Dan G.

Chevron Pipe Line Company
4800 Fournace Place
Bellaire, TX 77401
713/432-6000

February 2, 2012

VIA OVERNIGHT DELIVERY

Walter L. Baker, P.E.
Executive Secretary
DIVISION OF WATER QUALITY
Utah Department of Environmental Quality
195 North 1950 West
Salt Lake City, UT 84114

Re: CPL's Response to DWQ Review Comments, NOV Docket No. 110-01

Dear Mr. Baker:

Please find attached the response of Chevron Pipe Line Company ("CPL") to the Review Comments; Chevron 2nd Response to Notice of Violation & Order Docket No. 110-01, dated March 17, 2011, pertaining to the Red Butte spill. CPL appreciates the opportunity to submit this Response while reserving its right to contest any Findings of Fact and Alleged Violations. CPL further reserves its right to submit a Request for Agency Action with the Division of Water Quality in the event that CPL is unable to amicably resolve this matter. CPL looks forward to meeting with you and your staff to provide any additional information or to address any concerns DWQ may have regarding the attached Response or the Red Butte spill.

Please do not hesitate to contact me with any questions.

Very truly yours,

Terry Duhon
Vice President

CDG:bwt
Enclosure
cc: Jeffrey Cosgray, CPL
Denise Chancellor, AG's Office
Craig D. Galli, Holland & Hart LLP

Response of Chevron Pipe Line Company to
Review Comments; Notice of Violation and Order
Issued by the Utah Water Quality Board
Docket No. I10-01

Chevron Pipe Line Company (CPL) respectfully submits this response to the *Review Comments; Chevron 2nd Reponses to Notice of Violation Docket # I10-01* as provided by the Division of Water Quality (DWQ) on March 17, 2011 (herein referenced as "DWQ Comments") and the *Request for Human Health Risk Assessment for Red Butte Creek and Jordan River, Salt Lake City, Utah* as provided by the DWQ on June 8, 2011. CPL has met with DWQ on multiple occasions to discuss the DWQ Comments and Human Health Risk Assessment (HHRA) related activities. During the initial meeting that was conducted on April 12, 2011, it was agreed that an iterative approach would be taken to help ensure a comprehensive and complete response to the NOV. To help achieve this goal, the information included herein was initially provided to DWQ personnel in draft format for review and discussion prior to this formal submittal. CPL appreciates DWQ's efforts and support in this regard and trusts that the responses presented herein will be deemed complete and adequate resulting in closure of the Notice of Violation.

1. ***Initiate all action required to come into compliance*** *- DWQ concurs that Chevron has taken appropriate actions to date to come into compliance with all applicable provisions of the Utah Water Quality Act and Water Quality rules. Further work remains in the areas of long term monitoring and future cleanup actions (comments included below).*

   CPL Response:
   No response necessary. Additional information regarding the long-term monitoring and additional cleanup actions is presented in response to DWQ Comments 4 and 5 herein.

2. ***Immediately cease and desist all unpermitted discharges*** *- DWQ concurs that Chevron has taken appropriate actions to cease and desist all unpermitted discharges to date. There are still remaining source areas of oil in the creek from sediment and bank deposition areas that will need to be cleaned up in the future. DWQ requests that Chevron formally commit to such activity as a part of this response.*

   CPL Response:
   Chevron has previously committed to address any remaining source areas.

3. ***Submit to the Executive Secretary, a report which includes, but is not limited to a description of the following:***
   a) ***The initial release incident and Chevron's response*** *- CPL provides general analytical data from the source well field that shows the composition of the oil is variable. Neither the CPL nor Coast Guard data provide a complete characterization of the spilled oil as required, especially with regards to polycyclic aromatic hydrocarbons. Chevron should add text that clearly describes the available data, why obtaining the requested data is not*

available, additional information regarding any additives, and a discussion of the limitations of the data provided.

CPL Response:

At the time of the release the pipeline was carrying approximately 18% wax (blend of Myton and Gypsum) and 82% Weber Sands (Rangely Crude). Although a sample of the released crude oil was not collected, details regarding the compositional breakdown of the various crudes from Rangely and Myton/Gypsum Hills can be found in the analysis included as Annex A. The data for these crudes should be fairly consistent with the crude released. Also included in Annex A is a United States Coast Guard Marine Safety Lab Analysis performed for samples collected at the spill site near Red Butte Gardens and Liberty Park Pond.

DWQ personnel have requested clarification as to why CPL does not have more detailed information regarding the hazardous properties of the crude oil received at the refinery as part of "routine" operations. To respond to this, one must understand that the routine operation of a pipeline, or other transportation methods that involve crude oil, does not require the same knowledge of constituents that would be required when the material is inadvertently released and becomes a waste. As with many other products, there is an MSDS for the crude oil that provides the necessary properties, safety precautions, proper PPE, along with an abbreviated list of hazardous chemicals that are part of the oil. An MSDS for Rangely Crude is included in Annex A. In the case of Rangely Crude, the most common hazardous chemical property that would be on the MSDS is benzene. Other characteristics identified in the MSDS include flammability, corrosivity and other important information relevant to the safe handling of the material. However, the routine operation of a pipeline is to transport oil to either storage facilities or, as is the case with the Rangely to Salt Lake Crude Oil Pipeline System, to a refinery. Once at the refinery facility, there are certain properties that are monitored and managed to allow the introduction of crude oil into storage tanks or to the refinery crude unit, the first step to becoming a refined product. Critical properties and chemicals that must be monitored are:

- Benzene, which must be monitored for compliance with the Benzene Waste Operations under the National Environmental Standards for Hazards Air Pollutants (NESHAPS). This rule is identified as the Benzene Waste Operations NESHAPs (BWON) rule. *See* 40 CFR part 61 subpart FF.

- Sulfur content for planning purposes for processing through the Low Sulfur Diesel Unit at the refinery.

- The only other required analyses for refinery operating purposes include API gravity, boiling point, distillation properties, and pour point.

In other words, refineries have no need to monitor on a regular basis the breakdown of volatile and semi-volatile constituents that would become a concern if the material is handled as a waste. The Salt Lake Refinery maintains five 60,000 barrel crude oil tanks

that receive oil from throughout the region either through pipelines or trucks. Many of these oils are blended as they are pumped to the crude tanks for distribution to the crude oil process unit.

CPL does occasionally analyze the crude oil and various products produced from it for volatile and semi-volatile organics, metals and other standard analytes. These tests are compiled as library samples for comparison, if the need arises to look into these specific constituents. But routine sampling of these constituents is by no means a regular occurrence as it is not part of the routine operation of the pipeline or refinery, and is not required by law.

In the *Red Butte Creek Crude Oil Spill - Water, Sediment and Macro-invertebrate Sampling Plan* (see response to DWQ Comment 4.c), CPL proposed to collect and analyze four Rangely Crude (Weber Sands Mix) oil samples. The samples were collected over a ten week period between September 20, 2011 and November 30, 2011. The samples were collected from CPL's Salt Lake Station while oil was being delivered from the same, long-term producing oil field that was being shipped when the June 11, 2010 release occurred and are considered to be a representation of the oil that was previously released. The results of the four crude oil samples are presented in Annex A.

b) ***An estimate of oil released and supporting calculation*** – *No further information is required on this item.*

CPL Response:
No response necessary.

c) ***Chevron's cleanup activities for all waters of the state...*** - *This section is still incomplete. DWQ requested in the 11-8-10 review of Chevron's first response two areas for further information; 1) Chevron must provide detailed sub-parts of its cleanup actions to fully complete the record of actions it has undertaken. The resulting product should contain a detailed historical, record of Chevron's cleanup activities and supporting analytical work. Significantly more detailed descriptions appear to exist from the various cleanup plan elements considered by Unified Command (UC) supervised actions: An example includes the detailed site plan for the spill site, related soil sampling, and excavation activities. Chevron must document all analytical results it obtained as a part of these UC actions in the Cleanup Action Report. 2) Several Shoreline Cleanup Assessment Technique (SCAT) reviews have been performed during cleanup actions to date. Reports that document observations and locations from these reviews should be included in the Cleanup Action Report. A second cleanup activity that should included similarly is the extensive stream washing activities that Chevron conducted on Red Butte Creek Chevron should supply these detailed sub-part~ of the cleanup actions to fully complete the record of actions undertaken, The resulting product should be a detailed historical record of the cleanup activities and supporting analytical work.*

Chevron's 1-17-11 submittal contained adequate information regarding the SCAT surveys that have been performed to date. However, no information was received in the subject submittal that described the extensive stream washing activities that Chevron undertook shortly after the spill. Further, detail regarding the cleanup and restoration at the initial release site, Mt Olivet Cemetery, Liberty Park, and several intermediate creek sites is needed.

Chevron's response should include a detailed description of cleanup efforts that include; 1) stream washing activities conducted, 2) cleanup efforts completed at Mt. Olivet Cemetery, Liberty Park, and intermediate creek sites (Garden Park Ward, 1096 South 1100 East utility pole cleanup, Redmond/Harvard property, and the Hayes Property as examples.)

The final SCAT Summary is scheduled for submission with the next Quarterly Report as requested.

CPL Response:
Concise, non-technical summaries of the activities completed to date are provided in Annex B for the SCAT surveys (including the stream washing activities), Red Butte Spill Site, Liberty Park, Mt. Olivet Cemetery, Garden Park Ward, 1096 South 1100 East utility pole cleanup, Remund/Harvard Property, and the Hayes Property. More detailed technical reports with figures, lab certificates, drawings, photographs and other engineering information are being developed. These technical reports will be submitted to the DWQ upon completion of all final activities.

d) The proper and appropriate disposal of wastes associated with the release... *- The documentation is complete up to the point when CPL submitted it. This documentation will need to be updated and changed until all cleanup is completed.*

CPL Response:
No response necessary. Updated waste management documents are provided in quarterly reports.

4. Submit to the Executive Secretary a plan for establishing the extent of the area impacted by the release, to include at a minimum:

a) A report on the impact of the release

i. Air Quality - The Division of Air Quality (DAQ) has reviewed the monitoring logs provided by RMEC. DAQ compared the results of the sampling to exposure threshold limit values prepared by the American Conference of Governmental Industrial Hygienists (ACGIH). The sampling showed no persistent release of air emissions above the recommended level for the control of health hazards established by ACGIH for the limited number of chemical constituents reported. Please have the response contain a discussion about the screening criteria for the

sampled pollutants and a discussion about the impacts to human health. To meet the requirements for reporting the impacts contained in this section, we ask that CPL include a statement that indicates what screening levels were used to evaluate the impacts of air pollutants and how sampling demonstrates that the screening criteria was achieved.

CPL Response:

Air monitoring was conducted by RMEC Environmental Inc. during cleanup operations. This monitoring was conducted from June 16 to 23, 2010, and again between July 6 and July 18, 2010. Air sampling methods included:

- Real time air monitoring with a Photoionization Detector (PID) for benzene and mixed volatile organic hydrocarbons (VOC); and
- Integrated air monitoring using 3M passive organic vapor monitors (POVM) for petroleum constituent species (benzene, toluene, ethyl benzene, xylene, and total hydrocarbons).

Reports presenting the results of the monitoring activities are included in Annex C. Table 1, also presented in Annex C, provides a summary of the ranges of chemical concentrations from these reports, the laboratory limits of detection, and their respective screening levels.

The air monitoring results have been presented to and discussed with the DAQ and the Salt Lake Valley Health Department (SLVHD). To CPL's knowledge, neither of these agencies have raised concerns about the monitoring activities that were performed or the associated results.

As described herein, the monitoring results do not suggest that workers involved in the cleanup or the general public were exposed to chemical concentrations resulting from the release or cleanup operations that would be detrimental to human health. Results from the air sampling have been compared with appropriate regulatory values or "screening levels."

In the case of workers involved in the cleanup of the petroleum release, the results have been compared with the Permissible Exposure Limit (PEL). The PEL is a regulatory enforceable limit, which represents an 8 hour time weighted average (TWA) to which nearly all workers can be exposed 8 hours per day, 40 hours per week for a working lifetime without expectation of adverse health outcomes. These values assume potential exposures to otherwise healthy, adult employees. The five personnel samples taken using passive monitors are appropriate for comparison to the PEL based on regulatory standards and industry practice. In all cases, these results were below their respective PEL. This indicates that workers involved in the cleanup efforts would not be expected to suffer adverse health outcomes via inhalation, even without regard for further reductions in actual exposure based on the use of respiratory protective

equipment. Dermal exposure also appears to have been adequately controlled through the use of appropriate personal protective equipment (PPE).

In the case of potential exposure to the general public, several screening levels were considered. "Screening Levels," as defined by the EPA and the Agency for Toxic Substances and Disease Registry (ATSDR), are not considered levels indicating potential adverse health outcomes, but rather levels which are considered to be "safe" and therefore removed from further consideration related to cleanup or remediation efforts. There are several published screening levels related to indoor air, outdoor air, long-term/chronic exposures, intermediate exposures (>14 days but less than one year) and acute exposures (<14 days). Based on the fact that the site was relatively well controlled and potential exposure to the public, if any, would have been over a short duration during the cleanup period, the most appropriate screening level is the acute level (Ref. 3) issued by the ATSDR. Dermal exposure was not considered, as access to the site was controlled and exposure to the public via the dermal route would not be expected.

An appropriate sampling strategy was employed subsequent to the release and during cleanup efforts. Direct reading instruments were used to confirm the presence of specific petroleum chemical constituents, and identify short-term, peak concentrations. As expected in an outdoor environment with continuous air movement, air concentrations dropped below the limit of detection several feet from the surface of the creek.

Similarly, area concentrations and personnel monitoring results from the integrated sampling indicate average worst-case concentrations during the cleanup, and proximate to the source. Any readings taken further from the source in this outdoor environment would have dropped substantially within the first several feet from the source.

Despite the fact that the screening level (ASTDR) was below the limit of detection, given the expected reductions in concentration in public areas surrounding the release, and the fact that health effects from petroleum constituents typically occur from repeated exposure over a period of years, potential negative health outcomes to the public, if any, would be expected to be minimal. It is understood that petroleum odors have been observed in public areas surrounding the release. This does not necessarily indicate that levels that would negatively impact human health have been present, as petroleum odors are typically noticeable at concentrations well below appropriate screening levels.

ii. <u>Water Quality</u> - *DWQ believes that CPL's response on the impacts to water quality is deficient primarily due to a lack of specificity. Including the following action items in the response will provide the necessary specificity.*

1) CPL should review relevant USEPA guidance such as Guidelines for Ecological Risk Assessment (1996), Ecological Risk Assessment Guidance for Superfund (1997), and The Role of Screening-Level Risk Assessments and Refining Contaminants of Concern in Baseline Ecological Risk Assessments (2001). DWQ recommends that CPL provide a screening level ecological risk assessment that addresses both chemical toxicity and physical impacts from the remediation.

The purpose of the screening ecological risk assessment is to provide a general indication of the potential for ecological risk (or lack thereof) and may be conducted for several purposes including: 1) to estimate the likelihood that a particular ecological risk exists, 2) to identify the need for site-specific data collection efforts, or 3) to focus site specific ecological risk assessments where warranted (USEPA, 2001). The level of effort for the assessment must be adequate to support the conclusions. CPL concludes that"... there will be no long term impacts to the physical properties or aquatic biota of the creek" without providing adequate analyses to support this conclusion. Specific deficiencies are noted in the following comments.

2) Please provide a description of potential exposure pathways including an evaluation of exposure pathways that are likely complete. A conceptual site model that graphically illustrates exposure pathways should be constructed and discussed.

3) Please provide a description of the environmental setting for Red Butte Creek, Mt. Olivet Cemetery, Liberty Park Lake, and Jordan River. This includes a description of the receptors potentially affected by the spill.

4) Generic assessment endpoints should be selected and justified.

5) Screening ecotoxicity values should be selected and justified.

6) Data for the impacts of the spill/cleanup on macro invertebrates is available and should be included and discussed.

7) Petroleum Hydrocarbons in Creek/Stream Systems:
a. The description of crude oil is generic and should be based on the crude that was spilled to the extent possible using the data provided in Attachment A.
b. Please indicate what inorganic compounds are likely present in the oil and provide information on what the potential impacts of these compounds have on Red Butte Creek, Mt. Olivet Cemetery, Liberty Park Lake, and Jordan River biota.
c. Please provide additional details on why "It is impractical to evaluate the potential exposure and toxicity of each individual compound in crude oil."

8) Volatility, Solubility, and Toxicity in Aquatic Environments:

a. An evaluation of potential effects to water column biota is completely absent. This omission must be justified or water column biota evaluated.
b. The assessment should differentiate between potential acute and chronic effects. An evaluation of acute effects is appropriate for the non-persistent components and an evaluation of chronic effects appropriate for the more persistent components. The presence of fish post-spill supports that the oil did not render the creek sterile for fish but is insufficient to conclude an absence of long term effects such as impacts to survival, growth, and reproduction of the fish community.
c. No analytical data is presented or discussion of pre-and postcleanup concentrations. This data should be compared to the ecotoxicity values selected.
d. Photo-degradation of polycyclic aromatic hydrocarbons (PAHs) is known to substantially enhance their toxicity. This phenomenon should be discussed and evaluated to the extent possible.

CPL Response:
An Ecological Risk Assessment is being conducted by Environmental Resources Management (ERM) under the supervision and direction of DWQ personnel. A scoping document and schedule for the Ecological Risk Assessment has been prepared and is presented as Annex D. Macro-invertebrate samples were collected from supplemental sample locations during the first (August 2011) sampling event (see response to DWQ Comment 4.c) to provide data to facilitate the Ecological Risk Assessment. A summary to these supplemental sample locations is also presented in Annex D.

iii. *Chevron is correct in that the number of fish to be restocked will be based on these same estimates (from above the spill zone) or baseline conditions. The population estimates UDWR made in 2010 above the release zone was 1,024 fish/mile or 1681bs/surface acre. The Long Term Environmental Monitoring Plan reflects this number in that UDWR will restock 3,000 Bonneville Cutthroat Trout in a three mile stretch of Red Butte Creek in 2011 and 2012 in hopes to get the population over time back to this baseline level.*

In response to a statement made; "According to the Utah Division of Wildlife Resources (UDWR), the number of impacted fish and supporting macro-invertebrates has not been accurately tracked or estimated." As a point of clarification, please rephrase this as; "the number of impacted fish and macroinvertebrates were estimated based on samples taken above the release zone because it was not practical to make estimates of dead fish and macroinvertebrates within the release zone because they were gone/dead and not available to estimate."

The numbers provided in this section reflect the information that was provided in the July 2, 2010 report that USFWS provided to Chevron. However, some of the numbers that Chevron provided are not accurate with our current records.

The information below is accurate with the numbers in USFWS records. Please include the following in Chevron's updated response:

- *Captured -364 birds (this does not include 11 goose eggs, 12 duck eggs , and 5 ducklings)*
- *Washed/Cleaned -361 birds*
- *Released -328 birds*
- *Dead on Arrival -1 bird (this does not include 11 goose eggs, 12 duck eggs , and 5 ducklings)*
- *Euthanized -9 birds*
- *Died -27 birds*

This sentence, "Although detailed counts regarding the number of each species were not available, USFWS personnel estimated that Canada Geese represented approximately 75% of the birds that were captured and also represent the majority of the recorded fatalities" is not accurate. Canada geese did represent approximately75% of the birds that were captured; however, the majority of the recorded fatalities were mallards (27 out of 37 dead adult birds were mallards; this total includes DOA, euthanized, and dead categories).

Please change the text accordingly in Chevron's updated response.

CPL Response:

Impacts to avian wildlife were tracked by the U.S. Fish and Wildlife Service (USFWS) and were reported to the DWQ as follows on February 4, 2011 (the following list has been updated to reflect data obtained after the January 17, 2011 response):

- Captured – 364 birds (this does not include 11 goose eggs, 12 duck eggs, and 5 ducklings)
- Washed/Cleaned – 361 birds
- Released – 328 birds
- Dead on Arrival – 1 bird (this does not include 11 goose eggs, 12 duck eggs, and 5 ducklings)
- Euthanized – 9 birds
- Died – 27 birds

Avian species that were captured reportedly include Mallard Ducks, California Gulls, Canada Geese, and Domestic Geese. Although detailed counts regarding the number of each species were not available, USFWS personnel estimated that Canada Geese represented approximately 75% of the birds that were captured. Mallards represented approximately 73% of recorded fatalities (DOA, euthanized, and dead).

According to the Utah Division of Wildlife Resource (UDWR), the number of impacted fish and macroinvertebrates were estimated based on samples taken above the release zone because it was not practical to make estimates of dead fish and macroinvertebrates within the release zone because they were gone/dead and not available to estimate. Fish restocking/sampling and macroinvertebrate sampling activities, as outlined in the Long-Term Environmental Monitoring Plan, are being or will be performed to help ensure that these populations are restored to estimated baseline conditions. Baseline conditions will be based on population counts conducted upstream of the release zone and/or monitoring performed at comparable sites as prescribed in the *Red Butte Creek Crude Oil Spill - Water, Sediment and Macro-invertebrate Sampling Plan* (see response to DWQ Comment 4.c).

Included as Annex E is a summary of the fish that were collected and euthanized from Liberty Park Lake during November 2010 after the Lake was drained (drainage occurs as part of routine maintenance).

iv. Riparian Vegetation: Comment: Chevron's response provides a general commitment to replanting as needed and addressing access, erosion, or other impacts. Salt Lake City has requested that Chevron's restoration proceed more formally, with City and property owner involvement and approval. While riparian vegetation is not specifically a part of DWQ's NOV, DWQ encourages Chevron to include the following information and descriptions of the "impact of the release" in the updated response, but work directly with Salt Lake City in resolving riparian related issues.

With a comprehensive survey of Red Butte Creek to be done in the Spring/Summer 2011, Chevron must prepare a report that describes all riparian corridor impacts in detail, and provide a detailed work plan and schedule for restoration activities to address the impacts. This report must be submitted to Salt Lake City, as well as affected landowners along the corridor, for review and approval. Chevron must then obtain a Riparian Corridor Permit from Salt Lake City to conduct the restoration activities. Ongoing monitoring will be required to ensure that the restoration activities are successful.

CPL Response:
A detailed Riparian Vegetation Survey Workplan has been prepared and is presented as Annex F.

v. Loss of use of Public Use

Chevron's response is adequate at this time. Complete information should to be supplied at a later time.

CPL Response:
No response necessary.

b) ***Site plans and maps of the area affected by the release*** – *The "Flow Diagram supplement to existing aerial mapping" section is adequate, no further action is required.*

CPL Response:
No response necessary.

c) ***The proposed ongoing environmental monitoring plan*** - *DWQ provided a template for the ongoing environmental monitoring plan in its 11-8-10 review letter. Chevron's 1-17-11 response included narrative that addresses some aspects of the plan, but not a comprehensive ongoing monitoring plan. Chevron must take ownership of this monitoring plan and submit a final plan that fully describes the multi-faceted monitoring that will be undertaken.*

Action Item: Chevron must submit a final comprehensive ongoing environmental monitoring plan. Some of Chevron's statements included in the 1-17-11 response need to include further detail. Please edit the following statements for DWQ approval on this section:

1. Biological testing (benthic macro-invertebrates): Monitoring to be completed by DWQ with participation by Chevron or EarthFax, if desired.

2. Performance of up to four sampling events between now and July 2011: At least 4 quarterly sampling events for water chemistry to capture a complete hydro graph of one year need to be taken. All 4 consecutive events need to meet standards in order to be considered for a final cleanup result.

3. DWQ indicated that the latest round of water and sediment sampling found minimal to no hydrocarbons present: Unfortunately, the DWQ results for the fall sediment sampling that were provided were run with the wrong detection limits. Accordingly, resampling has occurred in February 2011. Results have not been received as of this date.

4. November and December Red Butte Creek inspections found no additional cleanup work to be done: This statement appears inappropriate to DWQ given the ongoing oil source areas that likely emanate from sediment and bank areas of Red Butte Creek. Ongoing sediment and bank soil cleanup actions still need to be acknowledged by Chevron.

5. The aforementioned observations suggest that Red Butte Creek has no long-term impacts from the spill: DWQ does not agree with this statement and believes it should be removed from any monitoring plans or discussion.

6. Therefore, we will compare Red Butte Creek to other urban streams in the Salt Lake City area as an approximate baseline. City Creek, Emigration Creek and Mill Creek are under consideration: Final decisions on reference streams should be made and included in the monitoring plan.

7. Coverage of the annual Red Butte Creek hydrocycle (June 2010 through July 2011) will be attained by performing up to four sampling events by July 2011: At least 4 sampling events must be conducted, and they all have to meet cleanup criteria. Sampling for water, macroinvertebrates, sediment, and bank soil will be collected at different frequencies and dates and meet the cleanup criteria included in the 11-8-10 letter.

CPL Response:
A revised Environmental Monitoring Plan (referenced as the *Red Butte Creek Crude Oil Spill - Water, Sediment and Macro-invertebrate Sampling Plan*) has been prepared and is presented as Annex G.

5. ***Submission of a Long Term Cleanup Action Plan*** *- Chevron's 1-17-11 response made numerous commitments regarding submission of additional reports and information for SCAT work, soils information and restoration plans at several sites, surface staining, and future stream work and permits.*

DWQ appreciates these commitments as stated and would expect them to be incorporated into the Draft Long Term Cleanup Work Plan as outlined in Chevron's 8-23-10 submission (Attachment E). As indicated in DWQ 's 11-8-10 letter, we anticipate Chevron compiling the Long Term Cleanup Action Plan in the next several months utilizing inputs from monitoring results and with input from DWQ. Final submission of this plan should be discussed with DWQ in a future meeting.

Chevron's response does not accurately capture the extent of groundwater monitoring being performed by the City, or commit to long term responsibility of future impacts that may be observed by the City.

1. It is requested that Chevron revise the response regarding groundwater to: 1) Identify that the Salt Lake City will conduct routine groundwater monitoring for potential impacts at wells and springs along the corridor; 2) Note that groundwater impacts, if experienced, may not be observed for many years; and 3) Indicate that if impacts are detected by the City over the long term, Chevron will provide all necessary assessment, and cleanup as warranted, to abate the impact.

2. Regarding Liberty Lake, the document received by DWQ on December 8, 2010 titled "Approved Liberty Lake Confirmation Sampling Plan.pdf" needs to incorporate DWQ's comments from January 20, 2011 in *an email to Harmon/Quintero from Whitehead/Bittner before it will have agency approval for Liberty Lake confirmation sampling.*

CPL Response:
A revised version of the Long-Term Cleanup Work Plan is presented as Annex H.

6. ***Request for Human Health Risk Assessment***

Evaluations of oil-related contaminants to toxicity benchmarks for Red Butte Creek water, sediment, and bank soils are criteria identified in the July 12, 2010 Draft Criteria and Next Steps: Phase I: Cleanup Plan and Phase II Restoration Plan l. Chevron Pipeline is preparing an ecological risk assessment to evaluate the potential impacts of oil-related contaminants to aquatic biota in Red Butte Creek water and sediment. To address the potential human health impacts of residual oil-related contaminants, Chevron is hereby also requested to prepare a human health risk assessment that addresses water, sediment, and bank soils for Red Butte Creek. There is urgency in the timeframe within which this should be completed. Would you please advise me at your earliest convenience what the most expeditious schedule that Chevron can undertake to complete this task. Please provide a schedule for completion of this assessment including a summary of any additional supporting efforts needed in your response.

Chevron should also provide similar assessments for the Jordan River. Specifically, Chevron should provide a determination whether quantitative human health and ecological risk assessments are warranted for the Jordan River. If quantitative assessments are warranted, Chevron should include a schedule for completing these assessments.

CPL Response:

A Human Health Risk Assessment will be conducted for Red Butte Creek by McDaniel Lambert, Inc. under the supervision and direction of DWQ personnel. CPL has proposed, with concurrence from DWQ, to defer the decision to conduct Human Health Risk Assessment for the Jordan River until the Red Butte Creek Assessment is complete. McDaniel Lambert, Inc. also performed the Human Health Risk Assessment for Liberty Park Lake. A scoping document for the Human Health Risk Assessment was previously submitted to DWQ. A copy of the scoping document was previously provided to DWQ.

Supplemental bank soil, sediment, surface water, and macro-invertebrate samples were collected from additional sample locations during the first (August 2011) quarterly sampling event (see response to DWQ Comment 4.d) to provide data for the Human Health Risk Assessment. A summary of these supplemental sample locations is presented in Annex I.

ANNEX LIST
(Annexes provided on attached CD)

Annex A	Crude Oil Description - General compositional breakdown of the various crudes from Rangely and Myton/Gypsum Hills - United States Coast Guard Marine Safety Lab Analysis - Rangely Crude MSDS - Rangely Crude (Weber Sands Mix) Oil Sample Results
Annex B	Non-technical summaries of the activities completed to date - SCAT surveys (including the stream washing activities) - Red Butte Spill Site - Liberty Park - Mt. Olivet Cemetery - Garden Park Ward - 1096 South 1100 East utility pole cleanup - Remund/Harvard Property - Hayes Property
Annex C	Air Monitoring Summary
Annex D	Ecological Risk Assessment - Scoping Document - Schedule - Supplemental Sampling Summary
Annex E	Liberty Park Lake Fish Summary
Annex F	*Riparian Vegetation Survey Work Plan*
Annex G	*Red Butte Creek Crude Oil Spill - Water, Sediment and Macro-invertebrate Sampling Plan*
Annex H	*Long-Term Cleanup Work Plan*
Annex I	Human Health Risk Assessment - Supplemental Sampling Summary

Annex A
Crude Oil Description

- *General compositional breakdown of the various crudes from Rangely and Myton/Gypsum Hills*
- *United States Coast Guard Marine Safety Lab Analysis*
- *Rangely Crude MSDS*
- *Rangely Crude (Weber Sands Mix) Oil Sample Results*

Schlumberger

Stock Tank Oil Analysis

Final Report
Prepared For
Dr. Rama Venkatesan
Chevron

Standard Conditions Used:
Pressure: 14.696 psia
Temperature: 60°F

Prepared by: S. George Mathews
Reviewed: Joseph T. Manakalathil
Schlumberger
Oilphase-DBR
16115 Park Row, Suite 150
Houston, Texas, 77084
(281) 285-6378

Date: January 12, 2011 Report# 200900161

TABLE OF CONTENTS

List of Tables

List of Figures

C30+ Compositional Analysis

High Temperature Gas Chromatography

EXECUTIVE SUMMARY

Objective

The objective of the study was to conduct analyses on stock tank oil sample from multiple fields sent from the Chevron's Briar park lab.

Introduction

Oilphase-DBR was requested by Dr. Rama Venkatesan of Chevron to conduct C30+ compositional analysis as well as generate a paraffin profile to C90+ on four (4) stock tank oils from multiple fields. Following additional discussions with Dr. Venkatesan, the procedures were finalized and tests conducted including Schlumberger's High Temperature Gas Chromatography (HTGC) technique.

Scope of Work

The following steps were taken:

1. The samples were conditioned to collect uniform sub-samples for further testing.
2. C30+ compositional analyses of the stock tank oils were conducted including molecular weight and density measurements.
3. Determine paraffin profile of the sample by High Temperature Gas Chromatography (HTGC) using wax appearance temperatures provided by client,

Results

The following are the results from the analysis:
On sample from Weber # 106 field:

- The paraffin content of the sample by HTGC analysis was determined to be 1.56 wt%.

On sample from Condensate #104 field:

- The paraffin content of the sample by HTGC analysis was determined to be 4.5 wt%.

On sample from Myton #1 field:

- The paraffin content of the sample by HTGC analysis was determined to be 9.17 wt%.

On sample from Gypsum Hills field:

- The paraffin content of the sample by HTGC analysis was determined to be 6.76 wt%.

Chain of Sample Custody

The samples remaining after measurements are stored at Oilphase DBR Houston Lab for a period of 30 days. Pending further instructions are received from the date of report delivery; these will be disposed off as appropriate.

RESULTS AND DISCUSSIONS

Fluids Preparation and Analysis

All four samples were conditioned at 70°C (158°F) under closed conditions to erase wax history, make the samples uniform and aid in proper sub -sampling for further tests. Details of the wax appearance temperature provided by client are given below.

Table 1: Wax Appearance Temperature Used for HTGC work

Sample ID	Wax Appearance Temperature (°F)
Weber # 106	68.0
Condensate # 104	62.6
Myton # 1	129
Gypsum Hills	109

C30+ Compositional Analysis

Conditioned stock tank samples were used for performing compositional analysis. Subsequently molecular weight measurements were performed using cryette and density measurements were performed using Anton Parr densitometer. The results of the analysis are presented in the Tables 2 – 9 in the following pages. The chromatograms are provided in figures 1 – 4.

Table 2: C30+ Composition & °API (Sample Weber # 106)

(Weber # 106)

Component	MW		Stock Tank Oil		
	(g/mole)		WT %	MOLE %	
Carbon Dioxide	44.01		0.00	0.00	
Hydrogen Sulfide	34.08		0.00	0.00	
Nitrogen	28.01		0.00	0.00	
Methane	16.04		0.00	0.00	
Ethane	30.07		0.00	0.00	
Propane	44.10		0.01	0.06	
I - Butane	58.12		0.02	0.06	
N - Butane	58.12		0.05	0.21	
I - Pentane	72.15		0.13	0.41	
N - Pentane	72.15		0.21	0.66	
C6	84.00		0.87	2.35	
M-C-Pentane	84.16		0.21	0.55	
Benzene	78.11		0.09	0.25	
Cyclohexane	84.16		0.28	0.76	
C7	96.00		1.93	4.56	
M-C-Hexane	98.19		0.77	1.79	
Toluene	92.14		0.24	0.58	
C8	107.00		3.33	7.08	
E-Benzene	106.17		0.15	0.32	
M/P-Xylene	106.17		0.46	0.99	
O-Xylene	106.17		0.22	0.47	
C9	121.00		3.69	6.94	
C10	134.00		4.67	7.92	
C11	147.00		4.27	6.59	
C12	161.00		3.96	5.59	
C13	175.00		4.43	5.75	
C14	190.00		4.12	4.93	
C15	206.00		4.30	4.74	
C16	222.00		3.68	3.76	
C17	237.00		3.48	3.33	
C18	251.00		3.41	3.09	
C19	263.00		3.37	2.91	
C20	275.00		3.00	2.48	
C21	291.00		2.67	2.09	
C22	300.00		2.60	1.97	
C23	312.00		2.34	1.70	
C24	324.00		2.10	1.47	
C25	337.00		1.99	1.34	
C26	349.00		1.91	1.24	
C27	360.00		1.83	1.15	
C28	372.00		1.75	1.07	
C29	382.00		1.70	1.01	
C30+	750.00		25.78	7.81	
Total			**100.00**	**100.00**	
MW				227	

Table 3: Calculated Fluid Properties (Weber # 106)

(Weber # 106)

Properties			Stock Tank Oil			
Cn+ Composition			Mass %	Mole %		
C7+			98.71	96.25		
C12+			78.41	57.44		
C20+			47.67	23.34		
C30+			25.78	7.81		
Molar Mass						
C7+			233			
C12+			310			
C20+			464			
C30+			750			
Density						
C7+			0.870			
C12+			0.900			
C20+			0.948			
C30+			1.010			
Fluid at 60°F			0.859			
OBM Contamination Level (wt%)			-	STO Basis		
			-			
Stock Tank Oil Properties at Standard Conditions:						
	Measured	Calculated		C30+ Properties		
MW	233	227		750		
Density (g/cm3)	0.859	0.866		1.010		
		Original STO		De-Contaminated		
STO Density (g/cm3)		0.859		-		
STO API Gravity		33.2		-		
OBM Density (g/cm3) @60°F		-				

Figure 1: Chromatogram of Sample (Weber # 106)

(Weber # 106)

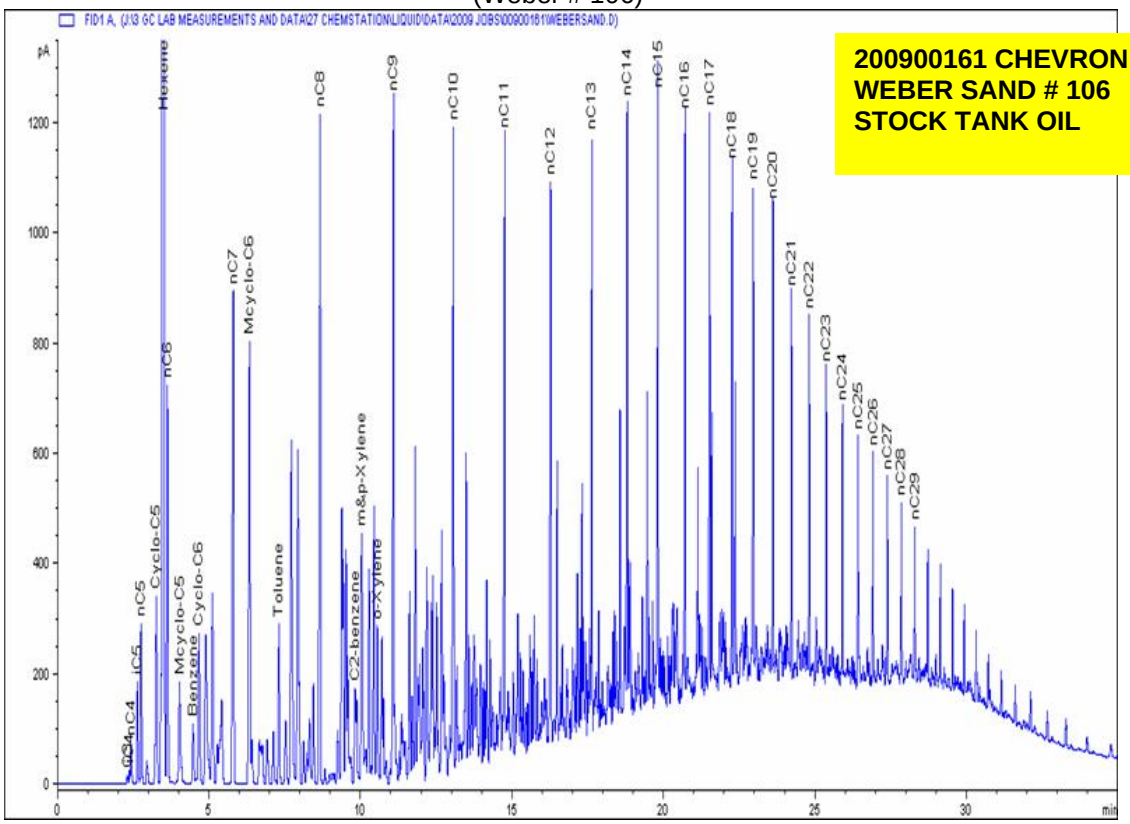


Table 4: C30+ Composition & °API (Sample Condensate # 104)

(Condensate # 104)

Component	MW		Stock Tank Oil		
	(g/mole)		WT %	MOLE %	
Carbon Dioxide	44.01		0.00	0.00	
Hydrogen Sulfide	34.08		0.00	0.00	
Nitrogen	28.01		0.00	0.00	
Methane	16.04		0.00	0.00	
Ethane	30.07		0.00	0.00	
Propane	44.10		0.13	0.42	
I - Butane	58.12		0.18	0.46	
N - Butane	58.12		0.58	1.46	
I - Pentane	72.15		0.93	1.89	
N - Pentane	72.15		1.07	2.18	
C6	84.00		3.54	6.20	
M-C-Pentane	84.16		1.06	1.85	
Benzene	78.11		0.33	0.62	
Cyclohexane	84.16		1.31	2.29	
C7	96.00		5.26	8.05	
M-C-Hexane	98.19		4.50	6.75	
Toluene	92.14		2.03	3.25	
C8	107.00		8.57	11.78	
E-Benzene	106.17		0.42	0.58	
M/P-Xylene	106.17		2.75	3.81	
O-Xylene	106.17		0.51	0.71	
C9	121.00		6.91	8.40	
C10	134.00		7.73	8.48	
C11	147.00		5.37	5.37	
C12	161.00		4.01	3.67	
C13	175.00		3.97	3.34	
C14	190.00		3.34	2.58	
C15	206.00		3.02	2.16	
C16	222.00		2.37	1.57	
C17	237.00		2.16	1.34	
C18	251.00		2.25	1.32	
C19	263.00		1.84	1.03	
C20	275.00		1.55	0.83	
C21	291.00		1.47	0.74	
C22	300.00		1.36	0.67	
C23	312.00		1.25	0.59	
C24	324.00		1.17	0.53	
C25	337.00		1.15	0.50	
C26	349.00		0.96	0.40	
C27	360.00		0.97	0.40	
C28	372.00		0.86	0.34	
C29	382.00		0.84	0.32	
C30+	580.00		12.28	3.11	
Total			**100.00**	**100.00**	
MW				147	

Table 5: Calculated Fluid Properties (Condensate # 104)

(Condensate # 104)

Properties			Stock Tank Oil			
Cn+ Composition			Mass %	Mole %		
C7+			93.57	87.38		
C12+			46.82	25.44		
C20+			23.86	8.44		
C30+			12.28	3.11		
Molar Mass						
C7+			157			
C12+			271			
C20+			416			
C30+			580			
Density						
C7+			0.825			
C12+			0.885			
C20+			0.944			
C30+			1.010			
Fluid at 60°F			0.791			
OBM Contamination Level (wt%)			-	STO Basis		
			-			
Stock Tank Oil Properties at Standard Conditions:						
	Measured	Calculated		C30+ Properties		
MW	156	147		580		
Density (g/cm3)	0.791	0.809		1.010		
		Original STO		De-Contaminated		
STO Density (g/cm3)		0.791		-		
STO API Gravity		47.4		-		
OBM Density (g/cm3) @60°F		-				

Figure 2: Chromatogram of Sample (Condensate # 104)

(Condensate # 104)

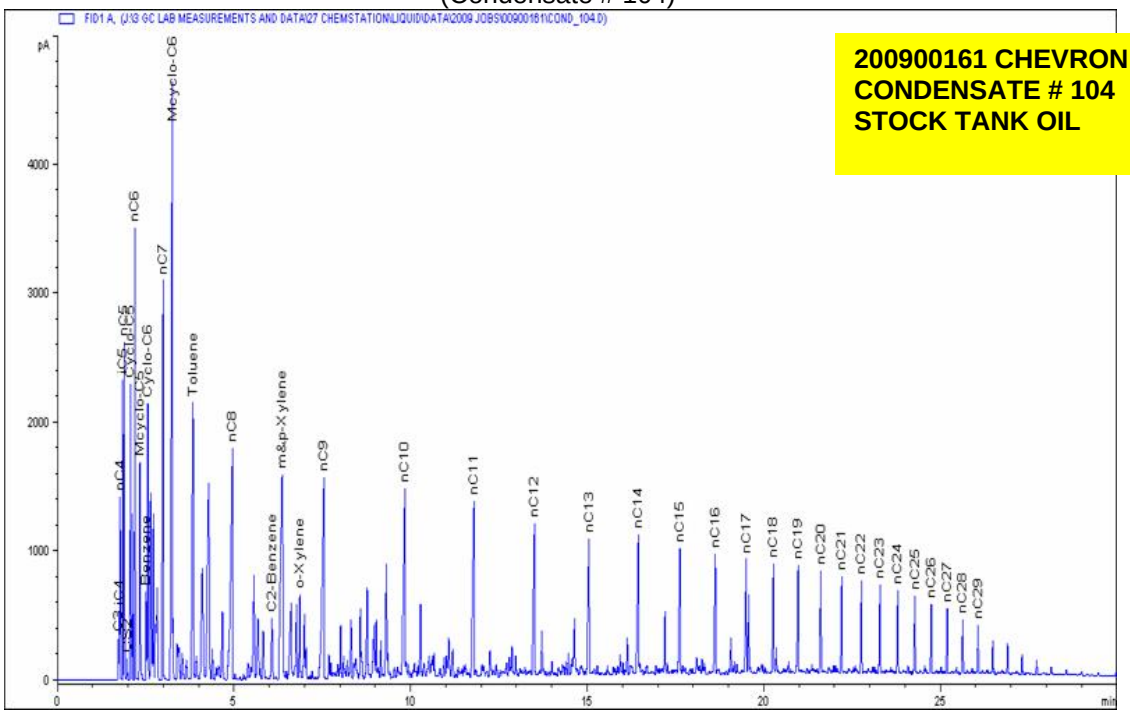


Table 6: C30+ Composition & °API (Sample Myton #1)

(Myton #1)

Component	MW		Stock Tank Oil		
	(g/mole)		WT %	MOLE %	
Carbon Dioxide	44.01		0.00	0.00	
Hydrogen Sulfide	34.08		0.00	0.00	
Nitrogen	28.01		0.00	0.00	
Methane	16.04		0.00	0.00	
Ethane	30.07		0.00	0.00	
Propane	44.10		0.02	0.15	
I - Butane	58.12		0.02	0.11	
N - Butane	58.12		0.07	0.41	
I - Pentane	72.15		0.10	0.46	
N - Pentane	72.15		0.14	0.64	
C6	84.00		0.47	1.85	
M-C-Pentane	84.16		0.18	0.69	
Benzene	78.11		0.03	0.12	
Cyclohexane	84.16		0.13	0.51	
C7	96.00		0.79	2.72	
M-C-Hexane	98.19		0.36	1.21	
Toluene	92.14		0.12	0.44	
C8	107.00		1.39	4.28	
E-Benzene	106.17		0.07	0.23	
M/P-Xylene	106.17		0.25	0.76	
O-Xylene	106.17		0.10	0.31	
C9	121.00		1.64	4.48	
C10	134.00		2.08	5.13	
C11	147.00		1.95	4.37	
C12	161.00		1.79	3.67	
C13	175.00		2.33	4.39	
C14	190.00		2.07	3.60	
C15	206.00		2.38	3.81	
C16	222.00		2.02	3.00	
C17	237.00		2.11	2.94	
C18	251.00		2.36	3.09	
C19	263.00		2.43	3.04	
C20	275.00		2.03	2.43	
C21	291.00		2.03	2.31	
C22	300.00		2.05	2.25	
C23	312.00		2.04	2.15	
C24	324.00		1.99	2.03	
C25	337.00		2.15	2.10	
C26	349.00		1.89	1.79	
C27	360.00		2.14	1.96	
C28	372.00		2.08	1.85	
C29	382.00		2.16	1.87	
C30+	750.00		52.03	22.87	
Total			**100.00**	**100.00**	
MW				330	

Table 7: Calculated Fluid Properties (Myton #1)

(Myton #1)

Properties			Stock Tank Oil			
Cn+ Composition			Mass %	Mole %		
C7+			99.18	96.37		
C12+			90.09	71.15		
C20+			72.59	43.60		
C30+			52.03	22.87		
Molar Mass						
C7+			339			
C12+			417			
C20+			549			
C30+			750			
Density						
C7+			0.923			
C12+			0.942			
C20+			0.971			
C30+			1.010			
Fluid at 60°F			**			
OBM Contamination Level (wt%)			-	STO Basis		
			-			
Stock Tank Oil Properties at Standard Conditions:						
	Measured	Calculated		C30+ Properties		
MW	334	330		750.00		
Density (g/cm3)	**	0.920		1.010		
**** Density Measurement not possible by Anton Parr Densitometer**						
		Original STO		De-Contaminated		
STO Density (g/cm3)		**		-		
STO API Gravity		-		-		
OBM Density (g/cm3) @60°F		-				

Figure 3: Chromatogram of Sample (Myton #1)

(Myton #1)

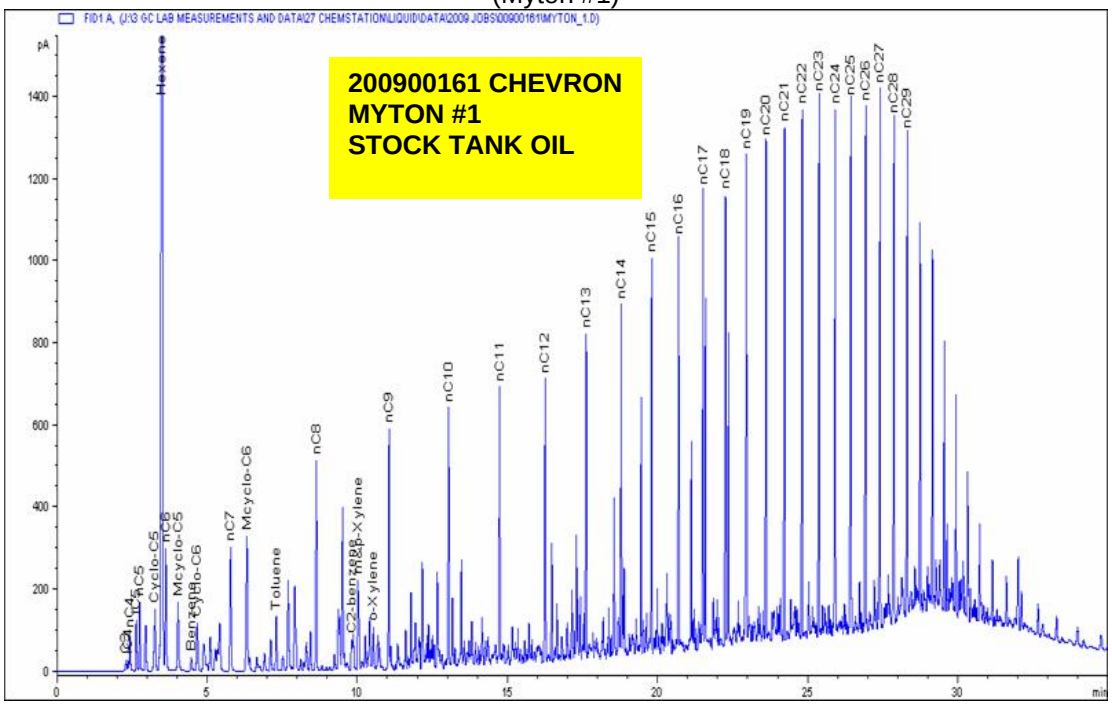


Table 8: C30+ Composition & °API (Sample Gypsum Hills)

(Gypsum Hills)

Component	MW		Stock Tank Oil		
	(g/mole)		WT %	MOLE %	
Carbon Dioxide	44.01		0.00	0.00	
Hydrogen Sulfide	34.08		0.00	0.00	
Nitrogen	28.01		0.00	0.00	
Methane	16.04		0.00	0.00	
Ethane	30.07		0.00	0.00	
Propane	44.10		0.01	0.07	
I - Butane	58.12		0.01	0.07	
N - Butane	58.12		0.04	0.24	
I - Pentane	72.15		0.07	0.36	
N - Pentane	72.15		0.08	0.38	
C6	84.00		0.29	1.21	
M-C-Pentane	84.16		0.19	0.81	
Benzene	78.11		0.01	0.04	
Cyclohexane	84.16		0.09	0.39	
C7	96.00		0.66	2.41	
M-C-Hexane	98.19		0.29	1.04	
Toluene	92.14		0.16	0.61	
C8	107.00		1.22	4.02	
E-Benzene	106.17		0.09	0.30	
M/P-Xylene	106.17		0.11	0.35	
O-Xylene	106.17		0.09	0.30	
C9	121.00		1.60	4.67	
C10	134.00		2.23	5.89	
C11	147.00		1.62	3.89	
C12	161.00		1.39	3.06	
C13	175.00		1.94	3.91	
C14	190.00		1.70	3.16	
C15	206.00		1.99	3.42	
C16	222.00		1.68	2.67	
C17	237.00		1.83	2.73	
C18	251.00		2.15	3.03	
C19	263.00		2.26	3.03	
C20	275.00		1.81	2.33	
C21	291.00		1.81	2.20	
C22	300.00		1.89	2.22	
C23	312.00		1.89	2.14	
C24	324.00		1.88	2.05	
C25	337.00		2.09	2.19	
C26	349.00		1.84	1.87	
C27	360.00		2.17	2.13	
C28	372.00		2.17	2.06	
C29	382.00		2.42	2.23	
C30+	750.00		56.25	26.51	
Total			**100.00**	**100.00**	
MW				353	

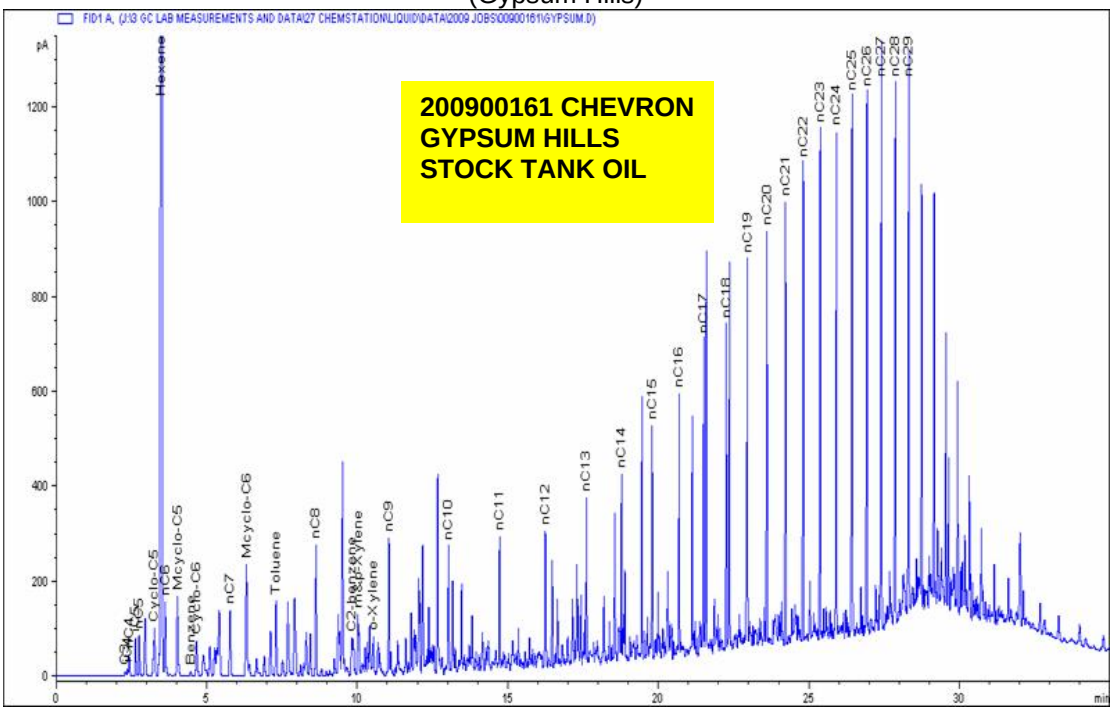
Table 9: Calculated Fluid Properties (Gypsum Hills)

(Gypsum Hills)

Properties			Stock Tank Oil			
Cn+ Composition			Mass %	Mole %		
C7+			99.50	97.68		
C12+			91.15	72.94		
C20+			76.21	47.93		
C30+			56.25	26.51		
Molar Mass						
C7+			360			
C12+			442			
C20+			562			
C30+			750			
Density						
C7+			0.931			
C12+			0.949			
C20+			0.974			
C30+			1.010			
Fluid at 60°F			**			
OBM Contamination Level (wt%)			-	STO Basis		
			-			
Stock Tank Oil Properties at Standard Conditions:						
	Measured	Calculated		C30+ Properties		
MW	367	353		750		
Density (g/cm3)	**	0.929		1.010		
**** Density Measurement not possible by Anton Parr Densitometer**						
		Original STO		De-Contaminated		
STO Density (g/cm3)		**		-		
STO API Gravity		-		-		
OBM Density (g/cm3) @60°F		-				

Figure 4: Chromatogram of Sample (Gypsum Hills)

(Gypsum Hills)



High Temperature Gas Chromatography of Stock Tank Oil

The n-paraffin compositional analyses of the samples are performed by homogenizing the mass and recovering a sub sample which is topped. Parent Oils are carefully topped to remove lower carbon number paraffin's. Subsequently the fluid is subjected to multiple extractions to separate and concentrate the higher carbon number paraffin's and yield a concentrated wax cut. Analysis of the topped oil and wax cut is performed by high temperature gas chromatography (HTGC). HTGC analysis of topped oil and wax cut yields n-paraffin distribution of the wax from C_{20} to C_{90}. This analysis is quantitative with a lower detection limit of less than 5 ppm for the full range of waxy paraffin's (C_{20} - C_{90}). This HTGC analysis of wax yields n-paraffin carbon number distribution curve. A plot of n-paraffin distribution is shown in Figure 5, Figure 8, Figure 11 and Figure 14. HTGC chromatograms of (a) topped oil and (b) wax cut are shown in Figure 6, Figure 7, Figure 9, Figure 10, Figure 12, Figure 13, Figure 15 and Figure 16.

Table 10: High Temperature Gas Chromatography of Stock Tank Liquid (Weber #106)

(Weber #106)

Wax Analysis - HTGC			
Job#	*200900161*	*Sample Weber # 106*	
Carbon Number	*n-Paraffin*	*n-Paraffin*	*Cumulative*
	(ppm)	(Wt %)	(Wt %)
C20	1567.0	0.15670	0.15670
C21	1443.8	0.14438	0.30108
C22	1342.8	0.13428	0.43536
C23	1170.4	0.11704	0.55239
C24	1086.2	0.10862	0.66101
C25	985.8	0.09858	0.75959
C26	882.2	0.08822	0.84781
C27	783.3	0.07833	0.92614
C28	668.1	0.06681	0.99295
C29	597.8	0.05978	1.05273
C30	562.9	0.05629	1.10903
C31	466.1	0.04661	1.15563
C32	402.6	0.04026	1.19589
C33	343.4	0.03434	1.23023
C34	357.2	0.03572	1.26594
C35	367.8	0.03678	1.30272
C36	265.9	0.02659	1.32931
C37	216.8	0.02168	1.35098
C38	259.2	0.02592	1.37691
C39	213.0	0.02130	1.39821
C40	237.9	0.02379	1.42200
C41	160.9	0.01609	1.43808
C42	151.2	0.01512	1.45321
C43	122.8	0.01228	1.46549
C44	98.1	0.00981	1.47530
C45	86.3	0.00863	1.48393
C46	73.6	0.00736	1.49129
C47	65.9	0.00659	1.49788
C48	58.3	0.00583	1.50371

Table 11: High Temperature Gas Chromatography of Stock Tank Liquid - Continued

(Weber #106)

Carbon Number	*n-Paraffin*	*n-Paraffin*	*Cumulative*
	(ppm)	(Wt %)	(Wt %)
C49	53.0	0.00530	1.50901
C50	48.1	0.00481	1.51383
C51	45.7	0.00457	1.51840
C52	39.5	0.00395	1.52234
C53	37.3	0.00373	1.52607
C54	33.8	0.00338	1.52946
C55	32.7	0.00327	1.53273
C56	28.6	0.00286	1.53559
C57	27.9	0.00279	1.53838
C58	24.1	0.00241	1.54079
C59	24.0	0.00240	1.54319
C60	20.0	0.00200	1.54519
C61	20.3	0.00203	1.54722
C62	15.3	0.00153	1.54875
C63	16.3	0.00163	1.55037
C64	11.9	0.00119	1.55156
C65	12.5	0.00125	1.55281
C66	9.2	0.00092	1.55373
C67	10.2	0.00102	1.55475
C68	7.9	0.00079	1.55555
C69	8.0	0.00080	1.55635
C70	5.8	0.00058	1.55693
C71	6.2	0.00062	1.55756
C72	4.6	0.00046	1.55802
C73	4.8	0.00048	1.55850
C74	3.4	0.00034	1.55884
C75	4.0	0.00040	1.55924
C76	3.2	0.00032	1.55956
C77	3.3	0.00033	1.55989
C78	2.7	0.00027	1.56016
C79	3.0	0.00030	1.56046
C80	2.1	0.00021	1.56067
C81	2.2	0.00022	1.56089
C82	1.8	0.00018	1.56107
C83	1.4	0.00014	1.56121
C84	1.4	0.00014	1.56135
C85	1.6	0.00016	1.56151
C86	1.2	0.00012	1.56163
C87	1.2	0.00012	1.56176
C88	1.1	0.00011	1.56187
C89	1.1	0.00011	1.56198
C90+	0.7	0.00007	1.56205
Total	15620.5	1.56205	

Figure 5: n-Paraffin Distribution (Weber # 106)
(Weber # 106)

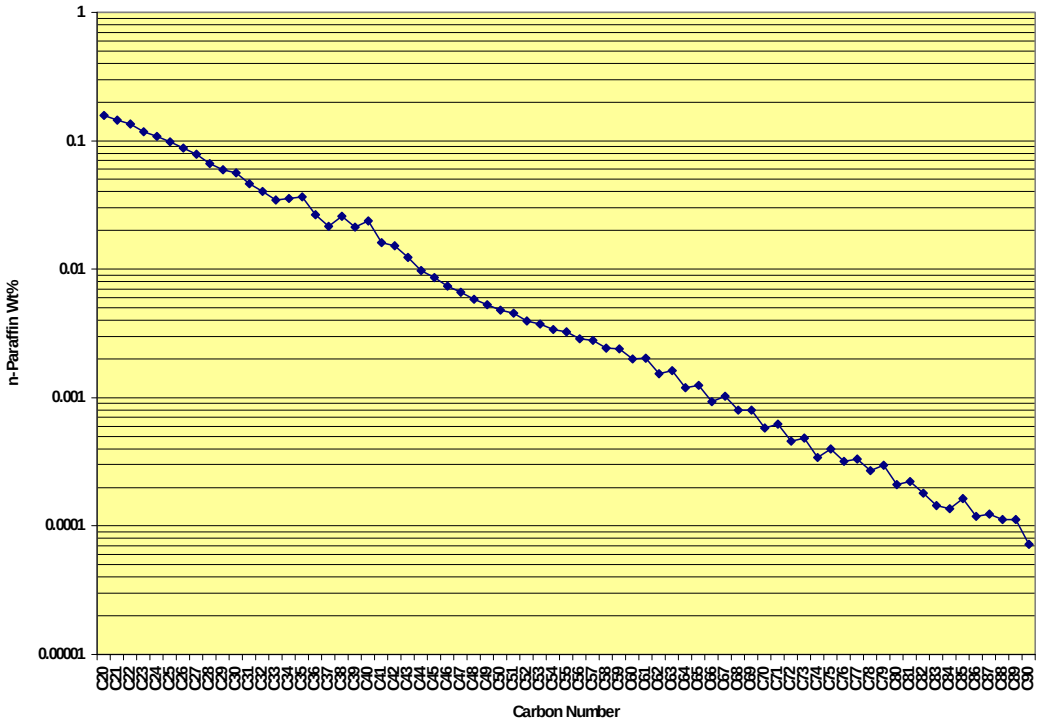


Figure 6: Chromatogram of Top Cut (Weber #106)
(Weber #106)

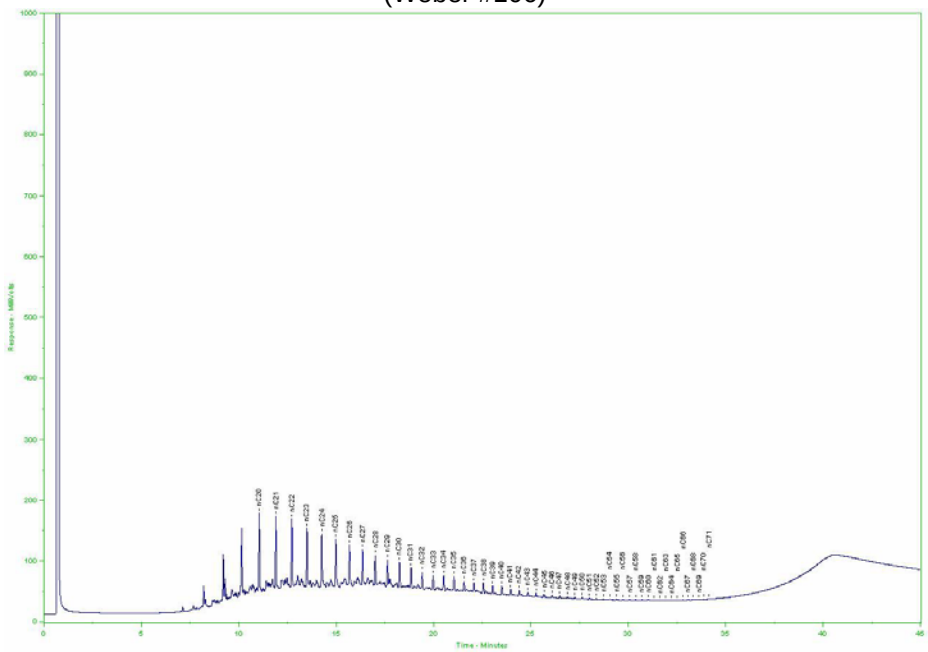


Figure 7: Chromatogram of Wax Cut (Weber # 106)

(Weber # 106)

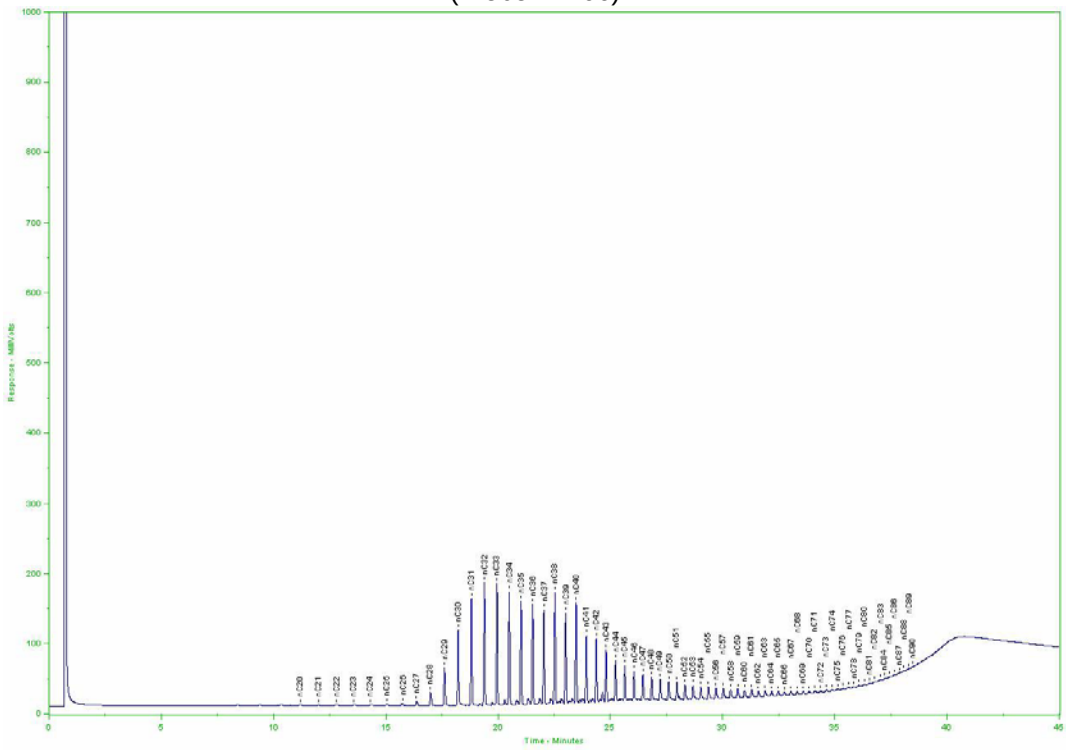


Table 12: High Temperature Gas Chromatography of Stock Tank Liquid (Condensate #104)

(Condensate #104)

Wax Analysis - HTGC			
Job#	*200900161*	*Sample Condensate # 104*	
Carbon Number	***n-Paraffin***	***n-Paraffin***	***Cumulative***
	(ppm)	(Wt %)	(Wt %)
C20	3019.8	0.30198	0.30198
C21	3769.7	0.37697	0.67895
C22	4035.2	0.40352	1.08247
C23	4209.2	0.42092	1.50339
C24	4183.8	0.41838	1.92177
C25	4132.6	0.41326	2.33503
C26	3805.5	0.38055	2.71558
C27	3546.4	0.35464	3.07022
C28	2893.8	0.28938	3.35960
C29	2665.8	0.26658	3.62618
C30	1945.1	0.19451	3.82069
C31	1684.5	0.16845	3.98914
C32	1002.9	0.10029	4.08943
C33	810.2	0.08102	4.17046
C34	534.7	0.05347	4.22392
C35	423.3	0.04233	4.26625
C36	291.7	0.02917	4.29542
C37	249.8	0.02498	4.32040
C38	213.3	0.02133	4.34173
C39	177.8	0.01778	4.35951
C40	165.3	0.01653	4.37604
C41	136.0	0.01360	4.38964
C42	130.3	0.01303	4.40267
C43	111.9	0.01119	4.41386
C44	98.0	0.00980	4.42366
C45	88.7	0.00887	4.43253
C46	79.8	0.00798	4.44051
C47	72.2	0.00722	4.44773
C48	61.9	0.00619	4.45392

Table 13: High Temperature Gas Chromatography of Stock Tank Liquid - Continued

(Condensate #104)

Carbon Number	*n-Paraffin*	*n-Paraffin*	*Cumulative*
	(ppm)	(Wt %)	(Wt %)
C49	57.0	0.00570	4.45962
C50	52.4	0.00524	4.46486
C51	52.3	0.00523	4.47009
C52	42.2	0.00422	4.47431
C53	43.5	0.00435	4.47865
C54	35.1	0.00351	4.48216
C55	37.4	0.00374	4.48591
C56	28.0	0.00280	4.48870
C57	29.3	0.00293	4.49163
C58	21.5	0.00215	4.49378
C59	21.8	0.00218	4.49596
C60	14.3	0.00143	4.49739
C61	14.3	0.00143	4.49882
C62	8.9	0.00089	4.49971
C63	8.6	0.00086	4.50056
C64	5.2	0.00052	4.50109
C65	4.1	0.00041	4.50149
C66	2.9	0.00029	4.50179
C67	2.5	0.00025	4.50204
C68	2.2	0.00022	4.50226
C69	1.6	0.00016	4.50242
C70	1.6	0.00016	4.50258
C71	1.3	0.00013	4.50270
C72	1.1	0.00011	4.50281
C73	1.0	0.00010	4.50291
C74	0.8	0.00008	4.50299
C75	0.7	0.00007	4.50306
C76	0.6	0.00006	4.50312
C77	0.6	0.00006	4.50318
C78	0.4	0.00004	4.50322
C79	0.9	0.00009	4.50330
C80	0.6	0.00006	4.50336
C81	0.6	0.00006	4.50342
C82	0.5	0.00005	4.50348
C83	0.6	0.00006	4.50353
C84	0.5	0.00005	4.50359
C85	0.5	0.00005	4.50364
C86	0.6	0.00006	4.50370
C87	0.5	0.00005	4.50375
C88	0.7	0.00007	4.50382
C89	0.4	0.00004	4.50386
C90+	0.4	0.00004	4.50390
Total	45039.0	4.50390	

Figure 8: n-Paraffin Distribution (Condensate # 104)
(Condensate # 104)

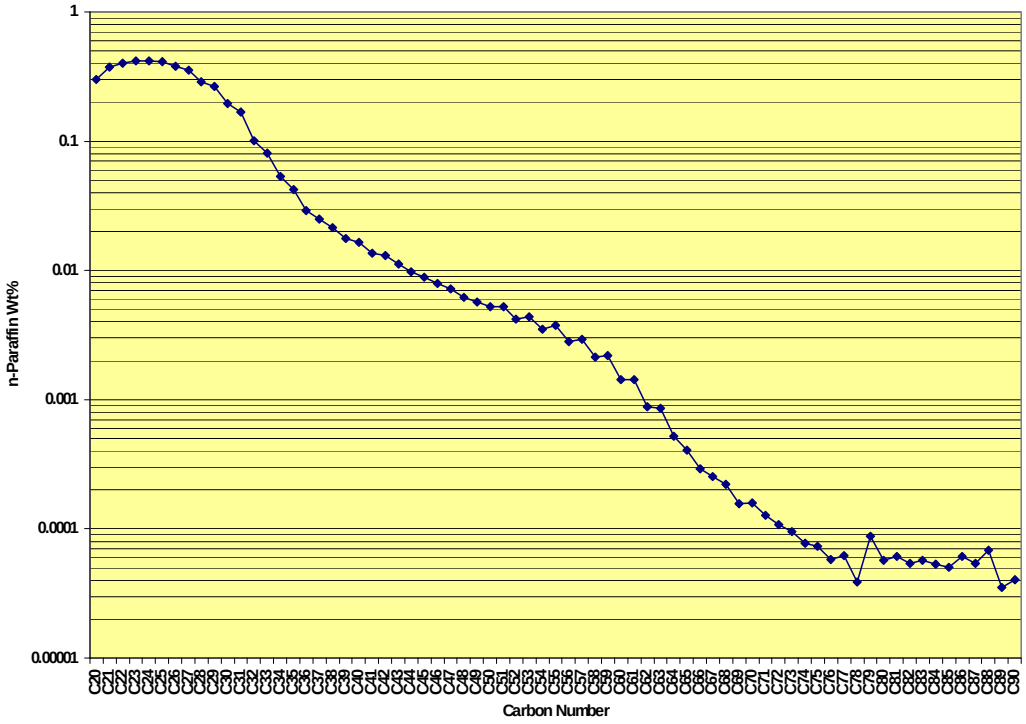


Figure 9: Chromatogram of Top Cut (Condensate #104)
(Condensate #104)

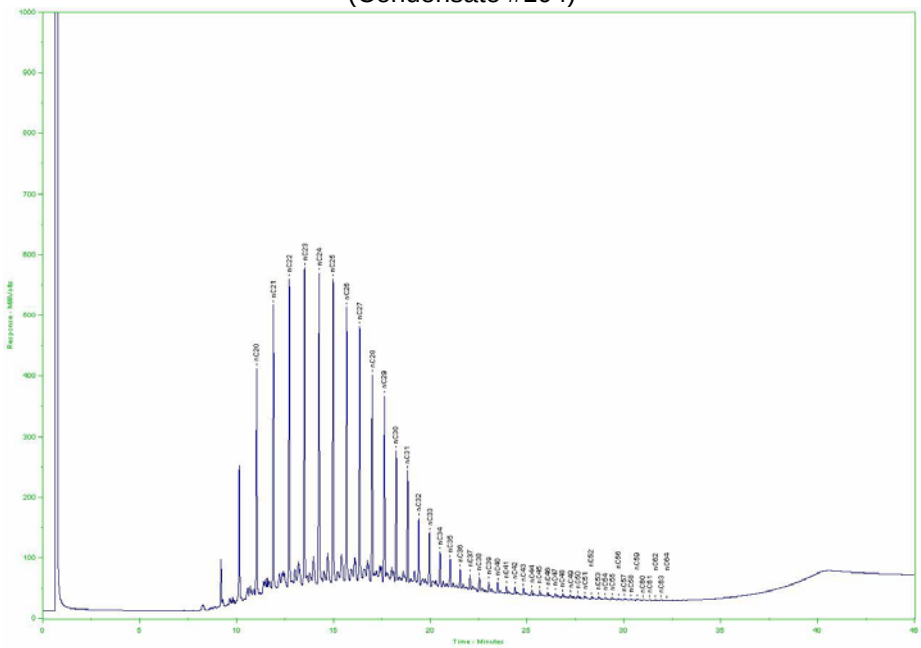


Figure 10: Chromatogram of Wax Cut (Condensate # 104)

(Condensate # 104)

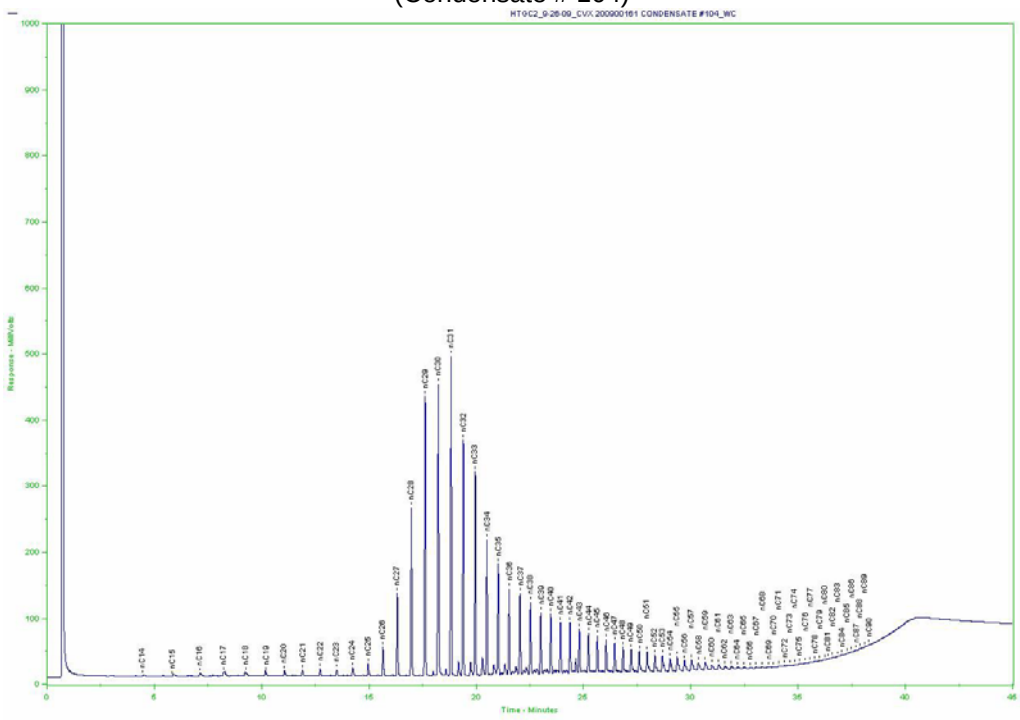


Table 14: High Temperature Gas Chromatography of Stock Tank Liquid (Myton #1)

(Myton #1)

Wax Analysis - HTGC			
Job#	200900161	Sample Myton #1	
Carbon Number	n-Paraffin	n-Paraffin	Cumulative
	(ppm)	(Wt %)	(Wt %)
C20	4979.7	0.49797	0.49797
C21	5568.0	0.55680	1.05477
C22	5826.8	0.58268	1.63745
C23	6277.6	0.62776	2.26521
C24	6197.2	0.61972	2.88493
C25	6707.0	0.67070	3.55563
C26	6492.2	0.64922	4.20485
C27	6732.3	0.67323	4.87808
C28	6067.7	0.60677	5.48486
C29	6234.2	0.62342	6.10827
C30	5578.4	0.55784	6.66612
C31	4484.1	0.44841	7.11452
C32	3057.5	0.30575	7.42027
C33	2503.4	0.25034	7.67062
C34	1908.6	0.19086	7.86148
C35	1591.8	0.15918	8.02066
C36	1151.9	0.11519	8.13586
C37	929.2	0.09292	8.22878
C38	721.7	0.07217	8.30094
C39	645.7	0.06457	8.36552
C40	549.4	0.05494	8.42045
C41	542.3	0.05423	8.47468
C42	461.2	0.04612	8.52081
C43	474.9	0.04749	8.56829
C44	409.4	0.04094	8.60924
C45	430.8	0.04308	8.65231
C46	357.6	0.03576	8.68807
C47	404.8	0.04048	8.72855
C48	331.1	0.03311	8.76166

Table 15: High Temperature Gas Chromatography of Stock Tank Liquid - Continued

(Myton #1)

Carbon Number	*n-Paraffin*	*n-Paraffin*	*Cumulative*
	(ppm)	(Wt %)	(Wt %)
C49	364.1	0.03641	8.79807
C50	342.9	0.03429	8.83236
C51	356.3	0.03563	8.86799
C52	305.0	0.03050	8.89849
C53	350.9	0.03509	8.93359
C54	277.3	0.02773	8.96132
C55	316.5	0.03165	8.99297
C56	233.9	0.02339	9.01636
C57	255.9	0.02559	9.04195
C58	187.0	0.01870	9.06065
C59	200.0	0.02000	9.08064
C60	161.2	0.01612	9.09677
C61	138.4	0.01384	9.11060
C62	93.2	0.00932	9.11993
C63	79.4	0.00794	9.12787
C64	59.5	0.00595	9.13382
C65	51.7	0.00517	9.13899
C66	38.7	0.00387	9.14286
C67	34.3	0.00343	9.14629
C68	25.2	0.00252	9.14881
C69	23.1	0.00231	9.15113
C70	18.3	0.00183	9.15295
C71	18.1	0.00181	9.15476
C72	15.0	0.00150	9.15626
C73	14.5	0.00145	9.15772
C74	12.6	0.00126	9.15898
C75	12.4	0.00124	9.16022
C76	10.9	0.00109	9.16132
C77	10.5	0.00105	9.16237
C78	8.8	0.00088	9.16325
C79	8.7	0.00087	9.16412
C80	6.5	0.00065	9.16477
C81	6.9	0.00069	9.16547
C82	5.3	0.00053	9.16599
C83	6.8	0.00068	9.16667
C84	5.7	0.00057	9.16724
C85	7.5	0.00075	9.16799
C86	5.6	0.00056	9.16855
C87	7.2	0.00072	9.16927
C88	5.3	0.00053	9.16980
C89	5.6	0.00056	9.17036
C90+	4.2	0.00042	9.17078
Total	91707.8	9.17078	

Figure 11: n-Paraffin Distribution (Myton #1)
(Myton #1)

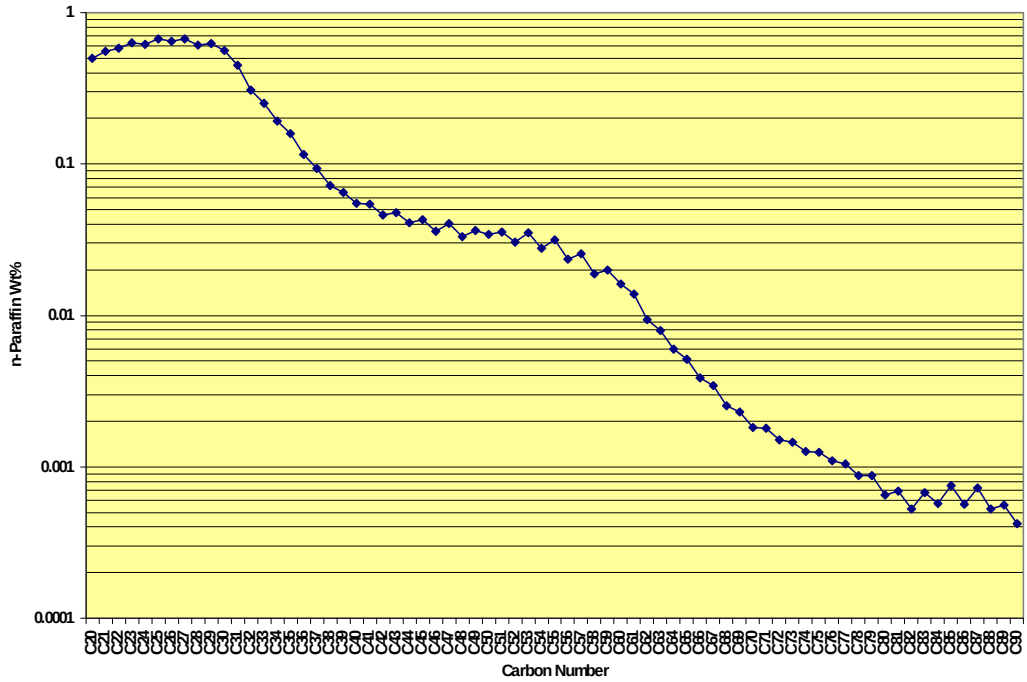


Figure 12: Chromatogram of Top Cut (Myton #1)
(Myton #1)

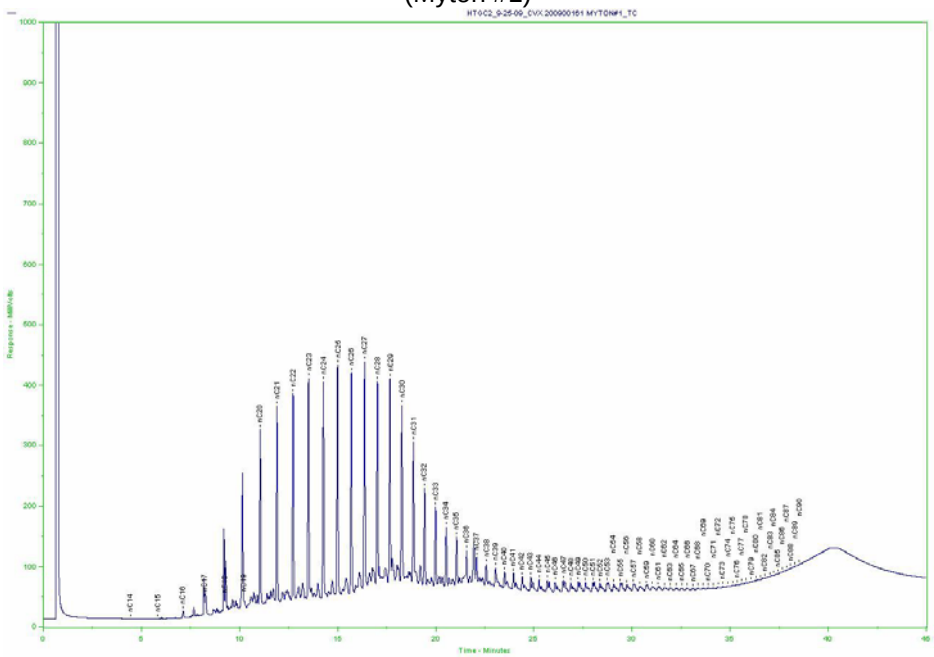


Figure 13: Chromatogram of Wax Cut (Myton #1)

(Myton #1)

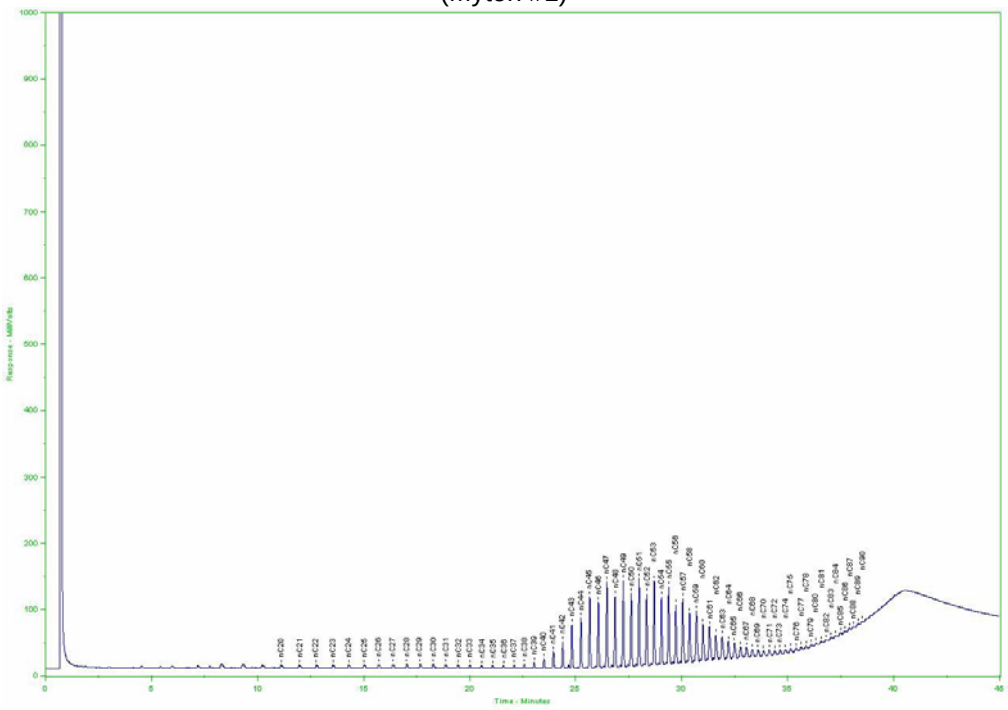


Table 16: High Temperature Gas Chromatography of Stock Tank Liquid (Gypsum Hills)

(Gypsum Hills)

Wax Analysis - HTGC			
Job#	200900161	Sample Gypsum Hills	
Carbon Number	n-Paraffin	n-Paraffin	Cumulative
	(ppm)	(Wt %)	(Wt %)
C20	3277.3	0.32773	0.32773
C21	3575.4	0.35754	0.68527
C22	3835.2	0.38352	1.06879
C23	4212.5	0.42125	1.49004
C24	4183.8	0.41838	1.90842
C25	4792.9	0.47929	2.38770
C26	4714.9	0.47149	2.85919
C27	5250.2	0.52502	3.38421
C28	4662.9	0.46629	3.85050
C29	5161.4	0.51614	4.36664
C30	4843.1	0.48431	4.85096
C31	3850.3	0.38503	5.23599
C32	2356.5	0.23565	5.47164
C33	1949.2	0.19492	5.66657
C34	1338.6	0.13386	5.80043
C35	1157.0	0.11570	5.91613
C36	833.5	0.08335	5.99948
C37	692.3	0.06923	6.06871
C38	542.8	0.05428	6.12299
C39	475.6	0.04756	6.17055
C40	356.0	0.03560	6.20615
C41	341.1	0.03411	6.24026
C42	299.4	0.02994	6.27020
C43	403.4	0.04034	6.31053
C44	298.3	0.02983	6.34036
C45	396.5	0.03965	6.38001
C46	270.1	0.02701	6.40702
C47	358.8	0.03588	6.44290
C48	222.5	0.02225	6.46515

Table 17: High Temperature Gas Chromatography of Stock Tank Liquid - Continued

(Gypsum Hills)

Carbon Number	*n-Paraffin*	*n-Paraffin*	*Cumulative*
	(ppm)	(Wt %)	(Wt %)
C49	268.4	0.02684	6.49199
C50	167.6	0.01676	6.50875
C51	196.6	0.01966	6.52841
C52	114.2	0.01142	6.53983
C53	239.2	0.02392	6.56376
C54	124.6	0.01246	6.57622
C55	320.2	0.03202	6.60824
C56	151.8	0.01518	6.62343
C57	345.8	0.03458	6.65800
C58	147.5	0.01475	6.67275
C59	328.0	0.03280	6.70555
C60	110.9	0.01109	6.71664
C61	153.8	0.01538	6.73202
C62	66.1	0.00661	6.73863
C63	65.4	0.00654	6.74517
C64	34.3	0.00343	6.74860
C65	34.7	0.00347	6.75207
C66	18.6	0.00186	6.75394
C67	22.6	0.00226	6.75620
C68	12.9	0.00129	6.75749
C69	16.2	0.00162	6.75911
C70	9.6	0.00096	6.76007
C71	9.2	0.00092	6.76099
C72	7.8	0.00078	6.76177
C73	5.3	0.00053	6.76230
C74		0.00000	6.76230
C75		0.00000	6.76230
C76		0.00000	6.76230
C77		0.00000	6.76230
C78		0.00000	6.76230
C79		0.00000	6.76230
C80		0.00000	6.76230
C81		0.00000	6.76230
C82		0.00000	6.76230
C83		0.00000	6.76230
C84		0.00000	6.76230
C85		0.00000	6.76230
C86		0.00000	6.76230
C87		0.00000	6.76230
C88		0.00000	6.76230
C89		0.00000	6.76230
C90+		0.00000	6.76230
Total	67623.0	6.76230	

Figure 14: n-Paraffin Distribution (Gypsum Hills)
(Gypsum Hills)

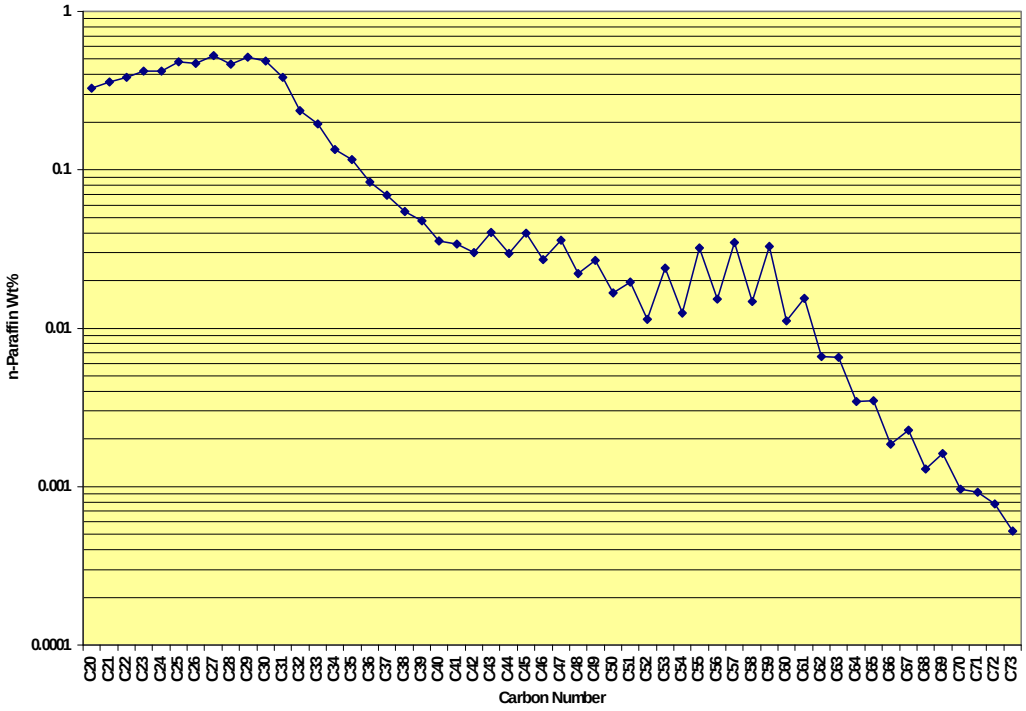


Figure 15: Chromatogram of Top Cut (Gypsum Hills)
(Gypsum Hills)

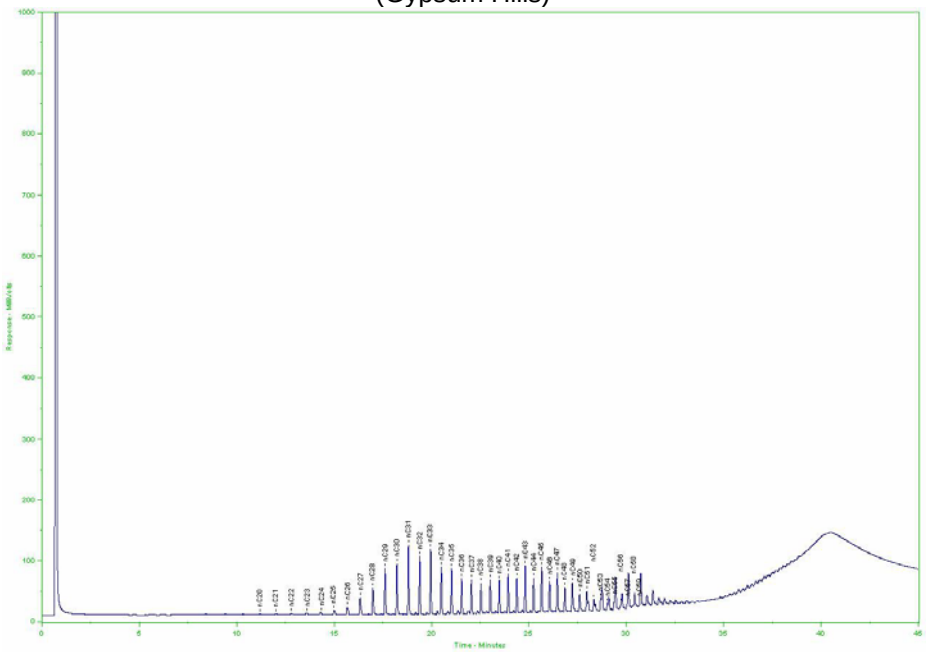
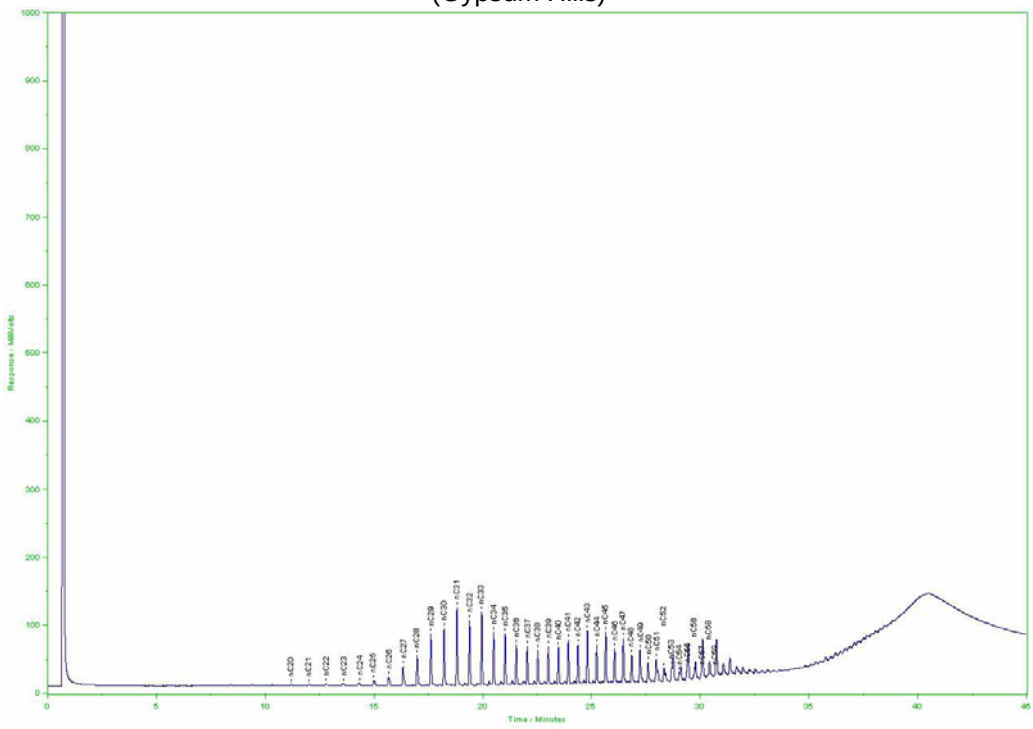


Figure 16: Chromatogram of Wax Cut (Gypsum Hills)

(Gypsum Hills)



APPENDIX: PROCEDURE

C30+ Compositional Analyses

The compositional analysis of liquid samples is performed on a temperature programmed GC equipped with a different capillary column, an FID detector and uses helium as a carrier gas. The temperature programming is also non-isothermal (in cycles from 50 to 570 ^{o}F), and the detection range covers C5 to C29 and lumped C30+. The analysis includes the associated common isomers.

The liquid GC utilizes a proprietary technology to determine hydrocarbon liquid carbon number distribution. For low C30+ fraction concentration (< 5 wt %), the GC is calibrated against ASTM D2887 Reference Gas Oil #1. The tuning parameter for this calibration is the C30+ fraction weight percent. A mean value of 2.5 wt % within a deviation of $\pm$ 0.4 wt % is considered acceptable as a control limit. A warning limit is set at 2.5 $\pm$ 0.6 wt %, and the GC is completely overhauled and returned to proper operation if the measured ASTM standard C30+ concentration is registered outside these limits.

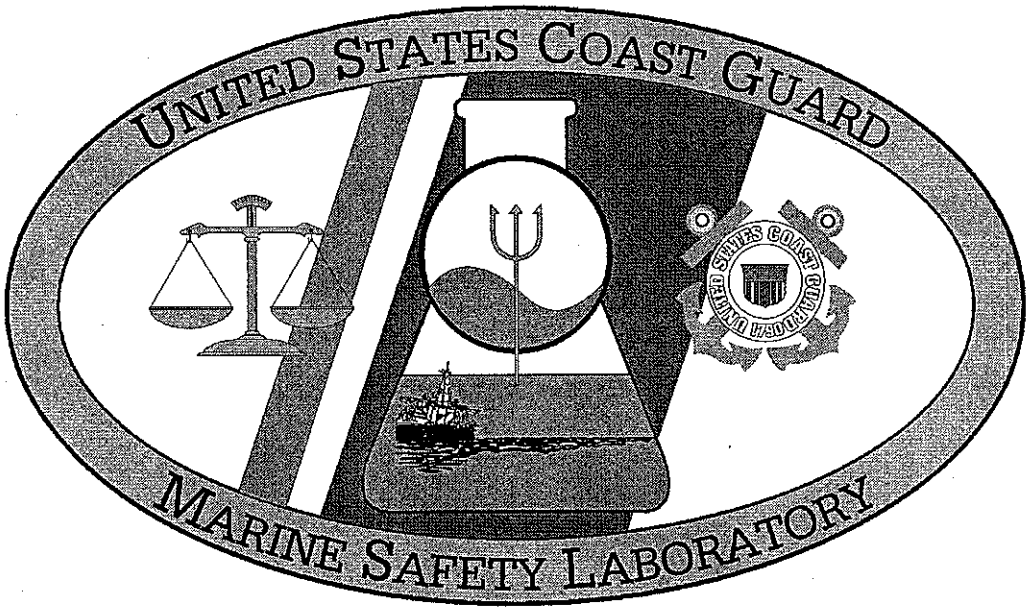
In much the same way, internal standard reference crude is used for calibration in the high C30+ region. This standard has a mean C30+ weight percent of 35.2 and a deviation of 1.8 wt % is considered an acceptable control limit. The warning limit for the reference crude is $\pm$ 2.7 wt %. All of the aforementioned standards are run on a regular basis and detailed records of the GC performance and overhauls are maintained and are provided to clients upon request.

Although the GC is calibrated with "real" crude oils, it cannot differentiate between n-alkanes and other paraffin groups for C6+ components. Only n-alkane peaks are identified and components between these peaks are lumped together into an overall carbon number grouping.

Oil Sample Analysis Report

U. S. EPA Region VIII
Case / Activity Number Z8DG

Marine Safety Laboratory
Case Number 10-159



U.S. Department of
Homeland Security

**United States
Coast Guard**

Manager
U.S. Coast Guard
Marine Safety Laboratory

1 Chelsea Street
New London, CT 06320
Phone: (860) 271-2704
Fax: (860) 271-2641

16450
28 Jun 2010

MEMORANDUM

From: K. Juaire
CG MSL

To: U. S. EPA Region VIII

Subj: OIL SAMPLE ANALYSIS REPORT, MSL CASE NUMBER 10-159
UNIT CASE / ACTIVITY NUMBER Z8DG

1. The laboratory analysis of this case has been completed and our report is forwarded. The technical data supporting the report (spectrograms and chromatograms) have been archived at our facility and are available upon request. We will maintain the oil samples in refrigerated storage pending final case disposition.

2. Questions concerning this report or the analytical methods used should be directed to the Supervisor of Analysis, Kristy Juaire.

#

Enclosure: (1) MSL Report 10-159

United States Coast Guard
Marine Safety Laboratory
Oil Spill Identification Report
10-159

Requestor: U. S. EPA Region VIII
Unit Case/Activity Number: Z8DG
Received: 25-Jun-10 **Via:** Federal Express 8731 7075 8847

Number Of Samples: 6
Lab NO. of Spills: 4, 5 and 6
Lab NO. of Suspects: 1, 2 and 3
Lab NO. of Background: n/a

Analysis Methods:

- ☑ GAS CHROMATOGRAPHY (GC)
- ☑ GAS CHROMATOGRAPHY-MASS SPECTROMETRY (GC-MS)
- ☐ INFRARED SPECTROSCOPY (IR)

Laboratory's Conclusion (as explained below): MATCH

SPECIAL INSTRUCTIONS: Compare MSL Case 10-159 to MSL Case 10-151.

RESULTS:

1. Samples 10-159-4, 5 and 6 were specified to be representative of spilled oil. Analysis indicates these samples are virtually identical to each other and contain very slightly weathered crude oil.

2. Samples 10-159-1, 2 and 3 are virtually identical to each other and contain crude oil with characteristics similar to those of samples 10-159-4, 5 and 6. Minor differences are consistent with slight weathering.

3. Samples 10-151-1 and 2 contain slightly weathered crude oil with characteristics similar to those of samples 10-159-1, 2, 3, 4, 5 and 6. Differences are consistent with slight weathering.

CONCLUSIONS:

1. Samples 10-159-1, 2, 3, 4, 5 and 6 represent different portions of the same petroleum oil. Minor differences are attributable to weathering.

2. Samples 10-151-1 and 2 and samples 10-159-1, 2, 3, 4, 5 and 6 are derived from a common source of petroleum oil. Differences are attributable to weathering.

SUPERVISOR OF ANALYSIS K. JUAIRE Kristy Juaire **DATE** 28-Jun-10

United States Coast Guard
Marine Safety Laboratory

Oil Spill Identification Analysis
Cost Recovery Documentation

Laboratory Case Number:	10-159
Requestor:	U. S. EPA Region VIII
Unit Case/Activity Number:	Z8DG
Number of Samples:	7
Cost Per Sample Prepared:	$20.00
Total Costs of Sample Preparation:	$140.00
Number of Analysis:	20
Cost Per Sample Prepared:	$86.00
Total Costs for Analysis:	$1,720.00
TOTAL COSTS:	$1,860.00

This documentation is provided for purposes of Phase IV - Documentation and Cost Recovery under the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300)

Signature: Kristy Guaire **Date:** 28 Jun 10

United States Coast Guard
Marine Safety Laboratory Sample
Check-In Log

MSL Case/Activity Number: 10-159

Requestor: U. S. EPA Region VIII **Unit Case Number** Z8DG

Federal Project Number: **Delivery Method:** Federal Express

Received Date: 25 Jun 10 **Delivery Number:** 8731 7075 8847

Priority: No **Rush:** Yes **Comparison** Yes

Lab Number 10-159	Sample Descriptions from Sample Jars	Spill	Source
1	Z8DGCPPR03 6/22/10	☐	☑
2	Z8DGCPPR03 6/22/10	☐	☑
3	Z8DGCPPR03 6/22/10	☐	☑
4	Z8DG CPPR04 6/22/10	☑	☐
5	Z8DG CPPR04 6/22/10	☑	☐
6	Z8DG CPPR04 6/22/10	☑	☐
7		☐	☐
8		☐	☐
9		☐	☐
10		☐	☐

Remarks: Comparison to CG MSL Case 10-151. Sample Descriptions taken from COC.

Samples checked in by: MST3 ZACHARY COTE Zachary A. Cote **Date:** 25 Jun 10

Sample Custodian: MST2 JOHN AGAPITO **Date:** 25 JUN 10

Supervisor of Analysis: K. JUAIRE Kristy Juaire **Date:** 28 Jun 10

United States Coast Guard
Marine Safety Laboratory Sample
Check-In Log

MSL Case/Activity Number: 10-151

Requestor: U. S. EPA Region VIII **Unit Case Number** Z8DG

Federal Project Number: **Delivery Method:** Federal Express

Received Date: 23 Jun 10 **Delivery Number:** 8710 4134 3750

Priority: No **Rush:** Yes **Comparison** No

Lab Number 10-151	Sample Descriptions from Sample Jars	Spill	Source
1	CPPR01 OIL FROM SPILL SITE 6-16-10	☑	☐
2	CPPR02 OIL FROM LIBERTY PARK - 3 1/3 MILES DOWNSTREAM (THICK OIL SCRAPPED FROM SIDE OF CONCRETE ON PONDS EDGE) 6-16-10	☑	☐
3		☐	☐
4		☐	☐
5		☐	☐
6		☐	☐
7		☐	☐
8		☐	☐
9		☐	☐
10		☐	☐

Remarks: Sample descriptions and spill/source designations taken from COC.

Samples checked in by: MST3 ZACHARY COTE Zachary A. Cote **Date:** 23 Jun 10

Sample Custodian: MST2 JOHN AGAPITO John Cofi **Date:** 24 JUN 10

Supervisor of Analysis: K. JUAIRE Kristy Juaire **Date:** 24 Jun 10

Page 1 of 1

Juaire, Kristy

From: Juaire, Kristy
Sent: Monday, June 28, 2010 2:07 PM
To: 'kent_alexander@urscorp.com'
Subject: Oil Sample Analysis Report
Attachments: MSL Case Report 10-159.pdf

Good afternoon, Kent -

The second report is attached. Please let me know that you have received them both. I have had some lost emails and want to make sure these have gotten to you.

Kristy Juaire
Chemist, CG MSL
860-271-2784

"We're all for progress; it's change we can't abide." -L.P.

MSL Check-In Discrepancy Worksheet

MSL Case Number: **10-159**

Unit/Agency: U. S. EPA Region VIII

Unit Case Number: Z8DG

Item #1 Discrepancies Noted: **Labeling**

Comments and Corrective Actions: Missing jar labels.

ok. 6/25/10 -JPH

Item #2 Discrepancies Noted: **Letter of Request**

Comments and Corrective Actions: LOR states 02 samples were sent for analysis but 6 samples were received.

ok. 6/25/10 -JPH

Item #3 Discrepancies Noted:

Comments and Corrective Actions:

Item #4 Discrepancies Noted:

Comments and Corrective Actions:

Item #5 Discrepancies Noted:

Comments and Corrective Actions:

Item #6 Discrepancies Noted:

Comments and Corrective Actions:

Enclosure (1)

URS Corporation
756 East Winchester Street, Suite 400
Salt Lake City, Utah 84107
Tel: 801.904.4000
Fax: 801.904.4100
www.urscorp.com

Chain of Custody Record

Page 1 of 1

SR 6/24/10

PROJECT: ~~CHEVRON RED BUTTE RELEASE~~

SITE: ~~DOWNSTREAM WHETHERED SITES~~

PREPARED BY (Signature): E. Kanter

FIELD SAMPLE I.D.	SAMPLE MATRIX	DATE/TIME	MS/MSD	NO. OF CONTAINTERS	ANALYSES: fingerprint	REMARKS
78DG CPPR04		6/22/10		3	3	fingerprint

REMARKS: COLLECTED FRAC TANKS AT CHEVRON SLC REFINERY

RELINQUISHED BY: E. Kanter — DATE: 6/22/10 — TIME: 7:20 A

RECIEVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME	RECIEVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME
[signature]	6/23/10	0719	Jenifer Peterson	6/24/10	1730						

RECIEVED FOR LABORATORY BY:	DATE	TIME	AIRBILL NO.	OPENED BY:	DATE	TIME	TEMP °C	SEAL #	CONDITION
MSTS ZACHARY COTE Zachary A. Cote	06/24/10	1019							

REMARKS:

Air Bill 8731 7075 8847

IEG-4\FH\3-96-30337coc.FH8

Chevron Products Co.
Salt Lake Refinery
2351 North 1100 West
Salt Lake City, Utah 84116

CHAIN-OF-CUSTODY FORM

Sampling Company: Chevron Pipeline	Sampling Personnel:
Project Name:	Project Number: 36548966
Analytical Laboratory: Chevron SLR Main Lab	Date of Shipment/Delivery:
Method of Shipment/Delivery:	Airbill Number: 8731 7075 8847

Field Sample No.	Date Sampled	Time Sampled	Sample Type	No. of Containers	Remarks
Z8DGCPPR03	6/22/10		crude	1-gal	duplicate sample 548932-1 at SLR Main Lab - fingerprint

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Jason Wong	6/22/10	14:00	Jenifer Peterson	6/22/10	14:00
Relinquished by: Jenifer Peterson	Date: 6/24/10	Time: 1730	Received by: MST3 ZACHARY COTE Zachary A. Cote USCG	Date: 25JUN10	Time: 1010
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

United States Coast Guard
Marine Safety Laboratory
Internal Chain Of Custody Record
Neat Samples

MSL CASE: 10-159

UNIT/AGENCY: U. S. EPA Region VIII
UNIT/AGENCY CASE NUMBER: Z8DG

REMARKS: Neat samples produced as per Marine Safety Laboratory Instruction 5200.5 Sample Preparation. "LI" refers to the library sample used as the Quality Control Match.

SAMPLE NUMBERS	RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME	REASON
1-6, QC	MST3 MIKE RUSHANE	25Jun10/1129	MST1 ALICIA TODMAN	25Jun10/1129	GC PREP
SAMPLE NUMBERS 1-6, QC	RELINQUISHED BY MST1 ALICIA TODMAN	DATE/TIME 25Jun10 1215	RECEIVED BY	DATE/TIME 25Jun10 1215	REASON STORAGE
SAMPLE NUMBERS	RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME	REASON
SAMPLE NUMBERS	RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME	REASON
SAMPLE NUMBERS	RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME	REASON
SAMPLE NUMBERS	RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME	REASON
SAMPLE NUMBERS	RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME	REASON

United States Coast Guard
Marine Safety Laboratory
Internal Chain Of Custody Record
Original Sample Jars

MSL CASE: 10-159

UNIT/AGENCY: U. S. EPA Region VIII
UNIT/AGENCY CASE NUMBER: Z8DG

REMARKS:

SAMPLE NUMBERS	RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME	REASON
1-6	MST3 ZACHARY COTE	25JUN10/1030	MST3 MIKE RUSHANE	25JUN10/1030	Sample Prep & Verification
1-6	M.D. Rushane USCG	25JUN10 1137	MST3 [illegible]	25JUN10 1130	Custodial Review & Storage
SAMPLE NUMBERS	RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME	REASON
SAMPLE NUMBERS	RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME	REASON
SAMPLE NUMBERS	RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME	REASON
SAMPLE NUMBERS	RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME	REASON
SAMPLE NUMBERS	RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME	REASON

UNITED STATES COAST GUARD
MARINE SAFETY LABORATORY

SAMPLE PREPARATION SHEET

MSL CASE NUMBER: **10-159** DATE PREPARED: 25 Jun 10

Oil samples were prepared using techniques listed below. The prepared samples were then placed into a separate vial and identified with the MSL case number and sample number along with the corresponding preparation code(s).

Oil samples eliminated by IR screening method: _____

The Quality Control sample is a duplicate of sample *10-159-1*

SAMPLE NUMBERS (sequential portion only)	PREPARATION CODE	RATIO*
1, 2, 3, 4, 5, 6, QC	2	

PREPARATION CODES

1. Portion of neat sample taken from sample jar (clean fuel oils).
2. Portion of sample taken from sample jar, anhydrous $MgSO_4$ added, then centrifuged.
3. Portion of sample taken from sample jar, diluted with cyclohexane, anhydrous $MgSO_4$ added, then centrifuged.
4. Entire sample extracted with 10 mls cyclohexane, anhydrous $MgSO_4$ added, then centrifuged.
5. Entire sample extracted with two separate 10 mL portions of cyclohexane, anhydrous $MgSO_4$ added to the combined cyclohexane solution, then centrifuged.
6. * Cyclohexane solution: ratio of oil to cyclohexane is known and shown in "Ratio" column.
7. Cyclohexane solution of unknown concentration.
8. Solvent evaporated with heat and a stream of N_2. Sample of unknown concentration.
9. Other:

_____

_____

Preparer's Signature _____ MST3 MIKE RUSHANE Date: 25 Jun 10

UNITED STATES COAST GUARD
MARINE SAFETY LABORATORY

QUALITY CONTROL SHEET

MSL CASE NUMBER: **10-159** DATE PREPARED: 25 Jun 10

A Quality Control (QC) sample was analyzed along with the samples of the case.

☑ The Quality Control (QC) sample is a duplicate of sample *10-159-1*

☐ Due to limited sample quantity in all samples of this case, _____ from MSL oil library was used for the Quality Control (QC) and Quality Control Match (QCM) samples.

☐ Infrared Spectroscopy was used as a screening method before final sample preparation. No Quality Control (QC) sample was available during IR screening.

ANALYTICAL METHODS

	SAT	N/A
GAS CHROMATOGRAPHY (GC)	☒	☐
GAS CHROMATOGRAPHY / MASS SPECTROMETRY (GC-MS)	☒	☐
INFRARED SPECTROSCOPY (IR)	☐	☒

The data and conclusions for the QC and QCM samples were virtually identical: Yes ☒ No ☐

Comments: /

Supervisor Signature: K. JUAIRE Date: 28 Jun 10

U. S. Coast Guard Marine Safety Laboratory (MSL)
1 Chelsea Street, New London, CT 06320

COPY

FY 2010 Master Signature/Initials Page

Name (Print)	Signature	Initials
WAYNE R. GRONLUND		WRG
Kristy Juaire		KLJ
SEAN BAKER		SRB
ALICIA C. TORMAN		
TOD JOHNSTON		TJ
Matthew Tyson		MT
JOHN P. AGAPITO		JPA
MICHAEL D. RUSHANE		MDR
KATIE WILSON		KW
MARGARET RABENSTEIN		MAR
ZACHARY A. COTE		ZAC

Original maintained by MSL Manager WR

UNITED STATES COAST GUARD
MARINE SAFETY LABORATORY

GAS CHROMATOGRAPHY (GC) WORKSHEET

MSL CASE NUMBER: **10-159** INSTRUMENT: ANA 1 DATE: 25 Jun 10

	Comparison													*uL of Cyclohexane Solution
	4	5	6	10-151-1	10-151-2									
1	Pm	Pm	Pm	Pm	Pm									3 uL
2	Pm	Pm	Pm	Pm	Pm									3 uL
3	Pm	Pm	Pm	Pm	Pm									3 uL
4	/	m	m	Pm	Pm									3 uL
5	m	/	m	Pm	Pm									3 uL
6	m	m	/	Pm	Pm									3 uL
10-151-1	Pm	Pm	Pm	/	Pm									3 uL
10-151-2	Pm	Pm	Pm	Pm	/									25 uL

1. Method / Analytical Conditions: **ASTM D3328** SOP: **MSLINST 5200.8**

HP Program Used:
- ☑ Oil Method
- ☐ Gas Method
- ☐ Other: _____

Column Used: Front
Column: DB-5, 30m X 0.32mm ID
Film Thickness: 0.1 micron
Column Number: US8660312H

2. Sample Preparation: Solvent: Cyclohexane
Concentration: ☑ 3.0uL oil / 1000 uL solvent ☐ Other: _____
*uL of cyclohexane solution (extract) used / 1000 uL total volume to approximate 3 uL oil / 1000 uL solvent solution.

3: Comments: Do comparisons show all spill samples are the same? ☒ Yes ☐ No ☐ N/A

Analyst Signature: MST1 ALICIA TODMAN Date: 28 Jun 10

Supervisor Signature: K. JUAIRE Date: 28 Jun 10

Page 1 of 1

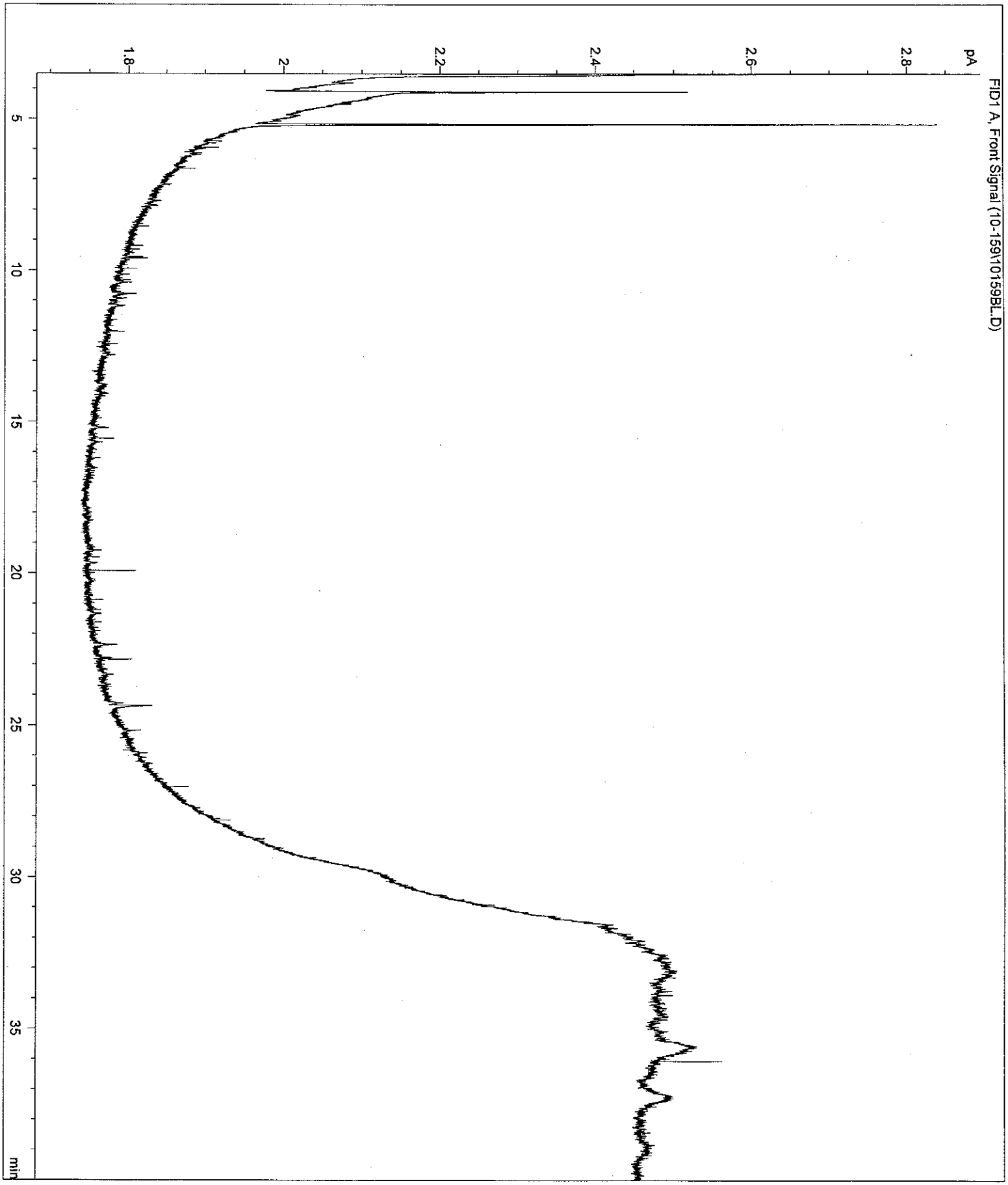
Sequence Table (Front Injector):

Line	Location	SampleName	Method Name	Num Inj	Data File
1	Vial 1	BLANK	OIL	1	BLANKF
2	Vial 2	10-159-1, QCM	OIL	1	1015901
3	Vial 3	10-159-4, SP	OIL	1	1015904
4	Vial 4	10-159-5, SP	OIL	1	1015905
5	Vial 5	10-159-6, SP	OIL	1	1015906
6	Vial 6	10-151-1, SP	OIL	1	1015101
7	Vial 7	10-151-2, SP	OIL	1	1015102
8	Vial 8	10-159-2	OIL	1	1015902
9	Vial 9	10-159-3	OILF	1	1015903
10	Vial 10	10-159-QC	OILF	1	10159QC
11	Vial 11	10-159-BL	OILF	1	10159BL

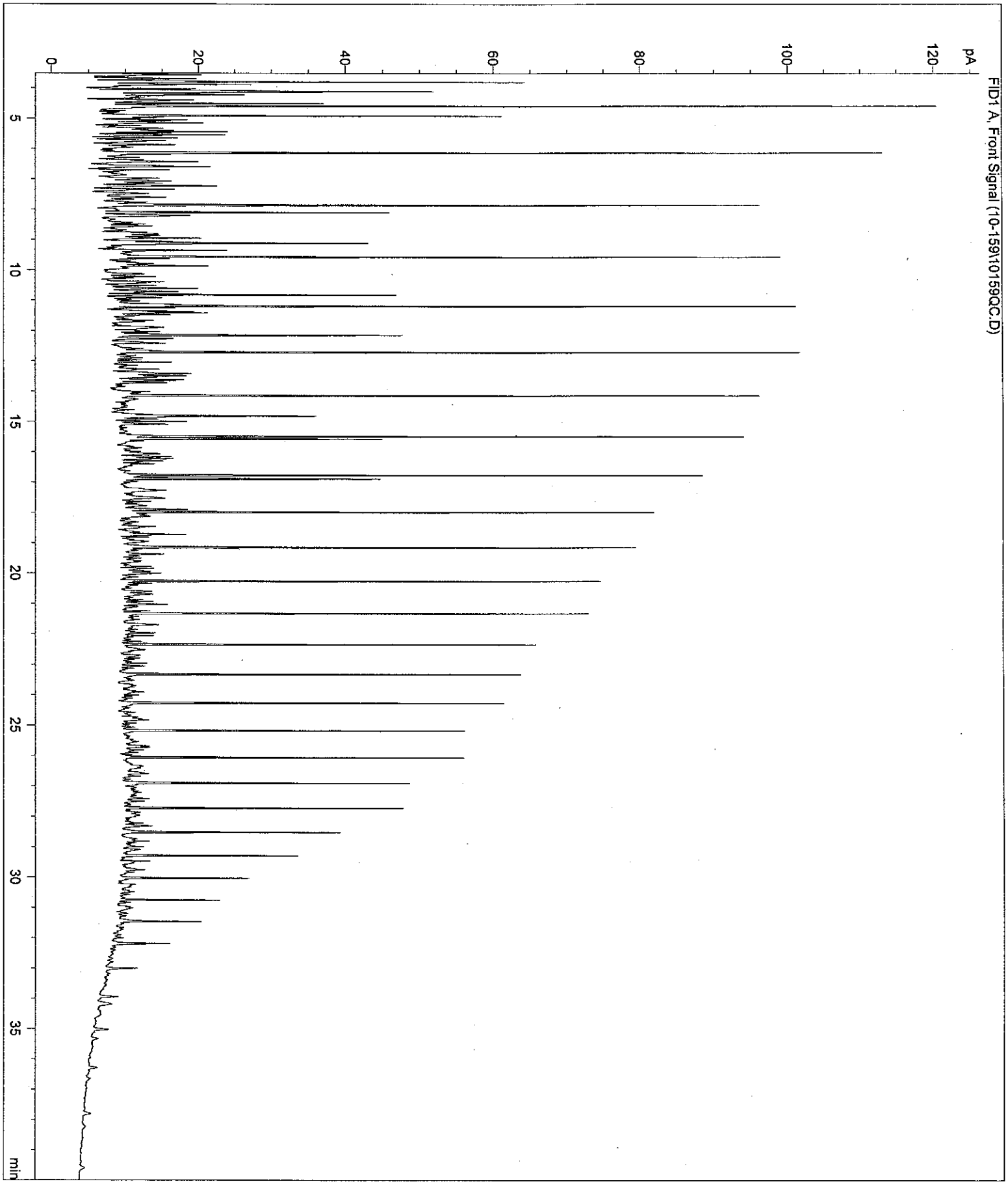
Sequence Table (Back Injector):

Line	Location	SampleName	Method Name	Num Inj	Data File
1	Vial 31	BLANK	OIL	1	BLANKR
2	Vial 32	10-160-4, QCM	OIL	1	1016004
3	Vial 33	10-160-1, SP	OIL	1	1016001
4	Vial 34	10-160-2	OIL	1	1016002
5	Vial 35	10-160-3	OIL	1	1016003
6	Vial 36	10-160-5	OIL	1	1016005
7	Vial 37	10-160-QC	OIL	1	10160QC
8	Vial 38	10-160-BL	OIL	1	10160BL

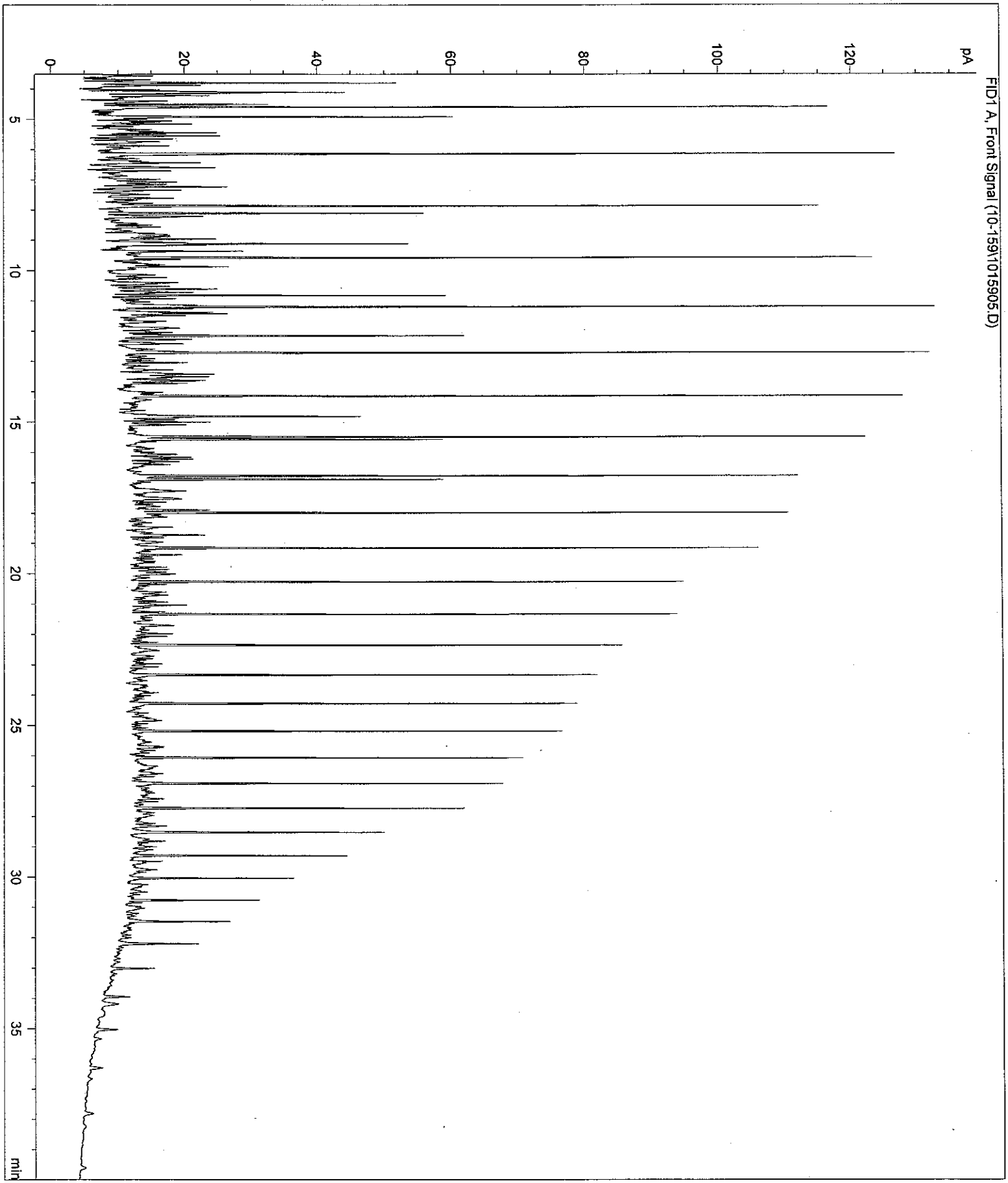
Sample Name: 10-159-BL
Comments:
Injection Date: 6/25/2010 Sequence: W:\10-159\0625.S
Acq. Method: C:\CHEM32\1\METHODS\OILF.M Seq. Line: 11
Operator: TODMAN Vial No. Vial 11
Data File: W:\10-159\10159BL.D



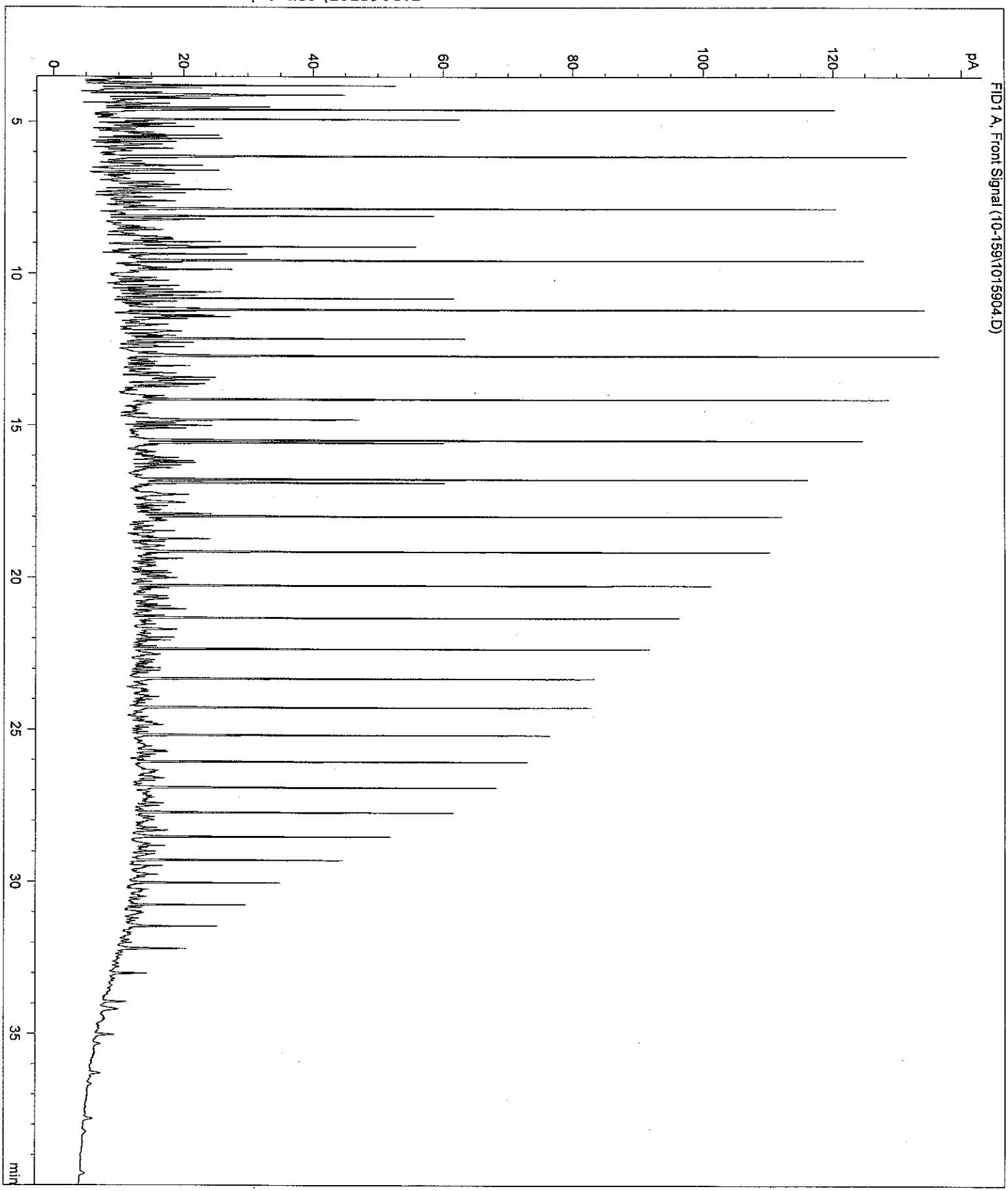
Sample Name: 10-159-QC
Comments:
Injection Date: 6/25/2010 Sequence: W:\10-159\0625.S
Acq. Method: C:\CHEM32\1\METHODS\OILF.M Seq. Line: 10
Operator: TODMAN Vial No. Vial 10
Data File: W:\10-159\10159QC.D



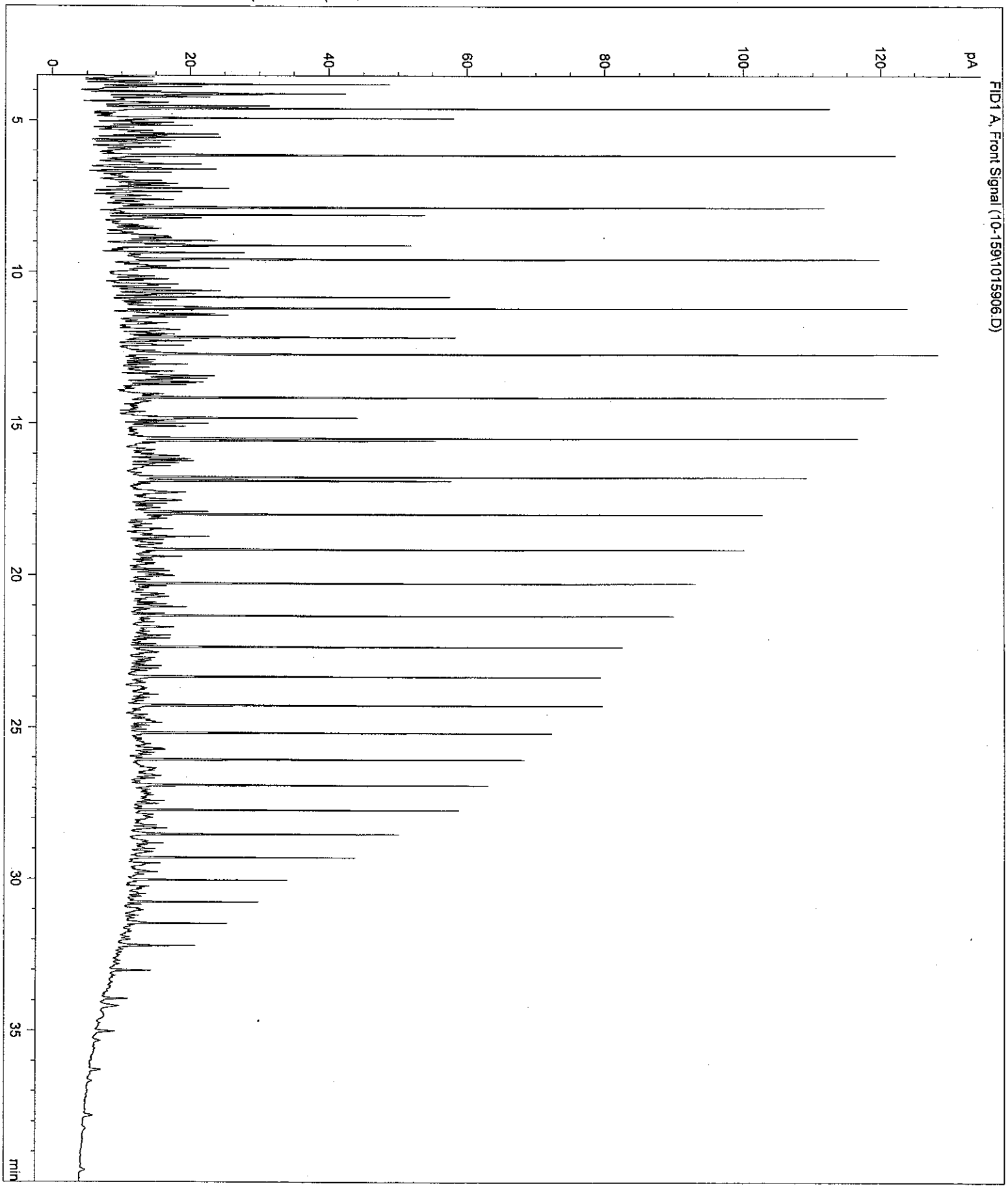
Sample Name: 10-159-5, SP
Comments:
Injection Date: 6/25/2010 Sequence: W:\10-159\0625.S
Acq. Method: C:\CHEM32\1\METHODS\OIL.M Seq. Line: 4
Operator: TODMAN Vial No. Vial 4
Data File: W:\10-159\1015905.D



Sample Name: 10-159-4, SP
Comments:
Injection Date: 6/25/2010 Sequence: W:\10-159\0625.S
Acq. Method: C:\CHEM32\1\METHODS\OIL.M Seq. Line: 3
Operator: TODMAN Vial No. Vial 3
Data File: W:\10-159\1015904.D

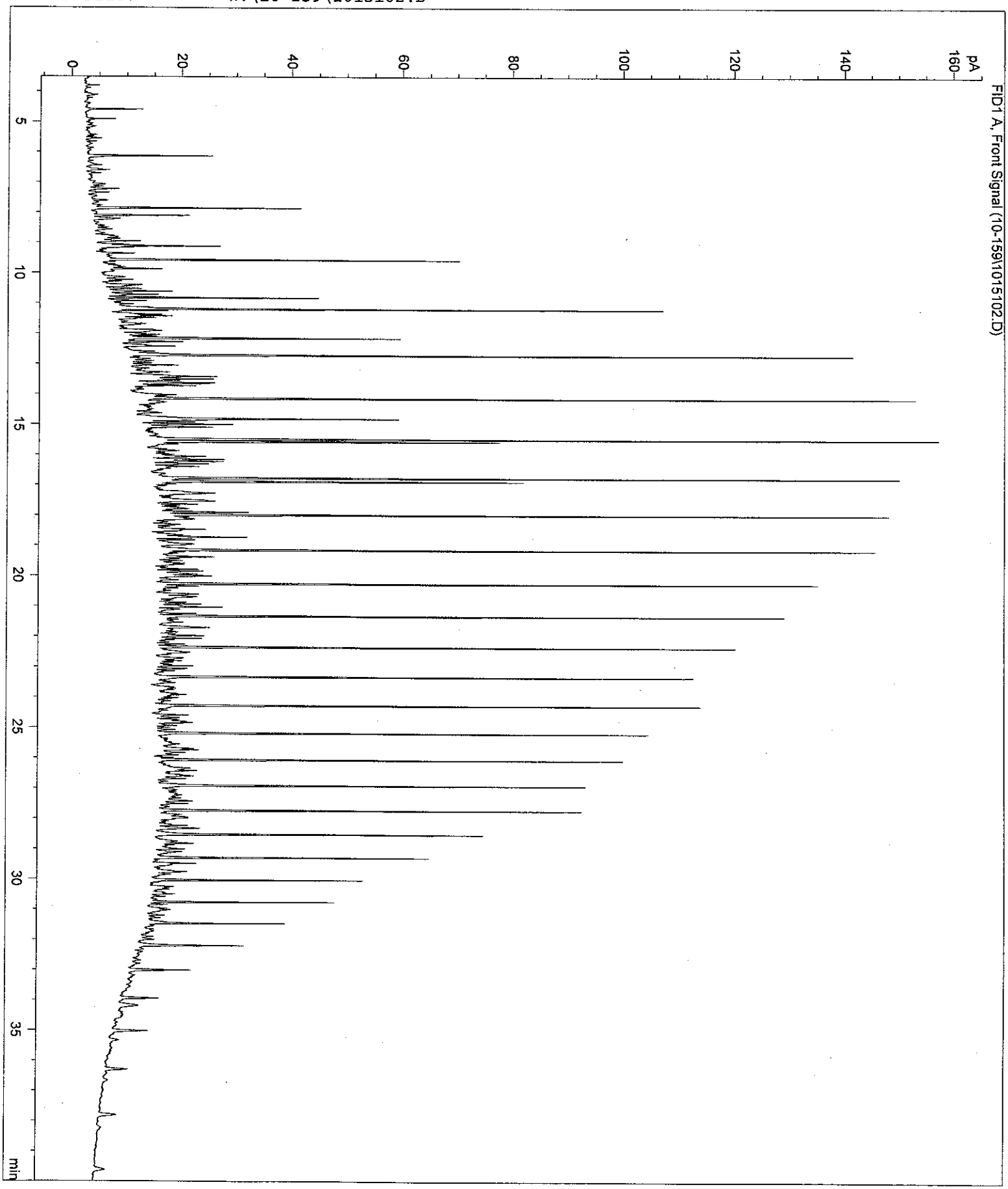


Sample Name: 10-159-6, SP
Comments:
Injection Date: 6/25/2010 Sequence: W:\10-159\0625.S
Acq. Method: C:\CHEM32\1\METHODS\OIL.M Seq. Line: 5
Operator: TODMAN Vial No. Vial 5
Data File: W:\10-159\1015906.D

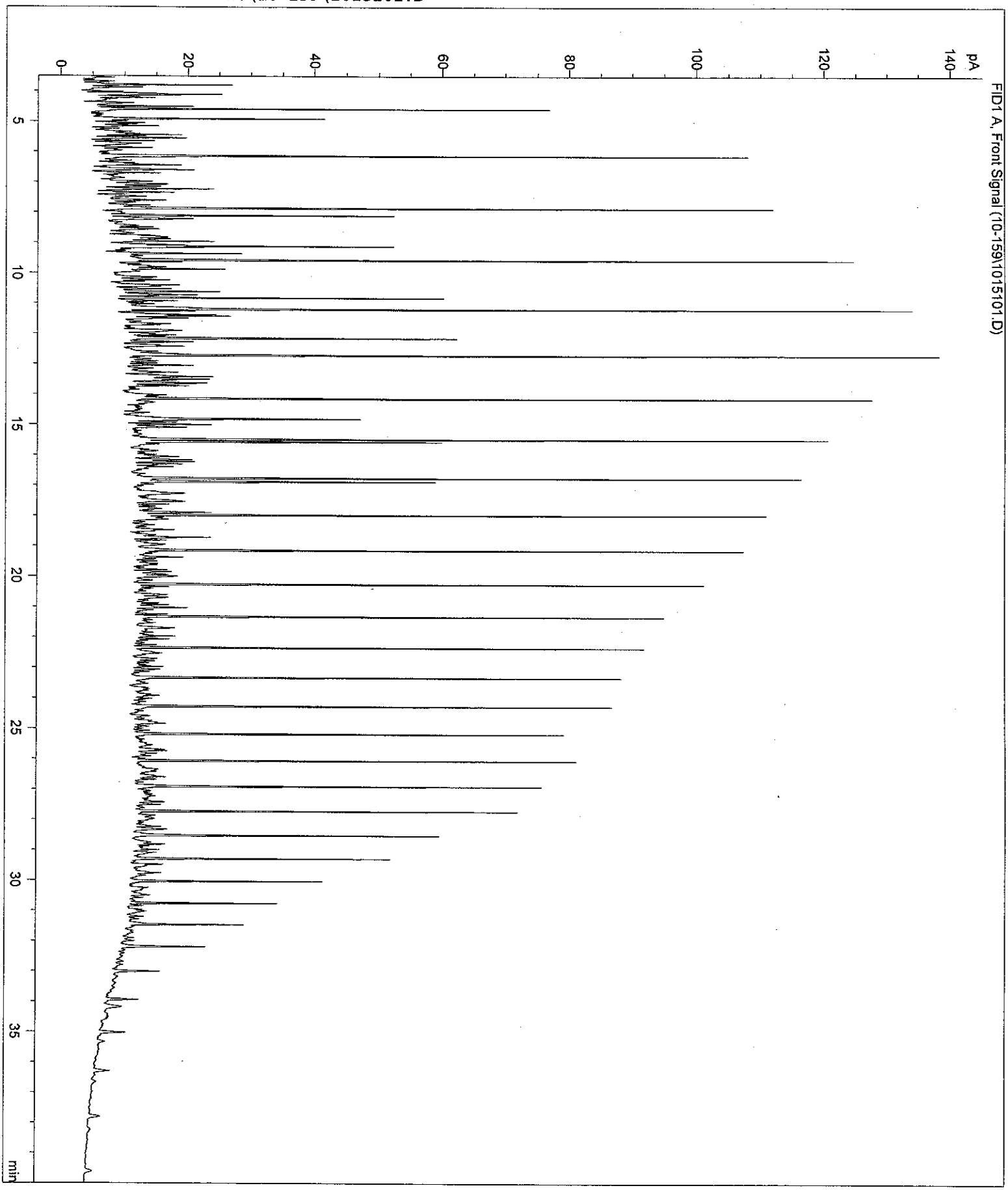


Sample Name: 10-151-2, SP
Comments:
Injection Date: 6/25/2010
Acq. Method: C:\CHEM32\1\METHODS\OIL.M
Operator: TODMAN
Data File: W:\10-159\1015102.D

Sequence: W:\10-159\0625.S
Seq. Line: 7
Vial No. Vial 7

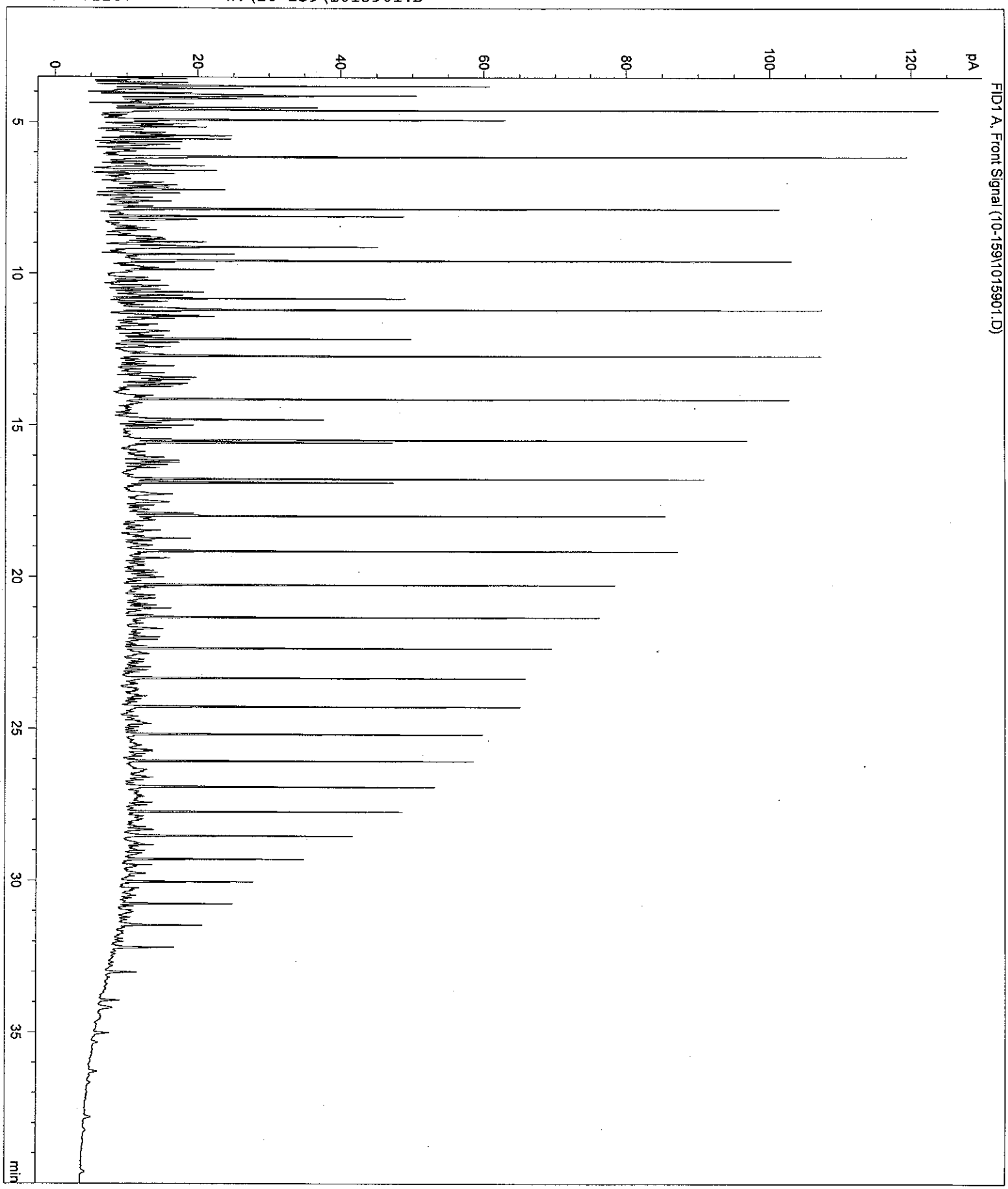


Sample Name: 10-151-1, SP
Comments:
Injection Date: 6/25/2010 Sequence: W:\10-159\0625.S
Acq. Method: C:\CHEM32\1\METHODS\OIL.M Seq. Line: 6
Operator: TODMAN Vial No. Vial 6
Data File: W:\10-159\1015101.D

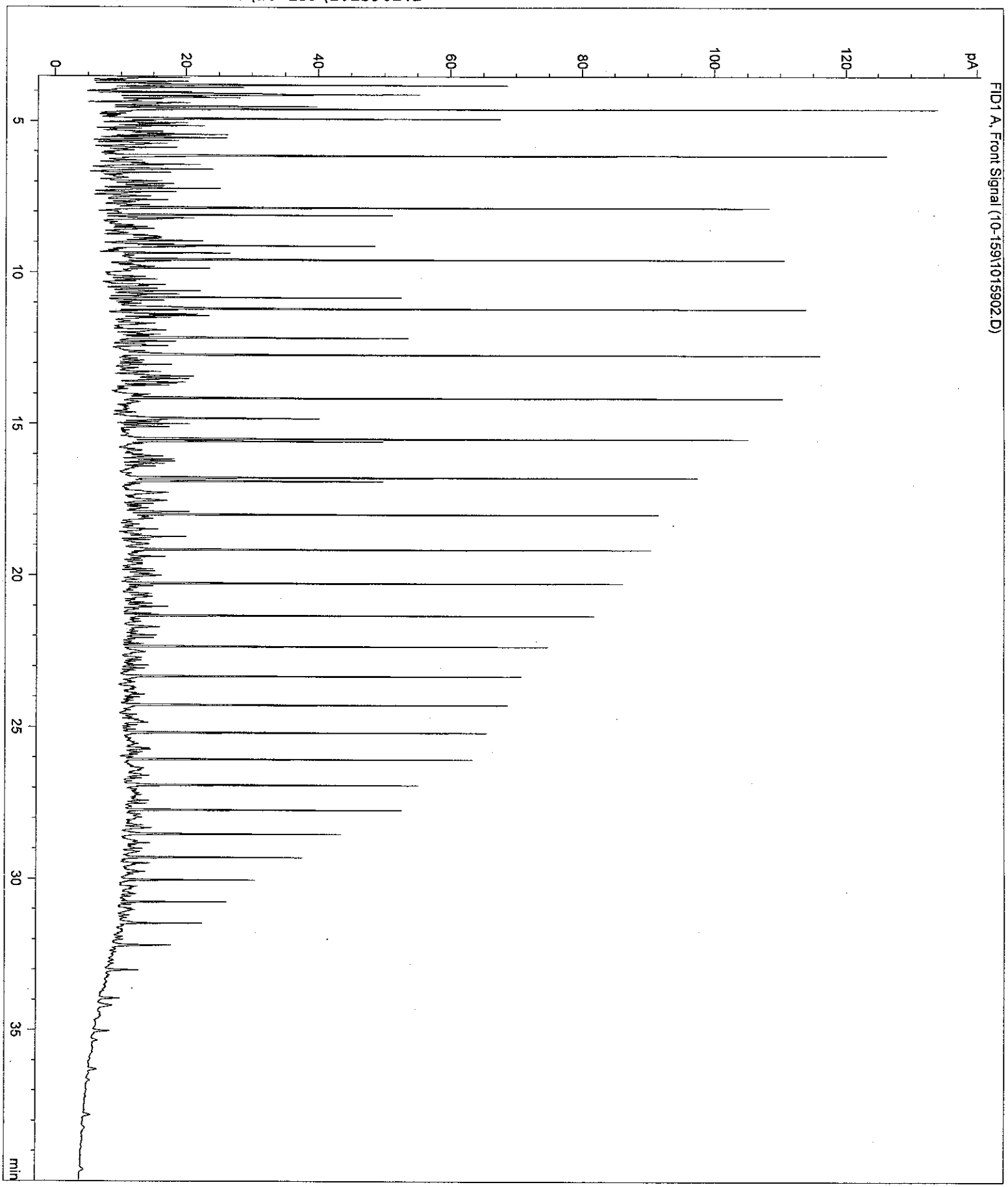


Sample Name: 10-159-1, QCM
Comments:
Injection Date: 6/25/2010
Acq. Method: C:\CHEM32\1\METHODS\OIL.M
Operator: TODMAN
Data File: W:\10-159\1015901.D

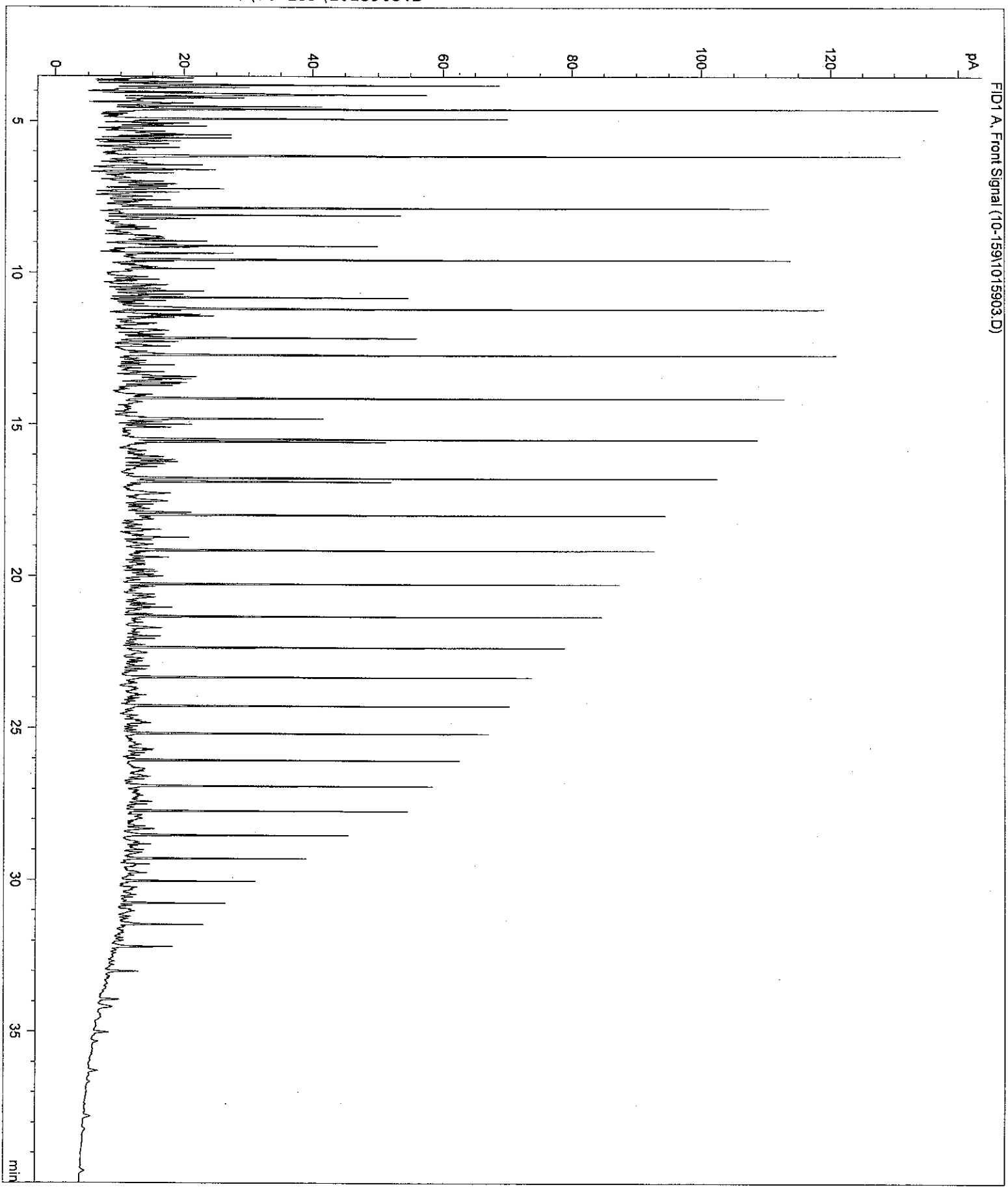
Sequence: W:\10-159\0625.S
Seq. Line: 2
Vial No. Vial 2



Sample Name: 10-159-2
Comments:
Injection Date: 6/25/2010 Sequence: W:\10-159\0625.S
Acq. Method: C:\CHEM32\1\METHODS\OIL.M Seq. Line: 8
Operator: TODMAN Vial No. Vial 8
Data File: W:\10-159\1015902.D



Sample Name: 10-159-3
Comments:
Injection Date: 6/25/2010 Sequence: W:\10-159\0625.S
Acq. Method: C:\CHEM32\1\METHODS\OILF.M Seq. Line: 9
Operator: TODMAN Vial No. Vial 9
Data File: W:\10-159\1015903.D



UNITED STATES COAST GUARD
MARINE SAFETY LABORATORY

GAS CHROMATOGRAPHY-MASS SPECTROMETRY (GC-MS) WORKSHEET

MSL CASE NUMBER: **10-159** INSTRUMENT: ANA 2 DATE: 25 Jun 10

	Comparison													
	4	5	6	10-151-1	10-151-2									*uL of Cyclohexane Solution
1	Pm	Pm	Pm	Pm	Pm									5 uL
2	Pm	Pm	Pm	Pm	Pm									5 uL
3	Pm	Pm	Pm	Pm	Pm									5 uL
4	/	m	m	Pm	Pm									5 uL
5	m	/	m	Pm	Pm									5 uL
6	m	m	/	Pm	Pm									5 uL
10-151-1	Pm	Pm	Pm	/	Pm									5 uL
10-151-2	Pm	Pm	Pm	Pm	/									40 uL

1. Method / Analytical Conditions: **ASTM D5739** SOP: **MSLINST 5200.9 / 5200.10**

HP Program Used:
- ☑ Biomark Method
- ☐ Gas Method
- ☐ Other:

Column: 30m x 0.25mm ID
Film Thickness: 0.25 micron
Column Number: US6545822H
Carrier Gas: Helium (Grade 6)

2. Sample Preparation: Solvent: Cyclohexane
Concentration: ☑ 5.0uL oil / 1000 uL solvent ☐ Other:
*uL of cyclohexane solution (extract) used / 1000 uL total volume to approximate 5 uL oil / 1000 uL solvent solution.

3: Comments: Do comparisons show all spill samples are the same? ☒ Yes ☐ No ☐ N/A

Analyst Signature: MST1 ALICIA TODMAN Date: 28 Jun 10

Supervisor: K. JUAIRE Date: 28 Jun 10

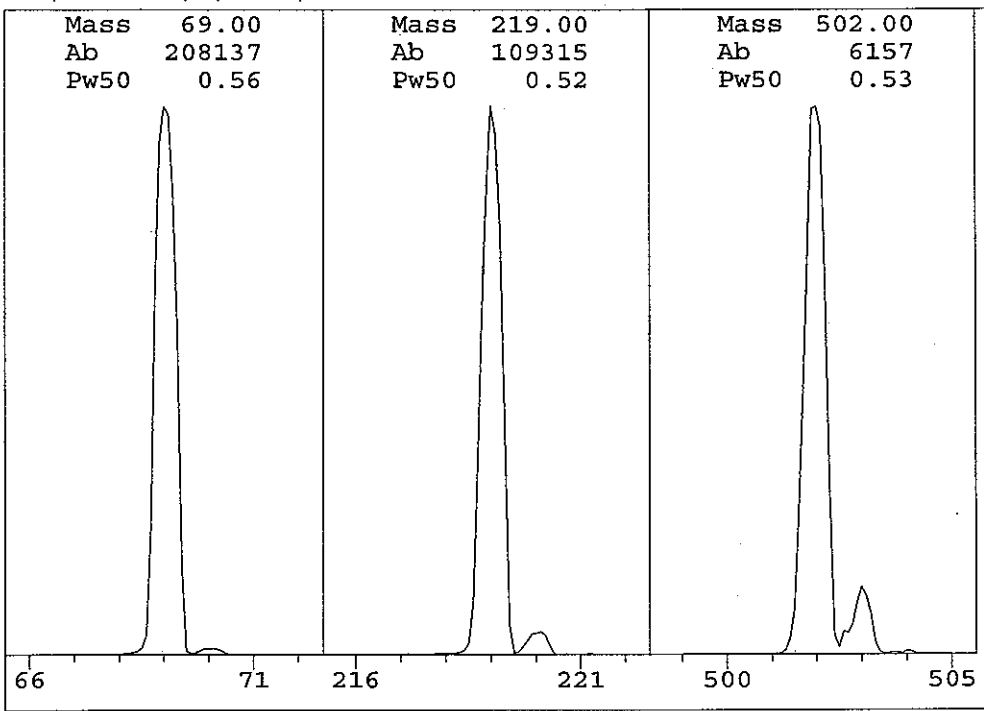
Page 1 of 1

```
   Sequence Name: W:\2010\MS_data\10-159\0625.S
         Comment: 10-159
        Operator: ACT
       Data Path: W:\2010\MS_DATA\10-159\
Instrument Control  Pre-Seq Cmd:
Data Analysis       Pre-Seq Cmd:

Instrument Control Post-Seq Cmd:
Data Analysis      Post-Seq Cmd:

   Method Sections To Run      On A Barcode Mismatch
    (X) Full Method              (X) Inject Anyway
    ( ) Reprocessing Only        ( ) Don't Inject

   ------------------------------------------------------------------------
   Line                    Sample Name/Misc Info
 1)  Sample         1  BLANK    BIOMARK3 BLANK
 2)  Sample         2  1015901  BIOMARK3 10-159-1, QCM
 3)  Sample         3  1015904  BIOMARK3 10-159-4, SP
 4)  Sample         4  1015905  BIOMARK3 10-159-5, SP
 5)  Sample         5  1015906  BIOMARK3 10-159-6, SP
 6)  Sample         6  1015101  BIOMARK3 10-151-1, SP
 7)  Sample         7  1015102  BIOMARK3 10-151-2, SP
 8)  Sample         8  1015902  BIOMARK3 10-159-2
 9)  Sample         9  1015903  BIOMARK3 10-159-3
10)  Sample        10  10159QC  BIOMARK3 10-159-QC
11)  Sample        11  10159BL  BIOMARK3 10-159-BL
```

5975 Standard Spectra Target Tune

Fri Jun 25 12:46:38 2010 Instrument: Instrument #1

C:\MSDCHEM\1\5975\stune.u



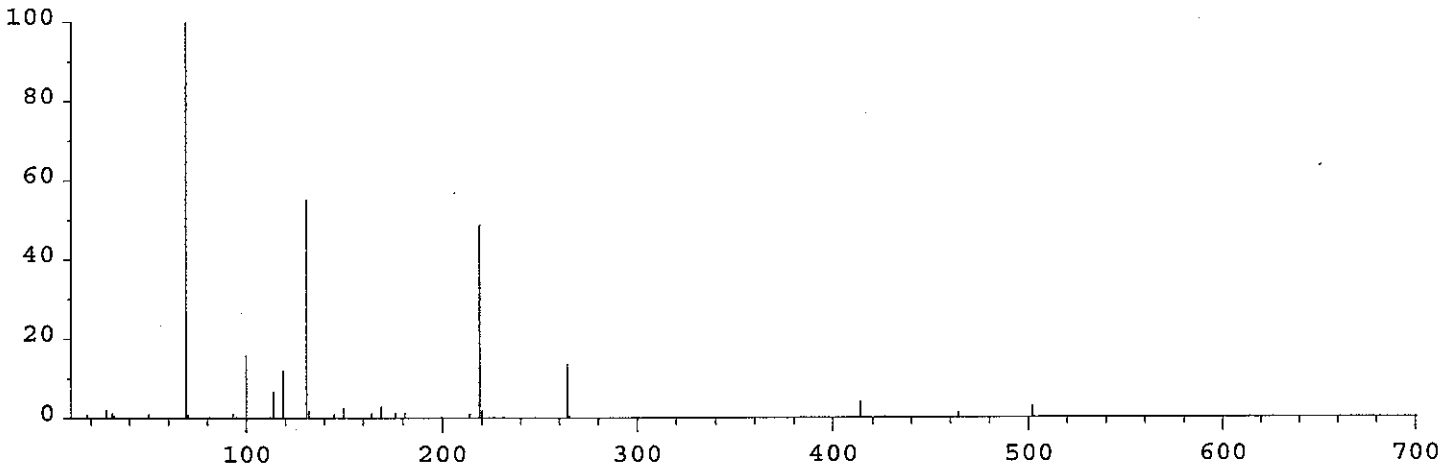
Ion Pol	POS	MassGain	-550
		MassOffs	-37
Emission	34.6	AmuGain	2025
EIEnrgy	69.9	AmuOffs	125.750
Filament	1	Wid219	-0.019
		DC Pol	POS
Repeller	14.88		
IonFcus	60.7	HEDEnab	ON
EntLens	0.0	EMVolts	1647
EntOffs	VAR		
		Samples	8
PFTBA	OPEN	Averages	3
		Stepsize	0.10

Zones:

MS Source	230	TurboSpd	100
MS Quad	150	HiVac	1.00e+00

Scan: 10.00 - 701.00 Samples: 8 Thresh: 100 Step: 0.10

82 peaks Base: 69.00 Abundance: 197696



Mass	Abund	Rel Abund	Iso Mass	Iso Abund	Iso Ratio
69.00	197696	100.00	70.00	1986	1.00
219.00	96296	48.71	220.00	4014	4.17
502.00	5705	2.89	503.00	604	10.59

Air/Water Check: H20~0.89% N2~2.23% O2~0.80% CO2~0.00% N2/H2O~250.88%

Column Flow: Front: 1.3 Back: 0 ml/min. Interface Temp: 305

Ramp Criteria:

Ion Focus Maximum 90 volts using ion 502; EM Gain 63169

Repeller Maximum 20 volts using ion 219;

MassGain Values @Samples: -546@3 -531@2 -516@1 -465@0 -421@FS

TARGET MASS:	50	69	131	219	414	502	1050
Amu Offset:	125.8	125.8	125.8	125.8	125.8	125.8	125.8
Entrance Lens Offset:	13.1	10.5	11.0	10.8	12.3	12.5	12.5
Target Abund(%):	1.0	100.0	55.0	45.0	3.5	2.5	
Actual Tune Abund(%):	1.0	100.0	55.3	48.7	4.2	2.9	

Quantitation Report (Not Reviewed)

Data Path : W:\2010\MS_DATA\10-159\
Data File : 10159BL.D
Acq On : 26 Jun 2010 1:20 am
Operator : ACT
Sample : 10-159-BL
Misc :
ALS Vial : 11 Sample Multiplier: 1

Quant Time: Jun 26 02:14:07 2010
Quant Method : C:\MSDCHEM\1\METHODS\BIOMARK3.M
Quant Title :
QLast Update : Wed May 27 09:43:48 2009
Response via : Initial Calibration

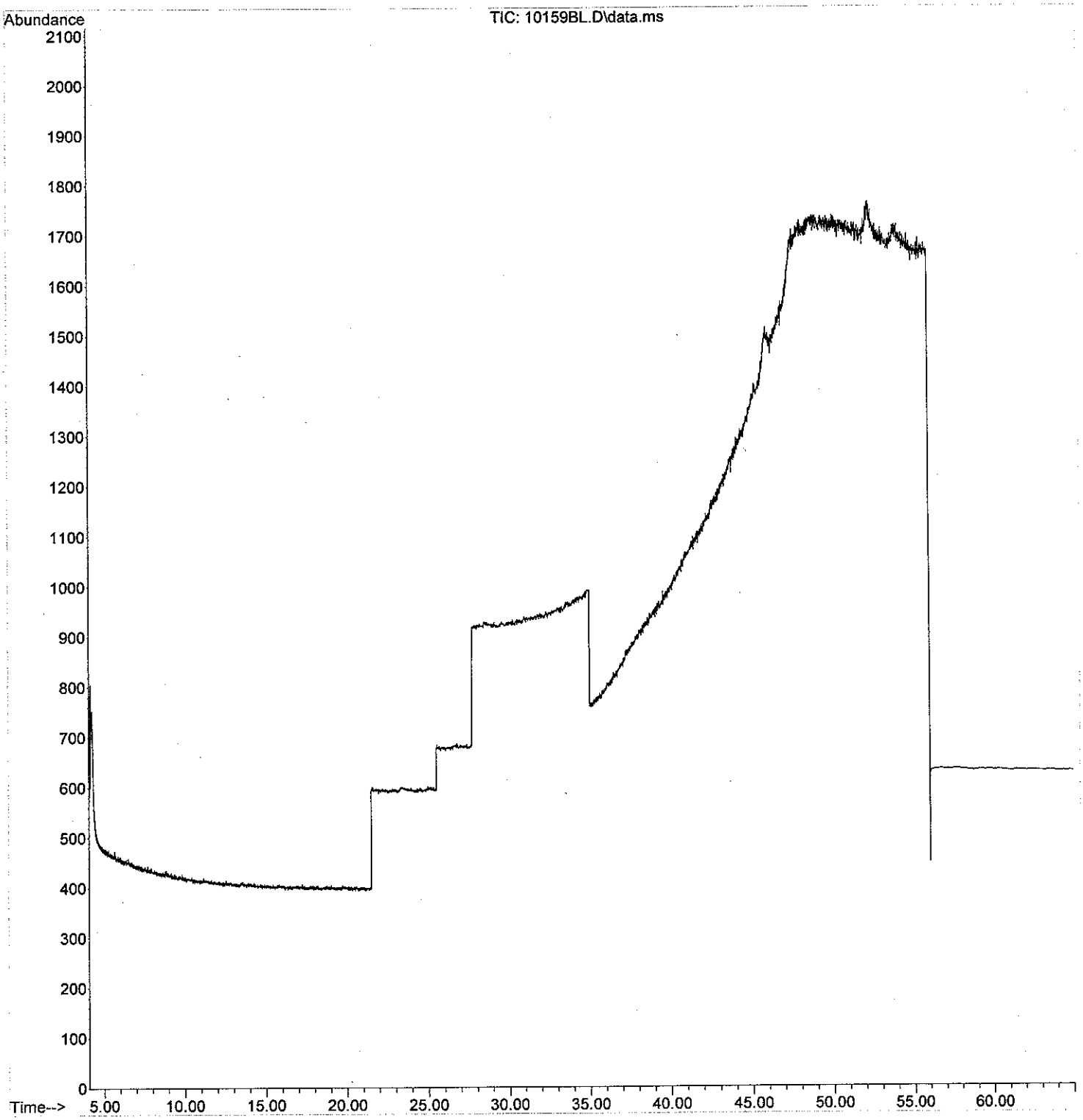
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
Target Compounds						Qvalue
1) 85-SATURATED HYDROCARBONS	0.000	85	0	N.D.		
2) n-C17	0.000	85	0	N.D.		
3) PRISTANE	0.000	85	0	N.D.		
4) n-C18	0.000	85	0	N.D.		
5) PHYTANE	0.000	85	0	N.D.		
6) 113-SATURATED HYDROCAR...	0.000	113	0	N.D.		
7) ACYCLIC ISOPRENOIDS/AL...	0.000	183	0	N.D.		
8) C2-NAPHTHALENES	0.000	156	0	N.D.		
9) C3-NAPHTHALENES	0.000	170	0	N.D.		
10) C4-NAPHTHALENES	0.000	184	0	N.D.		
11) PHENANTHRENE/ANTHRACENE	0.000	178	0	N.D.		
12) BENZONAPHTHIOPHENE	0.000	234	0	N.D.		
13) DIBENZOTHIOPHENE	0.000	184	0	N.D.		
14) C1-DIBENZOTHIOPHENE	0.000	198	0	N.D.		
15) C2-DIBENZOTHIOPHENE	0.000	212	0	N.D.		
16) C3-DIBENZOTHIOPHENE	27.941	226	103	No Calib		
17) C1-PHENANTHRENES	0.000	192	0	N.D.		
18) C2-PHENANTHRENES	0.000	206	0	N.D.		
19) C3-PHENANTHRENES	0.000	220	0	N.D.		
20) TRITERPANES/HOPANES	0.000	191	0	N.D.		
21) HOPANE A	0.000	191	0	N.D.		
22) HOPANE B	0.000	191	0	N.D.		
23) 14 a(H) STERANES	0.000	217	0	N.D.		
24) 14 b(H) STERANES	0.000	218	0	N.D.		
25) TRI-AROMATIC STERANES	0.000	231	0	N.D.		
26) METHYLHOPANES	46.422	205	324	No Calib		
27) NORHOPANES	0.000	177	0	N.D.		
28) PYRENE/FLUORANTHENE	0.000	202	0	N.D.		
29) METHYL PYRENE	0.000	216	0	N.D.		
30) FLUORENE	0.000	166	0	N.D.		
31) BICYCLONAPHTHALENES	0.000	208	0	N.D.		
32) CHRYSENE	0.000	228	0	N.D.		
33) C1-CHRYSENE	0.000	242	0	N.D.		
34) C2-CHRYSENE	0.000	256	0	N.D.		
35) C3-CHRYSENE	0.000	270	0	N.D.		
36) C4-CHRYSENE	0.000	284	0	N.D.		
37) SESQUITERPANES	0.000	123	0	N.D.		

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (Not Reviewed)

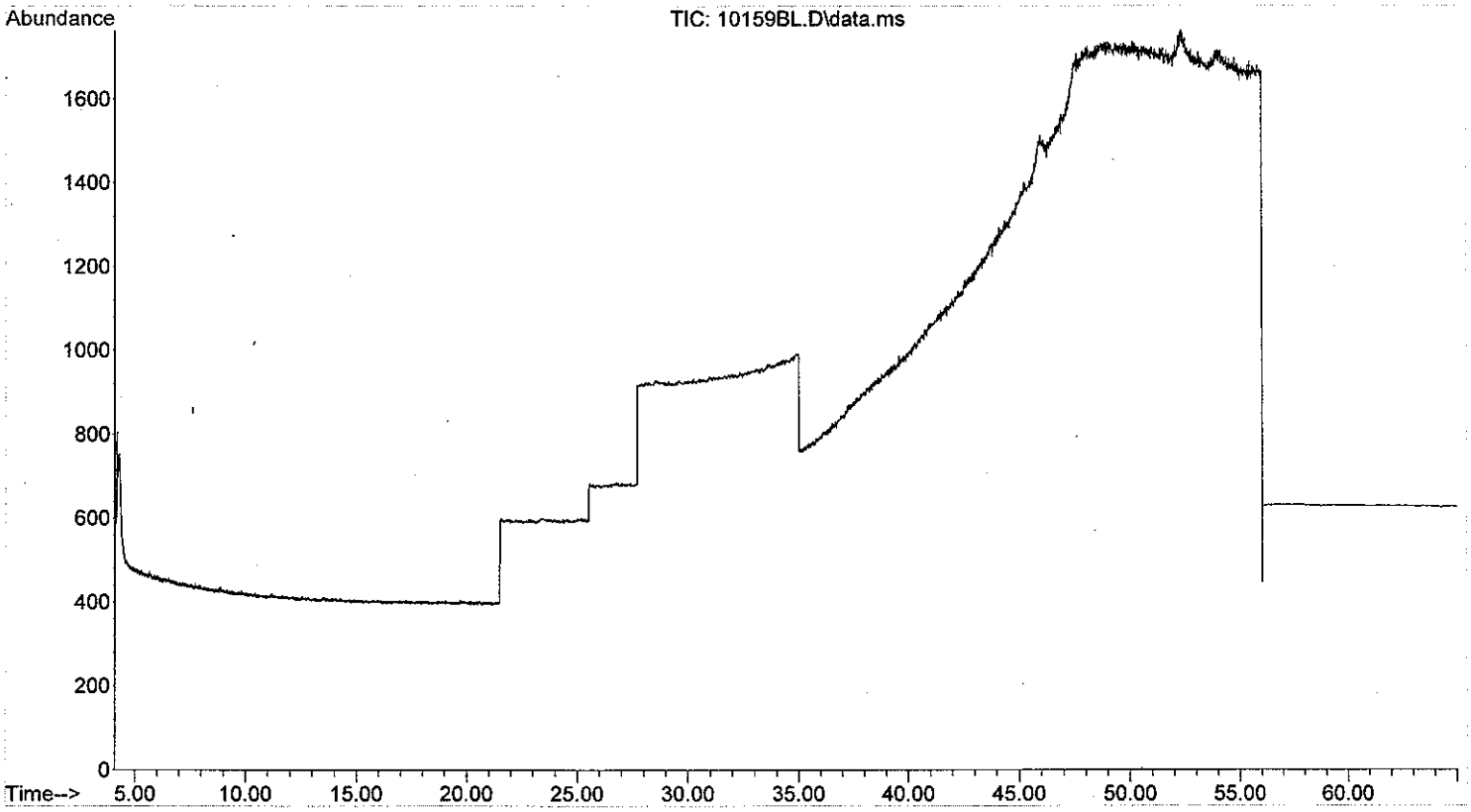
Data Path : W:\2010\MS_DATA\10-159\
Data File : 10159BL.D
Acq On : 26 Jun 2010 1:20 am
Operator : ACT
Sample : 10-159-BL
Misc :
ALS Vial : 11 Sample Multiplier: 1

Quant Time: Jun 26 02:14:07 2010
Quant Method : C:\MSDCHEM\1\METHODS\BIOMARK3.M
Quant Title :
QLast Update : Wed May 27 09:43:48 2009
Response via : Initial Calibration

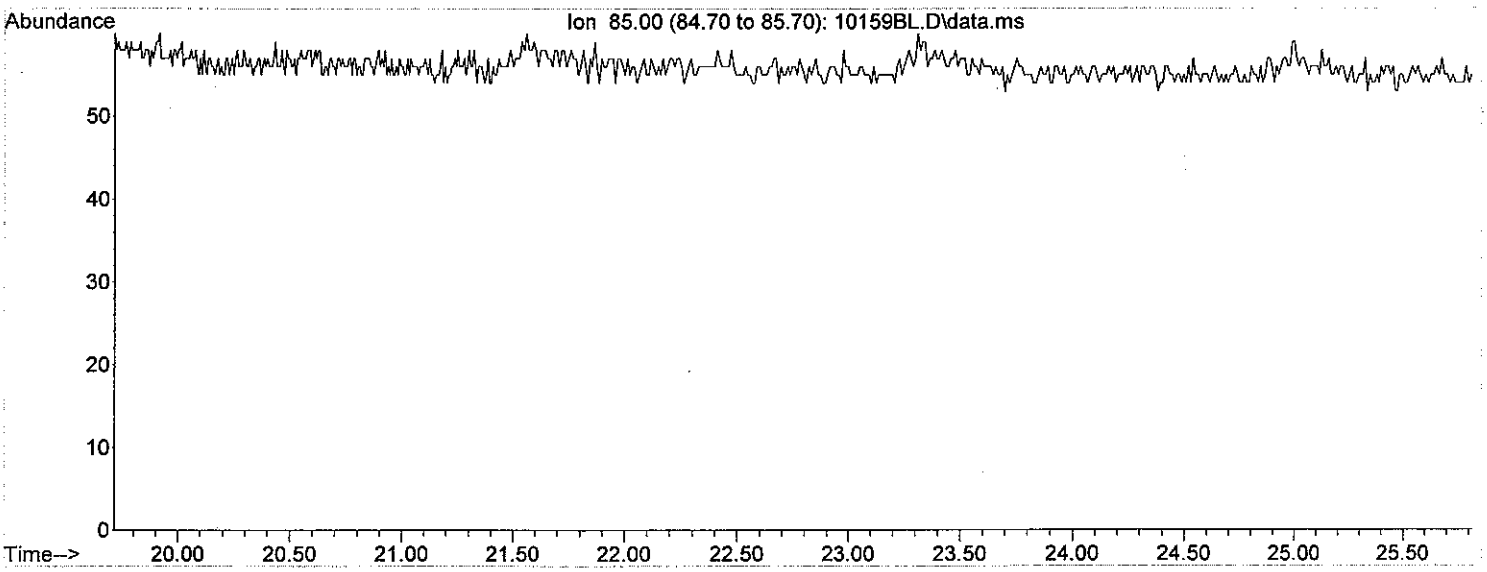


MSL GC-MS2 BIOMARKER ANALYSIS

File: W:\2010\MS_DATA\10-159\10159BL.D
Operator: ACT
Date Acquired: 26 Jun 2010 1:20 am
Method File: BIOMARK3.M
Sample Name: 10-159-BL Vial: 11
Misc Info:



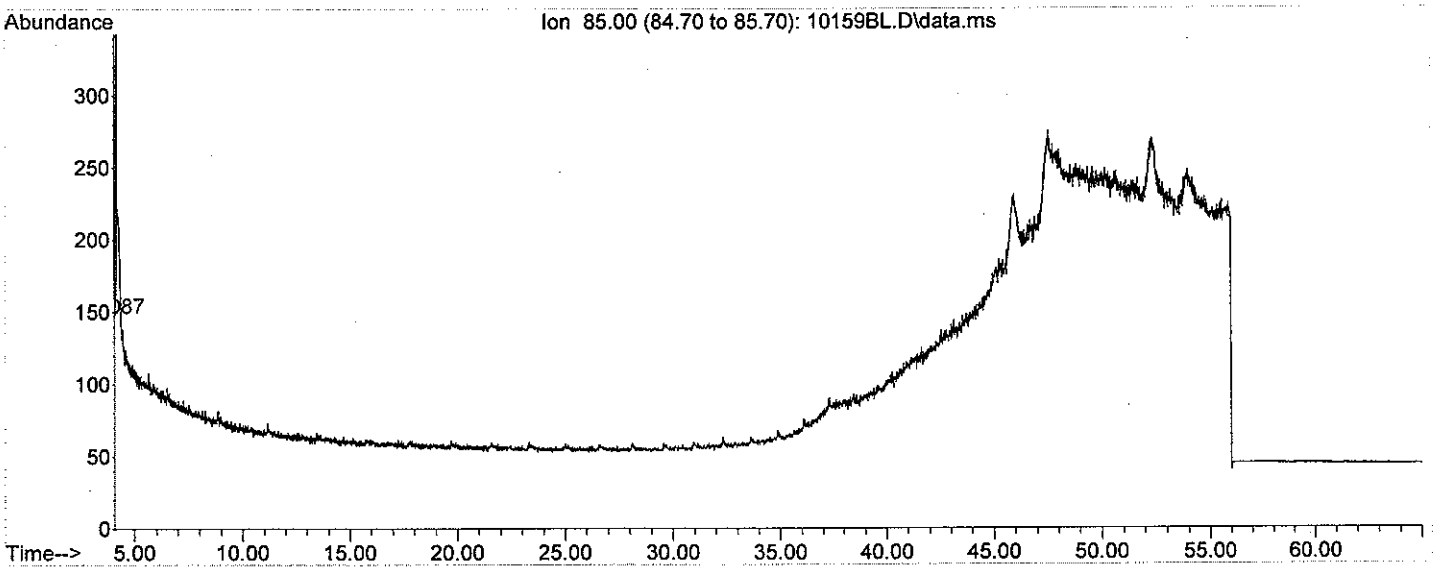
n-C17, Pristane, n-C18, Phytane



Pristane/Phytane = ----
C17/C18 = ----
Pristane/C17 = ----
Phytane/C18 = ----

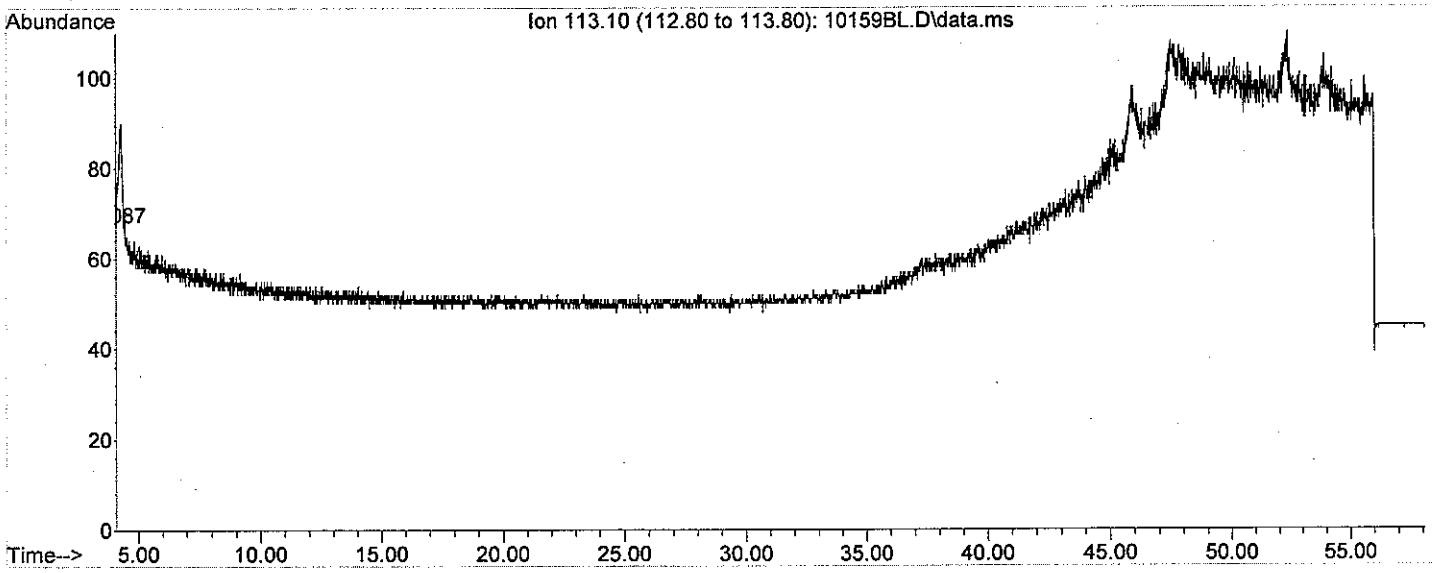
85-SATURATED HYDROCARBONS

Area = 0



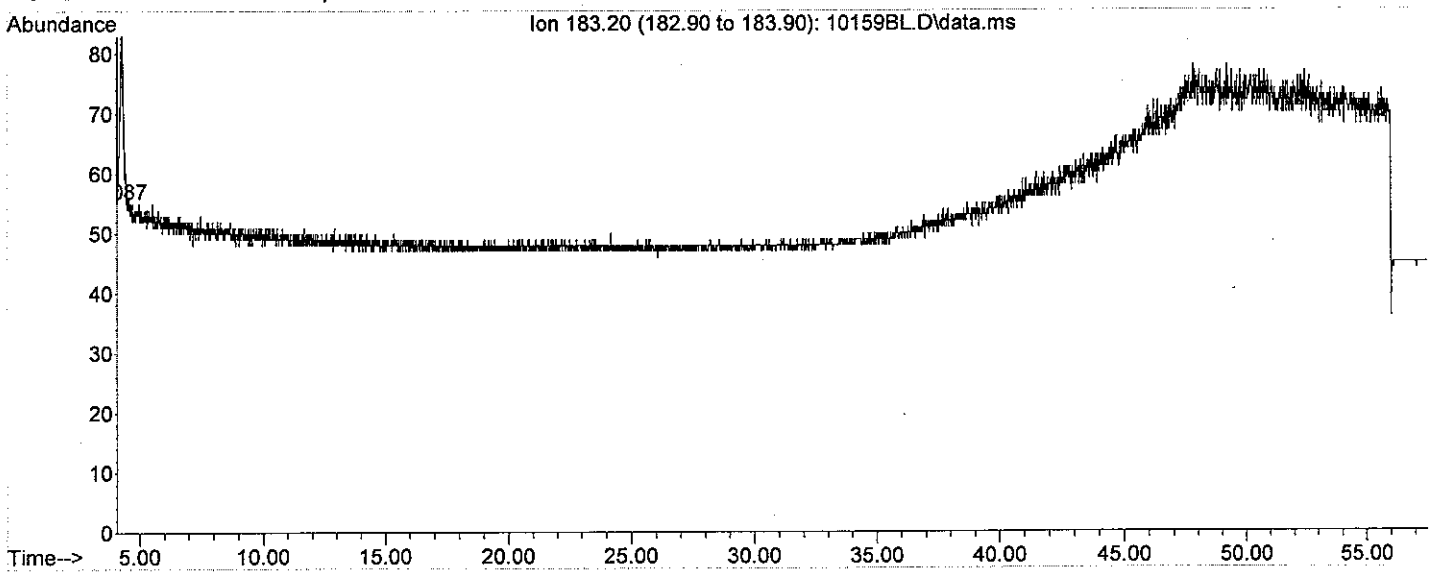
113-SATURATED HYDROCARBONS

Area = 0

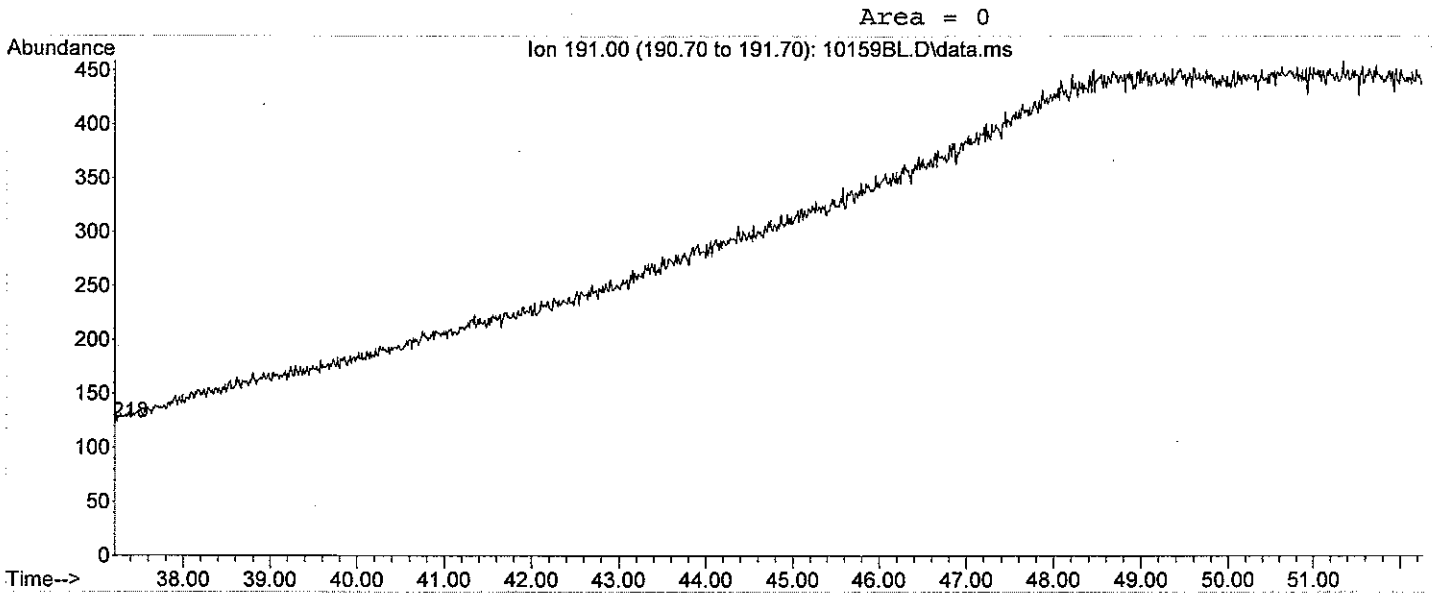


ACYCLIC ISOPRENOIDS/ALKANES

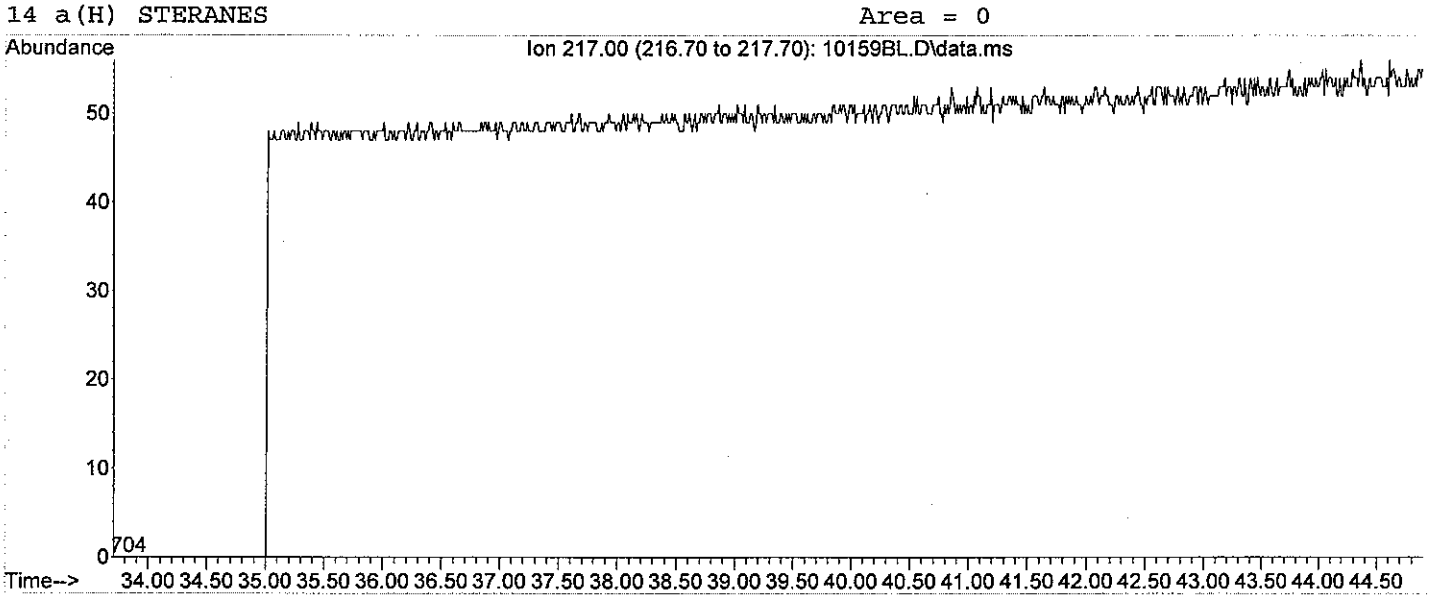
Area = 0



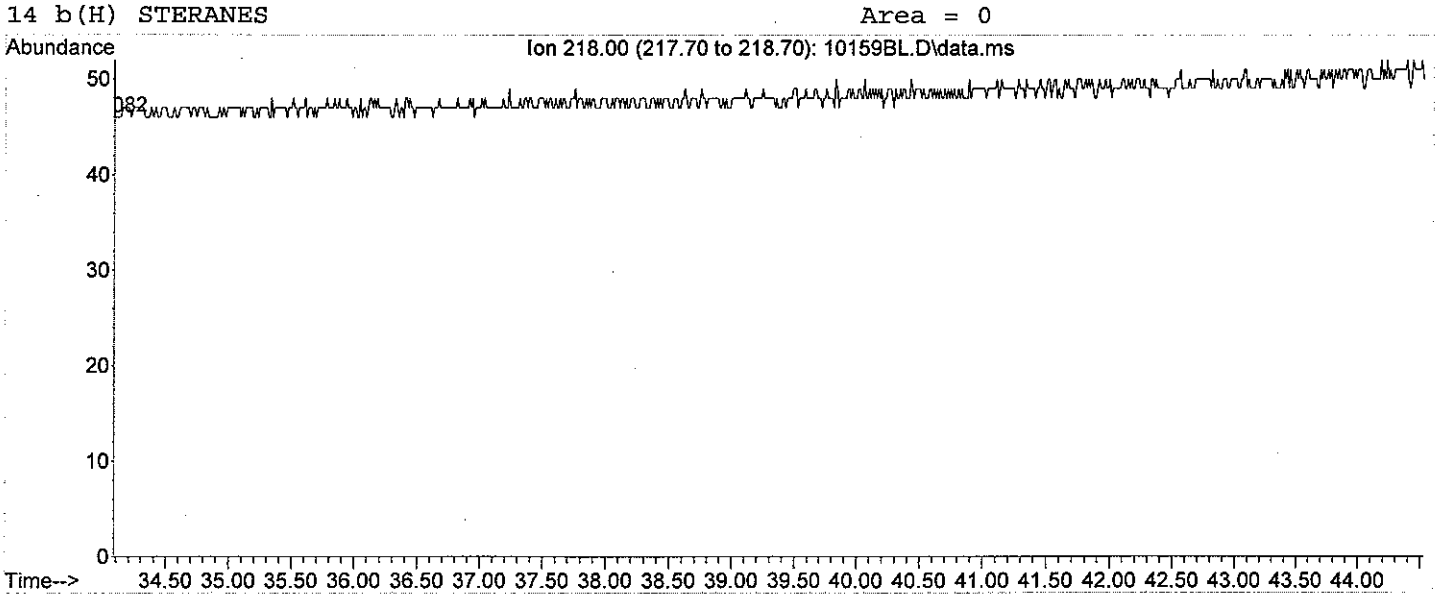
TRITERPANES/HOPANES



14 a(H) STERANES



14 b(H) STERANES



Quantitation Report (Not Reviewed)

Data Path : W:\2010\MS_DATA\10-159\
Data File : 10159QC.D
Acq On : 26 Jun 2010 12:07 am
Operator : ACT
Sample : 10-159-QC
Misc :
ALS Vial : 10 Sample Multiplier: 1

Quant Time: Jun 26 01:01:30 2010
Quant Method : C:\MSDCHEM\1\METHODS\BIOMARK3.M
Quant Title :
QLast Update : Wed May 27 09:43:48 2009
Response via : Initial Calibration

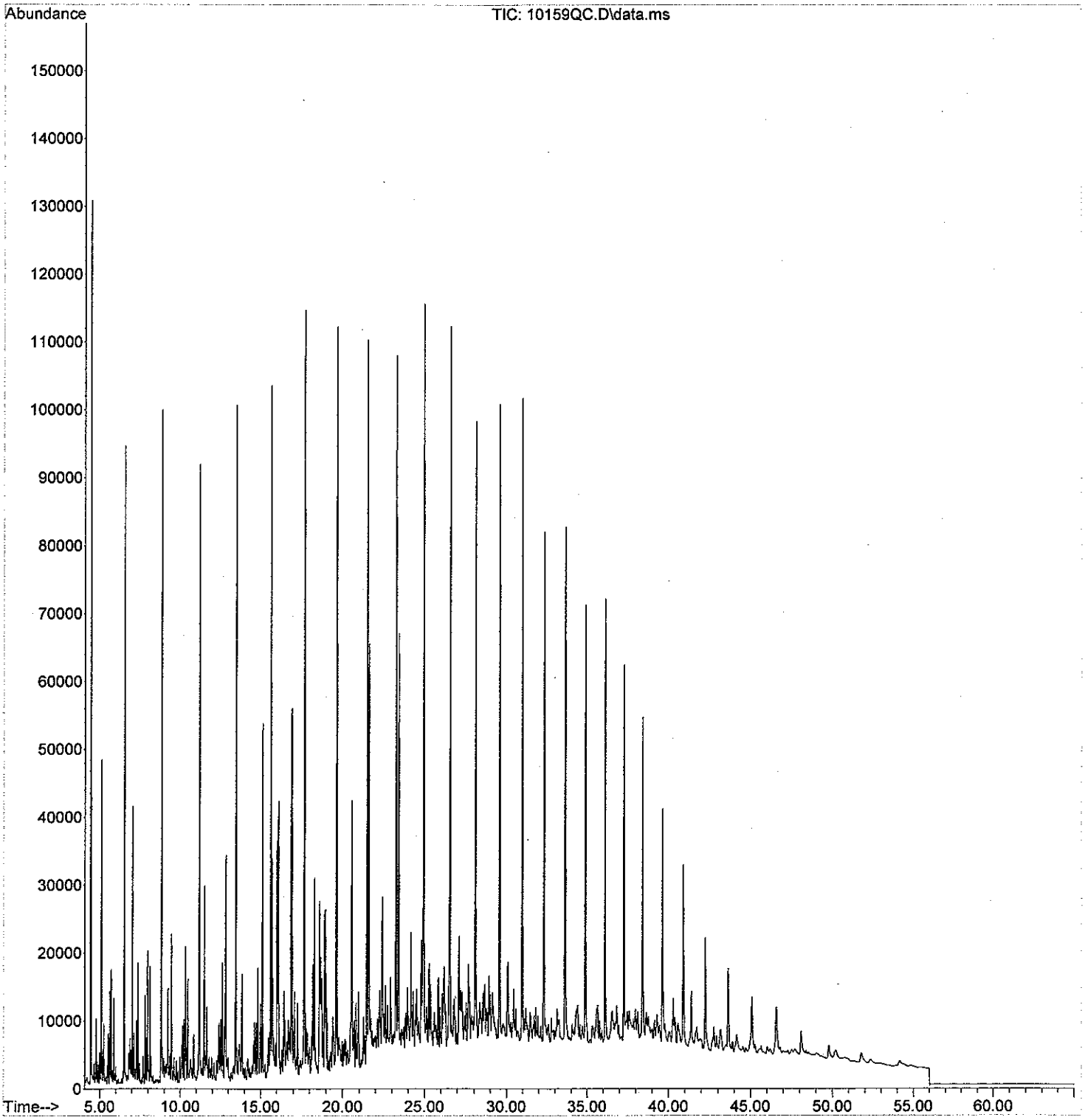
Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
Target Compounds					Qvalue
1) 85-SATURATED HYDROCARBONS	18.748	85	423525	No Calib	
2) n-C17	0.000	85	0	N.D.	
3) PRISTANE	21.895	85	-8785	No Calib	
4) n-C18	0.000	85	0	N.D.	
5) PHYTANE	0.000	85	0	N.D.	
6) 113-SATURATED HYDROCAR...	0.000	113	0	N.D.	
7) ACYCLIC ISOPRENOIDS/AL...	0.000	183	0	N.D.	
8) C2-NAPHTHALENES	0.000	156	0	N.D.	
9) C3-NAPHTHALENES	19.409	170	152547	No Calib	
10) C4-NAPHTHALENES	0.000	184	0	N.D.	
11) PHENANTHRENE/ANTHRACENE	0.000	178	0	N.D.	
12) BENZONAPHTHIOPHENE	32.115	234	62172	No Calib	
13) DIBENZOTHIOPHENE	22.438	184	189923	No Calib	
14) C1-DIBENZOTHIOPHENE	24.528	198	280892	No Calib	
15) C2-DIBENZOTHIOPHENE	26.493	212	142119	No Calib	
16) C3-DIBENZOTHIOPHENE	27.989	226	86038	No Calib	
17) C1-PHENANTHRENES	25.359	192	223099	No Calib	
18) C2-PHENANTHRENES	27.290	206	146161	No Calib	
19) C3-PHENANTHRENES	29.166	220	99688	No Calib	
20) TRITERPANES/HOPANES	41.399	191	173711	No Calib	
21) HOPANE A	0.000	191	0	N.D.	
22) HOPANE B	41.814	191	-3184	No Calib	
23) 14 a(H) STERANES	0.000	217	0	N.D.	
24) 14 b(H) STERANES	0.000	218	0	N.D.	
25) TRI-AROMATIC STERANES	0.000	231	0	N.D.	
26) METHYLHOPANES	0.000	205	0	N.D.	
27) NORHOPANES	0.000	177	0	N.D.	
28) PYRENE/FLUORANTHENE	28.915	202	34988	No Calib	
29) METHYL PYRENE	30.436	216	16683	No Calib	
30) FLUORENE	0.000	166	0	N.D.	
31) BICYCLONAPHTHALENES	0.000	208	0	N.D.	
32) CHRYSENE	0.000	228	0	N.D.	
33) C1-CHRYSENE	34.692	242	45432	No Calib	
34) C2-CHRYSENE	0.000	256	0	N.D.	
35) C3-CHRYSENE	0.000	270	0	N.D.	
36) C4-CHRYSENE	0.000	284	0	N.D.	
37) SESQUITERPANES	28.327	123	34703	No Calib	

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (Not Reviewed)

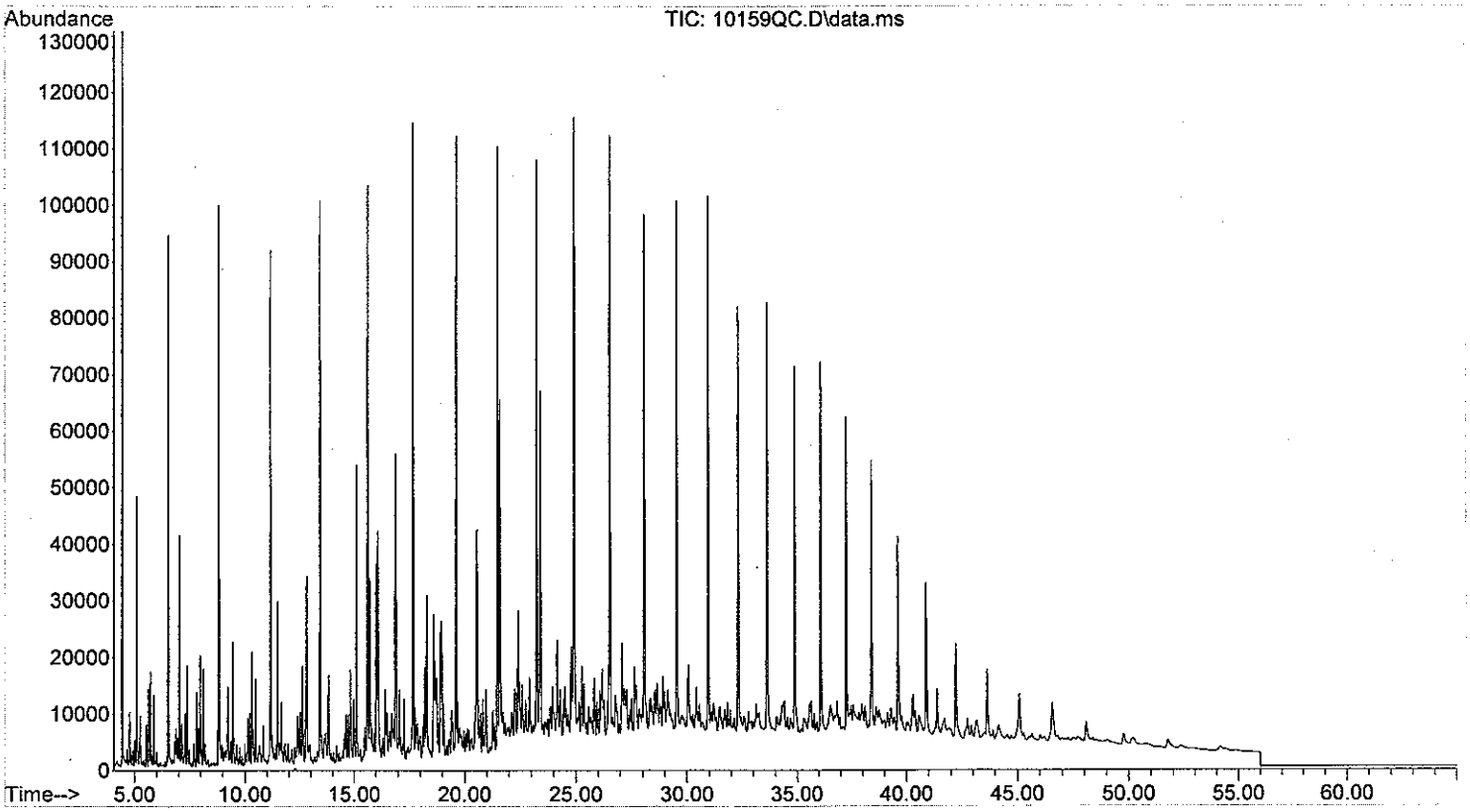
Data Path : W:\2010\MS_DATA\10-159\
Data File : 10159QC.D
Acq On : 26 Jun 2010 12:07 am
Operator : ACT
Sample : 10-159-QC
Misc :
ALS Vial : 10 Sample Multiplier: 1

