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Volume I

ANALYTICAL METHODOLOGY FOR HERBICIDE ORANGE

Volume I: Determination of Chemical Composition

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MAY 1975

FINAL REPORT DECEMBER 1972 — DECEMBER 1974

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18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Analysis	Tetrachlorodibenzo-p-dioxin (TCDD)
Chlorophenoxy-Type Herbicide	Dioxin
Gas Chromatograph-Mass Spectrometer	Organochlorine Compounds
Computerized Data Acquisition	Herbicide Orange

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

This report describes research performed by ARL at the request of the Air Force Logistics Command to develop and apply analytical methodology to characterize the USAF inventory of Herbicide Orange stocks. A computerized Gas Chromatograph-Mass Spectrometer (GC-MS) system was developed which permitted determination of the 15 to 25 major and minor herbicide components which are typically present in the stocks located at Gulfport, Mississippi. For determination of tetrachlorodibenzo-p-dioxin (TCDD), a fully automated GC-Quadrupole MS was developed and used in conjunction with an improved column-chromatography

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Item 20 Continued

sample-clean-up technique. The analytical methodology is described in detail.

PREFACE

The research and development described in this report were performed in-house by the Gaseous Ionization and Excitation Processes Group of the Chemistry Research Laboratory, Aerospace Research Laboratories (AFSC), Wright Patterson AFB, Ohio. This work was funded by Air Force Logistics Command, Assistant Deputy Chief of Staff/Distribution, Mr. Karl Merrill. Dr. Billy E. Welch, Special Assistant for Environmental Quality, Office of the Secretary of the Air Force, had overall cognizance for this effort which was undertaken to provide analytical chemistry support of USAF efforts to dispose of excess herbicide stocks in accordance with Environmental Protection Agency guidelines. The in-house work force was augmented during these studies via Contract No. F33615-73-C-4099 with Systems Research Laboratories, Inc., Dayton, Ohio 45440. These studies were performed under Project 7023, Task 702306, Work Unit 70230614, "Advanced Mass Spectrometric Analytical and Diagnostic Techniques for Materials and Research Applications."

The ARL principal investigator in these studies was Dr. Thomas O. Tiernan, ARL (LJ), Wright Patterson AFB, Ohio 45433.

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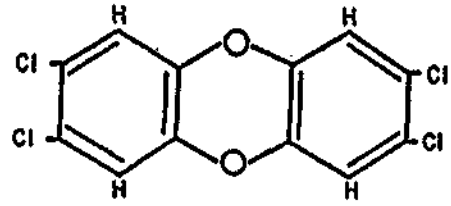
SECTION I

INTRODUCTION

During the 1960's a herbicide formulation consisting mainly of the n-butyl esters of 2,4-dichlorophenoxyacetic acid (2,4-D) and 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) and designated Herbicide Orange was employed as a defoliant in Southeast Asia. Research performed at Bionetics Laboratories and reported by Courtney et al early in 1970[1,2] implicated 2,4,5-T as a teratogenic agent. It was later reported[3-5] that the 2,4,5-T formulation employed by Courtney et al contained 30 μg/g of 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)--one



2,3,7,8-tetrachlorodibenzo-p-dioxin

of the most toxic and and potent teratogenic substances known. Subsequent to these findings, the Environmental Protection Agency promulgated more stringent rules regulating the domestic use of 2,4,5-T, and the Secretary of Defense ordered that use of these herbicide formulations in South Vietnam be discontinued. The abrupt ban on usage of 2,4,5-T defoliants left the Department of Defense (the Department of the Air Force, in particular) with 2.3 million gallons of such defoliants which are still stored in 55-gal. drums in Gulfport, Mississippi, and Johnston Island in the Pacific Ocean. Several methods for disposing of these herbicide stocks from the inventory are now under consideration. In order to secure required data to support use of selected lots of the herbicide inventory, the Air Force Logistics Command requested the Gaseous Excitation and Ionization Processes Group of the Chemistry Research Laboratory at the Aerospace Research Laboratories (Air Force Systems Command) to undertake the development and application of analytical methods for characterizing Air Force herbicide stocks at Gulfport, Mississippi. Prior to the work at ARL

some preliminary analyses had been performed by Dow Chemical Co, and the sample numbering system devised by Dow was retained throughout our studies.

An "Analysis Sequence Number" was assigned to each herbicide Transportation Control Number (TCN). The pertinent TCN's, the manufacturer of each batch, and the related Analysis Sequence Numbers are shown below:

Manufacturer	TCN	Analysis Sequence No.	Gallons on Hand as of 12 Jan 73
Thompson Company	94638155X012	5	44,440
Hercules Company	946481560001	8	27,500
Dow Chemical Company	94638155X052	10	383,680
Hercules Company	94648192001	14	118,360
		Total Gallons	573,980
		Approximate Market Value @ $40/gallon	$22,959,200

Representative samples from each of the above TCN's were collected by personnel from Kelly AFB/EHL(K) on 10 July 1973. Individual samples were taken by suspending a 1- or 2-oz. glass bottle from a wire and inserting the bottle ~18 in. into the herbicide and swirling the bottle. The bottle was then removed and capped and the exterior was cleaned. Each drum was numbered, and that number was scribed onto the glass bottle. Samples are precisely identified by listing the Analysis Sequence Number and barrel number. The convention adopted is shown here:

7 Hercules 8

Barrel # Manufacturer Analysis Sequence Number

This report describes the development and application of methodology developed for mass-spectrometric characterization of contaminants present in the herbicide samples at levels > 0.1%, including all volatile compounds and the chlorophenoxyacetic acids. The techniques for determining tetrachlorodibenzo-p-dioxin in concentrations > 0.02 ppm (0.02 μg/g) are also described, and the analytical results are summarized.

Tables and figures pertinent to the four Gulfport samples characterized are attached as Appendices A through D. Appendix E contains data from analysis of standard reference materials performed during these studies. Appendix F contains data from determination of TCDD in 250 samples of Herbicide Orange.

SECTION II

ANALYTICAL METHODOLOGY

A. MASS-SPECTROMETRIC TECHNIQUES USED FOR QUALITATIVE AND QUANTITATIVE IDENTIFICATION OF VOLATILE COMPONENTS

An unambiguous identification of unknown compounds present in Herbicide-Orange samples, which are primarily butyl esters of dichloro- and trichlorophenoxyacetic acids (XIII and XIV in Table I) can be accomplished easily only by using a gas chromatograph-mass spectrometer (GC-MS) computer system. With such a system, the individual volatile components of the herbicide are separated on the gas-chromatographic column, and each component in turn is admitted to the mass spectrometer and its mass spectrum is obtained in order to permit positive identification. An instrument of this type was developed at ARL and includes a DuPont 21-491 double-focusing mass spectrometer coupled through a stainless-steel Biemann-Watson separator to a Loenco gas chromatograph. This GC-MS system is controlled by a Hewlett-Packard Model 2116C, 24k-core, 16-bit minicomputer with a 2.5-million-word cartridge disc system. The scan rate and frequency response of the system were adjusted to permit mass spectra to be obtained every 9 sec., for scans extending over more than one mass decade (i.e., mass 10-100, mass 30-300, etc.); spectra of all compounds present in excess of 0.1% of the total sample injected were recorded.

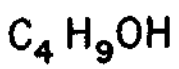
As the magnetic field of the mass spectrometer is scanned, mass-spectral peaks are measured by the computer, and data from each successive mass spectral scan are stored on the cartridge disc, along with the time elapsed since initial injection of the sample. A total analysis time of approximately 1 hr was required to elute the volatile herbicide constituents and record the data for these. The time required for the computer to rearrange these data in a convenient form for display was on the order of 15 to 45 min. When this procedure was complete, plots of any mass in the spectrum as a function of retention time were obtained within seconds.

In order to determine that the peaks observed in the total-ion chromatograms (for example, see Figure A-3) consisted of a single component, specific masses were displayed as a function of time (for example, see Figure A-8). In

TABLE I

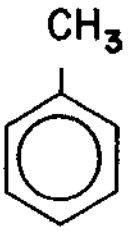
STRUCTURES AND NOMENCLATURE

I



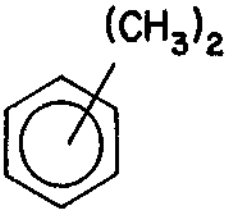
Butanol

II



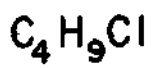
Toluene

III



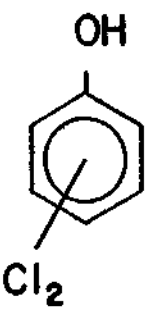
Xylenes

IV



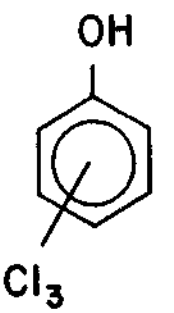
Butyl Chloride

V



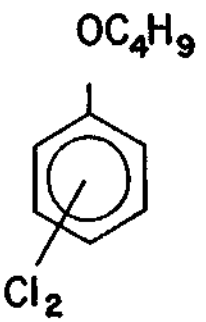
Dichlorophenol

VI



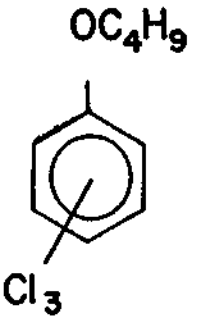
Trichlorophenol

VII



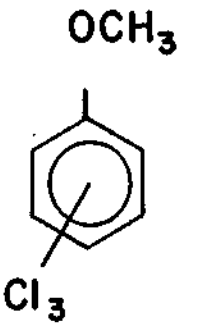
Butyl Ether of
Dichlorophenol

VIII



Butyl Ether of
Trichlorophenol

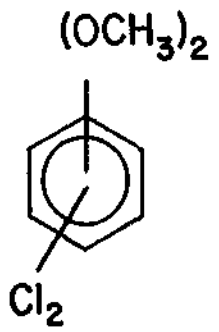
IX



Methyl Ether of
Trichlorophenol or
Trichloroanisole

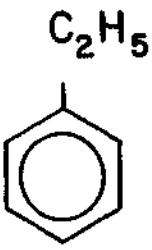
TABLE I (continued)

X



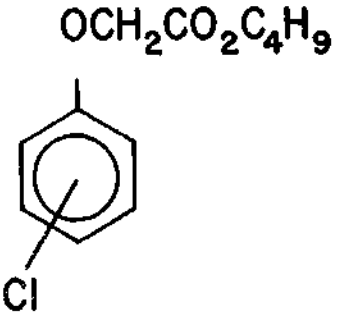
Dimethoxy-dichlorophenol or Dimethoxy-dichloroanisole

XI



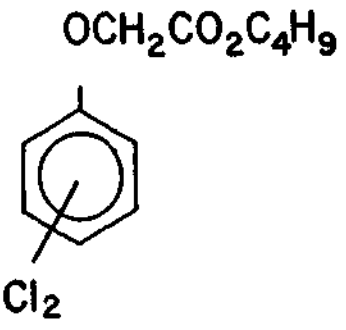
Ethyl Benzene

XII



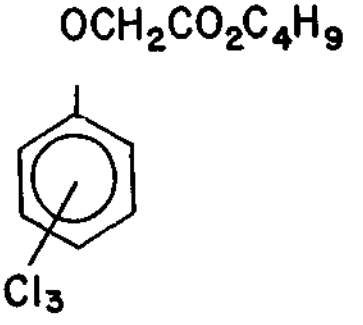
Butyl Ester of Monochloro-phenoxyacetic Acid

XIII



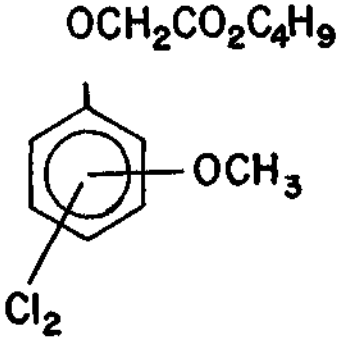
Butyl Ester of Dichloro-phenoxyacetic Acid

XIV



Butyl Ester of Trichloro-phenoxyacetic Acid

XV



Butyl Ester of Methoxy-dichlorophenoxyacetic Acid

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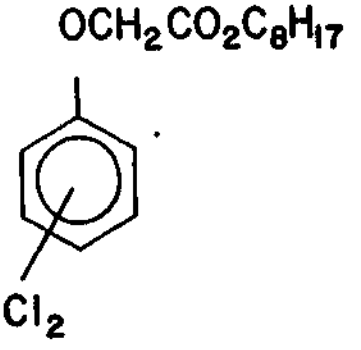
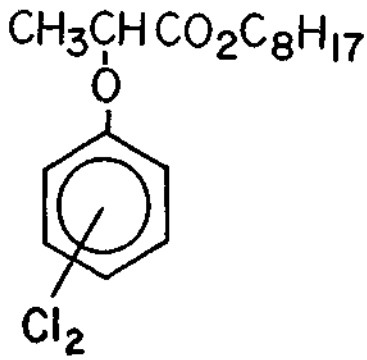


Octyl Ester of Dichlorophenoxy-acetic Acid

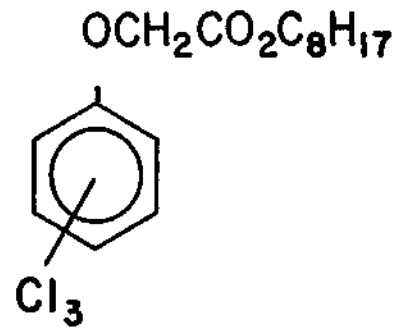
TABLE I (continued)

XVII



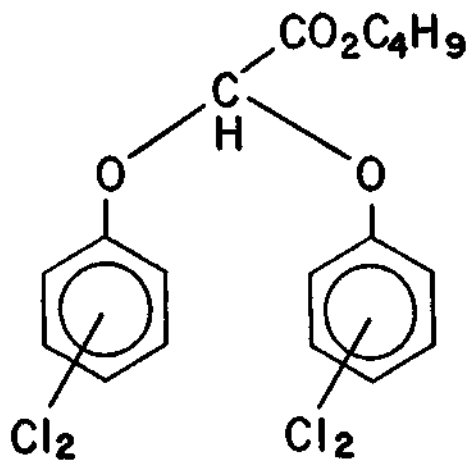
Octyl Ester of Dichlorophenoxy-propionic Acid or Octyl Ester of Silvex

XVIII



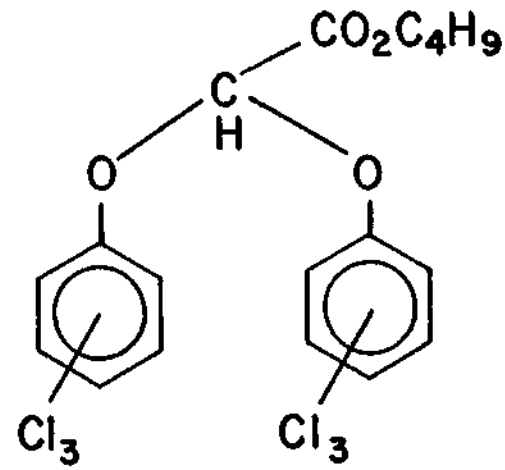
Octyl Ester of Trichlorophenoxyacetic Acid

XIX



Butyl Ester of Bis (dichlorophenoxy) Acetic Acid

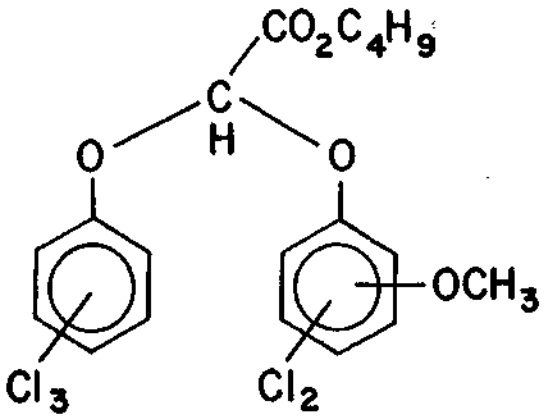
XX



Butyl Ester of Bis(trichlorophenoxy) Acetic Acid

TABLE I (continued)

XXI



Butyl Ester of (methoxy-dichlorophenoxy-) trichlorophenoxyacetic Acid

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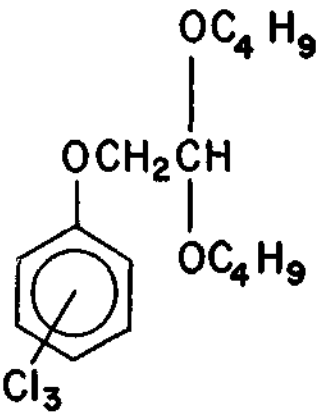
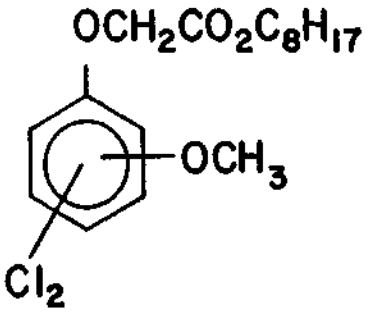


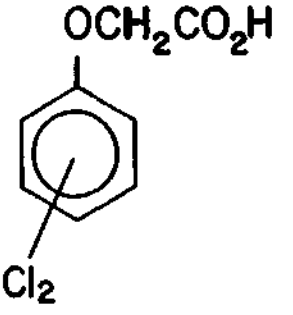
1,1-dibutoxy-2-trichlorophenoxy-ethane

XXIII



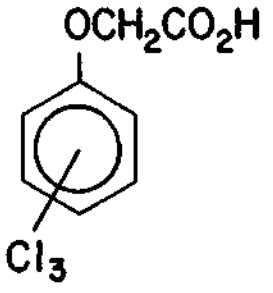
Butyl Ester of Methoxy-dichlorophenoxy-acetic Acid

XXIV



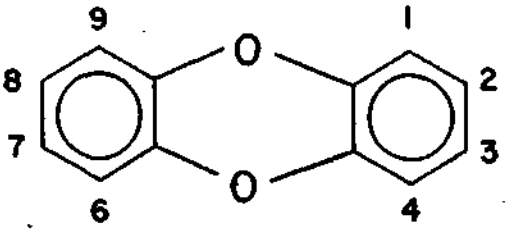
Dichlorophenoxyacetic Acid

XXV



Trichlorophenoxyacetic Acid

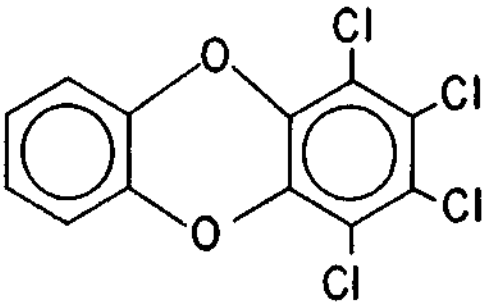
XXVI



Dibenzo-p-dioxin

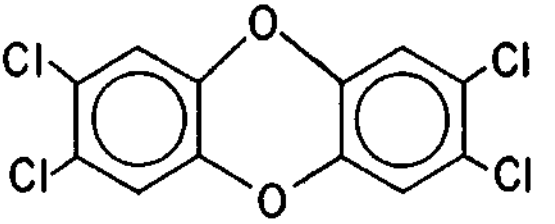
TABLE I (continued)

XXVII



1,2,3,4-Tetrachloro-dibenzo-p-dioxin

XXVIII



2,3,7,8-Tetrachloro-dibenzo-p-dioxin

addition, a high-resolution gas-chromatographic column (8-ft. x 1/8-in. O.D. 10% DC-200 on Gas Chrom Q) was used in a separate gas chromatograph, with flame-ionization detection (F.I.D.), to confirm that the single chromatographic peaks identified by the GC-MS-computer contained one compound only. These high-resolution chromatographic data were also used to determine relative quantities of the various compounds present in the herbicide samples, upon assuming equal F.I.D. sensitivities (see Figure A-1).

Each peak appearing in the total-ion and flame-ionization chromatograms indicates the elution of a specific compound at a particular time, and this chromatographic retention time alone can be used to identify the unknown compound, if a known compound which has the same retention time can be found. In general, while the retention time may be determined very accurately and can be reproducibly obtained for a given compound in a number of different solvents, this time is not a unique identification since many compounds may have identical retention times. A much more positive identification can be made if the mass spectrum of the component is obtained. While the latter is almost an unambiguous identification, uncertainties remain in some cases since strong similarities exist in the mass-spectral fragmentation patterns of various geometrical and chemical isomers. Therefore, a completely unambiguous identification of a compound in question can be obtained only by using both the mass-spectral fragmentation pattern and the retention times as measured on several different chromatographic columns. This statement assumes that standards of the isomer of the compound in question are readily available to permit direct comparison of the retention times and mass spectra of the known and unknown compounds. This is frequently not possible, and, in the present report, it will be indicated whether the standard spectrum was obtained in our laboratory under identical conditions to the unknown or whether the standard spectrum was obtained from the literature. In general, positional isomers were not distinguished since good standards for these species simply are not available.

The mass-spectral fragmentation pattern of the butyl ester of dichlorophenoxyacetic acid in itself does not permit one to make a distinction between the

n-butyl, iso-butyl, or tert-butyl isomers nor between 2,3-, 2,4-, 2,5-, 3,4-, or 3,5-dichloro isomers. In principle, these details can be determined, but only after authentic samples of each of these specific isomers are available and can be examined under identical chromatographic conditions. Table I gives the structural chemical formulae of all herbicide constituents identified in the present study, along with their nomenclature. Note that no positional information is implied by these structures. Since in our experience even reference standards identified by a supplier have been observed to contain more than one isomeric species, no attempt will be made in the present report to make a distinction between various structural isomers.

The identity of an unknown compound can be determined readily if a mass spectrum which contains at least six to eight mass peaks, including a molecular-ion peak, cab be obtained. The sensitivity of the GC-MS computer system used here is such that only compounds which have concentrations in excess of 0.1% give such a response for a sample volume of 5 to 10 $\mu\ell$ injected into the chromatograph. However, when one approaches these low levels, a significant problem is encountered in distinguishing mass-spectrometric peaks arising from the unknown compound from those peaks originating from residual material in the instrument (instrument background). Background peaks from the GC-MS itself are often larger than the small peaks that may be associated with the compound of interest. To delineate these two sources of mass-spectral peaks, two sub-routines are incorporated into the software of the computer system. The first is a program which subtracts one mass spectrum from another, normalizes the result to the largest difference found, and prints out all values larger than a specified percentage. Examples of this routine are included in Appendix A and can be seen in Table A-1. Here, Scan 77 is the background spectrum which is subtracted from Scan 85, and the normalized intensities greater than 1% are displayed. Although there was a large abundance peak at Mass 28 in both the background and the unknown scans, the resulting spectrum of interest does not include this background peak. Mass 28 would be reported in the unknown spectrum only if the difference were greater than 1% of the largest peak in the spectrum. Through the use of such normalized intensities, which are corrected for background, identification of unknowns is greatly simplified.

A second method for identification of small peaks which may be associated with an unknown compound is the mass chromatogram. After studying a normalized background-subtracted scan, very small peaks can be associated with the spectrum of interest by plotting the intensity of a certain mass as a function of chromatographic elution time and comparing the observed behavior either with a more intense peak that is known to arise from the unknown compound or with the total ion chromatogram of the unknown in the mixture. An example of the use of this subroutine is given in Appendix D (see Figure D-11 and D-12). Here total-ion chromatograms, the Mass-196 chromatogram, and the Mass-206 chromatogram for Herbicide Sample #264 are displayed as a function of chromatographic retention time. It is evident that Masses 196 and 206 originate not from the same compound but from two different compounds which elute at slightly different times. In this case, the relative amounts are such that this difference can actually be seen as a shoulder which appears at a longer time on the total-ion chromatogram. However, the compound, if present in smaller quantities, could not be observed visually in the total-ion chromatogram. It could be detected only if one of the masses which are associated with the lesser compound were displayed as a function of retention time. This technique greatly facilitates distinction of background mass-spectrometric peaks from small peaks arising from the unknown compound. This markedly simplifies identification of unknowns.

Qualitative identification of unknown species can be made by first obtaining a listing of spectra at elution times corresponding to maxima or shoulders in the reconstructed total-ion chromatogram, and then searching for a molecular-ion identification using the mass-chromatogram displays to distinguish background from authentic peaks. Mass spectra of components are verified by comparison with standard mass-spectrometric tables. Appendix E is a compilation of standard spectra taken in this laboratory for compounds that are of interest due to their suspected presence in the herbicide samples or due to their possible interference with low-level tetrachlorodibenzo-p-dioxin analysis. In each table the origin of the standard compound is given, along with the retention time of the compound and the time of the background spectrum.

In addition to comparison of unknown spectra with spectra obtained from the literature or with standard spectra obtained under different conditions, it is often necessary to identify an unknown compound by comparison with the standard spectrum of an analogous compound. This method of identification is exemplified in the identification of an impurity present in each of the four herbicide samples analyzed--the butyl ester of monochlorophenoxyacetic acid (XII). As can be seen from a comparison of the mass spectra in Tables A-9 and A-10 (see Appendix A), similarities between the two spectra include large m/e 57, 41, and 29 peaks, indicating the presence of the C_4H_9 group. The heaviest mass found that is associated with the molecular ion is 34 amu lower in Spectrum A-9 than in Spectrum A-10. The spectrum of I (Table A-10) has been identified from standard spectra to be the butyl ester of dichlorophenoxyacetic acid and the difference in the molecular-ion mass of 34 units, along with intense butyl ion fragments, indicates that Spectrum H of Gulfport #7 is a butyl ester of monochlorophenoxyacetic acid. In addition, Spectra I and H both have very intense m/e 91, m/e 101, and m/e 114 peaks. These correspond to loss of C_4H_8Cl, $CO_2C_4H_9$, and $CHCO_2C_4H_9$, respectively, from the molecular ion. Similar analogies are necessary in cases where the exact compound of interest is not readily available.

Two other identification techniques reported here greatly simplify the interpretation of the spectra of unknowns found in the four Gulfport herbicide samples analyzed. These techniques are (1) identification of butyl fragments in the spectrum and (2) the use of the isotope distributions to determine the number of chlorine atoms present in a given fragment. The basis for the butyl-fragment approach is seen in Figure A-6 (Appendix A). It is evident that only those total-ion chromatographic peaks which exhibit Masses 57, 41, and 29 can be associated with a butyl compound. Since the major components of Herbicide Orange are butyl esters, these compounds along with impurities containing butyl groups give rise to these masses.

The second technique mentioned above--the chlorine-isotope distribution--was also quite useful in classifying unknown compounds. Since the natural-chlorine isotope distribution of $^{35}Cl:^{37}Cl$ is approximately 3:1, mass spectra of

chlorine-containing compounds exhibit isotope-distribution patterns characteristic of the number of chlorine atoms present within the fragment; Table II gives theoretical distributions calculated for the various masses. In the rationale for identifying the butyl ester of monochlorophenoxyacetic acid (Table A-9 in Appendix A), it can be seen that the ratio of intensities of Mass 242:244 is approximately 3:1. On the other hand, the ratio of intensities of 276:278 in Spectrum I (Table A-10) is on the order of 1:0.6, which is the distribution expected for a Cl_2 compound. Spectrum I has been identified as that of the butyl ester of dichlorophenoxyacetic acid. In addition to the molecular ion of Compound H's being 34 amu less than the molecular ion of Compound I, Compound H is also determined to have one less chlorine atom than Compound I, based upon the m:m+2:m+4 distribution; therefore, the identity of Compound H is confirmed.

In the GC-MS characterization of Herbicide Orange, the herbicides (all liquids at room temperature) were injected in 1 to 10-$\mu\ell$ quantities into the GC-MS, and those compounds amenable to gas-chromatographic separation have been determined. Compounds having sufficient thermal and solvolytic stability and chemical inertness to elute from the gas-chromatographic column in detectable quantities are reported herein; inorganic impurities such as metals or nonvolatile forms thereof or chemically reactive species such as organic acids require special techniques. Early in our studies, it became apparent that a single gas-chromatographic column suitable for separation of the broad range of herbicide components would be difficult to develop. It was discovered that by employing a column with a rather polar stationary phase, a relatively rapid and efficient separation of the herbicide components having chromatographic retention times less than the butyl esters of 2,4-D (compounds with comparatively high vapor pressures) could be obtained. Components having vapor pressures less than the butyl esters of 2,4,5-T were characterized by using a different column with a less polar stationary phase, thereby obviating the intolerably long retention times obtained for the less volatile species when the more polar column was used.

TABLE II

NORMALIZED ION DISTRIBUTIONS OF CHLORINE-CONTAINING HYDROCARBON FRAGMENTS

Number of Cl Atoms	Normalized Intensity			
	m	m+2	m+4	m+6
1	1.0	0.324	-	-
2	1.0	0.648	0.105	-
3	1.0	0.972	0.315	0.034
4	0.772	1.0	0.486	0.105

Conditions for the gas-chromatographic separation of the more volatile compounds were:

Chromatographic Column:	10-ft. x 1/4-in. O.D. glass coil packed with 10% OV-225 on Gas Chrom Q
Column Temperature:	Programmed post-injection from 80 to 160° at 4°/min.

Figure D-3 shows a typical total-ion chromatogram (Herbicide Orange from Barrel #264) obtained under the above conditions. The lower limit of detectability for compounds in this region was 0.1%.

Conditions for gas-chromatographic separation of compounds with vapor pressures less than butyl 2,4,5-T were as follows:

Chromatographic Column:	10-ft. x 1/4-in. O.D. glass coil packed with 10% DC-200 on Gas Chrom Q
Column Temperature:	Programmed post-injection from 160 to 240° at 4°/min

Even under these chromatographic conditions, the less volatile compounds exhibited significant tailing which caused the lower limit of detectability for these compounds to be on the order of 0.5 to 1%.

Results obtained in the above GC-MS analyses were, in many instances, also compared with results obtained with a conventional gas chromatograph equipped with a flame-ionization detector and 8-ft. x 1/8-in. O.D. glass column. A gas chromatogram obtained for Herbicide Orange from Barrel #264 is shown in Figure D-1 (compare with Figure D-3).

B. TECHNIQUES USED FOR QUANTITATIVE DETERMINATION OF THE FREE ACID

In addition to the volatile components present in the Herbicide-Orange samples which were determined directly by the GC-MS procedures outlined above, a procedure for quantifying dichlorophenoxyacetic acid (XXIV) and trichlorophenoxyacetic acid (XXV) present in a matrix of esters of these acids was developed. The method entailed extraction of a chloroform solution of the herbicide with a solution of weak base, back extraction of the basic solution with ether, acidification of the basic solution to obtain the free acids, extraction of the acids, and treatment of the extract with acid methanol to obtain the methyl esters. The methyl esters obtained were determined quantitatively by using flame-ionization gas chromatography. Blanks and standards run through the procedure indicated that a negligible amount of saponification of the herbicide esters occurred during the extraction process and that recovery of known quantities of dichlorophenoxyacetic acid and trichlorophenoxyacetic acid added to Herbicide Orange is 100%.

The detailed procedure is as follows:

1) Weigh accurately 1 g of herbicide in a 50-ml glass-stoppered erlenmeyer flask.
2) Add 1.0 ml $CHCl_3$ (Matheson, Coleman, Bell, ACS Quality, Reagent Grade).
3) Add 5.0 ml of 5% aqueous $NaHCO_3$ and mix by gentle agitation for about 3 min. Pour mixture into separatory funnel and separate layers. Place aqueous layer in clean erlenmeyer flask.
4) Rewash organic layer with fresh 5.0-ml portion of $NaHCO_3$. Combine basic layers and extract with two 10-ml portions of diethyl ether. Discard ether.
5) Acidify aqueous layer (pH 1-2) by dropwise addition of concentrated H_2SO_4.
6) Extract the acidified mixture with 2.0 ml of $CHCl_3$. Place $CHCl_3$ extract in polyethylene snap-cap vial containing 100 mg anhydrous Na_2SO_4.
7) Re-extract aqueous layer with 1.0 ml fresh $CHCl_3$. Combine chloroform extracts over Na_2SO_4.

8) Transfer 1.0 ml of the dried extract to a clean polyethylene snap-cap vial and add 1.0 ml of methanol (Matheson, Coleman, Bell, ACS Quality, Reagent Grade) containing 0.1% (by volume) H_2SO_4.

9) Permit solution to stand at room temperature (24°C) for 12 hr and the inject 1.0 -μℓ aliquots of the solution into the gas chromatograph.

10) Chromatography conditions - Instrument used was a Varian 1520 Gas Chromatograph equipped with flame-ionization detector and 6-ft. x 1/4-in. O.D. glass column (on-column injection was employed) packed with 10% OV-3 on Gas Chrom Q (80/100 mesh). Injector temperature was 220°C, column oven temperature was 220°C, and detector temperature was 260°C. Helium-carrier-gas flow rate was 33 cc/min., air flow rate was 300 cc/min., and hydrogen flow rate was 24 cc/min. Retention times were 511 sec for the methyl dichlorophenoxyacetate and 1059 sec for the methyl trichlorophenoxyacetate.

11) Data acquisition was achieved with an Autolab System IV computing integrator and Burrell strip-chart recorder.

C. TECHNIQUES USED FOR QUANTITATIVE DETERMINATION OF TETRACHLORODIBENZO-p-DIOXIN

1. Chemistry of Chlorinated Dibenzo-p-dioxins

The heterocyclic organic molecule dibenzo-p-dioxin (XXVI) is the nucleus which can, by addition of chlorine atoms in Positions 1 through 9, be converted into a chlorinated dibenzo-p-dioxin. As noted previously in this report, 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)* is of particular significance because of its potent systemic and tertatogenic toxicity, although data obtained from biochemical testing[5-7] indicate that other chlorinated dibenzo-p-dioxins are also quite toxic. Because of the lack of toxicity data concerning the effects of dioxin upon man, the currently available results of animal testing must be used to gauge this threat which TCDD poses. It is

*TCDD is used herein to denote tetrachlorodibenzo-p-dioxin, positions of the chlorine substituents not being specified. Where it is desired to specify the positions of the chlorines, the appropriate numbers are prefixed to the TCDD, for example, 2,3,7,8-TCDD.

widely recognized to be the most toxic small molecule known (LD_{50} = 0.6 μg/kg in guinea pigs); the threat to man must at this point be assumed to be equally great. Thus, analytical methods for determining TCDD have been sought which can be used to detect and quantify TCDD in such samples as food stuffs, water, and soil at extremely low levels--on the order of 1 x 10^{-12} g TCDD/g or 1 part-per-trillion. Baughman and Meselson[8,9] have used such a method, and Ryan[10] and Crummett[11] have reported somewhat similar methods.

It should be noted at this point that several structural isomers can quite properly be referred to as tetrachlorodibenzo-p-dioxin; thus, it is possible to encounter not only 2,3,7,8-TCDD but also 1,2,3,4-TCDD, 2,3,6,8-TCDD, 2,3,6,9-TCDD, etc. Approximately twenty tetrachlorodibenzo-p-dioxins are possible. Any analytical method which does not involve a very sophisticated scheme for separating highly similar compounds prior to mass-spectral determination or which utilizes solely the molecular-ion region of the mass spectrum cannot possibly be used to make a distinction between the respective tetrachlorodibenzo-p-dioxins which may be present in the sample. Furthermore, depending upon the resolution of the mass spectrometer being employed, such techniques cannot be used to differentiate tetrachlorodibenzo-p-dioxin from other tetrachlorinated hydrocarbons having nearly the same mass (or mass fragments) as the TCDD. Specifically, it is not at all certain at this writing whether the TCDD levels in Gulfport Herbicides reported by Dow in 1971[12] and 1972[13] represent 2,3,7,8-TCDD or a mixture of TCDD's which may be composed, in part, of the 2,3,7,8-TCDD. At worst, the Dow values represent upper limits.

The emphasis in the work reported herein was the characterization of herbicide stocks stored at Gulfport, Mississippi; in the case of TCDD, a method which could be used to detect reliably and quantify tetrachlorodibenzo-p-dioxin present in Herbicide Orange at levels greater than 0.1 ppm was needed. The methods alluded to above[8-11] were not suitable for our purposes since the levels of TCDD of concern were 10^5 greater than TCDD levels detectable by the techniques referred to above. Rather than ultrasensitive methodology, we sought to develop an approach which has adequate sensitivity and specificity

but which, at the same time, is amenable to "batch-analysis" procedures, i.e., a method which involves minimal sample treatment so that several samples can be analyzed per day. The method which has been developed in our laboratory is summarized in the following

2. DETAILS OF THE METHODOLOGY DEVELOPED AT ARL

a. Macro Techniques

Silica-Gel Column Chromatography

A 50-ml buret (14-mm I.D. x 34 cm long) equipped with glass stopcock was filled with silica gel (100/120 mesh, Matheson, Coleman, Bell, GC Grade) which previously had been allowed to equilibrate with a solvent system consisting of 20% by volume benzene in hexane (both solvents were from Matheson, Coleman, and Bell and were ACS Quality, Analyzed Reagent Grade). The column was vibrated to compact the silica gel, and then the solvent was allowed to flow through the column until about 100 ml had eluted. A 10-ml aliquot of eluate was then collected to be used as a blank. One milliliter of the herbicide diluted with 1 ml of solvent was added to the top of the silica-gel column and the sample eluted with additional solvent. The next 24 ml of eluate was discarded, and finally 50 ml of eluate (containing tetrachlorodibenzo-p-dioxin) was collected. This last fraction was evaporated to a volume of 2 to 3 ml and transferred to a screw cap vial. A stream of dry, oil-free air was then used to remove the solvent, 50 $\mu\ell$ of chloroform (MCB, ACS Quality, Analyzed Reagent Grade) was added to dissolve the residue, and aliquots of this solution were analyzed by using flame-ionization gas chromatography and/or gas chromatography-mass spectrometry. For each additional herbicide sample, a new silica-gel column was utilized.

Flame-Ionization Gas Chromatography

A Varian gas chromatograph, Model 144510 equipped with a hydrogen-flame ionization detector (F.I.D.) was employed. The column used was a glass coil, 8-ft. long x 1/8-in. O.D. packed with 10% DC-200 on 60/80-mesh Gas Chrom Q. Conditions for the chromatography were:

Temperatures

Column: 240°

Injection: 230°

Detector: 300°

Gases

Carrier, helium at 40 cc/min (60 psig)

F.I.D. Air, 300 cc/min at 20 psig

F.I.D. Hydrogen, 30 cc/min at 10 psig.

The data were acquired on a Brown Instruments analog potentiometric recorder (1 mV) and simultaneously on an Autolab System IV computing integrator.

Gas Chromatography-Mass Spectrometry

A DuPont 21-491 double-focusing mass spectrometer coupled to a Loenco Model 160 gas chromatograph through a stainless steel Watson-Biemann separator was employed. Parameters for the gas chromatography are as follows:

Column: 8-ft. x 1/4-in. O.D. glass coil packed with 10% DC-200 on Gas Chrom Q.

Carrier Gas: Helium (incoming flow rate, 20 cc/min.)

Temperatures: Column, 220°

Injection port (glass lined), 285°

Separator, 310°

Transfer line connecting gas chromatograph and mass spectrometer, 320°

Mass-spectrometer parameters were as follows:

Ionizing voltage - 70 eV

Source Temperature - 300°

Single-ion monitoring was used; the mass spectrometer was tuned on m/e 320 (corresponding to the molecular ion) or m/e 322. The mass-spectrometer multiplier output was routed through the amplifier section of a Bell and Howell

oscillographic recorder (time constant set at 0.3 Hz) to a Hewlett-Packard Model 680 strip-chart recorder. Signal attenuation was accomplished by varying the span on the recorder. Peak heights of standards and unknowns were compared to obtain quantitative data.

b. Micro Techniques

In later studies, it was determined that the macro procedures outlined above were subject to sizable errors because of dioxin losses which occur in the concentration step. Also, it was discovered that some dioxin carryover can occur in sequential analysis runs if the glassware used is not subjected to rigorous cleaning procedures (hot chromic acid treatment for several hours). It was decided, therefore, to develop micro-level procedures which could be carried out with smaller, disposable columns. After considerable research, a procedure which completely eliminates the interfering compounds which complicate the TCDD analysis was developed. These compounds were found to be a significant factor, especially in the Dow herbicide samples, even when using single-ion-monitoring mass-spectrometric techniques. The identity of the interfering substances has not been precisely defined, but their chemical structure must be very similar to that of TCDD. With the new column procedure outlined below, the column is discarded after one use. Concurrent with the development of the micro-column chromatography procedures, a new GC-MS instrument having markedly greater sensitivity and the capability for rapid multiple ion monitoring was constructed in our laboratory. This instrument has much superior detection capabilities for TCDD over the Dupont 21-491 apparatus described above and was used for quantitation of all dioxin levels in the latter portion of this study. This apparatus is described further below.

Micro-Column Chromatography Procedures

Initial efforts to develop a micro-scale column chromatographic method for separating dioxin from the Herbicide-Orange matrix were directed toward use of columns made from 5 3/4-in. disposable glass transfer pipettes (Matheson Scientific) packed with either silica gel (Matheson Coleman and Bell) or alumina (Fisher A540). Solvents employed were hexane, 20% benzene in hexane, carbon tetrachloride, and

methylene chloride. Although nearly quantitative recoveries were achieved with both the alumina and silica gel columns, when standard solutions of TCDD were analyzed these simple columns were found to be inadequate for removing impurities present in the Dow Herbicide Orange which interferred with the QGC-MS determination of TCDD. However, the results obtained in these preliminary studies did suggest that use of a column containing both silica gel and alumina might be effective. For studies with alumina-silica gel, glass columns were made from 10-mm-O.D. Pyrex tubing which varied in length from 30 to 60 cm. In each case the columns were pulled down to ~ 2 mm O.D. on one end to restrict flow.

One-gram samples of Herbicide Orange (Diamond ASN 18) known to contain on the order of 14 ppm TCDD were chromatographed, and successive fractions of the eluate were collected and analyzed to determine the distribution of the TCDD in the column eluate. Figure 1 shows the results of such a study. The column employed in this case consisted of a 10-mm-O.D. glass tube packed with 19 cm of alumina and 21 cm of silica gel. As can be seen, the TCDD is distributed in 6-ml of column eluate. The recovery of TCDD in this series of experiments was acceptable, although less than 100% (45-88% was achieved); however, the time consumed to run a single 1-g sample was entirely too long (~ 45 min.). In subsequent experiments, shorter versions of the silica gel-alumina column were investigated as well as high liquid chromatography.

High-pressure liquid chromatography (HPLC) was also investigated as a means of accelerating the chromatographic separation of Dioxin from Herbicide Orange. Here again, recoveries of TCDD were quite acceptable (90-100%); however, in our cursory examination of this procedure, we found that a number of impurities present in the Dow herbicide eluted concurrently with TCDD, thus making a prolonged gas chromatographic separation necessary. Since the additional time consumed in the QGC-MS determination negated any time gained with HPLC, this approach was abandoned.

Efforts to determine the optimum liquid-chromatography column length--that which permitted quantitative recovery of TCDD in a reasonable period and yet which separated nearly all of the other components which complicate the QGC-MS determination of the TCDD in the column eluate--resulted in our finding a length

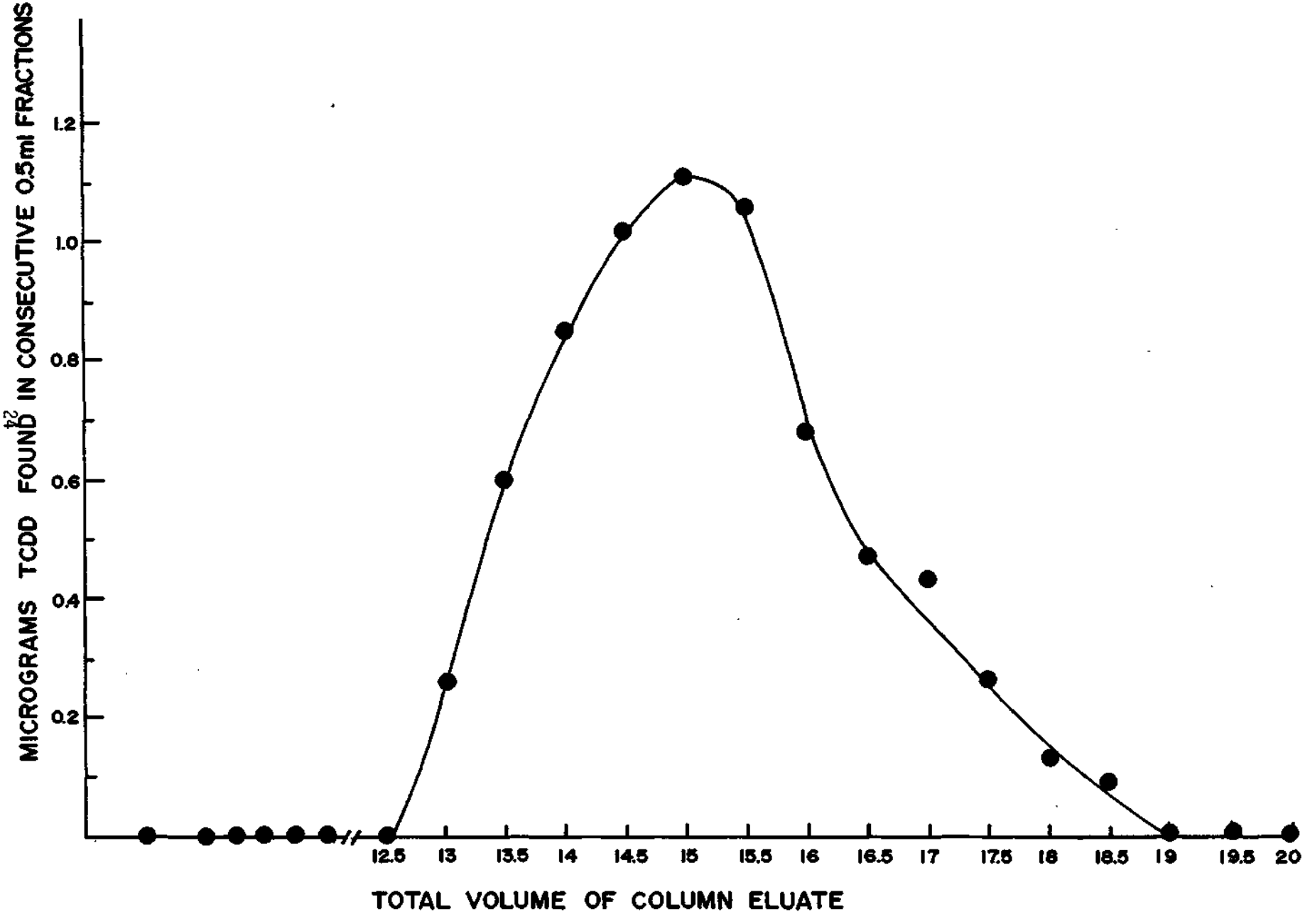


Figure 1. Distribution of TCDD in Fraction of Column Eluate

of 30 cm packed with 4 g each of silica gel and alumina to be acceptable. Extensive studies with this column demonstrated that the TCDD elutes with the solvent front--the first 5 ml corresponding to the void volume of the column can be discarded-- and that the next 6.0 ml contain 100% of the TCDD. These conclusions are based upon a series of experiments with 275 Dow 10 in which 1-g aliquots (including some with added TCDD) of this herbicide were analyzed and the concentrations of TCDD in various fractions of the eluate were determined. These results are given in Table III. It is noteworthy that the overall reproducibility of these independent runs is quite good (on the order of 20%) but the relative amounts of TCDD in the various fractions is somewhat variable. Thus, collection of a "narrow cut" of the column eluate is precluded because of the somewhat irregular distribution of TCDD within subfractions of the total 6 ml. The final procedure used to perform the bulk of the TCDD analyses is described in detail in the following:

Micro-Column Chromatography Procedure

1) Prepare 30 cm glass column using 10 mm O.D. Pyrex (pull down one end of glass tube to 2 mm O.D.).

2) Insert a plug of silanized glass wool into column; add 4 g of silica gel (Matheson, Coleman and Bell, GC Grade, 100-200 mesh) followed by 4 g of alumina (Fisher A540, 80-200 mesh, activated for 12 hrs at 120°C).

3) Moisten column with 20% benzene (Mallinckrodt Nanograde) in hexane (Matheson, Coleman and Bell, Pesticide Quality).

4) Dilute 1 g of Herbicide Orange with 0.5 ml of 20% benzene in hexane and transfer this solution to the top of the moistened silica-gel column. Wash vessel with an additional 0.3 ml of benzene-hexane solvent and add the wash to the top of the column.

5) Allow the herbicide solution to percolate into the alumina at the top of the column and then elute with 20% benzene in hexane.

6) Collect and discard the first 5 ml of eluate.

7) Retain the next 6 ml of eluate for analysis.

TABLE III

TCDD IN COLUMN ELUATE

	µg TCDD Found				
	275K*	275E	275F	275G	275J*
First 4 ml of eluate					
Next 1 ml of eluate					
Next 1 ml of eluate	0.034	0.013	0.007	0.004	0.20
Next 1 ml of eluate	0.240	0.058	0.065	0.048	0.32
Next 4 ml of eluate	0.32	0.148	0.116	0.138	0.04
TOTAL FOUND	0.59	0.221	0.188	0.19	0.59

*Spiked with an additional 0.33 µg TCDD/g

High-Sensitivity Gas Chromatograph-Mass Spectrometer System

In order to determine quantitatively TCDD at sub-parts-per-million concentrations in the presence of other similar compounds, a unique automated multiple-ion-monitoring gas chromatograph-mass spectrometer system was designed and fabricated at ARL.

The system, shown schematically in Figure 1a, consists principally of a Varian Model 2740 Gas Chromatograph and automatic sample injector coupled directly (no helium separator is used) to an Extranuclear Quadrupole Mass Spectrometer (QMS), and, for both control and data acquisition, both devices are coupled to an Autolab System IV Computing Integrator. The gas chromatograph was modified to include a sophisticated system of high-temperature switching valves (Valco Co.) and Granville-Phillips molecular leak valves arranged so that the effluent from the gas chromatographic column can be split into any desired ratio. One of the two sample streams can then be routed to the flame-ionization detector of the chromatograph, while the other passes into the source region of the quadrupole mass spectrometer. In addition, the switching manifold includes provision for closed-loop measurement of flow (a Matheson Linear Mass Flowmeter is employed) and pressure with only momentary interruption in operation. The pneumatic system is designed to minimize sample contact with metal surfaces; 1/8-in. O.D. glass columns are used in the chromatograph, and all transfer lines in contact with the sample are 1/8-in. glass-lined stainless steel (Alltech Associates). No sample enrichment device (helium separator) is required since the use of a high-speed pumping system on the source vacuum envelope permits introduction of all of the GC column effluent (column flows of 15-30 cc/min were used) directly into the mass spectrometer source. The Extranuclear Quadrupole Mass Spectrometer has a maximum mass resolution of 1000; but, for these studies, mass resolution on the order of 200 at m/e 320 was used. In the automated mode, the GC-QMS system functions sequentially as follows:

1) Automatic sample injector purges syringe, loads sample syringe, makes injection, and activates integrator.
2) Integrator begins data acquisition and, after a programmable delay, activates solenoid vent valve. This valve automatically switches the GC effluent into the QMS after the solvent has eluted, allowing all effluent to enter the ionization source.

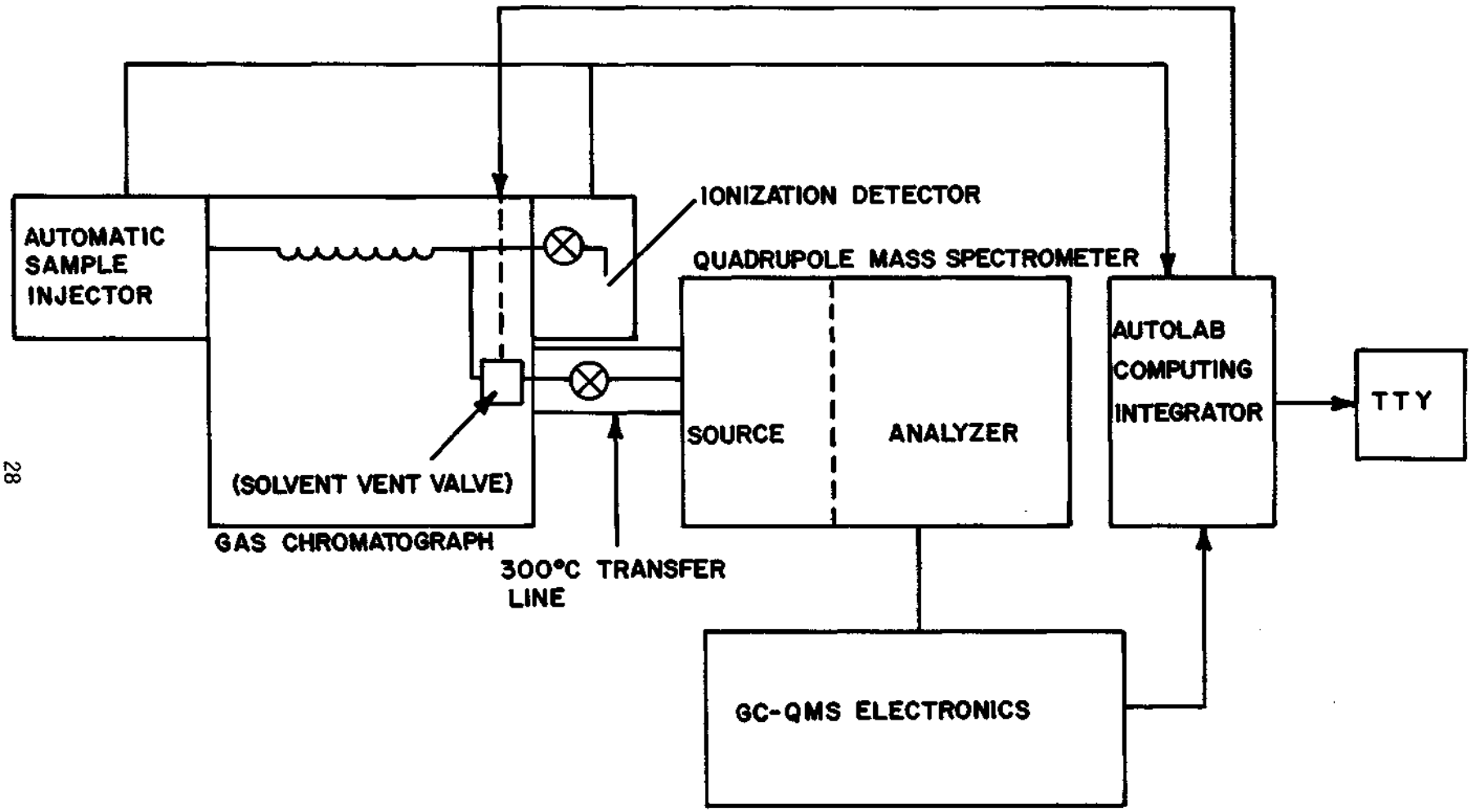


Figure 1a. SCHEMATIC REPRESENTATION OF AUTOMATED GC-QMS SYSTEM

3) After another programmable time delay, the integrator closes solvent vent valve, computes areas, and yields printout and punch paper tape records of data.

4) After a preselected time corresponding to the duration of the above process, the automatic sampler starts the above process.

The system as described above has sufficient reliability to operate unattended for as much as 24 consecutive hours. As indicated in Figure 1a, the data acquired via a teletype are simultaneously punched on paper tape. In addition, a strip-chart recording of all mass chromatograms is obtained. Data reduction is greatly simplified by use of a Hewlett-Packard 2116C Minicomputer with punch paper tape reader and Versatec High-Speed Line Printer. The computer is programmed to read the paper tape and calculate--on the basis of areas obtained for TCDD standards which are run in conjunction with the unknowns--the quantity of TCDD in the unknown Herbicide-Orange specimens. Multiple copies of the tabulated analyses are rapidly obtained via the Versatec.

Specific operating parameters for the gas chromatograph and mass spectrometer are as follows:

Gas Chromatograph:

Column: 6-ft. x 1/8-in. O.D. glass coiled column packed with 10% OV-17 on Chromosorb W/HP

Carrier Gas: Helium at 30 cc/min

Temperatures: Injector -240°
Column - 230°
FID detector - 240°
Transfer line into mass spectrometer - 310°

Mass Spectrometer:

Ionizing voltage 23 eV

Multiplier voltage - 3500 V

Envelope pressure - 2.3×10^{-4} torr

Analyzer pressure - 3.5×10^{-6} torr

Using the GC-QMS system in the configuration described above, we were able routinely to detect and quantify 80 picograms injected into the chromatograph with a standard deviation of less than 20%. This corresponds to a level of ~ 8 ppb in the unconcentrated liquid chromatography effluent, or approximately 50 ppb in the original formulation. Our limit of detectability, defined as a S/N ratio of 2, on the other hand, is on the order of 40 picograms injected into the chromatograph or 20 ppb in the Herbicide Orange. At levels between 20 ppb and 50 ppb in the formulation, the Autolab integrator cannot be relied upon, and peak heights yield standard deviations on the order of 50-100% at these levels. The 1,2,3,4-TCDD and 2,3,7,8-TCDD were observed to exhibit the same retention times with the techniques used so that the TCDD levels reported are upper limits for 2,3,7,8-TCDD.

SECTION III

RESULTS AND DISCUSSION

A. VOLATILE CONSTITUENTS IDENTIFIED IN HERBICIDE ORANGE

Tables IV through VII are lists of the components we have determined to be present in the four representative samples of Gulfport Herbicide Orange. The actual mass-spectral and gas-chromatographic data obtained for each of the four herbicide specimens have been consolidated and included in the report in Appendices A-D. In establishing the identity of components in each of the four herbicide samples, it was also helpful to compare the analytical data from the four samples; in fact, in a qualitative sense these four specimens were found to be very similar. Table VIII contains gas-chromatographic retention times obtained in "fingerprinting" the four Herbicide-Orange specimens (this "fingerprinting" technique is described in detail in Vol. II of this report)[14] along with the identities of the chromatographic peaks assigned following our GC-MS studies. The similarities of the four samples are apparent in Table VIII.

A detailed discussion of the rationale employed in interpreting the large volume of data contained in Appendices A-D is outlined below in two parts: (1) identification of volatile unknowns in Herbicide Orange based upon direct comparison of mass spectra of unknowns with standard mass spectra and (2) identification of volatile unknowns based solely upon mass spectral data obtained for the unknown without confirmation by direct comparison with a standard spectrum.

1. COMPOUNDS IDENTIFIED BY COMPARISON WITH STANDARDS

Butyl Esters of Dichlorophenoxyacetic Acid (XIII) and Trichlorophenoxyacetic Acid (XIV)

The gas chromatograms and total-ion chromatograms obtained for each of the four Herbicide-Orange samples (Figures A-1, A-2, B-1, B-2, C-1, C-2, D-1, and D-2) indicate that each of the four samples

TABLE IV

COMPOSITION OF VOLATILE CONSTITUENTS
IN GULFPORT DRUM #7[1]

PEAK LETTER[2]	RELATIVE AMOUNT[3]	PEAK IDENTIFICATION[4]	METHOD OF IDENTIFICATION[5]
A	0.81	Butanol (I)	a,b,c,d,e
B	1.3	Toluene (II)	a,b,c,d,e
C	0.11	Butyl chloride (IV)	a,b,c
D	<0.1	--	--
E	0.19	Dichlorophenol (V)	c,d,e
F	0.41	Trichlorophenol (VI)	c,d,e
G	<0.1	--	--
H	0.49	Butyl ester of monochlorophenoxyacetic acid (XII)	f
I	0.78	Butyl ester of dichlorophenoxyacetic acid (XIII)	b,c,d,e
J	42.4	Butyl ester of dichlorophenoxyacetic acid (XIII)	b,d,c,e
K	.92	Butyl ester of trichlorophenoxyacetic acid (XIV)	f
L	39.0	Butyl ester of trichlorophenoxyacetic acid (XIV)	b,c,d,e
M	6.1	Butyl ester of methoxy-dichlorophenoxyacetic acid (XV)	e
N	3.2	Octyl ester of dichlorophenoxyacetic acid (XVI)	b,c,d,e
O	0.3	Octyl ester of dichlorophenoxypropionic acid (XVII)	b,c,d,e
P	2.0	Octyl ester of trichlorophenoxyacetic acid (XVIII)	b,c,d,e
Q	0.37	Octyl ester of methoxy-dichlorophenoxyacetic acid (XXIII)	f

TABLE IV (continued)

PEAK LETTER[2]	RELATIVE AMOUNT[3]	PEAK IDENTIFICATION[4]	METHOD OF IDENTIFICATION[5]
R	0.41	Butyl ester of bis- dichloro-phenoxyacetic acid(XIX)	f
S	0.95	Butyl ester of bis- trichloro-phenoxyacetic acid (XX)	f
T	0.16	Butyl ester of trichloro-phenoxy-(methoxy-dichloro-phenoxy)-acetic acid(XXI)	f

1. Drum #7 is one of 500 drums obtained from Hercules Company (TCN 9464 8156 0001)
2. Refer to peak lettering in figures A-1, A-2, A-3, A-4, and A-5 in Appendix A.
3. Based upon flame ionization detector response, assuming equal sensitivities.
4. Table I gives structures of compounds referenced by roman numerals in parentheses.
5. The following methods were used in making positive identification of constituents in the herbicide mixture:

   a. Complete M.S., compared with literature M.S.

   b. Complete M.S., compared with spectrum obtained at ARL.

   c. Mass chromatograms of major peaks.

   d. Retention time agrees with authentic compound run under identical conditions on M.S.

   e. Retention time agrees with authentic compound run under identical conditions on F.I.D.

   f. Mass spectral cracking pattern agrees with analogous compounds run at ARL or reported in the literature.

TABLE V

COMPOSITION OF VOLATILE COMPOUNDS IN GULFPORT DRUM #59[1]

PEAK LETTER[2]	RELATIVE AMOUNT[3]	PEAK IDENTIFICATION[4]	METHOD OF IDENTIFICATION[5]
A	0.75	Butanol (I)	a,b,c,d,e
B	2.2	Toluene (II)	a,b,c,d,e
C	0.16	Butyl Chloride (IV)	a,b,c
D	< 0.1	--	--
E	0.26	Dichlorophenol (V)	b,c,d,e
F	<.1	--	--
G	<.1	--	--
H	0.67	Trichlorophenol (VI)	b,c,d,e
I	<.1	--	--
J	1.16	Butyl ester of monochloro-phenoxyacetic acid (XII)	f
K, L	44.2	Butyl ester of dichloro-phenoxyacetic acid (XIII)	b,c,d,e
M	.70	Butyl ester of trichloro-phenoxyacetic acid (XIV)	e
N	42.1	Butyl ester of trichloro-phenoxyacetic acid (XIV)	b,c,d,e
O	5.4	Butyl ester of methoxy-dichloro phenoxyacetic acid (XV)	e
P	0.58	Butyl ester of bis- dichloro-phenoxyacetic acid (XIX)	f
Q	1.8	Butyl ester of bis- trichloro-phenoxyacetic acid (XX)	f
R	0.21	Butyl ester of trichlorophenoxy-(methoxy-dichlorophenoxy)-acetic acid (XXI)	f

Table V (continued)

1. Drum #59 is one of 2152 drums obtained from Hercules Company (TCN 9464 8192 001).

2. Refer to peak lettering in figures B-1, B-2, B-3 and B-4 in Appendix B.

3. Based upon flame ionization detector response, assuming equal sensitivities.

4. Table I gives structures of compounds referenced by Roman numerals in parentheses.

5. The following methods were used in making positive identification of constituents in the herbicide mixture:

   a. Complete M.S., compared with literature M.S.

   b. Complete M.S., compared with spectrum obtained at ARL.

   c. Mass chromatograms of major peaks.

   d. Retention time agrees with authentic compound run under identical conditions on M.S.

   e. Retention time agrees with authentic compound run under identical conditions on F.I.D.

   f. Mass spectral cracking pattern agrees with analogous compounds run at ARL or reported in the literature.

TABLE VI

COMPOSITION OF VOLATILE COMPOUNDS IN GULFPORT DRUM #251[1]

PEAK LETTER[2]	RELATIVE AMOUNT[3]	PEAK IDENTIFICATION[4]	METHOD OF IDENTIFICATION[5]
A	0.28	Butanol (I)	a,b,c,d,e
B	<.1	--	--
C	.14	Butyl chloride (IV)	a,b,c
D	1.2		
E	0.22	Butyl ether of dichlorophenol(VII)	f
F	<.1	--	--
G	<.1	--	--
H	<.1	--	--
I, J	.31	Butyl ether of trichlorophenol (VIII)	f
K	1.6	Butyl ester of monochlorophenoxy-acetic acid (XII)	f
L	4.2	Butyl ester of dichlorophenoxy-acetic acid (XIII)	b,c
M	43.3	Butyl ester of dichlorophenoxy - acetic acid (XIII)	b,c,d,e
N	0.96	Butyl ester of trichlorophenoxy acetic acid (XIV)	c,f
O	44.1	Butyl ester of trichlorophenoxy-acetic acid (XIV)	b,c,d,e
P	1.9	Butyl ester of methoxy-dichloro-phenoxyacetic acid (XV)	f
Q	<0.25	--	--
R	0.36	1,1-Dibutoxy-2-trichlorophenoxy ethane XXII	f
S	<0.13	--	--
T	0.47	Butyl ester of bis- dichlorophenoxy acetic acid (XIX)	f
U	0.19	Butyl ester of bis- trichloro-phenoxy acetic acid(XX)	f

TABLE VI (continued)

1. Drum #251 is one of 6976 drums obtained from Dow Chemical Company (TCN 9463 8155 X052)

2. Refer to peak lettering in C-1, C-2, C-3, C-4, and C-5 in Appendix C.

3. Based upon flame ionization detector response, assuming equal sensitivities.

4. Table I gives structures of compounds referenced by Roman numerals in parentheses.

5. The following methods of identification were used in making positive identification of constituents in the herbicide mixture.

   a. Complete M.S., compared with literature M.S.

   b. Complete M.S., compared with spectrum obtained at ARL.

   c. Mass chromatograms of major peaks.

   d. Retention time agrees with authentic compound run under identical conditions on M.S.

   e. Retention time agrees with authentic compound run under identical condition on F.I.D.

   f. Mass spectral cracking pattern agrees with analogous compounds run at ARL or reported in the literature.

TABLE VII

COMPOSITION OF VOLATILE COMPOUNDS IN GULFPORT DRUM #264.[1]

PEAK LETTER[2]	RELATIVE AMOUNT[3]	PEAK IDENTIFICATION[4]	METHOD OF IDENTIFICATION[5]
A	1.13	Butanol (I)	a,b,c,d,e
B	0.51	Toluene (II)	a,b,c,d,e
C	2.6	Xylenes (III) or ethyl benzene (XI)	a,b,c,d,e
D	<.1		—
E	0.28	Dichlorophenol (V)	b,c,d,e
F	0.75	Trichloroanisole (IX)	a,b,c
G	3.6	Trichlorophenol (VI)	b,c,d,e
H.	0.18	Dichloro-methoxyanisole (X)	a,b,c
I	0.31	Dichloro-methoxyanisole (X)	a,b,c
J	<0.1	—	—
K	0.78	Butyl ester of monochlorophenoxy-acetic acid (XII)	f
L, M	1.0	Butyl ester of dichlorophenoxy acetic acid (XIII)	b,c
N	44.9	Butyl ester of dichlorophenoxy acetic acid (XIII)	b,c,d,e
O	0.44	Butyl ester of trichlorophenoxy-acetic acid	e
P	40.1	Butyl ester of trichlorophenoxy-acetic acid (XIV)	b,c,d,e
Q	2.5	Butyl ester of methoxy-dichloro-phenoxyacetic acid (XV)	e
R	0.27	Butyl ester of bis- dichloro-phenoxyacetic acid (XIX)	f
S	0.53	Butyl ester of bis- trichloro-phenoxyacetic acid (XX)	f

TABLE VII (continued)

1. Drum #264 is one of 808 drums obtained from Thompson Company (TCN 9463 8155 X012)

2. Refer to peak lettering in D-1, D-2, D-3, and D-4 in Appendix D.

3. Based upon flame ionization detector response, assuming equal sensitivities.

4. Table I gives structures of compounds referenced by Roman numerals in parentheses.

5. The following methods of identification were used in making positive identification of constituents in the herbicide mixture:

   a. Complete M.S., compared with literature M.S.

   b. Complete M.S., compared with spectrum obtained at ARL

   c. Mass chromatograms of major peaks

   d. Retention time agrees with authentic compound run under identical conditions on M.S.

   e. Retention time agrees with authentic compound run under identical conditions on F.I.D.

   f. Mass spectral cracking pattern agrees with analogous compounds run at ARL or reported in the literature.

TABLE VIII

RETENTION TIMES[a] (SEC) FOR SPECIES IDENTIFIED IN HERBICIDE ORANGE SAMPLES

COMPOUND	GULFPORT DRUM NUMBER[b]			
	7	59	251	264
Butanol (I)	27	27	26	27
Toluene (II)	43	43	-[c]	43
Xylenes (III), Ethylbenzene(XI)	-	-	-	68,76
Butyl Chloride (IV)	136	132	126	-
Dichlorophenol (V)	255	261	252	257
Peak D(#251)	-	-	390	-
Trichlorophenol (VI)	493	506	-	507
Trichloroanisole (IX)	-	-	-	629
Dichloro-Methoxyanisole (X)	-	-	-	713
Dichloro-Methoxyanisole (X)	-	-	-	761
Butoxydichlorophenol (VII)	-	-	757	-
Butoxytrichlorophenol (VIII)	-	-	990	-
Butyl-monochlorophenoxyacetate (XII)	1052	1075	1054	1062
Butyl-dichlorophenoxyacetate (XIII)	1262	-	1265	1140,1205
Butyl-dichlorophenoxyacetate (XIII)	1357	1373	1390	1406
Butyl-trichlorophenoxyacetate (XIV)	1462	1482	1464	1470
Butyl-trichlorophenoxyacetate (XIV)	1614	1620	1618	1626
Butyl-methoxy-dichlorophenoxyacetate (XV)	1650	1671	1646	1657
Octyl-dichlorophenoxyacetate(XVI)	1768	-	-	-
Octyl-dichlorophenoxypropionate(XVII)	1869	-	-	-
Octyl-trichlorophenoxyacetate(XVIII)	1931	-	-	-
1,1-dibutoxy-2-trichlorophenoxyethane (XXII)	-	-	1974	-
Octyl-methoxy-dichlorophenoxyacetate (XXIII)	1966	-	-	-
Butyl-bis-dichlorophenoxyacetate(XIX)	2691	2711	2665	2663

a. See chromatograms in Figures A-1, B-1, C-1 and D-1 of the appendix. Chromatographic parameters are as follows: 8 ft x 1/8" O.D. glass column packed with 10% DC-200 on Gas Chrom Q. Column temperature programmed from 110° to 240°C at 4°C/min. Data acquisition: Autolab System IV computing integrator and 1-mV strip-chart recorder.

b. Drum #7 is one of 500 drums obtained from Hercules Company (TCN 9464 8156 000), Drum #59 is one of 2152 drums obtained from Hercules Chemical Company (TCN 9464 8192 001), Drum #251 is one of 6976 drums obtained from Dow Chemical Company (TCN 9463 8155 X052), Drum #264 is one of 808 drums obtained from Thompson Company (TCN 9463 8155 X012).

c. Denotes none detected at levels greater than 0.1%.

contains primarily two compounds. This is as expected since specifications for Herbicide Orange [AFPID 6840-1 (Amended 11 April 1968)] stipulate that the herbicide will contain 50% (by volume) each of n-butyl 2,4-dichlorophenoxyacetate and n-butyl 2,4,5-trichlorophenoxyacetate. A comparison of the mass spectrum obtained for EPA-primary-standard butyl 2,4-dichlorophenoxyacetate (Appendix Table E-19) and mass-spectral data in Tables A-1, B-11, C-1, and D-13 reveals that the more volatile major component is a butyl ester of dichlorophenoxyacetic acid. The second major component, n-butyl 2,4,5-trichlorophenoxyacetate, was not available as an EPA primary standard; therefore, mass spectral data obtained for the second component (see either Table A-2 or C-2) was utilized as the standard spectrum for butyl trichlorophenoxyacetate.

In addition to the major peaks in the gas chromatograms and total-ion chromatograms of each of the four herbicide samples, the small peak obtained just prior to each of the major peaks was identified as a structural isomer of the butyl ester it precedes (c.f., Component I, Gulfport #7, Table A-10; Component K, Gulfport #59, Table B-10, Figure B-12; Component L, Gulfport #251, Table C-14, Figure C-19; and Components L and M, Tables D-11 and D-12, Figures D-15 and D-16). The identification of the small peak preceding the second major component, butyl trichlorophenoxyacetate (see F.I.D. chromatograms in Figures A-1, B-1, C-1, and D-1), was not possible since this component was not present in sufficient quantity to permit complete mass spectra to be obtained (interference from major components was encountered). Using the mass-chromatogram subroutines of the data-acquisition system, the most prominent peaks in the mass spectrum of butyl trichlorophenoxyacetate (m/e 196, 198, 209, and 219) were displayed, as shown in Figure C-20. Based upon the presence of these four masses in the mass spectrum of Component M in Gulfport #251 (see Table C-2), this component was identified as an isomer of the butyl ester of trichlorophenoxyacetic acid. This same butyl trichlorophenoxyacetate was found in the other herbicide samples, as indicated by a comparison of gas-chromatographic retention-time data (see Table VIII).

Butanol (I), Toluene (II), Xylenes (III), Ethyl Benzene (XI), and Butyl Chloride (IV)

Butanol was found to be an impurity in each of the four herbicide samples. In the GC-MS studies, only chromatographic resolution of these two components could be achieved (see Figure A-8), even when the gas-chromatographic column was operated at 60°. Therefore, the mass spectra obtained (Tables A-3, A-4, B-1, C-3, and D-1) for these components are actually combinations of the spectra of the two compounds. Note the slightly different retention times (indicating a partial resolution) of m/e 31 from butanol and m/e 91 from toluene. Xylenes or ethyl benzene (which have identical mass spectra) were found only in Gulfport #264. The xylenes/ethyl benzene peak was well separated from the butanol/toluene peak (see Table D-2 and Figure D-7). Butyl chloride was found in Samples #7, #59, and #251 in quantities approaching the lower limit of detectability (0.1%); however, the major fragment ions of this compound were prominent enough to permit an identification to be made (see Figures A-9, A-10, B-7, B-8, and C-8).

Dichlorophenol (V), Trichlorophenol (VI), and Trichloroanisole (IX)

Dichlorophenol and trichlorophenol were detected in Samples #7, #59, and #264; however, because of the quantities present, complete spectra could not be obtained for Sample #7. These are shown in Tables B-4, B-7, D-4, and D-6 and in Figures D-9 and D-11 and can be compared with standard spectra of these compounds in Tables E-20 and E-21. Trichloroanisole was identified in #264 as compound F, and its spectrum (Table D-5, Figure D-10) can be compared with the standard spectra (Table E-23) for this compound.

Cctyl Esters of Dichlorophenoxyacetic Acid (XVII), of Trichlorophenoxyacetic Acid (XVIII), and of Dichlorophenoxypropionic acid (XVII)

The highest molecular weight compounds that were found in the Gulfport samples for which standard spectra could be obtained were the octyl

esters of dichlorophenoxyacetic acid, trichlorophenoxyacetic acid, and dichlorophenoxypropionic acid. These were identified only in Gulfport #7 in quantities greater than 0.1% of the total volatile samples. Mass-spectral data in Tables A-11 through A-13 and Figures A-12 through A-14 can be compared with standard spectra given in Tables E-1 through E-18.

2. IDENTIFICATION OF UNKNOWNS WITHOUT COMPARISON WITH STANDARDS

In order to identify the remaining components in the four Gulfport samples, analogies with existing spectra shown largely in Appendix E, along with molecular ion and fragmentation patterns, were relied upon heavily. All components present in quantities larger than 0.1% in the pre-butyl* ester of dichlorophenoxyacetic acid region and larger than 0.3% in the post-butyl ester of trichlorophenoxyacetic acid region* were identified, except compounds D and J in Gulfport #251. However, the lack of success in making an unambiguous identification of these two compounds is not due to lack of sensitivity of the instrument, but inability to determine the molecular ion and important fragmentation that would unambiguously identify the unknown. This will be discussed in more detail in a later portion of this section.

Butyl Esters of Monochlorophenoxyacetic Acid and Methoxy-dichlorophenoxyacetic Acid

Two large impurities that are present in all four herbicide samples have been identified as the butyl esters of monochlorophenoxyacetic acid (XII) and methoxy-dichlorophenoxyacetic acid (XV). In Gulfport #7, these compounds appear as peaks H and M (see Table A-9); in Gulfport #59,

*Pre-butyl ester = components eluting from the chromatographic column prior to this ester.

Post-butyl ester = components eluting from the chromatographic column after butyl trichlorophenoxyacetate.

they are J and O (see Table B-9 and Figure B-11); in Gulfport #251, they are K and P (see Table C-13 and Figure C-18; Table C-19 and Figure C-24); and in Gulfport #264, they are K and Q (see Table D-10 and Figure D-14). A complete spectrum of the butyl ester of methoxy-dichlorophenoxyacetic acid superimposed upon the ester of trichloro-phenoxyacetic acid was obtained only from #251 (Table C-19), and the other three samples were concluded to have this same contaminant, based upon F.I.D. retention time (see Table VIII). If the spectra of the two butyl esters are compared with those of the butyl esters of dichlorophenoxyacetic acid and trichlorophenoxyacetic acid (Tables E-19 and A-2, respectively), it is apparent that prominent peaks which correspond to the molecular ion and to the molecular ion minus C_4H_8, C_4H_8Cl, $CO_2C_4H_9$, $HCCO_2C_4H_9$, and $OCH_2CO_2C_4H_9$ (Fragmentation Pathway A outlined, Figure 1b) are present. Based upon these features of the mass spectra, the unknowns are shown to be butyl esters of chlorinated phenoxyacetic acids. The isotope distribution of the molecular ion and the corresponding fragments confirm that these compounds are the monochloro- and dichloro-substituted phenoxyacetic acids.

Compounds D and J in Gulfport #251

Two compounds could not be identified conclusively in Gulfport #251. Compound D is 1.2% of the total, and Compound J is on the order of 0.1%. Data in Tables C-6 and C-11 and Figures C-9 and C-17 indicate that these compounds are very similar. Both compounds give rise to large butyl fragments along with m/e 31 (CH_3O^+), m/e 61, and m/e 116, but the isotope distributions of these major fragments do not indicate the presence of chlorine. These unknowns are possibly some type of butyl ether or ester of an unchlorinated acid, or alcohol. Any further identification would be completely speculative due to the lack of positive identification of a molecular ion in the mass spectra and the absence of reference spectra among the 12,000 standard mass spectra catalogued in the General Electric mass spectral Search Routine computer library.

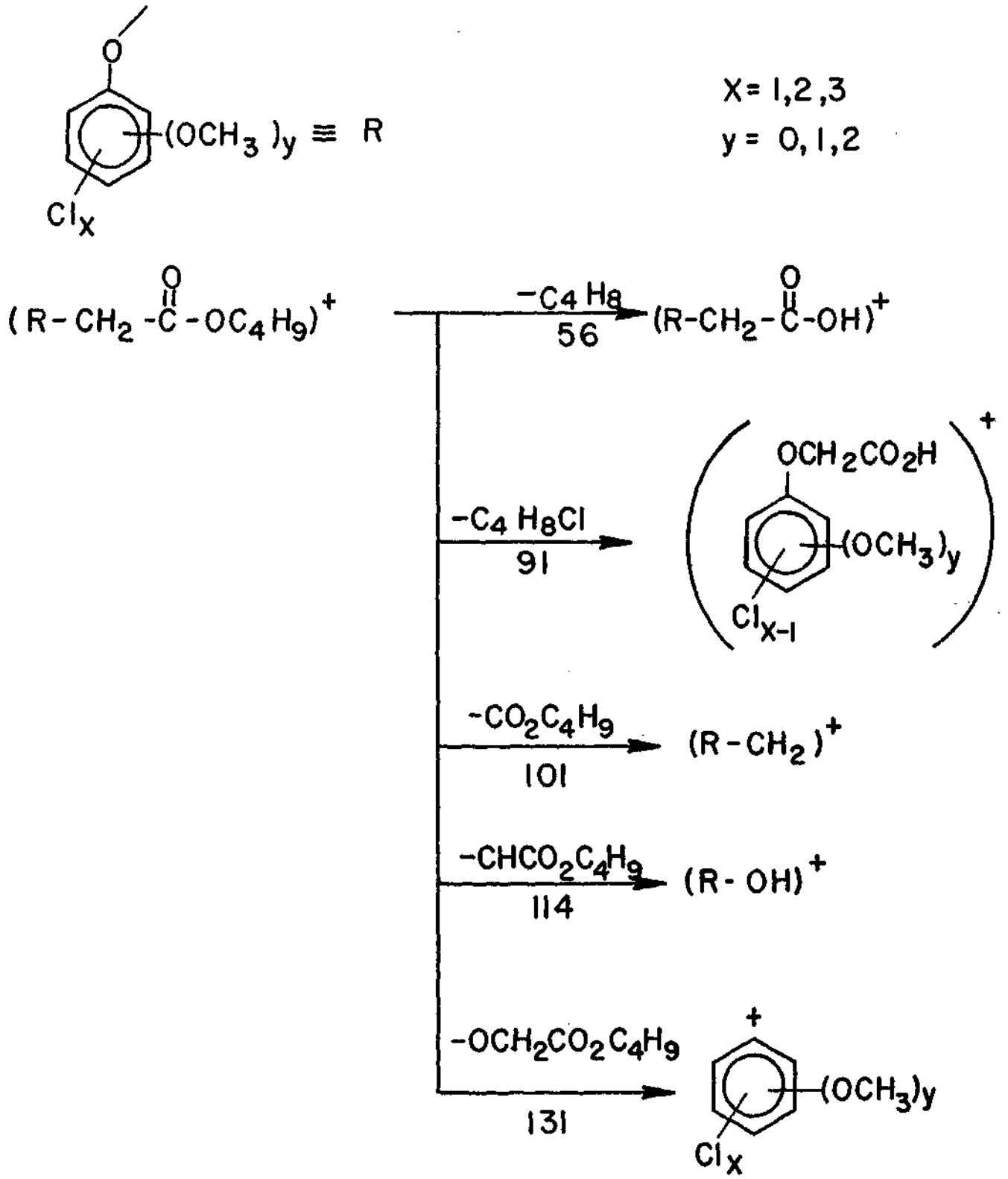


Figure 1b. Fragmentation Pathway A

Butyl Ethers of Dichlorophenol and Trichlorophenol

In Gulfport #251, Peaks E and I appear to be very similar to dichlorophenol and trichlorophenol, respectively, except for their retention times. It can be seen from Tables C-7 and C-1 that the mass spectrum of Component E is very similar to that of dichlorophenol (Table E-20), and the spectrum of Component I appears very similar to that of trichlorophenol (Table E-21). One difference in the fragmentation is the occurrence of large butyl ion fragmentation (see Figure C-6) and the occurrence of a molecular ion which is 56 mass units above the molecular ion of dichlorophenol and trichlorophenol. Fragmentation patterns obtained for these unknowns are very similar to those obtained for the butyl ether of phenol where one obtains a large signal for the butyl fragment and the base peak is the phenol ion (see Fragmentation Pathway B, Figure 2). Based upon these analogies Components E and I are assumed to be the butyl ethers of di- and tri-chlorinated phenol.

Dichloro-methoxybenzene

Two components in Gulfport #264 have been identified to be dichloro-methoxybenzene (X). The spectra of H and I (Tables D-7 and D-8 and Figure D-12) can be seen to be analogous to the standard spectra of dichloroanisole and trichloroanisole (Tables E-22 and E-23). The molecular ions $(M-15)^+$ and $(M-COCH_3)^+$ are the prominent ions in all these spectra, and the isotope distributions confirm the identity of these peaks (see Fragmentation Pathway C, Figure 3). The difference in retention times may be due to differences in position of substituents on the benzene ring. Since these are undoubtedly by-products of the methoxylation of tetrachlorobenzene, a mixture of positional isomers might be expected.

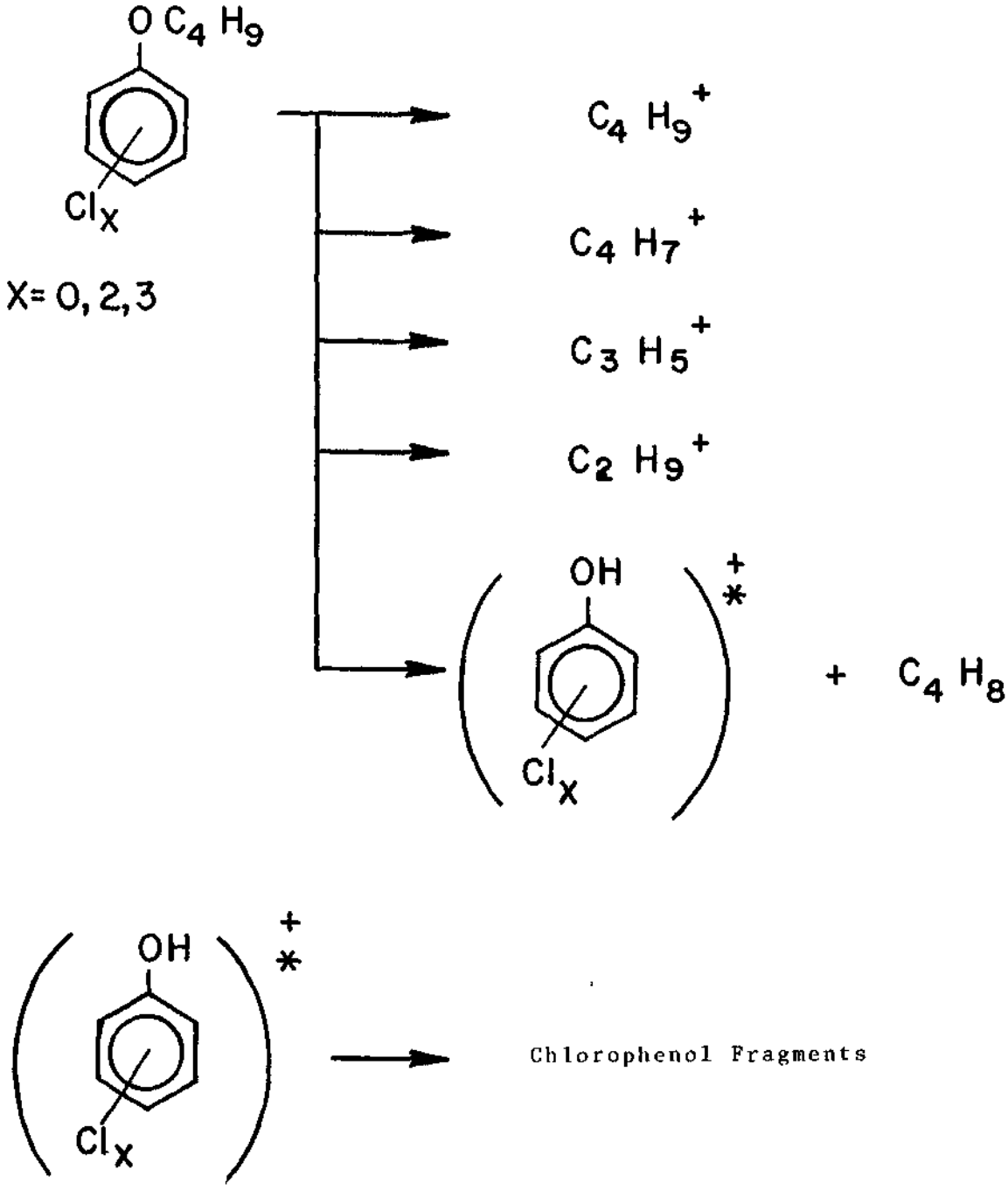


Figure 2. Fragmentation Pathway B

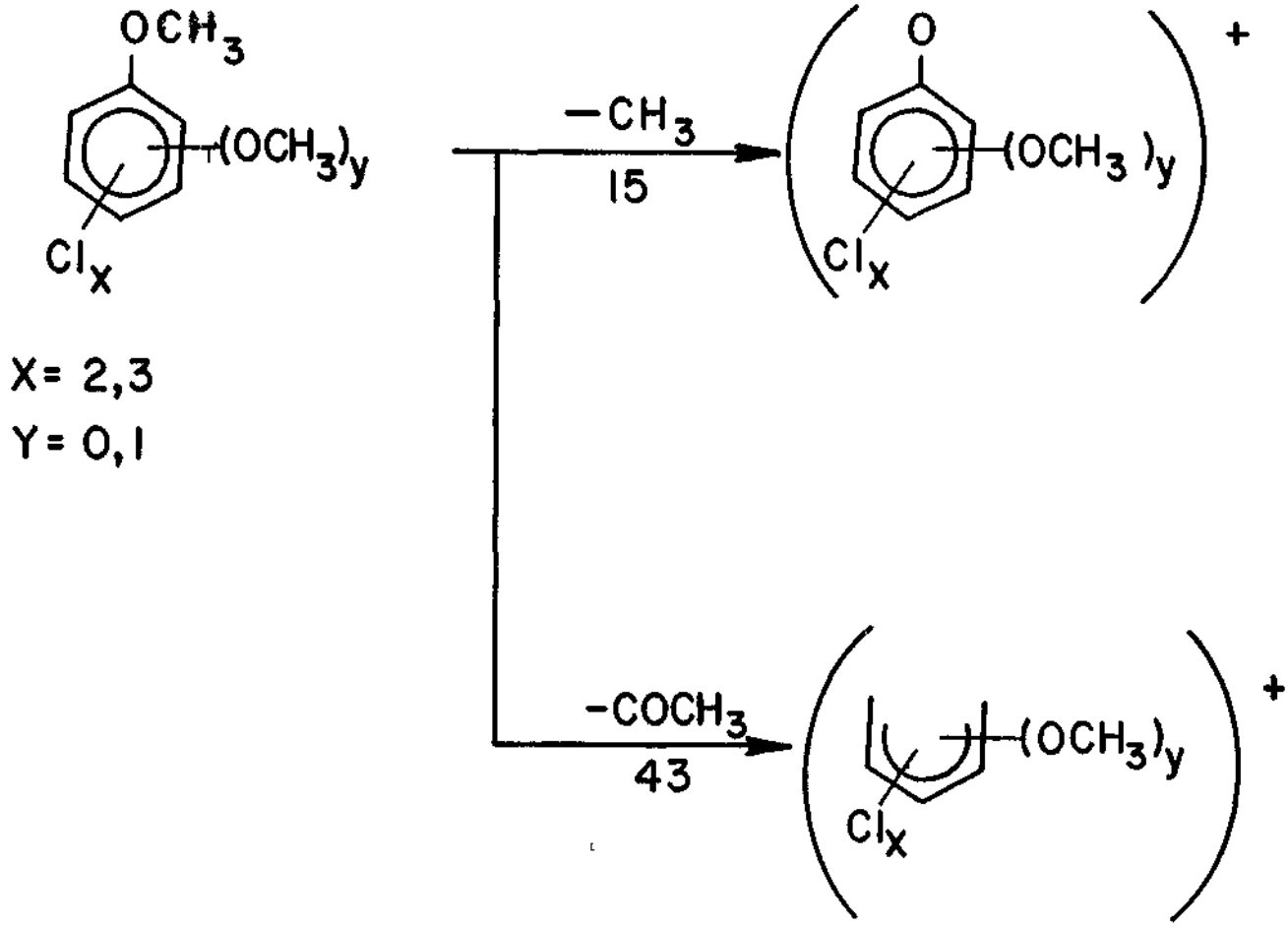


Figure 3. Fragmentation Pathway C

Octyl Ester of Methoxy-dichlorophenoxyacetic Acid (XXIII) and 1,1-Dibutoxy-2-Trichlorophenoxyethane (XXII)

A major impurity found in each of the four herbicide samples was determined to be the butyl ester of methoxy-dichlorophenoxyacetic acid. Such a compound could arise if one of the chlorines in trichlorophenoxyacetic acid is replaced by a methoxy group. Such an impurity in the trichlorophenoxyacetic acid would, when the acids are esterified with butanol or octanol, be converted to the corresponding ester during the synthesis of the herbicide. In Gulfport #7 — in addition to the octyl esters of the dichloro- and trichlorophenoxyacetic acids — the octyl ester of methoxy-dichlorophenoxyacetic acid was identified as Compound Q but was not identified in any of the other samples. Table A-14 gives a complete spectrum, and Figure A-15 shows it to elute after the analogous trichlorophenoxyacetic acid ester.

