EXPERIMENTAL DESIGN FOR THE STUDY OF EXTRACTION EFFICIENCIES OF THE CONTINUOUS LIQUID-LIQUID EXTRACTOR

BY

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(ABSTRACT)

An evaluation of a Continuous Countercurrent Liquid-Liquid Extraction (CCLLE) system in conjunction with a Gas Chromatograph Mass Spectrometer for application in trace analysis of Synthetic Organic Compounds.

An experiment is designed to test the extraction efficiency of the CCLLE system at less than 1ppb levels. Limitations of the CCLLE system are accessed.

Experimental data associated with the extraction efficiency study is included.

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I. Introduction

With the passing of the Safe Drinking Water Act (SDWA) of 1974, the USEPA was authorized to conduct research and oversee implementation of the SDWA[1]. One aspect of implementing SDWA is the regulation of drinking water contamination through the creation of Recommended Maximum Contaminant Levels (RMCLs), which are nonenforceable levels, and Maximum Contaminant Levels (MCLs), which are enforceable standards. Within the SDWA[1], a timetable is created that requires a monitoring program by community water systems for contaminants designated in the MCL list which include Synthetic Organic Compounds (SOCs).

In accessing the monitoring program the USEPA notes that the Method Detection Limit (MDL) varies depending upon the analytical equipment, the analyst, and the laboratory[1]. In the analysis of SOCs there are two fundamental limitations. One of these is detection at the instrument: the signal of the analyte in respect to the 'background noise' created by the detector; the other is contamination contribution by the analytical process. By using the Gas Chromatograph Mass Spectrometer (GCMS) the advantage of spectral confirmation enables the analysis of a broad spectrum of organic compounds. Although the Mass Spectrometer Detector has a higher instrument detection limit than other detectors, the MDL can be reduced by maximizing the amount of analyte at the point of injection. This is accomplished by increasing sample size while minimizing contamination from the analytical process. The other option—improving the sensitivity of the detector—often limits the type of organic compounds targeted.

For regulatory monitoring the ability to achieve Method Detection Limits equal to or less than Maximum Contamination Levels for a broad spectrum of Synthetic Organic Compounds with minimum contamination contribution by the analytical process is ideal. The intent of the project was to review an analytical process utilizing a Continuous Countercurrent Liquid-Liquid Extractor (CCLLE) in conjunction with a GCMS system. The ability of the system to approach this ideal scenario as well as any limitations will be evaluated.

II. Literature Review

Options for Trace Analysis

Approaching the ideal scenario—a high extraction efficiency of organic compounds with different physical and chemical characteristics—limits the number of viable methods. Specialized processes, such as precipitation, centrifugation, and ultrafiltration target a specific group of organic compounds such as humic materials, macromolecules, or compounds with a molecular weight of greater than 1000 Daltons[2]. Isolation and concentration of trace organic compounds can be best accomplished within the following categories[3]:

- Extraction by purging with a suitable gas (air, nitrogen, argon, helium);
- Membrane processes;
- Adsorption on a solid adsorbent followed by liberation by a solvent or desorption by a gas; and
- Liquid-Liquid Extraction.

Volatile Organic Analysis

One method for classification of organic compounds is by the vapor pressure. Compounds which have higher vapor pressures are extracted more efficiently through stripping with an inert gas. Such compounds are termed Volatile Organic Compounds (VOCs). Low detection limits can be achieved by passing large volumes of water through a sparger (stripper) then collecting the gaseous phase on an adsorbent. In contract to VOCs, SOCs have relatively

low vapor pressures and therefore have poor extraction efficiencies using this method. Other methods exist which are more appropriate for the analysis of SOCs.

Membrane Process

Membrane processes, specifically Reverse Osmosis (RO), physically separate SOCs by passing water at high pressure over a semipermeable membrane. Reinhard et al.[4] reported substantial reduction of Total Organic Carbon (TOCs) using RO with cellulose acetate (CA) and polyamide membranes (PA). CA membranes removed 89% while PA membranes removed 99% of TOCs respectively. With respect to targeting specific SOCs there were variations in removal efficiencies (73-98% defined as extractables), depending upon structural features of the compound. Malaiyandi et al.[5] compared XAD resin adsorption and RO membrane techniques for polar and nonpolar organic pollutants. The membranes used were cellulose triacetate (CAs), polyamide hydrazide (PaH), and polybenzimidaxolone (PBI). Both methods were adequate for trace organic isolation with PA membranes superior in total recovery and CAs being relatively ineffective.

Adsorption Processes

Early work by Braus[6] involved passing 5,000-75,000 gallons of water through a carbon filter. Liberation of the organic compounds was accomplished by solvent ether. The author's results were orientated towards taste and odor problems associated with the organic content. In order to target and analyze specific groups of compounds, adsorbents other than activated

carbon were found to be effective. Targeting pesticides and polychlorinated biphenyls (PCBs), Ahling and Jensen[7] used a filter with Chromosorb W covered with varying mixtures of Carbowax 4000 monostearate and n-undecane. The recovery study demonstrated the ability of a 10% Carbowax/30% undecane mixture to give good recoveries (30-150%). The authors noted only a 24-hour analysis time and ease of desorption from the Chromosorb W filter.

A considerable amount of research has been done in the use of polystyrene-divinylbenzene resins. There resins are abbreviated XAD-1, XAD-2, and XAD-4, with the variation in the number being the quaternary ammonium functional groups[8]. Wigilius et al.[9] reported excellent recoveries (73-80%) using XAD-2 for a 32-component mixture containing compounds of varying polarity. The authors noted, negatively, the resin's contamination contribution of target analytes to the analytical process and recommended pretreatment of the resins. James et al.[10] researched different pretreatment methods to attempt to minimize contamination. The authors concluded that water ruptures the resin beads resulting in the impurities. Using the sequence methanol-diethylether-sample, the pressure and temperature differentials were minimized such that the resin beads did not rupture. In addition to XAD-1, XAD-2, and XAD-4 Junk[11] reviewed in detail other types of adsorbents used for trace analysis. In general, Junk noted the simplicity and flexibility of using an adsorbent system in the field. Disadvantages were the complicated purification processes, availability of the various polymers as well as lack of familiarity using these adsorbents.

The adsorbents' characteristics are summarized as (1) functionality,

(2) surface area, (3) pore size, (4) particle size and shape, (5) chemical stability, and (6) solubility. Neutral hydrophobic pollutants tend to have affinity towards neutral functional groups such as styrene-divinylbenzenes. For a particular size of adsorbent the parameters maximizing surface area and pore size could be optimized. Maximization of one is at the expense of the other. The presence or absence of humic materials as well as other macromolecules should impact the effectiveness of the adsorbent. The negative impact is the blocking of sites of adsorption thus preventing permeation of smaller molecules. This effect in combination with the molecular weight of solutes being targeted will ultimately determine what type of adsorbent should be used. In the case of polished drinking water XAD-4 would be ideal; XAD-2 would be appropriate for water with high total organic carbon values which would be indicative of the presence of humic and fulvic acids. Reactivity of styrene-divinylbenzene and Tenax® during air sampling have been documented. Reactions in water are unusual but should be reviewed. The solubility of polymers in solvents used for elution is important. Even small amounts of dissolved polymers interfere with the analyses.

Liquid-Liquid Extraction

Variations of the countercurrent liquid-liquid extraction system have been applied to a spectrum of applications. Werner and Waldichuk[12] developed an extraction system for trace organics analysis of sea water. This system was designed for a solvent lighter than water. The solvent was funnelled through an internal tube, to the base of the extractor where it comes in contact with the sea water. Retaining the extracted analyte was

accomplished by a heated column termed 'evaporator'. This variation of a distillation column caused the solvent to vaporize at the top of the column resulting in condensation of the target analytes at the base of the column. Hydraulic washout of the solvent was addressed by saturating the sea water prior to extraction. The authors did not cite specific recovery data but did stability studies and reviewed potential applications. Goldberg and DeLong[13] developed extraction designs for solvents which are heavier or lighter than water. The fundamental design of those extraction systems is very similar to that evaluated in this paper; although, extractors evaluated in this literature review do not incorporate a scrubbing system for solvent recirculation. As with the extraction system discussed in this report, the extracted analytes in Goldberg and DeLong's designs were retained within the distillation flask which also acts to recirculate the solvent. The authors used chloroform and carbon tetrachloride as solvents and toluene as the analyte targeted. The results indicated recoveries of 60-70% when chloroform was used and 26-30% when carbon tetrachloride was used. The authors noted a solvent loss.

Ahnoff and Josefsson[14] used a variation of a stirrer extractor. This system used a magnetic stirrer to maximize the surface area of the interface between solvent and water. The water enters and exits the top of the extractor while a fixed volume of solvent is at the base. In instances where there is a lowering of the surface tension between the solvent and water, there results a formation of water-insoluble globules. This process is termed emulsification. The formation of these globules can reduce the volume of the extracting solvent and can negatively impact the extraction efficiency by reducing solvent recovery. The emulsion problem was addressed by the use of baffle

chambers. The authors varied water flow to maximize extraction efficiency with respect to hydraulic residence time. An extraction study was done on the pesticides lindane, aldrin, DDE, DDT, DDD, and dieldrin. Using the solvent cyclohexane, the recovery range was 79-83%. The authors noted a recovery loss due to adsorption onto glass walls of the feeding reservoir.

Stachel et al.[15] also targeted nonpolar compounds using a series of magnetic stirrers. The authors used the solvent pentane, which is less dense than water, to study the extraction efficiencies of pesticides. A peristaltic pump was used to feed the water into the extraction system. Given the minimal solubility of hexane, the solvent loss for eleven days of extraction did not exceed 20%. The compounds α-BHC, β-BHC, γ-BHC (lindane), and hexachlorobenzene (HCB) had a recovery range of 31-65% with respect to the first extractor and 12-19% with respect to the second extractor. The detection limit for the compounds extracted from 200 liters was as follows: α-BHC—0.2 ng/L; β-BHC—0.7 ng/L; lindane—0.5 ng/L; and HCB—0.2 ng/L.

Oliver and Nicol[16] used the solvent methylene chloride in a constant volume extraction system. Two hundred liters of water to be extracted was placed in a stainless steel barrel. In order to maximize the surface area to volume, methylene chloride was sprayed continuously through the sample. Five liters of the solvent were then concentrated. The system achieved picogram per liter detection limits for PCBs, chlorinated toluenes, and chlorinated benzenes. The recovery range was 41-75%.

III. Methods and Materials

Overview of the Experiment

The experiment was designed to study the stability and extraction efficiency of the Countercurrent Continuous Liquid-Liquid Extractor.

Municipal water was used as both the cooling water and as the matrix by which the spiking solution entered the extractor. Upon exiting the tap water faucet, the water stream split and flowed through the extraction water shut-off valve and the cooling water shut-off valve (Figure 1). The cooling water then entered and exited the modified Allihn Condenser. The extraction water then entered an activated charcoal column. The purpose of this column was to remove any trace synthetic organic compounds which were present in the tap water. Upon exiting the column, the extraction water passed through the fine adjustment valve which adjusted the pressure entering the flow meter. The pressure of the extraction water was monitored by the pressure gauge. The flow meter was calibrated to measure water flows at one atmosphere (14.7 psi) and 70°F. Prior to entering the flow meter the spiking solution was pumped into the extraction water. This water then enters and exits the extractor. Upon exiting the extractor the water passed onto the top of a modified one liter graduated cylinder containing activated charcoal. Air entered the base of the cylinder and exited the top to a venting system. Thus, this system was a solid phase counter current scrubber. After this treatment the water was screened with a halon detector prior to entering the drain. Air for both the primary extractor scrubber (see overview of extractor) and secondary graduated cylinder scrubber were supplied by an air

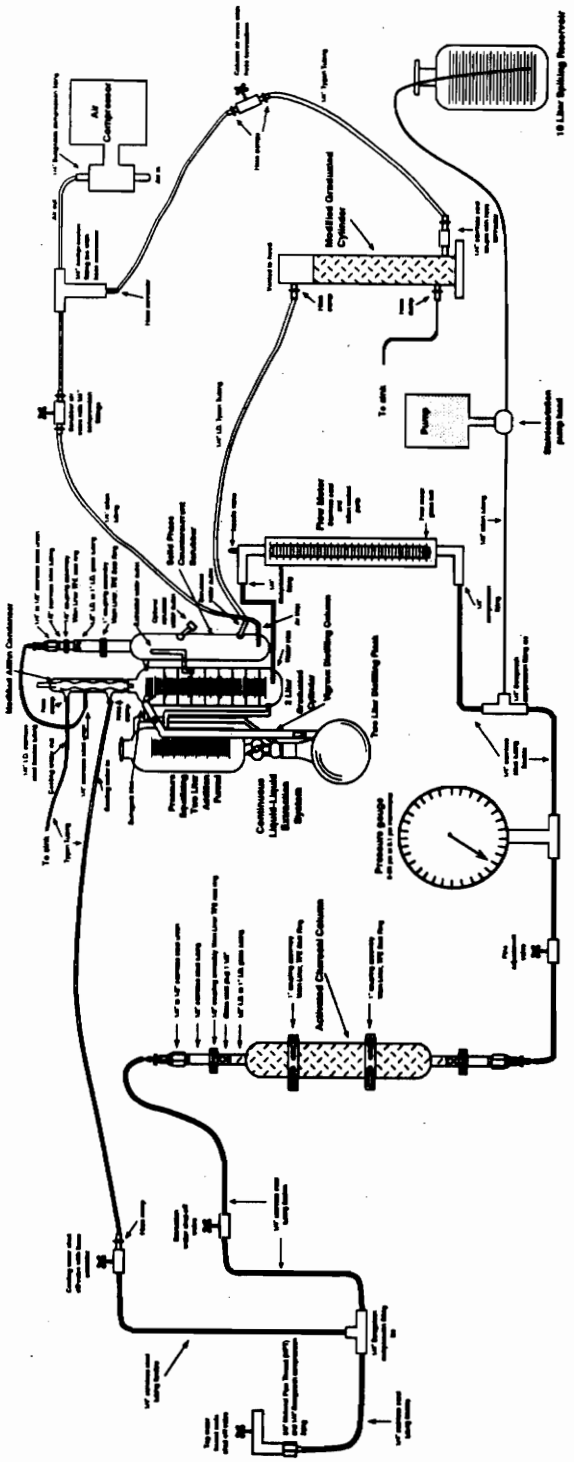


Figure 1

Experimental Design For The Study of Extraction Efficiencies of the Liquid-Liquid Extractor

compressor and regulated by valves. The spiking solution entering the extraction water was stored in a 10 liter spiking reservoir and pumped by a piston pump through 1/8-inch teflon tubing. This entire experiment was performed inside a 6 foot by 4 foot by 3.5 foot hood. A water leak detector at the surface of the hood was wired to a solenoid valve which was located after the main tap water valve (not shown in Figure 1). In the event of a water leak in the system the solenoid valve would close.

Assessment of Activated Charcoal Column

Introduction

This down-flow column used activated charcoal. Given the spectrum of compounds which would be theoretically targeted, the adsorption zone would be deep and breakthrough would be gradual. Given the limitation of cost for the experiment, certain components were used as available in the laboratory. The dimensions of the column were, therefore, determined by this constraining condition. In addition, other requirements took precedence over column design with respect to overall operating parameters of the experiment. Some of these parameters were also used to evaluate column design. Requirements that have dual roles, both in column design and in the extraction efficiency study, are the detection limit with respect to the volume extracted, the linear range of the flow meter with respect to measurement of flow, and the optimization of extraction efficiency within the extraction system (see derivation of extraction efficiency relationship, page 29). The decision that column design take a secondary role is based on the assumption that the synthetic organic compounds within municipal drinking water

should have a negligible contribution to the efficiency study. This assumption is based on the analysis of municipal water during stability studies of the extraction system. The results, as summarized in Table 1, can only be considered trace-level screening of the water, yet this data offers some insite into the levels of SOCs in municipal drinking water. Although adsorption studies and column tests were not done, the scenario of breakthrough and contribution to the extraction efficiency study (i.e. the integrity of the assumption) needed to be evaluated. This was done using the Bohart-Adams Equation which is amendable for testing breakthrough concentrations under theoretical conditions when given the pertinent column operating parameters as well as assumed parameters.

Variable within the Bohart-Adams Equation

The Bohart-Adams Equation is given by:

$$\ln (C_O/C_B - 1) = \ln e^{(KN_O x/V - 1)} - KC_O t \quad (1)$$

where:

t = breakthrough time (hr)
x = depth of carbon bed (ft)
No = adsorptive capacity of carbon (lb/ft^3)
Co = initial concentration of solute (lb/ft^3)
Cb = desired concentration at breakthrough (lb/ft^3)
K = rate constant (ft^3 liquid/lb carbon-hr)
V = linear flow velocity of feed to bed (ft/hr)

Table 2 summarizes operating parameters pertinent to the evaluation of column performance.

Table 1
Continuous Liquid-Liquid Extractor
Synthetic Organic Compounds Detected in Drinking Water

Compound	05/17/88 140 Liters Extracted (ug/L)	06/20/88 100 Liters Extracted (ug/L)	09/8/88 100 Liters Extracted (ug/L)	09/30/88 100 Liters Extracted (ug/L)
Hexachloroethane	0.0065	0.0015	0.0072	ND
Naphthalene	0.0039	0.0013	0.0032	0.0003
Dibenzofuran	0.0015	0.0042	0.0041	0.0003
Phenanthrene	0.0037	0.0014	0.0081	0.0009
Flouranthene	0.00074	0.0003	0.0016	0.0002
Acenapthene	ND	ND	0.0013	0.0043
Metetilachlor	NA	NA	[a]0.044	ND
Atrazine	NA	NA	ND	[a]0.021

Legend:

NA = The data was not evaluated for these compounds

ND = Not detected

[a]This compound was quantitated by assuming a response equal to that of the closest internal standard

Table 2
Operating Parameters for Activated Charcoal Column

Given:	
Column Diameter	1 inch
Column Depth	2 feet
Flow Rate	25 ml/min
	0.397 gallons/hour
Column Area	0.00545 ft^2
Application Rate	1.21 gpm/ft^2
Residence Time	12 minutes
Duration of Experiment	2650 minutes
	44.2 hours
Linear Velocity	9.72 ft/hr

Assume:	
Adsorptive capacity of carbon,	4 lb/ft^3 through 1 lb/ft^3
Rate Constant, K	5 ft^3 water/lb carbon-hr through
	1 ft^3 water/lb carbon-hr

Breakthrough Concentration

At an estimated influent concentration range of 0.0002-1 ug/L, the breakthrough concentraiton can be estimated by solving the Bohart-Adams Equation for Cb. Since the exponential $e^{KN_Ox/V} >> 1$ the equation can be simplified to:

$$\text{In } (C_O/C_B - 1) = \text{In } e^{(KN_Ox/V)} - KC_Ot \quad (2)$$

Since $\text{In } e^{KN_Ox/V} = e^{KN_Ox/V}$ the equation further simplifies to:

$$\text{In } (C_O/C_B - 1) = KN_Ox/V - KC_Ot \quad (3)$$

$$\text{In } (C_O/C_B - 1) = K (N_Ox/V - C_Ot) \quad (4)$$

Taking the inverse exponential gives:

$$\exp [K(N_Ox/V - C_Ot)] = C_O/C_B - 1 \quad (5)$$

$$\exp [K(N_Ox/V - C_Ot)] + 1 = C_O/C_B \quad (6)$$

Solving for the breakthrough concentration C_B gives:

$$C_B = C_O / (\exp [K(N_Ox/V - C_Ot)] + 1) \quad (7)$$

The two parameters, the adsorptive capacity and the rate constant, which are assumed and dependent upon the compound being removed can be varied to determine the effect on breakthrough concentration as a function of influent concentration. Table 3 and Figure 2 summarizes the breakthrough concentration at a fixed rate constant of 5 ft^3 water/lb carbon-hour and at varying adsorptive capacities of 4 lb/ft^3 through 1 lb/ft^3 at 44.2 hours. Table 4 and Figure 3 summarizes the breakthrough concentration at a adsorptive capacity of 4 lb/ft^3 with a variation of the rate constant of 5 ft^3 water/lb carbon-hour to 2 ft^3 water/lb carbon-hour. Table 5 and Figure 4 varies the rate constant from 4 ft^3 water/lb carbon-hour to 1 ft^3 water/lb carbon-hour at a fixed adsorptive capacity of 1 lb/ft^3.

Table 3
Activated Charcoal Column, Breakthrough Concentrations

Rate Constant K	5 ft^3 water/lb carbon-hour
Adsorptive Capacity	4 lb/ft^3 through 1 lb/ft^3
Column Depth	2 ft
Duration of Experiment	44.2 hours

Influent Concentration (ug/L)	Influent Concentration (lb/ft^3)	Breakthrough Concentration (lb/ft^3)	Breakthrough Concentration (ug/L)	
0.0002	1.25E-11	2.00E-13	3.21E-06	No=4
0.0005	3.12E-11	5.01E-13	8.03E-06	
0.001	6.24E-11	1.00E-12	1.61E-05	
0.002	1.25E-10	2.00E-12	3.21E-05	
0.005	3.12E-10	5.01E-12	8.03E-05	
0.01	6.24E-10	1.00E-11	1.61E-04	
0.02	1.25E-09	2.00E-11	3.21E-04	
0.05	3.12E-09	5.01E-11	8.03E-04	
0.1	6.24E-09	1.00E-10	1.61E-03	
0.15	9.36E-09	1.50E-10	2.41E-03	
0.2	1.25E-08	2.00E-10	3.21E-03	
0.35	2.18E-08	3.51E-10	5.62E-03	
0.5	3.12E-08	5.01E-10	8.03E-03	
1	6.24E-08	1.00E-09	1.61E-02	
0.0002	1.25E-11	5.45E-13	8.73E-06	No=3
0.0005	3.12E-11	1.36E-12	2.18E-05	
0.001	6.24E-11	2.73E-12	4.37E-05	
0.002	1.25E-10	5.45E-12	8.73E-05	
0.005	3.12E-10	1.36E-11	2.18E-04	
0.01	6.24E-10	2.73E-11	4.37E-04	
0.02	1.25E-09	5.45E-11	8.73E-04	
0.05	3.12E-09	1.36E-10	2.18E-03	
0.1	6.24E-09	2.73E-10	4.37E-03	
0.15	9.36E-09	4.09E-10	6.55E-03	
0.2	1.25E-08	5.45E-10	8.73E-03	
0.35	2.18E-08	9.54E-10	1.53E-02	
0.5	3.12E-08	1.36E-09	2.18E-02	
1	6.24E-08	2.73E-09	4.37E-02	

Table 3 (continued)
Activated Charcoal Column, Breakthrough Concentrations

Influent Concentration (ug/L)	Influent Concentration (lb/ft^3)	Breakthrough Concentration (lb/ft^3)	Breakthrough Concentration (ug/L)	
0.0002	1.25E-11	1.41E-12	2.27E-05	No=2
0.0005	3.12E-11	3.53E-12	5.66E-05	
0.001	6.24E-11	7.07E-12	1.13E-04	
0.002	1.25E-10	1.41E-11	2.27E-04	
0.005	3.12E-10	3.53E-11	5.66E-04	
0.01	6.24E-10	7.07E-11	1.13E-03	
0.02	1.25E-09	1.41E-10	2.27E-03	
0.05	3.12E-09	3.53E-10	5.66E-03	
0.1	6.24E-09	7.07E-10	1.13E-02	
0.15	9.36E-09	1.06E-09	1.70E-02	
0.2	1.25E-08	1.41E-09	2.27E-02	
0.35	2.18E-08	2.47E-09	3.97E-02	
0.5	3.12E-08	3.53E-09	5.66E-02	
1	6.24E-08	7.07E-09	1.13E-01	
0.0002	1.25E-11	3.29E-12	5.27E-05	No=1
0.0005	3.12E-11	8.22E-12	1.32E-04	
0.001	6.24E-11	1.64E-11	2.63E-04	
0.002	1.25E-10	3.29E-11	5.27E-04	
0.005	3.12E-10	8.22E-11	1.32E-03	
0.01	6.24E-10	1.64E-10	2.63E-03	
0.02	1.25E-09	3.29E-10	5.27E-03	
0.05	3.12E-09	8.22E-10	1.32E-02	
0.1	6.24E-09	1.64E-09	2.63E-02	
0.15	9.36E-09	2.46E-09	3.95E-02	
0.2	1.25E-08	3.29E-09	5.27E-02	
0.35	2.18E-08	5.75E-09	9.22E-02	
0.5	3.12E-08	8.22E-09	1.32E-01	
1	6.24E-08	1.64E-08	2.63E-01	

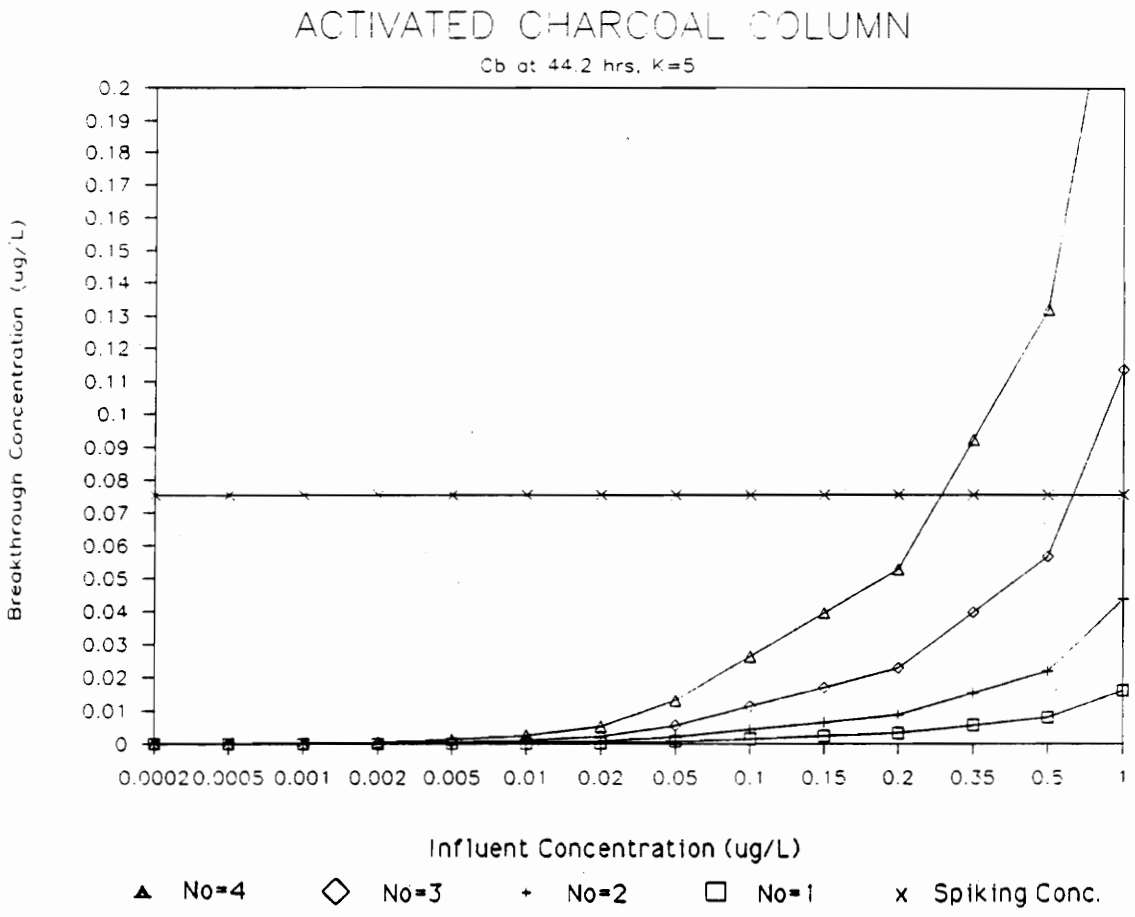


Figure 2

Activated Charcoal Column, Breakthrough Concentrations at K=5, N_0=4 through 1

Table 4
Activated Charcoal Column, Breakthrough Concentrations

Rate Constant K	5 ft^3 water/lb carbon-hour - 2 ft^3 water/lb carbon-hour
Adsorptive Capacity	4 lb/ft^3
Column Depth	2 ft
Duration of Experiment	44.2 hours

Influent Concentration (ug/L)	Influent Concentration (lb/ft^3)	Breakthrough Concentration (lb/ft^3)	Breakthrough Concentration (ug/L)	
0.0002	1.25E-11	2.00E-13	3.21E-06	K=5
0.0005	3.12E-11	5.01E-13	8.03E-06	
0.001	6.24E-11	1.00E-12	1.61E-05	
0.002	1.25E-10	2.00E-12	3.21E-05	
0.005	3.12E-10	5.01E-12	8.03E-05	
0.01	6.24E-10	1.00E-11	1.61E-04	
0.02	1.25E-09	2.00E-11	3.21E-04	
0.05	3.12E-09	5.01E-11	8.03E-04	
0.1	6.24E-09	1.00E-10	1.61E-03	
0.15	9.36E-09	1.50E-10	2.41E-03	
0.2	1.25E-08	2.00E-10	3.21E-03	
0.35	2.18E-08	3.51E-10	5.62E-03	
0.5	3.12E-08	5.01E-10	8.03E-03	
1	6.24E-08	1.00E-09	1.61E-02	
0.0002	1.25E-11	4.47E-13	7.17E-06	K=4
0.0005	3.12E-11	1.12E-12	1.79E-05	
0.001	6.24E-11	2.24E-12	3.58E-05	
0.002	1.25E-10	4.47E-12	7.17E-05	
0.005	3.12E-10	1.12E-11	1.79E-04	
0.01	6.24E-10	2.24E-11	3.58E-04	
0.02	1.25E-09	4.47E-11	7.17E-04	
0.05	3.12E-09	1.12E-10	1.79E-03	
0.1	6.24E-09	2.24E-10	3.58E-03	
0.15	9.36E-09	3.35E-10	5.38E-03	
0.2	1.25E-08	4.47E-10	7.17E-03	
0.35	2.18E-08	7.83E-10	1.25E-02	
0.5	3.12E-08	1.12E-09	1.79E-02	
1	6.24E-08	2.24E-09	3.58E-02	

Table 4 (continued)
Activated Charcoal Column, Breakthrough Concentrations

Influent Concentration (ug/L)	Influent Concentration (lb/ft^3)	Breakthrough Concentration (lb/ft^3)	Breakthrough Concentration (ug/L)	
0.0002	1.25E-11	9.74E-13	1.56E-05	K=3
0.0005	3.12E-11	2.44E-12	3.90E-05	
0.001	6.24E-11	4.87E-12	7.81E-04	
0.002	1.25E-10	9.74E-12	1.56E-04	
0.005	3.12E-10	2.44E-11	3.90E-04	
0.01	6.24E-10	4.87E-11	7.81E-03	
0.02	1.25E-09	9.74E-10	1.56E-03	
0.05	3.12E-09	2.44E-10	3.90E-03	
0.1	6.24E-09	4.87E-10	7.81E-02	
0.15	9.36E-09	7.31E-09	1.17E-02	
0.2	1.25E-08	9.74E-09	1.56E-02	
0.35	2.18E-08	1.70E-09	2.73E-02	
0.5	3.12E-08	2.44E-09	3.90E-02	
1	6.24E-08	4.87E-09	7.81E-01	
0.0002	1.25E-11	2.02E-12	3.23E-05	K=2
0.0005	3.12E-11	5.04E-12	8.08E-04	
0.001	6.24E-11	1.01E-11	1.62E-04	
0.002	1.25E-10	2.02E-11	3.23E-04	
0.005	3.12E-10	5.04E-11	8.08E-03	
0.01	6.24E-10	1.01E-10	1.62E-03	
0.02	1.25E-09	2.02E-10	3.23E-03	
0.05	3.12E-09	5.04E-10	8.08E-03	
0.1	6.24E-09	1.01E-09	1.62E-02	
0.15	9.36E-09	1.51E-09	2.42E-02	
0.2	1.25E-08	2.02E-09	3.23E-02	
0.35	2.18E-08	3.53E-09	5.66E-02	
0.5	3.12E-08	5.04E-09	8.08E-02	
1	6.24E-08	1.01E-08	1.62E-01	

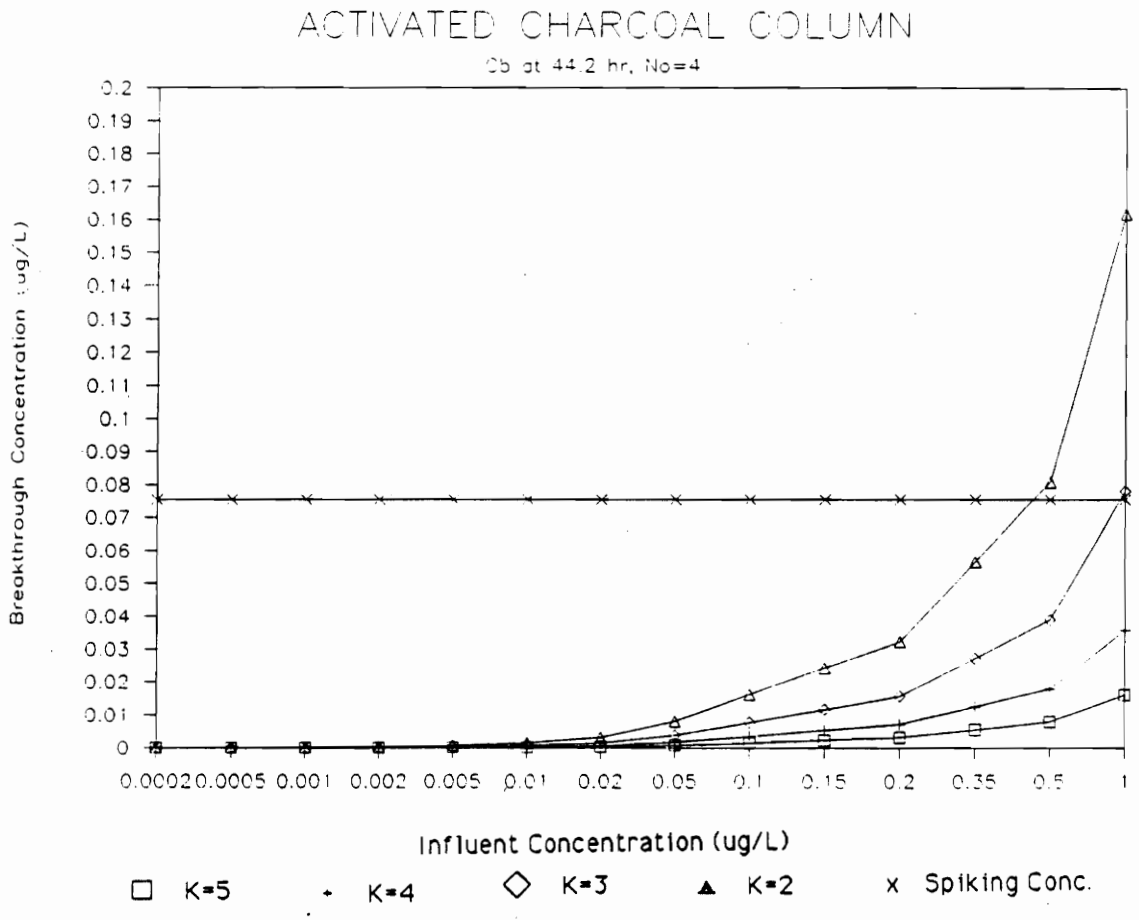


Figure 3

Activated Charcoal Column, Breakthrough Concentrations at N_0=4, K=5 through 2

Table 5
Activated Charcoal Column, Breakthrough Concentrations

Rate Constant K	4 ft^3 water/lb carbon-hour - 1 ft^3 water/lb carbon-hour
Adsorptive Capacity	1 lb/ft^3
Column Depth	2 ft
Duration of Experiment	44.2 hours

Influent Concentration (ug/L)	Influent Concentration (lb/ft^3)	Breakthrough Concentration (lb/ft^3)	Breakthrough Concentration (ug/L)	
0.0002	1.25E-11	3.81E-12	6.10E-05	K=4
0.0005	3.12E-11	8.92E-12	1.53E-04	
0.001	6.24E-11	1.90E-11	3.05E-04	
0.002	1.25E-10	3.81E-11	6.10E-04	
0.005	3.12E-10	9.52E-11	1.53E-03	
0.01	6.24E-10	1.90E-10	3.05E-03	
0.02	1.25E-09	3.81E-10	6.10E-03	
0.05	3.12E-09	9.52E-10	1.53E-02	
0.1	6.24E-09	1.90E-09	3.05E-02	
0.15	9.36E-09	2.86E-09	4.58E-02	
0.2	1.25E-08	3.81E-09	6.10E-02	
0.35	2.18E-08	6.66E-09	1.07E-01	
0.5	3.12E-08	9.52E-09	1.53E-01	
1	6.24E-08	1.90E-08	3.05E-01	
0.0002	1.25E-11	4.37E-12	7.01E-05	K=3
0.0005	3.12E-11	1.09E-11	1.75E-04	
0.001	6.24E-11	2.19E-11	3.50E-04	
0.002	1.25E-10	4.37E-11	7.01E-04	
0.005	3.12E-10	1.09E-10	1.75E-03	
0.01	6.24E-10	2.19E-10	3.50E-03	
0.02	1.25E-09	4.37E-10	7.01E-03	
0.05	3.12E-09	1.09E-09	1.75E-02	
0.1	6.24E-09	2.19E-09	3.50E-02	
0.15	9.36E-09	3.28E-09	5.26E-02	
0.2	1.25E-08	4.37E-09	7.01E-02	
0.35	2.18E-08	7.65E-09	1.23E-01	
0.5	3.12E-08	1.09E-08	1.75E-01	
1	6.24E-08	2.19E-08	3.50E-01	

Table 5 (continued)
Activated Charcoal Column, Breakthrough Concentrations

Influent Concentration (ug/L)	Influent Concentration (lb/ft^3)	Breakthrough Concentration (lb/ft^3)	Breakthrough Concentration (ug/L)	
0.0002	1.25E-11	4.97E-12	7.97E-05	K=2
0.0005	3.12E-11	1.24E-11	1.99E-04	
0.001	6.24E-11	2.49E-11	3.99E-04	
0.002	1.25E-10	4.97E-11	7.97E-04	
0.005	3.12E-10	1.24E-10	1.99E-03	
0.01	6.24E-10	2.49E-10	3.99E-03	
0.02	1.25E-09	4.97E-10	7.97E-03	
0.05	3.12E-09	1.24E-09	1.99E-02	
0.1	6.24E-09	2.49E-09	3.99E-02	
0.15	9.36E-09	3.73E-09	5.98E-02	
0.2	1.25E-08	4.97E-09	7.97E-02	
0.35	2.18E-08	8.70E-09	1.39E-01	
0.5	3.12E-08	1.24E-08	1.99E-01	
1	6.24E-08	2.49E-08	3.99E-01	
0.0002	1.25E-11	2.02E-12	8.97E-05	K=1
0.0005	3.12E-11	5.04E-11	2.24E-04	
0.001	6.24E-11	1.01E-11	4.49E-04	
0.002	1.25E-10	2.02E-11	8.97E-04	
0.005	3.12E-10	5.04E-10	2.24E-03	
0.01	6.24E-10	1.01E-10	4.49E-03	
0.02	1.25E-09	2.02E-10	8.97E-03	
0.05	3.12E-09	5.04E-09	2.24E-02	
0.1	6.24E-09	1.01E-09	4.49E-02	
0.15	9.36E-09	1.51E-09	6.73E-02	
0.2	1.25E-08	2.02E-09	8.97E-02	
0.35	2.18E-08	3.53E-09	1.57E-01	
0.5	3.12E-08	5.04E-08	2.24E-01	
1	6.24E-08	1.01E-08	4.49E-01	

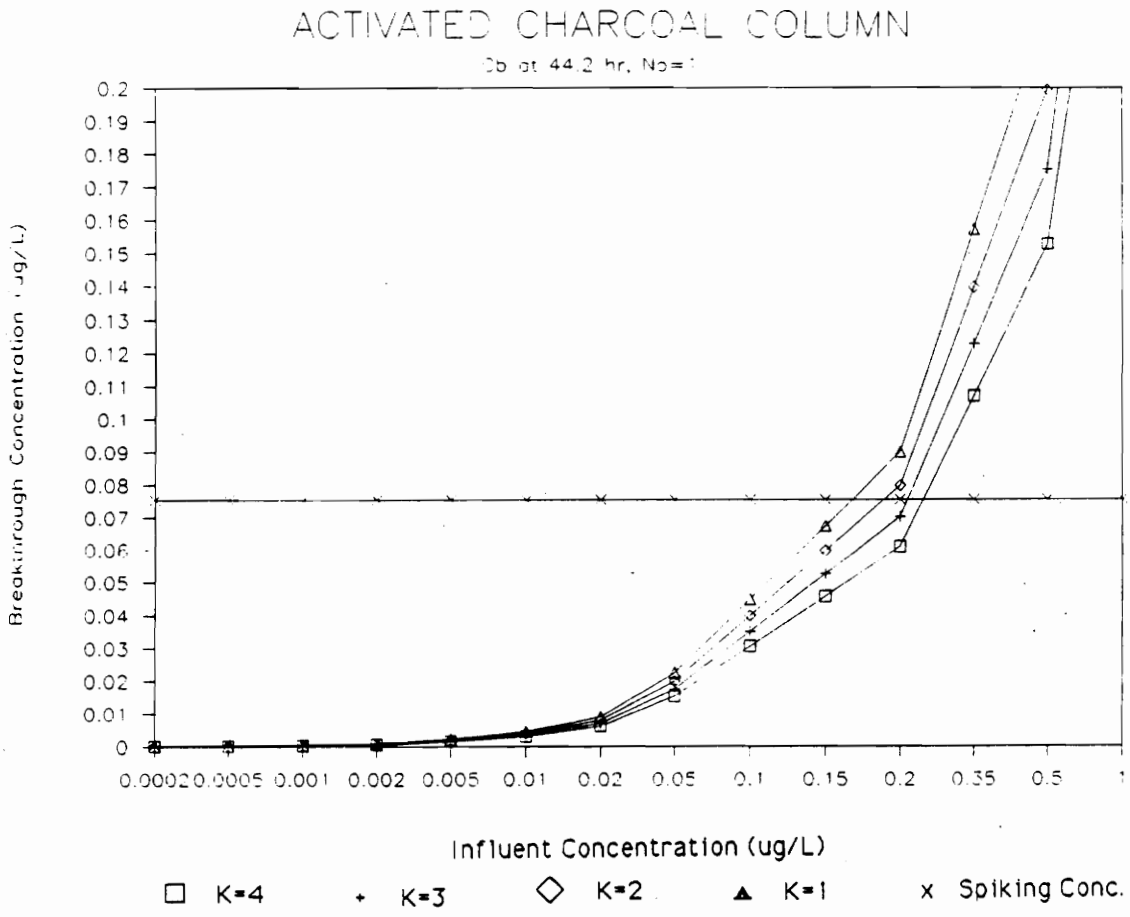


Figure 4

Activated Charcoal Column, Breakthrough Concentrations at N_0=1, K=4 through 1

As would be expected at low rate constants and/or low adsorptive capacities contribution by influent SOCs exceeds the spiking concentration into the extractor. At the range of SOCs detected in the water (Table 1) the contribution at 22.4 hours by the "native" PAHs with respect to the spiked PAHs was 11% (0.00449 ug/L / 0.0754 ug/L) at a adsorptive capacity and rate constant of 1. At these conditions contribution to the recovery of atrazine would be 6% (0.00897 ug/L / 0.151 ug/L).

Integrity of the Assumption of Removal

Contribution by specific SOCs present in the tap water to the recovery of spiked SOCs is likely, particularly under conditions of a low adsorptive capacity and rate constant. The range of contribution by SOCs present in the tap water is 6-11% of the spiking solution at the end of the experiment, 44.2 hours. The results in the recovery study should be qualified for the compounds detected in the tap water.

Overview of the Continuous Liquid-Liquid Extractor

The Continuous Liquid-Liquid Extractor is a countercurrent extraction system using methylene chloride as the extracting solvent. The water to be extracted enters the base of the extractor and immediately comes in contact with methylene chloride which is stirred by a Teflon magnetic stir bar (Figure 5, A). The vortex created by the stirring increases the surface area to volume ratio between the two liquids. The water exits the methylene chloride phase and enters the water column in which methylene chloride is

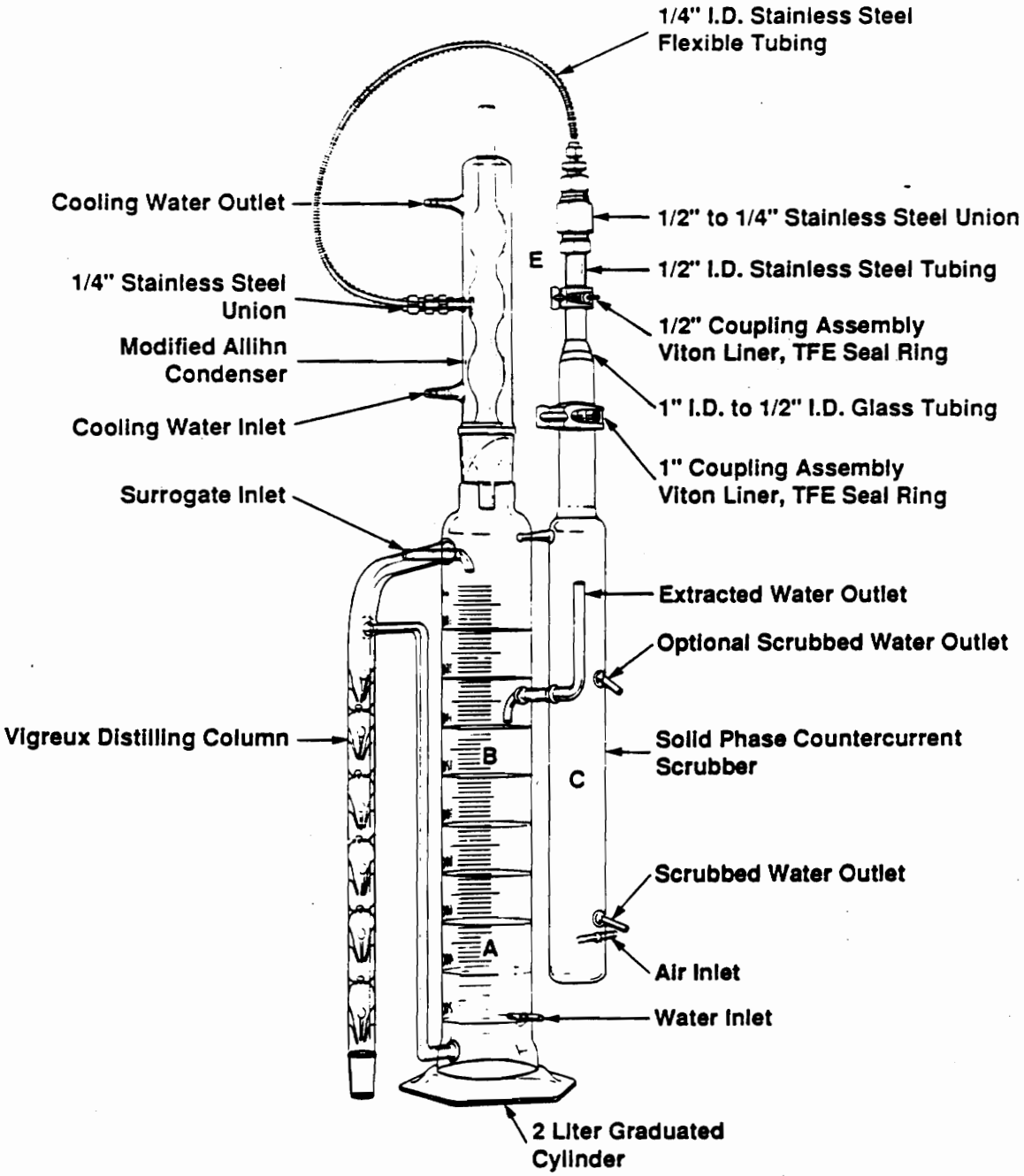


Figure 5
Continuous Liquid-Liquid Extractor

passing through from the Allihn Condenser (Figure 5, B). The water exits the extraction chamber and enters the solid phase countercurrent scrubber (Figure 5, C). The scrubber is filled with precleaned empty one milliter vials and is heated to 70°C to not only improve scrubbing efficiency but also to remove the methylene chloride-water azeotrope (38.8°C). Purified air enters the base of the scrubber and passes through the scrubbing column and exits the scrubber through the transfer line (Figure 5, C). The transfer line, 1/4" flexible stainless steel tubing, is insulated and heated to 80°C to ensure that condensation does not occur, as well as to create a temperature differential prior to entering the condenser. The methylene chloride and methylene chloride-water vapor azeotrope enters the modified Allihn Condenser where the vapors condense and are carried back into the water column by the continuously circulating methylene chloride. Circulation of the methylene chloride is created by heating the two liter distillation flask (Figure 6) causing the vapor to pass through the vigreux distillation column up into the modified Allihn Condenser. The methylene chloride then condenses and passes into the water column pooling at the base of the extractor where the extraction water enters (Figure 5, A). The weight of the water column and the increasing volume of methylene chloride cause the solvent to exit the base and pass over to the top of the vigurex distillation column where it rinses the column and pools in the distillation flask. The combination of the distillation plates created by the vigreux column and the continuous rinsing of the column traps the compounds targeted in the distillation flask. To compensate for hydraulic washout of the methylene chloride, the pressure equalizing two liter addition funnel can transfer methylene chloride into the

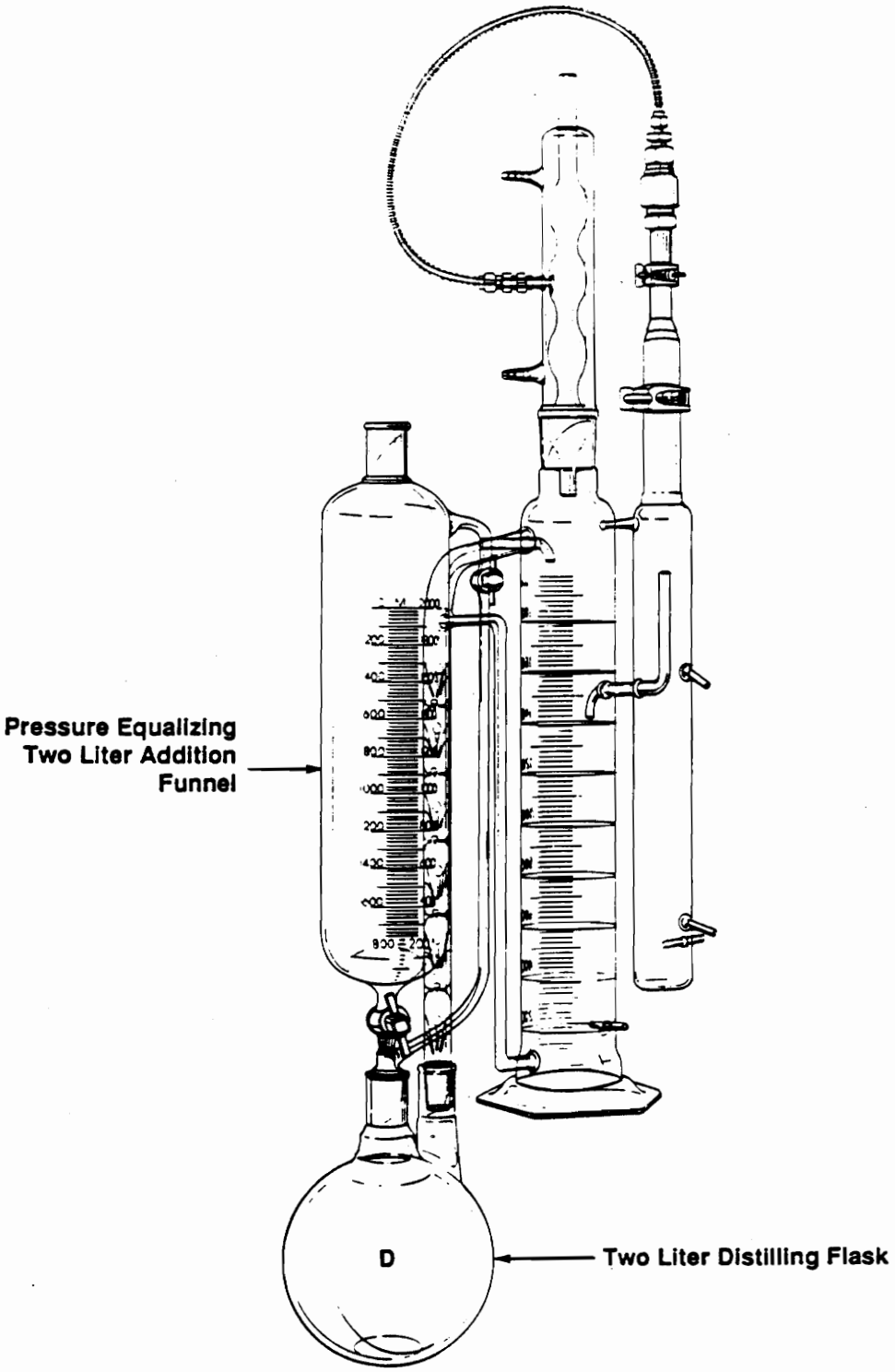


Figure 6
Continuous Liquid-Liquid Extraction System

flask without having the open the extraction system (Figure 6). In summary, there are three events creating the extraction system: water passing through the extractor, methylene chloride—the solvent—looping through the water, and the purged vapors looping back into the extractor.

Derivation of Extraction Efficiency Relationship

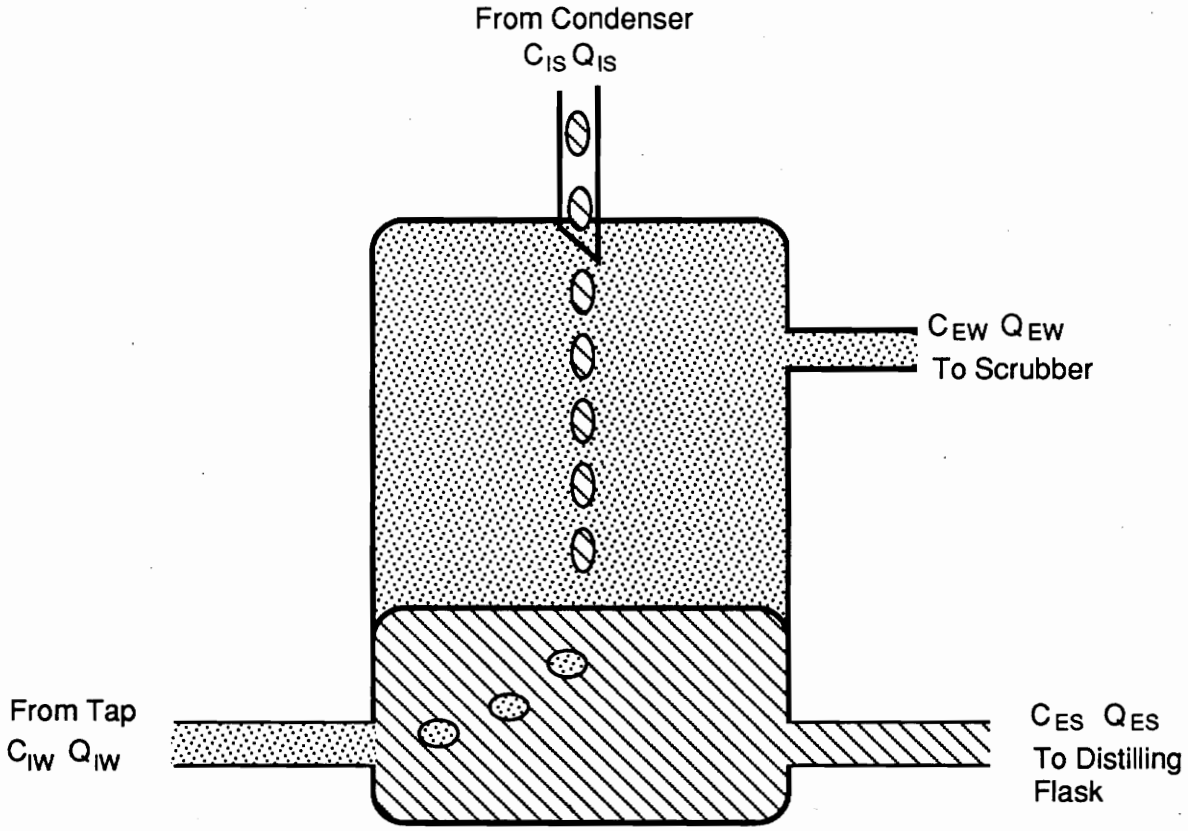
Theoretical recoveries can be estimated for any target analyte. The formula for estimating recoveries is derived form a mass balance relationship[16]. Figure 7 summarizes water flow entering and exiting the extractor as well as the solvent circulating through the water into the distillation flask. From this schematic the following mass balance relationship exists.

$$C_{iw}*Q_{iw} + C_{is}*Q_{is} = C_{es}*Q_{es} + C_{ew}*Q_{ew} \quad (8)$$

Given that the presence of distillation plates created by the vigruex column and the continuous rinsing of the Vigruex column by methylene chloride, an assumption is made that the concentration of target compounds in the influent solvent would be negligible. Therefore the term, $C_{is}*Q_{is}$, is removed from the mass balance, leading to:

$$C_{iw}*Q_{iw} = C_{es}*Q_{es} + C_{ew}*Q_{ew} \quad (9)$$

If the assumption is made that the system exhibits a high extraction efficiency and the influent concentraiton, C_{iw} is constant, this mass balance relationship is at steady state, and C_{es} is constant. The equilibriated concentration between water and solvent is defined as the partition coefficient with respect to methylene chloride,



LEGEND

	Methylene Chloride
	Water
C_{IW}	Concentration Analytes Influent Water
Q_{IW}	Flow Influent Water
C_{IS}	Concentration Analytes Influent Solvent
Q_{IS}	Flow Influent Solvent
C_{EW}	Concentration Analytes Effluent Water
Q_{EW}	Flow Effluent Water
C_{ES}	Concentration Analytes Effluent Solvent
Q_{ES}	Flow Effluent Solvent

Figure 7
Concentration-Flow Relationships Liquid-Liquid Extractor

$$Km = C_{es}/C_{ew} \quad (10)$$

where, Km is the partition coefficient for methylene chloride. Solving the relationship for C_{es} gives:

$$C_{es} = Km*C_{ew} \quad (11)$$

Substituting equation 11 into equation 9 gives, successively:

$$C_{iw}*Q_{iw} = Km*C_{ew}*Q_{es} + C_{ew}*Q_{ew} \quad (12)$$

$$C_{iw}*Q_{iw} = C_{ew}(Km*Q_{es} + Q_{ew}) \quad (13)$$

$$C_{iw}*Q_{iw}/C_{ew} = Km*Q_{es} + Q_{ew} \quad (14)$$

$$C_{iw}/C_{ew} = (Km*Q_{es} + Q_{ew})/Q_{iw} \quad (15)$$

Taking the reciprocal of equation 15 gives:

$$C_{ew}/C_{iw} = Q_{iw}/(Km*Q_{es} + Q_{ew}) \quad (16)$$

Subtracting each side of equation 16 from 1 gives:

$$1-(C_{ew}/C_{iw}) = 1 - Q_{iw}/(Km*Q_{es} + Q_{ew}) \quad (17)$$

Setting the value 1 in the left hand side of equation 17 to C_{iw}/C_{iw} gives:

$$(C_{iw} - C_{ew})/C_{iw} = 1 - Q_{iw}/(Km*Q_{es} + Q_{ew}) \quad (18)$$

For the extraction system to remain stable, the influent and effluent flow of water must be equal. Therefore, $Q_{iw}=Q_{ew}$, and setting the value 1 in equation 18 to $(Km*Q_{es} + Q_{ew})/(Km*Q_{es} + Q_{ew})$ gives:

$$(C_{iw} - C_{ew})/C_{iw} = (Km*Q_{es} + Q_{iw} - Q_{iw})/(Km*Q_{es} + Q_{ew}) \quad (19)$$

$$(C_{iw} - C_{ew})/C_{iw} = (Km*Q_{es})/(Km*Q_{es} + Q_{ew}) \quad (20)$$

In equation 20 the relationship

$$(C_{iw} - C_{ew})/C_{iw} \quad (21)$$

represents the remaining concentration of analyte divided by the initial concentration of the analyte. This is defined as the extraction efficiency, E. Therefore, for this system the extraction efficiency is given as:

$$E = (Km*Q_{es})/Km*Q_{es} + Q_{ew} \quad (22)$$

Dividing the numerator and denominator by Q_{ew} gives:

$$E = (Km(Q_{es}/Q_{ew}))/(Km(Q_{es}/Q_{ew}) + 1) \quad (23)$$

As stated earlier, for the extractor to remain stable influent solvent flow and effluent solvent flow as well as influent water flow and effluent water flow are equal. Thus, the extraction efficiency is maximized by increasing the ratio of solvent flow to water flow and is dependent upon the partition coefficient between methylene chloride and water. If values for partition coefficients in methylene chloride/water are not available, the octanal/water partition coefficient can be used as an estimate. Extraction efficiencies as a function of the partition coefficient, solvent flow, and water flow are summarized in Table 6 and depicted graphically in Figure 8. This is an asymptotic function the slope of which is dependent upon the ratio of solvent flow to water flow. At low partition coefficients the efficiency is a linear relationship, at intermediate partition coefficients this relationship is exponential, and at high partition coefficients this relationship is again linear.

Determination of Operating Parameters

In applying this extraction system to monitoring drinking water, an understanding of experimental parameters is very important. In designing an extraction the following parameters need to be determined:

- extraction efficiency
- influent concentration of the target analyte
- instrument detection limit
- preparation of extract
- required volume of extraction

Table 6
Theoretical Extraction Efficiency

E = (K*(QS/QW)) / (K*((QS/QW)+1)
K = Partition Coefficient in Methylene Chloride/Water
QS - Flow of Methlene Chloride
QW - Flow of water to be extracted
E1 - Extraction efficiency at (QS/QW) = 1
E2 - Extraction efficiency at (QS/QW) = 0.4
E3 - Extraction efficiency at (QS/QW) = 0.1

K	E1	E2	E3
0	0.000	0.000	0.000
1	0.500	0.286	0.091
2	0.667	0.444	0.167
3	0.750	0.545	0.231
4	0.800	0.615	0.286
5	0.833	0.667	0.333
6	0.857	0.706	0.375
7	0.875	0.737	0.412
8	0.889	0.762	0.444
9	0.900	0.783	0.474
10	0.909	0.800	0.500
11	0.917	0.815	0.524
12	0.923	0.828	0.545
13	0.929	0.839	0.565
14	0.933	0.848	0.583
15	0.938	0.857	0.600
16	0.941	0.865	0.615
17	0.944	0.872	0.630
18	0.947	0.878	0.643
19	0.950	0.884	0.655
20	0.952	0.889	0.667
21	0.955	0.894	0.677
22	0.957	0.898	0.688
23	0.958	0.902	0.697
24	0.960	0.906	0.706
25	0.962	0.909	0.714
26	0.963	0.912	0.722
27	0.964	0.915	0.730
28	0.966	0.918	0.737
29	0.967	0.921	0.744
30	0.968	0.923	0.750
31	0.969	0.925	0.756
32	0.970	0.928	0.762

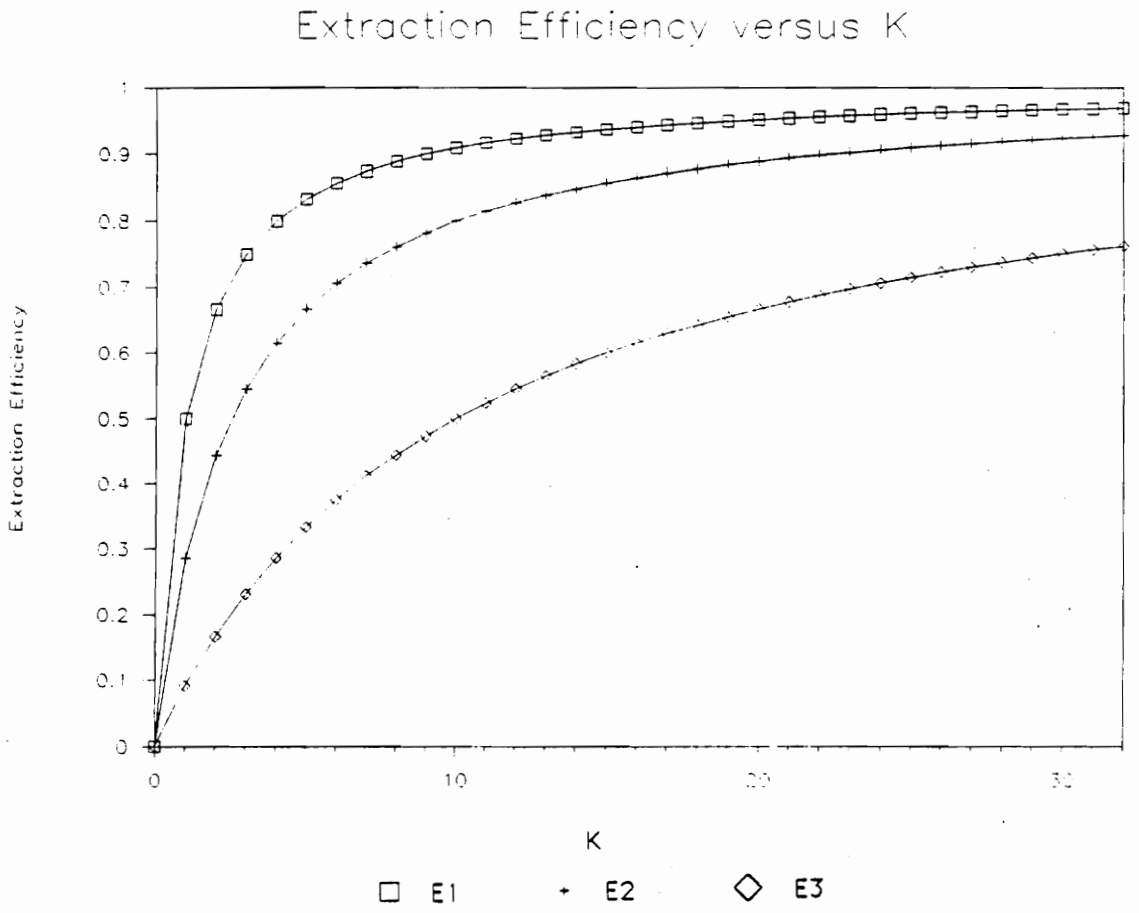


Figure 8
"K" Versus Extraction Efficiency

Extraction Efficiency

Equation 23 summarizes the parameters for extraction efficiency. The ratio of solvent flow to water flow should be maximized, but there are limiting conditions. Upon meeting the boiling point of methylene chloride, the volume of methylene chloride that vaporizes is dependent upon the surface area of the solvent within the distillation flask. During this study, a two liter flask was used. Increasing the volume of the distillation flask would be at the expense of increase contamination contributed by the solvent itself upon concentration for analysis. In addition, greater volumes might well be difficult to heat effectively. Minimizing water flow is advantageous for two reasons: it improves the solvent flow to water flow ratio and improves the representative sample from the drinking water being studied. The disadvantage is the increased duration of the experiment. Although this system is not real-time analysis, timely results are a pertinent issue. In this experiment a solvent to water flow ratio of 0.4 is used. With the water flow being set at 25 ml/min, and the solvent flow being estimated at 10 ml/min, the decisive parameter would be the partition coefficient. When targeting a group of compounds, the compound with the poorest partitioning would be the compound by which the system is operated to meet acceptable extraction efficiencies.

Influent concentration

In meeting water quality criteria for treated drinking water the influent concentration should be at least the MCL value or less. If additional information is available about loading from point and non-point sources,

influent concentrations to the treatment system, as well as potential effluent concentrations from the treatment process given the treatment efficiency, this information could be used to estimate influent concentration to the extractor.

Instrument Detection Limit

Detectors can have varying degrees of selectively as well as sensitivity. In this experiment a GCMS system is used. A Mass Spectrometer as a detector can determine and quantitate a broad spectrum of compounds at a relatively high instrument detection limit. Conversely, an Electron Capture Detector coupled with Gas Chromatography (GC-ECD) can detect organochlorine compounds at a detection factor of a 1000 lower than a GCMS system. Selecting the type of compounds as well as the instrument to quantitate those compounds is a factor in determining the necessary volume to be extracted in order to meet desired Method Detection Limits.

Preparation of Extract

Selective cleanups and preparation of the extract prior to analysis can be an option. This is normally selective in nature and thus is not conducive to analysis of a broad spectrum of compounds. In addition, cleanups can cause loss of the target analyte. On the positive side, selective preparation of the extract can improve detection limits by removing compounds that could potentially hinder detection of the target compounds. The option of using a selective cleanup would depend upon the analyte targeted as the interfering compound present in the water being extracted.

Required Volume of Extraction

Upon evaluating the various components within an analytical process: extraction efficiency, influent concentration of the target analyte, instrument detection limit, and preparation of the extract, the system or Method Detection Limit will ultimately be dependent upon the volume extracted. Equation 23 can be rewritten:

$$E = 1/(1 + (Q_{ew}/(Km)(Q_{es}))) \quad (24)$$

By dimensional analysis the total extraction volume required to achieve a desired detection limit is given by:

$$\text{Total Volume to be extracted in liters} = \frac{\text{Instrument Detection Limit (ug/ml)}}{\frac{\text{Influent Concentration ug/L*E}}{\text{Final Volume Extract (mL)}}}$$

Thus, upon evaluating the operating parameters the total volume to be calculated which would result in a method detection limit which is the targeted or anticipated influent concentration. Table 6 summarizes various scenarios for volume requirements given the operating parameters of the analytical sequence.

Spiking Concentration

The percent recovery is ultimately based on the absolute amount of extracted and quantitated with respect to the absolute amount spiked into the system. The theoretical concentration of the spiking solution with respect to the tap water is determined by a mass balance relationship.

$$(Cspike)\ (Qspike) = (Cmix)\ (Qtap) \quad (25)$$

Table 7
Volume Requirement for Continuous Liquid-Liquid Extractor

E = Extraction Efficiency
Km = Methylene Chloride/Water Partition Coefficient
Qs = Flow Solvent
Qw = Flow Water

$$\text{Total Volume} = \frac{\text{Instrument Detection Limit (ug/ml)}}{\text{Influent Concentration} * E\ (ug/L)} \text{ Final Volume Extract (ml)}$$

$E = (Km*Qs) / (Km*Qs+Qw)$
$E = 1/(1+(Qw/Km*Qs))$
Assume Final Volume Extract 0.2 ml.

Partition Coefficient	Extraction Efficiency	Influent Concentration (ug/l)	Instrument Detection Limit (ug/ml)	Total Operation Volume Required (liters)	Time Of Extractor (hours)	Comments
10	0.8000	1.00E-01	0.01	0.03	0.02	SD/LPC/HMDL
10	0.8000	1.00E-01	1.00	2.50	1.67	MD/LPC/HMDL
10	0.8000	1.00E-01	10.00	25.00	16.67	GD/LPC/HMDL
10	0.8000	1.00E-03	0.01	2.50	1.67	SD/LPC/LMDL
10	0.8000	1.00E-03	1.00	250.00	166.67	MD/LPC/LMDL
10	0.8000	1.00E-03	10.00	2500.00	1666.67	GD/LPC/LMDL
100	0.9756	1.00E-01	0.01	0.02	0.01	SD/MPC/HMDL
100	0.9756	1.00E-01	1.00	2.05	1.37	MD/MPC/HMDL
100	0.9756	1.00E-01	10.00	20.50	13.67	GD/MPC/HMDL
100	0.9756	1.00E-03	0.01	2.05	1.37	SD/MPC/LMDL
100	0.9756	1.00E-03	1.00	205.00	136.67	MD/MPC/HMDL
100	0.9756	1.00E-03	10.00	2050.00	1366.67	GD/MPC/LMDL
1000	0.9975	1.00E-01	0.01	0.02	0.01	SO/HPC/HMDL
1000	0.9975	1.00E-01	1.00	2.01	1.34	MD/HPC/HMDL
1000	0.9975	1.00E-01	10.00	20.05	13.37	GD/HPC/HMDL
1000	0.9975	1.00E-03	0.01	2.01	1.34	SD/HPC/LMDL
1000	0.9975	1.00E-03	1.00	200.50	133.67	MD/HPC/LMDL
1000	0.9975	1.00E-03	10.00	2005.00	1336.67	GD/HPC/LMDL

SD - Selective Detector (ex. GC-ECD)
MD - Moderate Detector (ex. GCMS Special Tune)
GD - General Detector (ex. GCMS Production Tune)
LPC - Low Partition Coefficient
MPC - Moderate Partition Coefficient
HPC - High Partition Coefficient
HMDL - High Method Detection Limit
LMDL - Low Method Detection Limit

where,

Cspike = Concentration Spiking Solution Flow
Qspike = Flow Spiking Solution
Cmix = Concentration at the Point of Mixing
Qtap = Flow Tap Water

The concentration at the point of mixing represents the theoretical concentration that would be present in the tap water. The individual standard components at their stock concentrations, their concentration in the feed line to the mixing point, and the concentration at the mixing point are summarized in Table 8. The concentration in the spiking reservoir is the spiking solution (Reference Figure 1). This concentration is obtained by adding 2.5 ml of the stock concentration to 10 liters of purified water within the spiking reservoir. The time of the extraction process is 2,650 minutes. The total volume of the spiking solution flow being 3.77 ml/min. The flow of the tap water is 25 ml/min.