Quant Time: Jun 26 01:01:30 2010
Quant Method : C:\MSDCHEM\1\METHODS\BIOMARK3.M
Quant Title :
QLast Update : Wed May 27 09:43:48 2009
Response via : Initial Calibration

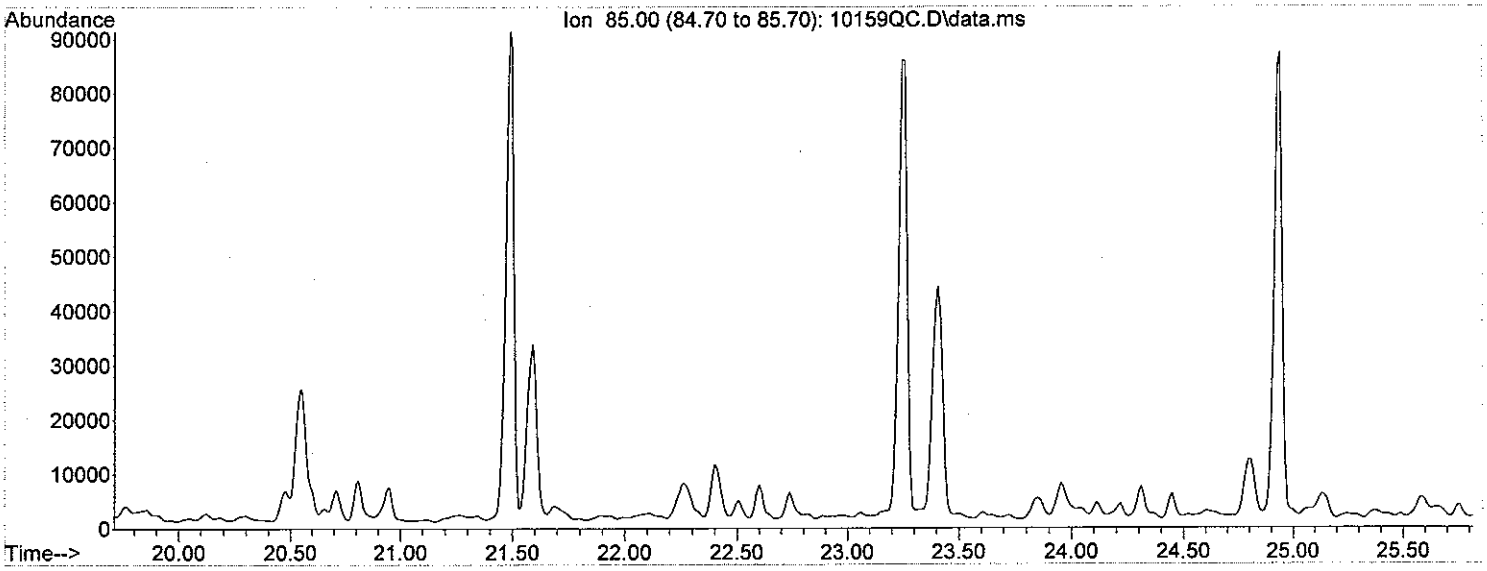


MARINE SAFETY LABORATORY GC-MS2 BIOMARKER ANALYSIS

File: \\Mslserver1\data archive\2010\MS_data\10-159\10159QC.D
Operator: ACT
Date Acquired: 26 Jun 2010 12:07 am
Method File: BIOMARK3.M
Sample Name: 10-159-QC Vial: 10
Misc Info:



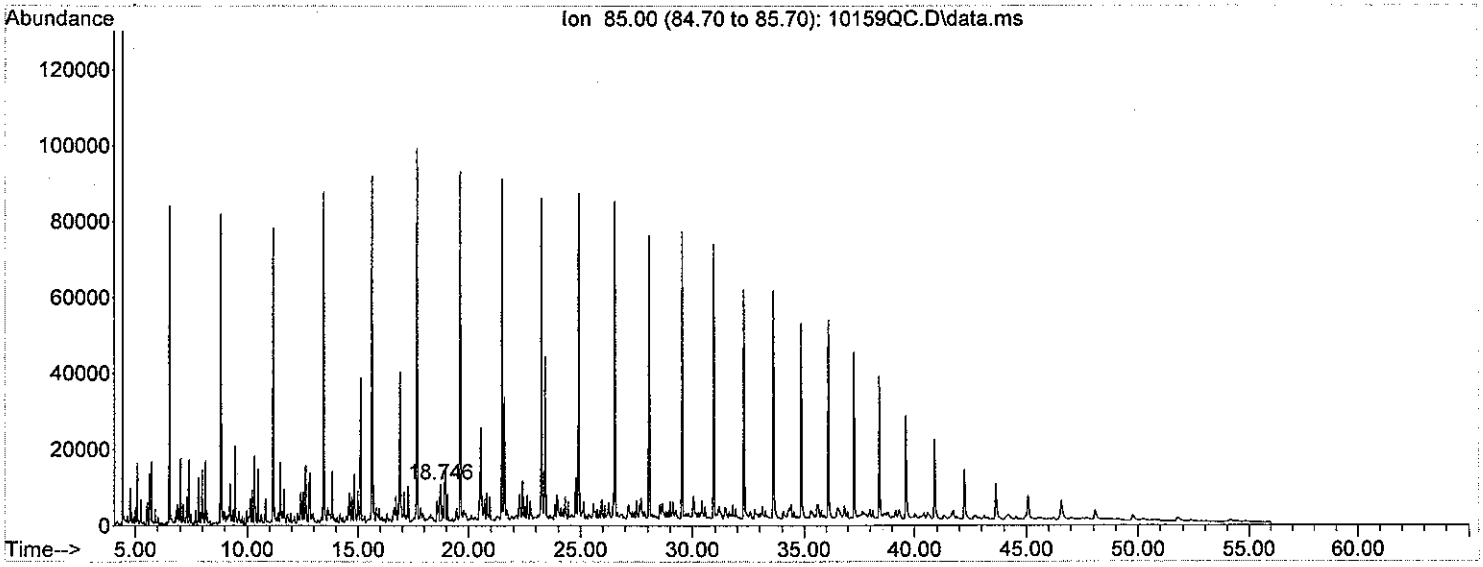
n-C17,Pristane,n-C18,Phytane



Pristane/Phytane = 0.672
C17/C18 = 0.992
Pristane/C17 = 0.403
Phytane/C18 = 0.595

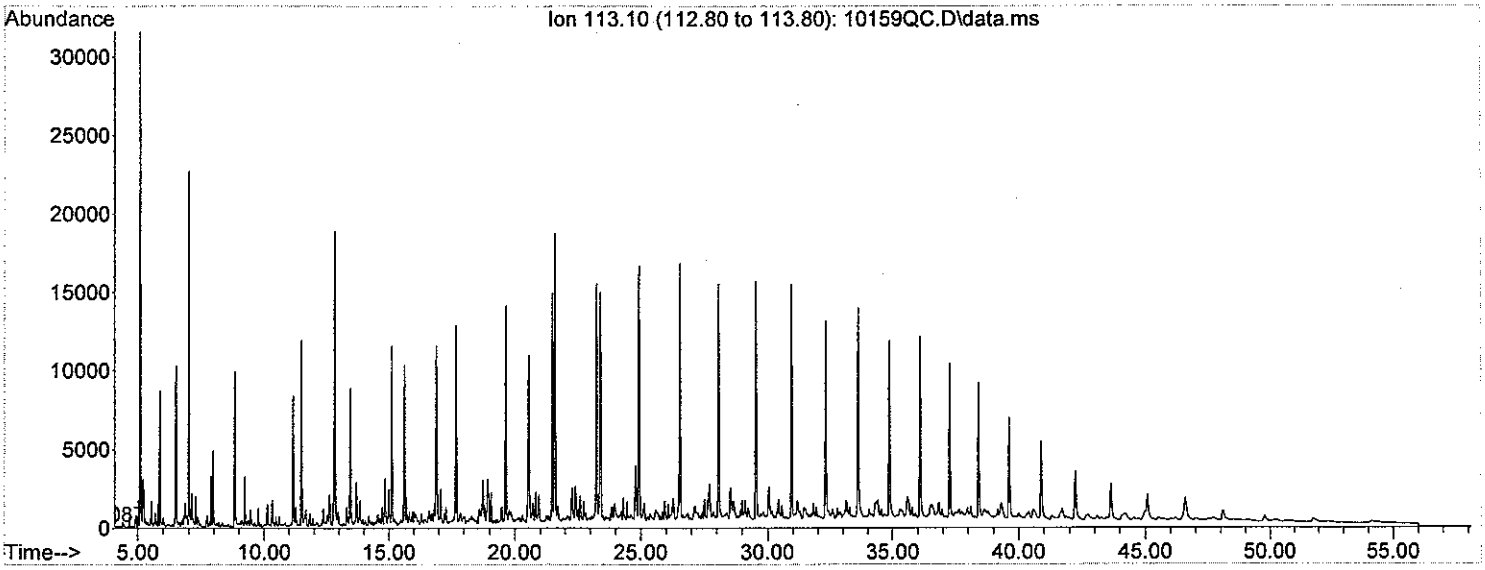
85-SATURATED HYDROCARBONS

Area = 423525



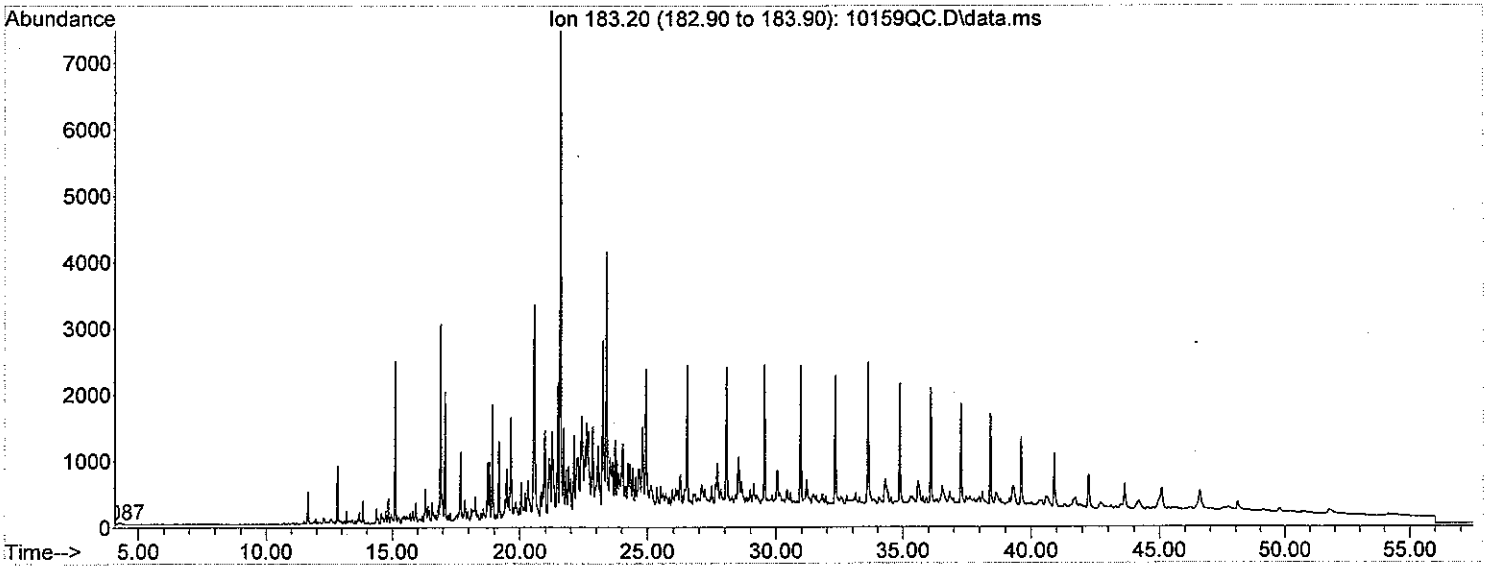
113-SATURATED HYDROCARBONS

Area = 0



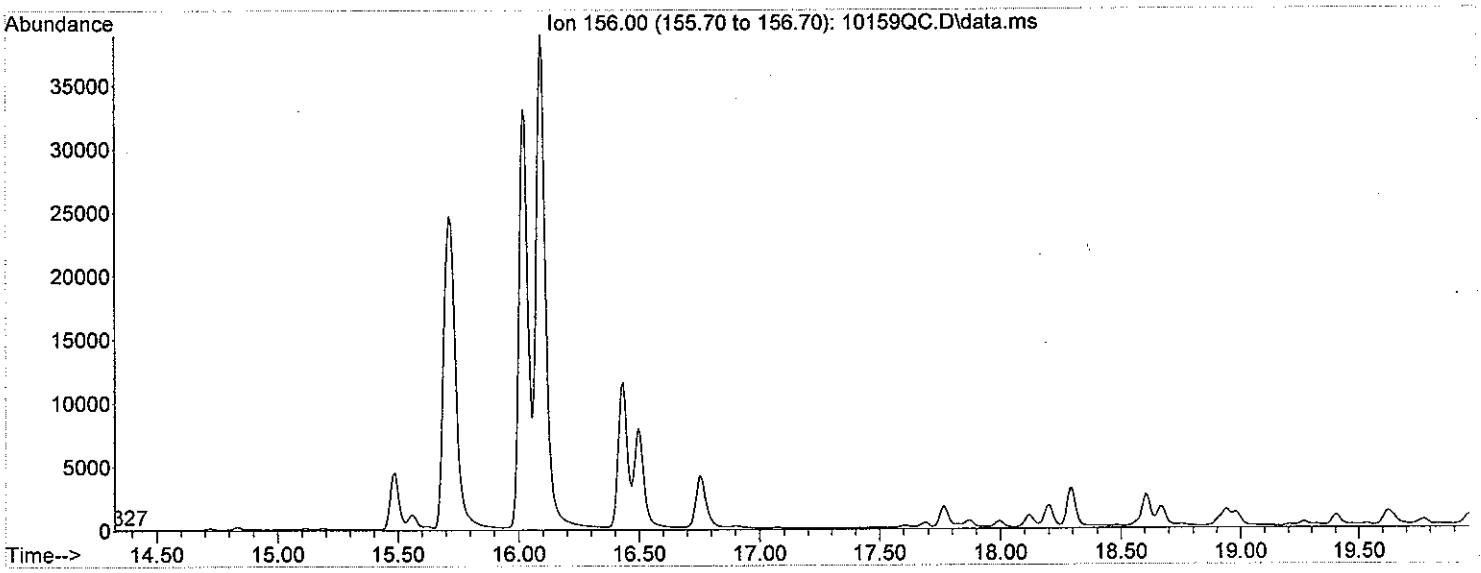
ACYCLIC ISOPRENOIDS/ALKANES

Area = 0



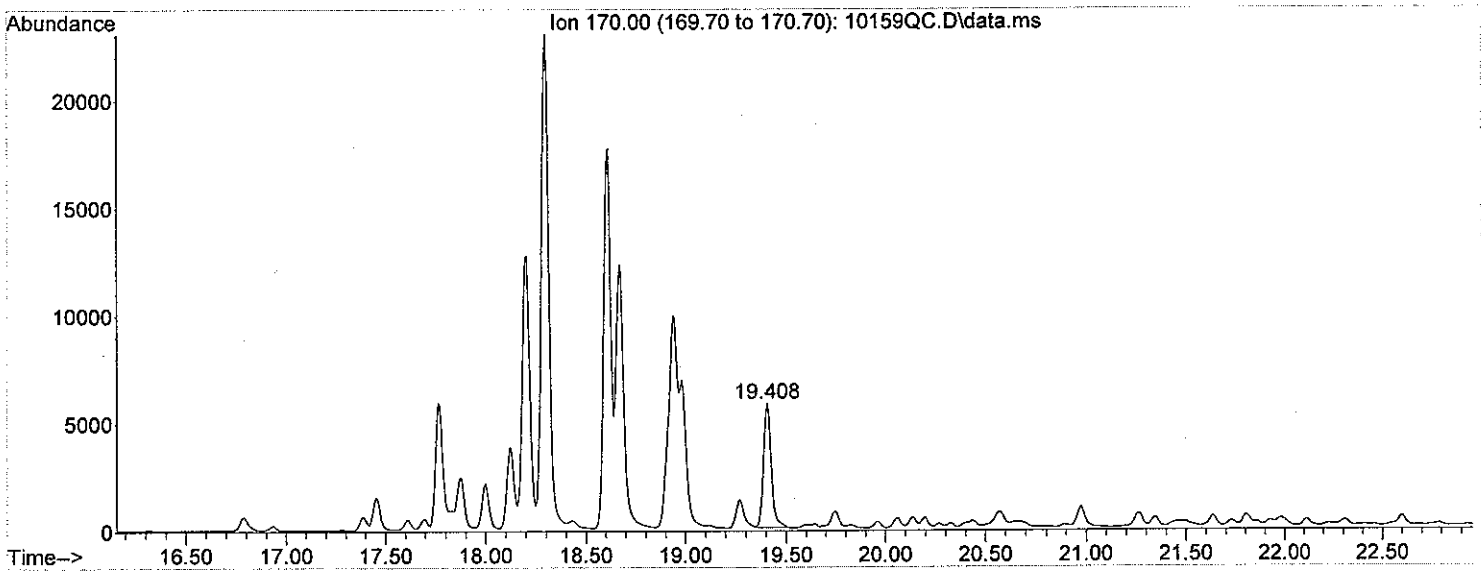
C2-NAPHTHALENES

Area = 0



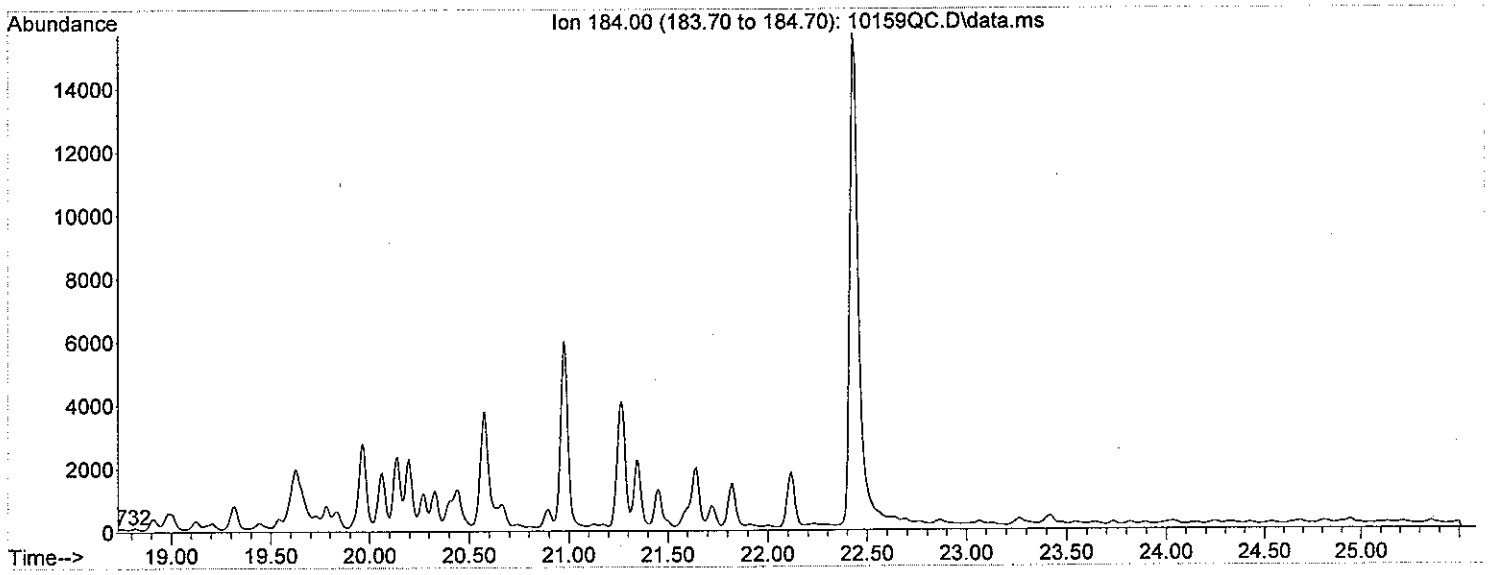
C3-NAPHTHALENES

Area = 152547



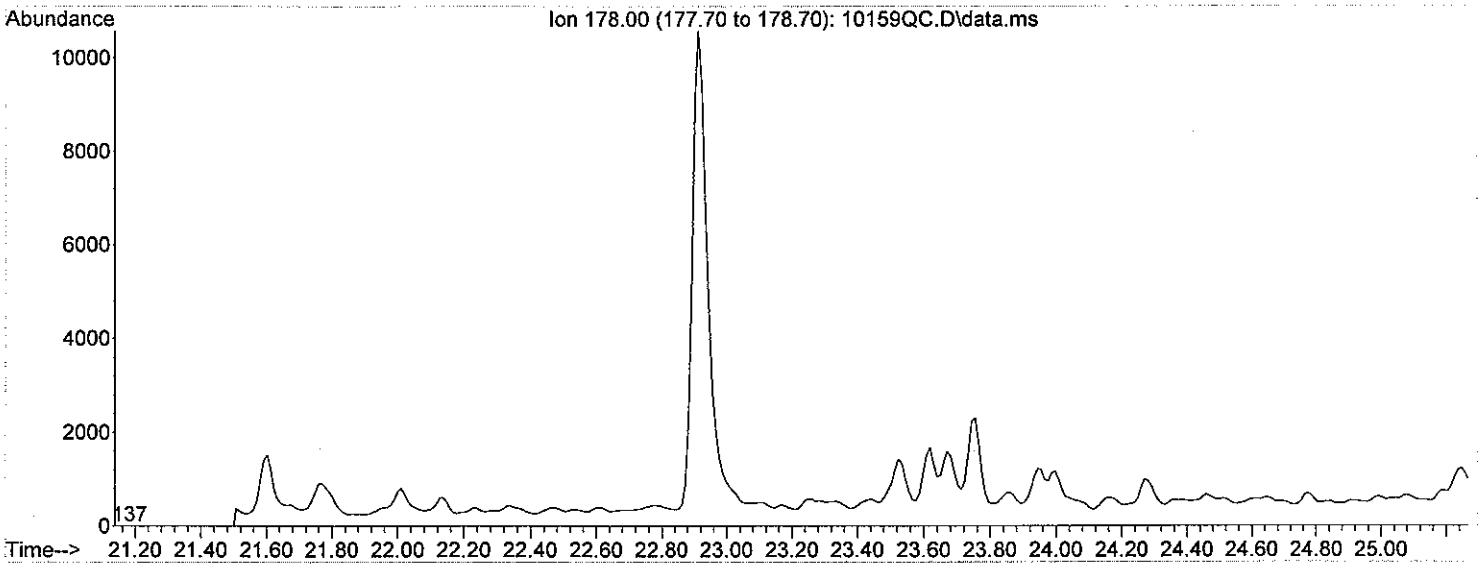
C4-NAPHTHALENES

Area = 0



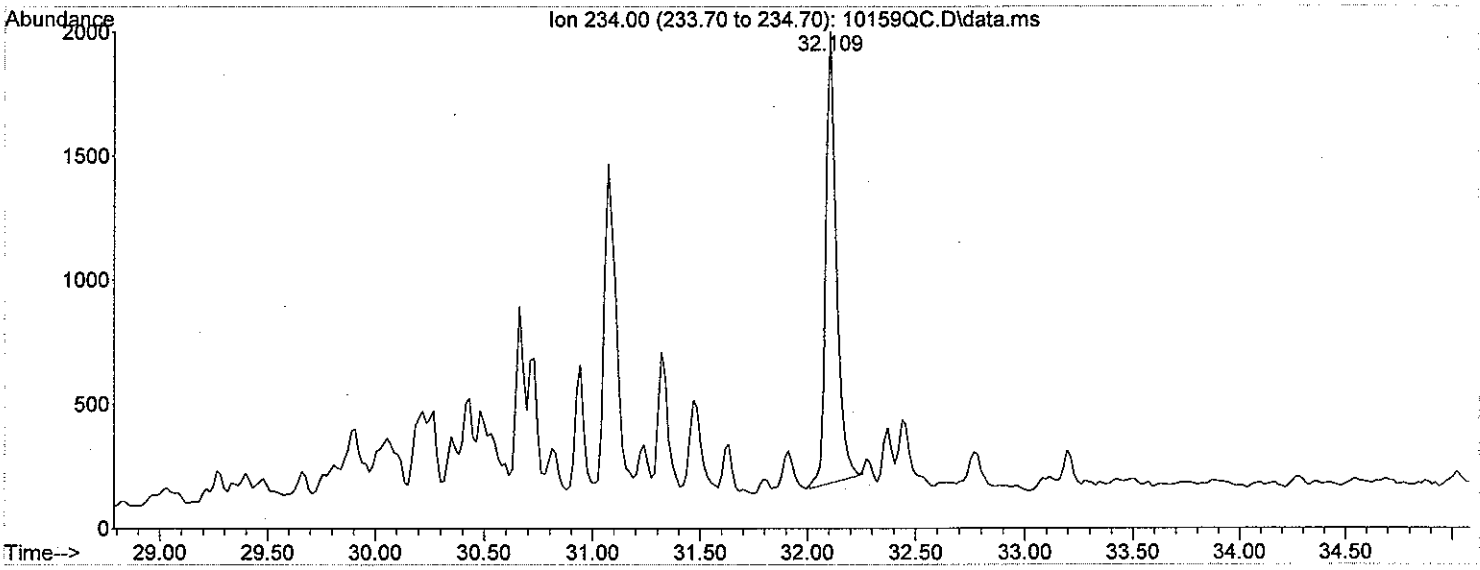
PHENANTHRENE/ANTHRACENE

Area = 0



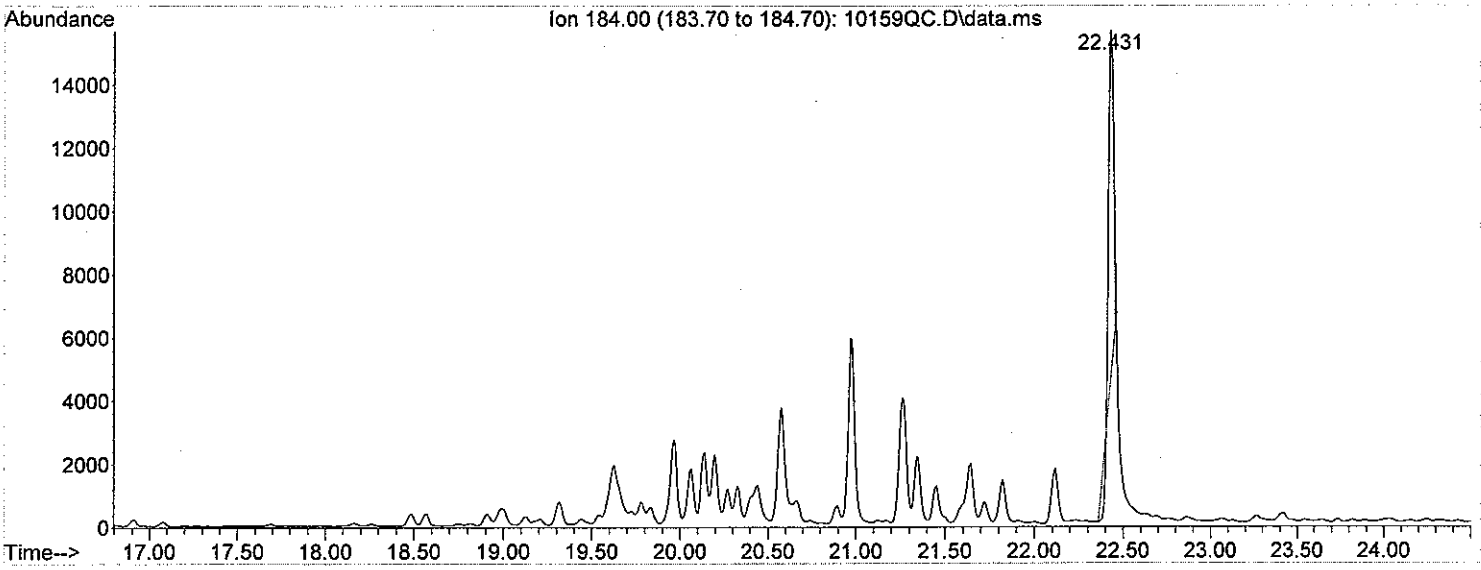
BENZONAPHTHIOPHENE

Area = 62171.6

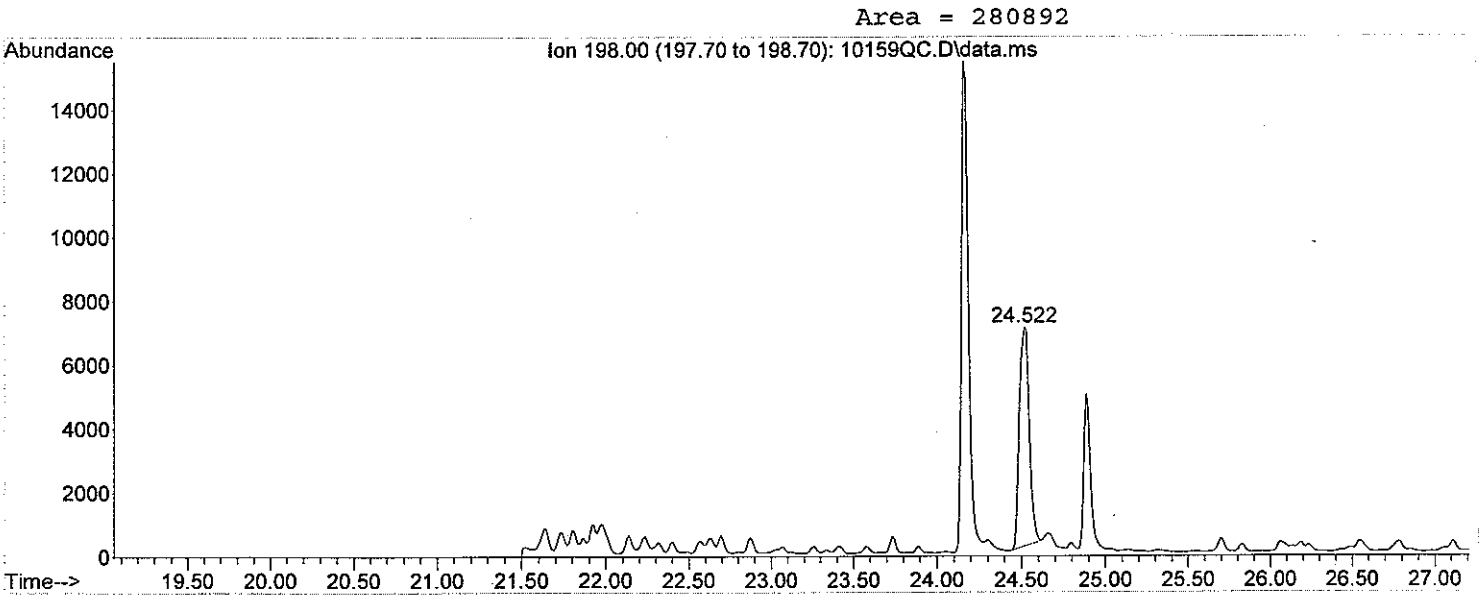


DIBENZOTHIOPHENE

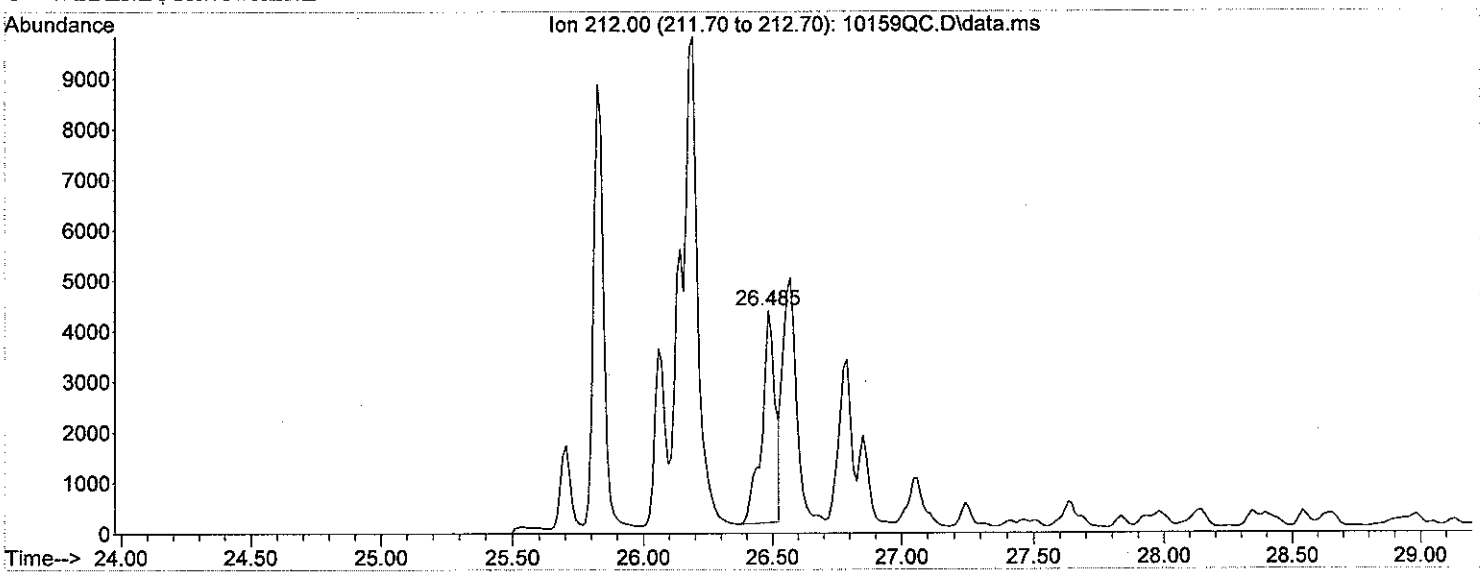
Area = 189923



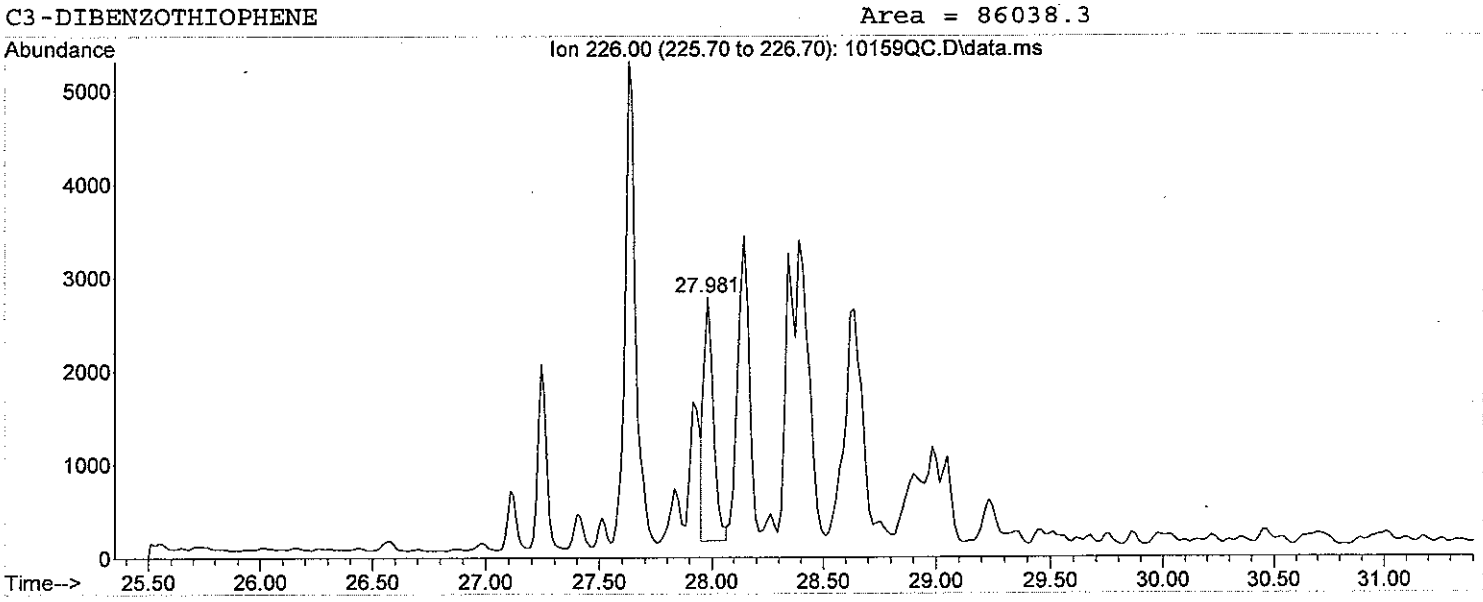
C1-DIBENZOTHIOPHENE



C2-DIBENZOTHIOPHENE

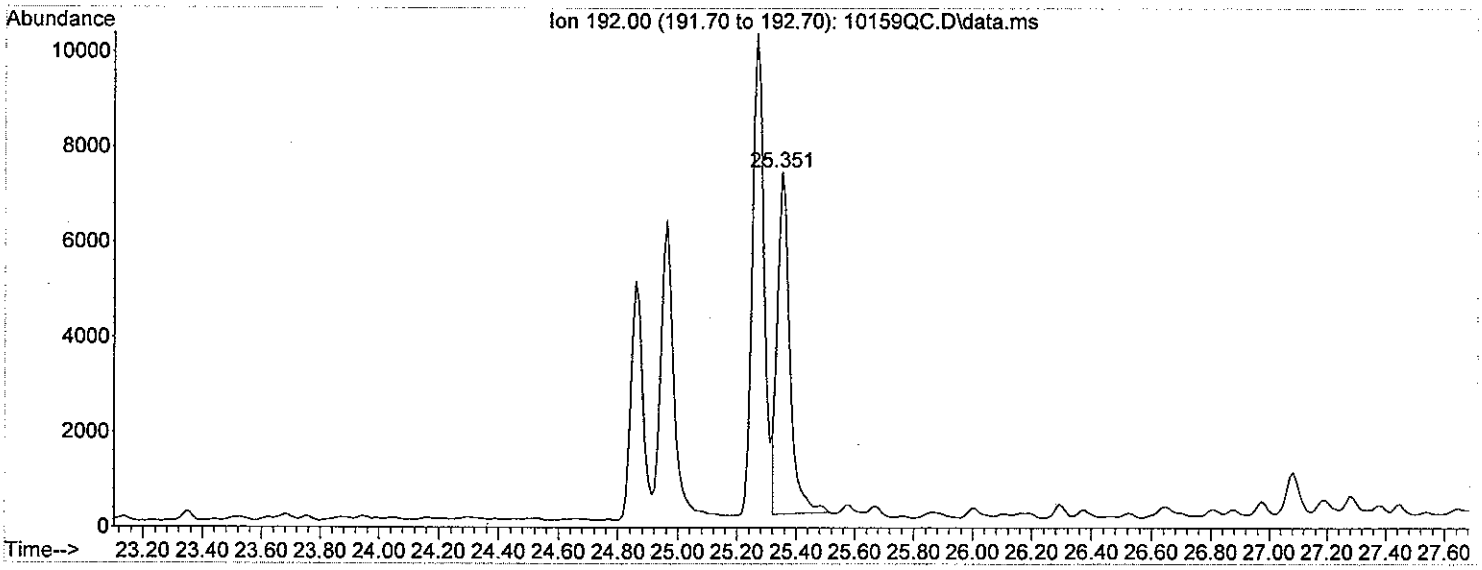


C3-DIBENZOTHIOPHENE



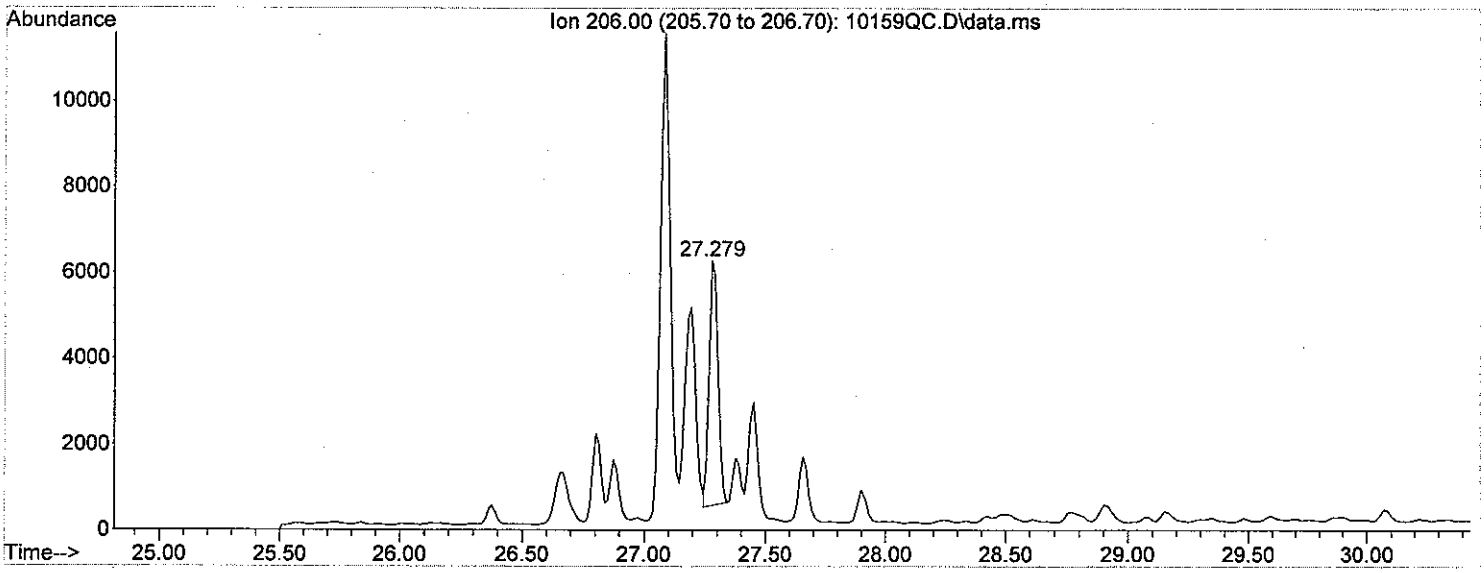
C1 - PHENANTHRENES

Area = 223099



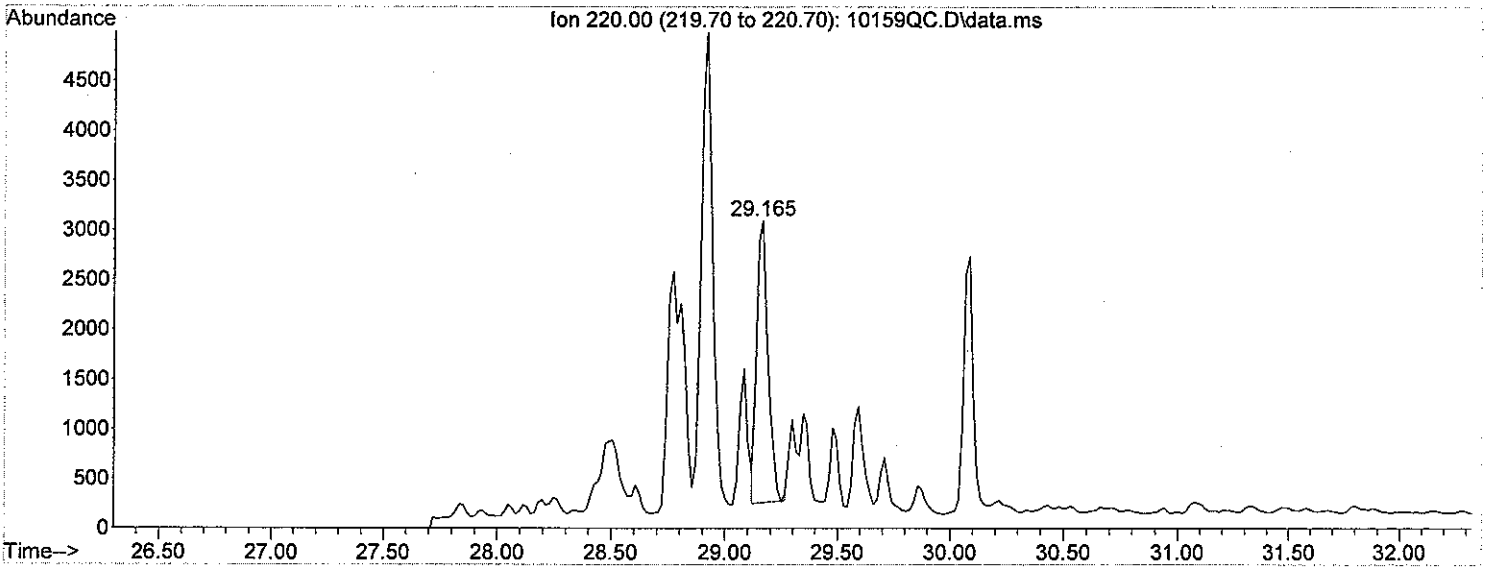
C2 - PHENANTHRENES

Area = 146161



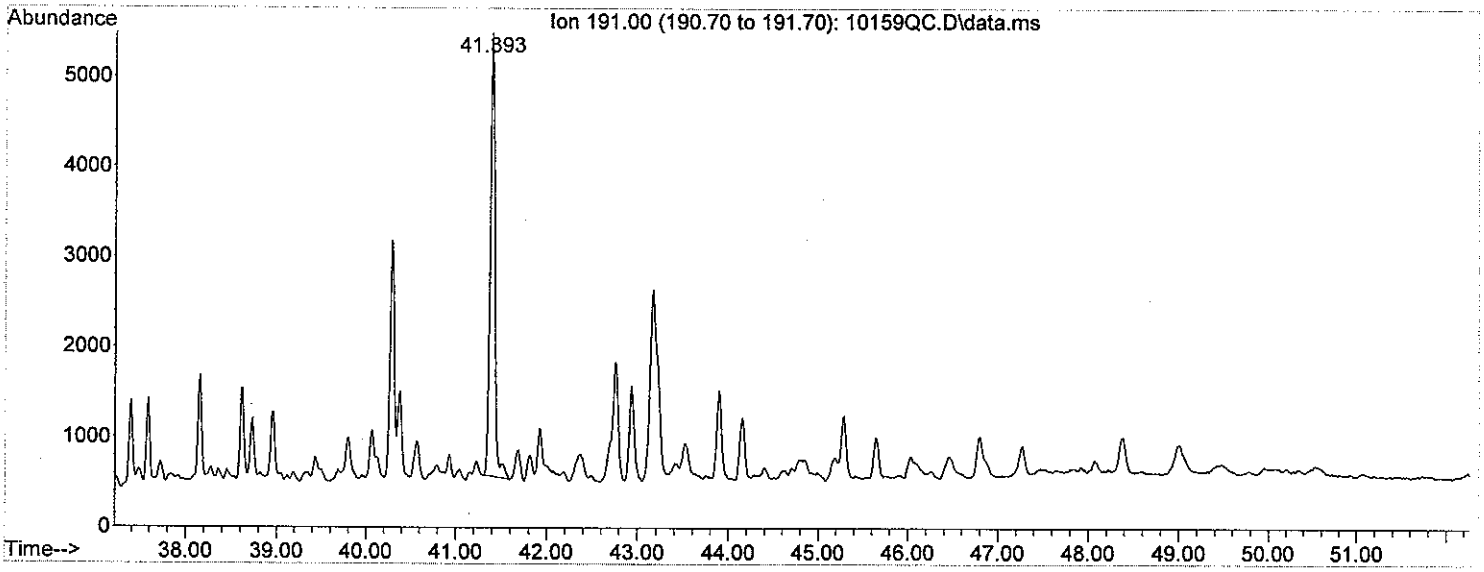
C3 - PHENANTHRENES

Area = 99687.7



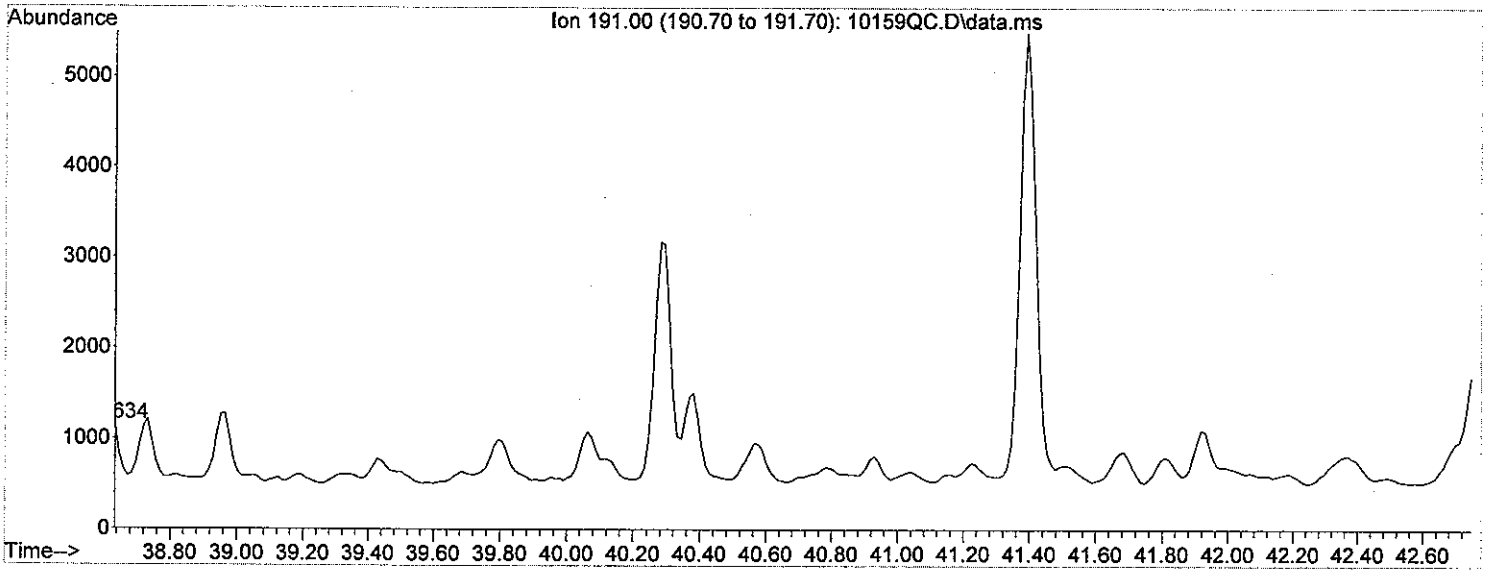
TRITERPANES/HOPANES

Area = 173711



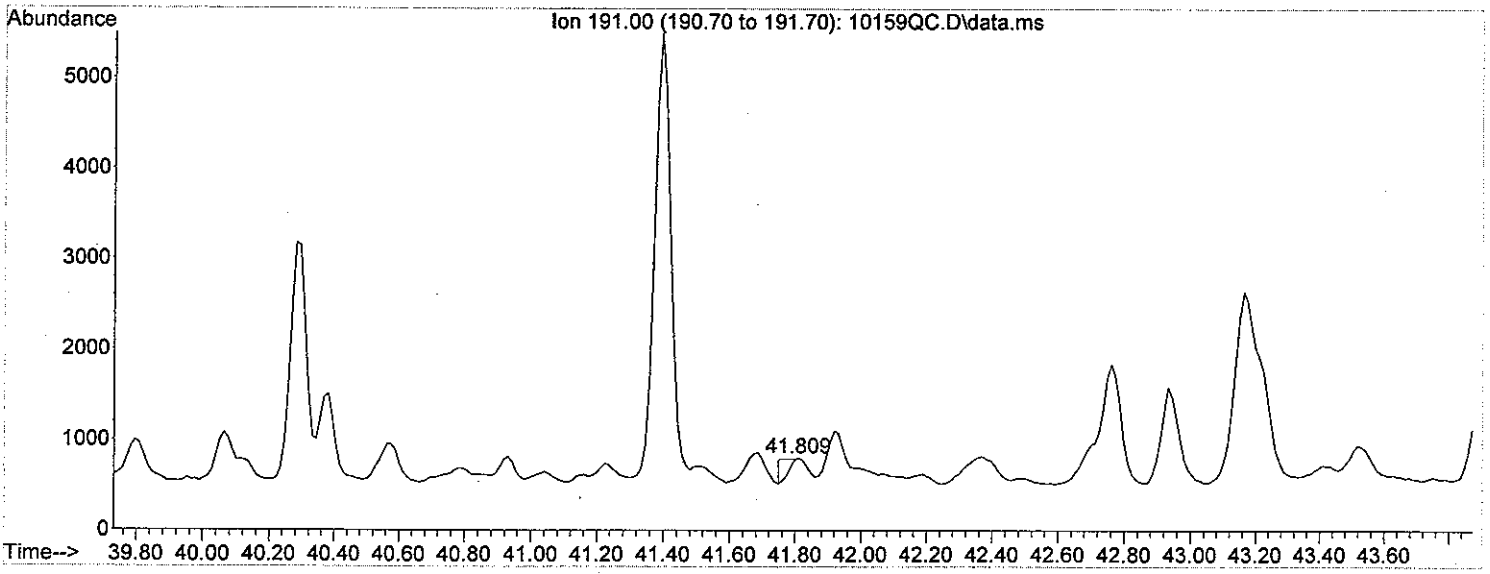
HOPANE A

Area = 0

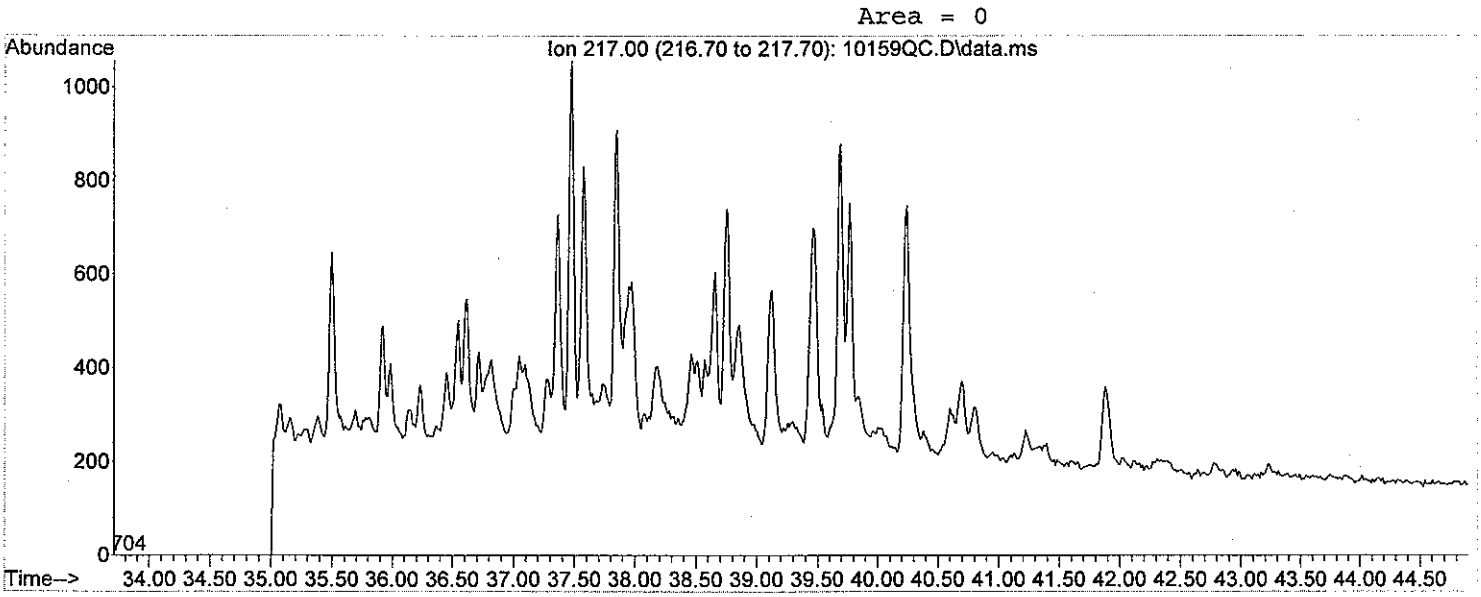


HOPANE B

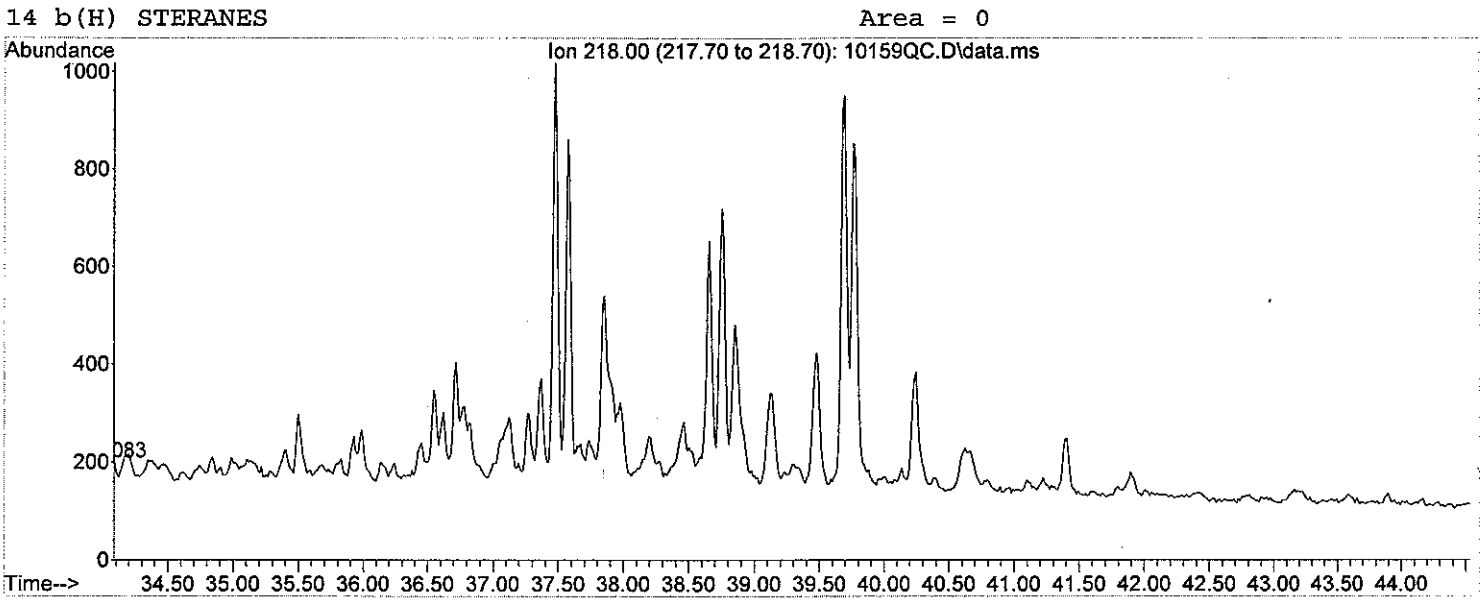
Area = -3183.6



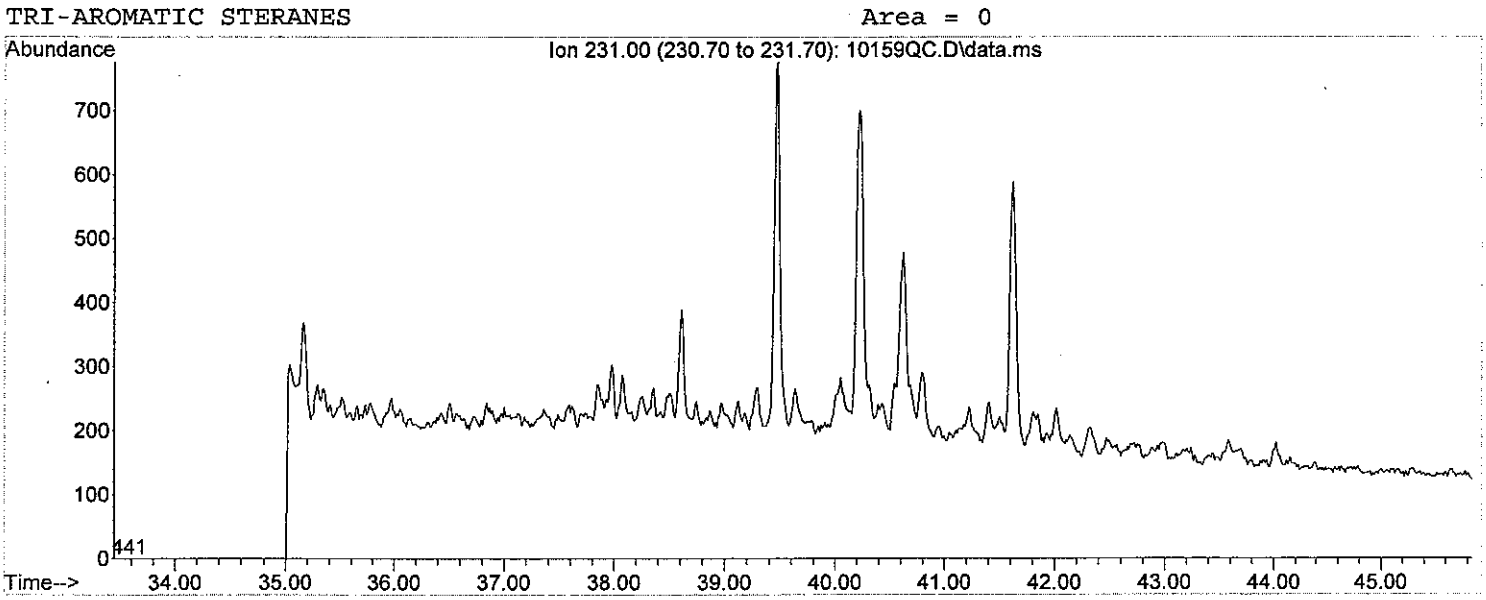
14 a(H) STERANES



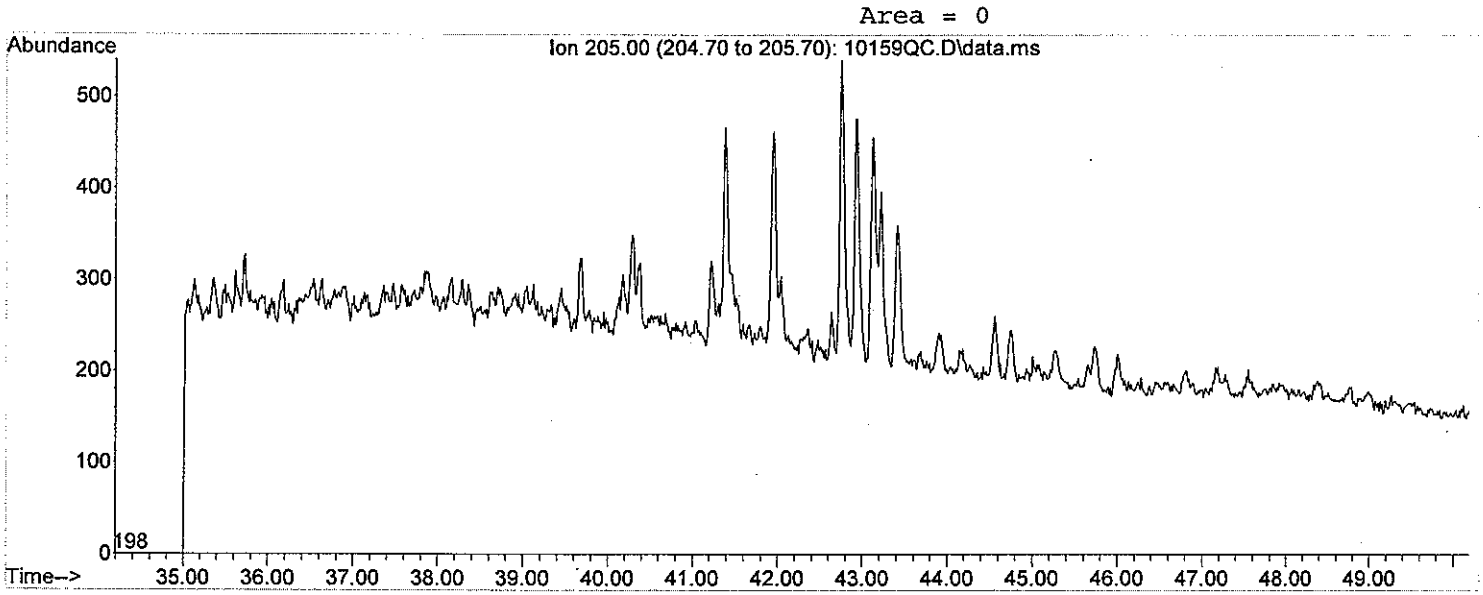
14 b(H) STERANES



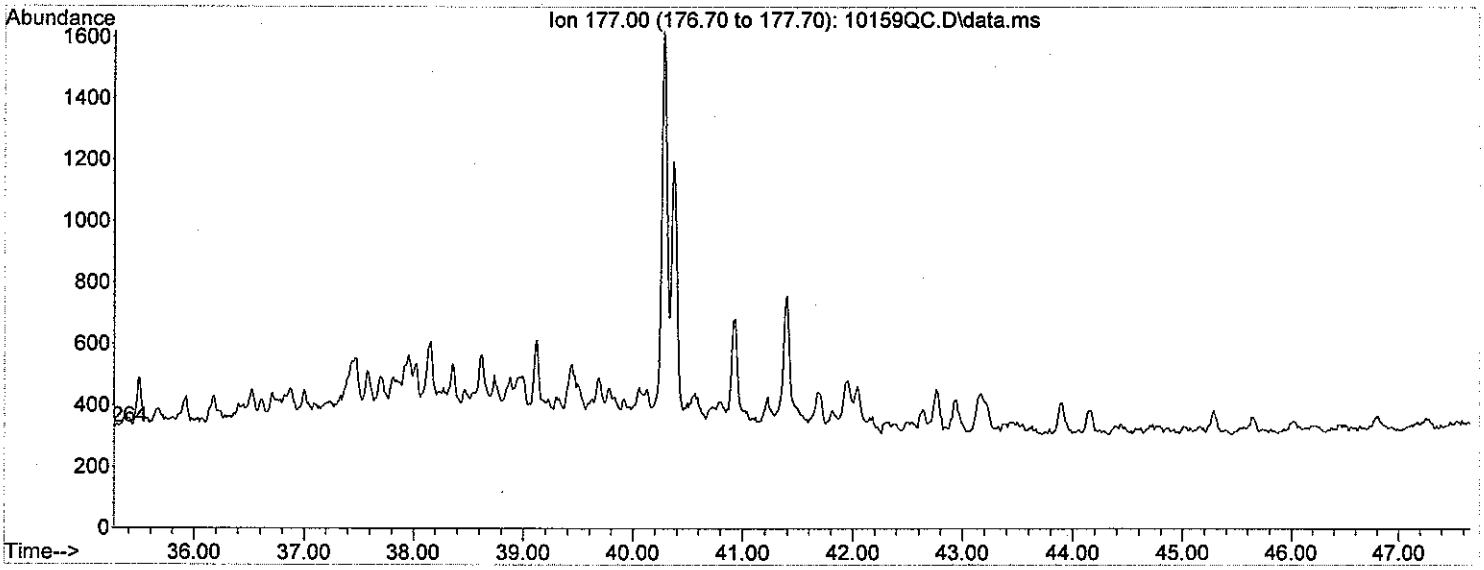
TRI-AROMATIC STERANES



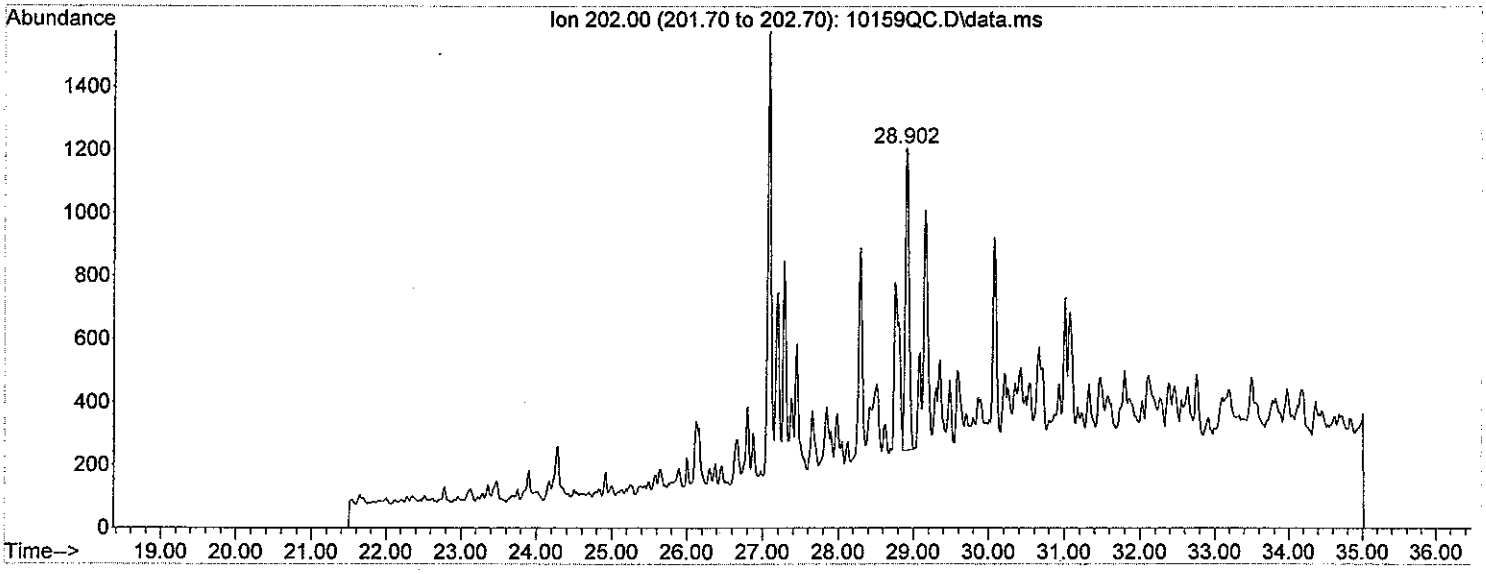
METHYLHOPANES



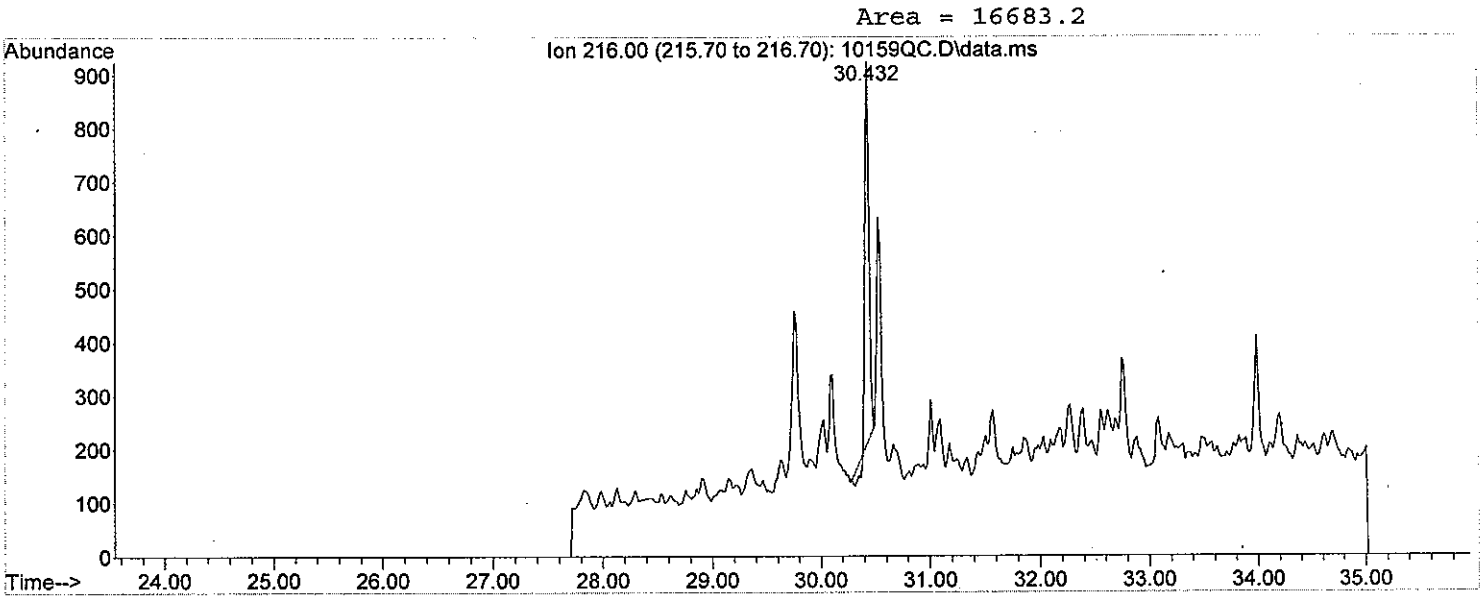
NORHOPANES



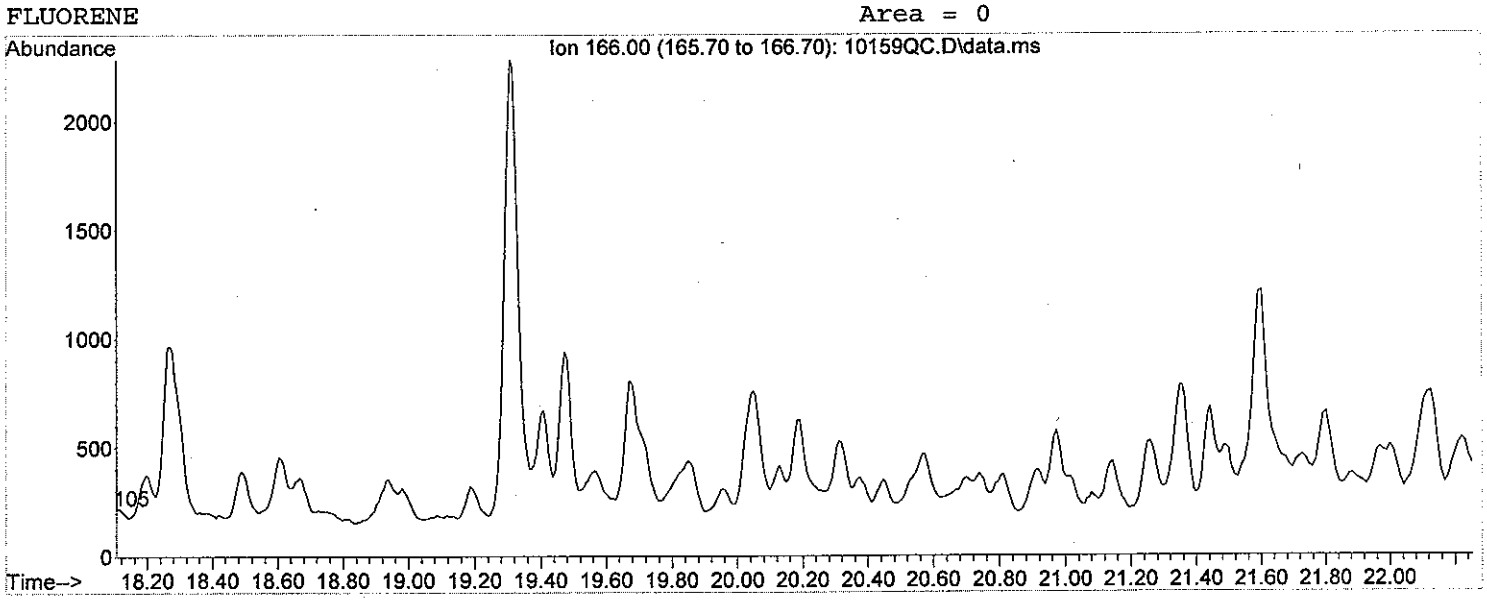
PYRENE/FLUORANTHENE



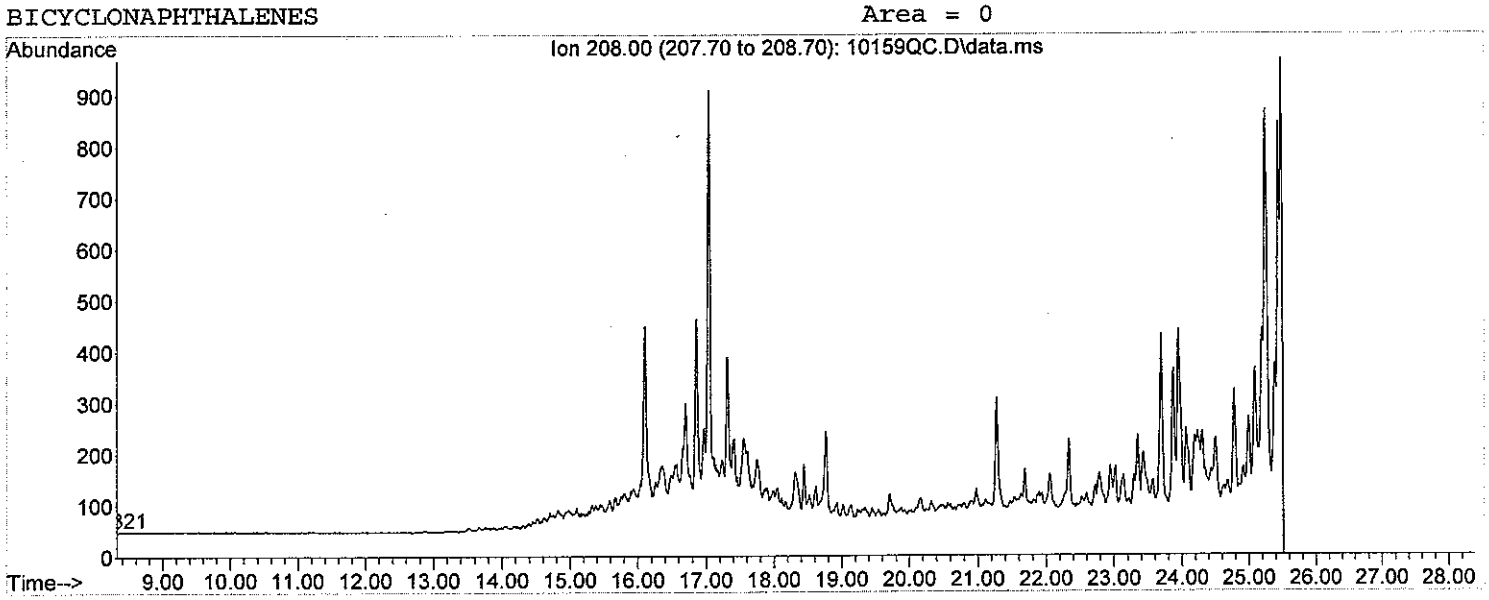
METHYL PYRENE



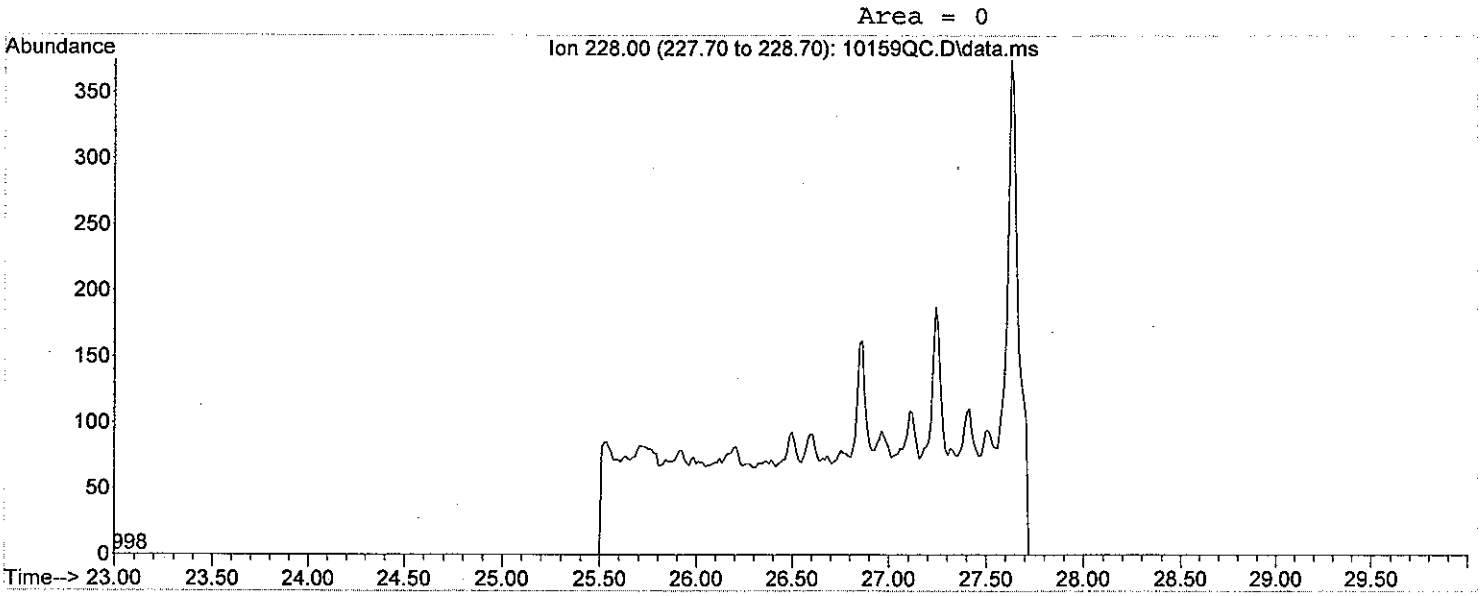
FLUORENE



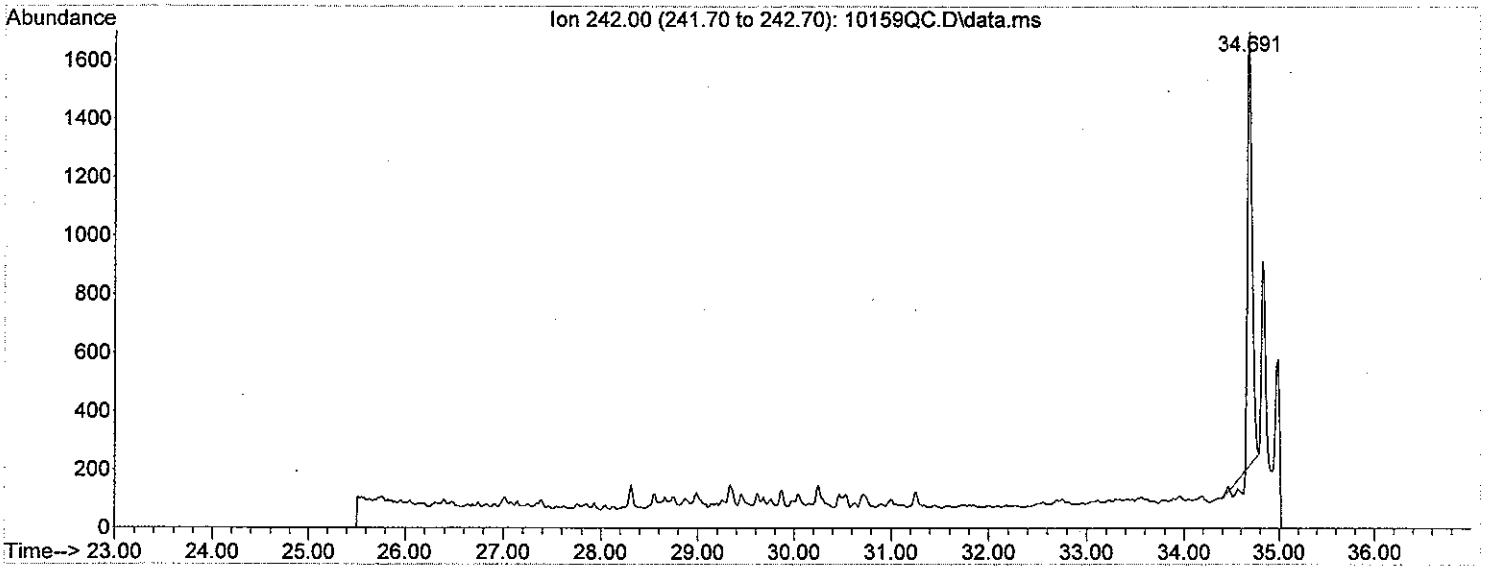
BICYCLONAPHTHALENES



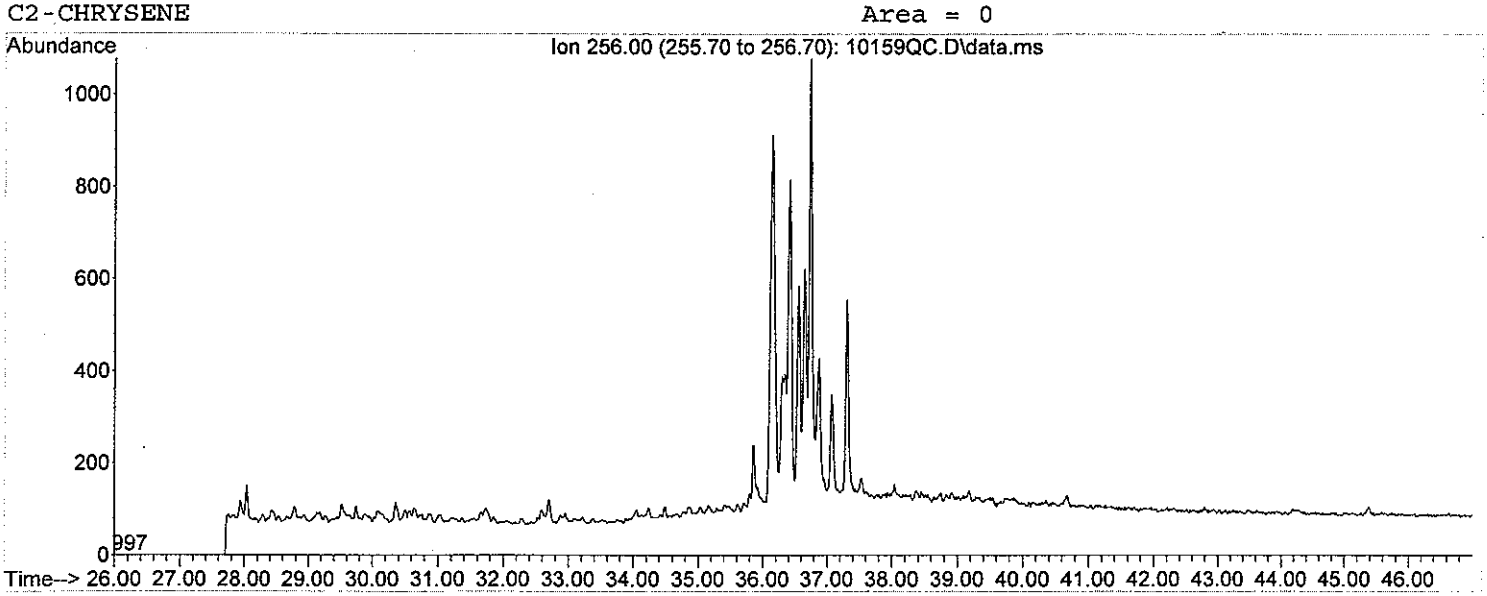
CHRYSENE



C1-CHRYSENE

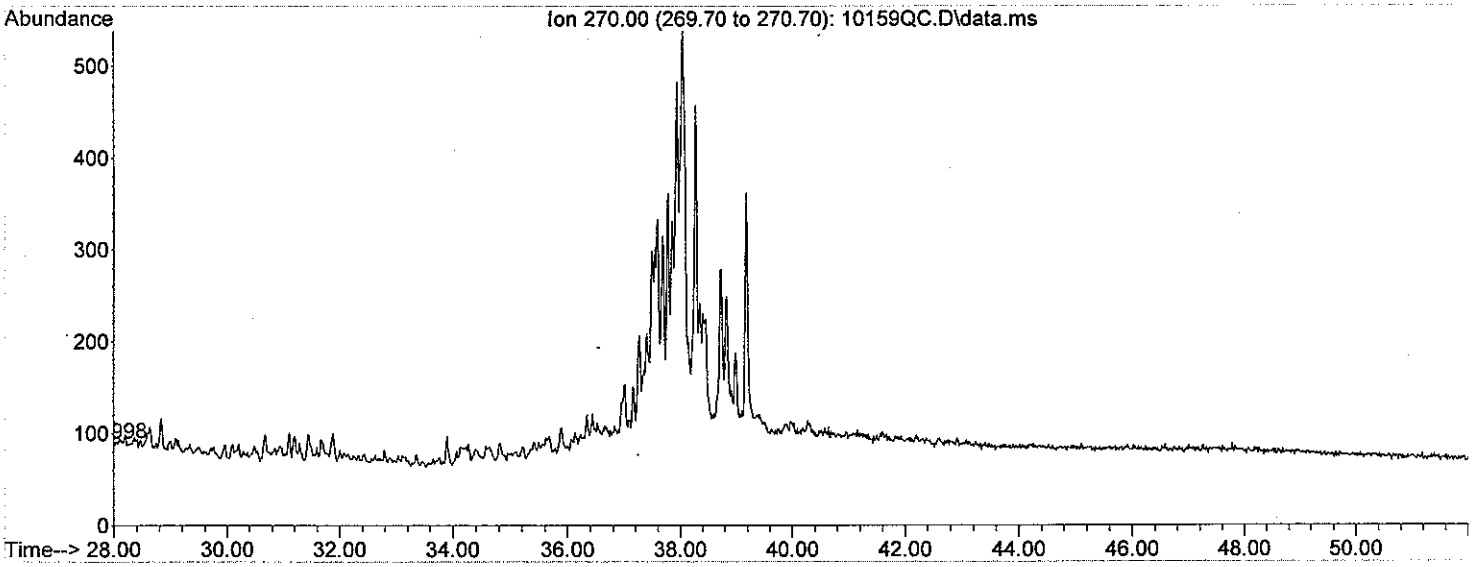


C2-CHRYSENE



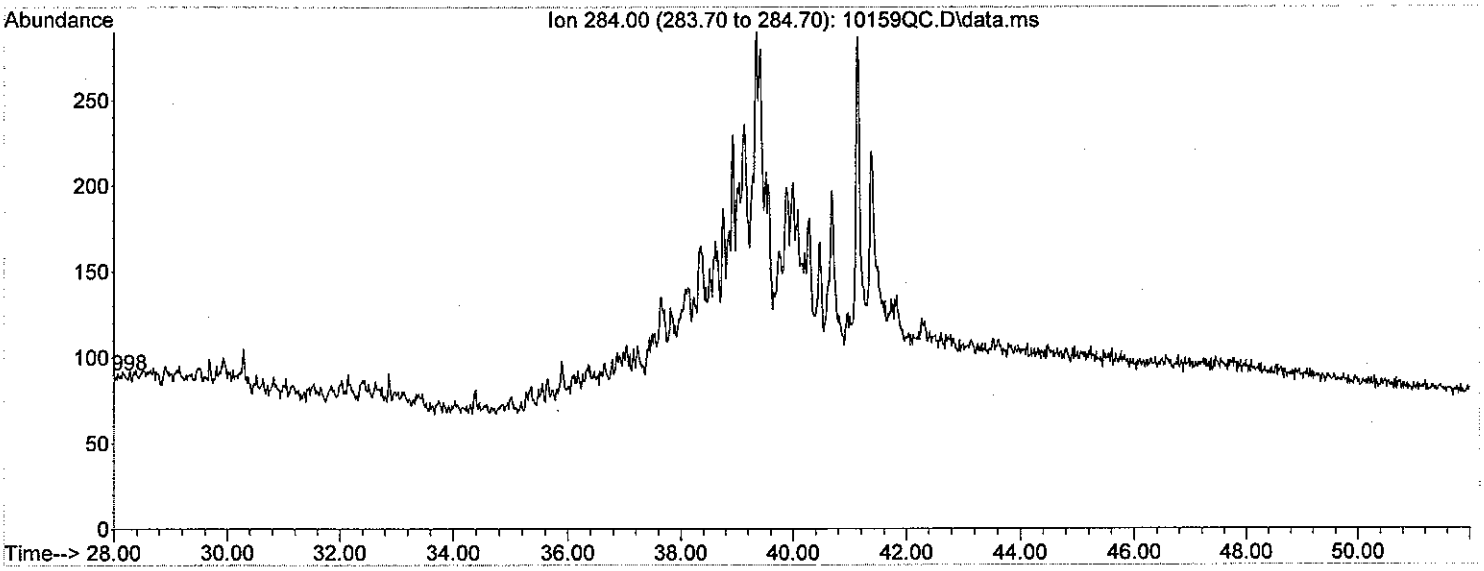
C3 - CHRYSENE

Area = 0



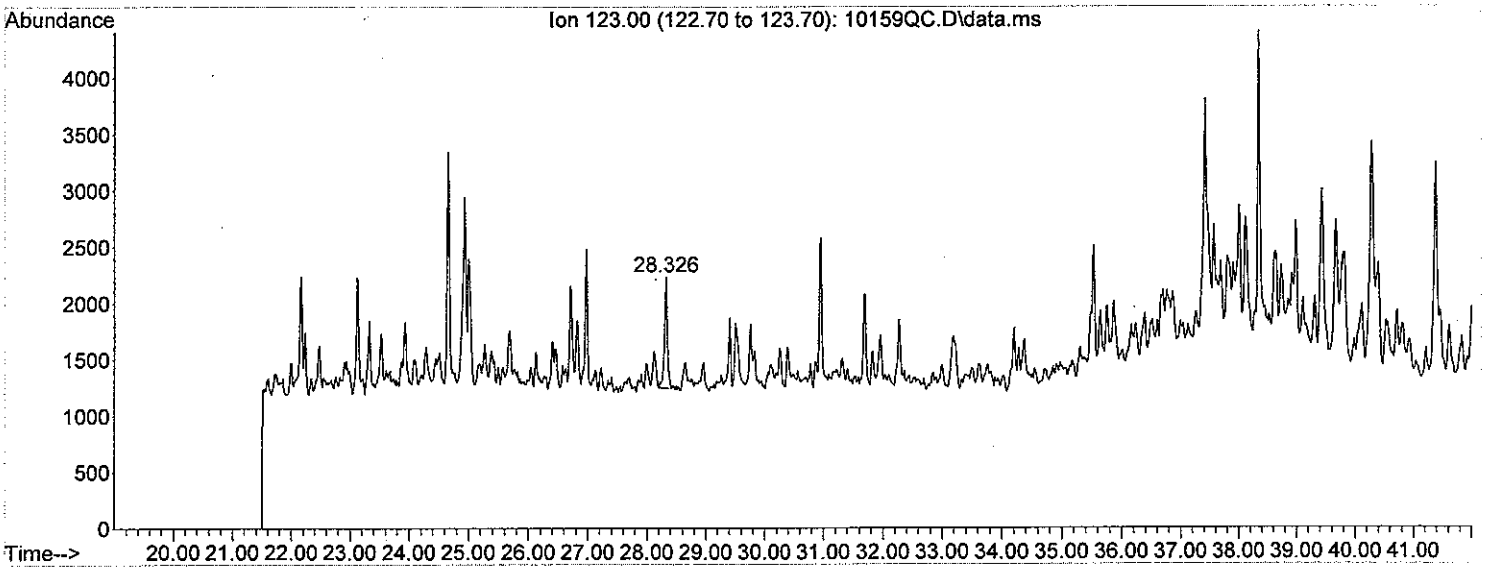
C4 - CHRYSENE

Area = 0



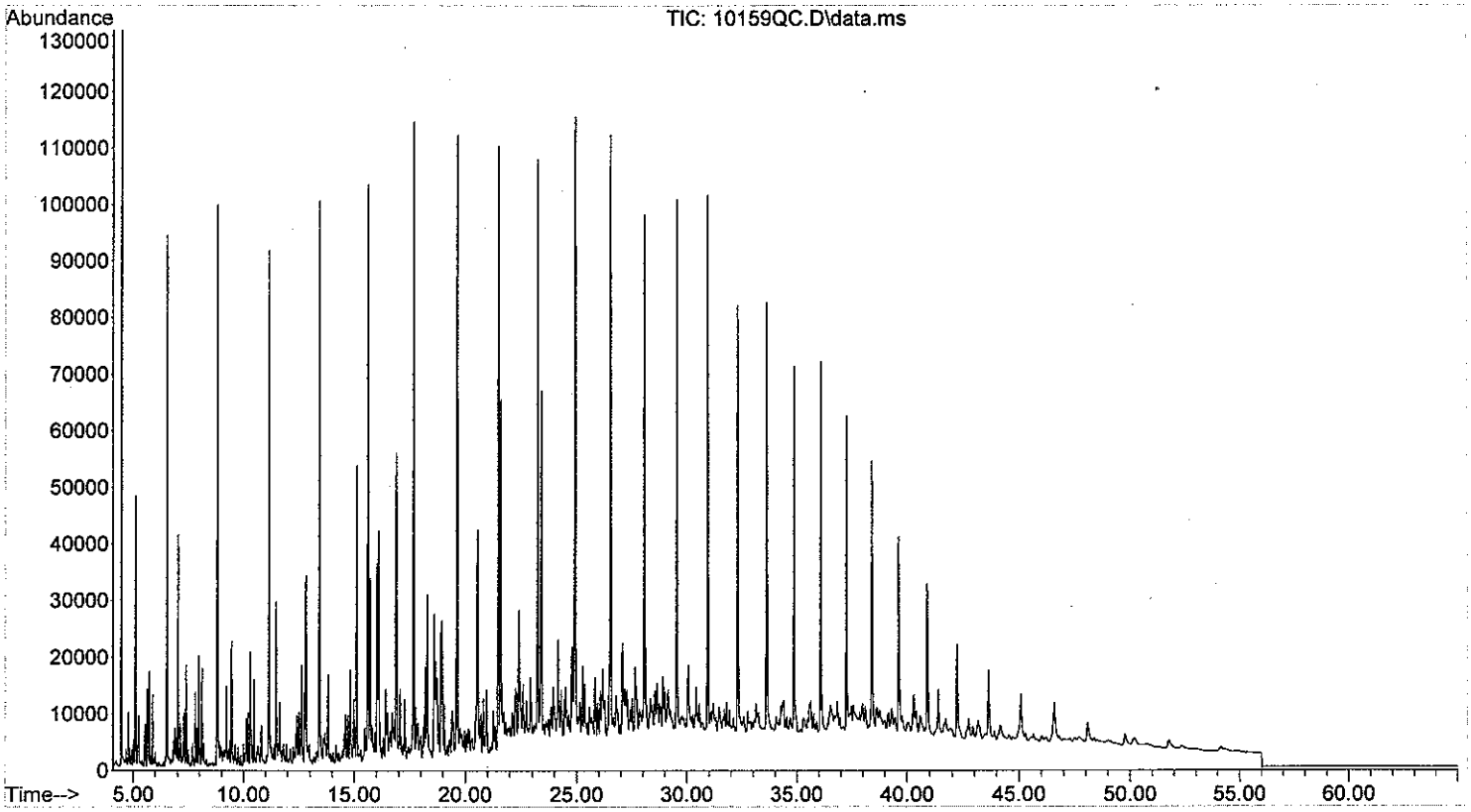
SESQUITERPANES

Area = 34702.8

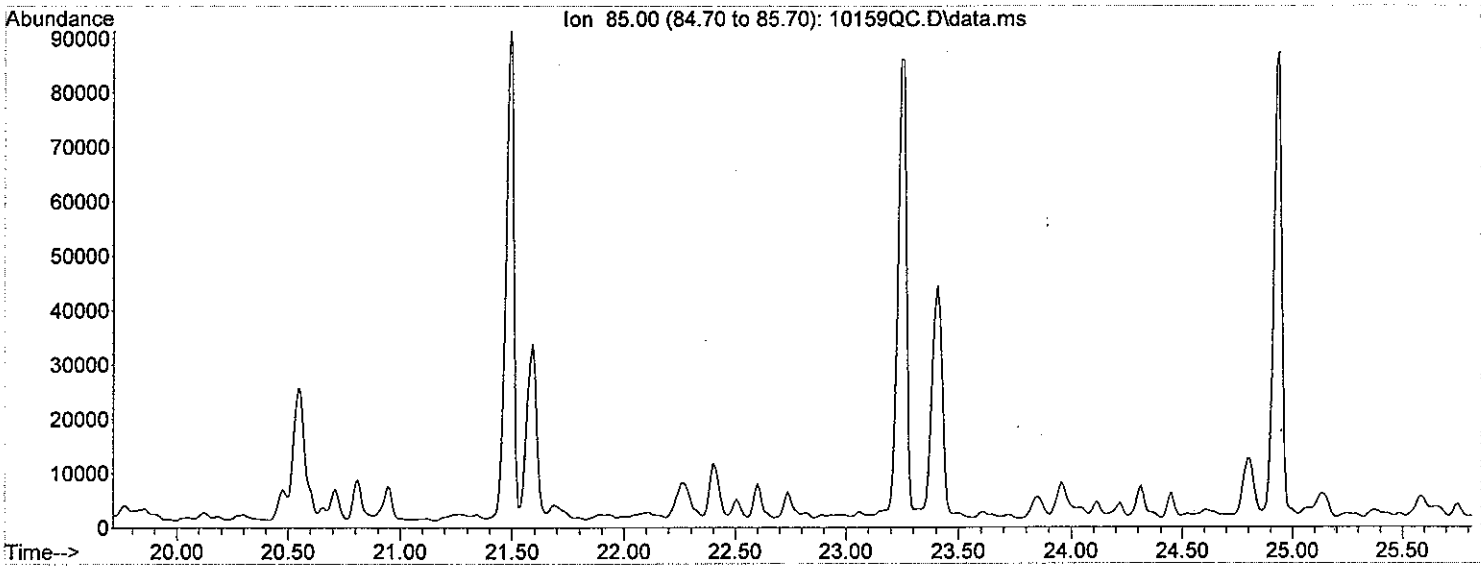


MSL GC-MS2 BIOMARKER ANALYSIS

File: W:\2010\MS_DATA\10-159\10159QC.D
Operator: ACT
Date Acquired: 26 Jun 2010 12:07 am
Method File: BIOMARK3.M
Sample Name: 10-159-QC Vial: 10
Misc Info:



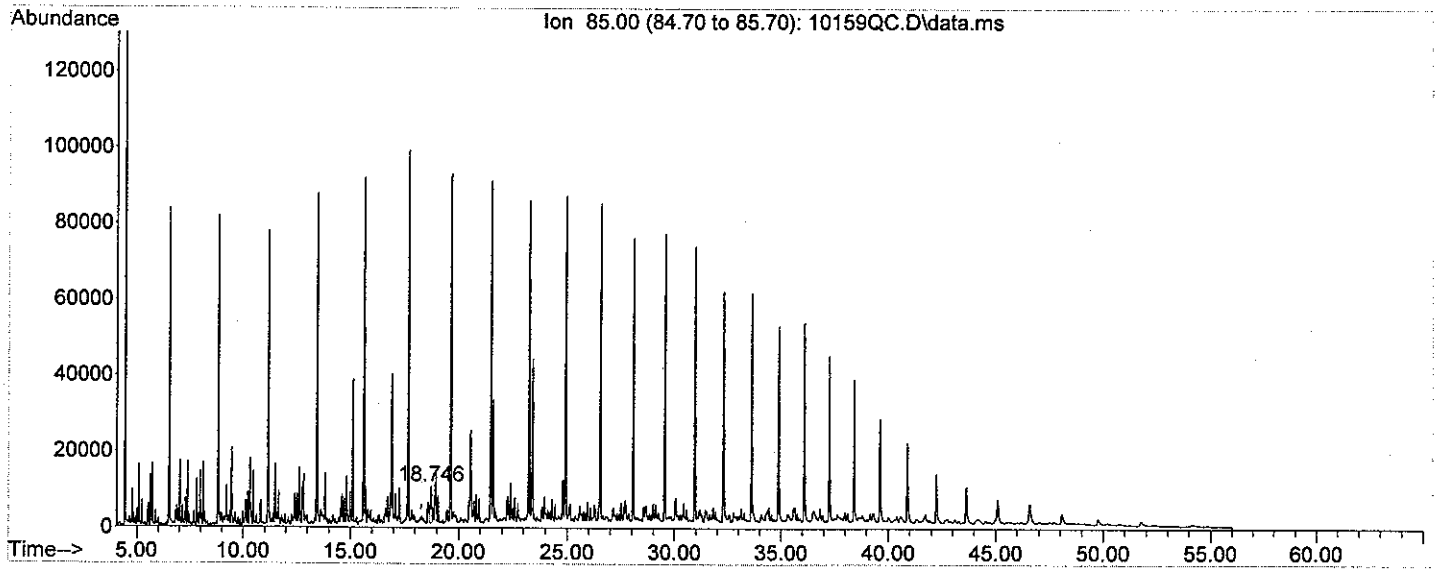
n-C17,Pristane,n-C18,Phytane



Pristane/Phytane = ----
C17/C18 = ----
Pristane/C17 = ----
Phytane/C18 = ----

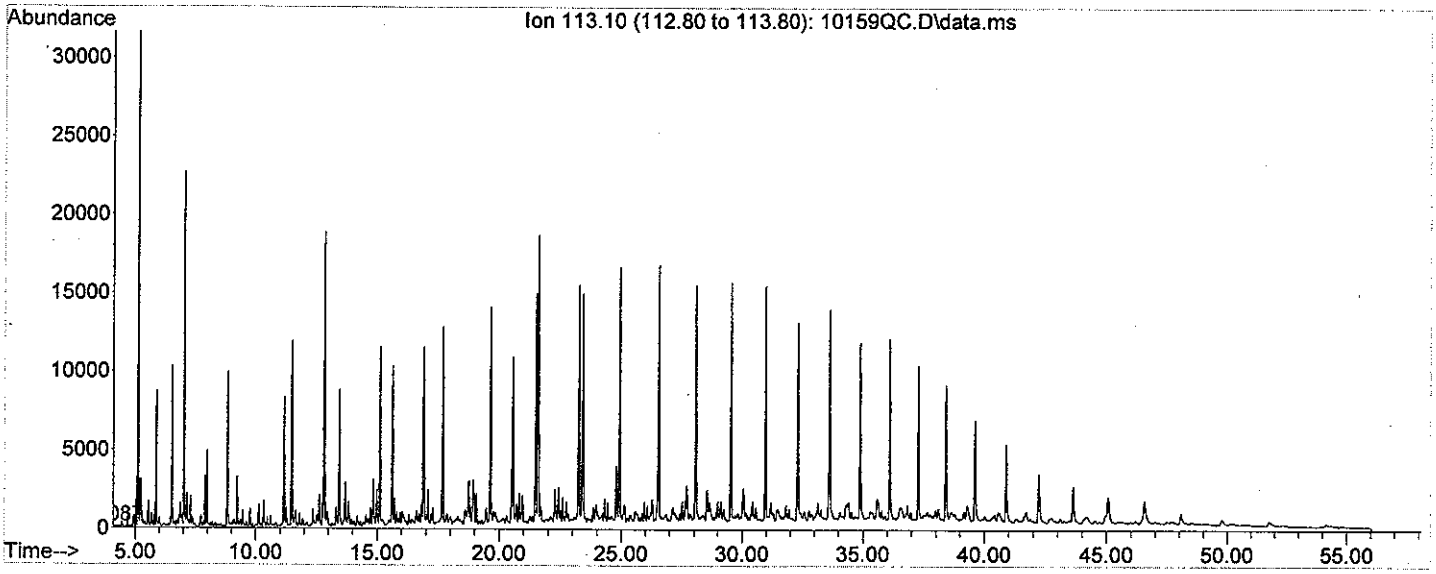
85-SATURATED HYDROCARBONS

Area = 423525



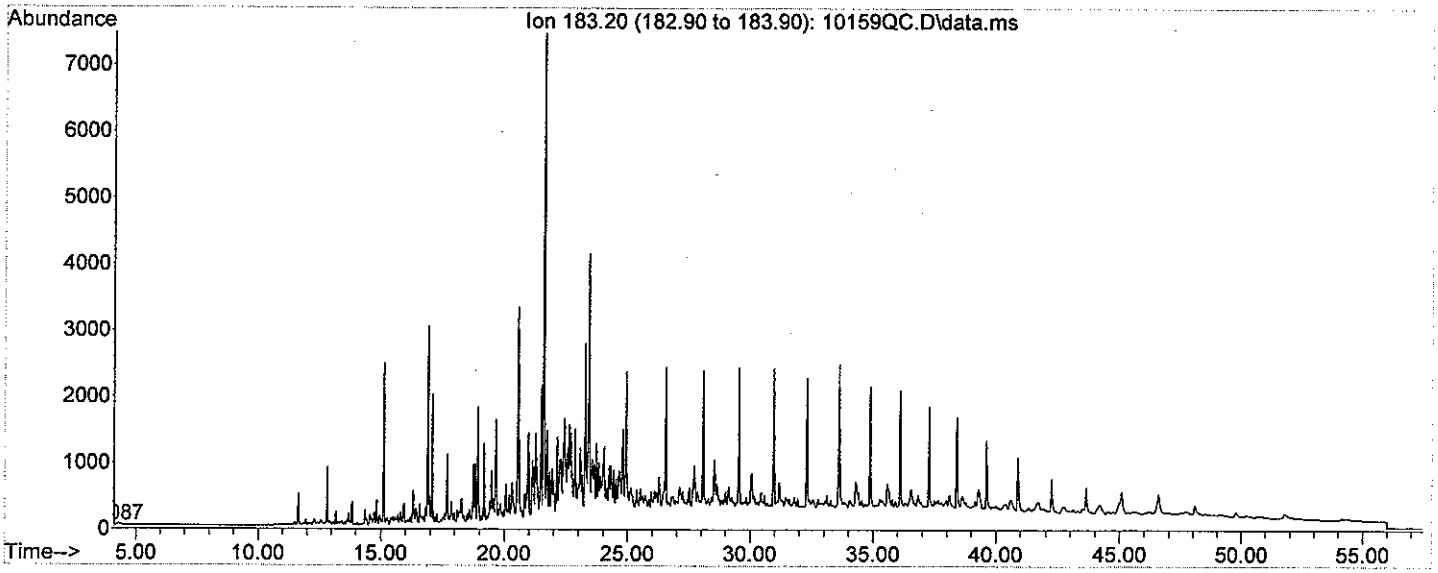
113-SATURATED HYDROCARBONS

Area = 0



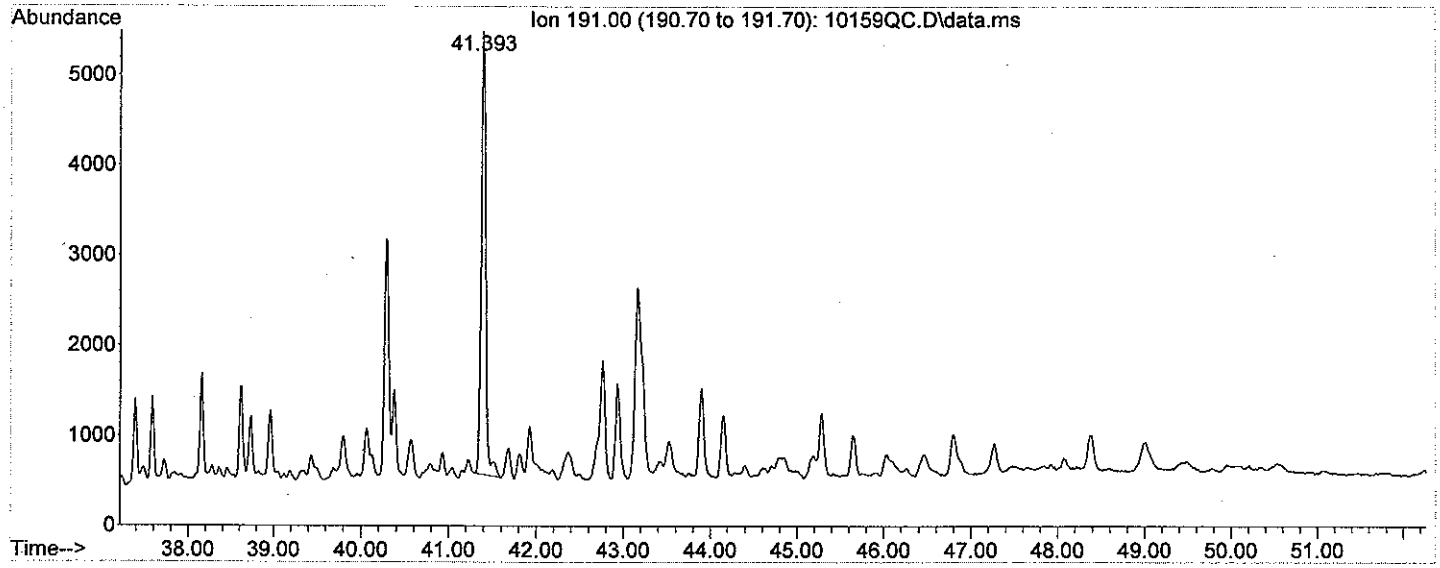
ACYCLIC ISOPRENOIDS/ALKANES

Area = 0



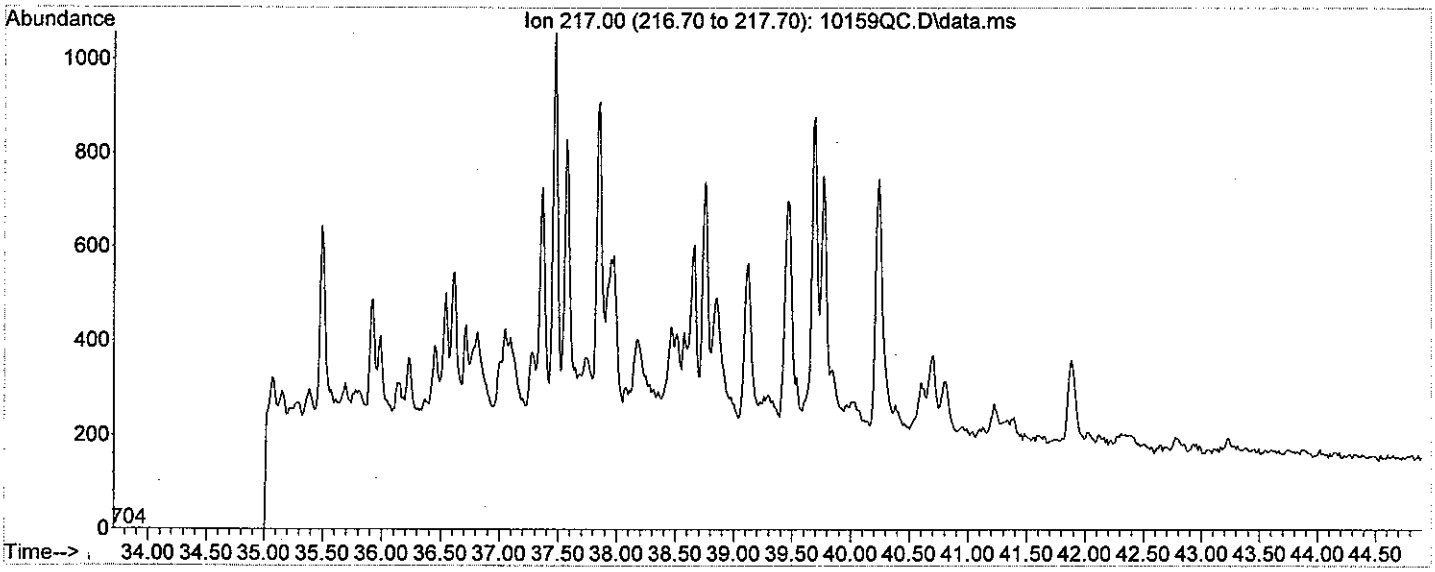
TRITERPANES/HOPANES

Area = 173711



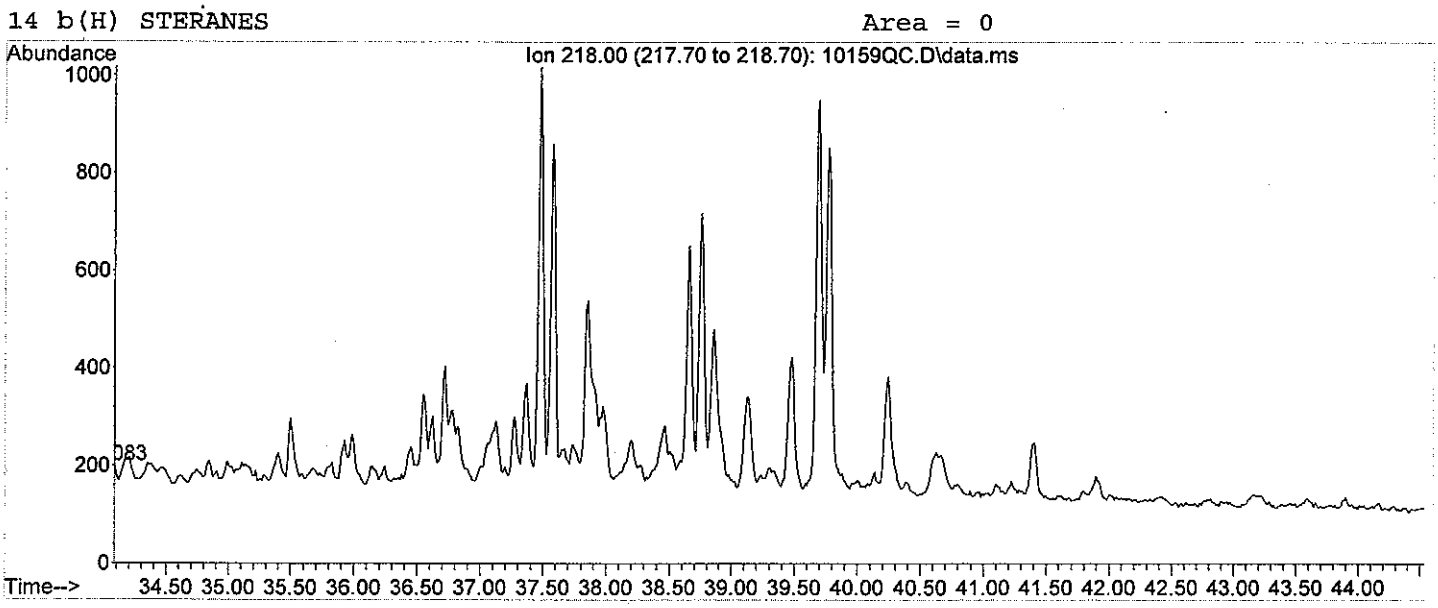
14 a(H) STERANES

Area = 0



14 b(H) STERANES

Area = 0



Quantitation Report (Not Reviewed)

Data Path : W:\2010\MS_DATA\10-159\
Data File : 1015904.D
Acq On : 25 Jun 2010 3:41 pm
Operator : ACT
Sample : 10-159-4, SP
Misc :
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Jun 25 16:35:05 2010
Quant Method : C:\MSDCHEM\1\METHODS\BIOMARK3.M
Quant Title :
QLast Update : Wed May 27 09:43:48 2009
Response via : Initial Calibration

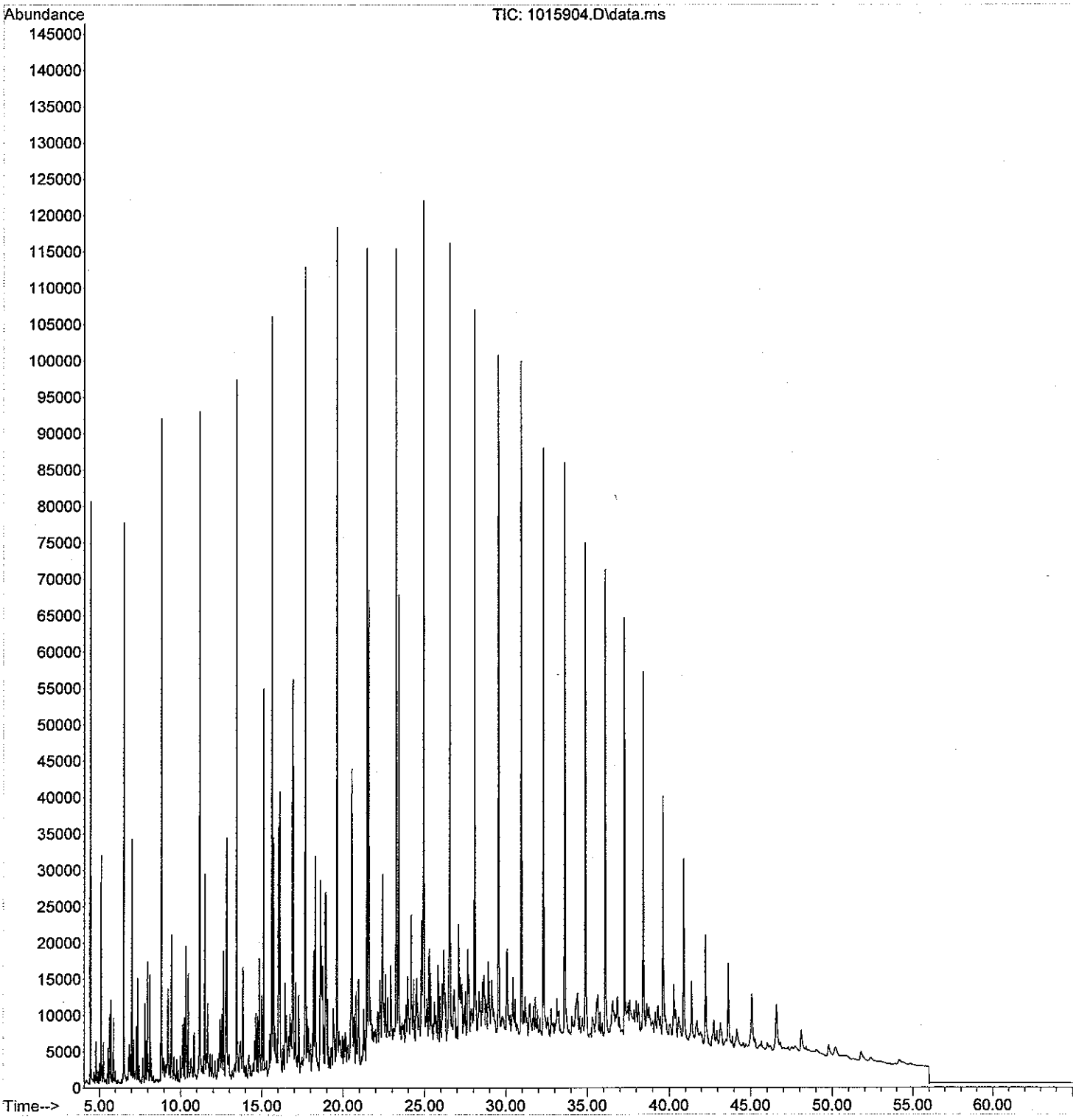
Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
Target Compounds					Qvalue
1) 85-SATURATED HYDROCARBONS	0.000	85	0	N.D.	
2) n-C17	0.000	85	0	N.D.	
3) PRISTANE	0.000	85	0	N.D.	
4) n-C18	0.000	85	0	N.D.	
5) PHYTANE	0.000	85	0	N.D.	
6) 113-SATURATED HYDROCAR...	0.000	113	0	N.D.	
7) ACYCLIC ISOPRENOIDS/AL...	0.000	183	0	N.D.	
8) C2-NAPHTHALENES	0.000	156	0	N.D.	
9) C3-NAPHTHALENES	19.411	170	151685	No Calib	
10) C4-NAPHTHALENES	0.000	184	0	N.D.	
11) PHENANTHRENE/ANTHRACENE	0.000	178	0	N.D.	
12) BENZONAPHTHIOPHENE	32.113	234	64185	No Calib	
13) DIBENZOTHIOPHENE	22.439	184	184632	No Calib	
14) C1-DIBENZOTHIOPHENE	24.528	198	285660	No Calib	
15) C2-DIBENZOTHIOPHENE	26.493	212	144455	No Calib	
16) C3-DIBENZOTHIOPHENE	27.988	226	126967	No Calib	
17) C1-PHENANTHRENES	25.359	192	222777	No Calib	
18) C2-PHENANTHRENES	27.292	206	150427	No Calib	
19) C3-PHENANTHRENES	29.168	220	102353	No Calib	
20) TRITERPANES/HOPANES	41.403	191	176211	No Calib	
21) HOPANE A	0.000	191	0	N.D.	
22) HOPANE B	0.000	191	0	N.D.	
23) 14 a(H) STERANES	0.000	217	0	N.D.	
24) 14 b(H) STERANES	0.000	218	0	N.D.	
25) TRI-AROMATIC STERANES	0.000	231	0	N.D.	
26) METHYLHOPANES	0.000	205	0	N.D.	
27) NORHOPANES	0.000	177	0	N.D.	
28) PYRENE/FLUORANTHENE	28.917	202	35267	No Calib	
29) METHYL PYRENE	30.436	216	18657	No Calib	
30) FLUORENE	0.000	166	0	N.D.	
31) BICYCLONAPHTHALENES	0.000	208	0	N.D.	
32) CHRYSENE	0.000	228	0	N.D.	
33) C1-CHRYSENE	34.693	242	56914	No Calib	
34) C2-CHRYSENE	36.744	256	25014	No Calib	
35) C3-CHRYSENE	0.000	270	0	N.D.	
36) C4-CHRYSENE	0.000	284	0	N.D.	
37) SESQUITERPANES	28.330	123	35613	No Calib	

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (Not Reviewed)

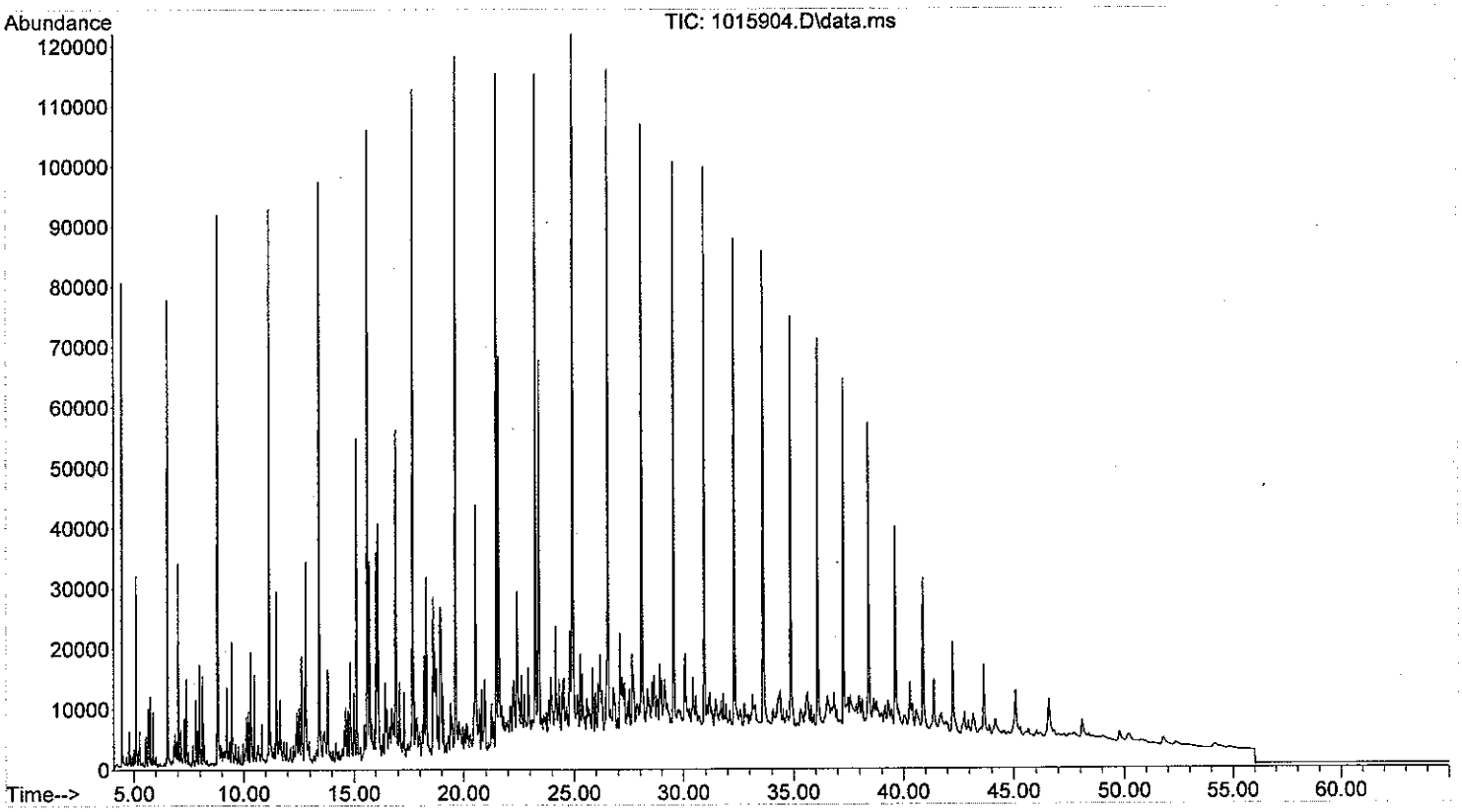
Data Path : W:\2010\MS_DATA\10-159\
Data File : 1015904.D
Acq On : 25 Jun 2010 3:41 pm
Operator : ACT
Sample : 10-159-4, SP
Misc :
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Jun 25 16:35:05 2010
Quant Method : C:\MSDCHEM\1\METHODS\BIOMARK3.M
Quant Title :
QLast Update : Wed May 27 09:43:48 2009
Response via : Initial Calibration

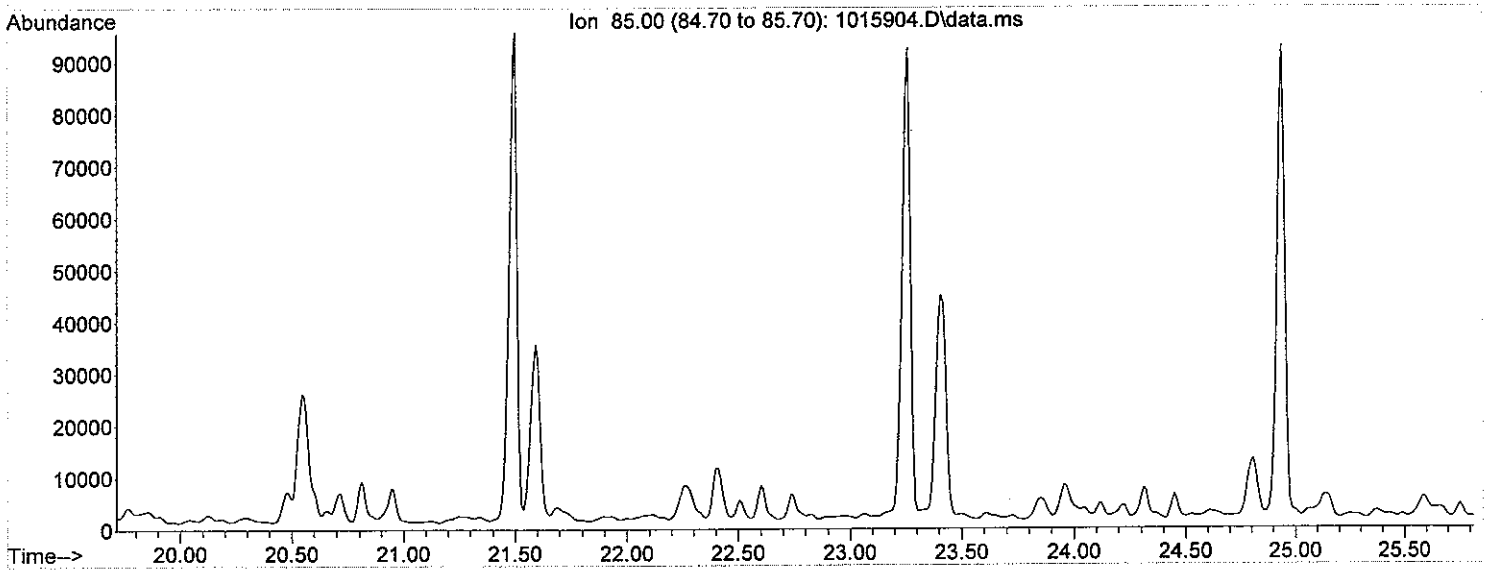


MARINE SAFETY LABORATORY GC-MS2 BIOMARKER ANALYSIS

File: \\Mslserver1\data archive\2010\MS_data\10-159\1015904.D
Operator: ACT
Date Acquired: 25 Jun 2010 3:41 pm
Method File: BIOMARK3.M
Sample Name: 10-159-4, SP Vial: 3
Misc Info:

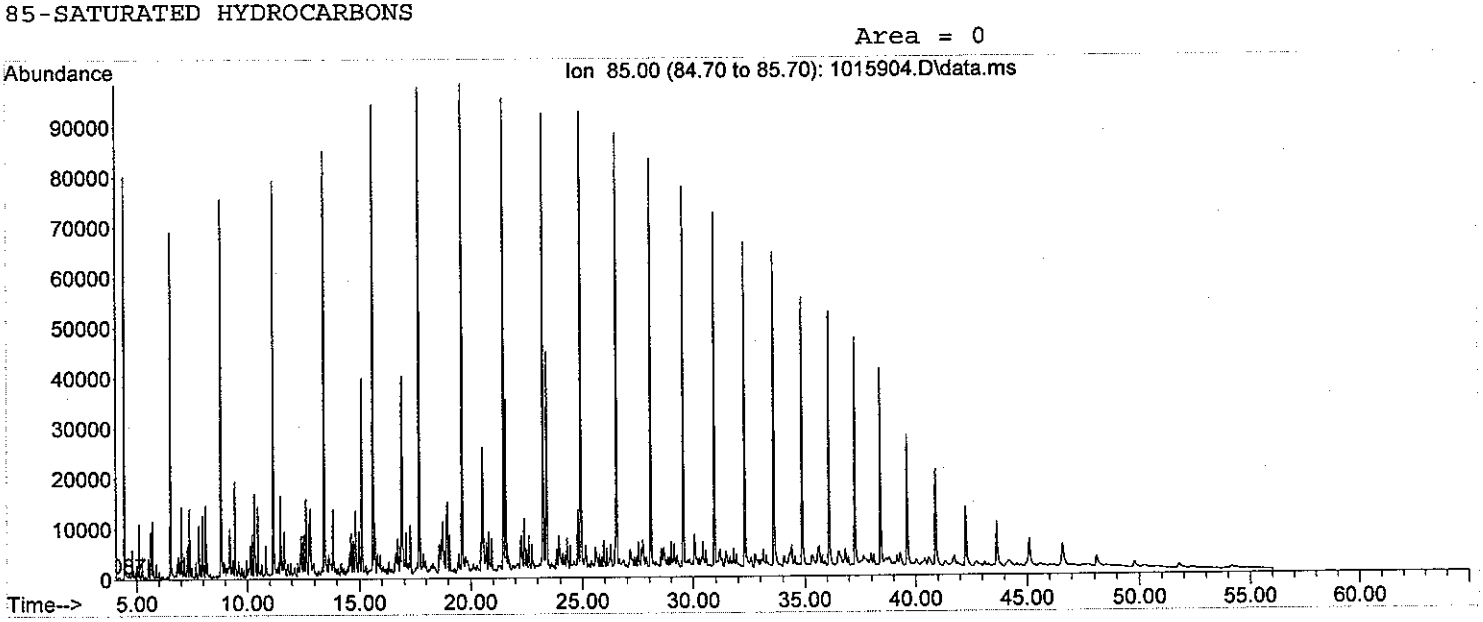


n-C17,Pristane,n-C18,Phytane

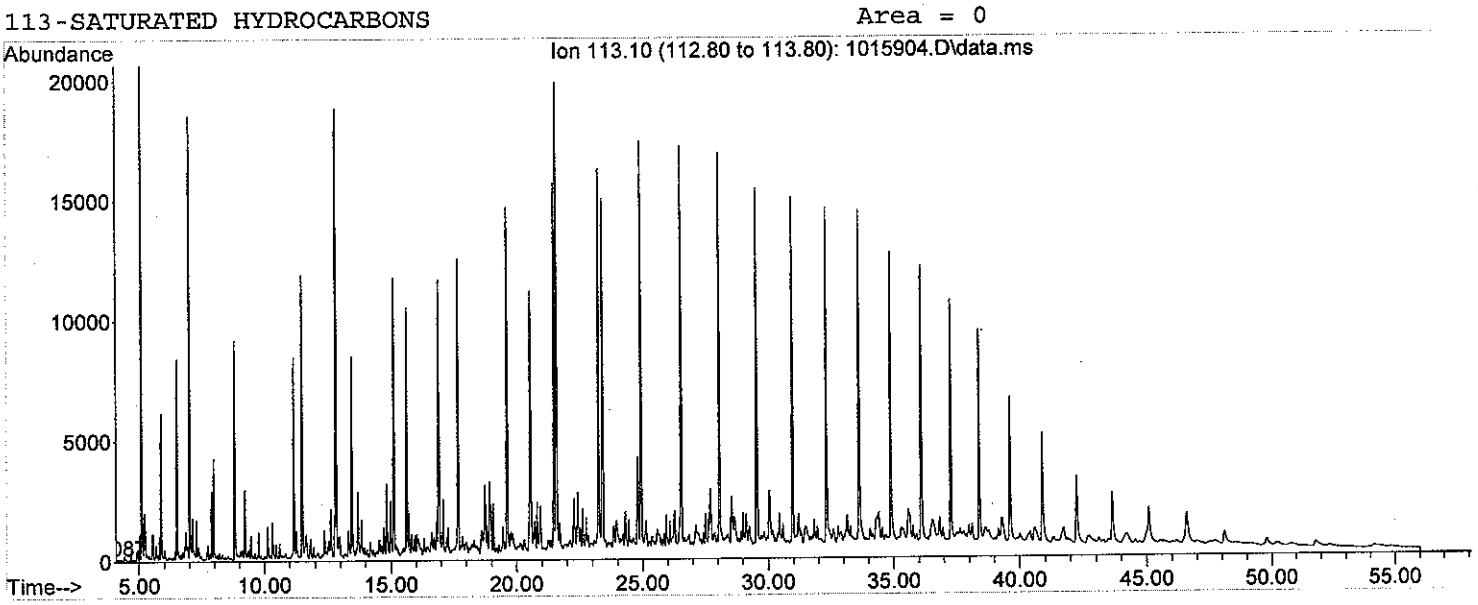


Pristane/Phytane = 0.687
C17/C18 = 0.978
Pristane/C17 = 0.410
Phytane/C18 = 0.583

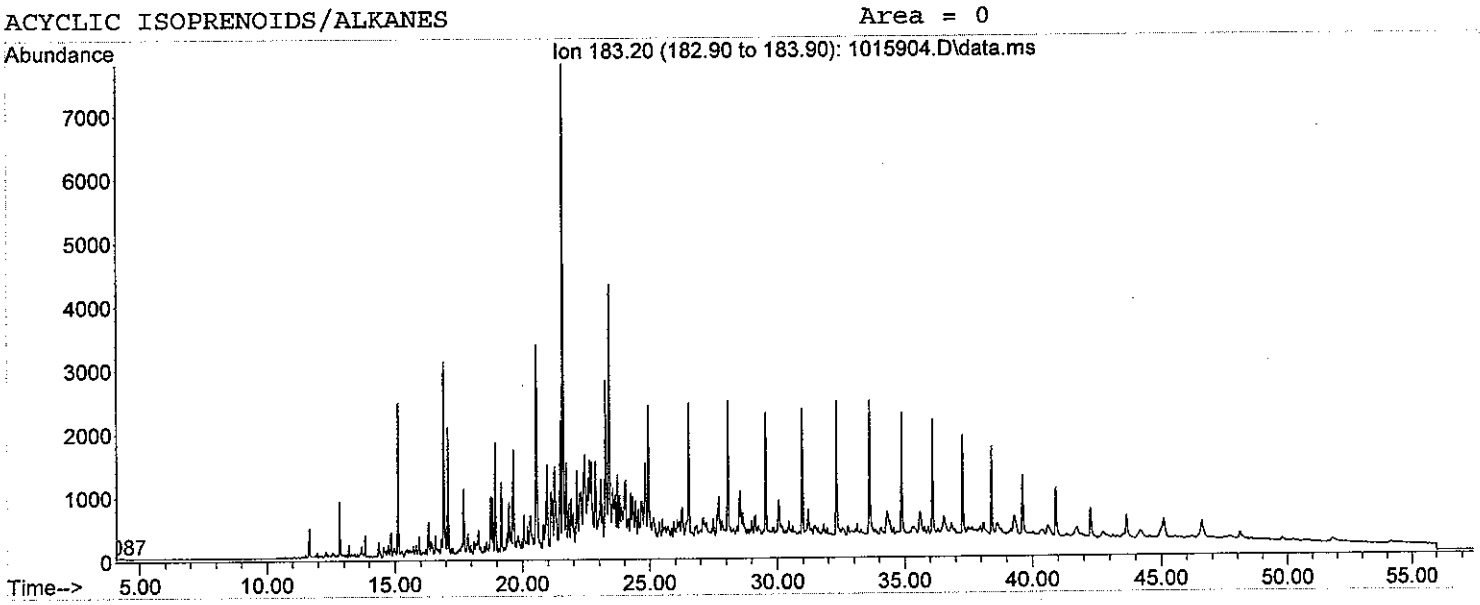
85-SATURATED HYDROCARBONS



113-SATURATED HYDROCARBONS

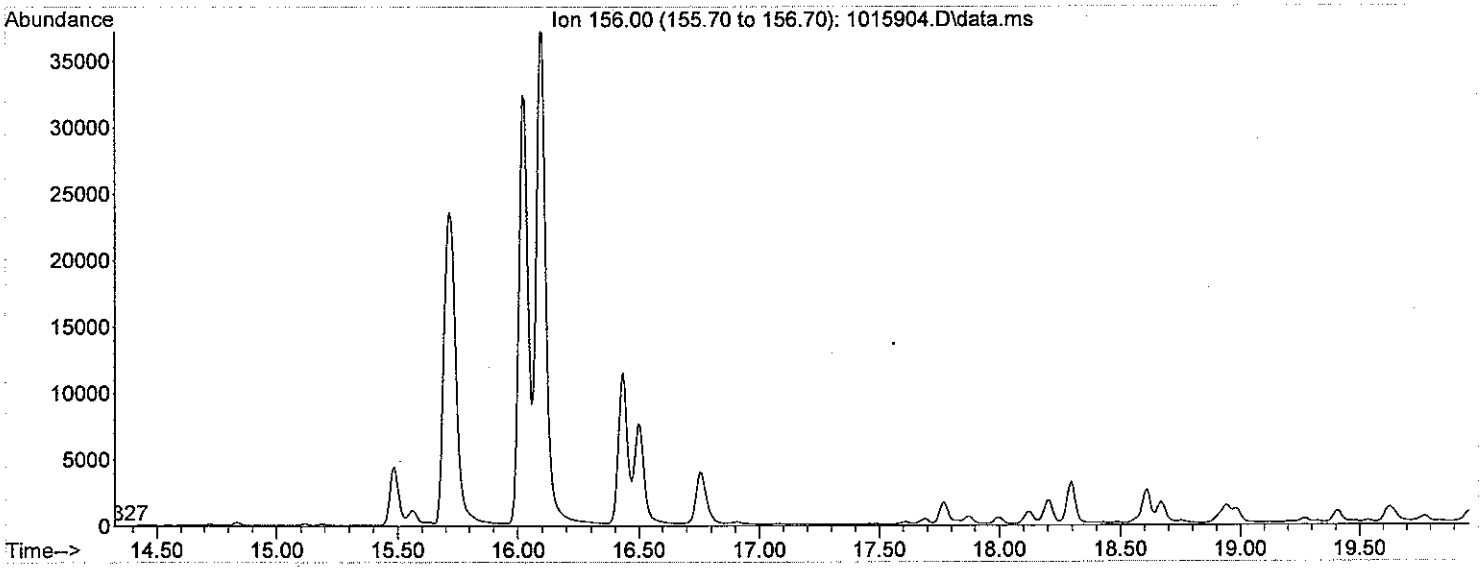


ACYCLIC ISOPRENOIDS/ALKANES



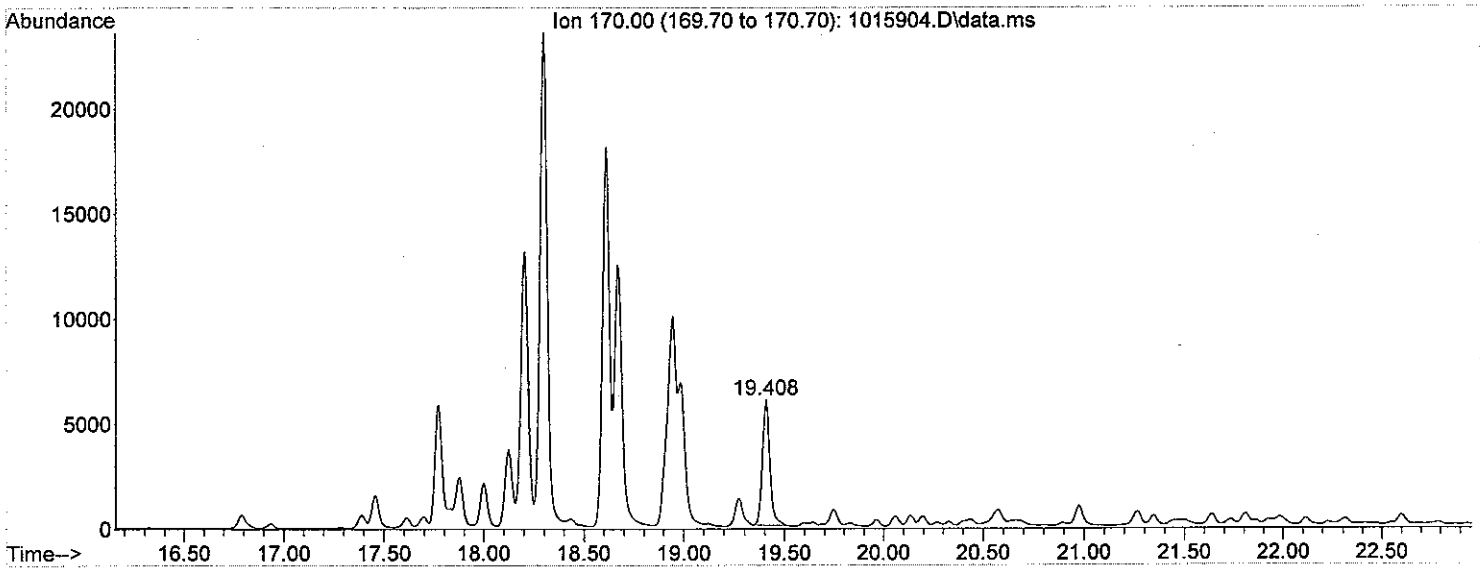
C2-NAPHTHALENES

Area = 0



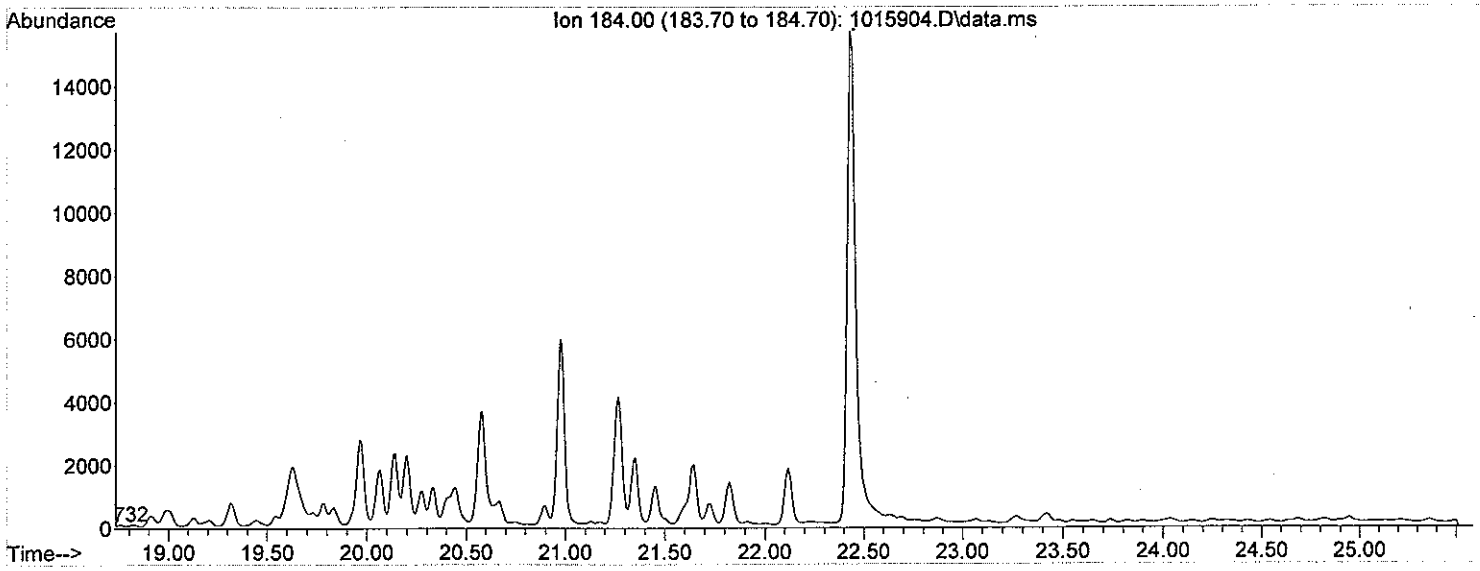
C3-NAPHTHALENES

Area = 151685



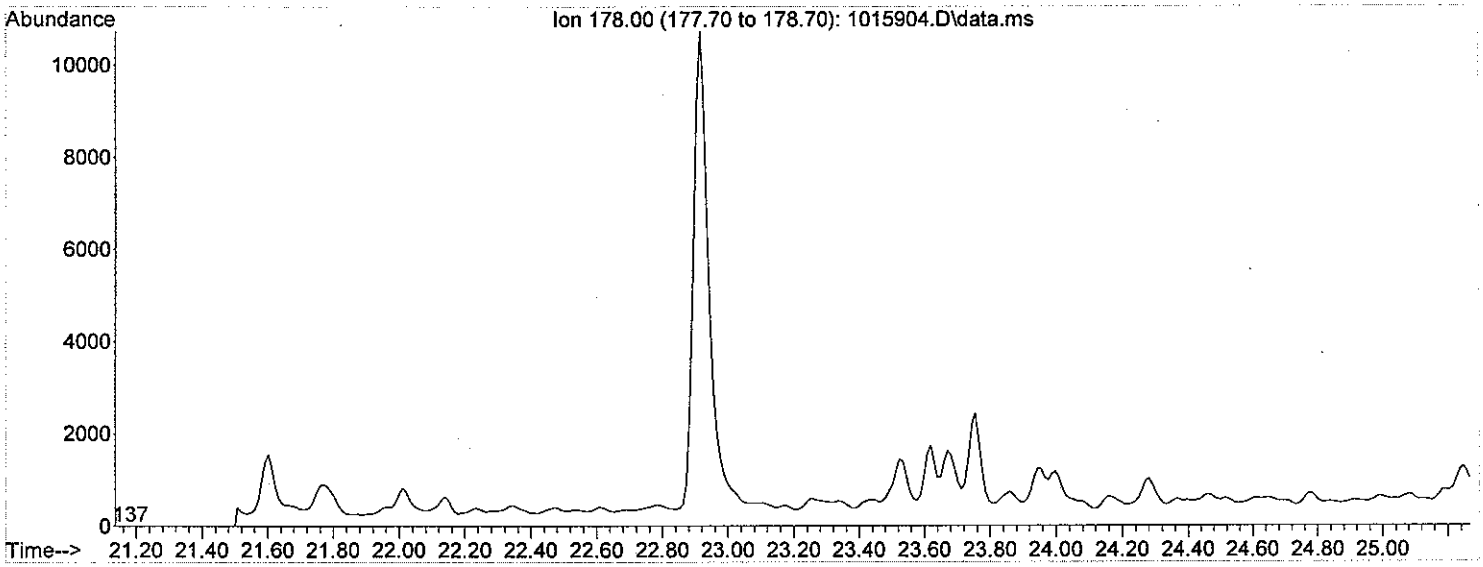
C4-NAPHTHALENES

Area = 0



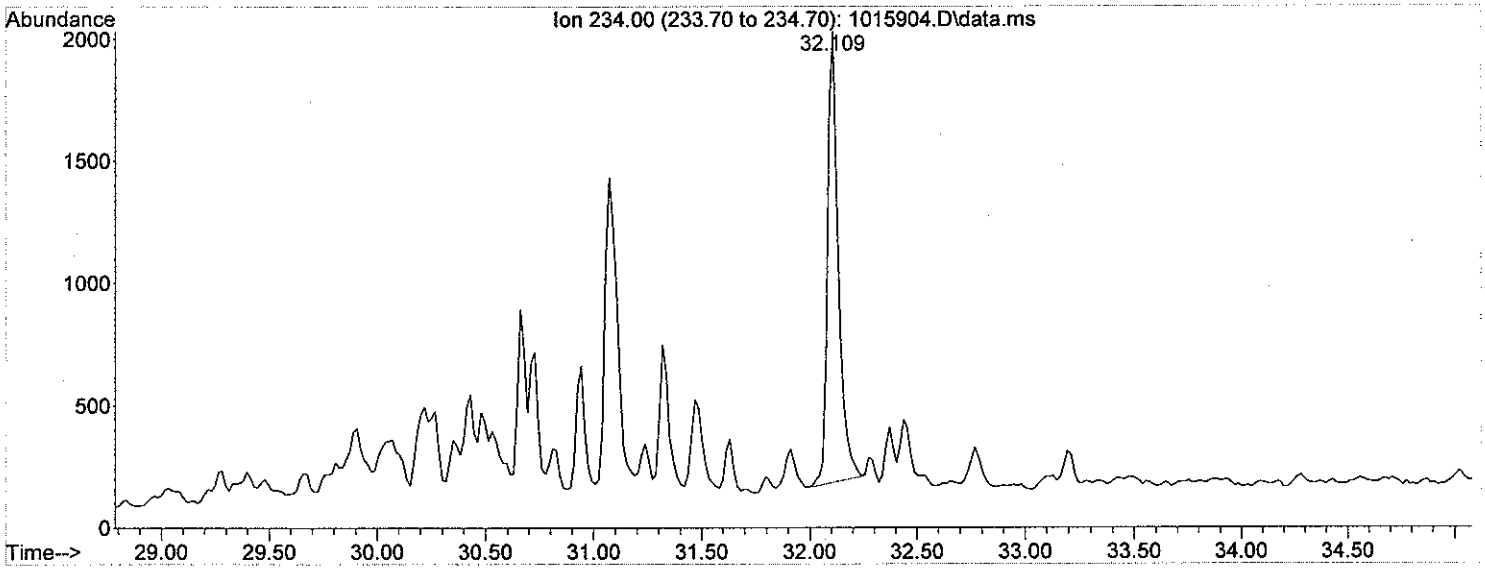
PHENANTHRENE/ANTHRACENE

Area = 0



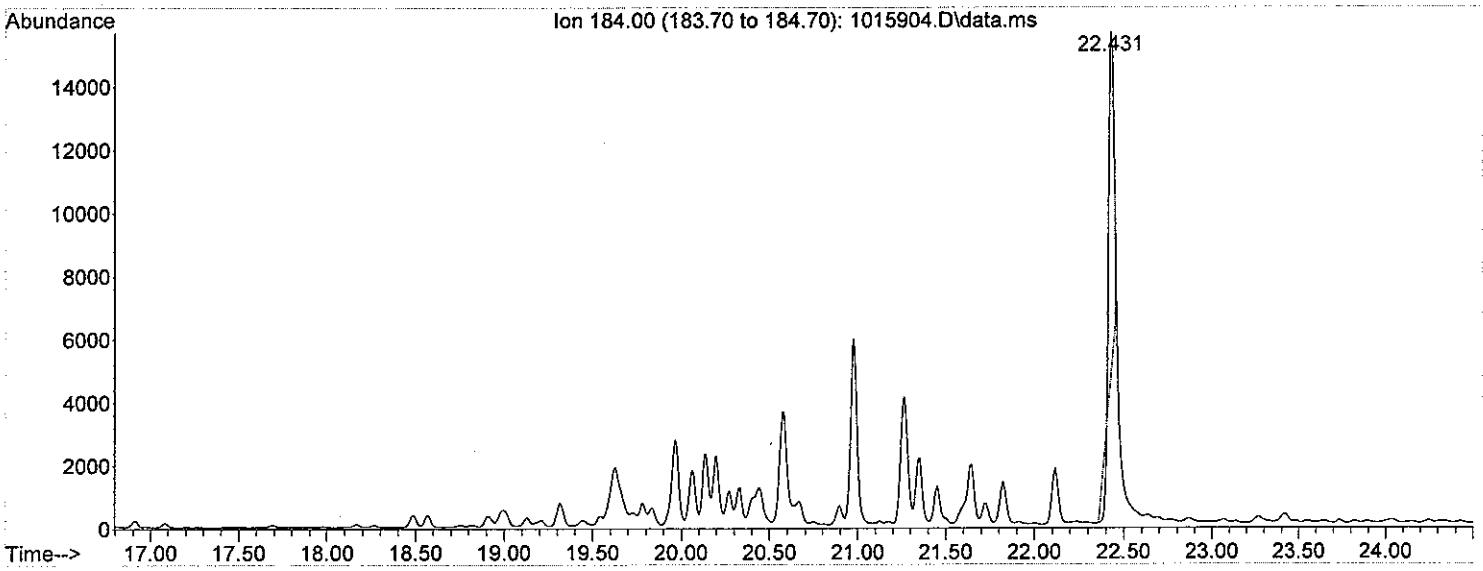
BENZONAPHTHIOPHENE

Area = 64185.1



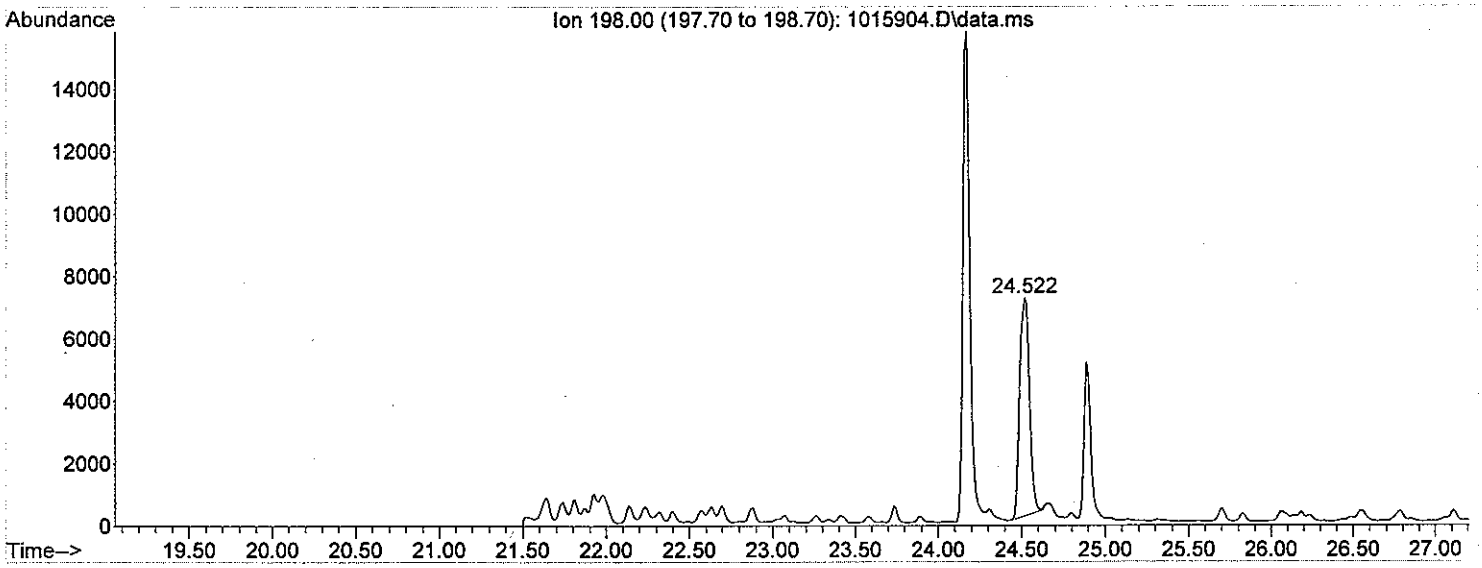
DIBENZOTHIOPHENE

Area = 184632



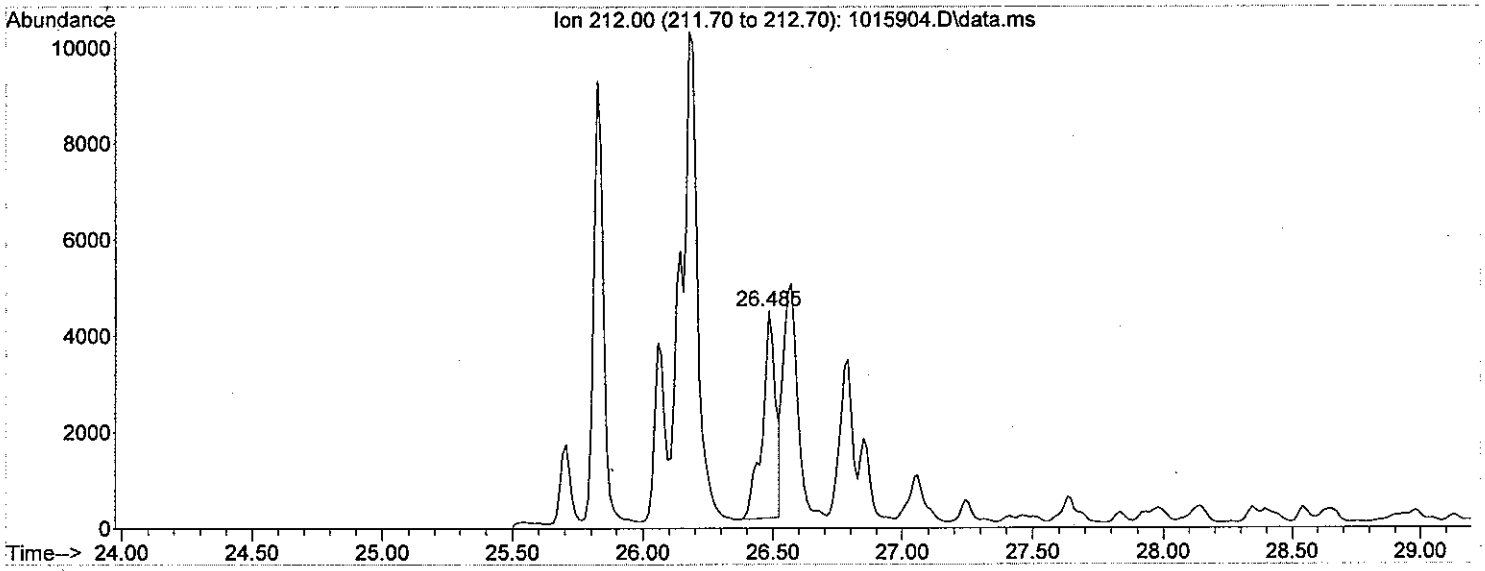
C1-DIBENZOTHIOPHENE

Area = 285660



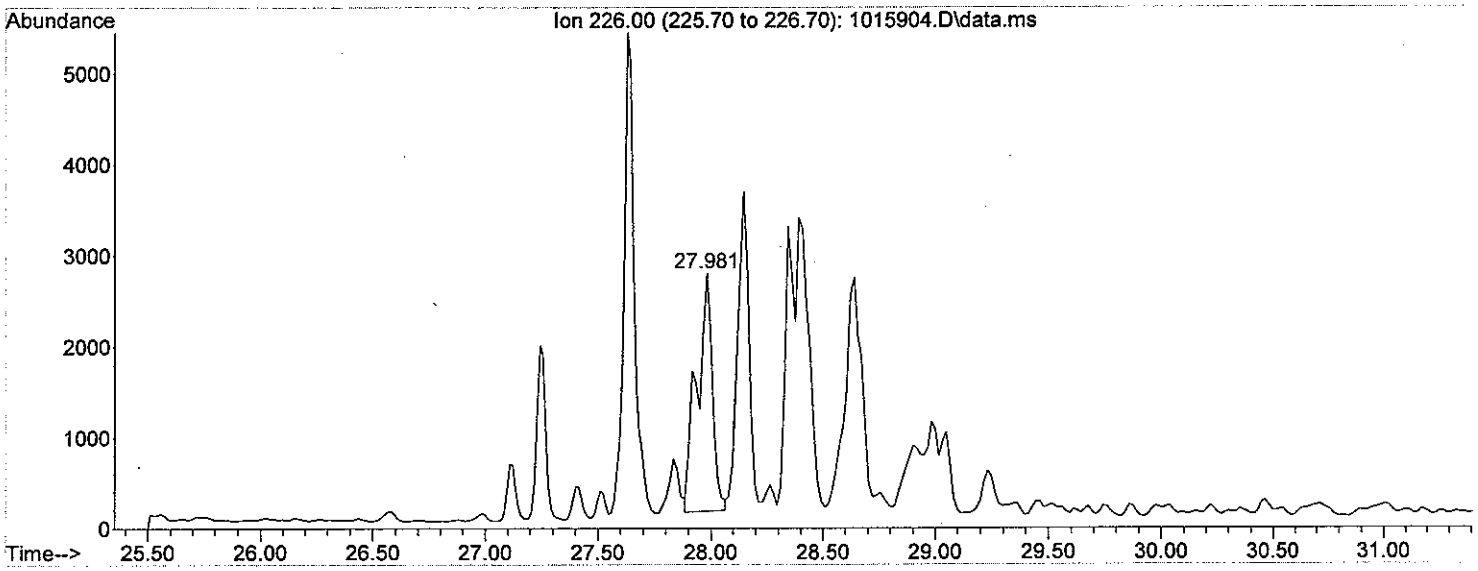
C2-DIBENZOTHIOPHENE

Area = 144455



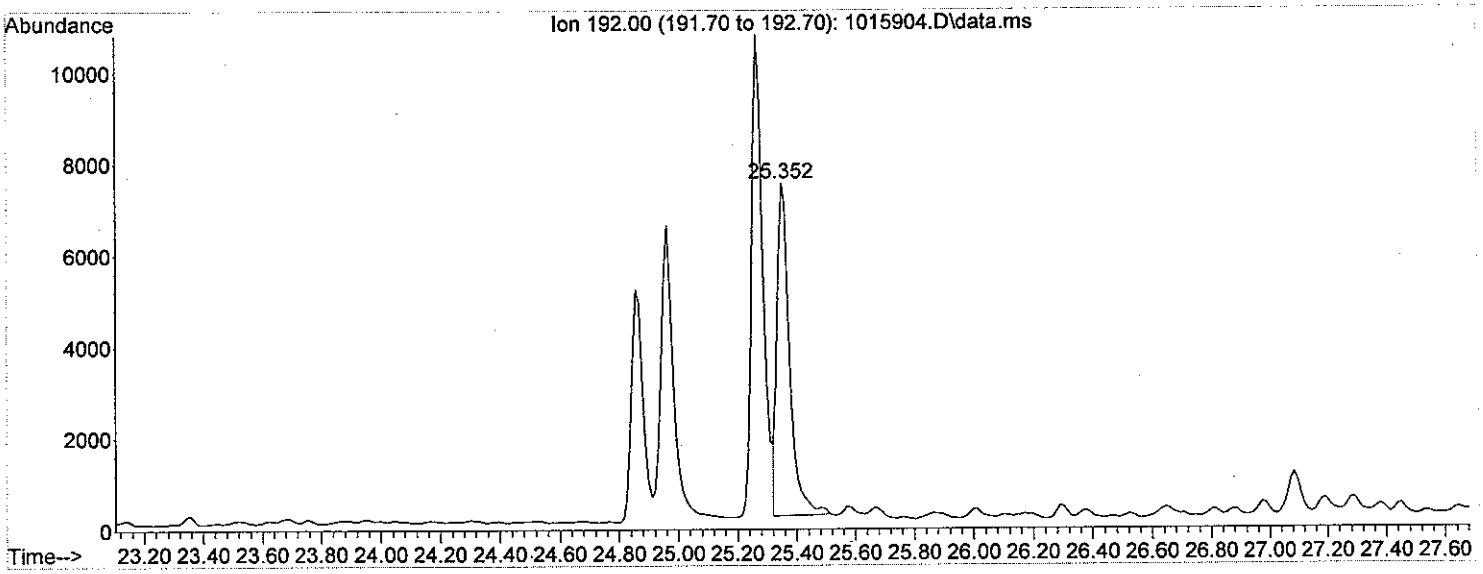
C3-DIBENZOTHIOPHENE

Area = 126967



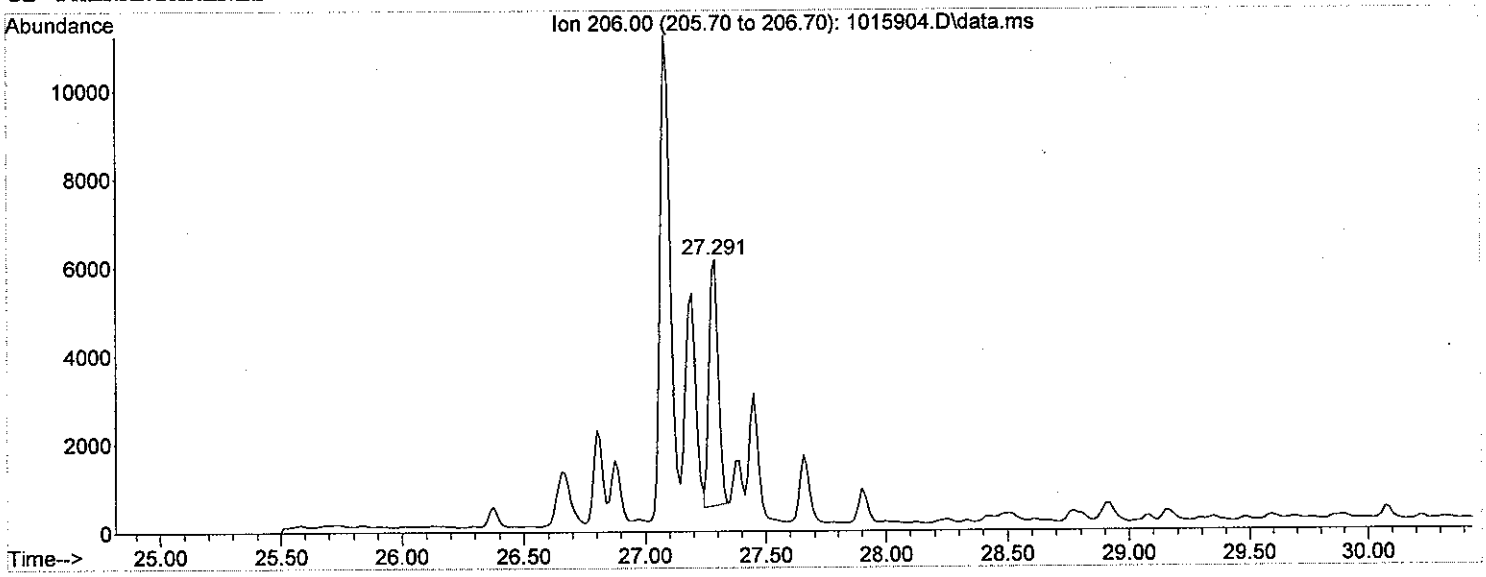
C1 - PHENANTHRENES

Area = 222777



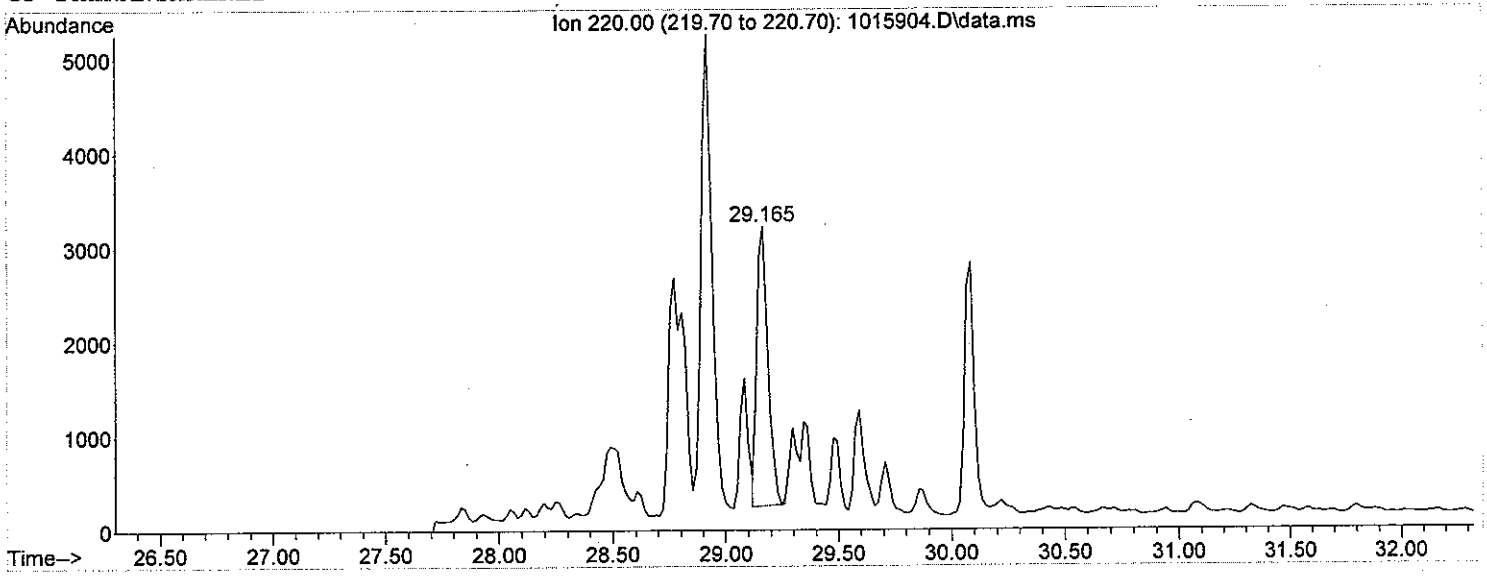
C2 - PHENANTHRENES

Area = 150427



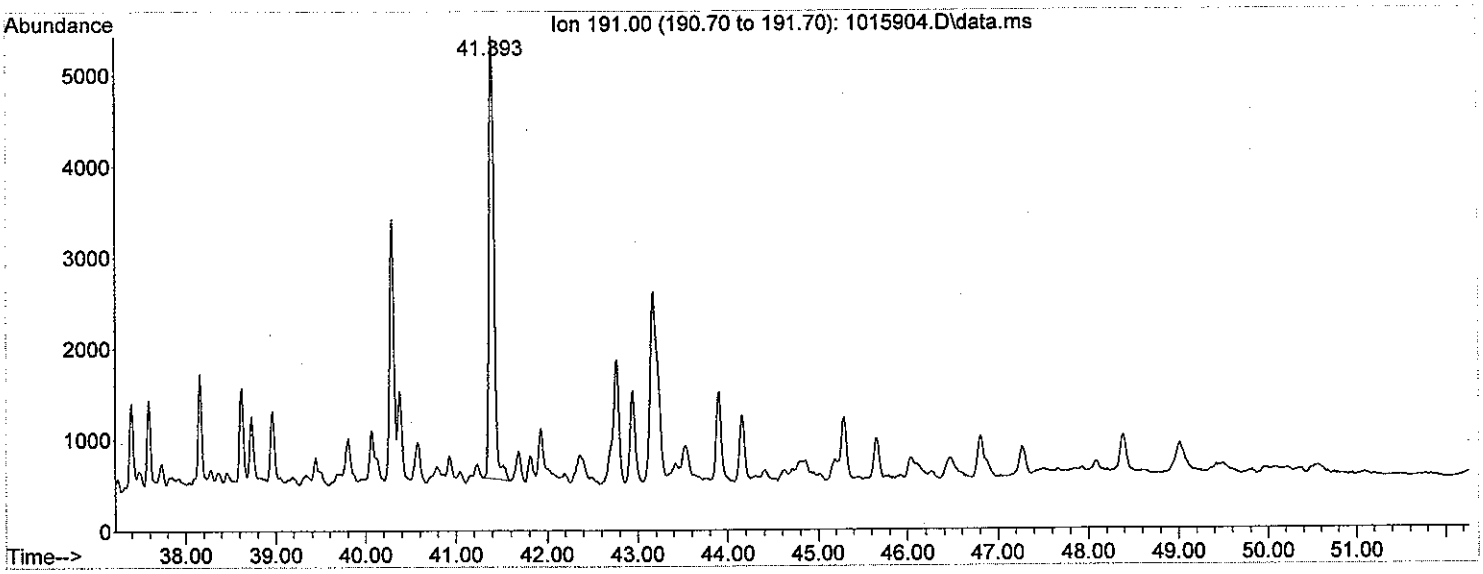
C3 - PHENANTHRENES

Area = 102353



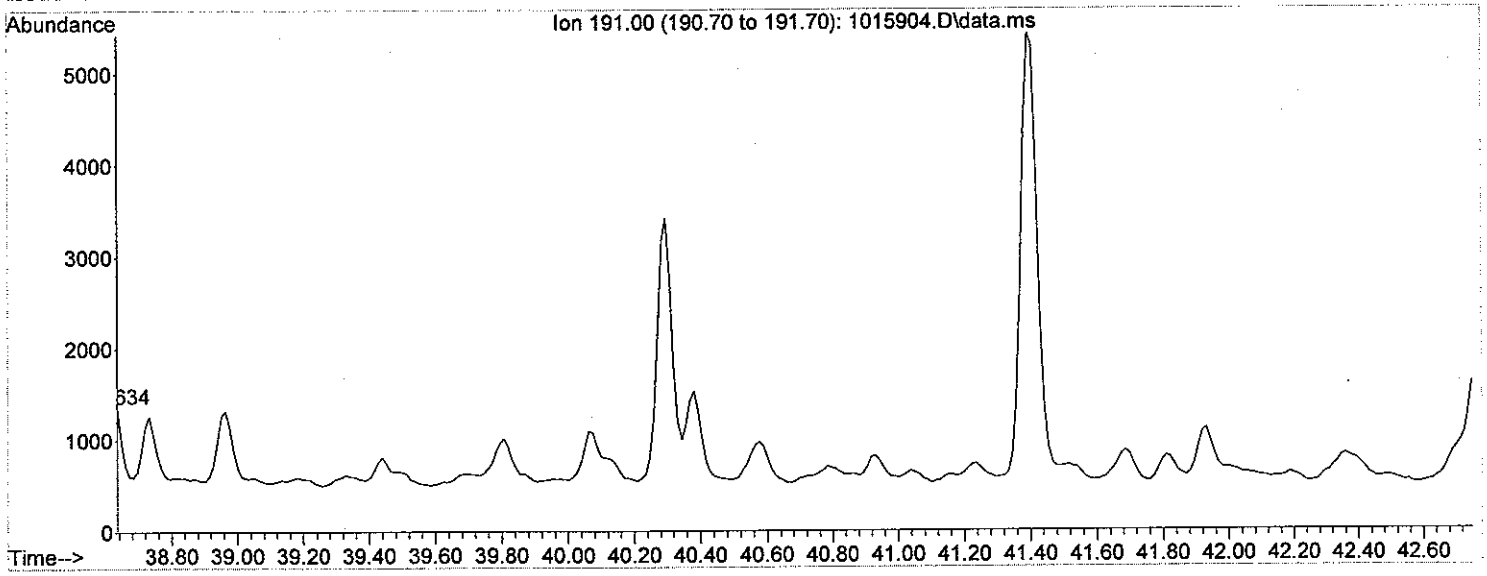
TRITERPANES/HOPANES

Area = 176211



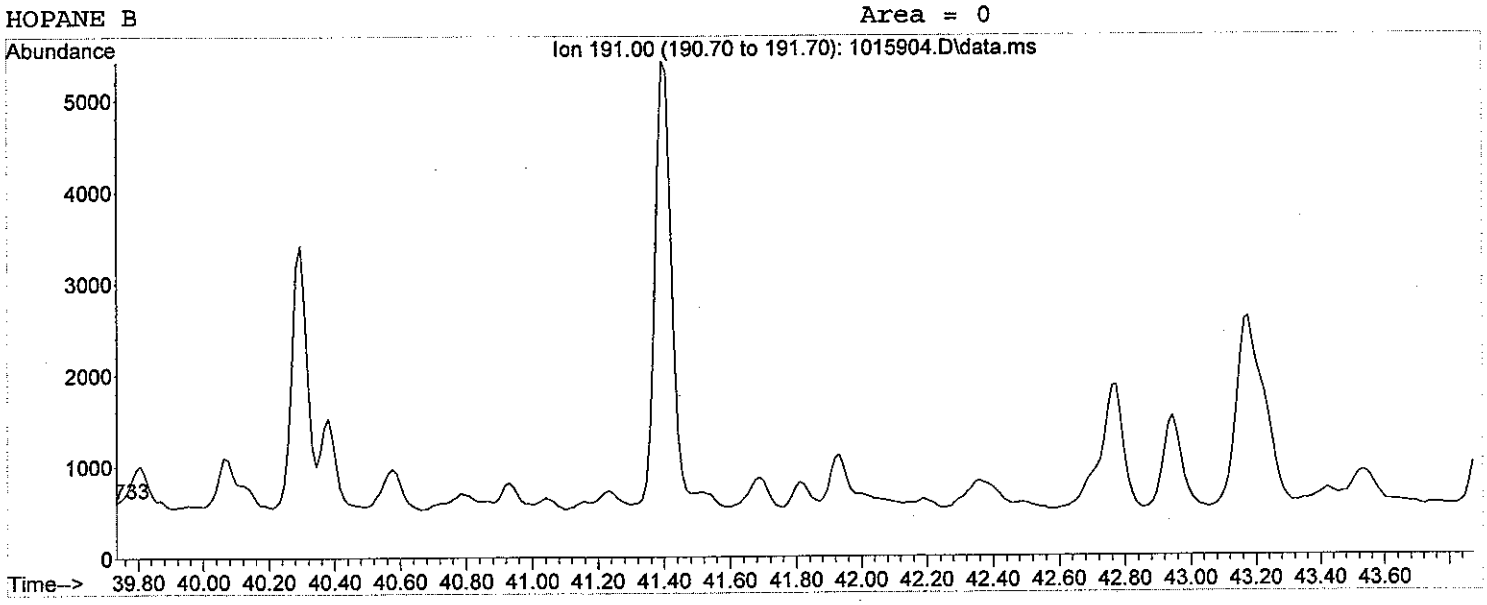
HOPANE A

Area = 0

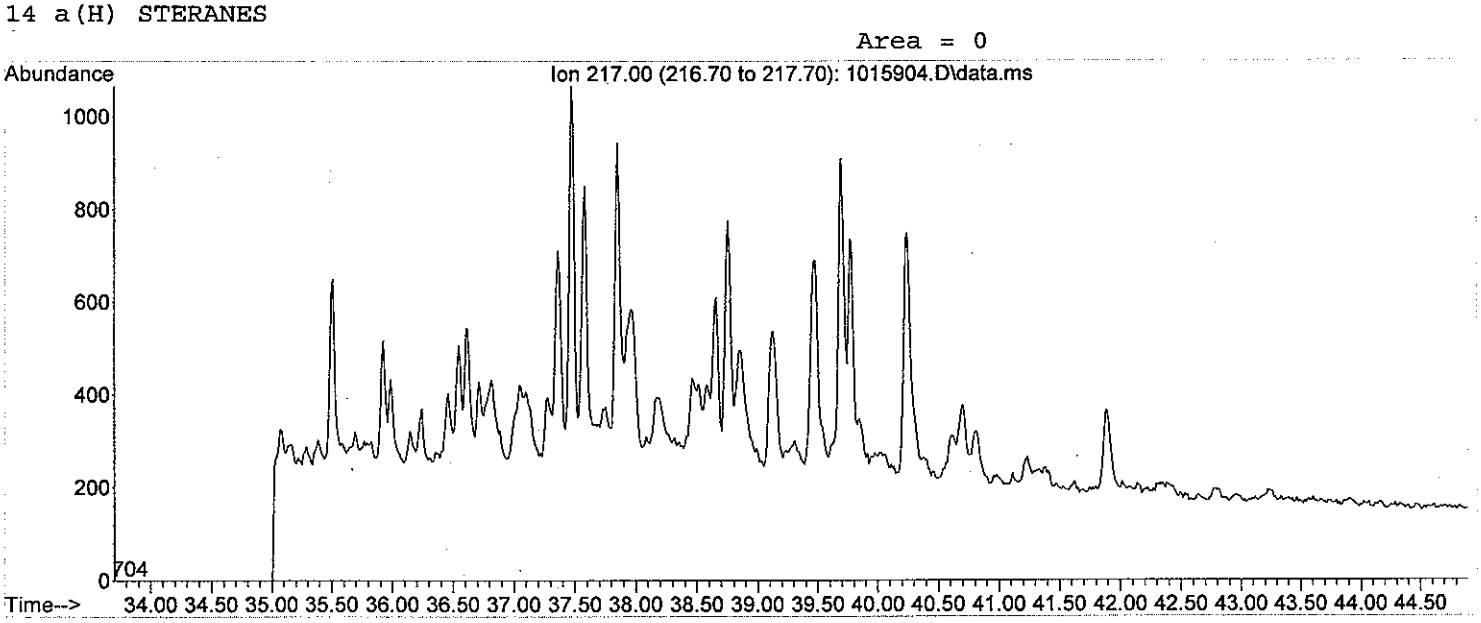


HOPANE B

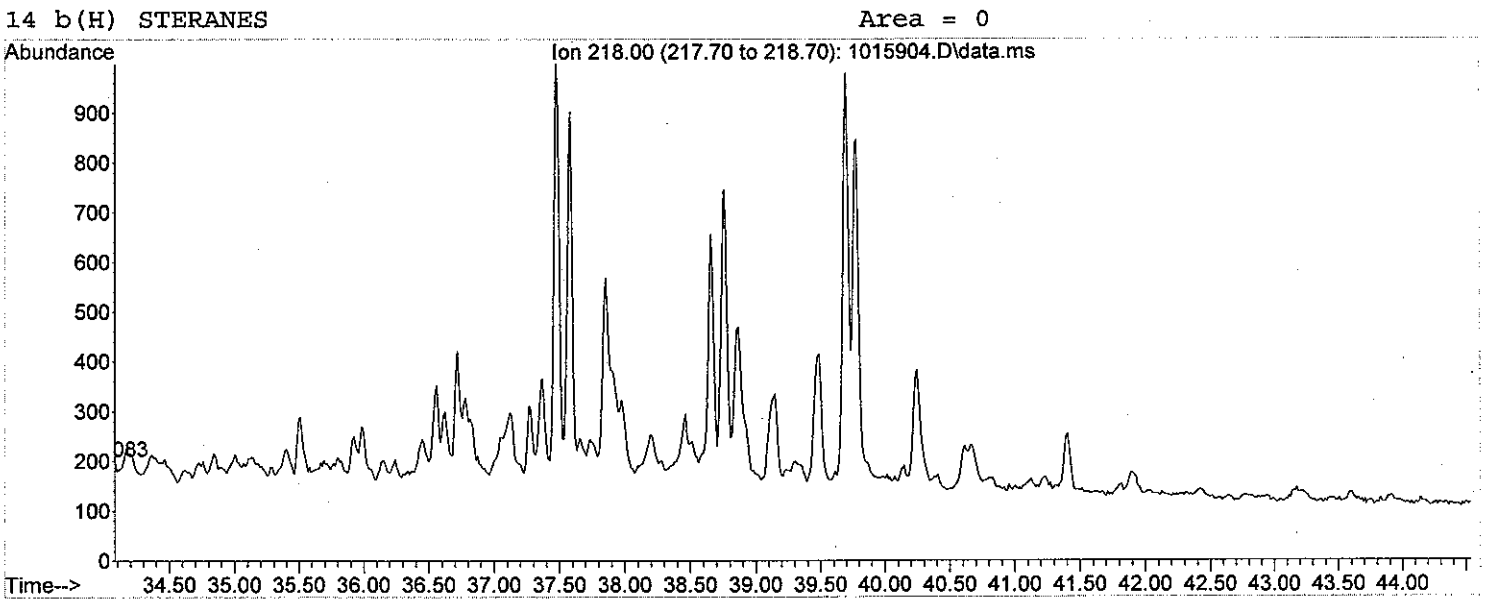
Area = 0



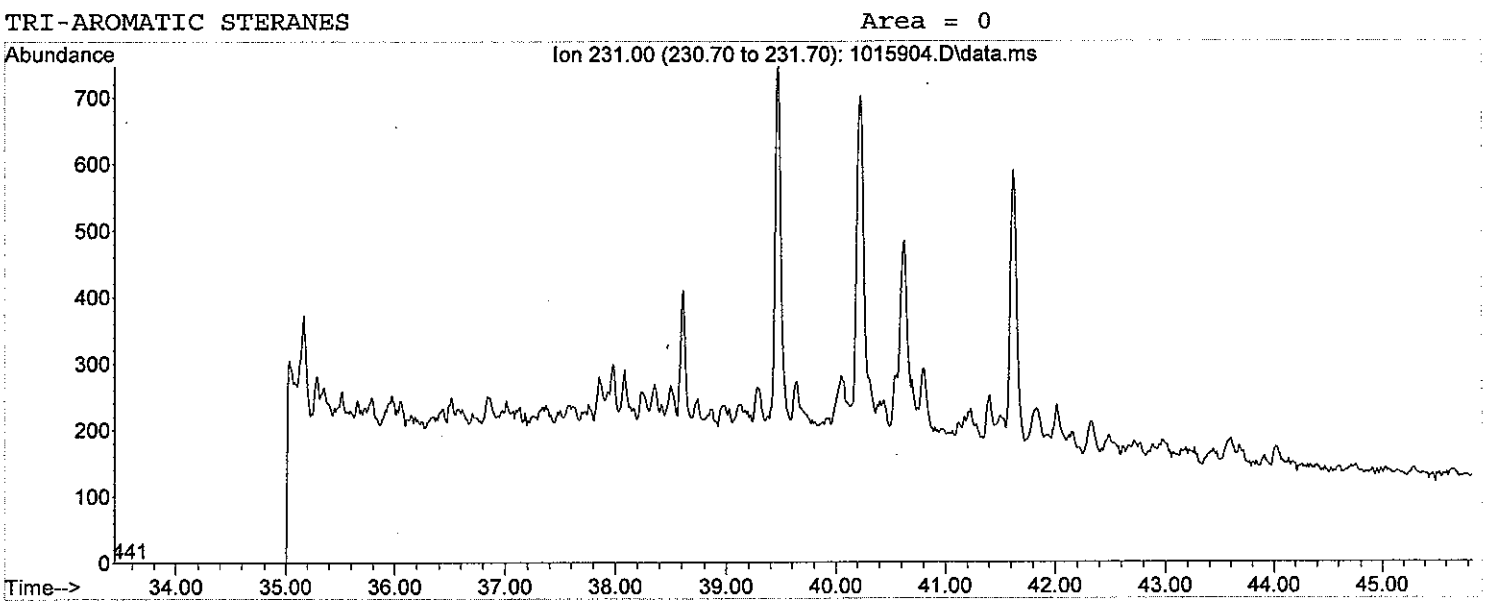
14 a(H) STERANES



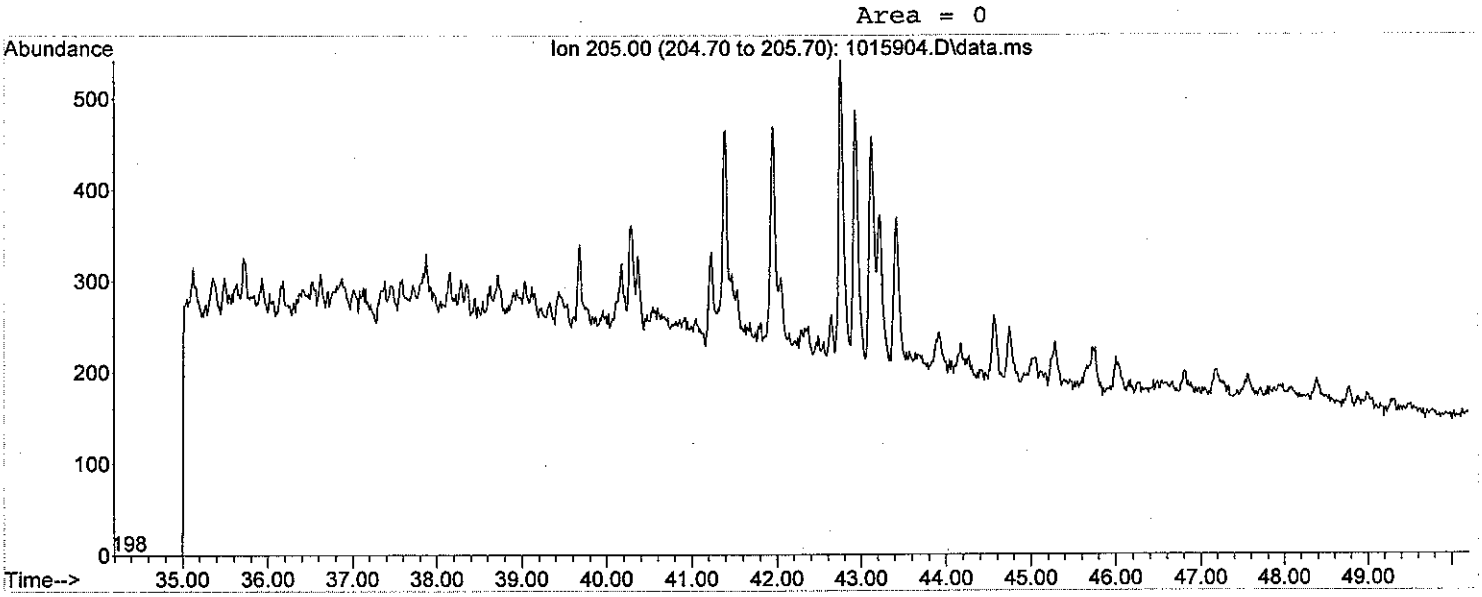
14 b(H) STERANES



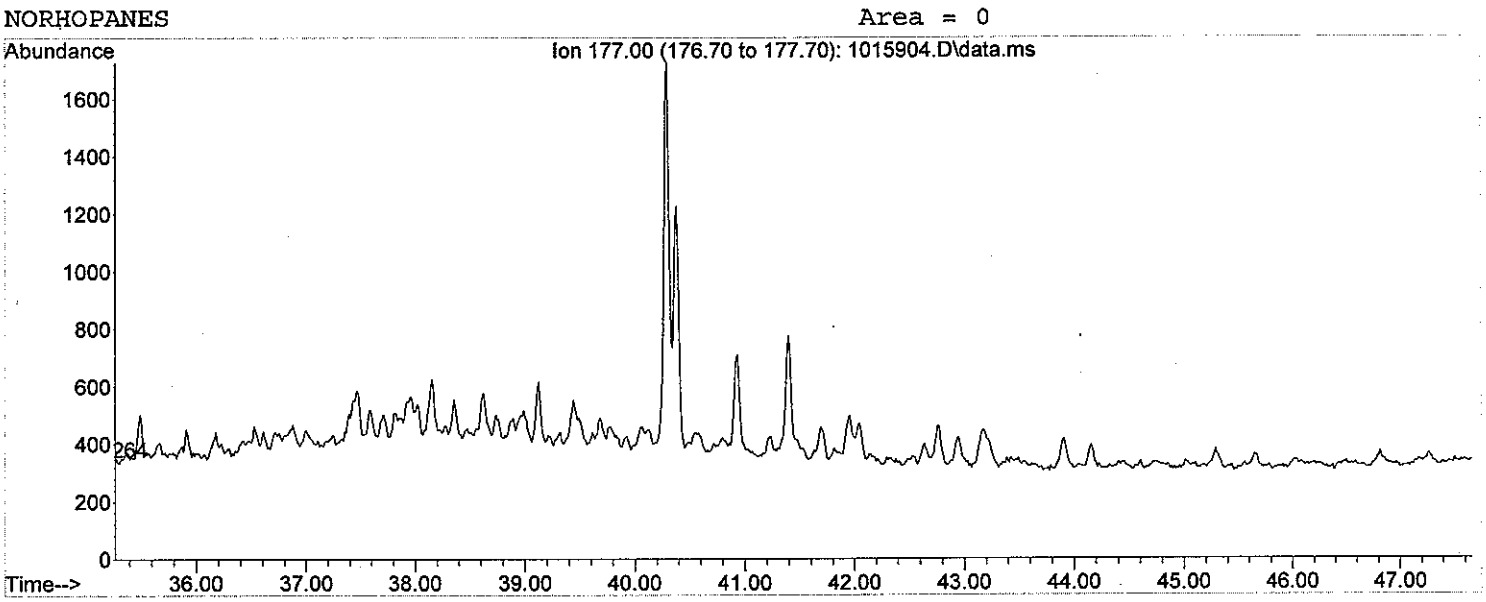
TRI-AROMATIC STERANES



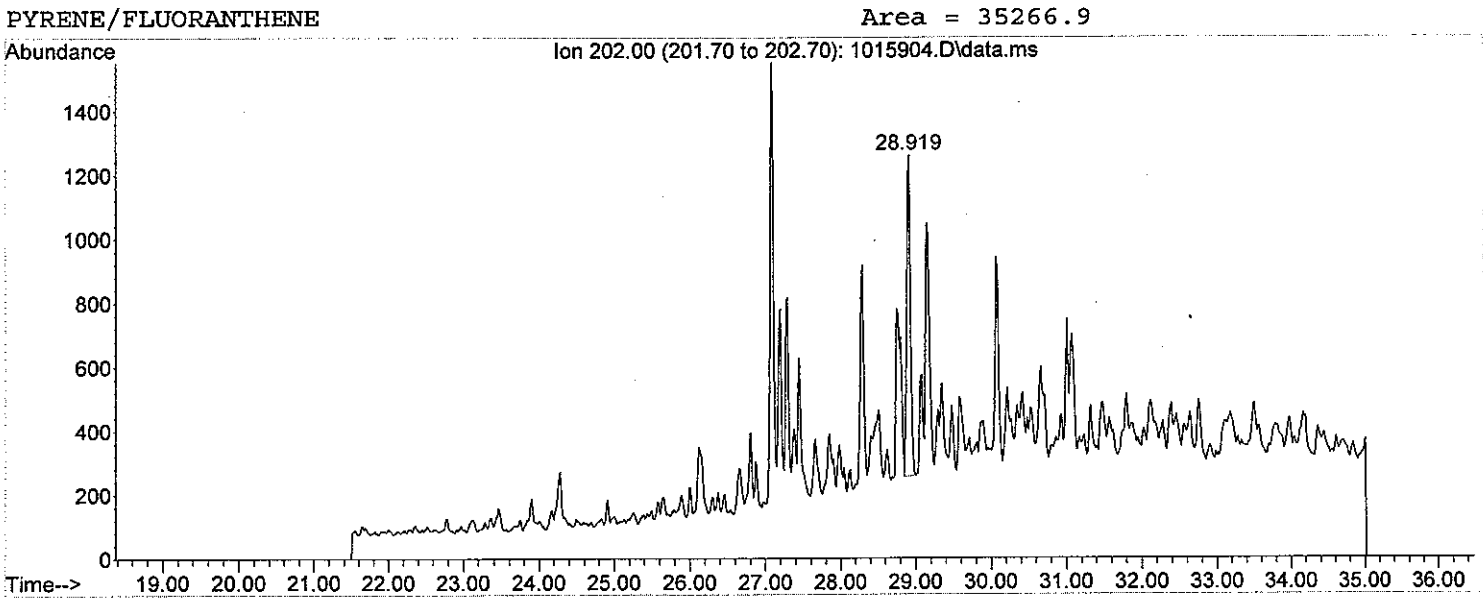
METHYLHOPANES



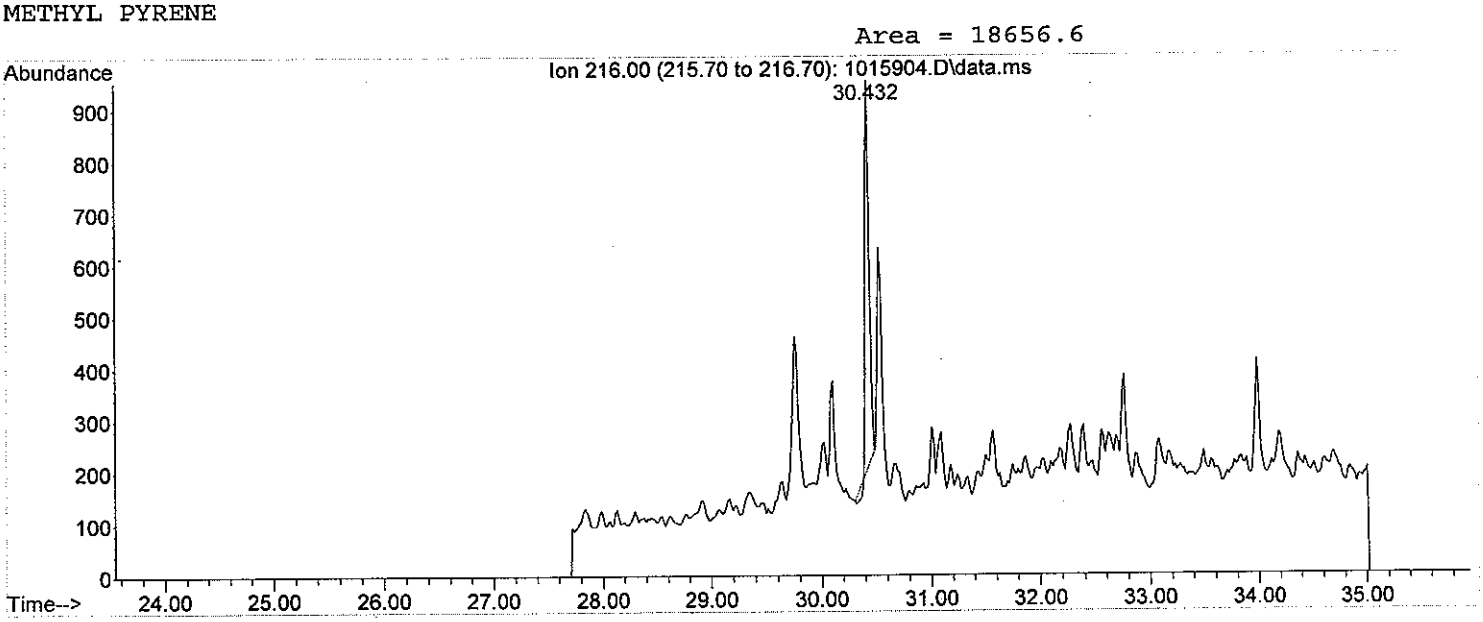
NORHOPANES



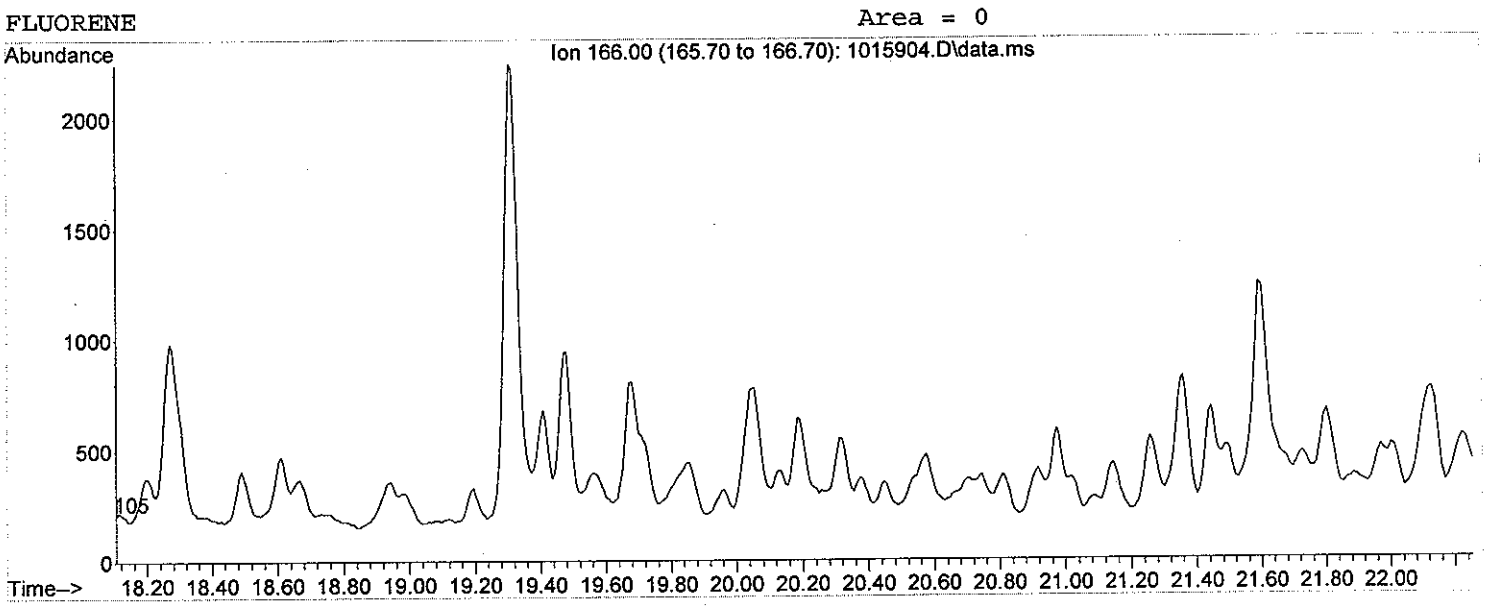
PYRENE/FLUORANTHENE



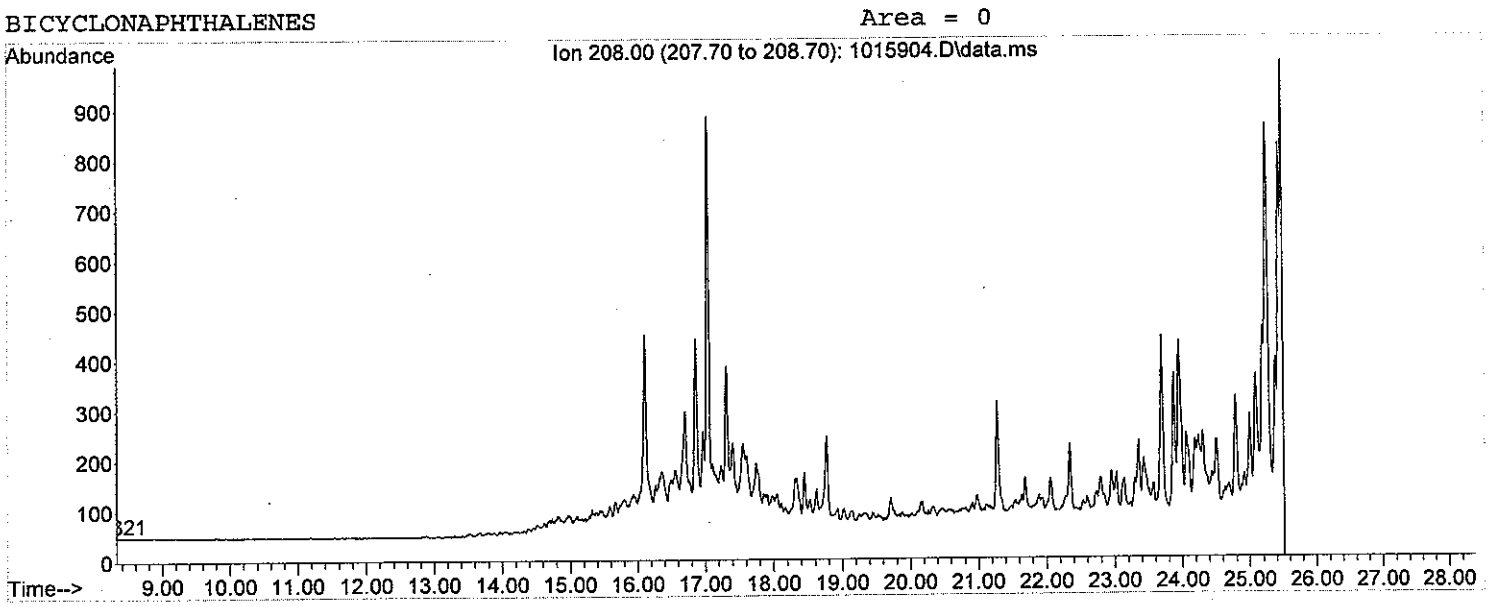
METHYL PYRENE



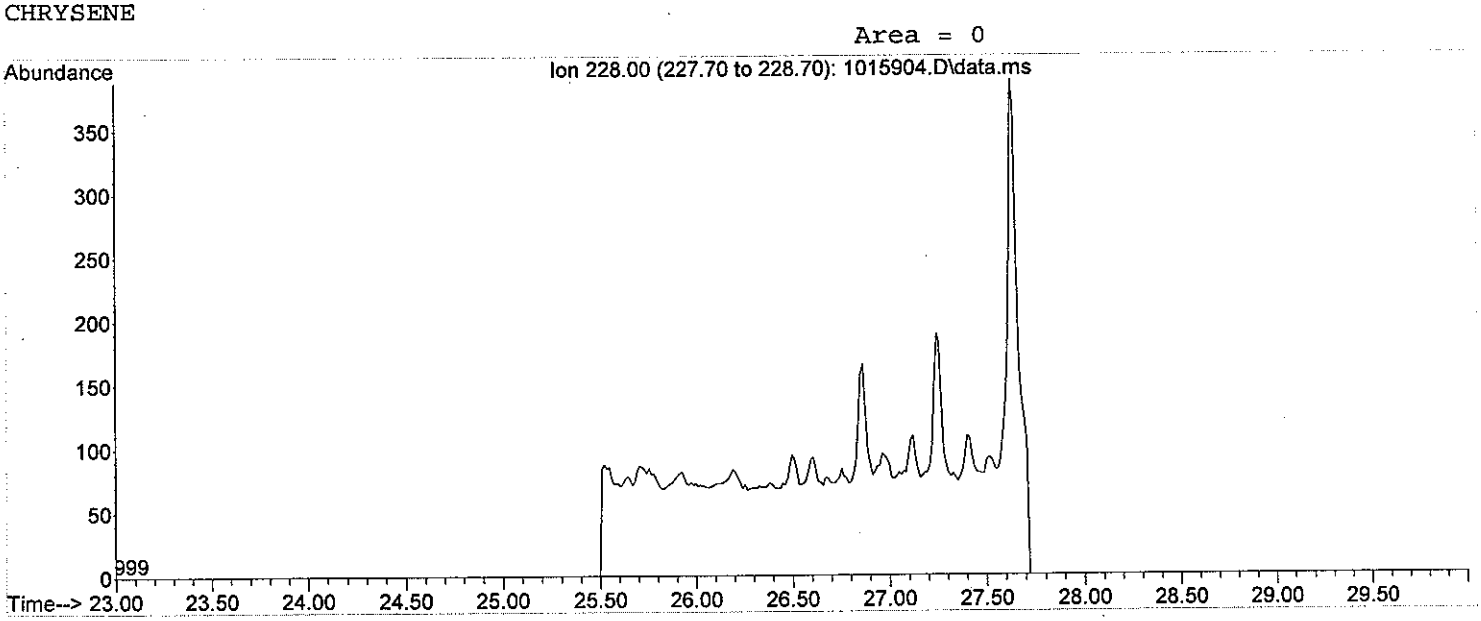
FLUORENE



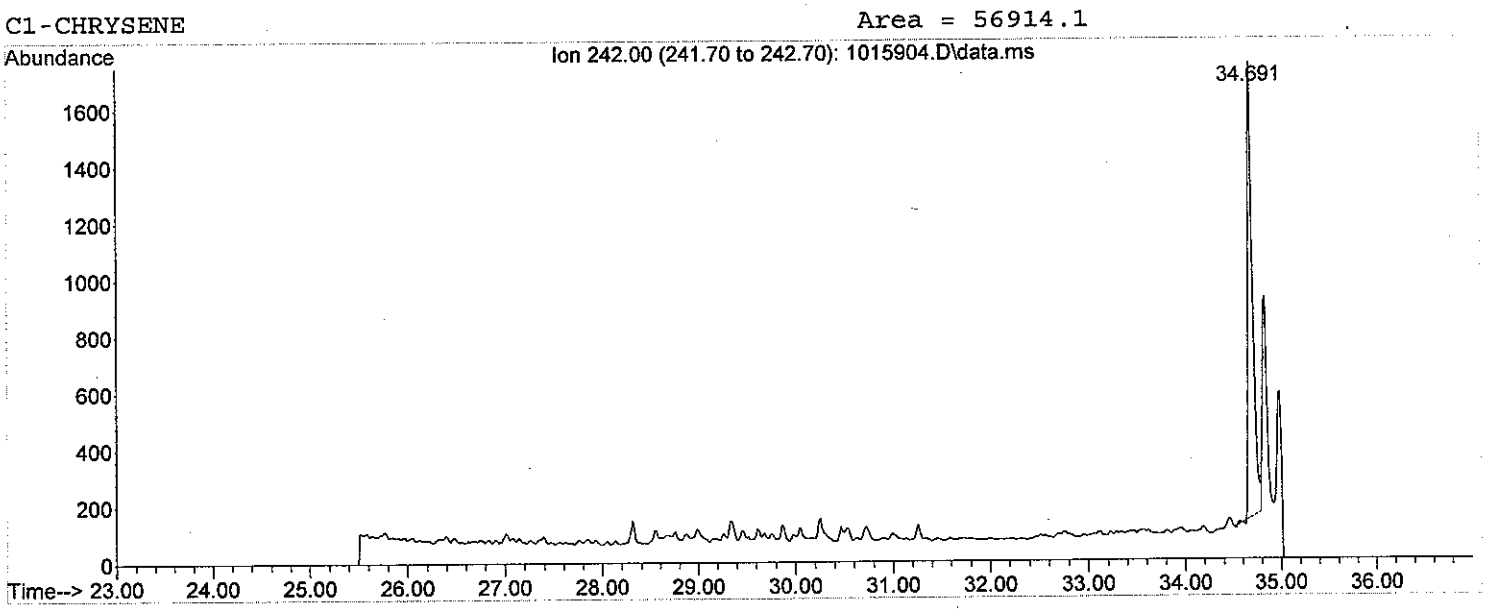
BICYCLONAPHTHALENES



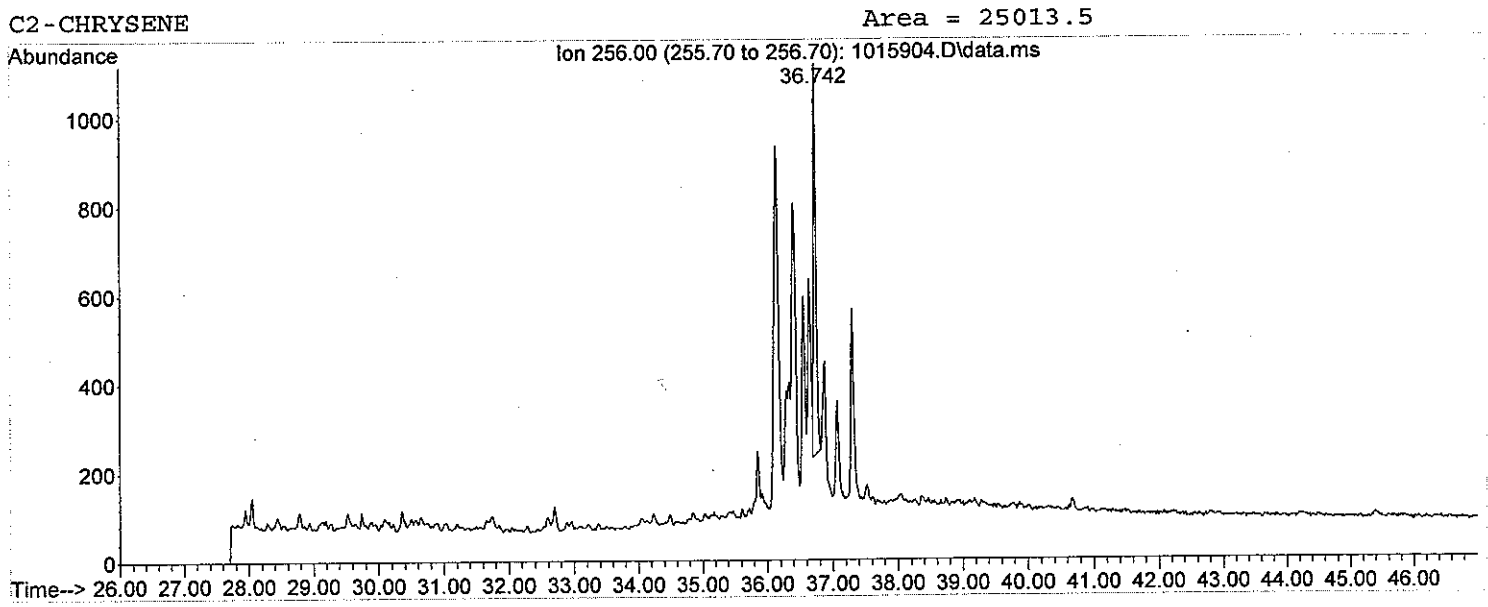
CHRYSENE



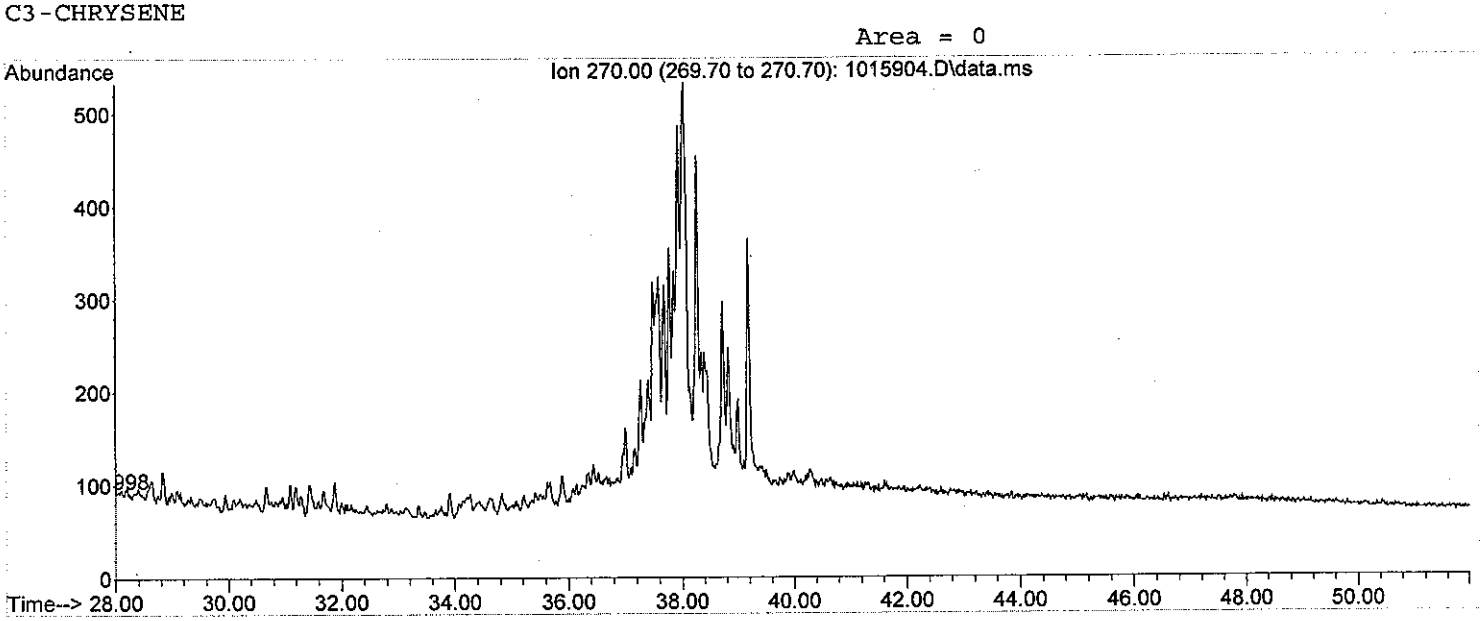
C1-CHRYSENE



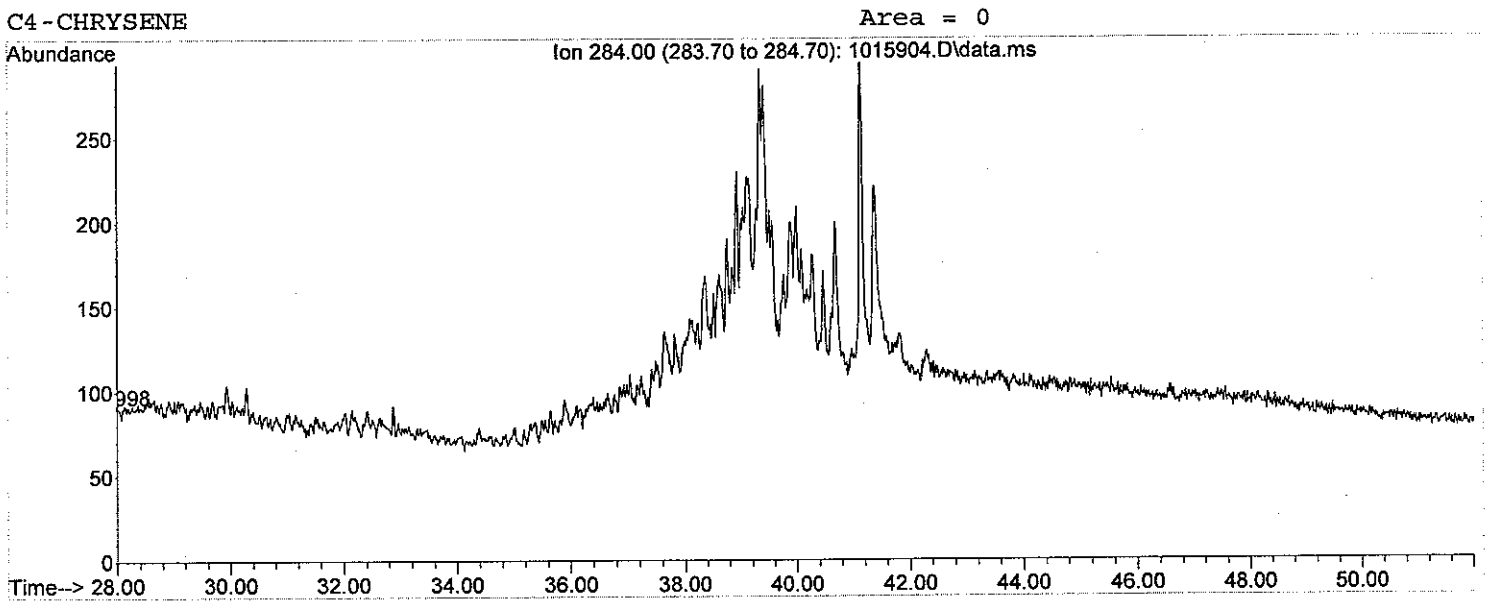
C2-CHRYSENE



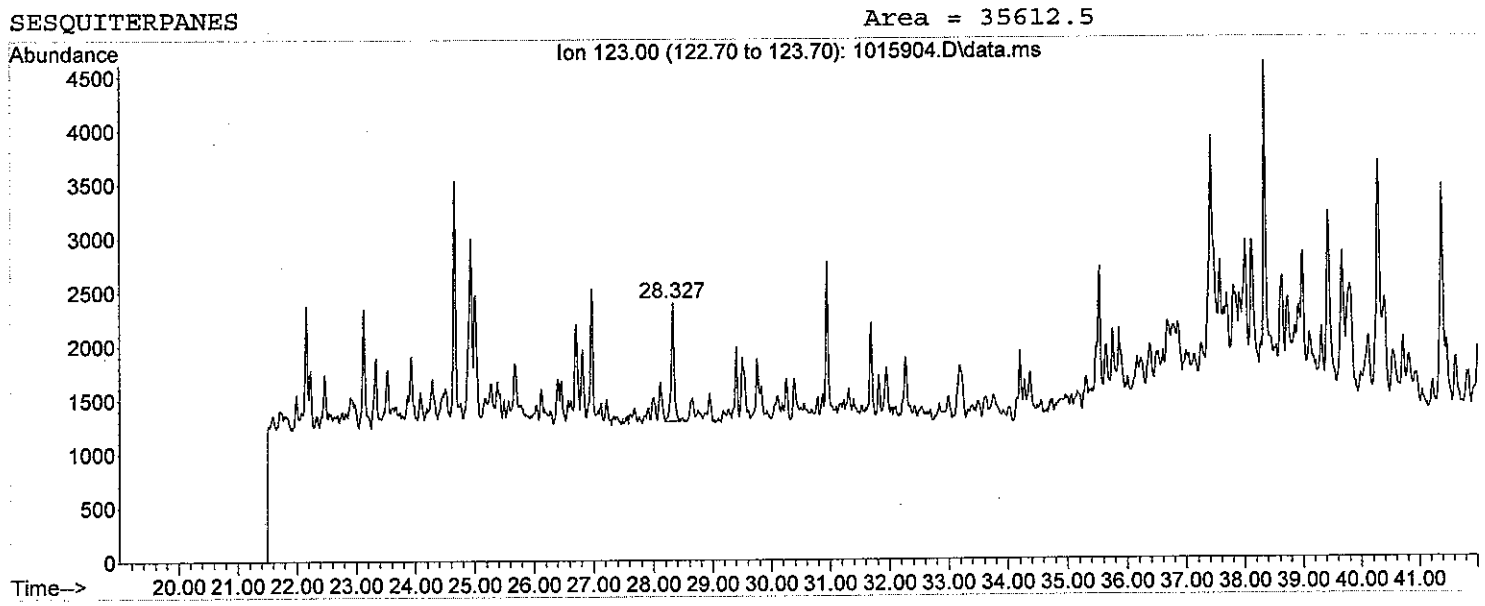
C3 - CHRYSENE



C4 - CHRYSENE

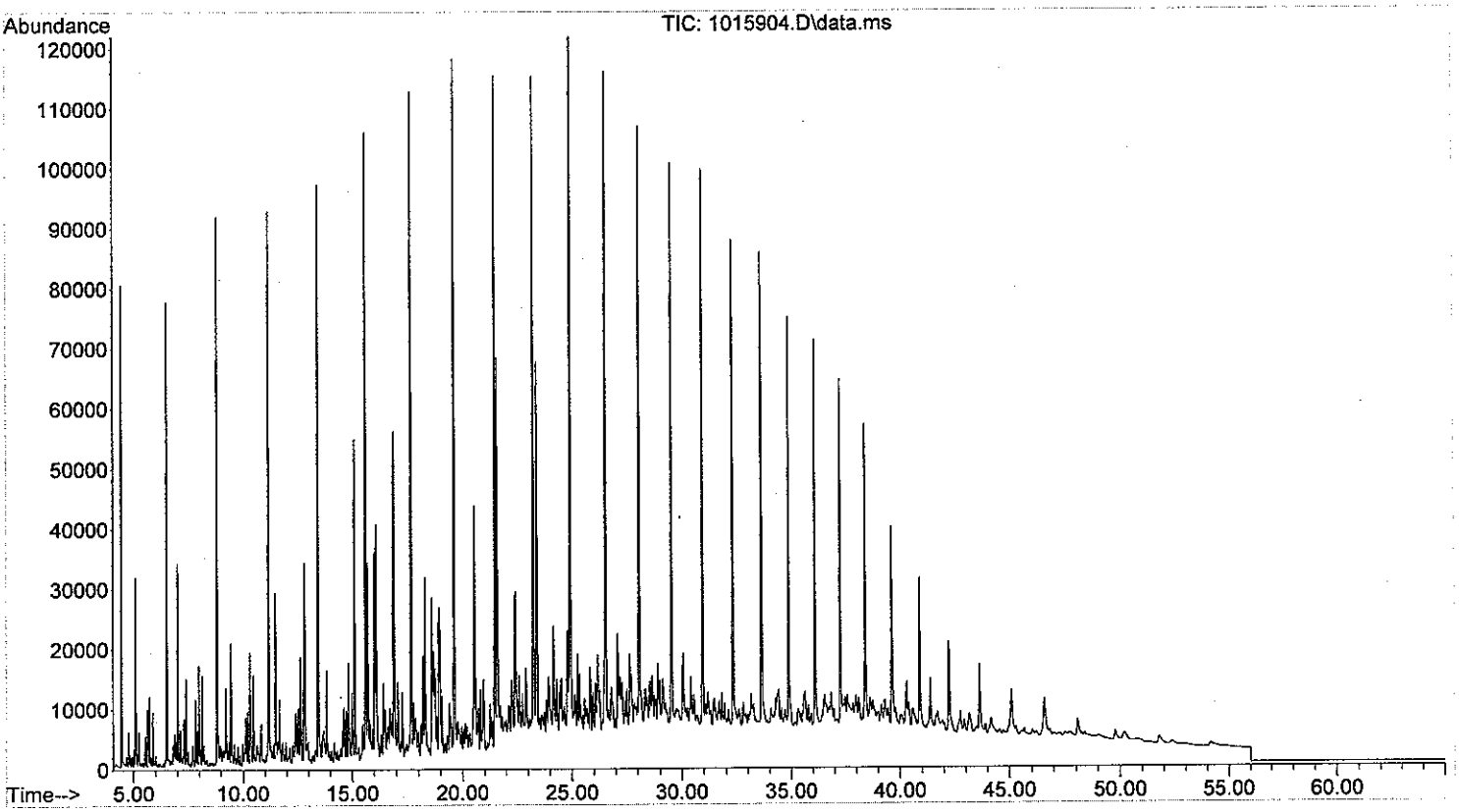


SESQUITERPANES

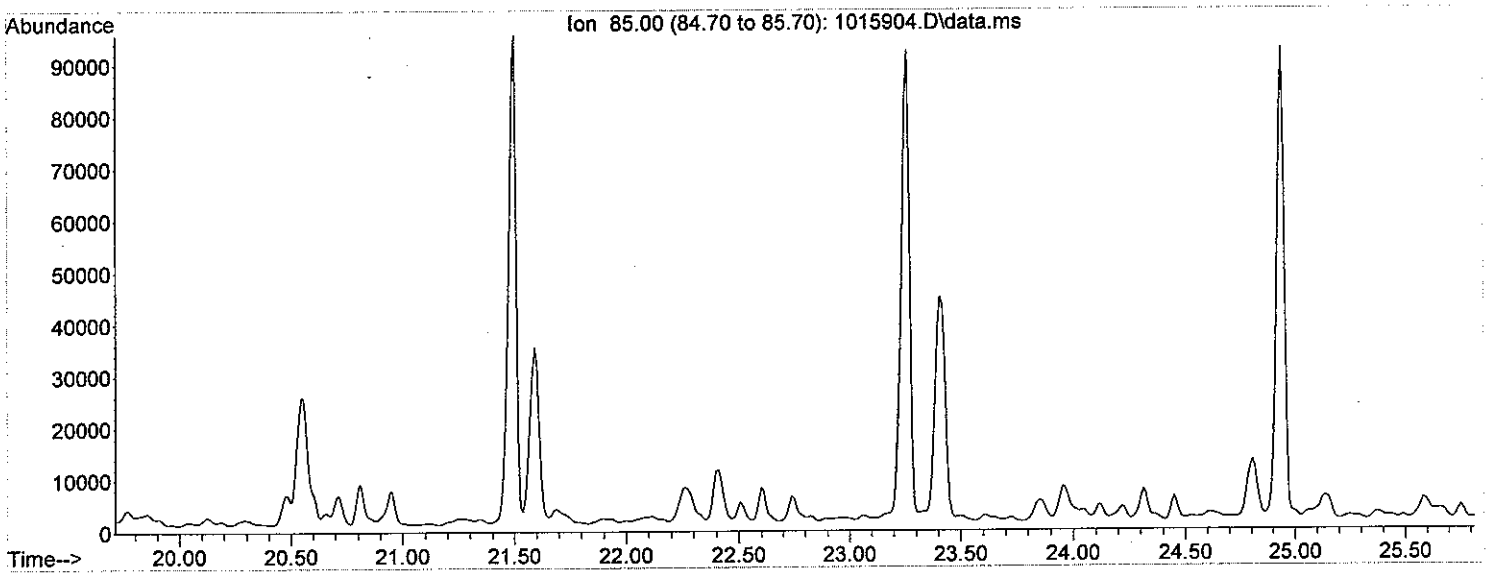


MSL GC-MS2 BIOMARKER ANALYSIS

File: W:\2010\MS_DATA\10-159\1015904.D
Operator: ACT
Date Acquired: 25 Jun 2010 3:41 pm
Method File: BIOMARK3.M
Sample Name: 10-159-4, SP Vial: 3
Misc Info:



