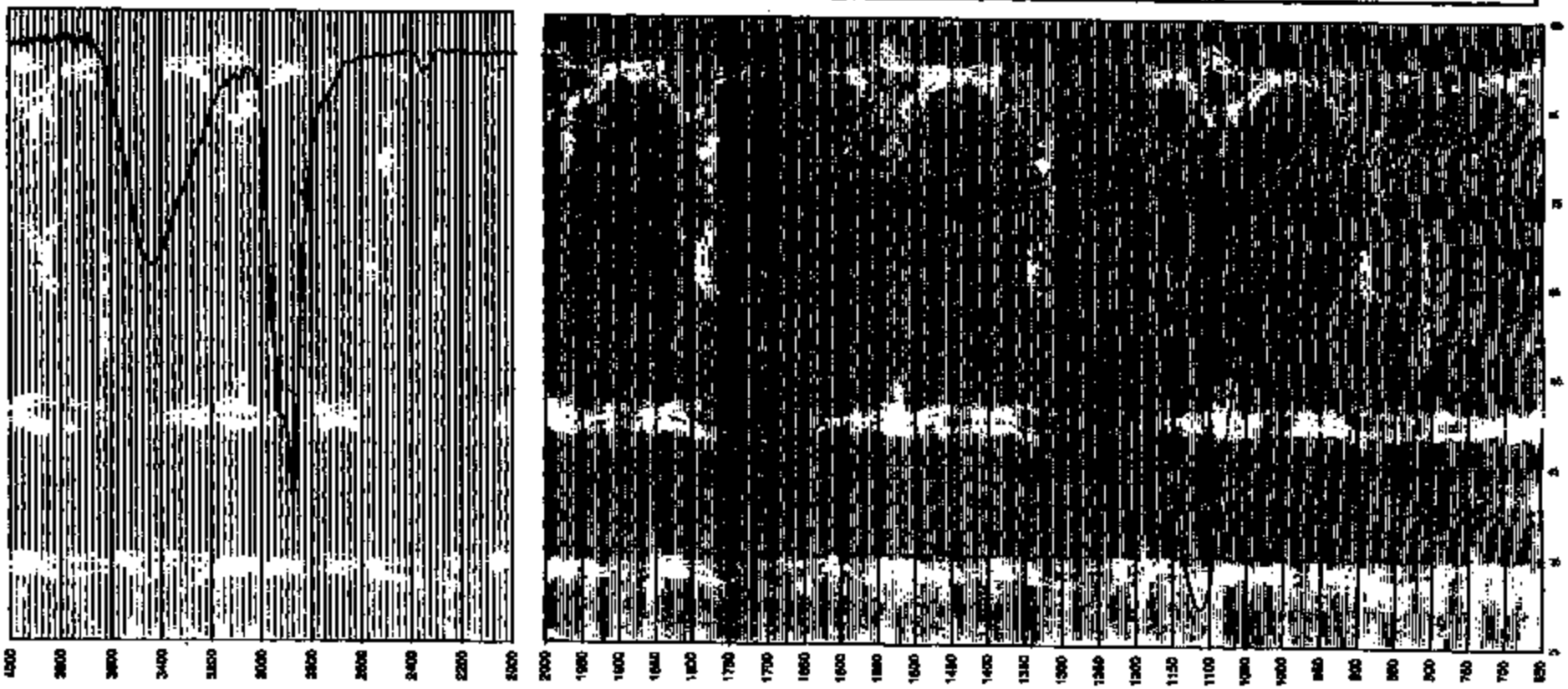
9900226 "D", HEXPORT, FITTING END

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE
Interpretation: Glycol based material (probably brake fluid) + metal salt (probably as oxalate)

Fri Feb 05 13:52:24 1999
Scans: 128 / 256
Resolution: 4.00
Gain: 4 / 4

Engineer: MCN
APOD: Norton-Beer (medium)
Detector: MCT[16]

Y Axis: % Transmittance
X Axis: Wavenumber



3713 2784

9900226 "D", HEXPORT, CAVITY

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE

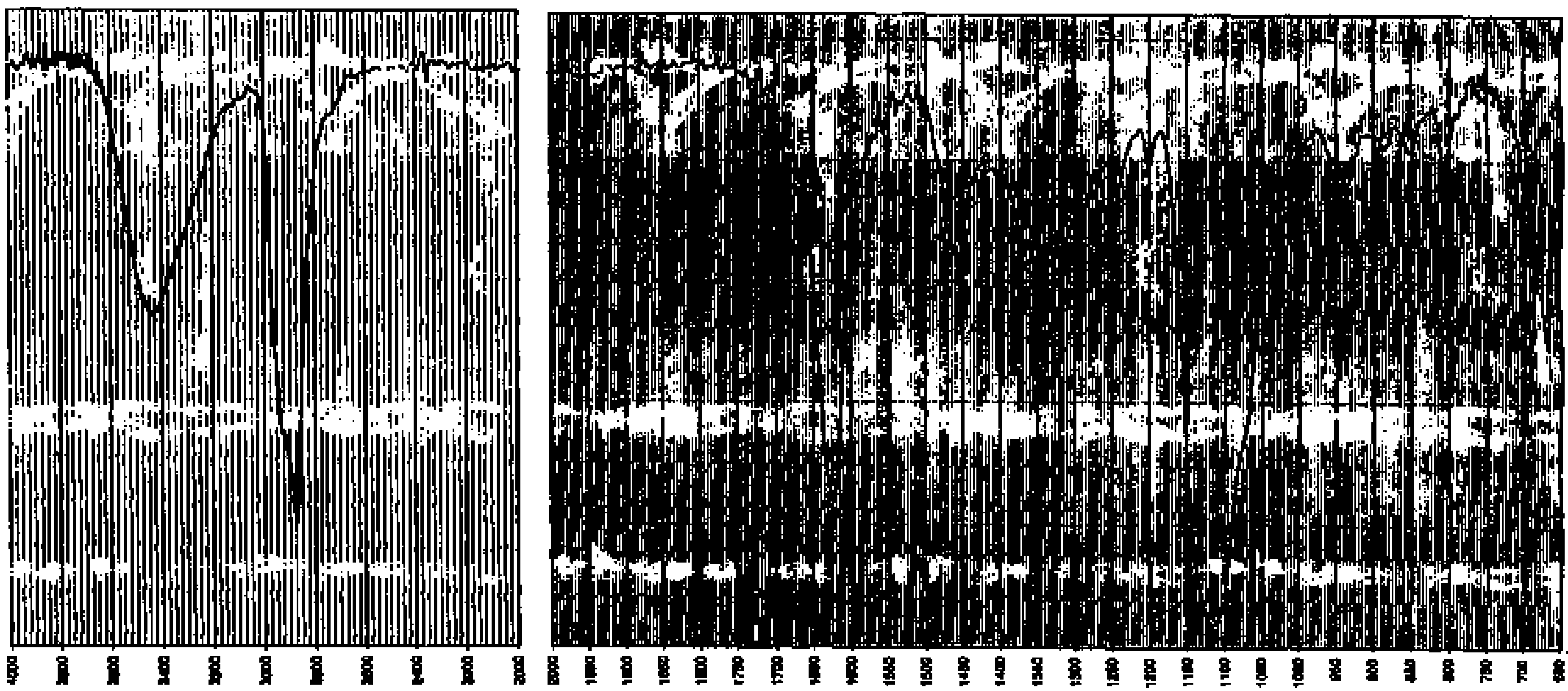
Fri Feb 05 13:47:09 1999
Scans: 128 / 256
Resolution: 4.00
Gain: 4 / 4

Engineer: MCH
APOD: Norton-Beer (medium)
Detector: MCT[15]

Y Axis: % Transmittance   X Axis: Wavenumber

Engineer: MH
Concur:

Interpretation: glycol based material (possibly brake fluid) + metal salt (probably carboxylate
Eglin (PA) + ms (PO)



3713 2785

9900226 "D" SEAL 1, LIQUID WITH BLACK

Specification:

Supplier:

Preparation method: AS RECEIVED

IR Technique: MICROSCOPE

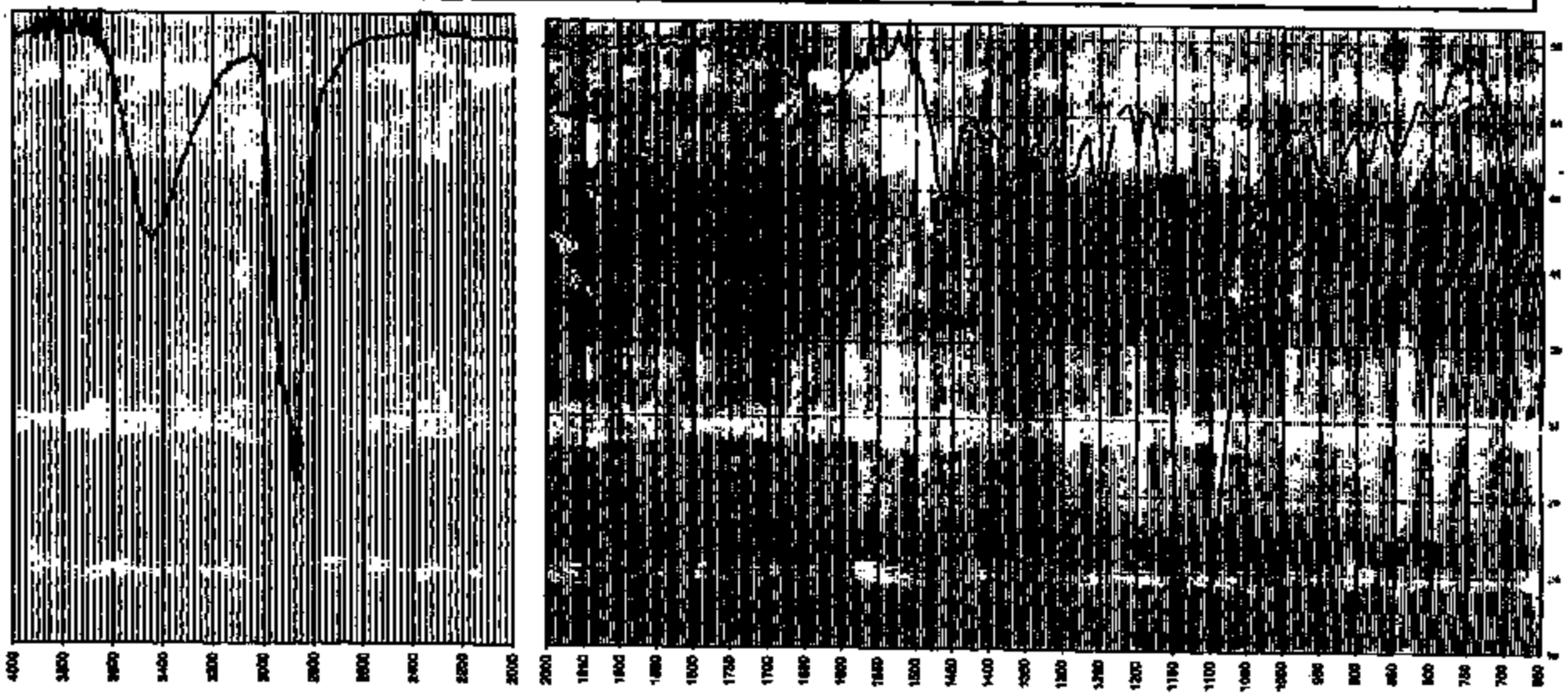
Interpretation: Glass [PDF]

Mon Feb 08 09:03:25 1999 Engineer: MCH

Scans: 128 / 256 APOD: Norton-Beer (medium)

Resolution: 4.00 Detector: MCT[1B]

Gain: 2R / 2R Y Axis: % Transmittance X Axis: Wavenumber

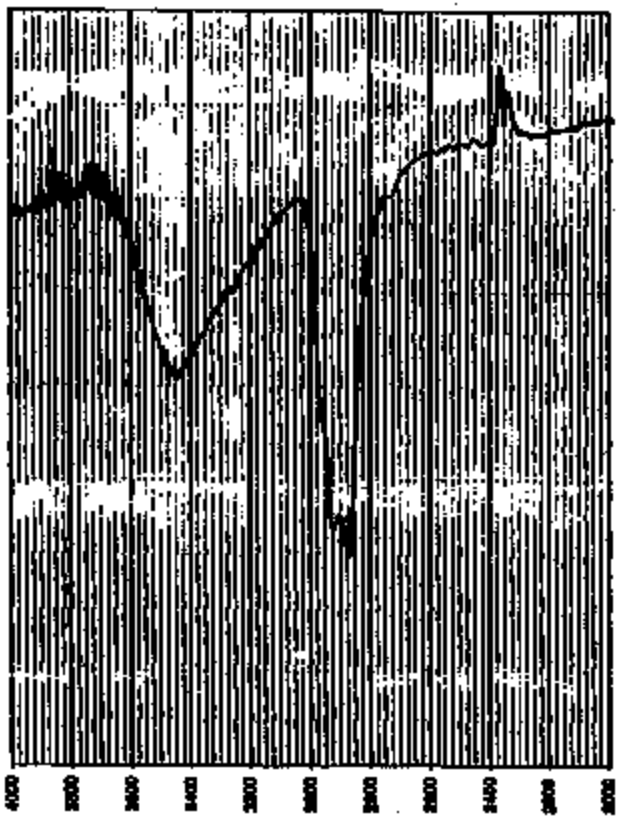


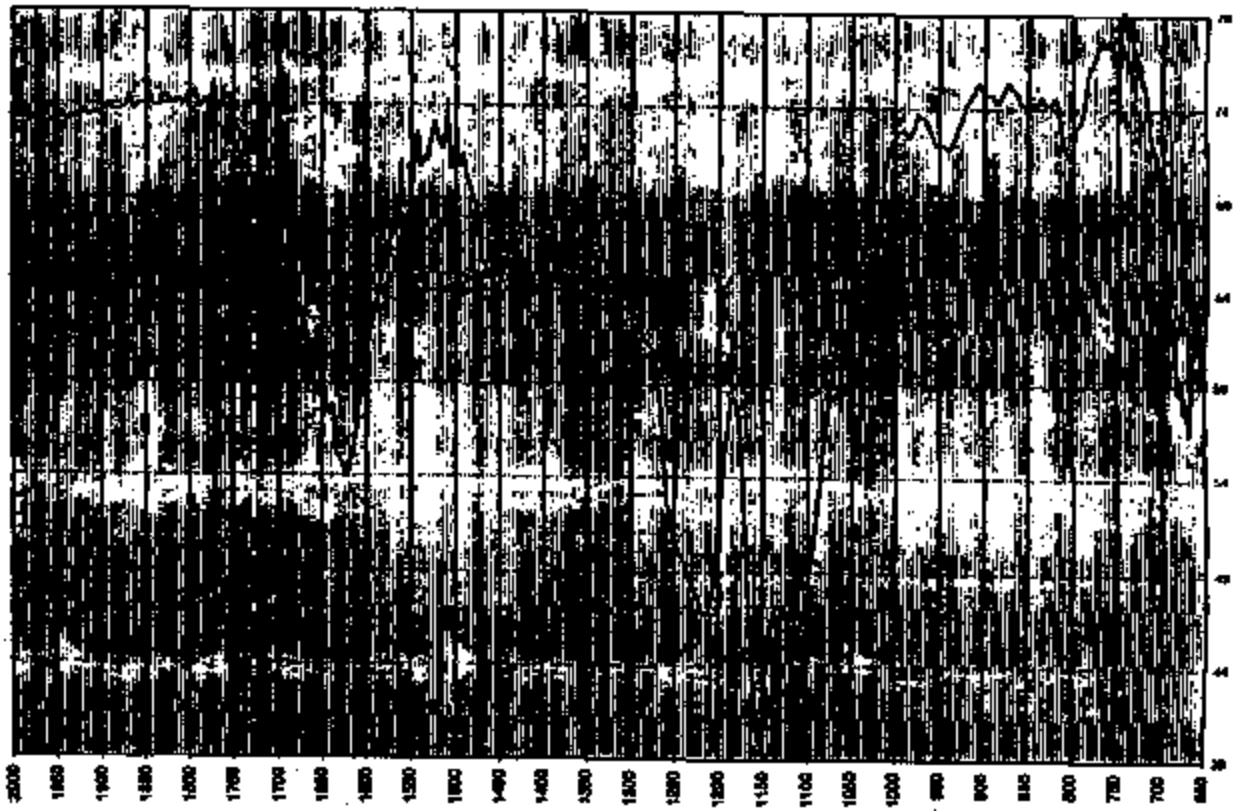
3713 2786

9900226 "D" SEAL 2, RESIDUE

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE
Interpretation: m.s (p.o) + glass + ptfe/n PEP

Mon Feb 08 09:43:34 1999 Engineer: MCH
Scans: 128 / 256 APOD: Norton-Beer (medium)
Resolution: 4.00 Detector: MCT[15]
Gain: 2R / 2R Y Axis: % Transmittance X Axis: Wavenumber





3713 2767

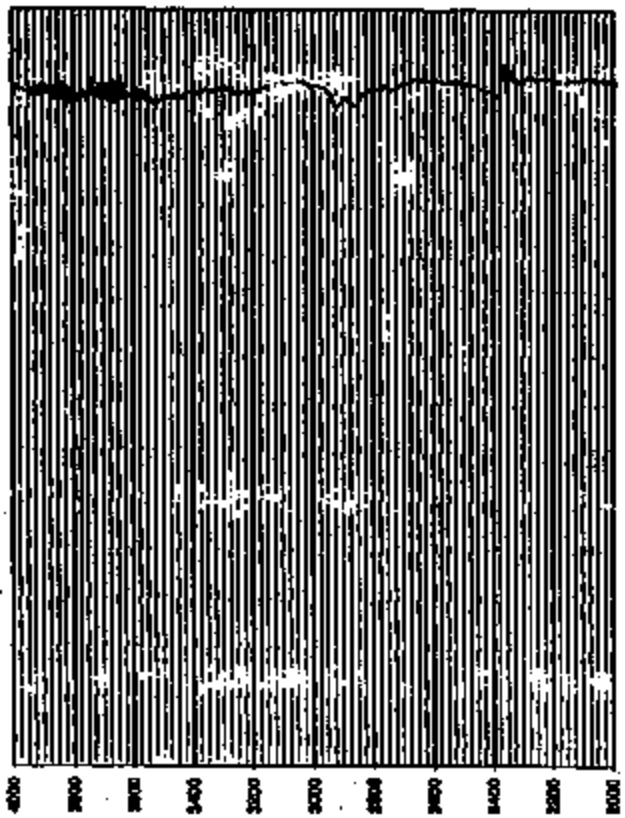
9900226 "D" SEAL2

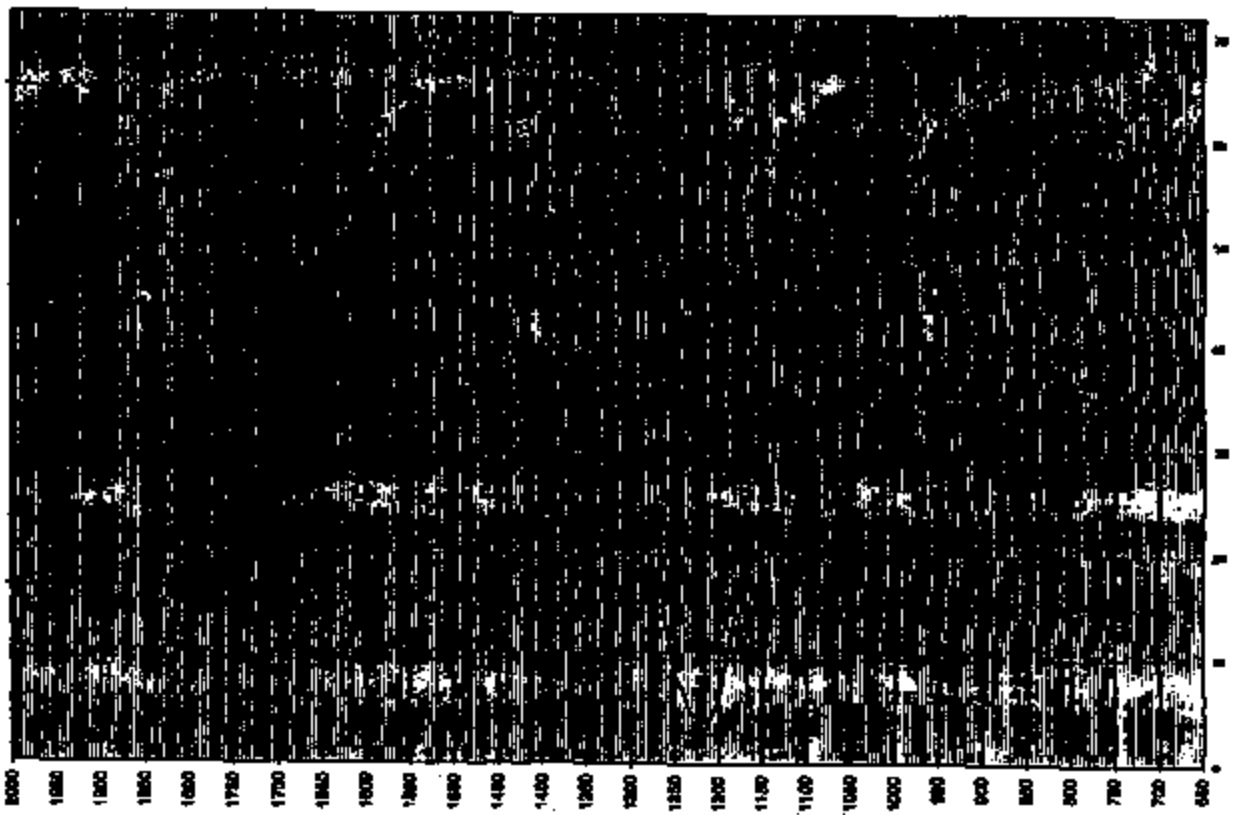
Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE

Mon Feb 06 09:38:54 1999 Engineer: MCH
Scans: 128 / 256 APOD: Norton-Beer (medium)
Resolution: 4.00 Detector: MCT[15]
Gain: 2R / 2R Y Axis: % Transmittance X Axis: Wavenumber

Engineer: _____
Owner: _____

Interpretation:





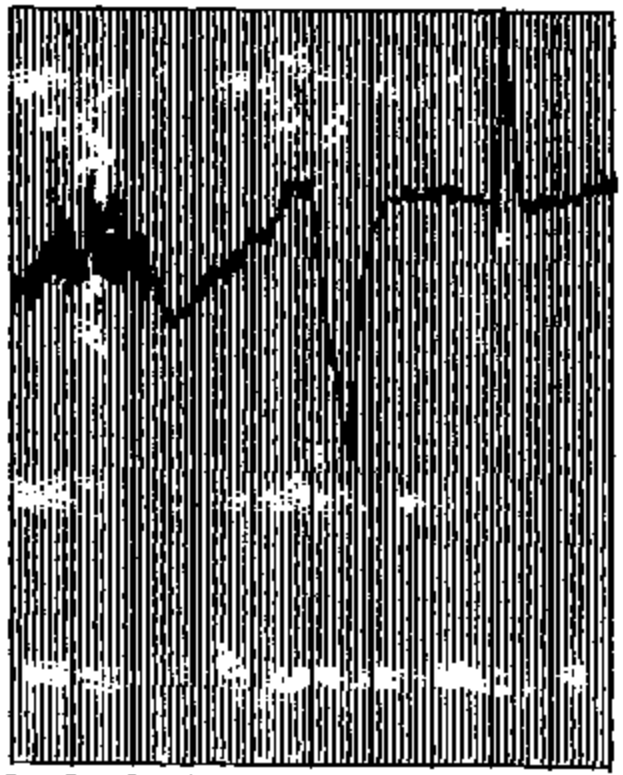
3713 2789

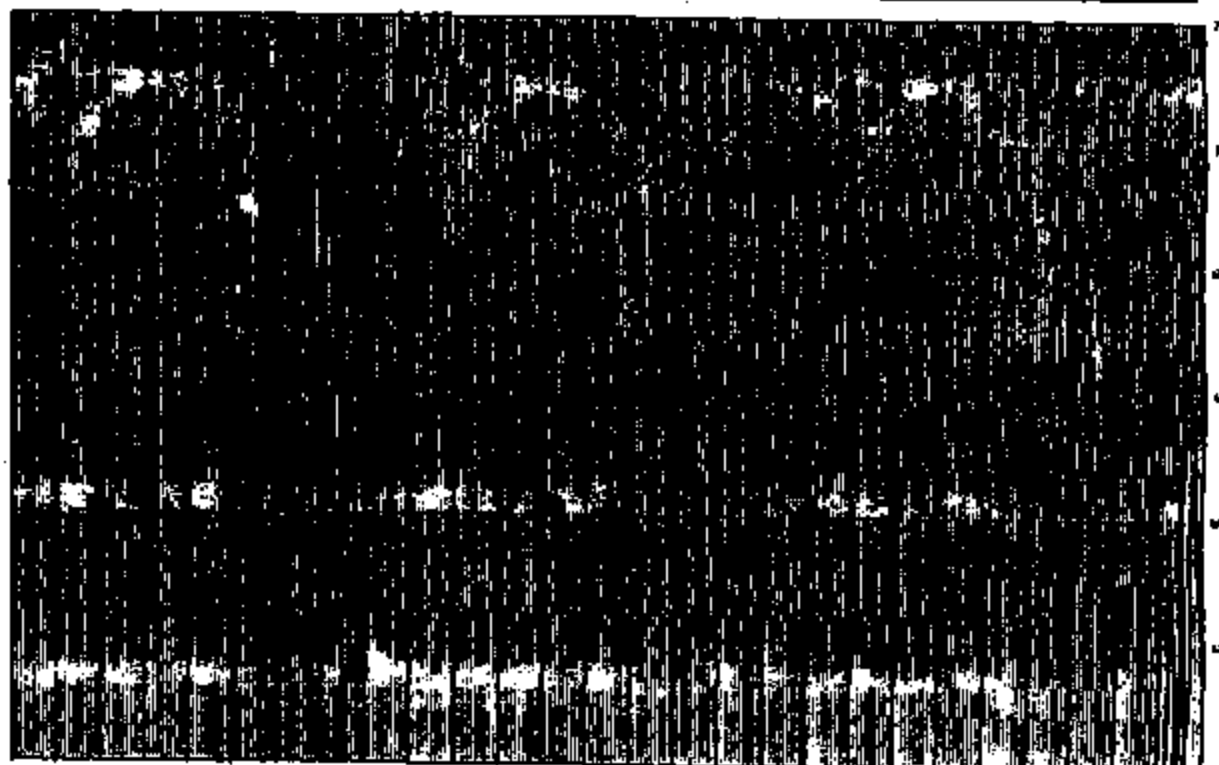
9900226 "D" SEAL 3,FLUID

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE
Interpretation: m.s. (p.o) v s b

Mon Feb 08 09:14:04 1999 Engineer: MCH
Scans: 128 / 256 APOD: Norton-Beer (medium)
Resolution: 4.00 Detector: MCT[16]
Gain: 2R / 2R Y Axis: % Transmittance X Axis: Wavenumber

Engineer:
Colour:





3713 2789

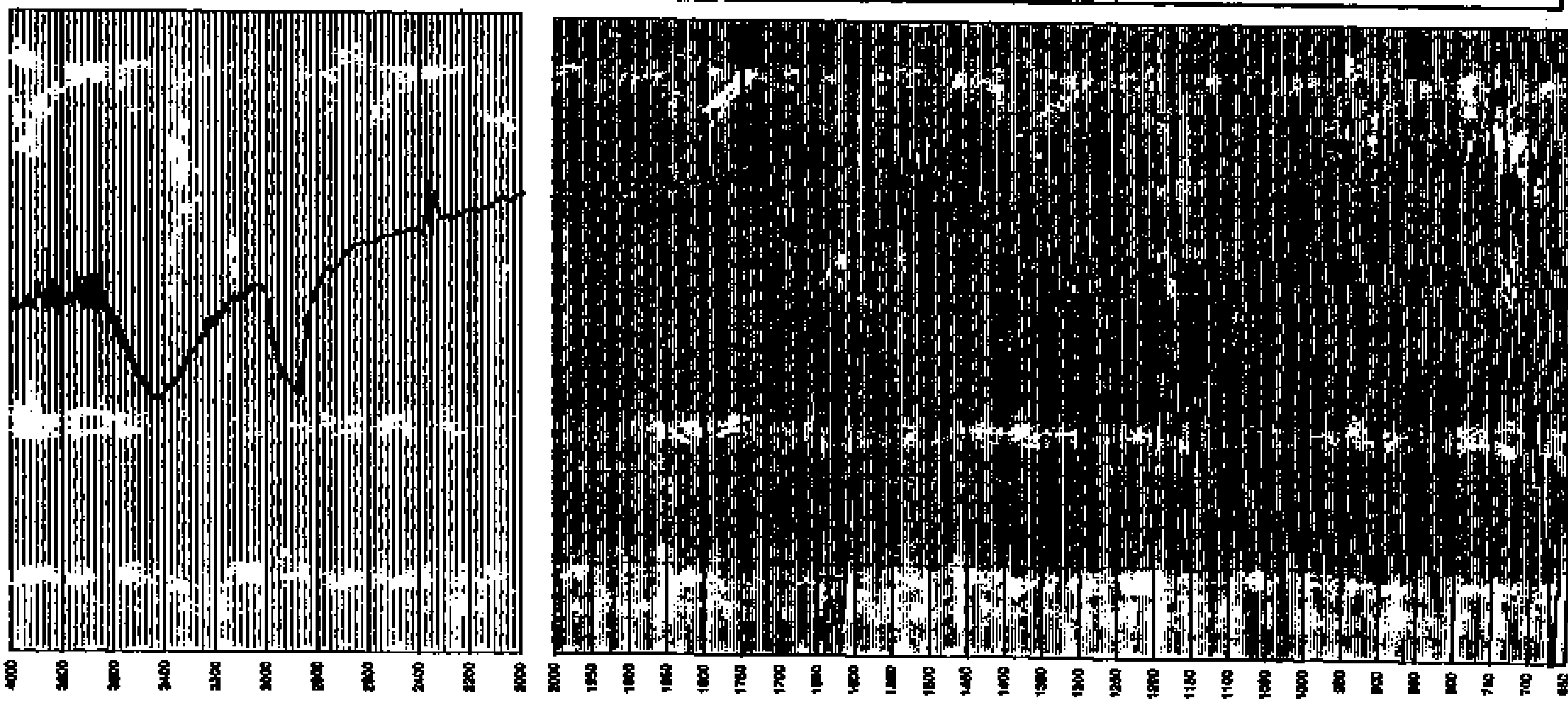
9900226 "D" SEAL 3, BROWN/BLACK RESIDUE

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE

Mon Feb 08 09:11:05 1999 Engineer: MCH
Scans: 128 / 256 APOD: Norton-Beer (medium)
Resolution: 4.00 Detector: MCT[15]
Gain: 8R / 2R

Engineer: ML
Concur:

Interpretation: m.s(y.o) + M1 Lilln FGP



3713 2790

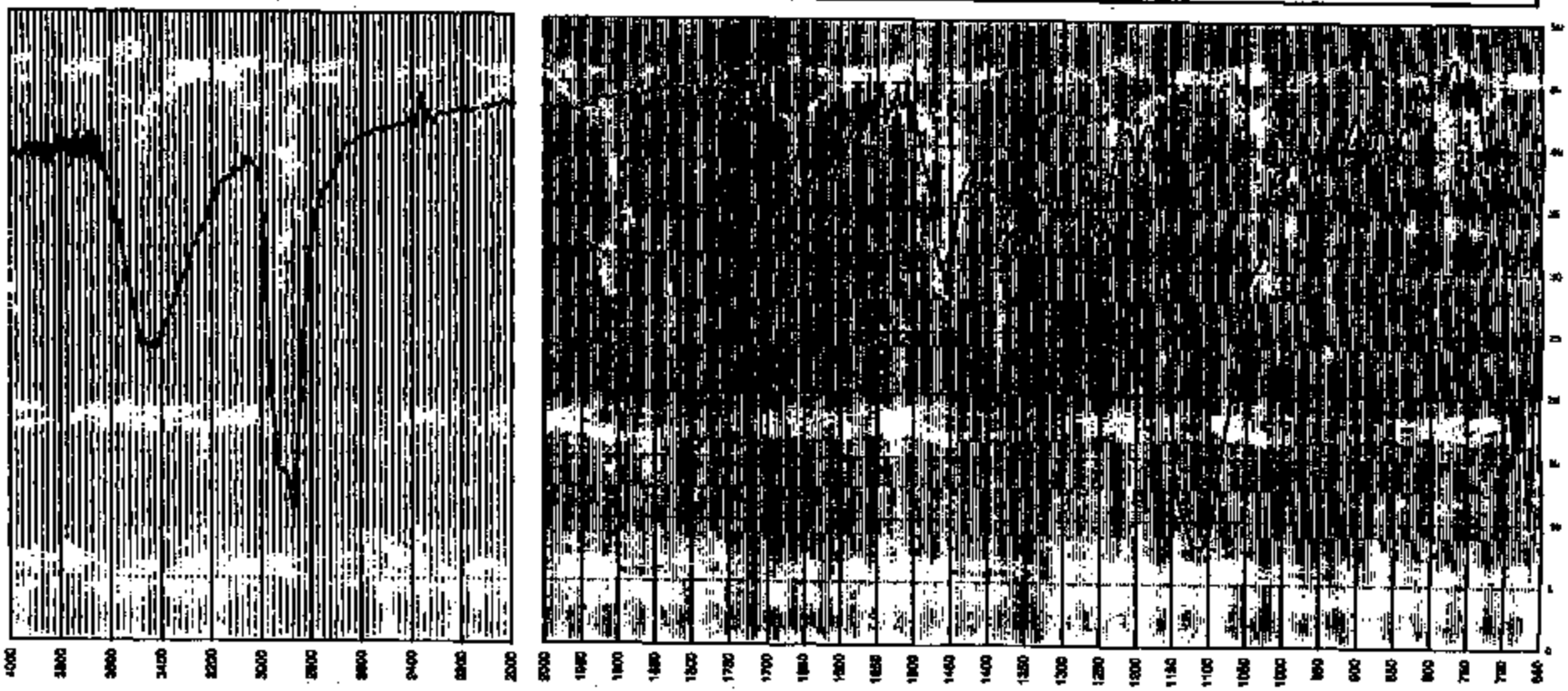
9900226 "D", WASHER

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE
Interpretation: glass(fiber) + MS (pb)

Fri Feb 05 14:43:03 1999
Scans: 128 / 256
Resolution: 4.00
Gain: 4 / 4

Engineer: MCH
APOD: Norton-Beer (medium)
Detector: MCT[15]
Y Axis: % Transmittance
X Axis: Wavenumbers

Engineer: MV
Checker:



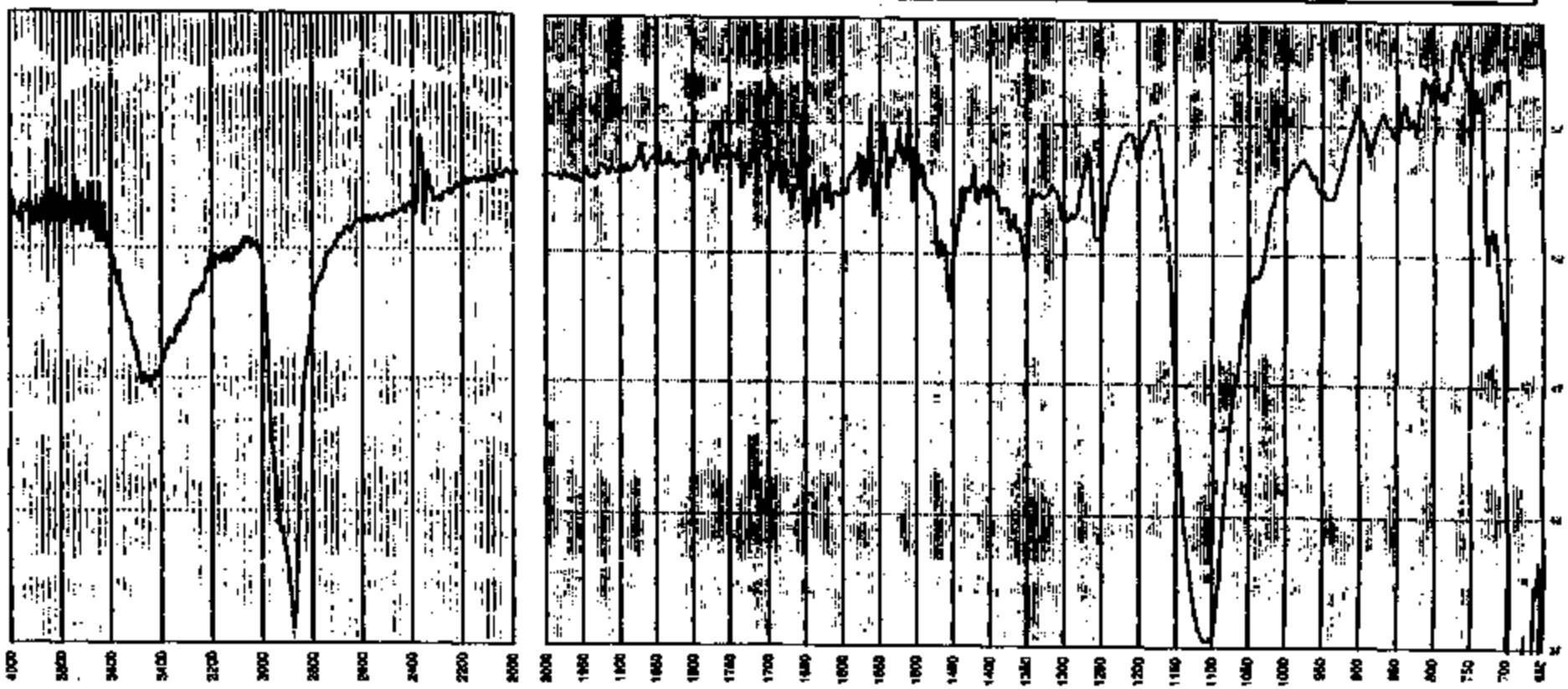
8719 2791

9900226 "D", CONVERTER

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE
Interpretation:
ess · glum (PBF)

Fri Feb 05 14:47:18 1999
Scans: 128 / 256
Resolution: 4.00
Gain: 4 / 4

Engineer: MOH
APOD: Norton-Beer (medium)
Detector: MCT[15]
Y Axis: % Transmittance
X Axis: Wavenumber



3713 2792

9900226 "D", SPACER

Specification:

Supplier:

Preparation method: AS RECEIVED

IR Technique: MICROSCOPE

Fri Feb 05 14:57:36 1999

Scans: 128 / 256

Resolution: 4.00

Gain: 4 / 4

Engineer: MCH

APOD: Norton-Beer (medium)

Detector: MCT[15]