Discussion of Equipment

During the experiment extraction water and spiking water came in contact with glass, stainless steel, and teflon. When possible, the components were cleaned in the following sequence: distilled water, methanol, and methylene chloride. After the methylene chloride was vented off, the equipment was baked at 500°C for 12 hours. The items not precleaned were the pressure gauge, flow meter, fine adjustment valve, needle valve, pumphead, and air compressor. With the exception of the air compressor, these items have stainless steel and/or teflon parts which would have no

Table 8
Spiking Summary

Compound	Spiking Solution (ug/ml)	Conc. at Feed to Mix (ug/ml)	Conc. at Mix/ Theoredical Conc. Tap Water (ug/L)
N-Nitrosodimethylamine	2.00	0.0005	0.0754
2-Fluorophenol (Surr.)	2.00	0.0005	0.0754
Phenol-D5 (Surr.)	2.00	0.0005	0.0754
Phenol	2.00	0.0005	0.0754
Bis(2-chloroethyl)ether	2.00	0.0005	0.0754
2-Chlorophenol	2.00	0.0005	0.0754
1,3-Dichlorobenzene	2.00	0.0005	0.0754
1,4-Dichlorobenzene	2.00	0.0005	0.0754
Benzyl Alcohol	2.00	0.0005	0.0754
1,2-Dichlorobenzene	2.00	0.0005	0.0754
2-Methylphenol	2.00	0.0005	0.0754
Bis(2-chloroisopropyl)ether	2.00	0.0005	0.0754
4-Methylphenol	2.00	0.0005	0.0754
N-Nitroso-di-n-propylamine	2.00	0.0005	0.0754
Hexachloroethane	2.00	0.0005	0.0754
Nitrobenzene-D-5 (Surr.)	2.00	0.0005	0.0754
Nitrobenzene	2.00	0.0005	0.0754
Isophorone	2.00	0.0005	0.0754
2-Nitrophenol	2.00	0.0005	0.0754
2,4-Dimethylphenol	2.00	0.0005	0.0754
Benzoic Acid	2.00	0.0005	0.0754
Bix(2-chloroethoxy)methane	2.00	0.0005	0.0754
2,4-Dichlorophenol	2.00	0.0005	0.0754
1,2,4-Trichlorobenzene	2.00	0.0005	0.0754
Naphthalene	2.00	0.0005	0.0754
4-Chloroaniline	2.00	0.0005	0.0754
Hexachlorobutadiene	2.00	0.0005	0.0754
4-Chloro-3-methylphenol	2.00	0.0005	0.0754
2-Methylnaphthalene	2.00	0.0005	0.0754
Hexachlorocyclopentadiene	2.00	0.0005	0.0754
2,4,6-Trichlorophenol	2.00	0.0005	0.0754
2,4,5-Trichlorophenol	2.00	0.0005	0.0754
2-Fluorobiphenyl (Surr.)	2.00	0.0005	0.0754
2-Chloronaphthalene	2.00	0.0005	0.0754
2-Nitroaniline	2.00	0.0005	0.0754
Dimethylphthalate	2.00	0.0005	0.0754
Acenaphthylane	2.00	0.0005	0.0754
2,6-Dinitrotoluene	2.00	0.0005	0.0754
3-Nitroaniline	2.00	0.0005	0.0754

Table 8 (continued)
Spiking Summary

Compound	Spiking Solution (ug/ml)	Conc. at Feed to Mix (ug/ml)	Conc. at Mix/ Theoredical Conc. Tap Water (ug/L)
Acenaphthene	2.00	0.0005	0.0754
2,4-Dinitrophenol	2.00	0.0005	0.0754
Fluorene	2.00	0.0005	0.0754
4-Chlorophenyl-phenylether	2.00	0.0005	0.0754
4-Nitrophenol	2.00	0.0005	0.0754
Dibenzofuran	2.00	0.0005	0.0754
2,4-Dinitrotoluene	2.00	0.0005	0.0754
4-Nitroaniline	2.00	0.0005	0.0754
4,6-Dinitro-2-methylphenol	2.00	0.0005	0.0754
n-Nitrosodiphenylamine	2.00	0.0005	0.0754
2,4,6-Tribromophenol (Surr.)	2.00	0.0005	0.0754
4-Bromophenyl-phenylether	2.00	0.0005	0.0754
Hexachlorobenzene	2.00	0.0005	0.0754
Pentachlorophenol	2.00	0.0005	0.0754
Phenanthrene	2.00	0.0005	0.0754
Anthracene	2.00	0.0005	0.0754
Di-n-butylphthalate	2.00	0.0005	0.0754
Fluoranthene	2.00	0.0005	0.0754
Pyrene	2.00	0.0005	0.0754
p-Terphenyl-D14 (Surr.)	2.00	0.0005	0.0754
Butylbenzylpthalate	2.00	0.0005	0.0754
Benzo(a)anthracene	2.00	0.0005	0.0754
3,3'-Dichlorobenzidene	2.00	0.0005	0.0754
Chrysene	2.00	0.0005	0.0754
Bix(2-ethylhexyl)phthalate	2.00	0.0005	0.0754
Di-n-octylphthalate	2.00	0.0005	0.0754
Benzo(b)fluoranthene	2.00	0.0005	0.0754
Benzo(k)fluoranthene	2.00	0.0005	0.0754
Benzo(a)pyrene	2.00	0.0005	0.0754
Indeno(1,2,3-CD)pyrene	2.00	0.0005	0.0754
Dibenz(a,h)anthracene	2.00	0.0005	0.0754
Benzo(g,h,i)perylene	2.00	0.0005	0.0754
2-Ethoxyethanol	2.00	0.0005	0.0754
2-Picoline	2.00	0.0005	0.0754
n-Nitrosomethylethylamine	2.00	0.0005	0.0754
Ethyl Mentanesulfonate	2.00	0.0005	0.0754
Aniline	2.00	0.0005	0.0754
m-Cresol	2.00	0.0005	0.0754
Acetophenone	2.00	0.0005	0.0754

Table 8 (continued)
Spiking Summary

Compound	Spiking Solution (ug/ml)	Conc. at Feed to Mix (ug/ml)	Conc. at Mix/ Theoredical Conc. Tap Water (ug/L)
n-Nitrosopyrrolidine	2.00	0.0005	0.0754
n-Nitrosomorpholine	2.00	0.0005	0.0754
o-Toluidine	2.00	0.0005	0.0754
n-Nitrosopiperidine	2.00	0.0005	0.0754
Diethylphthalate	2.00	0.0005	0.0754
n-Nitrosodiethylamine	2.00	0.0005	0.0754
2,6-Dichorophenol	2.00	0.0005	0.0754
Hexachloropropene	2.00	0.0005	0.0754
p-Phenylenediamine	2.00	0.0005	0.0754
n-Nitrosodi-n-butylamine	2.00	0.0005	0.0754
Safrole	2.00	0.0005	0.0754
1,2,4,5-Tetrachlorobenzene	2.00	0.0005	0.0754
Isosafrole	2.00	0.0005	0.0754
p-Dinitrobenzene	2.00	0.0005	0.0754
m-Dinitrobenzene	2.00	0.0005	0.0754
Pentachlorobenzene	2.00	0.0005	0.0754
2-Naphthylamine	2.00	0.0005	0.0754
1-Naphthylamine	2.00	0.0005	0.0754
2,3,4,6-Tetrachlorophenol	2.00	0.0005	0.0754
5-Nitro-o-toluidine	2.00	0.0005	0.0754
sym-Trinitrobenzene	2.00	0.0005	0.0754
Phenacetin	2.00	0.0005	0.0754
4-Aminobiphenyl	2.00	0.0005	0.0754
Pronamide	2.00	0.0005	0.0754
Pentachloronitrobenzene	2.00	0.0005	0.0754
Dinoseb	2.00	0.0005	0.0754
4-Nitroquinoline-1-oxide	2.00	0.0005	0.0754
p-(dimethylamino)azobenzene	2.00	0.0005	0.0754
Chlorobenzilate	2.00	0.0005	0.0754
3,3'-Dimethylbenzidene	2.00	0.0005	0.0754
2-Acetylaminofluorene	2.00	0.0005	0.0754
4,4'-Methylenebis-(2-chloroaniline)	2.00	0.0005	0.0754
7,12-Dimethylbenz(a)-anthracene	2.00	0.0005	0.0754
3-methylcholanthrene	2.00	0.0005	0.0754
Phorate	4.00	0.001	0.151
Disulfoton	4.00	0.001	0.151
Methyl Parathion	4.00	0.001	0.151
Malathion	4.00	0.001	0.151

Table 8 (continued)
Spiking Summary

Compound	Spiking Solution (ug/ml)	Conc. at Feed to Mix (ug/ml)	Conc. at Mix/ Theoredical Conc. Tap Water (ug/L)
Parathion	4.00	0.001	0.151
Alachlor	4.00	0.001	0.151
Atrazine	4.00	0.001	0.151
Famphur	4.00	0.001	0.151
alpha-BHC	4.00	0.001	0.151
beta-BHC	4.00	0.001	0.151
gamma-BHC (lindane)	4.00	0.001	0.151
Methylmethanesulfonate	2.00	0.0005	0.0754
delta-BHC	4.00	0.001	0.151
Heptachlor	4.00	0.001	0.151
Aldrin	4.00	0.001	0.151
Heptachlor Epoxide	4.00	0.001	0.151
gamma-Chlorodane	5.00	0.00125	0.188
alpha-Endosulfan	4.00	0.001	0.151
alpha-Chlorodane	5.00	0.00125	0.188
4,4'-DDE	4.00	0.001	0.151
Dieldrin	4.00	0.001	0.151
Endrin	4.00	0.001	0.151
Beta-Endosulfan	4.00	0.001	0.151
4,4'-DDD	4.00	0.001	0.151
Endrin Aldehyde	4.00	0.001	0.151
4,4'-DDT	4.00	0.001	0.151
Endosulfan Sulfate	4.00	0.001	0.151
p,p'-Methoxychlor	5.00	0.00125	0.181

contamination contribution. Air exiting the pump was passed through activated charcoal (not shown in Figure 1). Prior to connecting the extractor, water was passed through all components for approximately 1 hour. A summary of equipment and vendors is given in Table 9.

Table 9
Equipment Summary

Equipment	Vendor
Compression Fittings Stainless Steel	Swagelock
3/8" NPT male to 1/4" compression	Swagelock
1/4" Tee	Swagelock
1/4" NPT male to 1/4" Hose Clamp	Swagelock
1/4" to 1/2" female	Swagelock
Valves	
Course Adjustment	Nupro (Swagelock)
Fine Adjustment	Nupro (Swagelock)
Metering Valve/Needle Valve	Omega
1/4" Stainless Steel Flexible Tubing	Swagelock
Tygon Tubing	Fisher
Hose Clamps	Fisher
Activitated Charcoal Column	
1/2" Coupling Assembly	In House
1" Coupling Assembly	In House
1/2" to 1" Glass Tubing	In House
1" Glass Tubing	In House
Pressure Gauge	Omega
1/4" Teflon Tubing	Omega
Piston Pump Stainless Steel Pump Head	Omega
Flow Meter	Gilmont
Vespar Graphite Ferrules	Supelco
Heating Tape	Omega
1ml Glass Vials	Supelco
Continuous Liquid-Liquid Extraction System	
Two liter distilling flask	Fisher
Pressure Equalizing Addition Funnel	Fisher
Allihn Condenser (unmodified)	Fisher
Two liter graduated cylinder (unmodified)	Fisher
Liquid-Liquid Extractor	Design: J.C. Kuhn Jr., Dr. Charles Carter Glass Modifications: Alfred J. Heine Jr., Glass Blowing Ent.
Activated Charcoal	Calgon Corp.
5100 GCMS	Finnigan Corp.
Column: Restex RTX-5, 30 meter, 0.5 um	Restex Corp.
Standards	Aldrich Chemical Services Fisher Supelco
Telfon Stir Bar	Fisher
Magnetic Stirrer	Fisher
Various Laboratory Equipment	Fisher
Pipets	Fisher
Pipet Pumps	Fisher
Syringes	Fisher

IV. Results and Discussion

Recovery Summary

Mean average recoveries summarized in Table 10 generally demonstrate acceptable extraction efficiencies for the compounds listed with the exception being some amine derivatives, phenolic compounds, carboxylic acids and some compounds which have high instrument detection limits when analyzed by GCMS. A limitation to the extraction system is that the pH of the influent water is not adjusted. Extreme pH conditions (pH<2) favor the partitioning of acidic compounds. The poor recoveries of compounds which have disassociation constants (pKa) in the range of 3 to 5 such as phenols and carboxylic acids will not partition readily under neutral conditions.

The following amine derivatives which showed poor recoveries: Nitrosodimethylamine (34%), p-Phenylenediamine (Not Detected), 2-Naphthylamine (36%), and 1-Naphthyamine (31%). Aromatic amines tend to degrade within the instrument resulting in high instrument detection limits. This is particularly true with p-Phenylenediamine which very likely degrades in the injection port of the instrument.

The poor recoveries of the surrogates 2-Fluorophenol (41%) and Phenol-D5 (32%) as well as the target compounds Phenol (58%), 2,4-Dinitrophenol (ND), Pentachlorophenol (10%), and 2, 3, 4, 6-Tertachlorophenol (32%) can be attributed to several limitations other than pH adjustment of the influent water. Phenolic compounds in general show a high solubility in water. This is primarily a result of hydrogen bonding. In some instances the hydraulic retention time within the extractor would not be sufficient enough for a

Table 10
Recovery Summary

Compound Name	Spiking Solution (ug/ml)	Ideal Amount to Recover (ug)	First Injection Absolute Amount Recovered (ug)	Second Injection Absolute Amount Recovered (ug)	Percent Relative Standard Deviation For Injections	Mean Average Recovery
N-Nitrosodimethylamine	2.00	25.0	8.4	8.7	3.5	34.2
2-Fluorophenol (Surr.)	2.00	25.0	10.2	10.3	1.0	41.0
Phenol-D5 (Surr.)	2.00	25.0	8.4	7.7	8.7	32.2
Phenol	2.00	25.0	14.7	14.2	3.5	57.8
Bis(2-Chloroethyl)ether	2.00	25.0	21.2	21.1	0.5	84.6
2-Chlorophenol	2.00	25.0	17.4	17.7	1.7	70.2
1,3-Dichlorobenzene	2.00	25.0	17.7	16.3	8.2	68.0
1,4-Dichlorobenzene	2.00	25.0	19.0	17.8	6.5	73.6
Benzyl Alcohol	2.00	25.0	14.0	14.2	1.4	56.4
1,2-Dichlorobenzene	2.00	25.0	19.6	17.8	9.6	74.8
2-Methylphenol	2.00	25.0	17.9	17.6	1.7	71.0
Bis(2-chloroisopropyl)ether	2.00	25.0	20.6	21.1	2.4	83.4
4-Methylphenol	2.00	25.0	36.3	35.5	2.2	43.6
N-Nitroso-di-n-propylamine	2.00	25.0	23.8	23.2	2.6	94.0
Hexachloroethane	2.00	25.0	17.5	16.9	3.5	68.8
Nitrobenzene-D5 (Surr.)	2.00	25.0	22.6	23.9	5.6	93.0
Nitrobenzene	2.00	25.0	22.9	23.4	2.2	92.6
Isophorone	2.00	25.0	21.3	21.8	2.3	86.2
2-Nitrophenol	2.00	25.0	17.6	18.7	6.1	72.6
2,4-Dimethylphenol	2.00	25.0	17.8	18.3	2.8	72.2
Benzoic Acid	2.00	25.0	0.1	0.1	0.0	0.4
Bis(2-chloroethoxy)methane	2.00	25.0	19.7	19.9	1.0	79.2
2,4-Dichlorophenol	2.00	25.0	17.4	17.8	2.3	70.4
1,2,4-Trichlorobenzene	2.00	25.0	20.1	20.7	2.9	81.6

Table 10 (continued)
Recovery Summary

Compound Name	Spiking Solution (ug/ml)	Ideal Amount to Recover (ug)	First Injection Absolute Amount Recovered (ug)	Second Injection Absolute Amount Recovered (ug)	Percent Relative Standard Deviation For Injections	Mean Average Recovery
Naphthalene	2.00	25.0	19.1	19.8	3.6	77.8
4-Chloroaniline	2.00	25.0	30.2	34.8	14.2	130.0
Hexachlorobutadiene	2.00	25.0	13.6	13.5	0.7	54.2
4-Chloro-3-methylphenol	2.00	25.0	19.5	19.8	1.5	78.6
2-Methylnaphthalene	2.00	25.0	20.3	19.6	3.5	79.8
4-Nitrophenol	2.00	25.0	ND	ND	NA	0.0
Dibenzofuran	2.00	25.0	20.2	20.2	0.2	80.9
2,4-Dinitrotoluene	2.00	25.0	24.7	25.7	4.0	100.8
Diethylphthalate	2.00	25.0	19.5	20.4	4.5	79.8
4-Nitroaniline	2.00	25.0	22.0	24.2	9.4	92.5
4,6-Dinitro-2-methylphenol	2.00	25.0	ND	0.3	200.0	0.6
n-Nitrosodiphenylamine	2.00	25.0	20.9	20.9	0.0	83.6
2,4,6-Tribromophenol (Surr.)	2.00	25.0	20.1	20.1	0.0	80.4
4-Bromophenyl-phenylether	2.00	25.0	21.8	22.0	0.7	87.7
Hexachlorobenzene	2.00	25.0	14.6	14.3	1.9	57.8
Pentachlorophenol	2.00	25.0	2.6	2.5	3.1	10.2
Phenanthrene	2.00	25.0	19.8	19.2	3.1	78.0
Anthracene	2.00	25.0	23.0	22.5	2.4	91.1
Di-N-butylphthalate	2.00	25.0	33.7	31.6	6.4	130.6
Fluoranthene	2.00	25.0	21.7	22.1	1.7	87.7
Pyrene	2.00	25.0	16.7	17.8	6.3	69.0
p-Terphenyl-D14 (Surr.)	2.00	25.0	15.8	16.9	6.5	65.5
Butylbenzylpthalate	2.00	25.0	21.6	21.8	0.8	86.9
Benzo(a)anthracene	2.00	25.0	24.3	26.4	8.2	101.4

Table 10 (continued)
Recovery Summary

Compound Name	Spiking Solution (ug/ml)	Ideal Amount to Recover (ug)	First Injection Absolute Amount Recovered (ug)	Second Injection Absolute Amount Recovered (ug)	Percent Relative Standard Deviation For Injections	Mean Average Recovery
3,3'-Dichlorobenzidene	2.00	25.0	21.1	22.4	5.9	87.0
Chrysene	2.00	25.0	15.3	15.6	2.2	61.7
Bis(2-ethylhexyl)phthalate	2.00	25.0	97.7	93.8	4.0	382.9
Di-n-octylphthalate	2.00	25.0	10.4	11.1	6.7	43.0
Benzo(b)fluoranthene	2.00	25.0	14.6	15.8	7.7	60.9
Benzo(k)fluoranthene	2.00	25.0	12.7	13.5	6.2	52.4
Benzo(a)pyrene	2.00	25.0	11.7	12.9	9.8	49.2
Indeno(1,2,3-CD)pyrene	2.00	25.0	8.0	9.3	15.4	34.5
Dibenz(a,h)anthracene	2.00	25.0	5.7	6.7	15.9	24.8
Benzo(g,h,i)perylene	2.00	25.0	6.7	8.0	17.1	29.5
2-Ethoxyethanol	2.00	25.0	ND	ND	NA	0.0
2-Picoline	2.00	25.0	12.5	12.4	1.2	49.8
n-Nitrosomethylethylamine	2.00	25.0	13.0	13.6	4.7	53.2
n-Nitrosodiethylamine	2.00	25.0	24.9	25.5	2.4	100.8
Ethyl Mehtanesulfonate	2.00	25.0	13.0	13.5	3.9	52.9
Aniline	2.00	25.0	34.6	37.3	7.3	143.8
m-Cresol	2.00	25.0	37.7	36.8	2.2	149.0
Acetophenone	2.00	25.0	23.8	22.7	4.7	92.9
n-Nitrosopyrrolidine	2.00	25.0	16.2	16.0	0.7	64.4
n-Nitrosomorpholine	2.00	25.0	13.7	13.2	3.8	53.8
0-Toluidine	2.00	25.0	18.7	18.1	3.1	73.7
n-Nitrosopiperidine	2.00	25.0	21.8	21.8	0.2	87.2
Dieldrin	2.00	25.0	44.1	41.6	5.8	85.7
Endrin	2.00	25.0	28.4	40.7	5.8	79.1

Table 10 (continued)
Recovery Summary

Compound Name	Spiking Solution (ug/ml)	Ideal Amount to Recover (ug)	First Injection Absolute Amount Recovered (ug)	Second Injection Absolute Amount Recovered (ug)	Percent Relative Standard Deviation For Injections	Mean Average Recovery
beta-Endosulfan	2.00	25.0	36.4	37.7	3.5	74.1
4,4'-DOD	2.00	25.0	22.5	37.5	50.0	60.0
Endrin Aldehyde	2.00	25.0	ND	1.0	200.0	1.0
4,4'-DOT	2.00	25.0	41.6	42.3	1.6	83.9
Enclosulfan Sulfate	2.00	25.0	32.6	33.6	3.0	66.2
p,p'-Methoxychlor	2.00	25.0	57.6	58.2	1.0	92.6
delta-BHC	2.00	25.0	39.3	38.5	2.1	62.2
Heptachlor	2.00	25.0	41.7	39.4	5.7	64.9
Aldrin	2.00	25.0	38.8	37.1	4.5	60.7
Heptachlor Epoxide	2.00	25.0	50.4	49.1	2.6	79.6
Hexachlorocyclopentadiene	2.00	25.0	11.4	11.1	2.7	45.0
2,4,6-Trichlorophenol	2.00	25.0	11.1	11.5	3.5	45.2
2,4,5-Trichlorophenol	2.00	25.0	16.1	16.8	4.3	65.8
2-Fluorobiphenyl (Surr.)	2.00	25.0	19.5	19.6	0.5	78.2
2-Chloronaphthalene	2.00	25.0	19.2	19.5	1.6	77.4
2-Nitroaniline	2.00	25.0	20.3	24.9	20.4	90.4
Dimethylphthalate	2.00	25.0	21.6	22.1	2.3	87.4
Acenaphthylene	2.00	25.0	19.4	20.0	3.0	78.8
2,6-Dinitrotoluene	2.00	25.0	29.0	29.0	0.0	116.0
3-Nitroaniline	2.00	25.0	23.4	24.4	4.2	95.6
Acenaphthene	2.00	25.0	18.3	18.0	1.7	72.6
Fluorene	2.00	25.0	21.3	21.5	0.9	85.6
4-Chlorophenyl-phenylether	2.00	25.0	23.3	22.4	3.9	91.4
2,4-Dinitrophenol	2.00	25.0	ND	ND	NA	0.0

Table 10 (continued)
Recovery Summary

Compound Name	Spiking Solution (ug/ml)	Ideal Amount to Recover (ug)	First Injection Absolute Amount Recovered (ug)	Second Injection Absolute Amount Recovered (ug)	Percent Relative Standard Deviation For Injections	Mean Average Recovery
2,6-Dichorophenol	2.00	25.0	11.9	12.1	1.7	48.0
Hexachloropropene	2.00	25.0	0.6	0.6	0.0	2.4
p-Phenylenediamine	2.00	25.0	ND	ND		0.0
n-Nitrosodi-n-butylamine	2.00	25.0	19.5	21.2	8.4	81.4
Safrole	2.00	25.0	18.9	19.4	2.6	76.6
1,2,4,5-Tetrachlorobenzene	2.00	25.0	14.2	14.1	0.7	56.6
Isosafrole	2.00	25.0	17.1	17.2	3.6	68.6
p-Dinitrobenzene	2.00	25.0	26.3	27.7	5.2	108.0
m-Dinitrobenzene	2.00	25.0	23.8	26.3	10.0	100.2
Pentachlorobenzene	2.00	25.0	16.4	16.9	3.0	66.6
2-Naphthylamine	2.00	25.0	8.5	9.5	11.1	36.0
1-Naphthylamine	2.00	25.0	7.3	8.3	12.8	31.2
2,3,4,6-Tetrachlorophenol	2.00	25.0	7.9	8.1	2.5	32.0
5-Nitro-o-toluidine	2.00	25.0	22.8	23.5	3.0	92.6
syn-Trinitrobenzene	2.00	25.0	310.9	328.7	5.6	1279.2
Phenacetin	2.00	25.0	19.0	18.7	1.6	75.4
4-Aminobiphenyl	2.00	25.0	12.7	13.6	6.8	52.6
Pronamide	2.00	25.0	25.9	26.7	3.0	105.2
Pentachloronitrobenzene	2.00	25.0	21.6	21.6	0.0	86.4
Dinoseb	2.00	25.0	19.8	21.1	6.4	81.8
4-Nitroquinoline-1-oxide	2.00	25.0	20.8	22.5	7.9	86.6
p-(dimethylamino)azobenzene	2.00	25.0	17.7	17.5	1.1	70.4
Chlorobenzilate	2.00	25.0	19.1	20.1	5.1	78.4
3,3'-Dimethylbenzidene	2.00	25.0	2.4	2.7	11.8	10.2

Table 10 (continued)
Recovery Summary

Compound Name	Spiking Solution (ug/ml)	Ideal Amount to Recover (ug)	First Injection Absolute Amount Recovered (ug)	Second Injection Absolute Amount Recovered (ug)	Percent Relative Standard Deviation For Injections	Mean Average Recovery
2-Acetylaminofluorene	2.00	25.0	22.1	22.7	2.7	89.6
4,4'-Methylenebis-2-chloroaniline	2.00	25.0	14.1	14.1	0.3	56.3
7,12-Dimethylbenz(a)anthracene	2.00	25.0	5.8	6.3	8.1	24.2
3-Methylcholanthrene	2.00	25.0	5.7	5.9	4.2	23.1
Methyl Methanesulfonate	2.00	25.0	10.4	10.8	3.8	42.4
Phorate	4.00	50.0	18.9	19.7	4.0	38.6
Disulfoton	4.00	50.0	23.2	22.9	1.3	46.1
Methyl Parathion	4.00	50.0	23.4	23.2	0.9	46.6
Malathion	4.00	50.0	20.0	19.9	0.6	39.9
Parathion	4.00	50.0	27.6	29.5	6.7	57.1
Alachlor	4.00	50.0	42.4	40.0	5.8	82.4
Atrazine	4.00	50.0	43.9	44.0	0.2	87.9
Famphur	4.00	50.0	13.6	14.3	5.0	27.9
alpha-BHC	4.00	50.0	42.4	41.7	1.6	84.1
beta-BHC	4.00	50.0	41.5	42.0	1.2	83.5
Gamma-BHC (lindane)	4.00	50.0	42.2	41.3	2.2	83.5
gamma-Chlorodane	5.00	62.5	47.0	47.5	1.0	75.6
alpha-Endosulfan	4.00	50.0	26.8	27.2	1.5	54.0
alpha-Chlorodane	5.00	62.5	19.1	20.5	7.0	31.7
4,4'-DOE	4.00	50.0	22.5	25.3	11.7	47.8

substantial amount of partitioning to occur into the methylene chloride. This is particularly true for Phenol. In addition, the surrogates as well as Phenol have relatively high vapor pressures. As the extraction system heats up, volatilization of the phenols is likely. This would also justify the non-detection of 2-Ethoxyethanol. It should be noted that volatilization can also occur during the process of concentrating the extract. These compounds are also indicators of degradation sites within the instrument. This is particularly true for nitrophenols as well as pentachlorophenol. As a result they have very high instrument detection limits.

Certain compounds with recoveries greater than 120%: 4-Methylphenol (143.6%), 4-Chloroaniline (130%), aniline (143.8%), m-Cresol (149%), and sym-trinitrobenzene (1279%) have ions of quantitation which coelutes with other compound's mass spectrum. By adjusting the ramp temperature of the GC oven and increasing the duration fo the analysis, these compounds would likely not coelute, which would result in an improved accuracy of recovery.

Benzoic Acid (0.4%) has a very high solubility in water, particularly at a neutral pH, as well as being a poor responding compound with respect to GCMS analysis.

Organonitrogen compounds such as Malathion (40%) and α-Chlorodane (32%) have high instrument detection limits when analyzed by GCMS. In addition, these compounds would tend to hydrolyze during the extraction process. The recovery for Atrazine (88%) should be considered estimated due to its potential breakthrough in the activated charcoal column.

Phalate esters often contaminate during the extraction process. Recoveries of di-n-butylphthalate (130.6%) and bis(2-ethylhexyl)phthalate

(382.9%) are likely a result contamination contribution. In order to effectively target phthalate esters and additional extraction system in series would be needed. The relative change in recovery for phthalate esters or lack of change would indicate the extent of contamination contribution by the extraction system.

Due to the potential of breakthrough in the column, the results for polynuclear aromatic hydrocarbons should be qualified as estimated. The poor recovery of PAHs such as Dibenz(a, h)anthracene is likely instrument specific. These compounds are run frequently during production sequencies and typically have recovery problems. They are relatively non-volatile and have high boiling points. Once vaporized in the injection port any relatively 'cool' spots within the chromatographic system could cause condensation of some of the analyte resulting is less analyte being detected by the mass spectrometer.

V. Conclusion

Under the Safe Drinking Water Act MCLs are currently in place for the following pesticides: Endrin, 0.002 mg/L; Lindane, 0.0004 mg/L; and Methoxychlor, 0.1 mg/L. This extraction system in conjunction with a GCMS meets or exceeds these values with respect to detection.

The extraction system is not applicable for compounds which have dissociation constants at extreme pH values. In addition, compounds which degrade in the GCMS would not be amendable to the methodology developed in this paper. These compounds are summarized in Table 11.

Within limitations, the use of this extraction system enables detection of trace levels of a broad spectrum of Synthetic Organic Compounds (SOCs) without the need of using different detection systems associated with current drinking water methods. The detection system used, the GCMS, enables spectral confirmation and therefore a high level of confidence as to the presence or absence of the compound in drinking water. With the ability to adjust the extraction volume, various levels of detection can be achieved and therefore the monitoring of drinking water for potential and existing regulatory criteria is an appropriate application for this system.

Table 11

Compounds Not Amendable to the Continuous Liquid-Liquid Extraction System

Compound	Probable Reason
Benzoic Acid	Dissociation, constant degradation
4-Nitrophenol	Dissociation, constant degradation
4,6-Dinitro-2-methylphenol	Dissociation, constant degradation
2-Ethoxyethenol	Vapor pressure
Endrin Aldehyde	High solubility in water, degration
2,4-Dinitrophenol	Dissociation, constant degradation
p-Phenylenediamine	Degradation
Pentachlorophenol	Dissociation, constant degradation
Hexachloropropene	Degradation
3,3'-Dimethylbenzidene	Degradation

VI. Literature Cited

1) New Dimensions in Safe Drinking Water. 2nd Edition, American Water Works Association (1988).

2) Jolley R.L. and Suffet I.H., "Concentration Techniques For Isolating Organic Consituents in Environmental Water Samples", In Organic Pollutants in Water. Sugget, I.H. et al., Eds., American Chemical Society, Washington, D.C. pp. 6-7 (1987).

3) Biziuk, M. and Namiesnik J., "Simple Device for Isolation of Organic Compound From Water." Intern, J. Environ. Anal. Chem., 28, 193-207 (1986).

4) Reinhard M., Goodman N., McCarty P. and Argo D., "Removing Trace Organics by Reverse Osmosis Using Cellulose Acetate and Polyamide Membranes." Journal AWWA, 78, 163 (1986).

5) Malaiyandi M., Wightman R., and Laferriere C., "Concentration of Selected Organic Pollutants: Comparison of Adsorption and Reverse Osmosis Techniques." In Organic Pollutants in Water. pp. 163-179 (1987).

6) Braus H., Middleton F.M., and Walton G., "Organic Chemical Compounds in Raw and Filtered Surface Waters." Analytical Chemistry, 27, 1161 (1951).

7) Ahling B., Suren J., "Reversed Liquid-Liquid Partition in Determination of Polychlorinated Biphenyl (PLB) and Chlorinated Pesticides in Water." Analytical Chemistry, 42, p. 1483 (1970).

8) Kopfler F.C., Ringhand H.P., Miller R.G., "A Comparison of Seren Methods for Cencentrating Organic Chemicals from Environmental Water Samples." In Organic Pollutants In Water. Suffet I.H., Malaiyuandi M. Eds, p. 425-436 (1987).

9) Wigilius B., Boren H., "Systematic Approach to Adoption on EAD-2 Resin for the Concentration and Analysis of Trace Organics in Water Below the ug/1 Level." Journal of Chromatography, 391, 169-182 (1987).

VI. Literature Cited (continued)

10) James H.A., Steel L.P., and Wilson I., "Impurities Arising From the Use of XAD-2 Resins from the Extraction of Organic Pollutants in Drinking Water." Journal of Chromatography, 208, 89-95 (1981).

11) Junk G.A., "Synthetic Polymers for Accumulating Organic Compounds from Water." In Organic Pollutants in Water. Suffet I.H., Malaiyandi M. Eds., p. 201-246 (1987).

12) Werner A.E., Waldichuk M., "A Continuous Liquid-Liquid Extractor." Analytical Chemistry, 34, 1674-1676 (1962).

13) Goldberg M.C., DeLong L., "Extraction and Concentration of Organic Solute from Water." Analytical Chemistry, 45, 89-91 (1973).

14) Ahnoff M., Josefsson B., "Simple Apparatus for On-Site Continuous Liquid-Liquid Extraction of Organic Compounds From Natural Waters." Analytical Chemistry, 46, 658-663 (1974).

15) Stachel B., Baetjer K., Centinkaya M., Oneszeln J., Lahl V., Lierse K., Thiemann W., Gable B., Kozicki R., Podbieiski A., "On Site Continuous Liquid-Liquid Extraction of Nonpolar Organic Compounds in Water." Analytical Chemistry, 53, 1469-1472 (1981).

16) Carter C., Versar Corporation, Springfield, Virginia, Personal Communication (1988).

VII. Appendices

Appendix A

Results from Screening of Tap Water

Quantitation Report File: Z6890

Data: Z6890.TI
05/17/88 16:42:00
Sample: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
Conds.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
Submitted by: VERSAR Analyst: BLCK

AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT) * 0.714
Resp. fac. from Library Entry

Divide by 1000 to get mg/L

(mg/mL)(1000 mL)(1 mg / 1000 mg) / 140 Liter

= 0.0007143 mg/Liter

NO	NAME
1	1,4-DICHLOROBENZENE D4 ***INTERNAL STANDARD#1***
2	PHENOL
3	BIS (2-CHLOROETHYL)ETHER
4	2-CHLOROPHENOL
5	1,3-DICHLOROBENZENE
(6)	1,4-DICHLOROBENZENE ?
7	1,2-DICHLOROBENZENE
8	BENZYL ALCOHOL
9	2-METHYLPHENOL
10	BIS(2-CHLOROISOPROPYL)ETHER
(11)	HEXACHLOROETHANE
12	4-METHYLPHENOL
13	N-NITROSO-DI-N-PROPYLAMINE
14	NITROBENZENE
15	NAPHTHALENE D8 ***INTERNAL STANDARD#2***
16	ISOPHORONE
17	2-NITROPHENOL
18	2,4-DIMETHYLPHENOL
19	BIS(2-CHLOROETHOXY)METHANE
20	2,4-DICHLOROPHENOL
21	BENZOIC ACID
22	1,2,4-TRICHLOROBENZENE
(23)	NAPHTHALENE
24	4-CHLOROANILINE
25	HEXACHLOROBUTADIENE
26	4-CHLORO-3-METHYLPHENOL
27	2-METHYLNAPHTHALENE
28	ACENAPHTHENE D10 ***INTERNAL STANDARD#3***
29	HEXACHLOROCYCLOPENTADIENE
30	2,4,6-TRICHLOROPHENOL
(31)	2,4,5-TRICHLOROPHENOL ?
32	2-CHLORONAPHTHALENE
33	2-NITROANILINE
34	DIMETHYL PHTHALATE
35	ACENAPHTHYLENE
36	2,6-DINITROTOLUENE
37	3-NITROANILINE
38	ACENAPHTHENE
39	2,4-DINITROPHENOL
(40)	DIBENZOFURAN
41	4-NITROPHENOL
42	2,4-DINITROTOLUENE
43	FLUORENE
44	DIETHYLPHTHALATE
45	4-CHLOROPHENYLPHENYLETHER
46	4-NITROANILINE
47	4,6-DINITRO-2-METHYLPHENOL
48	N-NITROSODIPHENYLAMINE
49	4-BROMOPHENYL-PHENYLETHER
50	HEXACHLOROBENZENE

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount	%Tot
1	152	395	6:35	1	1.000	A BB	26068.	28.572 NG/UL	20.41
2	NOT FOUND								
3	NOT FOUND								
4	NOT FOUND								
5	146	387	6:27	1	0.980	A BB	245.	ND ~~0.196 NG~~	0.14
6	146	397	6:37	1	1.005	A BB	876. possible	~~0.676 NG~~	0.48
7	NOT FOUND								
8	108	422	7:02	1	1.068	A BV	4980.	Mis ID ~~7.415 NG~~	5.30
9	NOT FOUND								
10	NOT FOUND								
11	117	471	7:51	1	1.192	A VV	3930.	Hit 6.541 NG	4.67
12	NOT FOUND								
13	NOT FOUND								
14	77	489	8:09	15	0.819	A VB	2069.	Mis ID ~~1.440 NG~~	1.03
15	136	597	9:57	15	1.000	A BB	75066.	28.572 NG/UL	20.41
16	NOT FOUND								
17	NOT FOUND								
18	NOT FOUND								
19	NOT FOUND								
20	NOT FOUND								
21	NOT FOUND								
22	NOT FOUND								
23	128	600	10:00	15	1.005	A VB	13140.	Hit 3.924 NG	2.80
24	127	626	10:26	15	1.049	A BV	2239.	Mis ID ~~9.032 NG~~	2.17
25	NOT FOUND								
26	NOT FOUND								
27	NOT FOUND								
28	164	917	15:17	28	1.000	A VB	35431.	28.572 NG/UL	20.41
29	237	767	12:47	28	0.836	A BB	12113.	23.909 NG	17.08
30	NOT FOUND								
31	196	789	13:09	28	0.860	A BB	551.	Hit 0.953 NG	0.68
32	NOT FOUND								
33	NOT FOUND								
34	163	890	14:50	28	0.971	A BB	1073.	~~0.589 NG~~	0.42
35	152	888	14:48	28	0.968	A BB	113.	~~0.041 NG~~	0.03
36	NOT FOUND								
37	138	920	15:20	28	1.003	A BB	343.	Mis ID ~~1.954 NG~~	1.40
38	NOT FOUND								
39	NOT FOUND								
40	168	953	15:53	28	1.039	A BB	3637.	Hit 1.547 NG	1.11
41	NOT FOUND								
42	NOT FOUND								
43	166	1017	16:57	28	1.109	A BB	815.	ND ~~0.411 NG~~	0.29
44	149	1024	17:04	28	1.117	A VB	2814.	1.265 NG	0.90
45	NOT FOUND							Extraction contamination	
46	NOT FOUND								
47	NOT FOUND								
48	169	1051	17:31	28	1.146	A BB	395.	ND ~~0.405 NG~~	0.29
49	NOT FOUND								
50	NOT FOUND								

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R. Fac	R. Fac(L)	Ratio
1	6:35	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
2	5:59		0.909			50.00		1.768	
3	6:07		0.929			50.00		1.600	
4	6:10		0.937			50.00		1.209	
5	6:29	0.99	0.985	0.99	0.27	50.00	0.008	1.371	0.01
6	6:37	1.00	1.005	1.00	0.95	50.00	0.027	1.421	0.02
7	7:03		1.071			50.00		1.317	
8	7:01	1.00	1.066	1.00	10.38	50.00	0.153	0.736	0.21
9	7:24		1.124			50.00		1.052	
10	7:27		1.132			50.00		2.939	
11	7:49	1.00	1.187	1.00	9.16	50.00	0.121	0.659	0.18
12	7:48		1.185			50.00		1.081	
13	7:48		1.185			50.00		1.209	
14	8:06	1.01	0.815	1.00	2.02	50.00	0.022	0.547	0.04
15	9:56	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
16	8:45		0.881			50.00		1.095	
17	8:58		0.903			50.00		0.192	
18	9:13		0.928			50.00		0.350	
19	9:29		0.955			50.00		0.669	
20	9:39		0.971			50.00		0.331	
21	9:39		0.971			50.00		0.200	
22	9:51		0.992			50.00		0.377	
23	10:00	1.00	1.007	1.00	5.49	50.00	0.140	1.275	0.11
24	10:18	1.01	1.037	1.01	4.24	50.00	0.024	0.281	0.08
25	10:36		1.067			50.00		0.202	
26	11:52		1.195			50.00		0.347	
27	12:03		1.213			50.00		0.734	
28	15:16	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
29	12:47	1.00	0.837	1.00	33.47	50.00	0.273	0.409	0.67
30	13:03		0.855			50.00		0.452	
31	13:09	1.00	0.861	1.00	1.33	50.00	0.012	0.466	0.03
32	13:30		0.884			50.00		1.357	
33	14:00		0.917			50.00		0.617	
34	14:47	1.00	0.968	1.00	0.82	50.00	0.024	1.471	0.02
35	14:46	1.00	0.967	1.00	0.06	50.00	0.003	2.187	0.00
36	14:56		0.978			50.00		0.357	
37	15:19	1.00	1.003	1.00	2.74	50.00	0.008	0.142	0.05
38	15:22		1.007			50.00		1.469	
39	15:37		1.023			50.00		0.218	
40	15:52	1.00	1.039	1.00	2.17	50.00	0.082	1.896	0.04
41	16:00		1.048			50.00		0.369	
42	16:07		1.056			50.00		0.437	
43	16:56	1.00	1.109	1.00	0.58	50.00	0.018	1.598	0.01
44	17:02	1.00	1.116	1.00	1.77	50.00	0.064	1.794	0.04
45	17:03		1.117			50.00		0.668	
46	17:16		1.131			50.00		0.152	
47	17:21		1.136			50.00		0.239	
48	17:28	1.00	1.144	1.00	0.57	50.00	0.009	0.787	0.01
49	18:33		1.215			50.00		0.339	
50	18:54		1.238			50.00		0.395	

Quantitation Report File: Z6890

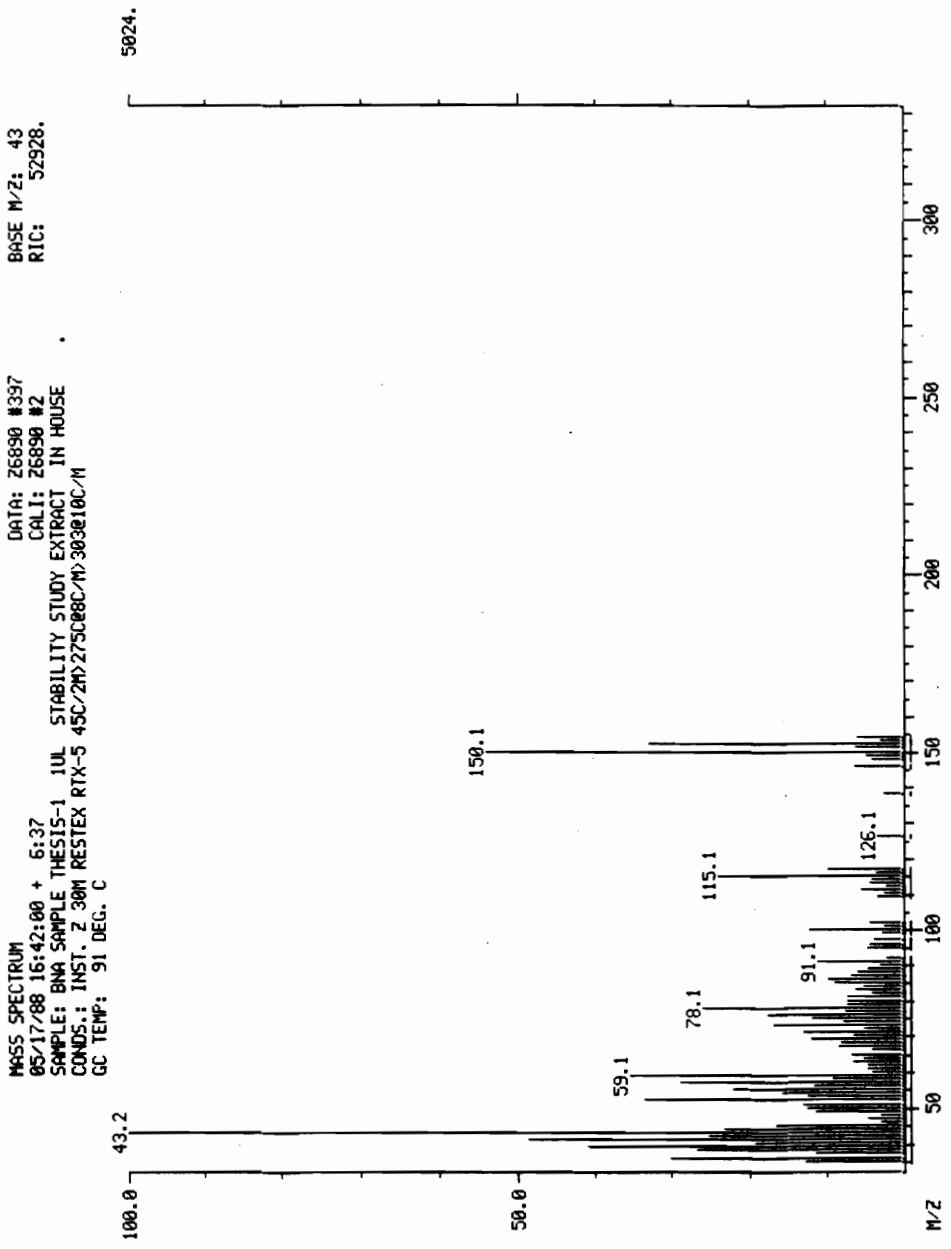
Data: Z6890.TI
05/17/88 16:42:00
Sample: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
Conds.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
Submitted by: VERSAR Analyst: BLCK

AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT) * 0.714
Resp. fac. from Library Entry

NO	NAME
51	PHENANTHRENE D10 ***INTERNAL STANDARD#4***
52	PENTACHLOROPHENOL
53	PHENANTHRENE
54	ANTHRACENE
55	DI-N-BUTYLPHTHALATE
56	FLUORANTHENE
57	CHRYSENE D12***INTERNAL STANDARD#5***
58	PYRENE
59	BUTYL BENZYL PHTHALATE
60	BENZO(A)ANTHRACENE
61	3,3'-DICHLOROBENZIDINE
62	CHRYSENE ?
63	BIS(2-ETHYLHEXYL)PHTHALATE
64	PERYLENE D12 ***INTERNAL STANDARD#6***
65	DI-N-OCTYL PHTHALATE
66	BENZO(B)FLUORANTHENE
67	BENZO(K)FLUORANTHENE
68	BENZO(A)PYRENE
69	INDENO(1,2,3-CD)PYRENE
70	DIBENZ(A,H)ANTHRACENE
71	BENZO(GHI)PERYLENE

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount	%Tot
51	188	1192	19:52	51	1.000	A VB	50118.	28.572 NG/UL	23.38
52	NOT FOUND								
53	178	1196	19:56	51	1.003	A VB	6764.	Hit 3.692 NG	3.02
54	178	1196	19:56	51	1.003	A VB	6764.	mis ID 3.787 NG	3.10
55	NOT FOUND							by RRT	
56	202	1423	23:43	51	1.194	A BB	1277.	Hit 0.741 NG	0.61
57	240	1700	28:20	57	1.000	A VB	33317.	28.572 NG/UL	23.38
58	202	1463	24:23	57	0.861	A BB	269.	~~0.067 NG~~	0.05
59	149	1617	26:57	57	0.951	A BB	5092.	2.761 NG	2.26
60	NOT FOUND							Extraction contamination	
61	NOT FOUND								
62	228	1703	28:23	57	1.002	A BB	1361.	Possible Hit ~~0.687 NG~~	0.56
63	149	1738	28:58	57	1.022	A BB	61605.	22.156 NG	18.13
64	264	1943	32:23	64	1.000	A BB	24677.	28.572 NG/UL	23.38
65	149	1846	30:46	64	0.950	A BB	7407.	2.606 NG	2.13
66	NOT FOUND							Extraction contamination	
67	NOT FOUND								
68	NOT FOUND								
69	NOT FOUND								
70	NOT FOUND								
71	NOT FOUND								

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R. Fac	R. Fac(L)	Ratio
51	19:49	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
52	19:31		0.985			50.00		0.130	
53	19:54	1.00	1.004	1.00	5.17	50.00	0.108	1.045	0.10
54	20:02	1.00	1.011	0.99	5.30	50.00	0.108	1.018	0.11
55	22:11		1.119			50.00		1.417	
56	23:40	1.00	1.194	1.00	1.04	50.00	0.020	0.982	0.02
57	28:15	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
58	24:20	1.00	0.861	1.00	0.09	50.00	0.006	3.456	0.00
59	26:54	1.00	0.952	1.00	3.87	50.00	0.122	1.582	0.08
60	28:12		0.998			50.00		1.701	
61	28:18		1.002			50.00		0.140	
62	28:20	1.00	1.003	1.00	0.96	50.00	0.033	1.699	0.02
63	28:55	1.00	1.024	1.00	31.02	50.00	1.479	2.385	0.62
64	32:19	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
65	30:43	1.00	0.950	1.00	3.65	50.00	0.240	3.290	0.07
66	31:22		0.971			50.00		1.381	
67	31:26		0.973			50.00		1.214	
68	32:10		0.995			50.00		1.196	
69	35:37		1.102			50.00		0.880	
70	35:44		1.106			50.00		0.873	
71	36:35		1.132			50.00		0.864	


MASS SPECTRUM
05/17/88 16:42:00 + 6:37
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 91 DEG. C
DATA: 26890 #397
CALI: 26890 #2
BASE M/Z: 43
RIC: 52928.
5024.
100.0
50.0
43.2
59.1
78.1
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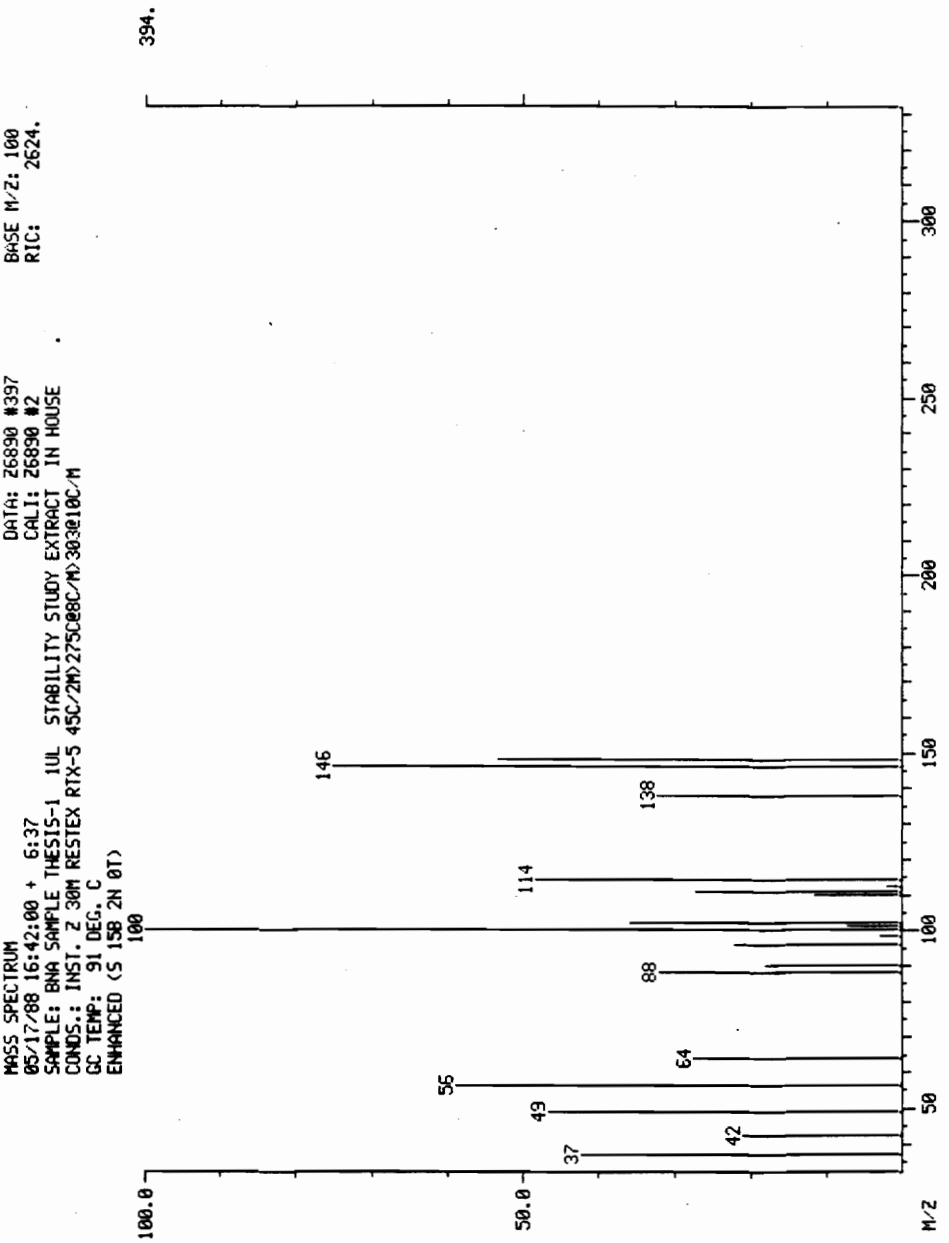
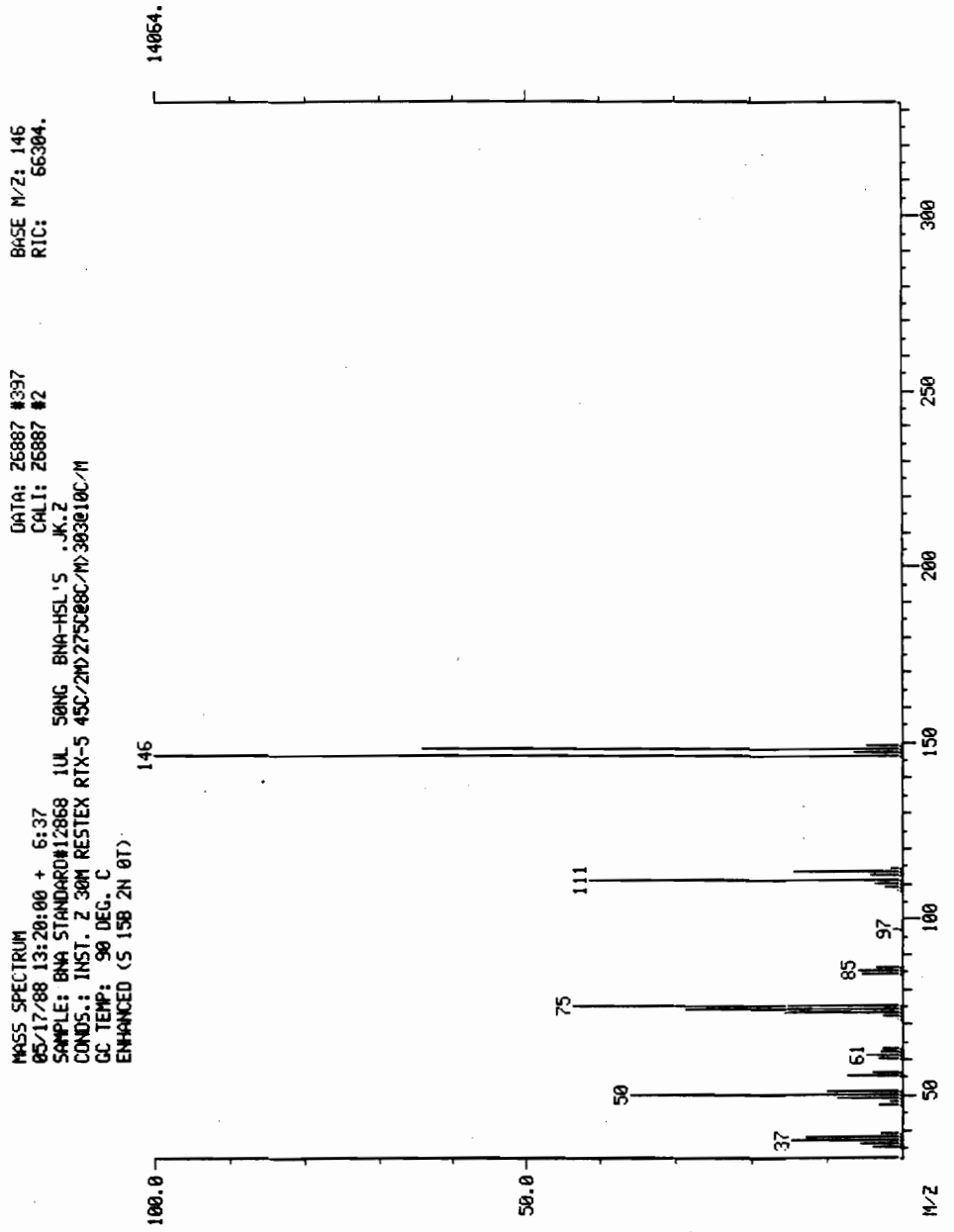
126.1
150.1
50
100
150
200
250
300
M/Z


MASS SPECTRUM
05/17/88 16:42:00 + 6:37
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275@8C/M>303@10C/M
GC TEMP: 91 DEG. C
ENHANCED (S 15@ 2N 0T)
DATA: Z6890 #397
CAL1: Z6890 #2
BASE M/Z: 100
RIC: 2624.
394.
100
146
138
114
88
64
55
49
42
37
100.0
50.0
50
100
150
200
250
300
M/Z


MASS SPECTRUM
05/17/88 13:20:00 + 6:37
SAMPLE: BNA STANDARD#12868 1UL 50NG BNA-HSL'S .JK.Z
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2MD275C@8C/MD303@10C/M
GC TEMP: 90 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: 26887 #397
CALI: 26887 #2
BASE M/Z: 146
RIC: 66304.
14064.
146
111
75
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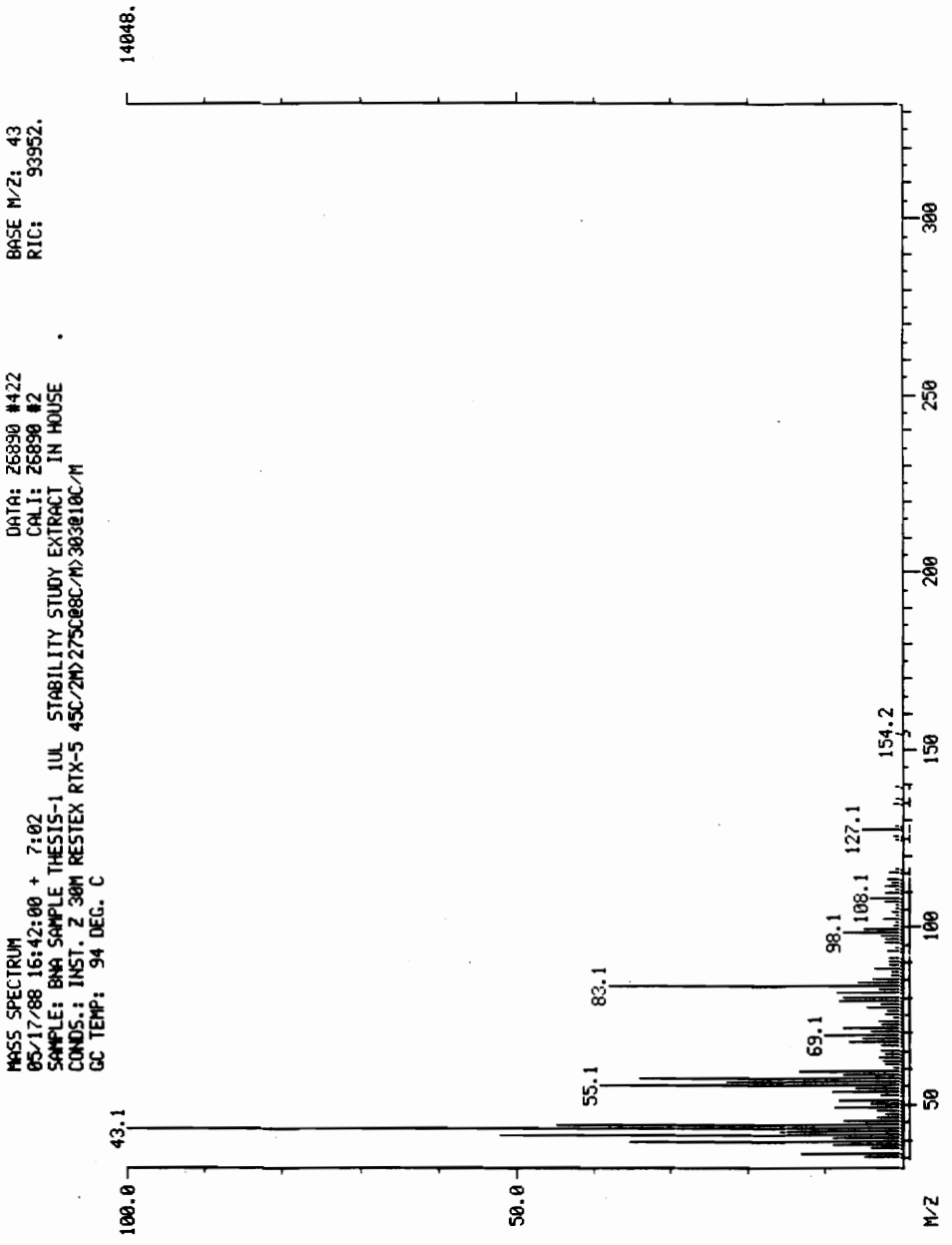
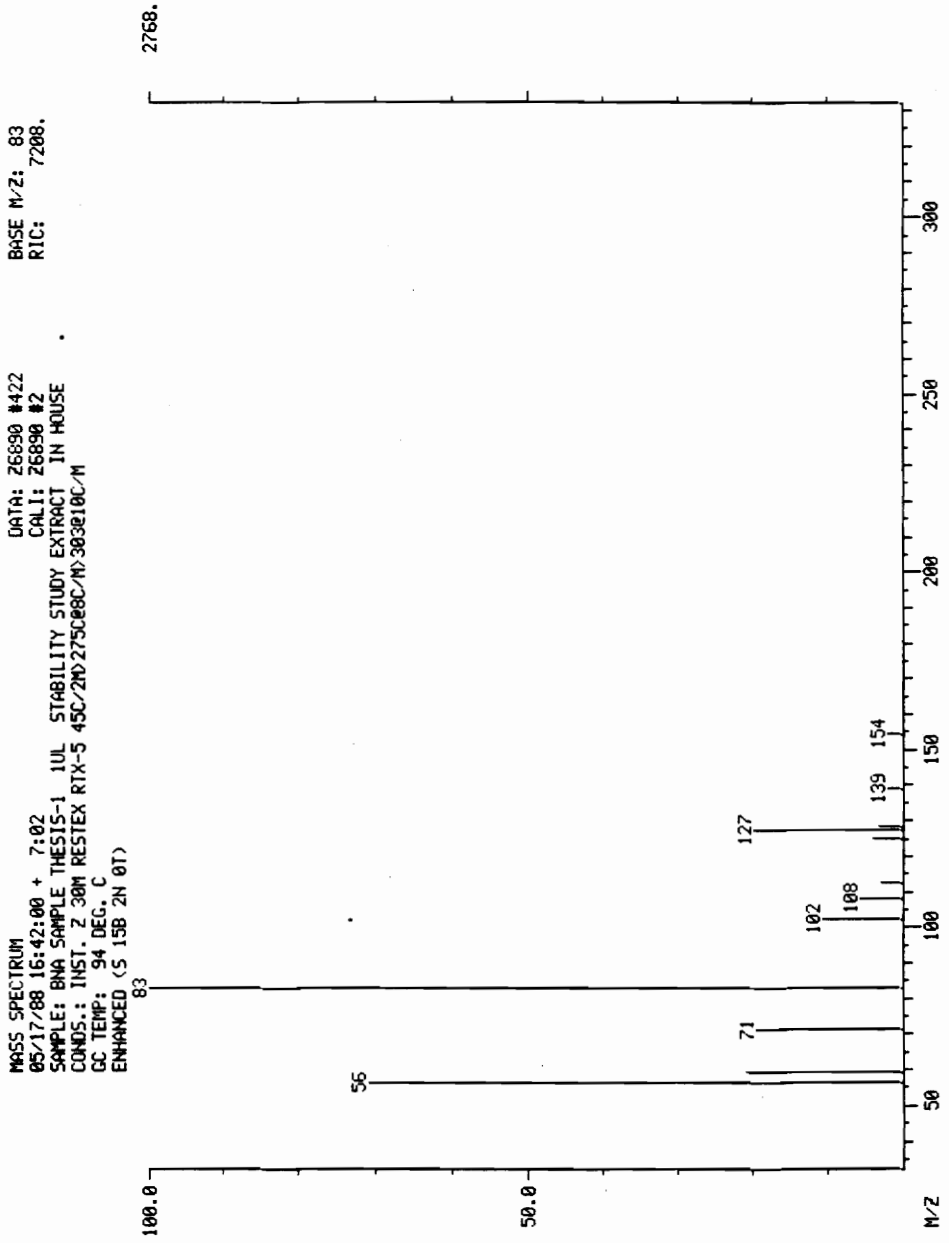
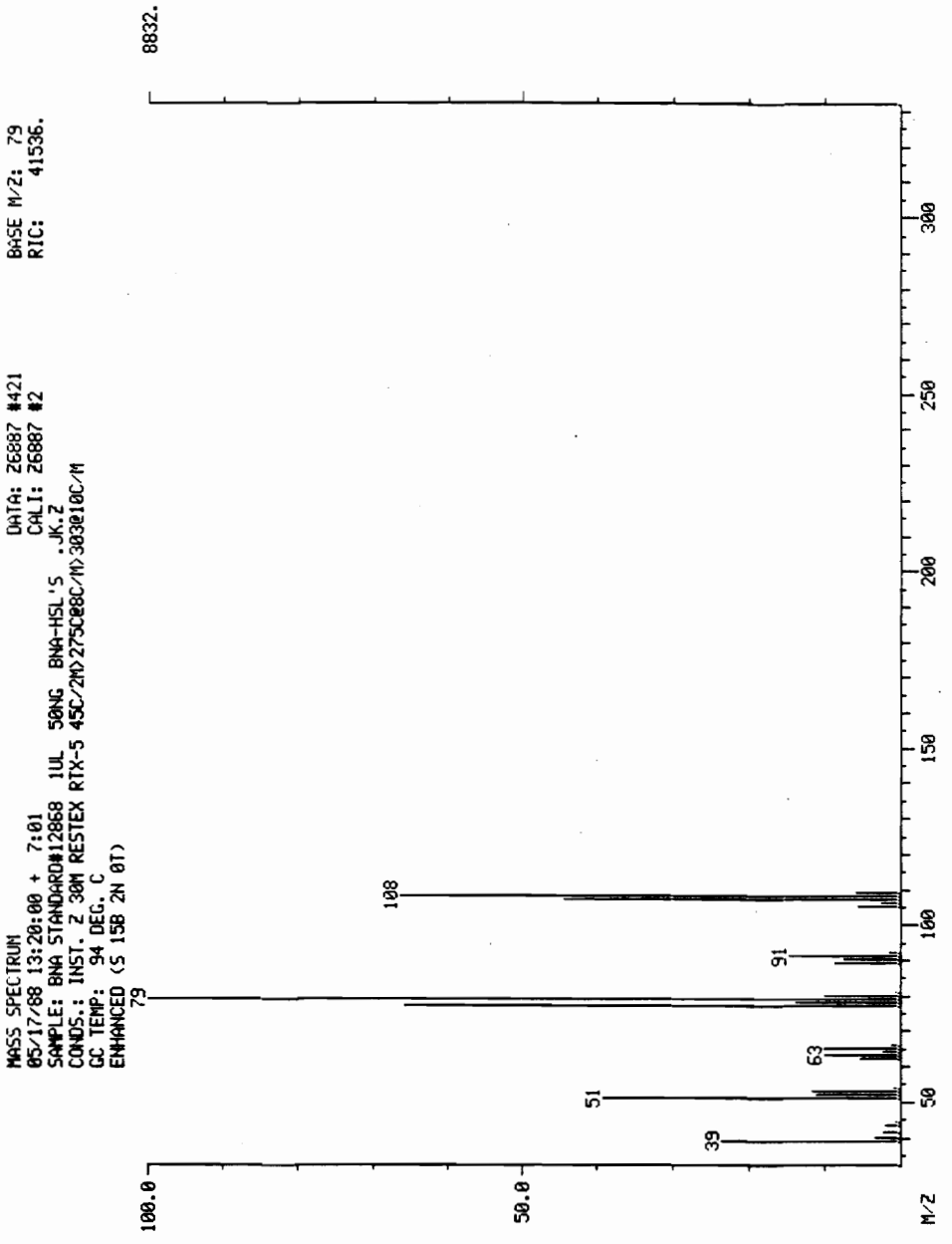
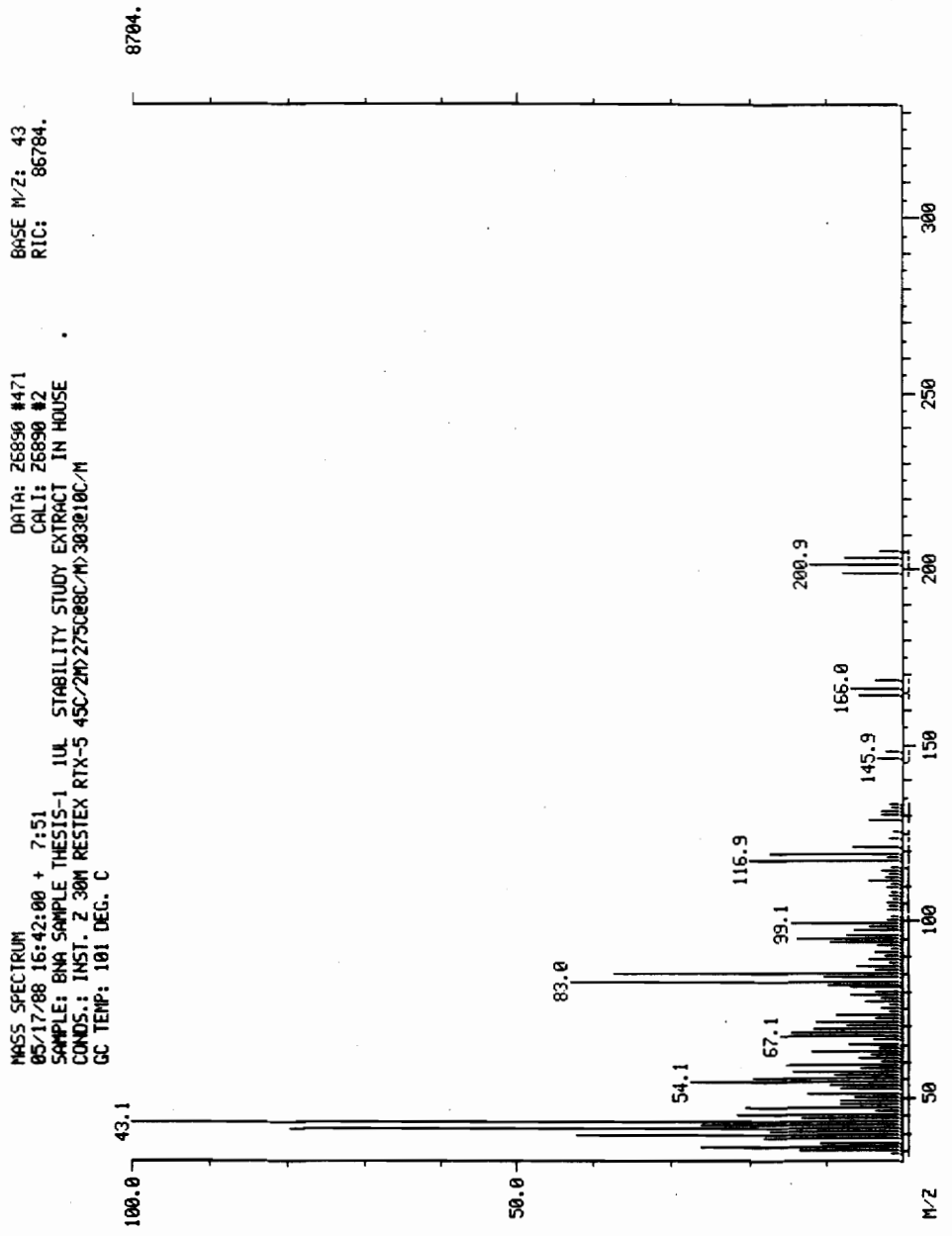
50.0
M/Z
50
100
150
200
250
300