Mass spectrometrically a very similar compound to the octyl ester of methoxy-dichlorophenoxyacetic acid is the 1,1-dibutoxy-2-trichlorophenoxyethane. This compound was identified as Compound R in Gulfport #251. Its identity is based upon the spectrum shown in Table C-18 and mass chromatograms displayed in Figure C-23. The retention times for this compound and the octyl ester of methoxy-dichlorophenoxyacetic acid are very similar; the major differences are: octyl-ion fragmentation is present in the octyl ester but absent in the dibutoxy compound; only di- and monochlorinated fragments are present in the octyl ester, but prominent trichlorophenol and molecular ions indicating a Cl_3 species are present in the dibutoxy spectrum. The identification of these compounds is not based upon a complete mass spectrum; however, their most probable identities are the octyl ester of methoxy-dichlorophenoxyacetic acid and 1,1-dibutoxy-trichlorophenoxy-ethane, respectively.

Butyl Esters of Bis-(chlorophenoxy)acetic Acids

The Herbicide-Orange samples were found to contain the butyl esters of bis-(chlorophenoxy)acetic acids. These compounds can be produced during the synthesis of the herbicide by reaction of the corresponding chlorinated phenol with possible impurities in the 2-chloroacetic acid such as 2,2-dichloracetic acid. The three impurities found were the butyl esters of bis-(dichlorophenoxy)acetic acid, bis-(trichlorophenoxy)acetic acid, and methoxy-dichlorophenoxy-trichlorophenoxyacetic acid. The last product is due to the methoxy-dichlorophenol impurity in the trichlorophenol, as discussed in the previous section. Each of the four herbicide samples was shown to contain at least two of these bis-compounds. In #7 and #59, all three products were present in levels greater than 0.1%. In addition to the butyl fragments, fragments very similar to the dichlorophenoxy-, trichlorophenoxy-, and methoxy-dichlorophenoxyacetic esters are seen. However, the lack of molecular ions corresponding to the mono-substituted chlorinated phenoxyacetic acid esters and the occurrence of this mass less 1 show the likelihood of a bis-substituted chlorinated phenoxyacetic ester. In addition, $(m-101)^+$ ions with proper chlorine distributions were identified for Species R in #7 (see Table A-15), for Species P in #59 (see Table B-14), for Species T in #251 (see Table C-16), and Species R in #264 (see Table D-14). The loss of 100 mass units from the radical ion (m/e 275 for the bis-dichlorophenoxyacetic ester and m/e 309 for the bis-trichlorophenoxyacetic ester) was also seen to involve a rearrangement to yield CO_2 and C_4H_8 as neutral products. Probable Fragmentation Pathway D is illustrated in Figure 4.

B. QUANTITIES OF DICHLOROPHENOXYACETIC ACID AND TRICHLOROPHENOXYACETIC ACID PRESENT IN HERBICIDE ORANGE

Using the procedure for analysis described previously, we determined the amount of di- and trichlorophenoxyacetic acids in the four Gulfport samples. For calibration of the gas chromatograph, chloroform solutions of EPA/FDA-primary-standard methyl dichloro- and methyl

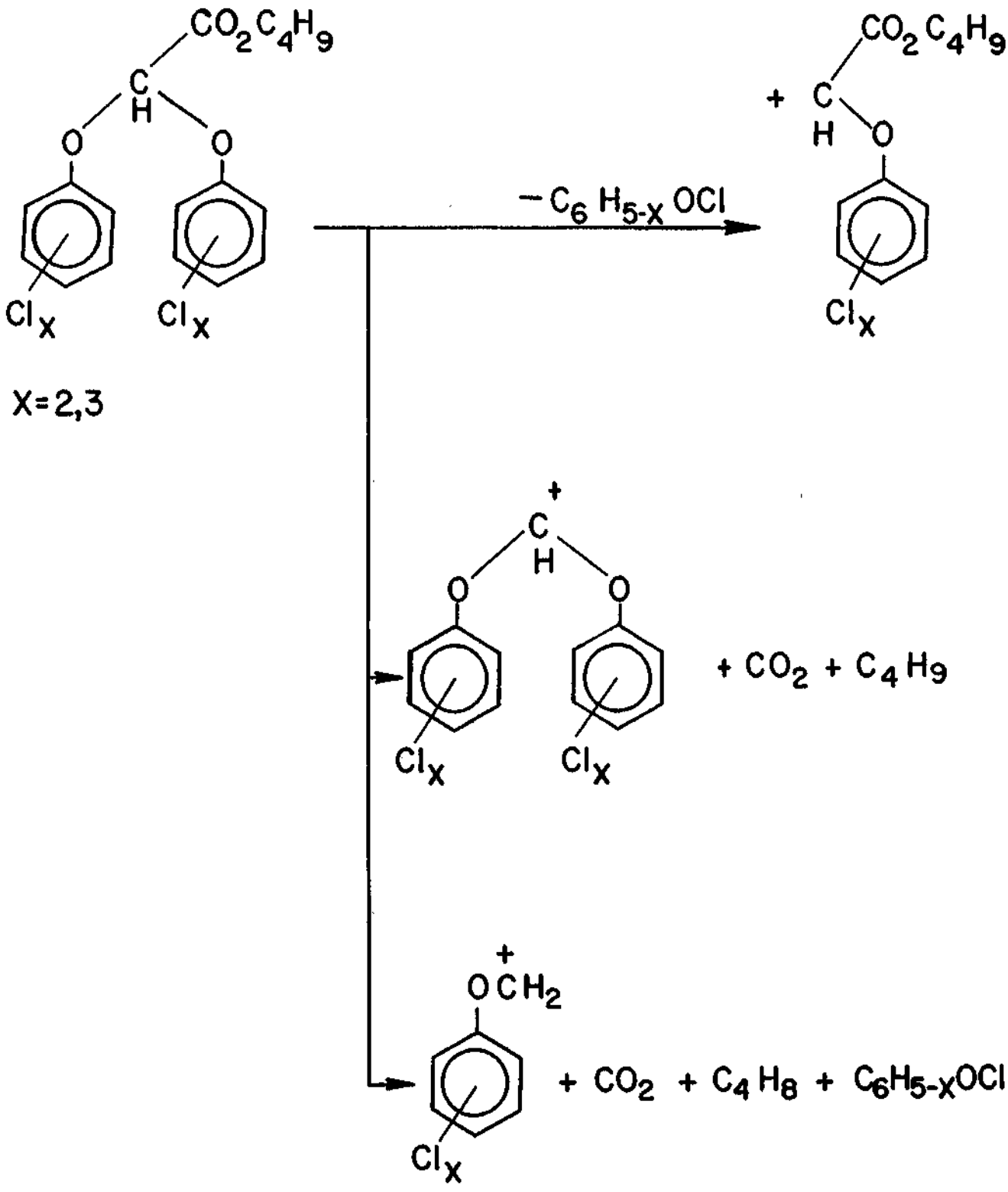
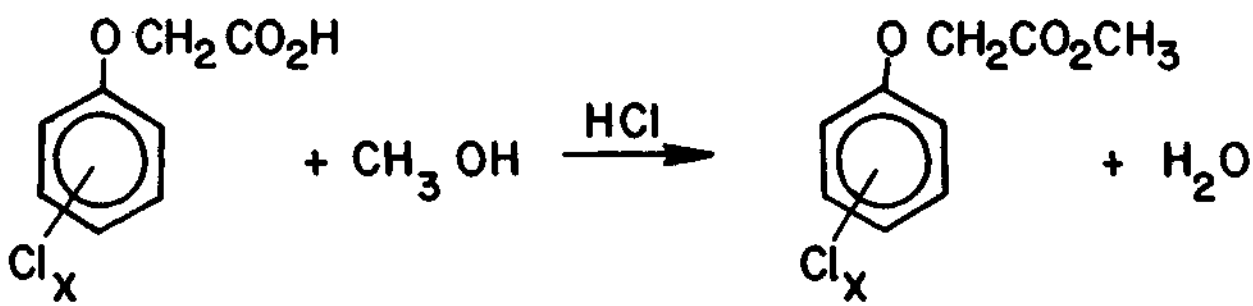


Figure 4. Fragmentation Pathway D

trichlorophenoxy-acetate were prepared, and calibration curves for the two esters were obtained; these showed the response of the flame-ionization detector to be linear over the range of interest (0.1 - 6 µg injected). A mixture of n-butyl 2,4-dichlorophenoxyacetate and n-butyl 2,4,5-trichlorophenoxyacetate (obtained from Hercules Co.) was prepared and washed with dilute base to obtain Herbicide Orange suitable for use as a blank. Analysis of the base-washed Herbicide Orange indicated less than 100 ppm of each of the free acids either to be present in the blank or to arise during the extraction process as a result of saponification. In any case, such levels were insignificant in view of the fact that tenths-of-percent levels of the free acids are present in the herbicide samples.

Two samples of the base-washed Hercules Herbicide Orange were prepared to contain known amounts of the EPA/FDA-primary-standard 2,4-dichlorophenoxyacetic acid and 2,4,5-trichlorophenoxyacetic acid. The samples were analyzed by the procedure outlined previously, and the percent recovery was determined by comparing the peak areas from the methyl dichlorophenoxyacetate and 2,4,5-trichlorophenoxyacetate esters in the standard herbicide samples with the methyl ester calibration curve. Correction for the slight difference in the molecular weight was also taken into account since, according to the following equation, the molecular weight increases during the analysis.



X=2,3

Table IX shows the results of the recovery study.

TABLE IX

RESULTS OF ANALYSIS OF HERBICIDE-ORANGE SAMPLES
PREPARED TO CONTAIN KNOWN AMOUNTS OF FREE ACIDS

	Theoretical/Found (µg/ml)%		% Recovered	
Sample	methyl 2,4-D	methyl 2,4,5-T	2,4-D	2,4,5-T
93-B	5.19/4.90		106	
93-B		4.26/4.43		96
93-C	3.65/3.15		116	
93-C		2.62/2.77		95

The prepared samples were employed as standards for determining the concentrations of free acids in the unknowns. Based upon the weight of free acids added, an average response/weight was determined, and this factor was utilized in calculating the amounts of free acids in the Gulfport herbicides, which are tabulated in Table X.

C. QUANTITY OF TETRACHLORODIBENZO-p-DIOXIN(S) (TCDD) PRESENT IN HERBICIDE ORANGE

In the initial phase of the work to determine tetrachlorodibenzo-p-dioxin (TCDD) in Herbicide Orange, the herbicide samples were analyzed by the macro clean-up method, followed by determination of TCDD by either flame-ionization gas chromatography or gas chromatography-mass spectrometry, as described previously in this report. As already noted, however, subsequent analyses led us to question the validity of this early data because the precision and reproducibility of the data were very poor. The weaknesses of the early method stemmed from the lengthy procedure, which was inherently difficult to reproduce. In particular, those steps which involved concentration of sample and several transfers were subject to considerable variations. These procedures were eliminated in the new micro-scale technique which is described in Sect. II (p. 22) of this report. The dioxin analytical data reported here were all obtained by using the new methodology, that is, micro-scale clean-up of the herbicide samples followed by specific-ion monitoring GC-QMS. Typical mass chromatograms obtained with the new GC-QMS are given in Figure 5, which shows the results of injecting 9 µℓ of a standard solution containing 80 ng TCDD/mℓ, followed by duplicate injections of 9 µℓ of an extract obtained from a Dow 10 specimen which contains 0.11 µg TCDD/g. The precision of the GC-QMS method of analysis is given in Table XI, which lists the results from six replicate analyses of a single extract from a Herbicide-Orange specimen, 249 Dow 10. Of interest also is the overall precision of the methodology, which is an indication of

TABLE X

QUANTITIES OF FREE ACIDS FOUND
IN HERBICIDE ORANGE

	% Free Acid Found (by weight)	
Sample	2,4-D	2,4,5-T
Gulfport #7	0.78	0.84
Gulfport #59	0.65	0.78
Gulfport #251	0.19	0.13
Gulfport #264	0.66	0.80

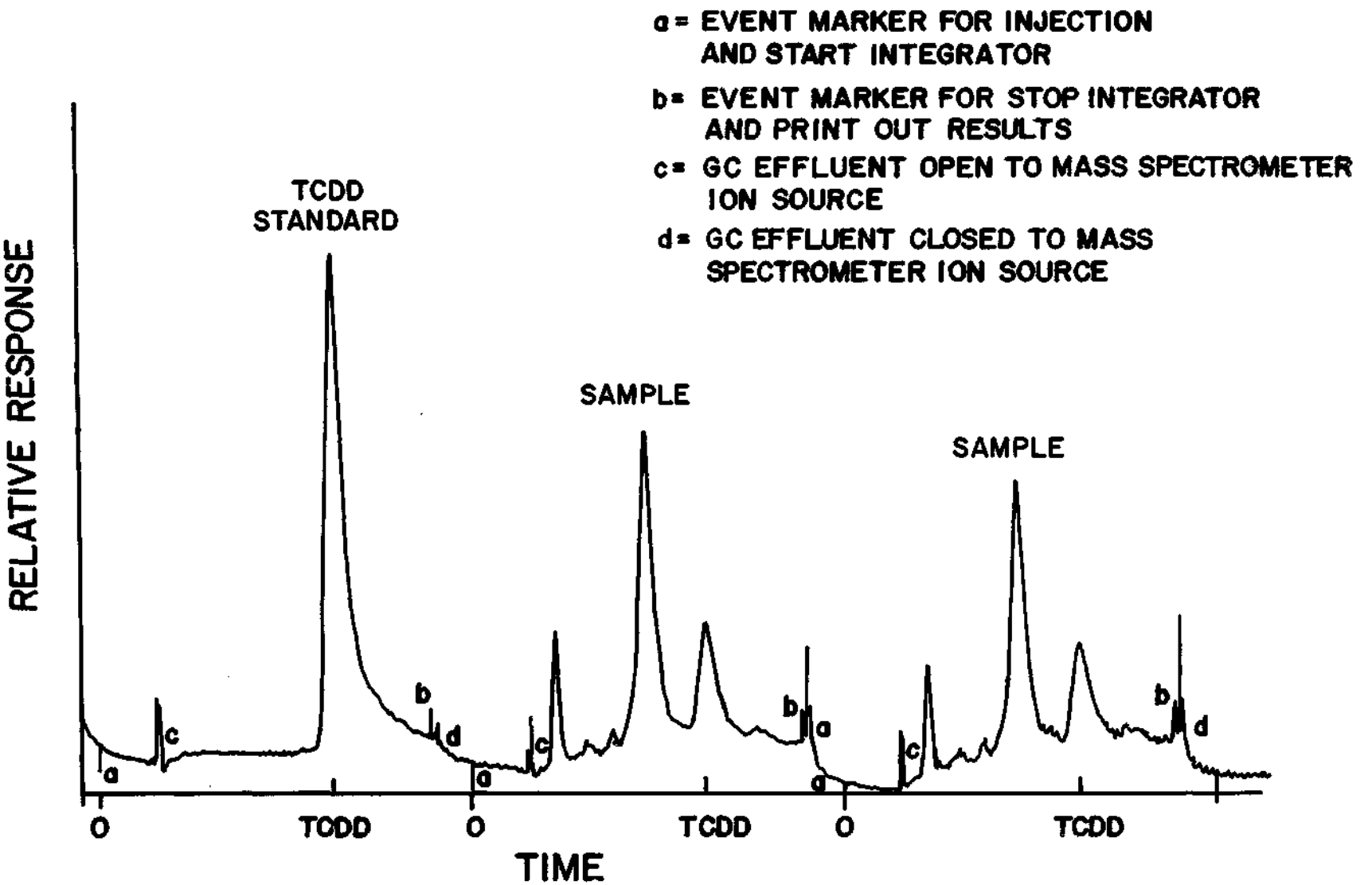


Figure 5. 80 ppb STANDARD AND REPLICATE INJECTIONS FOR DOW CHEMICAL (ASN-10) SAMPLE

TABLE XI

REPLICATE ANALYSES OF A SINGLE EXTRACT FROM DOW DRUM 249

ANALYSIS NO.	µg/g FOUND (ppm)
1	0.135
2	0.134
3	0.133
4	0.131
5	0.138
6	0.148
	$\bar{X}$ = 0.137
	x = 0.006
	%s = 4.4

where $\bar{X}$ = Arithmetic mean

s = Standard deviation

$\%s = \frac{s}{\bar{X}} \times 100$

the repeatability of the entire procedure, including weighing, column chromatography, and GC-QMS quantification. The results presented in Table XII demonstrate the overall precision of the method to be 12.5%. Of considerable importance is the ratio of the isotopic peaks in the region of the molecular ion, m/e 320. Table XIII shows the results obtained by scanning the m/e 315-330 region during elution of the chromatographic peak from injection of a TCDD standard and several replicates of 275 Dow 10. These data verify that the compound eluting at the retention time for TCDD has the expected ratio of isotopic peaks. Confirmatory studies which involve the new double-beam MS-30 mass spectrometer recently purchased by ARL have also been instituted. In these studies, samples were analyzed by GC-MS with the MS-30 tuned on m/e 320 at a resolution of 3000. A comparison of the low resolution GC-QMS results with the high resolution MS-30 results is given in Table XIV.

The methodology described above has been implemented to determine the TCDD content of approximately 250 specimens of Herbicide Orange. These results are summarized in bar-graph form in Figures 6-9. Tabulations of individual analytical results from which the bar graphs were constructed accompany this report as Appendix F.

The rationale for analyzing 60 samples from each of the 4 ASN batches, which, on the basis of preliminary analyses by Dow Chemical Co., were identified as "low dioxin" batches, is of necessity founded upon a non-parametric statistical approach; i.e., nothing is assumed about the distribution of the population. Such an approach has been described by Guenther,[14] who has discussed a method for calculating "distribution free upper tolerance levels" using the following equation:

$$\Pr(W \geq \beta) = \sum_{k=i}^{n} \binom{n}{k} (1 - \beta)^k \, B^{n-k} = E(i; n, 1 - \beta) \geq \gamma, \qquad (1)$$

where β = tolerance interval, W = observed value, and Pr = probability.

TABLE XII

RESULTS FROM REPLICATE ANALYSES
OF DOW DRUM 275

SPECIMEN NO.	µg/g FOUND (ppm)
1	0.22
2	0.18
3	0.20
4	0.25
5	0.25

$\bar{X}$ = 0.22

s = 0.0276

%s = 12.5

TABLE XIII

OBSERVED AND THEORETICAL RATIOS
OF TCDD ISOTOPIC PEAKS

SAMPLE	I_{320}/I_{322}
80 ppm Std.	0.84, 0.87
275 V	0.86
275 F	0.78, 0.74
275 G	0.74
275 L	0.80
Theoretical	0.77

TABLE XIV

COMPARISON OF HIGH-RESOLUTION AND LOW-RESOLUTION GC-MS RESULTS

SAMPLE	µg/g FOUND (ppm) GC-QMS	GC-MS-30
436 Dow 10	0.07	0.07
436 Dow 10	0.07	0.05
414 Dow 10	0.53	0.31
414 Dow 10		0.38
413 Dow 10	0.14	0.11
413 Dow 10		0.11
17 Hercules 14	< 0.02	0.01

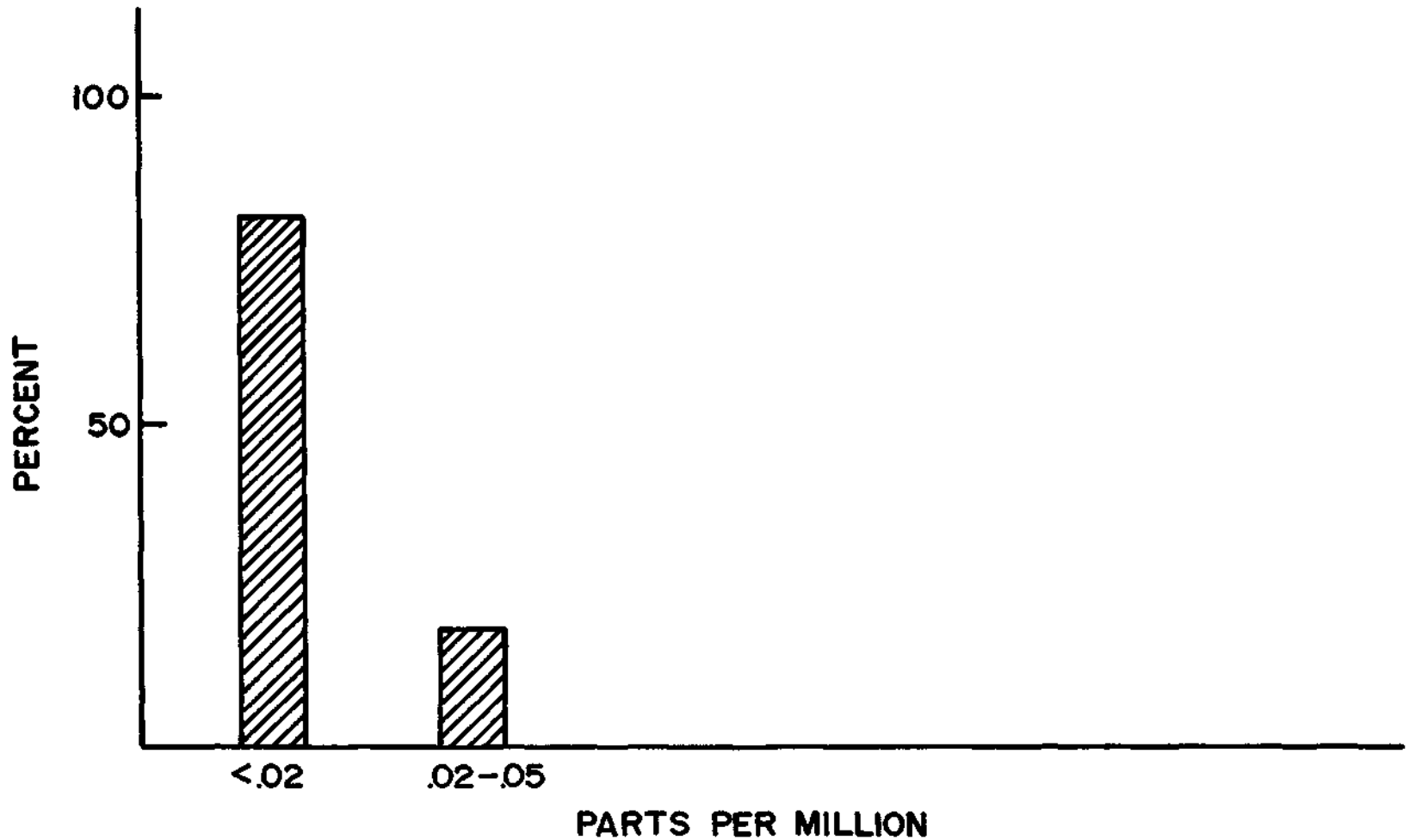


Figure 6. DIOXIN DISTRIBUTION IN 43 BARRELS OF HERCULES (ASN-14)

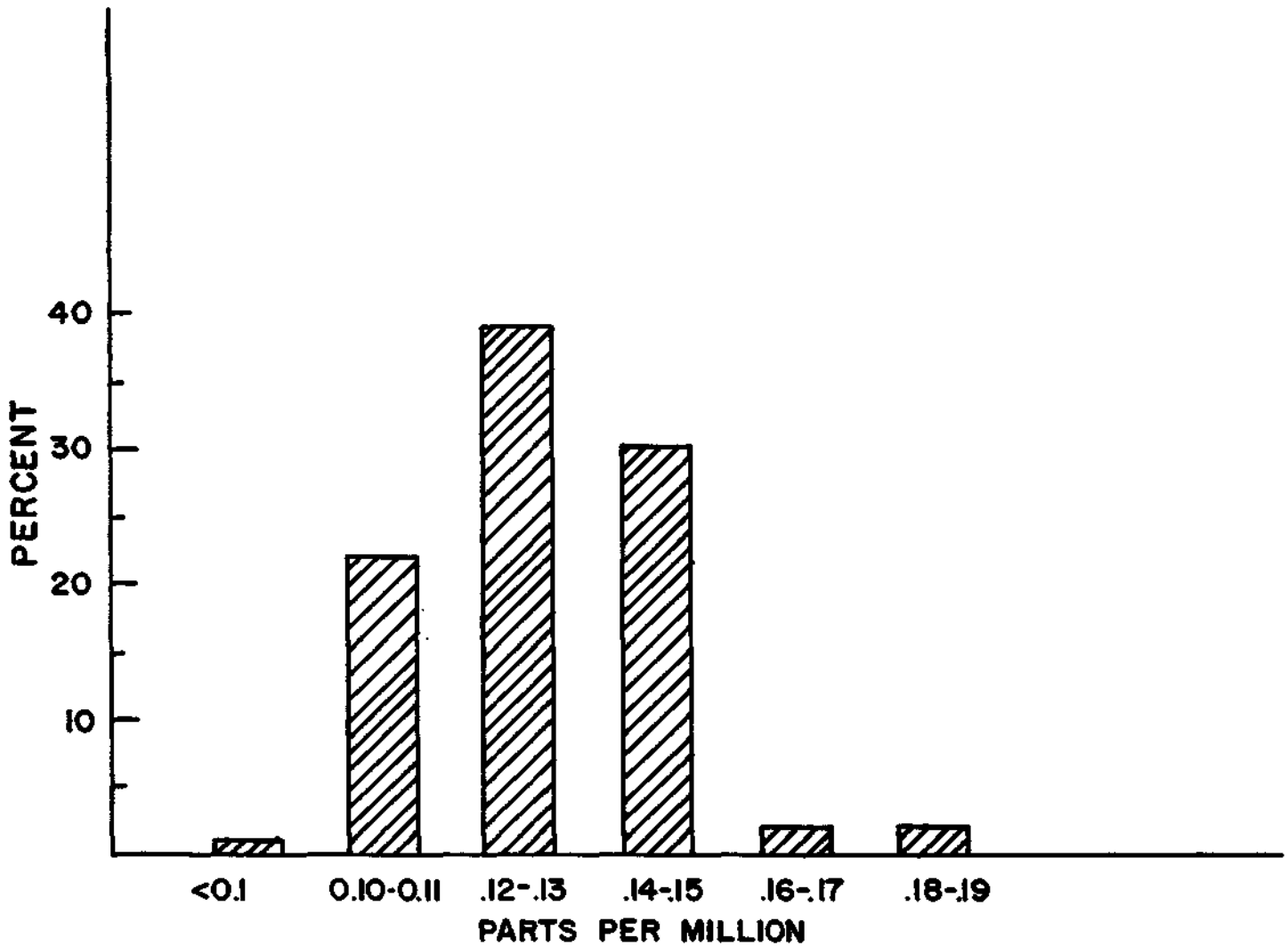


Figure 7. DIOXIN DISTRIBUTION IN 60 BARRELS OF THOMPSON (ASN-5)

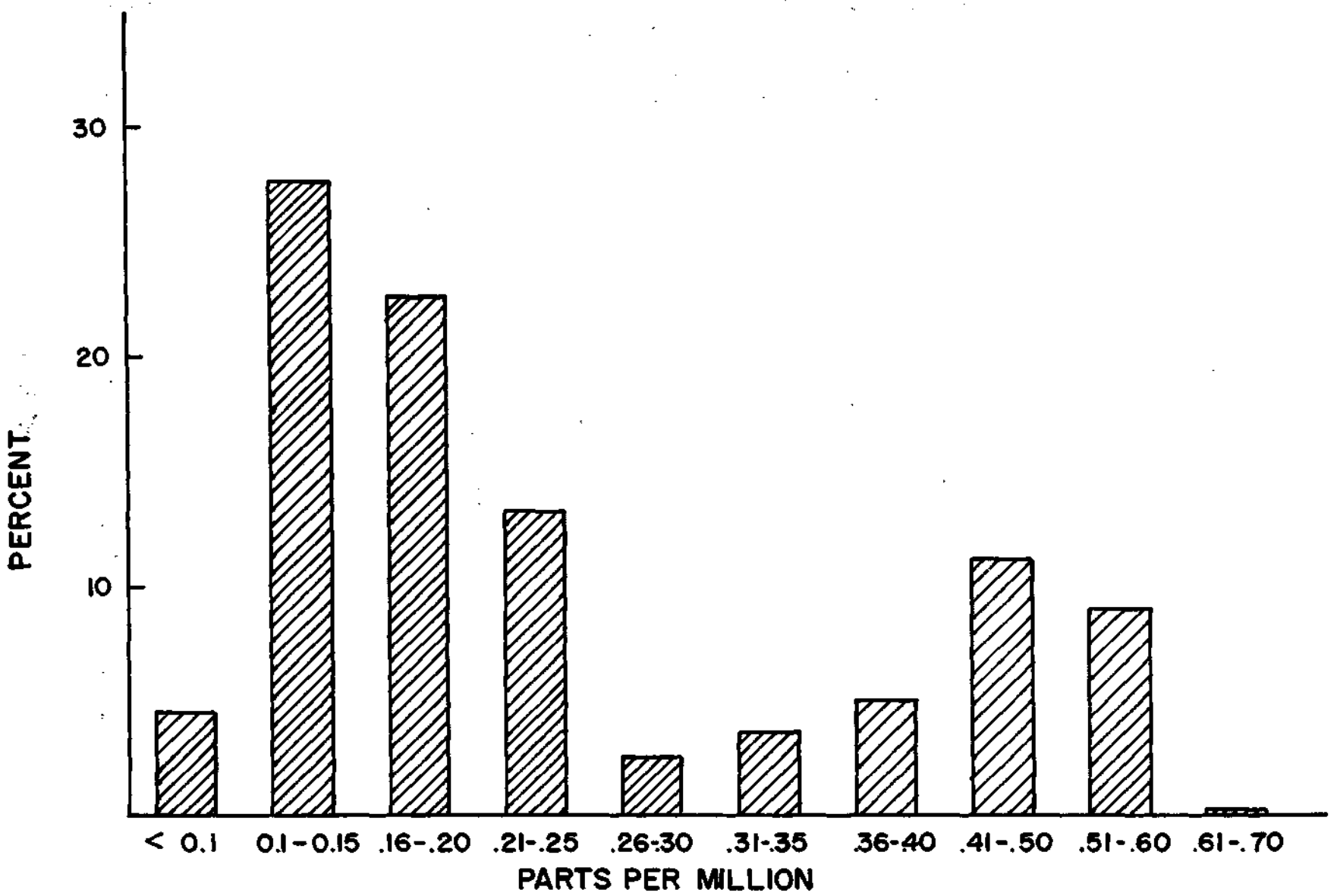


Figure 8. DIOXIN DISTRIBUTION IN 80 BARRELS OF DOW CHEMICAL (ASN-10)

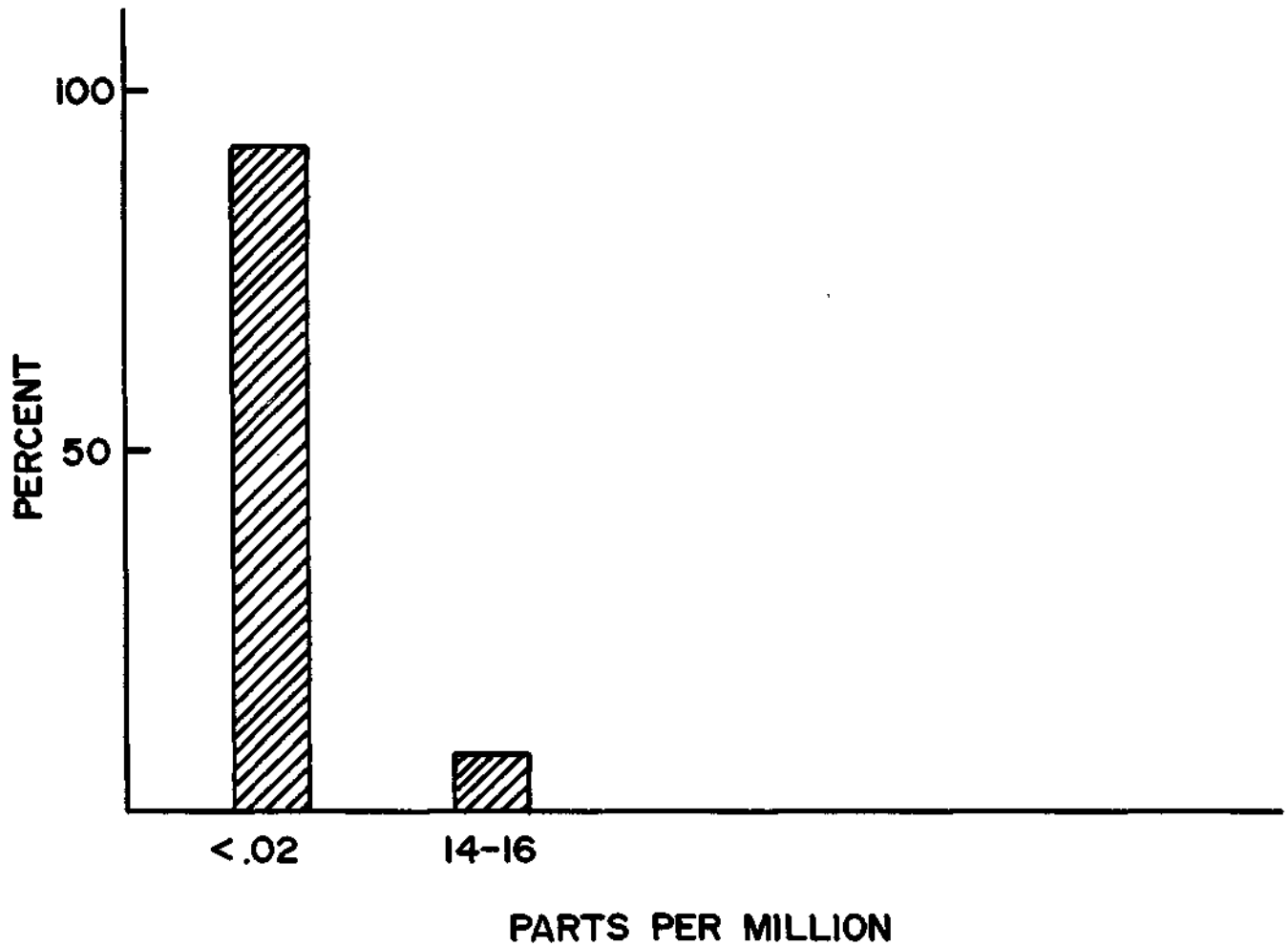


Figure 9. DIOXIN DISTRIBUTION IN 61 BARRELS LABELED HERCULES(ASN-8)

If one specifies

$$\Pr(W \geq 0.90) \geq 0.95 \qquad \text{but}$$

$$\Pr(W \geq 0.99) \geq 0.05$$

and solves Eq. (1) (by using the Binomial Tables), then a sample size of 52 is determined to be necessary. According to this treatment, regardless of the population size, if 52 samples are analyzed, one can have 95% confidence that 90% of the values obtained will fall below the third from the largest value.

SECTION IV

SUMMARY OF RESULTS

Table XV summarizes the results of the qualitative and quantitative analysis of selected samples of Herbicide Orange. Volatile constituents (with boiling points below 300°C at 1 atm) and the chlorophenoxyacetic acids are the main components in the Herbicide-Orange samples. The absolute response of the flame ionization detector (FID) was determined for the butyl ester of 2,4,-D and the butyl ester of 2,4,5-T through use of the EPA standards. Assuming that all components of the herbicide mixture gave an equal response on the flame ionization detector, we detected an average of 96 ±10% of the total herbicide sample injected onto the gas chromatographic column by FID. Thus, the relative amounts of volatile components listed in Tables IV through VII (pp. 32-39) and summarized in Table XV (p. 68) represent the absolute composition of the sample in percent by weight (within the limits of the assumption of equal detector response).

This report describes the in-depth GC-MS qualitative and quantitative analysis of representative samples from four separate drums in Gulfport, Mississippi, which were taken as representative samples of four lots of Herbicide Orange identified on the basis of preliminary Dow Chemical Co. Analyses as "low dioxin herbicide." In addition to the in-depth GC-MS characterization of the four representative samples, a concurrent study[15] described in Vol. II of this report was undertaken in which the homogeneity of the major and minor constituents in the drums representing each of the four Herbicide-Orange batches was examined by suing flame-ionization gas chromatography (FID-GC). By correlating the retention times measured for the various components in the FID-GC study (see Vol. II) with those measured in the present detailed GC-MS identification study, it is possible to derive qualitative data for the components of the several barrels of each herbicide lot analyzed. These results are summarized in Tables

TABLE XV

SUMMARY OF COMPOSITION OF HERBICIDE ORANGE

COMPOUND	GULFPORT DRUM NUMBER[a]			
	7	59	251	264
Butanol (I)	0.81	0.75	0.28	1.13
Toluene (II)	1.3	2.2	--[b]	0.51
Xylenes (III), Ethylbenzene(XI)	--	--	--	2.6
Butyl Chloride (IV)	0.11	0.16	0.14	--
Dichlorophenol (V)	0.19	0.26	--	0.28
Peak D(#251)	--	--	1.2	--
Trichlorophenol (VI)	0.41	0.67	--	3.6
Trichloroanisole (IX)	--	--	--	0.75
Dichloro-Methoxyanisole (X)	--	--	--	0.18
Dichloro-Methoxyanisole (X)	--	--	--	0.31
Butoxydichlorophenol (VII)	--	--	0.22	--
Butoxytrichlorophenol (VIII)	--	--	0.31	--
Butyl-monochlorophenoxyacetate (XII)	0.49	1.16	1.6	0.78
Butyl-dichlorophenoxyacetate (XIII)	0.78	--	4.2	1.0
Butyl-dichlorophenoxyacetate (XIII)	42.4	44.2	43.3	44.9
Butyl-trichlorophenoxyacetate (XIV)	0.92	0.70	0.96	0.44
Butyl-trichlorophenoxyacetate (XIV)	39.0	42.1	44.1	40.1
Butyl-methoxy-dichlorophenoxyacetate (XV)	6.1	5.4	1.9	2.5
Octyl-dichlorophenoxyacetate(XVI)	3.2	--	--	--
Octyl-dichlorophenoxypropionate(XVII)	0.3	--	--	--
Octyl-trichlorophenoxyacetate(XVIII)	2.0	--	--	--
1,1-dibutoxy-2-trichlorophenoxyethane (XXII)	--	--	0.36	--
Octyl-methoxy-dichlorophenoxyacetate (XXIII)	0.37	--	--	--
Butyl-bis-dichlorophenoxyacetate(XIX)	0.41	0.58	0.47	0.27
Butyl ester of bis Trichlorophen-oxyaceticacid (XX)	0.95	1.8	0.19	0.53
Butyl ester of Trichlorophenoxy-	0.16	0.21	--	--
2,4-Dichlorophenoxyacetic acid (free acid)	0.78	0.65	0.19	0.66
2,4,5-Trichlorophenoxyacetic acid (free acid)	0.84	0.78	0.13	0.80
Tetrachlorodibenzo-p-dioxin ($\mu g/g$)[c]	< 0.05	0.07	0.38	0.18

TABLE XV (continued)

a. Drum #7 is one of 500 drums obtained from Hercules Company (TCN 9464 8156 000); Drum #59 is one of 2152 drums obtained from Hercules Chemical Company (TCN 9464 8192 001); Drum #251 is one of 6976 drums obtained from Dow Chemical Company (TCN 9463 8155 X052); Drum #264 is one of 808 drums obtained from Thompson Company (TCN 9463 8155 X012).

b. Denotes none detected at levels greater than 0.1%.

c. ~~Note well that~~ the tetrachlorodibenzo-p-dioxin content is listed in µg/g (ppm); all other values are listed as relative percent (calculation of relative percent: $\frac{\text{peak area of component}}{\text{total area of all volatile components}} \times 100$).

XVI, XVII, XVIII, XIX and suggest that each lot is generally quite homogeneous. Furthermore, the feasibility of using the "fingerprint" of major and minor constituents to ascertain the manufacturer of an unidentified specimen of Herbicide Orange was conclusively demonstrated.

The homogeneity of each of the four batches of Herbicide Orange with respect to TCDD concentration is of utmost concern. Our data as shown in bar-graph form (Figures 6-9) lead one to the conclusion that only Thompson Co. ASN 5 (44,440 gallons in storage) and Hercules ASN 14 (118,360 gallons in storage) are sufficiently uniform in TCDD content and other constituents to be considered homogeneous throughout. Hercules ASN 8 (27,500 gallons in storage) is inhomogeneous in TCDD content--8% of the drums sampled were found to contain inordinately high levels of TCDD. It may well be that these "high dioxin specimens" or the drums from which they were obtained are actually mislabeled. This can be determined by the methodology described in Vol. II of this report. The DOW ASN 10 (383,680 gallons in storage) batch appears quite heterogeneous. The data shown in the bar graph (Figure 8) suggest the presence of two or more sub-groups,each with average TCDD content of well over 0.1 µg/g.

It should be noted that the distribution of dioxin levels in Figure 7 is sufficiently narrow (95% of the values obtained were within 20% of the mean value of 0.125 ppm) that it is a measure not only of the actual dioxin-level distribution but also of the precision of the analytical methodology (as discussed in an earlier section, the overall precision of the analysis is 12.5%). For the Dow ASN 10 samples, however, the distribution of dioxin levels is much broader and clearly is indicative of the actual spread of values in the batch itself. Again, the Dow material is certainly very inhomogeneous.

TABLE XVI

COMPOSITION OF VARIOUS DRUMS OF HERBICIDE ORANGE IN THE LOT DESIGNATED ANALYSIS SEQUENCE NUMBER 8 (HERCULES CO.)†

Compound		Drum Number			Average[a]
		2	7	11B	
Butanol	(b)	0.71	0.81	1.36	0.96
	(c)	26	27	25	26
Toluene		1.47	1.32	1.75	1.51
		43	43	41	42
Butyl Chloride		0.07	0.11	0.11	0.10
		134	136	137	136
Dichlorophenol		0.25	0.19	0.26	0.23
		265	255	256	259
Trichlorophenol		0.43	0.41	0.42	0.42
		511	493	497	500
Butyl monochlorophenoxyacetate		0.59	0.49	0.58	0.55
		1075	1052	1057	1061
Butyl dichlorophenoxyacetate		(d)	0.78	0.37	0.58
			1262	1267	1265
Butyl dichlorophenoxyacetate		42.8	42.5	39.8	41.7
		1382	1357	1367	1369
Butyl trichlorophenoxyacetate		0.90	0.92	0.85	0.89
		1486	1462	1467	1472
Butyl trichlorophenoxyacetate		39.3	39.0	38.6	38.9
		1608	1583	1593	1595
Butyl methoxydichlorophenoxyacetate		5.87	5.40	6.00	5.76
		1673	1650	1656	1660
Octyl dichlorophenoxyacetate		3.32	3.21	3.46	3.33
		1793	1768	1777	1779
Octyl dichlorophenoxypropionate		0.32	0.32	0.35	0.33
		1894	1869	1878	1880
Octyl trichlorophenoxyacetate		2.29	2.05	2.33	2.22
		1957	1931	1941	1943
Octyl methoxydichlorophenoxyacetate		0.38	0.37	0.37	0.37
		2002	1986	1976	1988

TABLE XVI (continued)

Compound	Drum Number			Average[a]
	2	7	11B	
Butyl (bis-dichlorophenoxy)acetate	0.34 2691	0.41 2700	0.38 2717	0.38 2703
Butyl (bis-trichlorophenoxy) acetate	(e)	1.8	(e)	
Butyl (methoxydichlorophenoxy) tri-chlorophenoxyacetate	(e)	0.21	(e)	
Tetrachlorodibenzo-p-dioxin (µg/g)	<0.05	<0.05	<0.05	<0.05[f]

†This lot obtained from Hercules Company (TCN 9464 8156 0001) contains 500 drums.

(a)Average relative percent and retention time for the respective compounds found in these samples.

Table shows two values for each volatile compound.

(b)Relative amount (%) of the compound

(c)Gas chromatographic retention time of the compound (sec.)

(d)Present in chromatogram but no numerical value obtained. Quantity present appears to be similar to amount found in other samples. The average was determined by dividing the sum of the values obtained by the number of actual observations.

(e)Analyses not performed.

(f)Additional TCDD analyses are summarized in Figure 9, p. 65.

TABLE XVII

COMPOSITION OF VARIOUS DRUMS OF HERBICIDE ORANGE IN THE LOT DESIGNATED ANALYSIS SEQUENCE NUMBER 14 (HERCULES COMPANY)†

Compound		Drum Number						Average(a)
		17	27	39	42	50	59	
Butanol	(b)	0.79	0.67	0.87	0.77	0.82	0.75	0.78
	(c)	25	27	26	27	31	27	27
Toluene		2.57	2.31	2.75	2.40	2.85	2.24	2.52
		39	43	42	43	49	43	43
Butyl Chloride		0.17	0.17	0.17	0.15	0.14	0.16	0.16
		122	129	126	130	147	132	131
Dichlorophenol		0.34	0.32	0.33	0.30	0.30	0.26	0.31
		249	257	250	258	287	261	260
Trichlorophenol		0.75	0.55	0.77	0.71	0.76	0.67	0.70
		492	487	498	501	543	506	505
Butyl monochlorophenoxyacetate		1.42	1.39	1.44	1.28	1.34	1.16	1.34
		1063	1063	1051	1068	1125	1075	1074
Butyl dichlorophenoxyacetate		1.03	1.09	0.79	0.92	0.65	(d)	0.90
		1274	1273	1260	1278	1338		1285
Butyl dichlorophenoxyacetate		43.1	42.6	42.3	42.7	43.4	44.4	43.2
		1380	1380	1361	1385	1434	1393	1389
Butyl trichlorophenoxyacetate		2.51	2.02	1.82	1.79	1.65	0.70	1.75
		1473	1471	1461	1476	1538	1482	1484
Butyl trichlorophenoxyacetate		40.6	41.2	40.3	41.1	40.4	42.1	41.0
		1606	1607	1588	1612	1662	1620	1616
Butyl methoxydichlorophenoxy-acetate		5.62	5.71	6.16	5.70	6.69	5.44	5.89
		1665	1662	1653	1666	1731	1671	1675
Butyl (bis-dichlorophenoxy)-acetate		0.45	0.46	0.53	0.39	0.38	0.58	0.47
		2687	2706	2670	2704	2814	2711	2715
Butyl (bis-trichlorophenoxy)-acetate		(e)	(e)	(e)	(e)	(e)	1.8	
Butyl (methoxydichlorophenoxy)-trichlorophenoxyacetate		(e)	(e)	(e)	(e)	(e)	0.21	
Tetrachlorodibenzo-p-dioxin (µg/g)		<0.05	<0.05	0.08	0.06	0.07	0.07	(f)

†This lot obtained from Hercules Company (TCN 9464 8192 001) contains 2152 drums.

(a)Average relative percent and retention time for the respective compounds found in these samples.

Table shows two values for each volatile compound.

TABLE XVII (continued)

(b) Relative amount (%) of the compound.

(c) Gas chromatographic retention time (sec).

(d) Present in chromatogram but no numerical value obtained. Quantity present appears to be similar to amount found in other samples. In this case the average value was calculated by dividing the sum of the values obtained by the number of actual observations.

(e) Analyses not performed.

(f) Additional TCDD analyses are summarized in Figure 6, p. 62.

TABLE XVIII

COMPOSITION OF VARIOUS DRUMS OF HERBICIDE ORANGE IN THE LOT DESIGNATED ANALYSIS SEQUENCE NUMBER 10 (DOW CHEMICAL CO.)[†]

Compound		Drum Number												Average[(a)]
		249	250	251	252	253	254	255	256	257	258	275	276	
Butanol	(b)	0.29	0.30	0.28	0.25	0.61	0.24	0.25	0.23	0.30	0.35	0.30	0.23	0.30
	(c)	27	27	26	27	27	26	27	26	26	27	27	27	27
Toluene		0.17	0.23	*	0.15	0.61	*	*	*	*	*	*	*	0.10 (d)
		43	42		42	42								42
Xylenes, Ethylbenzene		0.08	0.04	*	*	0.08	*	*	*	*	*	*	*	0.03
		77	75			75								76
Butyl Chloride		*	*	0.14	*	*	*	*	*	*	0.17	0.14	*	0.05
				126							128	128		127
Dichlorophenol		0.11	0.10	0.10	0.10	0.24	0.10	0.10	0.10	0.13	0.14	0.10	0.10	0.12
		261	255	252	261	257	257	252	254	254	256	255	258	256
Peak D		0.23	0.28	1.24	0.23	0.22	0.33	0.33	0.33	0.40	1.52	1.26	0.33	0.57
		403	392	390	404	398	397	389	393	392	389	393	398	395
Trichlorphenol**		0.38	0.48	0.15	0.39	0.24	0.12	0.12	0.12	0.17	0.21	0.21	0.11	0.23
		492	492	478	492	487	486	477	483	481	480	482	487	485
Butoxydichlorobenzene		0.10	0.13	0.22	0.11	0.04	0.14	0.14	0.13	0.14	0.28	0.31	0.13	0.16
		772	760	757	773	791	768	756	764	761	753	761	768	765
Butoxytrichlorobenzene		0.10	0.13	0.40	0.16	0.10	0.09	0.08	0.08	0.12	0.20	0.37	0.07	0.16
		1029	1014	1012	1030	1024	1025	1011	1021	1015	1009	1017	1025	1019
Butyl monochloro-phenoxyacetate		1.08	1.42	1.59	1.08	1.01	1.25	1.27	1.25	1.55	2.24	1.59	1.26	1.38
		1069	1054	1054	1070	1062	1066	1052	1062	1056	1049	1060	1066	1060
Butyl dichloro-phenoxyacetate		2.15	2.69	3.07	1.87	0.92	2.85	2.79	2.70	4.26	4.15	2.99	2.78	2.77
		1282	1268	1265	1280	1274	1280	1266	1277	1270	1260	1272	1280	1273

TABLE XVIII (continued)

Compound	Drum Number												Average[a]
	249	250	251	252	253	254	255	256	257	258	275	276	
Butyl dichloro-phenoxyacetate	43.2 1404	43.8 1358	43.3 1390	43.8 1406	44.3 1370	44.7 1403	44.4 1389	45.5 1403	44.1 1363	42.2 1353	44.2 1398	45.7 1408	44.1 1387
Butyl trichloro-phenoxyacetate	1.23 1482	2.23 1464	0.96 1464	1.45 1484	0.83 1471	0.82 1478	0.85 1464	0.85 1475	1.32 1465	1.46 1454	0.99 1470	0.85 1479	1.22 1471
Butyl trichloro-phenoxyacetate	43.2 1632	40.9 1582	44.1 1618	42.8 1635	41.9 1596	45.6 1633	45.6 1619	44.8 1631	42.1 1589	41.1 1577	43.6 1625	44.5 1635	43.4 1614
Butyl methoxydichloro-phenoxyacetate	3.48 1662	3.70 1642	1.97 1646	1.80 1663	3.34 1652	2.18 1662	2.21 1648	2.19 1659	3.73 1646	3.33 1632	1.99 1654	2.19 1663	2.68 1652
Octyl dichloro-phenoxyacetate**	0.40 1726	0.70 1708	0.25 1717	0.37 1728	0.27 1723	0.15 1731	0.18 1717	0.19 1728	0.27 1718	0.30 1706	0.21 1724	0.18 1732	0.29 1722
Octyl trichloro-phenoxyacetate**	1.19 1826	*	*	1.40 1830	1.64 1822	0.12 1819	0.12 1804	0.15 1816	0.18 1801	*	0.07 1812	0.14 1819	0.42 1817
1.1-dibutoxy-2-tri-chlorophenoxyethane	0.24 1990	*	0.36 1974	0.27 1995	0.65 1986	0.29 1990	0.29 1974	0.29 1987	0.40 1976	0.46 1966	0.36 1982	0.29 1990	0.33 1983
Butyl (bis-dichloro-phenoxy)acetate	0.42 2682	*	0.47 2665	0.44 2735	0.85 2694	0.29 2679	0.40 2652	0.29 2680	0.55 2682	0.56 2674	0.33 2677	0.39 2680	0.42 2682
Tetrachlorodibenzo-p-dioxin (µg/g)	0.13	0.20	0.38	0.17	0.11	0.22	0.22	0.30	0.21	0.41	0.22	0.29	(e)

†This lot obtained from Dow Chemical Co. (TCN 9463 8155 X052) contains 6976 drums.

(a)Average relative percent and retention time for the respective compounds found in these samples. Table shows two values for each volatile compound

(b)The relative amount (%) of the compound.

(c)Gas chromatographic retention time (sec).

TABLE XVIII (continued)

(d) In the cases where a compound was detected in only a few of the samples and not in others, the average was calculated by dividing the sum of the values by 12.

(e) Additional TCDD analyses are summarized in Figure 8, p. 64.

*None detected.

**Tentative identification based solely on gas chromatographic retention time.

Drums 249, 250, 251, and 252 contain an unidentified component at an average retention time of 790 sec and average relative percent concentration of 0.14; Drums 251, 254, 255, 256, 257, 258, 275, and 276 contained another unidentified component with retention time of 888 sec and 0.07 retention time and average relative percent concentration. Also, Drum 253 exhibited an unidentified component at 291 sec, relative intensity, 0.13% and Drum 252 was found to contain a component with a retention time of 1502 sec and relative intensity of 1.78%.

TABLE XIX

COMPOSITION OF VARIOUS DRUMS OF HERBICIDE ORANGE IN THE LOT DESIGNATED ANALYSIS SEQUENCE NUMBER 5 (THOMPSON CO.)†

Compound		Drum Number				Average[a]
		262	263	264	274	
Butanol	(b)	2.1	1.6	1.1	1.8	1.7
	(c)	26	27	27	27	27
Toluene		0.78	0.68	0.51	0.62	0.65
		42	42	43	43	43
Xylenes, ethyl benzene		3.8	3.5	2.6	3.5	3.4
		71	71	72	72	72
Butyl chloride		0.15	0.14	0.10	0.14	0.13
		104	103	104	105	104
Dichlorophenol		0.38	0.35	0.28	0.36	0.34
		257	254	257	259	257
Unknown		0.15	0.14	0.11	0.14	0.14
		291	287	289	293	290
Trichlorophenol		4.7	4.3	3.6	4.3	4.2
		506	501	507	510	506
Dichloromethoxyanisole		0.17	0.16	0.13	0.16	0.16
		599	594	601	603	599
Trichloroanisole		0.99	0.90	0.75	0.91	0.89
		629	625	629	634	629
Dichloromethoxyanisole		0.23	0.21	0.18	0.21	0.21
		712	708	713	717	713
Dichloromethoxyanisole		0.45	0.42	0.31	0.42	0.40
		760	756	761	766	761
Butyl monochlorophenoxyacetate		1.1	0.96	0.78	0.97	0.95
		1060	1057	1062	1066	1061
Butyl dichlorophenoxyacetate		0.36		0.29		0.16[d]
		1148		1145		1147
Butyl dichlorophenoxyacetate			0.28	0.16	0.30	0.19
			1200, 1212	1205	1209, 1220	1209
Unknown		0.11	0.40		0.39	0.23
		1238	1236		1245	1240

TABLE XIX (continued)

Compound	Drum Number				Average[a]
	262	263	264	274	
Butyl dichlorophenoxyacetate	0.21 1267	0.54 1264	0.53 1268	0.52 1276	0.45 1269
Butyl dichlorophenoxyacetate	42.1 1389	41.2 1387	44.9 1406	41.3 1397	42.4 1395
Butyl trichlorophenoxyacetate	0.37 1465	0.36 1464	0.44 1470	0.36 1473	0.38 1468
Butyl trichlorophenoxyacetate	41.1 1605	38.4 1605	40.1 1626	38.3 1619	39.5 1614
Butyl methoxydichlorophenoxyacetate		4.6 1649	2.5 1657	4.6 1659	2.9[d] 1655
Unknown		0.33 2296			0.1 2296
Unknown	0.12 2379				0.03 2379
Butyl-bis-dichlorophenoxyacetate		0.38 2689	0.27 2663		0.16 2676
Tetrachlorodibenzo-p-dioxin (µg/g)	(e)	(e)	0.18	(e)	(e)

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†This lot obtained from Thompson Company (TCN 9463 8155 X012) contains 808 drums.

(a) Average relative percent and retention time for the respective compounds found in these samples.

Table shows two values for each volatile compound.

(b) Relative amount (%) of the compound.

(c) Gas chromatographic retention time of the compound (sec).

(d) In the case where a compound was detected in only a few of the samples and not in others, the average was calculated by dividing the sum of the values by 4.

(e) Additional TCDD analyses are summarized in Figure 7, p. 63.

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APPENDIX A

PRESENTATION OF DATA ON GULFPORT #7 SAMPLES

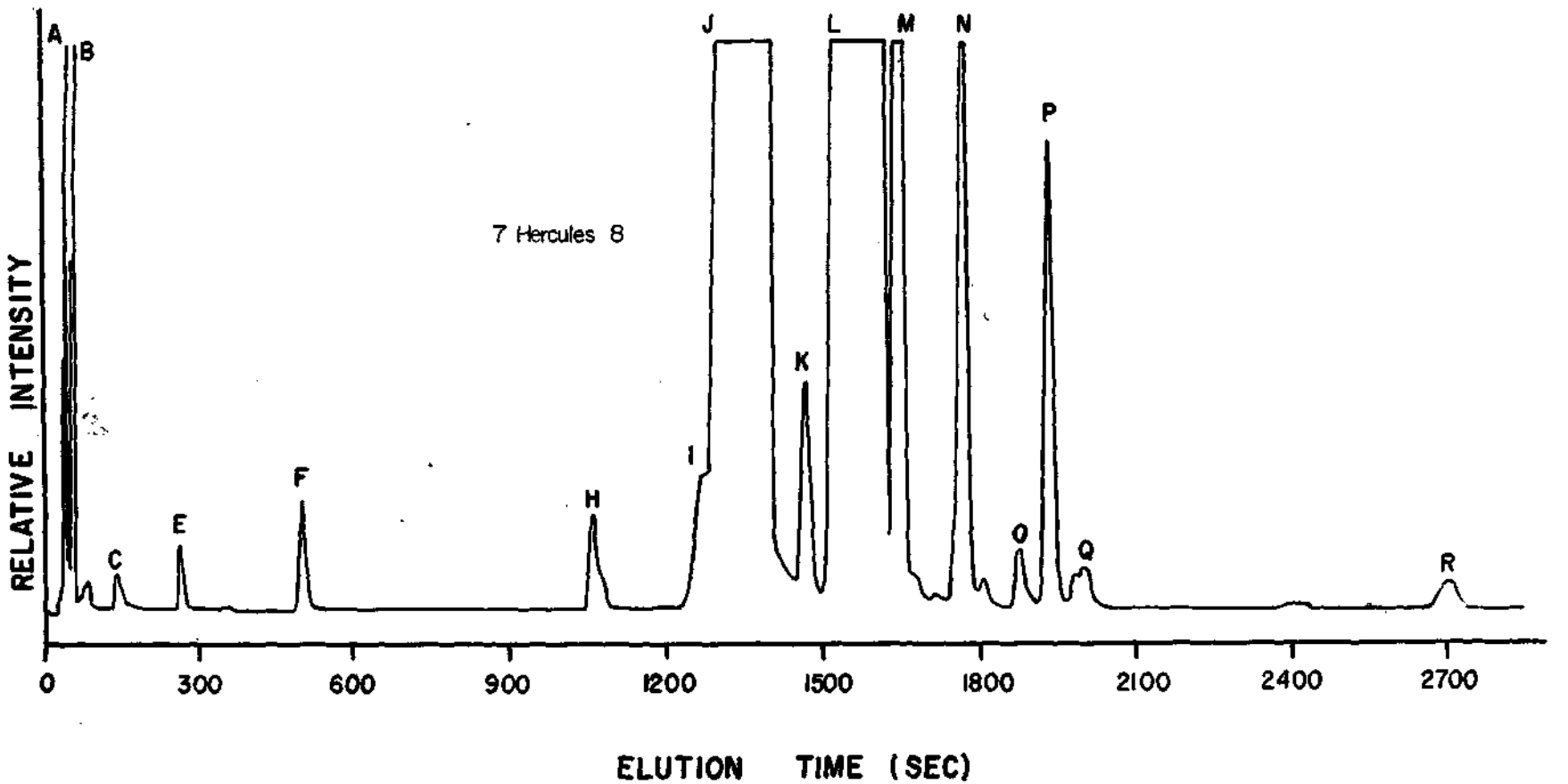

FIGURE A-1. F.I.D. Chromatograms of Gulfport #7

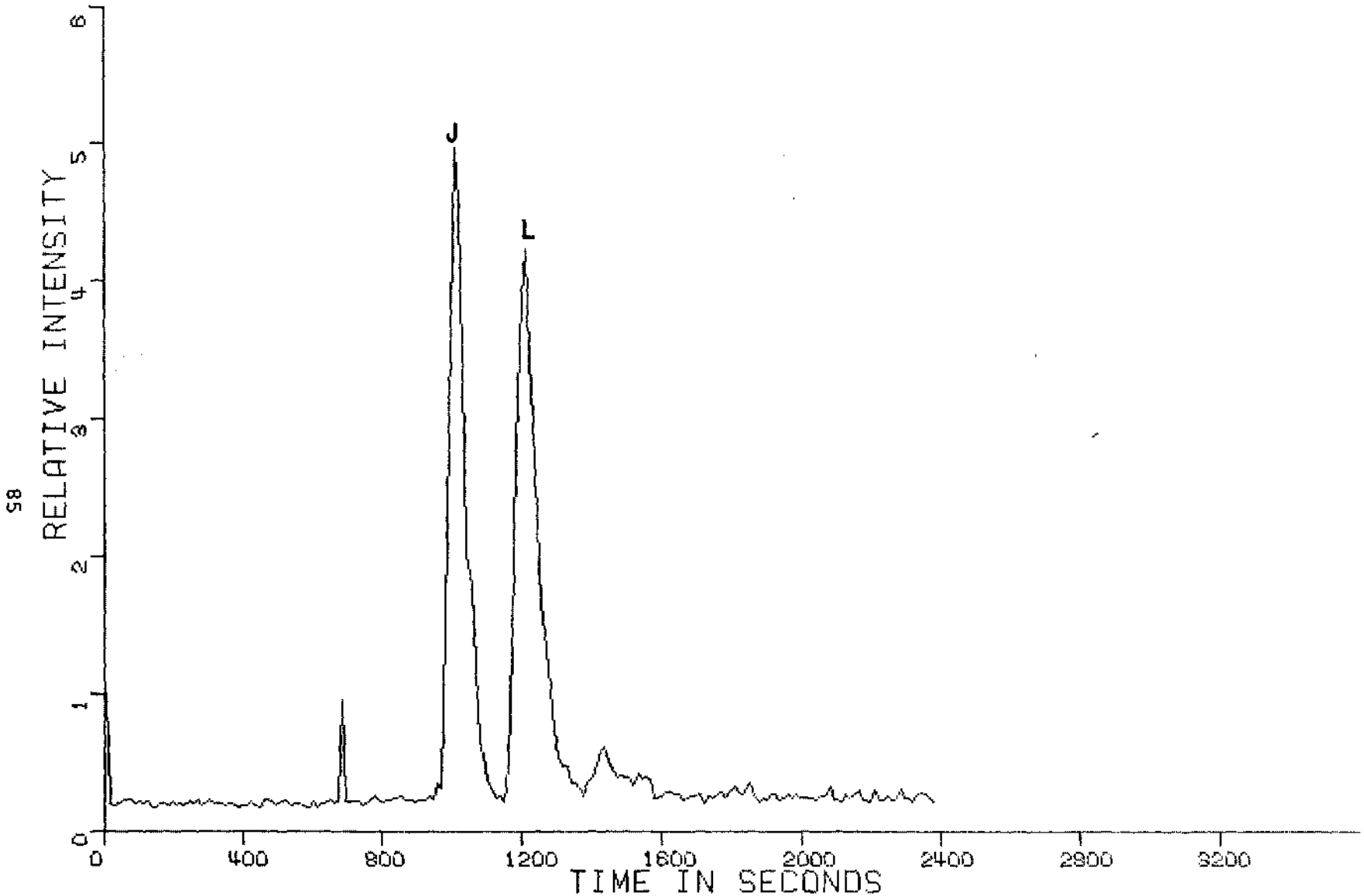

FIGURE A-2. TOTAL ION CHROMATOGRAM OF MAJOR CONSTITUENTS OF GULFPORT # 7

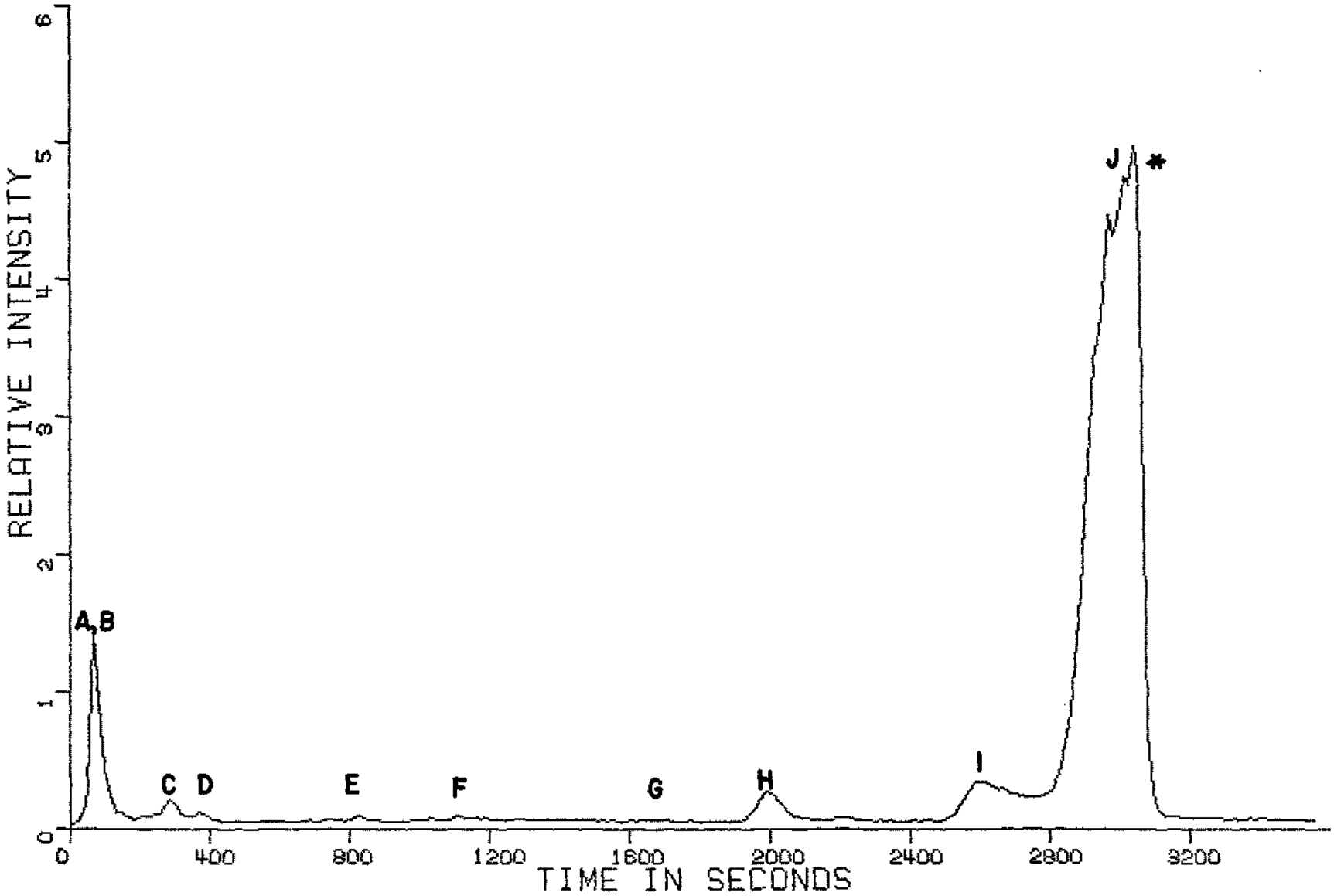

FIGURE A-3. TOTAL ION CHROMATOGRAM OF MINOR CONSTITUENTS OF GULFPORT # 7 ELUTING BEFORE THE N-BUTYL-ESTER OF 2,4-DICHLORO ACID

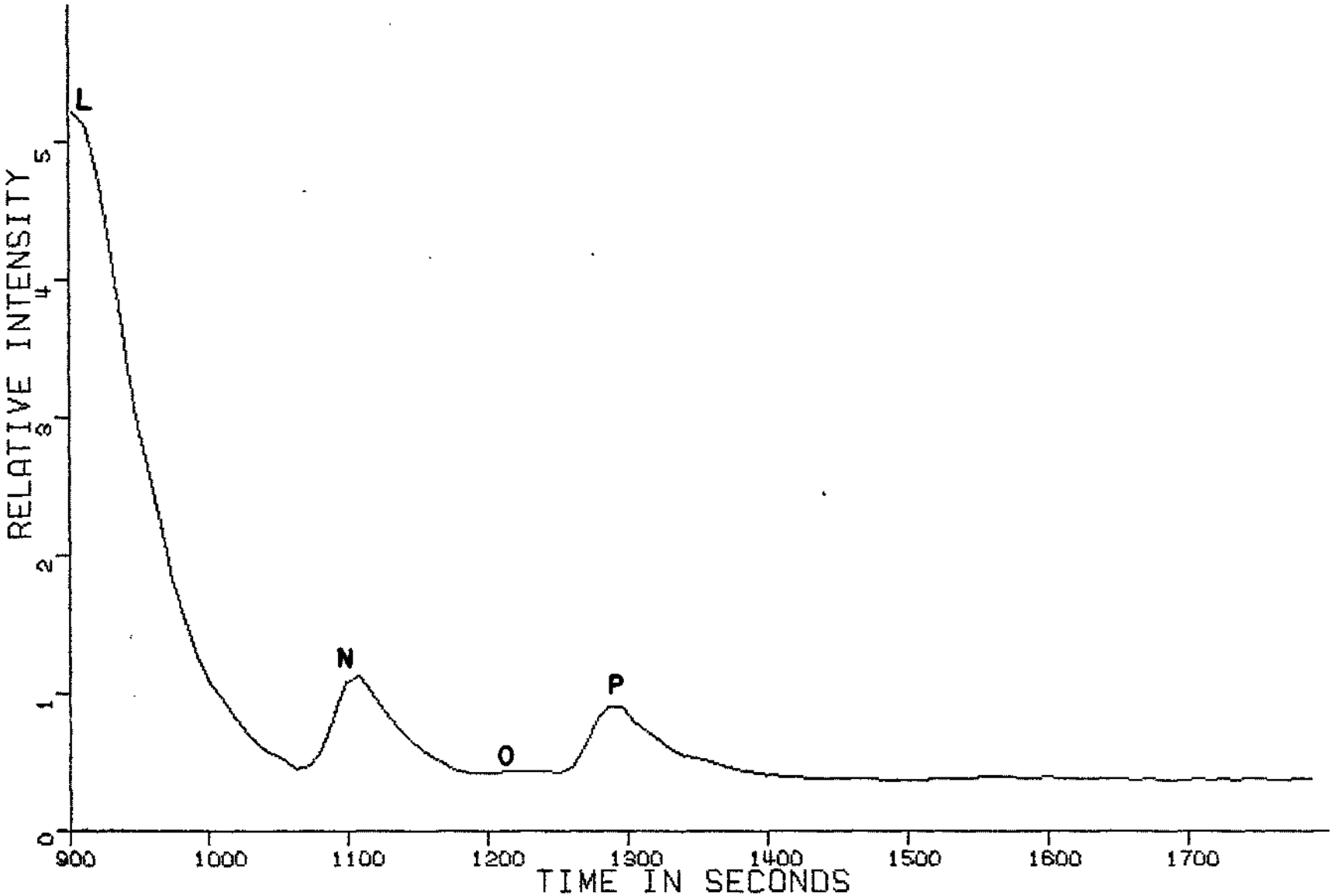

FIGURE A-4. TOTAL ION CHROMATOGRAM OF #7

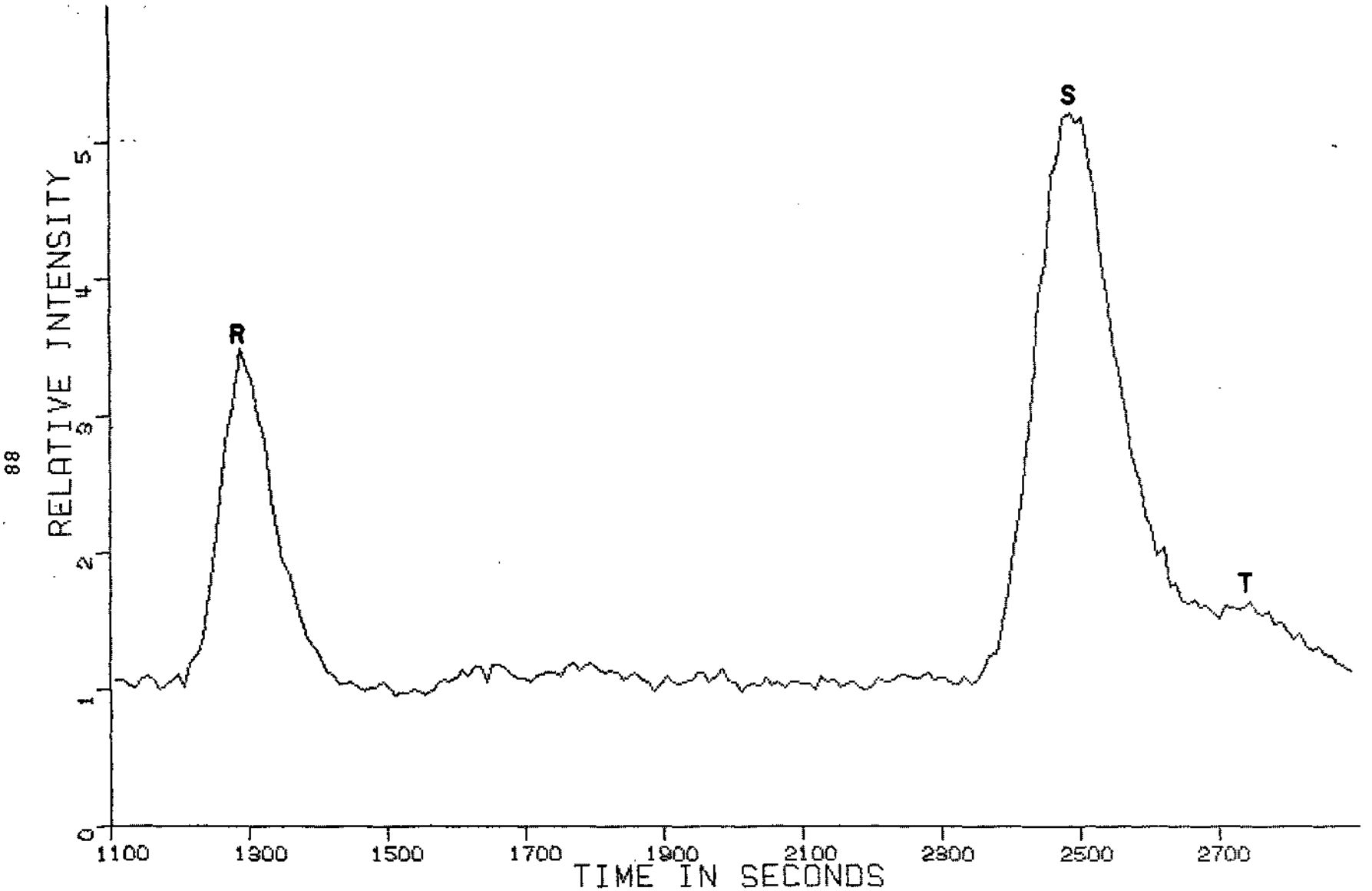

FIGURE A-5. TOTAL ION CHROMATOGRAM OF #7

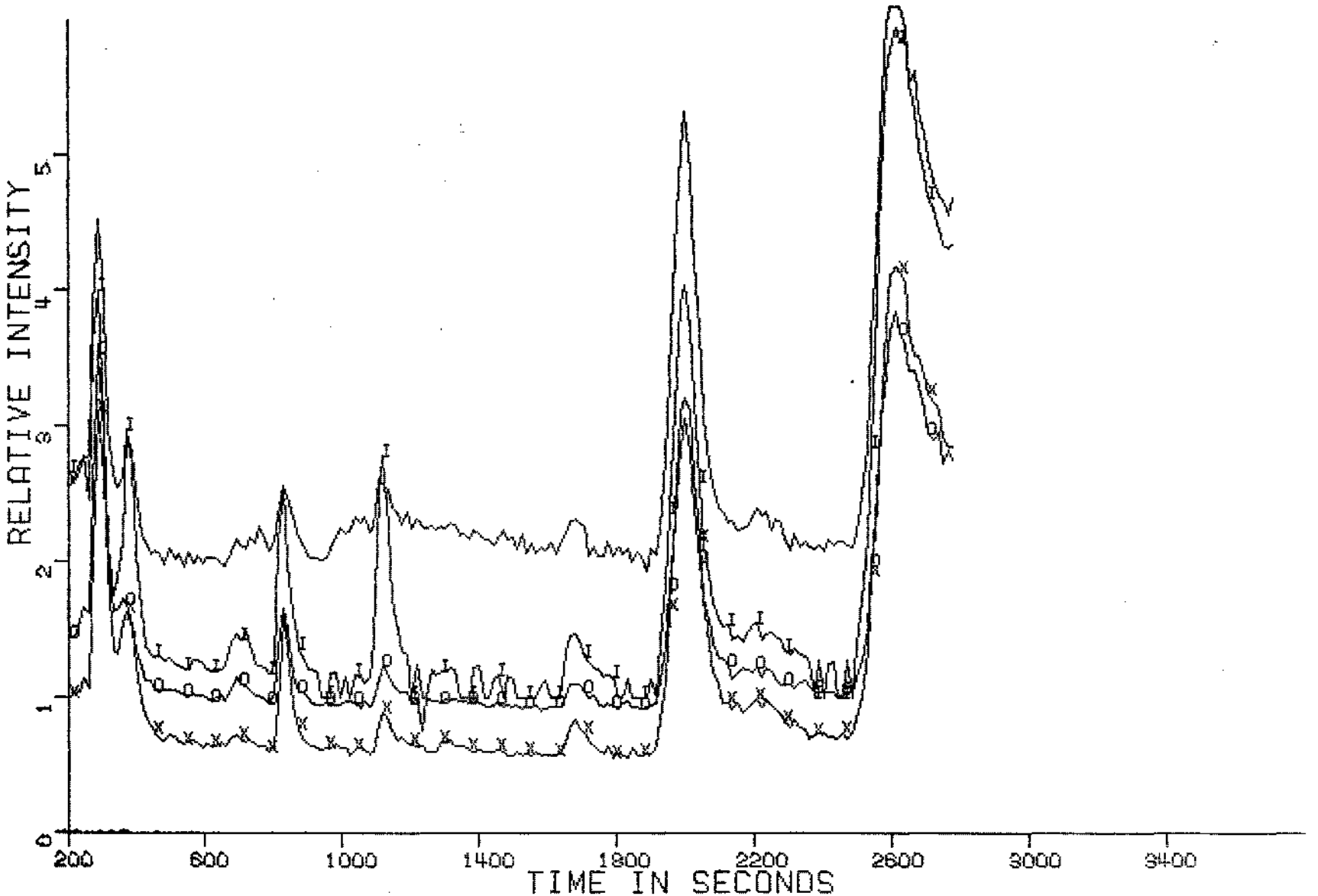

FIGURE A-6. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #7

I = MASS 57
X = MASS 29
O = MASS 41

TABLE A-1. Normalized Spectrum of Compound J. Butyl ester of dichlorophenoxyacetic acid (XIII)

FIL13-1 0.4 MICROLITER 100% GULFPORT#7 10-450 CD491 17 DEC

MASS	SCAN 85	SCAN 77	DIFF.	NORM. DIFF.
27.0	5407.	.	5407.	8.41
29.0	30134.	.	30134.	46.85
30.0	794.	.	794.	1.23
31.0	912.	.	912.	1.42
39.0	3102.	.	3102.	4.82
41.0	30658.	.	30658.	47.66
42.0	5782.	.	5782.	8.99
43.0	5587.	144.	5443.	8.46
44.0	715.	.	715.	1.11
55.0	4620.	.	4620.	7.18
56.0	2792.	.	2792.	4.34
57.0	64322.	.	64322.	100.00
63.0	3885.	.	3885.	6.04
73.0	2592.	.	2592.	4.03
74.0	2928.	.	2928.	4.55
75.0	4730.	.	4730.	7.35
85.0	1053.	.	1053.	1.64
97.0	782.	.	782.	1.22
109.0	5882.	.	5882.	9.14
111.0	7260.	.	7260.	11.29
112.0	1904.	.	1904.	2.96
133.0	3114.	.	3114.	4.84
135.0	2106.	1366.	740.	1.15
145.0	8036.	.	8036.	12.49
147.0	6761.	.	6761.	10.51
149.0	1926.	.	1926.	2.99
161.0	2851.	.	2851.	4.43
162.0	14288.	.	14288.	22.21
163.0	2629.	.	2629.	4.09
164.0	9227.	.	9227.	14.35
166.0	1456.	.	1456.	2.26
175.0	17495.	.	17495.	27.20
177.0	11063.	.	11063.	17.20
185.0	18035.	.	18035.	28.04
186.0	1861.	.	1861.	2.89
220.0	5882.	.	5882.	9.14
222.0	3385.	.	3385.	5.26
276.0	12804.	.	12804.	19.91
277.0	1717.	.	1717.	2.67
278.0	8189.	.	8189.	12.73

SCAN 85 CONTAINED 49 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE A-2. Normalized Spectrum of Compound L
Butyl ester of trichlorophenoxyacetic acid (XIV)

FIL13-1 0.4 MICROLITER 100% GULFPORT#7 10-450 CD491 17 DEC

MASS	SCAN 102	SCAN 95	DIFF.	NORM. DIFF.
27.0	4572.	.	4572.	6.53
29.0	29499.	1083.	28416.	40.59
30.0	706.	.	706.	1.01
39.0	2432.	.	2432.	3.47
41.0	30335.	.	30335.	43.33
42.0	5356.	.	5356.	7.65
43.0	5484.	440.	5044.	7.20
55.0	4667.	.	4667.	6.67
56.0	3147.	.	3147.	4.49
57.0	72233.	2217.	70016.	100.00
58.0	3207.	.	3207.	4.58
73.0	1475.	.	1475.	2.11
74.0	2732.	.	2732.	3.90
97.0	2794.	.	2794.	3.99
109.0	2992.	.	2992.	4.27
143.0	2596.	.	2596.	3.71
144.0	1844.	.	1844.	2.63
145.0	3716.	272.	3444.	4.92
146.0	3104.	.	3104.	4.43
147.0	1877.	402.	1475.	2.11
179.0	4511.	.	4511.	6.44
181.0	4708.	.	4708.	6.72
183.0	1922.	.	1922.	2.75
195.0	911.	.	911.	1.30
196.0	7014.	.	7014.	10.02
197.0	**1411.**	.	**1411.**	**2.02**
198.0	6676.	.	6676.	9.53
200.0	2095.	.	2095.	2.99
209.0	**7498.**	.	**7498.**	**10.71**
211.0	**7111.**	.	**7111.**	**10.16**
219.0	**9974.**	.	**9974.**	**14.25**
221.0	**6370.**	.	**6370.**	**9.10**
256.0	**3845.**	.	**3845.**	**5.49**
310.0	**7250.**	.	**7250.**	**10.35**
311.0	1197.	.	1197.	1.71
312.0	7108.	.	7108.	10.15
313.0	1210.	.	1210.	1.73
314.0	2325.	.	2325.	3.32

SCAN 102 CONTAINED 51 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE A-3. Normalized Spectrum of Compound A.
Butanol (I)

FIL03-2 10 MICROLITER 100% GULFPORT#7 25-300 CD 491 18 DEC

MASS	SCAN 3	SCAN 1	DIFF.	NORM. DIFF.
27.0	909.	290.	619.	13.04
28.0	13392.	11385.	2007.	42.28
29.0	1178.	264.	914.	19.25
32.0	1471.	1413.	58.	1.22
36.0	289.	.	289.	6.09
39.0	820.	.	820.	17.27
40.0	**219.**	**119.**	**100.**	**2.11**
41.0	2898.	638.	2260.	47.61
42.0	1605.	.	1605.	33.81
43.0	**4747.**	.	**4747.**	**100.00**
44.0	**829.**	.	**829.**	**17.46**
55.0	**1016.**	.	**1016.**	**21.40**
56.0	**2018.**	.	**2018.**	**42.51**
57.0	**4270.**	.	**4270.**	**89.95**
70.0	**958.**	.	**958.**	**20.18**
71.0	1750.	.	1750.	36.87
98.0	331.	.	331.	6.97
135.0	905.	.	905.	19.06
156.0	486.	.	486.	10.24

SCAN 3 CONTAINED 19 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE A-4. Normalized Spectrum of Compounds A and B.
Butanol (I) Toluene (II)

FIL03-2 10 MICROLITER 100% GULFPORT#7 25-300 CD 491 18 DEC

MASS	SCAN 5	SCAN 1	DIFF.	NORM. DIFF.
28.0	15621.	11385.	4236.	4.97
29.0	14514.	264.	14250.	16.70
31.0	48408.	.	48408.	56.74
33.0	3735.	.	3735.	4.38
37.0	1568.	.	1568.	1.84
38.0	3367.	.	3367.	3.95
39.0	18703.	.	18703.	21.92
40.0	3487.	119.	3368.	3.95
41.0	43705.	638.	43067.	50.48
42.0	18111.	.	18111.	21.23
43.0	37886.	.	37886.	44.41
44.0	2979.	.	2979.	3.49
45.0	6891.	.	6891.	8.08
46.0	2056.	.	2056.	2.41
50.0	4669.	.	4669.	5.47
51.0	7165.	.	7165.	8.40
52.0	2061.	.	2061.	2.42
53.0	1734.	.	1734.	2.03
55.0	8748.	.	8748.	10.25
56.0	46577.	.	46577.	54.60
57.0	9172.	.	9172.	10.75
61.0	1602.	.	1602.	1.88
62.0	2973.	.	2973.	3.48
63.0	6990.	.	6990.	8.19
64.0	**1751.**	.	**1751.**	**2.05**
65.0	10749.	.	10749.	12.60
66.0	1228.	.	1228.	1.44
70.0	**1183.**	.	**1183.**	**1.39**
71.0	**1165.**	.	**1165.**	**1.37**
73.0	**1396.**	.	**1396.**	**1.64**
74.0	**1011.**	.	**1011.**	**1.19**
85.0	**859.**	.	**859.**	**1.01**
89.0	**3150.**	.	**3150.**	**3.69**
90.0	1963.	.	1963.	2.30
91.0	85312.	.	85312.	100.00
92.0	56052.	.	56052.	65.70
93.0	4190.	.	4190.	4.91

SCAN 5 CONTAINED 53 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

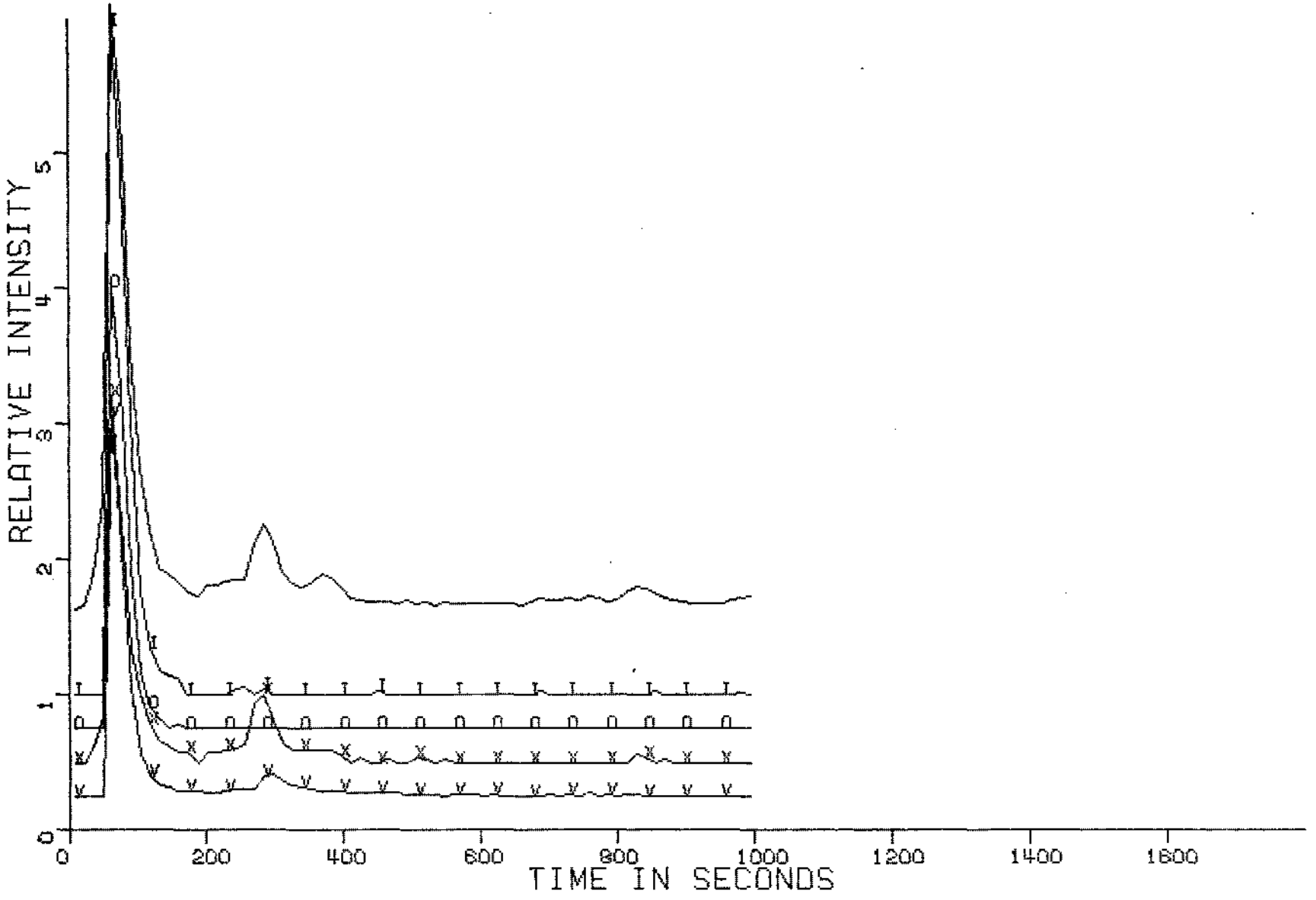

FIGURE A-7. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #7

I = MASS 91
O = MASS 92
X = MASS 56
V = MASS 31

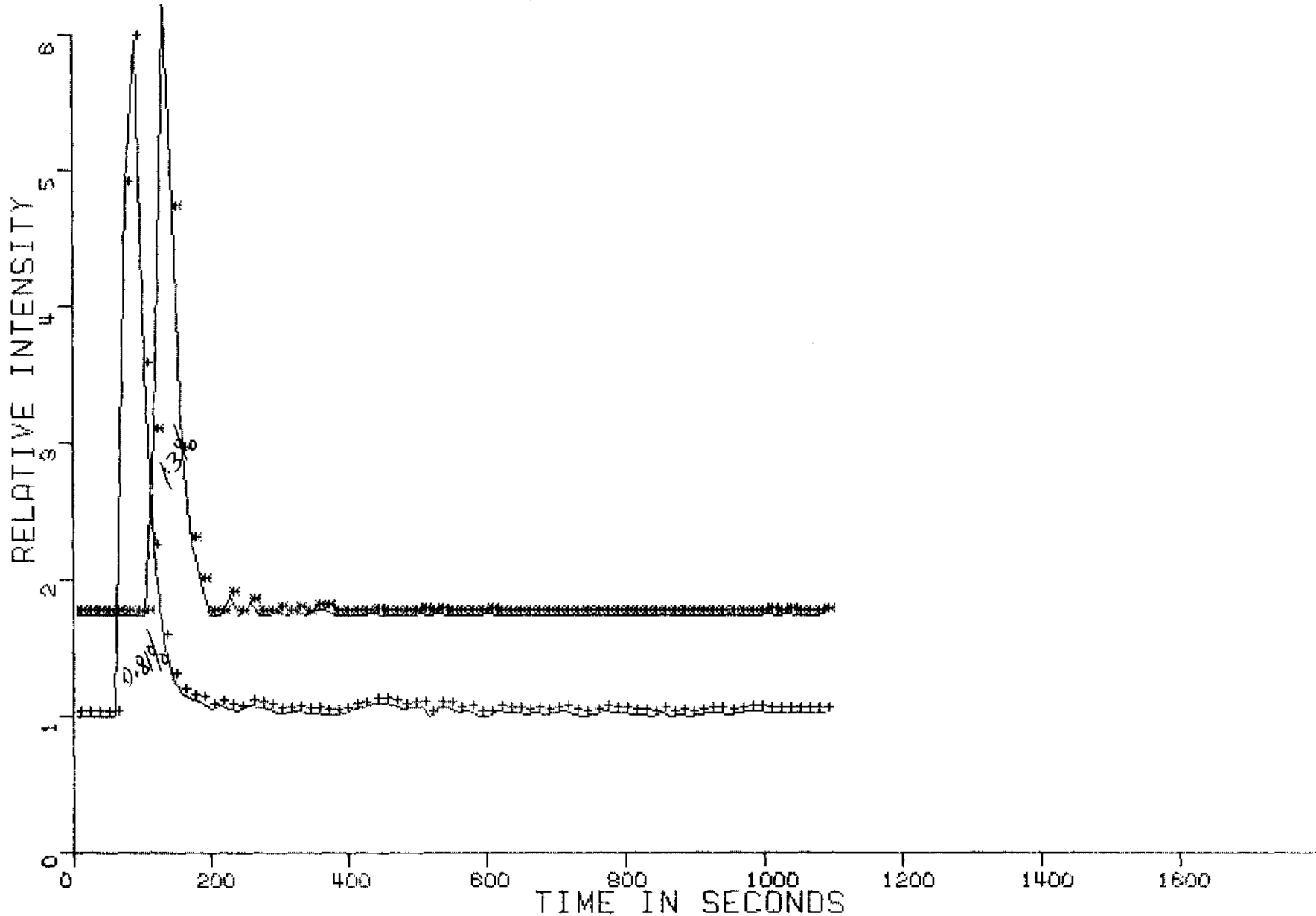

FIGURE A-8. MASS CHROMATOGRAMS FOR GULFPORT #7 10 FT. DC200 COLUMN
\+ = MASS 31
* = MASS 91

TABLE A-5. Normalized Mass Spectrum of Compound C. Butyl chloride (IV)

FIL03-2 10 MICROLITER 100% GULFPORT#7 25-300 CD 491 18 DEC

MASS	SCAN 21	SCAN 1	DIFF.	NORM. DIFF.
28.0	12158.	11385.	773.	7.33
29.0	9140.	264.	8876.	84.20
31.0	2479.	.	2479.	23.52
39.0	1746.	.	1746.	16.56
41.0	9774.	638.	9136.	86.66
42.0	1376.	.	1376.	13.05
43.0	4165.	.	4165.	39.51
44.0	991.	.	991.	9.40
45.0	1109.	.	1109.	10.52
49.0	1309.	.	1309.	12.42
51.0	577.	.	577.	5.47
55.0	2136.	.	2136.	20.26
56.0	8672.	.	8672.	82.26
57.0	10542.	.	10542.	100.00
70.0	1215.	.	1215.	11.53
71.0	540.	.	540.	5.12
73.0	808.	.	808.	7.66
77.0	3044.	.	3044.	28.87
79.0	940.	.	940.	8.92
83.0	373.	.	373.	3.54
91.0	756.	.	756.	7.17
107.0	401.	.	401.	3.80
135.0	1013.	.	1013.	9.61

SCAN 21 CONTAINED 24 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

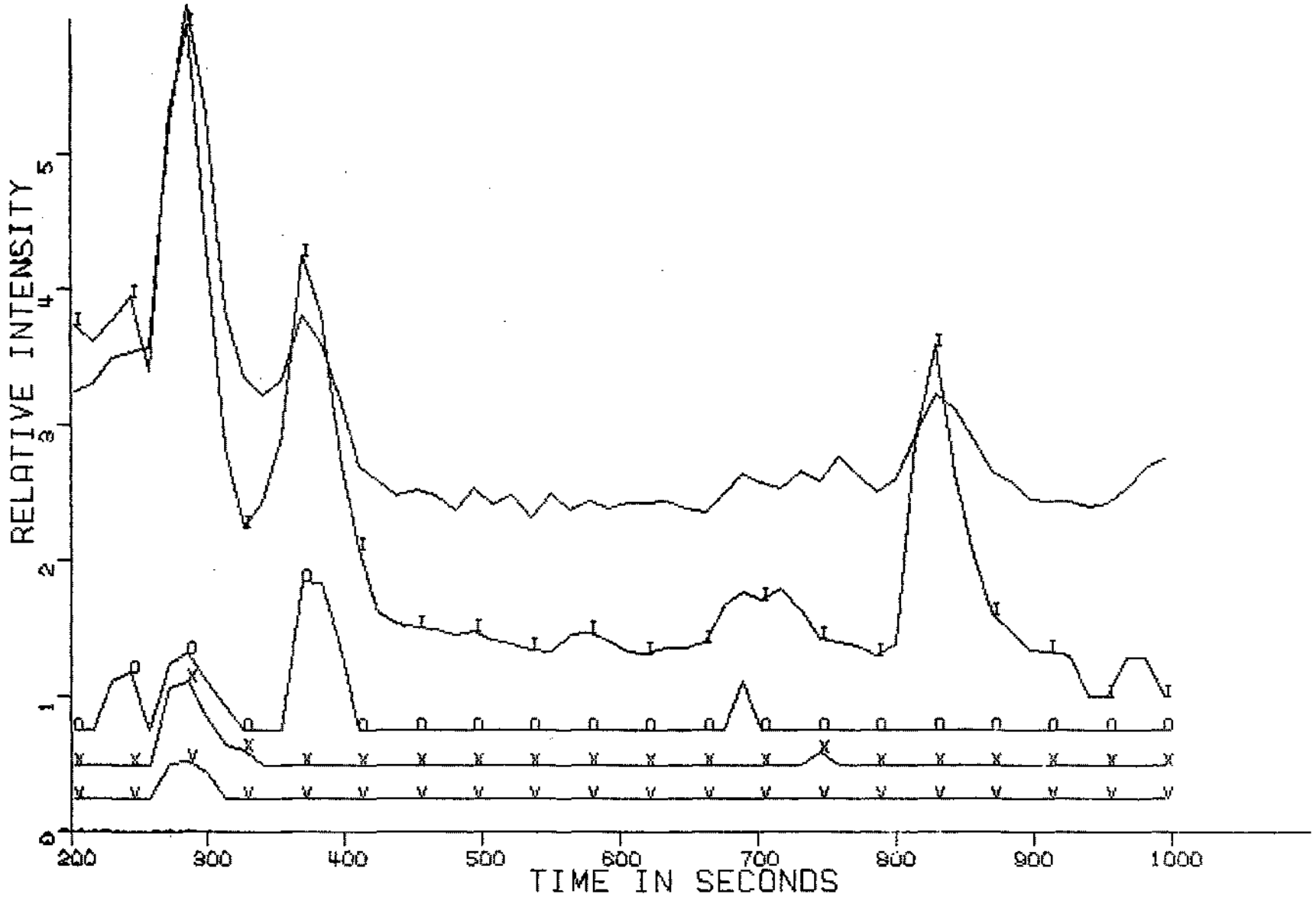

FIGURE A-9. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #7

I = MASS 57
X = MASS 49
O = MASS 70
V = MASS 51

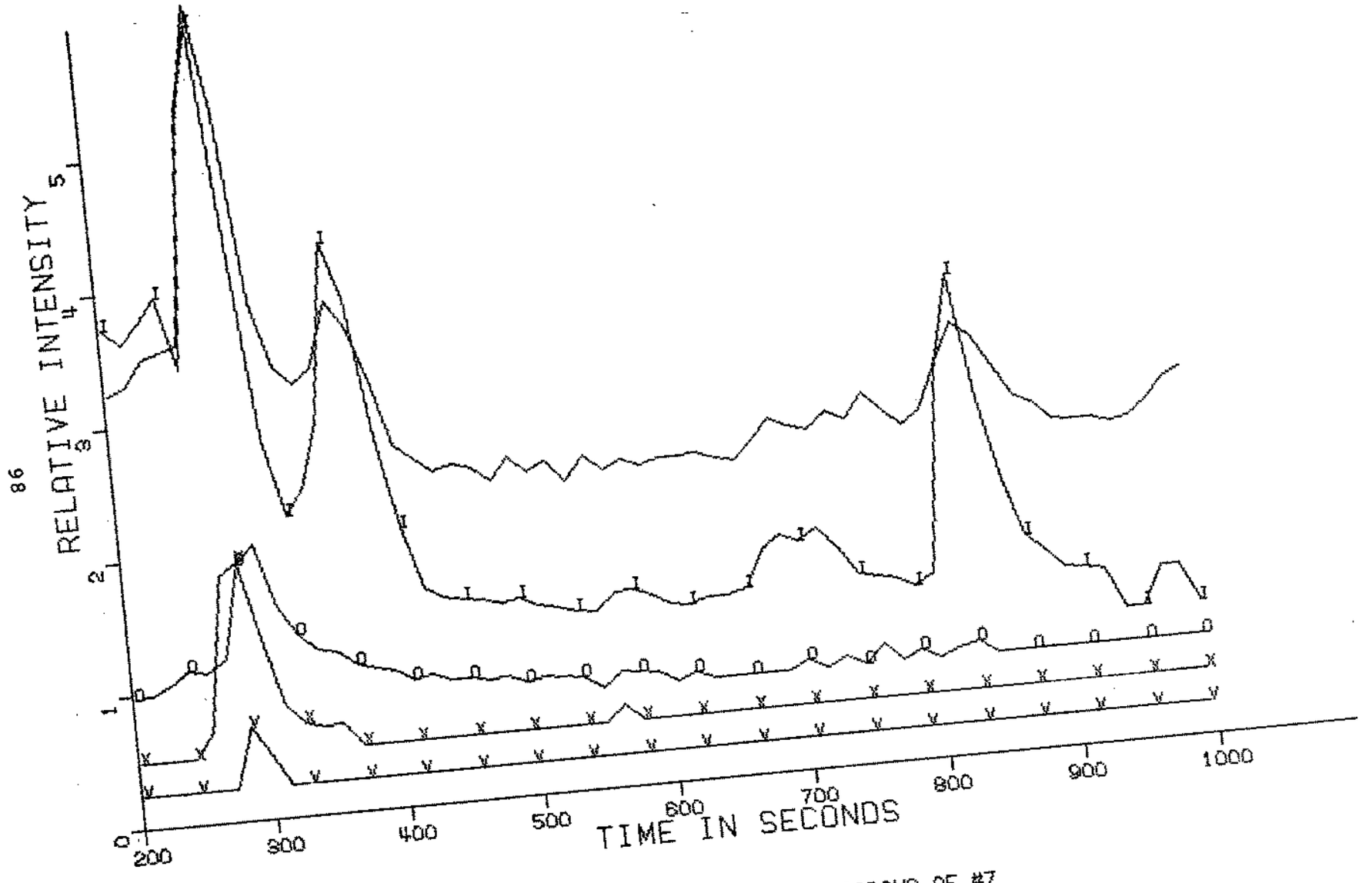

FIGURE A-10. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #7

I = MASS 57
X = MASS 77
O = MASS 31
V = MASS 79

TABLE A-6. Normalized Mass Spectrum of Compound D.