Y Axis: % Transmittance

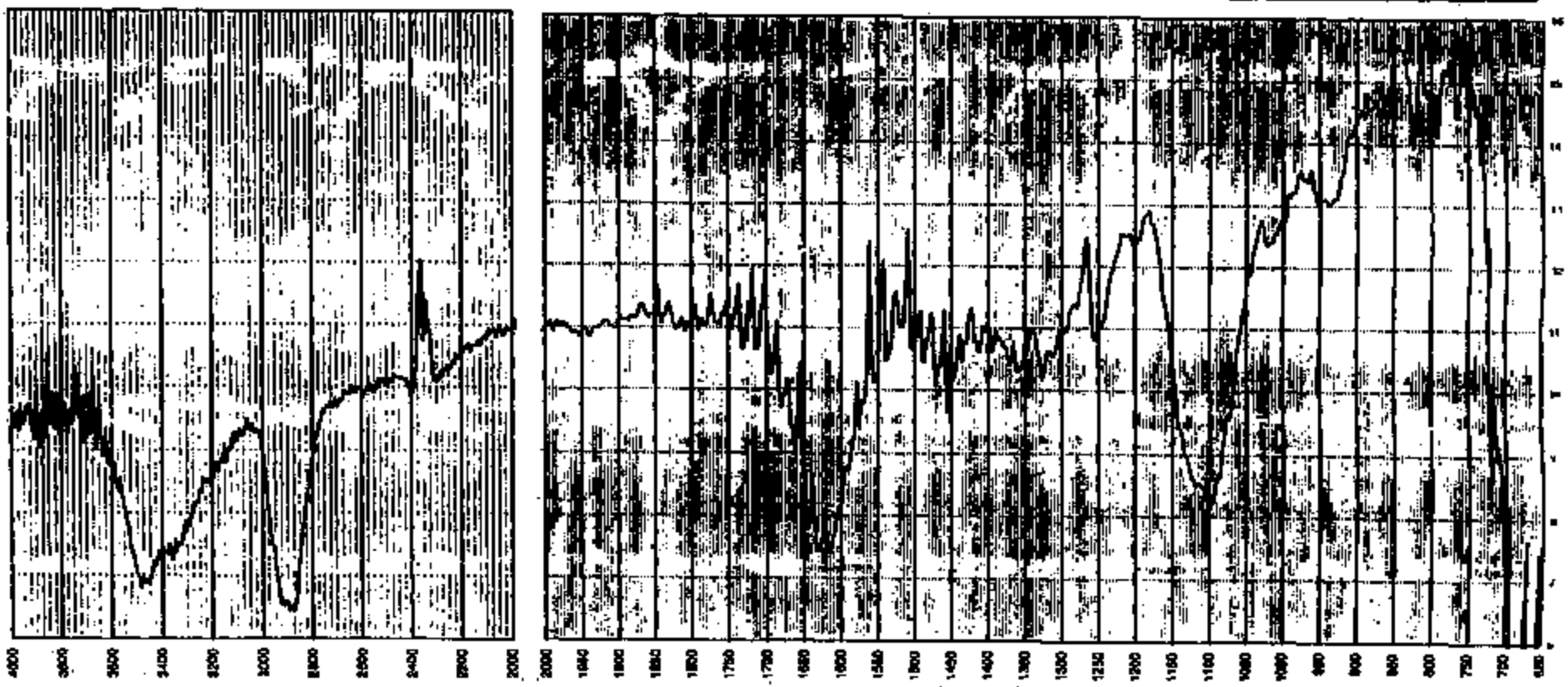
X Axis: Wavenumber

Engineer: MJ

Comp:

Interpretation:

N.S (rubber glove)



3713 2793

9900226 "D", DISC

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE

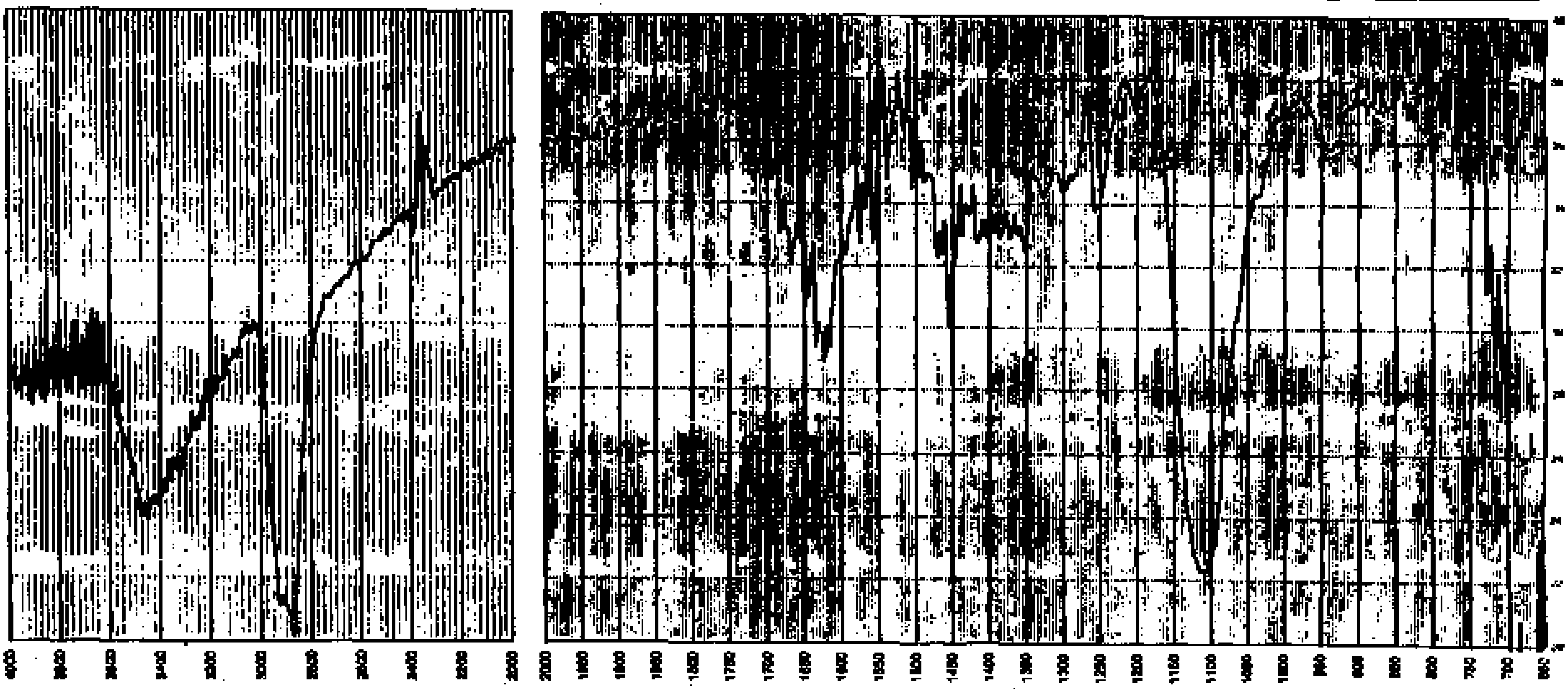
Fri Feb 06 14:54:18 1999
Scans: 128 / 256
Resolution: 4.00
Gain: 4 / 4

Engineer: MCH
APOD: Norton-Beer (medium)
Detector: MCT[15]

Y Axis: % Transmittance   X Axis: Wavenumber

Engineer: MF
Center:

Interpretation: [illegible]



3713 2794

9900226 "D", CUP, INTERIOR

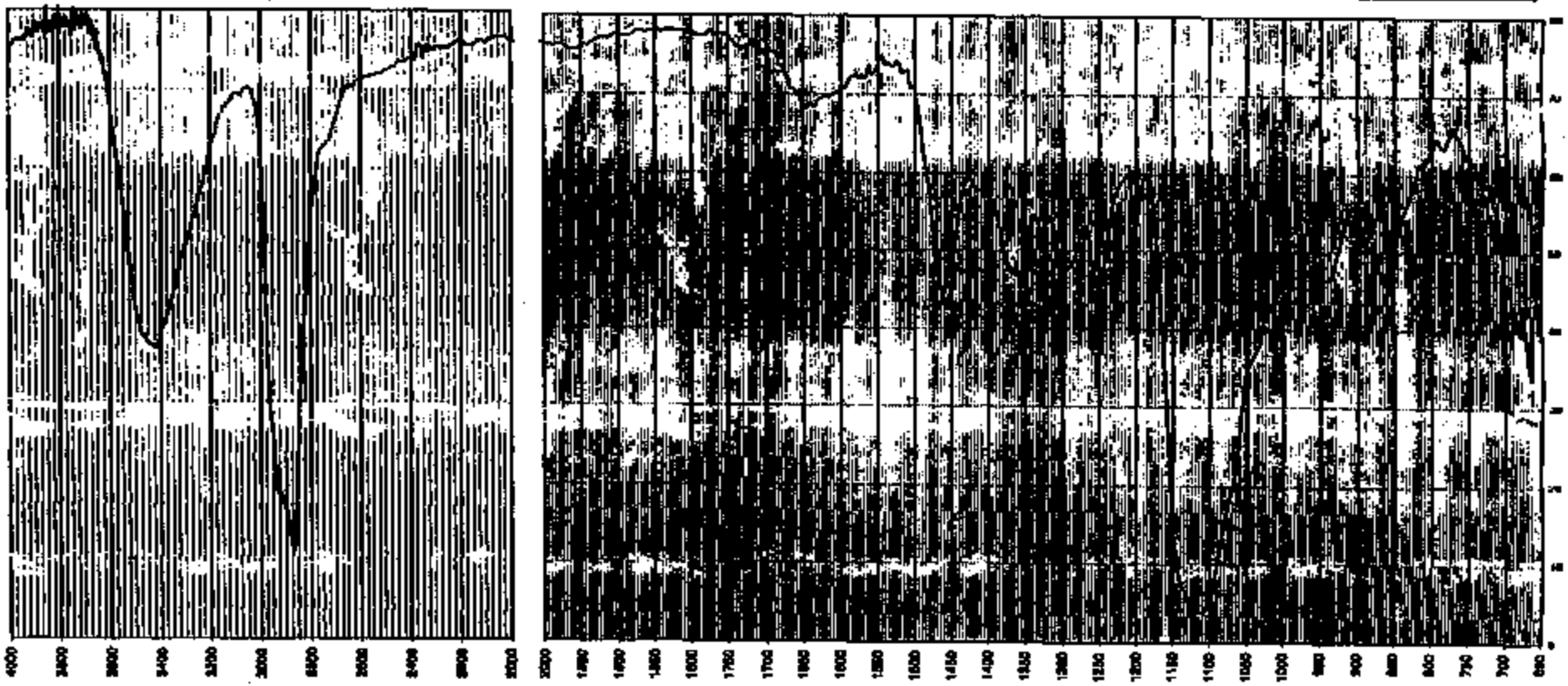
Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE

Fri Feb 05 14:07:56 1999
Scans: 128 / 256
Resolution: 4.00
Gain: 4 / 4

Engineer: MCH
APOD: Norton-Beer (medium)
Detector: MCT[15]
Y Axis: % Transmittance X Axis: Wavenumber

Engineer: MJ
Censor:

Interpretation: glucan (βBF)



3713 2796

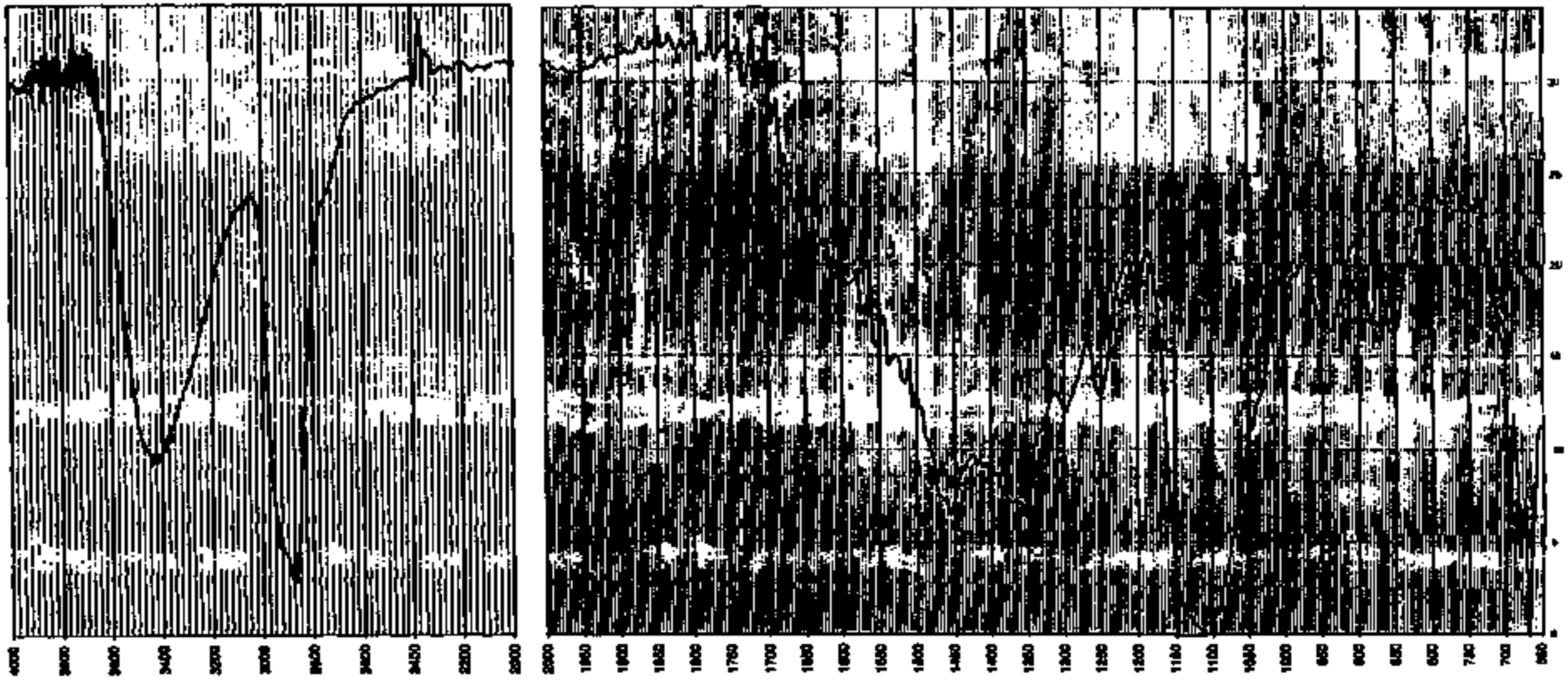
9900226 "D", CUP,SWITCH SIDE

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE
Interpretation: gbm (Br) + other hydrocarbon

Fri Feb 05 14:19:20 1999
Scans: 128 / 256
Resolution: 4.00
Gain: 4 / 4

Engineer: MCH
APOD: Norton-Beer (medium)
Detector: MCT[15]
Y Axis: % Transmittance
X Axis: Wavenumber

Engineer: MJ
Concur:



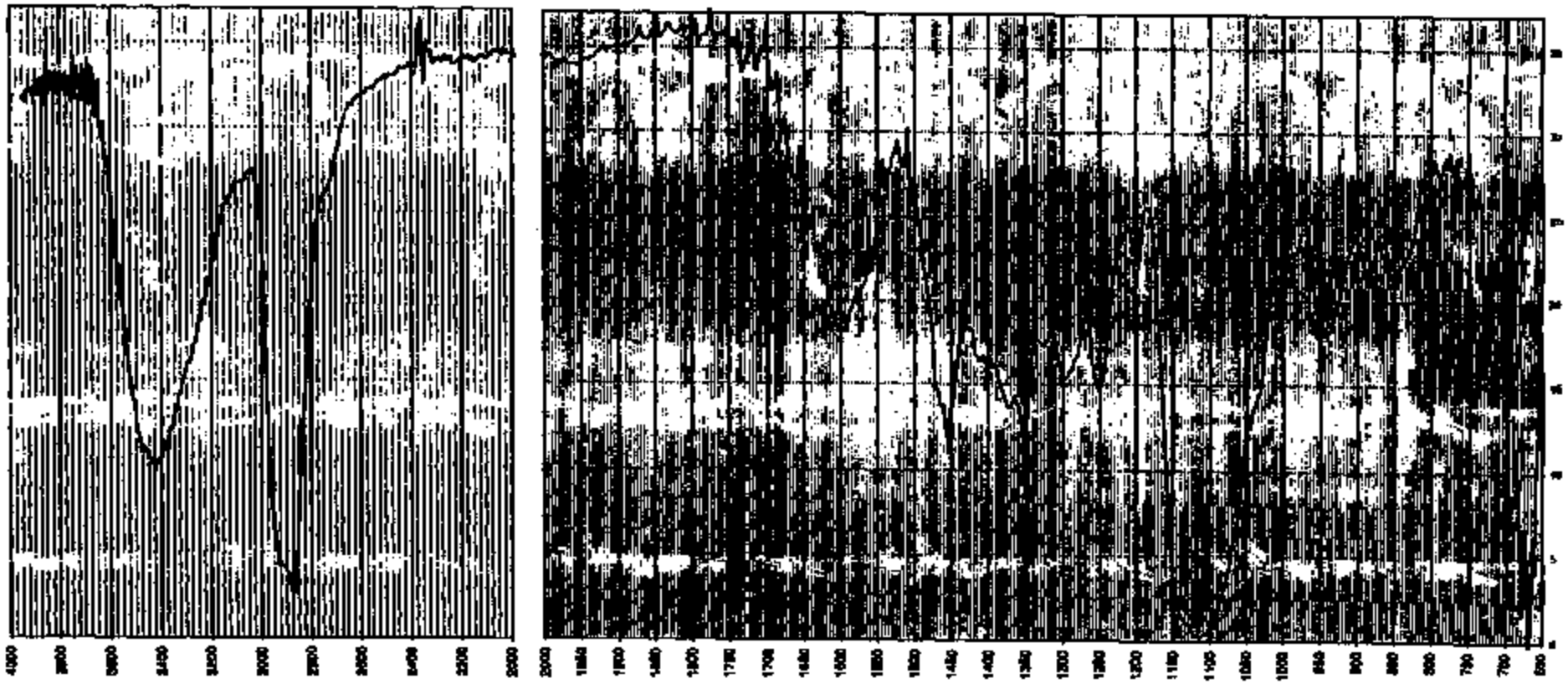
3713 2796

9900226 "D", CONTACT

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE
Interpretation:
m-s + gbm(KF)

Fri Feb 05 14:26:43 1999
Scans: 128 / 256
Resolution: 4.00
Gain: 4 / 4

Engineer: MCH
APOD: Norton-Beer (medium)
Detector: MCT[15]



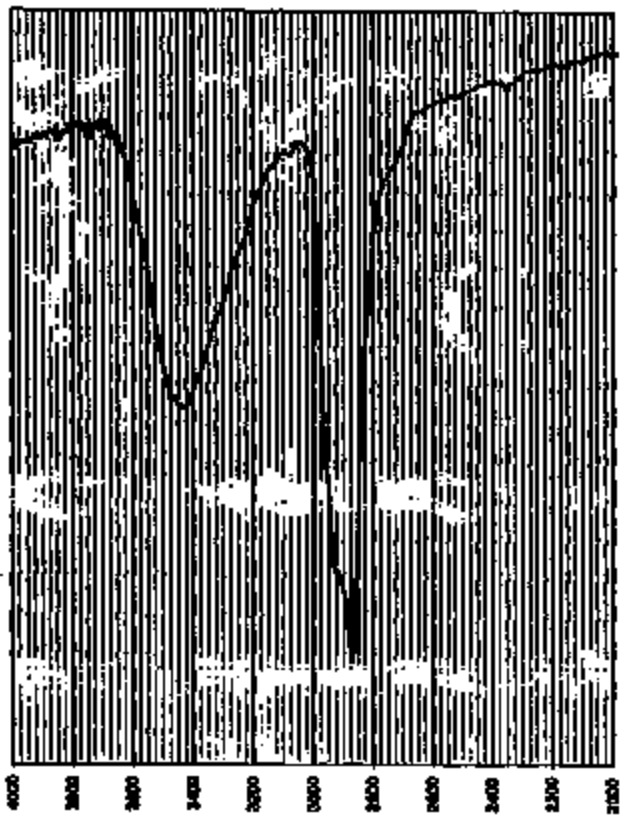
3713 2787

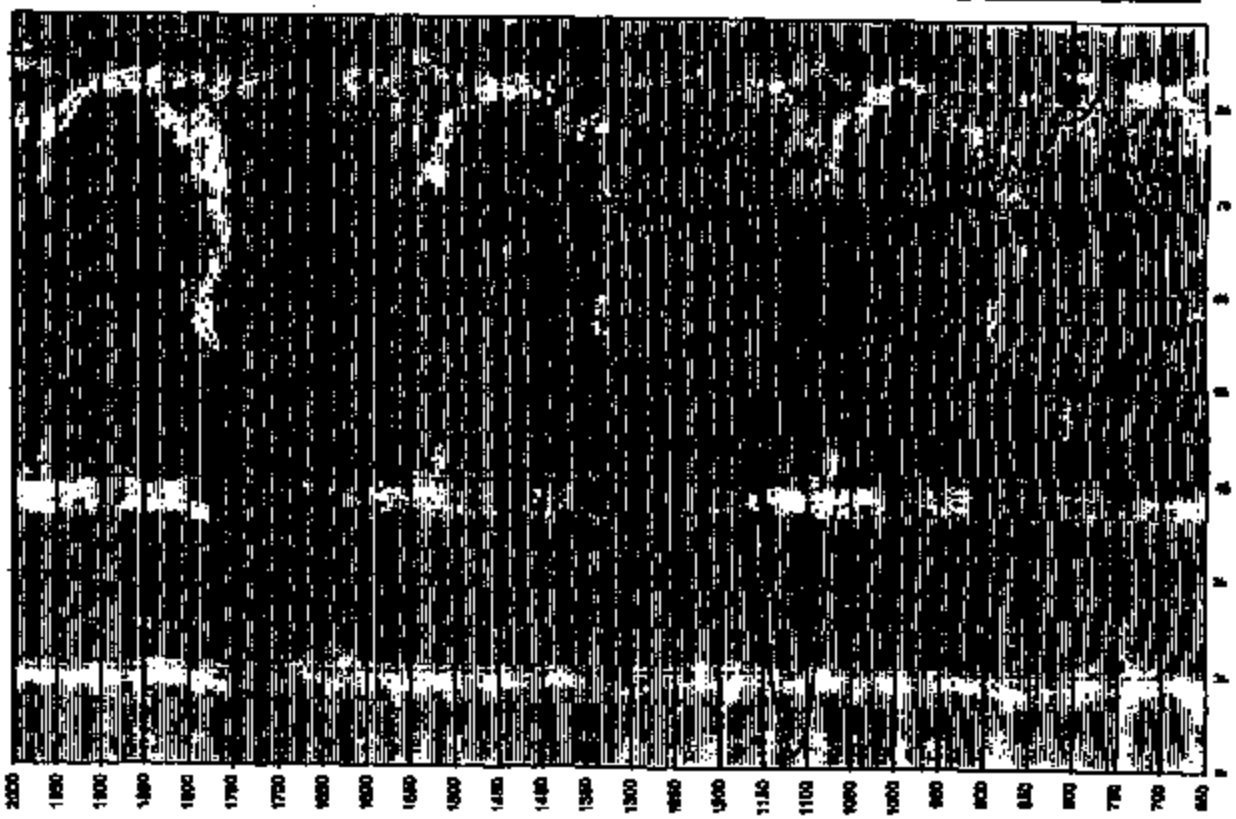
9900226 "D", BASE, CONNECTOR CAVITY

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE
Interpretation: poss. Sbm (w BP)

Fri Feb 05 14:29:48 1999
Scans: 128 / 256
Resolution: 4.00
Gain: 4 / 4

Engineer: MCH
APOD: Norton-Beer (medium)
Detector: MCT[15]
Y Axis: % Transmittance
X Axis: Wavenumber





3713 2788

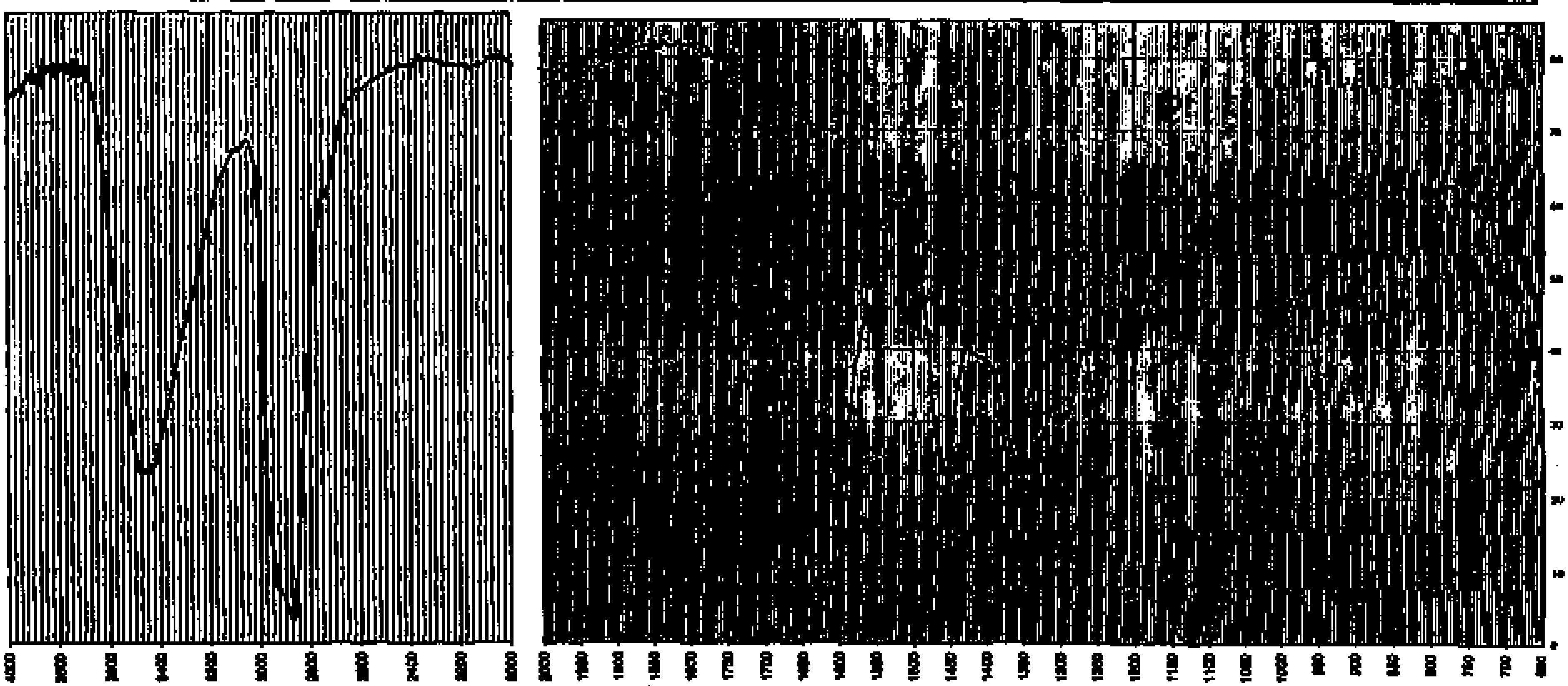
9900226 "F" HEXPORT, FITTING END

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE

Wed Feb 10 09:17:23 1999 Engineer: MCH
Scans: 128 / 256 APOD: Norton-Beer (medium)
Resolution: 4.00 Detector: MCT[15]
Gain: 4 / 4 Y Axis: % Transmittance X Axis: Wavenumber

Engineer: ML
Comm:

Interpretation:



3713 2799

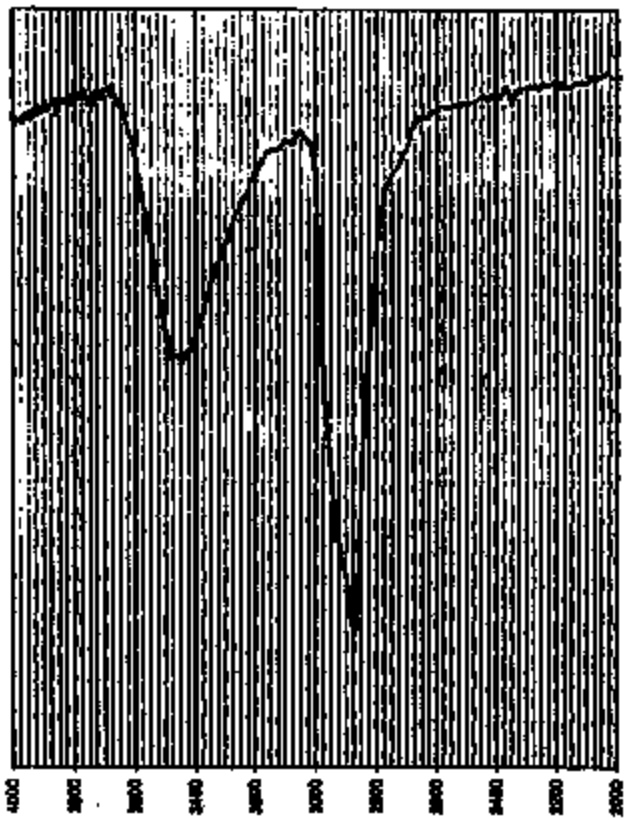
9900226 "F" HEXPORT, CAVITY

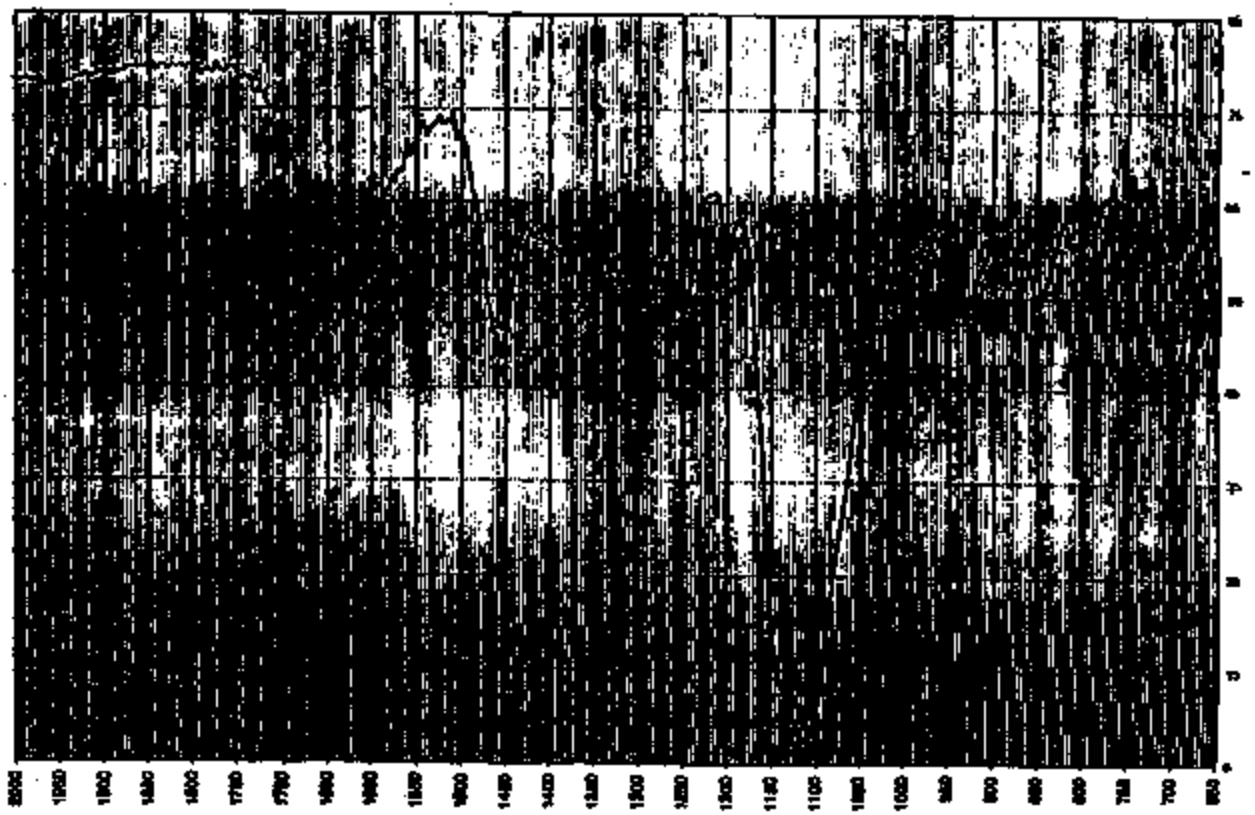
Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE

Wed Feb 10 09:12:20 1999 Engineer: MCH
Scans: 128 / 256 APOD: Norton-Beer (medium)
Resolution: 4.00 Detector: MCT[15]
Gain: 4 / 4 Y Axis: % Transmittance X Axis: Wavenumber

Engineer: MJ
Comm:

Interpretation:





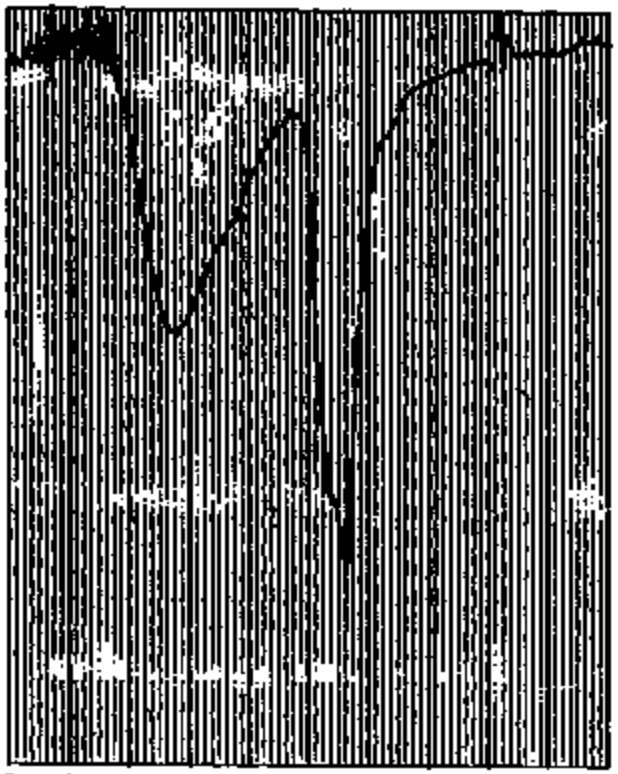
3713 2800

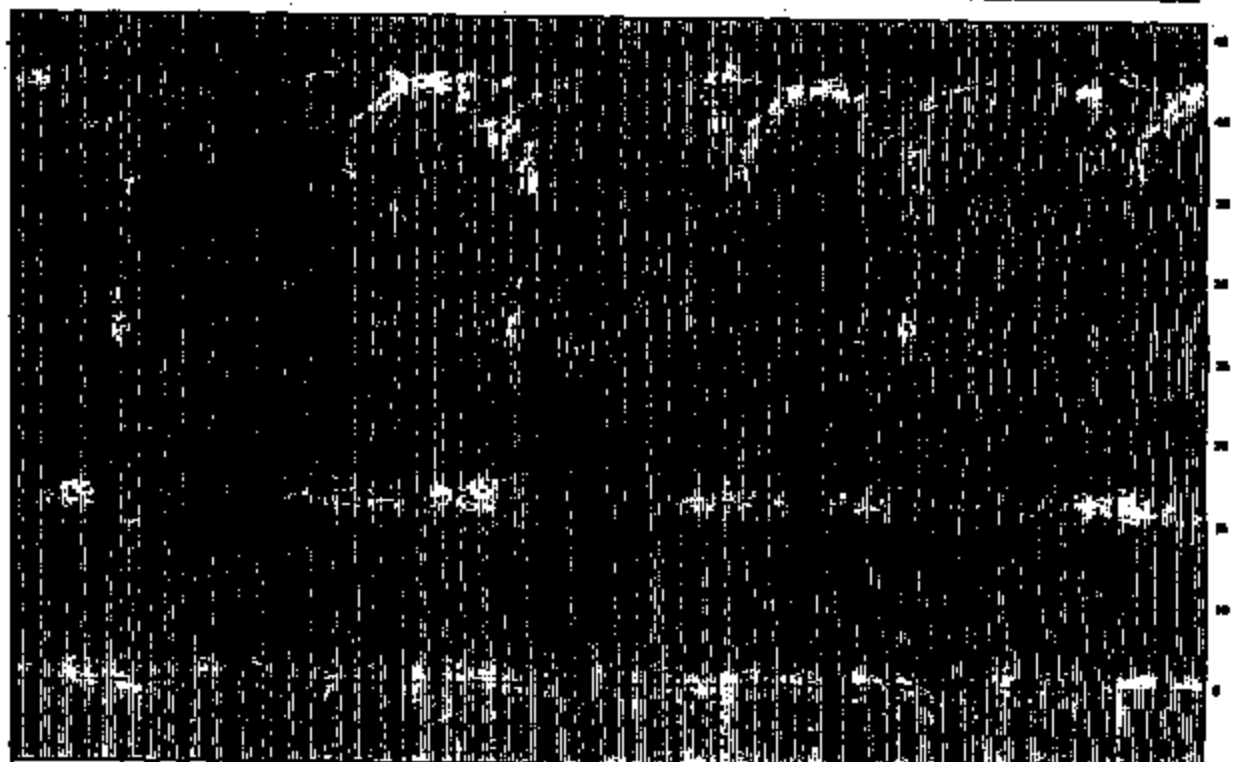
9900226 "F" SEAL 1, FLUID

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE
Interpretation:

Mon Feb 08 13:40:14 1999 Engineer: MCH
Scans: 128 / 256 APOD: Norton-Beer (medium)
Resolution: 4.00 Detector: MCT[15]
Gain: 2R / 2R Y Axis: % Transmittance X Axis: Wavenumber

Engineer: MH
Checker:





3713 2801

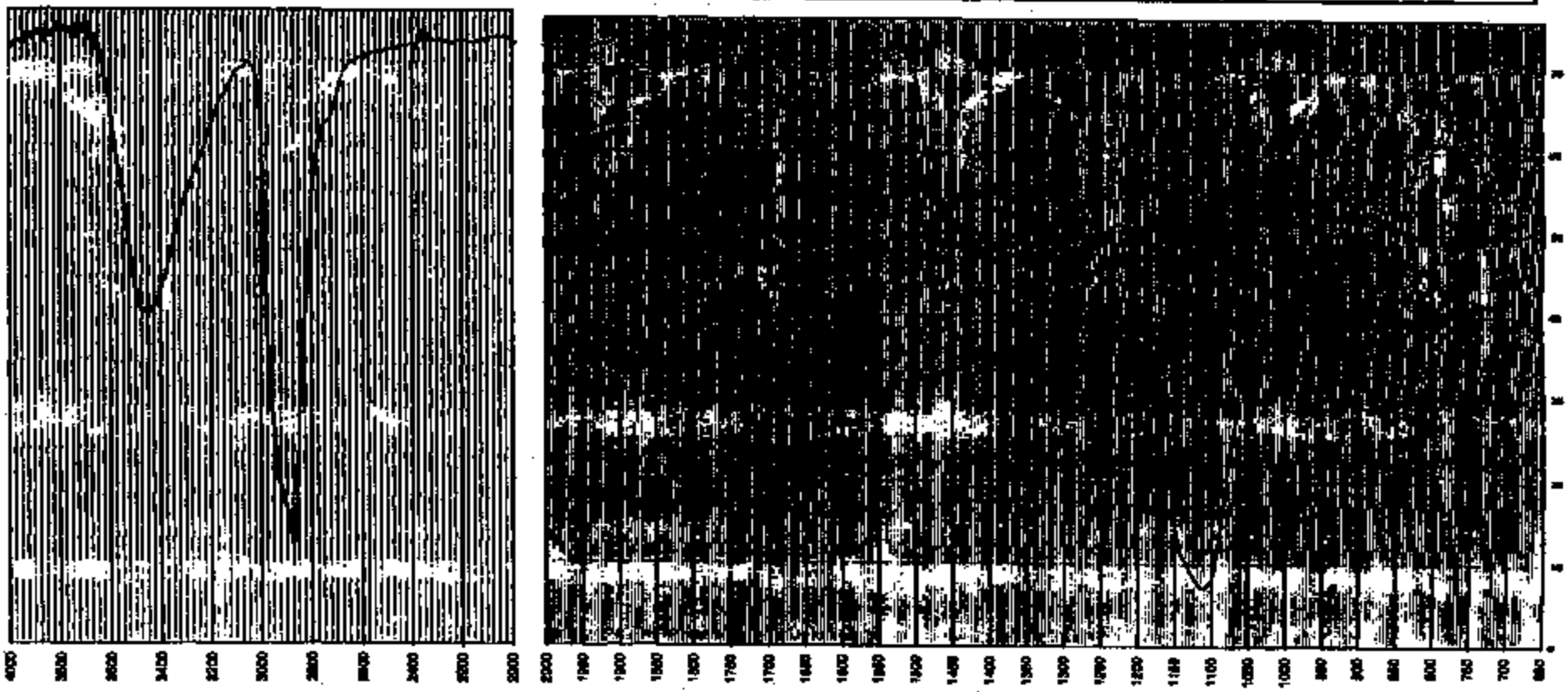
9900226 "F" SEAL 2, FLUID

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE

Mon Feb 08 13:47:00 1999 Engineer: MCH
Scans: 128 / 256 APOD: Norton-Beer (medium)
Resolution: 4.00 Detector: MCT[15]
Gain: 2R / 2R Y Axis: % Transmittance X Axis: Wavenumber

