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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF PESTICIDE PROGRAMS
ENVIRONMENTAL CHEMISTRY LABORATORY
BUILDING 1105—JOHN C. STENNIS SPACE CENTER
STENNIS SPACE CENTER, MISSISSIPPI 39529-6000
TELEPHONE (228) 688-3216 FACSIMILE (228) 688-3536

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MEMORANDUM

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SUBJECT: Pyrethrum Method Evaluation-Report No. ECM0188W1

FROM: Aubry E. Dupuy, Jr., Branch Chief *Aubry E. Dupuy, Jr.*
OPP/BEAD/Environmental Chemistry LaboratoryTO: Iwona Maher (7507C)
OPP/Environmental Fate and Effects Division
Environmental Risk Branch

The BEAD/Environmental Chemistry Lab has performed an Environmental Chemistry Method Evaluation (ECME) on Pyrethrins in water using the method, "Development And Validation of An Analytical Methodology For The Determination Of Total Pyrethrin In Water, Acetone And Fish Tissue".

The attached method evaluation report includes three parts:

Part I: Summary and Conclusions

In this section any problems encountered with the method and how they were handled are discussed. ECL's opinion of how well the method performed is also presented.

Part II: Analytical Results

In this section the individual results of each sample at each spiking level of each analyte is listed. The arithmetical means and descriptive statistics for each spiking level are also presented here.

Part III: Experimental Details

In this section any modification(s) that were made to the method, along with instrument parameters, spiking levels, example calculations, representative samples and standard chromatograms and standard curves are listed and/or discussed.



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If you have questions concerning this report, please contact Charles Kennedy at (228) 688-2443 or Aubry Dupuy at (228) 688-3212.

cc: Christian Byrne, QA Officer
BEAD/ECL

Charles Kennedy
BEAD/ECL

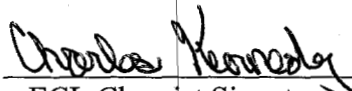
Environmental Chemistry Method Evaluation Report
Development And Validation Of An Analytical Methodology For The Determination
Of Total Pyrethrins In Water, Acetone And Fish Tissue

Report Number ECM0188W1

Final Report

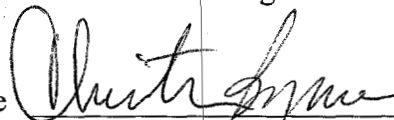
Environmental Chemistry Laboratory
Biological and Economic Analysis Division

Prepared by: Charles Kennedy


ECL Chemist Signature

11/19/01
Date

Reviewed by: Christian Byrne


ECL/QA Officer Signature

11/19/01
Date

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Part 1

Summary and Conclusions

ECB has completed the Environmental Chemistry Method Evaluation (ECME) "Development And Validation Of An Analytical Methodology For The Determination Of Total Pyrethrins In Water, Acetone and Fish Tissue". The method used to accomplish the analyses was submitted by the Pyrethrin Joint Venture/Chemical Specialties Manufacturer's Association in support of registration MRID No. 438841-02.

ECB established that the method could be used to monitor deep well water for the presence of Pyrethrin (Pyrethrin 1, Cinerin 1 and Jasmolin 1) at an LOQ of 0.056 ppb and above.

Residues of Pyrethrin 1, Cinerin 1, and Jasmolin 1 are extracted from 1000 mL of water with hexane. The organic phase was concentrated on a rotary evaporator and the residues were dissolved in acetonitrile:water. Solid phase extraction clean-up was then performed and the test material was eluted off the column with acetone. Samples were brought to final volume using hexane. Separation and quantification was performed by gas chromatography utilizing electron capture detection (GC-ECD).

In order to evaluate this method ECB fortified a well water matrix with Pyrethrum Extract (FEK-99) at 0.017 ppb (ECL calculated LOD), 0.056 ppb (registrant's claimed LOQ), and 0.56 ppb (10 x LOQ). All samples were extracted and analyzed in replicates of four at each fortification level. ECB found the precision to be well within the target limits of $\leq 20\%$ relative standard deviation (RSD) for Pyrethrin 1, Cinerin 1, and Jasmolin 1 at the LOQ, and 10 x LOQ levels. The average RSD at the LOQ for Pyrethrin 1, Cinerin 1, and Jasmolin 1 was 14.2. At 10 x LOQ the RSD was 2.39. The mean recovery at 10 x LOQ for Pyrethrin 1, Cinerin 1, and Jasmolin 1 (96.6%) was within the target range of 70.0% to 120%. Mean recovery at the LOQ for Pyrethrin 1, Cinerin 1, and Jasmolin (86.2%) was within the target range. ECB found the recoveries and precision to be similar to those claimed by the registrant.

Part II

EPA Analytical Results

Results:

1. Pyrethrin 1 Congeners (Pyrethrin 1, Cinerin 1, Jasmolin 1)

Recovery Values for Well Water Fortified at 0.017, 0.056, and 0.56 ppb in four replicates on Electron Capture GC Detector.

(3) Fortified (ppb)	(4) Recovery (ppb)	(5) Recovery %	(7) SD	(8) RSD %
Matrix Blk (1)	—	—	—	--
Sample#1-0.017 Sample#2-0.017 Sample#3-0.017 Sample#4-0.017 (2) Mean(6)	0.010 0.011 0.009 0.010 0.011			
Sample#1-0.056 Sample#2-0.056 Sample#3-0.056 Sample#4-0.056 Mean	0.042 0.058 0.046 0.047 0.048	75.0 104 82.1 83.9 86.2	12.2	14.2
Sample#1-0.56 Sample#2-0.56 Sample#3-0.56 Sample#4-0.56 Mean	0.547 0.555 0.535 0.526 0.541	97.7 99.1 95.5 93.9 96.6	2.31	2.39

Notes:

(1) Limit of Detection (LOD), equivalent to approximately 0.017 ppb in water sample.

Limit of Quantitation (LOQ), equivalent to 0.056 ppb in water sample.

The LOD and LOQ were determined by ECL as a 3:1 signal to noise ratio and 10:1 signal-to-noise ratio, respectively.

(2) The four values (Sample#1, Sample#2, Sample#3, Sample#4) are replicate water samples at each of three concentration levels of 0.017, 0.056, and 0.56 ppb.

(3) Fortified (ppb) = Pyrethrin 1, Cinerin 1, Jasmolin 1, Fortification Levels.

(4) Recovery (ppb) = Pyrethrin 1, Cinerin 1, Jasmolin 1 Recovery Average Levels in Terms of Concentration.

(5) Recovery % = Percent Average Recovery of Pyrethrin 1, Cinerin 1, Jasmolin 1 as referred to in the Calculation Section.

(6) Mean Recovery = Average Recovery of Sample#1, Sample#2, Sample#3 and Sample#4.

(7) SD = Standard Deviation of % Recovery of Four Replicate Samples of Pyrethrin 1, Cinerin 1, Jasmolin 1.

(8) RSD = Relative Standard Deviation of % Recovery of Four Replicate Samples of Pyrethrin 1, Cinerin 1, Jasmolin 1.

Part III

Experimental Details

General description of method:

A volume of 1000 mL well water was transferred to a 2000 mL separatory funnel. After completing spiking fortifications, the solution was extracted twice with 250 mL hexane by partitioning for about 2 minutes for each 250 mL. Thereafter, the combined organic phase was totally evaporated on a rotary evaporator at a temperature of 38 °C. The residue was dissolved in 20.0 mL of acetonitrile:water (50:50, v:v). C-18 solid phase extraction (SPE) clean-up columns were conditioned with 2 column volumes of acetonitrile followed by 2 column volumes of reagent grade water. Following addition of the samples to the C-18 columns, the columns were washed with 200 mL reagent grade water and dried for 10 minutes under vacuum. The test material was

then eluted from the column with 10 mL of acetone. The extracts were then reduced to dryness under a gentle stream of nitrogen, and brought to 5 mL using hexane before analysis by gas chromatography (GC). Following acceptance of the chromatographic data, the chromatograms were batch processed for the sum of the peak height and ng/mL for each of the three congener 1 peaks.