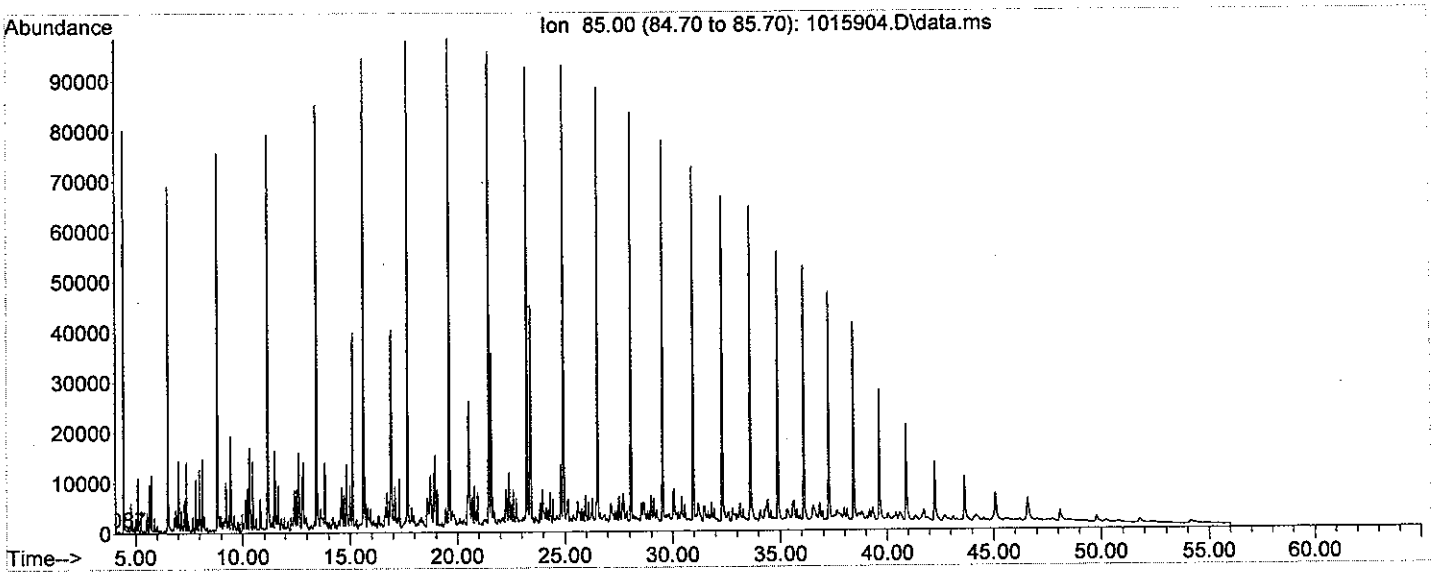
n-C17, Pristane, n-C18, Phytane



Pristane/Phytane = ----
C17/C18 = ----
Pristane/C17 = ----
Phytane/C18 = ----

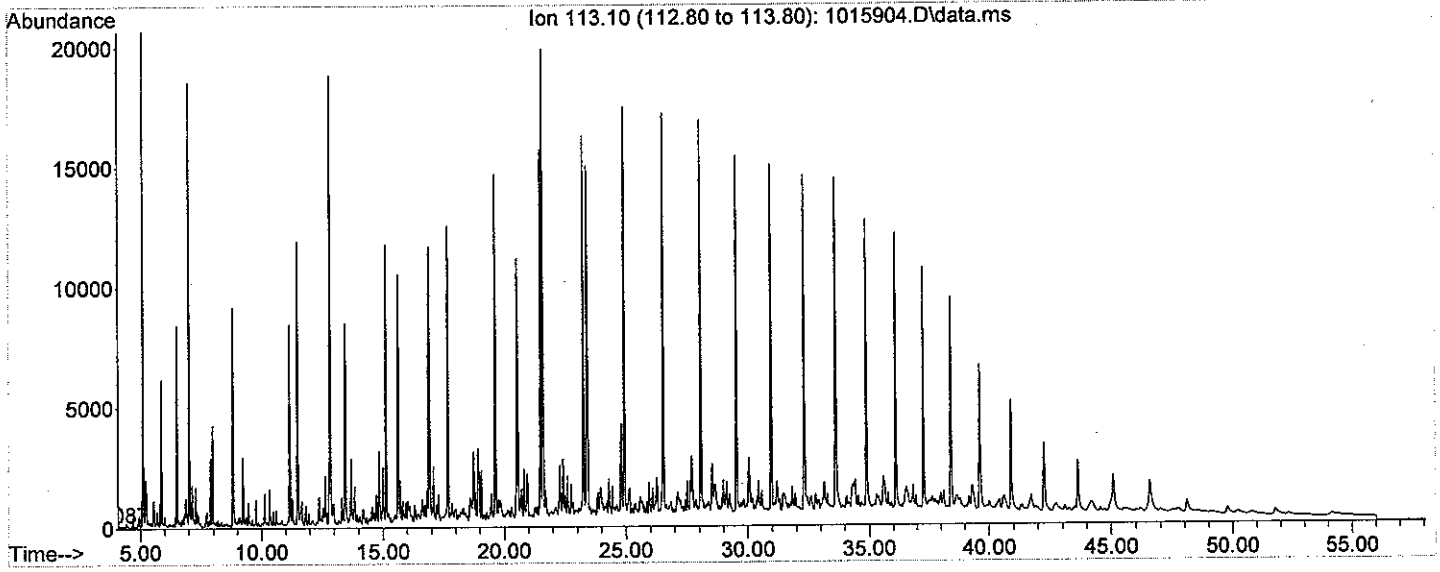
85-SATURATED HYDROCARBONS

Area = 0



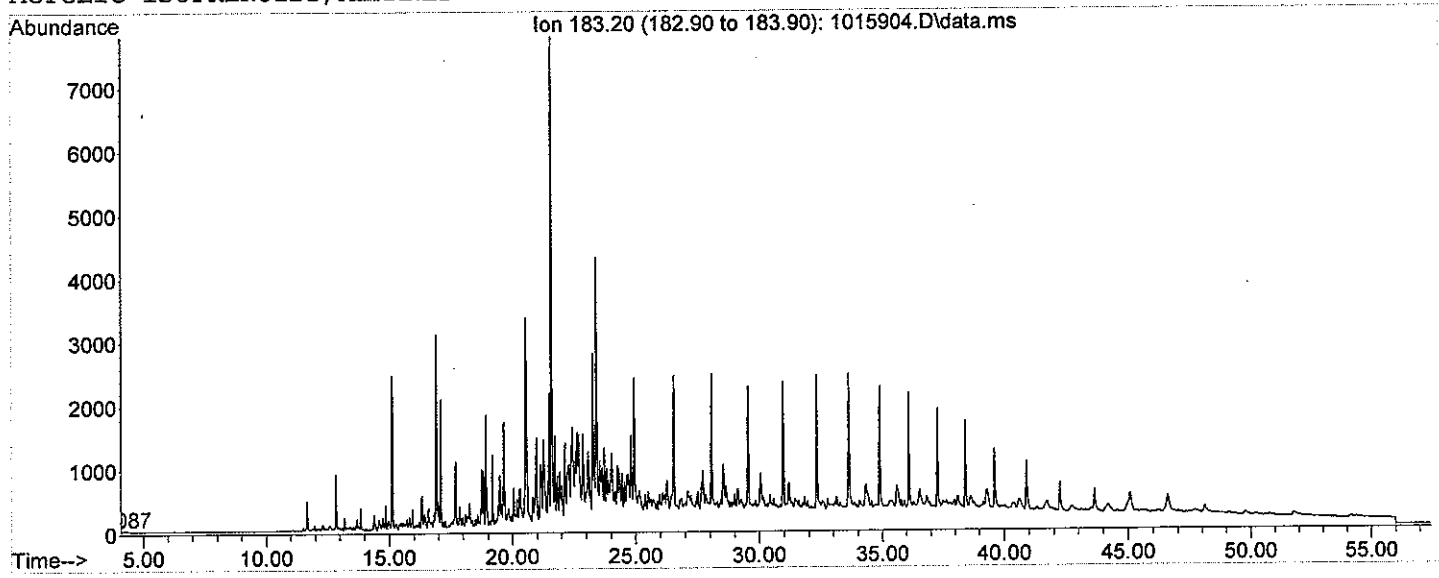
113-SATURATED HYDROCARBONS

Area = 0



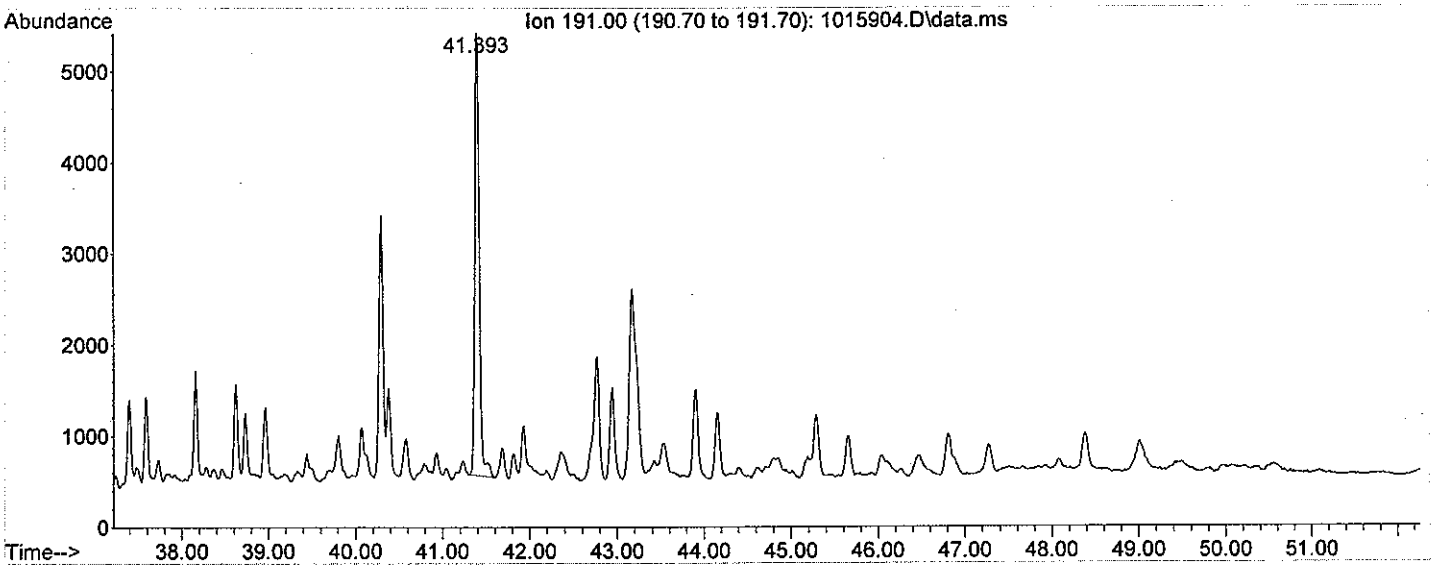
ACYCLIC ISOPRENOIDS/ALKANES

Area = 0



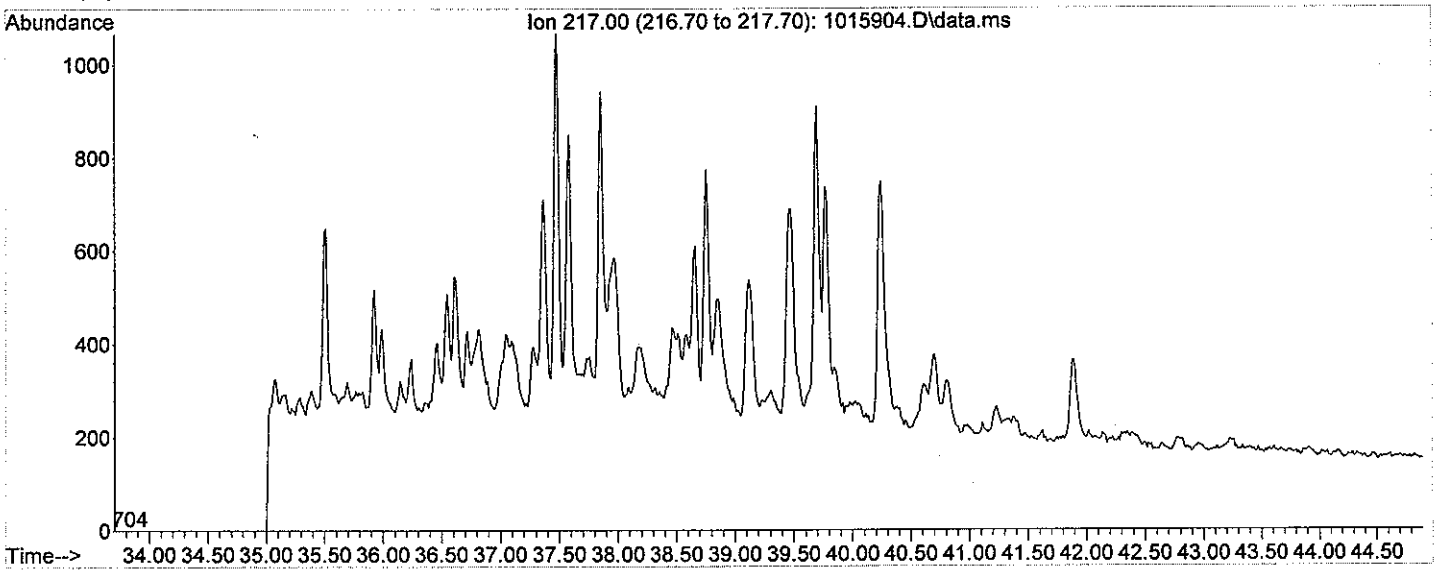
TRITERPANES/HOPANES

Area = 176211



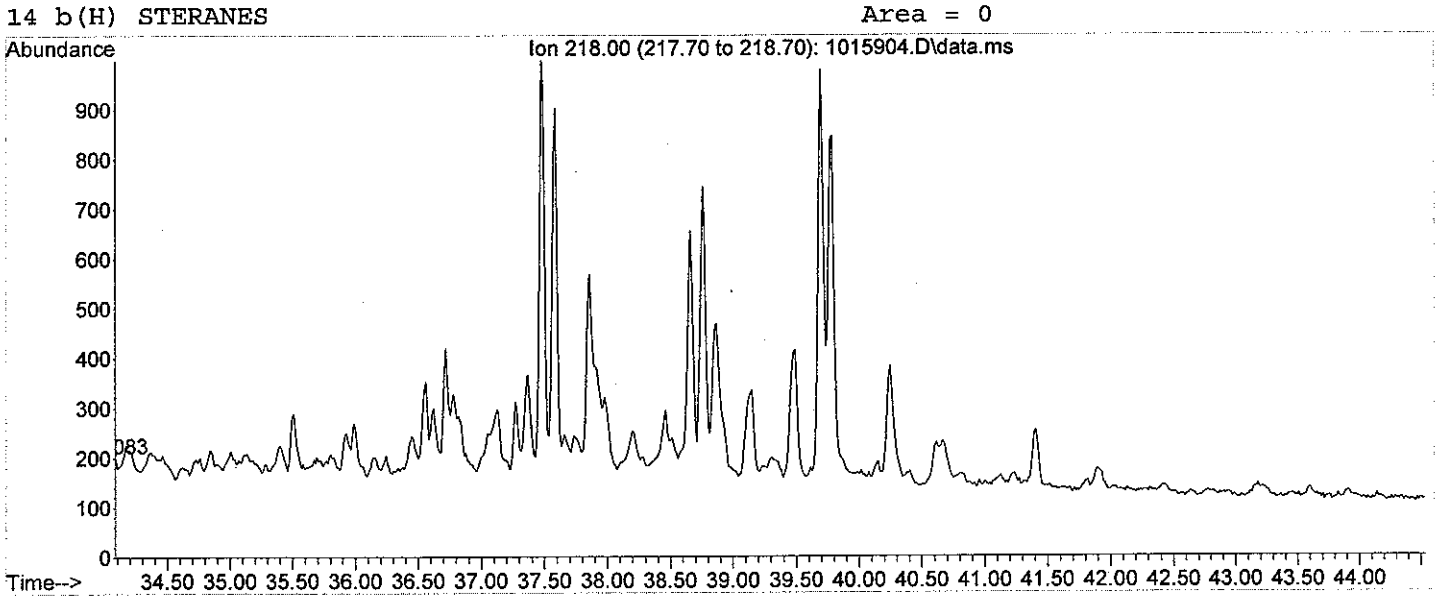
14 a(H) STERANES

Area = 0



14 b(H) STERANES

Area = 0



Quantitation Report (Not Reviewed)

Data Path : W:\2010\MS_DATA\10-159\
Data File : 1015906.D
Acq On : 25 Jun 2010 6:05 pm
Operator : ACT
Sample : 10-159-6, SP
Misc :
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Jun 25 18:59:39 2010
Quant Method : C:\MSDCHEM\1\METHODS\BIOMARK3.M
Quant Title :
QLast Update : Wed May 27 09:43:48 2009
Response via : Initial Calibration

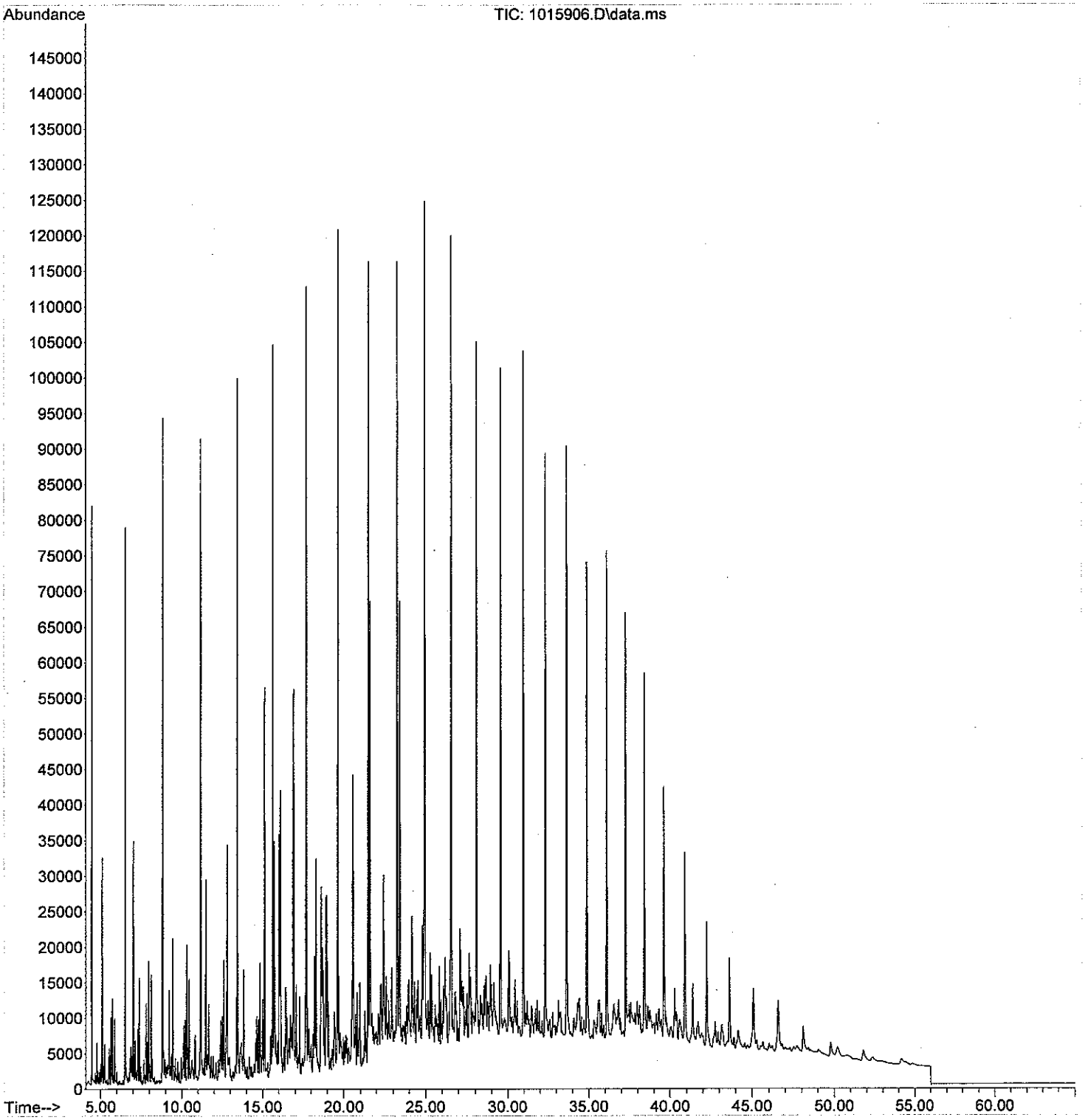
Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
Target Compounds					Qvalue
1) 85-SATURATED HYDROCARBONS	0.000	85	0	N.D.	
2) n-C17	0.000	85	0	N.D.	
3) PRISTANE	0.000	85	0	N.D.	
4) n-C18	0.000	85	0	N.D.	
5) PHYTANE	0.000	85	0	N.D.	
6) 113-SATURATED HYDROCAR...	0.000	113	0	N.D.	
7) ACYCLIC ISOPRENOIDS/AL...	0.000	183	0	N.D.	
8) C2-NAPHTHALENES	0.000	156	0	N.D.	
9) C3-NAPHTHALENES	19.410	170	156400	No Calib	
10) C4-NAPHTHALENES	0.000	184	0	N.D.	
11) PHENANTHRENE/ANTHRACENE	0.000	178	0	N.D.	
12) BENZONAPHTHIOPHENE	32.113	234	64358	No Calib	
13) DIBENZOTHIOPHENE	22.437	184	193133	No Calib	
14) C1-DIBENZOTHIOPHENE	24.528	198	293124	No Calib	
15) C2-DIBENZOTHIOPHENE	26.492	212	145935	No Calib	
16) C3-DIBENZOTHIOPHENE	27.989	226	89900	No Calib	
17) C1-PHENANTHRENES	25.359	192	229517	No Calib	
18) C2-PHENANTHRENES	27.291	206	151188	No Calib	
19) C3-PHENANTHRENES	29.168	220	102913	No Calib	
20) TRITERPANES/HOPANES	41.401	191	166501	No Calib	
21) HOPANE A	0.000	191	0	N.D.	
22) HOPANE B	0.000	191	0	N.D.	
23) 14 a(H) STERANES	37.481	217	19631	No Calib	
24) 14 b(H) STERANES	0.000	218	0	N.D.	
25) TRI-AROMATIC STERANES	0.000	231	0	N.D.	
26) METHYLHOPANES	0.000	205	0	N.D.	
27) NORHOPANES	0.000	177	0	N.D.	
28) PYRENE/FLUORANTHENE	28.915	202	36779	No Calib	
29) METHYL PYRENE	30.436	216	19460	No Calib	
30) FLUORENE	0.000	166	0	N.D.	
31) BICYCLONAPHTHALENES	0.000	208	0	N.D.	
32) CHRYSENE	0.000	228	0	N.D.	
33) C1-CHRYSENE	34.693	242	45265	No Calib	
34) C2-CHRYSENE	36.743	256	24985	No Calib	
35) C3-CHRYSENE	0.000	270	0	N.D.	
36) C4-CHRYSENE	0.000	284	0	N.D.	
37) SESQUITERPANES	0.000	123	0	N.D.	

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (Not Reviewed)

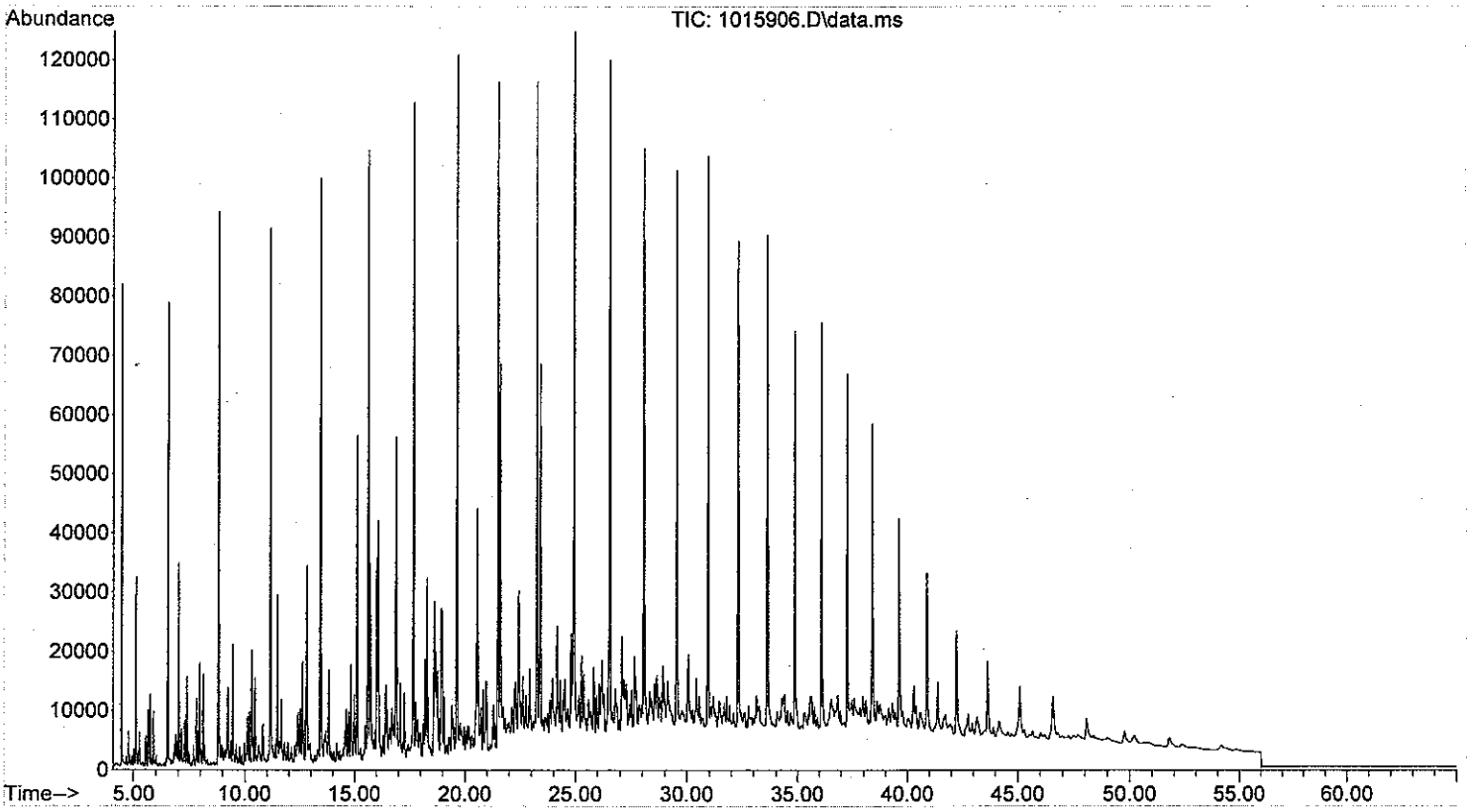
Data Path : W:\2010\MS_DATA\10-159\
Data File : 1015906.D
Acq On : 25 Jun 2010 6:05 pm
Operator : ACT
Sample : 10-159-6, SP
Misc :
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Jun 25 18:59:39 2010
Quant Method : C:\MSDCHEM\1\METHODS\BIOMARK3.M
Quant Title :
QLast Update : Wed May 27 09:43:48 2009
Response via : Initial Calibration

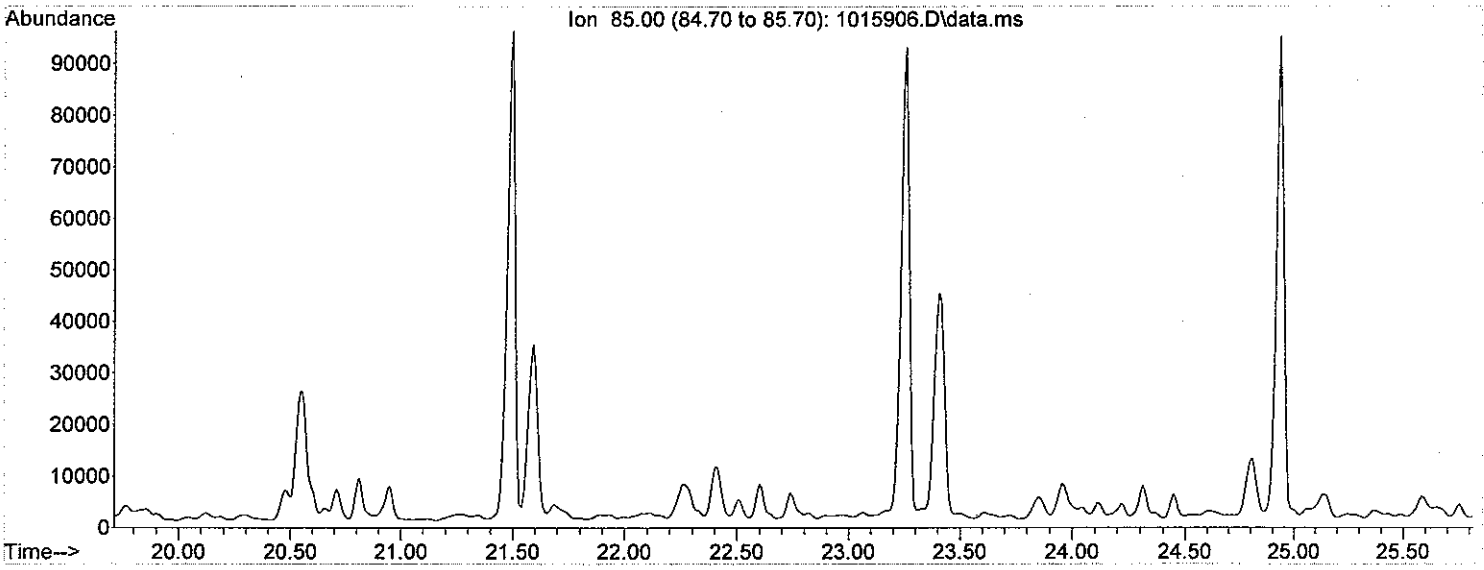


MARINE SAFETY LABORATORY GC-MS2 BIOMARKER ANALYSIS

File: \\Mslserver1\data archive\2010\MS_data\10-159\1015906.D
Operator: ACT
Date Acquired: 25 Jun 2010 6:05 pm
Method File: BIOMARK3.M
Sample Name: 10-159-6, SP Vial: 5
Misc Info:



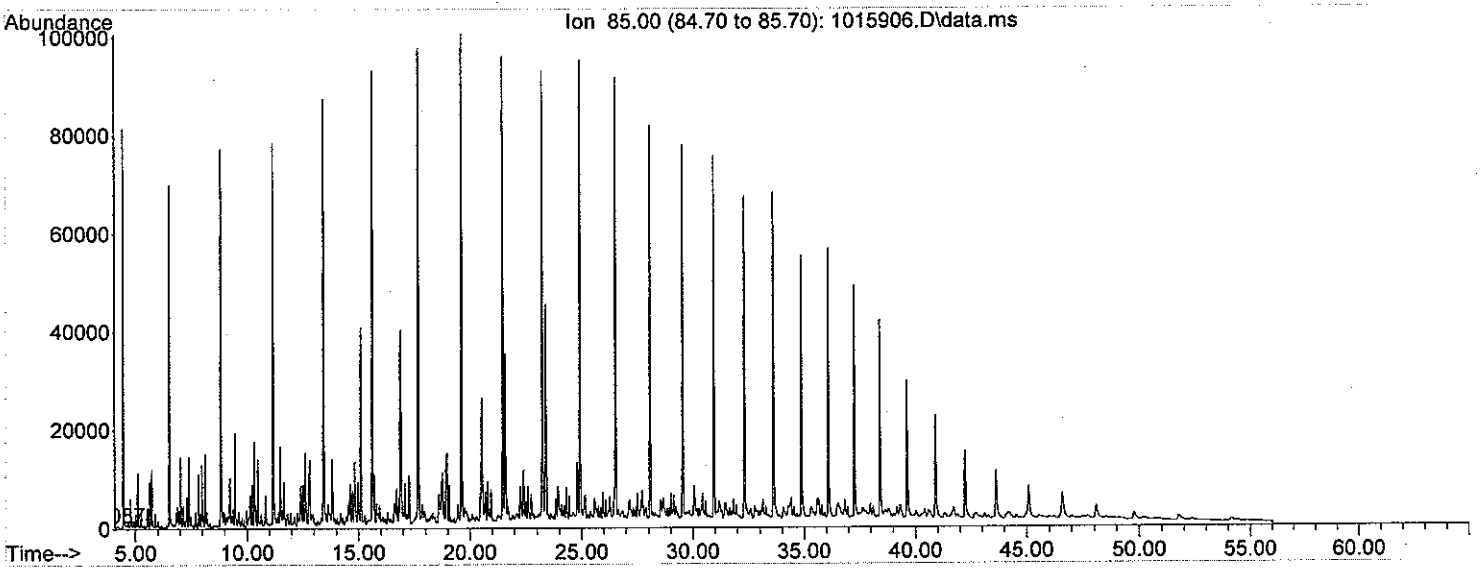
n-C17, Pristane, n-C18, Phytane



Pristane/Phytane = 0.661
C17/C18 = 0.986
Pristane/C17 = 0.401
Phytane/C18 = 0.599

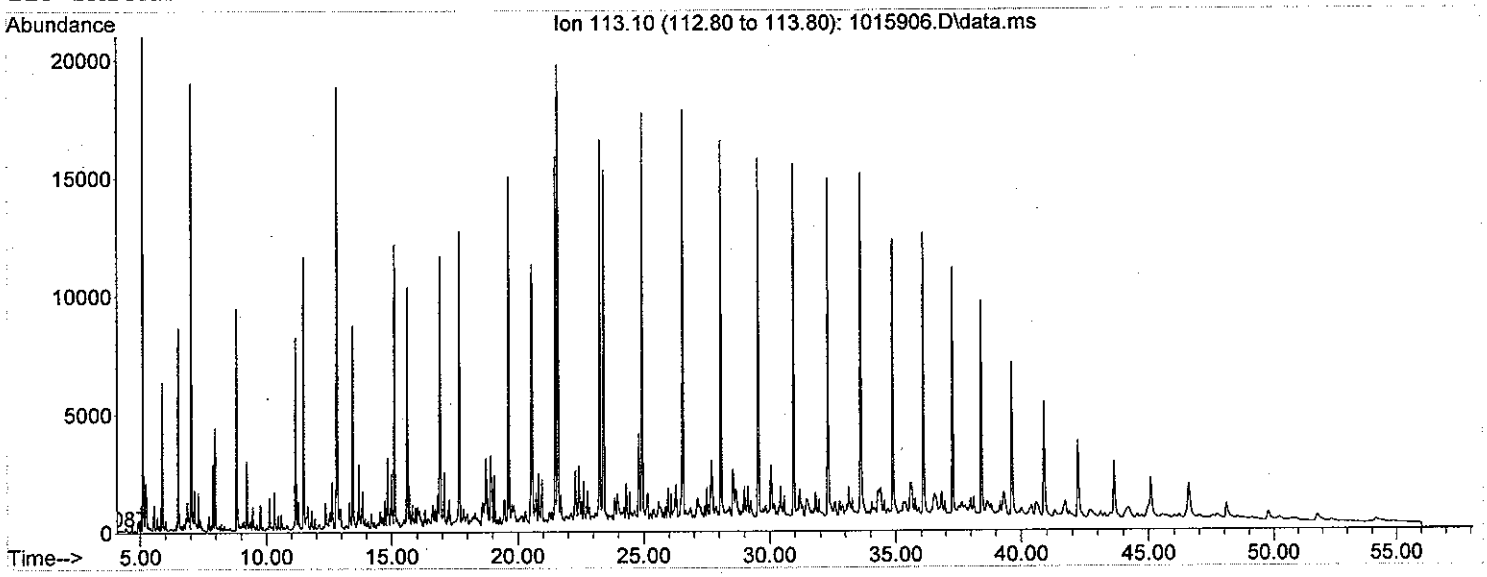
85-SATURATED HYDROCARBONS

Area = 0



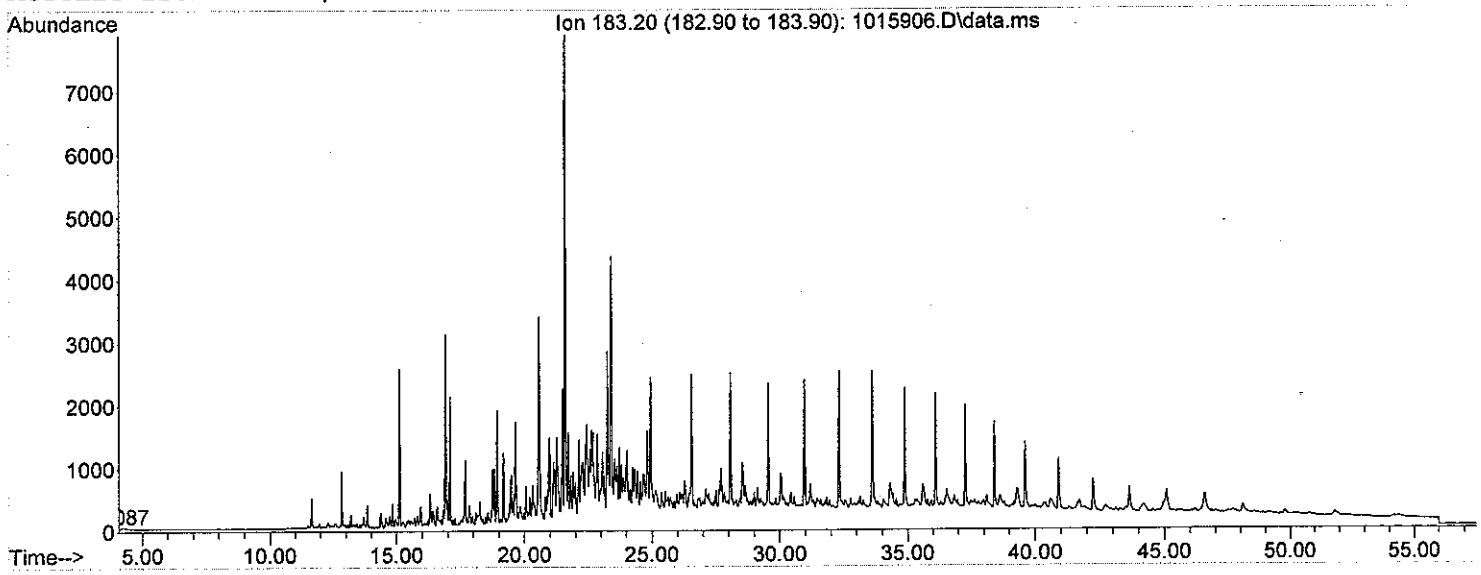
113-SATURATED HYDROCARBONS

Area = 0



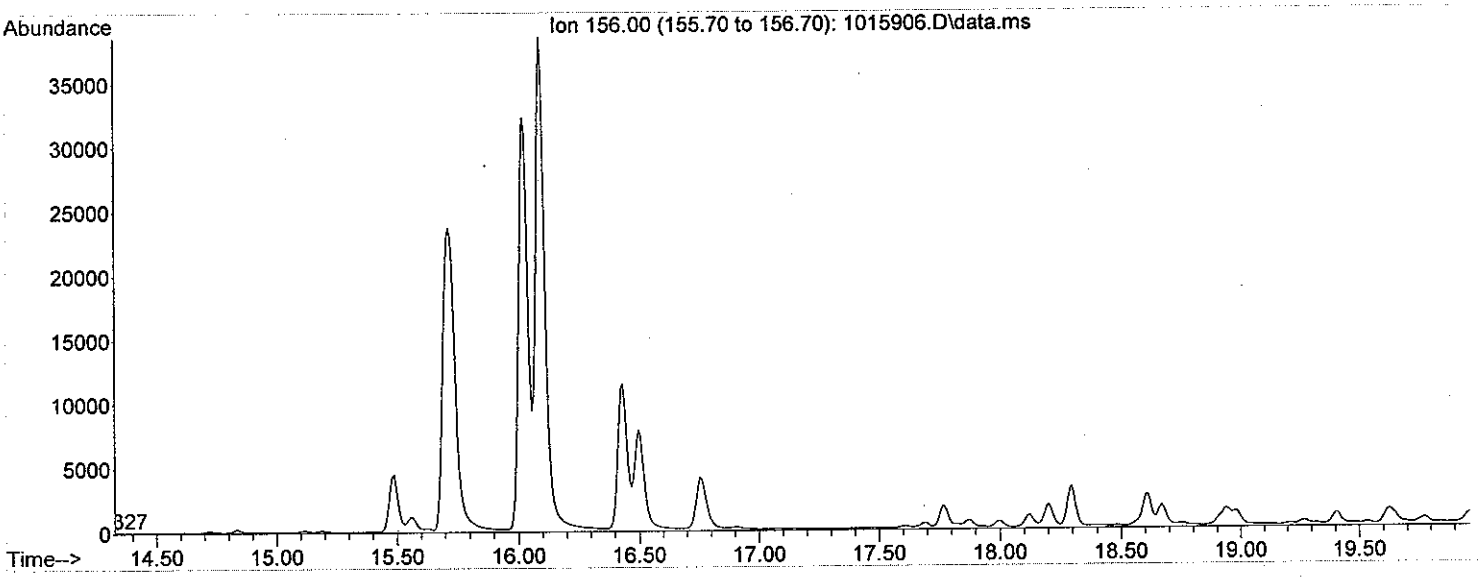
ACYCLIC ISOPRENOIDS/ALKANES

Area = 0



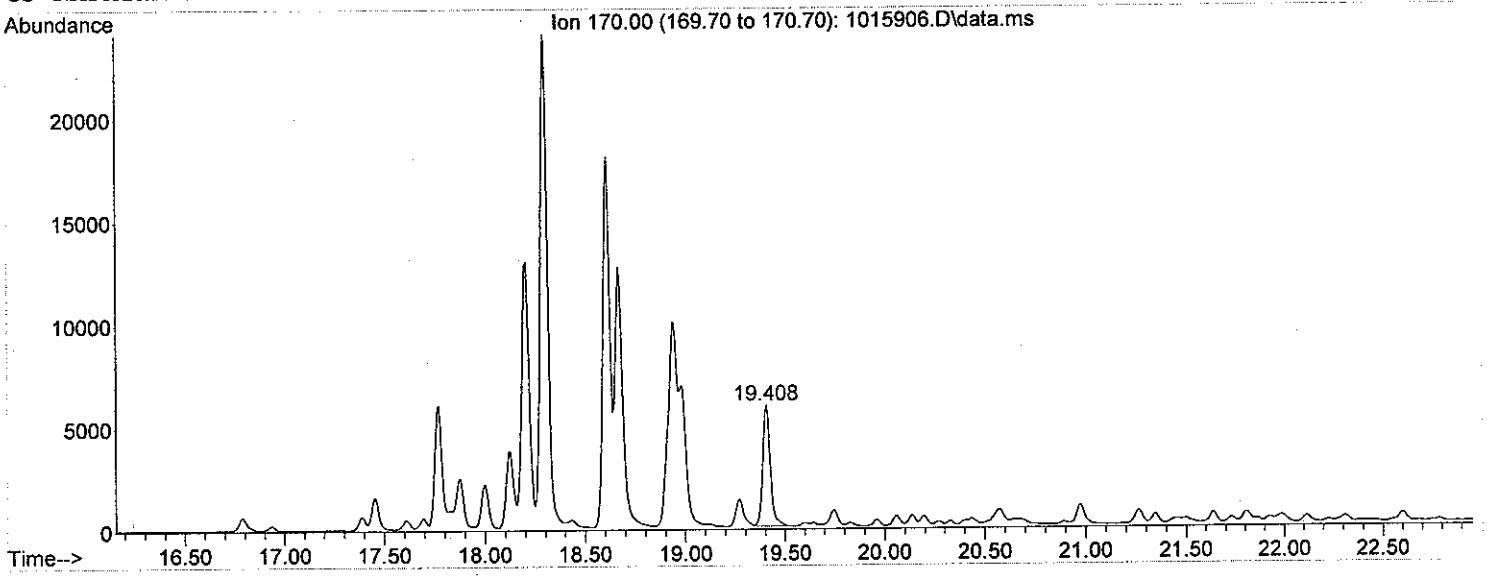
C2-NAPHTHALENES

Area = 0



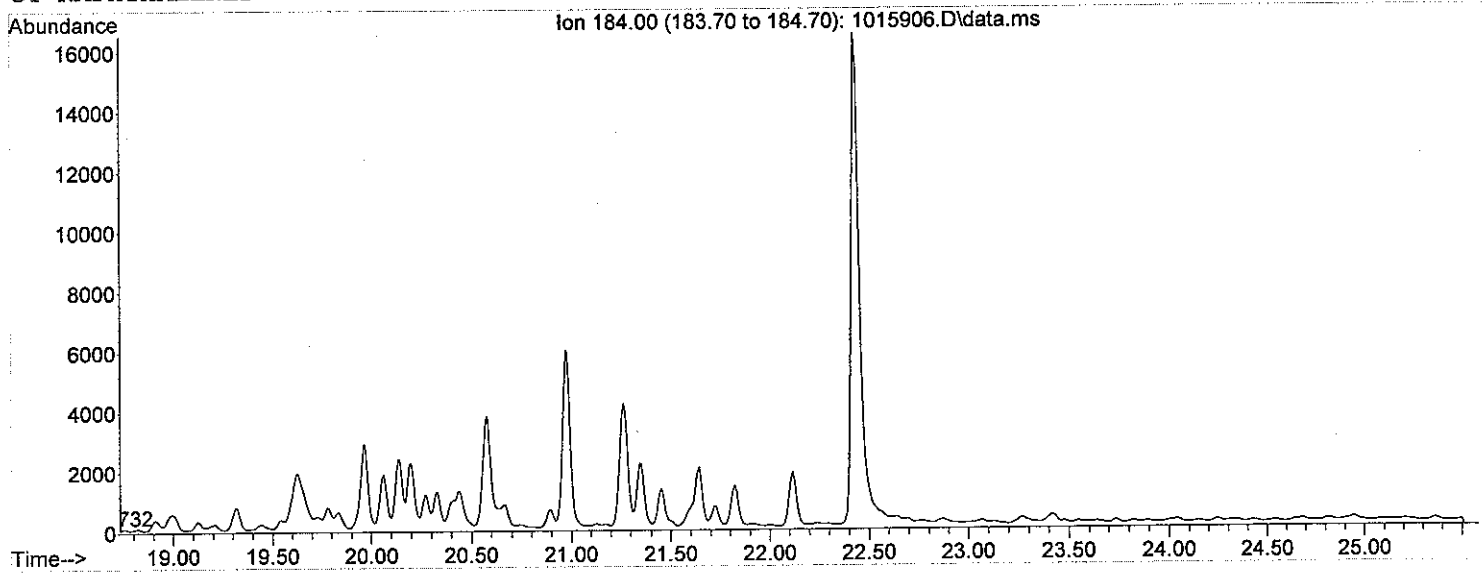
C3-NAPHTHALENES

Area = 156400



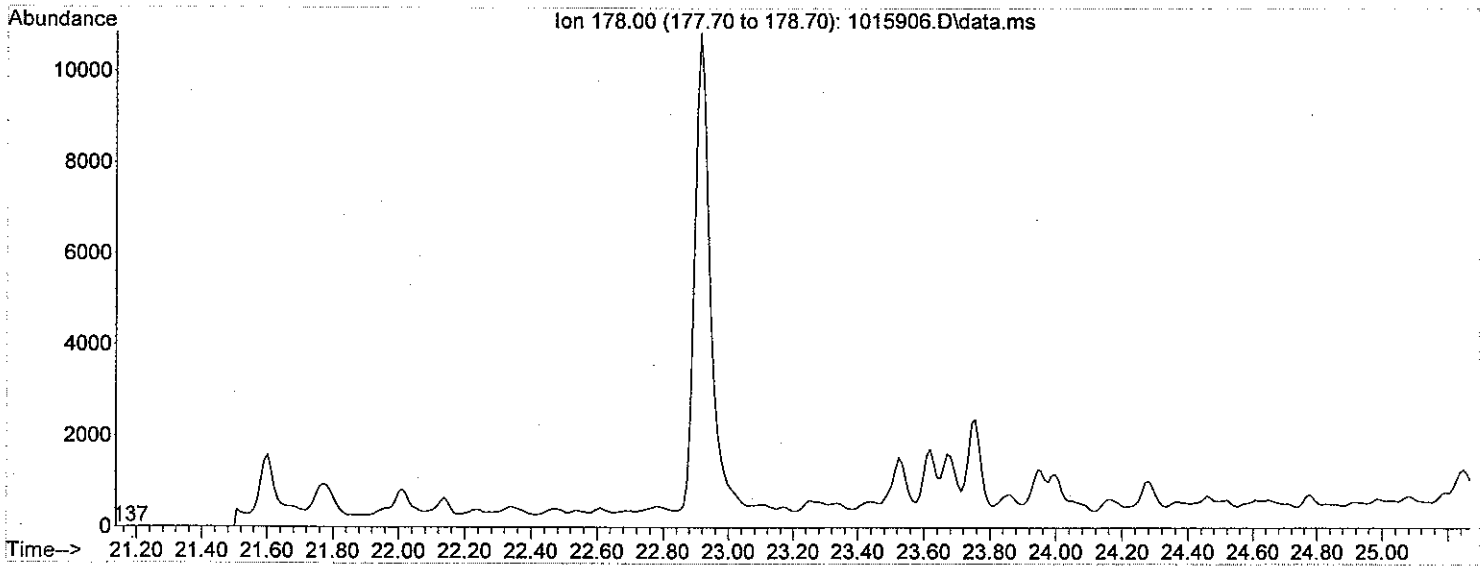
C4-NAPHTHALENES

Area = 0



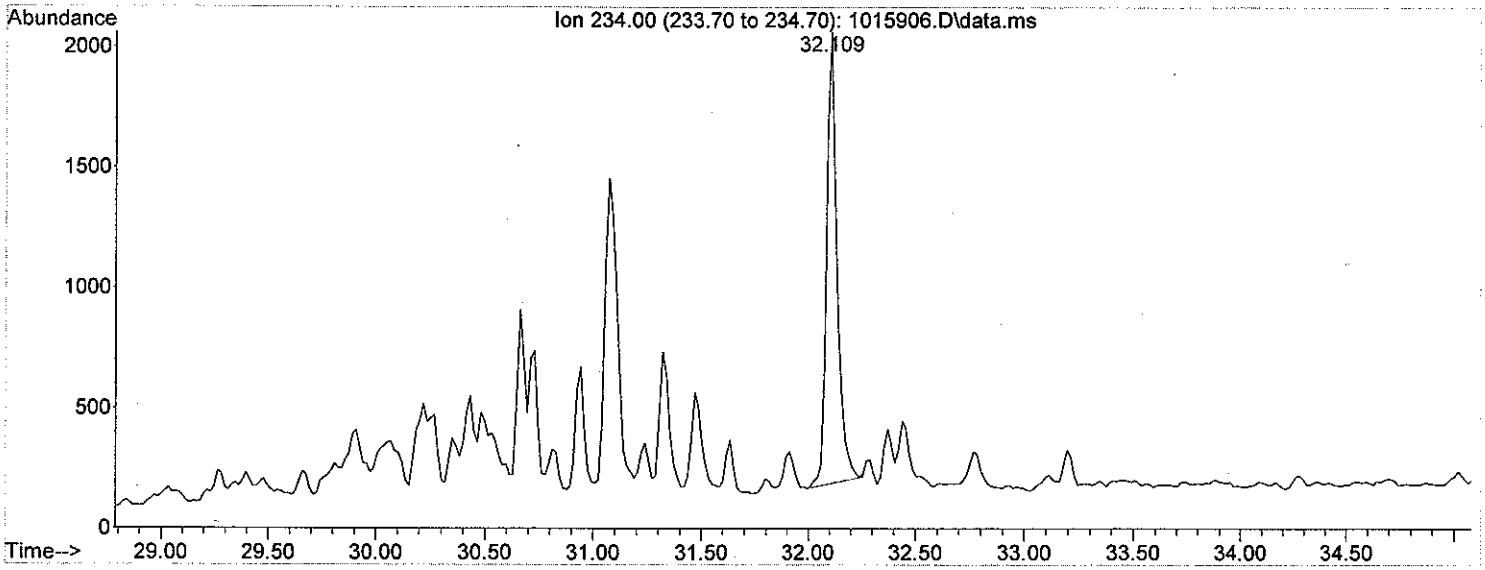
PHENANTHRENE/ANTHRACENE

Area = 0



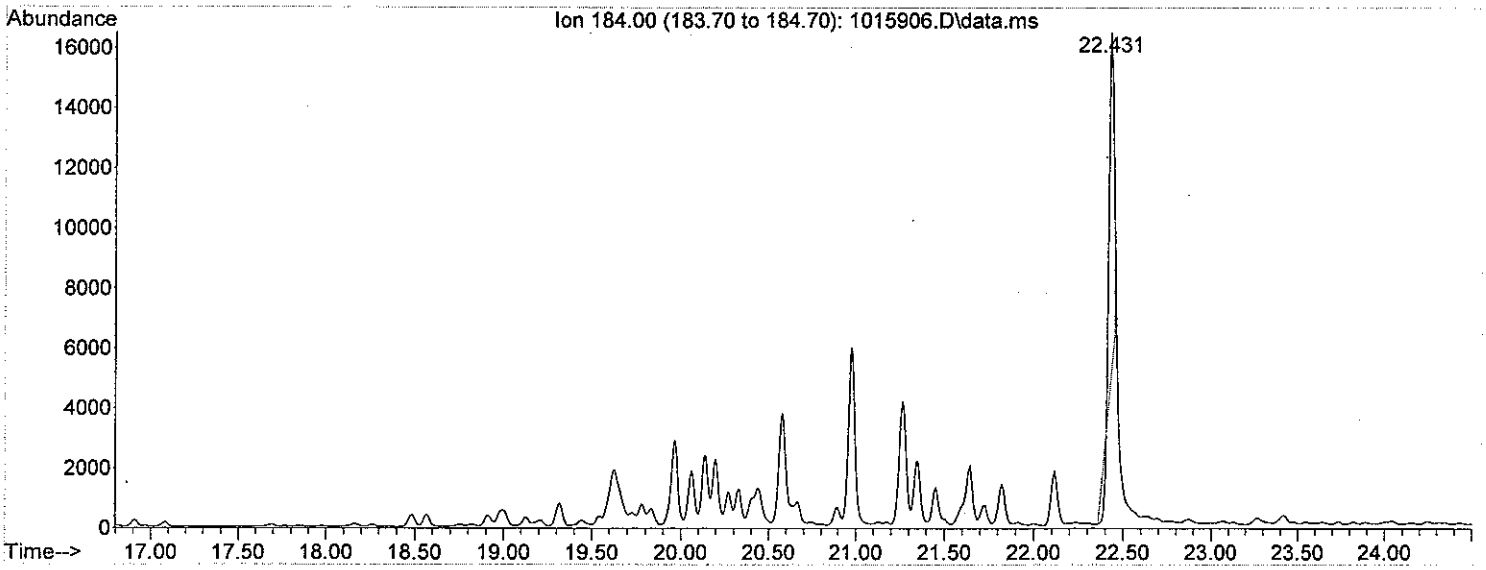
BENZONAPHTHIOPHENE

Area = 64358.5



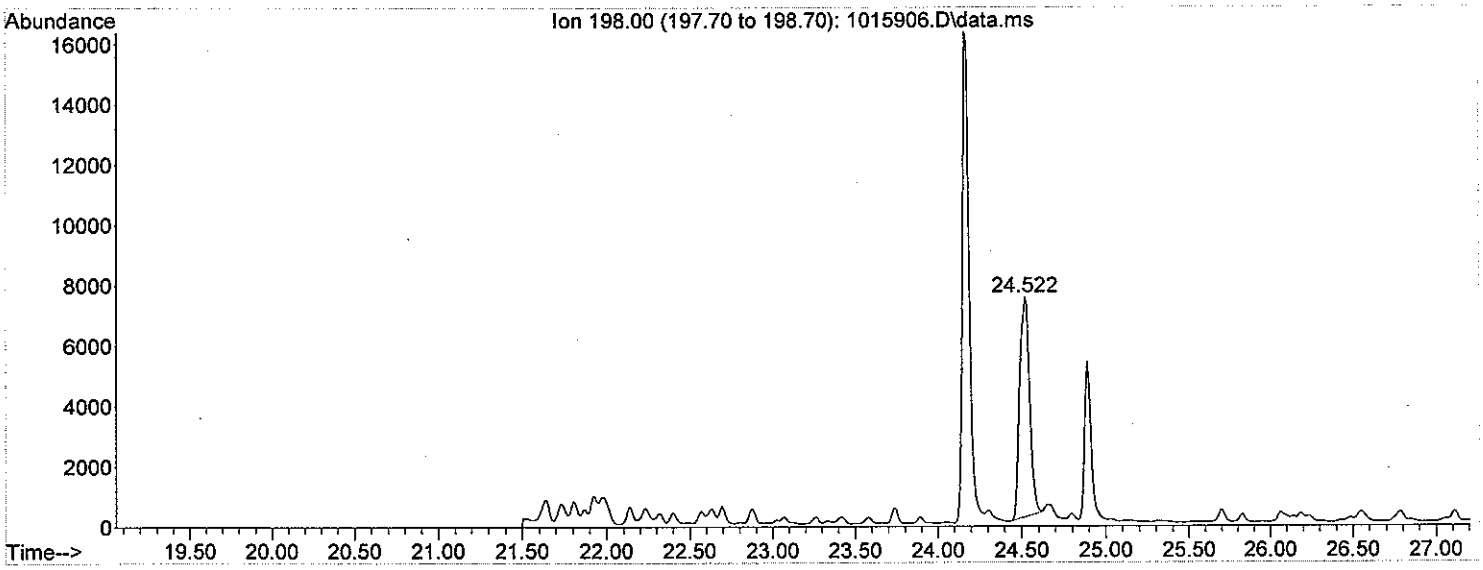
DIBENZOTHIOPHENE

Area = 193133



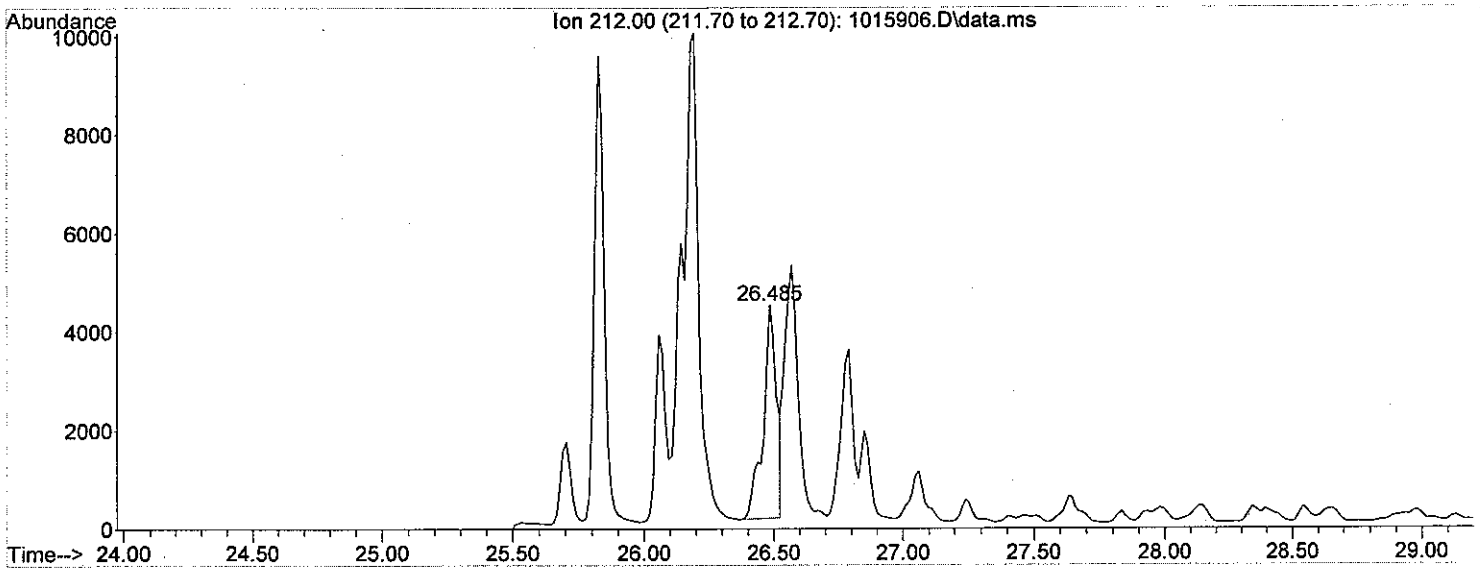
C1-DIBENZOTHIOPHENE

Area = 293124



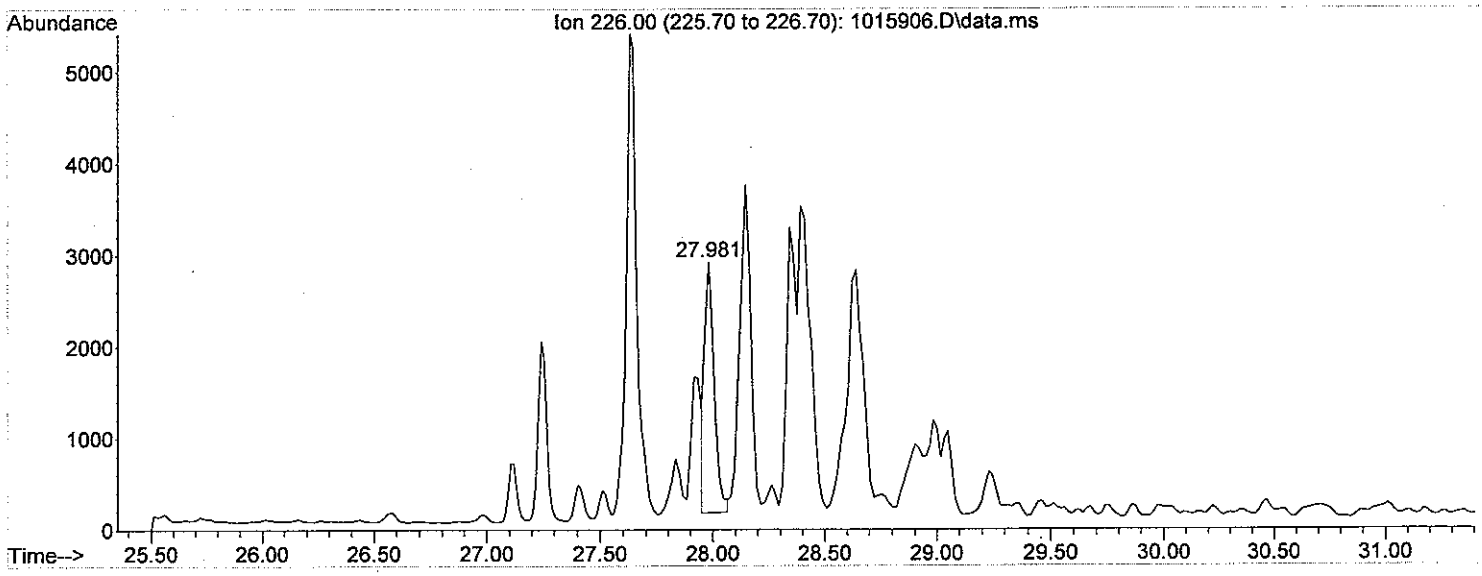
C2-DIBENZOTHIOPHENE

Area = 145935



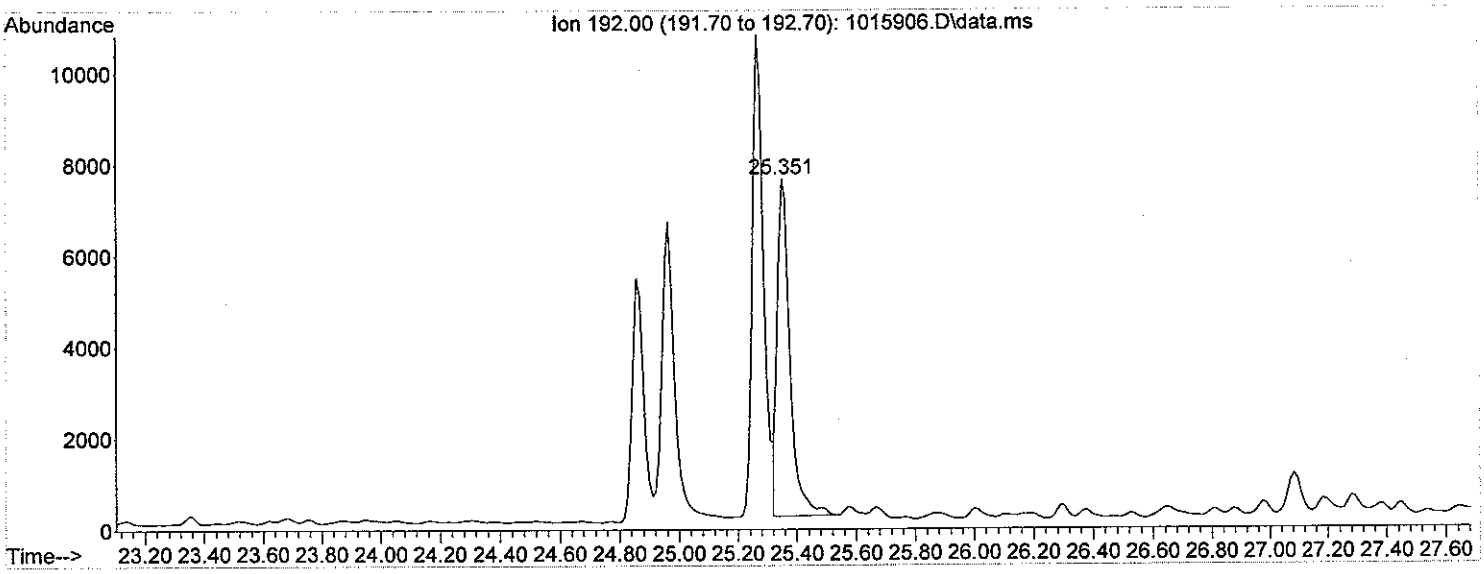
C3-DIBENZOTHIOPHENE

Area = 89900.1



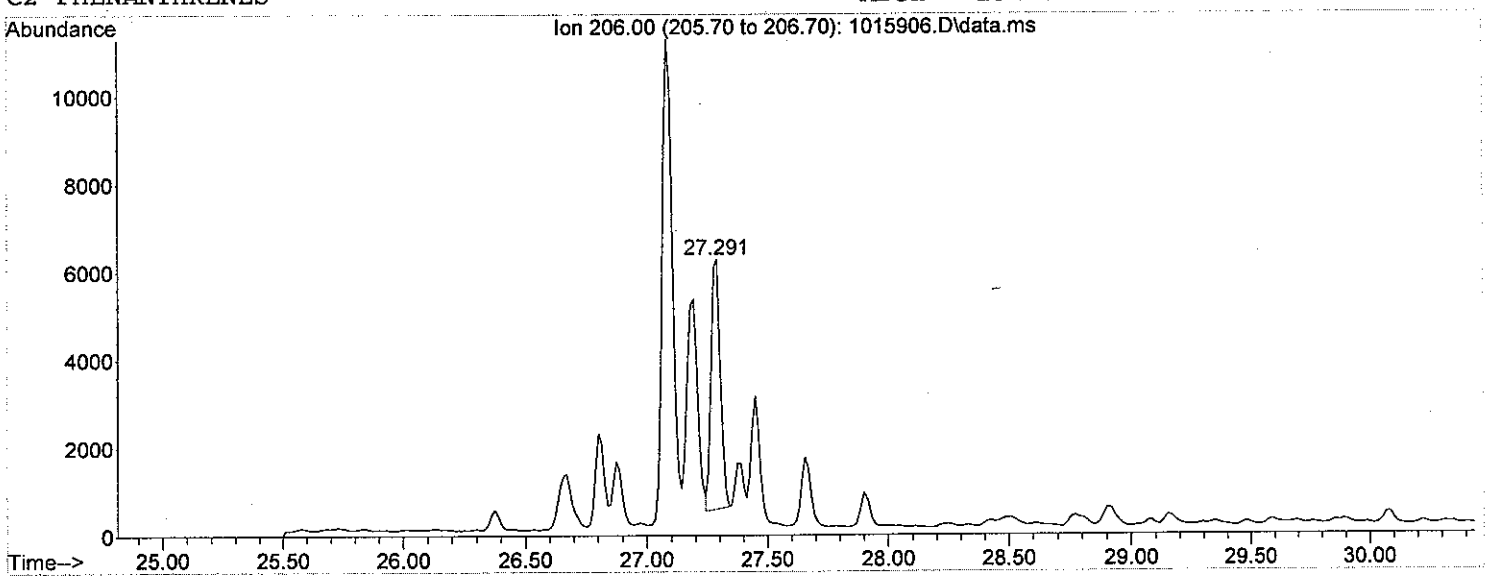
C1 - PHENANTHRENES

Area = 229517



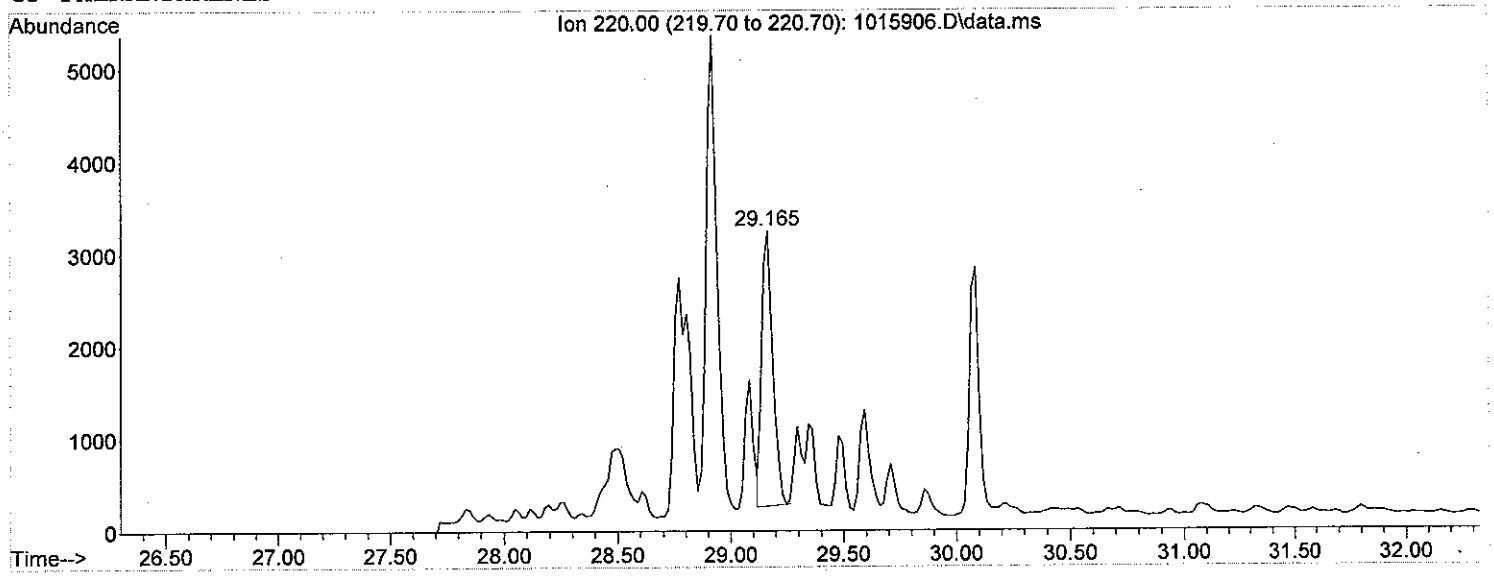
C2 - PHENANTHRENES

Area = 151188



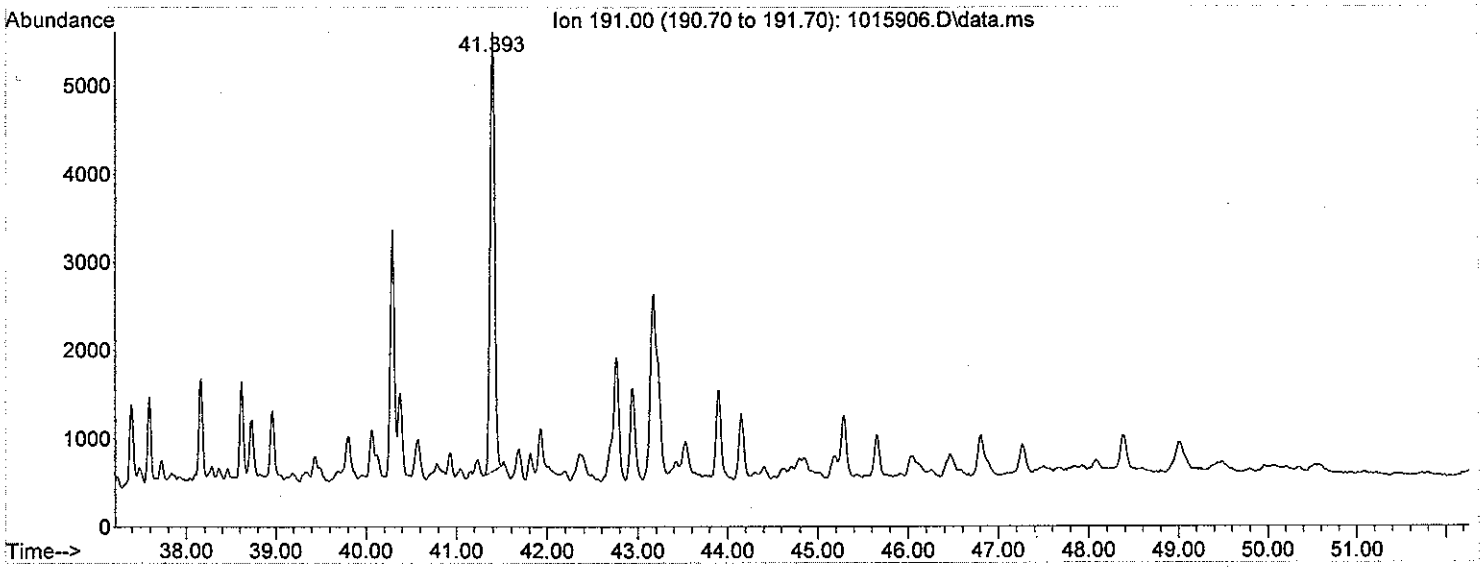
C3 - PHENANTHRENES

Area = 102913



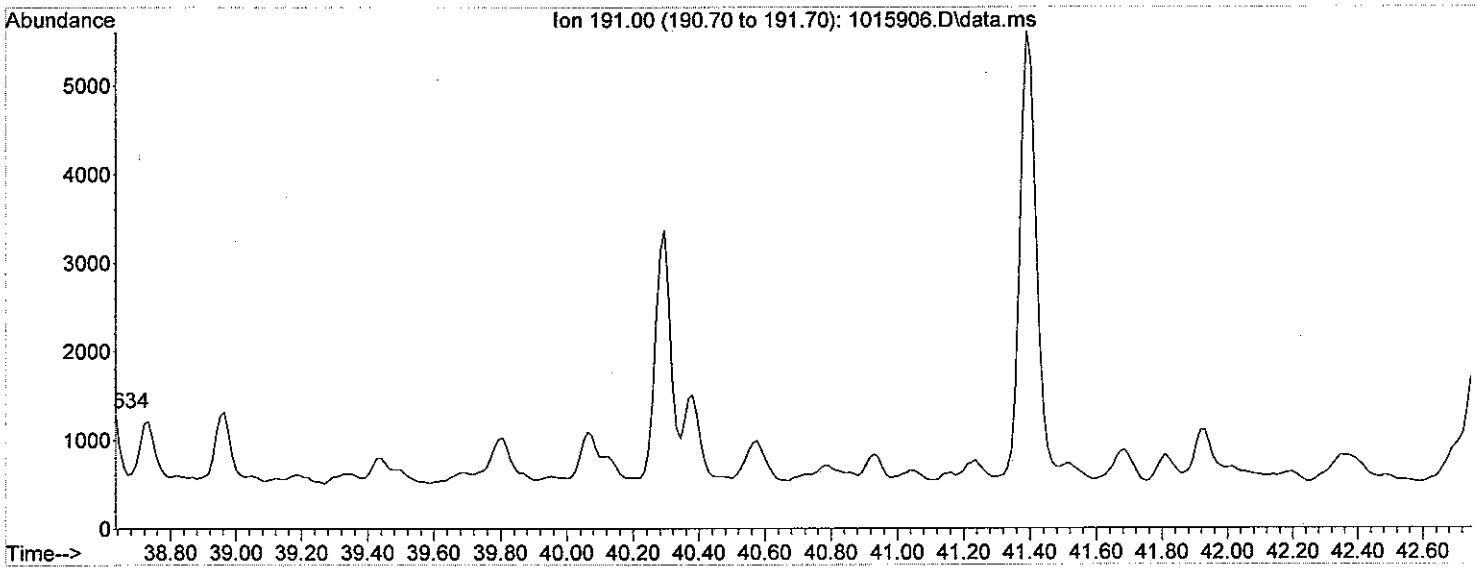
TRITERPANES/HOPANES

Area = 166501



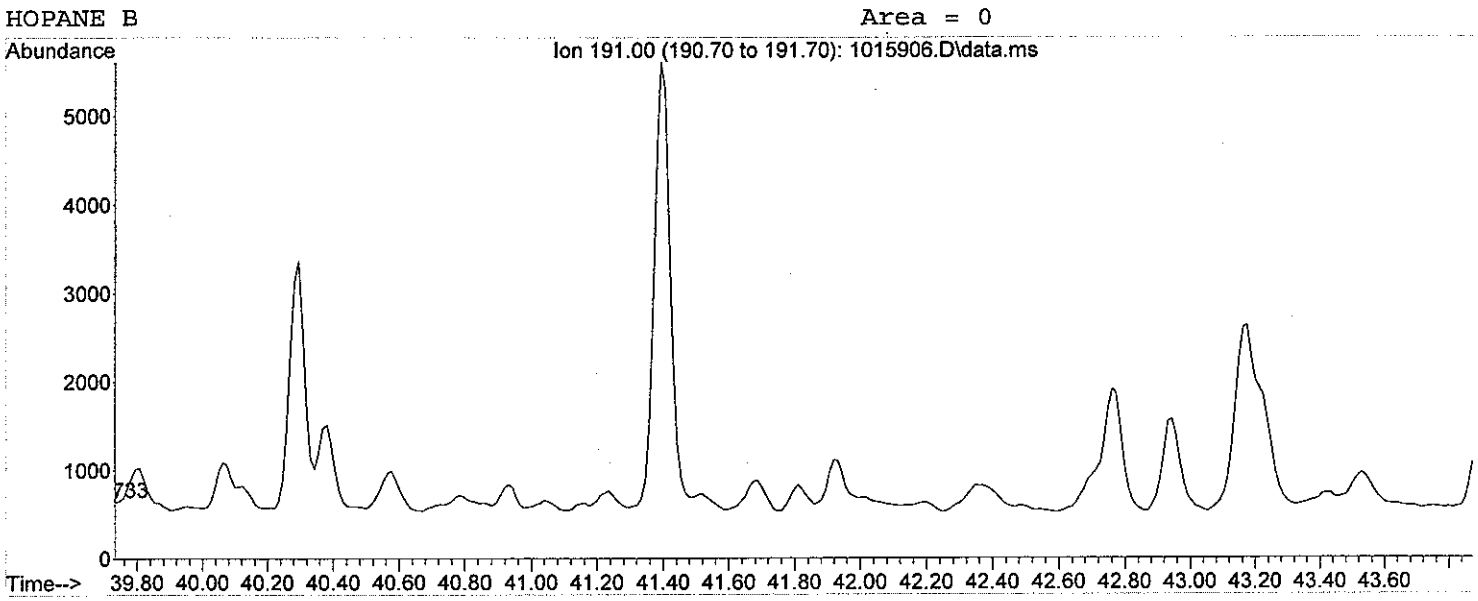
HOPANE A

Area = 0

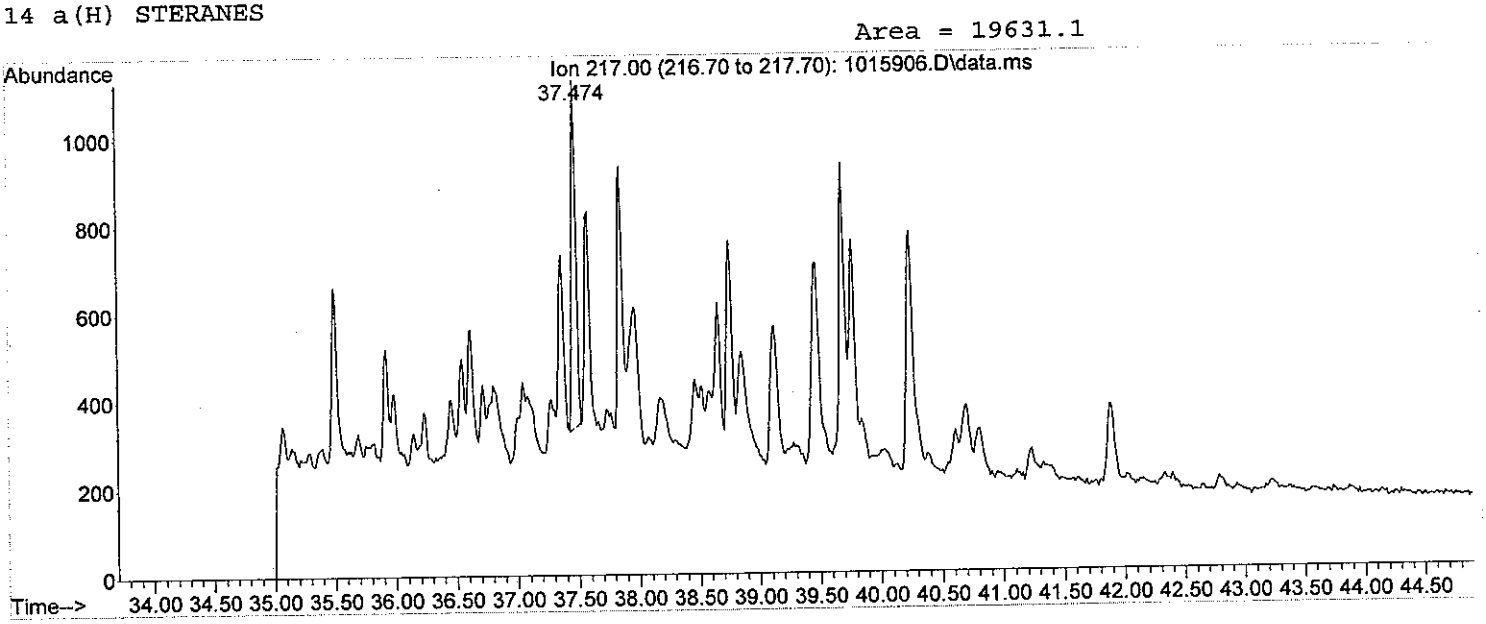


HOPANE B

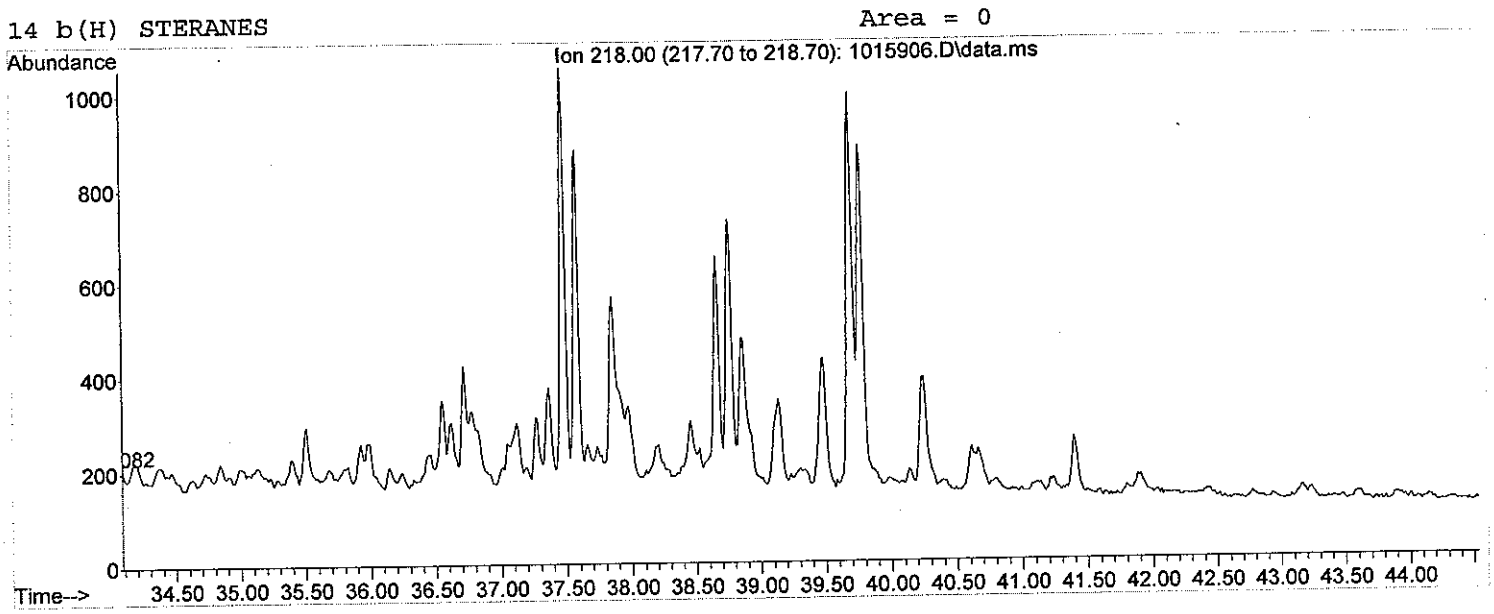
Area = 0



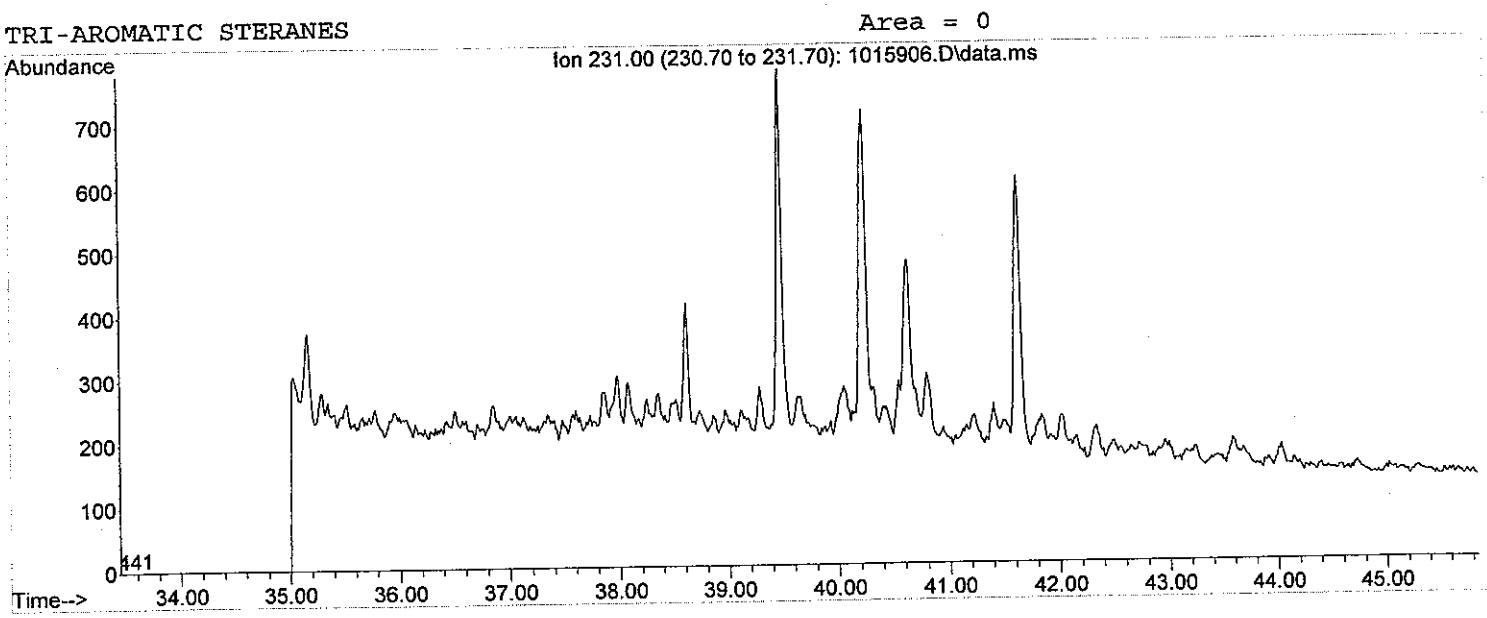
14 a(H) STERANES



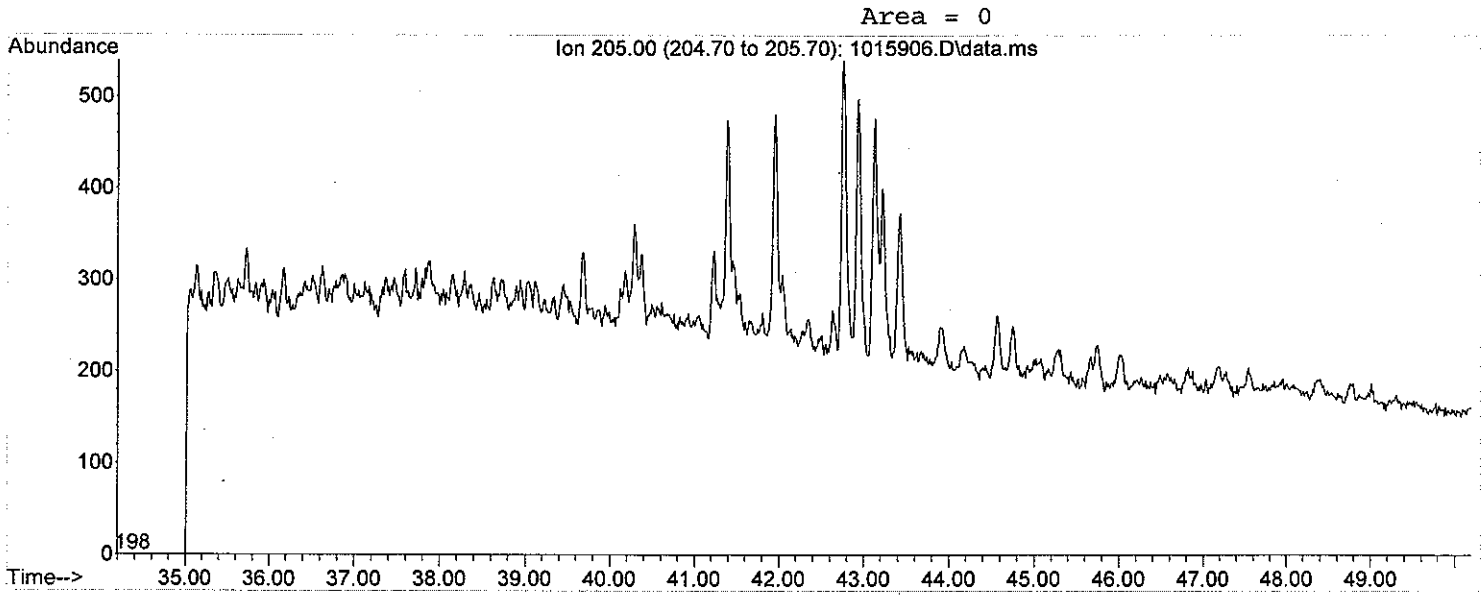
14 b(H) STERANES



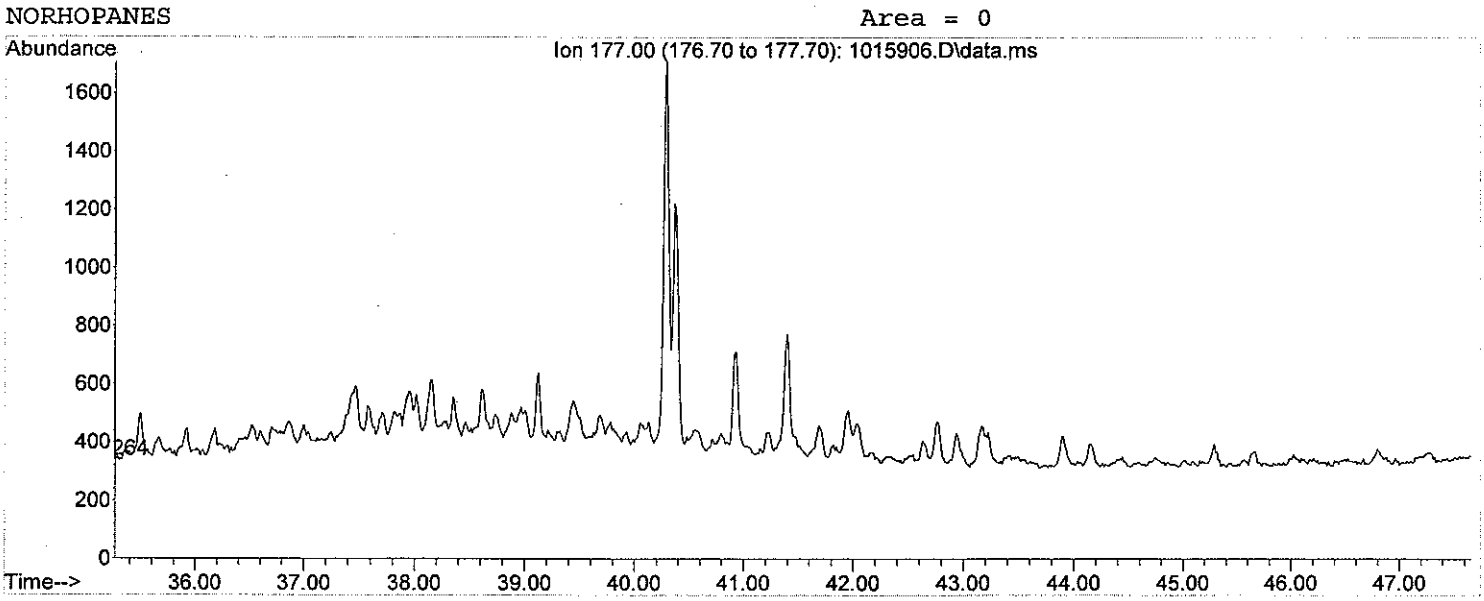
TRI-AROMATIC STERANES



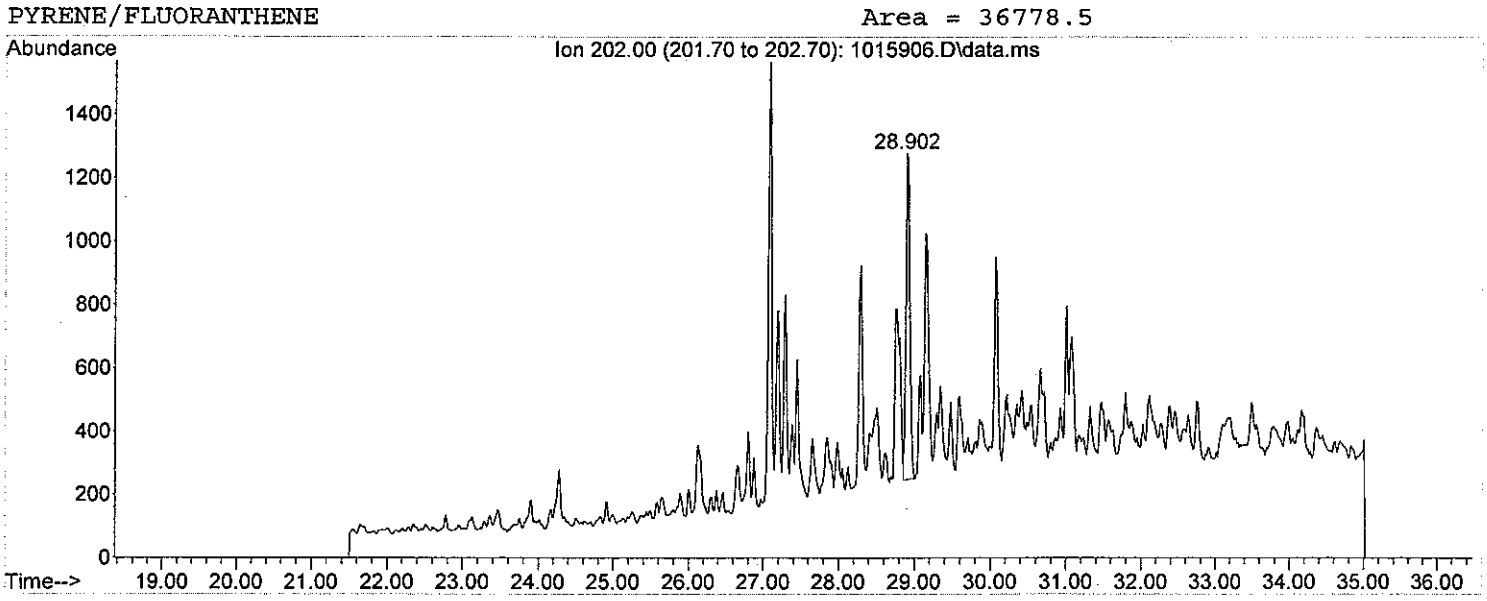
METHYLHOPANES



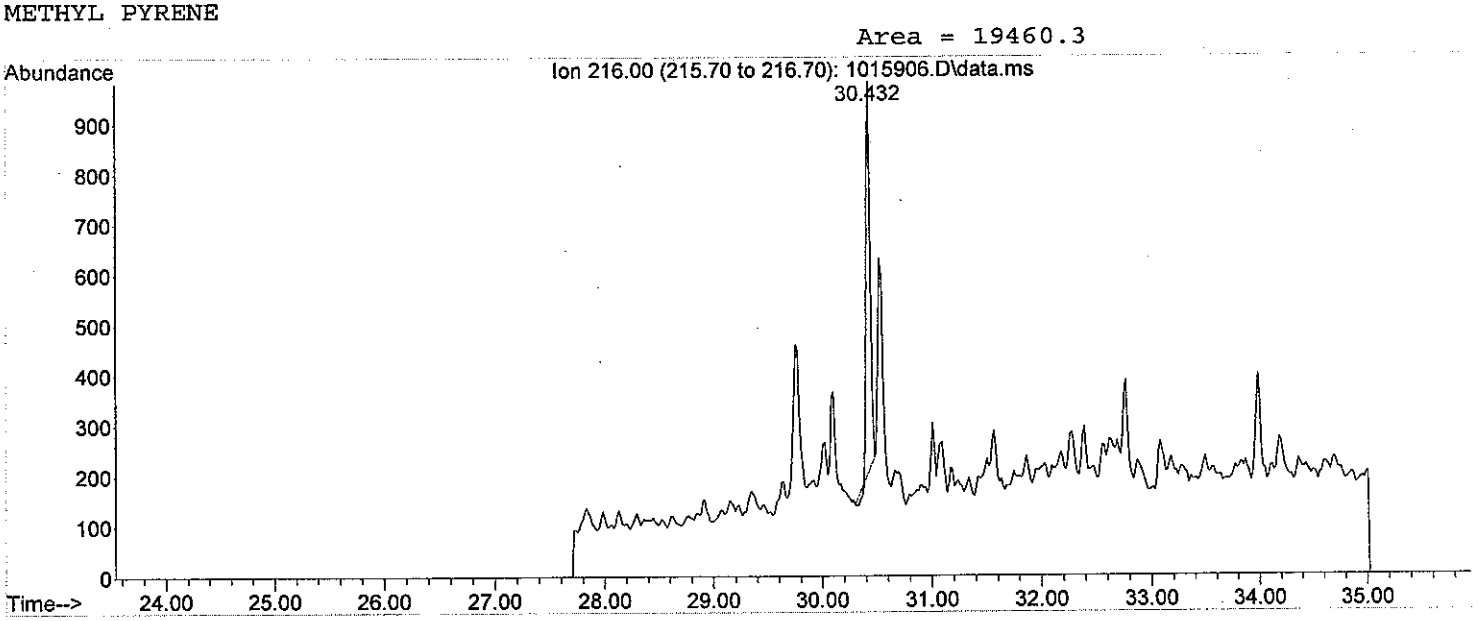
NORHOPANES



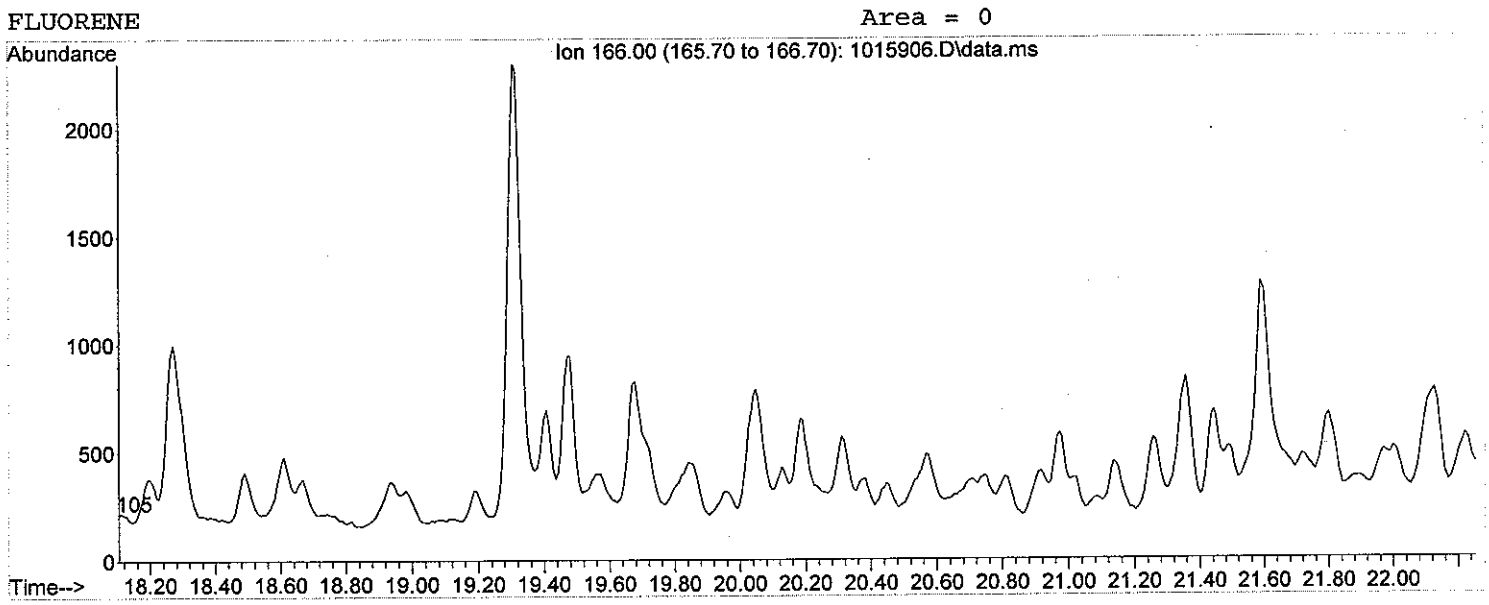
PYRENE/FLUORANTHENE



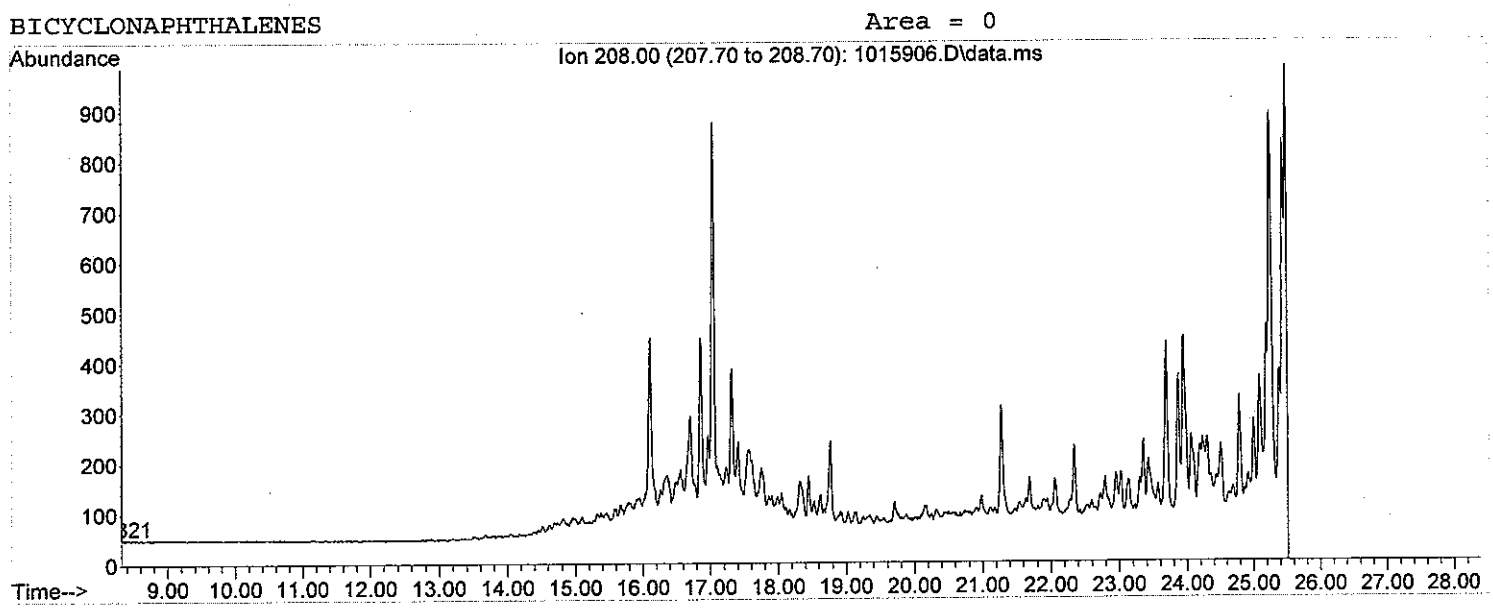
METHYL PYRENE



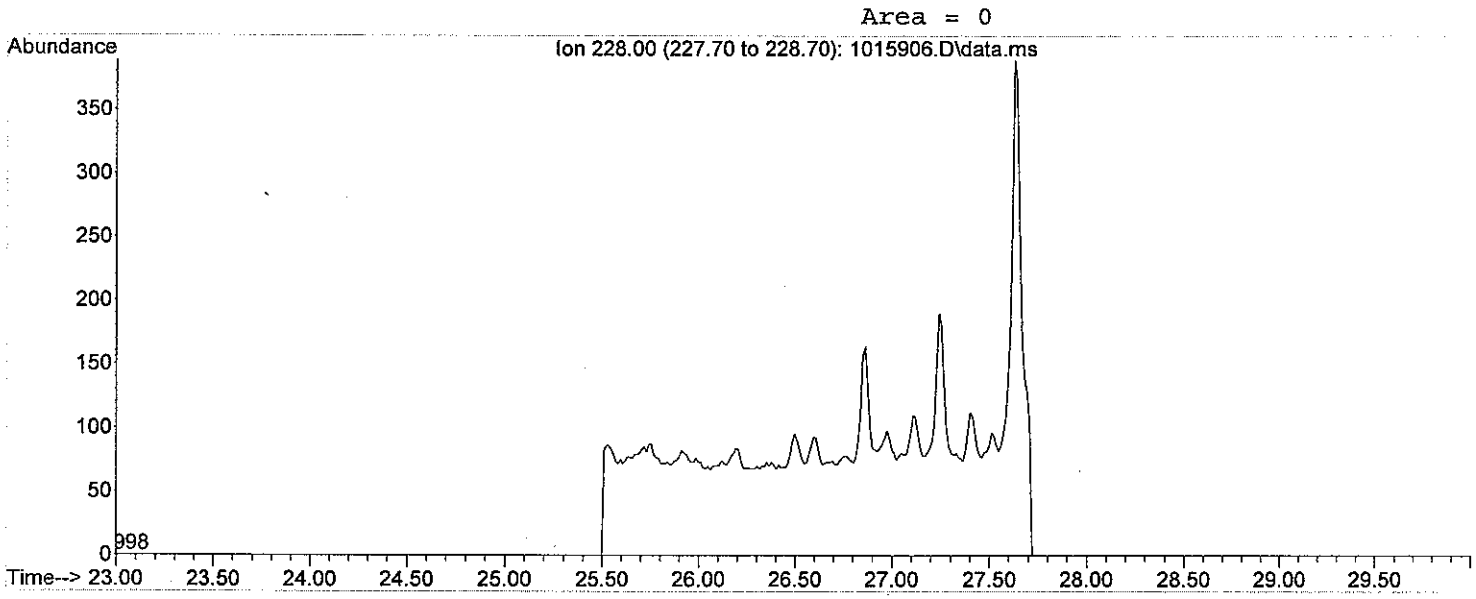
FLUORENE



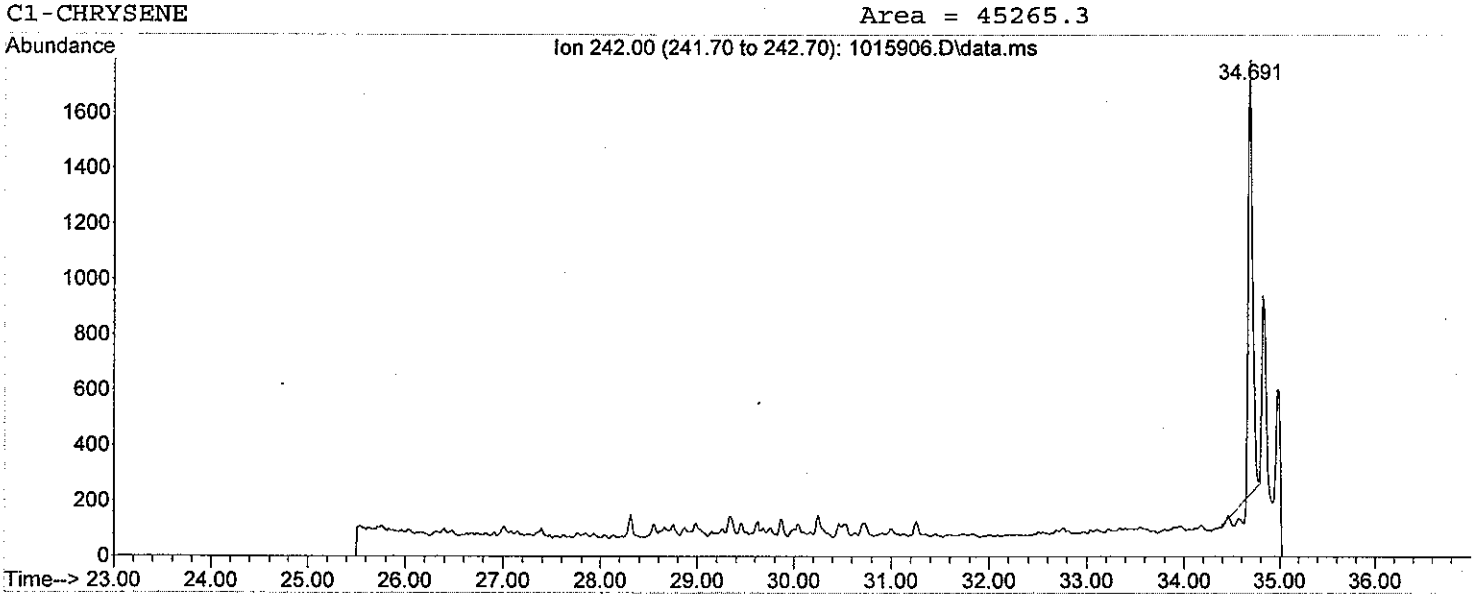
BICYCLONAPHTHALENES



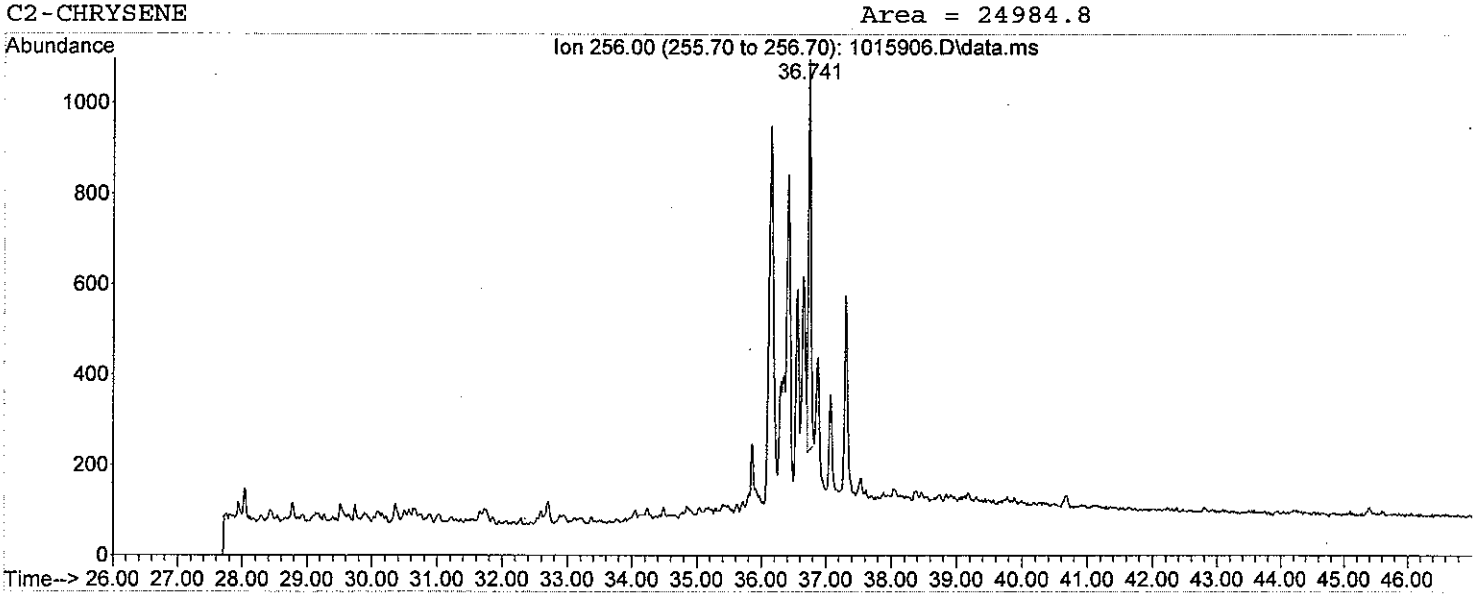
CHRYSENE



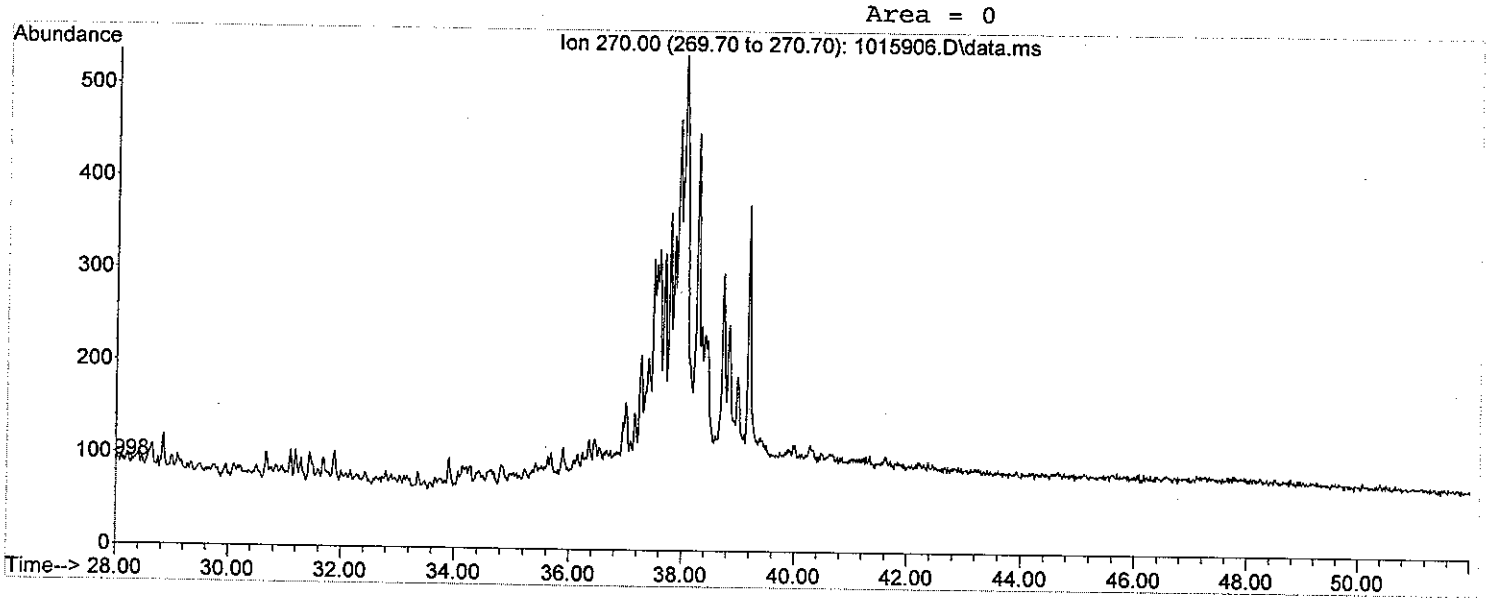
C1-CHRYSENE



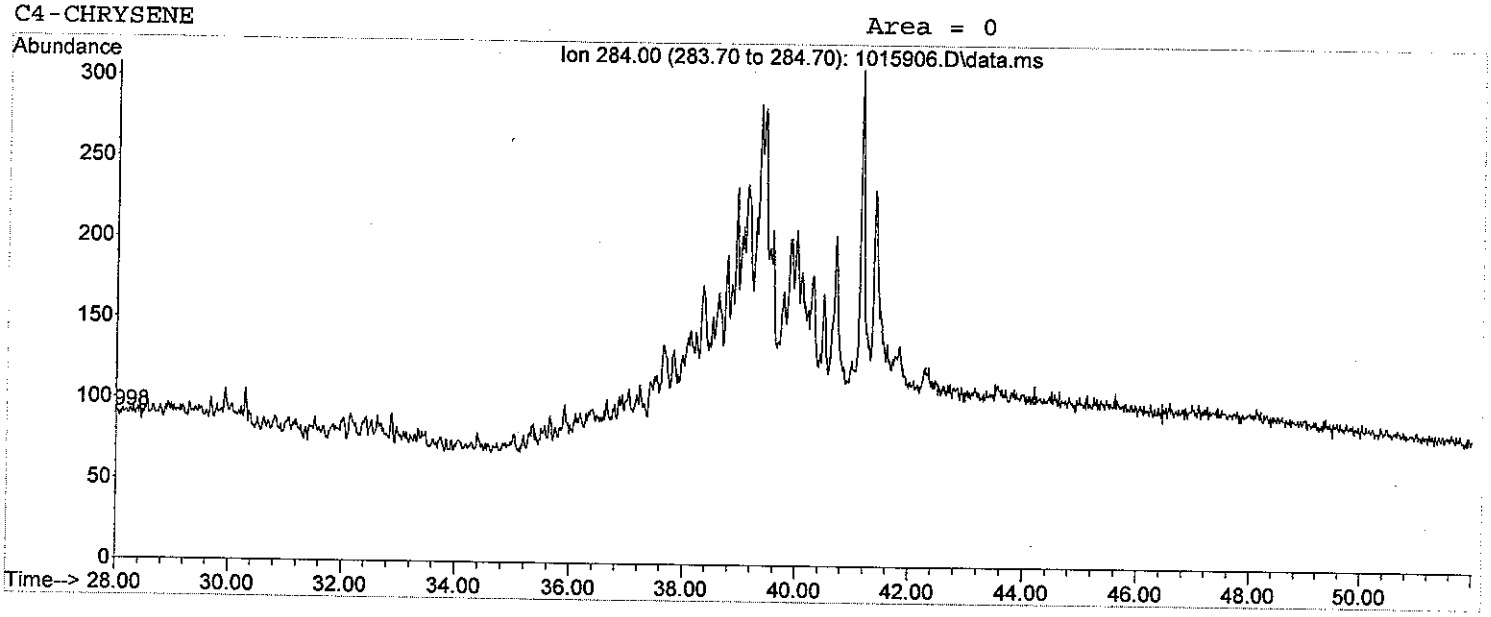
C2-CHRYSENE



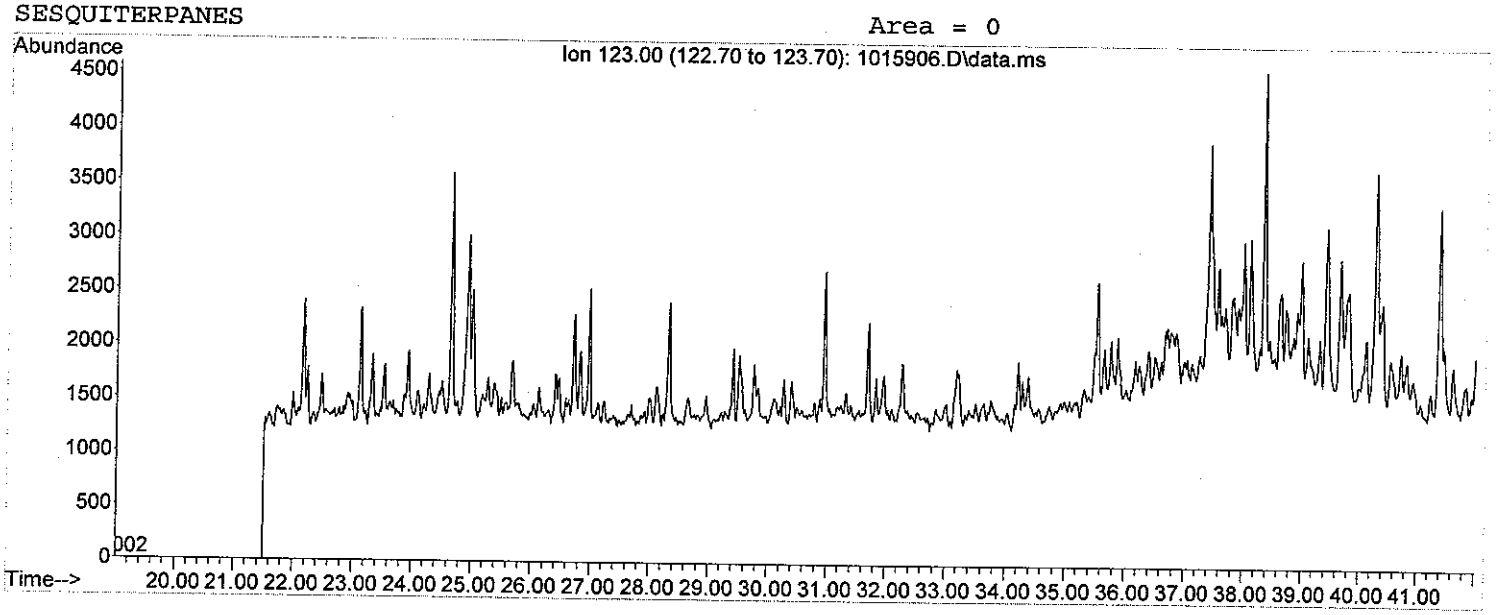
C3 - CHRYSENE



C4 - CHRYSENE

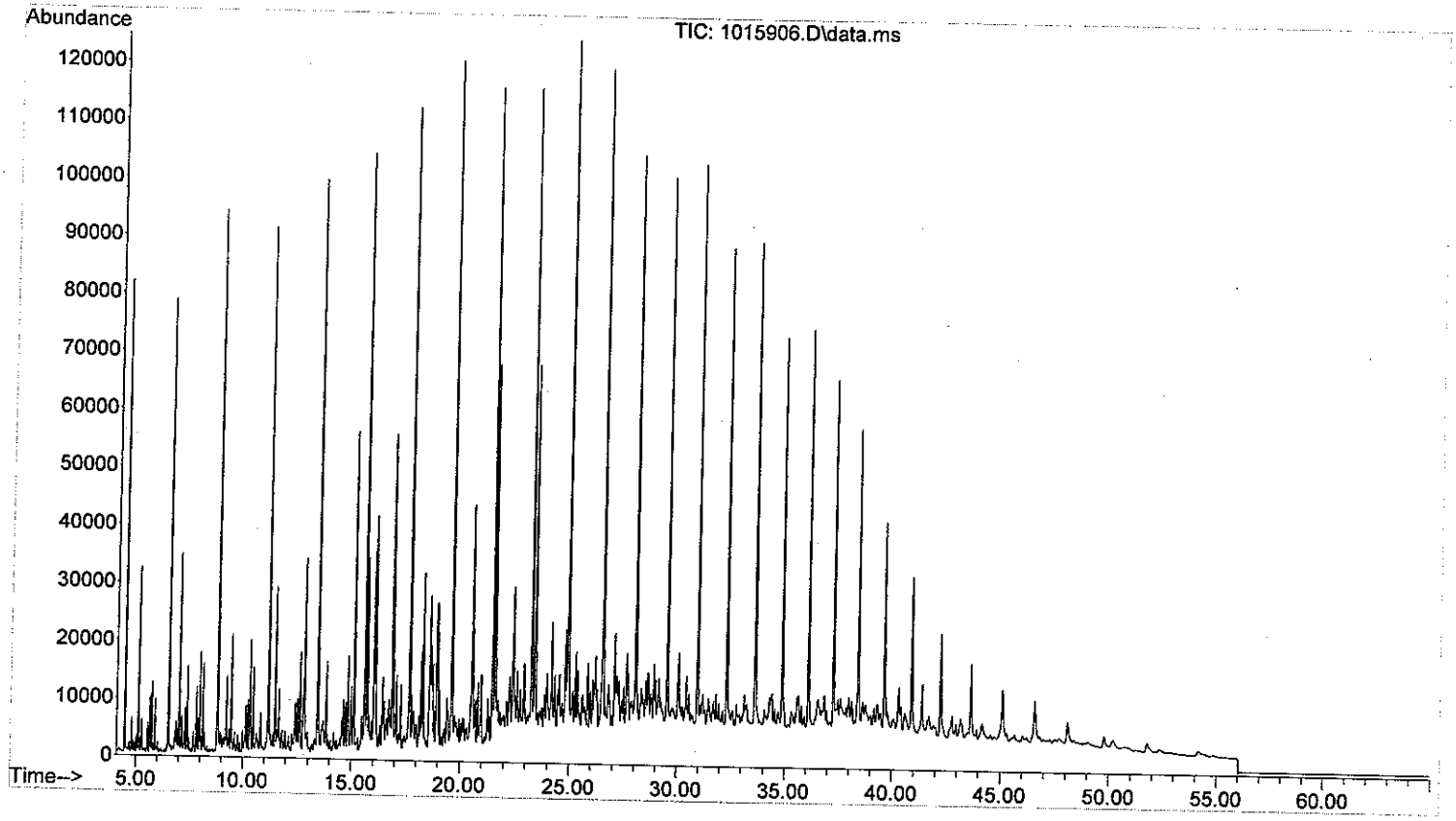


SESQUITERPANES

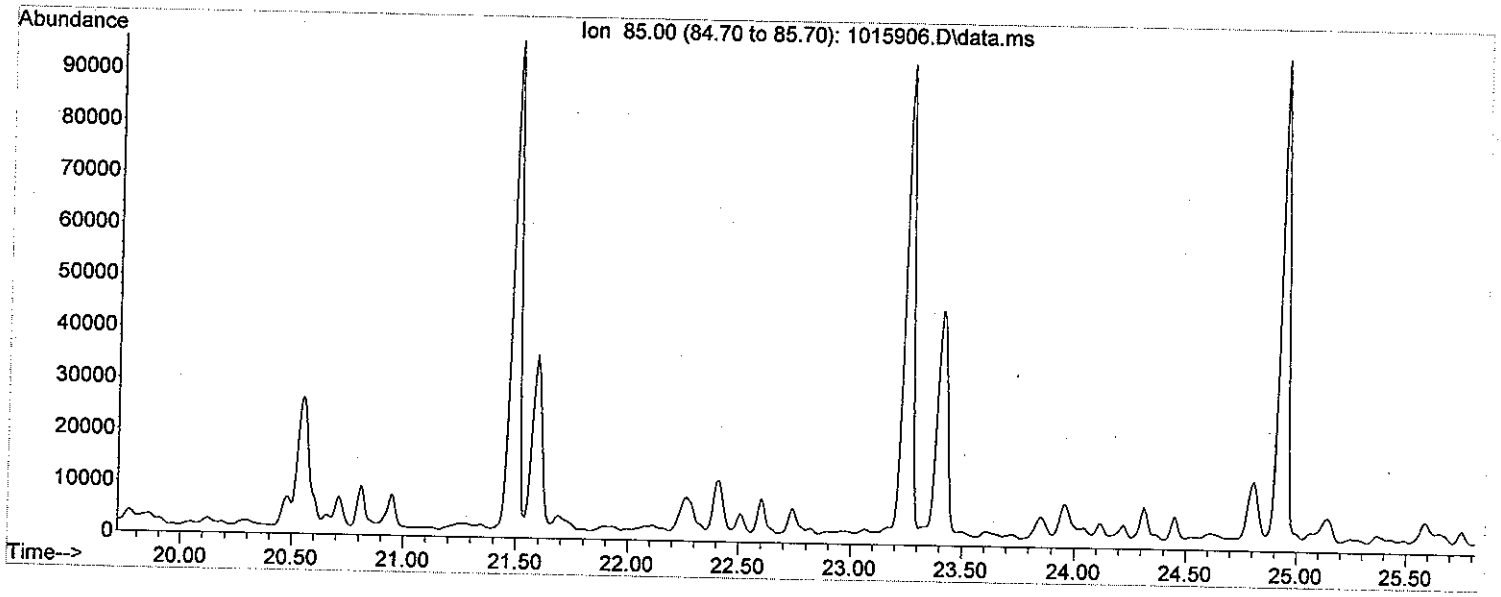


MSL GC-MS2 BIOMARKER ANALYSIS

File: W:\2010\MS_DATA\10-159\1015906.D
Operator: ACT
Date Acquired: 25 Jun 2010 6:05 pm
Method File: BIOMARK3.M
Sample Name: 10-159-6, SP
Misc Info: Vial: 5

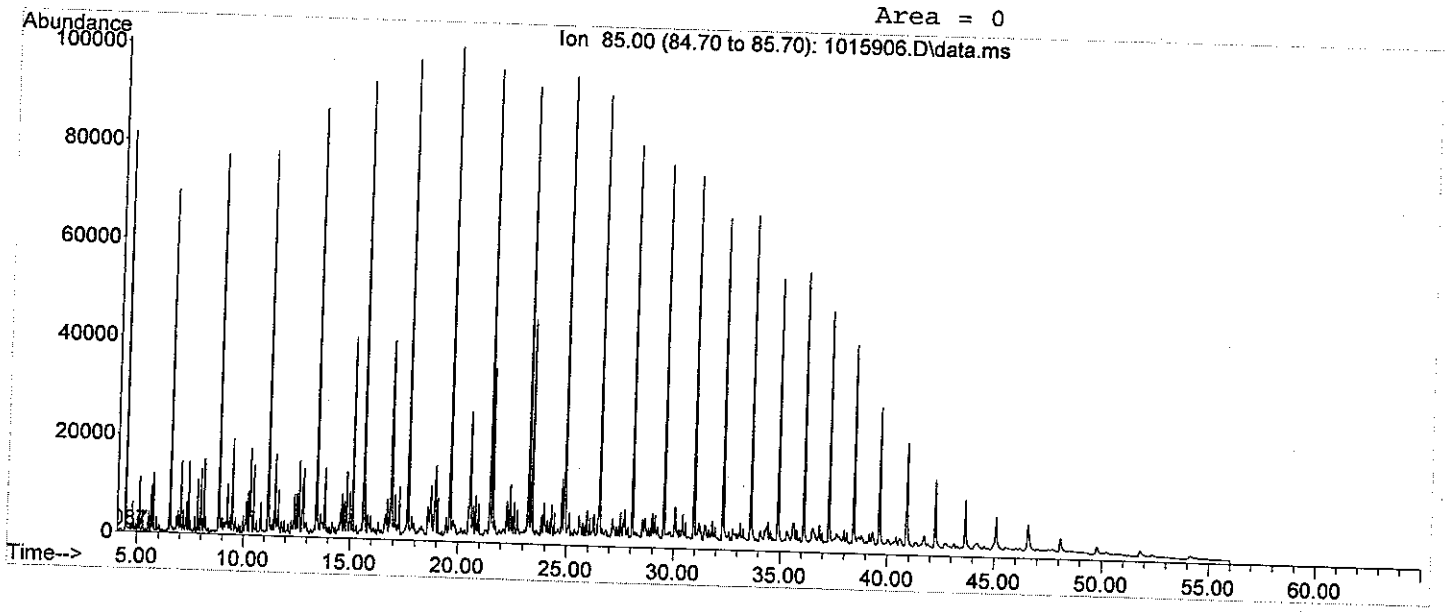


n-C17, Pristane, n-C18, Phytane

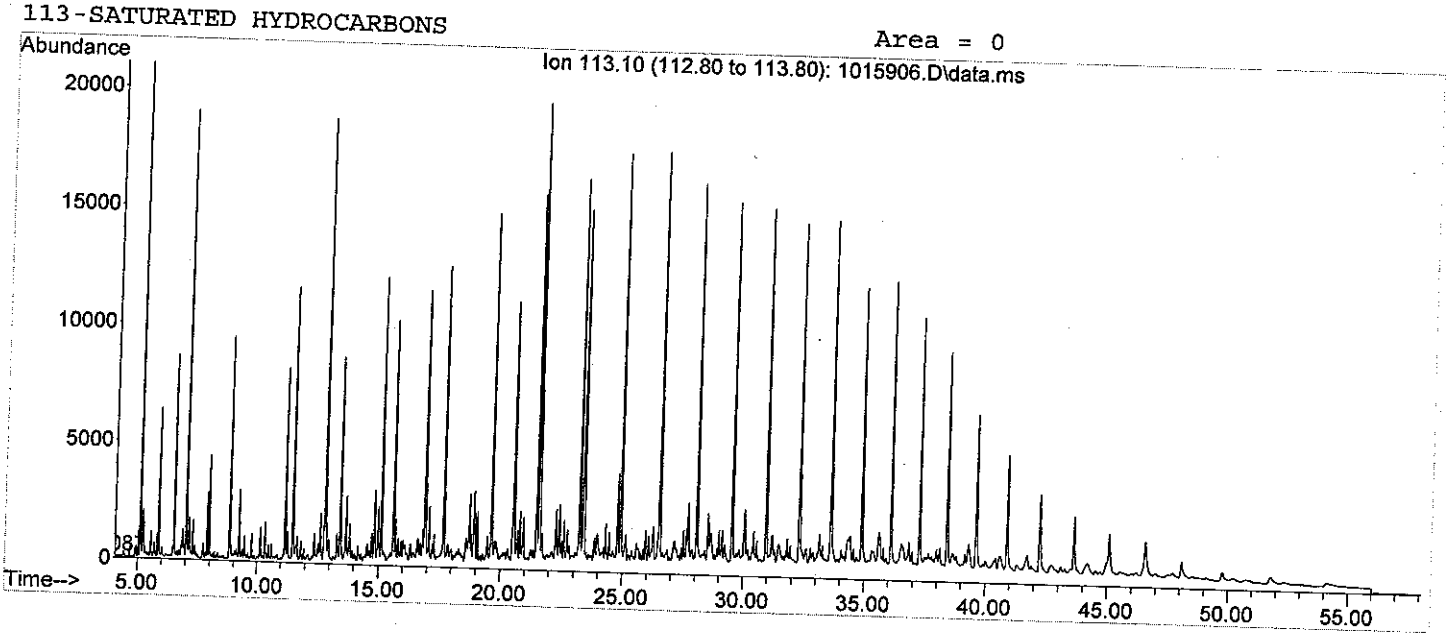


Pristane/Phytane = ----
C17/C18 = ----
Pristane/C17 = ----
Phytane/C18 = ----

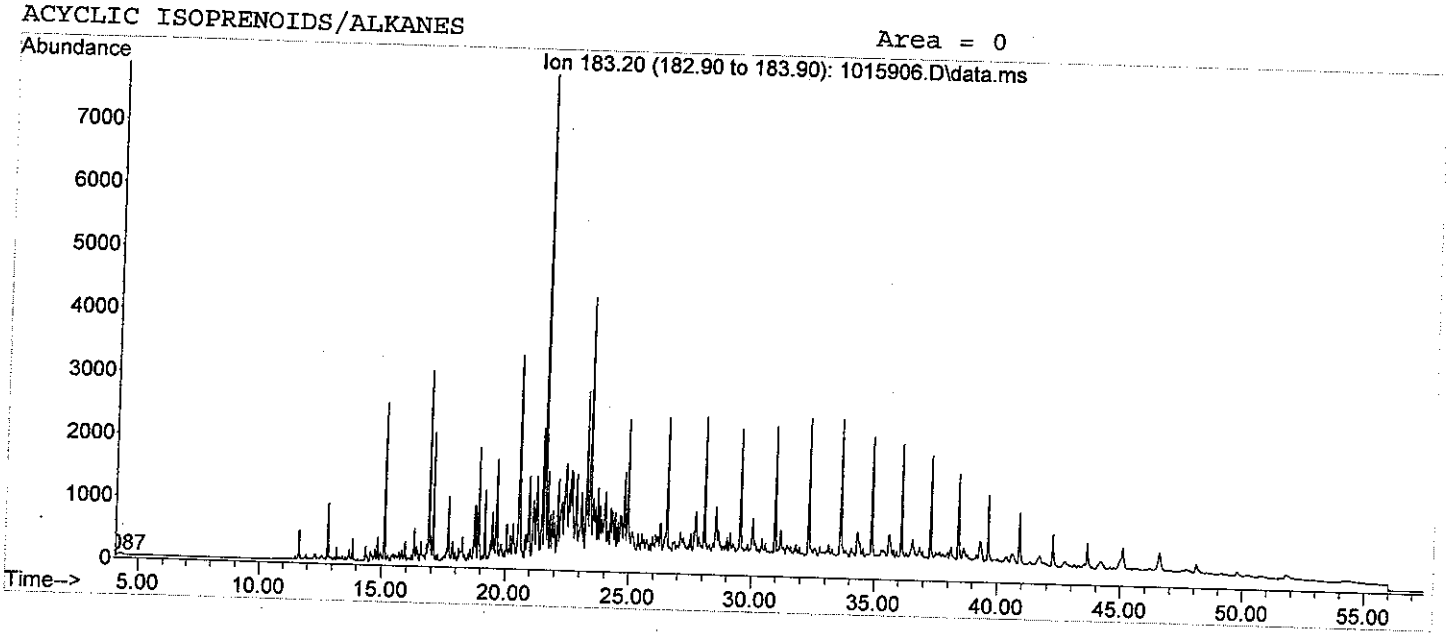
85-SATURATED HYDROCARBONS



113-SATURATED HYDROCARBONS

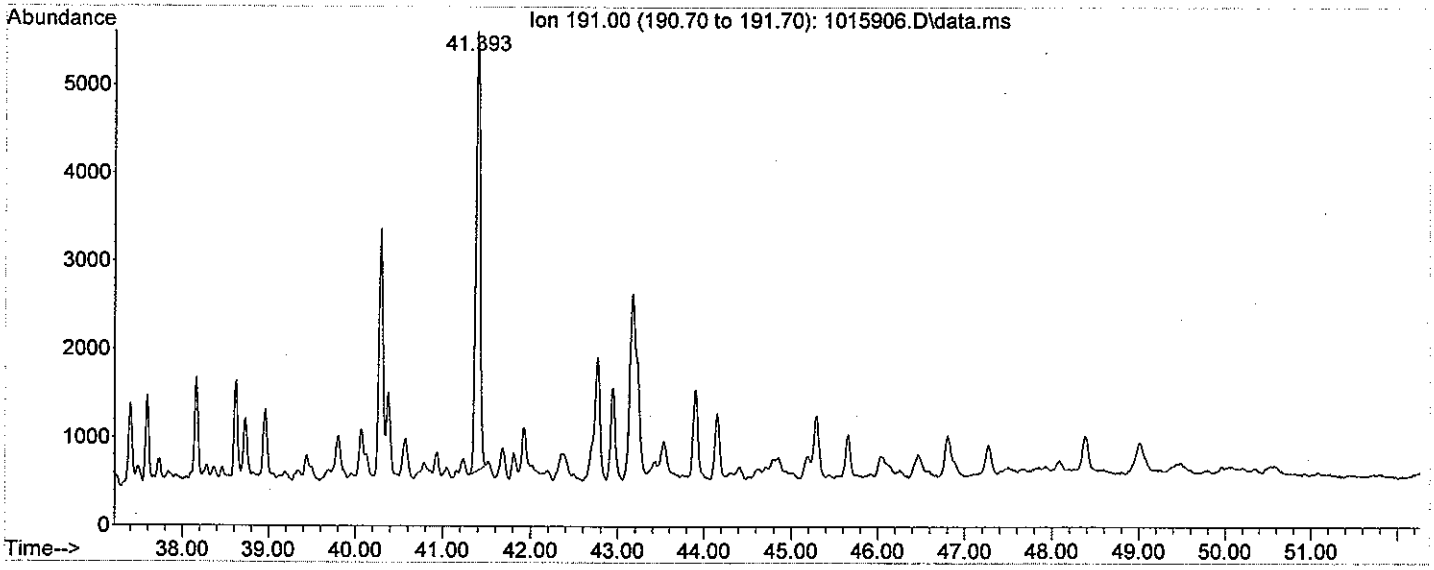


ACYCLIC ISOPRENOIDS/ALKANES



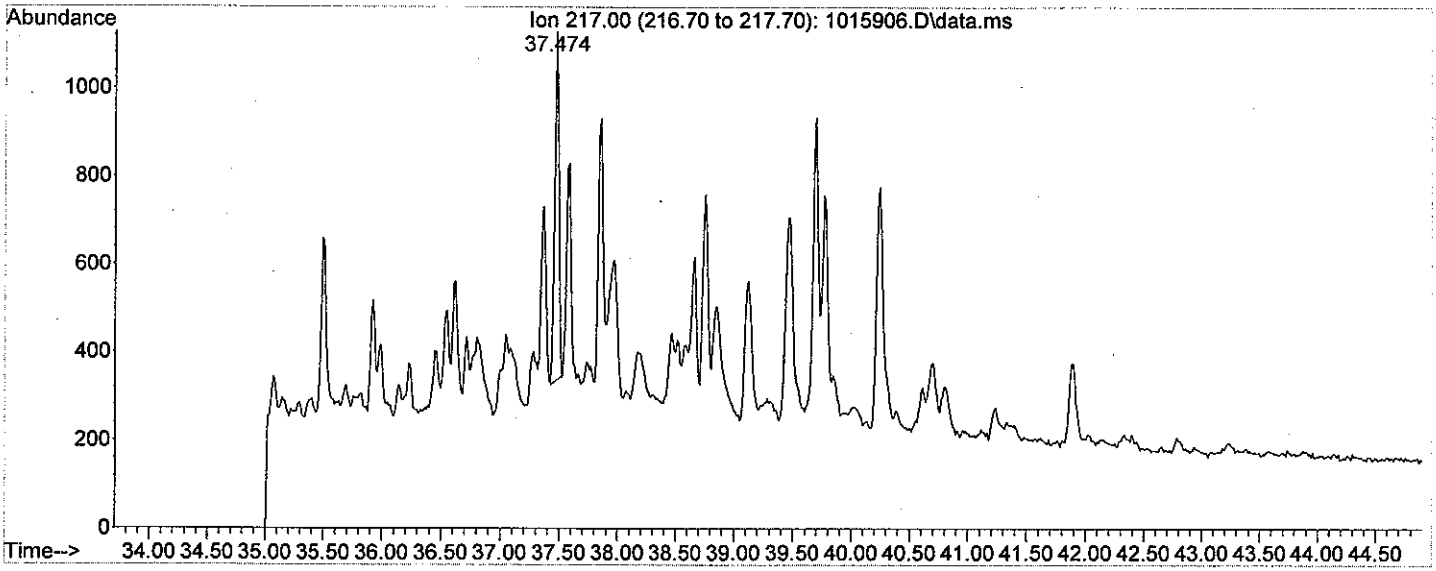
TRITERPANES/HOPANES

Area = 166501



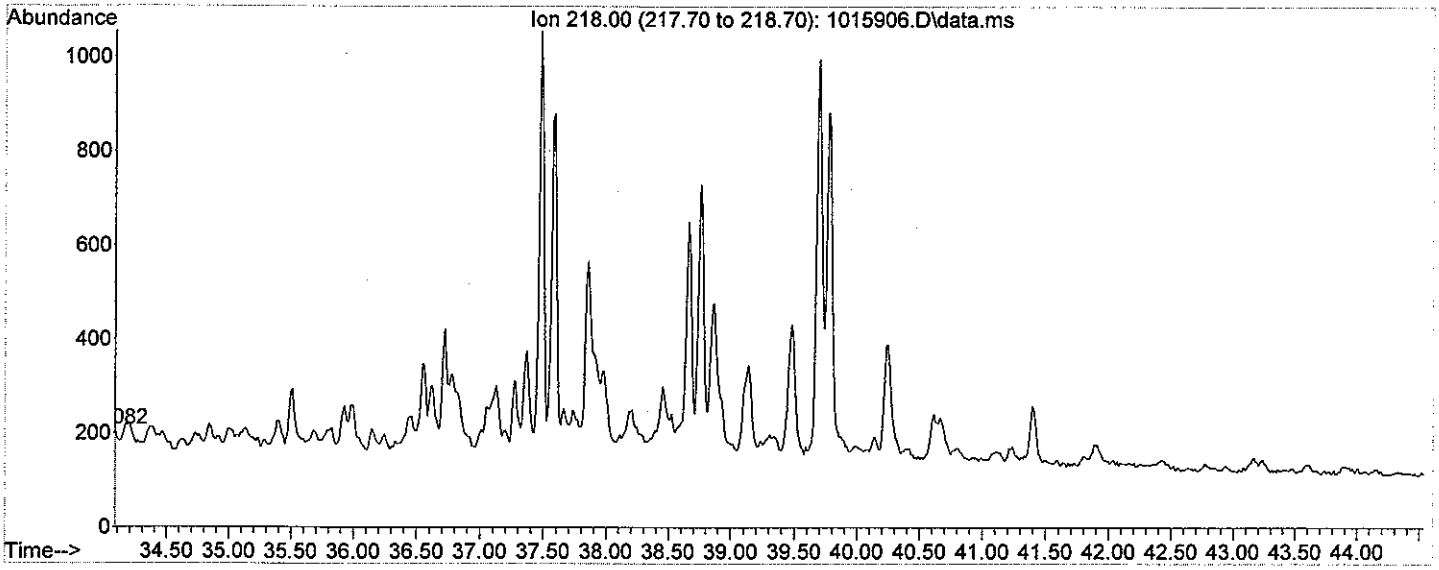
14 a(H) STERANES

Area = 19631.1



14 b(H) STERANES

Area = 0



Quantitation Report (Not Reviewed)

Data Path : W:\2010\MS_DATA\10-159\
Data File : 1015902.D
Acq On : 25 Jun 2010 9:42 pm
Operator : ACT
Sample : 10-159-2
Misc :
ALS Vial : 8 Sample Multiplier: 1

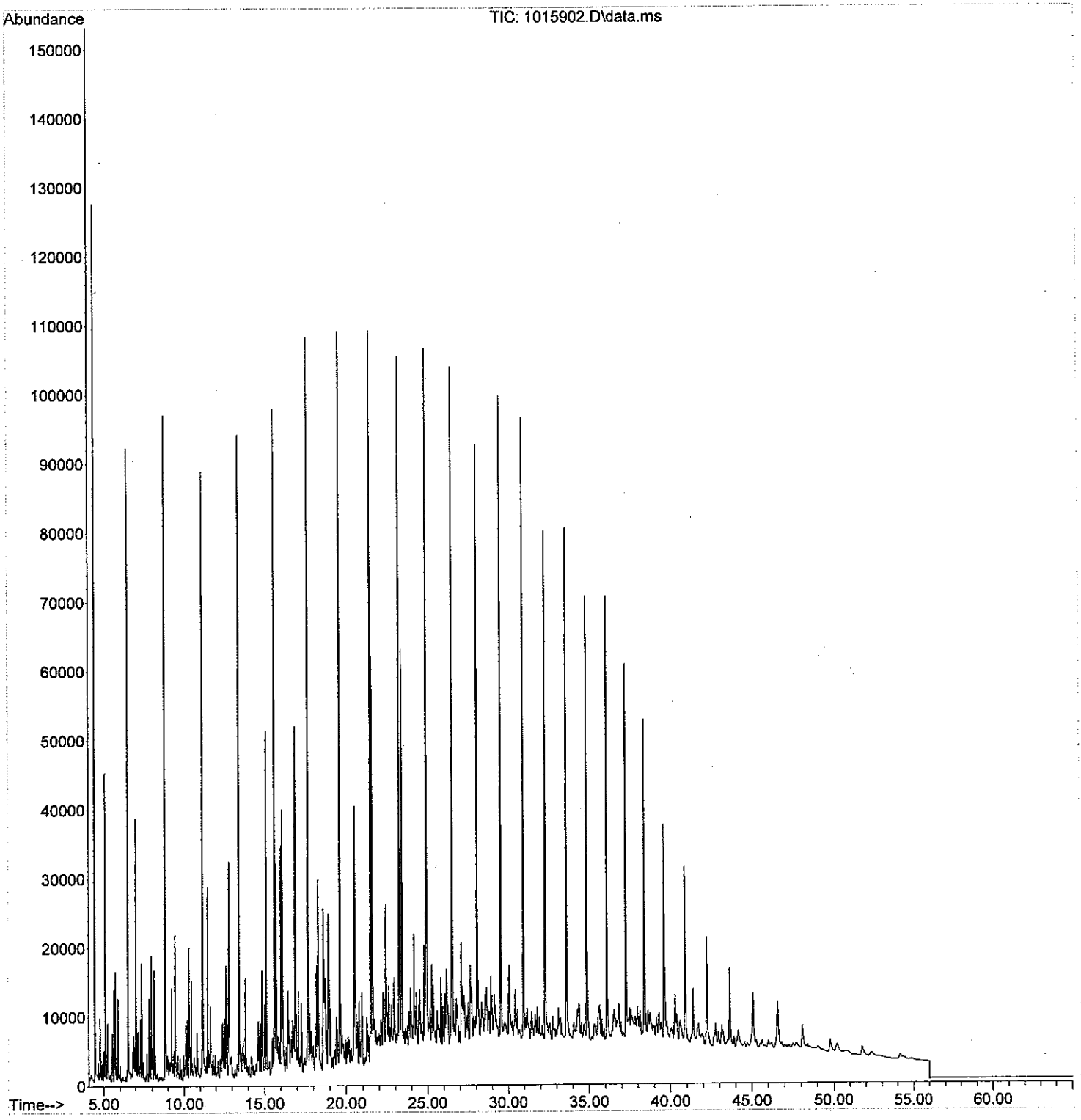
Quant Time: Jun 25 22:36:47 2010
Quant Method : C:\MSDCHEM\1\METHODS\BIOMARK3.M
Quant Title :
QLast Update : Wed May 27 09:43:48 2009
Response via : Initial Calibration

Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
Target Compounds					Qvalue
1) 85-SATURATED HYDROCARBONS	18.750	85	400807	No Calib	
2) n-C17	0.000	85	0	N.D.	
3) PRISTANE	21.898	85	-8535	No Calib	
4) n-C18	0.000	85	0	N.D.	
5) PHYTANE	0.000	85	0	N.D.	
6) 113-SATURATED HYDROCAR...	0.000	113	0	N.D.	
7) ACYCLIC ISOPRENOIDS/AL...	0.000	183	0	N.D.	
8) C2-NAPHTHALENES	0.000	156	0	N.D.	
9) C3-NAPHTHALENES	19.409	170	141787	No Calib	
10) C4-NAPHTHALENES	0.000	184	0	N.D.	
11) PHENANTHRENE/ANTHRACENE	0.000	178	0	N.D.	
12) BENZONAPHTHIOPHENE	32.115	234	58088	No Calib	
13) DIBENZOTHIOPHENE	22.437	184	185422	No Calib	
14) C1-DIBENZOTHIOPHENE	24.528	198	261413	No Calib	
15) C2-DIBENZOTHIOPHENE	26.494	212	131787	No Calib	
16) C3-DIBENZOTHIOPHENE	27.988	226	118314	No Calib	
17) C1-PHENANTHRENES	25.358	192	199238	No Calib	
18) C2-PHENANTHRENES	27.290	206	135356	No Calib	
19) C3-PHENANTHRENES	29.166	220	93163	No Calib	
20) TRITERPANES/HOPANES	41.398	191	168722	No Calib	
21) HOPANE A	0.000	191	0	N.D.	
22) HOPANE B	0.000	191	0	N.D.	
23) 14 a(H) STERANES	37.479	217	18195	No Calib	
24) 14 b(H) STERANES	0.000	218	0	N.D.	
25) TRI-AROMATIC STERANES	0.000	231	0	N.D.	
26) METHYLHOPANES	0.000	205	0	N.D.	
27) NORHOPANES	0.000	177	0	N.D.	
28) PYRENE/FLUORANTHENE	28.917	202	33030	No Calib	
29) METHYL PYRENE	30.437	216	16759	No Calib	
30) FLUORENE	0.000	166	0	N.D.	
31) BICYCLONAPHTHALENES	0.000	208	0	N.D.	
32) CHRYSENE	0.000	228	0	N.D.	
33) C1-CHRYSENE	34.692	242	48036	No Calib	
34) C2-CHRYSENE	0.000	256	0	N.D.	
35) C3-CHRYSENE	0.000	270	0	N.D.	
36) C4-CHRYSENE	0.000	284	0	N.D.	
37) SESQUITERPANES	28.327	123	31547	No Calib	

(#) = qualifier out of range (m) = manual integration (+) = signals summed

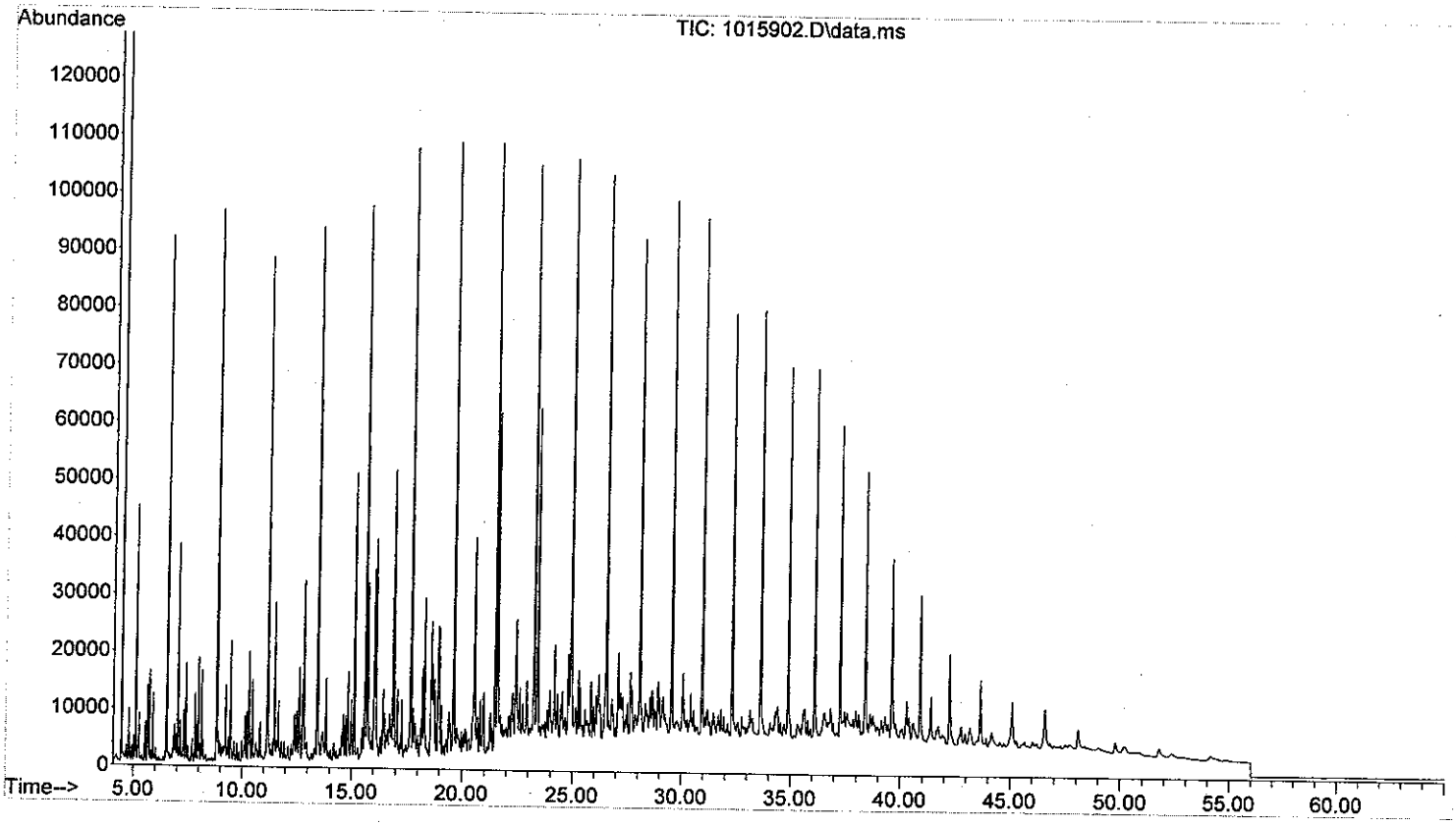
Data Path : W:\2010\MS_DATA\10-159\
Data File : 1015902.D
Acq On : 25 Jun 2010 9:42 pm
Operator : ACT
Sample : 10-159-2
Misc :
ALS Vial : 8 Sample Multiplier: 1

Quant Time: Jun 25 22:36:47 2010
Quant Method : C:\MSDCHEM\1\METHODS\BIOMARK3.M
Quant Title :
QLast Update : Wed May 27 09:43:48 2009
Response via : Initial Calibration

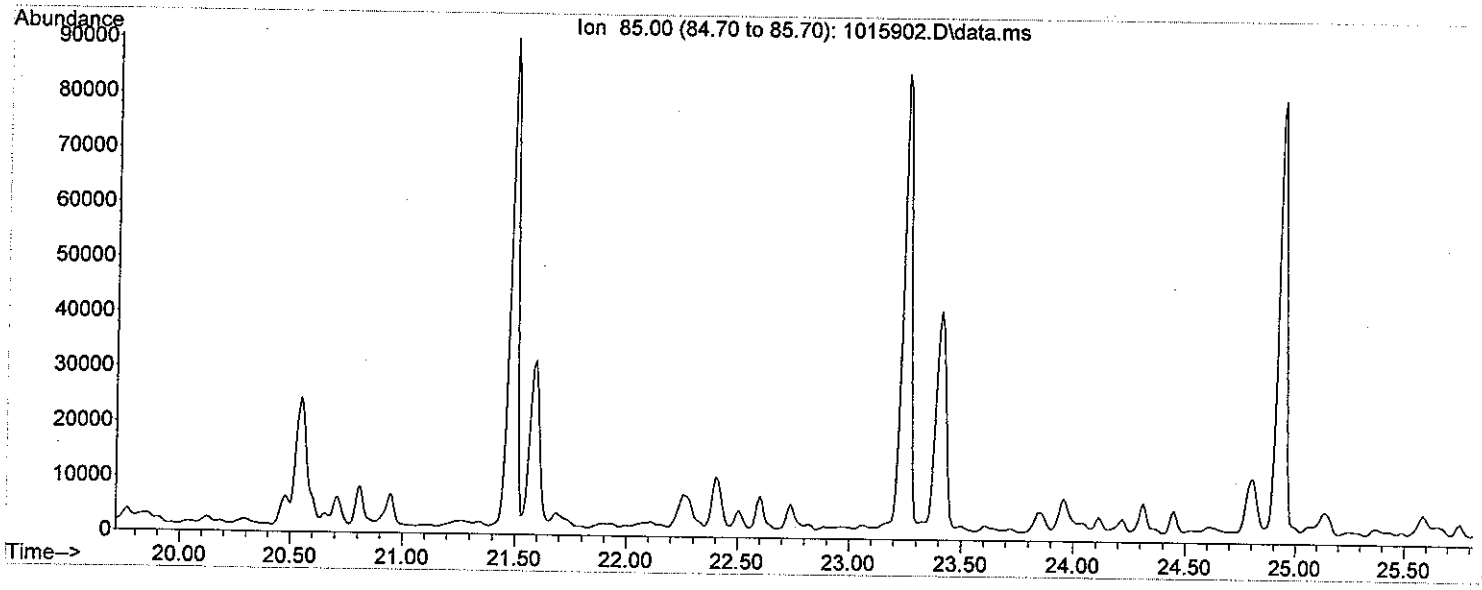


MARINE SAFETY LABORATORY GC-MS2 BIOMARKER ANALYSIS

File: \\Mslserver1\data archive\2010\MS_data\10-159\1015902.D
Operator: ACT
Date Acquired: 25 Jun 2010 9:42 pm
Method File: BIOMARK3.M
Sample Name: 10-159-2 Vial: 8
Misc Info:



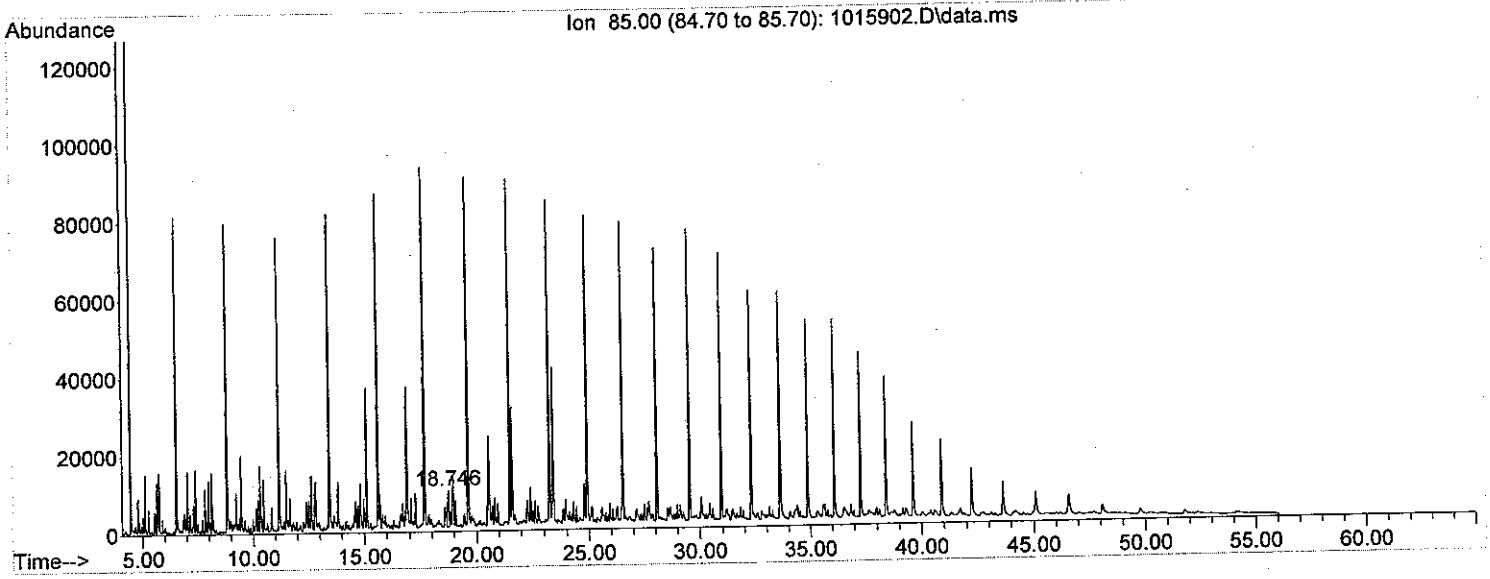
n-C17, Pristane, n-C18, Phytane



Pristane/Phytane = 0.697
C17/C18 = 1.013
Pristane/C17 = 0.407
Phytane/C18 = 0.591