MASS SPECTRUM
05/17/88 16:42:00 + 7:02
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2MD275@8C/MD303@10C/M
GC TEMP: 94 DEG. C
DATA: 26890 #422
CAL: 26890 #2
BASE M/Z: 43
RIC: 93952.
14048.
100.0
50.0
M/Z
43.1
55.1
69.1
83.1
98.1
108.1
127.1
154.2
50
100
150
200
250
300


MASS SPECTRUM
05/17/88 16:42:00 + 7:02
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 94 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: Z6890 #422
CALI: Z6890 #2
BASE M/Z: 83
RIC: 7208.
2768.
100.0
50.0
M/Z
50
100
150
200
250
300
83
56
71
127
102
108
139
154


MASS SPECTRUM
05/17/88 13:20:00 + 7:01
SAMPLE: BNA STANDARD#12868 1UL 50NG BNA-HSL'S
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 94 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: Z6887 #421
CALI: Z6887 #2
.JK.Z
BASE M/Z: 79
RIC: 41536.
8832.
100.0
50.0
M/Z
50
100
150
200
250
300
79
108
91
63
51
39


MASS SPECTRUM
05/17/88 16:42:00 + 7:51
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M@275@8C/M@303@10C/M
GC TEMP: 101 DEG. C
DATA: 26890 #471
CALI: 26890 #2
BASE M/Z: 43
RIC: 86784.
8704.
100.0
50.0
43.1
54.1
67.1
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99.1
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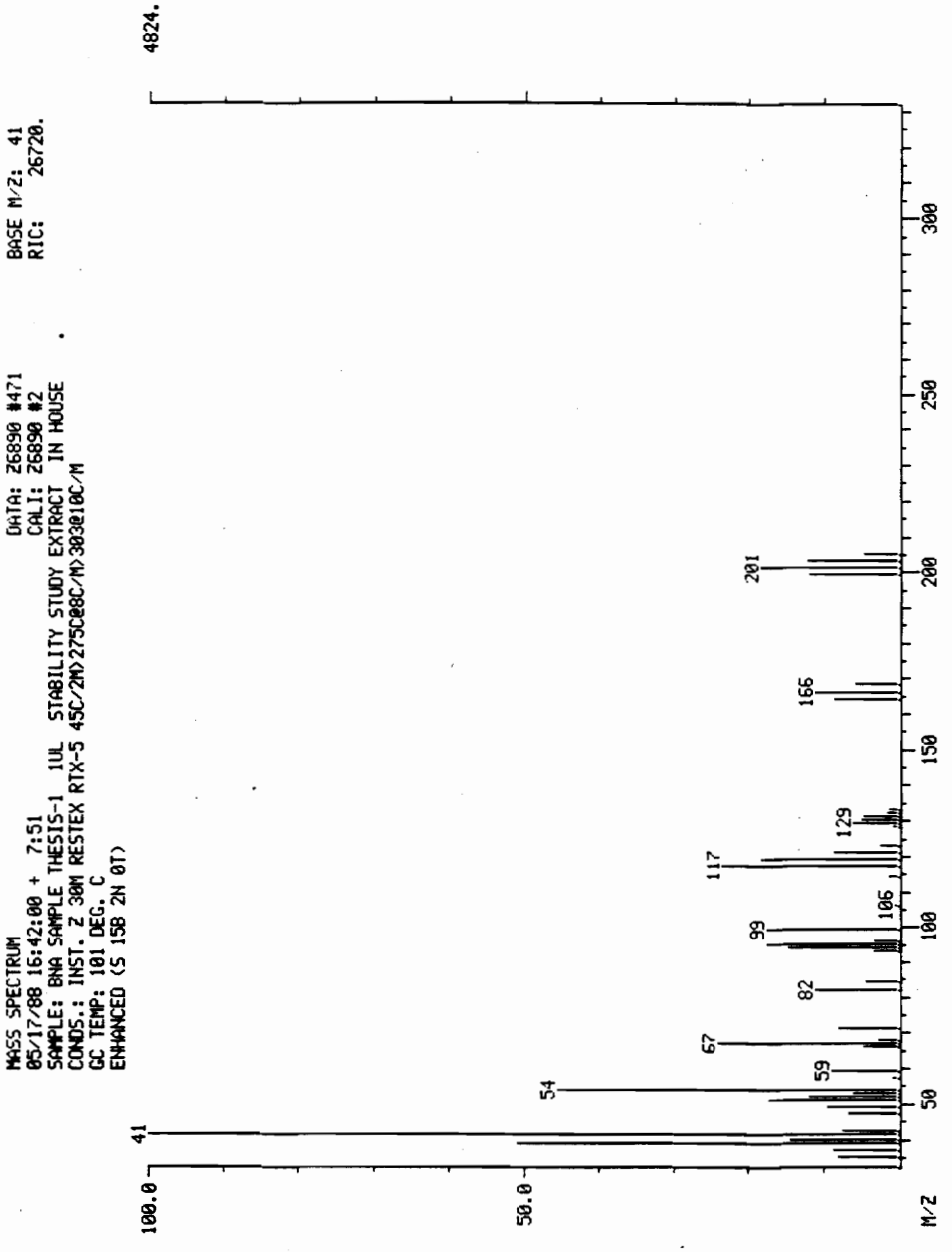
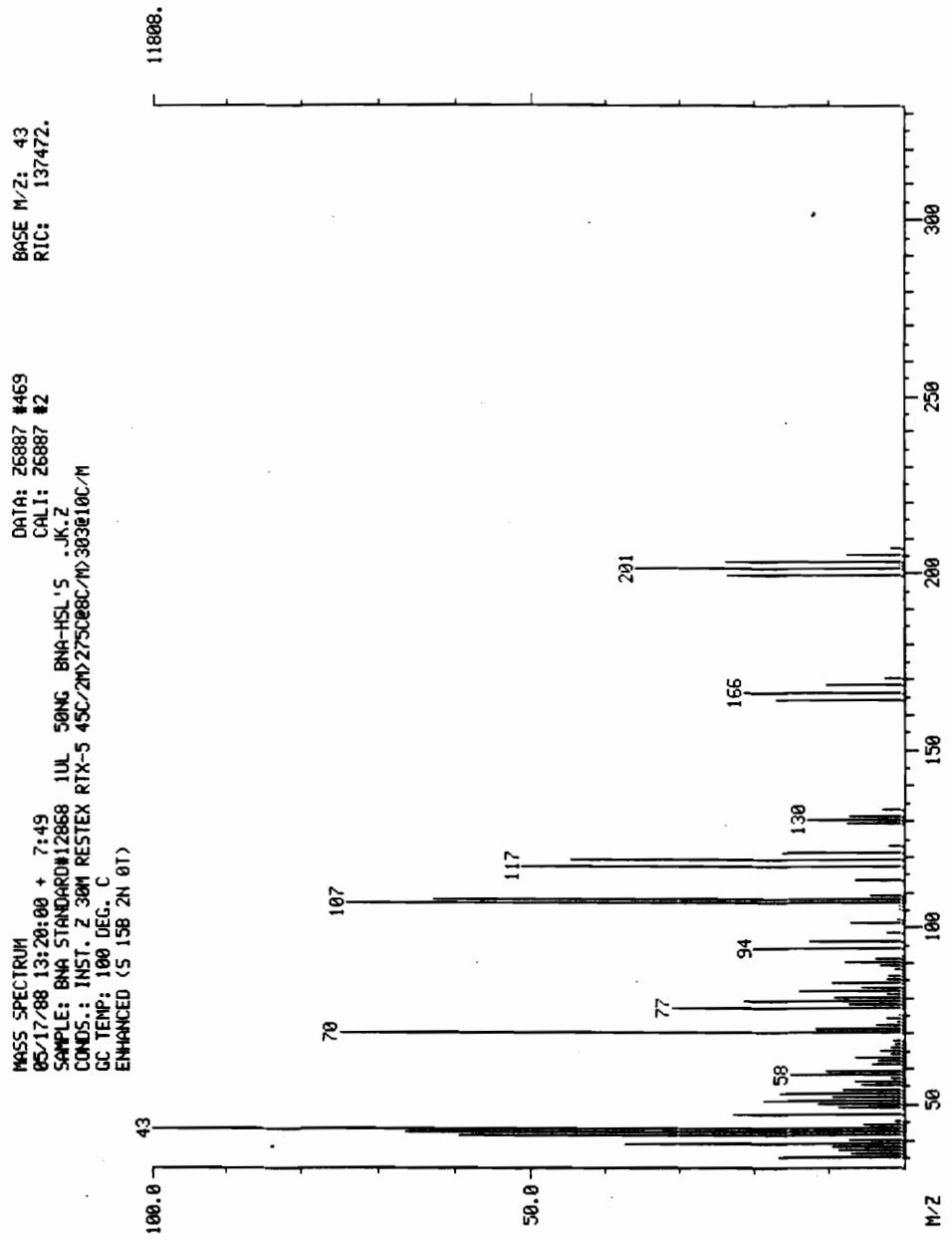
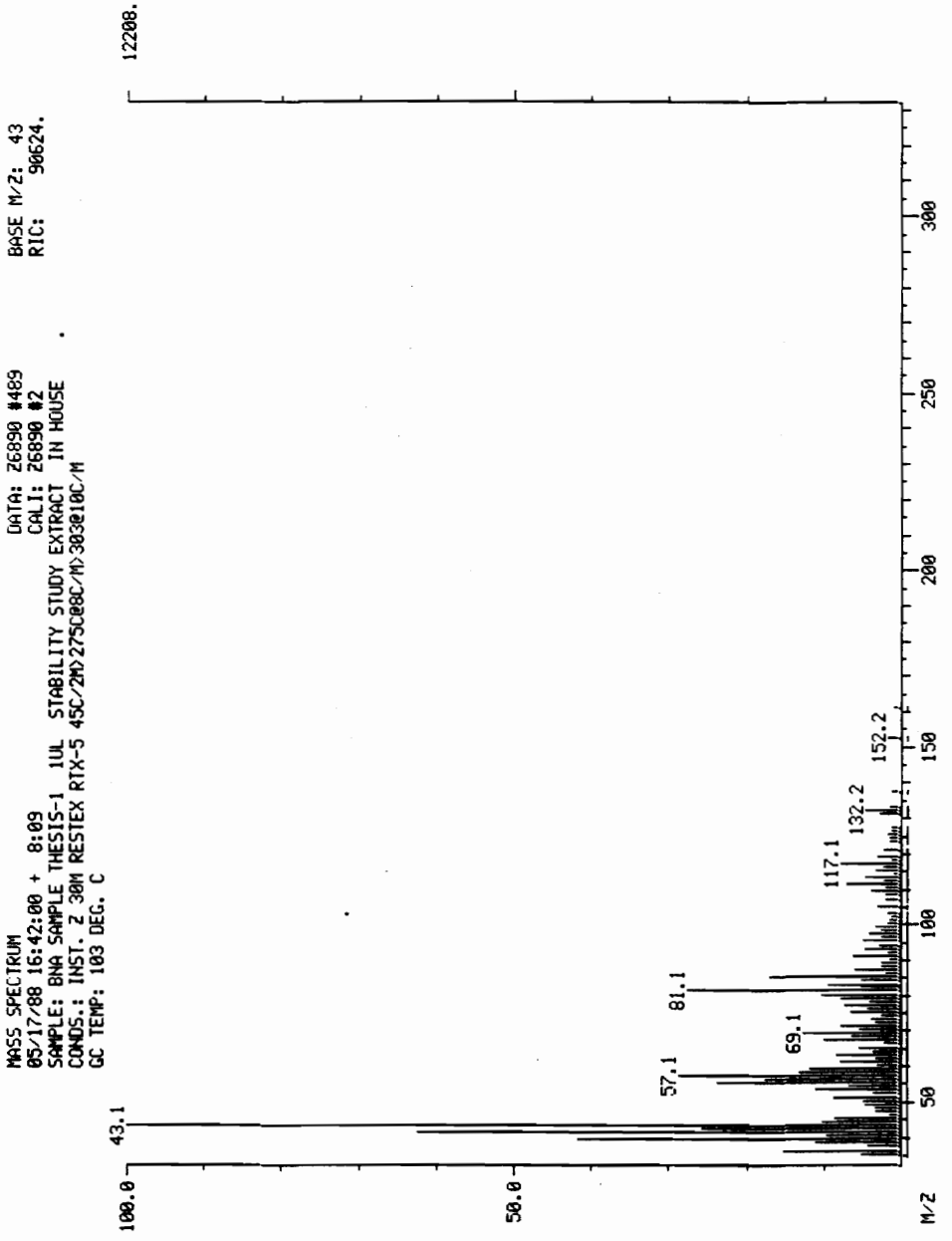
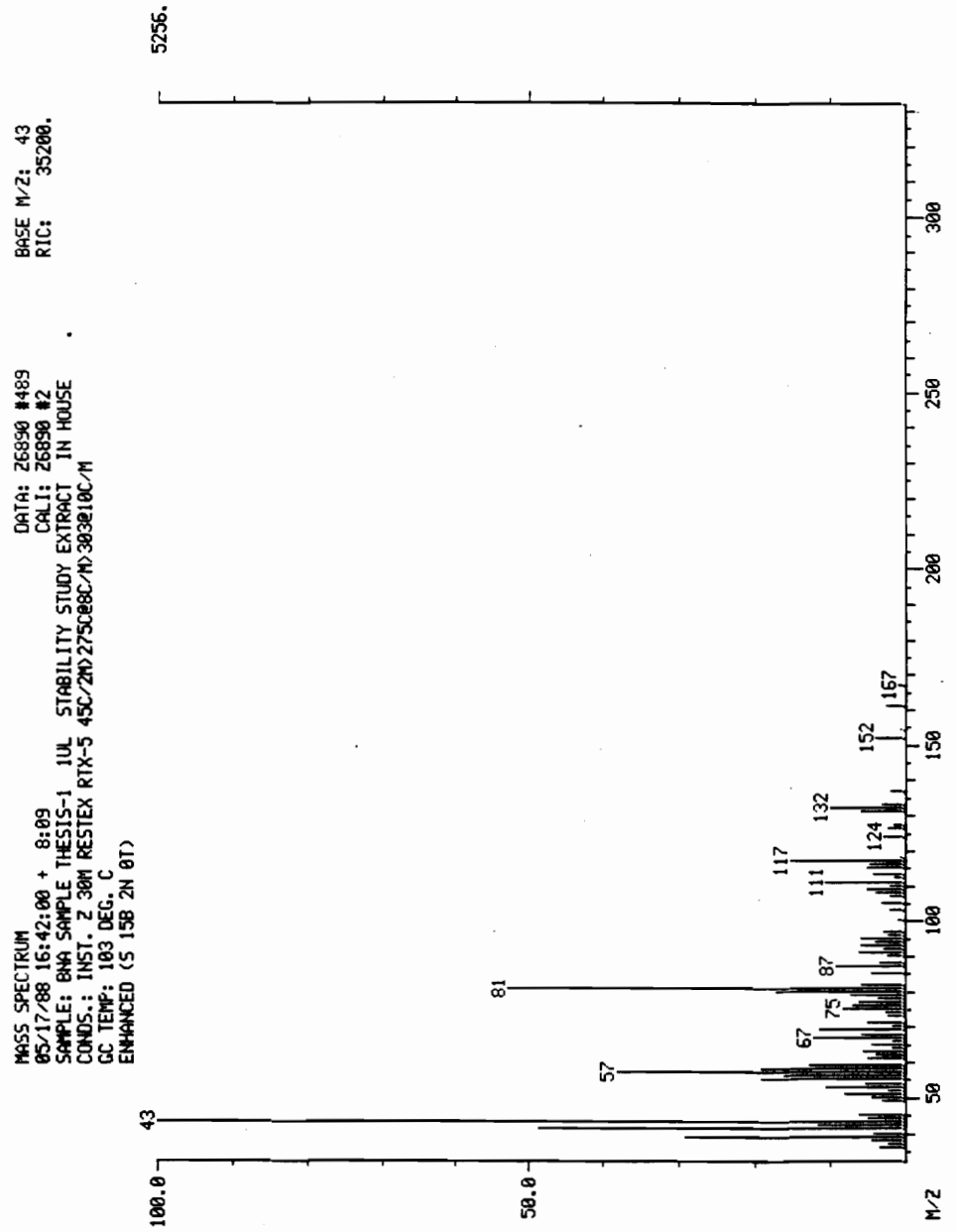
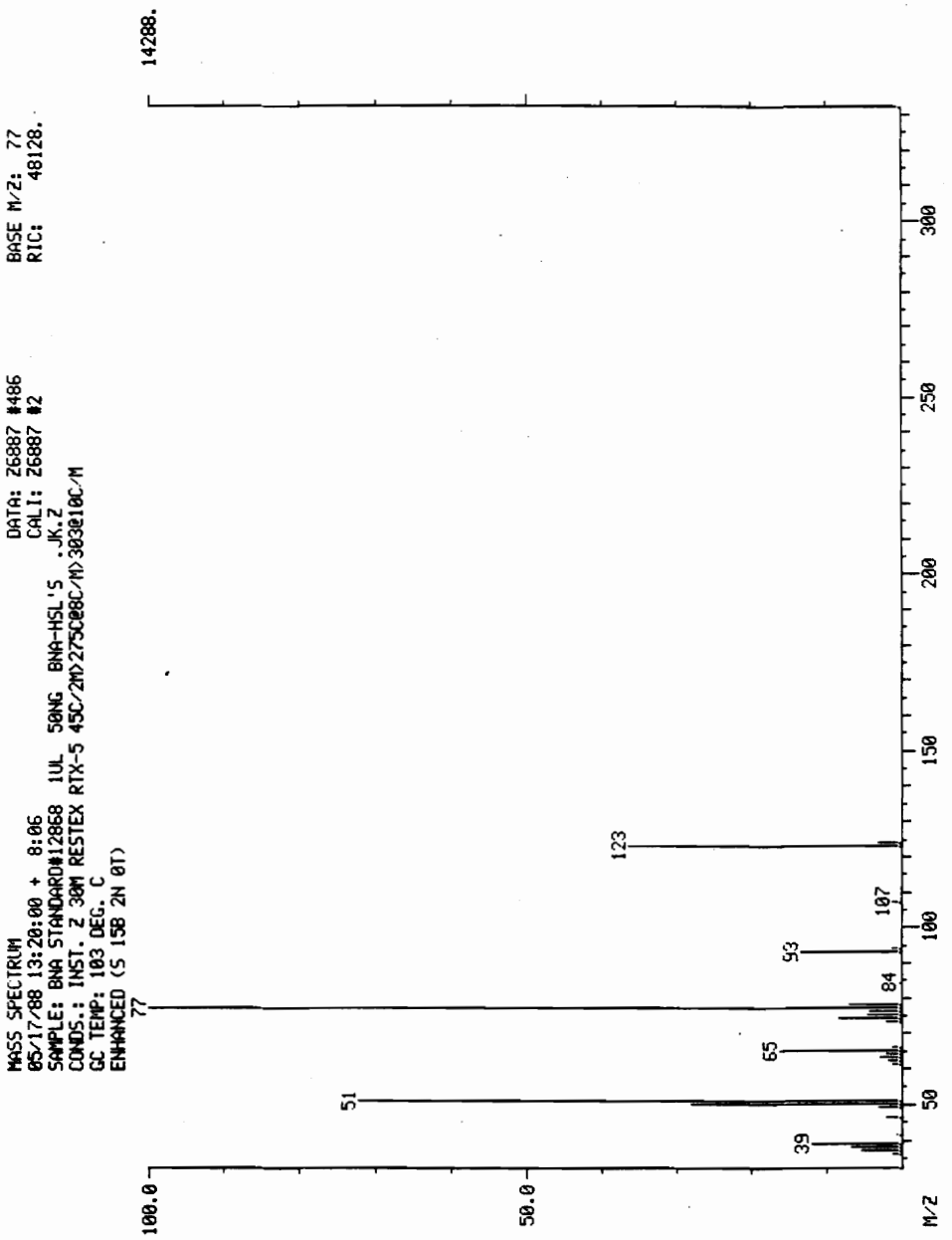
200.9
50
100
150
200
250
300
M/Z

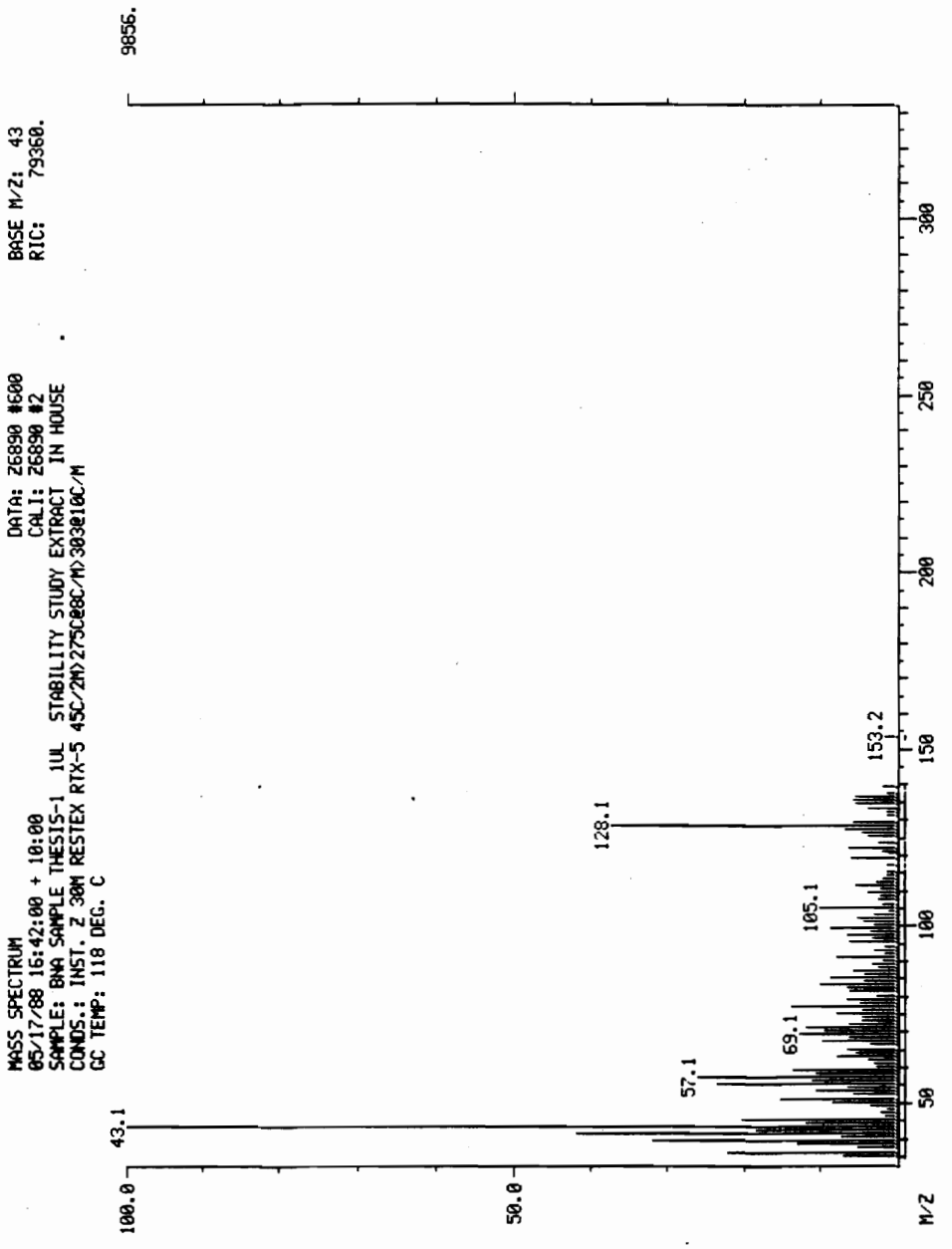

MASS SPECTRUM
05/17/88 16:42:00 + 7:51
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M)275C@8C/M)303@10C/M
GC TEMP: 101 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: 26890 #471
CAL: 26890 #2
BASE M/Z: 41
RIC: 26720.
4824.
100.0
50.0
M/Z
41
54
59
67
82
99
105
117
129
166
201
50
100
150
200
250
300

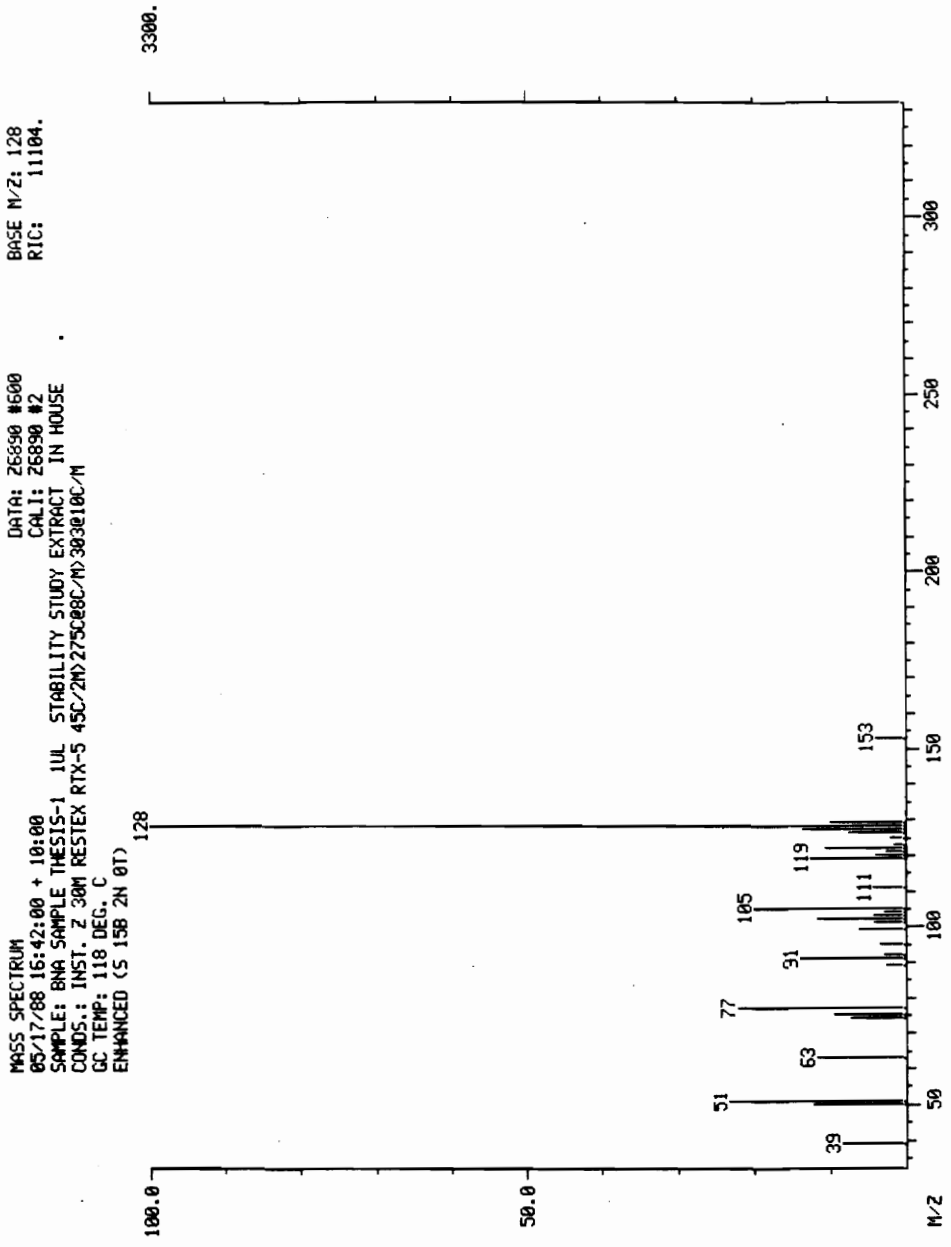

MASS SPECTRUM
05/17/88 13:20:00 + 7:49
SAMPLE: BNA STANDARD#12868 1UL 50NG BNA-HSL'S .JK.Z
CONDS.: INST.Z 30M RESTEK RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 100 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: 26887 #469
CALI: 26887 #2
BASE M/Z: 43
RIC: 137472.
11808.
100.0
50.0
M/Z
43
70
77
58
94
107
117
130
166
201
50
100
150
200
250
300

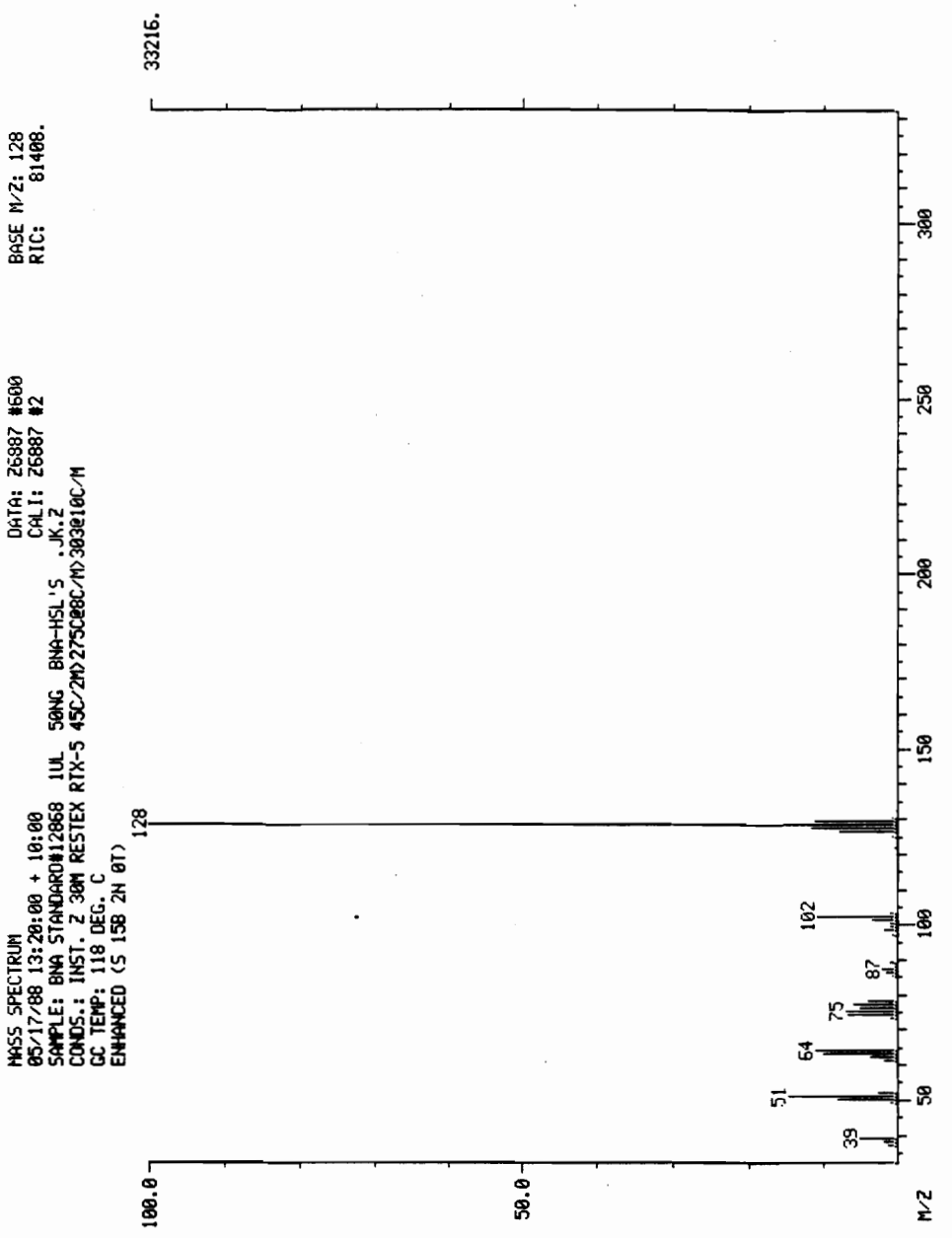

MASS SPECTRUM
05/17/88 16:42:00 + 8:09
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M/275C@8C/M>303@10C/M
GC TEMP: 103 DEG. C
DATA: Z6890 #489
CALI: Z6890 #2
BASE M/Z: 43
RIC: 90624.
12208.
100.0
50.0
M/Z
43.1
57.1
69.1
81.1
117.1
132.2
152.2
50
100
150
200
250
300


MASS SPECTRUM
05/17/88 16:42:00 + 8:09
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M/275C@8C/M/303@10C/M
GC TEMP: 103 DEG. C
ENHANCED (5 15B 2N 0T)
DATA: 26890 #489
CALI: 26890 #2
BASE M/Z: 43
RIC: 35200.
5256.
100.0
50.0
M/Z
43
57
67
75
81
87
111
117
124
132
152
157
50
100
150
200
250
300


MASS SPECTRUM
05/17/88 13:20:00 + 8:06
SAMPLE: BNA STANDARD#12868 1UL 50NG BNA-HSL'S .JK.Z
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 103 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: 26887 #486
CALI: 26887 #2
BASE M/Z: 77
RIC: 48128.
14288.
100.0
50.0
M/Z
77
51
39
65
84
93
107
123
50
100
150
200
250
300


MASS SPECTRUM
05/17/88 16:42:00 + 10:00
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 118 DEG. C
DATA: 26890 #600
CAL: 26890 #2
BASE M/Z: 43
RIC: 79360.
9856.
100.0
50.0
43.1
57.1
69.1
105.1
128.1
153.2
50
100
150
200
250
300
M/Z


MASS SPECTRUM
05/17/88 16:42:00 + 10:00
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 118 DEG. C
ENHANCED (5 15B 2N 0T)
DATA: 26890 #600
CALI: 26890 #2
BASE M/Z: 128
RIC: 11104.
3300.
100.0
50.0
M/Z
128
153
119
111
105
91
77
63
51
39
50
100
150
200
250
300


MASS SPECTRUM
05/17/88 13:20:00 + 10:00
SAMPLE: BNA STANDARD#12868 1UL 50NG BNA-HSL'S .JK.2
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2MD275C@8C/MD303@10C/M
GC TEMP: 118 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: 26887 #600
CALI: 26887 #2
BASE M/Z: 128
RIC: 81408.
33216.
128
102
87
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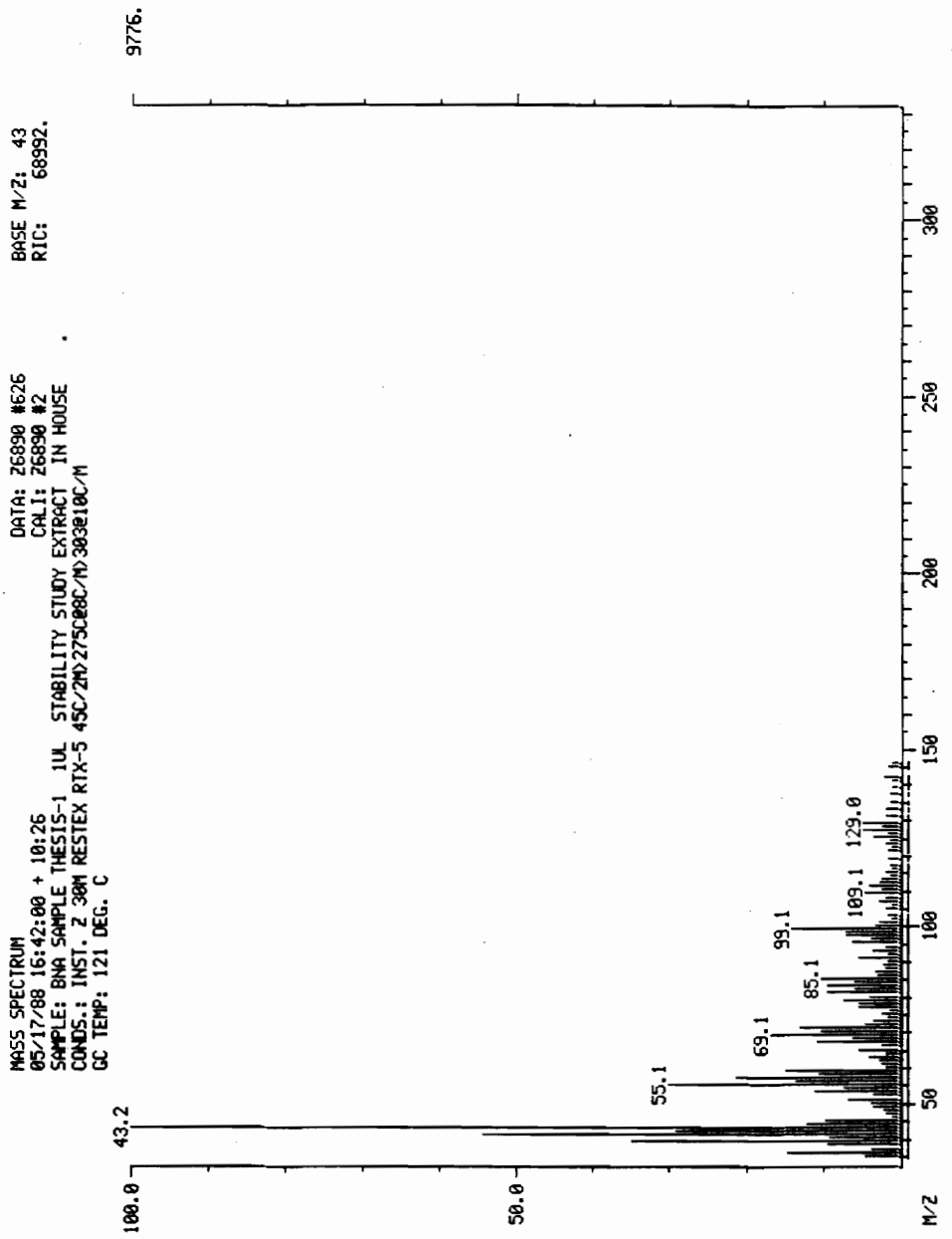
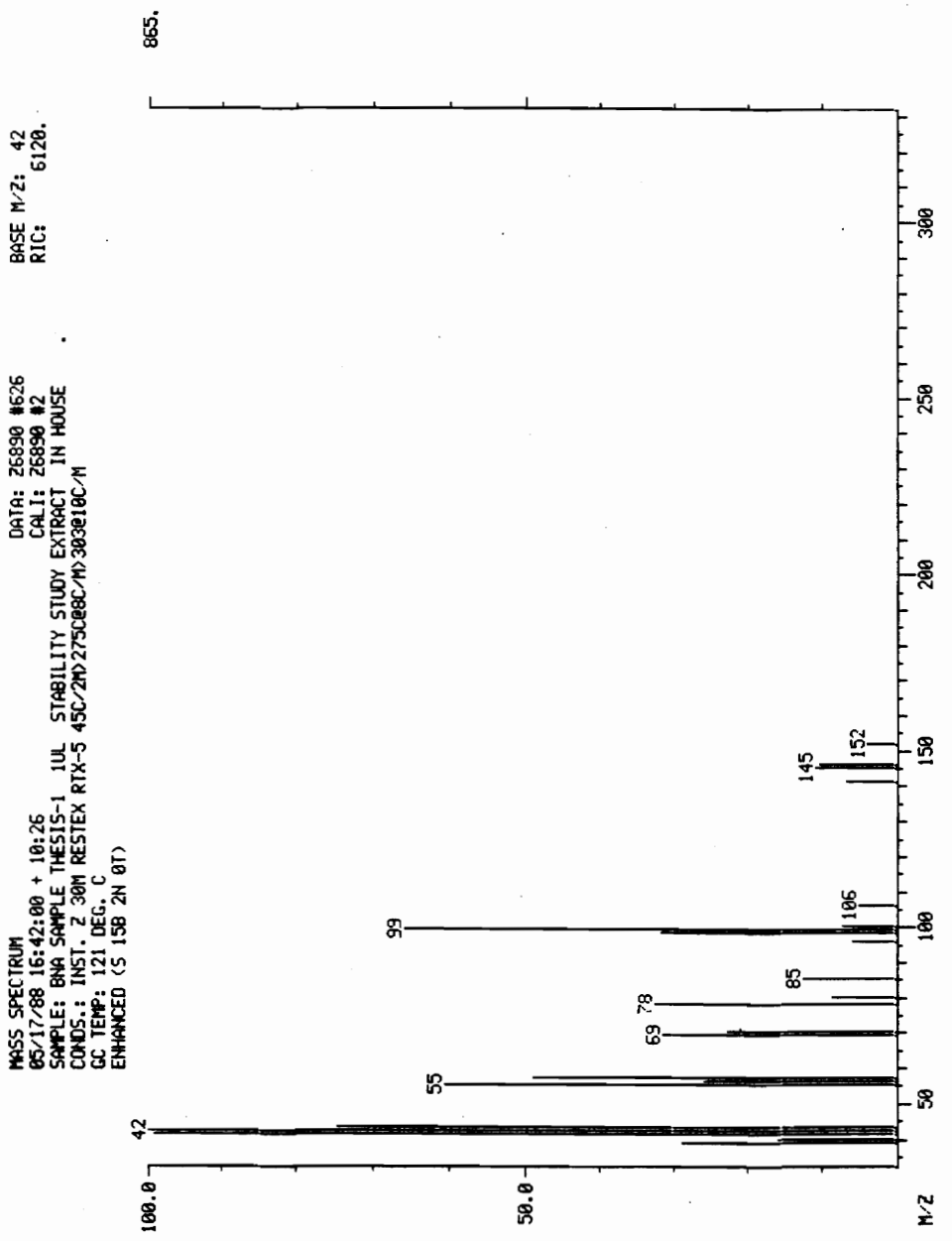
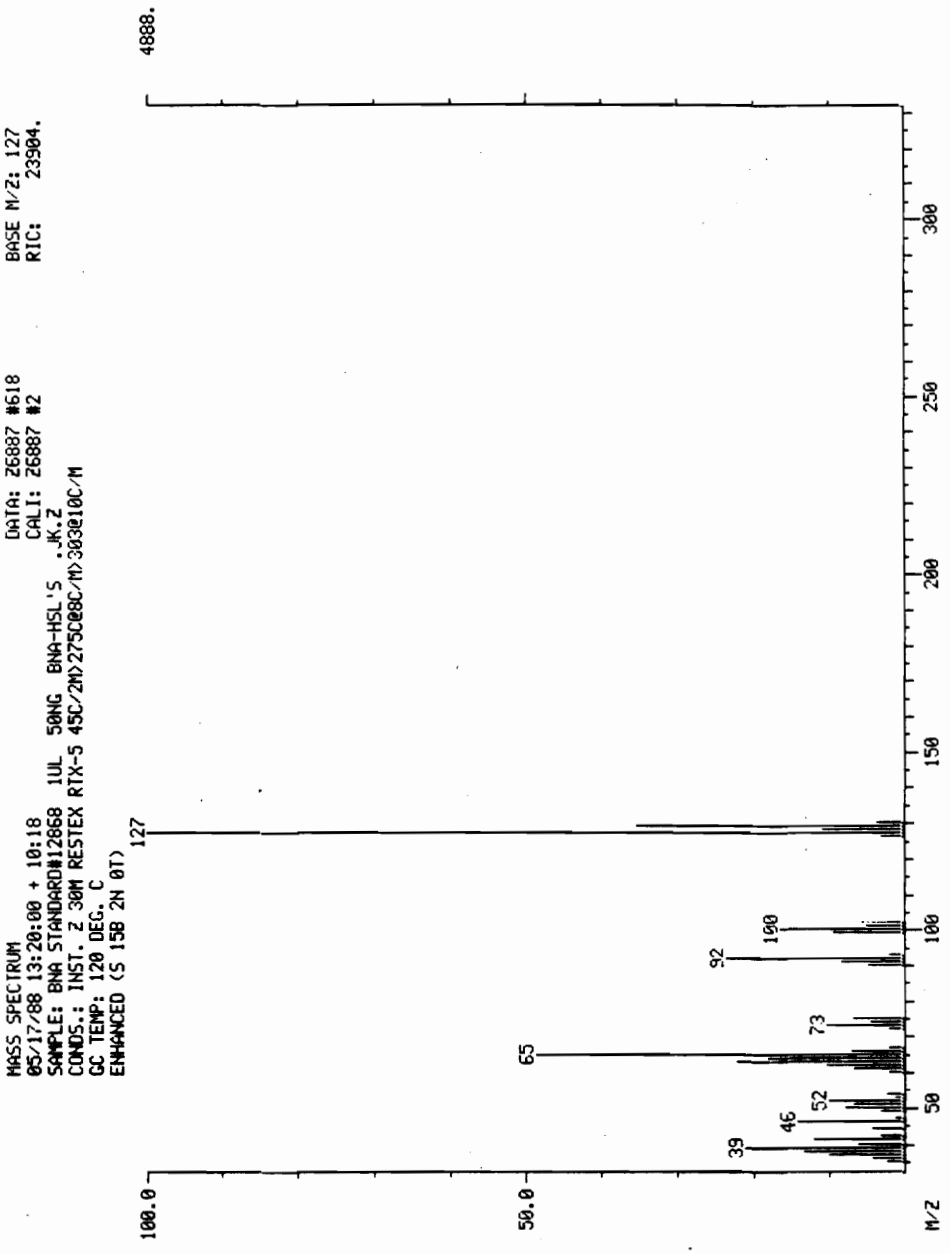
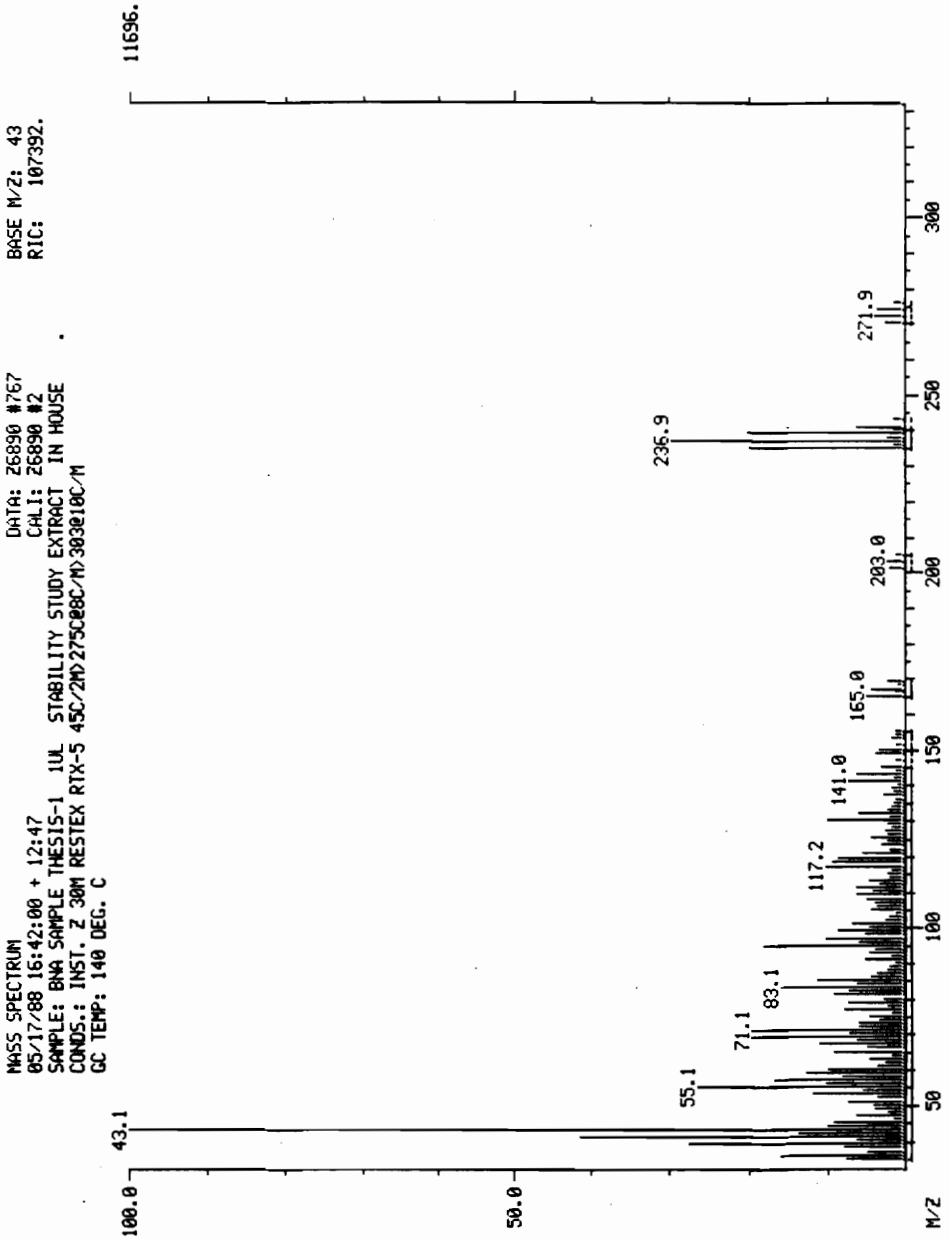
50.0
M/Z
50
100
150
200
250
300


MASS SPECTRUM
05/17/88 16:42:00 + 10:26
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. 2 30M RESTEX RTX-5 45C/2MD275C@8C/MD303@10C/M
GC TEMP: 121 DEG. C
DATA: 26890 #626
CALI: 26890 #2
BASE M/Z: 43
RIC: 68992.
9776.
100.0
50.0
43.2
55.1
69.1
85.1
99.1
109.1
129.0
50
100
150
200
250
300
M/Z


MASS SPECTRUM
05/17/88 16:42:00 + 10:26
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C08C/M>303@10C/M
GC TEMP: 121 DEG. C
ENHANCED (5 15B 2N 0T)
DATA: 26890 #626
CALI: 26890 #2
BASE M/Z: 42
RIC: 6120.
865.
100.0
50.0
M/Z
42
55
69
78
85
99
106
145
152
50
100
150
200
250
300


MASS SPECTRUM
05/17/88 13:20:00 + 10:18
SAMPLE: BNA STANDARD#12868 1UL 50NG BNA-HSL'S ..JK.Z
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M@275C@8C/M@303@10C/M
GC TEMP: 120 DEG. C
ENHANCED (S 15@ 2N 0T)
DATA: Z6887 #618
CALI: Z6887 #2
BASE M/Z: 127
RIC: 23904.
4888.
100.0
50.0
127
65
92
190
73
39
46
52
50
100
150
200
250
300
M/Z


MASS SPECTRUM
05/17/88 16:42:00 + 12:47
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M\275C@8C/M\303@10C/M
GC TEMP: 140 DEG. C
DATA: Z6890 #767
CALI: Z6890 #2
BASE M/Z: 43
RIC: 107392.
11696.
100.0
50.0
M/Z
43.1
55.1
71.1
83.1
117.2
141.0
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236.9
271.9
50
100
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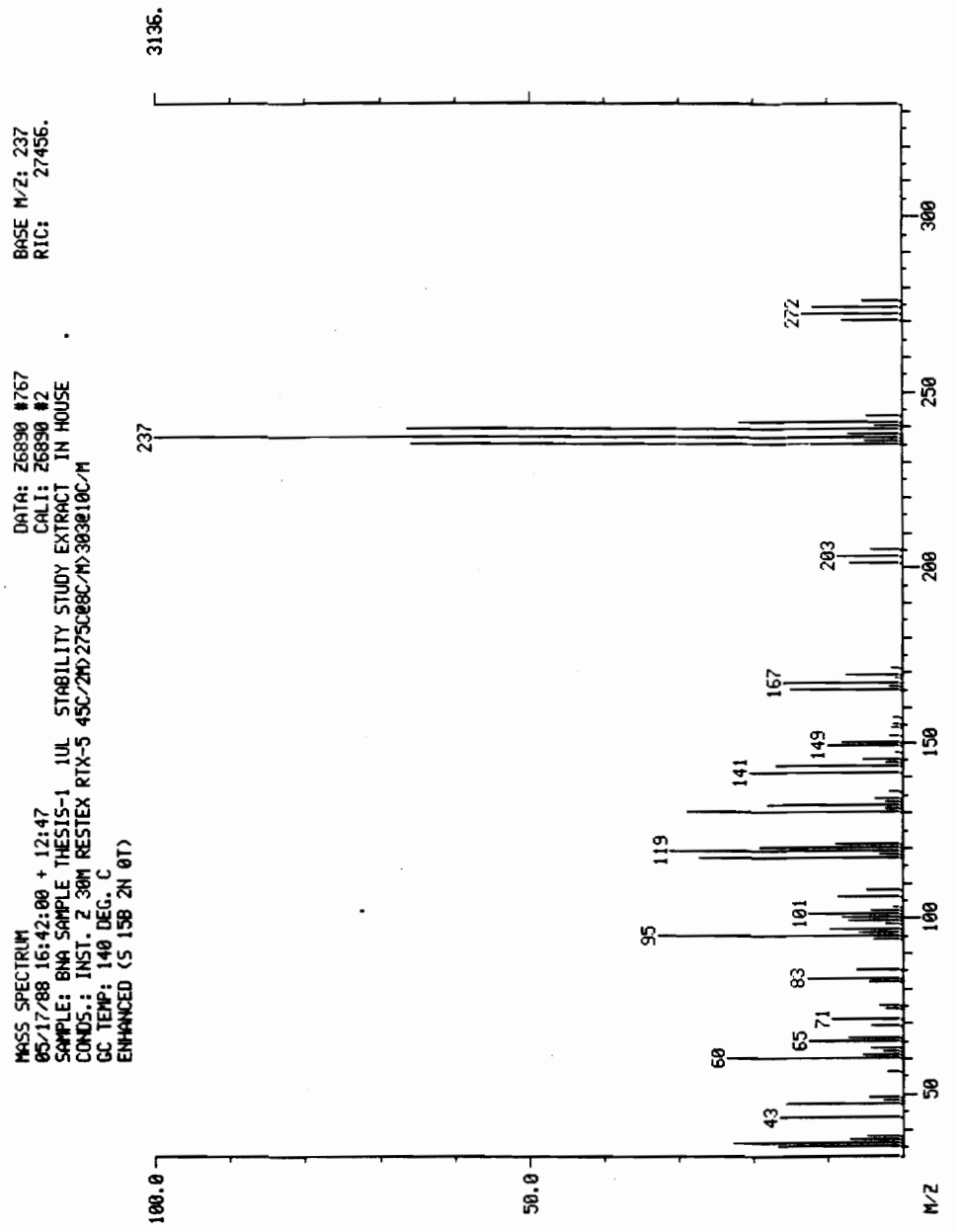
200
250
300


MASS SPECTRUM
05/17/88 16:42:00 + 12:47
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. 2 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 140 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: 26890 #767
CALI: 26890 #2
BASE M/Z: 237
RIC: 27456.
3136.
100.0
50.0
M/Z
43
60
65
71
83
95
101
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167
203
237
272
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100
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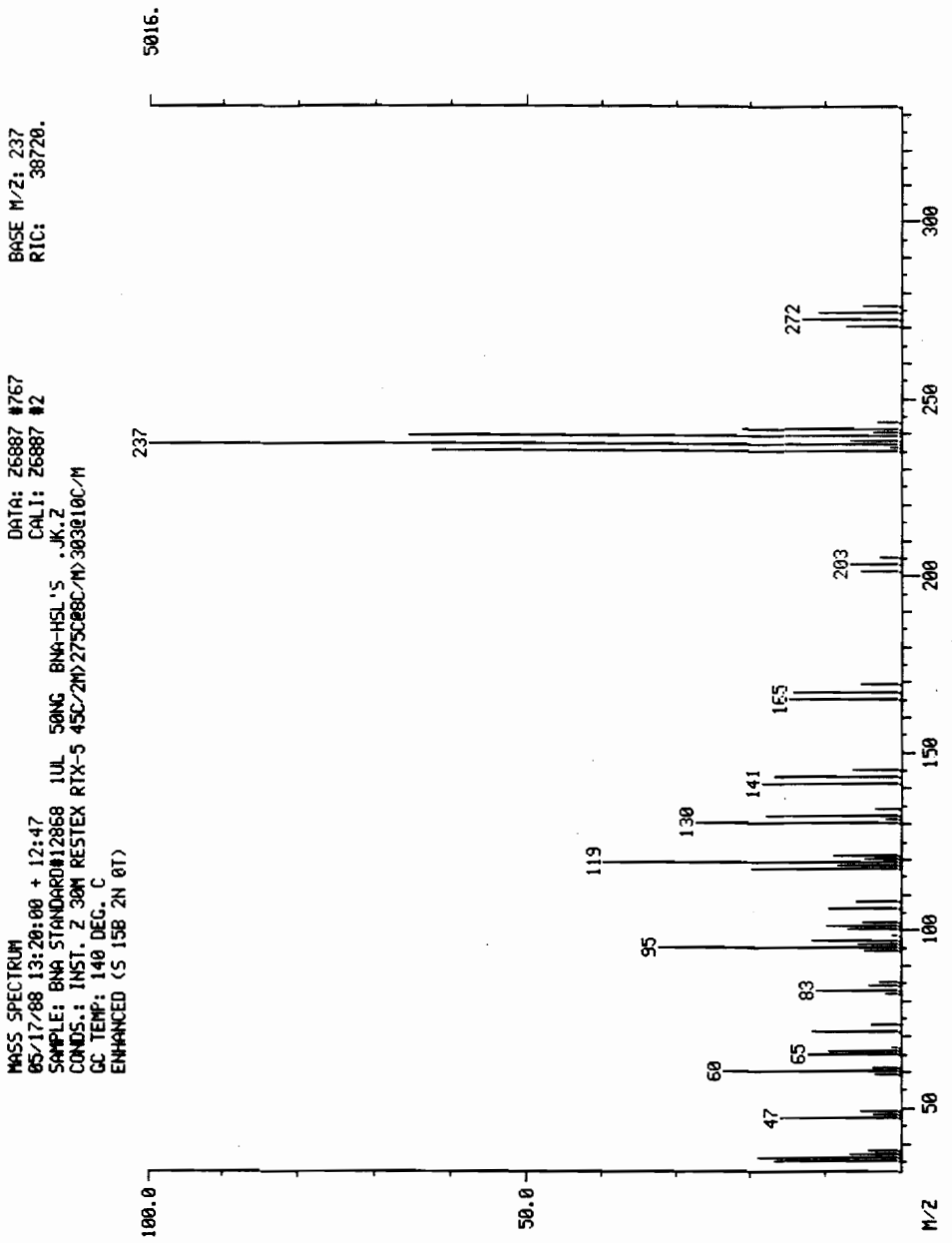
MASS SPECTRUM
05/17/88 13:20:00 + 12:47
SAMPLE: BNA STANDARD@12868 1UL 50NG BNA-HSL'S .JK.Z
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 140 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: Z6887 #767
CALI: Z6887 #2
BASE M/Z: 237
RIC: 38720.
5016.
100.0
50.0
M/Z
237
272
203
165
141
130
119
95
83
65
60
47
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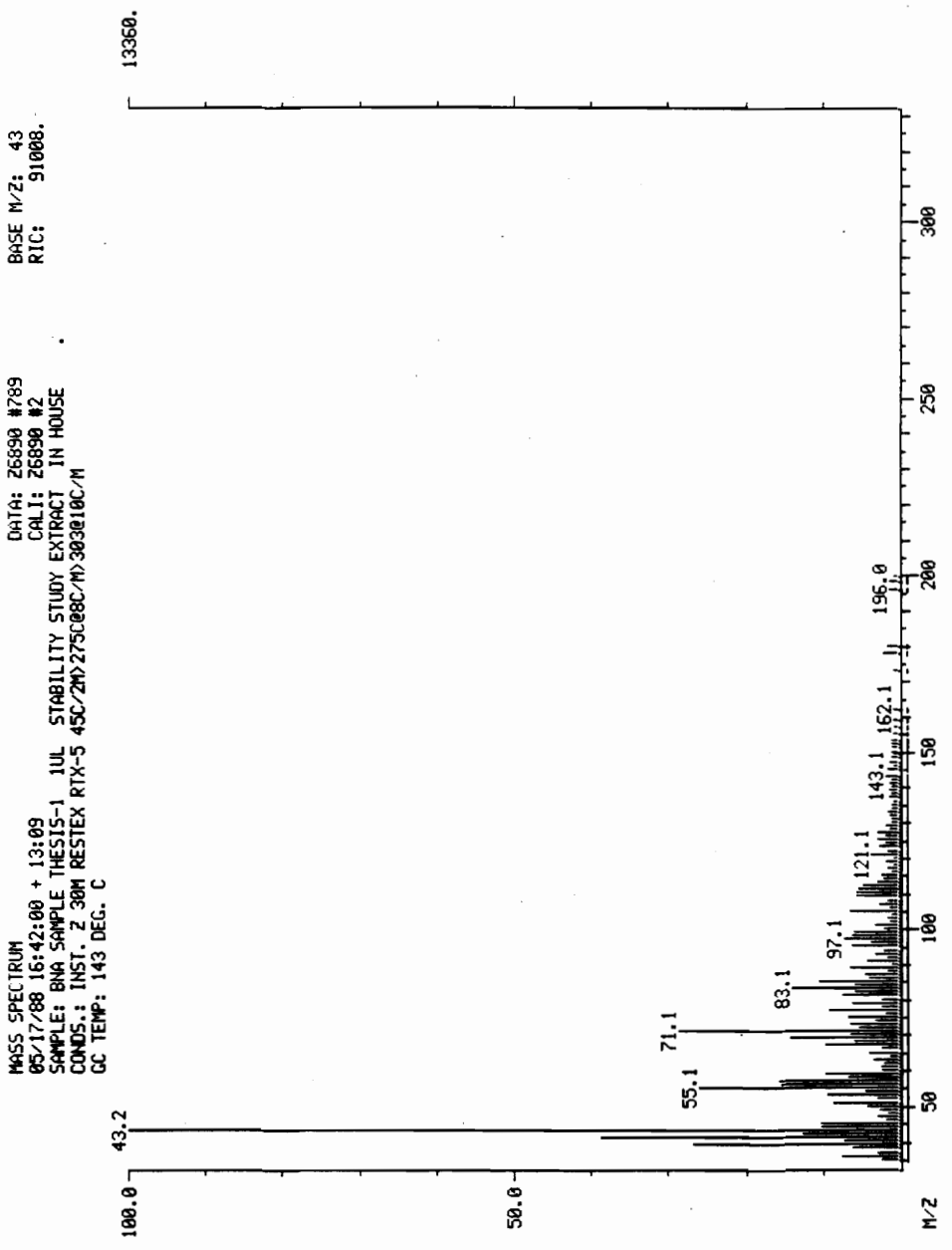
MASS SPECTRUM
05/17/88 16:42:00 + 13:09
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. 2 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 143 DEG. C
DATA: Z6890 #789
CALI: Z6890 #2
BASE M/Z: 43
RIC: 91008.
13360.
100.0
50.0
M/Z
43.2
55.1
71.1
83.1
97.1
121.1
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196.0
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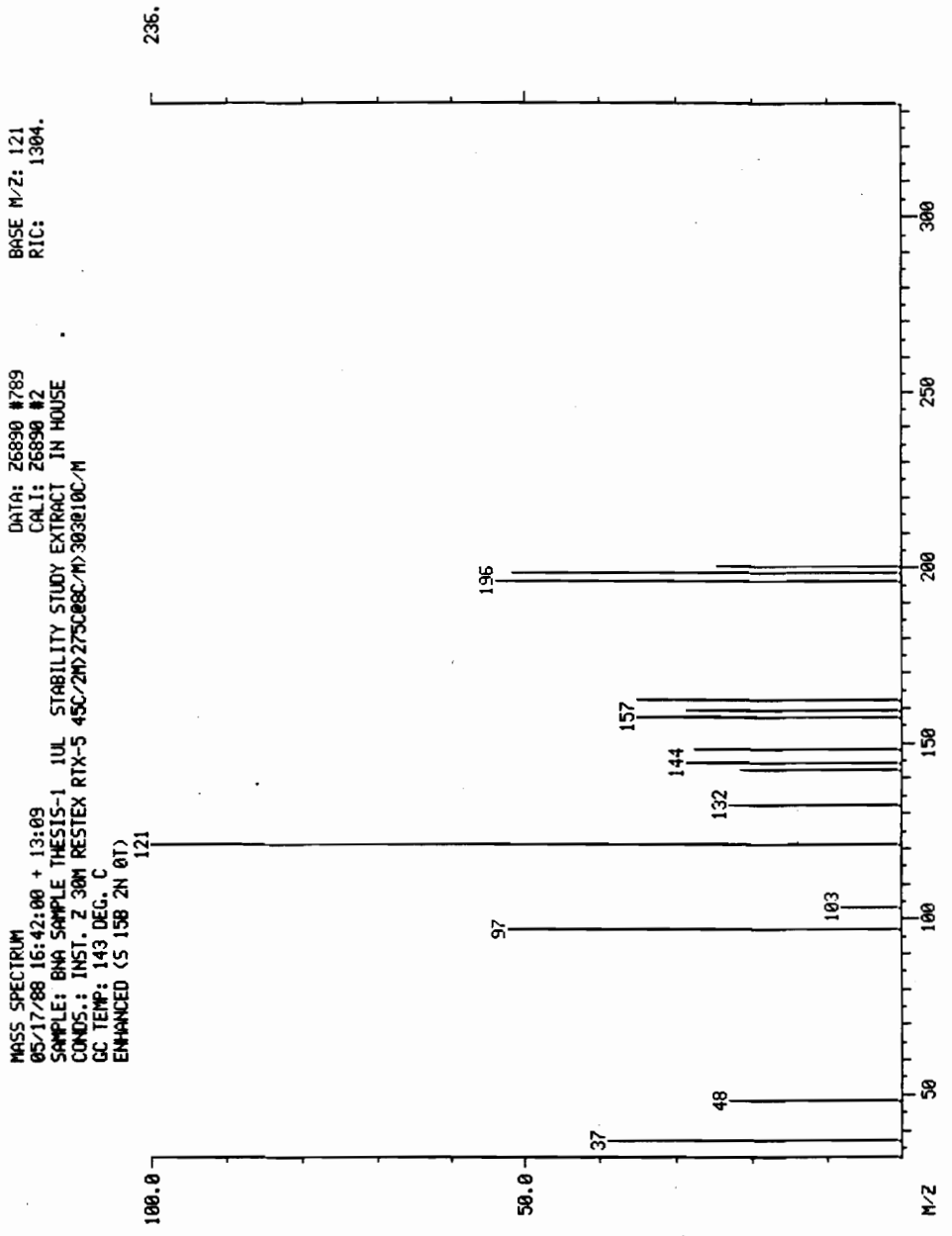
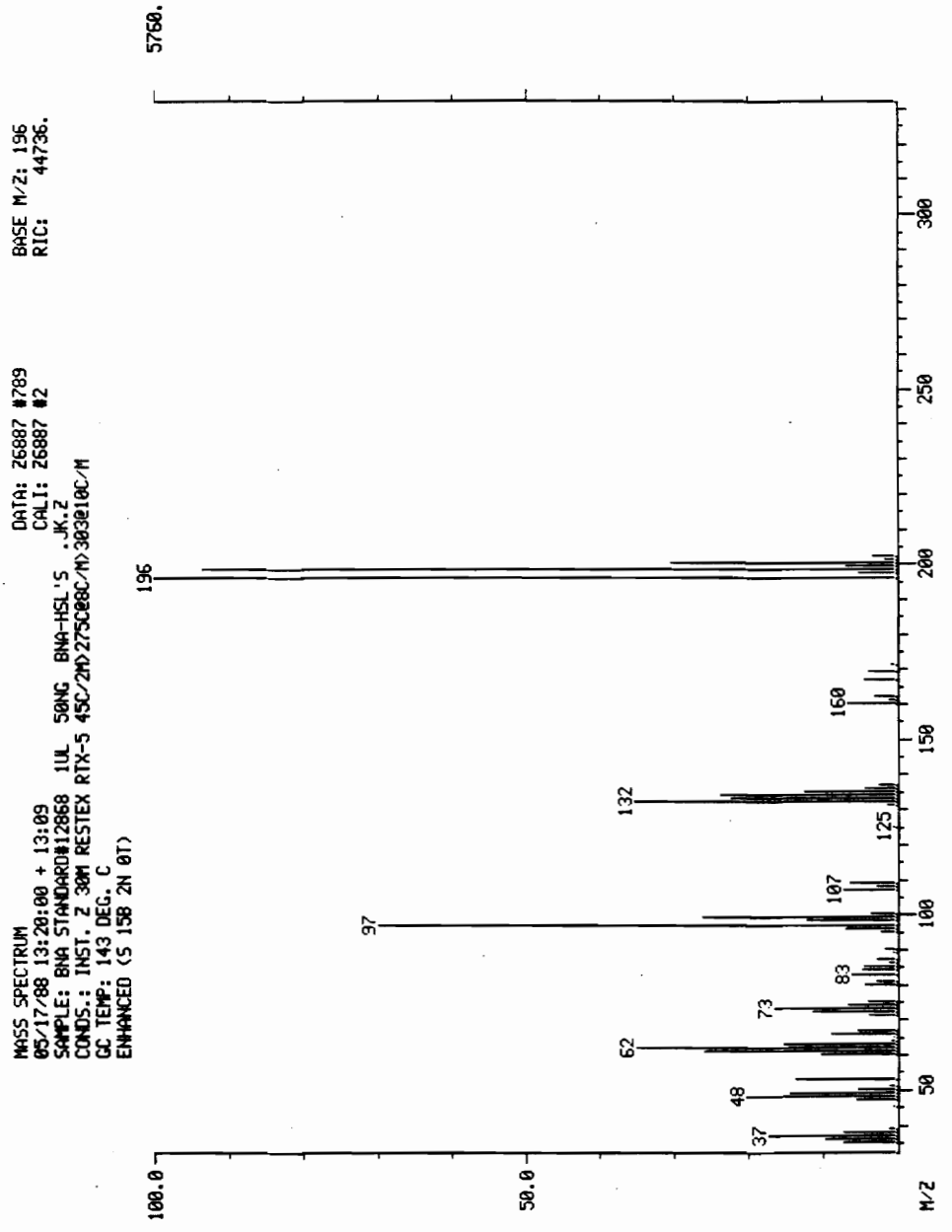
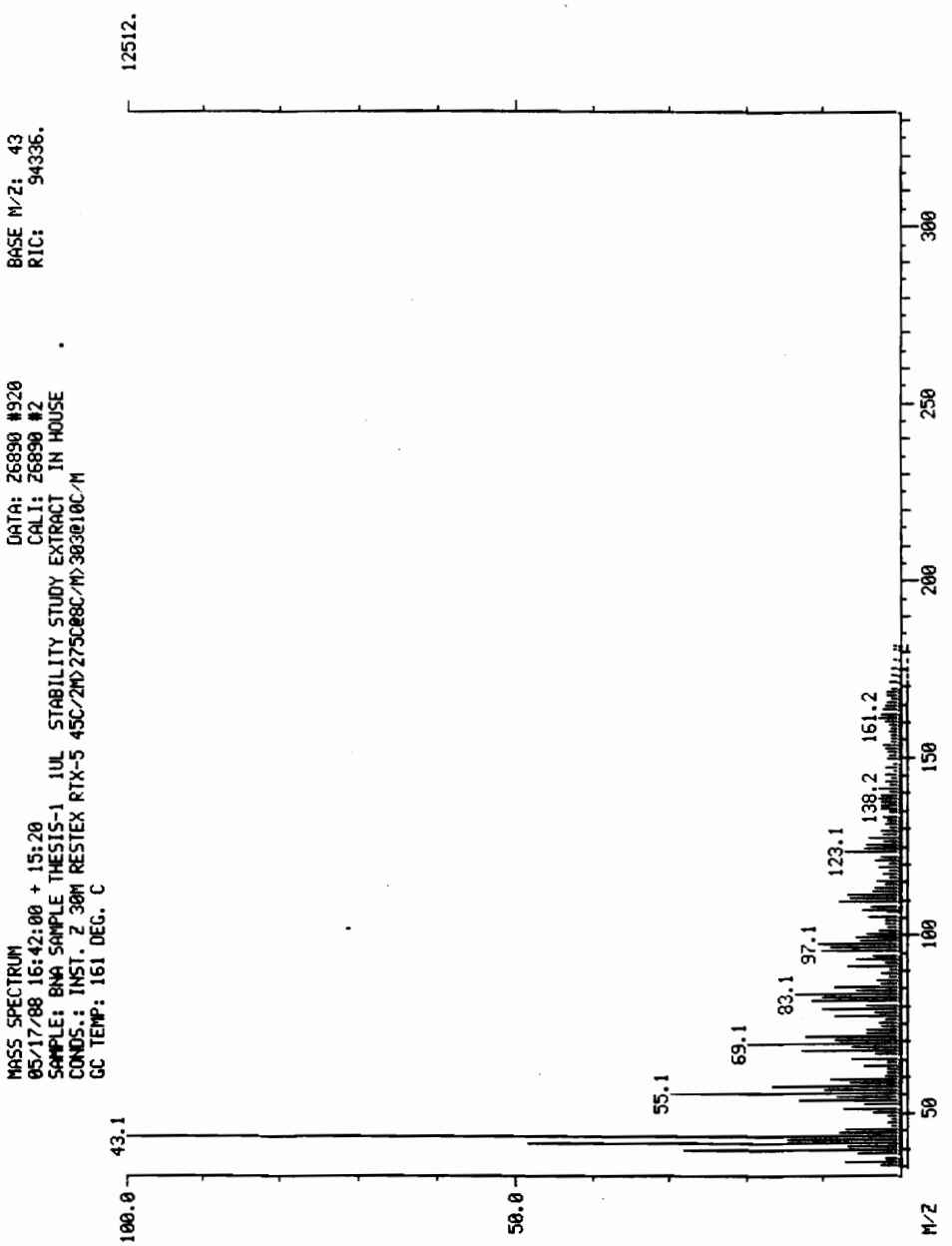
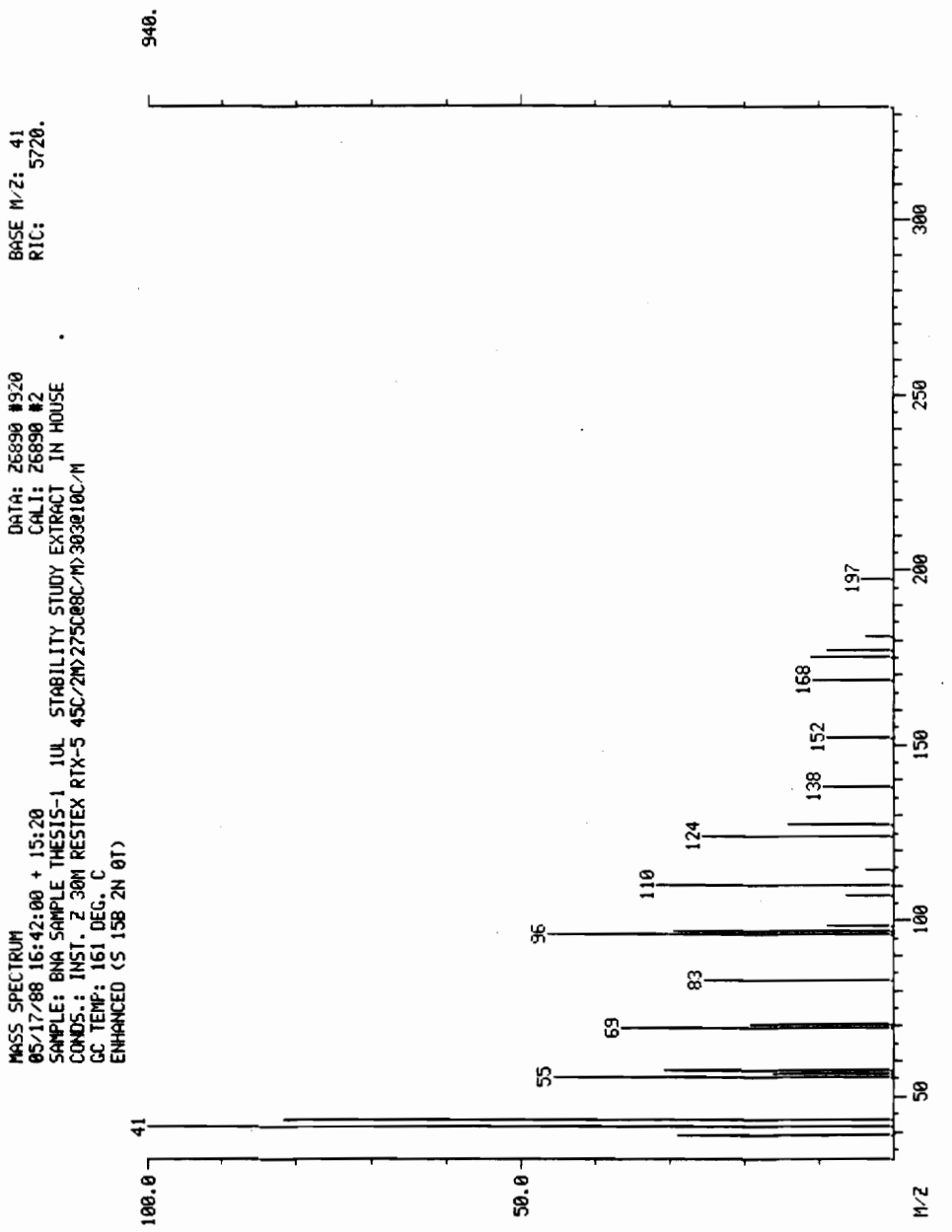
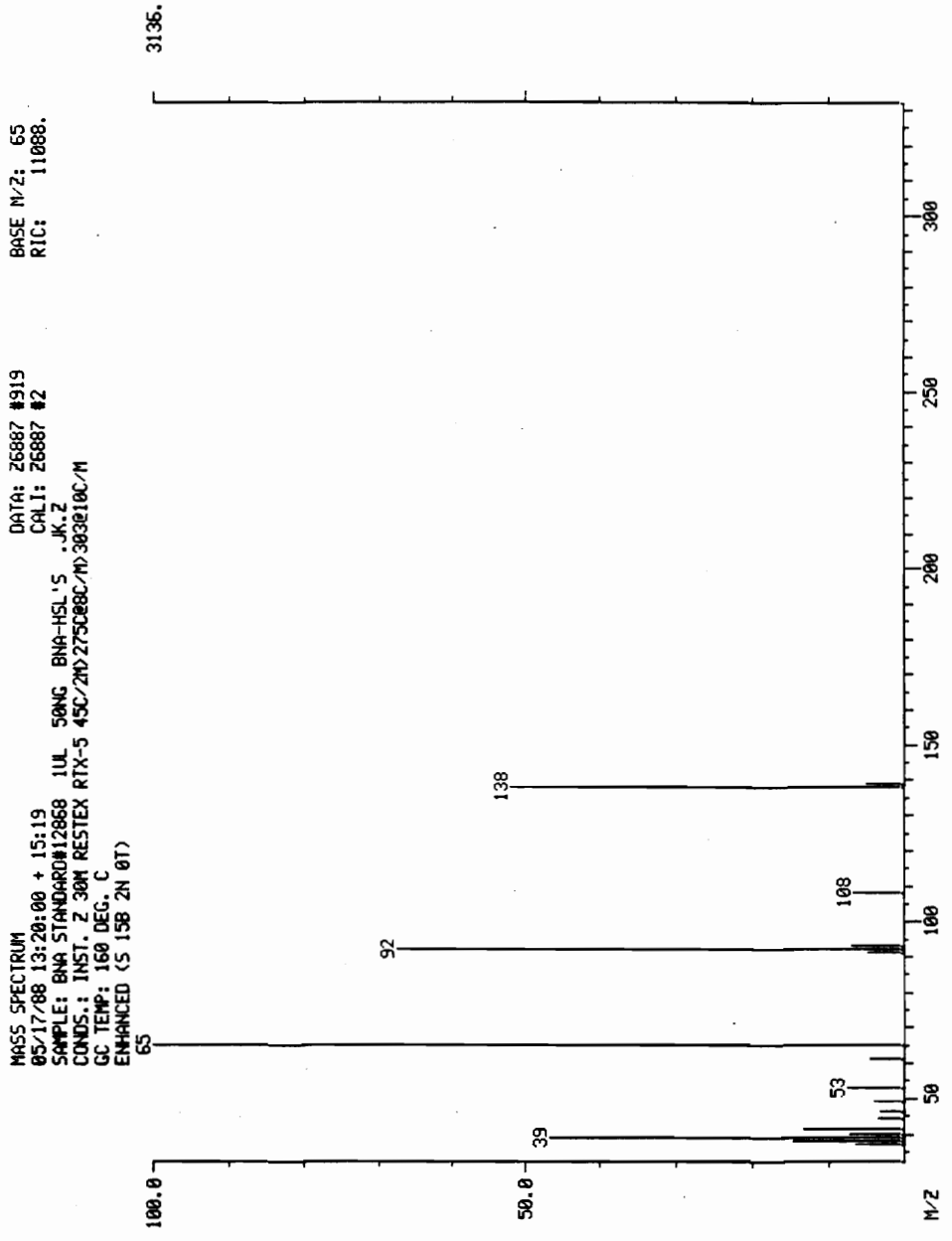
200
250
300