Table 1 (page 7) summarizes the retention times observed for the HP 6890 gas chromatograph with an electron capture detector.

The structural formula of Pyrethrum Extract (Pyrethrin 1, Cinerin 1, Jasmolin 1) is shown in Appendix A.

Modification to method:

The following column oven program rate and carrier flow was incorporated into this method validation by ECL to obtain a better peak resolution for Pyrethrin 1, Cinerin 1, Jasmolin 1.

From: 100 °C, to 275°C, ramp 10 degrees per minute, helium carrier gas flow 2.5 mL/min.
To: 90°C, to 275°C, ramp 7 degrees per minute, helium carrier gas 1.5 mL/min.

Sources of analytical reference standards:

Pyrethrum Extract (FEK-99) analytical standard was obtained from MKG (McLaughlin Gormley King Company), 8810 Tenth Avenue North, Minneapolis, Minnesota, 55427-4372 Telephone: (612)-544-0341. Fax (612) 544-6437

1. Pyrethrum Extract (containing Pyrethrin 1, Cinerin 1, and Jasmolin 1), CAS #8003-34-7, Lot # FEK-99, 58.12 % purity.

Source of sample matrix:

The deep well water used was obtained from Stennis Space Center, MS and was characterized by NASA Environmental Services Laboratory. A copy of the characterization report is included in Appendix B.

Instrumentation for quantitation (listed only if different from that listed in method)

Hewlett Packard 6890 GC System with Auto Injector and Electron Capture Detector.

Instrumentation for confirmation: Not applicable.

Relative retention parameters for the present evaluation:

Table 1

Pyrethrin 1 Congeners

Analyte	Chemical Abstracts Registry No.	Retention Time (Minutes)
Pyrethrin 1	8003-34-7	13.6
Cinerin 1	8003-34-7	14.6
Jasmolin 1	8003-34-7	14.8

Notes on analytical procedures:

ECB found the method to work well for Pyrethrin 1 congeners (Pyrethrin 1, Cinerin 1, and Jasmolin 1). A linear regression curve was used for all calculations.

Comments:

Due to baseline interference effecting recovery values of Pyrethrin 1, Cinerin 1, and Jasmolin 1, ECB found it necessary to change the oven temperature and program rate from those stated in method. This resulted in more accurate recovery values calculated by the HP-ChemStation.

Completion of a large analysis set (eighteen samples) required 2.5 days for weighing, spiking, and extraction, and approximately 12 hours for GC analysis and data collection.

(a) Calibration

The HP 6890 EC gas chromatograph was calibrated with Pyrethrum extract combined standards (Pyrethrin1, Cinerin 1, Jasmolin 1) at concentrations of 4.8 ng/mL, 12.0 ng/mL, 40.0 ng/mL and 120.0 ng/mL. The correlation coefficient was 0.9996049.

(b) Calculation Curve

1. Standard Curve

The HP-Chemstation contains preprogrammed data processing capabilities which processed the sum of the height for each of the three congener 1 peaks. A standard curve was generated from this data with a Lotus program at concentrations of 4.8ng/mL, 12.0ng/mL, 40.0ng/mL, and 120.0ng/mL. The calibration curve is constructed using polynomial regression with the concentration (ng/mL) on the X-axis and the response on the Y-axis.

2. Calculation of Analyte in Samples

- a. The concentration in ng/mL was calculated by substituting the Pyrethrins peak height of each sample into the linear regression equation, $Y = 13.660879X + 17.653915$.
- b. The total Pyrethrins (ppb) recovered is then found by the formula:

$$C = \frac{XV}{W}$$

where: C = concentration in ppb
X = analyte in sample extract (ng/mL)
V = final volume of extract (5 mL)
W = weight of sample extracted (1000 g)

3. Example Calculation

Sample: LOQ Sample#1 @ 0.056 ppb for Pyrethrin 1, Cinerin 1, and Jasmolin 1

Calibration curve equation is $Y = 13.660879X + 17.653915$
Total peak ht. (3) summation is 132.12744
Sample wt. is 1000g, final vol. is 5 mL

Substitute for Y, $132.12744 = 13.660879X + 17.653915$
 $X = (132.12744 - 17.776335)/13.660879$
 $X = 8.371 \text{ ng/mL}$

Conc.in sample = $\frac{8.371 \text{ ng/mL} \times 5 \text{ mL}}{1000\text{g}} = \frac{0.04185 \text{ ng}}{\text{g}}$ or 0.04185 ppb

Percent recovery: $\frac{0.042 \text{ ppb}}{0.056 \text{ ppb}} \times 100 = 75.0\%$

Chromatograms and Linear Regression Curves

A. Calibration Standards Analyzed by GC at 4.8 ng/mL, 12 ng/mL, 40.0 ng/mL, and 120.0 ng/mL.

A-1: 4.8 ng/mL.

A-2: 12.0 ng/mL.

A-3: 40.0 ng/mL.

A-4: 120.0 ng/mL.

B. Linear Regression Curves for Pyrethrin 1 congeners (total peak height summation of Pyrethrin 1, Cinerin 1, and Jasmolin 1 at each level of concentration).

B-1: Linear Regression Curves for Pyrethrin 1, Cinerin 1, and Jasmolin 1 at 4.8 ng/mL, 12.0 ng/mL, 40.0 ng/mL, and 120.0 ng/mL.

C. Pyrethrin 1 congeners (Pyrethrin 1, Cinerin 1, Jasmolin 1) Fortification at 0.017 ppb (LOD) Analyzed by Electron Capture GC.

C-1: Matrix Blank

C-2: Pyrethrin 1 congeners (Pyrethrin 1, Cinerin 1, Jasmolin 1) Sample #1 Fortified Well Water.

D. Pyrethrin 1 congeners (Pyrethrin 1, Cinerin 1, Jasmolin 1) Fortification at 0.056 ppb (LOQ) Analyzed by Electron Capture GC.

D-1: Matrix Blank.

D-2: Pyrethrin 1 congeners (Pyrethrin 1, Cinerin 1, Jasmolin 1) Sample #1 Fortified Well Water.