FIL03-2 10 MICROLITER 100% GULFPORT#7 25-300 CD 491 18 DEC

MASS	SCAN 27	SCAN 1	DIFF.	NORM. DIFF.
28.0	11627.	11385.	242.	3.50
29.0	3954.	264.	3690.	53.39
31.0	752.	.	752.	10.88
36.0	334.	.	334.	4.83
39.0	747.	.	747.	10.81
41.0	3276.	638.	2638.	38.17
43.0	1386.	.	1386.	20.05
44.0	739.	.	739.	10.69
55.0	1230.	.	1230.	17.80
56.0	1566.	.	1566.	22.66
57.0	6911.	.	6911.	100.00
58.0	340.	.	340.	4.92
70.0	2355.	.	2355.	34.08
75.0	580.	.	580.	8.39
135.0	1024.	.	1024.	14.82
168.0	630.	.	630.	9.12
197.0	591.	.	591.	8.55

SCAN 27 CONTAINED 19 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE A-7. Normalized Mass Spectrum of Compound E. Dichlorophenol (V)

FIL03-2 10 MICROLITER 100% GULFPORT#7 25-300 CD 491 18 DEC

MASS	SCAN 60	SCAN 48	DIFF.	NORM. DIFF.
28.0	11715.	11106.	609.	13.04
29.0	3890.	529.	3361.	71.97
31.0	231.	.	231.	4.95
38.0	193.	116.	77.	1.65
39.0	604.	293.	311.	6.66
41.0	3180.	812.	2368.	50.71
43.0	475.	377.	98.	2.10
44.0	802.	641.	161.	3.45
45.0	118.	.	118.	2.53
56.0	1141.	.	1141.	24.43
57.0	5513.	843.	4670.	100.00
98.0	392.	.	392.	8.39
162.0	665.	.	665.	14.24

SCAN 60 CONTAINED 16 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE A-8. Normalized Chromatogram of Compound G.

FIL03-2 10 MICROLITER 100% GULFPORT#7 25-300 CD 491 18 DEC

MASS	SCAN 121	SCAN 113	DIFF.	NORM. DIFF.
29.0	1170.	363.	807.	49.60
39.0	342.	.	342.	21.02
41.0	1223.	703.	520.	31.96
43.0	384.	168.	216.	13.28
44.0	742.	703.	39.	2.40
45.0	144.	.	144.	8.85
57.0	1627.	.	1627.	100.00
61.0	657.	.	657.	40.38
73.0	622.	.	622.	38.23
89.0	765.	.	765.	47.02
133.0	361.	.	361.	22.19
135.0	1262.	1099.	163.	10.02
168.0	696.	.	696.	42.78
197.0	567.	.	567.	34.85
249.0	326.	.	326.	20.04
253.0	626.	.	626.	38.48

SCAN 121 CONTAINED 18 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN .5%.

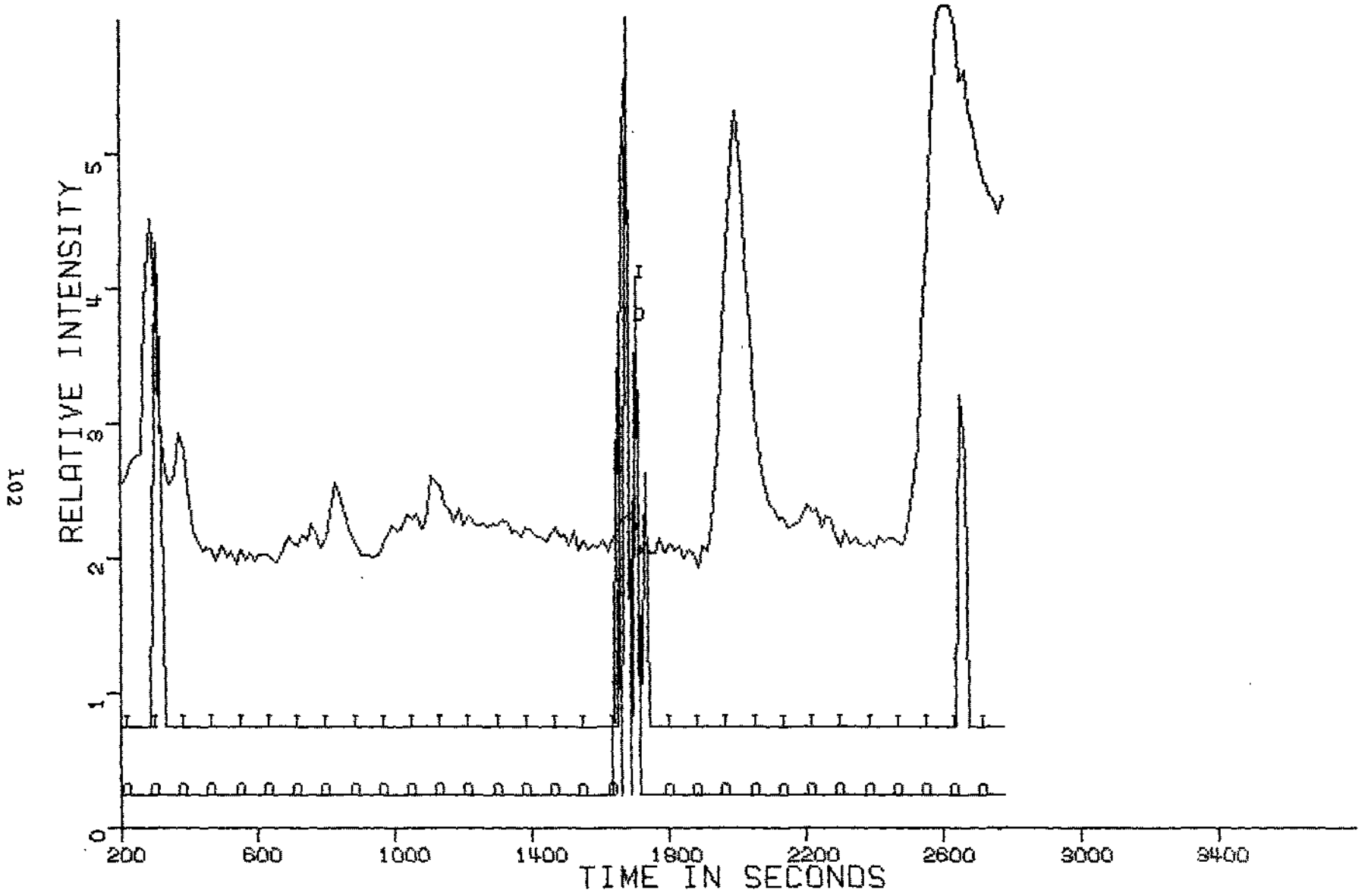

FIGURE A-11. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #7

I = MASS 61
O = MASS 89

TABLE A-9. Normalized Mass Spectrum of Compound H.
Butyl ester of monochlorophenoxyacetic acid (XII)

FIL03-2 10 MICROLITER 100% GULFPORT#7 25-300 CD 491 18 DEC

MASS	SCAN 144	SCAN 132	DIFF.	NORM. DIFF.
28.0	12410.	11885.	525.	5.15
29.0	9491.	246.	9245.	90.62
31.0	349.	.	349.	3.42
38.0	423.	.	423.	4.15
39.0	1652.	.	1652.	16.19
40.0	209.	.	209.	2.05
41.0	8085.	777.	7308.	71.63
42.0	1426.	.	1426.	13.98
43.0	1831.	160.	1671.	16.38
44.0	660.	.	660.	6.47
50.0	876.	.	876.	8.59
51.0	868.	.	868.	8.51
53.0	275.	.	275.	2.70
55.0	1129.	151.	978.	9.59
56.0	662.	.	662.	6.49
57.0	10685.	483.	10202.	100.00
58.0	431.	.	431.	4.22
63.0	963.	.	963.	9.44
64.0	595.	.	595.	5.83
73.0	1294.	753.	541.	5.30
74.0	423.	.	423.	4.15
75.0	2646.	.	2646.	25.94
77.0	1780.	.	1780.	17.45
93.0	448.	.	448.	4.39
99.0	1022.	.	1022.	10.02
111.0	3600.	.	3600.	35.29
113.0	2514.	.	2514.	24.64
127.0	378.	.	378.	3.71
128.0	3184.	.	3184.	31.21
130.0	941.	.	941.	9.22
141.0	6293.	.	6293.	61.68
143.0	2081.	.	2081.	20.40
151.0	6765.	.	6765.	66.31
156.0	569.	.	569.	5.58
186.0	984.	.	984.	9.65
197.0	643.	.	643.	6.30
242.0	2446.	.	2446.	23.98
244.0	817.	.	817.	8.01

SCAN 144 CONTAINED 42 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE A-10. Normalized Mass Spectrum of Compound I.
Butyl ester of dichlorophenoxyacetic acid (XIII)

FIL03-2 10 MICROLITER 100% GULFPORT#7 25-300 CD 491 18 DEC

MASS	SCAN 187	SCAN 166	DIFF.	NORM. DIFF.
28.0	13252.	10441.	2811.	17.85
29.0	12704.	989.	11715.	74.41
31.0	483.	.	483.	3.07
39.0	1428.	.	1428.	9.07
41.0	10386.	1207.	9179.	58.30
42.0	2464.	.	2464.	15.65
43.0	2456.	361.	2095.	13.31
44.0	745.	.	745.	4.73
45.0	338.	.	338.	2.15
51.0	429.	.	429.	2.72
55.0	1658.	.	1658.	10.53
56.0	1371.	.	1371.	8.71
57.0	16877.	1133.	15744.	100.00
58.0	787.	.	787.	5.00
59.0	211.	.	211.	1.34
63.0	1542.	.	1542.	9.79
73.0	1646.	1381.	265.	1.68
74.0	783.	.	783.	4.97
75.0	1734.	.	1734.	11.01
93.0	547.	.	547.	3.47
109.0	1526.	.	1526.	9.69
111.0	2261.	.	2261.	14.36
112.0	677.	.	677.	4.30
126.0	290.	.	290.	1.84
128.0	275.	.	275.	1.75
133.0	1171.	.	1171.	7.44
135.0	1436.	1024.	412.	2.62
145.0	1502.	.	1502.	9.54
147.0	1324.	.	1324.	8.41
149.0	593.	.	593.	3.77
162.0	4448.	.	4448.	28.25
164.0	3221.	.	3221.	20.46
166.0	578.	.	578.	3.67
168.0	598.	.	598.	3.80
175.0	4158.	.	4158.	26.41
176.0	959.	.	959.	6.09
177.0	2671.	.	2671.	16.97
185.0	6976.	.	6976.	44.31
186.0	826.	.	826.	5.25
187.0	2684.	.	2684.	17.05
189.0	257.	.	257.	1.63
197.0	685.	.	685.	4.35
241.0	869.	.	869.	5.52
276.0	881.	.	881.	5.60
278.0	624.	.	624.	3.96

SCAN 187 CONTAINED 49 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE A-11. Normalized Mass Spectrum of Compound N.
Octyl ester of dichlorophenoxyacetic acid (XVI)

FIL23-2 CD492 2 MICROLITERS #7 100% 900 SEC DELAY 18 MARCH

MASS	SCAN 25	SCAN 19	DIFF.	NORM. DIFF.
27.0	707.	276.	431.	5.66
29.0	2152.	1254.	898.	11.80
41.0	2768.	1049.	1719.	22.59
42.0	653.	196.	457.	6.01
43.0	5005.	386.	4619.	60.70
55.0	1754.	213.	1541.	20.25
56.0	675.	148.	527.	6.93
57.0	7609.	.	7609.	100.00
69.0	482.	47.	435.	5.72
70.0	2185.	.	2185.	28.72
71.0	3611.	141.	3470.	45.60
83.0	670.	.	670.	8.81
147.0	705.	262.	443.	5.82
162.0	584.	54.	530.	6.97
175.0	865.	95.	770.	10.12
177.0	548.	63.	485.	6.37
220.0	1681.	.	1681.	22.09
222.0	1134.	.	1134.	14.90
332.0	494.	.	494.	6.49

SCAN 25 CONTAINED 116 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

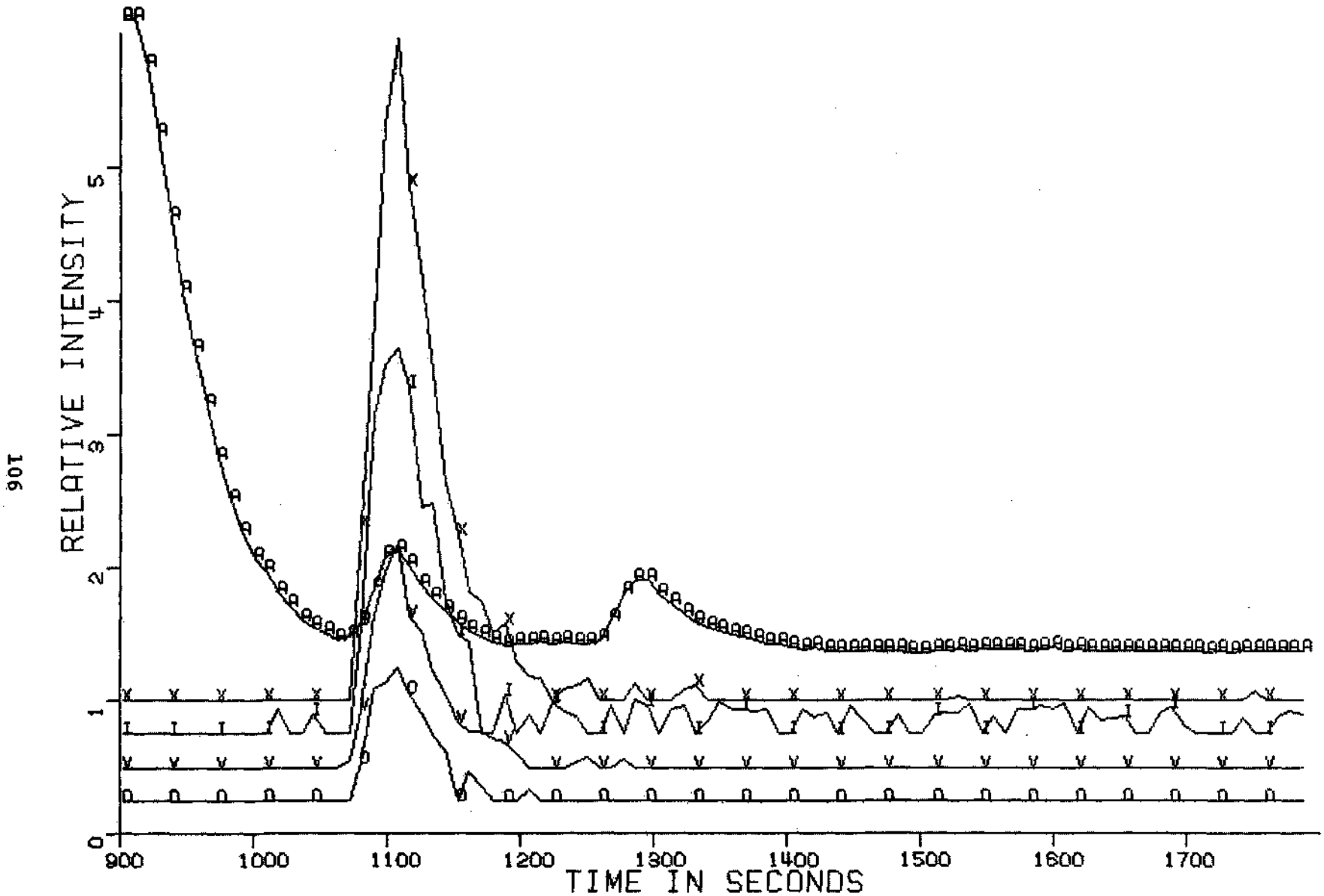

FIGURE A-12. TOTAL ION CHROMATOGRAM AND SELECTED ION CHROMATOGRAMS OF #7
A = TOTAL ION X = MASS 220 I = MASS 222
V = MASS 332 O = MASS 334

TABLE A-12. Normalized Mass Spectrum of Compound 0.
Octyl ester of dichlorophenoxypropionic acid (XVII)

FIL23-2 CD492 2 MICROLITERS #7 100% 900 SEC DELAY 18 MARCH

MASS	SCAN 38	SCAN 33	DIFF.	NORM. DIFF.
26.0	22.	.	22.	7.05
28.0	2190.	2091.	99.	31.73
40.0	41.	.	41.	13.14
43.0	629.	532.	97.	31.09
45.0	38.	.	38.	12.18
53.0	22.	.	22.	7.05
55.0	249.	157.	92.	29.49
56.0	161.	83.	78.	25.00
57.0	1353.	1097.	256.	82.05
58.0	69.	42.	27.	8.65
69.0	154.	92.	62.	19.87
71.0	654.	368.	286.	91.67
73.0	995.	683.	312.	100.00
80.0	30.	.	30.	9.62
95.0	38.	.	38.	12.18
113.0	45.	.	45.	14.42
147.0	337.	294.	43.	13.78
149.0	53.	.	53.	16.99
169.0	32.	.	32.	10.26
196.0	223.	61.	162.	51.92
197.0	47.	.	47.	15.06
198.0	242.	75.	167.	53.53
200.0	64.	35.	29.	9.29
202.0	23.	.	23.	7.37
207.0	227.	186.	41.	13.14
208.0	49.	.	49.	15.71
221.0	206.	.	206.	66.03
223.0	133.	.	133.	42.63
225.0	159.	.	159.	50.96
227.0	39.	.	39.	12.50
281.0	237.	167.	70.	22.44
282.0	41.	.	41.	13.14
295.0	32.	.	32.	10.26
325.0	20.	.	20.	6.41
380.0	48.	.	48.	15.38
431.0	24.	.	24.	7.69

SCAN 38 CONTAINED 65 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

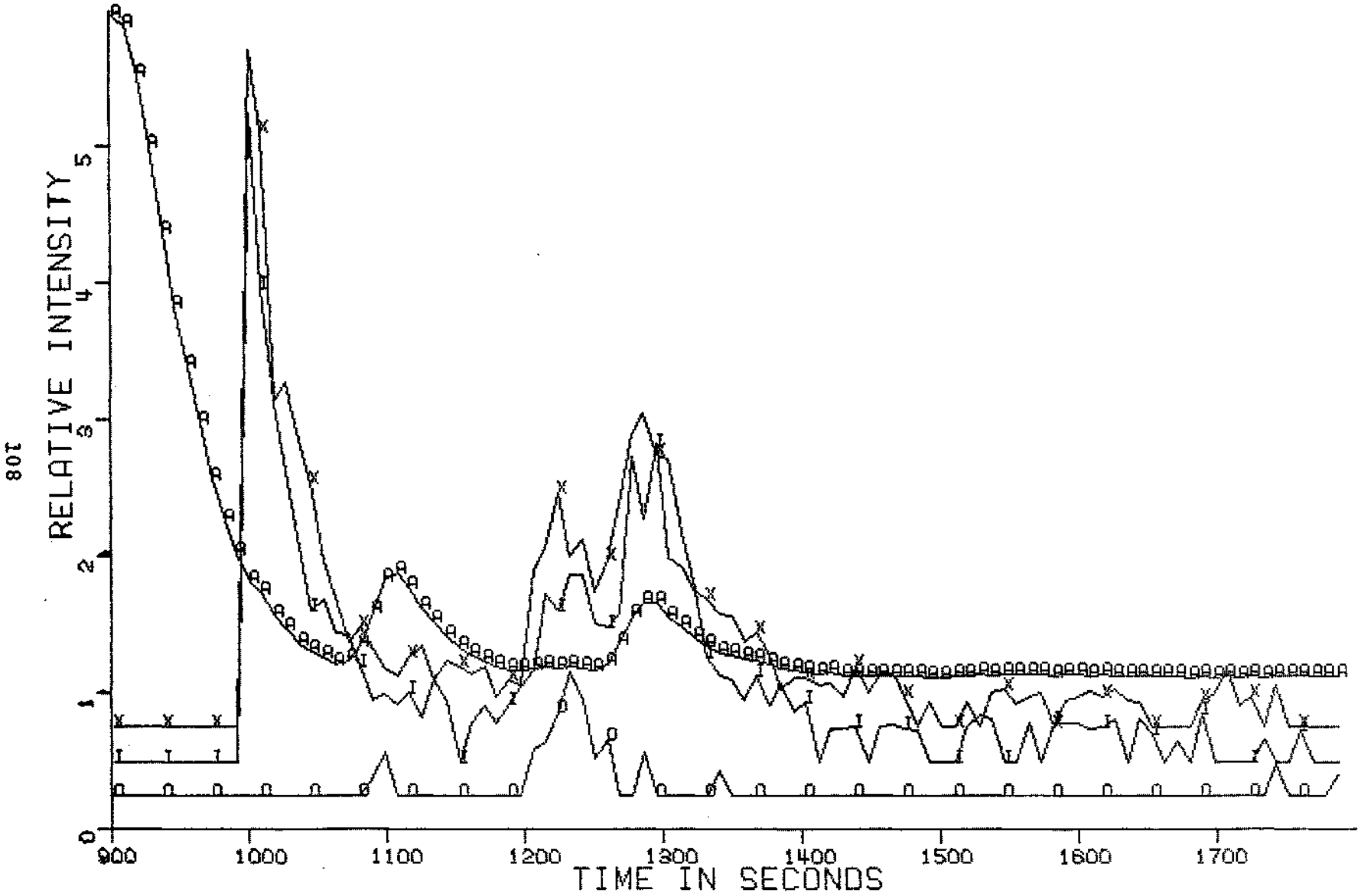

FIGURE A-13. TOTAL ION CHROMATOGRAM AND SELECTED ION CHROMATOGRAMS OF #7
A = TOTAL ION X = MASS 196 I = MASS 198
O = MASS 225

TABLE A-13. Normalized Mass Spectrum of Compound P.
Octyl ester of trichlorophenoxyacetic acid (XVIII)

FIL23-2 CD492 2 MICROLITERS #7 100% 900 SEC DELAY 18 MARCH

MASS	SCAN 44	SCAN 34	DIFF.	NORM. DIFF.
27.0	463.	133.	330.	5.97
28.0	2204.	1920.	284.	5.14
29.0	1478.	421.	1057.	19.13
41.0	2022.	547.	1475.	26.69
42.0	502.	76.	426.	7.71
43.0	4177.	511.	3666.	66.34
55.0	1564.	220.	1344.	24.32
56.0	747.	122.	625.	11.31
57.0	6641.	1115.	5526.	100.00
58.0	296.	.	296.	5.36
69.0	419.	82.	337.	6.10
70.0	2220.	213.	2007.	36.32
71.0	3323.	307.	3016.	54.58
83.0	600.	65.	535.	9.68
196.0	406.	54.	352.	6.37
209.0	396.	55.	341.	6.17
211.0	357.	.	357.	6.46
254.0	1066.	21.	1045.	18.91
256.0	995.	.	995.	18.01
258.0	335.	.	335.	6.06
366.0	346.	.	346.	6.26
368.0	349.	.	349.	6.32

SCAN 44 CONTAINED 110 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

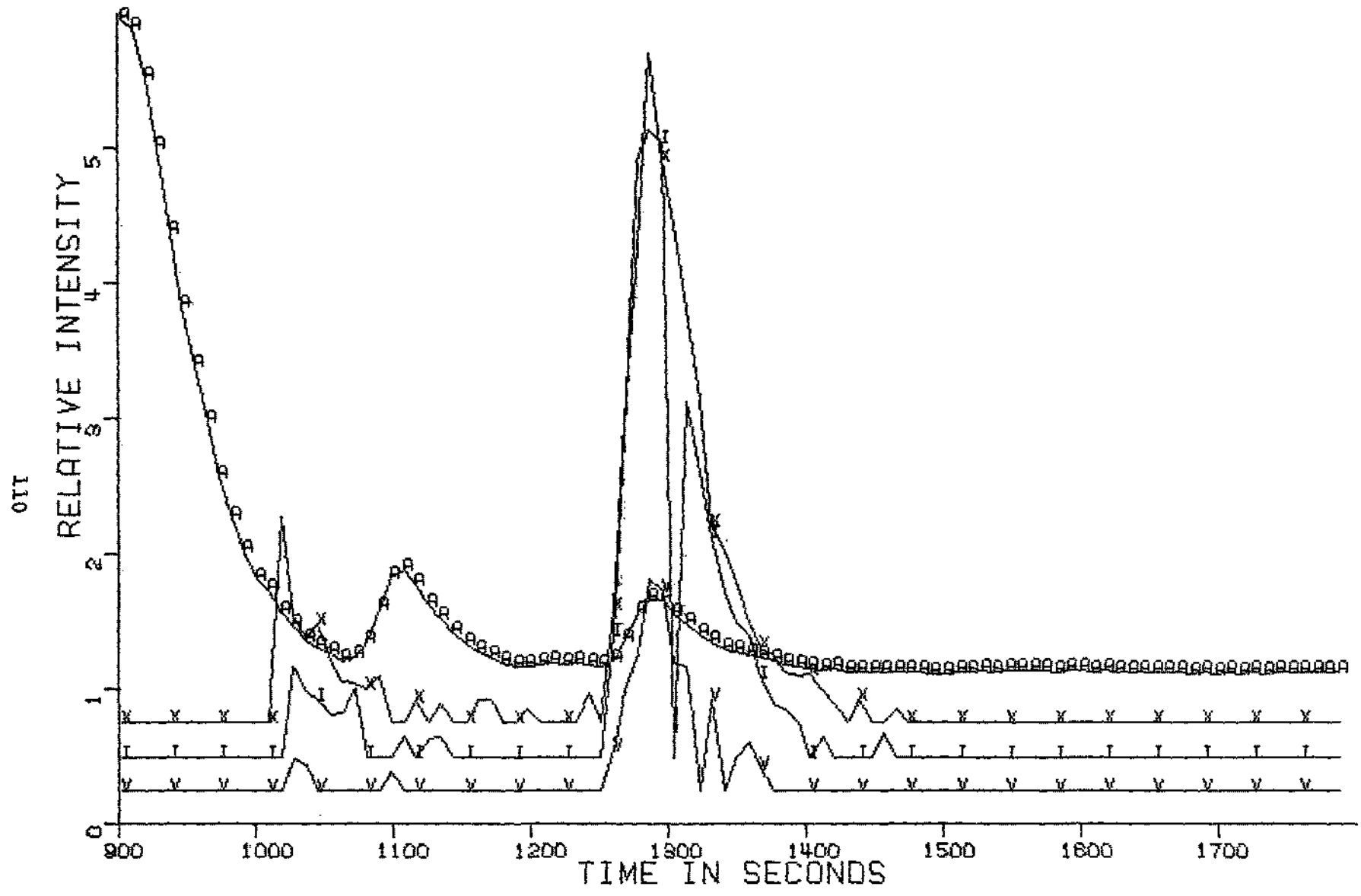

FIGURE A-14. TOTAL ION CHROMATOGRAM AND SELECTED ION CHROMATOGRAMS OF #7
A = TOTAL ION X = MASS 254 I = MASS 256
V = MASS 258

TABLE A-14. Normalized Mass Spectrum of Compound Q
Octyl ester of methoxy-dichlorophenoxyacetic acid (XXIII)

FIL23-2 CD492 2 MICROLITERS #7 100% 900 SEC DELAY 18 MARCH

MASS	SCAN 54	SCAN 70	DIFF.	NORM. DIFF.
27.0	160.	.	160.	15.30
29.0	386.	151.	235.	22.47
31.0	34.	.	34.	3.25
39.0	45.	.	45.	4.30
40.0	35.	.	35.	3.35
41.0	457.	164.	293.	28.01
42.0	150.	34.	116.	11.09
43.0	726.	131.	595.	56.88
44.0	344.	298.	46.	4.40
55.0	262.	55.	207.	19.79
56.0	158.	.	158.	15.11
57.0	1371.	325.	1046.	100.00
58.0	67.	.	67.	6.41
63.0	59.	19.	40.	3.82
64.0	28.	.	28.	2.68
65.0	22.	.	22.	2.10
69.0	89.	27.	62.	5.93
70.0	246.	38.	208.	19.89
71.0	560.	89.	471.	45.03
72.0	43.	.	43.	4.11
79.0	46.	30.	16.	1.53
83.0	97.	.	97.	9.27
84.0	22.	.	22.	2.10
85.0	46.	.	46.	4.40
97.0	63.	30.	33.	3.15
98.0	38.	.	38.	3.63
109.0	60.	.	60.	5.74
117.0	99.	.	99.	9.46
131.0	35.	.	35.	3.35
145.0	25.	.	25.	2.39
149.0	26.	.	26.	2.49
155.0	36.	.	36.	3.44
162.0	40.	.	40.	3.82
164.0	31.	.	31.	2.96
175.0	43.	.	43.	4.11
179.0	41.	.	41.	3.92
181.0	57.	18.	39.	3.73
191.0	60.	43.	17.	1.63
192.0	60.	.	60.	5.74
193.0	45.	31.	14.	1.34
194.0	64.	.	64.	6.12
196.0	94.	33.	61.	5.83
198.0	73.	46.	27.	2.58
207.0	378.	322.	56.	5.35
208.0	94.	.	94.	8.99
209.0	127.	45.	82.	7.84
210.0	16.	.	16.	1.53
211.0	45.	.	45.	4.30
219.0	40.	.	40.	3.82
223.0	38.	.	38.	3.63
250.0	76.	.	76.	7.27
252.0	43.	.	43.	4.11
254.0	108.	.	108.	10.33
256.0	83.	.	83.	7.93

282.0	67.	.	67.	6.41
357.0	70.	43.	27.	2.58
362.0	70.	.	70.	6.69
368.0	26.	.	26.	2.49
430.0	91.	70.	21.	2.01

SCAN 54 CONTAINED 76 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE A-15. Normalized Mass Spectrum of Compound R.
Butyl ester of bis- dichlorophenoxyacetic acid (XIX)

FIL09-3 10 MICROLITER 100% GULFPORT#7 25-450 CD492 22MAR

MASS	SCAN 55	SCAN 44	DIFF.	NORM. DIFF.
27.0	223.	71.	152.	8.39
29.0	1368.	182.	1186.	65.45
41.0	974.	186.	788.	43.49
55.0	326.	44.	282.	15.56
57.0	2162.	350.	1812.	100.00
63.0	254.	.	254.	14.02
74.0	123.	.	123.	6.79
75.0	145.	.	145.	8.00
109.0	174.	.	174.	9.60
110.0	96.	.	96.	5.30
111.0	197.	37.	160.	8.83
127.0	107.	.	107.	5.91
145.0	265.	.	265.	14.62
147.0	241.	80.	161.	8.89
162.0	307.	.	307.	16.94
163.0	306.	.	306.	16.89
164.0	241.	41.	200.	11.04
165.0	261.	.	261.	14.40
173.0	143.	.	143.	7.89
175.0	1458.	66.	1392.	76.82
176.0	115.	.	115.	6.35
177.0	1011.	34.	977.	53.92
179.0	149.	.	149.	8.22
191.0	287.	.	287.	15.84
193.0	138.	.	138.	7.62
201.0	201.	.	201.	11.09
203.0	119.	.	119.	6.57
219.0	123.	16.	107.	5.91
275.0	611.	.	611.	33.72
276.0	94.	.	94.	5.19
277.0	397.	.	397.	21.91
335.0	112.	.	112.	6.18
337.0	126.	.	126.	6.95
339.0	117.	.	117.	6.46

SCAN 55 CONTAINED 81 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

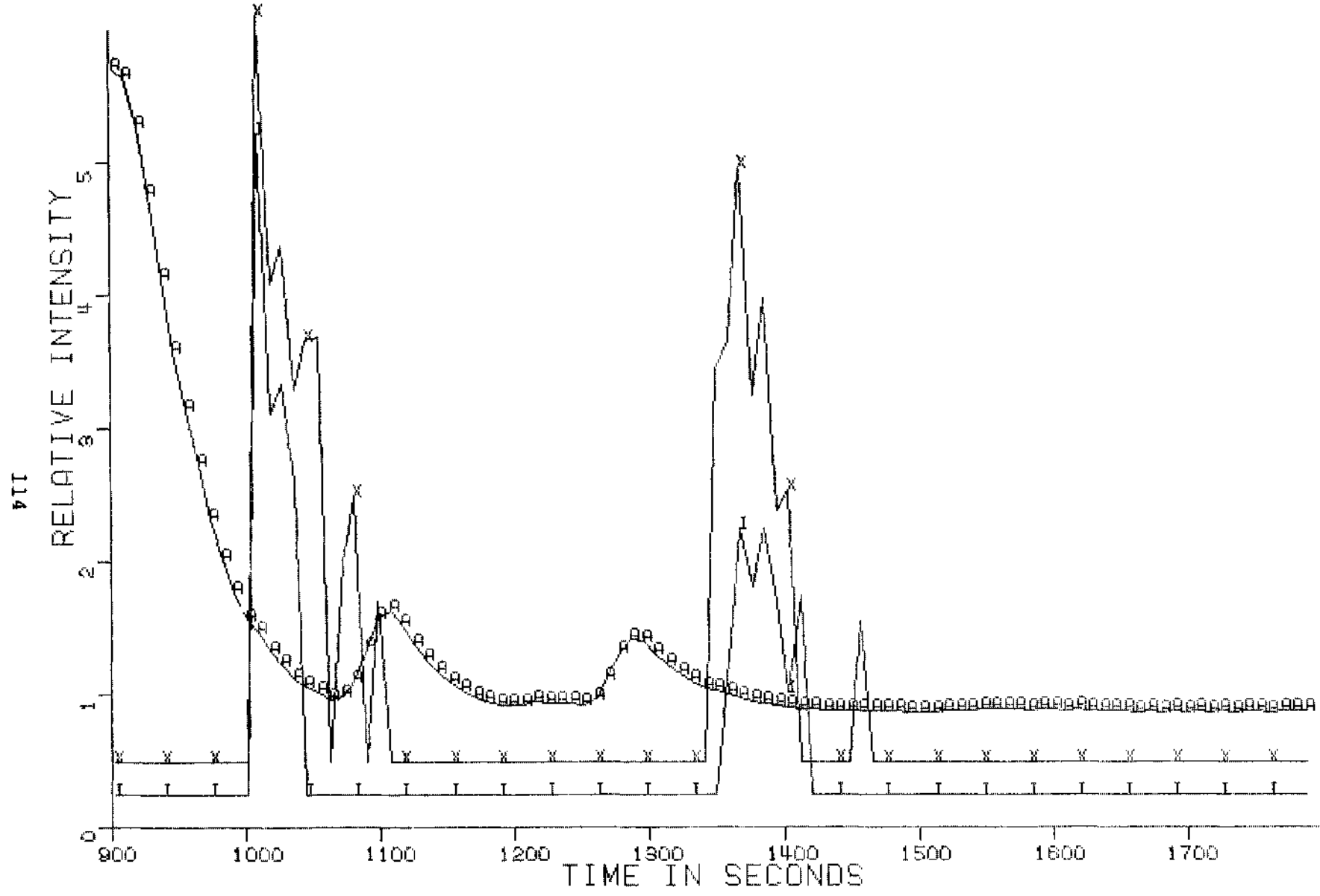

FIGURE A-15. TOTAL ION CHROMATOGRAM AND SELECTED ION CHROMATOGRAMS OF #7
A = TOTAL ION X = MASS 250 I = MASS 252

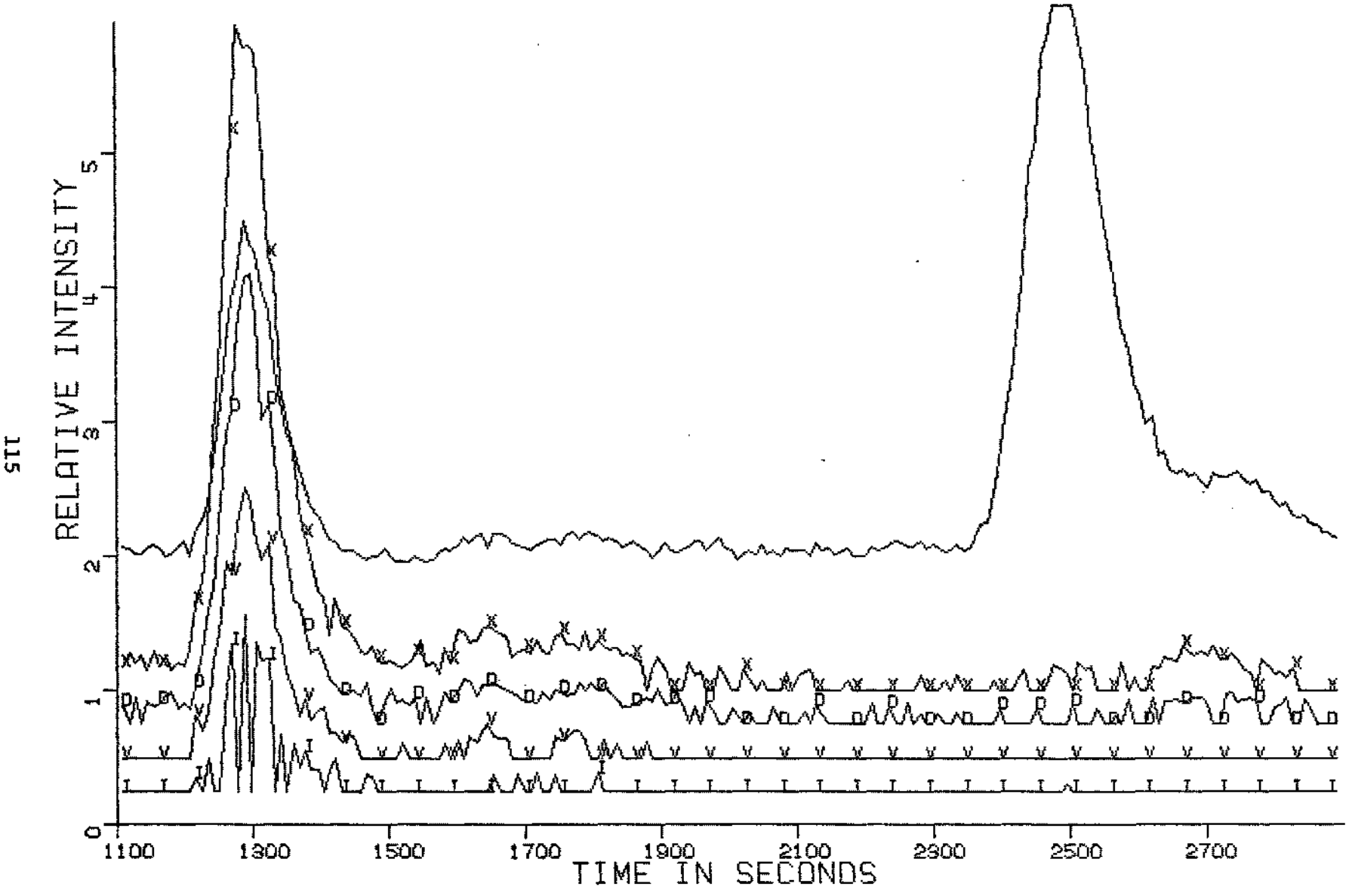

FIGURE A-16. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #7
X = MASS 175 D = MASS 177 V = MASS 275
I = MASS 277

TABLE A-16. Normalized Mass Spectrum of Compound S.
Butyl ester of bis- trichlorophenoxyacetic acid (XX)

FIL09-3 10 MICROLITER 100% GULFPORT#7 25-450 CD492 22MAR

MASS	SCAN 189	SCAN 173	DIFF.	NORM. DIFF.
27.0	307.	.	307.	7.09
29.0	2341.	115.	2226.	51.40
41.0	1472.	71.	1401.	32.35
55.0	762.	33.	729.	16.83
57.0	4507.	176.	4331.	100.00
58.0	220.	.	220.	5.08
97.0	250.	.	250.	5.77
109.0	227.	.	227.	5.24
162.0	287.	.	287.	6.63
164.0	220.	.	220.	5.08
179.0	292.	23.	269.	6.21
196.0	249.	.	249.	5.75
197.0	353.	.	353.	8.15
198.0	287.	.	287.	6.63
199.0	279.	.	279.	6.44
209.0	1628.	42.	1586.	36.62
211.0	1785.	.	1785.	41.21
213.0	600.	.	600.	13.85
235.0	367.	.	367.	8.47
237.0	432.	.	432.	9.97
309.0	636.	.	636.	14.68
311.0	601.	.	601.	13.88

SCAN 189 CONTAINED 96 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

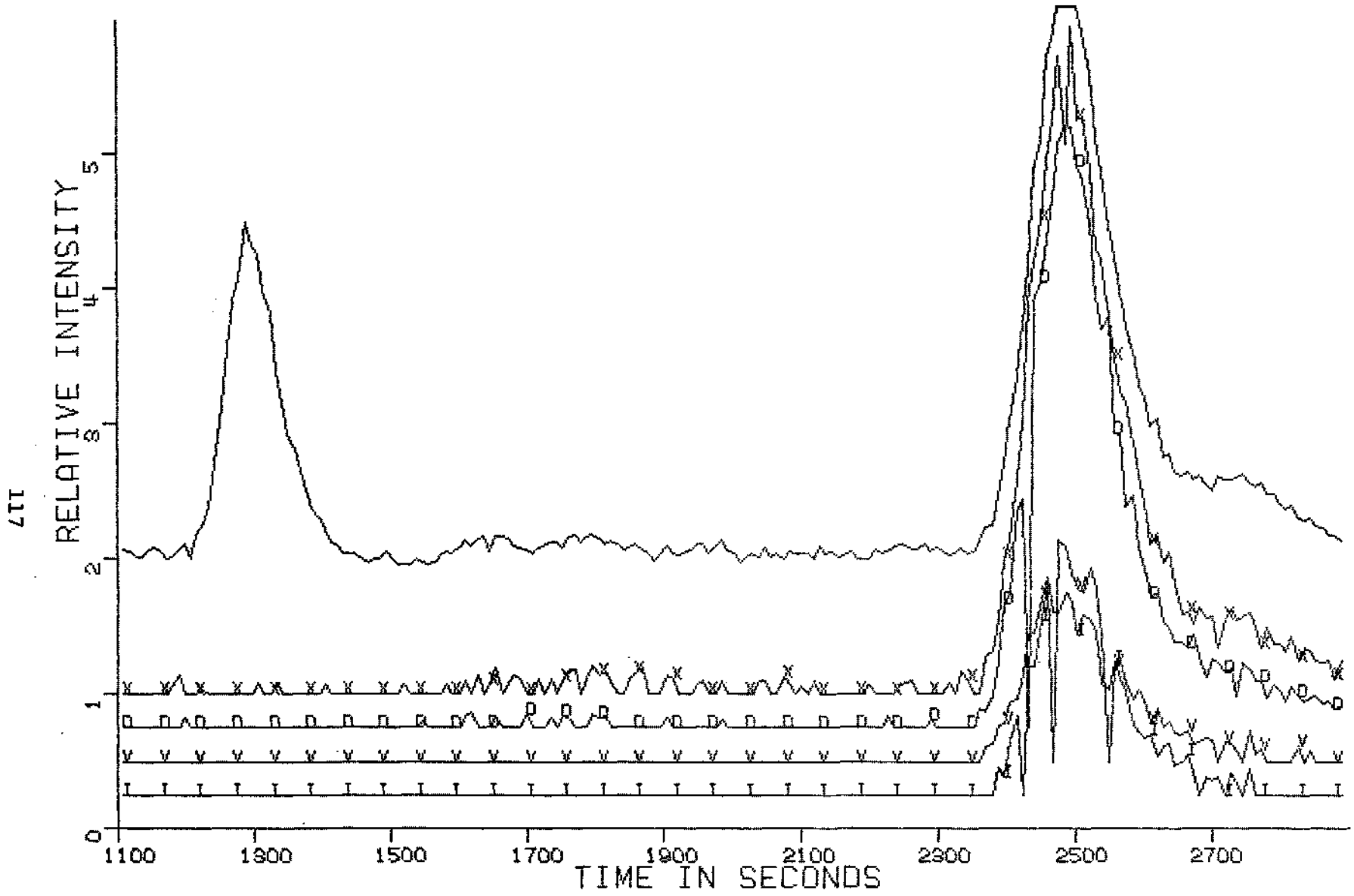

FIGURE A-17. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #7
X = MASS 209 D = MASS 211 V = MASS 309
I = MASS 311

TABLE A-17. Normalized Mass Spectrum of Compound T. Butyl ester of trichlorophenoxy-(methoxy-dichlorophenoxy)-acetic acid (XXI)

FIL09-3 10 MICROLITER 100% GULFPORT#7 25-450 CD492 22MAR

MASS	SCAN 217	SCAN 173	DIFF.	NORM. DIFF.
27.0	60.	.	60.	7.10
29.0	392.	115.	277.	32.78
36.0	62.	38.	24.	2.84
38.0	43.	.	43.	5.09
39.0	51.	.	51.	6.04
41.0	253.	71.	182.	21.54
42.0	34.	.	34.	4.02
43.0	95.	52.	43.	5.09
55.0	199.	33.	166.	19.64
56.0	29.	.	29.	3.43
57.0	1021.	176.	845.	100.00
63.0	48.	.	48.	5.68
69.0	78.	.	78.	9.23
71.0	41.	.	41.	4.85
74.0	35.	.	35.	4.14
87.0	48.	.	48.	5.68
97.0	35.	.	35.	4.14
111.0	39.	.	39.	4.62
132.0	35.	.	35.	4.14
144.0	38.	.	38.	4.50
145.0	38.	.	38.	4.50
147.0	102.	61.	41.	4.85
148.0	15.	.	15.	1.78
162.0	89.	.	89.	10.53
163.0	30.	.	30.	3.55
164.0	44.	.	44.	5.21
167.0	27.	.	27.	3.20
169.0	29.	.	29.	3.43
175.0	83.	.	83.	9.82
177.0	73.	.	73.	8.64
179.0	37.	23.	14.	1.66
181.0	48.	.	48.	5.68
193.0	64.	.	64.	7.57
196.0	68.	.	68.	8.05
197.0	50.	.	50.	5.92
198.0	64.	.	64.	7.57
205.0	125.	.	125.	14.79
207.0	218.	195.	23.	2.72
209.0	219.	42.	177.	20.95
211.0	98.	.	98.	11.60
219.0	71.	.	71.	8.40
221.0	86.	42.	44.	5.21
225.0	32.	.	32.	3.79
231.0	28.	.	28.	3.31
235.0	69.	.	69.	8.17
282.0	27.	.	27.	3.20
305.0	30.	.	30.	3.55
309.0	32.	.	32.	3.79
311.0	38.	.	38.	4.50

SCAN 217 CONTAINED 56 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

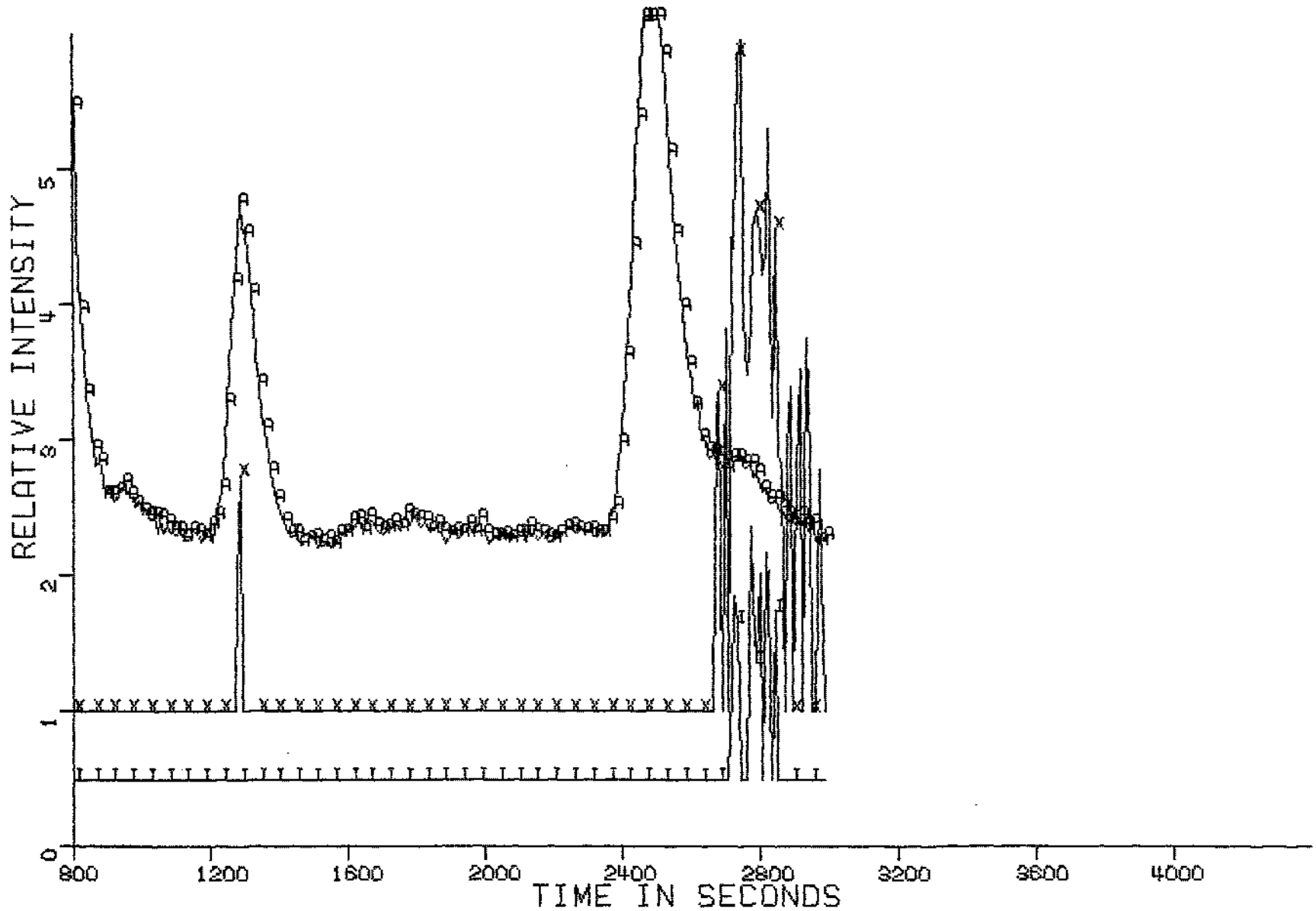

FIGURE A-18. TOTAL ION CHROMATOGRAM AND SELECTED ION CHROMATOGRAMS OF #7
A = TOTAL ION X = MASS 205 I = MASS 305

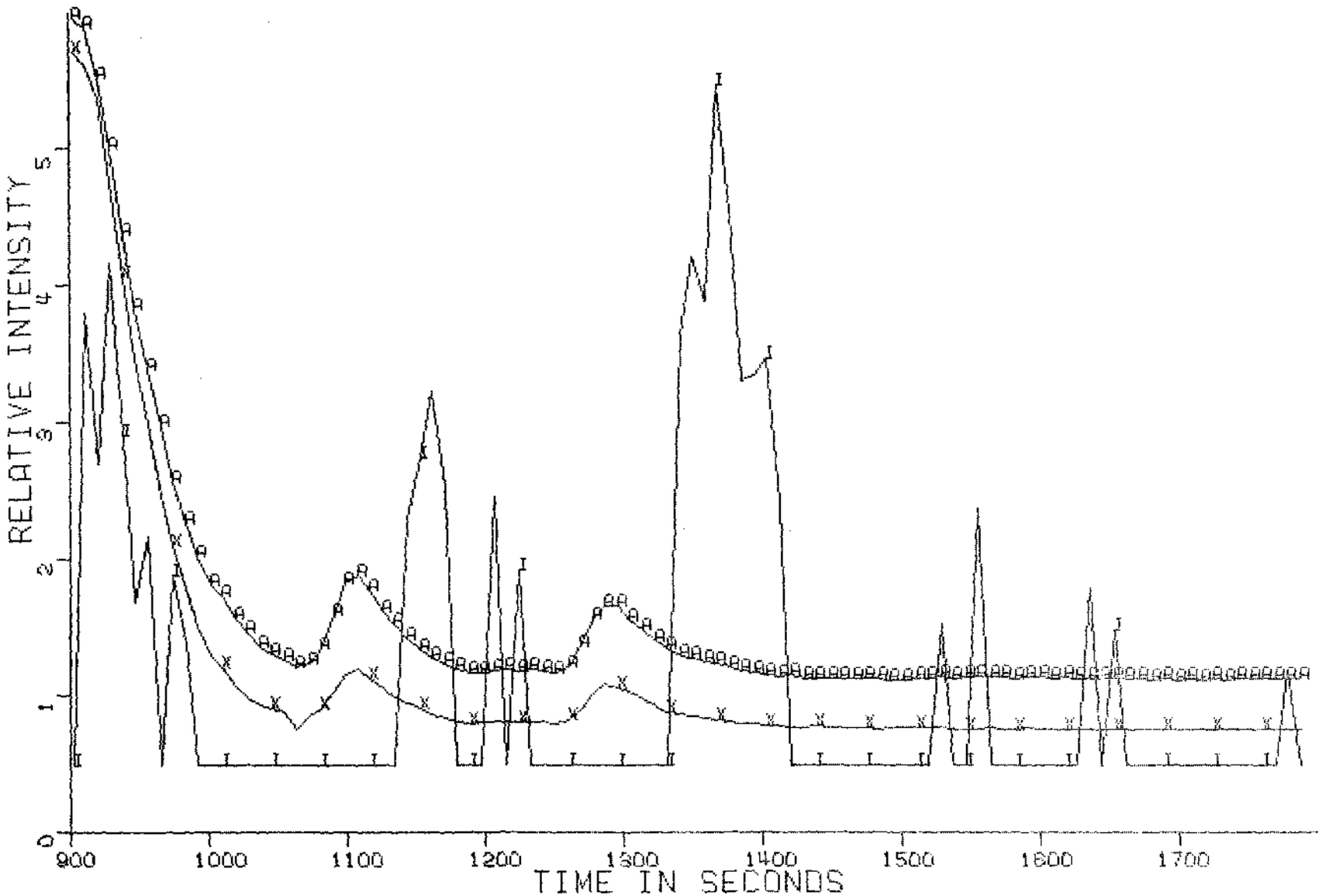

FIGURE A-19. TOTAL ION CHROMATOGRAM AND SELECTED ION CHROMATOGRAMS OF #7
A = TOTAL ION X = MASS 57 I = MASS 117

APPENDIX B

PRESENTATION OF DATA ON GULFPORT #59 SAMPLES

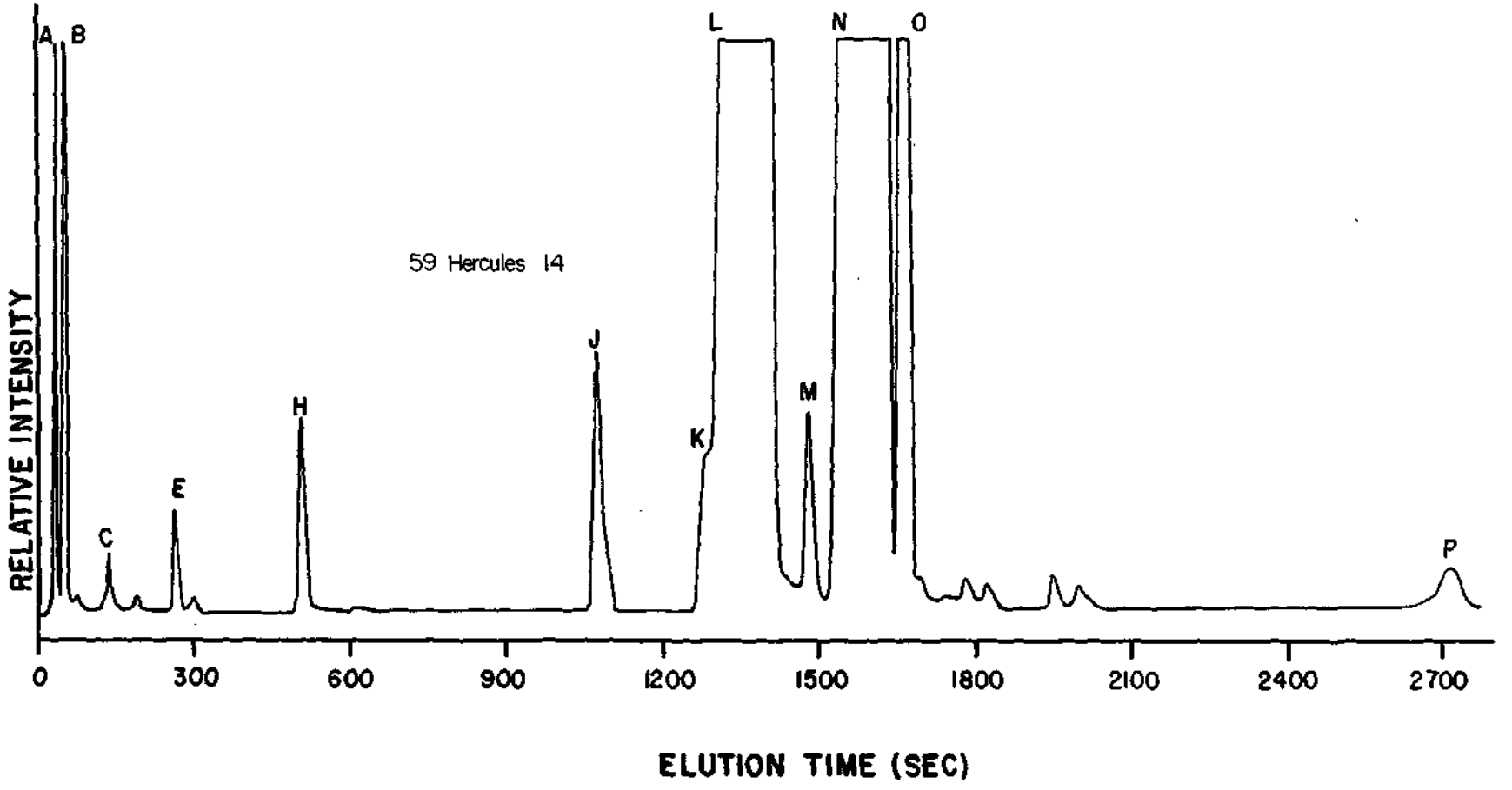

FIGURE B-1. F.I.D. Chromatogram of Gulfport #59.

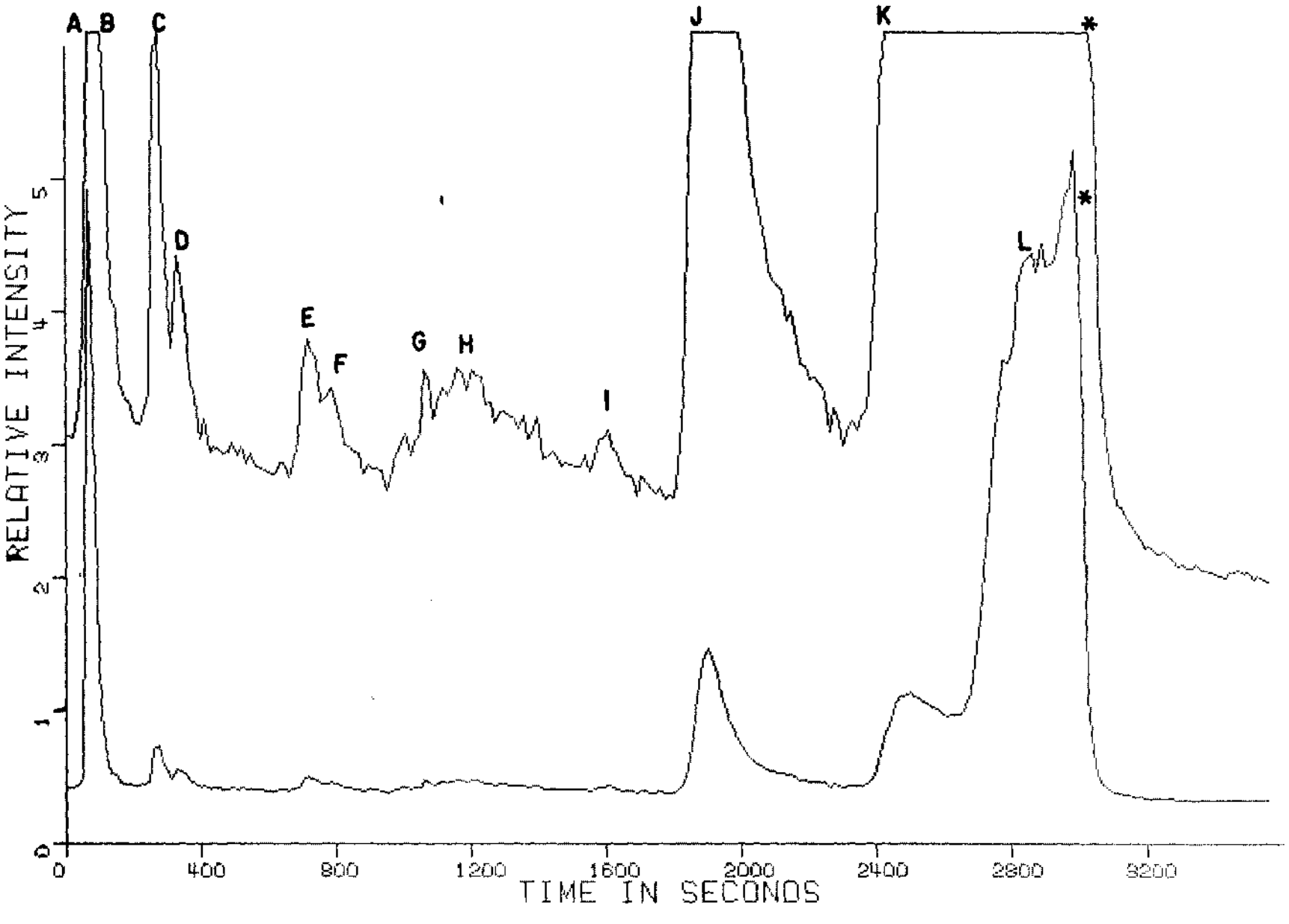

FIGURE B-3. TOTAL ION CHROMATOGRAM OF #59 (TWO DIFFERENT SENSITIVITIES)

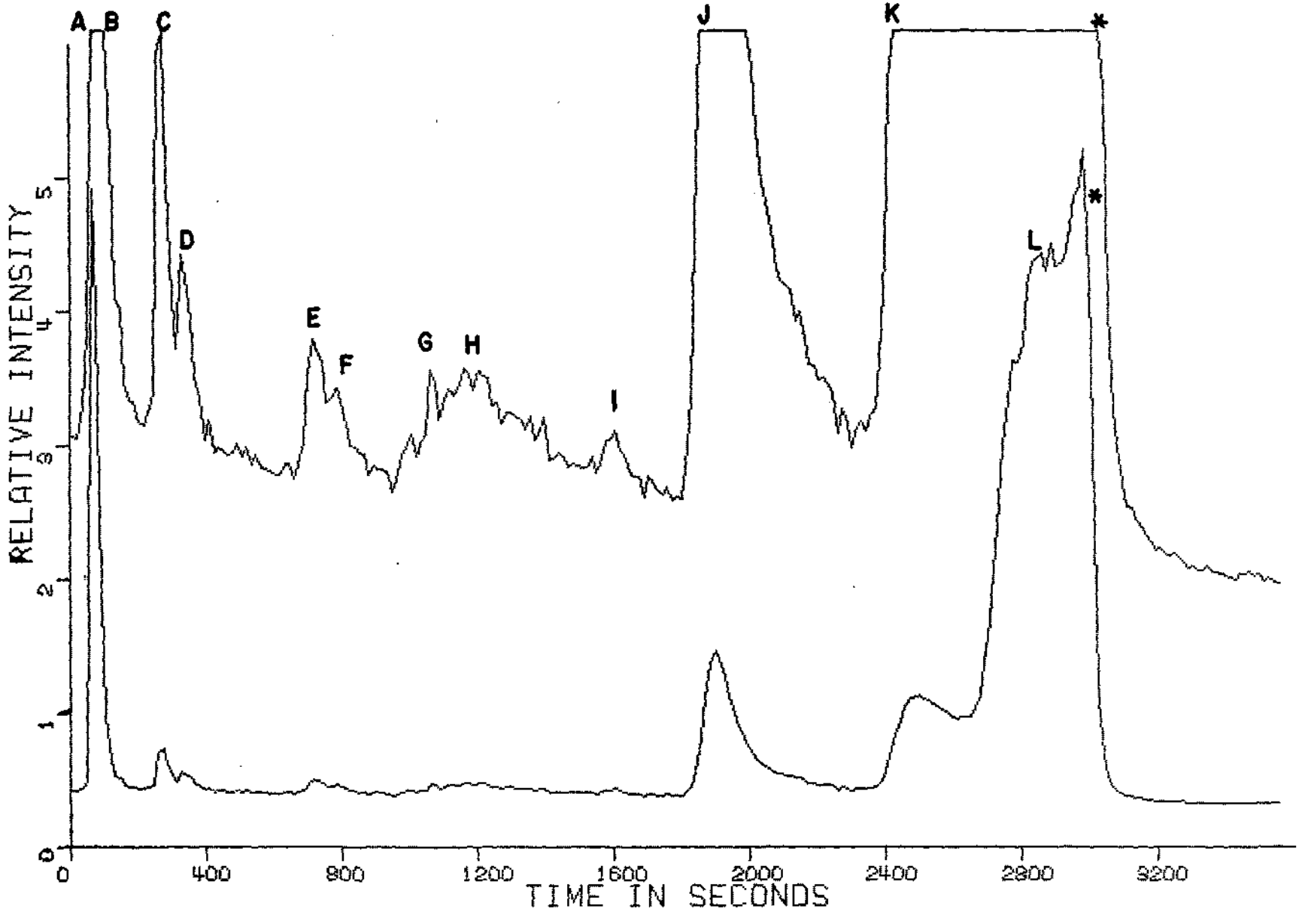

FIGURE B-3. TOTAL ION CHROMATOGRAM OF #59 (TWO DIFFERENT SENSITIVITIES)

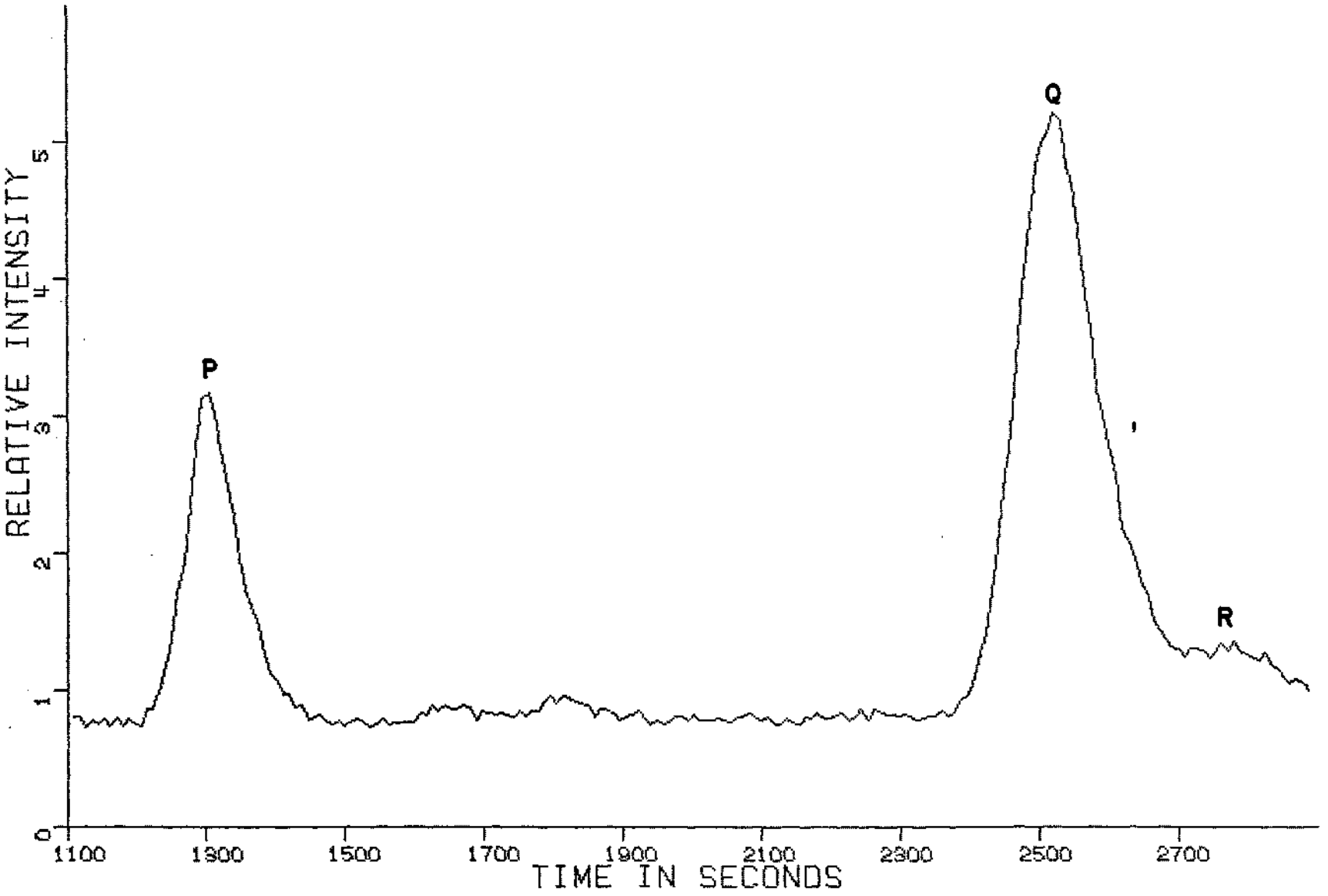

FIGURE B-4. TOTAL ION CHROMATOGRAM OF #59

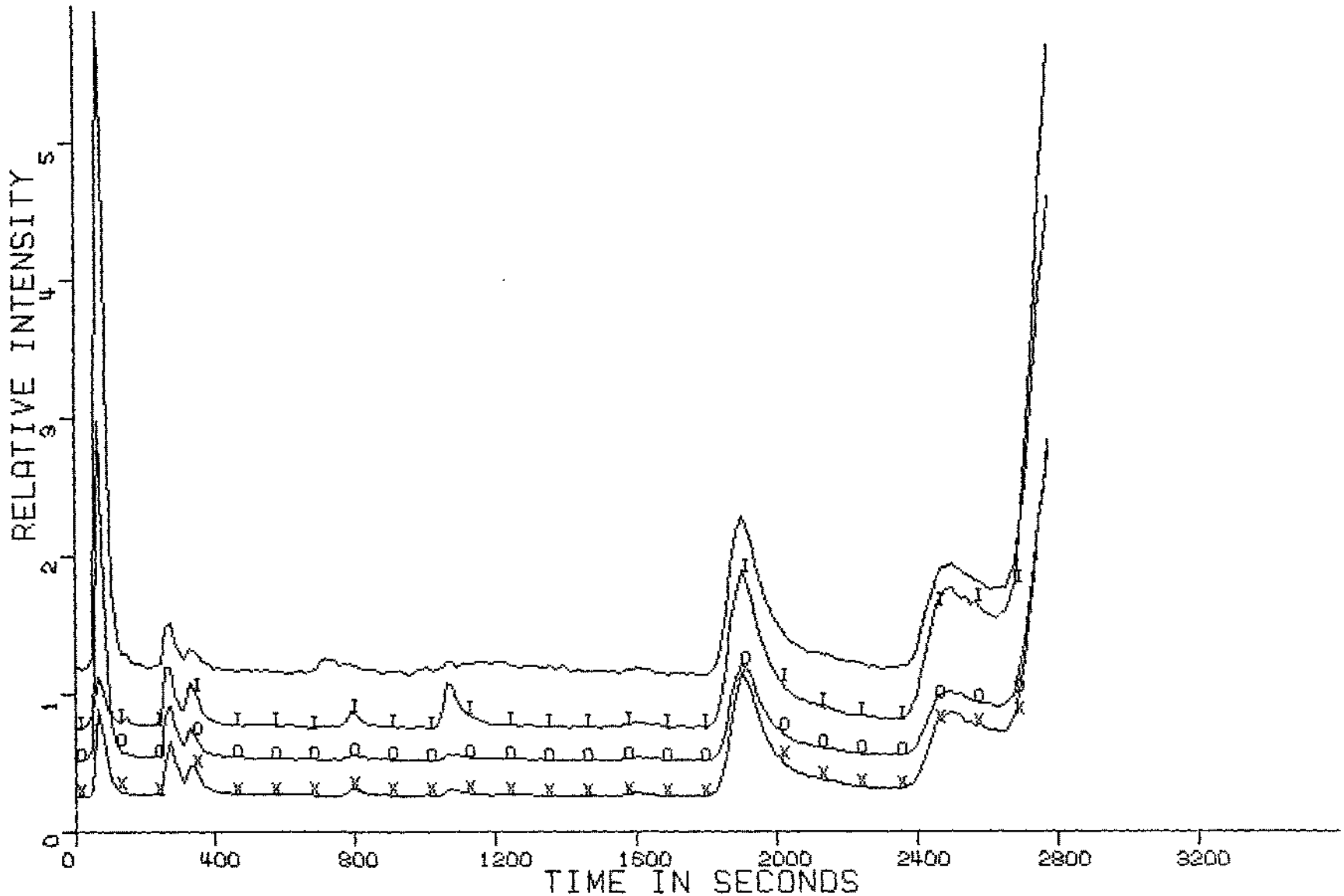

FIGURE B-5. TOTAL ION CHROMATOGRAM AND BUTYL FRAGMENT MASS CHROMATOGRAMS OF #59
I = MASS 57 O = MASS 41
X = MASS 29

TABLE B-1. Normalized Mass Spectrum of Compounds A and B.
Butanol (I) Toluene (II)

FIL04-2 10 MICROLITER 100% GULFPORT#59 25-300 CD491 20 DEC

MASS	SCAN 6	SCAN 2	DIFF.	NORM. DIFF.
29.0	18759.	273.	18486.	6.38
31.0	64119.	.	64119.	22.13
39.0	48354.	344.	48010.	16.57
41.0	58503.	756.	57747.	19.94
42.0	23007.	.	23007.	7.94
43.0	85432.	170.	85262.	29.43
45.0	21359.	.	21359.	7.37
51.0	21311.	.	21311.	7.36
56.0	72410.	.	72410.	25.00
63.0	19611.	.	19611.	6.77
65.0	34525.	.	34525.	11.92
91.0	291109.	1434.	289675.	100.00
92.0	186809.	.	186809.	64.49

SCAN 6 CONTAINED 73 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

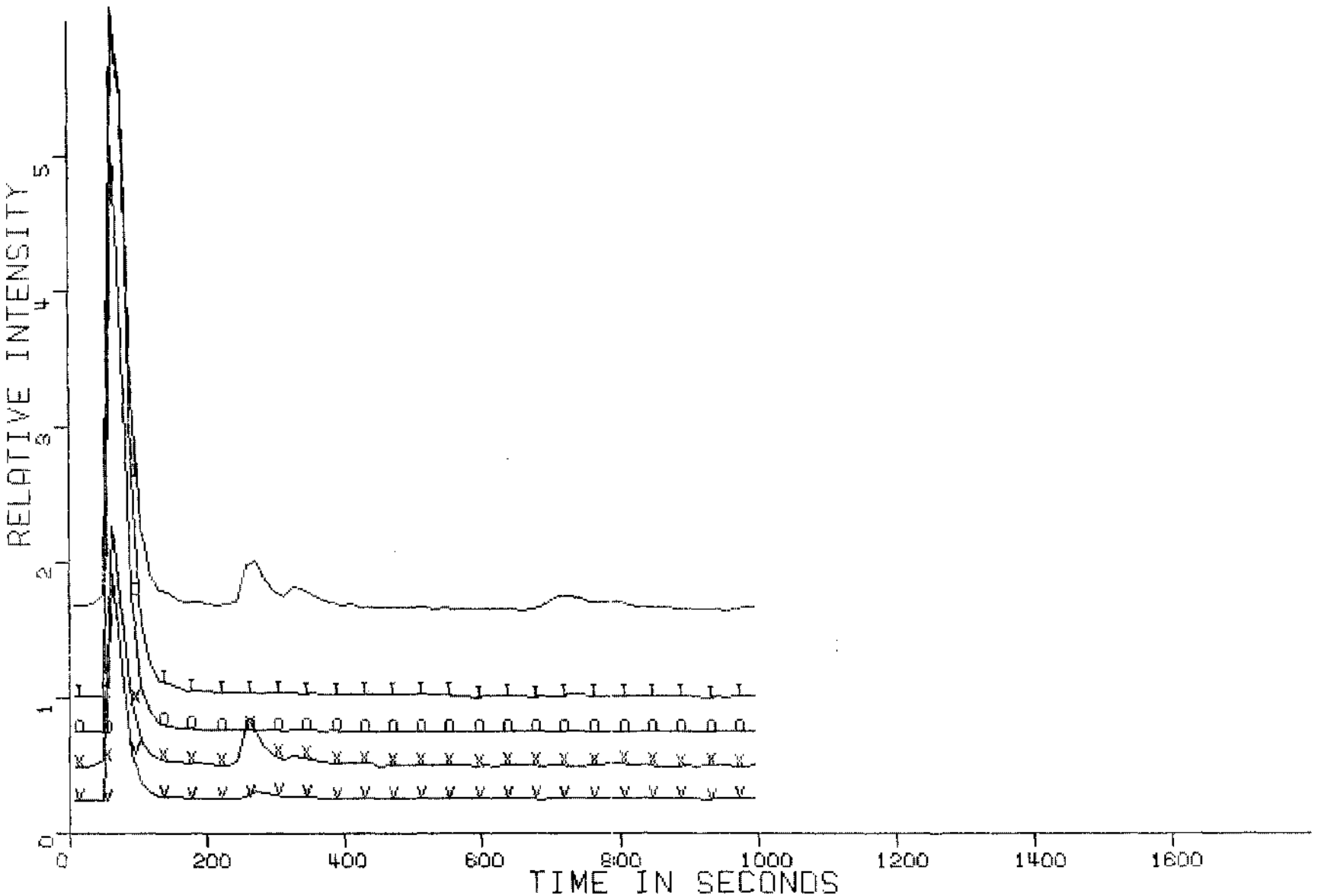

FIGURE B-6. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #59

I = MASS 91
O = MASS 92
X = MASS 56
V = MASS 31

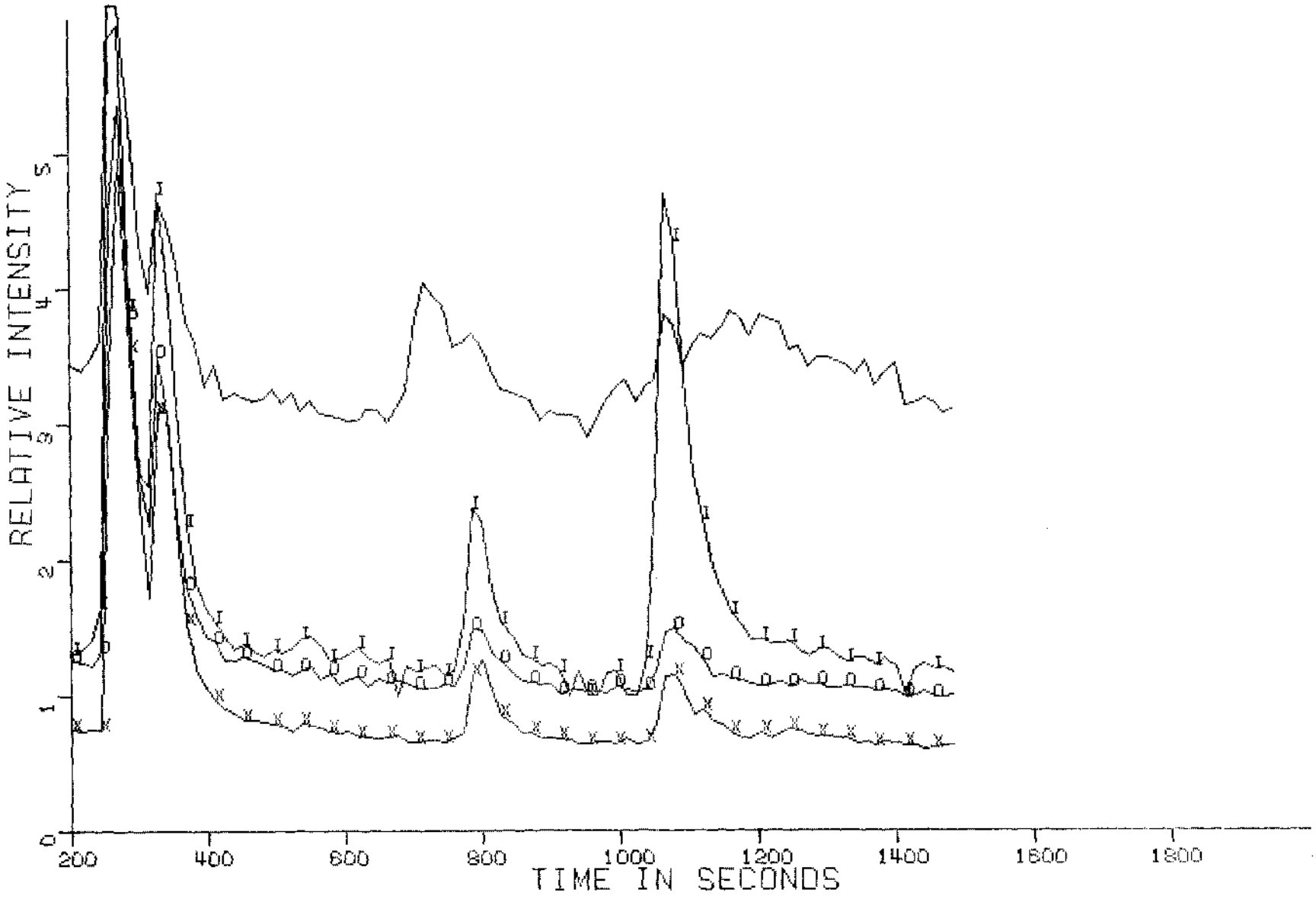

FIGURE B-8. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #59

I = MASS 57
X = MASS 29
O = MASS 41

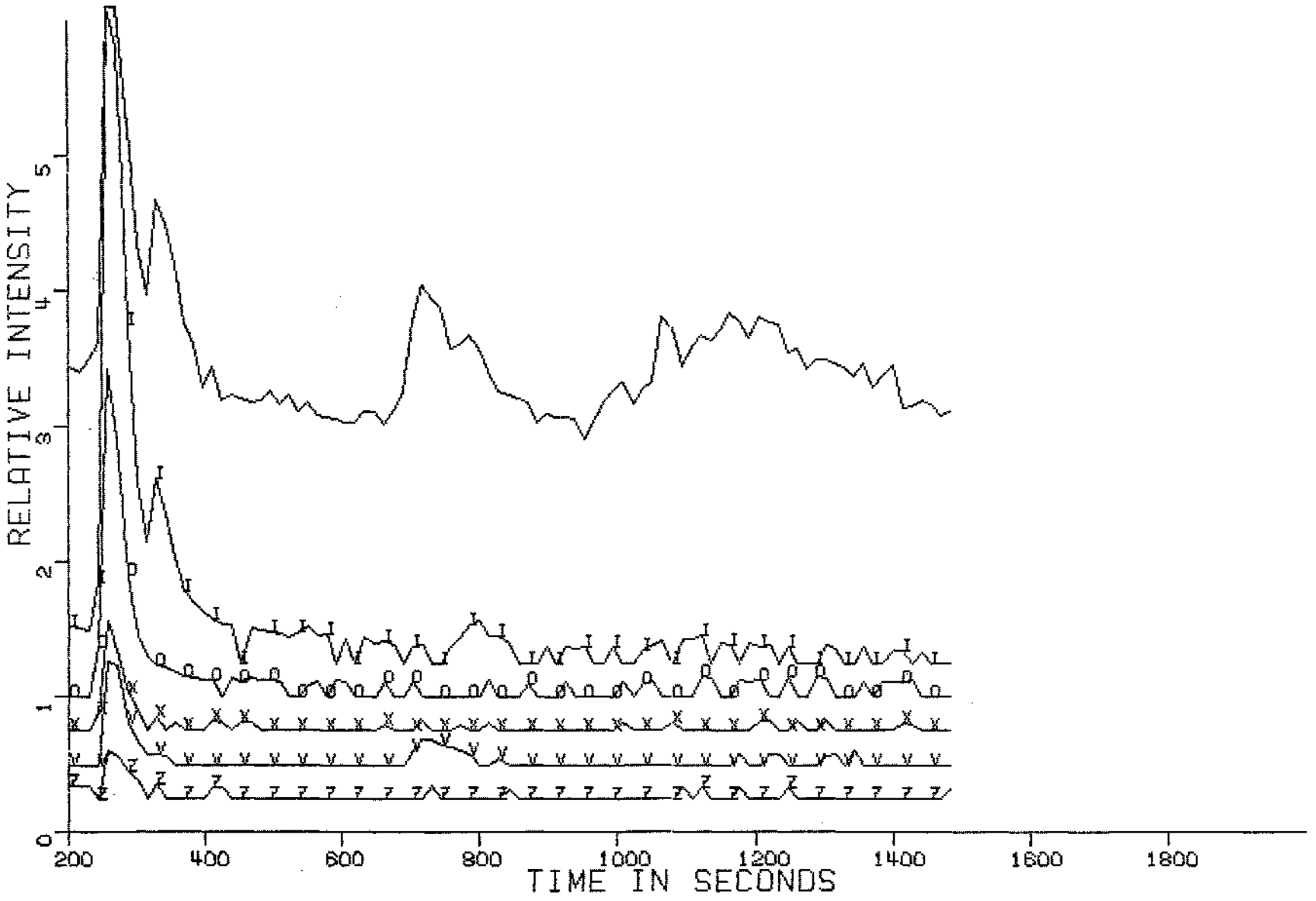

FIGURE B-7. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #59

I = MASS 58 O = MASS 77
X = MASS 79 V = MASS 49 Z = MASS 51

TABLE B-3. Normalized Mass Spectrum of Compound D.