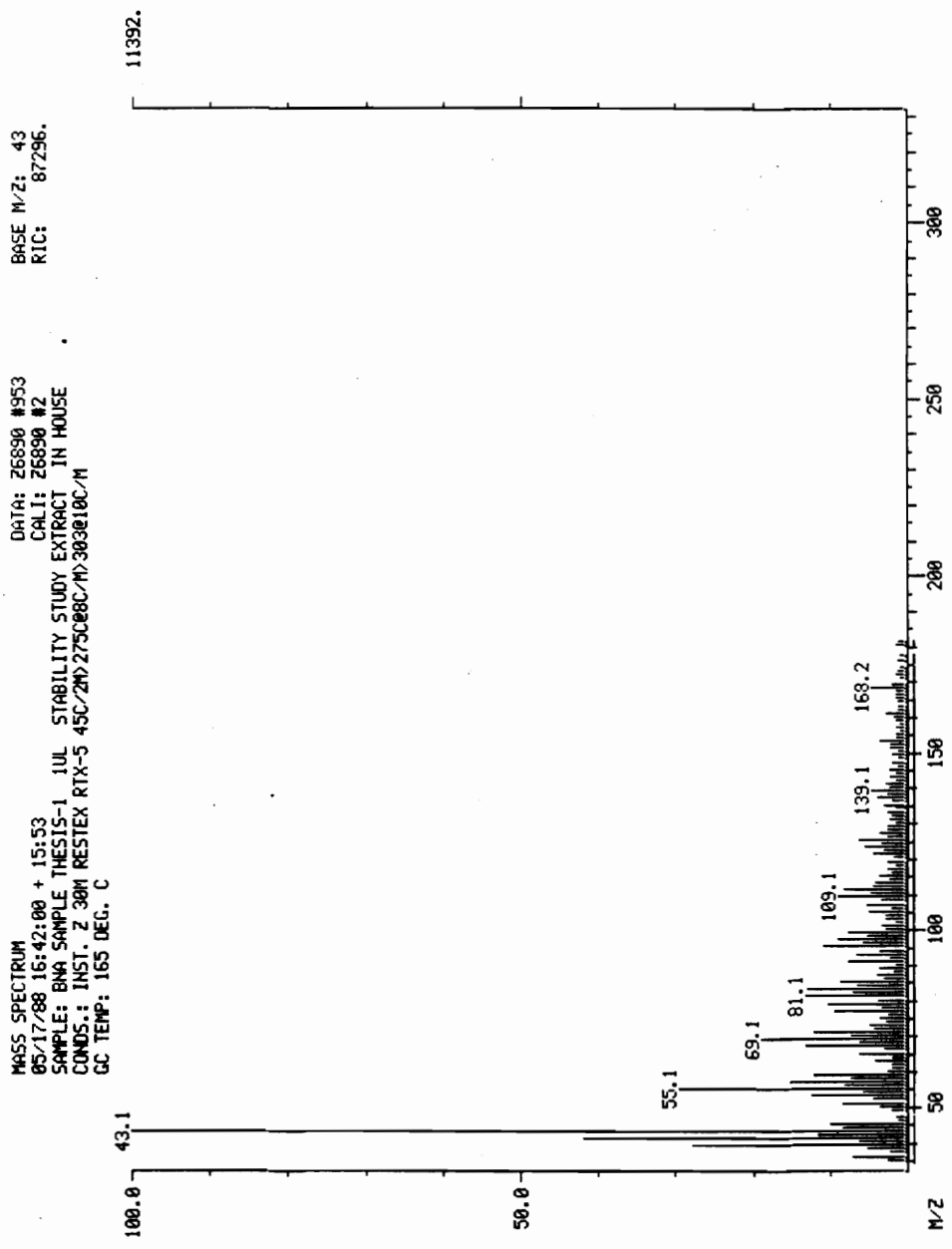

MASS SPECTRUM
05/17/88 16:42:00 + 13:09
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 143 DEG. C
ENHANCED (5 15B 2N 0T)
DATA: Z6890 #789
CAL: Z6890 #2
BASE M/Z: 121
RIC: 1304.
100.0
50.0
M/Z
236.
121
97
103
48
37
196
157
144
132
50
100
150
200
250
300

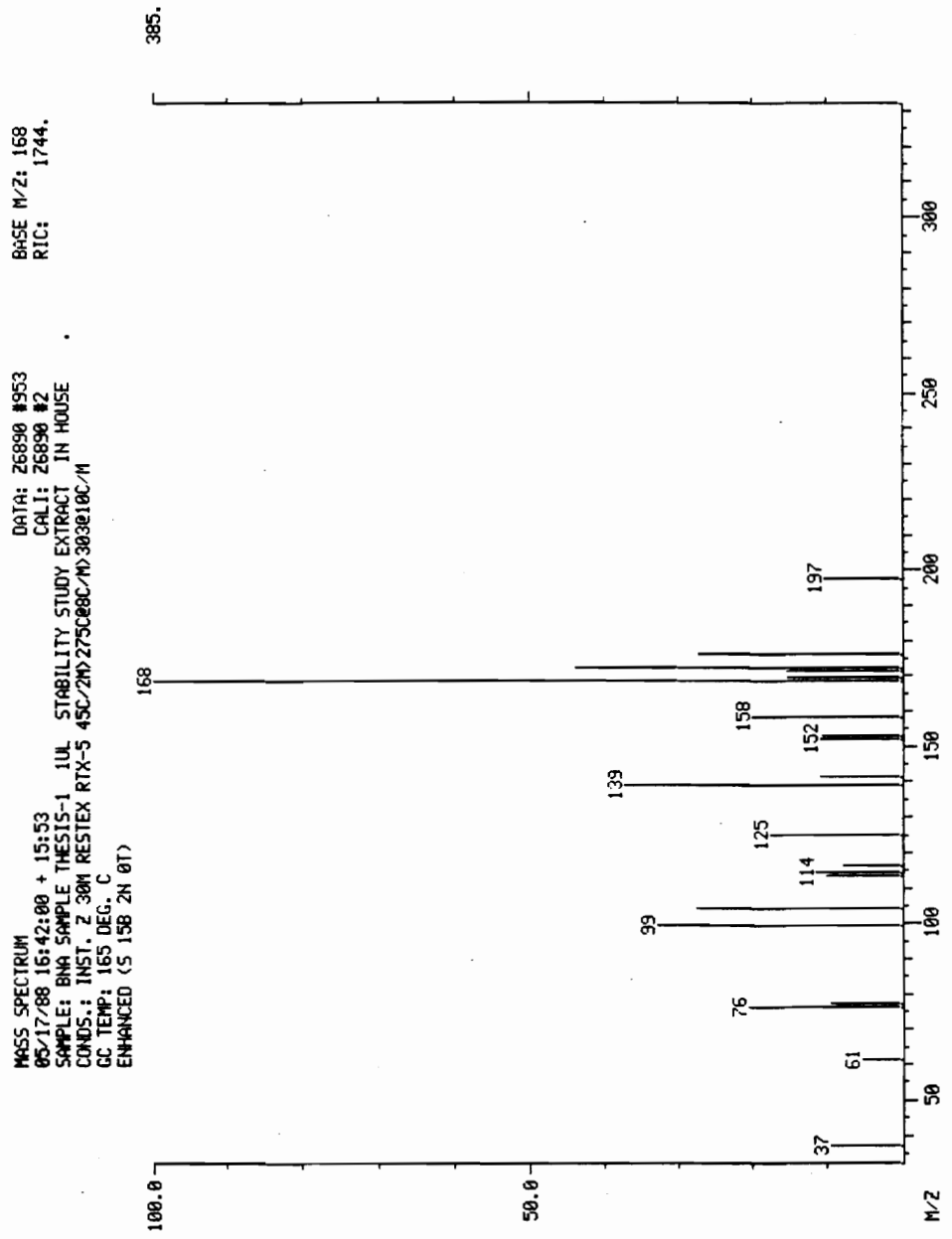

MASS SPECTRUM
05/17/88 13:20:00 + 13:09
SAMPLE: BNA STANDARD#12868 1UL 50NG BNA-HSL'S
CONDS.: INST. 2 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 143 DEG. C
ENHANCED (5 15B 2N 0T)
DATA: Z6887 #789
CALI: Z6887 #2
.JK.Z
BASE M/Z: 196
RIC: 44736.
5760.
100.0
50.0
M/Z
196
97
132
160
125
107
83
73
62
48
37
50
100
150
200
250
300

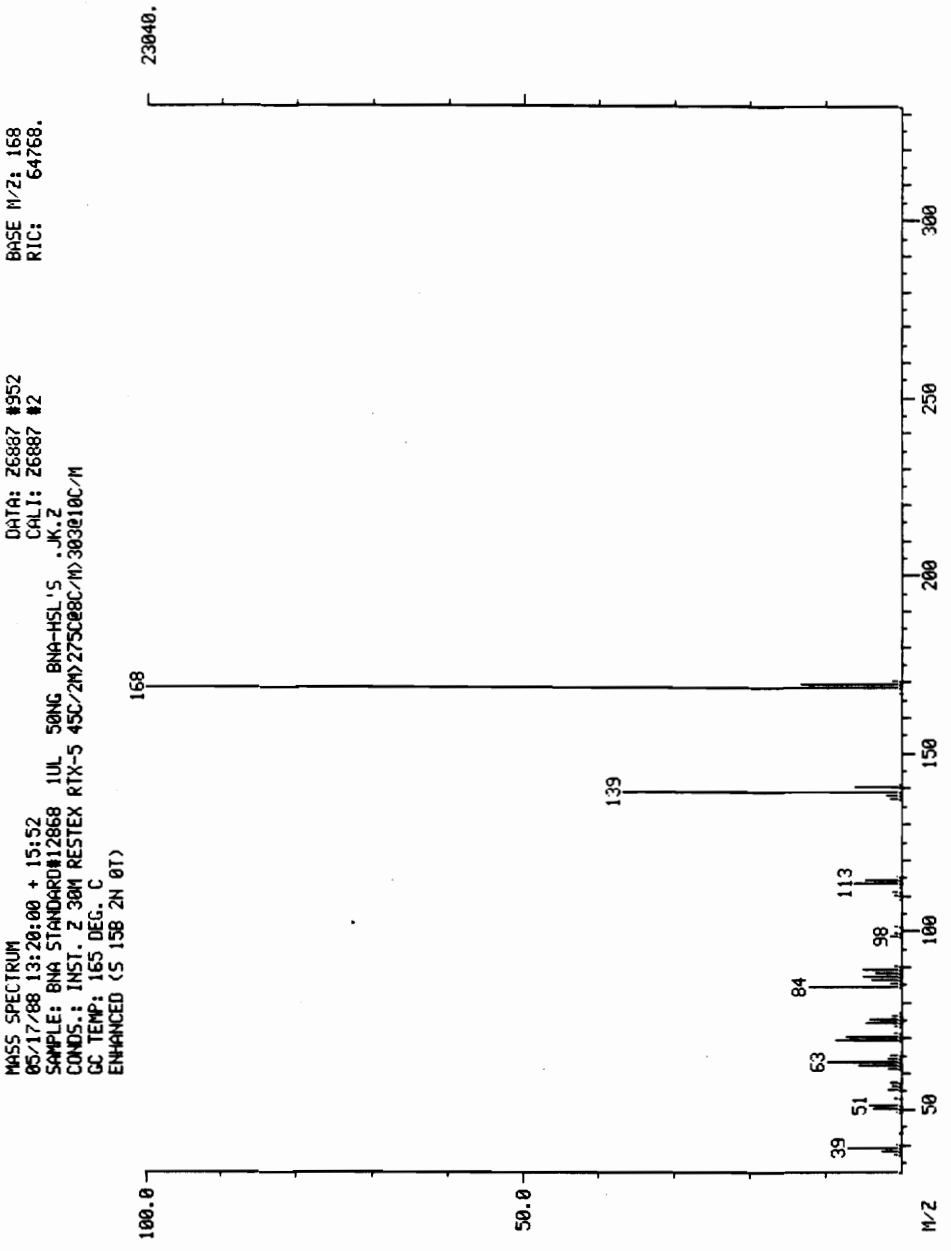

MASS SPECTRUM
05/17/88 16:42:00 + 15:20
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 161 DEG. C
DATA: Z6890 #920
CALI: Z6890 #2
BASE M/Z: 43
RIC: 94336.
12512.
100.0
50.0
43.1
55.1
69.1
83.1
97.1
123.1
138.2
161.2
50
100
150
200
250
300
M/Z

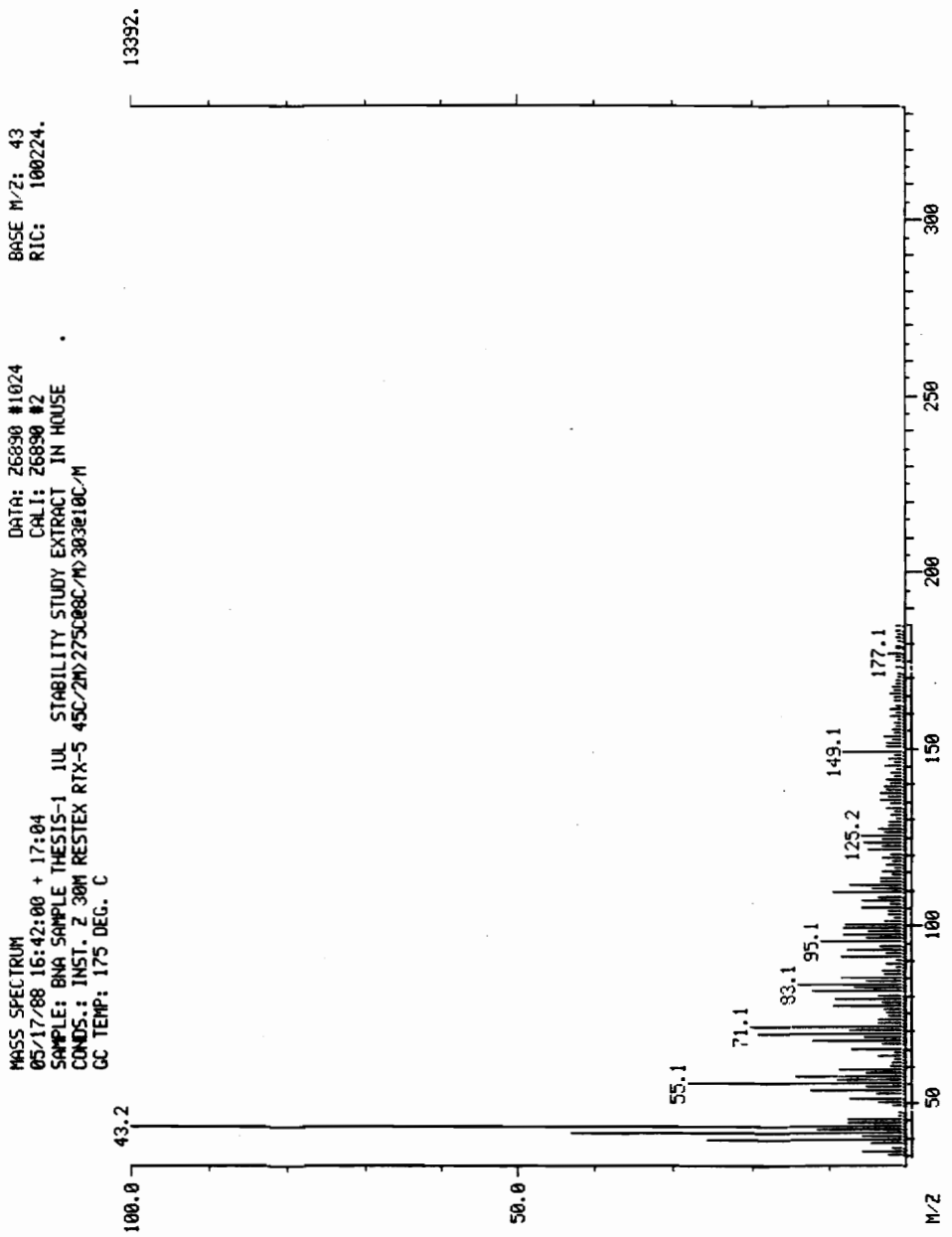

MASS SPECTRUM
05/17/88 16:42:00 + 15:20
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 161 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: 26890 #920
CALI: 26890 #2
BASE M/Z: 41
RIC: 5720.
940.
100.0
50.0
M/Z
41
55
69
83
96
110
124
138
152
168
197
50
100
150
200
250
300

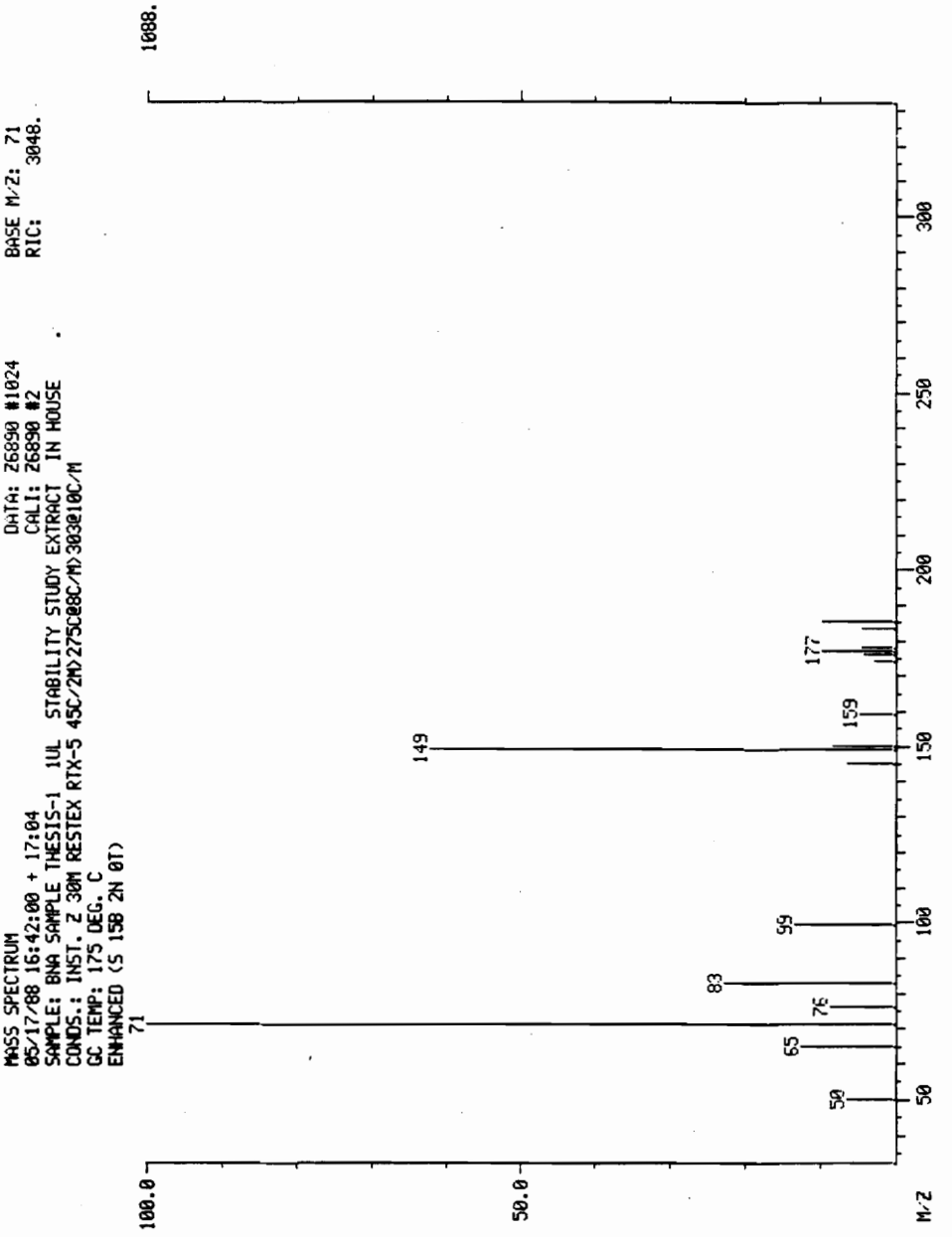

MASS SPECTRUM
05/17/88 13:20:00 + 15:19
SAMPLE: BNA STANDARD#12868 1UL 50NG BNA-HSL'S .JK.Z
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 160 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: Z6887 #919
CALI: Z6887 #2
BASE M/Z: 65
RIC: 11088.
3136.
100.0
50.0
M/Z
50
100
150
200
250
300
65
92
138
108
53
39

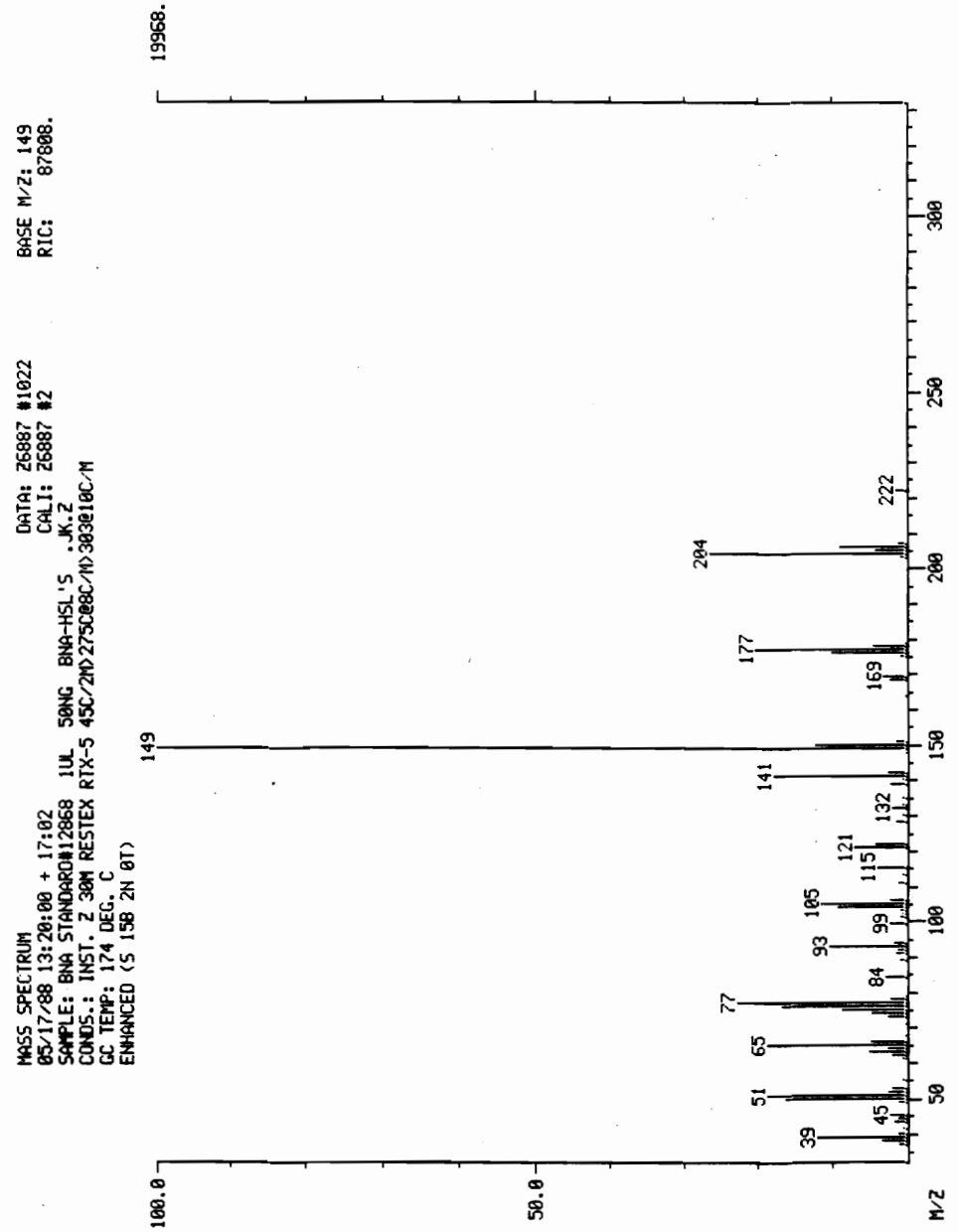

MASS SPECTRUM
05/17/88 16:42:00 + 15:53
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 165 DEG. C
DATA: Z6890 #953
CALI: Z6890 #2
BASE M/Z: 43
RIC: 87296.
11392.
100.0
50.0
M/Z
43.1
55.1
69.1
81.1
109.1
139.1
168.2
50
100
150
200
250
300

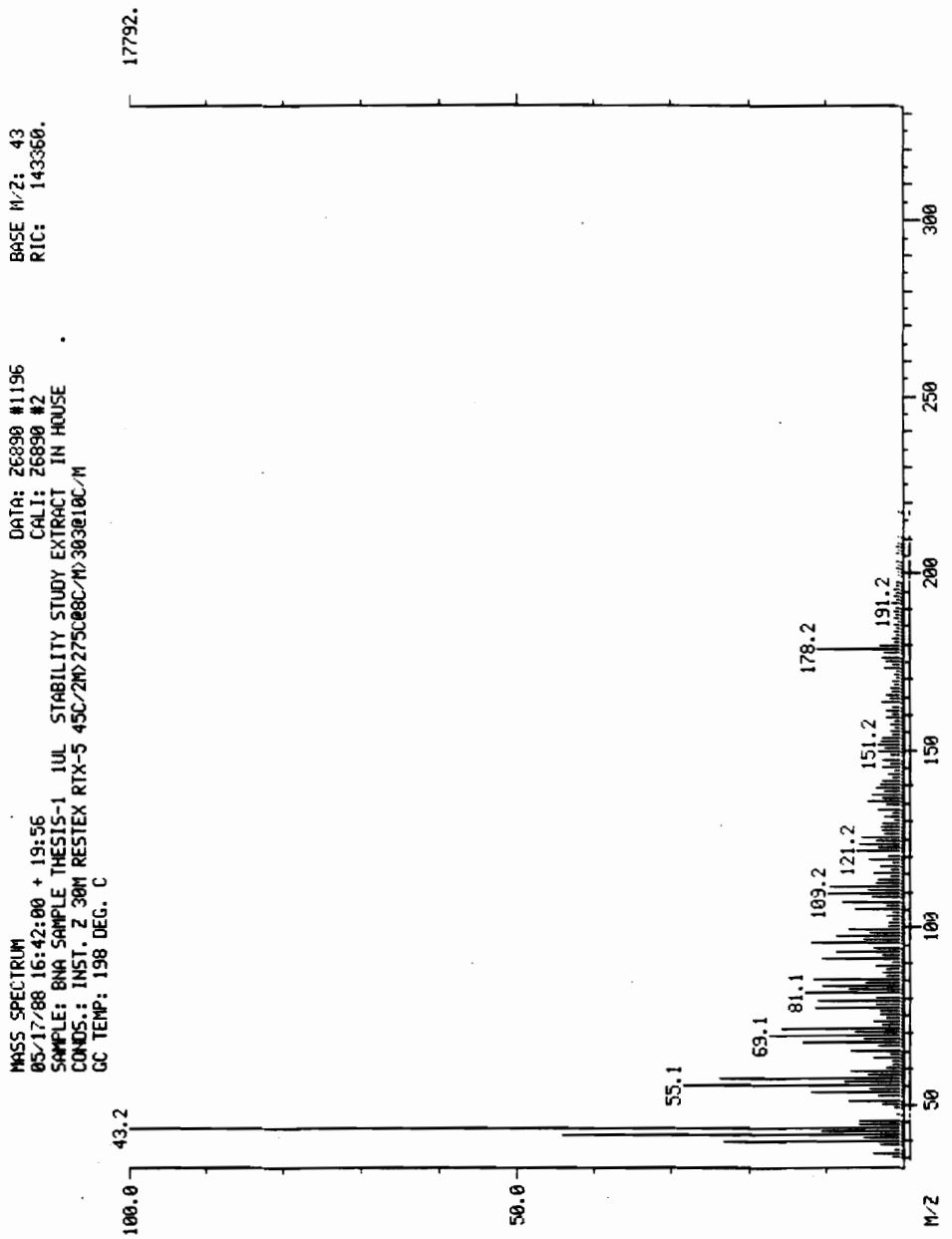

MASS SPECTRUM
05/17/88 16:42:00 + 15:53
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 165 DEG. C
ENHANCED (5 15B 2N 0T)
DATA: 26890 #953
CAL: 26890 #2
BASE M/Z: 168
RIC: 1744.
385.
100.0
50.0
M/Z
168
197
158
152
139
125
114
99
76
61
37
50
100
150
200
250
300

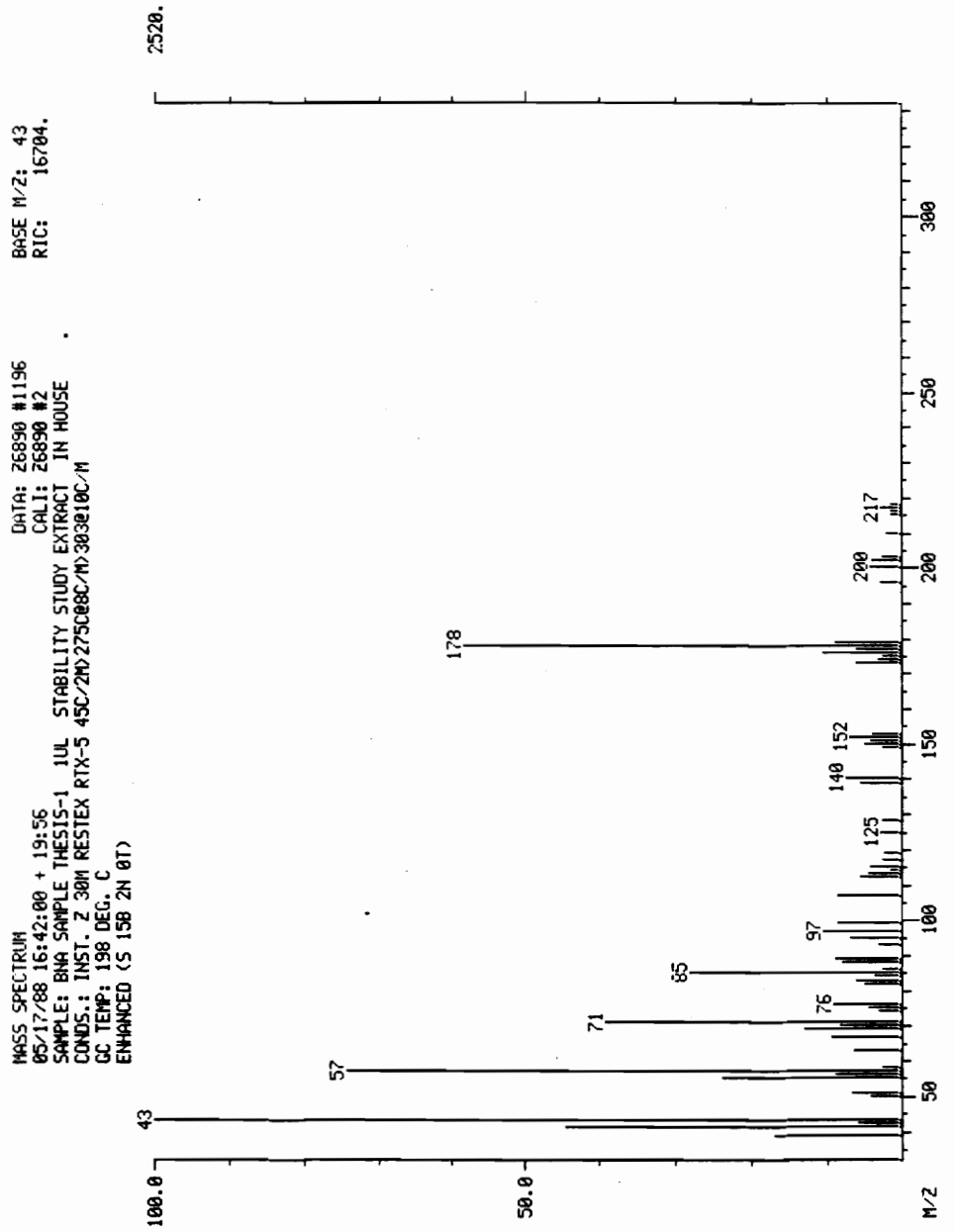

MASS SPECTRUM
05/17/88 13:20:00 + 15:52
SAMPLE: BNA STANDARD#12868 1UL 50NG BNA-HSL'S .JK.Z
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 165 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: 26887 #952
CALI: 26887 #2
BASE M/Z: 168
RIC: 64768.
23040.
168
139
113
98
84
63
51
39
100.0
50.0
M/Z
50
100
150
200
250
300

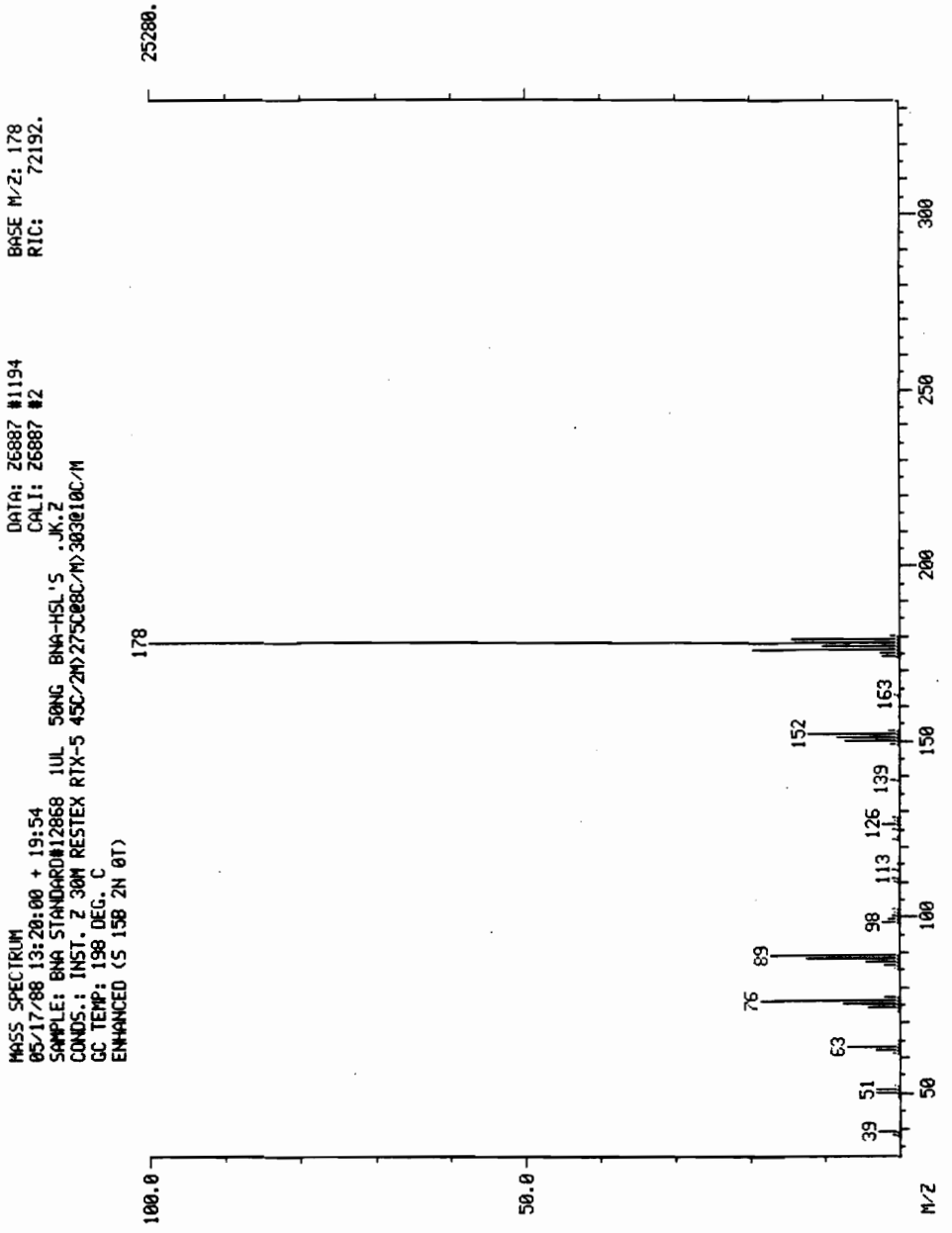

MASS SPECTRUM
05/17/88 16:42:00 + 17:04
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M\275C@8C/M\303@10C/M
GC TEMP: 175 DEG. C
DATA: 26890 #1024
CALI: 26890 #2
BASE M/Z: 43
RIC: 100224.
13392.
100.0
50.0
43.2
55.1
71.1
83.1
95.1
125.2
149.1
177.1
50
100
150
200
250
300
M/Z

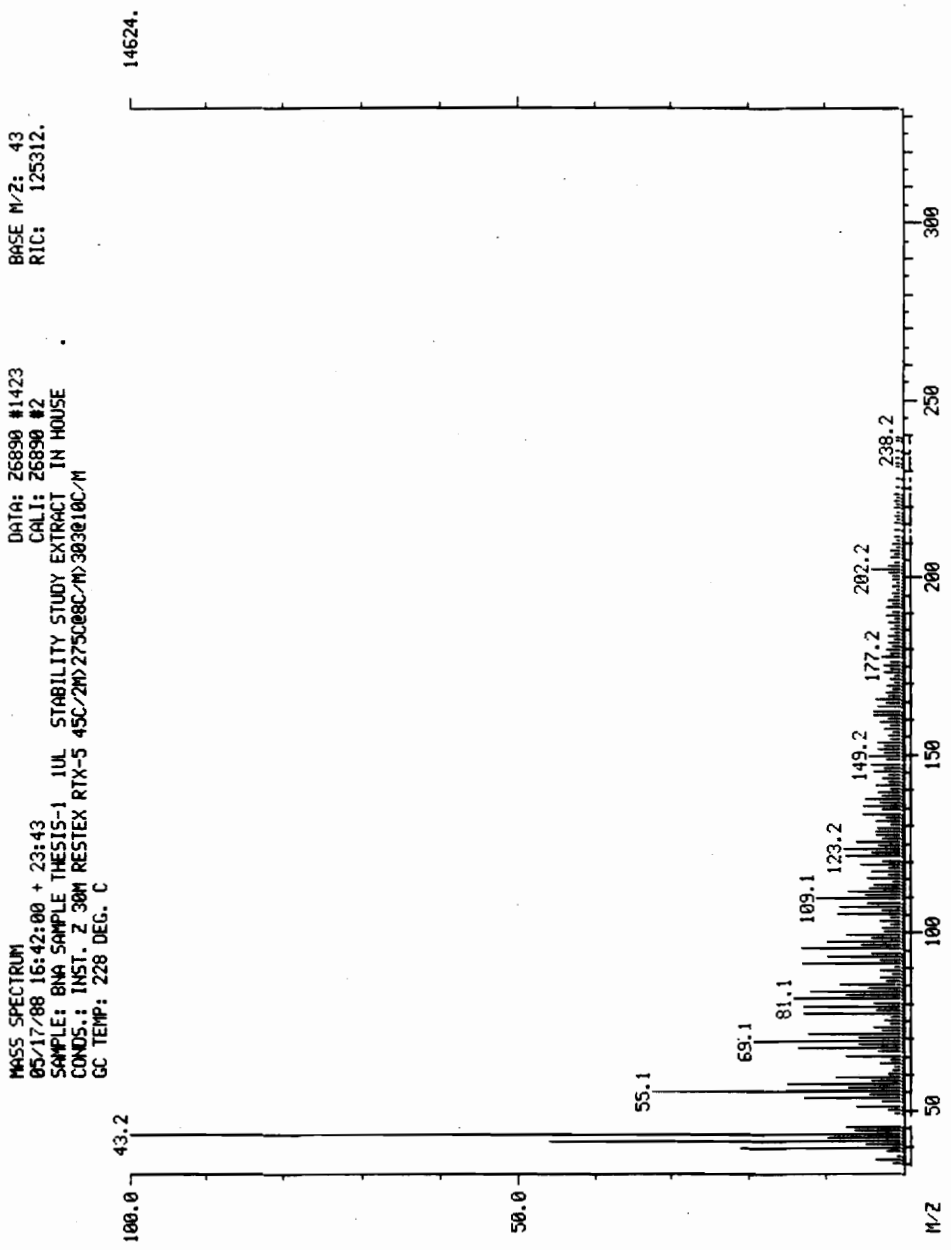

MASS SPECTRUM
05/17/88 16:42:00 + 17:04
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: 1 INST. Z 30M RESTEX RTX-5 45C/2M>275@8C/M>303@10C/M
GC TEMP: 175 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: Z6890 #1024
CAL1: Z6890 #2
BASE M/Z: 71
RIC: 3048.
1000.
100.0
50.0
M/Z
50
65
71
76
83
99
149
159
177
50
100
150
200
250
300

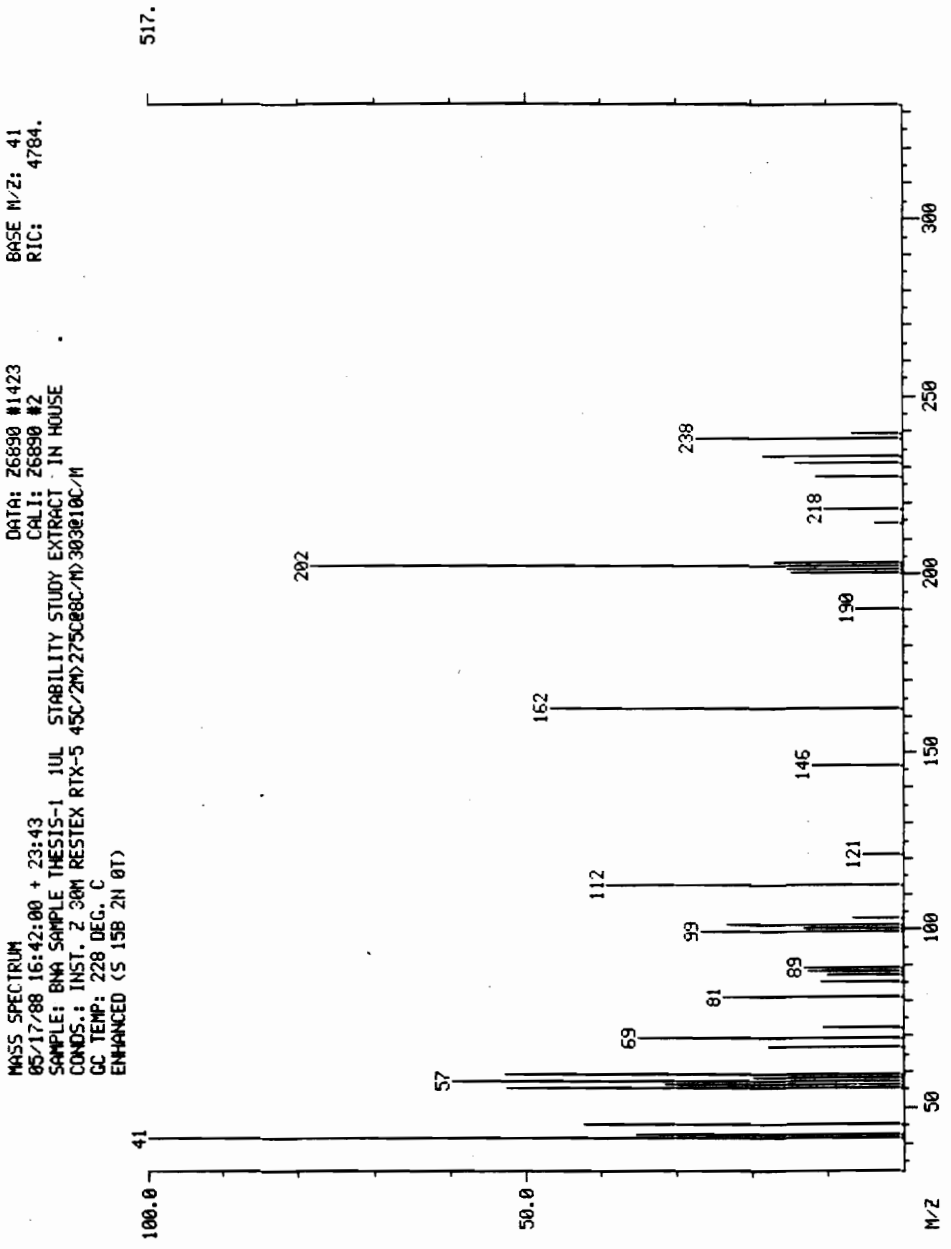

MASS SPECTRUM
05/17/88 13:20:00 + 17:02
SAMPLE: BNA STANDARD#12868 1UL 50NG BNA-HSL'S .JK.Z
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2MD275C@8C/MD303@10C/M
GC TEMP: 174 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: Z6887 #1022
CALI: Z6887 #2
BASE M/Z: 149
RIC: 87808.
19968.
100.0
50.0
M/Z
149
204
222
177
169
141
77
65
51
39
45
84
93
99
105
115
121
132
50
100
150
200
250
300

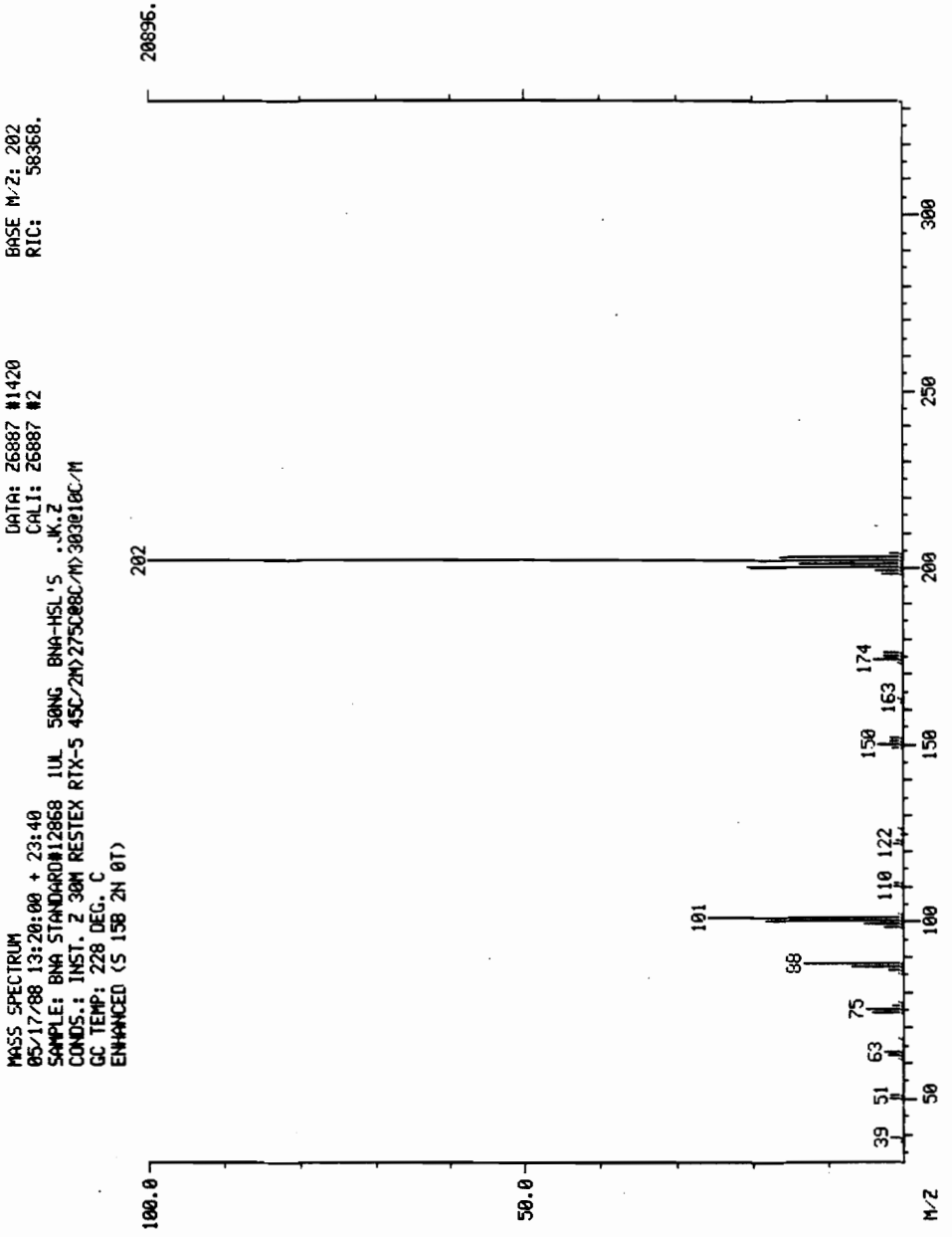

MASS SPECTRUM
05/17/88 16:42:00 + 19:56
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. 2 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 198 DEG. C
DATA: 26890 #1196
CAL1: 26890 #2
BASE M/Z: 43
RIC: 143360.
17792.
100.0
50.0
M/Z
43.2
55.1
63.1
81.1
109.2
121.2
151.2
178.2
191.2
50
100
150
200
250
300

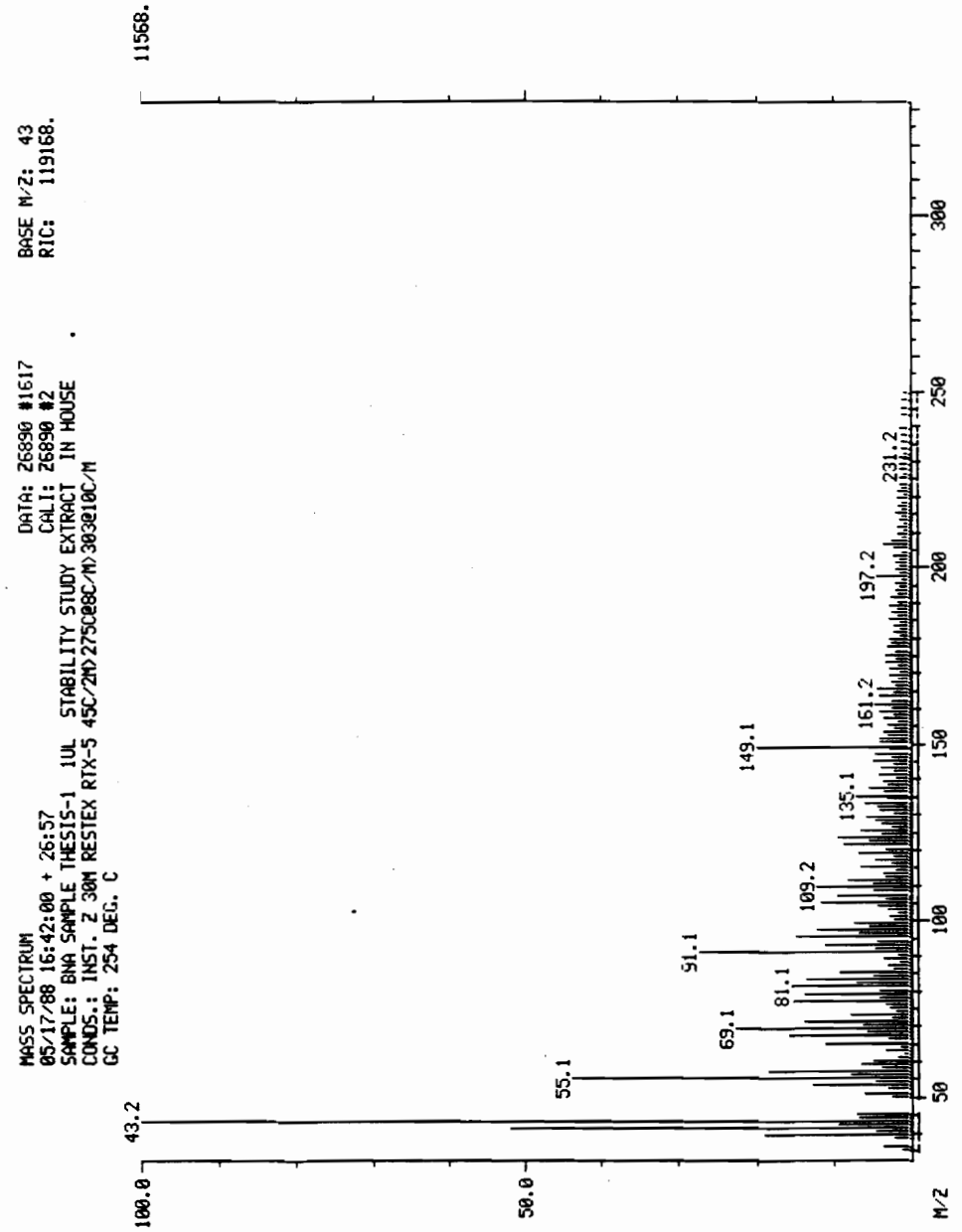

MASS SPECTRUM
05/17/88 16:42:00 + 19:56
SAMPLE: BHA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 198 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: 26890 #1196
CALI: 26890 #2
BASE M/Z: 43
RIC: 16704.
2520.
100.0
50.0
M/Z
43
57
71
65
76
97
125
140
152
178
200
217
50
100
150
200
250
300


MASS SPECTRUM
05/17/88 13:20:00 + 19:54
SAMPLE: BNA STANDARD#12868 1UL 50NG BNA-HSL'S .JK.Z
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M)275C@8C/M)303@10C/M
GC TEMP: 198 DEG. C
ENHANCED (S 158 2N 0T)
DATA: Z6887 #1194
CALI: Z6887 #2
BASE M/Z: 178
RIC: 72192.
25200.
100.0
50.0
M/Z
178
152
163
89
76
63
51
39
98
113
126
139
50
100
150
200
250
300


MASS SPECTRUM
05/17/00 16:42:00 + 23:43
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275@8C/M>303@10C/M
GC TEMP: 228 DEG. C
DATA: 26890 #1423
CALI: 26890 #2
BASE M/Z: 43
RIC: 125312.
14624.
100.0
50.0
M/Z
43.2
55.1
69.1
81.1
109.1
123.2
149.2
177.2
202.2
238.2
50
100
150
200
250
300


MASS SPECTRUM
05/17/88 16:42:00 + 23:43
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 228 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: 26890 #1423
CAL: 26890 #2
BASE M/Z: 41
RIC: 4784.
517.
100.0
50.0
M/Z
41
57
69
81
89
99
112
121
146
152
190
202
218
238
50
100
150
200
250
300


MASS SPECTRUM
05/17/88 13:20:00 + 23:40
SAMPLE: BNA STANDARD#12868 1UL 50NG BNA-HSL'S ..JK.2
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 228 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: Z6887 #1420
CALI: Z6887 #2
BASE M/Z: 202
RIC: 58368.
20896.
100.0
50.0
M/Z
202
101
88
75
63
51
39
110
122
150
163
174
50
100
150
200
250
300


MASS SPECTRUM
05/17/88 16:42:00 + 26:57
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M)275C@8C/M)303@10C/M
GC TEMP: 254 DEG. C
DATA: 26890 #1617
CALI: 26890 #2
BASE M/Z: 43
RIC: 119168.
11568.
100.0
50.0
M/Z
43.2
55.1
69.1
81.1
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109.2
135.1
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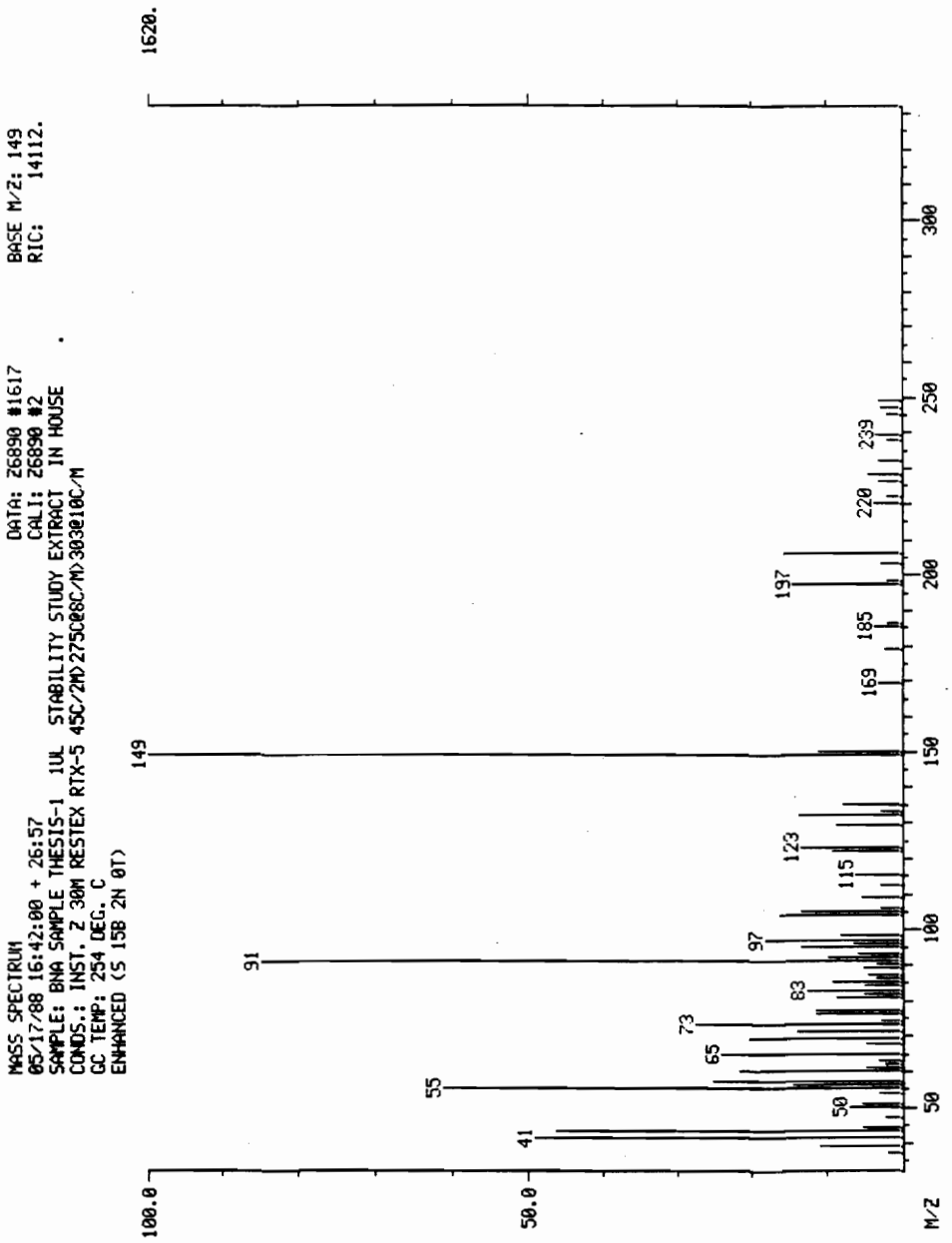
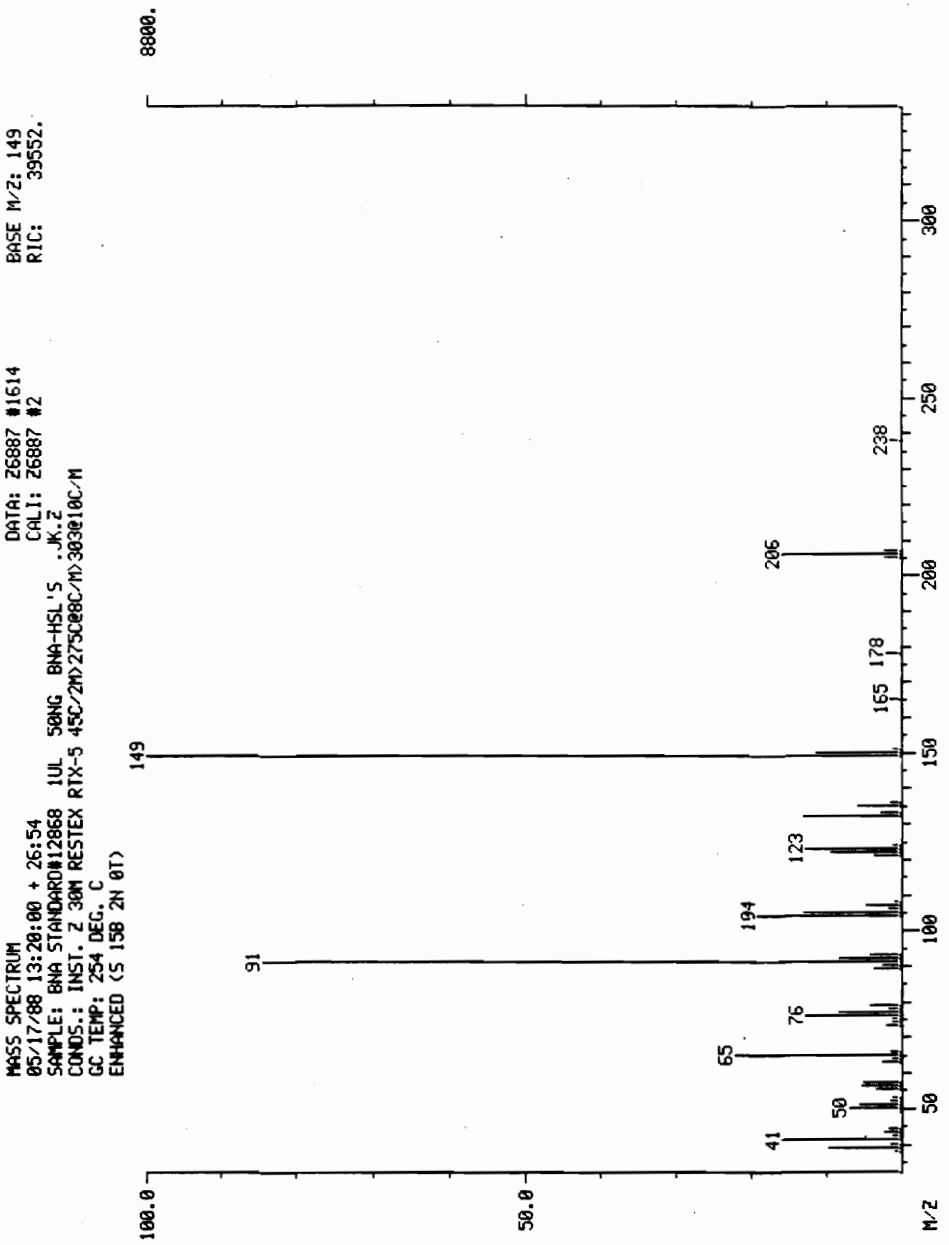
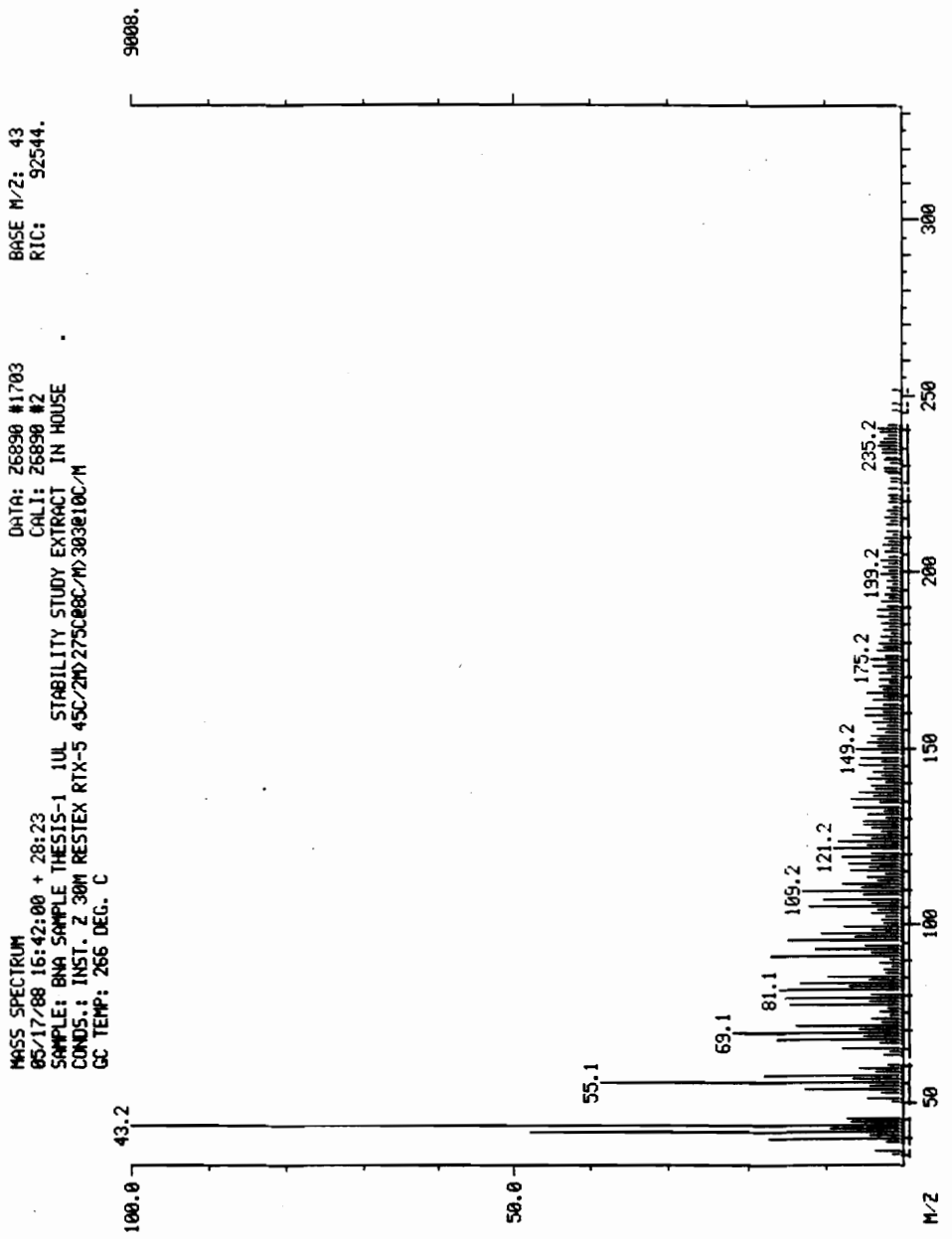
161.2
197.2
231.2
50
100
150
200
250
300