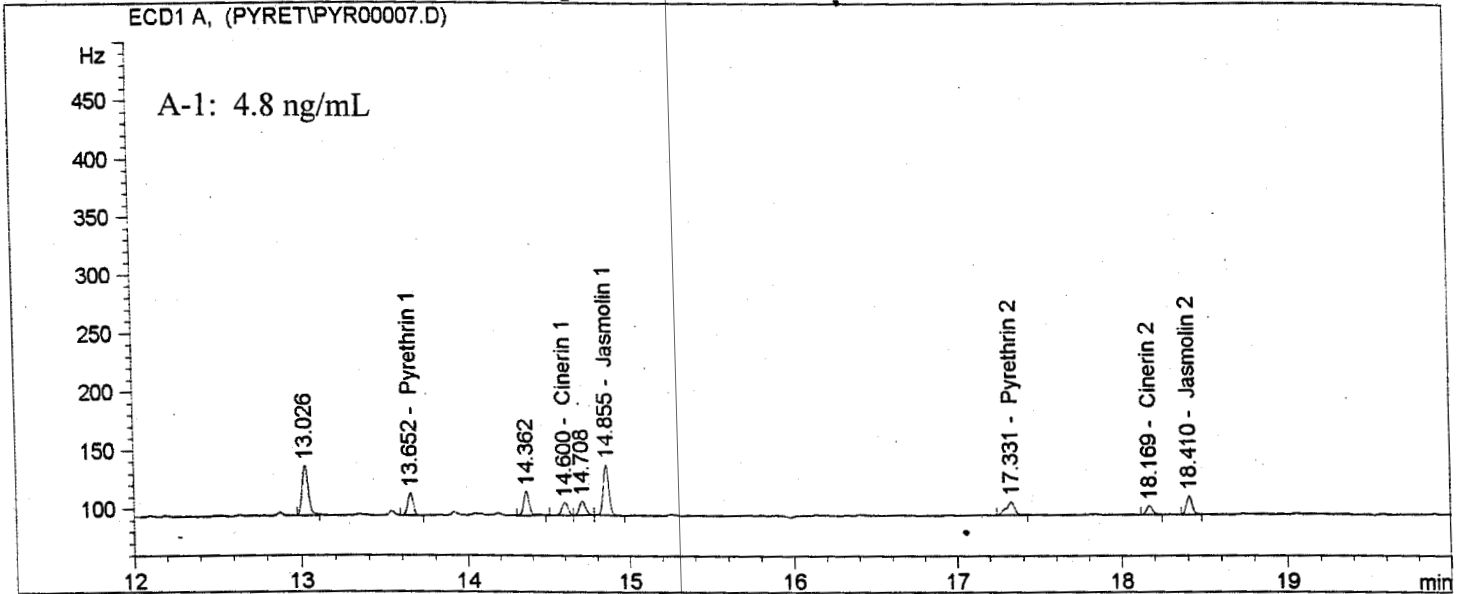
E. Pyrethrin 1 congeners (Pyrethrin 1, Cinerin 1, Jasmolin 1) Fortification at 0.56 ppb (10 x LOQ) Analyzed by Electron Capture GC.

E-1: Matrix Blank.

E-2: Pyrethrin 1 congeners (Pyrethrin 1, Cinerin 1, Jasmolin 1) Sample #1 Fortified Well Water.

A. Calibration Standards Analyzed by GC at 4.8 ng/mL, 12 ng/mL, 40.0 ng/mL, and 120.0 ng/mL.

ECM0188W1: Study Title-" Development And Validation Of An Analytical Methodology For The Determination Of Total Pyrethrins In Water, Acetone and Fish Tissue " (water only)



External Standard Report

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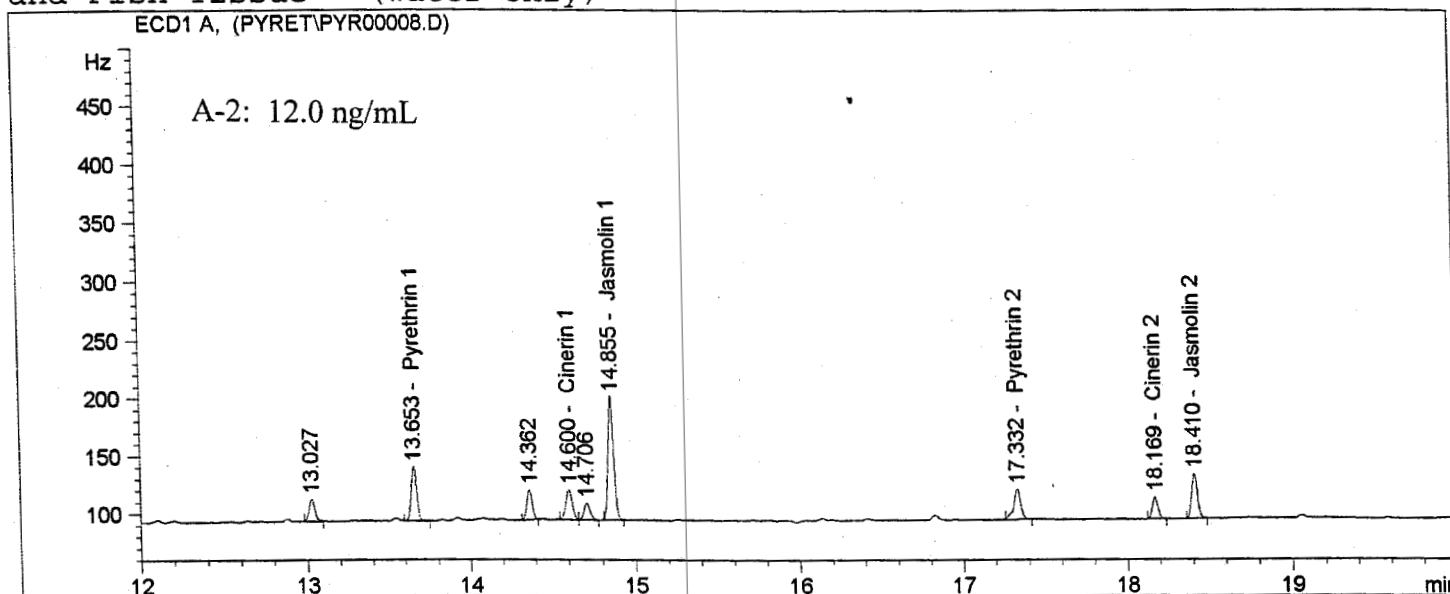
RetTime [min]	Type	Height [Hz]	Amt/Height	Amount [ng/ml]	Grp	Name
13.652	VB	18.79973	2.02624e-1	3.80928	1	Pyrethrin 1
14.600	BV	10.53654	3.61896e-1	3.81313	1	Cinerin 1
14.855	VP	43.03318	9.60088e-2	4.13156	1	Jasmolin 1
17.331	PB	11.16399	4.68902e-1	5.23482		Pyrethrin 2
18.169	PBA	7.32187	5.81324e-1	4.25638		Cinerin 2
18.410	BB	15.56569	3.15352e-1	4.90866		Jasmolin 2

Totals : 26.15384

Results obtained with enhanced integrator!
 Group summary :

Group ID	Use	Height [Hz]	Amount [ng/ml]	Group Name
1		73.26044	11.75200	

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13.653	VP	45.99372	2.70896e-1	12.45950	1	Pyrethrin 1
14.600	BV	25.82171	5.05513e-1	13.05321	1	Cinerin 1
14.855	BB	105.74532	1.17389e-1	12.41336	1	Jasmolin 1
17.332	BB	26.04466	4.86029e-1	12.65846		Pyrethrin 2
18.169	BB	18.78065	6.87792e-1	12.91719		Cinerin 2
18.410	PBA	38.66542	3.27217e-1	12.65197		Jasmolin 2