FIL04-2 10 MICROLITER 100% GULFPORT#59 25-300 CD491 20 DEC

MASS	SCAN 24	SCAN 15	DIFF.	NORM. DIFF.
28.0	28932.	27365.	1567.	13.81
29.0	8658.	833.	7825.	68.95
31.0	1545.	692.	853.	7.52
32.0	1946.	1760.	186.	1.64
38.0	238.	.	238.	2.10
39.0	1551.	777.	774.	6.82
41.0	9205.	1703.	7502.	66.10
42.0	945.	.	945.	8.33
43.0	1846.	1283.	563.	4.96
44.0	1109.	698.	411.	3.62
49.0	284.	.	284.	2.50
50.0	284.	.	284.	2.50
55.0	1524.	.	1524.	13.43
56.0	5095.	1019.	4076.	35.92
57.0	12403.	1054.	11349.	100.00
59.0	447.	.	447.	3.94
77.0	871.	.	871.	7.67
78.0	543.	.	543.	4.78
79.0	373.	.	373.	3.29
83.0	1127.	.	1127.	9.93
111.0	396.	.	396.	3.49
126.0	177.	.	177.	1.56
137.0	277.	.	277.	2.44
141.0	447.	.	447.	3.94
156.0	1288.	.	1288.	11.35
162 0	132.	.	132.	1.16
168.0	1439.	.	1439.	12.68
177.0	388.	.	388.	3.42
183.0	400.	.	400.	3.52
188.0	564.	.	564.	4.97

SCAN 24 CONTAINED 45 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

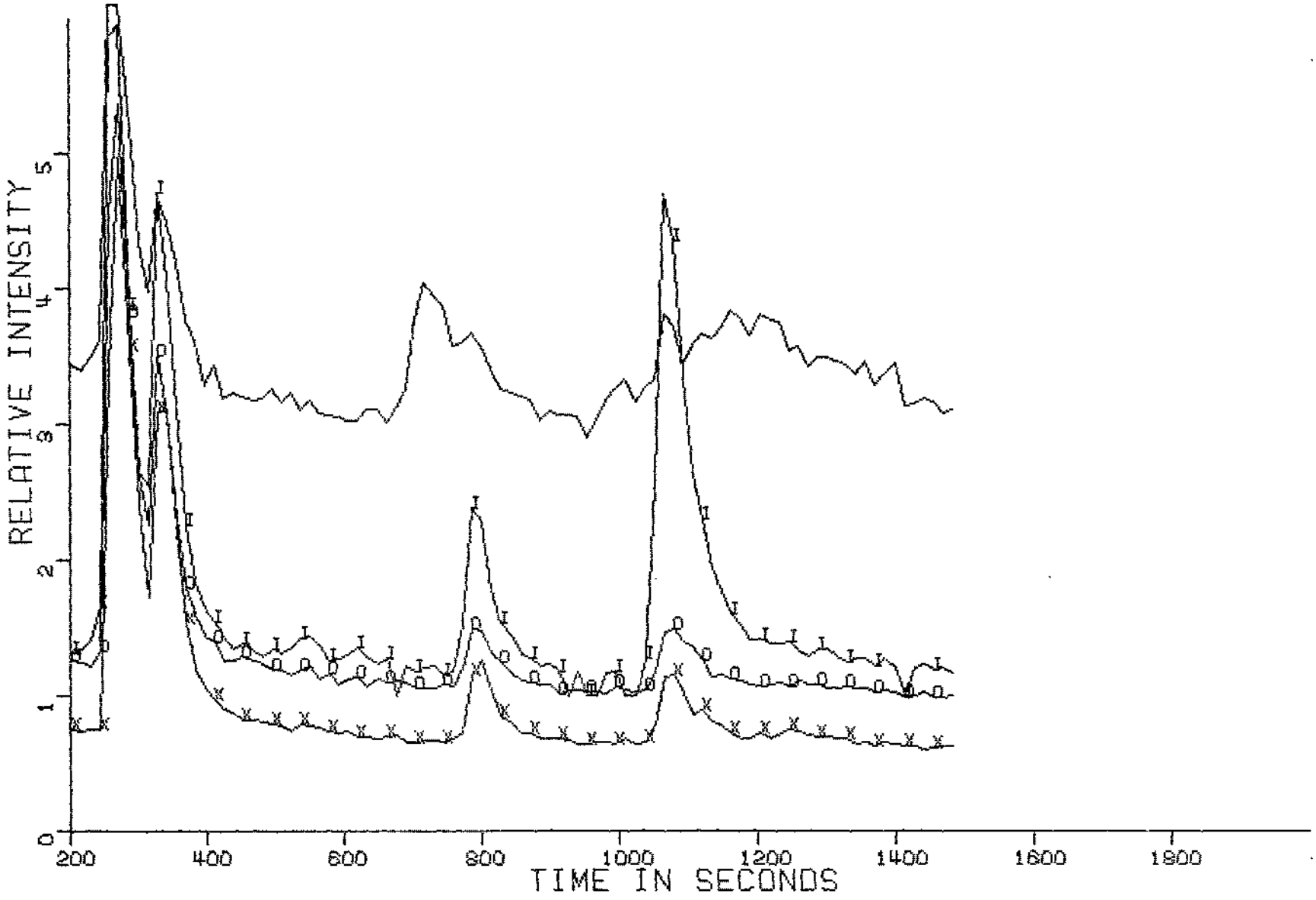

FIGURE B-8. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #59

I = MASS 57
X = MASS 29
O = MASS 41

TABLE B-4. Normalized Mass Spectrum of Compound E. Dichlorophenol (V)

FIL04-2 10 MICROLITER 100% GULFPORT#59 25-300 CD491 20 DEC

MASS	SCAN 52	SCAN 46	DIFF.	NORM. DIFF.
31.0	526.	316.	210.	2.63
37.0	411.	.	411.	5.15
38.0	553.	.	553.	6.94
39.0	696.	366.	330.	4.14
45.0	313.	204.	109.	1.37
49.0	667.	.	667.	8.36
50.0	562.	.	562.	7.05
62.0	819.	.	819.	10.27
63.0	4237.	.	4237.	53.14
73.0	1760.	888.	872.	10.94
74.0	429.	.	429.	5.38
75.0	574.	409.	165.	2.07
78.0	399.	.	399.	5.00
79.0	266.	.	266.	3.34
93.0	948.	.	948.	11.89
95.0	363.	.	363.	4.55
97.0	213.	.	213.	2.67
98.0	2940.	.	2940.	36.87
99.0	1100.	.	1100.	13.79
119.0	492.	.	492.	6.17
126.0	1072.	.	1072.	13.44
127.0	422.	.	422.	5.29
128.0	545.	.	545.	6.83
133.0	714.	.	714.	8.95
153.0	225.	.	225.	2.82
162.0	7974.	.	7974.	100.00
163.0	682.	.	682.	8.55
164.0	5119.	.	5119.	64.20
165.0	495.	.	495.	6.21
166.0	909.	.	909.	11.40
187.0	1911.	1672.	239.	3.00
199.0	466.	.	466.	5.84
209.0	214.	.	214.	2.68
218.0	450.	.	450.	5.64
219.0	703.	.	703.	8.82

SCAN 52 CONTAINED 52 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

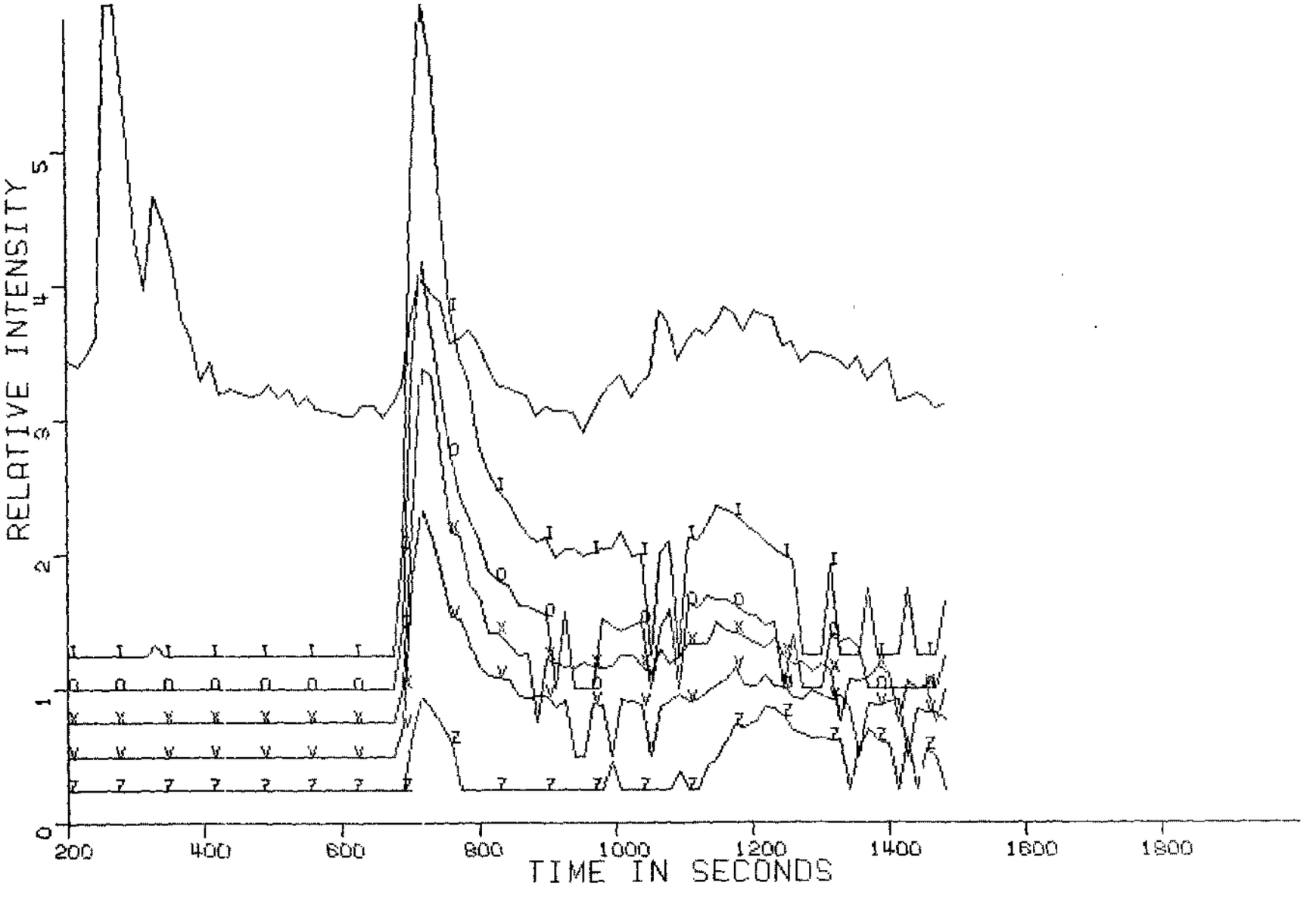

FIGURE B-9. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #59

I = MASS 162
X = MASS 83
V = MASS 98
O = MASS 164
Z = MASS 99

TABLE B-5. Normalized Mass Spectrum of Compound F.

FIL04-2 10 MICROLITER 100% GULFPORT#59 25-300 CD491 20 DEC

MASS	SCAN 56	SCAN 46	DIFF.	NORM.DIFF
29.0	765.	656.	109.	3.06
31.0	428.	316.	112.	3.15
36.0	306.	256.	50.	1.40
37.0	231.	.	231.	6.49
39.0	496.	366.	130.	3.65
41.0	1479.	1055.	424.	11.91
44.0	766.	711.	55.	1.54
45.0	345.	204.	141.	3.96
49.0	401.	.	401.	11.26
53.0	269.	.	269.	7.56
57.0	1736.	998.	738.	20.73
63.0	2228.	.	2228.	62.58
73.0	1055.	888.	167.	4.69
79.0	179.	.	179.	5.03
91.0	1652.	1500.	152.	4.27
93.0	412.	.	412.	11.57
98.0	1643.	.	1643.	46.15
103.0	153.	.	153.	4.30
105.0	254.	.	254.	7.13
109.0	222.	.	222.	6.24
133.0	631.	.	631.	17.72
141.0	454.	.	454.	12.75
162.0	3560.	.	3560.	100.00
164.0	2296.	.	2296.	64.49
165.0	351.	.	351.	9.86
166.0	414.	.	414.	11.63
168.0	1328.	1223.	105.	2.95
195.0	637.	598.	39.	1.10
199.0	737.	.	737.	20.70
200.0	289.	.	289.	8.12
203.0	269.	.	269.	7.56
207.0	435.	.	435.	12.22
250.0	416.	.	416.	11.69
251.0	191.	.	191.	5.37

SCAN 56 CONTAINED 49 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE B-6. Normalized Mass Spectrum of Compound G.

FIL04-2 10 MICROLITER 100% GULFPORT#59 25-300 CD491 20 DEC

MASS	SCAN 77	SCAN 71	DIFF.	NORM. DIFF.
29.0	2111.	527.	1584.	13.44
31.0	401.	279.	122.	1.04
38.0	226.	.	226.	1.92
39.0	582.	411.	171.	1.45
41.0	2413.	888.	1525.	12.94
43.0	583.	489.	94.	.80
47.0	273.	.	273.	2.32
56.0	604.	.	604.	5.13
57.0	12339.	556.	11783.	100.00
58.0	496.	.	496.	4.21
63.0	871.	647.	224.	1.90
65.0	228.	.	228.	1.93
73.0	1232.	953.	279.	2.37
75.0	430.	.	430.	3.65
92.0	426.	.	426.	3.62
103.0	1713.	.	1713.	14.54
128.0	242.	.	242.	2.05
159.0	788.	.	788.	6.69
165.0	253.	.	253.	2.15
168.0	1404.	1182.	222.	1.88
187.0	1826.	1754.	72.	.61
193.0	321.	.	321.	2.72
199.0	443.	.	443.	3.76
216.0	519.	.	519.	4.40
249.0	427.	.	427.	3.62
250.0	410.	.	410.	3.48
253.0	1862.	1697.	165.	1.40
255.0	723.	.	723.	6.14

SCAN 77 CONTAINED 45 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN .5%.

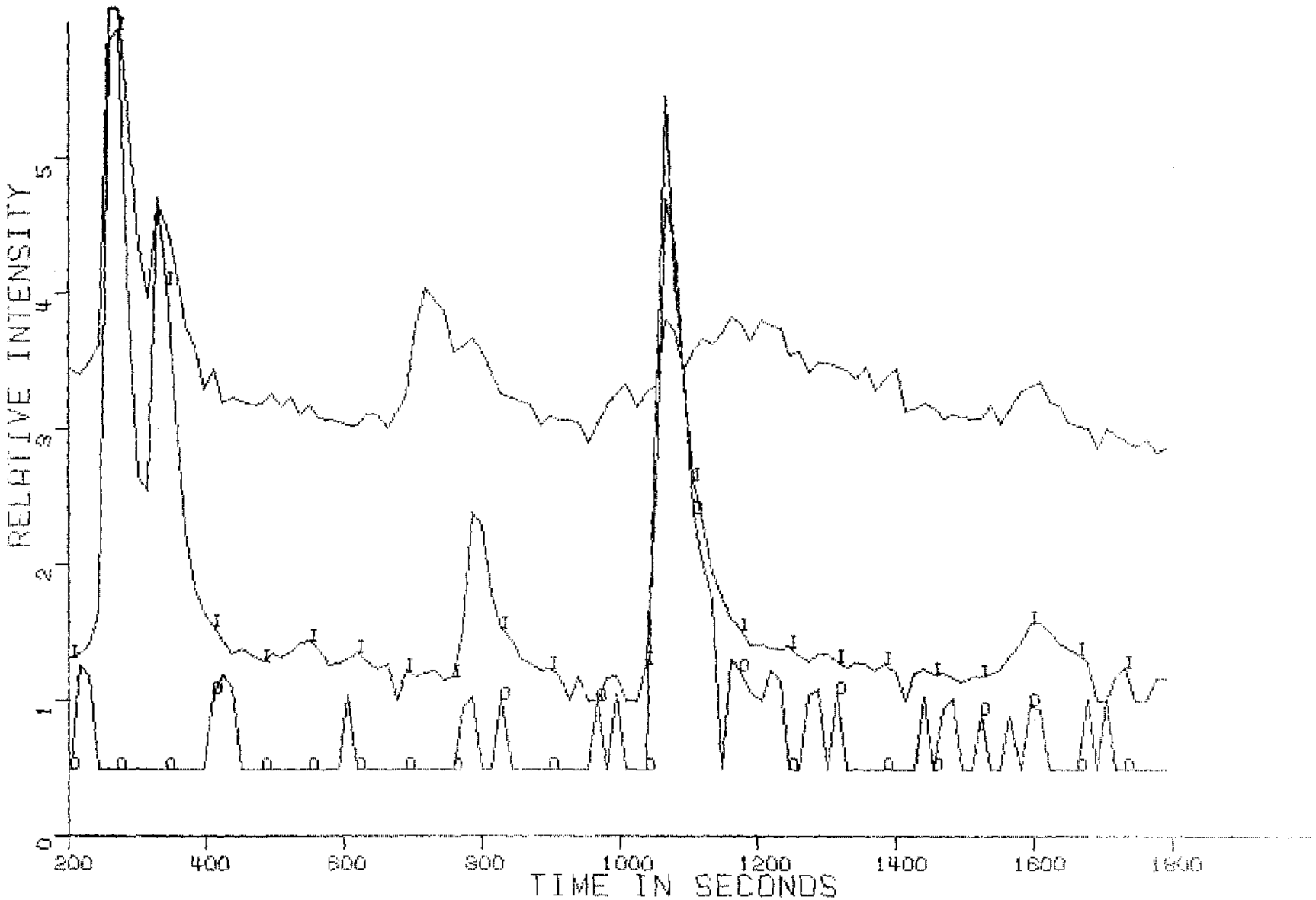

FIGURE B-10. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #59

I = MASS 57
O = MASS 103

TABLE B-7. Normalized Spectrum of Compound H. Trichlorophenol (VI)

FIL04-2 10 MICROLITER 100% GULFPORT#59 25-300 CD491 20 DEC

MASS	SCAN 85	SCAN 70	DIFF.	NORM. DIFF.
29.0	632.	549.	83.	3.60
31.0	315.	273.	42.	1.82
32.0	1908.	1821.	87.	3.77
36.0	332.	274.	58.	2.52
38.0	205.	.	205.	8.89
39.0	478.	434.	44.	1.91
40.0	398.	353.	45.	1.95
41.0	1229.	921.	308.	13.36
43.0	570.	419.	151.	6.55
44.0	843.	765.	78.	3.38
45.0	413.	249.	164.	7.11
48.0	322.	.	322.	13.97
49.0	309.	.	309.	13.41
51.0	313.	.	313.	13.58
55.0	256.	.	256.	11.11
57.0	1735.	.	1735.	75.27
62.0	585.	.	585.	25.38
63.0	1071.	680.	391.	16.96
65.0	252.	.	252.	10.93
73.0	1965.	1084.	881.	38.22
74.0	427.	.	427.	18.52
75.0	576.	.	576.	24.99
77.0	482.	.	482.	20.91
81.0	472.	.	472.	20.48
93.0	2047.	.	2047.	88.81
95.0	804.	.	804.	34.88
97.0	1072.	.	1072.	46.51
98.0	1049.	627.	422.	18.31
99.0	759.	.	759.	32.93
103.0	247.	174.	73.	3.17
126.0	276.	.	276.	11.97
133.0	786.	.	786.	34.10
135.0	1597.	1283.	314.	13.62
147.0	435.	.	435.	18.87
149.0	404.	.	404.	17.53
156.0	1103.	1025.	78.	3.38
162.0	1685.	1235.	450.	19.52
164.0	988.	.	988.	42.86
168.0	1184.	.	1184.	51.37
195.0	488.	.	488.	21.17
196.0	2305.	.	2305.	100.00
198.0	2194.	.	2194.	95.18
217.0	529.	.	529.	22.95
253.0	2199.	1541.	658.	28.55
254.0	524.	.	524.	22.73
255.0	1102.	334.	768.	33.32
257.0	371.	.	371.	16.10

SCAN 85 CONTAINED 54 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE B-8. Normalized Spectrum of Compound I.

FIL04-2 10 MICROLITER 100% GULFPORT#59 25-300 CD491 20 DEC

MASS	SCAN 116	SCAN 108	DIFF.	NORM. DIFF.
28.0	26487.	26043.	444.	30.75
29.0	1178.	392.	786.	54.43
31.0	290.	248.	42.	2.91
38.0	175.	.	175.	12.12
39.0	404.	.	404.	27.98
40.0	394.	334.	60.	4.16
41.0	1587.	869.	718.	49.72
42.0	247.	.	247.	17.11
43.0	429.	410.	19.	1.32
44.0	733.	601.	132.	9.14
45.0	236.	.	236.	16.34
56.0	1398.	.	1398.	96.81
57.0	1929.	485.	1444.	100.00
60.0	483.	.	483.	33.45
61.0	850.	.	850.	58.86
62.0	287.	.	287.	19.88
69.0	118.	.	118.	8.17
89.0	1051.	.	1051.	72.78
93.0	525.	.	525.	36.36
98.0	467.	445.	22.	1.52
103.0	148.	.	148.	10.25
119.0	303.	.	303.	20.98
121.0	310.	.	310.	21.47
133.0	617.	.	617.	42.73
156.0	1241.	275.	966.	66.90
162.0	485.	.	485.	33.59
172.0	209.	.	209.	14.47
197.0	816.	739.	77.	5.33
252.0	141.	.	141.	9.76
255.0	500.	475.	25.	1.73

SCAN 116 CONTAINED 45 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE B-9. Normalized Mass Spectrum of Compound J.
Butyl ester of monochlorophenoxyacetic acid (XII)

FIL04-2 10 MICROLITER 100% GULFPORT#59 25-300 CD491 20 DEC

MASS	SCAN 137	SCAN 128	DIFF.	NORM. DIFF.
28.0	27783.	24564.	3219.	7.73
29.0	33367.	333.	33034.	79.32
39.0	4615.	299.	4316.	10.36
41.0	26444.	645.	25799.	61.94
42.0	5020.	.	5020.	12.05
43.0	6032.	240.	5792.	13.91
50.0	2747.	.	2747.	6.60
51.0	2645.	.	2645.	6.35
55.0	4082.	.	4082.	9.80
56.0	2616.	.	2616.	6.28
57.0	42195.	546.	41649.	100.00
63.0	2629.	.	2629.	6.31
75.0	10117.	447.	9670.	23.22
77.0	7080.	.	7080.	17.00
99.0	3664.	.	3664.	8.80
111.0	14936.	.	14936.	35.86
113.0	10692.	.	10692.	25.67
115.0	2096.	.	2096.	5.03
128.0	15961.	.	15961.	38.32
130.0	5002.	.	5002.	12.01
141.0	28394.	434.	27960.	67.13
142.0	6284.	.	6284.	15.09
143.0	9090.	.	9090.	21.83
144.0	2252.	.	2252.	5.41
151.0	38516.	.	38516.	92.48
152.0	3285.	.	3285.	7.89
186.0	5354.	.	5354.	12.86
242.0	12838.	.	12838.	30.82
244.0	4491.	.	4491.	10.78

SCAN 137 CONTAINED 87 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

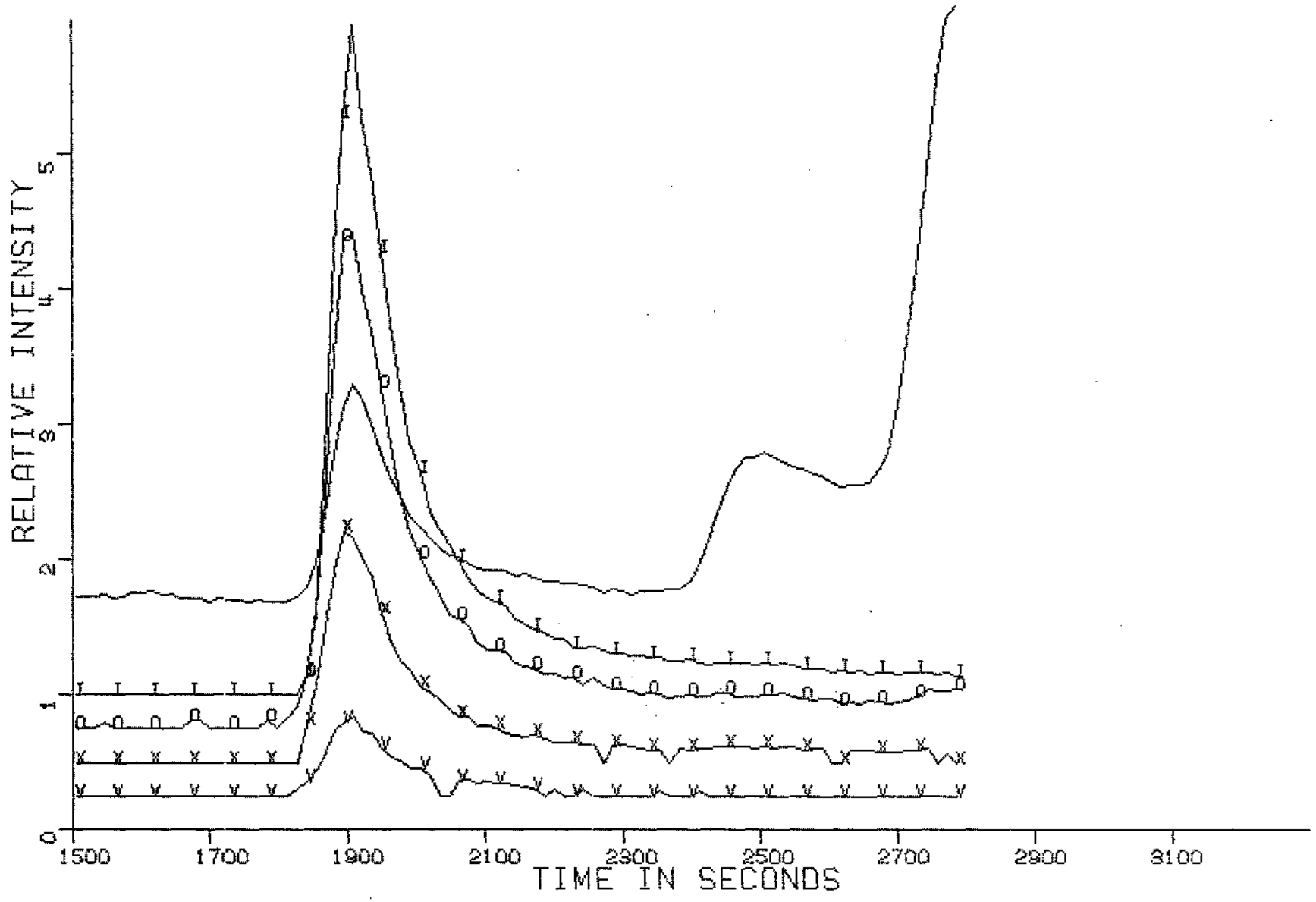

FIGURE B-11. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #59

I = MASS 151
X = MASS 242
O = MASS 141
V = MASS 244

TABLE B-10. Normalized Mass Spectrum of Compound K.
Butyl ester of dichlorophenoxyacetic acid (XIII)

FIL04-2 10 MICROLITER 100% GULFPORT#59 25-300 CD491 20 DEC

MASS	SCAN 180	SCAN 128	DIFF.	NORM. DIFF
28.0	27339.	24564.	2775.	7.48
29.0	22320.	333.	21987.	59.26
39.0	2195.	299.	1896.	5.11
41.0	19206.	645.	18561.	50.03
42.0	4133.	.	4133.	11.14
43.0	4745.	240.	4505.	12.14
55.0	3340.	.	3340.	9.00
56.0	2882.	.	2882.	7.77
57.0	37649.	546.	37103.	100.00
63.0	2399.	.	2399.	6.47
75.0	3236.	447.	2789.	7.52
109.0	2870.	.	2870.	7.74
111.0	5029.	.	5029.	13.55
133.0	2448.	579.	1869.	5.04
145.0	3277.	.	3277.	8.83
147.0	3125.	275.	2850.	7.68
151.0	1881.	.	1881.	5.07
162.0	12522.	.	12522.	33.75
164.0	7796.	.	7796.	21.01
175.0	**11083.**	.	**11083.**	**29.87**
176.0	**2452.**	.	**2452.**	**6.61**
177.0	**7162.**	.	**7162.**	**19.30**
185.0	**20430.**	.	**20430.**	**55.06**
186.0	2643.	.	2643.	7.12
187.0	8197.	.	8197.	22.09
241.0	2280.	.	2280.	6.15
276.0	2672.	.	2672.	7.20
278.0	1866.	.	1866.	5.03

SCAN 180 CONTAINED 97 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

TABLE B-11. Normalized Mass Spectrum of Compound L.
Butyl ester of dichlorophenoxyacetic acid (XIII)

FIL04-2 10 MICROLITER 100% GULFPORT#59 25-300 CD491 20 DEC

MASS	SCAN 199	SCAN 128	DIFF.	NORM. DIFF.
29.0	83057.	333.	82724.	50.59
41.0	73146.	645.	72501.	44.34
42.0	14062.	.	14062.	8.60
43.0	15025.	240.	14785.	9.04
55.0	12617.	.	12617.	7.72
57.0	164072.	546.	163526.	100.00
63.0	9177.	.	9177.	5.61
75.0	10837.	447.	10390.	6.35
109.0	14471.	.	14471.	8.85
111.0	18025.	.	18025.	11.02
145.0	19974.	.	19974.	12.21
147.0	16730.	275.	16455.	10.06
162.0	40403.	.	40403.	24.71
164.0	25520.	.	25520.	15.61
175.0	48087.	.	48087.	29.41
176.0	10221.	.	10221.	6.25
177.0	31584.	.	31584.	19.31
185.0	53698.	.	53698.	32.84
187.0	19249.	.	19249.	11.77
220.0	15267.	.	15267.	9.34
222.0	9672.	.	9672.	5.91
276.0	32388.	.	32388.	19.81
278.0	21497.	.	21497.	13.15

SCAN 199 CONTAINED 127 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

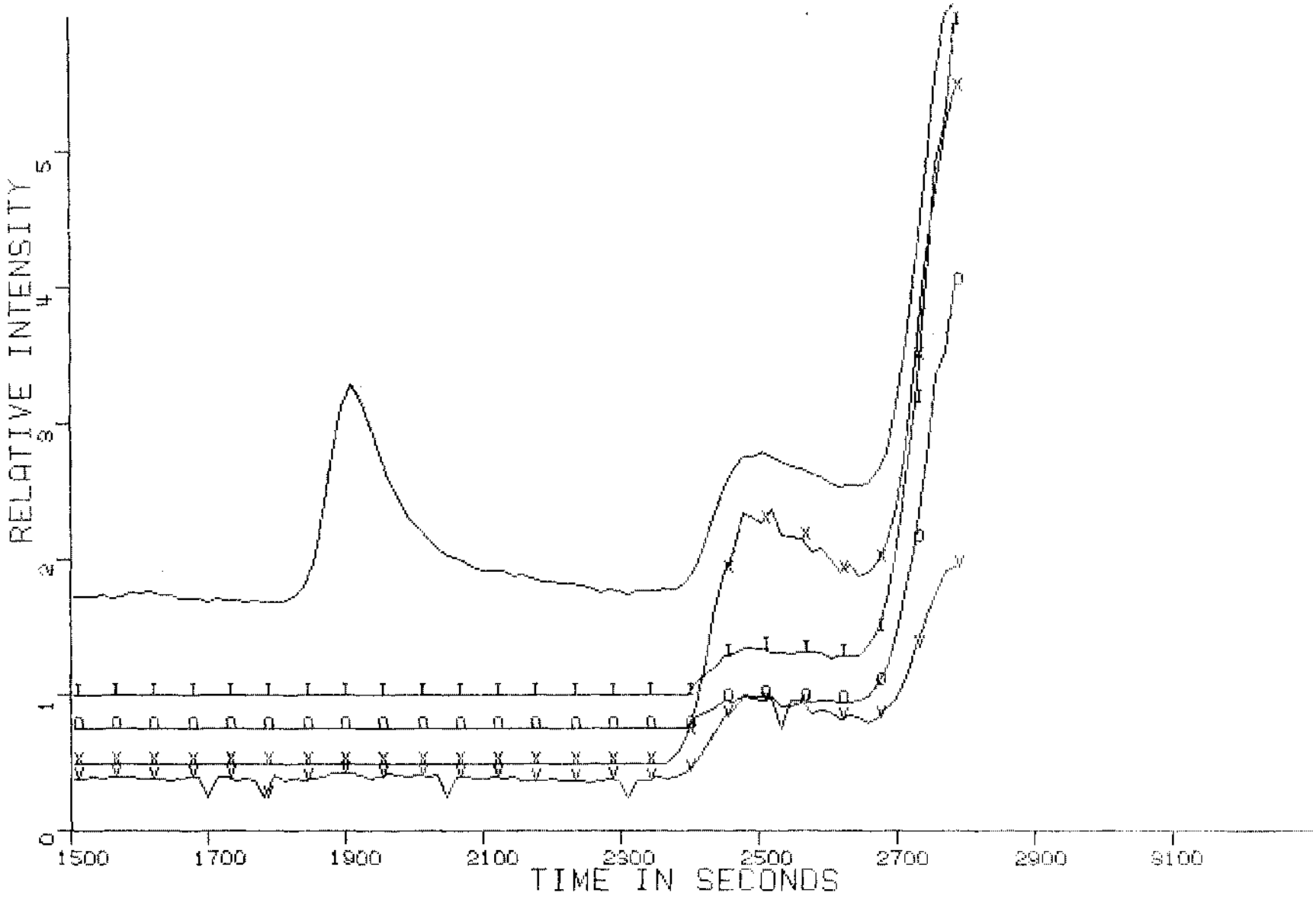

FIGURE B-12. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #59

I = MASS 276
X = MASS 185
O = MASS 278
V = MASS 187

TABLE B-12. Normalized Mass Spectrum of Compound O.
Butyl ester of methoxy-dichlorophenoxyacetic acid (XV)

FIL05-3 0.2 microliter 100% gulfport#59 25-450 cc492 2 Apr

MASS	SCAN 110	SCAN 71	DIFF.	NORM. DIFF.
26.0	39.	.	39.	.77
27.0	496.	.	496.	9.74
28.0	2455.	2459.	-4.	-.08
29.0	3230.	.	3230.	63.41
30.0	65.	.	65.	1.28
31.0	112.	.	112.	2.20
32.0	381.	441.	-60.	-1.18
36.0	145.	32.	113.	2.22
38.0	58.	.	58.	1.14
39.0	232.	.	232.	4.55
40.0	43.	18.	25.	.49
41.0	2295.	.	2295.	45.05
42.0	445.	.	445.	8.74
43.0	468.	.	468.	9.19
44.0	234.	63.	171.	3.36
50.0	67.	.	67.	1.32
53.0	65.	.	65.	1.28
55.0	427.	.	427.	8.38
56.0	289.	.	289.	5.67
57.0	5094.	.	5094.	100.00
58.0	181.	.	181.	3.55
59.0	34.	.	34.	.67
61.0	51.	.	51.	1.00
62.0	104.	.	104.	2.04
63.0	51.	.	51.	1.00
71.0	28.	.	28.	.55
73.0	129.	.	129.	2.53
74.0	141.	.	141.	2.77
75.0	88.	.	88.	1.73
79.0	47.	.	47.	.92
82.0	20.	.	20.	.39
84.0	48.	.	48.	.94
85.0	61.	.	61.	1.20
96.0	51.	.	51.	1.00
97.0	231.	.	231.	4.53
99.0	136.	.	136.	2.67
107.0	51.	.	51.	1.00
108.0	71.	.	71.	1.39
109.0	138.	.	138.	2.71
111.0	106.	.	106.	2.08
112.0	78.	.	78.	1.53
113.0	85.	.	85.	1.67
128.0	61.	.	61.	1.20
132.0	57.	.	57.	1.12
133.0	44.	.	44.	.86
134.0	44.	.	44.	.86
142.0	46.	.	46.	.90
143.0	108.	.	108.	2.12
144.0	103.	.	103.	2.02
145.0	215.	.	215.	4.22
146.0	109.	.	109.	2.14
147.0	126.	.	126.	2.47
148.0	92.	.	92.	1.81
149.0	46.	.	46.	.90

151.0	28.	.	28.	.55
160.0	67.	.	67.	1.32
162.0	75.	.	75.	1.47
163.0	112.	.	112.	2.20
165.0	51.	.	51.	1.00
167.0	87.	.	87.	1.71
169.0	69.	.	69.	1.35
171.0	38.	.	38.	.75
173.0	26.	.	26.	.51
175.0	146.	.	146.	2.87
177.0	137.	.	137.	2.69
179.0	245.	.	245.	4.81
180.0	28.	.	28.	.55
181.0	176.	.	176.	3.46
183.0	60.	.	60.	1.18
186.0	32.	.	32.	.63
190.0	141.	.	141.	2.77
191.0	327.	.	327.	6.42
193.0	228.	.	228.	4.48
194.0	174.	.	174.	3.42
195.0	72.	.	72.	1.41
196.0	348.	.	348.	6.83
197.0	39.	.	39.	.77
198.0	291.	.	291.	5.71
200.0	111.	.	111.	2.18
205.0	170.	.	170.	3.34
206.0	49.	.	49.	.96
207.0	197.	.	197.	3.87
209.0	388.	.	388.	7.62
211.0	327.	.	327.	6.42
213.0	87.	.	87.	1.71
214.0	50.	.	50.	.98
215.0	188.	.	188.	3.69
217.0	56.	.	56.	1.10
219.0	321.	.	321.	6.30
221.0	251.	.	251.	4.93
223.0	41.	.	41.	.80
250.0	99.	.	99.	1.94
252.0	60.	.	60.	1.18
254.0	168.	.	168.	3.30
256.0	125.	.	125.	2.45
258.0	42.	.	42.	.82
306.0	470.	.	470.	9.23
307.0	88.	.	88.	1.73
308.0	325.	.	325.	6.38
310.0	360.	.	360.	7.07
311.0	39.	.	39.	.77
312.0	249.	.	249.	4.89
314.0	75.	.	75.	1.47

SCAN 110 CONTAINED 104 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN-1000%.

TABLE B-13. Normalized Mass Spectrum of Compound O, with Spectrum of Compound N Subtracted.
Butyl ester of methoxy-dichlorophenoxyacetic acid (XV)
Butyl ester of trichlorophenoxyacetic acid (XIV)

FIL05-3 0.2 microliter 100% Gulfport#59 25-450 CD492 2 Apr

MASS	SCAN 110	SCAN 99	DIFF.	NORM. DIFF.
26.0	39.	42.	-3.	-.64
27.0	496.	589.	-93.	-19.79
28.0	2455.	2348.	107.	22.77
29.0	3230.	3535.	-305.	-64.89
30.0	65.	90.	-25.	-5.32
31.0	112.	121.	-9.	-1.91
32.0	381.	334.	47.	10.00
36.0	145.	81.	64.	13.62
38.0	58.	21.	37.	7.87
39.0	232.	241.	-9.	-1.91
40.0	43.	41.	2.	.43
41.0	2295.	2948.	-653.	-138.94
42.0	445.	564.	-119.	-25.32
43.0	468.	632.	-164.	-34.89
44.0	234.	172.	62.	13.19
50.0	67.	.	67.	14.26
53.0	65.	.	65.	13.83
55.0	427.	516.	-89.	-18.94
56.0	289.	386.	-97.	-20.64
57.0	5094.	7998.	-2904.	-617.87
58.0	181.	326.	-145.	-30.85
59.0	34.	46.	-12.	-2.55
61.0	51.	67.	-16.	-3.40
62.0	104.	124.	-20.	-4.26
63.0	51.	57.	-6.	-1.28
71.0	28.	67.	-39.	-8.30
73.0	129.	200.	-71.	-15.11
74.0	141.	227.	-86.	-18.30
75.0	88.	73.	15.	3.19
79.0	47.	.	47.	10.00
82.0	20.	.	20.	4.26
84.0	48.	95.	-47.	-10.00
85.0	61.	54.	7.	1.49
96.0	51.	44.	7.	1.49
97.0	231.	234.	-3.	-.64
99.0	136.	67.	69.	14.68
107.0	51.	106.	-55.	-11.70
108.0	71.	96.	-25.	-5.32
109.0	138.	234.	-96.	-20.43
111.0	106.	118.	-12.	-2.55
112.0	78.	.	78.	16.60
113.0	85.	.	85.	18.09
128.0	61.	.	61.	12.98
132.0	57.	63.	-6.	-1.28
133.0	44.	37.	7.	1.49
134.0	44.	.	44.	9.36
142.0	46.	.	46.	9.79
143.0	108.	255.	-147.	-31.28
144.0	103.	151.	-48.	-10.21
145.0	215.	436.	-221.	-47.02
146.0	109.	254.	-145.	-30.85
147.0	126.	231.	-105.	-22.34
148.0	92.	136.	-44.	-9.36
149.0	46.	48.	-2.	-.43

151.0	28.	.	28.	5.96
160.0	67.	.	67.	14.26
162.0	75.	76.	-1.	-.21
163.0	112.	.	112.	23.83
165.0	51.	.	51.	10.85
167.0	87.	160.	-73.	-15.53
169.0	69.	179.	-110.	-23.40
171.0	38.	50.	-12.	-2.55
173.0	26.	34.	-8.	-1.70
175.0	146.	120.	26.	5.53
177.0	137.	88.	49.	10.43
179.0	245.	427.	-182.	-38.72
180.0	28.	.	28.	5.96
181.0	176.	484.	-308.	-65.53
183.0	60.	203.	-143.	-30.43
186.0	32.	.	32.	6.81
190.0	141.	53.	88.	18.72
191.0	327.	.	327.	69.57
193.0	228.	.	228.	48.51
194.0	174.	.	174.	37.02
195.0	72.	120.	-48.	-10.21
196.0	348.	902.	-554.	-117.87
197.0	39.	150.	-111.	-23.62
198.0	291.	802.	-511.	-108.72
200.0	111.	277.	-166.	-35.32
205.0	170.	.	170.	36.17
206.0	49.	.	49.	10.43
207.0	197.	84.	113.	24.04
209.0	388.	837.	-449.	-95.53
211.0	327.	804.	-477.	-101.49
213.0	87.	266.	-179.	-38.09
214.0	50.	.	50.	10.64
215.0	188.	.	188.	40.00
217.0	56.	.	56.	11.91
219.0	321.	1109.	-788.	-167.66
221.0	251.	669.	-418.	-88.94
223.0	41.	109.	-68.	-14.47
250.0	99.	.	99.	21.06
252.0	60.	.	60.	12.77
254.0	168.	382.	-214.	-45.53
256.0	125.	.	125.	26.60
258.0	42.	141.	-99.	-21.06
306.0	470.	.	470.	100.00
307.0	88.	.	88.	18.72
308.0	325.	.	325.	69.15
310.0	360.	888.	-528.	-112.34
311.0	39.	.	39.	8.30
312.0	249.	933.	-684.	-145.53
314.0	75.	220.	-145.	-30.85

SCAN 110 CONTAINED 104 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN-1000%.

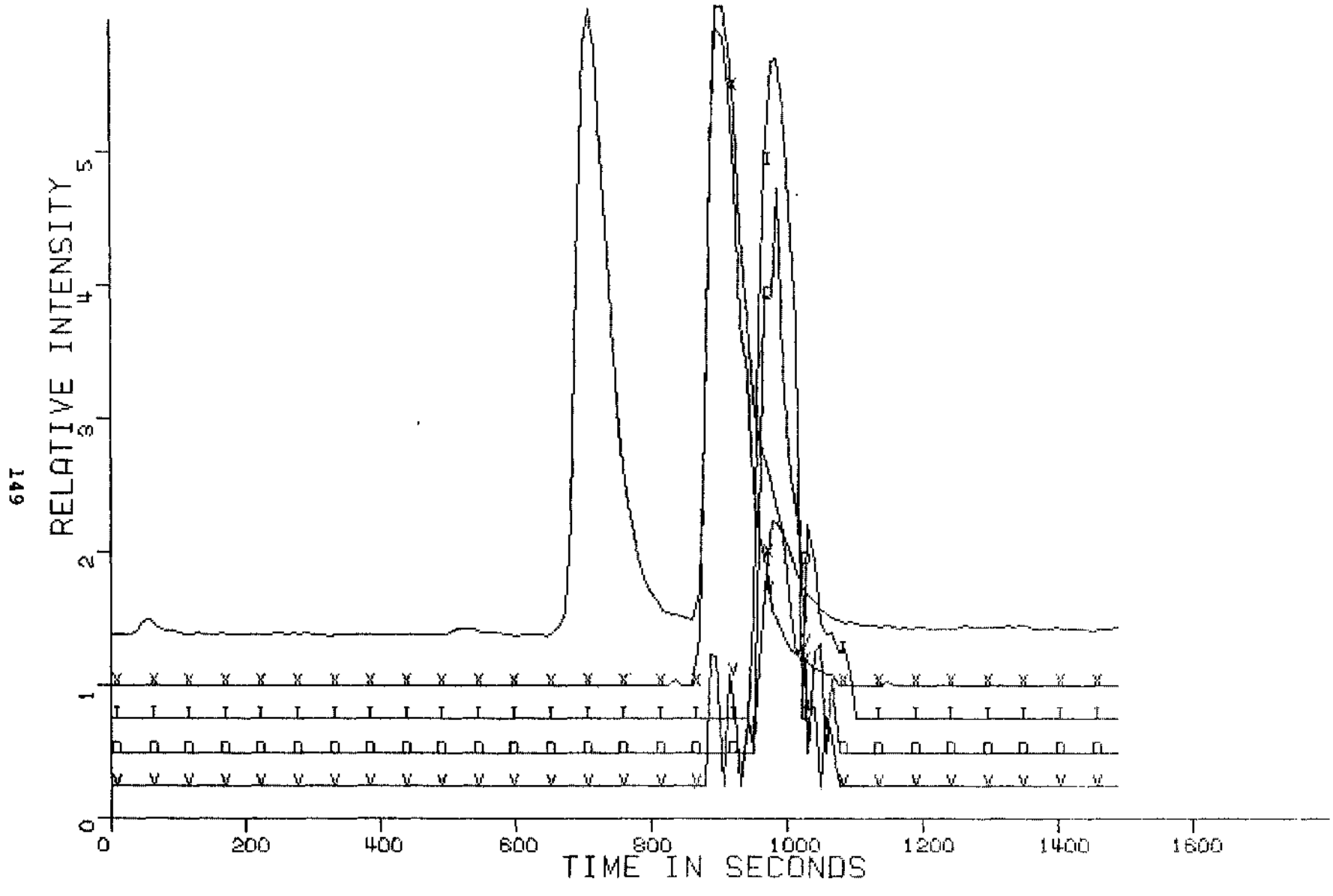

Figure B-13. TOTAL ION CHROMATOGRAM AND SELECTED ION CHROMATOGRAMS OF #59
X = MASS 219 I = MASS 306 D = MASS 308
V = MASS 215

TABLE B-14. Normalized Mass Spectrum of Compound P.
Butyl ester of bis- dichlorophenoxyacetic acid (XIX)

FIL12-3 10 MICROLITER 100% GULFPORT#59 25-450 CD492 22 MAR

MASS	SCAN 68	SCAN 50	DIFF.	NORM. DIFF.
27.0	257.		257.	10.64
29.0	1699.	276.	1423.	58.92
41.0	1206.	146.	1060.	43.89
55.0	465.	.	465.	19.25
57.0	2716.	301.	2415.	100.00
58.0	155.	.	155.	6.42
63.0	255.	.	255.	10.56
73.0	319.	126.	193.	7.99
75.0	262.	36.	226.	9.36
109.0	300.	54.	246.	10.19
110.0	124.	.	124.	5.13
111.0	217.	.	217.	8.99
128.0	167.	.	167.	6.92
145.0	401.	.	401.	16.60
162.0	342.	72.	270.	11.18
163.0	450.	.	450.	18.63
164.0	245.	.	245.	10.14
165.0	306.	.	306.	12.67
173.0	131.	.	131.	5.42
175.0	2285.	.	2285.	94.62
177.0	1360.	.	1360.	56.31
179.0	270.	.	270.	11.18
191.0	321.	30.	291.	12.05
193.0	208.	.	208.	8.61
201.0	179.	.	179.	7.41
203.0	132.	.	132.	5.47
219.0	215.	.	215.	8.90
221.0	191.	49.	142.	5.88
275.0	811.	.	811.	33.58
277.0	584.	.	584.	24.18
335.0	235.	.	235.	9.73
337.0	231.	.	231.	9.57
339.0	122.	.	122.	5.05

SCAN 68 CONTAINED 86 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

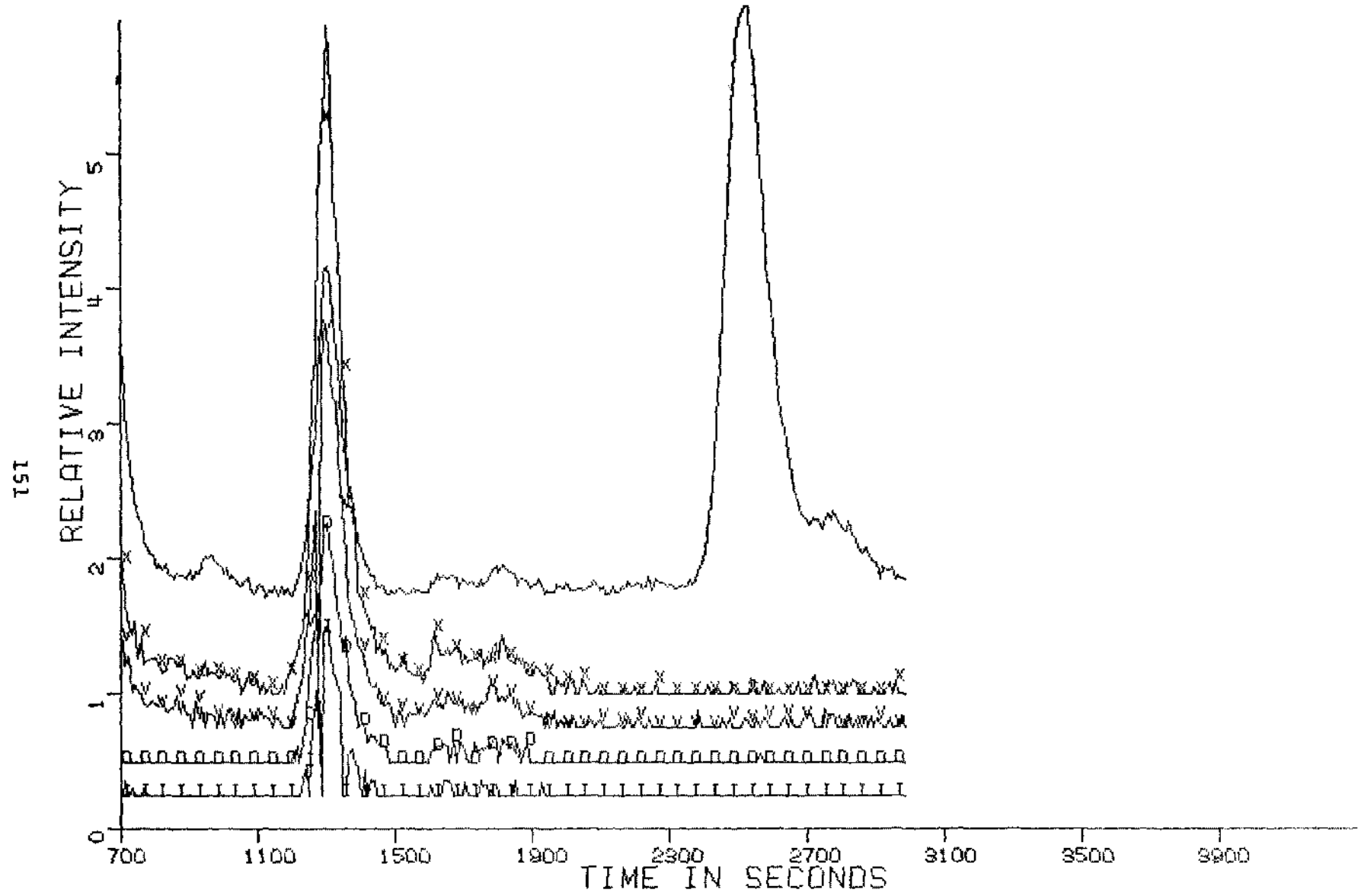

Figure B-14. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF SS#59
X = MASS 175 V = MASS 177 D = MASS 275
I = MASS 277

TABLE B-15. Normalized Mass Spectrum of Compound Q.
Butyl ester of bis- trichlorophenoxyacetic acid (XX)

FIL12-3 10 MICROLITER 100% GULFPORT#59 25-450 CD492 22 MAR

MASS	SCAN 204	SCAN 180	DIFF.	NORM. DIFF.
27.0	438.	30.	408.	6.40
29.0	3311.	93.	3218.	50.50
41.0	1932.	83.	1849.	29.02
55.0	1097.	.	1097.	17.22
57.0	6492.	120.	6372.	100.00
97.0	398.	24.	374.	5.87
109.0	342.	.	342.	5.37
162.0	349.	.	349.	5.48
179.0	355.	.	355.	5.57
181.0	421.	.	421.	6.61
196.0	480.	48.	432.	6.78
198.0	389.	.	389.	6.10
199.0	356.	.	356.	5.59
209.0	2865.	.	2865.	44.96
211.0	2548.	.	2548.	39.99
213.0	767.	.	767.	12.04
235.0	613.	.	613.	9.62
237.0	543.	.	543.	8.52
309.0	882.	.	882.	13.84
311.0	917.	.	917.	14.39

SCAN 204 CONTAINED 115 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

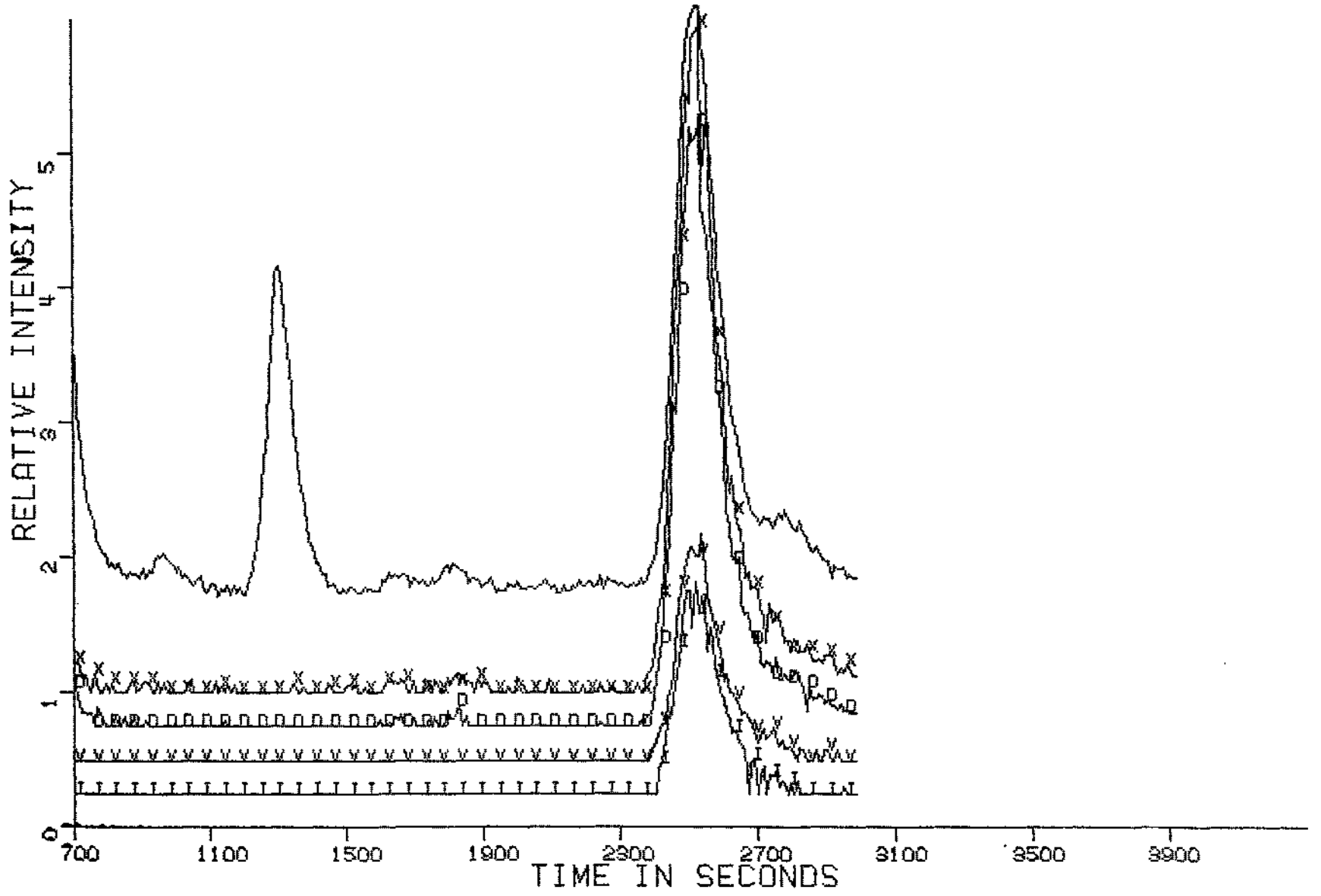

FIGURE B-15. TOTAL ION CHROMATOGRAM AND SELECTED ION CHROMATOGRAM OF #59
X = MASS 209 D = MASS 211 V = MASS 309
I = MASS 311

TABLE B-16. Normalized Mass Spectrum of Compound R

Butyl ester of trichlorophenoxy-(methoxy-dichlorophenoxy)-acetic acid (XXI)

FIL12-3 10 MICROLITER 100% GULFPORT#59 25-450 CD492 22 MAR

MASS	SCAN 236	SCAN 180	DIFF.	NORM. DIFF.
27.0	52.	30.	22.	2.20
28.0	2097.	2443.	-346.	-34.67
29.0	446.	93.	353.	35.37
32.0	383.	446.	-63.	-6.31
36.0	37.	63.	-26.	-2.61
39.0	45.	.	45.	4.51
41.0	343.	83.	260.	26.05
43.0	27.	.	27.	2.71
44.0	87.	173.	-86.	-8.62
53.0	24.	.	24.	2.40
55.0	127.	.	127.	12.73
57.0	1118.	120.	998.	100.00
58.0	80.	.	80.	8.02
69.0	19.	.	19.	1.90
73.0	193.	237.	-44.	-4.41
87.0	83.	.	83.	8.32
97.0	101.	24.	77.	7.72
99.0	41.	.	41.	4.11
145.0	30.	.	30.	3.01
146.0	26.	.	26.	2.61
147.0	95.	103.	-8.	-.80
162.0	80.	.	80.	8.02
164.0	56.	.	56.	5.61
179.0	75.	.	75.	7.52
191.0	59.	21.	38.	3.81
193.0	64.	34.	30.	3.01
195.0	51.	.	51.	5.11
196.0	63.	48.	15.	1.50
197.0	47.	.	47.	4.71
198.0	65.	.	65.	6.51
199.0	43.	.	43.	4.31
205.0	144.	.	144.	14.43
207.0	209.	185.	24.	2.40
208.0	66.	.	66.	6.61
209.0	233.	.	233.	23.35
211.0	232.	.	232.	23.25
213.0	60.	.	60.	6.01
219.0	124.	.	124.	12.42
221.0	118.	69.	49.	4.91
223.0	50.	.	50.	5.01
231.0	54.	.	54.	5.41
235.0	52.	.	52.	5.21
237.0	40.	.	40.	4.01
281.0	72.	87.	-15.	-1.50
305.0	51.	.	51.	5.11
309.0	36.	.	36.	3.61
401.0	18.	.	18.	1.80

SCAN 236 CONTAINED 47 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN-1000%.

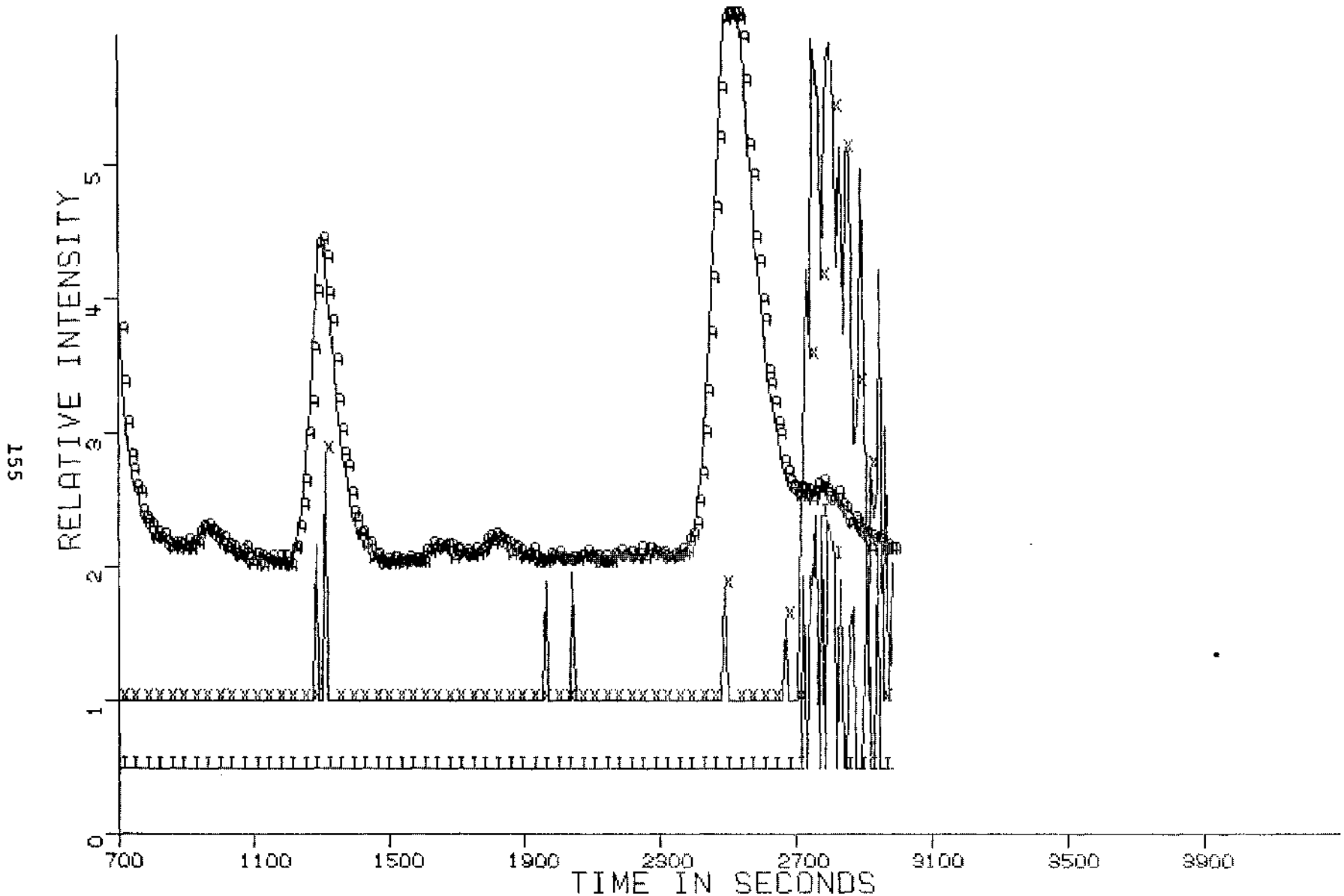

FIGURE B-16. TOTAL ION CHROMATOGRAM AND SELECTED ION CHROMATOGRAMS OF #59
A = TOTAL ION X = MASS 205 I = MASS 305

APPENDIX C

PRESENTATION OF DATA ON GULFPORT #251 SAMPLES

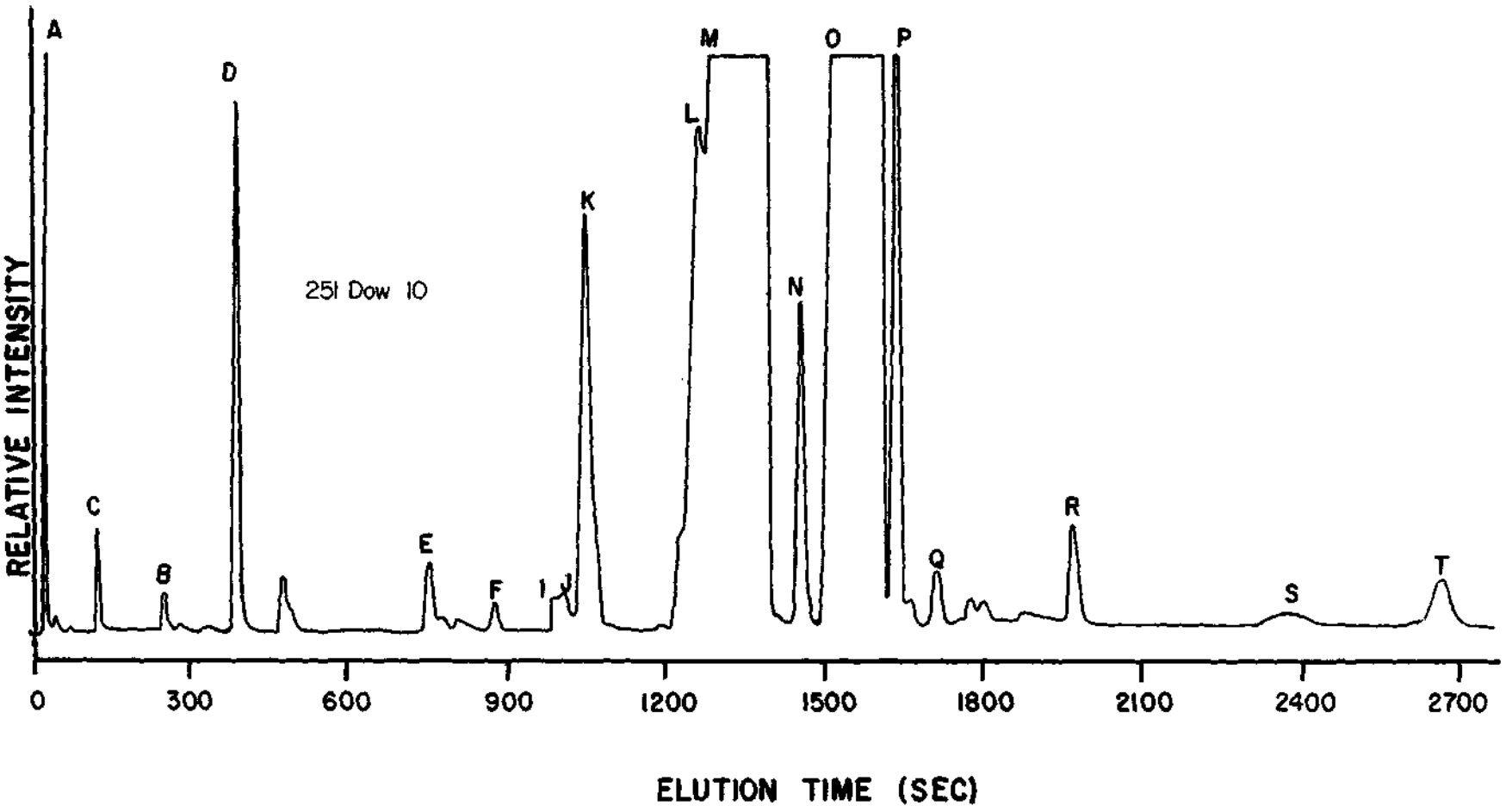

FIGURE C-1. F.I.D. Chromatogram of Gulfport #251.

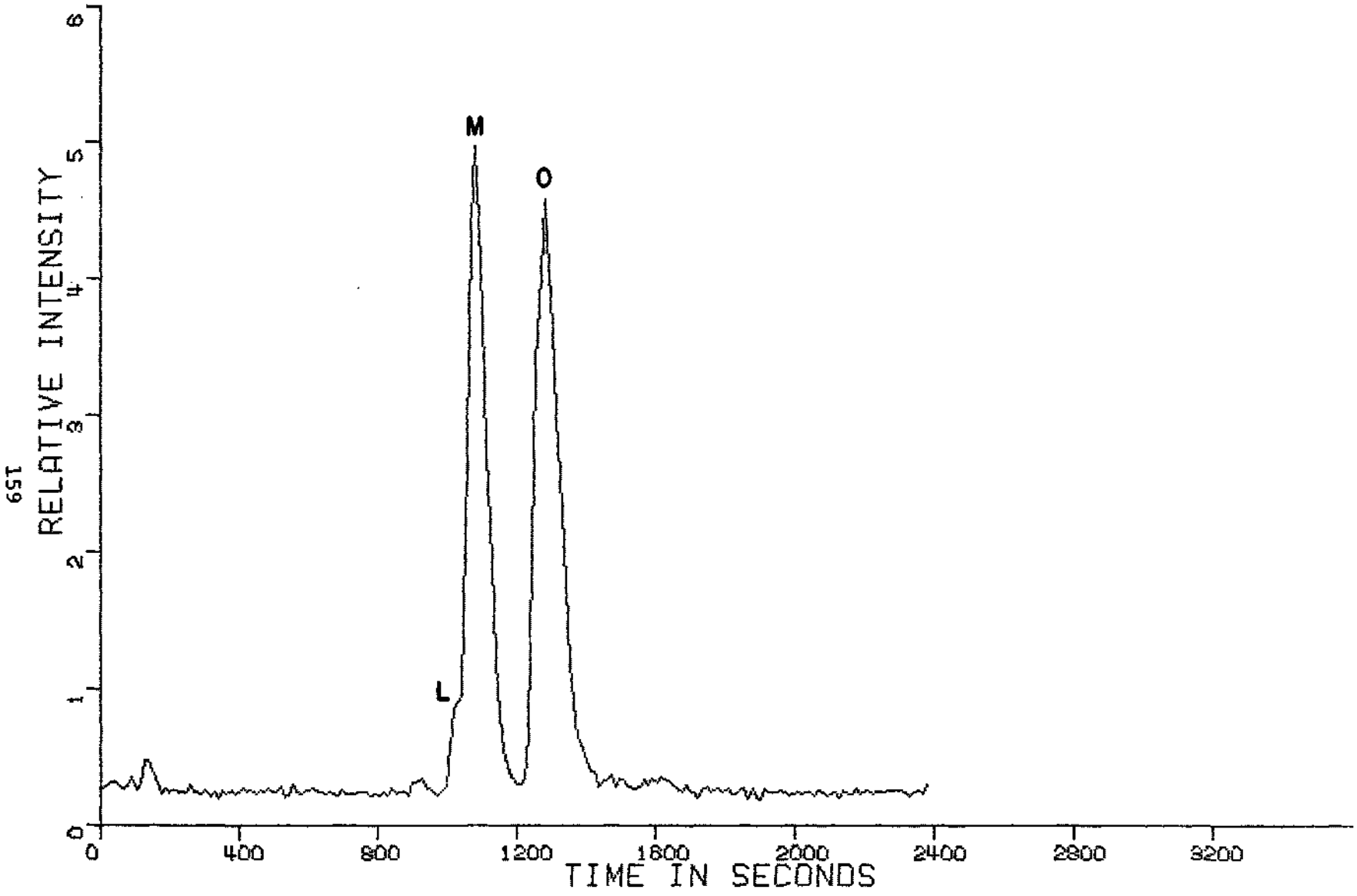

FIGURE C-2. TOTAL ION CHROMATOGRAM OF MAJOR CONSTITUENTS OF GULFPORT #251

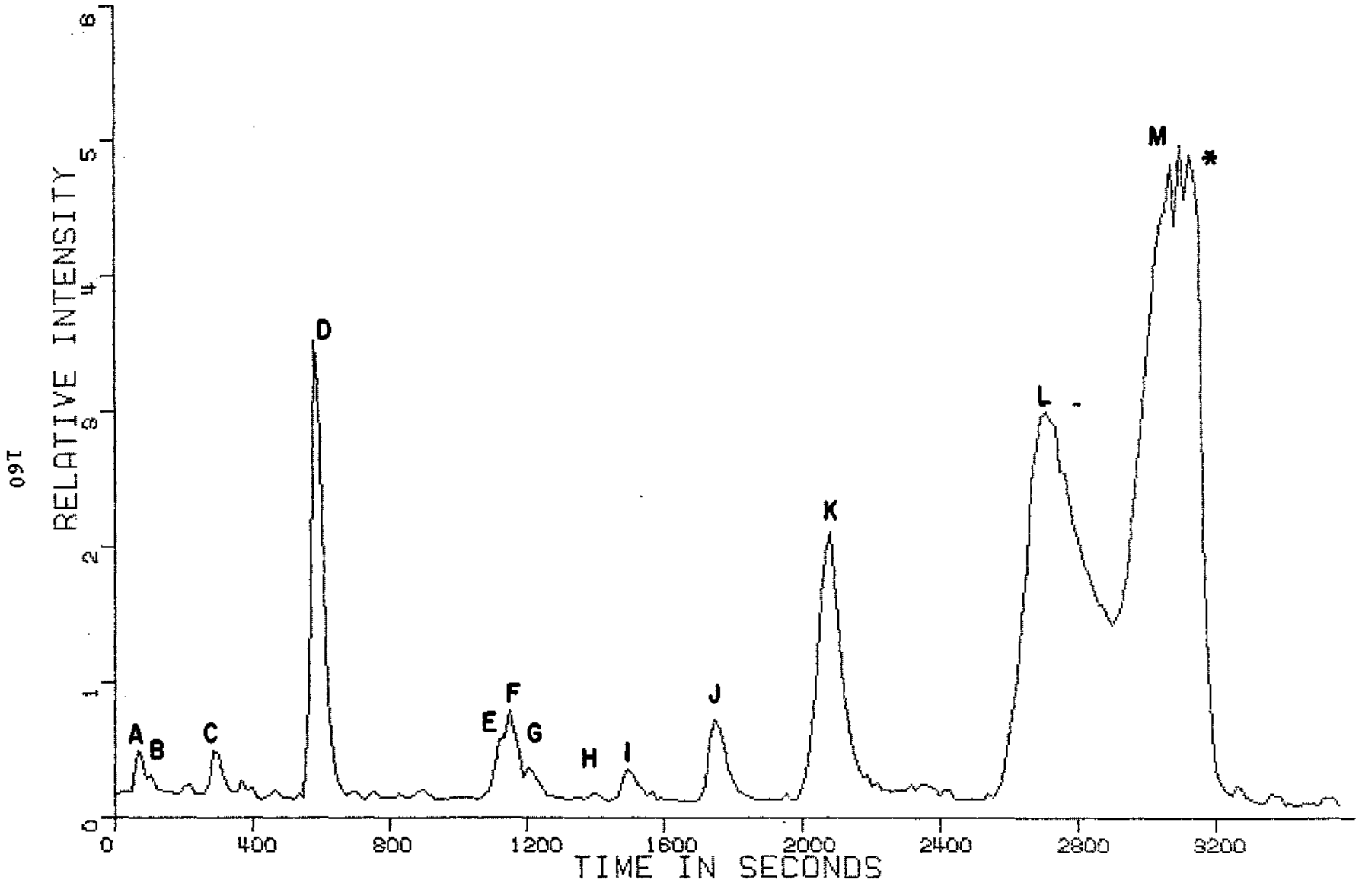

FIGURE C-3. TOTAL ION CHROMATOGRAM OF MINOR CONSTITUENTS OF GULFPORT #251 ELUTING BEFORE THE N-BUTYL ESTER OF 2,4-DICHLORO ACID

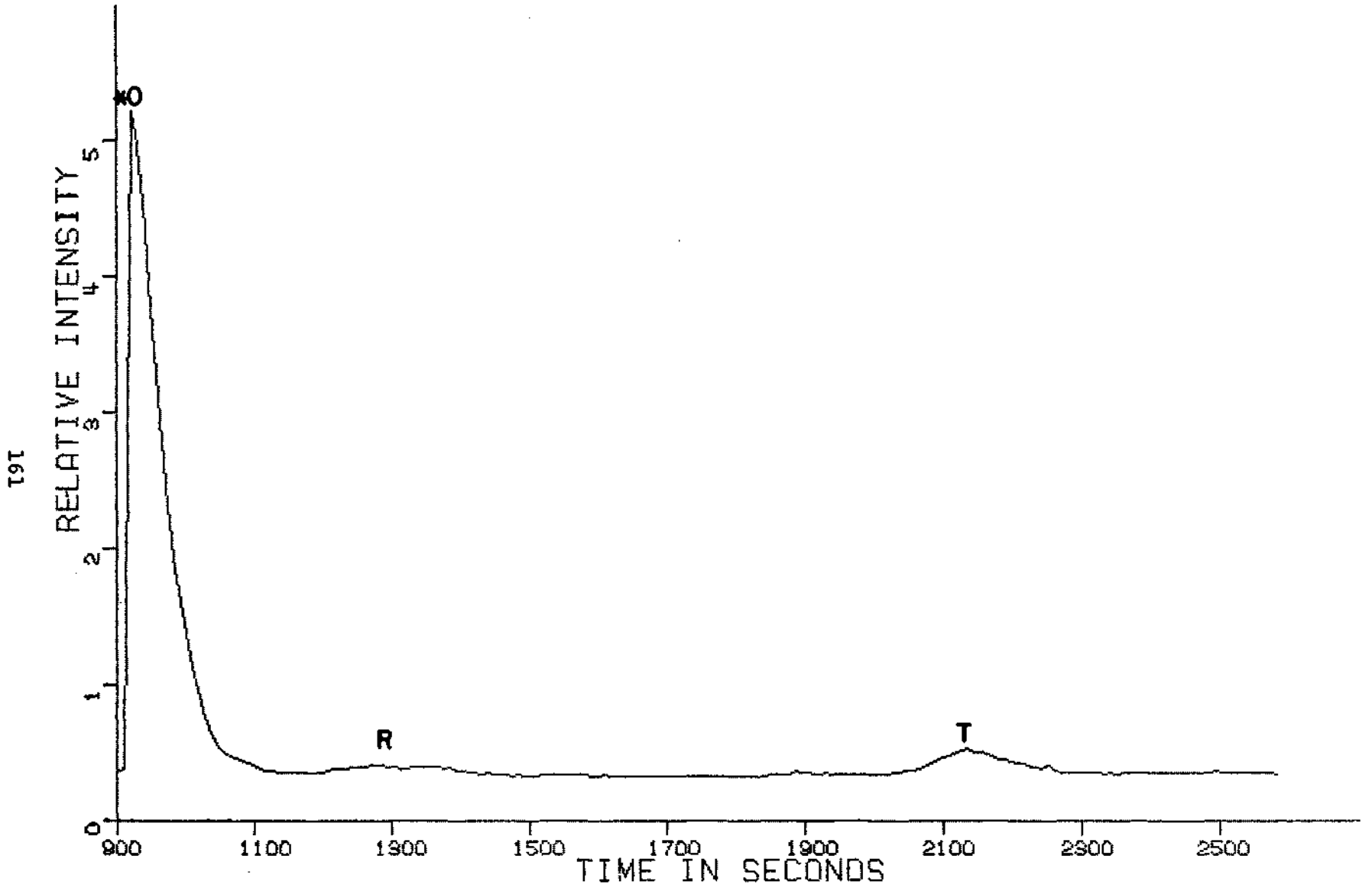

FIGURE C-4. TOTAL ION CHROMATOGRAM OF #251

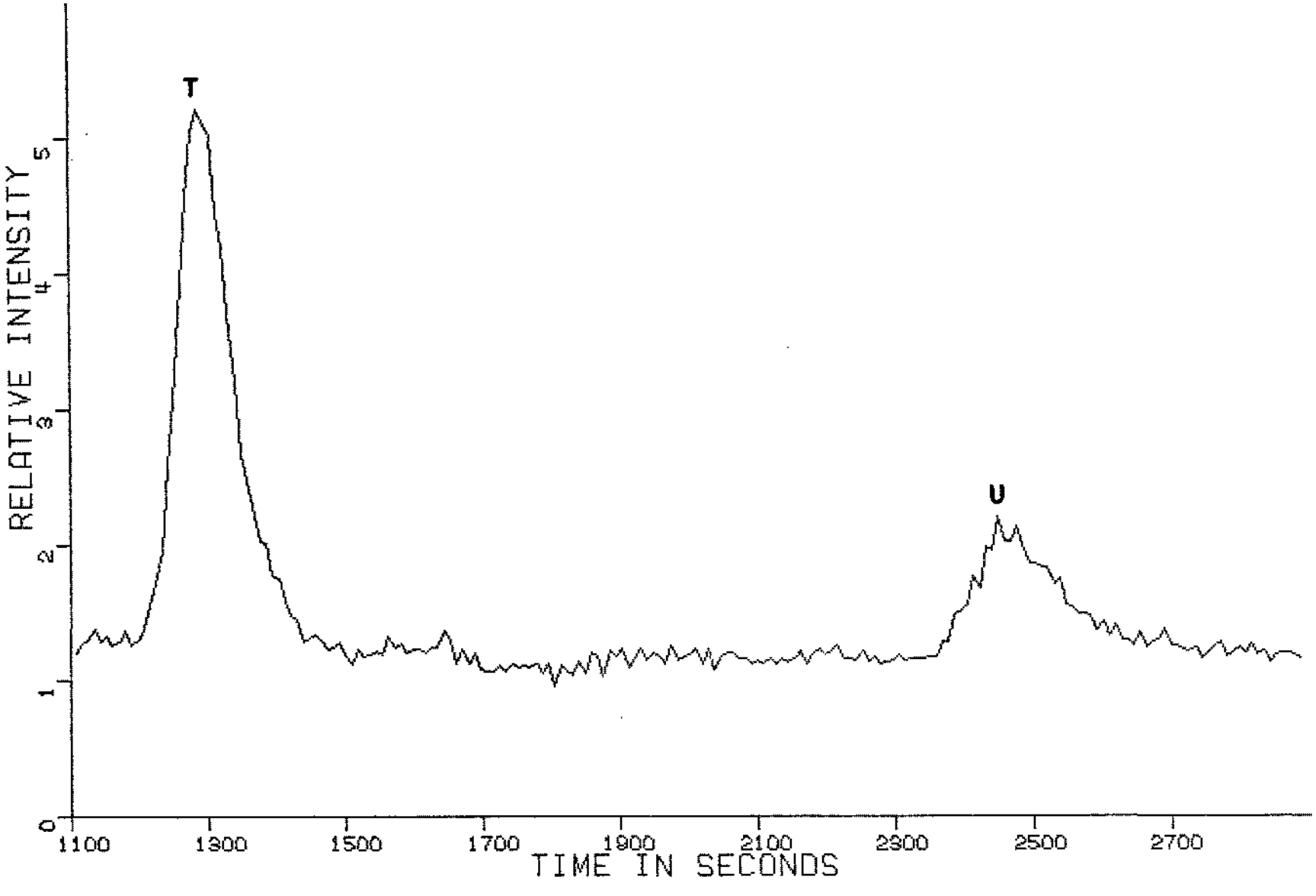

FIGURE C-5. TOTAL ION CHROMATOGRAM OF #251

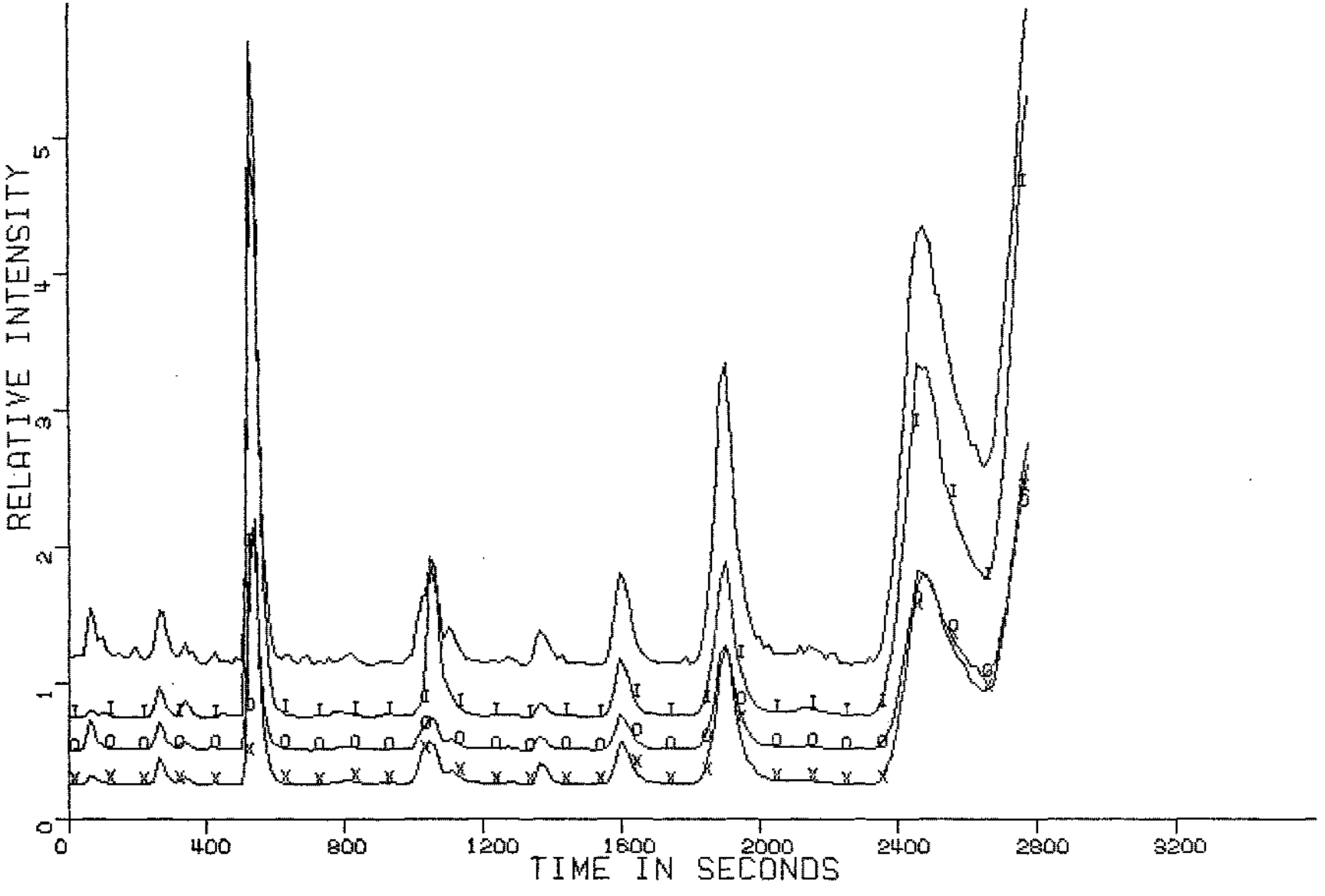

FIGURE C-6. TOTAL ION CHROMATOGRAM AND BUTYL FRAGMENT MASS CHROMATOGRAMS OF #251
I = MASS 57
O = MASS 41
X = MASS 29

TABLE C-1. Normalized Mass Spectrum of Compound M.
Butyl ester of dichlorophenoxy - acetic acid (XIII)

FIL15-1 0.4 MICROLITER 100% GULFPORT#251 10-450 CD491,17 DEC

MASS	SCAN 91	SCAN 70	DIFF.	NORM. DIFF.
15.0	836.	.	836.	1.25
27.0	6570.	.	6570.	9.82
29.0	37171.	.	37171.	55.57
30.0	909.	.	909.	1.36
31.0	1067.	.	1067.	1.60
38.0	699.	.	699.	1.05
39.0	3528.	.	3528.	5.27
41.0	32363.	.	32363.	48.38
42.0	6332.	.	6332.	9.47
43.0	6167.	.	6167.	9.22
44.0	1004.	.	1004.	1.50
50.0	1595.	.	1595.	2.38
51.0	978.	.	978.	1.46
55.0	4870.	.	4870.	7.28
57.0	66889.	.	66889.	100.00
58.0	2901.	.	2901.	4.34
63.0	4100.	.	4100.	6.13
73.0	2827.	.	2827.	4.23
74.0	3091.	.	3091.	4.62
75.0	5076.	.	5076.	7.59
77.0	979.	.	979.	1.46
85.0	1112.	.	1112.	1.66
97.0	778.	.	778.	1.16
109.0	5932.	.	5932.	8.87
111.0	7037.	.	7037.	10.52
133.0	3121.	.	3121.	4.67
135.0	2195.	.	2195.	3.28
145.0	7917.	.	7917.	11.84
147.0	6649.	.	6649.	9.94
149.0	2089.	.	2089.	3.12
161.0	2981.	.	2981.	4.46
162.0	14081.	.	14081.	21.05
163.0	2862.	.	2862.	4.28
164.0	8856.	.	8856.	13.24
166.0	1423.	.	1423.	2.13
175.0	17056.	.	17056.	25.50
176.0	3438.	.	3438.	5.14
177.0	10992.	.	10992.	16.43
179.0	1945.	.	1945.	2.91
185.0	16987.	.	16987.	25.40
187.0	6114.	.	6114.	9.14
220.0	5833.	.	5833.	8.72
222.0	3623.	.	3623.	5.42
276.0	11742.	.	11742.	17.55
278.0	7494.	.	7494.	11.20

SCAN 91 CONTAINED 56 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE C-2. Normalized Mass Spectrum of Compound 0
Butyl ester of trichlorophenoxyacetic acid (XIV)

FIL15-1 0.4 MICROLITER 100% GULFPORT#251 10-450 CD491,17 DEC

MASS	SCAN 108	SCAN 70	DIFF.	NORM. DIFF.
27.0	5963.	.	5963.	7.65
29.0	36962.	.	36962.	47.44
30.0	882.	.	882.	1.13
39.0	3167.	.	3167.	4.07
41.0	31904.	.	31904.	40.95
42.0	6057.	.	6057.	7.77
43.0	5770.	.	5770.	7.41
44.0	1042.	.	1042.	1.34
55.0	4997.	.	4997.	6.41
56.0	3462.	.	3462.	4.44
57.0	77905.	.	77905.	100.00
58.0	3511.	.	3511.	4.51
62.0	1636.	.	1636.	2.10
73.0	1846.	.	1846.	2.37
74.0	2760.	.	2760.	3.54
75.0	913.	.	913.	1.17
97.0	2810.	.	2810.	3.61
99.0	1126.	.	1126.	1.45
107.0	1157.	.	1157.	1.49
109.0	3239.	.	3239.	4.16
111.0	1531.	.	1531.	1.97
143.0	2657.	.	2657.	3.41
144.0	2276.	.	2276.	2.92
145.0	4219.	.	4219.	5.42
146.0	3148.	.	3148.	4.04
147.0	2231.	.	2231.	2.86
148.0	1581.	.	1581.	2.03
167.0	1873.	.	1873.	2.40
169.0	2061.	.	2061.	2.65
179.0	4428.	.	4428.	5.68
181.0	4730.	.	4730.	6.07
183.0	1928.	.	1928.	2.47
195.0	1054.	.	1054.	1.35
196.0	6973.	.	6973.	8.95
197.0	1509.	.	1509.	1.94
198.0	6913.	.	6913.	8.87
200.0	**2123.**	.	**2123.**	**2.73**
209.0	7931.	.	7931.	10.18
211.0	7331.	.	7331.	9.41
213.0	2406.	.	2406.	3.09
219.0	**10105.**	.	**10105.**	**12.97**
221.0	**6483.**	.	**6483.**	**8.32**
254.0	**4126.**	.	**4126.**	**5.30**
256.0	**3930.**	.	**3930.**	**5.04**
310.0	7459.	.	7459.	9.57
311.0	1305.	.	1305.	1.68
312.0	7194.	.	7194.	9.23
313.0	1609.	.	1609.	2.07
314.0	2658.	.	2658.	3.41

SCAN 108 CONTAINED 65 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE C-3. Normalized Mass Spectrum of Compound A. Butanol (I)

FIL0B-1 5 MICROLITER 100% GULFPORT#251 25-300 CD491 19 DEC

MASS	SCAN 5	SCAN 2	DIFF.	NORM. DIFF.
28.0	21133.	19519.	1614.	10.37
29.0	3742.	278.	3464.	22.26
30.0	213.	.	213.	1.37
31.0	15555.	.	15555.	99.97
33.0	1440.	.	1440.	9.26
37.0	187.	.	187.	1.20
38.0	231.	.	231.	1.48
39.0	2486.	228.	2258.	14.51
40.0	819.	286.	533.	3.43
41.0	12944.	874.	12070.	77.58
42.0	5836.	.	5836.	37.51
43.0	10844.	165.	10679.	68.64
44.0	1248.	562.	686.	4.41
45.0	1233.	130.	1103.	7.09
50.0	165.	.	165.	1.06
53.0	231.	.	231.	1.48
55.0	2468.	.	2468.	15.86
56.0	15559.	.	15559.	100.00
57.0	2643.	210.	2433.	15.64
73.0	920.	658.	262.	1.68
91.0	1094.	896.	198.	1.27
92.0	189.	.	189.	1.21
138.0	189.	.	189.	1.21
158.0	189.	.	189.	1.21
163.0	162.	.	162.	1.04
182.0	397.	.	397.	2.55

SCAN 5 CONTAINED 74 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE C-4. Normalized Mass Spectrum of Compound B.