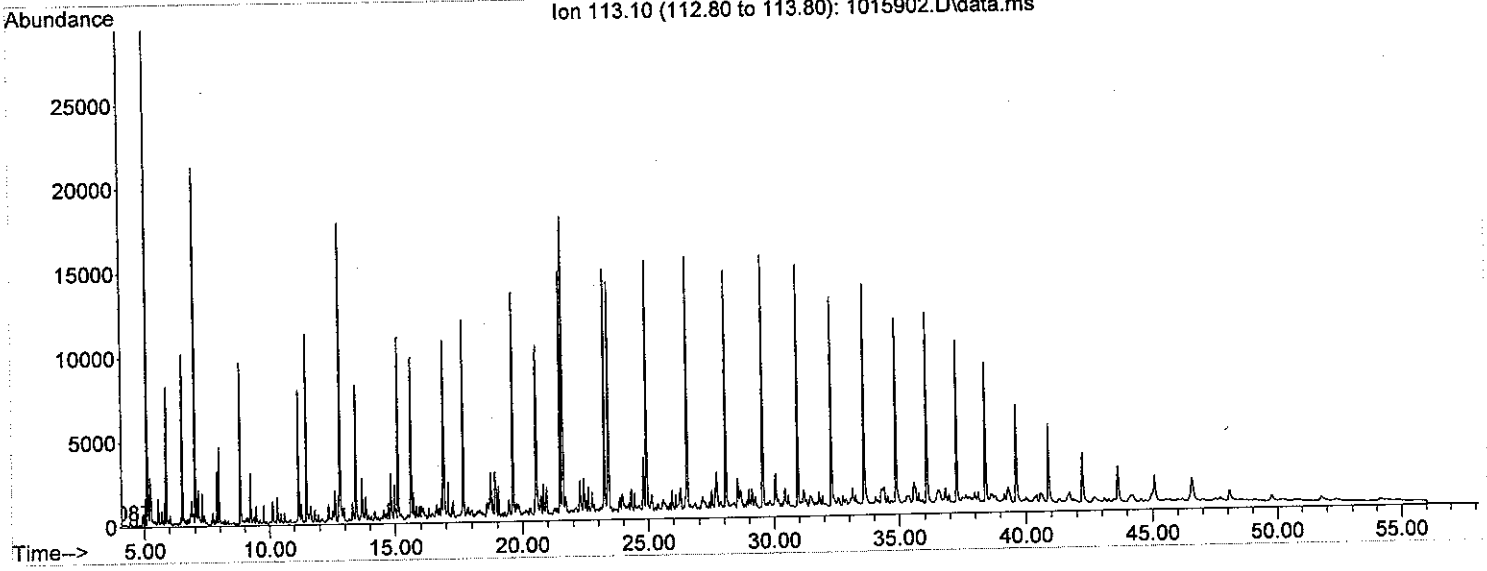
85-SATURATED HYDROCARBONS

Area = 400807



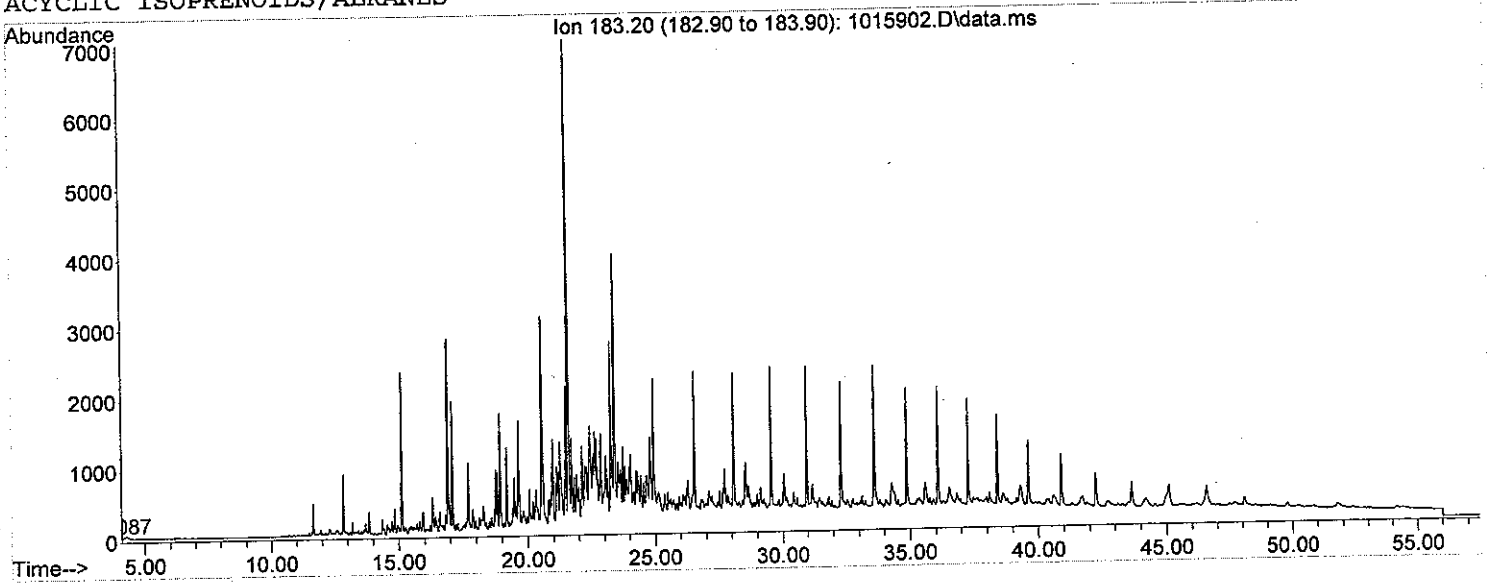
113-SATURATED HYDROCARBONS

Area = 0

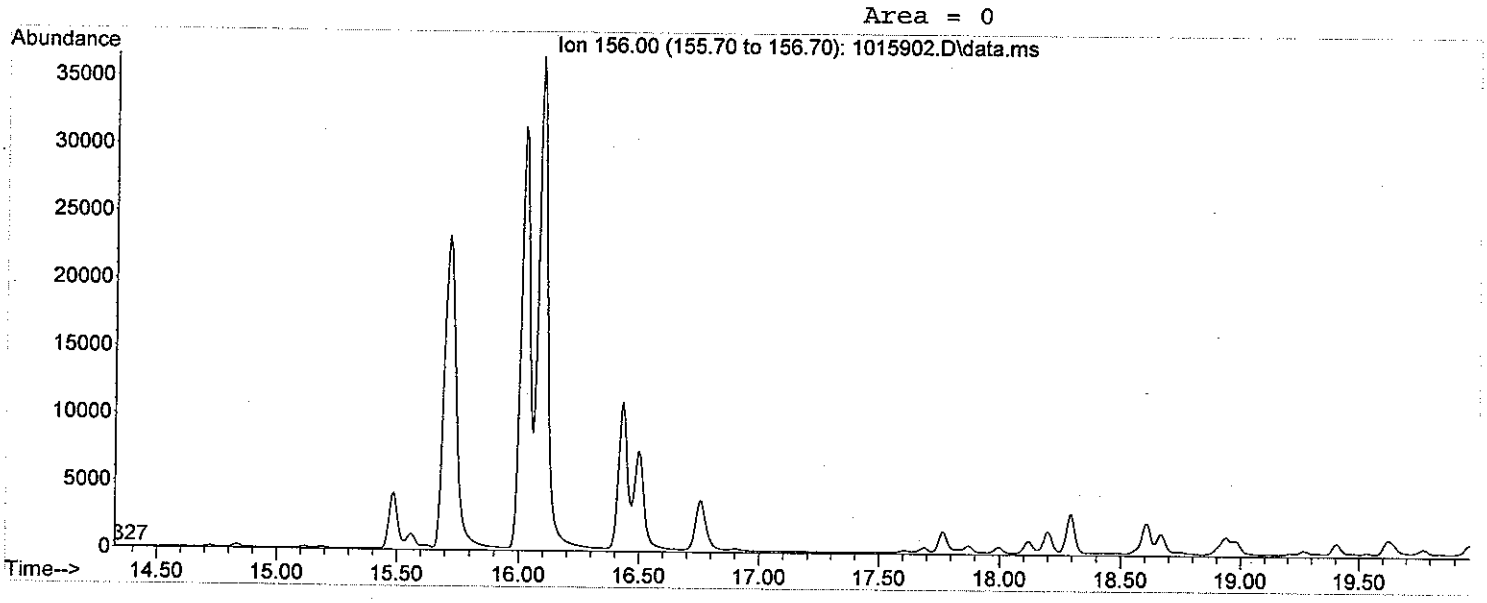


ACYCLIC ISOPRENOIDS/ALKANES

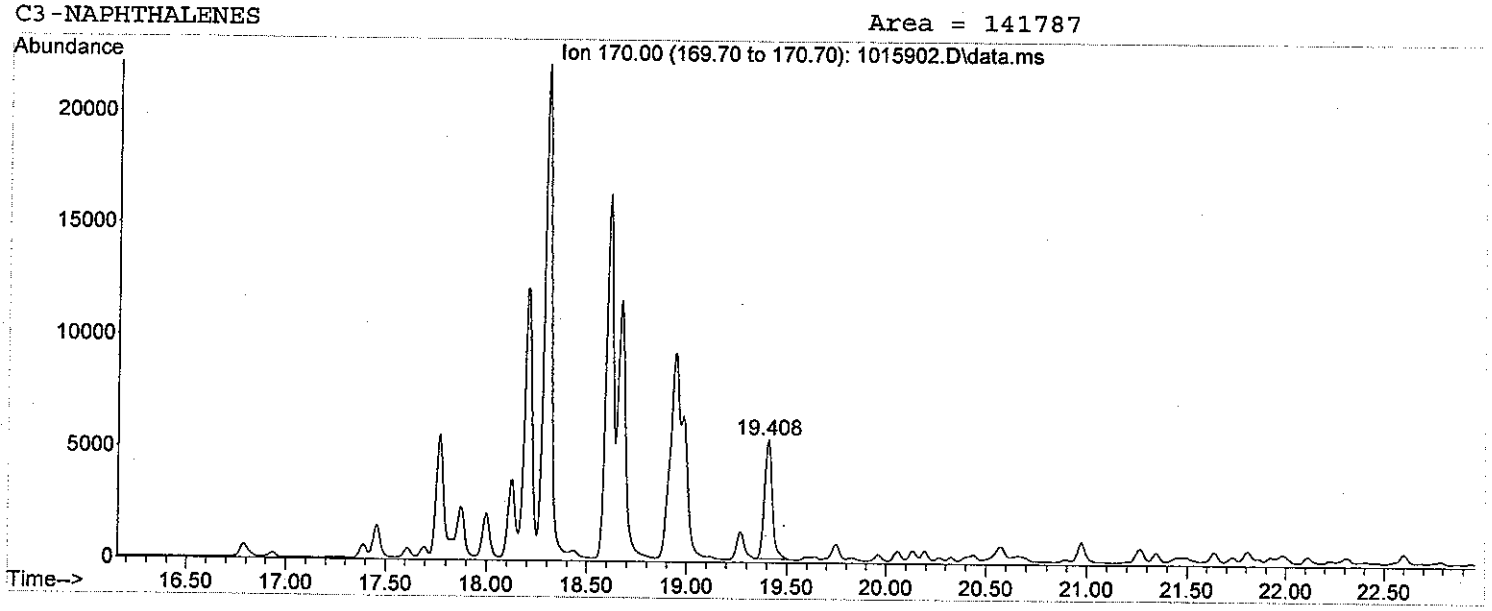
Area = 0



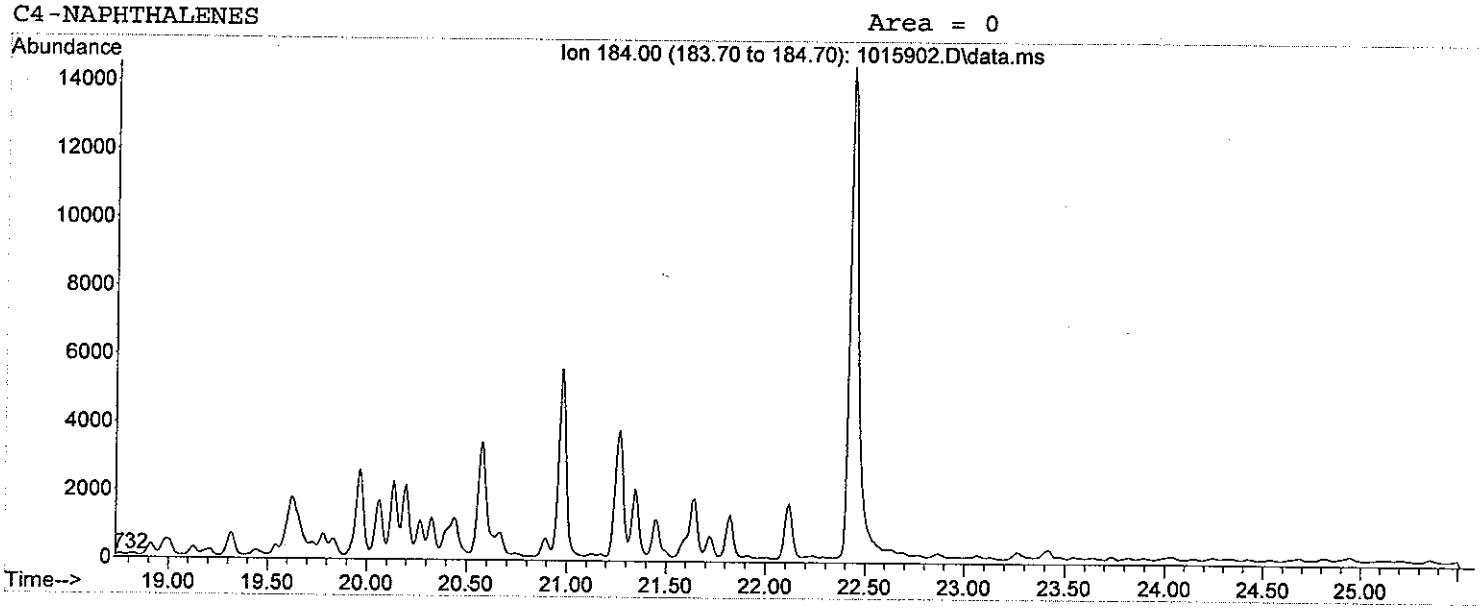
C2 -NAPHTHALENES



C3 -NAPHTHALENES

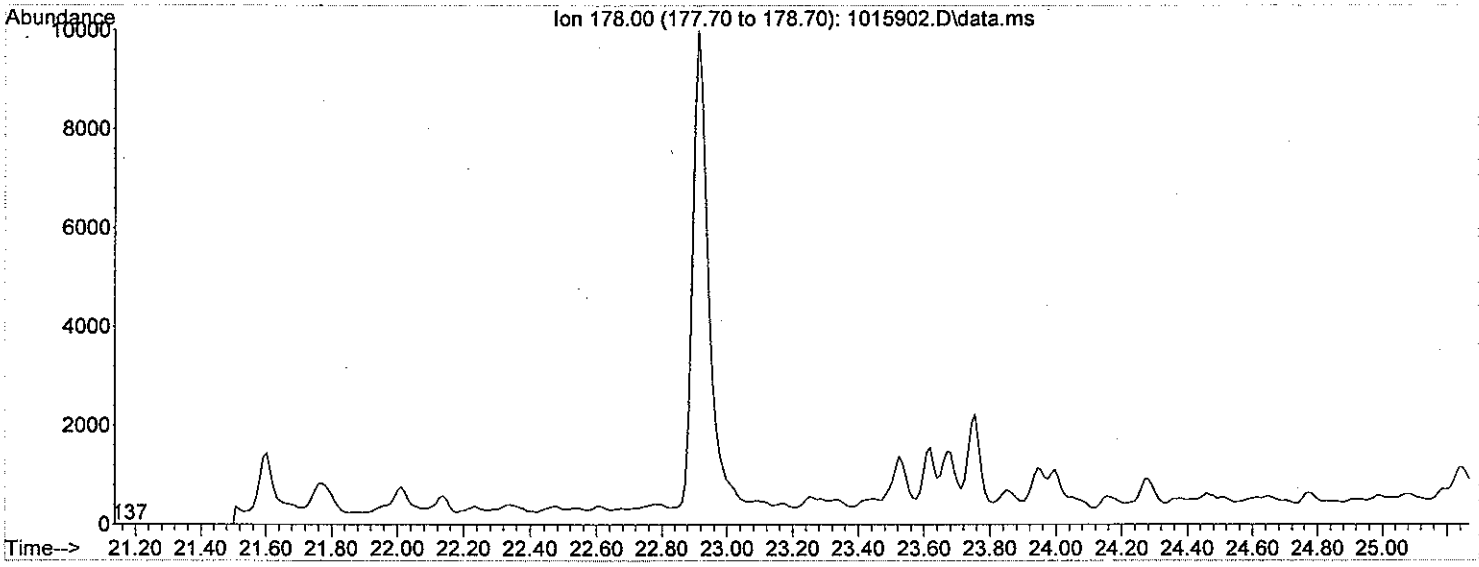


C4 -NAPHTHALENES



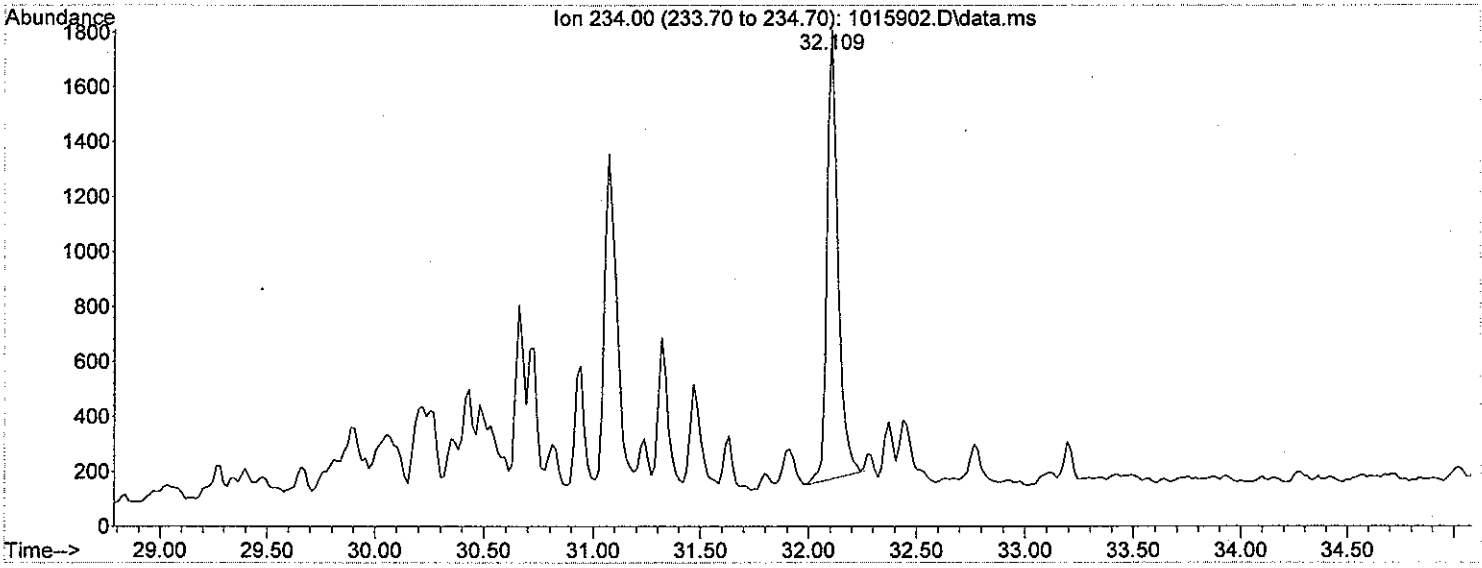
PHENANTHRENE/ANTHRACENE

Area = 0



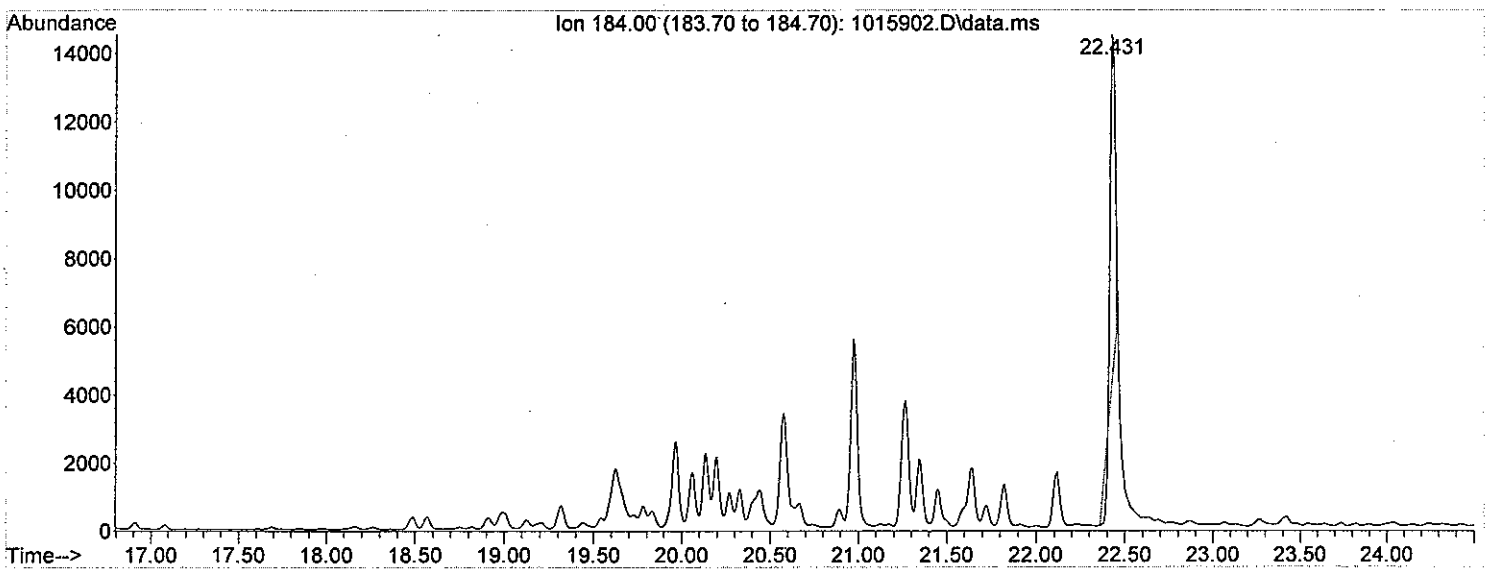
BENZONAPHTHIOPHENE

Area = 58087.9



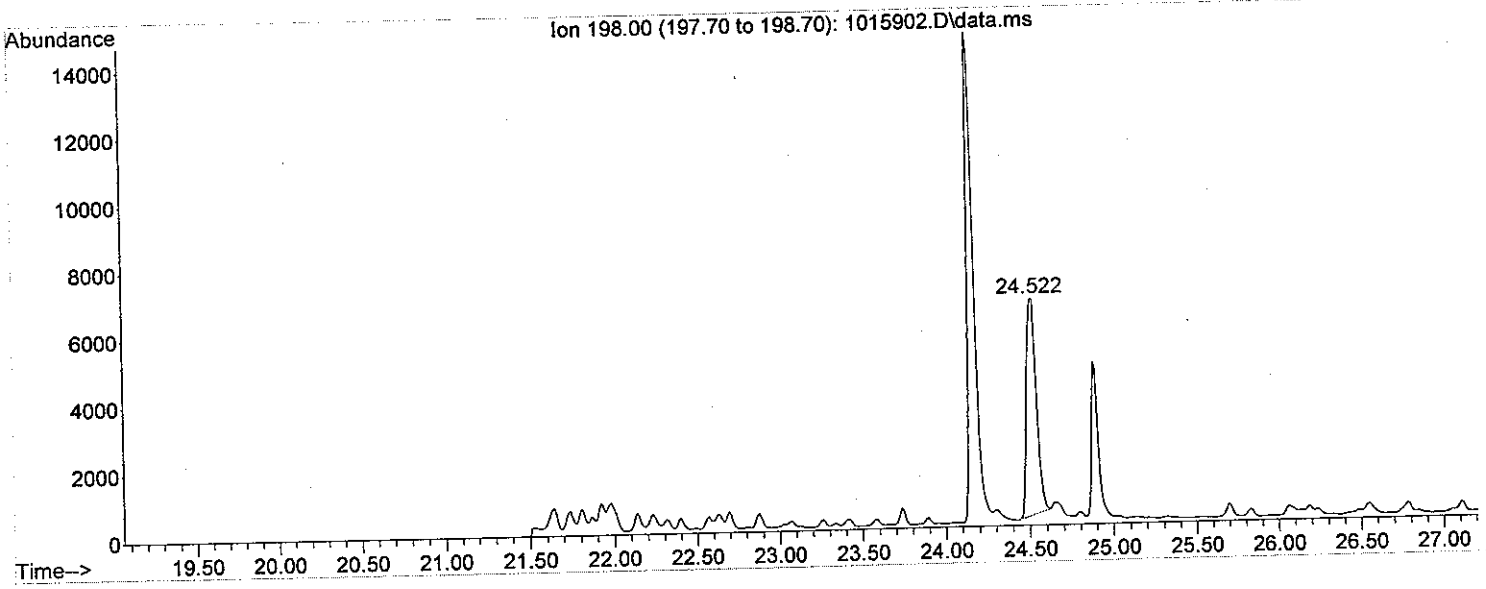
DIBENZOTHIOPHENE

Area = 185422



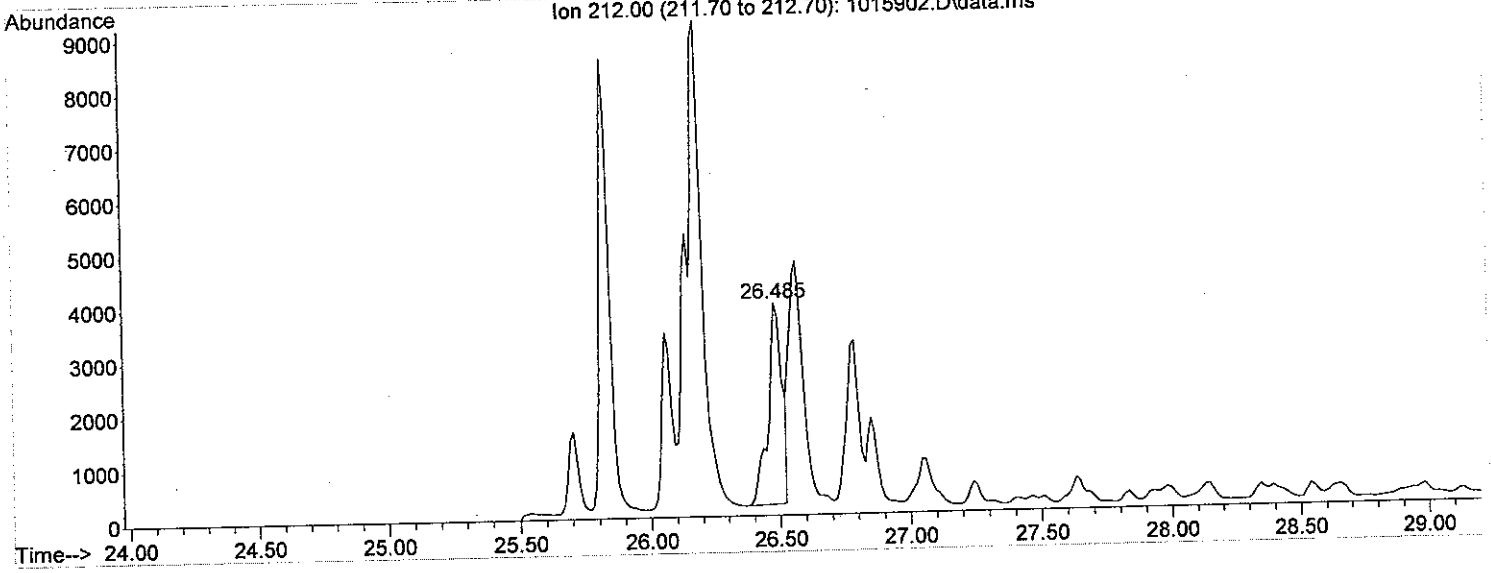
C1-DIBENZOTHIOPHENE

Area = 261413



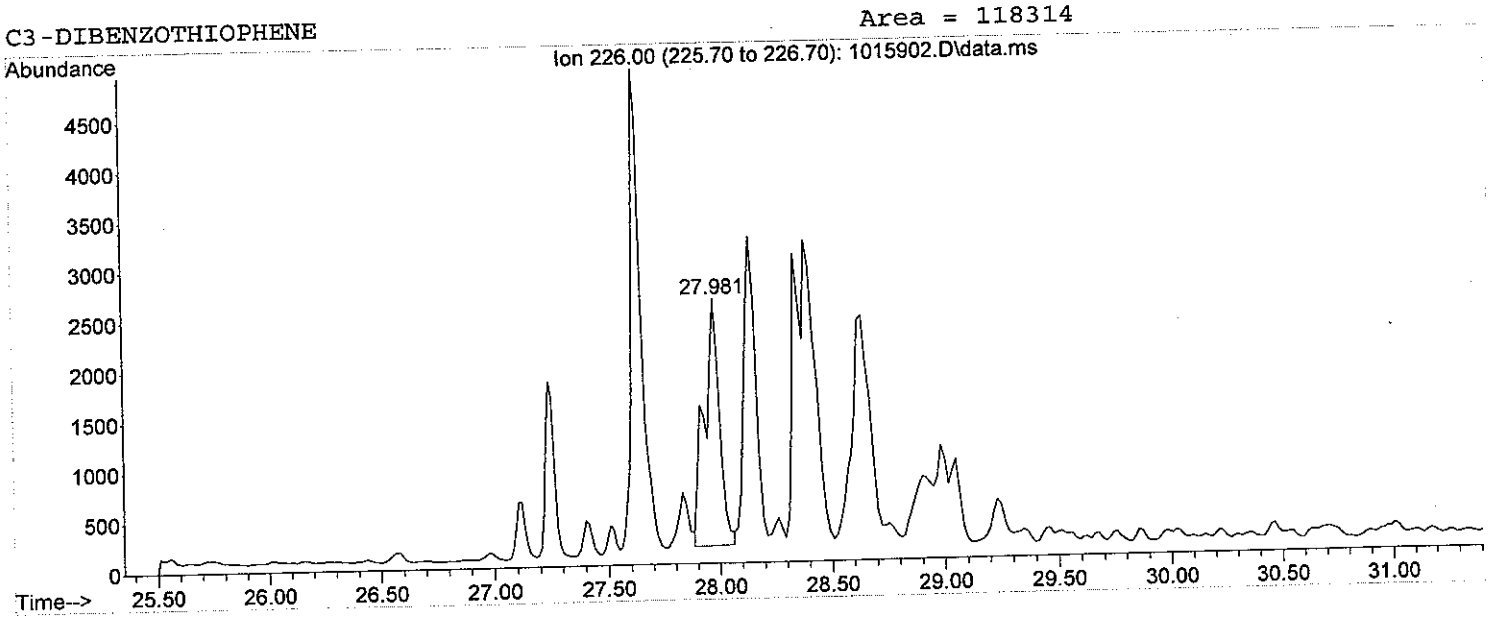
C2-DIBENZOTHIOPHENE

Area = 131787

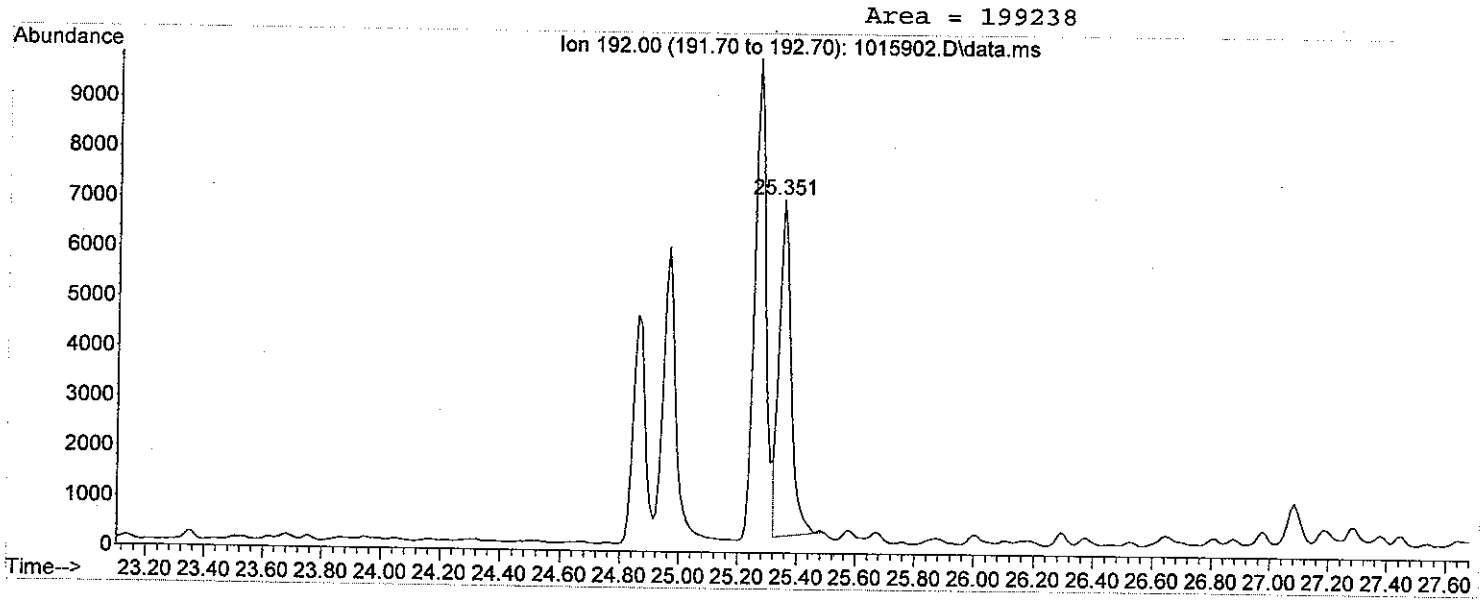


C3-DIBENZOTHIOPHENE

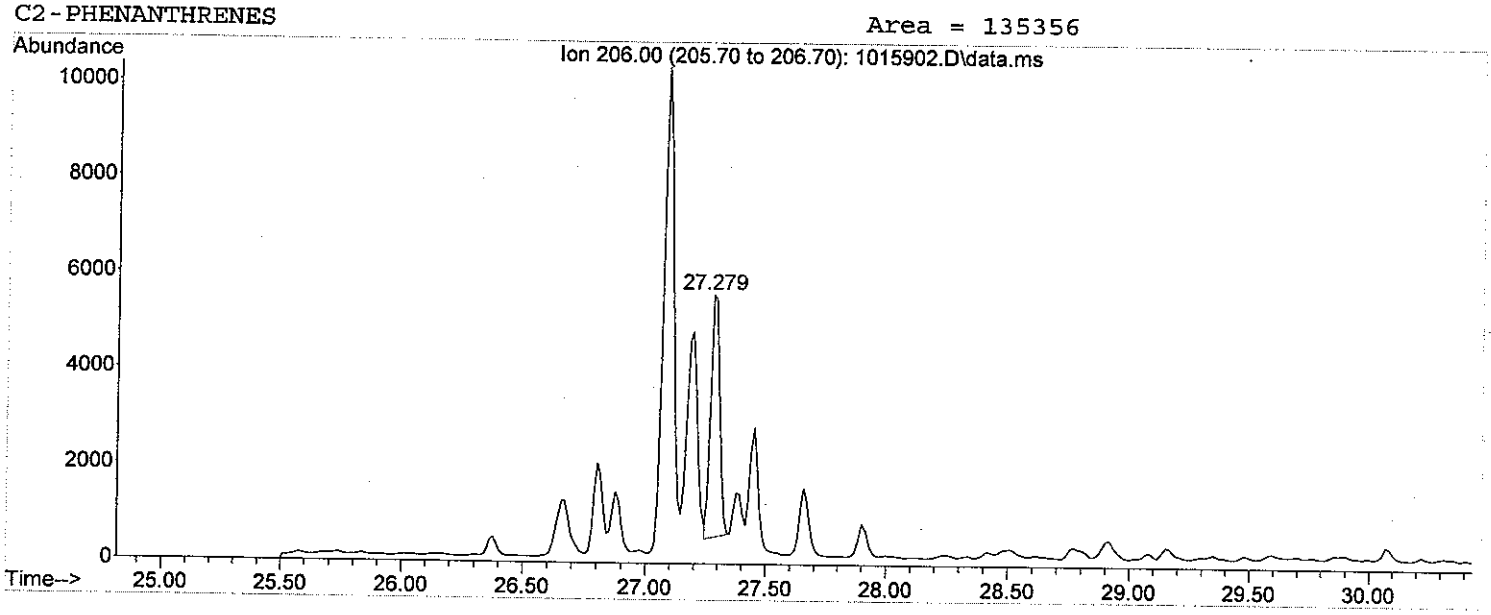
Area = 118314



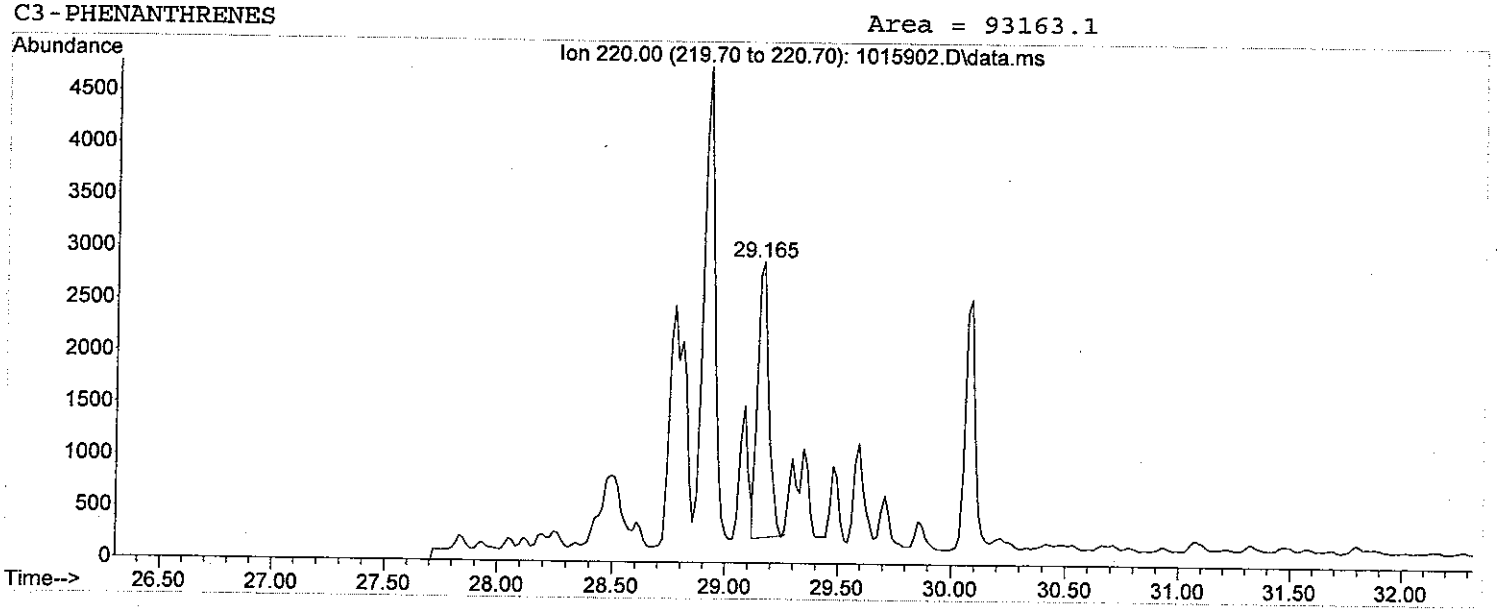
C1 - PHENANTHRENES



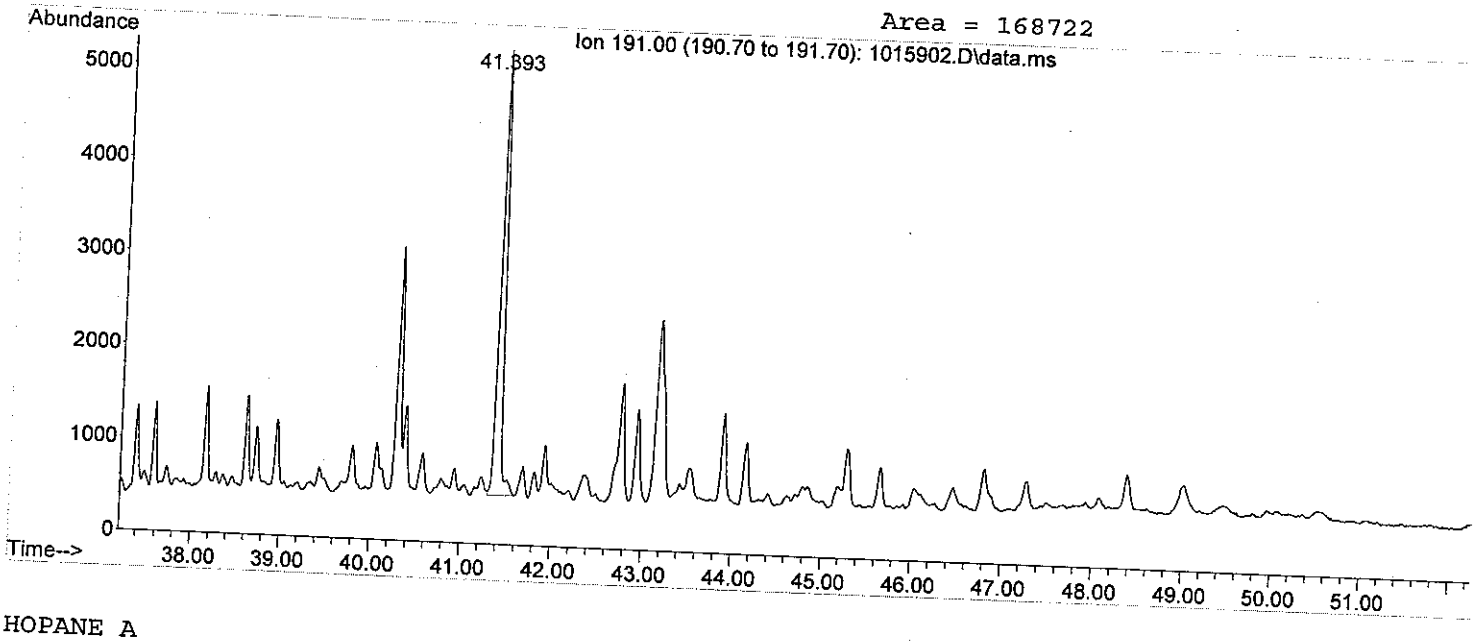
C2 - PHENANTHRENES



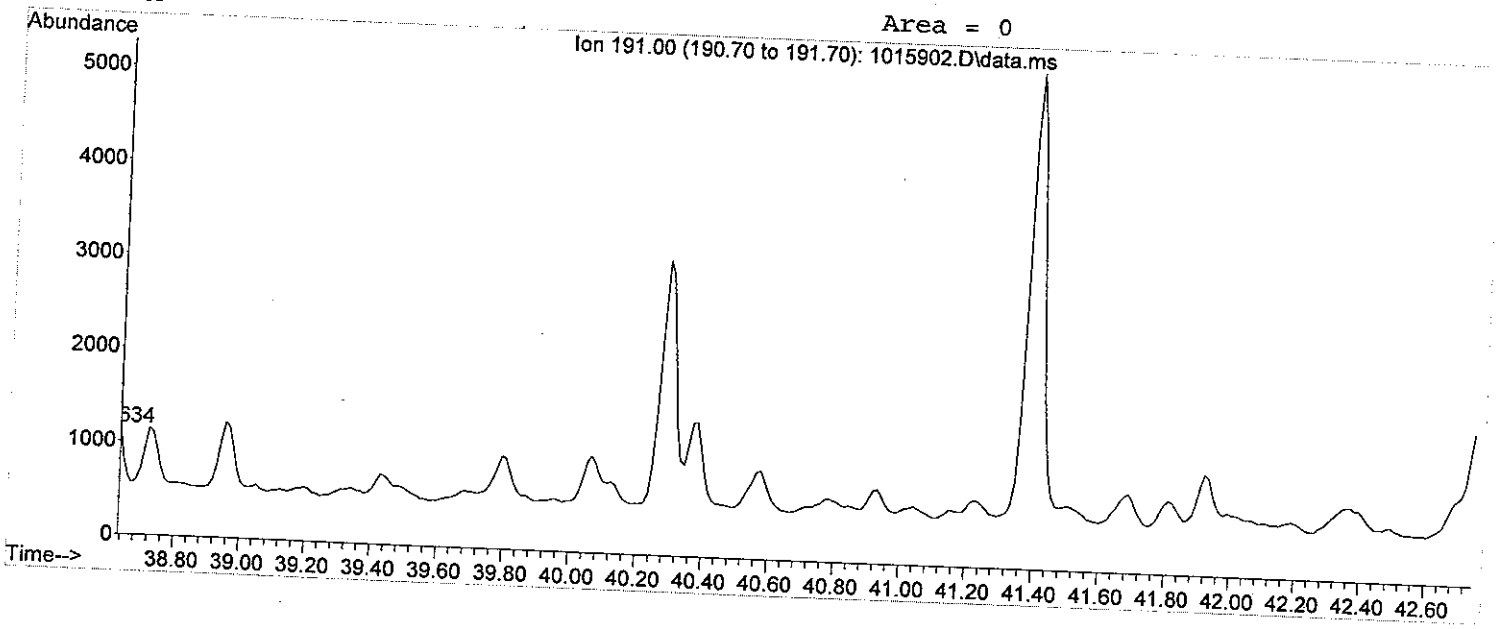
C3 - PHENANTHRENES



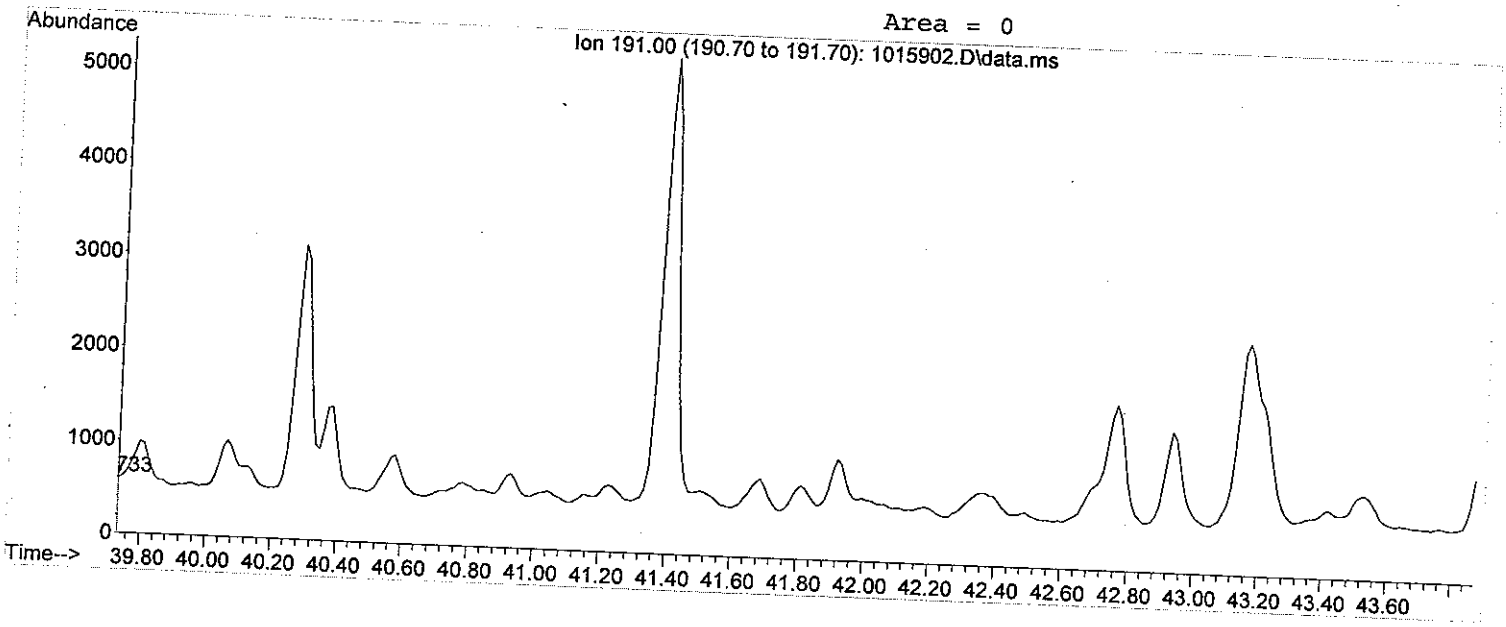
TRITERPANES/HOPANES



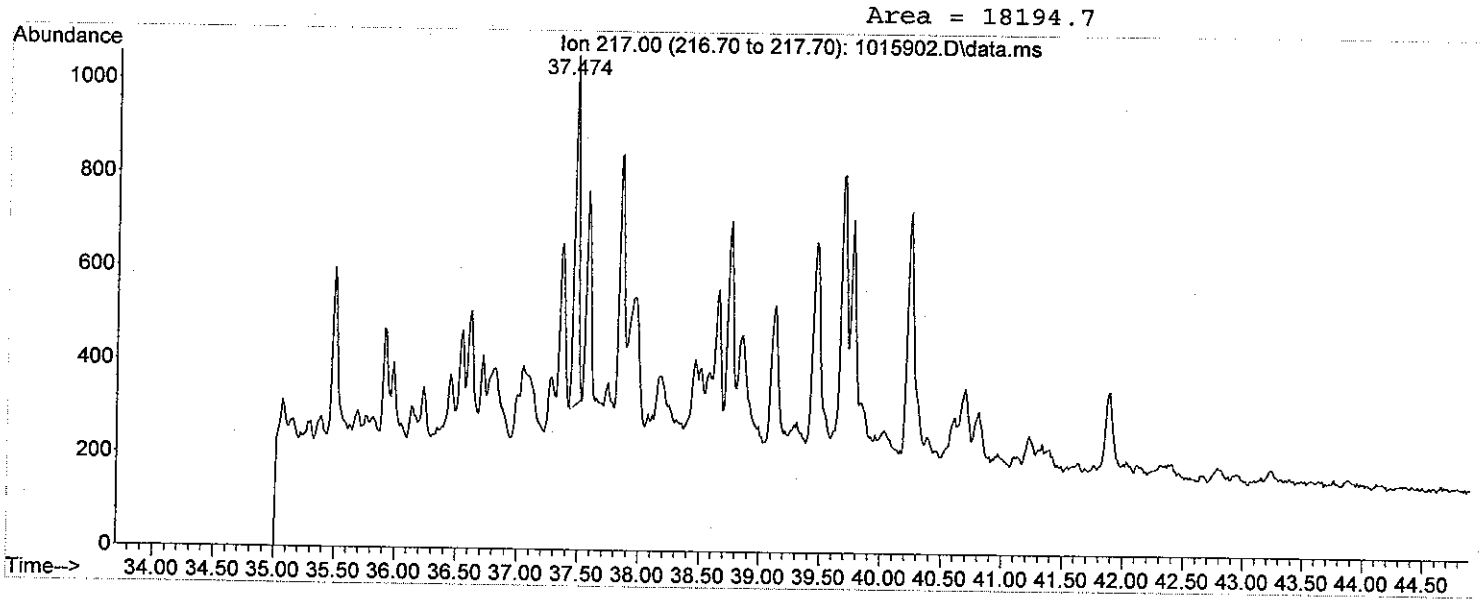
HOPANE A



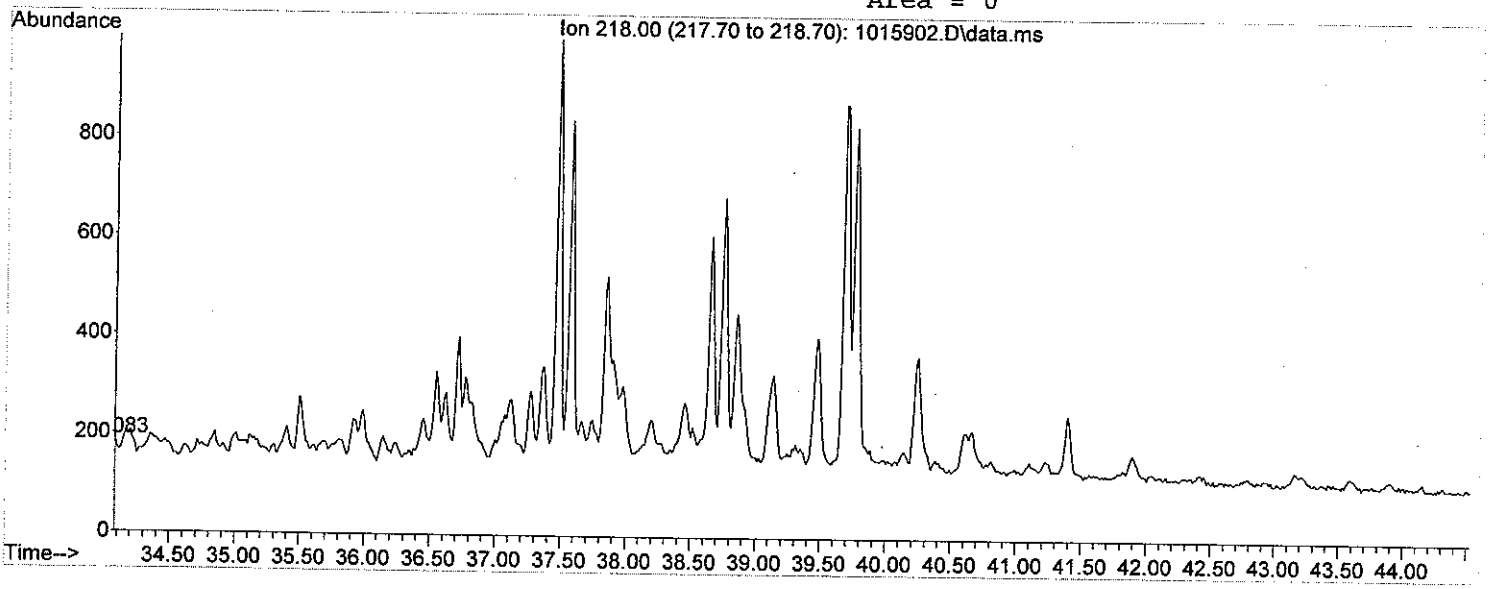
HOPANE B



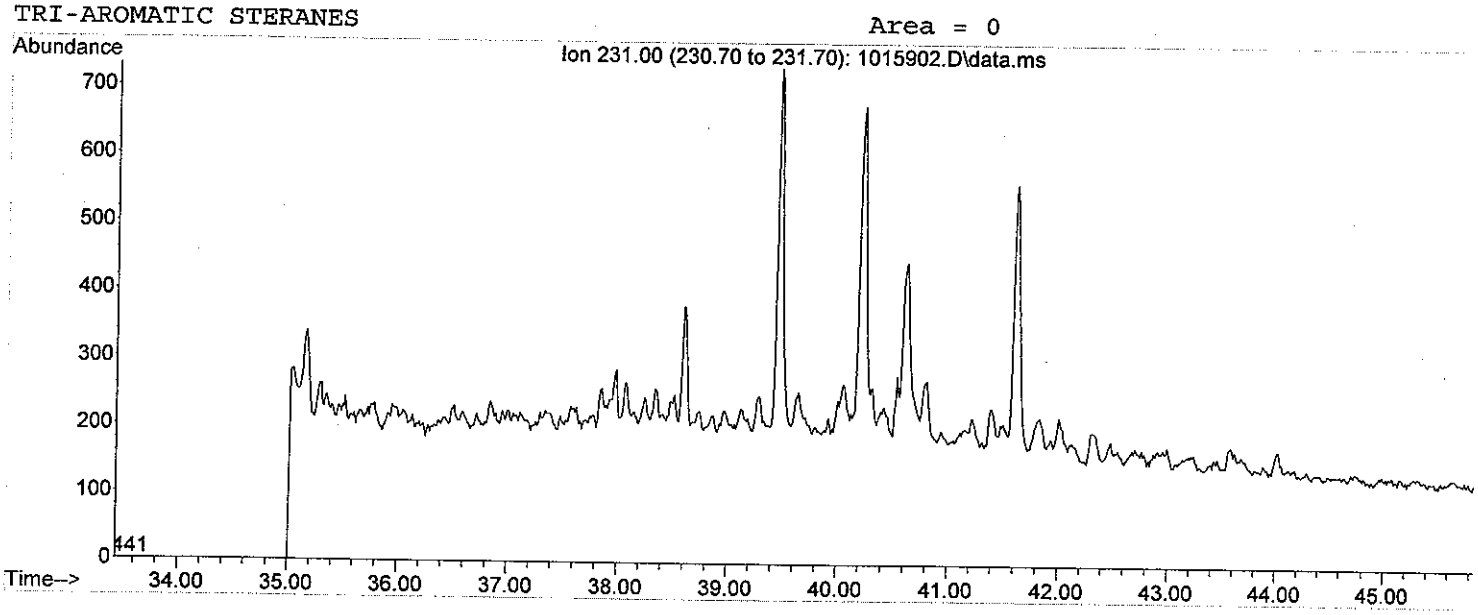
14 a(H) STERANES



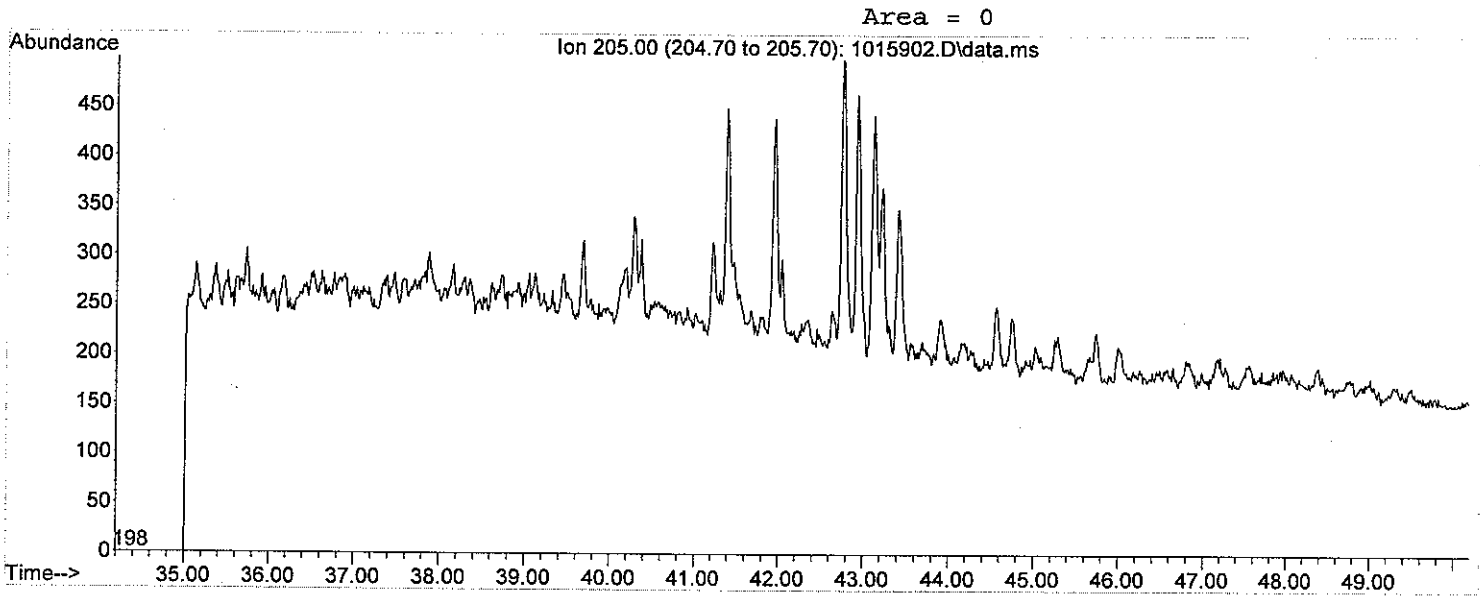
14 b(H) STERANES



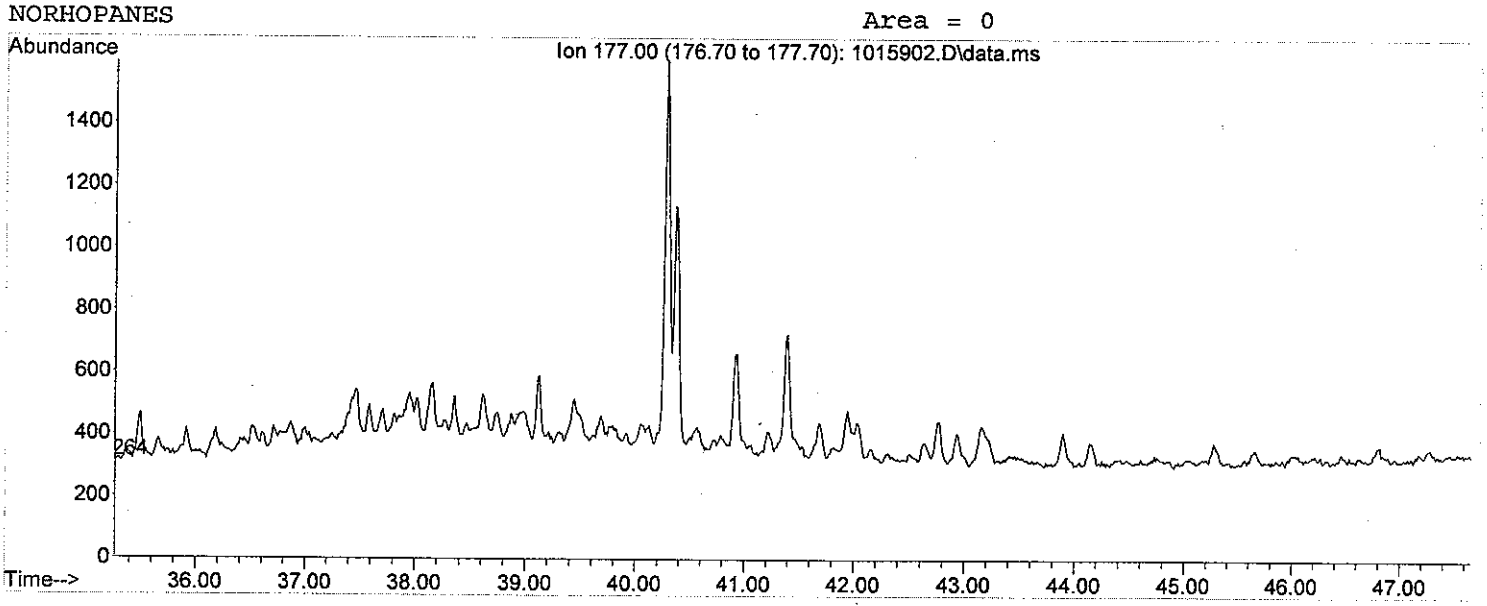
TRI-AROMATIC STERANES



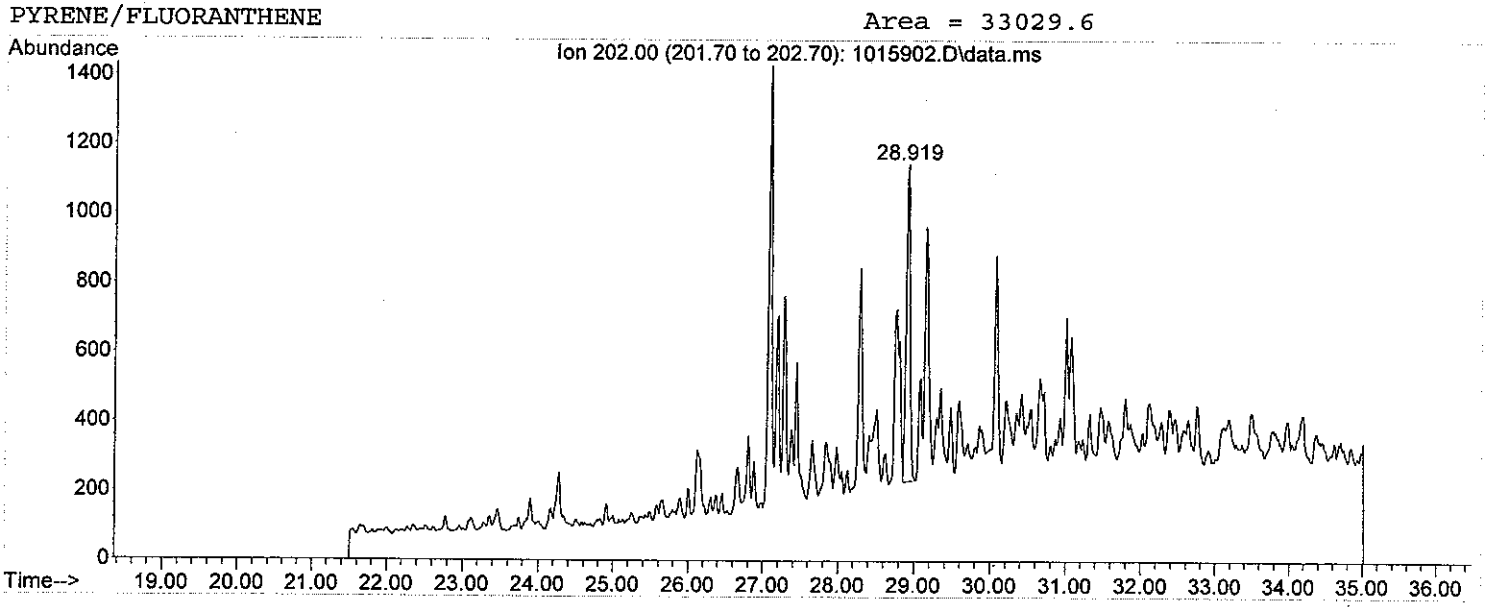
METHYLHOPANES



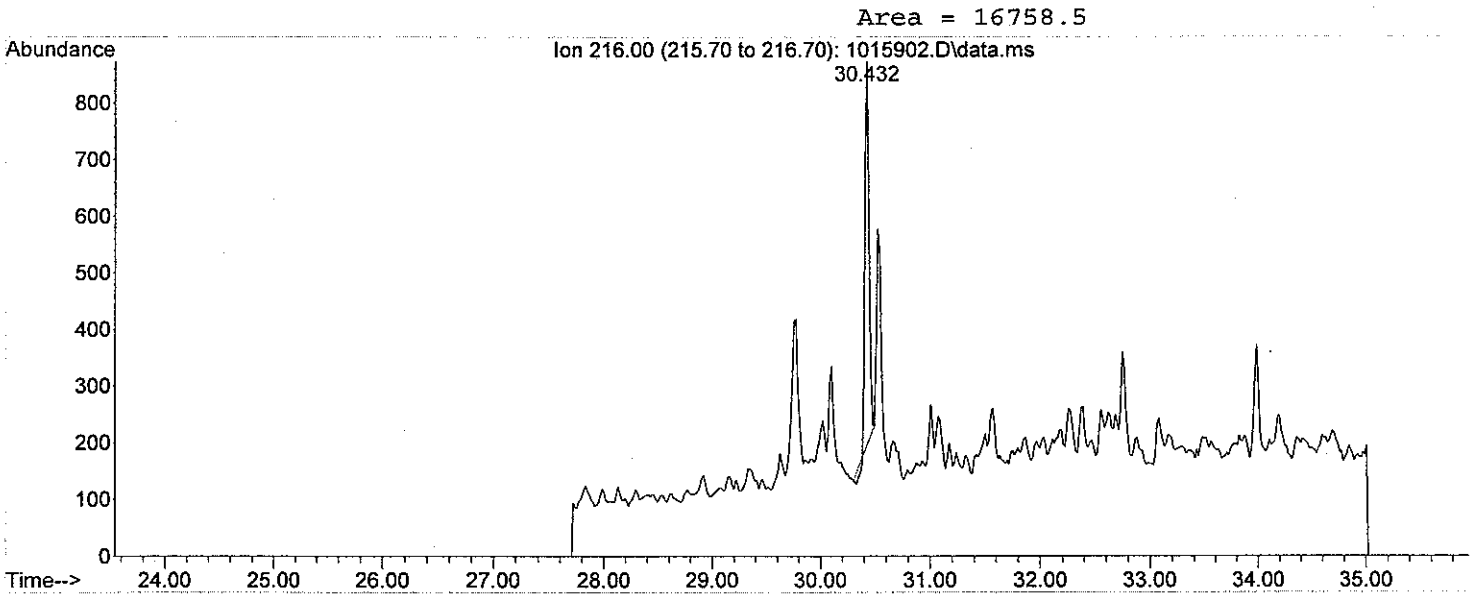
NORHOPANES



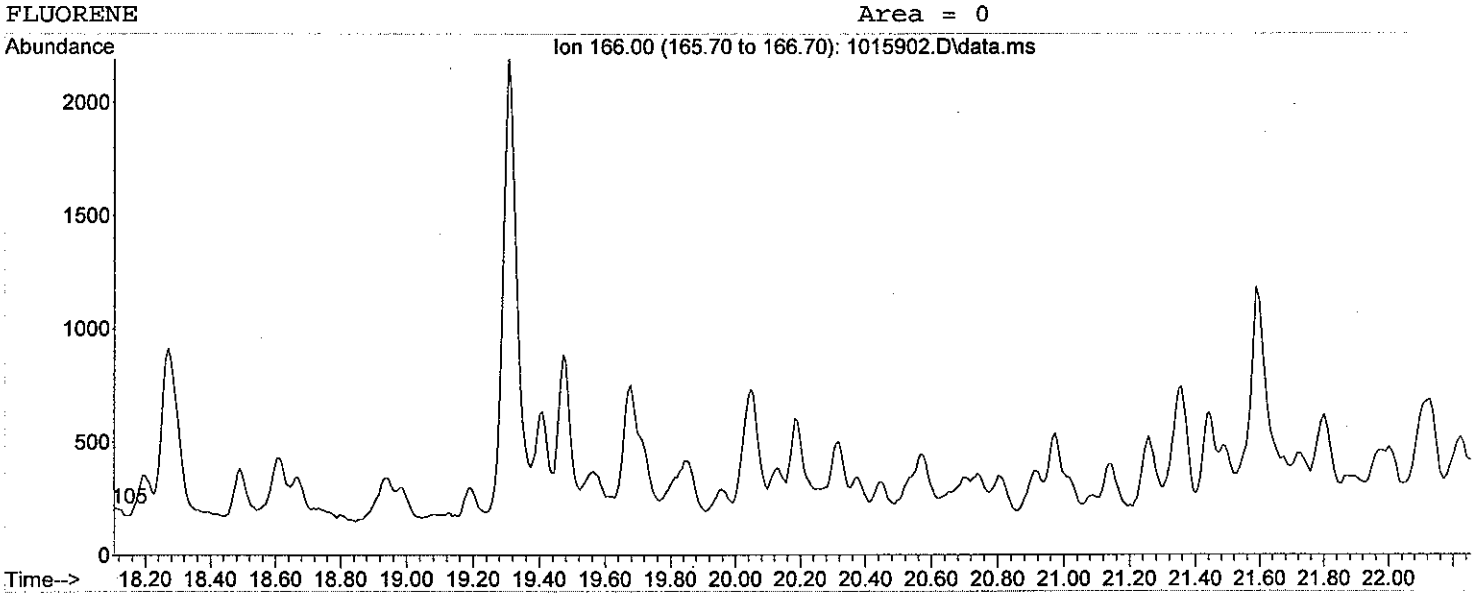
PYRENE/FLUORANTHENE



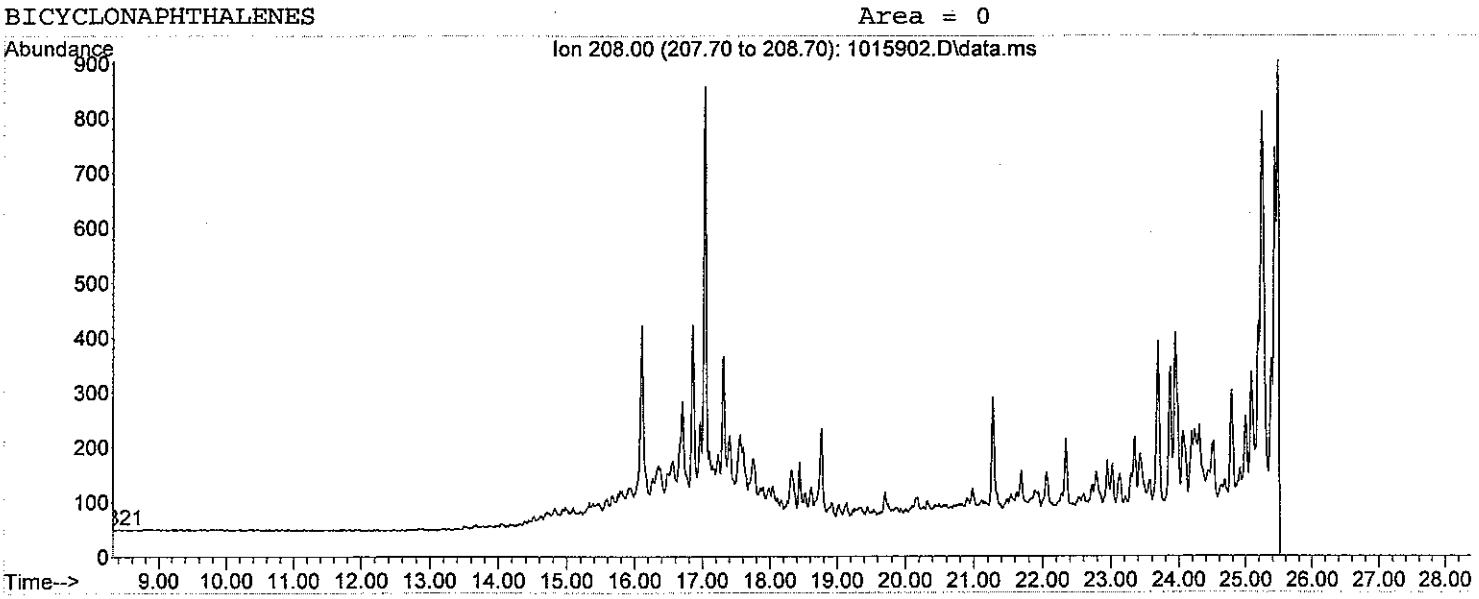
METHYL PYRENE



FLUORENE

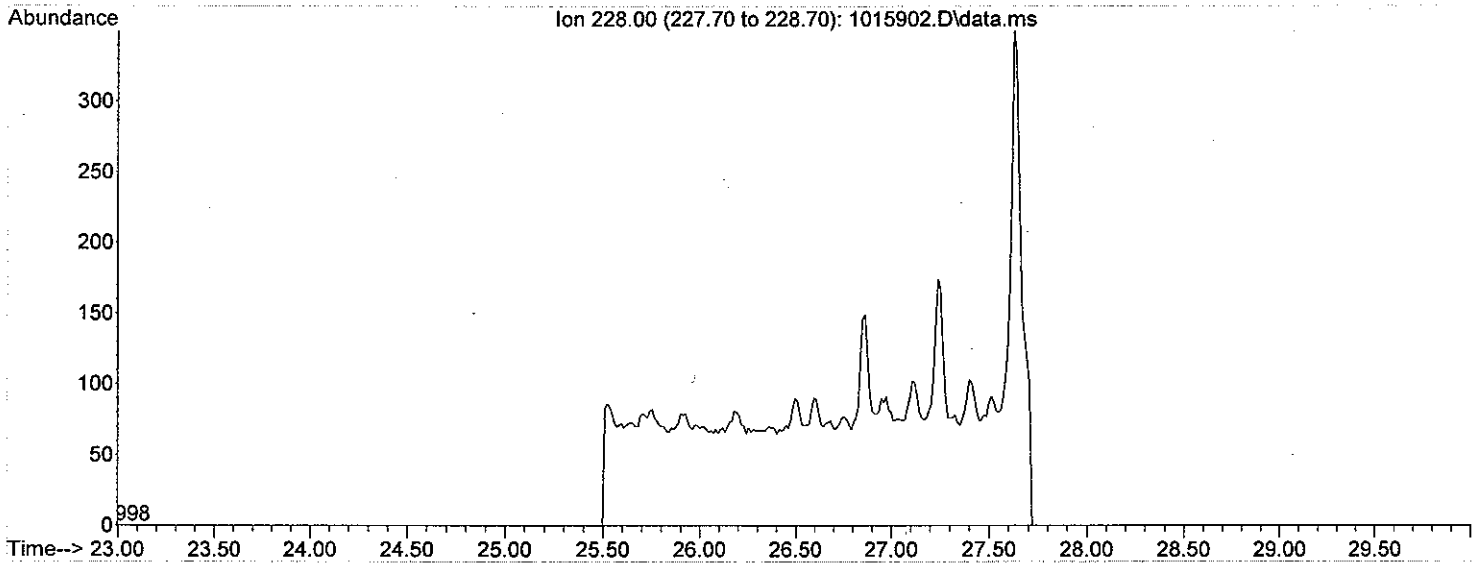


BICYCLONAPHTHALENES



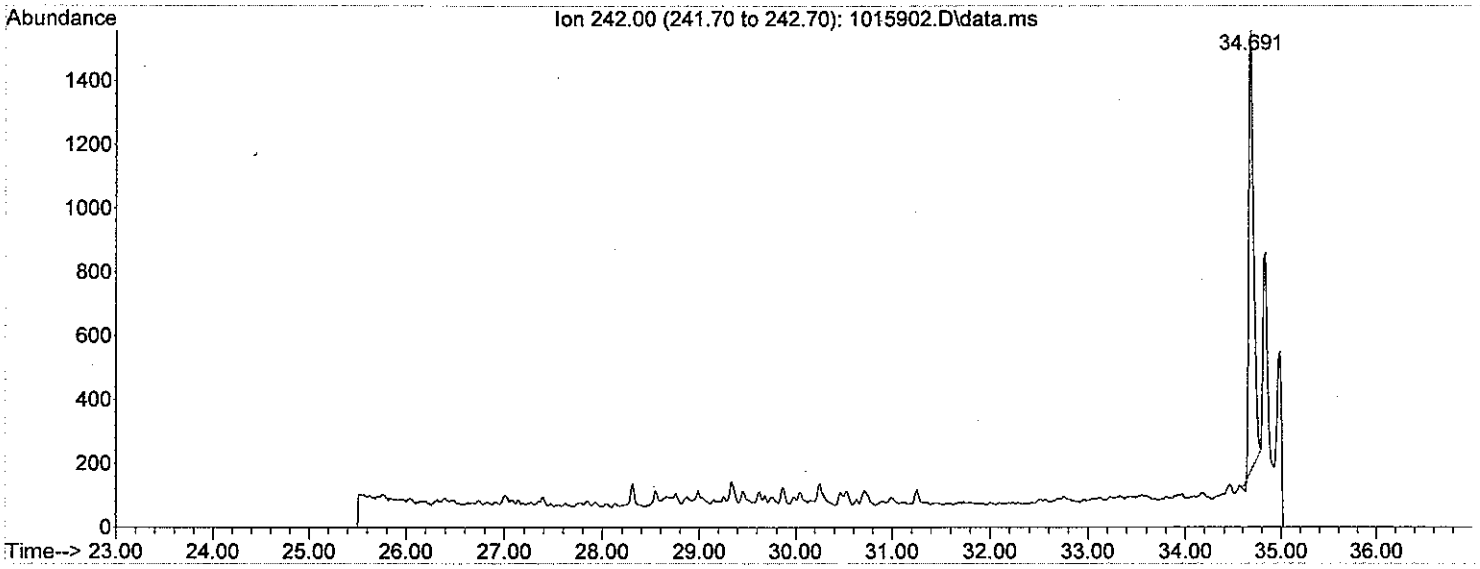
CHRYSENE

Area = 0



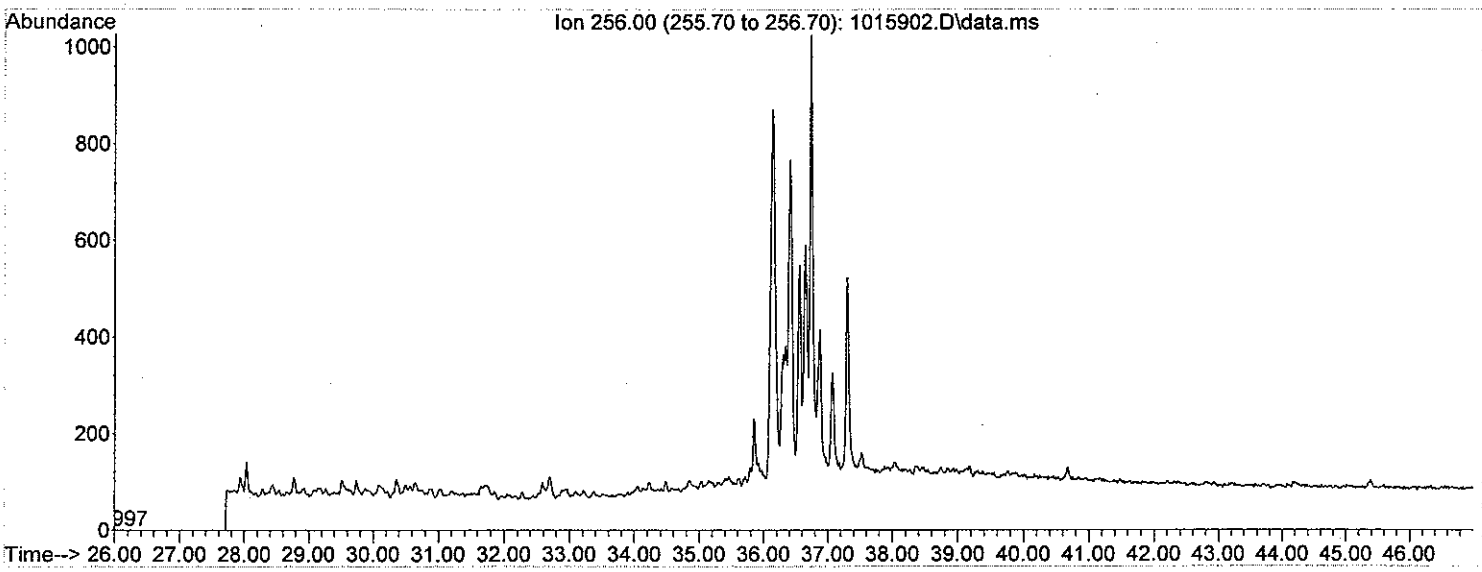
C1-CHRYSENE

Area = 48035.8

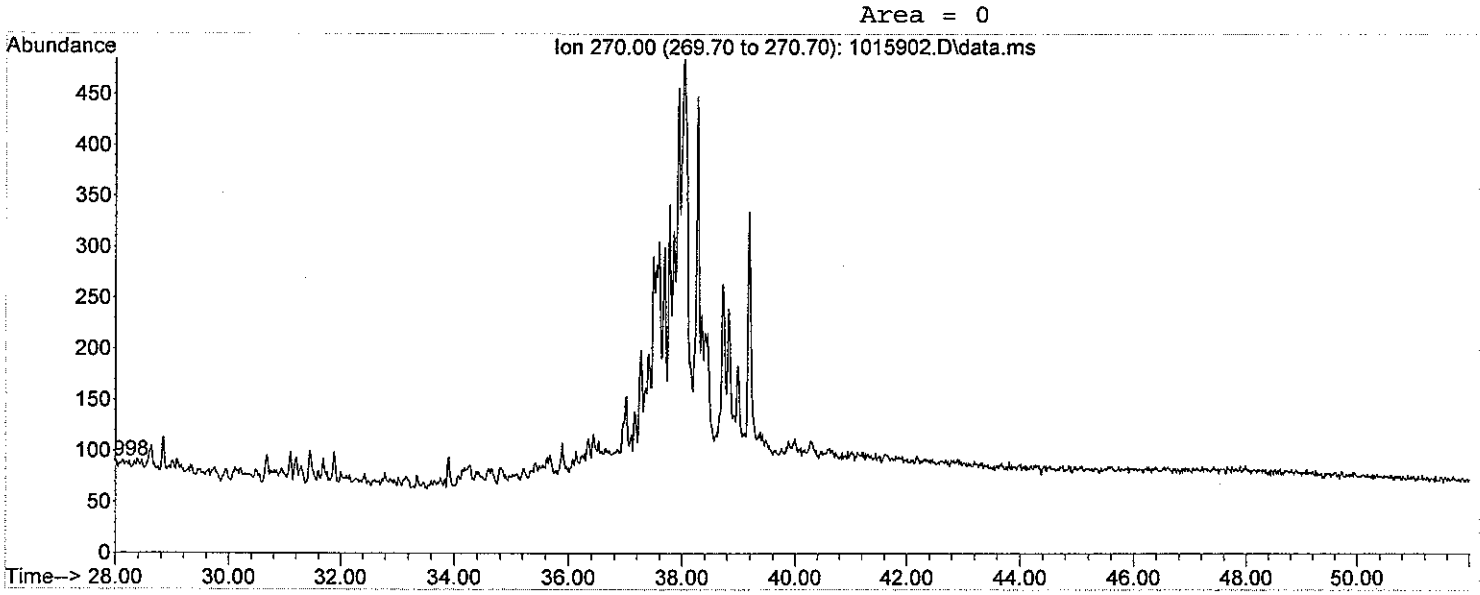


C2-CHRYSENE

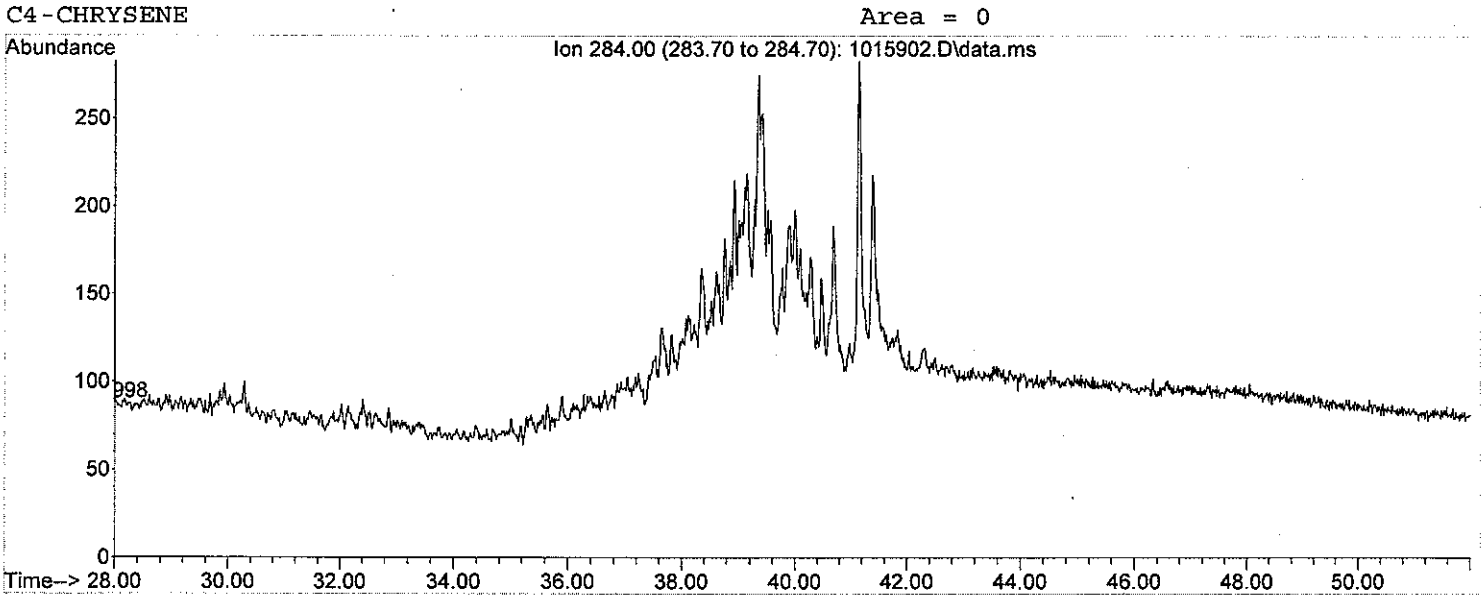
Area = 0



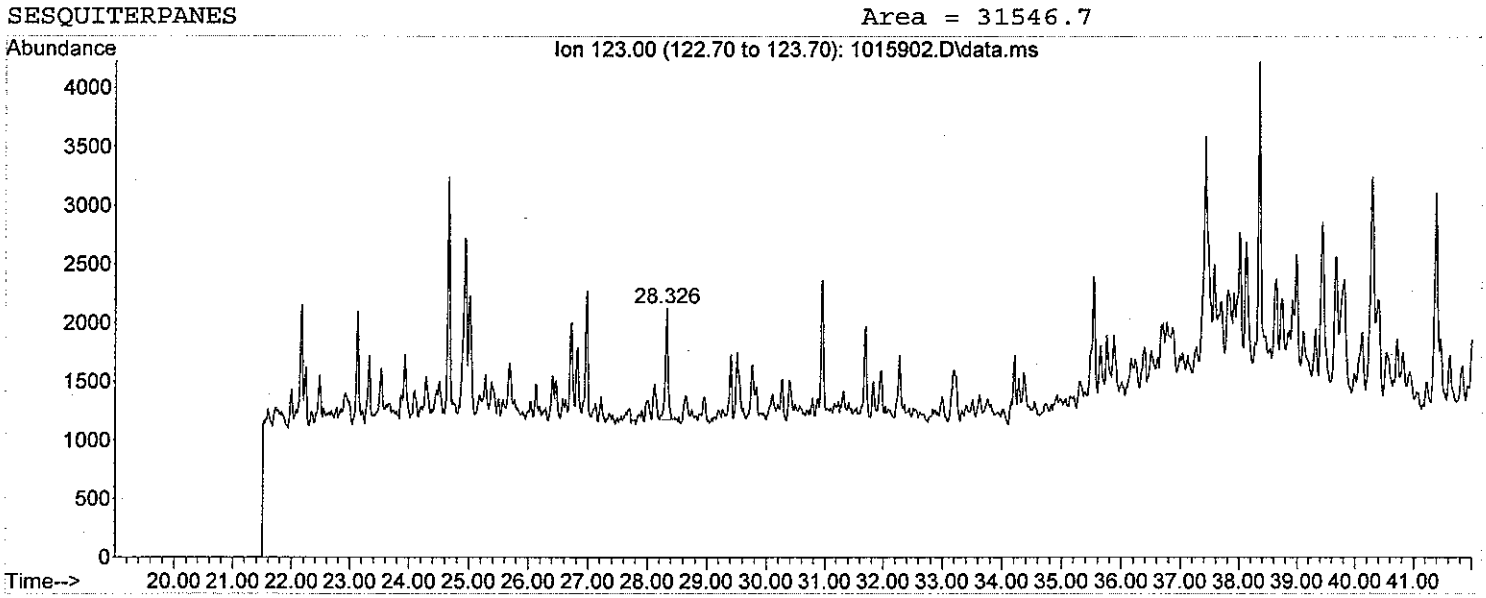
C3 - CHRYSENE



C4 - CHRYSENE

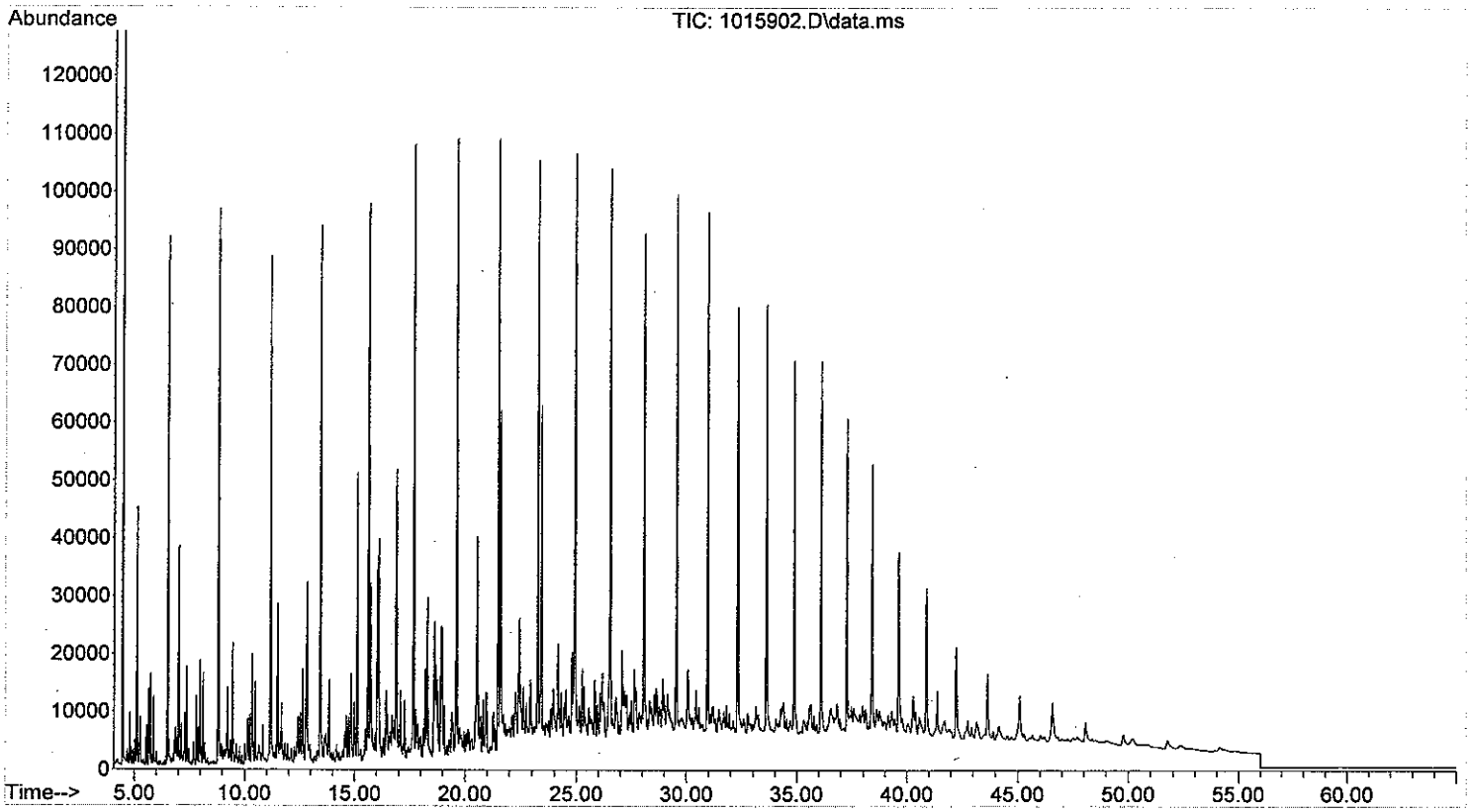


SESQUITERPANES

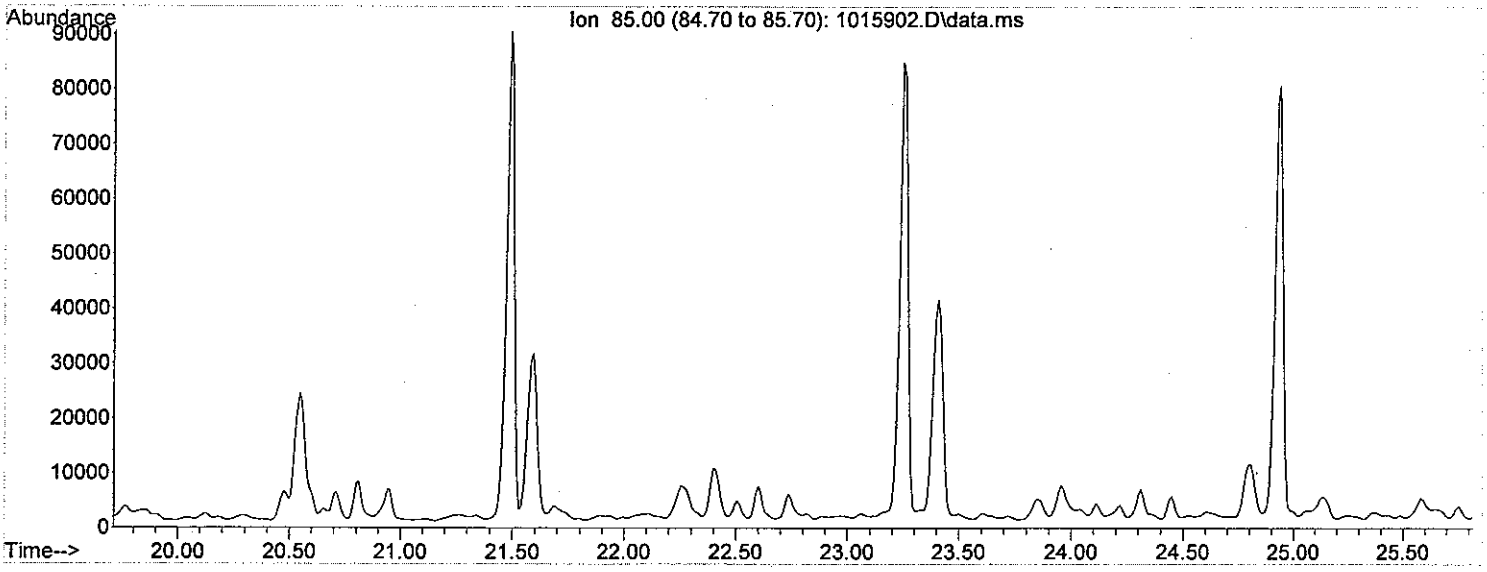


MSL GC-MS2 BIOMARKER ANALYSIS

File: W:\2010\MS_DATA\10-159\1015902.D
Operator: ACT
Date Acquired: 25 Jun 2010 9:42 pm
Method File: BIOMARK3.M
Sample Name: 10-159-2 Vial: 8
Misc Info:



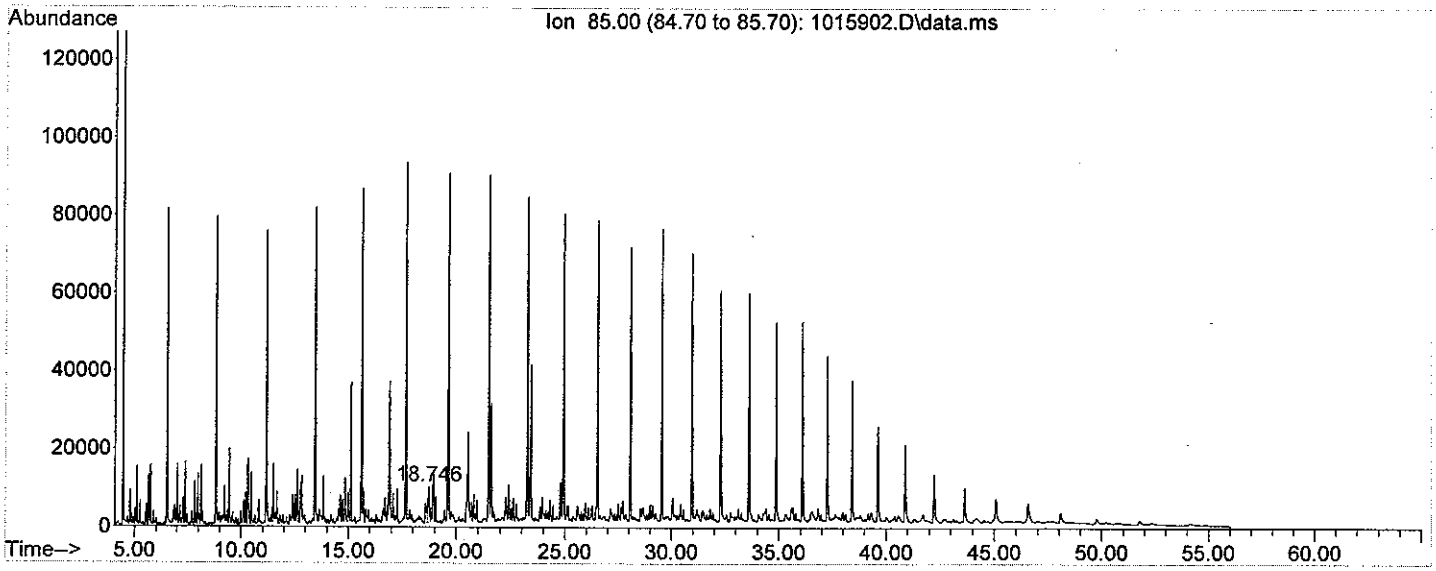
n-C17,Pristane,n-C18,Phytane



Pristane/Phytane = ----
C17/C18 = ----
Pristane/C17 = ----
Phytane/C18 = ----

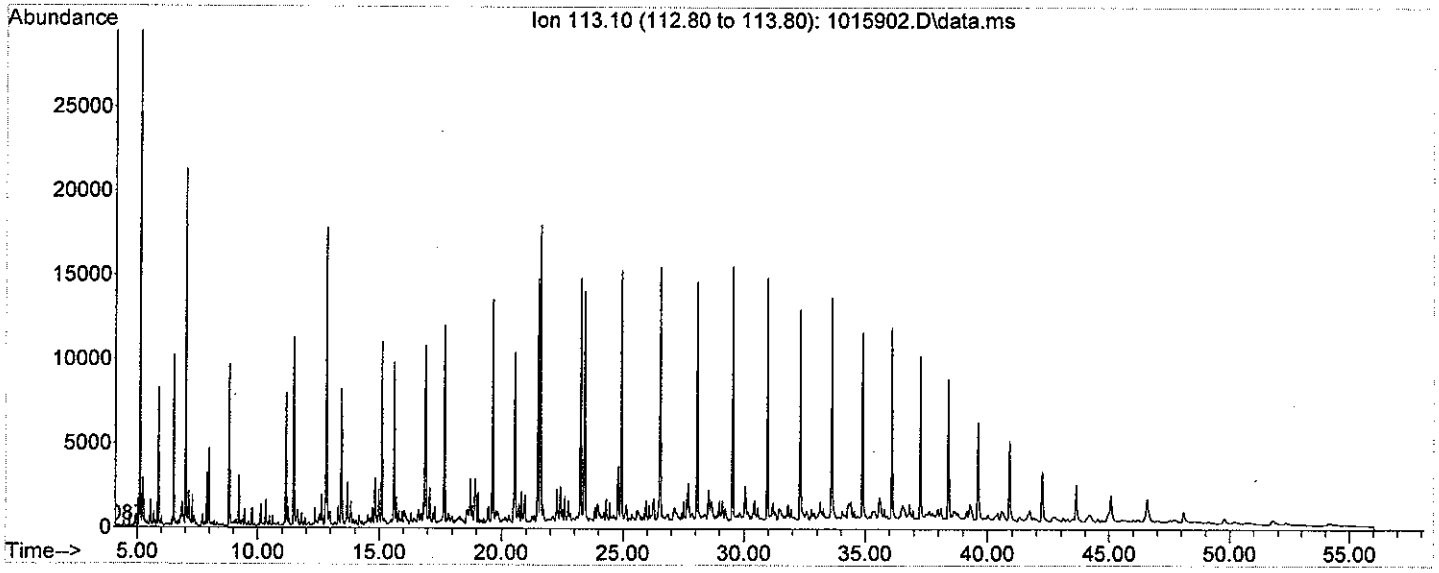
85-SATURATED HYDROCARBONS

Area = 400807



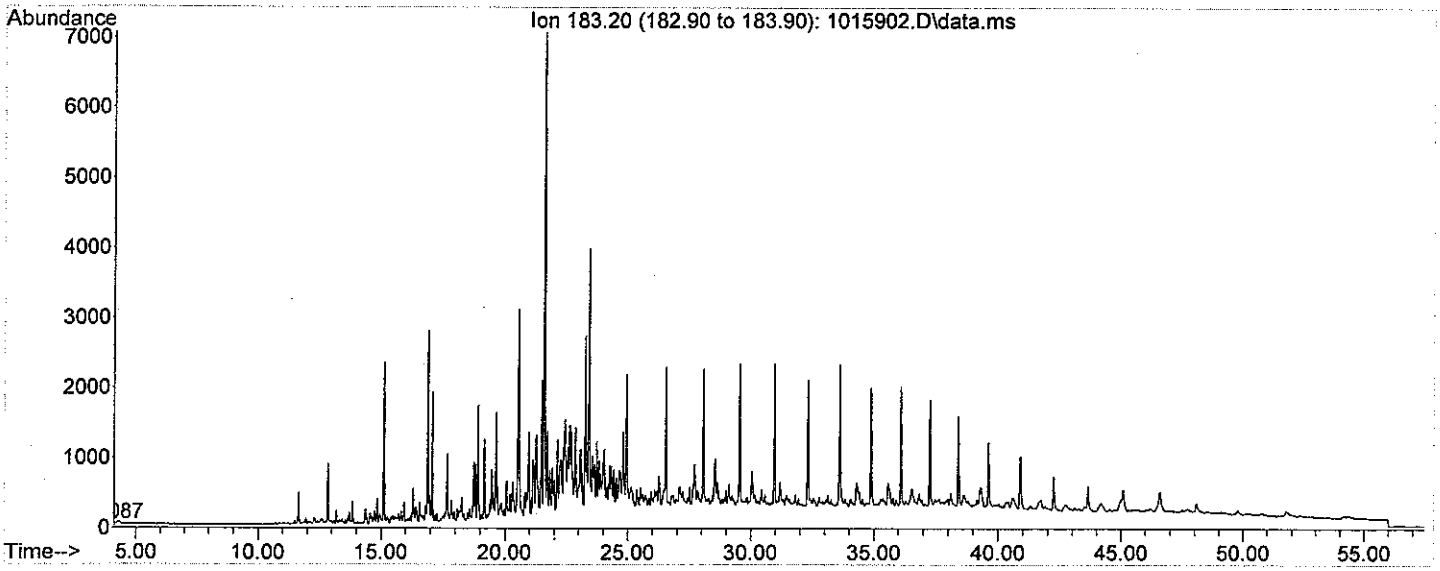
113-SATURATED HYDROCARBONS

Area = 0



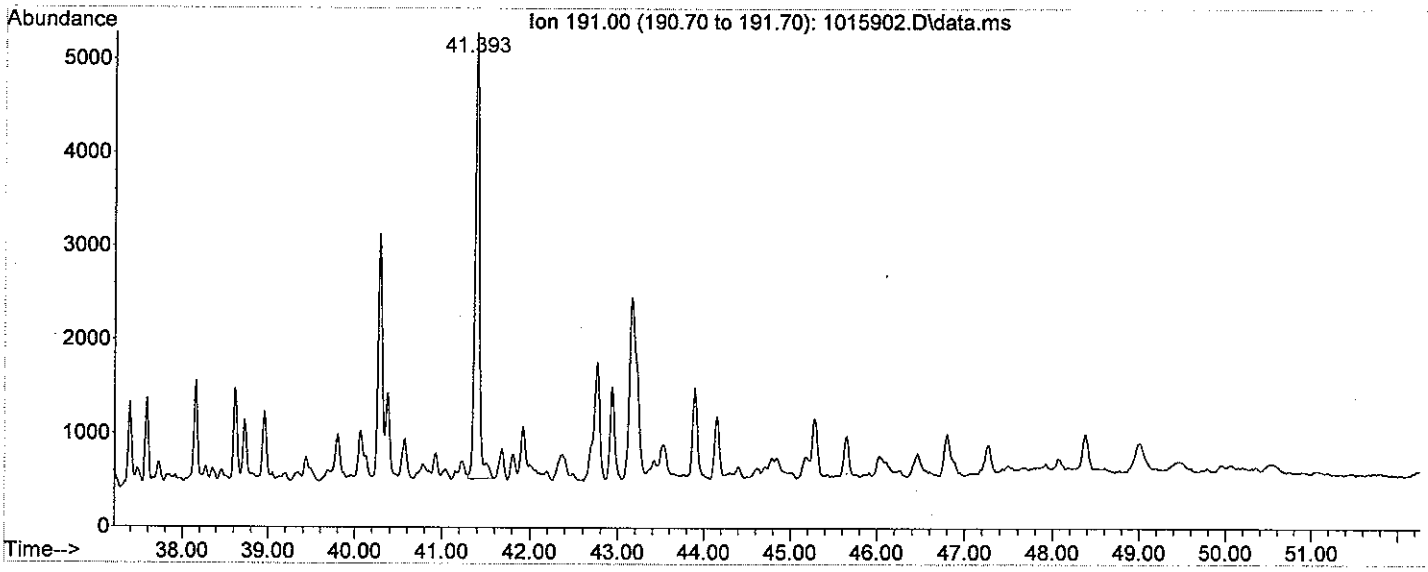
ACYCLIC ISOPRENOIDS/ALKANES

Area = 0



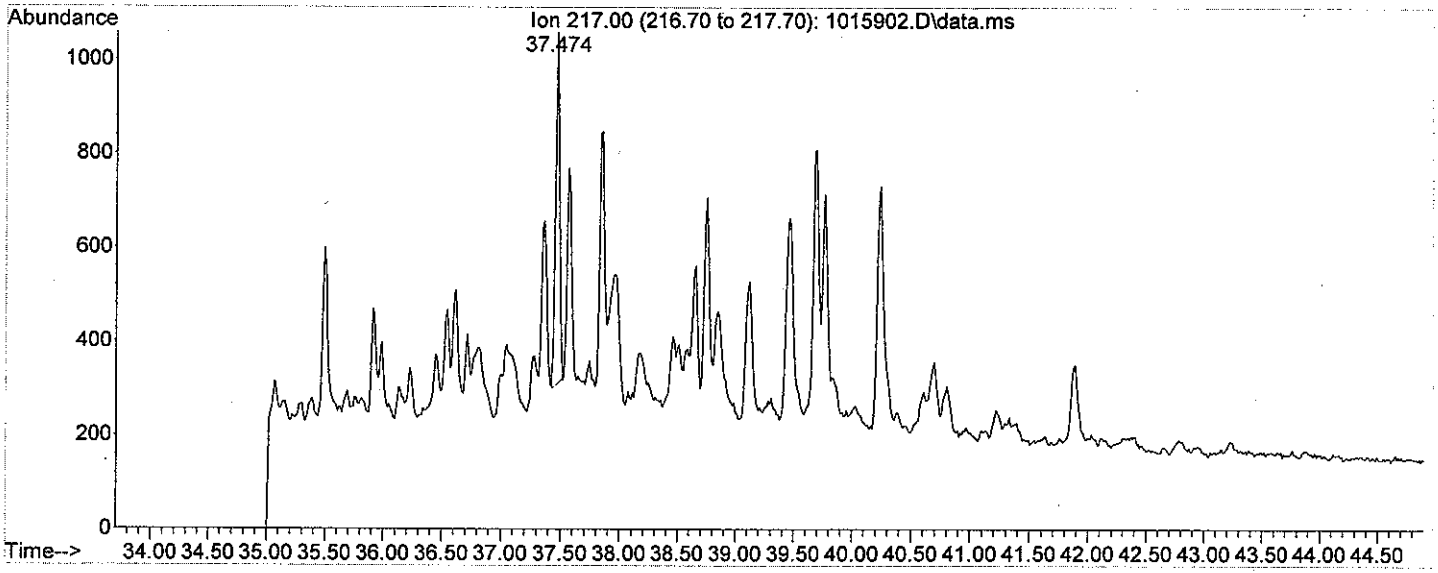
TRITERPANES/HOPANES

Area = 168722



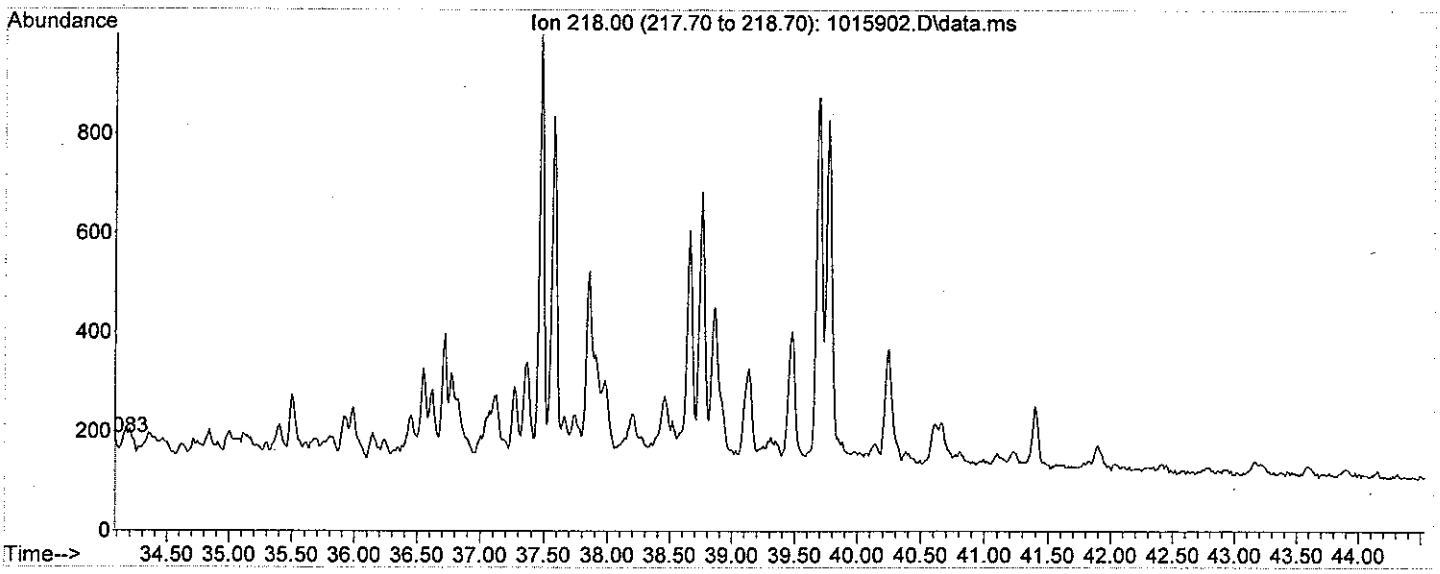
14 a(H) STERANES

Area = 18194.7



14 b(H) STERANES

Area = 0



Quantitation Report (Not Reviewed)

Data Path : W:\2010\MS_DATA\10-159\
Data File : 1015903.D
Acq On : 25 Jun 2010 10:55 pm
Operator : ACT
Sample : 10-159-3
Misc :
ALS Vial : 9 Sample Multiplier: 1

Quant Time: Jun 25 23:49:08 2010
Quant Method : C:\MSDCHEM\1\METHODS\BIOMARK3.M
Quant Title :
QLast Update : Wed May 27 09:43:48 2009
Response via : Initial Calibration

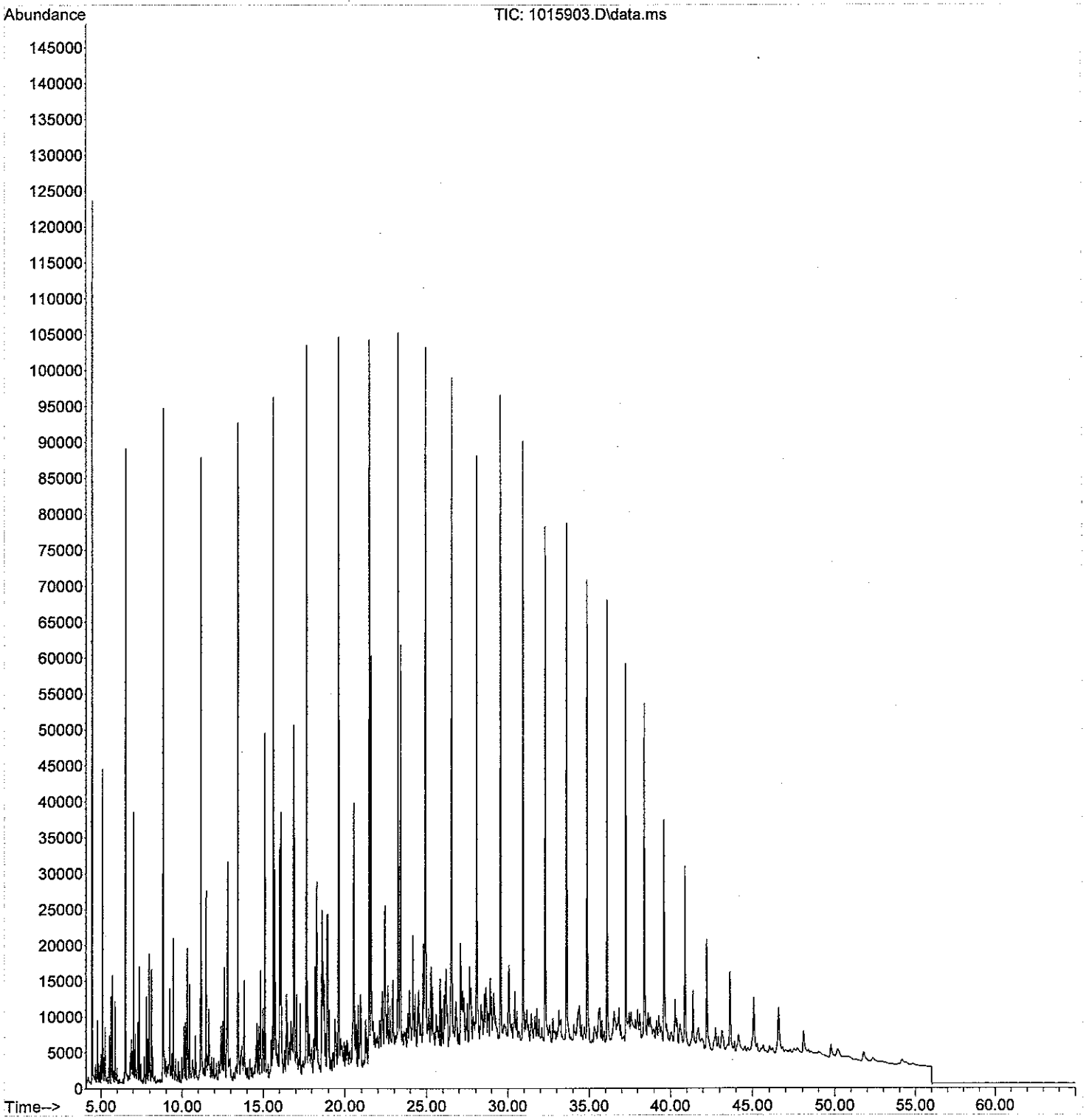
Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
Target Compounds					Qvalue
1) 85-SATURATED HYDROCARBONS	18.747	85	389360	No Calib	
2) n-C17	0.000	85	0	N.D.	
3) PRISTANE	0.000	85	0	N.D.	
4) n-C18	0.000	85	0	N.D.	
5) PHYTANE	0.000	85	0	N.D.	
6) 113-SATURATED HYDROCAR...	0.000	113	0	N.D.	
7) ACYCLIC ISOPRENOIDS/AL...	0.000	183	0	N.D.	
8) C2-NAPHTHALENES	0.000	156	0	N.D.	
9) C3-NAPHTHALENES	19.408	170	137005	No Calib	
10) C4-NAPHTHALENES	0.000	184	0	N.D.	
11) PHENANTHRENE/ANTHRACENE	0.000	178	0	N.D.	
12) BENZONAPHTHIOPHENE	32.117	234	56093	No Calib	
13) DIBENZOTHIOPHENE	22.437	184	153584	No Calib	
14) C1-DIBENZOTHIOPHENE	24.527	198	257623	No Calib	
15) C2-DIBENZOTHIOPHENE	26.493	212	128915	No Calib	
16) C3-DIBENZOTHIOPHENE	27.988	226	79928	No Calib	
17) C1-PHENANTHRENES	25.359	192	205151	No Calib	
18) C2-PHENANTHRENES	27.291	206	133176	No Calib	
19) C3-PHENANTHRENES	29.165	220	92364	No Calib	
20) TRITERPANES/HOPANES	41.399	191	159601	No Calib	
21) HOPANE A	0.000	191	0	N.D.	
22) HOPANE B	41.812	191	1151	No Calib	
23) 14 a(H) STERANES	0.000	217	0	N.D.	
24) 14 b(H) STERANES	0.000	218	0	N.D.	
25) TRI-AROMATIC STERANES	0.000	231	0	N.D.	
26) METHYLHOPANES	0.000	205	0	N.D.	
27) NORHOPANES	0.000	177	0	N.D.	
28) PYRENE/FLUORANTHENE	0.000	202	0	N.D.	
29) METHYL PYRENE	30.437	216	14904	No Calib	
30) FLUORENE	0.000	166	0	N.D.	
31) BICYCLONAPHTHALENES	0.000	208	0	N.D.	
32) CHRYSENE	0.000	228	0	N.D.	
33) C1-CHRYSENE	34.695	242	50327	No Calib	
34) C2-CHRYSENE	0.000	256	0	N.D.	
35) C3-CHRYSENE	0.000	270	0	N.D.	
36) C4-CHRYSENE	0.000	284	0	N.D.	
37) SESQUITERPANES	0.000	123	0	N.D.	

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (Not Reviewed)

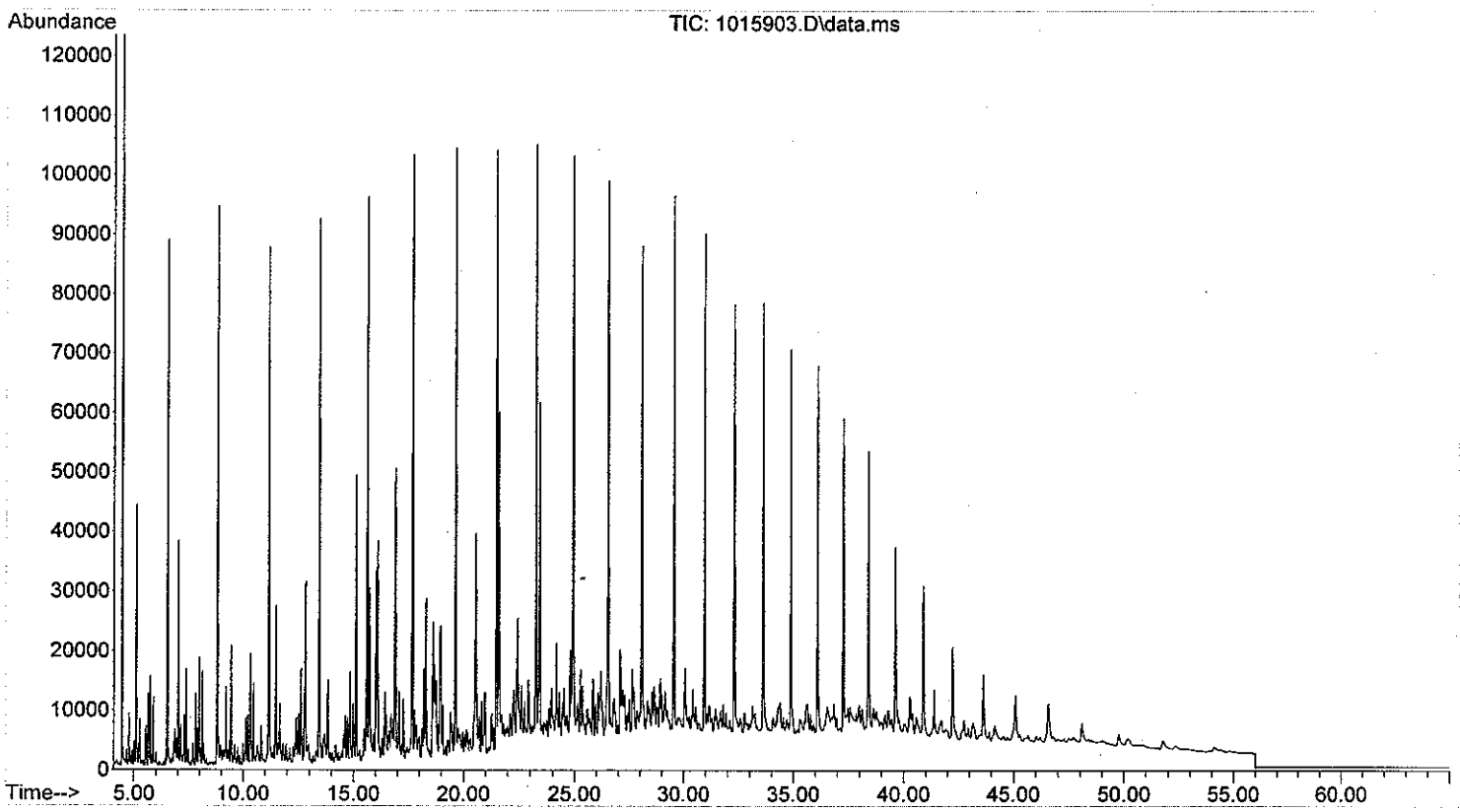
Data Path : W:\2010\MS_DATA\10-159\
Data File : 1015903.D
Acq On : 25 Jun 2010 10:55 pm
Operator : ACT
Sample : 10-159-3
Misc :
ALS Vial : 9 Sample Multiplier: 1

Quant Time: Jun 25 23:49:08 2010
Quant Method : C:\MSDCHEM\1\METHODS\BIOMARK3.M
Quant Title :
QLast Update : Wed May 27 09:43:48 2009
Response via : Initial Calibration

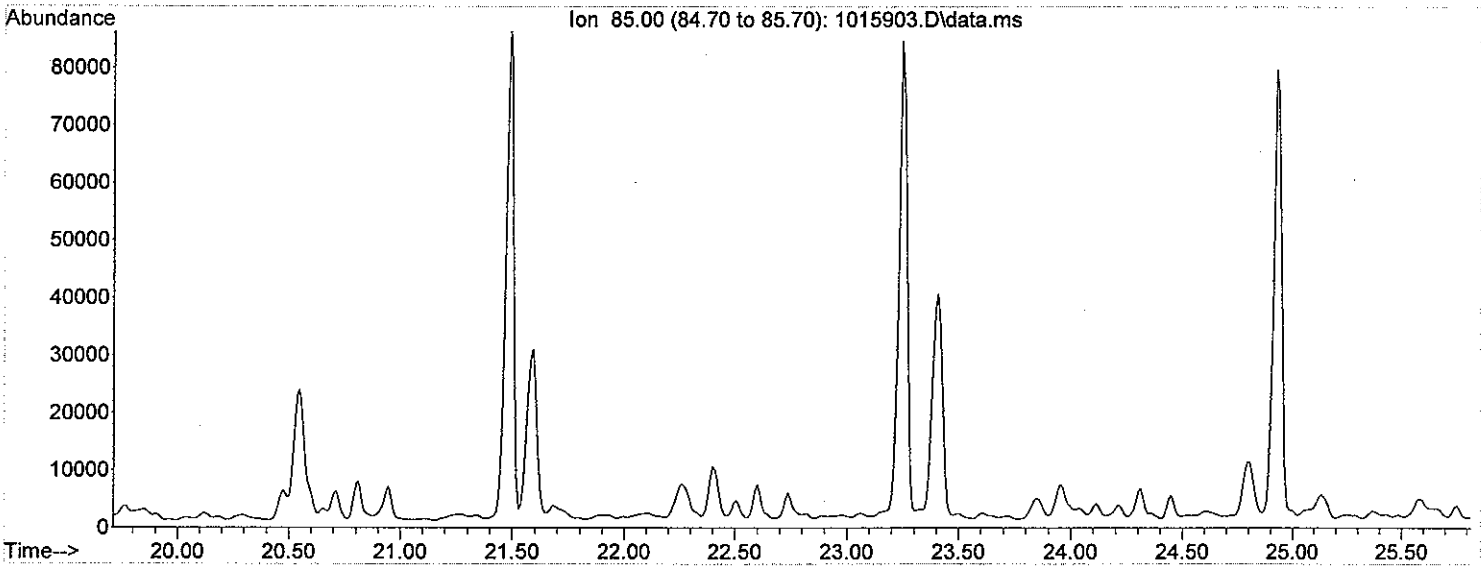


MARINE SAFETY LABORATORY GC-MS2 BIOMARKER ANALYSIS

File: \\Mslserver1\data archive\2010\MS_data\10-159\1015903.D
Operator: ACT
Date Acquired: 25 Jun 2010 10:55 pm
Method File: BIOMARK3.M
Sample Name: 10-159-3 Vial: 9
Misc Info:



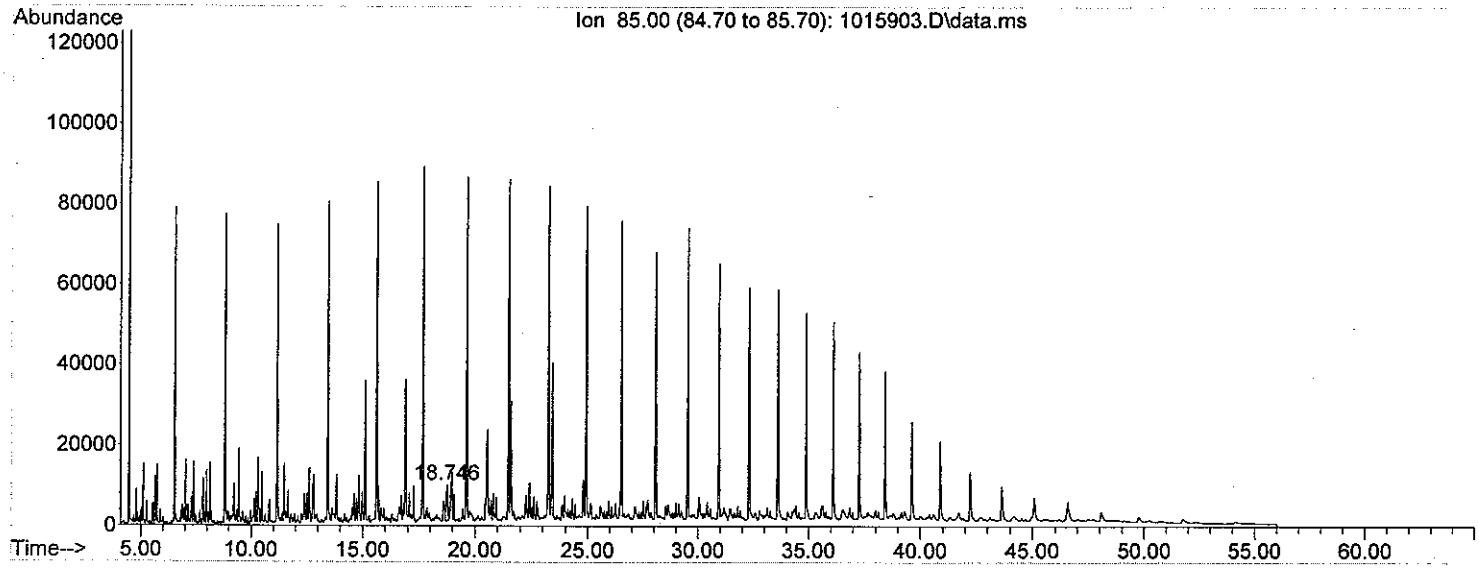
n-C17,Pristane,n-C18,Phytane



Pristane/Phytane = 0.697
C17/C18 = 0.984
Pristane/C17 = 0.416
Phytane/C18 = 0.588

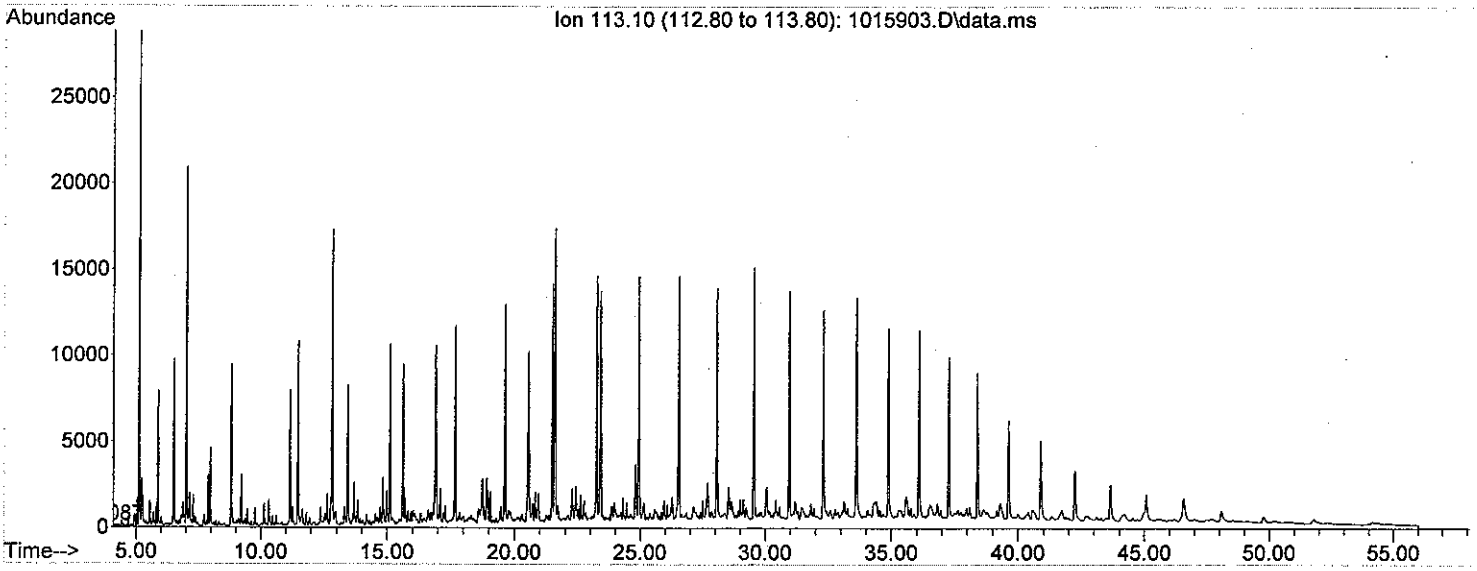
85-SATURATED HYDROCARBONS

Area = 389360



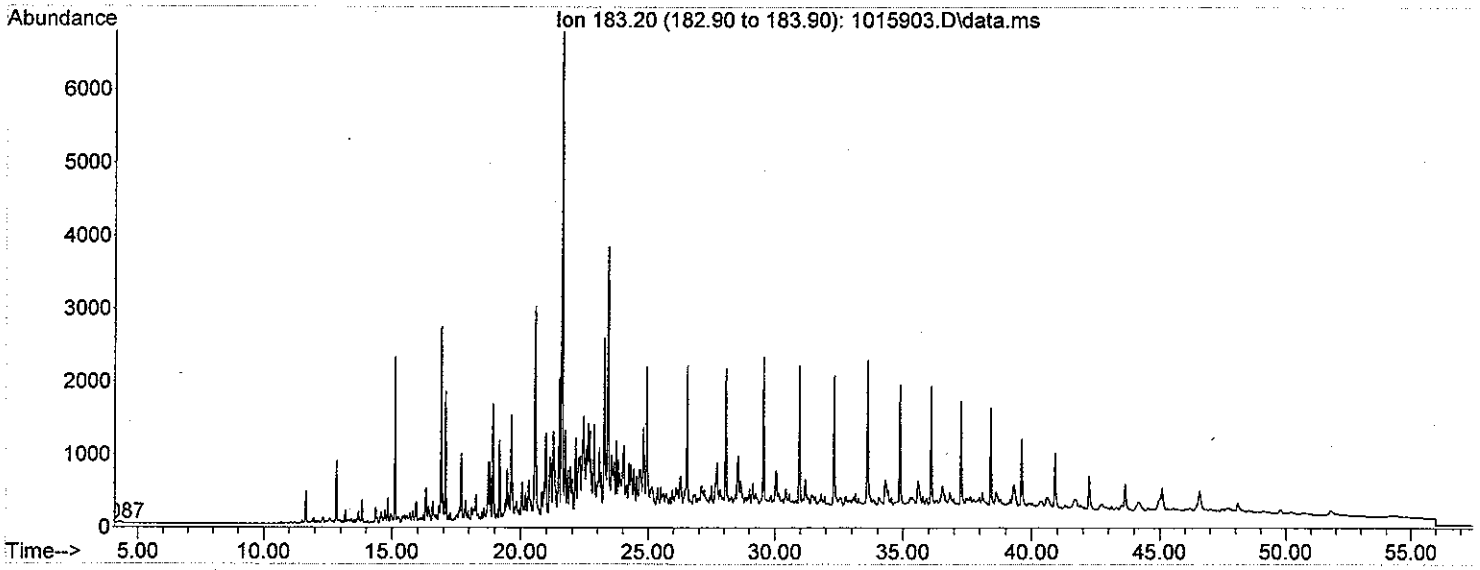
113-SATURATED HYDROCARBONS

Area = 0



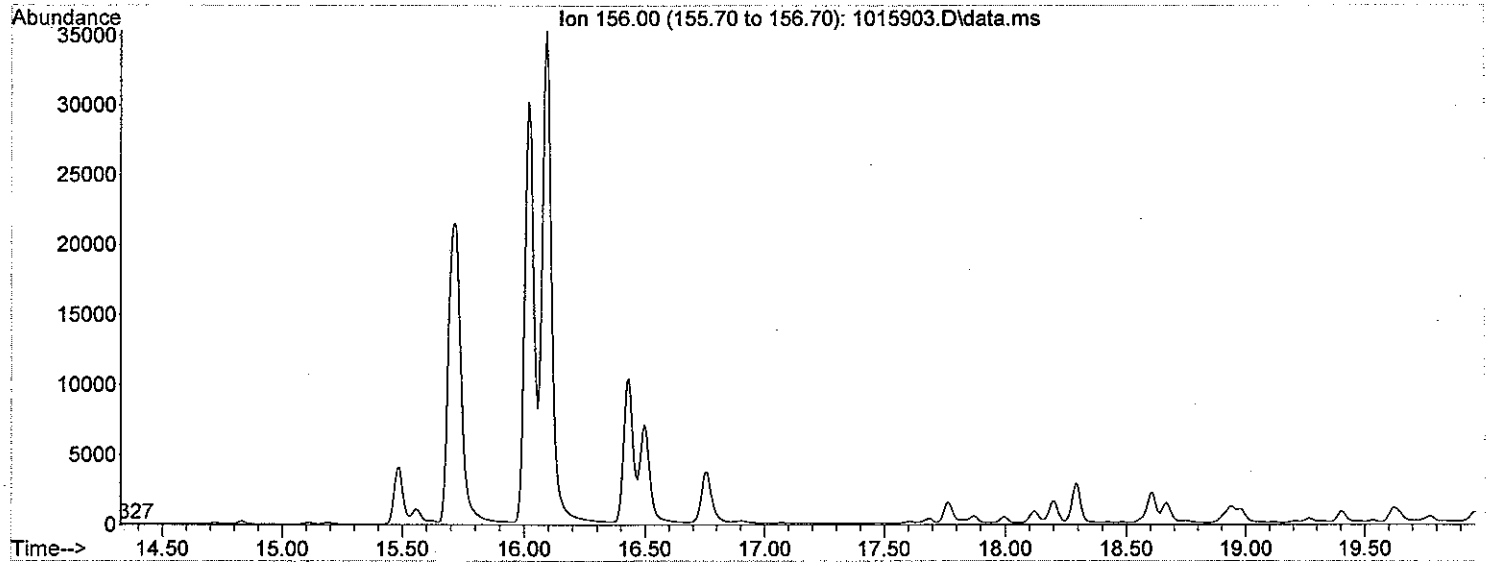
ACYCLIC ISOPRENOIDS/ALKANES

Area = 0



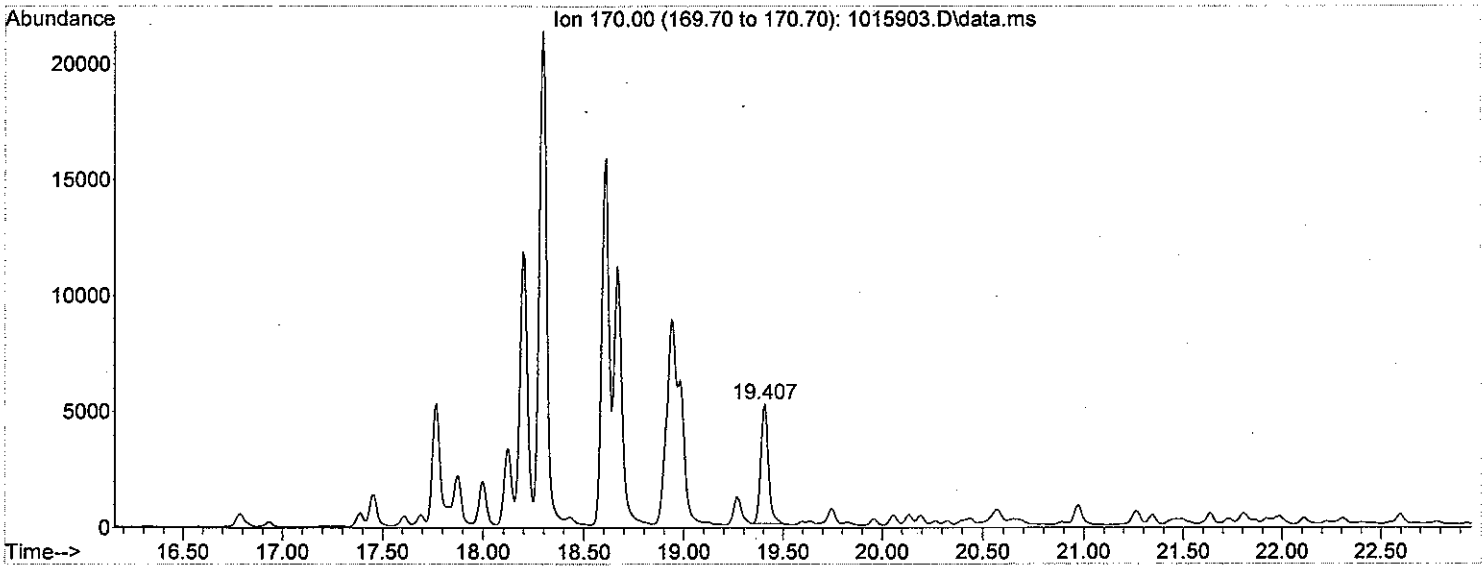
C2-NAPHTHALENES

Area = 0



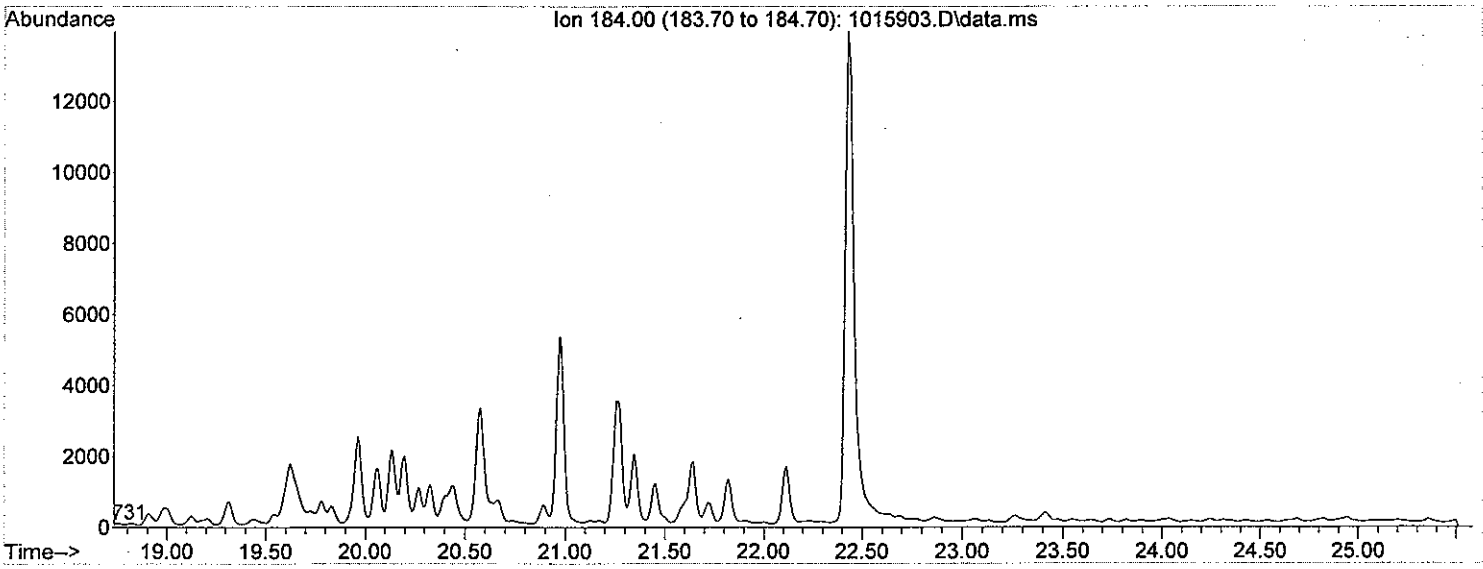
C3-NAPHTHALENES

Area = 137005



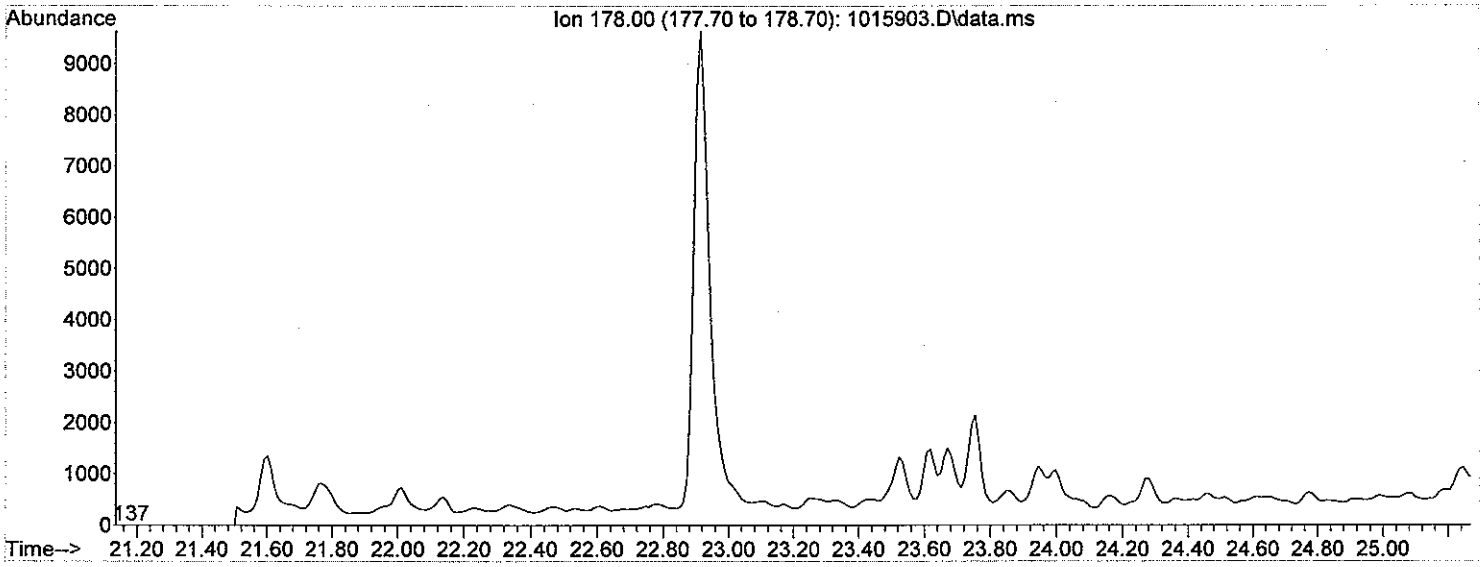
C4-NAPHTHALENES

Area = 0



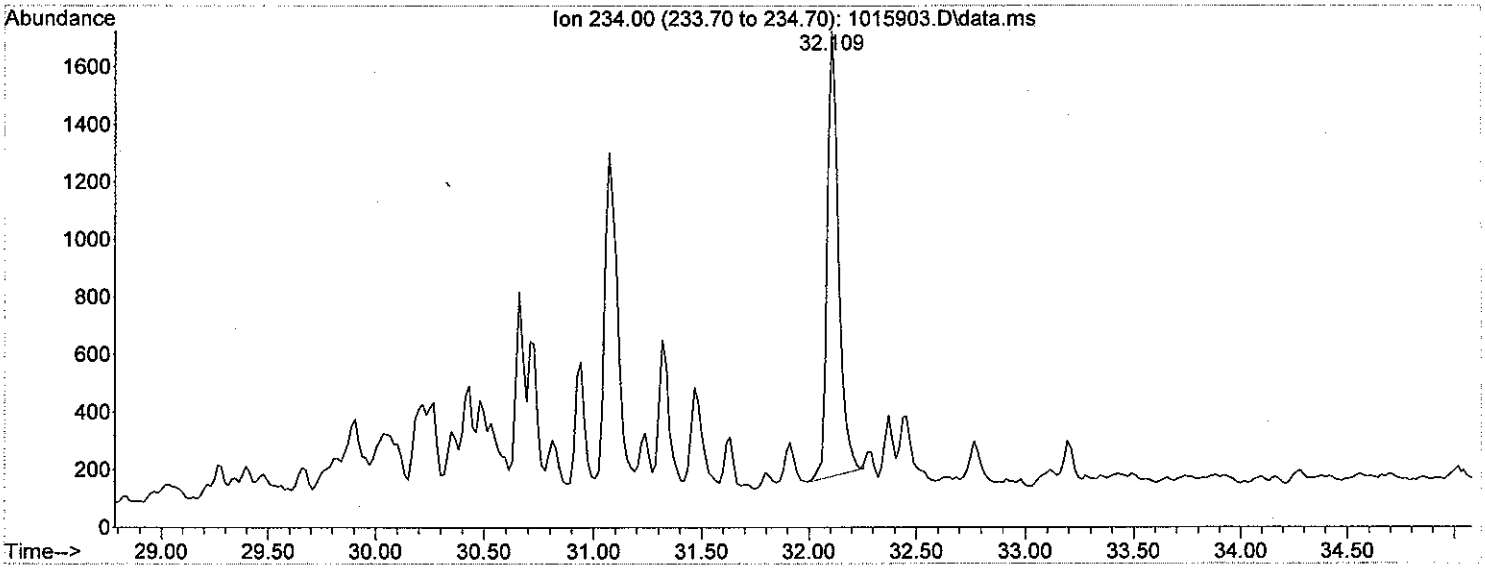
PHENANTHRENE/ANTHRACENE

Area = 0



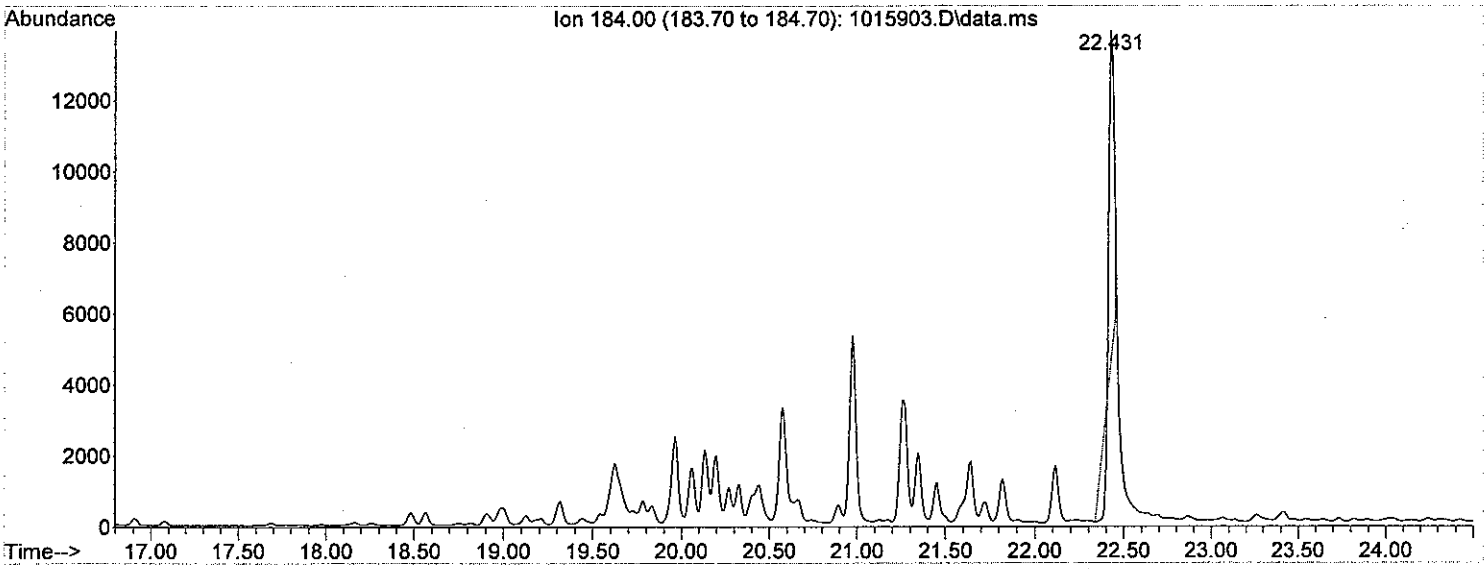
BENZONAPHTHIOPHENE

Area = 56092.6



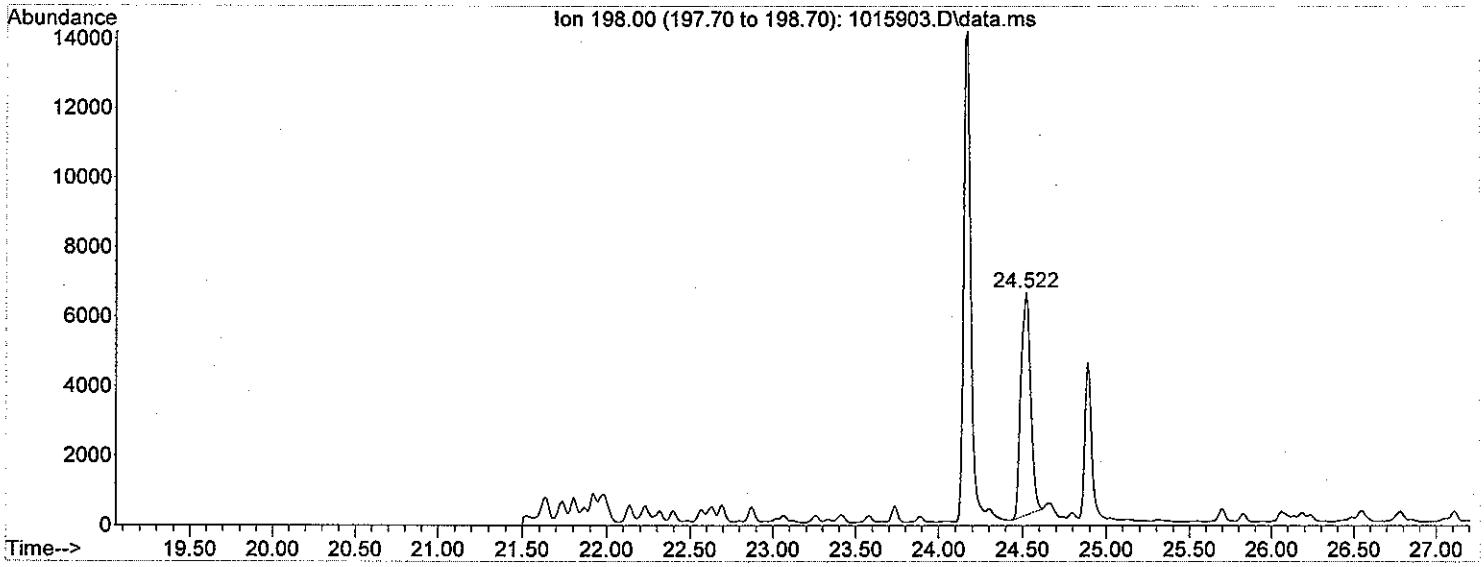
DIBENZOTHIOPHENE

Area = 153584



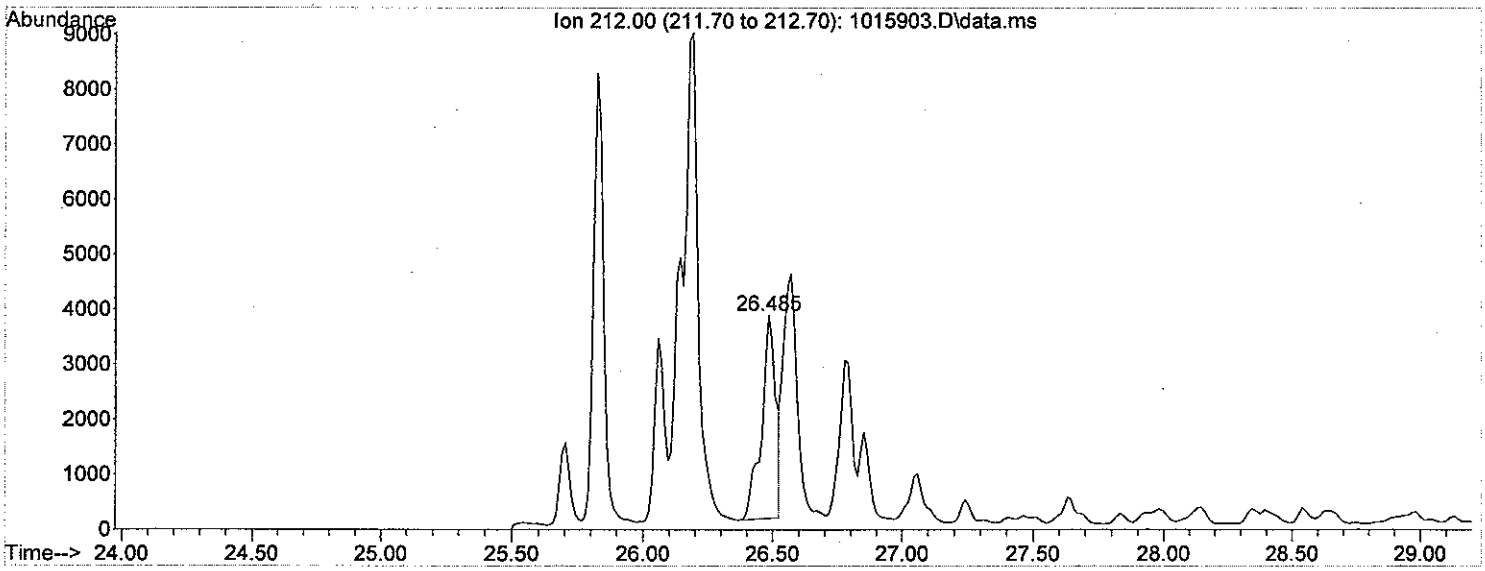
C1-DIBENZOTHIOPHENE

Area = 257623



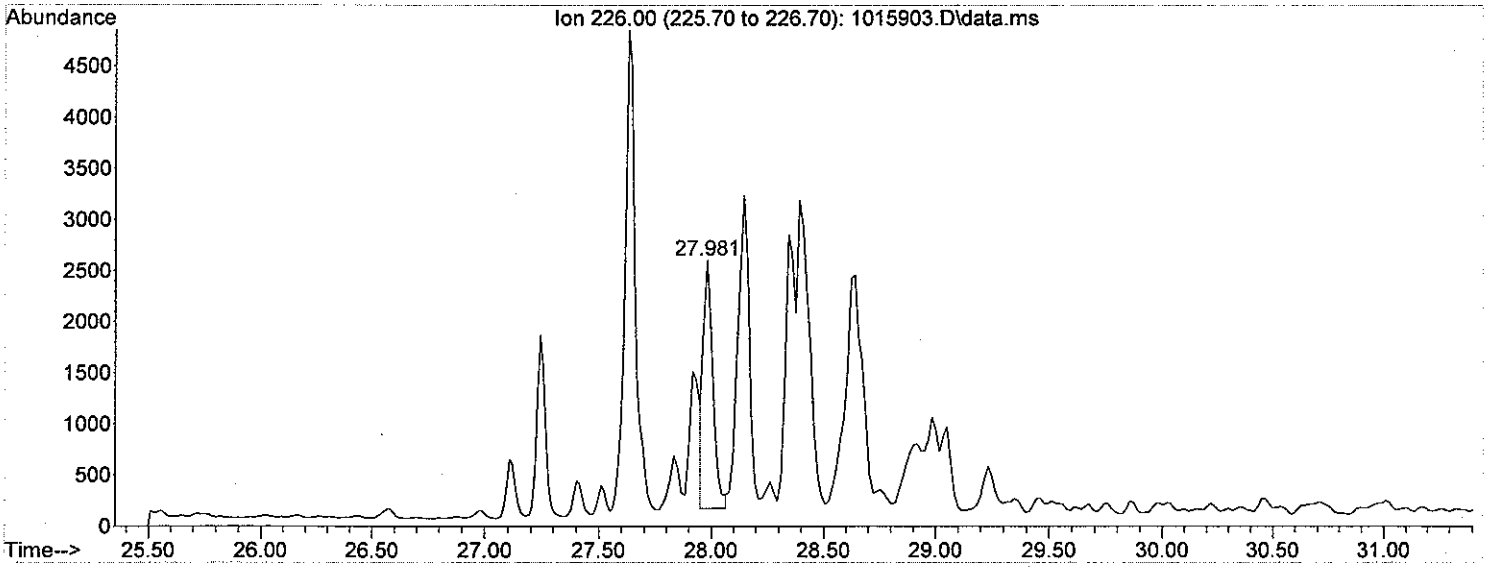
C2-DIBENZOTHIOPHENE

Area = 128915



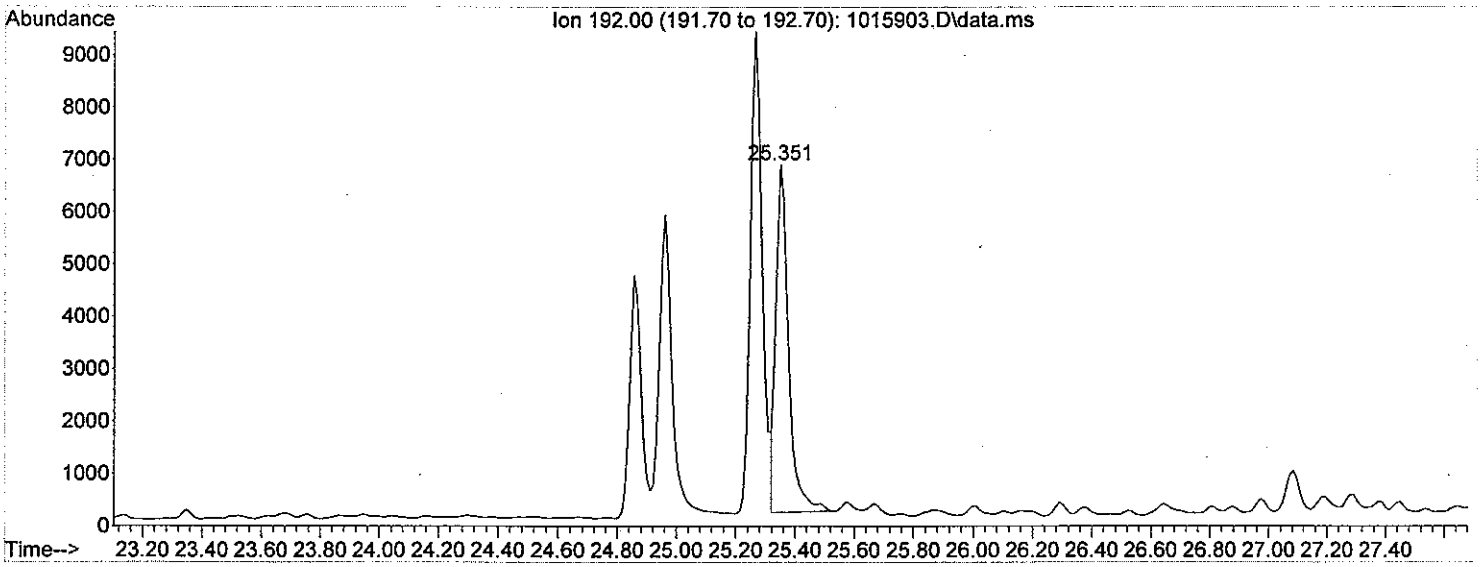
C3-DIBENZOTHIOPHENE

Area = 79927.7



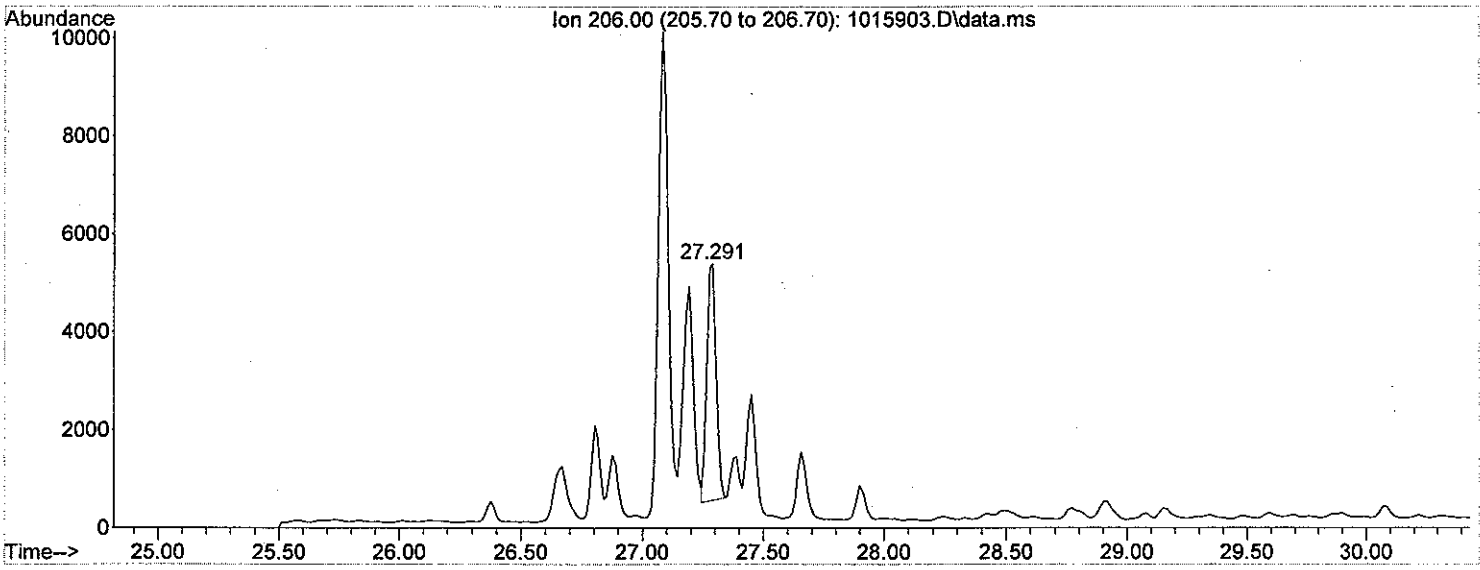
C1 - PHENANTHRENES

Area = 205151



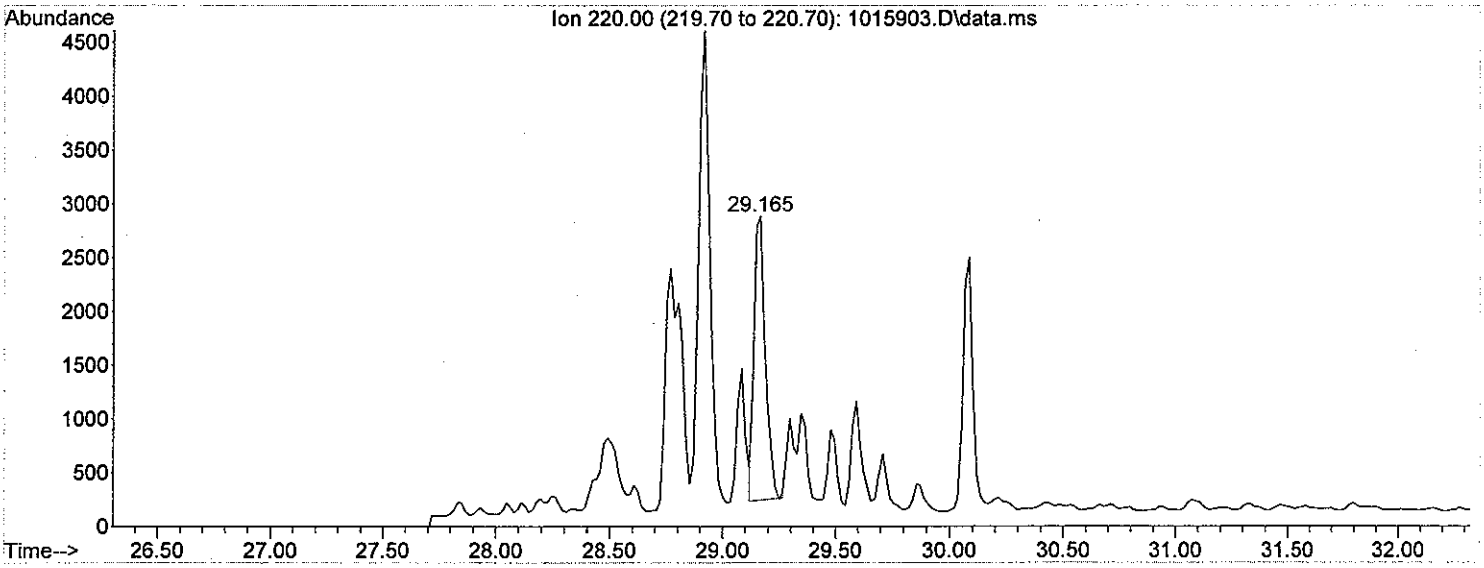
C2 - PHENANTHRENES

Area = 133176

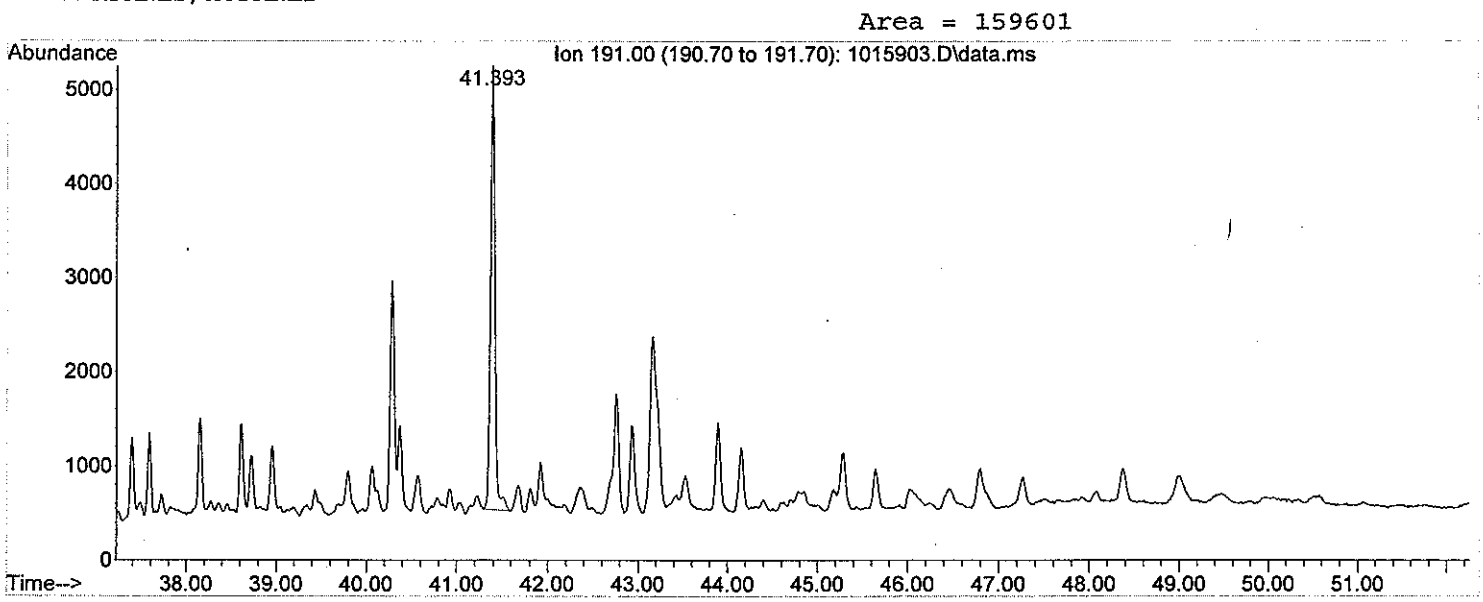


C3 - PHENANTHRENES

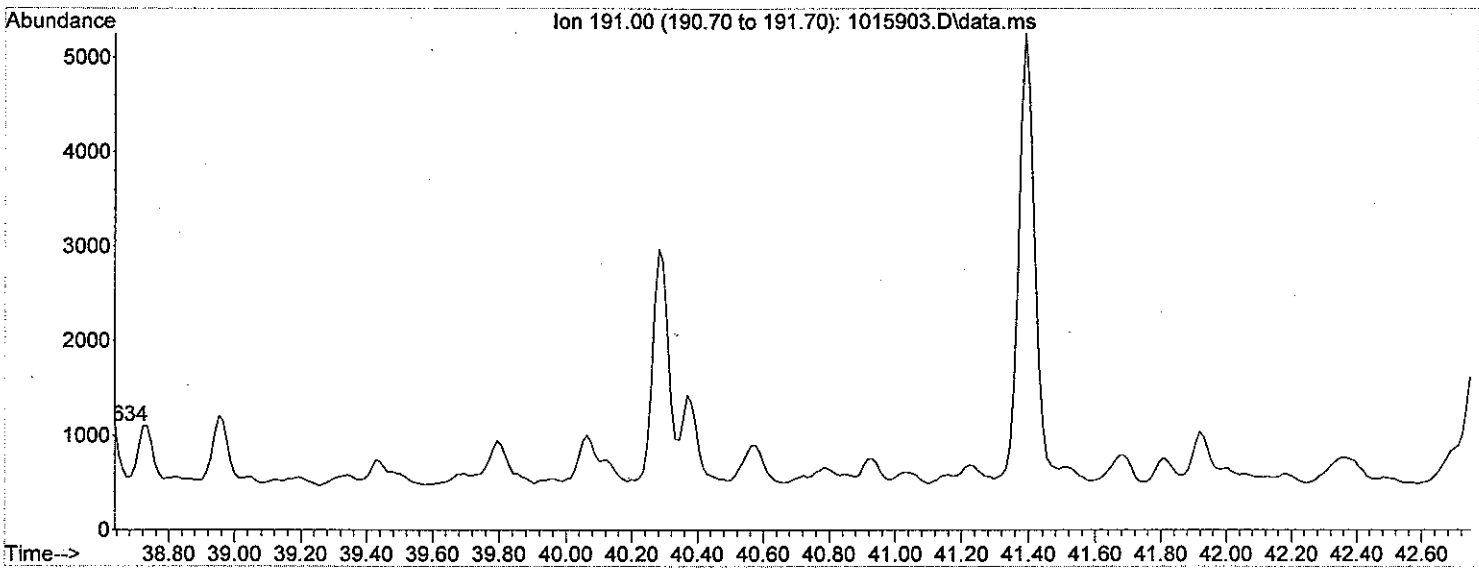
Area = 92364.3



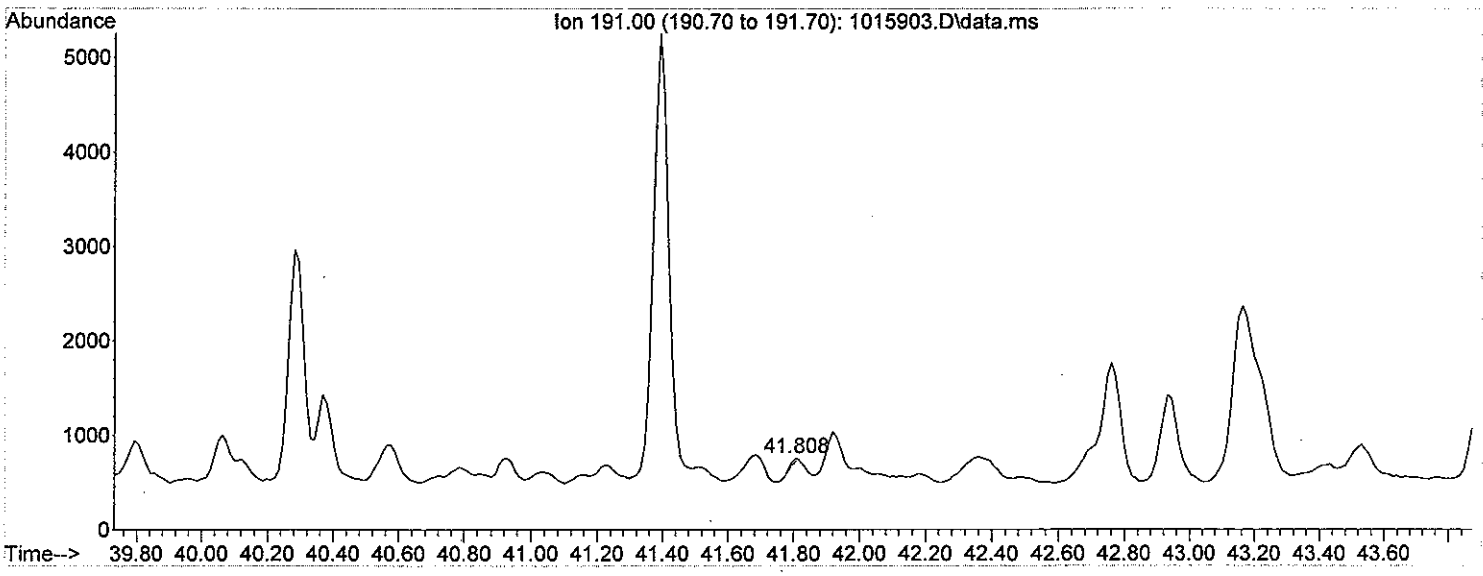
TRITERPANES/HOPANES



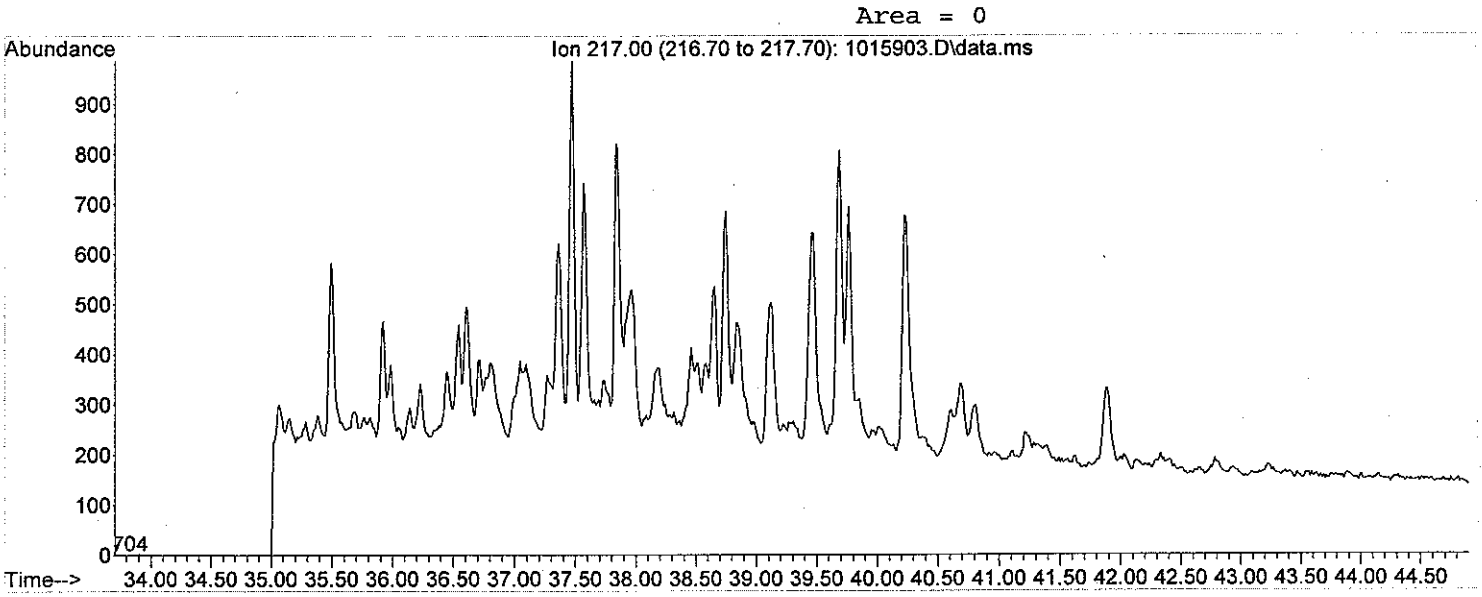
HOPANE A



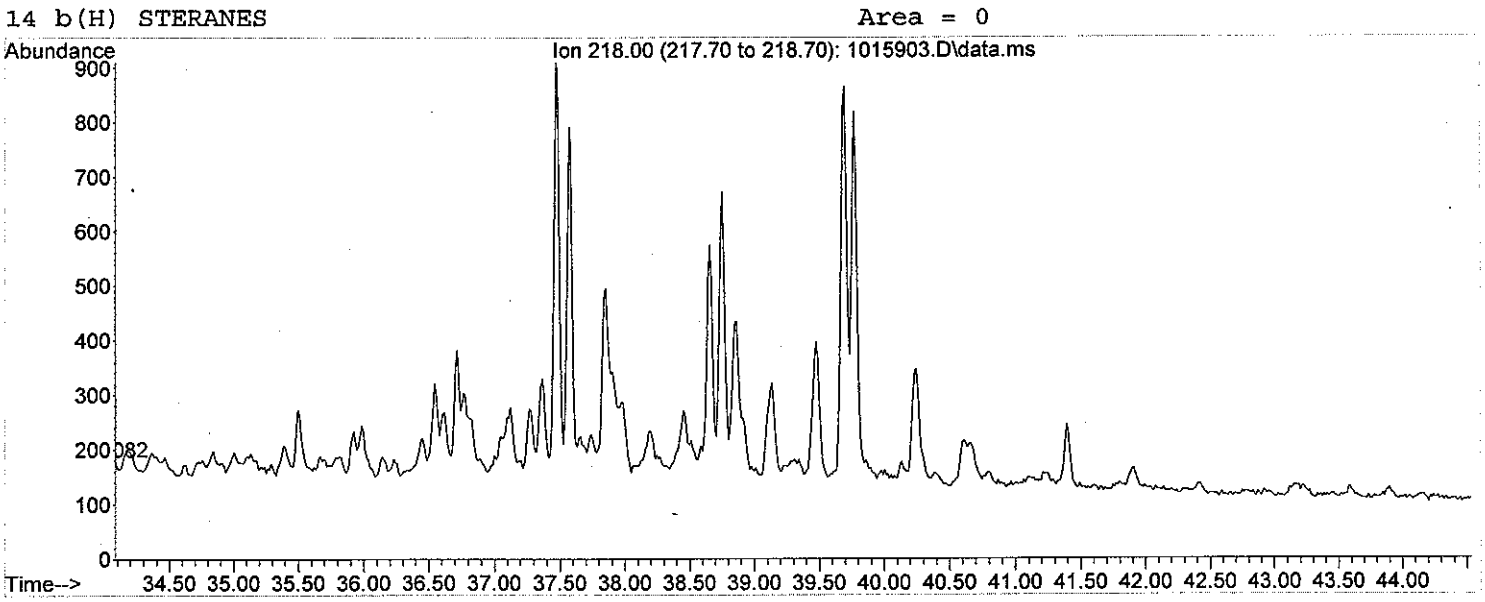
HOPANE B



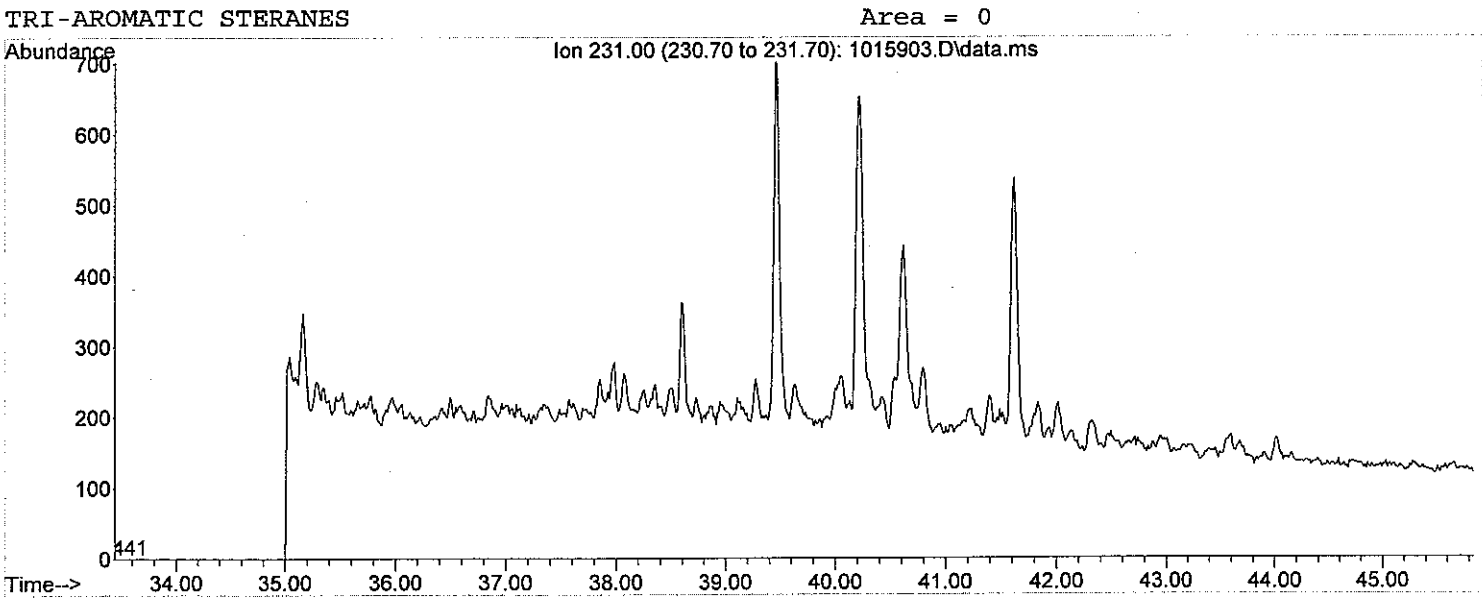
14 a(H) STERANES



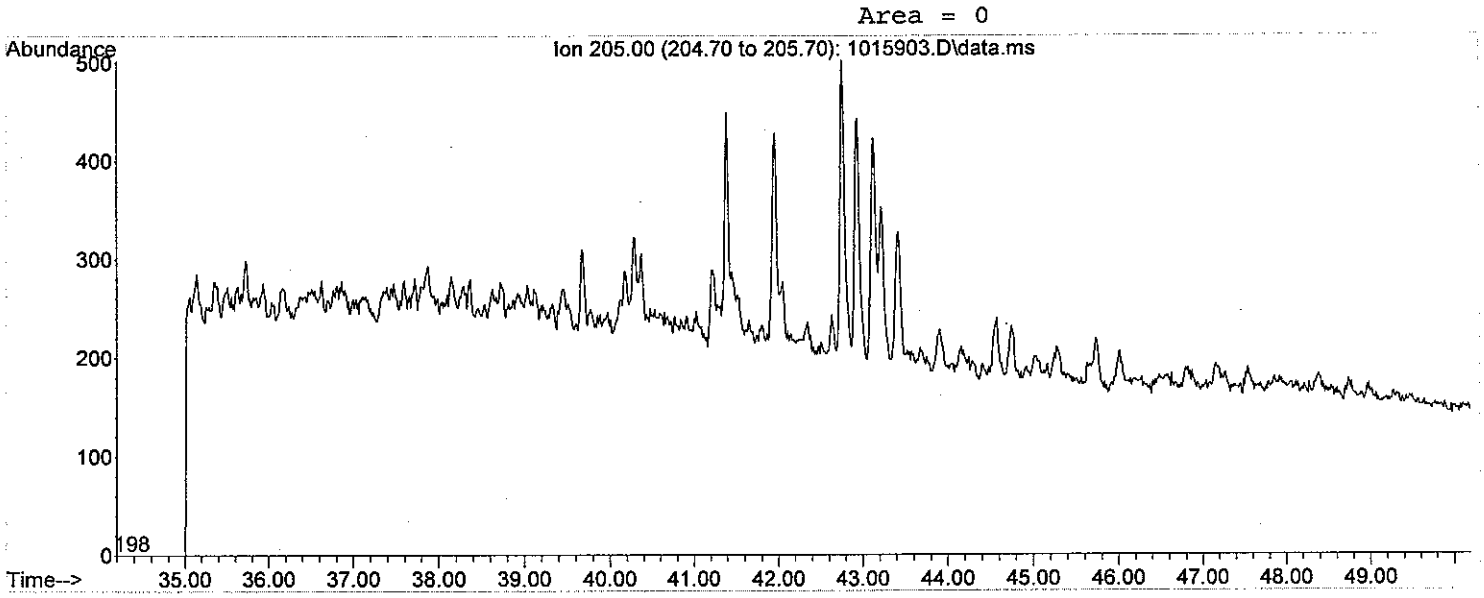
14 b(H) STERANES



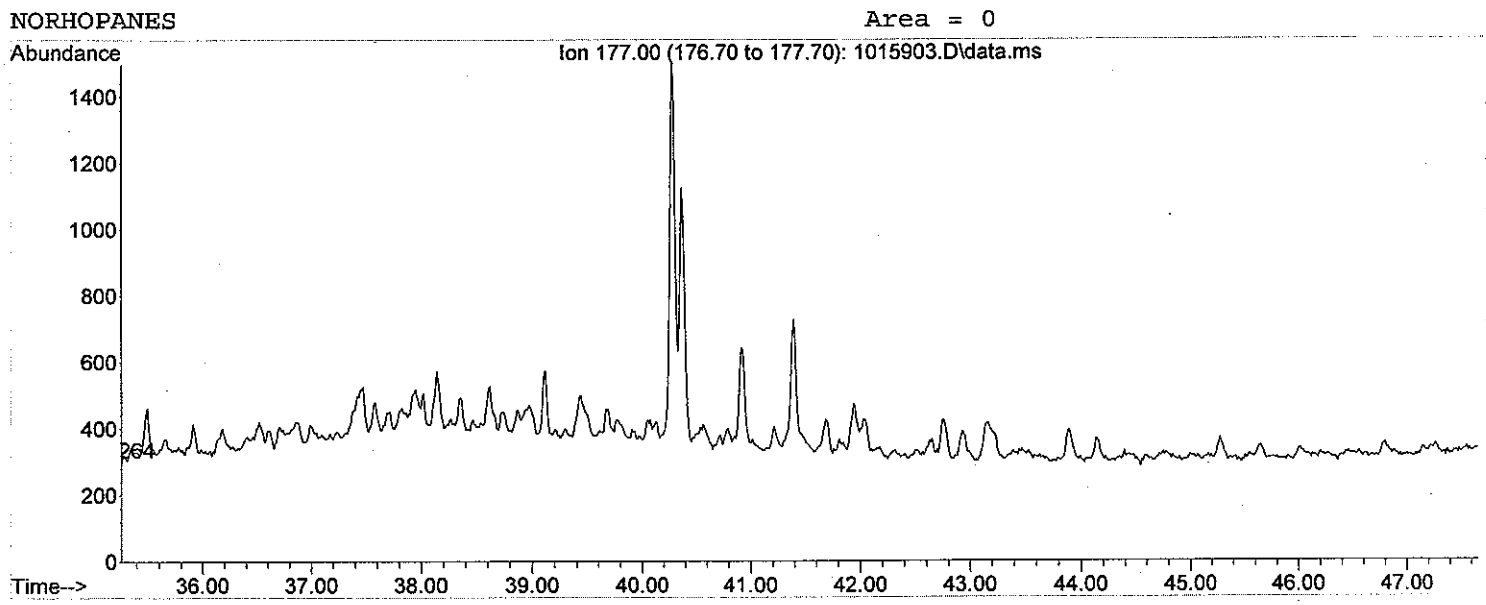
TRI-AROMATIC STERANES



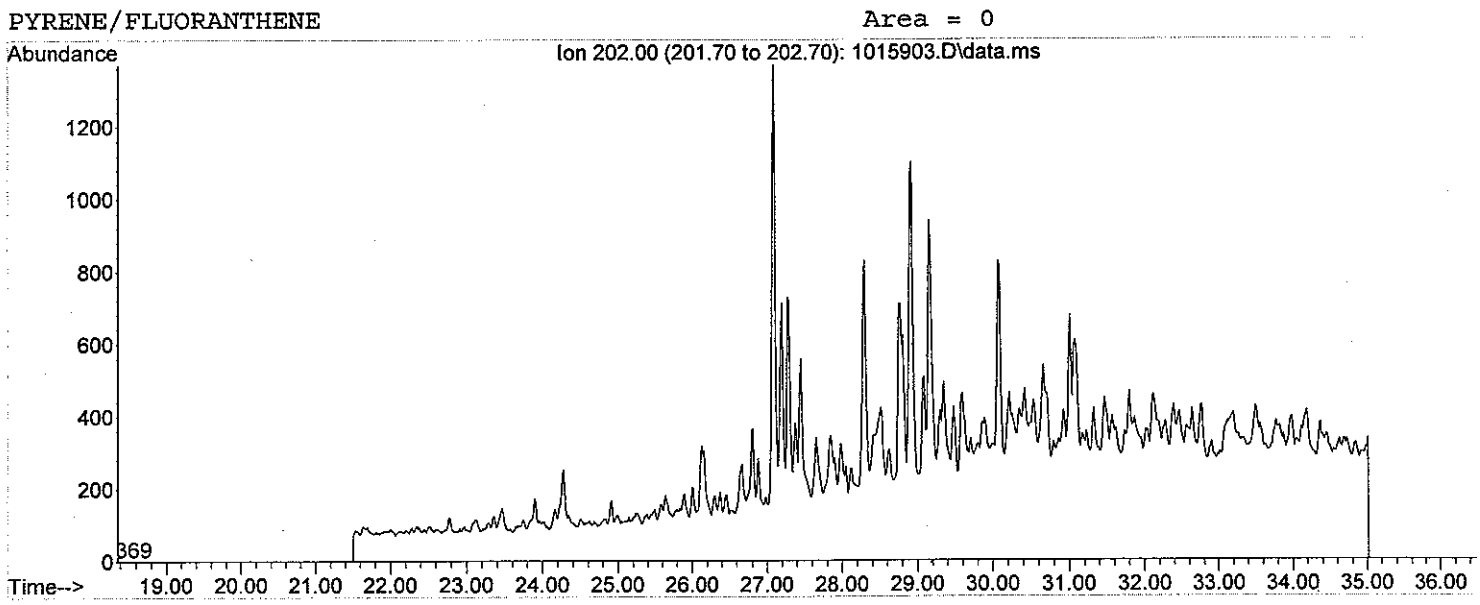
METHYLHOPANES



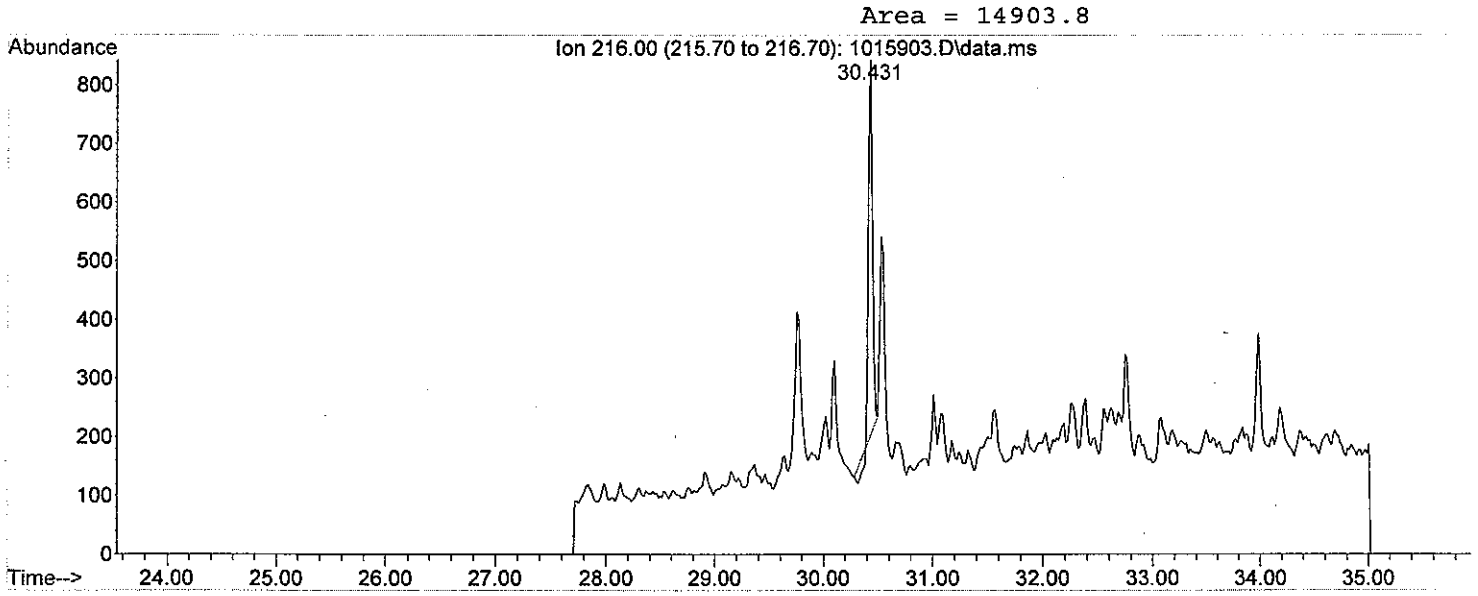
NORHOPANES



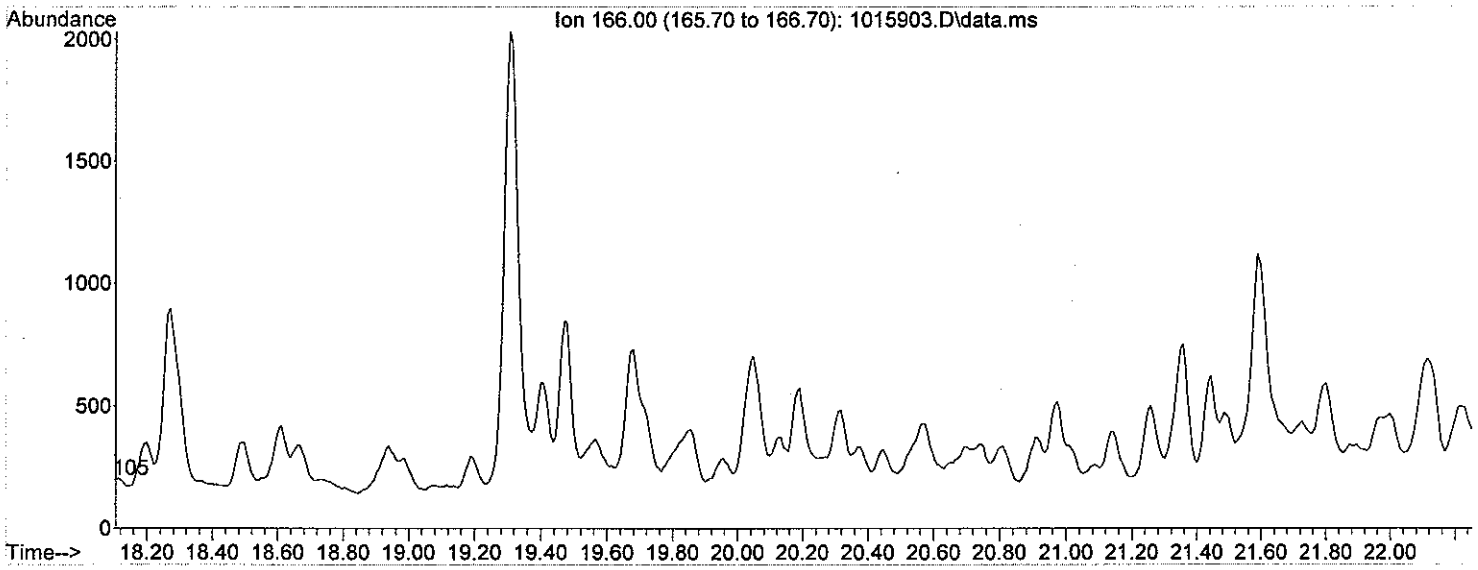
PYRENE/FLUORANTHENE



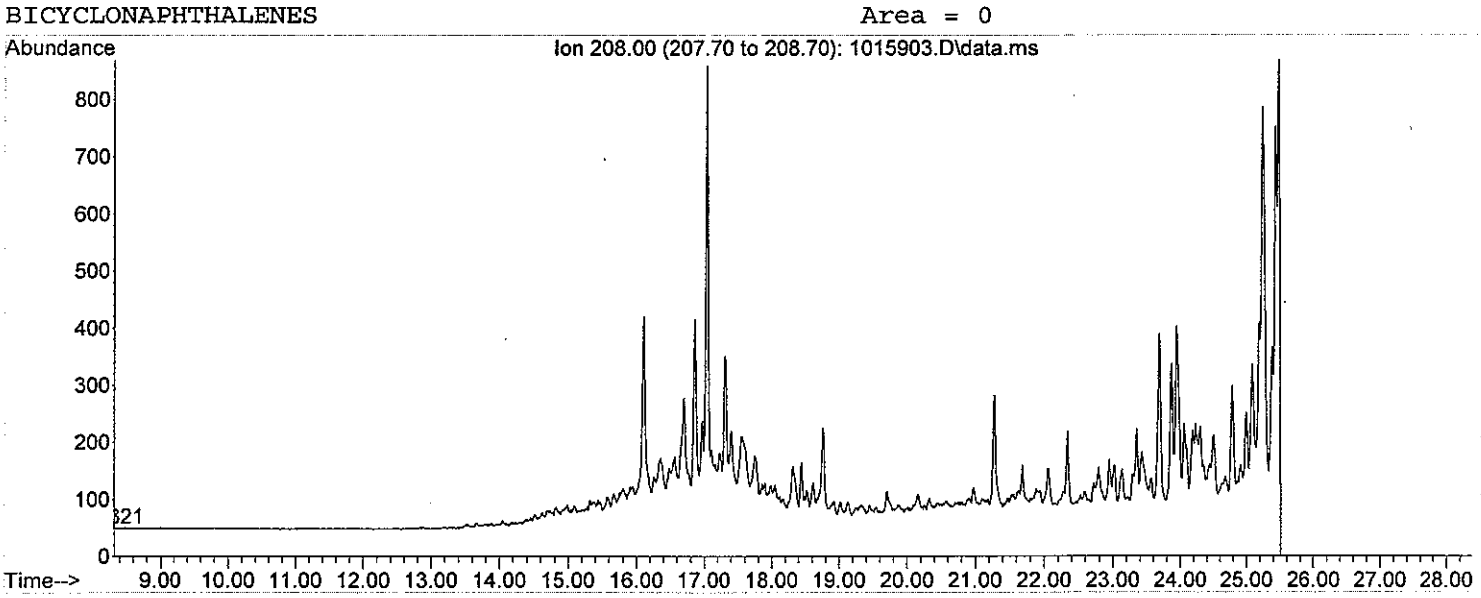
METHYL PYRENE



FLUORENE

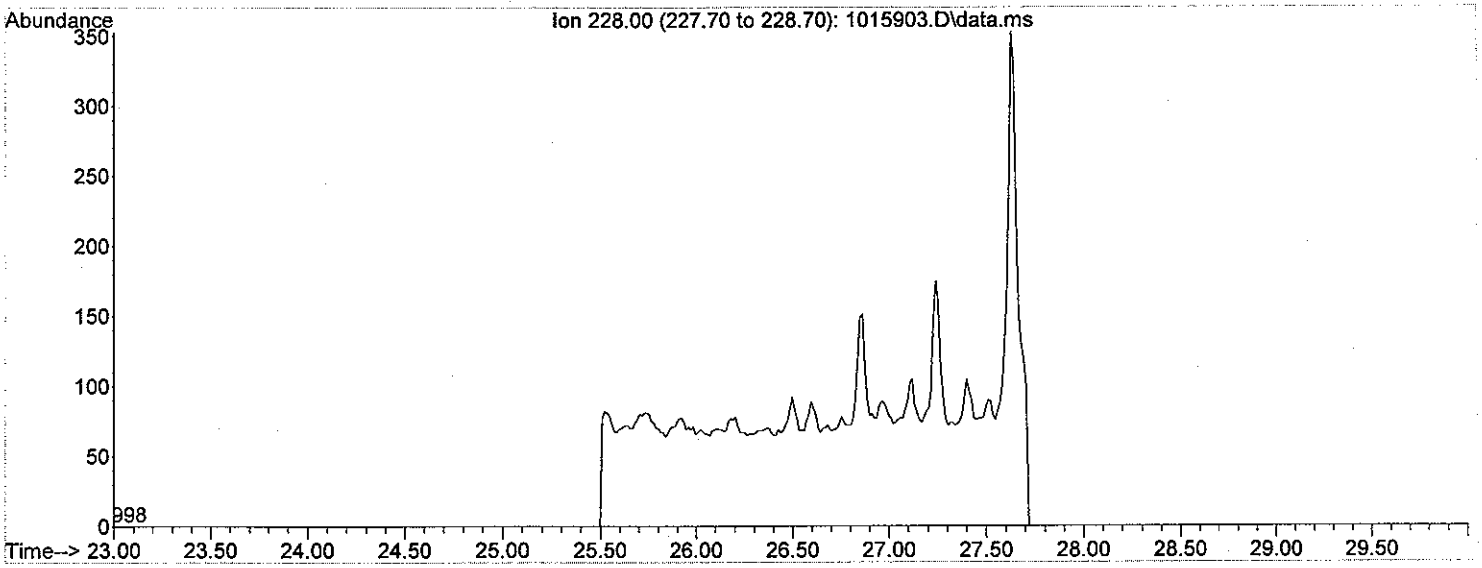


BICYCLONAPHTHALENES



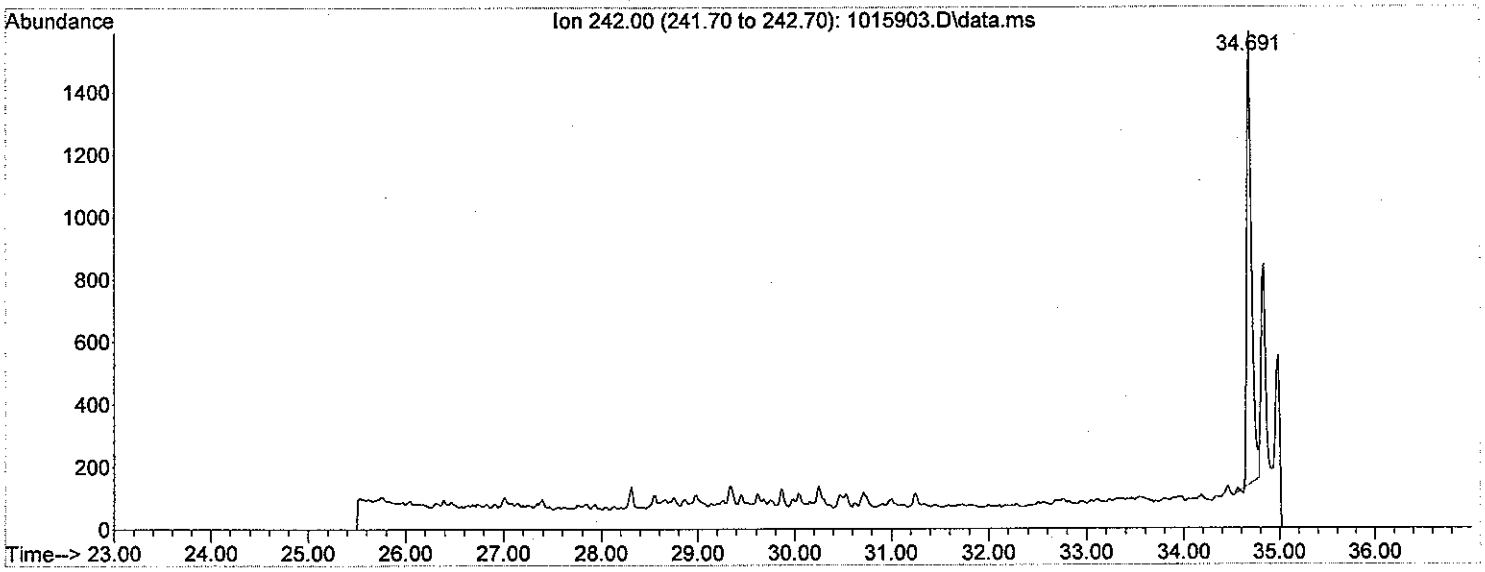
CHRYSENE

Area = 0



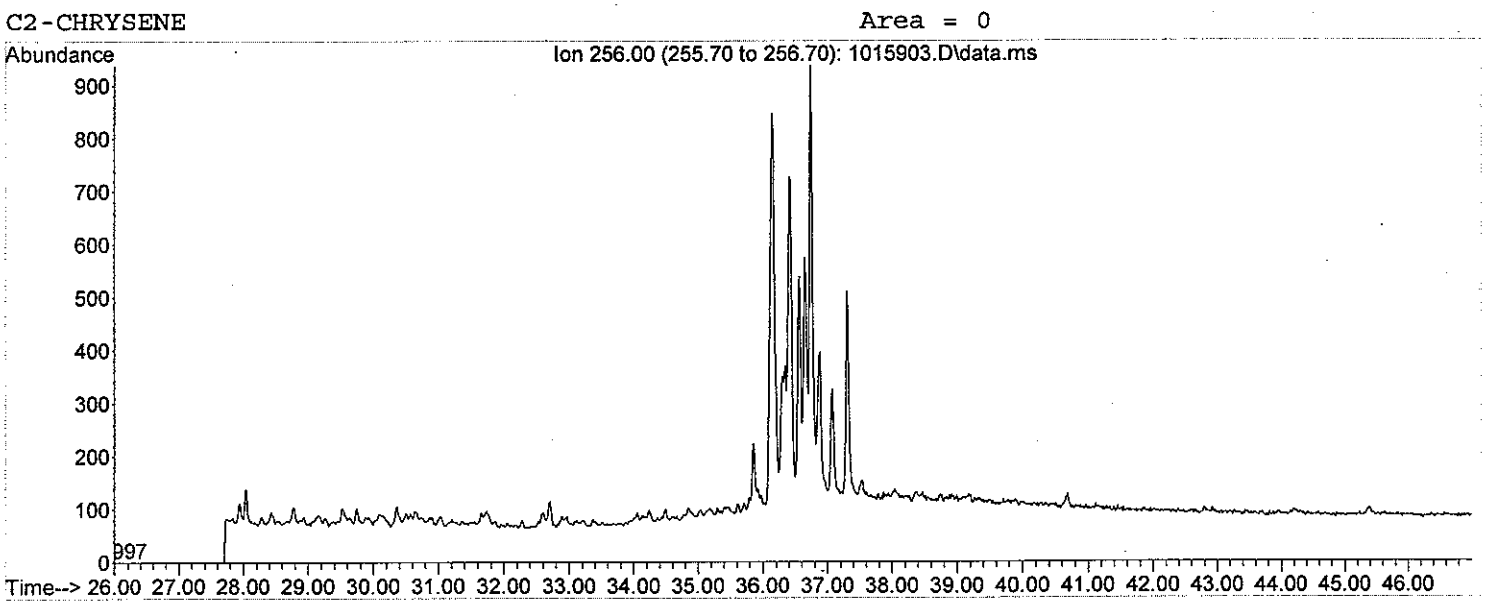
C1-CHRYSENE

Area = 50327.5

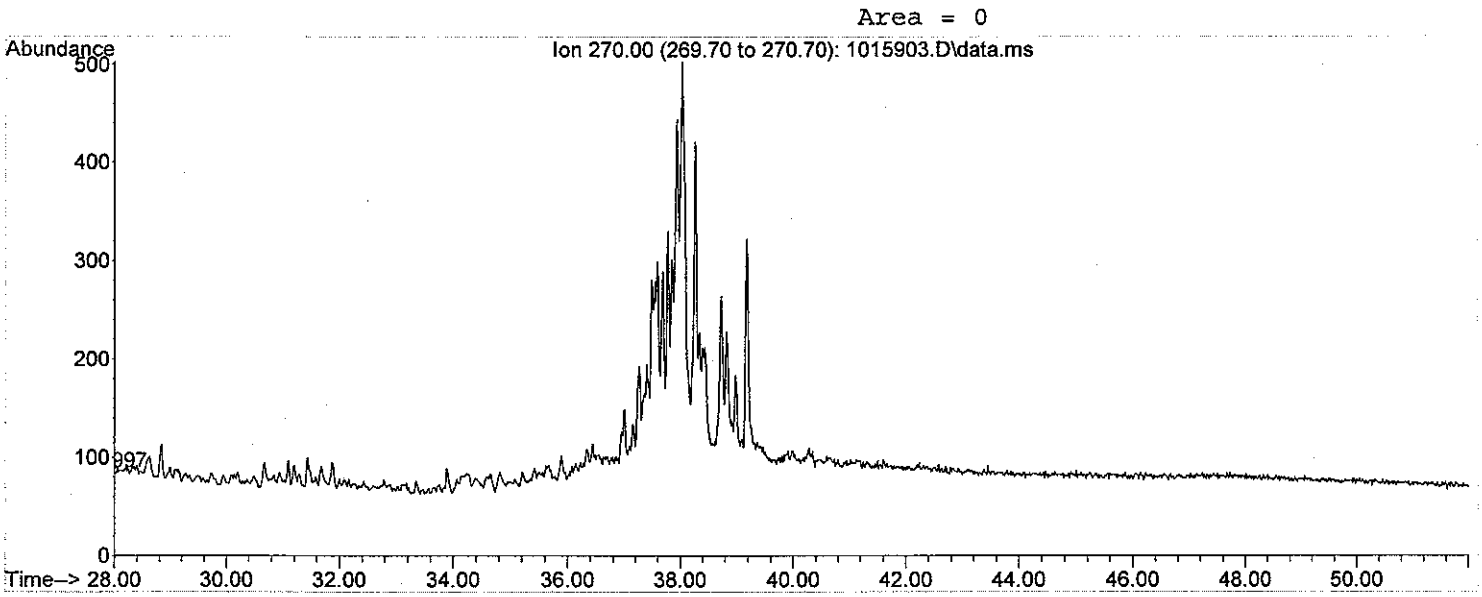


C2-CHRYSENE

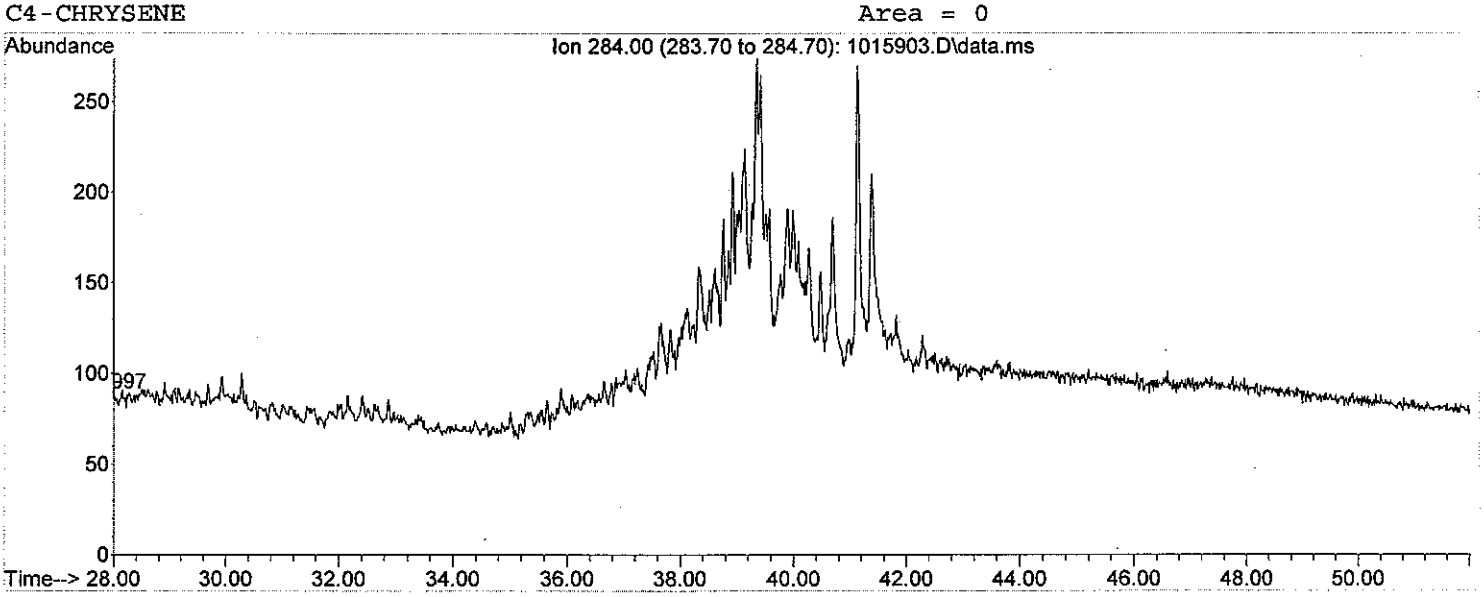
Area = 0



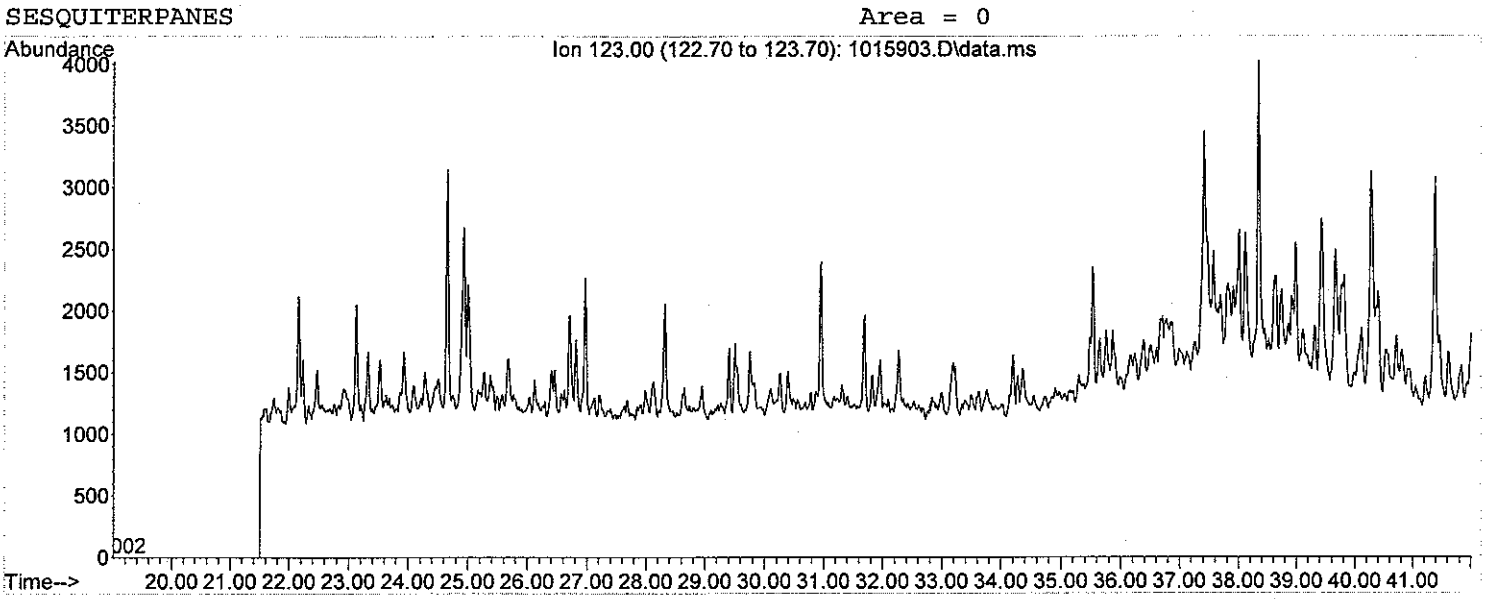
C3 - CHRYSENE



C4 - CHRYSENE

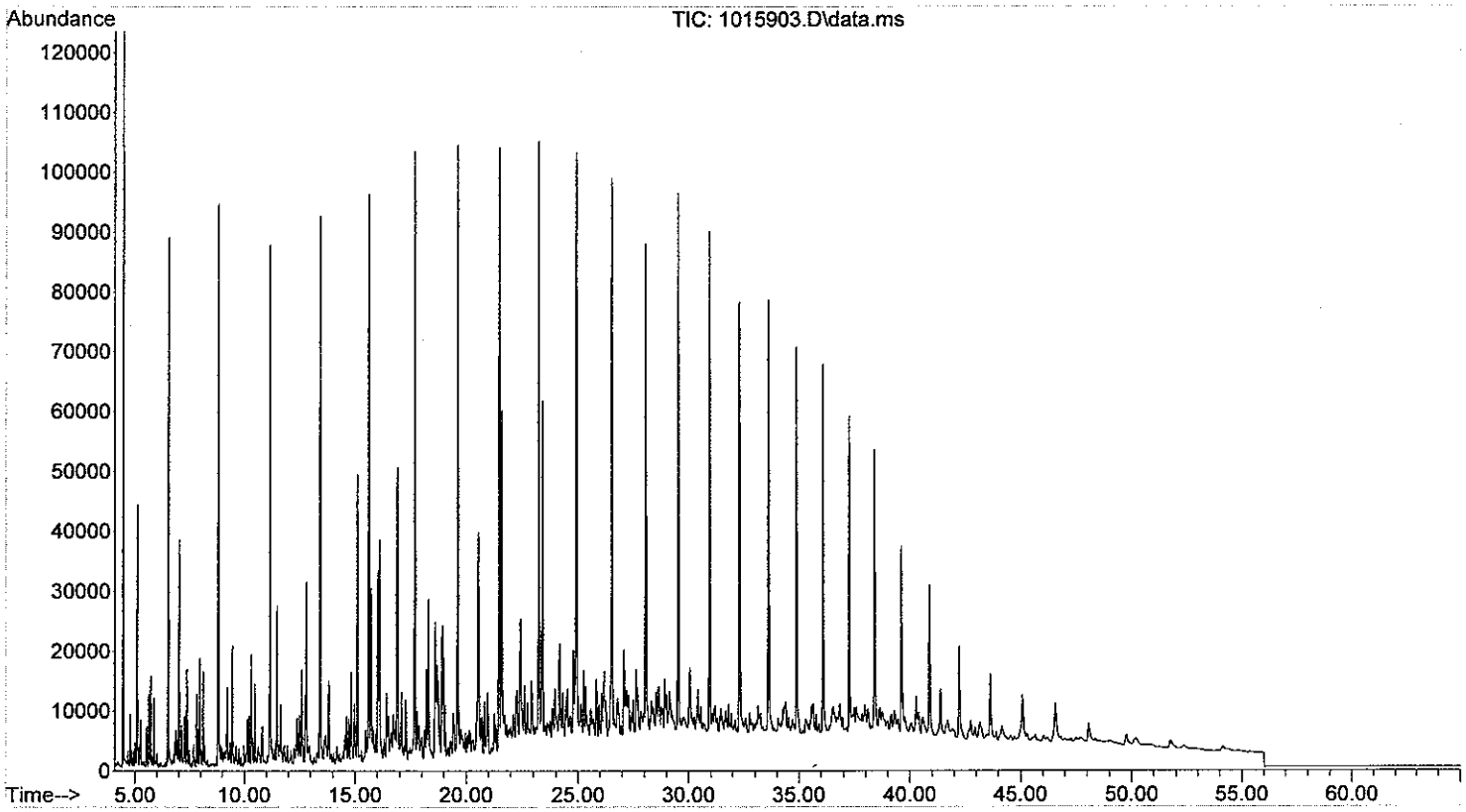


SESQUITERPANES

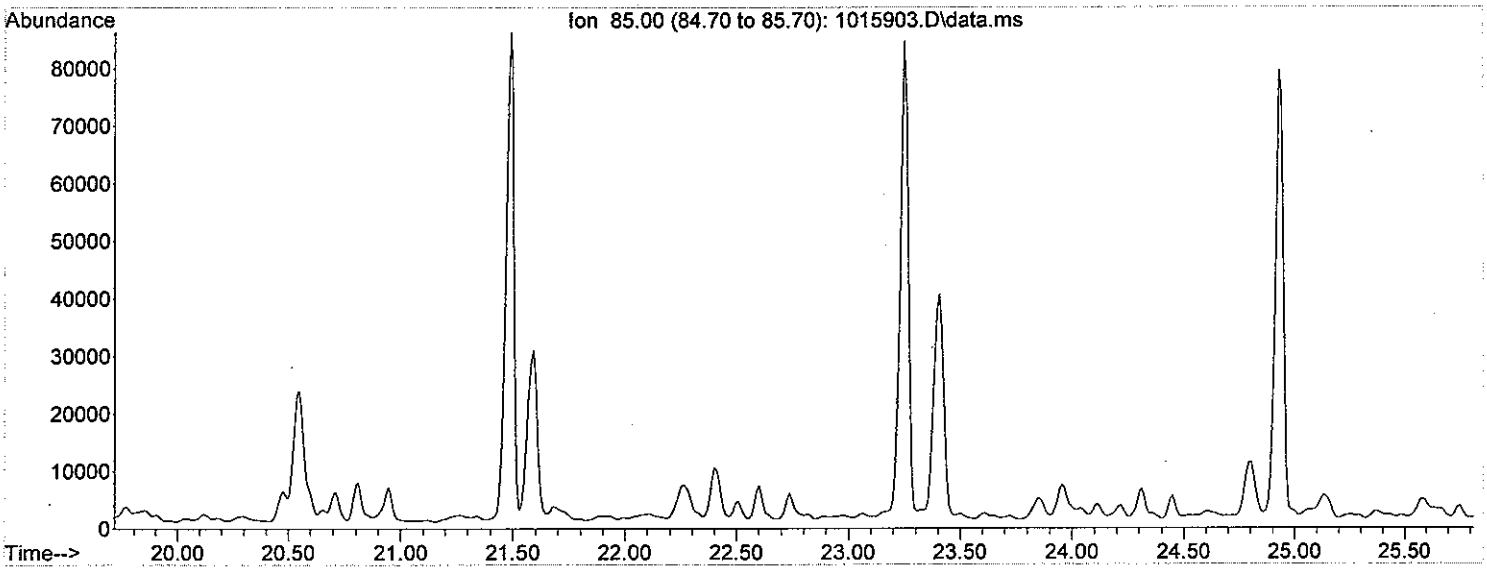


MSL GC-MS2 BIOMARKER ANALYSIS

File: W:\2010\MS_DATA\10-159\1015903.D
Operator: ACT
Date Acquired: 25 Jun 2010 10:55 pm
Method File: BIOMARK3.M
Sample Name: 10-159-3 Vial: 9
Misc Info:



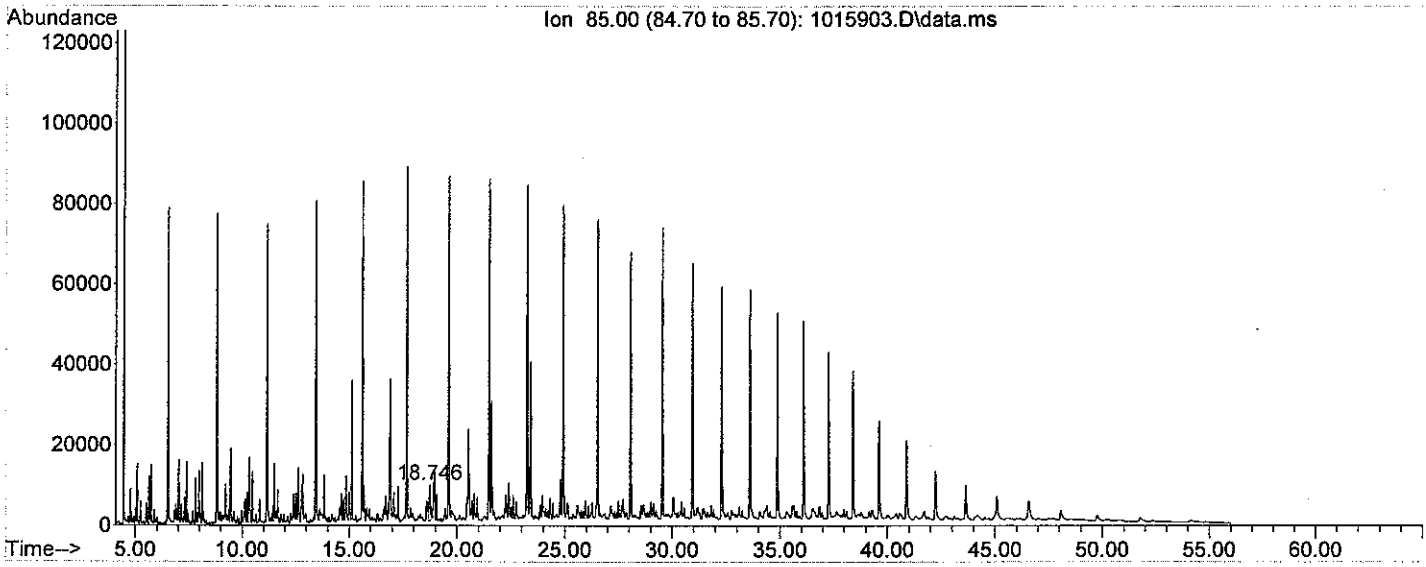
n-C17,Pristane,n-C18,Phytane



Pristane/Phytane = ----
C17/C18 = ----
Pristane/C17 = ----
Phytane/C18 = ----

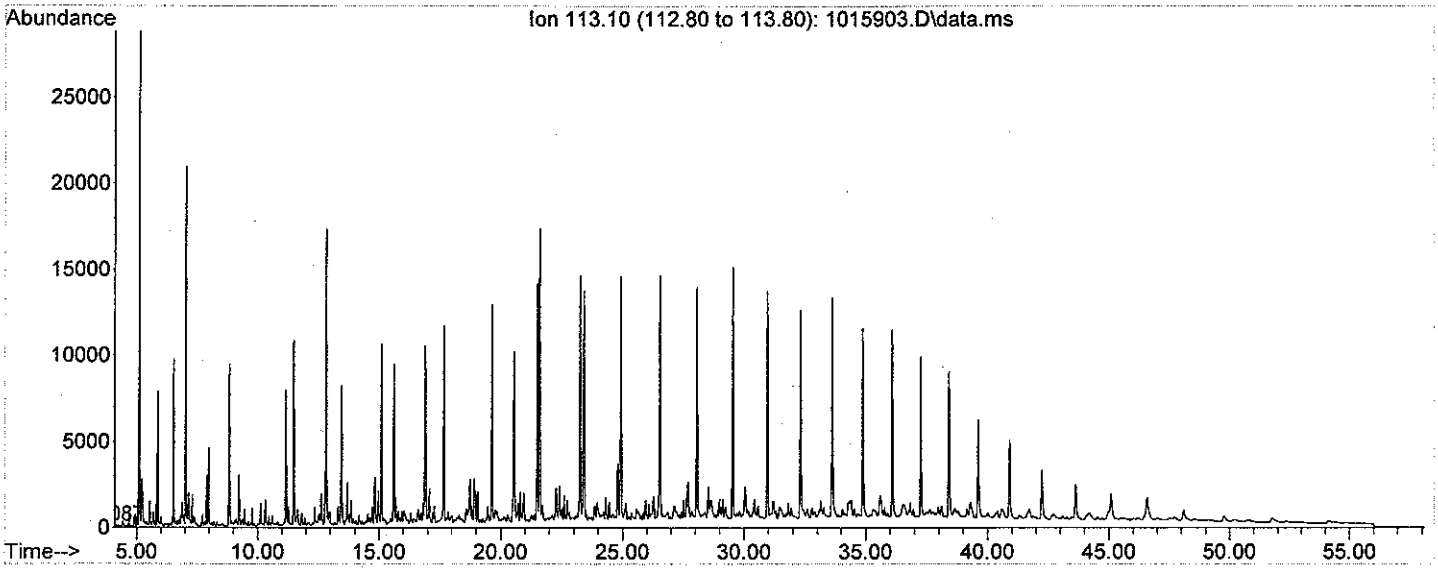
85-SATURATED HYDROCARBONS

Area = 389360



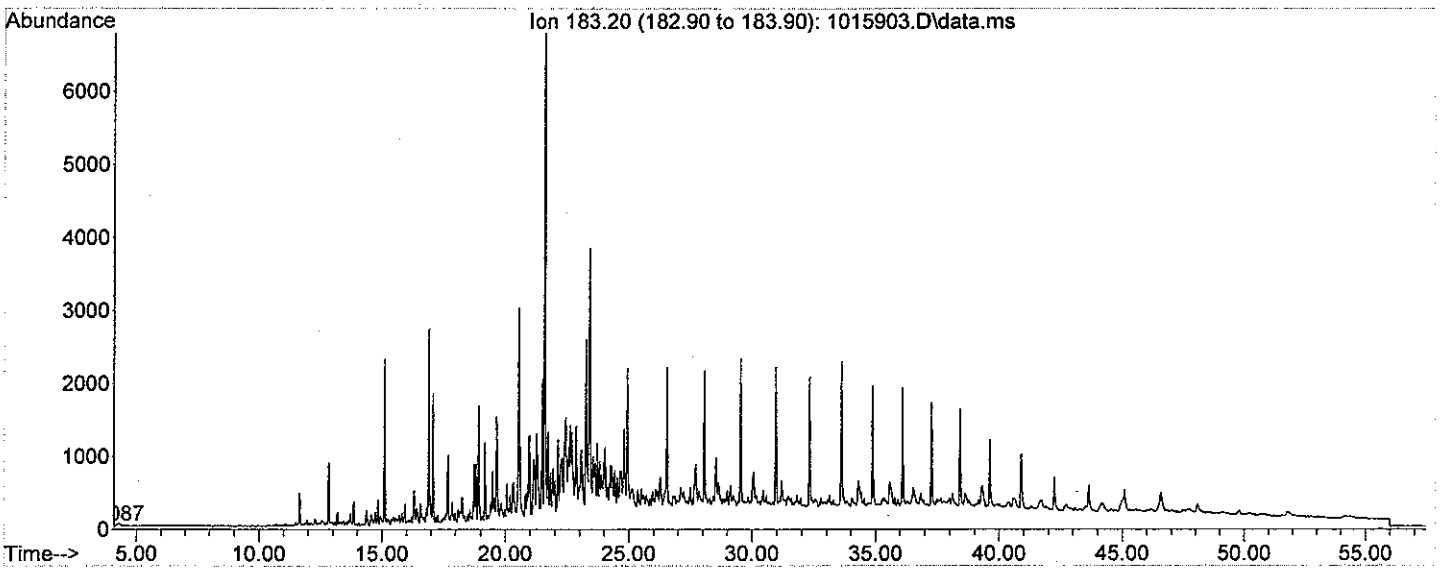
113-SATURATED HYDROCARBONS

Area = 0



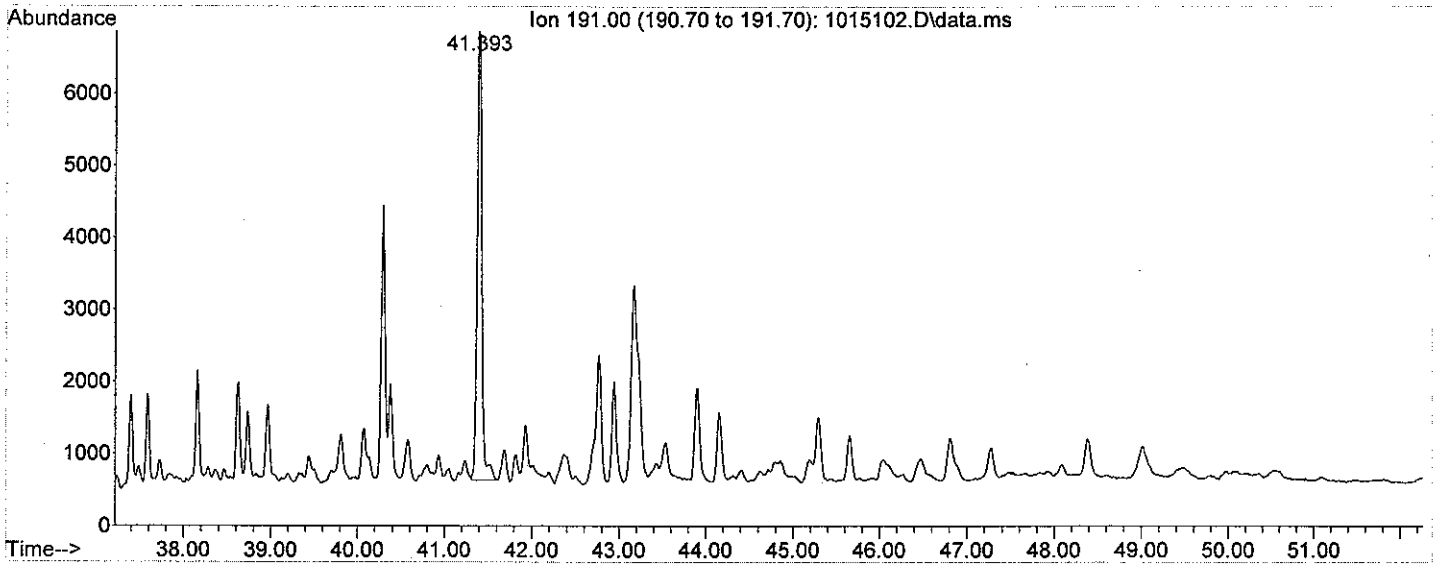
ACYCLIC ISOPRENOIDS/ALKANES

Area = 0



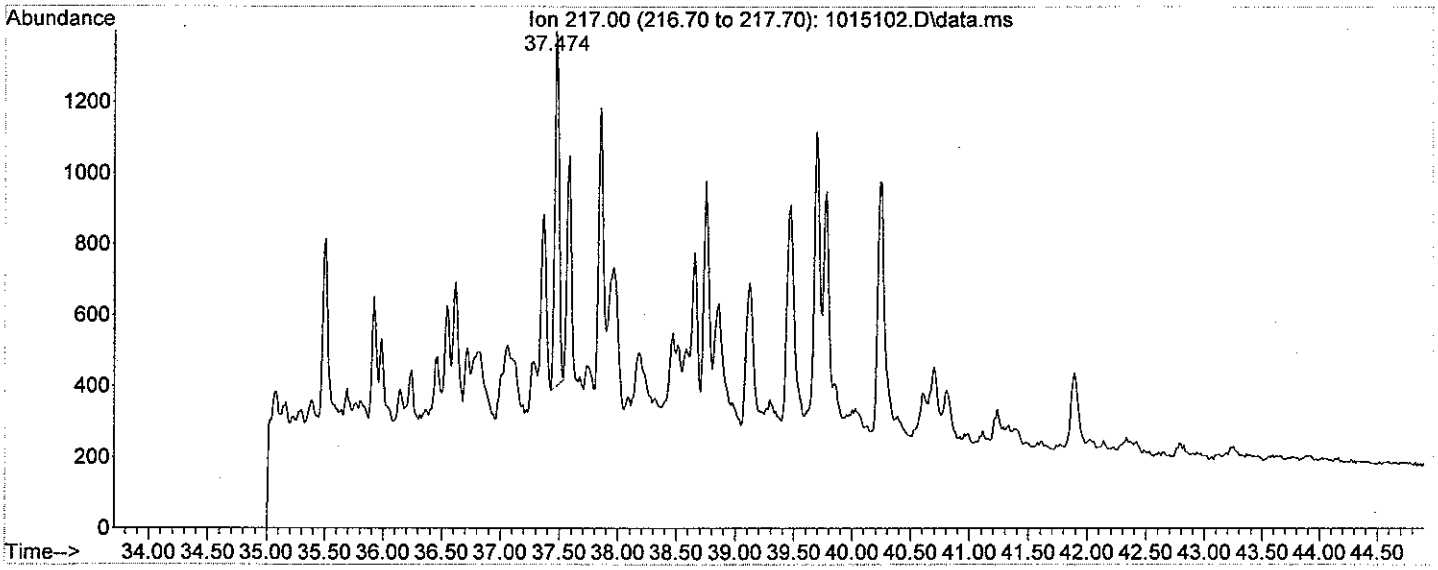
TRITERPANES/HOPANES

Area = 233677



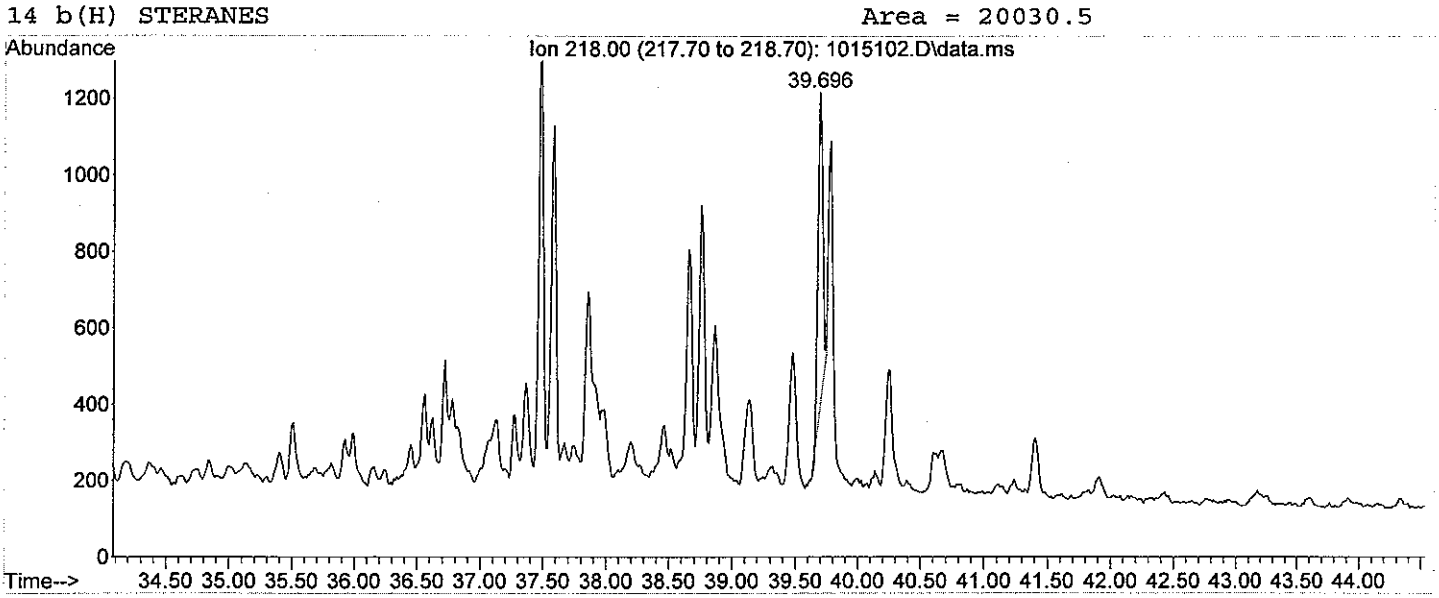
14 a(H) STERANES

Area = 25806.5



14 b(H) STERANES

Area = 20030.5



Quantitation Report (Not Reviewed)

Data Path : W:\2010\MS_DATA\10-159\
Data File : 1015101.D
Acq On : 25 Jun 2010 7:18 pm
Operator : ACT
Sample : 10-151-1, SP
Misc :
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Jun 25 20:12:03 2010
Quant Method : C:\MSDCHEM\1\METHODS\BIOMARK3.M
Quant Title :
QLast Update : Wed May 27 09:43:48 2009
Response via : Initial Calibration

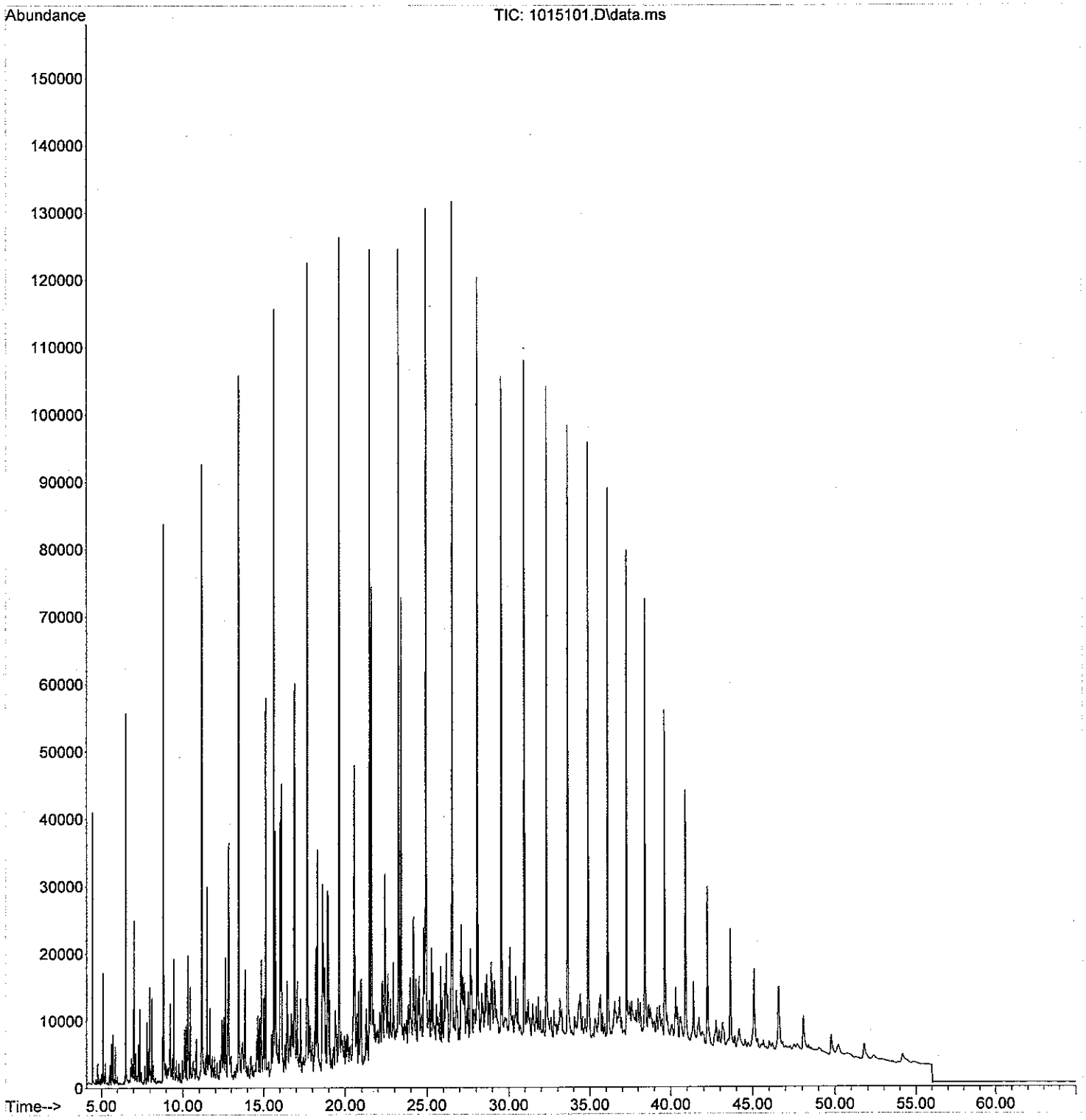
Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
Target Compounds					Qvalue
1) 85-SATURATED HYDROCARBONS	18.750	85	473219	No Calib	
2) n-C17	0.000	85	0	N.D.	
3) PRISTANE	0.000	85	0	N.D.	
4) n-C18	0.000	85	0	N.D.	
5) PHYTANE	0.000	85	0	N.D.	
6) 113-SATURATED HYDROCAR...	0.000	113	0	N.D.	
7) ACYCLIC ISOPRENOIDS/AL...	0.000	183	0	N.D.	
8) C2-NAPHTHALENES	16.759	156	129263	No Calib	
9) C3-NAPHTHALENES	19.409	170	165274	No Calib	
10) C4-NAPHTHALENES	0.000	184	0	N.D.	
11) PHENANTHRENE/ANTHRACENE	0.000	178	0	N.D.	
12) BENZONAPHTHIOPHENE	32.114	234	68788	No Calib	
13) DIBENZOTHIOPHENE	22.437	184	202634	No Calib	
14) C1-DIBENZOTHIOPHENE	24.526	198	309629	No Calib	
15) C2-DIBENZOTHIOPHENE	26.493	212	156936	No Calib	
16) C3-DIBENZOTHIOPHENE	27.990	226	95119	No Calib	
17) C1-PHENANTHRENES	25.360	192	242952	No Calib	
18) C2-PHENANTHRENES	27.292	206	162902	No Calib	
19) C3-PHENANTHRENES	29.167	220	110945	No Calib	
20) TRITERPANES/HOPANES	41.405	191	192156	No Calib	
21) HOPANE A	0.000	191	0	N.D.	
22) HOPANE B	0.000	191	0	N.D.	
23) 14 a(H) STERANES	37.481	217	20878	No Calib	
24) 14 b(H) STERANES	0.000	218	0	N.D.	
25) TRI-AROMATIC STERANES	0.000	231	0	N.D.	
26) METHYLHOPANES	0.000	205	0	N.D.	
27) NORHOPANES	0.000	177	0	N.D.	
28) PYRENE/FLUORANTHENE	28.918	202	39658	No Calib	
29) METHYL PYRENE	30.436	216	19351	No Calib	
30) FLUORENE	0.000	166	0	N.D.	
31) BICYCLONAPHTHALENES	0.000	208	0	N.D.	
32) CHRYSENE	0.000	228	0	N.D.	
33) C1-CHRYSENE	34.694	242	61081	No Calib	
34) C2-CHRYSENE	36.744	256	27357	No Calib	
35) C3-CHRYSENE	0.000	270	0	N.D.	
36) C4-CHRYSENE	0.000	284	0	N.D.	
37) SESQUITERPANES	0.000	123	0	N.D.	