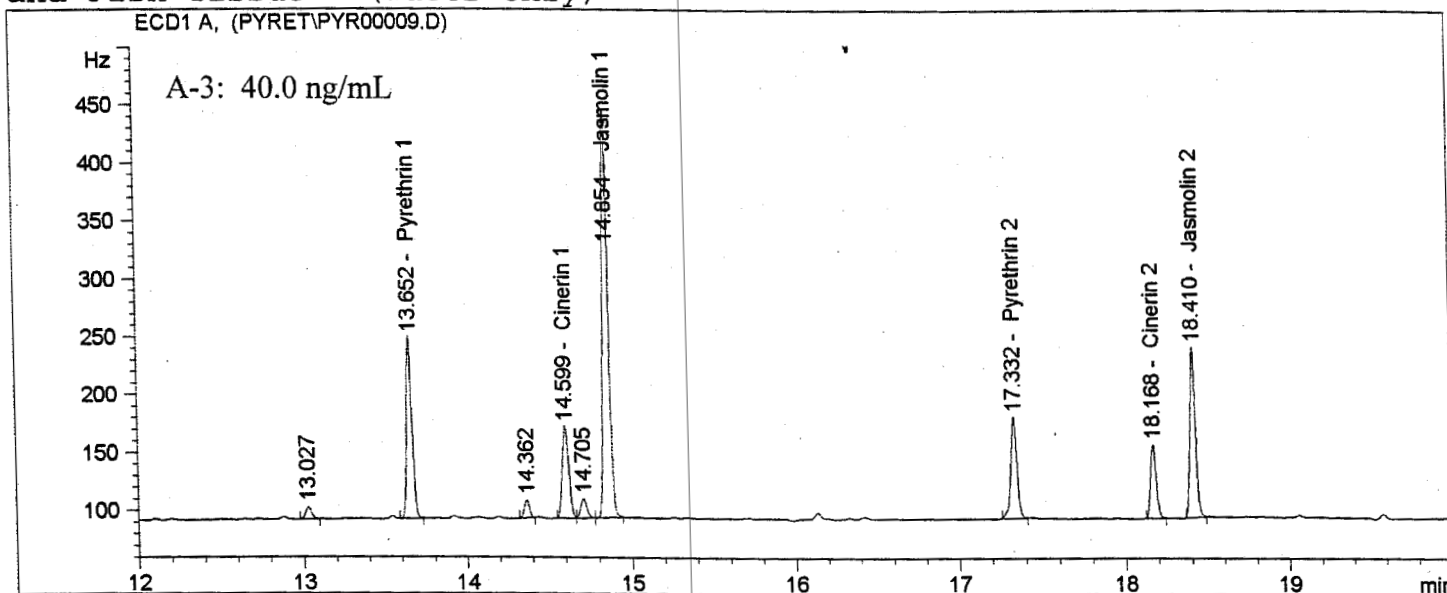
Totals : 76.15369

Results obtained with enhanced integrator!

Group summary :

Group ID	Use	Height [Hz]	Amount [ng/ml]	Group Name
1		177.56075	37.92608	Pyrethreen

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13.652	VB	155.46696	2.81451e-1	43.75638	1	Pyrethrin 1
14.599	BV	78.11035	5.38684e-1	42.07677	1	Cinerin 1
14.854	VB	351.57721	1.23461e-1	43.40595	1	Jasmolin 1
17.332	BB	87.01488	4.72225e-1	41.09059		Pyrethrin 2
18.168	BB	63.58353	6.53066e-1	41.52422		Cinerin 2
18.410	BB	146.62439	2.91428e-1	42.73040		Jasmolin 2

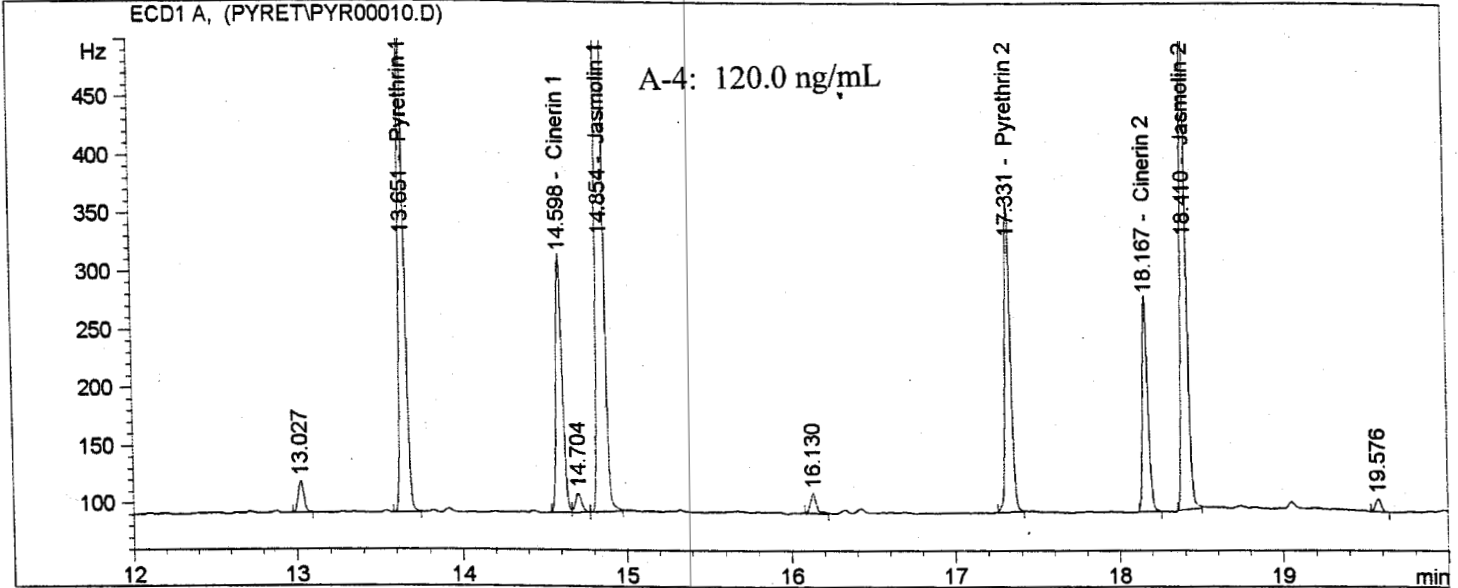
Totals : 254.58431

Results obtained with enhanced integrator!

Group summary :

Group ID	Use	Height [Hz]	Amount [ng/ml]	Group Name
1		585.15453	129.23910	Pyrethreen

ECM0188W1: Study Title-" Development And Validation Of An Analytical Methodology For The Determination Of Total Pyrethrins In Water, Acetone and Fish Tissue " (water only)



External Standard Report

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RetTime [min]	Type	Height [Hz]	Amt/Height	Amount [ng/ml]	Grp	Name
13.651	VB	430.42355	2.77330e-1	119.36941	1	Pyrethrin 1
14.598	BV	220.52264	5.42582e-1	119.65159	1	Cinerin 1
14.854	VB	999.82819	1.19621e-1	119.60085	1	Jasmolin 1
17.331	BB	265.99615	4.51783e-1	120.17259		Pyrethrin 2
18.167	BP	183.55005	6.52014e-1	119.67727		Cinerin 2
18.410	BB	434.31406	2.75800e-1	119.78377		Jasmolin 2

Totals : 718.25548

Results obtained with enhanced integrator!

Group summary :

Group ID	Use	Height [Hz]	Amount [ng/ml]	Group Name
1		1650.77438	358.62184	Pyrethreen

B. Linear Regression Curves for Pyrethrin 1 congeners (total peak height summation of Pyrethrin 1, Cinerin 1, and Jasmolin 1 at each level of concentration).

B-1: Linear Regression Curves for Pyrethrin 1, Cinerin 1, and Jasmolin 1 at 4.8 ng/mL, 12.0 ng/mL, 40.0 ng/mL, and 120.0 ng/mL.