FIL0B-1 5 MICROLITER 100% GULFPORT#251 25-300 CD491 19 DEC

MASS	SCAN 8	SCAN 2	DIFF.	NORM. DIFF.
28.0	20622.	19519.	1103.	45.77
29.0	1396.	278.	1118.	46.39
31.0	1723.	.	1723.	71.49
32.0	1809.	1764.	45.	1.87
33.0	133.	.	133.	5.52
39.0	677.	228.	449.	18.63
41.0	2412.	874.	1538.	63.82
42.0	720.	.	720.	29.88
43.0	2575.	165.	2410.	100.00
44.0	759.	562.	197.	8.17
45.0	212.	130.	82.	3.40
55.0	532.	.	532.	22.07
56.0	2202.	.	2202.	91.37
57.0	1898.	210.	1688.	70.04
73.0	822.	658.	164.	6.80
74.0	136.	.	136.	5.64
75.0	551.	302.	249.	10.33
79.0	122.	.	122.	5.06
81.0	327.	240.	87.	3.61
105.0	159.	.	159.	6.60
126.0	112.	.	112.	4.65
127.0	299.	246.	53.	2.20
140.0	184.	.	184.	7.63
148.0	141.	.	141.	5.85
149.0	241.	162.	79.	3.28
157.0	163.	.	163.	6.76
158.0	155.	.	155.	6.43
169.0	857.	371.	486.	20.17
179.0	304.	241.	63.	2.61
181.0	133.	.	133.	5.52
183.0	448.	412.	36.	1.49
186.0	180.	.	180.	7.47
188.0	368.	306.	62.	2.57
195.0	507.	426.	81.	3.36
197.0	647.	583.	64.	2.66
200.0	318.	207.	111.	4.61
202.0	93.	.	93.	3.86
203.0	261.	209.	52.	2.16
209.0	154.	.	154.	6.39
218.0	331.	257.	74.	3.07
250.0	380.	343.	37.	1.54
253.0	1688.	1635.	53.	2.20
267.0	150.	.	150.	6.22

SCAN 8 CONTAINED 73 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE C-5. Normalized Mass Spectrum of Compound C. Butyl chloride (IV)

FIL0B-1 5 MICROLITER 100% GULFPORT#251 25-300 CD491 19 DEC

MASS	SCAN 21	SCAN 18	DIFF.	NORM. DIFF.
29.0	11209.	366.	10843.	74.22
30.0	289.	.	289.	1.98
31.0	524.	.	524.	3.59
38.0	212.	.	212.	1.45
39.0	1952.	307.	1645.	11.26
40.0	499.	217.	282.	1.93
41.0	12128.	920.	11208.	76.71
42.0	2326.	.	2326.	15.92
43.0	2094.	333.	1761.	12.05
48.0	177.	.	177.	1.21
49.0	2916.	.	2916.	19.96
50.0	273.	.	273.	1.87
51.0	1154.	250.	904.	6.19
53.0	180.	.	180.	1.23
55.0	2286.	194.	2092.	14.32
56.0	14610.	.	14610.	100.00
57.0	12751.	278.	12473.	85.37
58.0	510.	.	510.	3.49
60.0	273.	.	273.	1.87
71.0	528.	.	528.	3.61
73.0	734.	546.	188.	1.29
76.0	281.	.	281.	1.92
77.0	7416.	199.	7217.	49.40
79.0	2276.	.	2276.	15.58
95.0	671.	.	671.	4.59
97.0	275.	.	275.	1.88
107.0	1032.	.	1032.	7.06
109.0	396.	79.	317.	2.17
138.0	224.	.	224.	1.53
158.0	239.	.	239.	1.64
168.0	864.	.	864.	5.91
181.0	179.	.	179.	1.23
182.0	499.	351.	148.	1.01
200.0	300.	.	300.	2.05
209.0	153.	.	153.	1.05
251.0	161.	.	161.	1.10
278.0	253.	.	253.	1.73

SCAN 21 CONTAINED 77 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

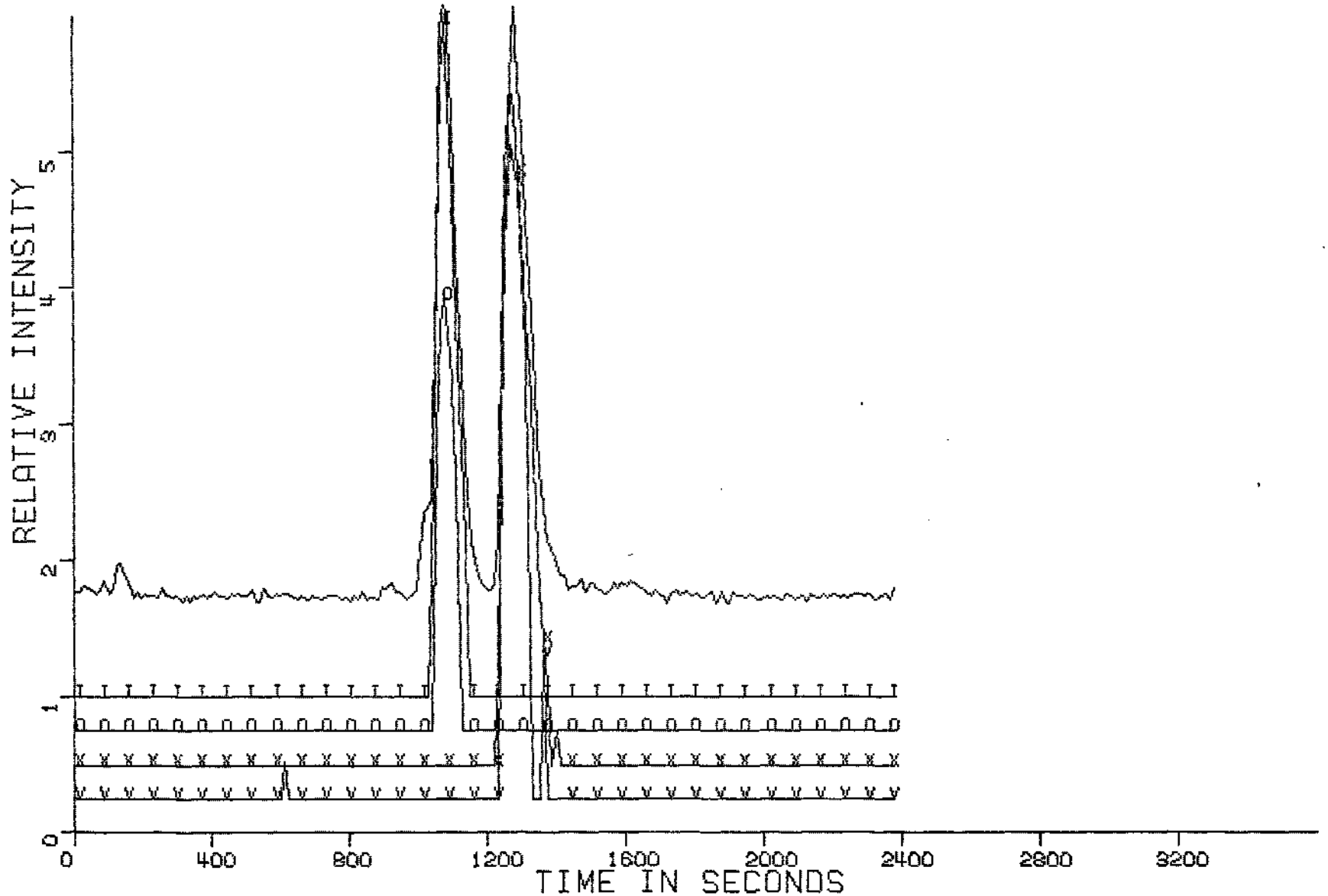

FIGURE C-7. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #251

I = MASS 276
O = MASS 278
X = MASS 310
V = MASS 312

TABLE C-6. Normalized Mass Spectra of Compound D.

FIL0B-1 5 MICROLITER 100% GULFPORT#251 25-300 CD491 19 DEC

MASS	SCAN 43	SCAN 39	DIFF.	NORM. DIFF.
28.0	21380.	11738.	9642.	4.20
29.0	108581.	571.	108010.	47.06
30.0	3015.	.	3015.	1.31
31.0	11518.	138.	11380.	4.96
39.0	12274.	343.	11931.	5.20
41.0	83014.	1020.	81994.	35.72
42.0	12238.	.	12238.	5.33
43.0	8584.	365.	8219.	3.58
44.0	5227.	630.	4597.	2.00
45.0	5341.	79.	5262.	2.29
55.0	13958.	.	13958.	6.08
56.0	**97896.**	**296.**	**97600.**	**42.52**
57.0	**230447.**	**912.**	**229535.**	**100.00**
58.0	**10446.**	.	**10446.**	**4.55**
60.0	**47410.**	.	**47410.**	**20.65**
61.0	**25749.**	.	**25749.**	**11.22**
73.0	3486.	744.	2742.	1.19
77.0	3046.	275.	2771.	1.21
87.0	15597.	.	15597.	6.80
89.0	7658.	.	7658.	3.34

SCAN 43 CONTAINED 70 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

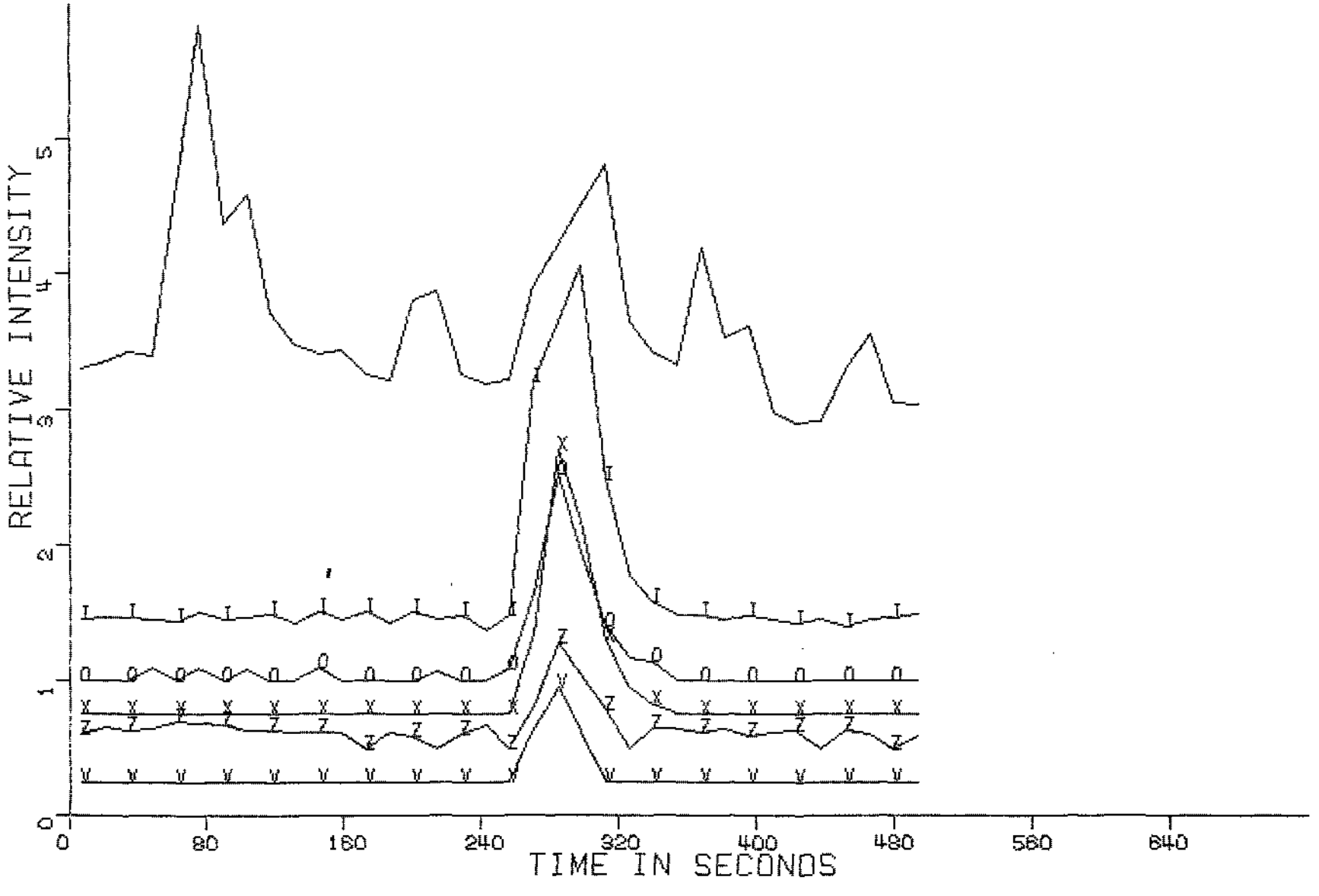

FIGURE C-8. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #251
I = MASS 77
O = MASS 79
X = MASS 49
Z = MASS 51
V = MASS 107

TABLE C-7. Normalized Mass Spectrum of Compound E. Butyl ether of dichlorophenol (VII)

FIL0B-1 5 MICROLITER 100% GULFPORT#251 25-300 CD491 19 DEC

MASS	SCAN 81	SCAN 76	DIFF.	NORM. DIFF
29.0	13778.	787.	12991.	52.31
30.0	298.	.	298.	1.20
37.0	256.	.	256.	1.03
38.0	423.	.	423.	1.70
39.0	2557.	371.	2186.	8.80
41.0	9818.	885.	8933.	35.97
42.0	442.	.	442.	1.78
50.0	458.	.	458.	1.84
51.0	450.	159.	291.	1.17
53.0	514.	.	514.	2.07
55.0	1474.	251.	1223.	4.92
56.0	1429.	162.	1267.	5.10
57.0	6396.	951.	5445.	21.92
58.0	251.	.	251.	1.01
61.0	410.	.	410.	1.65
62.0	782.	.	782.	3.15
63.0	3255.	.	3255.	13.11
64.0	251.	.	251.	1.01
69.0	261.	.	261.	1.05
72.0	331.	.	331.	1.33
73.0	1603.	612.	991.	3.99
74.0	730.	.	730.	2.94
75.0	1318.	268.	1050.	4.23
83.0	310.	.	310.	1.25
85.0	318.	.	318.	1.28
97.0	459.	.	459.	1.85
98.0	1658.	186.	1472.	5.93
99.0	894.	.	894.	3.60
100.0	490.	.	490.	1.97
101.0	367.	.	367.	1.48
103.0	253.	.	253.	1.02
109.0	826.	110.	716.	2.88
111.0	563.	.	563.	2.27
126.0	701.	.	701.	2.82
128.0	510.	.	510.	2.05
133.0	1298.	299.	999.	4.02
135.0	1350.	1083.	267.	1.08
145.0	462.	.	462.	1.86
147.0	579.	131.	448.	1.80
161.0	436.	.	436.	1.76
162.0	24837.	.	24837.	100.00
163.0	1970.	.	1970.	7.93
164.0	14973.	.	14973.	60.29

165.0	1152.	162.	990.	3.99
166.0	2535.	.	2535.	10.21
175.0	292.	.	292.	1.18
177.0	365.	.	365.	1.47
196.0	612.	.	612.	2.46
198.0	453.	.	453.	1.82
218.0	2009.	248.	1761.	7.09
219.0	269.	.	269.	1.08
220.0	1338.	.	1338.	5.39

SCAN 81 CONTAINED 100 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE C-8. Normalized Mass Spectrum of Compound F.

FIL0B-1 5 MICROLITER 100% GULFPORT#251 25-300 CD491 19 DEC

MASS	SCAN 83	SCAN 76	DIFF.	NORM. DIFF.
28.0	12847.	11920.	927.	1.42
29.0	17600.	787.	16813.	25.70
31.0	720.	.	720.	1.10
39.0	2122.	371.	1751.	2.68
41.0	14274.	885.	13389.	20.47
42.0	777.	.	777.	1.19
47.0	1107.	.	1107.	1.69
55.0	1940.	251.	1689.	2.58
56.0	2194.	162.	2032.	3.11
57.0	66360.	951.	65409.	100.00
58.0	3215.	.	3215.	4.92
63.0	1084.	.	1084.	1.66
103.0	7805.	.	7805.	11.93
131.0	691.	.	691.	1.06
159.0	3652.	.	3652.	5.58
162.0	7902.	.	7902.	12.08
164.0	4657.	.	4657.	7.12
166.0	798.	.	798.	1.22

SCAN 83 CONTAINED 95 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE C-9. Normalized Mass Spectrum of Compound G.

FIL0B-1 5 MICROLITER 100% GULFPORT#251 25-300 CD491 19 DEC

MASS	SCAN 87	SCAN 76	DIFF.	NORM. DIFF.
28.0	13248.	11920.	1328.	9.01
29.0	4779.	787.	3992.	27.09
31.0	330.	.	330.	2.24
39.0	733.	371.	362.	2.46
41.0	4553.	885.	3668.	24.89
42.0	372.	.	372.	2.52
43.0	667.	238.	429.	2.91
45.0	325.	.	325.	2.21
55.0	1502.	251.	1251.	8.49
56.0	2734.	162.	2572.	17.46
57.0	10981.	951.	10030.	68.07
58.0	432.	.	432.	2.93
71.0	212.	.	212.	1.44
73.0	1222.	612.	610.	4.14
74.0	664.	.	664.	4.51
100.0	347.	.	347.	2.36
101.0	14734.	.	14734.	100.00
102.0	687.	.	687.	4.66
103.0	666.	.	666.	4.52
119.0	480.	.	480.	3.26
156.0	829.	663.	166.	1.13
157.0	1494.	.	1494.	10.14
159.0	294.	.	294.	2.00
161.0	161.	.	161.	1.09
162.0	499.	.	499.	3.39
164.0	362.	.	362.	2.46
175.0	173.	.	173.	1.17
177.0	190.	.	190.	1.29

SCAN 87 CONTAINED 69 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

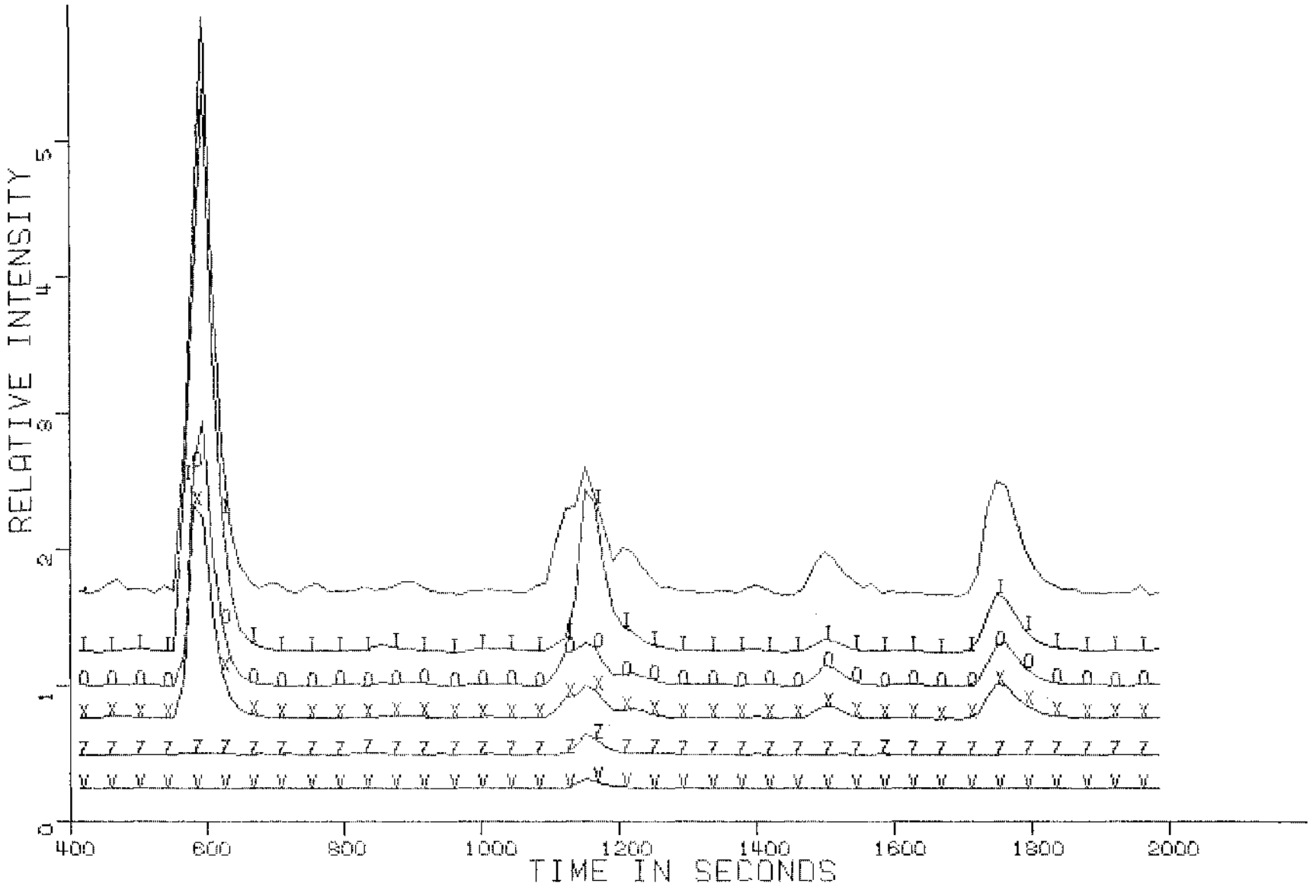

FIGURE C-9. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #251

I = MASS 57
O = MASS 29
X = MASS 41
Z = MASS 103
V = MASS 159

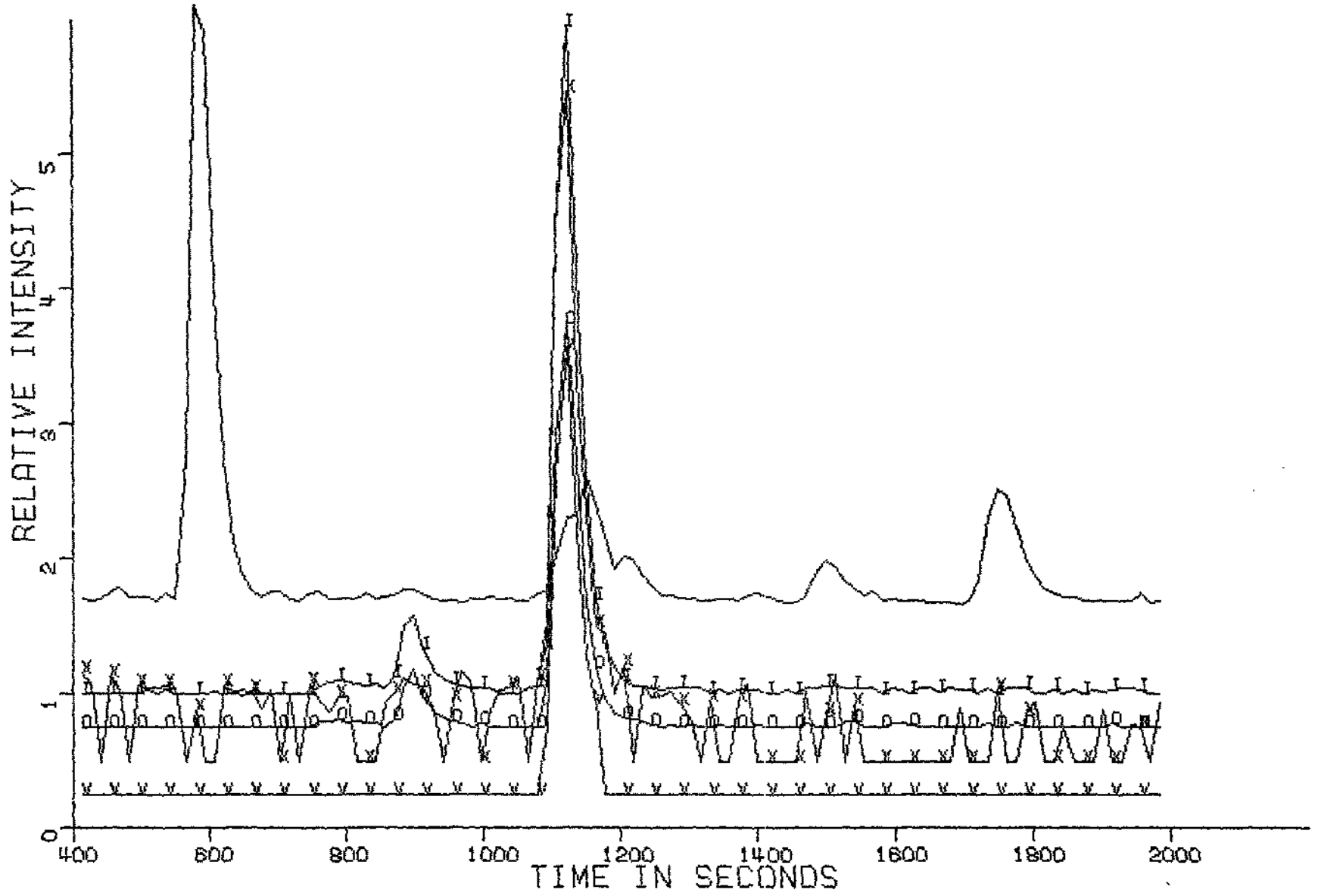

FIGURE C-10. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #251

I = MASS 162
O = MASS 164 X = MASS 218 V = MASS 220

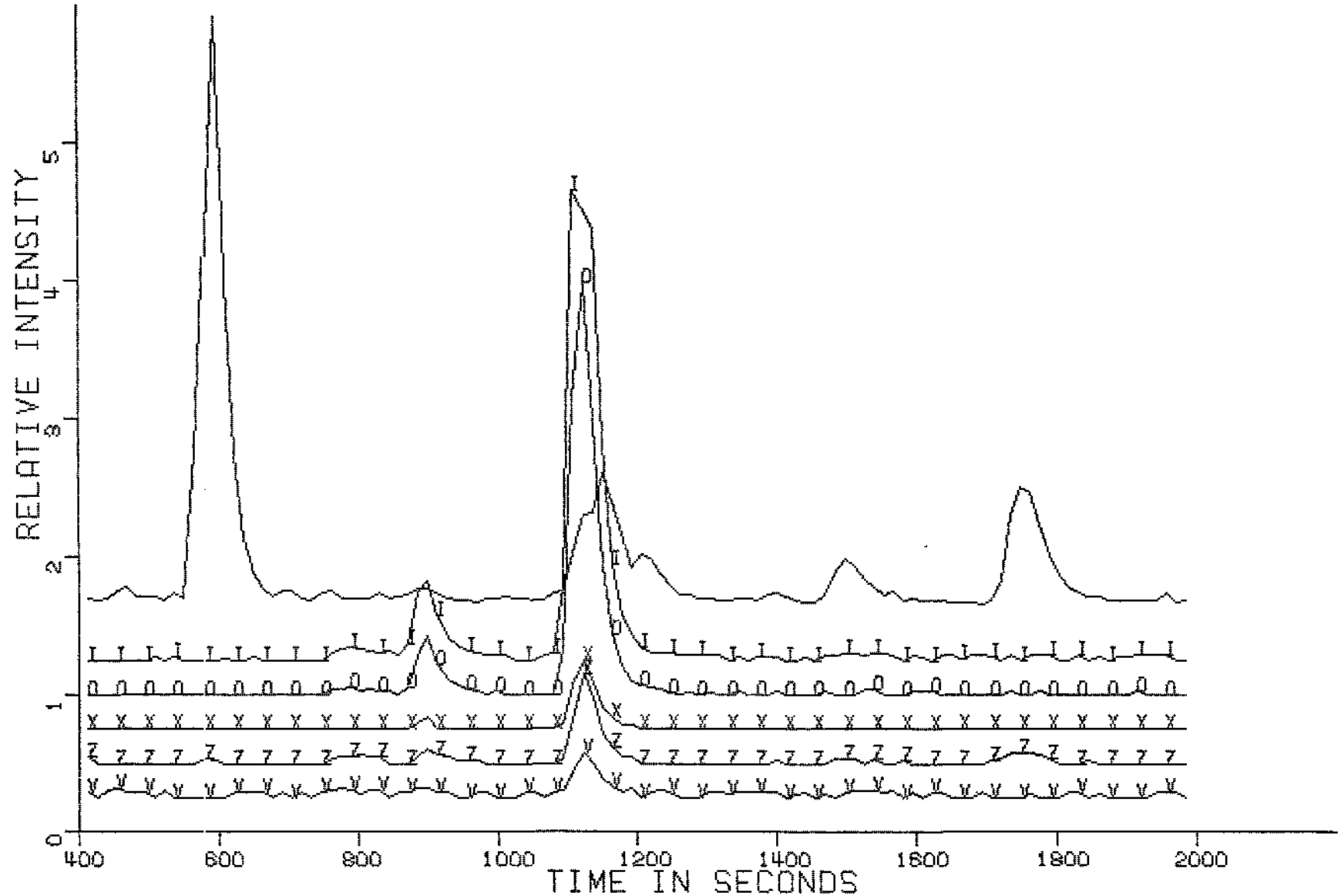

FIGURE C-11. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #251
I = MASS 162 O = MASS 164
X = MASS 166 Z = MASS 63
V = MASS 98

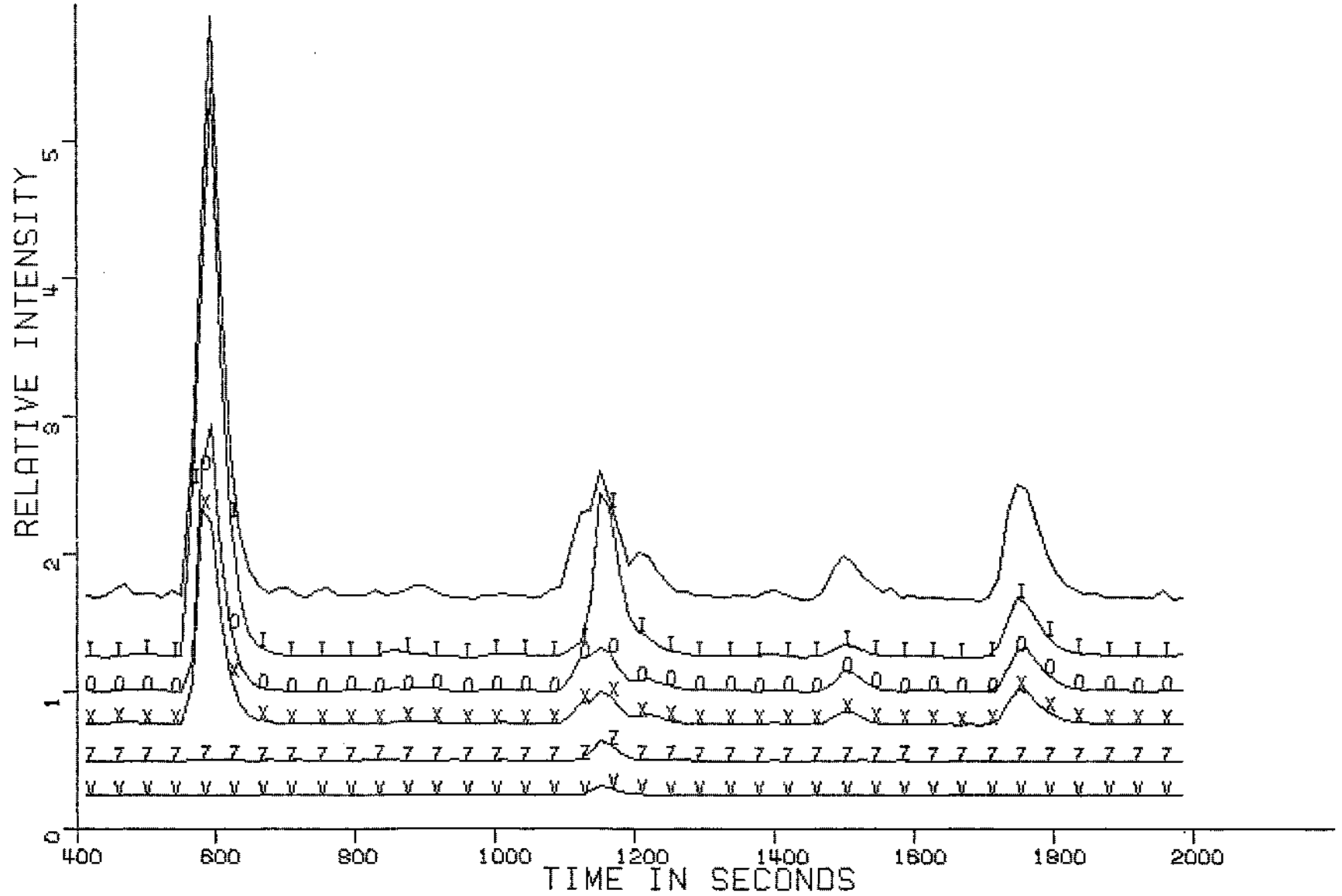

FIGURE C-12. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #251
I = MASS 57
X = MASS 41
V = MASS 159
O = MASS 29
Z = MASS 103

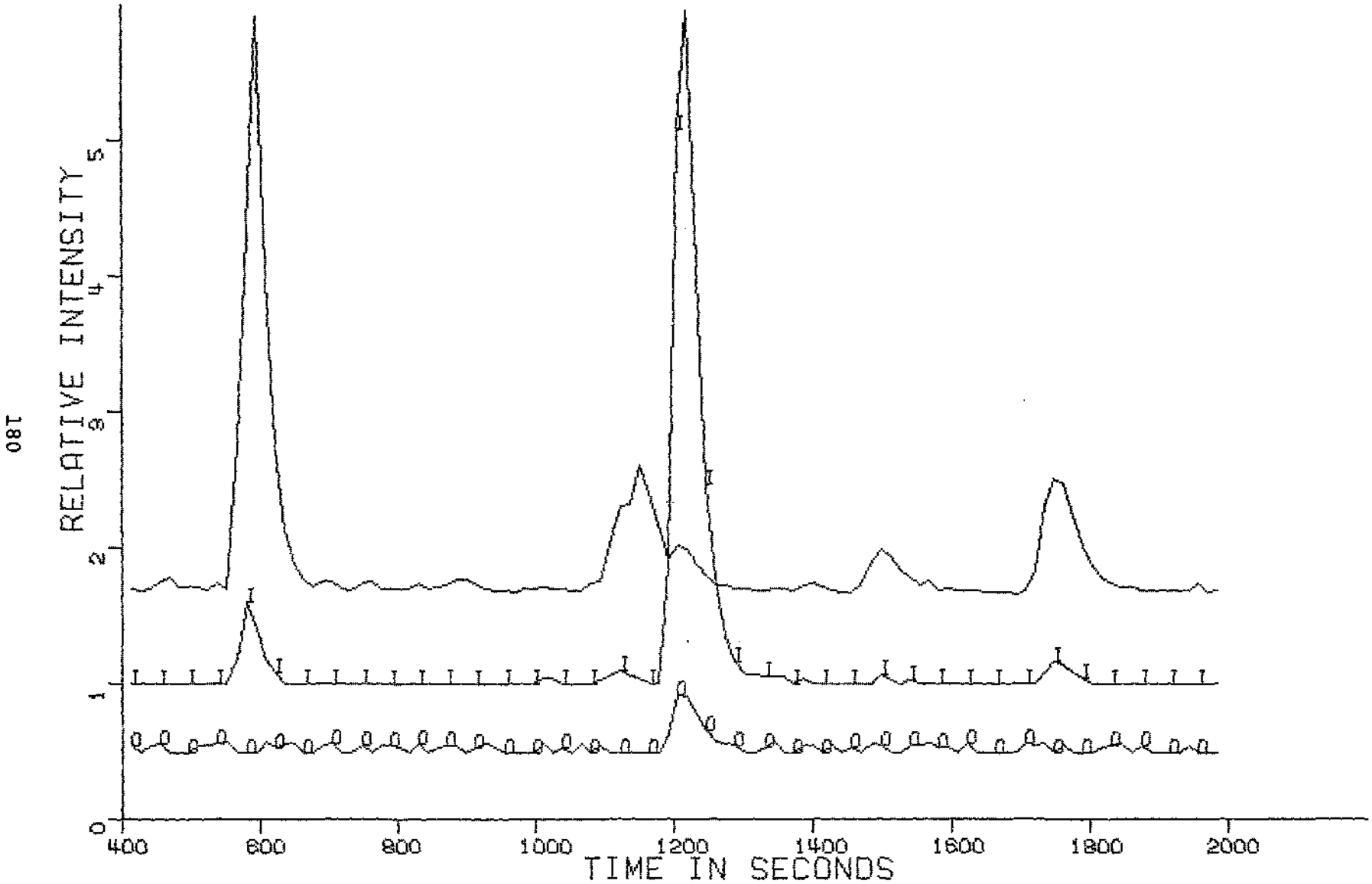

FIGURE C-13. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #251

I = MASS 101

TABLE C-10. Normalized Mass Spectrum of Compound H.

FIL0B-1 5 MICROLITER 100% GULFPORT#251 25-300 CD491 19 DEC

MASS	SCAN 101	SCAN 99	DIFF.	NORM. DIFF.
29.0	1411.	492.	919.	69.73
32.0	2151.	1917.	234.	17.75
36.0	354.	282.	72.	5.46
39.0	654.	370.	284.	21.55
41.0	1767.	1050.	717.	54.40
43.0	349.	276.	73.	5.54
50.0	218.	.	218.	16.54
51.0	555.	218.	337.	25.57
55.0	280.	200.	80.	6.07
57.0	1472.	986.	486.	36.87
63.0	114.	.	114.	8.65
65.0	199.	.	199.	15.10
75.0	232.	214.	18.	1.37
77.0	1636.	493.	1143.	86.72
79.0	345.	152.	193.	14.64
81.0	318.	208.	110.	8.35
93.0	232.	198.	34.	2.58
94.0	363.	.	363.	27.54
103.0	126.	.	126.	9.56
107.0	1618.	300.	1318.	100.00
108.0	297.	.	297.	22.53
119.0	196.	168.	28.	2.12
132.0	134.	.	134.	10.17
134.0	187.	.	187.	14.19
135.0	992.	899.	93.	7.06
137.0	284.	.	284.	21.55
141.0	303.	.	303.	22.99
149.0	230.	.	230.	17.45
152.0	421.	.	421.	31.94
156.0	694.	603.	91.	6.90
157.0	171.	.	171.	12.97
164.0	134.	.	134.	10.17
168.0	890.	.	890.	67.53
170.0	187.	.	187.	14.19
186.0	163.	.	163.	12.37
188.0	296.	258.	38.	2.88
189.0	203.	.	203.	15.40
193.0	190.	169.	21.	1.59
195.0	339.	235.	104.	7.89
197.0	581.	491.	90.	6.83
200.0	249.	.	249.	18.89
208.0	697.	206.	491.	37.25
216.0	258.	235.	23.	1.75
217.0	269.	244.	25.	1.90

SCAN 101 CONTAINED 64 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

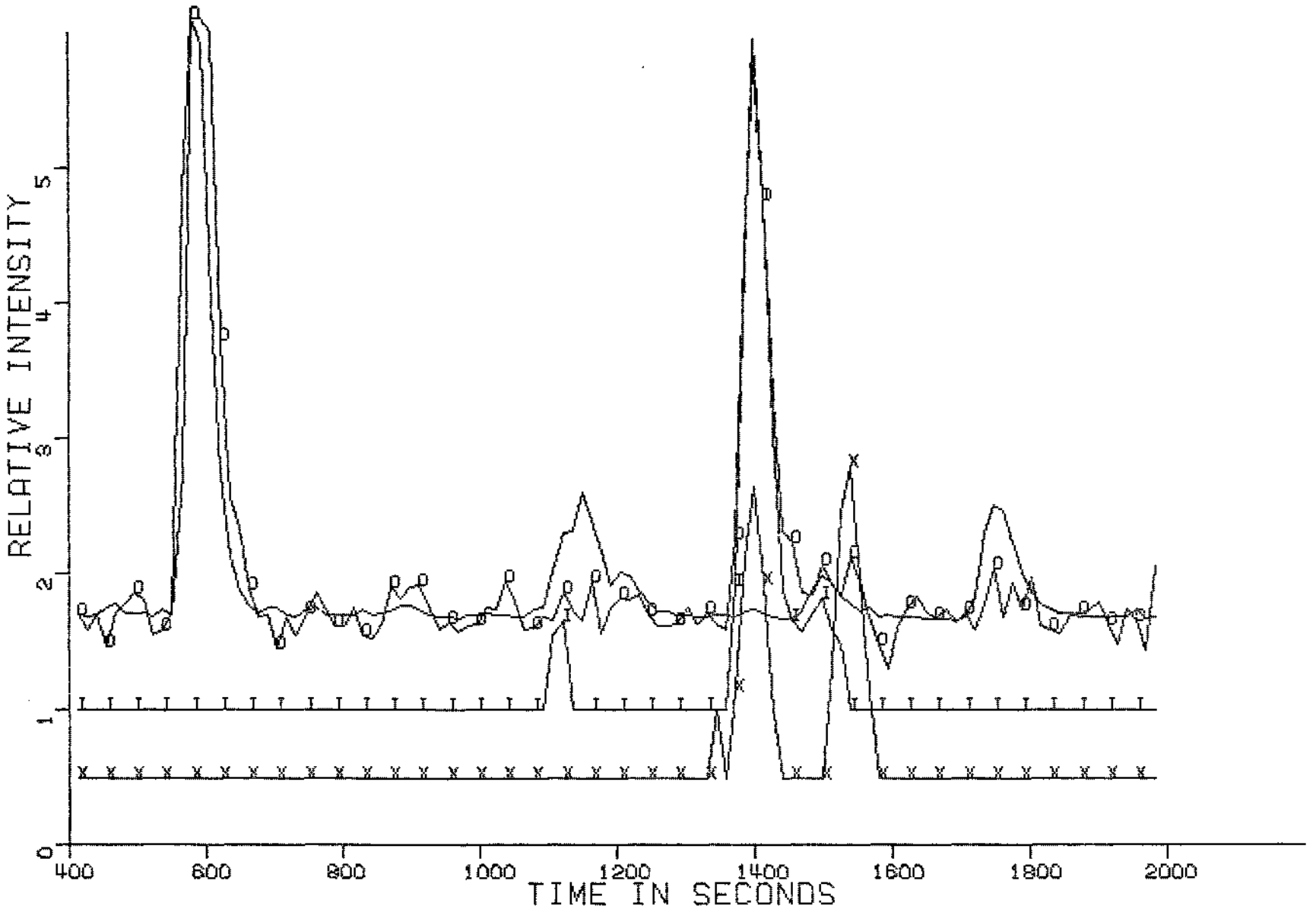

FIGURE C-14. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #251

I = MASS 107
X = MASS 208
O = MASS 77

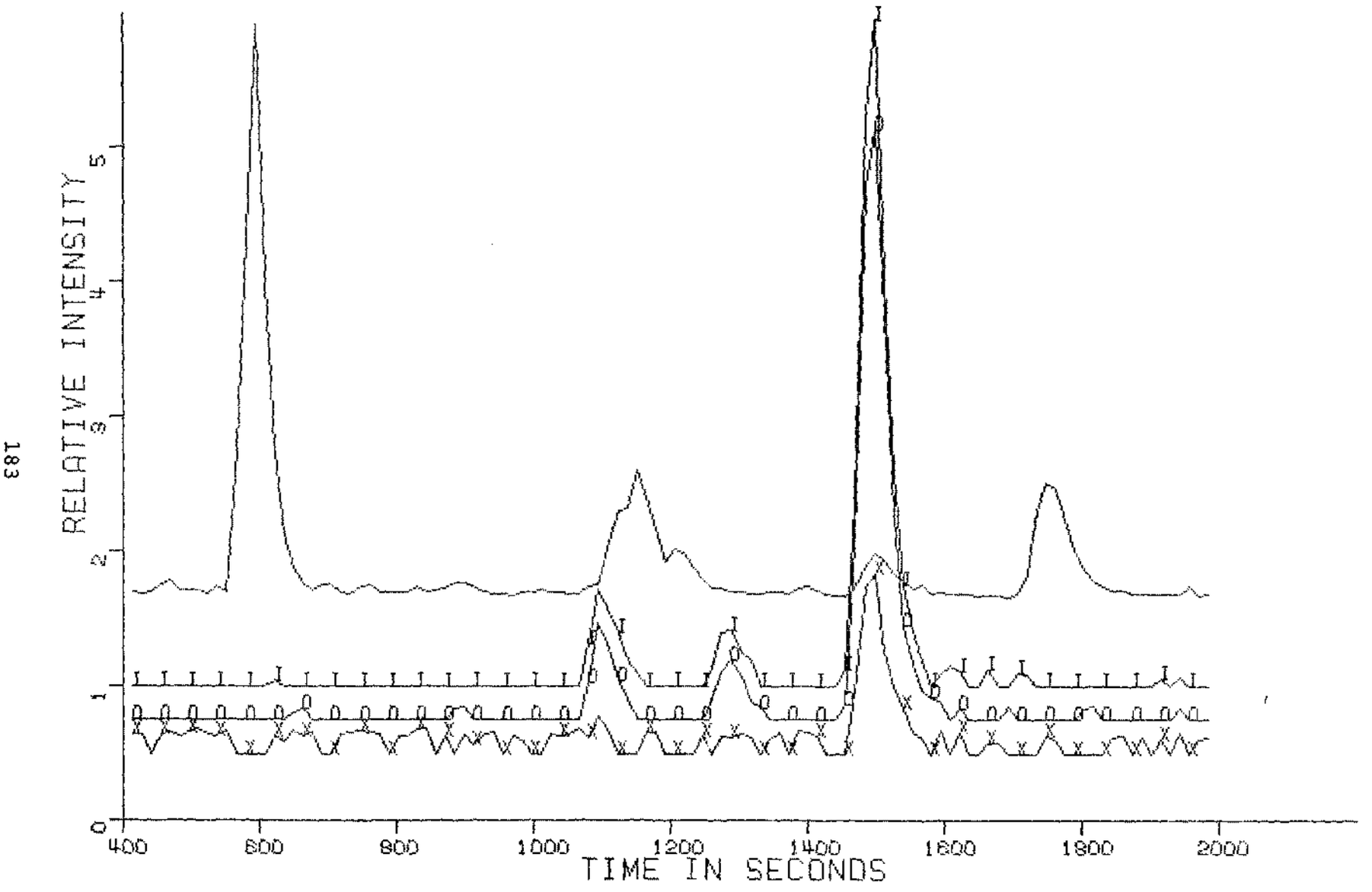

FIGURE C-15. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #251

I = MASS 196
X = MASS 200
O = MASS 198

TABLE C-11. Normalized Mass Spectrum of Compound I. Butyl ether of trichlorophenol (VIII)

FIL0B-1 5 MICROLITER 100% GULFPORT#251 25-300 CD491 19 DEC

MASS	SCAN 108	SCAN 104	DIFF.	NORM. DIFF.
28.0	12400.	12229.	171.	2.13
29.0	8638.	622.	8016.	100.00
30.0	179.	.	179.	2.23
31.0	188.	.	188.	2.35
37.0	211.	.	211.	2.63
39.0	1452.	397.	1055.	13.16
40.0	259.	.	259.	3.23
41.0	6031.	852.	5179.	64.61
42.0	442.	.	442.	5.51
43.0	437.	277.	160.	2.00
53.0	271.	.	271.	3.38
55.0	1016.	.	1016.	12.67
56.0	1452.	196.	1256.	15.67
57.0	5892.	541.	5351.	66.75
58.0	244.	.	244.	3.04
59.0	95.	.	95.	1.19
60.0	305.	.	305.	3.80
61.0	348.	.	348.	4.34
62.0	396.	.	396.	4.94
63.0	193.	.	193.	2.41
69.0	260.	.	260.	3.24
72.0	170.	.	170.	2.12
73.0	999.	712.	287.	3.58
74.0	410.	.	410.	5.11
83.0	209.	.	209.	2.61
85.0	148.	.	148.	1.85
87.0	327.	.	327.	4.08
89.0	240.	.	240.	2.99
90.0	312.	.	312.	3.89
97.0	1091.	.	1091.	13.61
99.0	381.	.	381.	4.75
100.0	432.	.	432.	5.39
101.0	271.	.	271.	3.38
109.0	486.	.	486.	6.06
118.0	276.	.	276.	3.44
127.0	146.	.	146.	1.82
132.0	372.	.	372.	4.64
133.0	508.	301.	207.	2.58
134.0	328.	.	328.	4.09
135.0	1010.	882.	128.	1.60
136.0	159.	.	159.	1.98
138.0	224.	.	224.	2.79
143.0	752.	.	752.	9.38
145.0	269.	.	269.	3.36
147.0	194.	.	194.	2.42
148.0	150.	.	150.	1.87
157.0	185.	.	185.	2.31
161.0	97.	.	97.	1.21
162.0	315.	143.	172.	2.15
163.0	201.	.	201.	2.51
167.0	282.	.	282.	3.52
169.0	754.	.	754.	9.41
179.0	308.	208.	100.	1.25
181.0	132.	.	132.	1.65

183.0	431.	350.	81.	1.01
186.0	131.	.	131.	1.63
187.0	641.	445.	196.	2.45
189.0	143.	.	143.	1.78
191.0	261.	.	261.	3.26
195.0	233.	138.	95.	1.19
196.0	**7587.**	.	**7587.**	**94.65**
197.0	994.	455.	539.	6.72
198.0	6716.	.	6716.	83.78
199.0	438.	.	438.	5.46
200.0	**2036.**	.	**2036.**	**25.40**
202.0	**315.**	.	**315.**	**3.93**
209.0	**189.**	.	**189.**	**2.36**
211.0	**159.**	.	**159.**	**1.98**
218.0	**144.**	.	**144.**	**1.80**
252.0	748.	.	748.	9.33
254.0	786.	.	786.	9.81
255.0	383.	256.	127.	1.58
256.0	185.	.	185.	2.31

SCAN 108 CONTAINED 95 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

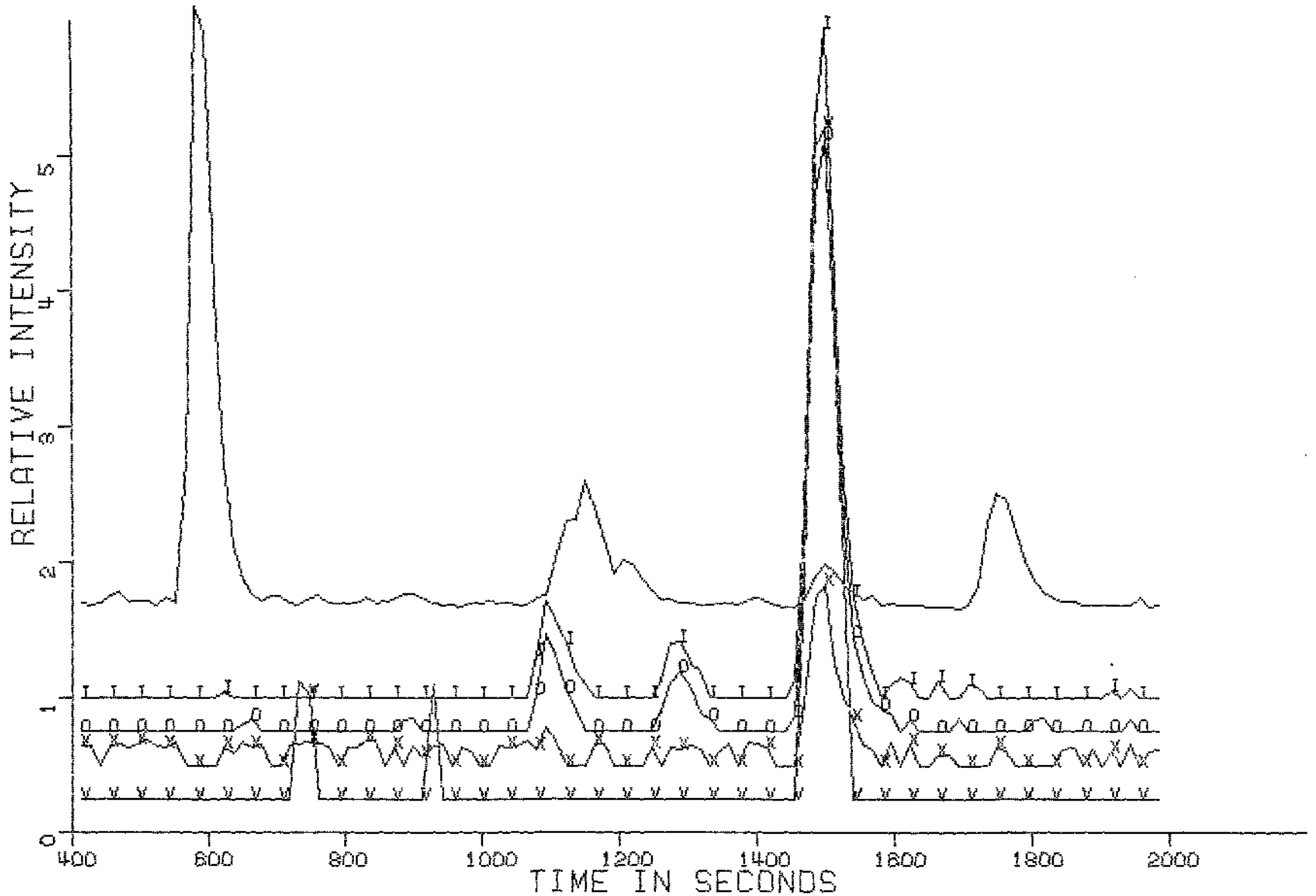

FIGURE C-16. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #251

I = MASS 196
X = MASS 200
O = MASS 198
V = MASS 252

TABLE C-12. Normalized Mass Spectra of Compound J. Butyl ether of trichlorophenol (VIII)

FIL0B-1 5 MICROLITER 100% GULFPORT#251 25-300 CD491 19 DEC

MASS	SCAN 126	SCAN 121	DIFF.	NORM. DIFF.
28.0	13180.	12339.	841.	3.53
29.0	16702.	310.	16392.	68.76
30.0	461.	.	461.	1.93
31.0	2973.	.	2973.	12.47
39.0	1888.	274.	1614.	6.77
41.0	14781.	802.	13979.	58.64
42.0	3671.	.	3671.	15.40
43.0	2543.	.	2543.	10.67
44.0	2426.	644.	1782.	7.48
45.0	1051.	.	1051.	4.41
53.0	326.	.	326.	1.37
55.0	1995.	.	1995.	8.37
56.0	20514.	164.	20350.	85.36
57.0	24310.	471.	23839.	100.00
58.0	1118.	.	1118.	4.69
59.0	467.	.	467.	1.96
60.0	8209.	.	8209.	34.44
61.0	12233.	.	12233.	51.32
62.0	365.	.	365.	1.53
63.0	412.	.	412.	1.73
69.0	977.	.	977.	4.10
71.0	605.	.	605.	2.54
87.0	393.	.	393.	1.65
88.0	756.	.	756.	3.17
89.0	17395.	.	17395.	72.97
90.0	623.	.	623.	2.61
91.0	983.	520.	463.	1.94
101.0	**610.**	.	**610.**	**2.56**
116.0	**5825.**	.	**5825.**	**24.43**
117.0	**876.**	.	**876.**	**3.67**
134.0	**528.**	.	**528.**	**2.21**
135.0	1493.	918.	575.	2.41
145.0	986.	.	986.	4.14
169.0	748.	271.	477.	2.00
172.0	518.	.	518.	2.17
182.0	423.	.	423.	1.77

SCAN 126 CONTAINED 68 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

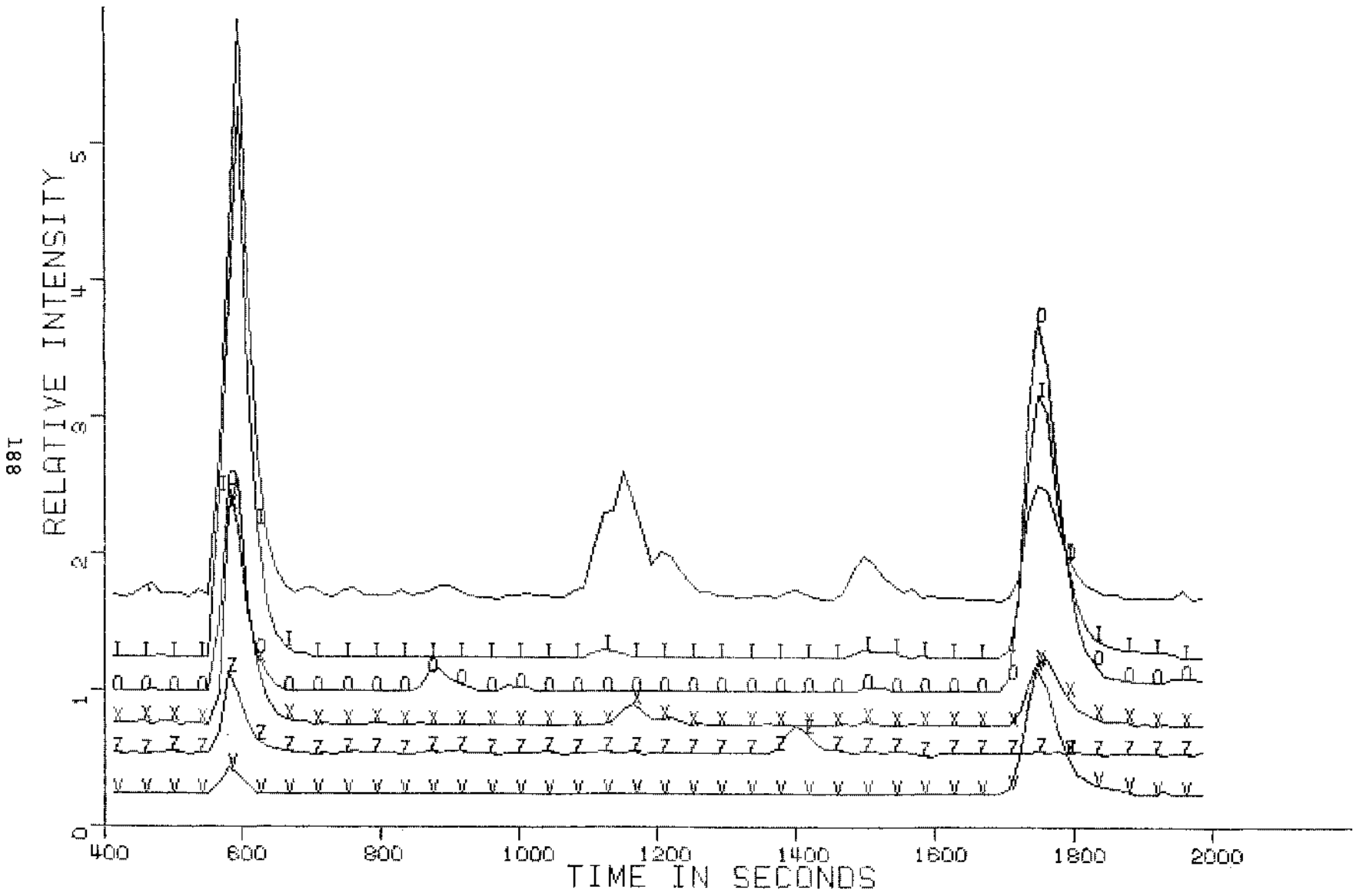

FIGURE C-17. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #251

I = MASS 61
X = MASS 31
V = MASS 116
O = MASS 89
Z = MASS 77

TABLE C-13. Normalized Mass Spectrum of Compound K.
Butyl ester of monochlorophenoxyacetic acid (XII)

FIL0B-1 5 MICROLITER 100% GULFPORT#251 25-300 CD491 19 DEC

MASS	SCAN 150	SCAN 139	DIFF.	NORM. DIFF.
28.0	15762.	13016.	2746.	4.39
29.0	55498.	614.	54884.	87.68
30.0	1452.	.	1452.	2.32
31.0	1488.	132.	1356.	2.17
38.0	1924.	.	1924.	3.07
39.0	7991.	319.	7672.	12.26
40.0	835.	114.	721.	1.15
41.0	43552.	950.	42602.	68.06
42.0	8350.	.	8350.	13.34
43.0	9488.	.	9488.	15.16
50.0	4563.	.	4563.	7.29
51.0	4656.	185.	4471.	7.14
52.0	639.	.	639.	1.02
53.0	1062.	.	1062.	1.70
55.0	6458.	213.	6245.	9.98
56.0	3539.	477.	3062.	4.89
57.0	63584.	987.	62597.	100.00
58.0	2882.	.	2882.	4.60
62.0	1017.	.	1017.	1.62
63.0	4380.	.	4380.	7.00
64.0	3038.	.	3038.	4.85
65.0	1071.	.	1071.	1.71
70.0	738.	.	738.	1.18
71.0	656.	.	656.	1.05
73.0	4070.	633.	3437.	5.49
74.0	1785.	.	1785.	2.85
75.0	14936.	288.	14648.	23.40
76.0	3180.	.	3180.	5.08
77.0	10631.	239.	10392.	16.60
78.0	1875.	.	1875.	3.00
85.0	1322.	.	1322.	2.11
92.0	992.	.	992.	1.58
99.0	5166.	.	5166.	8.25
101.0	1798.	.	1798.	2.87
105.0	989.	.	989.	1.58
107.0	718.	.	718.	1.15
111.0	19737.	.	19737.	31.53
112.0	1912.	.	1912.	3.05
113.0	14187.	.	14187.	22.66
114.0	1229.	.	1229.	1.96
115.0	2776.	.	2776.	4.43
127.0	1629.	.	1629.	2.60
128.0	17951.	.	17951.	28.68
129.0	1858.	.	1858.	2.97
130.0	5806.	.	5806.	9.28
141.0	32594.	306.	32288.	51.58
142.0	7093.	.	7093.	11.33
143.0	10508.	157.	10351.	16.54
144.0	2351.	.	2351.	3.76
150.0	1264.	.	1264.	2.02
151.0	37762.	.	37762.	60.33
152.0	3561.	.	3561.	5.69
186.0	5048.	.	5048.	8.06

188.0	1689.	.	1689.	2.70
207.0	1346.	.	1346.	2.15
242.0	12236.	.	12236.	19.55
243.0	1608.	.	1608.	2.57
244.0	3844.	.	3844.	6.14

SCAN 150 CONTAINED 121 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

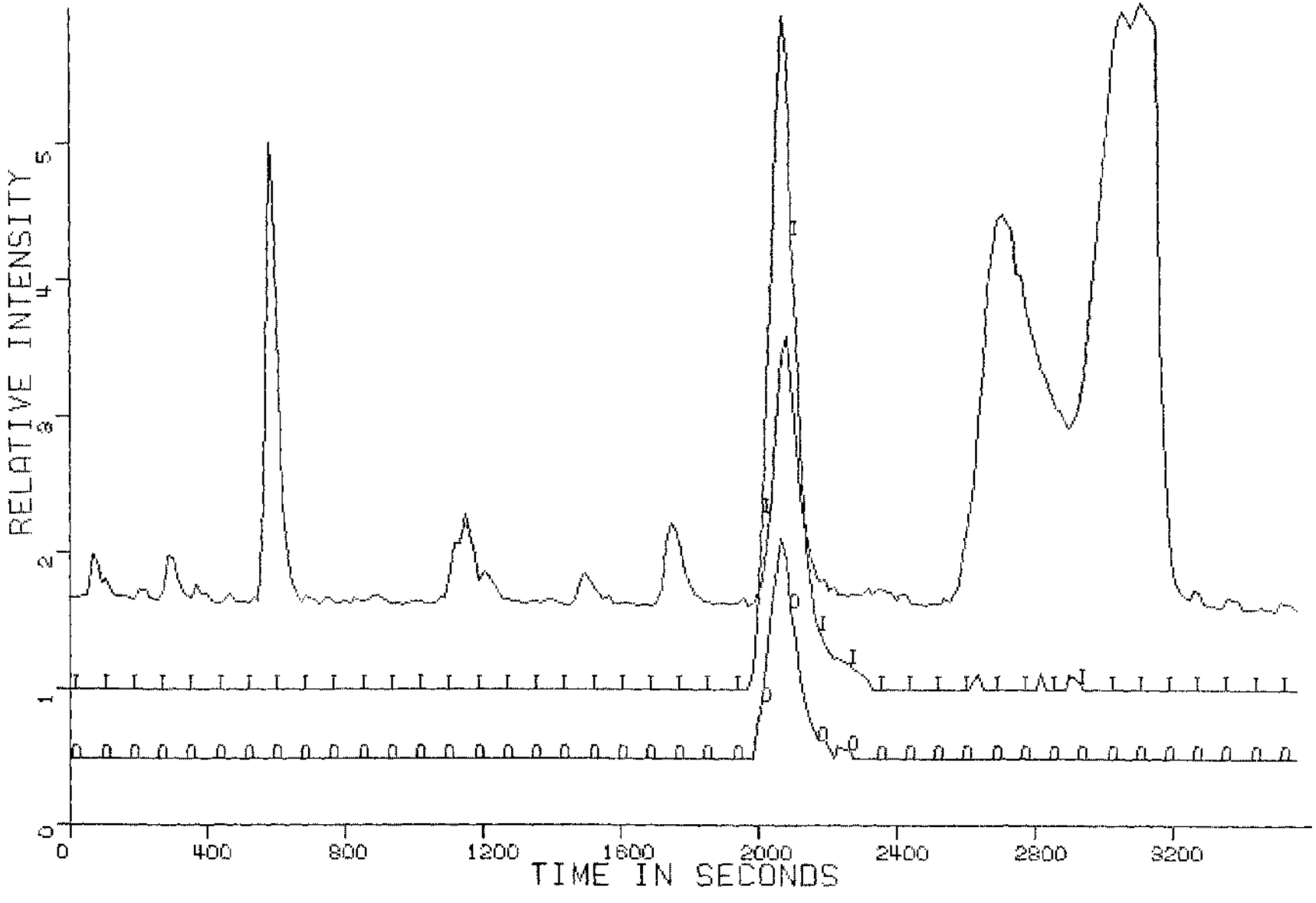

FIGURE C-18. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #251

I = MASS 242
O = MASS 244

TABLE C-14. Normalized Mass Spectrum of Compound L.
Butyl ester of dichlorophenoxyacetic acid (XIII)

FIL0B-1 5 MICROLITER 100% GULFPORT#251 25-300 CD491 19 DEC

MASS	SCAN 195	SCAN 181	DIFF.	NORM. DIFF.
28.0	17657.	12393.	5264.	3.73
29.0	86018.	649.	85369.	60.57
30.0	2001.	.	2001.	1.42
31.0	2498.	.	2498.	1.77
38.0	1664.	.	1664.	1.18
39.0	8965.	286.	8679.	6.16
41.0	72947.	923.	72024.	51.10
42.0	16303.	.	16303.	11.57
43.0	17646.	438.	17208.	12.21
50.0	2516.	.	2516.	1.79
51.0	2362.	.	2362.	1.68
53.0	1446.	.	1446.	1.03
55.0	11110.	155.	10955.	7.77
56.0	9678.	.	9678.	6.87
57.0	141952.	1005.	140947.	100.00
58.0	6469.	.	6469.	4.59
62.0	2537.	.	2537.	1.80
63.0	9332.	.	9332.	6.62
71.0	1772.	.	1772.	1.26
73.0	7071.	680.	6391.	4.53
74.0	5247.	.	5247.	3.72
75.0	9557.	277.	9280.	6.58
77.0	2488.	305.	2183.	1.55
84.0	1701.	.	1701.	1.21
85.0	2203.	.	2203.	1.56
97.0	1701.	.	1701.	1.21
98.0	2114.	164.	1950.	1.38
109.0	10973.	.	10973.	7.79
110.0	3061.	.	3061.	2.17
111.0	15344.	.	15344.	10.89
112.0	4804.	.	4804.	3.41
113.0	4529.	.	4529.	3.21
126.0	1609.	.	1609.	1.14
133.0	7212.	236.	6976.	4.95
135.0	4799.	916.	3883.	2.75
145.0	11301.	.	11301.	8.02
146.0	1649.	.	1649.	1.17
147.0	10151.	149.	10002.	7.10
149.0	3285.	243.	3042.	2.16
161.0	3769.	.	3769.	2.67
162.0	35387.	363.	35024.	24.85

163.0	5333.	.	5333.	3.78
164.0	23484.	234.	23250.	16.50
165.0	1986.	.	1986.	1.41
166.0	3986.	.	3986.	2.83
175.0	34921.	.	34921.	24.78
176.0	7599.	.	7599.	5.39
177.0	23323.	186.	23137.	16.42
178.0	4772.	.	4772.	3.39
179.0	3682.	.	3682.	2.61

SCAN 195 CONTAINED 127 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

NOTE: This is not a complete mass spectrum. Mass 179 was the highest mass recorded by the computer storage routine for this scan.

TABLE C-15. Normalized Mass Spectrum of Compound M.
Butyl ester of dichlorophenoxyacetic acid (XIII)

FIL0B-1 5 MICROLITER 100% GULFPORT#251 25-300 CD491 19 DEC

MASS	SCAN 216	SCAN 181	DIFF.	NORM. DIFF.
28.0	19339.	12393.	6946.	3.77
29.0	104025.	649.	103376.	56.07
30.0	2452.	.	2452.	1.33
31.0	2695.	.	2695.	1.46
39.0	9559.	286.	9273.	5.03
41.0	88007.	923.	87084.	47.24
42.0	17446.	.	17446.	9.46
43.0	17747.	438.	17309.	9.39
50.0	3729.	.	3729.	2.02
51.0	2326.	.	2326.	1.26
55.0	13789.	155.	13634.	7.40
56.0	8635.	.	8635.	4.68
57.0	185362.	1005.	184357.	100.00
58.0	8280.	.	8280.	4.49
62.0	3381.	.	3381.	1.83
63.0	10759.	.	10759.	5.84
71.0	2020.	.	2020.	1.10
73.0	7271.	680.	6591.	3.58
74.0	7684.	.	7684.	4.17
75.0	12703.	277.	12426.	6.74
77.0	2504.	305.	2199.	1.19
84.0	2089.	.	2089.	1.13
85.0	2885.	.	2885.	1.56
97.0	2274.	.	2274.	1.23
98.0	2937.	164.	2773.	1.50
99.0	1995.	.	1995.	1.08
109.0	15568.	.	15568.	8.44
110.0	4715.	.	4715.	2.56
111.0	18833.	.	18833.	10.22
112.0	4915.	.	4915.	2.67
113.0	4960.	.	4960.	2.69
133.0	7725.	236.	7489.	4.06
135.0	5291.	916.	4375.	2.37
145.0	20012.	.	20012.	10.86
146.0	1980.	.	1980.	1.07
147.0	16536.	149.	16387.	8.89
149.0	4652.	243.	4409.	2.39
161.0	7313.	.	7313.	3.97
162.0	38408.	363.	38045.	20.64
163.0	7200.	.	7200.	3.91
164.0	25244.	234.	25010.	13.57
165.0	2198.	.	2198.	1.19
166.0	4124.	.	4124.	2.24

SCAN 216 CONTAINED 127 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

NOTE: This is not a complete mass spectrum. Mass 166 was the highest mass recorded by the computer storage routine for this scan.

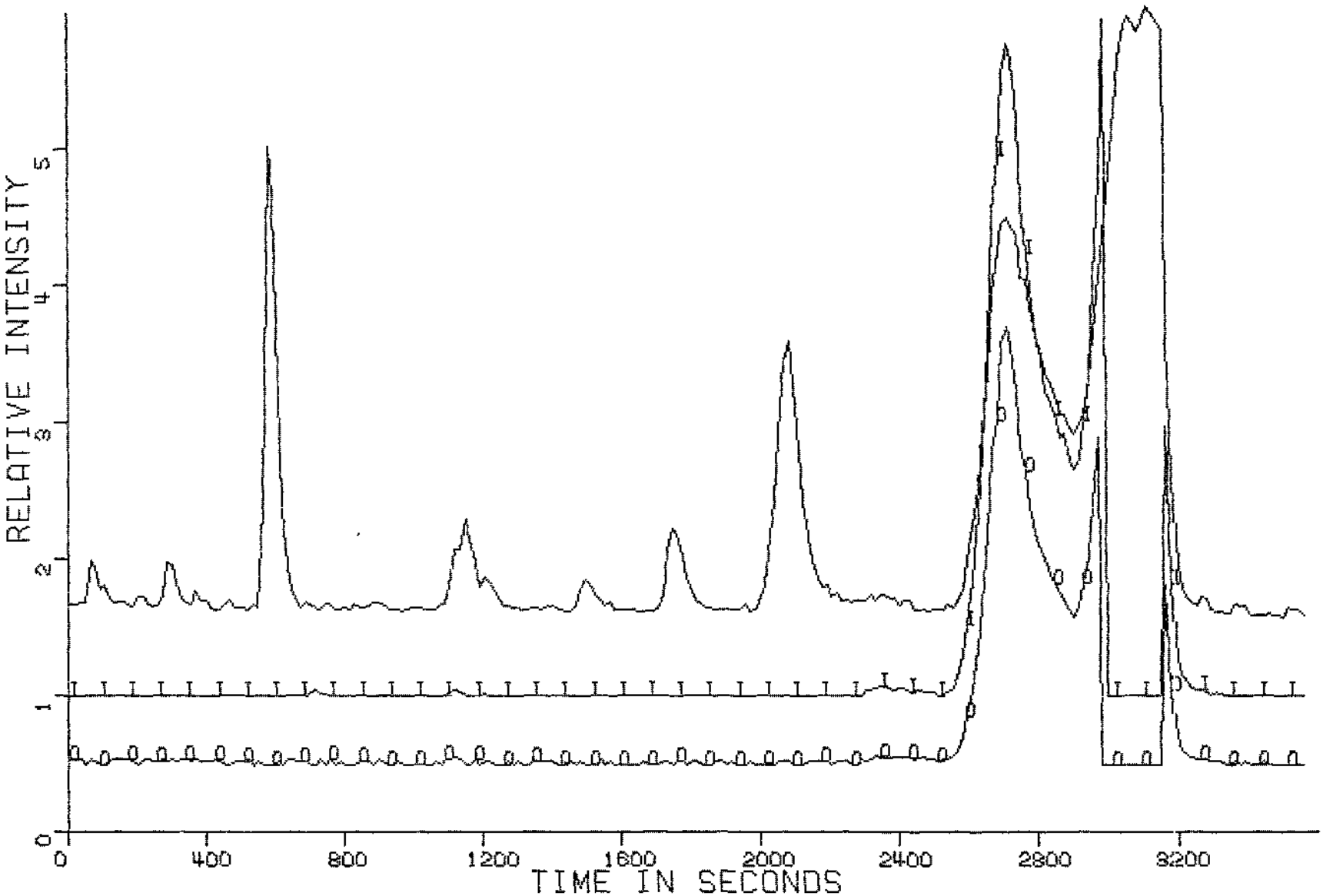

FIGURE C-19. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #251

I = MASS 175
O = MASS 177

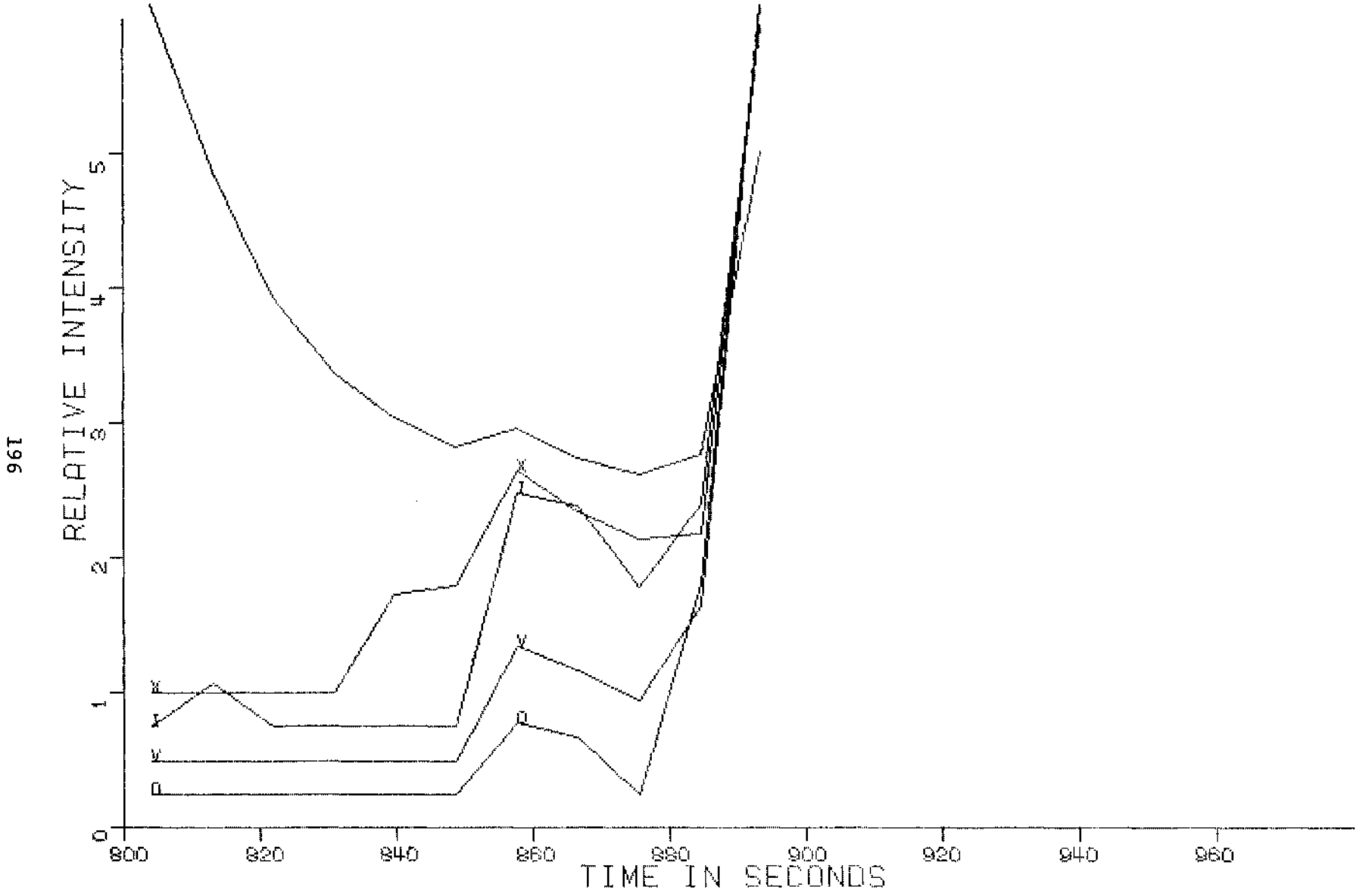

FIGURE C-20. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #251
X = MASS 196 I = MASS 198 V = MASS 209
D = MASS 219

Butyl ester of bis- dichlorophenoxyacetic acid (XIX)

TABLE C-16. Normalized Mass Spectrum of Compound T.