Engineer: MC
Checker:

Interpretation: sim. glyn (yBF)



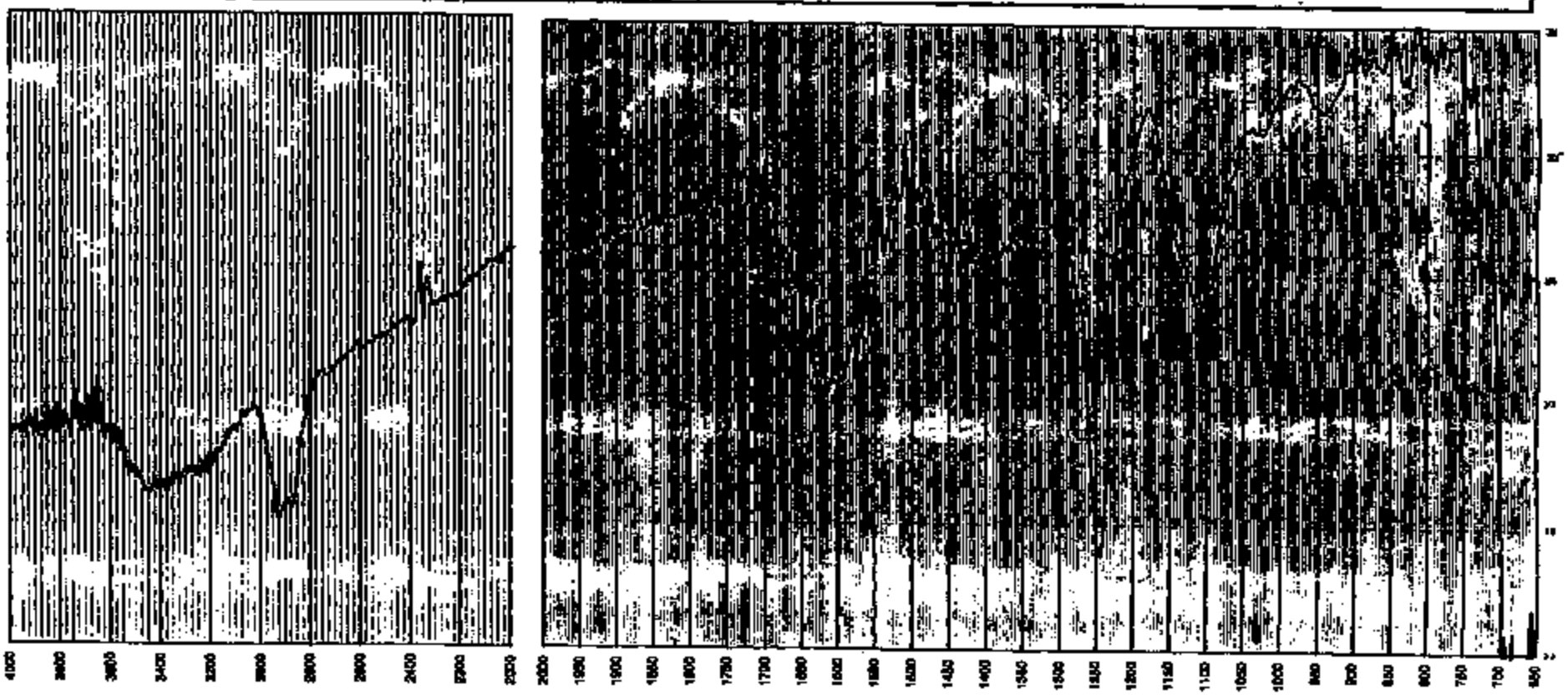
9713 2802

9900226 "F" SEAL 3, RESIDUE

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE
Interpretation:

Mon Feb 08 13:51:50 1999
Scans: 128 / 256
Resolution: 4.00
Gain: 2R / 2R

Engineer: MCH
APOD: Norton-Beer (medium)
Detector: MCT[15]
Y Axis: % Transmittance
X Axis: Wavenumbers



3713 2803

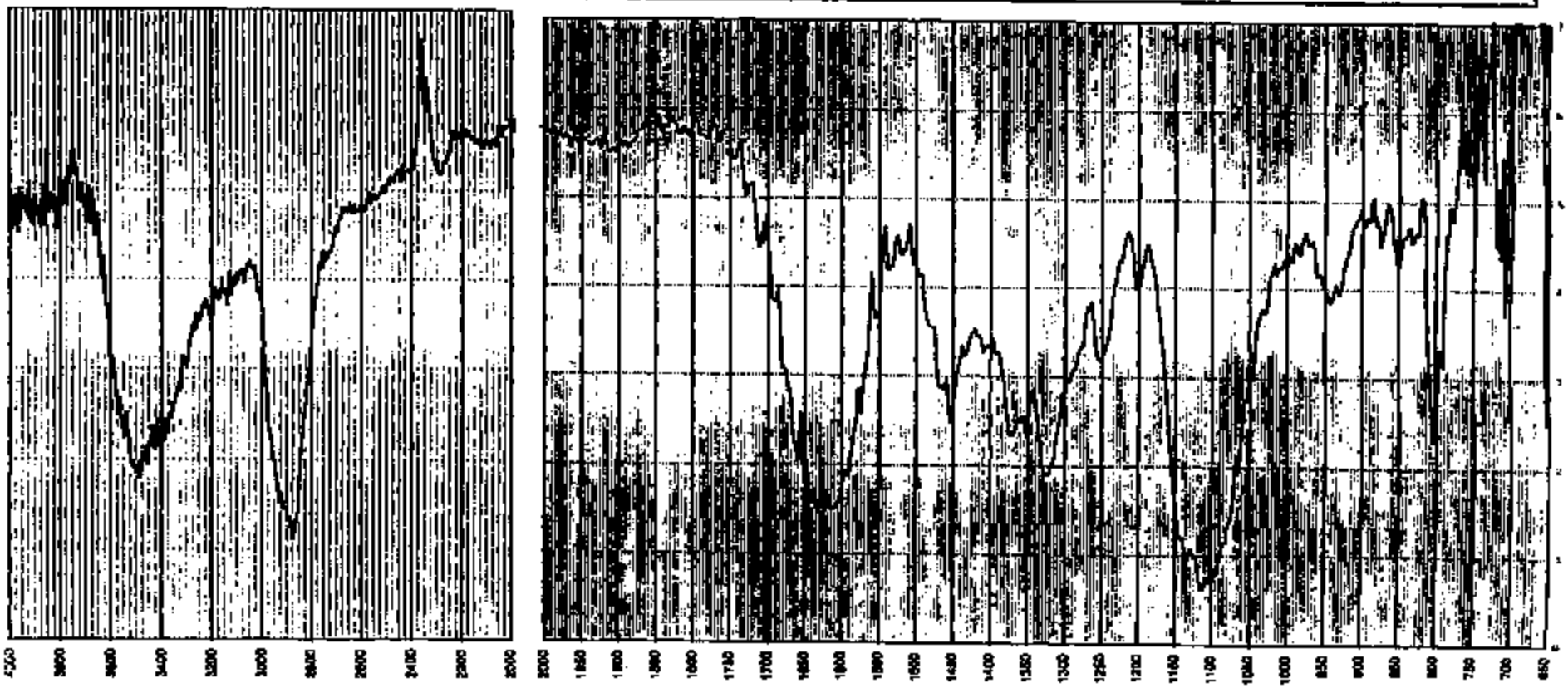
9900226 "F" WASHER

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE

Wed Feb 10 09:39:52 1999 Engineer: MCH
Scans: 128 / 256 APOD: Norton-Beer (medium)
Resolution: 4.00 Detector: MCT[15]
Gain: 4 / 4 Y Axis: % Transmittance X Axis: Wavenumber

Engineer: MH
Consec:

Interpretation: 3bm(pkf) + m-s(p-o)



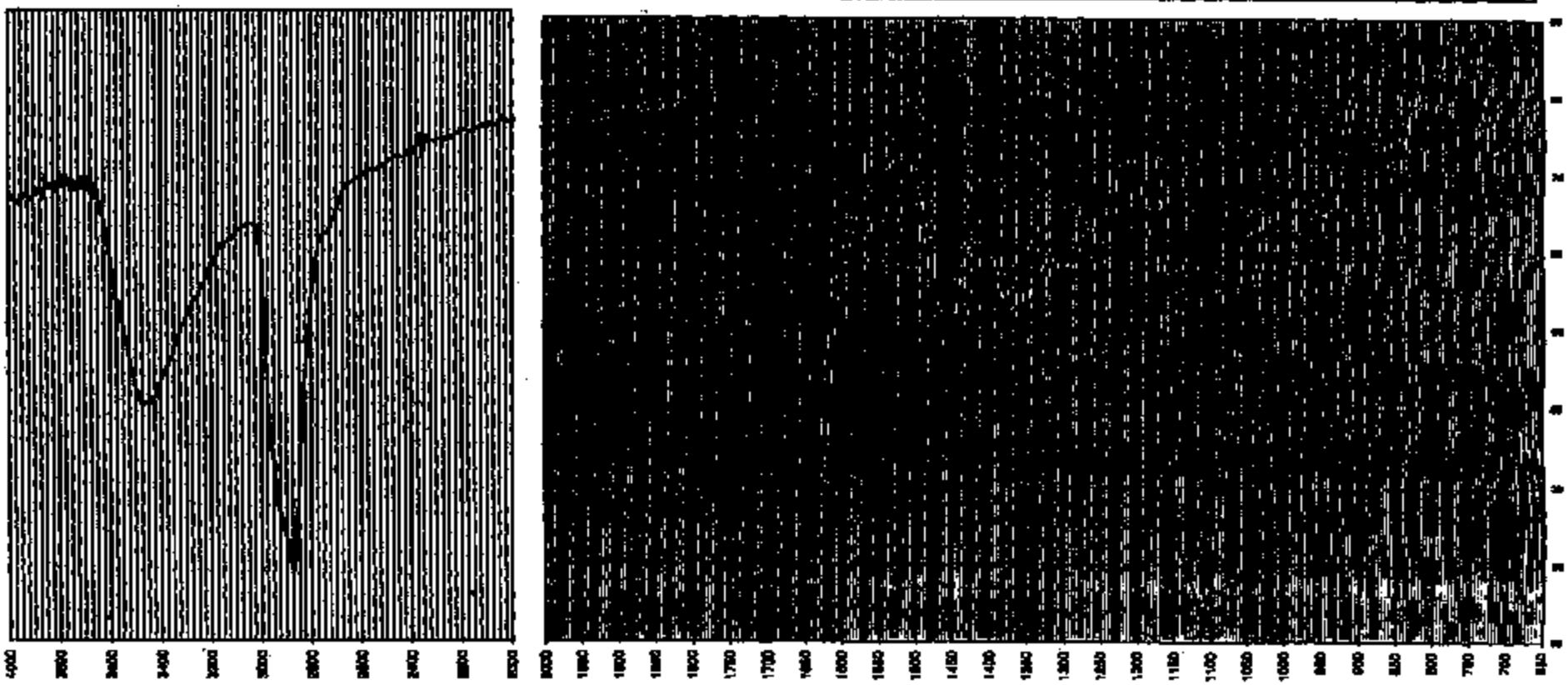
3713 2804

9900226 "F" CONVERTER

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE

Wed Feb 10 09:43:16 1999 Engineer: MCH
Scans: 128 / 256 APOD: Norton-Beer (medium)
Resolution: 4.00 Detector: MCT[15]
Gain: 4 / 4 Y Axis: % Transmittance X Axis: Wavenumber

Engineer: mk
Comm:
Interpretation: ghm(pBF) + ms(p.o)



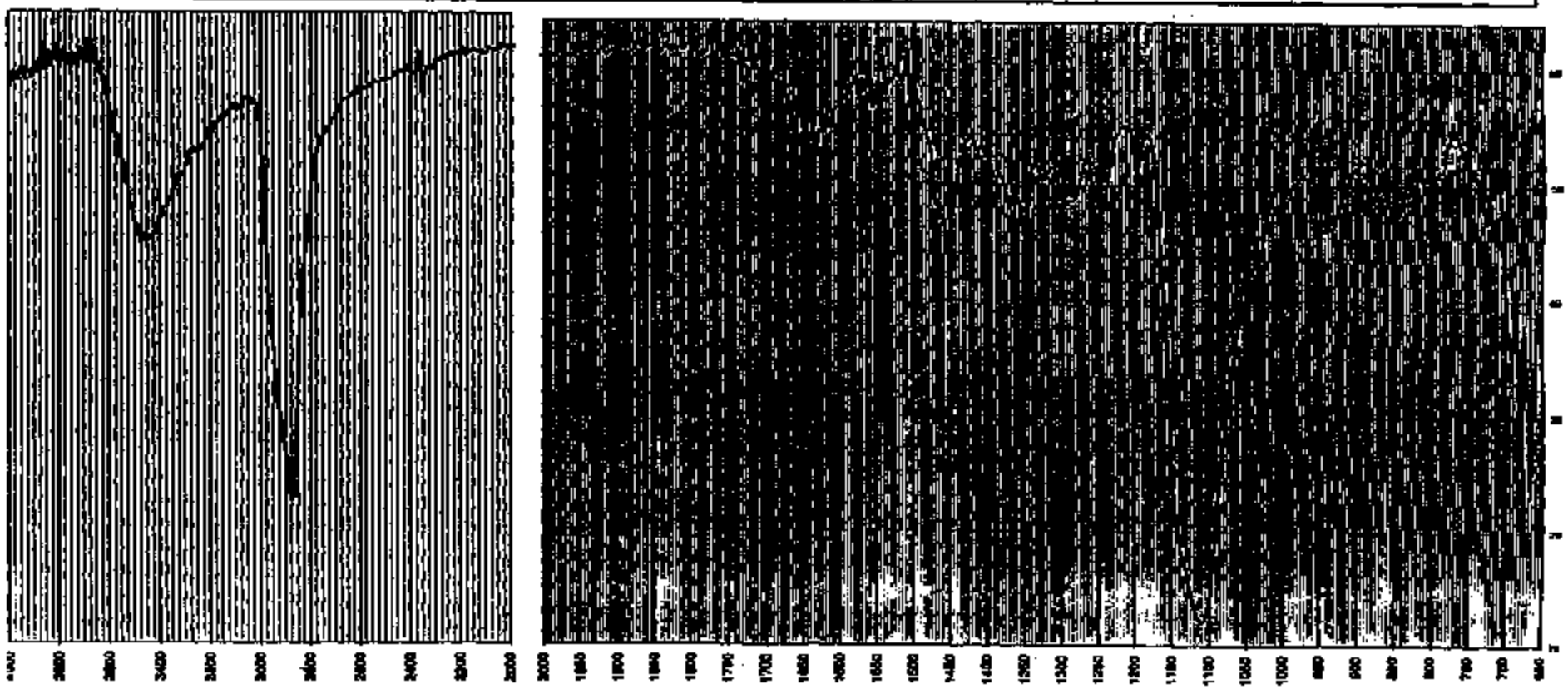
3713 2805

9900226 "F" SPACER

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE
Interpretation: ess sbm(rBF)

Wed Feb 10 09:54:52 1999 Engineer: MCH
Scans: 128 / 256 APOD: Norton-Beer (medium)
Resolution: 4.00 Detector: MCT[15]
Gain: 4 / 4 Y Axis: % Transmittance X Axis: Wavenumber

Engineer: MH
Contact:



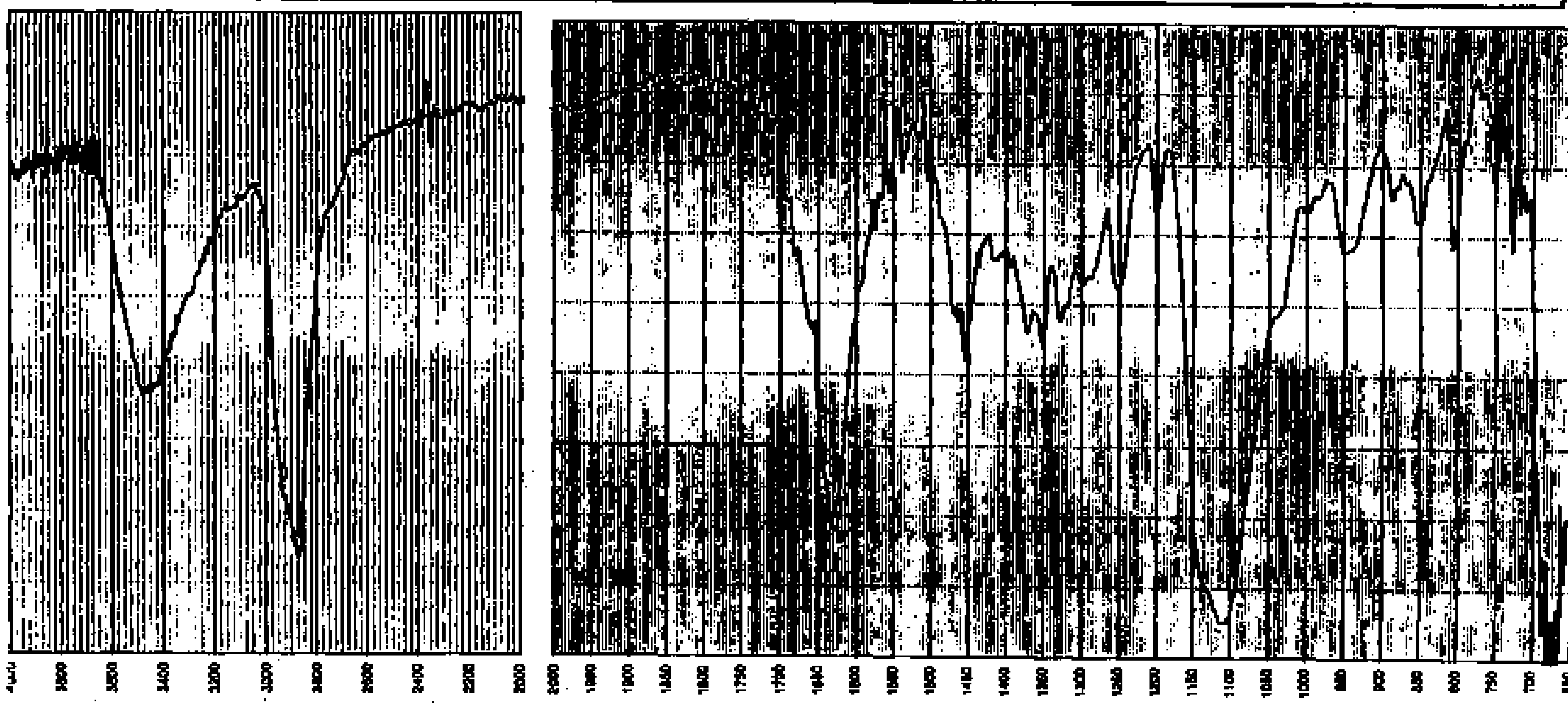
3713 2806

9900226 "F" DISC

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE

Wed Feb 10 09:59:19 1999
Engineer: MCH
Scans: 128 / 256
APOD: Norton-Beer (medium)
Resolution: 4.00
Detector: MCT[15]
Gain: 4 / 4
Y Axis: % Transmittance
X Axis: Wavenumber

Engineer: mjl
Concur:
Interpretation: m.s(pc) + gbm (rBr)



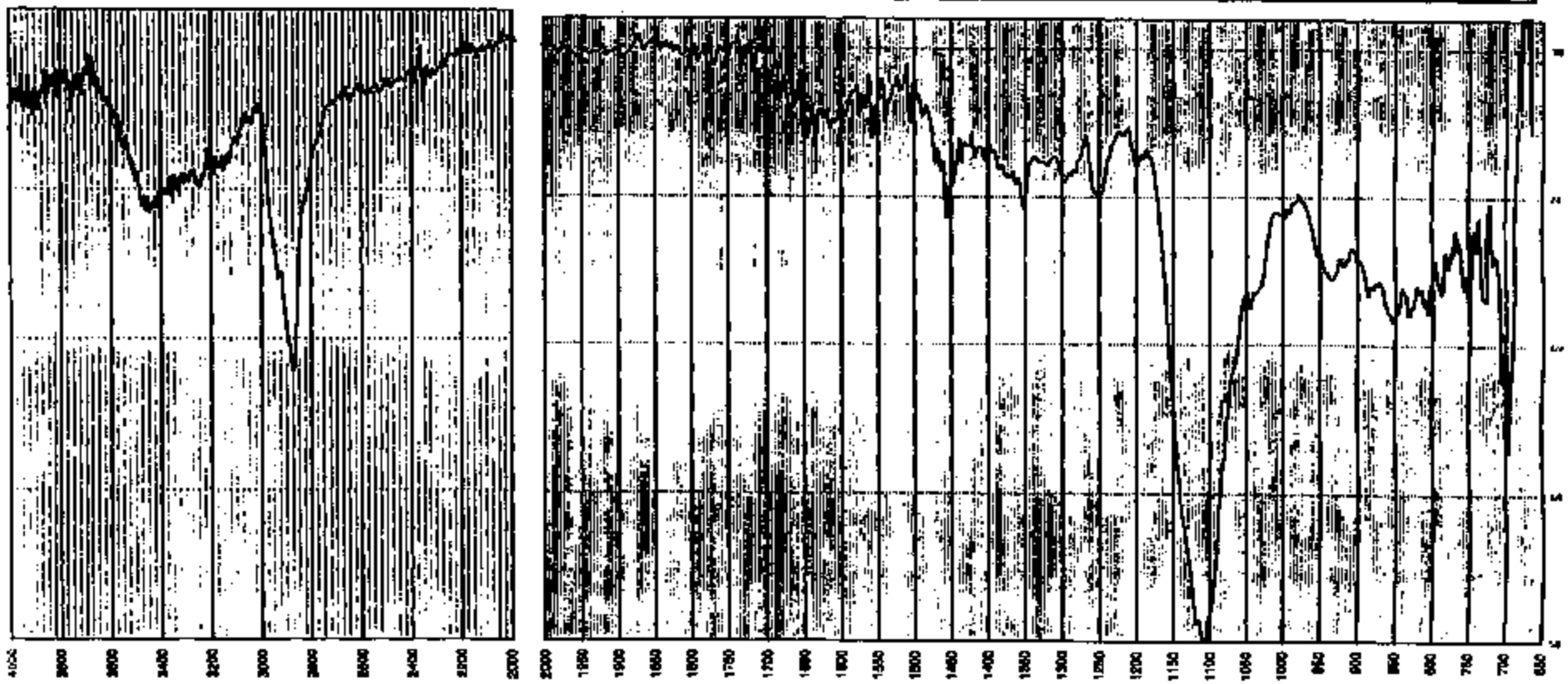
3713 2607

9900226 "F" CUP, INTERIOR

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE
Interpretation: ess shoulder

Wed Feb 10 09:36:45 1999 Engineer: MCH
Scans: 128 / 256 APOD: Norton-Beer (medium)
Resolution: 4.00 Detector: MCT[15]
Gain: 4 / 4 Y Axis: % Transmittance X Axis: Wavenumber

Engineer: MCH
Colour:

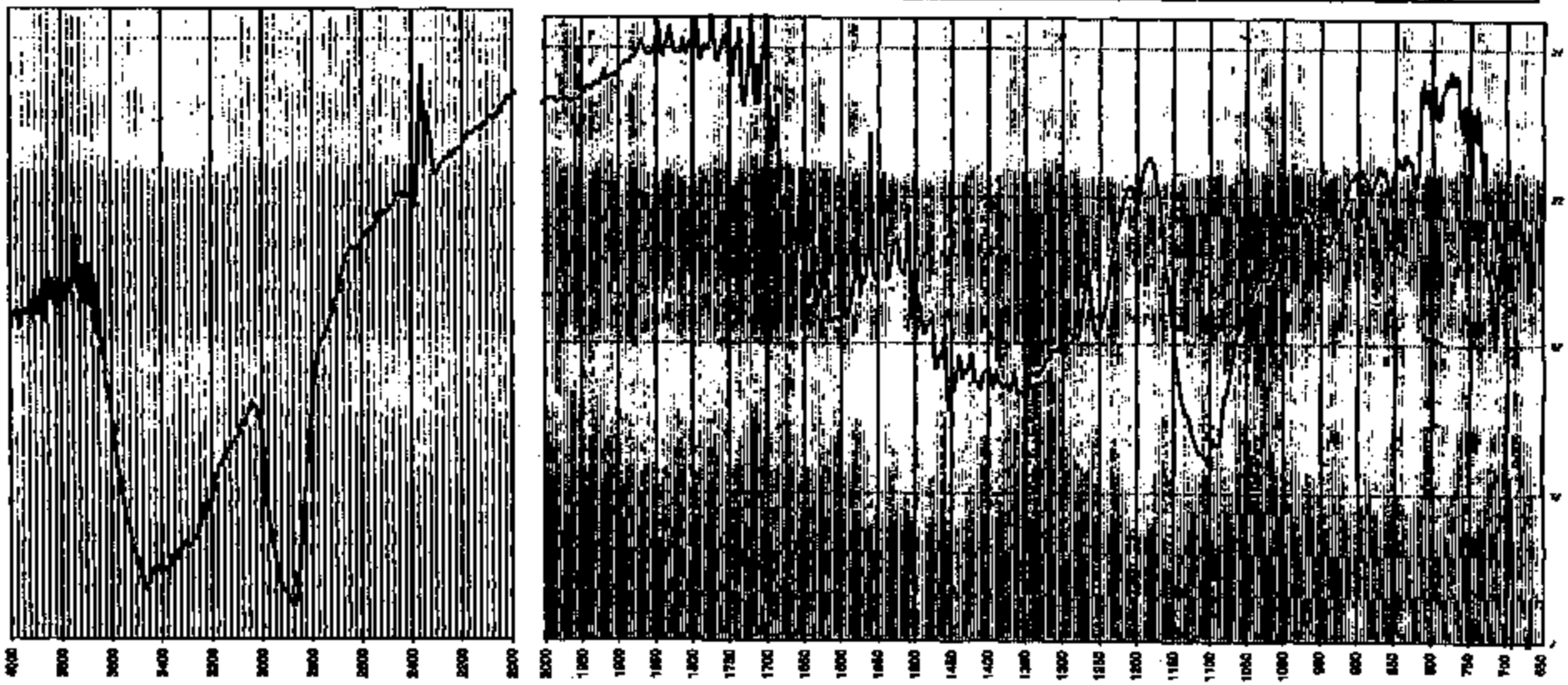


3713 2808

9900226 "F" CUP, SWITCH SIDE, BLACK

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE
Interpretation: ghm - allen

Wed Feb 10 09:20:29 1999 Engineer: MCH
Scans: 128 / 256 APOD: Norton-Beer (medium)
Resolution: 4.00 Detector: MCT[15]
Gain: 4 / 4 Y Axis: % Transmittance X Axis: Wavenumber



3713 2809

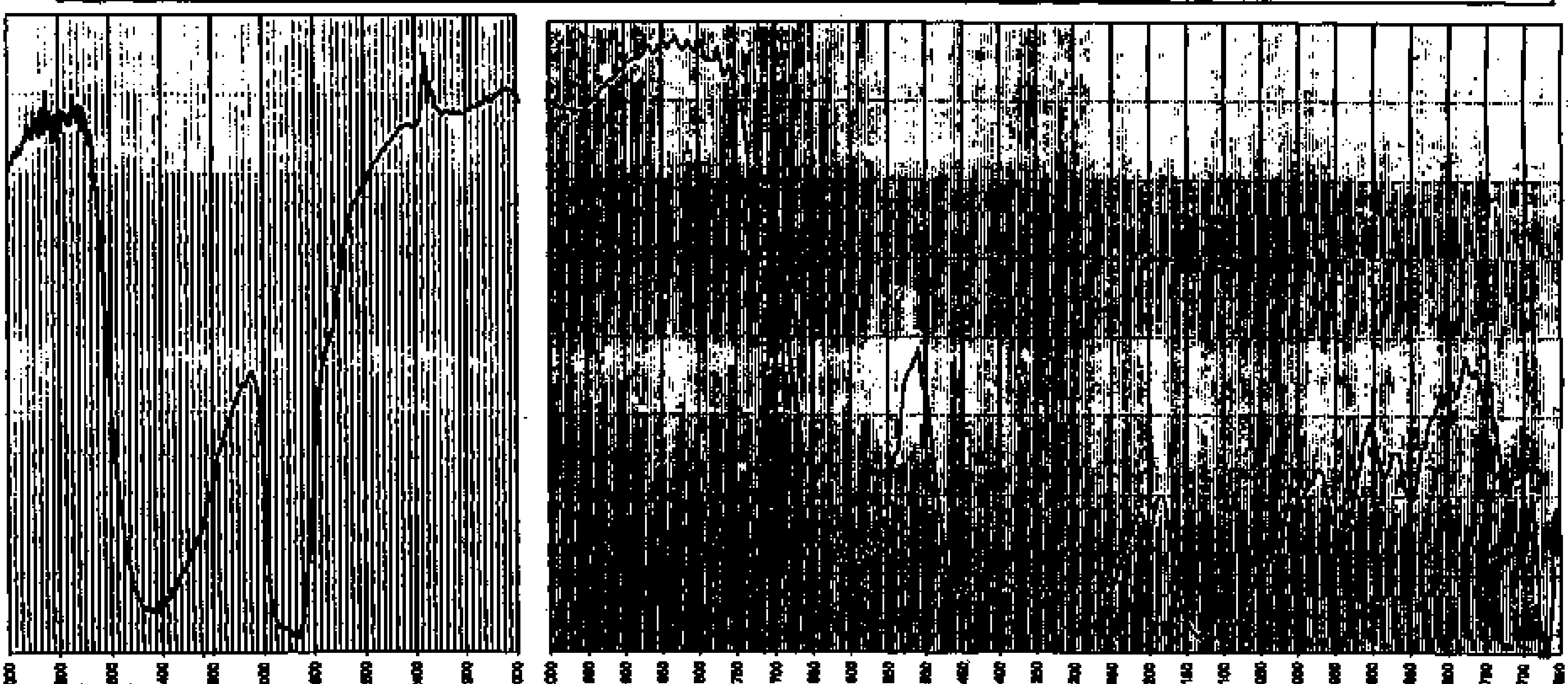
9900226 "F" CONTACT

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE

Wed Feb 10 10:03:24 1999 Engineer: MCH
Scans: 128 / 256 APOD: Norton-Beer (medium)
Resolution: 4.00 Detector: MCT[15]
Gain: 4 / 4
Y Axis: % Transmittance X Axis: Wavenumber

Engineer: [illegible]
Comments:

Interpretation: [illegible]

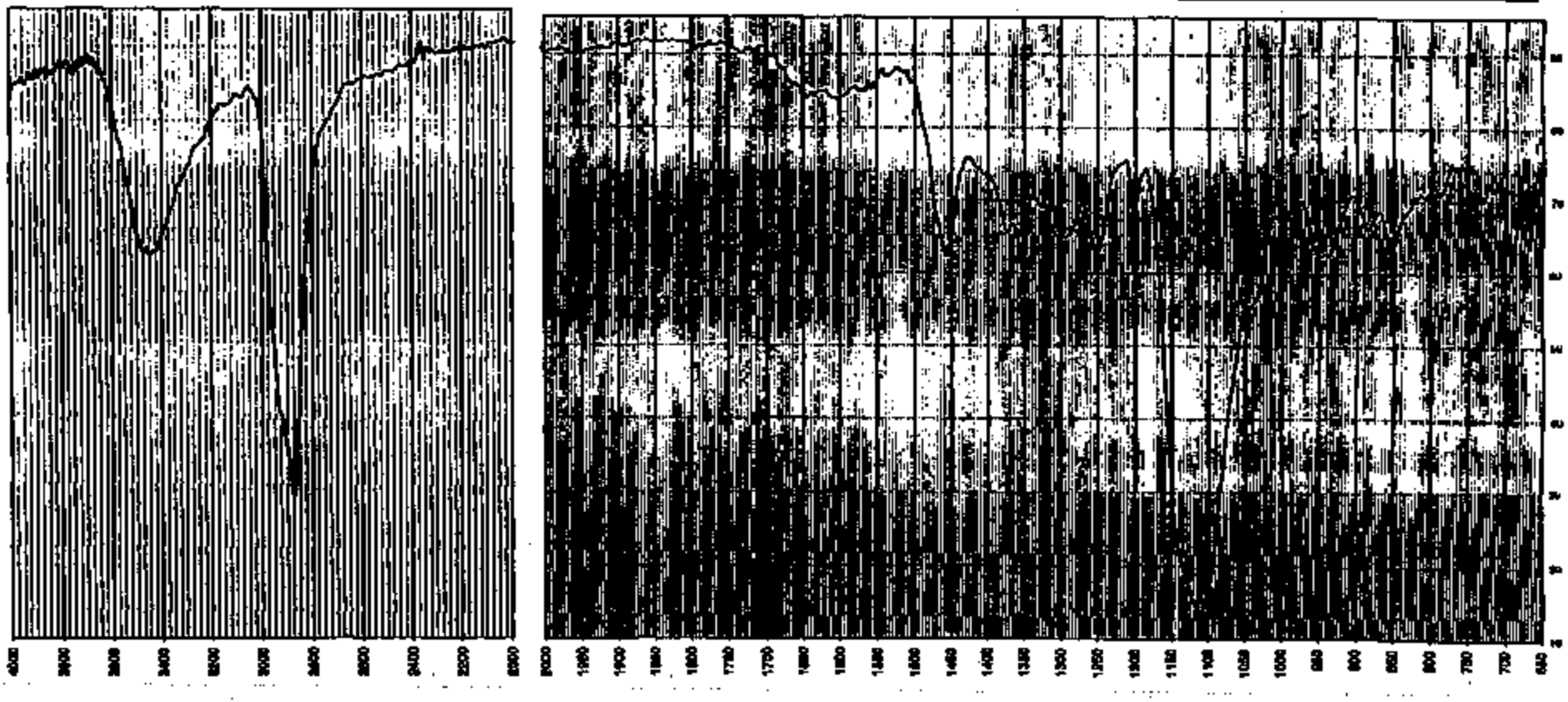


3713 2610

9900226 "F" BASE, CONNECTER CAVITY

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE
Interpretation: csh sbm (pBF)

Wed Feb 10 10:06:19 1999 Engineer: MCH
Scans: 128 / 256 APOD: Norton-Beer (medium)
Resolution: 4.00 Detector: MCT[15]
Gain: 4 / 4 Y Axis: % Transmittance X Axis: Wavenumber



3713 2811

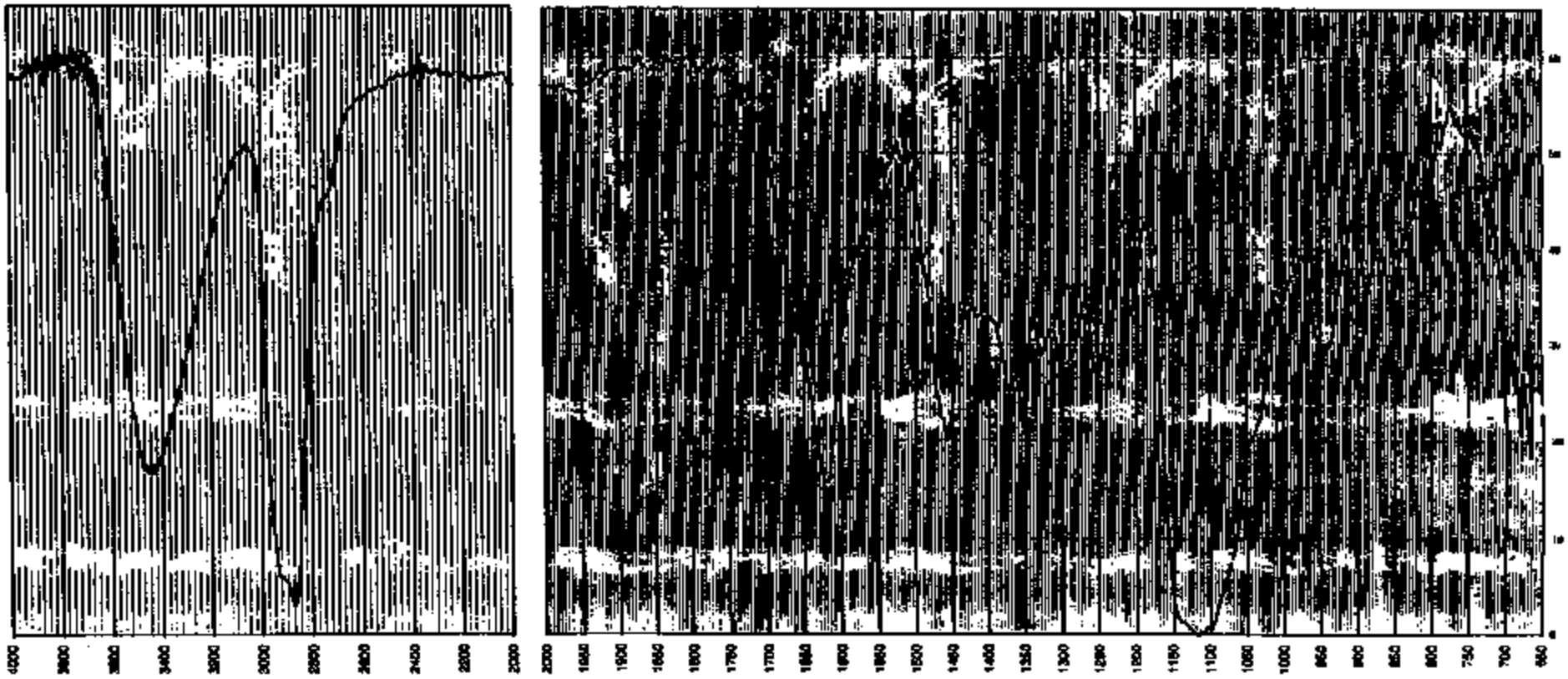
9900220 IR REAPORT, FITTING END

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE

Fri Feb 05 15:11:26 1999
Scans: 128 / 256
Resolution: 4.00
Gain: 4 / 4

Engineer: MCH
APOD: Norton-Beer (medium)
Detector: MCT[15]
Y Axis: % Transmittance X Axis: Wavenumbers

Engineer: MJ
Comm:
Interpretation: m.s(ao)-v sb m (pht)



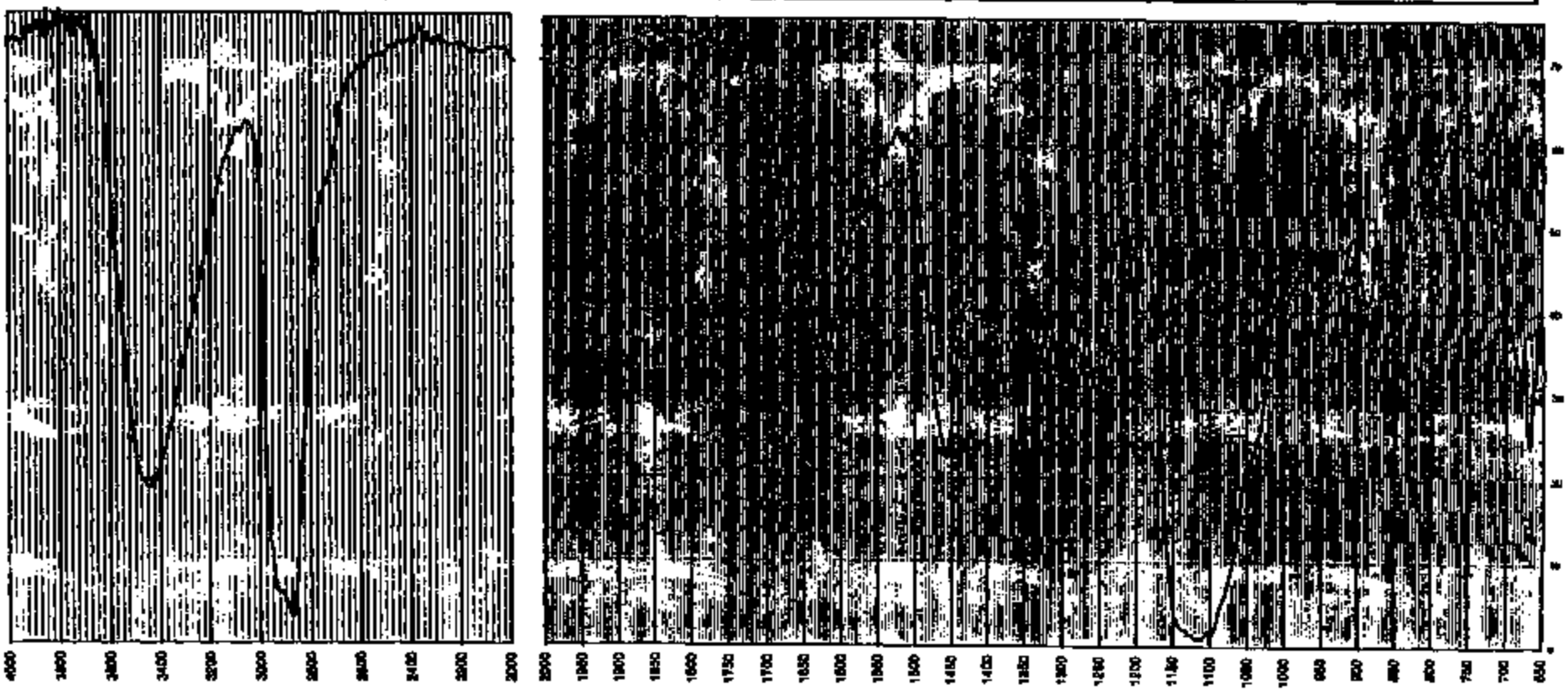
3713 2812

9900226 11 HEXPORT, CAVITY

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE
Interpretation: glass (PBR) + gas (...)