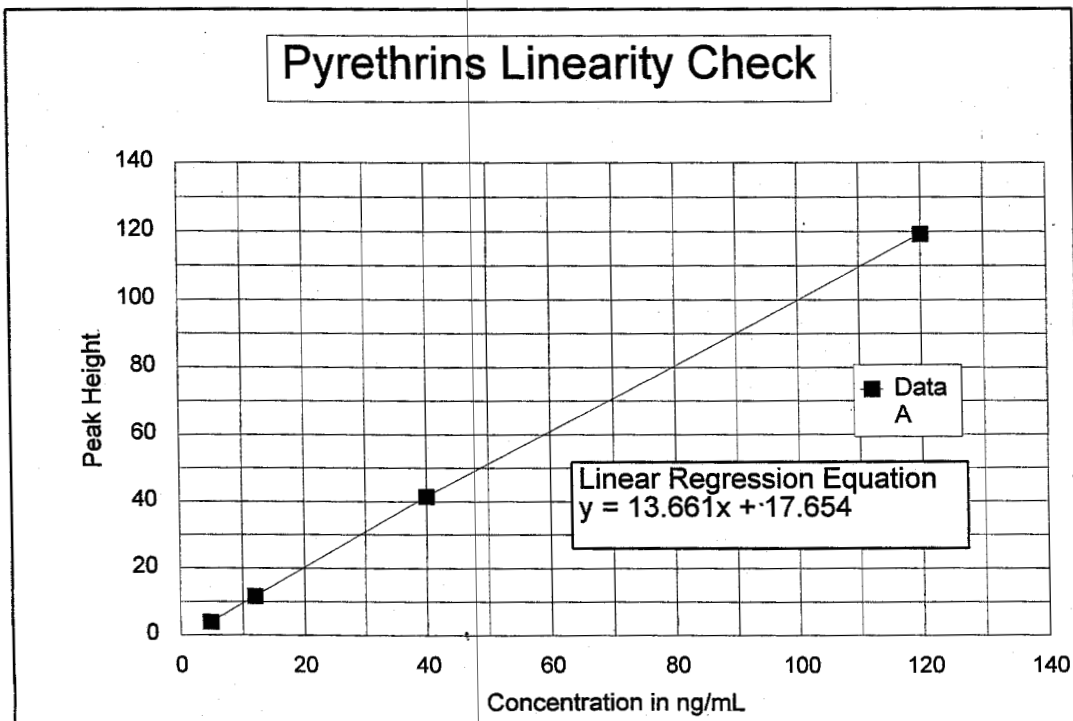
Compound Name: Pyrethrins

Date Analysis Run: 10/03/01

<u>Standard Concentration</u> ng/ml	<u>Peak Height</u>
4.8	72.369
12.0	177.561
40.0	585.155
120	1650.774

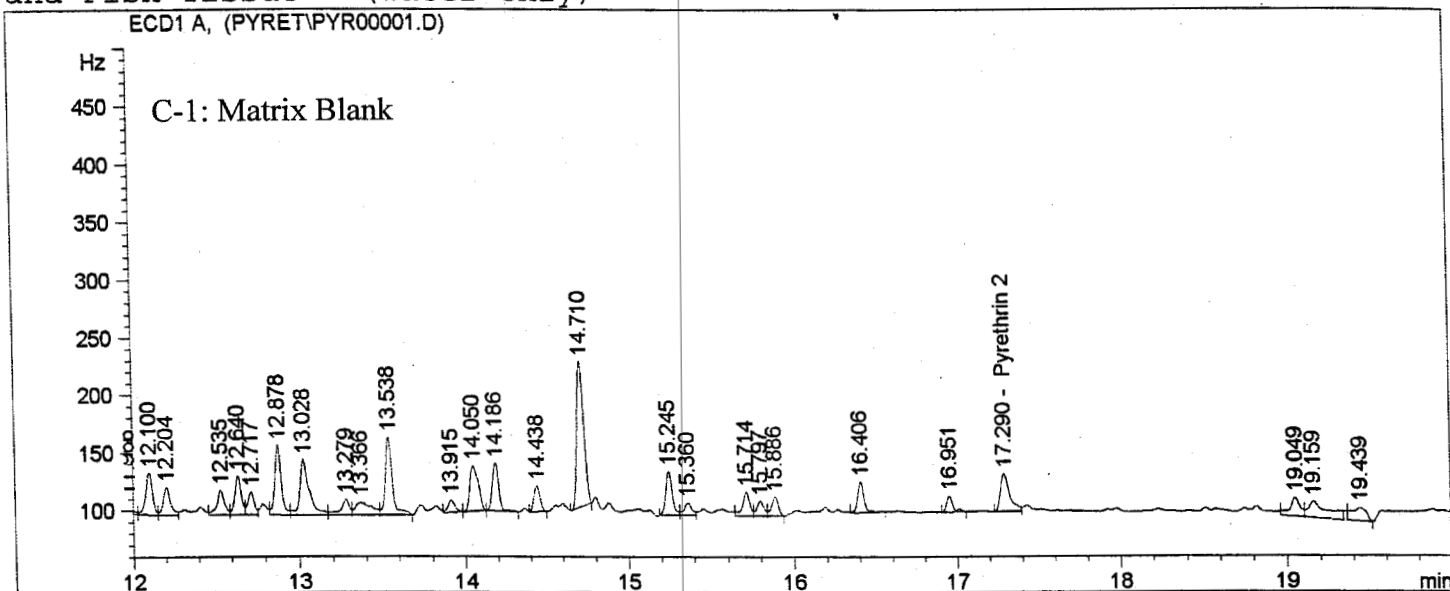
Regression Output

Constant	17.653915
Std Err of Y Est	17.551324
R Squared	0.9996049
No. of Observations	4
Degrees of Freedom	2
X Coefficient(s)	13.660879
Std Err of Coef.	0.1920446



C. Pyrethrin 1 congeners (Pyrethrin 1, Cinerin 1, Jasmolin 1) Fortification at 0.017 ppb (LOD)
 Analyzed by Electron Capture GC.

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External Standard Report

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 Dilution : 1.0000

Signal 1: ECD1 A,

RetTime [min]	Type	Height [Hz]	Amt/Height	Amount [ng/ml]	Grp	Name
13.652	-	-	-	-	1	Pyrethrin 1
14.600	-	-	-	-	1	Cinerin 1
14.855	-	-	-	-	1	Jasmolin 1
17.290	PV	32.34060	4.57202e-1	14.78617		Pyrethrin 2
18.169	-	-	-	-		Cinerin 2
18.410	-	-	-	-		Jasmolin 2

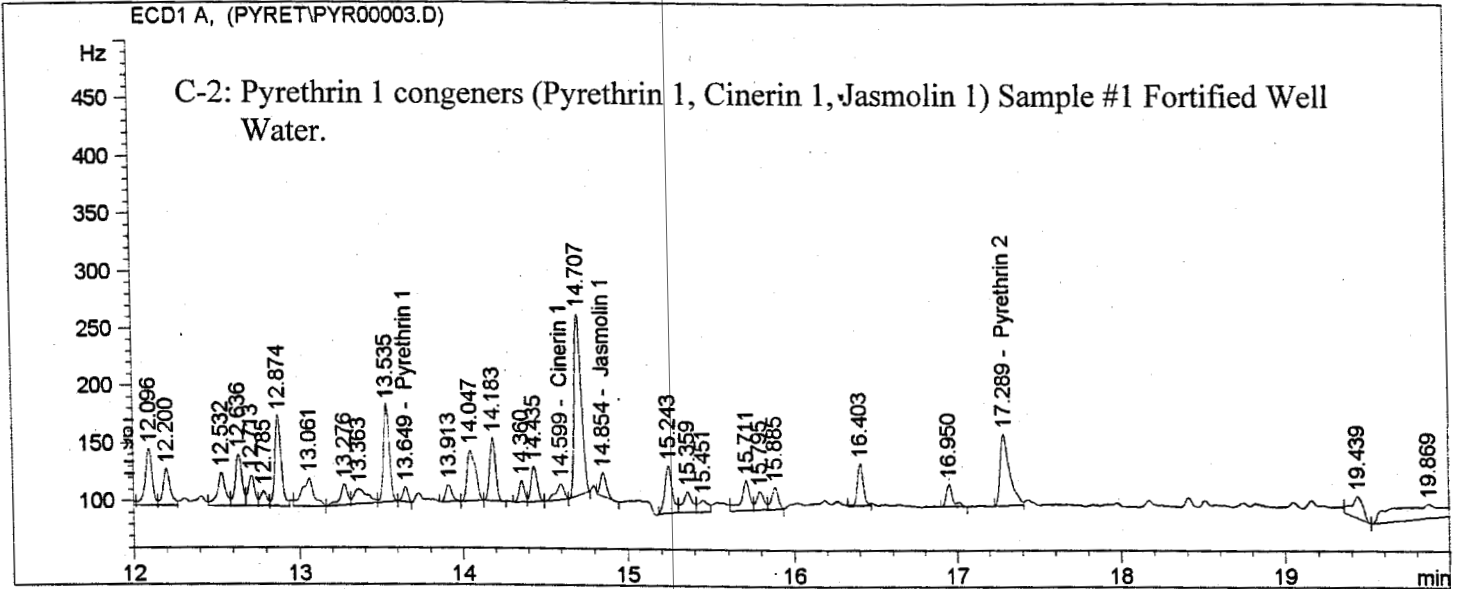
Totals : 14.78617

Results obtained with enhanced integrator!