FIL07-3 10 MICROLITER 100% GULFPORT#251 25-450 CD492 21 MAR

MASS	SCAN 66	SCAN 55	DIFF.	NORM. DIFF.
27.0	250.	34.	216.	10.86
29.0	1405.	213.	1192.	59.93
41.0	1027.	184.	843.	42.38
55.0	293.	89.	204.	10.26
57.0	2270.	358.	1912.	96.13
58.0	149.	.	149.	7.49
63.0	203.	23.	180.	9.05
74.0	177.	.	177.	8.90
75.0	303.	.	303.	15.23
98.0	125.	.	125.	6.28
109.0	298.	.	298.	14.98
110.0	147.	18.	129.	6.49
111.0	178.	31.	147.	7.39
127.0	130.	.	130.	6.54
128.0	163.	.	163.	8.20
133.0	155.	39.	116.	5.83
135.0	108.	.	108.	5.43
145.0	324.	57.	267.	13.42
147.0	290.	.	290.	14.58
162.0	268.	.	268.	13.47
163.0	439.	.	439.	22.07
164.0	170.	31.	139.	6.99
165.0	291.	.	291.	14.63
173.0	123.	.	123.	6.18
175.0	2088.	99.	1989.	100.00
176.0	160.	.	160.	8.04
177.0	1061.	116.	945.	47.51
178.0	142.	.	142.	7.14
179.0	249.	.	249.	12.52
191.0	420.	41.	379.	19.05
193.0	280.	.	280.	14.08
201.0	196.	.	196.	9.85
219.0	195.	.	195.	9.80
275.0	950.	32.	918.	46.15
276.0	194.	.	194.	9.75
277.0	588.	.	588.	29.56
335.0	164.	.	164.	8.25
337.0	148.	.	148.	7.44
339.0	107.	.	107.	5.38

SCAN 66 CONTAINED 93 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

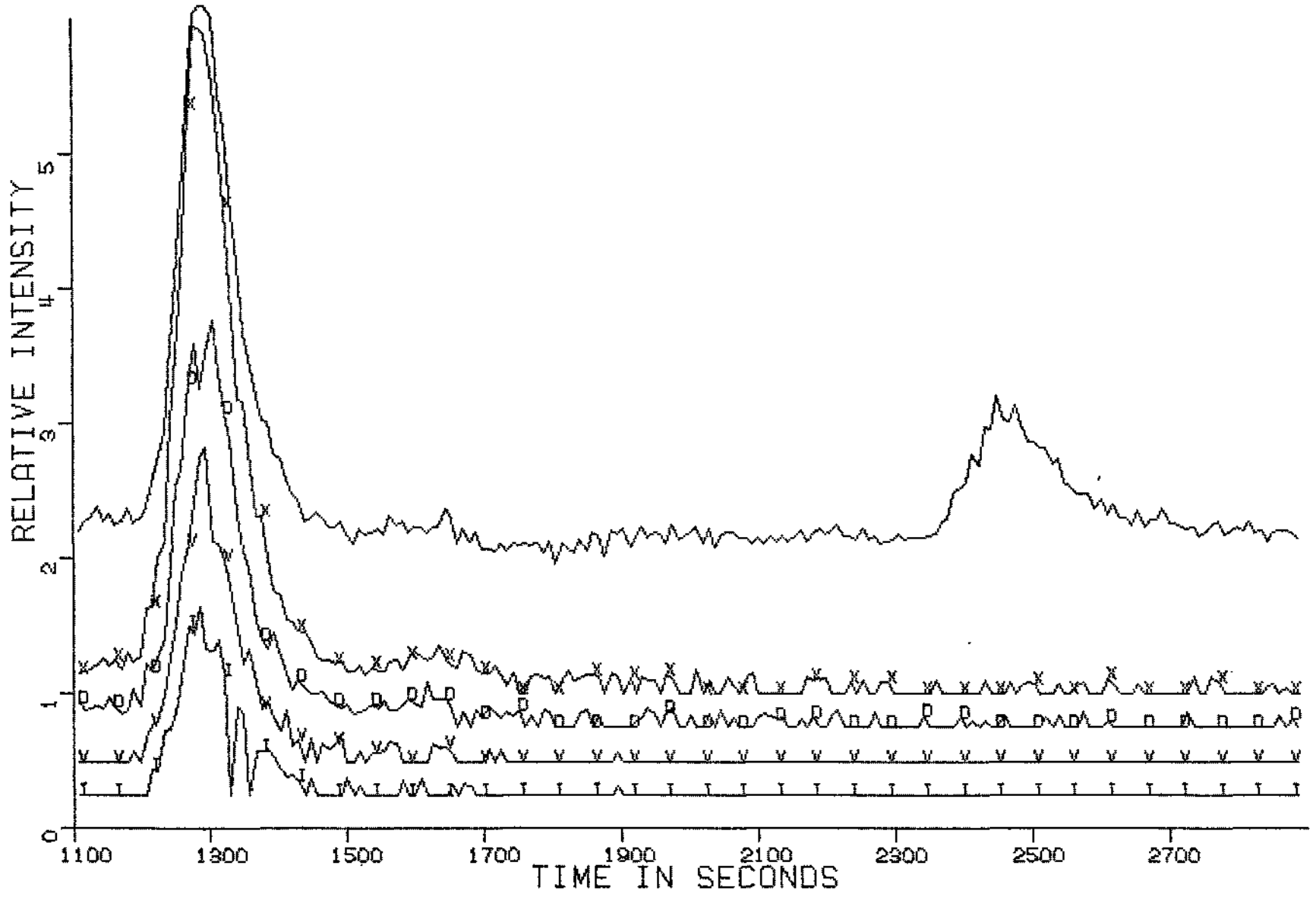

FIGURE C-21. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #251
X = MASS 175 D = MASS 177 V = MASS 275
I = MASS 277

TABLE C-17. Normalized Mass Spectrum of Compound U.
Butyl ester of bis- trichlorophenoxy acetic acid (XX)

FIL07-3 10 MICROLITER 100% GULFPORT#251 25-450 CD492 21 MAR

MASS	SCAN 196	SCAN 183	DIFF.	NORM. DIFF.
27.0	74.	17.	57.	6.43
29.0	531.	158.	373.	42.10
41.0	367.	110.	257.	29.01
43.0	81.	.	81.	9.14
55.0	201.	.	201.	22.69
57.0	1060.	174.	886.	100.00
73.0	238.	192.	46.	5.19
74.0	48.	.	48.	5.42
96.0	57.	.	57.	6.43
97.0	66.	.	66.	7.45
144.0	57.	.	57.	6.43
145.0	54.	.	54.	6.09
162.0	58.	.	58.	6.55
164.0	47.	.	47.	5.30
179.0	68.	.	68.	7.67
196.0	88.	.	88.	9.93
197.0	71.	.	71.	8.01
198.0	108.	.	108.	12.19
208.0	64.	.	64.	7.22
209.0	383.	.	383.	43.23
211.0	429.	.	429.	48.42
213.0	140.	.	140.	15.80
225.0	96.	.	96.	10.84
235.0	87.	.	87.	9.82
237.0	68.	.	68.	7.67
309.0	148.	.	148.	16.70

SCAN 196 CONTAINED 54 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

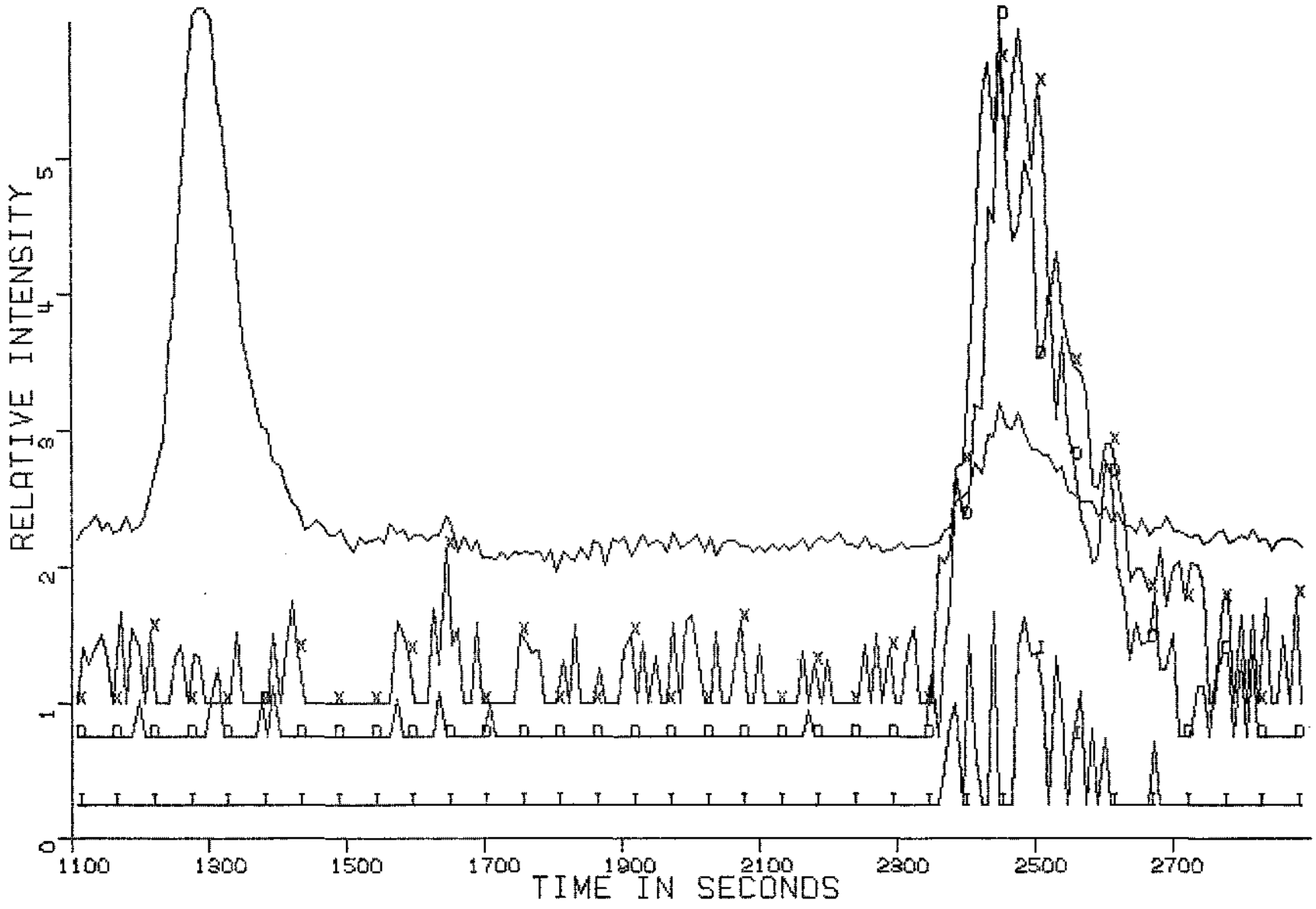

Figure C-22. TOTAL ION CHROMATOGRAM AND SELECTED ION CHROMATOGRAMS OF #251
X = MASS 209 D = MASS 311 I = MASS 311

TABLE C-18. Normalized Spectrum of Compound R.
1,1-Dibutoxy-2-trichlorophenoxy ethane XXII

FIL54-1 5 MICROLITER 100% GULFPORT#251 25-450 CD492 9 APR

MASS	SCAN 26	SCAN 45	DIFF.	NORM. DIFF.
27.0	245.	59.	186.	7.15
29.0	1289.	313.	976.	37.50
41.0	1140.	282.	858.	32.96
42.0	369.	36.	333.	12.79
43.0	232.	63.	169.	6.49
55.0	247.	76.	171.	6.57
56.0	234.	49.	185.	7.11
57.0	3240.	637.	2603.	100.00
58.0	143.	.	143.	5.49
117.0	1341.	95.	1246.	47.87
179.0	176.	.	176.	6.76
196.0	322.	102.	220.	8.45
198.0	303.	86.	217.	8.34
209.0	327.	64.	263.	10.10
211.0	395.	.	395.	15.17
368.0	489.	32.	457.	17.56
370.0	454.	28.	426.	16.37

SCAN 26 CONTAINED 92 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

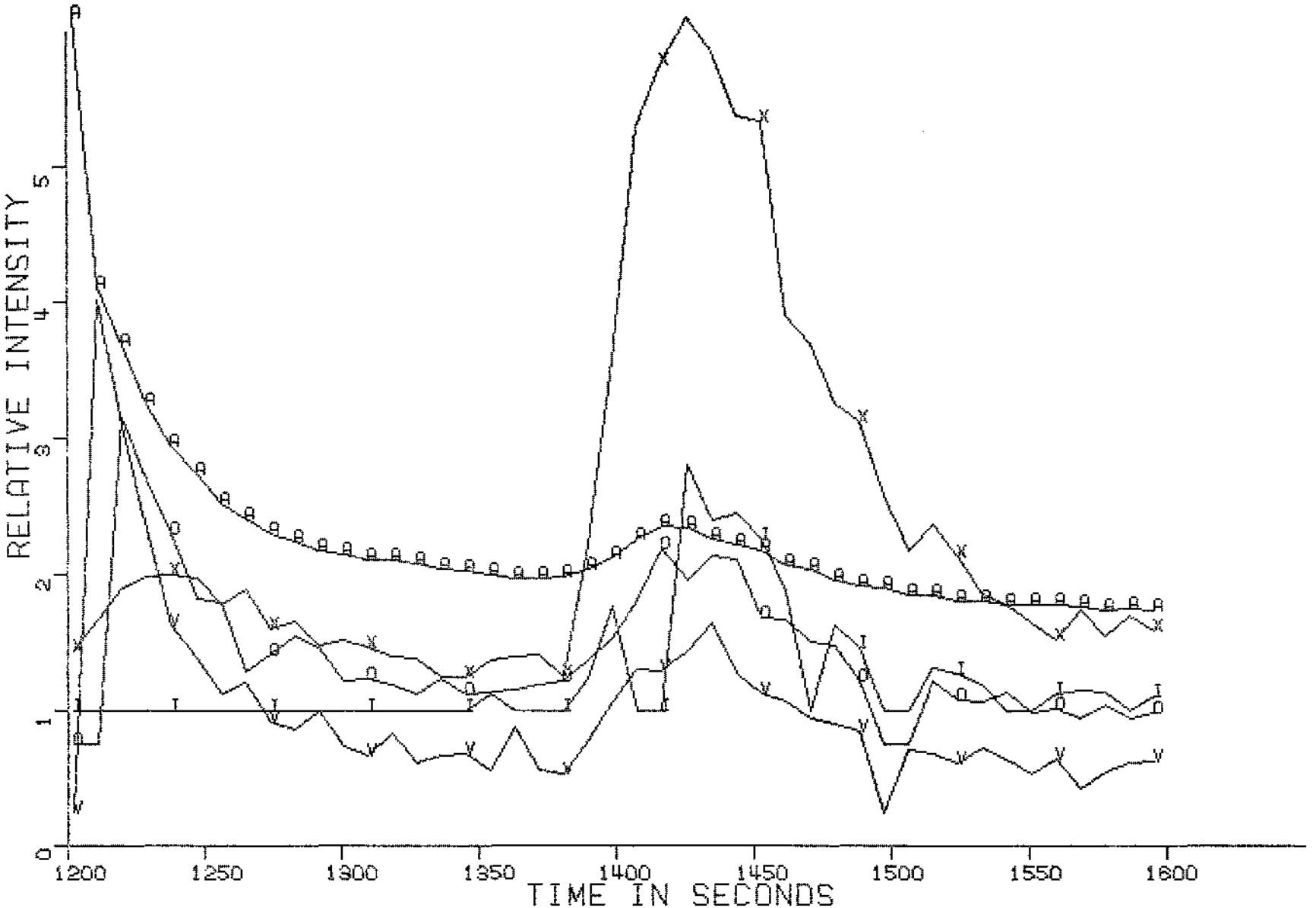

FIGURE C-23. TOTAL ION CHROMATOGRAM AND SELECTED ION CHROMATOGRAMS OF #251
A = TOTAL ION X = MASS 117 I = MASS 368
O = MASS 209 V = MASS 196

TABLE C-19. Normalized Spectrum of Compound P Superimposed on Compound O.
Butyl ester of methoxy-dichlorophenoxyacetic acid (XV)
Butyl ester of trichlorophenoxyacetic acid (XIV)

FIL56-1 0.2 MICROLITER 100% GULFPORT #251 25-450 CD492 10 APR

MASS	SCAN 113	SCAN 48	DIFF.	NORM. DIFF.
27.0	3184.	353.	2831.	9.12
29.0	17466.	373.	17093.	55.04
30.0	325.	.	325.	1.05
31.0	909.	.	909.	2.93
40.0	662.	.	662.	2.13
41.0	11678.	277.	11401.	36.71
42.0	2663.	.	2663.	8.57
43.0	3199.	.	3199.	10.30
44.0	1612.	1202.	410.	1.32
55.0	2620.	.	2620.	8.44
56.0	1182.	.	1182.	3.81
57.0	31667.	611.	31056.	100.00
58.0	1049.	.	1049.	3.38
72.0	367.	.	367.	1.18
73.0	712.	.	712.	2.29
74.0	747.	.	747.	2.41
85.0	621.	.	621.	2.00
97.0	1362.	.	1362.	4.39
99.0	1211.	.	1211.	3.90
110.0	444.	.	444.	1.43
111.0	1184.	.	1184.	3.81
112.0	612.	.	612.	1.97
143.0	975.	.	975.	3.14
144.0	993.	.	993.	3.20
145.0	1583.	.	1583.	5.10
147.0	883.	.	883.	2.84
160.0	501.	.	501.	1.61
162.0	737.	.	737.	2.37
165.0	314.	.	314.	1.01
169.0	421.	.	421.	1.36
175.0	1120.	.	1120.	3.61
177.0	1010.	.	1010.	3.25
179.0	1315.	.	1315.	4.23
181.0	1843.	.	1843.	5.93
191.0	1339.	.	1339.	4.31
192.0	1779.	.	1779.	5.73
193.0	903.	.	903.	2.91
194.0	622.	.	622.	2.00
196.0	2611.	.	2611.	8.41
198.0	2411.	.	2411.	7.76
207.0	1037.	408.	629.	2.03
208.0	410.	.	410.	1.32
209.0	2382.	.	2382.	7.67
210.0	539.	.	539.	1.74
215.0	940.	.	940.	3.03
217.0	675.	.	675.	2.17
218.0	455.	.	455.	1.47
219.0	3481.	.	3481.	11.21
220.0	608.	.	608.	1.96
221.0	2741.	.	2741.	8.83
250.0	597.	.	597.	1.92
252.0	389.	.	389.	1.25
254.0	1409.	.	1409.	4.54
256.0	1925.	.	1925.	6.20

276.0	345.	.	345.	1.11
306.0	3914.	.	3914.	12.60
308.0	3767.	.	3767.	12.13
310.0	3199.	.	3199.	10.30
312.0	2435.	.	2435.	7.84
314.0	1433.	.	1433.	4.61

SCAN 113 CONTAINED 72 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

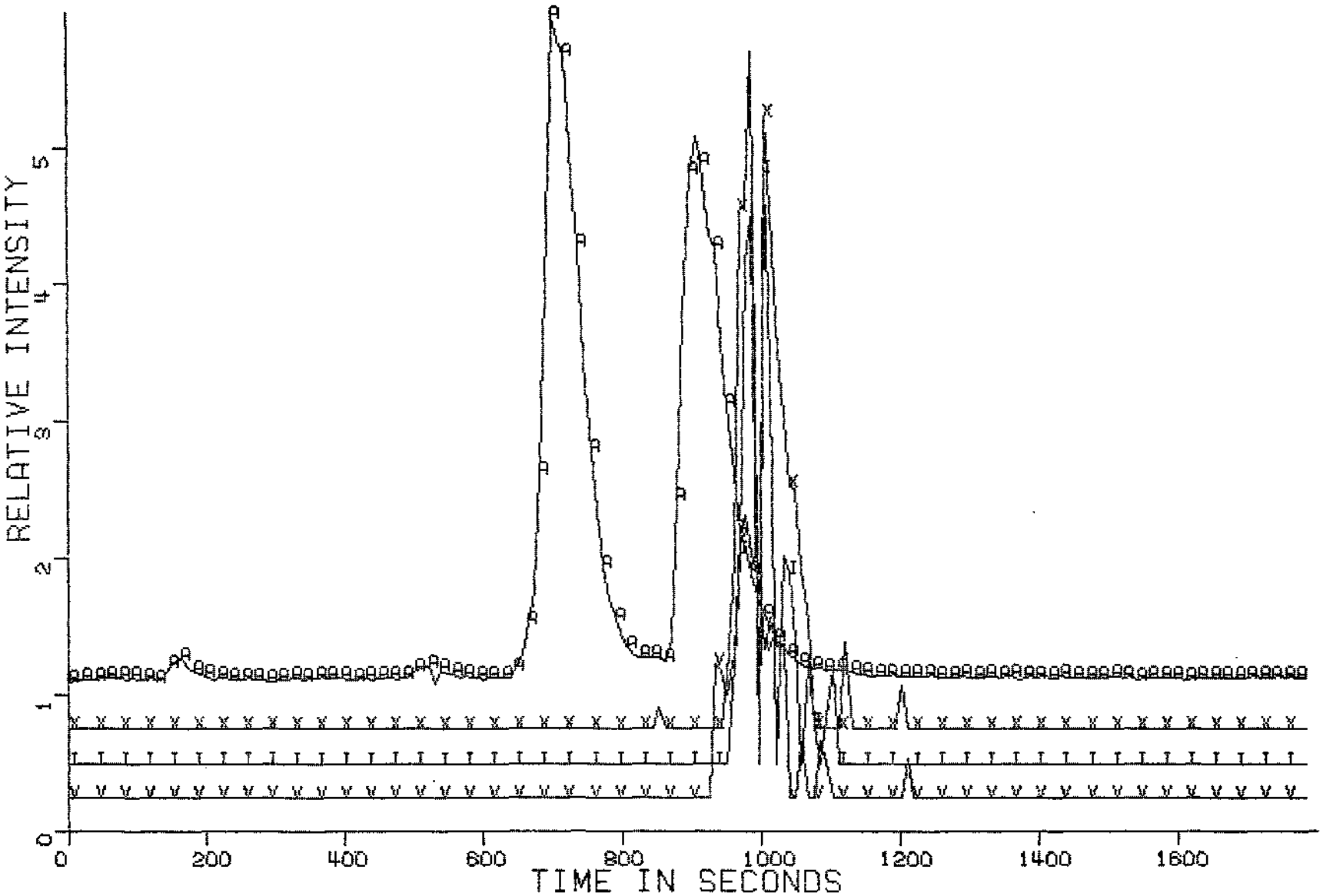

FIGURE C-24. TOTAL ION CHROMATOGRAM AND SELECTED ION CHROMATOGRAMS OF #251
A = TOTAL ION X = MASS 306 I = MASS 308
V = MASS 215

APPENDIX D

PRESENTATION OF DATA ON GULFPORT #264 SAMPLES

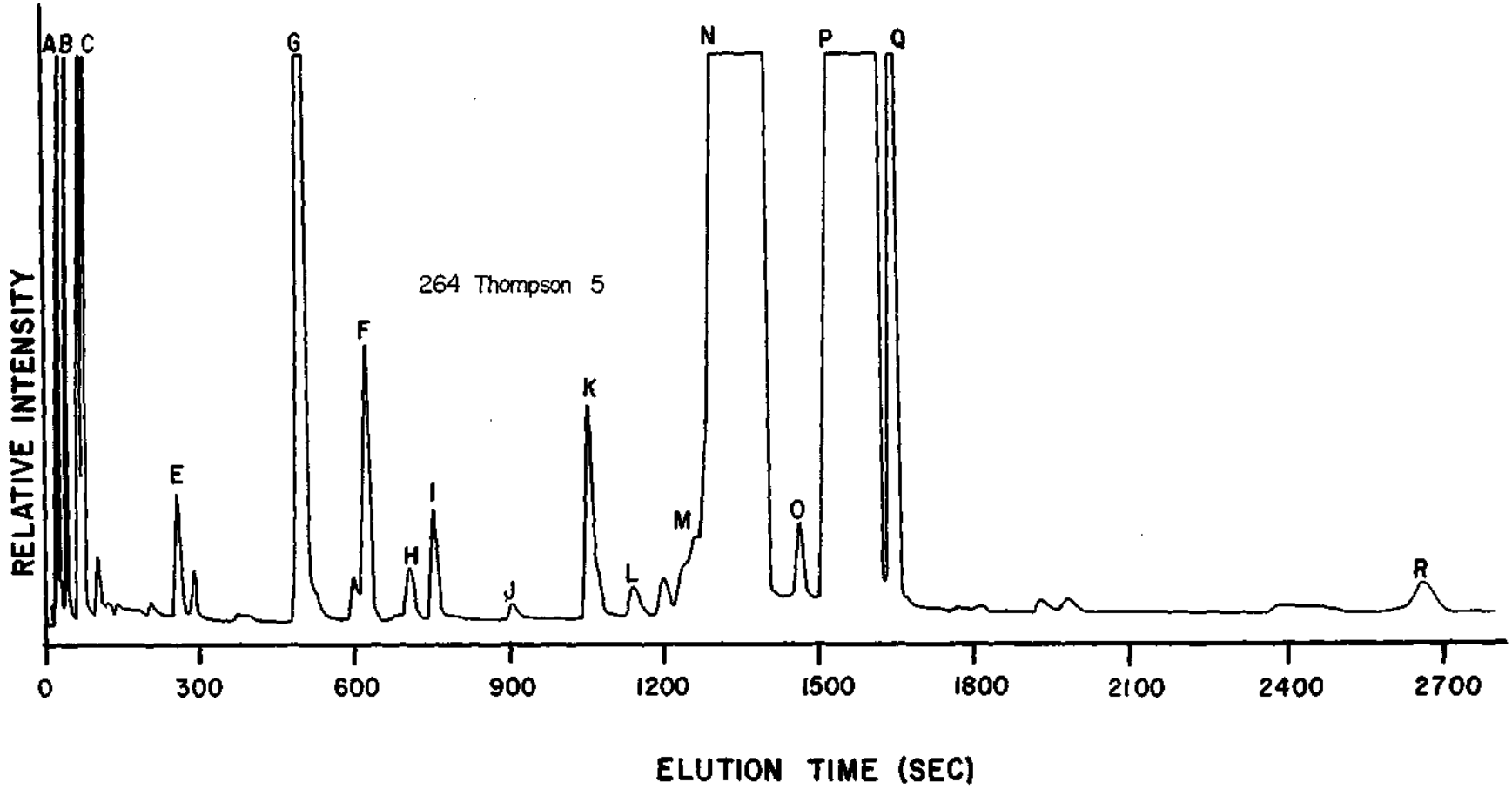

FIGURE D-1. F.I.D. Chromatogram of Gulfport #264

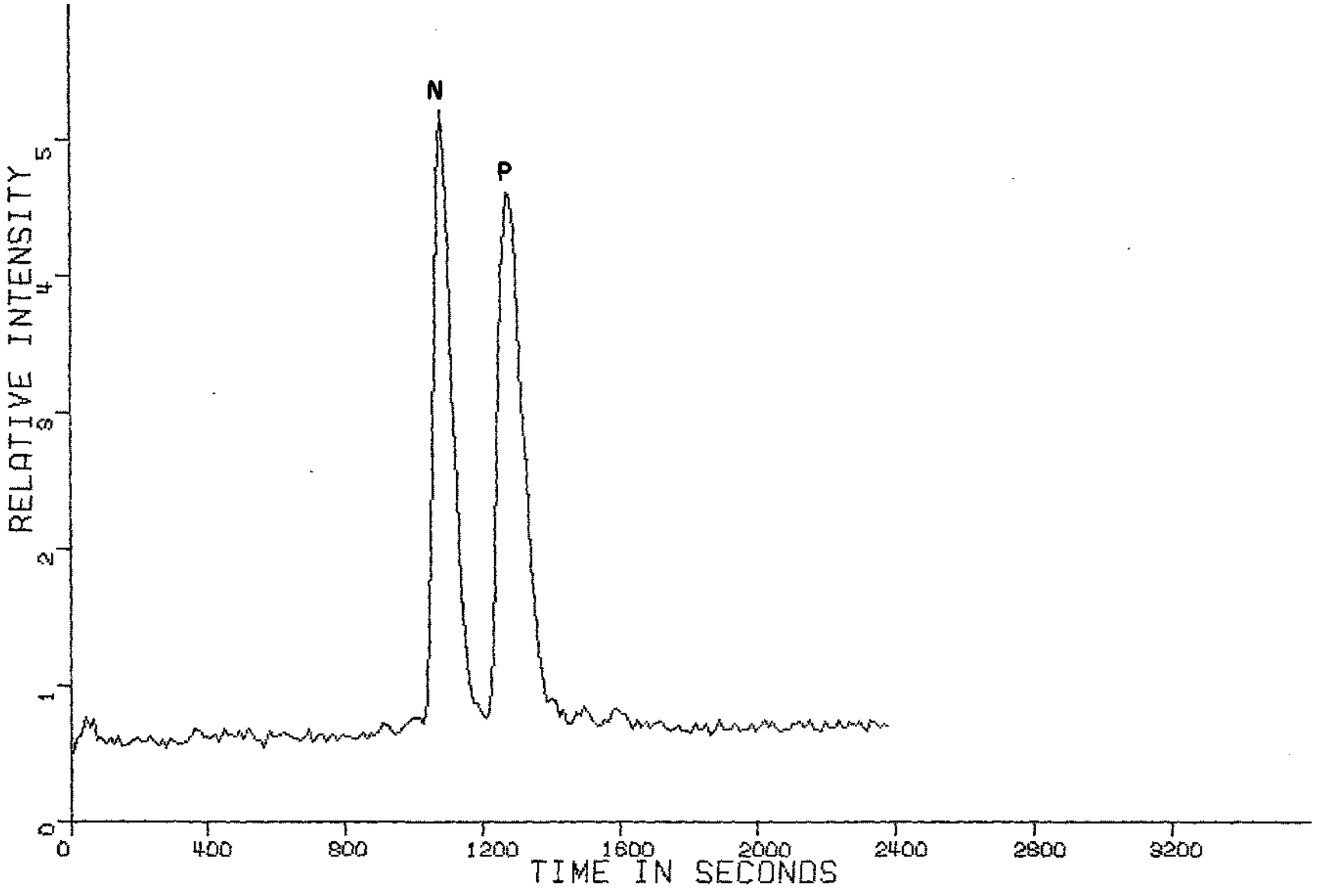

FIGURE D-2. TOTAL ION CHROMATOGRAM OF MAJOR CONSTITUENTS OF GULFPORT # 264

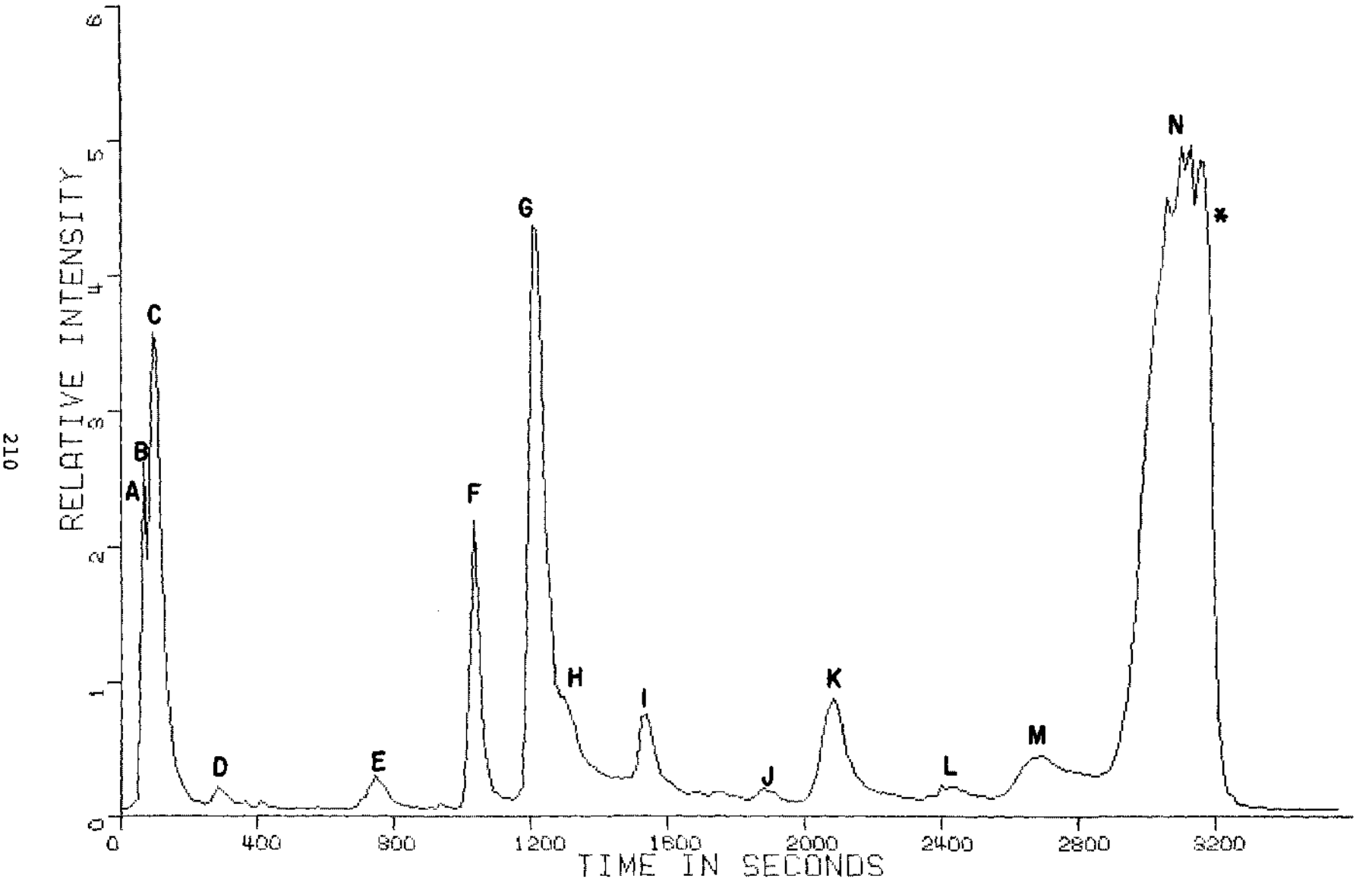

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FIGURE D-3. TOTAL ION CHROMATOGRAM OF MINOR CONSTITUENTS OF GULFPORT #264 ELUTING BEFORE THE N-BUTYL ESTER OF 2,4-DICHLORO ACID

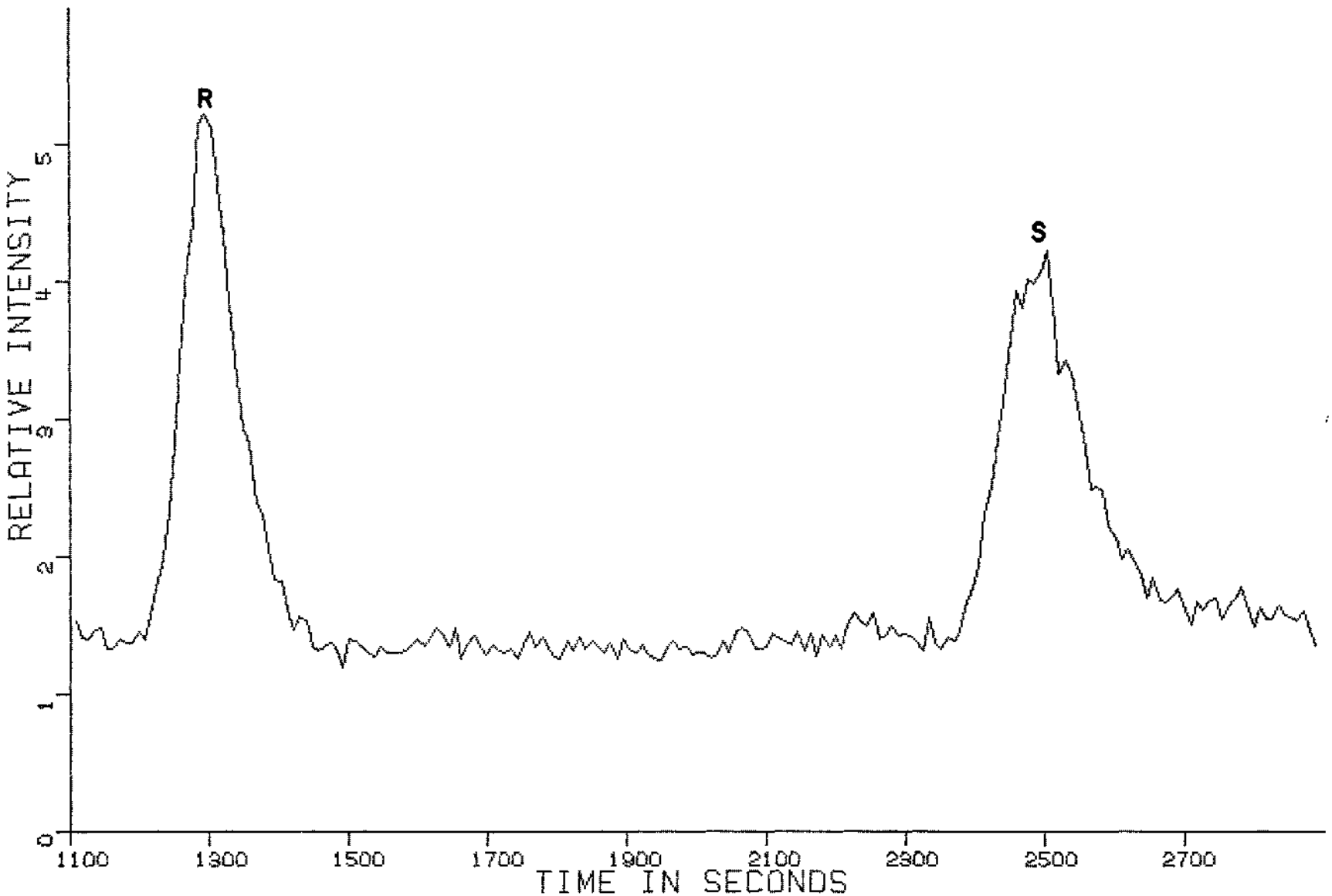

FIGURE D-4. TOTAL ION CHROMATOGRAM OF #264

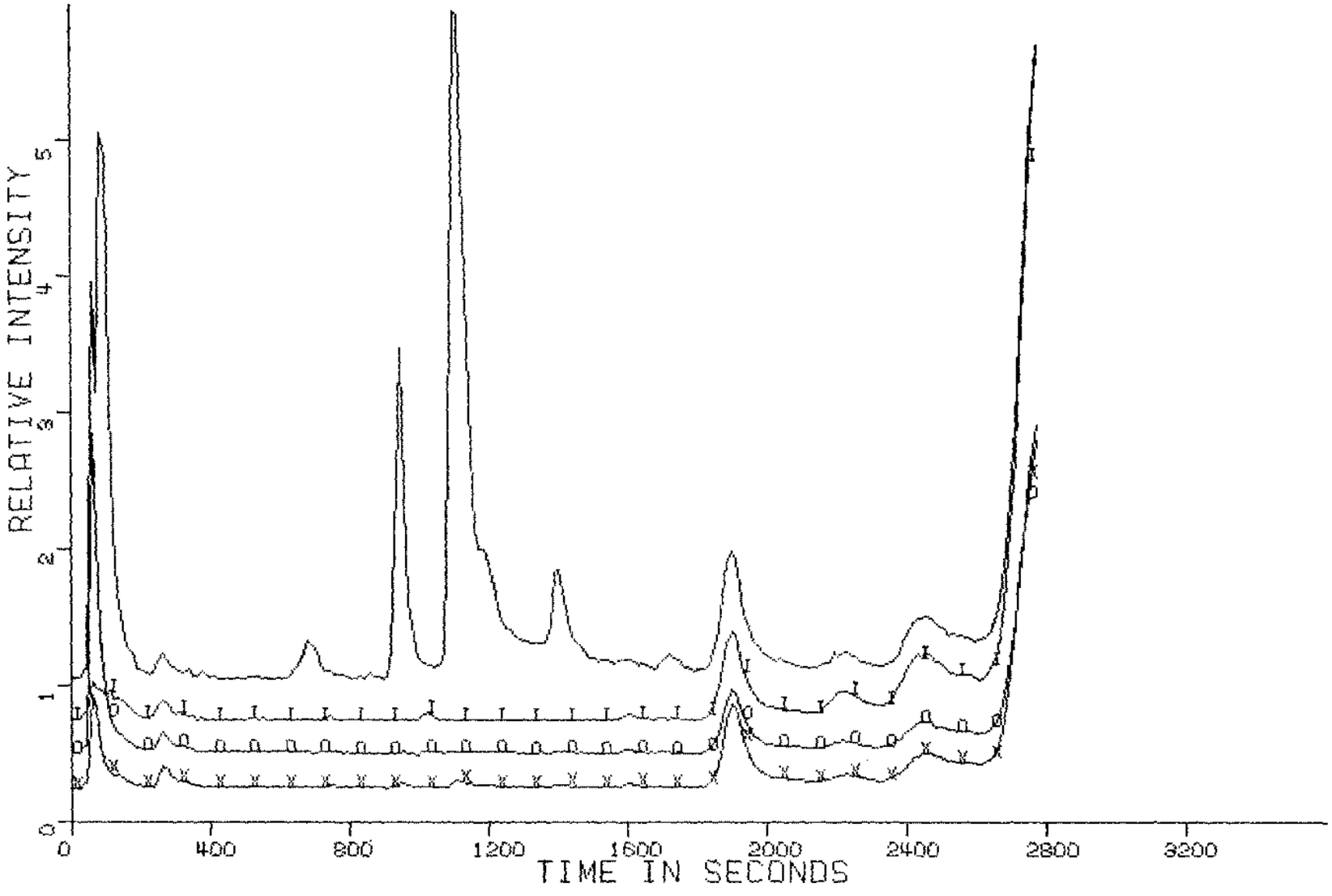

FIGURE D-5. TOTAL ION CHROMATOGRAM AND BUTYL FRAGMENT MASS CHROMATOGRAMS OF #264
I = MASS 57 O = MASS 41
X = MASS 29

TABLE D-1. Normalized Mass Spectrum of Compounds A and B. Butanol (I) Toluene (II)

FIL0C-1 10 MICROLITER 100% GULFPORT#264 25-300 CD491 19 DEC

MASS	SCAN 5	SCAN 2	DIFF.	NORM. DIFF.
28.0	29908.	11140.	18768.	11.48
29.0	34998.	142.	34856.	21.32
31.0	163507.	.	163507.	100.00
33.0	14256.	.	14256.	8.72
39.0	27986.	220.	27766.	16.98
41.0	120521.	608.	119913.	73.34
42.0	55060.	.	55060.	33.67
43.0	107926.	.	107926.	66.01
45.0	13502.	.	13502.	8.26
55.0	21754.	.	21754.	13.30
56.0	135410.	.	135410.	82.82
57.0	14165.	.	14165.	8.66
91.0	36096.	.	36096.	22.08
92.0	24259.	.	24259.	14.84

SCAN 5 CONTAINED 51 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

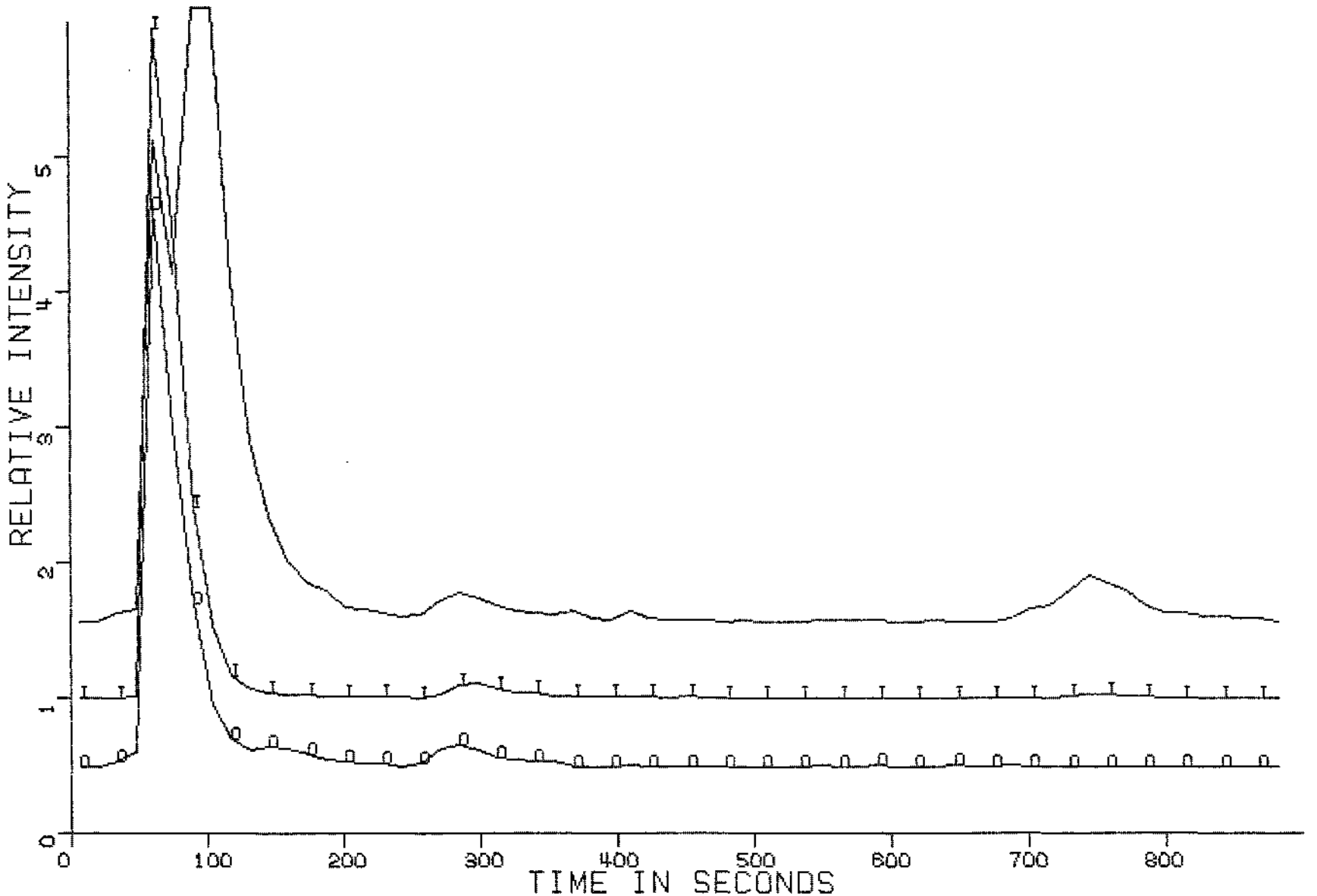

FIGURE D-6. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #264

I = MASS 31 O = MASS 58

TABLE D-2. Normalized Mass Spectrum of Compound C. Xylenes (III) or ethyl benzene (XI)

FIL0C-1 10 MICROLITER 100% GULFPORT#264 25-300 CD491 19 DEC

MASS	SCAN 8	SCAN 2	DIFF.	NORM. DIFF.
31.0	17725.	.	17725.	5.42
39.0	48820.	220.	48600.	14.85
41.0	24489.	608.	23881.	7.30
43.0	19786.	.	19786.	6.05
50.0	17128.	.	17128.	5.23
51.0	45652.	.	45652.	13.95
52.0	21186.	.	21186.	6.47
63.0	19072.	.	19072.	5.83
65.0	27411.	.	27411.	8.38
77.0	40497.	.	40497.	12.38
78.0	21743.	.	21743.	6.64
79.0	22490.	.	22490.	6.87
91.0	327243.	.	327243.	100.00
92.0	32173.	.	32173.	9.83
105.0	65775.	.	65775.	20.10
106.0	165255.	.	165255.	50.50

SCAN 8 CONTAINED 77 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

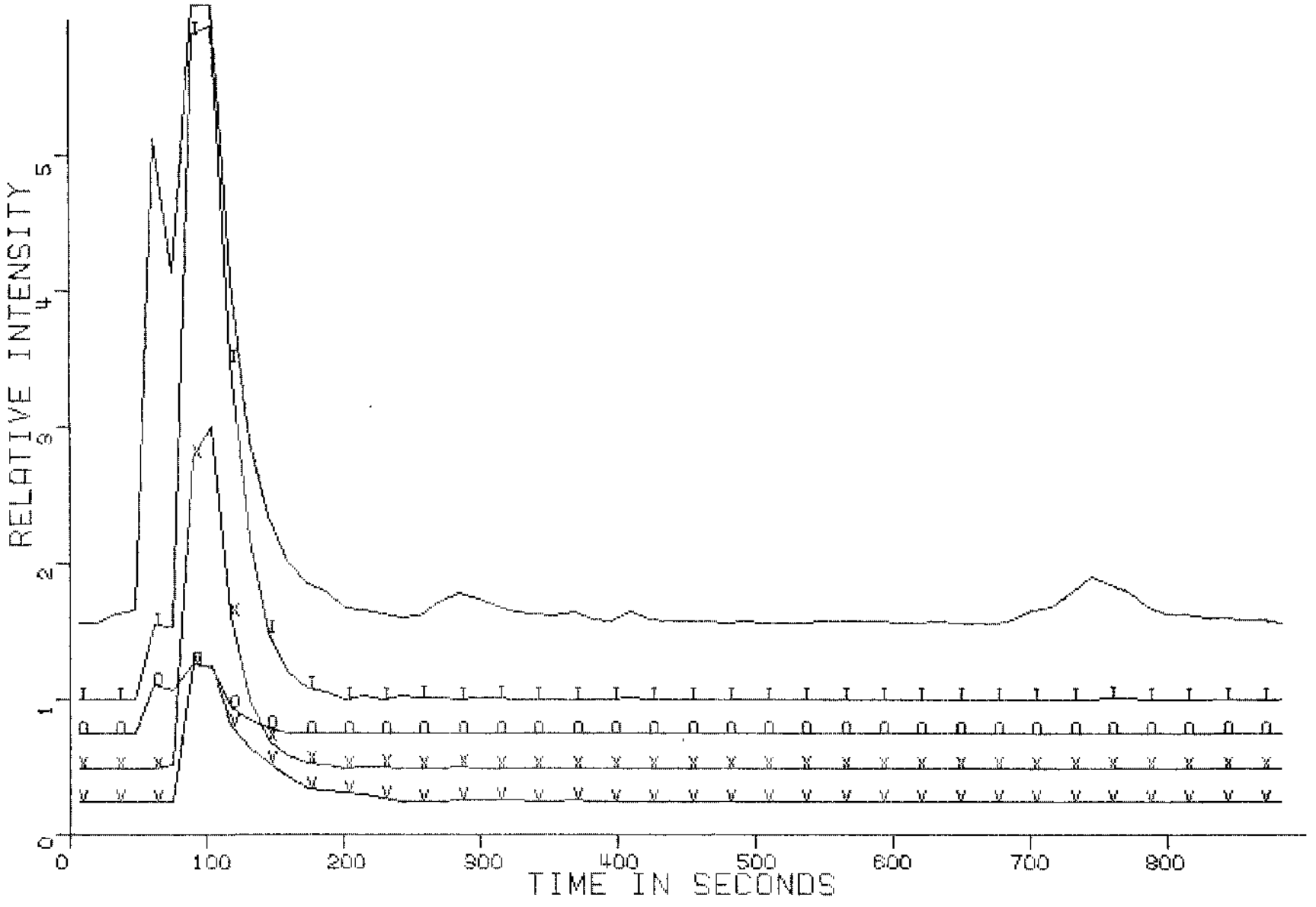

TABLE D-7. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #284

I = MASS 91
O = MASS 92
X = MASS 106
V = MASS 105

TABLE D-3. Normalized Mass Spectrum of Compound D.

FIL0C-1 10 MICROLITER 100% GULFPORT#264 25-300 CD491 19 DEC

MASS	SCAN 21	SCAN 18	DIFF.	NORM. DIFF.
28.0	12146.	11958.	188.	2.43
29.0	8546.	818.	7728.	100.00
30.0	236.	.	236.	3.05
31.0	3327.	442.	2885.	37.33
39.0	1742.	842.	900.	11.65
40.0	276.	.	276.	3.57
41.0	8038.	1857.	6181.	79.98
42.0	1133.	.	1133.	14.66
43.0	1615.	1076.	539.	6.97
44.0	1070.	823.	247.	3.20
45.0	6559.	.	6559.	84.87
49.0	425.	.	425.	5.50
55.0	1373.	.	1373.	17.77
56.0	5037.	.	5037.	65.18
57.0	7671.	1101.	6570.	85.02
73.0	694.	.	694.	8.98
77.0	1128.	.	1128.	14.60
79.0	415.	223.	192.	2.48
105.0	711.	.	711.	9.20
106.0	348.	.	348.	4.50
119.0	1921.	1828.	93.	1.20
133.0	653.	429.	224.	2.90
135.0	1023.	.	1023.	13.24
141.0	315.	.	315.	4.08
148.0	453.	226.	227.	2.94
253.0	842.	.	842.	10.90

SCAN 21 CONTAINED 28 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE D-4. Normalized Mass Spectrum of Compound E. Dichlorophenol (V)

'IL0C-1 10 MICROLITER 100% GULFPORT#264 25-300 CD491 19 DEC

MASS	SCAN 54	SCAN 47	DIFF.	NORM. DIFF.
31.0	944.	142.	802.	4.92
36.0	635.	.	635.	3.90
37.0	1379.	.	1379.	8.46
38.0	1059.	.	1059.	6.50
39.0	939.	278.	661.	4.06
42.0	190.	.	190.	1.17
45.0	385.	.	385.	2.36
48.0	773.	.	773.	4.74
49.0	1829.	.	1829.	11.22
50.0	1216.	.	1216.	7.46
53.0	1191.	.	1191.	7.31
61.0	1355.	.	1355.	8.31
62.0	2082.	.	2082.	12.77
63.0	11343.	.	11343.	69.60
64.0	1158.	.	1158.	7.11
65.0	290.	.	290.	1.78
71.0	176.	.	176.	1.08
73.0	2638.	.	2638.	16.19
74.0	1059.	.	1059.	6.50
75.0	1167.	.	1167.	7.16
81.0	1075.	.	1075.	6.60
97.0	606.	.	606.	3.72
98.0	6031.	.	6031.	37.00
99.0	2467.	.	2467.	15.14
100.0	1998.	.	1998.	12.26
126.0	2398.	.	2398.	**14.71**
128.0	989.	.	989.	6.07
133.0	1601.	.	1601.	9.82
135.0	1523.	.	1523.	9.34
137.0	213.	.	213.	**1.31**
156.0	511.	.	511.	**3.14**
162.0	**16298.**	.	**16298.**	**100.00**
164.0	**10425.**	.	**10425.**	**63.96**
165.0	812.	.	812.	4.98
166.0	1666.	.	1666.	10.22
168.0	653.	.	653.	4.01
187.0	513.	.	513.	3.15
253.0	622.	.	622.	3.82

SCAN 54 CONTAINED 45 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

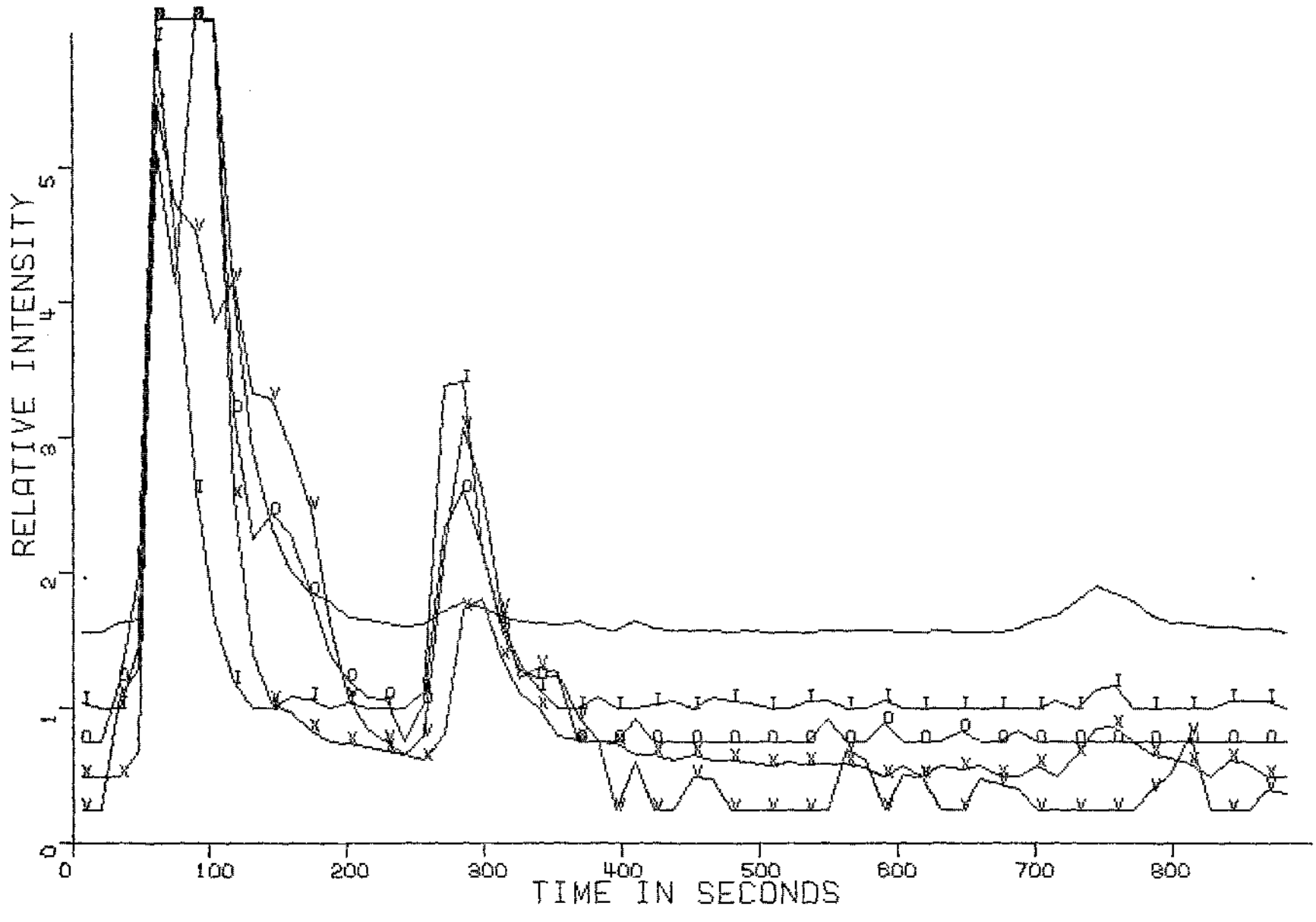

FIGURE D-8. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #284

I = MASS 45
X = MASS 31
O = MASS 58
V = MASS 57

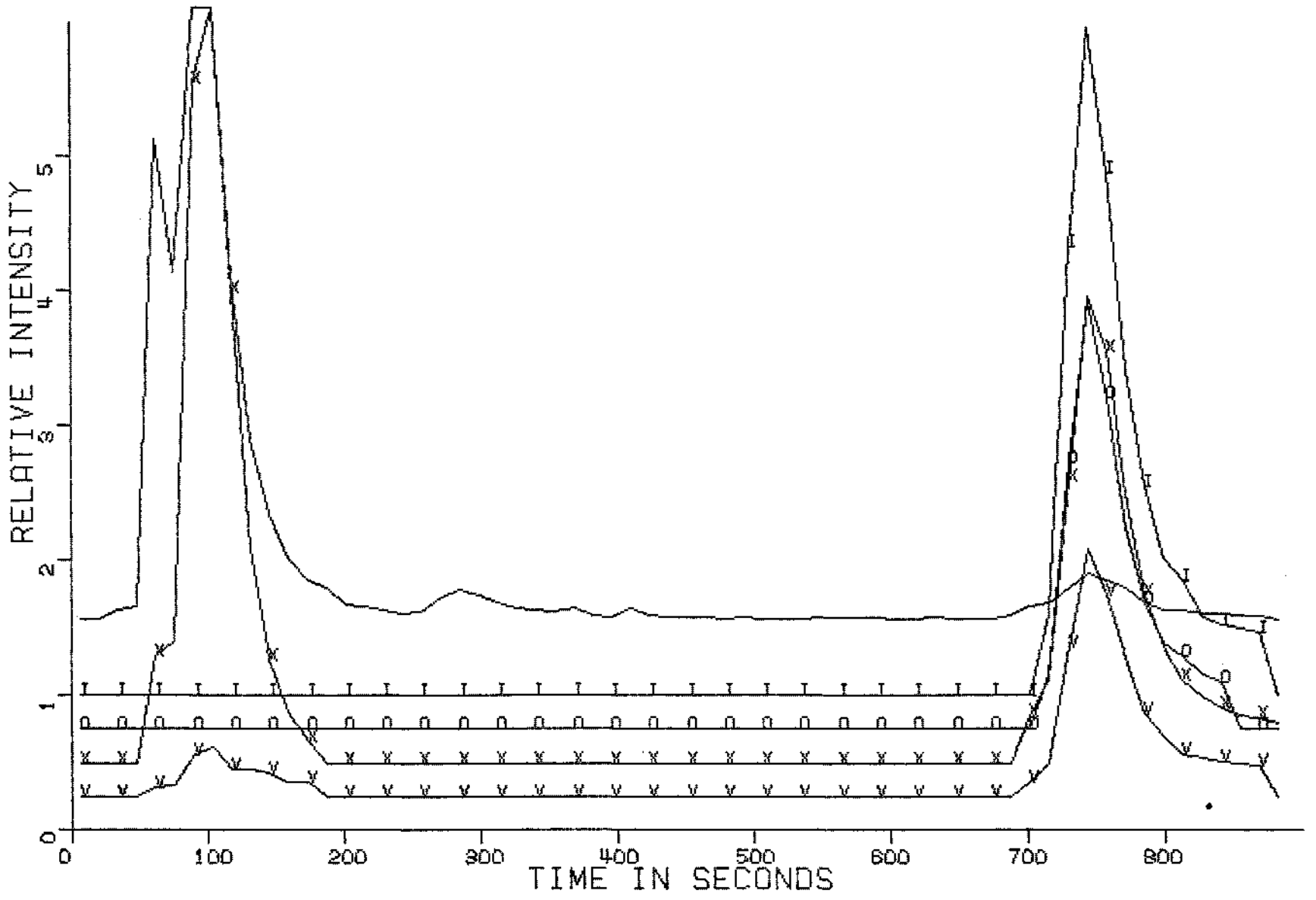

FIGURE D-9. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #264

I = MASS 162
X = MASS 63
O = MASS 164
V = MASS 98

TABLE D-5. Normalized Mass Spectrum of Compound F. Trichloroanisole (IX)

FIL0C-1 10 MICROLITER 100% GULFPORT#264 25-300 CD491 19 DEC

MASS	SCAN 75	SCAN 65	DIFF.	NORM. DIFF.
37.0	6663.	.	6663.	9.04
48.0	3923.	.	3923.	5.32
49.0	4311.	.	4311.	5.85
50.0	3867.	.	3867.	5.25
61.0	12266.	.	12266.	16.65
62.0	15754.	.	15754.	21.38
72.0	6369.	.	6369.	8.64
73.0	10032.	695.	9337.	12.67
74.0	13049.	.	13049.	17.71
75.0	5389.	.	5389.	7.31
83.0	5429.	.	5429.	7.37
84.0	4488.	.	4488.	6.09
85.0	4603.	.	4603.	6.25
96.0	4949.	.	4949.	6.72
97.0	26978.	.	26978.	36.61
99.0	9195.	.	9195.	12.48
107.0	9662.	.	9662.	13.11
108.0	4838.	.	4838.	6.57
109.0	13639.	.	13639.	18.51
111.0	6573.	.	6573.	8.92
132.0	3948.	.	3948.	5.36
145.0	4752.	.	4752.	6.45
167.0	51564.	.	51564.	69.98
169.0	49274.	.	49274.	66.87
171.0	**16601.**	.	**16601.**	**22.53**
195.0	**46604.**	.	**46604.**	**63.25**
197.0	**48414.**	.	**48414.**	**65.70**
199.0	**15663.**	.	**15663.**	**21.26**
210.0	69797.	.	69797.	94.72
211.0	6442.	.	6442.	8.74
212.0	73687.	.	73687.	100.00
213.0	5896.	.	5896.	8.00
214.0	22337.	.	22337.	30.31

SCAN 75 CONTAINED 120 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

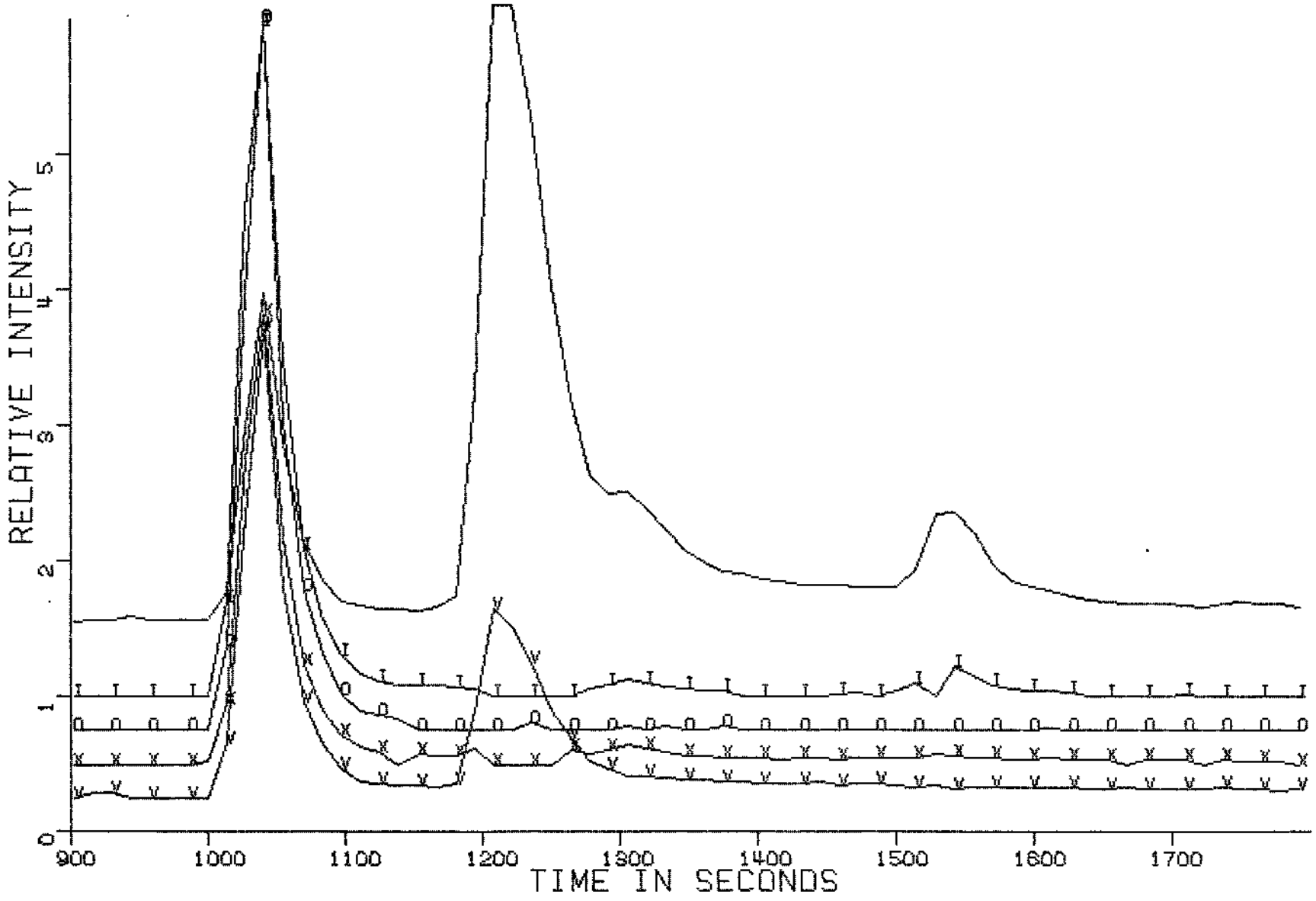

FIGURE D-10. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #284

I = MASS 210
X = MASS 195
O = MASS 212
V = MASS 197

TABLE D-6. Normalized Mass Spectrum of Compound G. Trichlorophenol (VI)

FIL0C-1 10 MICROLITER 100% GULFPORT#264 25-300 CD491 19 DEC

MASS	SCAN 87	SCAN 65	DIFF.	NORM. DIFF.
37.0	12784.	.	12784.	5.29
48.0	28323.	.	28323.	11.72
49.0	15495.	.	15495.	6.41
53.0	15135.	.	15135.	6.26
61.0	27836.	.	27836.	11.52
62.0	37087.	.	37087.	15.34
63.0	21494.	866.	20628.	8.53
66.0	14833.	.	14833.	6.14
73.0	23306.	695.	22611.	9.35
97.0	108835.	.	108835.	45.03
98.0	23356.	.	23356.	9.66
99.0	48248.	.	48248.	19.96
132.0	68701.	.	68701.	28.42
133.0	36431.	.	36431.	15.07
134.0	45901.	.	45901.	18.99
135.0	22251.	1065.	21186.	8.76
162.0	14461.	.	14461.	5.98
196.0	241713.	.	241713.	100.00
197.0	19546.	.	19546.	8.09
198.0	227363.	.	227363.	94.06
199.0	16647.	.	16647.	6.89
200.0	73843.	.	73843.	30.55

SCAN 87 CONTAINED 126 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

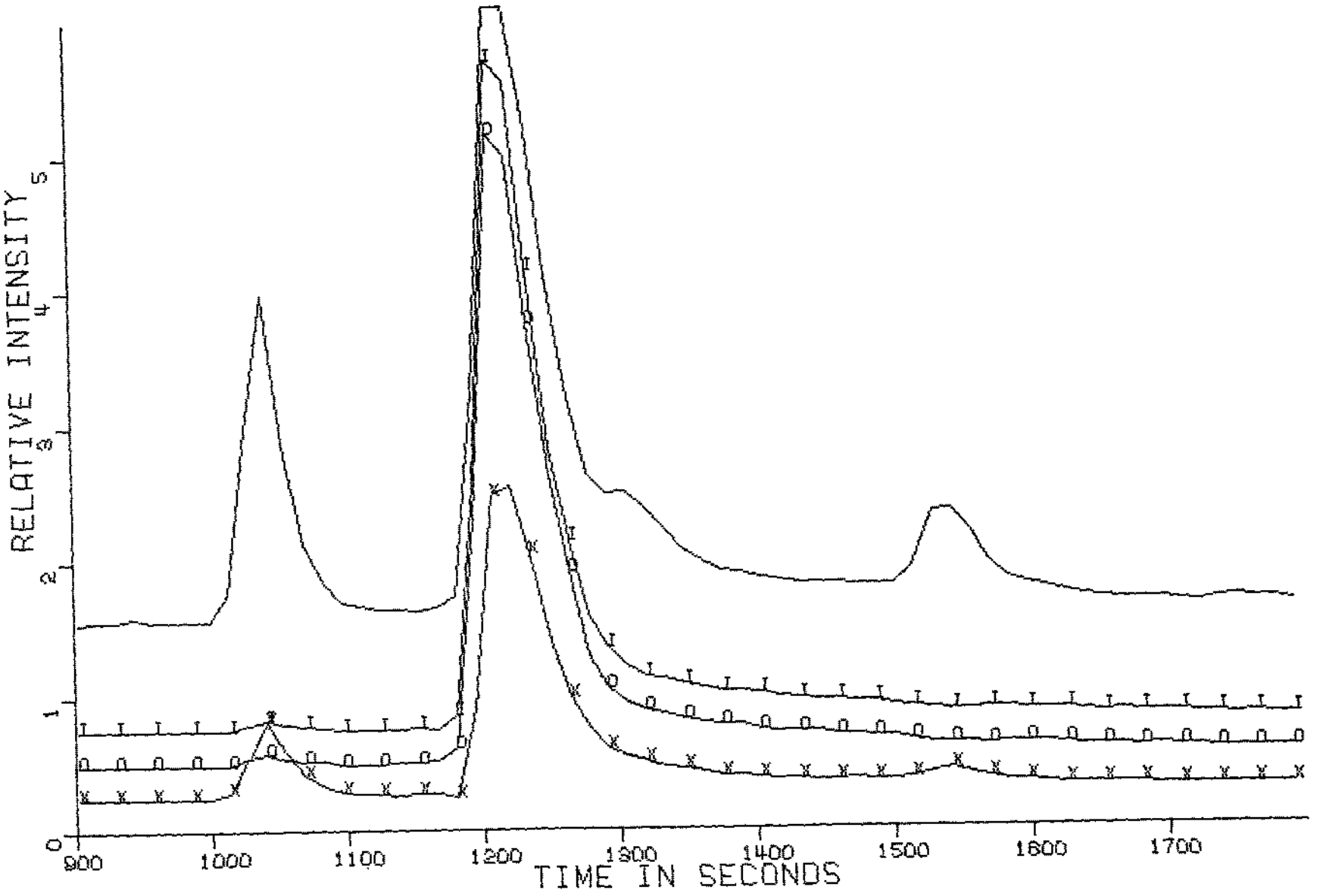

FIGURE D-11. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #264

I = MASS 196

O = MASS 120

TABLE D-7. Normalized Mass Spectrum of Compound H. Dichloro-methoxyanisole (X)

FIL0C-1 10 MICROLITER 100% GULFPORT#264 25-300 CD491 19 DEC

MASS	SCAN 94	SCAN 85	DIFF.	NORM. DIFF.
28.0	14193.	12188.	2005.	11.66
29.0	1419.	412.	1007.	5.86
31.0	1522.	256.	1266.	7.37
32.0	2167.	1945.	222.	1.29
35.0	619.	.	619.	3.60
36.0	2725.	643.	2082.	12.11
37.0	2888.	450.	2438.	14.18
38.0	1379.	363.	1016.	5.91
39.0	1096.	438.	658.	3.83
44.0	1352.	962.	390.	2.27
47.0	980.	.	980.	5.70
48.0	4993.	685.	4308.	25.06
49.0	3238.	604.	2634.	15.32
50.0	3708.	.	3708.	21.57
53.0	4575.	489.	4086.	23.77
55.0	206.	.	206.	1.20
60.0	2071.	.	2071.	12.05
61.0	5413.	906.	4507.	26.22
62.0	7573.	1200.	6373.	37.08
63.0	4729.	2422.	2307.	13.42
65.0	831.	414.	417.	2.43
66.0	2070.	340.	1730.	10.06
67.0	1218.	.	1218.	7.09
71.0	595.	.	595.	3.46
72.0	2027.	421.	1606.	9.34
73.0	4562.	2664.	1898.	11.04
74.0	2041.	661.	1380.	8.03
75.0	2139.	678.	1461.	8.50
76.0	312.	.	312.	1.82
77.0	1291.	.	1291.	7.51
80.0	1081.	.	1081.	6.29
81.0	957.	583.	374.	2.18
82.0	257.	.	257.	1.50
83.0	1129.	.	1129.	6.57
85.0	2257.	257.	2000.	11.64
87.0	1318.	.	1318.	7.67
91.0	895.	696.	199.	1.16
96.0	1351.	296.	1055.	6.14
97.0	14655.	.	14655.	85.26
98.0	3175.	1803.	1372.	7.98
99.0	9468.	.	9468.	55.08
100.0	1708.	.	1708.	9.94
107.0	1322.	.	1322.	7.69
108.0	586.	.	586.	3.41
109.0	1714.	.	1714.	9.97
111.0	843.	.	843.	4.90
113.0	3542.	.	3542.	20.61
114.0	298.	.	298.	1.73
115.0	1278.	.	1278.	7.43
120.0	722.	.	722.	4.20
127.0	2462.	.	2462.	14.32
128.0	4436.	.	4436.	25.81
129.0	1004.	.	1004.	5.84
130.0	1441.	.	1441.	8.38

131.0	570.	.	570.	3.32
132.0	7114.	1591.	5523.	32.13
133.0	5112.	910.	4202.	24.45
134.0	5017.	.	5017.	29.19
135.0	3807.	1334.	2473.	14.39
136.0	1055.	281.	774.	4.50
137.0	625.	.	625.	3.64
141.0	2094.	.	2094.	12.18
143.0	897.	.	897.	5.22
147.0	925.	.	925.	5.38
148.0	766.	.	766.	4.46
149.0	402.	.	402.	2.34
150.0	649.	.	649.	3.78
156.0	706.	.	706.	4.11
160.0	1495.	749.	746.	4.34
163.0	3042.	.	3042.	17.70
165.0	1698.	.	1698.	9.88
167.0	1211.	.	1211.	7.05
168.0	778.	.	778.	4.53
169.0	1289.	1035.	254.	1.48
190.0	229.	.	229.	1.33
191.0	11081.	.	11081.	64.47
192.0	1098.	.	1098.	6.39
193.0	6834.	.	6834.	39.76
194.0	620.	.	620.	3.61
195.0	1980.	802.	1178.	6.85
196.0	22814.	5625.	17189.	100.00
197.0	2348.	1409.	939.	5.46
198.0	21729.	5547.	16182.	94.14
199.0	1809.	.	1809.	10.52
200.0	7053.	1718.	5335.	31.04
201.0	507.	.	507.	2.95
202.0	813.	283.	530.	3.08
206.0	11474.	.	11474.	66.75
207.0	1147.	.	1147.	6.67
208.0	7804.	.	7804.	45.40
209.0	767.	.	767.	4.46
210.0	1714.	1093.	621.	3.61
212.0	520.	.	520.	3.03

SCAN 94 CONTAINED 108 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

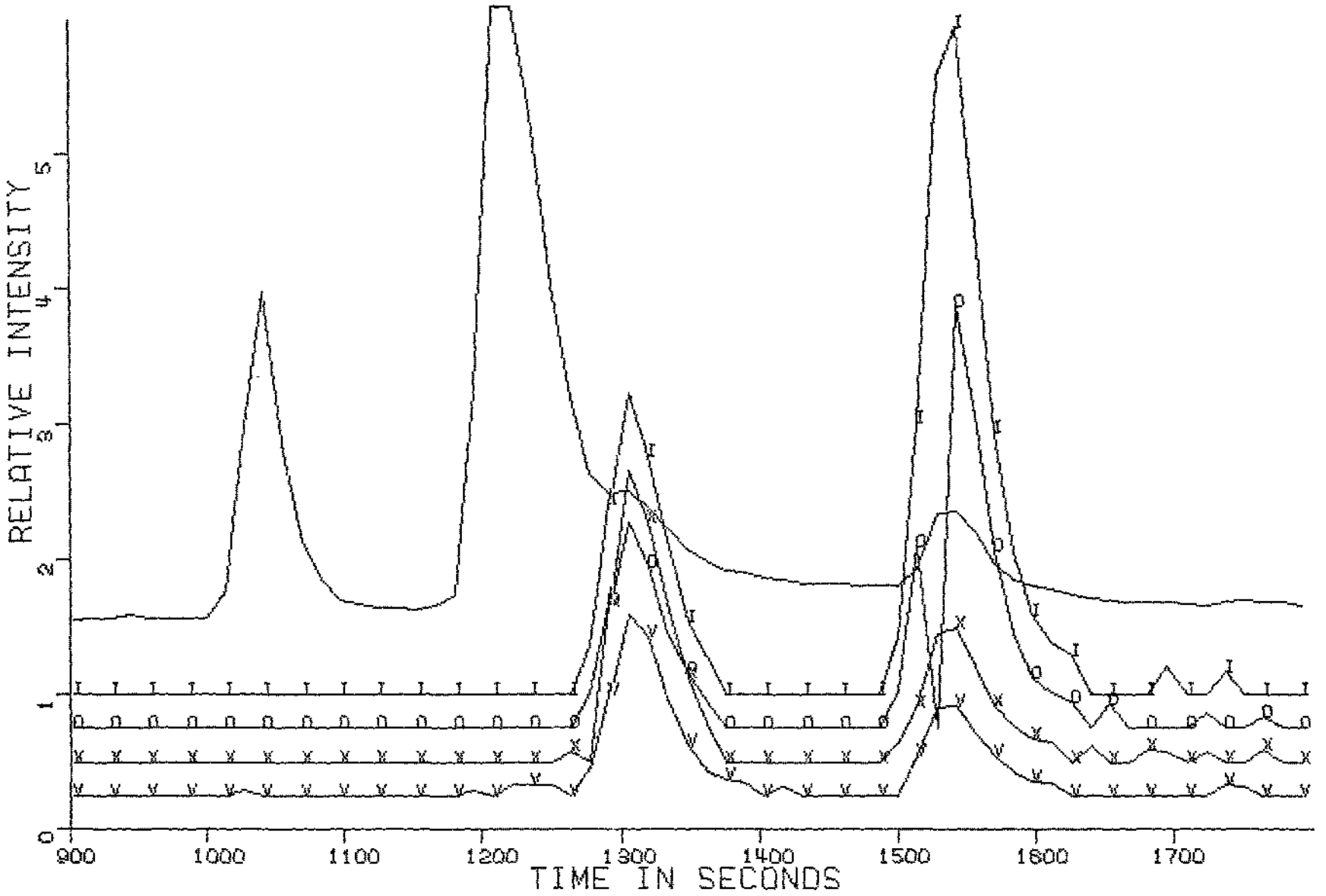

FIGURE D-12. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #284

I = MASS 206
X = MASS 191
O = MASS 208
V = MASS 193

TABLE D-8. Normalized Mass Spectrum of Compound I. Dichloro-methoxyanisole (X)

FIL0C-1 10 MICROLITER 100% GULFPORT#264 25-300 CD491 19 DEC

MASS	SCAN 110	SCAN 106	DIFF.	NORM. DIFF.
29.0	1011.	528.	483.	2.05
35.0	537.	255.	282.	1.20
36.0	1654.	1221.	433.	1.84
37.0	1727.	970.	757.	3.22
38.0	1042.	614.	428.	1.82
39.0	1113.	467.	646.	2.74
41.0	1233.	744.	489.	2.08
43.0	832.	242.	590.	2.51
47.0	809.	371.	438.	1.86
49.0	1846.	1066.	780.	3.31
50.0	2912.	687.	2225.	9.45
51.0	1092.	.	1092.	4.64
53.0	2412.	974.	1438.	6.11
55.0	510.	.	510.	2.17
57.0	602.	320.	282.	1.20
59.0	527.	.	527.	2.24
60.0	1199.	.	1199.	5.09
61.0	3509.	1613.	1896.	8.06
62.0	4656.	2123.	2533.	10.76
63.0	3695.	1586.	2109.	8.96
64.0	550.	.	550.	2.34
65.0	809.	297.	512.	2.18
66.0	968.	.	968.	4.11
67.0	600.	.	600.	2.55
69.0	1563.	.	1563.	6.64
71.0	724.	.	724.	3.08
72.0	1573.	874.	699.	2.97
73.0	3232.	2072.	1160.	4.93
74.0	1974.	740.	1234.	5.24
75.0	2039.	751.	1288.	5.47
76.0	560.	.	560.	2.38
77.0	1832.	.	1832.	7.78
78.0	780.	.	780.	3.31
79.0	559.	.	559.	2.38
83.0	681.	.	681.	2.89
84.0	1114.	.	1114.	4.73
85.0	3768.	495.	3273.	13.91
86.0	758.	.	758.	3.22
87.0	1647.	.	1647.	7.00
89.0	501.	.	501.	2.13
91.0	861.	.	861.	3.66
93.0	733.	.	733.	3.11
95.0	528.	.	528.	2.24
96.0	1136.	.	1136.	4.83
97.0	8069.	5569.	2500.	10.62
98.0	2059.	1201.	858.	3.65
99.0	5631.	2561.	3070.	13.04
100.0	1560.	.	1560.	6.63
101.0	1175.	.	1175.	4.99
102.0	564.	.	564.	2.40
103.0	610.	.	610.	2.59
104.0	497.	.	497.	2.11
105.0	481.	.	481.	2.04
107.0	1031.	.	1031.	4.38

108.0	655.	.	655.	2.78
109.0	1329.	565.	764.	3.25
110.0	534.	.	534.	2.27
111.0	1392.	.	1392.	5.91
112.0	775.	.	775.	3.29
113.0	3606.	.	3606.	15.32
114.0	612.	.	612.	2.60
115.0	1338.	.	1338.	5.69
119.0	651.	.	651.	2.77
120.0	1990.	.	1990.	8.46
121.0	666.	287.	379.	1.61
122.0	1285.	.	1285.	5.46
124.0	541.	.	541.	2.30
126.0	1104.	.	1104.	4.69
127.0	655.	.	655.	2.78
128.0	775.	.	775.	3.29
131.0	610.	.	610.	2.59
137.0	569.	.	569.	2.42
141.0	1383.	.	1383.	5.88
142.0	692.	.	692.	2.94
143.0	913.	.	913.	3.88
145.0	572.	.	572.	2.43
147.0	675.	.	675.	2.87
148.0	3521.	.	3521.	14.96
149.0	1408.	657.	751.	3.19
150.0	2557.	.	2557.	10.86
151.0	759.	.	759.	3.22
152.0	668.	.	668.	2.84
156.0	1239.	.	1239.	5.26
157.0	658.	.	658.	2.80
158.0	609.	.	609.	2.59
160.0	1250.	705.	545.	2.32
161.0	663.	.	663.	2.82
162.0	1556.	1305.	251.	1.07
163.0	16071.	.	16071.	68.29
164.0	1939.	.	1939.	8.24
165.0	10145.	.	10145.	43.11
166.0	1204.	.	1204.	5.12
167.0	2323.	584.	1739.	7.39
171.0	594.	.	594.	2.52
175.0	571.	.	571.	2.43
177.0	1055.	.	1055.	4.48
179.0	804.	.	804.	3.42
182.0	613.	.	613.	2.60
187.0	726.	.	726.	3.08
191.0	4882.	.	4882.	20.74
192.0	1429.	.	1429.	6.07
193.0	3348.	.	3348.	14.23
194.0	1116.	.	1116.	4.74
195.0	1124.	668.	456.	1.94
202.0	662.	.	662.	2.81
206.0	23535.	.	23535.	100.00

SCAN 110 CONTAINED 127 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

NOTE: This is not a complete mass spectrum. Mass 206 was the highest mass recorded by the computer storage routine for this scan.

TABLE D-9. Normalized Mass Spectrum of Compound J.

FIL0C-1 10 MICROLITER 100% GULFPORT#264 25-300 CD491 19 DEC

MASS	SCAN 136	SCAN 132	DIFF.	NORM. DIFF.
29.0	787.	531.	256.	8.36
31.0	222.	.	222.	7.25
36.0	812.	752.	60.	1.96
37.0	447.	323.	124.	4.05
39.0	453.	.	453.	14.78
40.0	125.	.	125.	4.08
42.0	581.	217.	364.	11.88
43.0	456.	293.	163.	5.32
45.0	2799.	230.	2569.	83.84
47.0	231.	.	231.	7.54
49.0	510.	.	510.	16.64
50.0	638.	.	638.	20.82
59.0	692.	.	692.	22.58
61.0	842.	794.	48.	1.57
62.0	1018.	.	1018.	33.22
63.0	1260.	858.	402.	13.12
67.0	211.	.	211.	6.89
73.0	2857.	1227.	1630.	53.20
74.0	879.	.	879.	28.69
75.0	1313.	543.	770.	25.13
85.0	384.	.	384.	12.53
109.0	934.	.	934.	30.48
111.0	1148.	.	1148.	37.47
133.0	1492.	.	1492.	48.69
134.0	719.	660.	59.	1.93
135.0	1676.	1315.	361.	11.78
136.0	231.	.	231.	7.54
145.0	**1143.**	.	**1143.**	**37.30**
147.0	1237.	133.	1104.	36.03
149.0	670.	.	670.	21.87
161.0	1197.	.	1197.	39.07
162.0	**691.**	.	**691.**	**22.55**
163.0	**918.**	.	**918.**	**29.96**
165.0	**423.**	.	**423.**	**13.81**
175.0	**1985.**	.	**1985.**	**64.78**
177.0	**1814.**	.	**1814.**	**59.20**
198.0	3064.	.	3064.	100.00
199.0	2046.	.	2046.	66.78
201.0	678.	.	678.	22.13
234.0	1574.	.	1574.	51.37

SCAN 136 CONTAINED 56 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

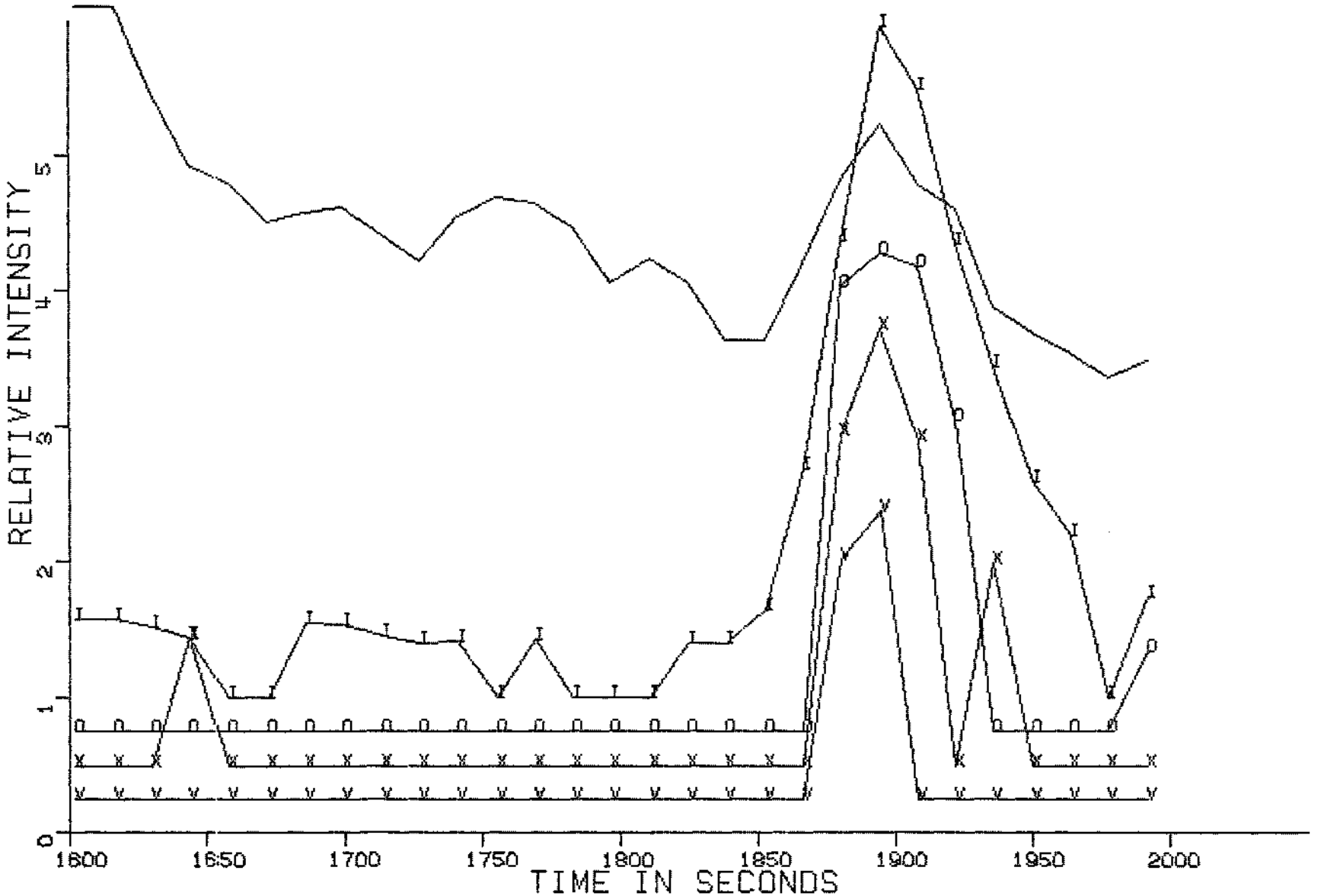

FIGURE D-13. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #264

I = MASS 45
X = MASS 177
O = MASS 175
V = MASS 161

TABLE D-10. Normalized Mass Spectrum of Compound K. Butyl ester of monochlorophenoxyacetic acid (XII)

FIL0C-1 10 MICROLITER 100% GULFPORT#264 25-300 CD491 19 DEC

MASS	SCAN 150	SCAN 142	DIFF.	NORM. DIFF.
28.0	13548.	12639.	909.	2.71
29.0	31050.	397.	30653.	91.33
30.0	769.	.	769.	2.29
31.0	983.	.	983.	2.93
38.0	1141.	283.	858.	2.56
39.0	4498.	.	4498.	13.40
41.0	24230.	768.	23462.	69.90
42.0	4544.	.	4544.	13.54
43.0	5304.	311.	4993.	14.88
45.0	367.	.	367.	1.09
48.0	347.	.	347.	1.03
49.0	485.	.	485.	1.45
50.0	2766.	.	2766.	8.24
51.0	2532.	.	2532.	7.54
52.0	372.	.	372.	1.11
53.0	828.	406.	422.	1.26
55.0	3393.	.	3393.	10.11
56.0	1770.	.	1770.	5.27
57.0	33564.	.	33564.	100.00
58.0	1308.	.	1308.	3.90
62.0	981.	.	981.	2.92
63.0	2879.	648.	2231.	6.65
64.0	1467.	.	1467.	4.37
71.0	428.	.	428.	1.28
73.0	2831.	1343.	1488.	4.43
74.0	1170.	.	1170.	3.49
75.0	7724.	602.	7122.	21.22
76.0	1739.	.	1739.	5.18
77.0	5848.	.	5848.	17.42
78.0	1137.	.	1137.	3.39
79.0	433.	.	433.	1.29
85.0	980.	221.	759.	2.26
91.0	544.	.	544.	1.62
93.0	641.	.	641.	1.91
99.0	3389.	743.	2646.	7.88
100.0	402.	.	402.	1.20
101.0	992.	.	992.	2.96
105.0	622.	.	622.	1.85
111.0	10850.	.	10850.	32.33
112.0	1137.	.	1137.	3.39
113.0	8111.	.	8111.	24.17
115.0	1567.	.	1567.	4.67
127.0	950.	.	950.	2.83
128.0	10163.	.	10163.	30.28
129.0	1035.	.	1035.	3.08
130.0	3274.	.	3274.	9.75
133.0	694.	.	694.	2.07
141.0	18230.	380.	17850.	53.18
142.0	4065.	.	4065.	12.11
143.0	5913.	.	5913.	17.62
144.0	1356.	.	1356.	4.04
150.0	798.	.	798.	2.38
151.0	23566.	.	23566.	70.21
152.0	1847.	.	1847.	5.50

169.0	**342.**	.	**342.**	**1.02**
186.0	**3215.**	.	**3215.**	**9.58**
187.0	**685.**	.	**685.**	**2.04**
188.0	**1093.**	.	**1093.**	**3.26**
207.0	**966.**	.	**966.**	**2.88**
242.0	6883.	.	6883.	20.51
243.0	842.	.	842.	2.51
244.0	2235.	.	2235.	6.66
253.0	758.	.	758.	2.26

SCAN 150 CONTAINED 78 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

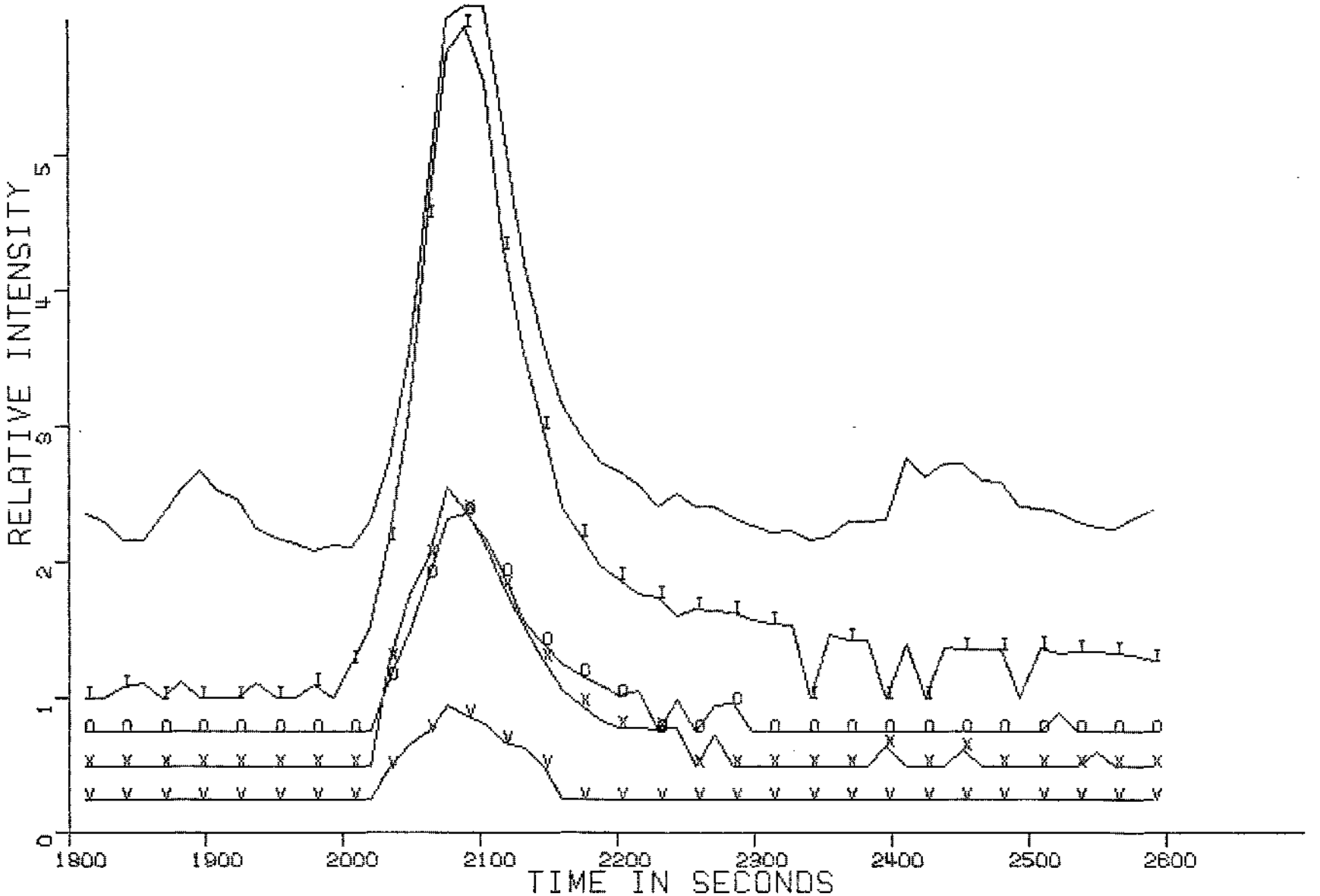

FIGURE D-14. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #284

I = MASS 141
X = MASS 242
O = MASS 143
V = MASS 244

TABLE D-11. Normalized Mass Spectrum of Compound L.
Butyl ester of dichlorophenoxyacetic acid(XIII)

FIL0C-1 10 MICROLITER 100% GULFPORT#264 25-300 CD491 19 DEC

MASS	SCAN 176	SCAN 169	DIFF.	NORM. DIFF.
28.0	13269.	12652.	617.	7.98
29.0	5200.	2691.	2509.	32.44
32.0	2091.	1925.	166.	2.15
38.0	214.	.	214.	2.77
39.0	857.	511.	346.	4.47
40.0	208.	166.	42.	.54
41.0	4995.	2556.	2439.	31.53
42.0	1171.	530.	641.	8.29
43.0	2681.	554.	2127.	27.50
51.0	429.	.	429.	5.55
53.0	267.	.	267.	3.45
55.0	544.	.	544.	7.03
56.0	491.	.	491.	6.35
57.0	11028.	3293.	7735.	100.00
62.0	528.	.	528.	6.83
63.0	843.	535.	308.	3.98
73.0	1315.	1131.	184.	2.38
74.0	567.	317.	250.	3.23
75.0	1264.	935.	329.	4.25
98.0	378.	.	378.	4.89
99.0	600.	.	600.	7.76
109.0	724.	.	724.	9.36
111.0	1361.	.	1361.	17.60
113.0	755.	.	755.	9.76
133.0	**781.**	**516.**	**265.**	**3.43**
135.0	1205.	1051.	154.	1.99
147.0	772.	.	772.	9.98
156.0	510.	.	510.	6.59
162.0	**1523.**	.	**1523.**	**19.69**
168.0	**696.**	.	**696.**	**9.00**
169.0	**289.**	.	**289.**	**3.74**
175.0	**2961.**	.	**2961.**	**38.28**
176.0	508.	.	508.	6.57
177.0	1920.	.	1920.	24.82
242.0	434.	.	434.	5.61
250.0	272.	.	272.	3.52
278.0	497.	.	497.	6.43

SCAN 176 CONTAINED 46 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN .5%.