MASS SPECTRUM
05/17/88 16:42:00 + 26:57
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2MD/275@8C/MD/303@10C/M
GC TEMP: 254 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: 26890 #1617
CALI: 26890 #2
BASE M/Z: 149
RIC: 14112.
1620.
100.0
50.0
M/Z
149
91
55
41
50
65
73
83
97
115
123
169
185
197
220
239
50
100
150
200
250
300


MASS SPECTRUM
05/17/88 13:20:00 + 26:54
SAMPLE: BNA STANDARD#12868 1UL 50NG BNA-HSL'S ..JK.Z
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 254 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: Z6887 #1614
CALI: Z6887 #2
BASE M/Z: 149
RIC: 39552.
8800.
100.0
50.0
M/Z
149
91
65
41
50
76
194
123
165
178
206
238
50
100
150
200
250
300


MASS SPECTRUM
05/17/88 16:42:00 + 28:23
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 266 DEG. C
DATA: 26890 #1703
CALI: 26890 #2
BASE M/Z: 43
RIC: 92544.
9008.
100.0
50.0
43.2
55.1
69.1
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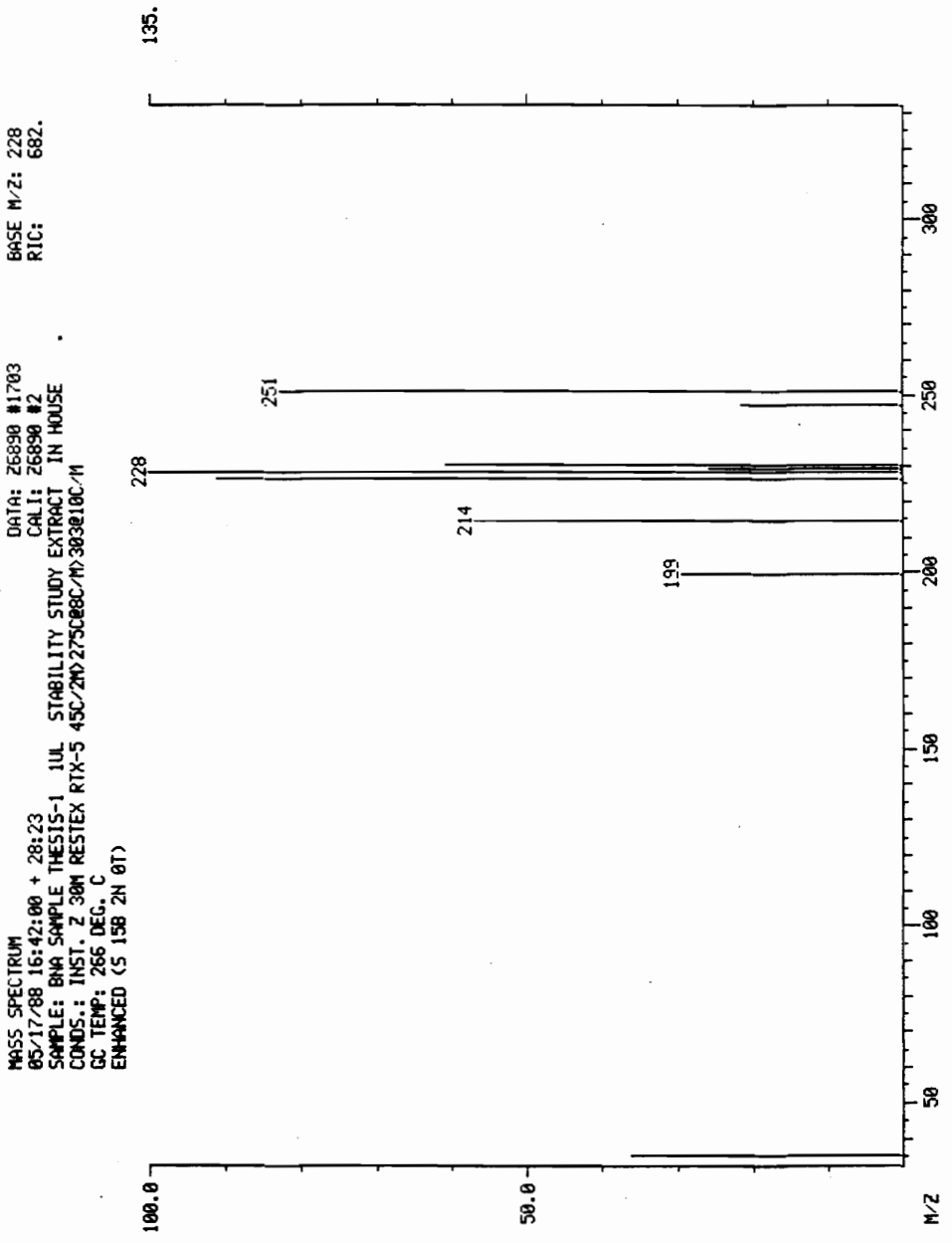
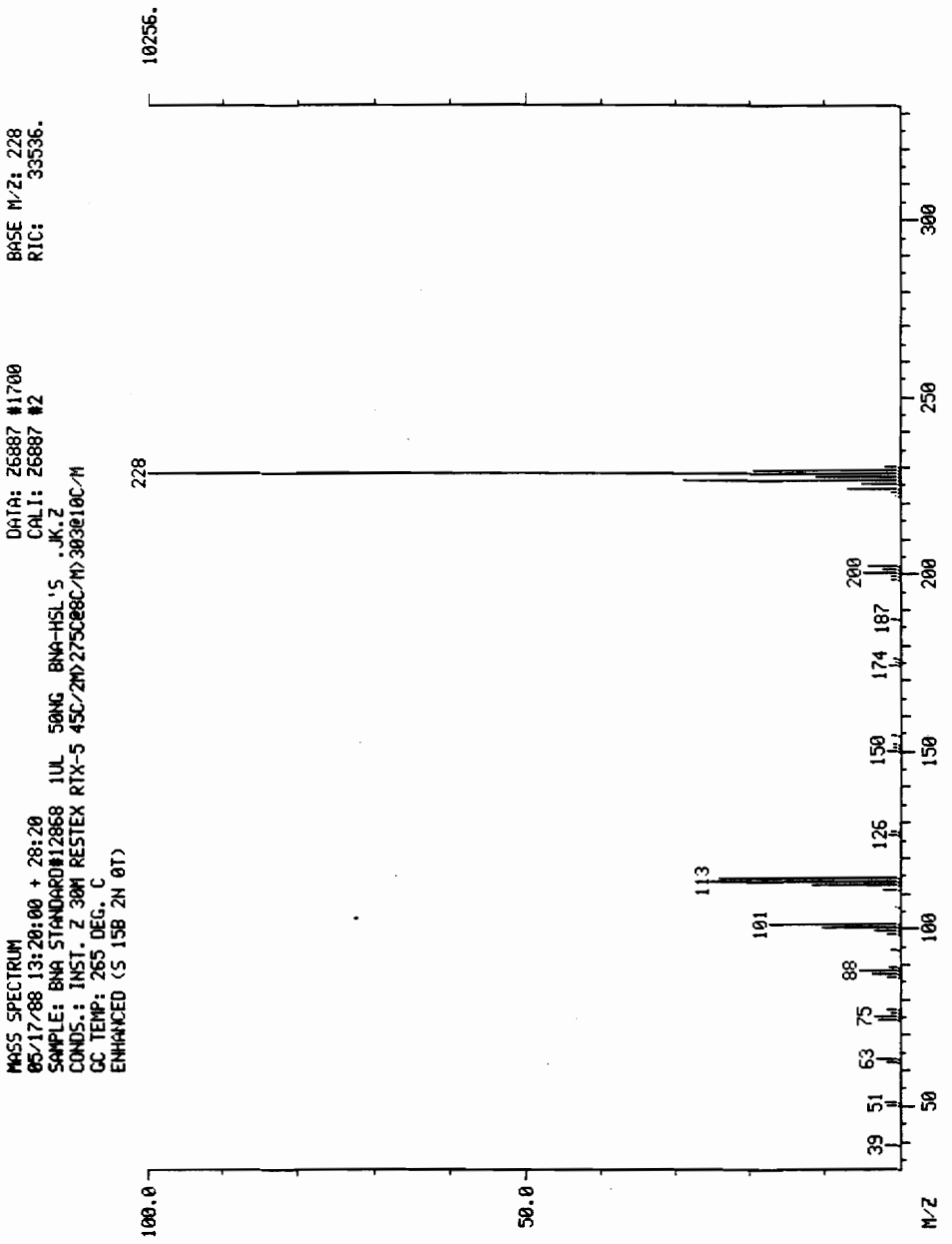
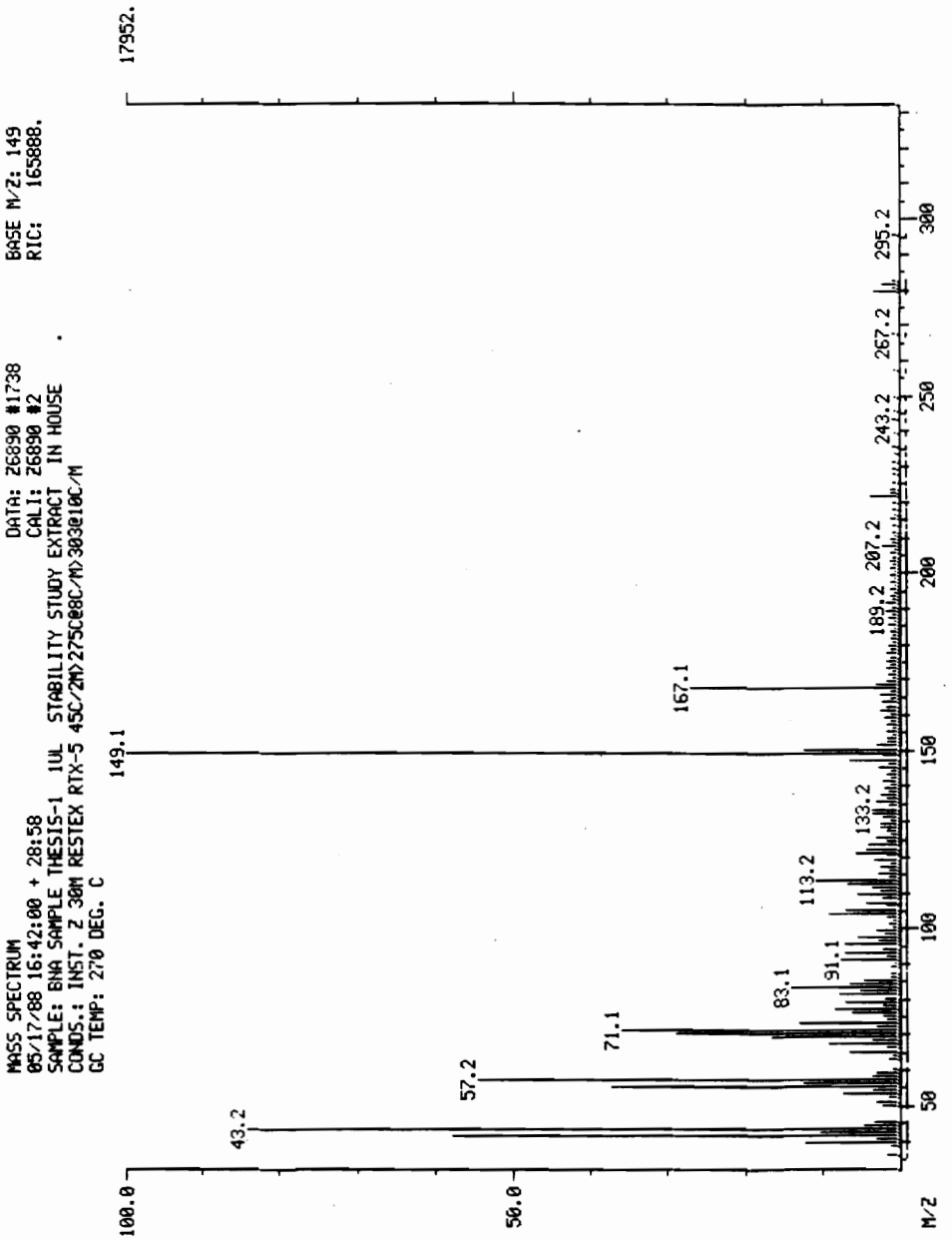
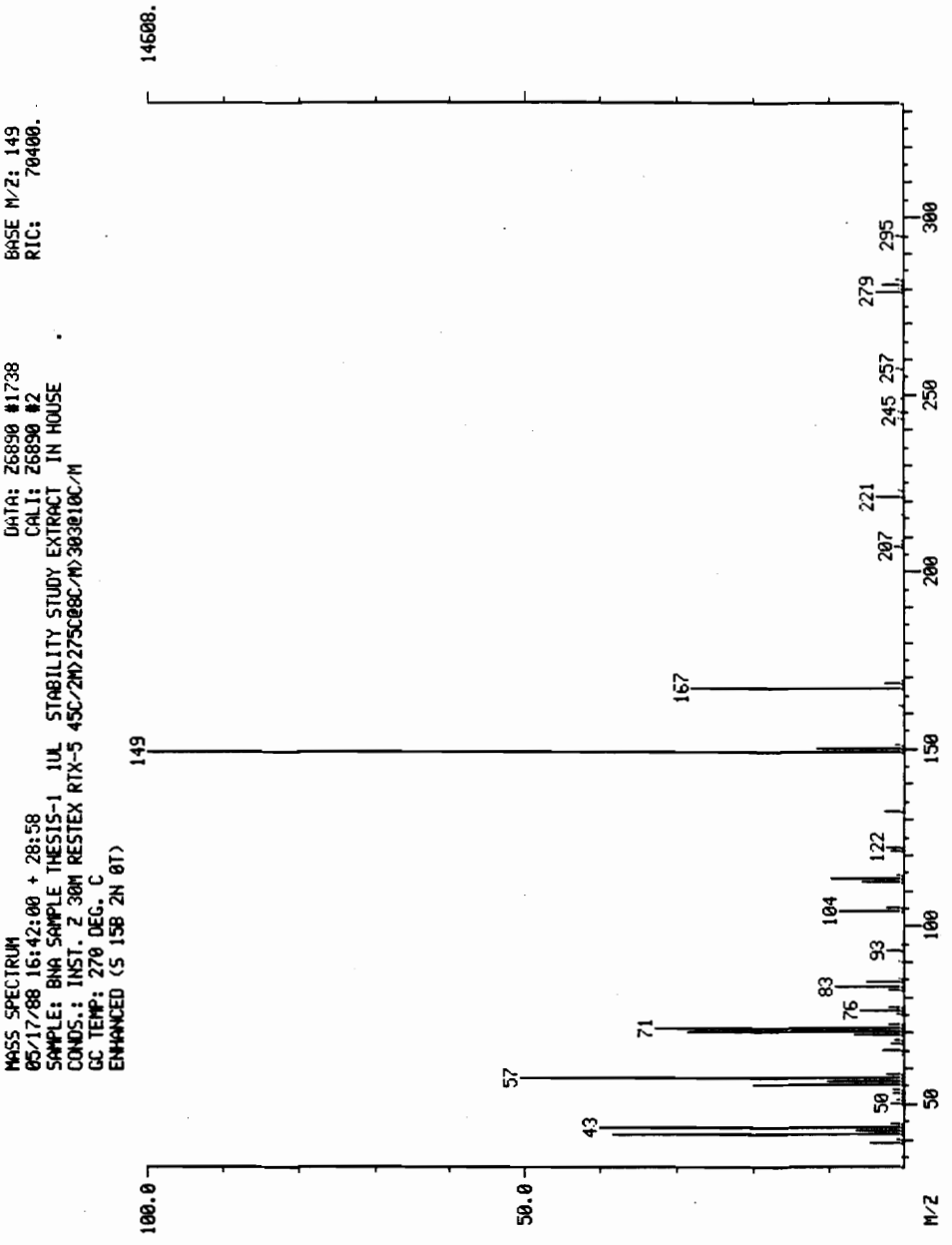
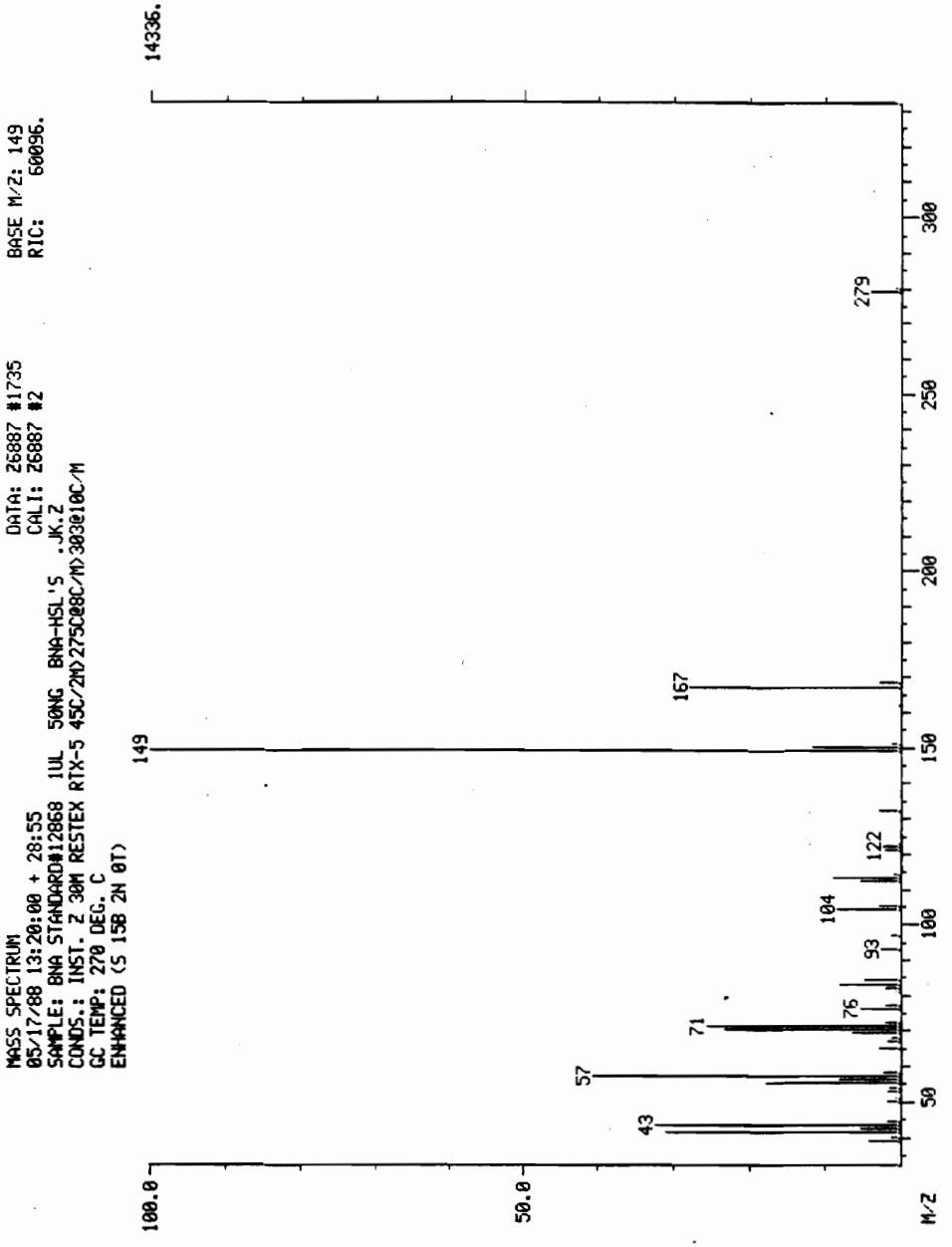
193.2
235.2
50
100
150
200
250
300
M/Z

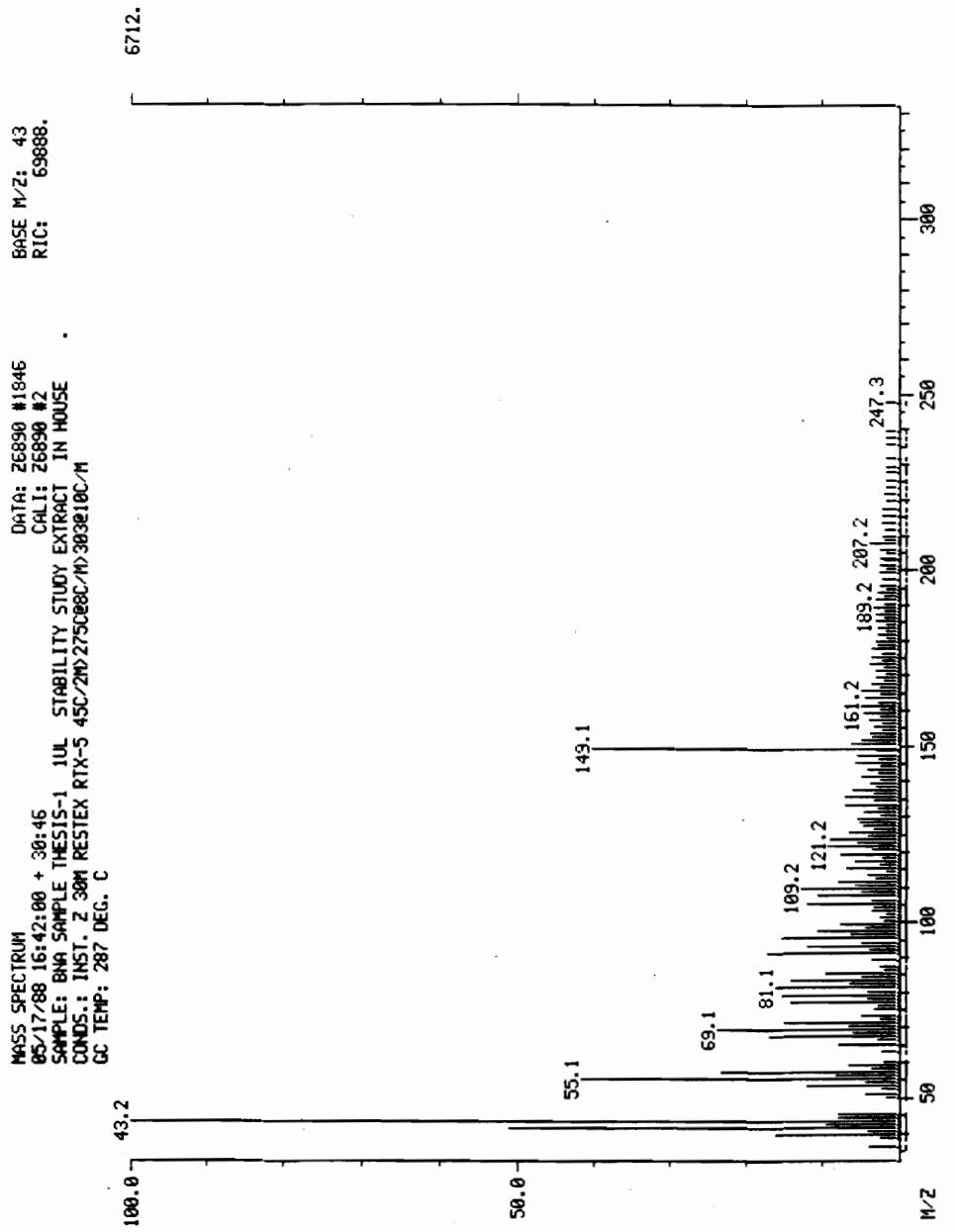

MASS SPECTRUM
05/17/88 16:42:00 + 28:23
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 266 DEG. C
ENHANCED (5 15@ 2N 0T)
DATA: 26890 #1703
CAL: 26890 #2
BASE M/Z: 228
RIC: 682.
135.
228
251
214
199
100.0
50.0
50
100
150
200
250
300
M/Z

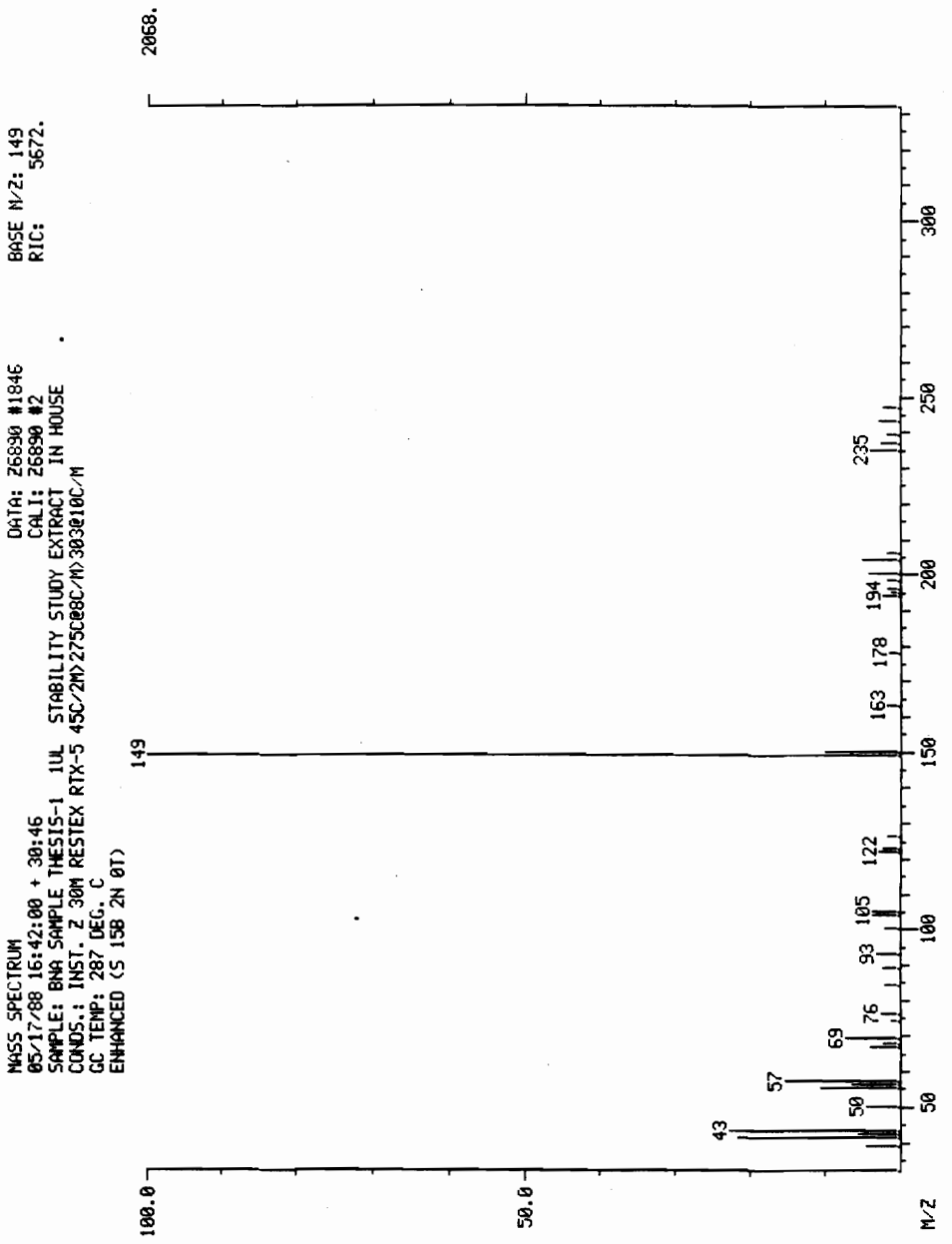

MASS SPECTRUM
05/17/88 13:20:00 + 28:20
SAMPLE: BNA STANDARD#12868 1UL 50NG BNA-HSL'S ..JK.Z
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M)275C@8C/M)303@10C/M
GC TEMP: 265 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: Z6887 #1700
CALI: Z6887 #2
BASE M/Z: 228
RIC: 33536.
10256.
100.0
50.0
M/Z
228
113
101
88
75
63
51
39
126
150
174
187
200
50
100
150
200
250
300

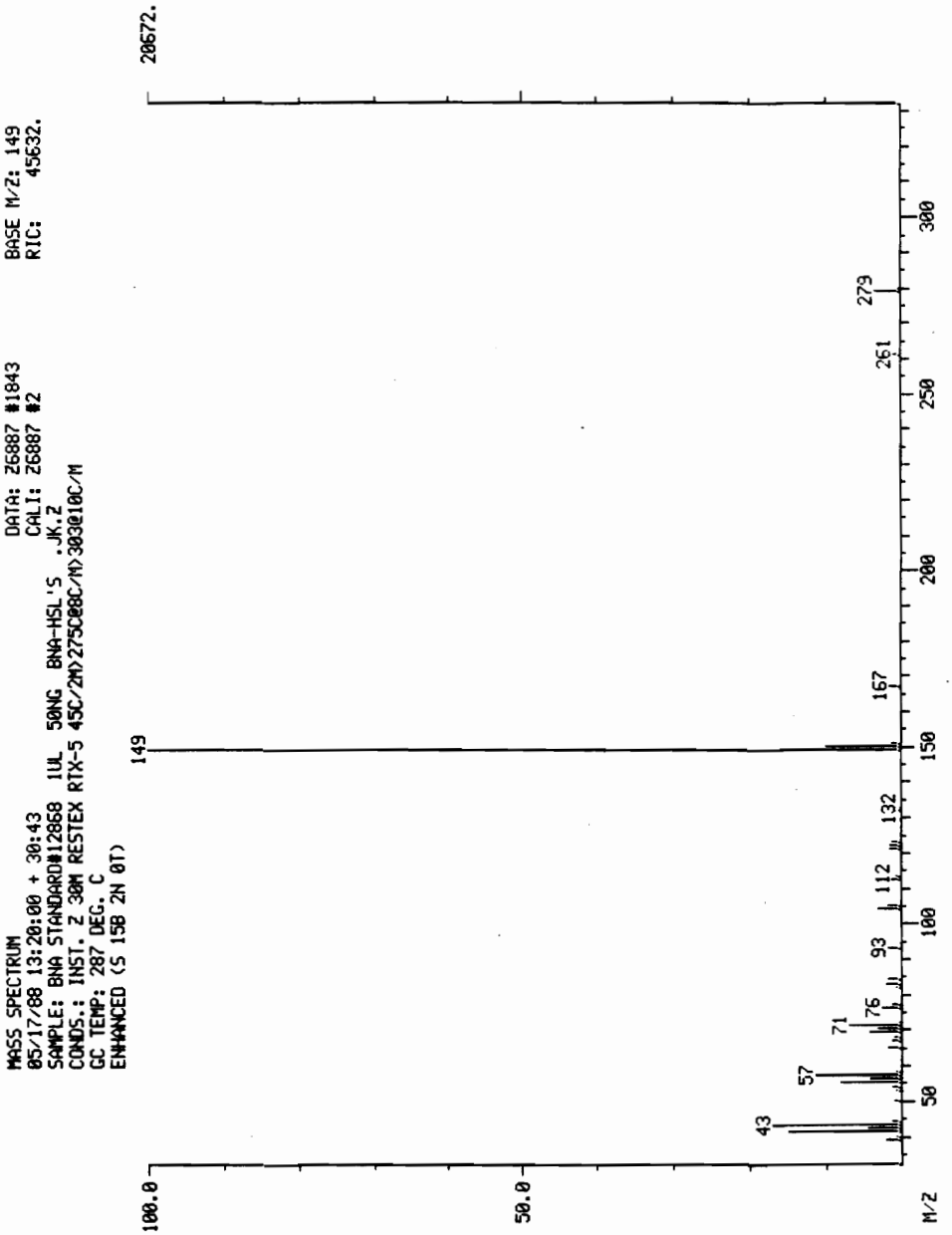

MASS SPECTRUM
05/17/88 16:42:00 + 28:58
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275C@8C/M>303@10C/M
GC TEMP: 270 DEG. C
DATA: Z6890 #1738
CALI: Z6890 #2
BASE M/Z: 149
RIC: 165888.
17952.
100.0
50.0
M/Z
43.2
57.2
71.1
83.1
91.1
113.2
133.2
149.1
167.1
189.2
207.2
243.2
267.2
295.2
50
100
150
200
250
300


MASS SPECTRUM
05/17/88 16:42:00 + 28:58
SAMPLE: BHA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2MN275C@8C/MN303@10C/M
GC TEMP: 270 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: 26890 #1738
CAL1: 26890 #2
BASE M/Z: 149
RIC: 70400.
14608.
100.0
50.0
M/Z
149
167
57
43
71
50
76
83
93
104
122
207
221
245
257
279
295


MASS SPECTRUM
05/17/88 13:20:00 + 28:55
SAMPLE: BNA STANDARD#12868 1UL 50NG BNA-HSL'S ..JK.Z
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2MD275C@8C/MD303@10C/M
GC TEMP: 270 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: 26887 #1735
CALI: 26887 #2
BASE M/Z: 149
RIC: 60096.
14336.
100.0
50.0
M/Z
149
167
279
57
43
71
76
93
104
122
50
100
150
200
250
300


MASS SPECTRUM
05/17/88 16:42:00 + 30:46
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M>275@8C/M>303@10C/M
GC TEMP: 287 DEG. C
DATA: 26890 #1946
CALI: 26890 #2
BASE M/Z: 43
RIC: 69888.
6712.
100.0
50.0
M/Z
43.2
55.1
69.1
81.1
109.2
121.2
143.1
161.2
189.2
207.2
247.3
50
100
150
200
250
300


MASS SPECTRUM
05/17/88 16:42:00 + 30:46
SAMPLE: BNA SAMPLE THESIS-1 1UL STABILITY STUDY EXTRACT IN HOUSE
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M\275C@8C/M\303@10C/M
GC TEMP: 287 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: Z6890 #1846
CALI: Z6890 #2
BASE M/Z: 149
RIC: 5672.
2068.
100.0
50.0
M/Z
149
43
57
69
76
93
105
122
163
178
194
235
50
100
150
200
250
300


MASS SPECTRUM
05/17/88 13:20:00 + 30:43
SAMPLE: BNA STANDARD#12868 1UL 50NG BNA-HSL'S .JK.Z
CONDS.: INST. Z 30M RESTEX RTX-5 45C/2M)275C@8C/M)303@10C/M
GC TEMP: 287 DEG. C
ENHANCED (S 15B 2N 0T)
DATA: Z6887 #1843
CALI: Z6887 #2
BASE M/Z: 149
RIC: 45632.
20672.
100.0
50.0
M/Z
149
167
279
261
43
57
71
76
93
112
132
50
100
150
200
250
300

Quantitation Report File: Z7114

Data: Z7114 TI
06/20/88 20:04:00
Sample: _____
Conds: INST Z 30M RESTEX RTX-5 45C/2M>275@8C/M>302@10C/M
Formula: E Instrument: 5100 Weight: 0.016
Submitted by: VERSAR Analyst: BLCK Acct. No.: _____

AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac from Library Entry

No	Name
1	C130 1,4-DICHLOROBENZENE-D4 **INT. STD. #1**
2	C330 2-CHLOROPHENOL
3	C315 PHENOL
4	C325 BIS (2-CHLOROETHYL) ETHER
5	C335 1,3-DICHLOROBENZENE
6	C340 1,4-DICHLOROBENZENE
7	C350 1,2-DICHLOROBENZENE
8	C345 BENZYL ALCOHOL
9	C360 BIS (2-CHLOROISOPROPYL) ETHER
10	C355 2-METHYLPHENOL
11	C375 HEXACHLOROETHANE
12	C365 4-METHYLPHENOL
13	C370 N-NITROSO-DI-N-PROPYLAMINE
14	C140 NAPHTHALENE-D8**INT. STD. #2**
15	C410 NITROBENZENE
16	C415 ISOPHORONE
17	C420 2-NITROPHENOL
18	C425 2,4-DIMETHYLPHENOL
19	C435 BIS (2-CHLOROETHOXY) METHANE
20	C440 2,4-DICHLOROPHENOL
21	C445 1,2,4-TRICHLOROBENZENE
22	C450 NAPHTHALENE
23	C430 BENZOIC ACID
24	C455 4-CHLOROANILINE
25	C460 HEXACHLOROBUTADIENE
26	C465 4-CHLORO-3-METHYLPHENOL
27	C470 2-METHYLNAPHTHALENE
28	C150 ACENAPHTHALENE-D10**INT. STD. #3**
29	C510 HEXACHLOROCYCLOPENTADIENE
30	C515 2,4,6-TRICHLOROPHENOL
31	C520 2,4,5-TRICHLOROPHENOL
32	C525 2-CHLORONAPHTHALENE
33	C530 2-NITROANILINE
34	C540 ACENAPHTHYLENE
35	C535 DIMETHYL PHTHALATE
36	C575 2,6-DINITROTOLUENE
37	C550 ACENAPHTHENE
38	C545 3-NITROANILINE
39	C555 2,4-DINITROPHENOL
40	C565 DIBENZOFURAN
41	C560 4-NITROPHENOL
42	C570 2,4-DINITROTOLUENE
43	C590 FLUORENE
44	C585 4-CHLOROPHENYL-PHENYLETHER
45	C580 DIETHYLPHTHALATE
46	C595 4-NITROANILINE
47	C610 4,6-DINITRO-2-METHYLPHENOL

No	Name
48	C615 N-NITROSODIPHENYLAMINE
49	C625 4-BROMOPHENYL-PHENYLETHER
50	C630 HEXACHLOROBENZENE

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
1	152	619	10:19	1	1.000	A BB	30483.	40.000	NG/UL	14.05
2	128	590	9:50	1	0.953	A BB	700.	0.721	NG	0.25
3	NOT FOUND									
4	NOT FOUND									
5	NOT FOUND									
6	146	622	10:22	1	1.005	A BB	401.	0.338	NG	0.12
7	146	653	10:53	1	1.055	A BB	244	0.205	NG	0.07
8	108	649	10:49	1	1.048	A BB	3179.	5.698	NG	2.00
9	NOT FOUND									
10	108	672	11:12	1	1.086	A BB	254.	0.272	NG	0.10
11	117	707	11:47	1	1.142	A BB	960.	1.503	NG	0.53
12	NOT FOUND									
13	70	689	11:29	1	1.113	A BB	462.	0.426	NG	0.15
14	136	847	14:07	14	1.000	A BB	91342.	40.000	NG/UL	14.05
15	NOT FOUND									
16	82	767	12:47	14	0.906	A VB	3058.	1.180	NG	0.41
17	139	781	13:01	14	0.922	A BB	281.	0.541	NG	0.19
18	NOT FOUND									
19	NOT FOUND									
20	162	824	13:44	14	0.973	A BB	334.	0.406	NG	0.14
21	NOT FOUND									
22	128	850	14:10	14	1.004	A BB	3616.	1.288	NG	0.45
23	NOT FOUND									
24	NOT FOUND									
25	NOT FOUND									
26	NOT FOUND									
27	142	981	16:21	14	1.158	A BB	1999.	1.090	NG	0.38
28	164	1184	19:44	28	1.000	A BB	49117.	40.000	NG/UL	14.05
29	237	1025	17:05	28	0.866	A BB	4250.	7.955	NG	2.80
30	196	1041	17:21	28	0.879	A BB	802.	1.569	NG	0.55
31	NOT FOUND									
32	NOT FOUND									
33	NOT FOUND									
34	152	1156	19:16	28	0.976	A BB	758.	0.293	NG	0.10
35	163	1145	19:05	28	0.967	A BB	1997.	1.014	NG	0.36
36	NOT FOUND									
37	153	1190	19:50	28	1.005	A BV	815.	0.459	NG	0.16
38	NOT FOUND									
39	NOT FOUND									
40	168	1221	20:21	28	1.031	A BB	1060.	0.421	NG	0.15
41	65	1221	20:21	28	1.031	A BB	294.	0.561	NG*	0.20
42	NOT FOUND									
43	166	1288	21:28	28	1.088	A BB	727.	0.380	NG	0.13
44	NOT FOUND									
45	149	1283	21:23	28	1.084	A BB	3362.	1.581	NG	0.56
46	NOT FOUND									
47	NOT FOUND									
48	169	1315	21:55	28	1.111	A BB	1338.	1.245	NG	0.44
49	NOT FOUND									
50	NOT FOUND									

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R Fac	R Fac(L)	Ratio
1	10:15	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
2	9:45	1.01	0.950	1.00	0.72	50.00	0.018	1.273	0.01
3	9:27		0.920						
4	9:40		0.942						
5	10:10		0.990						
6	10:19	1.00	1.005	1.00	0.34	50.00	0.011	1.558	0.01
7	10:50	1.00	1.055	1.00	0.21	50.00	0.006	1.560	0.00
8	10:44	1.01	1.045	1.00	5.70	50.00	0.083	0.732	0.11
9	11:13		1.093						
10	11:08	1.01	1.084	1.00	0.27	50.00	0.007	1.227	0.01
11	11:44	1.00	1.143	1.00	1.50	50.00	0.025	0.838	0.03
12	11:32		1.123						
13	11:37	0.99	1.131	0.98	0.43	50.00	0.012	1.425	0.01
14	14:04	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
15	12:00		0.853						
16	12:43	1.01	0.904	1.00	1.18	50.00	0.027	1.135	0.02
17	12:58	1.00	0.922	1.00	0.54	50.00	0.002	0.228	0.01
18	13:09		0.935						
19	13:28		0.957						
20	13:41	1.00	0.973	1.00	0.41	50.00	0.003	0.361	0.01
21	13:57		0.992						
22	14:08	1.00	1.005	1.00	1.29	50.00	0.032	1.229	0.03
23	13:30		0.960						
24	14:23		1.023						
25	14:44		1.047						
26	15:57		1.134						
27	16:19	1.00	1.159	1.00	1.09	50.00	0.018	0.803	0.02
28	19:42	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
29	17:03	1.00	0.865	1.00	7.96	50.00	0.069	0.435	0.16
30	17:19	1.00	0.879	1.00	1.57	50.00	0.013	0.416	0.03
31	17:24		0.883						
32	17:50		0.905						
33	18:18		0.929						
34	19:11	1.00	0.974	1.00	0.29	50.00	0.012	2.110	0.01
35	19:03	1.00	0.967	1.00	1.01	50.00	0.033	1.603	0.02
36	19:14		0.976						
37	19:49	1.00	1.005	1.00	0.46	50.00	0.013	1.445	0.01
38	19:39		0.997						
39	19:58		1.014						
40	20:19	1.00	1.031	1.00	0.42	50.00	0.017	2.050	0.01
41	20:13	1.01	1.026	1.00	0.56	50.00	0.005	0.427	0.01
42	20:29		1.040						
43	21:26	1.00	1.088	1.00	0.38	50.00	0.012	1.557	0.01
44	21:29		1.091						
45	21:21	1.00	1.084	1.00	1.58	50.00	0.055	1.732	0.03
46	21:39		1.099						
47	21:47		1.106						
48	21:53	1.00	1.111	1.00	1.24	50.00	0.022	0.875	0.02
49	23:03		1.170						
50	23:29		1.192						

Quantitation Report File: Z7114

Data: Z7114.TI
06/20/98 20:04:00
Sample: _____
Conds: INST.Z 30M RESTEX RTX-5 45C/2M>275@8C/M>302@10C/M
Formula: E Instrument: 5100 Weight: 0.016
Submitted by: VERSAR Analyst: BLCK Acct. No.: _____

AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. Fac. from Library Entry

No	Name
51	C160 PHENANTHRENE-D10**INT. STD. #4**
52	C635 PENTACHLOROPHENOL
53	C640 PHENANTHRENE
54	C645 ANTHRACENE
55	C650 DI-N-BUTYLPHTHALATE
56	C655 FLUORANTHENE
57	C715 PYRENE
58	C170 CHRYSENE-D12**INT. STD. #5**
59	C720 BUTYLBENZYLPHTHALATE
60	C730 BENZO(A)ANTHRACENE
61	C740 CHRYSENE
62	C725 3,3'-DICHLOROBENZIDINE
63	C735 BIS (2-ETHYLHEXYL) PHTHALATE
64	C175 PERYLENE-D12**INT. STD. #6**
65	C760 DI-N-OCTYL PHTHALATE
66	C765 BENZO(B)FLUORANTHENE
67	C770 BENZO(K)FLUORANTHENE
68	C775 BENZO(A)PYRENE
69	C780 INDENO(1,2,3-CD)PYRENE
70	C785 DIBENZ(A,H)ANTHRACENE
71	C790 BENZO(G,H,I)PERYLENE

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
51	188	1469	24:29	51	1.000	A BV	76720.	40.000	NG/UL	14.05
52	NOT FOUND									
53	178	1473	24:33	51	1.003	A VB	2906.	1.435	NG	0.50
54	178	1473	24:33	51	1.003	A VB	2906.	1.416	NG	0.50
55	149	1600	26:40	51	1.089	A BB	17110.	6.301	NG	2.21
56	202	1707	28:27	51	1.162	A BB	545.	0.278	NG	0.10
57	202	1750	29:10	51	1.191	A BB	269.	0.141	NG	0.05
58	240	1985	33:05	58	1.000	A BB	17036.	40.000	NG/UL	14.05
59	149	1891	31:31	58	0.953	A BB	1731.	2.111	NG	0.74
60	NOT FOUND									
61	228	1990	33:10	58	1.003	A BB	179.	0.259	NG	0.09
62	NOT FOUND									
63	149	2003	33:23	58	1.009	A BB	4791.	3.502	NG	1.23
64	264	2291	38:11	64	1.000	A BB	16985.	40.000	NG/UL	14.05
65	149	2116	35:16	64	0.924	A BB	180.	0.094	NG	0.03
66	NOT FOUND									
67	NOT FOUND									
68	NOT FOUND									
69	NOT FOUND									
70	NOT FOUND									
71	NOT FOUND									

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R.Fac	R.Fac(L)	Ratio
51	24:27	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
52	24:04		0.984						
53	24:32	1.00	1.003	1.00	1.44	50.00	0.030	1.056	0.03
54	24:41	0.99	1.010	0.99	1.42	50.00	0.030	1.070	0.03
55	26:39	1.00	1.090	1.00	6.30	50.00	0.178	1.416	0.13
56	28:26	1.00	1.163	1.00	0.28	50.00	0.006	1.023	0.01
57	29:09	1.00	1.192	1.00	0.14	50.00	0.003	0.993	0.00
58	33:04	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
59	31:00	1.00	0.953	1.00	2.11	50.00	0.081	1.926	0.04
60	33:01		0.998						
61	33:09	1.00	1.003	1.00	0.26	50.00	0.008	1.626	0.01
62	33:00		0.998						
63	33:22	1.00	1.009	1.00	3.50	50.00	0.225	3.213	0.07
64	38:09	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
65	35:14	1.00	0.924	1.00	0.09	50.00	0.008	4.507	0.00
66	36:34		0.958						
67	36:40		0.961						
68	37:55		0.994						
69	44:02		1.154						
70	44:11		1.158						
71	45:47		1.200						

Quantitation Report File: THESIS2

Data: THESIS2.TI
09/08/88 7:41:00
Sample: JK EXTRACT #2 9/2/88-9/6/88 100ML/MIN .Z
Conds.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
Formula: Instrument: Z Weight: 0.004
Submitted by: VERSAR Analyst: BLCK Acct. No.: _____

AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac. from Library Entry

No	Name
1	CI30 1,4-DICHLOROBENZENE-D4 **INT. STD. #1**
2	C330 2-CHLOROPHENOL
3	C315 PHENOL
4	C325 BIS (2-CHLOROETHYL) ETHER
5	C335 1,3-DICHLOROBENZENE
6	C340 1,4-DICHLOROBENZENE
7	C350 1,2-DICHLOROBENZENE
8	C345 BENZYL ALCOHOL
9	C360 BIS (2-CHLOROISOPROPYL) ETHER
10	C355 2-METHYLPHENOL
11	C375 HEXACHLOROETHANE
12	C365 4-METHYLPHENOL
13	C370 N-NITROSO-DI-N-PROPYLAMINE
14	CI40 NAPHTHALENE-D8**INT. STD. #2**
15	C410 NITROBENZENE
16	C415 ISOPHORONE
17	C420 2-NITROPHENOL
18	C425 2,4-DIMETHYLPHENOL
19	C435 BIS (2-CHLOROETHOXY) METHANE
20	C440 2,4-DICHLOROPHENOL
21	C445 1,2,4-TRICHLOROBENZENE
22	C450 NAPHTHALENE
23	C430 BENZOIC ACID
24	C455 4-CHLOROANILINE
25	C460 HEXACHLOROBUTADIENE
26	C465 4-CHLORO-3-METHYLPHENOL
27	C470 2-METHYLNAPHTHALENE
28	CI50 ACENAPHTHALENE-D10**INT. STD. #3**
29	C510 HEXACHLOROCYCLOPENTADIENE
30	C515 2,4,6-TRICHLOROPHENOL
31	C520 2,4,5-TRICHLOROPHENOL
32	C525 2-CHLORONAPHTHALENE
33	C530 2-NITROANILINE
34	C540 ACENAPHTHYLENE
35	C535 DIMETHYL PHTHALATE
36	C575 2,6-DINITROTOLUENE
37	C550 ACENAPHTHENE
38	C545 3-NITROANILINE
39	C555 2,4-DINITROPHENOL
40	C565 DIBENZOFURAN
41	C560 4-NITROPHENOL
42	C570 2,4-DINITROTOLUENE
43	C590 FLUORENE
44	C585 4-CHLOROPHENYL-PHENYLETHER
45	C580 DIETHYLPHTHALATE
46	C595 4-NITROANILINE
47	C610 4,6-DINITRO-2-METHYLPHENOL

No	Name
48	C615 N-NITROSODIPHENYLAMINE
49	C625 4-BROMOPHENYL-PHENYLETHER
50	C630 HEXACHLOROBENZENE

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
1	152	429	7:09	1	1.000	A BB	61562.	40.000	NG/UI	11.79
2	128	405	6:45	1	0.944	A BB	2273.	1.095	NG	0.32
3	NOT FOUND									
4	NOT FOUND									
5	146	424	7:04	1	0.988	A BB	194.	0.084	NG	0.02
6	146	431	7:11	1	1.005	A BB	1115.	0.463	NG	0.14
7	NOT FOUND									
8	108	458	7:38	1	1.068	A BB	9398.	7.685	NG	2.27
9	45	471	7:51	1	1.098	A BB	1797.	0.507	NG	0.15
10	108	476	7:56	1	1.110	A BB	259.	0.134	NG	0.04
11	117	507	8:27	1	1.182	A BB	9611.	7.271	NG	2.14
12	NOT FOUND									
13	NOT FOUND									
14	136	635	10:35	14	1.000	A BB	168429.	40.000	NG/UI	11.79
15	NOT FOUND									
16	NOT FOUND									
17	NOT FOUND									
18	107	588	9:48	14	0.926	A BB	607.	0.280	NG	0.08
19	93	607	10:07	14	0.956	A BV	924.	0.338	NG	0.10
20	NOT FOUND									
21	180	629	10:29	14	0.991	A BB	155.	0.092	NG	0.03
22	128	638	10:38	14	1.005	A VV	17918.	3.223	NG	0.95
23	122	613	10:13	14	0.965	A BB	995.	0.857	NG#	0.25
24	NOT FOUND									
25	225	673	11:13	14	1.060	A BB	1074.	1.204	NG	0.35
26	NOT FOUND									
27	142	753	12:33	14	1.186	A BV	806.	0.240	NG	0.07
28	164	956	15:56	28	1.000	A BB	80028.	40.000	NG/UI	11.79
29	237	805	13:25	28	0.842	A BB	5465.	6.437	NG	1.90
30	NOT FOUND									
31	NOT FOUND									
32	NOT FOUND									
33	NOT FOUND									
34	152	926	15:26	28	0.969	A BB	403.	0.093	NG	0.03
35	163	923	15:23	28	0.965	A BB	5736.	1.646	NG	0.49
36	NOT FOUND									
37	153	961	16:01	28	1.005	A BV	3637.	1.258	NG	0.37
38	NOT FOUND									
39	NOT FOUND									
40	168	991	16:31	28	1.037	A VB	15958.	4.119	NG	1.21
41	NOT FOUND									
42	NOT FOUND									
43	166	1055	17:35	28	1.104	A VB	9987.	3.243	NG	0.96
44	204	1061	17:41	28	1.110	A VV	924.	0.649	NG	0.19
45	NOT FOUND									
46	NOT FOUND									
47	198	1079	17:59	28	1.129	A VV	303.	0.525	NG#	0.15
48	169	1085	18:05	28	1.135	A BB	4158.	3.095	NG	0.91
49	NOT FOUND									
50	NOT FOUND									

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R.Fac	R.Fac(L)	Ratio
1	7:07	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
2	6:42	1.01	0.941	1.00	1.10	50.00	0.030	1.348	0.02
3	6:27		0.906						
4	6:37		0.930						
5	7:02	1.00	0.988	1.00	0.08	50.00	0.003	1.493	0.00
6	7:10	1.00	1.007	1.00	0.46	50.00	0.014	1.565	0.01
7	7:37		1.070						
8	7:33	1.01	1.061	1.01	7.69	50.00	0.122	0.795	0.15
9	7:59	0.98	1.122	0.98	0.51	50.00	0.023	2.304	0.01
10	7:55	1.00	1.112	1.00	0.13	50.00	0.003	1.259	0.00
11	8:25	1.00	1.183	1.00	7.27	50.00	0.125	0.857	0.15
12	8:18		1.166						
13	8:21		1.173						
14	10:33	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
15	8:40		0.821						
16	9:19		0.883						
17	9:33		0.905						
18	9:45	1.01	0.924	1.00	0.28	50.00	0.003	0.514	0.01
19	10:02	1.01	0.951	1.01	0.34	50.00	0.004	0.647	0.01
20	10:13		0.968						
21	10:27	1.00	0.991	1.00	0.09	50.00	0.001	0.407	0.00
22	10:36	1.00	1.005	1.00	3.22	50.00	0.085	1.320	0.06
23	10:09	1.01	0.962	1.00	0.86	50.00	0.005	0.276	0.02
24	10:53		1.032						
25	11:11	1.00	1.060	1.00	1.20	50.00	0.005	0.212	0.02
26	12:24		1.175						
27	12:39	0.99	1.199	0.99	0.24	50.00	0.004	0.797	0.00
28	15:53	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
29	13:23	1.00	0.843	1.00	6.44	50.00	0.055	0.424	0.13
30	13:38		0.858						
31	13:44		0.865						
32	14:07		0.889						
33	14:35		0.918						
34	15:23	1.00	0.969	1.00	0.09	50.00	0.004	2.178	0.00
35	15:20	1.00	0.965	1.00	1.65	50.00	0.057	1.742	0.03
36	15:30		0.976						
37	15:59	1.00	1.006	1.00	1.26	50.00	0.036	1.445	0.03
38	15:53		1.000						
39	16:11		1.019						
40	16:29	1.00	1.038	1.00	4.12	50.00	0.160	1.207	0.08
41	16:30		1.039						
42	16:41		1.050						
43	17:33	1.00	1.105	1.00	3.24	50.00	0.100	1.589	0.06
44	17:38	1.00	1.110	1.00	0.65	50.00	0.009	0.712	0.01
45	17:34		1.106						
46	17:47		1.120						
47	17:55	1.00	1.128	1.00	0.52	50.00	0.003	0.789	0.01
48	18:02	1.00	1.135	1.00	3.10	50.00	0.042	0.671	0.06
49	19:08		1.205						
50	19:31		1.229						

Quantitation Report File: THESIS2

Data: THESIS2.TI
09/08/88 7:41:00
Sample: JK EXTRACT #2 9/2/88-9/6/88 100ML/MIN . Z
Conds.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
Formula: Instrument: Z Weight: 0.004
Submitted by: VERSAR Analyst: BLCK Acct. No.: _____

AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac. from Library Entry

No	Name
51	C160 PHENANTHRENE-D10**INT. STD. #4**
52	C635 PENTACHLOROPHENOL
53	C640 PHENANTHRENE
54	C645 ANTHRACENE
55	C650 DI-N-BUTYLPHTHALATE
56	C655 FLUORANTHENE
57	C715 PYRENE
58	C170 CHRYSENE-D12**INT. STD. #5**
59	C720 BUTYLBENZYLPHTHALATE
60	C730 BENZO(A)ANTHRACENE
61	C740 CHRYSENE
62	C725 3,3'-DICHLOROBENZIDINE
63	C735 BIS (2-ETHYLHEXYL) PHTHALATE
64	C175 PERYLENE-D12**INT. STD. #6**
65	C760 DI-N-OCTYL PHTHALATE
66	C765 BENZO(B)FLUORANTHENE
67	C770 BENZO(K)FLUORANTHENE
68	C775 BENZO(A)PYRENE
69	C780 INDENO(1,2,3-CD)PYRENE
70	C785 DIBENZ(A,H)ANTHRACENE
71	C790 BENZO(G,H,I)PERYLENE

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
51	188	1230	20:30	51	1.000	A BB	174000.	40.000	NG/UL	11.79
52	NOT FOUND									
53	178	1234	20:34	51	1.003	A VB	39192.	8.146	NG	2.40
54	178	1234	20:34	51	1.003	A VB	39192.	8.115	NG	2.39
55	149	1365	22:45	51	1.110	A VB	55362.	7.925	NG	2.34
56	202	1460	24:20	51	1.187	A BB	7230.	1.573	NG	0.46
57	202	1500	25:00	51	1.220	A BB	4118.	0.862	NG	0.25
58	240	1735	28:55	58	1.000	A BB	100616.	40.000	NG/UL	11.79
59	NOT FOUND									
60	228	1732	28:52	58	0.998	A BV	956.	0.371	NG	0.11
61	228	1740	29:00	58	1.003	A VB	1081.	0.420	NG	0.12
62	NOT FOUND									
63	149	1767	29:27	58	1.018	A BV	75327.	21.955	NG	6.47
64	264	1985	33:05	64	1.000	A BB	72148.	40.000	NG/UL	11.79
65	149	1875	31:15	64	0.945	A BB	16732.	2.531	NG	0.75
66	252	1920	32:00	64	0.967	A VB	1526.	0.664	NG	0.20
67	252	1924	32:04	64	0.969	A BB	1099.	0.538	NG	0.16
68	252	1973	32:53	64	0.994	A BB	1141.	0.599	NG	0.18
69	276	2215	36:55	64	1.116	A BB	595.	0.329	NG	0.10
70	278	2222	37:02	64	1.119	A BB	552.	0.398	NG	0.12
71	276	2284	38:04	64	1.151	A BB	374.	0.248	NG	0.07

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R.Fac	R.Fac(L)	Ratio
51	20:26	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
52	20:06		0.984						
53	20:31	1.00	1.004	1.00	8.15	50.00	0.180	1.106	0.16
54	20:39	1.00	1.011	0.99	8.12	50.00	0.180	1.110	0.16
55	22:42	1.00	1.111	1.00	7.92	50.00	0.255	1.606	0.16
56	24:16	1.00	1.188	1.00	1.57	50.00	0.033	1.057	0.03
57	24:57	1.00	1.221	1.00	0.86	50.00	0.019	1.070	0.02
58	28:52	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
59	27:24		0.949						
60	28:49	1.00	0.998	1.00	0.37	50.00	0.008	1.074	0.01
61	28:57	1.00	1.003	1.00	0.42	50.00	0.009	1.079	0.01
62	28:51		0.999						
63	29:23	1.00	1.018	1.00	21.96	50.00	0.599	1.364	0.44
64	32:59	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
65	31:11	1.00	0.945	1.00	2.53	50.00	0.186	3.668	0.05
66	31:56	1.00	0.968	1.00	0.66	50.00	0.017	1.775	0.01
67	32:00	1.00	0.970	1.00	0.54	50.00	0.012	1.136	0.01
68	32:49	1.00	0.995	1.00	0.60	50.00	0.013	1.057	0.01
69	36:48	1.00	1.116	1.00	0.33	50.00	0.007	1.003	0.01
70	36:55	1.00	1.119	1.00	0.40	50.00	0.006	0.770	0.01
71	37:56	1.00	1.150	1.00	0.25	50.00	0.004	0.666	0.00

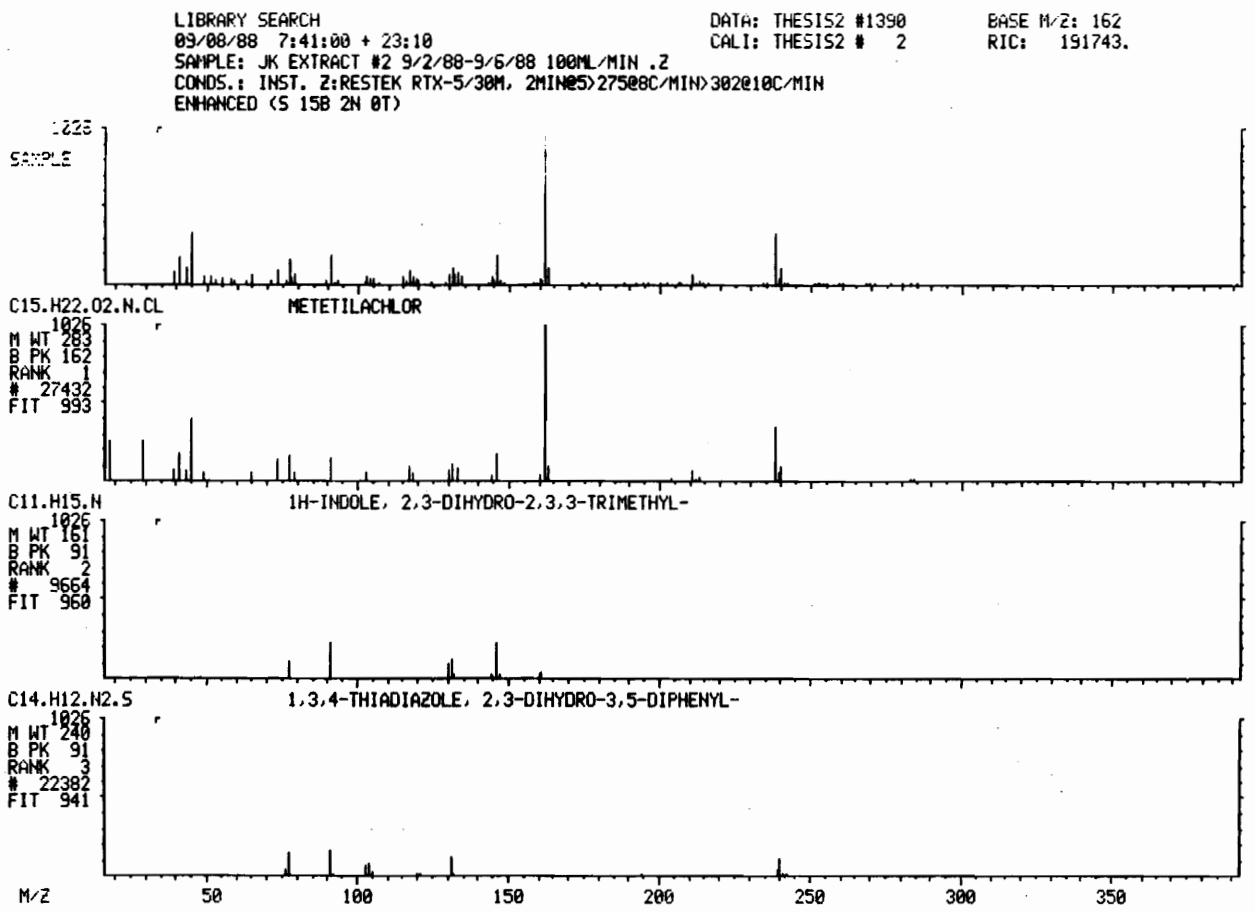
Library Search Data: THESIS2 #1390 Base m/z: 162
09/08/88 7:41:00 + 23:10 Cali: THESIS2 # 2 RIC: 171743.
Sample: JK EXTRACT #2 9/2/88-9/6/88 100ML/MIN . Z
Conds.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
Enhanced (S 15B 2N OT)

42222 spectra in LIBRARYNB searched for maximum FIT
121 matched at least 5 of the 16 largest peaks in the unknown

Rank	In.	Name
1	27432	METETILACHLOR
2	9664	1H-INDOLE, 2,3-DIHYDRO-2,3,3-TRIMETHYL-
3	22382	1,3,4-THIADIAZOLE, 2,3-DIHYDRO-3,5-DIPHENYL-
4	22000	INDOLINE, 3-BENZYL-2,3-DIMETHYL-
5	9764	CYCLOPROPANECARBOXYLIC ACID, 1-PHENYL-

Rank	Formula	M.Wt	B.Pk	Purity	Fit	RFit
1	C15.H22.O2.N.CL	283	162	805	793	809
2	C11.H15.N	161	91	184	760	184
3	C14.H12.N2.S	240	91	179	741	182
4	C17.H19.N	237	146	125	739	130
5	C10.H10.O2	162	162	395	703	402

Rank	Ret.Time	B.P.Int.	US.Par.1	US.Par.2	C.A.S. #
1	---	---	---	---	51218-45-2
2	---	---	---	---	18791-58-3
3	---	---	---	---	36350-07-3
4	---	---	---	---	18791-63-0
5	---	---	---	---	6170-95-2


LIBRARY SEARCH
09/08/88 7:41:00 + 23:10
SAMPLE: JK EXTRACT #2 9/2/88-9/6/88 100ML/MIN .Z
CONDS.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
ENHANCED (S 15B 2N 0T)
DATA: THESIS2 #1390
CALI: THESIS2 # 2
BASE M/Z: 162
RIC: 191743.
SAMPLE
C15.H22.O2.N.CL
METETILACHLOR
M WT 283
B PK 162
RANK 1
27432
FIT 993
C11.H15.N
1H-INDOLE, 2,3-DIHYDRO-2,3,3-TRIMETHYL-
M WT 161
B PK 91
RANK 2
9664
FIT 960
C14.H12.N2.S
1,3,4-THIADIAZOLE, 2,3-DIHYDRO-3,5-DIPHENYL-
M WT 240
B PK 91
RANK 3
22382
FIT 941
M/Z
50
100
150
200
250
300
350

Quantitation Report File: Z8113

Data: Z8113.TI
09/30/88 20:49:00
Sample: CONTINUOUS LIQUID LIQUID EXTRACTION 9/30/88
Conds.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
Formula: Instrument: Z Weight: 0.005
Submitted by: VERSAR Analyst: BLCK Acct. No.: _____

AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac. from Library Entry

No	Name
1	CI30 1,4-DICHLOROBENZENE-D4 **INT. STD. #1**
2	C330 2-CHLOROPHENOL
3	C315 PHENOL
4	C325 BIS (2-CHLOROETHYL) ETHER
5	C335 1,3-DICHLOROBENZENE
6	C340 1,4-DICHLOROBENZENE
7	C350 1,2-DICHLOROBENZENE
8	C345 BENZYL ALCOHOL
9	C360 BIS (2-CHLOROISOPROPYL) ETHER
10	C355 2-METHYLPHENOL
11	C375 HEXACHLOROETHANE
12	C365 4-METHYLPHENOL
13	C370 N-NITROSO-DI-N-PROPYLAMINE
14	CS50 2-FLUOROPHENOL**ACID SURR.**
15	CS45 PHENOL-D5**ACID SURR.**
16	CI40 NAPHTHALENE-D8**INT. STD.#2**
17	C410 NITROBENZENE
18	C415 ISOPHORONE
19	C420 2-NITROPHENOL
20	C425 2,4-DIMETHYLPHENOL
21	C435 BIS (2-CHLOROETHOXY) METHANE
22	C440 2,4-DICHLOROPHENOL
23	C445 1,2,4-TRICHLOROBENZENE
24	C450 NAPHTHALENE
25	C430 BENZOIC ACID
26	C455 4-CHLOROANILINE
27	C460 HEXACHLOROBUTADIENE
28	C465 4-CHLORO-3-METHYLPHENOL
29	C470 2-METHYLNAPHTHALENE
30	CS20 NITROBENZENE-D5**BN SURR.**
31	CI50 ACENAPHTHALENE-D10**INT. STD.#3**
32	C510 HEXACHLOROCYCLOPENTADIENE
33	C515 2,4,6-TRICHLOROPHENOL
34	C520 2,4,5-TRICHLOROPHENOL
35	C525 2-CHLORONAPHTHALENE
36	C530 2-NITROANILINE
37	C540 ACENAPHTHYLENE
38	C535 DIMETHYL PHTHALATE
39	C575 2,6-DINITROTOLUENE
40	C550 ACENAPHTHENE
41	C545 3-NITROANILINE
42	C555 2,4-DINITROPHENOL
43	C565 DIBENZOFURAN
44	C560 4-NITROPHENOL
45	C570 2,4-DINITROTOLUENE
46	C590 FLUORENE
47	C585 4-CHLOROPHENYL-PHENYLETHER