Group summary :

Group ID	Use	Height [Hz]	Amount [ng/ml]	Group Name
1		0.00000	0.00000	Pyrethreen

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 External Standard Report
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 Dilution : 1.0000

Signal 1: ECD1 A,

RetTime [min]	Type	Height [Hz]	Amt/Height	Amount [ng/ml]	Grp	Name
13.649	VP	12.48951	1.63156e-1	2.03774	1	Pyrethrin 1
14.599	VP	13.50536	4.03609e-1	5.45088	1	Cinerin 1
14.854	VP	19.61647	6.65541e-2	1.30556	1	Jasmolin 1
17.289	PV	61.35602	4.54285e-1	27.87309		Pyrethrin 2
18.169		-	-	-		Cinerin 2
18.410		-	-	-		Jasmolin 2

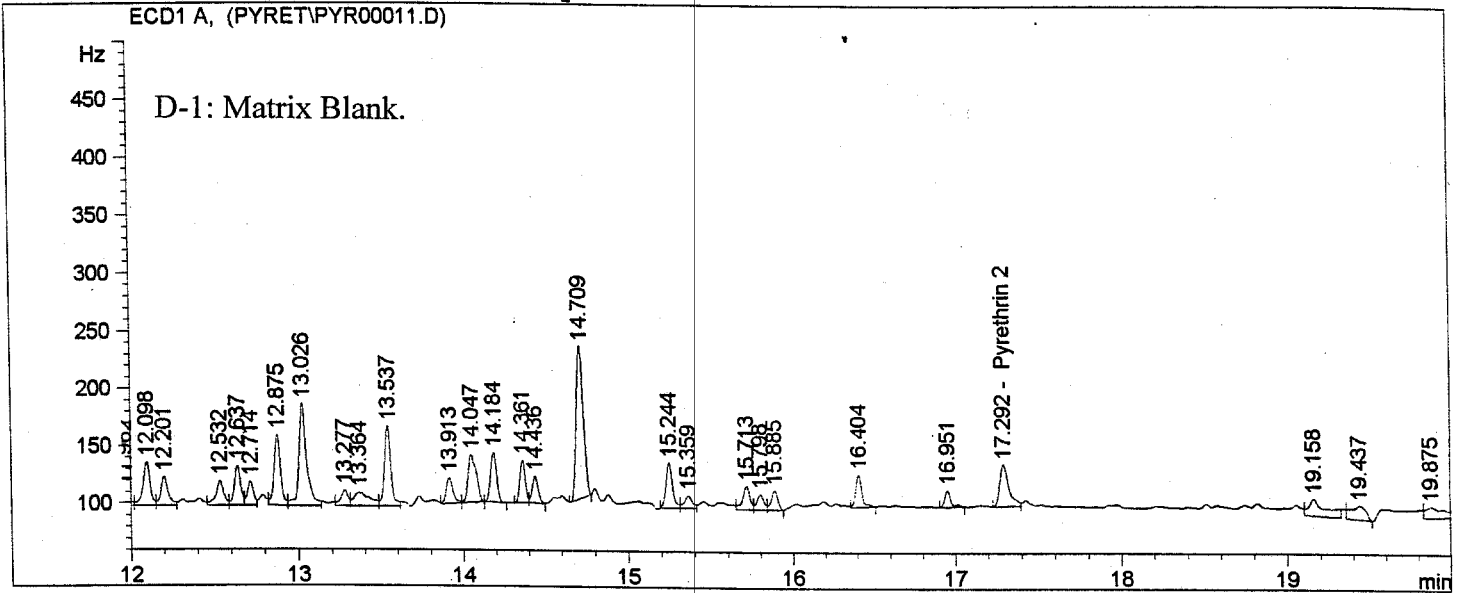
Totals : 36.66727

Results obtained with enhanced integrator!
 Group summary :

Group ID	Use	Height [Hz]	Amount [ng/ml]	Group Name
1		45.61134	8.79417	Pyrethreen

D. Pyrethrin 1 congeners (Pyrethrin 1, Cinerin 1, Jasmolin 1) Fortification at 0.056 ppb (LOQ)
 Analyzed by Electron Capture GC.

ECM0188W1: Study Title-" Development And Validation Of An Analytical Methodology For The Determination Of Total Pyrethrins In Water, Acetone and Fish Tissue " (water only)



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 External Standard Report
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 Dilution : 1.0000

Signal 1: ECD1 A,

RetTime [min]	Type	Height [Hz]	Amt/Height	Amount [ng/ml]	Grp	Name
13.652	-	-	-	-	1	Pyrethrin 1
14.600	-	-	-	-	1	Cinerin 1
14.855	-	-	-	-	1	Jasmolin 1
17.292	PV	36.57590	4.56487e-1	16.69644		Pyrethrin 2
18.169	-	-	-	-		Cinerin 2
18.410	-	-	-	-		Jasmolin 2

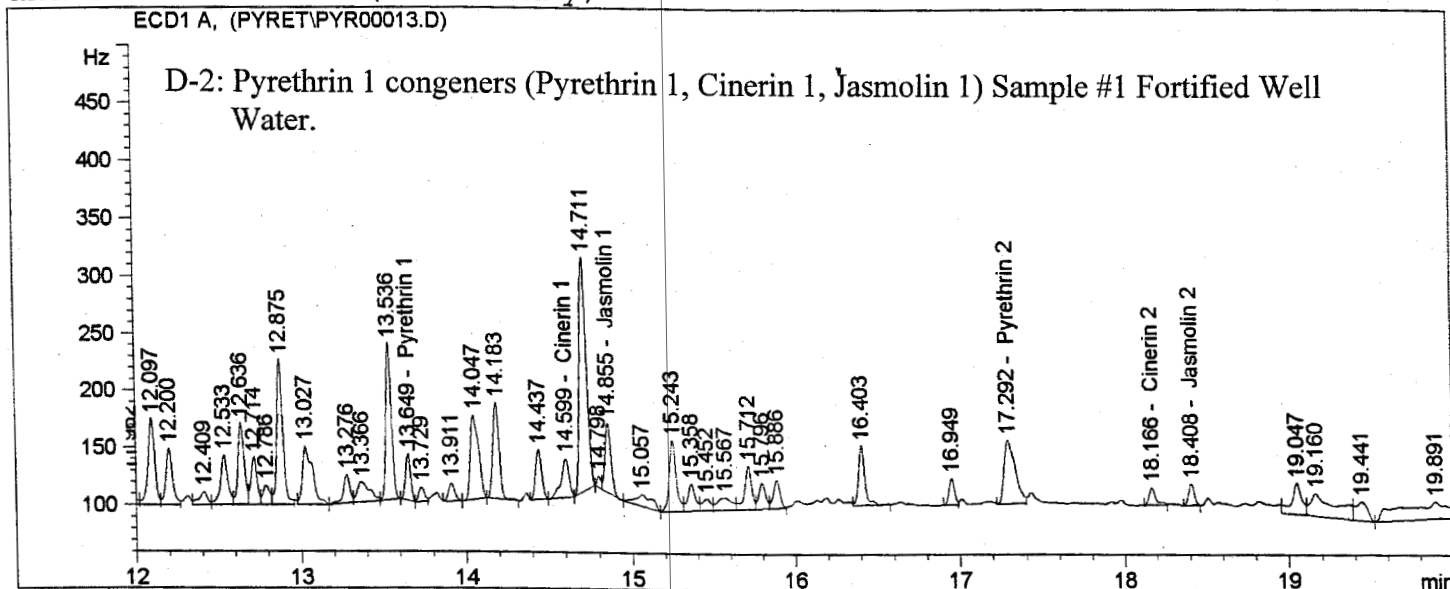
Totals : 16.69644

Results obtained with enhanced integrator!