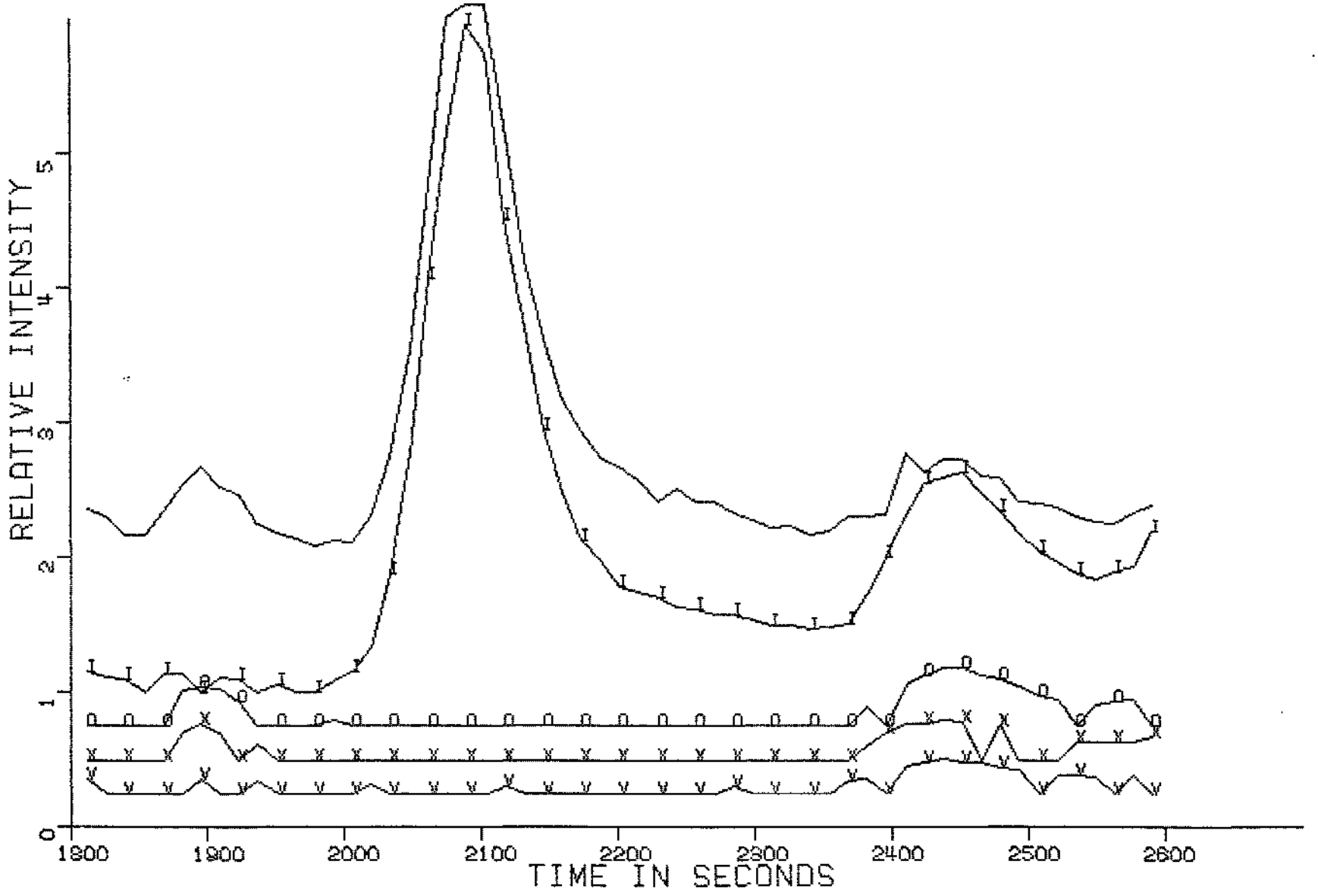

FIGURE D-15. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #284

I = MASS 57
X = MASS 177
O = MASS 175
V = MASS 162

TABLE D-12: Normalized Mass Spectrum of Compound M.
Butyl ester of dichlorophenoxyacetic acid (XIII)

FIL0C-1 10 MICROLITER 100% GULFPORT#264 25-300 CD491 19 DEC

MASS	SCAN 193	SCAN 183	DIFF.	NORM. DIFF.
29.0	13327.	2718.	10609.	58.65
30.0	425.	.	425.	2.35
31.0	474.	.	474.	2.62
37.0	304.	.	304.	1.68
38.0	471.	189.	282.	1.56
39.0	1861.	676.	1185.	6.55
41.0	12428.	2876.	9552.	52.81
42.0	2958.	530.	2428.	13.42
43.0	3368.	1490.	1878.	10.38
45.0	1682.	.	1682.	9.30
47.0	188.	.	188.	1.04
49.0	250.	.	250.	1.38
50.0	689.	373.	316.	1.75
51.0	568.	.	568.	3.14
53.0	425.	.	425.	2.35
55.0	1582.	.	1582.	8.75
56.0	1409.	.	1409.	7.79
57.0	23781.	5693.	18088.	100.00
58.0	1076.	.	1076.	5.95
59.0	742.	.	742.	4.10
61.0	717.	.	717.	3.96
62.0	841.	.	841.	4.65
63.0	1647.	408.	1239.	6.85
72.0	286.	.	286.	1.58
73.0	2956.	1202.	1754.	9.70
74.0	1295.	317.	978.	5.41
75.0	2055.	1002.	1053.	5.82
85.0	468.	.	468.	2.59
98.0	623.	.	623.	3.44
109.0	1909.	463.	1446.	7.99
111.0	2643.	856.	1787.	9.88
112.0	631.	.	631.	3.49
113.0	971.	.	971.	5.37
128.0	489.	.	489.	2.70
135.0	1341.	1038.	303.	1.68
143.0	585.	.	585.	3.23
145.0	2209.	.	2209.	12.21
146.0	485.	.	485.	2.68
147.0	1802.	.	1802.	9.96
161.0	682.	.	682.	3.77
162.0	4734.	842.	3892.	21.52
163.0	795.	.	795.	4.40
164.0	3075.	.	3075.	17.00
175.0	5071.	1082.	3989.	22.05
177.0	3359.	906.	2453.	13.56
179.0	1061.	.	1061.	5.87
185.0	5625.	.	5625.	31.10
186.0	716.	.	716.	3.96
187.0	2283.	.	2283.	12.62
195.0	369.	.	369.	2.04
211.0	661.	.	661.	3.65
217.0	198.	.	198.	1.09
220.0	**1328.**	.	**1328.**	**7.34**
233.0	**890.**	.	**890.**	**4.92**

249.0	306.	.	306.	1.69
270.0	668.	.	668.	3.69
276.0	1852.	.	1852.	10.24
278.0	1218.	.	1218.	6.73

SCAN 193 CONTAINED 68 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

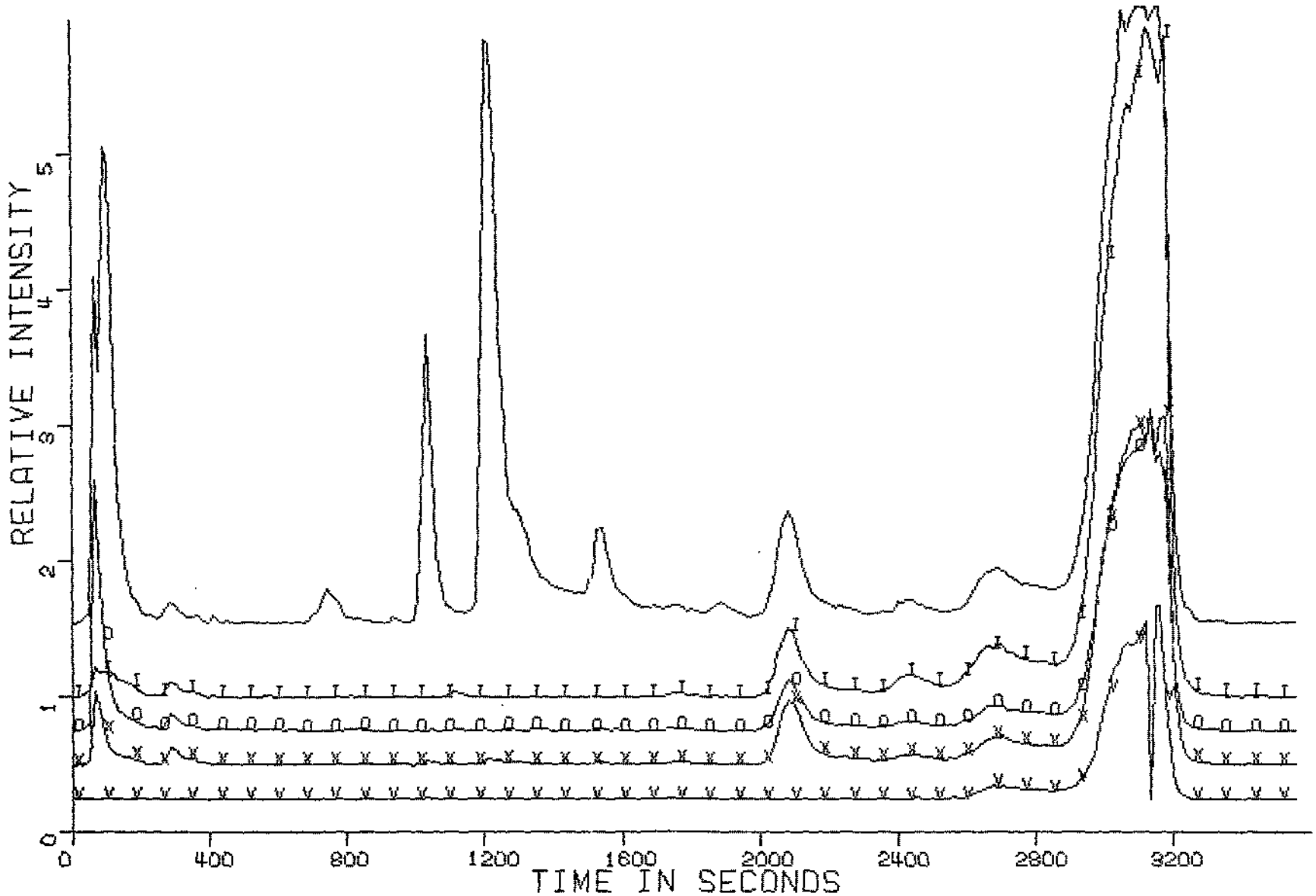

FIGURE D-16. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #284

I = MASS 57
X = MASS 29
O = MASS 41
V = MASS 185

TABLE D-13: Normalized mass Spectrum of Compound N.
Butyl ester of dichlorophenoxyacetic acid (XIII)

FIL0C-1 10 MICROLITER 100% GULFPORT#264 25-300 CD491 19 DEC

MASS	SCAN 217	SCAN 183	DIFF.	NORM. DIFF.
29.0	116846.	2718.	114128.	55.62
41.0	96308.	2876.	93432.	45.53
42.0	19392.	530.	18862.	9.19
43.0	19252.	1490.	17762.	8.66
55.0	15687.	.	15687.	7.64
57.0	210897.	5693.	205204.	100.00
63.0	11949.	408.	11541.	5.62
75.0	13775.	1002.	12773.	6.22
109.0	17567.	463.	17104.	8.34
111.0	20722.	856.	19866.	9.68
145.0	**23721.**	.	**23721.**	**11.56**
147.0	20145.	.	20145.	9.82
162.0	43769.	842.	42927.	20.92
164.0	28323.	.	28323.	13.80
175.0	**52985.**	1082.	**51903.**	**25.29**
176.0	**11093.**	.	**11093.**	**5.41**
177.0	**34305.**	906.	**33399.**	**16.28**
185.0	**51154.**	.	**51154.**	**24.93**
187.0	**18665.**	.	**18665.**	**9.10**
220.0	18321.	.	18321.	8.93
222.0	10709.	.	10709.	5.22
276.0	35292.	.	35292.	17.20
278.0	22643.	.	22643.	11.03

SCAN 217 CONTAINED 127 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

TABLE D-14. Normalized Mass Spectrum of Compound R.
Butyl ester of bis- dichlorophenoxyacetic acid (XIX)

FIL10-3 10 MICROLITER 100% GULFPORT#264 25-450 CD492 22MAR

MASS	SCAN 67	SCAN 55	DIFF.	NORM. DIFF.
27.0	163.	28.	135.	9.84
28.0	1697.	1564.	133.	9.69
29.0	1208.	192.	1016.	74.05
39.0	70.	.	70.	5.10
41.0	683.	87.	596.	43.44
43.0	74.	.	74.	5.39
55.0	245.	.	245.	17.86
57.0	1664.	292.	1372.	100.00
58.0	140.	.	140.	10.20
63.0	231.	.	231.	16.84
74.0	114.	.	114.	8.31
75.0	183.	.	183.	13.34
97.0	82.	.	82.	5.98
100.0	69.	.	69.	5.03
109.0	153.	.	153.	11.15
110.0	90.	.	90.	6.56
111.0	126.	25.	101.	7.36
127.0	78.	.	78.	5.69
128.0	74.	.	74.	5.39
133.0	124.	.	124.	9.04
145.0	236.	.	236.	17.20
146.0	74.	.	74.	5.39
147.0	177.	108.	69.	5.03
161.0	101.	.	101.	7.36
162.0	243.	36.	207.	15.09
163.0	360.	.	360.	26.24
164.0	133.	.	133.	9.69
165.0	248.	.	248.	18.08
173.0	94.	.	94.	6.85
175.0	1279.	67.	1212.	88.34
176.0	144.	.	144.	10.50
177.0	788.	.	788.	57.43
179.0	133.	.	133.	9.69
191.0	275.	.	275.	20.04
193.0	142.	.	142.	10.35
201.0	177.	.	177.	12.90
203.0	84.	.	84.	6.12
219.0	135.	.	135.	9.84
221.0	152.	39.	113.	8.24
275.0	512.	.	512.	37.32
276.0	100.	.	100.	7.29
277.0	310.	.	310.	22.59
335.0	103.	.	103.	7.51
337.0	128.	.	128.	9.33

SCAN 67 CONTAINED 72 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

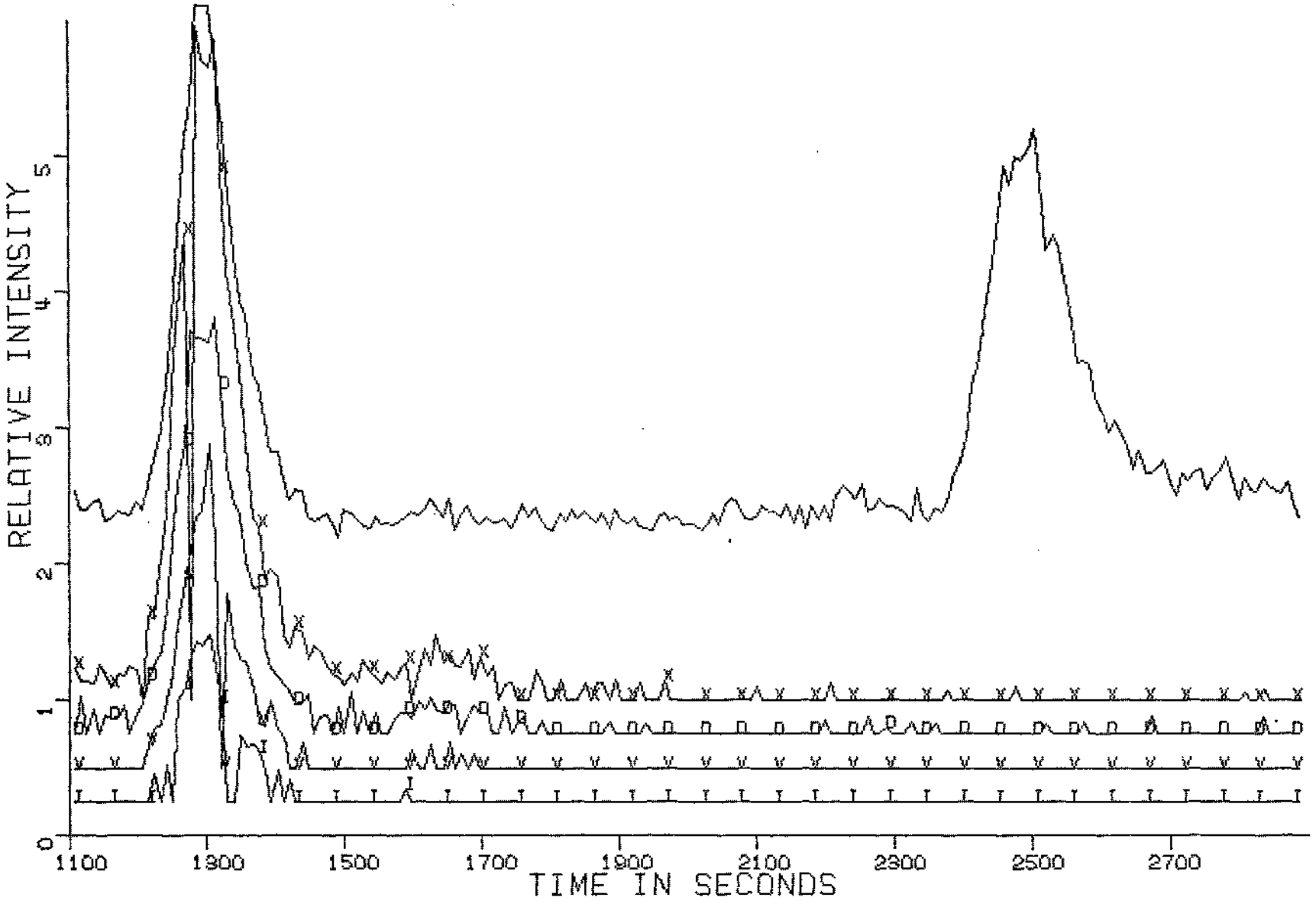

FIGURE D-17. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #264
X = MASS 175 D = MASS 177 V = MASS 275
I = MASS 277

TABLE D-15. Normalized Mass Spectrum of Compound S.
Butyl ester of bis- trichlorophenoxyacetic acid (XX)

FIL10-3 10 MICROLITER 100% GULFPORT#264 25-450 CD492 22MAR

MASS	SCAN 201	SCAN 187	DIFF.	NORM. DIFF.
28.0	2328.	2003.	325.	21.08
29.0	900.	90.	810.	52.53
41.0	615.	88.	527.	34.18
55.0	215.	.	215.	13.94
57.0	1667.	125.	1542.	100.00
97.0	127.	43.	84.	5.45
109.0	88.	.	88.	5.71
145.0	95.	.	95.	6.16
162.0	99.	.	99.	6.42
181.0	87.	.	87.	5.64
196.0	89.	.	89.	5.77
197.0	135.	.	135.	8.75
198.0	111.	.	111.	7.20
199.0	113.	.	113.	7.33
209.0	674.	.	674.	43.71
211.0	600.	.	600.	38.91
213.0	184.	.	184.	11.93
225.0	100.	.	100.	6.49
235.0	134.	.	134.	8.69
237.0	91.	.	91.	5.90
309.0	257.	.	257.	16.67
313.0	84.	.	84.	5.45

SCAN 201 CONTAINED 63 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

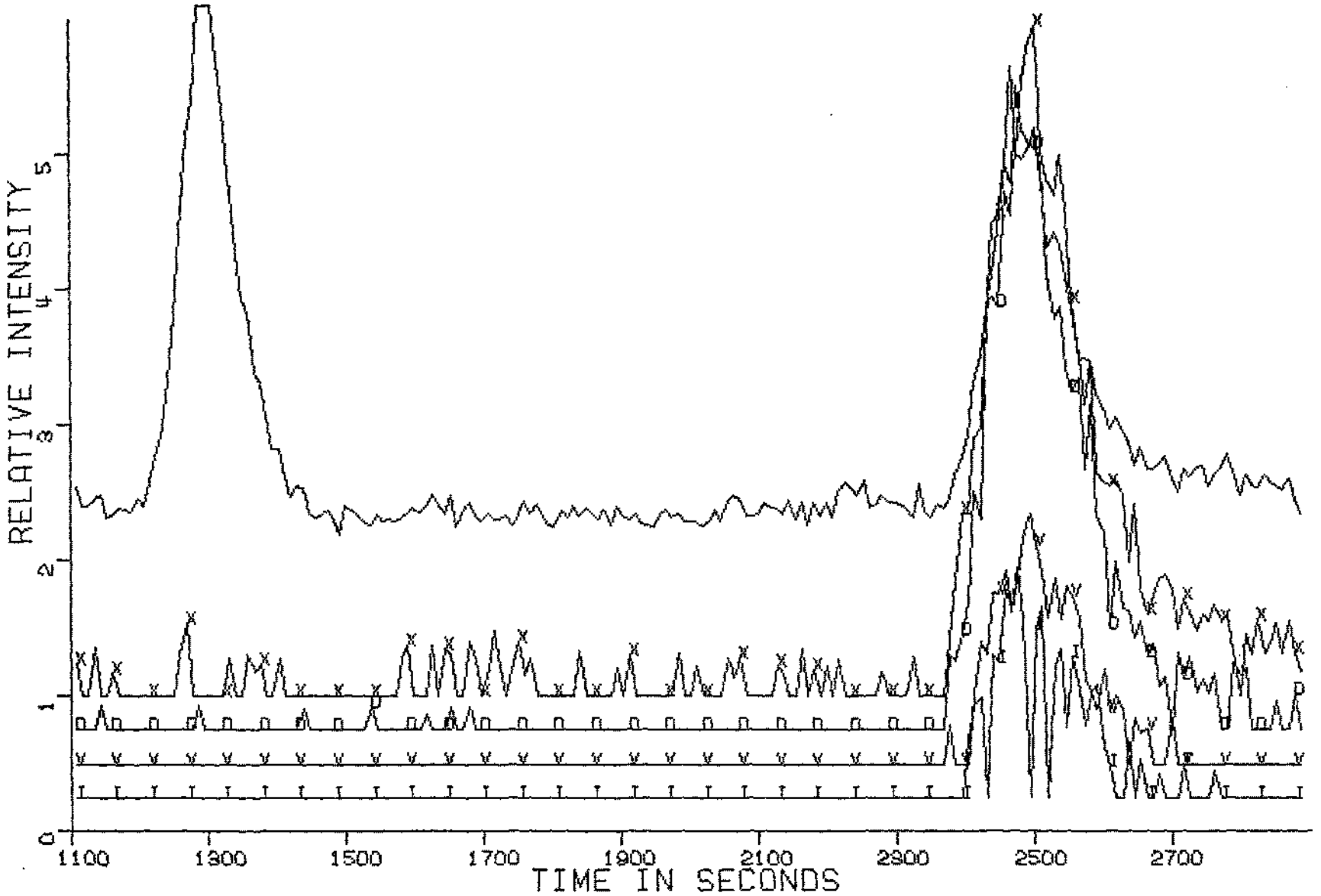

FIGURE D-18. TOTAL ION CHROMATOGRAM AND SELECTED MASS CHROMATOGRAMS OF #264
X = MASS 209 D = MASS 211 V = MASS 309
I = MASS 311

APPENDIX E

PRESENTATION OF DATA ON STANDARD SAMPLES

TABLE E-1. 1-Butanol Standard Spectrum (Baker, reagent grade).

FIL12-2 0.4 MICROLITER 100% N-BUTANOL 25-300 CD491 7 JAN

MASS	SCAN 5	SCAN 1	DIFF.	NORM. DIFF.
27.0	15311.	.	15311.	59.29
28.0	5591.	2038.	3553.	13.76
29.0	9525.	.	9525.	36.88
31.0	**25825.**	.	**25825.**	**100.00**
33.0	2366.	.	2366.	9.16
39.0	5079.	.	5079.	19.67
40.0	1330.	.	1330.	5.15
41.0	**24372.**	.	**24372.**	**94.37**
42.0	**10210.**	.	**10210.**	**39.54**
43.0	**23092.**	.	**23092.**	**89.42**
44.0	**9242.**	.	**9242.**	**35.79**
45.0	1917.	.	1917.	7.42
55.0	4437.	.	4437.	17.18
56.0	23959.	.	23959.	92.77
57.0	4767.	.	4767.	18.46
72.0	4197.	.	4197.	16.25

SCAN 5 CONTAINED 20 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

TABLE E-2. 2-Butanol Standard Spectrum (MCB).

FIL10-2 0.4 MICROLITER 100% 2-BUTANOL 25-300 CD491, 7JAN

MASS	SCAN 4	SCAN 1	DIFF.	NORM. DIFF.
27.0	9973.	.	9973.	16.11
29.0	10871.	.	10871.	17.57
31.0	13297.	.	13297.	21.48
41.0	9993.	.	9993.	16.15
43.0	37152.	.	37152.	60.03
44.0	5083.	.	5083.	8.21
45.0	61890.	.	61890.	100.00
57.0	5344.	.	5344.	8.63
59.0	10454.	.	10454.	16.89
72.0	6067.	.	6067.	9.80

SCAN 4 CONTAINED 20 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

TABLE E-3. Tert-Butanol Standard Spectrum. (MCB)

FIL09-2 0.4 MICROLITER 100% TERT-BUTANOL 25-300 CD491, 7 JAN

MASS	SCAN 4	SCAN 1	DIFF.	NORM. DIFF.
27.0	6880.	.	6880.	15.46
28.0	8114.	2258.	5856.	13.16
29.0	6820.	.	6820.	15.32
31.0	9816.	.	9816.	22.05
39.0	14237.	.	14237.	31.98
40.0	3364.	.	3364.	7.56
41.0	44512.	.	44512.	100.00
43.0	2311.	.	2311.	5.19
55.0	7323.	.	7323.	16.45
56.0	21879.	.	21879.	49.15
57.0	3023.	.	3023.	6.79
59.0	16292.	.	16292.	36.60

SCAN 4 CONTAINED 19 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

TABLE E-4: Iso-Butanol Standard Spectrum (MCB)

FIL08-2 0.4 MICROLITER 100% ISO-BUTANOL 25-300 CD491, 7 JAN

MASS	SCAN 4	SCAN 1	DIFF.	NORM. DIFF.
27.0	23413.	.	23413.	22.43
29.0	9303.	.	9303.	8.91
31.0	37568.	.	37568.	35.99
33.0	53614.	.	53614.	51.36
39.0	11840.	.	11840.	11.34
41.0	58468.	.	58468.	56.01
42.0	55274.	.	55274.	52.95
43.0	104396.	.	104396.	100.00
57.0	9245.	.	9245.	8.86
72.0	5359.	.	5359.	5.13
74.0	5272.	.	5272.	5.05

SCAN 4 CONTAINED 20 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

TABLE E-5. 1-Chloro-butane Standard Spectrum (MCB)

FIL55-1 0.4 MICROLITER 100% 1-CHLORO BUTANE 25-450 CD492 1 APR

MASS	SCAN 10	SCAN 2	DIFF.	NORM. DIFF.
26.0	8746.	.	8746.	5.23
27.0	69428.	31.	69397.	41.50
28.0	41803.	6352.	35451.	21.20
29.0	43925.	41.	43884.	26.25
38.0	2662.	35.	2627.	1.57
39.0	20956.	31.	20925.	12.51
40.0	4386.	70.	4316.	2.58
41.0	118531.	49.	118482.	70.86
42.0	9855.	.	9855.	5.89
43.0	82498.	78.	82420.	49.29
44.0	2964.	444.	2520.	1.51
49.0	5140.	.	5140.	3.07
50.0	2143.	.	2143.	1.28
51.0	3171.	.	3171.	1.90
53.0	2203.	.	2203.	1.32
55.0	14086.	47.	14039.	8.40
56.0	167203.	.	167203.	100.00
57.0	10133.	.	10133.	6.06
62.0	2420.	.	2420.	1.45
63.0	9051.	.	9051.	5.41
65.0	2852.	.	2852.	1.71

SCAN 10 CONTAINED 89 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-6. Ethyl benzene Standard Spectrum (MCB)

FIL18-2 0.4 MICROLITER 100% ETHYLBENZENE 25-300 CD491 9 JAN

MASS	SCAN 8	SCAN 2	DIFF.	NORM. DIFF.
27.0	6463.	.	6463.	3.71
38.0	1875.	.	1875.	1.08
39.0	12266.	.	12266.	7.03
41.0	2325.	.	2325.	1.33
50.0	6237.	.	6237.	3.58
51.0	18327.	.	18327.	10.51
52.0	6508.	.	6508.	3.73
53.0	1905.	.	1905.	1.09
62.0	1771.	.	1771.	1.02
63.0	5436.	.	5436.	3.12
65.0	15077.	.	15077.	8.64
74.0	1898.	.	1898.	1.09
77.0	13750.	.	13750.	7.88
78.0	11320.	.	11320.	6.49
79.0	6809.	.	6809.	3.90
89.0	3036.	.	3036.	1.74
91.0	174404.	.	174404.	100.00
92.0	13436.	.	13436.	7.70
103.0	5721.	.	5721.	3.28
104.0	3910.	.	3910.	2.24
105.0	10572.	.	10572.	6.06
106.0	63533.	.	63533.	36.43
107.0	5272.	.	5272.	3.02

SCAN 8 CONTAINED 32 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-7. 1,4-Dimethyl benzene Standard Spectrum (Chemical Samples, 99.9%)

FIL00-2 0.4 MICROLITER 100% 1,4 DIMETHYL BENZENE 25-300 CD491, 8 JAN

MASS	SCAN 7	SCAN 4	DIFF.	NORM. DIFF.
39.0	8354.	.	8354.	5.61
51.0	11165.	.	11165.	7.50
65.0	7480.	.	7480.	5.03
77.0	16707.	.	16707.	11.23
79.0	10826.	.	10826.	7.28
91.0	148792.	.	148792.	100.00
92.0	11473.	.	11473.	7.71
103.0	7798.	.	7798.	5.24
105.0	40189.	.	40189.	27.01
106.0	102071.	.	102071.	68.60
107.0	8534.	.	8534.	5.74

SCAN 7 CONTAINED 26 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

TABLE E-8. 1,2-Dimethyl benzene Standard Spectrum (Chemical Samples, 99.9%).

FIL05-2 0.4 MICROLITER 100% 1,2 DIMETHYL BENZENE 25-300 CD491 @, 8 JAN

MASS	SCAN 9	SCAN 2	DIFF.	NORM. DIFF.
39.0	11376.	.	11376.	8.91
51.0	13666.	.	13666.	10.71
65.0	8719.	.	8719.	6.83
77.0	13867.	.	13867.	10.87
78.0	6616.	.	6616.	5.18
79.0	8314.	.	8314.	6.51
91.0	127619.	.	127619.	100.00
92.0	9660.	.	9660.	7.57
103.0	6940.	.	6940.	5.44
105.0	29768.	.	29768.	23.33
106.0	72611.	.	72611.	56.90

SCAN 9 CONTAINED 29 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

TABLE E-9. 1,3-Dimethyl benzene Standard Spectrum (Chemical Samples, 99.9%)

FIL06-5 0.4 MICROLITER 100% 1,3 DIMETHYL BENZENE 25-300 CD491, 8JAN

MASS	SCAN 8	SCAN 3	DIFF.	NORM. DIFF.
27.0	7332.	.	7332.	5.51
39.0	15326.	.	15326.	11.52
51.0	14999.	.	14999.	11.28
52.0	8282.	.	8282.	6.23
65.0	9140.	.	9140.	6.87
77.0	16052.	.	16052.	12.07
78.0	7499.	.	7499.	5.64
79.0	9232.	.	9232.	6.94
91.0	132990.	.	132990.	100.00
92.0	10469.	.	10469.	7.87
103.0	7314.	.	7314.	5.50
105.0	35794.	.	35794.	26.91
106.0	87694.	.	87694.	65.94
107.0	7672.	.	7672.	5.77

SCAN 8 CONTAINED 35 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

TABLE E-10. Toluene Standard Spectrum (Fisher, 99.9%).

FIL07-2 0.4 MICROLITER 100% TOLUENE 25-300 CD491 7 JAN

MASS	SCAN 5	SCAN 3	DIFF.	NORM. DIFF.
39.0	13411.	.	13411.	9.15
51.0	7591.	.	7591.	5.18
63.0	7787.	.	7787.	5.31
65.0	15055.	.	15055.	10.27
91.0	146576.	.	146576.	100.00
92.0	110376.	.	110376.	75.30
93.0	8130.	.	8130.	5.55

SCAN 5 CONTAINED 23 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 5.0%.

TABLE -11. Isooctyl ester of Silvex (trichlorophenoxy propionic acid) Standard Spectrum (98%, kit number 53, Polyscience Corporation).

FIL21-1 1 MICROLITER 20% ISO-OCTYL SILVEX/ CHCL3 25-450 CD492 19 MAR

MASS	SCAN 97	SCAN 73	DIFF.	NORM. DIFF.
27.0	469.	16.	453.	7.58
29.0	1075.	63.	1012.	16.93
39.0	176.	.	176.	2.95
41.0	1596.	55.	1541.	25.79
42.0	335.	.	335.	5.61
43.0	3450.	.	3450.	57.73
53.0	91.	.	91.	1.52
55.0	1601.	30.	1571.	26.29
56.0	809.	.	809.	13.54
57.0	6052.	76.	5976.	100.00
58.0	309.	.	309.	5.17
63.0	64.	.	64.	1.07
69.0	1070.	.	1070.	17.90
70.0	545.	.	545.	9.12
71.0	2620.	.	2620.	43.84
72.0	162.	.	162.	2.71
73.0	744.	391.	353.	5.91
74.0	107.	.	107.	1.79
75.0	75.	.	75.	1.26
83.0	510.	.	510.	8.53
84.0	485.	.	485.	8.12
85.0	160.	.	160.	2.68
97.0	262.	.	262.	4.38
99.0	101.	.	101.	1.69
109.0	136.	.	136.	2.28
111.0	118.	.	118.	1.97
113.0	222.	.	222.	3.71
133.0	105.	.	105.	1.76
145.0	164.	.	164.	2.74
147.0	276.	147.	129.	2.16
159.0	66.	.	66.	1.10
162.0	166.	.	166.	2.78
164.0	116.	.	116.	1.94
175.0	316.	.	316.	5.29
177.0	165.	.	165.	2.76
179.0	120.	.	120.	2.01
181.0	67.	.	67.	1.12
188.0	124.	.	124.	2.07
190.0	87.	.	87.	1.46
196.0	1191.	.	1191.	19.93
197.0	117.	.	117.	1.96
198.0	938.	.	938.	15.70
199.0	82.	.	82.	1.37
200.0	389.	.	389.	6.51
207.0	329.	235.	94.	1.57
220.0	418.	.	418.	6.99
221.0	196.	99.	97.	1.62
222.0	270.	.	270.	4.52
223.0	835.	.	835.	13.97
224.0	121.	.	121.	2.02
225.0	742.	.	742.	12.42
226.0	83.	.	83.	1.39
227.0	214.	.	214.	3.58
268 0	101.	256 .	101.	1.69

270.0	146.	.	146.	2.44
332.0	156.	.	156.	2.61
380.0	135.	.	135.	2.26
382.0	169.	.	169.	2.83

SCAN 97 CONTAINED 99 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-12. Isooctyl ester of silvex (trichlorophenoxy propionic acid) Standard Spectrum(98%, kit number 53, Polyscience Corporation).

FIL21-1 1 MICROLITER 20% ISO-OCTYL SILVEX/ CHCL3 25-450 CD492 19 MAR

MASS	SCAN 114	SCAN 73	DIFF.	NORM. DIFF.
26.0	87.	.	87.	1.01
27.0	953.	16.	937.	10.83
29.0	1826.	63.	1763.	20.37
39.0	308.	.	308.	3.56
41.0	2957.	55.	2902.	33.54
42.0	468.	.	468.	5.41
43.0	5522.	.	5522.	63.82
53.0	178.	.	178.	2.06
55.0	3179.	30.	3149.	36.39
56.0	1085.	.	1085.	12.54
57.0	8729.	76.	8653.	100.00
58.0	408.	.	408.	4.72
62.0	104.	.	104.	1.20
67.0	145.	.	145.	1.68
69.0	1981.	.	1981.	22.89
70.0	520.	.	520.	6.01
71.0	5718.	.	5718.	66.08
72.0	438.	.	438.	5.06
73.0	1044.	391.	653.	7.55
74.0	191.	.	191.	2.21
75.0	88.	.	88.	1.02
83.0	662.	.	662.	7.65
84.0	446.	.	446.	5.15
85.0	392.	.	392.	4.53
97.0	430.	.	430.	4.97
99.0	98.	.	98.	1.13
109.0	179.	.	179.	2.07
111.0	225.	.	225.	2.60
113.0	421.	.	421.	4.87
143.0	118.	.	118.	1.36
145.0	125.	.	125.	1.44
146.0	98.	.	98.	1.13
159.0	129.	.	129.	1.49
160.0	128.	.	128.	1.48
161.0	133.	.	133.	1.54
162.0	124.	.	124.	1.43
167.0	95.	.	95.	1.10
169.0	90.	.	90.	1.04
179.0	163.	.	163.	1.88
181.0	183.	.	183.	2.11
188.0	212.	.	212.	2.45
190.0	163.	.	163.	1.88
192.0	499.	.	499.	5.77
194.0	246.	.	246.	2.84
195.0	87.	.	87.	1.01
196.0	2664.	.	2664.	30.79
197.0	274.	.	274.	3.17
198.0	2421.	.	2421.	27.98
199.0	260.	.	260.	3.00
200.0	811.	.	811.	9.37
219.0	130.	.	130.	1.50
223.0	1726.	.	1726.	19.95
224.0	208.	.	208.	2.40
225.0	1647.	258 .	1647.	19.03

226.0	146.	.	146.	1.69
227.0	547.	.	547.	6.32
268.0	210.	.	210.	2.43
270.0	243.	.	243.	2.81
376.0	90.	.	90.	1.04
380.0	292.	.	292.	3.37
382.0	319.	.	319.	3.69

SCAN 114 CONTAINED 123 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-13. Isooctyl ester of 2,4,5-trichlorophenoxy-acetic acid Standard Spectrum (90%, kit number 53, Polyscience Corporation).

FIL20-2 1 MICROLITER 20% ISO-OCTYL-2,4,5-T/ CHCL3 25-450 CD492 19 MAR

MASS	SCAN 121	SCAN 77	DIFF.	NORM. DIFF.
27.0	903.	47.	856.	8.93
29.0	2513.	60.	2453.	25.58
31.0	140.	.	140.	1.46
39.0	518.	.	518.	5.40
41.0	5249.	140.	5109.	53.29
42.0	1419.	.	1419.	14.80
43.0	9448.	167.	9281.	96.80
44.0	421.	247.	174.	1.81
53.0	218.	.	218.	2.27
54.0	109.	.	109.	1.14
55.0	5082.	64.	5018.	52.34
56.0	2316.	79.	2237.	23.33
57.0	9763.	175.	9588.	100.00
58.0	415.	.	415.	4.33
62.0	163.	.	163.	1.70
67.0	220.	.	220.	2.29
68.0	471.	.	471.	4.91
69.0	6133.	52.	6081.	63.42
70.0	1693.	.	1693.	17.66
71.0	4918.	120.	4798.	50.04
72.0	268.	.	268.	2.80
74.0	196.	40.	156.	1.63
82.0	154.	.	154.	1.61
83.0	1829.	.	1829.	19.08
84.0	3033.	.	3033.	31.63
85.0	722.	.	722.	7.53
86.0	121.	.	121.	1.26
97.0	767.	44.	723.	7.54
109.0	264.	.	264.	2.75
111.0	147.	.	147.	1.53
112.0	181.	.	181.	1.89
113.0	126.	.	126.	1.31
115.0	137.	.	137.	1.43
133.0	104.	.	104.	1.08
143.0	170.	.	170.	1.77
144.0	141.	.	141.	1.47
145.0	420.	.	420.	4.38
146.0	328.	.	328.	3.42
148.0	190.	.	190.	1.98
167.0	125.	.	125.	1.30
169.0	143.	.	143.	1.49
179.0	403.	.	403.	4.20
181.0	381.	.	381.	3.97
183.0	204.	.	204.	2.13
196.0	342.	.	342.	3.57
198.0	340.	.	340.	3.55
200.0	105.	.	105.	1.10
209.0	933.	60.	873.	9.11
211.0	772.	.	772.	8.05
213.0	262.	.	262.	2.73
254.0	1549.	.	1549.	16.16
255.0	209.	.	209.	2.18
256.0	1507.	.	1507.	15.72
257.0	162.	.	162.	1.69

366.0	663.	.	663.	6.91
368.0	579.	.	579.	6.04
370.0	185.	.	185.	1.93

SCAN 121 CONTAINED 115 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-14. Isooctyl ester of 2,4,5 trichlorophenoxy-acetic acid Standard Spectrum (90% kit number 53, Polyscience Corporation).

FIL20-2 1 MICROLITER 20% ISO-OCTYL-2,4,5-T/ CHCL3 25-450 CD492 19 MAR

MASS	SCAN 105	SCAN 77	DIFF.	NORM. DIFF.
27.0	487.	47.	440.	4.90
29.0	1190.	60.	1130.	12.59
39.0	269.	.	269.	3.00
41.0	2789.	140.	2649.	29.51
42.0	684.	.	684.	7.62
43.0	6112.	167.	5945.	66.22
53.0	169.	.	169.	1.88
55.0	2780.	64.	2716.	30.26
56.0	2117.	79.	2038.	22.70
57.0	9152.	175.	8977.	100.00
58.0	421.	.	421.	4.69
67.0	94.	.	94.	1.05
68.0	152.	.	152.	1.69
69.0	2052.	52.	2000.	22.28
70.0	1641.	.	1641.	18.28
71.0	3164.	120.	3044.	33.91
72.0	231.	.	231.	2.57
73.0	962.	337.	625.	6.96
74.0	134.	40.	94.	1.05
81.0	171.	67.	104.	1.16
83.0	1214.	.	1214.	13.52
84.0	559.	.	559.	6.23
85.0	493.	.	493.	5.49
86.0	93.	.	93.	1.04
97.0	809.	44.	765.	8.52
109.0	136.	.	136.	1.51
111.0	138.	.	138.	1.54
112.0	145.	.	145.	1.62
113.0	115.	.	115.	1.28
143.0	110.	.	110.	1.23
144.0	131.	.	131.	1.46
145.0	277.	.	277.	3.09
146.0	180.	.	180.	2.01
147.0	526.	166.	360.	4.01
148.0	206.	.	206.	2.29
169.0	130.	.	130.	1.45
179.0	366.	.	366.	4.08
181.0	262.	.	262.	2.92
183.0	136.	.	136.	1.51
196.0	371.	.	371.	4.13
198.0	252.	.	252.	2.81
200.0	121.	.	121.	1.35
209.0	575.	60.	515.	5.74
211.0	499.	.	499.	5.56
213.0	137.	.	137.	1.53
221.0	342.	124.	218.	2.43
254.0	1136.	.	1136.	12.65
255.0	145.	.	145.	1.62
256.0	1121.	.	1121.	12.49
257.0	152.	.	152.	1.69
258.0	315.	.	315.	3.51
281.0	233.	142.	91.	1.01
355.0	175.	69.	106.	1.18
366.0	464.	.	464.	5.17

368.0	457.	.	457.	5.09
370.0	163.	.	163.	1.82
429.0	93.	.	93.	1.04

SCAN 105 CONTAINED 107 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-15. Isooctyl ester of 2,4-dichlorophenoxy-acetic acid Standard Spectrum (99+%, kit number 53, Polyscience Corporation).

FIL26-1 1 MICROLITER 20% ISO-OCTYL 2,4-D/ CHCL3 25-400 CD492 19 MAR

MASS	SCAN 101	SCAN 61	DIFF.	NORM. DIFF.
27.0	941.	.	941.	9.45
29.0	2436.	50.	2386.	23.97
39.0	608.	.	608.	6.11
41.0	4945.	90.	4855.	48.76
42.0	1309.	.	1309.	13.15
43.0	9968.	67.	9901.	99.45
44.0	389.	217.	172.	1.73
53.0	294.	.	294.	2.95
55.0	4701.	38.	4663.	46.84
56.0	1786.	.	1786.	17.94
57.0	10144.	188.	9956.	100.00
58.0	435.	20.	415.	4.17
63.0	302.	.	302.	3.03
67.0	173.	.	173.	1.74
68.0	410.	.	410.	4.12
69.0	5454.	.	5454.	54.78
70.0	1206.	.	1206.	12.11
71.0	5034.	.	5034.	50.56
72.0	217.	.	217.	2.18
74.0	156.	.	156.	1.57
75.0	394.	27.	367.	3.69
77.0	151.	.	151.	1.52
83.0	1954.	.	1954.	19.63
84.0	3104.	.	3104.	31.18
85.0	661.	.	661.	6.64
86.0	116.	.	116.	1.17
97.0	624.	.	624.	6.27
98.0	101.	.	101.	1.01
101.0	101.	.	101.	1.01
109.0	438.	.	438.	4.40
110.0	172.	.	172.	1.73
111.0	629.	.	629.	6.32
112.0	237.	.	237.	2.38
113.0	251.	.	251.	2.52
115.0	108.	.	108.	1.08
133.0	230.	.	230.	2.31
135.0	126.	.	126.	1.27
145.0	686.	.	686.	6.89
147.0	640.	70.	570.	5.73
149.0	224.	.	224.	2.25
161.0	185.	.	185.	1.86
162.0	666.	.	666.	6.69
163.0	165.	.	165.	1.66
164.0	425.	.	425.	4.27
175.0	1601.	.	1601.	16.08
177.0	979.	.	979.	9.83
179.0	152.	.	152.	1.53
220.0	2136.	.	2136.	21.45

221.0	292.	76.	216.	2.17
222.0	1217.	.	1217.	12.22
223.0	171.	.	171.	1.72
332.0	975.	.	975.	9.79
334.0	515.	.	515.	5.17
336.Ø	153.	.	153.	1.54

SCAN 101 CONTAINED 105 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-16. Isooctyl ester of 2,4-dichlorophenoxy-acetic acid Standard Spectrum (99+%, kit number 53, Polyscience Corporation).

FIL26-1 1 MICROLITER 20% ISO-OCTYL 2,4-D/ CHCL3 25-400 CD492 19 MAR

MASS	SCAN 88	SCAN 61	DIFF.	NORM. DIFF.
27.0	1710.	.	1710.	6.69
29.0	3934.	50.	3884.	15.19
39.0	866.	.	866.	3.39
41.0	7773.	90.	7683.	30.05
42.0	1974.	.	1974.	7.72
43.0	18564.	67.	18497.	72.34
44.0	661.	217.	444.	1.74
53.0	340.	.	340.	1.33
55.0	7993.	38.	7955.	31.11
56.0	5138.	.	5138.	20.10
57.0	25756.	188.	25568.	100.00
58.0	1077.	20.	1057.	4.13
63.0	520.	.	520.	2.03
67.0	280.	.	280.	1.10
68.0	409.	.	409.	1.60
69.0	5269.	.	5269.	20.61
70.0	4595.	.	4595.	17.97
71.0	7799.	.	7799.	30.50
72.0	501.	.	501.	1.96
74.0	365.	.	365.	1.43
75.0	599.	27.	572.	2.24
83.0	3014.	.	3014.	11.79
84.0	1356.	.	1356.	5.30
85.0	1581.	.	1581.	6.18
97.0	2073.	.	2073.	8.11
98.0	274.	.	274.	1.07
101.0	419.	.	419.	1.64
109.0	665.	.	665.	2.60
110.0	256.	.	256.	1.00
111.0	1248.	.	1248.	4.88
112.0	374.	.	374.	1.46
113.0	506.	.	506.	1.98
133.0	404.	.	404.	1.58
145.0	1343.	.	1343.	5.25
147.0	1243.	70.	1173.	4.59
149.0	292.	.	292.	1.14
161.0	341.	.	341.	1.33
162.0	1238.	.	1238.	4.84
163.0	382.	.	382.	1.49
164.0	766.	.	766.	3.00
175.0	2553.	.	2553.	9.99
176.0	331.	.	331.	1.29
177.0	1624.	.	1624.	6.35
179.0	297.	.	297.	1.16
220.0	3750.	.	3750.	14.67

221.0	452.	76.	376.	1.47
222.0	2309.	.	2309.	9.03
223.0	284.	.	284.	1.11
224.0	387.	.	387.	1.51
332.0	1655.	.	1655.	6.47
333.0	399.	.	399.	1.56
334.0	1089.	.	1089.	4.26

SCAN 88 CONTAINED 119 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-17. 2-ethyl-hexyl ester of 2,4,5-trichlorophenoxy-acetic acid Standard Spectrum (EPA/FDA Standard)

FIL42-1 0.5 MICROLITER 10% 2-ETHYL-HEXYL-2,4,5-T/ REALLY 25-450 CD492 1

MASS	SCAN 112	SCAN 99	DIFF.	NORM. DIFF.
27.0	1169.	39.	1130.	7.83
29.0	3241.	103.	3138.	21.75
39.0	445.	.	445.	3.08
41.0	4701.	45.	4656.	32.27
42.0	1188.	42.	1146.	7.94
43.0	10020.	107.	9913.	68.70
53.0	153.	.	153.	1.06
55.0	3170.	66.	3104.	21.51
56.0	1322.	.	1322.	9.16
57.0	14545.	115.	14430.	100.00
58.0	594.	.	594.	4.12
68.0	164.	.	164.	1.14
69.0	1216.	.	1216.	8.43
70.0	5559.	81.	5478.	37.96
71.0	7753.	84.	7669.	53.15
72.0	487.	.	487.	3.37
73.0	662.	354.	308.	2.13
74.0	193.	46.	147.	1.02
83.0	1524.	.	1524.	10.56
84.0	583.	.	583.	4.04
97.0	239.	.	239.	1.66
109.0	264.	.	264.	1.83
112.0	271.	.	271.	1.88
143.0	221.	.	221.	1.53
144.0	180.	.	180.	1.25
145.0	348.	.	348.	2.41
146.0	278.	.	278.	1.93
147.0	334.	142.	192.	1.33
148.0	205.	.	205.	1.42
167.0	170.	.	170.	1.18
179.0	476.	.	476.	3.30
181.0	496.	.	496.	3.44
183.0	171.	.	171.	1.19
196.0	541.	.	541.	3.75
198.0	613.	.	613.	4.25
200.0	182.	.	182.	1.26
209.0	661.	60.	601.	4.16
210.0	145.	.	145.	1.00
211.0	657.	.	657.	4.55
213.0	167.	.	167.	1.16
219.0	146.	.	146.	1.01
221.0	264.	119.	145.	1.00
254.0	2013.	.	2013.	13.95
255.0	171.	.	171.	1.19
256.0	1888.	.	1888.	13.08
257.0	215.	.	215.	1.49
258.0	623.	.	623.	4.32
366.0	520.	.	520.	3.60
368.0	608.	.	608.	4.21
370.0	161.	.	161.	1.12

SCAN 112 CONTAINED 116 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-18. 2-ethyl-hexyl ester of 2,4-dichlorophenoxy-acetic acid Standard Spectrum (EPA/FDA Standard)

FIL41-2 1 MICROLITER 10% 2-ETHYL-HEXYL-2,4, D/ CHCL3 CD492 19 MAR 25-4

MASS	SCAN 93	SCAN 76	DIFF.	NORM. DIFF.
27.0	1387.	.	1387.	8.08
29.0	3945.	25.	3920.	22.82
39.0	667.	.	667.	3.88
41.0	5648.	52.	5596.	32.58
42.0	1402.	.	1402.	8.16
43.0	12591.	48.	12543.	73.03
44.0	541.	242.	299.	1.74
53.0	234.	.	234.	1.36
55.0	3853.	29.	3824.	22.26
56.0	1683.	.	1683.	9.80
57.0	17209.	34.	17175.	100.00
58.0	644.	.	644.	3.75
63.0	409.	.	409.	2.38
69.0	1274.	.	1274.	7.42
70.0	5122.	.	5122.	29.82
71.0	8801.	.	8801.	51.24
72.0	607.	.	607.	3.53
73.0	519.	315.	204.	1.19
74.0	244.	.	244.	1.42
75.0	551.	40.	511.	2.98
83.0	1460.	.	1460.	8.50
84.0	653.	.	653.	3.80
85.0	238.	.	238.	1.39
97.0	186.	.	186.	1.08
109.0	566.	.	566.	3.30
110.0	188.	.	188.	1.09
111.0	795.	.	795.	4.63
112.0	475.	.	475.	2.77
113.0	407.	.	407.	2.37
133.0	273.	.	273.	1.59
145.0	943.	.	943.	5.49
149.0	234.	.	234.	1.36
161.0	330.	.	330.	1.92
162.0	1518.	.	1518.	8.84
163.0	301.	.	301.	1.75
164.0	793.	.	793.	4.62
175.0	1554.	.	1554.	9.05
176.0	275.	.	275.	1.60
177.0	1022.	.	1022.	5.95
185.0	356.	.	356.	2.07
220.0	3668.	.	3668.	21.36
221.0	401.	84.	317.	1.85
222.0	2084.	.	2084.	12.13
223.0	220.	.	220.	1.28
224.0	372.	.	372.	2.17
332.0	1046.	.	1046.	6.09
333.0	255.	.	255.	1.48
334.0	755.	.	755.	4.40

SCAN 93 CONTAINED 112 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-19. Isobutyl ester of 2,4-dichlorophenoxyacetic acid Standard Spectrum (EPA/FDA Standard)

FIL0A-3 10 MICROLITER 1% ISOBUTYL-2,4-D 25-300 CD491 10 JAN

MASS	SCAN 168	SCAN 158	DIFF.	NORM. DIFF.
27.0	2984.	.	2984.	5.29
29.0	16009.	.	16009.	28.38
30.0	274.	.	274.	.49
31.0	412.	.	412.	.73
36.0	392.	.	392.	.69
39.0	2193.	.	2193.	3.89
41.0	18679.	.	18679.	33.11
42.0	3821.	.	3821.	6.77
43.0	4524.	.	4524.	8.02
44.0	914.	.	914.	1.62
53.0	367.	.	367.	.65
55.0	1893.	.	1893.	3.36
56.0	2966.	.	2966.	5.26
57.0	56412.	.	56412.	100.00
63.0	1726.	.	1726.	3.06
73.0	1175.	.	1175.	2.08
75.0	2130.	.	2130.	3.78
85.0	463.	.	463.	.82
112.0	829.	.	829.	1.47
145.0	3189.	.	3189.	5.65
147.0	2800.	.	2800.	4.96
161.0	1289.	.	1289.	2.28
162.0	7660.	.	7660.	13.58
164.0	5066.	.	5066.	8.98
175.0	9413.	.	9413.	16.69
176.0	1741.	.	1741.	3.09
177.0	5948.	.	5948.	10.54
185.0	4475.	.	4475.	7.93
220.0	4694.	.	4694.	8.32
222.0	3035.	.	3035.	5.38
276.0	6996.	.	6996.	12.40
278.0	4392.	.	4392.	7.79

SCAN 168 CONTAINED 34 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN .0%.

TABLE E-20. 2,4,-dichlorophenol Standard Spectrum (MCB)

FIL17-2 0.5 MICROLITER 40% 2.4 DICHLORO PHENOL 25-300 CD491 10 JAN

MASS	SCAN 54	SCAN 47	DIFF.	NORM. DIFF.
29.0	602.	.	602.	1.12
31.0	1787.	.	1787.	3.33
36.0	1117.	.	1117.	2.08
37.0	2545.	.	2545.	4.75
38.0	2464.	.	2464.	4.60
39.0	1768.	.	1768.	3.30
48.0	1652.	.	1652.	3.08
49.0	4812.	.	4812.	8.97
50.0	2235.	.	2235.	4.17
51.0	639.	.	639.	1.19
53.0	2983.	.	2983.	5.56
60.0	713.	.	713.	1.33
61.0	3032.	.	3032.	5.65
62.0	4765.	.	4765.	8.89
63.0	26843.	.	26843.	50.06
64.0	3164.	.	3164.	5.90
65.0	819.	.	819.	1.53
66.0	551.	.	551.	1.03
73.0	5166.	.	5166.	9.63
74.0	1540.	.	1540.	2.87
75.0	1907.	.	1907.	3.56
81.0	2743.	.	2743.	5.12
83.0	800.	.	800.	1.49
98.0	20763.	.	20763.	38.72
99.0	6985.	.	6985.	13.03
100.0	6970.	.	6970.	13.00
101.0	2003.	.	2003.	3.74
126.0	6977.	.	6977.	13.01
128.0	4311.	.	4311.	8.04
162.0	53618.	.	53618.	100.00
163.0	3881.	.	3881.	7.24
164.0	33708.	.	33708.	62.87
165.0	2068.	.	2068.	3.86
166.0	5375.	.	5375.	10.02
198.0	1494.	.	1494.	2.79

SCAN 54 CONTAINED 42 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-21. 2,4,5-trichlorophenol Standard Spectrum (MCB)

FIL19-2 0.4 MICROLITER 40% 2,4,5-TRICHLORO PHENOL 19-300 CD491 10 JAN

MASS	SCAN 60	SCAN 56	DIFF.	NORM. DIFF.
29.0	206.	.	206.	1.45
31.0	244.	.	244.	1.72
36.0	525.	.	525.	3.70
37.0	709.	.	709.	5.00
38.0	341.	.	341.	2.41
48.0	1907.	.	1907.	13.45
49.0	1056.	.	1056.	7.45
53.0	916.	.	916.	6.46
61.0	1552.	.	1552.	10.95
62.0	2154.	.	2154.	15.20
63.0	1520.	.	1520.	10.72
66.0	1052.	.	1052.	7.42
73.0	1367.	.	1367.	9.64
74.0	470.	.	470.	3.32
75.0	330.	.	330.	2.33
97.0	5821.	.	5821.	41.07
98.0	1599.	.	1599.	11.28
99.0	2889.	.	2889.	20.38
100.0	593.	.	593.	4.18
132.0	3921.	.	3921.	27.66
134.0	2617.	.	2617.	18.46
135.0	1278.	.	1278.	9.02
162.0	1622.	.	1622.	11.44
164.0	786.	.	786.	5.55
196.0	14174.	.	14174.	100.00
198.0	13075.	442.	12633.	89.13
200.0	4390.		4390.	30.97

SCAN 60 CONTAINED 29 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-22. Dichloro-anisole (dichloromethoxy benzene) Standard Spectrum (Aldrich, 99%)

FIL56-1 2 MICROLITER 2% DI- PLUS TRI- CHLORO-ANISOLE 25-450 CD492 1 APR

MASS	SCAN 121	SCAN 109	DIFF.	NORM. DIFF.
29.0	493.	67.	426.	2.41
31.0	198.	.	198.	1.12
37.0	1010.	.	1010.	5.72
38.0	708.	33.	675.	3.83
39.0	341.	.	341.	1.93
47.0	241.	35.	206.	1.17
48.0	211.	.	211.	1.20
49.0	460.	.	460.	2.61
50.0	823.	.	823.	4.66
51.0	722.	.	722.	4.09
53.0	466.	.	466.	2.64
60.0	247.	.	247.	1.40
61.0	914.	.	914.	5.18
62.0	1567.	.	1567.	8.88
63.0	3496.	.	3496.	19.81
64.0	266.	.	266.	1.51
72.0	560.	.	560.	3.17
73.0	3619.	331.	3288.	18.63
74.0	1601.	52.	1549.	8.78
75.0	3002.	.	3002.	17.01
76.0	306.	.	306.	1.73
77.0	673.	.	673.	3.81
83.0	543.	.	543.	3.08
84.0	587.	.	587.	3.33
85.0	714.	.	714.	4.05
86.0	284.	.	284.	1.61
87.0	204.	.	204.	1.16
97.0	844.	20.	824.	4.67
98.0	841.	.	841.	4.77
99.0	314.	.	314.	1.78
100.0	249.	.	249.	1.41
107.0	529.	.	529.	3.00
109.0	1286.	.	1286.	7.29
110.0	294.	.	294.	1.67
111.0	1258.	.	1258.	7.13
112.0	337.	.	337.	1.91
113.0	716.	.	716.	4.06
126.0	636.	.	636.	3.60
128.0	191.	.	191.	1.08
133.0	10818.	.	10818.	61.30
134.0	722.	.	722.	4.09
135.0	7097.	.	7097.	40.22
136.0	442.	.	442.	2.50
137.0	1099.	.	1099.	6.23
141.0	203.	.	203.	1.15
145.0	578.	.	578.	3.28
147.0	571.	112.	459.	2.60
148.0	212.	.	212.	1.20
161.0	14755.	.	14755.	83.61
162.0	1034.	.	1034.	5.86
163.0	9349.	.	9349.	52.98
164.0	650.	.	650.	3.68
165.0	1630.	.	1630.	9.24
176.0	17647.	.	17647.	100.00

177.0	1439.	.	1439.	8.15
178.0	10807.	.	10807.	61.24
179.0	821.	.	821.	4.65
180.0	1645.	.	1645.	9.32

SCAN 121 CONTAINED 122 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-23. Trichloro-anisole (trichloromethoxy-benzene) Standard Spectrum (Aldrich, 98%)

FIL56-1 2 MICROLITER 2% DI- PLUS TRI- CHLORO-ANISOLE 25-450 CD492 1 APR

MASS	SCAN 160	SCAN 137	DIFF.	NORM. DIFF.
29.0	127.	74.	53.	1.79
30.0	36.	.	36.	1.22
31.0	48.	.	48.	1.62
35.0	55.	.	55.	1.86
36.0	228.	81.	147.	4.97
37.0	243.	.	243.	8.22
38.0	108.	44.	64.	2.17
47.0	62.	.	62.	2.10
48.0	130.	.	130.	4.40
49.0	146.	.	146.	4.94
50.0	100.	.	100.	3.38
53.0	92.	.	92.	3.11
55.0	62.	.	62.	2.10
56.0	30.	.	30.	1.01
60.0	90.	.	90.	3.04
61.0	302.	.	302.	10.22
62.0	387.	.	387.	13.09
63.0	63.	.	63.	2.13
71.0	74.	37.	37.	1.25
72.0	181.	.	181.	6.12
73.0	1470.	1138.	332.	11.23
74.0	445.	100.	345.	11.67
75.0	325.	62.	263.	8.90
77.0	60.	.	60.	2.03
83.0	188.	.	188.	6.36
84.0	192.	16.	176.	5.95
85.0	194.	43.	151.	5.11
86.0	52.	.	52.	1.76
87.0	52.	.	52.	1.76
95.0	35.	.	35.	1.18
96.0	165.	.	165.	5.58
97.0	804.	.	804.	27.20
98.0	95.	.	95.	3.21
99.0	241.	.	241.	8.15
107.0	339.	.	339.	11.47
108.0	155.	.	155.	5.24
109.0	505.	.	505.	17.08
110.0	125.	.	125.	4.23
111.0	232.	.	232.	7.85
112.0	63.	.	63.	2.13
113.0	57.	.	57.	1.93
118.0	36.	.	36.	1.22
131.0	82.	.	82.	2.77
132.0	122.	.	122.	4.13
134.0	72.	.	72.	2.44
143.0	139.	.	139.	4.70
144.0	114.	.	114.	3.86
145.0	228.	.	228.	7.71
146.0	83.	.	83.	2.81
147.0	474.	312.	162.	5.48
148.0	73.	43.	30.	1.01
149.0	105.	34.	71.	2.40
160.0	112.	.	112.	3.79
162.0	82.	.	82.	2.77

167.0	1865.	.	1865.	63.09
169.0	1928.	.	1928.	65.22
171.0	530.	.	530.	17.93
173.0	52.	.	52.	1.76
175.0	71.	.	71.	2.40
177.0	62.	.	62.	2.10
179.0	107.	.	107.	3.62
181.0	143.	.	143.	4.84
195.0	1915.	.	1915.	64.78
196.0	117.	.	117.	3.96
197.0	1929.	.	1929.	65.26
198.0	113.	.	113.	3.82
199.0	617.	.	617.	20.87
201.0	75.	.	75.	2.54
210.0	2956.	.	2956.	100.00
211.0	215.	.	215.	7.27
212.0	2698.	.	2698.	91.27
213.0	213.	.	213.	7.21
214.0	853.	.	853.	28.86
216.0	129.	.	129.	4.36
267.0	39.	.	39.	1.32
342.0	70.	.	70.	2.37
344.0	64.	.	64.	2.17

SCAN 160 CONTAINED 105 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-24. Dibenzo-p-dioxin in $CHCl_3$ (Analabs).

FIL48-1 5 MICROLITER 2% DIBENZO-P-DIOXIN/ CHCL3 25-450 CD492 27 MAR

MASS	SCAN 8	SCAN 2	DIFF.	NORM. DIFF.
26.0	611.	.	611.	2.11
38.0	871.	32.	839.	2.90
39.0	793.	.	793.	2.74
50.0	2331.	.	2331.	8.05
51.0	3268.	.	3268.	11.29
52.0	2419.	.	2419.	8.36
53.0	623.	.	623.	2.15
62.0	442.	.	442.	1.53
63.0	2079.	.	2079.	7.18
64.0	1689.	.	1689.	5.83
74.0	924.	.	924.	3.19
75.0	1032.	.	1032.	3.56
76.0	1328.	.	1328.	4.59
77.0	896.	.	896.	3.09
78.0	494.	.	494.	1.71
79.0	403.	.	403.	1.39
80.0	307.	.	307.	1.06
92.0	5763.	.	5763.	19.91
101.0	420.	.	420.	1.45
102.0	2462.	.	2462.	8.50
104.0	334.	.	334.	1.15
126.0	581.	.	581.	2.01
127.0	2202.	.	2202.	7.61
128.0	6581.	.	6581.	22.73
129.0	825.	.	825.	2.85
130.0	349.	.	349.	1.21
139.0	328.	.	328.	1.13
155.0	1840.	.	1840.	6.36
156.0	478.	.	478.	1.65
184.0	28951.	.	28951.	100.00
185.0	4068.	.	4068.	14.05
186.0	378.	.	378.	1.31

SCAN 8 CONTAINED 85 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-25: 2-chloro-dibenzo-dioxin in $CHCl_3$ Standard Spectrum. (Analabs)

FIL49-1 5 MICROLITER 2-CHLORO-P-DIOXIN 160-240 29 APRIL

MASS	SCAN 30	SCAN 23	DIFF.	NORM. DIFF.
26.0	225.	.	225.	1.28
38.0	356.	.	356.	2.03
39.0	296.	.	296.	1.68
50.0	1573.	.	1573.	8.95
51.0	1545.	.	1545.	8.79
52.0	865.	.	865.	4.92
53.0	370.	.	370.	2.11
62.0	374.	.	374.	2.13
63.0	2437.	.	2437.	13.86
64.0	481.	.	481.	2.74
68.0	316.	.	316.	1.80
73.0	184.	.	184.	1.05
74.0	898.	.	898.	5.11
75.0	1109.	.	1109.	6.31
76.0	677.	.	677.	3.85
77.0	815.	.	815.	4.64
79.0	746.	.	746.	4.24
81.0	273.	.	273.	1.55
86.0	190.	.	190.	1.08
92.0	208.	.	208.	1.18
101.0	470.	.	470.	2.67
109.0	2817.	.	2817.	16.03
110.0	1151.	.	1151.	6.55
125.0	182.	.	182.	1.04
126.0	1332.	.	1332.	7.58
127.0	2724.	.	2724.	15.50
128.0	273.	.	273.	1.55
136.0	275.	.	275.	1.56
139.0	212.	.	212.	1.21
155.0	4212.	.	4212.	23.96
156.0	468.	.	468.	2.66
162.0	591.	.	591.	3.36
164.0	246.	.	246.	1.40
183.0	848.	.	848.	4.82
189.0	416.	.	416.	2.37
191.0	201.	.	201.	1.14
218.0	17577.	.	17577.	100.00
219.0	2387.	.	2387.	13.58
220.0	5838.	.	5838.	33.21
221.0	804.	.	804.	4.57

SCAN 30 CONTAINED 109 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-26. 2,7-dichloro-dibenzo-p-dioxin Standard Solution (Analabs)

FIL51-1 5 MICROLITER SAT.SOL. 2,7 DICHLORO-P-DIOXIN 29 MARCH

MASS	SCAN 59	SCAN 52	DIFF.	NORM. DIFF.
37.0	103.	.	103.	1.52
38.0	111.	.	111.	1.64
49.0	83.	.	83.	1.23
50.0	530.	.	530.	7.84
51.0	708.	.	708.	10.47
53.0	150.	.	150.	2.22
60.0	89.	.	89.	1.32
61.0	113.	.	113.	1.67
62.0	382.	.	382.	5.65
63.0	951.	.	951.	14.07
73.0	114.	.	114.	1.69
74.0	537.	.	537.	7.94
75.0	774.	.	774.	11.45
76.0	114.	.	114.	1.69
79.0	433.	.	433.	6.41
80.0	453.	.	453.	6.70
81.0	129.	.	129.	1.91
84.0	84.	.	84.	1.24
85.0	83.	.	83.	1.23
86.0	184.	.	184.	2.72
87.0	87.	.	87.	1.29
88.0	69.	.	69.	1.02
94.0	103.	.	103.	1.52
97.0	80.	.	80.	1.18
98.0	216.	.	216.	3.20
99.0	156.	.	156.	2.31
100.0	80.	.	80.	1.18
108.0	83.	.	83.	1.23
109.0	71.	.	71.	1.05
110.0	151.	.	151.	2.23
113.0	107.	.	107.	1.58
125.0	306.	.	306.	4.53
126.0	2004.	.	2004.	29.64
127.0	668.	.	668.	9.88
128.0	118.	.	118.	1.75
160.0	227.	.	227.	3.36
161.0	363.	.	363.	5.37
162.0	116.	.	116.	1.72
163.0	114.	.	114.	1.69
189.0	2074.	.	2074.	30.68
191.0	673.	.	673.	9.96
217.0	410.	.	410.	6.07
218.0	98.	.	98.	1.45
219.0	94.	.	94.	1.39
223.0	79.	.	79.	1.17
252.0	6760.	.	6760.	100.00
253.0	1077.	.	1077.	15.93
254.0	4347.	.	4347.	64.30
255.0	629.	.	629.	9.30
256.0	738.	.	738.	10.92
257.0	92.	.	92.	1.36

SCAN 59 CONTAINED 87 PEAKS AND

NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-27. 2,3-dichloro-dibenzo-dioxin Standard Spectrum. (Analabs)

FIL50-1 6 MICROLITER 2,3-DICHLORO-P-DIOXIN VIAL #2 29 MARCH

MASS	SCAN 59	SCAN 53	DIFF.	NORM. DIFF.
38.0	195.	.	195.	2.13
39.0	161.	.	161.	1.75
49.0	100.	.	100.	1.09
50.0	850.	.	850.	9.26
51.0	357.	.	357.	3.89
52.0	506.	.	506.	5.51
53.0	181.	.	181.	1.97
61.0	116.	.	116.	1.26
62.0	310.	.	310.	3.38
63.0	717.	.	717.	7.81
64.0	180.	.	180.	1.96
73.0	121.	.	121.	1.32
74.0	587.	.	587.	6.40
75.0	335.	.	335.	3.65
76.0	343.	.	343.	3.74
77.0	132.	.	132.	1.44
80.0	489.	.	489.	5.33
81.0	180.	.	180.	1.96
84.0	117.	.	117.	1.28
85.0	293.	.	293.	3.19
86.0	147.	.	147.	1.60
87.0	123.	.	123.	1.34
91.0	111.	.	111.	1.21
92.0	126.	.	126.	1.37
94.0	113.	.	113.	1.23
97.0	312.	.	312.	3.40
98.0	109.	.	109.	1.19
99.0	219.	.	219.	2.39
108.0	105.	.	105.	1.14
109.0	198.	.	198.	2.16
111.0	104.	.	104.	1.13
113.0	334.	.	334.	3.64
115.0	94.	.	94.	1.02
125.0	390.	.	390.	4.25
126.0	2277.	.	2277.	24.81
127.0	966.	.	966.	10.53
128.0	161.	.	161.	1.75
160.0	276.	.	276.	3.01
161.0	624.	.	624.	6.80
162.0	142.	.	142.	1.55
163.0	165.	.	165.	1.80
172.0	102.	.	102.	1.11
182.0	168.	.	168.	1.83
189.0	2055.	.	2055.	22.40
191.0	765.	.	765.	8.34
196.0	218.	.	218.	2.38
198.0	171.	.	171.	1.86
217.0	245.	.	245.	2.67
219.0	108.	.	108.	1.18
223.0	210.	.	210.	2.29
225.0	101.	.	101.	1.10
252.0	9176.	.	9176.	100.00
253.0	1392.	.	1392.	15.17
254.0	5928.	.	5928.	64.60

255.0	840.	.	840.	9.15
256.0	1080.	.	1080.	11.77
257.0	131.	.	131.	1.43

SCAN 59 CONTAINED 94 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-28. 1,2,4-trichloro-dibenzo-p-dioxin Standard Spectrum. (Analabs)

FIL52-1 10 MICROLITER 1.5 % 1,2,4-TRICHLORO-P-DIOXIN 29 MARCH

MASS	SCAN 83	SCAN 78	DIFF.	NORM. DIFF.
26.0	55.	.	55.	1.55
37.0	51.	.	51.	1.44
38.0	93.	.	93.	2.62
39.0	50.	.	50.	1.41
49.0	42.	.	42.	1.19
50.0	358.	.	358.	10.10
51.0	175.	.	175.	4.94
52.0	242.	.	242.	6.83
53.0	90.	.	90.	2.54
61.0	72.	.	72.	2.03
62.0	64.	.	64.	1.81
63.0	167.	.	167.	4.71
64.0	114.	.	114.	3.22
73.0	70.	34.	36.	1.02
74.0	146.	.	146.	4.12
75.0	172.	.	172.	4.85
76.0	181.	.	181.	5.11
77.0	64.	.	64.	1.81
79.0	66.	.	66.	1.86
80.0	147.	.	147.	4.15
81.0	48.	.	48.	1.35
84.0	87.	.	87.	2.46
87.0	64.	.	64.	1.81
92.0	38.	.	38.	1.07
96.0	60.	.	60.	1.69
97.0	112.	.	112.	3.16
98.0	89.	.	89.	2.51
99.0	60.	.	60.	1.69
108.0	176.	.	176.	4.97
109.0	59.	.	59.	1.67
110.0	48.	.	48.	1.35
119.0	93.	.	93.	2.62
121.0	68.	.	68.	1.92
123.0	52.	.	52.	1.47
125.0	135.	.	135.	3.81
126.0	63.	.	63.	1.78
131.0	65.	.	65.	1.83
133.0	74.	.	74.	2.09
143.0	525.	.	525.	14.82
144.0	455.	.	455.	12.84
145.0	157.	.	157.	4.43
147.0	69.	.	69.	1.95
149.0	44.	.	44.	1.24
159.0	66.	.	66.	1.86
160.0	553.	.	553.	15.61
161.0	68.	.	68.	1.92
162.0	224.	.	224.	6.32
194.0	82.	.	82.	2.31
195.0	273.	.	273.	7.71
196.0	76.	.	76.	2.15
197.0	178.	.	178.	5.02
204.0	52.	.	52.	1.47
207.0	102.	40.	62.	1.75
208.0	42.	.	42.	1.19

216.0	77.	.	77.	2.17
223.0	737.	.	737.	20.80
225.0	529.	.	529.	14.93
226.0	58.	.	58.	1.64
227.0	76.	.	76.	2.15
230.0	58.	.	58.	1.64
232.0	69.	.	69.	1.95
251.0	112.	.	112.	3.16
253.0	87.	.	87.	2.46
254.0	64.	.	64.	1.81
257.0	52.	.	52.	1.47
286.0	3543.	.	3543.	100.00
287.0	599.	.	599.	16.91
288.0	3329.	.	3329.	93.96
289.0	501.	.	501.	14.14
290.0	1044.	.	1044.	29.47

SCAN 83 CONTAINED 88 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-29. 1,2,3,4-tetra-chloro-dibenzo-p-dioxin Standard Spectrum. (Analabs)

FIL53-1 5 MICROLITER 3% 1,2,3,4-TETRACHLORO-P-DIOXIN 29 MARCH

MASS	SCAN 127	SCAN 111	DIFF.	NORM. DIFF.
26.0	217.	.	217.	6.35
27.0	44.	.	44.	1.29
35.0	41.	.	41.	1.20
36.0	196.	.	196.	5.73
37.0	42.	.	42.	1.23
38.0	204.	.	204.	5.97
39.0	165.	.	165.	4.83
47.0	39.	.	39.	1.14
49.0	40.	.	40.	1.17
50.0	704.	.	704.	20.60
51.0	290.	.	290.	8.48
52.0	430.	.	430.	12.58
53.0	124.	.	124.	3.63
61.0	66.	.	66.	1.93
62.0	75.	.	75.	2.19
63.0	333.	.	333.	9.74
64.0	174.	.	174.	5.09
74.0	220.	.	220.	6.44
75.0	275.	14.	261.	7.64
76.0	284.	.	284.	8.31
77.0	49.	.	49.	1.43
79.0	104.	52.	52.	1.52
80.0	89.	.	89.	2.60
83.0	41.	.	41.	1.20
85.0	47.	.	47.	1.38
87.0	114.	.	114.	3.34
89.0	39.	.	39.	1.14
92.0	91.	.	91.	2.66
95.0	108.	.	108.	3.16
97.0	168.	.	168.	4.92
98.0	180.	.	180.	5.27
99.0	48.	.	48.	1.40
104.0	71.	.	71.	2.08
107.0	69.	.	69.	2.02
109.0	56.	.	56.	1.64
110.0	35.	.	35.	1.02
111.0	141.	.	141.	4.13
113.0	39.	.	39.	1.14
114.0	54.	.	54.	1.58
115.0	96.	.	96.	2.81
118.0	90.	.	90.	2.63
120.0	130.	.	130.	3.80
121.0	47.	.	47.	1.38
122.0	52.	.	52.	1.52
123.0	89.	.	89.	2.60
125.0	122.	.	122.	3.57
129.0	64.	.	64.	1.87
132.0	104.	.	104.	3.04
133.0	76.	.	76.	2.22
135.0	44.	.	44.	1.29
142.0	145.	.	145.	4.24
153.0	45.	.	45.	1.32
155.0	79.	.	79.	2.31
159.0	141.	.	141.	4.13

160.0	449.	.	449.	13.14
161.0	536.	.	536.	15.68
181.0	64.	.	64.	1.87
183.0	48.	.	48.	1.40
187.0	63.	.	63.	1.84
194.0	514.	.	514.	15.04
195.0	106.	.	106.	3.10
196.0	305.	.	305.	8.92
198.0	75.	.	75.	2.19
222.0	53.	.	53.	1.55
229.0	163.	.	163.	4.77
231.0	165.	.	165.	4.83
233.0	47.	.	47.	1.38
240.0	59.	.	59.	1.73
243.0	48.	.	48.	1.40
250.0	106.	.	106.	3.10
252.0	41.	.	41.	1.20
257.0	724.	.	724.	21.18
258.0	120.	.	120.	3.51
259.0	665.	.	665.	19.46
260.0	115.	.	115.	3.36
261.0	235.	.	235.	6.88
264.0	39.	.	39.	1.14
266.0	72.	.	72.	2.11
285.0	89.	.	89.	2.60
286.0	114.	.	114.	3.34
287.0	72.	.	72.	2.11
288.0	101.	.	101.	2.95
293.0	50.	.	50.	1.46
320.0	2510.	.	2510.	73.43
322.0	3418.	.	3418.	100.00
324.0	1561.	.	1561.	45.67
326.0	323.	.	323.	9.45

SCAN 127 CONTAINED 107 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-30. 2,3,7,8-tetrachloro-dibenzo-p-dioxin in CS_2 (Analabs)

FIL46-2 50 MICROLITER 0.1% DIOXIN IN CS2 25-450 CD492 21 MAR

MASS	SCAN 116	SCAN 107	DIFF.	NORM. DIFF.
35.0	36.	.	36.	1.06
36.0	104.	53.	51.	1.50
37.0	49.	.	49.	1.44
38.0	74.	28.	46.	1.35
39.0	39.	.	39.	1.15
49.0	55.	.	55.	1.62
50.0	256.	.	256.	7.53
53.0	63.	.	63.	1.85
61.0	145.	.	145.	4.26
62.0	248.	.	248.	7.29
63.0	184.	.	184.	5.41
65.0	49.	.	49.	1.44
72.0	67.	.	67.	1.97
73.0	235.	144.	91.	2.68
74.0	407.	.	407.	11.97
75.0	51.	.	51.	1.50
77.0	55.	.	55.	1.62
79.0	74.	.	74.	2.18
84.0	65.	.	65.	1.91
85.0	184.	.	184.	5.41
87.0	53.	.	53.	1.56
96.0	83.	.	83.	2.44
97.0	377.	.	377.	11.09
98.0	125.	.	125.	3.68
99.0	87.	.	87.	2.56
108.0	67.	.	67.	1.97
109.0	257.	.	257.	7.56
110.0	46.	.	46.	1.35
111.0	90.	.	90.	2.65
113.0	288.	.	288.	8.47
114.0	78.	.	78.	2.29
115.0	173.	.	173.	5.09
120.0	39.	.	39.	1.15
123.0	43.	.	43.	1.26
125.0	110.	.	110.	3.24
126.0	54.	.	54.	1.59
128.0	98.	.	98.	2.88
129.0	89.	.	89.	2.62
132.0	71.	.	71.	2.09
133.0	62.	.	62.	1.82
134.0	68.	.	68.	2.00
143.0	45.	.	45.	1.32
144.0	76.	.	76.	2.24
146.0	36.	.	36.	1.06
147.0	41.	.	41.	1.21
148.0	40.	.	40.	1.18
157.0	43.	.	43.	1.26
158.0	88.	.	88.	2.59
159.0	88.	.	88.	2.59
160.0	397.	.	397.	11.68
161.0	630.	.	630.	18.53
162.0	306.	.	306.	9.00
163.0	81.	.	81.	2.38
175.0	38.	286	38.	1.12

187.0	37.	.	37.	1.09
194.0	419.	.	419.	12.32
195.0	70.	.	70.	2.06
196.0	266.	.	266.	7.82
198.0	37.	.	37.	1.09
222.0	46.	.	46.	1.35
228.0	47.	.	47.	1.38
229.0	34.	.	34.	1.00
250.0	99.	.	99.	2.91
252.0	50.	.	50.	1.47
257.0	836.	.	836.	24.59
258.0	128.	.	128.	3.76
259.0	686.	.	686.	20.18
260.0	126.	.	126.	3.71
281.0	111.	72.	39.	1.15
285.0	82.	.	82.	2.41
287.0	136.	.	136.	4.00
320.0	2698.	.	2698.	79.35
322.0	3400.	.	3400.	100.00
324.0	1646.	.	1646.	48.41
325.0	323.	.	323.	9.50
326.0	388.	.	388.	11.41

SCAN 116 CONTAINED 94 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

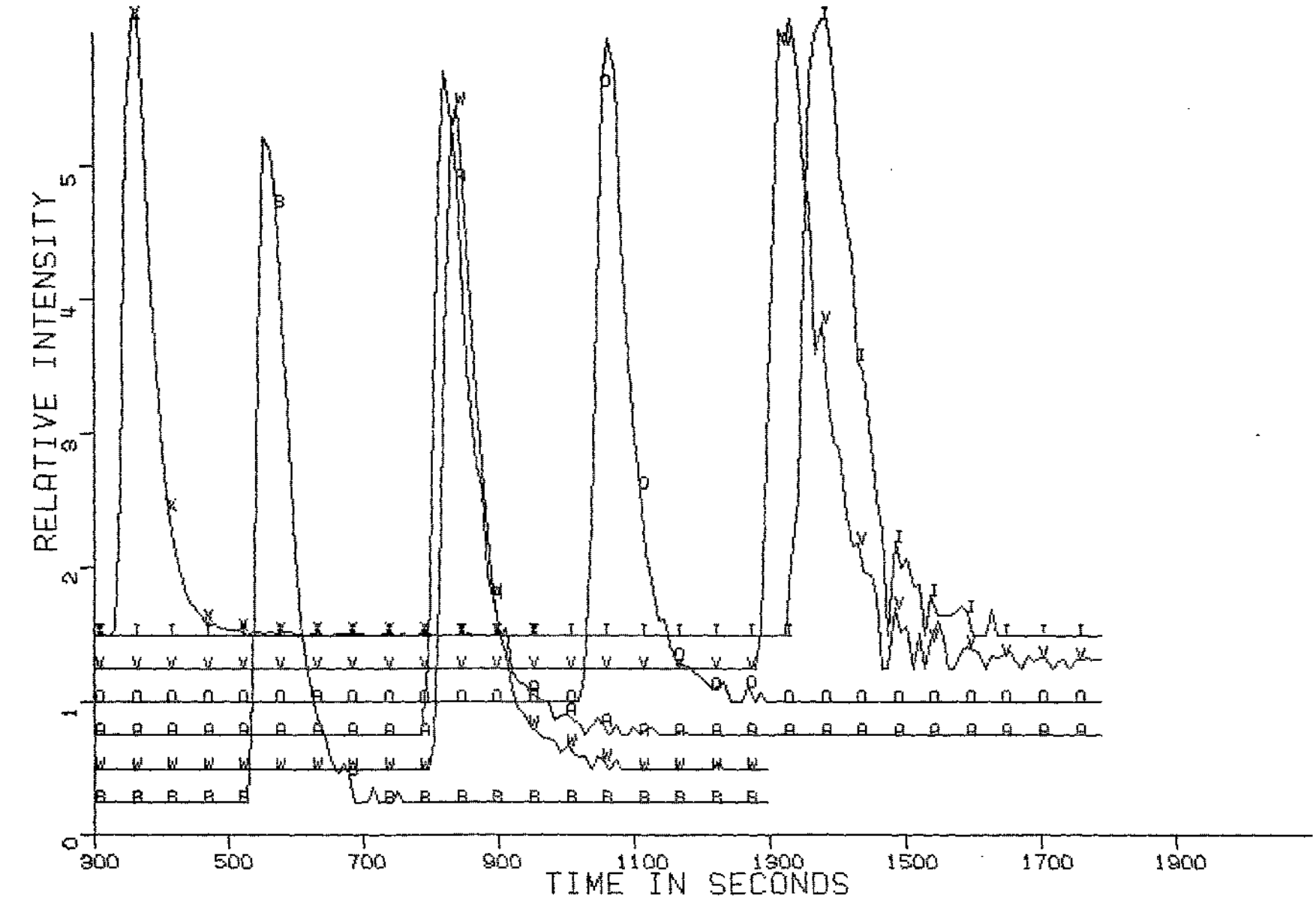

FIGURE E-1. SELECTED ION CHROMATOGRAMS OF DIBENZO-P-DIOXIN STANDARDS
X = NO CHLORINE I = 1, 2, 3, 4-TETRA CHLORO V = 2, 3, 7, 8 TETRA CHLORO
O = 1, 2, 4-TRI CHLORO A = 2, 7-DICHLORO W = 2, 3-DICHLORO
B = 2-CHLORO

TABLE E-31. 1,2,3,5-tetrachloro-benzene Standard Spectrum. (Analabs)

FIL54-2 2 MICROLITER 4% 1,2,3,5-TETRACHLORO BENZENE/ CHCL3 25-450 CD492

MASS	SCAN 131	SCAN 117	DIFF.	NORM. DIFF.
35.0	198.	.	198.	1.95
36.0	433.	.	433.	4.27
37.0	768.	.	768.	7.57
38.0	241.	.	241.	2.38
47.0	216.	.	216.	2.13
48.0	114.	.	114.	1.12
49.0	453.	.	453.	4.47
50.0	179.	.	179.	1.76
54.0	360.	.	360.	3.55
55.0	124.	.	124.	1.22
60.0	203.	.	203.	2.00
61.0	355.	.	355.	3.50
62.0	129.	.	129.	1.27
71.0	366.	.	366.	3.61
72.0	571.	.	571.	5.63
73.0	1375.	81.	1294.	12.76
74.0	1798.	.	1798.	17.72
75.0	112.	.	112.	1.10
84.0	785.	.	785.	7.74
85.0	134.	.	134.	1.32
86.0	255.	.	255.	2.51
89.0	358.	.	358.	3.53
90.0	368.	.	368.	3.63
91.0	121.	.	121.	1.19
96.0	108.	.	108.	1.06
107.0	807.	.	807.	7.95
108.0	1675.	.	1675.	16.51
109.0	1405.	.	1405.	13.85
110.0	448.	.	448.	4.42
111.0	312.	.	312.	3.08
118.0	146.	.	146.	1.44
119.0	123.	.	123.	1.21
120.0	107.	.	107.	1.05
143.0	996.	.	996.	9.82
144.0	526.	.	526.	5.18
145.0	715.	.	715.	7.05
146.0	324.	.	324.	3.19
147.0	164.	.	164.	1.62
179.0	1825.	.	1825.	17.99
180.0	345.	.	345.	3.40
181.0	1724.	.	1724.	16.99
182.0	213.	.	213.	2.10
183.0	539.	.	539.	5.31
214.0	8061.	.	8061.	79.46
215.0	622.	.	622.	6.13
216.0	10145.	.	10145.	100.00
217.0	773.	.	773.	7.62
218.0	4853.	.	4853.	47.84
219.0	337.	.	337.	3.32
220.0	1072.	.	1072.	10.57

SCAN 131 CONTAINED 90 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-32. DDT (1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane) Standard Spectrum (99%, kit number 51AX, Polyscience Corporation).