Fri Feb 06 15:06:54 1999
Scans: 128 / 256
Resolution: 4.00
Gain: 4 / 4

Engineer: MCH
APOD: Norton-Beer (medium)
Detector: MCT[15]
Y Axis: % Transmittance
X Axis: Wavenumber



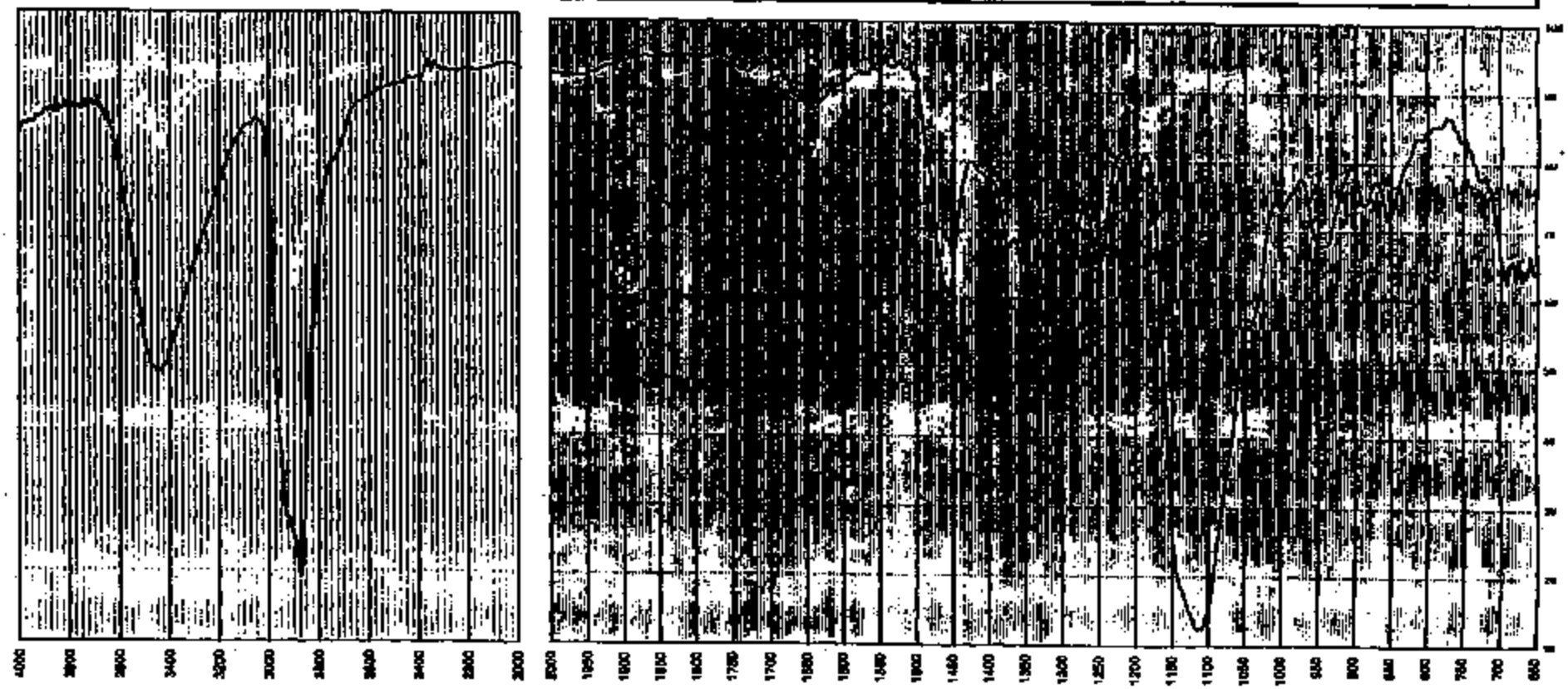
3713 2813

9900226 11 SEAL 1, FLUID

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE
Interpretation:

Mon Feb 08 10:12:17 1999
Scans: 128 / 256
Resolution: 4.00
Gain: 2R / 2R

Engineer: MCH
APOD: Norton-Beer (medium)
Detector: MCT[15]



3713 2814

9900226 11 SEAL 2, FLUID

Specification:

Supplier:

Preparation method: AS RECEIVED

IR Technique: MICROSCOPE

Mon Feb 08 13:23:05 1999 Engineer: MCH

Scans: 128 / 256 APOD: Norton-Beer (medium)

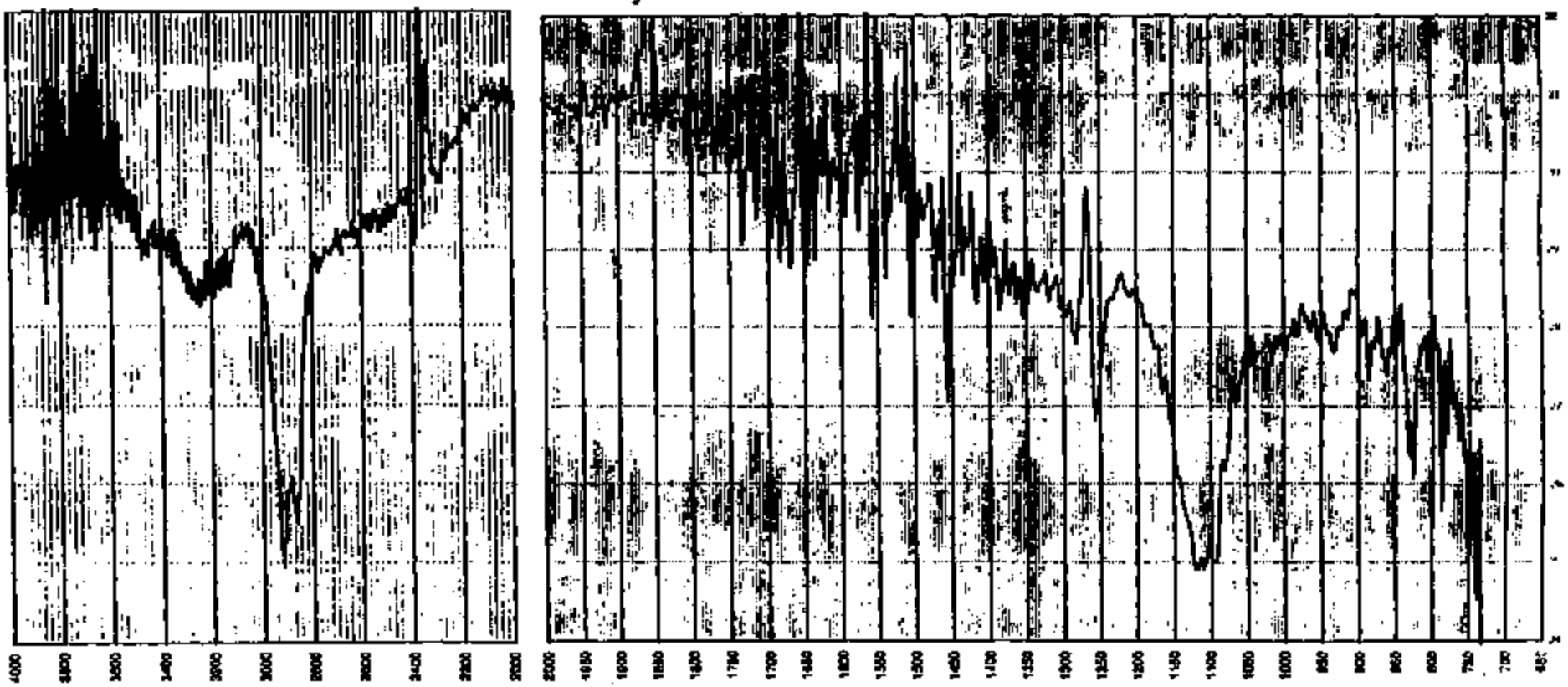
Resolution: 4.00 Detector: MCT[15]

Gain: 2R / 2R Y Axis: % Transmittance X Axis: Wavenumber

Engineer: wsl

Comm:

Interpretation: glass + silicone

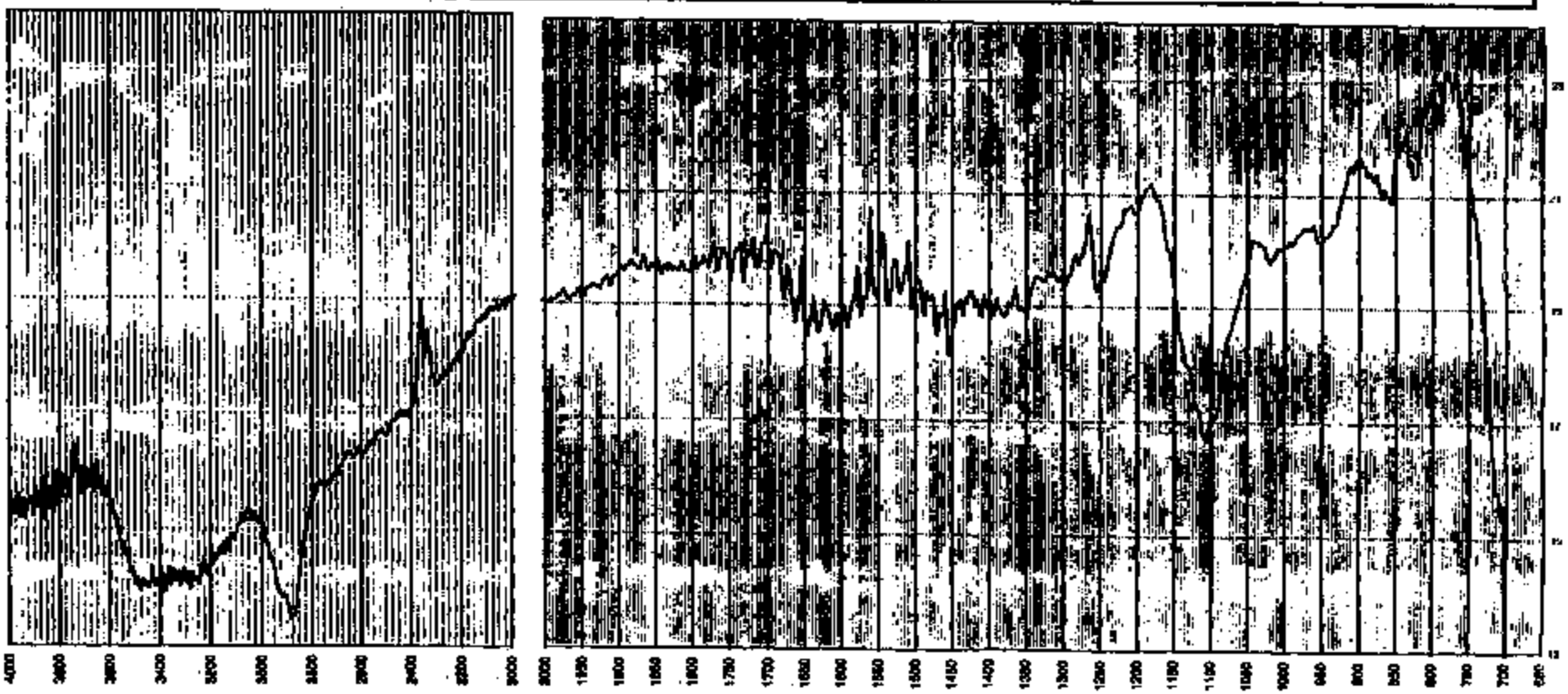


3713 2815

9900226 11 SEAL 3, FLUID

Specification:
Supplier:
Preparation method: AS RECEIVED
IR Technique: MICROSCOPE
Interpretation: ohm + hastelloy silicide

Mon Feb 08 13:26:49 1999 Engineer: MCH
Scans: 128 / 256 APOD: Norton-Beer (medium)
Resolution: 4.00 Detector: MCT[15]
Gain: 2R / 2R Y Axis: % Transmittance X Axis: Wavenumber



3713 2816

Project No. 9900226
Book No. 2765 TITLE SPEED CONTROL CUT OFF SWITCH

From Page No.

BY G. STEVENS LEAD COORDINATOR: S. LAROUCHE

RECEIVED: 3 SAMPLES (3 PIECES EACH) OF KAPTON STRIPS (D.E.F. # 11 - PREMATURE MODE) WERE RECEIVED ON 1/26/99.

REQUESTED: DETERMINE EXTENT/CAUSE OF DAMAGE OF THE KAPTON STRIPS.

CONCLUSION: DAMAGE IS CONSISTENT W/ CLS# 98-0105.

SEE REPORT FOR DETAILS

To Page No.

Witnessed & Understood by me.	Date	Invented by	Date
		[illegible]	4/1/99

Project No. 990026
Book No. 2765 TITLE SPEED CONTROL CUT OFF SWITCH

From Page No.

ADDITIONAL SAMPLES

SAMPLE C HEX PORT - PARTIALLY BURNED & CHARRED KAPTON LAYERS

#5 KAPTON LAYERS 1-3

#6 KAPTON LAYERS 1-3

SHEAR FRACTURE IN THE TOP TEFLON LAYERS OF #5-1 & #6-1 WERE FOUND

SAMPLE C TEFLON LAYERS WERE MELTED NO INFORMATION WAS OBTAINED FROM EXAMINATION OF THE KAPTON LAYERS.

To Page No.

Witnessed & Understood by me.	Date	Invented by	Date
		Recorded by Vladimir L. Botha	9/7/99

3713 2818

Central Laboratory
15000 Century Drive
Dearborn, MI 48120-1267
FAX (313) 322-1614

Report 9900226

February 10, 1999

To:	G. Stevens	(313) 32-36686	39-07224 FAX
From:	V. Beltran	(313) 39-05018	

Subject: Speed Control Cut Off Switch
Part Number: F2VY-9F924-A
Specification: Not Provided
Supplier: Texas Instruments

Received: 3 samples (3 specimens each) of Kapton Strips identified as D, F, and 11 (pre-failure mode) were received on January 26, 1999.

Object: Determine the extent/cause of the damage of the Kapton strips.

Conclusion: The damage visible on the strips is consistent with the damage seen in CLS#960105. Fractured strip material and torn Teflon layers provide a potential leak path. Cracking is present in the strips of the pre-failure mode samples.

Data and Analysis:

Reflected Light Microscopy

Tears were found on the Teflon layers of each strip (Figure 1) of the failed samples. The Teflon was pealed away to reveal the presence of brittle fractures (Figure 2. See also Reference CLS#9604105). When stacked in the proper orientation, the deformed areas of the fractures of each strip fit together. The alignment of fractures in the strips provides a possible leak path.

Figure 1.
Typical Example of Torn Teflon Layer

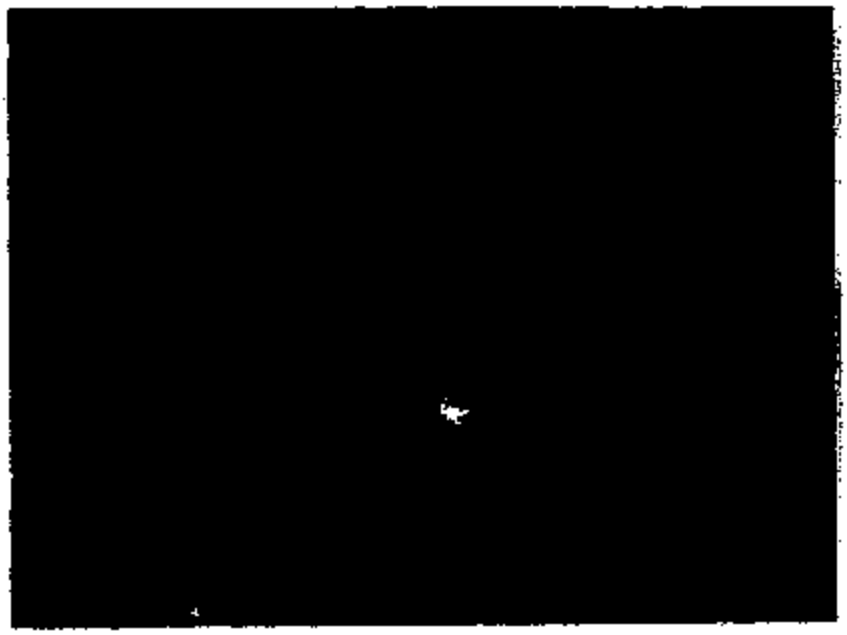


Figure 2.
Typical Example of Damaged Kapton Material.

Reflected Light Microscopy continued

Microscopic examination of the pre-failure mode sample (#11) reveals the presence of fractures in the early stage of development (Figure 3). It has not been determined if these cracks completely penetrate the Kapton material. No signs of tearing in the Teflon layer surrounding these cracks could be found. This may indicate that the Kapton material in this sample may have been brittle at the time of deformation and fractured. The deformation may not have been sufficient to tear the Teflon layer.

Figure 3.
Possible Early Stage of Fracture Formation in Pre-Failure Mode Sample

By: _____
Vladimir S. Beltran (VBELTRA1)
Laboratory Engineer

Central Laboratory
15000 Century Drive
Dearborn, MI 48120-1267
FAX (313) 322-1614

Report 9900226

February 3, 1999

To: G. Stevens (313) 32-36659 (313) 39-07224 FAX

From: P. J. Nalos (313) 33-75359

Subject: Speed Control Cutoff Switch
Part Number: F2VY-9F924-A
Specification: Not Provided
Supplier: Texas Instruments

Received: Ten pieces of filter paper, containing particles scraped from component parts, were received on January 28, 1999. They were identified as A, B, and C (Cup and Port samples), and D and F (Cup and Contact samples).

Object: Perform EDS analysis on each sample.

Conclusion: There was transfer of copper-zinc material from the contact to the cup region on each part.

Data and Analysis:

Surface Analysis
(Scanning Electron Microscopy (SEM), and Energy Dispersive X-ray Spectroscopy (EDS))

Particles from each piece of filter paper were placed on a carbon stud for examination in a scanning electron microscope (SEM) using Energy Dispersive X-ray Spectroscopy (EDS). The D and F samples were wet, so a portion of each was rinsed in freon and re-filtered before particles were placed on a carbon stud. Four particles/groups of particles from each sample were examined. Although there was some variation in the analyzed samples, typical EDS spectra are given in Figures 1 - 10. The following elements were detected in these spectra, in decreasing order of elemental concentration.

A Cup	B Cup	C Cup	D Cup	F Cup
Zinc	Copper	Zinc	Zinc	Copper
Copper	Zinc	Iron	Copper	Zinc
Aluminum	Phosphorus	Copper	Potassium	Potassium
Iron	Iron	Chromium	Iron	Sulfur
Silicon	Silicon	Silicon	Silicon	Iron
Calcium	Sulfur	Calcium	Sulfur	
Sulfur	Potassium	Sulfur		
Potassium	Calcium			

A Port	B Port	C Port	D Contact	F Contact
Iron	Silicon	Iron	Copper	Copper
Copper	Calcium	Copper	Silver	Zinc
Aluminum	Phosphorus	Zinc	Zinc	Silver
Potassium	Aluminum	Sulfur	Iron	Potassium
	Copper	Aluminum	Silicon	Iron
	Zinc	Silicon		Sulfur
	Iron			
	Titanium			
	Chlorine			

Surface Analysis (continued)

There are several particles in the A, B, and C cup samples that are iron-rich. These are from the steel base material. A typical EDS spectrum is shown in Figure 11 for these particles.

The number of copper-zinc particles in the cup indicate material transfer from the contact to the cup. The S port sample was composed primarily of fibers.

By: _____
Patrick J. Nalice (PNAILOS)
Laboratory Specialist

Enclosures: Figures 1 - 11
PJN/pjn

Central Laboratory
15000 Century Drive
Dearborn, MI 48120-1267
FAX (313) 322-1614

Report 9900226

February 10, 1999

To: G. Stevens (313) 32-36686 39-07224 FAX

From: V. Beltran (313) 39-05016

Subject: Speed Control Cut Off Switch
Part Number: F2VY-9F924-A
Specification: Not Provided
Supplier: Texas Instruments

Received: 3 samples (3 specimens each) of Kapton Strips identified as D, F, and 11 (pre-failure mode) were received on January 26, 1999.

Object: Determine the extent/cause of the damage of the Kapton strips.

Conclusion: The damage visible on the strips is consistent with the damage seen in CLS#980105. Fractured strip material and torn Teflon layers provide a potential leak path. Cracking is present in the strips of the pre-failure mode samples.

Data and Analysis:

Reflected Light Microscopy

Tears were found on the Teflon layers of each strip (Figure 1) of the failed samples. The Teflon was peeled away to reveal the presence of brittle fractures (Figure 2. See also Reference CLS#9804105). When stacked in the proper orientation, the deformed areas of the fractures of each strip fit together. The alignment of fractures in the strips provides a possible leak path.

Figure 1.
Typical Example of Torn Teflon Layer

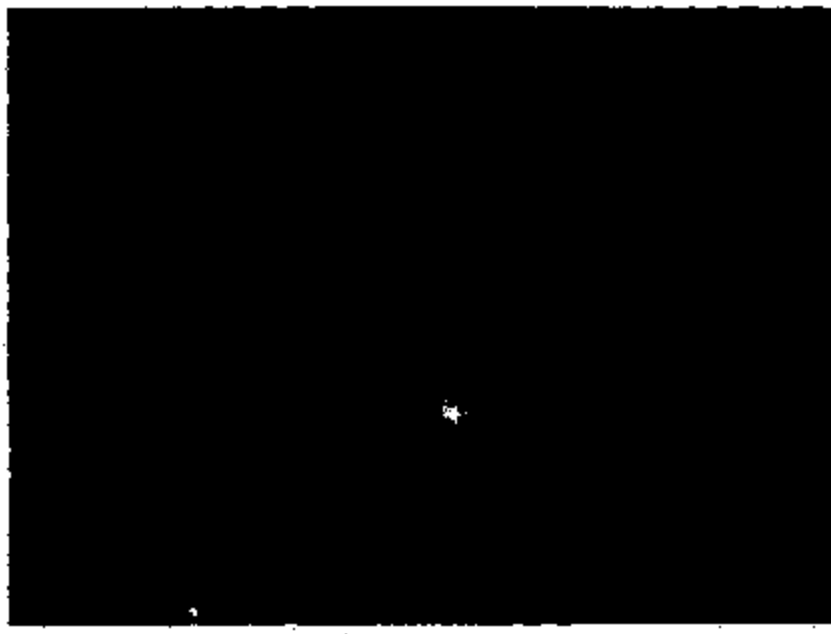


Figure 2.
Typical Example of Damaged Kapton Material

Reflected Light Microscopy continued

Microscopic examination of the pre-failure mode sample (#11) reveals the presence of fractures in the early stage of development (Figure 3). It has not been determined if these cracks completely penetrate the Kapton material. No signs of tearing in the Teflon layer surrounding these cracks could be found. This may indicate that the Kapton material in this sample may have been brittle at the time of deformation and fractured. The deformation may not have been sufficient to tear the Teflon layer.

Figure 3.
Possible Early Stage of Fracture Formation in Pre-Failure Mode Sample

By: Vladimir S. Beltran

Vladimir S. Beltran (VBELTRA1)
Laboratory Engineer

Central Laboratory
15000 Century Drive
Dearborn, MI 48120-1267
FAX (313) 322-1614

Report 9900228

February 3, 1999

To: G. Stevens (313) 32-38686 (313) 39-07224 FAX

From: P. J. Nalloa (313) 33-75358

Subject: Speed Control Cutoff Switch
Part Number: F2VY-9F924-A
Specification: Not Provided
Supplier: Texas Instruments

Received: Ten pieces of filter paper, containing particles scraped from component parts, were received on January 26, 1999. They were identified as A, B, and C (Cup and Port samples), and D and F (Cup and Contact samples).

Object: Perform EDS analysis on each sample.

Conclusion: There was transfer of copper-zinc material from the contact to the cup region on each part.

Data and Analysis:

Surface Analysis
(Scanning Electron Microscopy (SEM), and Energy Dispersive X-ray Spectroscopy (EDS))

Particles from each piece of filter paper were placed on a carbon stud for examination in a scanning electron microscope (SEM) using Energy Dispersive X-ray Spectroscopy (EDS). The D and F samples were wet, so a portion of each was rinsed in freon and re-filtered before particles were placed on a carbon stud. Four particles/groups of particles from each sample were examined. Although there was some variation in the analyzed samples, typical EDS spectra are given in Figures 1 - 10. The following elements were detected in these spectra, in decreasing order of elemental concentration.

A Cup	B Cup	C Cup	D Cup	F Cup
Zinc	Copper	Zinc	Zinc	Copper
Copper	Zinc	Iron	Copper	Zinc
Aluminum	Phosphorus	Copper	Potassium	Potassium
Iron	Iron	Chromium	Iron	Sulfur
Silicon	Silicon	Silicon	Silicon	Iron
Calcium	Sulfur	Calcium	Sulfur	
Sulfur	Potassium	Sulfur		
Potassium	Calcium			

A Port	B Port	C Port	D Contact	F Contact
Iron	Silicon	Iron	Copper	Copper
Copper	Calcium	Copper	Silver	Zinc
Aluminum	Phosphorus	Zinc	Zinc	Silver
Potassium	Aluminum	Sulfur	Iron	Potassium
	Copper	Aluminum	Silicon	Iron
	Zinc	Silicon		Sulfur
	Iron			
	Titanium			
	Chlorine			

Central Laboratory
15000 Century Drive
Dearborn, MI 48120-1267
FAX (313) 322-1614

Report 9900228

February 4, 1999

To: G. Stevens (313) 32-36686 (313) 39-07224 FAX

From: P. J. Nailos (313) 33-75358

Subject: Speed Control Cutoff Switch
Part Number: F2VY-9F924-A
Specification: Not Provided
Supplier: Texas Instruments

Received: Two short lengths of copper tubing and two brass fittings were received on February 2, 1999. A copper tube and brass fitting were placed in a bath of old brake fluid, and a potential applied across the two parts; the other set was placed in a bath of new brake fluid, with a potential applied across the two parts.

Object: Perform an EDS analysis on the surface deposits.

Data and Analysis:

Surface Analysis
(Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray Spectroscopy (EDS))

A portion of the surface deposit from each sample was removed, rinsed in freon, and placed on a carbon stud for Energy Dispersive X-ray Spectroscopy (EDS) in a scanning electron microscope (SEM). The following elements were detected, in decreasing order of elemental concentration.

Copper Tube - New Brake Fluid	Copper Tube - Old Brake Fluid	Fitting - New Brake Fluid	Fitting - Old Brake Fluid
Copper	Copper	Copper	Copper
Zinc	Chlorine	Zinc	Potassium
Sulfur		Chlorine	Sulfur
Iron			
Calcium			
Aluminum			
Silicon			

By: Patrick J. Nailos (PNAILOS)
Laboratory Specialist

Enclosures: Figures 1 - 4
PJN/pjn

Surface Analysis (continued)

There are several particles in the A, B, and C cup samples that are iron-rich. These are from the steel base material. A typical EDS spectrum is shown in Figure 11 for these particles.

The number of copper-zinc particles in the cup indicate material transfer from the contact to the cup. The B port sample was composed primarily of fibers.

By: _____
Patrick J. Nallos (PNAILOS)
Laboratory Specialist

Enclosures: Figures 1 - 11
PJN/pjn

Central Laboratory
15000 Century Drive
Dearborn, MI 48120-1267
FAX (313) 322-1614

Report 9900226

February 4, 1999

To: G. Stevens (313) 32-39696 (313) 39-07224 FAX

From: P. J. Nalos (313) 33-75358

Subject: Speed Control Cutoff Switch
Part Number: F2VY-9F924-A
Specification: Not Provided
Supplier: Texas Instruments

Received: Two short lengths of copper tubing and two brass fittings were received on February 2, 1999. A copper tube and brass fitting were placed in a bath of old brake fluid, and a potential applied across the two parts; the other set was placed in a bath of new brake fluid, with a potential applied across the two parts.

Object: Perform an EDS analysis on the surface deposits.

Data and Analysis:

Surface Analysis
(Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray Spectroscopy (EDS))

A portion of the surface deposit from each sample was removed, rinsed in freon, and placed on a carbon stud for Energy Dispersive X-ray Spectroscopy (EDS) in a scanning electron microscope (SEM). The following elements were detected, in decreasing order of elemental concentration.

Copper Tube - New Brake Fluid	Copper Tube - Old Brake Fluid	Fitting - New Brake Fluid	Fitting - Old Brake Fluid
Copper	Copper	Copper	Copper
Zinc	Chlorine	Zinc	Potassium
Sulfur		Chlorine	Sulfur
Iron			
Calcium			
Aluminum			
Silicon			

By: _____
Patrick J. Nalos (PNALOS)
Laboratory Specialist

Enclosures: Figures 1 - 4
PJN/pjn

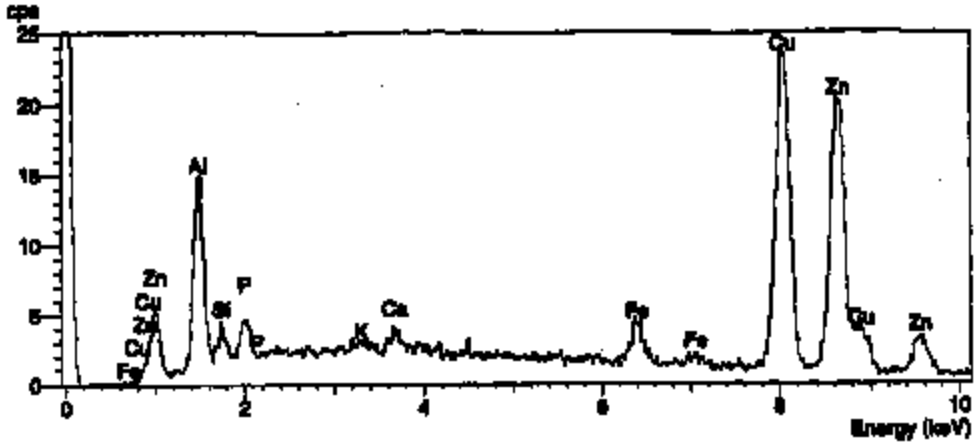


Figure 1: Typical EDS X-ray spectrum of particles from the A Cup sample.

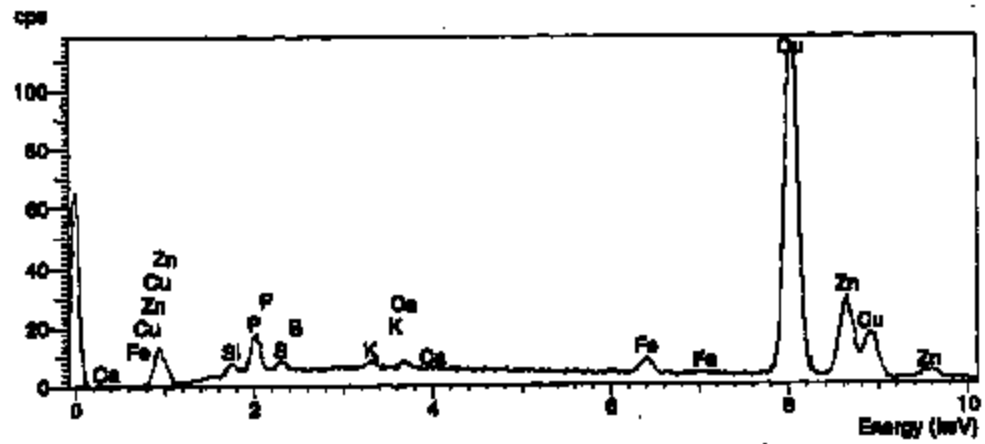


Figure 2: Typical EDS X-ray spectrum of particles from the B Cup Sample.

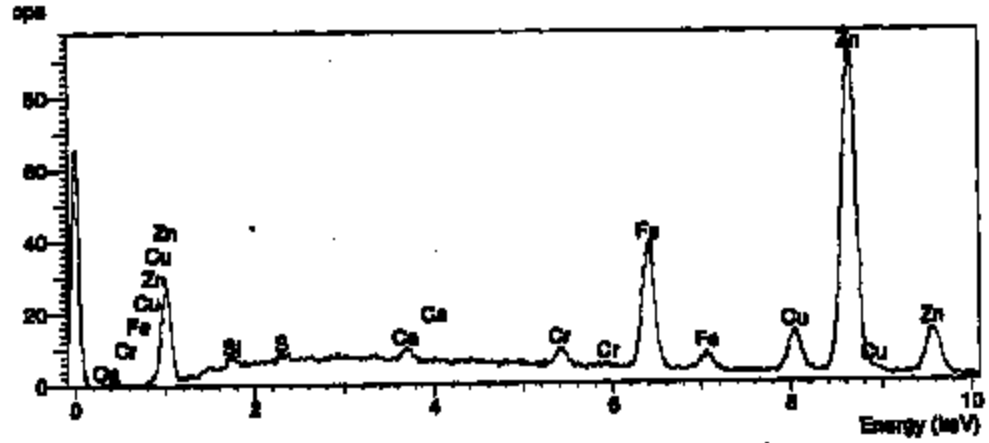


Figure 3: Typical EDS X-ray spectrum of particles from the C Cup sample.

Note: Nominal magnifications given for photomicrographs.

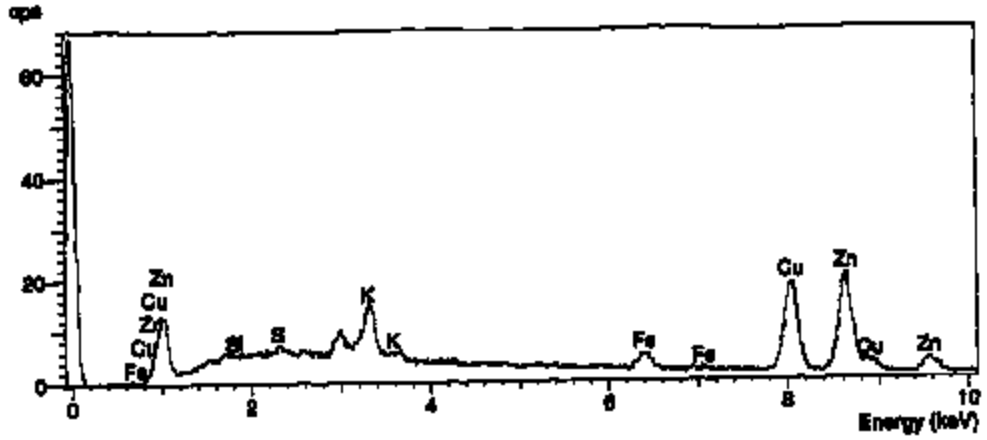


Figure 4: Typical EDS X-ray spectrum of particles from the D Cup Sample.

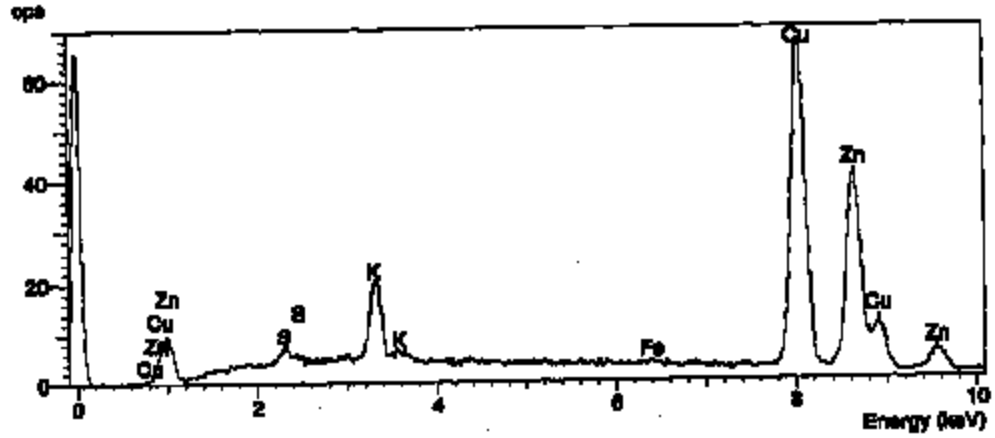


Figure 5: Typical EDS X-ray spectrum of particles from the F Cup sample.