No	Name
48	C580 DIETHYLPHTHALATE
49	C595 4-NITROANILINE
50	C610 4,6-DINITRO-2-METHYLPHENOL

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
1	152	376	6:16	1	1.000	A BB	32582.	40.000	NG/UL	13.88
2	NOT FOUND									
3	NOT FOUND									
4	NOT FOUND									
5	NOT FOUND									
6	NOT FOUND									
7	NOT FOUND									
8	NOT FOUND									
9	45	419	6:59	1	1.114	A BB	290.	0.149	NG	0.05
10	NOT FOUND									
11	NOT FOUND									
12	NOT FOUND									
13	NOT FOUND									
14	NOT FOUND									
15	NOT FOUND									
16	136	574	9:34	16	1.000	A BB	97841.	40.000	NG/UL	13.88
17	77	468	7:48	16	0.815	A VB	1579.	1.280	NG	0.44
18	82	504	8:24	16	0.878	A VB	982.	0.398	NG	0.14
19	NOT FOUND									
20	NOT FOUND									
21	93	551	9:11	16	0.960	A BB	166.	0.101	NG	0.03
22	NOT FOUND									
23	NOT FOUND									
24	128	577	9:37	16	1.005	A BB	1012.	0.289	NG	0.10
25	122	549	9:09	16	0.956	A BB	2426.	4.179	NG#	1.45
26	NOT FOUND									
27	NOT FOUND									
28	NOT FOUND									
29	NOT FOUND									
30	NOT FOUND									
31	164	888	14:48	31	1.000	A BB	49050.	40.000	NG/UL	13.88
32	237	741	12:21	31	0.834	A BB	380.	0.812	NG	0.28
33	NOT FOUND									
34	NOT FOUND									
35	NOT FOUND									
36	NOT FOUND									
37	NOT FOUND									
38	163	859	14:19	31	0.967	A BB	583.	0.260	NG	0.09
39	NOT FOUND									
40	153	893	14:53	31	1.006	A BB	856.	0.429	NG	0.15
41	138	889	14:49	31	1.001	A BB	340.	1.349	NG#	0.47
42	NOT FOUND									
43	168	923	15:23	31	1.039	A BB	775.	0.282	NG	0.10
44	NOT FOUND									
45	NOT FOUND									
46	NOT FOUND									
47	NOT FOUND									
48	149	991	16:31	31	1.116	A BB	5178.	2.060	NG	0.72
49	NOT FOUND									
50	NOT FOUND									

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R.Fac	R.Fac(L)	Ratio
1	6:16	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
2	5:52		0.936						
3	5:41		0.907						
4	5:49		0.928						
5	6:11		0.987						
6	6:19		1.008						
7	6:45		1.077						
8	6:42		1.069						
9	7:08	0.98	1.138	0.98	0.15	50.00	0.007	2.391	0.00
10	7:05		1.130						
11	7:30		1.197						
12	7:28		1.191						
13	7:29		1.194						
14	3:48		0.606						
15	5:39		0.902						
16	9:35	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
17	7:46	1.00	0.810	1.01	1.28	50.00	0.013	0.504	0.03
18	8:25	1.00	0.878	1.00	0.40	50.00	0.008	1.009	0.01
19	8:37		0.899						
20	8:52		0.925						
21	9:08	1.01	0.953	1.01	0.10	50.00	0.001	0.674	0.00
22	9:17		0.969						
23	9:30		0.991						
24	9:38	1.00	1.005	1.00	0.29	50.00	0.008	1.433	0.01
25	9:18	0.98	0.970	0.99	4.18	50.00	0.020	0.737	0.08
26	9:57		1.038						
27	10:14		1.068						
28	11:28		1.197						
29	11:39		1.216						
30	7:43		0.805						
31	14:48	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
32	12:22	1.00	0.836	1.00	0.81	50.00	0.006	0.382	0.02
33	12:38		0.854						
34	12:43		0.859						
35	13:04		0.883						
36	13:34		0.917						
37	14:19		0.967						
38	14:20	1.00	0.968	1.00	0.26	50.00	0.010	1.025	0.01
39	14:29		0.979						
40	14:54	1.00	1.007	1.00	0.43	50.00	0.014	1.628	0.01
41	14:51	1.00	1.003	1.00	1.35	50.00	0.006	0.706	0.03
42	15:09		1.024						
43	15:24	1.00	1.041	1.00	0.28	50.00	0.013	2.744	0.01
44	15:31		1.048						
45	15:38		1.056						
46	16:27		1.111						
47	16:34		1.119						
48	16:33	1.00	1.118	1.00	2.06	50.00	0.084	2.049	0.04
49	16:44		1.131						
50	16:51		1.139						

Quantitation Report File: Z8113

Data: Z8113.TI
09/30/88 20:49:00
Sample: CONTINUOUS LIQUID LIQUID EXTRACTION 9/30/88
Conds.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
Formula: Instrument: Z Weight: 0.005
Submitted by: VERSAR Analyst: BLCK Acct. No.: _____

AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac. from Library Entry

No	Name
51	C615 N-NITROSODIPHENYLAMINE
52	C625 4-BROMOPHENYL-PHENYLETHER
53	C630 HEXACHLOROBENZENE
54	CS25 2-FLUOROBIPHENYL**BN SURR.**
55	CI60 PHENANTHRENE-D10**INT. STD.#4**
56	C635 PENTACHLOROPHENOL
57	C640 PHENANTHRENE
58	C645 ANTHRACENE
59	C650 DI-N-BUTYLPHTHALATE
60	C655 FLUORANTHENE
61	C715 PYRENE
62	CS55 2,4,6,-TRIBROMOPHENOL**ACID SURR.**
63	CI70 CHRYSENE-D12**INT. STD.#5**
64	C720 BUTYLBENZYLPHTHALATE
65	C730 BENZO(A)ANTHRACENE
66	C740 CHRYSENE
67	C725 3,3'-DICHLOROBENZIDINE
68	C735 BIS (2-ETHYLHEXYL) PHTHALATE
69	CS30 P-TERPHENYL-D14**BN SURR.**
70	CI75 PERYLENE-D12**INT. STD.#6**
71	C760 DI-N-OCTYL PHTHALATE
72	C765 BENZO(B)FLUORANTHENE
73	C770 BENZO(K)FLUORANTHENE
74	C775 BENZO(A)PYRENE
75	C780 INDENO(1,2,3-CD)PYRENE
76	C785 DIBENZ(A,H)ANTHRACENE
77	C790 BENZO(G,H,I)PERYLENE

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
51	NOT FOUND									
52	NOT FOUND									
53	NOT FOUND									
54	NOT FOUND									
55	188	1156	19:16	55	1.000	A BV	96086.	40.000	NG/UL	13.88
56	NOT FOUND									
57	178	1160	19:20	55	1.003	A VB	2848.	0.916	NG	0.32
58	178	1160	19:20	55	1.003	A VB	2848.	0.932	NG	0.32
59	149	1296	21:36	55	1.121	A BB	23223.	5.925	NG	2.06
60	202	1382	23:02	55	1.196	A BB	532.	0.185	NG	0.06
61	202	1422	23:42	55	1.230	A BB	265.	0.091	NG	0.03
62	NOT FOUND									
63	240	1654	27:34	63	1.000	A BB	66621.	40.000	NG/UL	13.88
64	149	1574	26:14	63	0.952	A BB	2581.	1.480	NG	0.51
65	NOT FOUND									
66	NOT FOUND									

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
67	NOT FOUND									
68	149	1694	28:14	63	1.024	A BB	66195.	25.568	NG	8.87
69	NOT FOUND									
70	264	1897	31:37	70	1.000	A BB	57555.	40.000	NG/UL	13.88
71	149	1803	30:03	70	0.950	A BB	7054.	1.559	NG	0.54
72	NOT FOUND									
73	NOT FOUND									
74	NOT FOUND									
75	NOT FOUND									
76	NOT FOUND									
77	NOT FOUND									

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R.Fac	R.Fac(L)	Ratio
51	16:58		1.146						
52	18:02		1.218						
53	18:23		1.242						
54	12:53		0.870						
55	19:17	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
56	18:59		0.984						
57	19:21	1.00	1.003	1.00	0.92	50.00	0.024	1.295	0.02
58	19:30	0.99	1.011	0.99	0.93	50.00	0.024	1.273	0.02
59	21:37	1.00	1.121	1.00	5.92	50.00	0.193	1.632	0.12
60	23:03	1.00	1.195	1.00	0.18	50.00	0.004	1.199	0.00
61	23:43	1.00	1.230	1.00	0.09	50.00	0.002	1.207	0.00
62	17:15		0.895						
63	27:34	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
64	26:14	1.00	0.952	1.00	1.48	50.00	0.031	1.047	0.03
65	27:31		0.998						
66	27:39		1.003						
67	27:38		1.002						
68	28:14	1.00	1.024	1.00	25.57	50.00	0.795	1.554	0.51
69	24:26		0.886						
70	31:37	1.00	1.000	1.00	40.00	40.00	1.000	1.000	1.00
71	30:03	1.00	0.950	1.00	1.56	50.00	0.098	3.145	0.03
72	30:41		0.970						
73	30:45		0.973						
74	31:28		0.995						
75	34:34		1.093						
76	34:40		1.096						
77	35:25		1.120						

4/13/88

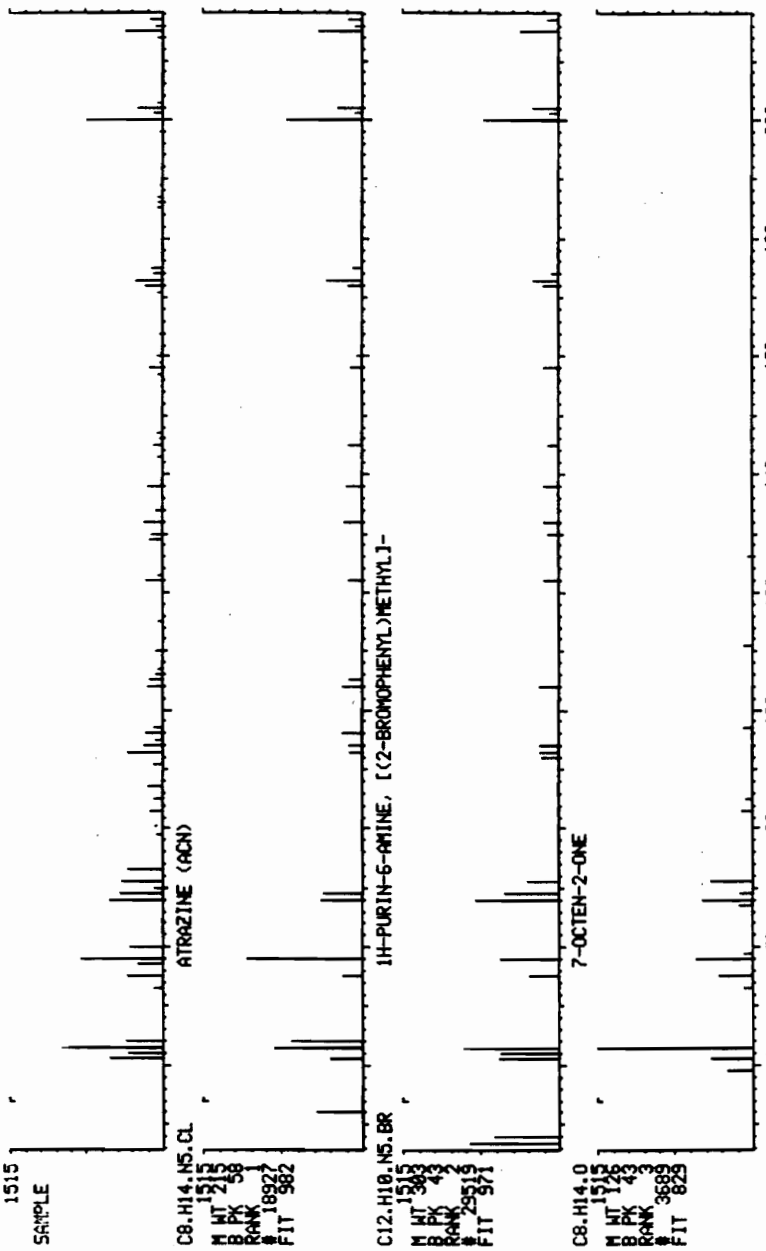
Library Search Data: Z8113 #1130 Base m/z: 43
09/30/88 20:49:00 + 18:50 Cali: Z8113 # 2 RIC: 51199.
Sample: CONTINUOUS LIQUID LIQUID EXTRACTION , 1.5UL INJECTION
Conds.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
Enhanced (S 15B 2N OT)

42222 spectra in LIBRARYNB searched for maximum FIT
72 matched at least 5 of the 16 largest peaks in the unknown

Rank	In.	Name
1	18927	ATRAZINE (ACN)
2	29519	1H-PURIN-6-AMINE, [(2-BROMOPHENYL)METHYL]-
3	3689	7-OCTEN-2-ONE
4	21041	TERBUTHYLAZINE (ACN)
5	9649	2-PROPENAMIDE, 2-METHYL-N-PHENYL-

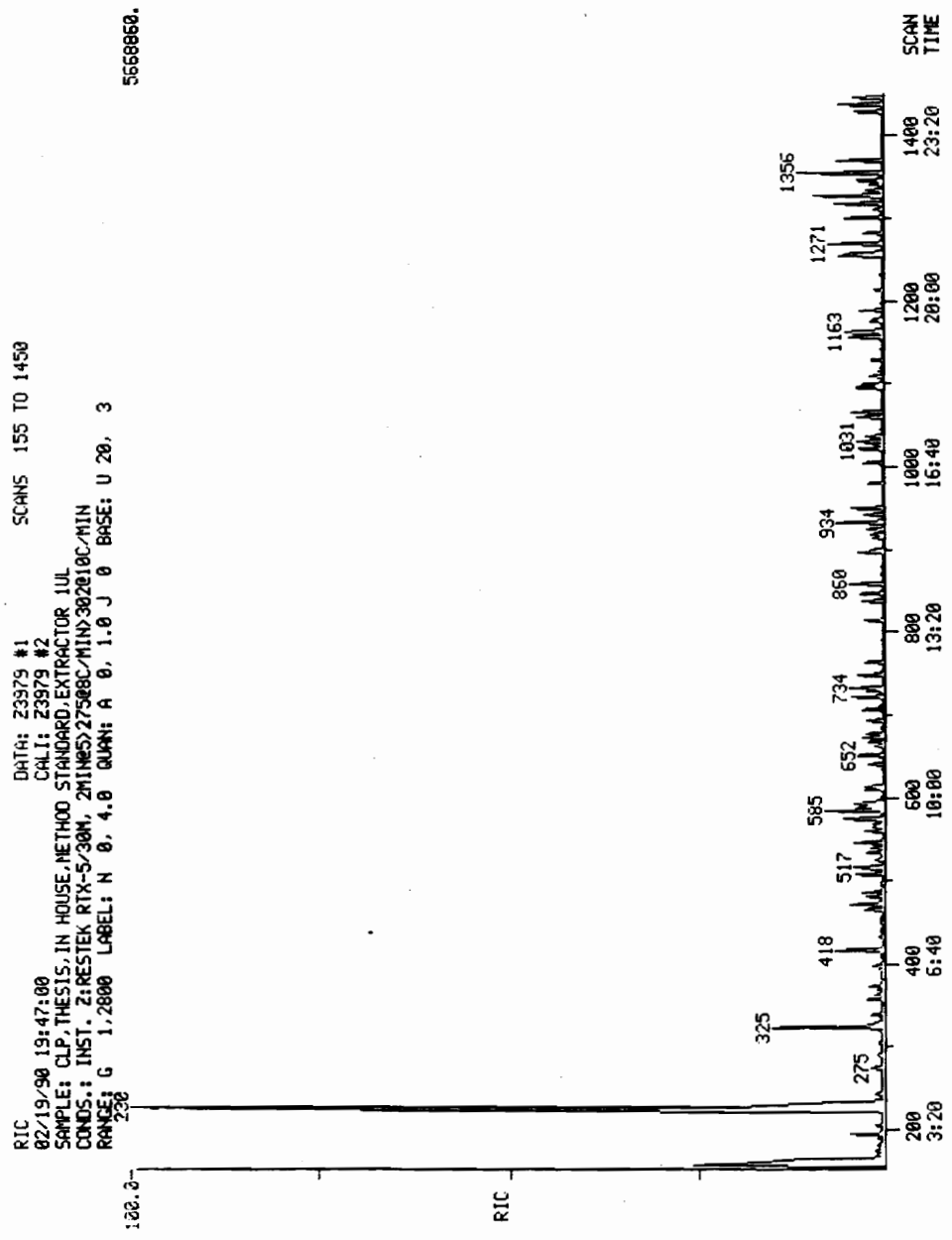
Rank	Formula	M.Wt	B.Pk	Purity	Fit	RFit
1	C8.H14.N5.CL	215	58	707	982	707
2	C12.H10.N5.BR	303	43	690	971	702
3	C8.H14.O	126	43	182	829	210
4	C9.H16.N5.CL	229	41	390	822	411
5	C10.H11.O.N	161	91	173	821	179

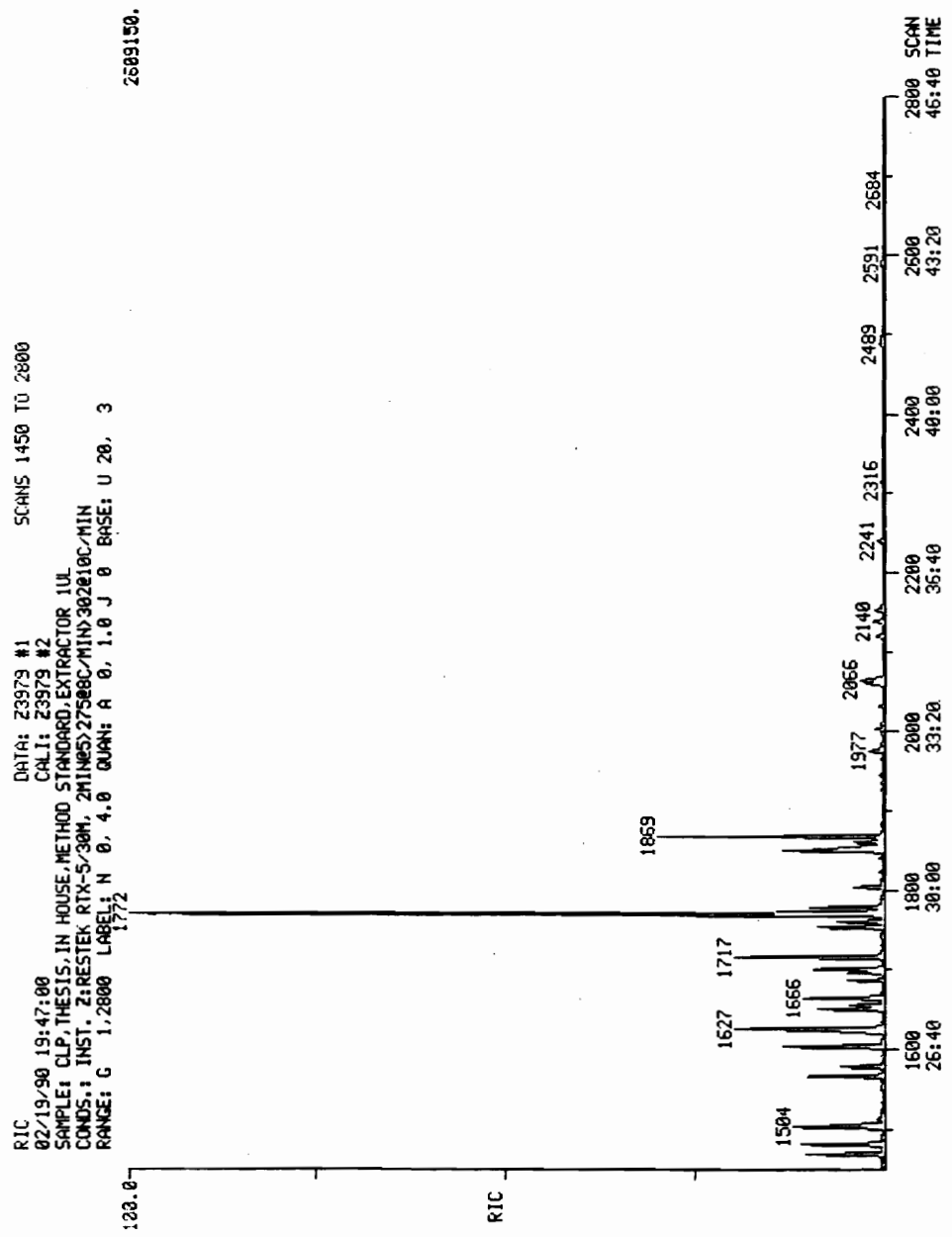
Rank	Ret. Time	B.P. Int.	US. Par. 1	US. Par. 2	C.A.S. #
1	___	___	___	___	1912-24-9
2	___	___	___	___	74421-49-1
3	___	___	___	___	3664-60-6
4	___	___	___	___	5915-41-3
5	___	___	___	___	1611-83-2

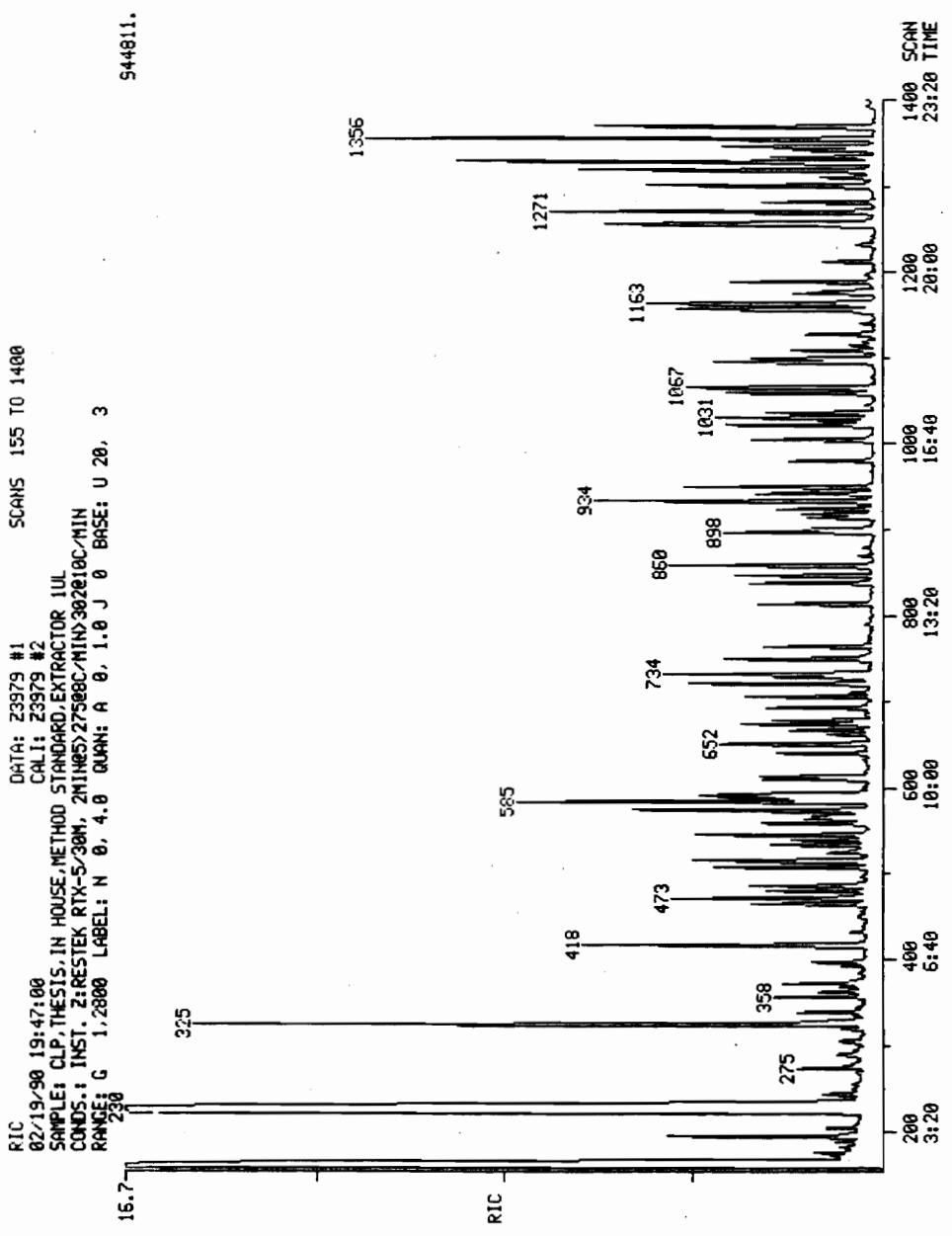

LIBRARY SEARCH
09/30/88 20:49:00 + 18:50
SAMPLE: CONTINUOUS LIQUID LIQUID EXTRACTION , 1.5UL INJECTION
CONDS.: INST. 2:RESTEK RTX-5/30M, 2MIN@5)275@8C/MIN)302@10C/MIN
ENHANCED (S 150 2N 0T)
DATA: Z8113 #1130
CALI: Z8113 # 2
BASE M/Z: 43
RIC: 51199.
1515
SAMPLE
C8.H14.N5.CL
ATRAZINE (ACN)
M WT 215
BPK 58
RANK 1
18927
FIT 982
C12.H10.N5.BR
1H-PURIN-6-AMINE, [(2-BROMOPHENYL)METHYL]-
M WT 303
BPK 43
RANK 2
29515
FIT 971
C8.H14.O
7-OCTEN-2-ONE
M WT 126
BPK 43
RANK 3
3689
FIT 829
M/Z
40
60
80
100
120
140
160
180
200

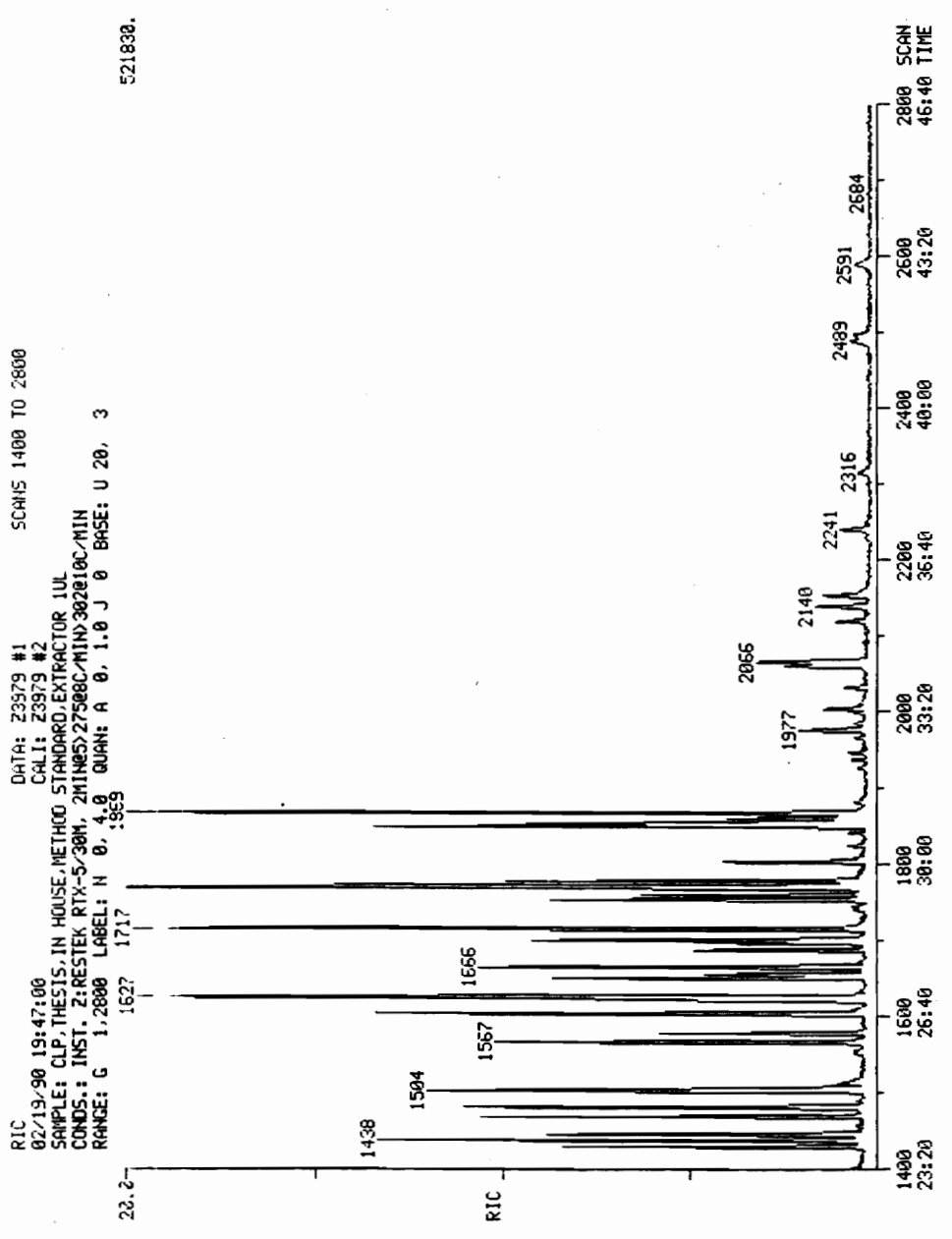
Appendix B

Recovery Data from the Experiment


RIC
02/19/90 19:47:00 DATA: Z3979 #1 SCANS 155 TO 1450
SAMPLE: CLP,THESIS,IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL CALI: Z3979 #2
CONDS.: INST. Z:RESTEK RTX-5/30M, 2MINES)275@C/MIN)302@10C/MIN
RANGE: G 1.2800 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
5668860.
100.0
RIC
230
275
325
418
517
585
652
734
860
934
1031
1163
1271
1356
200 3:20
400 6:40
600 10:00
800 13:20
1000 16:40
1200 20:00
1400 23:20
SCAN TIME


RIC
02/19/90 19:47:00
SAMPLE: CLP,THESIS,IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL
CONDS.: INST. 2:RESTEK RTX-5/30M, 2MINES)275@8C/MIN)302@10C/MIN
RANGE: G 1,2800 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
DATA: Z3979 #1
CAL: Z3979 #2
SCANS 1450 TO 2800
2609150.
100.0
RIC
1772
1859
1977
2066
2140
2241
2315
2489
2591
2684
1504
1627
1666
1717
1600
26:40
1800
30:00
2000
33:20
2200
36:40
2400
40:00
2600
43:20
2800
46:40
SCAN
TIME


RIC
02/19/90 19:47:00
SAMPLE: CLP,THESIS,IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL
CONDS.: INST. Z:RESTEK RTX-5/30M, 2MIN@5)275@C/MIN)302@10C/MIN
RANGE: G 1,2000 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
DATA: Z3979 #1
CAL: Z3979 #2
SCANS 155 TO 1400
944811.
15.7
RIC
230
325
275
358
418
473
585
652
734
860
898
934
1031
1067
1163
1271
1356
200
3:20
400
6:40
600
10:00
800
13:20
1000
16:40
1200
20:00
1400
23:20
SCAN
TIME


RIC
02/19/90 19:47:00
SAMPLE: CLP,THESIS,IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL
CONDS.: INST. 2:RESTEK RTX-5/30M, 2MIN@5)275@C/MIN)302@10C/MIN
RANGE: G 1,2@@@ LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
DATA: Z3979 #1
CALI: Z3979 #2
SCANS 1400 TO 2800
521830.
RIC
1438
1504
1567
1666
1717
1622
1959
1977
2065
2140
2241
2316
2489
2591
2684
1400
23:20
1600
26:40
1800
30:00
2000
33:20
2200
36:40
2400
40:00
2600
43:20
2800
46:40
SCAN
TIME

Quantitation Report File: Z3979

Data: Z3979.TI
02/19/90 19:47:00
Sample: CLP,THESIS,IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL
Conds.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
Formula: Instrument: Z Weight: 0.007
Submitted by: VERSAR Analyst: JK Acct. No.:

AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac. from Library Entry

No	Name
1	CI30 1,4-DICHLOROBENZENE-D4 **INT. STD. #1**
2	C330 2-CHLOROPHENOL
3	C315 PHENOL
4	C325 BIS (2-CHLOROETHYL) ETHER
5	C335 1,3-DICHLOROBENZENE
6	C340 1,4-DICHLOROBENZENE
7	C350 1,2-DICHLOROBENZENE
8	C345 BENZYL ALCOHOL
9	C360 BIS (2-CHLOROISOPROPYL) ETHER
10	C355 2-METHYLPHENOL
11	C375 HEXACHLOROETHANE
12	C365 4-METHYLPHENOL
13	C370 N-NITROSO-DI-N-PROPYLAMINE
14	CS50 2-FLUOROPHENOL**ACID SURR. **
15	CS45 PHENOL-D5**ACID SURR. **
16	CI40 NAPHTHALENE-D8**INT. STD. #2**
17	C410 NITROBENZENE
18	C415 ISOPHORONE
19	C420 2-NITROPHENOL
20	C425 2,4-DIMETHYLPHENOL
21	C435 BIS (2-CHLOROETHOXY) METHANE
22	C440 2,4-DICHLOROPHENOL
23	C445 1,2,4-TRICHLOROBENZENE
24	C450 NAPHTHALENE
25	C430 BENZOIC ACID
26	C455 4-CHLOROANILINE
27	C460 HEXACHLOROBUTADIENE
28	C465 4-CHLORO-3-METHYLPHENOL
29	C470 2-METHYLNAPHTHALENE
30	CS20 NITROBENZENE-D5**BN SURR. **
31	CI50 ACENAPHTHENE-D10**INT. STD. #3**
32	C510 HEXACHLOROCYCLOPENTADIENE
33	C515 2,4,6-TRICHLOROPHENOL
34	C520 2,4,5-TRICHLOROPHENOL
35	C525 2-CHLORONAPHTHALENE
36	C530 2-NITROANILINE
37	C540 ACENAPHTHYLENE
38	C535 DIMETHYL PHTHALATE
39	C544 2,6-DINITROTOLUENE
40	C550 ACENAPHTHENE
41	C545 3-NITROANILINE
42	C555 2,4-DINITROPHENOL
43	C565 DIBENZOFURAN
44	C560 4-NITROPHENOL
45	C570 2,4-DINITROTOLUENE
46	C590 FLUORENE
47	C585 4-CHLOROPHENYL-PHENYLETHER

No	Name
48	C580 DIETHYLPHTHALATE
49	C595 4-NITROANILINE
50	CS25 2-FLUOROBIPHENYL**BN SURR. **

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
1	152	515	8:35	1	1.000	A BB	36951.	10.000	NG/UL	0.72
2	128	487	8:07	1	0.946	A BB	68868.	17.443	NG.	1.26
3	94	467	7:47	1	0.907	A BV	73824.	14.697	NG.	1.06
4	93	482	8:02	1	0.936	A VB	77083.	21.187	NG	1.52
5	146	509	8:29	1	0.988	A BV	102555.	17.676	NG	1.27
6	146	517	8:37	1	1.004	A VB	114448.	19.040	NG.	1.37
7	146	547	9:07	1	1.062	A BB	109277.	19.568	NG	1.41
8	108	541	9:01	1	1.050	A BV	24454.	13.975	NG	1.01
9	45	566	9:26	1	1.099	A BV	77149.	20.569	NG	1.48
10	108	561	9:21	1	1.089	A BB	53670.	17.870	NG	1.29
11	117	595	9:55	1	1.155	A BB	32698.	17.488	NG	1.26
12	108	585	9:45	1	1.136	A BV	107247.	36.267	NG	2.61
13	70	590	9:50	1	1.146	A VB	66788.	23.756	NG.	1.71
14	112	340	5:40	1	0.660	A BB	41105.	10.204	NG*A1	0.73
15	99	465	7:45	1	0.903	A BB	35288.	8.352	NG*A2	0.60
16	136	730	12:10	16	1.000	A BB	93339.	10.000	NG/UL	0.72
17	77	614	10:14	16	0.841	A BB	86722.	22.854	NG	1.64
18	82	652	10:52	16	0.893	A BB	174428.	21.301	NG	1.53
19	139	668	11:08	16	0.915	A BB	33812.	17.564	NG	1.26
20	107	675	11:15	16	0.925	A BB	73475.	17.756	NG	1.28
21	93	694	11:34	16	0.951	A BB	86410.	19.742	NG	1.42
22	162	707	11:47	16	0.968	A BB	66427.	17.421	NG	1.25
23	180	723	12:03	16	0.990	A BB	82243.	20.059	NG.	1.44
24	128	734	12:14	16	1.005	A BB	235036.	19.123	NG	1.38
25	122	688	11:28	16	0.942	A BB	207.	0.111	NG	0.01
26	127	751	12:31	16	1.029	A BV	68853.	30.242	NG	2.18
27	225	765	12:45	16	1.048	A BB	30615.	13.557	NG	0.98
28	107	838	13:58	16	1.148	A BV	65325.	19.454	NG.	1.40
29	142	860	14:20	16	1.178	A BB	155316.	20.333	NG	1.46
30	82	611	10:11	16	0.837	A BB	92122.	22.602	NG*B1	1.63
31	164	1061	17:41	31	1.000	A BB	50922.	10.000	NG/UL	0.72
32	237	901	15:01	31	0.849	A BB	18908.	11.393	NG	0.82
33	196	919	15:19	31	0.866	A BV	24736.	11.068	NG	0.80
34	196	925	15:25	31	0.872	A VB	36037.	16.091	NG	1.16
35	162	951	15:51	31	0.896	A VB	150341.	19.205	NG	1.38
36	65	981	16:21	31	0.925	A BB	34214.	20.324	NG	1.46
37	152	1031	17:11	31	0.972	A BB	196464.	19.415	NG	1.40
38	163	1023	17:03	31	0.964	A BV	174042.	21.597	NG	1.55
39	165	1037	17:17	31	0.977	A VB	34269.	29.016	NG	2.09
40	153	1067	17:47	31	1.006	A BB	132089.	18.348	NG.	1.32
41	138	1061	17:41	31	1.000	A BB	31021.	23.375	NG	1.68
42	NOT FOUND									
43	168	1096	18:16	31	1.033	A BB	194223.	20.241	NG	1.46
44	NOT FOUND									
45	165	1110	18:30	31	1.046	A BB	37499.	24.685	NG.	1.78
46	166	1163	19:23	31	1.096	A BB	157216.	21.334	NG	1.54
47	204	1165	19:25	31	1.098	A BB	77280.	23.277	NG	1.68
48	149	1157	19:17	31	1.090	A BV	249339.	19.480	NG	1.40
49	138	1179	19:39	31	1.111	A BV	22402.	22.035	NG	1.59
50	172	934	15:34	31	0.880	A BB	165011.	19.480	NG*B2	1.40

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R. Fac	R. Fac(L)	Ratio
1	8:36	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
2	8:08	1.00	0.946	1.00	17.44	10.00	1.864	1.069	1.74
3	7:48	1.00	0.907	1.00	14.70	10.00	1.998	1.359	1.47
4	8:03	1.00	0.936	1.00	21.19	10.00	2.086	0.985	2.12
5	8:30	1.00	0.988	1.00	17.68	10.00	2.775	1.570	1.77
6	8:38	1.00	1.004	1.00	19.04	10.00	3.097	1.627	1.90
7	9:08	1.00	1.062	1.00	19.57	10.00	2.957	1.511	1.96
8	9:02	1.00	1.050	1.00	13.97	10.00	0.662	0.474	1.40
9	9:27	1.00	1.099	1.00	20.57	10.00	2.088	1.015	2.06
10	9:21	1.00	1.087	1.00	17.87	10.00	1.452	0.813	1.79
11	9:56	1.00	1.155	1.00	17.49	10.00	0.885	0.506	1.75
12	9:45	1.00	1.134	1.00	36.27	10.00	2.902	0.800	3.63
13	9:51	1.00	1.145	1.00	23.76	10.00	1.807	0.761	2.38
14	5:41	1.00	0.661	1.00	10.20	10.00	1.112	1.090	1.02
15	7:46	1.00	0.903	1.00	8.35	10.00	0.955	1.143	0.84
16	12:12	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
17	10:16	1.00	0.842	1.00	22.85	10.00	0.929	0.407	2.29
18	10:54	1.00	0.893	1.00	21.30	10.00	1.869	0.877	2.13
19	11:10	1.00	0.915	1.00	17.56	10.00	0.362	0.206	1.76
20	11:16	1.00	0.923	1.00	17.76	10.00	0.787	0.443	1.78
21	11:36	1.00	0.951	1.00	19.74	10.00	0.926	0.469	1.97
22	11:49	1.00	0.969	1.00	17.42	10.00	0.712	0.409	1.74
23	12:04	1.00	0.989	1.00	20.06	10.00	0.881	0.439	2.01
24	12:15	1.00	1.004	1.00	19.12	10.00	2.518	1.317	1.91
25	11:29	1.00	0.941	1.00	0.11	10.00	0.002	0.199	0.01
26	12:32	1.00	1.027	1.00	30.24	10.00	0.738	0.244	3.02
27	12:47	1.00	1.048	1.00	13.56	10.00	0.328	0.242	1.36
28	14:00	1.00	1.148	1.00	19.45	10.00	0.700	0.360	1.95
29	14:22	1.00	1.178	1.00	20.33	10.00	1.664	0.818	2.03
30	10:13	1.00	0.837	1.00	22.60	10.00	0.987	0.437	2.26
31	17:43	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
32	15:03	1.00	0.849	1.00	11.39	10.00	0.371	0.326	1.14
33	15:20	1.00	0.865	1.00	11.07	10.00	0.486	0.439	1.11
34	15:27	1.00	0.872	1.00	16.09	10.00	0.708	0.440	1.61
35	15:53	1.00	0.897	1.00	19.20	10.00	2.952	1.537	1.92
36	16:23	1.00	0.925	1.00	20.32	10.00	0.672	0.331	2.03
37	17:13	1.00	0.972	1.00	19.41	10.00	3.858	1.987	1.94
38	17:04	1.00	0.963	1.00	21.60	10.00	3.418	1.583	2.16
39	17:19	1.00	0.977	1.00	29.02	10.00	0.673	0.232	2.90
40	17:49	1.00	1.006	1.00	18.35	10.00	2.594	1.414	1.83
41	17:43	1.00	1.000	1.00	23.38	10.00	0.609	0.261	2.34
42	18:02		1.018						
43	18:18	1.00	1.033	1.00	20.24	10.00	3.814	1.884	2.02
44	18:14		1.029						
45	18:32	1.00	1.046	1.00	24.69	10.00	0.736	0.298	2.47
46	19:25	1.00	1.096	1.00	21.33	10.00	3.087	1.447	2.13
47	19:27	1.00	1.098	1.00	23.28	10.00	1.518	0.652	2.33
48	19:19	1.00	1.090	1.00	19.48	10.00	4.896	2.514	1.95
49	19:41	1.00	1.111	1.00	22.04	10.00	0.440	0.200	2.20
50	15:36	1.00	0.881	1.00	19.48	10.00	3.240	1.663	1.95

Quantitation Report File: Z3979

Data: Z3979.TI
02/19/90 19:47:00
Sample: CLP,THESIS,IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL
Conds.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
Formula: Instrument: Z Weight: 0.007
Submitted by: VERSAR Analyst: JK Acct. No.:

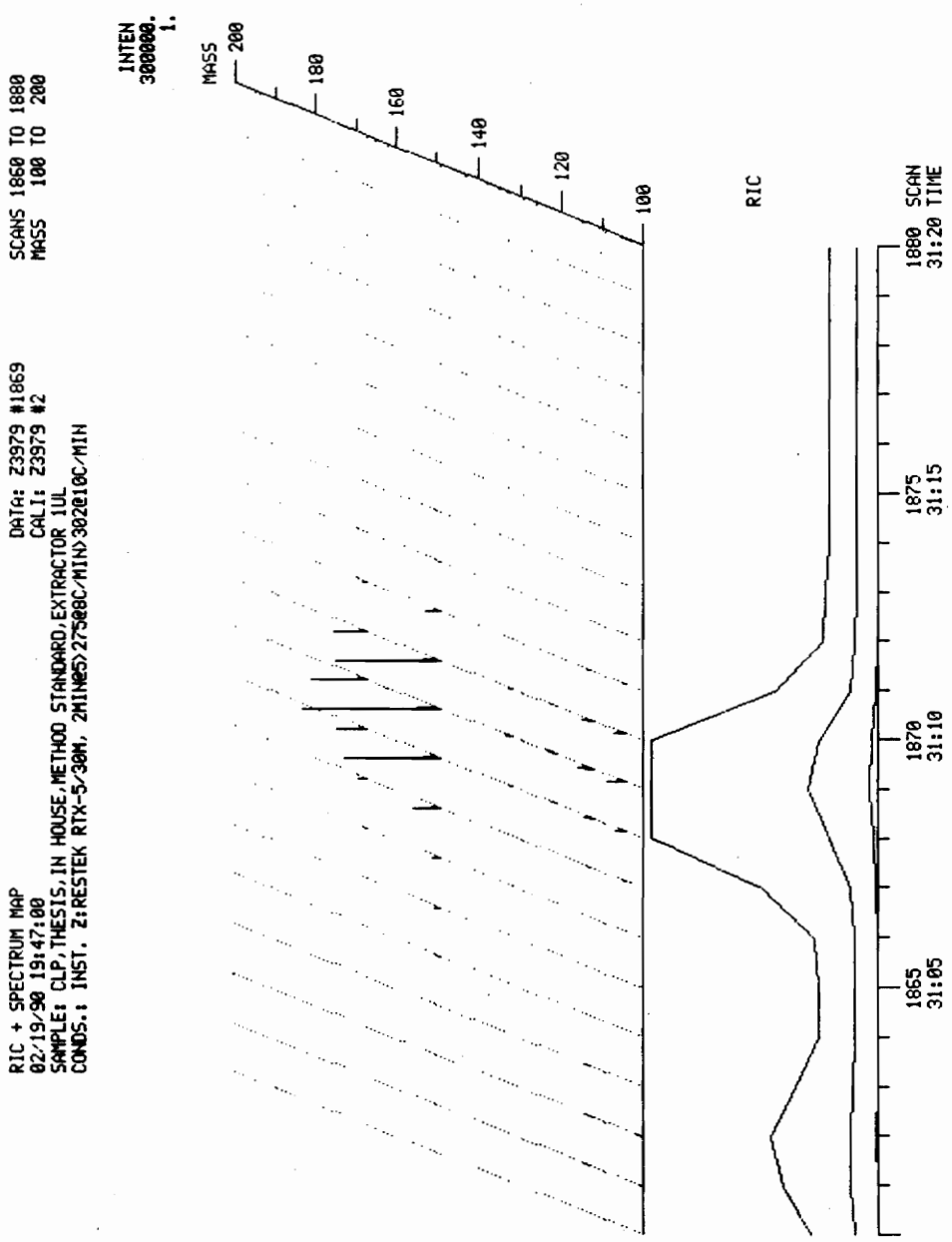
AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac. from Library Entry

No	Name
51	C555 2,4,6,-TRIBROMOPHENOL**ACID SURR.**
52	C160 PHENANTHRENE-D10**INT. STD.#4**
53	C635 PENTACHLOROPHENOL
54	C640 PHENANTHRENE
55	C645 ANTHRACENE
56	C650 DI-N-BUTYLPHTHALATE
57	C655 FLUORANTHENE
58	C610 4,6-DINITRO-2-METHYLPHENOL
59	C615 N-NITROSODIPHENYLAMINE
60	C625 4-BROMOPHENYL-PHENYLETHER
61	C630 HEXACHLOROBENZENE
62	C170 CHRYSENE-D12**INT. STD.#5**
63	C720 BUTYLBENZYLPHTHALATE
64	C730 BENZO(A)ANTHRACENE
65	C740 CHRYSENE
66	C725 3,3'-DICHLOROBENZIDINE
67	C741 BIS(2-ETHYLHEXYL)PHTHALATE
68	C530 P-TERPHENYL-D14**BN SURR.**
69	C715 PYRENE
70	C175 PERYLENE-D12**INT. STD.#6**
71	C760 DI-N-OCTYL PHTHALATE
72	C765 BENZO(B)FLUORANTHENE
73	C770 BENZO(K)FLUORANTHENE
74	C775 BENZO(A)PYRENE
75	C780 INDENO(1,2,3-CD)PYRENE
76	C785 DIBENZ(A,H)ANTHRACENE
77	C790 BENZO(G,H,I)PERYLENE
78	C310 N-NITROSODIMETHYLAMINE

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
51	330	1213	20:13	31	1.143	A BB	14129.	20.097	NG#A3	1.45
52	188	1343	22:23	52	1.000	A BB	85355.	10.000	NG/UL	0.72
53	266	1318	21:58	52	0.981	A BB	2728.	2.580	NG.	0.19
54	178	1347	22:27	52	1.003	A BV	201067.	19.806	NG	1.43
55	178	1356	22:36	52	1.010	A VB	234680.	23.040	NG	1.66
56	149	1470	24:30	52	1.095	A BV	349435.	33.693	NG	2.42
57	202	1579	26:19	52	1.176	A BV	161282.	21.732	NG	1.56
58	NOT FOUND									
59	169	1190	19:50	52	0.886	A BV	97862.	20.896	NG	1.50
60	248	1258	20:58	52	0.937	A BB	40580.	21.840	NG	1.57
61	284	1283	21:23	52	0.955	A BB	35900.	14.580	NG	1.05
62	240	1857	30:57	62	1.000	A BV	63724.	10.000	NG/UL	0.72
63	149	1761	29:21	62	0.948	A BB	82314.	21.628	NG	1.56
64	228	1854	30:54	62	0.998	A BV	147916.	24.310	NG	1.75
65	228	1862	31:02	62	1.003	A VV	96314.	15.262	NG	1.10

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
66	252	1854	30:54	62	0.998	A BB	33763.	21.114	NQ	1.52
67	149	1869	31:09	62	1.006	A BB	513868.	97.667	NQ	7.03
68	244	1657	27:37	62	0.892	A BV	92747.	15.830	NQ*B3	1.14
69	202	1623	27:03	62	0.874	A BB	154190.	16.706	NQ.	1.20
70	264	2154	35:54	70	1.000	A BB	34051.	10.000	NQ/UL	0.72
71	149	1977	32:57	70	0.918	A BB	82898.	10.377	NQ	0.75
72	252	2062	34:22	70	0.957	A BV	83678.	14.625	NQ	1.05
73	252	2066	34:26	70	0.959	A VB	72656.	12.687	NQ	0.91
74	252	2140	35:40	70	0.994	A BB	60725.	11.689	NQ	0.84
75	276	2488	41:28	70	1.155	A BV	36954.	7.970	NQ	0.57
76	278	2497	41:37	70	1.159	A BB	25226.	5.716	NQ	0.41
77	276	2591	43:11	70	1.203	A BB	32512.	6.738	NQ	0.48
78	74	206	3:26	1	0.400	A BB	22446.	8.426	NQ	0.61

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R. Fac	R. Fac(L)	Ratio
51	20:16	1.00	1.144	1.00	20.10	10.00	0.277	0.138	2.01
52	22:26	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
53	22:01	1.00	0.982	1.00	2.58	10.00	0.032	0.124	0.26
54	22:29	1.00	1.003	1.00	19.81	10.00	2.356	1.187	1.98
55	22:38	1.00	1.010	1.00	23.04	10.00	2.749	1.193	2.30
56	24:32	1.00	1.094	1.00	33.69	10.00	4.094	1.215	3.37
57	26:22	1.00	1.176	1.00	21.73	10.00	1.890	0.869	2.17
58	19:47		0.883						
59	19:52	1.00	0.886	1.00	20.90	10.00	1.147	0.549	2.09
60	21:00	1.00	0.937	1.00	21.84	10.00	0.475	0.218	2.18
61	21:25	1.00	0.955	1.00	14.58	10.00	0.421	0.288	1.46
62	31:01	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
63	29:24	1.00	0.948	1.00	21.63	10.00	1.292	0.597	2.16
64	30:56	1.00	0.998	1.00	24.31	10.00	2.321	0.955	2.43
65	31:04	1.00	1.002	1.00	15.26	10.00	1.511	0.990	1.53
66	30:57	1.00	0.998	1.00	21.11	10.00	0.530	0.251	2.11
67	31:12	1.00	1.006	1.00	97.67	10.00	8.064	0.826	9.77
68	27:39	1.00	0.892	1.00	15.83	10.00	1.455	0.919	1.58
69	27:05	1.00	0.874	1.00	16.71	10.00	2.420	1.448	1.67
70	36:00	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
71	33:00	1.00	0.917	1.00	10.38	10.00	2.435	2.346	1.04
72	34:25	1.00	0.956	1.00	14.63	10.00	2.457	1.680	1.46
73	34:31	1.00	0.959	1.00	12.69	10.00	2.134	1.682	1.27
74	35:45	1.00	0.994	1.00	11.69	10.00	1.783	1.526	1.17
75	41:38	1.00	1.157	1.00	7.97	10.00	1.085	1.362	0.80
76	41:44	1.00	1.160	1.00	5.72	10.00	0.741	1.296	0.57
77	43:20	1.00	1.204	1.00	6.74	10.00	0.955	1.417	0.67
78	3:26	1.00	0.399	1.00	8.43	10.00	0.607	0.721	0.84


RIC + SPECTRUM MAP
02/19/90 19:47:00
SAMPLE: CLP,THESIS,IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL
CONDS.: INST. 2:RESTEK RTX-5/30M, 2MIN@5)275@C/MIN)302@10C/MIN
DATA: Z3979 #1869
CALI: Z3979 #2
SCANS 1860 TO 1880
MASS 100 TO 200
INTEN
300000.
1.
MASS
200
180
160
140
120
100
RIC
1865
31:05
1870
31:10
1875
31:15
1880 SCAN
31:20 TIME

Quantitation Report File: Z3979

Data: Z3979.TI
02/19/90 19:47:00
Sample: CLP,THESIS,IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL
Conds.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
Formula: Instrument: Z Weight: 0.007
Submitted by: VERSAR Analyst: JK Acct. No.:

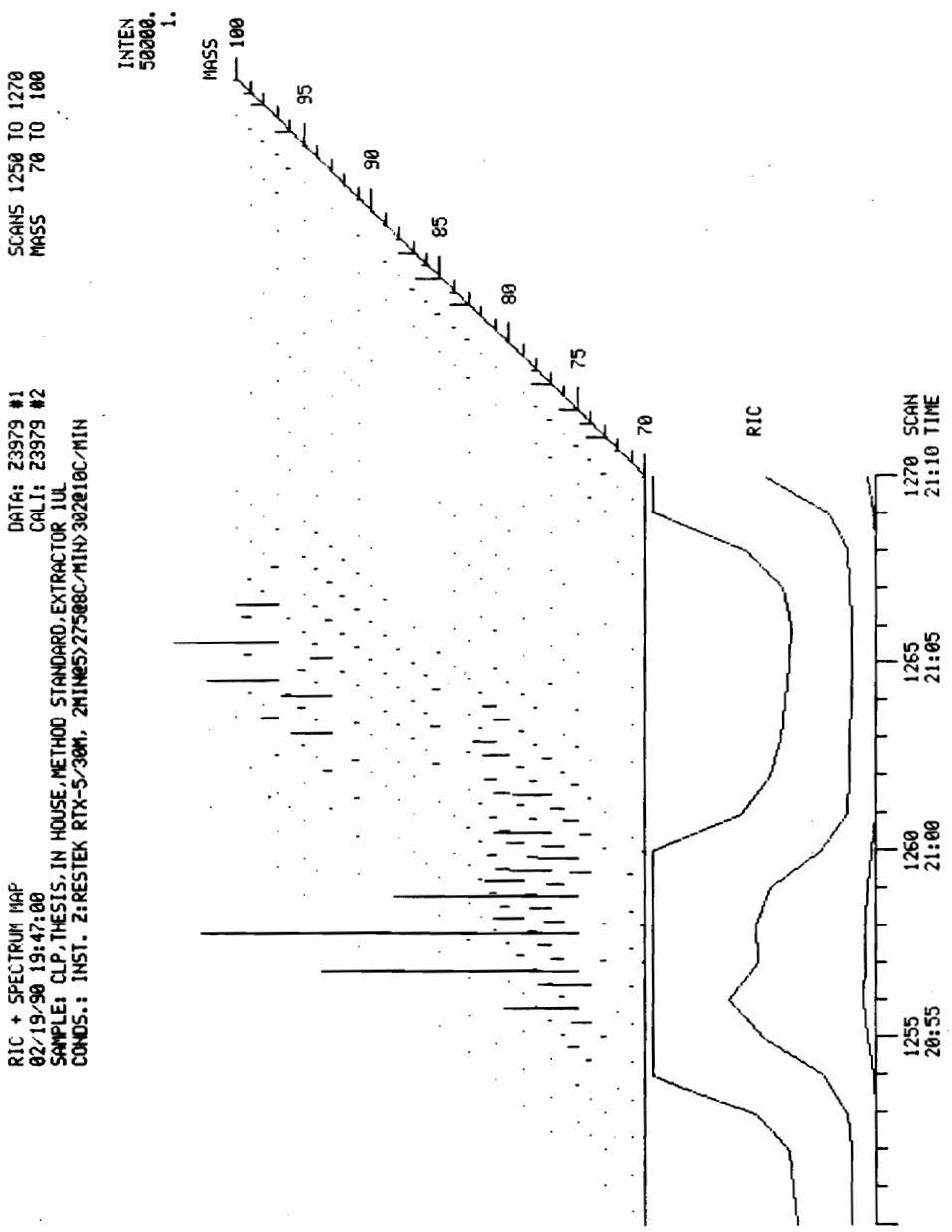
AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac. from Library Entry

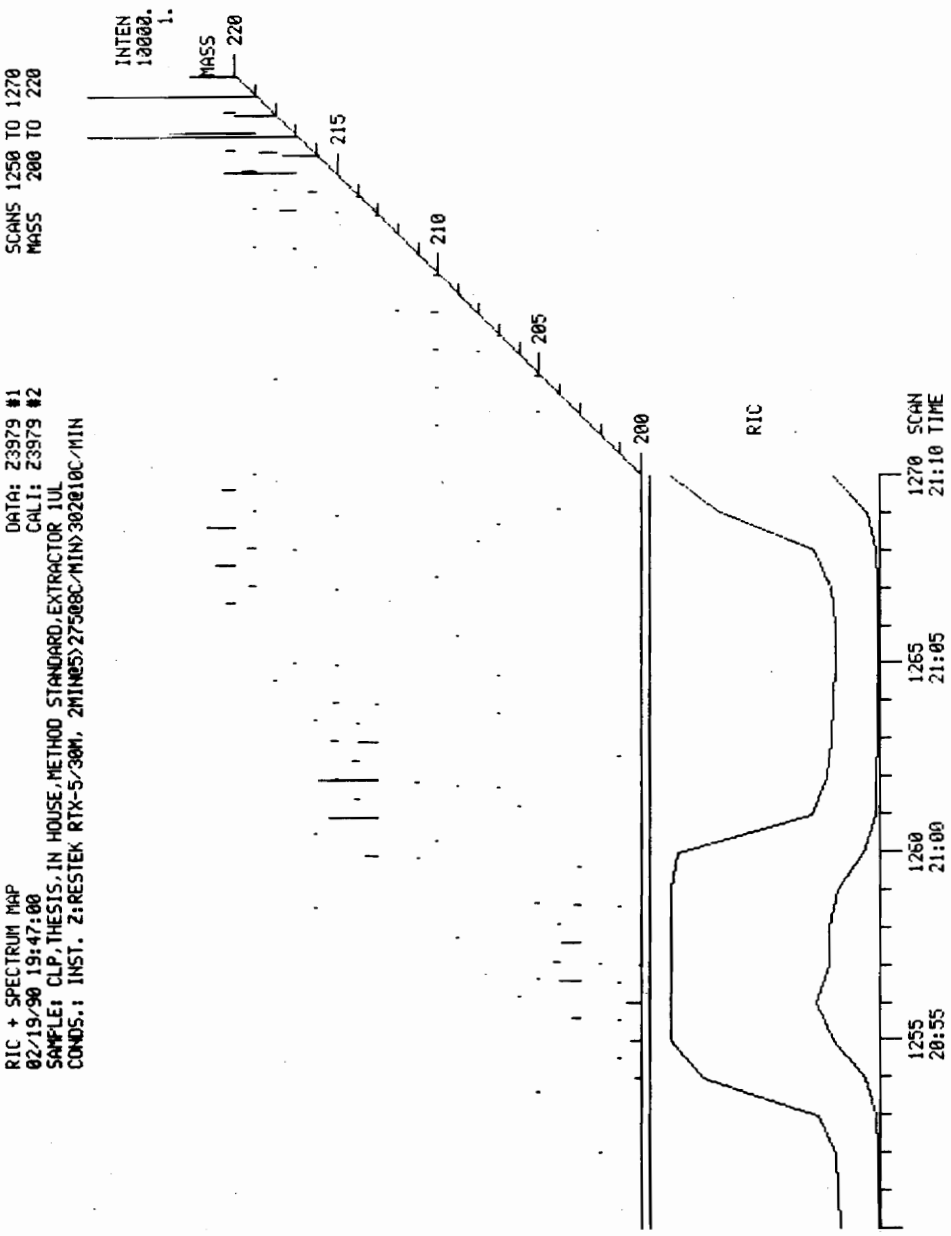
No	Name
1	CI30 1,4-DICHLOROBENZENE-D4 **INT. STD. #1**
2	C017 2-ETHOXYETHANOL
3	C930 2-PICOLINE
4	C922 N-NITROSOMETHYLETHYLAMINE
5	C921 N-NITROSODIETHYLAMINE
6	C320 ANILINE
7	C948 ETHYL METHANESULFONATE
8	C925 N-NITROSOPYRROLIDINE
9	C923 N-NITROSOMORPHOLINE
10	C916 METHYL METHANESULFONATE
11	C940 M-CRESOL
12	C952 O-TOLUIDINE
13	C900 ACETOPHENONE
14	CI40 NAPHTHALENE-D8**INT. STD. #2**
15	C911 HEXACHLOROPROPENE
16	C932 SAFROLE
17	C920 N-NITROSODI-N-BUTYLAMINE
18	C906 2,6-DICHLOROPHENOL
19	C950 P-PHENYLENEDIAMINE
20	C924 N-NITROSOPIPERIDINE
21	C912 ISOSAFROLE
22	CI50 ACENAPHTHENE-D10**INT. STD. #3**
23	C933 1,2,4,5-TETRACHLOROBENZENE
24	C947 M-DINITROBENZENE
25	C909 P-DINITROBENZENE
26	C919 2-NAPHTHYLAMINE
27	C934 2,3,4,6-TETRACHLOROPHENOL
28	C927 PENTACHLOROBENZENE
29	C897 1-NAPHTHYLAMINE
30	C954 SYM-TRINITROBENZENE
31	C926 5-NITRO-O-TOLUIDINE
32	CI60 PHENANTHRENE-D10**INT. STD. #4**
33	C929 PHENACETIN
34	C931 PRONAMIDE
35	C902 4-AMINOBIPHENYL
36	C928 PENTACHLORONITROBENZENE
37	C904 DINOSEB
38	C949 4-NITROQUINOLINE-1-OXIDE
39	CI70 CHRYSENE-D12**INT. STD. #5**
40	C907 P-(DIMETHYLAMINO)AZOBENZENE
41	C905 CHLOROBENZILATE
42	C908 3,3'DIMETHYLBENZIDINE
43	C901 2-ACETYLAMINOFLUORENE
44	C915 4,4'-METHYLENEBIS(2-CHLOROANILINE)
45	CI75 PERYLENE-D12**INT. STD. #6**
46	C914 3-METHYLCHOLANTHRENE
47	C945 7,12-DIMETHYLBENZ(A)ANTHRACENE

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
1	152	515	8:35	1	1.000	A BB	36951.	10.000	NG/UL	0.99
2	NOT	FOUND								
3	93	275	4:35	1	0.534	A BB	52392.	12.537	NG	1.24
4	42	291	4:51	1	0.565	A BB	56250.	12.995	NG	1.28
5	42	374	6:14	1	0.726	A VV	68869.	24.895	NG	2.46
6	93	473	7:53	1	0.918	A BV	166271.	34.639	NG	3.42
7	79	416	6:56	1	0.808	A BB	46440.	12.976	NG	1.28
8	100	588	9:48	1	1.142	A BB	21663.	16.158	NG	1.59
9	56	592	9:52	1	1.150	A BB	39534.	13.708	NG	1.35
10	80	328	5:28	1	0.637	A BB	32503.	10.752	NG	1.06
11	108	585	9:45	1	1.136	A BV	107247.	37.674	NG	3.72
12	106	593	9:53	1	1.151	A BB	118733.	18.698	NG	1.85
13	105	585	9:45	1	1.136	A BB	121903.	23.774	NG	2.35
14	136	730	12:10	14	1.000	A BB	93339.	10.000	NG/UL	0.99
15	213	754	12:34	14	1.033	A BB	1207.	0.618	NG	0.06
16	162	847	14:07	14	1.160	A BB	53954.	18.967	NG	1.87
17	84	815	13:35	14	1.116	A BB	48188.	19.486	NG	1.92
18	162	749	12:29	14	1.026	A BB	44925.	11.857	NG	1.17
19	NOT	FOUND								
20	42	642	10:42	1	1.247	A VB	82113.	21.783	NG	2.15
21	162	943	15:43	22	0.889	A BV	51724.	17.078	NG	1.69
22	164	1061	17:41	22	1.000	A BB	50922.	10.000	NG/UL	0.99
23	216	898	14:58	22	0.846	A BB	67678.	14.202	NG	1.40
24	168	1027	17:07	22	0.968	A BB	18161.	23.808	NG	2.35
25	168	1006	16:46	22	0.948	A BB	37767.	26.306	NG	2.60
26	143	1115	18:35	22	1.051	A BB	20558.	8.502	NG	0.84
27	232	1129	18:49	22	1.064	A BB	9984.	7.981	NG	0.79
28	250	1100	18:20	22	1.037	A BB	52859.	16.434	NG	1.62
29	143	1129	18:49	22	1.064	A VB	41731.	7.228	NG	0.71
30	75	1256	20:56	22	1.184	A BB	204104.	310.931	NG	30.68
31	152	1176	19:36	22	1.108	A BB	33833.	22.799	NG	2.25
32	188	1343	22:23	32	1.000	A BB	85355.	10.000	NG/UL	0.99
33	108	1259	20:59	32	0.937	A BB	61348.	18.968	NG	1.87
34	173	1329	22:09	32	0.990	A BB	65345.	25.934	NG	2.56
35	169	1312	21:52	32	0.977	A BV	56651.	12.650	NG	1.25
36	237	1335	22:15	32	0.994	A BB	17647.	21.567	NG	2.13
37	211	1357	22:37	32	1.010	A BB	15964.	19.809	NG	1.95
38	190	1507	25:07	32	1.122	A BB	5012.	20.757	NG	2.05
39	240	1857	30:57	39	1.000	A BV	63724.	10.000	NG/UL	0.99
40	120	1688	28:08	39	0.909	A BB	42919.	17.715	NG	1.75
41	139	1698	28:18	39	0.914	A BB	82364.	19.124	NG	1.89
42	212	1754	29:14	39	0.945	A BB	7629.	2.425	NG	0.24
43	181	1805	30:05	39	0.972	A BB	47033.	22.092	NG	2.18
44	231	1854	30:54	39	0.998	A BB	16530.	14.061	NG	1.39
45	264	2154	35:54	45	1.000	A BB	34051.	10.000	NG/UL	0.99
46	268	2241	37:21	45	1.040	A BB	18065.	5.658	NG	0.56
47	256	2066	34:26	45	0.959	A BB	19702.	5.807	NG	0.57

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R.Fac	R.Fac(L)	Ratio
1	8:36	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
2	2:55		0.339						
3	4:36	1.00	0.535	1.00	12.54	10.00	1.418	1.131	1.25
4	4:52	1.00	0.566	1.00	12.99	10.00	1.522	1.171	1.30
5	6:15	1.00	0.727	1.00	24.90	10.00	1.864	0.749	2.49
6	7:54	1.00	0.919	1.00	34.64	10.00	4.500	1.299	3.46
7	6:57	1.00	0.808	1.00	12.98	10.00	1.257	0.969	1.30

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R.Fac	R.Fac(L)	Ratio
8	9:49	1.00	1.141	1.00	16.16	10.00	0.586	0.363	1.62
9	9:53	1.00	1.149	1.00	13.71	10.00	1.070	0.780	1.37
10	5:29	1.00	0.638	1.00	10.75	10.00	0.880	0.818	1.08
11	9:46	1.00	1.136	1.00	37.67	10.00	2.902	0.770	3.77
12	9:54	1.00	1.151	1.00	18.70	10.00	3.213	1.718	1.87
13	9:47	1.00	1.138	1.00	23.77	10.00	3.299	1.388	2.38
14	12:12	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
15	12:36	1.00	1.033	1.00	0.62	10.00	0.013	0.209	0.06
16	14:10	1.00	1.161	1.00	18.97	10.00	0.578	0.305	1.90
17	13:37	1.00	1.116	1.00	19.49	10.00	0.516	0.265	1.95
18	12:32	1.00	1.027	1.00	11.86	10.00	0.481	0.406	1.19
19	13:37		1.116						
20	10:43	1.00	1.246	1.00	21.78	10.00	2.222	1.020	2.18
21	15:46	1.00	0.890	1.00	17.08	10.00	1.016	0.595	1.71
22	17:43	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
23	15:01	1.00	0.848	1.00	14.20	10.00	1.329	0.936	1.42
24	17:09	1.00	0.968	1.00	23.81	10.00	0.357	0.150	2.38
25	16:48	1.00	0.948	1.00	26.31	10.00	0.742	0.282	2.63
26	18:38	1.00	1.052	1.00	8.50	10.00	0.404	0.475	0.85
27	18:52	1.00	1.065	1.00	7.98	10.00	0.196	0.246	0.80
28	18:23	1.00	1.038	1.00	16.43	10.00	1.038	0.632	1.64
29	18:52	1.00	1.065	1.00	7.23	10.00	0.820	1.134	0.72
30	20:57	1.00	1.183	1.00	310.93	10.00	4.008	0.129	31.09
31	19:39	1.00	1.109	1.00	22.80	10.00	0.664	0.291	2.28
32	22:26	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
33	21:01	1.00	0.937	1.00	18.97	10.00	0.719	0.379	1.90
34	22:12	1.00	0.990	1.00	25.93	10.00	0.766	0.295	2.59
35	21:54	1.00	0.976	1.00	12.65	10.00	0.664	0.525	1.27
36	22:18	1.00	0.994	1.00	21.57	10.00	0.207	0.096	2.16
37	22:40	1.00	1.010	1.00	19.81	10.00	0.187	0.094	1.98
38	25:11	1.00	1.123	1.00	20.76	10.00	0.059	0.028	2.08
39	31:01	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
40	28:12	1.00	0.909	1.00	17.72	10.00	0.674	0.380	1.77
41	28:22	1.00	0.915	1.00	19.12	10.00	1.293	0.676	1.91
42	29:18	1.00	0.945	1.00	2.43	10.00	0.120	0.494	0.24
43	30:08	1.00	0.972	1.00	22.09	10.00	0.738	0.334	2.21
44	30:58	1.00	0.998	1.00	14.06	10.00	0.259	0.184	1.41
45	36:00	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
46	37:28	1.00	1.041	1.00	5.66	10.00	0.531	0.938	0.57
47	34:31	1.00	0.959	1.00	5.81	10.00	0.579	0.996	0.58