FIL47-1 DDT,DDE,RONNEL/CHCL3 10 MICROLITERS CD492 20 MARCH

MASS	SCAN 111	SCAN 103	DIFF.	NORM.DIFF.
27.0	32.	.	32.	4.32
28.0	875.	835.	40.	5.41
32.0	152.	140.	12.	1.62
36.0	91.	28.	63.	8.51
38.0	31.	.	31.	4.19
39.0	52.	.	52.	7.03
41.0	34.	.	34.	4.59
42.0	17.	.	17.	2.30
43.0	76.	.	76.	10.27
44.0	72.	34.	38.	5.14
50.0	99.	.	99.	13.38
51.0	81.	.	81.	10.95
56.0	17.	.	17.	2.30
57.0	111.	67.	44.	5.95
62.0	50.	.	50.	6.76
63.0	61.	.	61.	8.24
70.0	19.	.	19.	2.57
73.0	121.	97.	24.	3.24
74.0	83.	.	83.	11.22
75.0	262.	24.	238.	32.16
76.0	58.	.	58.	7.84
77.0	32.	.	32.	4.32
80.0	34.	.	34.	4.59
81.0	21.	.	21.	2.84
82.0	86.	.	86.	11.62
85.0	54.	.	54.	7.30
87.0	110.	.	110.	14.86
88.0	262.	.	262.	35.41
89.0	32.	.	32.	4.32
93.0	45.	.	45.	6.08
97.0	27.	.	27.	3.65
98.0	35.	.	35.	4.73
99.0	46.	.	46.	6.22
100.0	65.	.	65.	8.78
101.0	48.	.	48.	6.49
105.0	155.	.	155.	20.95
106.0	81.	.	81.	10.95
107.0	34.	.	34.	4.59
110.0	53.	.	53.	7.16
111.0	48.	.	48.	6.49
113.0	22.	.	22.	2.97
122.0	36.	.	36.	4.86
123.0	163.	.	163.	22.03
124.0	71.	.	71.	9.59
126.0	34.	.	34.	4.59
135.0	34.	.	34.	4.59
136.0	58.	.	58.	7.84
138.0	35.	.	35.	4.73
162.0	23.	.	23.	3.11
165.0	324.	28.	296.	40.00
173.0	36.	.	36.	4.86
175.0	71.	.	71.	9.59
176.0	333.	47.	286.	38.65
177.0	67.	.	67.	9.05

178.0	71.	.	71.	9.59
196.0	60.	.	60.	8.11
199.0	68.	.	68.	9.19
200.0	52.	.	52.	7.03
201.0	30.	.	30.	4.05
211.0	49.	.	49.	6.62
212.0	740.	.	740.	100.00
214.0	184.	.	184.	24.86
235.0	693.	50.	643.	86.89
236.0	107.	.	107.	14.46
237.0	437.	.	437.	59.05
239.0	97.	.	97.	13.11
246.0	260.	96.	164.	22.16
247.0	205.	.	205.	27.70
248.0	237.	54.	183.	24.73
249.0	140.	.	140.	18.92
250.0	75.	.	75.	10.14
281.0	50.	.	50.	6.76
282.0	352.	.	352.	47.57
283.0	86.	.	86.	11.62
284.0	337.	.	337.	45.54
285.0	66.	.	66.	8.92
316.0	82.	37.	45.	6.08
318.0	120.	47.	73.	9.86
320.0	58.	.	58.	7.84

SCAN 111 CONTAINED 81 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-33. DDE (1,1 dichloro-2,2-bis (p-chlorophenyl)ethylene) Standard Spectrum (99%, kit number 51AX, Polyscience Corporation).

FIL47-1 DDT, DDE, RONNEL/CHCL3 10 MICROLITERS CD492 20 MARCH

MASS	SCAN 88	SCAN 80	DIFF.	NORM. DIFF.
27.0	57.	.	57.	1.49
35.0	40.	.	40.	1.04
36.0	154.	34.	120.	3.13
38.0	72.	.	72.	1.88
39.0	133.	.	133.	3.47
49.0	51.	.	51.	1.33
51.0	251.	.	251.	6.56
52.0	40.	.	40.	1.04
61.0	86.	.	86.	2.25
62.0	214.	.	214.	5.59
63.0	177.	.	177.	4.62
73.0	217.	101.	116.	3.03
74.0	357.	.	357.	9.33
75.0	578.	.	578.	15.10
76.0	54.	.	54.	1.41
81.0	58.	.	58.	1.52
84.0	76.	.	76.	1.99
85.0	120.	.	120.	3.13
86.0	185.	.	185.	4.83
87.0	444.	.	444.	11.60
88.0	388.	.	388.	10.14
89.0	52.	.	52.	1.36
92.0	144.	.	144.	3.76
93.0	119.	.	119.	3.11
97.0	113.	.	113.	2.95
98.0	215.	.	215.	5.62
99.0	289.	.	289.	7.55
101.0	49.	.	49.	1.28
105.0	1113.	.	1113.	29.08
106.0	413.	.	413.	10.79
109.0	89.	.	89.	2.32
110.0	176.	.	176.	4.60
111.0	266.	.	266.	6.95
112.0	53.	.	53.	1.38
113.0	49.	.	49.	1.28
122.0	430.	.	430.	11.23
123.0	676.	.	676.	17.66
124.0	272.	.	272.	7.11
125.0	148.	.	148.	3.87
126.0	40.	.	40.	1.04
127.0	69.	.	69.	1.80
134.0	55.	.	55.	1.44
135.0	95.	.	95.	2.48
136.0	48.	.	48.	1.25
137.0	78.	.	78.	2.04
138.0	53.	.	53.	1.38
140.0	430.	.	430.	11.23
141.0	360.	.	360.	9.40
142.0	143.	.	143.	3.74
147.0	66.	.	66.	1.72
149.0	112.	.	112.	2.93
150.0	172.	.	172.	4.49
160.0	94.	.	94.	2.46
161.0	40.	.	40.	1.04

163.0	109.	.	109.	2.85
164.0	39.	.	39.	1.02
170.0	173.	.	173.	4.52
172.0	149.	.	149.	3.89
173.0	72.	.	72.	1.88
174.0	320.	.	320.	8.36
175.0	330.	.	330.	8.62
176.0	1244.	.	1244.	32.50
177.0	135.	.	135.	3.53
184.0	62.	.	62.	1.62
186.0	45.	.	45.	1.18
199.0	66.	.	66.	1.72
209.0	55.	.	55.	1.44
210.0	568.	.	568.	14.84
211.0	127.	.	127.	3.32
212.0	184.	.	184.	4.81
213.0	40.	.	40.	1.04
233.0	123.	.	123.	3.21
235.0	66.	.	66.	1.72
245.0	100.	.	100.	2.61
246.0	3828.	.	3828.	100.00
247.0	770.	.	770.	20.11
248.0	2580.	.	2580.	67.40
249.0	434.	.	434.	11.34
250.0	460.	.	460.	12.02
251.0	67.	.	67.	1.75
280.0	246.	.	246.	6.43
281.0	285.	.	285.	7.45
282.0	262.	.	262.	6.84
283.0	333.	.	333.	8.70
284.0	66.	.	66.	1.72
316.0	2155.	.	2155.	56.30
317.0	380.	.	380.	9.93
318.0	2563.	.	2563.	66.95
320.0	1312.	.	1312.	34.27
322.0	308.	.	308.	8.05

SCAN 88 CONTAINED 125 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-34. Ronnel (0,0-dimethyl-0-(2,4,5 trichlorophenyl) phosphorothioate) Standard Spectrum (99%, kit number 52, Polyscience Corporation).

FIL47-1 DDT,DDE,RONNEL/CHCL3 10 MICROLITERS CD492 20 MARCH

MASS	SCAN 50	SCAN 40	DIFF.	NORM. DIFF.
27.0	66.	.	66.	1.03
29.0	221.	80.	141.	2.20
31.0	423.	.	423.	6.60
36.0	174.	.	174.	2.72
37.0	87.	.	87.	1.36
45.0	259.	.	259.	4.04
46.0	80.	.	80.	1.25
47.0	2540.	.	2540.	39.66
48.0	189.	.	189.	2.95
49.0	208.	.	208.	3.25
50.0	893.	.	893.	13.94
52.0	246.	.	246.	3.84
61.0	195.	.	195.	3.04
62.0	1017.	.	1017.	15.88
63.0	1121.	.	1121.	17.50
64.0	227.	.	227.	3.54
65.0	75.	.	75.	1.17
72.0	120.	.	120.	1.87
73.0	189.	45.	144.	2.25
74.0	280.	.	280.	4.37
77.0	98.	.	98.	1.53
79.0	2251.	.	2251.	35.14
80.0	122.	.	122.	1.90
81.0	71.	.	71.	1.11
83.0	186.	.	186.	2.90
84.0	96.	.	96.	1.50
85.0	115.	.	115.	1.80
93.0	1653.	.	1653.	25.81
94.0	274.	.	274.	4.28
95.0	213.	.	213.	3.33
96.0	271.	.	271.	4.23
97.0	674.	.	674.	10.52
98.0	87.	.	87.	1.36
99.0	234.	.	234.	3.65
107.0	228.	.	228.	3.56
108.0	106.	.	106.	1.65
109.0	2762.	.	2762.	43.12
110.0	141.	.	141.	2.20
111.0	141.	.	141.	2.20
125.0	6405.	.	6405.	100.00
127.0	341.	.	341.	5.32
129.0	71.	.	71.	1.11
132.0	109.	.	109.	1.70
133.0	88.	.	88.	1.37
134.0	75.	.	75.	1.17
143.0	122.	.	122.	1.90
144.0	108.	.	108.	1.69
145.0	97.	.	97.	1.51
167.0	389.	.	389.	6.07
169.0	350.	.	350.	5.46
171.0	124.	.	124.	1.94
179.0	67.	.	67.	1.05
193.0	83.	.	83.	1.30
195.0	182.	.	182.	2.84

196.0	272.	.	272.	4.25
197.0	186.	.	186.	2.90
198.0	330.	.	330.	5.15
200.0	104.	.	104.	1.62
207.0	128.	39.	89.	1.39
270.0	304.	.	304.	4.75
285.0	6234.	.	6234.	97.33
286.0	770.	.	770.	12.02
287.0	4078.	.	4078.	63.67
289.0	913.	.	913.	14.25

SCAN 50 CONTAINED 106 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-35. DDD (1,1-dichloro-2,2-bis-(p-chlorophenyl)ethane), or Rhothane, or TDE Standard Spectrum (70%, kit number 51AX, Polyscience Corporation).

FIL43-4 4 MICROLITER 1% DDD/ CHCL3 25-450 CD492 22MAR

MASS	SCAN 100	SCAN 83	DIFF.	NORM. DIFF.
36.0	196.	.	196.	1.83
38.0	124.	.	124.	1.16
39.0	242.	.	242.	2.26
50.0	527.	.	527.	4.93
51.0	623.	.	623.	5.83
62.0	147.	.	147.	1.38
63.0	426.	.	426.	3.99
73.0	245.	59.	186.	1.74
74.0	366.	.	366.	3.42
75.0	1063.	68.	995.	9.31
76.0	321.	.	321.	3.00
77.0	163.	.	163.	1.53
81.0	322.	.	322.	3.01
82.0	968.	32.	936.	8.76
85.0	205.	.	205.	1.92
86.0	117.	.	117.	1.09
87.0	291.	.	291.	2.72
88.0	1022.	69.	953.	8.92
89.0	252.	.	252.	2.36
93.0	164.	.	164.	1.53
98.0	121.	.	121.	1.13
99.0	306.	.	306.	2.86
100.0	347.	.	347.	3.25
101.0	551.	.	551.	5.16
102.0	263.	.	263.	2.46
105.0	123.	.	123.	1.15
106.0	435.	17.	418.	3.91
107.0	126.	.	126.	1.18
111.0	190.	.	190.	1.78
113.0	120.	.	120.	1.12
125.0	138.	.	138.	1.29
136.0	438.	.	438.	4.10
137.0	298.	.	298.	2.79
138.0	194.	.	194.	1.82
139.0	190.	.	190.	1.78
149.0	124.	.	124.	1.16
150.0	142.	.	142.	1.33
151.0	224.	.	224.	2.10
163.0	460.	.	460.	4.30
164.0	462.	.	462.	4.32
165.0	4451.	83.	4368.	40.87
166.0	707.	.	707.	6.61
172.0	176.	.	176.	1.65
174.0	140.	.	140.	1.31
175.0	141.	.	141.	1.32
176.0	740.	52.	688.	6.44
177.0	327.	.	327.	3.06
178.0	1108.	.	1108.	10.37
179.0	109.	.	109.	1.02
199.0	1172.	.	1172.	10.97
200.0	416.	.	416.	3.89
201.0	395.	.	395.	3.70
202.0	117.	.	117.	1.09
212.0	782.	85.	697.	6.52

213.0	255.		255.	2.39
235.0	10882.	194.	10688.	100.00
236.0	1826.	23.	1803.	16.87
237.0	7055.	116.	6939.	64.92
238.0	1105.	.	1105.	10.34
239.0	1187.	.	1187.	11.11
240.0	157.	.	157.	1.47
250.0	320.	.	320.	2.99
284.0	125.	.	125.	1.17

SCAN 100 CONTAINED 119 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-36. DDD(1,1-dichloro-2,2-bis-(o,p-chlorophenyl)ethane) or Rhothane, or TDE Standard Spectrum (25%, kit number 51AX, Polyscience Corporation).

FIL43-4 4 MICROLITER 1% DDD/ CHCL3 25-450 CD492 22MAR

MASS	SCAN 88	SCAN 83	DIFF.	NORM. DIFF.
27.0	87.	.	87.	1.42
36.0	91.	.	91.	1.49
39.0	159.	.	159.	2.60
50.0	279.	.	279.	4.56
51.0	336.	.	336.	5.49
62.0	113.	.	113.	1.85
63.0	214.	.	214.	3.50
73.0	121.	59.	62.	1.01
74.0	210.	.	210.	3.43
75.0	651.	68.	583.	9.53
76.0	151.	.	151.	2.47
77.0	86.	.	86.	1.41
81.0	168.	.	168.	2.75
82.0	465.	32.	433.	7.08
85.0	117.	.	117.	1.91
86.0	76.	.	76.	1.24
87.0	161.	.	161.	2.63
88.0	659.	69.	590.	9.65
89.0	84.	.	84.	1.37
93.0	107.	.	107.	1.75
99.0	176.	.	176.	2.88
100.0	189.	.	189.	3.09
101.0	329.	.	329.	5.38
102.0	173.	.	173.	2.83
105.0	117.	.	117.	1.91
106.0	196.	17.	179.	2.93
107.0	73.	.	73.	1.19
111.0	73.	.	73.	1.19
135.0	87.	.	87.	1.42
136.0	135.	.	135.	2.21
137.0	204.	.	204.	3.34
138.0	93.	.	93.	1.52
139.0	85.	.	85.	1.39
149.0	73.	.	73.	1.19
150.0	86.	.	86.	1.41
151.0	162.	.	162.	2.65
152.0	72.	.	72.	1.18
163.0	274.	.	274.	4.48
164.0	232.	.	232.	3.79
165.0	2446.	83.	2363.	38.64
166.0	371.	.	371.	6.07
172.0	75.	.	75.	1.23
174.0	95.	.	95.	1.55
175.0	94.	.	94.	1.54
176.0	525.	52.	473.	7.74
177.0	249.	.	249.	4.07
178.0	563.	.	563.	9.21
179.0	66.	.	66.	1.08
199.0	783.	.	783.	12.80
200.0	325.	.	325.	5.31
201.0	334.	.	334.	5.46
202.0	79.	.	79.	1.29
212.0	476.	85.	391.	6.39
214.0	127.	.	127.	2.08

235.0	6309.	194.	6115.	100.00
236.0	949.	23.	926.	15.14
237.0	4059.	116.	3943.	64.48
238.0	597.	.	597.	9.76
239.0	673.	.	673.	11.01
248.0	180.	.	180.	2.94
249.0	71.	.	71.	1.16
250.0	128.	.	128.	2.09

SCAN 88 CONTAINED 98 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-37. Aldrin (1,2,3,4,10,10-hexachloro-1,4,4α,5,8,8α - hexahydro-1,4-endo-exo-5,8-dimethano-naphthalene) Standard Spectrum (99%, kit number 51AX, Polyscience Corporation).

FIL44-1 0.5 MICROLITER 10% ALDRIN/ CHCL3 25-450 CD492 21 MAR

MASS	SCAN 63	SCAN 53	DIFF.	NORM. DIFF
27.0	189.	.	189.	7.72
36.0	152.	.	152.	6.21
38.0	65.	.	65.	2.66
39.0	394.	.	394.	16.10
40.0	177.	.	177.	7.23
41.0	79.	.	79.	3.23
50.0	38.	.	38.	1.55
51.0	147.	.	147.	6.01
53.0	26.	.	26.	1.06
61.0	41.	.	41.	1.68
62.0	31.	.	31.	1.27
63.0	84.	.	84.	3.43
65.0	455.	.	455.	18.59
66.0	2447.	.	2447.	100.00
67.0	176.	.	176.	7.19
73.0	116.	50.	66.	2.70
74.0	85.	.	85.	3.47
75.0	156.	.	156.	6.38
76.0	27.	.	27.	1.10
77.0	164.	.	164.	6.70
78.0	57.	.	57.	2.33
79.0	1041.	.	1041.	42.54
80.0	78.	.	78.	3.19
83.0	38.	.	38.	1.55
85.0	82.	.	82.	3.35
91.0	841.	.	841.	34.37
92.0	303.	.	303.	12.38
93.0	50.	.	50.	2.04
96.0	53.	.	53.	2.17
97.0	67.	.	67.	2.74
98.0	57.	.	57.	2.33
99.0	51.	.	51.	2.08
100.0	41.	.	41.	1.68
101.0	689.	.	689.	28.16
102.0	54.	.	54.	2.21
103.0	215.	.	215.	8.79
104.0	36.	.	36.	1.47
107.0	59.	.	59.	2.41
109.0	55.	.	55.	2.25
110.0	117.	.	117.	4.78
111.0	128.	.	128.	5.23
113.0	73.	.	73.	2.98
114.0	37.	.	37.	1.51
115.0	36.	.	36.	1.47
116.0	32.	.	32.	1.31
125.0	32.	.	32.	1.31
127.0	80.	.	80.	3.27
128.0	29.	.	29.	1.19
129.0	27.	.	27.	1.10
135.0	39.	.	39.	1.59
141.0	39.	.	39.	1.59
143.0	44.	.	44.	1.80
145.0	64.	.	64.	2.62
147.0	48.	.	48.	1.96

149.0	37.	.	37.	1.51
150.0	122.	.	122.	4.99
151.0	223.	.	223.	9.11
154.0	412.	.	412.	16.84
162.0	198.	.	198.	8.09
170.0	94.	.	94.	3.84
173.0	46.	.	46.	1.88
186.0	149.	.	149.	6.09
187.0	57.	.	57.	2.33
191.0	85.	.	85.	3.47
193.0	87.	.	87.	3.56
207.0	40.	.	40.	1.63
214.0	48.	.	48.	1.96
216.0	101.	.	101.	4.13
217.0	48.	.	48.	1.96
218.0	63.	.	63.	2.57
219.0	90.	.	90.	3.68
220.0	101.	.	101.	4.13
221.0	126.	.	126.	5.15
222.0	84.	.	84.	3.43
224.0	43.	.	43.	1.76
227.0	58.	.	58.	2.37
229.0	69.	.	69.	2.82
230.0	35.	.	35.	1.43
239.0	33.	.	33.	1.35
243.0	26.	.	26.	1.06
250.0	63.	.	63.	2.57
251.0	75.	.	75.	3.06
255.0	133.	.	133.	5.44
256.0	117.	.	117.	4.78
257.0	155.	.	155.	6.33
258.0	156.	.	156.	6.38
259.0	75.	.	75.	3.06
261.0	493.	.	493.	20.15
262.0	111.	.	111.	4.54
263.0	772.	.	772.	31.55
264.0	114.	.	114.	4.66
267.0	197.	.	197.	8.05
291.0	137.	.	137.	5.60
293.0	204.	.	204.	8.34
295.0	82.	.	82.	3.35
296.0	108.	.	108.	4.41
298.0	239.	.	239.	9.77
300.0	151.	.	151.	6.17
302.0	76.	.	76.	3.11

SCAN 63 CONTAINED 105 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

TABLE E-38. Endrin (1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4α,5,6,7,8,8α-octahydro-1,4-endo-endo ,5,8-dimethanonaphthalene) Standard Spectrum (99%, kit number 51AX, Polyscience Corporation).

FIL08-3 2.5 MICROLITER 2% ENDRIN IN CHCL3 CD492 22 MARCH

MASS	SCAN 94	SCAN 85	DIFF.	NORM. DIFF.
27.0	149.	.	149.	15.99
29.0	86.	.	86.	9.23
36.0	149.	.	149.	15.99
38.0	41.	.	41.	4.40
39.0	189.	.	189.	20.28
40.0	22.	.	22.	2.36
41.0	53.	.	53.	5.69
50.0	60.	.	60.	6.44
51.0	84.	.	84.	9.01
53.0	35.	.	35.	3.76
55.0	120.	.	120.	12.88
57.0	36.	.	36.	3.86
61.0	33.	.	33.	3.54
62.0	63.	.	63.	6.76
63.0	77.	.	77.	8.26
65.0	85.	.	85.	9.12
66.0	225.	.	225.	24.14
67.0	932.	.	932.	100.00
68.0	56.	.	56.	6.01
69.0	43.	.	43.	4.61
72.0	30.	.	30.	3.22
73.0	156.	64.	92.	9.87
74.0	101.	.	101.	10.84
75.0	94.	.	94.	10.09
77.0	115.	.	115.	12.34
79.0	162.	.	162.	17.38
81.0	45.	.	45.	4.83
82.0	66.	.	66.	7.08
83.0	48.	.	48.	5.15
85.0	31.	.	31.	3.33
86.0	69.	.	69.	7.40
87.0	88.	.	88.	9.44
95.0	111.	.	111.	11.91
96.0	55.	.	55.	5.90
97.0	49.	.	49.	5.26
98.0	56.	.	56.	6.01
99.0	74.	.	74.	7.94
100.0	62.	29.	33.	3.54
101.0	145.	.	145.	15.56
102.0	48.	.	48.	5.15
103.0	41.	.	41.	4.40
107.0	41.	.	41.	4.40
108.0	62.	.	62.	6.65
109.0	44.	.	44.	4.72
111.0	66.	.	66.	7.08
113.0	128.	.	128.	13.73
115.0	61.	.	61.	6.55
123.0	40.	.	40.	4.29
133.0	43.	.	43.	4.61
135.0	30.	.	30.	3.22
136.0	39.	.	39.	4.18
137.0	62.	.	62.	6.65
138.0	44.	.	44.	4.72
139.0	127.	.	127.	13.63

140.0	55.	.	55.	5.90
143.0	26.	.	26.	2.79
145.0	25.	.	25.	2.68
147.0	127.	.	127.	13.63
148.0	47.	.	47.	5.04
149.0	149.	.	149.	15.99
150.0	41.	.	41.	4.40
151.0	45.	.	45.	4.83
163.0	26.	.	26.	2.79
165.0	106.	68.	38.	4.08
166.0	20.	.	20.	2.15
171.0	48.	.	48.	5.15
172.0	45.	.	45.	4.83
173.0	103.	.	103.	11.05
174.0	35.	.	35.	3.76
175.0	97.	.	97.	10.41
176.0	37.	.	37.	3.97
177.0	44.	.	44.	4.72
181.0	59.	.	59.	6.33
182.0	52.	.	52.	5.58
183.0	35.	.	35.	3.76
185.0	66.	.	66.	7.08
193.0	53.	.	53.	5.69
194.0	55.	.	55.	5.90
196.0	43.	.	43.	4.61
197.0	36.	.	36.	3.86
199.0	41.	.	41.	4.40
207.0	116.	61.	55.	5.90
209.0	199.	.	199.	21.35
211.0	83.	.	83.	8.91
212.0	61.	.	61.	6.55
217.0	62.	.	62.	6.65
219.0	50.	.	50.	5.36
221.0	50.	.	50.	5.36
229.0	30.	.	30.	3.22
235.0	301.	169.	132.	14.16
236.0	55.	.	55.	5.90
237.0	153.	109.	44.	4.72
239.0	34.	.	34.	3.65
243.0	74.	.	74.	7.94
244.0	72.	.	72.	7.73
245.0	92.	.	92.	9.87
247.0	64.	.	64.	6.87
250.0	131.	.	131.	14.06
252.0	72.	.	72.	7.73
277.0	35.	.	35.	3.76
279.0	78.	.	78.	8.37
281.0	127.	.	127.	13.63
283.0	75.	.	75.	8.05
309.0	36.	.	36.	3.86
315.0	113.	.	113.	12.12
317.0	129.	.	129.	13.84
319.0	112.	.	112.	12.02
321.0	35.	.	35.	3.76
343.0	82.	.	82.	8.80

SCAN 94 CONTAINED 114 PEAKS AND
NORMALIZED % PRINTED FOR VALUES GREATER THAN 1.0%.

APPENDIX F

TCDD DETERMINATIONS ON HERBICIDE-ORANGE SAMPLES

NOTE:

Gulfport drums analyzed were as follows:

Drum Numbers	Number of Drum Analyzed	Analysis Sequence No.	Manufacturer
456-515	60	5	Thompson Co.
7, 304-363	61	8	Hercules Co.
386-455, 249-258, 275, 276	80	10	Dow Chemical Co.
12-60E	43	14	Hercules Co.
TOTAL	244		

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03300201	269.0	2485692.					
03300202	272.0	2424187.					
	270.5	2454939.	.06700	1.25	.402	S	.067 STD
03300203	270.0	788927.					
03300204	270.0	814687.					
	270.0	801807.	.02188	1.61	.131		249XF
03300205	268.0	993175.					
03300206	268.0	1294102.					
	268.0	1143638.	.03121	13.16	.187		250X0
03300207	269.0	2454973.					
03300208	267.0	2133642.					
	268.0	2294307.	.06262	7.00	.376		251X
03300209	270.0	2665366.					
03300210	270.0	2897608.					
	270.0	2781487.	.06700	4.17	.402	S	.067 STD
03300211	267.0	2776435.					
03300212	266.0	2727540.					
	266.5	2751987.	.06629	.89	.398		250X
03300213	270.0	741195.					
03300214	271.0	986952.					
	270.5	864073.	.02081	14.22	.125		252X
03300215	272.0	752099.					
03300216	270.0	1355360.					
	271.0	1054129.	.02539	20.58	.152		256X
03300217	272.0	2493665.					
03300218	271.0	2605945.					
	271.5	2549805.	.06700	2.20	.402	S	.067 STD
03300219	274.0	733855.					
03300220	273.0	687727.					
	273.5	710791.	.01868	3.24	.112		253X
03300221	272.0	1450962.					
03300222	270.0	1403678.					
	271.0	1427320.	.03751	1.66	.225		255X
03300223	271.0	1409293.					
03300224	271.0	1228565.					
	271.0	1319932.	.03468	6.77	.208		276X

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03300409	277.0	3722527.					
03300410	274.0	3349345.					
	275.5	3535936.	.06700	5.28	.067	S	.067 STD
03300411	272.0	1819332.					
03300412	273.0	1930913.					
	272.5	1979122.	.03561	3.18	.036		275N-9
03300413	271.0	1230529.					
03300414	272.0	1144425.					
	271.5	1187477.	.02250	3.63	.023		275N-10
03300415	NO PEAK						
03300416	NO PEAK						
	.0	.	.00000$$$$$$$$		.000		275P-6
03300425	273.0	2443792.					
03300426	272.0	2384011.					
	272.5	2413901.	.06700	1.24	.067	S	.067 STD
03300417	275.0	1706265.					
03300418	273.0	1708574.					
	274.0	1707419.	.04739	.07	.047		275P-7
03300419	272.0	2788761.					
03300420	273.0	2838050.					
	272.5	2813405.	.07809	.88	.078		275P-8
03300423	269.0	809234.					
03300424	268.0	772671.					
	268.5	790952.	.02195	2.31	.022		275N-11
03300425	273.0	2443792.					
03300426	272.0	2384011.					
	272.5	2413901.	.06700	1.24	.067	S	.067 STD
03300127	272.0	2492400.					
03300128	269.0	2509228.					
	270.5	2500814.	.06941	.34	.069		275P-9
03300129	269.0	1260792.					
03300130	270.0	1201087.					
	269.5	1230939.	.03417	2.43	.034		275P-10
03300131	269.0	864118.					
03300132	266.0	894566.					
	267.5	879342.	.02441	1.73	.024		275P-11
03300133	269.0	2539275.					
03300134	271.0	2718967.					
	270.0	2629121.	.06700	3.42	.067	S	.067 STD
03300135	275.0	245641.					
03300136	273.0	238330.					
	274.0	241985.	.00617	1.51	.006		275Q-6
03300137	272.0	3126818.					
03300138	271.0	2844020.					
	271.5	2985419.	.07600	4.74	.076		275Q-7
03300139	270.0	3102403.					
03300140	269.0	3124514.					
	269.5	3113458.	.07934	.36	.079		275Q-8

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03310101	279.0	2103267.					
03310101	279.0	2103267.					
	279.0	2103267.	.06700	.00	.402	S	.067 STD
03310103	276.0	696122.					
03310104	274.0	704047.					
	275.0	700084.	.02230	.57	.134		249X,2X
03310105	272.0	1014572.					
03310106	272.0	1032723.					
	272.0	1023647.	.03261	.89	.196		250X,2X
03310107	274.0	2071398.					
03310108	272.0	1996339.					
	273.0	2033868.	.06479	1.85	.389		251X,2X
03310109	277.0	2249254.					
03310110	276.0	2405879.					
	276.5	2327566.	.06700	3.36	.402	S	.067 STD
03310111	273.0	2625596.					
03310112	274.0	2570605.					
	273.5	2598100.	.07479	1.06	.449		258X,2X
03310113	270.0	1034437.					
03310114	271.0	1193673.					
	270.5	1114055.	.03207	7.15	.192		252X,2X
03310115	274.0	1759117.					
03310116	274.0	1625359.					
	274.0	1692238.	.04871	3.95	.292		256X,2X
03310117	276.0	2826994.					
03310118	275.0	2761995.					
	275.5	2794494.	.06700	1.16	.402	S	.067 STD
03310119	273.0	1699146.					
03310120	273.0	1335211.					
	273.0	1517178.	.03638	11.99	.218		257-1
03310121	274.0	510510.					
03310122	NO PEAK						
	137.0	255255.	.00612	100.00	.037		IGNORE
03310123	273.0	87722.					
03310124	NO PEAK						
	136.5	43861.	.00105	100.00	.006		IGNORE

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03310125	273.0	3314488.					
03310126	276.0	2836532.					
	274.5	3075510.	.06700	7.77	.402	S	.067 STD
03310127	271.0	1655693.					
03310128	271.0	1797600.					
	271.0	1726646.	.03762	4.11	.226		257
03310129	272.0	963642.					
03310130	271.0	951417.					
	271.5	957529.	.02086	.64	.125		457
03310131	272.0	1229632.					
03310132	274.0	1236308.					
	273.0	1232970.	.02686	.27	.161		458
03310133	273.0	3442447.					
03310134	272.0	3616234.					
	272.5	3529340.	.06700	2.46	.402	S	.067 STD
03310135	273.0	1933922.					
03310136	274.0	1839587.					
	273.5	1886754.	.03582	2.50	.215		254X, 2X
03310137	275.0	5239109.					
03310138	272.0	5359321.					
	273.5	5299215.	.10060	1.13	.604		.096 STD
03310139	276.0	963312.					
03310140	276.0	1196043.					
	276.0	1080077.	.02050	10.81	.123		459
03310141	272.0	3678274.					
03310142	264.0	3789833.					
	268.0	3734053.	.06700	1.49	.402	S	.067 STD
03310143	273.0	1251415.					
03310144	275.0	1162382.					
	274.0	1206898.	.02166	3.69	.130		460
03310145	274.0	1980590.					
03310146	272.0	1823042.					
	273.0	1901816.	.03412	4.14	.205		275S - 6
03310147	272.0	7407016.					
03310148	273.0	7309242.					
	272.5	7358129.	.13203	.66	.792		275S - 7

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS	
03310105	274.0	2828262.				
03310106	273.0	3393299.				
	273.5	3110780.	.09600	9.08	.384	S .096 STD
03310103	273.0	1741513.				
03310104	273.0	1545780.				
	273.0	1643646.	.05072	5.95	.203	276-HP
03310107	274.0	3256496.				
03310108	274.0	2502258.				
	274.0	2879377.	.08886	13.10	.355	258-HP
03310109	270.0	743459.				
03310110	270.0	709376.				
	270.0	726417.	.02242	2.35	.090	254-2-HP

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03310149	273.0	2108455.					
03310149	273.0	2108455.					
	273.0	2108455.	.09600	.00	.096	S	.096 STD
03310151	273.0	5130640.					
03310151	273.0	5130640.					
	273.0	5130640.	.23360	.00	.234		275S-8
03310153	268.0	1991780.					
03310154	271.0	2475724.					
	269.5	2233752.	.10170	10.83	.102		275S-9
03310155	NO PEAK						
03310156	263.0	403898.					
	131.5	201949.	.00919	100.00	.009		275S-10
03310157	271.0	3142540.					
03310158	274.0	3665451.					
	272.5	3403995.	.09600	7.68	.096	S	.098 STD
03310159	268.0	2260976.					
03310160	268.0	897510.					
	268.0	1579243.	.04454	43.17	.045		275S-11
03310161	263.0	525662.					
03310162	264.0	451983.					
	263.5	488822.	.01379	7.54	.014		275S-12
03310163	272.0	312934.					
03310164	274.0	319523.					
	273.0	316228.	.00892	1.04	.009		456(X1/6)

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03310165	273.0	4281548.					
03310166	272.0	4258667.					
	272.5	4270108.	.09600	.27	.576	S	.096 STD
03310167	276.0	810159.					
03310168	276.0	792818.					
	276.0	801488.	.01802	1.08	.108		461
03310169	277.0	806740.					
03310170	277.0	774752.					
	277.0	790746.	.01778	2.02	.107		462
03310171	275.0	798202.					
03310172	274.0	816732.					
	274.5	807467.	.01815	1.15	.109		463
03310173	275.0	4117331.					
03310174	275.0	4261573.					
	275.0	4189452.	.09600	1.72	.576	S	.096 STD
03310175	276.0	887409.					
03310176	275.0	858022.					
	275.5	872715.	.02000	1.68	.120		464
03310177	276.0	856695.					
03310178	275.0	876798.					
	275.5	866746.	.01986	1.16	.119		465
03310177	276.0	856695.					
03310178	275.0	876798.					
	275.5	866746.	.01986	1.16	.119		465

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03310181	272.0	3122586.					
03310182	274.0	3457658.					
	273.0	3290122.	.09600	5.09	.576	S	.096 STD
03310183	272.0	1043993.					
03310184	273.0	633155.					
	272.5	838574.	.02447	24.50	.147		253-HP***
03310185	275.0	2467736.					
03310186	274.0	3298249.					
	274.5	2882992.	.08412	14.40	.505		UNKNOWN
03310187	278.0	3739008.					
03310188	277.0	769119.					
	277.5	2254063.	.06577	65.88	.395		476-HP***
03310189	273.0	3593956.					
03310190	272.0	4129683.					
	272.5	3861819.	.09600	6.94	.576	S	.096 STD
03310191	279.0	817271.					
03310192	276.0	809128.					
	277.5	813199.	.02022	.50	.121		466
03310193	276.0	796619.					
03310194	275.0	807498.					
	275.5	802058.	.01994	.68	.120		467
03310195	276.0	894487.					
03310196	276.0	852142.					
	276.0	873314.	.02171	2.42	.130		467-2
03310197	273.0	4499438.					
03310198	273.0	4647510.					
	273.0	4573474.	.09600	1 62	.576	S	.096 STD
03310199	278.0	710320.					
03310100	278.0	722157.					
	278.0	716238.	.01503	.83	.090		468
03310101	276.0	336387.					
03310102	278.0	315708.					
	278.0	326087.	.00684	3.16	.041		469
03310103	273.0	1741513.					
03310104	273.0	1545780.					
	273.0	1643646.	.03450	5.95	.207		276-HP**

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03320101	278.0	2529758.					
03320102	279.0	2577786.					
	278.5	2553772.	.09600	.94	.576	S	.096 STD
03320103	276.0	612141.					
03320104	277.0	657132.					
	276.5	634636.	.02386	3.54	.143		249X,3X
03320105	272.0	1212415.					
03320106	273.0	1145361.					
	272.5	1178888.	.04472	2.84	.266		250X,3X
03320107	272.0	2390929.					
03320108	272.0	2239188.					
	272.0	2314608.	.08701	3.26	.522		276-HP
03320109	273.0	3487006.					
03320110	272.0	3362509.					
	272.5	3424757.	.09600	1.82	.576	S	.096 STD
03320111	273.0	1724155.					
03320112	273.0	1743233.					
	273.0	1733694.	.04869	.55	.292		276Y
03320113	275.0	1821073.					
03320114	274.0	1743784.					
	274.5	1782428.	.04996	2.17	.300		.049 STD
03320115	272.0	2487150.					
03320116	271.0	2403869.					
	271.5	2445119.	.06854	1.72	.411		251X,3X

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03320117	276.0	1770712.					
03320117	276.0	1770712.					
	276.0	1770712.	.04800	.00	.288	S	.048 STD
03320119	271.0	2991180.					
03320120	271.0	2780431.					
	271.0	2885805.	.07023	3.65	.469		258X,3X
03320121	271.0	1081034.					
03320122	272.0	1313242.					
	271.5	1197138.	.03245	9.70	.195		252X,3X
03320123	272.0	1978151.					
03320124	273.0	1912925.					
	272.5	1945538.	.05274	1.68	.316		256X,3X
03320125	274.0	2091963.					
03320126	273.0	2041485.					
	273.5	2066724.	.04800	1.22	.288	S	048 STD
03320127	274.0	1193650.					
03320128	273.0	1175049.					
	273.5	1184349.	.02751	.79	.165		456
03320129	273.0	849792.					
03320130	274.0	921955.					
	273.5	885873.	.02057	4.07	.123		457
03320131	274.0	2193395.					
03320132	273.0	1140439.					
	273.5	1666917.	.03871	31.58	.232		458
03320133	272.0	2246958.					
03320134	274.0	2246399.					
	273.0	2246678.	.04800	.05	.288	S	.048 STD
03320135	274.0	957208.					
03320136	274.0	936743.					
	274.0	947015.	.02023	1.08	.121		459
03320137	276.0	1014933.					
03320138	275.0	961962.					
	275.5	988447.	.02112	2.68	.127		460
03320139	274.0	882940.					
03320140	273.0	842822.					
	273.5	862881.	.01844	2.32	.111		461
03320141	274.0	2045527.					
03320142	273.0	1980482.					
	273.5	2013004.	.04800	1.62	.288	S	.048 STD
03320143	274.0	938601.					
03320144	276.0	783970.					
	275.0	861285.	.02054	8.98	.123		462
03320145	276.0	845402.					
03320146	274.0	761142.					
	275.0	803272.	.01915	5.24	.115		463
03320147	274.0	900569.					
03320148	273.0	1031272.					
	273.5	965920.	.02303	6.77	.138		464

03320149	273.0	2111461.					
03320150	273.0	2057105.					
	273.0	2084283.	.04800	1.30	.288	S	.048 STD
03320151	277.0	809040.					
03320152	277.0	734863.					
	277.0	771951.	.01778	4.80	.107		465
03320153	277.0	797435.					
03320154	276.0	770094.					
	276.5	783764.	.01805	1.74	.108		466
03320155	274.0	4444260.					
03320156	274.0	1126038.					
	274.0	2785149.	.06414	59.57	.385		467-HP

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03320157	274.0	2224453.					
03320158	273.0	2490774.					
	273.5	2357613.	.04800	5.65	.288	S	.048 STD
03320159	273.0	1024496.					
03320160	273.0	912016.					
	273.0	968256.	.01971	5.81	.118		467
03320161	274.0	889260.					
03320162	273.0	820535.					
	273.5	854897.	.01741	4.02	.104		468
03320163	276.0	369739.					
03320164	275.0	336568.					
	275.5	353153.	.00719	4.70	.043		469
03320165	275.0	2269145.					
03320166	274.0	2138489.					
	274.5	2203817.	.04800	2.96	.288	S	.048 STD
03320167	276.0	815952.					
03320168	275.0	853088.					
	275.5	834520.	.01818	2.22	.109		467-2
03320169	275.0	4619963.					
03320170	274.0	4221102.					
	274.5	4420533.	.09628	4.51	.578		.096 STD
03320171	275.0	2493798.					
03320172	276.0	975050.					
	275.5	1734424.	.03778	43.78	.227		456
03320173	276.0	2238053.					
03320174	275.0	2237290.					
	275.5	2237671.	.04800	.00	.288	S	.048 STD
03320175	279.0	1169981.					
03320176	278.0	1148366.					
	278.5	1159173.	.02487	.93	.149		458
03320177	274.0	1849577.					
03320178	272.0	1844578.					
	273.0	1847077.	.03962	.14	.238		254X
03320179	273.0	4747977.					
03320180	273.0	4118957.					
	273.0	4433467.	.09510	7.09	.571		250-HP***

03390109	499.0	1886238.						
03390110	500.0	1862393.						
	499.5	1874315.	.08100	.64	.486	S	.081	STD
03390111	504.0	1877760.						
03390112	501.0	1870249.						
	502.5	1874004.	.08099	.20	.486		.081	STD
03390113	502.0	666998.						
03390114	505.0	607116.						
	503.5	637057.	.02753	4.70	.165		406	
03390115	505.0	642932.						
03390116	508.0	567256.						
	506.5	605094.	.02615	6.25	.157		407	

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03390117	505.0	1645179.					
03390118	503.0	1557749.					
	504.0	1601464.	.03100	2.73	.486	S	.001 STD
03390119	507.0	569186.					
03390120	510.0	559559.					
	508.5	564372.	.02855	.85	.171		408A
03390121	513.0	553250.					
03390122	512.0	569476.					
	512.5	561363.	.02839	1.45	.170		409
03390123	513.0	2027975.					
03390124	512.0	2204049.					
	512.5	2116012.	.10703	4.16	.642		410

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03390117	505.0	1645179.					
03390118	503.0	1557749.					
	504.0	1601464.	.08100	2.73	.486	S	.081 STD
03390127	508.0	1139712.					
03390128	506.0	1196173.					
	507.0	1167942.	.05907	2.42	.354		411
03390129	508.0	2441443.					
03390129	508.0	2441443.					
	508.0	2441443.	.12349	.00	.741		412
03390131	512.0	863168.					
03390132	513.0	774578.					
	512.5	818873.	.04142	5.41	.249		413

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03390109	NO PEAK						
03390110	500.0	1862393.					
	250.0	931196.	.08100	100.00	.486	S	.081 STD
03390135	514.0	2287027.					
03390136	516.0	[illegible]					
	515.0	2299733.	.20004	.55	1.200		414
03390137	517.0	2323945.					
03390138	519.0	2106525.					
	518.0	2210235.	.19269	4.91	1.156		415
03390139	516.0	588952.					
03390140	509.0	584541.					
	512.5	587747.	.05113	.55	.307		416

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03390149	499.0	2430000.					
03390149	499.0	2430000.					
	499.0	2430000.	.08100	.00	.486	S	.081 STD*
03390145	515.0	2383253.					
03390145	515.0	2383253.					
	515.0	2383253.	.07944	.00	.477		417
03390148	515.0	820059.					
03390149	517.0	850109.					
	516.0	835084.	.02784	1.00	.167		418
03390150	518.0	2409164.					
03390151	513.0	2590969.					
	515.5	2500066.	.08334	3.64	.500		419

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03390149	499.0	2430000.					
03390149	499.0	2430000.					
	499.0	2430000.	.00100	.00	.486	S	.081 STD*
03390152	507.0	244*227.					
03390154	NO PEAK						
	253.5	1224113.	.04080	100.00	.245		420

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03390173	510.0	2620877.					
03390174	513.0	2542442.					
	511.5	2581659.	.08100	1.52	.486	S	.081 STD
03390175	505.0	787879.					
03390176	509.0	817368.					
	507.0	802623.	.02518	1.84	.151		427
03390177	503.0	907150.					
03390178	502.0	916689.					
	502.5	911919.	.02861	.52	.172		428
03390179	497.0	3289418.					
03390180	503.0	3566704.					
	500.0	3388061.	.10630	5.27	.638		429
03390181	509.0	4850811.					
03390182	511.0	3274886.					
	510.0	4062848.	.08100	19.39	.486	S	.081 STD
03390183	518.0	3377298.					
03390184	520.0	2843528.					
	519.0	3110413.	.06201	8.58	.372		430
03390185	517.0	3164603.					
03390186	520.0	3514181.					
	518.5	3339392.	.06658	5.23	.399		432
03390187	NO PEAK						
03390188	518.0	1160280.					
	259.0	580140.	.01157	100.00	.069		433

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03400102	513.0	3066965.					
03400102	513.0	3066965.					
	513.0	3066965.	.08100	.00	.486	S	.081 STD*
03400103	516.0	3037678.					
03400104	514 0	3169747.					
	515.0	3103712.	.08197	2.13	.492		434
00000000	511.0	1078066.					
03400106	519.0	1008422.					
	515.0	1043244.	.02755	3.34	.165		435
03400107	523.0	3655198.					
03400108	530.0	3210615.					
	526.5	3432906.	.09066	6.48	.544		412
03400109	528.0	3514982.					
03400110	527.0	3651738.					
	527.5	3583360.	.08100	1.91	.486	S	.081 STD
03400111	528.0	1766818.					
03400112	531.0	1860011.					
	529.5	1813414.	.04099	2.57	.246		411
03400113	535.0	3764101.					
03400114	531.0	3080355.					
	533.0	3422228.	.07736	9.99	.464		410
03400115	527.0	937865.					
03400116	529.0	920114.					
	528.0	928989.	.02100	.96	.126		409
03400117	526.0	3472366.					
03400118	535.0	3545990.					
	530.5	3509173.	.08100	1.00	.486	S	.081 STD
03400119	533.0	977053.					
03400120	532.0	986299.					
	535.5	981976.	.02267	.44	.136		408A
03400121	538 0	996912.					
03400122	531.0	970320.					
	534.5	983616.	.02270	1.35	.136		407
03400123	525.0	985510.					
03400124	524.0	902833.					
	524.5	944171.	.02179	4.38	.131		406
03400125	524.0	3495140.					
03400126	527.0	3521795.					
	525.5	3508467.	.08100	.38	.486	S	.081
03400127	529.0	3500351.					
03400128	532.0	3208299.					
	530.5	3354325.	.07744	4.35	.465		404
03400129	535.0	1064073.					
03400130	534.0	1054719.					
	534.5	1029396.	.02377	2.46	.143		418
03400131	535.0	2928453.					
03400132	528.0	2695972.					
	531.5	2812212.	.06493	4.13	.390		417

03400133	532.0	3470725.					
03400134	529.0	3583429.					
	530.5	3527077.	.08100	1.60	.486	S	.081 STD
03400135	530.0	524788.					
03400136	530.0	2601870.					
	530.0	1563329.	.03590	66.43	.215		436
03400137	531.0	1640593.					
03400138	529.0	1869672.					
	530.0	1755132.	.04031	6.53	.242		437
03400139	527.0	1086830.					
03400140	533.0	805503.					
	530.0	946166.	.02173	14.87	.130		438
03400141	531.0	3775407.					
03400142	531.0	3591638.					
	531.0	3683522.	.08100	2.49	.486	S	.081 STD
03400143	532.0	1165740.					
03400144	531.0	1072971.					
	531.5	1119355.	.02461	4.14	.148		439
03400145	535.0	3539377.					
03400146	534.0	3043995.					
	534.5	3291686.	.07238	7.52	.434		440
03400147	537.0	1532003.					
03400148	538.0	1732011.					
	537.5	1632007.	.03589	6.13	.215		441
03400149	535.0	3877970.					
03400150	535.0	3592179.					
	535.0	3735074.	.08100	3.83	.486	S	.081 STD
03400151	539.0	1588490.					
03400152	538.0	1882230.					
	538.5	1735364.	.03763	8.46	.226		442
03400153	544.0	1181925.					
03400154	543.0	1003509.					
	543.5	1092717.	.02370	8.16	.142		443
03400155	537.0	3480414.					
03400156	542.0	3278148.					
	539.5	3379281.	.07328	2.99	.440		444
03400157	543.0	3464025.					
03400158	537.0	3554074.					
	540.0	3509049.	.08100	1.28	.486	S	.081 STD
03400159	538.0	1414240.					
03400160	534.0	1429186.					
	536.0	1422013.	.03282	.51	.197		445
03400161	535.0	1268942.					
03400162	531.0	1635887.					
	533.0	1452414.	.03353	12.63	.201		446
03400163	533.0	3847059.					
03400164	536.0	3328521.					
	534.5	3587789.	.08232	7.23	.497		447

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03400165	533.0	3588035.					
03400166	533.0	3772590.					
	533.0	3680312.	.08100	2.51	.486	S	.081 STD
03400167	534.0	1111454.					
03400168	533.0	1008290.					
	533.5	1059872.	.02333	4.87	.140		448
03400170	535.0	2950515.					
03400170	535.0	2950515.					
	535.0	2950515.	.06494	.00	.390		449*
03400171	538.0	899796.					
03400172	531.0	1059141.					
	534.5	979468.	.02156	8.13	.129		450

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03400173	531.0	3739164.					
03400174	525.0	3692838.					
	528.0	3716001.	.08100	.62	.486	S	.081 STD
03400175	533.0	1498698.					
03400176	541.0	1797815.					
	537.0	1648256.	.03593	9.07	.216		451
03400177	539.0	4243382.					
03400178	536.0	3498605.					
	537.5	3871033.	.08438	9.62	.506		452
03400180	535.0	1069342.					
03400180	535.0	1069342.					
	535.0	1069342.	.02331	.00	.140		453*
03400181	530.0	4152630.					
03400182	537.0	3921386.					
	533.5	4037008.	.08100	2.86	.486	S	.081 STD
03400183	535.0	1674633.					
03400184	540.0	1687861.					
	537.5	1681247.	.03373	.39	.202		454
03400186	544.0	3926292.					
03400186	544.0	3926292.					
	544.0	3926292.	.07878	.00	.473		455
03400187	538.0	2747020.					
03400188	538.0	2388486.					
	538.0	2563753.	.05144	7.15	.309		275Z

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03410197	531.0	409754.					
03410198	531.0	384176.					
	531.0	396965.	.08100	3.22	.486	S	.081 STD
03410199	538.0	114609.					
03410100	537.0	110557.					
	537.5	112583.	.02297	1.80	.138		389A
03410101	543.0	180569.					
03410102	545.0	193311.					
	544.0	186940.	.03814	3.41	.229		390A
03410103	541.0	143855.					
03410104	543.0	127164.					
	542.0	135509.	.02765	6.16	.166		391B

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03410105	537.0	362629.					
03410106	543.0	400804.					
	540.0	381716.	.08100	5.00	.486	S	.081 STD
03410107	544.0	155620.					
03410108	543.0	174187.					
	543.5	164903.	.03499	5.63	.210		392A
03410109	NO PEAK						
03410110	545.0	120447.					
	272.5	60223.	.01278	100.00	.077		393A
03410111	545.0	99562.					
03410112	547.0	91164.					
	546.0	95363.	.02024	4.40	.121		394A

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03410113	544.0	364073.					
03410114	551.0	359115.					
	547.5	361594.	.08100	.69	.486	S	.081 STD
03410115	NO PEAK						
03410116	549.0	120982.					
	274.5	60491.	.01355	100.00	.081		395A
03410117	552.0	240654.					
03410118	552.0	279311.					
	552.0	259982.	.05824	7.43	.349		388A
03410119	NO PEAK						
03410120	548.0	110995.					
	274.0	55497.	.01243	100.00	.075		396A
03410121	548.0	352132.					
03410122	545.0	322611.					
	546.5	337371.	.08100	4.38	.486	S	.081 STD
03410123	NO PEAK						
03410124	547.0	321172.					
	273.5	160586.	.03856	100.00	.231		434
03410125	547.0	132973.					
03410126	546.0	115507.					
	546.5	124240.	.02983	7.03	.179		435
03410127	548.0	418316.					
03410128	547.0	351556.					
	547.5	384936.	.09242	8.67	.555		412
03410129	545.0	383106.					
03410130	545.0	365984.					
	545.0	374545.	.08100	2.29	.486	S	.081 STD
03410131	546.0	165387.					
03410132	543.0	162233.					
	544.5	163810.	.03543	.96	.213		411
03410133	550.0	572670.					
03410134	548.0	305913.					
	549.0	439291.	.09500	30.30	.570		410
03410135	NO PEAK						
03410136	548.0	93259.					
	274.0	46629.	.01008	100.00	.061		409
03410137	551.0	379062.					
03410138	554.0	338721.					
	552.5	359291.	.08100	5.73	.486	S	.081 STD
03410139	549.0	136075.					
03410140	553.0	105628.					
	551.0	120851.	.02725	12.60	.163		408A
03410141	556.0	114892.					
03410142	558.0	103798.					
	557.0	109345.	.02465	5.07	.148		407
03410143	560.0	107331.					
03410144	555.0	94441.					
	557.5	100886.	.02274	6.39	.136		406

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS			
03410146	549.0	353542.						
03410146	549.0	353542.						
	549.0	353542.	.08100	.00	.486	S	.081	STD*
03410147	547.0	410559.						
03410148	549.0	405131.						
	548.0	407845.	.09344	.67	.561		404	
03410149	551.0	174513.						
03410150	553.0	83373.						
	552.0	128943.	.02954	35.34	.177		418	
03410151	551.0	407234.						
03410152	549.0	264458.						
	550.0	335846.	.07695	21.26	.462		417	
03410154	550.0	319540.						
03410154	550.0	319540.						
	550.0	319540.	.08100	.00	.486	S	.081	STD*
03410155	551.0	296055.						
03410156	548.0	47715.						
	549.5	171885.	.04357	72.24	.261		436	
03410157	545.0	106970.						
03410158	553.0	155609.						
	549.0	131289.	.03328	18.52	.200		437	
03410159	555.0	120397.						
03410160	555.0	73804.						
	555.0	97140.	.02462	23.94	.148		438	
03410161	553.0	242657.						
03410162	556.0	350903.						
	554.5	296780.	.00100	18.24	.486	S	.081	
03410163	557.0	273303.						
03410164	560.0	100094.						
	558.5	186698.	.05096	46.39	.306		439	
03410165	557.0	171219.						
03410166	556.0	331098.						
	556.5	251158.	.06855	31.83	.411		440	
03410167	NO PEAK							
03410168	538.0	166269.						
	269.0	83134.	.02269	100.00	.136		441	

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03410161	553.0	242657.					
03410162	556.0	350903.					
	554.5	296780.	.08100	18.24	.486	S	.081 STD
03410163	557.0	273303.					
03410164	560.0	100094.					
	558.5	186698.	.05096	46.39	.306		439
03410165	557.0	171219.					
03410166	556.0	331098.					
	556.5	251158.	.06855	31.83	.411		440
03410167	NO PEAK						
03410168	538.0	166269.					
	269.0	83134.	.02269	100.00	.136		441

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03410169	535.0	295550.					
03410170	544.0	328085.					
	539.5	311817.	.08100	5.22	.486	S	.081 STD
03410171	548.0	152447.					
03410172	549.0	137100.					
	548.5	144773.	.03761	5.30	.226		442
03410173	542.0	119030.					
03410174	541.0	105745.					
	541.5	112387.	.02919	5.91	.175		443
03410175	538.0	357786.					
03410176	539.0	299333.					
	538.5	328559.	.08535	8.90	.512		444

03410189	524.0	361426.					
03410189	524.0	361426.					
	524.0	361426.	.08100	.00	.486	S	.081 STD*
03410190	532.0	220761.					
03410194	531.0	275303.					
	531.5	248032.	.05559	10.99	.334		386B
03410195	531.0	252055.					
03410196	530.0	260612.					
	530.5	256333.	.05745	1.67	.345		387A

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03420177	538.0	418197.					
03420178	538.0	332472.					
	538.0	375334.	.08100	11.42	.486	S	.081 STD
03420179	536.0	134242.					
03420180	535.0	131075.					
	535.5	132658.	.02863	1.19	.172		445
03420181	537.0	167153.					
03420182	531.0	138385.					
	534.0	152769.	.03297	9.42	.198		446
03420183	539.0	357705.					
03420184	541.0	274807.					
	540.0	316256.	.06825	13.11	.410		447
03420185	546.0	321550.					
03420186	546.0	359930.					
	546.0	340740.	.08100	5.63	.486	S	.081 STD
03420187	547.0	113222.					
03420188	546.0	109322.					
	546.5	111272.	.02645	1.75	.159		448
03420189	543.0	363864.					
03420190	541.0	326800.					
	542.0	345332.	.08209	5.37	.493		449
03420191	541.0	93312.					
03420192	540.0	106433.					
	540.5	102372.	.02434	3.97	.146		450
03420193	546.0	373607.					
03420194	543.0	357519.					
	544.5	365563.	.08100	2.20	.486	S	.081 STD
03420195	547.0	155360.					
03420196	545.0	157588.					
	546.0	156474.	.03467	.71	.208		451
03420197	545.0	391411.					
03420198	540.0	364219.					
	542.5	377815.	.08371	3.60	.502		452
03420199	544.0	89634.					
03420100	545.0	108135.					
	544.5	98884.	.02191	9.35	.131		453
03420101	548.0	376254.					
03420102	545.0	386178.					
	546.5	381216.	.08100	1.30	.486	S	.081 STD
03420103	552.0	150190.					
03420104	551.0	153885.					
	551.5	152037.	.03230	1.21	.194		454
03420105	548.0	414655.					
03420106	542.0	570981.					
	545.0	492818.	.10471	15.86	.628		455
03420107	549.0	216697.					
03420108	547.0	226022.					
	548.0	221389.	.04713	2.31	.283		2752

03420109	541.0	411903.						
03420110	535.0	416497.						
	538.0	414200.	.08100	.55	.486	S	.081	STD
03420111	536.0	379208.						
03420112	544.0	311935.						
	540.0	345571.	.65758	9.73	.405		251Z	
03420113	544.0	192326.						
03420114	546.0	204102.						
	545.0	198214.	.03076	2.97	.233		306B	
03420115	549.0	282829.						
03420116	547.0	253730.						
	548.0	268279.	.05246	5.42	.315		387A	
03420117	542.0	376555.						
03420118	542.0	380273.						
	542.0	378414.	.08100	.49	.486	S	.081	STD
03420119	546.0	100216.						
03420120	546.0	98563.						
	547.0	99388.	.02127	.83	.128		389A	
03420121	550.0	171126.						
03420122	549.0	205791.						
	549.5	188458.	.04034	9.20	.242		390A	
03420123	548.0	145093.						
03420124	544.0	114019.						
	546.0	129556.	.02773	11.99	.166		391A	
03420125	544.0	391874.						
03420126	541.0	353295.						
	542.5	372584.	.08100	5.18	.486	S	.081	STD
03420127	546.0	130324.						
03420128	548.0	140309.						
	547.0	135316.	.02942	3.69	.177		392A	
03420129	539.0	97096.						
03420130	547.0	96401.						
	543.0	97003.	.02109	.62	.127		393A	
03420131	541.0	93077.						
03420132	541.0	92172.						
	541.0	92624.	.02014	.49	.121		394A	
03420133	539.0	355755.						
03420134	538.0	357102.						
	538.5	356428.	.08100	.19	.486	S	.081	STD
03420135	536.0	116987.						
03420136	536.0	119145.						
	536.0	118066.	.02683	.91	.161		395A	
03420137	538.0	239665.						
03420138	539.0	254916.						
	538.5	247290.	.05620	3.00	.337		388A	
03420139	NO PEAK							
03420140	NO PEAK							
	.0		.00000$$$$$$$$$		.000		397A	

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03420141	532.0	344964.					
03420142	531.0	338468.					
	531.5	341716.	.08100	.95	.486	S	081 STD
03420143	526.0	388259.					
03420144	524.0	418300.					
	525.0	403319.	.09560	3.73	.574		434
03420145	520.0	188752.					
03420146	516.0	112791.					
	518.0	150771.	.02626	1.82	.158		435
03420147	515.0	403509.					
03420148	519.0	532285.					
	517.0	467897.	.11091	13.74	.665		412
03420149	523.0	459629.					
03420150	521.0	399234.					
	522.0	429431.	.08100	7.03	.486	S	.081 STD
03420151	522.0	157561.					
03420152	523.0	168194.					
	522.5	162877.	.03072	3.26	.184		411
03420153	524.0	385410.					
03420154	525.0	350822.					
	524.5	368120.	.06750	2.04	.405		410
03420155	520.0	127468.					
03420156	521.0	120465.					
	520.5	123966.	.02336	2.82	.140		409
03420157	520.0	394489.					
03420158	525.0	388252.					
	526.5	391370.	.09100	.60	.486	S	.081 STD
03420159	526.0	110232.					
03420160	531.0	117855.					
	528.5	114044.	.02279	1.17	.143		408A
03420161	524.0	117050.					
03420162	529.0	113979.					
	526.5	115479.	.02411	.49	.145		407
03420163	529.0	104379.					
03420164	522.0	98346.					
	525.5	101362.	.02099	2.90	.126		406

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03430102	520.0	359724.					
03430102	520.0	359724.					
	520.0	359724.	.08100	.00	.486	S	.081 STD
03430103	NO PEAK						
03430104	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		397A
03430105	515.0	227609.					
03430106	515.0	228242.					
	515.0	227925.	.05132	.14	.308		398A
03430107	522.0	106200.					
03430108	523.0	107167.					
	522.5	106683.	.02402	.45	.144		399A
03430109	522.0	332139.					
03430110	522.0	326172.					
	522.0	329155.	.08100	.91	.486	S	.081 STD
03430111	523.0	103900.					
03430112	519.0	107533.					
	521.0	105716.	.02602	1.72	.156		400A
03430113	519.0	145686.					
03430114	521.0	128326.					
	520.0	137006.	.03372	6.34	.202		402A
03430115	527.0	90852.					
03430116	522.0	93770.					
	524.5	92311.	.02272	1.58	.136		403A
03430117	521.0	285139.					
03430118	520.0	277403.					
	520.5	281270.	.08100	1.38	.486	S	.081 STD
03430119	520.0	385681.					
03430120	521.0	396093.					
	520.5	390887.	.11257	1.33	.675		27-D1
03430121	523.0	278052.					
03430122	521.0	284472.					
	522.0	281262.	.08100	1.14	.486		251Z
03430123	524.0	223750.					
03430124	524.0	213164.					
	524.0	218457.	.06291	2.42	.377		275Z
03430125	523.0	307412.					
03430126	523.0	272105.					
	523.0	289758.	.08100	6.09	.486	S	.081 STD
03430127	529.0	27363.					
03430128	525.0	29103.					
	527.0	28234.	.00789	3.08	.047		L-1

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03430129	528.0	279532.					
03430130	528.0	261901.					
	528.0	270716.	.08100	3.26	.486	S	.081 STD
03430131	532.0	25507.					
03430132	532.0	28091.					
	532.0	26799.	.00802	4.82	.048		L-2
03430133	534.0	233519.					
03430134	531.0	246837.					
	532.5	240178.	.08100	2.77	.486	S	.081 STD
03430135	NO PEAK						
03430136	NO PEAK						
	.0		.00000¢$$$$$$$$		.000		438

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03430137	536.0	290262.					
03430138	536.6	286902.					
	536.0	288582.	.08100	.58	.486	S	.081 STD
03430139	537.0	94745.					
03430140	536.0	89572.					
	536.5	92158.	.02587	2.81	.155		439
03430141	536.0	304684.					
03430142	532.0	288639.					
	534.0	296661.	.08327	2.70	.500		440
03430143	537.0	120835.					
03430144	532.0	140570.					
	534.5	130702.	.03669	7.55	.220		441
03430145	534.0	325180.					
03430146	533.0	320308.					
	533.5	322744.	.08100	.75	.486	S	.081 STD
03430147	534.0	135815.					
03430148	539.0	144027.					
	536.5	139921.	.03512	2.93	.211		442
03430149	536.0	93666.					
03430150	531.0	89534.					
	533.5	91600.	.02299	2.26	.138		443
03430151	534.0	292786.					
03430151	534.0	292786.					
	534.0	292786.	.07348	.00	.441		444
03430152	535.0	300634.					
03430153	533.0	297509.					
	534.0	299071.	.08100	.52	.486	S	.081 STD
03430154	534.0	110510.					
03430155	529.0	115343.					
	531.5	112926.	.03058	2.14	.184		445

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03440129	538.0	358025.					
03440130	538.0	336973.					
	538.0	347499.	.08100	3.03	.486	S	.081 STD
03440131	551.0	74396.					
03440132	557.0	62853.					
	554.0	68624.	.01600	8.41	.096		DR5-2A
03440133	536.0	232837.					
03440134	523.0	233698.					
	529.5	233267.	.05437	.18	.326		DR5-3A
03440135	522.0	338106.					
03440136	527.0	340820.					
	524.5	339463.	.07913	.40	.475		DR5-4A
03440137	531.0	296764.					
03440138	524.0	303946.					
	527.5	300355.	.08100	1.20	.486	S	.081 STD
03440139	531.0	798046.					
03440140	533.0	810211.					
	532.0	804378.	.21693	.73	1.302		DR5-5A
03440141	539.0	23274.					
03440142	538.0	17175.					
	538.5	20224.	.00545	15.08	.033		H-1
03440143	NO PEAK						
03440144	NO PEAK						
	.0		.00000$$$$$$$$		.000		H-2
03440145	551.0	277171.					
03440146	548.0	289580.					
	549.5	283375.	.08100	2.19	.486	S	.081 STD
03440147	549.0	63313.					
03440148	549.0	58777.					
	549.0	61045.	.01745	3.72	.105		H-3
03440149	534.0	257994.					
03440150	539.0	225050.					
	536.5	241522.	.06904	6.82	.414		H-4
03440151	535.0	571507.					
03440152	528.0	578436.					
	531.5	574971.	.16435	.60	.986		H-5

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03440153	522.0	331398.					
03440154	519.0	329837.					
	520.5	330617.	.08100	.24	.486	S	.081 STD
03440155	517.0	220930.					
03440156	515.0	217729.					
	516.0	219329.	.05373	.73	.322		H-6
03440157	518.0	9172106.					
03440158	515.0	9591184.					
	516.5	9381686.	2.29848	2.23	13.791		DR-1B
03440159	518.0	20580.					
03440160	NO PEAK						
	259.0	10290.	.00252	100.00	.015		DR-2B
03440161	521.0	329107.					
03440162	521.0	332388.					
	521.0	330747.	.08100	.50	.486	S	.081 STD
03440163	NO PEAK						
03440164	NO PEAK						
	.0		.00000$$$$$$$$$		.000		DR-3B
03440165	NO PEAK						
03440166	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		DR-4B
03440167	524.0	5539590.					
03440168	524.0	5493128.					
	524.0	5516359.	1.35096	.42	8.106		DR-5B
03440169	526.0	351775.					
03440170	530.0	330625.					
	528.0	341200.	.08100	3.10	.486	S	.081 STD
03440171	528.0	392787.					
03440172	530.0	366440.					
	529.0	379613.	.09012	3.47	.541		DR-6B
03440173	NO PEAK						
03440174	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		DR-7B
03440175	535.0	76419.					
03440176	535.0	81249.					
	535.0	78834.	.01871	3.06	.112		481
03440177	532.0	271935.					
03440178	532.0	270370.					
	532.0	271402.	.08100	.19	.486	S	.081 STD
03440179	536.0	67924.					
03440180	536.0	68661.					
	536.0	68292.	.02038	.54	.122		482
03440181	536.0	68862.					
03440182	536.0	65340.					
	536.0	67101.	.02003	2.62	.120		483
03440183	534.0	63603.					
03440184	543.0	68035.					
	538.5	65819.	.01964	3.37	.118		484

03440185	538.0	228154.					
03440186	535.0	220579.					
	536.5	224366.	.08100	1.69	.486	S .081	STD
03440187	533.0	76809.					
03440188	536.0	79773.					
	534.5	78291.	.02826	1.89	.170	485	
03440189	536.0	62190.					
03440190	532.0	61895.					
	534.0	62042.	.02240	.24	.134	470	
03440191	536.0	74181.					
03440192	533.0	70451.					
	534.5	72316.	.02611	2.58	.157	471	
03440193	531.0	252888.					
03440194	534.0	224047.					
	532.5	238467.	.08100	6.05	.486	S .081	STD
03440195	541.0	64408.					
03440196	538.0	73620.					
	539.5	69014.	.02344	6.67	.141	472	
03440197	533.0	71200.					
03440198	538.0	66649.					
	535.5	68924.	.02341	3.30	.140	473	
03440199	536.0	67797.					
03440100	536.0	63471.					
	536.0	65634.	.02229	3.30	.134	474	
03440101	534.0	243912.					
03440102	537.0	244205.					
	535.5	244058.	.08100	.06	.486	S .081	STD
03440103	535.0	55256.					
03440104	536.0	51520.					
	535.5	53388.	.01772	3.50	.106	475	
03440105	538.0	68129.					
03440106	540.0	63910.					
	539.0	66023.	.02191	3.19	.131	476	
03440107	544.0	65260.					
03440108	543.0	69801.					
	543.5	67530.	.02241	3.36	.134	477	

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03450201	531.0	283272.					
03450202	531.0	277023.					
	531.0	280147.	.08500	1.12	.510	S	.081 STD
03450203	540.0	76231.					
03450204	537.0	80461.					
	538.5	78346.	.02377	2.70	.143		478
03450205	534.0	101422.					
03450206	530.0	103375.					
	532.0	102398.	.03107	.95	.186		479
03450207	525.0	76619.					
03450208	525.0	78545.					
	525.0	77582.	.02354	1.24	.141		480
03450209	525.0	267147.					
03450210	522.0	283533.					
	523.5	275340.	.08500	2.98	.510	S	.081 STD
03450211	529.0	74584.					
03450212	526.0	75953.					
	527.5	75268.	.02324	.91	.139		486
03450213	532.0	62512.					
03450214	528.0	57411.					
	530.0	59961.	.01851	4.25	.111		487
03450215	529.0	77642.					
03450216	526.0	85358.					
	527.5	81500.	.02516	4.73	.151		488
03450217	527.0	276943.					
03450218	524.0	251089.					
	525.5	264016.	.08500	4.90	.510	S	.081 STD
03450219	531.0	67264.					
03450220	527.0	70549.					
	529.0	68906.	.02218	2.38	.133		489
03450221	524.0	71854.					
03450222	530.0	72724.					
	527.0	72289.	.02327	.60	.140		490
03450223	534.0	73391.					
03450224	527.0	70093.					
	530.5	71742.	.02310	2.30	.139		491

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03450225	520.0	276753.					
03450226	531.0	265121.					
	529.5	270937.	.08100	2.15	.486	S	.081 STD
03450227	523.0	76926.					
03450228	523.0	77615.					
	523.0	77270.	.02310	.45	.139		492
03450229	527.0	72033.					
03450230	526.0	54544.					
	526.5	63288.	.01892	13.82	.114		493
03450231	525.0	52685.					
03450232	523.0	57770.					
	524.5	55227.	.01651	4.60	.099		494
03450233	521.0	233391.					
03450234	527.0	245950.					
	524.0	229649.	.08100	2.65	.486	S	.081 STD
03450235	534.0	59464.					
03450236	528.0	70976.					
	531.0	70220.	.02373	1.08	.142		495
03450237	535.0	62001.					
03450238	535.0	61495.					
	535.0	62148.	.02101	1.05	.126		496
03450239	532.0	65752.					
03450240	531.0	68769.					
	531.5	67560.	.02294	1.20	.137		497

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03450241	532.0	286043.					
03450242	538.0	256861.					
	535.0	271452.	.08100	5.38	.486	S	.081 STD
03450243	542.0	115217.					
03450244	539.0	82746.					
	540.5	98981.	.02954	16.40	.177		498
03450245	543.0	75382.					
03450246	553.0	80084.					
	548.0	77733.	.02320	3.02	.139		499
03450247	557.0	74164.					
03450248	560.0	71569.					
	558.5	72866.	.02174	1.78	.130		500
03450249	555.0	263721.					
03450250	552.0	268298.					
	553.5	266009.	.08100	.86	.486	S	.081 STD
03450251	559.0	70321.					
03450252	562.0	64333.					
	560.5	67327.	.02050	4.45	.123		501
03450253	567.0	73688.					
03450254	566.0	71672.					
	566.5	72680.	.02213	1.39	.133		502
03450255	558.0	62854.					
03450256	557.0	65726.					
	557.5	64290.	.01958	2.23	.117		503
03450257	553.0	303845.					
03450257	553.0	303845.					
	553.0	303845.	.08100	.00	.486	S	.081 STD*
03450258	562.0	89966.					
03450259	558.0	85203.					
	560.0	87584.	.02335	2.72	.140		504
03450260	558.0	74814.					
03450261	555.0	71721.					
	556.5	73267.	.01953	2.11	.117		505
03450262	553.0	66067.					
03450263	556.0	72520.					
	554.5	69293.	.01847	4.66	.111		506
03450264	551.0	282156.					
03450265	554.0	281116.					
	552.5	281636.	.08100	.18	.486	S	.081 STD
03450266	558.0	75554.					
03450267	552.0	78534.					
	555.0	77044.	.02216	1.93	.133		507
03450268	559.0	86278.					
03450269	558.0	81673.					
	558.5	83975.	.02415	2.74	.145		508
03450270	557.0	83649.					
03450271	557.0	82030.					
	557.0	82539.	.02374	.62	.142		509

03450264	551.0	282156.					
03450265	554.0	281116.					
	552.5	281636.	.08100	.10	.486	S	.081 STD*
03450272	558.0	73551.					
03450273	559.0	73869.					
	558.5	73720.	.02120	.23	.127		510
03450274	557.0	69634.					
03450275	555.0	63813.					
	556.0	66723.	.01919	4.36	.115		511
03450276	556.0	81494.					
03450277	552.0	85707.					
	554.0	83600.	.02404	2.52	.144		512

03450278	549.0	306734.					
03450279	552.0	302569.					
	550.5	304621.	.08100	.69	.486	S	.081 STD
03450280	550.0	76138.					
03450281	555.0	73655.					
	552.5	74896.	.01992	1.66	.119		513
03450282	552.0	72750.					
03450283	555.0	72458.					
	553.5	72604.	.01931	.20	.116		514
03450284	556.0	86373.					
03450285	550.0	83376.					
	553.0	84874.	.02244	4.74	.135		515

03450286	547.0	230553.					
03450287	553.0	296205.					
	550.0	298379.	.08100	.73	.486	S	.081 STD
03450288	NO PEAK						
03450289	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		20A(<.02)
03450290	NO PEAK						
03450291	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		21(<.02)
03450292	NO PEAK						
03450293	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		22(<.02)

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03460197	488.0	361905.					
03460198	485.0	356955.					
	486.5	359430.	.08100	.69	.486	S	.081 STD
03460199	NO PEAK						
03460100	NO PEAK						
	.0		.00000$$$$$$$$$		.000		23
03460101	468.0	11174.					
03460102	NO PEAK						
	234.0	5587.	.00126	100.00	.000		24

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03460104	498.0	364469.					
03460104	498.0	364469.					
	498.0	364469.	.08100	.00	.486	S	.081 STD*
03460105	NO PEAK						
03460106	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		26(<.02)
03460107	NO PEAK						
03460108	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		28(<.02)
03460109	NO PEAK						
03460110	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		29(<.02)
03460111	498.0	272630.					
03460112	492.0	277210.					
	495.0	274920.	.08100	.03	.486	S	.081 STD
03460113	NO PEAK						
03460114	467.0	11286.					
	233.5	5643.	.00166	100.00	.010		30
03460115	470.0	35115.					
03460116	474.0	17212.					
	472.0	26163.	.00771	34.21	.046		31
03460117	481.0	13471.					
03460118	482.0	9930.					
	481.5	11700.	.00345	15.13	.021		32
03460119	497.0	172118.					
03460120	494.0	194901.					
	495.5	183509.	.08100	6.21	.486	S	.081 STD
03460121	477.0	14017.					
03460122	475.0	18296.					
	476.0	16156.	.00713	13.24	.043		33
03460123	462.0	11159.					
03460124	NO PEAK						
	231.0	5579.	.00246	100.00	.015		34
03460125	486.0	7136250.					
03460126	490.0	7105879.					
	488.0	7121065.	3.14320	.21	18.859		H START

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS	
03460201	487.0	174059.				
03460202	501.0	231226.				
	494.0	202643.	.08100	14.11	.486	S .081 STD
03460203	517.0	2517.				
03460204	NO PEAK					
	258.5	1258.	.00050	100.00	.003	35(<.02)
03460205	NO PEAK					
03460206	NO PEAK					
	.0	.	.00000$$$$$$$$$		.000	36(<.02)
03460207	NO PEAK					
03460208	NO PEAK					
	.0	.	.00000$$$$$$$$$		.000	37(<.02)
03460211	NO PEAK					
03460212	NO PEAK					
	.0	.	.00000$$$$$$$$$		.000	38(<.02)
03460213	NO PEAK					
03460214	NO PEAK					
	.0	.	.00000$$$$$$$$$		.000	39A(<.02)
03460215	NO PEAK					
03460216	481.0	4435.				
	240.5	2217.	.00089	100.00	.005	40(<.02)

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03460217	503.0	247891.					
03460218	507.0	253047.					
	505.0	250469.	.08100	1.03	.486	S	.081 STD
03460219	NO PEAK						
03460220	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		41(<.02)
03460221	NO PEAK						
03460222	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		42A
03460223	NO PEAK						
03460224	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		43(<.02)
03460225	506.0	227352.					
03460226	506.0	271633.					
	506.0	249492.	.08100	8.87	.486	S	.081 STD
03460227	NO PEAK						
03460228	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		44
03460229	NO PEAK						
03460230	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		45
03460231	NO PEAK						
03460232	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		46(<.02)
03460233	504.0	235069.					
03460234	504.0	230032.					
	504.0	232550.	.08100	1.08	.486	S	.081 STD
03460235	NO PEAK						
03460236	483.0	10099.					
	241.5	5049.	.00176	100.00	.011		47
03460237	485.0	7356.					
03460238	NO PEAK						
	242.5	3678.	.00128	100.00	.008		48
03460239	NO PEAK						
03460240	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		49
03460241	501.0	213855.					
03460242	504.0	202670.					
	502.5	208262.	.08100	2.69	.486	S	.081 STD
03460243	NO PEAK						
03460244	NO PEAK						
	.0		.00000$$$$$$$$$		.000		50A(<.02)
03460245	481.0	6757.					
03460246	NO PEAK						
	240.5	3378.	.00131	100.00	.008		51
03460247	NO PEAK						
03460248	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		52(<.02)

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03460249     504.0     180397.
03460250     507.0     191917.
             505.5     186157.     .08100      3.09        .486  S    .081 STD
03460251    NO  PEAK
03460252    NO  PEAK
               .0           .     .00000$$$$$$$$$        .000       53(<.02)
03460253    NO  PEAK
03460254    NO  PEAK
               .0           .     .00000$$$$$$$$$        .000       54(<.02)
03460255    NO  PEAK
03460255    NO  PEAK
               .0           .     .00000$$$$$$$$$        .000       55(<.02)*


03460256    NO  PEAK
03460257     505.0     142819.
             252.5      71409.     .08100    100.00        .486  S    .081 STD
03460258    NO  PEAK
03460259    NO  PEAK
               .0                 .00000$$$$$$$$$        .000       56(<.02)
03460260    NO  PEAK
03460261     487.0       6590.
             243.5       3295.     .00374    100.00        .022       57(<.02)
0#460262    NO  PEAK
03460263    NO  PEAK
               .0           .     .00000$$$$$$$$$        .000       58(<.02)


03460264     504.0     158768.
03460265     506.0     176418.
             505.0     167593.     .08100      5.27        .486  S    .081 STD
03460266    NO  PEAK
03460267    NO  PEAK
               .0                 .00000$$$$$$$$$        .000       60(<.02)
03460268    NO  PEAK
03460269    NO  PEAK
               .0                 .00000$$$$$$$$$        .000       60A
03460270     476.0       8548.
03460271    NO  PEAK
             238.0       4274.     .00207    100.00        .012         60B

 RUN  #    RET TIME     AREA      UGRAM/ML  % STD DEV   UGRAMS


03460273     497.0     266219.
03460274     490.0     287336.
             493.5     276777.     .08100      3.81        .486  S    .081 STD
03460275    NO  PEAK
03460276    NO  PEAK
               .0           .     .00000$$$$$$$$$        .000       60C(<.02)
03460277    NO  PEAK
03460278    NO  PEAK
               .0           .     .00000$$$$$$$$$        .000       60D(<.02)
03460279    NO  PEAK
03460280    NO  PEAK
               .0           .     .00000$$$$$$$$$        .000         60E(<.02)
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RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03460281	491.0	194106.					
03460282	491.0	143359.					
	491.0	168732.	.00100	15.04	.486	S	.081 STD
03460283	NO PEAK						
03460284	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		1(<.02)
03460285	NO PEAK						
03460286	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		4(<.02)
03460287	NO PEAK						
03460288	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		5(<.02)
03460289	NO PEAK						
03460290	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		6(<.02)
03460291	484.0	170119.					
03460292	487.0	192807.					
	485.5	181463.	.00100	6.25	.486	S	.081 STD
03460293	NO PEAK						
03460294	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		7B(<.02)
03460295	NO PEAK						
03460296	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		8(<.02)
03460297	NO PEAK						
03460298	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		10(<.02)
03460297	NO PEAK						
03460298	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		10(<.02)*
03460299	517.0	160771.					
03460200	515.0	132480.					
	516.0	146625.	.00100	9.65	.486	S	.081 STD
03460201	NO PEAK						
03460202	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		11(<.02)
03460203	NO PEAK						
03460204	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		11A(<.02)
03460205	NO PEAK						
03460206	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		304(<.02)

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03470113	504.0	157561.					
03470114	499.0	186369.					
	501.0	171965.	.00100	8.38	.496	S	.001 STD
03470115	NO PEAK						
03470116	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		305(<.02)
03470117	NO PEAK						
03470118	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		306(<.02)
03470119	NO PEAK						
03470120	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		307(<.02)
03470121	512.0	200151.					
03470122	515.0	176825.					
	513.5	188488.	.00100	6.19	.496	S	.001 STD
03470123	NO PEAK						
03470124	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		308(<.02)
03470125	509.0	6184977.					
03470126	508.0	6142888.					
	508.5	6163933.	2.64886	.34	15.893		309

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03470127	512.0	203355.					
03470128	509.0	205769.					
	510.5	204562.	.08100	.59	.486	S	.081 STD
03470129	NO PEAK						
03470130	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		310(<.02)
03470131	NO PEAK						
03470132	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		311(<.02)
03470133	NO PEAK						
03470134	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		312(<.02)
03470135	511.0	214396.					
03470136	508.0	180730.					
	509.5	197563.	.08100	8.52	.486	S	.081 STD
03470137	NO PEAK						
03470138	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		313(<.02)
03470139	NO PEAK						
03470140	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		314(<.02)
03470141	NO PEAK						
03470142	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		315(<.02)
03470143	508.0	215759.					
03470144	510.0	211602.					
	509.0	213680.	.08100	.97	.486	S	.081 STD
03470145	NO PEAK						
03470146	NO PEAK						
	.0		.00000$$$$$$$$$		.000		316(<.02)
03470147	NO PEAK						
03470148	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		317(<.02)
03470149	NO PEAK						
03470150	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		2B(<.02)
03470151	507.0	207886.					
03470152	507.0	194673.					
	507.0	201279.	.08100	3.26	.486	S	.081 STD
03470153	NO PEAK						
03470154	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		3(<.02)
03470155	NO PEAK						
03470156	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		318(<.02)
03470157	NO PEAK						
03470158	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		319(<.02)

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03470159     507.0     196784.
03470160     513.0     140602.
             510.0     168693.     .08100     16.65       .486  S    .081 STD
03470161    NO  PEAK
03470162    NO  PEAK
               .0          . .    .00000$$$$$$$$$       .000       320(<.02)
03470163    NO  PEAK
03470164    NO  PEAK
               .0          .      .00000$$$$$$$$$       .000       321(<.02)
03470165    NO  PEAK
03470166    NO  PEAK
               .9          .      .00000$$$$$$$$$       .000       322(<.02)


03470167     507.0     219164.
03470168     507.0     183105.
             507.0     201134.     .08100      8.96       .486  S    .081 STD
03470169    NO  PEAK
03470169    NO  PEAK
               .0          .      .00000$$$$$$$$$       .000       323(<.02)*
03470170    NO  PEAK
03470171    NO  PEAK
               .0          .      .00000$$$$$$$$$       .000       324(<.02)
03470172    NO  PEAK
03470173    NO  PEAK
               .0          .      .00000$$$$$$$$$       .000       325(<.02)


03470174     517.0     167905.
03470175     511.0     181328.
             514.0     174616.     .08100      3.84       .486  S    .081 STD
03470176    NO  PEAK
03470177    NO  PEAK
               .0          .      .00000$$$$$$$$$       .000       326(<.02)
03470178     504.0    5128680.
03470179     497.0    5148701.
             500.5    5138691.    2.38370       .19     14.302       327
03470180     506.0      20327.
03470181    NO  PEAK
             253.0      10163.     .00471    100.00       .028         328*
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RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03480102	492.0	168189.					
03480103	493.0	183409.					
	492.5	175799.	.08100	4.33	.486	S	.081 STD
03480104	NO PEAK						
03480104	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		338(<.02)*
03480105	NO PEAK						
03480106	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		339(<.02)
03480107	NO PEAK						
03480108	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		328,2X(<.02)
03480109	491.0	316615.					
03480110	491.0	235990.					
	491.0	301306.	.08100	5.08	.486	S	.081 STD
03480111	NO PEAK						
03480112	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		34,2X(<.02)
03480113	NO PEAK						
03480114	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		338,2X(<.0

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03490110	506.0	172541.					
03490110	506.0	172541.					
	506.0	172541.	.08100	.00	.486	S	.081 STD
03490111	NO PEAK						
03490112	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		H-1
03490113	504.0	64406.					
03490114	502.0	54154.					
	503.0	59280.	.02783	8.65	.167		408A

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03490139	503.0	279430.					
03490140	506.0	280151.					
	504.5	279810.	.00100	.14	.486	S	.001 STD
03490141	509.0	35316.					
03490142	512.0	29962.					
	510.5	32139.	.00930	9.09	.056		436
03490143	501.0	95191.					
03490144	506.0	97702.					
	503.5	96981.	.02518	.92	.151		437
03490145	503.0	49800.					
03490146	505.0	48966.					
	504.5	49267.	.01430	.83	.086		438
03490147	507.0	67209.					
03490148	506.0	64964.					
	506.5	66086.	.01913	1.70	.115		439
03490149	502.0	279372.					
03490150	501.0	293465.					
	501.5	286419.	.00291	2.46	.497		440
03490151	501.0	100445.					
03490152	502.0	87641.					
	501.5	94043.	.02722	6.81	.163		441
03490153	501.0	265017.					
03490154	507.0	253994.					
	504.0	259505.	.00100	2.12	.406	S	.001 STD
03490155	505.0	84173.					
03490156	501.0	92939.					
	503.0	89056.	.02780	5.40	.167		446
03490157	500.0	230104.					
03490158	499.0	241920.					
	499.5	236062.	.07365	2.48	.442		447
03490159	497.0	226750.					
03490160	498.0	211102.					
	497.5	218926.	.06833	.83	.410		455

RUN #	RET TIME	AREA	UGRAM/ML	% STD DEV	UGRAMS		
03500101	465.0	180323.					
03500102	465.0	170723.					
	465.0	175523.	.08100	2.73	.486	S	.081 STD
03500103	NO PEAK						
03500104	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		340(<.02)
03500105	NO PEAK						
03500106	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		341(<.02)
03500107	450.0	4134282.					
03500108	451.0	3534241.					
	450.5	3834261.	1.76943	7.82	10.617		342
03500109	459.0	211869.					
03500110	456.0	209915.					
	457.5	210892.	.08100	.46	.486	S	.081 STD
03500111	NO PEAK						
03500112	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		343(<.02)
03500113	NO PEAK						
03500114	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		344(<.02)
03500115	NO PEAK						
03500116	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		345(<.02)
03500117	461.0	320812.					
03500118	462.0	319329.					
	461.5	320070.	.08100	.23	.486	S	.081 STD
03500119	NO PEAK						
03500120	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		346(<.02)
03500121	NO PEAK						
03500122	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		347(<.02)
03500123	NO PEAK						
03500124	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		348(<.02)
03500125	464.0	267874.					
03500126	464.0	301859.					
	464.0	284866.	.08100	5.97	.486	S	.081 STD
03500127	NO PEAK						
03500128	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		349(<.02)
03500129	NO PEAK						
03500130	NO PEAK						
	.0	.	.00000$$$$$$$$$		.000		350(<.02)
03500131	459.0	5858374.					
03500132	454.0	6141524.					
	456.5	5999949.	1.70605	2.36	10.236		351

03500133	460.0	365425.					
03500134	463.0	291645.					
	461.5	328535.	.08100	11.23	.486	S	434
03500135	461.0	105633.					
03500136	460.0	105371.					
	460.5	105502.	.02601	.13	.156		434
03500137	460.0	98267.					
03500138	458.6	98573.					
	459.0	98420.	.02427	.15	.146		405
03500139	457.0	181575.					
03500140	458.0	144339.					
	457.5	162957.	.04018	11.43	.241		401A
03500141	464.0	263443.					
03500142	464.0	257479.					
	464.0	260461.	.08100	1.15	.486	S	.081 STD
03500143	NO PEAK						
03500144	NO PEAK						
	.0	.	.00000********		.000		12B
03500145	454.0	2770527.					
03500146	456.0	2812506.					
	455.0	2791516.	.86813	.75	5.209		BEFORE RIN

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