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (Not Reviewed)

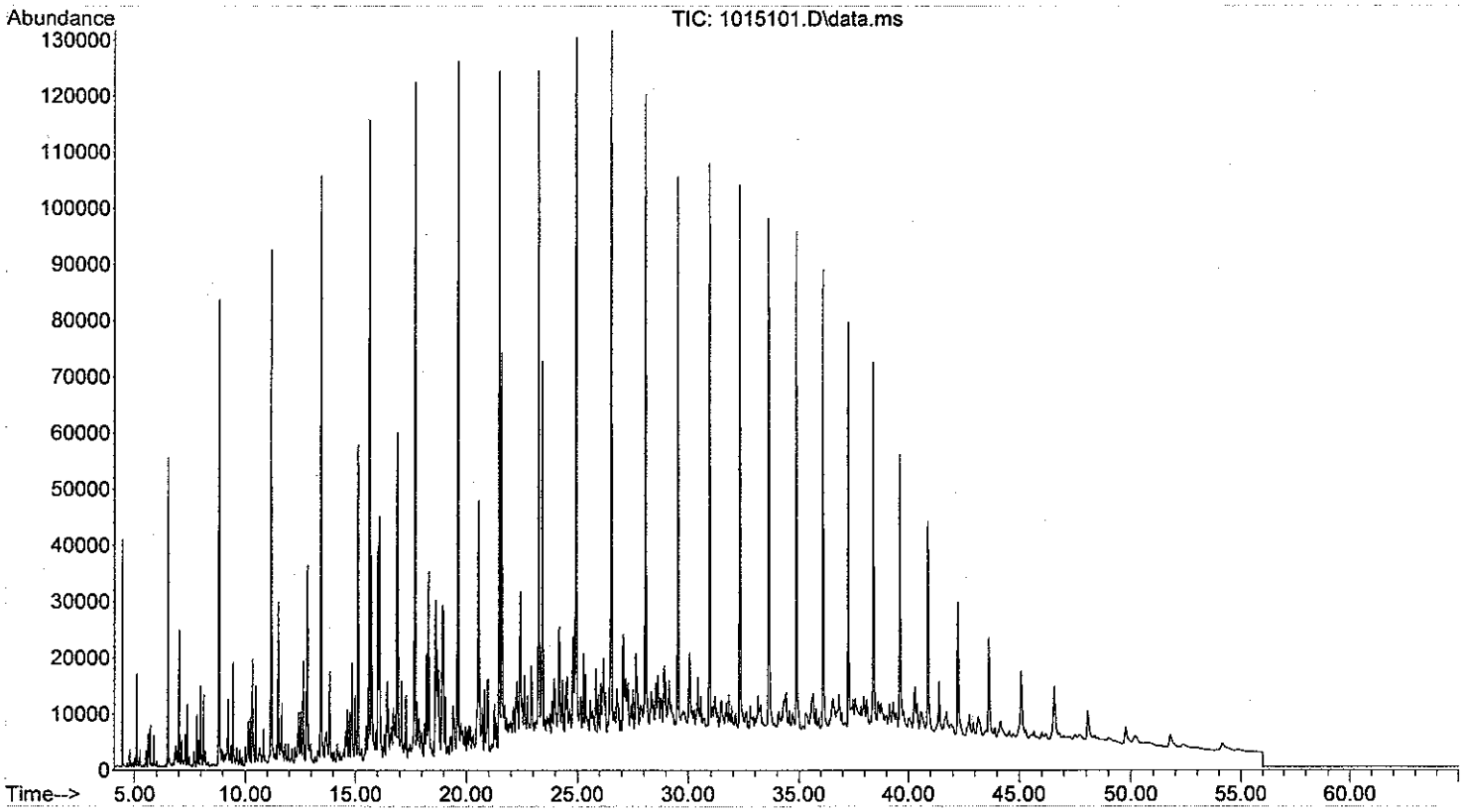
Data Path : W:\2010\MS_DATA\10-159\
Data File : 1015101.D
Acq On : 25 Jun 2010 7:18 pm
Operator : ACT
Sample : 10-151-1, SP
Misc :
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Jun 25 20:12:03 2010
Quant Method : C:\MSDCHEM\1\METHODS\BIOMARK3.M
Quant Title :
QLast Update : Wed May 27 09:43:48 2009
Response via : Initial Calibration

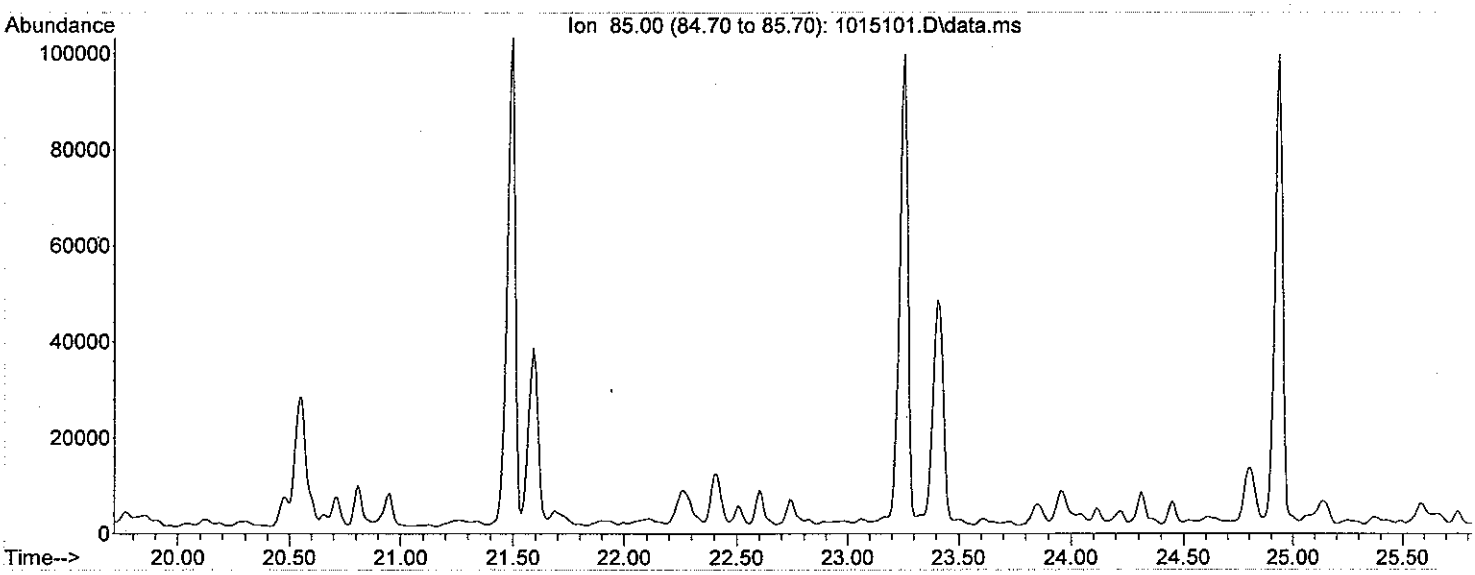


MARINE SAFETY LABORATORY GC-MS2 BIOMARKER ANALYSIS

File: \\Mslserver1\data archive\2010\MS_data\10-159\1015101.D
Operator: ACT
Date Acquired: 25 Jun 2010 7:18 pm
Method File: BIOMARK3.M
Sample Name: 10-151-1, SP Vial: 6
Misc Info:



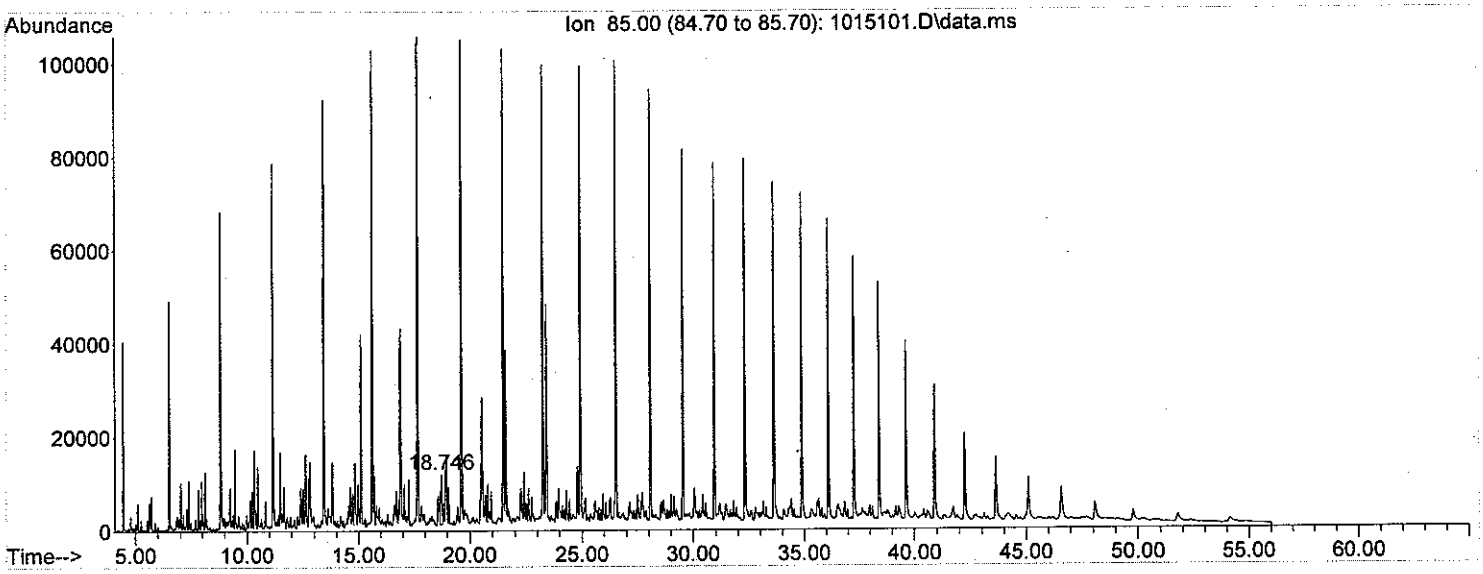
n-C17, Pristane, n-C18, Phytane



Pristane/Phytane = 0.702
C17/C18 = 0.987
Pristane/C17 = 0.405
Phytane/C18 = 0.569

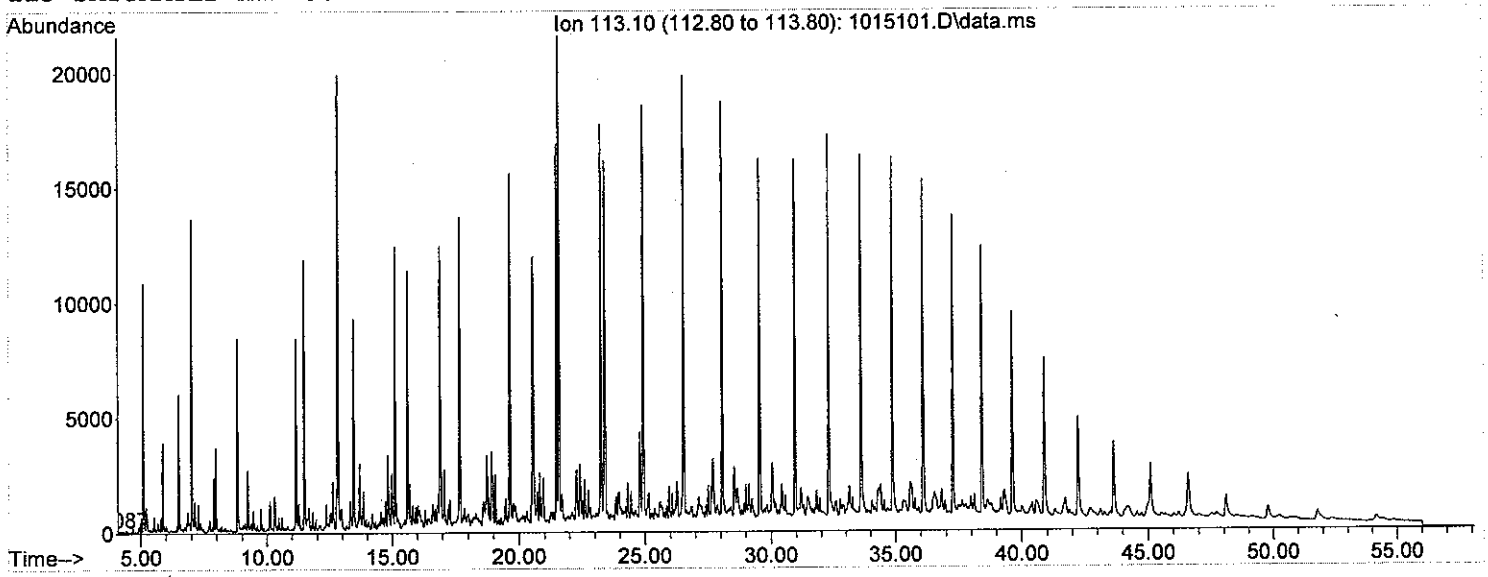
85-SATURATED HYDROCARBONS

Area = 473219



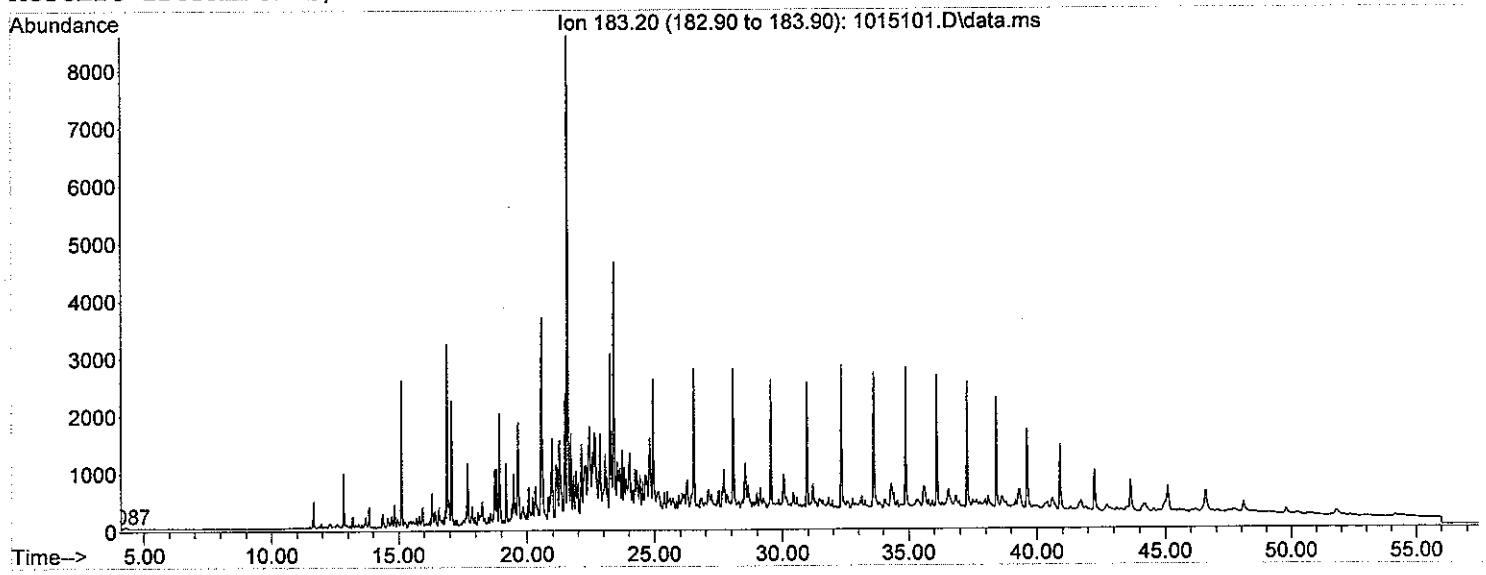
113-SATURATED HYDROCARBONS

Area = 0



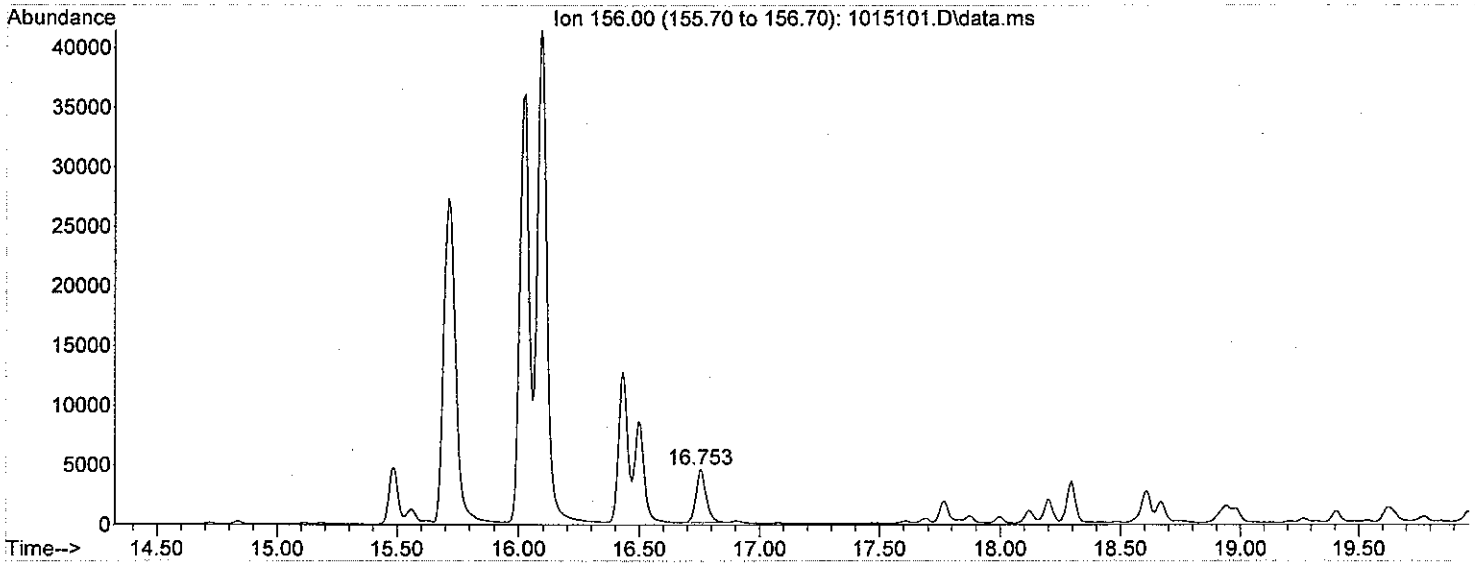
ACYCLIC ISOPRENOIDS/ALKANES

Area = 0



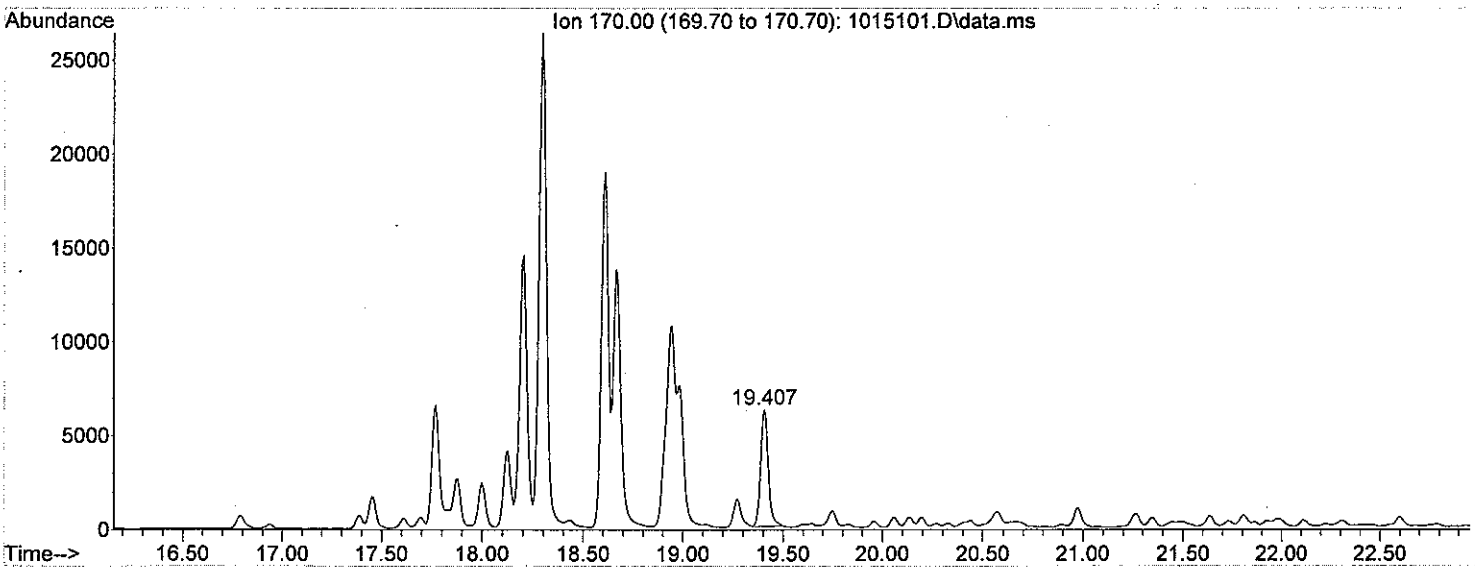
C2-NAPHTHALENES

Area = 129263



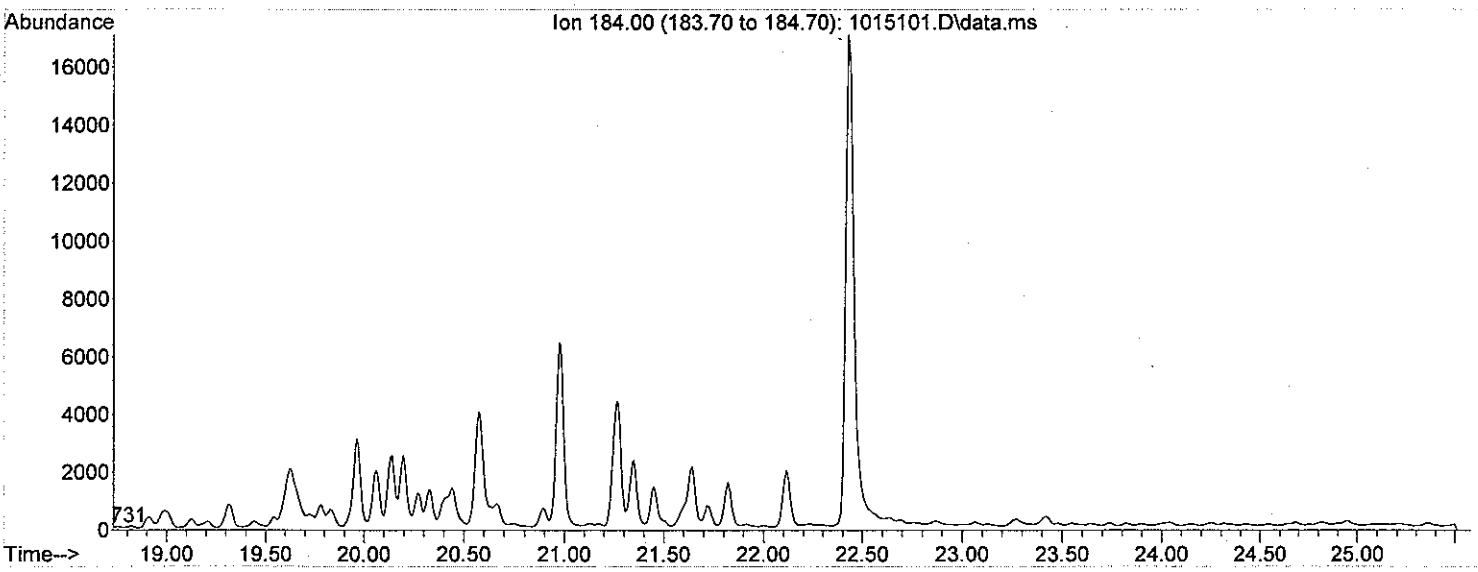
C3-NAPHTHALENES

Area = 165274



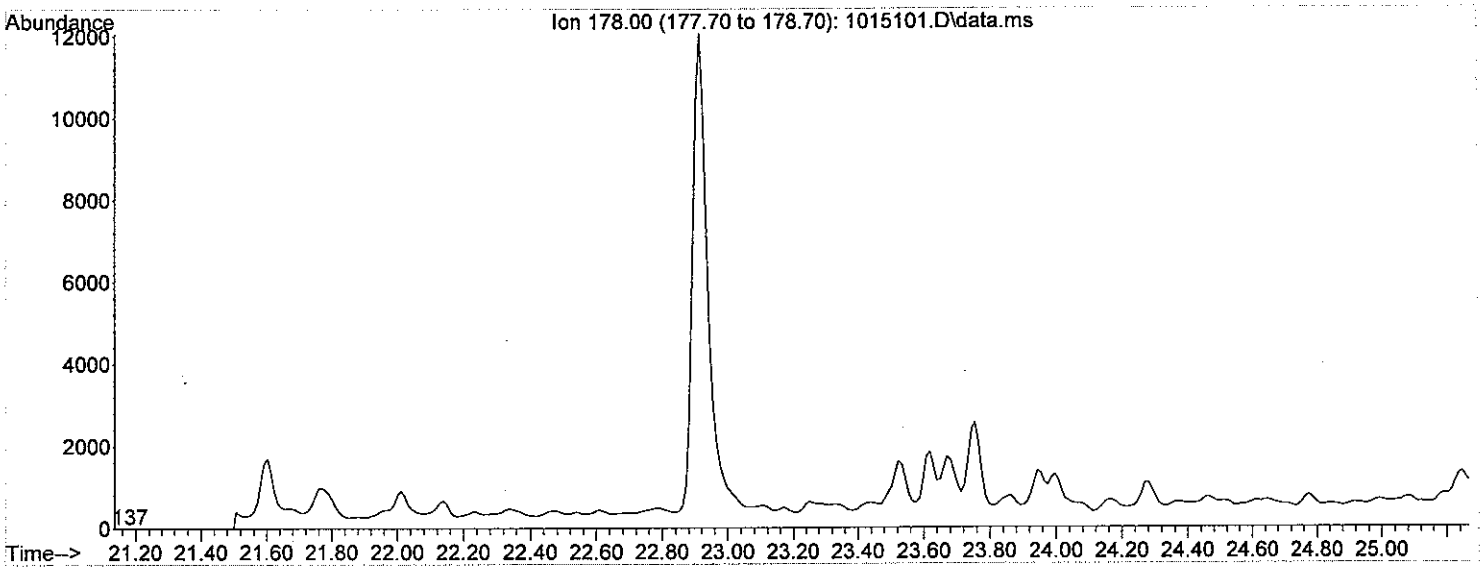
C4-NAPHTHALENES

Area = 0



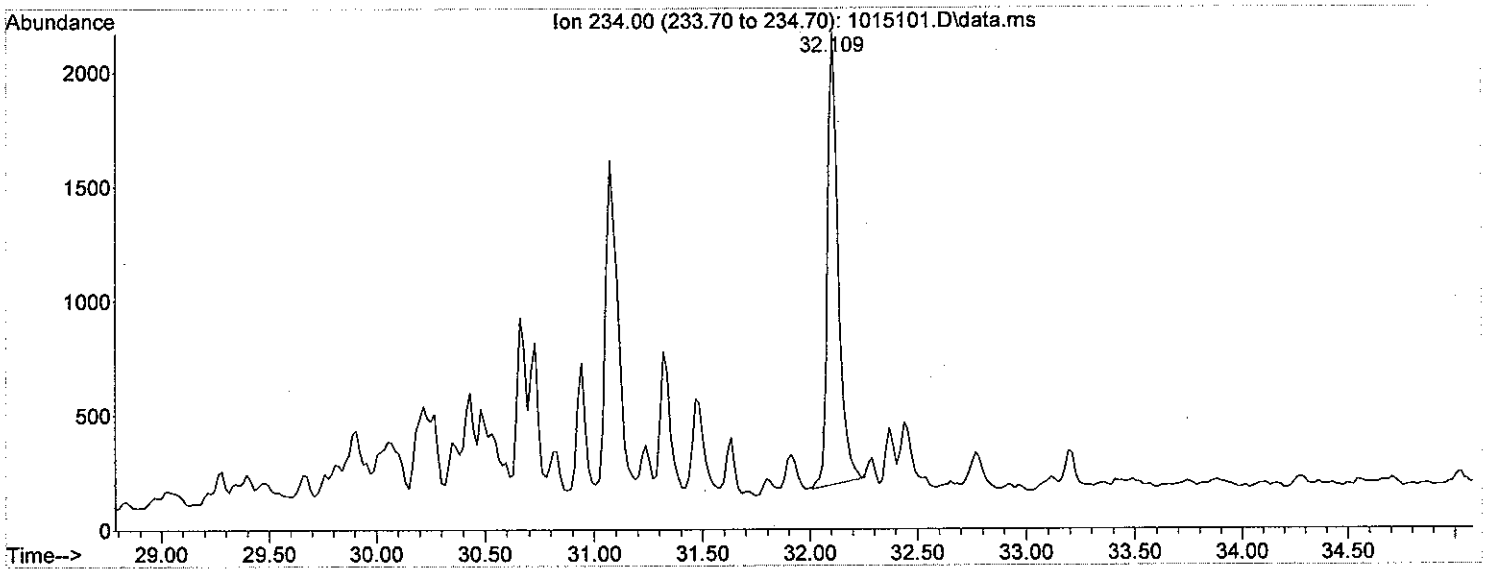
PHENANTHRENE/ANTHRACENE

Area = 0



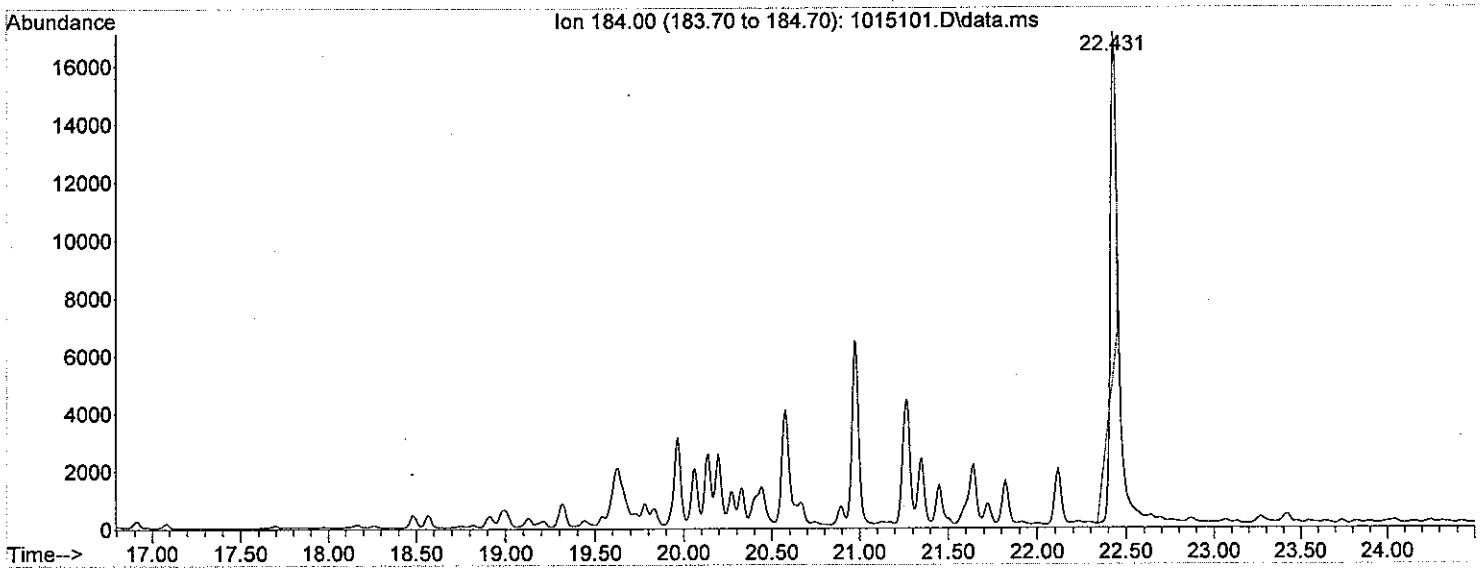
BENZONAPHTHIOPHENE

Area = 68788.4



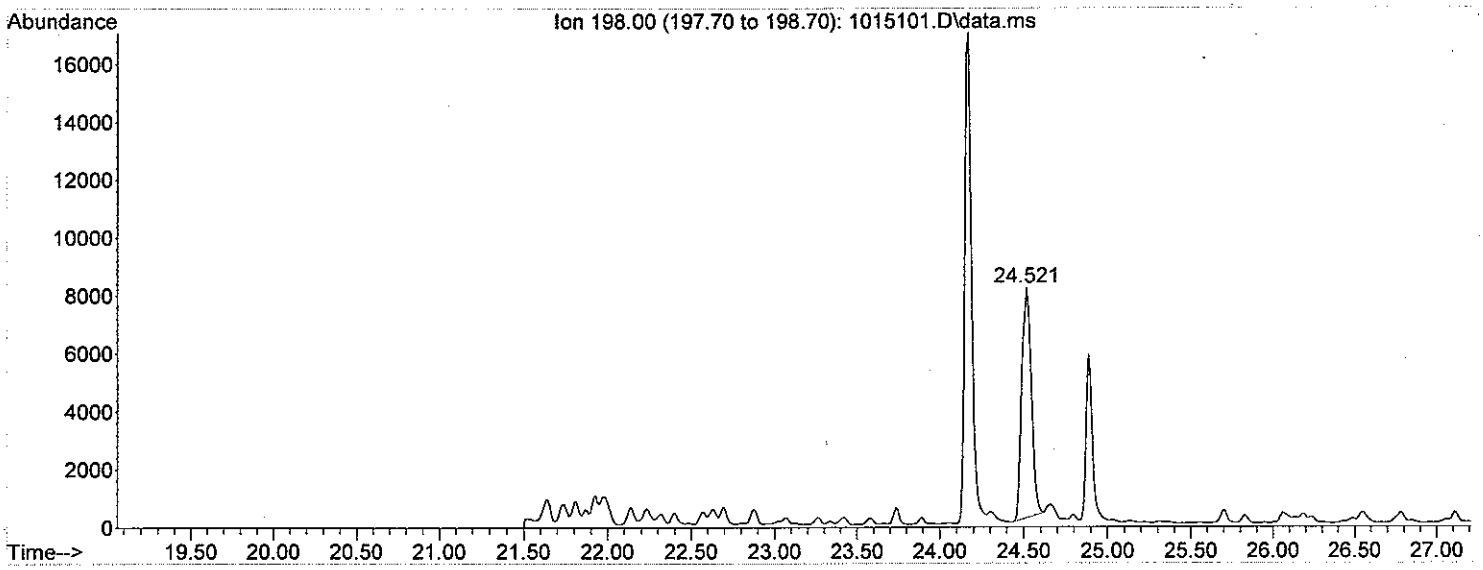
DIBENZOTHIOPHENE

Area = 202634



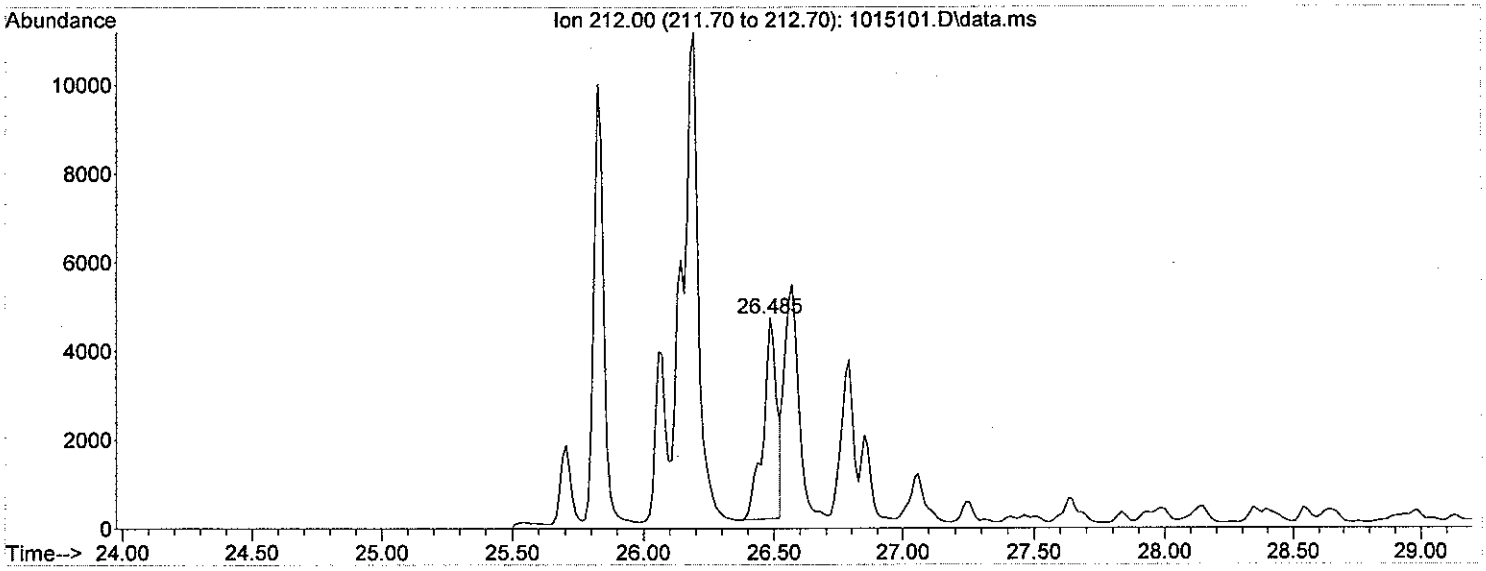
C1-DIBENZOTHIOPHENE

Area = 309629



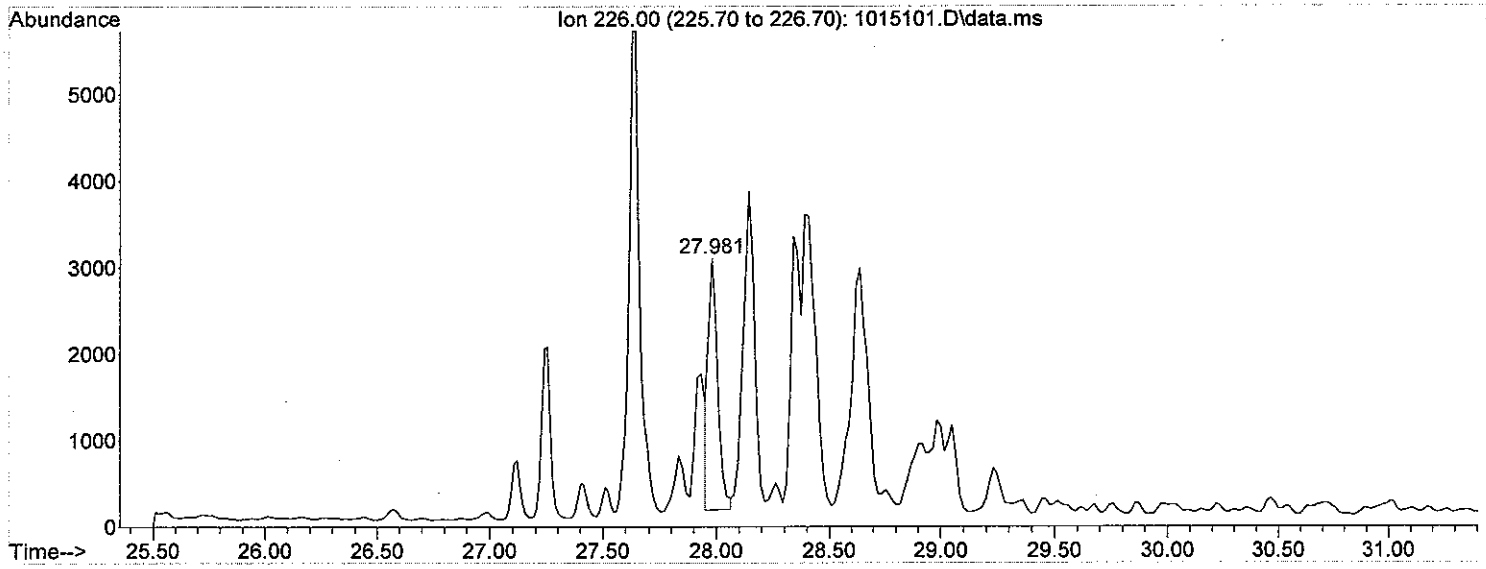
C2-DIBENZOTHIOPHENE

Area = 156936



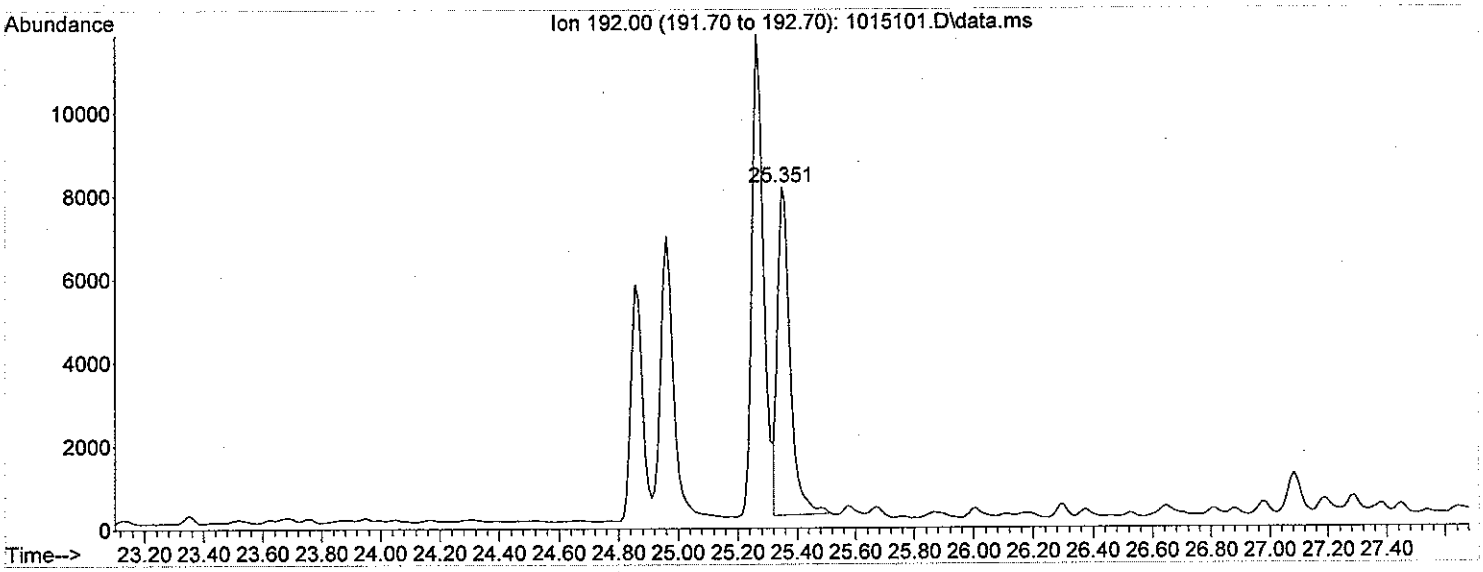
C3-DIBENZOTHIOPHENE

Area = 95118.8



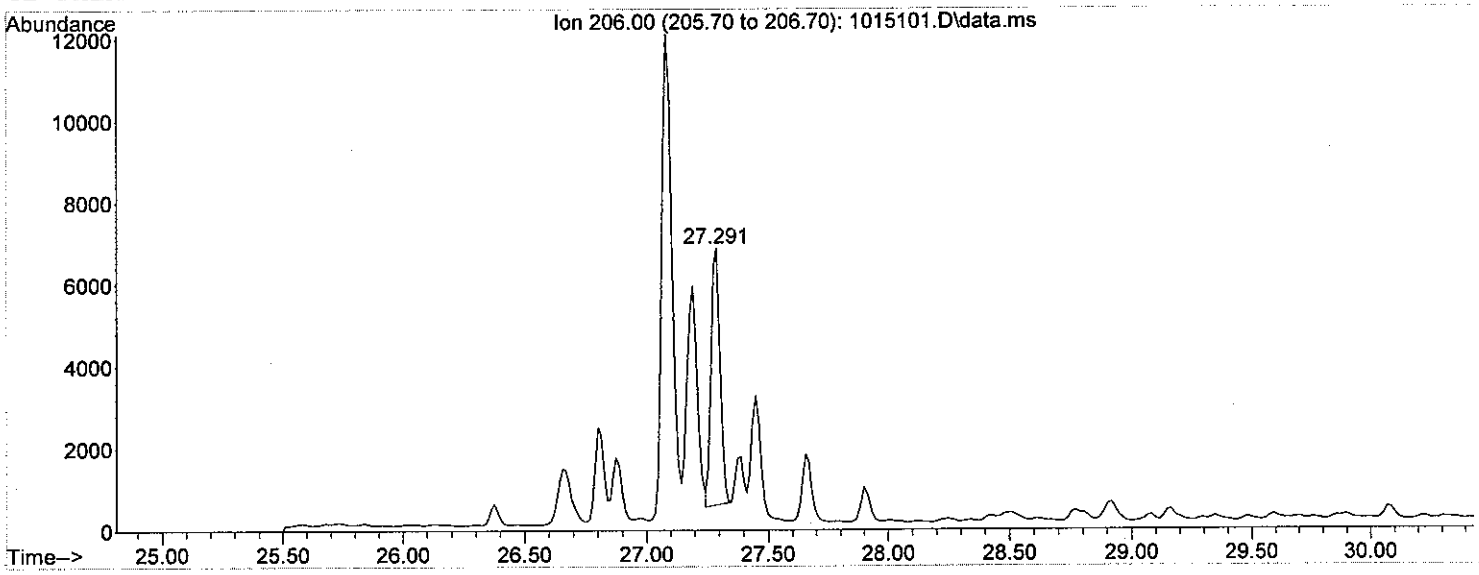
C1 - PHENANTHRENES

Area = 242952



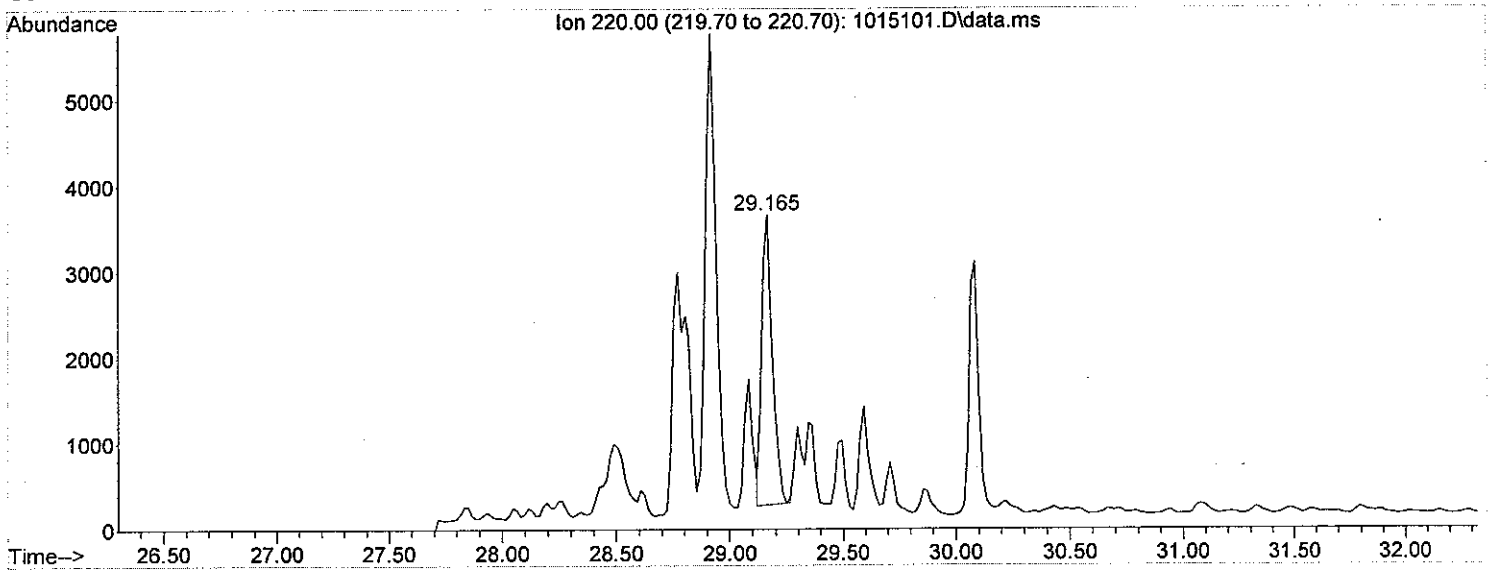
C2 - PHENANTHRENES

Area = 162902



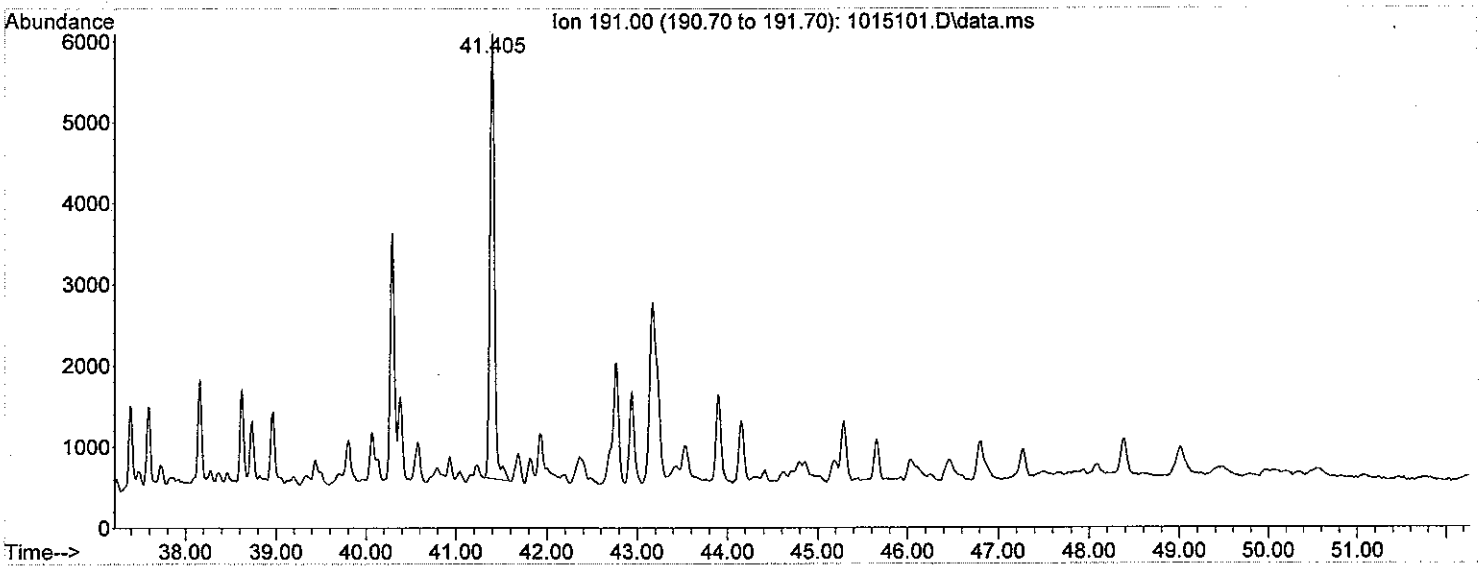
C3 - PHENANTHRENES

Area = 110945



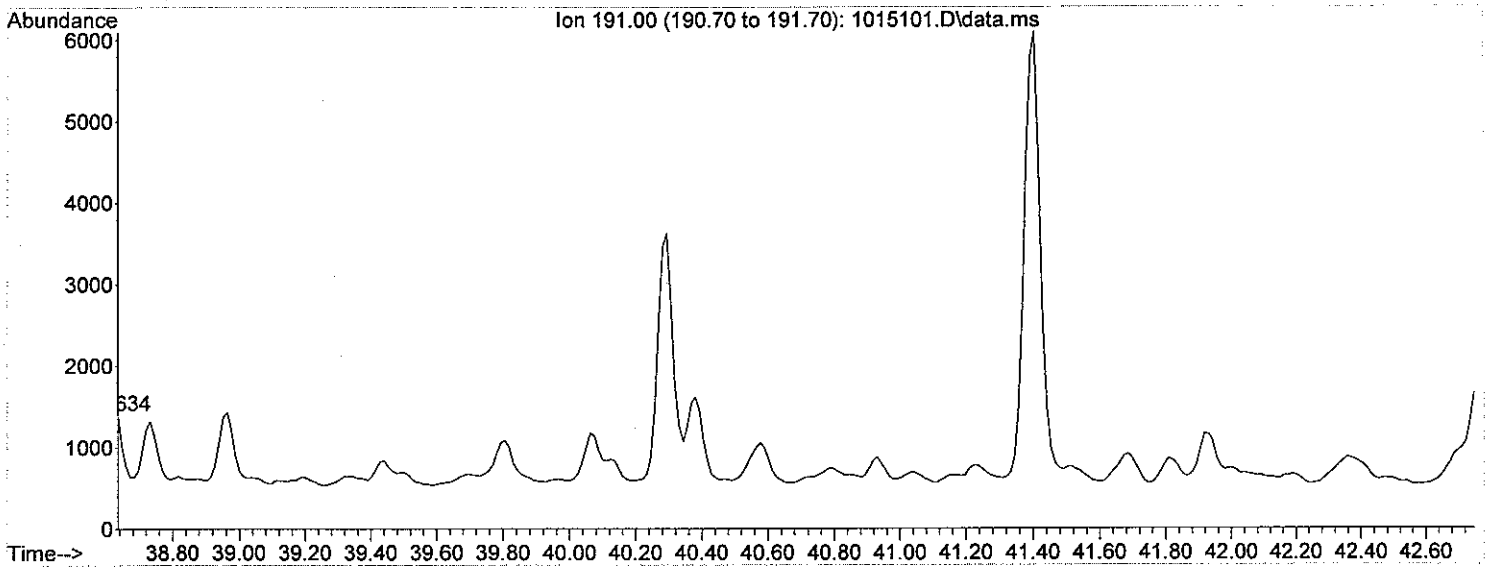
TRITERPANES/HOPANES

Area = 192156



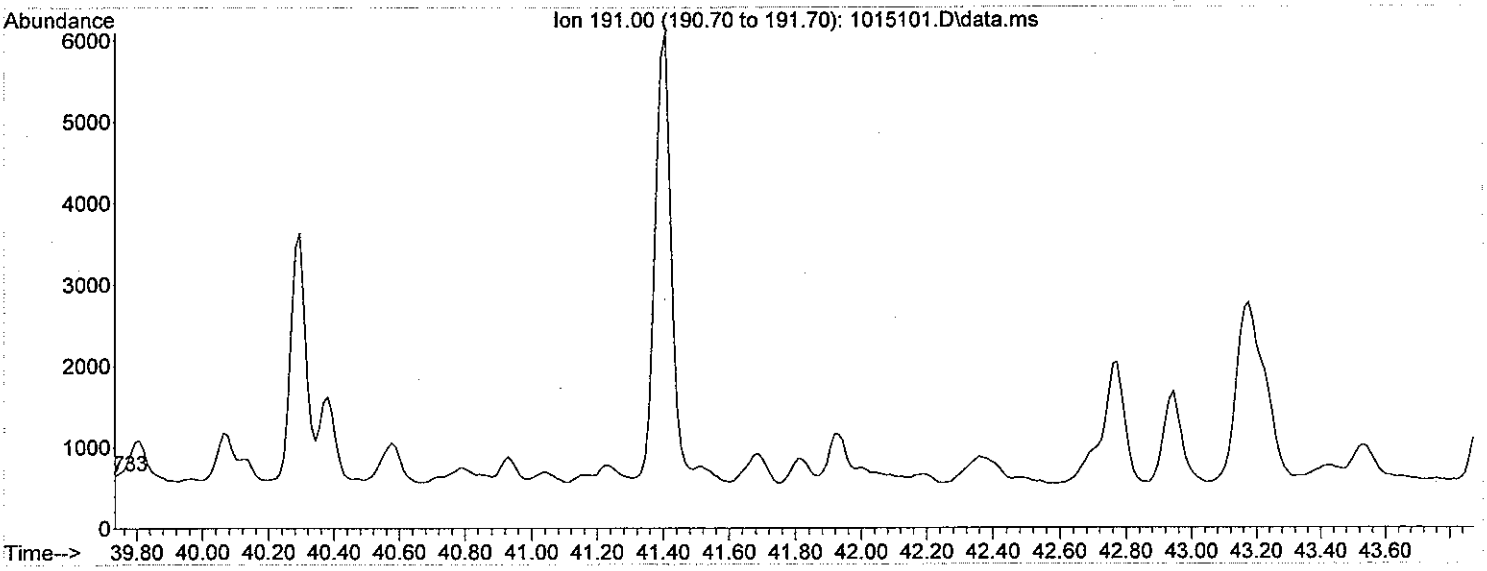
HOPANE A

Area = 0



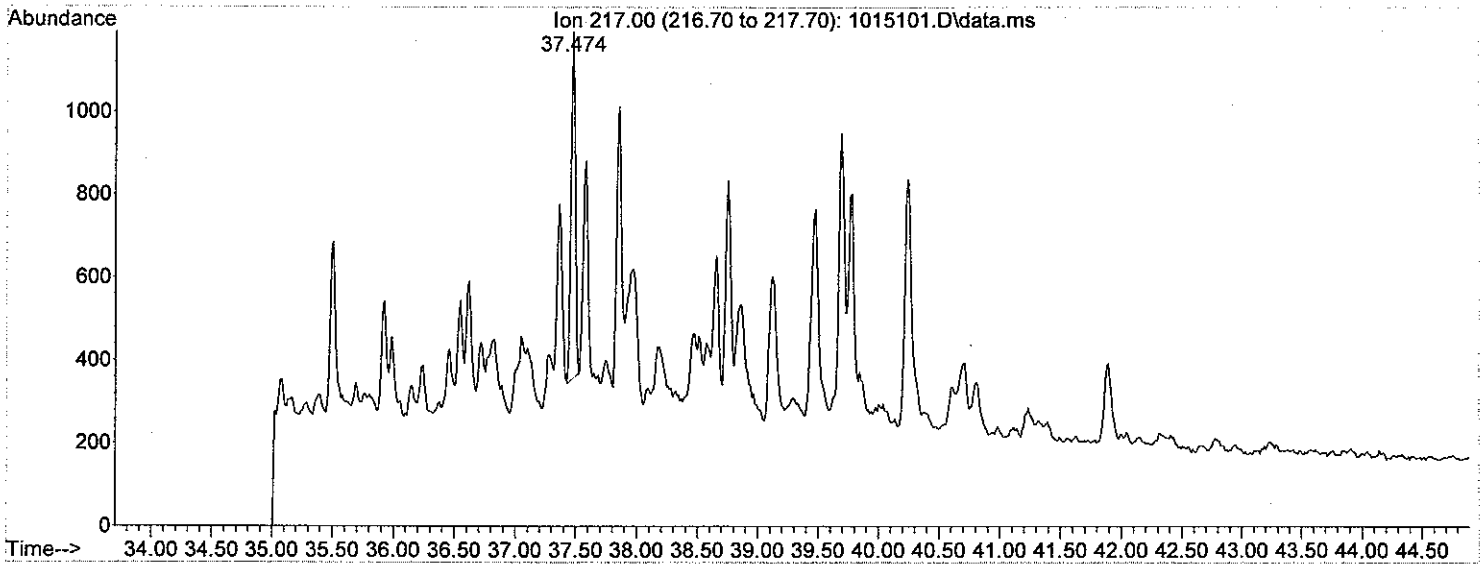
HOPANE B

Area = 0



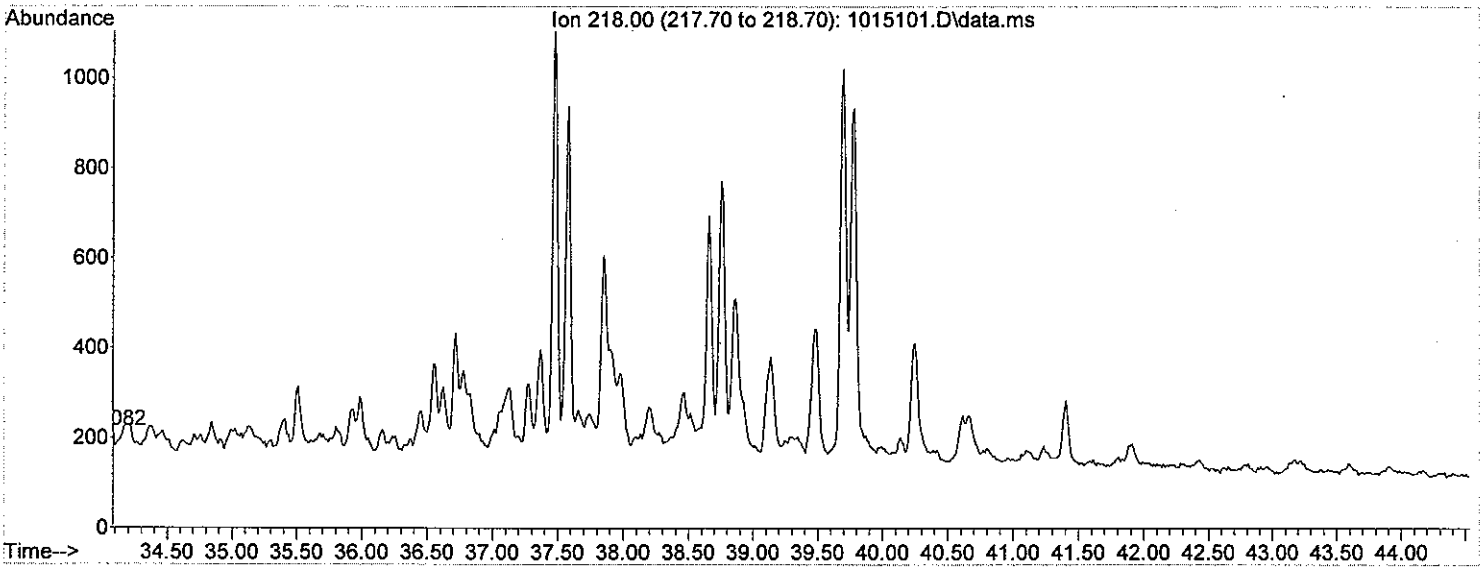
14 a(H) STERANES

Area = 20878.2



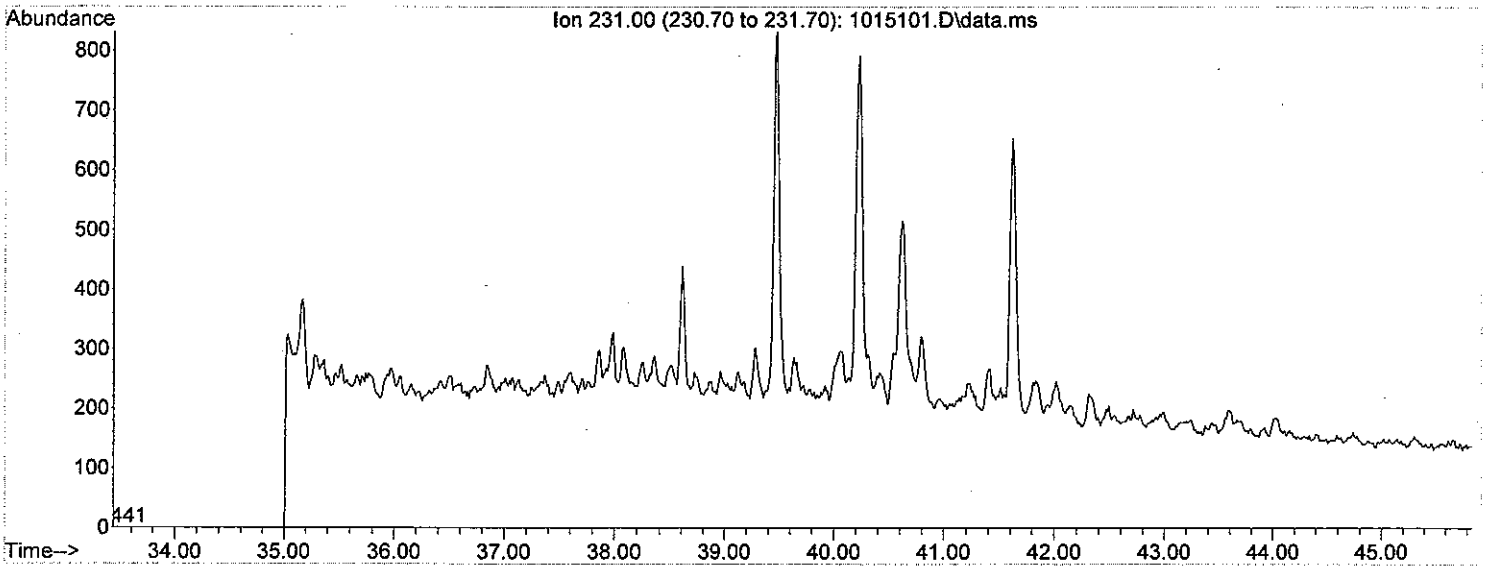
14 b(H) STERANES

Area = 0

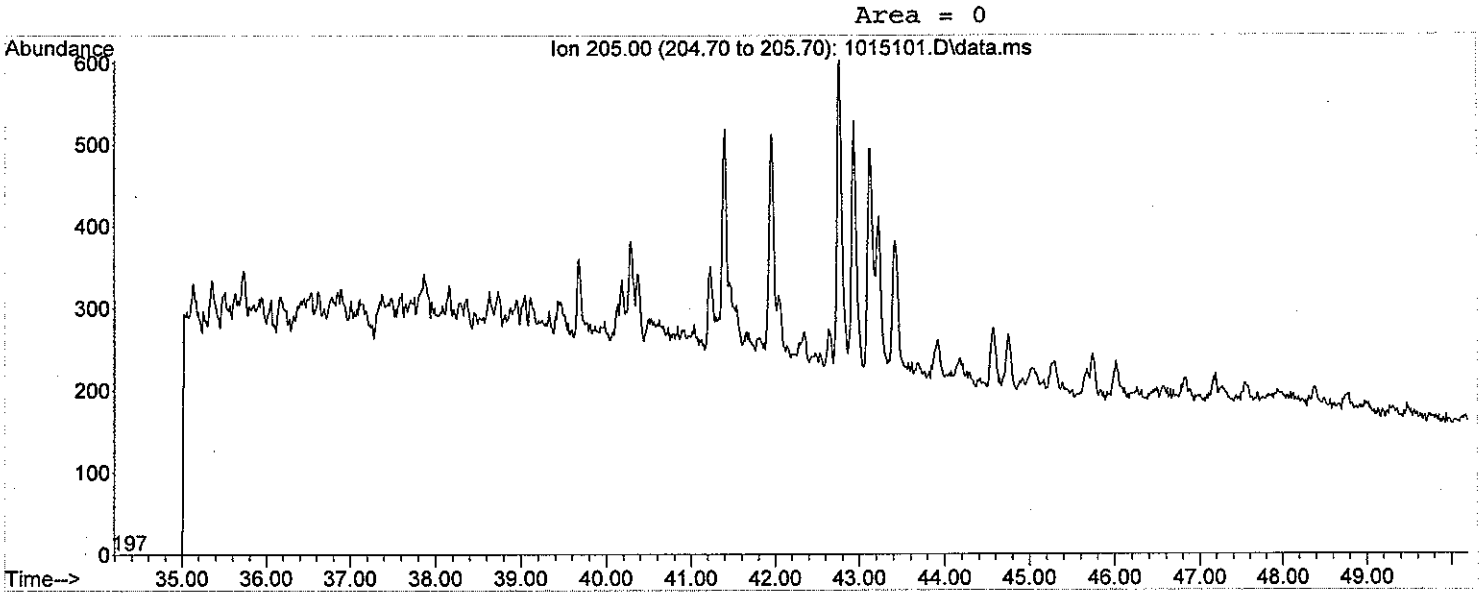


TRI-AROMATIC STERANES

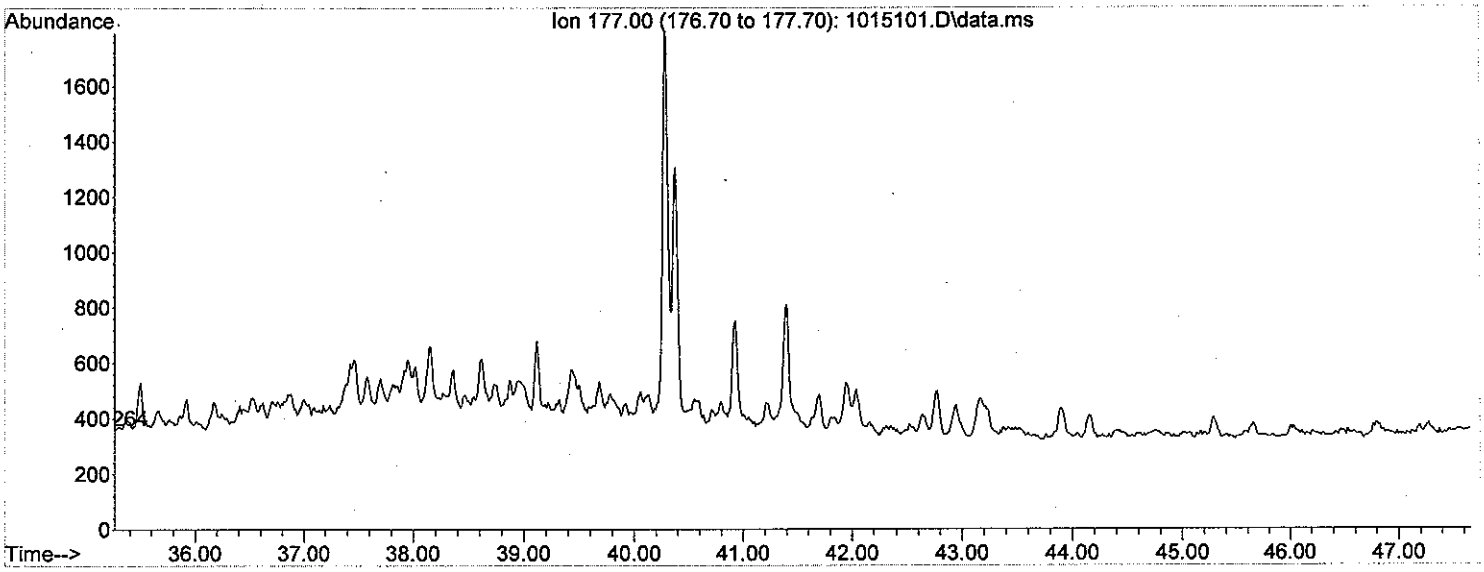
Area = 0



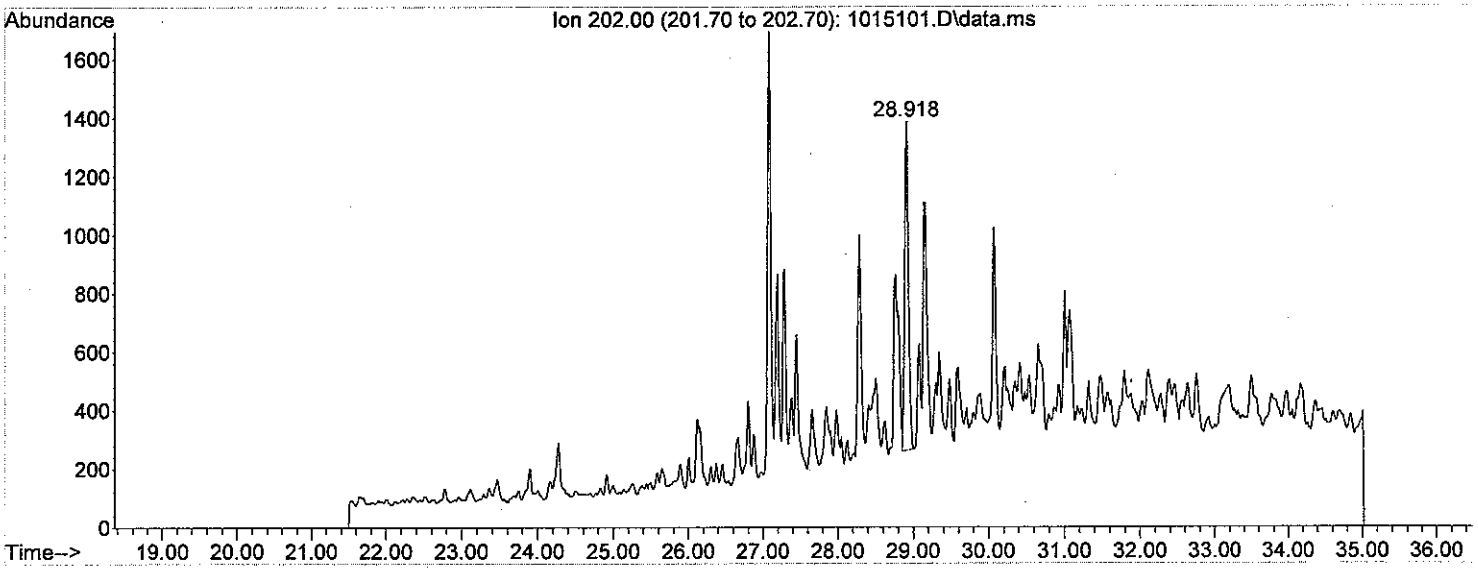
METHYLHOPANES



NORHOPANES

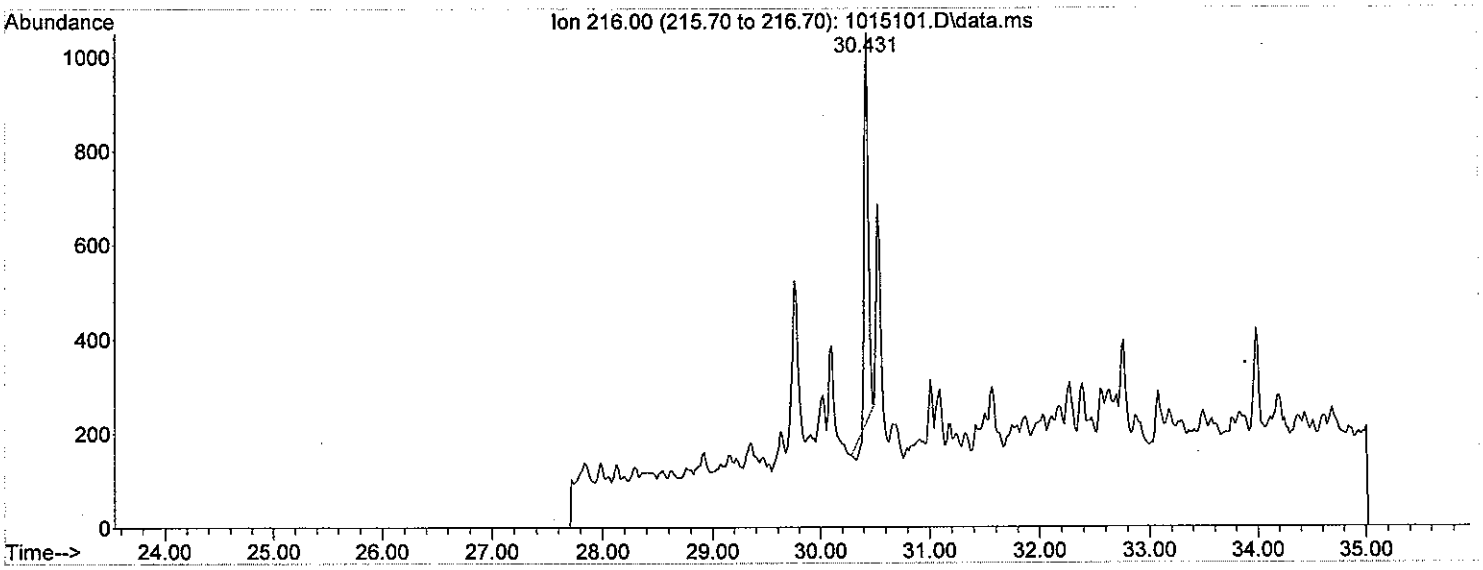


PYRENE/FLUORANTHENE



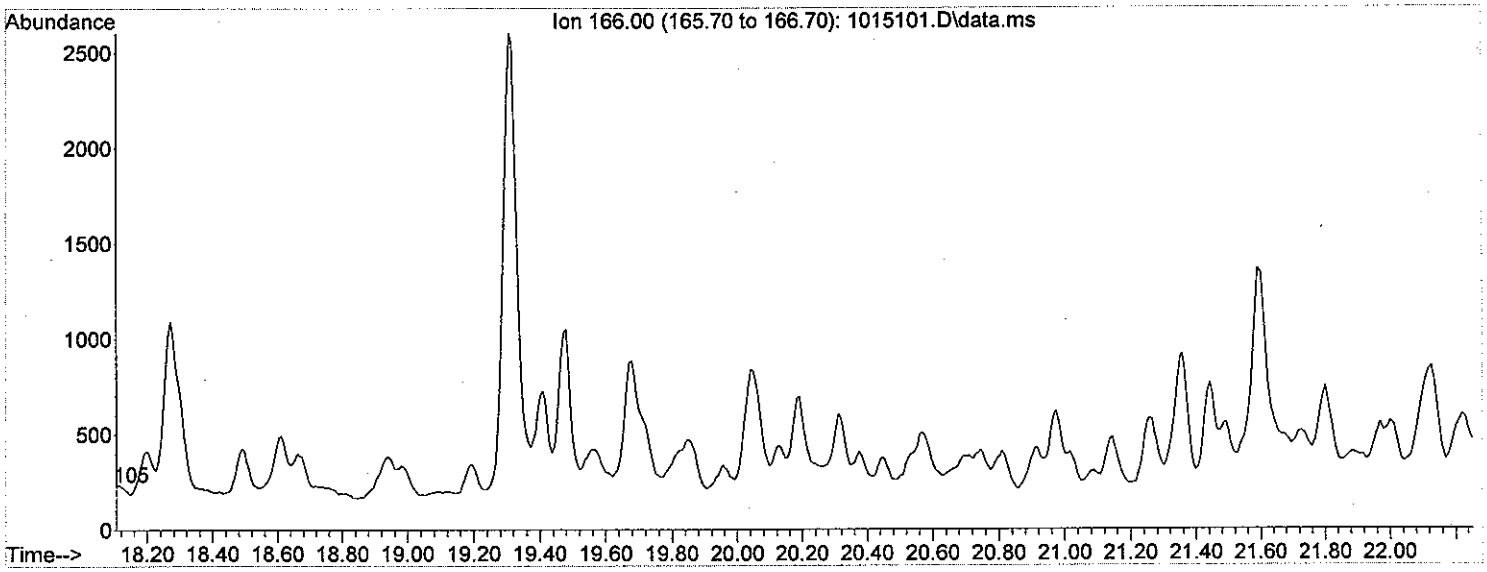
METHYL PYRENE

Area = 19351.2



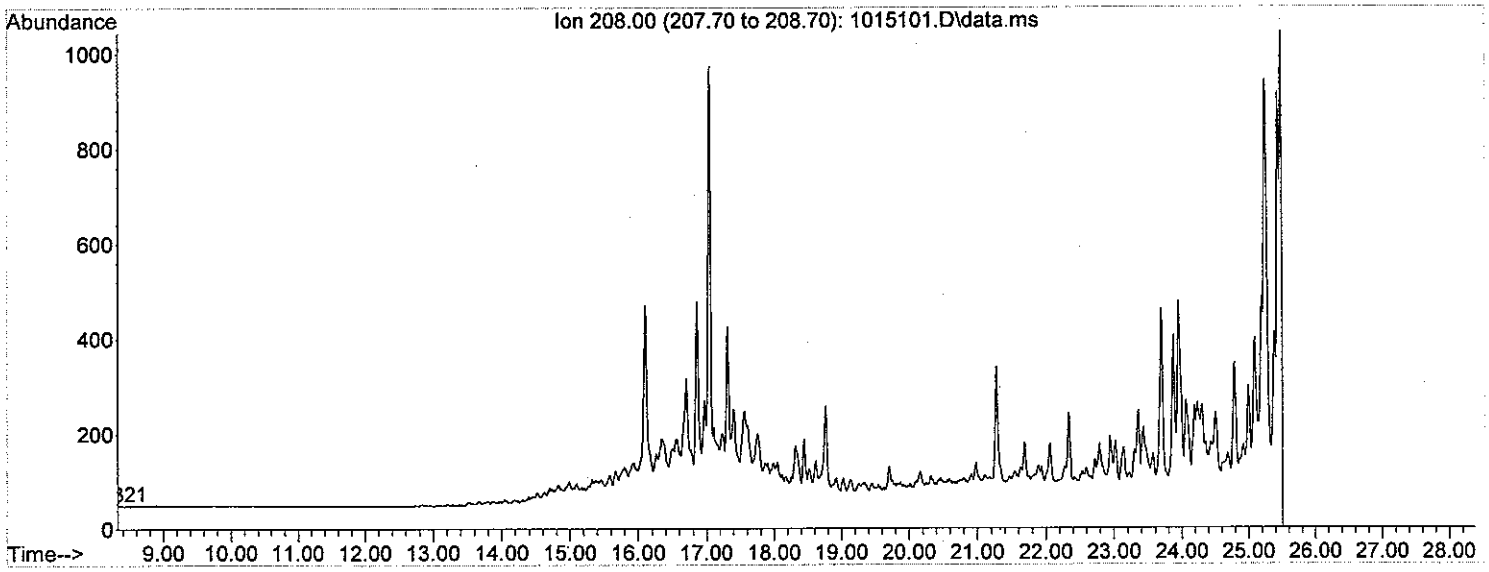
FLUORENE

Area = 0



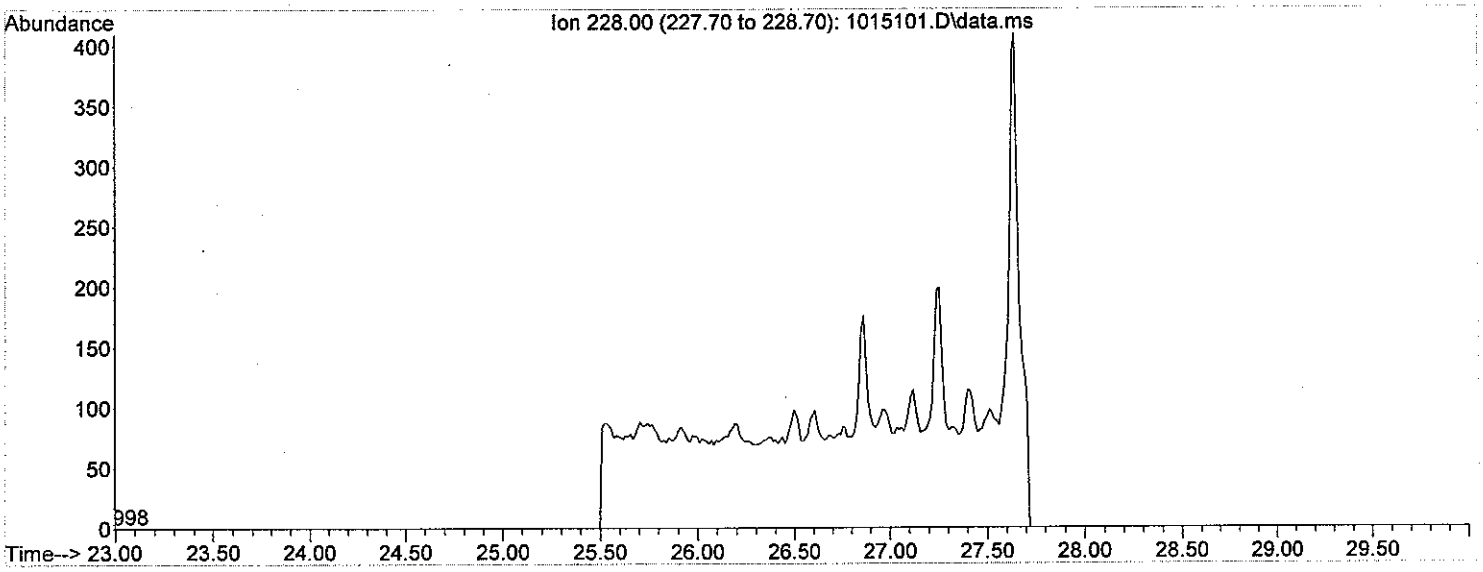
BICYCLONAPHTHALENES

Area = 0



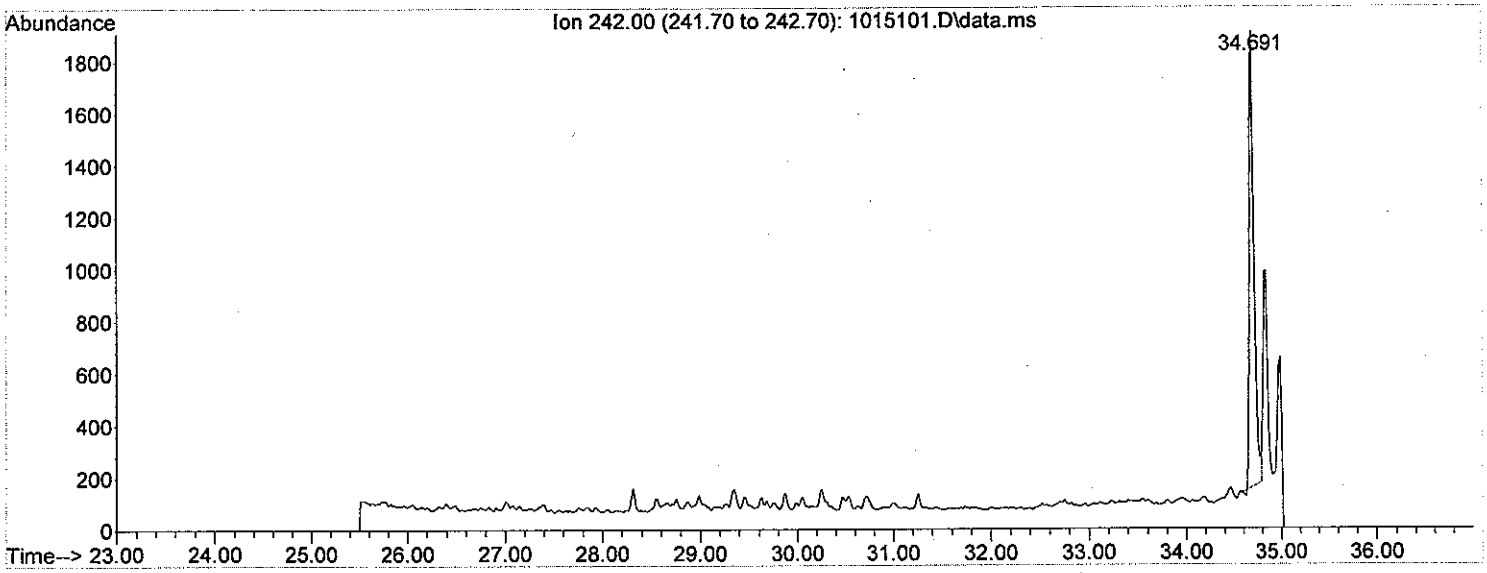
CHRYSENE

Area = 0



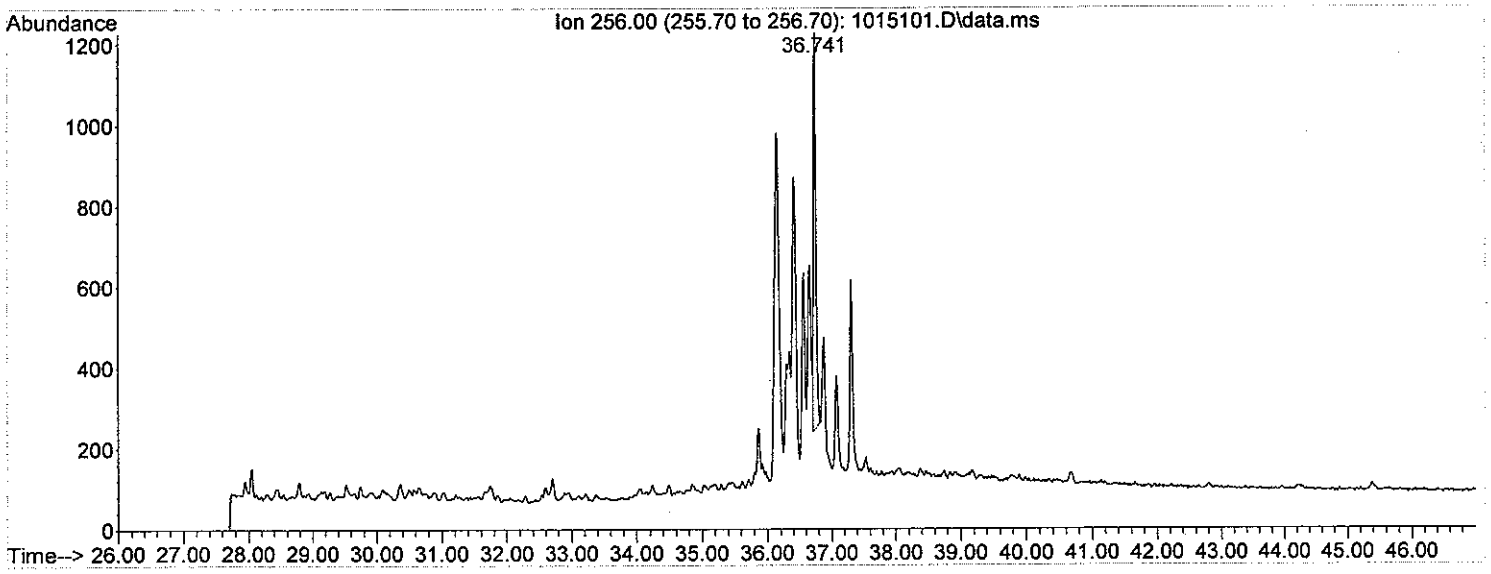
C1 - CHRYSENE

Area = 61080.8

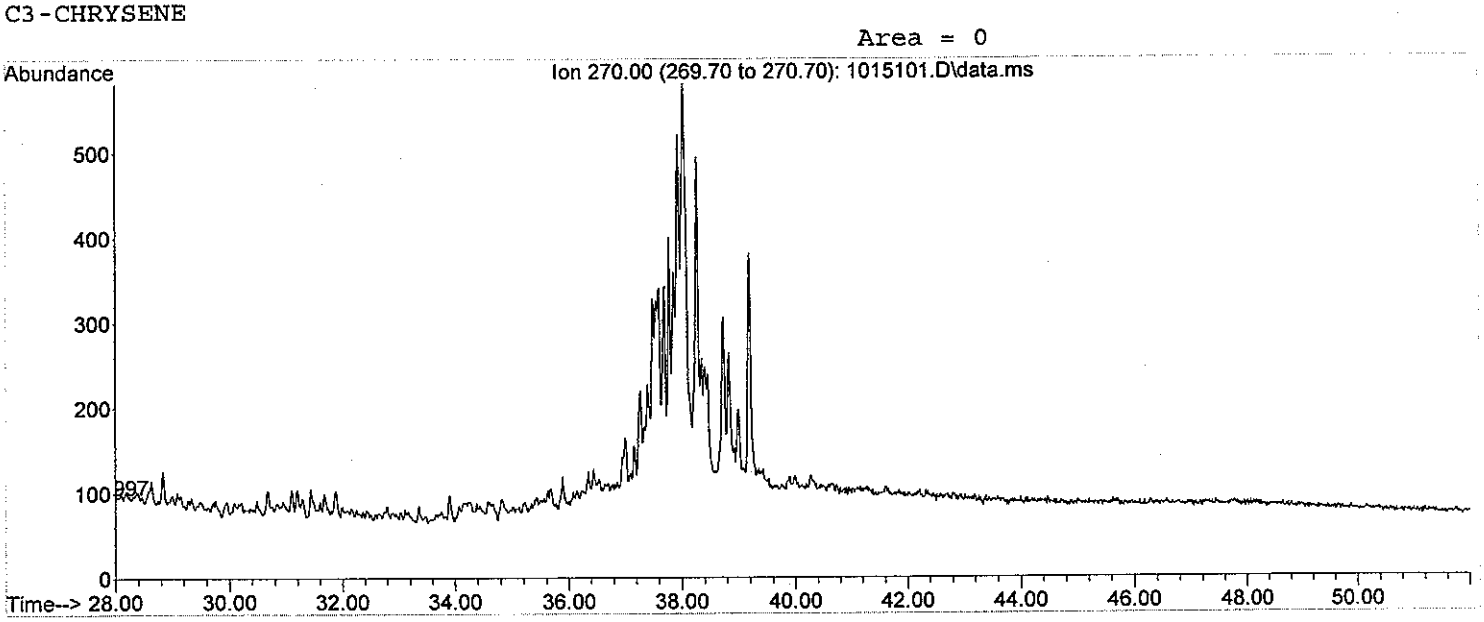


C2 - CHRYSENE

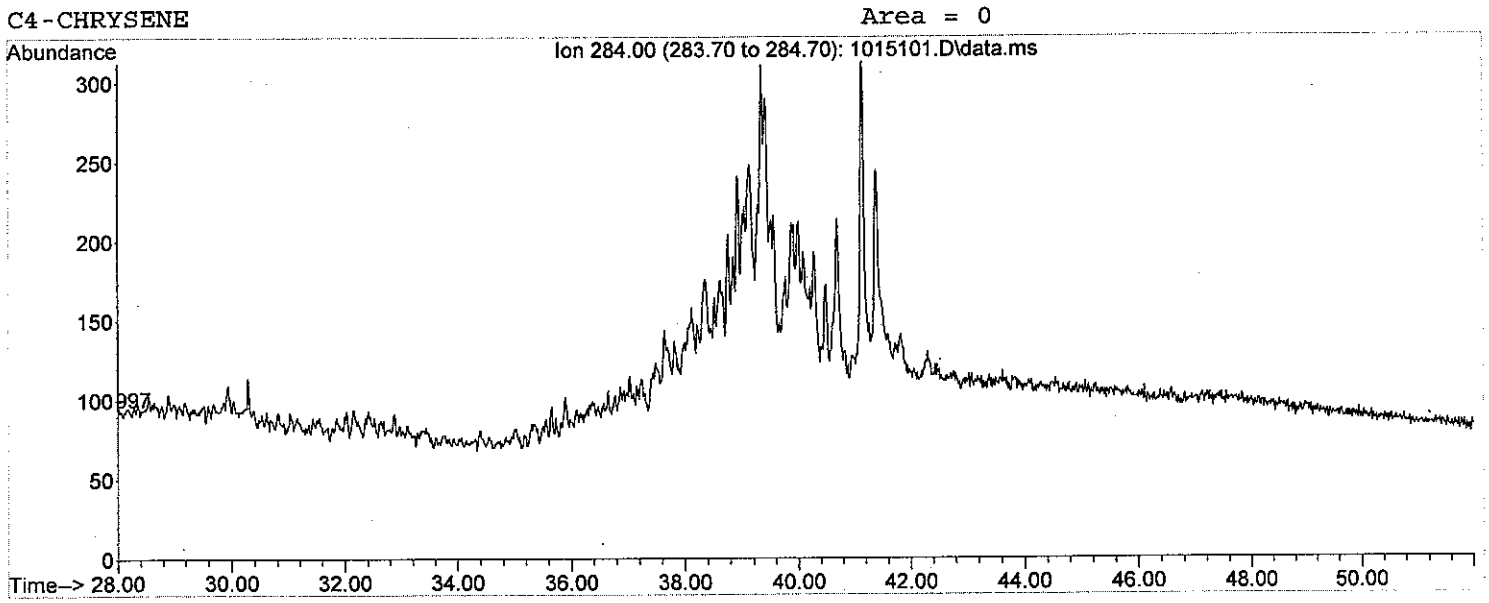
Area = 27357.5



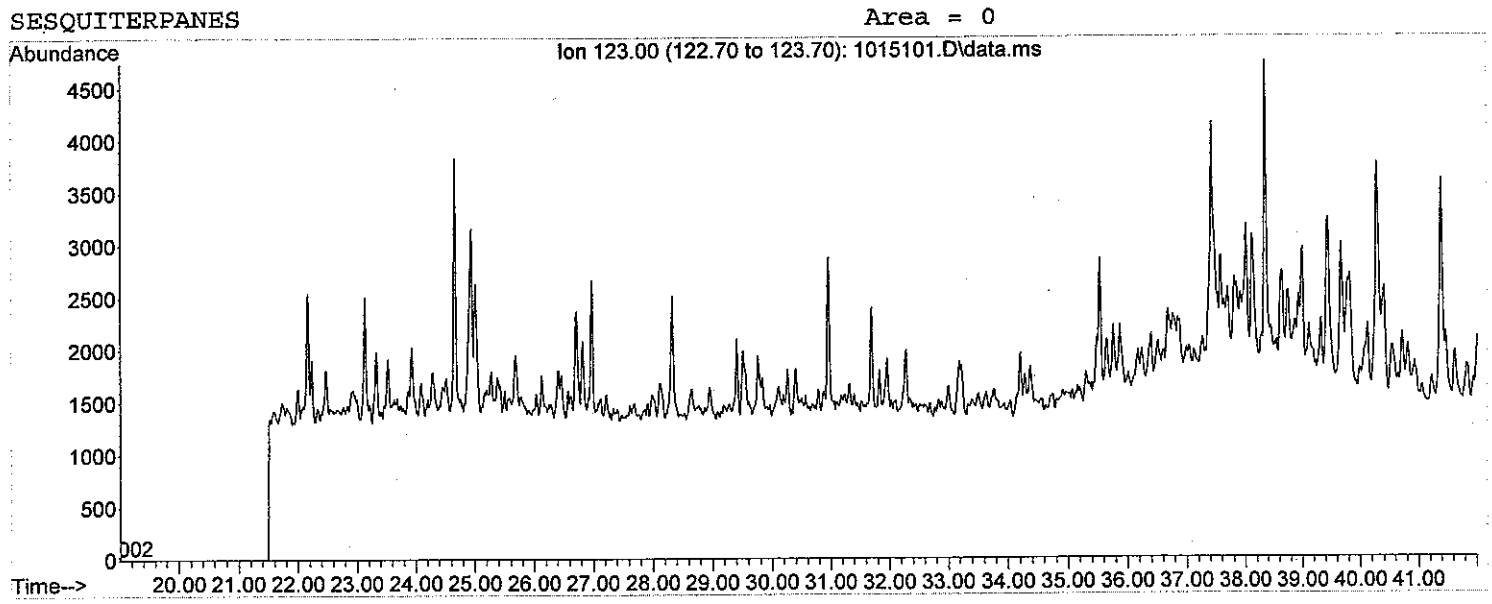
C3 - CHRYSENE



C4 - CHRYSENE

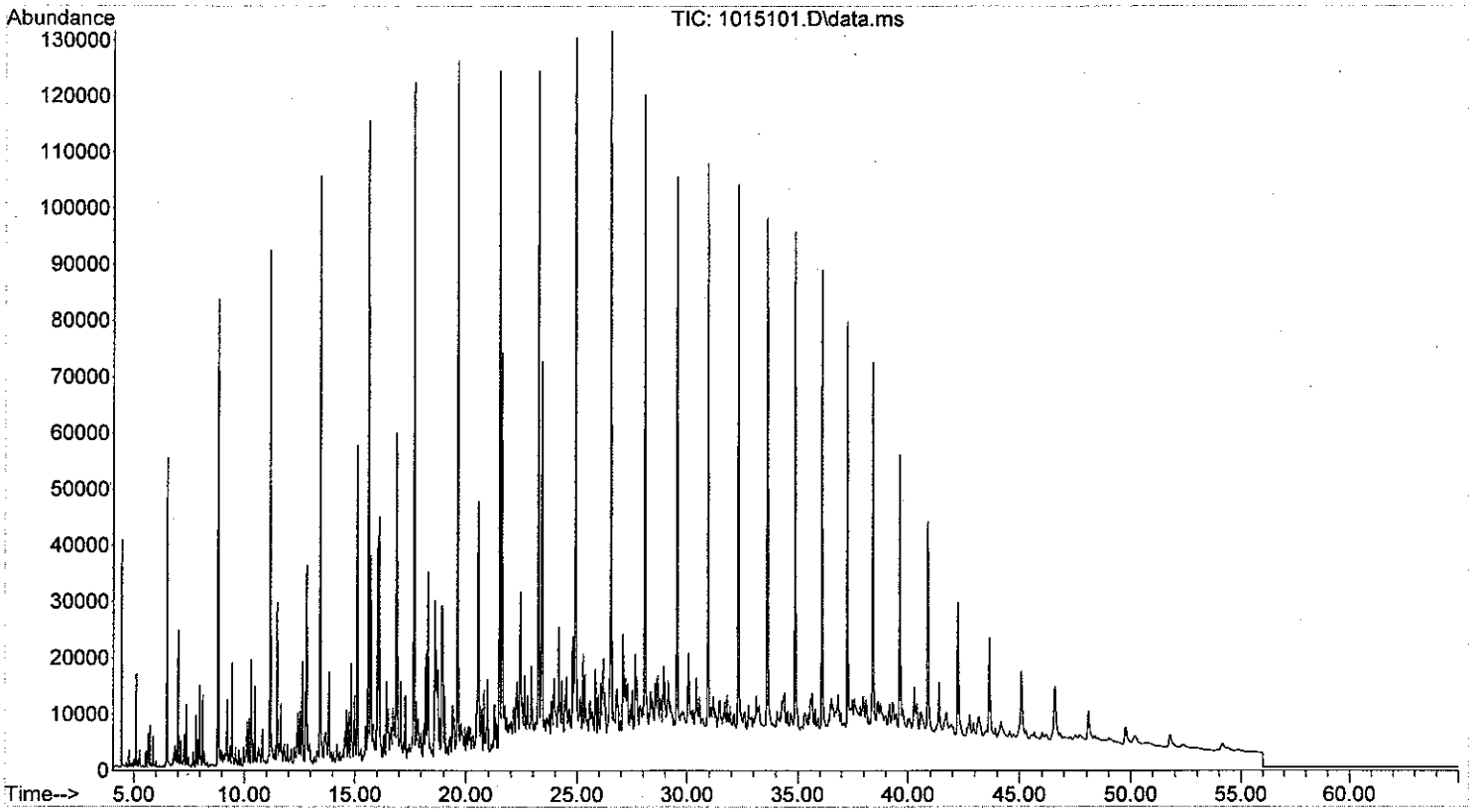


SESQUITERPANES

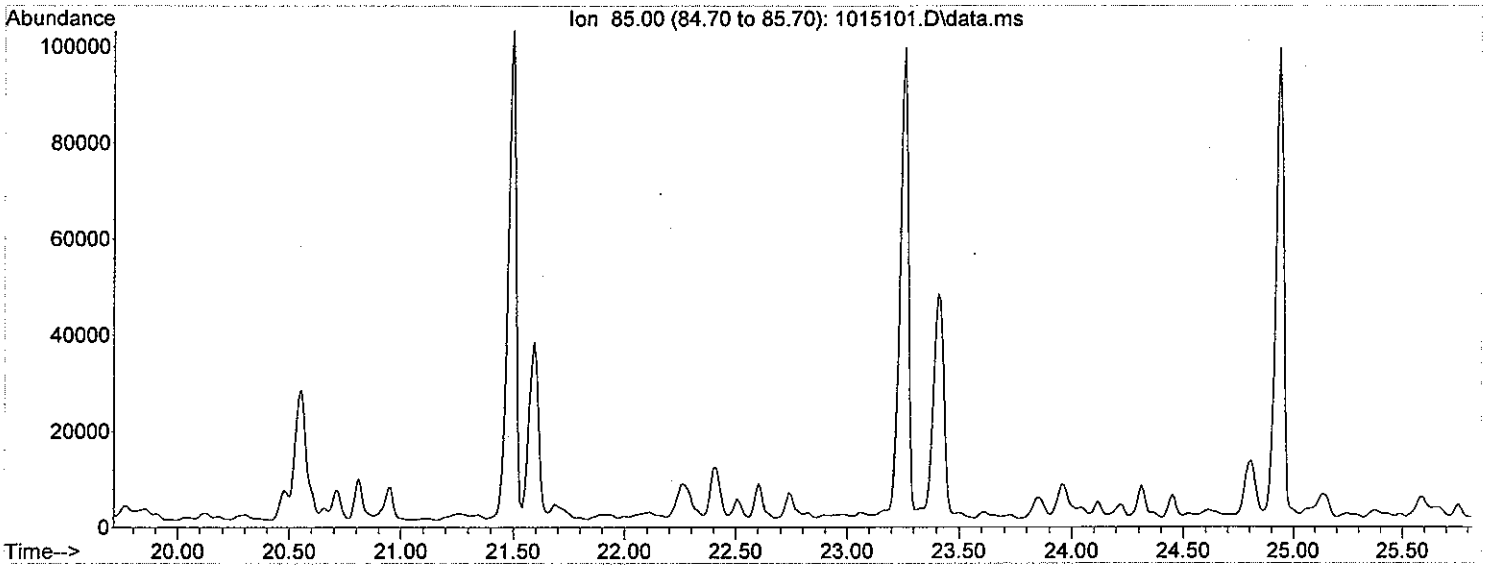


MSL GC-MS2 BIOMARKER ANALYSIS

File: W:\2010\MS_DATA\10-159\1015101.D
Operator: ACT
Date Acquired: 25 Jun 2010 7:18 pm
Method File: BIOMARK3.M
Sample Name: 10-151-1, SP Vial: 6
Misc Info:



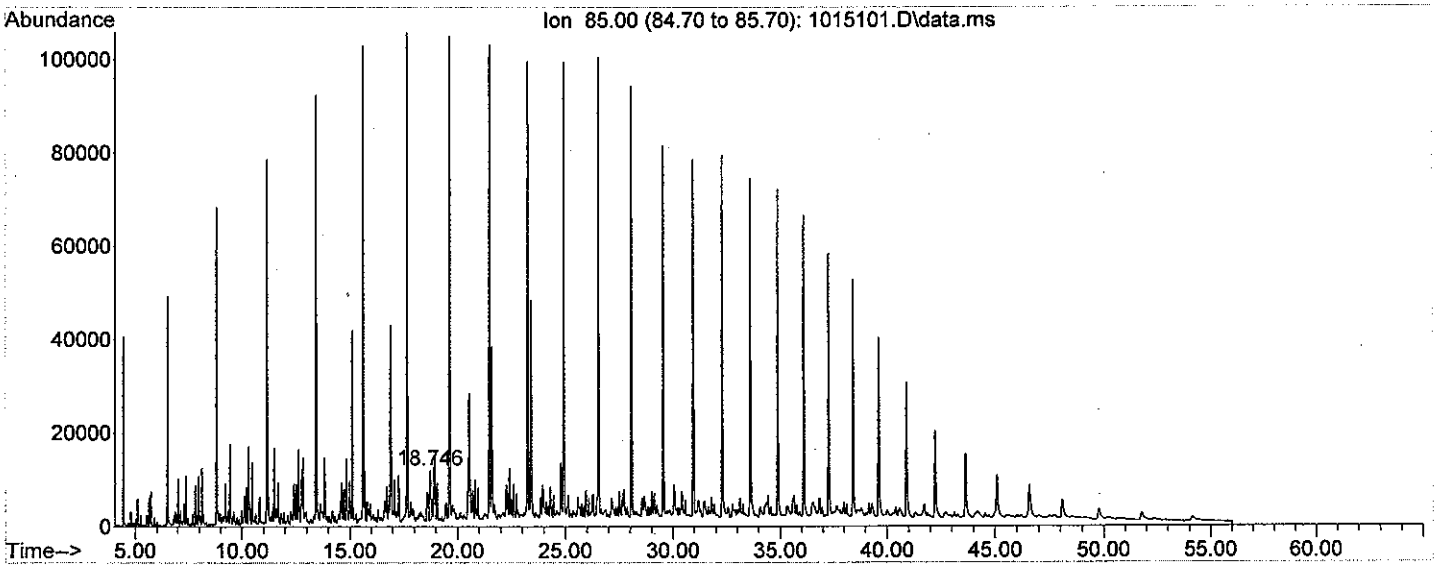
n-C17,Pristane,n-C18,Phytane



Pristane/Phytane = ----
C17/C18 = ----
Pristane/C17 = ----
Phytane/C18 = ----

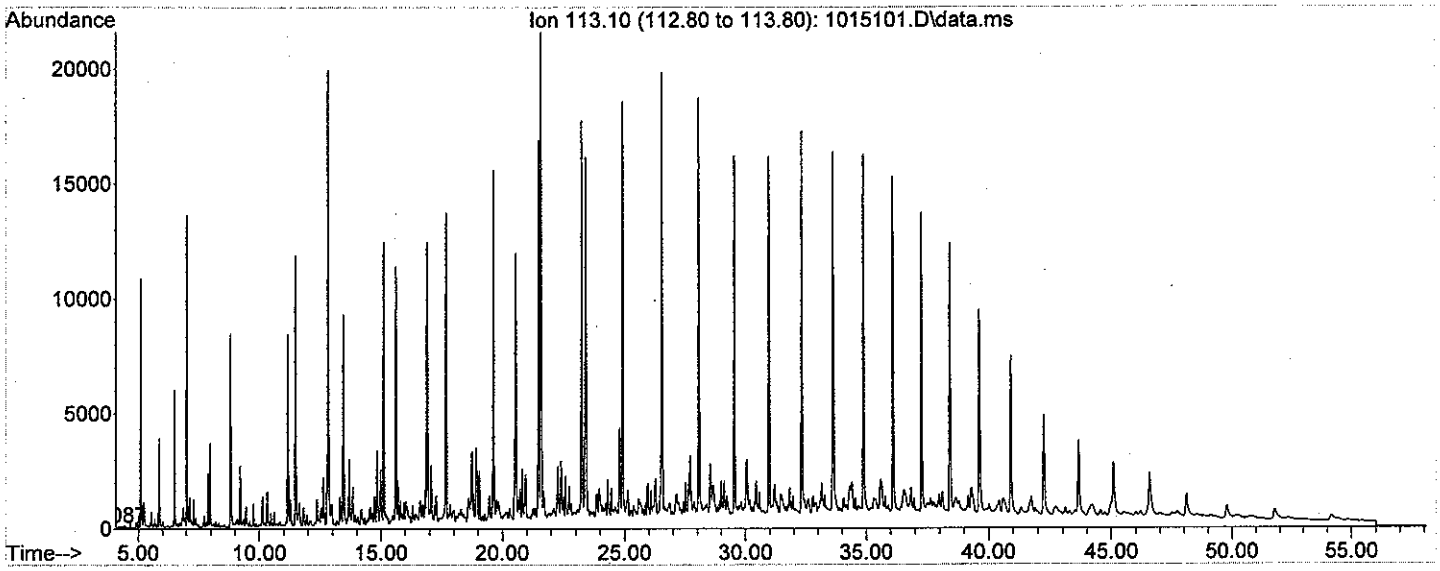
85-SATURATED HYDROCARBONS

Area = 473219



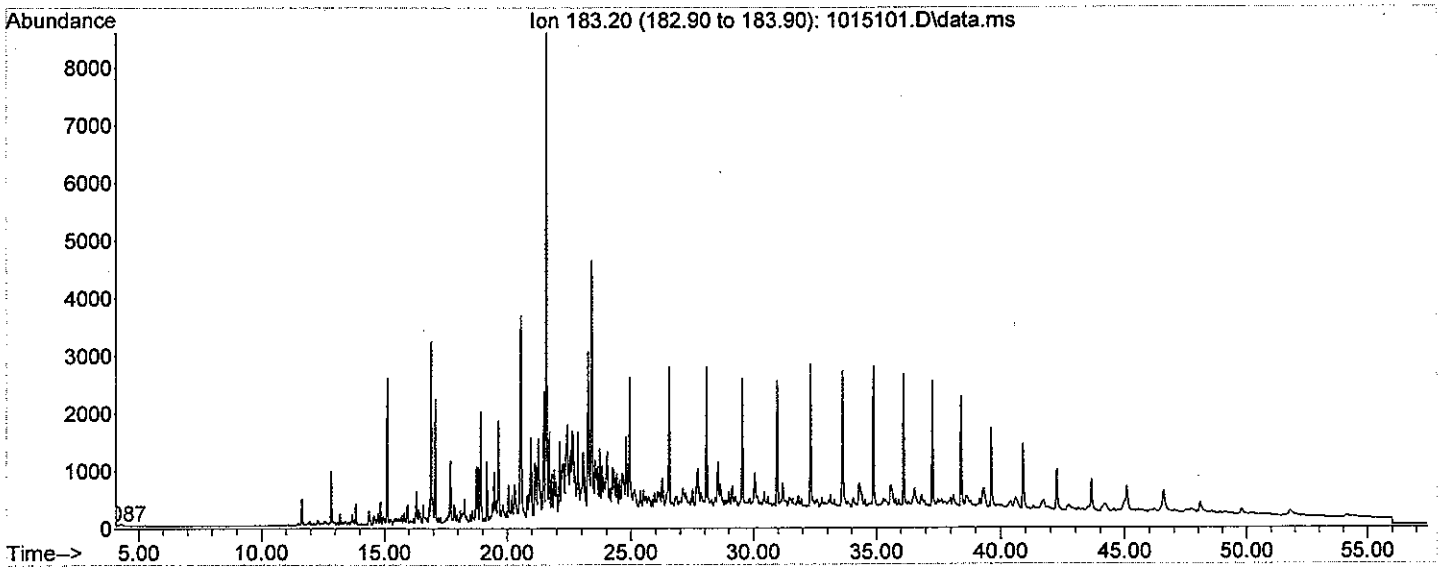
113-SATURATED HYDROCARBONS

Area = 0



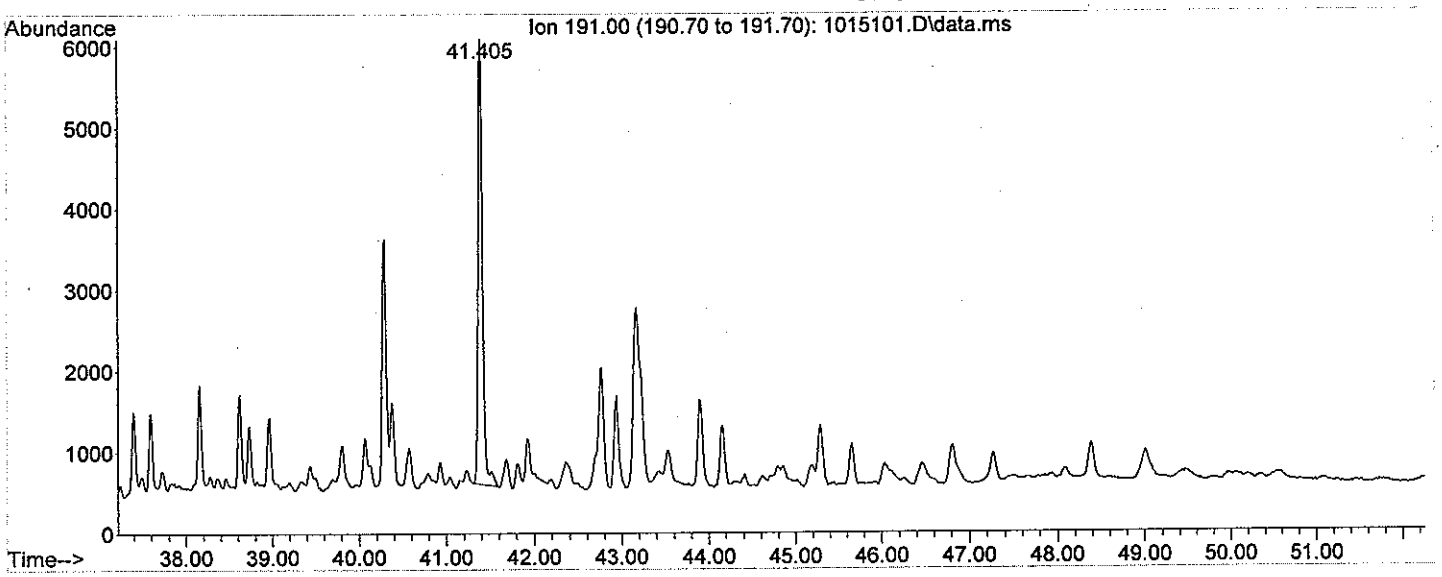
ACYCLIC ISOPRENOIDS/ALKANES

Area = 0



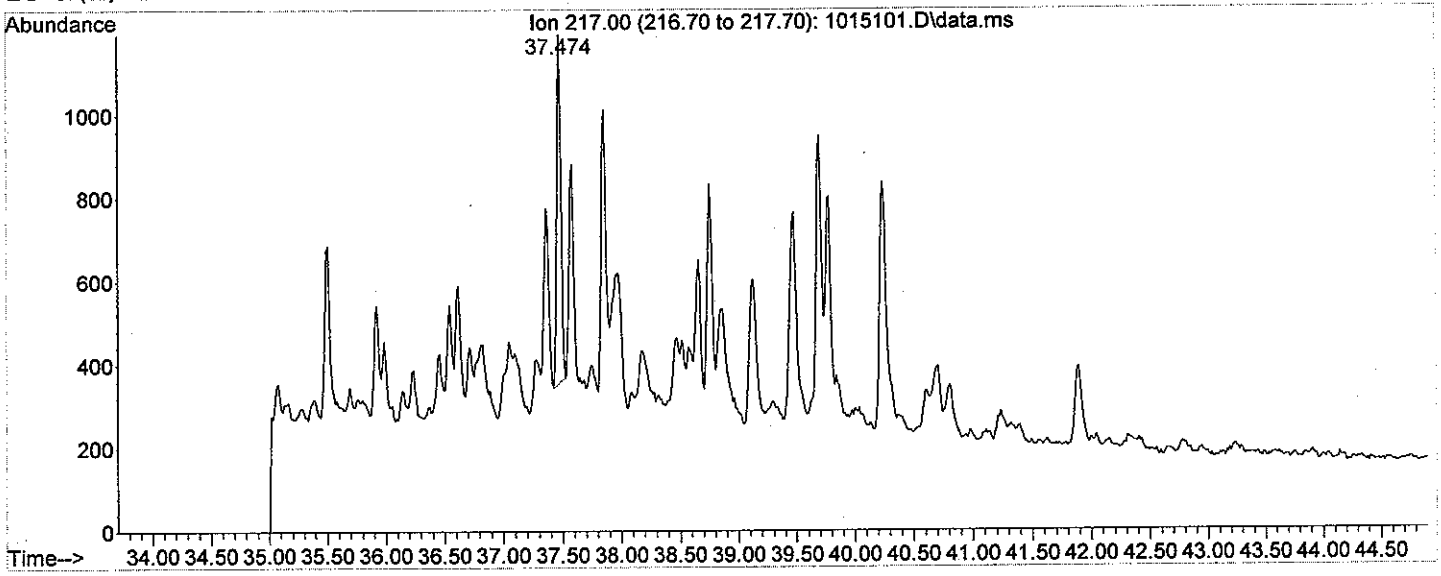
TRITERPANES/HOPANES

Area = 192156



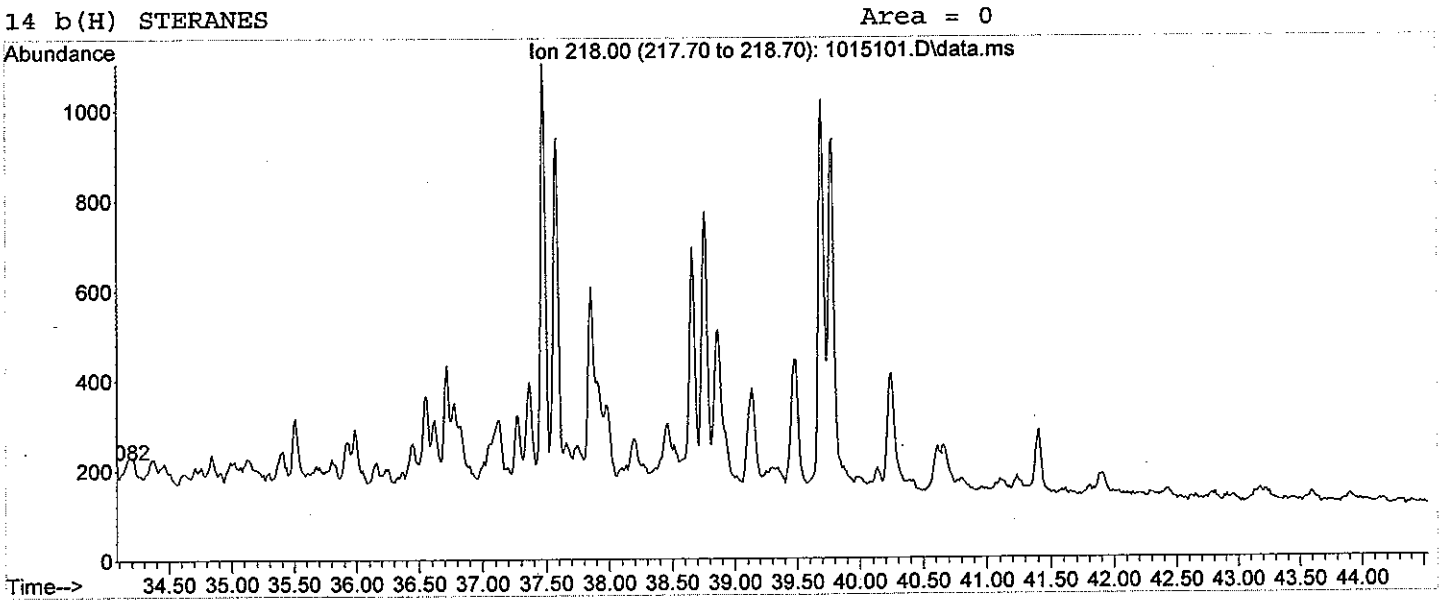
14 a(H) STERANES

Area = 20878.2



14 b(H) STERANES

Area = 0



Quantitation Report (Not Reviewed)

Data Path : W:\2010\MS_DATA\10-159\
Data File : 1015102.D
Acq On : 25 Jun 2010 8:30 pm
Operator : ACT
Sample : 10-151-2, SP
Misc :
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Jun 25 21:24:24 2010
Quant Method : C:\MSDCHEM\1\METHODS\BIOMARK3.M
Quant Title :
QLast Update : Wed May 27 09:43:48 2009
Response via : Initial Calibration

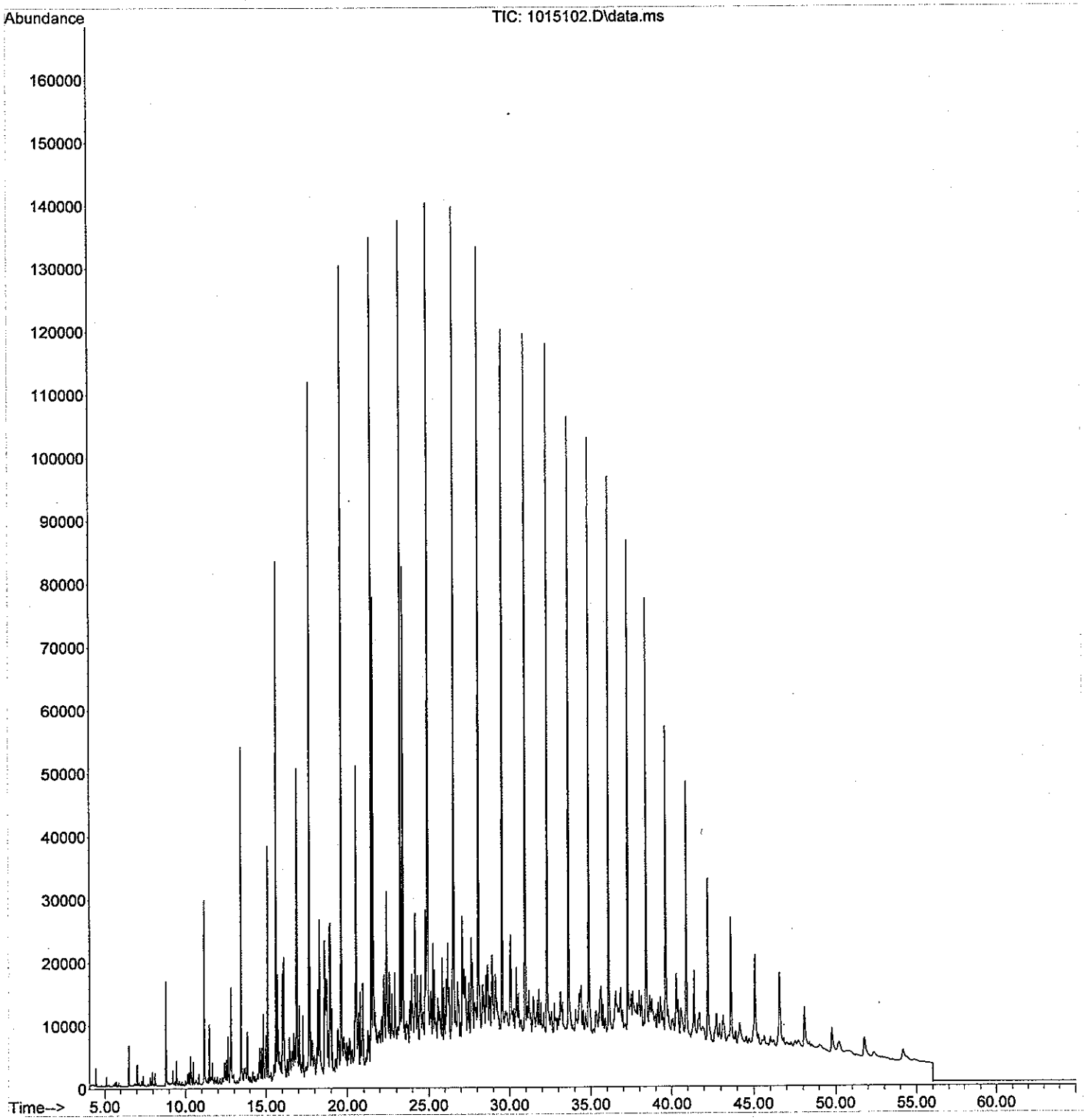
Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
Target Compounds					Qvalue
1) 85-SATURATED HYDROCARBONS	0.000	85	0	N.D.	
2) n-C17	0.000	85	0	N.D.	
3) PRISTANE	0.000	85	0	N.D.	
4) n-C18	0.000	85	0	N.D.	
5) PHYTANE	0.000	85	0	N.D.	
6) 113-SATURATED HYDROCAR...	0.000	113	0	N.D.	
7) ACYCLIC ISOPRENOIDS/AL...	0.000	183	0	N.D.	
8) C2-NAPHTHALENES	0.000	156	0	N.D.	
9) C3-NAPHTHALENES	19.410	170	129069	No Calib	
10) C4-NAPHTHALENES	0.000	184	0	N.D.	
11) PHENANTHRENE/ANTHRACENE	0.000	178	0	N.D.	
12) BENZONAPHTHIOPHENE	32.113	234	81909	No Calib	
13) DIBENZOTHIOPHENE	22.438	184	168847	No Calib	
14) C1-DIBENZOTHIOPHENE	24.527	198	329808	No Calib	
15) C2-DIBENZOTHIOPHENE	26.493	212	178219	No Calib	
16) C3-DIBENZOTHIOPHENE	27.990	226	110566	No Calib	
17) C1-PHENANTHRENES	25.359	192	258314	No Calib	
18) C2-PHENANTHRENES	27.292	206	187597	No Calib	
19) C3-PHENANTHRENES	29.169	220	124590	No Calib	
20) TRITERPANES/HOPANES	41.405	191	233677	No Calib	
21) HOPANE A	0.000	191	0	N.D.	
22) HOPANE B	0.000	191	0	N.D.	
23) 14 a(H) STERANES	37.483	217	25807	No Calib	
24) 14 b(H) STERANES	39.704	218	20031	No Calib	
25) TRI-AROMATIC STERANES	41.630	231	23379	No Calib	
26) METHYLHOPANES	0.000	205	0	N.D.	
27) NORHOPANES	0.000	177	0	N.D.	
28) PYRENE/FLUORANTHENE	28.917	202	44025	No Calib	
29) METHYL PYRENE	30.437	216	21552	No Calib	
30) FLUORENE	0.000	166	0	N.D.	
31) BICYCLONAPHTHALENES	0.000	208	0	N.D.	
32) CHRYSENE	0.000	228	0	N.D.	
33) C1-CHRYSENE	34.692	242	71025	No Calib	
34) C2-CHRYSENE	36.743	256	31004	No Calib	
35) C3-CHRYSENE	0.000	270	0	N.D.	
36) C4-CHRYSENE	0.000	284	0	N.D.	
37) SESQUITERPANES	28.331	123	50016	No Calib	

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (Not Reviewed)

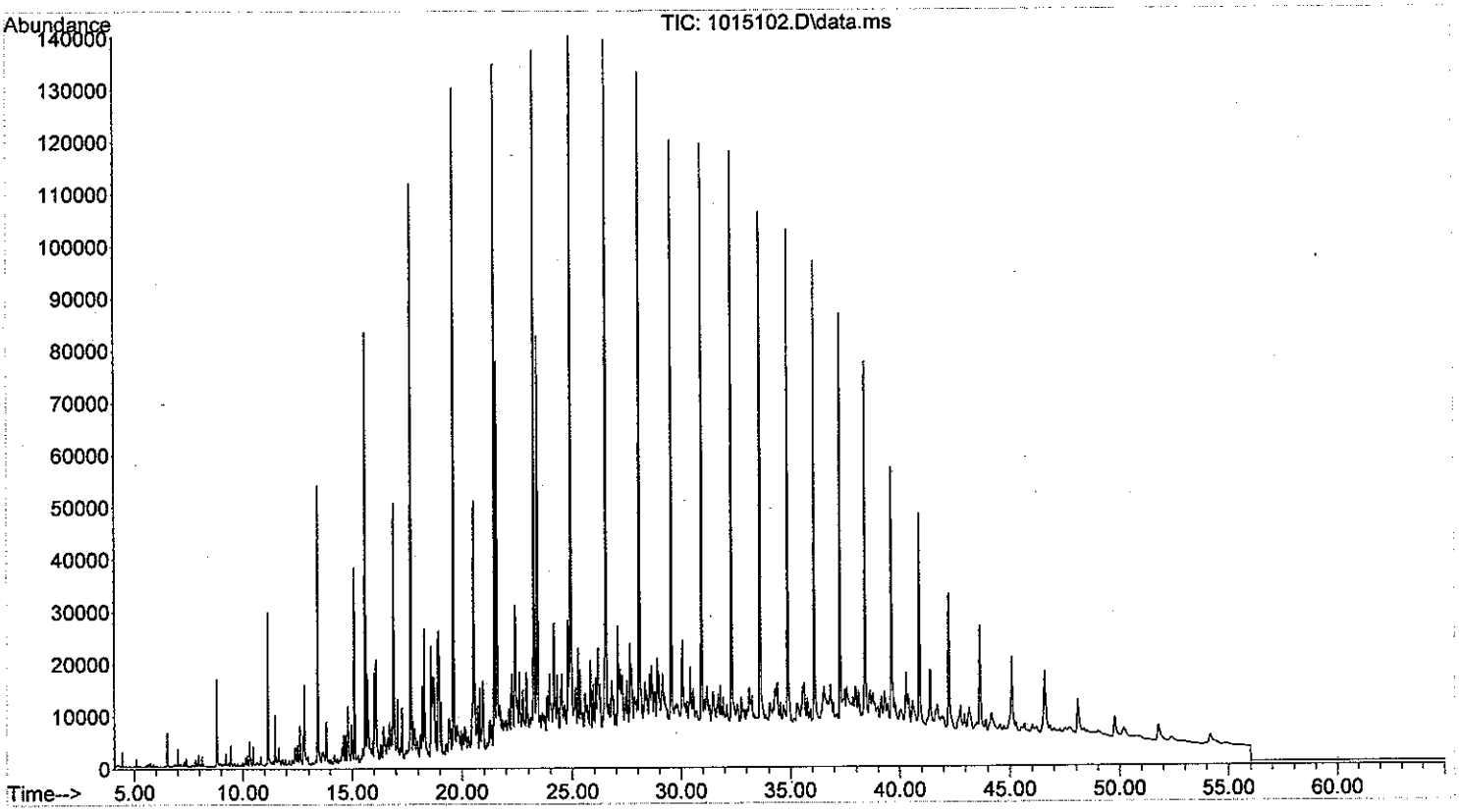
Data Path : W:\2010\MS_DATA\10-159\
Data File : 1015102.D
Acq On : 25 Jun 2010 8:30 pm
Operator : ACT
Sample : 10-151-2, SP
Misc :
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Jun 25 21:24:24 2010
Quant Method : C:\MSDCHEM\1\METHODS\BIOMARK3.M
Quant Title :
QLast Update : Wed May 27 09:43:48 2009
Response via : Initial Calibration

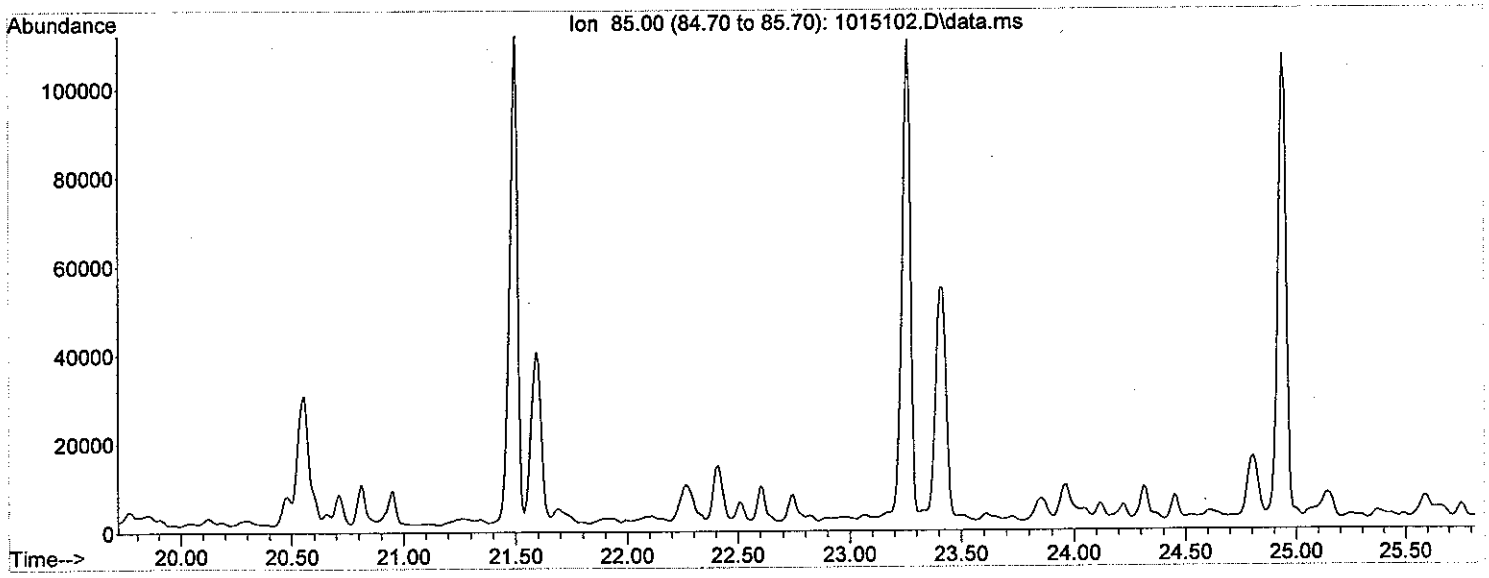


MARINE SAFETY LABORATORY GC-MS2 BIOMARKER ANALYSIS

File: \\Mslserver1\data archive\2010\MS_data\10-159\1015102.D
Operator: ACT
Date Acquired: 25 Jun 2010 8:30 pm
Method File: BIOMARK3.M
Sample Name: 10-151-2, SP Vial: 7
Misc Info:



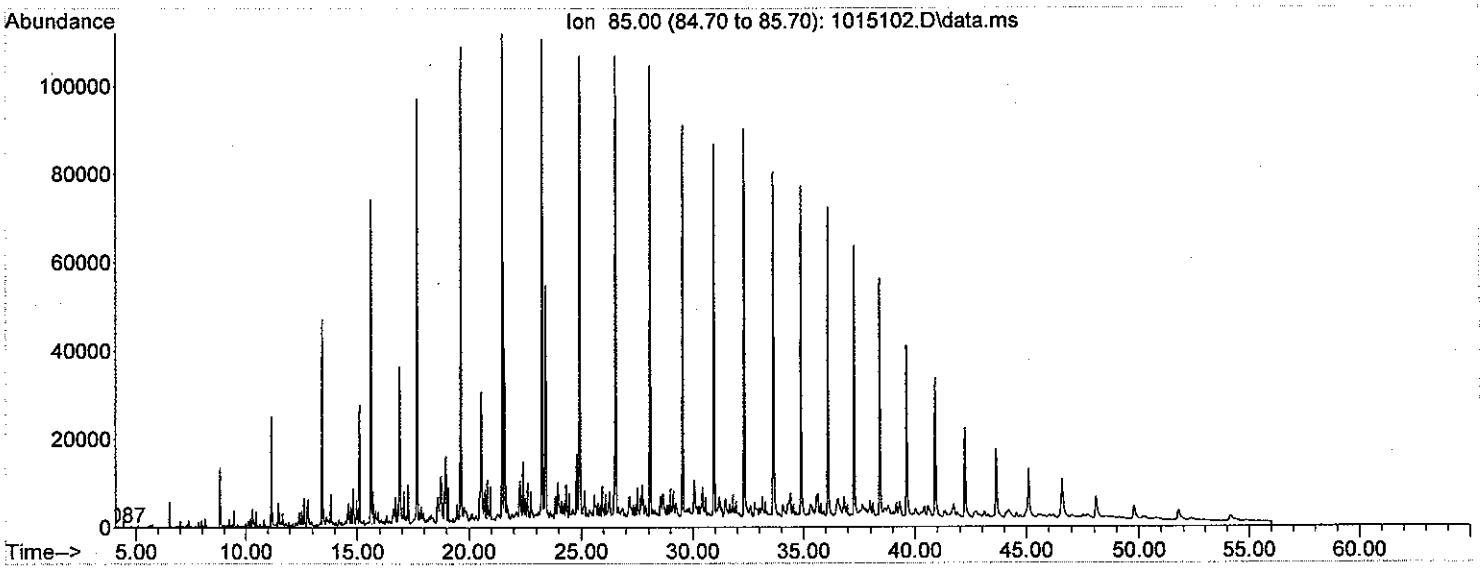
n-C17, Pristane, n-C18, Phytane



Pristane/Phytane = 0.667
C17/C18 = 0.933
Pristane/C17 = 0.427
Phytane/C18 = 0.598