Group summary :

Group ID	Use	Height [Hz]	Amount [ng/ml]	Group Name
1		0.00000	0.00000	Pyrethreen

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 External Standard Report
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 Dilution : 1.0000

Signal 1: ECD1 A,

RetTime [min]	Type	Height [Hz]	Amt/Height	Amount [ng/ml]	Grp	Name
13.649	VP	39.54349	2.43603e-1	9.63293	1	Pyrethrin 1
14.599	VP	32.86967	4.90822e-1	16.13317	1	Cinerin 1
14.855	VP	59.71428	1.02902e-1	6.14470	1	Jasmolin 1
17.292	VV	55.02047	4.54659e-1	25.01555		Pyrethrin 2
18.166	PB	14.91378	6.18804e-1	9.22871		Cinerin 2
18.408	PV	18.49860	3.08848e-1	5.71325		Jasmolin 2

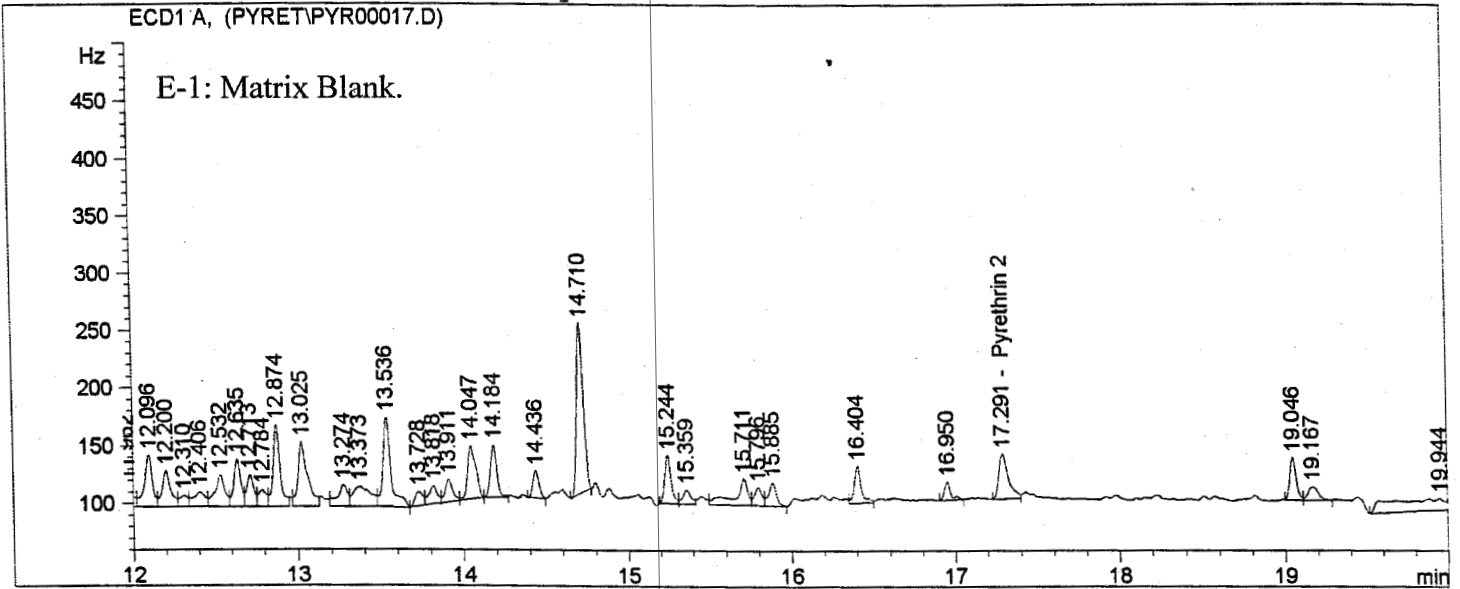
Totals : 71.86830

Results obtained with enhanced integrator!
 Group summary :

Group ID	Use	Height [Hz]	Amount [ng/ml]	Group Name
1		132.12744	31.91079	Pyrethreen

E. Pyrethrin 1 congeners (Pyrethrin 1, Cinerin 1, Jasmolin 1) Fortification at 0.56 ppb (10 x LOQ) Analyzed by Electron Capture GC.

ECM0188W1: Study Title-" Development And Validation Of An Analytical Methodology For The Determination Of Total Pyrethrins In Water, Acetone and Fish Tissue " (water only)



=====
 External Standard Report
 =====

Sorted By : Signal
 Calib. Data Modified : Thursday, October 04, 2001 7:51:28 AM
 Multiplier : 1.0000
 Dilution : 1.0000

Signal 1: ECD1 A,

RetTime [min]	Type	Height [Hz]	Amt/Height	Amount [ng/ml]	Grp	Name
13.652		-	-	-	1	Pyrethrin 1
14.600		-	-	-	1	Cinerin 1
14.855		-	-	-	1	Jasmolin 1
17.291	PV	38.41558	4.56226e-1	17.52619		Pyrethrin 2
18.169		-	-	-		Cinerin 2
18.410		-	-	-		Jasmolin 2

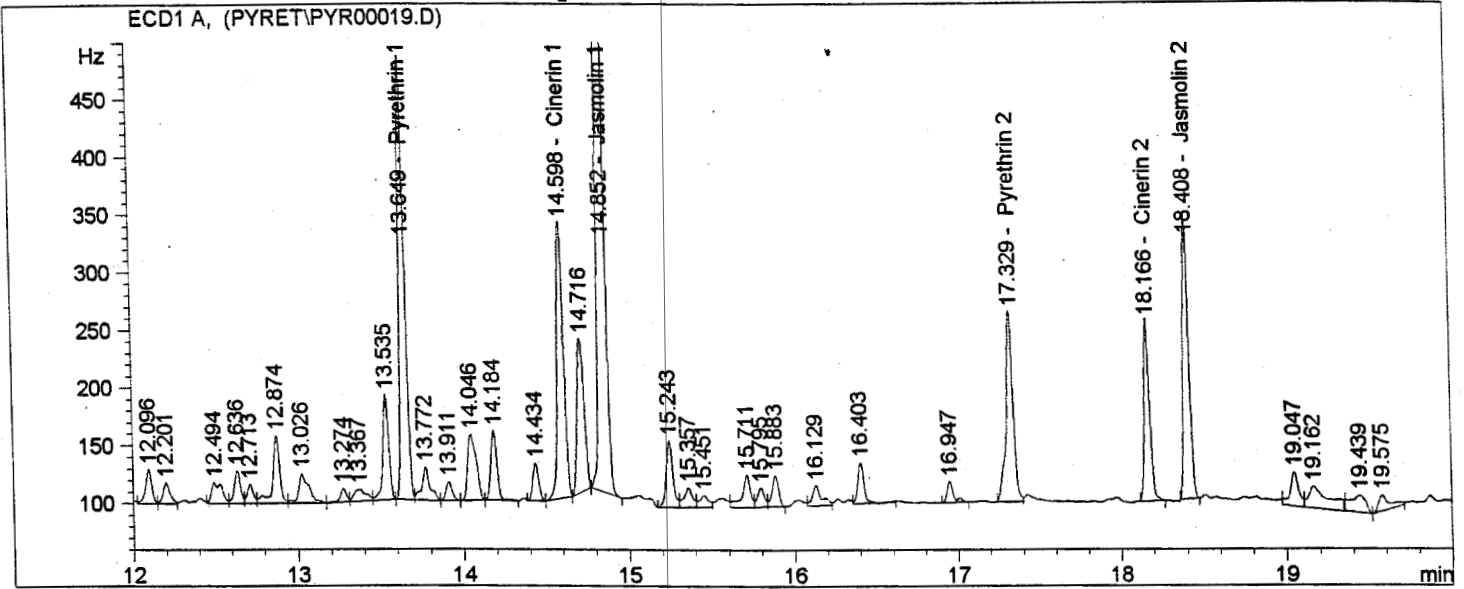
Totals : 17.52619

Results obtained with enhanced integrator!
 Group summary :