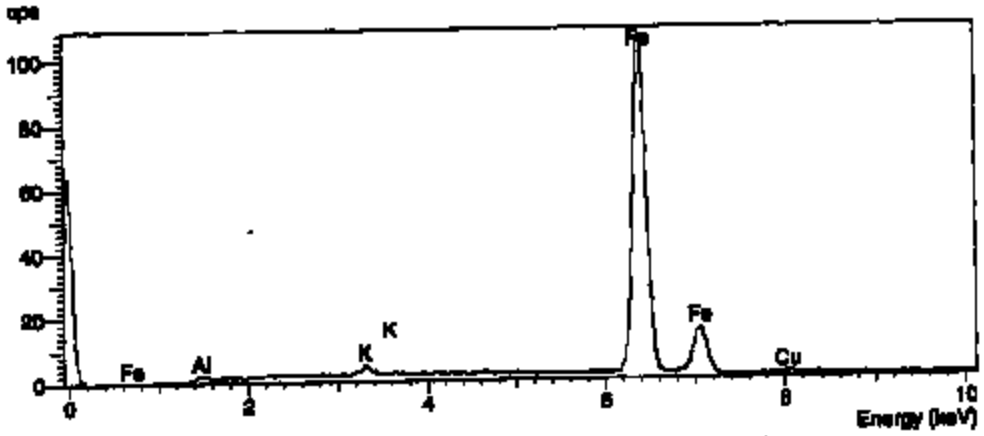


Figure 6: Typical EDS X-ray spectrum of particles from the A Port sample.

Note: Nominal magnifications given for photomicrographs.

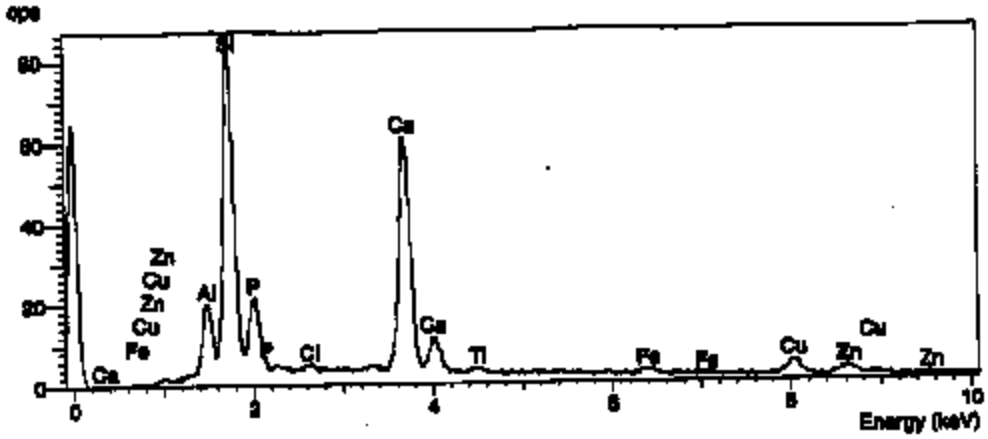


Figure 7: Typical EDS X-ray spectrum of particles from the B Port sample.

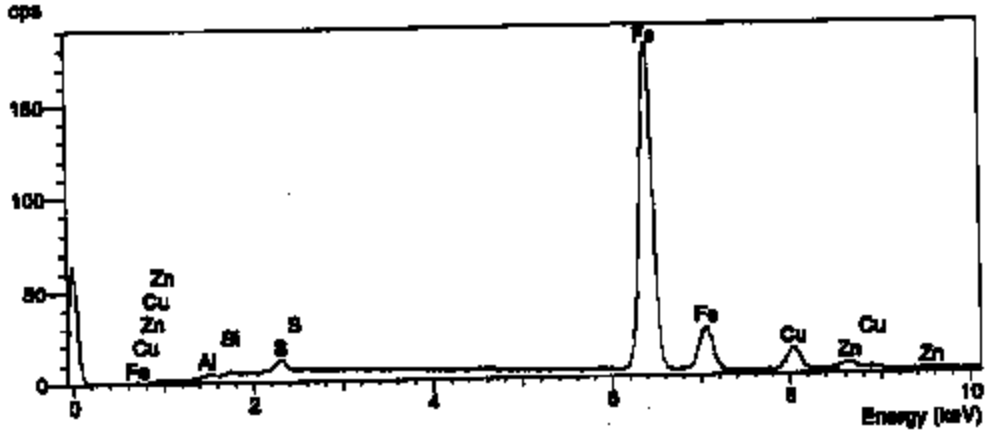


Figure 8: Typical EDS X-ray spectrum of particles from the C Port sample.

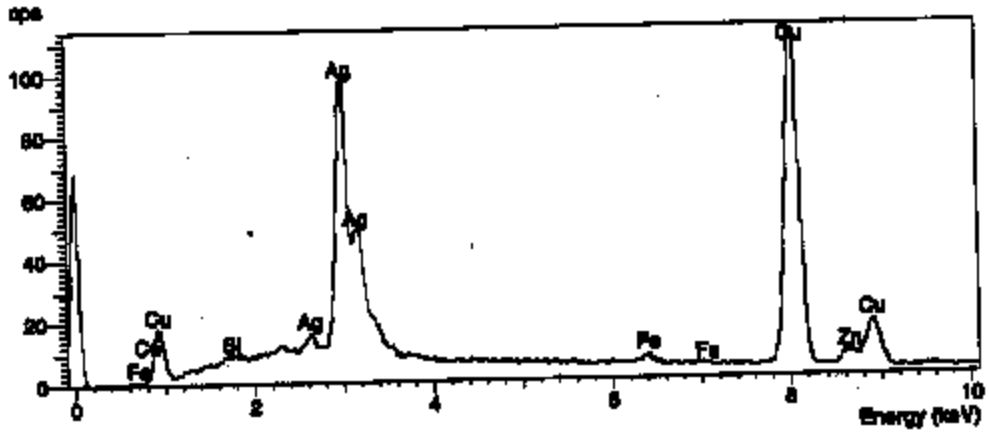


Figure 9: Typical EDS X-ray spectrum of particles from the D Contact sample.

Note: Nominal magnifications given for photomicrographs.

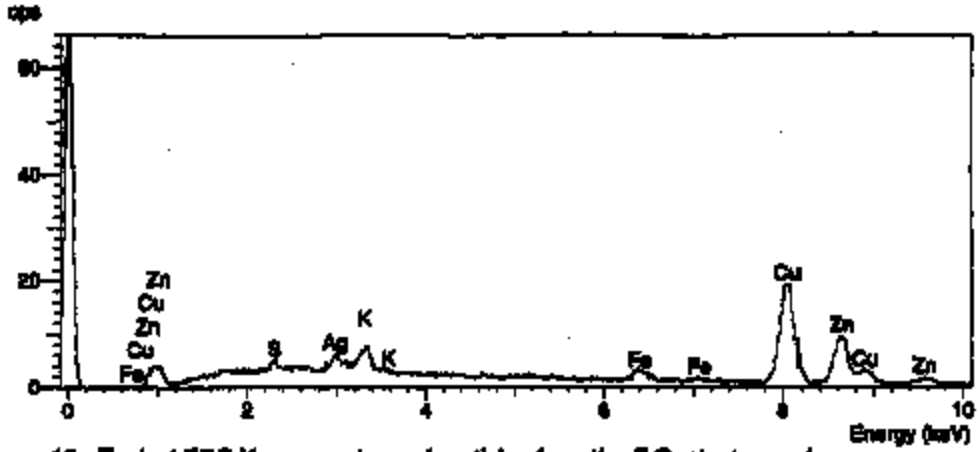


Figure 10: Typical EDS X-ray spectrum of particles from the F Contact sample.

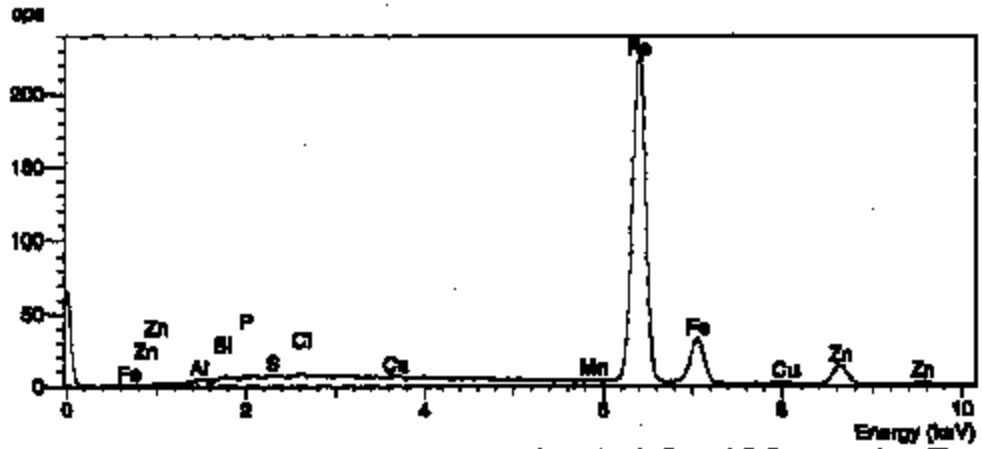


Figure 11: Typical EDS X-ray spectrum of particles from the A, B, and C Cup samples. These are representative of the steel base material.

Note: Nominal magnifications given for photomicrographs.

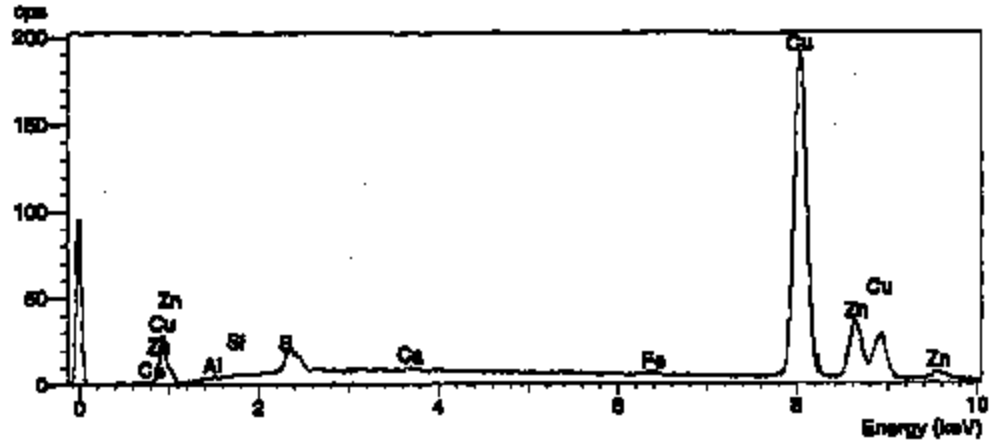


Figure 1: Typical EDS X-ray spectrum of the Copper Tubing - New Brake Fluid sample.

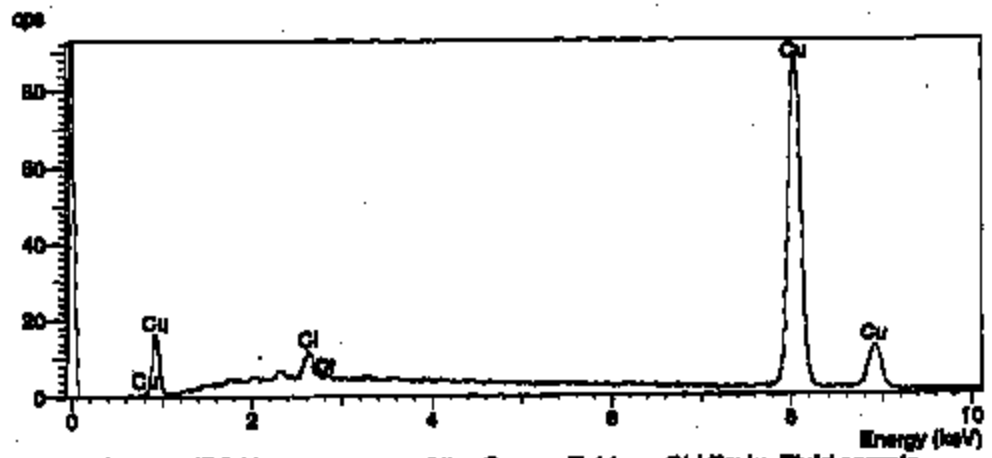


Figure 2: Typical EDS X-ray spectrum of the Copper Tubing - Old Brake Fluid sample.

Note: Nominal magnifications given for photomicrographs.

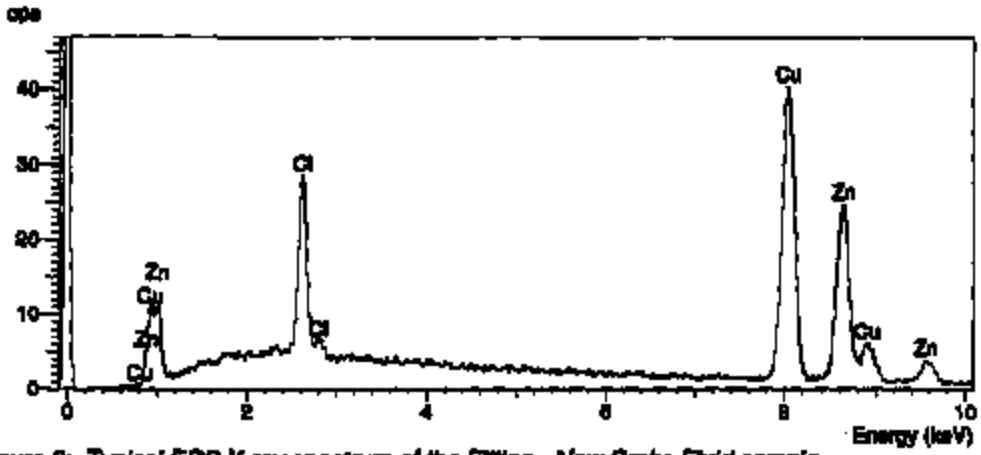


Figure 3: Typical EDS X-ray spectrum of the Fitting - New Brake Fluid sample.

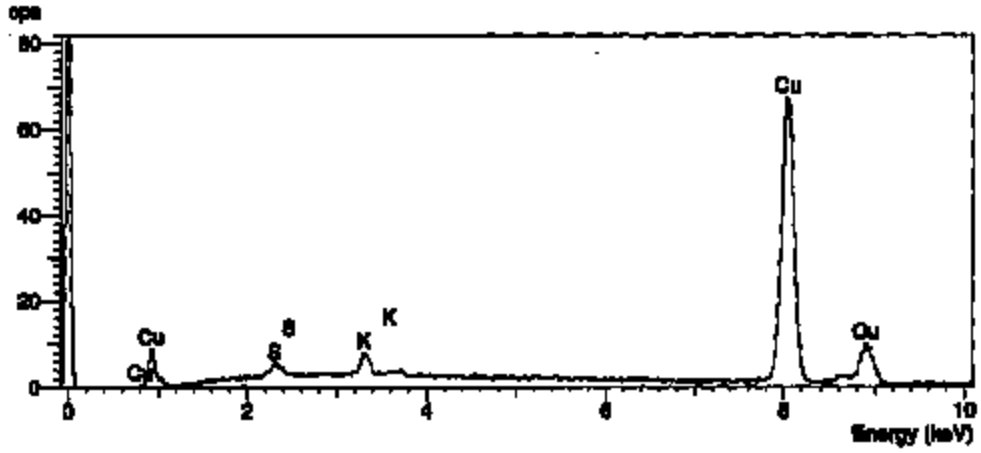
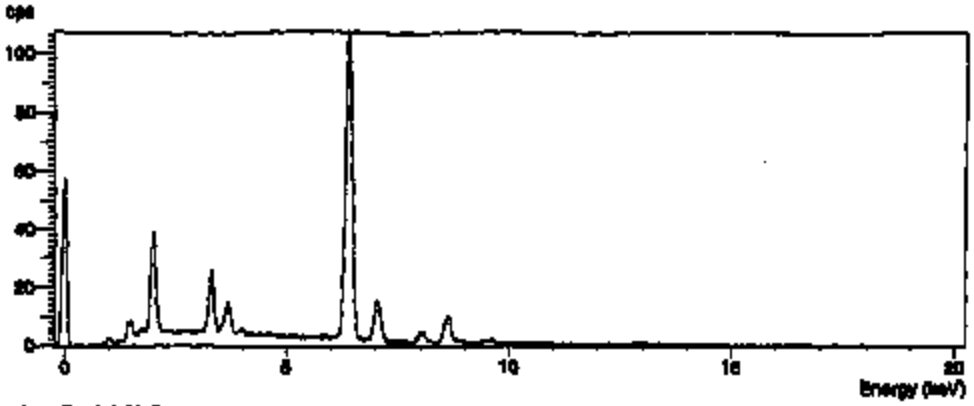
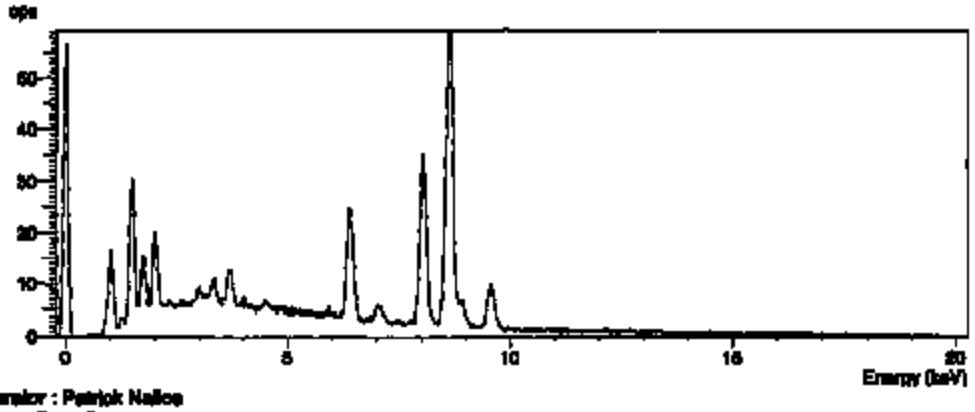


Figure 4: Typical EDS X-ray spectrum of the Fitting - Old Brake Fluid sample.

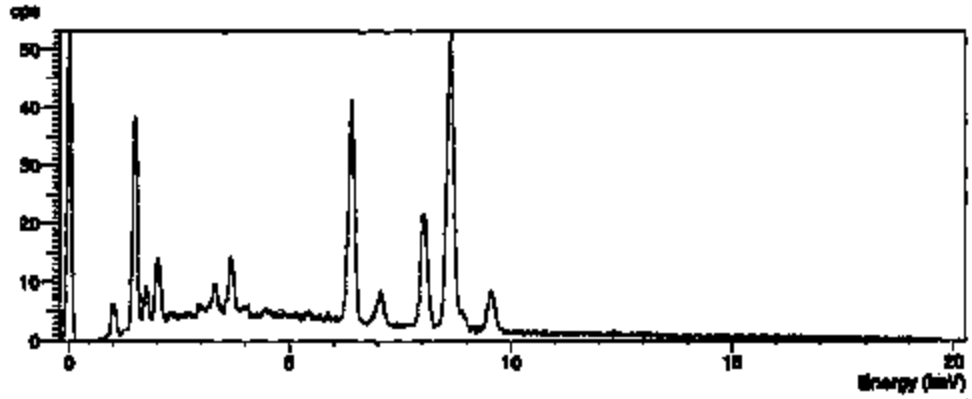
Note: Nominal magnifications given for photomicrographs.



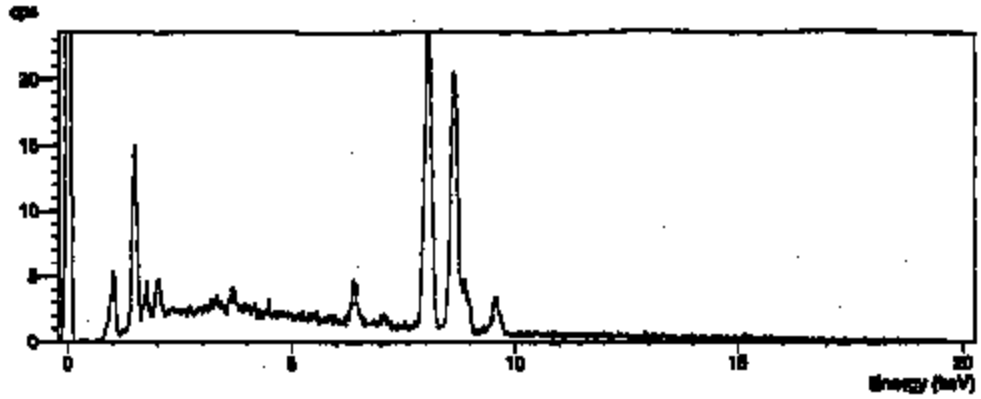
Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
ACup1 (1/27/99 13:08)



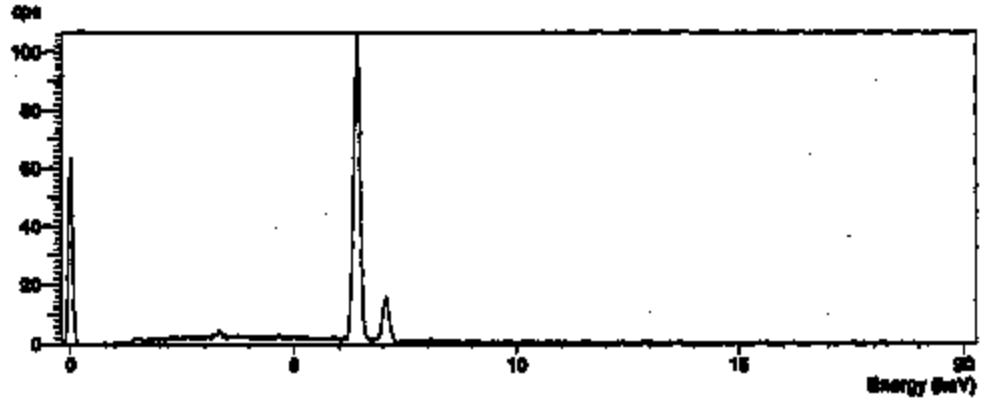
Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
ACup2 (1/27/99 19:08)



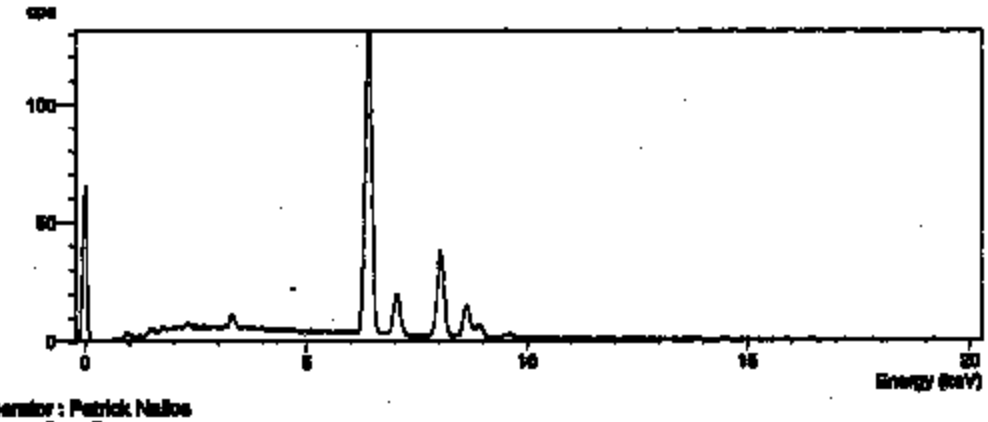
Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
ACup3 (1/28/99 07:43)



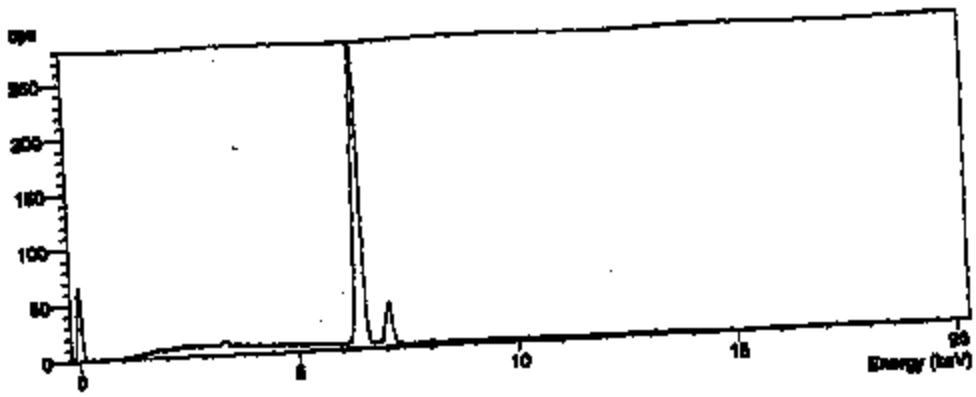
Operator : Patrick Nallos
Client : Greg Stevens
Job : 9900226
ADup4 (1/28/99 07:48)



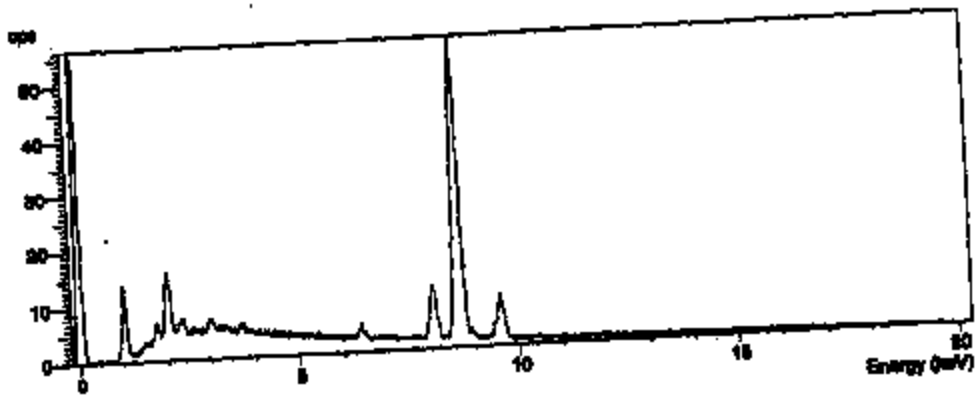
Operator : Patrick Nallos
Client : Greg Stevens
Job : 9900226
APort1 (1/28/99 07:54)



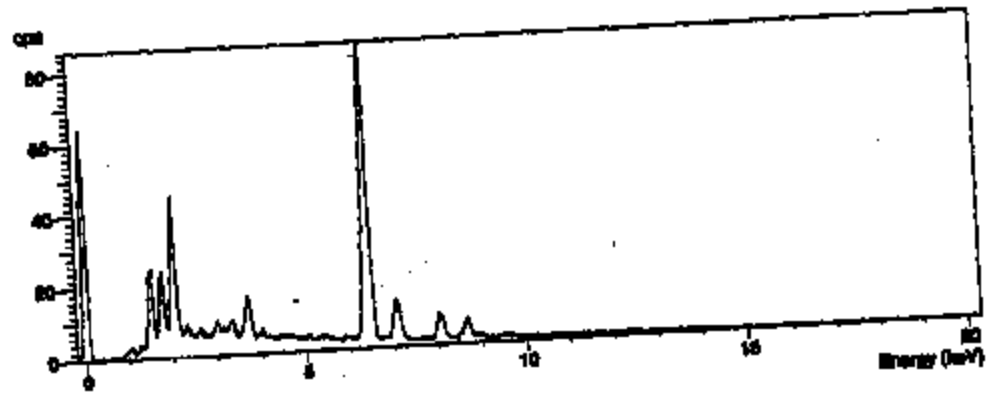
Operator : Patrick Nallos
Client : Greg Stevens
Job : 9900226
APort2 (1/28/99 08:01)



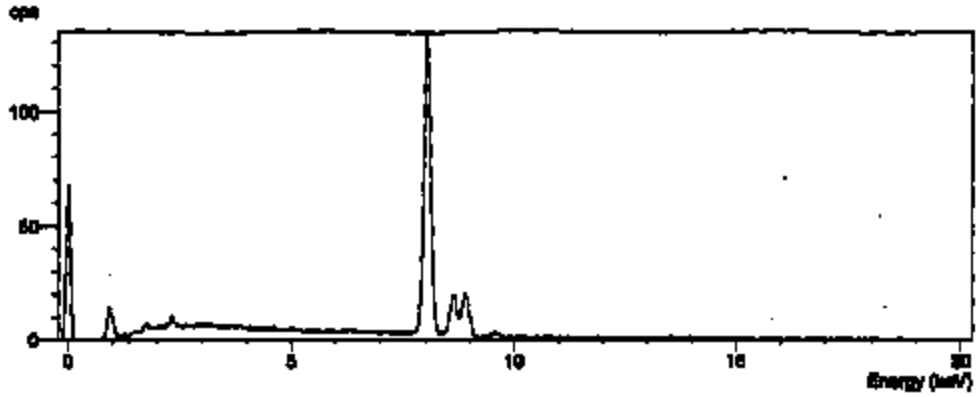
Operator : Patrick Nallos
Client : Greg Stevens
Job : 9900226
APort9 (1/28/99 05:19)



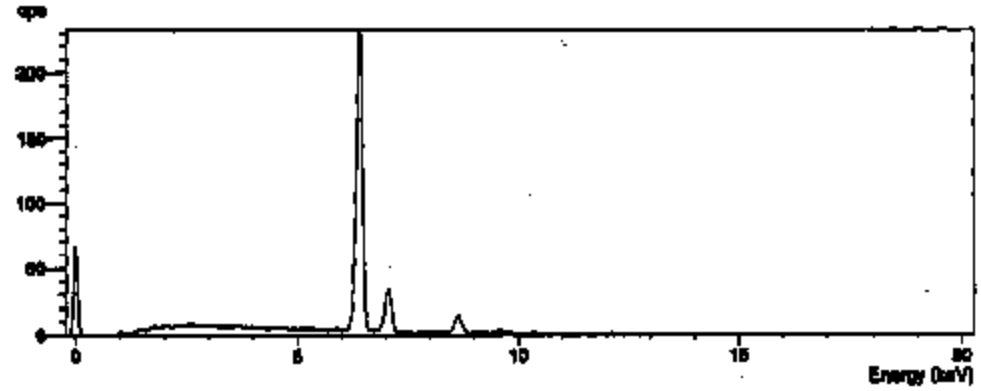
Operator : Patrick Nallos
Client : Greg Stevens
Job : 9900226
9Cup1 (1/28/99 05:22)



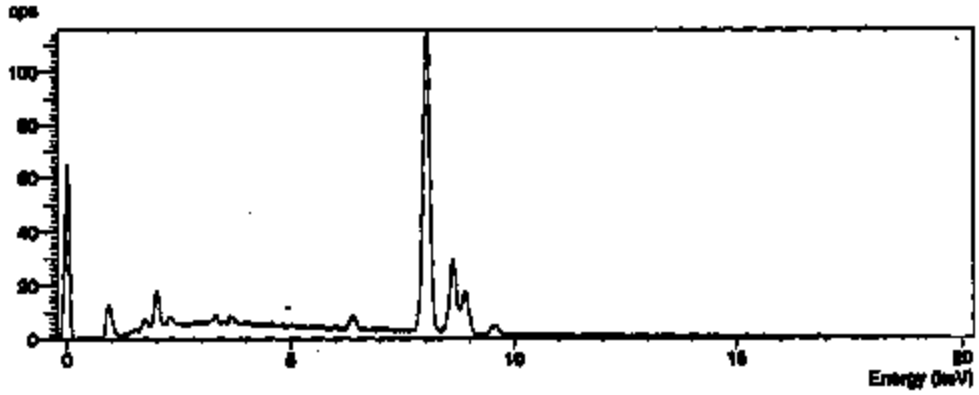
Operator : Patrick Nallos
Client : Greg Stevens
Job : 9900226
9Cup2 (1/28/99 05:24)



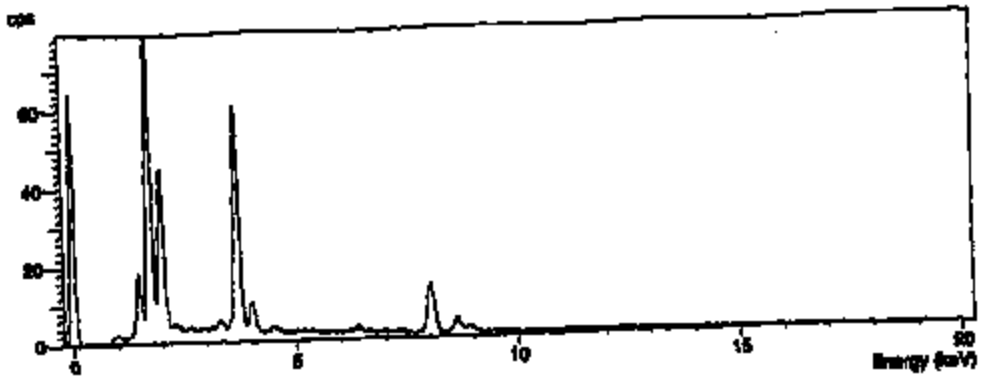
Operator : Patrick Nalbo
Client : Greg Stevens
Job : 9900226
BCup3 (1/26/99 08:26)



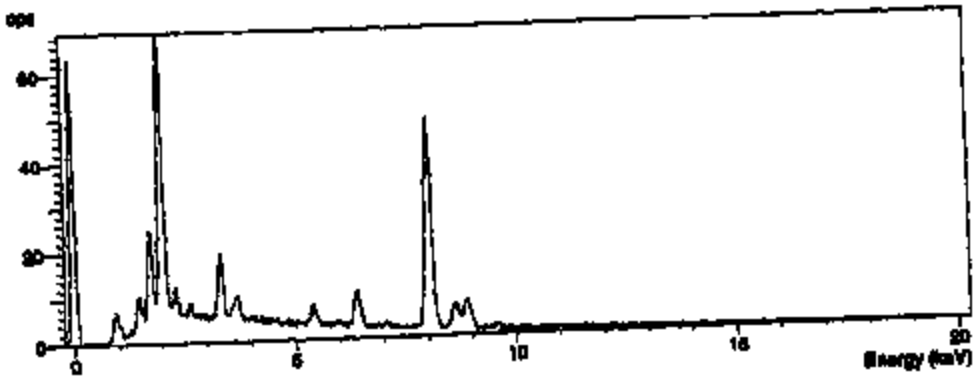
Operator : Patrick Nalbo
Client : Greg Stevens
Job : 9900226
BCup4 (1/26/99 08:28)



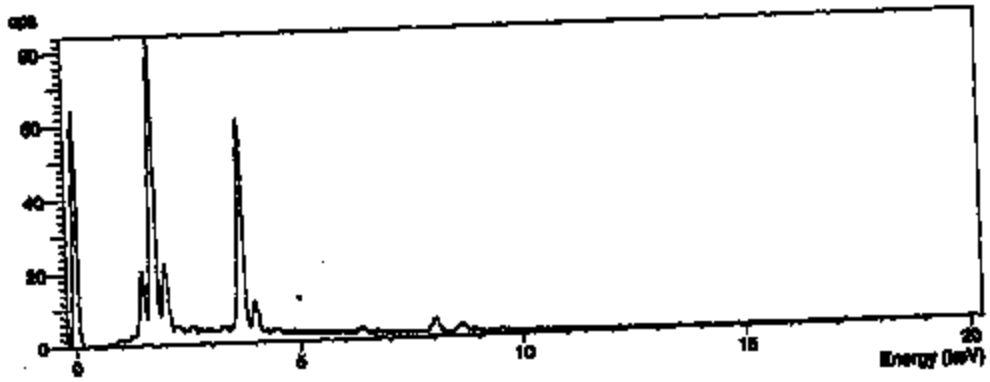
Operator : Patrick Nalbo
Client : Greg Stevens
Job : 9900226
BCup5 (1/26/99 08:30)



Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
BPort1 (1/26/99 08:30)

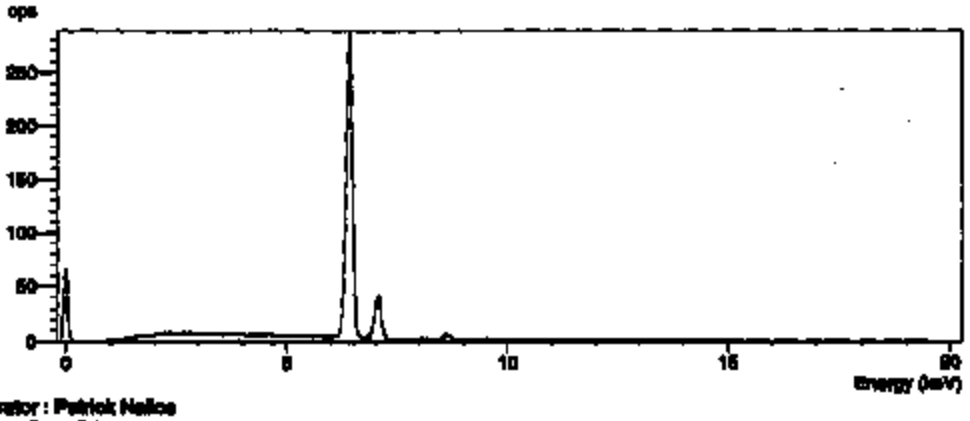


Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
BPort2 (1/26/99 08:35)

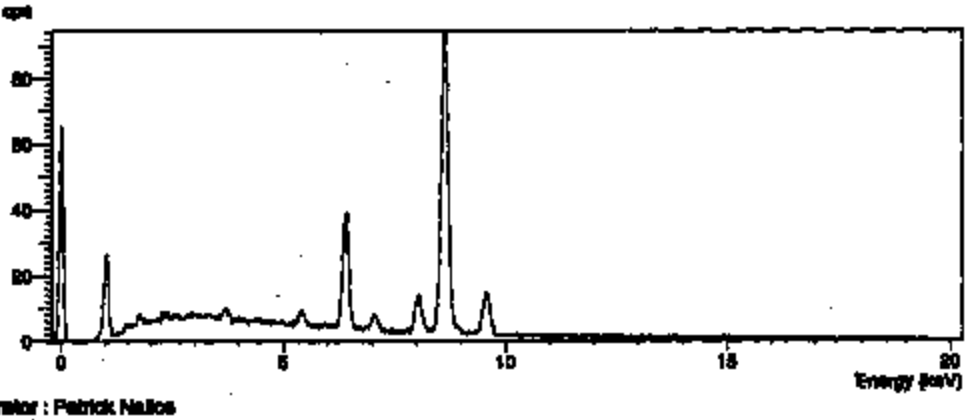


Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
BPort3 (1/26/99 08:37)