RIC + SPECTRUM MAP
02/19/90 19:47:00
SAMPLE: CLP,THESIS,IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL
CONDS.: INST. 2:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
DATA: Z3979 #1
CALI: Z3979 #2
SCANS 1250 TO 1270
MASS 70 TO 100
INTEN
50000.
1.
MASS
100
95
90
85
80
75
70
RIC
1255
20:55
1260
21:00
1265
21:05
1270 SCAN
21:10 TIME


RIC + SPECTRUM MAP
02/19/90 19:47:00
SAMPLE: CLP,THESIS,IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL
CONDS.: INST. 2:RESTEK RTX-5/30M, 2MIN@5)275@8C/MIN)302@10C/MIN
DATA: Z3979 #1
CALI: Z3979 #2
SCANS 1250 TO 1270
MASS 200 TO 220
INTEN
10000.
1.
MASS
220
215
210
205
200
RIC
1255
20:55
1260
21:00
1265
21:05
1270
21:10
SCAN
TIME

Quantitation Report File: Z3979

Data: Z3979.TI
02/19/90 19:47:00
Sample: CLP,THESIS,IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL
Conds.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
Formula: Instrument: Z Weight: 0.007
Submitted by: VERSAR Analyst: JK Acct. No.:

AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac. from Library Entry

No	Name
1	C160 PHENANTHRENE-D10**INT. STD. #4**
2	PHORATE
3	DISULFOTON
4	METHYL PARATHION
5	MALATHION
6	PARATHION
7	ALACHLOR
8	ATRAZINE
9	C170 CHRYSENE-D12**INT. STD. #5**
10	FAMPHUR

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
1	188	1343	22:23	1	1.000	A BB	85355.	10.000	NG/UL	4.29
2	75	1256	20:56	1	0.935	A BB	204104.	18.993	NG	8.15
3	88	1356	22:36	1	1.010	A VB	162150.	23.217	NG	9.96
4	109	1430	23:50	1	1.065	A VV	87517.	23.392	NG	10.04
5	125	1483	24:43	1	1.104	A BB	86412.	20.024	NG	8.59
6	97	1506	25:06	1	1.121	A BB	29693.	27.637	NG	11.86
7	160	1438	23:58	1	1.071	A BV	78219.	42.363	NG	18.17
8	200	1302	21:42	1	0.969	A BB	79839.	43.865	NG	18.82
9	240	1857	30:57	9	1.000	A BV	63724.	10.000	NG/UL	4.29
10	218	1755	29:15	9	0.945	A VB	109051.	13.614	NG	5.84

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R.Fac	R.Fac(L)	Ratio
1	22:24	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
2	20:57	1.00	0.935	1.00	18.99	20.00	1.196	1.259	0.95
3	22:37	1.00	1.010	1.00	23.22	20.00	0.950	0.818	1.16
4	23:51	1.00	1.065	1.00	23.39	20.00	0.513	0.438	1.17
5	24:44	1.00	1.104	1.00	20.02	20.00	0.506	0.506	1.00
6	25:07	1.00	1.121	1.00	27.64	20.00	0.174	0.126	1.38
7	23:59	1.00	1.071	1.00	42.36	20.00	0.458	0.216	2.12
8	21:42	1.00	0.969	1.00	43.87	20.00	0.468	0.213	2.19
9	30:58	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
10	29:16	1.00	0.945	1.00	13.61	20.00	0.856	1.257	0.68

Quantitation Report File: Z3979

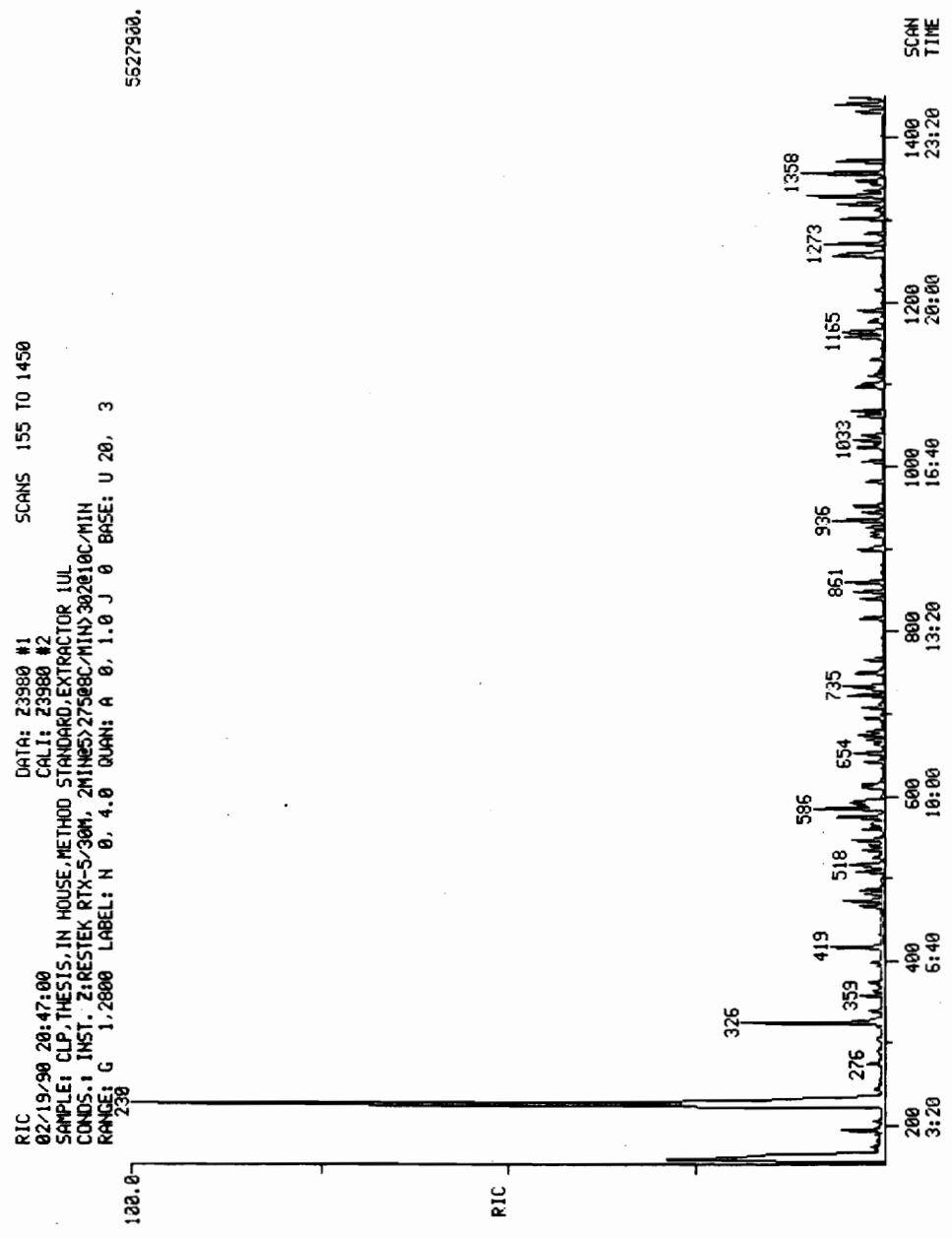
Data: Z3979.TI
02/19/90 19:47:00
Sample: CLP,THESIS,IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL
Conds.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
Formula: Instrument: Z Weight: 0.007
Submitted by: VERSAR Analyst: JK Acct. No.:

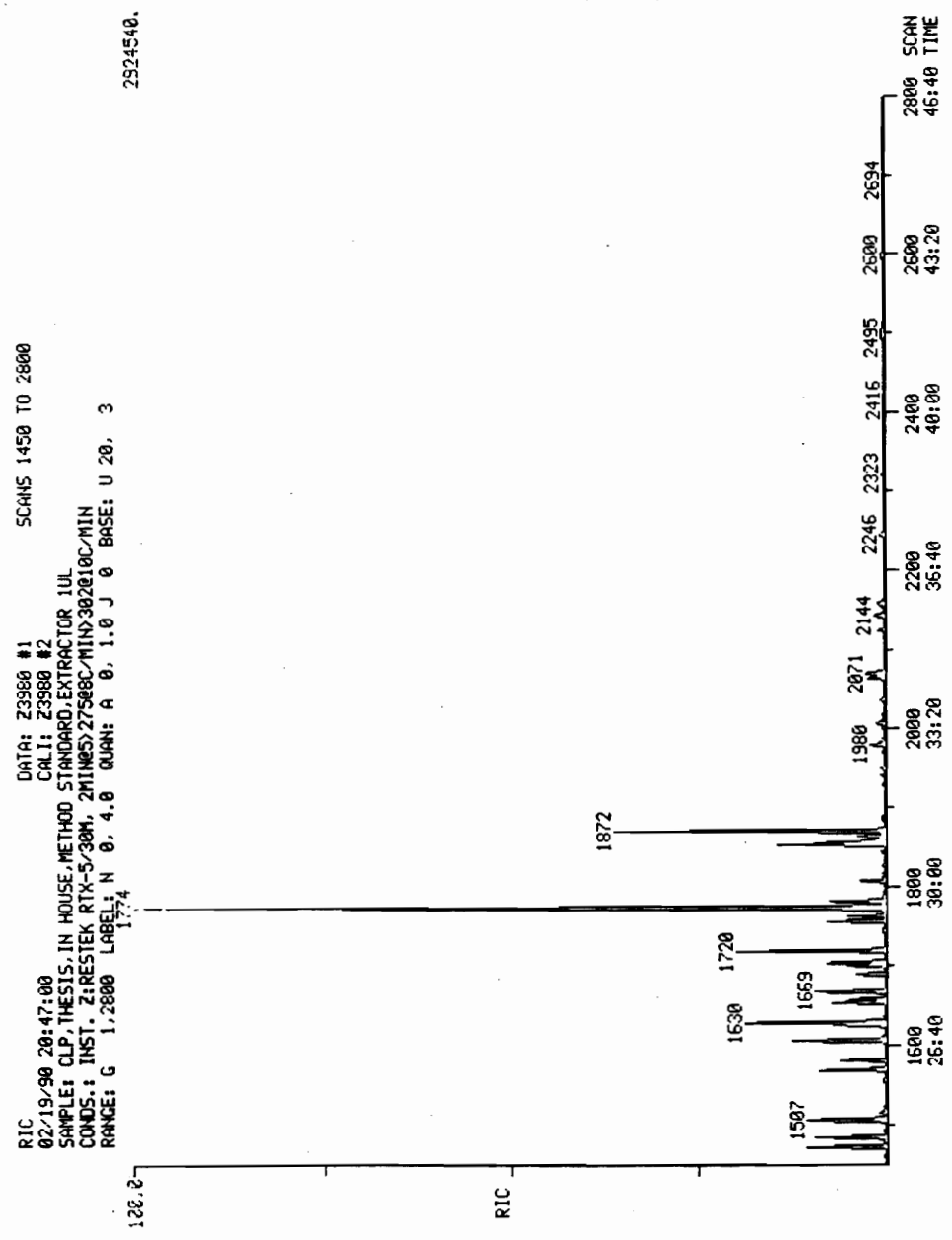
AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac. from Library Entry

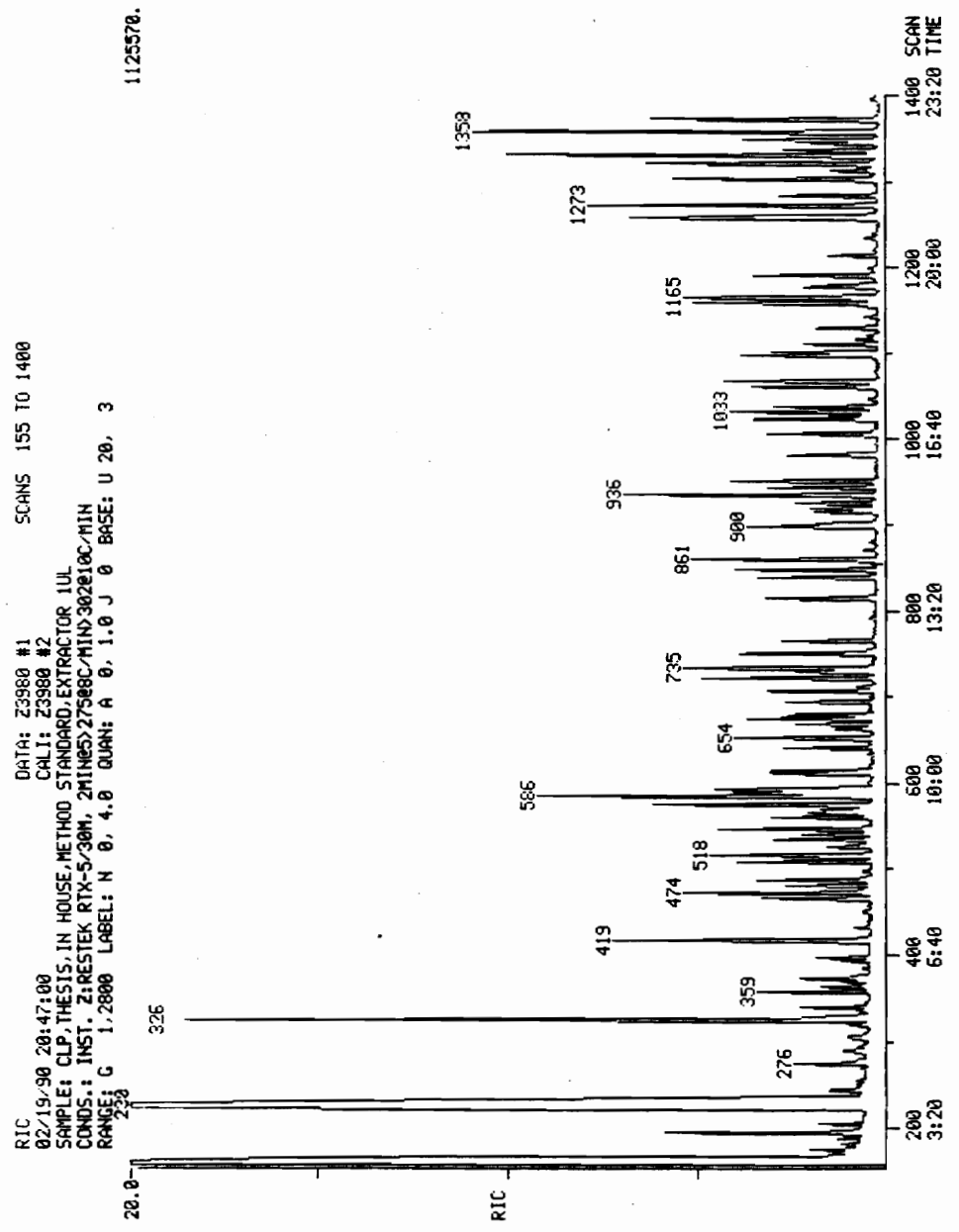
No	Name
1	CI60 PHENANTHRENE-D10**INT. STD. #4**
2	ALPHA BHC
3	BETA BHC
4	GAMMA BHC (LINDANE)
5	DELTA BHC
6	HEPTACHLOR
7	HEPTACHLOR EPOXIDE
8	GAMMA CHLORODANE
9	CI70 CHRYSENE-D12**INT. STD. #5**
10	ALPHA ENDOSULFAN
11	4,4'-DDE
12	DIELDRIN
13	ENDRIN
14	BETA ENDOSULFAN
15	4,4'-DDD
16	ENDRIN ALDEHYDE
17	4,4'-DDT
18	ENDOSULFAN SULFATE
19	ALPHA-CHLORODANE
20	P,P'-METHOXYCHLOR
21	ALDRIN

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
1	188	1343	22:23	1	1.000	A BB	85355.	10.000	NG/UL	1.39
2	181	1271	21:11	1	0.946	A BB	87088.	42.365	NG	5.89
3	181	1319	21:59	1	0.982	A BV	61711.	41.465	NG	5.76
4	181	1329	22:09	1	0.990	A VV	75382.	42.181	NG	5.86
5	183	1371	22:51	1	1.021	A BB	56609.	39.338	NG	5.46
6	100	1446	24:06	1	1.077	A BB	43955.	41.736	NG	5.80
7	81	1568	26:08	1	1.168	A VB	46862.	50.361	NG	7.00
8	373	1605	26:45	1	1.195	A BB	40280.	47.011	NG	6.53
9	240	1857	30:57	9	1.000	A BV	63724.	10.000	NG/UL	1.39
10	195	1626	27:06	9	0.876	A BB	21176.	26.818	NG	3.73
11	248	1652	27:32	9	0.890	A BB	34677.	22.486	NG	3.12
12	79	1666	27:46	9	0.897	A VB	77641.	44.085	NG	6.12
13	81	1702	28:22	9	0.917	A VB	21702.	38.441	NG	5.34
14	159	1716	28:36	9	0.924	A BB	15153.	36.350	NG	5.05
15	235	1717	28:37	9	0.925	A BV	123144.	35.668	NG	4.96
16	67	1745	29:05	9	0.940	A BB	1834.	~~1.760~~	~~NG~~	0.24
17	165	1774	29:34	9	0.955	A BV	65086.	41.618	NG	5.78
18	272	1780	29:40	9	0.959	A BB	22020.	32.608	NG	4.53
19	373	1627	27:07	9	0.876	A BB	38646.	19.121	NG	2.66
20	227	1851	30:51	9	0.997	A BB	237720.	57.654	NG	8.01
21	66	1504	25:04	1	1.120	A BB	64361.	38.760	NG	5.38

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R.Fac	R.Fac(L)	Ratio
1	22:26	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
2	21:14	1.00	0.947	1.00	42.37	20.00	0.510	0.241	2.12
3	22:01	1.00	0.981	1.00	41.47	20.00	0.361	0.174	2.07
4	22:11	1.00	0.989	1.00	42.18	20.00	0.442	0.209	2.11
5	22:53	1.00	1.020	1.00	39.34	20.00	0.332	0.169	1.97
6	24:10	1.00	1.077	1.00	41.74	20.00	0.257	0.123	2.09
7	26:11	1.00	1.167	1.00	50.36	20.00	0.275	0.109	2.52
8	26:48	1.00	1.195	1.00	47.01	25.00	0.189	0.100	1.88
9	31:00	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
10	27:10	1.00	0.876	1.00	26.82	20.00	0.166	0.124	1.34
11	27:36	1.00	0.890	1.00	22.49	20.00	0.272	0.242	1.12
12	27:50	1.00	0.898	1.00	44.08	20.00	0.609	0.276	2.20
13	28:27	1.00	0.918	1.00	38.44	20.00	0.170	0.089	1.92
14	28:40	1.00	0.925	1.00	36.35	20.00	0.119	0.065	1.82
15	28:41	1.00	0.925	1.00	35.67	20.00	0.966	0.542	1.78
16	29:09	1.00	0.940	1.00	1.76	20.00	0.014	0.163	0.09
17	29:37	1.00	0.955	1.00	41.62	20.00	0.511	0.245	2.08
18	29:43	1.00	0.959	1.00	32.61	20.00	0.173	0.106	1.63
19	27:11	1.00	0.877	1.00	19.12	25.00	0.243	0.317	0.76
20	30:54	1.00	0.997	1.00	57.65	25.00	1.492	0.647	2.31
21	25:08	1.00	1.120	1.00	38.76	20.00	0.377	0.195	1.94


RIC
02/19/90 20:47:00
SAMPLE: CLP,THESIS,IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL
CONDS.: INST. 2:RESTEK RTX-5/30M, 2MIN@5>275@C/MIN>302@10C/MIN
RANGE: G 1,2@@@ LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
DATA: Z3980 #1
CALI: Z3980 #2
SCANS 155 TO 1450
5527@@@.
100.0
RIC
230
326
276
359
419
518
586
654
735
861
936
1033
1165
1273
1358
200
3:20
400
6:40
600
10:00
800
13:20
1000
16:40
1200
20:00
1400
23:20
SCAN
TIME


RIC
02/19/90 20:47:00
SAMPLE: CLP.THESIS.IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL
CONDS.: INST. 2:RESTEK RTX-5/30M, 2MIN@5)275@8C/MIN)302@10C/MIN
RANGE: G 1,2800 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20. 3
DATA: Z3980 #1
CALI: Z3980 #2
SCANS 1450 TO 2800
2924540.
128.2
RIC
1774
1872
1720
1630
1669
1507
1980
2071
2144
2246
2323
2416
2495
2600
2694
1600
26:40
1800
30:00
2000
33:20
2200
36:40
2400
40:00
2600
43:20
2800
46:40
SCAN
TIME


RIC
02/19/90 20:47:00
SAMPLE: CLP,THESIS,IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL
CONDS.: INST. 2:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
RANGE: G 1,2000 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
DATA: Z3980 #1
CALI: Z3980 #2
SCANS 155 TO 1400
1125570.
20.0
RIC
230
326
276
359
419
474
518
586
654
735
861
900
936
1033
1165
1273
1353
200
3:20
400
6:40
600
10:00
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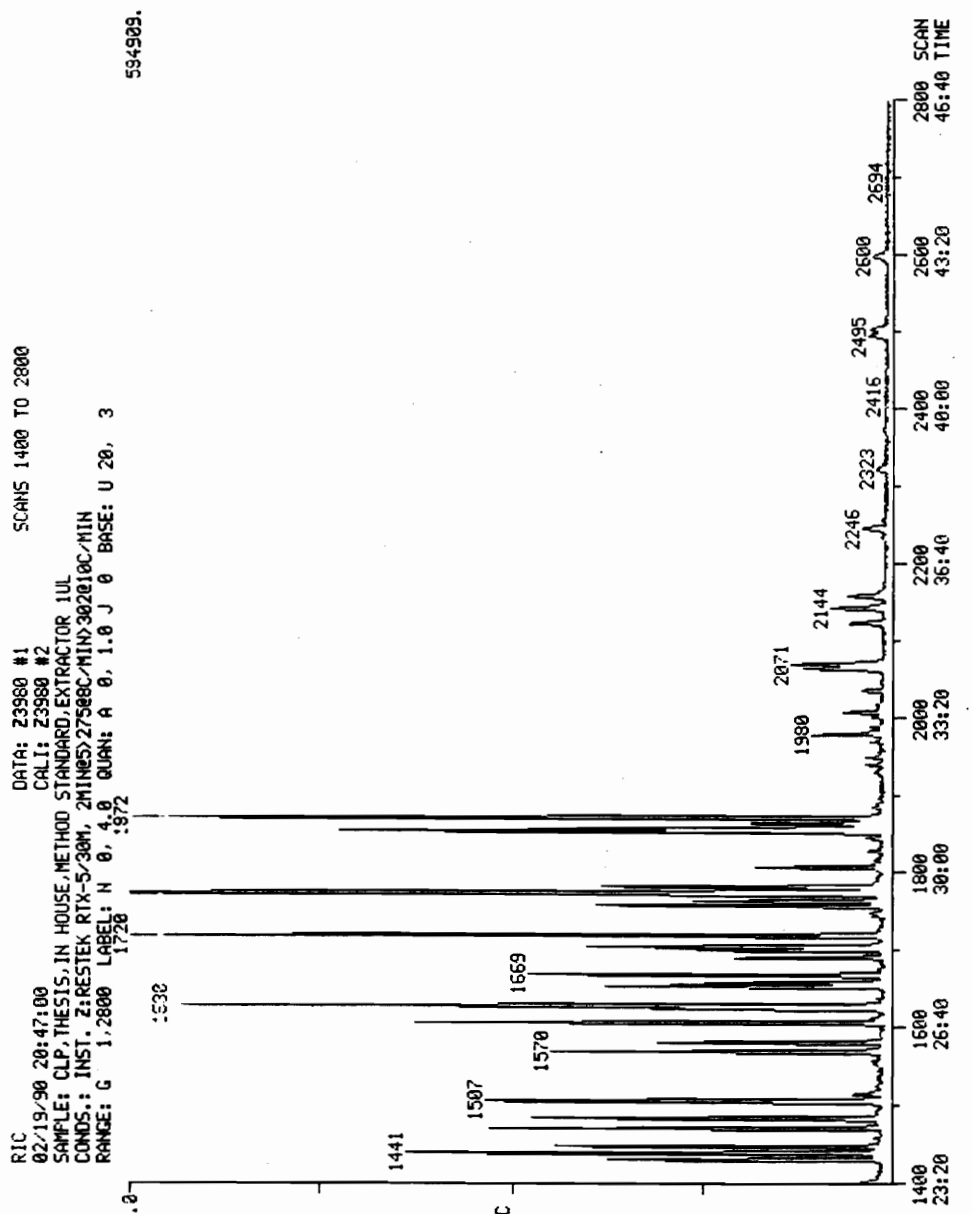
13:20
1000
16:40
1200
20:00
1400
23:20
SCAN
TIME


RIC
02/19/90 20:47:00
SAMPLE: CLP,THESIS,IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL
CONDS.: INST. Z:RESTEK RTX-5/30M, 2MIN@5)275@8C/MIN)3@2@10C/MIN
RANGE: G 1,2800 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
DATA: Z3980 #1
CALI: Z3980 #2
SCANS 1400 TO 2800
534909.
20.0
RIC
1441
1507
1570
1669
1720
1972
1980
2071
2144
2246
2323
2416
2495
2600
2694
1400 23:20
1600 26:40
1800 30:00
2000 33:20
2200 36:40
2400 40:00
2600 43:20
2800 46:40 SCAN TIME

Quantitation Report File: Z3980

Data: Z3980.TI
02/19/90 20:47:00
Sample: CLP,THESIS,IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL
Conds.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
Formula: Instrument: Z Weight: 0.007
Submitted by: VERSAR Analyst: JK Acct. No.:

AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac. from Library Entry

No	Name
1	CI30 1,4-DICHLOROBENZENE-D4 **INT. STD. #1**
2	C330 2-CHLOROPHENOL
3	C315 PHENOL
4	C325 BIS (2-CHLOROETHYL) ETHER
5	C335 1,3-DICHLOROBENZENE
6	C340 1,4-DICHLOROBENZENE
7	C350 1,2-DICHLOROBENZENE
8	C345 BENZYL ALCOHOL
9	C360 BIS (2-CHLOROISOPROPYL) ETHER
10	C355 2-METHYLPHENOL
11	C375 HEXACHLOROETHANE
12	C365 4-METHYLPHENOL
13	C370 N-NITROSO-DI-N-PROPYLAMINE
14	CS50 2-FLUOROPHENOL**ACID SURR.**
15	CS45 PHENOL-D5**ACID SURR.**
16	CI40 NAPHTHALENE-D8**INT. STD.#2**
17	C410 NITROBENZENE
18	C415 ISOPHORONE
19	C420 2-NITROPHENOL
20	C425 2,4-DIMETHYLPHENOL
21	C435 BIS (2-CHLOROETHOXY) METHANE
22	C440 2,4-DICHLOROPHENOL
23	C445 1,2,4-TRICHLOROBENZENE
24	C450 NAPHTHALENE
25	C430 BENZOIC ACID
26	C455 4-CHLOROANILINE
27	C460 HEXACHLOROBUTADIENE
28	C465 4-CHLORO-3-METHYLPHENOL
29	C470 2-METHYLNAPHTHALENE
30	CS20 NITROBENZENE-D5**BN SURR.**
31	CI50 ACENAPHTHENE-D10**INT. STD.#3**
32	C510 HEXACHLOROCYCLOPENTADIENE
33	C515 2,4,6-TRICHLOROPHENOL
34	C520 2,4,5-TRICHLOROPHENOL
35	C525 2-CHLORONAPHTHALENE
36	C530 2-NITROANILINE
37	C540 ACENAPHTHYLENE
38	C535 DIMETHYL PHTHALATE
39	C544 2,6-DINITROTOLUENE
40	C550 ACENAPHTHENE
41	C545 3-NITROANILINE
42	C555 2,4-DINITROPHENOL
43	C565 DIBENZOFURAN
44	C560 4-NITROPHENOL
45	C570 2,4-DINITROTOLUENE
46	C590 FLUORENE
47	C585 4-CHLOROPHENYL-PHENYLETHER

No	Name
48	C580 DIETHYLPHTHALATE
49	C595 4-NITROANILINE
50	CS25 2-FLUOROBIPHENYL**BN SURR.**

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
1	152	515	8:35	1	1.000	A BB	43034.	10.000	NG/UL	0.71
2	128	488	8:08	1	0.948	A BB	81368.	17.695	NG.	1.25
3	94	468	7:48	1	0.909	A BV	83048.	14.197	NG.	1.01
4	93	483	8:03	1	0.938	A VV	89956.	21.230	NG	1.50
5	146	510	8:30	1	0.990	A BV	109901.	16.265	NG	1.15
6	146	518	8:38	1	1.006	A VB	124407.	17.771	NG.	1.26
7	146	548	9:08	1	1.064	A BB	115801.	17.805	NG	1.26
8	108	542	9:02	1	1.052	A BV	29028.	14.244	NG	1.01
9	45	567	9:27	1	1.101	A BV	92151.	21.095	NG	1.50
10	108	562	9:22	1	1.091	A BV	61605.	17.613	NG	1.25
11	117	596	9:56	1	1.157	A BB	36805.	16.902	NG	1.20
12	108	586	9:46	1	1.138	A BV	122158.	35.470	NG	2.51
13	70	591	9:51	1	1.148	A VB	75962.	23.200	NG.	1.64
14	112	341	5:41	1	0.662	A BB	48303.	10.295	NG#A1	0.73
15	99	466	7:46	1	0.905	A BB	37760.	7.674	NG#A2	0.54
16	136	731	12:11	16	1.000	A BB	101557.	10.000	NG/UL	0.71
17	77	615	10:15	16	0.841	A BB	96577.	23.392	NG	1.66
18	82	654	10:54	16	0.895	A BB	193825.	21.754	NG	1.54
19	139	669	11:09	16	0.915	A BB	39105.	18.669	NG	1.32
20	107	676	11:16	16	0.925	A VB	82549.	18.334	NG	1.30
21	93	695	11:35	16	0.951	A BV	95150.	19.979	NG	1.42
22	162	708	11:48	16	0.969	A BB	73855.	17.802	NG	1.26
23	180	724	12:04	16	0.990	A BB	92481.	20.731	NG.	1.47
24	128	735	12:15	16	1.005	A BB	264770.	19.799	NG	1.40
25	122	689	11:29	16	0.943	A BB	171.	0.085	NG	0.01
26	127	752	12:32	16	1.029	A BV	86170.	34.785	NG	2.47
27	225	766	12:46	16	1.048	A BB	33149.	13.492	NG	0.96
28	107	840	14:00	16	1.149	A BB	72417.	19.820	NG.	1.40
29	142	861	14:21	16	1.178	A BB	162541.	19.557	NG	1.39
30	82	612	10:12	16	0.837	A BB	105938.	23.888	NG#B1	1.69
31	164	1062	17:42	31	1.000	A BB	53215.	10.000	NG/UL	0.71
32	237	902	15:02	31	0.849	A BB	19252.	11.100	NG	0.79
33	196	920	15:20	31	0.866	A BV	26787.	11.470	NG	0.81
34	196	926	15:26	31	0.872	A VB	39390.	16.830	NG	1.19
35	162	953	15:53	31	0.897	A VB	159283.	19.470	NG	1.38
36	65	983	16:23	31	0.926	A BB	43911.	24.960	NG	1.77
37	152	1033	17:13	31	0.973	A BB	211887.	20.037	NG	1.42
38	163	1024	17:04	31	0.964	A BB	185710.	22.052	NG	1.56
39	165	1039	17:19	31	0.978	A VB	35772.	28.984	NG	2.05
40	153	1069	17:49	31	1.007	A BB	135453.	18.005	NG.	1.28
41	138	1063	17:43	31	1.001	A BB	33844.	24.403	NG	1.73
42	NOT FOUND									
43	168	1098	18:18	31	1.034	A BB	202360.	20.180	NG	1.43
44	NOT FOUND									
45	165	1112	18:32	31	1.047	A BB	40745.	25.666	NG.	1.82
46	166	1165	19:25	31	1.097	A BB	165207.	21.452	NG	1.52
47	204	1167	19:27	31	1.099	A BB	77546.	22.350	NG	1.58
48	149	1160	19:20	31	1.092	A BV	273369.	20.437	NG	1.45
49	138	1181	19:41	31	1.112	A BV	25692.	24.183	NG	1.71
50	172	936	15:36	31	0.881	A BB	173446.	19.593	NG#B2	1.39

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R. Fac	R. Fac(L)	Ratio
1	8:36	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
2	8:08	1.00	0.946	1.00	17.70	10.00	1.891	1.069	1.77
3	7:48	1.00	0.907	1.00	14.20	10.00	1.930	1.359	1.42
4	8:03	1.00	0.936	1.00	21.23	10.00	2.090	0.985	2.12
5	8:30	1.00	0.988	1.00	16.26	10.00	2.554	1.570	1.63
6	8:38	1.00	1.004	1.00	17.77	10.00	2.891	1.627	1.78
7	9:08	1.00	1.062	1.00	17.81	10.00	2.691	1.511	1.78
8	9:02	1.00	1.050	1.00	14.24	10.00	0.675	0.474	1.42
9	9:27	1.00	1.099	1.00	21.10	10.00	2.141	1.015	2.11
10	9:21	1.00	1.087	1.00	17.61	10.00	1.432	0.813	1.76
11	9:56	1.00	1.155	1.00	16.90	10.00	0.855	0.506	1.69
12	9:45	1.00	1.134	1.00	35.47	10.00	2.839	0.800	3.55
13	9:51	1.00	1.145	1.00	23.20	10.00	1.765	0.761	2.32
14	5:41	1.00	0.661	1.00	10.30	10.00	1.122	1.090	1.03
15	7:46	1.00	0.903	1.00	7.67	10.00	0.877	1.143	0.77
16	12:12	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
17	10:16	1.00	0.842	1.00	23.39	10.00	0.951	0.407	2.34
18	10:54	1.00	0.893	1.00	21.75	10.00	1.909	0.877	2.18
19	11:10	1.00	0.915	1.00	18.67	10.00	0.385	0.206	1.87
20	11:16	1.00	0.923	1.00	18.33	10.00	0.813	0.443	1.83
21	11:36	1.00	0.951	1.00	19.98	10.00	0.937	0.469	2.00
22	11:49	1.00	0.969	1.00	17.80	10.00	0.727	0.409	1.78
23	12:04	1.00	0.989	1.00	20.73	10.00	0.911	0.439	2.07
24	12:15	1.00	1.004	1.00	19.80	10.00	2.607	1.317	1.98
25	11:29	1.00	0.941	1.00	0.08	10.00	0.002	0.199	0.01
26	12:32	1.00	1.027	1.00	34.78	10.00	0.848	0.244	3.48
27	12:47	1.00	1.048	1.00	13.49	10.00	0.326	0.242	1.35
28	14:00	1.00	1.148	1.00	19.82	10.00	0.713	0.360	1.98
29	14:22	1.00	1.178	1.00	19.56	10.00	1.600	0.818	1.96
30	10:13	1.00	0.837	1.00	23.89	10.00	1.043	0.437	2.39
31	17:43	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
32	15:03	1.00	0.849	1.00	11.10	10.00	0.362	0.326	1.11
33	15:20	1.00	0.865	1.00	11.47	10.00	0.503	0.439	1.15
34	15:27	1.00	0.872	1.00	16.83	10.00	0.740	0.440	1.68
35	15:53	1.00	0.897	1.00	19.47	10.00	2.993	1.537	1.95
36	16:23	1.00	0.925	1.00	24.96	10.00	0.825	0.331	2.50
37	17:13	1.00	0.972	1.00	20.04	10.00	3.982	1.987	2.00
38	17:04	1.00	0.963	1.00	22.05	10.00	3.490	1.583	2.21
39	17:19	1.00	0.977	1.00	28.98	10.00	0.672	0.232	2.90
40	17:49	1.00	1.006	1.00	18.00	10.00	2.545	1.414	1.80
41	17:43	1.00	1.000	1.00	24.40	10.00	0.636	0.261	2.44
42	18:02		1.018						
43	18:18	1.00	1.033	1.00	20.18	10.00	3.803	1.884	2.02
44	18:14		1.029						
45	18:32	1.00	1.046	1.00	25.67	10.00	0.766	0.298	2.57
46	19:25	1.00	1.096	1.00	21.45	10.00	3.105	1.447	2.15
47	19:27	1.00	1.098	1.00	22.35	10.00	1.457	0.652	2.24
48	19:19	1.00	1.090	1.00	20.44	10.00	5.137	2.514	2.04
49	19:41	1.00	1.111	1.00	24.18	10.00	0.483	0.200	2.42
50	15:36	1.00	0.881	1.00	19.59	10.00	3.259	1.663	1.96

Quantitation Report File: Z3980

Data: Z3980.TI
02/19/90 20:47:00
Sample: CLP,THESIS,IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL
Conds.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
Formula: Instrument: Z Weight: 0.007
Submitted by: VERSAR Analyst: JK Acct. No.:

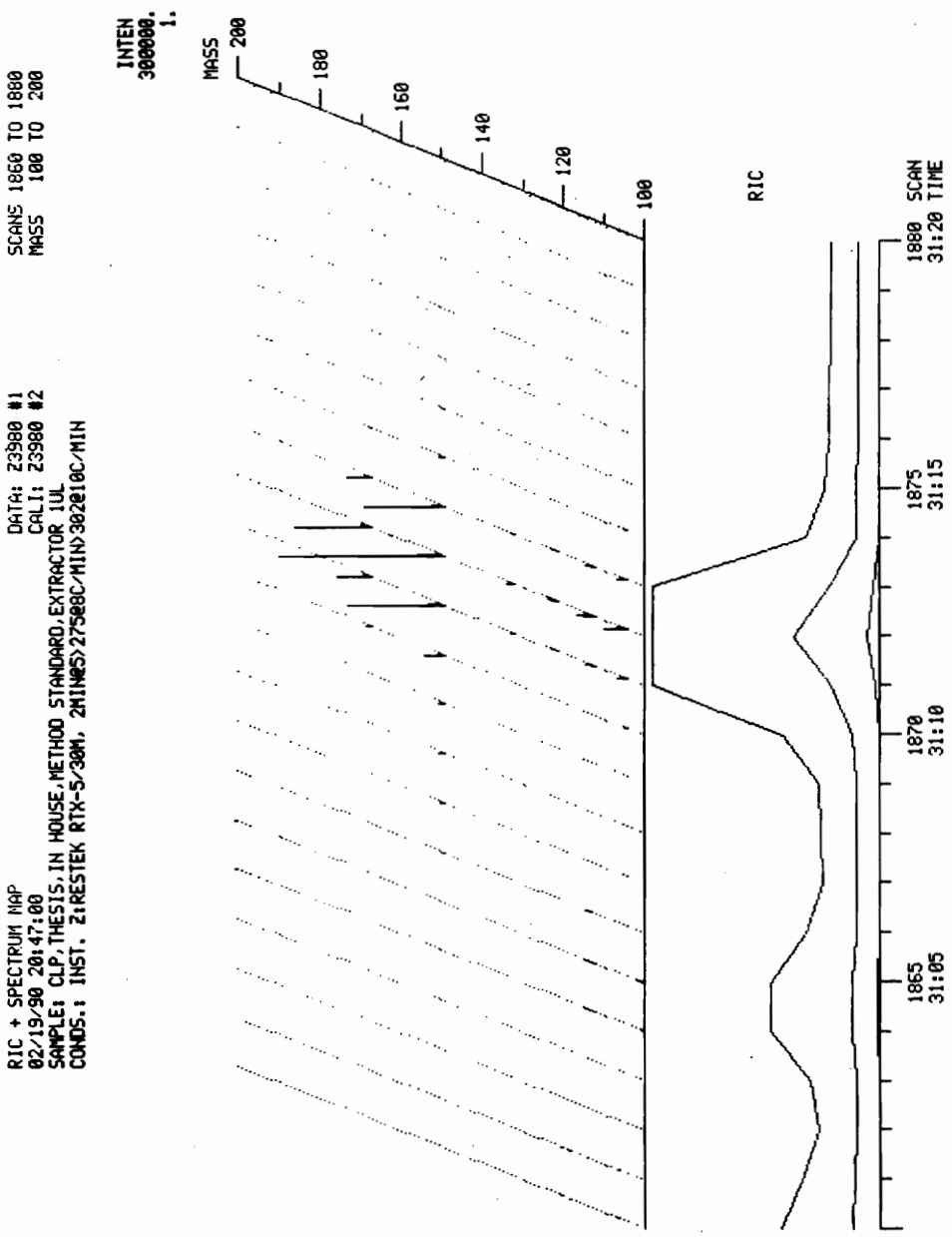
AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac. from Library Entry

No	Name
51	CS55 2,4,6,-TRIBROMOPHENOL**ACID SURR.**
52	CI60 PHENANTHRENE-D10**INT. STD.#4**
53	C635 PENTACHLOROPHENOL
54	C640 PHENANTHRENE
55	C645 ANTHRACENE
56	C650 DI-N-BUTYLPHTHALATE
57	C655 FLUORANTHENE
58	C610 4,6-DINITRO-2-METHYLPHENOL
59	C615 N-NITROSODIPHENYLAMINE
60	C625 4-BROMOPHENYL-PHENYLETHER
61	C630 HEXACHLOROBENZENE
62	CI70 CHRYSENE-D12**INT. STD.#5**
63	C720 BUTYLBENZYLPHTHALATE
64	C730 BENZO(A)ANTHRACENE
65	C740 CHRYSENE
66	C725 3,3'-DICHLOROBENZIDINE
67	C741 BIS(2-ETHYLHEXYL)PHTHALATE
68	CS30 P-TERPHENYL-D14**BN SURR.**
69	C715 PYRENE
70	CI75 PERYLENE-D12**INT. STD.#6**
71	C760 DI-N-OCTYL PHTHALATE
72	C765 BENZO(B)FLUORANTHENE
73	C770 BENZO(K)FLUORANTHENE
74	C775 BENZO(A)PYRENE
75	C780 INDENO(1,2,3-CD)PYRENE
76	C785 DIBENZ(A,H)ANTHRACENE
77	C790 BENZO(G,H,I)PERYLENE
78	C310 N-NITROSODIMETHYLAMINE

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
51	330	1215	20:15	31	1.144	A BB	14745.	20.070	NG#A3	1.42
52	188	1346	22:26	52	1.000	A BB	91044.	10.000	NG/UL	0.71
53	266	1321	22:01	52	0.981	A BB	2816.	2.497	NG.	0.18
54	178	1350	22:30	52	1.003	A BV	208118.	19.220	NG	1.36
55	178	1358	22:38	52	1.009	A VV	244476.	22.502	NG	1.59
56	149	1473	24:33	52	1.094	A BV	349970.	31.636	NG	2.24
57	202	1582	26:22	52	1.175	A BV	174567.	22.053	NG	1.56
58	198	1187	19:47	52	0.882	A BB	234.	0.290	NG	0.02
59	169	1192	19:52	52	0.886	A BB	104172.	20.854	NG	1.48
60	248	1260	21:00	52	0.936	A BB	43522.	21.960	NG	1.56
61	284	1285	21:25	52	0.955	A BB	37681.	14.347	NG	1.02
62	240	1860	31:00	62	1.000	A VB	64145.	10.000	NG/UL	0.71
63	149	1764	29:24	62	0.948	A BV	83533.	21.805	NG	1.55
64	228	1857	30:57	62	0.998	A BV	161715.	26.403	NG	1.87
65	228	1864	31:04	62	1.002	A VB	99059.	15.594	NG	1.11

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
66	252	1857	30:57	62	0.998	A BB	36004.	22.368	NG	1.59
67	149	1872	31:12	62	1.006	A BV	497142.	93.868	NG	6.65
68	244	1660	27:40	62	0.892	A BV	99782.	16.919	NG*BG	1.20
69	202	1626	27:06	62	0.874	A BB	165436.	17.807	NG.	1.26
70	264	2159	35:59	70	1.000	A BB	31487.	10.000	NG/UL	0.71
71	149	1980	33:00	70	0.917	A BB	82317.	11.144	NG	0.79
72	252	2065	34:25	70	0.956	A BV	93802.	15.840	NG	1.12
73	252	2071	34:31	70	0.959	A VB	71278.	13.460	NG	0.95
74	252	2144	35:44	70	0.993	A BV	61831.	12.871	NG	0.91
75	276	2495	41:35	70	1.156	A BB	39703.	9.260	NG	0.66
76	278	2504	41:44	70	1.160	A BB	27508.	6.740	NG	0.48
77	276	2599	43:19	70	1.204	A BB	35802.	8.024	NG	0.57
78	74	207	3:27	1	0.402	A BV	26958.	8.689	NG	0.62

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R.Fac	R.Fac(L)	Ratio
51	20:16	1.00	1.144	1.00	20.07	10.00	0.277	0.138	2.01
52	22:26	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
53	22:01	1.00	0.982	1.00	2.50	10.00	0.031	0.124	0.25
54	22:29	1.00	1.003	1.00	19.22	10.00	2.286	1.189	1.92
55	22:38	1.00	1.010	1.00	22.50	10.00	2.685	1.193	2.25
56	24:32	1.00	1.094	1.00	31.64	10.00	3.844	1.215	3.16
57	26:22	1.00	1.176	1.00	22.05	10.00	1.917	0.869	2.21
58	19:47	1.00	0.883	1.00	0.29	10.00	0.003	0.089	0.03
59	19:52	1.00	0.886	1.00	20.85	10.00	1.144	0.549	2.09
60	21:00	1.00	0.937	1.00	21.96	10.00	0.478	0.218	2.20
61	21:25	1.00	0.955	1.00	14.35	10.00	0.414	0.288	1.43
62	31:01	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
63	29:24	1.00	0.948	1.00	21.80	10.00	1.302	0.597	2.18
64	30:56	1.00	0.998	1.00	26.40	10.00	2.521	0.955	2.64
65	31:04	1.00	1.002	1.00	15.59	10.00	1.544	0.990	1.56
66	30:57	1.00	0.998	1.00	22.37	10.00	0.561	0.251	2.24
67	31:12	1.00	1.006	1.00	93.87	10.00	7.750	0.826	9.39
68	27:39	1.00	0.892	1.00	16.92	10.00	1.556	0.919	1.69
69	27:05	1.00	0.874	1.00	17.81	10.00	2.579	1.448	1.78
70	36:00	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
71	33:00	1.00	0.917	1.00	11.14	10.00	2.614	2.346	1.11
72	34:25	1.00	0.956	1.00	15.84	10.00	2.661	1.680	1.58
73	34:31	1.00	0.959	1.00	13.46	10.00	2.264	1.682	1.35
74	35:45	1.00	0.994	1.00	12.87	10.00	1.964	1.526	1.29
75	41:38	1.00	1.157	1.00	9.26	10.00	1.261	1.362	0.93
76	41:44	1.00	1.160	1.00	6.74	10.00	0.874	1.296	0.67
77	43:20	1.00	1.204	1.00	8.02	10.00	1.137	1.417	0.80
78	3:26	1.00	0.399	1.01	8.69	10.00	0.626	0.721	0.87


RIC + SPECTRUM MAP
02/19/90 20:47:00
SAMPLE: CLP,THESIS.IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL
CONDS.: INST. 2:RESTEK RTX-5/30M, 2MIN@5)275@C/MIN)3@2@10C/MIN
DATA: 23980 #1
CALI: 23980 #2
SCANS 1860 TO 1880
MASS 100 TO 200
INTEN
300000.
1.
MASS
200
180
160
140
120
100
RIC
1865
31:05
1870
31:10
1875
31:15
1880
31:20
SCAN
TIME

Quantitation Report File: Z3980

Data: Z3980.TI
02/19/90 20:47:00
Sample: CLP,THESIS,IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL
Conds.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
Formula: Instrument: Z Weight: 0.007
Submitted by: VERSAR Analyst: JK Acct. No.:

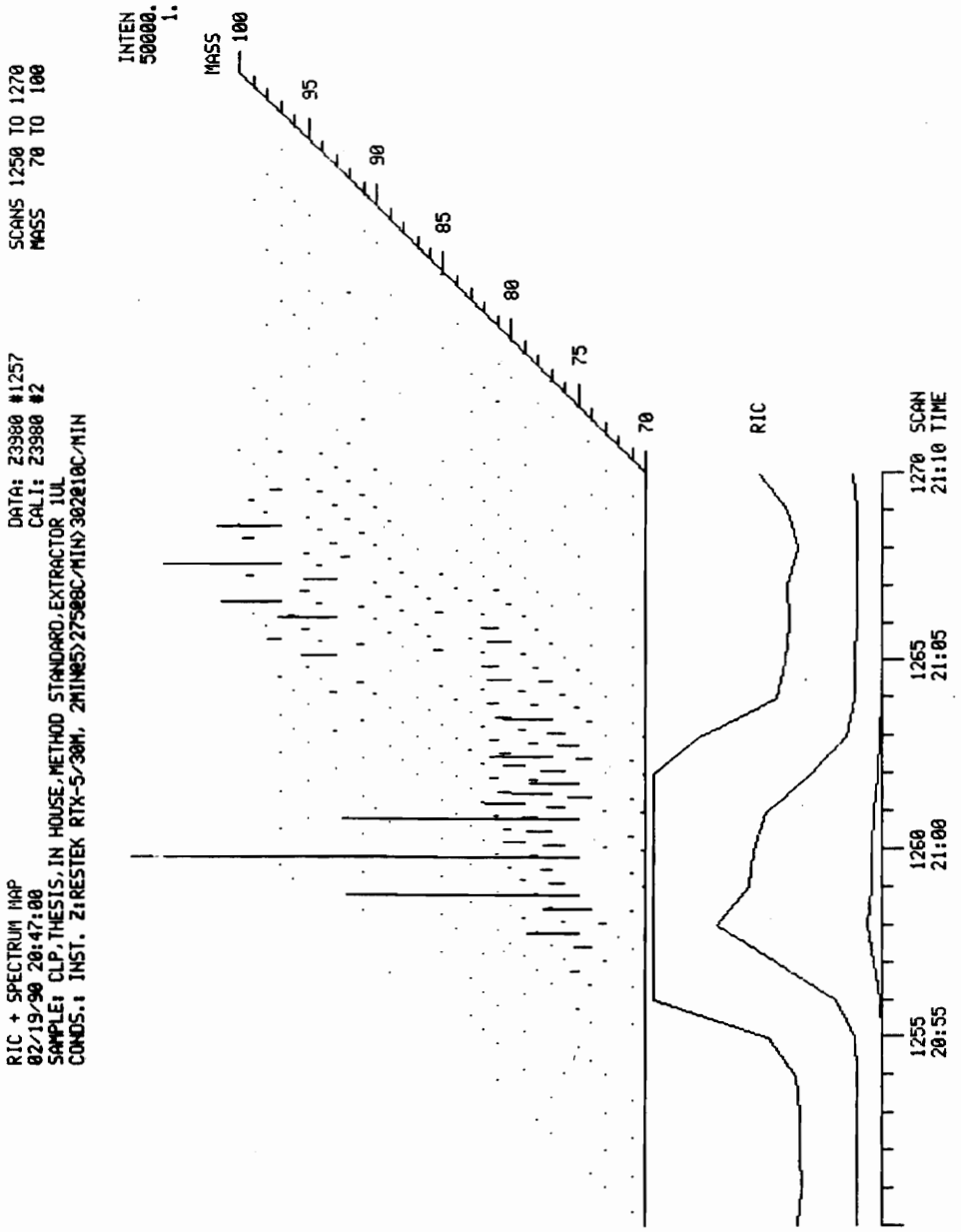
AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac. from Library Entry

No	Name
1	CI30 1,4-DICHLOROBENZENE-D4 **INT. STD. #1**
2	C017 2-ETHOXYETHANOL
3	C930 2-PICOLINE
4	C922 N-NITROSOMETHYLETHYLAMINE
5	C921 N-NITROSODIETHYLAMINE
6	C320 ANILINE
7	C948 ETHYL METHANESULFONATE
8	C925 N-NITROSOPYRROLIDINE
9	C923 N-NITROSOMORPHOLINE
10	C940 M-CRESOL
11	C952 O-TOLUIDINE
12	C900 ACETOPHENONE
13	CI40 NAPHTHALENE-D8**INT. STD. #2**
14	C911 HEXACHLOROPROPENE
15	C932 SAFROLE
16	C920 N-NITROSODI-N-BUTYLAMINE
17	C906 2,6-DICHLOROPHENOL
18	C950 P-PHENYLENEDIAMINE
19	C924 N-NITROSOPIPERIDINE
20	C912 ISOSAFROLE
21	CI50 ACENAPHTHENE-D10**INT. STD. #3**
22	C933 1,2,4,5-TETRACHLOROBENZENE
23	C947 M-DINITROBENZENE
24	C909 P-DINITROBENZENE
25	C919 2-NAPHTHYLAMINE
26	C934 2,3,4,6-TETRACHLOROPHENOL
27	C927 PENTACHLOROBENZENE
28	C897 1-NAPHTHYLAMINE
29	C954 SYM-TRINITROBENZENE
30	C926 5-NITRO-O-TOLUIDINE
31	CI60 PHENANTHRENE-D10**INT. STD. #4**
32	C929 PHENACETIN
33	C931 PRONAMIDE
34	C902 4-AMINOBIPHENYL
35	C928 PENTACHLORONITROBENZENE
36	C904 DINOSEB
37	C949 4-NITROQUINOLINE-1-OXIDE
38	CI70 CHRYSENE-D12**INT. STD. #5**
39	C907 P-(DIMETHYLAMINO)AZOBENZENE
40	C905 CHLOROBENZILATE
41	C908 3,3'DIMETHYLBENZIDINE
42	C901 2-ACETYLAMINOFLUORENE
43	C915 4,4'-METHYLENEBIS(2-CHLOROANILINE)
44	CI75 PERYLENE-D12**INT. STD. #6**
45	C914 3-METHYLCHOLANTHRENE
46	C945 7,12-DIMETHYLBENZ(A)ANTHRACENE
47	C916 METHYL METHANESULFONATE

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
1	152	515	8:35	1	1.000	A BB	43034.	10.000	NG/UL	0.95
2	59	175	2:55	1	0.340	A VV	5584.	9.389	NG	0.32
3	93	276	4:36	1	0.536	A BV	60287.	12.387	NG	1.18
4	42	292	4:52	1	0.567	A BB	68685.	13.625	NG	1.30
5	42	375	6:15	1	0.728	A VB	82035.	25.463	NG	2.42
6	93	474	7:54	1	0.920	A BV	208406.	37.280	NG	3.54
7	79	416	6:56	1	0.808	A BB	56211.	13.486	NG	1.28
8	100	589	9:49	1	1.144	A BB	25055.	16.047	NG	1.53
9	56	593	9:53	1	1.151	A BB	44257.	13.177	NG	1.25
10	108	586	9:46	1	1.138	A BV	122158.	36.846	NG	3.50
11	106	594	9:54	1	1.153	A VB	134102.	18.134	NG	1.72
12	105	586	9:46	1	1.138	A BB	135364.	22.668	NG	2.16
13	136	731	12:11	13	1.000	A BB	101557.	10.000	NG/UL	0.95
14	213	755	12:35	13	1.033	A BB	1192.	0.561	NG	0.05
15	162	849	14:09	13	1.161	A BB	60154.	19.435	NG	1.85
16	84	816	13:36	13	1.116	A BB	57087.	21.216	NG	2.02
17	162	751	12:31	13	1.027	A BB	49719.	12.060	NG	1.15
18	NOT	FOUND								
19	42	643	10:43	1	1.249	A BB	95812.	21.825	NG	2.08
20	162	945	15:45	21	0.890	A BV	54467.	17.209	NG	1.64
21	164	1062	17:42	21	1.000	A BB	53215.	10.000	NG/UL	0.95
22	216	900	15:00	21	0.847	A BB	70243.	14.105	NG	1.34
23	168	1028	17:08	21	0.968	A BB	20956.	26.288	NG	2.50
24	168	1008	16:48	21	0.949	A BB	41592.	27.722	NG	2.64
25	143	1117	18:37	21	1.052	A BB	24130.	9.549	NG	0.91
26	232	1131	18:51	21	1.065	A BB	10564.	8.080	NG	0.77
27	250	1102	18:22	21	1.038	A BB	56665.	16.858	NG	1.60
28	143	1131	18:51	21	1.065	A VV	50038.	8.293	NG	0.79
29	75	1258	20:58	21	1.185	A BB	225461.	328.666	NG	31.25
30	152	1178	19:38	21	1.109	A BB	36380.	23.459	NG	2.23
31	188	1346	22:26	31	1.000	A BB	91044.	10.000	NG/UL	0.95
32	108	1261	21:01	31	0.937	A BB	64568.	18.716	NG	1.78
33	173	1331	22:11	31	0.989	A BB	71777.	26.707	NG	2.54
34	169	1314	21:54	31	0.976	A BV	64972.	13.602	NG	1.29
35	237	1337	22:17	31	0.993	A BB	18831.	21.576	NG	2.05
36	211	1359	22:39	31	1.010	A BB	18157.	21.122	NG	2.01
37	190	1509	25:09	31	1.121	A BB	5799.	22.516	NG	2.14
38	240	1860	31:00	38	1.000	A VB	64145.	10.000	NG/UL	0.95
39	120	1691	28:11	38	0.909	A BV	42657.	17.491	NG	1.66
40	139	1701	28:21	38	0.915	A BV	87051.	20.079	NG	1.91
41	212	1758	29:18	38	0.945	A BB	8703.	2.748	NG	0.26
42	181	1808	30:08	38	0.972	A BB	48547.	22.654	NG	2.15
43	231	1857	30:57	38	0.998	A BB	16689.	14.103	NG	1.34
44	264	2159	35:59	44	1.000	A BB	31487.	10.000	NG/UL	0.95
45	268	2246	37:26	44	1.040	A BB	17536.	5.939	NG	0.56
46	256	2070	34:30	44	0.959	A BB	19635.	6.258	NG	0.60
47	80	329	5:29	1	0.639	A BB	36672.	10.417	NG	0.99

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R.Fac	R.Fac(L)	Ratio
1	8:36	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
2	2:55	1.00	0.339	1.00	3.39	10.00	0.130	0.383	0.34
3	4:36	1.00	0.535	1.00	12.39	10.00	1.401	1.131	1.24
4	4:52	1.00	0.566	1.00	13.62	10.00	1.596	1.171	1.36
5	6:15	1.00	0.727	1.00	25.46	10.00	1.906	0.749	2.55
6	7:54	1.00	0.919	1.00	37.28	10.00	4.843	1.299	3.73
7	6:57	1.00	0.808	1.00	13.49	10.00	1.306	0.969	1.35

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R.Fac	R.Fac(L)	Ratio
8	9:49	1.00	1.141	1.00	16.05	10.00	0.582	0.363	1.60
9	9:53	1.00	1.149	1.00	13.18	10.00	1.028	0.780	1.32
10	9:46	1.00	1.136	1.00	36.85	10.00	2.839	0.770	3.68
11	9:54	1.00	1.151	1.00	18.13	10.00	3.116	1.718	1.81
12	9:47	1.00	1.138	1.00	22.67	10.00	3.146	1.388	2.27
13	12:12	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
14	12:36	1.00	1.033	1.00	0.56	10.00	0.012	0.209	0.06
15	14:10	1.00	1.161	1.00	19.43	10.00	0.592	0.305	1.94
16	13:37	1.00	1.116	1.00	21.22	10.00	0.562	0.265	2.12
17	12:32	1.00	1.027	1.00	12.06	10.00	0.490	0.406	1.21
18	13:37		1.116						
19	10:43	1.00	1.246	1.00	21.82	10.00	2.226	1.020	2.18
20	15:46	1.00	0.890	1.00	17.21	10.00	1.024	0.595	1.72
21	17:43	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
22	15:01	1.00	0.848	1.00	14.11	10.00	1.320	0.936	1.41
23	17:09	1.00	0.968	1.00	26.29	10.00	0.394	0.150	2.63
24	16:48	1.00	0.948	1.00	27.72	10.00	0.782	0.282	2.77
25	18:38	1.00	1.052	1.00	9.55	10.00	0.453	0.475	0.95
26	18:52	1.00	1.065	1.00	8.08	10.00	0.199	0.246	0.81
27	18:23	1.00	1.038	1.00	16.86	10.00	1.065	0.632	1.69
28	18:52	1.00	1.065	1.00	8.29	10.00	0.940	1.134	0.83
29	20:57	1.00	1.183	1.00	328.67	10.00	4.237	0.129	32.87
30	19:39	1.00	1.109	1.00	23.46	10.00	0.684	0.291	2.35
31	22:26	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
32	21:01	1.00	0.937	1.00	18.72	10.00	0.709	0.379	1.87
33	22:12	1.00	0.990	1.00	26.71	10.00	0.788	0.295	2.67
34	21:54	1.00	0.976	1.00	13.60	10.00	0.714	0.525	1.36
35	22:18	1.00	0.994	1.00	21.58	10.00	0.207	0.096	2.16
36	22:40	1.00	1.010	1.00	21.12	10.00	0.199	0.094	2.11
37	25:11	1.00	1.123	1.00	22.52	10.00	0.064	0.028	2.25
38	31:01	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
39	28:12	1.00	0.909	1.00	17.49	10.00	0.665	0.380	1.75
40	28:22	1.00	0.915	1.00	20.08	10.00	1.357	0.676	2.01
41	29:18	1.00	0.945	1.00	2.75	10.00	0.136	0.494	0.27
42	30:08	1.00	0.972	1.00	22.65	10.00	0.757	0.334	2.27
43	30:58	1.00	0.998	1.00	14.10	10.00	0.260	0.184	1.41
44	36:00	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
45	37:28	1.00	1.041	1.00	5.94	10.00	0.557	0.938	0.59
46	34:31	1.00	0.959	1.00	6.26	10.00	0.624	0.996	0.63
47	5:29	1.00	0.638	1.00	10.42	10.00	0.852	0.818	1.04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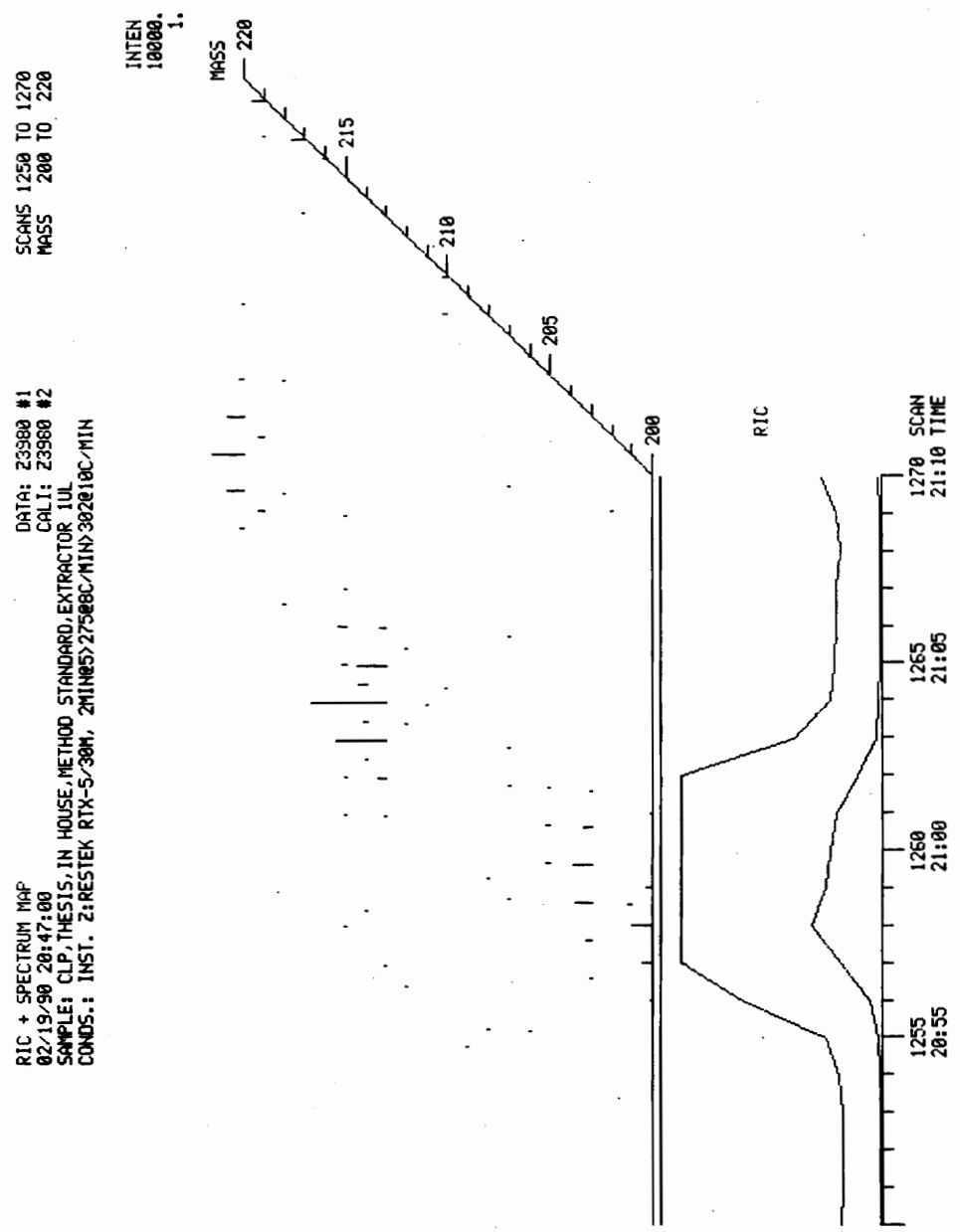
02/19/90 20:47:00
SAMPLE: CLP,THESIS,IN HOUSE,METHOD STANDARD.EXTRACTOR 1UL
CONDS.: INST. Z:RESTEK RTX-5/30M, 2MIN@5)275@C/MIN)302@10C/MIN
DATA: 23980 #1257
CALI: 23980 #2
SCANS 1250 TO 1270
MASS 70 TO 100
INTEN
50000.
1.
MASS
100
95
90
85
80
75
70
RIC
1255
20:55
1260
21:00
1265
21:05
1270 SCAN
21:10 TIME


RIC + SPECTRUM MAP
02/19/90 20:47:00
SAMPLE: CLP.THESIS.IN HOUSE.METHOD STANDARD.EXTRACTOR 1UL
CONDS.: INST. 2:RESTEK RTX-5/30M, 2MIN@5/275@8C/MIN/30@10C/MIN
DATA: 23980 #1
CAL: 23980 #2
SCANS 1250 TO 1270
MASS 200 TO 220
INTEN
10000.
1.
MASS
220
215
210
205
200
RIC
1255
20:55
1260
21:00
1265
21:05
1270 SCAN
21:10 TIME

Quantitation Report File: Z3980

Data: Z3980.TI
02/19/90 20:47:00
Sample: CLP,THESIS,IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL
Conds.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
Formula: Instrument: Z Weight: 0.007
Submitted by: VERSAR Analyst: JK Acct. No.:

AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac. from Library Entry

No	Name
1	CI60 PHENANTHRENE-D10**INT. STD. #4**
2	PHORATE
3	DISULFOTON
4	METHYL PARATHION
5	MALATHION
6	PARATHION
7	ALACHLOR
8	ATRAZINE
9	CI70 CHRYSENE-D12**INT. STD. #5**
10	FAMPHUR

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
1	188	1346	22:26	1	1.000	A BB	91044.	10.000	NG/UL	4.28
2	75	1258	20:58	1	0.935	A BB	225461.	19.669	NG	8.42
3	88	1359	22:39	1	1.010	A VB	170627.	22.904	NG	9.81
4	109	1432	23:52	1	1.064	A BV	92529.	23.187	NG	9.93
5	125	1485	24:45	1	1.103	A BV	91390.	19.854	NG	8.50
6	97	1509	25:09	1	1.121	A BB	33813.	29.506	NG	12.64
7	160	1441	24:01	1.	1.071	A BV	78851.	40.037	NG	17.15
8	200	1304	21:44	1	0.969	A BB	85449.	44.014	NG	18.85
9	240	1860	31:00	9	1.000	A VB	64145.	10.000	NG/UL	4.28
10	218	1758	29:18	9	0.945	A BB	115660.	14.344	NG	6.14

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R.Fac	R.Fac(L)	Ratio
1	22:24	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
2	20:57	1.00	0.935	1.00	19.67	20.00	1.238	1.259	0.98
3	22:37	1.00	1.010	1.00	22.90	20.00	0.937	0.818	1.15
4	23:51	1.00	1.065	1.00	23.19	20.00	0.508	0.438	1.16
5	24:44	1.00	1.104	1.00	19.85	20.00	0.502	0.506	0.99
6	25:07	1.00	1.121	1.00	29.51	20.00	0.186	0.126	1.48
7	23:59	1.00	1.071	1.00	40.04	20.00	0.433	0.216	2.00
8	21:42	1.00	0.969	1.00	44.01	20.00	0.469	0.213	2.20
9	30:58	1.00	1.000	I.00	10.00	10.00	1.000	1.000	1.00
10	29:16	1.00	0.945	1.00	14.34	20.00	0.902	1.257	0.72

Quantitation Report File: Z3980

Data: Z3980.TI
02/19/90 20:47:00
Sample: CLP,THESIS,IN HOUSE,METHOD STANDARD,EXTRACTOR 1UL
Conds.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
Formula: Instrument: Z Weight: 0.007
Submitted by: VERBAR Analyst: JK Acct. No.:

AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac. from Library Entry

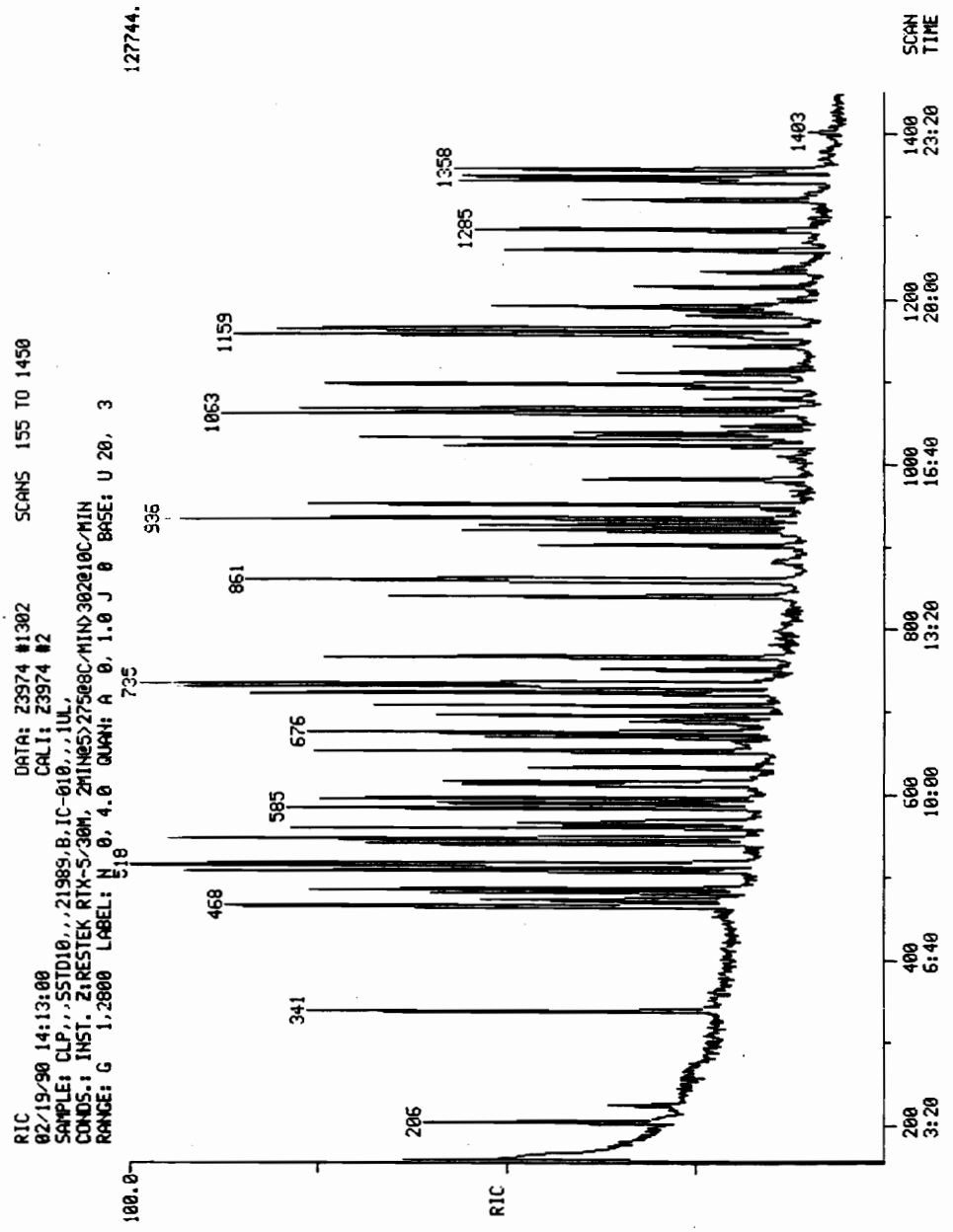
No	Name
1	CI60 PHENANTHRENE-D10**INT. STD. #4**
2	ALPHA BHC
3	BETA BHC
4	GAMMA BHC (LINDANE)
5	DELTA BHC
6	HEPTACHLOR
7	ALDRIN
8	HEPTACHLOR EPOXIDE
9	GAMMA CHLORODANE
10	CI70 CHRYSENE-D12**INT. STD. #5**
11	ALPHA ENDOSULFAN
12	4,4'-DDE
13	DIELDRIN
14	ENDRIN
15	BETA ENDOSULFAN
16	4,4'-DDD
17	ENDRIN ALDEHYDE
18	4,4'-DDT
19	ENDOSULFAN SULFATE
20	ALPHA-CHLORODANE
21	P,P'-METHOXYCHLOR