Group ID	Use	Height [Hz]	Amount [ng/ml]	Group Name
1		0.00000	0.00000	Pyrethreen

E-2: Pyrethrin 1 congeners (Pyrethrin 1, Cinerin 1, Jasmolin 1) Sample #1 Fortified Well Water.

ECM0188W1: Study Title-" Development And Validation Of An Analytical Methodology For The Determination Of Total Pyrethrins In Water, Acetone and Fish Tissue " (water only)



External Standard Report

Sorted By : Signal
 Calib. Data Modified : Thursday, October 04, 2001 7:51:28 AM
 Multiplier : 1.0000
 Dilution : 1.0000

Signal 1: ECD1 A,

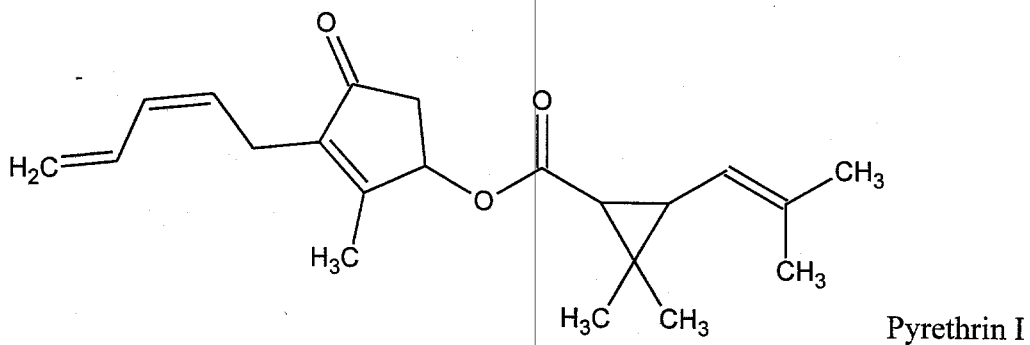
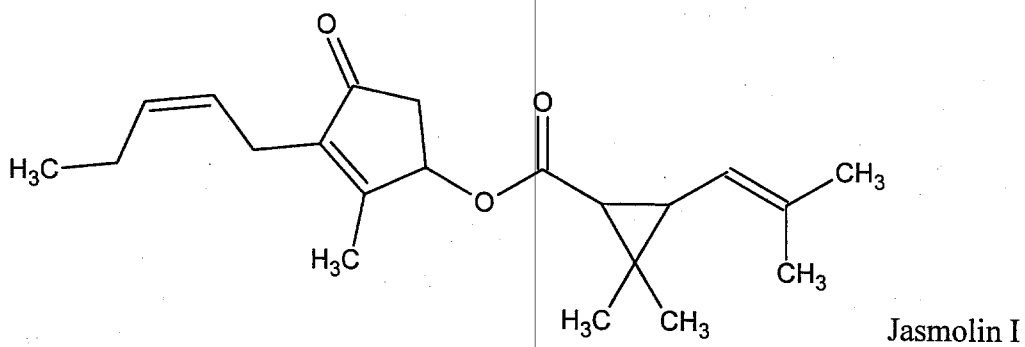
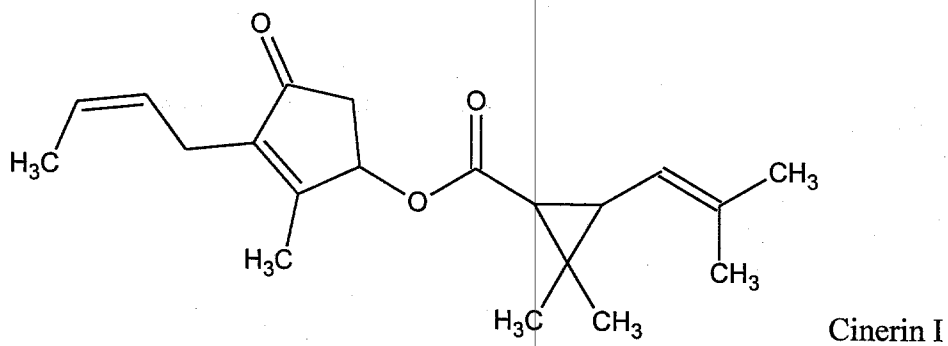
RetTime [min]	Type	Height [Hz]	Amt/Height	Amount [ng/ml]	Grp	Name
13.649	VV	383.11948	2.76909e-1	106.08916	1	Pyrethrin 1
14.598	VP	239.34081	5.43295e-1	130.03259	1	Cinerin 1
14.852	VP	890.94708	1.19492e-1	106.46070	1	Jasmolin 1
17.329	BV	163.27399	4.52255e-1	73.84148		Pyrethrin 2
18.166	BP	154.61281	6.51465e-1	100.72478		Cinerin 2
18.408	BV	246.49188	2.76920e-1	68.25857		Jasmolin 2

Totals : 585.40730

Results obtained with enhanced integrator!
 Group summary :

Group ID	Use	Height [Hz]	Amount [ng/ml]	Group Name
1		1513.40736	342.58246	Pyrethreen

APPENDIX A.



APPENDIX B.

NASA Environmental Services Laboratory

Laboratory EPA #: MS00903
Operated by Lockheed/G.B.Tech
Bldg. 8100, Rm. 112c, SSC
688-1447
File#o:\...\EPA0801

To: Dr. Christian J. Byrne
EPA/ECS, Bldg. 1105
688-3213
SSC

Project Number: 010821C
Sample I.D. 003533 Wetland
Sample I.D. 003532 Deepwell
Received Date: 08-21-01
Received By: K. Lehr
SWR# PM00210500

Reviewed by: John Hughes

The Wetlands Culvert sample was collected August 21, 2001 at 10:45.
The Deepwell sample was collected August 21, 2001 at 10:10. The
sample collector analyzed all analytical parameters except Turbidity, in
the field. Turbidity was analyzed in the laboratory, as soon as possible,
on receipt of the sample into the laboratory.

Parameter	Method	Technique	Det. Limits	Results	
				Wetlands culvert	Deepwell
Temperature	SM2550 B	Thermistor	0.1 Degree C	30.7 °C	22.9 °C
Ph	150.1 USEPA	Electrode	0.1 pH units	6.43	9.22
Dissolved Oxygen	SM-4500-O.G	Electrode	0.1 mg/L	0.78 mg/L	0.80 mg/L
Turbidity	180.1 USEPA	TU Meter	0.05 NTU	1.73 ntu	0.517 ntu
Conductivity	120.1 USEPA	Cond. Meter	0.001 mmhos/cm	0.106 mmhos/cm	0.338 mmhos/cm

All records concerning the analysis of the samples are available within the Environmental Laboratory
Archive room by request.