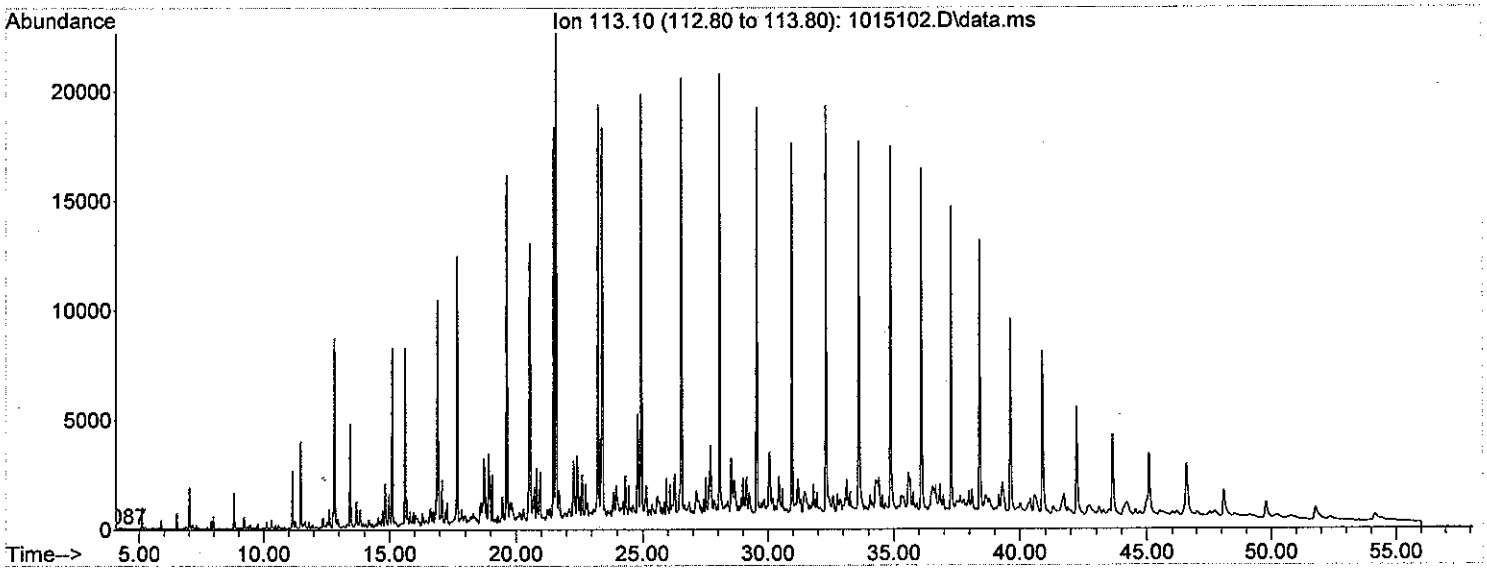
85-SATURATED HYDROCARBONS

Area = 0



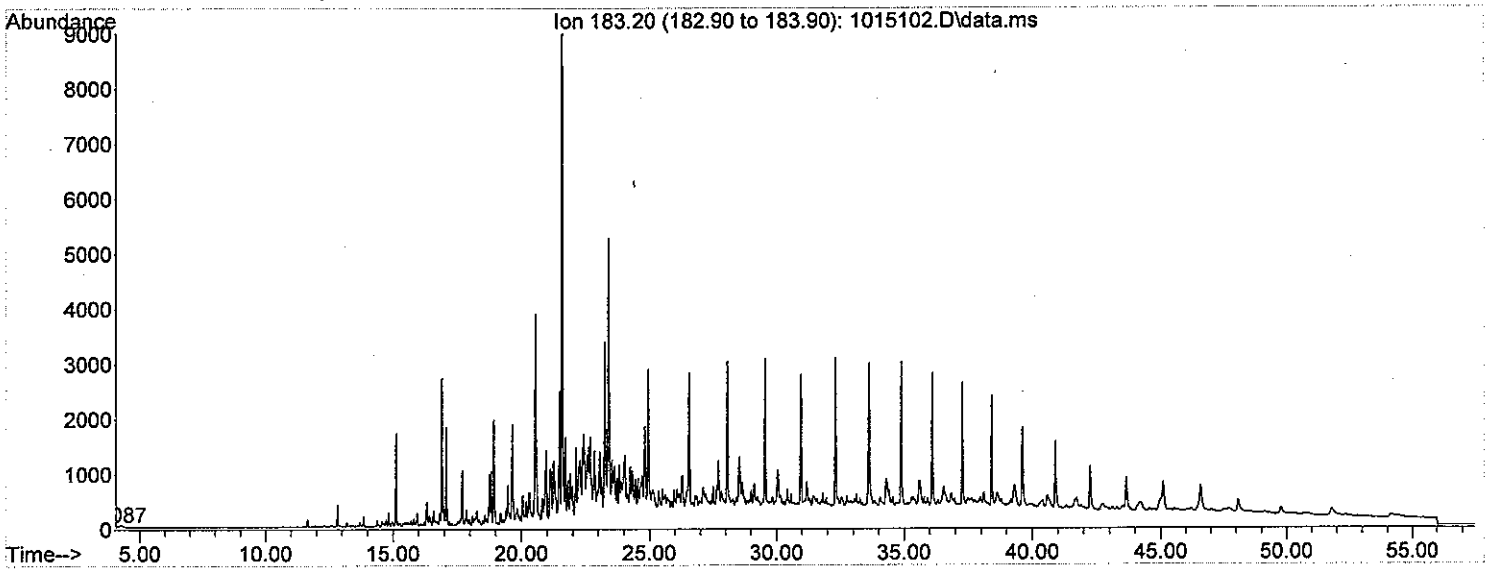
113-SATURATED HYDROCARBONS

Area = 0



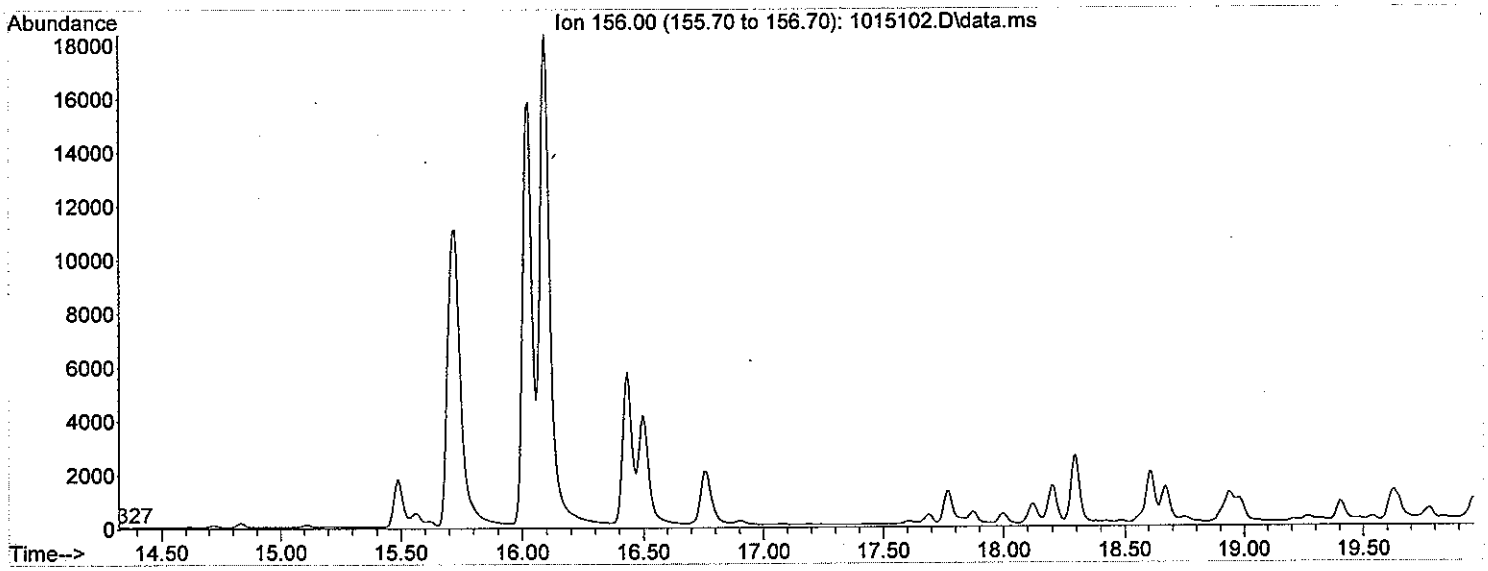
ACYCLIC ISOPRENOIDS/ALKANES

Area = 0



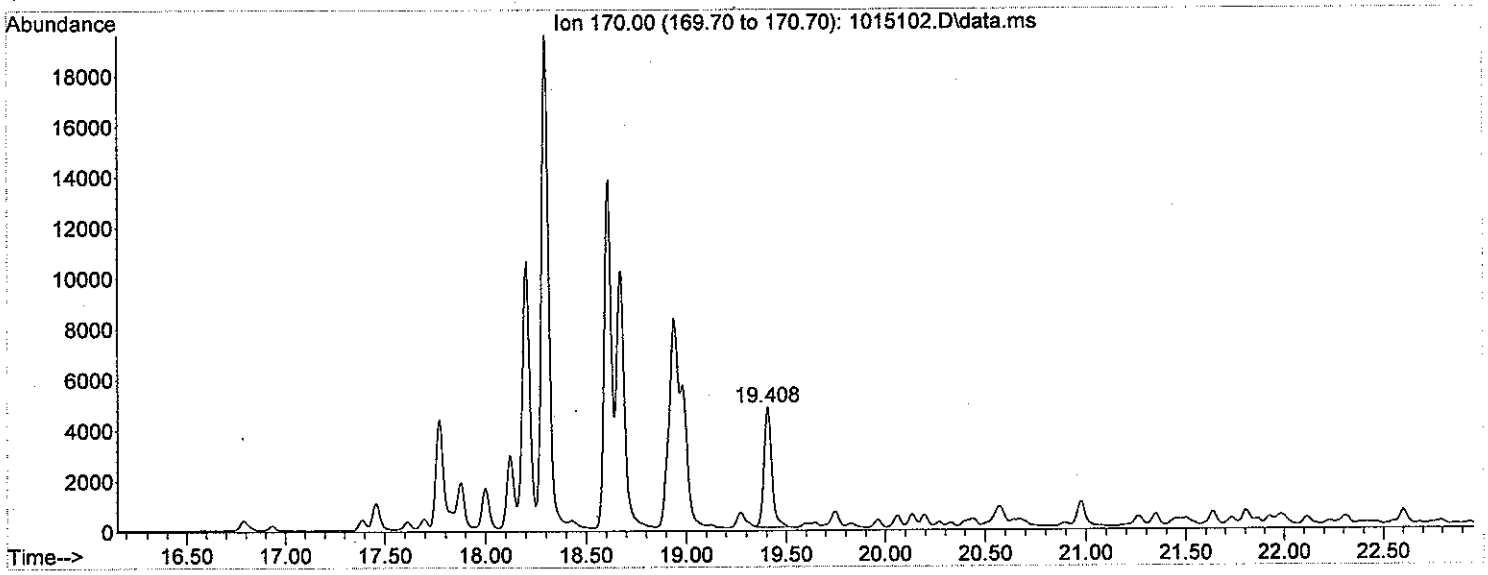
C2-NAPHTHALENES

Area = 0



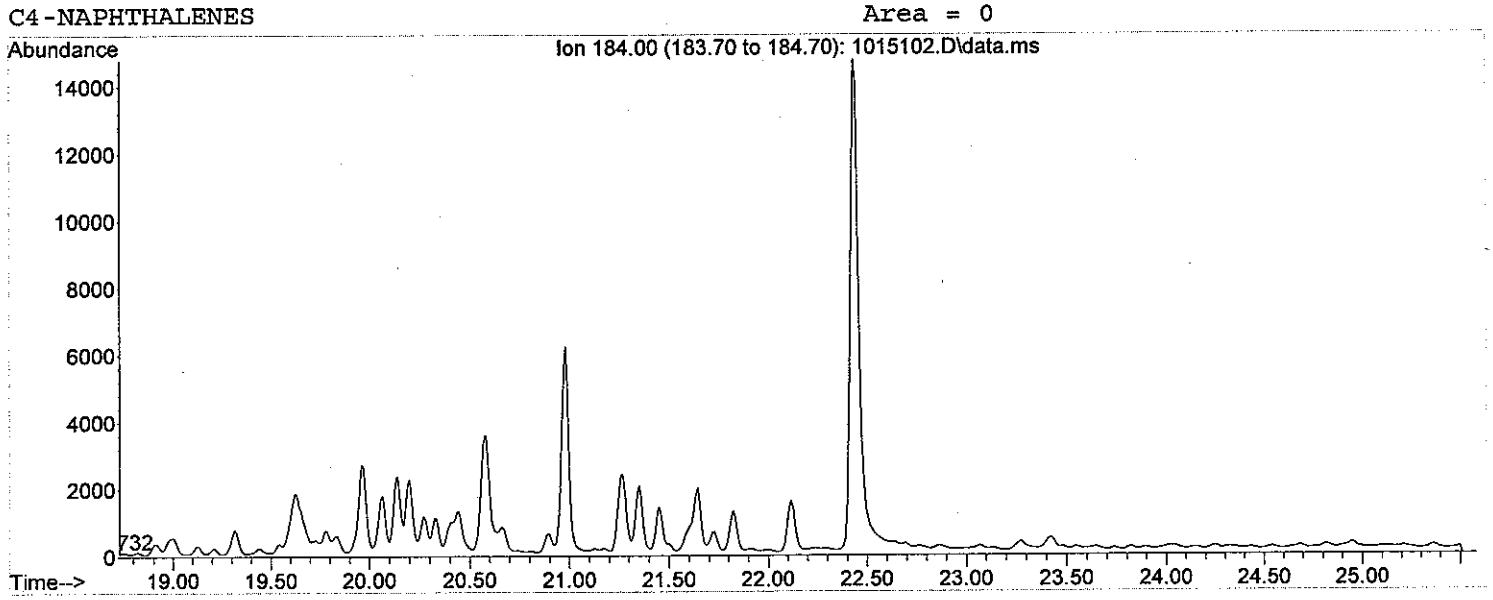
C3-NAPHTHALENES

Area = 129069



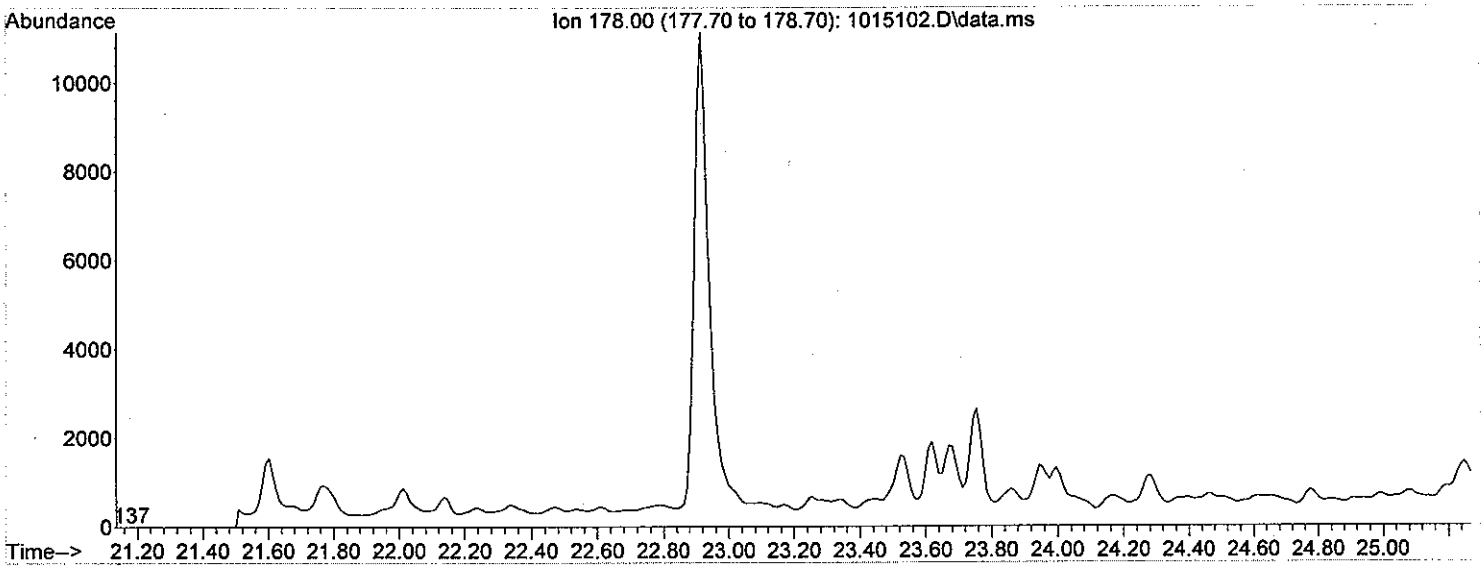
C4-NAPHTHALENES

Area = 0



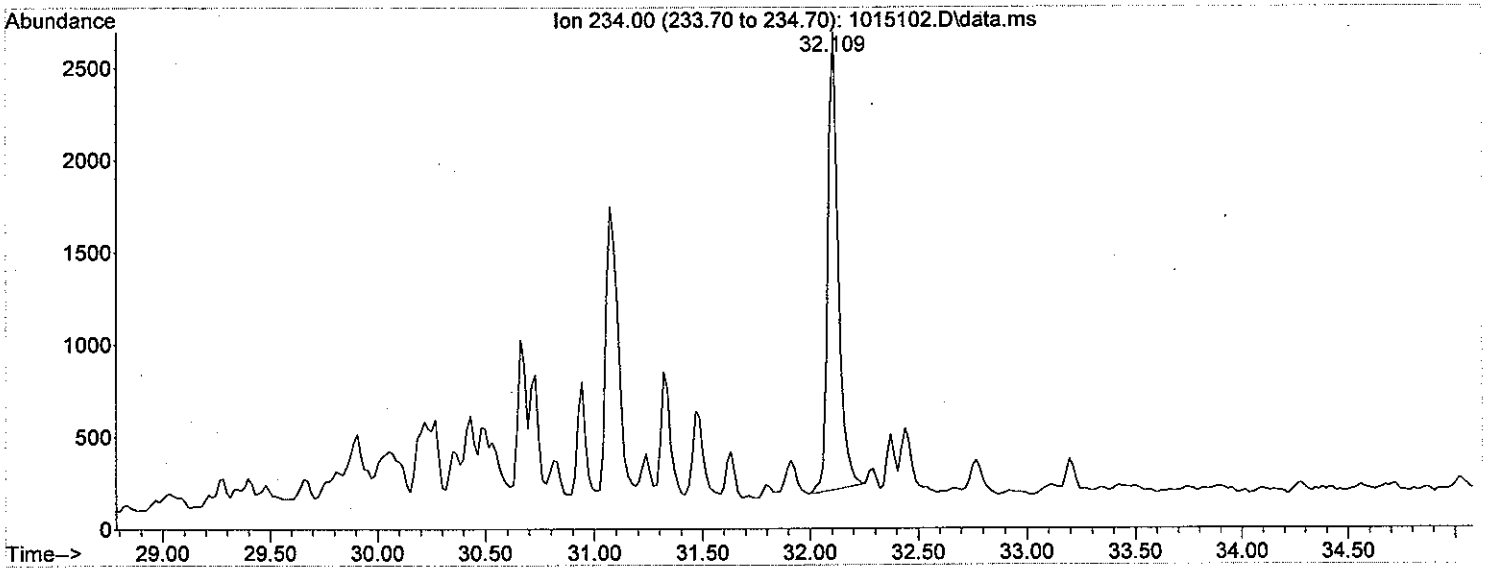
PHENANTHRENE/ANTHRACENE

Area = 0



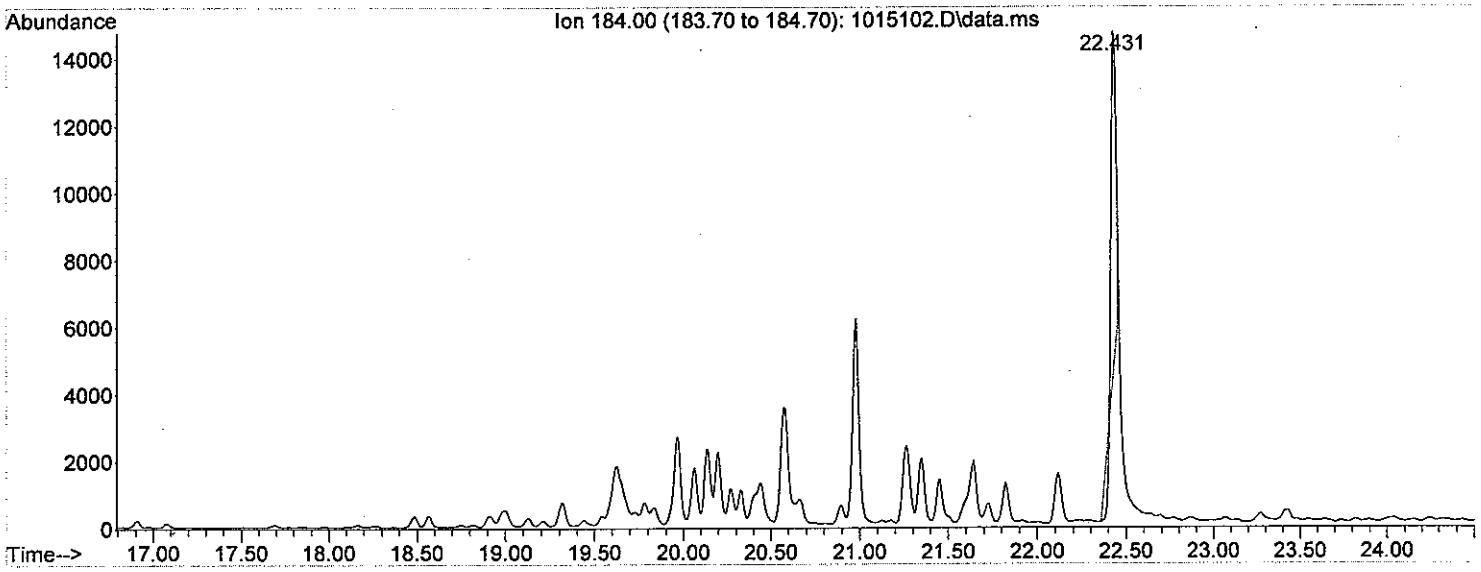
BENZONAPHTHIOPHENE

Area = 81908.7



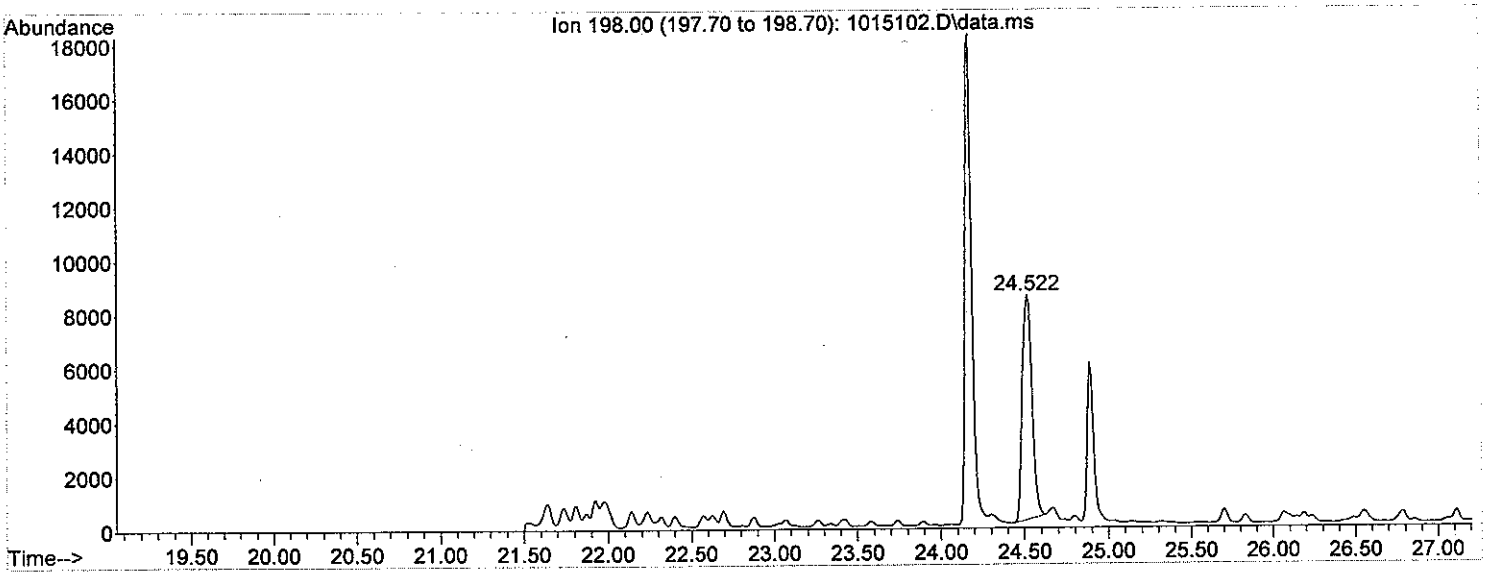
DIBENZOTHIOPHENE

Area = 168847



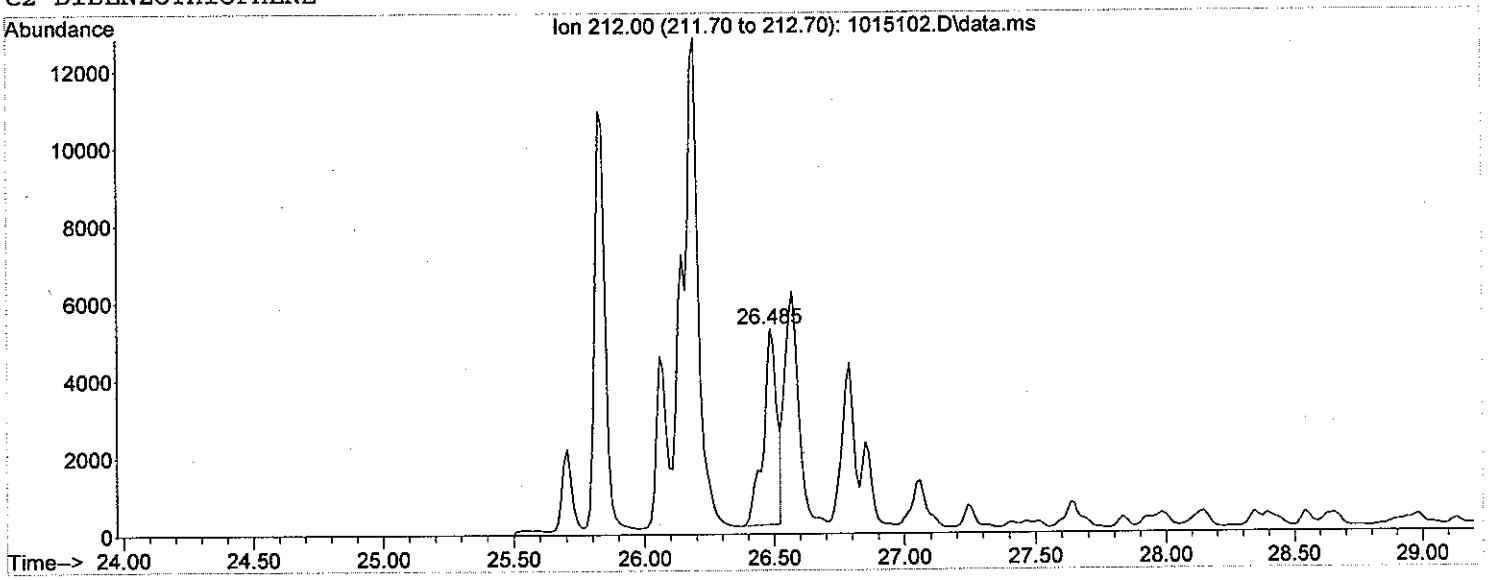
C1-DIBENZOTHIOPHENE

Area = 329808



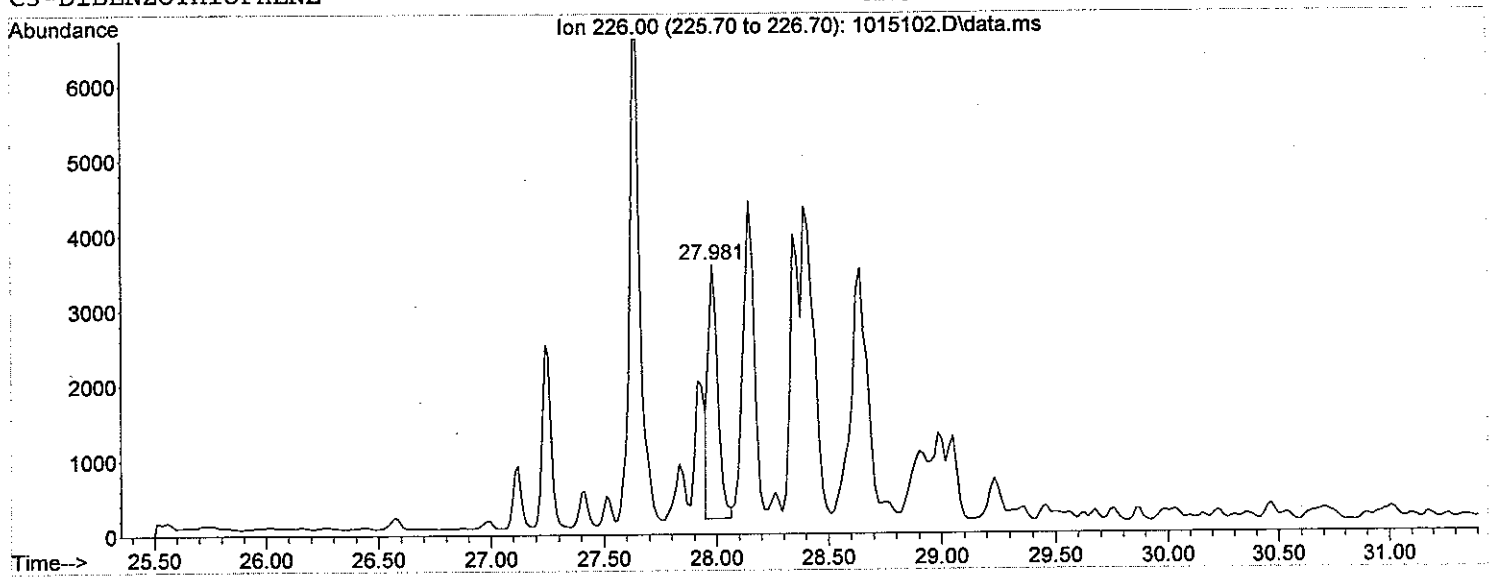
C2-DIBENZOTHIOPHENE

Area = 178219



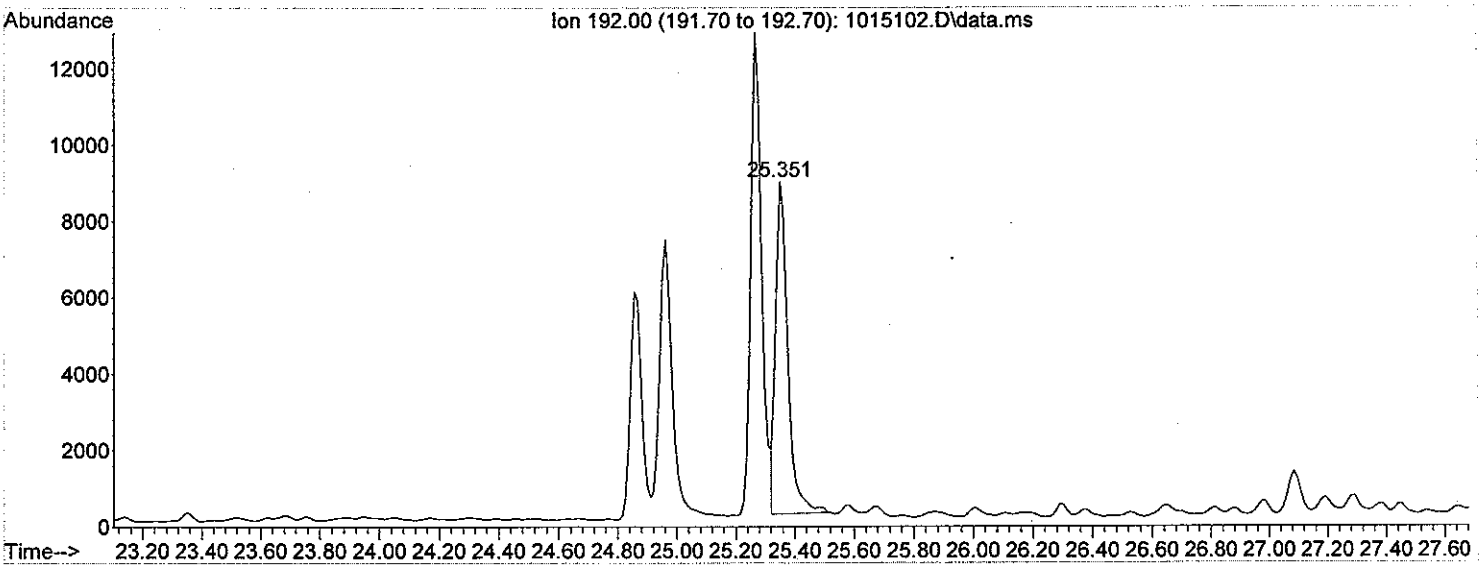
C3-DIBENZOTHIOPHENE

Area = 110566



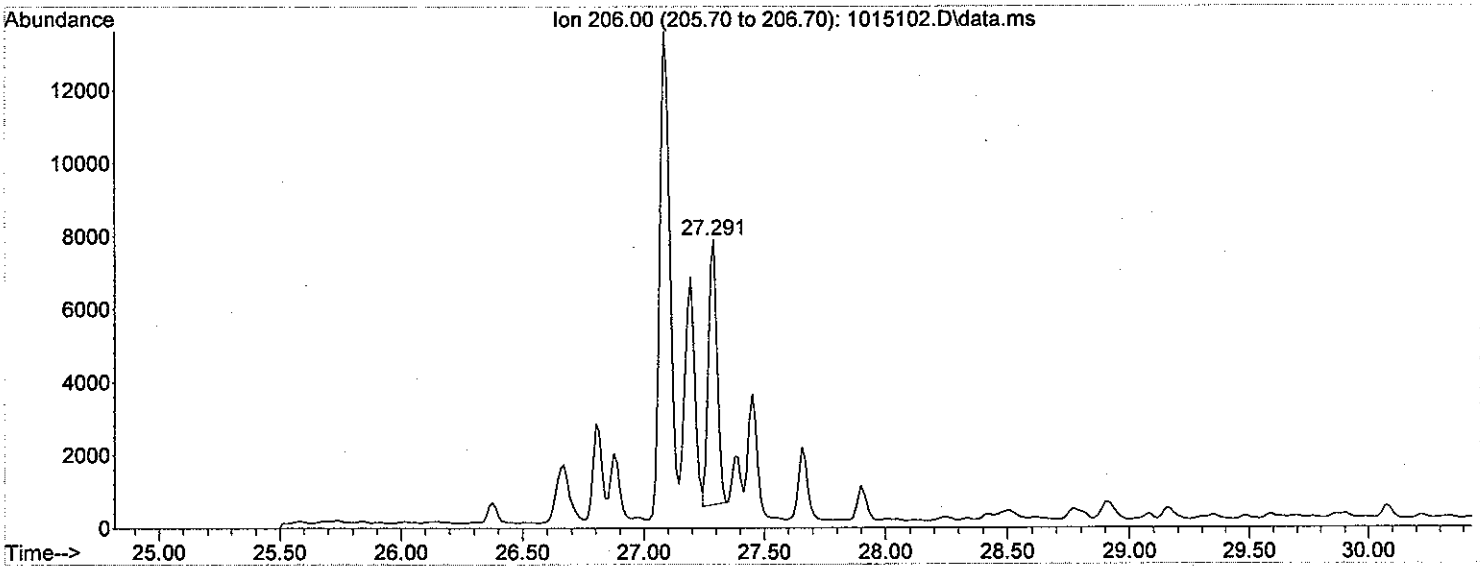
C1 - PHENANTHRENES

Area = 258314



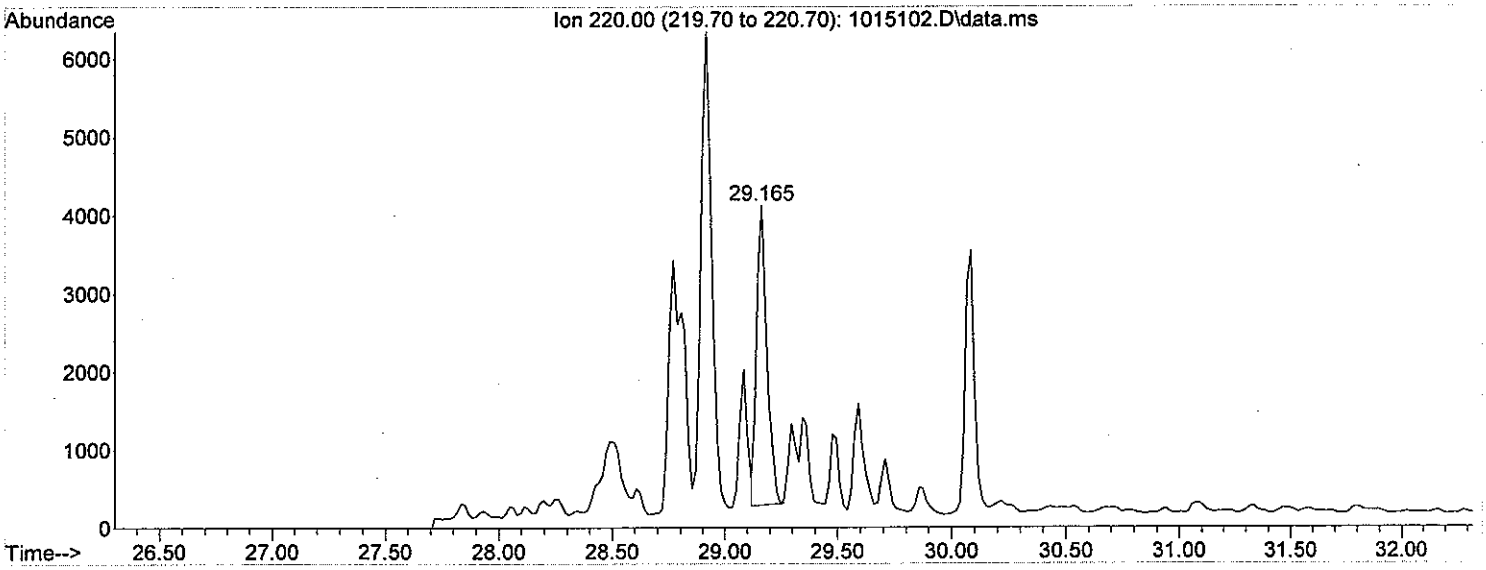
C2 - PHENANTHRENES

Area = 187597

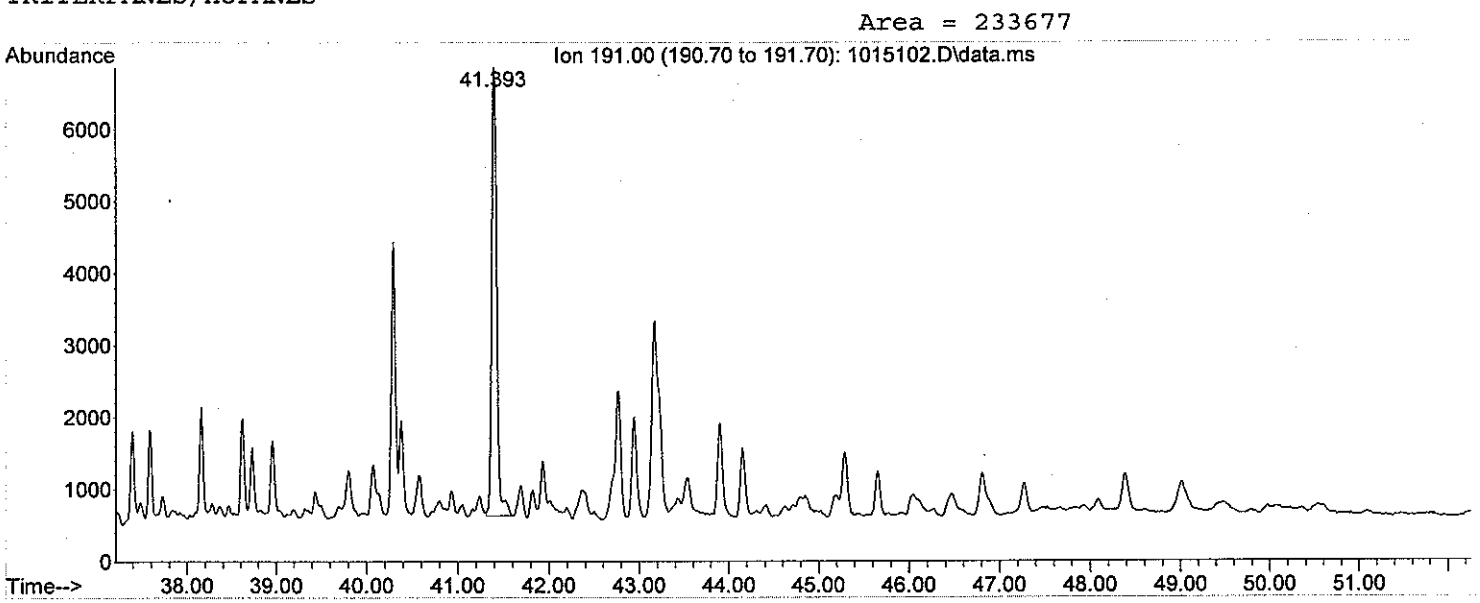


C3 - PHENANTHRENES

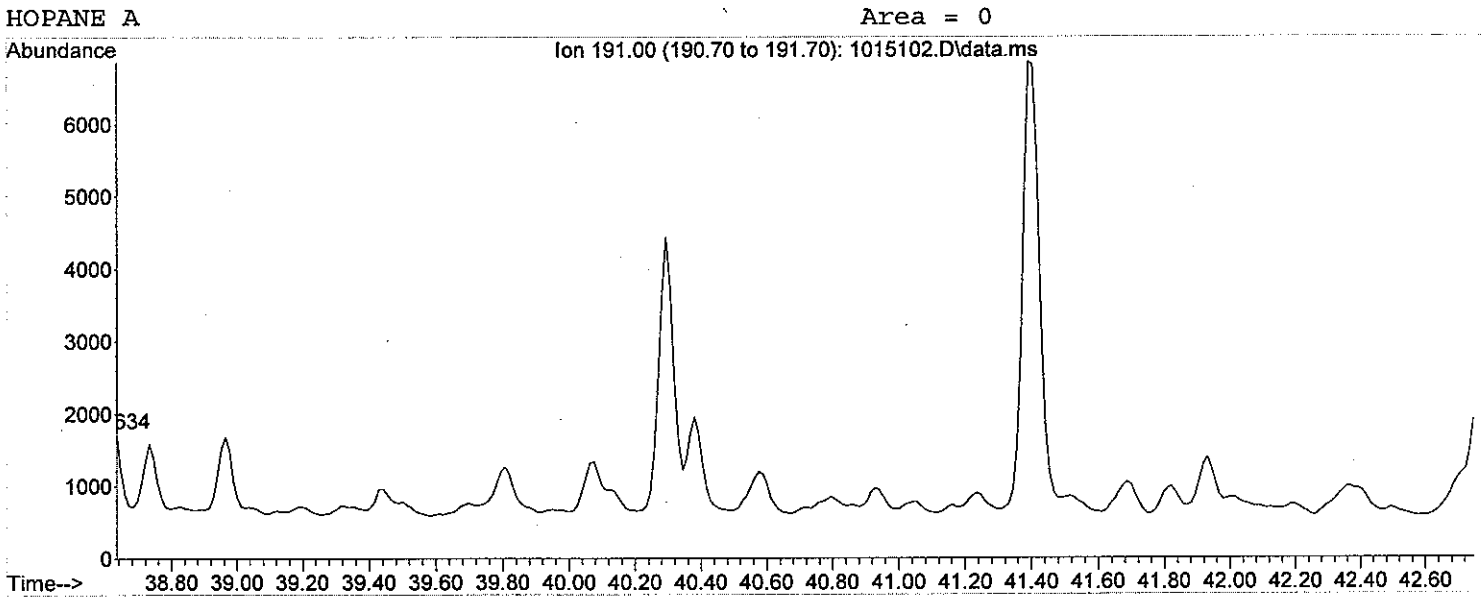
Area = 124590



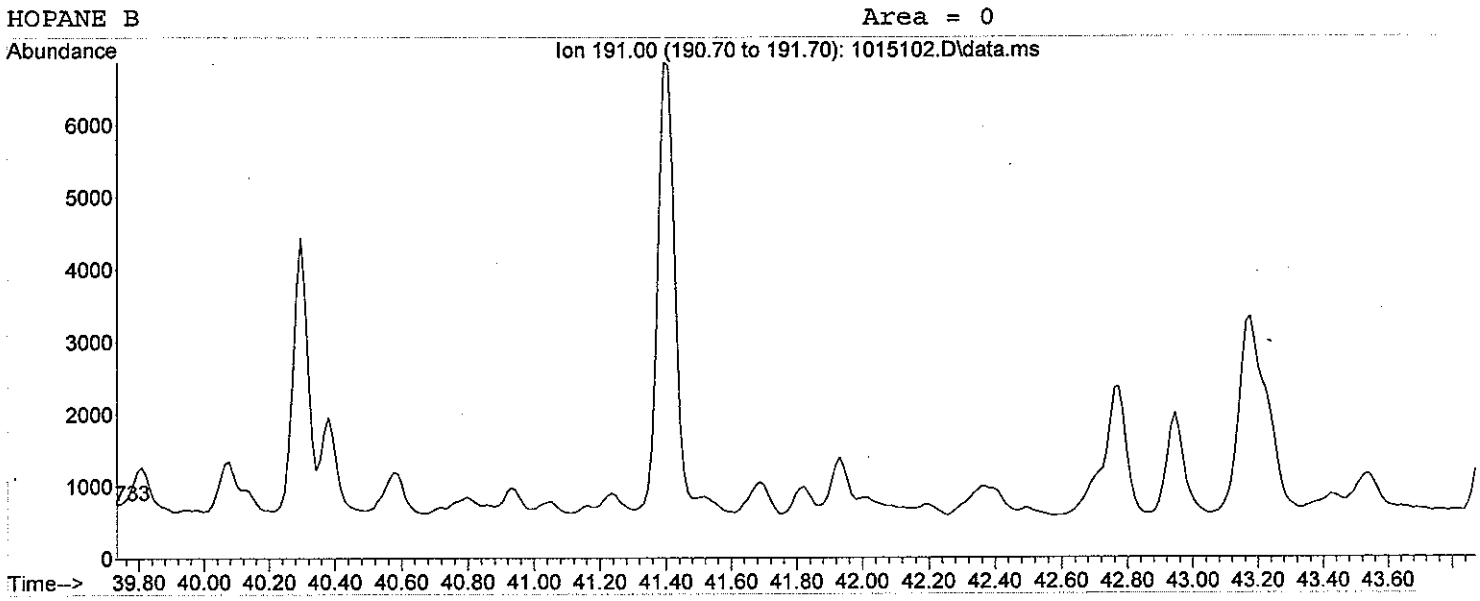
TRITERPANES/HOPANES



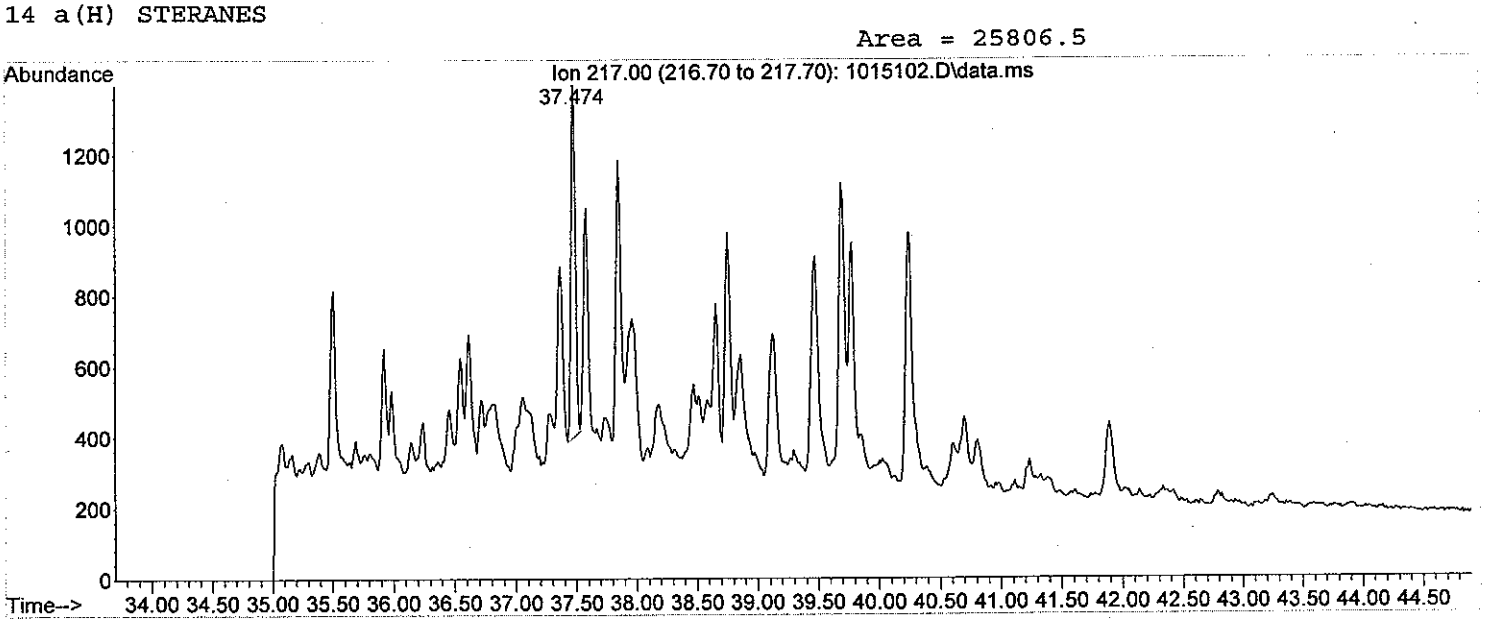
HOPANE A



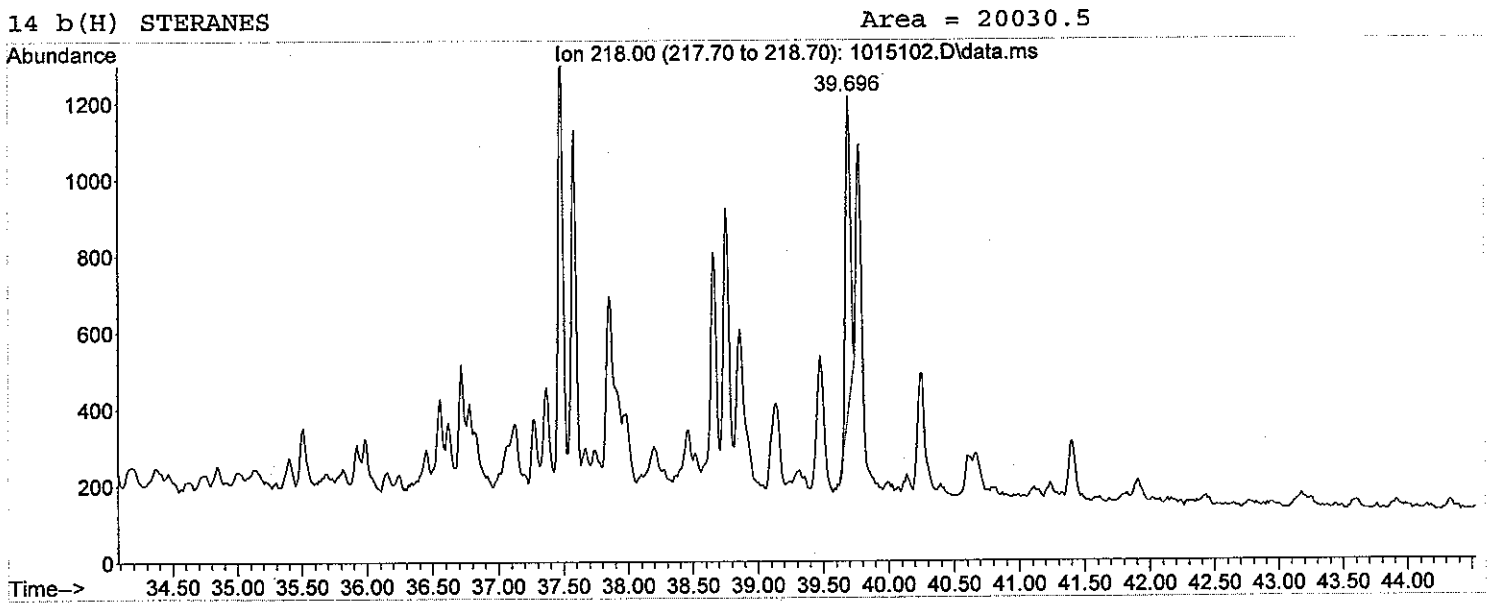
HOPANE B



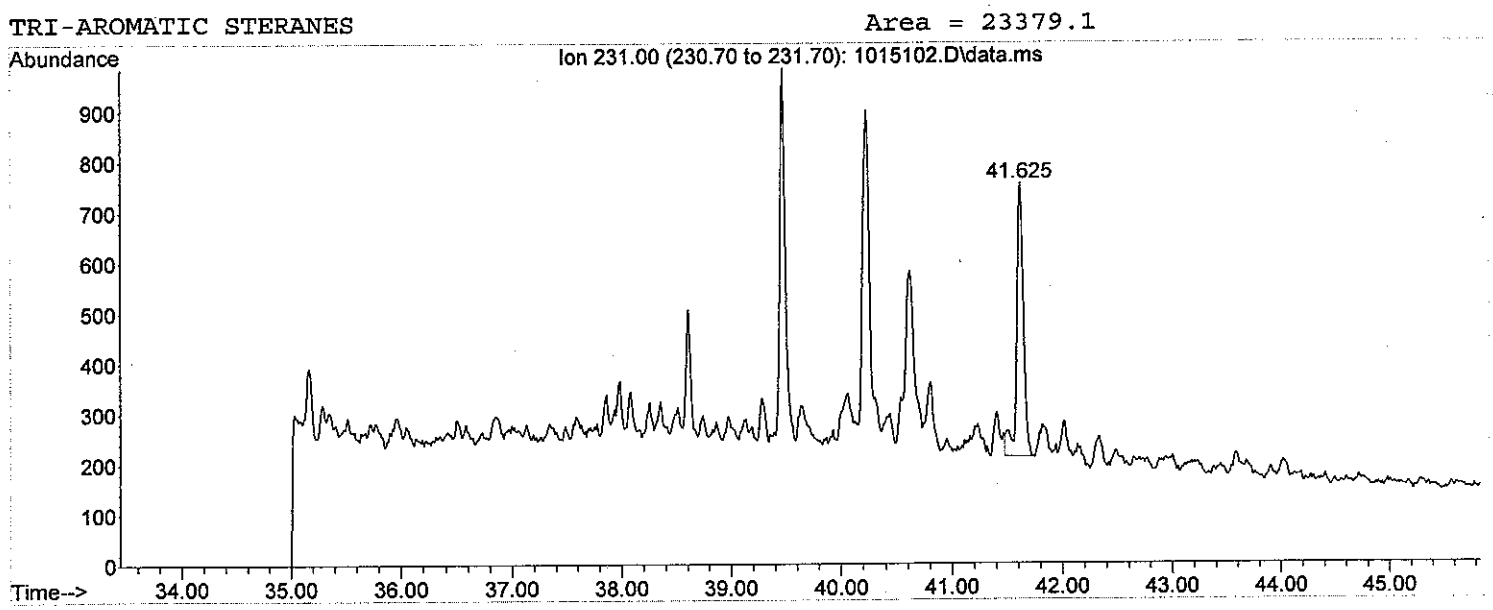
14 a(H) STERANES



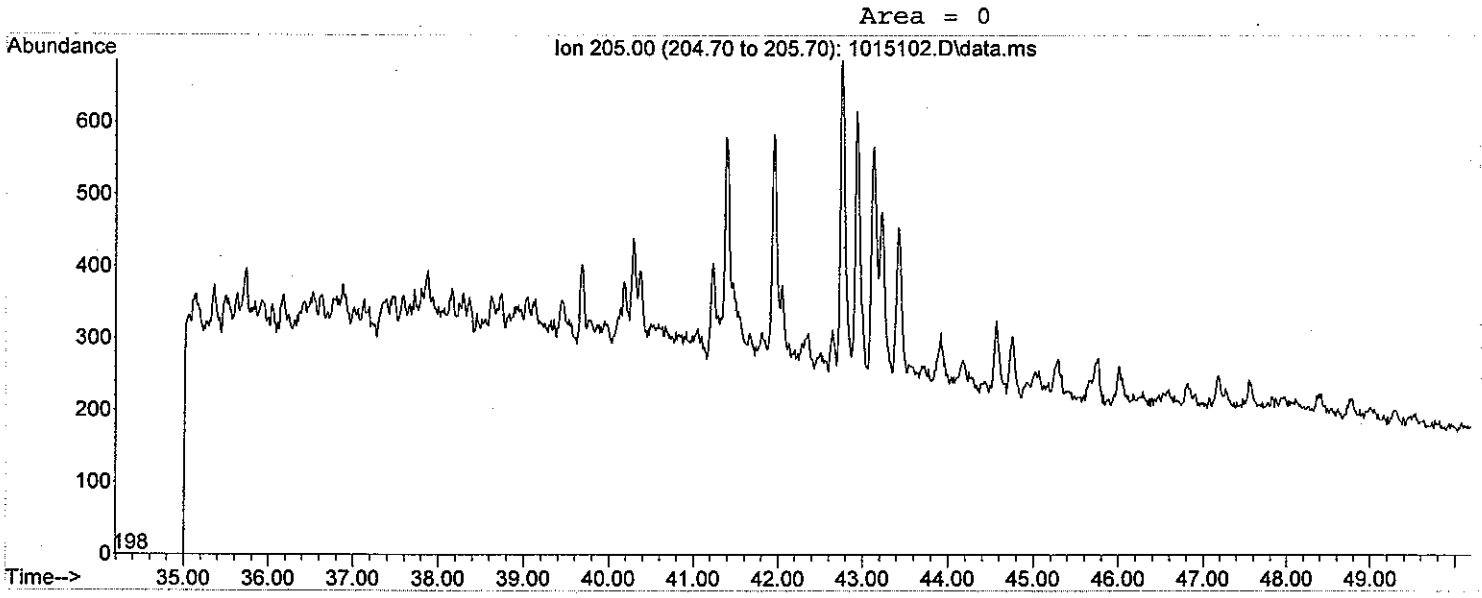
14 b(H) STERANES



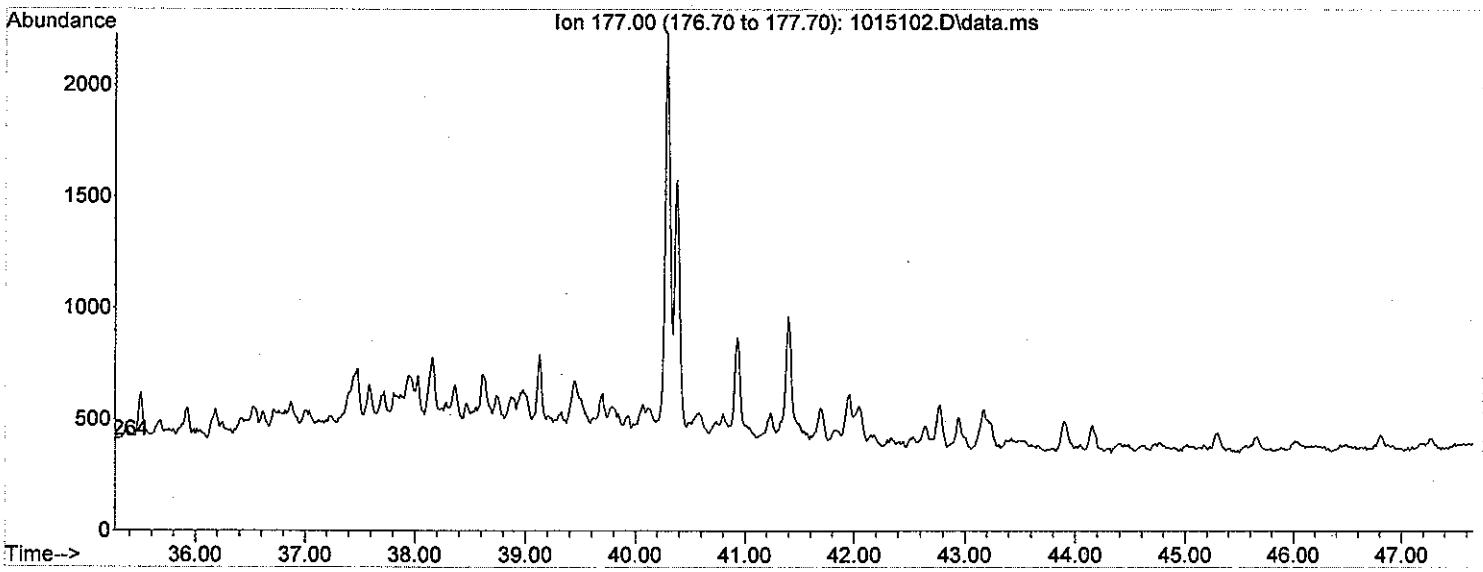
TRI-AROMATIC STERANES



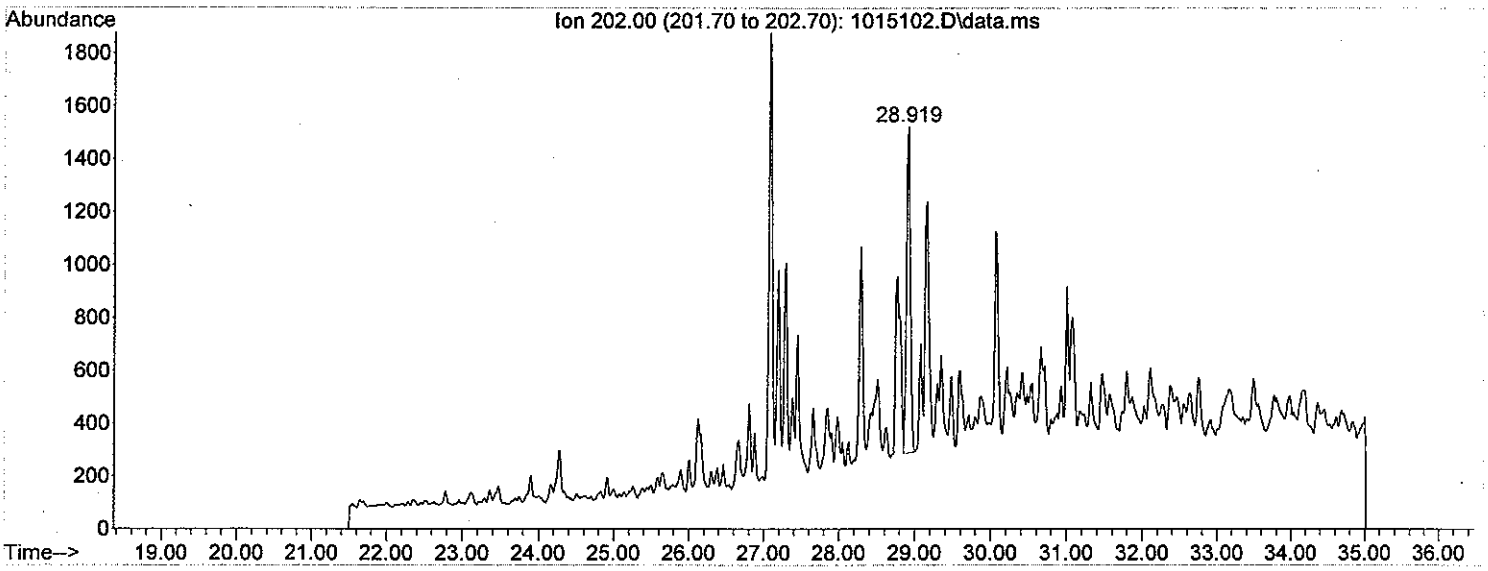
METHYLHOPANES



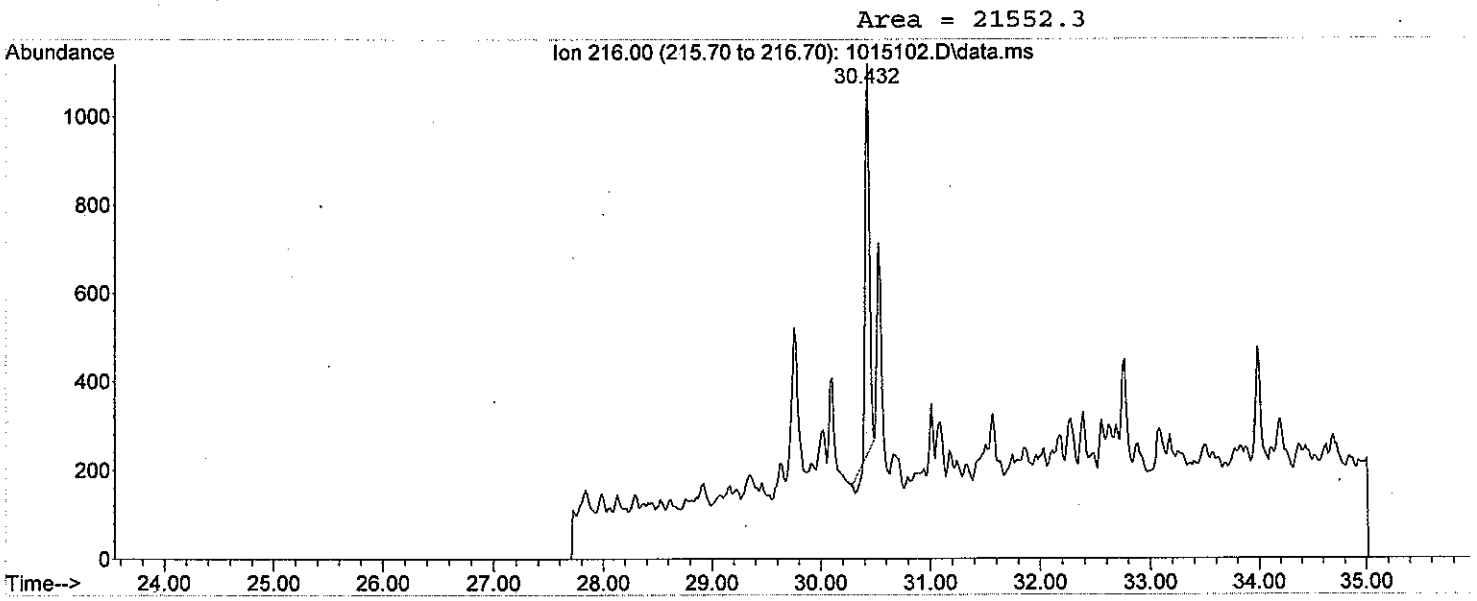
NORHOPANES



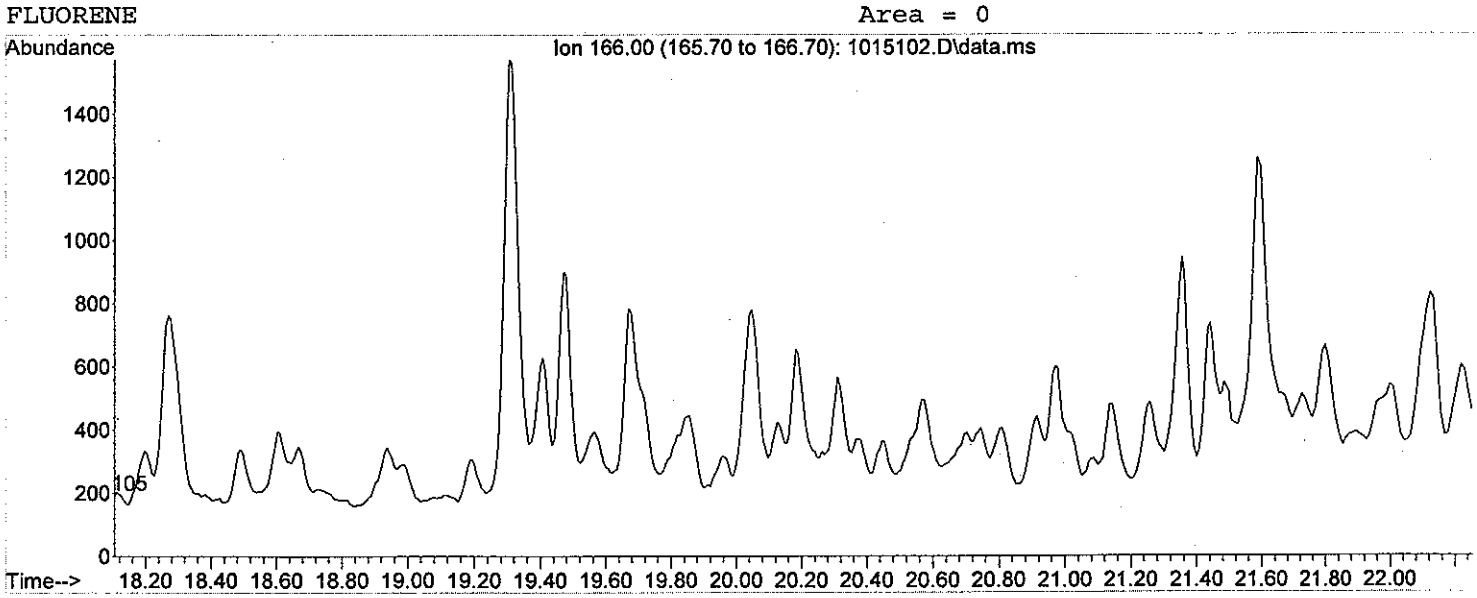
PYRENE/FLUORANTHENE



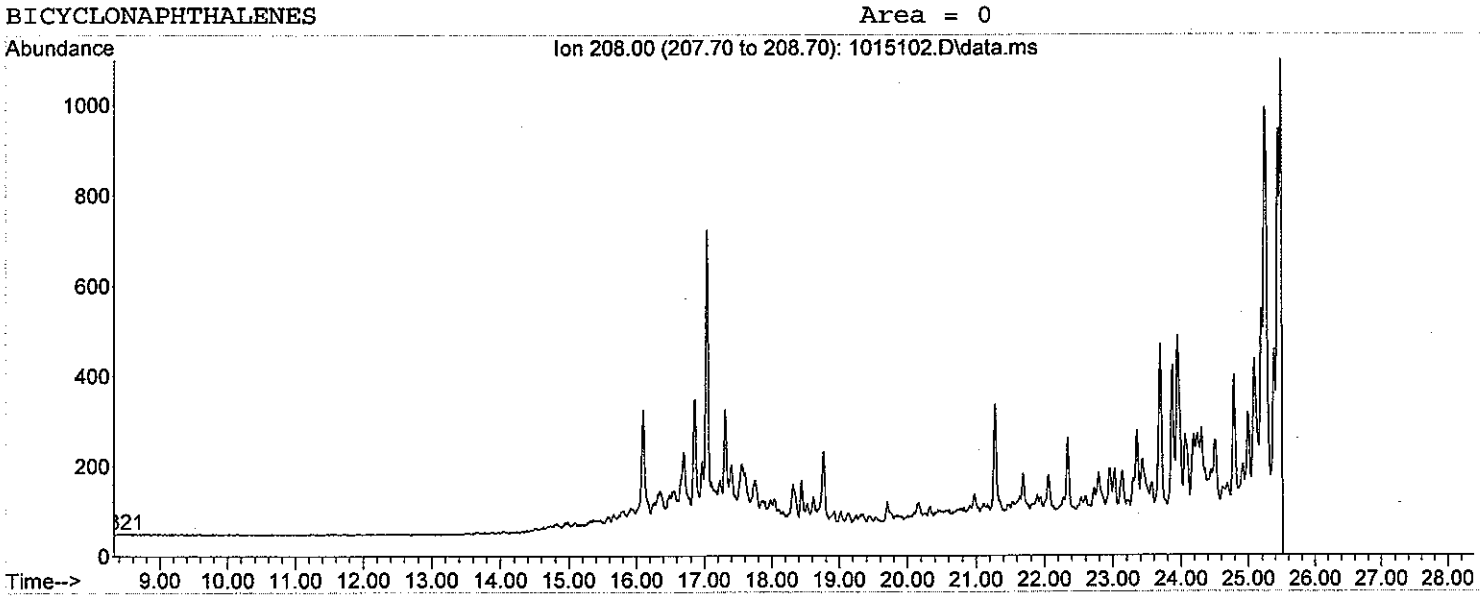
METHYL PYRENE



FLUORENE

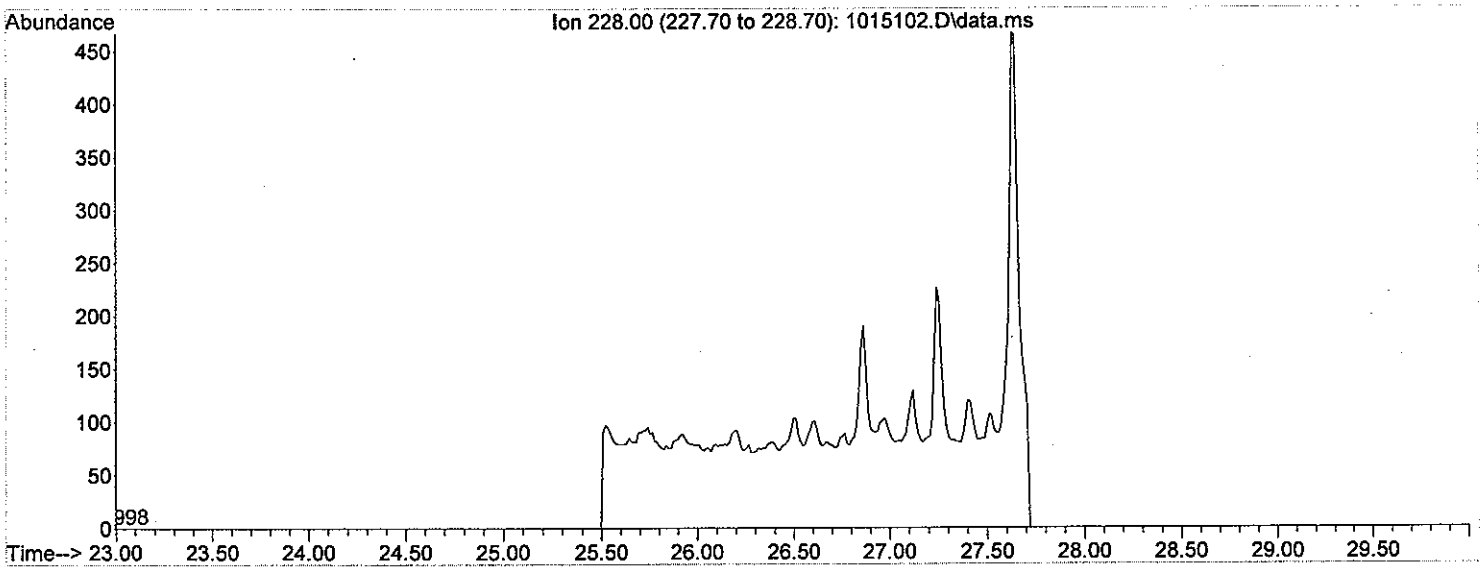


BICYCLONAPHTHALENES



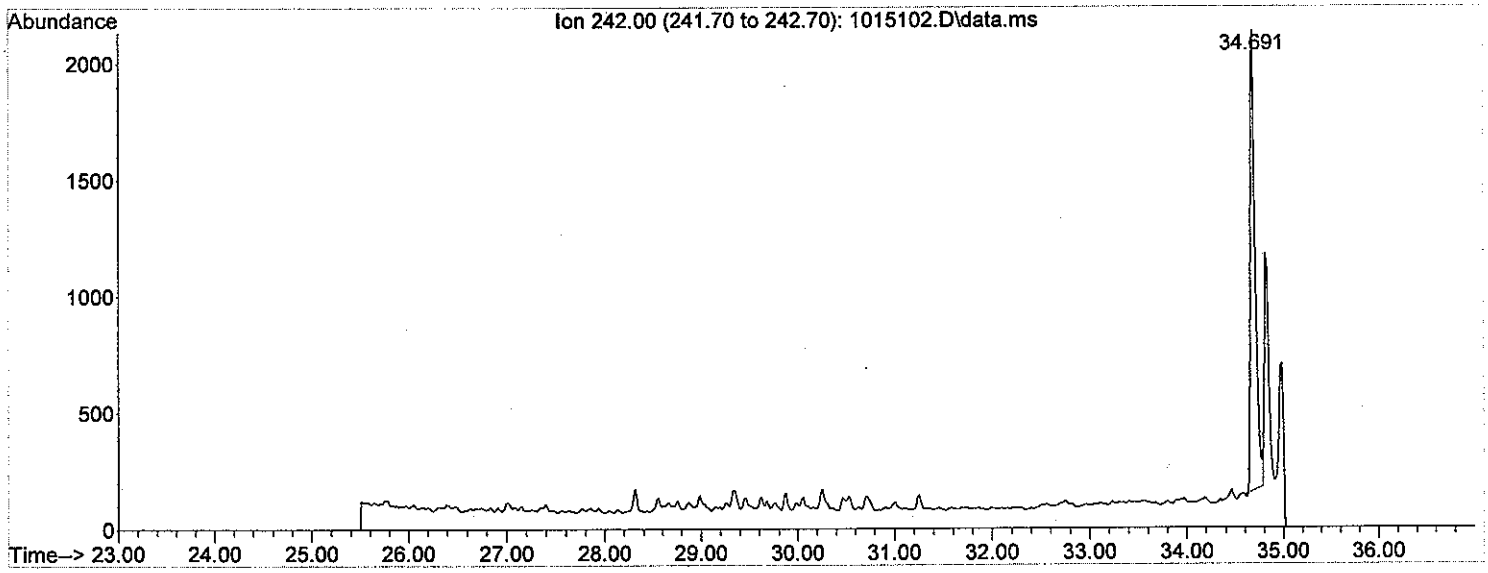
CHRYSENE

Area = 0



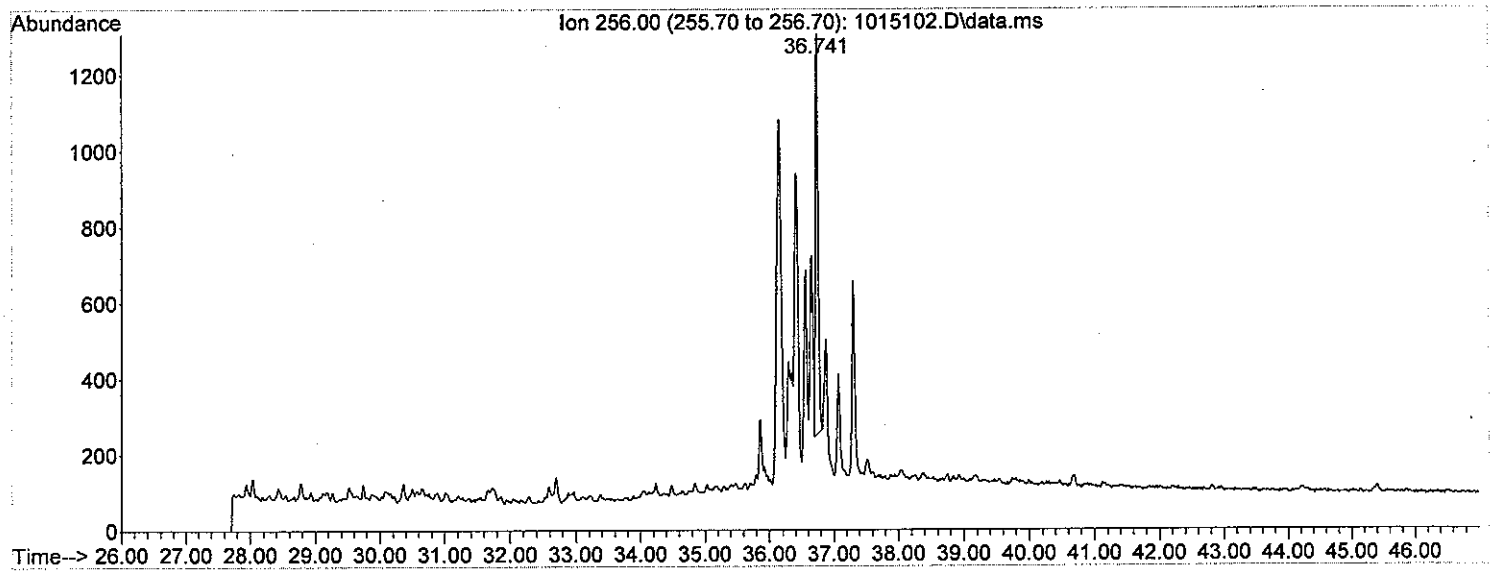
C1-CHRYSENE

Area = 71024.5



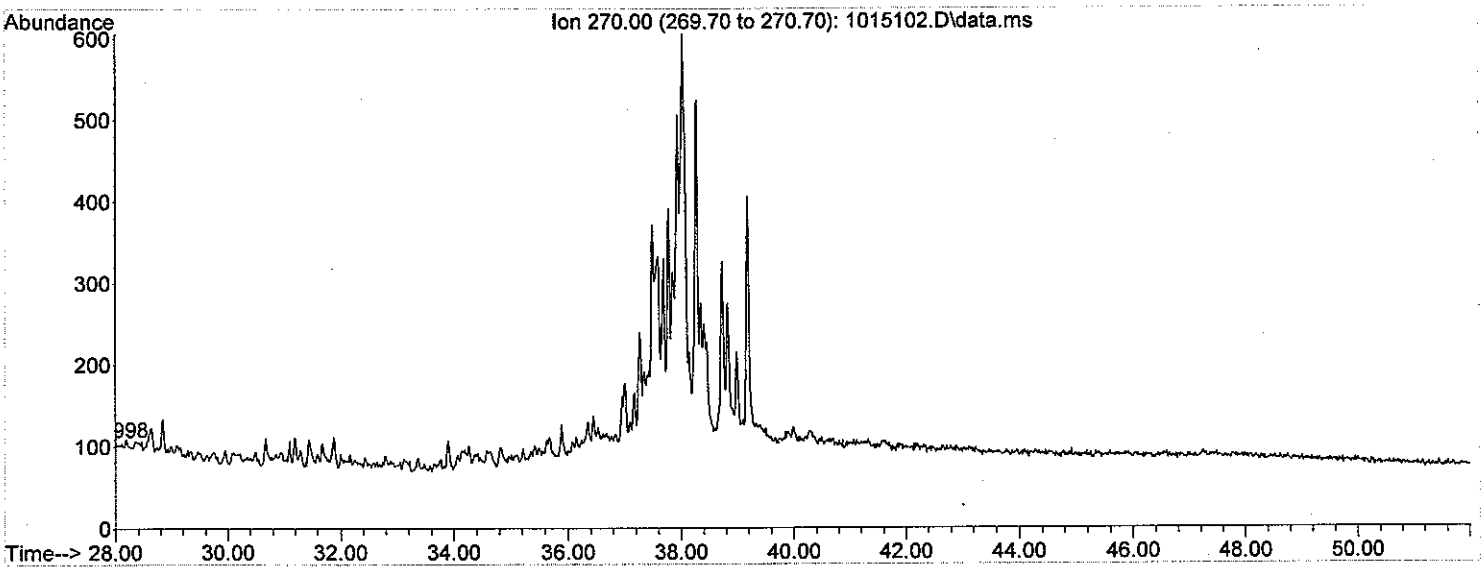
C2-CHRYSENE

Area = 31003.7



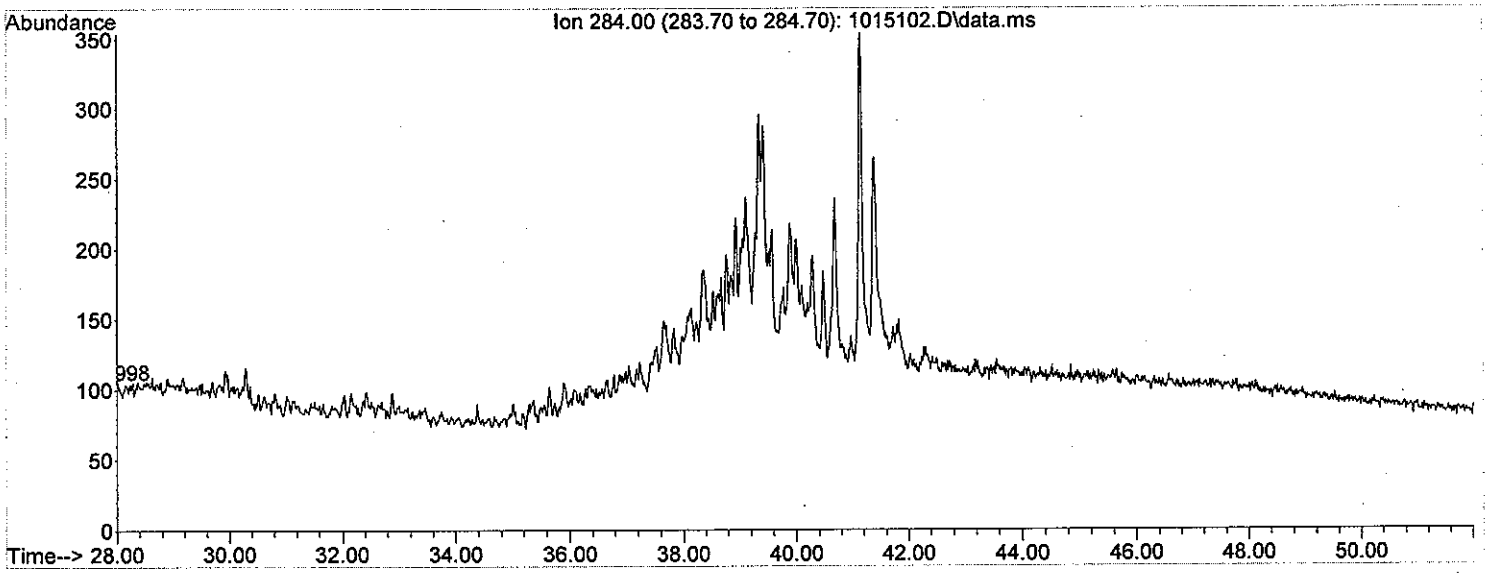
C3 - CHRYSENE

Area = 0



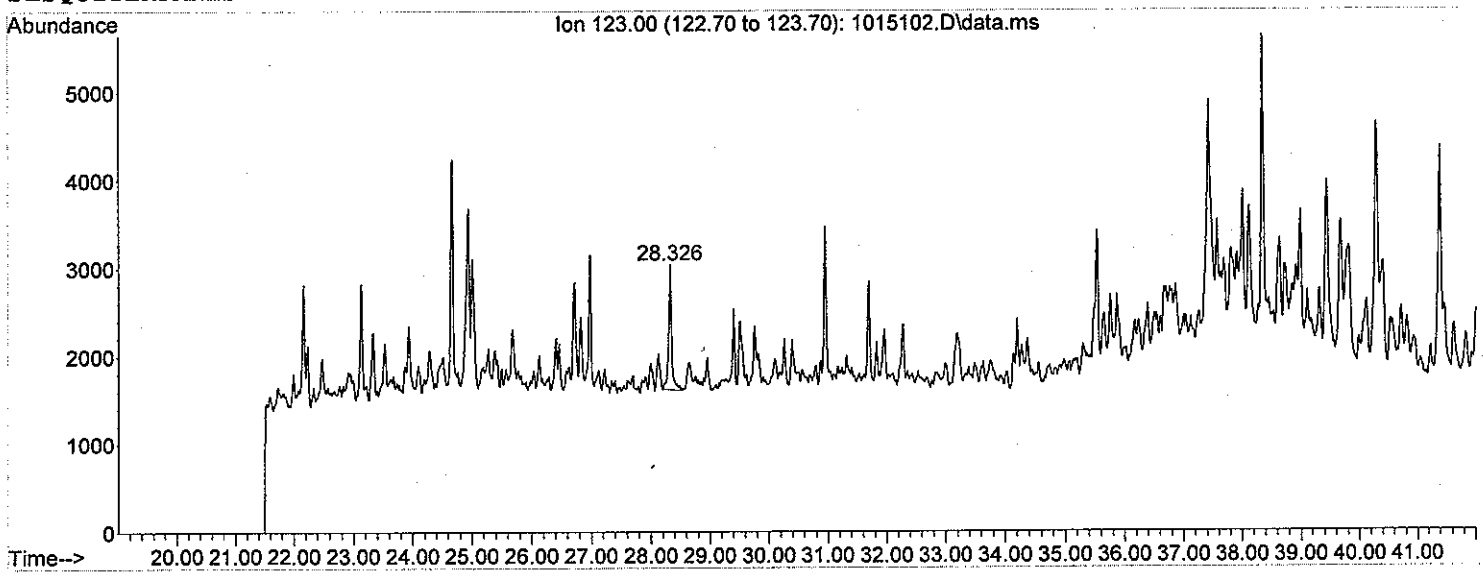
C4 - CHRYSENE

Area = 0



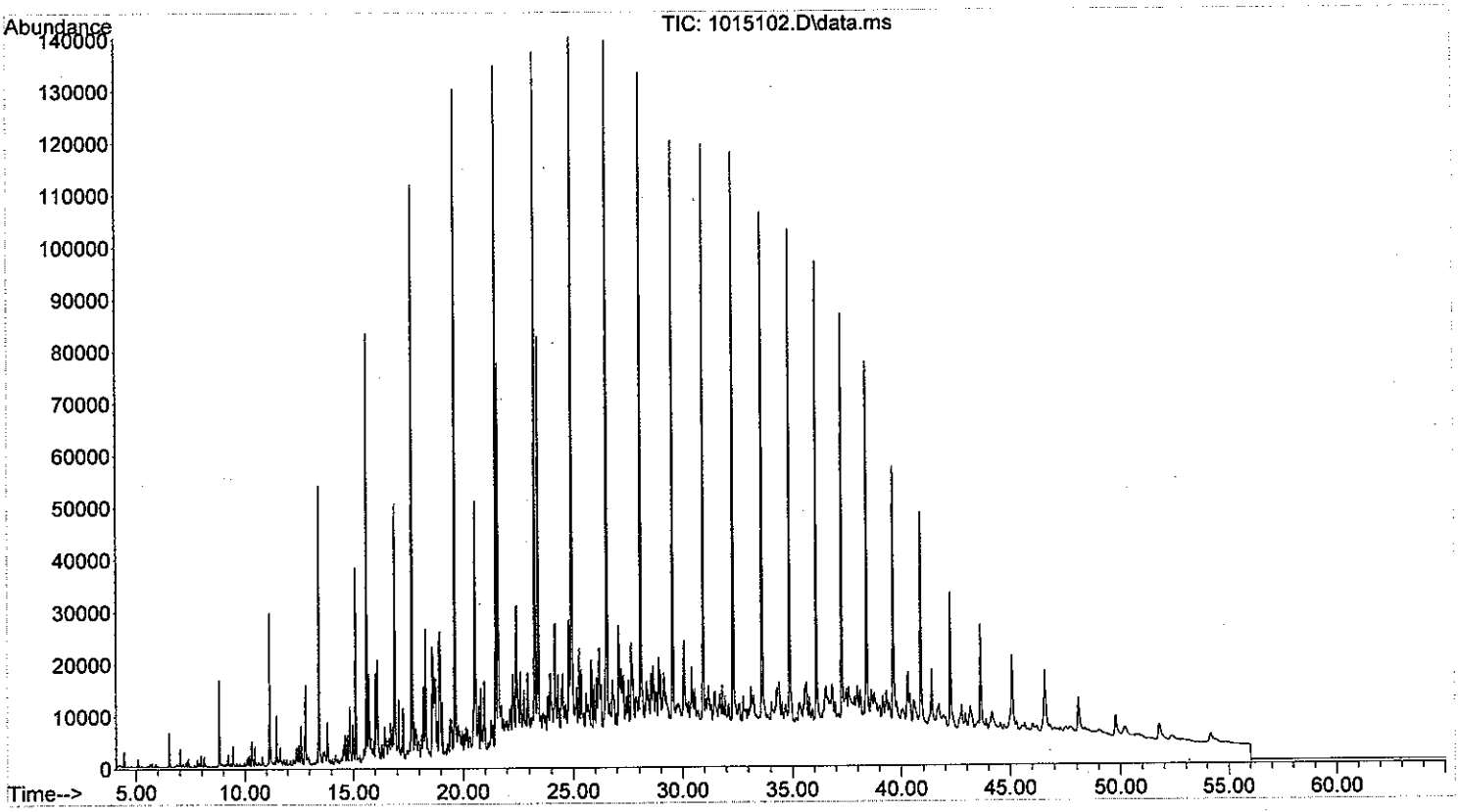
SESQUITERPANES

Area = 50015.9

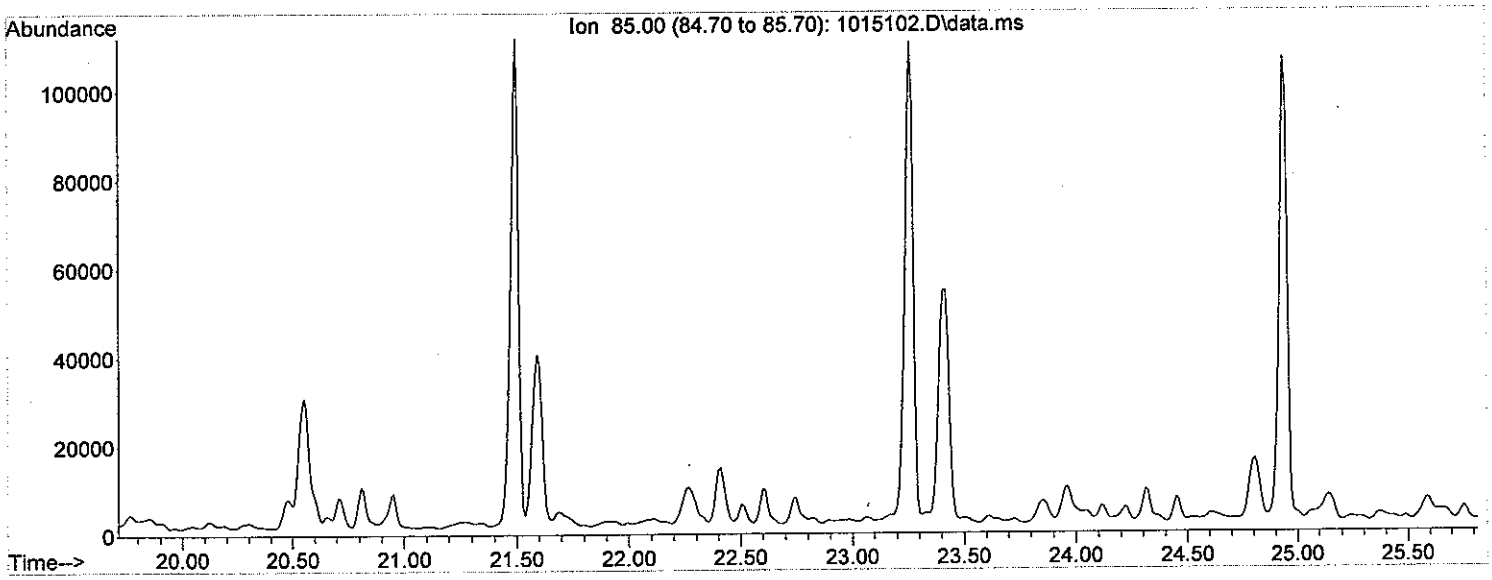


MSL GC-MS2 BIOMARKER ANALYSIS

File: W:\2010\MS_DATA\10-159\1015102.D
Operator: ACT
Date Acquired: 25 Jun 2010 8:30 pm
Method File: BIOMARK3.M
Sample Name: 10-151-2, SP Vial: 7
Misc Info:



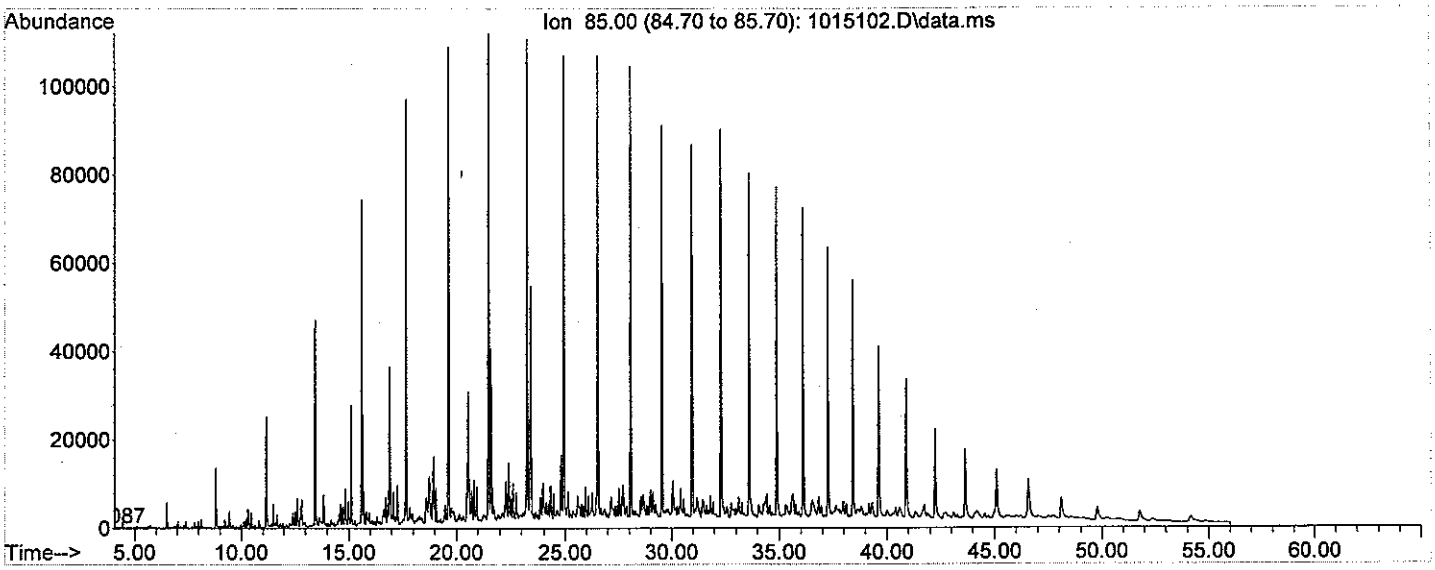
n-C17, Pristane, n-C18, Phytane



Pristane/Phytane = ----
C17/C18 = ----
Pristane/C17 = ----
Phytane/C18 = ----

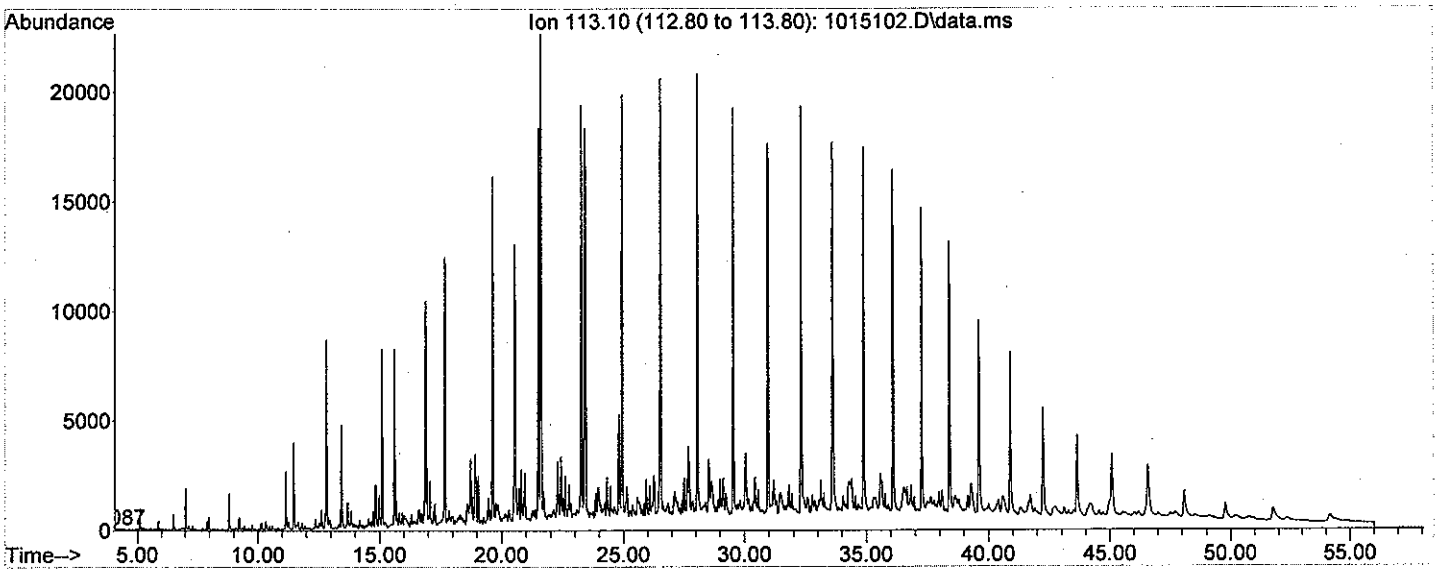
85-SATURATED HYDROCARBONS

Area = 0



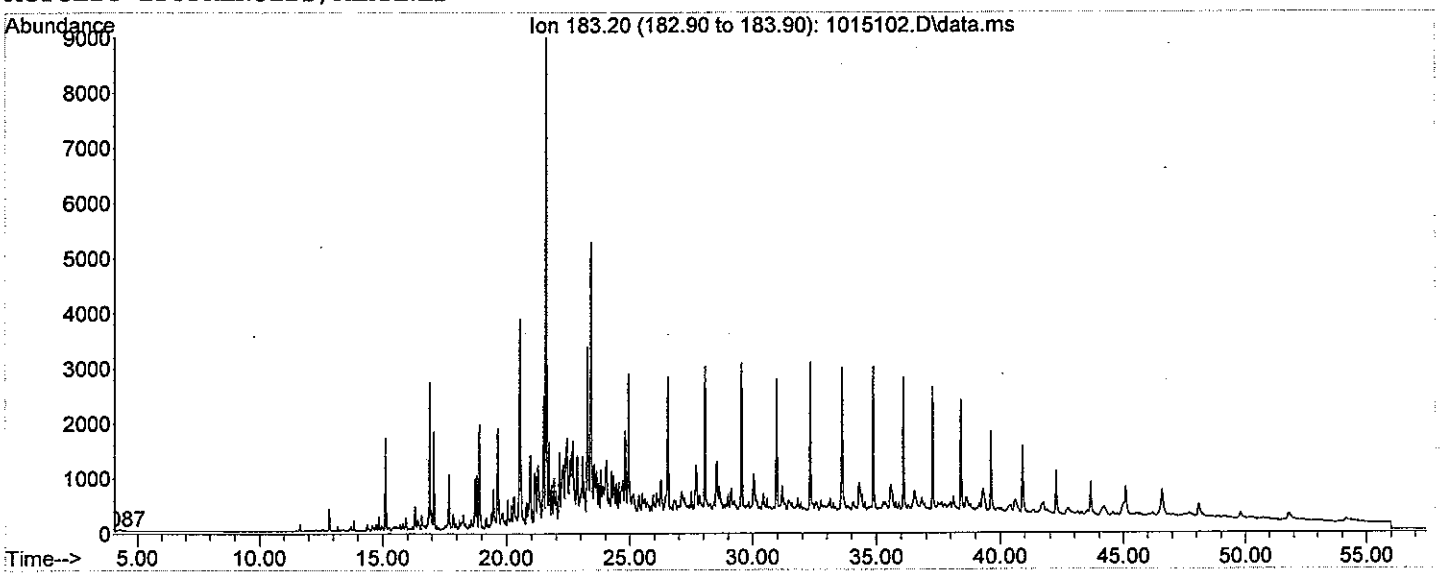
113-SATURATED HYDROCARBONS

Area = 0



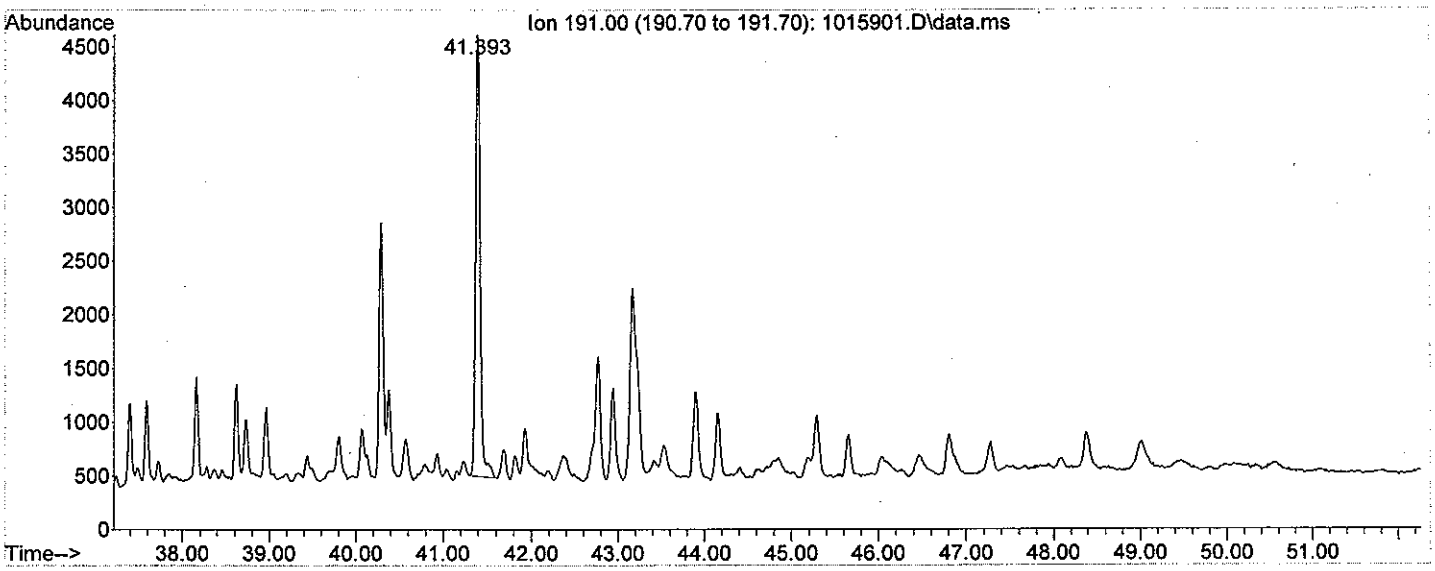
ACYCLIC ISOPRENOIDS/ALKANES

Area = 0



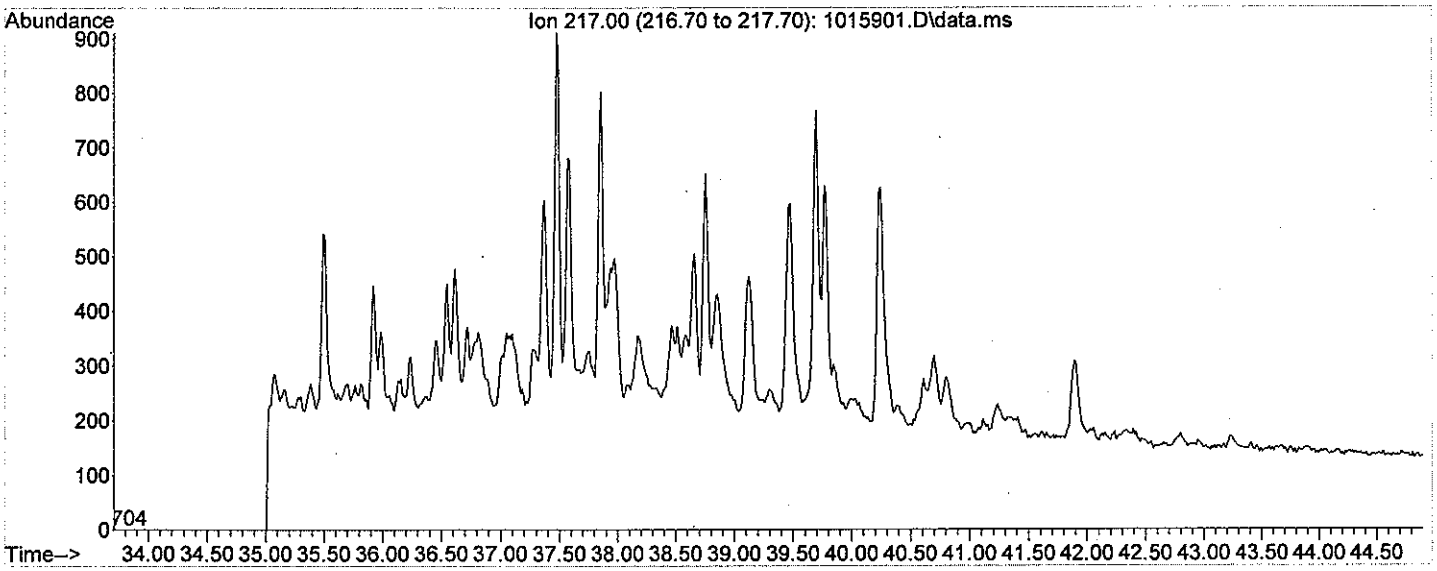
TRITERPANES/HOPANES

Area = 150194



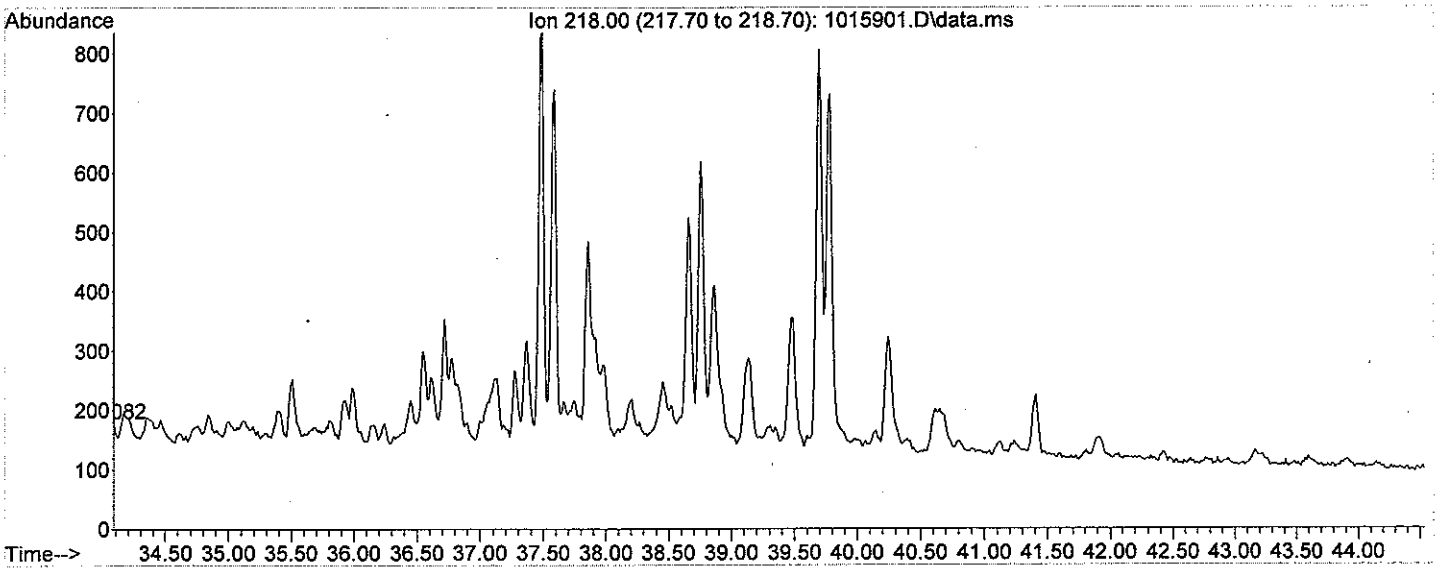
14 a(H) STERANES

Area = 0



14 b(H) STERANES

Area = 0



Quantitation Report (Not Reviewed)

Data Path : W:\2010\MS_DATA\10-159\
Data File : 1015901.D
Acq On : 25 Jun 2010 2:28 pm
Operator : ACT
Sample : 10-159-1, QCM
Misc :
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Jun 25 15:22:47 2010
Quant Method : C:\MSDCHEM\1\METHODS\BIOMARK3.M
Quant Title :
QLast Update : Wed May 27 09:43:48 2009
Response via : Initial Calibration

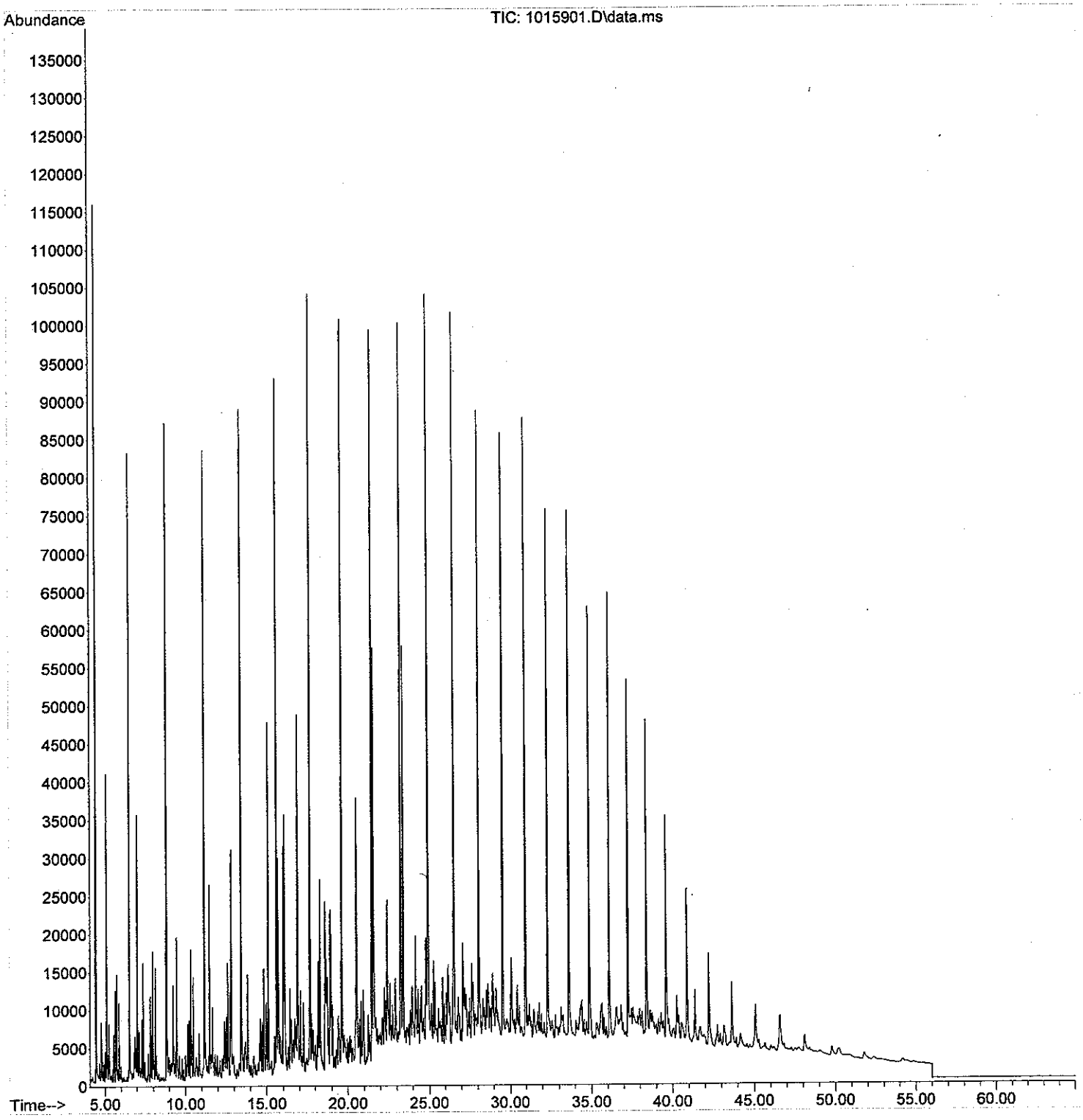
Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
Target Compounds					Qvalue
1) 85-SATURATED HYDROCARBONS	18.929	85	214978	No Calib	
2) n-C17	0.000	85	0	N.D.	
3) PRISTANE	0.000	85	0	N.D.	
4) n-C18	0.000	85	0	N.D.	
5) PHYTANE	0.000	85	0	N.D.	
6) 113-SATURATED HYDROCAR...	0.000	113	0	N.D.	
7) ACYCLIC ISOPRENOIDS/AL...	0.000	183	0	N.D.	
8) C2-NAPHTHALENES	0.000	156	0	N.D.	
9) C3-NAPHTHALENES	19.410	170	129142	No Calib	
10) C4-NAPHTHALENES	0.000	184	0	N.D.	
11) PHENANTHRENE/ANTHRACENE	0.000	178	0	N.D.	
12) BENZONAPHTHIOPHENE	32.116	234	53439	No Calib	
13) DIBENZOTHIOPHENE	22.439	184	128082	No Calib	
14) C1-DIBENZOTHIOPHENE	24.528	198	236956	No Calib	
15) C2-DIBENZOTHIOPHENE	26.494	212	119191	No Calib	
16) C3-DIBENZOTHIOPHENE	27.990	226	75544	No Calib	
17) C1-PHENANTHRENES	25.362	192	190862	No Calib	
18) C2-PHENANTHRENES	27.292	206	122396	No Calib	
19) C3-PHENANTHRENES	29.167	220	85106	No Calib	
20) TRITERPANES/HOPANES	41.403	191	150194	No Calib	
21) HOPANE A	0.000	191	0	N.D.	
22) HOPANE B	0.000	191	0	N.D.	
23) 14 a(H) STERANES	0.000	217	0	N.D.	
24) 14 b(H) STERANES	0.000	218	0	N.D.	
25) TRI-AROMATIC STERANES	0.000	231	0	N.D.	
26) METHYLHOPANES	0.000	205	0	N.D.	
27) NORHOPANES	0.000	177	0	N.D.	
28) PYRENE/FLUORANTHENE	28.917	202	30620	No Calib	
29) METHYL PYRENE	30.437	216	15616	No Calib	
30) FLUORENE	0.000	166	0	N.D.	
31) BICYCLONAPHTHALENES	0.000	208	0	N.D.	
32) CHRYSENE	0.000	228	0	N.D.	
33) C1-CHRYSENE	34.693	242	42801	No Calib	
34) C2-CHRYSENE	0.000	256	0	N.D.	
35) C3-CHRYSENE	0.000	270	0	N.D.	
36) C4-CHRYSENE	0.000	284	0	N.D.	
37) SESQUITERPANES	28.330	123	29479	No Calib	

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (Not Reviewed)

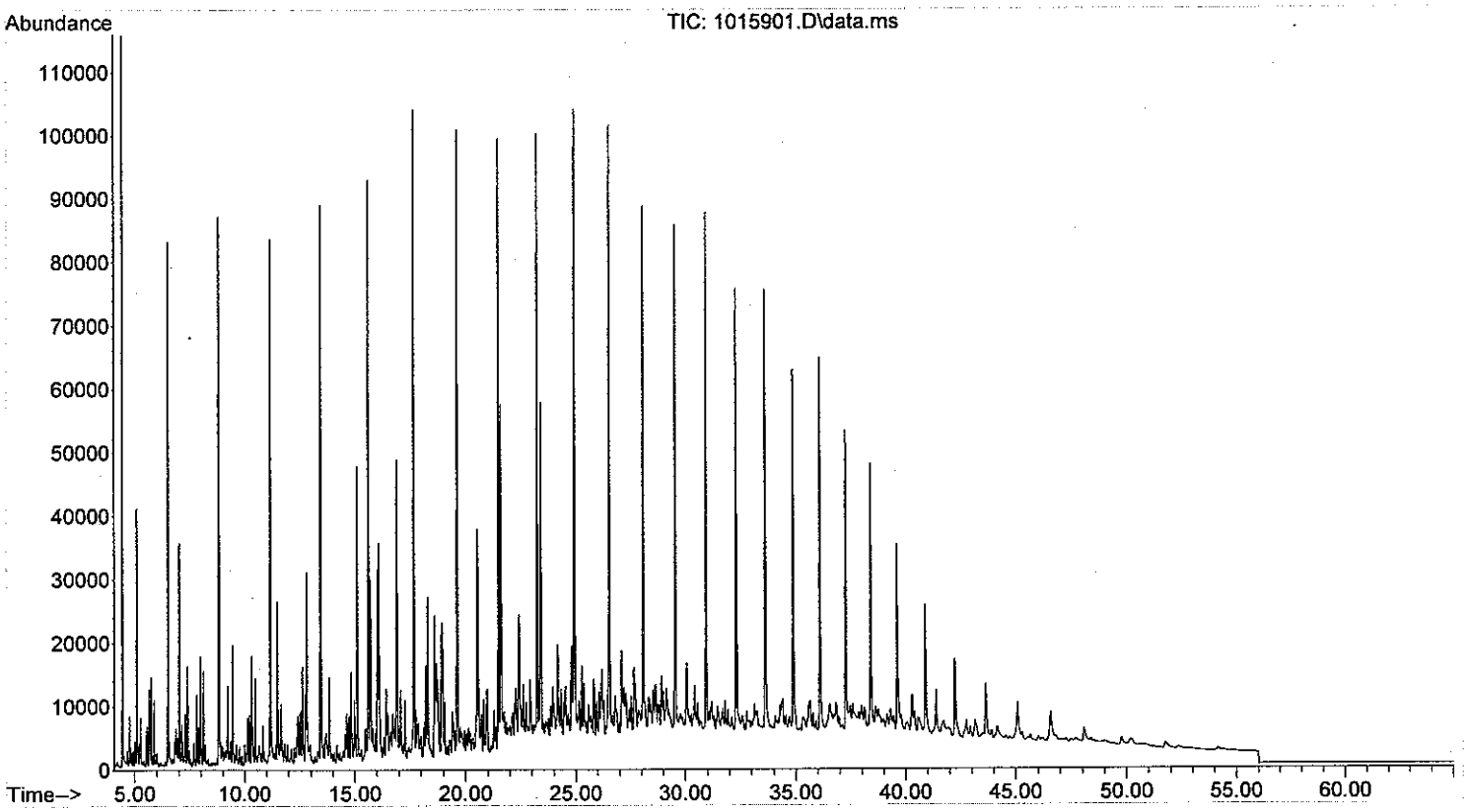
Data Path : W:\2010\MS_DATA\10-159\
Data File : 1015901.D
Acq On : 25 Jun 2010 2:28 pm
Operator : ACT
Sample : 10-159-1, QCM
Misc :
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Jun 25 15:22:47 2010
Quant Method : C:\MSDCHEM\1\METHODS\BIOMARK3.M
Quant Title :
QLast Update : Wed May 27 09:43:48 2009
Response via : Initial Calibration

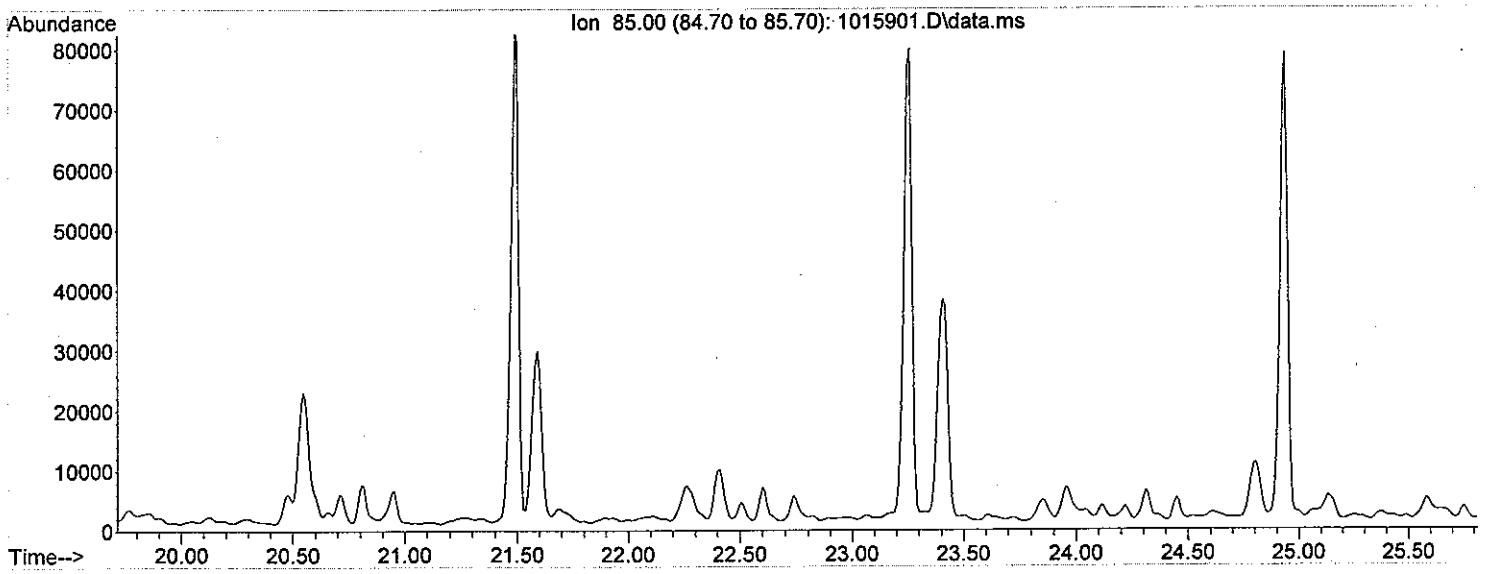


MARINE SAFETY LABORATORY GC-MS2 BIOMARKER ANALYSIS

File: \\Mslserver1\data archive\2010\MS_data\10-159\1015901.D
Operator: ACT
Date Acquired: 25 Jun 2010 2:28 pm
Method File: BIOMARK3.M
Sample Name: 10-159-1, QCM Vial: 2
Misc Info:



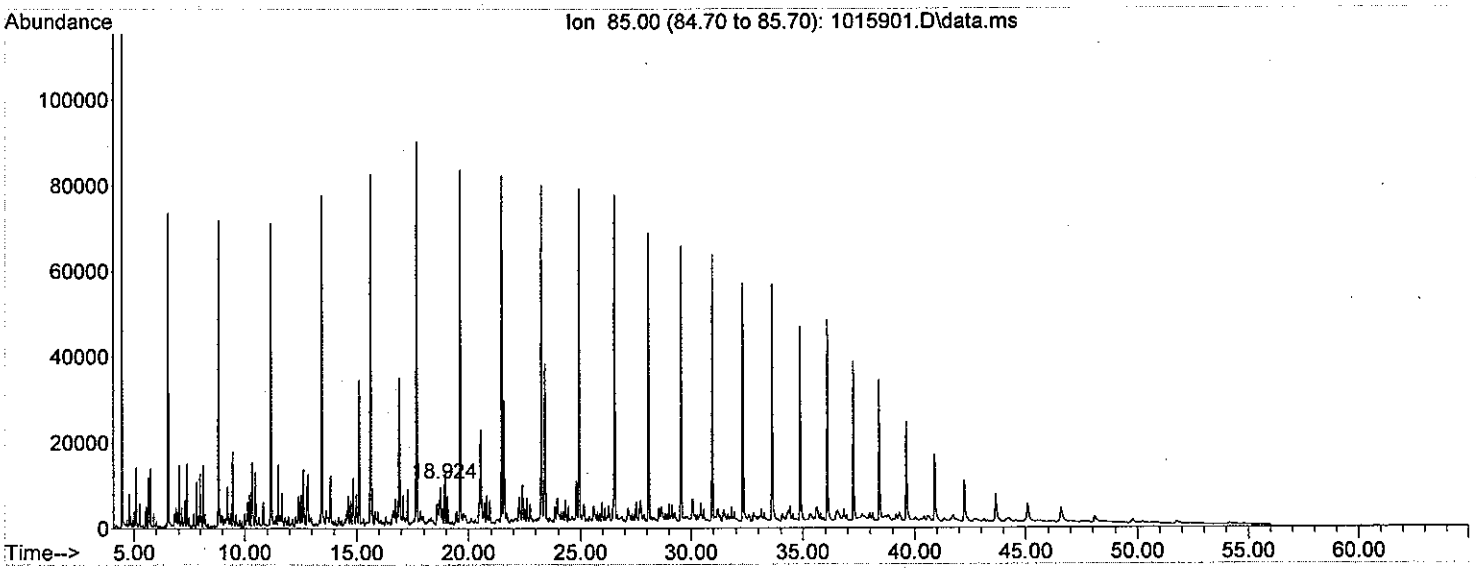
n-C17,Pristane,n-C18,Phytane



Pristane/Phytane = 0.672
C17/C18 = 0.982
Pristane/C17 = 0.401
Phytane/C18 = 0.586

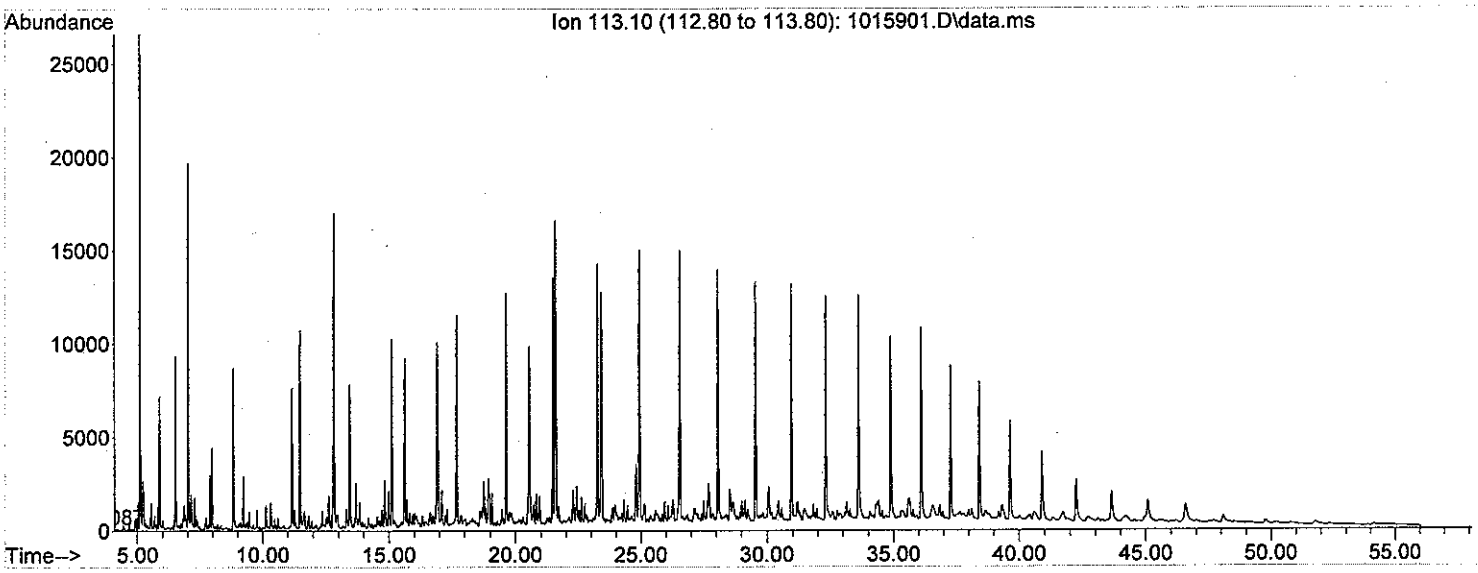
85-SATURATED HYDROCARBONS

Area = 214978



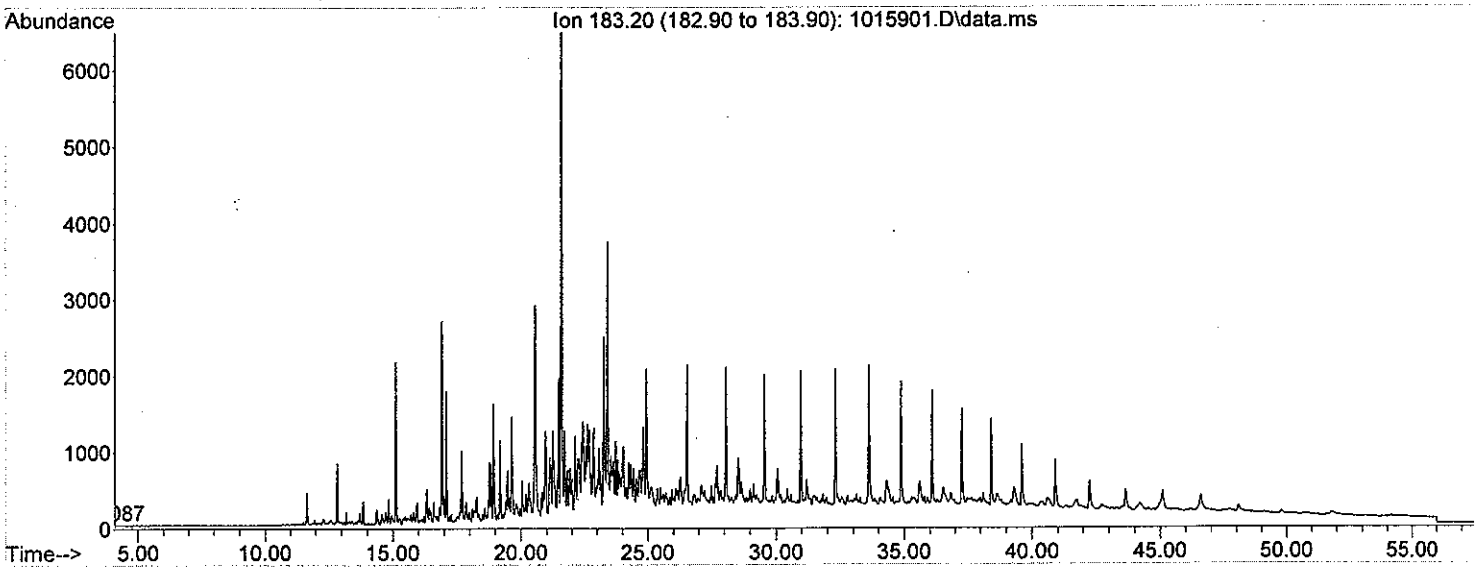
113-SATURATED HYDROCARBONS

Area = 0



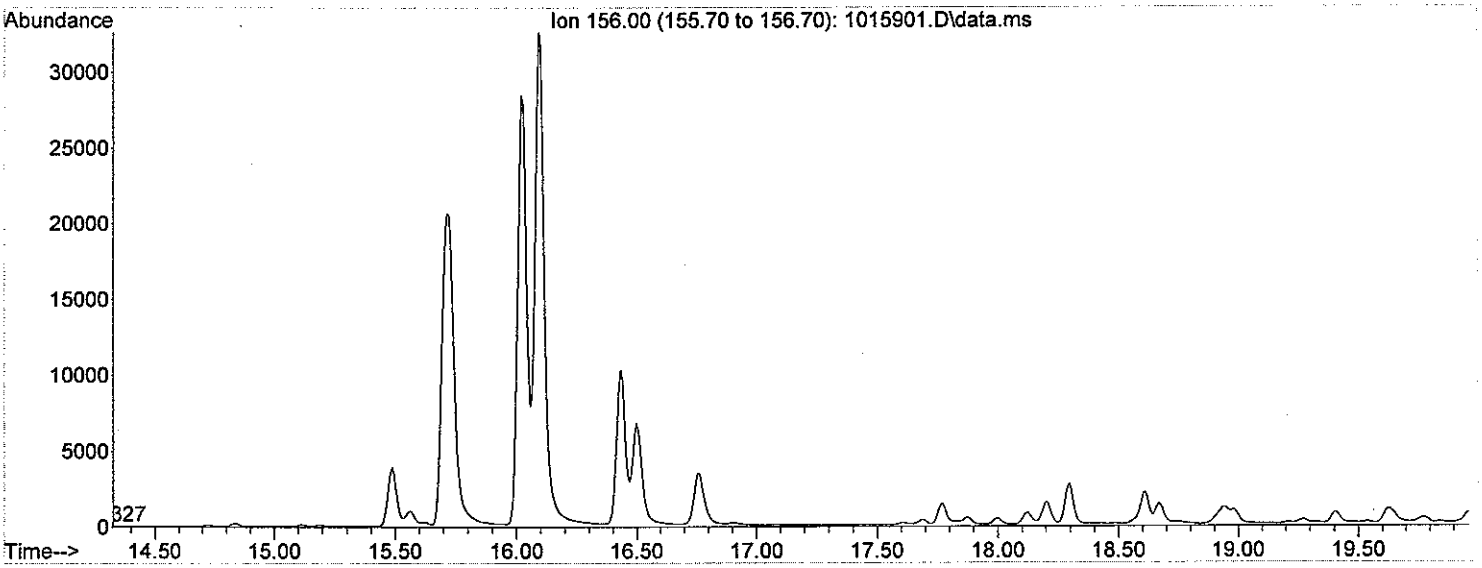
ACYCLIC ISOPRENOIDS/ALKANES

Area = 0



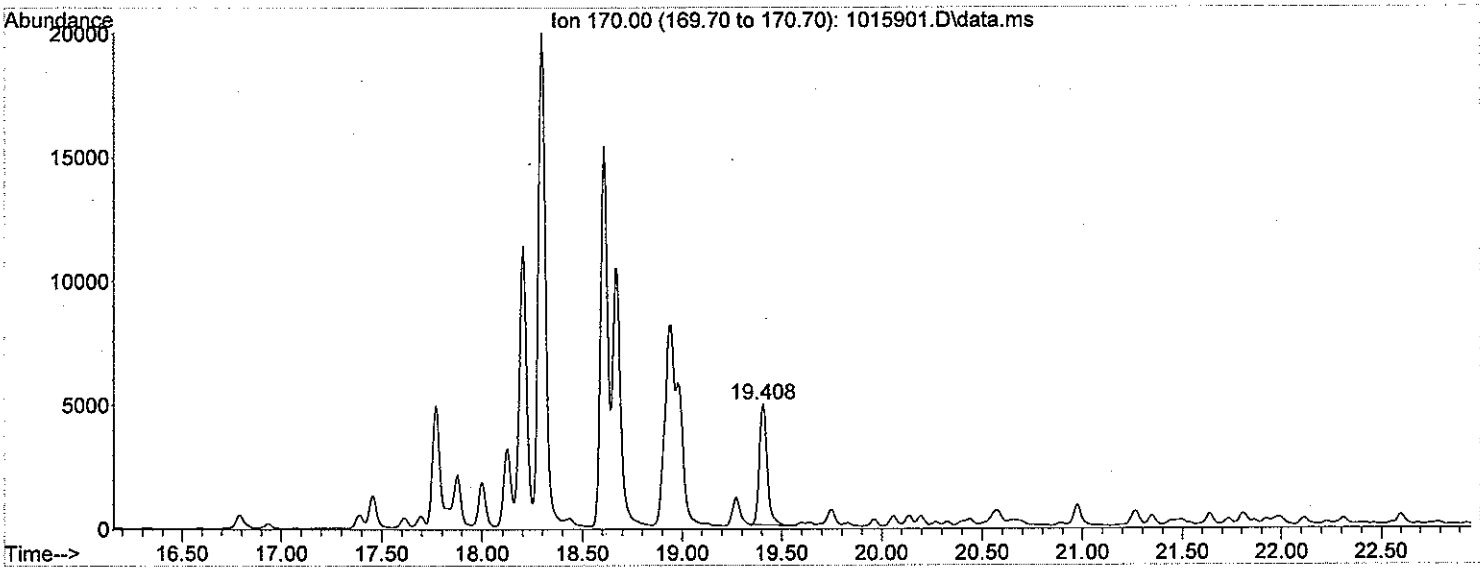
C2-NAPHTHALENES

Area = 0



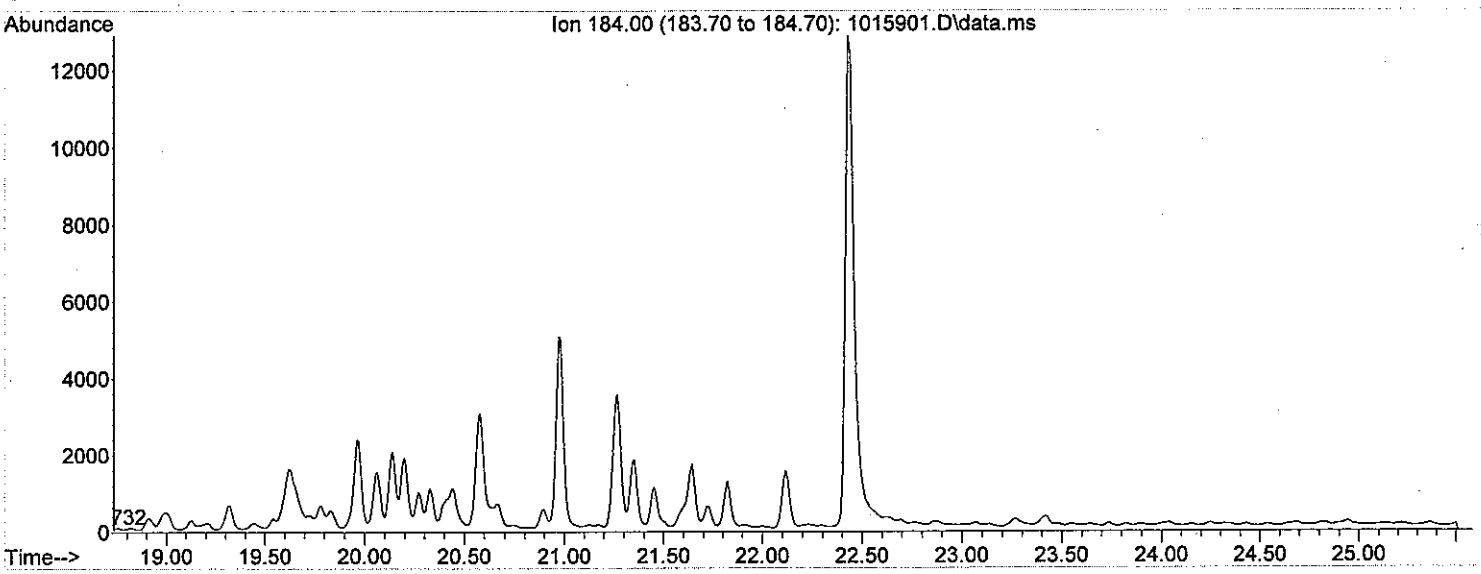
C3-NAPHTHALENES

Area = 129142



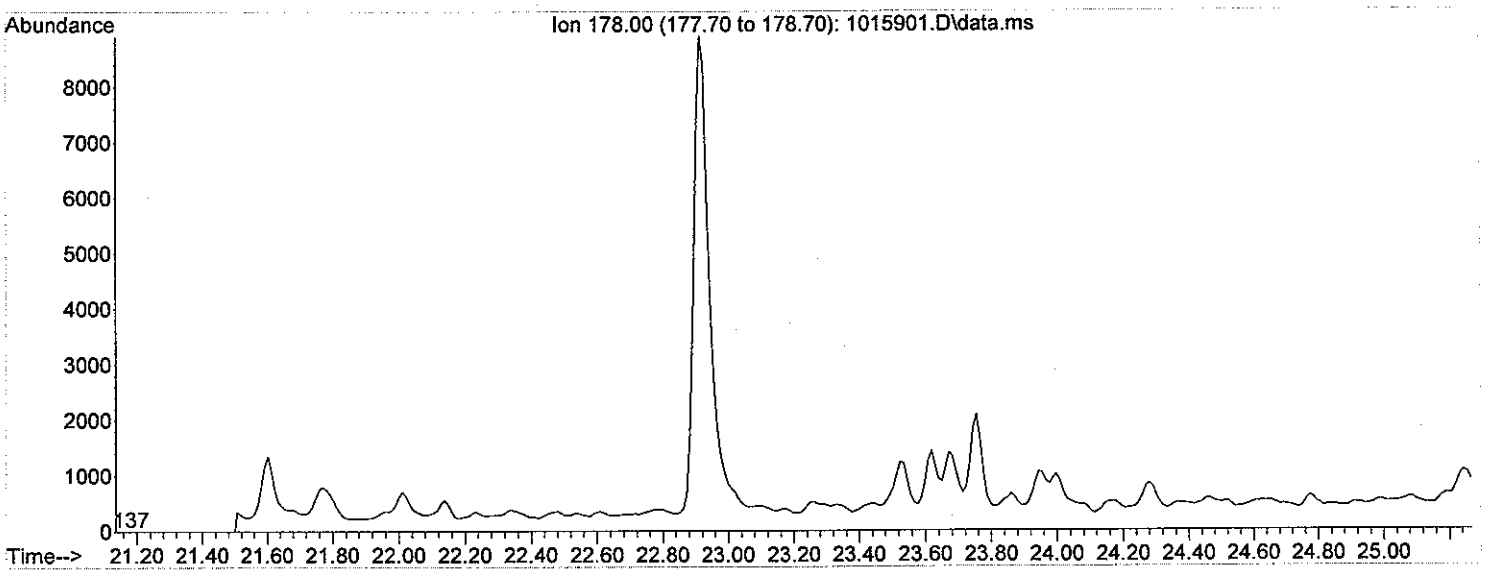
C4-NAPHTHALENES

Area = 0



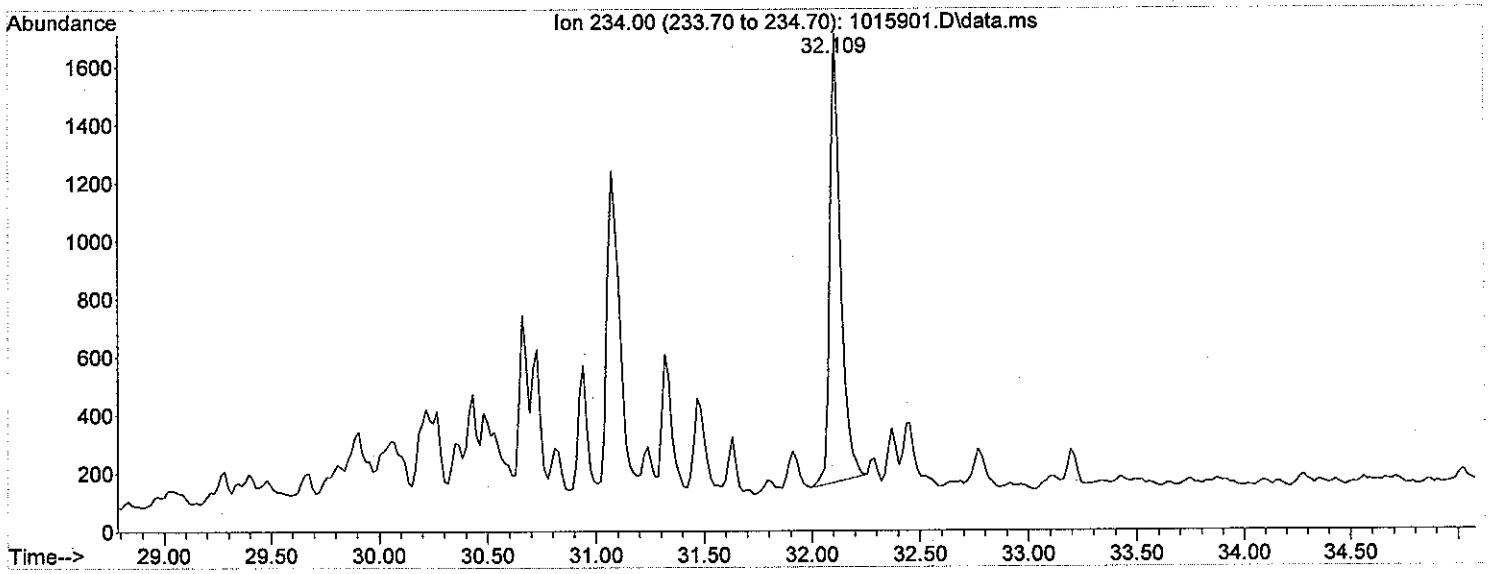
PHENANTHRENE/ANTHRACENE

Area = 0



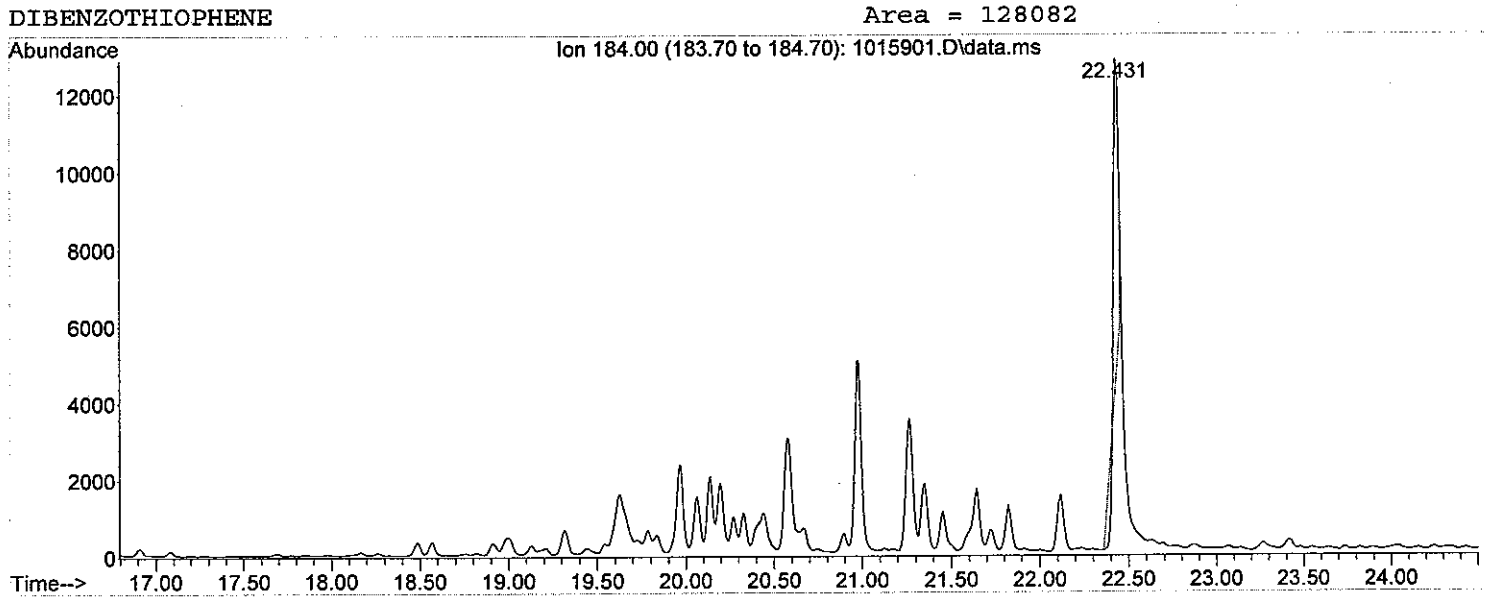
BENZONAPHTHIOPHENE

Area = 53439.4



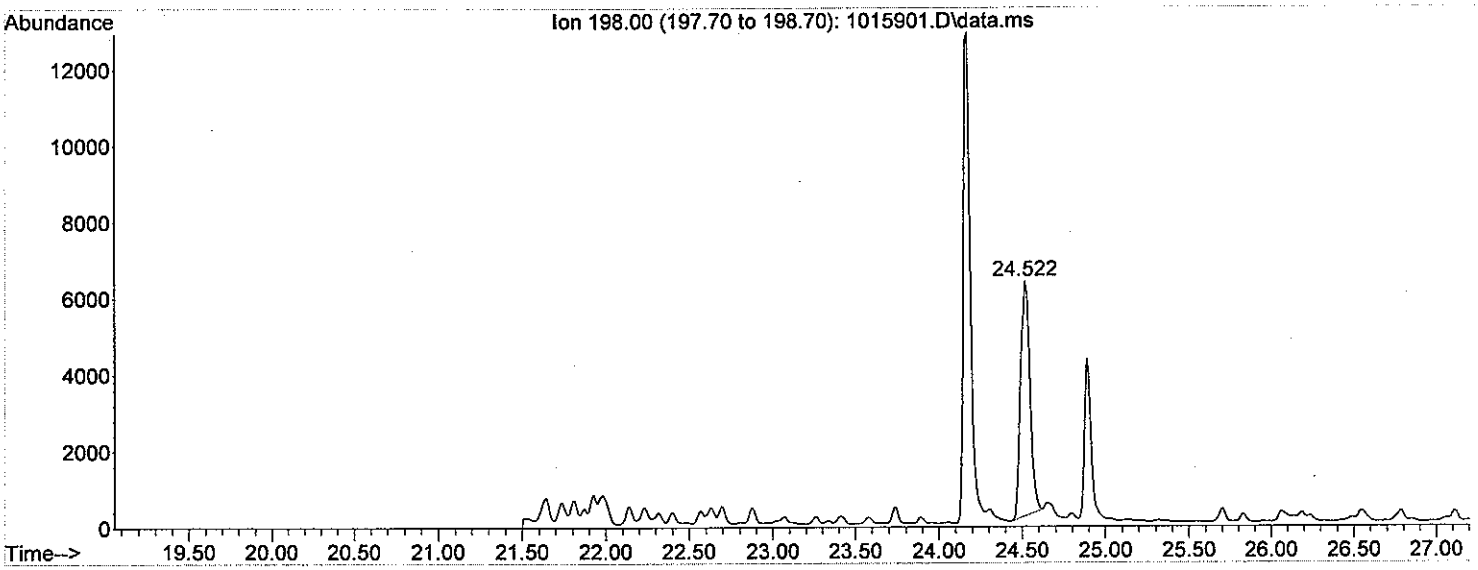
DIBENZOTHIOPHENE

Area = 128082



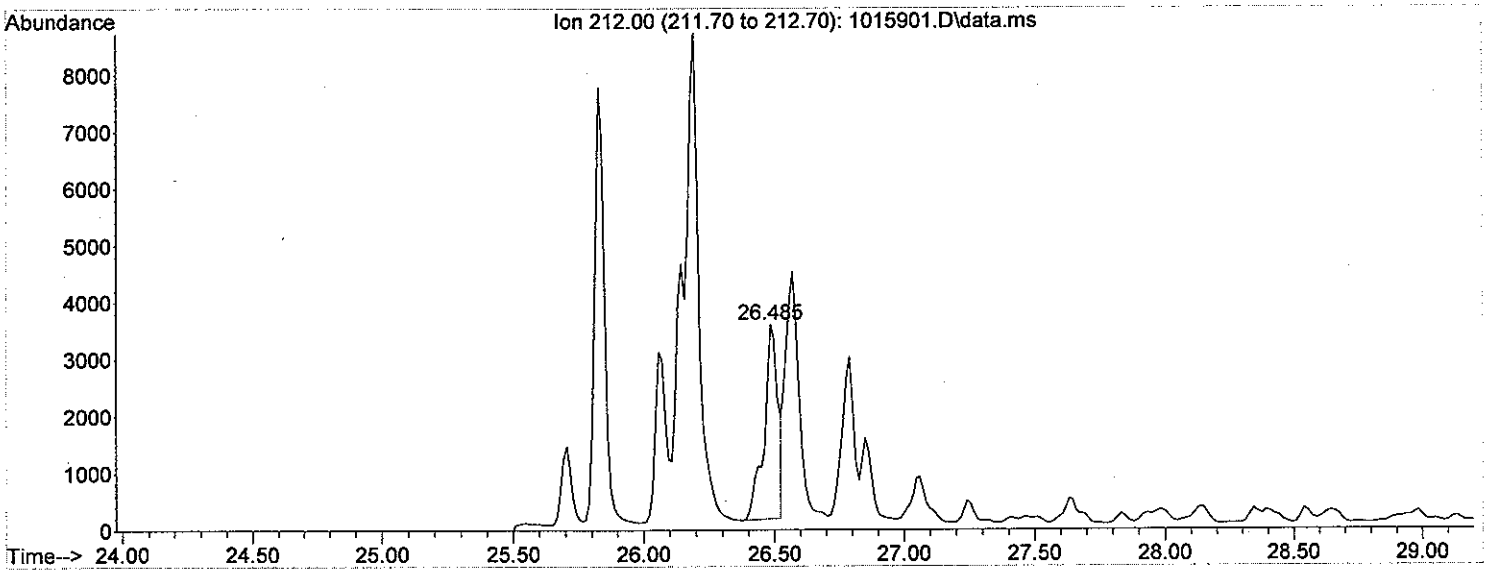
C1-DIBENZOTHIOPHENE

Area = 236956



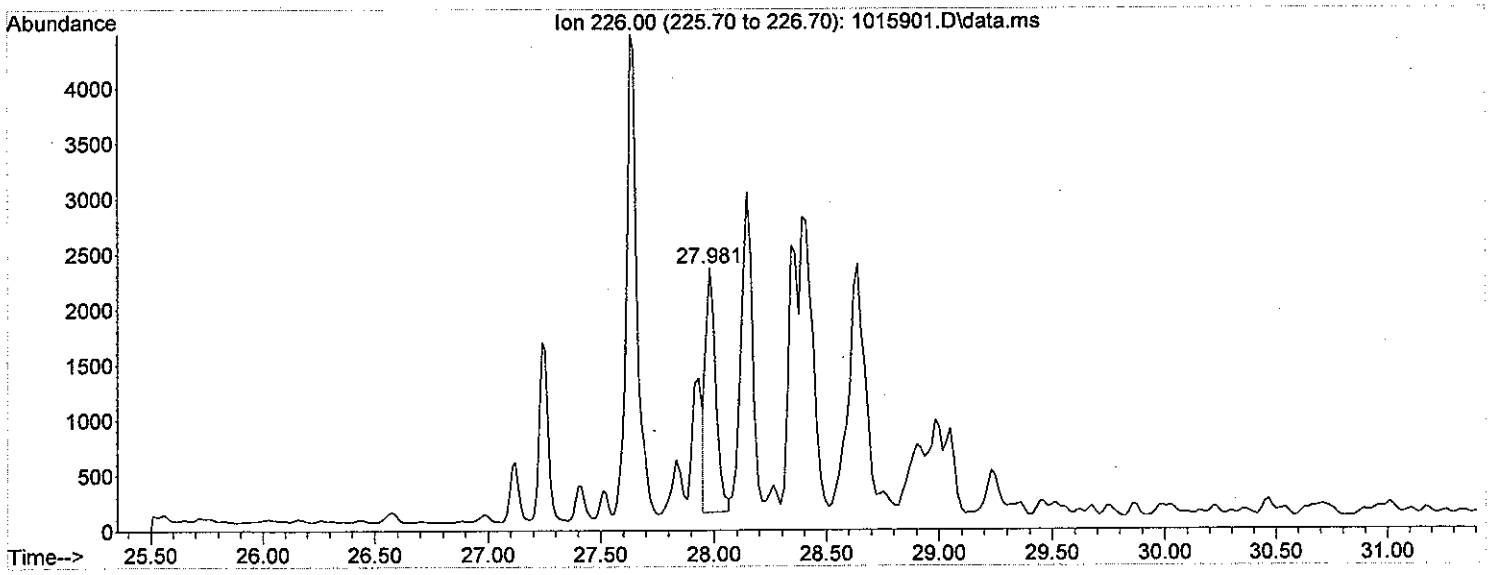
C2-DIBENZOTHIOPHENE

Area = 119191



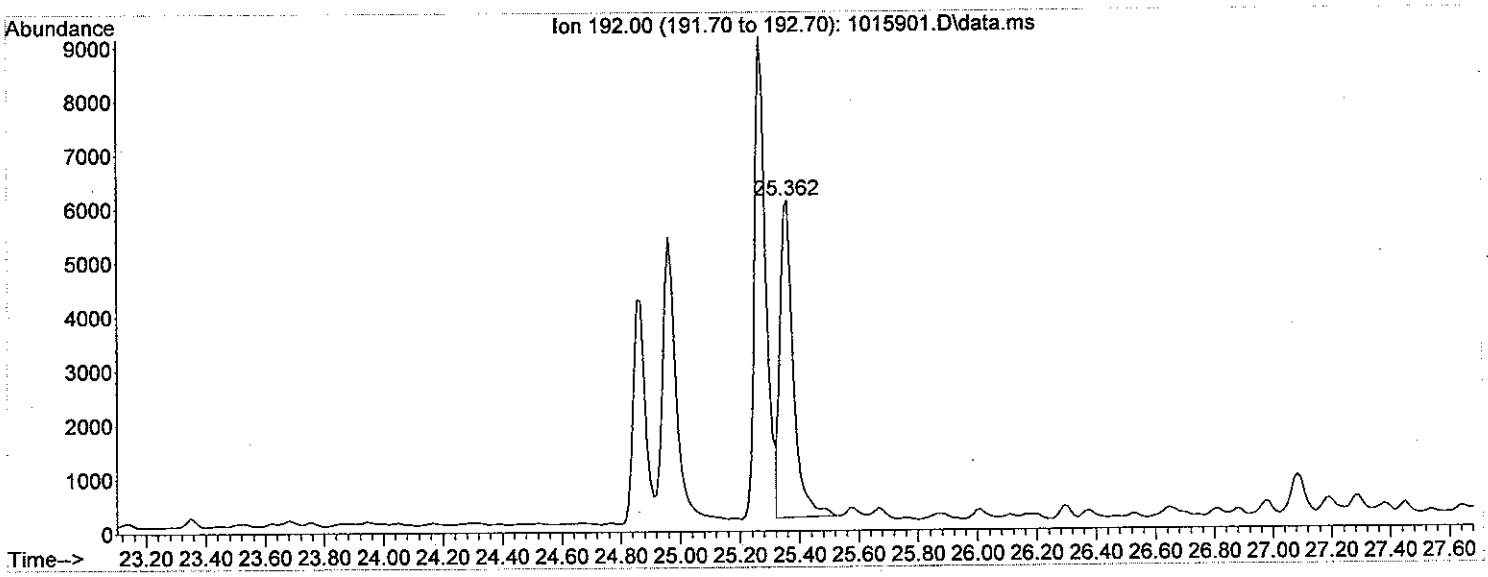
C3-DIBENZOTHIOPHENE

Area = 75543.7



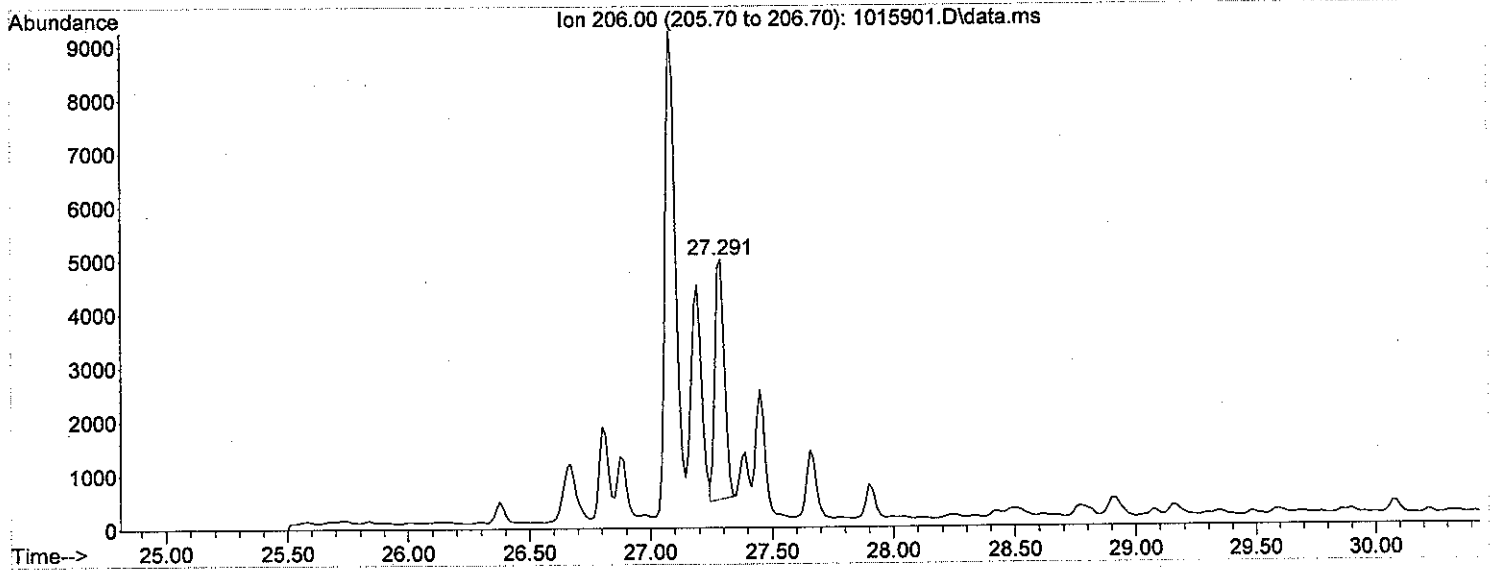
C1 - PHENANTHRENES

Area = 190862



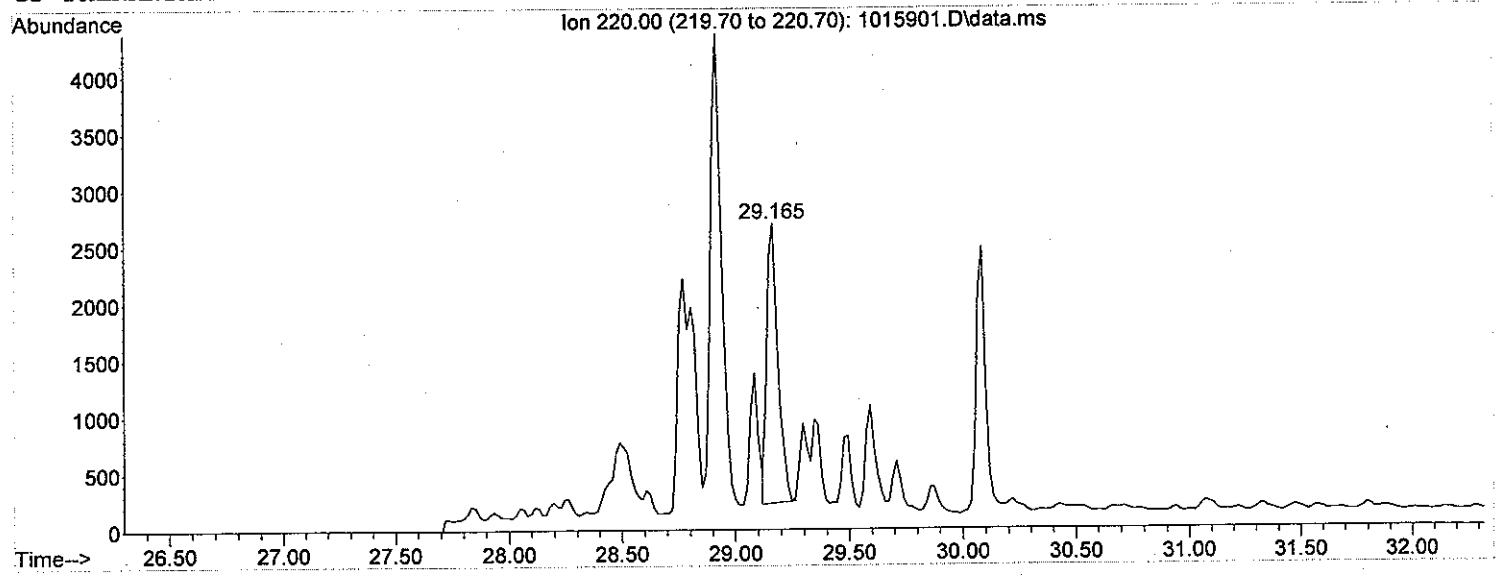
C2 - PHENANTHRENES

Area = 122396



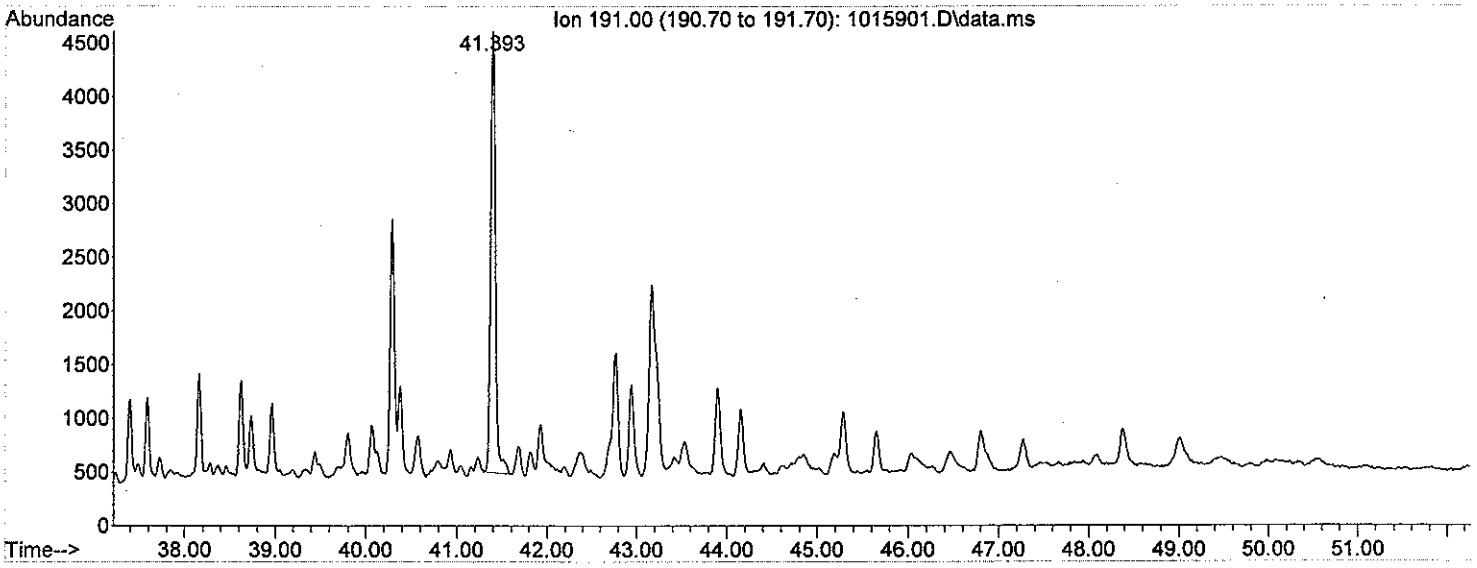
C3 - PHENANTHRENES

Area = 85106.3



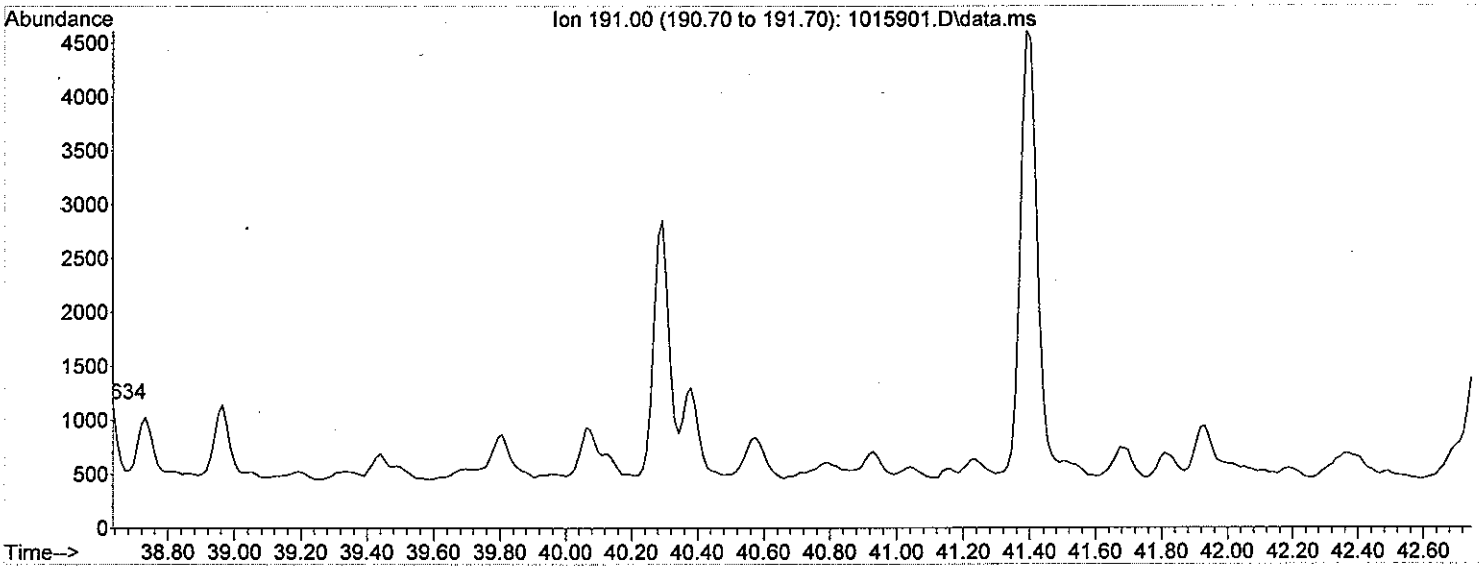
TRITERPANES/HOPANES

Area = 150194



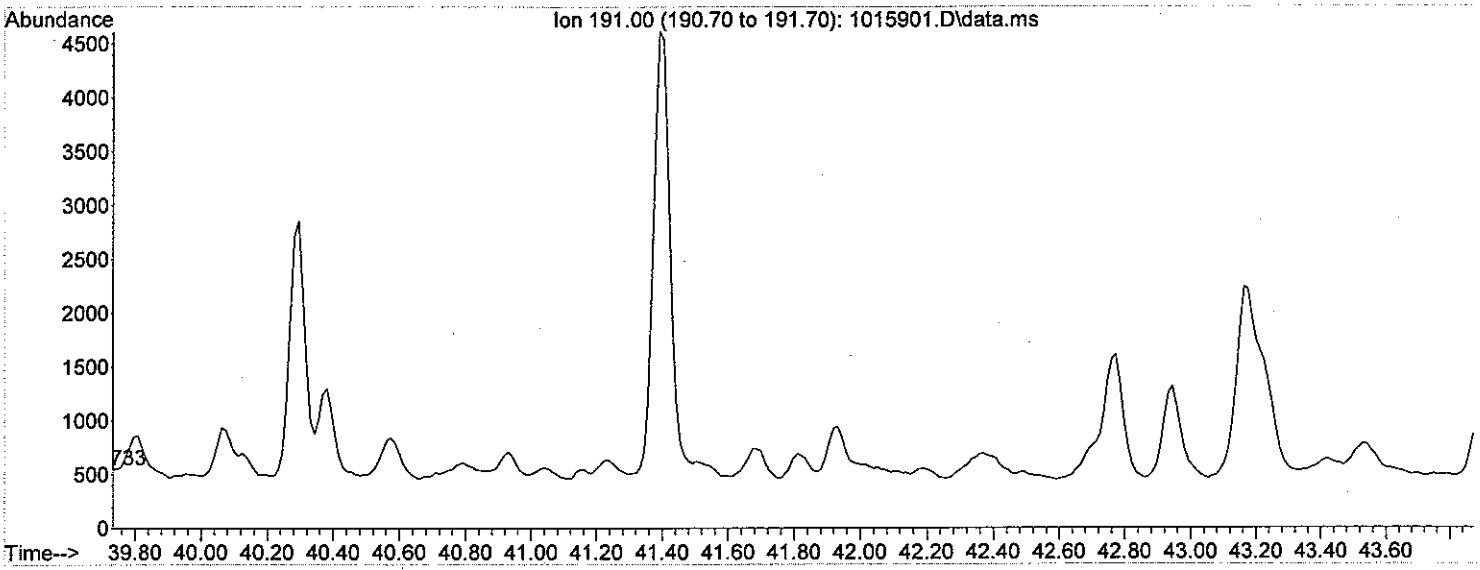
HOPANE A

Area = 0

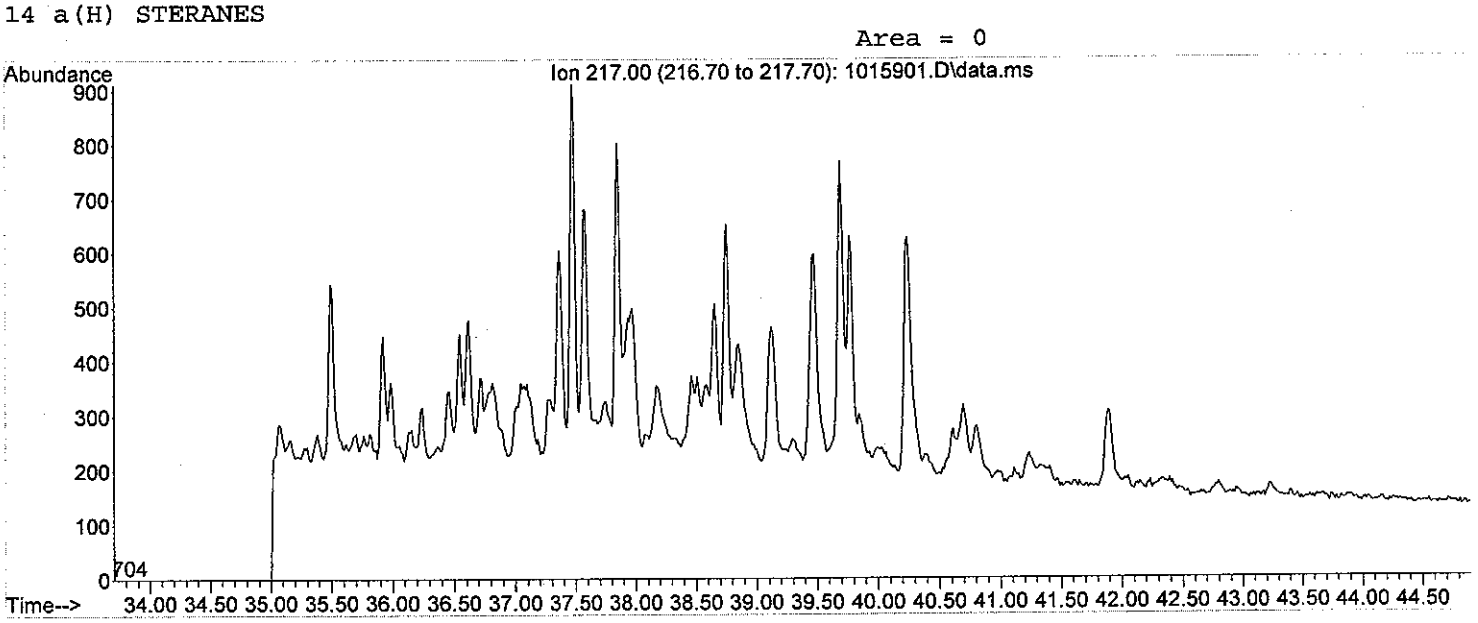


HOPANE B

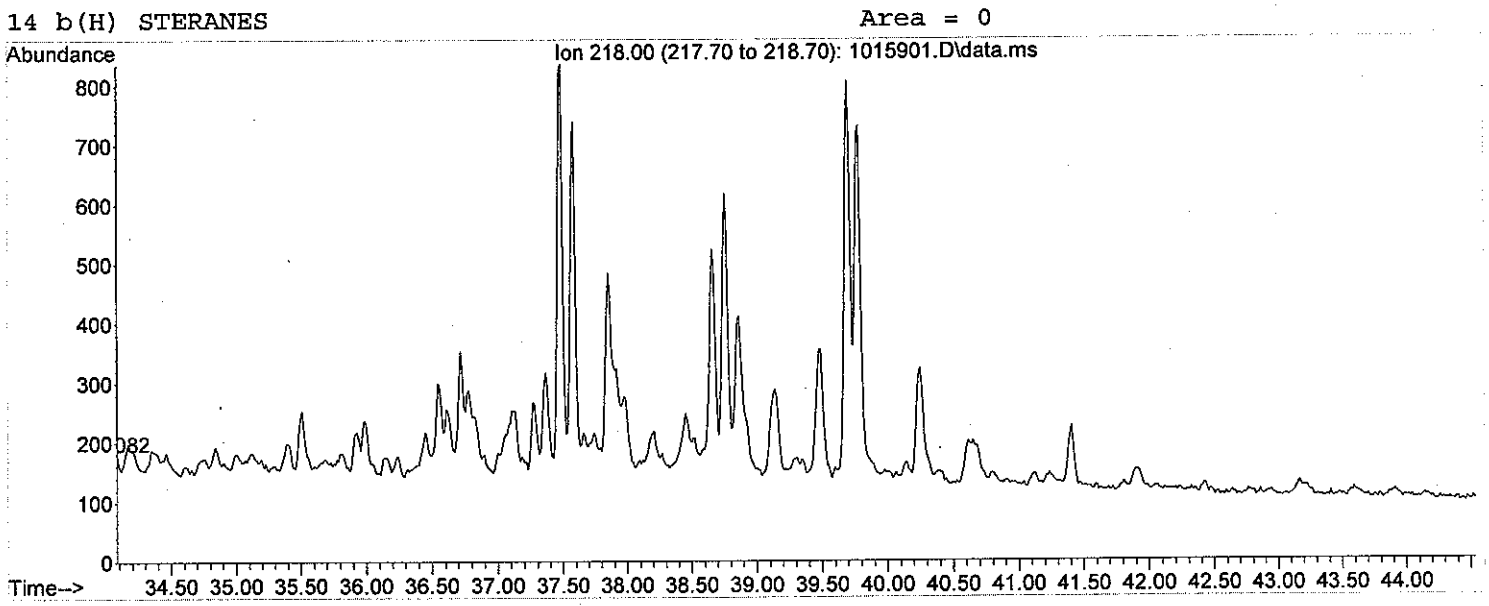
Area = 0



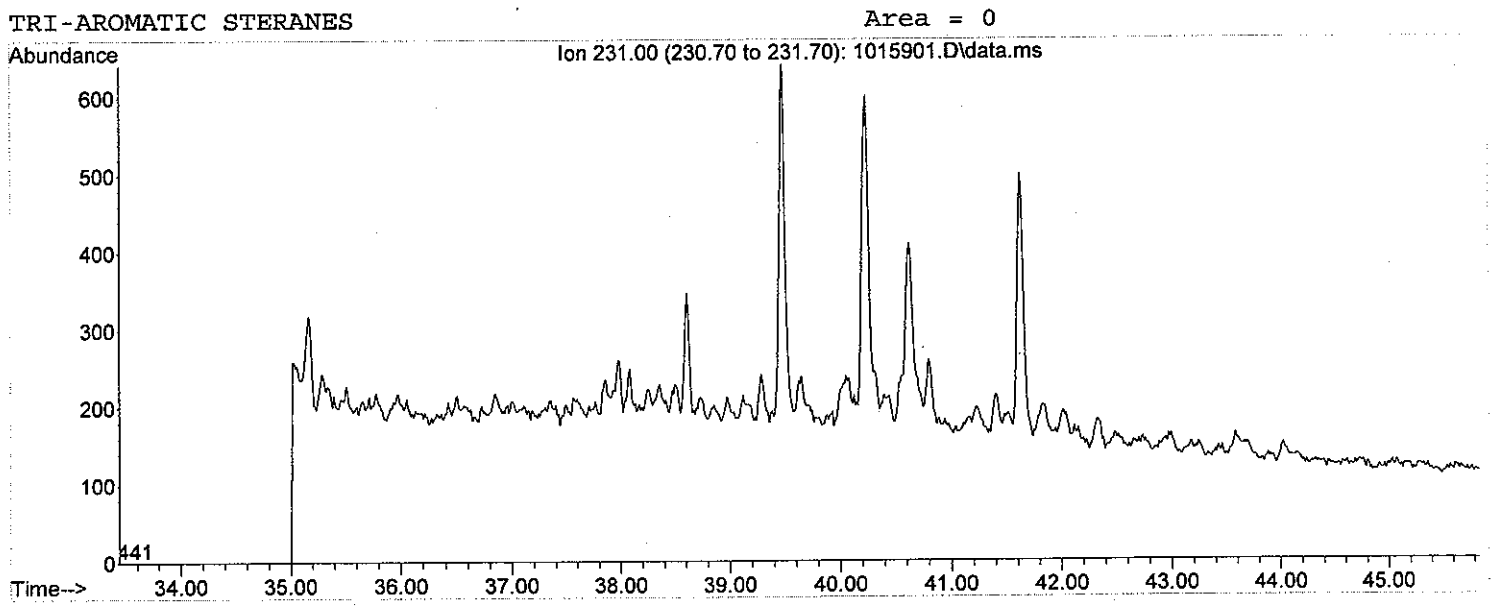
14 a(H) STERANES



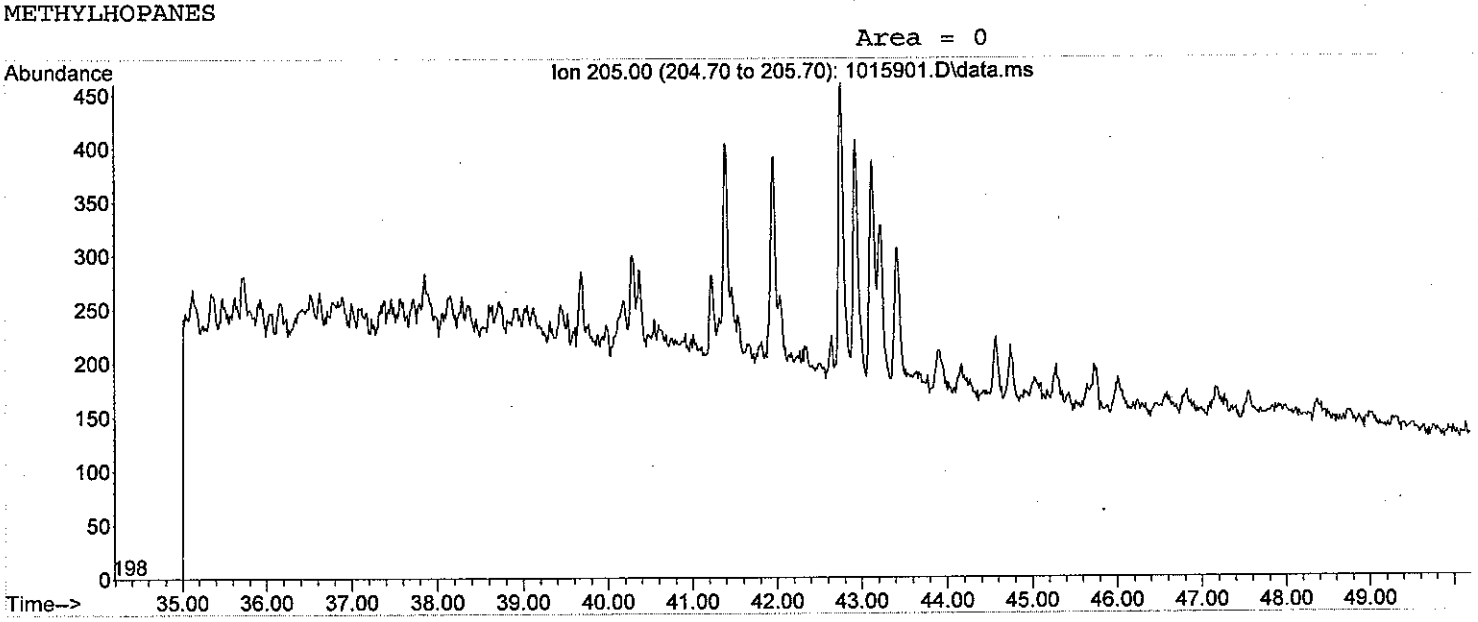
14 b(H) STERANES



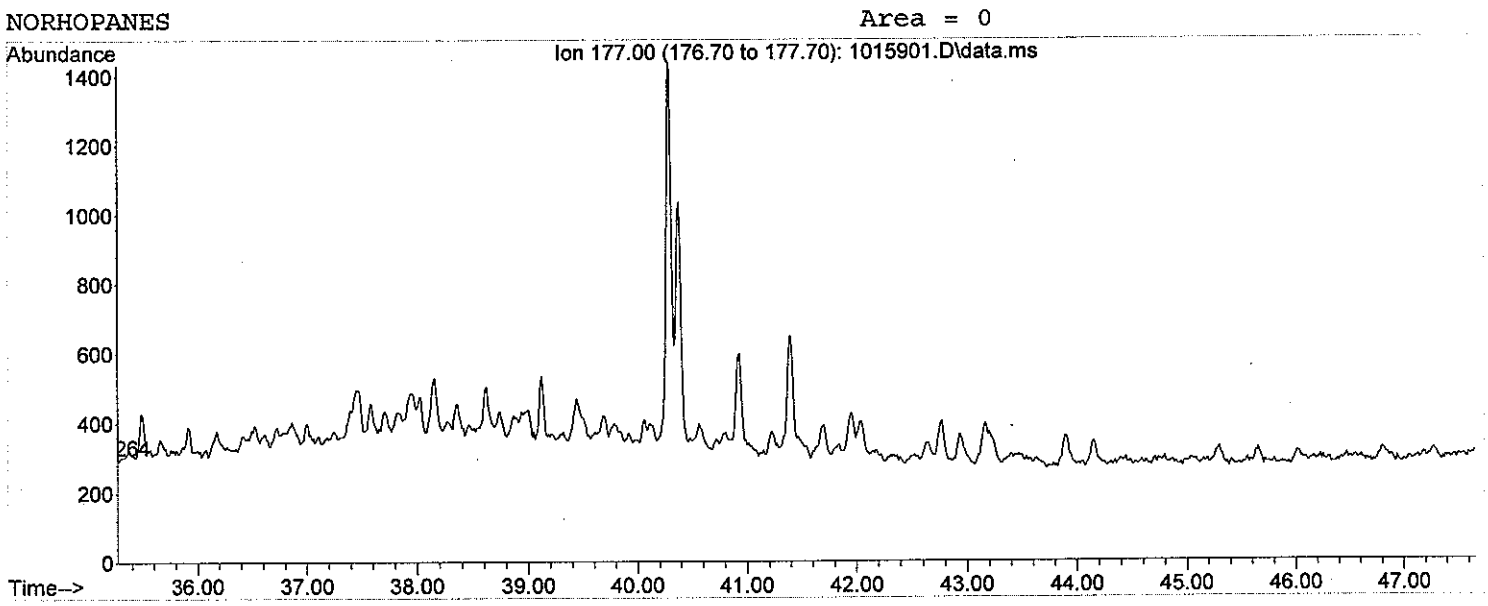
TRI-AROMATIC STERANES



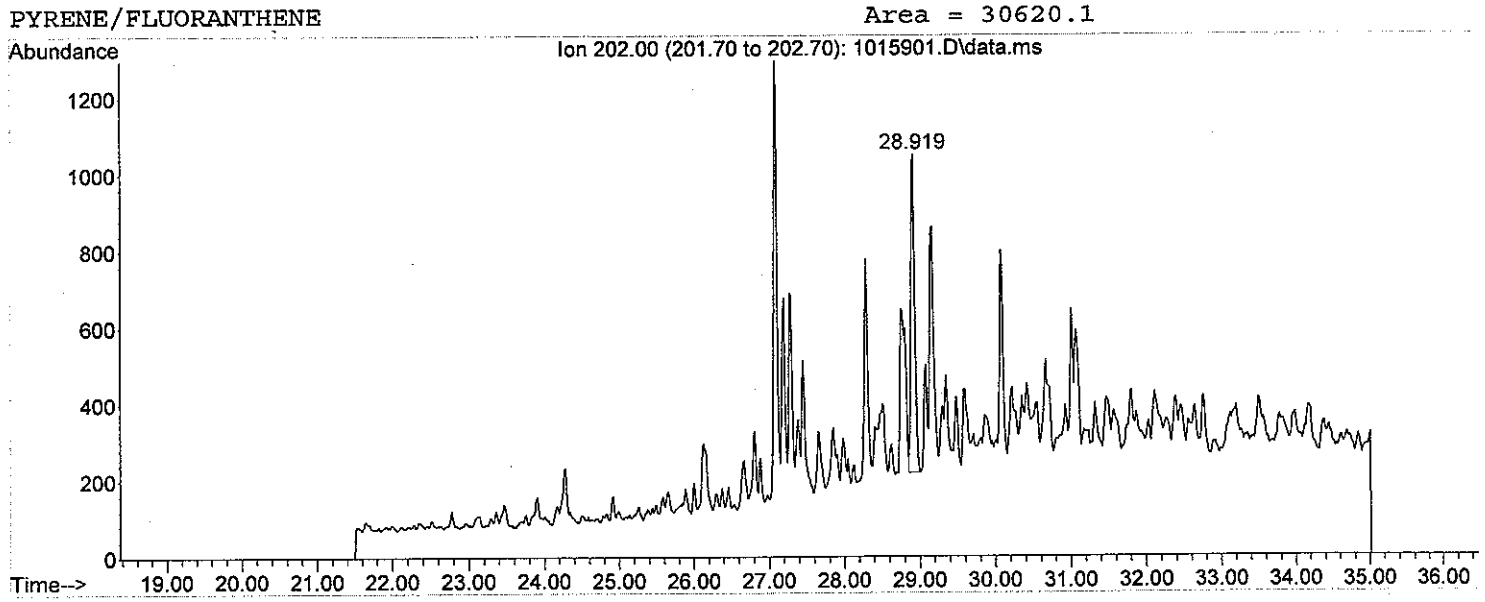
METHYLHOPANES



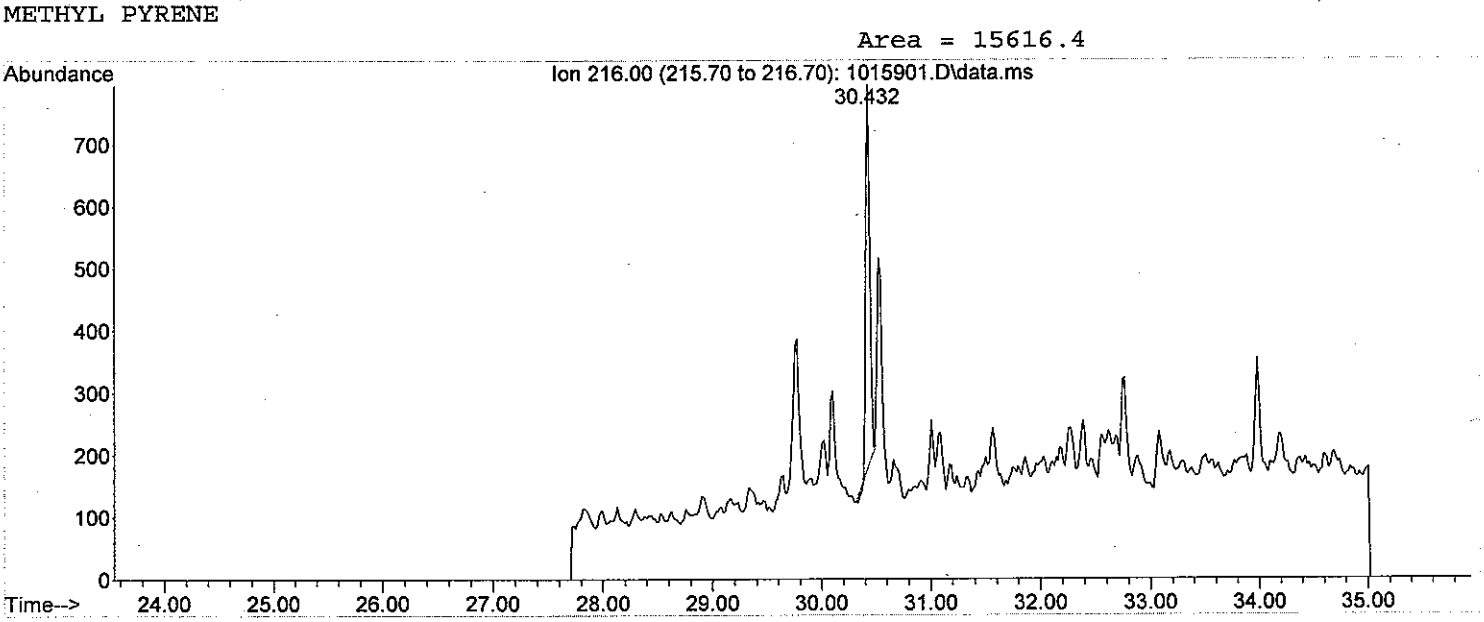
NORHOPANES



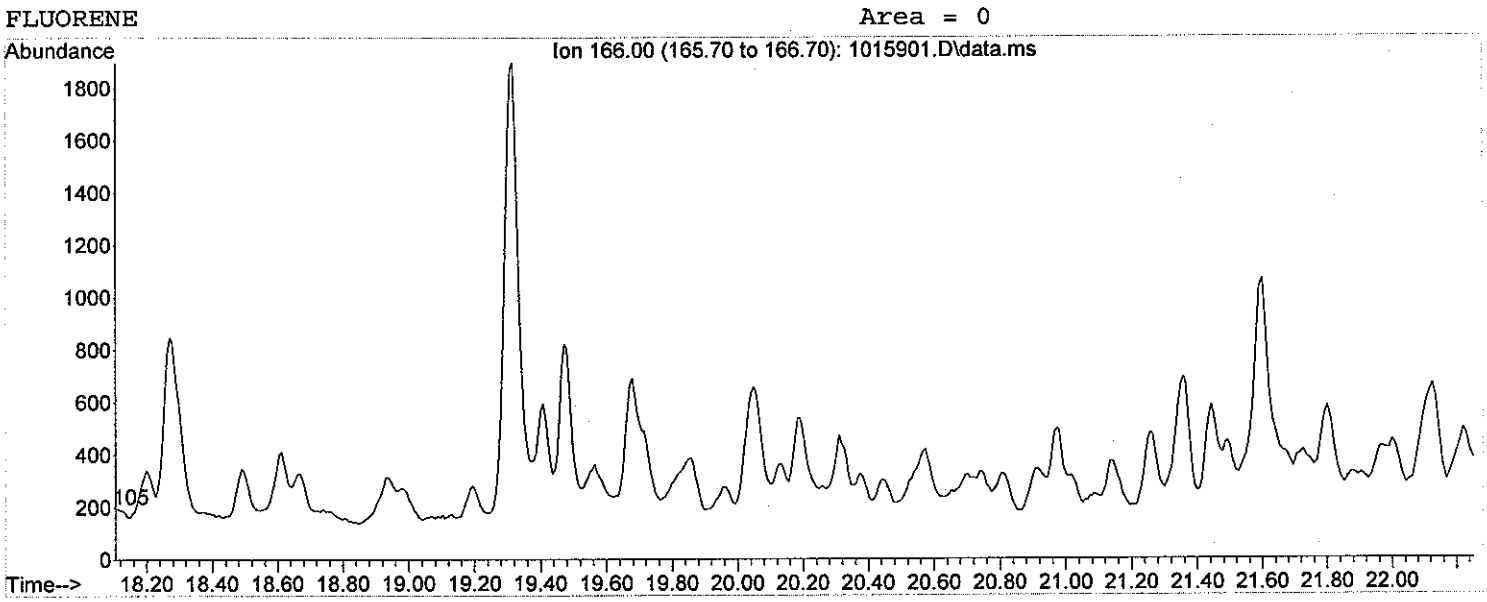
PYRENE/FLUORANTHENE



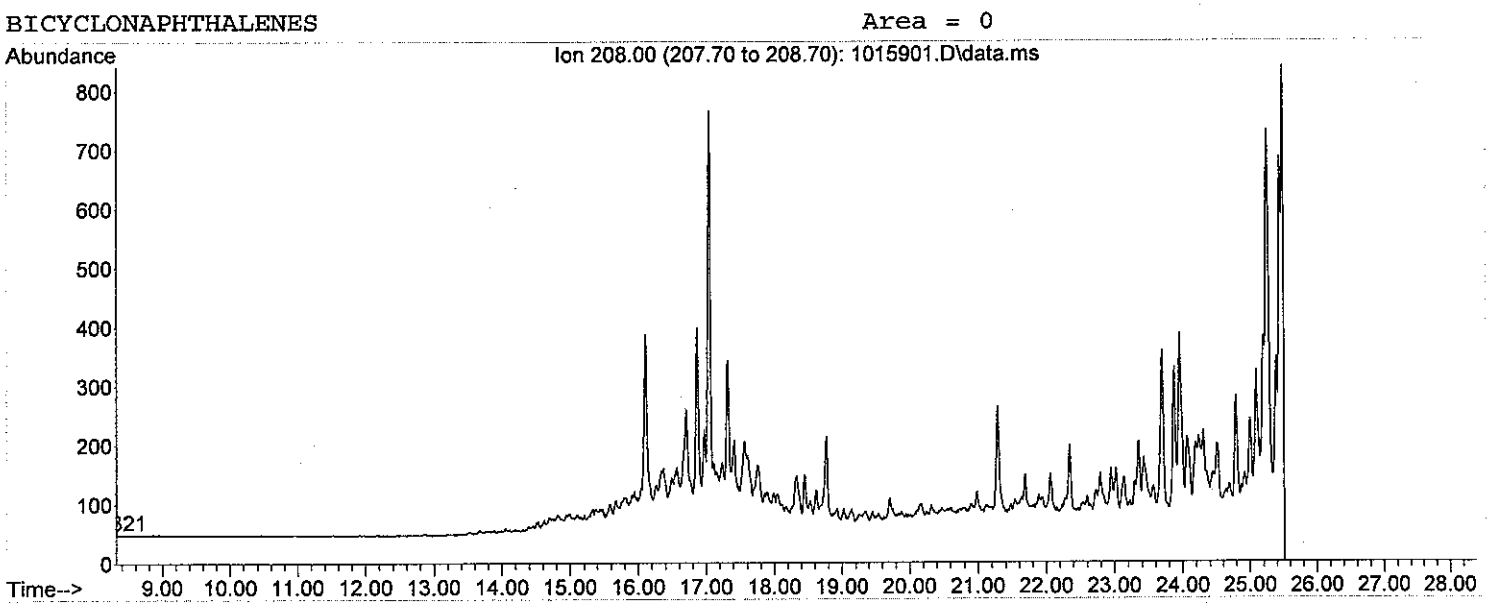
METHYL PYRENE



FLUORENE

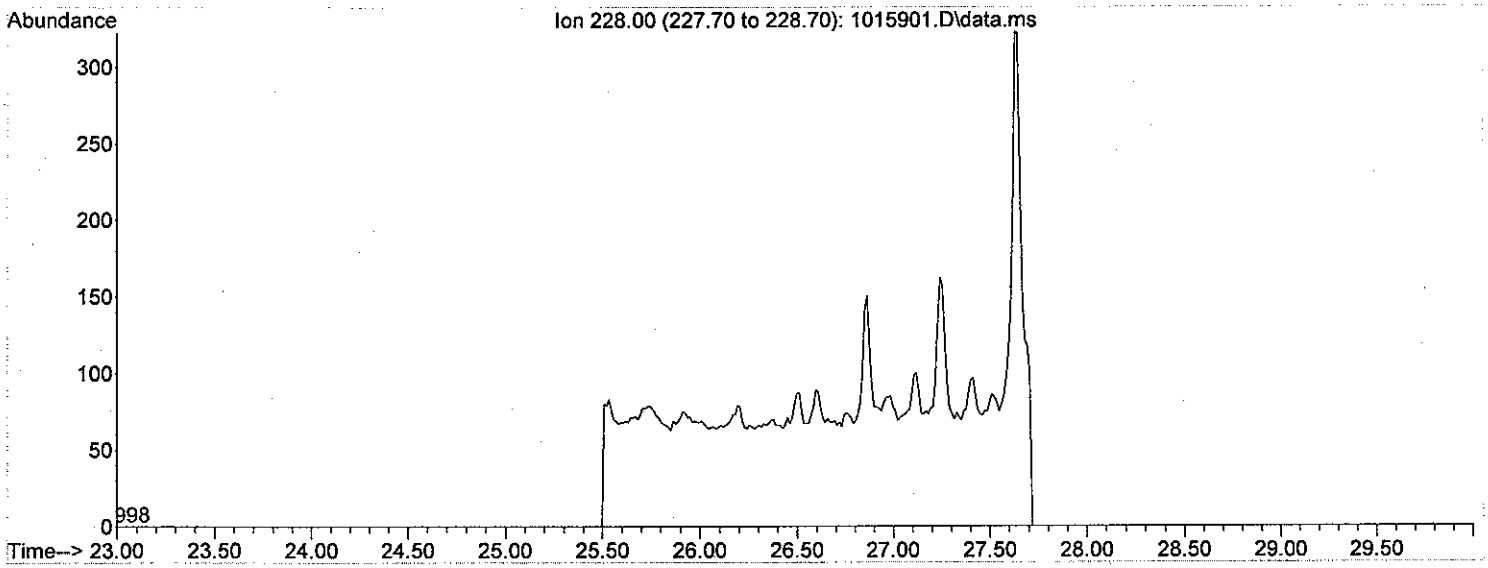


BICYCLONAPHTHALENES



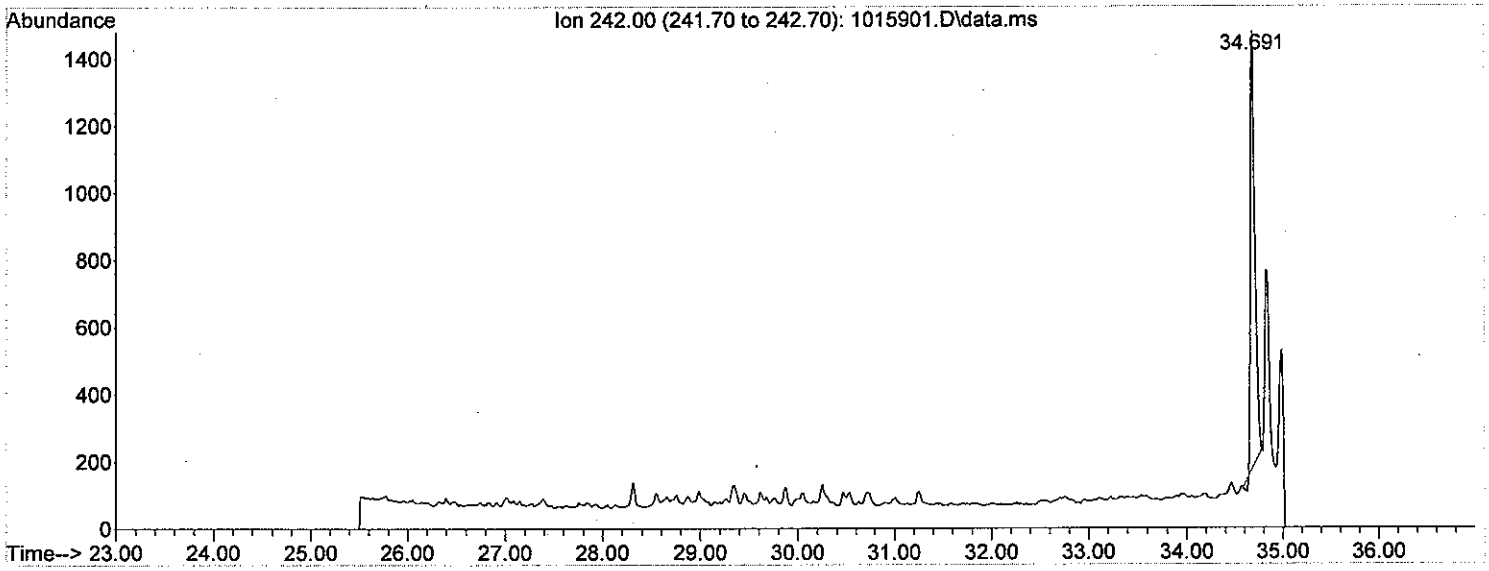
CHRYSENE

Area = 0



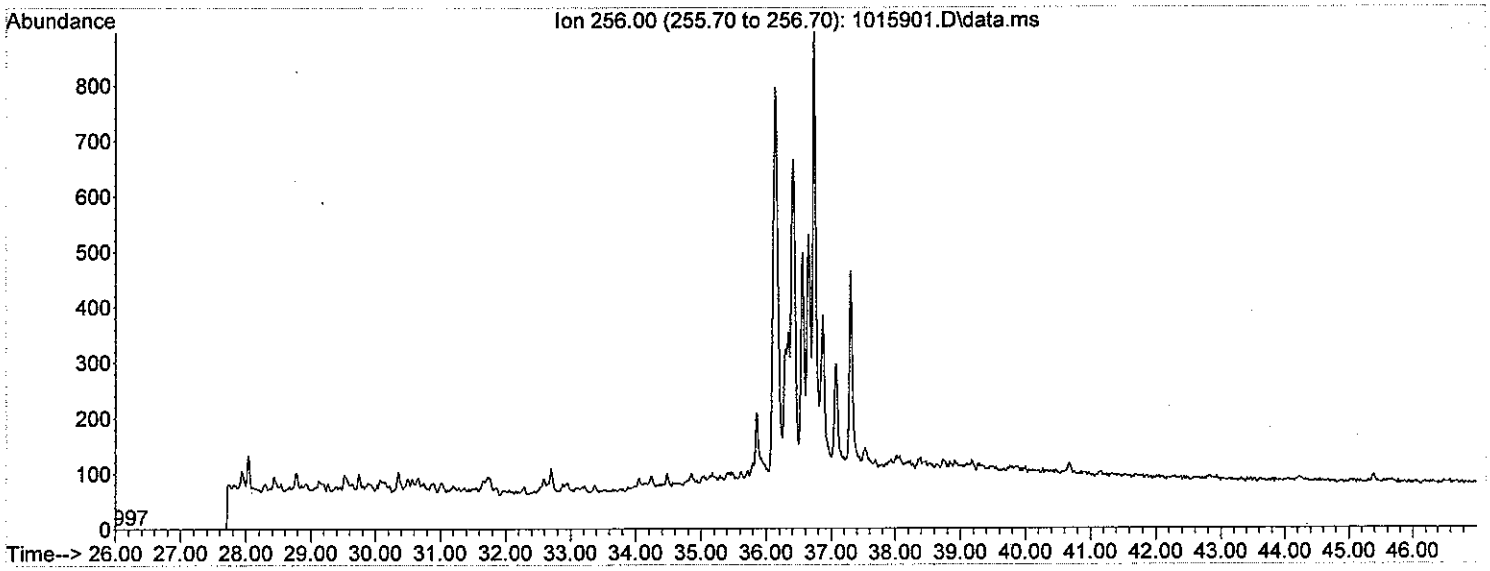
C1-CHRYSENE

Area = 42801.1



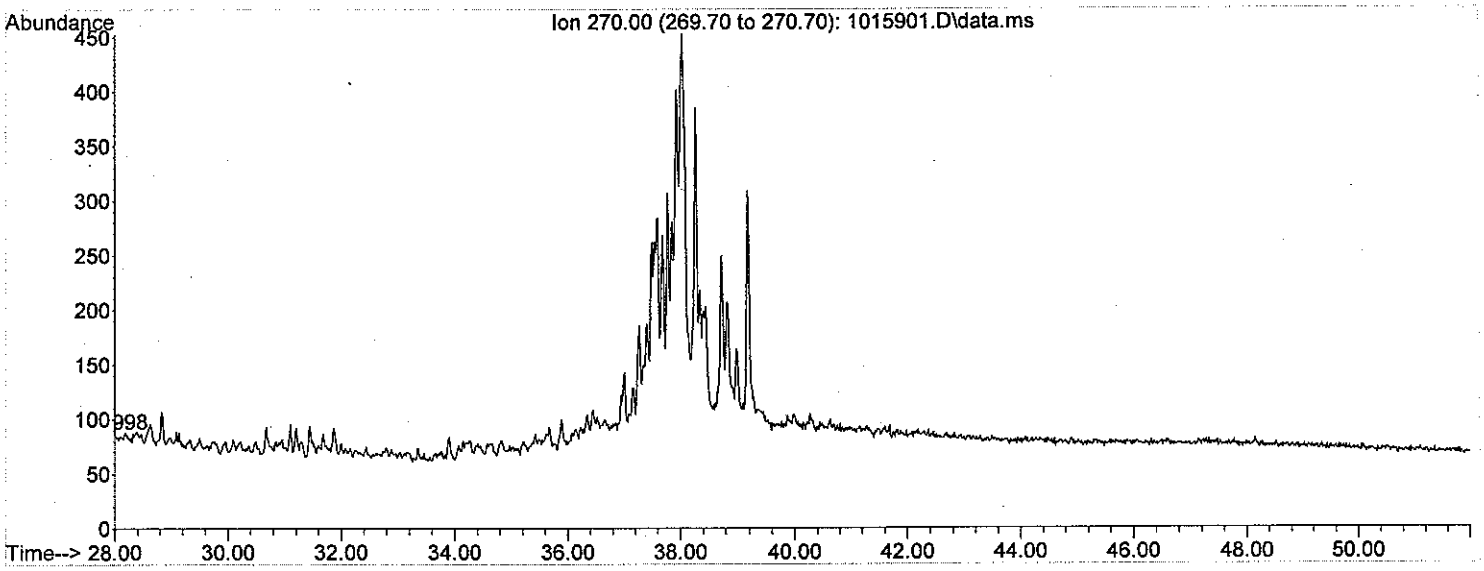
C2-CHRYSENE

Area = 0



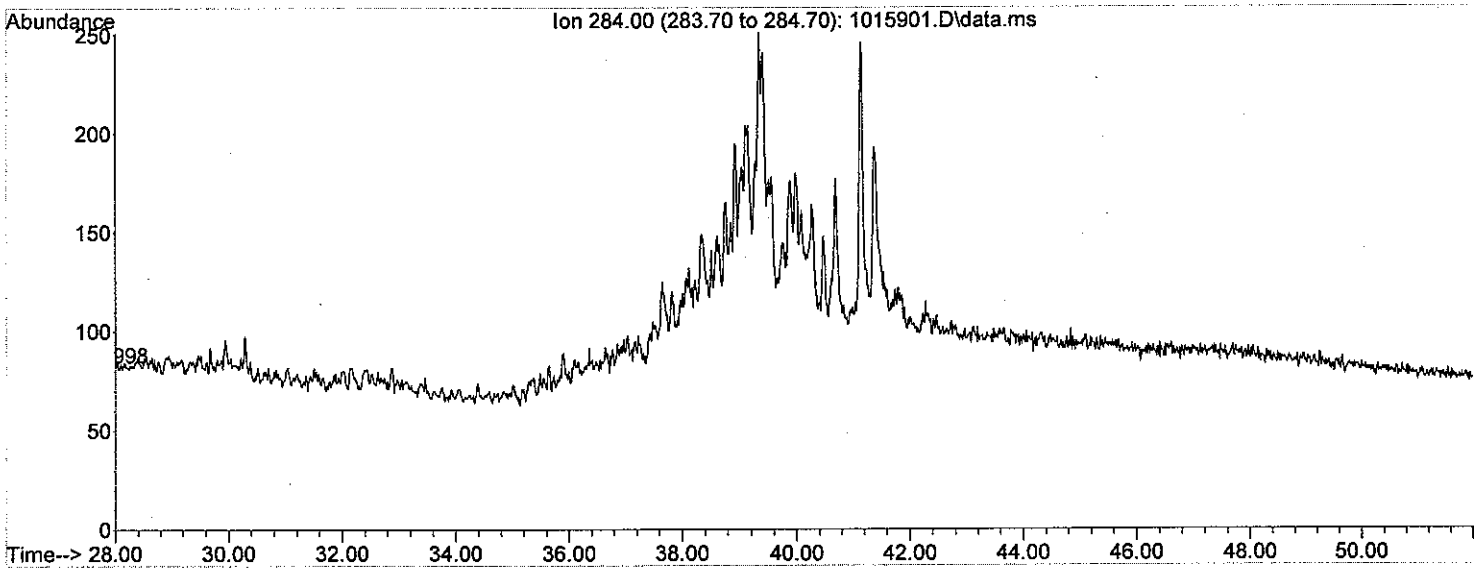
C3 - CHRYSENE

Area = 0



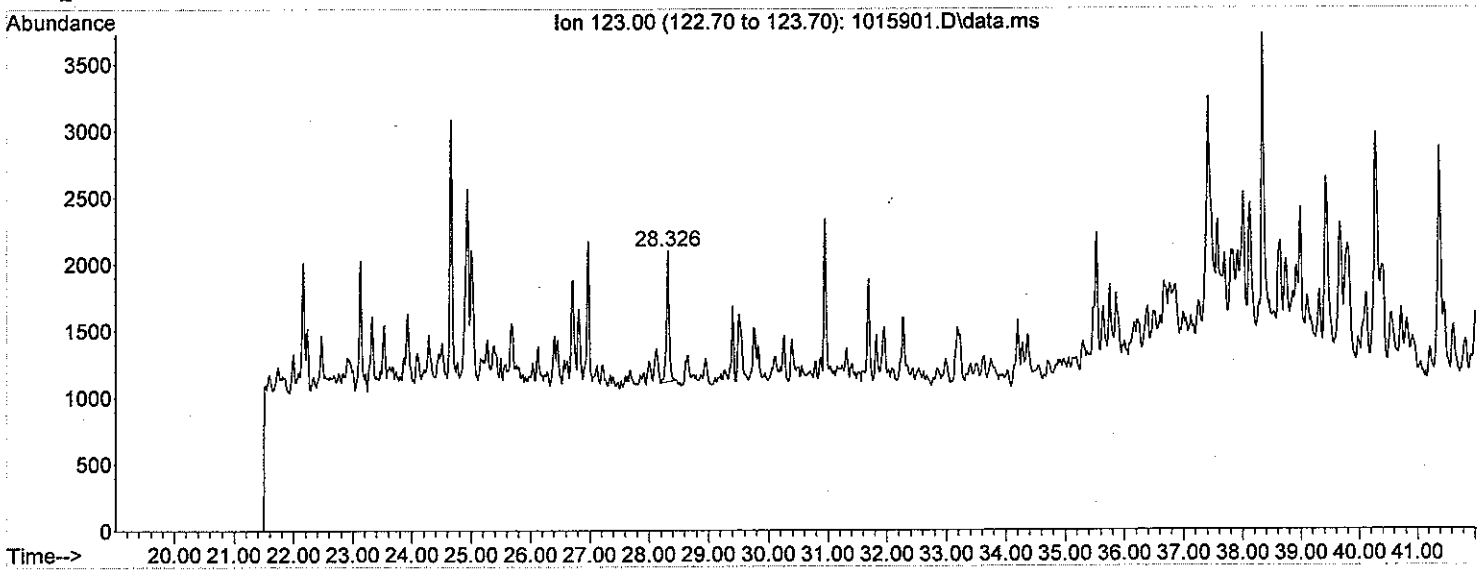
C4 - CHRYSENE

Area = 0



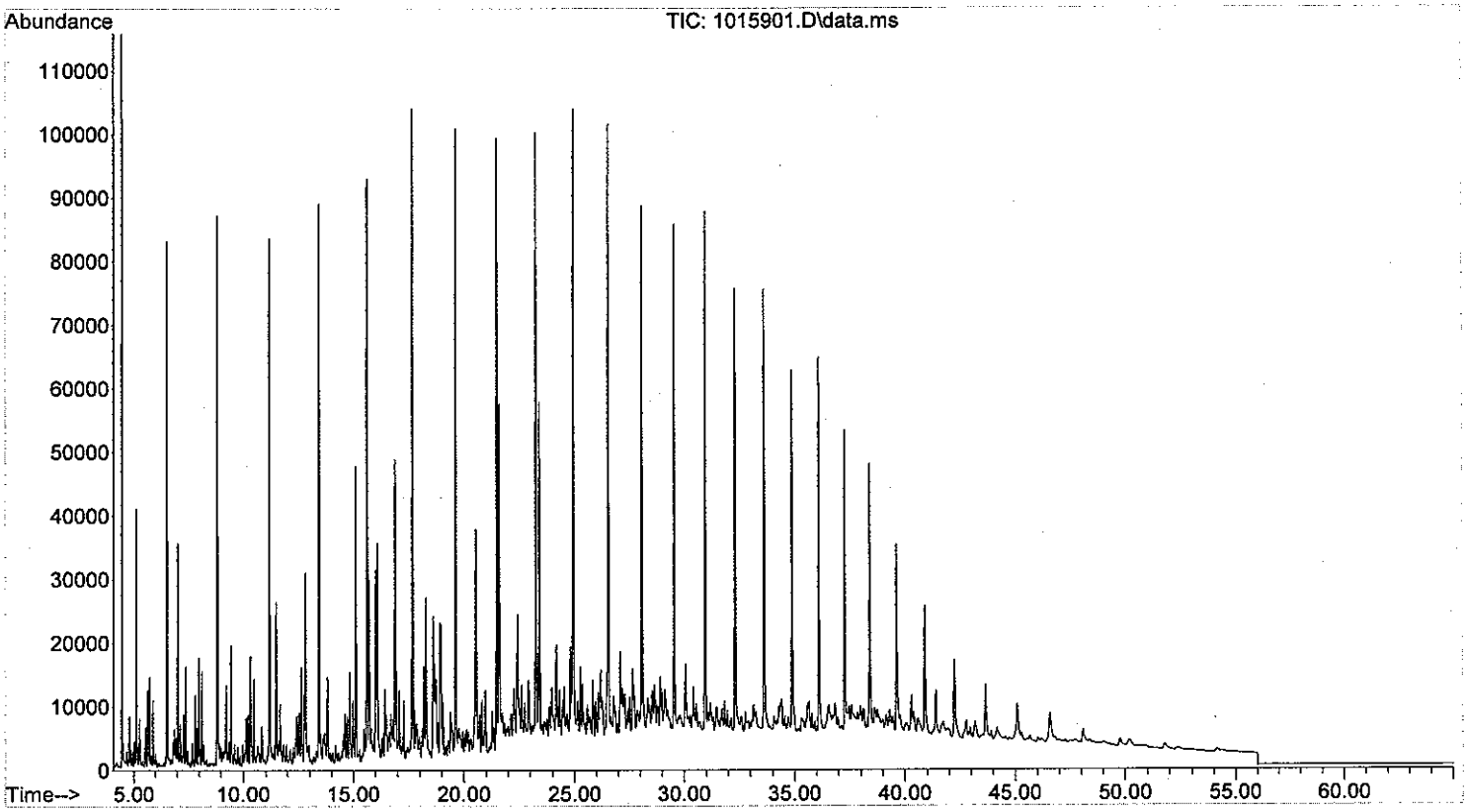
SESQUITERPANES

Area = 29479.1

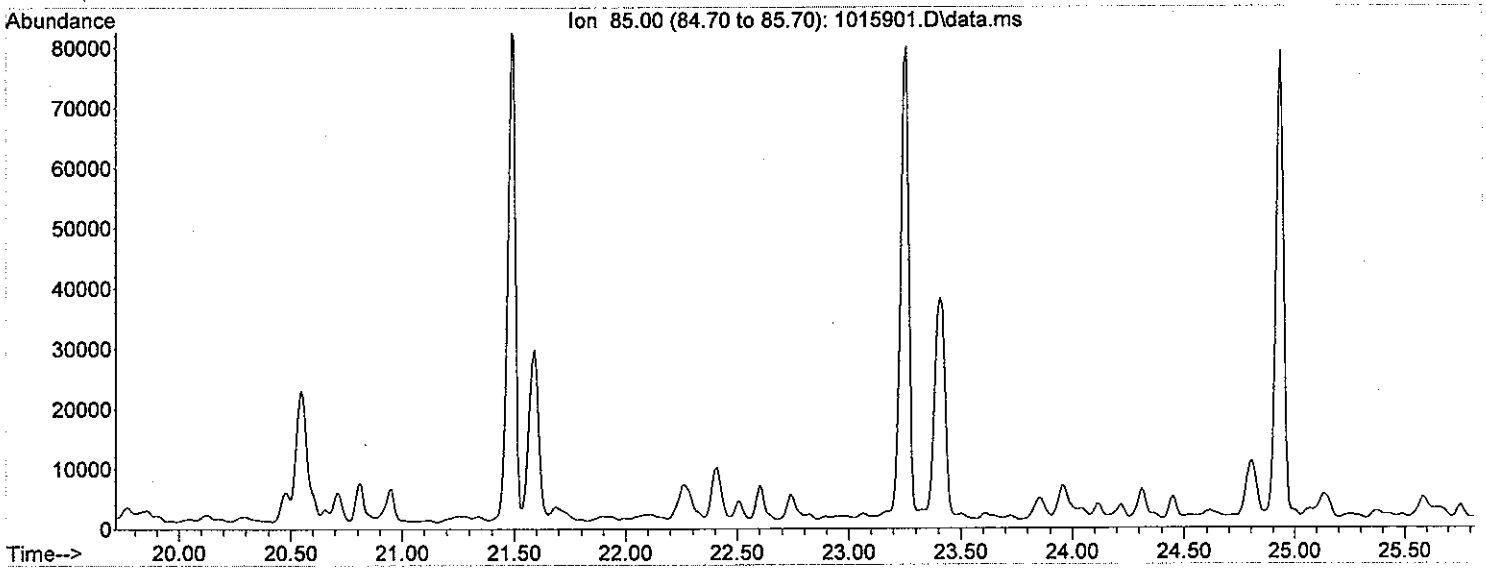


MSL GC-MS2 BIOMARKER ANALYSIS

File: W:\2010\MS_DATA\10-159\1015901.D
Operator: ACT
Date Acquired: 25 Jun 2010 2:28 pm
Method File: BIOMARK3.M
Sample Name: 10-159-1, QCM Vial: 2
Misc Info:



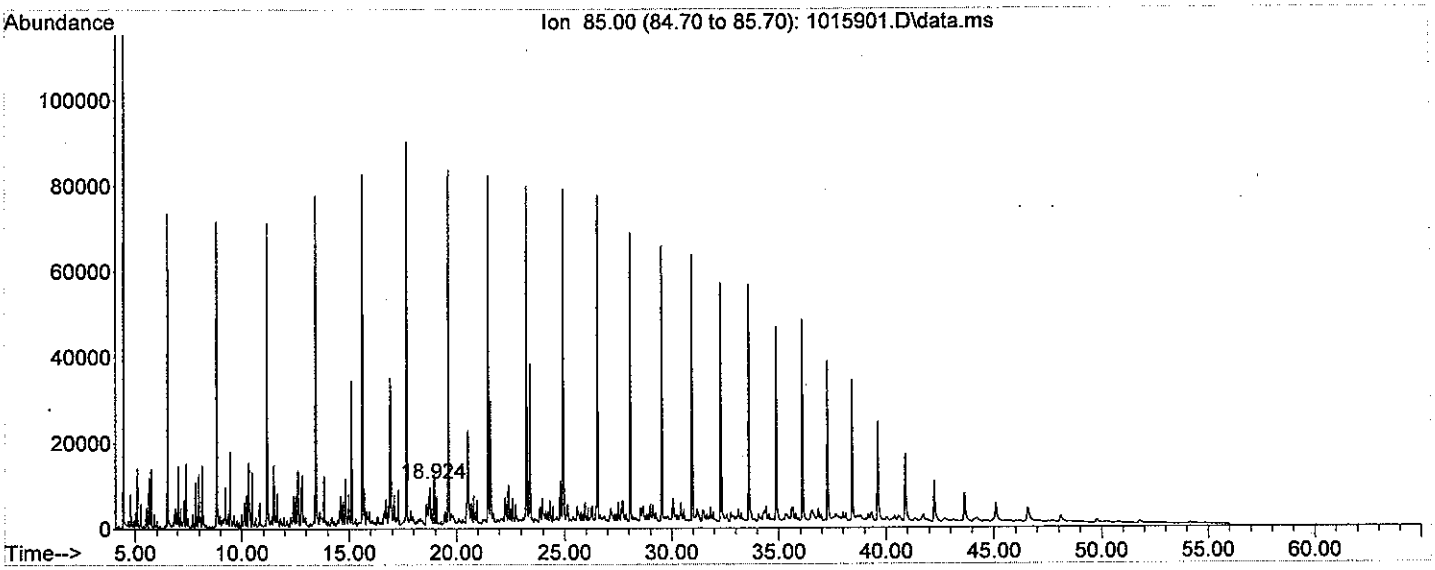
n-C17,Pristane,n-C18,Phytane



Pristane/Phytane = ----
C17/C18 = ----
Pristane/C17 = ----
Phytane/C18 = ----

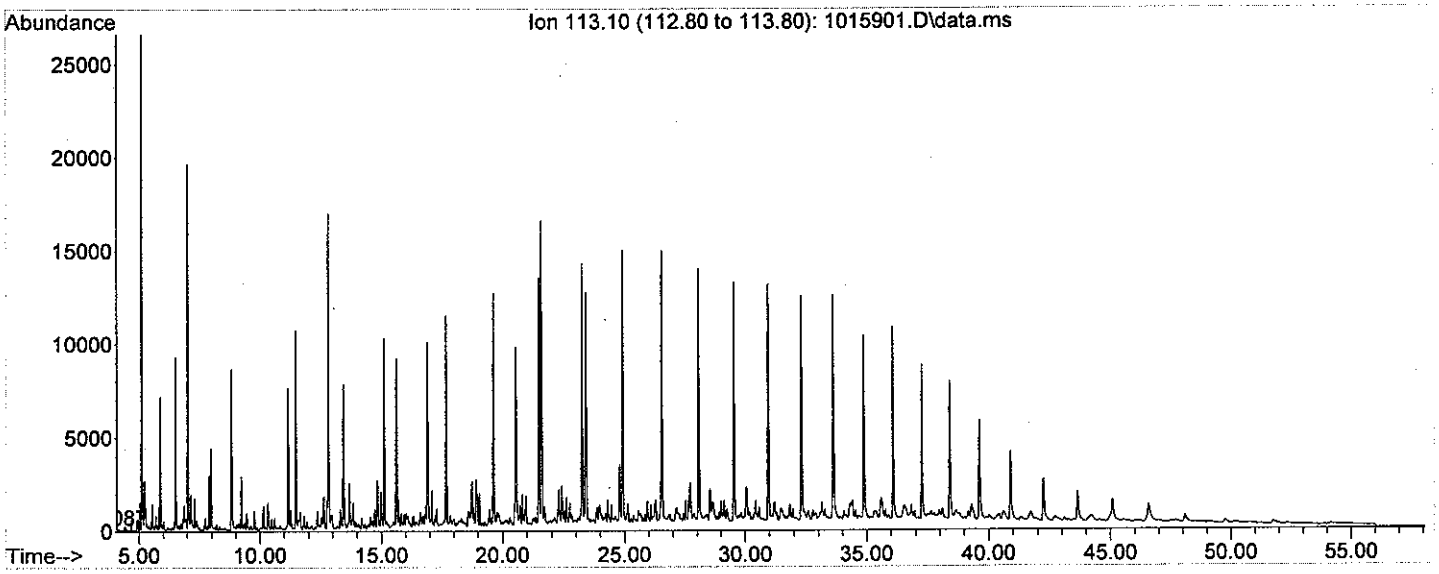
85-SATURATED HYDROCARBONS

Area = 214978



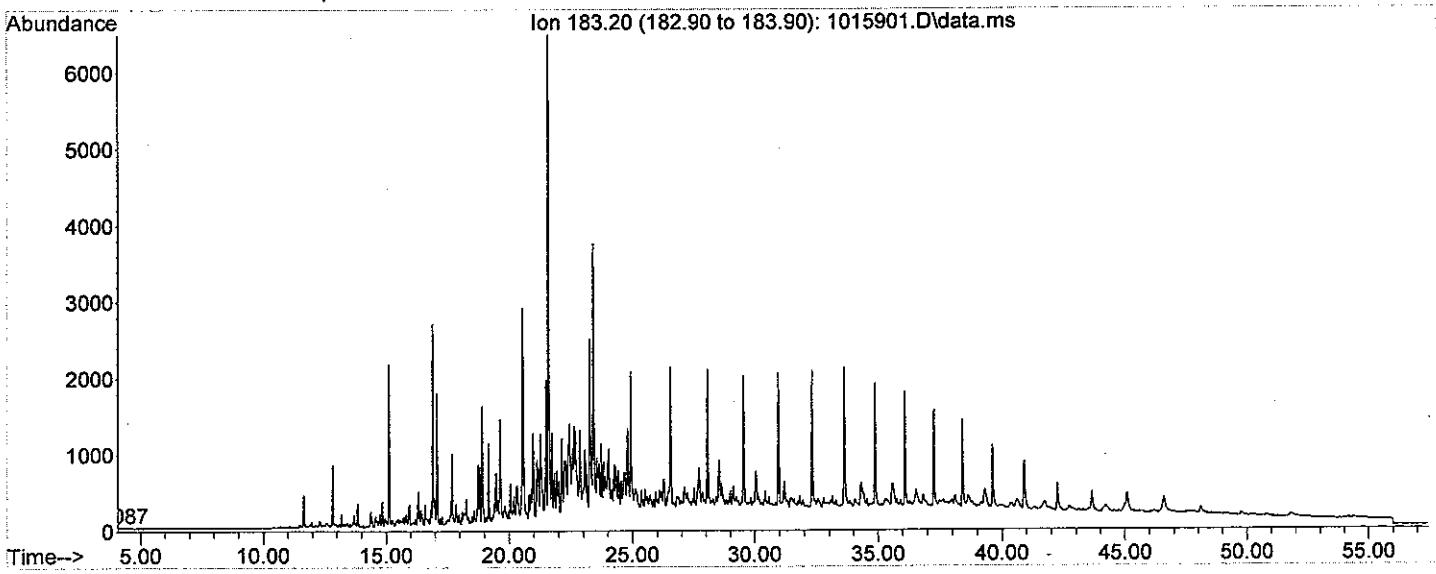
113-SATURATED HYDROCARBONS

Area = 0



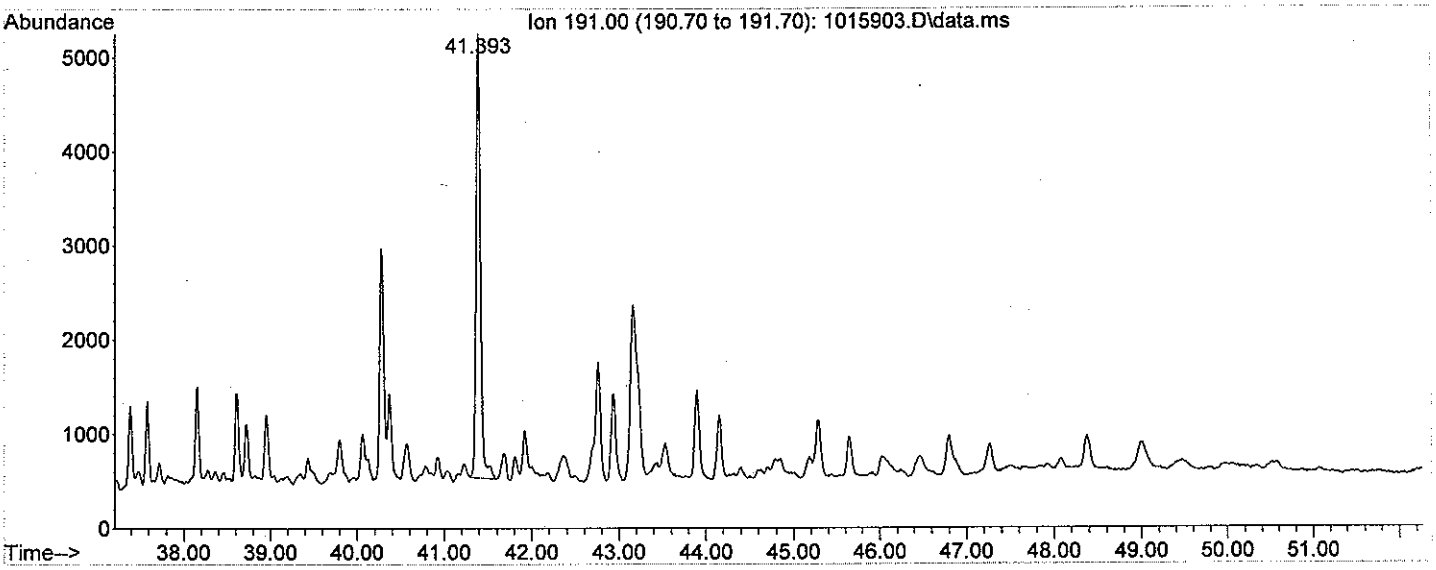
ACYCLIC ISOPRENOIDS/ALKANES

Area = 0



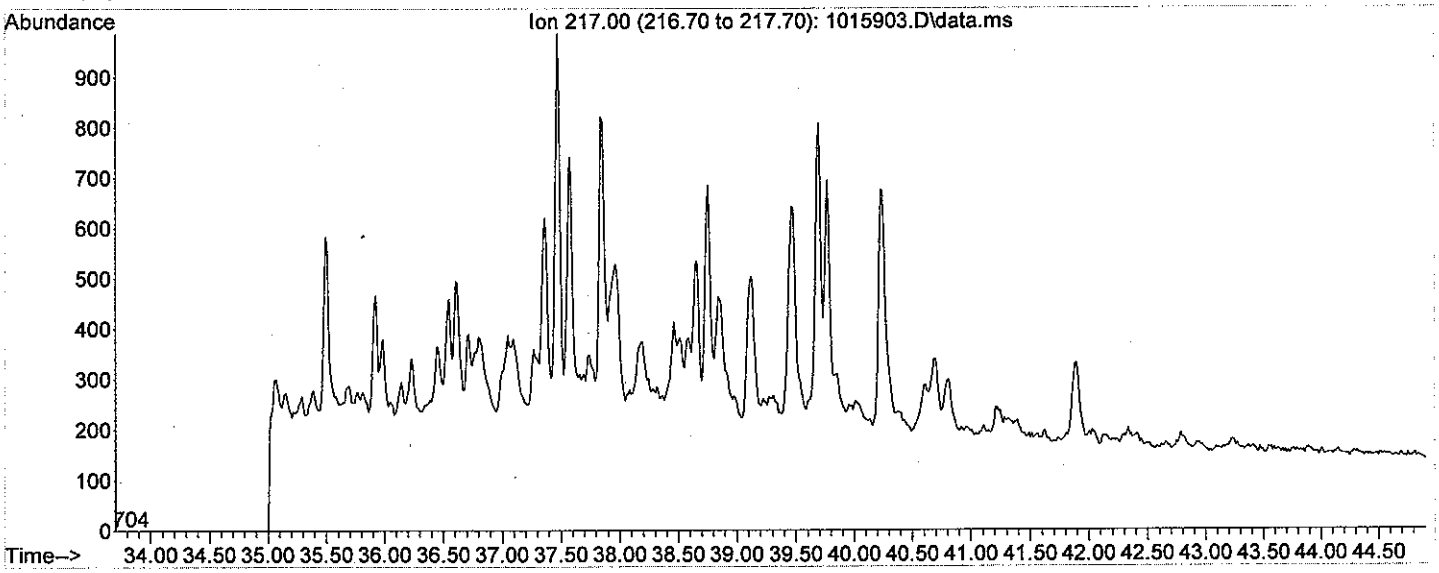
TRITERPANES/HOPANES

Area = 159601



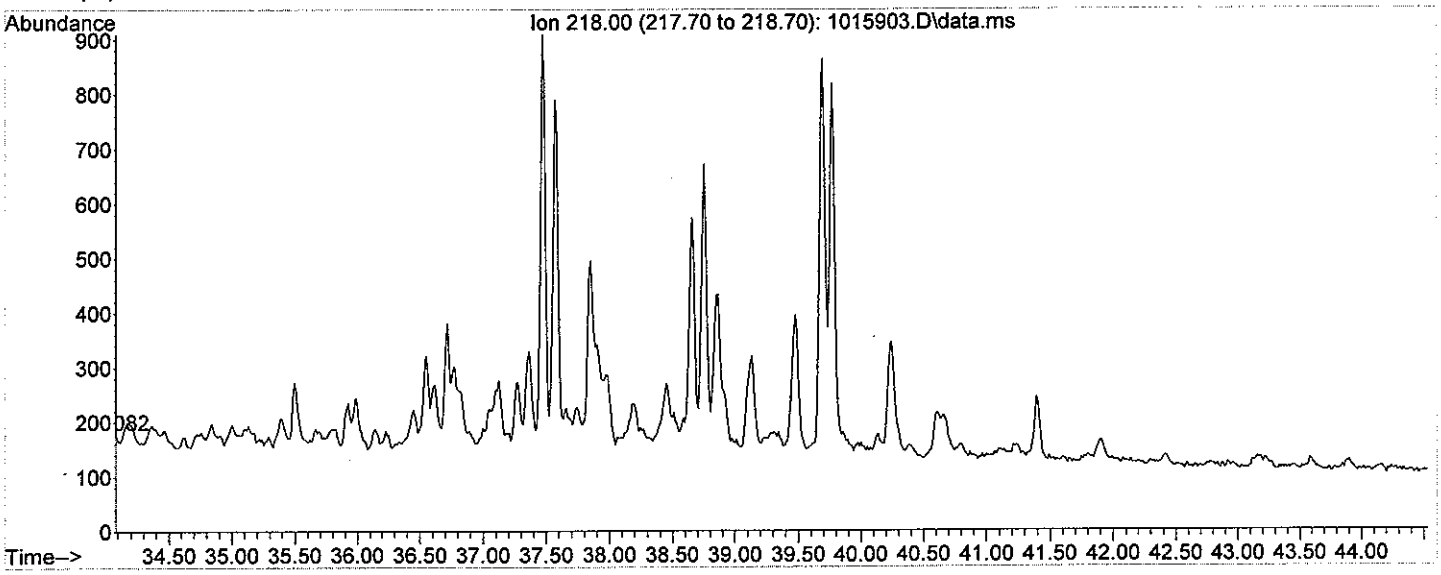
14 a(H) STERANES

Area = 0



14 b(H) STERANES

Area = 0



Data Path : W:\2010\MS_DATA\10-159\
Data File : 1015905.D
Acq On : 25 Jun 2010 4:53 pm
Operator : ACT
Sample : 10-159-5, SP
Misc :
ALS Vial : 4 Sample Multiplier: 1

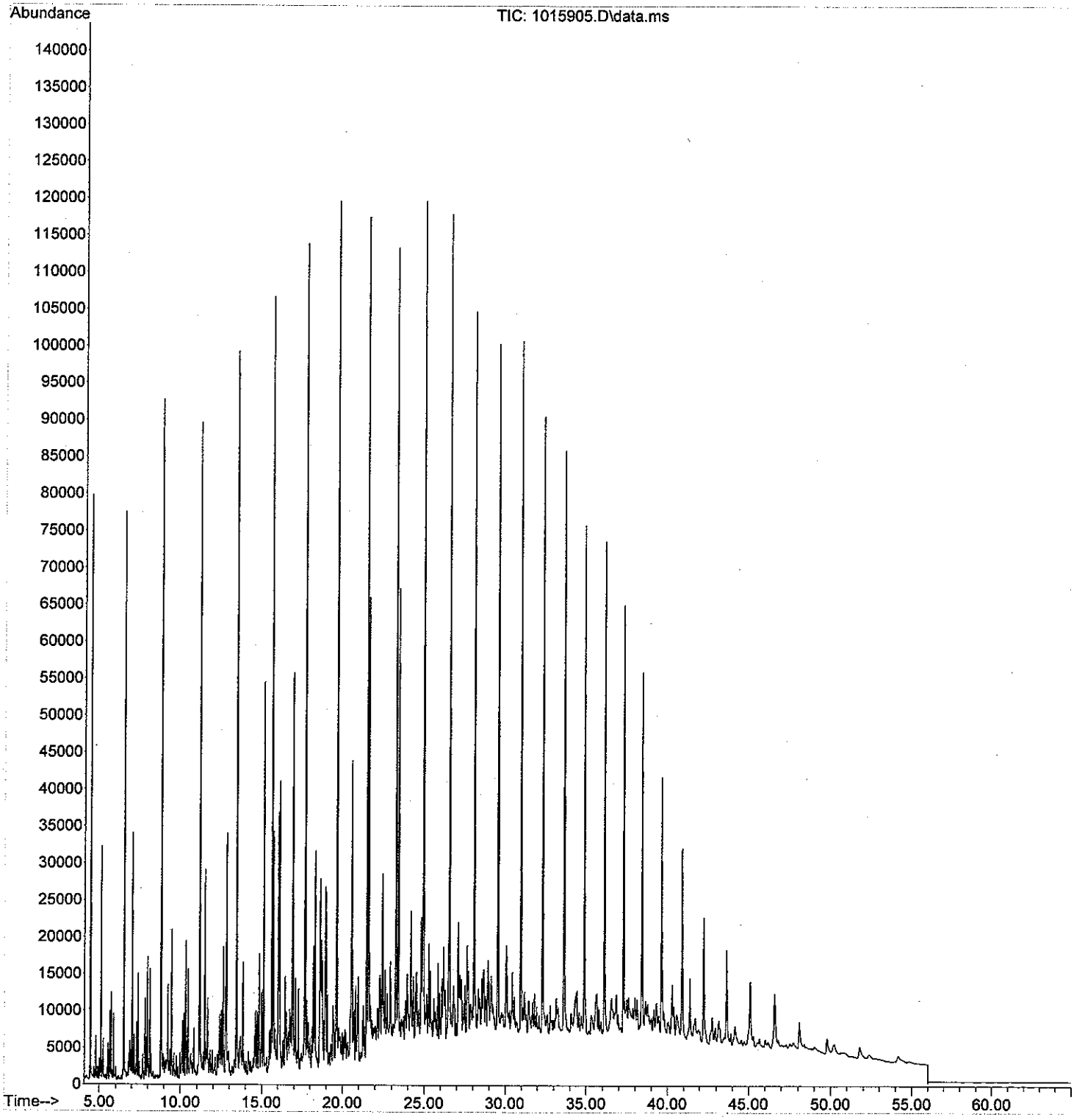
Quant Time: Jun 25 17:47:22 2010
Quant Method : C:\MSDCHEM\1\METHODS\BIOMARK3.M
Quant Title :
QLast Update : Wed May 27 09:43:48 2009
Response via : Initial Calibration

Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
Target Compounds					Qvalue
1) 85-SATURATED HYDROCARBONS	0.000	85	0	N.D.	
2) n-C17	0.000	85	0	N.D.	
3) PRISTANE	0.000	85	0	N.D.	
4) n-C18	0.000	85	0	N.D.	
5) PHYTANE	0.000	85	0	N.D.	
6) 113-SATURATED HYDROCAR...	0.000	113	0	N.D.	
7) ACYCLIC ISOPRENOIDS/AL...	0.000	183	0	N.D.	
8) C2-NAPHTHALENES	0.000	156	0	N.D.	
9) C3-NAPHTHALENES	19.410	170	150267	No Calib	
10) C4-NAPHTHALENES	0.000	184	0	N.D.	
11) PHENANTHRENE/ANTHRACENE	0.000	178	0	N.D.	
12) BENZONAPHTHIOPHENE	32.114	234	64167	No Calib	
13) DIBENZOTHIOPHENE	22.438	184	160704	No Calib	
14) C1-DIBENZOTHIOPHENE	24.526	198	284430	No Calib	
15) C2-DIBENZOTHIOPHENE	26.491	212	144090	No Calib	
16) C3-DIBENZOTHIOPHENE	27.988	226	126585	No Calib	
17) C1-PHENANTHRENES	25.359	192	224406	No Calib	
18) C2-PHENANTHRENES	27.290	206	148316	No Calib	
19) C3-PHENANTHRENES	29.167	220	100907	No Calib	
20) TRITERPANES/HOPANES	41.402	191	179549	No Calib	
21) HOPANE A	0.000	191	0	N.D.	
22) HOPANE B	0.000	191	0	N.D.	
23) 14 a(H) STERANES	0.000	217	0	N.D.	
24) 14 b(H) STERANES	0.000	218	0	N.D.	
25) TRI-AROMATIC STERANES	0.000	231	0	N.D.	
26) METHYLHOPANES	0.000	205	0	N.D.	
27) NORHOPANES	0.000	177	0	N.D.	
28) PYRENE/FLUORANTHENE	28.917	202	36525	No Calib	
29) METHYL PYRENE	30.436	216	17545	No Calib	
30) FLUORENE	0.000	166	0	N.D.	
31) BICYCLONAPHTHALENES	0.000	208	0	N.D.	
32) CHRYSENE	0.000	228	0	N.D.	
33) C1-CHRYSENE	34.693	242	56231	No Calib	
34) C2-CHRYSENE	36.743	256	24761	No Calib	
35) C3-CHRYSENE	0.000	270	0	N.D.	
36) C4-CHRYSENE	0.000	284	0	N.D.	
37) SESQUITERPANES	28.329	123	37325	No Calib	

(#) = qualifier out of range (m) = manual integration (+) = signals summed

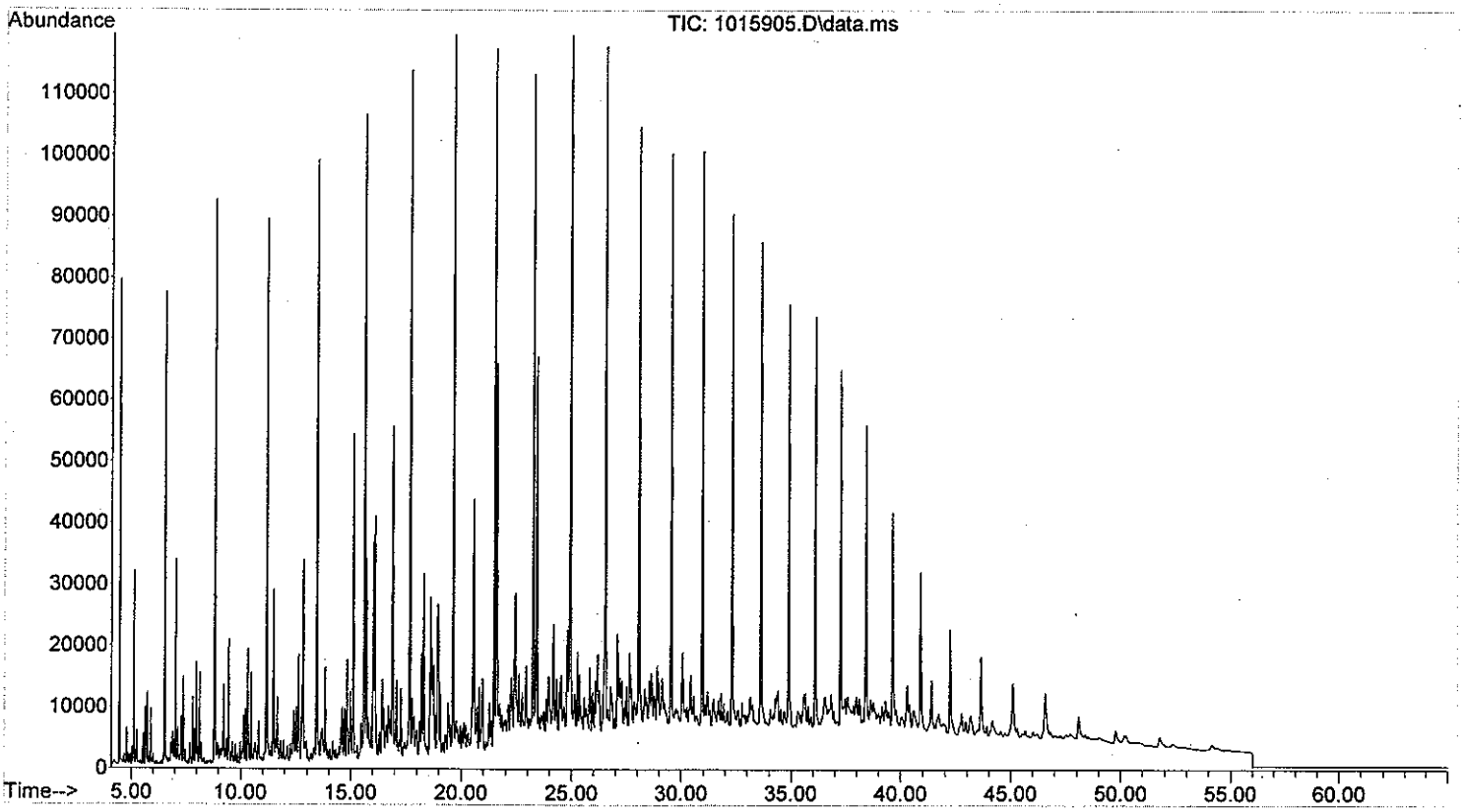
Data Path : W:\2010\MS_DATA\10-159\
Data File : 1015905.D
Acq On : 25 Jun 2010 4:53 pm
Operator : ACT
Sample : 10-159-5, SP
Misc :
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Jun 25 17:47:22 2010
Quant Method : C:\MSDCHEM\1\METHODS\BIOMARK3.M
Quant Title :
QLast Update : Wed May 27 09:43:48 2009
Response via : Initial Calibration

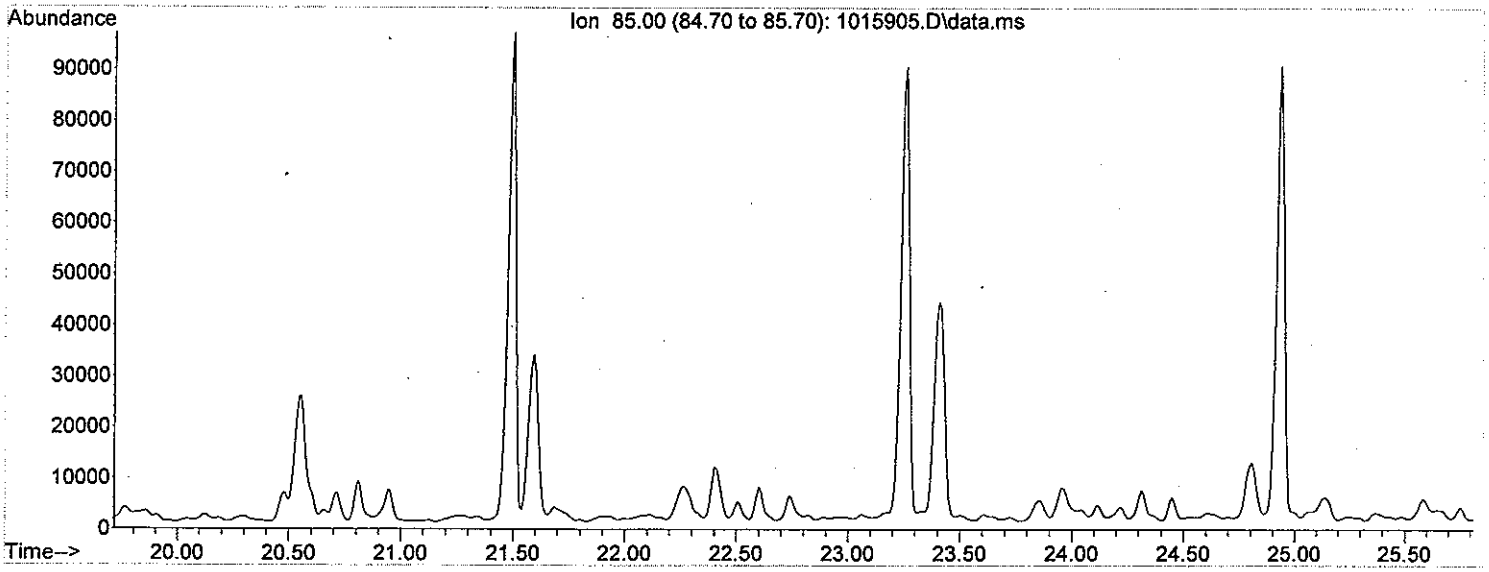


MARINE SAFETY LABORATORY GC-MS2 BIOMARKER ANALYSIS

File: \\Mslserver1\data archive\2010\MS_data\10-159\1015905.D
Operator: ACT
Date Acquired: 25 Jun 2010 4:53 pm
Method File: BIOMARK3.M
Sample Name: 10-159-5, SP Vial: 4
Misc Info:

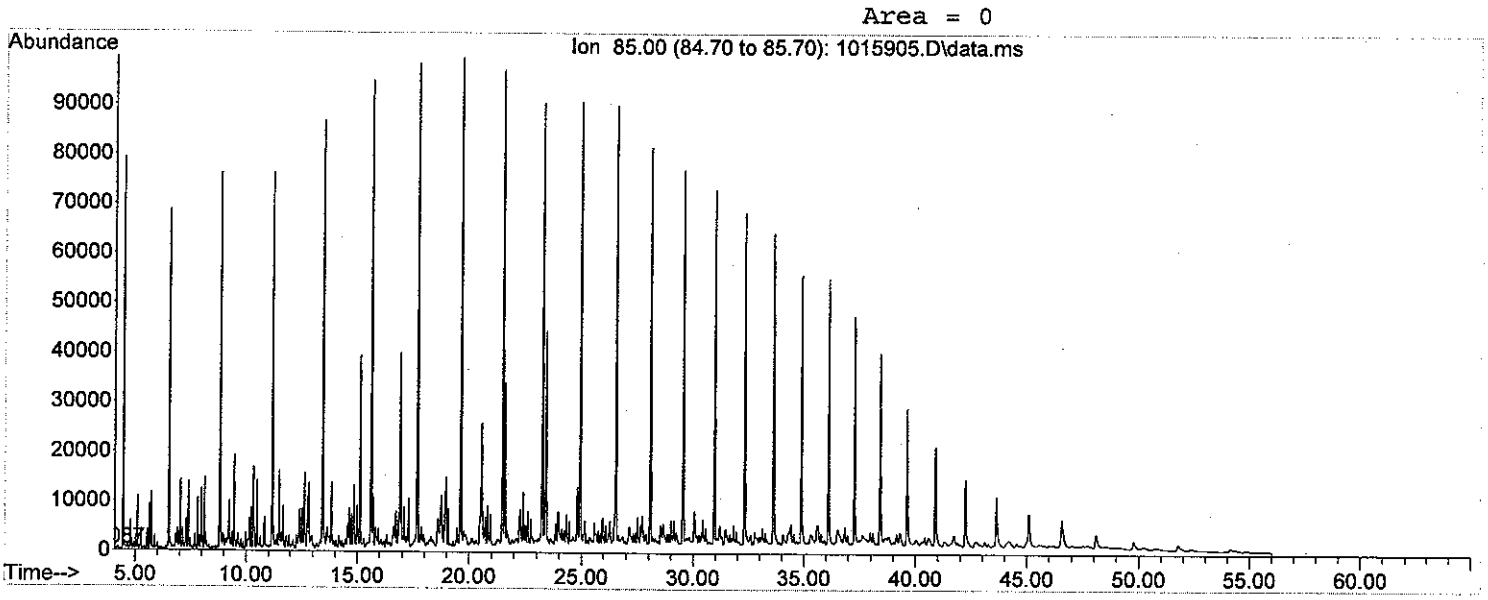


n-C17,Pristane,n-C18,Phytane

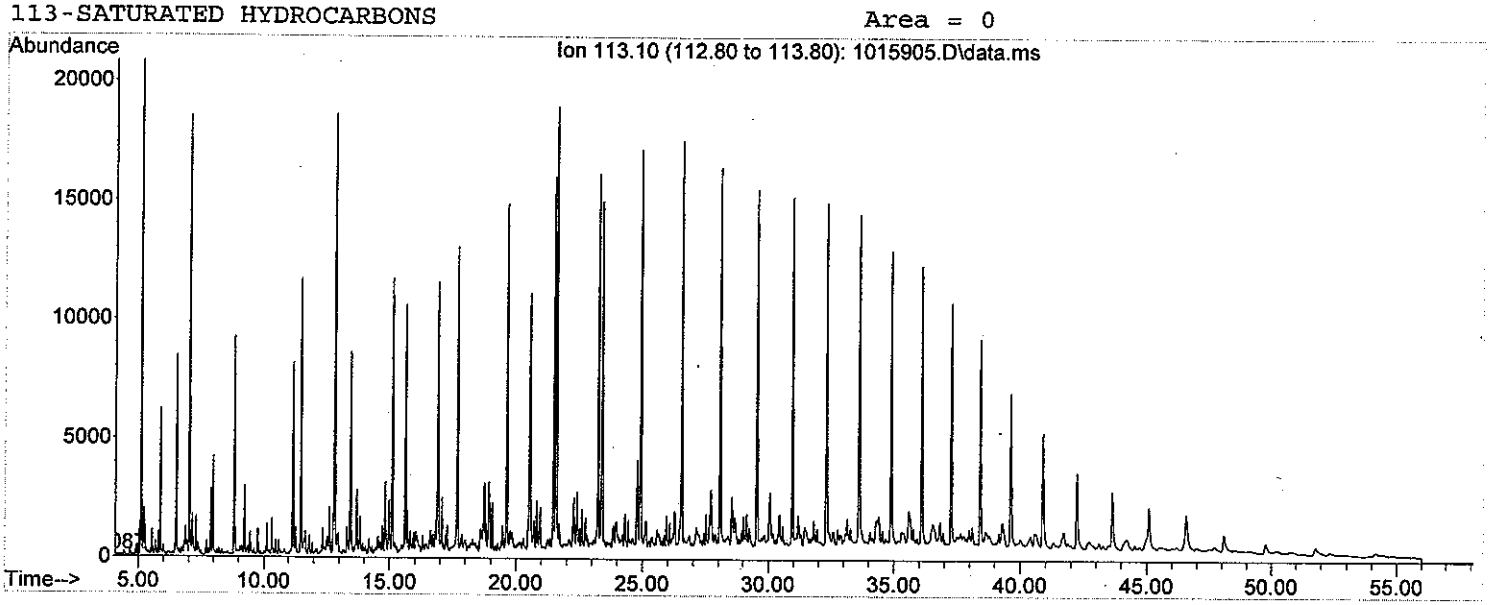


Pristane/Phytane = 0.672
C17/C18 = 0.962
Pristane/C17 = 0.407
Phytane/C18 = 0.582