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
1	188	1346	22:26	1	1.000	A BB	91044.	10.000	NG/UL	1.38
2	181	1273	21:13	1	0.946	A BB	91465.	41.714	NG	5.77
3	181	1321	22:01	1	0.981	A BV	66735.	42.039	NG	5.82
4	181	1331	22:11	1	0.989	A VV	78812.	41.345	NG	5.72
5	183	1373	22:53	1	1.020	A BB	59095.	38.500	NG	5.33
6	100	1449	24:09	1	1.077	A BB	44263.	39.402	NG	5.45
7	66	1507	25:07	1	1.120	A BV	65780.	37.139	NG	5.14
8	81	1570	26:10	1	1.166	A VB	48711.	49.077	NG	6.79
9	373	1607	26:47	1	1.194	A BB	43477.	47.572	NG	6.59
10	240	1860	31:00	10	1.000	A VB	64145.	10.000	NG/UL	1.38
11	195	1629	27:09	10	0.876	A BB	21635.	27.220	NG	3.77
12	248	1655	27:35	10	0.890	A BB	39229.	25.271	NG	3.50
13	79	1669	27:49	10	0.897	A BB	73795.	41.626	NG	5.76
14	81	1706	28:26	10	0.917	A BB	23142.	40.723	NG	5.64
15	159	1719	28:39	10	0.924	A BB	15830.	37.725	NG	5.22
16	235	1720	28:40	10	0.925	A BV	130452.	37.537	NG	5.20
17	67	1747	29:07	10	0.939	A VV	1016.	0.968	NG	0.13
18	165	1776	29:36	10	0.955	A BV	66600.	42.307	NG	5.86
19	272	1783	29:43	10	0.959	A BB	22815.	33.564	NG	4.65
20	373	1630	27:10	10	0.876	A BB	41718.	20.506	NG	2.84
21	227	1854	30:54	10	0.997	A BB	241467.	58.178	NG	8.05

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R.Fac	R.Fac(L)	Ratio
1	22:26	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
2	21:14	1.00	0.947	1.00	41.71	20.00	0.502	0.241	2.09
3	22:01	1.00	0.981	1.00	42.04	20.00	0.366	0.174	2.10
4	22:11	1.00	0.989	1.00	41.34	20.00	0.433	0.209	2.07
5	22:53	1.00	1.020	1.00	38.50	20.00	0.325	0.169	1.92
6	24:10	1.00	1.077	1.00	39.40	20.00	0.243	0.123	1.97
7	25:08	1.00	1.120	1.00	37.14	20.00	0.361	0.195	1.86
8	26:11	1.00	1.167	1.00	49.08	20.00	0.268	0.109	2.45
9	26:48	1.00	1.195	1.00	47.57	25.00	0.191	0.100	1.90
10	31:00	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
11	27:10	1.00	0.876	1.00	27.22	20.00	0.169	0.124	1.36
12	27:36	1.00	0.890	1.00	25.27	20.00	0.306	0.242	1.26
13	27:50	1.00	0.898	1.00	41.63	20.00	0.575	0.276	2.08
14	28:27	1.00	0.918	1.00	40.72	20.00	0.180	0.089	2.04
15	28:40	1.00	0.925	1.00	37.72	20.00	0.123	0.065	1.89
16	28:41	1.00	0.925	1.00	37.54	20.00	1.017	0.542	1.88
17	29:09	1.00	0.940	1.00	0.97	20.00	0.008	0.163	0.05
18	29:37	1.00	0.955	1.00	42.31	20.00	0.519	0.245	2.12
19	29:43	1.00	0.959	1.00	33.56	20.00	0.178	0.106	1.68
20	27:11	1.00	0.877	1.00	20.51	25.00	0.260	0.317	0.82
21	30:54	1.00	0.997	1.00	58.18	25.00	1.506	0.647	2.33

Appendix C

Standards Data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02/19/90 14:13:00
SAMPLE: CLP,,,SSTD10,,,21989,B,IC-010,,,1UL,
CONDS.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
RANGE: G 1.2800 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
DATA: Z3974 #1302
CALI: Z3974 #2
SCANS 155 TO 1450
127744.
100.0
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206
341
468
518
585
676
735
861
936
1063
1159
1285
1358
1403
200
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1200
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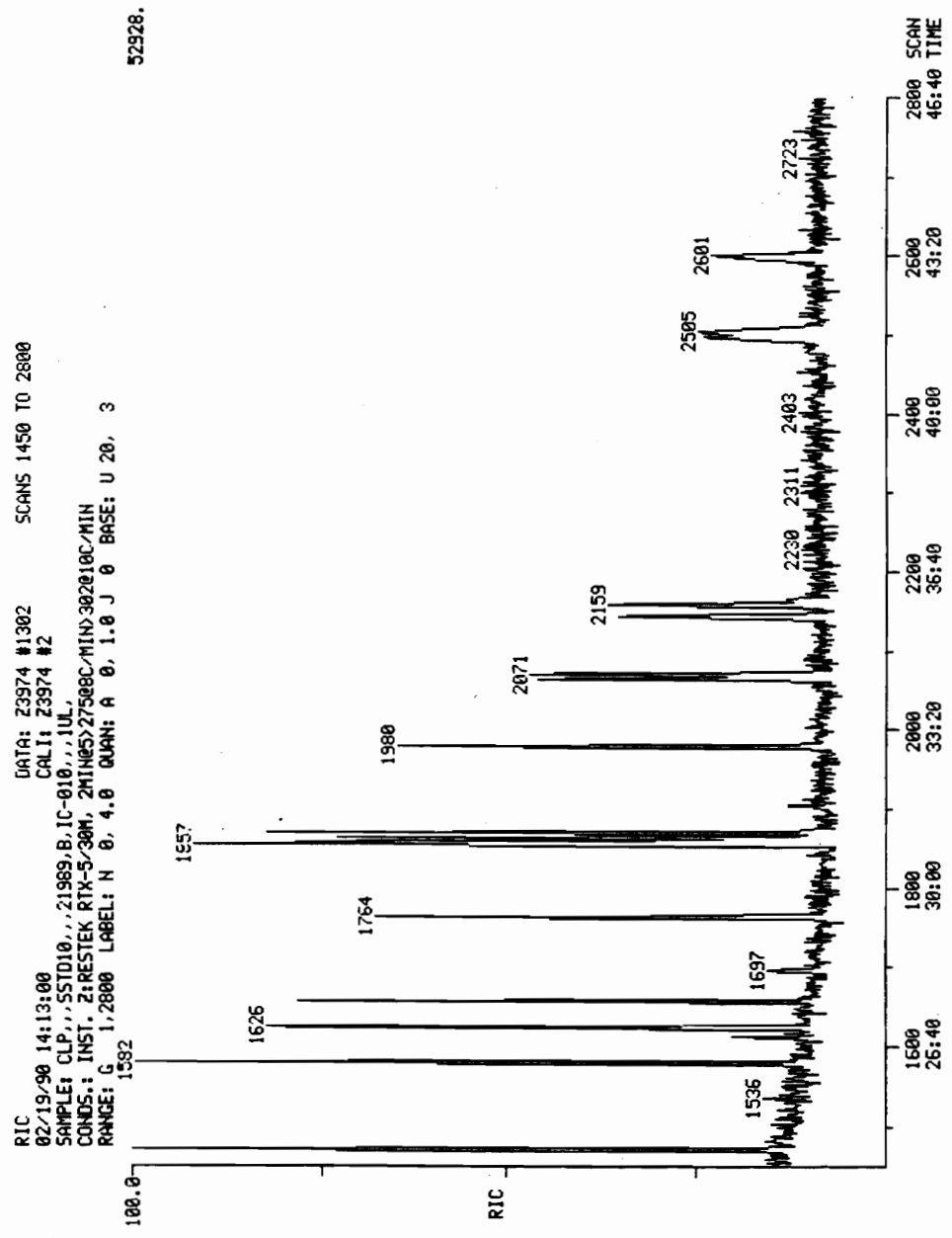
SCAN
TIME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SAMPLE: CLP,,,,SSTD10,,,21989,B,IC-010,,,,1UL,
CONDS.: INST. 2:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
RANGE: G 1.2800 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
DATA: 23974 #1302
CALI: 23974 #2
SCANS 1450 TO 2800
52928.
100.0
RIC
1582
1536
1626
1697
1764
1857
1980
2071
2159
2230
2311
2403
2505
2601
2723
1600 26:40
1800 30:00
2000 33:20
2200 36:40
2400 40:00
2600 43:20
2800 46:40 SCAN TIME

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Quantitation Report    File: Z3974

Data: Z3974.TI
02/19/90 14:13:00
Sample: CLP,,,SSTD10,,,21989,B,IC-010,,,1UL,
Conds.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
Formula:                    Instrument: Z          Weight:     0.006
Submitted by: VERSAR        Analyst: JK            Acct. No.:

AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac. from  Library Entry

 No  Name
  1  C310 N-NITROSODIMETHYLAMINE
  2  CS50 2-FLUOROPHENOL**ACID SURR.**
  3  CS45 PHENOL-D5**ACID SURR.**
  4  C315 PHENOL
  5  C325 BIS (2-CHLOROETHYL) ETHER
  6  C330 2-CHLOROPHENOL
  7  C335 1,3-DICHLOROBENZENE
  8  CI30 1,4-DICHLOROBENZENE-D4 **INT. STD. #1**
  9  C340 1,4-DICHLOROBENZENE
 10  C345 BENZYL ALCOHOL
 11  C350 1,2-DICHLOROBENZENE
 12  C355 2-METHYLPHENOL
 13  C360 BIS (2-CHLOROISOPROPYL) ETHER
 14  C365 4-METHYLPHENOL
 15  C370 N-NITROSO-DI-N-PROPYLAMINE
 16  C375 HEXACHLOROETHANE
 17  CS20 NITROBENZENE-D5**BN SURR.**
 18  C410 NITROBENZENE
 19  C415 ISOPHORONE
 20  C420 2-NITROPHENOL
 21  C425 2,4-DIMETHYLPHENOL
 22  C430 BENZOIC ACID
 23  C435 BIS (2-CHLOROETHOXY) METHANE
 24  C440 2,4-DICHLOROPHENOL
 25  C445 1,2,4-TRICHLOROBENZENE
 26  CI40 NAPHTHALENE-D8**INT. STD.#2**
 27  C450 NAPHTHALENE
 28  C455 4-CHLOROANILINE
 29  C460 HEXACHLOROBUTADIENE
 30  C465 4-CHLORO-3-METHYLPHENOL
 31  C470 2-METHYLNAPHTHALENE
 32  C510 HEXACHLOROCYCLOPENTADIENE
 33  C515 2,4,6-TRICHLOROPHENOL
 34  C520 2,4,5-TRICHLOROPHENOL
 35  CS25 2-FLUOROBIPHENYL**BN SURR.**
 36  C525 2-CHLORONAPHTHALENE
 37  C530 2-NITROANILINE
 38  C535 DIMETHYL PHTHALATE
 39  C540 ACENAPHTHYLENE
 40  C544 2,6-DINITROTOLUENE
 41  C545 3-NITROANILINE
 42  CI50 ACENAPHTHENE-D10**INT. STD.#3**
 43  C550 ACENAPHTHENE
 44  C555 2,4-DINITROPHENOL
 45  C560 4-NITROPHENOL
 46  C565 DIBENZOFURAN
 47  C570 2,4-DINITROTOLUENE
```

No	Name
48	C580 DIETHYLPHTHALATE
49	C590 FLUORENE
50	C585 4-CHLOROPHENYL-PHENYLETHER

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hgh	Amount		%Tot
1	74	206	3:26	8	0.399	A BV	25296.	10.000	NG	1.28
2	112	341	5:41	8	0.661	A BB	38253.	10.000	NG*A1	1.28
3	99	466	7:46	8	0.903	A BB	40120.	10.000	NG*A2	1.28
4	94	468	7:48	8	0.907	A BV	47696.	10.000	NG.	1.28
5	93	483	8:03	8	0.936	A VB	34547.	10.000	NG	1.28
6	128	488	8:08	8	0.946	A BB	37491.	10.000	NG.	1.28
7	146	510	8:30	8	0.988	A BB	55092.	10.000	NG	1.28
8	152	516	8:36	8	1.000	A BB	35087.	10.000	NG/UL	1.28
9	146	518	8:38	8	1.004	A BB	57078.	10.000	NG.	1.28
10	108	542	9:02	8	1.050	A BV	16616.	10.000	NG	1.28
11	146	548	9:08	8	1.062	A BB	53027.	10.000	NG	1.28
12	108	561	9:21	8	1.087	A BB	28518.	10.000	NG	1.28
13	45	567	9:27	8	1.099	A BB	35616.	10.000	NG	1.28
14	108	585	9:45	8	1.134	A BB	28080.	10.000	NG	1.28
15	70	591	9:51	8	1.145	A BB	26696.	10.000	NG.	1.28
16	117	596	9:56	8	1.155	A BB	17754.	10.000	NG	1.28
17	82	613	10:13	26	0.837	A BV	34017.	10.000	NG*B1	1.28
18	77	616	10:16	26	0.842	A BB	31670.	10.000	NG	1.28
19	82	654	10:54	26	0.893	A BB	68344.	10.000	NG	1.28
20	139	670	11:10	26	0.915	A VB	16067.	10.000	NG	1.28
21	107	676	11:16	26	0.923	A BB	34537.	10.000	NG	1.28
22	122	689	11:29	26	0.941	A VB	15504.	10.000	NG	1.28
23	93	696	11:36	26	0.951	A BB	36531.	10.000	NG	1.28
24	162	709	11:49	26	0.969	A BV	31824.	10.000	NG	1.28
25	180	724	12:04	26	0.989	A BB	34219.	10.000	NG.	1.28
26	136	732	12:12	26	1.000	A BB	77901.	10.000	NG/UL	1.28
27	128	735	12:15	26	1.004	A BB	102577.	10.000	NG	1.28
28	127	752	12:32	26	1.027	A BB	19002.	10.000	NG	1.28
29	225	767	12:47	26	1.048	A BB	18847.	10.000	NG	1.28
30	107	840	14:00	26	1.148	A BB	28026.	10.000	NG.	1.28
31	142	862	14:22	26	1.178	A BB	63753.	10.000	NG	1.28
32	237	903	15:03	42	0.849	A BB	12146.	10.000	NG	1.28
33	196	920	15:20	42	0.865	A BV	16355.	10.000	NG	1.28
34	196	927	15:27	42	0.872	A VB	16390.	10.000	NG	1.28
35	172	936	15:36	42	0.881	A BB	61992.	10.000	NG*B2	1.28
36	162	953	15:53	42	0.897	A BB	57289.	10.000	NG	1.28
37	65	983	16:23	42	0.925	A BB	12320.	10.000	NG	1.28
38	163	1024	17:04	42	0.963	A BB	58974.	10.000	NG	1.28
39	152	1033	17:13	42	0.972	A BB	74056.	10.000	NG	1.28
40	165	1039	17:19	42	0.977	A BB	8643.	10.000	NG	1.28
41	138	1063	17:43	42	1.000	A BB	9712.	10.000	NG	1.28
42	164	1063	17:43	42	1.000	A BB	37266.	10.000	NG/UL	1.28
43	153	1069	17:49	42	1.006	A BB	52684.	10.000	NG.	1.28
44	184	1082	18:02	42	1.018	A BB	3674.	10.000	NG	1.28
45	109	1094	18:14	42	1.029	A BB	8123.	10.000	NG.	1.28
46	168	1098	18:18	42	1.033	A BB	70223.	10.000	NG	1.28
47	165	1112	18:32	42	1.046	A BB	11117.	10.000	NG.	1.28
48	149	1159	19:19	42	1.090	A BV	93674.	10.000	NG	1.28
49	166	1165	19:25	42	1.096	A BB	53930.	10.000	NG	1.28
50	204	1167	19:27	42	1.098	A BB	24297.	10.000	NG	1.28

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R.Fac	R.Fac(L)	Ratio
1	3:26	1.00	0.399	1.00	10.00	10.00	0.721	0.721	1.00
2	5:41	1.00	0.661	1.00	10.00	10.00	1.090	1.090	1.00
3	7:46	1.00	0.903	1.00	10.00	10.00	1.143	1.143	1.00
4	7:48	1.00	0.907	1.00	10.00	10.00	1.359	1.359	1.00
5	8:03	1.00	0.936	1.00	10.00	10.00	0.985	0.985	1.00
6	8:08	1.00	0.946	1.00	10.00	10.00	1.069	1.069	1.00
7	8:30	1.00	0.988	1.00	10.00	10.00	1.570	1.570	1.00
8	8:36	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
9	8:38	1.00	1.004	1.00	10.00	10.00	1.627	1.627	1.00
10	9:02	1.00	1.050	1.00	10.00	10.00	0.474	0.474	1.00
11	9:08	1.00	1.062	1.00	10.00	10.00	1.511	1.511	1.00
12	9:21	1.00	1.087	1.00	10.00	10.00	0.813	0.813	1.00
13	9:27	1.00	1.099	1.00	10.00	10.00	1.015	1.015	1.00
14	9:45	1.00	1.134	1.00	10.00	10.00	0.800	0.800	1.00
15	9:51	1.00	1.145	1.00	10.00	10.00	0.761	0.761	1.00
16	9:56	1.00	1.155	1.00	10.00	10.00	0.506	0.506	1.00
17	10:13	1.00	0.837	1.00	10.00	10.00	0.437	0.437	1.00
18	10:16	1.00	0.842	1.00	10.00	10.00	0.407	0.407	1.00
19	10:54	1.00	0.893	1.00	10.00	10.00	0.877	0.877	1.00
20	11:10	1.00	0.915	1.00	10.00	10.00	0.206	0.206	1.00
21	11:16	1.00	0.923	1.00	10.00	10.00	0.443	0.443	1.00
22	11:29	1.00	0.941	1.00	10.00	10.00	0.199	0.199	1.00
23	11:36	1.00	0.951	1.00	10.00	10.00	0.469	0.469	1.00
24	11:49	1.00	0.969	1.00	10.00	10.00	0.409	0.409	1.00
25	12:04	1.00	0.989	1.00	10.00	10.00	0.439	0.439	1.00
26	12:12	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
27	12:15	1.00	1.004	1.00	10.00	10.00	1.317	1.317	1.00
28	12:32	1.00	1.027	1.00	10.00	10.00	0.244	0.244	1.00
29	12:47	1.00	1.048	1.00	10.00	10.00	0.242	0.242	1.00
30	14:00	1.00	1.148	1.00	10.00	10.00	0.360	0.360	1.00
31	14:22	1.00	1.178	1.00	10.00	10.00	0.818	0.818	1.00
32	15:03	1.00	0.849	1.00	10.00	10.00	0.326	0.326	1.00
33	15:20	1.00	0.865	1.00	10.00	10.00	0.439	0.439	1.00
34	15:27	1.00	0.872	1.00	10.00	10.00	0.440	0.440	1.00
35	15:36	1.00	0.881	1.00	10.00	10.00	1.663	1.663	1.00
36	15:53	1.00	0.897	1.00	10.00	10.00	1.537	1.537	1.00
37	16:23	1.00	0.925	1.00	10.00	10.00	0.331	0.331	1.00
38	17:04	1.00	0.963	1.00	10.00	10.00	1.583	1.583	1.00
39	17:13	1.00	0.972	1.00	10.00	10.00	1.987	1.987	1.00
40	17:19	1.00	0.977	1.00	10.00	10.00	0.232	0.232	1.00
41	17:43	1.00	1.000	1.00	10.00	10.00	0.261	0.261	1.00
42	17:43	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
43	17:49	1.00	1.006	1.00	10.00	10.00	1.414	1.414	1.00
44	18:02	1.00	1.018	1.00	10.00	10.00	0.099	0.099	1.00
45	18:14	1.00	1.029	1.00	10.00	10.00	0.218	0.218	1.00
46	18:18	1.00	1.033	1.00	10.00	10.00	1.884	1.884	1.00
47	18:32	1.00	1.046	1.00	10.00	10.00	0.298	0.298	1.00
48	19:19	1.00	1.090	1.00	10.00	10.00	2.514	2.514	1.00
49	19:25	1.00	1.096	1.00	10.00	10.00	1.447	1.447	1.00
50	19:27	1.00	1.098	1.00	10.00	10.00	0.652	0.652	1.00

Quantitation Report File: Z3974

Data: Z3974.TI
02/19/90 14:13:00
Sample: CLP,,,SSTD10,,,21989,B,IC-010,,,1UL,
Conds.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
Formula: Instrument: Z Weight: 0.006
Submitted by: VERSAR Analyst: JK Acct. No.:

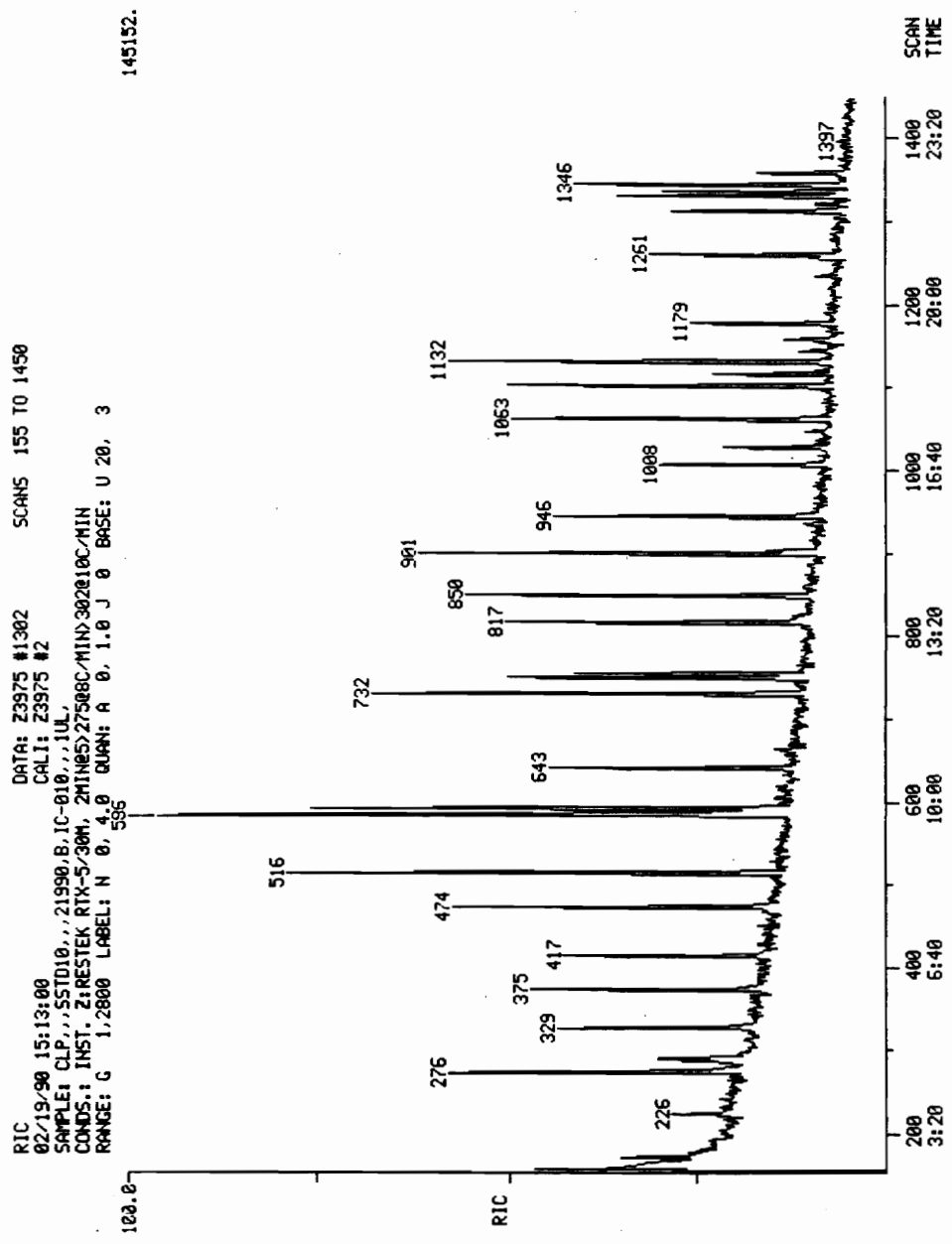
AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac. from Library Entry

No	Name
51	C595 4-NITROANILINE
52	C610 4,6-DINITRO-2-METHYLPHENOL
53	C615 N-NITROSODIPHENYLAMINE
54	CS55 2,4,6,-TRIBROMOPHENOL**ACID SURR.**
55	C625 4-BROMOPHENYL-PHENYLETHER
56	C630 HEXACHLOROBENZENE
57	C635 PENTACHLOROPHENOL
58	CI60 PHENANTHRENE-D10**INT. STD.#4**
59	C640 PHENANTHRENE
60	C645 ANTHRACENE
61	C650 DI-N-BUTYLPHTHALATE
62	C655 FLUORANTHENE
63	C715 PYRENE
64	CS30 P-TERPHENYL-D14**BN SURR.**
65	C720 BUTYLBENZYLPHTHALATE
66	C730 BENZO(A)ANTHRACENE
67	C725 3,3'-DICHLOROBENZIDINE
68	CI70 CHRYSENE-D12**INT. STD.#5**
69	C740 CHRYSENE
70	C741 BIS(2-ETHYLHEXYL)PHTHALATE
71	C760 DI-N-OCTYL PHTHALATE
72	C765 BENZO(B)FLUORANTHENE
73	C770 BENZO(K)FLUORANTHENE
74	C775 BENZO(A)PYRENE
75	CI75 PERYLENE-D12**INT. STD.#6**
76	C780 INDENO(1,2,3-CD)PYRENE
77	C785 DIBENZ(A,H)ANTHRACENE
78	C790 BENZO(G,H,I)PERYLENE

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
51	138	1181	19:41	42	1.111	A BB	7440.	10.000	NG	1.28
52	198	1187	19:47	58	0.883	A BB	4787.	10.000	NG	1.28
53	169	1192	19:52	58	0.886	A BB	29604.	10.000	NG	1.28
54	330	1216	20:16	42	1.144	A BB	5145.	10.000	NG#A3	1.28
55	248	1260	21:00	58	0.937	A BB	11745.	10.000	NG	1.28
56	284	1285	21:25	58	0.955	A BB	15565.	10.000	NG	1.28
57	266	1321	22:01	58	0.982	A BB	6684.	10.000	NG.	1.28
58	188	1345	22:25	58	1.000	A BB	53955.	10.000	NG/UL	1.28
59	178	1349	22:29	58	1.003	A BV	64171.	10.000	NG	1.28
60	178	1358	22:38	58	1.010	A VV	64386.	10.000	NG	1.28
61	149	1472	24:32	58	1.094	A BB	65558.	10.000	NG	1.28
62	202	1582	26:22	58	1.176	A BB	46912.	10.000	NG	1.28
63	202	1625	27:05	68	0.874	A BV	44513.	10.000	NG.	1.28
64	244	1659	27:39	68	0.892	A BV	28257.	10.000	NG#B3	1.28
65	149	1764	29:24	68	0.948	A BB	18355.	10.000	NG	1.28

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
66	228	1856	30:56	68	0.998	A BV	29345.	10.000	NG	1.28
67	252	1857	30:57	68	0.998	A BB	7712.	10.000	NG	1.28
68	240	1860	31:00	68	1.000	A BV	30733.	10.000	NG/UL	1.28
69	228	1864	31:04	68	1.002	A VB	30435.	10.000	NG	1.28
70	149	1872	31:12	68	1.006	A BB	25375.	10.000	NG	1.28
71	149	1980	33:00	75	0.917	A BV	39049.	10.000	NG	1.28
72	252	2065	34:25	75	0.956	A BV	27968.	10.000	NG	1.28
73	252	2071	34:31	75	0.959	A VB	27994.	10.000	NG	1.28
74	252	2145	35:45	75	0.994	A BB	25394.	10.000	NG	1.28
75	264	2159	35:59	75	1.000	A BB	16645.	10.000	NG/UL	1.28
76	276	2498	41:38	75	1.157	A BV	22666.	10.000	NG	1.28
77	278	2504	41:44	75	1.160	A BB	21574.	10.000	NG	1.28
78	276	2600	43:20	75	1.204	A BB	23588.	10.000	NG	1.28

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R.Fac	R.Fac(L)	Ratio
51	19:41	1.00	1.111	1.00	10.00	10.00	0.200	0.200	1.00
52	19:47	1.00	0.883	1.00	10.00	10.00	0.089	0.089	1.00
53	19:52	1.00	0.886	1.00	10.00	10.00	0.549	0.549	1.00
54	20:16	1.00	1.144	1.00	10.00	10.00	0.138	0.138	1.00
55	21:00	1.00	0.937	1.00	10.00	10.00	0.218	0.218	1.00
56	21:25	1.00	0.955	1.00	10.00	10.00	0.288	0.288	1.00
57	22:01	1.00	0.982	1.00	10.00	10.00	0.124	0.124	1.00
58	22:25	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
59	22:29	1.00	1.003	1.00	10.00	10.00	1.189	1.189	1.00
60	22:38	1.00	1.010	1.00	10.00	10.00	1.193	1.193	1.00
61	24:32	1.00	1.094	1.00	10.00	10.00	1.215	1.215	1.00
62	26:22	1.00	1.176	1.00	10.00	10.00	0.869	0.869	1.00
63	27:05	1.00	0.874	1.00	10.00	10.00	1.448	1.448	1.00
64	27:39	1.00	0.892	1.00	10.00	10.00	0.919	0.919	1.00
65	29:24	1.00	0.948	1.00	10.00	10.00	0.597	0.597	1.00
66	30:56	1.00	0.998	1.00	10.00	10.00	0.955	0.955	1.00
67	30:57	1.00	0.998	1.00	10.00	10.00	0.251	0.251	1.00
68	31:00	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
69	31:04	1.00	1.002	1.00	10.00	10.00	0.990	0.990	1.00
70	31:12	1.00	1.006	1.00	10.00	10.00	0.826	0.826	1.00
71	33:00	1.00	0.917	1.00	10.00	10.00	2.346	2.346	1.00
72	34:25	1.00	0.956	1.00	10.00	10.00	1.680	1.680	1.00
73	34:31	1.00	0.959	1.00	10.00	10.00	1.682	1.682	1.00
74	35:45	1.00	0.994	1.00	10.00	10.00	1.526	1.526	1.00
75	35:59	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
76	41:38	1.00	1.157	1.00	10.00	10.00	1.362	1.362	1.00
77	41:44	1.00	1.160	1.00	10.00	10.00	1.296	1.296	1.00
78	43:20	1.00	1.204	1.00	10.00	10.00	1.417	1.417	1.00


RIC
02/19/90 15:13:00
SAMPLE: CLP,,,SSTD10,,,21990,B,IC-010,,,1UL,
CONDS.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
RANGE: G 1.2800 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
DATA: Z3975 #1302
CALI: Z3975 #2
SCANS 155 TO 1450
145152.
100.0
RIC
596
516
474
417
375
329
276
226
732
643
901
850
817
946
1132
1063
1008
1179
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1346
1397
200
3:20
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600
10:00
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1200
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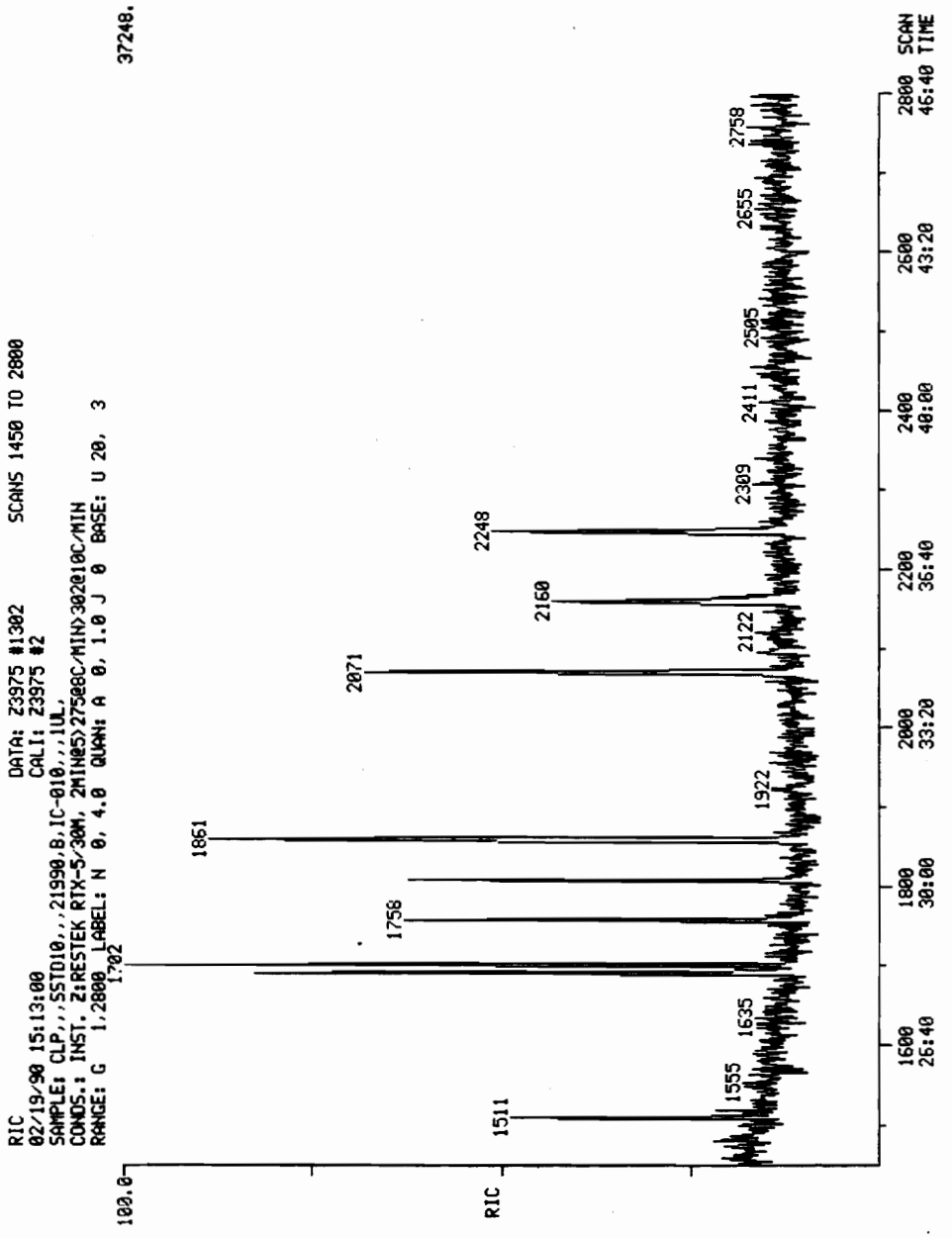
1400
23:20
SCAN
TIME


RIC
02/19/90 15:13:00
SAMPLE: CLP,,,SSTD10,,,21990,B,IC-010,,,,1UL,
CONDS.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@0C/MIN>302@10C/MIN
RANGE: G 1,2800 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
DATA: Z3975 #1302
CALI: Z3975 #2
SCANS 1450 TO 2800
37248.
100.0
RIC
1511
1555
1635
1702
1756
1861
1922
2071
2122
2160
2248
2309
2411
2505
2555
2758
1600
26:40
1800
30:00
2000
33:20
2200
36:40
2400
40:00
2600
43:20
2800
46:40
SCAN
TIME

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Quantitation Report    File: Z3975

Data: Z3975.TI
02/19/90 15:13:00
Sample: CLP,,,SSTD10,,,21990,B,IC-010,,,1UL,
Conds.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
Formula:                    Instrument: Z          Weight:     0.007
Submitted by: VERSAR        Analyst: JK            Acct. No.:

AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac. from  Library Entry

 No  Name
  1  C017 2-ETHOXYETHANOL
  2  C930 2-PICOLINE
  3  C922 N-NITROSOMETHYLETHYLAMINE
  4  C916 METHYL METHANESULFONATE
  5  C921 N-NITROSODIETHYLAMINE
  6  C948 ETHYL METHANESULFONATE
  7  C320 ANILINE
  8  CI30 1,4-DICHLOROBENZENE-D4 **INT. STD. #1**
  9  C940 M-CRESOL
 10  C900 ACETOPHENONE
 11  C925 N-NITROSOPYRROLIDINE
 12  C923 N-NITROSOMORPHOLINE
 13  C952 O-TOLUIDINE
 14  C924 N-NITROSOPIPERIDINE
 15  CI40 NAPHTHALENE-D8**INT. STD. #2**
 16  C906 2,6-DICHLOROPHENOL
 17  C911 HEXACHLOROPROPENE
 18  C950 P-PHENYLENEDIAMINE
 19  C920 N-NITROSODI-N-BUTYLAMINE
 20  C932 SAFROLE
 21  C933 1,2,4,5-TETRACHLOROBENZENE
 22  C912 ISOSAFROLE
 23  C909 P-DINITROBENZENE
 24  C947 M-DINITROBENZENE
 25  CI50 ACENAPHTHENE-D10**INT. STD. #3**
 26  C927 PENTACHLOROBENZENE
 27  C919 2-NAPHTHYLAMINE
 28  C897 1-NAPHTHYLAMINE
 29  C934 2,3,4,6-TETRACHLOROPHENOL
 30  C926 5-NITRO-O-TOLUIDINE
 31  C954 SYM-TRINITROBENZENE
 32  C929 PHENACETIN
 33  C902 4-AMINOBIPHENYL
 34  C931 PRONAMIDE
 35  C928 PENTACHLORONITROBENZENE
 36  CI60 PHENANTHRENE-D10**INT. STD. #4**
 37  C904 DINOSEB
 38  C949 4-NITROQUINOLINE-1-OXIDE
 39  C907 P-(DIMETHYLAMINO)AZOBENZENE
 40  C905 CHLOROBENZILATE
 41  C908 3,3'DIMETHYLBENZIDINE
 42  C901 2-ACETYLAMINOFLUORENE
 43  C915 4,4'-METHYLENEBIS(2-CHLOROANILINE)
 44  CI70 CHRYSENE-D12**INT. STD. #5**
 45  C945 7,12-DIMETHYLBENZ(A)ANTHRACENE
 46  CI75 PERYLENE-D12**INT. STD. #6**
 47  C914 3-METHYLCHOLANTHRENE
```
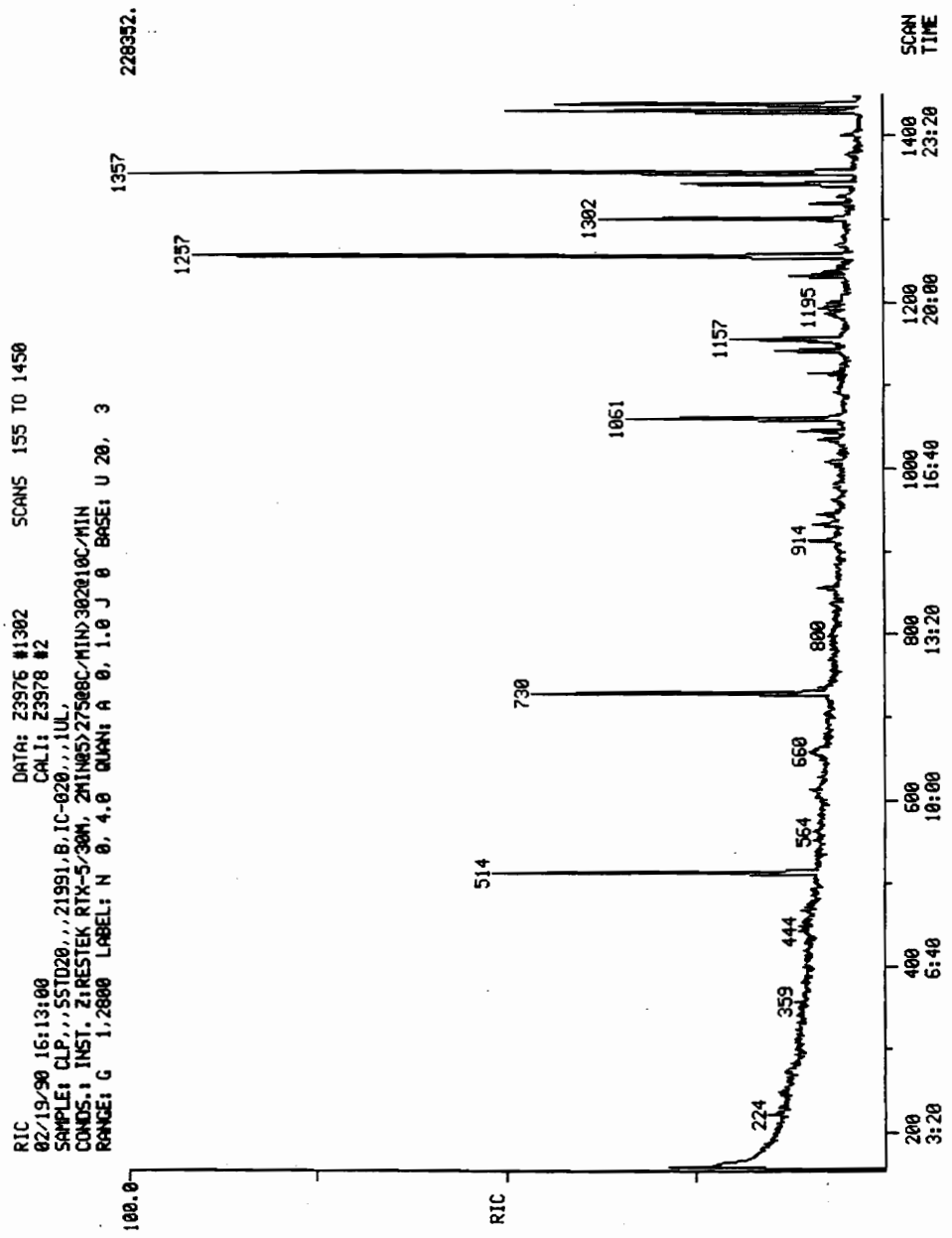

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
1	59	175	2:55	8	0.339	A BB	11683.	10.000	NG	2.13
2	93	276	4:36	8	0.535	A BB	34471.	10.000	NG	2.13
3	42	292	4:52	8	0.566	A BB	35706.	10.000	NG	2.13
4	80	329	5:29	8	0.638	A BB	24935.	10.000	NG	2.13
5	42	375	6:15	8	0.727	A BB	22819.	10.000	NG	2.13
6	79	417	6:57	8	0.808	A BB	29521.	10.000	NG	2.13
7	93	474	7:54	8	0.919	A BB	39595.	10.000	NG	2.13
8	152	516	8:36	8	1.000	A BB	30480.	10.000	NG/UL	2.13
9	108	586	9:46	8	1.136	A BV	23482.	10.000	NG	2.13
10	105	587	9:47	8	1.138	A BB	42296.	10.000	NG	2.13
11	100	589	9:49	8	1.141	A BB	11059.	10.000	NG	2.13
12	56	593	9:53	8	1.149	A BB	23789.	10.000	NG	2.13
13	106	594	9:54	8	1.151	A BB	52379.	10.000	NG	2.13
14	42	643	10:43	8	1.246	A BB	31094.	10.000	NG	2.13
15	136	732	12:12	15	1.000	A BB	63458.	10.000	NG/UL	2.13
16	162	752	12:32	15	1.027	A BB	25760.	10.000	NG	2.13
17	213	756	12:36	15	1.033	A BB	13276.	10.000	NG	2.13
18	108	817	13:37	15	1.116	A BV	10624.	10.000	NG	2.13
19	84	817	13:37	15	1.116	A BB	16813.	10.000	NG	2.13
20	162	850	14:10	15	1.161	A BB	19340.	10.000	NG	2.13
21	216	901	15:01	25	0.848	A BB	28130.	10.000	NG	2.13
22	162	946	15:46	25	0.890	A BB	17879.	10.000	NG	2.13
23	168	1008	16:48	25	0.948	A BB	8475.	10.000	NG	2.13
24	168	1029	17:09	25	0.968	A BB	4503.	10.000	NG	2.13
25	164	1063	17:43	25	1.000	A BB	30060.	10.000	NG/UL	2.13
26	250	1103	18:23	25	1.038	A BB	18987.	10.000	NG	2.13
27	143	1118	18:38	25	1.052	A BB	14274.	10.000	NG	2.13
28	143	1132	18:52	25	1.065	A BB	34082.	10.000	NG	2.13
29	232	1132	18:52	25	1.065	A BB	7385.	10.000	NG	2.13
30	152	1179	19:39	25	1.109	A BB	8760.	10.000	NG	2.13
31	75	1257	20:57	25	1.183	A BB	3875.	10.000	NG	2.13
32	108	1261	21:01	36	0.937	A BB	17574.	10.000	NG	2.13
33	169	1314	21:54	36	0.976	A BB	24333.	10.000	NG	2.13
34	173	1332	22:12	36	0.990	A BB	13691.	10.000	NG	2.13
35	237	1338	22:18	36	0.994	A BB	4446.	10.000	NG	2.13
36	188	1346	22:26	36	1.000	A BB	46379.	10.000	NG/UL	2.13
37	211	1360	22:40	36	1.010	A BB	4379.	10.000	NG	2.13
38	190	1511	25:11	36	1.123	A BB	1312.	10.000	NG	2.13
39	120	1692	28:12	44	0.909	A BB	10234.	10.000	NG	2.13
40	139	1702	28:22	44	0.915	A BB	18193.	10.000	NG	2.13
41	212	1758	29:18	44	0.945	A BB	13288.	10.000	NG	2.13
42	181	1808	30:08	44	0.972	A BB	8993.	10.000	NG	2.13
43	231	1858	30:58	44	0.998	A BB	4966.	10.000	NG	2.13
44	240	1861	31:01	44	1.000	A BB	26918.	10.000	NG/UL	2.13
45	256	2071	34:31	46	0.959	A BB	14142.	10.000	NG	2.13
46	264	2160	36:00	46	1.000	A BB	14193.	10.000	NG/UL	2.13
47	268	2248	37:28	46	1.041	A BB	13309.	10.000	NG	2.13

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R.Fac	R.Fac(L)	Ratio
1	2:55	1.00	0.339	1.00	10.00	10.00	0.383	0.383	1.00
2	4:36	1.00	0.535	1.00	10.00	10.00	1.131	1.131	1.00
3	4:52	1.00	0.566	1.00	10.00	10.00	1.171	1.171	1.00
4	5:29	1.00	0.638	1.00	10.00	10.00	0.818	0.818	1.00
5	6:15	1.00	0.727	1.00	10.00	10.00	0.749	0.749	1.00
6	6:57	1.00	0.808	1.00	10.00	10.00	0.969	0.969	1.00
7	7:54	1.00	0.919	1.00	10.00	10.00	1.299	1.299	1.00

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R.Fac	R.Fac(L)	Ratio
8	8:36	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
9	9:46	1.00	1.136	1.00	10.00	10.00	0.770	0.770	1.00
10	9:47	1.00	1.138	1.00	10.00	10.00	1.388	1.388	1.00
11	9:49	1.00	1.141	1.00	10.00	10.00	0.363	0.363	1.00
12	9:53	1.00	1.149	1.00	10.00	10.00	0.780	0.780	1.00
13	9:54	1.00	1.151	1.00	10.00	10.00	1.718	1.718	1.00
14	10:43	1.00	1.246	1.00	10.00	10.00	1.020	1.020	1.00
15	12:12	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
16	12:32	1.00	1.027	1.00	10.00	10.00	0.406	0.406	1.00
17	12:36	1.00	1.033	1.00	10.00	10.00	0.209	0.209	1.00
18	13:37	1.00	1.116	1.00	10.00	10.00	0.167	0.167	1.00
19	13:37	1.00	1.116	1.00	10.00	10.00	0.265	0.265	1.00
20	14:10	1.00	1.161	1.00	10.00	10.00	0.305	0.305	1.00
21	15:01	1.00	0.848	1.00	10.00	10.00	0.936	0.936	1.00
22	15:46	1.00	0.890	1.00	10.00	10.00	0.595	0.595	1.00
23	16:48	1.00	0.948	1.00	10.00	10.00	0.282	0.282	1.00
24	17:09	1.00	0.968	1.00	10.00	10.00	0.150	0.150	1.00
25	17:43	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
26	18:23	1.00	1.038	1.00	10.00	10.00	0.632	0.632	1.00
27	18:38	1.00	1.052	1.00	10.00	10.00	0.475	0.475	1.00
28	18:52	1.00	1.065	1.00	10.00	10.00	1.134	1.134	1.00
29	18:52	1.00	1.065	1.00	10.00	10.00	0.246	0.246	1.00
30	19:39	1.00	1.109	1.00	10.00	10.00	0.291	0.291	1.00
31	20:57	1.00	1.183	1.00	10.00	10.00	0.129	0.129	1.00
32	21:01	1.00	0.937	1.00	10.00	10.00	0.379	0.379	1.00
33	21:54	1.00	0.976	1.00	10.00	10.00	0.525	0.525	1.00
34	22:12	1.00	0.990	1.00	10.00	10.00	0.295	0.295	1.00
35	22:18	1.00	0.994	1.00	10.00	10.00	0.096	0.096	1.00
36	22:26	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
37	22:40	1.00	1.010	1.00	10.00	10.00	0.094	0.094	1.00
38	25:11	1.00	1.123	1.00	10.00	10.00	0.028	0.028	1.00
39	28:12	1.00	0.909	1.00	10.00	10.00	0.380	0.380	1.00
40	28:22	1.00	0.915	1.00	10.00	10.00	0.676	0.676	1.00
41	29:18	1.00	0.945	1.00	10.00	10.00	0.494	0.494	1.00
42	30:08	1.00	0.972	1.00	10.00	10.00	0.334	0.334	1.00
43	30:58	1.00	0.998	1.00	10.00	10.00	0.184	0.184	1.00
44	31:01	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
45	34:31	1.00	0.959	1.00	10.00	10.00	0.996	0.996	1.00
46	36:00	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
47	37:28	1.00	1.041	1.00	10.00	10.00	0.938	0.938	1.00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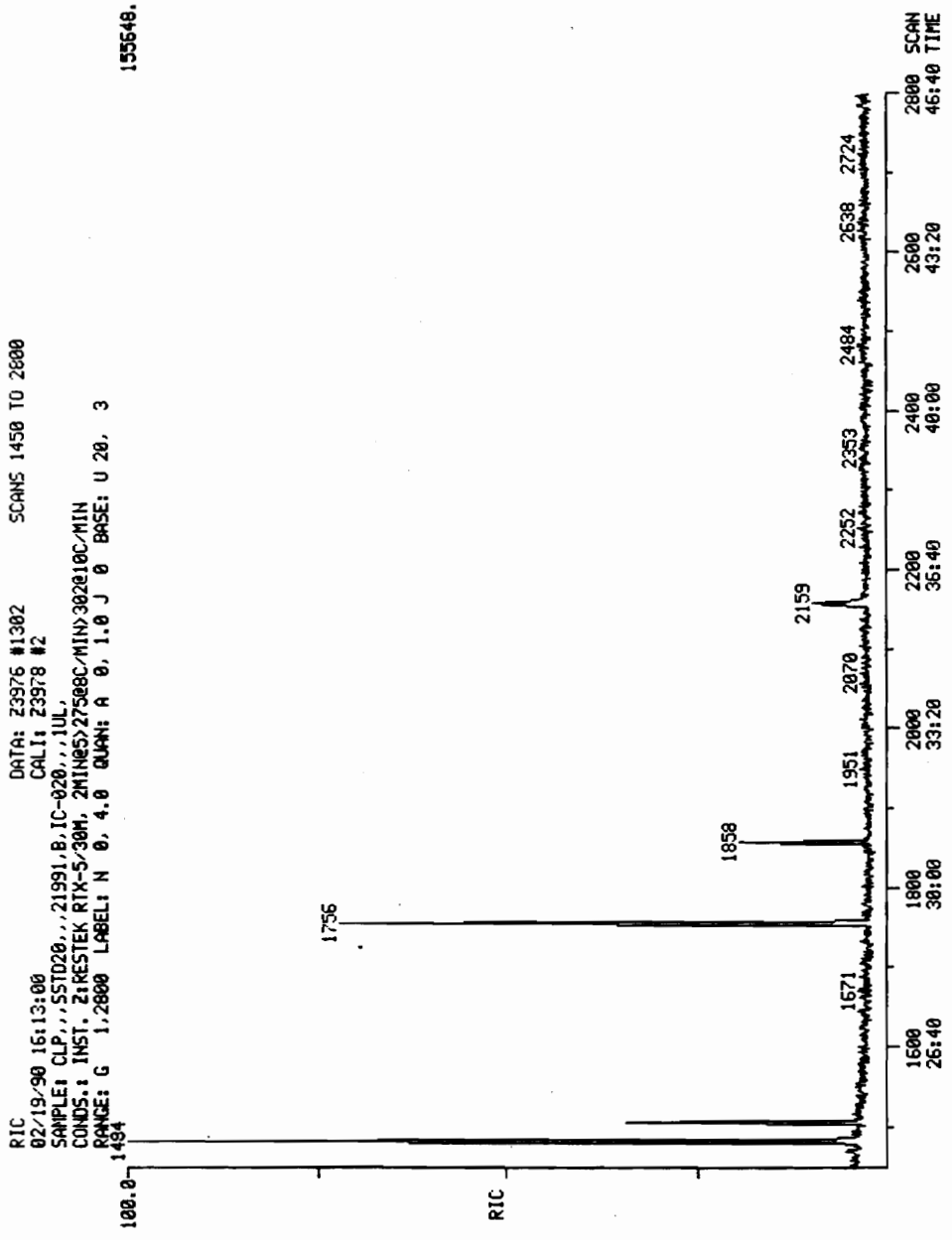
SAMPLE: CLP,,,SSTD20,,,21991,B,IC-020,,,1UL,
CONDS.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
RANGE: G 1.2800 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
DATA: Z3976 #1302
CALI: Z3978 #2
SCANS 155 TO 1450
228352.
100.0
RIC
224
359
444
514
564
660
730
800
914
1061
1157
1195
1257
1302
1357
200
3:20
400
6:40
600
10:00
800
13:20
1000
16:40
1200
20:00
1400
23:20
SCAN
TIME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CONDS.: INST. 2:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
RANGE: G 1.2000 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
DATA: Z3976 #1302
CALI: Z3978 #2
SCANS 1450 TO 2600
155648.
100.0
RIC
1494
1671
1756
1858
1951
2070
2159
2252
2353
2484
2638
2724
1600
26:40
1800
30:00
2000
33:20
2200
36:40
2400
40:00
2600
43:20
2800
46:40
SCAN
TIME

Quantitation Report File: Z3976

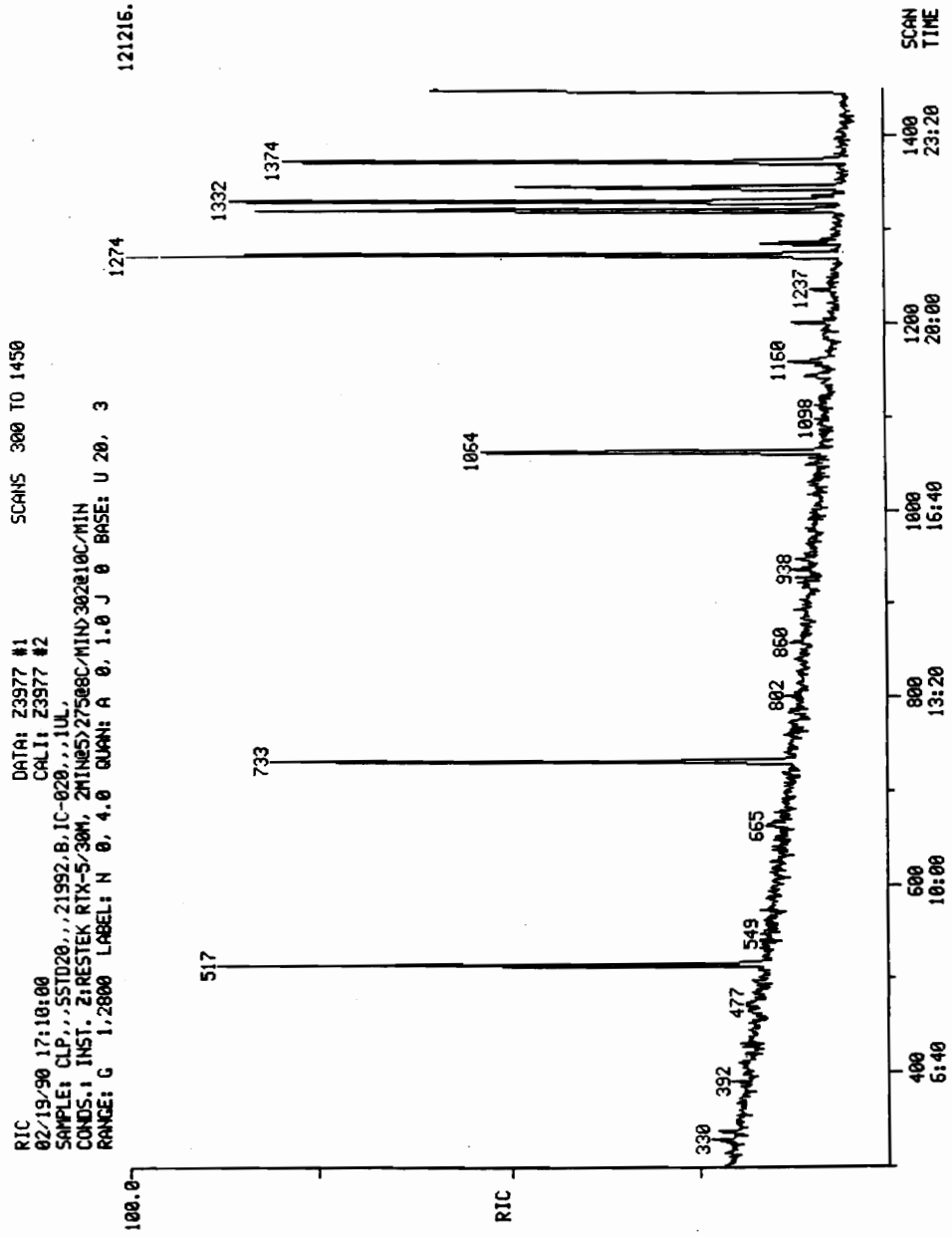
Data: Z3976.TI
02/19/90 16:13:00
Sample: CLP,,,SSTD20,,,21991,B,IC-020,,,1UL,
Conds.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
Formula: Instrument: Z Weight: 0.007
Submitted by: VERSAR Analyst: JK Acct. No.:

AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac. from Library Entry

No	Name
1	CI60 PHENANTHRENE-D10**INT. STD. #4**
2	PHORATE
3	DISULFOTON
4	METHYL PARATHION
5	MALATHION
6	PARATHION
7	ALACHLOR
8	ATRAZINE
9	CI70 CHRYSENE-D12**INT. STD. #5**
10	FAMPHUR

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
1	188	1344	22:24	1	1.000	A BB	46115.	10.000	NG/UL	5.56
2	75	1257	20:57	1	0.935	A BB	116119.	20.000	NG	11.11
3	88	1357	22:37	1	1.010	A BB	75468.	20.000	NG	11.11
4	109	1431	23:51	1	1.065	A BB	40426.	20.000	NG	11.11
5	125	1484	24:44	1	1.104	A BB	46631.	20.000	NG	11.11
6	97	1507	25:07	1	1.121	A BB	11609.	20.000	NG	11.11
7	160	1439	23:59	1	1.071	A BB	19951.	20.000	NG	11.11
8	200	1302	21:42	1	0.969	A BB	19667.	20.000	NG	11.11
9	240	1858	30:58	9	1.000	A BB	24379.	10.000	NG/UL	5.56
10	218	1756	29:16	9	0.945	A BB	61289.	20.000	NG	11.11

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R.Fac	R.Fac(L)	Ratio
1	22:24	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
2	20:57	1.00	0.935	1.00	20.00	20.00	1.259	1.259	1.00
3	22:37	1.00	1.010	1.00	20.00	20.00	0.818	0.818	1.00
4	23:51	1.00	1.065	1.00	20.00	20.00	0.438	0.438	1.00
5	24:44	1.00	1.104	1.00	20.00	20.00	0.506	0.506	1.00
6	25:07	1.00	1.121	1.00	20.00	20.00	0.126	0.126	1.00
7	23:59	1.00	1.071	1.00	20.00	20.00	0.216	0.216	1.00
8	21:42	1.00	0.969	1.00	20.00	20.00	0.213	0.213	1.00
9	30:58	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
10	29:16	1.00	0.945	1.00	20.00	20.00	1.257	1.257	1.00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RANGE: G 1,2000 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
DATA: Z3977 #1
CAL: Z3977 #2
SCANS 300 TO 1450
121216.
100.0
RIC
330
392
477
517
549
665
733
802
860
938
1064
1098
1158
1237
1274
1332
1374
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600
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13:20
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1200
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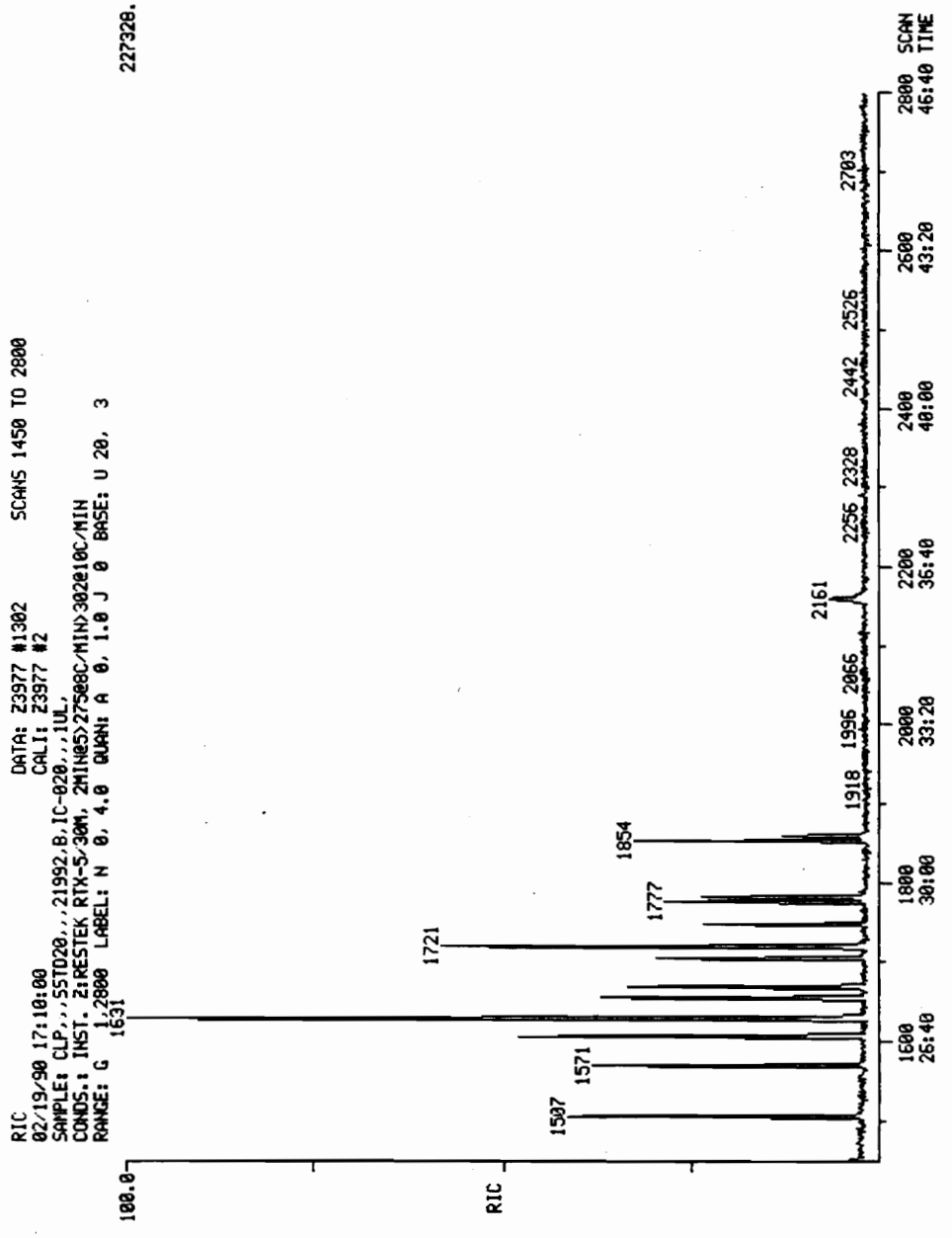
23:20
SCAN
TIME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CONDS.: INST. Z: RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
RANGE: G 1.2000 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
DATA: Z3977 #1302
CALI: Z3977 #2
SCANS 1450 TO 2000
227328.
100.0
RIC
1631
1721
1854
1777
1571
1507
1918
1995
2065
2161
2256
2328
2442
2526
2703
1600
26:40
1800
30:00
2000
33:20
2200
36:40
2400
40:00
2600
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2800
46:40
SCAN
TIME

Quantitation Report File: Z3977

Data: Z3977.TI
02/19/90 17:10:00
Sample: CLP,,,SSTD20,,,21992,B,IC-020,,,1UL,
Conds.: INST. Z:RESTEK RTX-5/30M, 2MIN@5>275@8C/MIN>302@10C/MIN
Formula: Instrument: Z Weight: 0.007
Submitted by: VERSAR Analyst: JK Acct. No.:

AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac. from Library Entry

No	Name
1	ALPHA BHC
2	BETA BHC
3	GAMMA BHC (LINDANE)
4	CI60 PHENANTHRENE-D10**INT. STD. #4**
5	DELTA BHC
6	HEPTACHLOR
7	ALDRIN
8	HEPTACHLOR EPOXIDE
9	GAMMA CHLORODANE
10	ALPHA ENDOSULFAN
11	ALPHA-CHLORODANE
12	4,4'-DDE
13	DIELDRIN
14	ENDRIN
15	BETA ENDOSULFAN
16	4,4'-DDD
17	ENDRIN ALDEHYDE
18	4,4'-DDT
19	ENDOSULFAN SULFATE
20	P,P'-METHOXYCHLOR
21	CI70 CHRYSENE-D12**INT. STD. #5**

No	m/z	Scan	Time	Ref	RRT	Meth	Area(Hght)	Amount		%Tot
1	181	1274	21:14	4	0.947	A BB	22796.	20.000	NQ	4.82
2	181	1321	22:01	4	0.981	A BB	16504.	20.000	NQ	4.82
3	181	1331	22:11	4	0.989	A BB	19818.	20.000	NQ	4.82
4	188	1346	22:26	4	1.000	A BB	47327.	10.000	NQ/UL	2.41
5	183	1373	22:53	4	1.020	A BB	15958.	20.000	NQ	4.82
6	100	1450	24:10	4	1.077	A BB	11679.	20.000	NQ	4.82
7	66	1508	25:08	4	1.120	A BB	18414.	20.000	NQ	4.82
8	81	1571	26:11	4	1.167	A BB	10319.	20.000	NQ	4.82
9	373	1608	26:48	4	1.195	A BB	11877.	25.000	NQ	6.02
10	195	1630	27:10	21	0.876	A BB	7052.	20.000	NQ	4.82
11	373	1631	27:11	21	0.877	A BB	22563.	25.000	NQ	6.02
12	248	1656	27:36	21	0.890	A BB	13773.	20.000	NQ	4.82
13	79	1670	27:50	21	0.898	A BB	15729.	20.000	NQ	4.82
14	81	1707	28:27	21	0.918	A BB	5042.	20.000	NQ	4.82
15	159	1720	28:40	21	0.925	A BB	3723.	20.000	NQ	4.82
16	235	1721	28:41	21	0.925	A BB	30834.	20.000	NQ	4.82
17	67	1749	29:09	21	0.940	A BB	9305.	20.000	NQ	4.82
18	165	1777	29:37	21	0.955	A BB	13967.	20.000	NQ	4.82
19	272	1783	29:43	21	0.959	A BB	6031.	20.000	NQ	4.82
20	227	1854	30:54	21	0.997	A BB	46031.	25.000	NQ	6.02
21	240	1860	31:00	21	1.000	A BB	28456.	10.000	NQ/UL	2.41

No	Ret(L)	Ratio	RRT(L)	Ratio	Amnt	Amnt(L)	R.Fac	R.Fac(L)	Ratio
1	21:14	1.00	0.947	1.00	20.00	20.00	0.241	0.241	1.00
2	22:01	1.00	0.981	1.00	20.00	20.00	0.174	0.174	1.00
3	22:11	1.00	0.989	1.00	20.00	20.00	0.209	0.209	1.00
4	22:26	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00
5	22:53	1.00	1.020	1.00	20.00	20.00	0.169	0.169	1.00
6	24:10	1.00	1.077	1.00	20.00	20.00	0.123	0.123	1.00
7	25:08	1.00	1.120	1.00	20.00	20.00	0.195	0.195	1.00
8	26:11	1.00	1.167	1.00	20.00	20.00	0.109	0.109	1.00
9	26:48	1.00	1.195	1.00	25.00	25.00	0.100	0.100	1.00
10	27:10	1.00	0.876	1.00	20.00	20.00	0.124	0.124	1.00
11	27:11	1.00	0.877	1.00	25.00	25.00	0.317	0.317	1.00
12	27:36	1.00	0.890	1.00	20.00	20.00	0.242	0.242	1.00
13	27:50	1.00	0.898	1.00	20.00	20.00	0.276	0.276	1.00
14	28:27	1.00	0.918	1.00	20.00	20.00	0.089	0.089	1.00
15	28:40	1.00	0.925	1.00	20.00	20.00	0.065	0.065	1.00
16	28:41	1.00	0.925	1.00	20.00	20.00	0.542	0.542	1.00
17	29:09	1.00	0.940	1.00	20.00	20.00	0.163	0.163	1.00
18	29:37	1.00	0.955	1.00	20.00	20.00	0.245	0.245	1.00
19	29:43	1.00	0.959	1.00	20.00	20.00	0.106	0.106	1.00
20	30:54	1.00	0.997	1.00	25.00	25.00	0.647	0.647	1.00
21	31:00	1.00	1.000	1.00	10.00	10.00	1.000	1.000	1.00

VII. Vita

Jay C. Kuhn was born at Fort Orde, California on July 17, 1959. He attended high school at Woodberry Forest School in Orange, Virginia. He received a B.S. in Chemistry from Denison University and is currently a candidate for an M.S. in Environmental Sciences and Engineering. He spent six years at Versar Corporation as a Senior Chemist and is currently an Associate Scientist with ICF Kaiser Engineers.