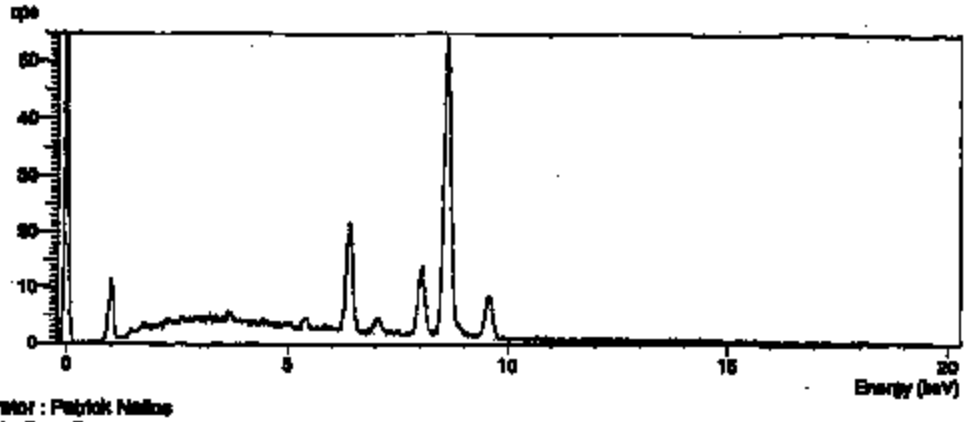
Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
BPort4 (1/26/99 08:41)



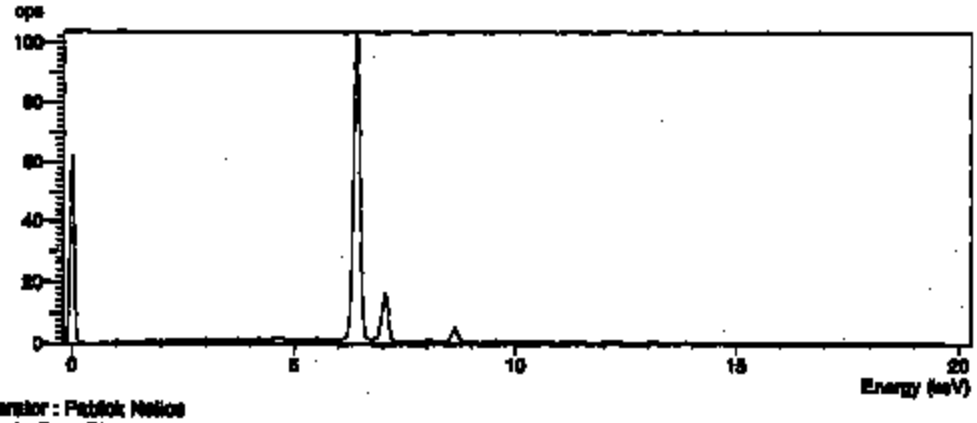
Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
CCup1 (1/26/99 08:05)



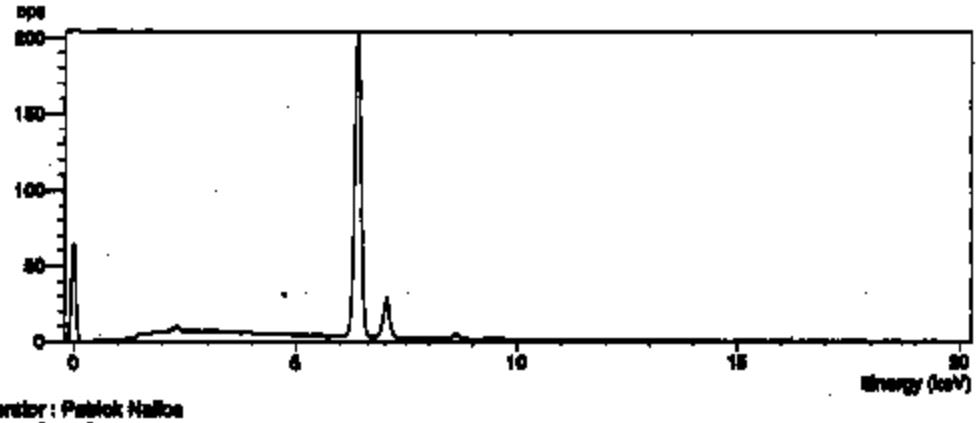
Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
CCup2 (1/26/99 08:08)



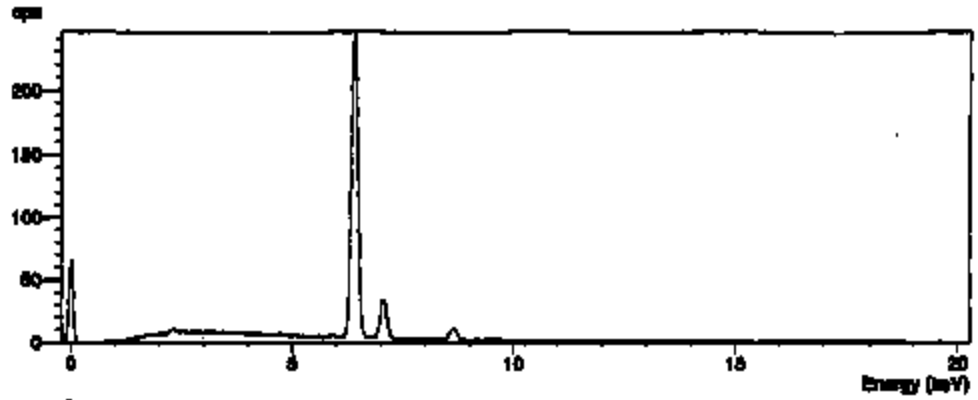
Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
COup3 (1/28/99 09:14)



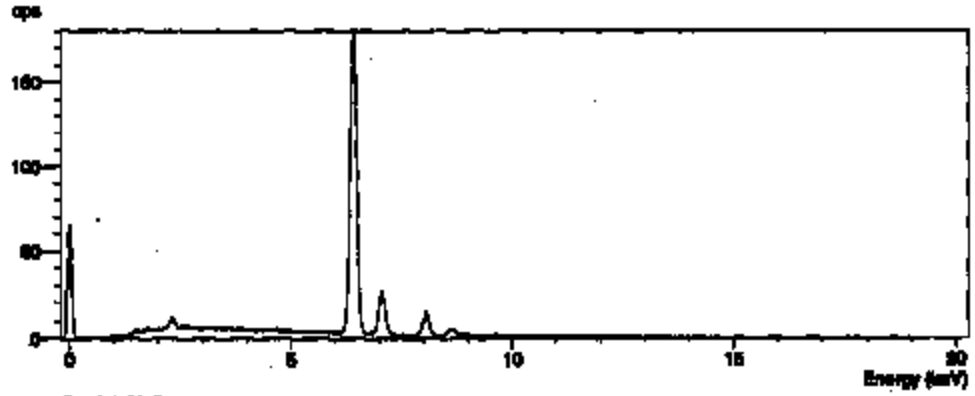
Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
COup4 (1/28/99 09:34)



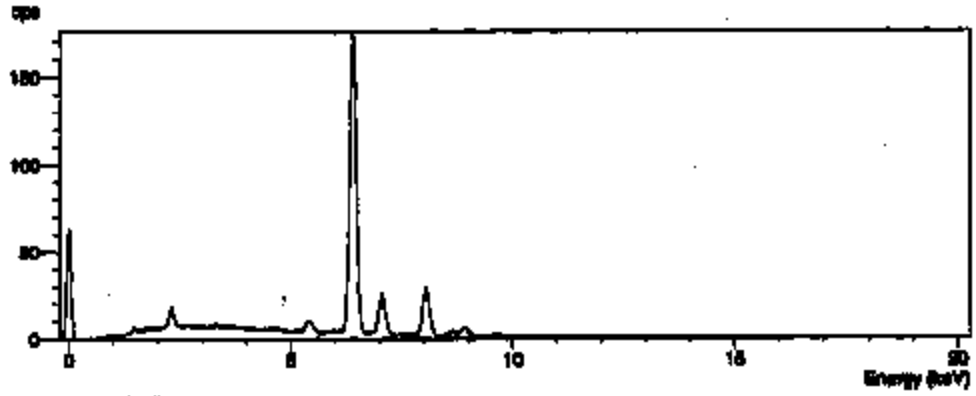
Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
CPort1 (1/28/99 09:26)



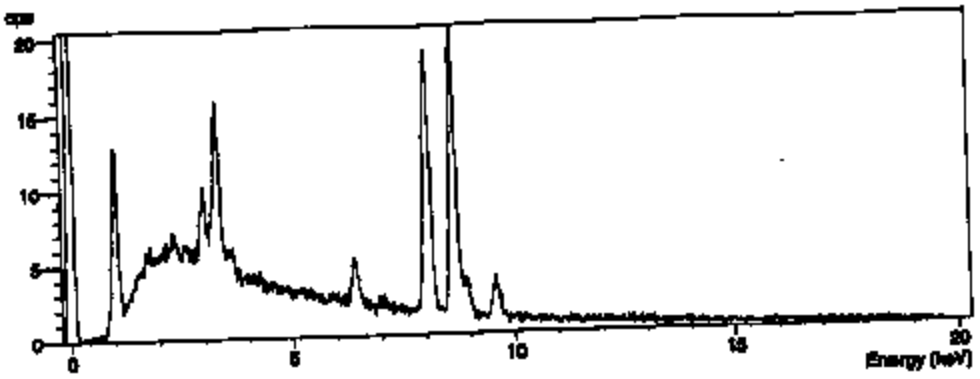
Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
CPort2 (1/29/99 09:31)



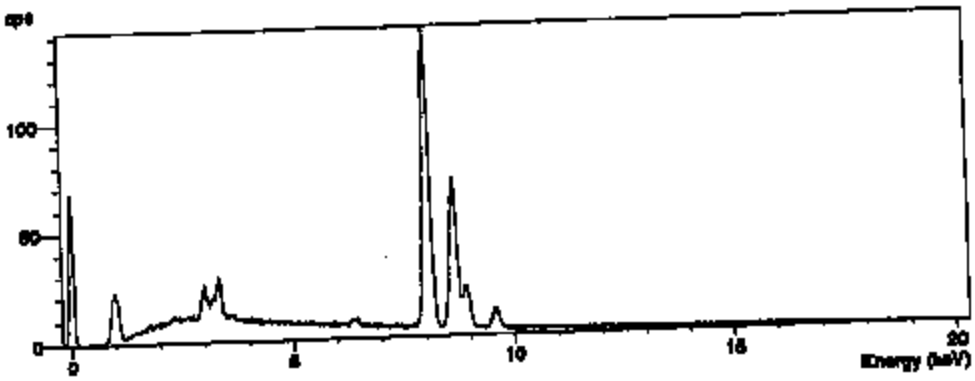
Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
CPort3 (1/29/99 09:32)



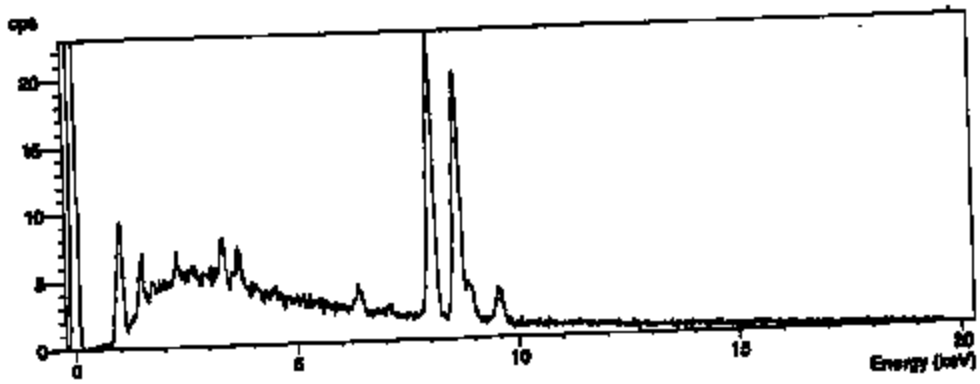
Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
CPort4 (1/29/99 09:34)



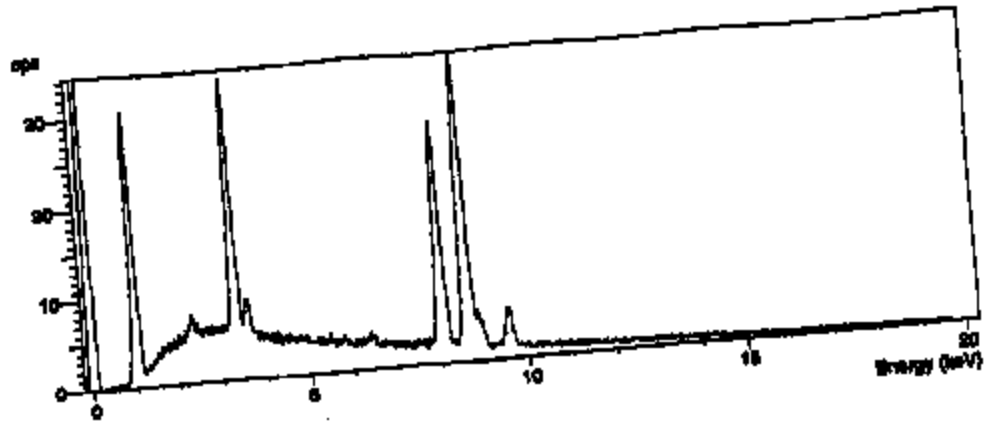
Operator : Patrick Nallos
Client : Greg Stevens
Job : 9900226
DCup1 (1/28/99 08:58)



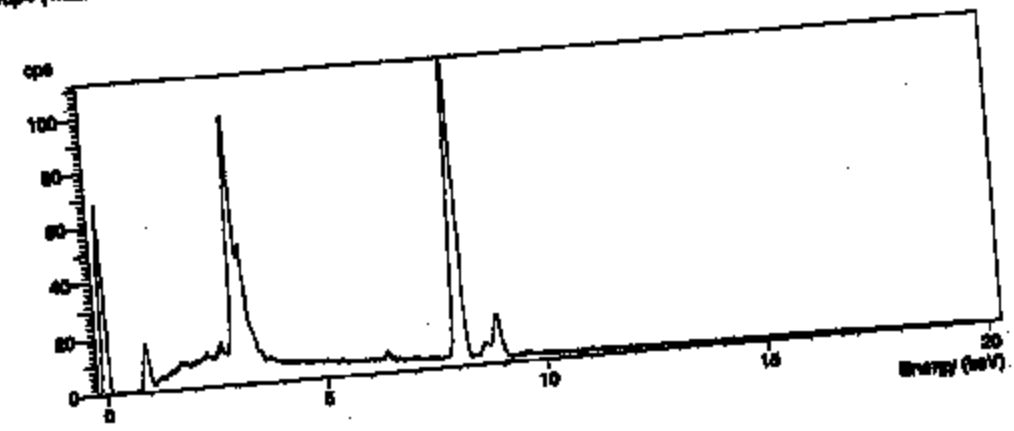
Operator : Patrick Nallos
Client : Greg Stevens
Job : 9900226
DCup2 (1/28/99 08:58)



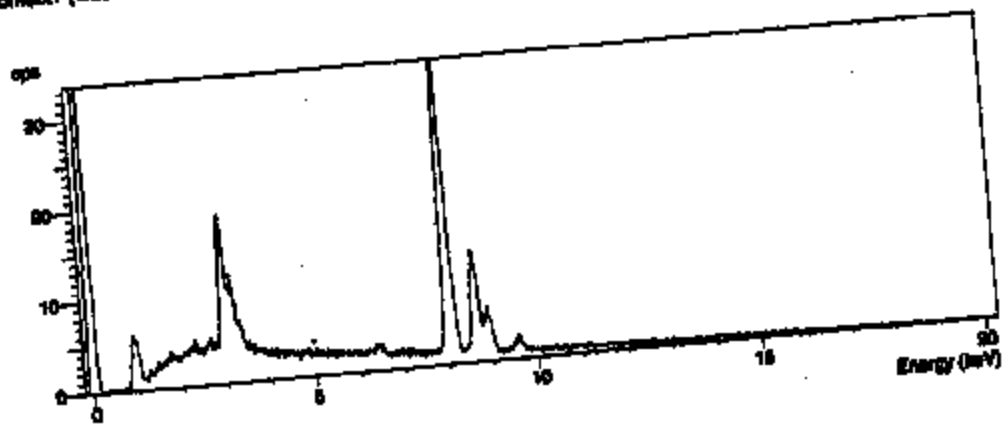
Operator : Patrick Nallos
Client : Greg Stevens
Job : 9900226
DCup3 (1/28/99 08:58)



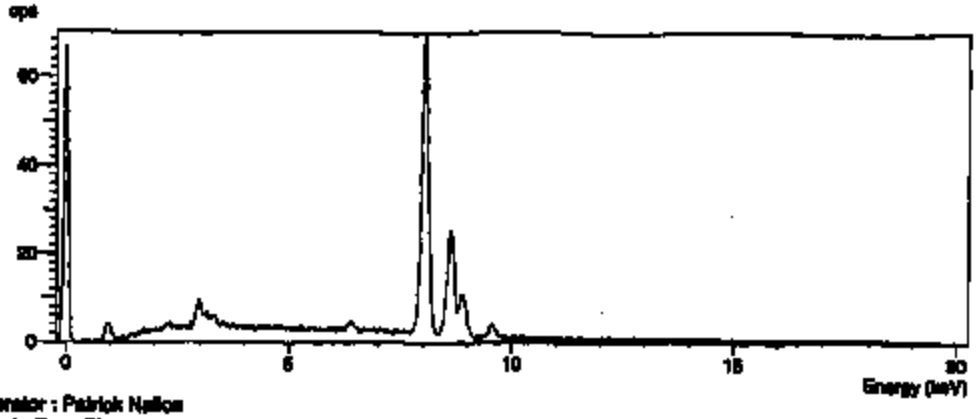
Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
DCup4 (1/28/99 08:00)



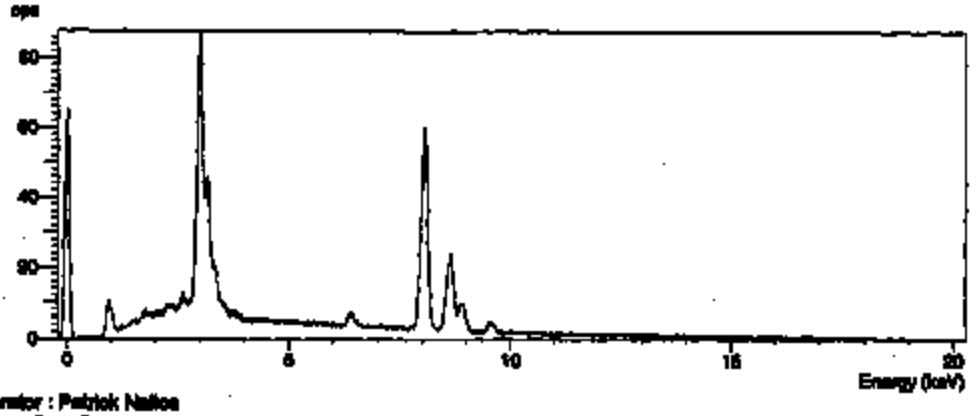
Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
DControl1 (1/28/99 08:04)



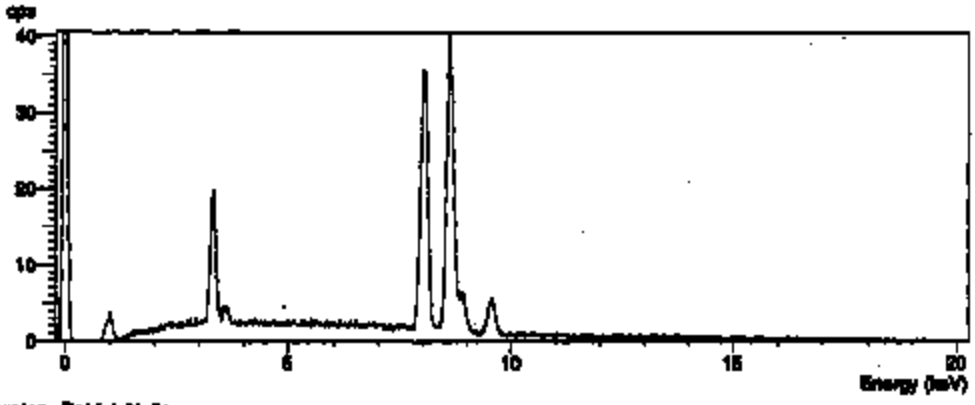
Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
DControl2 (1/28/99 08:08)



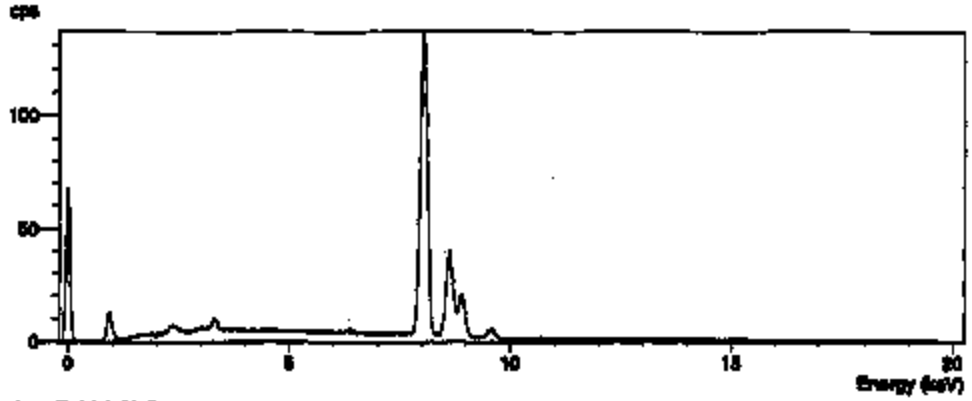
Operator : Patrick Nallos
Client : Greg Stevens
Job : 9900226
DContact3 (1/28/99 09:06)



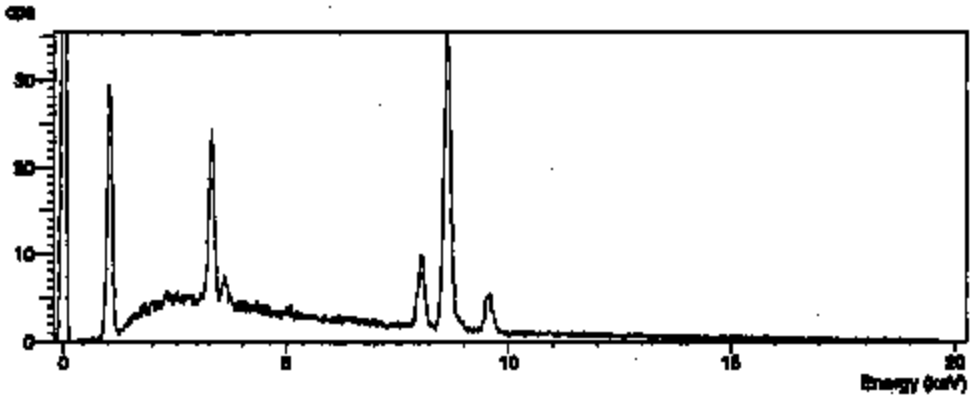
Operator : Patrick Nallos
Client : Greg Stevens
Job : 9900226
DContact4 (1/28/99 09:12)



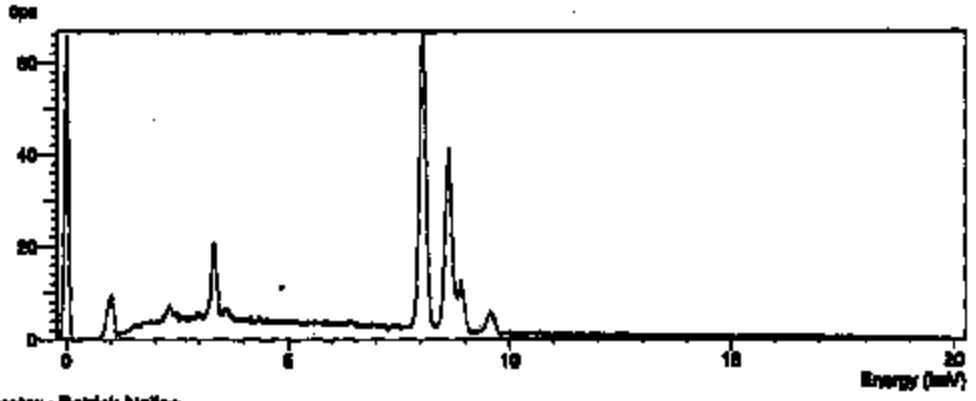
Operator : Patrick Nallos
Client : Greg Stevens
Job : 9900226
FOupt1 (1/28/99 09:18)



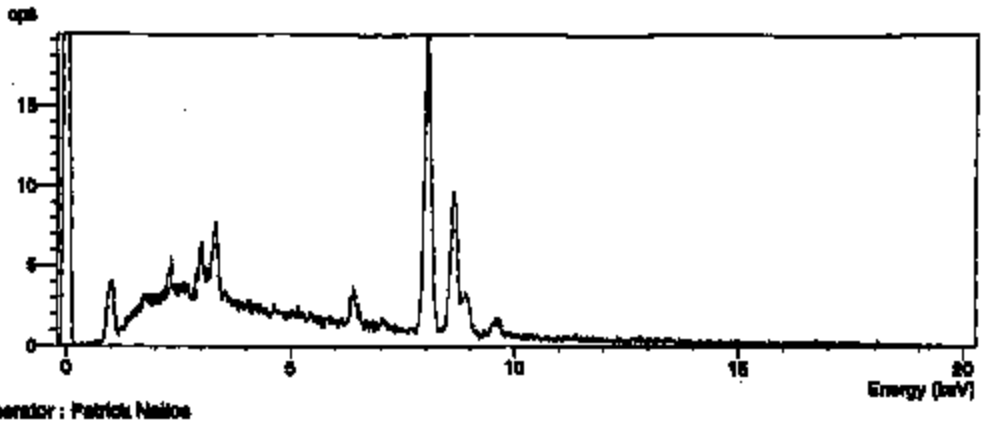
Operator : Patrick Nallos
Client : Greg Stevens
Job : 9900226
PCup2 (1/29/99 09:28)



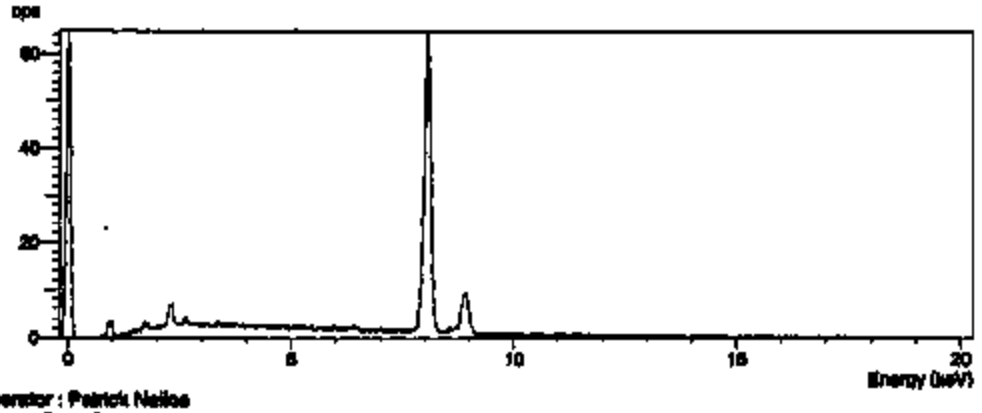
Operator : Patrick Nallos
Client : Greg Stevens
Job : 9900226
PCup3 (1/29/99 09:30)



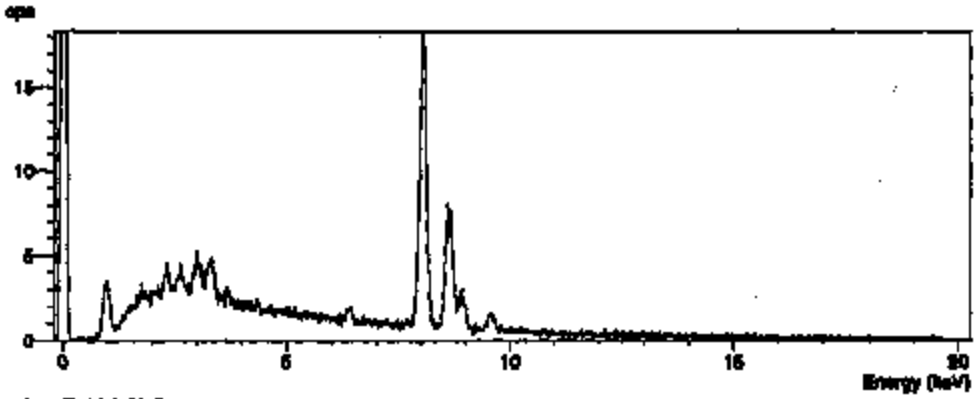
Operator : Patrick Nallos
Client : Greg Stevens
Job : 9900226
PCup4 (1/29/99 09:26)



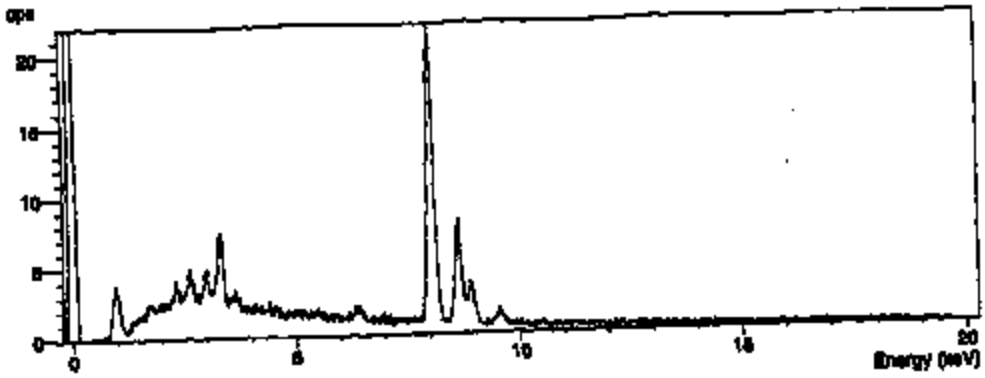
Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
FContact1 (1/29/99 09:40)



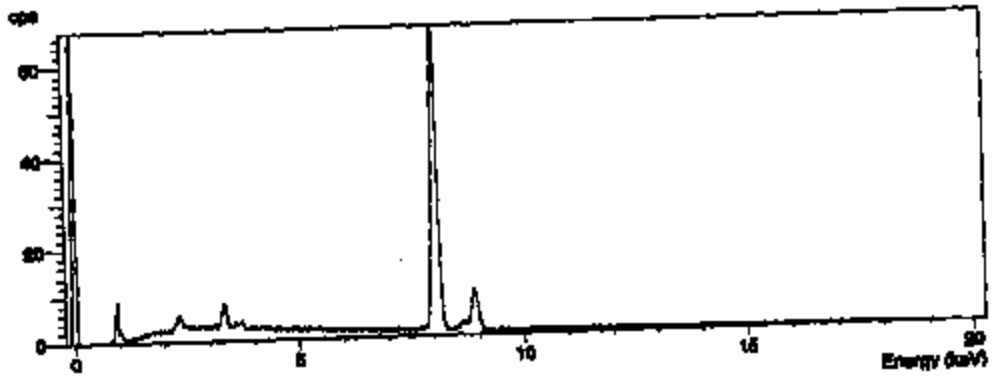
Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
FContact2 (1/29/99 09:48)



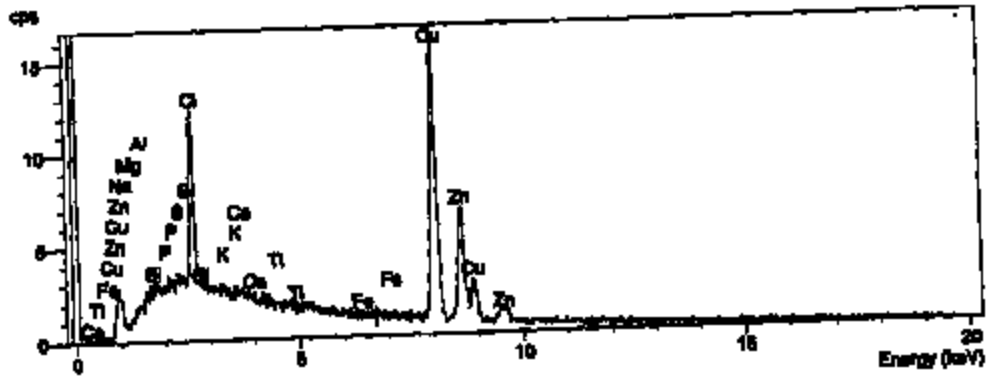
Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
FContact3 (1/29/99 09:48)



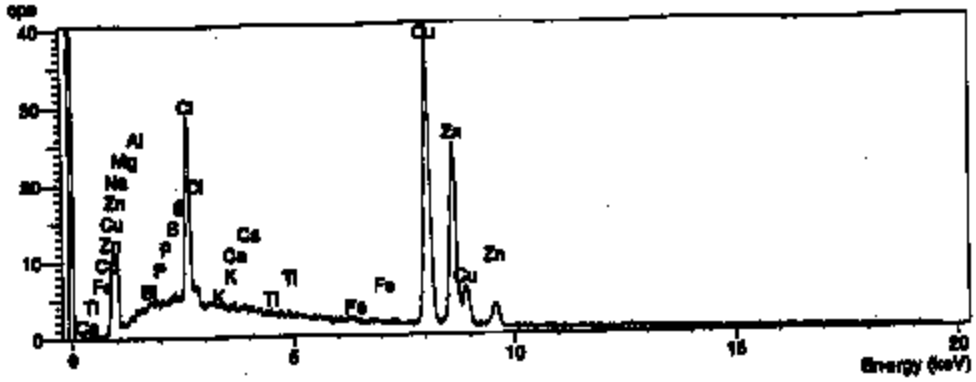
Operator : Patrick Nallos
Client : Greg Stevens
Job : 9900226
FContact4 (1/29/99 09:50)



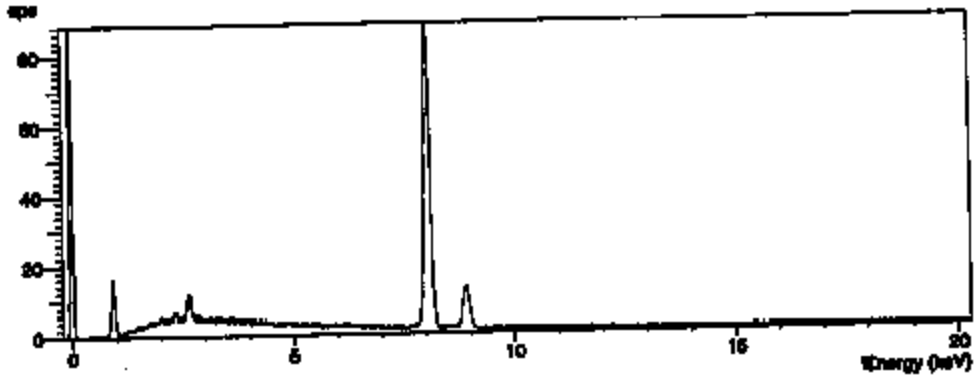
Operator : Patrick Nallos
Client : Greg Stevens
Job : 9900226
Fitting Old (9/2/99 11:00)



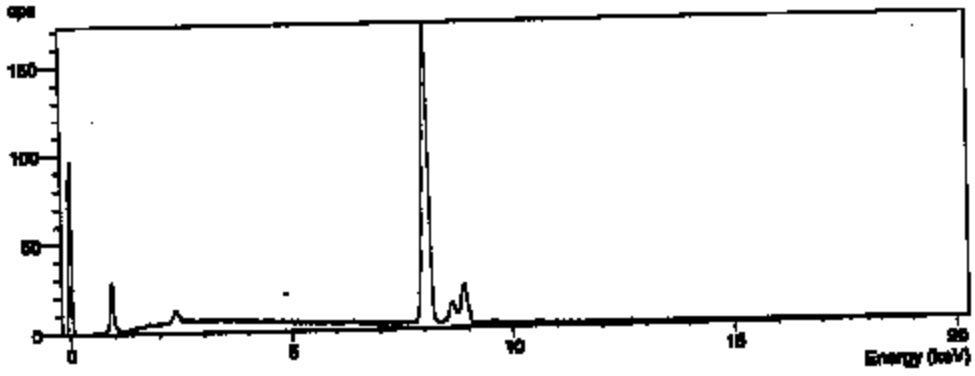
Operator : Patrick Nallos
Client : Greg Stevens
Job : 9900226
Fitting New1 (2/3/99 14:07)



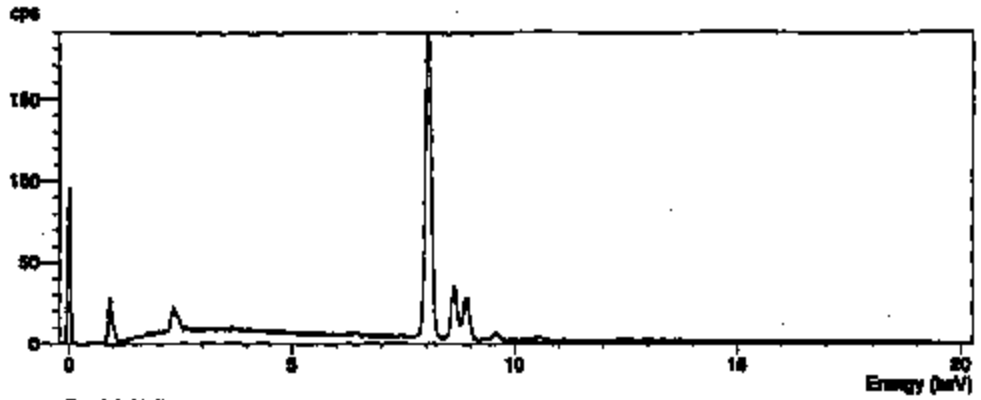
Operator : Patrick Nalice
Client : Greg Stevens
Job : 9900228
Fitting New2 (2/3/99 14:22)



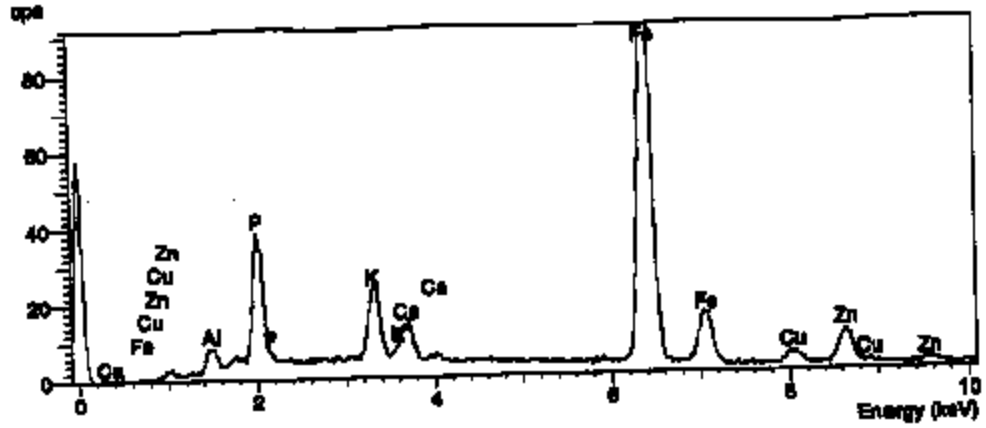
Operator : Patrick Nalice
Client : Greg Stevens
Job : 9900228
Copper Tubing Old1 (2/3/99 14:49)