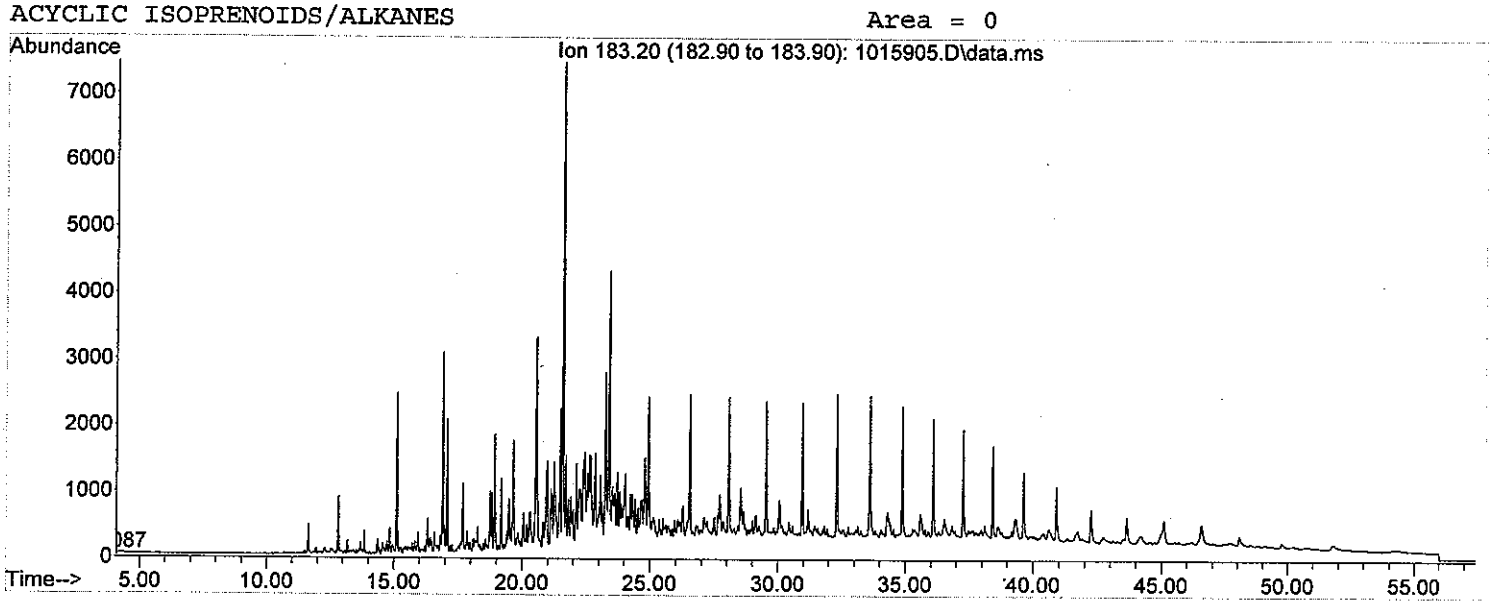
85-SATURATED HYDROCARBONS



113-SATURATED HYDROCARBONS

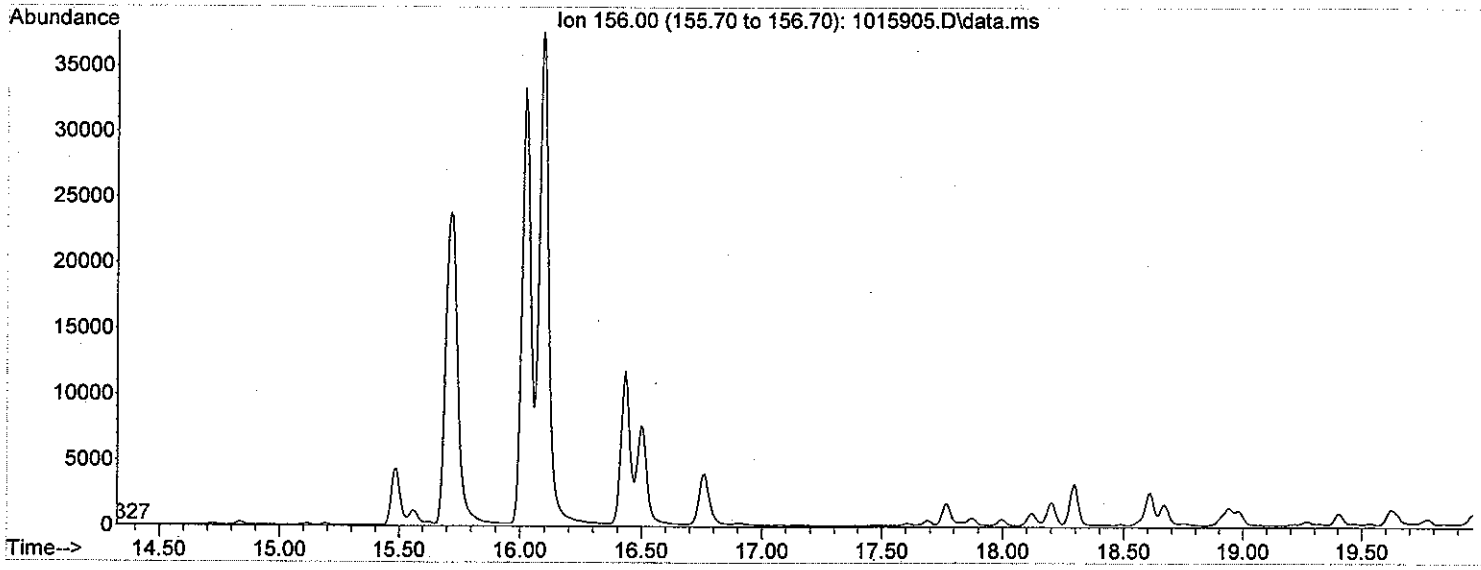


ACYCLIC ISOPRENOIDS/ALKANES



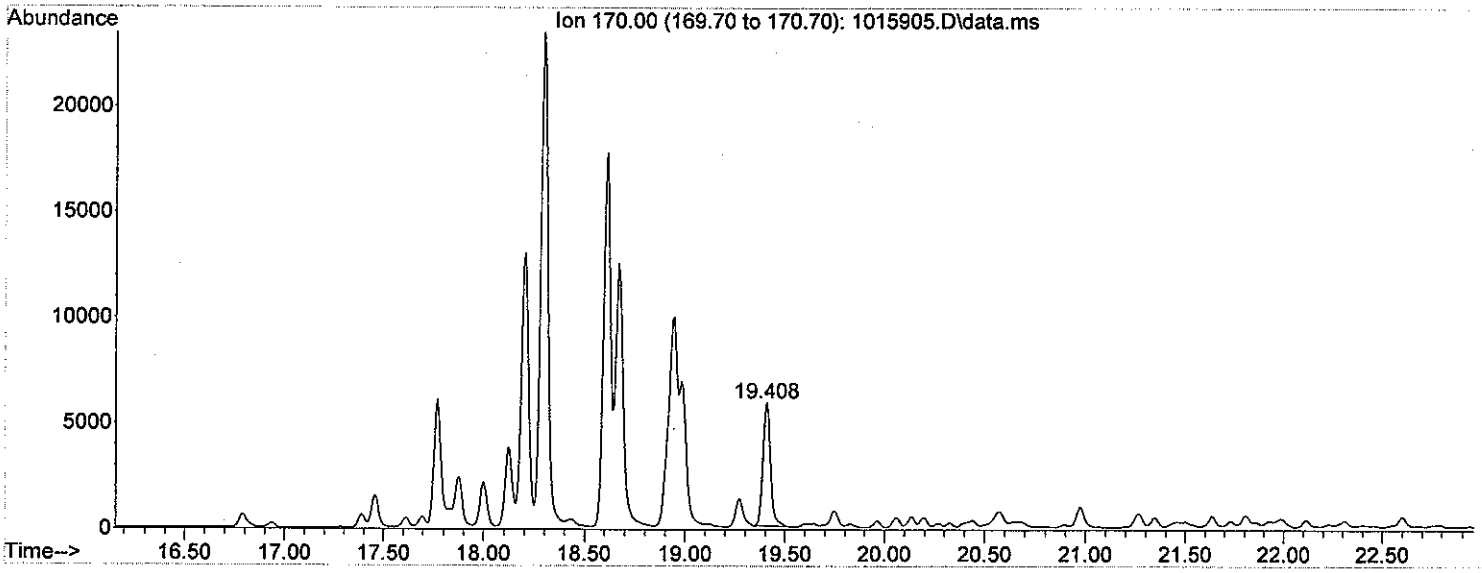
C2-NAPHTHALENES

Area = 0



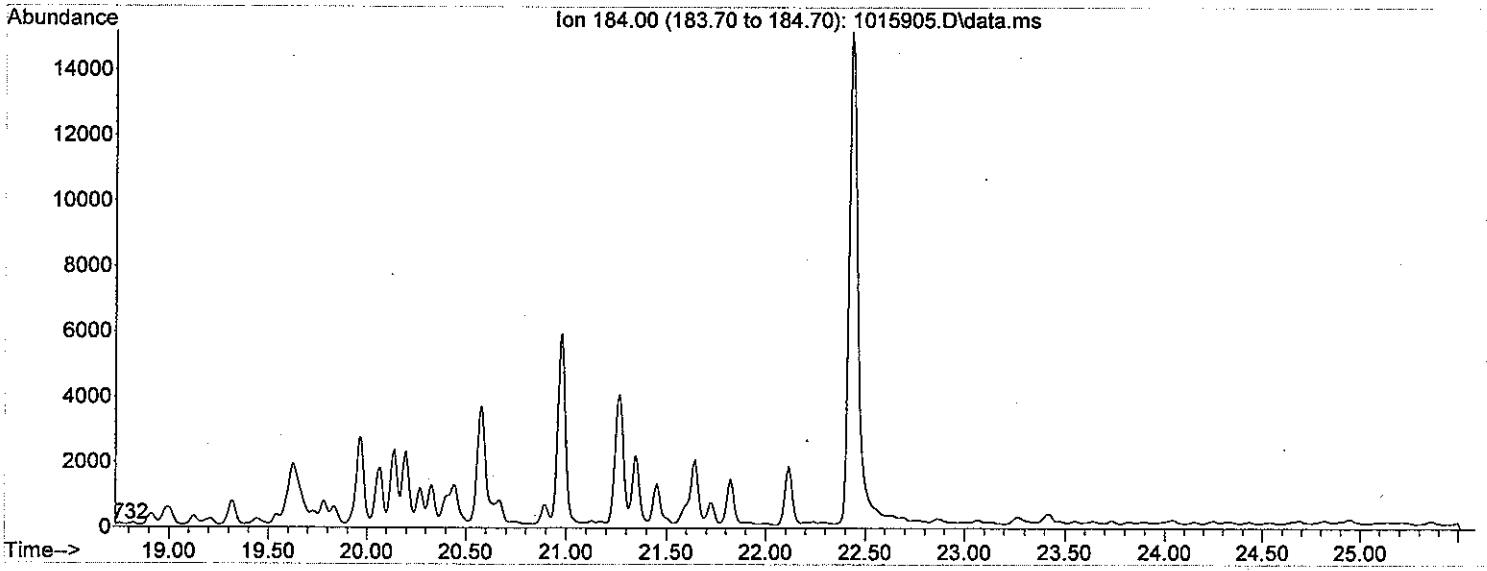
C3-NAPHTHALENES

Area = 150267

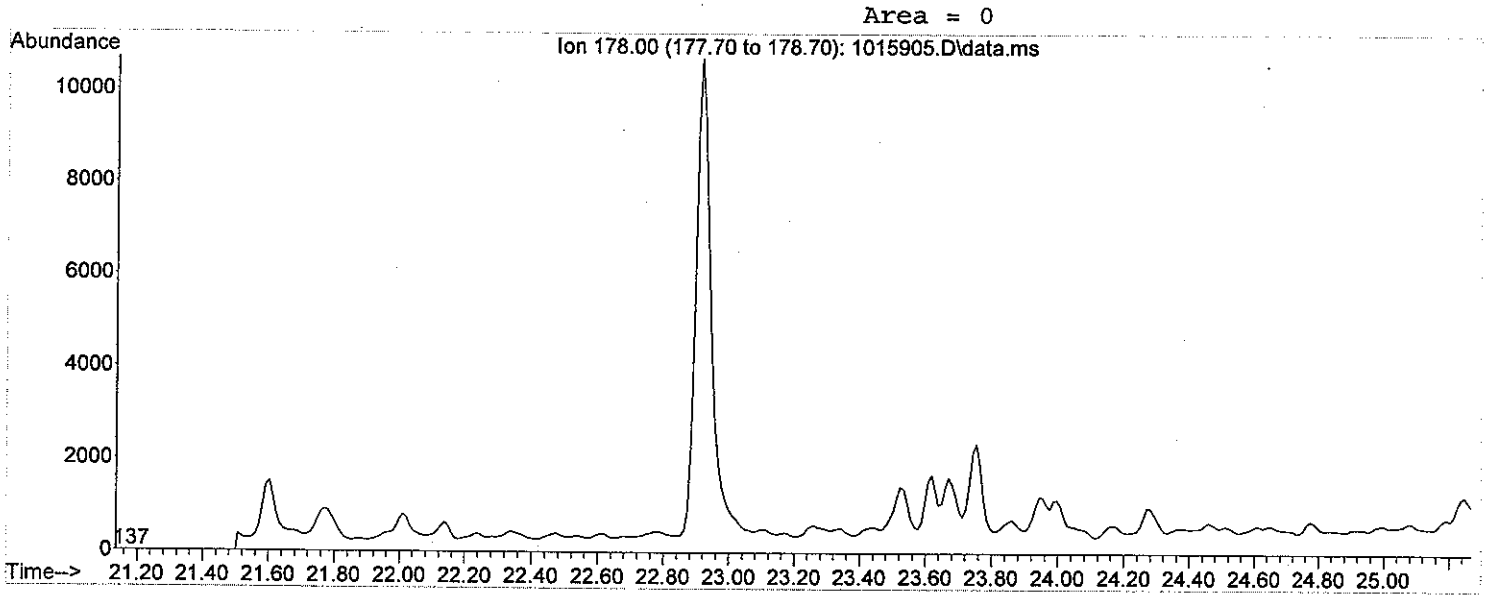


C4-NAPHTHALENES

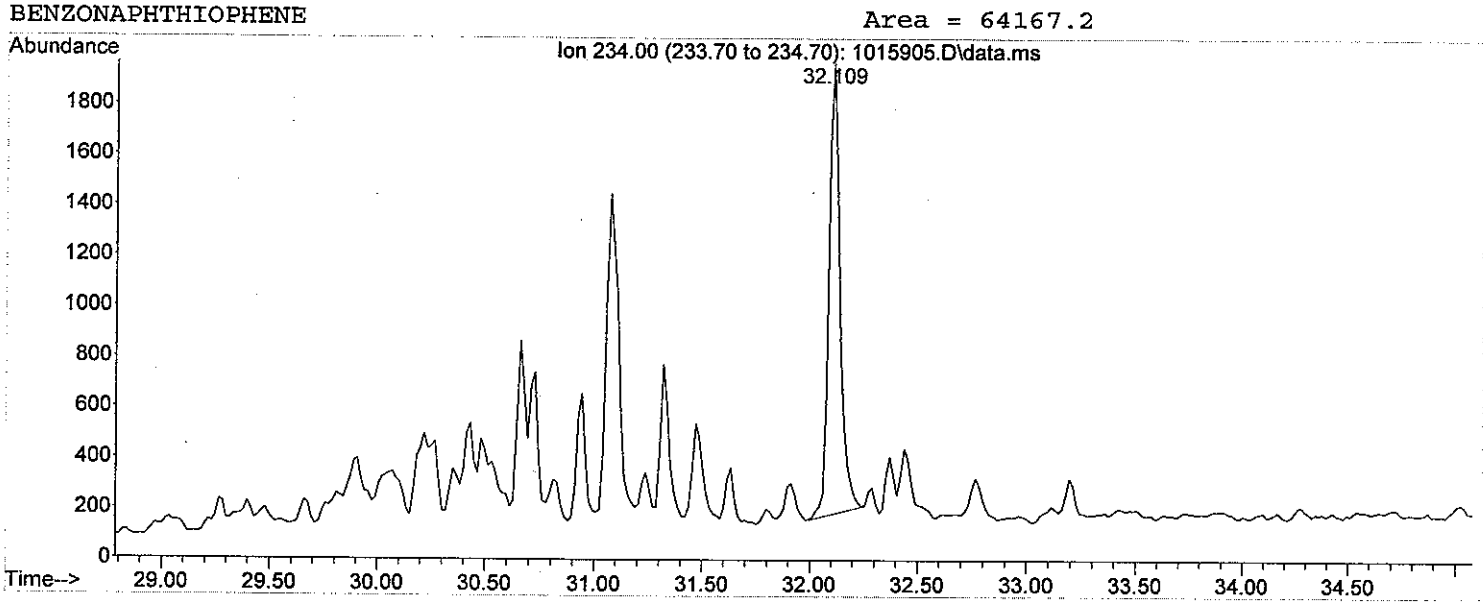
Area = 0



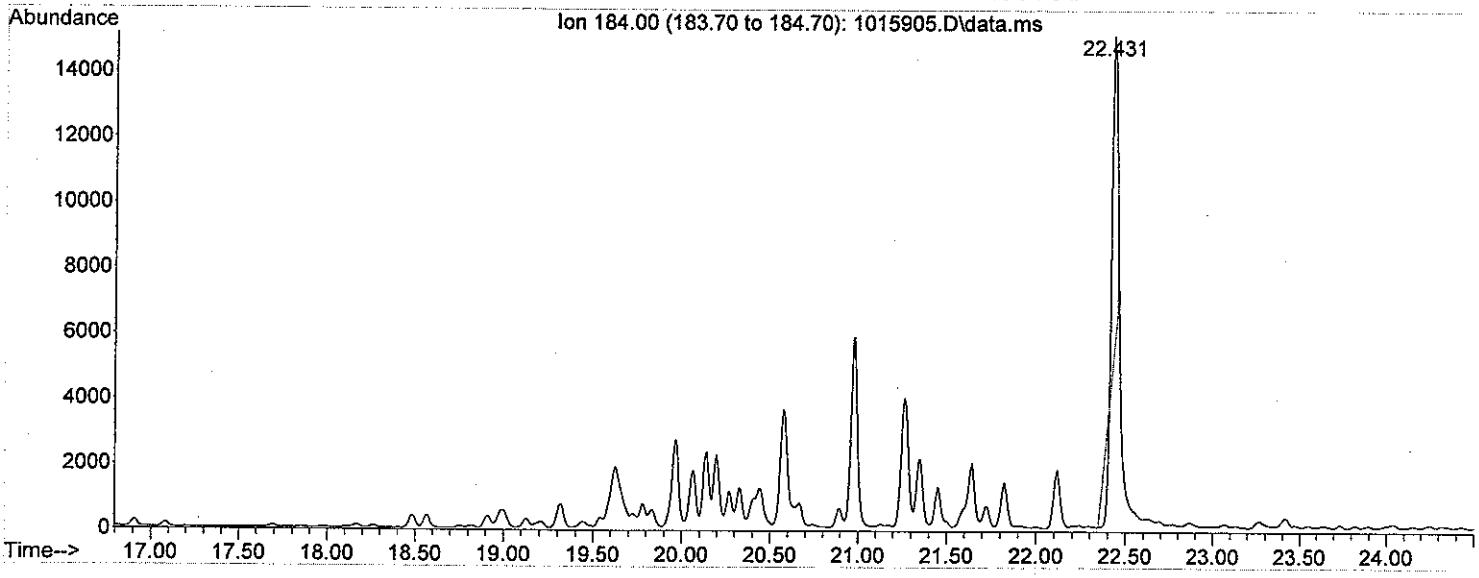
PHENANTHRENE/ANTHRACENE



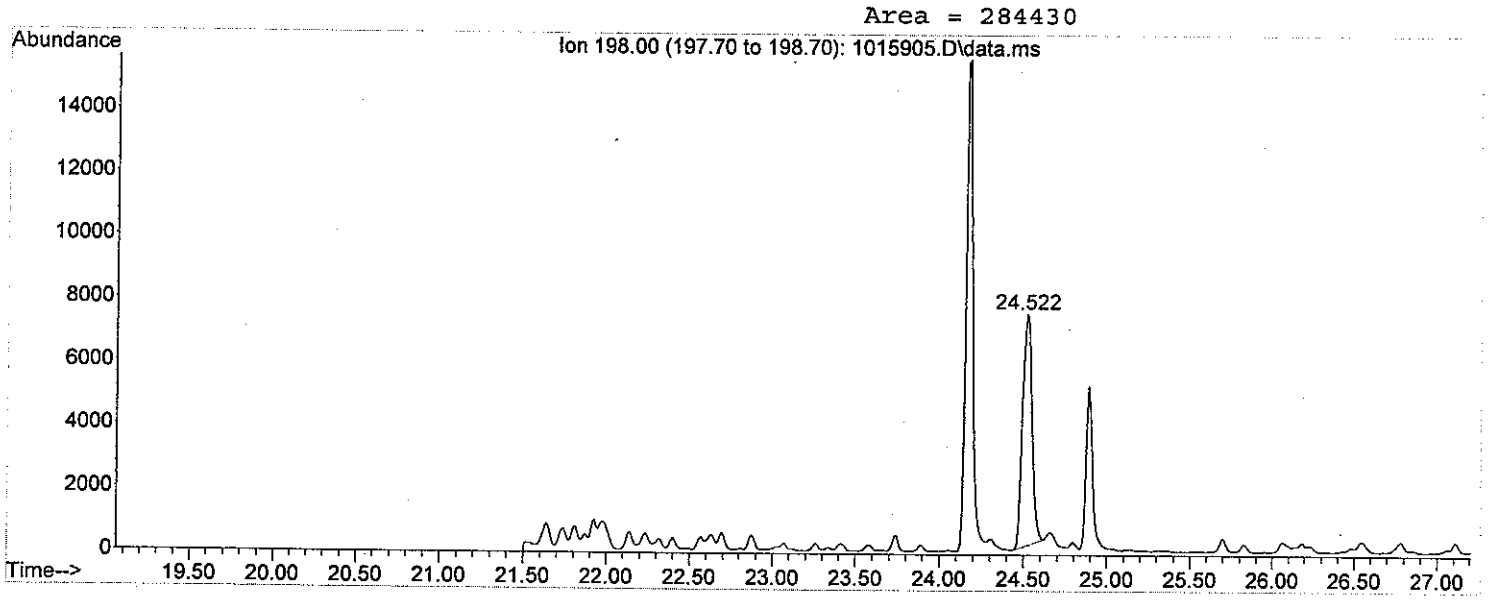
BENZONAPHTHIOPHENE



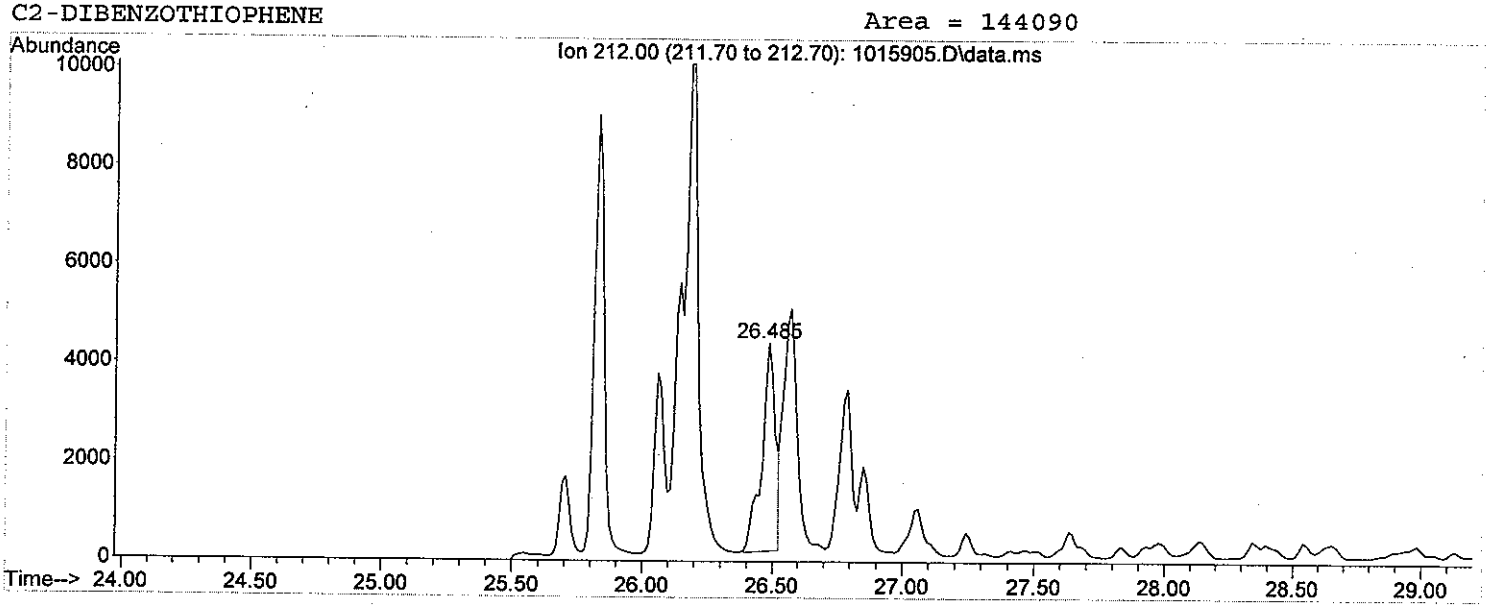
DIBENZOTHIOPHENE



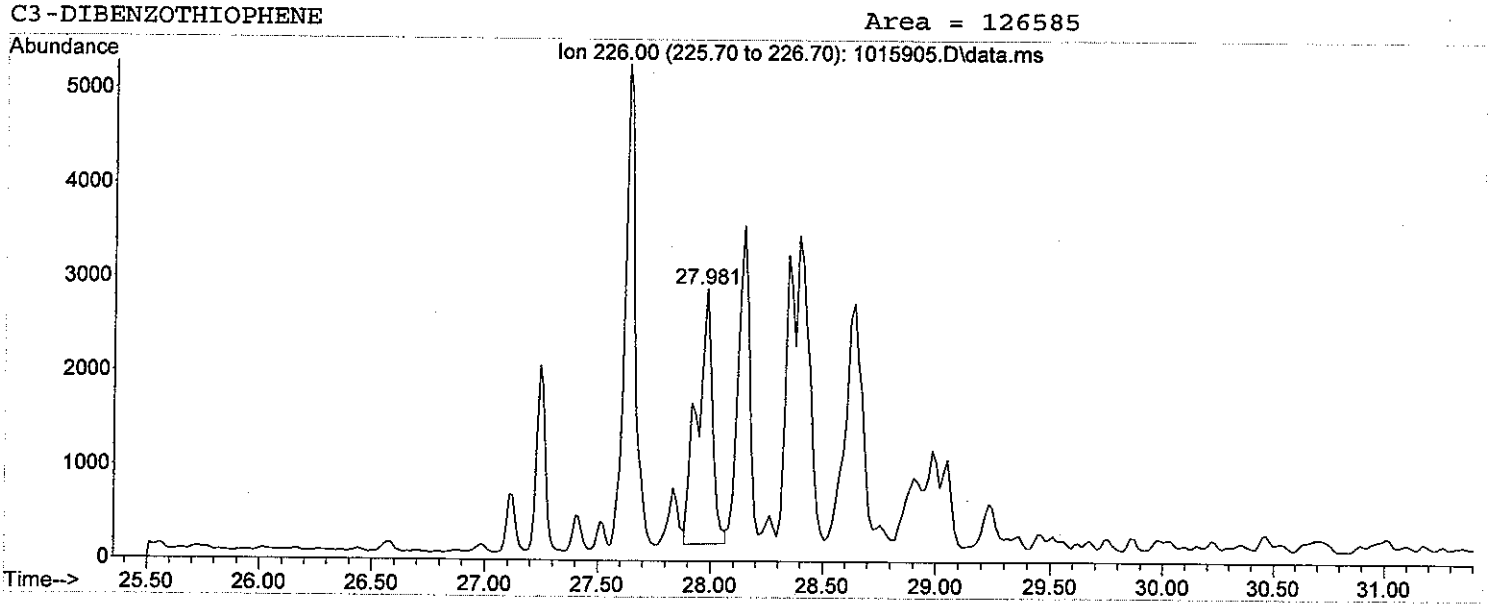
C1-DIBENZOTHIOPHENE



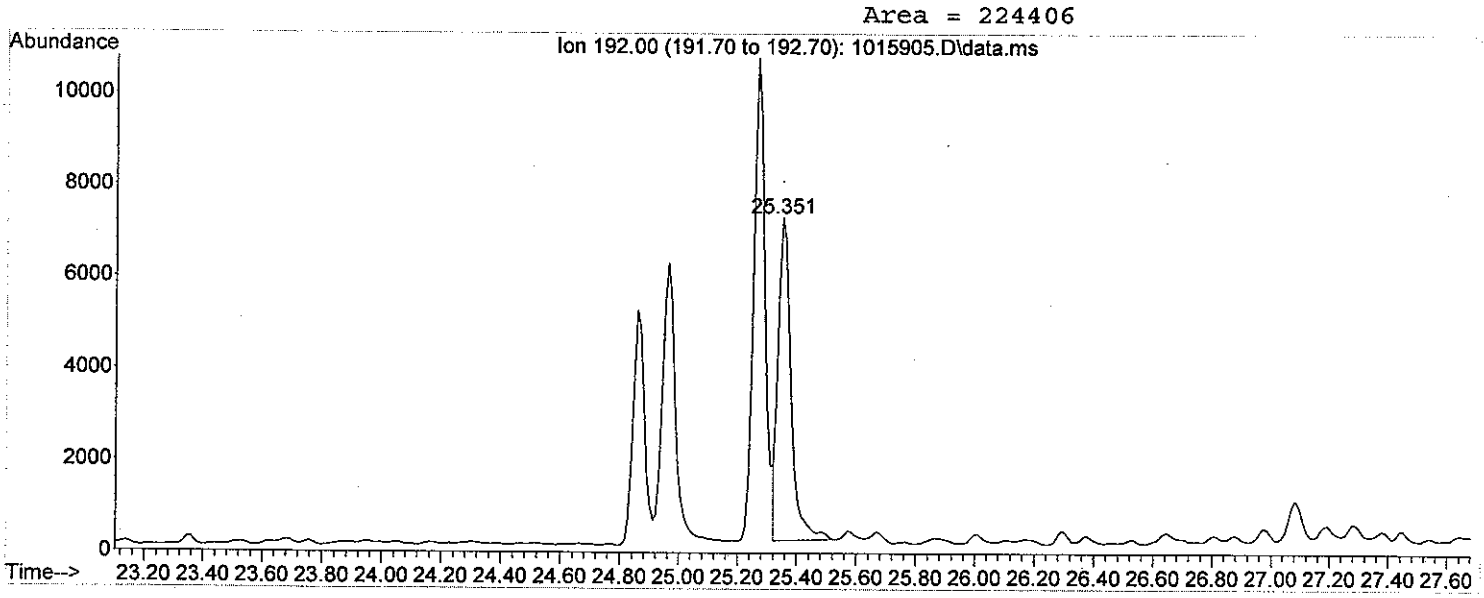
C2-DIBENZOTHIOPHENE



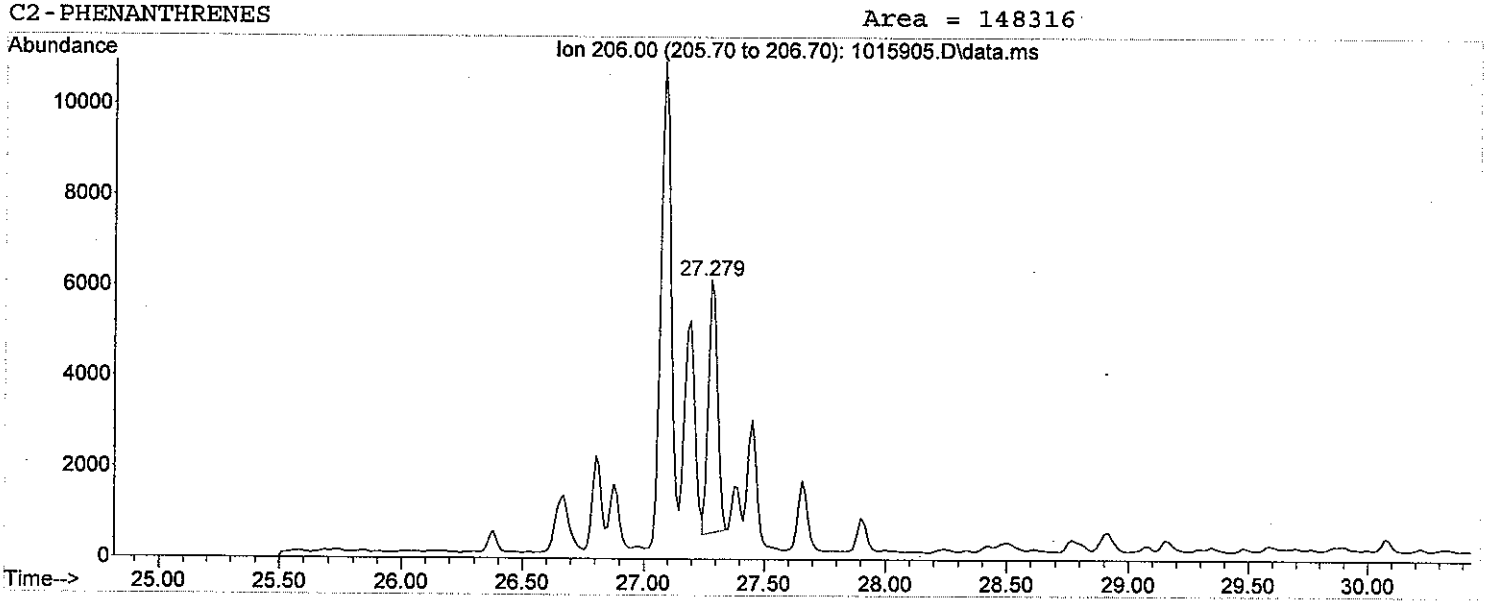
C3-DIBENZOTHIOPHENE



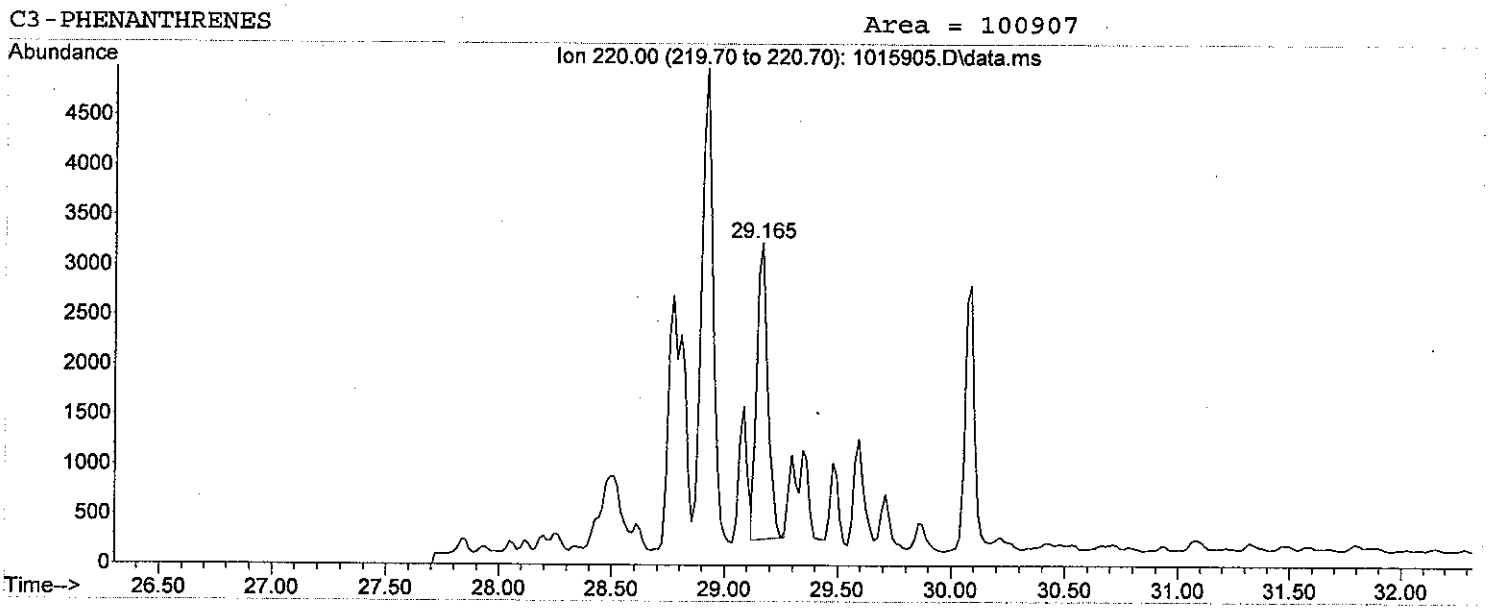
C1 - PHENANTHRENES



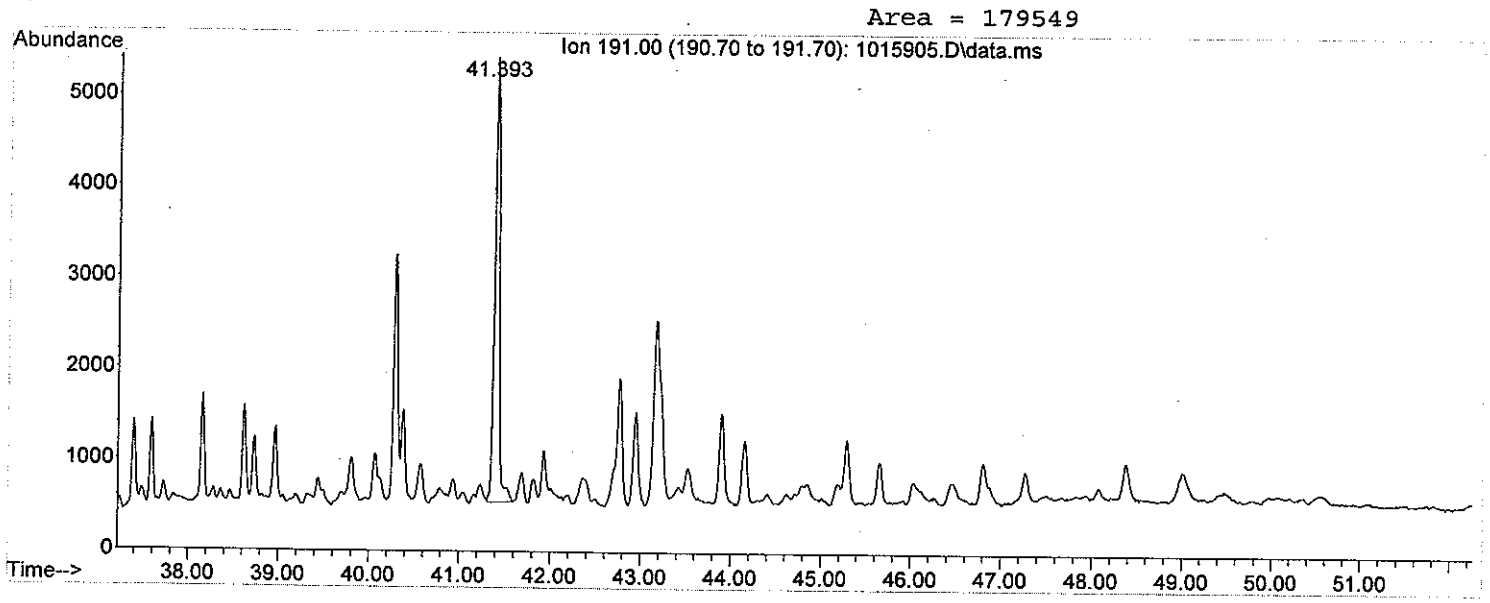
C2 - PHENANTHRENES



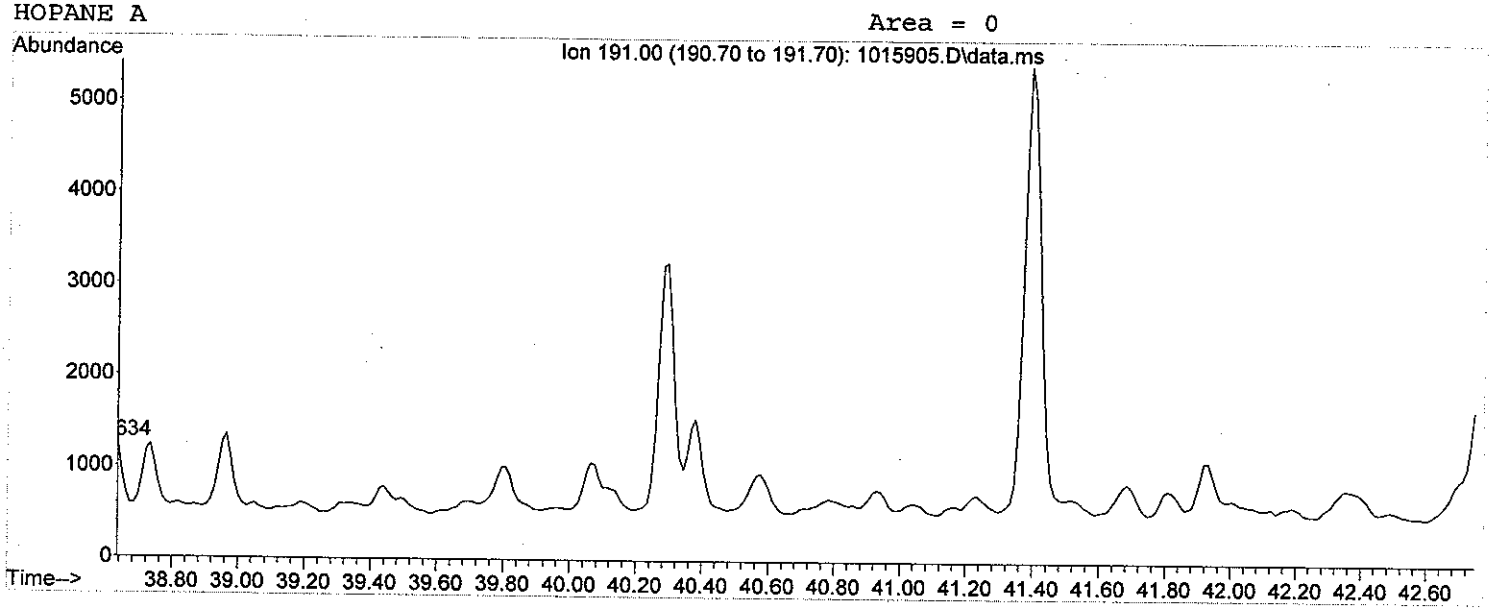
C3 - PHENANTHRENES



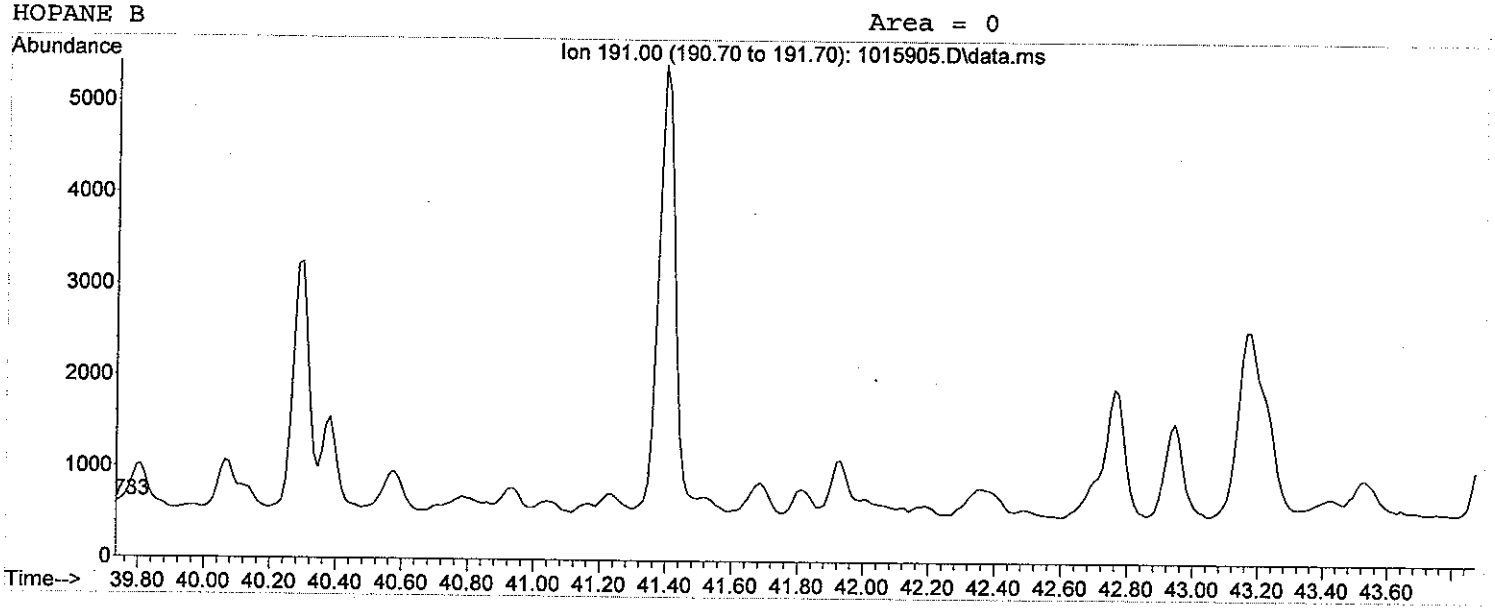
TRITERPANES/HOPANES



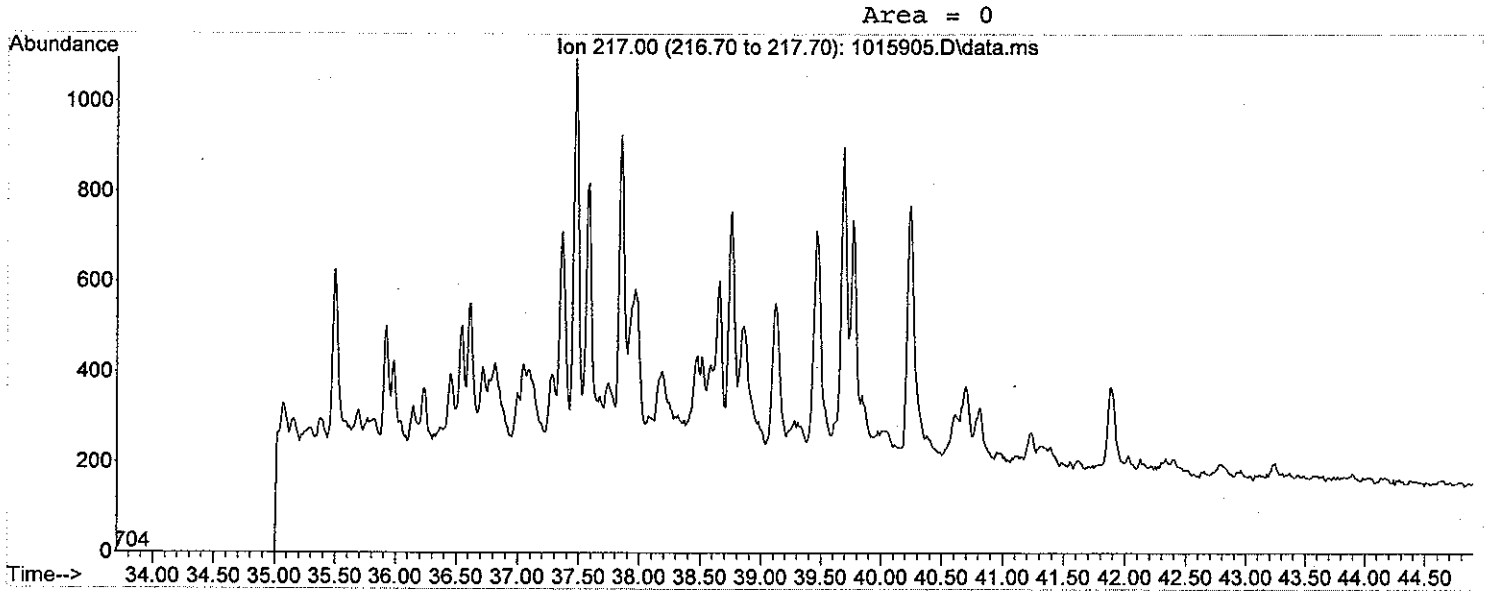
HOPANE A



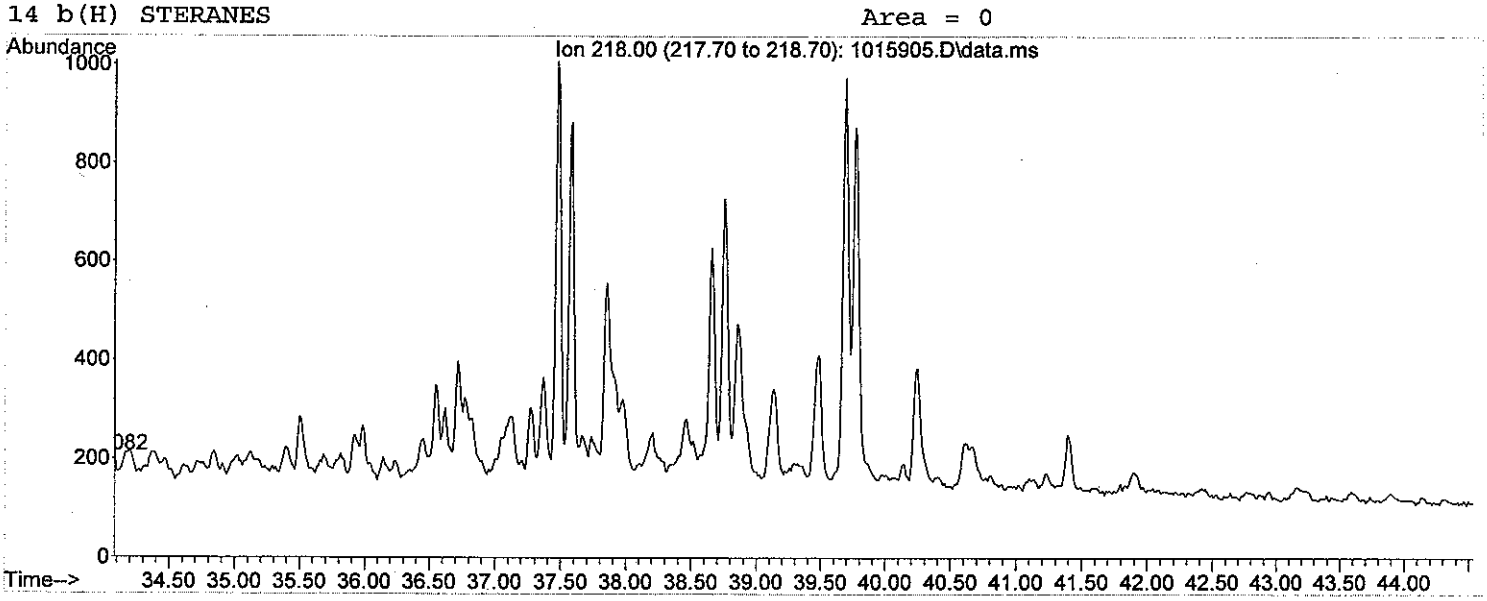
HOPANE B



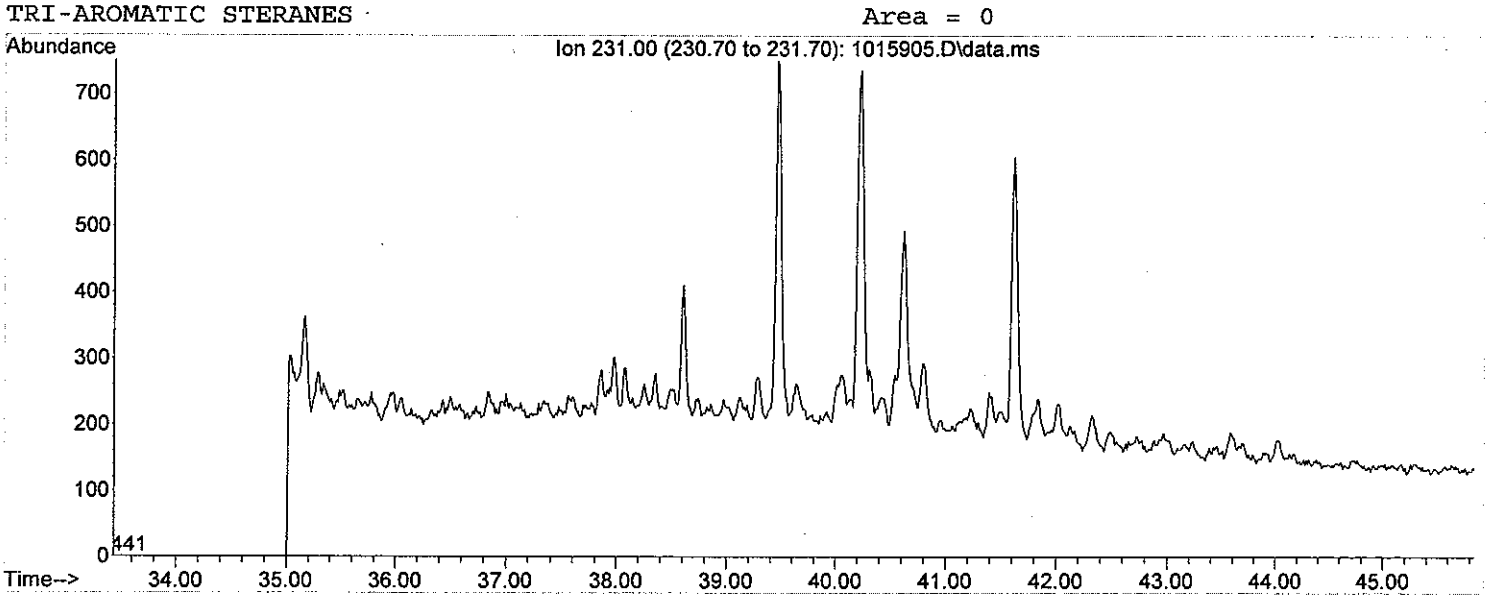
14 a(H) STERANES



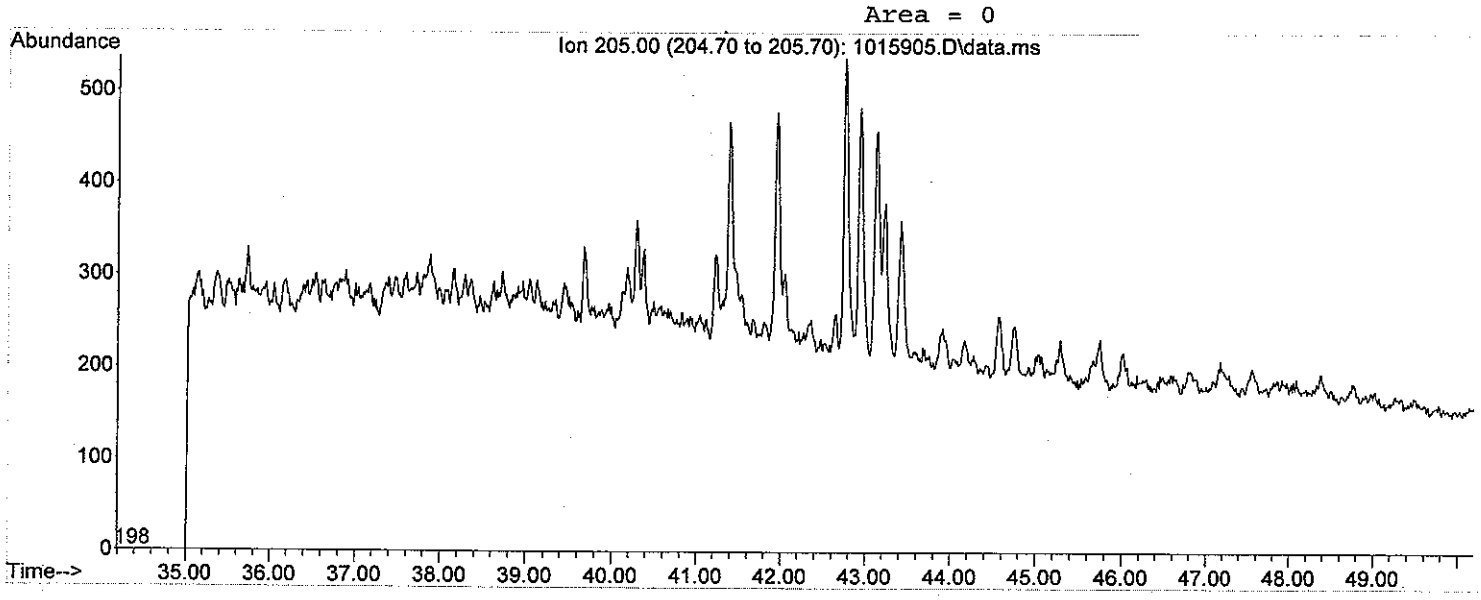
14 b(H) STERANES



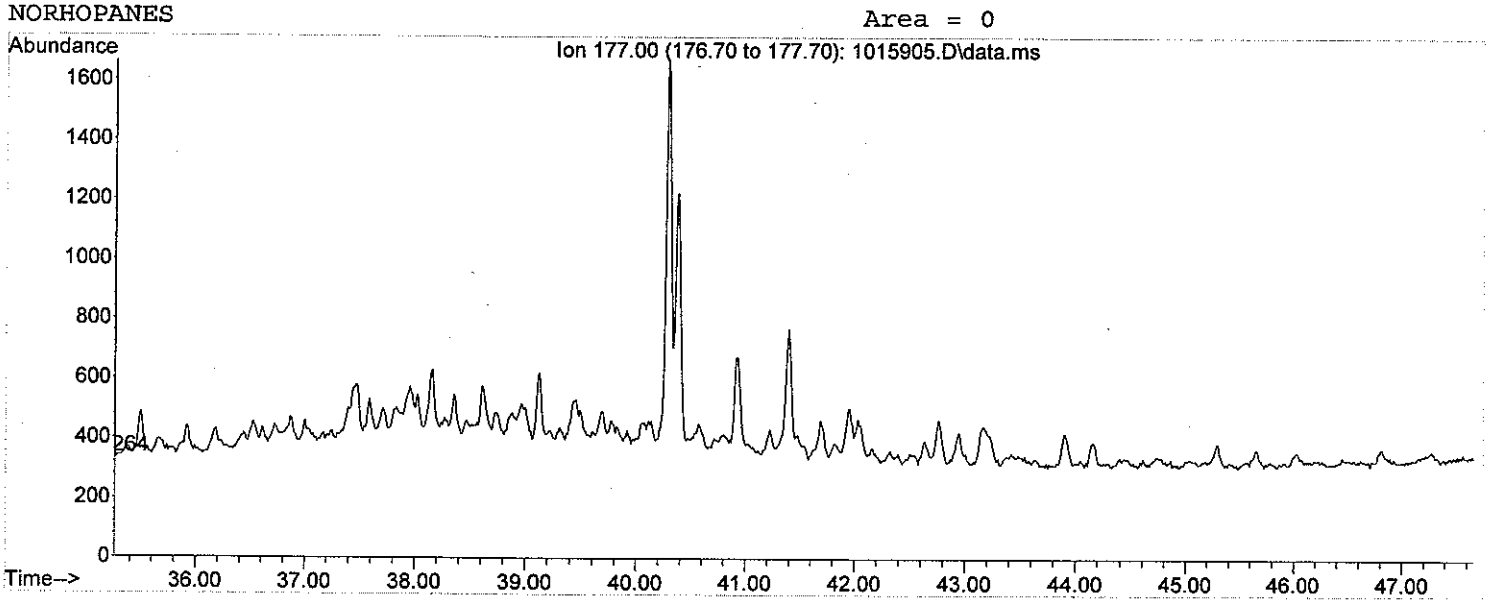
TRI-AROMATIC STERANES



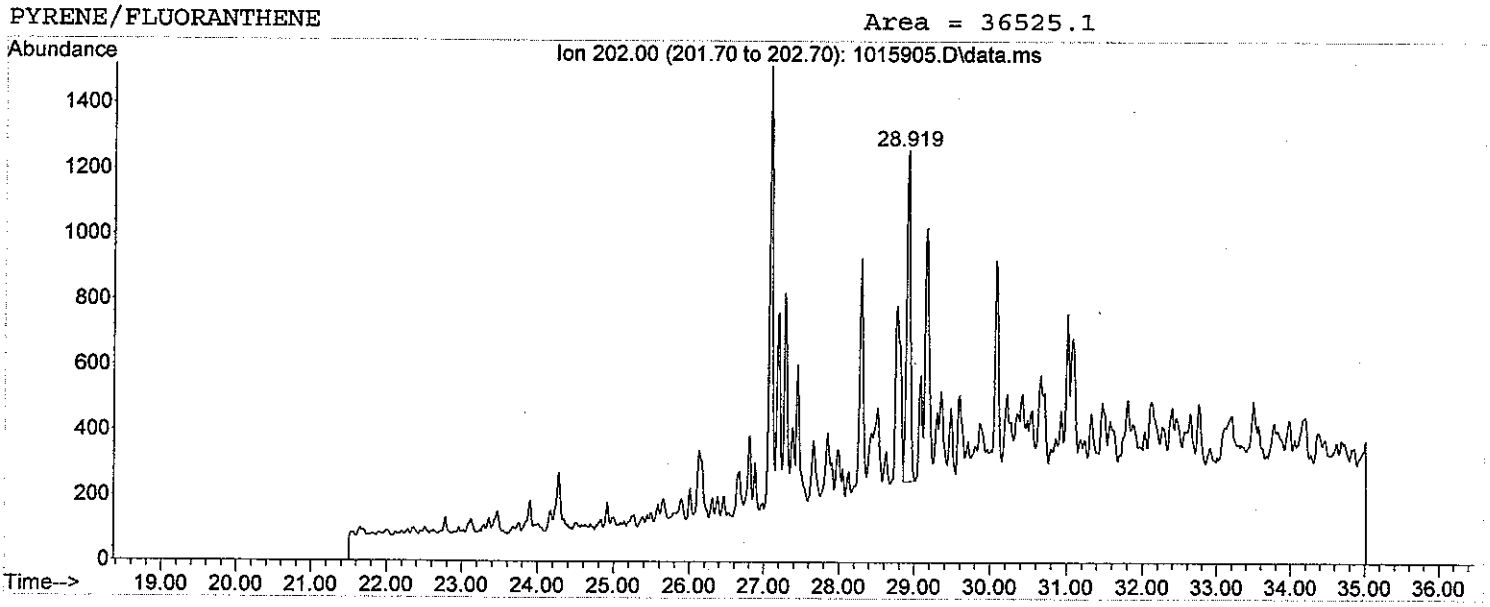
METHYLHOPANES



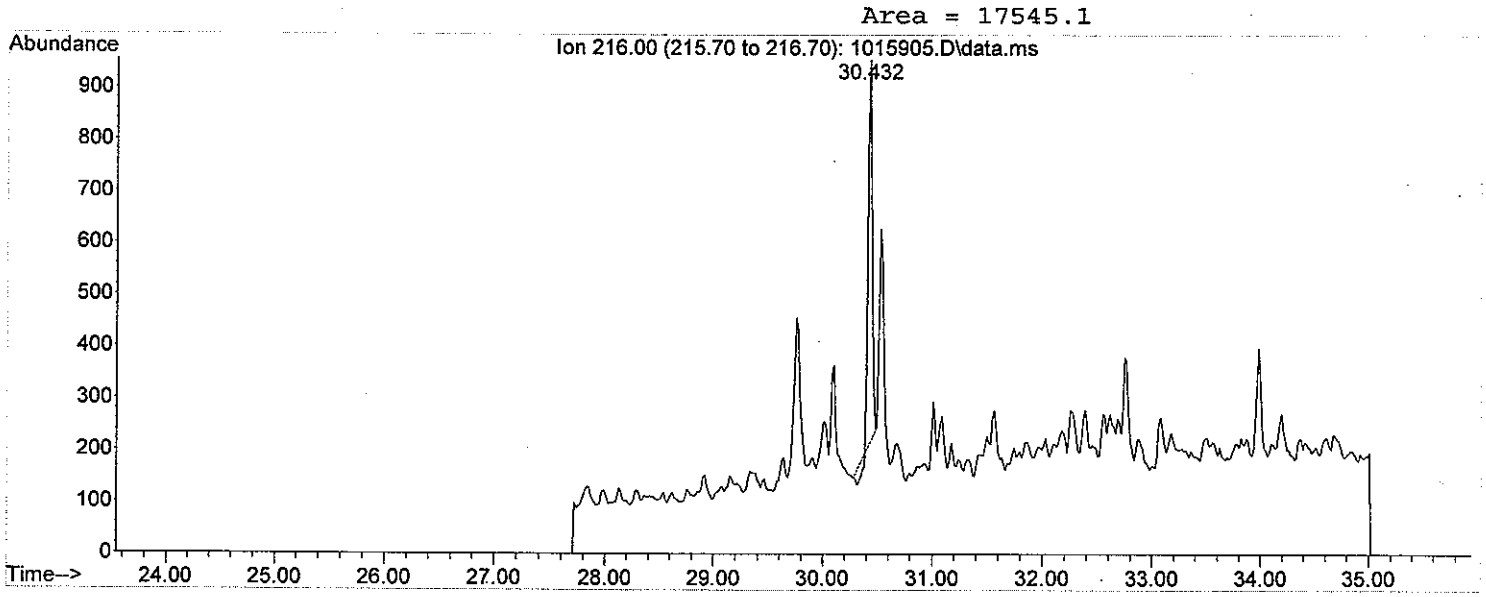
NORHOPANES



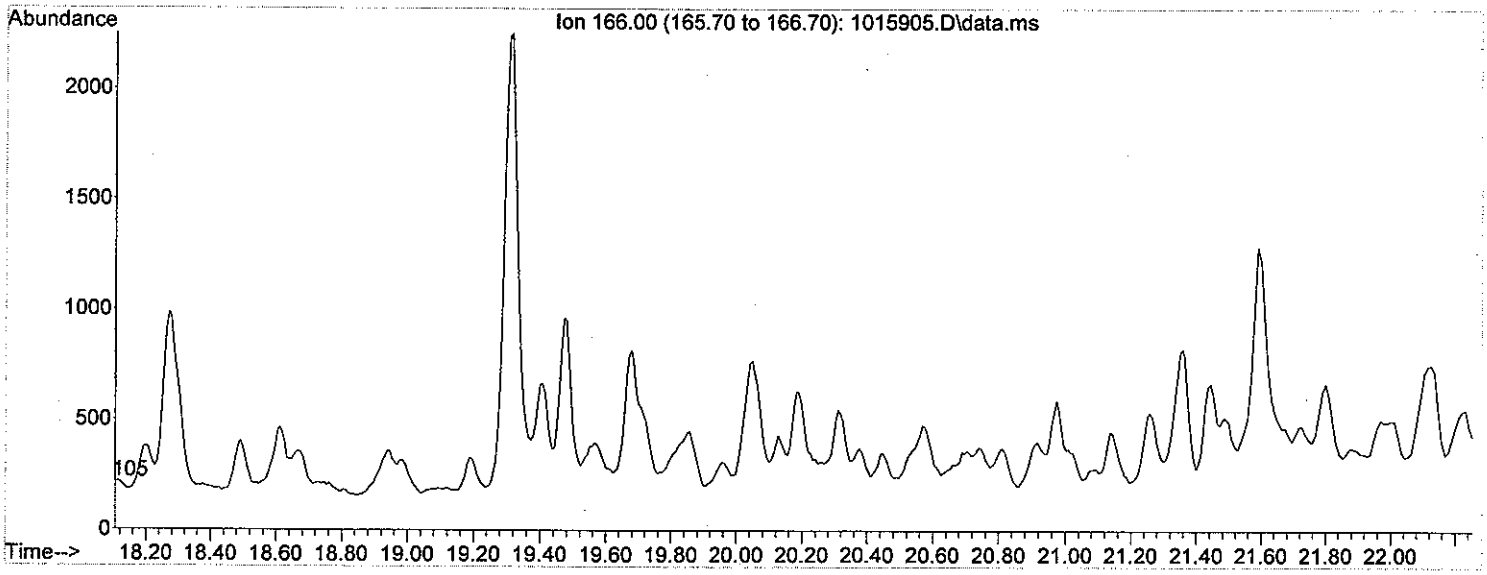
PYRENE/FLUORANTHENE



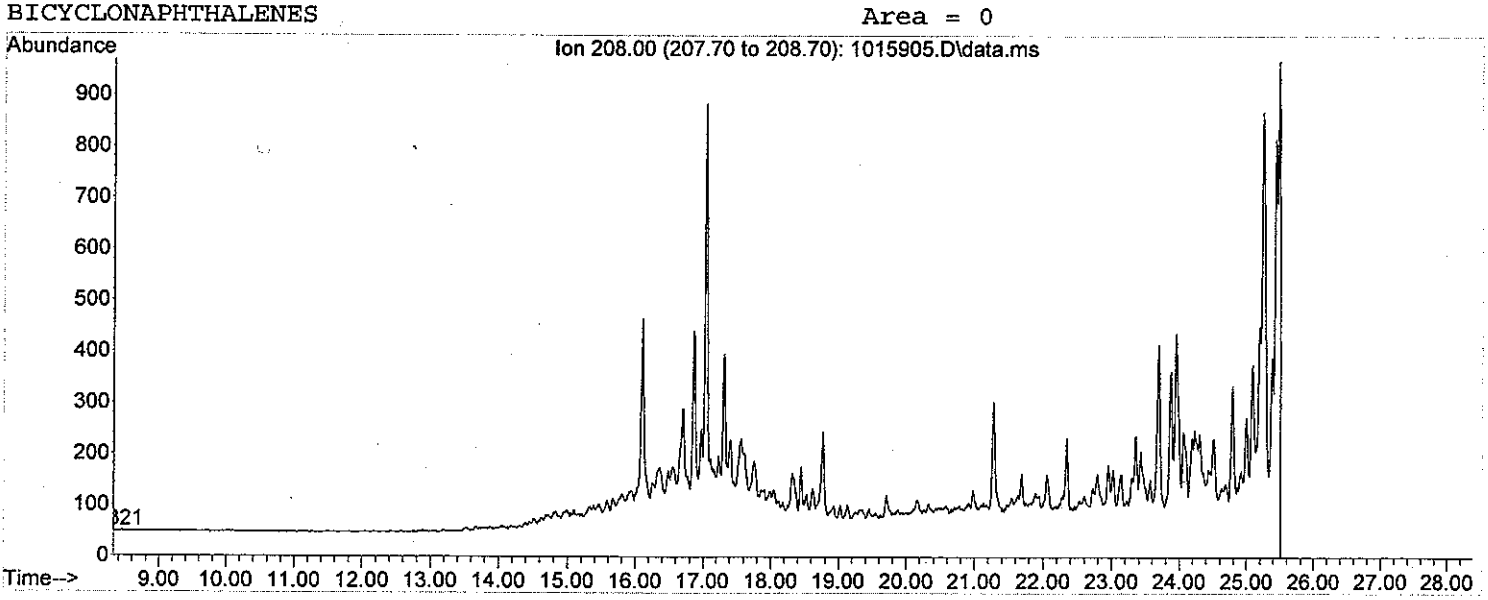
METHYL PYRENE



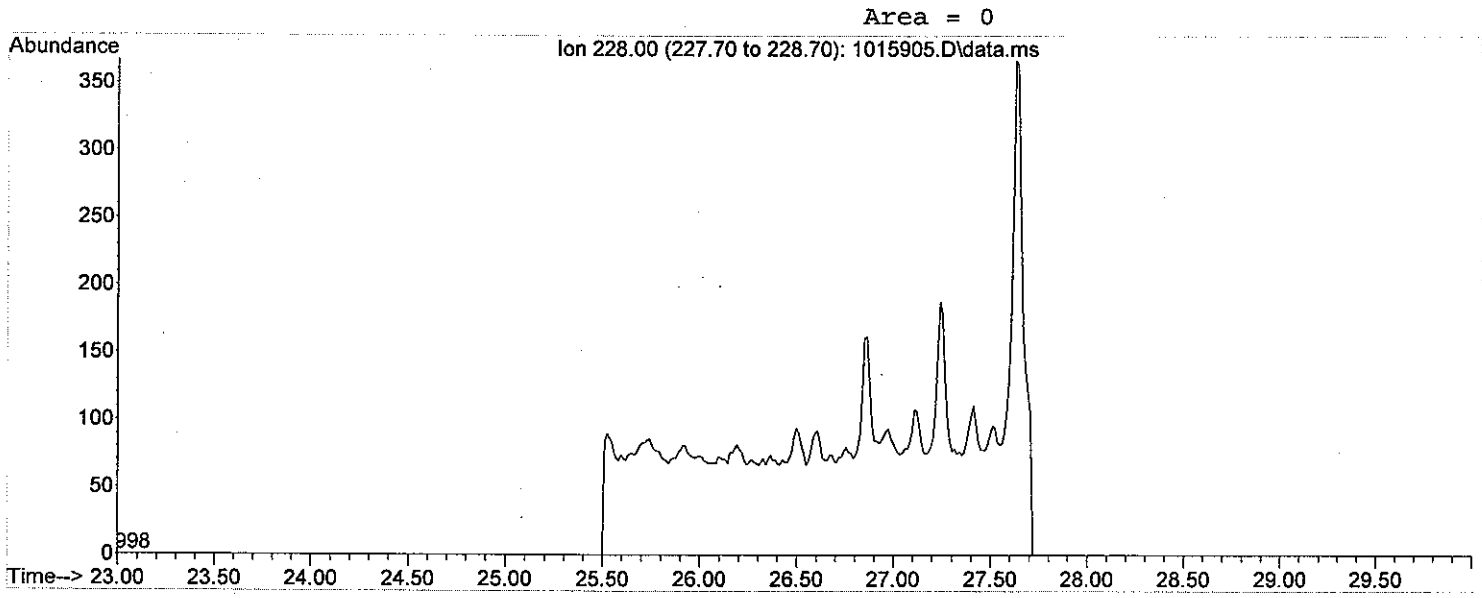
FLUORENE



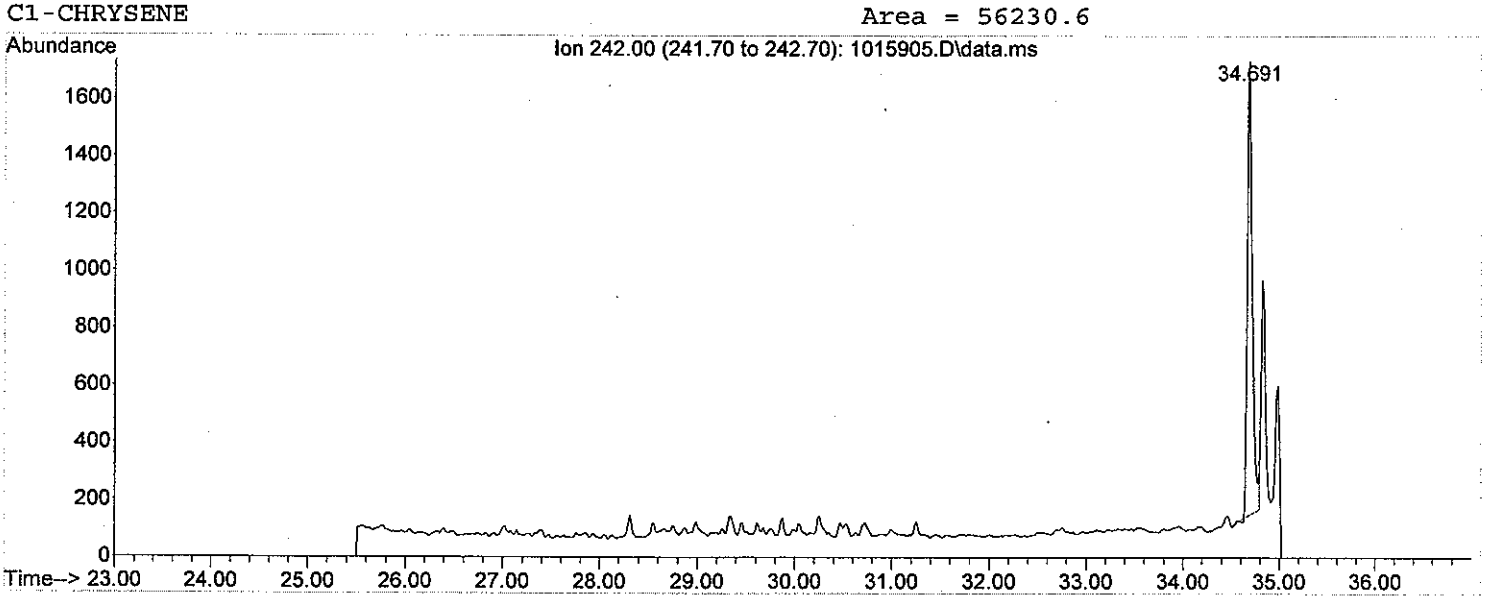
BICYCLONAPHTHALENES



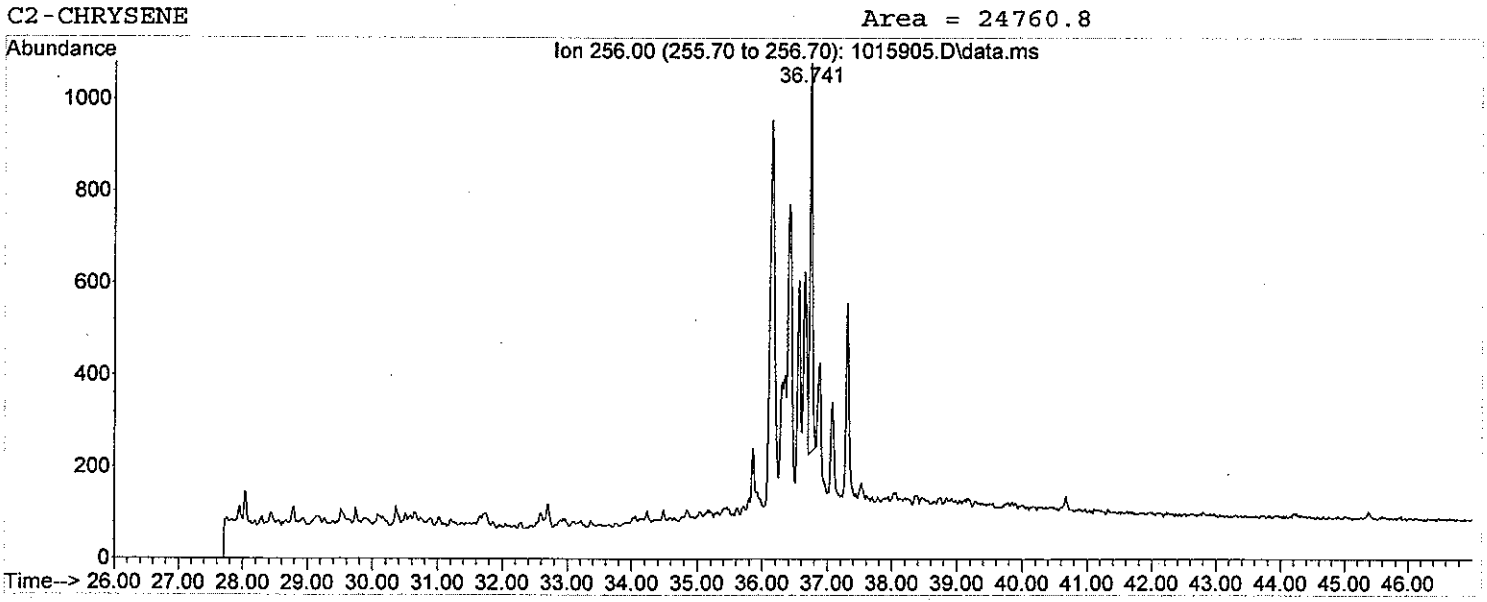
CHRYSENE



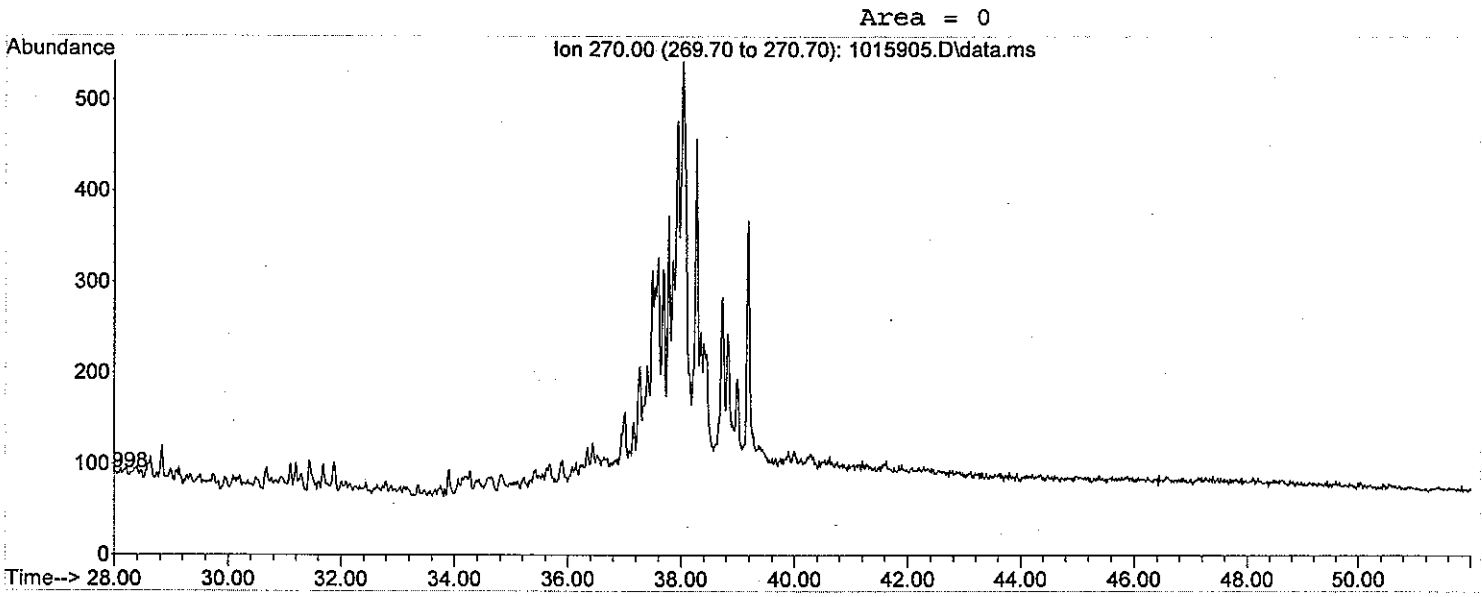
C1-CHRYSENE



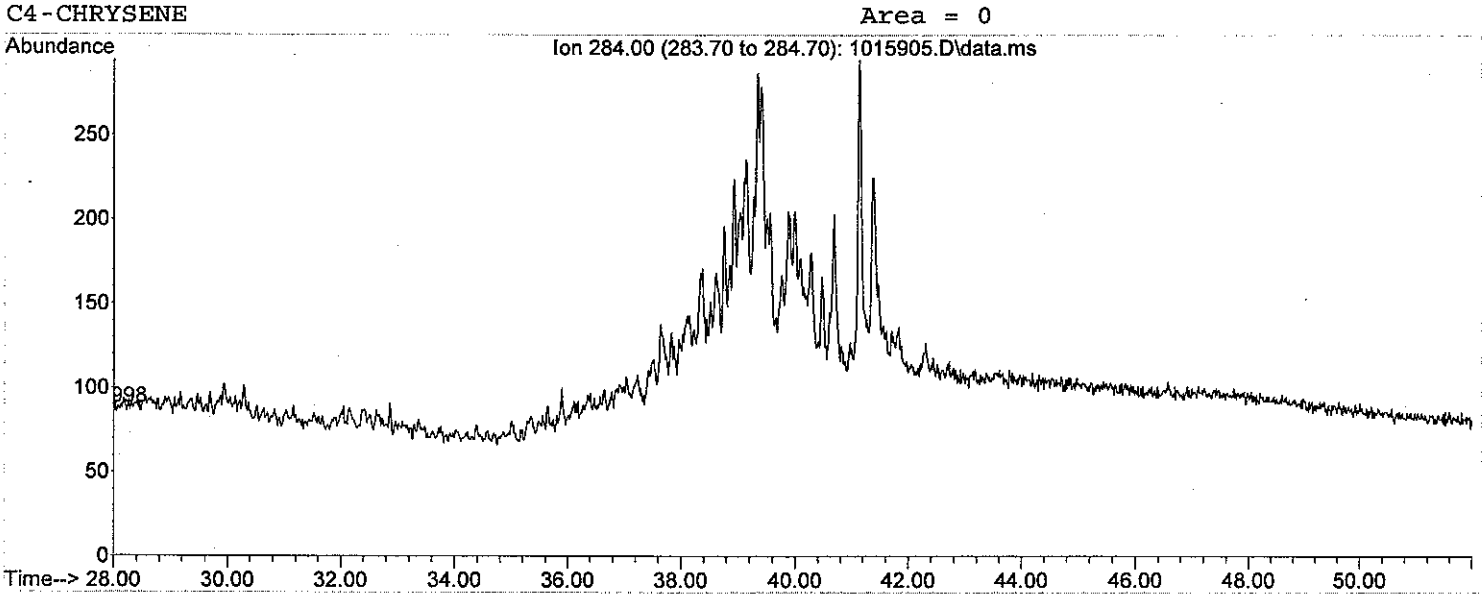
C2-CHRYSENE



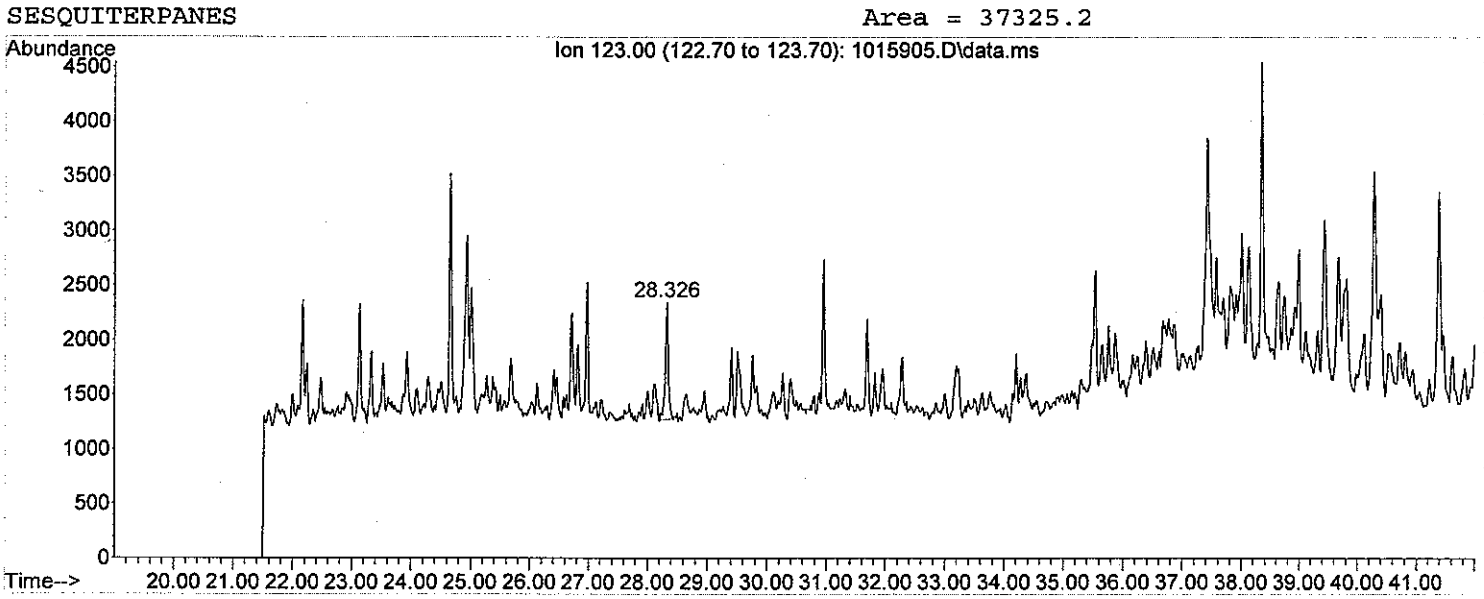
C3 - CHRYSENE



C4 - CHRYSENE

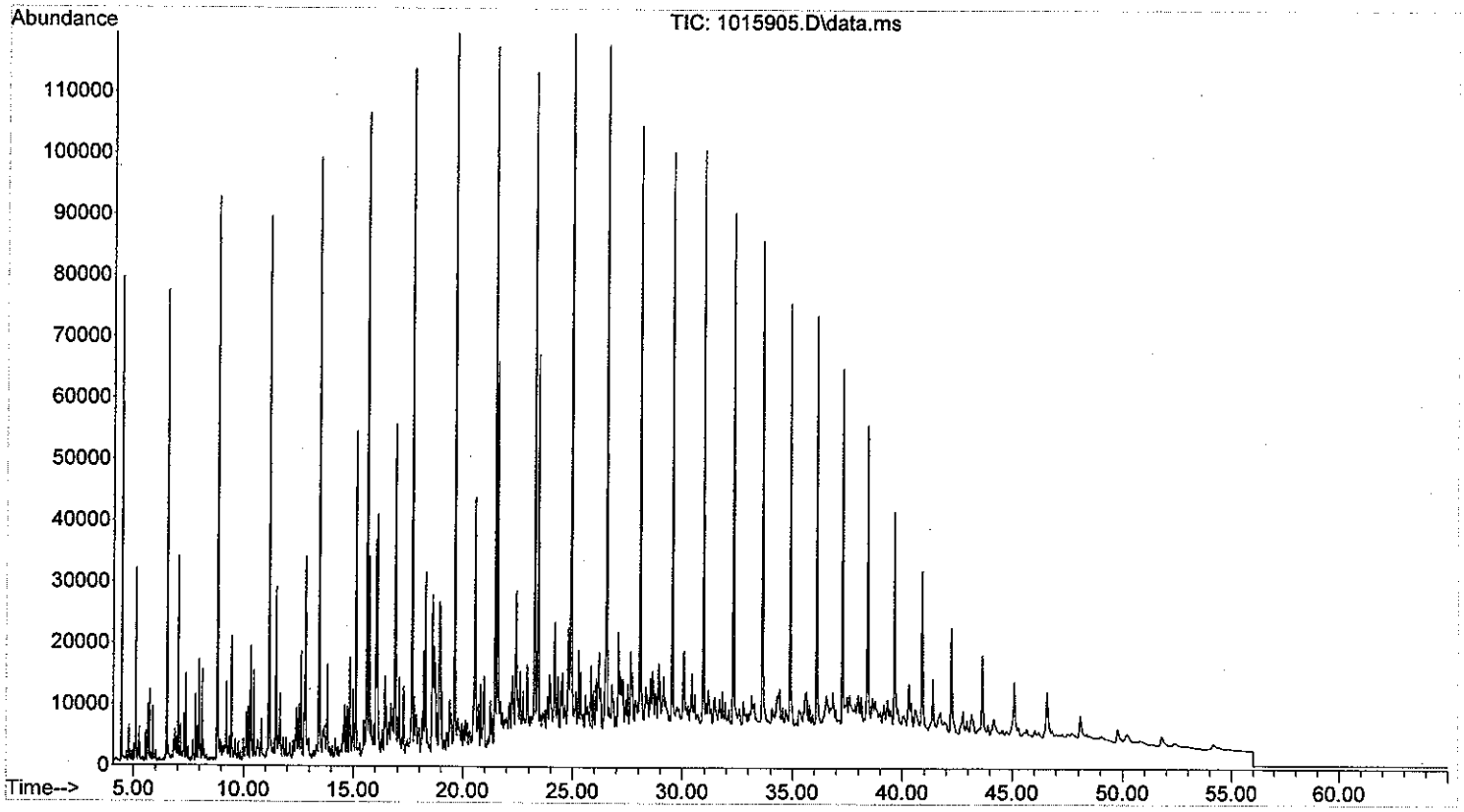


SESQUITERPANES

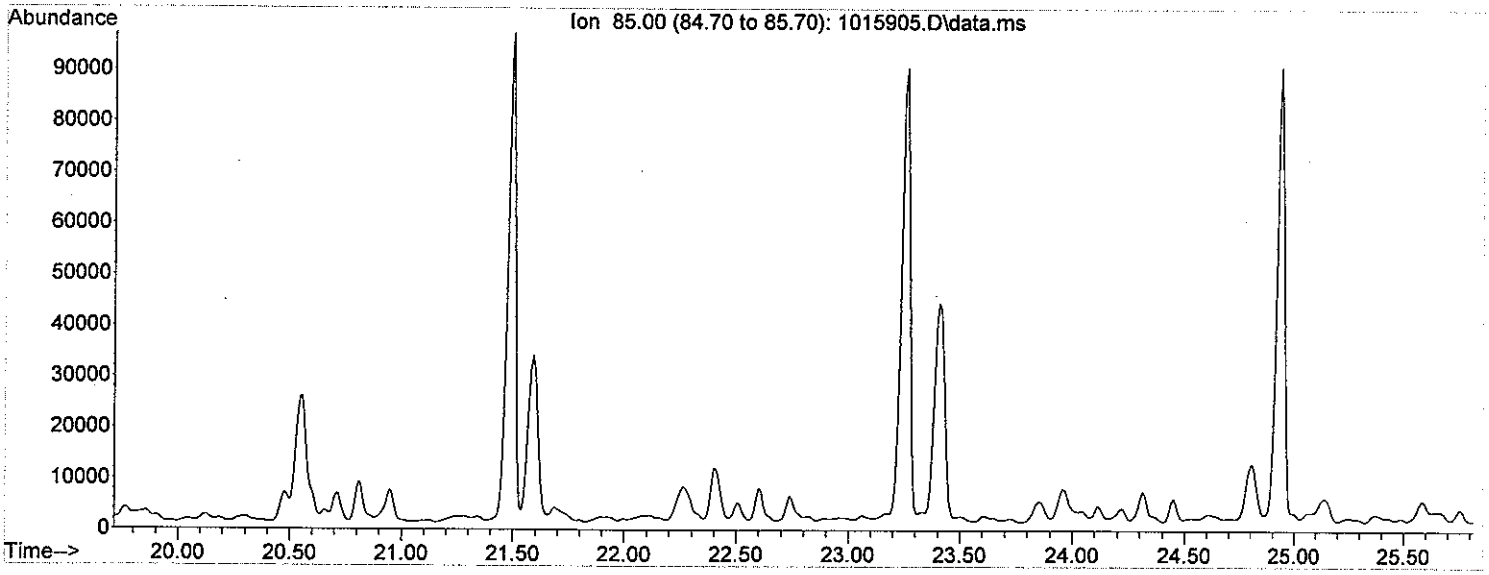


MSL GC-MS2 BIOMARKER ANALYSIS

File: W:\2010\MS_DATA\10-159\1015905.D
Operator: ACT
Date Acquired: 25 Jun 2010 4:53 pm
Method File: BIOMARK3.M
Sample Name: 10-159-5, SP Vial: 4
Misc Info:



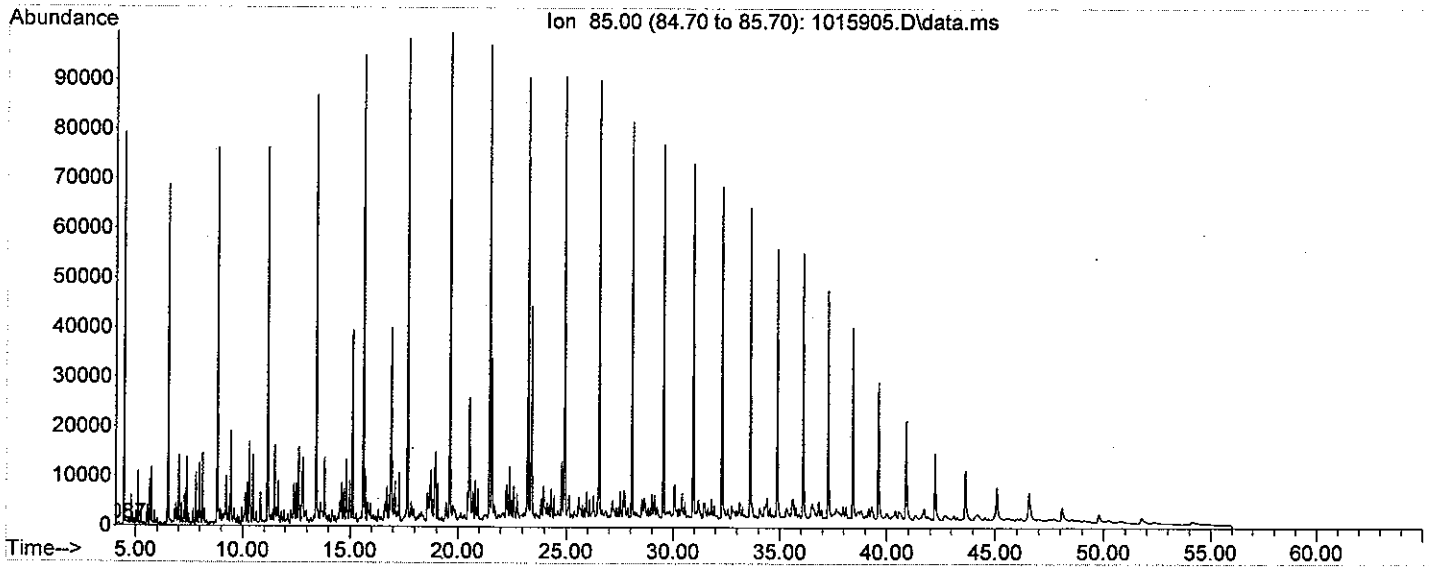
n-C17, Pristane, n-C18, Phytane



Pristane/Phytane = ----
C17/C18 = ----
Pristane/C17 = ----
Phytane/C18 = ----

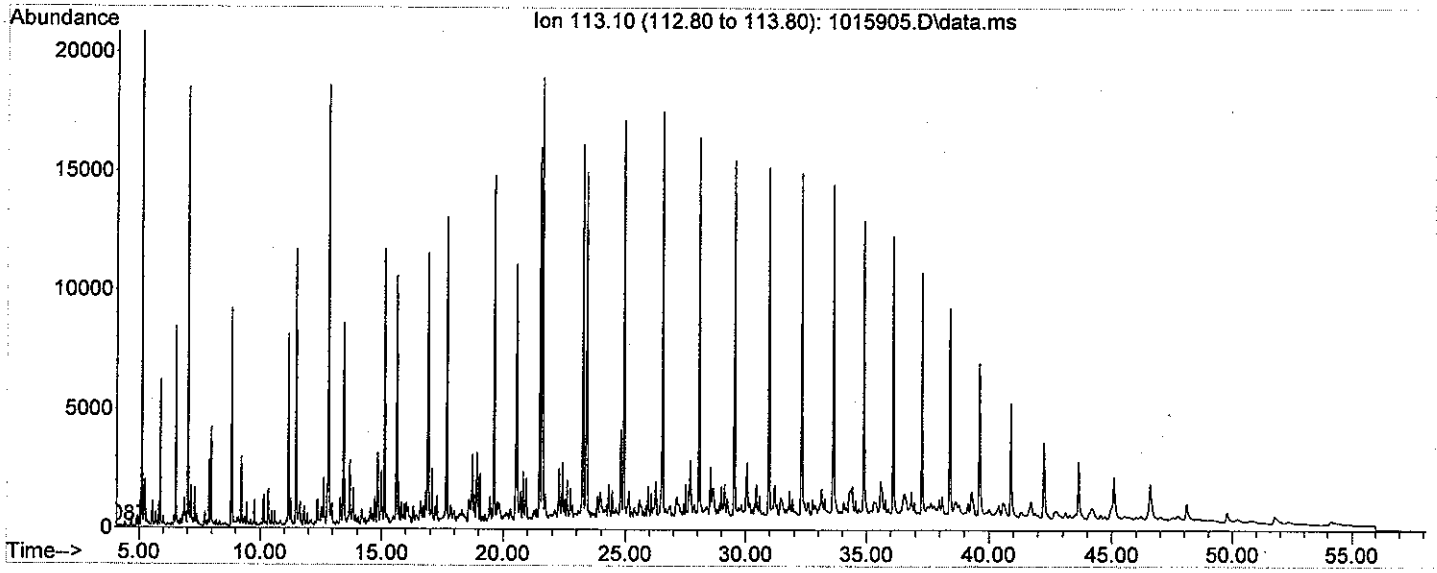
85-SATURATED HYDROCARBONS

Area = 0



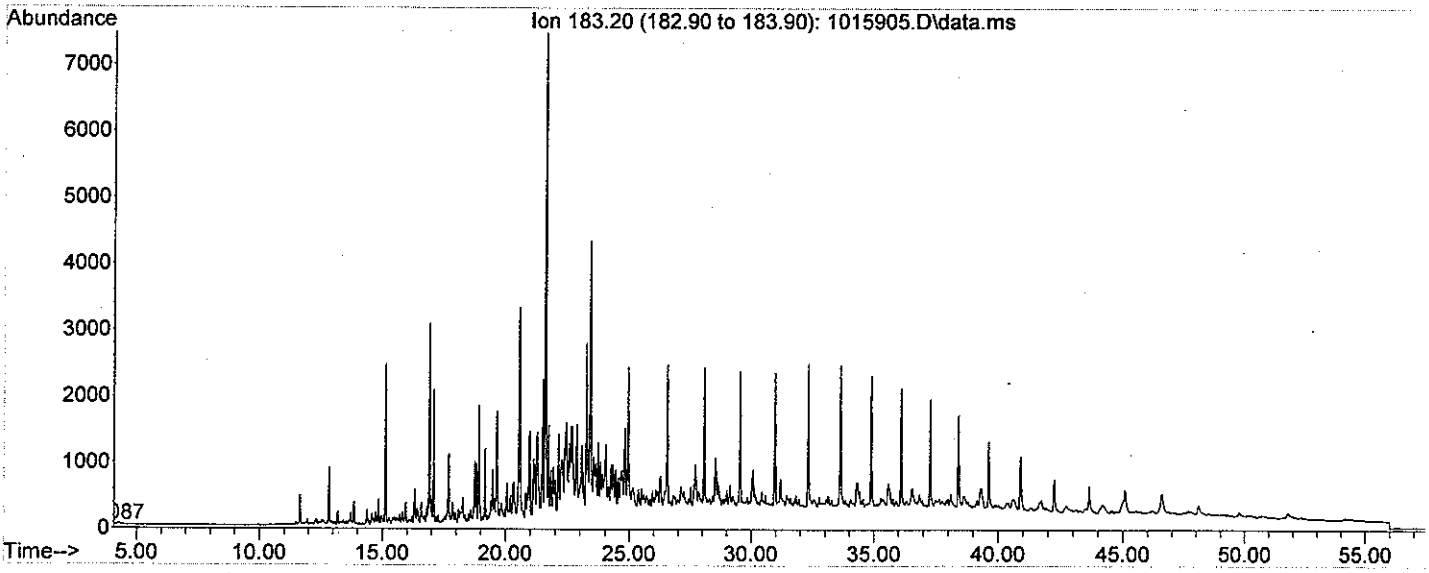
113-SATURATED HYDROCARBONS

Area = 0

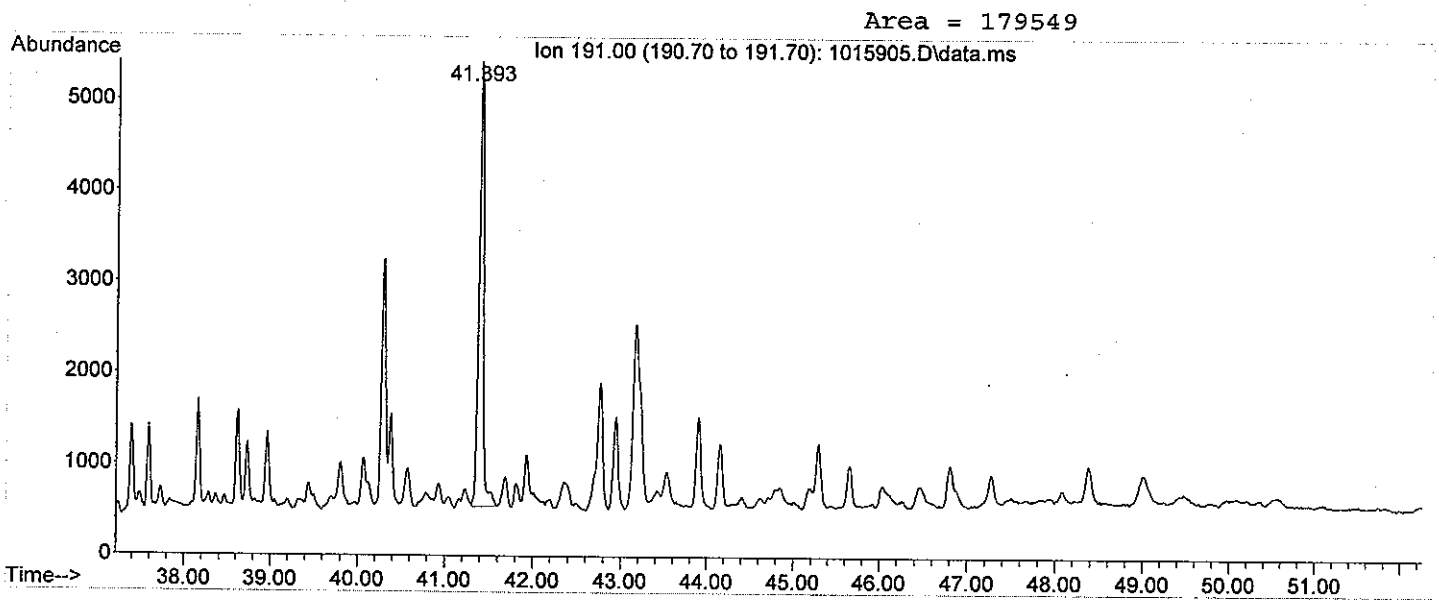


ACYCLIC ISOPRENOIDS/ALKANES

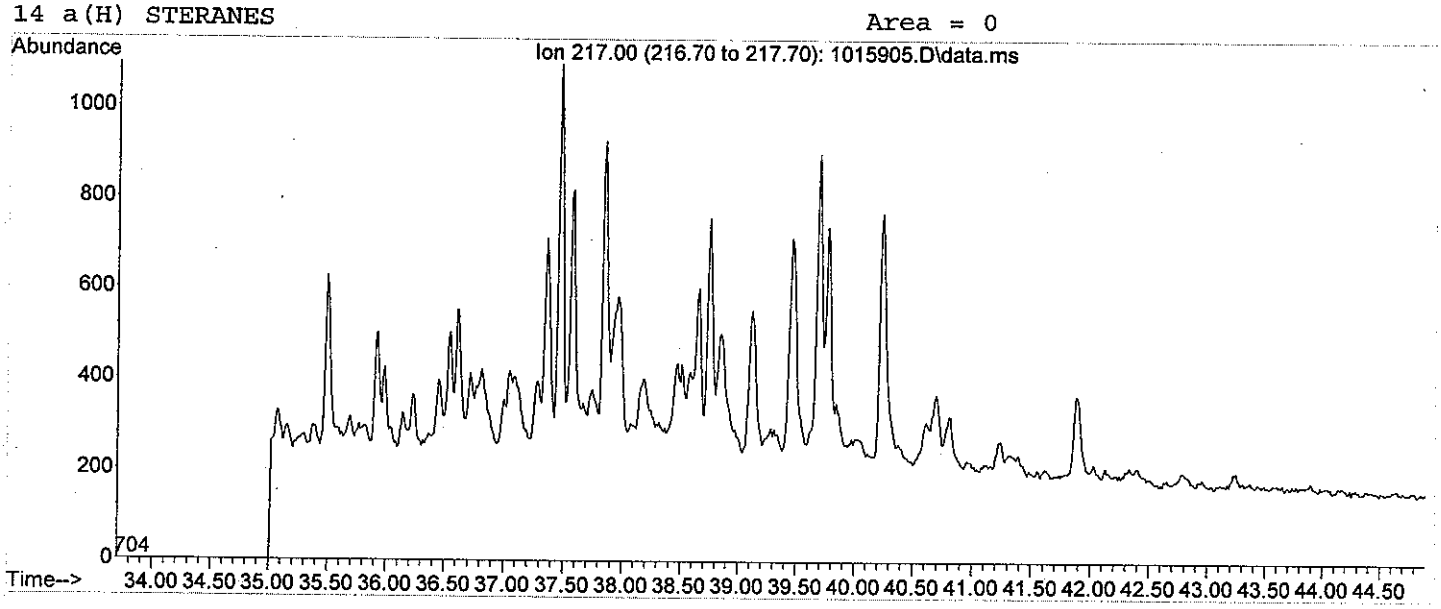
Area = 0



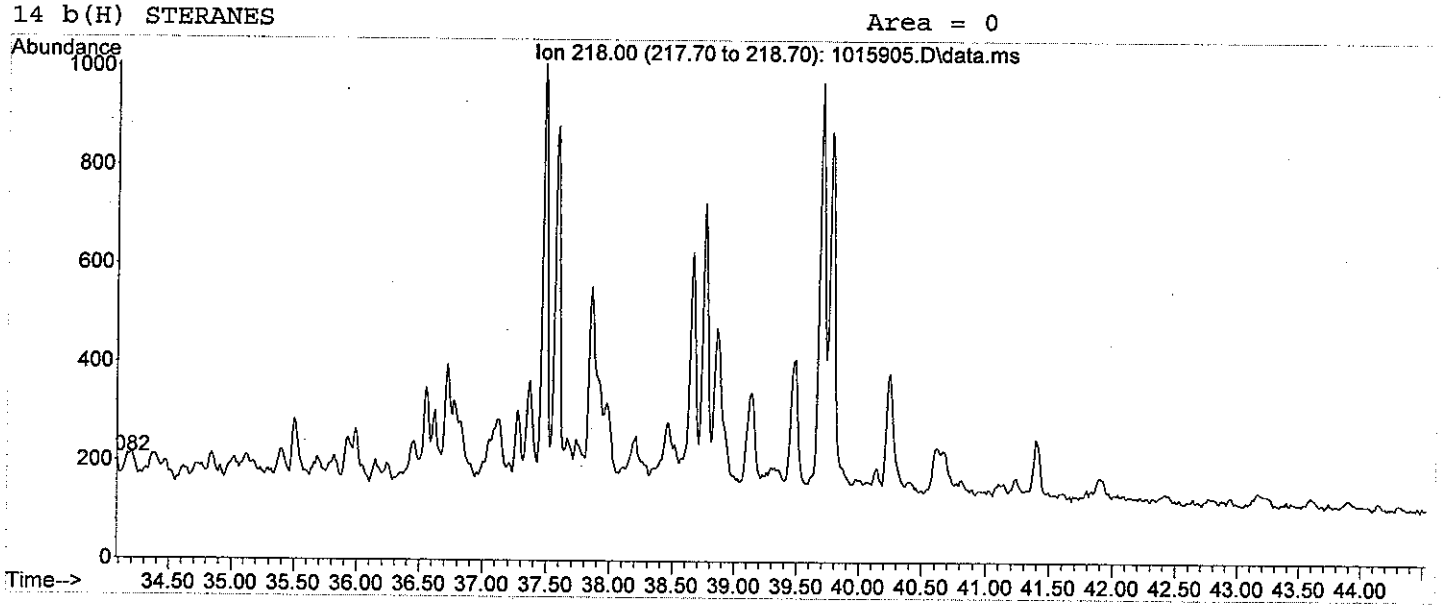
TRITERPANES/HOPANES



14 a(H) STERANES



14 b(H) STERANES



Material Safety Data Sheet

CRUDE OIL

MSDS: 002493 Revision #:9 Revision Date:10/01/93

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

CRUDE OIL

PRODUCT NUMBER(S): CPS296000
SYNONYM: Petroleum

COMPANY IDENTIFICATION

Chevron USA Products Company
Environmental, Safety, and Health
575 Market St., Room 2900
San Francisco, CA 94105-2856

EMERGENCY TELEPHONE NUMBERS

HEALTH (24 hr): (800)231-0623 or
(510)231-0623 (International)
TRANSPORTATION (24 hr): CHEMTREC
(800)424-9300 or (202)483-7616

PRODUCT INFORMATION: (800)822-5823 MSDS Requests
(918)560-4134 Technical

2. COMPOSITION/INFORMATION ON INGREDIENTS

100.0 % CRUDE OIL

CONTAINING

COMPONENTS	AMOUNT	LIMIT/QTY	AGENCY/TYPE
CRUDE OIL Chemical Name: PETROLEUM CAS8002059	100.0%		
INCLUDING			
BENZENE Chemical Name: BENZENE CAS71432		(10,A2) ppm Table Z-2 Table Z-2 10 LBS	ACGIH TWA OSHA PEL OSHA CEILING CERCLA 302.4 RQ

Refer to the OSHA Benzene Standard (29 CFR 1910.1028) and Table Z-2 for detailed training, exposure monitoring, respiratory protection and medical surveillance requirements before using this product.

HYDROGEN SULFIDE
Chemical Name: HYDROGEN SULFIDE

CAS7783064	10 ppm	ACGIH TWA
	21 mg/m3	ACGIH STEL
	Table Z-2	OSHA PEL
	Table Z-2	OSHA CEILING
	100 LBS	CERCLA 302.4 RQ
	500 LBS	SARA 302 TPQ
	100 LBS	SARA 304 RQ

COMPOSITION COMMENT:
All the components of this material are on the Toxic Substances Control Act Chemical Substances Inventory.

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	TPQ - Threshold Planning Quantity
RQ - Reportable Quantity	PEL - Permissible Exposure Limit
C - Ceiling Limit	CAS - Chemical Abstract Service Number
A1-5 - Appendix A Categories	() - Change Has Been Proposed

3. HAZARDS IDENTIFICATION

********** EMERGENCY OVERVIEW **********

Amber to black viscous liquid with a mild, pungent to sulfurous odor.

- FLAMMABLE
- MAY RELEASE HIGHLY TOXIC AND FLAMMABLE HYDROGEN SULFIDE (H2S) GAS
- VAPOR HARMFUL
- MAY CAUSE EYE IRRITATION
- HARMFUL OR FATAL IF SWALLOWED - CAN ENTER LUNGS AND CAUSE DAMAGE
- CANCER SUSPECT AGENT
- PROLONGED OR REPEATED SKIN CONTACT MAY INCREASE THE RISK OF SKIN CANCER
- PROLONGED OR REPEATED INHALATION MAY CAUSE CANCER

****

POTENTIAL HEALTH EFFECTS
EYE:
The eye irritation potential of this substance has not been determined. However, it may be slightly irritating to the eyes and could cause prolonged (days) impairment of your vision. The degree of the injury will depend on the amount of material that gets into the eye and the speed and thoroughness of the first aid treatment. This hazard evaluation is based on the known toxicity of the ingredients in this substance.
SKIN:
Expected to cause no more than minor skin irritation, but prolonged or frequently repeated skin contact may be harmful. The systemic toxicity of this substance has not been determined. However, it should be practically non-toxic to internal organs if it gets on the skin. This hazard evaluation is based on data from similar materials.
INGESTION:
The oral toxicity of this substance has not been determined. However, it may be slightly toxic to internal organs if swallowed. The degree of injury will depend on the amount absorbed from the gut. This hazard evaluation is based on the known toxicity of the ingredients in this substance. Because of the low viscosity of this substance, it can directly enter the lungs if it is swallowed (this is called aspiration). This can occur during the act of swallowing or when vomiting the substance. Once in the lungs, the substance is very difficult to remove

and can cause severe injury to the lungs and death.
INHALATION:
Breathing the vapor may be irritating to the respiratory tract. Prolonged breathing of vapors can cause central nervous system effects. This substance contains sulfur compounds which may form hydrogen sulfide. The rotten eggs odor of hydrogen sulfide is unreliable as an indicator of concentration. The U.S. Occupational Safety and Health Administration (OSHA) considers an atmophere containing concentrations of H2S greater than 300 ppm to be Immediately Dangerous to Life and Health (IDLH). This hazard evaluation is based on the known toxicity of the ingredients in this substance. This substance is highly toxic to internal organs if inhaled. The degree of injury will depend on the airborne concentration and duration of exposure.
SIGNS AND SYMPTOMS OF EXPOSURE:
EYE: May include pain, tears, swelling, redness, and blurred vision.
INHALATION: Respiratory tract irritation may include, but may not be limited to, one or more of the following: nasal discharge, sore throat, coughing, bronchitis, pulmonary edema and difficulty in breathing.
INHALATION: Central nervous system effects may include one or more of following: headache, dizziness, loss of appetite, weakness and loss of coordination.

4. FIRST AID MEASURES

EYE:
Flush eyes immediately with fresh water for at least 15 minutes while holding the eyelids open. Remove contact lenses if worn. No additional first aid should be necessary. However, if irritation persists, see a doctor.
SKIN:
Remove contaminated clothing. Wash skin thoroughly with soap and water. See a doctor if any signs or symptoms described in this document occur. Discard contaminated non-waterproof shoes and boots. Wash contaminated clothing.
INGESTION:
If swallowed, give water or milk to drink and telephone for medical advice. DO NOT make person vomit unless directed to do so by medical personnel. If medical advice cannot be obtained, then take the person and product container to the nearest medical emergency treatment center or hospital.
INHALATION:
If any signs or symptoms as described in this document occur, move the person to fresh air. If any of these effects continue, see a doctor. If there are signs or symptoms as described in this document due to breathing hydrogen sulfide, move the person to fresh air. If breathing has stopped, apply artificial respiration. Call a doctor.
NOTE TO PHYSICIANS:
Ingestion of this product or subsequent vomiting can result in aspiration of light hydrocarbon liquid which can cause pneumonitis.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES
FLASH POINT: <59 - 199+F (<15 - 93+C)
AUTOIGNITION: NDA
FLAMMABILITY LIMITS (% by volume in air): Lower: NDA Upper: NDA
EXTINGUISHING MEDIA:
CO2, Dry Chemical, Foam, Water Fog. Do not use water spray or a direct stream of water.
NFPA RATINGS: Health 1; Flammability 3; Reactivity 0.

FIRE FIGHTING INSTRUCTIONS:
This material presents a fire hazard. Liquid quickly evaporates and forms vapor (fumes) which can catch fire and burn with explosive violence. Invisible vapor spreads easily and can be set on fire by many sources such as pilot lights, welding equipment, and electrical motors and switches. Fire hazard is greater as liquid temperature rises above 15 F. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
COMBUSTION PRODUCTS:
Normal combustion forms carbon dioxide, water vapor and may produce oxides of sulfur and nitrogen. Incomplete combustion can produce carbon monoxide.

6. ACCIDENTAL RELEASE MEASURES

CHEMTREC EMERGENCY NUMBER (24 hr): (800)424-9300 or (202)483-7616
ACCIDENTAL RELEASE MEASURES:
Eliminate all sources of ignition in vicinity of spill or released vapor.

Clean up spills immediately, observing precautions in Exposure Controls/ Personal Protection section. This material is considered to be a water pollutant and releases of this product should be prevented from contaminating soil and water and from entering drainage and sewer systems. U.S.A. regulations require reporting spills of this material that could reach any surface waters. The toll free number for the U.S. Coast Guard National Response Center is (800) 424-8802.

7. HANDLING AND STORAGE

HANDLING AND STORAGE:
DO NOT USE OR STORE near flame, sparks or hot surfaces. USE ONLY IN WELL VENTILATED AREA.

Toxic quantities of hydrogen sulfide (H2S) may be present in storage tanks and bulk transport vessels which contain or have contained this material. Persons opening or entering these compartments should first determine if H2S is present. See Exposure Controls/Personal Protection section. DO NOT ATTEMPT RESCUE WITHOUT WEARING APPROVED SUPPLIED-AIR OR self-contained breathing equipment.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT
EYE/FACE PROTECTION:
Do not get this material in your eyes. Eye contact can be avoided by wearing chemical goggles.
SKIN PROTECTION:
No special skin protection is usually necessary. Avoid prolonged or frequently repeated skin contact with this material. Skin contact can be minimized by wearing protective clothing.
RESPIRATORY PROTECTION:
This material may be an inhalation hazard and, unless ventilation is adequate, the use of approved respiratory protection is recommended. Note: If any of the applicable hydrogen sulfide standards are likely to be exceeded, positive supplied-air respiratory protection must be used. The ACGIH TWA for hydrogen sulfide is 10 ppm. The OSHA STEL is 15ppm. Refer to the OSHA Benzene Standard to determine what type of respirator is

required based on exposure levels.
ENGINEERING CONTROLS:
Use this material only in well ventilated areas.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL DESCRIPTION:
Amber to black viscous liquid with a mild, pungent to sulfurous odor.

pH:	NDA
VAPOR PRESSURE:	0 - 14 PSIA
VAPOR DENSITY (AIR=1):	NDA
BOILING POINT:	100 - 1500F and higher.
FREEZING POINT:	NDA
MELTING POINT:	NDA
SOLUBILITY:	Soluble in hydrocarbon solvents; insoluble in water.
SPECIFIC GRAVITY:	0.75 - 1.04
DENSITY:	NDA
EVAPORATION RATE:	NDA
VISCOSITY:	<0.9 - >20000 cSt @ 104F
PERCENT VOLATILE (VOL):	40-100% to 1000F

10. STABILITY AND REACTIVITY

HAZARDOUS DECOMPOSITION PRODUCTS:
NDA.
CHEMICAL STABILITY:
Stable.
CONDITIONS TO AVOID:
No data available.
INCOMPATIBILITY WITH OTHER MATERIALS:
May react with strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
HAZARDOUS POLYMERIZATION:
Polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

EYE EFFECTS:
No product toxicology data available. The hazard evaluation was based on data on the components.
SKIN EFFECTS:
No product toxicology data available. The hazard evaluation was based on data from similar materials.
ACUTE ORAL EFFECTS:
No product toxicology data available. The hazard evaluation was based on data on the components.
ACUTE INHALATION EFFECTS:
No product toxicology data available. The hazard evaluation was based on data on the components.
CHRONIC EFFECTS/CARCINOGENICITY:
The International Agency for Research on Cancer (IARC) reviewed the carcinogenic potential of crude oil in 1989 and concluded that there was limited evidence for the carcinogenicity of crude oil in animals and inadequate evidence for the carcinogenicity of crude oil in humans. The basis for the findings for animals are results from studies in which

crudes applied to the skin of lab animals showed benign and malignant skin tumors in some studies, but not in others.

This product may contain significant amounts of polynuclear aromatic hydrocarbons (PAH's) which have been shown to cause skin cancer after prolonged and frequent contact with the skin of test animals. Brief or intermittent skin contact with this product is not expected to have serious effects if it is washed from the skin. While skin cancer is unlikely to occur in human beings following use of this product, skin contact and breathing of mists or vapors should be reduced to a minimum.

ADDITIONAL TOXICOLOGY INFORMATION:
This product contains benzene. The OSHA Benzene Standard (29 CFR 1910.1028) contains detailed requirements for training, exposure monitoring, respiratory protection and medical surveillance triggered by the exposure level. Refer to the OSHA Standard before using this product. Repeated or prolonged breathing of benzene vapors has been associated with the development of chromosomal damage in experimental animals and various blood diseases in humans ranging from aplastic anemia to leukemia (a form of cancer). All of these diseases can be fatal. No birth defects have been shown to occur in pregnant laboratory animals exposed to doses not toxic to the mother. However, some evidence of fetal toxicity such as delayed physical development has been seen at such levels. The available information on the effects of benzene on human pregnancies is inadequate but it has been established that benzene can cross the human placenta.

12. ECOLOGICAL INFORMATION

ECOTOXICITY:
This material may be toxic to aquatic organisms and should be kept out of sewage and drainage systems and all bodies of water.
ENVIRONMENTAL FATE:
No data available.

13. DISPOSAL CONSIDERATIONS

DISPOSAL CONSIDERATIONS:
This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by USEPA under RCRA (40CFR261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

14. TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT SHIPPING NAME: PETROLEUM CRUDE OIL
DOT HAZARD CLASS: 3 (FLAMMABLE LIQUID)
DOT IDENTIFICATION NUMBER: UN1267
DOT PACKING GROUP: N/A

15. REGULATORY INFORMATION

SARA 311 CATEGORIES:

1. Immediate (Acute) Health Effects: YES
2. Delayed (Chronic) Health Effects: YES
3. Fire Hazard: YES
4. Sudden Release of Pressure Hazard: NO
5. Reactivity Hazard: NO

REGULATORY LISTS SEARCHED:

01=SARA 313	11=NJ RTK	21=TSCA Sect 4(e)
02=MASS RTK	12=CERCLA 302.4	22=TSCA Sect 5(a)(2)
03=NTP Carcinogen	13=MN RTK	23=TSCA Sect 6
04=CA Prop 65-Carcin	14=ACGIH TWA	24=TSCA Sect 12(b)
05=CA Prop 65-Repro Tox	15=ACGIH STEL	25=TSCA Sect 8(a)
06=IARC Group 1	16=ACGIH Calc TLV	26=TSCA Sect 8(d)
07=IARC Group 2A	17=OSHA PEL	27=TSCA Sect 4(a)
08=IARC Group 2B	18=DOT Marine Pollutant	28=Canadian WHMIS
09=SARA 302/304	19=Chevron TWA	29=OSHA CEILING
10=PA RTK	20=EPA Carcinogen	30=Chevron STEL

The following components of this material are found on the regulatory lists indicated.

BENZENE
is found on lists: 01,02,03,04,06,10,11,12,13,14,17,20,28,29,
HYDROGEN SULFIDE
is found on lists: 02,09,10,11,12,13,14,15,17,28,29,
PETROLEUM
is found on lists: 02,10,11,13,

16. OTHER INFORMATION

NFPA RATINGS: Health 1; Flammability 3; Reactivity 0;
(Least-0, Slight-1, Moderate-2, High-3, Extreme-4). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

REVISION STATEMENT:
This Material Safety Data Sheet has been revised to comply with the ANSI Z400.1 Standard. Changes have also been made throughout this MSDS. Please read the entire document.

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the Toxicology and Health Risk Assessment Unit, CRTC, P.O. Box 4054, Richmond, CA 94804

****

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modification of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

NDA - No Data Available NA - Not Applicable

****
THIS IS THE LAST PAGE OF THIS MSDS.
****

CRUDE OIL SAMPLE RESULTS
CHEVRON PIPE LINE RANGELY CRUDE (WEBER SANDS MIX) SAMPLES

On June 11, 2010 approximately 800 barrels of crude oil were released from the Chevron Pipe Line ("CPL") Rangely to Salt Lake Crude Oil Pipe Line System at a point near Red Butte Creek in Salt Lake City, Utah. Based on recovery calculations of the total 800 barrels released, approximately 400 barrels entered Red Butte Creek. In an attempt to better understand the physical variability of crude oil carried in the pipeline, CPL contracted EarthFax Engineering, Inc. to collect multiple samples of the crude oil as it was being delivered to CPL's Salt Lake Station from the same, long-term producing oil field that was being shipped on June 11, 2010, when the release occurred. This source is known as the Weber Sands Mix. Four Weber Sands Mix samples were collected during the period of September 20, 2011, through November 30, 2011. Each sample was taken to the Chevron Salt Lake Refinery laboratory where it was split into two discrete samples for delivery to two laboratories under chain of custody: Savant, Inc. (Savant) in Midland, Michigan and American West Analytical Laboratories (AWAL) in Salt Lake City, Utah, Savant analyzed the samples for specific gravity (ASTM Method D4052), simulated distillation by gas chromatography (ASTM Method D6417), and clay gel analysis by HPLC (ASTM Method D2007). AWAL analyzed the samples for semi volatile organics (SVOAs) SIMS List by GC/MS Method 8270D/3580 and volatile organics (VOAs) Full List by Method 8260C. Due to a special DOT requirement for handling and shipping of petroleum samples, the samples were prepared, packaged, labeled and shipped by the Refinery laboratory director.

The results from both laboratories are attached. The Savant analytical results are summarized in Table 1, along with the results of basic statistical analyses. In all cases, the standard deviation is less than the mean, suggesting that variability between the samples is not substantial. In fact, with one exception, the coefficient of variation for each of the analytes is less than about 20%, indicating that the samples come from a population that is relatively homogenous. The one exception is in the percent volatilized at 371 ^{o}C, where one obvious outlier results in a coefficient of variation of 55.3%. If that outlier is removed, the coefficient of variation for that analyte decreases to 2.3%.

TABLE 1
Crude Oil Analyses Results Summary and General Statistics

Analyte	Sample Collection Date				Standard Deviation	Mean	Coeff. of Variation (%)
	20 Sep 2011	3 Oct 2011	3 Nov 2011	30 Nov 2011			
Aromatics wt%	58.8	53.6	62.8	68.7	6.4	61.0	10.5
Saturates wt%	34.4	38	28.5	23.3	6.5	31.0	20.9
Polars wt%	6.8	8.4	8.7	8	0.8	8.0	10.5
Asphaltenes wt%	<0.1	<0.1	<0.1	<0.1	NA	NA	NA
% Volatized at 371˚C	65.7	62.8	8.6	64	27.8	50.3	55.3
Spec. Gravity at 60˚F	0.9379	0.8589	0.8579	0.8579	0.04	0.88	4.5

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Galen Williams
EarthFax Engineering
7324 So. Union Park Ave., # 100
Midvale, UT 84047
TEL: (801) 561-1555

RE: Chevron PL: Red Butte 1 Release / UC1300-17

Dear Galen Williams: Lab Set ID: 1109382

American West Analytical Laboratories received 1 sample(s) on 9/21/2011 for the analyses presented in the following report.

All analyses were performed in accordance to The NELAC Institute protocols unless noted otherwise. American West Analytical Laboratories is certified by The NELAC Institute in Utah and Texas; and is state certified in Colorado, Idaho, and Missouri. Certification document is available upon request. If you have any questions or concerns regarding this report please feel free to call.

The abbreviation "Surr" found in organic reports indicates a surrogate compound that is intentionally added by the laboratory to determine sample injection, extraction, and/or purging efficiency. The "Reporting Limit" found on the report is equivalent to the practical quantitation limit (PQL). This is the minimum concentration that can be reported by the method referenced and the sample matrix. The reporting limit must not be confused with any regulatory limit. Analytical results are reported to three significant figures for quality control and calculation purposes.

Thank You,

Approved by: Kyle F. Gross Digitally signed by Kyle F. Gross DN: cn=Kyle F. Gross, o=AWAL, ou=AWAL, email=kyle@awal-labs.com, c=US Date: 2011.10.05 07:00:52 -06'00'

Laboratory Director or designee

ORGANIC ANALYTICAL REPORT

Client: EarthFax Engineering **Contact:** Galen Williams
Project: Chevron PL: Red Butte 1 Release / UC1300-17
Lab Sample ID: 1109382-001B
Client Sample ID: Weber Sand Mix
Collection Date: 9/20/2011 0700h
Received Date: 9/21/2011 0826h **Method:** SW8270D

Analytical Results SVOA SIM List by GC/MS Method 8270D/3580A

Analyzed: 9/29/2011 2245h **Extracted:** 9/22/2011 0920h
Units: mg/kg
Dilution Factor: 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Acenaphthene	83-32-9	1.50	< 1.50	
Acenaphthylene	208-96-8	1.50	< 1.50	
Anthracene	120-12-7	1.50	< 1.50	
Benz(a)anthracene	56-55-3	1.50	**30.7**	
Benzo(a)pyrene	50-32-8	1.50	< 1.50	[1]
Benzo(b)fluoranthene	205-99-2	1.50	< 1.50	
Benzo(g,h,i)perylene	191-24-2	1.50	< 1.50	
Benzo(k)fluoranthene	207-08-9	1.50	< 1.50	
Chrysene	218-01-9	1.50	**11.8**	
Dibenz(a,h)anthracene	53-70-3	1.50	< 1.50	
Fluoranthene	206-44-0	1.50	< 1.50	
Fluorene	86-73-7	1.50	**51.1**	
Indene	95-13-6	1.50	< 1.50	
Indeno(1,2,3-cd)pyrene	193-39-5	1.50	< 1.50	
Pyrene	129-00-0	1.50	**8.90**	

[1] - Outliers observed in the matrix spike.

Analyzed: 10/2/2011 0426h **Extracted:** 9/22/2011 0920h
Units: mg/kg
Dilution Factor: 10

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
1-Methylnaphthalene	90-12-0	15.0	**717**	~
2-Methylnaphthalene	91-57-6	15.0	**565**	~
Naphthalene	91-20-3	15.0	**343**	~
Phenanthrene	85-01-8	15.0	**174**	~

~ - The reporting limits were raised due to high analyte concentrations.

American West ANALYTICAL LABORATORIES
463 West 3600 South
Salt Lake City, UT 84115
Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com
web: www.awal-labs.com
Kyle F. Gross
Laboratory Director
Jose Rocha
QA Officer

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

ORGANIC ANALYTICAL REPORT

Client: EarthFax Engineering **Contact:** Galen Williams
Project: Chevron PL: Red Butte 1 Release / UC1300-17
Lab Sample ID: 1109382-001B
Client Sample ID: Weber Sand Mix
Collection Date: 9/20/2011 0700h
Received Date: 9/21/2011 0826h **Method:** SW8270D

Analytical Results SVOA List by GC/MS Method 8270D/3580A

Analyzed: 9/22/2011 1755h **Extracted:** 9/22/2011 0920h
Units: mg/kg
Dilution Factor: 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
1,1´-Biphenyl	92-52-4	50.0	**198**	
1,2,4,5-Tetrachlorobenzene	95-94-3	50.0	< 50.0	
1,2,4-Trichlorobenzene	120-82-1	50.0	< 50.0	
1,2-Dichlorobenzene	95-50-1	50.0	< 50.0	
1,3,5-Trinitrobenzene	99-35-4	50.0	< 50.0	
1,4-Naphthoquinone	130-15-4	50.0	< 50.0	
1,3-Dichlorobenzene	541-73-1	50.0	< 50.0	
1,3-Dinitrobenzene	99-65-0	50.0	< 50.0	
1,4-Dichlorobenzene	106-46-7	50.0	< 50.0	
1,4-Phenylenediamine	106-50-3	50.0	< 50.0	
1-Chloronaphthalene	90-13-1	50.0	< 50.0	
1-Naphthylamine	134-32-7	50.0	< 50.0	
2,3,4,6-Tetrachlorophenol	58-90-2	50.0	< 50.0	
2,4,5-Trichlorophenol	95-95-4	50.0	< 50.0	
2,4,6-Trichlorophenol	88-06-2	50.0	< 50.0	
2,4-Dichlorophenol	120-83-2	50.0	< 50.0	
2,4-Dimethylphenol	105-67-9	50.0	< 50.0	
2,4-Dinitrophenol	51-28-5	50.0	< 50.0	
2,4-Dinitrotoluene	121-14-2	50.0	< 50.0	
2,6-Dichlorophenol	87-65-0	50.0	< 50.0	
2,6-Dinitrotoluene	606-20-2	50.0	< 50.0	
2-Acetylaminofluorene	53-96-3	50.0	< 50.0	
2-Chloronaphthalene	91-58-7	50.0	< 50.0	
2-Chlorophenol	95-57-8	50.0	< 50.0	
2-Methylphenol	95-48-7	50.0	< 50.0	
2-Naphthylamine	91-59-8	50.0	< 50.0	
2-Nitroaniline	88-74-4	50.0	< 50.0	
2-Nitrophenol	88-75-5	50.0	< 50.0	
2-Picoline	109-06-8	50.0	< 50.0	
3&4-Methylphenol		50.0	< 50.0	

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1109382-001B
Client Sample ID: Weber Sand Mix

Analyzed: 9/22/2011 1755h **Extracted:** 9/22/2011 0920h
Units: mg/kg
Dilution Factor: 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
3,3′-Dichlorobenzidine	91-94-1	50.0	< 50.0	
3,3′-Dimethylbenzidine	119-93-7	50.0	< 50.0	
3-Methylcholanthrene	56-49-5	50.0	< 50.0	
3-Nitroaniline	99-09-2	50.0	< 50.0	
4,6-Dinitro-2-methylphenol	534-52-1	50.0	< 50.0	
4-Aminobiphenyl	92-67-1	50.0	< 50.0	
4-Bromophenyl phenyl ether	101-55-3	50.0	< 50.0	
4-Chloro-3-methylphenol	59-50-7	60.0	< 60.0	
4-Chloroaniline	106-47-8	50.0	< 50.0	
4-Chlorophenyl phenyl ether	7005-72-3	50.0	< 50.0	
4-Nitroaniline	100-01-6	50.0	< 50.0	
4-Nitrophenol	100-02-7	50.0	< 50.0	
5-Nitro-o-toluidine	99-55-8	50.0	< 50.0	
7,12-Dimethylbenz(a)anthracene	57-97-6	50.0	< 50.0	
a,a-Dimethylphenethylamine	122-09-8	50.0	< 50.0	
Acetophenone	98-86-2	50.0	< 50.0	
alpha-Terpineol	98-55-5	50.0	< 50.0	
Aniline	62-53-3	50.0	< 50.0	
Aramite	140-57-8	50.0	< 50.0	
Azobenzene	103-33-3	50.0	< 50.0	
Benzidine	92-87-5	50.0	< 50.0	
Benzoic acid	65-85-0	150	< 150	
Benzyl alcohol	100-51-6	60.0	< 60.0	
Bis(2-chloroethoxy)methane	111-91-1	50.0	< 50.0	
Bis(2-chloroethyl) ether	111-44-4	50.0	< 50.0	
Bis(2-chloroisopropyl) ether	108-60-1	50.0	< 50.0	
Bis(2-ethylhexyl) phthalate	117-81-7	50.0	< 50.0	
bis(2-ethylhexyl)adipate	103-23-1	50.0	< 50.0	
Butyl benzyl phthalate	85-68-7	50.0	< 50.0	
Carbazole	86-74-8	50.0	< 50.0	
Chlorobenzilate	510-15-6	50.0	< 50.0	
Di-n-butyl phthalate	84-74-2	50.0	< 50.0	
Di-n-octyl phthalate	117-84-0	50.0	< 50.0	
Diallate (cis or trans)	2303-16-4	50.0	< 50.0	
Dibenzofuran	132-64-9	50.0	**55.3**	
Diethyl phthalate	84-66-2	50.0	< 50.0	
Dimethoate	60-51-5	50.0	< 50.0	

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1109382-001B
Client Sample ID: Weber Sand Mix

Analyzed: 9/22/2011 1755h **Extracted:** 9/22/2011 0920h
Units: mg/kg
Dilution Factor: 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Dimethyl phthalate	131-11-3	50.0	< 50.0	
Dimethylaminoazobenzene	60-11-7	50.0	< 50.0	
Dinoseb	88-85-7	50.0	< 50.0	
Diphenylamine	122-39-4	50.0	< 50.0	
Disulfoton	298-04-4	50.0	< 50.0	
Ethyl methanesulfonate	62-50-0	50.0	< 50.0	
Famphur	52-85-7	50.0	< 50.0	
Hexachlorobutadiene	87-68-3	50.0	< 50.0	
Hexachlorocyclopentadiene	77-47-4	50.0	< 50.0	
Hexachloroethane	67-72-1	50.0	< 50.0	
Hexachlorophene	70-30-4	120	< 120	
Hexachloropropene	1888-71-7	50.0	< 50.0	
Isodrin	465-73-6	50.0	< 50.0	
Isophorone	78-59-1	50.0	< 50.0	
Isosafrole	120-58-1	50.0	< 50.0	
Kepone	143-50-0	50.0	< 50.0	
Methapyrilene	91-80-5	50.0	< 50.0	
Methyl methanesulfonate	66-27-3	50.0	< 50.0	
N-Nitrosodi-n-butylamine	924-16-3	50.0	< 50.0	
N-Nitrosodiethylamine	55-18-5	50.0	< 50.0	
N-Nitrosodimethylamine	62-75-9	50.0	< 50.0	
N-Nitrosodiphenylamine	86-30-6	50.0	< 50.0	
N-Nitrosodi-n-propylamine	621-64-7	50.0	< 50.0	
N-Nitrosomethylethylamine	10595-95-6	50.0	< 50.0	
N-Nitrosomorpholine	59-89-2	50.0	< 50.0	
N-Nitrosopiperidine	100-75-4	50.0	< 50.0	
N-Nitrosopyrrolidine	930-55-2	50.0	< 50.0	
Nitrobenzene	98-95-3	50.0	< 50.0	
Nitroquinoline-1-oxide	56-57-5	100	< 100	
O,O,O-Triethyl phosphorothioate	126-68-1	50.0	< 50.0	
o-Toluidine	95-53-4	50.0	< 50.0	
Parathion	56-38-2	50.0	< 50.0	
Methyl parathion	298-00-0	50.0	< 50.0	
Pentachlorobenzene	608-93-5	50.0	< 50.0	
Pentachloronitrobenzene	82-68-8	50.0	< 50.0	
Phenacetin	62-44-2	50.0	< 50.0	
Phenol	108-95-2	50.0	< 50.0	

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1109382-001B
Client Sample ID: Weber Sand Mix

Analyzed: 9/22/2011 1755h **Extracted:** 9/22/2011 0920h
Units: mg/kg
Dilution Factor: 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Phorate	298-02-2	50.0	< 50.0	
Pronamide	23950-58-5	50.0	< 50.0	
Pyridine	110-86-1	50.0	< 50.0	
Quinoline	91-22-5	50.0	< 50.0	
Safrole	94-59-7	50.0	< 50.0	
Tetraethyl dithiopyrophosphate	3689-24-5	50.0	< 50.0	
Thionazin	297-97-2	50.0	< 50.0	
Surr: 2,4,6-Tribromophenol	118-79-6	10-180	**96.7**	
Surr: 2-Fluorobiphenyl	321-60-8	29-152	**90.1**	
Surr: 2-Fluorophenol	367-12-4	10-181	**81.0**	
Surr: Nitrobenzene-d5	4165-60-0	23-174	**202**	S
Surr: Phenol-d6	13127-88-3	10-184	**78.4**	
Surr: Terphenyl-d14	1718-51-0	11-148	**110**	

[1] - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.
Internal standard areas were outside of the QC limits. MS samples yielded similar results indicating matrix interference.
S - Surrogate recoveries outside the control limits. MS samples yielded similar results indicating matrix interference.

Analyzed: 9/23/2011 1054h **Extracted:** 9/22/2011 0920h
Units: mg/kg
Dilution Factor: 10

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
n-Decane	124-18-5	500	**7,980**	~
n-Octadecane	593-45-3	500	**5,030**	~

~ - The reporting limits were raised due to high analyte concentrations.
Internal standard areas were outside of the QC limits. MS samples yielded similar results indicating matrix interference.

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

ORGANIC ANALYTICAL REPORT

Client: EarthFax Engineering **Contact:** Galen Williams
Project: Chevron PL: Red Butte 1 Release / UC1300-17
Lab Sample ID: 1109382-001A
Client Sample ID: Weber Sand Mix
Collection Date: 9/20/2011 0700h
Received Date: 9/21/2011 0826h **Method:** SW8260C

Analytical Results VOAs Full List by GC/MS Method 8260C

Analyzed: 9/23/2011 0118h
Units: µg/kg
Dilution Factor: 10000

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
1,1,1,2-Tetrachloroethane	630-20-6	20,000	< 20,000	
1,1,1-Trichloroethane	71-55-6	20,000	< 20,000	
1,1,2,2-Tetrachloroethane	79-34-5	20,000	< 20,000	
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	20,000	< 20,000	
1,1,2-Trichloroethane	79-00-5	20,000	< 20,000	
1,1-Dichloropropene	563-58-6	20,000	< 20,000	
1,1-Dichloroethane	75-34-3	20,000	< 20,000	
1,1-Dichloroethene	75-35-4	20,000	< 20,000	
1,2,3-Trichlorobenzene	87-61-6	20,000	< 20,000	
1,2,3-Trichloropropane	96-18-4	20,000	< 20,000	
1,2,3-Trimethylbenzene	526-73-8	20,000	**395,000**	
1,2,4-Trichlorobenzene	120-82-1	20,000	< 20,000	
1,2,4-Trimethylbenzene	95-63-6	20,000	**841,000**	
1,2-Dibromo-3-chloropropane	96-12-8	50,000	< 50,000	
1,2-Dibromoethane	106-93-4	20,000	< 20,000	
1,2-Dichlorobenzene	95-50-1	20,000	< 20,000	
1,2-Dichloroethane	107-06-2	20,000	< 20,000	
1,2-Dichloropropane	78-87-5	20,000	< 20,000	
1,3,5-Trimethylbenzene	108-67-8	20,000	**360,000**	
1,3-Dichlorobenzene	541-73-1	20,000	< 20,000	
1,3-Dichloropropane	142-28-9	20,000	< 20,000	
1,4-Dichlorobenzene	106-46-7	20,000	< 20,000	
1,4-Dioxane	123-91-1	500,000	< 500,000	
2,2-Dichloropropane	594-20-7	20,000	< 20,000	
2-Butanone	78-93-3	100,000	< 100,000	
2-Chloroethyl vinyl ether	110-75-8	50,000	< 50,000	
2-Chlorotoluene	95-49-8	20,000	< 20,000	
2-Hexanone	591-78-6	50,000	< 50,000	
2-Nitropropane	79-46-9	50,000	< 50,000	
4-Chlorotoluene	106-43-4	20,000	< 20,000	

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1109382-001A
Client Sample ID: Weber Sand Mix

Analyzed: 9/23/2011 0118h
Units: µg/kg
Dilution Factor: 10000

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
4-Isopropyltoluene	99-87-6	20,000	**180,000**	
4-Methyl-2-pentanone	108-10-1	50,000	< 50,000	
Acetone	67-64-1	100,000	< 100,000	
Acetonitrile	75-05-8	50,000	< 50,000	
Acrolein	107-02-8	50,000	< 50,000	
Acrylonitrile	107-13-1	100,000	< 100,000	
Allyl chloride	107-05-1	50,000	< 50,000	
Benzene	71-43-2	20,000	**701,000**	
Benzyl chloride	100-44-7	50,000	< 50,000	
Bis(2-chloroisopropyl) ether	108-60-1	50,000	< 50,000	
Bromobenzene	108-86-1	20,000	< 20,000	
Bromochloromethane	74-97-5	20,000	< 20,000	
Bromodichloromethane	75-27-4	20,000	< 20,000	
Bromoform	75-25-2	20,000	< 20,000	
Bromomethane	74-83-9	50,000	< 50,000	
Butyl acetate	123-86-4	100,000	< 100,000	
Carbon disulfide	75-15-0	20,000	< 20,000	
Carbon tetrachloride	56-23-5	20,000	< 20,000	
Chlorobenzene	108-90-7	20,000	< 20,000	
Chloroethane	75-00-3	20,000	< 20,000	
Chloroform	67-66-3	20,000	< 20,000	
Chloromethane	74-87-3	50,000	< 50,000	
Chloroprene	126-99-8	20,000	< 20,000	
cis-1,2-Dichloroethene	156-59-2	20,000	< 20,000	
cis-1,3-Dichloropropene	10061-01-5	20,000	< 20,000	
Cyclohexane	110-82-7	20,000	**1,350,000**	
Cyclohexanone	108-94-1	500,000	< 500,000	
Dibromochloromethane	124-48-1	20,000	< 20,000	
Dibromomethane	74-95-3	20,000	< 20,000	
Dichlorodifluoromethane	75-71-8	20,000	< 20,000	
Ethyl acetate	141-78-6	100,000	< 100,000	
Ethyl ether	60-29-7	100,000	< 100,000	
Ethyl methacrylate	97-63-2	20,000	< 20,000	
Ethylbenzene	100-41-4	20,000	**417,000**	
Hexachlorobutadiene	87-68-3	20,000	< 20,000	
Iodomethane	74-88-4	50,000	< 50,000	
Isobutyl alcohol	78-83-1	1,000,000	< 1,000,000	

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1109382-001A
Client Sample ID: Weber Sand Mix

Analyzed: 9/23/2011 0118h
Units: µg/kg
Dilution Factor: 10000

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Isopropyl acetate	108-21-4	100,000	< 100,000	
Isopropyl alcohol	67-63-0	400,000	< 400,000	
Isopropylbenzene	98-82-8	20,000	**123,000**	
m,p-Xylene	179601-23-1	20,000	**2,010,000**	
Methacrylonitrile	126-98-7	50,000	< 50,000	
Methyl Acetate	79-20-9	50,000	< 50,000	
Methyl methacrylate	80-62-6	50,000	< 50,000	
Methyl tert-butyl ether	1634-04-4	20,000	< 20,000	
Methylene chloride	75-09-2	50,000	< 50,000	
n-Amyl acetate	628-63-7	100,000	< 100,000	
n-Butyl alcohol	71-36-3	1,000,000	< 1,000,000	
n-Butylbenzene	104-51-8	20,000	**85,000**	
n-Hexane	110-54-3	20,000	**1,570,000**	
n-Propylbenzene	103-65-1	20,000	**195,000**	
Naphthalene	91-20-3	20,000	**207,000**	
o-Xylene	95-47-6	20,000	**715,000**	
Pentachloroethane	76-01-7	20,000	< 20,000	
Propionitrile	107-12-0	250,000	< 250,000	
Propyl acetate	109-60-4	100,000	< 100,000	
sec-Butylbenzene	135-98-8	20,000	**93,400**	
Styrene	100-42-5	20,000	< 20,000	
tert-Butyl alcohol	76-65-0	200,000	< 200,000	
tert-Butylbenzene	98-06-6	20,000	**24,900**	
Tetrachloroethene	127-18-4	20,000	< 20,000	
Tetrahydrofuran	109-99-9	20,000	< 20,000	
Toluene	108-88-3	20,000	**1,320,000**	
trans-1,2-Dichloroethene	156-60-5	20,000	< 20,000	
trans-1,3-Dichloropropene	10061-02-6	20,000	< 20,000	
trans-1,4-Dichloro-2-butene	110-57-6	20,000	< 20,000	
Trichloroethene	79-01-6	20,000	< 20,000	
Trichlorofluoromethane	75-69-4	20,000	< 20,000	
Vinyl acetate	108-05-4	100,000	< 100,000	
Vinyl chloride	75-01-4	10,000	< 10,000	
Xylenes, Total	1330-20-7	20,000	**2,730,000**	
Surr: 1,2-Dichloroethane-d4	17060-07-0	68-147	**94.3**	
Surr: 4-Bromofluorobenzene	460-00-4	71-144	**100**	
Surr: Dibromofluoromethane	1868-53-7	71-129	**93.0**	

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1109382-001A
Client Sample ID: Weber Sand Mix

Analyzed: 9/23/2011 0118h
Units: µg/kg
Dilution Factor: 10000

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Surr: Toluene-d8	2037-26-5	72-129	**99.1**	

The reporting limits were raised due to high analyte concentrations.
Sampling and analytical preparation performed by method 5030C.

Analyzed: 9/24/2011 1801h
Units: µg/kg
Dilution Factor: 100000

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Methylcyclohexane	108-87-2	200,000	**1,910,000**	
n-Octane	111-65-9	200,000	**1,970,000**	
Surr: 1,2-Dichloroethane-d4	17060-07-0	68-147	**94.7**	
Surr: 4-Bromofluorobenzene	460-00-4	71-144	**98.8**	
Surr: Dibromofluoromethane	1868-53-7	71-129	**92.8**	
Surr: Toluene-d8	2037-26-5	72-129	**102**	

The reporting limits were raised due to high analyte concentrations.
Sampling and analytical preparation performed by method 5030C.

REVISED
NB 9/22/11
Full list VOC & semi SIM added.

American West Analytical Laboratories

D

WORK ORDER Summary

Work Order: 1109382
Page 1 of 1 9/28/2011

Client: EarthFax Engineering
Client ID: EAR100 **Contact:** Galen Williams
Project: Chevron PL: Red Butte 1 Release / UC1300-17 **QC Level:** LEVEL I **WO Type:** Standard
Comments: Full list volatiles and full list semi-volatiles SIM Mode added per Galan Williams on 9-22-11.;

Sample ID	Client Sample ID	Collected Date	Received Date	Date Due	Matrix	Test Code	Sel	Storage	
1109382-001A	Weber Sand Mix	9/20/2011 0700h	9/21/2011 0826h	10/5/2011	Oil	8260-S	☑	Purge	1
1109382-001B						3580-SVOA-WASTE-O	☐	hall - semi	
						8270-O	☑	hall - semi	
						8270-O-SIM	☑	hall - semi	

EarthFax Engineering, Inc.
7324 South Union Park Avenue
Suite 100
Midvale, Utah 84047

1109382

CHAIN-OF-CUSTODY FORM

Sampling Company: EARTHFAX ENGINEERING	Sampling Personnel: L. DUSHANE
Project Name: CHEVRON PL: RED BUTTE 2 RELEASE	Project Number: UC 1300-17
Analytical Laboratory: AWAL	Date of Shipment/Delivery: 9/20/11
Method of Shipment/Delivery: HAND	Airbill Number:

Field Sample No.	Date Sampled	Time Sampled	Sample Type	No. of Containers	Remarks
WEBER SAND MIX	9/20/11	0700	VOA, 4oz. JAR	(2)	ANALYZE FOR: BTEX 8260C AND PAH 8270D
					8260C - Full List
					8270D - Full List SIM
					(per Galen Williams - DB 9/22/11)

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
LRD	9/20/11	0826	Daniel Brun	9/20/11	8:26
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

20.5°

Lab Set ID: 1109382

Samples Were:	COC Tape Was:	Container Type:	No. Rec.
☐ Shipped By:	**Present on Outer Package**	☐ AWAL Supplied Plastic	
☑ Hand Delivered	☐ Yes ☐ No ☐ N/A	☐ AWAL Supplied Clear Glass	
☑ Ambient	**Unbroken on Outer package**	☐ AWAL Supplied Amber Glass	
☐ Chilled	☐ Yes ☐ No ☑ N/A	☐ AWAL Supplied VOA/TOC/TOX Vials	
Temperature 20.5 °C	**Present on Sample**	☐ Amber ☐ Clear ☐ Headspace ☐ No Headspace	
Rec. Broken/Leaking ☐ Yes ☑ No ☐ N/A	☐ Yes ☑ No ☐ N/A	☐ Non AWAL Supplied Container	
Notes:	**Unbroken on Sample**	**Notes:**	
	☐ Yes ☐ No ☑ N/A		
Properly Preserved ☑ Yes ☐ No ☐ N/A	**Notes:**		
Notes:			
Rec. Within Hold ☑ Yes ☐ No		**Discrepancies Between Labels and COC** ☐ Yes ☑ No	
Notes:		**Notes:**	

DB

DB

Bottle Type	Preservative	All pHs OK															
Ammonia	pH <2 H_2SO_4																
COD	pH <2 H_2SO_4																
Cyanide	PH >12 NaOH																
Metals	pH <2 HNO_3																
NO_2 & NO_3	pH <2 H_2SO_4																
Nutrients	pH <2 H_2SO_4																
O & G	pH <2 HCL																
Phenols	pH <2 H_2SO_4																
Sulfide	pH > 9NaOH, ZnAC																
TKN	pH <2 H_2SO_4																
TOC	pH <2 H_3PO_4																
T PO_4	pH <2 H_2SO_4																
TPH	pH <2 HCL																

Procedure:
1) Pour a small amount of sample in the sample lid
2) Pour sample from Lid gently over wide range pH paper
3) **Do Not** dip the pH paper in the sample bottle or lid
4) If sample is not preserved properly list its extension and receiving pH in the appropriate column above
5) Flag COC and notify client for further instructions
6) Place client conversation on COC
7) Samples may be adjusted at client request

2011 October 12

EarthFax Engineering

Specific Gravity
ASTM D4052

Customer ID:	Savant ID:	@ 60°F
Weber Sand Mix 9/21/2011	S110923F	0.9379

William G. Lutz
Laboratory Manager

2011 October 12

EarthFax Engineering

Simulated Distillation by Gas Chromatography
ASTM D6417

Customer ID:	Savant ID:	% Volatized @ 371°C
Weber Sand Mix 9/21/11	S110923F	65.7

William G. Lutz
Laboratory Manager

2011 October 25

EarthFax Engineering

Clay Gel Analysis - HPLC
ASTM D2007

Customer ID:	Savant ID:	Aromatics Wt. %	Saturates Wt. %	Polars Wt. %	Asphaltenes Wt. %
Weber Sand Mix 9/21/11	S110923F	58.8	34.4	6.8	<0.1

William G. Lutz
Laboratory Manager

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Galen Williams
EarthFax Engineering
7324 So. Union Park Ave., # 100
Midvale, UT 84047
TEL: (801) 561-1555

RE: Red Butte 1 Release / UC1300-17

Dear Galen Williams: Lab Set ID: 1110019

American West Analytical Laboratories received 1 sample(s) on 10/3/2011 for the analyses presented in the following report.

All analyses were performed in accordance to The NELAC Institute protocols unless noted otherwise. American West Analytical Laboratories is certified by The NELAC Institute in Utah and Texas; and is state certified in Colorado, Idaho, and Missouri. Certification document is available upon request. If you have any questions or concerns regarding this report please feel free to call.

The abbreviation "Surr" found in organic reports indicates a surrogate compound that is intentionally added by the laboratory to determine sample injection, extraction, and/or purging efficiency. The "Reporting Limit" found on the report is equivalent to the practical quantitation limit (PQL). This is the minimum concentration that can be reported by the method referenced and the sample matrix. The reporting limit must not be confused with any regulatory limit. Analytical results are reported to three significant figures for quality control and calculation purposes.

Thank You,

Approved by: Kyle F. Gross Digitally signed by Kyle F. Gross DN: cn=Kyle F. Gross, o=AWAL, ou=AWAL, email=kyle@awal-labs.com, c=US Date: 2011.10.07 16:11:23 -06'00'

Laboratory Director or designee

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

ORGANIC ANALYTICAL REPORT

Client: EarthFax Engineering **Contact:** Galen Williams
Project: Red Butte 1 Release / UC1300-17
Lab Sample ID: 1110019-001B
Client Sample ID: Weber Sand Mix Crude
Collection Date: 10/3/2011 1535h
Received Date: 10/3/2011 1619h **Method:** SW8270D

Analytical Results SVOA SIM List by GC/MS Method 8270D/3580A

Analyzed: 10/5/2011 1800h **Extracted:** 10/4/2011 1010h
Units: mg/kg
Dilution Factor: 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
1-Methylnaphthalene	90-12-0	1.50	**508**	E
2-Methylnaphthalene	91-57-6	1.50	**399**	E
Acenaphthene	83-32-9	1.50	< 1.50	
Acenaphthylene	208-96-8	1.50	< 1.50	
Anthracene	120-12-7	1.50	< 1.50	
Benz(a)anthracene	56-55-3	1.50	< 1.50	
Benzo(a)pyrene	50-32-8	1.50	< 1.50	
Benzo(b)fluoranthene	205-99-2	1.50	< 1.50	
Benzo(g,h,i)perylene	191-24-2	1.50	< 1.50	
Benzo(k)fluoranthene	207-08-9	1.50	< 1.50	
Chrysene	218-01-9	1.50	**31.8**	
Dibenz(a,h)anthracene	53-70-3	1.50	< 1.50	
Fluoranthene	206-44-0	1.50	< 1.50	
Fluorene	86-73-7	1.50	< 1.50	
Indene	95-13-6	1.50	< 1.50	
Indeno(1,2,3-cd)pyrene	193-39-5	1.50	< 1.50	
Naphthalene	91-20-3	1.50	**282**	E
Phenanthrene	85-01-8	1.50	**99.3**	
Pyrene	129-00-0	1.50	< 1.50	

E - Estimated value. The concentration exceeds the calibration range. See full scan mode for concentration.

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

ORGANIC ANALYTICAL REPORT

Client: EarthFax Engineering **Contact:** Galen Williams
Project: Red Butte 1 Release / UC1300-17
Lab Sample ID: 1110019-001B
Client Sample ID: Weber Sand Mix Crude
Collection Date: 10/3/2011 1535h
Received Date: 10/3/2011 1619h **Method:** SW8270D

Analytical Results SVOA List by GC/MS Method 8270D/3580A

Analyzed: 10/4/2011 1557h **Extracted:** 10/4/2011 1010h
Units: mg/kg
Dilution Factor: 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
1,2,4,5-Tetrachlorobenzene	95-94-3	50.0	< 50.0	
1,2,4-Trichlorobenzene	120-82-1	50.0	< 50.0	
1,2-Dichlorobenzene	95-50-1	50.0	< 50.0	
1,3,5-Trinitrobenzene	99-35-4	50.0	< 50.0	
1,4-Naphthoquinone	130-15-4	50.0	< 50.0	
1,3-Dichlorobenzene	541-73-1	50.0	< 50.0	
1,3-Dinitrobenzene	99-65-0	50.0	< 50.0	
1,4-Dichlorobenzene	106-46-7	50.0	< 50.0	
1,4-Phenylenediamine	106-50-3	50.0	< 50.0	
1-Chloronaphthalene	90-13-1	50.0	< 50.0	
1-Methylnaphthalene	90-12-0	50.0	**277**	
1-Naphthylamine	134-32-7	50.0	< 50.0	
2,3,4,6-Tetrachlorophenol	58-90-2	50.0	< 50.0	
2,4,5-Trichlorophenol	95-95-4	50.0	< 50.0	
2,4,6-Trichlorophenol	88-06-2	50.0	< 50.0	
2,4-Dichlorophenol	120-83-2	50.0	< 50.0	
2,4-Dimethylphenol	105-67-9	50.0	< 50.0	
2,4-Dinitrophenol	51-28-5	50.0	< 50.0	
2,4-Dinitrotoluene	121-14-2	50.0	< 50.0	[1]@
2,6-Dichlorophenol	87-65-0	50.0	< 50.0	
2,6-Dinitrotoluene	606-20-2	50.0	< 50.0	
2-Acetylaminofluorene	53-96-3	50.0	< 50.0	
2-Chloronaphthalene	91-58-7	50.0	< 50.0	
2-Chlorophenol	95-57-8	50.0	< 50.0	
2-Methylnaphthalene	91-57-6	50.0	**643**	
2-Methylphenol	95-48-7	50.0	< 50.0	
2-Naphthylamine	91-59-8	50.0	< 50.0	
2-Nitroaniline	88-74-4	50.0	< 50.0	
2-Nitrophenol	88-75-5	50.0	< 50.0	
2-Picoline	109-06-8	50.0	< 50.0	

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1110019-001B
Client Sample ID: Weber Sand Mix Crude

Analyzed: 10/4/2011 1557h **Extracted:** 10/4/2011 1010h
Units: mg/kg
Dilution Factor: 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
3&4-Methylphenol		50.0	< 50.0	
3,3´-Dichlorobenzidine	91-94-1	50.0	< 50.0	
3,3´-Dimethylbenzidine	119-93-7	50.0	< 50.0	
3-Methylcholanthrene	56-49-5	50.0	< 50.0	
3-Nitroaniline	99-09-2	50.0	< 50.0	
4,6-Dinitro-2-methylphenol	534-52-1	50.0	< 50.0	
4-Aminobiphenyl	92-67-1	50.0	< 50.0	
4-Bromophenyl phenyl ether	101-55-3	50.0	< 50.0	
4-Chloro-3-methylphenol	59-50-7	60.0	< 60.0	
4-Chloroaniline	106-47-8	50.0	**118**	
4-Chlorophenyl phenyl ether	7005-72-3	50.0	< 50.0	
4-Nitroaniline	100-01-6	50.0	< 50.0	
4-Nitrophenol	100-02-7	50.0	< 50.0	
5-Nitro-o-toluidine	99-55-8	50.0	< 50.0	
7,12-Dimethylbenz(a)anthracene	57-97-6	50.0	< 50.0	
a,a-Dimethylphenethylamine	122-09-8	50.0	< 50.0	
Acenaphthene	83-32-9	50.0	< 50.0	
Acenaphthylene	208-96-8	50.0	< 50.0	
Acetophenone	98-86-2	50.0	< 50.0	
alpha-Terpineol	98-55-5	50.0	< 50.0	
Aniline	62-53-3	50.0	< 50.0	
Anthracene	120-12-7	50.0	< 50.0	
Aramite	140-57-8	50.0	< 50.0	
Azobenzene	103-33-3	50.0	< 50.0	
Benz(a)anthracene	56-55-3	50.0	< 50.0	
Benzidine	92-87-5	50.0	< 50.0	
Benzo(a)pyrene	50-32-8	50.0	< 50.0	
Benzo(b)fluoranthene	205-99-2	50.0	< 50.0	
Benzo(g,h,i)perylene	191-24-2	50.0	< 50.0	
Benzo(k)fluoranthene	207-08-9	50.0	< 50.0	
Benzoic acid	65-85-0	150	< 150	
Benzyl alcohol	100-51-6	60.0	< 60.0	
Bis(2-chloroethoxy)methane	111-91-1	50.0	< 50.0	
Bis(2-chloroethyl) ether	111-44-4	50.0	< 50.0	
Bis(2-chloroisopropyl) ether	108-60-1	50.0	< 50.0	
Bis(2-ethylhexyl) phthalate	117-81-7	50.0	< 50.0	
bis(2-ethylhexyl)adipate	103-23-1	50.0	< 50.0	

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1110019-001B
Client Sample ID: Weber Sand Mix Crude

Analyzed: 10/4/2011 1557h **Extracted:** 10/4/2011 1010h
Units: mg/kg
Dilution Factor: 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Butyl benzyl phthalate	85-68-7	50.0	< 50.0	
Carbazole	86-74-8	50.0	< 50.0	
Chlorobenzilate	510-15-6	50.0	< 50.0	
Chrysene	218-01-9	50.0	< 50.0	
Di-n-butyl phthalate	84-74-2	50.0	< 50.0	
Di-n-octyl phthalate	117-84-0	50.0	< 50.0	
Diallate (cis or trans)	2303-16-4	50.0	< 50.0	
Dibenz(a,h)anthracene	53-70-3	50.0	< 50.0	
Dibenzofuran	132-64-9	50.0	< 50.0	
Diethyl phthalate	84-66-2	50.0	< 50.0	
Dimethoate	60-51-5	50.0	< 50.0	
Dimethyl phthalate	131-11-3	50.0	< 50.0	
Dimethylaminoazobenzene	60-11-7	50.0	< 50.0	
Dinoseb	88-85-7	50.0	< 50.0	
Diphenylamine	122-39-4	50.0	< 50.0	
Disulfoton	298-04-4	50.0	< 50.0	
Ethyl methanesulfonate	62-50-0	50.0	< 50.0	
Famphur	52-85-7	50.0	< 50.0	
Fluoranthene	206-44-0	50.0	< 50.0	
Fluorene	86-73-7	50.0	< 50.0	
Hexachlorobenzene	118-74-1	50.0	< 50.0	
Hexachlorobutadiene	87-68-3	50.0	< 50.0	
Hexachlorocyclopentadiene	77-47-4	50.0	< 50.0	
Hexachloroethane	67-72-1	50.0	< 50.0	
Hexachlorophene	70-30-4	120	< 120	
Hexachloropropene	1888-71-7	50.0	< 50.0	
Indene	95-13-6	50.0	< 50.0	
Indeno(1,2,3-cd)pyrene	193-39-5	50.0	< 50.0	
Isodrin	465-73-6	50.0	< 50.0	
Isophorone	78-59-1	50.0	< 50.0	
Isosafrole	120-58-1	50.0	< 50.0	
Kepone	143-50-0	50.0	< 50.0	
Methapyrilene	91-80-5	50.0	< 50.0	
Methyl methanesulfonate	66-27-3	50.0	< 50.0	
N-Nitrosodi-n-butylamine	924-16-3	50.0	< 50.0	
N-Nitrosodiethylamine	55-18-5	50.0	< 50.0	
N-Nitrosodimethylamine	62-75-9	50.0	< 50.0	

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1110019-001B
Client Sample ID: Weber Sand Mix Crude

Analyzed: 10/4/2011 1557h **Extracted:** 10/4/2011 1010h
Units: mg/kg
Dilution Factor: 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
N-Nitrosodiphenylamine	86-30-6	50.0	< 50.0	
N-Nitrosodi-n-propylamine	621-64-7	50.0	< 50.0	
N-Nitrosomethylethylamine	10595-95-6	50.0	< 50.0	
N-Nitrosomorpholine	59-89-2	50.0	< 50.0	
N-Nitrosopiperidine	100-75-4	50.0	< 50.0	
N-Nitrosopyrrolidine	930-55-2	50.0	< 50.0	
Naphthalene	91-20-3	50.0	**336**	
Nitrobenzene	98-95-3	50.0	< 50.0	
Nitroquinoline-1-oxide	56-57-5	100	< 100	
O,O,O-Triethyl phosphorothioate	126-68-1	50.0	< 50.0	
o-Toluidine	95-53-4	50.0	< 50.0	
Parathion	56-38-2	50.0	< 50.0	
Methyl parathion	298-00-0	50.0	< 50.0	
Pentachlorobenzene	608-93-5	50.0	< 50.0	
Pentachloronitrobenzene	82-68-8	50.0	< 50.0	
Pentachlorophenol	87-86-5	50.0	< 50.0	
Phenacetin	62-44-2	50.0	< 50.0	
Phenanthrene	85-01-8	50.0	**114**	
Phenol	108-95-2	50.0	< 50.0	
Phorate	298-02-2	50.0	< 50.0	
Pronamide	23950-58-5	50.0	< 50.0	
Pyrene	129-00-0	50.0	< 50.0	@
Pyridine	110-86-1	50.0	< 50.0	
Quinoline	91-22-5	50.0	< 50.0	
Safrole	94-59-7	50.0	< 50.0	
Tetraethyl dithiopyrophosphate	3689-24-5	50.0	< 50.0	
Thionazin	297-97-2	50.0	< 50.0	
Surr: 2,4,6-Tribromophenol	118-79-6	10-180	**77.1**	
Surr: 2-Fluorobiphenyl	321-60-8	29-152	**71.3**	
Surr: 2-Fluorophenol	367-12-4	10-181	**82.9**	
Surr: Nitrobenzene-d5	4165-60-0	23-174	**201**	S
Surr: Phenol-d6	13127-88-3	10-184	**86.0**	
Surr: Terphenyl-d14	1718-51-0	11-148	**100**	

[1] - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.
@ - High RPD due to suspected sample non-homogeneity or matrix interference.
S - Surrogate recoveries outside the control limits. MS samples yielded similar results indicating matrix interference.

Lab Sample ID: 1110019-001B
Client Sample ID: Weber Sand Mix Crude

Analyzed: 10/4/2011 2028h **Extracted:** 10/4/2011 1010h
Units: mg/kg
Dilution Factor: 5

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
n-Decane	124-18-5	250	**3,480**	~
n-Octadecane	593-45-3	250	**2,150**	~

~ - The reporting limits were raised due to high analyte concentrations.

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115
Phone: (801) 263-8686, Toll Free: (888) 263-8686, Fax: (801) 263-8687
e-mail: awal@awal-labs.com, web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

ORGANIC ANALYTICAL REPORT

Client: EarthFax Engineering
Contact: Galen Williams
Project: Red Butte 1 Release / UC1300-17
Lab Sample ID: 1110019-001A
Client Sample ID: Weber Sand Mix Crude
Collection Date: 10/3/2011 1535h
Received Date: 10/3/2011 1619h
Method: SW8260C

Analytical Results VOAs Full List by GC/MS Method 8260C

Analyzed: 10/5/2011 1205h
Units: µg/kg
Dilution Factor: 10000

Compound	CAS Number	MDL Limit	Reporting Limit	Analytical Result	Qual
1,1,1,2-Tetrachloroethane	630-20-6	2,500	20,000	< 20,000	U
1,1,1-Trichloroethane	71-55-6	2,300	20,000	< 20,000	U
1,1,2,2-Tetrachloroethane	79-34-5	2,400	20,000	< 20,000	U
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	4,600	20,000	< 20,000	U
1,1,2-Trichloroethane	79-00-5	1,300	20,000	< 20,000	U
1,1-Dichloropropene	563-58-6	3,000	20,000	< 20,000	U
1,1-Dichloroethane	75-34-3	2,200	20,000	< 20,000	U
1,1-Dichloroethene	75-35-4	3,000	20,000	< 20,000	U
1,2,3-Trichlorobenzene	87-61-6	2,600	20,000	< 20,000	U
1,2,3-Trichloropropane	96-18-4	2,400	20,000	< 20,000	U
1,2,3-Trimethylbenzene	526-73-8	1,800	20,000	**460,000**	
1,2,4-Trichlorobenzene	120-82-1	2,100	20,000	< 20,000	U
1,2,4-Trimethylbenzene	95-63-6	2,700	20,000	**914,000**	
1,2-Dibromo-3-chloropropane	96-12-8	9,400	50,000	< 50,000	U
1,2-Dibromoethane	106-93-4	2,500	20,000	< 20,000	U
1,2-Dichlorobenzene	95-50-1	1,500	20,000	< 20,000	U
1,2-Dichloroethane	107-06-2	2,300	20,000	< 20,000	U
1,2-Dichloropropane	78-87-5	1,700	20,000	< 20,000	U
1,3,5-Trimethylbenzene	108-67-8	2,600	20,000	**388,000**	
1,3-Dichlorobenzene	541-73-1	1,700	20,000	< 20,000	U
1,3-Dichloropropane	142-28-9	1,900	20,000	< 20,000	U
1,4-Dichlorobenzene	106-46-7	2,200	20,000	< 20,000	U
1,4-Dioxane	123-91-1	110,000	500,000	< 500,000	U

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115
Phone: (801) 263-8686, Toll Free: (888) 263-8686, Fax: (801) 263-8687
e-mail: awal@awal-labs.com, web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1110019-001A
Client Sample ID: Weber Sand Mix Crude

Analyzed: 10/5/2011 1205h
Units: µg/kg
Dilution Factor: 10000

Compound	CAS Number	MDL Limit	Reporting Limit	Analytical Result	Qual
2,2-Dichloropropane	594-20-7	3,800	20,000	< 20,000	U
2-Butanone	78-93-3	9,600	100,000	< 100,000	U
2-Chloroethyl vinyl ether	110-75-8	3,900	50,000	< 50,000	U
2-Chlorotoluene	95-49-8	1,900	20,000	< 20,000	U
2-Hexanone	591-78-6	5,000	50,000	< 50,000	U
2-Nitropropane	79-46-9	9,000	50,000	< 50,000	U
4-Chlorotoluene	106-43-4	3,100	20,000	< 20,000	U
4-Isopropyltoluene	99-87-6	3,000	20,000	< 20,000	U
4-Methyl-2-pentanone	108-10-1	4,800	50,000	**299,000**	
Acetone	67-64-1	37,000	100,000	**965,000**	
Acetonitrile	75-05-8	48,000	50,000	< 50,000	U
Acrolein	107-02-8	47,000	50,000	< 50,000	U
Acrylonitrile	107-13-1	3,500	100,000	< 100,000	U
Allyl chloride	107-05-1	2,200	50,000	< 50,000	U
Benzene	71-43-2	1,800	20,000	**707,000**	
Benzyl chloride	100-44-7	2,900	50,000	< 50,000	U
Bis(2-chloroisopropyl) ether	108-60-1	3,500	50,000	< 50,000	U
Bromobenzene	108-86-1	2,400	20,000	< 20,000	U
Bromochloromethane	74-97-5	1,600	20,000	< 20,000	U
Bromodichloromethane	75-27-4	2,300	20,000	< 20,000	U
Bromoform	75-25-2	2,400	20,000	< 20,000	U
Bromomethane	74-83-9	3,600	50,000	< 50,000	U
Butyl acetate	123-86-4	3,600	100,000	< 100,000	U
Carbon disulfide	75-15-0	2,400	20,000	< 20,000	U
Carbon tetrachloride	56-23-5	4,600	20,000	< 20,000	U
Chlorobenzene	108-90-7	2,500	20,000	6,300	J
Chloroethane	75-00-3	8,600	20,000	< 20,000	U
Chloroform	67-66-3	2,000	20,000	< 20,000	U
Chloromethane	74-87-3	2,400	50,000	< 50,000	U

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115
Phone: (801) 263-8686, Toll Free: (888) 263-8686, Fax: (801) 263-8687
e-mail: awal@awal-labs.com, web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1110019-001A
Client Sample ID: Weber Sand Mix Crude

Analyzed: 10/5/2011 1205h
Units: µg/kg
Dilution Factor: 10000

Compound	CAS Number	MDL Limit	Reporting Limit	Analytical Result	Qual
Chloroprene	126-99-8	2,300	20,000	< 20,000	U
cis-1,2-Dichloroethene	156-59-2	1,900	20,000	< 20,000	U
cis-1,3-Dichloropropene	10061-01-5	2,200	20,000	< 20,000	U
Cyclohexane	110-82-7	3,000	20,000	**1,500,000**	
Cyclohexanone	108-94-1	35,000	500,000	< 500,000	U
Dibromochloromethane	124-48-1	2,100	20,000	< 20,000	U
Dibromomethane	74-95-3	2,600	20,000	< 20,000	U
Dichlorodifluoromethane	75-71-8	2,500	20,000	< 20,000	U
Ethyl acetate	141-78-6	4,700	100,000	< 100,000	U
Ethyl ether	60-29-7	2,400	100,000	< 100,000	U
Ethyl methacrylate	97-63-2	2,300	20,000	< 20,000	U
Ethylbenzene	100-41-4	2,800	20,000	**400,000**	
Hexachlorobutadiene	87-68-3	2,200	20,000	< 20,000	U
Iodomethane	74-88-4	2,900	50,000	< 50,000	U
Isobutyl alcohol	78-83-1	15,000	1,000,000	< 1,000,000	U
Isopropyl acetate	108-21-4	3,600	100,000	< 100,000	U
Isopropyl alcohol	67-63-0	200,000	400,000	< 400,000	U
Isopropylbenzene	98-82-8	3,000	20,000	**129,000**	
m,p-Xylene	179601-23-1	6,500	20,000	**1,930,000**	
Methacrylonitrile	126-98-7	7,700	50,000	< 50,000	U
Methyl Acetate	79-20-9	7,900	50,000	< 50,000	U
Methyl methacrylate	80-62-6	1,800	50,000	< 50,000	U
Methyl tert-butyl ether	1634-04-4	2,100	20,000	< 20,000	U
Methylene chloride	75-09-2	3,100	50,000	< 50,000	U
n-Amyl acetate	628-63-7	2,200	100,000	< 100,000	U
n-Butyl alcohol	71-36-3	67,000	1,000,000	< 1,000,000	U
n-Butylbenzene	104-51-8	3,900	20,000	**77,400**	
n-Hexane	110-54-3	1,800	20,000	**1,600,000**	
n-Propylbenzene	103-65-1	4,200	20,000	**221,000**	

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115
Phone: (801) 263-8686, Toll Free: (888) 263-8686, Fax: (801) 263-8687
e-mail: awal@awal-labs.com, web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1110019-001A
Client Sample ID: Weber Sand Mix Crude

Analyzed: 10/5/2011 1205h
Units: µg/kg
Dilution Factor: 10000

Compound	CAS Number	MDL Limit	Reporting Limit	Analytical Result	Qual
Naphthalene	91-20-3	2,500	20,000	**200,000**	
o-Xylene	95-47-6	2,400	20,000	**671,000**	
Pentachloroethane	76-01-7	1,600	20,000	< 20,000	U
Propionitrile	107-12-0	22,000	250,000	< 250,000	U
Propyl acetate	109-60-4	4,700	100,000	< 100,000	U
sec-Butylbenzene	135-98-8	3,000	20,000	**100,000**	
Styrene	100-42-5	2,100	20,000	< 20,000	U
tert-Butyl alcohol	76-65-0	39,000	200,000	< 200,000	U
tert-Butylbenzene	98-06-6	2,600	20,000	**26,500**	
Tetrachloroethene	127-18-4	3,100	20,000	< 20,000	U
Tetrahydrofuran	109-99-9	7,600	20,000	< 20,000	U
Toluene	108-88-3	4,200	20,000	**1,410,000**	
trans-1,2-Dichloroethene	156-60-5	2,800	20,000	< 20,000	U
trans-1,3-Dichloropropene	10061-02-6	1,900	20,000	< 20,000	U
trans-1,4-Dichloro-2-butene	110-57-6	2,800	20,000	< 20,000	U
Trichloroethene	79-01-6	3,000	20,000	< 20,000	U
Trichlorofluoromethane	75-69-4	9,300	20,000	< 20,000	U
Vinyl acetate	108-05-4	6,900	100,000	< 100,000	U
Vinyl chloride	75-01-4	2,600	10,000	< 10,000	U
Xylenes, Total	1330-20-7	8,600	20,000	**2,600,000**	
Surr: 1,2-Dichloroethane-d4	17060-07-0	0	68-147	**91.5**	
Surr: 4-Bromofluorobenzene	460-00-4	0	71-144	**99.3**	
Surr: Dibromofluoromethane	1868-53-7	0	71-129	**92.2**	
Surr: Toluene-d8	2037-26-5	0	72-129	**98.3**	

U - This flag indicates the compound was analyzed for but not detected above the MDL.
J - Estimated value between the MDL and the reporting limit (PQL).
The reporting limits were raised due to high analyte concentrations.
Sampling and analytical preparation performed by method 5030C.

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115
Phone: (801) 263-8686, Toll Free: (888) 263-8686, Fax: (801) 263-8687
e-mail: awal@awal-labs.com, web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1110019-001A
Client Sample ID: Weber Sand Mix Crude

Analyzed: 10/6/2011 1243h
Units: µg/kg
Dilution Factor: 100000

Compound	CAS Number	MDL Limit	Reporting Limit	Analytical Result	Qual
Methylcyclohexane	108-87-2	47,000	200,000	**3,180,000**	
n-Octane	111-65-9	32,000	200,000	**3,090,000**	
Surr: 1,2-Dichloroethane-d4	17060-07-0	0	68-147	**90.2**	
Surr: 4-Bromofluorobenzene	460-00-4	0	71-144	**103**	
Surr: Dibromofluoromethane	1868-53-7	0	71-129	**91.8**	
Surr: Toluene-d8	2037-26-5	0	72-129	**106**	

The reporting limits were raised due to high analyte concentrations.
Sampling and analytical preparation performed by method 5030C.

American West Analytical Laboratories

D

WORK ORDER Summary

Work Order: **1110019**

Client: EarthFax Engineering — Page 1 of 1 — 10/3/2011

Client ID: EAR100 — Contact: Galen Williams

Project: Red Butte 1 Release / UC1300-17 — QC Level: LEVEL I — WO Type: Standard

DB

Sample ID	Client Sample ID	Collected Date	Received Date	Date Due	Matrix	Test Code	Sel	Storage	
1110019-001A	Weber Sand Mix Crude	10/3/2011 1535h	10/3/2011 1619h	10/17/2011	Oil	8260-S	☑	VOCFridge	2
1110019-001B						3580-SVOA-WASTE-O	☐	hall - semi	1
						8270-O	☑	hall - semi	
						8270-O-SIM	☑	hall - semi	

1110019

Page 1 of 1

CHEVRON PIPE LINE COMPANY
Salt Lake Pump Station
Salt Lake City, Utah

CHAIN-OF-CUSTODY FORM

Sampling Company: EARTHFAX ENGINEERING	Sampling Personnel: L. DUSHANE
Project Name: RED BUTTE 1 RELEASE	Project Number: UC1300-17
Analytical Laboratory: AWAL	Date of Shipment/Delivery: 10/3/11
Method of Shipment/Delivery: HAND	Airbill Number:

Field Sample No.	Date Sampled	Time Sampled	Sample Type	No. of Containers	Remarks
WEBER SAND MIX CRUDE	10/3/11	1535	GRAB	3	ANALYZE FOR: 8260C TO LOWEST MDL; 8270D WITH SELECTIVE ION MONITORING.
					REPORT RESULTS TO: GALEN WILLIAMS, EARTHFAX ENGINEERING; GWILLIAMS@EARTHFAX.COM

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
L. DUSHANE	10/3/11	1619	Denise Brown	10/3/11	1619
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

7.1° on ice

Lab Set ID: 1110019

Samples Were:	COC Tape Was:	Container Type:	No. Rec.
☐ Shipped By:	Present on Outer Package	☐ AWAL Supplied Plastic	
☑ Hand Delivered	☐ Yes ☐ No ☐ N/A	☐ AWAL Supplied Clear Glass	
☐ Ambient	Unbroken on Outer package	☐ AWAL Supplied Amber Glass	
☑ Chilled on ice	☐ Yes ☐ No ☑ N/A	☐ AWAL Supplied VOA/TOC/TOX Vials	
Temperature 7.1 °C	Present on Sample	☐ Amber ☐ Clear ☐ Headspace ☐ No Headspace	
Rec. Broken/Leaking ☐ Yes ☑ No ☐ N/A	☐ Yes ☑ No ☐ N/A	☐ Non AWAL Supplied Container	
Notes:	Unbroken on Sample	Notes:	
Properly Preserved ☑ Yes ☐ No ☐ N/A	☐ Yes ☐ No ☑ N/A		
Notes:	Notes:		
Rec. Within Hold ☑ Yes ☐ No		Discrepancies Between Labels and COC ☐ Yes ☑ No	
Notes:		Notes:	

DB

DB

Bottle Type	Preservative	All pHs OK															
Ammonia	pH <2 H_2SO_4																
COD	pH <2 H_2SO_4																
Cyanide	PH >12 NaOH																
Metals	pH <2 HNO_3																
NO_2 & NO_3	pH <2 H_2SO_4																
Nutrients	pH <2 H_2SO_4																
O & G	pH <2 HCL																
Phenols	pH <2 H_2SO_4																
Sulfide	pH > 9NaOH, ZnAC																
TKN	pH <2 H_2SO_4																
TOC	pH <2 H_3PO_4																
T PO_4	pH <2 H_2SO_4																
TPH	pH <2 HCL																

Procedure:
1) Pour a small amount of sample in the sample lid
2) Pour sample from Lid gently over wide range pH paper
3) **Do Not** dip the pH paper in the sample bottle or lid
4) If sample is not preserved properly list its extension and receiving pH in the appropriate column above
5) Flag COC and notify client for further instructions
6) Place client conversation on COC
7) Samples may be adjusted at client request

2011 October 12

EarthFax Engineering

Specific Gravity
ASTM D4052

Customer ID:	Savant ID:	@ 60°F
Weber Sand Mix Crude 10/3/2011	S111005N	0.8589

William G. Lutz
Laboratory Manager

2011 October 12

EarthFax Engineering

Simulated Distillation by Gas Chromatography
ASTM D6417

Customer ID:	Savant ID:	% Volatized @ 371°C
Weber Sand Mix Crude 10/3/11	S111005N	62.8

William G. Lutz
Laboratory Manager

2011 October 25

EarthFax Engineering

Clay Gel Analysis - HPLC
ASTM D2007

Customer ID:	Savant ID:	Aromatics Wt. %	Saturates Wt. %	Polars Wt. %	Asphaltenes Wt. %
Weber Sand Mix Crude 10/3/11	S111005N	53.6	38.0	8.4	<0.1

William G. Lutz
Laboratory Manager

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Galen Williams
EarthFax Engineering
7324 So. Union Park Ave., # 100
Midvale, UT 84047
TEL: (801) 561-1555

RE: Red Butte 1 Release / UC1300-17

Dear Galen Williams: Lab Set ID: 1111067

American West Analytical Laboratories received 1 sample(s) on 11/3/2011 for the analyses presented in the following report.

All analyses were performed in accordance to The NELAC Institute protocols unless noted otherwise. American West Analytical Laboratories is certified by The NELAC Institute in Utah and Texas; and is state certified in Colorado, Idaho, and Missouri. Certification document is available upon request. If you have any questions or concerns regarding this report please feel free to call.

The abbreviation "Surr" found in organic reports indicates a surrogate compound that is intentionally added by the laboratory to determine sample injection, extraction, and/or purging efficiency. The "Reporting Limit" found on the report is equivalent to the practical quantitation limit (PQL). This is the minimum concentration that can be reported by the method referenced and the sample matrix. The reporting limit must not be confused with any regulatory limit. Analytical results are reported to three significant figures for quality control and calculation purposes.

Thank You,

Approved by: Kyle F. Gross Digitally signed by Kyle F. Gross DN: cn=Kyle F. Gross, o=AWAL, ou=AWAL, email=kyle@awal-labs.com, c=US Date: 2011.11.15 11:43:57 -07'00'

Laboratory Director or designee

ORGANIC ANALYTICAL REPORT

Client: EarthFax Engineering **Contact:** Galen Williams
Project: Red Butte 1 Release / UC1300-17
Lab Sample ID: 1111067-001B
Client Sample ID: Weber Sand Mix Crude
Collection Date: 11/3/2011 0840h
Received Date: 11/3/2011 1025h **Method:** SW8270D

Analytical Results SVOA SIM List by GC/MS Method 8270D/3580A

Analyzed: 11/4/2011 1550h **Extracted:** 11/3/2011 1554h
Units: mg/kg
Dilution Factor: 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
1-Methylnaphthalene	90-12-0	1.50	**618**	E
2-Methylnaphthalene	91-57-6	1.50	**439**	E
Acenaphthene	83-32-9	1.50	< 1.50	I
Acenaphthylene	208-96-8	1.50	< 1.50	
Anthracene	120-12-7	1.50	< 1.50	
Benz(a)anthracene	56-55-3	1.50	< 1.50	
Benzo(a)pyrene	50-32-8	1.50	< 1.50	
Benzo(b)fluoranthene	205-99-2	1.50	< 1.50	
Benzo(g,h,i)perylene	191-24-2	1.50	< 1.50	
Benzo(k)fluoranthene	207-08-9	1.50	< 1.50	
Chrysene	218-01-9	1.50	**32.4**	
Dibenz(a,h)anthracene	53-70-3	1.50	< 1.50	
Fluoranthene	206-44-0	1.50	< 1.50	
Fluorene	86-73-7	1.50	< 1.50	
Indene	95-13-6	1.50	< 1.50	
Indeno(1,2,3-cd)pyrene	193-39-5	1.50	< 1.50	
Naphthalene	91-20-3	1.50	**287**	E
Phenanthrene	85-01-8	1.50	**130**	E
Pyrene	129-00-0	1.50	**7.50**	

E - Estimated value. The concentration exceeds the calibration range. See full scan run for analyte concentration.
I - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.

American West ANALYTICAL LABORATORIES
463 West 3600 South
Salt Lake City, UT 84115
Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com
web: www.awal-labs.com
Kyle F. Gross
Laboratory Director
Jose Rocha
QA Officer

ORGANIC ANALYTICAL REPORT

Client: EarthFax Engineering **Contact:** Galen Williams
Project: Red Butte 1 Release / UC1300-17
Lab Sample ID: 1111067-001B
Client Sample ID: Weber Sand Mix Crude
Collection Date: 11/3/2011 0840h
Received Date: 11/3/2011 1025h **Method:** SW8270D

Analytical Results SVOA List by GC/MS Method 8270D/3580A

Analyzed: 11/3/2011 2041h **Extracted:** 11/3/2011 1554h
Units: mg/kg
Dilution Factor: 1

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
1,2,4,5-Tetrachlorobenzene	95-94-3	50.0	< 50.0	
1,2,4-Trichlorobenzene	120-82-1	50.0	< 50.0	
1,2-Dichlorobenzene	95-50-1	50.0	< 50.0	
1,3,5-Trinitrobenzene	99-35-4	50.0	< 50.0	
1,4-Naphthoquinone	130-15-4	50.0	< 50.0	
1,3-Dichlorobenzene	541-73-1	50.0	< 50.0	
1,3-Dinitrobenzene	99-65-0	50.0	< 50.0	
1,4-Dichlorobenzene	106-46-7	50.0	< 50.0	
1,4-Phenylenediamine	106-50-3	50.0	< 50.0	
1-Chloronaphthalene	90-13-1	50.0	< 50.0	
1-Methylnaphthalene	90-12-0	50.0	**242**	
1-Naphthylamine	134-32-7	50.0	< 50.0	
2,3,4,6-Tetrachlorophenol	58-90-2	50.0	< 50.0	
2,4,5-Trichlorophenol	95-95-4	50.0	< 50.0	
2,4,6-Trichlorophenol	88-06-2	50.0	< 50.0	
2,4-Dichlorophenol	120-83-2	50.0	< 50.0	
2,4-Dimethylphenol	105-67-9	50.0	< 50.0	
2,4-Dinitrophenol	51-28-5	50.0	< 50.0	
2,4-Dinitrotoluene	121-14-2	50.0	< 50.0	[1]@
2,6-Dichlorophenol	87-65-0	50.0	< 50.0	
2,6-Dinitrotoluene	606-20-2	50.0	< 50.0	
2-Acetylaminofluorene	53-96-3	50.0	< 50.0	
2-Chloronaphthalene	91-58-7	50.0	< 50.0	
2-Chlorophenol	95-57-8	50.0	< 50.0	
2-Methylnaphthalene	91-57-6	50.0	**557**	
2-Methylphenol	95-48-7	50.0	< 50.0	
2-Naphthylamine	91-59-8	50.0	< 50.0	
2-Nitroaniline	88-74-4	50.0	< 50.0	
2-Nitrophenol	88-75-5	50.0	< 50.0	
2-Picoline	109-06-8	50.0	< 50.0	

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1111067-001B
Client Sample ID: Weber Sand Mix Crude

Analyzed: 11/3/2011 2041h **Extracted:** 11/3/2011 1554h
Units: mg/kg
Dilution Factor: 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
3&4-Methylphenol		50.0	< 50.0	
3,3´-Dichlorobenzidine	91-94-1	50.0	< 50.0	
3,3´-Dimethylbenzidine	119-93-7	50.0	< 50.0	
3-Methylcholanthrene	56-49-5	50.0	< 50.0	
3-Nitroaniline	99-09-2	50.0	< 50.0	
4,6-Dinitro-2-methylphenol	534-52-1	50.0	< 50.0	
4-Aminobiphenyl	92-67-1	50.0	< 50.0	
4-Bromophenyl phenyl ether	101-55-3	50.0	< 50.0	
4-Chloro-3-methylphenol	59-50-7	60.0	< 60.0	
4-Chloroaniline	106-47-8	50.0	< 50.0	
4-Chlorophenyl phenyl ether	7005-72-3	50.0	< 50.0	
4-Nitroaniline	100-01-6	50.0	< 50.0	
4-Nitrophenol	100-02-7	50.0	< 50.0	'@
5-Nitro-o-toluidine	99-55-8	50.0	< 50.0	
7,12-Dimethylbenz(a)anthracene	57-97-6	50.0	< 50.0	
a,a-Dimethylphenethylamine	122-09-8	50.0	< 50.0	
Acenaphthene	83-32-9	50.0	< 50.0	
Acenaphthylene	208-96-8	50.0	< 50.0	
Acetophenone	98-86-2	50.0	< 50.0	
alpha-Terpineol	98-55-5	50.0	< 50.0	
Aniline	62-53-3	50.0	< 50.0	
Anthracene	120-12-7	50.0	< 50.0	
Aramite	140-57-8	50.0	< 50.0	
Azobenzene	103-33-3	50.0	< 50.0	
Benz(a)anthracene	56-55-3	50.0	< 50.0	
Benzidine	92-87-5	50.0	< 50.0	
Benzo(a)pyrene	50-32-8	50.0	< 50.0	
Benzo(b)fluoranthene	205-99-2	50.0	< 50.0	
Benzo(g,h,i)perylene	191-24-2	50.0	< 50.0	
Benzo(k)fluoranthene	207-08-9	50.0	< 50.0	
Benzoic acid	65-85-0	150	< 150	
Benzyl alcohol	100-51-6	60.0	< 60.0	
Bis(2-chloroethoxy)methane	111-91-1	50.0	< 50.0	
Bis(2-chloroethyl) ether	111-44-4	50.0	< 50.0	
Bis(2-chloroisopropyl) ether	108-60-1	50.0	< 50.0	
Bis(2-ethylhexyl) phthalate	117-81-7	50.0	< 50.0	
bis(2-ethylhexyl)adipate	103-23-1	50.0	< 50.0	

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1111067-001B
Client Sample ID: Weber Sand Mix Crude

Analyzed: 11/3/2011 2041h **Extracted:** 11/3/2011 1554h
Units: mg/kg
Dilution Factor: 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
Butyl benzyl phthalate	85-68-7	50.0	< 50.0	
Carbazole	86-74-8	50.0	< 50.0	
Chlorobenzilate	510-15-6	50.0	< 50.0	
Chrysene	218-01-9	50.0	< 50.0	
Di-n-butyl phthalate	84-74-2	50.0	< 50.0	
Di-n-octyl phthalate	117-84-0	50.0	< 50.0	
Diallate (cis or trans)	2303-16-4	50.0	< 50.0	
Dibenz(a,h)anthracene	53-70-3	50.0	< 50.0	
Dibenzofuran	132-64-9	50.0	< 50.0	
Diethyl phthalate	84-66-2	50.0	< 50.0	
Dimethoate	60-51-5	50.0	< 50.0	
Dimethyl phthalate	131-11-3	50.0	< 50.0	
Dimethylaminoazobenzene	60-11-7	50.0	< 50.0	
Dinoseb	88-85-7	50.0	< 50.0	
Diphenylamine	122-39-4	50.0	< 50.0	
Disulfoton	298-04-4	50.0	< 50.0	
Ethyl methanesulfonate	62-50-0	50.0	< 50.0	
Famphur	52-85-7	50.0	< 50.0	
Fluoranthene	206-44-0	50.0	< 50.0	
Fluorene	86-73-7	50.0	< 50.0	
Hexachlorobenzene	118-74-1	50.0	< 50.0	
Hexachlorobutadiene	87-68-3	50.0	< 50.0	
Hexachlorocyclopentadiene	77-47-4	50.0	< 50.0	
Hexachloroethane	67-72-1	50.0	< 50.0	
Hexachlorophene	70-30-4	120	< 120	
Hexachloropropene	1888-71-7	50.0	< 50.0	
Indene	95-13-6	50.0	< 50.0	
Indeno(1,2,3-cd)pyrene	193-39-5	50.0	< 50.0	
Isodrin	465-73-6	50.0	< 50.0	
Isophorone	78-59-1	50.0	< 50.0	
Isosafrole	120-58-1	50.0	< 50.0	
Kepone	143-50-0	50.0	< 50.0	
Methapyrilene	91-80-5	50.0	< 50.0	
Methyl methanesulfonate	66-27-3	50.0	< 50.0	
N-Nitrosodi-n-butylamine	924-16-3	50.0	< 50.0	
N-Nitrosodiethylamine	55-18-5	50.0	< 50.0	
N-Nitrosodimethylamine	62-75-9	50.0	< 50.0	

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1111067-001B
Client Sample ID: Weber Sand Mix Crude

Analyzed: 11/3/2011 2041h **Extracted:** 11/3/2011 1554h
Units: mg/kg
Dilution Factor: 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
N-Nitrosodiphenylamine	86-30-6	50.0	< 50.0	
N-Nitrosodi-n-propylamine	621-64-7	50.0	< 50.0	
N-Nitrosomethylethylamine	10595-95-6	50.0	< 50.0	
N-Nitrosomorpholine	59-89-2	50.0	< 50.0	
N-Nitrosopiperidine	100-75-4	50.0	< 50.0	
N-Nitrosopyrrolidine	930-55-2	50.0	< 50.0	
Naphthalene	91-20-3	50.0	**307**	
Nitrobenzene	98-95-3	50.0	< 50.0	
Nitroquinoline-1-oxide	56-57-5	100	< 100	
O,O,O-Triethyl phosphorothioate	126-68-1	50.0	< 50.0	
o-Toluidine	95-53-4	50.0	< 50.0	
Parathion	56-38-2	50.0	< 50.0	
Methyl parathion	298-00-0	50.0	< 50.0	
Pentachlorobenzene	608-93-5	50.0	< 50.0	
Pentachloronitrobenzene	82-68-8	50.0	< 50.0	
Pentachlorophenol	87-86-5	50.0	< 50.0	
Phenacetin	62-44-2	50.0	< 50.0	
Phenanthrene	85-01-8	50.0	**121**	
Phenol	108-95-2	50.0	< 50.0	
Phorate	298-02-2	50.0	< 50.0	
Pronamide	23950-58-5	50.0	< 50.0	
Pyrene	129-00-0	50.0	< 50.0	
Pyridine	110-86-1	50.0	< 50.0	
Quinoline	91-22-5	50.0	< 50.0	
Safrole	94-59-7	50.0	< 50.0	
Tetraethyl dithiopyrophosphate	3689-24-5	50.0	< 50.0	
Thionazin	297-97-2	50.0	< 50.0	
Surr: 2,4,6-Tribromophenol	118-79-6	10-180	**66.8**	
Surr: 2-Fluorobiphenyl	321-60-8	29-152	**74.5**	
Surr: 2-Fluorophenol	367-12-4	10-181	**84.4**	
Surr: Nitrobenzene-d5	4165-60-0	23-174	**176**	S
Surr: Phenol-d6	13127-88-3	10-184	**80.6**	
Surr: Terphenyl-d14	1718-51-0	11-148	**102**	

[1] - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.
@ - High RPD due to suspected sample non-homogeneity or matrix interference.
S - Surrogate recoveries outside the control limits. MS samples yielded similar results indicating matrix interference.

Lab Sample ID: 1111067-001B
Client Sample ID: Weber Sand Mix Crude

Analyzed: 11/14/2011 1305h **Extracted:** 11/3/2011 1554h
Units: mg/kg
Dilution Factor: 10

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
n-Decane	124-18-5	500	**6,990**	~
n-Octadecane	593-45-3	500	**4,120**	~

~ - The reporting limits were raised due to high analyte concentrations.

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115
Phone: (801) 263-8686, Toll Free: (888) 263-8686, Fax: (801) 263-8687
e-mail: awal@awal-labs.com, web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

ORGANIC ANALYTICAL REPORT

Client: EarthFax Engineering
Contact: Galen Williams
Project: Red Butte 1 Release / UC1300-17
Lab Sample ID: 1111067-001A
Client Sample ID: Weber Sand Mix Crude
Collection Date: 11/3/2011 0840h
Received Date: 11/3/2011 1025h
Method: SW8260C

Analytical Results — VOAs Full List by GC/MS Method 8260C

Analyzed: 11/4/2011 0245h
Units: µg/kg
Dilution Factor: 10000

Compound	CAS Number	MDL Limit	Reporting Limit	Analytical Result	Qual
1,1,1,2-Tetrachloroethane	630-20-6	2,500	20,000	< 20,000	U
1,1,1-Trichloroethane	71-55-6	2,300	20,000	< 20,000	U
1,1,2,2-Tetrachloroethane	79-34-5	2,400	20,000	< 20,000	U
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	4,600	20,000	< 20,000	U
1,1,2-Trichloroethane	79-00-5	1,300	20,000	< 20,000	U
1,1-Dichloropropene	563-58-6	3,000	20,000	< 20,000	U
1,1-Dichloroethane	75-34-3	2,200	20,000	< 20,000	U
1,1-Dichloroethene	75-35-4	3,000	20,000	< 20,000	U
1,2,3-Trichlorobenzene	87-61-6	2,600	20,000	< 20,000	U
1,2,3-Trichloropropane	96-18-4	2,400	20,000	< 20,000	U
1,2,3-Trimethylbenzene	526-73-8	1,800	20,000	**443,000**	
1,2,4-Trichlorobenzene	120-82-1	2,100	20,000	< 20,000	U
1,2,4-Trimethylbenzene	95-63-6	2,700	20,000	**869,000**	B
1,2-Dibromo-3-chloropropane	96-12-8	9,400	50,000	< 50,000	U
1,2-Dibromoethane	106-93-4	2,500	20,000	< 20,000	U
1,2-Dichlorobenzene	95-50-1	1,500	20,000	< 20,000	U
1,2-Dichloroethane	107-06-2	2,300	20,000	< 20,000	U
1,2-Dichloropropane	78-87-5	1,700	20,000	< 20,000	U
1,3,5-Trimethylbenzene	108-67-8	2,600	20,000	**358,000**	
1,3-Dichlorobenzene	541-73-1	1,700	20,000	< 20,000	U
1,3-Dichloropropane	142-28-9	1,900	20,000	< 20,000	U
1,4-Dichlorobenzene	106-46-7	2,200	20,000	< 20,000	U
1,4-Dioxane	123-91-1	110,000	500,000	< 500,000	U

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115
Phone: (801) 263-8686, Toll Free: (888) 263-8686, Fax: (801) 263-8687
e-mail: awal@awal-labs.com, web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1111067-001A
Client Sample ID: Weber Sand Mix Crude

Analyzed: 11/4/2011 0245h
Units: µg/kg
Dilution Factor: 10000

Compound	CAS Number	MDL Limit	Reporting Limit	Analytical Result	Qual
2,2-Dichloropropane	594-20-7	3,800	20,000	< 20,000	U
2-Butanone	78-93-3	9,600	100,000	< 100,000	U
2-Chloroethyl vinyl ether	110-75-8	3,900	50,000	< 50,000	U
2-Chlorotoluene	95-49-8	1,900	20,000	< 20,000	U
2-Hexanone	591-78-6	5,000	50,000	< 50,000	U
2-Nitropropane	79-46-9	9,000	50,000	< 50,000	U
4-Chlorotoluene	106-43-4	3,100	20,000	< 20,000	U
4-Isopropyltoluene	99-87-6	3,000	20,000	**192,000**	
4-Methyl-2-pentanone	108-10-1	4,800	50,000	< 50,000	U
Acetone	67-64-1	37,000	100,000	< 100,000	U
Acetonitrile	75-05-8	48,000	50,000	< 50,000	U
Acrolein	107-02-8	47,000	50,000	< 50,000	U
Acrylonitrile	107-13-1	3,500	100,000	< 100,000	U
Allyl chloride	107-05-1	2,200	50,000	< 50,000	U
Benzene	71-43-2	1,800	20,000	**690,000**	
Benzyl chloride	100-44-7	2,900	50,000	< 50,000	U
Bis(2-chloroisopropyl) ether	108-60-1	3,500	50,000	< 50,000	U
Bromobenzene	108-86-1	2,400	20,000	< 20,000	U
Bromochloromethane	74-97-5	1,600	20,000	< 20,000	U
Bromodichloromethane	75-27-4	2,300	20,000	< 20,000	U
Bromoform	75-25-2	2,400	20,000	< 20,000	U
Bromomethane	74-83-9	3,600	50,000	< 50,000	U
Butyl acetate	123-86-4	3,600	100,000	< 100,000	U
Carbon disulfide	75-15-0	2,400	20,000	< 20,000	U
Carbon tetrachloride	56-23-5	4,600	20,000	< 20,000	U
Chlorobenzene	108-90-7	2,500	20,000	5,800	J
Chloroethane	75-00-3	8,600	20,000	< 20,000	U
Chloroform	67-66-3	2,000	20,000	< 20,000	U
Chloromethane	74-87-3	2,400	50,000	< 50,000	U

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115
Phone: (801) 263-8686, Toll Free: (888) 263-8686, Fax: (801) 263-8687
e-mail: awal@awal-labs.com, web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1111067-001A
Client Sample ID: Weber Sand Mix Crude

Analyzed: 11/4/2011 0245h
Units: µg/kg
Dilution Factor: 10000

Compound	CAS Number	MDL Limit	Reporting Limit	Analytical Result	Qual
Chloroprene	126-99-8	2,300	20,000	< 20,000	U
cis-1,2-Dichloroethene	156-59-2	1,900	20,000	< 20,000	U
cis-1,3-Dichloropropene	10061-01-5	2,200	20,000	< 20,000	U
Cyclohexane	110-82-7	3,000	20,000	**1,420,000**	
Cyclohexanone	108-94-1	35,000	500,000	< 500,000	U
Dibromochloromethane	124-48-1	2,100	20,000	< 20,000	U
Dibromomethane	74-95-3	2,600	20,000	< 20,000	U
Dichlorodifluoromethane	75-71-8	2,500	20,000	< 20,000	U
Ethyl acetate	141-78-6	4,700	100,000	< 100,000	U
Ethyl ether	60-29-7	2,400	100,000	11,900	J
Ethyl methacrylate	97-63-2	2,300	20,000	< 20,000	U
Ethylbenzene	100-41-4	2,800	20,000	**379,000**	
Hexachlorobutadiene	87-68-3	2,200	20,000	< 20,000	U
Iodomethane	74-88-4	2,900	50,000	< 50,000	U
Isobutyl alcohol	78-83-1	15,000	1,000,000	< 1,000,000	U
Isopropyl acetate	108-21-4	3,600	100,000	< 100,000	U
Isopropyl alcohol	67-63-0	200,000	400,000	< 400,000	U
Isopropylbenzene	98-82-8	3,000	20,000	**120,000**	
m,p-Xylene	179601-23-1	6,500	20,000	**1,790,000**	
Methacrylonitrile	126-98-7	7,700	50,000	< 50,000	U
Methyl Acetate	79-20-9	7,900	50,000	< 50,000	U
Methyl methacrylate	80-62-6	1,800	50,000	< 50,000	U
Methyl tert-butyl ether	1634-04-4	2,100	20,000	< 20,000	U
Methylene chloride	75-09-2	3,100	50,000	**69,600**	
n-Amyl acetate	628-63-7	2,200	100,000	< 100,000	U
n-Butyl alcohol	71-36-3	67,000	1,000,000	< 1,000,000	U
n-Butylbenzene	104-51-8	3,900	20,000	**89,100**	
n-Hexane	110-54-3	1,800	20,000	**1,720,000**	
n-Propylbenzene	103-65-1	4,200	20,000	**198,000**	

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115
Phone: (801) 263-8686, Toll Free: (888) 263-8686, Fax: (801) 263-8687
e-mail: awal@awal-labs.com, web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1111067-001A
Client Sample ID: Weber Sand Mix Crude

Analyzed: 11/4/2011 0245h
Units: µg/kg
Dilution Factor: 10000

Compound	CAS Number	MDL Limit	Reporting Limit	Analytical Result	Qual
Naphthalene	91-20-3	2,500	20,000	**206,000**	
o-Xylene	95-47-6	2,400	20,000	**634,000**	
Pentachloroethane	76-01-7	1,600	20,000	< 20,000	U
Propionitrile	107-12-0	22,000	250,000	< 250,000	U
Propyl acetate	109-60-4	4,700	100,000	< 100,000	U
sec-Butylbenzene	135-98-8	3,000	20,000	**104,000**	
Styrene	100-42-5	2,100	20,000	< 20,000	U
tert-Butyl alcohol	76-65-0	39,000	200,000	< 200,000	U
tert-Butylbenzene	98-06-6	2,600	20,000	**26,800**	
Tetrachloroethene	127-18-4	3,100	20,000	< 20,000	U
Tetrahydrofuran	109-99-9	7,600	20,000	< 20,000	U
Toluene	108-88-3	4,200	20,000	**1,320,000**	
trans-1,2-Dichloroethene	156-60-5	2,800	20,000	< 20,000	U
trans-1,3-Dichloropropene	10061-02-6	1,900	20,000	< 20,000	U
trans-1,4-Dichloro-2-butene	110-57-6	2,800	20,000	< 20,000	U
Trichloroethene	79-01-6	3,000	20,000	< 20,000	U
Trichlorofluoromethane	75-69-4	9,300	20,000	< 20,000	U
Vinyl acetate	108-05-4	6,900	100,000	< 100,000	U
Vinyl chloride	75-01-4	2,600	10,000	< 10,000	U
Xylenes, Total	1330-20-7	8,600	20,000	**2,420,000**	
Surr: 1,2-Dichloroethane-d4	17060-07-0	0	68-147	**94.6**	
Surr: 4-Bromofluorobenzene	460-00-4	0	71-144	**97.3**	
Surr: Dibromofluoromethane	1868-53-7	0	71-129	**93.1**	
Surr: Toluene-d8	2037-26-5	0	72-129	**98.0**	

U - This flag indicates the compound was analyzed for but not detected above the MDL.
J - Estimated value between the MDL and the reporting limit (PQL).
B - This analyte was also detected in the method blank below the PQL.
The reporting limits were raised due to high analyte concentrations.
Sampling and analytical preparation performed by method 5030C.

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115
Phone: (801) 263-8686, Toll Free: (888) 263-8686, Fax: (801) 263-8687
e-mail: awal@awal-labs.com, web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1111067-001A
Client Sample ID: Weber Sand Mix Crude

Analyzed: 11/4/2011 1018h
Units: µg/kg
Dilution Factor: 100000

Compound	CAS Number	MDL Limit	Reporting Limit	Analytical Result	Qual
Methylcyclohexane	108-87-2	47,000	200,000	**3,690,000**	
n-Octane	111-65-9	32,000	200,000	**3,180,000**	
Surr: 1,2-Dichloroethane-d4	17060-07-0	0	68-147	**96.3**	
Surr: 4-Bromofluorobenzene	460-00-4	0	71-144	**98.2**	
Surr: Dibromofluoromethane	1868-53-7	0	71-129	**91.6**	
Surr: Toluene-d8	2037-26-5	0	72-129	**103**	

The reporting limits were raised due to high analyte concentrations.
Sampling and analytical preparation performed by method 5030C.