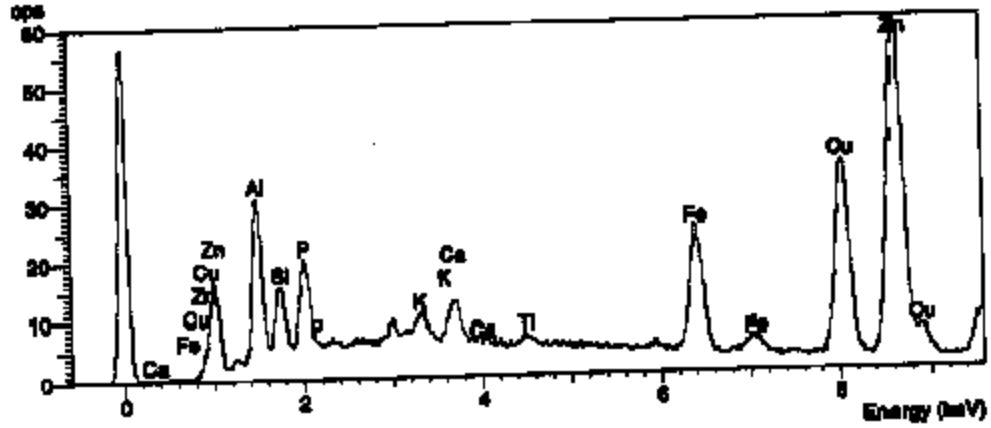
Operator : Patrick Nalice
Client : Greg Stevens
Job : 9900228
Copper Tubing New1 (2/3/99 15:01)



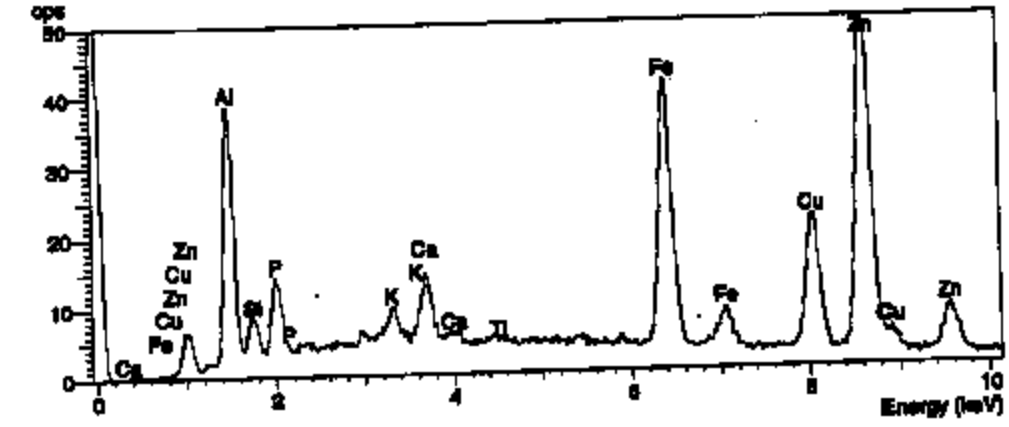
Operator : Patrick Nellos
Client : Greg Stevens
Job : 9900226
Copper Tubing New2 (2/3/99 15:07)



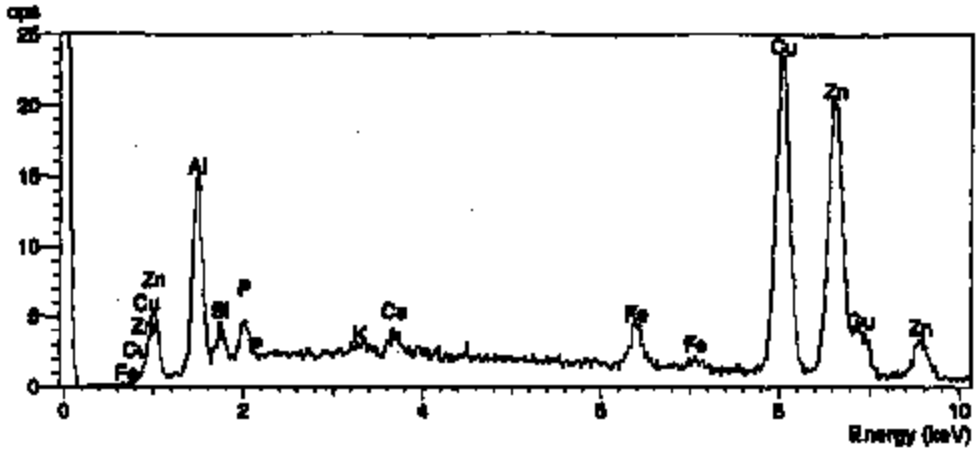
Acup1



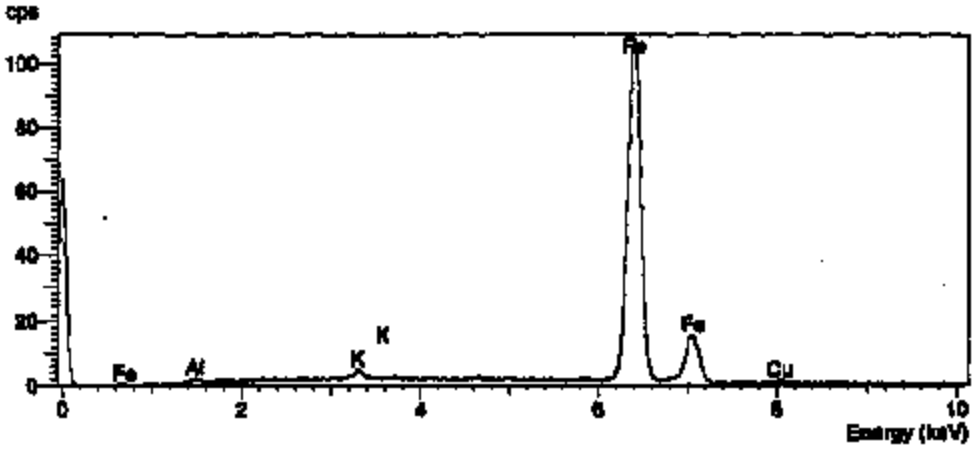
Acup2



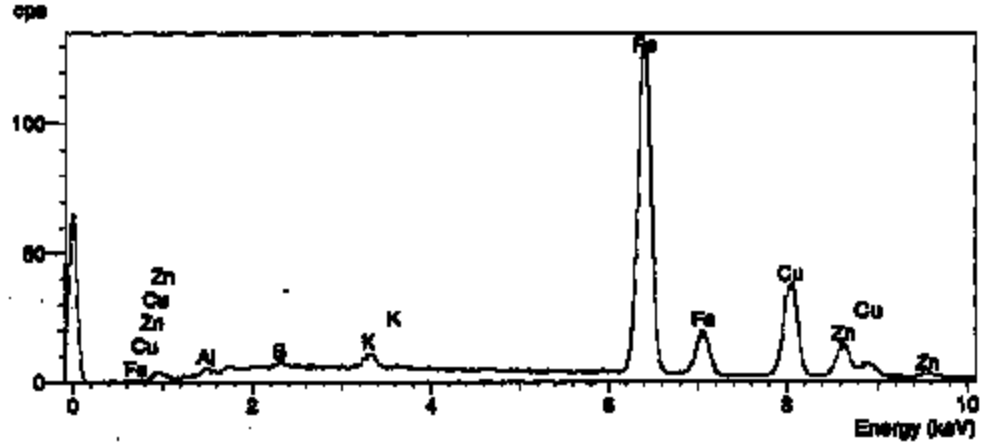
Acup3



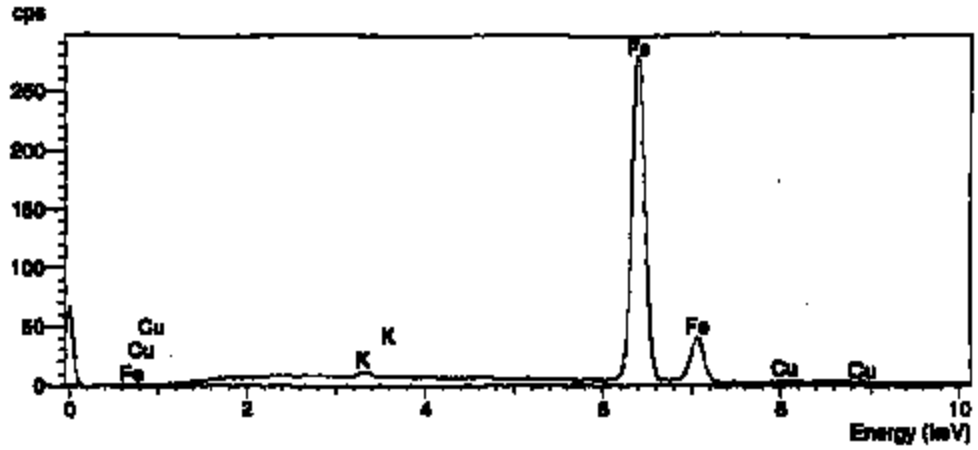
Acup4



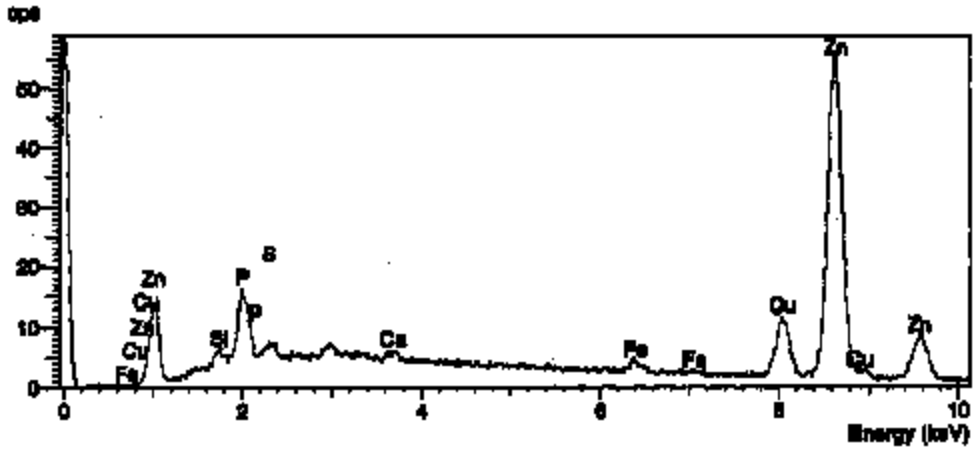
Aport1



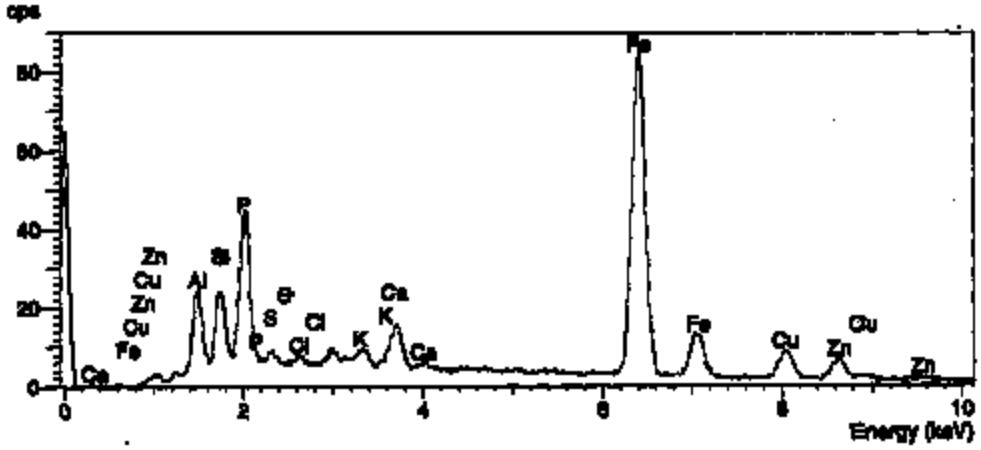
Aport2



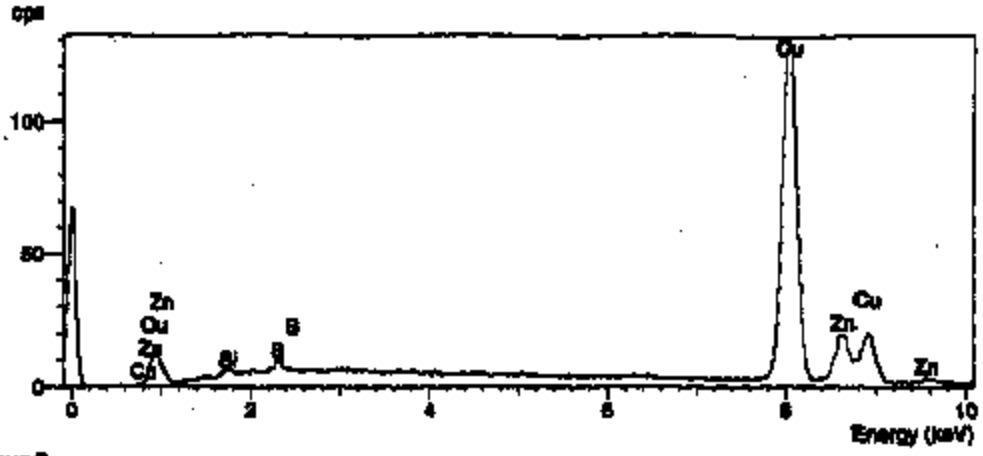
Apart3



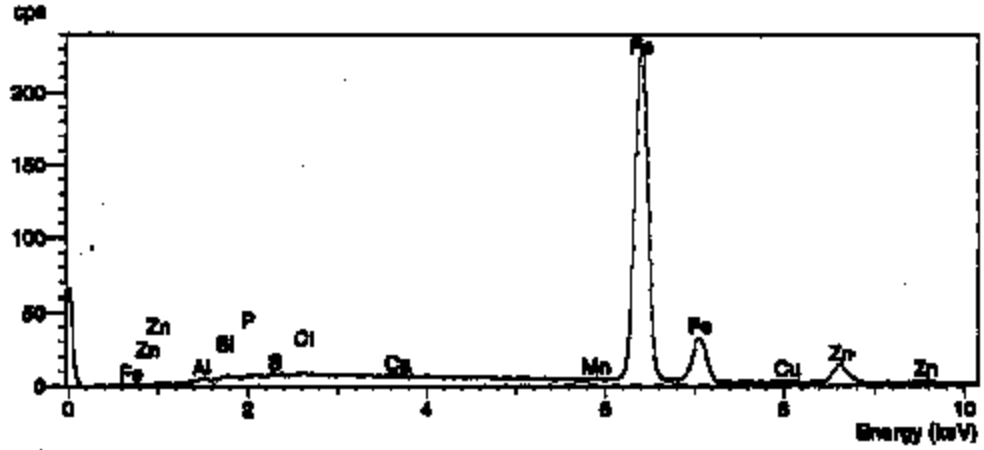
Boup1



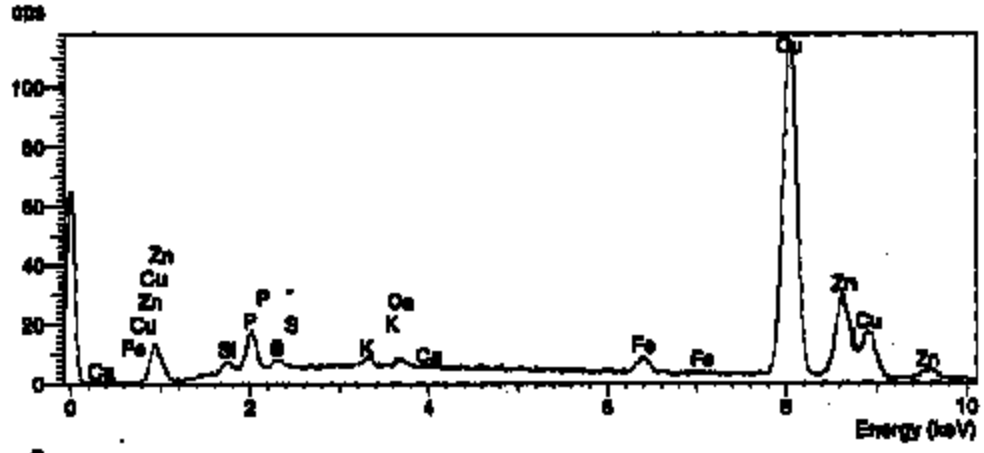
Boup2



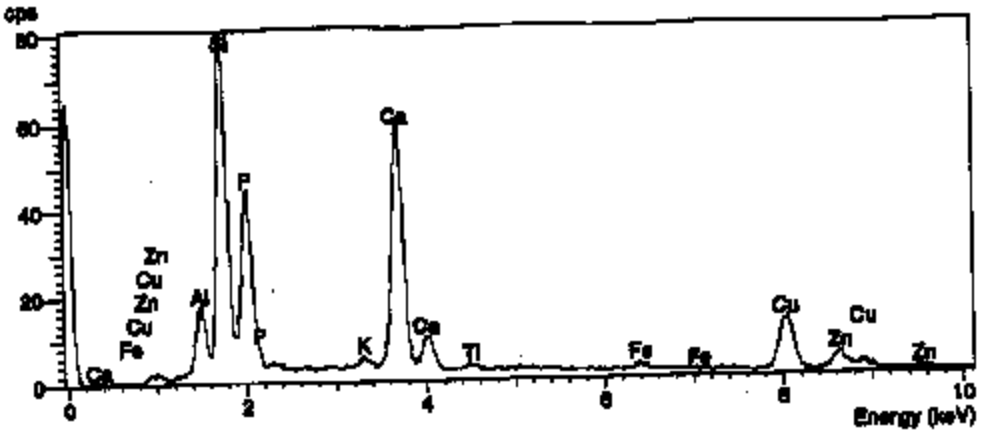
Bcup3



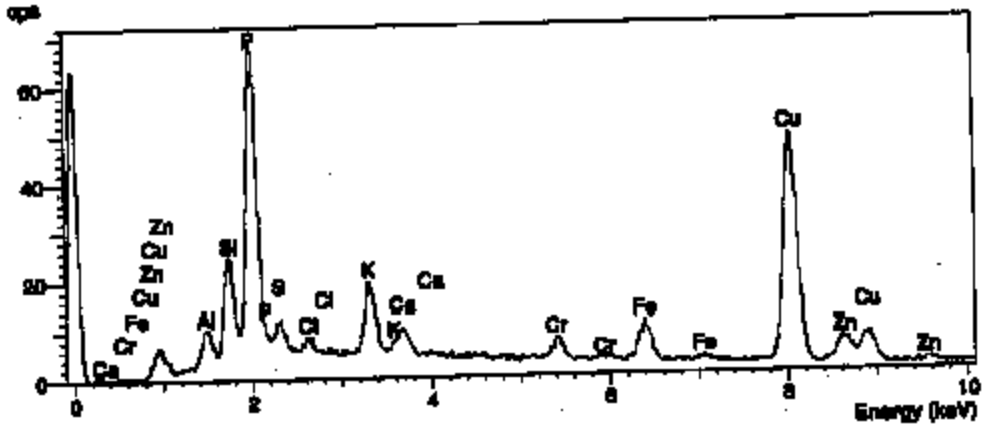
Bcup4



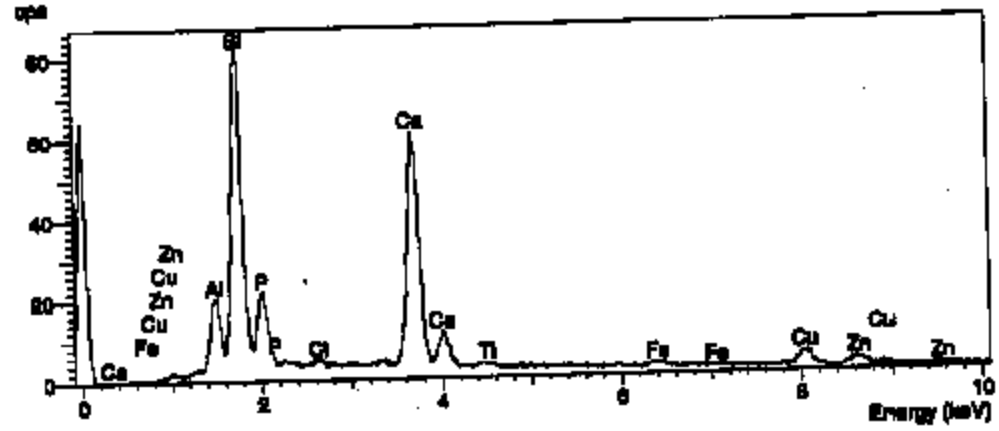
Bcup6



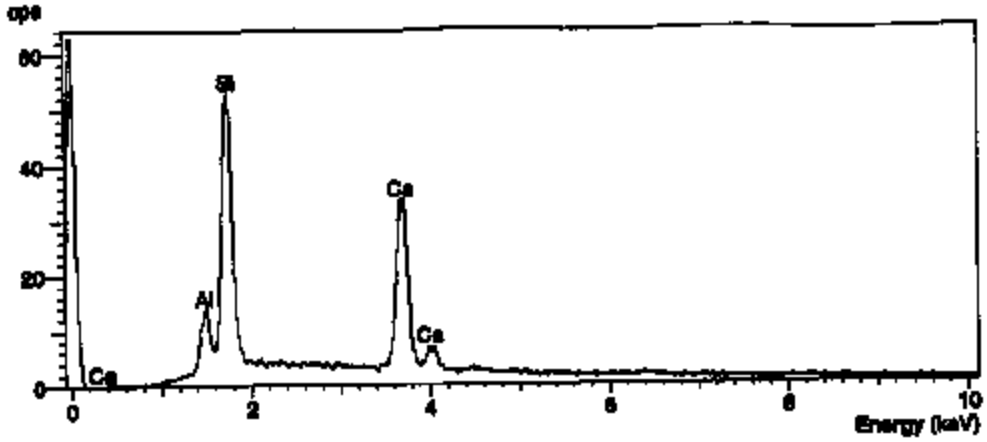
Bport1



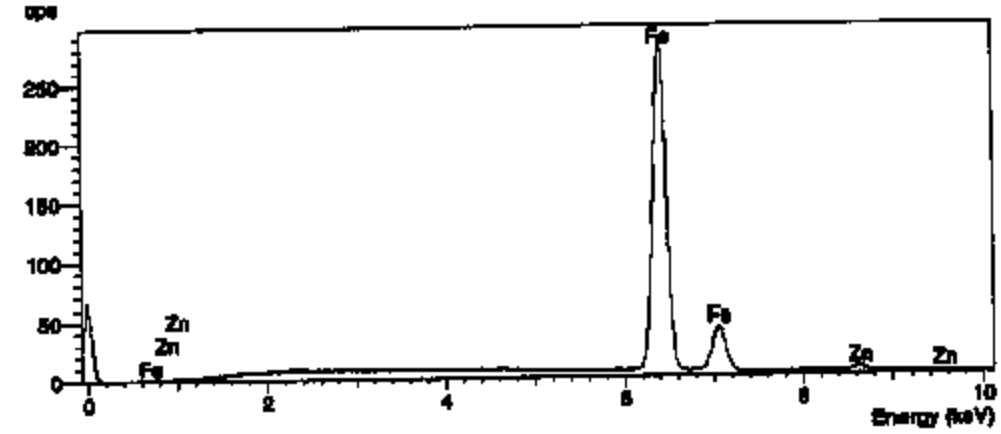
Bport2



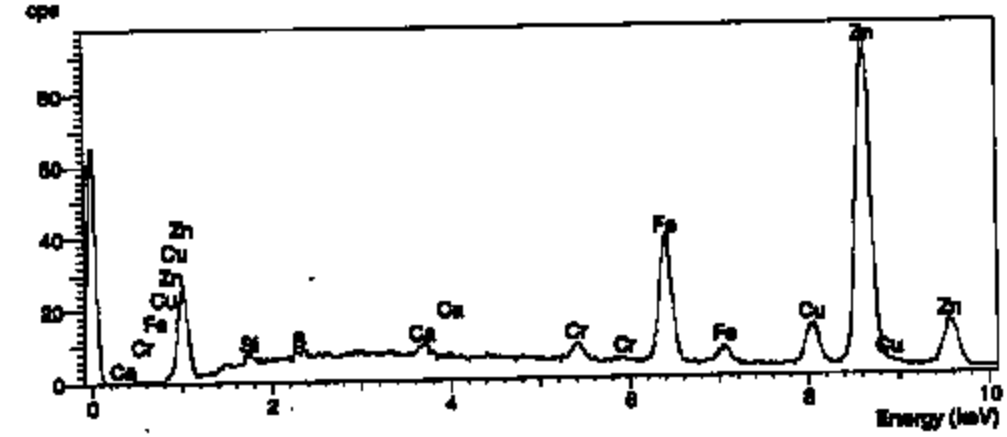
Bport3



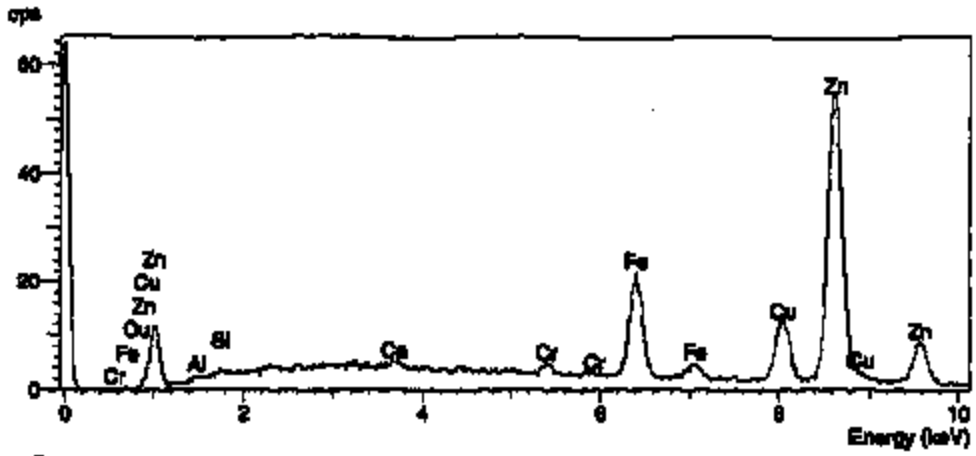
Bport4



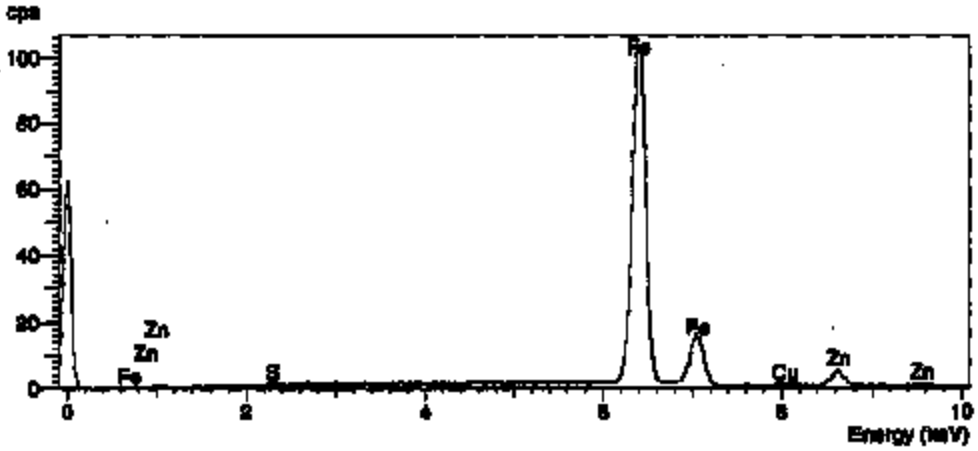
Ccup1



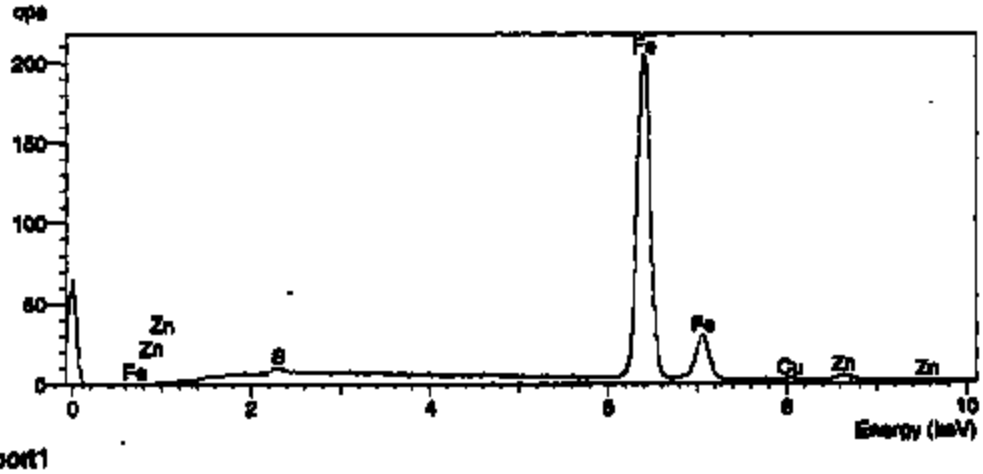
Ccup2



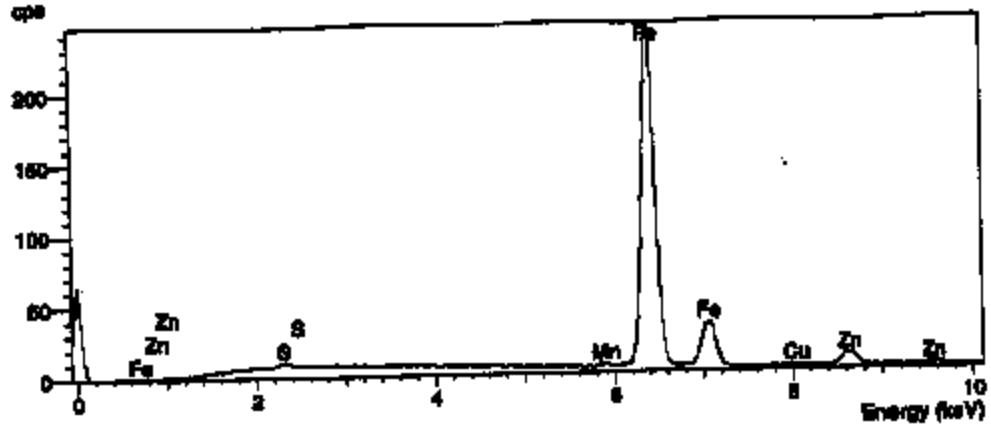
Ccup3



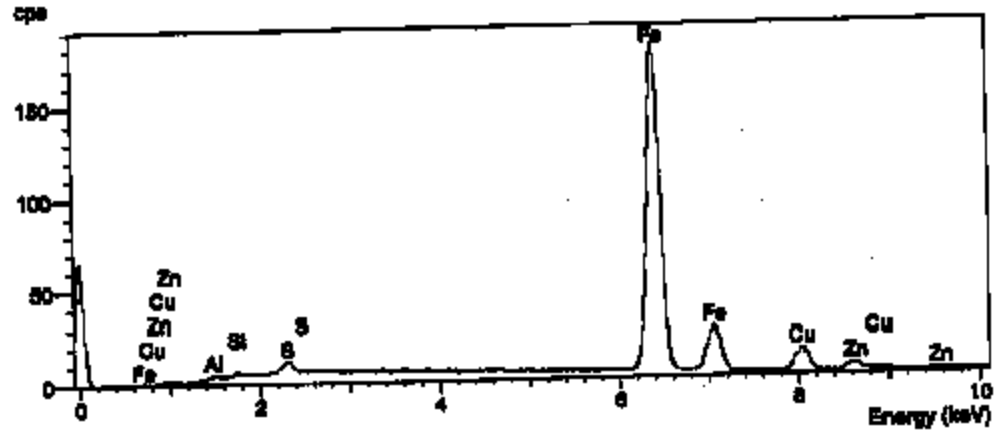
Ccup4



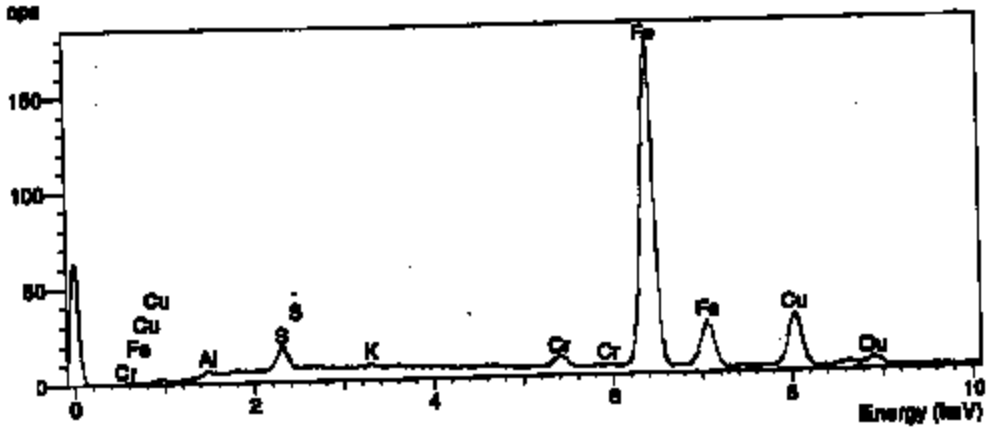
Cport1



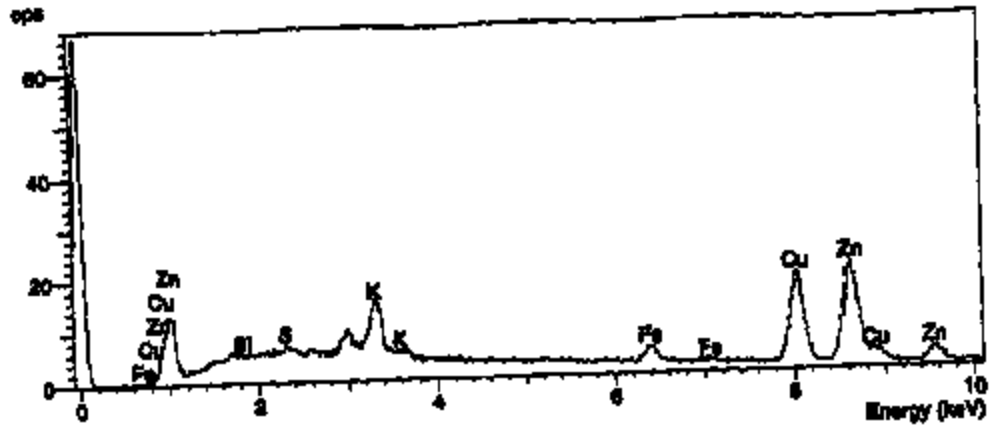
Cport2



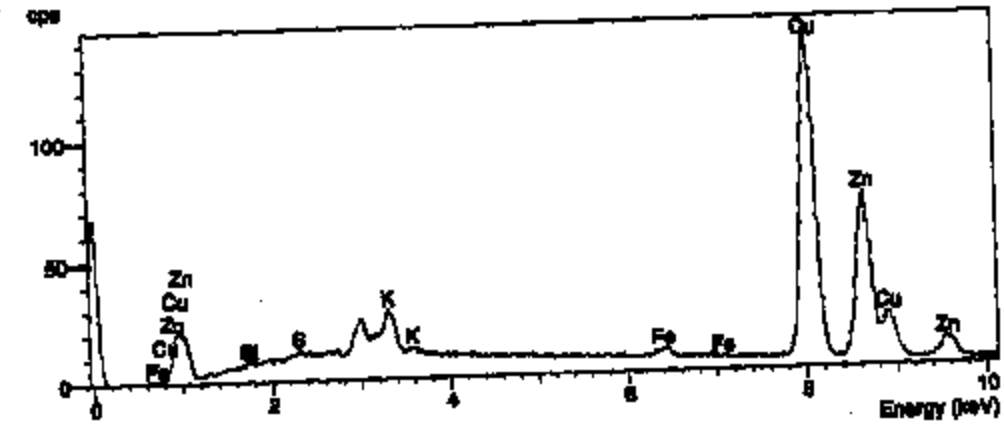
Cport3



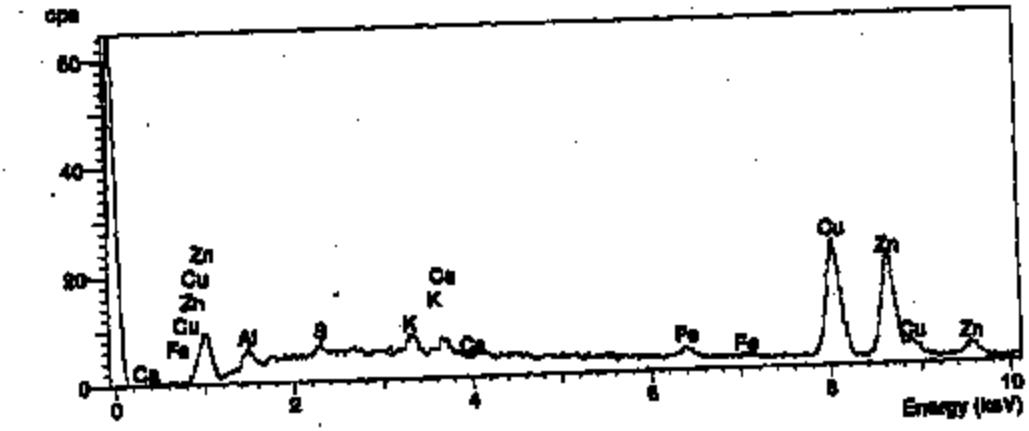
Cport4



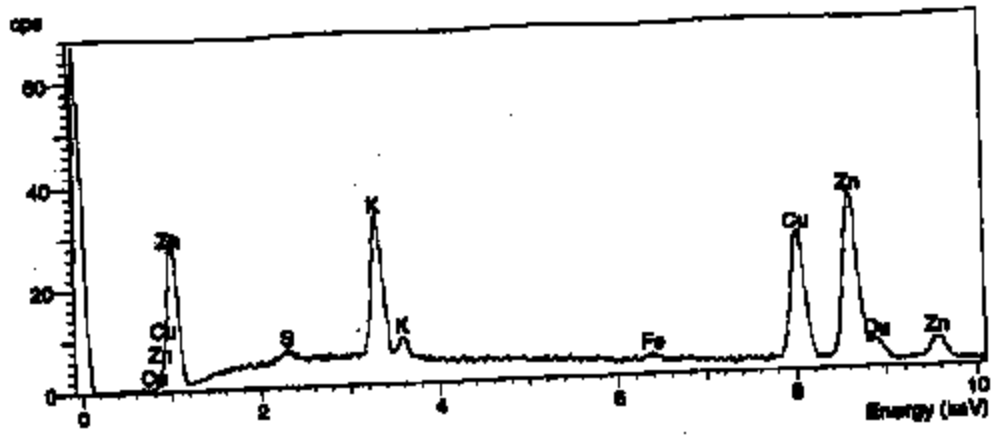
Dcup1



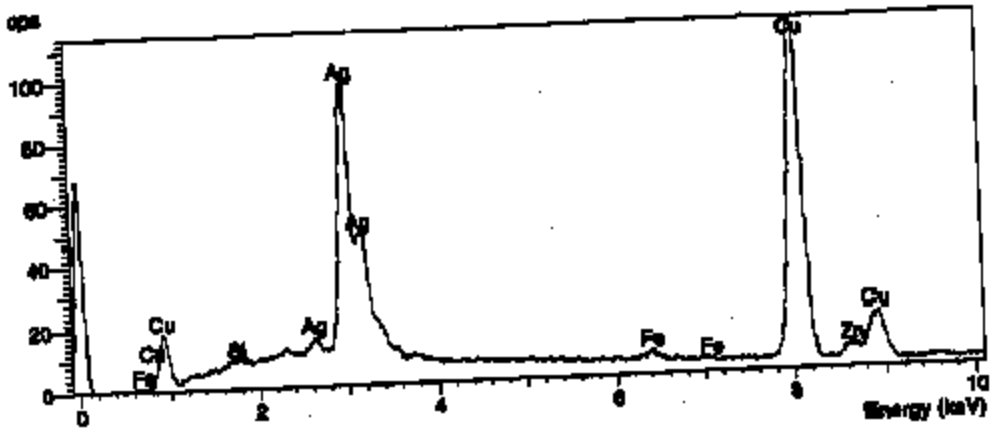
Dcup2



Dcup3

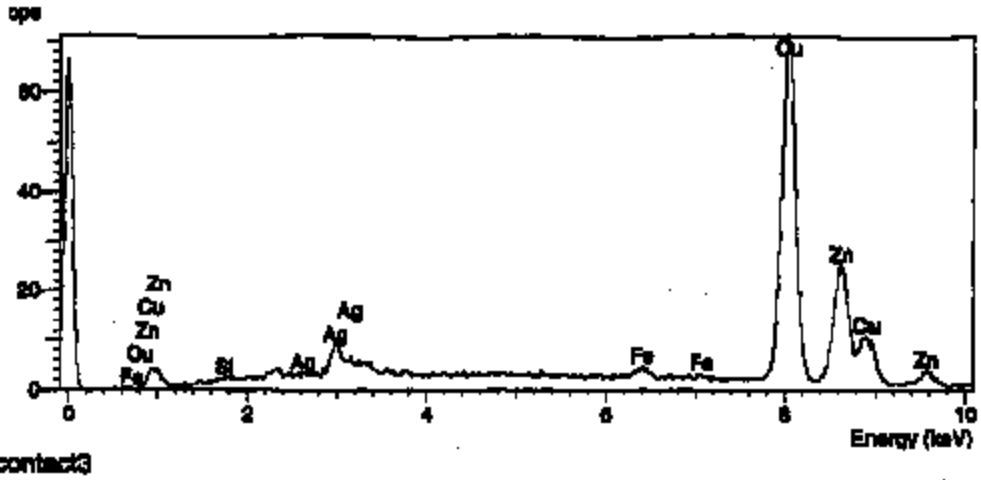


Dcup4

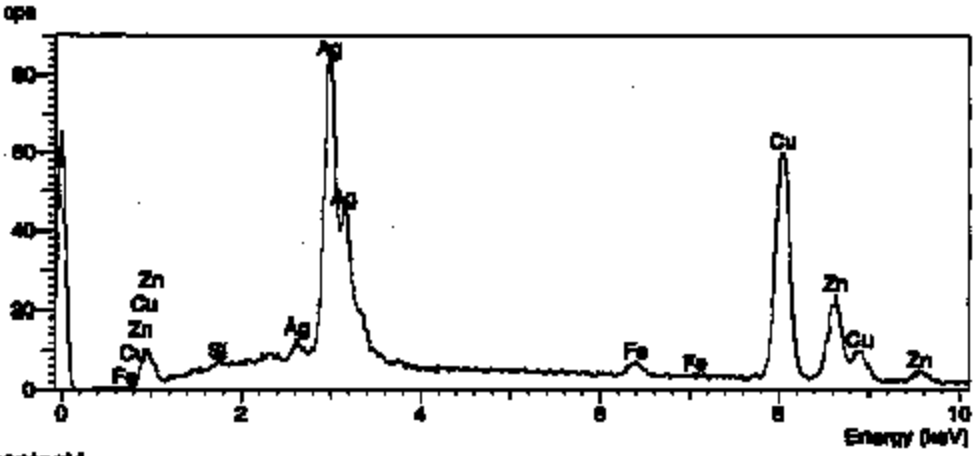


Dcontact1

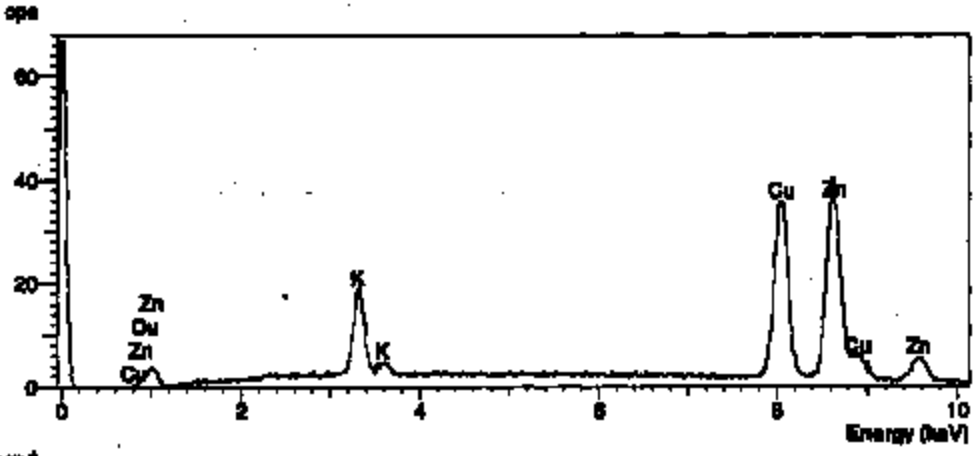
Dcontact2



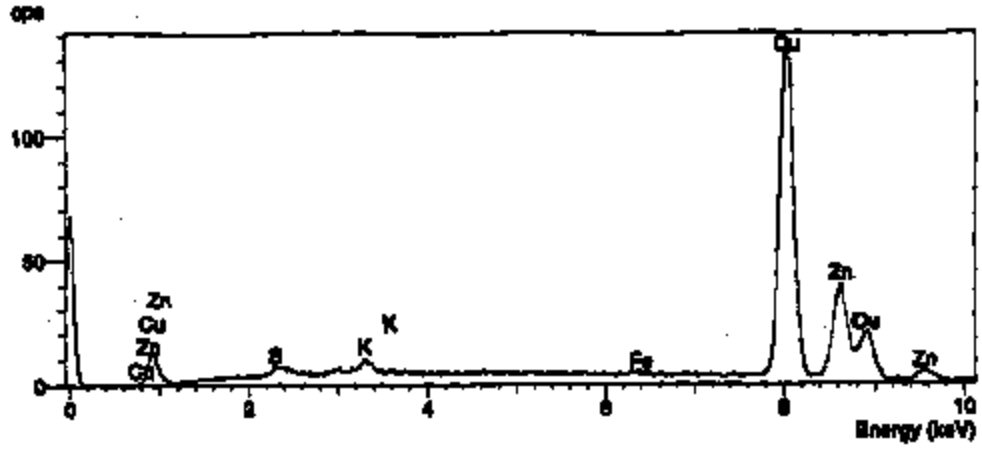
Dcontact3



Dcontact4

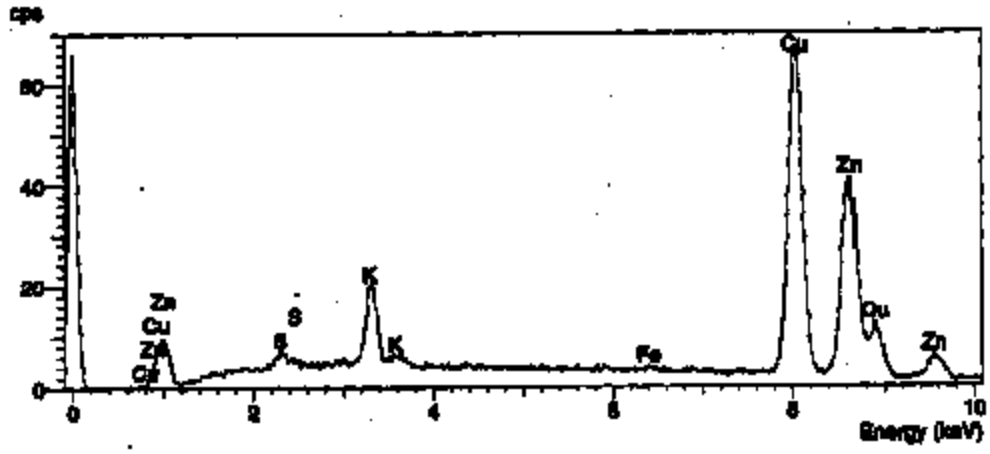


Foup1

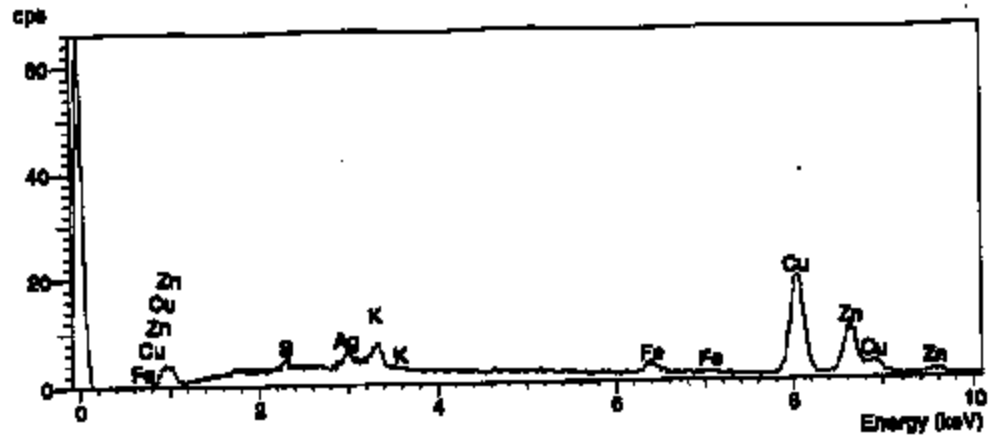


Foup2

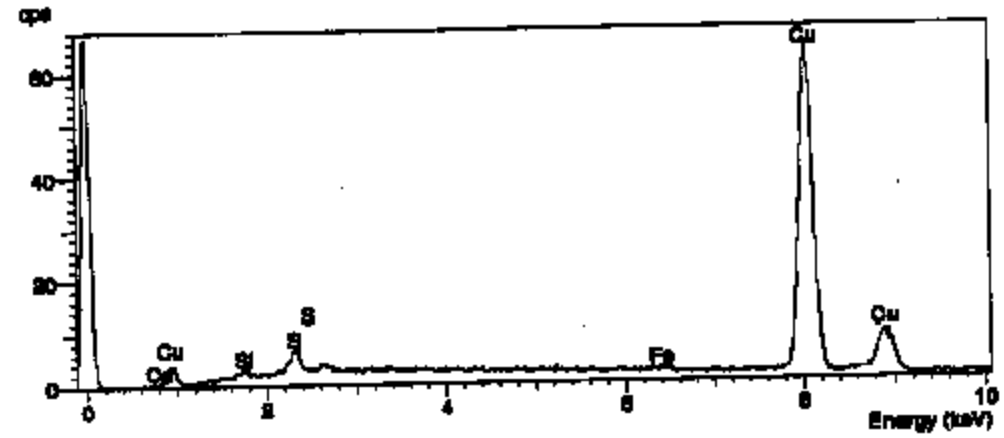
Foup3



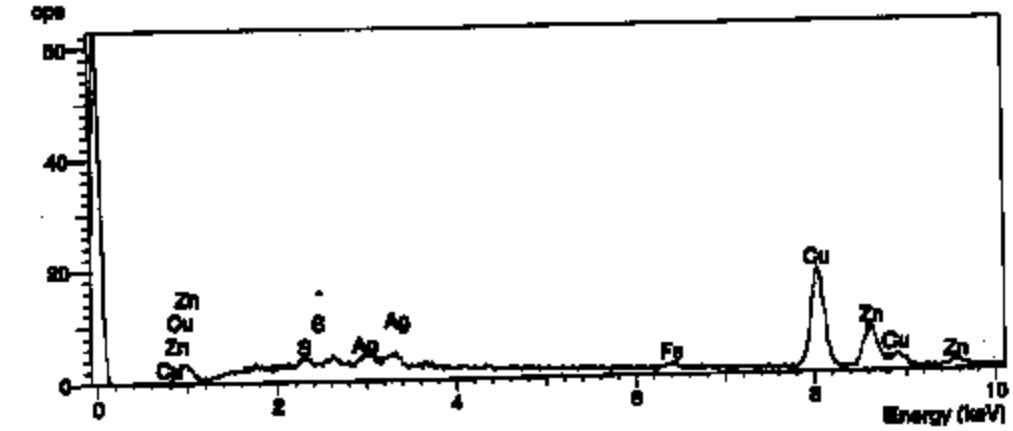
Foup4



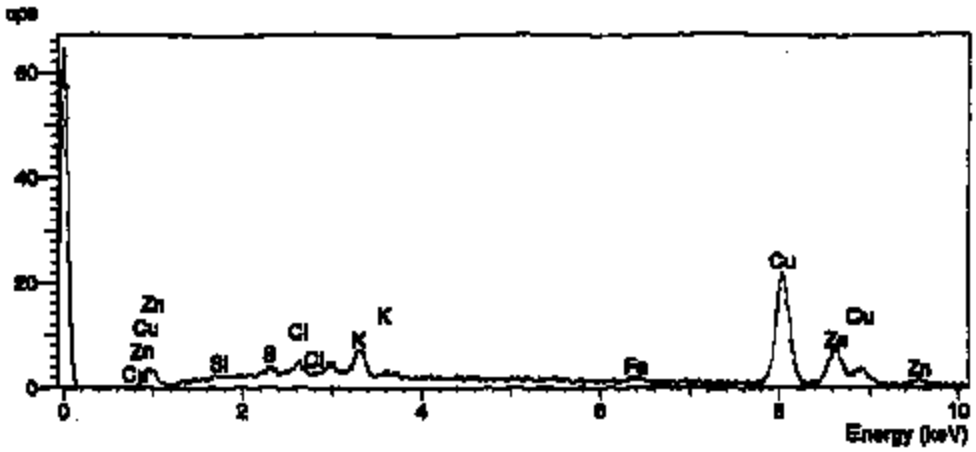
Fcontact1



Fcontact2



Fcontact3


cps
60
40
20
0
Zn
Cu
Zn
Cu
Si
S
Cl
Cl
K
K
Fe
Cu
Cu
Ze
Zn
0
2
4
6
8
10
Energy (keV)

Foontact4

Project No. 99-6226-5
Book No. 2756 TITLE Speed Control Shutoff Switch

From Page No. To Gary Stevens / Steve LaRoche

Subject: Speed Control Shutoff Switch
Part No. F2VY-9F924-A
Specification: Not Provided
Supplier: Texas Instruments

Received: Ten pieces of filter paper were received on 1/20/98. They were identified as A, B, C (Cup + Port), D + F (Cup + Socket)

Object: Perform EDS analysis on the filter paper with in the

Test Data

SEM Examination & EDS Analysis

Particles were removed from each piece of filter paper & placed on a carbon stub. Pieces D + F (with cup + socket) were had "wet" particles due to brake fluid. The particles were rinsed w/ Freon onto new pieces of paper. These cleaned particles were then transferred to a carbon stub for EDS analysis.
4 representative particles from each paper were examined using EDS 50 sec live time, 19.635 kV & work dist 3. The following elements were detected in decreasing order of elemental concentration.

A Cup	1	2	3	4
	Fe	Zn	Zn	Zn
	Zn	Cu	Cu	Cu
	P	Al	Fe	Al
	K	Fe	Al	Fe
	Cu	Si	Si	Si
	Al	K	Ca	Ca
	Ca	S	K	S
	Mn	Ti	S	K
			Mn	
			Ti	

To Page No. 33

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	

From Page No. 32 EDS Analysis Cont'd

A Part

1	2	3
Fe	Fe	Fe
Cu	Cu	Cu
Al	Zn	K
K	K	
	Al	
	S	

B Cup

1	2	3	4	5
Zn	Fe	Cu	Fe	Cu
Cu	P	Zn	Zn	Zn
P	Cu	S	Cu	P
Fe	Al	Si	Al	Fe
Si	Zn		Si	Si
S	Si		S	S
Cu	Cu		P	K
	K		Cl	Ca
	S		Mn	
	Cl		Ca	

B Part

1	2	3	4
Si	Cu	Si	Si
Ca	P	Ca	Ca
Cu	Zn	P	Al
Zn P	Si	Al	
~~Al Zn~~	Fe	Cu	
Al	K	Zn	
Fe	Al	Fe	
K	Cr	Ti	
Ti	S	Cl	
	Ca		
	Cl		

To Page No. 34

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	

Project No. 990-226-5

34 Book No. 2756 TITLE Speed Control Shutoff Switch (cont)

From Page No. 33 EDS Analysis (cont)

C Cup	1	2	3	4
	Fe	Zn	Zn	Fe
	Zn	Fe	Cu	Zn
		Cu	Fe	Cu
		Cr	Cr	S
		Si	Al	
		Ca	Ca	
		S	Si	

C Port	1	2	3	4
	Fe	Fe	Fe	Fe
	Zn	Zn	Cu	Cu
	Cu	Cu	Zn	Zn
	S	S	S	S
		Mn	Al	Cr
			Si	Al
				K

D Cup	1	2	3	4
	Zn	Cu	Zn	Zn
	Cu	Zn	Cu	Cu
	K	K	Al	K
	Fe	Fe	Fe	Fe
	Si	S	K	S
	S	Si	Ca	
			S	

To Page No. 35

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	

From Page No. 34 EDS Analysis (cont)

D Contact	1	2	3	4
	Cu	Cu	Cu	Cu
	Ag	Zn	Zn	Ag
	Zn	Ag	Ag	Zn
	Fe	Fe	Fe	Fe
	Si		Si	Si

FCup	1	2	3	4
	Zn	Cu	Zn	Cu
	Cu	Zn	Cu	Zn
	~~Fe~~ K	K	K	K
		Fe	S	S
		Si		Fe

FContact	1	2	3	4
	Cu	Cu	Cu	Cu
	Zn	S	Zn	Zn
	Ag	Si	Ag	Ag
	K	Fe	Fe	K
	Fe		S	Cl
	S			Fe
				S
				Si

There is tender about 1/2 the centers of the cup on each switch (Cu/Zn present - cups)
B part sample is mainly fibers. A, C part and the Fe-rich
Centers are Cu-Zn-Ag

To Page No. 36

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by	

Project No. 9900226-5
Book No. 2756 TITLE Speed Control Cutoff Switch (cont)

From Page No. 27

4 additional samples were received 2/3/97. They were
2 Copper tubing + 2 Brass fittings
They were in either a new or old brake fluid

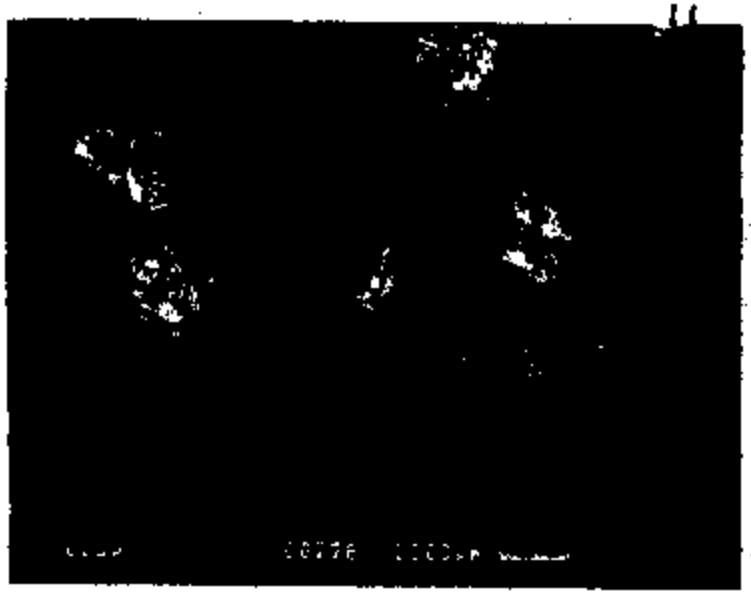
[illegible] examined via optical, and in [illegible] & placed on carbon stub for EDS analysis

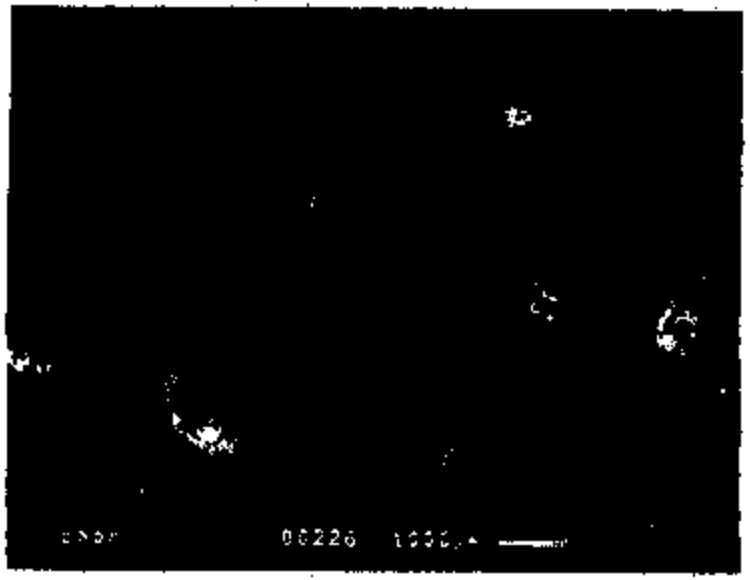
The following elements were detected in decreasing order of elemental concentration

Copper Tubing New	Copper Tubing Old	Fitting New	Fitting Old
Cu	Cu	Cu	Cu
Zn	Cl	Zn	K
S		Cl	S
Fe			
Ca			
Al			
Si			

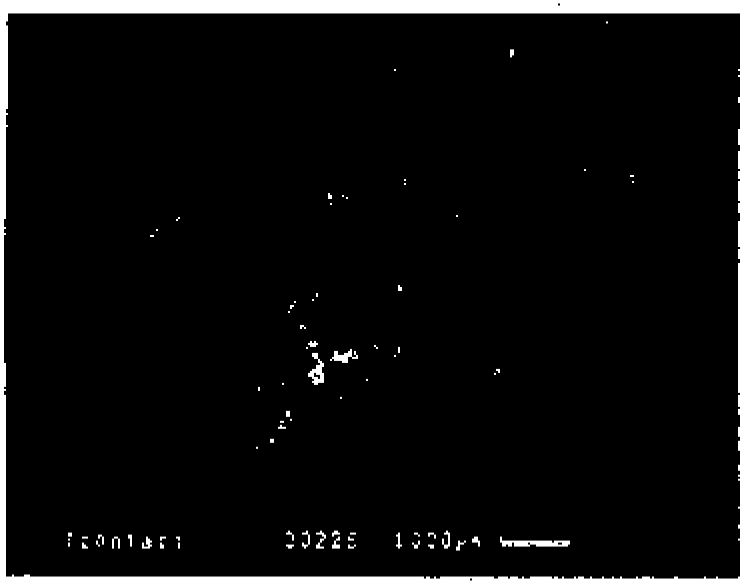
To Page No. ____

Witnessed & Understood by me.	Date	Invented by / Recorded by [signature]	Date 2/4/97





3713 2871



[illegible] results. Listed at 9:47:02 10 on 2/4/94
Operator: Patrick Hanlon
Client: Greg Stevens
Job: 9400022
Spectrum label: Copper Tubing Box2

System resolution = 64 eV

Quantitative method: ZAF (2 iterations).
Analysed all elements and normalised results.

4 peaks possibly omitted: 0.00, 3.12, 10.54, 12.60 keV

Standards:
Al K Al2O3 21/11/93
Si K Quartz 01/12/93
S K FeS2 01/12/93
Ca K Wollas 21/11/91
Fe K Fe 01/12/93
Cu K Cu 01/12/93
Zn K Zn 01/12/93

Elmt	Spect. Type	Element %	Atomic %
Al K	ED	0.12	0.28
Si K	ED	0.09	0.21
S K	ED	0.55	1.09
Ca K	ED	0.15	0.24
Fe K	ED	0.27	0.31
Cu K	ED	80.55	80.20
Zn K	ED	18.27	17.68
Total		100.00	100.00

* = <2 Sigma

Fit Indices

Al K	0.1
Si K	0.8
S K	82.2
Ca K	0.5
Fe K	0.9
Cu K	5.3
Zn K	2.1

3713 2873

SEMQuant results, [illegible]
Operator: Patrick Bailey
Client: Grey Surveys
Job: 9906224
Spectrum label: Copper Tubing Old1

System resolution = 68 eV

Quantitative method: ZAF (2 iterations)
Analysed all elements and normalised results.

2 peaks possibly omitted: 0.00, 7.44 keV

Standards :
Cl K RCl 15/02/94
Cu K Cu 01/12/91

Elmt	Spect. Type	Element %	Atomic %
Cl K	ED	1.79	3.16
Cu K	ED	98.21	96.84
Total		100.00	100.00

* = <2 Sigma

Fit Indices

Cl K	0.7
Cu K	2.1

EDXQuant results, Listed at 3:29:45 PM on 2/1/94
Operator: Patrick Naifox
Client: Greg Stevens
Job: 990222a
Spectrum label: Filter[0] New2

System resolution = 131 eV

Quantitative method: ZAF (2 iterations).
Analysed all elements and normalised results.

1 peak possibly omitted: 0.00 keV

Standards :
Cl K HCl 15/02/94
Cu K Cu 01/12/93
Zn K Zn 01/12/93

Elmt	Spect. Type	Element %	Atomic %
Cl K	KD	7.91	12.04
Cu K	KD	51.70	49.60
Zn K	KD	41.21	38.36
Total		100.00	100.00

* = <2 Sigma

Fit Indices

Cl K	0.3
Cu K	2.1
Zn K	1.2

[illegible]uant results. Listed at 1:2x:?2 PM on 2/1/96
Operator: Patrick Burlos
Client: Greg Stevens
Job: 9964226
Spectrum label: Pitting Old

System resolution = <1 eV

Quantitative method: ZAF (2 iterations).
 Analysed all elements and normalised results.

 1 peak possibly omitted: 0.00 keV

Standards :
 S K   FeS2 01/12/91
 K K   HAR-16 02/12/91
 Cu K   Cu 01/12/93

Elmt	Spect. Type	Element %	Atomic %
S K	KD	0.81	1.58
K K	KD	1.56	2.90
Cu K	KD	97.62	95.52
Total		100.00	100.00

* = <2 Sigma

Fit Indices

S K	1.6
K K	1.7
Cu K	5.1

3713 2876

SEMQuant results, taken at 1:30:18 PM on 1/2x/9x
Operator: Patrick Matos
Client: Greg Stevens
Job: 990622x
Spectrum label: Avlgpl

System resolution - 102 eV

Quantitative method: ZAF (3 iterations).
 Analysed all elements and normalised results.

 1 peak possibly omitted: 0.00 keV

Standards :
 Al K Al2O3 23/11/93
 P K GaP 29/11/93
 K K MAD-10 02/12/93
 Ca K Wollas 23/11/93
 Mn K Mn 01/12/93
 Fe K Fe 01/12/93
 Cu K Cu 01/12/93
 Zn K Zn 01/12/93

Elm.	Spect. Type	Element %	Atomic %
Al K	BO	2.45	4.59
P K	BO	9.38	15.27
K K	BO	4.95	6.38
Ca K	BO	2.42	3.04
Mn K	BO	0.35	0.32
Fe K	BO	62.86	56.75
Cu K	BO	4.01	3.18
Zn K	BO	11.57	10.47
Total		100.00	100.00

* = <2 Sigma

Fit-Indices

Al K	1.8
P K	0.7
K K	0.3
Ca K	0.4
Mn K	2.2
Fe K	2.0
Cu K	0.8
Zn K	1.4

3713 2877

Quant results. Listed at 11:17:54 PM on 1/20/96
Operator: Patrick Mullins
Client: Greg Stevens
Job: 960022e
Spectrum label: Acup2

System resolution = 162 eV

Quantitative method: ZAF (3 iterations).
Analysed all elements and normalised results.

1 peak possibly omitted: 0.00 keV

Standards :
Al K Al2O3 23/11/93
Si K Quartz 01/12/93
S K FeS2 01/12/91
K K NAB-1B 02/12/93
Ca K Wollas 23/11/93
Ti K Ti 01/12/91
Fe K Fe 01/12/93
Cu K Cu 01/12/91
Zn K Zn 01/12/91

Elmt	Spect. Type	Element %	Atomic %
Al K	KD	8.44	17.10
Si K	KD	2.93	5.71
S K	KD	0.38	0.65
K K	KD	0.65	0.91
Ca K	KD	1.19	1.62
Ti K	KD	0.31	0.37
Fe K	KD	7.36	7.20
Cu K	KD	23.99	20.64
Zn K	KD	54.71	45.78
Total		100.00	100.00

* = <2 Sigma

Fit Indices

Al K	0.6
Si K	60.1
S K	31.8
K K	0.4
Ca K	0.3
Ti K	0.3
Fe K	0.5
Cu K	2.8
Zn K	1.9

SEMQuant results, Dated at 1:19:05 PM on 1/24/96
Operator: Patrick Marion
Client: Greg Stevens
Job: 9900226
Spectrum label: A0spt

System resolution = 163 eV

Quantitative method: ZAF (3 iterations).
Analysed all elements and normalised results.

2 peaks possibly omitted: 0.00, 5.46 keV

Standards :
Al K Al2O3 23/11/93
Si K Quartz 01/12/93
S K FeS2 01/12/93
K K HAD-10 02/12/93
Ca K Wollas 23/11/93
Ti K Ti 01/12/93
Mn K Mn 01/12/93
Fe K Fe 01/12/93
Cu K Cu 01/12/93
Zn K Zn 01/12/93

Elmt	Spect. Type	Element %	Atomic %
Al K	RD	12.23	23.74
Si K	RD	1.87	1.48
S K	RD	0.36	0.59
K K	RD	0.76	1.02
Ca K	RD	1.46	2.17
Ti K	RD	0.17	0.18
Mn K	RD	0.25	0.24
Fe K	RD	14.61	13.71
Cu K	RD	15.48	12.76
Zn K	RD	52.58	42.10
Total		100.00	100.00

* = <2 Sigma

Fit Indices

Al K	0.1
Si K	46.1
S K	25.7
K K	0.5
Ca K	0.6
Ti K	0.6
Mn K	0.6
Fe K	0.8
Cu K	0.7
Zn K	0.7

SEMQuant results. Created at 1:41:48 PM on 1/29/98
Operator: Patrick Hatton
Client: Greg Stevens
Job: 9806?1c
Spectrum label: Acup4

System resolution 161 eV

Quantitative method: ZAF (3 iterations).
Analysed all elements and normalised results.

1 peak possibly omitted: 0.00 keV

Standards :
Al K Al2O3 23/11/91
Si K Quartz 01/12/91
S K FeS2 01/12/91
K K MAD-10 02/12/91
Ca K Wollas 23/11/91
Fe K Fe 01/12/91
Cu K Cu 01/12/91
Zn K Zn 01/12/91

Elmt	Spect. Type	Element %	Atomic %
Al K	SD	10.21	20.88
Si K	SD	1.39	2.73
S K	SD	0.26	0.44
K K	SD	0.21	0.29
Ca K	SD	0.59	0.81
Fe K	SD	2.47	2.44
Cu K	SD	39.61	34.52
Zn K	SD	45.24	38.00
Total		100.00	100.00

* = <2 Sigma

Fit Indices

Al K	0.5
Si K	7.3
S K	1.7
K K	0.6
Ca K	0.7
Fe K	0.6
Cu K	1.4
Zn K	1.2

[illegible] results. Listed at [illegible] PM on [illegible]
Operator: Patrick Nelson
Client: Greg Stevens
Job: "SHD22r
Spectrum label: APort1

System resolution = 161 eV

Quantitative method: XAF (2 iterations).
Analysed all elements and normalised results.

1 peak possibly omitted: 0.00 keV

Standards :
Al K Al2O3 21/11/93
K K MAb-10 02/12/93
Fe K Fe 01/12/93
Cu K Cu 01/12/94

Elmt	Spect. Type	Element %	Atomic %
Al K	KD	0.81	1.70
K K	KD	0.74	1.04
Fe K	KD	97.14	96.31
Cu K	KD	1.09	0.95
Total		100.00	100.00

* = <2 Sigma

Fit Indices

Al K 0.2
K K 0.5
Fe K 1.7
Cu K 0.5

3713 2991

```
SEMQuant results, started at 1:4?:21 PM on 1/??/9?
Operator: Patrick Mallon
Client: Grey Stevens
Job: 9900226
Spectrum label: APort?

System resolution =  163 eV

Quantitative method: FAP ( 2 iterations).
 Analysed all elements and normalised results.

 1 peak possibly omitted: 6.0b keV

Standards :
 Al K       Al2O3 23/11/91
 S  K       FeS2 01/12/91
 K  K       MAD-10 02/12/91
 Fe K       Fe 01/12/91
 Cu K       Cu 01/12/91
 Zn K       Zn 01/12/91


Elmt    Spect.  Element   Atomic
        Type      %         %
Al K      ED      0.75      1.61
S  K      ED      0.28      0.51
K  K      ED      0.98      1.46
Fe K      ED     54.79     56.18
Cu K      ED     30.70     28.18
Zn K      ED     13.50     12.04
Total           100.00    100.00

* = 2 Sigma

Fit Indices
-----------
Al K    0.6
S  K    0.1
K  K    0.4
Fe K    1.6
Cu K    1.6
Zn K    0.7
```

3713 2882

```
SEMQuant results, Listed at 1:48:04 PM on 1/26/96
Operator: Patrick Barlow
Client: Greg Stevens
Job: 9600226
Spectrum label: APart 1

System resolution =  163 eV

Quantitative method: ZAF ( 2 iterations).
 Analysed all elements and normalised results.

 1 peak possibly omitted: 0.00 keV

Standards :
 K  K       MAD-10 02/12/91
 Fe K       Fe 01/12/93
 Cu K       Cu 01/12/91


Elmt    Spect.  Element  Atomic
        Type       %        %
K  K     ED       0.62     0.88
Fe K     ED      98.00    97.91
Cu K     ED       1.38     1.21
Total            100.00   100.00

* = <2 Sigma

Fit Indices
----------- ------
K  K    0.2
Fe K    3.1
Cu K    2.0
```

[illegible]Quant results, Dated at 1:52:09 PM on 1/29/[illegible]
Operator: Patrick Bellos
Client: Greg Stevens
Job: [illegible]
Spectrum label: Sampl

System resolution = 161 eV

Quantitative method: ZAF (1 iterations).
 Analysed all elements and normalised results.

 2 peaks possibly omitted: 0.00, 2.96 keV

Standards :
 Si K   Quartz 01/12/93
 P K   GaP 29/11/91
 S K   FeS2 01/12/93
 Ca K   Wollas 21/11/91
 Fe K   Fe 01/12/93
 Cu K   Cu 01/12/91
 Zn K   Zn 01/12/91

Elem	Spect. Type	Element %	Atomic %
Si K	MU	0.92	2.00
P K	MU	4.01	7.89
S K	MU	0.85	1.62
Ca K	MU	0.41	0.62
Fe K	MU	3.10	1.20
Cu K	MU	10.98	10.52
Zn K	MU	81.73	76.15
Total		100.00	100.00

* = <2 Sigma

Fit Indices

Si K	0.5
P K	0.6
S K	0.7
Ca K	0.4
Fe K	0.4
Cu K	0.6
Zn K	0.5

3713 2894

[illegible] results. Listed at 1:54:29 PM on 1/29/96
Operator: Patrick Naylor
Client: Greg Stevens
Job: 9900/22c
Spectrum label: Bulk2

System resolution = 143 eV

Quantitative method: XRF (3 iterations).
Analysed all elements and normalised results.

1 peak possibly omitted: 4.08 keV

Standards :

Al K	Al2O3 23/11/93
Si K	Quartz 01/12/93
P K	GaP 29/11/93
S K	FeS2 01/12/93
Cl K	KCl 15/02/94
K K	MAD-10 02/12/93
Ca K	Wollas 23/11/93
Fe K	Fe 01/12/93
Cu K	Cu 01/12/93
Zn K	Zn 01/12/93

Elmt	Spect. Type	Element %	Atomic %
Al K	ED	7.95	13.25
Si K	ED	5.86	9.39
P K	ED	11.74	17.05
S K	ED	1.00	1.41
Cl K	ED	0.58	0.73
K K	ED	1.01	1.16
Ca K	ED	2.87	3.22
Fe K	ED	52.24	42.08
Cu K	ED	8.81	6.23
Zn K	ED	7.95	5.47
Total		100.00	100.00

* = <3 Sigma

Fit Indices

Al K	0.1
Si K	0.3
P K	0.1
S K	0.3
Cl K	5.7
K K	1.3
Ca K	1.2
Fe K	0.8
Cu K	0.1
Zn K	0.1

8713 2805

[illegible]Quant results, Created at 1:[illegible] PM on 1/[illegible]
Operator: Patrick Miller
Client: Greg Stevens
Job: 950022c
Spectrum label: [illegible]pa1

System resolution = 161 eV

Quantitative method: ZAF (2 iterations).
 Analyzed all elements and normalized results.

 1 peak possibly omitted: 6.00 keV

Standards :
 Si K   Quartz 01/12/91
 S K   ZnS 01/12/91
 Cu K   Cu 01/12/91
 Zn K   Zn 01/12/91

Elmt	Spect. Type	Element %	Atomic %
Si K	KD	0.56	1.24
S K	KD	0.42	1.21
Cu K	KD	84.56	83.78
Zn K	KD	14.27	13.74
Total		100.00	100.00

* = <2 Sigma

Fit Indices

Si K 0.4
S K 0.6
Cu K 2.4
Zn K 1.7

[illegible] results, Started at 2:04:33 PM on 1/29/99
Operator: Patrick Mallon
Client: Greg Stevens
Job: 990129a
Spectrum label: Rcmp4

System resolution = 161 eV

Quantitative method: XRF (2 iterations).
Analysed all elements and normalised results.

2 peaks possibly omitted: 0.00, 11.98 keV

Standards :
Al K Al2O3 23/11/91
Si K Quartz 01/12/91
P K GaP 29/11/93
S K FeS2 01/12/91
Cl K KCl 05/02/94
Ca K Wollas 23/11/91
Mn K Mn 01/12/91
Fe K Fe 01/12/91
Cu K Cu 01/12/91
Zn K Zn 01/12/91

Elmt	Spect. Type	Element %	Atomic %
Al K	BD	0.45	0.93
Si K	BD	0.39	0.77
P K	BD	0.21	0.38
S K	BD	0.22	0.38
Cl K	BD	0.21	0.33
Ca K	BD	0.15	0.20
Mn K	BD	0.20*	0.20*
Fe K	BD	95.28	95.70
Cu K	BD	0.68	0.60
Zn K	BD	12.24	10.51
Total		100.00	100.00

* = <2 Sigma

Fit Indices

Al K	0.2
Si K	0.5
P K	0.7
S K	0.3
Cl K	0.5
Ca K	4.4
Mn K	5.7
Fe K	5.1
Cu K	0.7
Zn K	0.7

3713 2867