American West Analytical Laboratories

D

WORK ORDER Summary

Work Order: 1111067
Page 1 of 1 11/3/2011

Client: EarthFax Engineering
Client ID: EAR100 **Contact:** Galen Williams
Project: Red Butte 1 Release / UC1300-17 **QC Level:** LEVEL I **WO Type:** Standard
Comments: Report 8260 down to the MDL / for 8270 report SIM; HOK-DB

Sample ID	Client Sample ID	Collected Date	Received Date	Date Due	Matrix	Test Code	Sel	Storage	
1111067-001A	Weber Sand Mix Crude	11/3/2011 0840h	11/3/2011 1025h	11/17/2011	Oil	8260-S	☑	vOC	1
1111067-001B						3580-SVOA-WASTE-O	☐	Hall-Semi	2
						8270-O	☑	Hall-Semi	
						8270-O-SIM	☑	Hall-Semi	

CHEVRON PIPE LINE COMPANY
Salt Lake Pump Station
Salt Lake City, Utah

CHAIN-OF-CUSTODY FORM 1111067

Sampling Company: EARTHFAX ENGINEERING	Sampling Personnel: L. DUSHANE
Project Name: RED BUTTE 1 RELEASE	Project Number: UC1300-17
Analytical Laboratory: AWAL	Date of Shipment/Delivery: 11/3/11
Method of Shipment/Delivery: HAND	Airbill Number:

Field Sample No.	Date Sampled	Time Sampled	Sample Type	No. of Containers	Remarks
WEBER SAND MIX CRUDE	11/3/11	0842	GRAB	(3) VOA's UNPRESERVED	ANALYZE FOR: 8260C TO LOWEST MDL; 8270D WITH SELECTIVE ION MONITORING.
					REPORT RESULTS TO: GALEN WILLIAMS EARTHFAX ENGINEERING GWILLIAMS@EARTHFAX.COM

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
LDS	11/3/11	1025	Galen Hay	11/3/11	1025
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

9.0 on ice

Lab Set ID: 1111067

Samples Were:	COC Tape Was:	Container Type:	No. Rec.
☐ Shipped By:	Present on Outer Package ☐ Yes ☐ No ☐ N/A	☒ AWAL Supplied Plastic	
☒ Hand Delivered		☐ AWAL Supplied Clear Glass	
☐ Ambient	Unbroken on Outer package ☐ Yes ☐ No ☐ N/A	☐ AWAL Supplied Amber Glass	
☒ Chilled on ice		☐ AWAL Supplied VOA/TOC/TOX Vials ☐ Amber ☐ Clear ☐ Headspace ☐ No Headspace	
Temperature 9.1 °C	Present on Sample ☐ Yes ☐ No ☐ N/A	☐ Non AWAL Supplied Container	
Rec. Broken/Leaking ☐ Yes ☒ No ☐ N/A			
Notes:	Unbroken on Sample ☐ Yes ☐ No ☐ N/A	Notes:	
Properly Preserved ☒ Yes ☐ No ☐ N/A	Notes:		
Notes:			
Rec. Within Hold ☒ Yes ☐ No		Discrepancies Between Labels and COC ☐ Yes ☒ No	
Notes:		Notes:	

Bottle Type	Preservative	All pHs OK															
Ammonia	pH <2 H_2SO_4																
COD	pH <2 H_2SO_4																
Cyanide	PH >12 NaOH																
Metals	pH <2 HNO_3																
NO_2 & NO_3	pH <2 H_2SO_4																
Nutrients	pH <2 H_2SO_4																
O & G	pH <2 HCL																
Phenols	pH <2 H_2SO_4																
Sulfide	pH > 9NaOH, ZnAC																
TKN	pH <2 H_2SO_4																
TOC	pH <2 H_3PO_4																
T PO_4	pH <2 H_2SO_4																
TPH	pH <2 HCL																

Procedure:
1) Pour a small amount of sample in the sample lid
2) Pour sample from Lid gently over wide range pH paper
3) **Do Not** dip the pH paper in the sample bottle or lid
4) If sample is not preserved properly list its extension and receiving pH in the appropriate column above
5) Flag COC and notify client for further instructions
6) Place client conversation on COC
7) Samples may be adjusted at client request

American West Analytical Laboratories

D

WORK ORDER Summary

Work Order: 1111067
Page 1 of 1 11/3/2011

Client: EarthFax Engineering
Client ID: EAR100 **Contact:** Galen Williams
Project: Red Butte 1 Release / UC1300-17 **QC Level:** LEVEL I **WO Type:** Standard
Comments: Report 8260 down to the MDL / for 8270 report SIM; HOK-DB

Sample ID	Client Sample ID	Collected Date	Received Date	Date Due	Matrix	Test Code	Sel	Storage	
1111067-001A	Weber Sand Mix Crude	11/3/2011 0840h	11/3/2011 1025h	11/17/2011	Oil	8260-S	☑	vOC	1
1111067-001B						3580-SVOA-WASTE-O	☐	Hall-Semi	2
						8270-O	☑	Hall-Semi	
						8270-O-SIM	☑	Hall-Semi	

CHEVRON PIPE LINE COMPANY
Salt Lake Pump Station
Salt Lake City, Utah

CHAIN-OF-CUSTODY FORM 1111067

Sampling Company: EARTHFAX ENGINEERING	Sampling Personnel: L. DUSHANE
Project Name: RED BUTTE 1 RELEASE	Project Number: UC1300-17
Analytical Laboratory: AWAL	Date of Shipment/Delivery: 11/3/11
Method of Shipment/Delivery: HAND	Airbill Number:

Field Sample No.	Date Sampled	Time Sampled	Sample Type	No. of Containers	Remarks
WEBER SAND MIX CRUDE	11/3/11	0842	GRAB	(3) VOA's UNPRESERVED	ANALYZE FOR: 8260C TO LOWEST MDL; 8270D WITH SELECTIVE ION MONITORING.
					REPORT RESULTS TO: GALEN WILLIAMS EARTHFAX ENGINEERING GWILLIAMS@EARTHFAX.COM

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
LDS	11/3/11	1025	Galen Hy	11/3/11	1025
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

9.0 on ice

Lab Set ID: 1111067

Samples Were:	COC Tape Was:	Container Type:	No. Rec.
☐ Shipped By:	**Present on Outer Package** ☐ Yes ☐ No ☐ N/A	☒ AWAL Supplied Plastic	
☒ Hand Delivered		☐ AWAL Supplied Clear Glass	
☐ Ambient	**Unbroken on Outer package** ☐ Yes ☐ No ☐ N/A	☐ AWAL Supplied Amber Glass	
☒ Chilled on ice		☐ AWAL Supplied VOA/TOC/TOX Vials ☐ Amber ☐ Clear ☐ Headspace ☐ No Headspace	
Temperature 9.1 °C	**Present on Sample** ☐ Yes ☐ No ☐ N/A	☐ Non AWAL Supplied Container	
Rec. Broken/Leaking ☐ Yes ☒ No ☐ N/A		**Notes:**	
Notes:	**Unbroken on Sample** ☐ Yes ☐ No ☐ N/A		
Properly Preserved ☒ Yes ☐ No ☐ N/A	**Notes:**		
Notes:		**Discrepancies Between Labels and COC** ☐ Yes ☒ No	
Rec. Within Hold ☒ Yes ☐ No		**Notes:**	
Notes:			

Bottle Type	Preservative	All pHs OK
Ammonia	pH <2 H_2SO_4	
COD	pH <2 H_2SO_4	
Cyanide	PH >12 NaOH	
Metals	pH <2 HNO_3	
NO_2 & NO_3	pH <2 H_2SO_4	
Nutrients	pH <2 H_2SO_4	
O & G	pH <2 HCL	
Phenols	pH <2 H_2SO_4	
Sulfide	pH > 9NaOH, ZnAC	
TKN	pH <2 H_2SO_4	
TOC	pH <2 H_3PO_4	
T PO_4	pH <2 H_2SO_4	
TPH	pH <2 HCL	

Procedure:
1) Pour a small amount of sample in the sample lid
2) Pour sample from Lid gently over wide range pH paper
3) **Do Not** dip the pH paper in the sample bottle or lid
4) If sample is not preserved properly list its extension and receiving pH in the appropriate column above
5) Flag COC and notify client for further instructions
6) Place client conversation on COC
7) Samples may be adjusted at client request

2011 November 16

EarthFax Engineering

Specific Gravity
ASTM D4052

Customer ID:	Savant ID:	@ 60°F
WEBER SAND MIX CRUDE 11/3/2011	S111107AL	0.8579

Theodore W. Selby
Director, R & D

2011 November 16

EarthFax Engineering

Simulated Distillation by Gas Chromatography
ASTM D6417

Customer ID:	Savant ID:	% Volatized @ 371°C
WEBER SAND MIX CRUDE 11/3/2011	S111107AL	8.6

Theodore W. Selby
Director, R & D

2011 November 21

EarthFax Engineering

Clay Gel Analysis - HPLC
ASTM D2007

Customer ID:	Savant ID:	Aromatics Wt. %	Saturates Wt. %	Polars Wt. %	Asphaltenes Wt. %
WEBER SAND MIX CRUDE 11/3/2011	S111107AL	62.8	28.5	8.7	<0.1

Theodore W. Selby
Director, R & D

American West
ANALYTICAL LABORATORIES

Galen Williams
EarthFax Engineering
7324 So. Union Park Ave., # 100
Midvale, UT 84047
TEL: (801) 561-1555

RE: Red Butte 1 Release / UC1300-17

Dear Galen Williams: Lab Set ID: 1111498

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

American West Analytical Laboratories received 1 sample(s) on 11/30/2011 for the analyses presented in the following report.

All analyses were performed in accordance to The NELAC Institute protocols unless noted otherwise. American West Analytical Laboratories is certified by The NELAC Institute in Utah and Texas; and is state certified in Colorado, Idaho, and Missouri. Certification document is available upon request. If you have any questions or concerns regarding this report please feel free to call.

The abbreviation "Surr" found in organic reports indicates a surrogate compound that is intentionally added by the laboratory to determine sample injection, extraction, and/or purging efficiency. The "Reporting Limit" found on the report is equivalent to the practical quantitation limit (PQL). This is the minimum concentration that can be reported by the method referenced and the sample matrix. The reporting limit must not be confused with any regulatory limit. Analytical results are reported to three significant figures for quality control and calculation purposes.

Thank You,

Approved by: Kyle F. Gross Digitally signed by Kyle F. Gross DN: cn=Kyle F. Gross, o=AWAL, ou=AWAL, email=kyle@awal-labs.com, c=US Date: 2011.12.06 16:20:38 -07'00'

Laboratory Director or designee

ORGANIC ANALYTICAL REPORT

Client: EarthFax Engineering **Contact:** Galen Williams
Project: Red Butte 1 Release / UC1300-17
Lab Sample ID: 1111498-001B
Client Sample ID: Weber Sand Mix Crude
Collection Date: 11/30/2011 1000h
Received Date: 11/30/2011 1111h **Method:** SW8270D

Analytical Results SVOA SIM List by GC/MS Method 8270D/3580A

Analyzed: 12/5/2011 1944h **Extracted:** 11/30/2011 1408
Units: mg/kg
Dilution Factor: 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
1-Methylnaphthalene	90-12-0	1.50	**617**	E
2-Methylnaphthalene	91-57-6	1.50	**498**	E
Acenaphthene	83-32-9	1.50	< 1.50	
Acenaphthylene	208-96-8	1.50	**23.1**	
Anthracene	120-12-7	1.50	< 1.50	
Benz(a)anthracene	56-55-3	1.50	**42.3**	
Benzo(a)pyrene	50-32-8	1.50	< 1.50	1
Benzo(b)fluoranthene	205-99-2	1.50	< 1.50	
Benzo(g,h,i)perylene	191-24-2	1.50	< 1.50	
Benzo(k)fluoranthene	207-08-9	1.50	< 1.50	
Chrysene	218-01-9	1.50	**9.70**	
Dibenz(a,h)anthracene	53-70-3	1.50	< 1.50	
Fluoranthene	206-44-0	1.50	< 1.50	
Fluorene	86-73-7	1.50	**25.3**	
Indene	95-13-6	1.50	< 1.50	
Indeno(1,2,3-cd)pyrene	193-39-5	1.50	< 1.50	
Naphthalene	91-20-3	1.50	**331**	E
Phenanthrene	85-01-8	1.50	**118**	E
Pyrene	129-00-0	1.50	**8.10**	

E - Estimated value. The concentration exceeds the calibration range. See full scan run.
1 - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.

American West ANALYTICAL LABORATORIES
463 West 3600 South
Salt Lake City, UT 84115
Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com
web: www.awal-labs.com
Kyle F. Gross
Laboratory Director
Jose Rocha
QA Officer

ORGANIC ANALYTICAL REPORT

Client: EarthFax Engineering **Contact:** Galen Williams
Project: Red Butte 1 Release / UC1300-17
Lab Sample ID: 1111498-001B
Client Sample ID: Weber Sand Mix Crude
Collection Date: 11/30/2011 1000h
Received Date: 11/30/2011 1111h **Method:** SW8270D

Analytical Results SVOA List by GC/MS Method 8270D/3580A

Analyzed: 12/2/2011 0755h **Extracted:** 11/30/2011 1408
Units: mg/kg
Dilution Factor: 1

Compound	CAS Number	Reporting Limit	Analytical Result	Qual
1-Methylnaphthalene	90-12-0	50.0	**330**	
2-Methylnaphthalene	91-57-6	50.0	**771**	
Acenaphthene	83-32-9	50.0	< 50.0	
Acenaphthylene	208-96-8	50.0	< 50.0	
Anthracene	120-12-7	50.0	< 50.0	
Benz(a)anthracene	56-55-3	50.0	< 50.0	
Benzo(a)pyrene	50-32-8	50.0	< 50.0	
Benzo(b)fluoranthene	205-99-2	50.0	< 50.0	
Benzo(g,h,i)perylene	191-24-2	50.0	< 50.0	
Benzo(k)fluoranthene	207-08-9	50.0	< 50.0	
Chrysene	218-01-9	50.0	< 50.0	
Dibenz(a,h)anthracene	53-70-3	50.0	< 50.0	
Fluoranthene	206-44-0	50.0	< 50.0	
Fluorene	86-73-7	50.0	< 50.0	
Indene	95-13-6	50.0	< 50.0	
Indeno(1,2,3-cd)pyrene	193-39-5	50.0	< 50.0	
Naphthalene	91-20-3	50.0	**428**	
Phenanthrene	85-01-8	50.0	**174**	
Pyrene	129-00-0	50.0	< 50.0	
Surr: 2,4,6-Tribromophenol	118-79-6	10-180	**71.6**	
Surr: 2-Fluorobiphenyl	321-60-8	29-152	**98.7**	
Surr: 2-Fluorophenol	367-12-4	10-181	**104**	
Surr: Nitrobenzene-d5	4165-60-0	23-174	**251**	S
Surr: Phenol-d6	13127-88-3	10-184	**103**	
Surr: Terphenyl-d14	1718-51-0	11-148	**119**	

S - Surrogate recoveries outside the control limits. MS samples yielded similar results indicating matrix interference.

463 West 3600 South
Salt Lake City, UT 84115

Phone: (801) 263-8686
Toll Free: (888) 263-8686
Fax: (801) 263-8687
e-mail: awal@awal-labs.com

web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

American West ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115
Phone: (801) 263-8686, Toll Free: (888) 263-8686, Fax: (801) 263-8687
e-mail: awal@awal-labs.com, web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

ORGANIC ANALYTICAL REPORT

Client: EarthFax Engineering **Contact:** Galen Williams
Project: Red Butte 1 Release / UC1300-17
Lab Sample ID: 1111498-001A
Client Sample ID: Weber Sand Mix Crude
Collection Date: 11/30/2011 1000h
Received Date: 11/30/2011 1111h **Method:** SW8260C

Analytical Results VOAs Full List by GC/MS Method 8260C

Analyzed: 12/1/2011 0920h
Units: µg/kg
Dilution Factor: 100000

Compound	CAS Number	MDL Limit	Reporting Limit	Analytical Result	Qual
Methylcyclohexane	108-87-2	47,000	200,000	**3,020,000**	
n-Octane	111-65-9	32,000	200,000	**3,490,000**	
Surr: 1,2-Dichloroethane-d4	17060-07-0	0	68-147	**83.4**	
Surr: 4-Bromofluorobenzene	460-00-4	0	71-144	**99.0**	
Surr: Dibromofluoromethane	1868-53-7	0	71-129	**89.3**	
Surr: Toluene-d8	2037-26-5	0	72-129	**109**	

The reporting limits were raised due to high analyte concentrations.
Sampling and analytical preparation performed by method 5030C.

Analyzed: 12/1/2011 0424h
Units: µg/kg
Dilution Factor: 10000

Compound	CAS Number	MDL Limit	Reporting Limit	Analytical Result	Qual
1,1,1,2-Tetrachloroethane	630-20-6	2,500	20,000	< 20,000	U
1,1,1-Trichloroethane	71-55-6	2,300	20,000	< 20,000	U
1,1,2,2-Tetrachloroethane	79-34-5	2,400	20,000	< 20,000	U
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	4,600	20,000	< 20,000	U
1,1,2-Trichloroethane	79-00-5	1,300	20,000	< 20,000	U
1,1-Dichloropropene	563-58-6	3,000	20,000	< 20,000	U
1,1-Dichloroethane	75-34-3	2,200	20,000	< 20,000	U
1,1-Dichloroethene	75-35-4	3,000	20,000	< 20,000	U
1,2,3-Trichlorobenzene	87-61-6	2,600	20,000	< 20,000	U
1,2,3-Trichloropropane	96-18-4	2,400	20,000	< 20,000	U
1,2,3-Trimethylbenzene	526-73-8	1,800	20,000	**433,000**	

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115
Phone: (801) 263-8686, Toll Free: (888) 263-8686, Fax: (801) 263-8687
e-mail: awal@awal-labs.com, web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1111498-001A
Client Sample ID: Weber Sand Mix Crude

Analyzed: 12/1/2011 0424h
Units: µg/kg
Dilution Factor: 10000

Compound	CAS Number	MDL Limit	Reporting Limit	Analytical Result	Qual
1,2,4-Trichlorobenzene	120-82-1	2,100	20,000	< 20,000	U
1,2,4-Trimethylbenzene	95-63-6	2,700	20,000	**912,000**	
1,2-Dibromo-3-chloropropane	96-12-8	9,400	50,000	< 50,000	U
1,2-Dibromoethane	106-93-4	2,500	20,000	< 20,000	U
1,2-Dichlorobenzene	95-50-1	1,500	20,000	< 20,000	U
1,2-Dichloroethane	107-06-2	2,300	20,000	< 20,000	U
1,2-Dichloropropane	78-87-5	1,700	20,000	< 20,000	U
1,3,5-Trimethylbenzene	108-67-8	2,600	20,000	**356,000**	
1,3-Dichlorobenzene	541-73-1	1,700	20,000	< 20,000	U
1,3-Dichloropropane	142-28-9	1,900	20,000	< 20,000	U
1,4-Dichlorobenzene	106-46-7	2,200	20,000	< 20,000	U
1,4-Dioxane	123-91-1	110,000	500,000	< 500,000	U
2,2-Dichloropropane	594-20-7	3,800	20,000	< 20,000	U
2-Butanone	78-93-3	9,600	100,000	< 100,000	U
2-Chloroethyl vinyl ether	110-75-8	3,900	50,000	< 50,000	U
2-Chlorotoluene	95-49-8	1,900	20,000	< 20,000	U
2-Hexanone	591-78-6	5,000	50,000	< 50,000	U
2-Nitropropane	79-46-9	9,000	50,000	< 50,000	U
4-Chlorotoluene	106-43-4	3,100	20,000	< 20,000	U
4-Isopropyltoluene	99-87-6	3,000	20,000	**245,000**	
4-Methyl-2-pentanone	108-10-1	4,800	50,000	< 50,000	U
Acetone	67-64-1	37,000	100,000	**1,180,000**	
Acetonitrile	75-05-8	48,000	50,000	< 50,000	U
Acrolein	107-02-8	47,000	50,000	< 50,000	U
Acrylonitrile	107-13-1	3,500	100,000	< 100,000	U
Allyl chloride	107-05-1	2,200	50,000	< 50,000	U
Benzene	71-43-2	1,800	20,000	**639,000**	
Benzyl chloride	100-44-7	2,900	50,000	< 50,000	U
Bis(2-chloroisopropyl) ether	108-60-1	3,500	50,000	< 50,000	U

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115
Phone: (801) 263-8686, Toll Free: (888) 263-8686, Fax: (801) 263-8687
e-mail: awal@awal-labs.com, web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1111498-001A
Client Sample ID: Weber Sand Mix Crude

Analyzed: 12/1/2011 0424h
Units: µg/kg
Dilution Factor: 10000

Compound	CAS Number	MDL Limit	Reporting Limit	Analytical Result	Qual
Bromobenzene	108-86-1	2,400	20,000	< 20,000	U
Bromochloromethane	74-97-5	1,600	20,000	< 20,000	U
Bromodichloromethane	75-27-4	2,300	20,000	< 20,000	U
Bromoform	75-25-2	2,400	20,000	< 20,000	U
Bromomethane	74-83-9	3,600	50,000	< 50,000	U
Butyl acetate	123-86-4	3,600	100,000	< 100,000	U
Carbon disulfide	75-15-0	2,400	20,000	< 20,000	U
Carbon tetrachloride	56-23-5	4,600	20,000	< 20,000	U
Chlorobenzene	108-90-7	2,500	20,000	7,000	J
Chloroethane	75-00-3	8,600	20,000	< 20,000	U
Chloroform	67-66-3	2,000	20,000	< 20,000	U
Chloromethane	74-87-3	2,400	50,000	< 50,000	U
Chloroprene	126-99-8	2,300	20,000	< 20,000	U
cis-1,2-Dichloroethene	156-59-2	1,900	20,000	< 20,000	U
cis-1,3-Dichloropropene	10061-01-5	2,200	20,000	< 20,000	U
Cyclohexane	110-82-7	3,000	20,000	**1,310,000**	
Cyclohexanone	108-94-1	35,000	500,000	< 500,000	U
Dibromochloromethane	124-48-1	2,100	20,000	< 20,000	U
Dibromomethane	74-95-3	2,600	20,000	< 20,000	U
Dichlorodifluoromethane	75-71-8	2,500	20,000	< 20,000	U
Ethyl acetate	141-78-6	4,700	100,000	< 100,000	U
Ethyl ether	60-29-7	2,400	100,000	< 100,000	U
Ethyl methacrylate	97-63-2	2,300	20,000	< 20,000	U
Ethylbenzene	100-41-4	2,800	20,000	**392,000**	
Hexachlorobutadiene	87-68-3	2,200	20,000	< 20,000	U
Iodomethane	74-88-4	2,900	50,000	< 50,000	U
Isobutyl alcohol	78-83-1	15,000	1,000,000	< 1,000,000	U
Isopropyl acetate	108-21-4	3,600	100,000	< 100,000	U
Isopropyl alcohol	67-63-0	200,000	400,000	< 400,000	U

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115
Phone: (801) 263-8686, Toll Free: (888) 263-8686, Fax: (801) 263-8687
e-mail: awal@awal-labs.com, web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1111498-001A
Client Sample ID: Weber Sand Mix Crude

Analyzed: 12/1/2011 0424h
Units: µg/kg
Dilution Factor: 10000

Compound	CAS Number	MDL Limit	Reporting Limit	Analytical Result	Qual
Isopropylbenzene	98-82-8	3,000	20,000	**135,000**	
m,p-Xylene	179601-23-1	6,500	20,000	**1,680,000**	
Methacrylonitrile	126-98-7	7,700	50,000	< 50,000	U
Methyl Acetate	79-20-9	7,900	50,000	< 50,000	U
Methyl methacrylate	80-62-6	1,800	50,000	< 50,000	U
Methyl tert-butyl ether	1634-04-4	2,100	20,000	< 20,000	U
Methylene chloride	75-09-2	3,100	50,000	20,000	JB
n-Amyl acetate	628-63-7	2,200	100,000	< 100,000	U
n-Butyl alcohol	71-36-3	67,000	1,000,000	< 1,000,000	U
n-Butylbenzene	104-51-8	3,900	20,000	**133,000**	
n-Hexane	110-54-3	1,800	20,000	**2,040,000**	
n-Propylbenzene	103-65-1	4,200	20,000	**207,000**	
Naphthalene	91-20-3	2,500	20,000	**240,000**	
o-Xylene	95-47-6	2,400	20,000	**652,000**	
Pentachloroethane	76-01-7	1,600	20,000	< 20,000	U
Propionitrile	107-12-0	22,000	250,000	< 250,000	U
Propyl acetate	109-60-4	4,700	100,000	< 100,000	U
sec-Butylbenzene	135-98-8	3,000	20,000	**111,000**	
Styrene	100-42-5	2,100	20,000	< 20,000	U
tert-Butyl alcohol	76-65-0	39,000	200,000	< 200,000	U
tert-Butylbenzene	98-06-6	2,600	20,000	**46,900**	
Tetrachloroethene	127-18-4	3,100	20,000	< 20,000	U
Tetrahydrofuran	109-99-9	7,600	20,000	< 20,000	U
Toluene	108-88-3	4,200	20,000	**1,170,000**	
trans-1,2-Dichloroethene	156-60-5	2,800	20,000	< 20,000	U
trans-1,3-Dichloropropene	10061-02-6	1,900	20,000	< 20,000	U
trans-1,4-Dichloro-2-butene	110-57-6	2,800	20,000	< 20,000	U
Trichloroethene	79-01-6	3,000	20,000	< 20,000	U
Trichlorofluoromethane	75-69-4	9,300	20,000	< 20,000	U

American West
ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, UT 84115
Phone: (801) 263-8686, Toll Free: (888) 263-8686, Fax: (801) 263-8687
e-mail: awal@awal-labs.com, web: www.awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Lab Sample ID: 1111498-001A
Client Sample ID: Weber Sand Mix Crude

Analyzed: 12/1/2011 0424h
Units: µg/kg
Dilution Factor: 10000

Compound	CAS Number	MDL Limit	Reporting Limit	Analytical Result	Qual
Vinyl acetate	108-05-4	6,900	100,000	< 100,000	U
Vinyl chloride	75-01-4	2,600	10,000	< 10,000	U
Xylenes, Total	1330-20-7	8,600	20,000	**2,330,000**	
Surr: 1,2-Dichloroethane-d4	17060-07-0	0	68-147	**107**	
Surr: 4-Bromofluorobenzene	460-00-4	0	71-144	**99.3**	
Surr: Dibromofluoromethane	1868-53-7	0	71-129	**103**	
Surr: Toluene-d8	2037-26-5	0	72-129	**97.8**	

U - This flag indicates the compound was analyzed for but not detected above the MDL.
J - Estimated value between the MDL and the reporting limit (PQL).
B - This analyte was also detected in the method blank below the PQL.
The reporting limits were raised due to high analyte concentrations.
Sampling and analytical preparation performed by method 5030C.

American West Analytical Laboratories

RUSH

D

WORK ORDER Summary

Work Order: 1111498
Page 1 of 1 11/30/2011

Client: EarthFax Engineering
Client ID: EAR100 **Contact:** Galen Williams
Project: Red Butte 1 Release / UC1300-17 **QC Level:** LEVEL I **WO Type:** Standard
Comments: Run SIM of SVOC; Report VOC down to the MDL; 4 Day Rush added per Galen 11/30/2011;

Sample ID	Client Sample ID	Collected Date	Received Date	Date Due	Matrix	Test Code	Sel	Storage	
1111498-001A	Weber Sand Mix Crude	11/30/2011 1000h	11/30/2011 1111h	12/6/2011	Oil	8260-S	☑	voc	1
1111498-001B						3580-SVOA-WASTE-O	☐	Hall-Semi	2
						8270-O	☑	Hall-Semi	
						8270-O-SIM	☑	Hall-Semi	

LABORATORY USE ONLY

SAMPLES WERE:
1 Shipped or hand delivered
Notes:
2 Ambient or Chilled
Notes: on ice
3 Temperature 7.6
4 Received Broken/Leaking (Improperly Sealed)
Y N
Notes:
5 Properly Preserved
Y N
Notes:
Received Within
Y N
Notes

CHEVRON PIPE LINE COMPANY
Salt Lake Pump Station
Salt Lake City, Utah

1111498

CHAIN-OF-CUSTODY FORM

Sampling Company: EARTHFAX ENGINEERING	Sampling Personnel: L. DUSHANE
Project Name: RED BUTTE 1 RELEASE	Project Number: UC 1300 -17
Analytical Laboratory: AWAL	Date of Shipment/Delivery: 11/30/11
Method of Shipment/Delivery: HAND	Airbill Number:

Field Sample No.	Date Sampled	Time Sampled	Sample Type	No. of Containers	Remarks
WEBER SAND MIX CRUDE	11/30/11	1000	GRAB	3	ANALYZE FOR:
				•	8260C TO LOWEST MDL
				•	8270D WITH SELECTIVE ION MONITORING
					REPORT RESULTS TO:
					GALEN WILLIAMS EARTHFAX ENGINEERING
					GWILLIAMS@EARTHFAX.COM
					*Needs results by Tues. 12/6 per Galen W. SB 11/30/11

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
L.D.S.	11/30/11	1111		11/30/11	11:11
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

7.6

2011 December 14

EarthFax Engineering

Specific Gravity
ASTM D4052

Customer ID:	Savant ID:	@ 60°F
WEBER SAND MIX CRUDE 11/30/11	S111201G	0.8579

Theodore W. Selby
Director, R & D

2011 December 14

EarthFax Engineering

Simulated Distillation by Gas Chromatography
ASTM D6417

Customer ID:	Savant ID:	% Volatized @ 371°C
WEBER SAND MIX CRUDE 11/30/11	S111201G	64.0

Theodore W. Selby
Director, R & D

2012 January 3

EarthFax Engineering

Clay Gel Analysis - HPLC
ASTM D2007

Customer ID:	Savant ID:	Aromatics Wt. %	Saturates Wt. %	Polars Wt. %	Asphaltenes Wt. %
Weber Sand Mix Crude 11/30/11	S111201G	68.7	23.3	8.0	<0.1

Theodore W. Selby
Director, R & D

Annex B
Non-technical summaries of the activities completed to date

- *SCAT Surveys (including the stream washing activities)*
- *Red Butte Spill Site*
- *Liberty Park*
- *Mt. Olivet Cemetery*
- *Garden Park Ward*
- *1096 South 1100 East utility pole cleanup*
- *Remund/Harvard Property*
- *Hayes Property*

CHEVRON PIPE LINE COMPANY
RED BUTTE CRUDE OIL RELEASE
SUMMARY OF SHORELINE CONTAMINANT ASSESSMENT AND STREAM WASHING AND RINSING EFFORTS

After the June 11, 2011 crude oil release ("Release") had been controlled, Chevron Pipe Line ("CPL") began assessing the impacts of the event on the Red Butte Creek and Jordan River drainages as well as on ancillary impact areas such as the Mt. Olivet Cemetery and storm sewer network. One of the first activities during such a release into any active flowing channel where steep, slippery slopes are present along with potential "live" utility crossings, and potential exposure to poisonous plants and animals is to assess the overall safety before personnel are allowed into the area to begin evaluating impact and performing cleanup activities. According to pre-existing polices established by Chevron's Global Response Team, specially trained safety personnel always assess each area with safety representatives from involved State and Federal agencies. It is only after these assessments have been made and the teams that will enter the sites have been briefed on the safety concerns are personnel allowed into the environment. Safety observations and measures are entered onto the Chevron Pipe Line Job Safety Analysis forms that all personnel are required to read and sign daily.

In order to standardize the evaluation methodology and descriptions of observations by different responders to the various sites impacted by the Release, CPL follows the protocols established by the Hazardous Materials Response Division of the National Oceanic and Atmospheric Administration ("NOAA"). Specifically for the Red Butte Release, the "Shoreline Assessment Manual" Published by NOAA was the guidance document used. The first effort is to develop Shoreline Contaminant Assessment Teams ("SCATs") to walk the impacted areas and identify using GPS markers all areas requiring immediate response by cleanup crews. The SCAT manual contains specific visual and graphic quantifiers on oil presence, thickness, distribution, etc. that standardize the reports turned in by the teams. The leader of each team maintains radio contact with several Rapid Response Teams ("RRTs") which are made up of personnel equipped with absorbent materials, barrier booms, flagging to mark locations, portable pump activated high and low energy washers and other equipment that can be used to remove oil from impacted plants, rocks, structures, etc. Through this process all areas initially identified by the SCAT personnel are then re-visited after the RRTs have performed the first cleaning efforts. Electronic ARCGIS™ based maps of the drainage and reported areas are set up at the Incident Command Center and are updated routinely as information comes in from the field. The computer based maps allow quantification of the impacts with estimates of recovered oil. Using this process, the entire drainage, or segments if it has been divided, can be classified as to the overall level of contamination with the NOAA identifiers of Heavy, Moderate, Light, Very Light and None. Included in that map are pockets within the overall drainage that may have different identifiers. As cleanup progresses, the entire drainage eventually satisfies the "None" classification with localized areas with higher classifications related to hot spots.

There were two general washing methodologies deployed on Red Butte. The first was a high energy spray washer that effectively removed heavy staining along rocks, foundation walls,

thicker tree branches or trunks and other areas where the high pressure spray would not cause damage to the plant or structure. The second method utilized a much lower energy spray that by design simulated rainfall. These devices were used to wash root masses, leaves, stream channel banks where the intent was to remove impacted soil but not erode soil away that may increase potential for permanent damage. Initially the cleaning agent used on structures and rocks in the channel was Simple Green™ mixed at low ratios with the water in the sprayers. However, at the direction of specialists from the Chevron Energy Technology Corporation early in the response its use was limited to cleaning of tools and equipment at the respective staging areas and not within the Red Butte drainage itself. Cleaning was eventually limited to the high or low pressure spray washers referenced above. The cleaning was followed by two coordinated higher energy flushes down the channel to naturally scour the channel and transport residue and materials removed during the high and low energy washes downstream into Liberty Lake where it could be recovered. The source of the higher flows was through controlled discharge from Red Butte Dam, located approximately one mile upstream of the Release site.

At Red Butte, each SCAT consisted of an engineer, a riparian biologist, a spill response and remediation engineer/scientist and an agency representative. As cleanup from the washing progressed some areas were deemed as “no further action” sites when the SCAT members revisited them. In some cases the teams would make a determination that, for example additional cleaning of a root mass would result in more serious impact to the habitat by killing the tree, thus changing the canopy and temperature controls or destroying the macro-invertebrate habitat than leaving small section of oil or oil staining. Such areas were logged using GPS coordinates on the SCAT maps and each member of the team, including the agency representative would sign that day’s SCAT form that no additional cleaning should take place at those specific areas. The end result is that some isolated locations within the entire Red Butte drainage that had been classified on the whole as “None” would have small identifiers where these areas occur and what classification they have. Most were “Light” to “Very Light” as there was not an abundance of free oil anywhere in the drainage. At Red Butte, the known areas with such a classification are: 1) portions of the active channel on the Peter Hayes property, 2): areas beneath structures on the Remund/Normandie shared property where the staining can’t be accessed by cleaning crews because of unsafe access beneath structures, 3) the minor TPH detection beneath the utility pole at 1096 South 1100 East, and 4) a small area upstream of Chipeta Way just below the Red Butte spill site where there exists a threat to the overhead canopy. Each of these sites is discussed further in separate summary reports.

Finally, just as with Red Butte, SCATs were performed along the Jordan River from just upstream of 1300 South which is the southern-most storm sewer where oil from Red Butte could enter the Jordan River all the way to just upstream of the entrance to the Great Salt Lake. The classification system for the River is essentially the same except the Jordan is a much larger drainage than Red Butte so the SCATs performed the surveys from a boat. With minor sheens captured in the absorbent booms and pads placed at the inlets at 1300 South, 900 South and 800 South, as well as at each major road crossing on the first day of the release, free oil and sheens on the water surface were rapidly captured. The focus then became staining of vegetation along the River banks. Some of these areas were observed by walking teams rather

than from the boats. Recommended action was to re-visit some of these areas after spring runoff in 2011 to assess impacts. However, damage to reeds and other near-shore vegetation along the Jordan River was not deemed as being a threat to the habitat as it was on Red Butte, due primarily to the absence of large overhead canopies and a much wider river width with thick, well developed vegetation along both banks.

This document provides a concise, non-technical summary of activities that took place to assess and direct cleanup activities along Red Butte Creek and the Jordan River. A more detailed technical report with figures, lab certificates, design drawings, photographs and other engineering information is being developed and will be submitted to the DWQ.

CHEVRON PIPE LINE COMPANY
RED BUTTE CRUDE OIL RELEASE
SUMMARY OF REMEDIATION AND RECLAMATION ACTIVITIES
RED BUTTE SPILL SITE

This summary addresses activities at the Red Butte Release Site ("Release Site") where crude oil flowed from the pipeline both over and under the surface and down the adjacent channel slope into Red Butte Creek. At the time of the release the site was occupied by several underground utilities and a Rocky Mountain Power overhead to ground transfer facility ("RMP Terminal"). The RMP Terminal transferred power transmitted through overhead power lines suspended on poles running down Red Butte Canyon through a series of utility towers to the ground surface where the power is transferred to users as an underground source. The released oil flowed directly into the RMP Terminal with part flowing across the surface and down the channel into Red Butte Creek. However, quantities of the oil settled in around the deep concrete foundations for the utility poles and their appurtenances traveling along the contact between the concrete and the soil to depths estimated from the initial investigation of 12 to 18-feet below the surface. The oil also followed the foundations for the underground transfer footings and the underground lines themselves for some distance at a depth of approximately 5-feet below the surface. It is of note that analytical results from exploration boreholes installed at the site between June 23 and 26 (EarthFax, July 2010) demonstrated that all underground impact remained within the small service area defining the RMP Terminal and the underground conduits within 100-feet of the RMP Terminal and that no oil passed beneath the adjacent roadway or impacted the buildings on the southwest side of the road.

On June 12, 2010 at points directly downstream of the Release Site in the Red Butte Creek channel, Chevron Pipe Line ("CPL") constructed two underflow weirs across the channel. The weirs captured oil floating on the water surface upstream of the weir with creek flow passing through culverts installed through the weirs along the bottom of the channel. These structures effectively minimized further flow of oil down the Red Butt drainage. A favorable benefit of the Red Butte drainage is that it terminates at the Liberty Park Lake ("Lake") on 700 East and 1300 South in Salt Lake City. After closing the outfall from the Lake to the Jordan River, the oil was recovered effectively without significant further downstream impact. Note that the Lake activities and reclamation are addressed in a separate summary report.

Once the oil flow was stopped and the underflow dams were containing captured oil for recovery, the focus became removal of the RMP Terminal concrete foundations and all impacted soil at the Release Site. This included excavation and cleaning impacted portions of the Red Butte channel. The power entering the RMP Terminal was shut down immediately upon notification of the release. This allowed CPL to begin excavation to remove all of the concrete foundations and impacted soil from the site including beneath Red Butte Creek. To accomplish this work, particularly in the channel, a temporary diversion of current and forecast flows down Red Butte had to be constructed. This was accomplished by installing hydraulic plugs in two of the three 30-inch culverts beneath the Red Butte Bonneville Shoreline Trail Bridge and a diversion pipe into the third, center culvert. Water in the pipe bypassed the

channel to a point approximately 150 feet downstream where it was directed back into the channel below the lower of the two underflows dams. This allowed CPL to excavate to the required depth below the former Red Butte channel to both remove impacted soil and to reconstruct the channel and adjoining area.

Excavation at the Release Site began on July 22, 2010, with backfill commencing on August 16, 2010. Once excavation had been completed to what appeared to be the extent of contamination, confirmation samples were collected for laboratory analysis. The cleanup standard agreed to by the Red Butte Unified Command was the Utah DERR Initial Screening Levels ("ISLs") for hydrocarbon constituents. Once the samples were collected, no backfill activities were initiated until the analytical results had been returned demonstrating compliance with the ISLs. If the sample did not satisfy the ISLs, additional excavation took place and the specific area was re-sampled. Only after confirmation samples demonstrated compliance with the ISLs did backfill commence. Because RMP planned to relocate the Terminal away from the original location, CPL backfilled the site to match existing lines and grades from the top of the slope that was not impacted by the release down to the north side of the Red Butte Creek that also was not impacted by the release.

Finally, in late September once all soil had been excavated and removed off site, CPL re-constructed the Red Butte channel to match the inflow elevation above the impacted part of the drainage with the channel elevation downstream of the impacted area. The channel was reconstructed with properly sized rock, sand and gravel along with re-planting of the appropriate riparian vegetation to restore the channel to not only the proper hydraulic capabilities but also to restore the habitat.

A total of 2,300 cubic yards of contaminated soil were excavated and removed from the site to the Clean Harbors landfill in western Utah. Reconfiguration of the slope without the formerly flat RMP Terminal resulted in placement and compaction of 1,800 cubic yards of clean imported fill. Once all contaminated material had been excavated the underflow weirs were removed. Following channel re-construction the temporary diversion pipe was removed and total flow down Red Butte Creek was returned to the channel on September 14. Finally, as part of the site restoration the Bonneville Shoreline Trail, which traverses the site was reconstructed to match the new lines and grades at the site. Drainage features were also installed to allow storm water runoff to spread across the site rather than flowing down the new slope where it could incise a channel in and carry sediment loads directly to Red Butte Creek.

In March 2011, CPL agreed with the University of Utah to fund a project that includes site engineering and landscape design services to remediate the west edge of the Red Butte Garden Amphitheatre, Bonneville Shoreline Trail and adjacent areas following site disturbance and soil removal resulting from the oil spills.

This document provides a concise, non-technical summary of activities that took place to remediate and restore the ground and channel impacted at the Release Site. A more detailed technical report with figures, lab certificates, design drawings, photographs and other

engineering information is being developed and will be submitted to the DWQ when the information is available and compiled.

CHEVRON PIPE LINE COMPANY
RED BUTTE CRUDE OIL RELEASE
SUMMARY OF REMEDIATION AND RECLAMATION ACTIVITIES
LIBERTY PARK

Crude oil released from the Red Butte Release ("Release") traveled down Red Butte Creek to approximately 900 East where it flows into an underground storm drain that discharges into Liberty Lake ("Lake") through the Red Butte Inlet, located in the northeast corner of the Lake. A manually-controlled gate valve on a connecting culvert allows flow from Red Butte to travel along 700 East and enter the Lake through the Emigration Inlet located on the southeast corner of the Lake. At the time of the release, that gate was open resulting in crude oil entering the Lake through both inlets. Outfall from the Lake is controlled by a gate valve and overflow weir on the southwest side of the Lake that allow the City to regulate discharge from the Lake to the 1300 South storm sewers that drain down both 1300 South and 900 South to the Jordan River. The gate valve from the Lake was also open at the time of the release resulting in limited discharge of oil to the Jordan River. However, closing the outlet from the Lake along with placement of control measures in the Jordan River greatly limited the downstream extent of impact and prevented discharge of oil to the Great Salt Lake.

Because the Lake is the receptor of the Red Butte drainage, it was used as the downstream collection and recovery point for part of the released oil. Chevron Pipe Line ("CPL") deployed vacuum trucks, Baker Tanks, absorbent booms and other recovery equipment to the Park, which served as a staging area for the recovery efforts. The impact of the release to the Lake and surrounding areas resulted in damage and staining of the concrete ringwall around the Lake and both islands, the soil underlying the ringwall, some nearby concrete sidewalk panels where large trucks traveled, grass, sprinklers and some other features.

After the oil had been recovered from the Lake and the majority of the emergency and recovery activity work was complete the next step was to remove impacted sediment and then to restore the Lake and Park for public use. The first phase involved draining the Lake to allow removal of all sediment on the Lake. Several track mounted excavators were used to remove pre-event sediment that had been accumulating in the Lake over the previous five to seven years since Salt Lake County last made an effort to remove the sediment. At the same time, CPL removed and disposed of the original concrete ringwalls and the visibly stained soil beneath them. Overall, counting the concrete and soil beneath it plus the Lake bottom sediment, 13,041 tons of material were excavated and disposed of at the Wasatch Regional Landfill in Tooele County, Utah. Of this volume, an equivalent 9,500 cubic yards of sediment was removed from the Lake bottom.

As removal of the various materials advanced, confirmation samples were collected at thirty randomly selected locations throughout the Lake. Fifteen were in the Lake bottom where the sediment had been removed and fifteen were in the newly exposed, visually clean soil beneath the former ringwalls. Confirmation samples were collected by first verifying that the randomly selected location was free of visual staining and had total organic vapor

measurements of less than 100 ppm using a photo-ionization detector ("PID"). Once those criteria had been satisfied, the top four to six inches of soil were excavated to expose a fresh surface. From that surface a sample was collected for laboratory analysis. Samples were analyzed for the constituents generally accepted at a November 15, 2010 meeting with CPL, Salt Lake City and Utah DWQ. Because the Lake is open to the general public, it was decided to evaluate the confirmation sample results using standard EPA human health risk assessment procedures. This evaluation included exposure pathways for a child falling into the Lake and coming into contact with the bottom 26 times per year for a lifetime. That risk assessment confirmed that the resulting exposure under that scenario was below the acceptable cancer and non-cancer risks established by the U.S. EPA. Additionally, on April 14, 2011 samples of soil were collected beneath the 8-inch concrete floor and sidewall slabs at both the Red Butte and Emigration inlet structures. These samples were analyzed for the same analytes as the other confirmation samples. Results were applied to and satisfied the same human health risk models for cancer and non-cancer EPA standards applied to the Lake bottom samples referenced above.

Upon completion of the concrete, soil and sediment removal and the confirmation sampling, CPL retained a general construction contractor to re-contour the Lake bottom and construct a new retaining wall around the Lake and both islands. Unlike the original ringwall, the new wall was constructed as a structural retaining wall with a concrete footing anchored with rebar to the new concrete wall. The exposed wall was hand rubbed with an epoxy-based polymer grout to cover the form joints, air bubble holes and to create a uniform, smooth surface. Another enhancement was addition of a rip-rap section against the wall extending out into the Lake approximately 8 feet. This rip-rap surface will minimize erosion of soil near the new wall. In addition to construction of the new retaining wall, the aeration system was re-installed but was upgraded with new bubblers to more effectively provide aeration of the water during the seasons when algae and pond weed forms in the Lake. Finally, damaged sprinklers, concrete sidewalk sections outside the Lake wall and new sod and an entrance ramp in the northeast corner of the Lake were constructed.

On the morning of April 19, 2011, CPL met with representatives of the DWQ and Salt Lake City wherein the respective representatives notified CPL that the cleanup and restoration of the Liberty Park Lake was complete and that they were satisfied no residual health risks existed that would prevent unrestricted use of the Lake. At the time this summary was prepared, CPL was developing a schedule to conduct a site walk with representatives of Salt Lake City and Utah DWQ to review the improvements and develop a punch list of items needing final adjustments. At present, a date to re-open the Lake for use by the public was being targeted for the first week of May, 2011.

At a later meeting on April 19, representatives of CPL, DWQ and the City approved a filling plan that involved having the City open the Lake outlet to the Jordan River and activate the aeration system. Approximately five hours after the aeration system was activated, CPL collected water samples at both inlets, the outlet and from three randomly selected points in the Lake. The sampling was performed on April 25 and results did not reveal any detectable oil

contamination in the outflows from the Lake. Sampling results will be included in the detailed technical report referenced below.

This document provides a concise, non-technical summary of activities that took place to remediate impact from the release, remove all Lake sediment, rebuild the retaining wall and return Liberty Park and Liberty Lake to public use. A more detailed technical report with figures, lab certificates, the human health risk assessment, concrete wall design drawings, photographs and other engineering information is being developed and will be submitted to the DWQ once the information is compiled.

CHEVRON PIPE LINE COMPANY
RED BUTTE CRUDE OIL RELEASE
SUMMARY OF REMEDIATION AND RECLAMATION ACTIVITIES
MT. OLIVET CEMETERY

When the Red Butte Crude Oil Release occurred, a gate valve was open on the system that draws water from the Red Butte Creek drainage and carries it in a conveyance pipe to the storage reservoir located in the northeast corner of the Mt. Olivet Cemetery ("Cemetery"). This resulted in water and the released oil being transported to the inlet box adjacent to the reservoir. At the time of the event, the Cemetery reservoir was full and water was being diverted by a pre-set level control in the inlet box into a short, unlined open channel to the eastern road of the Cemetery into a culvert below the road that daylights into the historic Olivet drainage ditch that flows through the Cemetery and enters the storm drain system at 500 South and 1500 East. That storm drain flows along 1350 East to 800 South where it then flows west and discharges to the Jordan River.

During the early stages of the spill response, representatives of the US EPA and DWQ along with Chevron Pipe Line ("CPL") inspected the reservoir and collected samples. Based on their review of the laboratory analysis of the samples, and with authorization of the Red Butte Release Unified Command, the Cemetery reservoir was deemed in late summer as suitable for use and distribution of Class 4 agricultural water use. Up until that time, Baker Tanks provided by CPL with clean water and distribution pumps were used to distribute irrigation water at the Cemetery.

The referenced drainage ditch, not the entire Cemetery, is eligible for listing on the National Register of Historic Places. But overall, the ditch was in a state of disrepair with several breaks in the old concrete, missing rocks, tree root damage and other structural issues with extensive fractures in the concrete that allowed water and the oil to penetrate the soil beneath. The majority of the open concrete ditch was also stained with oil. Working with EPA and Utah DWQ, CPL obtained permission from the Utah State Historic Preservation Officer to replace the concrete ditch along its length with two exceptions. There is a hand built rock waterfall in the upper portion of the ditch and what is referred to as the water feature near the lower end of the ditch that were only to be cleaned and restored rather than replaced.

Remediation and reclamation activities included removal of the entire rock and concrete lined ditch, with the exception of the waterfall and water feature. Additionally, all impacted soil encountered beneath the old ditch and in the small open channel that runs from the reservoir beneath the road to the entrance of the concrete lined ditch was excavated. A total of 152 cubic yards of oil impacted soil were excavated from below the former ditch and disposed at the Clean Harbors landfill. The extent of excavation was confirmed through confirmation tests intended to demonstrate that the soils left in-place were free of oil staining and satisfied Utah DEQ laboratory concentrations of hydrocarbon constituents leaving underlying soil free of contamination from the oil spill.

Once the contaminated soil had been excavated and removed from the site, the following improvements were made to restore the impacted portions of the Cemetery back to original conditions.

- The entire drainage ditch was re-constructed using steel re-enforced concrete that was stamped with special forms to appear much like a rock surface,
- The small open drainage channel by the reservoir was re-built and rip-rap lined from the control box to the underground pipe that discharges to the new concrete ditch,
- Several trees were removed at the direction of the Cemetery Sextant,
- The waterfall was cleaned and re-built in place as needed using the original rock,
- The water feature was initially cleaned and restored, as requested. However, due to the need to better manage the flow down the new, non-leaking concrete channel, the Cemetery Board requested that CPL re-build the sidewalls of the feature and install a combination weir/trash-rack structure to capture leaves and debris that are generated during spring and fall runoff,
- The lower parking lot and road from the south side of the maintenance buildings to the north around the main house continuing up the main entrance to the east was re-paved.

Upon completion of all reclamation activities at the Cemetery, members of Unified Command, the Cemetery Sextant and some board members evaluated the work and determined that it had been completed to their satisfaction. Additionally, at the April 2011 Unified Command meeting, it was agreed that work at the Cemetery was completed to the satisfaction of that regulatory body.

This document provides a concise summary of activities that took place to remediate and restore the impacted areas at the Cemetery. A more detailed and technical report with figures, lab certificates and other engineering information will be developed and submitted to the DWQ when the information is compiled.

CHEVRON PIPE LINE COMPANY
RED BUTTE CRUDE OIL RELEASE
SUMMARY OF ACTIVITIES AT THE GARDEN PARK WARD

The Garden Park Church is an LDS Ward Building located at 1150 East Yale Avenue in Salt Lake City, Utah. Red Butte Creek enters the property to the east where it flows across a small waterfall feature into a small pool with a gate. The gate allows water to either continue flowing west through a buried pipe or through a small, concrete lined decorative pond. This aesthetic setting, with the pond and surrounding gardens, makes it a popular location for weddings and other activities. The site is listed on the Utah Register of Historic Places.

At the time of the Red Butte release, there were no activities ongoing at the church and the Creek was diverted through the conveyance pipe under the pond the morning of June 12, 2010. In addition to receiving calls from the groundskeepers at the church, first day SCATs identified it as a site that was impacted by the event. Personnel from Chevron Pipe Line ("CPL") and EarthFax were at the church within hours of the reported impact and arranged for Rapid Response Teams to mobilize there. Initial activities involved cleanup efforts of the Creek around the pond and cleanup efforts of the conveyance lines beneath the pond and the pond itself. Most of the impact was in the form of stained rocks and concrete along the Creek and in the rockwork surrounding the pond. Cleanup efforts at this location were focused around returning the church to service because several weddings had been scheduled there prior to the event. However, even with the concentrated effort, the facility was not returned for use until late summer. During that time, CPL arranged alternative venues for weddings at other popular wedding locations such as Mill Creek Inn and LaCaille in Salt Lake City. The Garden Park Church remains a routine monitoring location during routine, post storm event SCAT visits along Red Butte.

CHEVRON PIPE LINE COMPANY
RED BUTTE CRUDE OIL RELEASE
SUMMARY OF ACTIVITIES AT 1096 SOUTH 1100 EAST

The property owner along Red Butte Creek at 1096 South 1100 East, Mr. Neil Wursten, reported oil on his property early in June after the release. This area was evaluated by the SCATs and Chevron Pipe Line ("CPL") sent cleaning crews to clean the oil along the Creek on this property. After cleaning and confirmation sampling had been completed it was documented that the majority of the property had been cleaned to the satisfaction of the owner and in accordance with the clean up goals established by Unified Command with one exception. Much of the work at this site involved more than just cleaning. Soil was actually excavated and disposed off site with placement of clean imported fill to the original lines and grades at the property. The noted exception was in an area adjacent to the Creek where the owner had constructed a concrete retaining wall. Adjacent to the wall is a wooden utility pole where the surrounding soil was logged by the SCATs as containing visually contaminated soil. The stained soil was excavated to an elevation where there was no visual staining and the organic vapors were low. Having satisfied those criteria, a confirmation sample was collected adjacent to the pole. Typically, backfill does not commence until the analytical results are returned demonstrating compliance with the Utah Division of Environmental Response and Remediation Initial Screening Levels. However, this site was immediately adjacent to the active channel; so, to avoid undermining of the concrete wall foundation, the pole, and to avoid creating safety concerns, the area was backfilled based on the lack of visual staining and low organic vapors.

Analytical results identified one detection of Total Petroleum Hydrocarbons within approximately six inches of and just below the utility pole at a depth of four feet. Because backfill was complete, the effort required to excavate down to this level through the new engineered fill, would required removal of the utility pole and likely the concrete retaining wall. Because of the complexity of this activity, disturbance to the property and the potential for introduction of high sediment load into the Creek, the land owner requested that CPL not excavate further on his property. While the residual concentration of TPH was low, it did exceed the Initial Screening Levels and could not be left in place without technical justification and approval by Unified Command. CPL consulted the Unified Command about leaving the small area in place due to its depth and lack of exposure pathways. CPL agreed that if the land owner and/or Unified Command directed, it would remove the utility pole and portions of the retaining wall to excavate the soil and backfill the site with clean fill followed by restoration of the wall and replacement of the utility pole. On March 31, 2011, the Utah Division of Water Quality ("DWQ") issued a memorandum wherein DWQ agreed that the most effective alternative was to leave the small area of soil in place and allow the hydrocarbons to degrade naturally. The other members of Unified Command concurred with DWQ's conclusion. CPL continues to work with the property owner to gain formal approval of the plan.

CHEVRON PIPE LINE COMPANY
RED BUTTE CRUDE OIL RELEASE
SUMMARY OF CURRENT STATUS
REMUND/HARVARD PROPERTY

The property in question is located on Normandie Circle and Harvard Avenue where two separate property owners share a section along Red Butte Creek that was impacted by the June release. DEQ along with the property owner located at 1365 E. Harvard Avenue, have expressed concern that this location represents an ongoing source of oil contamination. This is due to Chevron Pipe Line's ("CPL") inability to assess and adequately remove, if necessary, any remaining oil from this property based on safety and other stream bank concerns. Prior owners of this property, long before the oil release, constructed a "summer home" structure that spans Red Butte Creek. In response to stream bank erosion under the structure, owners have attempted to buttress stream banks under the structure with stacked and cemented sandbags that provided porosity and flow paths for oil from the creek.

The concern raised is that most of the sand bags and other areas on the property appear to have been stained by the oil that could require further assessment by CPL to establish the extent of contamination and development of a remediation plan. Normally, this would be a routine issue first defined by the SCATs with follow up cleaning by the response teams. The difficulty is that much of the impact is along portions of the channel that are confined on all sides by the vertical channel sidewalls that are formed in places by concrete, the Creek bottom, and the overlying foundation of the building. This confined space condition complicates safe entry under CPL safety protocols (CPL's confined space procedure, HES 201 in compliance with OSHA citation 29 CFR 1910.146) to accurately assess and remediate the impact from the release. Most specifically, the foundation is not adequately supported as evidenced in several places by concrete piers that have several inches of separation from the overlying structure they were intended to support, some of which have since been linked to the structure with cables or chains. Some of the sand bags in question appear to be hanging as they are embedded in concrete that was placed in what appears to have been an effort to avoid undermining of the structure by the Creek. Even earlier attempts to stabilize the foundation are evidenced by rusted out steel poles that once attached to the floor beams above. Because of this obvious history of repeated failed attempts to safely stabilize the structure, it is necessary before any physical investigation of the impact from the Red Butte release can be made to stabilize the site in a fashion that will allow safe access to perform both the site assessment and eventual entry for any additional cleaning and reclamation.

CPL developed a Work Plan for sampling at this site and submitted it to Utah DWQ on April 28. Included was a statement that a structural engineer would visit the site to evaluate the setting and the previous attempts by property owners at stabilizing the foundation to determine if there are structural limitations to the current configuration that could be worsened by access for sampling, investigation, sand bag removal and cleaning. Since submittal of that plan, a Utah licensed structural engineer did visit the site and made an assessment. His response is attached to this summary. He stated that the structure is not safe and that it should not be

occupied. Additionally, he recommended that the structure be provided with additional support before crews access the area under the structure to collect samples. Very high stream flows at the time of his visit precluded seeing the actual creek bottom to take measurements required to design the required temporary support. Once flows are down and the area that will serve as the foundation for temporary stabilization can be observed, a design will be submitted to CPL. The design will include temporary support measures to be deployed to allow safe working conditions. Once it has been demonstrated that a safe working environment has been established, the above referenced sampling Work Plan will be implemented. Based on the observations of the structural engineer and the results of the sample analysis, options will be presented through the Unified Command and DEQ Division of Water Quality to remediate this property and the path forward will be developed with a tentative schedule for implementation.

Also, Mr. Remund is now represented by legal counsel who will be copied on the draft Work Plan.

CHEVRON PIPE LINE COMPANY
RED BUTTE CRUDE OIL RELEASE
SUMMARY OF ACTIVITIES ON THE HAYES PROPERTY

Mr. Hayes owns a home located at 1731 East 900 South on Red Butte Creek where it flows into a culvert under 900 South. Two primary issues on this property remain. The first is a pocket of crude oil in the channel sediment along the north side of the active channel. Sampling conducted by the Division of Water Quality in February confirmed that this oil was present and displayed the characteristics of the released oil. Chevron Pipe Line ("CPL") dispatched crews to clean this site where as much of the oil as possible was removed. However, some small traces of oil appear to remain.

The second issue involves both the Hayes property and that of his neighbor to the east. Ivy plants that originate near the channel bank and climb up the slope began to display yellowing at the far end where the newest growth was developing. Mr. Hayes claims the yellowing is a result of the oil that was in contact with the ivy during the initial stages of the release and that the ivy would likely die. In response, CPL sent two riparian biologists and a botanist from Bio-West to the site to evaluate the yellowing of the leaves. That event was observed by a representative of EarthFax and the Salt Lake Valley Health Department. Samples of the ivy were collected from the area and a neighborhood reconnaissance was made to observe other ivy stands. Several stands on adjacent properties some distance from the Hayes property and Red Butte Creek were observed to have the same yellowing. Bio-West sent several samples to a botanist at Utah State University for analysis. Bio-West reported back to CPL that the yellowing was a fungus common to this strain of ivy that is often caused by temperature shock or other unusual activities near the ivy. The botanist stated that as long as the source of the shock was removed, the plant would likely recover during the next growing season.

CPL had planned further investigation and cleaning on Mr. Hayes's property; however, CPL and its contractors received notification from Mr. Hayes that all future access to his property had been denied. Accordingly, no further action has been allowed to occur regarding the two issues.

Annex C
Air Monitoring Summary

Table 1
Air Monitoring Results Summary

Sample Location	Activity	Method	Date	Benzene (ppm)	Ethyl Benzene (ppm)	Toluene (ppm)	Total Hydrocarbons (ppm)	Xylene (ppm)
Around pressure washing and mouth of culvert	Cleanup operations	PID	7/6 - 7/15	ND (0.05 - 2.0)	na	na	0.001 - 44	na
Directly above creek and at edge of the banks	none	PID	6/16 - 6/23	ND (0.05)	na	na	0.001 - 9	na
Directly above creek and at edge of the banks	Flushing creek with large volumes of water	PID	7/15	ND (0.05 - 0.70)	na	na	0.001 - 44	na
Several feet from source	all activities	PID	all dates	ND (0.05)	na	na	ND (0.001)	na
Various locations along creek - directly against water surface	none	Integrated Area Sampling	6/16 - 6/23	ND (0.022)	ND (0.21)	ND (0.21)	ND (0.064 - 0.22)	ND (0.24)
Various locations along creek - directly against water surface	Cleanup operations	Integrated Area Sampling	7/6 - 7/18	ND (0.022)	ND (0.21)	ND (0.21)	ND (0.064 - 3.0)	ND (0.24)
Personnel Samples (5 workers)	Cleanup operations	Integrated Personnel Sampling	7/6 - 7/10	ND (0.18 - 0.71)	ND (0.21)	ND (0.18 - 0.71)	ND (0.24 - 4.5)	ND (0.18 - 0.47)
PEL				1	100	200	na	100
ATSDR Screening Level				0.009	9.2	1.06	na	1.82

Legend
na = not applicable based on instrument or method limitations
PEL = OSHA permissible exposure TWA limit
ASTDR = Agency for Toxic Substances and Disease Registry
LOD - Limit of Detection for the sampling and analytical method
ND = non detectable with detection limit provided in parenthesis

Air Monitoring Summary Report
Chevron Pipeline Red Butte Creek Release

July 2, 2010

Prepared For:

Peter Sarmicanic CIH, CSP
Chevron Products Company
841 Chevron Way
Richmond, CA 94801

Report Prepared By:

RMEC ENVIRONMENTAL, INC.
2188 South Highland Drive, Suite 201
Salt Lake City, UT 84106

Frank DeRosso, MSPH, CIH
Senior Scientist

Reviewed By:

Daryl Hancock, CHMM
Project Manager

INTRODUCTION

This report has been prepared to summarize the results of area air monitoring in the vicinity of Red Butte Creek following the Chevron Pipeline crude oil release that occurred on June 12, 2010. The monitoring was performed by environmental scientists/ industrial hygienists from RMEC Environmental, Inc. (RMEC) to provide an independent third party assessment of potential petroleum vapor exposures to residents and other receptors in the vicinity of the creek.

The area air monitoring was performed at various times and locations between June 16, and June 25, 2010. Frank DeRosso, MSPH, CIH, Daniel Nye, MSPH, CIH, Ian Percy and Cody Paul of RMEC performed the air monitoring. Senior Scientist Frank DeRosso, MSPH, CIH, also provided project oversight and developed this summary report.

BACKGROUND INFORMATION

RMEC was contacted by safety personnel from Chevron Salt Lake Refinery on June 15, 2010, and was asked to provide personnel to perform air monitoring along the Red Butte Creek in support of the petroleum clean-up efforts from the pipeline release. RMEC met with Chevron employee Tammy Charette, the safety lead for clean-up efforts, on June 16, 2010, at the Chevron Pipeline Incident Command Center at 2875 South Decker Lake Drive in Salt Lake City. At this meeting RMEC was provided with a copy of an air monitoring plan developed by Chevron. The plan designated that area air monitoring for various petroleum-related vapors was to be performed three times daily (~7:00 AM, Noon and 4:00 PM) at the following locations:

- 1731 East 900 South
- Bonneview Park
- 1225 Harvard
- Liberty Park Pond
- 1300 South 900 West (creek inlet to Jordan River)
- 960 West 900 South (creek inlet to Jordan River)

RMEC agreed to provide personnel to implement the plan and began performing area air monitoring in the afternoon of June 16. RMEC performed field modifications to the plan as conditions dictated and began the three times per day monitoring on June 18, 2010.

METHODS AND MATERIALS

Real-Time Air Monitoring

RMEC used several instruments to assess the level of petroleum-related vapors in the vicinity of Red Butte Creek and the ponds at Liberty Park. RMEC used an UltraRae 3000 Photo-ionization Detector (PID) to measure airborne benzene levels, an EntryRae PGM 3000 to measure hydrogen sulfide (H_2S) levels and a ppb UltraRae PID to measure VOC levels at the designated locations along Red Butte Creek. RMEC personnel, in

accordance with manufacturer's guidelines, calibrated all instruments on the morning of each day of monitoring. Instrument serial numbers and calibration information are included with the monitoring results in Appendix A.

Integrated Area Monitoring

RMEC also collected integrated area air samples at selected locations using 3M 3500 passive organic vapor monitors (POVMs). The POVMs were set up at the designated sample locations at specific points that were assumed to have the highest concentration of petroleum vapors. The presence of petroleum odors and the VOC measurements obtained from the real time air monitoring were used to choose the locations where the POVMs were deployed.

The POVMs were deployed for ~24 hour periods, collected, and submitted under chain of custody to ALS Laboratory Group of Salt Lake City. ALS Laboratory Group is an American Industrial Hygiene Association (AIHA) accredited laboratory. The POVMs were analyzed for benzene, toluene, ethyl benzene, xylene (BTEX), and total hydrocarbons.

RESULTS/DISCUSSION

Real Time Monitoring

The results of the real time monitoring are summarized in Appendix A. These tables essentially are a reproduction of the field notes taken during the real time monitoring events.

All benzene levels measured during the sampling events were below the instrument detection limit (<0.05 ppm) at all locations. All hydrogen sulfide levels were also below the instrument detection limit of 1 ppm.

RMEC did find measurable levels of total VOCs during the monitoring events. Total VOC levels ranged from approximately 1 – 9,000 parts per billion (ppb) at various locations along Red Butte Creek. The highest VOC measurements were typically obtained directly above Red Butte Creek in areas were water was flowing over rocks or falls or was otherwise being agitated or disturbed. VOC levels were typically <1 ppb once the sampler moved a few feet away from the creek. VOC levels were generally higher in the afternoon as outdoor temperatures warmed. Please note that the VOC levels indicated in the table are instantaneous peak concentrations measured at various points at the sampled properties and should not be considered long term average concentrations.

Intermittent petroleum odors were noted at various times and locations at the designated sampling points (see notes in tables). However, the presence of petroleum odors did not always correlate with the presence of measurable levels of VOCs (i.e. VOC levels were sometimes below 1ppb even when odors were present).

POVM Monitoring

The results of the 24-hour integrated monitoring using the POVMs are summarized in Appendix B.

All benzene, toluene, ethyl benzene, and xylene (BTEX) levels measured with the POVMs were below laboratory detection limits. Only two of the 14 POVM samples showed measurable levels of total hydrocarbons. These samples were located at 1731 East 900 South along the creek and at 1102 South 900 East, above the creek on the west side of the 900 East bridge. The total hydrocarbon level in these samples was 0.22 ppm and 0.072 ppm, respectively.

Appendix A

June 16th 2010

Notes: Benzene measured with Ultra Rae 3000. VOC and H2S measured with Entry Rae PGM 3000. Benzene Cal Gas # 927895, H2S/VOC Cal Gas # 7H350035

Sample Serial #	Time	Exact Location of Sample	H2S (ppm)	VOC (ppm)	Benzene (ppm)	Comments
RMEC061610DN01	5:00 PM	1731 East 900 South (Backyard along water way)	<1	<1	<0.05	Moderate odor along stream. Met with resident. Recived Permission to access property as needed.
RMEC061610DN02	5:20 PM	1225 East Harvard (Backyard along water way)	<1	<1	<0.05	Moderate odor along stream. Met with resident. Recived Permission to access property as needed.
RMEC061610DN03	5:30 PM	Bonneview Park (Upstream Bridge and Grafe area)	<1	<1	<0.05	Moderate intermittent odors. Strongest along water fall.
RMEC061610DN04	5:50 PM	Liberty Park (Perimeter of Lake)	<1	<1	<0.05	Intermittent light to moderate odors.

June 17th 2010

Notes: Benzene measured with Ultra Rae 3000. VOC and H2S measured with Entry Rae PGM 3000. Benzene Cal Gas # 927895, H2S/VOC Cal Gas # 7H350035

Sample Serial #	Time	Exact Location of Sample	H2S (ppm)	VOC (ppm)	Benzene (ppm)	Comments
RMEC061710FD01	9:13 AM	1300 South 900 West (Creek entry into Jordan River)	<1	<1	<0.05	Clear and Calm. 61 F. Intermittent light odors.
RMEC061710FD02	9:44 AM	960 West 900 South (Creek entry)	<1	<1	<0.05	Intermittent light odors.
RMEC061710FD03	10:00 AM	Liberty Park (Perimeter of Lake)	<1	<1	<0.05	Clear and Calm. 70 F. Intermittent light odors.
RMEC061710FD04	11:10 AM	1731 East 900 South (Along water way)	<1	<1	<0.05	Intermittent very light odors.
RMEC061710FD05	11:55 AM	Bonneview Park (Along waterway east of parking lot)	<1	<1	<0.05	Moderate odor near waterfall, intermittent light odors elsewhere.
RMEC061710FD06	12:10 PM	1225 Harvard (Along waterway)	<1	<1	<0.05	Intermittent light odors.
RMEC061710FD07	3:25 PM	1731 East 900 South (Along water way)	<1	<1	<0.05	Slight odor. Stronger than in AM.
RMEC061710FD08	3:50 PM	Bonneview Park (East along waterway)	<1	<1	<0.05	Slight intermittent odors.
RMEC061710FD09	4:05 PM	1225 Harvard (Along waterway)	<1	<1	<0.05	Slight intermittent odors. Stronger than in AM.
RMEC061710FD10	4:15 PM	Liberty Park (Perimeter of Lake)	<1	<1	<0.05	Slight intermittend odors.
RMEC061710FD11	4:30 PM	900 South 960 West (Creek entry to river)	<1	<1	<0.05	No odor.
RMEC061710FD12	4:45 PM	1300 South 900 West (Creek entry into Jordan River)	<1	<1	<0.05	Slight odors.

June 18th 2010

Notes: Benzene measured with Ultra Rae 3000. VOC and H2S measured with Entry Rae PGM 3000. Entry Rae P6M 3000 failed on sample RMEC061810FD03 and VOC readings where taken with a ppb Rae 3000 for the rest of the day. Benzene Cal Gas # 34LS-21-5, Lot # GAK-21-5-2, H2S/VOC Cal Gas # 7H350035, VOC-Isobutylene Cal Gas Lot# 1073104

Sample Serial #	Time	Exact Location of Sample	H2S (ppm)	VOC (ppb)	Benzene (ppm)	Comments
RMEC061810FD01	7:30 AM	1731 East 900 South (along river)	<1	<1 (ppm)	<0.05	Slight odor at street level. Less odor along river. Clear and calm around 55 F.
RMEC061810FD02	7:50 AM	Bonneview Park (along river)	<1	<1 (ppm)	<0.05	Slight odor in parking lot and along river.
RMEC061810FD03	8:10 AM	1225 Harvard (Along river)	N/A (Instrament Failure)	N/A (Instrament Failure)	<0.05	Slight odor along street and in back yard. Stream appeared cleaner than day before.
RMEC061810FD04	8:50 AM	Liberty Park (Perimeter of Lake)	N/A	<1	<0.05	No odor.
RMEC061810FD05	9:05 AM	1300 South 900 West (Creek entry into Jordan River)	N/A	<1	<0.05	No odor.
RMEC061810FD06	9:15 AM	960 West 900 South (Creek entry)	N/A	<1	<0.05	Very slight odor. Clear, and calm 67 F.
RMEC061810FD07	11:40 AM	1731 East 900 South (Along water way)	N/A	<1-200	<0.05	Intermitent Moderate odor along stream bank at the east end of the house.
RMEC061810FD08	11:50 AM	Bonneview Park (Along river)	N/A	<1-480	<0.05	Consistent moderate odor near boom deployemnt. Intermittent moderate odors along pathway.
RMEC061810FD09	12:12 PM	1225 Harvard	N/A	<1-975	<0.05	Hightest VOC reading on east side of property. Intermitent moderate odor.
RMEC061810FD10	12:43 PM	Liberty Park	N/A	<1	<0.05	Intermittent very slight odor around perimeter of lake.
RMEC061810FD11	1:07 PM	900 West 1300 South (Inlet)	N/A	<1	<0.05	No odor.
RMEC061810FD12	1:16 PM	960 West 900 South (Inlet)	N/A	<1	<0.05	No odor.
RMEC061810FD13	3:20 PM	1731 East 900 South (Along the River)	N/A	<1-300	<0.05	Slight odor upstream from the house. Clear and calm 81 F.
RMEC061810FD14	3:30 PM	Bonneview (Along the river)	N/A	<1-4000	<0.05	0-1000 ppb along river. 2000-4000 ppb on bridge below waterfall moderate intermittent odor.
RMEC061810FD15	3:40 PM	1225 Harvard (Along the River)	N/A	<1-1000	<0.05	Moderate intermittent odor. Highest VOC level near outlet under pool.
RMEC061810FD16	4:00 PM	Liberty Park (Near lake)	N/A	<1	<0.05	Very slight intermittent odor. Clear and calm 82 F.
RMEC061810FD17	4:15 PM	1300 South 900 West (Creek entry into Jordan River)	N/A	<1	<0.05	No odor.
RMEC061810FD18	4:30 PM	960 West 900 South (Near inlet)	N/A	<1	<0.05	No odor.

June 19th 2010

Notes: Benzene measured with Ultra Rae 3000. VOC measured with ppb Rae 3000. Benzene Cal Gas # 34LS-21-5, Lot # GAK-21-5-2, VOC-Isobutylene Cal Gas Lot# 1073104

Sample Serial #	Time	Exact Location of Sample	H2S (ppm)	VOC (ppb)	Benzene (ppm)	Comments
RMEC061910IP01	7:05 AM	1731 East 900 South	N/A	<1-214	<0.05	Shaded along creek, 61 F. Intermittent slight to moderate petroleum odor. Highest PID reading at west end of lot along creek.
RMEC061910IP02	7:12 AM	Bonneview Park (Along creek)	N/A	<1-73	<0.05	Shaded along creek, clear, 62 F. Slight petroleum odor in parking lot, intermitent slight to moderate petroleum odors along creek.
RMEC061910IP03	7:35 AM	1225 Harvard	N/A	<1-310	<0.05	Sunny, clear, 63 F. Intermittent slight to moderate petroleum odors along creek, highest PID reading at east end of lot along creek.
RMEC061910IP04	8:00 AM	Liberty Park (Around perimeter of pond)	N/A	<1-97	<0.05	Sunny, clear, 65 F. Intermittent slight petroleum odors around perimeter of lake.
RMEC061910IP05	8:15 AM	900 West 1300 South (Inlet)	N/A	<1-36	<0.05	Sunny, clear, 66 F. No petroleum odors, slight breeze east/south east. Some solvent like odors migrating on-site from nearby autobody shop.
RMEC061910IP06	8:30 AM	960 West 900 South (Inlet)	N/A	<1-214	<0.05	Sunny, clear, 68 F. Slight breeze east/south east. Intermittent slight to moderate petroleum odors.
RMEC061910IP07	11:40 AM	1731 East 900 South (Along creek)	N/A	<1-298	<0.05	Sunny, clear, shaded along creeek. Circulating breeze, intermittent slight to moderate petroleum odors. Highest PID readings at east end of lot near creek.
RMEC061910IP08	12:03 PM	Bonneview Park (Along creek)	N/A	<1-1623	<0.05	Sunny, clear, shaded along creek. Calm to vbery slight breeze. Highest PID readings near boom deployment north side of creek. Also saw 1000 ppb VOC's about 100 yards up river east of booms.
RMEC061910IP09	12:20 PM	1225 Harvard (Along Creek)	N/A	<1-3206	<0.05	Sunny, clear, 85 F. Very slight breeze. Highest PID readings near absorbent pad deployments along bridges and patios West side of lot. Saw about 1500 ppb VOC's adjacent to creek on east side of lot. Intermittent moderate petroleum odors.
RMEC061910IP10	12:50 PM	Liberty Park (Perimeter of pond)	N/A	<1533	<0.05	Sunny, 85 F, breezy winds South East. Moderate intermittent petoleum odors along North East portion of pond, also the site of the highest PID readings. No other odors observed.
RMEC061910IP11	1:15 PM	900 West 1300 South (Inlet)	N/A	<1-79	<0.05	Sunny, 89 F, breezy winds South East. Very slight intermittent petoleum odors.
RMEC061910IP12	1:30 PM	960 West 900 South (Inlet)	N/A	<1-135	<0.05	Sunny, 91 F, breezy winds South/South-East. Slight intermittent petoleum odor directly at inlet, also location of highest PID readings. No odor along creek bank downstream.
RMEC061910IP13	3:50 PM	1731 East 900 South	N/A	10-315	<0.05	Sunny, 89 F, calm and shaded near creek. Moderate intermittent petroleum odors. Did not appear creek was at surge level.
RMEC061910IP14	4:00 PM	Bonneview Park (Along creek)	N/A	250-5602	<0.05	Clear, shady, 85 F. Slight breeze. Surge began while at this location. Ambient levels of VOC's ranged from 250-500 ppb before surge. After surge VOC levels reached 5602 ppb. Moderate to stong petoleum odors.
RMEC061910IP15	4:33 PM	1731 East 900 South	N/A	1205-9240	<0.05	Clear, shady, 85 F. Slight breeze. Surge occuring. Strong petroleum odors. Highest PID readings along creek east end of lot.
RMEC061910IP16	4:55 PM	1225 Harvard	N/A	20-3352	<0.05	Mix of sun and shade, 85 F. Slight breeze. Surge occuring. Highest readings at east and west ends of lot. Moderate petrouleum odor.
RMEC061910IP17	5:30 PM	Liberty Park (Perimeter of pond)	N/A	26-4230	<0.05	Sunny, 89 F. Windy. Suge occuring. Suge water is coming in north east inlet, also the locatoin of highest PID readings. All other portions of pond were <100 ppb VOC's Intermittent moderate petroleum odors along north east portion of pond.
RMEC061910IP18	5:55 PM	900 West 1300 South (Inlet)	N/A	7-58	<0.05	Sunny, 90 F, Windy. No Petroleum odors.
RMEC061910IP19	6:20 PM	960 West 900 South (Inlet)	N/A	5-168	<0.05	Sunny, 90 F, windy. Very slight intermittent petroleum odors. Highest PID reading directly above inlet.

June 20th 2010

Notes: Benzene measured with Ultra Rae 3000. VOC measured with ppb Rae 3000. Benzene Cal Gas # 34LS-21-5, Lot # GAK-21-5-2, VOC-Isobutylene Cal Gas Lot# 1073104

Sample Serial #	Time	Exact Location of Sample	H2S (ppm)	VOC (ppb)	Benzene (ppm)	Comments
RMEC062010CP01	7:40 AM	1731 East 900 South (Along River)	N/A	<1-50	<0.05	Clear, calm winds, 68 F. Very slight odor. Highest VOC along east edge of property.
RMEC062010CP02	8:00 AM	Bonneview (Along the river)	N/A	<1	<0.05	Very slight odor. No VOC's measured. No Benzene.
RMEC062010CP03	8:15 AM	1225 Harvard (Along the River)	N/A	<1-52	<0.05	Highest VOC below pond area. 66 F. Very slight odor.
RMEC062010CP04	8:40 AM	Lilberty Park (Perimeter of Lake)	N/A	<1-284	<0.05	70 F. Slight intermittent odor. Mild southeast wind. Highest VOC south side of lake.
RMEC062010CP05	8:55 AM	1300 South 900 West (Inlet to Jordan River)	N/A	<1	<0.05	71 F. Little to no odor.
RMEC062010CP06	9:10 AM	960 West 900 South (Inlet to Jordan River)	N/A	<1	<0.05	No odor.
RMEC062010CP07	12:42 PM	1731 East 900 South (Along River)	N/A	<1-474	<0.05	84 F. Slight odor. Strongest above bend in creek. VOC's highest there also. No detections further east or west.
RMEC062010CP08	1:00 PM	Bonneview (Along the river)	N/A	<1-250	<0.05	81 F. Slight odors along various parts of the bank. Highest VOC detection at water fall. Light breeze from southeast.
RMEC062010CP09	1:20 PM	1225 Harvard (Along the River)	N/A	<1	<0.05	86 . Clear. Breezy. Little to no odor.
RMEC062010CP10	1:50 PM	Lilberty Park (Perimeter of Lake)	N/A	<1-10	<0.05	90 F. Very slight intermittent odor. Sustained south-southeast wind. VOC detection at south end of the lake.
RMEC062010CP11	2:05 PM	1300 South 900 West (Inlet to Jordan River)	N/A	<1	<0.05	90 F. Light southeast wind. No odor.
RMEC062010CP12	2:15 PM	960 West 900 South (Inlet to Jordan River)	N/A	<1	<0.05	91 F. Light southeast wind. Slight odor above discharge.
RMEC062010CP13	4:30 PM	1731 East 900 South (Along River)	N/A	100-5926	<0.05	89 F. Light east wind. Moderate odors. Clean-up crew working in immediate vicinity disturbing the river bed.
RMEC062010CP14	4:50 PM	Bonneview (Along the river)	N/A	<1-875	<0.05	89 F. Clear. Sunny. More humid down along the river due to vegitation. Slight north-northwest wind. Most significant results found west of waterfall.
RMEC062010CP15	5:20 PM	1225 Harvard (Along the River)	N/A	<1-2960	<0.05	90 F. Light breeze. Intermittent odors throughout. Sheen visible on water surface.
RMEC062010CP16	5:50 PM	Lilberty Park (Perimeter of Lake)	N/A	<1-400	<0.05	89 F. Steady breeze from south and east. VOC detection from south end and northeast corner of lake. Slight odor.
RMEC062010CP17	6:05 PM	1300 South 900 West (Inlet to Jordan River)	N/A	<1	<0.05	89 F. Light breeze. No odors.
RMEC062010CP18	6:12 PM	960 West 900 South (Inlet to Jordan River)	N/A	<1-1	<0.05	89 F. Clear. Visible sheen on water where sampled. Very light odors.

June 21st 2010

Notes: Benzene measured with Ultra Rae 3000. VOC measured with ppb RAE 3000. Benzene Cal Gas # 34LS-21-5, Lot # GAK-21-5-2, VOC-Isobutylene Cal Gas Lot# 1073104

Sample Serial #	Time	Exact Location of Sample	H2S (ppm)	VOC (ppb)	Benzene (ppm)	Comments
RMEC062110FD01	7:25 AM	1731 East 900 South (Along River)	N/A	<1	<0.05	61 F, clear and calm. Very slight odor at street level. Less odor at creek.
RMEC062110FD02	7:40 AM	Bonneview (Along the river)	N/A	<1	<0.05	Very slight odor in parking lot and along creek.
RMEC062110FD03	7:50 AM	1225 Harvard (Along the River)	N/A	<1	<0.05	Very slight odor below pool even less in other locations.
RMEC062110FD04	8:15 AM	Lilberty Park (Perimeter of Lake)	N/A	<1	<0.05	64 F, clear and calm. Very slight to no odors.
RMEC062110FD05	8:30 AM	1300 South 900 West (Inlet to Jordan River)	N/A	<1	<0.05	No odor.
RMEC062110FD06	8:40 AM	960 West 900 South (Inlet to Jordan River)	N/A	<1	<0.05	No petroleum odors. "Rotten Egg" odor noticed when worker strirred river bottom.
RMEC062110DN01	12:40 PM	1731 East 900 South (Along River)	N/A	<1-944	<0.05	Peak 944 ppb on west culvert. Rest of creek area <100 ppb. Slight odor dependent on wind speed.
RMEC062110DN02	12:10 PM	Bonneview (Along the river)	N/A	<1	<0.05	74 F. Warm, light wind from south. Weak odors all along creek.
RMEC062110DN03	12:51 PM	1225 Harvard (Along the River)	N/A	<1-283	<0.05	81 F, light winds, and sun. Slight odor near culvert/opening under pond. Peak of 283 ppb.
RMEC062110DN04	1:15 PM	Lilberty Park (Perimeter of Lake)	N/A	<1	<0.05	No strong HCO odors. Peak of 283 ppb, but sod-cutting machine was in area. Noticible sheen on lake.
RMEC062110DN05	1:30 PM	1300 South 900 West (Inlet to Jordan River)	N/A	<1	<0.05	82 F, light winds. No stong HCO odors, and no visible sheen.
RMEC062110DN06	1:36 PM	960 West 900 South (Inlet to Jordan River)	N/A	<1	<0.05	82 F, light winds. No strong HCO odors detected. Workers putting up poly.
RMEC062110DN07	1:52 PM	1102 South 900 East (Creek Bed)	N/A	<1-870	<0.05	870 ppb measured 36" from creek. 170 measured in B2. 0 ppb measured 4-10 feet from creek bed.
RMEC062110FD07	3:45 PM	1731 East 900 South (Along River)	N/A	<1-790	<0.05	82 F. Slight petroleum odor along east end of property.
RMEC062110FD08	3:55 PM	Bonneview (Along the river)	N/A	<1-70	<0.05	82 F, slight breeze. Highest reading near booms. Slight odor.
RMEC062110FD09	4:05 PM	1225 Harvard (Along the River)	N/A	<1-30	<0.05	Slight odor near garage/pool. Highest VOC's below pool.
RMEC062110FD10	4:15 PM	1102 South 900 East (Above Culvert)	N/A	<1-1700	<0.05	Highest derectly above stream. Power washing in progress down stream.
RMEC062110FD11	4:30 PM	Lilberty Park (Perimeter of Lake)	N/A	<1-2	<0.05	No petroleum odors. Lake bottom odors.
RMEC062110FD12	4:40 PM	1300 South 900 West (Inlet to Jordan River)	N/A	<1	<0.05	No odor.
RMEC062110FD13	4:50 PM	960 West 900 South (Inlet to Jordan River)	N/A	<1	<0.05	No odor.

June 22nd 2010

Notes: Benzene measured with Ultra Rae 3000. VOC measured with ppb Rae 3000. Benzene Cal Gas # 34LS-21-5, Lot # GAK-21-5-2, VOC-Isobutylene Cal Gas Lot# 1073104

Sample Serial #	Time	Exact Location of Sample	H2S (ppm)	VOC (ppb)	Benzene (ppm)	Comments
RMEC062210FD01	7:00 AM	1731 East 900 South (Along River)	N/A	<1	<0.05	58 F, clear and calm. Very slight odor on path to river.
RMEC062210FD02	7:20 AM	Bonneview (Along the river)	N/A	<1	<0.05	Very slight odor in parking lot. Less odor along river.
RMEC062210FD03	7:25 AM	1225 Harvard (Along the River)	N/A	<1	<0.05	Very slight odor.
RMEC062210FD04	7:35 AM	1102 South 900 East (Creek Bed)	N/A	<1-100	<0.05	Slight Petroleum odor. Highest VOC reading directly above creek. Typicall <1 elsewhere.
RMEC062210FD05	8:00 AM	Lilberty Park (Perimeter of Lake)	N/A	<1-500	<0.05	<1 ppb along lake perimeter. No odors. 0-500 ppb near free tanks south end of park (intermittent).
RMEC062210FD06	8:15 AM	1300 South 900 West (Inlet to Jordan River)	N/A	<1-4000	0-0.15	No petroleum odor at river inlet. Benzene <0.05 and VOCs 0-50 at inlet. Storng galoline odor in parking area. Likely from auto shop. Benzene 0-.15ppm. VOC's 0-4000 ppb.
RMEC062210FD07	8:25 AM	960 West 900 South (Inlet to Jordan River)	N/A	<1	<0.05	60 F. No odors. Slight breeze from east.
RMEC062210IP01	12:10 PM	1731 East 900 South (Along River)	N/A	<1-173	<0.05	78 F, Slight breeze. Slight petroleum odor along creek east side of lot. Point of highest PID readings.
RMEC062210IP02	12:30 PM	Bonneview (Along the river)	N/A	<1	<0.05	82 F, shady, sligh breeze. Not petroleum odors.
RMEC062210IP03	12:42 PM	1225 Harvard (Along the River)	N/A	<1	<0.05	82 F, sunny, slight breeze. No petroleum odors.
RMEC062210IP04	12:58 PM	1102 South 900 East (Creek Bed)	N/A	<1-1008	<0.05	82 F, sunny, some shade, slight breeze. Slight petroleum odors at exit of culvert, also highest PID reading.
RMEC062210IP05	1:13 PM	Lilberty Park (Perimeter of Lake)	N/A	<1	<0.05	82 F, sunny, slight breeze. No petroleum odors.
RMEC062210IP06	1:40 PM	1300 South 900 West (Inlet to Jordan River)	N/A	<1	<0.05	84 F, sunny, slight breeze. No petroleum odors.
RMEC062210IP07	1:55 PM	960 West 900 South (Inlet to Jordan River)	N/A	<1	<0.05	84 F, sunny, slight breeze. No petroleum odors.
RMEC062110FD08	2:55 PM	1731 East 900 South (Along River)	N/A	<1-1700	<0.05	Moderate odor. Creek very buddy. Cleaning activities upstream? Highest VOC readings along east end of property.
RMEC062110FD09	3:10 PM	Bonneview (Along the river)	N/A	<1-750	<0.05	78 F, mild east breeze. Intermittent moderate odors.
RMEC062110FD10	3:20 PM	1225 Harvard (Along the River)	N/A	<1-20	<0.05	79 F. Very slight odor neer pool.
RMEC062110FD11	3:25 PM	1102 South 900 East (Above Culvert)	N/A	<1-1100	<0.05	Highest VOC at culvert. VOCs about 100 to 200 ppb along creek. VOC about 25 at street level. Slight to moderate odor.
RMEC062110FD12	3:45 PM	Lilberty Park (Perimeter of Lake)	N/A	<1	<0.05	82 F. Slight breeze from west. No odors.
RMEC062110FD13	3:55 PM	1300 South 900 West (Inlet to Jordan River)	N/A	<1	<0.05	Moderate Breeze from northeast. No odors.
RMEC062110FD14	4:10 PM	960 West 900 South (Inlet to Jordan River)	N/A	<1	<0.05	82 F. No odors.

June 23rd 2010

Notes: Benzene measured with Ultra Rae 3000. VOC measured with ppb Rae 3000. Benzene Cal Gas # 34LS-21-5, Lot # GAK-21-5-2, VOC-Isobutylene Cal Gas Lot# 1073104

Sample Serial #	Time	Exact Location of Sample	H2S (ppm)	VOC (ppb)	Benzene (ppm)	Comments
RMEC062310FD01	7:10 AM	1731 East 900 South (Along River)	N/A	<1	<0.05	58 F, clear and calm. Very slight petroleum odor on street and at river.
RMEC062310FD02	7:25 AM	Bonneview (Along the river)	N/A	<1	<0.05	Slight petroleum odor. River running clearer than on 6/22/10
RMEC062310FD03	7:35 AM	1225 Harvard (Along the River)	N/A	<1	<0.05	61 F. Very slight odor.
RMEC062310FD04	7:40 AM	1102 South 900 East (Creek Bed)	N/A	<1-175	<0.05	Very slight odor. VOC's measured directly above turbulent water coming out of culvert. All other VOC's <1ppb.
RMEC062310FD05	8:05 AM	Lilberty Park (Perimeter of Lake)	N/A	<1-250	<0.05	63 F. Highest VOC at Frac Tanks. VOC <1 everywhere else.
RMEC062310FD06	8:20 AM	1300 South 900 West (Inlet to Jordan River)	N/A	<1	0-0.15	No odor.
RMEC062310FD07	8:30 AM	960 West 900 South (Inlet to Jordan River)	N/A	<1	<0.05	No odor.
RMEC062310IP01	10:58 AM	1731 East 900 South (Along River)	N/A	<11598	<0.05	74 F. Shady and calm. Highest VOC reading at creek level on east side of lot. Up to 700 ppb on creek bank creek bank at house level. Slight to moderate petroleum odors.
RMEC062310IP02	11:13 AM	Bonneview (Along the river)	N/A	<1-860	<0.05	75 F. Shady and calm. Worker placing booms. Highest VOC readings around workers in boom deployment area. Sligh petroleum odor.
RMEC062310IP03	11:28 AM	1225 Harvard (Along the River)	N/A	<1	<0.05	78 F. Shade/Sun and calm. No petroleum odors.
RMEC062310IP04	11:43 AM	1102 South 900 East (Creek Bed)	N/A	<1	<0.05	80 F. Sun and calm. No petroleum odors.
RMEC062310IP05	12:00 PM	Lilberty Park (Perimeter of Lake)	N/A	0-78	<0.05	85 F. Sunny, slight breeze. Very slight intermitent petroleum odor on northeast side of lake.
RMEC062310IP06	12:25 PM	1300 South 900 West (Inlet to Jordan River)	N/A	<1	<0.05	86 F. Sunny with a slight breeze. No petroleum odor.
RMEC062310IP07	12:40 PM	960 West 900 South (Inlet to Jordan River)	N/A	<1	<0.05	86 F. Sunny with a slight breeze. No petroleum odor.
RMEC062310IP08	3:05 PM	1731 East 900 South (Along River)	N/A	<1-1108	<0.05	Shady and calm. Slight to moderate intermitent petroleum odor east side of lot highest PID.
RMEC062310IP09	3:50 PM	Bonneview (Along the river)	N/A	<1-480	<0.05	Shady and calm. Slight intermittent petroleum odor near boom deployment.
RMEC062310IP10	4:05 PM	1225 Harvard (Along the River)	N/A	<198	<0.05	Sunny and calm. Very slight intermittent petroleum odors on west end of lot.
RMEC062310IP11	4:20 PM	1102 South 900 East (Above Culvert)	N/A	<1-263	<0.05	Sun/Shade, hot, and calm. No petroleum odor, however PID reading found near outlet.
RMEC062310IP12	4:35 PM	Lilberty Park (Perimeter of Lake)	N/A	<1	<0.05	86 F. Sunny and calm. No petroleum odors.
RMEC062310IP13	4:50 PM	1300 South 900 West (Inlet to Jordan River)	N/A	<1	<0.05	87 F. Sunny with a slight breeze. No petroleum odor.
RMEC062310IP14	5:05 PM	960 West 900 South (Inlet to Jordan River)	N/A	<1	<0.05	87 F. Sunny with a slight breeze. No petroleum odor.

Appendix B

Sample Info	Date	Sample Number	Analyte	Measured Concentration (ppm)
1731 E. 900 S. Area Sample - along creek east of house, ~8 'above surface of creek	6/18/2010-6-19/2010	HU 8892	Benzene	<0.0062
			Ethyl benzene	<0.059
			Toluene	<0.059
			Total Hydrocarbons	<0.062
			Xylene	<0.059
Bonneview Park Area Sample - Near boom deployment area	6/18/2010-6-19/2010	HU 8915	Benzene	<0.0062
			Ethyl benzene	<0.059
			Toluene	<0.059
			Total Hydrocarbons	<0.062
			Xylene	<0.059
1225 Harvard Ave. Area Sample - Near bridge along west end of pool	6/18/2010-6-19/2010	HU 8864	Benzene	<0.0062
			Ethyl benzene	<0.059
			Toluene	<0.059
			Total Hydrocarbons	<0.062
			Xylene	<0.059
Liberty Park Area Sample - NE corner of pond near creek inlet	6/18/2010-6-19/2010	HU 8950	Benzene	<0.0061
			Ethyl benzene	<0.058
			Toluene	<0.059
			Total Hydrocarbons	<0.061
			Xylene	<0.058
900 W. 1300 S. Area Sample - North bank nnear creek inlet ~8' above water	6/18/2010-6-19/2010	HU 8884	Benzene	<0.0061
			Ethyl benzene	<0.059
			Toluene	<0.059
			Total Hydrocarbons	<0.062
			Xylene	<0.059
960 W. 900 S. Area Sample - South bank near creek inlet ~8'above water	6/18/2010-6-19/2010	HU 8880	Benzene	<0.0061
			Ethyl benzene	<0.059
			Toluene	<0.059
			Total Hydrocarbons	<0.061
			Xylene	<0.059
1731 E. 900 S. Area Sample - along creek east of house, ~8 'above surface of creek	6/19/2010-6/20/2010	HU 8920	Benzene	<0.0059
			Ethyl benzene	<0.056
			Toluene	<0.056
			Total Hydrocarbons	0.22
			Xylene	<0.056

Sample Info	Date	Sample Number	Analyte	Measured Concentration (ppm)
Bonneview Park Area Sample - Near boom deployment area	6/19/2010-6/20/2010	HU 8854	Benzene	<0.0056
			Ethyl benzene	<0.054
			Toluene	<0.054
			Total Hydrocarbons	<0.056
			Xylene	<0.054
1225 Harvard Ave. Area Sample - Near bridge along west end of pool	6/19/2010-6/20/2010	HU 8878	Benzene	<0.0059
			Ethyl benzene	<0.056
			Toluene	<0.056
			Total Hydrocarbons	<0.059
			Xylene	<0.056
Field Blank	6/19/2010-6/20/2010	HU 8898	Benzene	None Detected
			Ethyl benzene	None Detected
			Toluene	None Detected
			Total Hydrocarbons	None Detected
			Xylene	None Detected
Liberty Park Area Sample - NE corner of pond near creek inlet	6/19/2010-6/20/2010	HU 8838	Benzene	<0.0059
			Ethyl benzene	<0.056
			Toluene	<0.056
			Total Hydrocarbons	<0.059
			Xylene	<0.056
900 W. 1300 S. Area Sample - North bank nnear creek inlet ~8' above water	6/19/2010-6/20/2010	HU 8893	Benzene	<0.0059
			Ethyl benzene	<0.057
			Toluene	<0.057
			Total Hydrocarbons	<0.059
			Xylene	<0.057
960 W. 900 S. Area Sample - South bank near creek inlet ~8'above water	6/19/2010-6/20/2010	HU 8839	Benzene	<0.0059
			Ethyl benzene	<0.057
			Toluene	<0.057
			Total Hydrocarbons	<0.060
			Xylene	<0.057
Field Blank	6/20/10	HU 8843	Benzene	None Detected
			Ethyl benzene	None Detected
			Toluene	None Detected
			Total Hydrocarbons	None Detected
			Xylene	None Detected

24 -Hour Integrated Air Monitoring Results

Sample Info	Date	Sample Number	Analyte	Measured Concentration (ppm)
1102 S. 900 E. Area Sample - Above creek along west side of 900 East bridge	6/21/2010 - 6/22/2010	HY 9164	Benzene	<0.0071
			Ethyl benzene	<0.068
			Toluene	<0.068
			Total Hydrocarbons	<0.071
			Xylene	<0.068
Field Blank	6/21/2010 - 6/22/2010	HM 5589	Benzene	NA
			Ethyl benzene	NA
			Toluene	NA
			Total Hydrocarbons	NA
			Xylene	NA
1102 S. 900 E. Area Sample - Above creek along west side of 900 East bridge	6/22/2010 - 6/23/2010	HG 4713	Benzene	<0.0065
			Ethyl benzene	<0.062
			Toluene	<0.062
			Total Hydrocarbons	0.072
			Xylene	<0.068
Field Blank	6/22/2010 - 6/23/2010	HG 4901	Benzene	None Detected
			Ethyl benzene	None Detected
			Toluene	None Detected
			Total Hydrocarbons	None Detected
			Xylene	None Detected

Air Monitoring Summary Report
Chevron Pipeline Red Butte Creek Release

August 5, 2010

Prepared For:

Peter Sarmicanic CIH, CSP
Chevron Products Company
841 Chevron Way
Richmond, CA 94801

Report Prepared By:

RMEC ENVIRONMENTAL, INC.
2188 South Highland Drive, Suite 201
Salt Lake City, UT 84106

William Newkirk
Industrial Hygienist

Reviewed By:

Daniel E. Nye, MSPH, CIH
Certified Industrial Hygienist

INTRODUCTION

This report has been prepared to summarize the results of area air monitoring in the vicinity of Red Butte Creek following the Chevron Pipeline crude oil release that occurred on June 12, 2010. The monitoring was performed by industrial hygienists from RMEC Environmental, Inc. (RMEC) to provide an independent third party assessment of potential petroleum vapor exposures to residents and other receptors in the vicinity of the creek.

The area air monitoring was performed at various times and locations between July 6, and July 18, 2010. Frank DeRosso, MSPH, CIH, Ian Percy and William Newkirk of RMEC performed the air monitoring. Senior Scientist Frank DeRosso, MSPH, CIH, also provided project oversight. The final report was reviewed by Daniel E. Nye, MSPH, CIH, also of RMEC.

BACKGROUND INFORMATION

RMEC was contacted by safety personnel from Chevron Salt Lake Refinery on June 15, 2010, and was asked to provide personnel to perform air monitoring along the Red Butte Creek in support of the petroleum clean-up efforts from the pipeline release. RMEC met with Chevron employee Tammy Charette, the safety lead for clean-up efforts, on June 16, 2010, at the Chevron Pipeline Incident Command Center at 2875 South Decker Lake Drive in Salt Lake City. At this meeting, RMEC was provided with a copy of an air monitoring plan developed by Chevron. RMEC completed this sampling on June 26, 2010. On July 01, 2010 RMEC was again contacted by Chevron employees and requested that RMEC meet with them on July 05, 2010 to discuss further sampling efforts. RMEC met with Don Johnson and Robin Schelling of Chevron Pipeline on July 05, 2010 and discussed the a sampling plan that designated area air monitoring for various petroleum-related vapors was to be performed three times daily (~7:00 AM, Noon and 4:00 PM) at the following locations:

- 1731 East 900 South, Salt Lake City
- Bonneview Park, Salt Lake City
- 1365 Harvard Ave., Salt Lake City
- 1225 Harvard Ave., Salt Lake City
- Garden Park Ward LDS Chapel, Salt Lake City
- Liberty Park Pond, Salt Lake City
- 1300 South 900 West, Salt Lake City (creek inlet to Jordan River)
- 960 West 900 South, Salt Lake City (creek inlet to Jordan River)

RMEC agreed to provide personnel to implement the plan and began performing area air monitoring on the afternoon of July 06, 2010. RMEC performed field modifications to the plan as conditions dictated and began the three times per day monitoring on July 07, 2010.

METHODS AND MATERIALS

Real-Time Air Monitoring

RMEC used two instruments to monitor the level of petroleum-related vapors in the vicinity of Red Butte Creek and the pond at Liberty Park. RMEC used an UltraRAE 3000 Photo-ionization Detector (PID) (SN 596-000577) to measure airborne benzene levels and a ppbRAE 3000 PID (SN 594-900623) to measure VOC levels at the designated locations along Red Butte Creek. RMEC personnel, in accordance with manufacturer's guidelines, calibrated all instruments on the morning of each day of monitoring. Instrument serial numbers and calibration information are included with the monitoring results in Appendix A.

Integrated Area Monitoring

RMEC also collected integrated area air samples at selected locations using 3M™ 3500 passive organic vapor monitors (POVMs). The POVMs were set up at the designated sample locations at specific points that were assumed to have the highest concentration of petroleum vapors. The presence of petroleum odors and the VOC measurements obtained from the real time air monitoring were used to choose the locations where the POVMs were deployed.

The area POVMs were deployed for ~24 hour periods, collected, and submitted under chain of custody to ALS Laboratory Group of Salt Lake City. Personal samples were deployed during representative portions of the work shift and submitted to the laboratory. ALS Laboratory Group is an American Industrial Hygiene Association (AIHA) accredited laboratory. The POVMs were analyzed for benzene, toluene, ethyl benzene, xylene (BTEX), and total hydrocarbons following the methods specified by the manufacturer of the POVM (3M™ Corp.).

RESULTS/DISCUSSION

Real Time Monitoring

The results of the real time monitoring are summarized in Appendix A. These tables essentially are a reproduction of the field notes taken during the real time monitoring events.

RMEC found measurable levels of benzene during several sampling events. These levels ranged from <0.05 - 2.0 parts per million (ppm) (0.05 ppm level of detection). The benzene levels were typically obtained around the workers who were pressure-washing the rocks and banks of Red Butte Creek (wash-crew), at the mouth of a culvert at 1102 S 900 E, Salt lake City (the highest peak) on three different sampling events. Benzene was also found at five of the nine sampling locations during "the flush," where the creek was flooded with an increased water flow rate. The flush occurred on July 15, 2010 and

began reaching the monitoring locations around 10:20AM and continued for about 2.5 hours. Benzene levels ranged from <0.05 – 0.70 ppm. These measurements were taken directly over the creek and a few feet off the bank.

RMEC found measurable levels of total VOCs during the monitoring events. Total VOC levels ranged from approximately 1 – 44,000 parts per billion (ppb) at various locations along Red Butte Creek. The highest VOC measurements were typically obtained directly above Red Butte Creek in areas were water was flowing over rocks and waterfalls or was otherwise being agitated or disturbed by the wash crew. VOC levels were typically <1 ppb once the sampler moved a few feet away from the creek. VOC levels were generally higher in the afternoon as outdoor temperatures increased. Please note that the VOC levels indicated in the table are instantaneous peak concentrations measured at various points at the sampled properties and should not be considered long term average concentrations.

Intermittent petroleum odors were noted at various times and locations at the designated sampling points (see notes in tables). However, the presence of petroleum odors did not always correlate with the presence of measurable levels of VOCs (i.e. VOC levels were sometimes below 1ppb even when odors were present). It should be noted that in locations where power-washing activities occurred, there is the possibility that the exhaust from gasoline-powered equipment may have contributed to the readings obtained from direct-reading instruments.

POVM Area Monitoring

The results of the 24-hour integrated area air monitoring using the POVMs are summarized in Appendix B. The laboratory analytical reports are enclosed as Appendix C.

11 POVM samples showed measurable levels of total hydrocarbons. These samples were located at Bonneview Park along the creek, 1365 Harvard Ave. along the creek, 1225 Harvard Ave. along the creek and at 1102 South 900 East above the creek on the west side of the 900 East bridge. The total hydrocarbon levels in these samples ranged from 0.064 – 3.0 ppm. It should be noted that in locations where power-washing activities occurred, there is the possibility that the exhaust from gasoline-powered equipment may have contributed to the monitoring results.

POVM Employee Monitoring

The results of the employee monitoring using the POVMs are summarized in Appendix D. The table identifies the sample by personnel, task, date, sample number, the sample duration, the measured concentration for the sample period, the calculated 8-hour time-weighted average (8-hr TWA) exposure, and the applicable occupational exposure standard. The laboratory analytical reports are enclosed as Appendix C.

RMEC performed personal sampling on four Chevron Employees and one Kodiak employee from the wash crew: Mike Eaton, Johnny Fox, Johnny Fox, Paul Freeman, Dan Tarlton, and Caleb Hundersmark (Kodiak). The monitored Chevron employees performed various supervisory duties during pressure washing and debris removal operations. The Kodiak employee performed various cleanup and pressure washing duties during the monitoring event.

All employee 8-hr TWA exposures were below the applicable OSHA Permissible Exposure Limit (PEL). 8-hr TWA benzene levels ranged from <0.018 – 0.084 ppm. 8-hr TWA ethyl benzene levels ranged from <0.18 – <0.35 ppm. 8-hr TWA toluene levels ranged from <0.18 – 0.71 ppm. 8-hr xylene levels ranged from < 0.18 - 0.47 ppm. 8-hr TWA total hydrocarbon levels ranged from <0.24 – 4.5 ppm. It should be noted that in locations where power-washing activities occurred, there is the possibility that the exhaust from gasoline-powered equipment may have contributed to the monitoring results.

APPENDIX A

Real Time Monitoring

Glossary Terms for Field Notes

Intermittent (VOCs and Benzene) - RMEC collected several 60 second samples with direct reading instruments at the sample locations. Where the term intermittent was used, the direct reading instruments reported readings that fluctuated from non-detect to the noted levels.

Sustained (VOCs and Benzene) – RMEC collected several 60 second samples with direct reading instruments at the sample locations. Where the term sustained was used, the direct reading instruments reported levels where the recorded value was the lowest observed reading, not an average, during the sampling periods.

These other definitions are subjective because each person has different interpretations.

Slight Odors –	Barely noticeable to human smell.
Light Odors –	Noticeable.
Moderate Odors –	Easily noticeable with possibility of being a nuisance.
Strong –	Likely for odor to be a nuisance.
Heavy –	Nuisance is expected.

July 6th 2010

Notes: Benzene measured with UltraRAE 3000 SN 596-901159. VOC measured with ppbRAE 3000 SN 594-900623. Benzene Cal Gas - AFC Precision Gas Mixture Benzene 5.0 PPM Lot# GAK-21-5-2, VOC Cal Gas - RAE Systems Isobutylene 10 PPM Lot# 107310A Cyl 17.

Sample Serial #	Time	Exact Location of Sample	Badge Sample (Y/N)	VOC (ppb)	Benzene (ppm)	Comments
RMEC070610IP01	10:50 AM	Bonneview (along creek)	Y-HM5602	<1-6334	N/A	Intermittent moderate petroleum odors. Highest VOC's near cleaning ops at east side of park. Some exhaust odors from portable equipment. Shady, 80 F, slight breeze.
RMEC070610IP02	11:15 AM	1731 East 900 South (along creek)	Y-HM5561	<1	N/A	Shady, calm, 80 F. No petroleum odors.
RMEC070610IP03	11:55 AM	1365 Harvard (along creek)	Y-HM5556	<1-661	N/A	Shady, calm, 80 F. Very slight intermittent petroleum odors near house over creek. Crew on lunch.
RMEC070610IP04	12:15 PM	1225 Harvard (along creek)	Y-HM5575	<1-148	N/A	Sunny, calm, 80 F. No petroleum odors.
RMEC070610IP05	12:25 PM	Garden Park Ward Harvard Ave.	Y-HM5588	<1	N/A	Sunny, 80 F, Slight breeze. No petroleum odors.
RMEC070610-IP06	12:40 PM	1102 South 900 East (along creek)	Y-HM5603	<1-2010	N/A	Sun/shade, 80 F, slight breeze. Slight intermittent petroleum odors. Highest VOC by culvert outlet @ 900 E. Less that 500 ppb along creek to west.
RMEC070610IP07	1:35 PM	Liberty Park (perimeter of pond)	N	<1	N/A	Sunny, 83 F, slight breeze. No petroleum odors.
RMEC070610IP08	2:05 PM	1300 South 900 West (inlet)	N	<1	N/A	Sunny, 85 F, breezy. No petroleum odors. No crews working.
RMEC070610IP09	2:16 PM	960 West 900 South (inlet)	N	<1	N/A	Sunny, 85 F, breezy. No petroleum odors. Four man crew working booms.
RMEC070610IP10	3:15 PM	1731 East 900 South (along creek)	Y-HM5561	<1	N/A	Sun/shade, 85 F, calm. No petroleum odors.
RMEC070610IP11	3:30 PM	Bonneview (along creek)	Y-HM5602	<1-4841	N/A	Shady, calm, 85 F. Crews working, pressure washing, vacuuming, etc. Moderate petroleum odors adjacent to cleaning crews. Highest VOC near boom deployment area
RMEC070610IP12	3:45 PM	1365 Harvard (along creek)	Y-HM5556	<1-126	N/A	Shady, calm, 85 F. Crews in assembly line moving wood. VOC readings at bridge. Very slight intermittent petroleum odor at that location.
RMEC070610IP13	4:00 PM	1225 Harvard (along creek)	Y-HM5575	<1-267	N/A	Sunny, calm, 85 F. Intermittent, very slight petroleum odors @ East end of property, highest VOC's.
RMEC070610IP14	4:10 PM	Garden Park Ward Harvard Ave. (along creek)	Y-HM5588	<1	N/A	Sun/shade, 85 F, breezy. No petroleum odors.
RMEC070610IP15	4:20 PM	1102 South 900 East (along creek)	Y-HM5603	<1-98	N/A	Sun/shade, 85 F, breezy. Very slight petroleum odors near culvert @ 900 E, location of highest VOC's. No VOC's along path on north side of creek.
RMEC070610IP16	4:35 PM	Liberty Park (perimeter of pond)	N	<1	N/A	Sunny, 86 F, breezy. No petroleum odors.
RMEC070610IP17	4:45 PM	1300 South 900 West (inlet)	N	<1	N/A	Sunny, 86 F, breezy. No petroleum odors.
RMEC070610IP18	5:00 PM	960 West 900 South (inlet)	N	<1	N/A	Sunny, 86 F, breezy. No petroleum odors.

July 7th 2010

Notes: Benzene measured with UltraRAE 3000 SN 596-901159. VOC measured with ppbRAE 3000 SN 594-900623. Benzene Cal Gas - AFC Precision Gas Mixture Benzene 5.0 PPM Lot# GAK-21-5-2, VOC Cal Gas - RAE Systems Isobutylene 10 PPM Lot# 107310A Cyl 17.

Sample Serial #	Time	Exact Location of Sample	Badge Sample (Y/N)	VOC (ppb)	Benzene (ppm)	Comments
RMEC070710WN01	7:56 AM	Bonneview (along creek)	Y-HM5602	<1	N/A	Winds 5-10 mph, 68^{0}F, shady. No odors.
RMEC070710WN02	7:48 AM	1731 East 900 South (along creek)	Y-HM5561	<1	N/A	Winds 5-10 mph, 68 F, shady. No odors.
RMEC070710WN03	8:05 AM	1365 Harvard (along creek)	Y-HM5556	<1-1132	N/A	Winds 5-10 mph, 66 F, shady. Slight intermittent odors on sidewalk and side of house. Moderate odors at back door (70 ppb). Peak on bridge over water. Moderate odor along creek.
RMEC070710WN04	8:45 AM	1225 Harvard	Y-HM5575	<1-34	N/A	Winds 5-10 mph, 66 F, shady. Slight odor at culvert at end of pond.
RMEC070710WN05	8:55 AM	Garden Park Ward (along creek)	Y-HM5588	<1	N/A	Light breeze, 67 F, shady. No odors.
RMEC070710WN06	9:05 AM	1102 S. 900 E. (along creek)	Y-HM5603	<1-1875	N/A	Winds 5-10 mph, 67 F, shady. Strong odor at mouth of culvert. Slight to moderate odor along creek.

RMEC070710WN07	9:15 AM	Liberty Park (perimeter of pond)	N	<1	N/A	Winds 10-15 mph, 69 F, sunny. No odors.
RMEC070710WN08	9:30 AM	1300 South 900 West (inlet)	N	<1	N/A	Light winds, sunny, 70 F. No odors.
RMEC070710WN09	9:50 AM	960 West 900 South (inlet)	N	<1-29	N/A	Light winds, sunny, 73 F. No odors, but got a one-time reading at mouth of inlet.
RMEC070710WN10	12:00 PM	1731 East 900 South (along creek)	Y-HM5612	<1	<0.05	Sunny, 78 F, light breeze. No odors.
RMEC070710WN11	12:25 PM	Bonneview (along creek)	Y-HM6159	<1	<0.05	Shady, 78 F, light breeze. No odors.
RMEC070710WN12	12:40 PM	1365 Harvard (along creek)	Y-HM6202	<1-179	<0.05	Shady, 82 F, slight breeze. Light odor on bridge directly over creek (only readings)
RMEC070710WN13	1:10 PM	1225 Harvard (along creek)	Y-HM6229	<1-328	<0.05	Sunny, 85 F, calm. Light to moderate odor near creek outlet under pond. Light odor (30 ppb) along creek.
RMEC070710WN14	1:25 PM	Garden Park Ward (along creek)	Y-HM6257	<1-73	<0.05	Sunny, 85 F, calm. Light odors near bridge (about 30 ppb) along most of creek.
RMEC070710WN15	1:45 PM	1102 South 900 East (along creek)	Y-HM6153	<1-4041	<0.05	Shady, 86 F, calm. Light to moderate odor along creek. Heavy odor at culvery opening.
RMEC070710WN16	2:15 PM	Liberty Park (perimeter of pond)	N	<1	<0.05	Sunny, 86 F, calm. No odors.
RMEC070710WN17	2:50 PM	1300 South 900 West (inlet to river)	N	<1	<0.05	Sunny, 86 F, calm. No odors.
RMEC070710WN18	3:10 PM	960 West 900 South (inlet)	N	<1	<0.05	Sunny, 84 F, light breeze. No odors.
RMEC070710WN19	4:00 PM	1731 East 900 South (along creek)	Y-HM5612	<1	<0.05	Shady, 84 F, light breeze. No odors
RMEC070710WN20	4:20 PM	Bonneview (along creek)	Y-HM6159	<1	<0.05	Shady, 83 F, calm. No odor.
RMEC070710WN21	4:30 PM	1365 Harvard (along creek)	Y-HM6202	<1-2405	<0.05	Shady, 83 F, calm. Light to moderate odor. About 200 ppb along creek. Peak at bridge.
RMEC070710WN22	4:45 PM	1225 Harvard (along creek)	Y-HM6229	<1-1016	<0.05	Sunny, 86 F, calm. Light to moderate odor. About 300 ppb along creek. Peak at culvert under pond. Visible oil on water
RMEC070710WN23	4:56 PM	Garden Park Ward (along creek)	Y-HM6257	<1	<0.05	Sunny, 87 F, calm. Light to heavy odor. [1175 Harvard had moderate odors at culvert (779 ppb)]
RMEC070710WN24	5:13 PM	1102 South 900 East (along creek)	Y-HM6183	<1-4088	<0.05	Shady, 86 F, calm. Light to heavy odor. Around 500 ppb along creek. The peak is at culvert from road.
RMEC070710WN25	5:25 PM	Liberty Park (perimeter of pond)	N	<1-25	<0.05	Sunny, 87 F, calm. Slight odor near inlet from creek.
RMEC070710WN26	6:00 PM	1300 South 900 W (River inlet)	N	<1	<0.05	Sunny, 87 F, calm. No odor.
RMEC070710WN27	6:06 PM	960 West 900 South (river inlet)	N	<1	<0.05	Sunny, 87 F, calm. No odor.

July 8th 2010

Notes: Benzene measured with UltraRAE 3000 SN 596-901159. VOC measured with ppbRAE 3000 SN 594-900623. Benzene Cal Gas - AFC Precision Gas Mixture Benzene 5.0 PPM Lot# GAK-21-5-2, VOC Cal Gas - RAE Systems Isobutylene 10 PPM Lot# 107310A Cyl 17.

Sample Serial #	Time	Exact Location of Sample	Badge Sample (Y/N)	VOC (ppb)	Benzene (ppm)	Comments
RMEC070810WN01	8:00 AM	1731 East 900 South (along creek)	Y-HM5612	<1	<0.05	Partly cloudy, 70 F, breezy. No odors.
RMEC070810WN02	8:35 AM	Bonneview (along creek)	Y-HM6159	<1	<0.05	Partly cloudy, 74 F, breezy. No odors.
RMEC070810WN03	8:45 AM	1365 Harvard (along creek)	Y-HM6202	<1-3253	<0.05-0.35	Partly cloudy, 74 F, calm. Light to moderate odors. Benzene found around bridge. Around 400 ppb along creek, peak at bridge. About 50 ppb on street.
RMEC070810WN04	9:03 AM	1225 Harvard (along creek)	Y-HM6229	<1-25	<0.05	Partly cloudy, 74 F, calm. Slight intermittent odor at mouth of culvert under pond.
RMEC070810WN05	9:18 AM	Garden Park Ward (along creek)	Y-HM6257	<1	<0.05	Partly cloudy, 74 F, calm. No odors.
RMEC070810WN06	9:30 AM	1102 South 900 East (along creek)	Y-HM6153	<1-431	<0.05	Partly cloudy, 74 F, calm. Intermittent light to moderate odor along creek. Moderate odor at culvert under road.
RMEC070810WN07	9:45 AM	Liberty Park (Around perimeter of pond)	N	<1-31	<0.05	Partly cloudy, 75 F, calm. Intermittent slight odor at inlet of creek to pond.
RMEC070810WN08	10:25 AM	1300 South 910 West (at inlet to Jordan River)	N	<1-59	<0.05	Sunny, 81 F, calm. Light odors around inlet to river. New dumpster located at site.
RMEC070810WN09	10:40 AM	960 West 900 South (at inlet to Jordan River)	N	<1	<0.05	Sunny, 84 F, calm. No odors.

RMEC070810WN10	12:30 PM	1731 East 900 South (along creek)	Y-HM5105	<1	<0.05	Shady, 85 F, calm. No odors.
RMEC070810WN11	12:18 PM	Bonneview (along creek)	Y-HM5113	<1	<0.05	Shady, 85 F, calm. No odors.
RMEC070810WN12	12:45 PM	1365 Harvard (along creek)	Y-HG7454	<1-13.41 ppm	<0.05-0.3	Shady, 84 F, calm. Light to moderate odors around house. Heavy peak odors at bridge. Moderate to heavy odor along east end of stream. Benzene starts at bridge and gets heavier upstream.
RMEC070810WN13	1:15 PM	1225 Harvard (along creek)	Y-HM5059	<1-1669	<0.05	Sunny, 88 F, calm. 100 ppb @ house. 50 ppb @ street. Moderate to strong odors along entire length of creek.
RMEC070810WN14	1:30 PM	Garden Park Ward (along creek)	Y-HM5138	<1-425	<0.05	Sunny, 88 F, calm. 10 ppb @ street. About 300 ppb along creek. Light to moderate odors.
RMEC070810WN15	1:45 PM	1102 South 900 East (along creek)	Y-HM6386	<1-2525	<0.05	Shady, 88 F, calm. Moderate odor at street. Heavy odor at culvert. About 200-400 ppb along creek.
RMEC070810WN16	2:05 PM	Liberty Park (perimeter of pond)	N	<1-133	<0.05	Sunny, 91 F, calm. Light odor (10 ppb) around entire pond. Peak is at creek inlet.
RMEC070810WN17	2:45 PM	1300 South 900 West (Inlet to Jordan River)	N	<1-10	<0.05	Sunny, 91 F, calm. Slight odor at inlet.
RMEC070810WN18	3:00 PM	960 West 900 South (Inlet to Jordan River)	N	<1-225	<0.05	Sunny, 92 F, calm. Moderate odor where metal plates were opened in the road over the skimmers.
RMEC070810WN19	4:00 PM	1731 East 900 South (along creek)	Y-HM5105	<1	<0.05	Cloudy, calm, 90 F. No odor.
RMEC070810WN20	4:10 PM	Bonneview (along creek)	Y-HM5113	<1	<0.05	Cloudy/light rain, calm, 89 F. No odor.
RMEC070810WN21	4:20 PM	1365 Harvard (along creek)	Y-HG4754	<1-443	<0.05	Cloudy/light rain, calm, 89 F. Light to moderate odor along creek, peak at bridge.
RMEC070810WN22	4:30 PM	1225 Harvard (along creek)	Y-HM5059	<1-676	<0.05	Cloudy/light rain, breezy, 83 F. Light to moderate odor. Peak was east of pond.
RMEC070810WN23	4:40 PM	Garden Park Ward (along creek)	Y-HM5138	<1-30	<0.05	Cloudy/raining, heavy wind gusts. Light odor along entire creek.
RMEC070810WN24	4:50 PM	1102 South 900 East (along creek)	Y-HM6386	<1-3553	<0.05	Cloudy/raining, heavy wind gusts. Moderate odor along creek (700 ppb). Peak at culvert at road.
RMEC070810WN25	5:00 PM	Liberty Park (Around perimeter of pond)	N	<1-123	<0.05	Sunny, 85 F, light winds. Light odor at inlet (15 ppb). Peak at oil boom dumpsters.
RMEC070810WN26	5:30 PM	1300 South 900 West (Inlet to Jordan River)	N	<1	<0.05	Sunny, 85 F, calm. No odor.
RMEC070810WN27	5:45 PM	960 West 900 South (Inlet to Jordan River)	N	<1	<0.05	Sunny, 85 F, calm. No odor.

July 9th 2010

Notes: Benzene measured with UltraRAE 3000 SN 596-901159. VOC measured with ppbRAE 3000 SN 594-900623. Benzene Cal Gas - AFC Precision Gas Mixture Benzene 5.0 PPM Lot# GAK-21-5-2, VOC Cal Gas - RAE Systems Isobutylene 10 PPM Lot# 107310A Cyl 17.

Sample Serial #	Time	Exact Location of Sample	Badge Sample (Y/N)	VOC (ppb)	Benzene (ppm)	Comments
RMEC070910WN01	8:05 AM	1731 East 900 South	Y-HM5105	<1	<0.05	Shady, 70 F, calm. No odors.
RMEC070910WN02	8:15 AM	Bonneview Park (Along creek)	Y-HM5113	<1	<0.05	Shady, 70 F, slight breeze. No odors.
RMEC070910WN03	8:30 AM	1365 Harvard (along creek)	Y-HG7454	<1	<0.05	Shady, 70 F, calm. No odors.
RMEC070910WN04	8:50 AM	1225 Harvard (along creek)	Y-HM5159	<1-820	<0.05	Sunny, 71 F, light breeze. Light odors at culvert under pond. Moderate odors at east end of property.
RMEC070910WN05	9:05 AM	Garden Park Ward (along creek)	Y-HM5138	<1	<0.05	Sunny, 73 F, calm. No odors.
RMEC070910WN06	9:15 AM	1102 East 900 South (along creek)	Y-HG6386	<1-540	<0.05	Shady, 73 F, calm. Moderate odors at mouth of culvert under road. Light odor along creek.
RMEC070910WN07	9:30 AM	Liberty Park (Around perimeter of pond)	N	<1-53	<0.05	Sunny, 73 F, calm. Light odor from a worker pouring gas into machine. Otherwise, no odors.
RMEC070910WN08	10:05 AM	1300 South 900 West (Inlet to Jordan River)	N	<1	<0.05	Sunny, 78 F, calm. No odors.
RMEC070910WN09	10:25 AM	900 South 960 West (Inlet to Jordan River)	N	<1	<0.05	Sunny, 84 F, calm. No odors.
RMEC070910WN10	12:10 PM	1731 East 900 South (along creek)	Y-HR6333	<1	<0.05	Shady, 85 F, calm. No odors.
RMEC070910WN11	12:00 PM	Bonneview (along creek)	Y-HR6325	<1	<0.05	Shady, 85 F, calm. No odors.
RMEC070910WN12	12:20 PM	1365 Harvard (along creek)	Y-HR6349	<1	<0.05	Shady, 85 F, calm. No odors.
RMEC070910WN13	12:35 PM	1225 Harvard (along creek)	Y-HM5134	<1-1979	<0.05	Sunny, 85 F, calm. Light odor at house. Heavy odor at culvert at end of pond. Moderate odor along creek.
RMEC070910WN14	1:00 PM	Garden Park Ward (along creek)	Y-HL4262	<1-588	<0.05	Sunny, 85 F, calm. Light intermittent odor along creek, with peak at bridge.
RMEC070910WN15	1:15 PM	1102 South 900 East (along creek)	Y-HL4217	<1-2333	<0.05	Shady, 89 F, calm. Light to moderate odor along creek. Peak at culverty on 900 East.
RMEC070910WN16	1:30 PM	Liberty Park (perimeter of pond)	N	<1-287	<0.05	Cloudy, 84 F, light breeze. Light intermittent odor along east perimeter. Peak VOC at mouth of inlet.
RMEC070910WN17	2:29 PM	1300 South 900 West (Inlet to Jordan River)	N	<1	<0.05	Cloudy, 84 F, winds 10-15 mph. No odor.
RMEC070910WN18	2:03 PM	900 South 960 West (Inlet to Jordan River)	N	<1	<0.05	Cloudy, 83 F, light breeze. No odor.
RMEC070910WN19	4:08 PM	1731 East 900 South (along creek)	Y-HR6333	<1	<0.05	Shady, 80 F, calm. No odor.
RMEC070910WN20	4:16 PM	Bonneview (along creek)	Y-HR6325	<1	<0.05	Shady, 82 F, calm. No odors.
RMEC070910WN21	4:30 PM	1365 Harvard (along creek)	Y-HR6349	<1-15	<0.05	Shady, 82 F, calm. Slight intermittent odor at bridge.
RMEC070910WN22	4:43 PM	1225 Harvard (along creek)	Y-HM5134	<1-8562	<0.05-0.85	Sunny, 82 F, calm. Benzene found on west end of property. VOC on all property. 100 ppb along creek. Peak levels near wash crew. As I started monitoring near the East end of the wash crew, I started picking up readings for Benzene on the ultraRAE 3000 PID. The levels started about 0.35 ppm and intermittently increased to 0.85 ppm. As I came from the West end I noticed the same pattern of sustained Benzene at 0.40 ppmand increased to 0.95 ppm peaks. This data is consistent with other Benzene found at 1365 Harvard sampled on 7/8/10 at 8:45 AM with readings at 0.35 ppm at end of wash crew.
RMEC070910WN23	5:00 PM	Garden Park Ward (along creek)	Y-HL4262	<1-22.9 ppm	<0.05-0.95	Sunny, 88 F, calm. About 300 ppb along creek. Peak levels of VOC near wash crew. Benzene was found near wash crew only. 0.40 ppm sustained, 0.95 peak.
RMEC070910WN24	5:30 PM	1102 South 900 East (along creek)	Y-HL4217	<1-18.87 ppm	<0.05	Shady, 88 F, calm. About 300 ppb at house. About 100 ppb along creek. Peak was at culvert under 900 E at east edge of property. 400 ppb at street.
RMEC070910WN25	5:55 PM	Liberty Park (perimeter of pond)	N	<1-706	<0.05	Sunny, 87 F, calm. Intermittent odor from inlet only.
RMEC070910WN26	6:20 PM	1300 South 900 West (Inlet to Jordan River)	N	<1	<0.05	Sunny, 89 F, calm. No odor

RMEC070910WN27	6:40 PM	900 South 960 West (Inlet to Jordan River)	N	<1	<0.05	Sunny, 88F, calm. No odor.

July 10th 2010

Notes: Benzene measured with UltraRAE 3000 SN 596-901159. VOC measured with ppbRAE 3000 SN 594-900623. Benzene Cal Gas - AFC Precision Gas Mixture Benzene 5.0 PPM Lot# GAK-21-5-2, VOC Cal Gas - RAE Systems Isobutylene 10 PPM Lot# 107310A Cyl 17.

Sample Serial #	Time	Exact Location of Sample	Badge Sample (Y/N)	VOC (ppb)	Benzene (ppm)	Comments
RMEC071010WN01	8:00 AM	1731 East 900 South (Along River)	Y-HR6333	<1	<0.05	Shady, 68 F, calm. No odors.
RMEC071010WN02	8:10 AM	Bonneview (Along the river)	Y-HR6325	<1	<0.05	Shady, 69 F, calm. No odors.
RMEC071010WN03	8:20 AM	1365 Harvard (Along the River)	Y-HR6349	<1	<0.05	Shady, 69 F, calm. No odors.
RMEC071010WN04	8:30 AM	1225 Harvard (along creek)	Y-HM5134	<1	<0.05	Shady, 71 F, calm. No odors.
RMEC071010WN05	8:45 AM	Garden Park Ward (along creek)	Y-HL4262	<1	<0.05	Sunny, 71 F, calm. No odors.
RMEC071010WN06	8:55 AM	1102 South 900 East (along creek)	Y-HL4217	<1-16.01 ppm	<0.05-1.75	Sunny/shade, 74 F, calm. Using an ultraRAE and PPBRAE to measure benzene and total VOC's respectively, I measured 0.5 ppm on the sidewalk with peaks of 0.85 ppm. At the mouth of the culvery, I measured sustained benzene at 1.5 ppm with peaks of 2.0 ppm. Along the creek and next to the home, I measured sustained benzene at 0.35 ppm with peaks of 0.85 ppm. With respect to VOC's, I measured 500 ppb sustained on sidewalk with peaks of 3000 ppb. At the culvert sustained VOC was 8000 ppb with peaks at 16 ppm. Along creek and at house the VOC reading was sustained 500 ppb with peaks of 3000 ppb. At 11:30 AM - Recalibrated equipment and sampled culvert again. I used a ultraRAE 3000 PID and Draggar tube. PID gave readings of 0.05 ppm benzene. Draggar tube showed no benzene.
RMEC071010WN07	10:00 AM	Liberty Park (perimeter of pond)	N	<1-355	<0.05	Sunny, 79 F, calm. No odor.
RMEC071010WN08	10:30 AM	1300 South 900 W (River inlet)	N	<1	<0.05	Sunny, 86 F, calm. No odor.
RMEC071010WN09	10:40 AM	960 West 900 South (river inlet)	N	<1	<0.05	Sunny, 91 F, calm. No odor.
RMEC071010WN10	12:15 PM	1731 East 900 South (along creek)	Y-HL4240	<1	<0.05	Shady, 91 F, calm. No odor.
RMEC071010WN11	12:30 PM	Bonneview (along creek)	Y-HL4288	<1	<0.05	Shady, 91 F, calm. No odor.
RMEC071010WN12	12:40 PM	1365 Harvard (along creek)	Y-HL4221	<1	<0.05	Shady, 89 F, calm. No odor.
RMEC071010WN13	12:50 PM	1225 Harvard (along creek)	Y-HL4287	<1	<0.05	Sunny, 90 F, calm. No odor. 1:00 PM - Wash Crew - Benzene levels around the crew were about 0.25 ppm on both ends. Benzene levels within 3 feet of pump motor were sustained at 4000 ppb with peaks of 16.82 ppm near pump motors. Performed personal sample with 3M 3500 passive filter #HL4254. Performed an area air sample using Draggar tubes for benzene with no visible detection.
RMEC071010WN14	1:30 PM	Garden Park Ward (along creek)	Y-XP6212	<1-5000	<0.05	Sunny, 90 F, calm. About 300 ppb on all property with several peak spots on creek.
RMEC071010WN15	2:20 PM	1102 South 900 East (along creek)	Y-XP6218	<1-12 ppm	<0.05-0.35	Sunny/shade, 94 F, calm. Sampled culvert and creek using Draggar tubes and ultraRAE 3000 for benzene and used a PPBRAE 3000 for total VOC's. VOC's were about 1000 ppb along creek and 500 ppb next to house. At the culvert at the road, the VOC's were sustained at 4000 ppb with intermittent peaks at 10-12 ppm. Benzene was found on property at culvert on 900 east at 0.25 sustained with intermittent. Peaks at 0.35 ppm using the ultraRAE 3000. No detection with Draggar tubes.
RMEC071010WN16	3:10 PM	Liberty Park (perimeter of pond)	N	<1-401	<0.05	Sunny, 90 F, light breeze. Odors of 40 ppb around entire perimeter, with intermittent peaks at inlet.
RMEC071010WN17	3:40 PM	1300 South 900 West (Inlet to Jordan River)	N	<1	<0.05	Sunny, 93 F, light breeze. No odors.
RMEC071010WN18	4:00 PM	960 West 900 South (Inlet to Jordan River)	N	<1-37	<0.05	Sunny, 98 F, light breeze. Intermittent odors from vacuum truck.
RMEC071010WN19	5:45 PM	1731 East 900 South (along creek)	Y-HL4240	<1	<0.05	Shady, 87 F, calm. No odor.
RMEC071010WN20	5:55 PM	Bonneview (along creek)	Y-HL4288	<1	<0.05	Shady, 88 F, calm. No odor.
RMEC071010WN21	6:05 PM	1365 Harvard (along creek)	Y-HL4221	<1	<0.05	Shady, 88 F, calm. No odor.

RMEC071010WN22	6:20 PM	1225 Harvard (along creek)	Y-HL4287	<1-30	<0.05	Sunny, 88 F, calm. Slight odors on all of property. Wash crew - High levels of benzene and VOCs were measured during wash crews' last 15 minutes of work. Sustained levels of benzene about 0.95 ppm around workers running pump motors. Peak levels at 2.45 ppm. This peak was in conjunction with four pump motors running simultaneously within an eight foot radius. As soon as pumps shut off, the benzene levels dropped to <0.05 ppm. VOC's were in the rang of 18-20 ppm and peaks near 33 ppm.
RMEC071010WN23	6:50 PM	Garden Park Ward (along creek)	Y-XP6212	<1-803	<0.05	Sunny, 87 F, calm. Intermittent moderate odors
RMEC071010WN24	5:30 PM	1102 South 900 East (along creek)	Y-XP6218	<1-7136	<0.05	Shady, 85 F, calm. About 200 ppb along creek with peaks at cuvert at 900 east.
RMEC071010WN25	7:00 PM	Liberty Park (perimeter of pond)	N	<1-40	<0.05	Sunny, 85 F, calm. Slight odor at the inlet. About 10 ppb around entire perimeter
RMEC071010WN26	7:29 PM	1300 South 900 W (River inlet)	N	<1	<0.05	Shady, 83 F, calm. No odor.
RMEC071010WN27	7:40 PM	900 South 960 West (Inlet to Jordan River)	N	<1	<0.05	Shady, 83 F, calm. No odor.

July 11th 2010

Notes: Benzene measured with UltraRAE 3000 SN 596-901159. VOC measured with ppbRAE 3000 SN 594-900623. Benzene Cal Gas - AFC Precision Gas Mixture Benzene 5.0 PPM Lot# GAK-21-5-2, VOC Cal Gas - RAE Systems Isobutylene 10 PPM Lot# 107310A Cyl 17.

Sample Serial #	Time	Exact Location of Sample	Badge Sample (Y/N)	VOC (ppb)	Benzene (ppm)	Comments
RMEC071110IP01	7:30 AM	1731 East 900 South (Along River)	Y-HL4240	<1	<0.05	73 F, overcast, slight breeze. No petroleum odors.
RMEC071110IP02	7:42 AM	Bonneview (Along the river)	Y-HL4288	<1	<0.05	74 F, overcast, calm. No petroleum odors.
RMEC071110IP03	7:53 AM	1365 Harvard (Along the River)	Y-HL4221	<1	<0.05	73 F, overcast, calm. No petroleum odors.
RMEC071110IP04	8:03 AM	1225 Harvard (along creek)	Y-HL4287	<1	<0.05	73 F, overcast, calm. No petroleum odors.
RMEC071110IP05	8:13 AM	Garden Park Ward (along creek)	Y-XP6212	<1-113	<0.05	73 F, overcast, slight breeze out of east. Very slight intermittent petroleum odors downstream of visual oil below north bridge.
RMEC071110IP06	8:24 AM	1102 South 900 East (along creek)	Y-XP6218	<1-676	<0.05	73 F, mostly cloudy, calm. Highest VOC reading @ outlet of culverty @ 900 East. <1 ppb VOC's along sidewalk following creek west. Slight petroleum odor at culvert.
RMEC071110IP07	8:45 AM	Liberty Park (perimeter of pond)	N	<1	<0.05	73 F, thunderstorm, rain, wind. No petroleum odors.
RMEC071110IP08	9:00 AM	1300 South 900 West (along creek)	N	<1	<0.05	73 F, overcast, slight breeze. No petroleum odors.
RMEC071110IP09	9:13 AM	960 West 900 South (Inlet to Jordan River)	N	<1	<0.05	73 F, overcast, slight breeze. No petroleum odors.
RMEC071110IP10	12:00 PM	1731 East 900 South (along creek)	Y-XP6162	<1	<0.05	82 F, shade, calm. No petroleum odors.
RMEC071110IP11	12:30 PM	Bonneview (along creek)	Y-XP6216	<1	<0.05	80 F, shady, calm. No petroleum odors.
RMEC071110IP12	12:45 PM	1365 Harvard (along creek)	Y-XP6206	<1-38	<0.05	82 F, shady, calm. No petroleum odors.
RMEC071110IP13	12:55 PM	1225 Harvard (along creek)	Y-XP6223	<1-170	<0.05	82 F, sunny, calm. Very slight petroleum odor at east end of property near creek, location of highest VOC reading.
RMEC071110IP14	1:08 PM	Garden Park Ward (along creek)	Y-XP6231	<1-239	<0.05	82 F, overcast, calm to slight east breeze. Slight petroleum odor downstream of north bridge where oil has pooled is body, highest VOCs.
RMEC071110IP15	1:24 PM	1102 South 900 East (along creek)	Y-XP4289	<1-1091	<0.05	82 F, overcast, slight breeze. Slight petroleum odor at culvert, highest VOCs. <300 ppb VOCs along sidewalk.
RMEC071110IP16	2:00 PM	Liberty Park (perimeter of pond)	N	<1-205	<0.05	85 F, overcast, slight breeze. Very slight petroleum odors along NE portion of lake, highest VOCs, <50 around rest of perimeter.
RMEC071110IP17	2:20 PM	1300 South 900 West (along creek)	N	<1	<0.05	87 F, sunny, slight breeze. No petroleum odor.
RMEC071110IP18	2:35 PM	960 West 900 South (Inlet to Jordan River)	N	<1	<0.05	87 F, sunny, slight breeze. No petroleum odor.
RMEC071110IP19	3:40 PM	1731 East 900 South (along creek)	Y-XP6162	<1	<0.05	88 F, shady, calm. No petroleum odors.

RMEC071110IP20	3:53 PM	Bonneview (along creek)	Y-XP6216	<1	<0.05	88 F, shady, calm. No petroleum odors.
RMEC071110IP21	4:05 PM	1365 Harvard (along creek)	Y-XP6206	<1	<0.05	88 F, shady, calm. No petroleum odors.
RMEC071110IP22	4:15 PM	1225 Harvard (along creek)	Y-XP6223	<1-74	<0.05	88 F, sunny, calm. No petroleum odors.
RMEC071110IP23	4:40 PM	Garden Park Ward (along creek)	Y-XP6231	<1-449	<0.05	90 F, sunny, calm. Slight intermittent petroleum odors. Crews pressure washing upstream. Water murky.
RMEC071110IP24	4:50 PM	1102 South 900 East (along creek)	Y-XP4289	<1-2874	<0.05	90 F, shady, calm. Slight petroleum odors @ culvert, highest VOCs, <600 ppb VOCs along sidewalk. Water murky from washing upstream.
RMEC071110IP25	5:00 PM	Liberty Park (perimeter of pond)	N	<1-298	<0.05	90 F, sunny, calm. Slight intermittent petroleum odors near inlet on NE corner of pond, highest VOCs. <100 ppb VOCs around rest of pond with no noticeable petroleum odors.
RMEC071110IP26	5:20 PM	1300 South 900 West (Inlet to Jordan River)	N	<1	<0.05	90 F, sunny, calm. No petroleum odors.
RMEC071110IP27	5:35 PM	960 West 900 South (Inlet to Jordan River)	N	<1	<0.05	90 F, sunny, calm. No petroleum odors.
RMEC071110IP28	5:54 PM	1102 South 900 East (along creek)	Y-XP4289	<1-5185	<0.05	Shady, 90 F, calm. Moderate petroleum odors at culvert, highest VOCs. <500 ppb VOCs along sidewalk. Crews washing upstream.
RMEC071110IP29	6:20 PM	Garden Park Ward (along creek)	Y-XP6231	<1-44170	<0.05-1.05	90 F, sunny, calm. Crews pressure washing with portable pumps. A lot of exhaust. High VOC and benzene readings obtained adjacent to engine exhaust. <2000 ppb VOC and <0.05 benzene away from engine exhaust.

July 12th 2010

Notes: Benzene measured with UltraRAE 3000 SN 596-901159. VOC measured with ppbRAE 3000 SN 594-900623. Benzene Cal Gas - AFC Precision Gas Mixture Benzene 5.0 PPM Lot# GAK-21-5-2, VOC Cal Gas - RAE Systems Isobutylene 10 PPM Lot# 107310A Cyl 17.

Sample Serial #	Time	Exact Location of Sample	Badge Sample (Y/N)	VOC (ppb)	Benzene (ppm)	Comments
RMEC071210WN01	7:45 AM	1731 East 900 South (Along River)	Y-XP6162	<1	<0.05	Shady, 70 F, calm. No odors.
RMEC071210WN02	7:55 AM	Bonneview (Along the river)	Y-XP6216	<1	<0.05	Shady, 70 F, calm. No odors.
RMEC071210WN03	8:05 AM	1365 Harvard (Along the River)	Y-XP6206	<1	<0.05	Shady, 70 F, calm. No odors.
RMEC071210WN04	8:15 AM	1225 Harvard (Along the River)	Y-XP6223	<1	<0.05	Sun/shade, 70 F, calm. No odors.
RMEC071210WN05	8:25 AM	Garden Park Ward (along creek)	Y-XP6231	<1	<0.05	Sunny, 71 F, calm. No odors.
RMEC071210WN06	8:35 AM	1102 South 900 East (along creek)	Y-XP4289	<1-2451	<0.05	Sunny/shade, 71 F, calm. Peak odor at culvert 900 East. Slight to moderate odor along creek. About 80 ppb at house.
RMEC071210WN07	9:35 AM	Liberty Park (perimeter of pond)	N	<1-480	<0.05	Sunny/shade, 81 F, calm. Intermittent slight odor around perimeter of pond with peak on north side of inlet.
RMEC071210WN08	10:12 AM	1300 South 900 West (Inlet to Jordan River)	N	<1	<0.05	Sunny, 81 F, calm. No odors.
RMEC071210WN09	10:22 AM	900 South 960 West (Inlet to Jordan River)	N	<1	<0.05	Sunny, 81 F, calm. No odors.
RMEC071210WN10	11:30 AM	1731 East 900 South (along creek)	Y-XP6696	<1	<0.05	Shady, 86 F, calm. No odors.
RMEC071210WN11	11:55 AM	Bonneview (along creek)	Y-XP6759	<1	<0.05	Shady, 86 F, calm. No odors.
RMEC071210WN12	12:05 PM	1365 Harvard (along creek)	Y-XP6680	<1	<0.05	Shady, 86 F, calm. No odors.
RMEC071210WN13	12:20 PM	1225 Harvard (along creek)	Y-XP6755	<1	<0.05	Sunny, 86 F, calm. No odors.
RMEC071210WN14	12:30 PM	Garden Park Ward (along creek)	Y-XP6721	<1	<0.05	Sunny, 87 F, calm. No odor.
RMEC071210WN15	12:40 PM	1102 South 900 East (along creek)	Y-XP6770	<1-8458	<0.05	Sun/shade, 88 F, calm. Strong peak odor at culvert at 900 East, Moderate odor along creek, with light to moderate intermittent odor at house.
RMEC071210WN16	1:01 PM	Liberty Park (perimeter of pond)	N	<1-1440	<0.05	Sunny, 89 F, light breeze. Peak odor at inlet. Otherwise intermittent light odor near inlet. No odor around other parts.
RMEC071210WN17	1:43 PM	1300 South 900 West (Inlet to Jordan River)	N	<1	<0.05	Sunny, 89 F. No odors.
RMEC071210WN18	2:00 PM	900 South 960 West (Inlet to Jordan River)	N	<1	<0.05	Sunny, 89 F. No odors.
RMEC071210WN19	3:50 PM	1731 East 900 South	Y-XP6696	<1	<0.05	Shady, 87 F, calm. No odor.
RMEC071210WN20	4:00 PM	Bonneview	Y-XP6759	<1	<0.05	Shady, 87 F, calm. No odor.
RMEC071210WN21	4:10 PM	1365 Harvard	Y-XP6880	<1	<0.05	Shady, 88 F, calm. No odor.
RMEC071210WN22	4:20 PM	1225 Harvard	Y-XP6755	<1	<0.05	Sunny, 91 F, calm. No odor.
RMEC071210WN23	4:30 PM	Garden Park Ward (along creek)	Y-XP6721	<1	<0.05	Sunny, 91 F, light breeze. No odors.
RMEC071210WN24	4:35 PM	1102 South 900 East	Y - XP6770	<1-41.35	<0.05	Shady, 91 F, slight breeze. Heavy odors at culvery at 900 East. About 4000 ppb along creek and 1000 ppb at house.
RMEC071210WN25	4:45 PM	Liberty Park	N	<1-3644	<0.05	Sunny, 91 F, slight breeze. Odors only found at inlet. They were about 300 ppb with intermittent peaks.
RMEC071210WN26	5:50 PM	1300 South 900 West	N	<1	<0.05	Sunny, 94 F, slight breeze. No odor.
RMEC071210WN27	6:15 PM	900 South 960 West (Inlet to Jordan River)	N	<1	<0.05	Sunny, 97 F, slight breeze. No odor.

July 13th 2010

Notes: Benzene measured with UltraRAE 3000 SN 596-901159. VOC measured with ppbRAE 3000 SN 594-900623. Benzene Cal Gas - AFC Precision Gas Mixture Benzene 5.0 PPM Lot# GAK-21-5-2, VOC Cal Gas - RAE Systems Isobutylene 10 PPM Lot# 107310A Cyl 17.

Sample Serial #	Time	Exact Location of Sample	Badge Sample (Y/N)	VOC (ppb)	Benzene (ppm)	Comments
RMEC071310WN01	7:45 AM	1731 East 900 South (Along River)	Y-XP6696	<1	<0.05	Shady, 73 F, calm. No odors.
RMEC071310WN02	7:57 AM	Bonneview (Along the river)	Y-XP6759	<1	<0.05	Shady, 73 F, calm. No odors.
RMEC071310WN03	8:06 AM	1365 Harvard	Y-XP6680	<1	<0.05	Shady, 73 F, calm. No odors.
RMEC071310WN04	8:17 AM	1225 Harvard (Along the River)	Y-XP6755	<1	<0.05	Sun/shade, 74 F, slight breeze. No odors
RMEC071310WN05	8:25 AM	Garden Park Ward	Y-6721	<1	<0.05	Sunny, 74 F, calm. No odors.
RMEC071310WN06	8:40 AM	1102 South 900 East (Creek Bed)	Y-XP6770	<1-118	<0.05	Sun/shade, 74 F, calm. Moderate odors at culvert at 900 East. No odors along creek. Intermittent odors of 50 ppb at west culvert. No odors at house.
RMEC071310WN07	9:00 AM	Liberty Park (Perimeter of Lake)	N	<1	<0.05	Sun/shade, 74 F, calm. No odors.
RMEC071310WN08	9:38 AM	1300 South 900 West (Inlet to Jordan River)	N	<1	<0.05	Sun/shade, 74 F, calm. No odors.
RMEC071310WN09	9:51 AM	960 West 900 South (Inlet to Jordan River)	N	<1	<0.05	Sun/shade, 75 F, calm. No odors.
RMEC071310WN10	11:15 AM	1731 East 900 South (Along River)	Y-XP6744	<1	<0.05	Shady, 85 F, calm. No odors.
RMEC071310WN11	11:25 AM	Bonneview (Along the river)	Y-XP6678	<1	<0.05	Shady, 85 F, calm. No odors.
RMEC071310WN12	11:45 AM	1365 Harvard (along creek)	Y-XP6728	<1	<0.05	Shady, 87 F, calm. No odor.
RMEC071310WN13	12:00 PM	1225 Harvard (Along the River)	Y-XP6841	<1	<0.05	Sunny, 86 F, calm. No odor.
RMEC071310WN14	12:10 PM	Garden Park Ward	Y-XP6782	<1	<0.05	Sunny, 86 F, calm. No odor.
RMEC071310WN15	12:25 PM	1102 South 900 East (Creek Bed)	Y-XP6819	<1-1781	<0.05	Sun/shade, 85 F, calm. Intermittent strong odors at culvert at 900 East. About 25 ppb along creek. No odors at house.
RMEC071310WN16	12:47 PM	Lilberty Park (Perimeter of Lake)	N	<1	<0.05	Cloudy, 89 F, light breeze. No odors.
RMEC071310WN17	1:31 PM	1300 South 900 West (Inlet to Jordan River)	N	<1	<0.05	Cloudy, 90 F, slight breeze. No odors.
RMEC071310WN18	1:47 PM	960 West 900 South (Inlet to Jordan River)	N	<1	<0.05	Sunny, 92 F, slight breeze. No odors.
RMEC071310WN19	4:13 PM	1731 East 900 South (Along River)	Y-XP6744	<1	<0.05	Shady, 87 F, calm. No odor.
RMEC071310WN20	4:23 PM	Bonneview (Along the river)	Y-XP6678	<1	<0.05	Shady, 87 F, calm. No odor.
RMEC071310WN21	4:34 PM	1365 Harvard	Y-XP6728	<1	<0.05	Shady, 88 F, calm. No odor.
RMEC071310WN22	4:45 PM	1225 Harvard (Along the River)	Y-XP6841	<1	<0.05	Sun/shade, 89 F, calm. No odors.
RMEC071310WN23	4:55 PM	Garden Park Ward	Y-XP6782	<1	<0.05	Sunny, 90 F, calm. No odor.
RMEC071310WN24	5:10 PM	1102 South 900 East (Above Culvert)	Y-XP6819	<1-839	<0.05	Shady, 91 F, slight breeze. Peak intermittent odor at culvert (900 East). 15 ppb odor along creek and at house.
RMEC071310WN25	5:27 PM	Lilberty Park (Perimeter of Lake)	N	<1	<0.05	Sunny, 93 F, light breeze. No odors.
RMEC071310WN26	5:55 PM	1300 South 900 West (Inlet to Jordan River)	N	<1	<0.05	Sunny, 93 F, light breeze. No odors.
RMEC071310WN27	6:10 PM	960 West 900 South (Inlet to Jordan River)	N	<1	<0.05	Sunny, 93 F, light breeze. No odors.

July 14th 2010

Notes: Benzene measured with UltraRAE 3000 SN 596-901159. VOC measured with ppbRAE 3000 SN 594-900623. Benzene Cal Gas - AFC Precision Gas Mixture Benzene 5.0 PPM Lot# GAK-21-5-2, VOC Cal Gas - RAE Systems Isobutylene 10 PPM Lot# 107310A Cyl 17.

Sample Serial #	Time	Exact Location of Sample	Badge Sample (Y/N)	VOC (ppm)	Benzene (ppm)	Comments
RMEC071410-WN07	8:16 AM	1731 East 900 South (Backyard along water way)	Y (XP 6744)	<1	<0.05	Shady, 70 degrees F, slight breeze. No odors.
RMEC071410-WN02	8:27 AM	Bonneview Park (Upstream Bridge and Grafe area)	Y (XP 6678)	<1	<0.05	Shady, 70 degrees F, calm. No odors.
RMEC071410-WN03	8:37 AM	1365 Harvard	Y (XP 6728)	<1	<0.05	Shady, 70 degrees F, calm. No odors.
RMEC071410-WN04	8:48 AM	1225 Harvard	Y (XP 6841)	<1	<0.05	Cloudy, 71 degrees F, calm. No odors.
RMEC071410-WN05	8:59 AM	Garden Park Ward	Y (XP 6782)	<1	<0.05	Cloudy, 71 degrees F, light rain, calm. No odors.
RMEC071410-WN06	9:10 AM	1102 South 900 East	Y (XP 6819)	<1-1378	<0.05	Partly sunny/shade, 72 degrees F, calm. Slight intermittent odors at street and along creek. Strong odors at culvert at 900 E.
RMEC071410-WN07	9:32 AM	Liberty Park (Perimeter of Lake)	N	<1-30	<0.05	Partly sunny, 73 degrees F, calm. Light intermittent odors at the inlet.
RMEC071410-WN08	10:11 AM	1300 South 900 West (inlet to river)	N	<1	<0.05	Sunny, 75 degrees F, slight breeze. No odors.
RMEC071410-WN09	10:38 AM	900 South 960 West (Creek entry to river)	N	<1	<0.05	Sunny, 78 degrees F, calm. No odors.
RMEC071410-WN10	11:00 AM	1731 East 900 South (Backyard along water way)	Y (HA 4412)	<1-608	<0.05	Shade, 78 degrees F, slight breeze. Light to moderate intermittent odors along creek and house.
RMEC071410-WN11	11:09 AM	Bonneview Park (Upstream Bridge and Grafe area)	Y (XP 6856)	<1	<0.05	Shade, 78 degrees F, light breeze. No odors.
RMEC071410-WN12	11:25 AM	1365 Harvard	Y (XP 6791)	<1-123	<0.05	Shade, 80 degrees F, calm. Light intermittent odors along creek.
RMEC071410-WN13	11:50 AM	1225 Harvard	Y (XP 6763)	<1-08	<0.05	Sunny, 81 degrees F, calm. Slight intermittent odors.
RMEC071410-WN14	12:10 PM	Garden Park Ward	Y (XP 6769)	<1-38	<0.05	Sunny, 81 degrees F, slight breeze. Light intermittent odors along creek.
RMEC071410-WN15	12:45 PM	1102 South 900 East	Y (XP 6776)	<1-2661	<0.05	Sun/shade, 82 degrees F, calm. Strong odor peaks at culvert at 900 E. Intermittent moderate odors along creek.
RMEC071410-WN16	1:04 PM	Liberty Park (Perimeter of Lake)	N	<1	<0.05	Sun/shade, 83 degrees F, light breeze. No odors.
RMEC071410-WN17	1:38 PM	1300 South 900 West (inlet to river)	N	<1	<0.05	Sunny, 85 degrees F, light breeze. No odors.
RMEC071410-WN18	1:48 PM	900 South 960 West (Creek entry to river)	N	<1	<0.05	Sunny, 85 degrees F, light breeze. No odors.
RMEC071410-WN19	4:31 PM	1731 East 900 South (Backyard along water way)	Y (HA 4412)	<1	<0.05	Shady, 83 degrees F, calm. No odors.
RMEC071410-WN20	4:40 PM	Bonneview Park (Upstream Bridge and Grafe area)	Y (XP 6856)	<1	<0.05	Shady, 83 degrees F, calm. No odors.
RMEC071410-WN21	4:49 PM	1365 Harvard	Y (XP 6791)	<1	<0.05	Shady, 83 degrees F, slight breeze. No odors.
RMEC071410-WN22	4:59 PM	1225 Harvard	Y (XP 6763)	<1	<0.05	Sunny, 85 degrees F, calm. No odors.
RMEC071410-WN23	5:13 PM	Garden Park Ward	Y (XP 6769)	<1	<0.05	Sunny, 85 degrees F, calm. No odors.
RMEC071410-WN24	5:21 PM	1102 South 900 East	Y (XP 6776)	<1-1072	<0.05	Sun/shade, 85 degrees F, calm. Intermittent light odors at house. Moderate odors with intermittent strong odor peaks.
RMEC071410-WN25	5:34 PM	Liberty Park (Perimeter of Lake)	N	<1	<0.05	Sunny, 85 degrees F, light breeze. No odors.
RMEC071410-WN26	6:01 PM	1300 South 900 West (inlet to river)	N	<1	<0.05	Sunny, 87 degrees F, calm. No odors.
RMEC071410-WN27	6:19 PM	900 South 960 West (Creek entry to river)	N	<1	<0.05	Sunny, 87 degrees F, slight breeze. No odors.

July 15th 2010

Notes: Benzene measured with UltraRAE 3000 SN 596-901159. VOC measured with ppbRAE 3000 SN 594-900623. Benzene Cal Gas - AFC Precision Gas Mixture Benzene 5.0 PPM Lot# GAK-21-5-2, VOC Cal Gas - RAE Systems Isobutylene 10 PPM Lot# 107310A Cyl 17.

Sample Serial #	Time	Exact Location of Sample	Badge Sample (Y/N)	VOC (ppm)	Benzene (ppm)	Comments
RMEC071510-WN01	6:55 AM	1731 East 900 South	Y (HR 6734)	<1	<0.05	Shade, 68 degrees F, calm. No odors.
RMEC071510-WN02	7:05 AM	Bonneview	Y (HR 6727)	<1	<0.05	Shady, 68 degrees F, calm. No odors.
RMEC071510-WN03	7:13 AM	1365 Harvard	Y (HR 6731)	<1	<0.05	Shady, 68 degrees F, calm. No odors.
RMEC071510-WN04	7:23 AM	1225 Harvard	Y (HM 5386)	<1-25	<0.05	Shady, 69 degrees F, calm. Slight odor at culvert under pond.
RMEC071510-WN05	7:31 AM	Garden Park Ward	Y (HM 5290)	<1-29	<0.05	Shady, 69 degrees F, calm. Slight odor along creek.

RMEC071510-WN06	7:44 AM	1102 South 900 East	Y (HM 5329)	<1-9218	<0.05-0.35	Shady, 69 degrees F, calm. About 200 ppb along creek with intermittent peaks at 900 E culvert. Intermittent benzene readings of 0.10-0.35 ppm at culvert.
RMEC071510-WN07	8:55 AM	Liberty Park	N	<1	<0.05	Shade,sun, 71 degrees F, calm. No odor.
RMEC071510-WN08	9:28 AM	1300 South 900 West	N	<1	<0.05	Shade/sun, 72 degrees F, calm. No odor.
RMEC071510-WN09	9:38 AM	900 South 960 West (Creek entry to river)	N	<1	<0.05	Shade/sun, 76 degrees F, calm. No odor.
RMEC071510-WN10	10:25 AM	1731 East 900 South	Y (HR 6734)	<1-8934	<0.05-0.70	Shady, 78 degrees F, light breeze. Intermittent strong VOCs. Benzene is consistent at 0.60 ppm with peaks.
RMEC071510-WN11	10:45 AM	Bonneview	Y (HR 6727)	<1-5263	<0.05-0.15	Shady, 80 degrees F, light breeze. VOCs range from 1800-2000 ppb along creek with peak at waterfall. Benzene at 0.15 at waterfall, and 0.10 along rest of creek.
RMEC071510-WN12	11:34 AM	1365 Harvard	Y (HR 6731)	<1-4077	<0.05-0.55	Shady, 77 degrees F, calm. Moderate odors along creek with peaks at west end of property. Benzene levels highest under house on creek.
RMEC071510-WN13	12:09 PM	1225 Harvard	Y (HR 5386)	<1-2939	<0.05-0.15	Sunny, 79 degrees F, calm. Moderate odors along creek, with peaks at each end of pond. Benzene only found on east end of property.
RMEC071510-WN14	12:25 PM	Garden Park Ward	Y (HM 5290)	<1-353	<0.05	Sunny, 80 degrees F, calm. Light intermittent odors along creek.
RMEC071510-WN15	12:40 PM	1102 South 900 East	Y (HM 5329)	<1-5897	<0.05-0.15	Sun/shade, 81 degrees F, strong odors at culvert at 900 E. Light to moderate odors along rest of creek. Benzene found only at 900 E culvert.
RMEC071510-WN16	1:15 PM	Liberty Park	N	<1	<0.05	Sunny, 84 degrees F, calm. No odors.
RMEC071510-WN17	1:50 PM	1300 South 900 West	N	<1	<0.05	Sunny, 87 degrees F, light breeze. No odors.
RMEC071510-WN18	2:05 PM	900 South 960 West (Creek entry to river)	N	<1	<0.05	Sunny/shade, 87 degrees F, light breeze. No odors.
RMEC071510-WN19	2:30 PM	1731 East 900 South	Y (HR 6734)	<1	<0.05	Shady, 83 degrees F, light breeze. No odors.
RMEC071510-WN20	2:41 PM	Bonneview	Y (HR 6727)	<1	<0.05	Shady, 84 degrees F, slight breeze. No odors.
RMEC071510-WN21	2:53 PM	1365 Harvard	Y (HR 6731)	<1	<0.05	Shady, 84 degrees F, calm. No odors.
RMEC071510-WN22	3:09 PM	1225 Harvard	Y (HM 5386)	<1	<0.05	Sunny, 85 degrees F, calm. No odors.
RMEC071510-WN23	3:21 PM	Garden Park Ward	Y (HM 5290)	<1	<0.05	Sunny, 86 degrees F, calm. No odors.
RMEC071510-WN24	3:34 PM	1102 South 900 East	Y (HM 5329)	<1-3764	<0.05	Shady, 85 degrees F, calm. Odors only found at culvert on 900 E.
RMEC071510-WN25	3:50 PM	Liberty Park	N	<1	<0.05	Sun/shade, 86 degrees F, slight breeze. No odors.
RMEC071510-WN26	4:21 PM	1300 South 900 West	N	<1	<0.05	Sunny, 89 degrees F, calm. No odors.
RMEC071510-WN27	4:33 PM	900 South 960 West (Creek entry to river)	N	<1	<0.05	Sunny, 89 degrees F, calm. No odors.

APPENDIX B

POVM Area Monitoring Results

Sample Info	Date	Sample Number	Analyte	Measured Concentration (ppm)
1731 E. 900 S. Area Sample - along creek east of house, ~8 'above surface of creek	7/6/2010-7/7/2010	HM 5561	Benzene	<0.0059
			Ethyl benzene	<0.056
			Toluene	<0.056
			Total Hydrocarbons	<0.059
			Xylene	<0.056
Bonneview Park Area Sample - Near boom deployment area	7/6/2010-7/7/2010	HM 5602	Benzene	<0.0058
			Ethyl benzene	<0.055
			Toluene	<0.055
			Total Hydrocarbons	**0.064**
			Xylene	<0.055
1365 Harvard Ave. Area Sample - Near bridge along west end of waterfall	7/6/2010-7/7/2010	HM 5556	Benzene	<0.0059
			Ethyl benzene	<0.056
			Toluene	<0.056
			Total Hydrocarbons	<0.059
			Xylene	<0.056
1225 Harvard Ave. Area Sample - Near bridge along west end of pool	7/6/2010-7/7/2010	HM5575	Benzene	<0.0059
			Ethyl benzene	<0.056
			Toluene	<0.056
			Total Hydrocarbons	<0.059
			Xylene	<0.056
Garden Park Ward Building Area Sample - On tree limb over west end of creek ~5' above water	7/6/2010-7/7/2010	HM 5588	Benzene	MISSING
			Ethyl benzene	MISSING
			Toluene	MISSING
			Total Hydrocarbons	MISSING
			Xylene	MISSING
1102 S. 900 E. Area Sample - along creek east of house, ~4' above mouth of culvert	7/6/2010-7/7/2010	HM 5603	Benzene	<0.0059
			Ethyl benzene	<0.056
			Toluene	<0.056
			Total Hydrocarbons	<0.059
			Xylene	<0.056
Johnny Fox Personal Sample - Chevron supervisor working with crew scrubbing creek	7/6/2010-7/6/2010	HM 5599	Benzene	<0.022
			Ethyl benzene	<0.21
			Toluene	<0.21
			Total Hydrocarbons	**0.66**
			Xylene	<0.21
Paul Freeman Personal Sample - Chevron safety supervisor working with crew pressure washing creek	7/6/2010-7/6/2010	HM5593	Benzene	<0.025
			Ethyl benzene	<0.24
			Toluene	<0.24
			Total Hydrocarbons	<0.25
			Xylene	<0.24
Field Blank	7/6/2010-7/7/2010	HM 6127	Benzene	None Detected
			Ethyl benzene	None Detected
			Toluene	None Detected
			Total Hydrocarbons	None Detected
			Xylene	None Detected

Sample Info	Date	Sample Number	Analyte	Measured Concentration (ppm)
Mike Eaton Personal Sample - Chevron safety supervisor working with crew pressure washing creek	7/7/2010-7/7/2010	HM 6184	**Benzene**	**0.026**
			Ethyl benzene	<0.12
			Toluene	**0.2**
			Total Hydrocarbons	**2.2**
			Xylene	**0.16**
Paul Freeman Personal Sample - Chevron safety supervisor working with crew scrubbing creek	7/7/2010-7/7/2010	HM 6139	Benzene	<0.014
			Ethyl benzene	<0.14
			Toluene	<0.14
			Total Hydrocarbons	**0.45**
			Xylene	<0.14
Dan Tarlton Personal Sample - Chevron safety supervisor working with crew cutting and clearing wood at 1365 Harvard Ave.	7/7/2010-7/7/2010	HM 5626	Benzene	<0.016
			Ethyl benzene	<0.15
			Toluene	<0.15
			Total Hydrocarbons	<0.16
			Xylene	<0.15
1731 E. 900 S. Area Sample - along creek east of house, ~8 'above surface of creek	7/7/2010-7/8/2010	HM 5612	Benzene	<0.0061
			Ethyl benzene	<0.058
			Toluene	<0.058
			Total Hydrocarbons	<0.061
			Xylene	<0.058
Bonneview Park Area Sample - Near boom deployment area	7/7/2010-7/8/2010	HM 6159	Benzene	<0.0061
			Ethyl benzene	<0.059
			Toluene	<0.059
			Total Hydrocarbons	0.062
			Xylene	<0.059
1365 Harvard Ave. Area Sample - Near bridge along west end of waterfall	7/7/2010-7/8/2010	HM 6202	Benzene	<0.0061
			Ethyl benzene	<0.059
			Toluene	<0.059
			Total Hydrocarbons	**0.26**
			Xylene	<0.059
1225 Harvard Ave. Area Sample - Near bridge along west end of pool	7/7/2010-7/8/2010	HM 6229	Benzene	<0.0061
			Ethyl benzene	<0.058
			Toluene	<0.059
			Total Hydrocarbons	<0.061
			Xylene	<0.058
Garden Park Ward Building Area Sample - On tree limb over west end of creek ~5' above water	7/7/2010-7/8/2010	HM 6257	Benzene	<0.0061
			Ethyl benzene	<0.058
			Toluene	<0.059
			Total Hydrocarbons	<0.061
			Xylene	<0.058
1102 S. 900 E. Area Sample - along creek east of house, ~4' above mouth of culvert	7/7/2010-7/8/2010	HM 6153	Benzene	<0.0061
			Ethyl benzene	<0.059
			Toluene	<0.059
			Total Hydrocarbons	**0.074**
			Xylene	<0.059
Field Blank	7/7/2010-7/8/2010	HM 4201	Benzene	None Detected
			Ethyl benzene	None Detected
			Toluene	None Detected
			Total Hydrocarbons	None Detected
			Xylene	None Detected

Sample Info	Date	Sample Number	Analyte	Measured Concentration (ppm)
1731 E. 900 S. Area Sample - along creek east of house, ~8 'above surface of creek	7/8/2010-7/9/2010	HM 5105	Benzene	<0.0062
			Ethyl benzene	<0.059
			Toluene	<0.060
			Total Hydrocarbons	<0.062
			Xylene	<0.059
Bonneview Park Area Sample - Near boom deployment area	7/8/2010-7/9/2010	HM 5113	Benzene	<0.0062
			Ethyl benzene	<0.059
			Toluene	<0.059
			Total Hydrocarbons	<0.062
			Xylene	<0.059
1365 Harvard Ave. Area Sample - Near bridge along west end of waterfall	7/8/2010-7/9/2010	HG 4754	Benzene	<0.0062
			Ethyl benzene	<0.059
			Toluene	<0.059
			Total Hydrocarbons	<0.062
			Xylene	<0.059
1225 Harvard Ave. Area Sample - Near bridge along west end of pool	7/8/2010-7/9/2010	HM 5059	Benzene	<0.0063
			Ethyl benzene	<0.060
			Toluene	<0.060
			Total Hydrocarbons	<0.063
			Xylene	<0.060
Garden Park Ward Building Area Sample - On tree limb over west end of creek ~5' above water	7/8/2010-7/9/2010	HM 5138	Benzene	<0.0063
			Ethyl benzene	<0.060
			Toluene	<0.060
			Total Hydrocarbons	<0.063
			Xylene	<0.060
1102 S. 900 E. Area Sample - along creek east of house, ~4' above mouth of culvert	7/8/2010-7/9/2010	HG 6386	Benzene	<0.0063
			Ethyl benzene	<0.060
			Toluene	<0.060
			Total Hydrocarbons	<0.063
			Xylene	<0.060
Field Blank	7/8/2010-7/9/2010	HL 4214	Benzene	None Detected
			Ethyl benzene	None Detected
			Toluene	None Detected
			Total Hydrocarbons	None Detected
			Xylene	None Detected

Sample Info	Date	Sample Number	Analyte	Measured Concentration (ppm)
1731 E. 900 S. Area Sample - along creek east of house, ~8 'above surface of creek	7/9/2010-7/10/2010	HR 6333	Benzene	<0.0061
			Ethyl benzene	<0.058
			Toluene	<0.059
			Total Hydrocarbons	<0.061
			Xylene	<0.058
Bonneview Park Area Sample - Near boom deployment area	7/9/2010-7/10/2010	HR 6325	Benzene	<0.0060
			Ethyl benzene	<0.057
			Toluene	<0.058
			Total Hydrocarbons	<0.060
			Xylene	<0.057
1365 Harvard Ave. Area Sample - Near bridge along west end of waterfall	7/9/2010-7/10/2010	HR 6349	Benzene	<0.0060
			Ethyl benzene	<0.058
			Toluene	<0.058
			Total Hydrocarbons	<0.061
			Xylene	<0.058
1225 Harvard Ave. Area Sample - Near bridge along west end of pool	7/9/2010-7/10/2010	HM 5134	Benzene	<0.0061
			Ethyl benzene	<0.058
			Toluene	<0.058
			Total Hydrocarbons	**0.079**
			Xylene	<0.058
Garden Park Ward Building Area Sample - On tree limb over west end of creek ~5' above water	7/9/2010-7/10/2010	HL 4262	Benzene	<0.0059
			Ethyl benzene	<0.058
			Toluene	<0.058
			Total Hydrocarbons	<0.059
			Xylene	<0.058
1102 S. 900 E. Area Sample - along creek east of house, ~4' above mouth of culvert	7/9/2010-7/10/2010	HL 4217	Benzene	<0.0059
			Ethyl benzene	<0.056
			Toluene	<0.056
			Total Hydrocarbons	**0.2**
			Xylene	<0.056
Field Blank	7/9/2010-7/10/2010	XP 6182	Benzene	None Detected
			Ethyl benzene	None Detected
			Toluene	None Detected
			Total Hydrocarbons	None Detected
			Xylene	None Detected

Sample Info	Date	Sample Number	Analyte	Measured Concentration (ppm)
Caleb Hundersmark (non-smoker) - Personal Sample - Works on crew pressure washing the creek	7/9/2010-7/9/2010	HL 4214	**Benzene**	**0.056**
			Ethyl benzene	<.23
			Toluene	**0.47**
			Total Hydrocarbons	**3**
			Xylene	**0.31**
1731 E. 900 S. Area Sample - along creek east of house, ~8 'above surface of creek	7/10/2010-7/11/2010	HL 4240	Benzene	<0.0061
			Ethyl benzene	<0.059
			Toluene	<0.059
			Total Hydrocarbons	<0.062
			Xylene	<0.059
Bonneview Park Area Sample - Near boom deployment area	7/10/2010-7/11/2010	HL 4288	Benzene	<0.0061
			Ethyl benzene	<0.059
			Toluene	<0.059
			Total Hydrocarbons	<0.062
			Xylene	<0.059
1365 Harvard Ave. Area Sample - Near bridge along west end of waterfall	7/10/2010-7/11/2010	HL 4221	Benzene	<0.0061
			Ethyl benzene	<0.058
			Toluene	<0.059
			Total Hydrocarbons	<0.061
			Xylene	<0.058
1225 Harvard Ave. Area Sample - Near bridge along west end of pool	7/10/2010-7/11/2010	HL 4287	Benzene	<0.0061
			Ethyl benzene	<0.058
			Toluene	<0.058
			Total Hydrocarbons	<0.061
			Xylene	<0.058
Garden Park Ward Building Area Sample - On tree limb over west end of creek ~5' above water	7/10/2010-7/11/2010	XP 6212	Benzene	<0.0062
			Ethyl benzene	<0.060
			Toluene	<0.060
			Total Hydrocarbons	<0.063
			Xylene	<0.060
1102 S. 900 E. Area Sample - along creek east of house, ~4' above mouth of culvert	7/10/2010-7/11/2010	XP 6218	Benzene	<0.0064
			Ethyl benzene	<0.061
			Toluene	<0.061
			Total Hydrocarbons	**0.14**
			Xylene	<0.061
Field Blank	7/10/2010-7/11/2010	XP 6184	Benzene	None Detected
			Ethyl benzene	None Detected
			Toluene	None Detected
			Total Hydrocarbons	None Detected
			Xylene	None Detected

Sample Info	Date	Sample Number	Analyte	Measured Concentration (ppm)
1731 E. 900 S. Area Sample - along creek east of house, ~8 'above surface of creek	7/11/2010-7/12/2010	XP 6162	Benzene	<0.0063
			Ethyl benzene	<0.061
			Toluene	<0.061
			Total Hydrocarbons	<0.064
			Xylene	<0.0561
Bonneview Park Area Sample - Near boom deployment area	7/11/2010-7/12/2010	XP 6216	Benzene	<0.0063
			Ethyl benzene	<0.061
			Toluene	<0.061
			Total Hydrocarbons	<0.064
			Xylene	<0.061
1365 Harvard Ave. Area Sample - Near bridge along west end of waterfall	7/11/2010-7/12/2010	XP 6206	Benzene	<0.0063
			Ethyl benzene	<0.061
			Toluene	<0.061
			Total Hydrocarbons	<0.064
			Xylene	<0.061
1225 Harvard Ave. Area Sample - Near bridge along west end of pool	7/11/2010-7/12/2010	XP 6223	Benzene	<0.0063
			Ethyl benzene	<0.061
			Toluene	<0.061
			Total Hydrocarbons	<0.064
			Xylene	<0.061
Garden Park Ward Building Area Sample - On tree limb over west end of creek ~5' above water	7/11/2010-7/12/2010	XP 6231	Benzene	<0.0063
			Ethyl benzene	<0.061
			Toluene	<0.061
			Total Hydrocarbons	<0.064
			Xylene	<0.061
1102 S. 900 E. Area Sample - along creek east of house, ~4' above mouth of culvert	7/11/2010-7/12/2010	HL 4289	Benzene	<0.0063
			Ethyl benzene	<0.061
			Toluene	<0.061
			Total Hydrocarbons	**1.8**
			Xylene	<0.061
Field Blank	7/11/2010-7/12/2010	XP 6195	Benzene	<0.0063
			Ethyl benzene	<0.061
			Toluene	<0.061
			Total Hydrocarbons	<0.064
			Xylene	<0.061

Sample Info	Date	Sample Number	Analyte	Measured Concentration (ppm)
1731 E. 900 S. Area Sample - along creek east of house, ~8 'above surface of creek	7/12/2010-7/13/2010	XP 6696	Benzene	<0.0062
			Ethyl benzene	<0.059
			Toluene	<0.059
			Total Hydrocarbons	<0.062
			Xylene	<0.059
Bonneview Park Area Sample - Near boom deployment area	7/12/2010-7/13/2010	XP 6759	Benzene	<0.0063
			Ethyl benzene	<0.060
			Toluene	<0.060
			Total Hydrocarbons	<0.063
			Xylene	<0.060
1365 Harvard Ave. Area Sample - Near bridge along west end of waterfall	7/12/2010-7/13/2010	XP 6680	Benzene	<0.0062
			Ethyl benzene	<0.059
			Toluene	<0.060
			Total Hydrocarbons	<0.060
			Xylene	<0.059
1225 Harvard Ave. Area Sample - Near bridge along west end of pool	7/12/2010-7/13/2010	XP 6755	Benzene	<0.0062
			Ethyl benzene	<0.059
			Toluene	<0.060
			Total Hydrocarbons	<0.062
			Xylene	<0.059
Garden Park Ward Building Area Sample - On tree limb over west end of creek ~5' above water	7/12/2010-7/13/2010	XP 6721	Benzene	<0.0062
			Ethyl benzene	<0.059
			Toluene	<0.060
			Total Hydrocarbons	<0.062
			Xylene	<0.059
1102 S. 900 E. Area Sample - along creek east of house, ~4' above mouth of culvert	7/12/2010-7/13/2010	XP 6770	Benzene	<0.0062
			Ethyl benzene	<0.059
			Toluene	<0.059
			Total Hydrocarbons	**7.5**
			Xylene	**0.17**
Field Blank	7/12/2010-7/13/2010	XP 6694	Benzene	None Detected
			Ethyl benzene	None Detected
			Toluene	None Detected
			Total Hydrocarbons	None Detected
			Xylene	None Detected

Sample Info	Date	Sample Number	Analyte	Measured Concentration (ppm)
1731 E. 900 S. Area Sample - along creek east of house, ~8 'above surface of creek	7/13/2010-7/14/2010	XP 6744	Benzene	<0.0062
			Ethyl benzene	<0.059
			Toluene	<0.059
			Total Hydrocarbons	<0.062
			Xylene	<0.059
Bonneview Park Area Sample - Near boom deployment area	7/13/2010-7/14/2010	XP 6678	Benzene	<0.0062
			Ethyl benzene	<0.059
			Toluene	<0.059
			Total Hydrocarbons	<0.062
			Xylene	<0.059
1365 Harvard Ave. Area Sample - Near bridge along west end of waterfall	7/13/2010-7/14/2010	XP 6728	Benzene	<0.0062
			Ethyl benzene	<0.059
			Toluene	<0.060
			Total Hydrocarbons	<0.062
			Xylene	<0.059
1225 Harvard Ave. Area Sample - Near bridge along west end of pool	7/13/2010-7/14/2010	XP 6841	Benzene	<0.0062
			Ethyl benzene	<0.059
			Toluene	<0.059
			Total Hydrocarbons	<0.062
			Xylene	<0.059
Garden Park Ward Building Area Sample - On tree limb over west end of creek ~5' above water	7/13/2010-7/14/2010	XP 6782	Benzene	<0.0061
			Ethyl benzene	<0.059
			Toluene	<0.059
			Total Hydrocarbons	<0.062
			Xylene	<0.059
1102 S. 900 E. Area Sample - along creek east of house, ~4' above mouth of culvert	7/13/2010-7/14/2010	XP 6819	Benzene	<0.0060
			Ethyl benzene	<0.058
			Toluene	<0.058
			Total Hydrocarbons	**2.1**
			Xylene	<0.058
Field Blank	7/13/2010-7/14/2010	HR 6679	Benzene	None Detected
			Ethyl benzene	None Detected
			Toluene	None Detected
			Total Hydrocarbons	None Detected
			Xylene	None Detected

Sample Info	Date	Sample Number	Analyte	Measured Concentration (ppm)
1731 E. 900 S. Area Sample - along creek east of house, ~8 'above surface of creek	7/14/2010-7/15/2010	XP 4412	Benzene	<0.0074
			Ethyl benzene	<0.071
			Toluene	<0.071
			Total Hydrocarbons	<0.074
			Xylene	<0.071
Bonneview Park Area Sample - Near boom deployment area	7/14/2010-7/15/2010	XP 6856	Benzene	<0.0059
			Ethyl benzene	<0.056
			Toluene	<0.057
			Total Hydrocarbons	<0.059
			Xylene	<0.056
1365 Harvard Ave. Area Sample - Near bridge along west end of waterfall	7/14/2010-7/15/2010	XP 6791	Benzene	<0.0059
			Ethyl benzene	<0.057
			Toluene	<0.057
			Total Hydrocarbons	<0.060
			Xylene	<0.057
1225 Harvard Ave. Area Sample - Near bridge along west end of pool	7/14/2010-7/15/2010	XP 6763	Benzene	<0.0075
			Ethyl benzene	<0.072
			Toluene	<0.072
			Total Hydrocarbons	<0.076
			Xylene	<0.072
Garden Park Ward Building Area Sample - On tree limb over west end of creek ~5' above water	7/14/2010-7/15/2010	XP 6769	Benzene	<0.0076
			Ethyl benzene	<0.073
			Toluene	<0.073
			Total Hydrocarbons	<0.076
			Xylene	<0.073
1102 S. 900 E. Area Sample - along creek east of house, ~4' above mouth of culvert	7/14/2010-7/15/2010	XP 6776	Benzene	<0.0077
			Ethyl benzene	<0.074
			Toluene	<0.074
			Total Hydrocarbons	**0.27**
			Xylene	<0.074
Field Blank	7/14/2010-7/15/2010	HL 7983	Benzene	None Detected
			Ethyl benzene	None Detected
			Toluene	None Detected
			Total Hydrocarbons	None Detected
			Xylene	None Detected

Sample Info	Date	Sample Number	Analyte	Measured Concentration (ppm)
1731 E. 900 S. Area Sample - along creek east of house, ~8 'above surface of creek	7/15/2010-7/16/2010	HR 6734	Benzene	<0.0050
			Ethyl benzene	<0.048
			Toluene	<0.048
			Total Hydrocarbons	<0.050
			Xylene	<0.048
Bonneview Park Area Sample - Near boom deployment area	7/15/2010-7/16/2010	HR 6727	Benzene	<0.0050
			Ethyl benzene	<0.048
			Toluene	<0.048
			Total Hydrocarbons	<0.050
			Xylene	<0.048
1365 Harvard Ave. Area Sample - Near bridge along west end of waterfall	7/15/2010-7/16/2010	HR 6731	Benzene	<0.0050
			Ethyl benzene	<0.048
			Toluene	<0.048
			Total Hydrocarbons	<0.050
			Xylene	<0.048
1225 Harvard Ave. Area Sample - Near bridge along west end of pool	7/15/2010-7/16/2010	HM 5386	Benzene	<0.0050
			Ethyl benzene	<0.048
			Toluene	<0.048
			Total Hydrocarbons	<0.050
			Xylene	<0.048
Garden Park Ward Building Area Sample - On tree limb over west end of creek ~5' above water	7/15/2010-7/16/2010	HM 5290	Benzene	<0.0050
			Ethyl benzene	<0.048
			Toluene	<0.048
			Total Hydrocarbons	<0.050
			Xylene	<0.048
1102 S. 900 E. Area Sample - along creek east of house, ~4' above mouth of culvert	7/15/2010-7/16/2010	HM 5329	Benzene	<0.0050
			Ethyl benzene	<0.048
			Toluene	<0.048
			Total Hydrocarbons	**0.6**
			Xylene	<0.048
Field Blank	7/15/2010-7/16/2010	HL 7958	Benzene	None Detected
			Ethyl benzene	None Detected
			Toluene	None Detected
			Total Hydrocarbons	None Detected
			Xylene	None Detected

Sample Info	Date	Sample Number	Analyte	Measured Concentration (ppm)
1731 E. 900 S. Area Sample - along creek east of house, ~8 'above surface of creek	7/16/2010-7/17/2010	HL 4089	Benzene	<0.0064
			Ethyl benzene	<0.061
			Toluene	<0.061
			Total Hydrocarbons	<0.064
			Xylene	<0.061
Bonneview Park Area Sample - Near boom deployment area	7/16/2010-7/17/2010	HL 4117	Benzene	<0.0066
			Ethyl benzene	<0.063
			Toluene	<0.063
			Total Hydrocarbons	<0.066
			Xylene	<0.063
1365 Harvard Ave. Area Sample - Near bridge along west end of waterfall	7/16/2010-7/17/2010	HL 4064	Benzene	<0.0066
			Ethyl benzene	<0.063
			Toluene	<0.063
			Total Hydrocarbons	<0.066
			Xylene	<0.063
1225 Harvard Ave. Area Sample - Near bridge along west end of pool	7/16/2010-7/17/2010	HL 4108	Benzene	<0.0068
			Ethyl benzene	<0.065
			Toluene	<0.065
			Total Hydrocarbons	<0.068
			Xylene	<0.065
Garden Park Ward Building Area Sample - On tree limb over west end of creek ~5' above water	7/16/2010-7/17/2010	HL 4082	Benzene	<0.0068
			Ethyl benzene	<0.065
			Toluene	<0.065
			Total Hydrocarbons	<0.069
			Xylene	<0.065
1102 S. 900 E. Area Sample - along creek east of house, ~4' above mouth of culvert	7/16/2010-7/17/2010	HL 4080	Benzene	<0.0069
			Ethyl benzene	<0.066
			Toluene	<0.066
			Total Hydrocarbons	**0.22**
			Xylene	<0.066
Field Blank	7/16/2010-7/17/2010	HL 4106	Benzene	None Detected
			Ethyl benzene	None Detected
			Toluene	None Detected
			Total Hydrocarbons	None Detected
			Xylene	None Detected

Sample Info	Date	Sample Number	Analyte	Measured Concentration (ppm)
1731 E. 900 S. Area Sample - along creek east of house, ~8 'above surface of creek	7/17/2010-7/18/2010	HL 4107	Benzene	<0.0065
			Ethyl benzene	<0.063
			Toluene	<0.063
			Total Hydrocarbons	<0.066
			Xylene	<0.063
Bonneview Park Area Sample - Near boom deployment area	7/17/2010-7/18/2010	HG 4873	Benzene	<0.0065
			Ethyl benzene	<0.062
			Toluene	<0.062
			Total Hydrocarbons	<0.065
			Xylene	<0.062
1365 Harvard Ave. Area Sample - Near bridge along west end of waterfall	7/17/2010-7/18/2010	HG 4852	Benzene	<0.0065
			Ethyl benzene	<0.062
			Toluene	<0.062
			Total Hydrocarbons	<0.065
			Xylene	<0.062
1225 Harvard Ave. Area Sample - Near bridge along west end of pool	7/17/2010-7/18/2010	HL 4053	Benzene	<0.0065
			Ethyl benzene	<0.062
			Toluene	<0.062
			Total Hydrocarbons	**0.19**
			Xylene	<0.062
Garden Park Ward Building Area Sample - On tree limb over west end of creek ~5' above water	7/17/2010-7/18/2010	HL 4065	Benzene	<0.0064
			Ethyl benzene	<0.061
			Toluene	<0.061
			Total Hydrocarbons	<0.064
			Xylene	<0.061
1102 S. 900 E. Area Sample - along creek east of house, ~4' above mouth of culvert	7/17/2010-7/18/2010	HL 7953	Benzene	<0.0064
			Ethyl benzene	<0.062
			Toluene	<0.062
			Total Hydrocarbons	<0.065
			Xylene	<0.062
Field Blank	7/17/2010-7/18/2010	HM 5348	Benzene	None Detected
			Ethyl benzene	None Detected
			Toluene	None Detected
			Total Hydrocarbons	None Detected
			Xylene	None Detected

APPENDIX C

Laboratory Analytical Reports

ANALYTICAL REPORT

Report Date July 12, 2010

Frank Derosso
RMEC, Inc.
2188 S Highland Dr. Suite 201
Salt Lake City, UT 84106

Phone: (801) 467-3661
Fax: (801) 583-1463
E-mail: fderosso@rmec.net

Client Project ID: RMEC, Inc. 070710
Purchase Order: PJ10E-2114
Workorder: 1018844
Project Manager Paul Pope

Analytical Results

Sample ID: **HM5602** Media: 3M 3500 ORGANIC POVM Collected: 7/6/2010
Lab ID: 1018844001 Sampling Location: RED BUTTE CREEK Received: 7/7/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1531 Minutes Analyzed: 7/10/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.018	<0.0058	0.0010
Ethyl benzene	<0.010	<0.24	<0.055	0.010
Toluene	<0.010	<0.21	<0.055	0.010
Total Hydrocarbons	**0.011**	**0.23**	**0.064**	0.010
Xylene	<0.010	<0.24	<0.055	0.010

Sample ID: **HM5599** Media: 3M 3500 ORGANIC POVM Collected: 7/6/2010
Lab ID: 1018844002 Sampling Location: RED BUTTE CREEK Received: 7/7/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 405 Minutes Analyzed: 7/10/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.070	<0.022	0.0010
Ethyl benzene	<0.010	<0.90	<0.21	0.010
Toluene	<0.010	<0.79	<0.21	0.010
Total Hydrocarbons	**0.030**	**2.3**	**0.66**	0.010
Xylene	<0.010	<0.90	<0.21	0.010

Sample ID: **HM5561** Media: 3M 3500 ORGANIC POVM Collected: 7/6/2010
Lab ID: 1018844003 Sampling Location: RED BUTTE CREEK Received: 7/7/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1500 Minutes Analyzed: 7/10/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.019	<0.0059	0.0010
Ethyl benzene	<0.010	<0.24	<0.056	0.010
Toluene	<0.010	<0.21	<0.056	0.010
Total Hydrocarbons	<0.010	<0.21	<0.059	0.010
Xylene	<0.010	<0.24	<0.056	0.010

ANALYTICAL REPORT

Client Project ID: RMEC, Inc. 070710
Purchase Order: PJ10E-2114
Workorder: 1018844
Project Manager Paul Pope

Analytical Results

Sample ID: **HM5593** Media: 3M 3500 ORGANIC POVM Collected: 7/6/2010
Lab ID: 1018844004 Sampling Location: RED BUTTE CREEK Received: 7/7/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 357 Minutes Analyzed: 7/10/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.079	<0.025	0.0010
Ethyl benzene	<0.010	<1.0	<0.24	0.010
Toluene	<0.010	<0.89	<0.24	0.010
Total Hydrocarbons	<0.010	<0.88	<0.25	0.010
Xylene	<0.010	<1.0	<0.24	0.010

Sample ID: **HM5556** Media: 3M 3500 ORGANIC POVM Collected: 7/6/2010
Lab ID: 1018844005 Sampling Location: RED BUTTE CREEK Received: 7/7/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1504 Minutes Analyzed: 7/10/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.019	<0.0059	0.0010
Ethyl benzene	<0.010	<0.24	<0.056	0.010
Toluene	<0.010	<0.21	<0.056	0.010
Total Hydrocarbons	<0.010	<0.21	<0.059	0.010
Xylene	<0.010	<0.24	<0.056	0.010

Sample ID: **HM5575** Media: 3M 3500 ORGANIC POVM Collected: 7/6/2010
Lab ID: 1018844006 Sampling Location: RED BUTTE CREEK Received: 7/7/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1498 Minutes Analyzed: 7/10/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.019	<0.0059	0.0010
Ethyl benzene	<0.010	<0.25	<0.056	0.010
Toluene	<0.010	<0.21	<0.056	0.010
Total Hydrocarbons	<0.010	<0.21	<0.059	0.010
Xylene	<0.010	<0.25	<0.056	0.010

Sample ID: **HM5603** Media: 3M 3500 ORGANIC POVM Collected: 7/6/2010
Lab ID: 1018844007 Sampling Location: RED BUTTE CREEK Received: 7/7/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1500 Minutes Analyzed: 7/10/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.019	<0.0059	0.0010

Results Continued on Next Page

ANALYTICAL REPORT

Client Project ID: RMEC, Inc. 070710
Purchase Order: PJ10E-2114
Workorder: 1018844
Project Manager Paul Pope

Analytical Results

Sample ID: **HM5603**	Media: 3M 3500 ORGANIC POVM	Collected: 7/6/2010
Lab ID: 1018844007	Sampling Location: RED BUTTE CREEK	Received: 7/7/2010

Method: 3M 3500/3520 POVM | Sampling Parameter: Exposure 1500 Minutes | Analyzed: 7/10/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Ethyl benzene	<0.010	<0.24	<0.056	0.010
Toluene	<0.010	<0.21	<0.056	0.010
Total Hydrocarbons	<0.010	<0.21	<0.059	0.010
Xylene	<0.010	<0.24	<0.056	0.010

Sample ID: **HM6127**	Media: 3M 3500 ORGANIC POVM	Collected: 7/6/2010
Lab ID: 1018844008	Sampling Location: RED BUTTE CREEK	Received: 7/7/2010

Method: 3M 3500/3520 POVM | Sampling Parameter: Exposure Not Provided | Analyzed: 7/11/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	NA	NA	0.0010
Ethyl benzene	<0.010	NA	NA	0.010
Toluene	<0.010	NA	NA	0.010
Total Hydrocarbons	<0.010	NA	NA	0.010
Xylene	<0.010	NA	NA	0.010

Workorder Comments

1018844 "Total Hydrocarbons" is the sum of all peaks in the chromatogram minus the solvent and requested analyte peaks and was quantitated against n-hexane

Report Authorization

Method: 3M 3500/3520 POVM

Young Hee Yoon — Analyst

Thomas J. Masoian — Peer Review

Laboratory Contact Information

Phone: (801) 266-7700
Email: alslt.lab@alsglobal.com
Web: www.datachem.com

ALS Laboratory Group (formerly DataChem Laboratories, Inc.)
960 W Levoy Drive
Salt Lake City, Utah 84123

ANALYTICAL REPORT

Client Project ID: RMEC, Inc. 070710
Purchase Order: PJ10E-2114
Workorder: 1018844
Project Manager Paul Pope

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS is accredited by ANSI/ACLASS (ISO 17025:2005) for specific fields of testing as documented in its current scope of accreditation (ID#AT-1421) which is available on request by contacting your project manager or view on the internet at http://www.aclasscorp.com. The quality systems implemented in the laboratory apply to all technologies performed by ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

Definitions

LOD = Limit of Detection = MDL = Method Detection Limit, A statistical estimate of method/media/instrument sensitivity.
LOQ = Limit of Quantitation = RL = Reporting Limit, A verified value of method/media/instrument sensitivity.
ND = Not Detected, Testing result not detected above the LOD or LOQ.
** No result could be reported, see sample comments for details.
< This testing result is less than the numerical value.
( ) This testing result is between the LOD and LOQ and has higher analytical uncertainty than values at or above the LOQ.

ANALYTICAL REPORT

Report Date July 12, 2010

Frank Derosso
RMEC, Inc.
2188 S Highland Dr. Suite 201
Salt Lake City, UT 84106

Phone: (801) 467-3661
Fax: (801) 583-1463
E-mail: fderosso@rmec.net

Client Project ID: RMEC, Inc. 070810
Purchase Order: PJ10E-2114
Workorder: 1018944
Project Manager Paul Pope

Analytical Results

Sample ID: **HM 6229** Media: 3M 3500 ORGANIC POVM Received: 7/8/2010
Lab ID: 1018944001 Sampling Location: RED BUTTE CREEK

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1445 Minutes Analyzed: 7/11/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0061	0.0010
Ethyl benzene	<0.010	<0.25	<0.058	0.010
Toluene	<0.010	<0.22	<0.059	0.010
Total Hydrocarbons	<0.010	<0.22	<0.061	0.010
Xylene	<0.010	<0.25	<0.058	0.010

Sample ID: **HM 6257** Media: 3M 3500 ORGANIC POVM Received: 7/8/2010
Lab ID: 1018944002 Sampling Location: RED BUTTE CREEK

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1445 Minutes Analyzed: 7/11/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0061	0.0010
Ethyl benzene	<0.010	<0.25	<0.058	0.010
Toluene	<0.010	<0.22	<0.059	0.010
Total Hydrocarbons	<0.010	<0.22	<0.061	0.010
Xylene	<0.010	<0.25	<0.058	0.010

Sample ID: **HM 6153** Media: 3M 3500 ORGANIC POVM Received: 7/8/2010
Lab ID: 1018944003 Sampling Location: RED BUTTE CREEK

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1440 Minutes Analyzed: 7/11/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0061	0.0010
Ethyl benzene	<0.010	<0.25	<0.059	0.010
Toluene	<0.010	<0.22	<0.059	0.010
Total Hydrocarbons	**0.012**	**0.26**	**0.074**	0.010
Xylene	<0.010	<0.25	<0.059	0.010

ANALYTICAL REPORT

Client Project ID: RMEC, Inc. 070810
Purchase Order: PJ10E-2114
Workorder: 1018944
Project Manager Paul Pope

Analytical Results

Sample ID: **HM 5626** Media: 3M 3500 ORGANIC POVM Received: 7/8/2010
Lab ID: 1018944004 Sampling Location: RED BUTTE CREEK

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 567 Minutes Analyzed: 7/11/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.050	<0.016	0.0010
Ethyl benzene	<0.010	<0.65	<0.15	0.010
Toluene	<0.010	<0.56	<0.15	0.010
Total Hydrocarbons	<0.010	<0.55	<0.16	0.010
Xylene	<0.010	<0.65	<0.15	0.010

Sample ID: **HM 6139** Media: 3M 3500 ORGANIC POVM Received: 7/8/2010
Lab ID: 1018944005 Sampling Location: RED BUTTE CREEK

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 615 Minutes Analyzed: 7/11/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.046	<0.014	0.0010
Ethyl benzene	<0.010	<0.60	<0.14	0.010
Toluene	<0.010	<0.52	<0.14	0.010
Total Hydrocarbons	**0.031**	**1.6**	**0.45**	0.010
Xylene	<0.010	<0.60	<0.14	0.010

Sample ID: **HM 6184** Media: 3M 3500 ORGANIC POVM Received: 7/8/2010
Lab ID: 1018944006 Sampling Location: RED BUTTE CREEK

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 687 Minutes Analyzed: 7/11/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	**0.0020**	**0.082**	**0.026**	0.0010
Ethyl benzene	<0.010	<0.53	<0.12	0.010
Toluene	**0.016**	**0.74**	**0.20**	0.010
Total Hydrocarbons	**0.17**	**7.7**	**2.2**	0.010
Xylene	**0.013**	**0.69**	**0.16**	0.010

Sample ID: **HM 5612** Media: 3M 3500 ORGANIC POVM Received: 7/8/2010
Lab ID: 1018944007 Sampling Location: RED BUTTE CREEK

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1450 Minutes Analyzed: 7/12/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.019	<0.0061	0.0010

Results Continued on Next Page

ANALYTICAL REPORT

Client Project ID: RMEC, Inc. 070810
Purchase Order: PJ10E-2114
Workorder: 1018944
Project Manager Paul Pope

Analytical Results

Sample ID: **HM 5612** Media: 3M 3500 ORGANIC POVM Received: 7/8/2010
Lab ID: 1018944007 Sampling Location: RED BUTTE CREEK

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1450 Minutes Analyzed: 7/12/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Ethyl benzene	<0.010	<0.25	<0.058	0.010
Toluene	<0.010	<0.22	<0.058	0.010
Total Hydrocarbons	<0.010	<0.22	<0.061	0.010
Xylene	<0.010	<0.25	<0.058	0.010

Sample ID: **HM 6159** Media: 3M 3500 ORGANIC POVM Received: 7/8/2010
Lab ID: 1018944008 Sampling Location: RED BUTTE CREEK

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1440 Minutes Analyzed: 7/12/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0061	0.0010
Ethyl benzene	<0.010	<0.25	<0.059	0.010
Toluene	<0.010	<0.22	<0.059	0.010
Total Hydrocarbons	<0.010	<0.22	<0.062	0.010
Xylene	<0.010	<0.25	<0.059	0.010

Sample ID: **HM 6202** Media: 3M 3500 ORGANIC POVM Received: 7/8/2010
Lab ID: 1018944009 Sampling Location: RED BUTTE CREEK

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1440 Minutes Analyzed: 7/12/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0061	0.0010
Ethyl benzene	<0.010	<0.25	<0.059	0.010
Toluene	<0.010	<0.22	<0.059	0.010
Total Hydrocarbons	**0.042**	**0.91**	**0.26**	0.010
Xylene	<0.010	<0.25	<0.059	0.010

Sample ID: **HL 4201** Media: 3M 3500 ORGANIC POVM Received: 7/8/2010
Lab ID: 1018944010 Sampling Location: RED BUTTE CREEK

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure Not Provided Analyzed: 7/12/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	NA	NA	0.0010
Ethyl benzene	<0.010	NA	NA	0.010

Results Continued on Next Page

ANALYTICAL REPORT

Client Project ID: RMEC, Inc. 070810
Purchase Order: PJ10E-2114
Workorder: 1018944
Project Manager Paul Pope

Analytical Results

Sample ID: **HL 4201** Media: 3M 3500 ORGANIC POVM Received: 7/8/2010
Lab ID: 1018944010 Sampling Location: RED BUTTE CREEK

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure Not Provided Analyzed: 7/12/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Toluene	<0.010	NA	NA	0.010
Total Hydrocarbons	<0.010	NA	NA	0.010
Xylene	<0.010	NA	NA	0.010

Workorder Comments

1018944 "Total Hydrocarbons" is the sum of all peaks in the chromatogram minus the solvent and requested analyte peaks and was quantitated against n-hexane

Report Authorization

Method: 3M 3500/3520 POVM

Young Hee Yoon
Analyst

Thomas J. Masoian
Peer Review

Laboratory Contact Information

Phone: (801) 266-7700
Email: alslt.lab@alsglobal.com
Web: www.datachem.com

ALS Laboratory Group (formerly DataChem Laboratories, Inc.)
960 W Levoy Drive
Salt Lake City, Utah 84123

ANALYTICAL REPORT

Client Project ID: RMEC, Inc. 070810
Purchase Order: PJ10E-2114
Workorder: 1018944
Project Manager Paul Pope

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS is accredited by ANSI/ACLASS (ISO 17025:2005) for specific fields of testing as documented in its current scope of accreditation (ID#AT-1421) which is available on request by contacting your project manager or view on the internet at http://www.aclasscorp.com. The quality systems implemented in the laboratory apply to all technologies performed by ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

Definitions

LOD = Limit of Detection = MDL = Method Detection Limit, A statistical estimate of method/media/instrument sensitivity.
LOQ = Limit of Quantitation = RL = Reporting Limit, A verified value of method/media/instrument sensitivity.
ND = Not Detected, Testing result not detected above the LOD or LOQ.
** No result could be reported, see sample comments for details.
< This testing result is less than the numerical value.
( ) This testing result is between the LOD and LOQ and has higher analytical uncertainty than values at or above the LOQ.

ANALYTICAL REPORT

Report Date July 13, 2010

Frank Derosso
RMEC, Inc.
2188 S Highland Dr. Suite 201
Salt Lake City, UT 84106

Phone: (801) 467-3661
Fax: (801) 583-1463
E-mail: fderosso@rmec.net

Client Project ID: RMEC, Inc 070910
Purchase Order: PJ10E-2114
Workorder: 1019059
Project Manager Paul Pope

Analytical Results

Sample ID: **HM 5105** Media: 3M 3500 ORGANIC POVM Collected: 7/9/2010
Lab ID: 1019059001 Sampling Location: Red Butte Creek Received: 7/9/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1420 Minutes Analyzed: 7/11/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0062	0.0010
Ethyl benzene	<0.010	<0.26	<0.059	0.010
Toluene	<0.010	<0.22	<0.060	0.010
Total Hydrocarbons	<0.010	<0.22	<0.062	0.010
Xylene	<0.010	<0.26	<0.059	0.010

Sample ID: **HM 5113** Media: 3M 3500 ORGANIC POVM Collected: 7/9/2010
Lab ID: 1019059002 Sampling Location: Red Butte Creek Received: 7/9/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1425 Minutes Analyzed: 7/11/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0062	0.0010
Ethyl benzene	<0.010	<0.26	<0.059	0.010
Toluene	<0.010	<0.22	<0.059	0.010
Total Hydrocarbons	<0.010	<0.22	<0.062	0.010
Xylene	<0.010	<0.26	<0.059	0.010

Sample ID: **HG 4754** Media: 3M 3500 ORGANIC POVM Collected: 7/9/2010
Lab ID: 1019059003 Sampling Location: Red Butte Creek Received: 7/9/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1425 Minutes Analyzed: 7/11/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0062	0.0010
Ethyl benzene	<0.010	<0.26	<0.059	0.010
Toluene	<0.010	<0.22	<0.059	0.010
Total Hydrocarbons	<0.010	<0.22	<0.062	0.010
Xylene	<0.010	<0.26	<0.059	0.010

ANALYTICAL REPORT

Client Project ID: RMEC, Inc 070910
Purchase Order: PJ10E-2114
Workorder: 1019059
Project Manager Paul Pope

Analytical Results

Sample ID: **HM 5059** Media: 3M 3500 ORGANIC POVM Collected: 7/9/2010
Lab ID: 1019059004 Sampling Location: Red Butte Creek Received: 7/9/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1400 Minutes Analyzed: 7/11/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0063	0.0010
Ethyl benzene	<0.010	<0.26	<0.060	0.010
Toluene	<0.010	<0.23	<0.060	0.010
Total Hydrocarbons	<0.010	<0.22	<0.063	0.010
Xylene	<0.010	<0.26	<0.060	0.010

Sample ID: **HM 5138** Media: 3M 3500 ORGANIC POVM Collected: 7/9/2010
Lab ID: 1019059005 Sampling Location: Red Butte Creek Received: 7/9/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1410 Minutes Analyzed: 7/11/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0063	0.0010
Ethyl benzene	<0.010	<0.26	<0.060	0.010
Toluene	<0.010	<0.23	<0.060	0.010
Total Hydrocarbons	<0.010	<0.22	<0.063	0.010
Xylene	<0.010	<0.26	<0.060	0.010

Sample ID: **HG 6386** Media: 3M 3500 ORGANIC POVM Collected: 7/9/2010
Lab ID: 1019059006 Sampling Location: Red Butte Creek Received: 7/9/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1410 Minutes Analyzed: 7/11/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0063	0.0010
Ethyl benzene	<0.010	<0.26	<0.060	0.010
Toluene	<0.010	<0.23	<0.060	0.010
Total Hydrocarbons	<0.010	<0.22	<0.063	0.010
Xylene	<0.010	<0.26	<0.060	0.010

Sample ID: **HL 4214** Media: 3M 3500 ORGANIC POVM Collected: 7/9/2010
Lab ID: 1019059007 Sampling Location: Red Butte Creek Received: 7/9/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 0 Minutes Analyzed: 7/11/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	NA	NA	0.0010

Results Continued on Next Page

ANALYTICAL REPORT

Client Project ID: RMEC, Inc 070910
Purchase Order: PJ10E-2114
Workorder: 1019059
Project Manager Paul Pope

Analytical Results

Sample ID: HL 4214	Media: 3M 3500 ORGANIC POVM	Collected: 7/9/2010
Lab ID: 1019059007	Sampling Location: Red Butte Creek	Received: 7/9/2010

Method: 3M 3500/3520 POVM | Sampling Parameter: Exposure 0 Minutes | Analyzed: 7/11/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Ethyl benzene	<0.010	NA	NA	0.010
Toluene	<0.010	NA	NA	0.010
Total Hydrocarbons	<0.010	NA	NA	0.010
Xylene	<0.010	NA	NA	0.010

Workorder Comments

1019059 Total Hydrocarbons is the sum of all peaks minus solvent and analyte peaks and was quantitated against n-hexane.

Report Authorization

Method: 3M 3500/3520 POVM

Fred Rejali — Analyst

Thomas J. Masoian — Peer Review

Laboratory Contact Information

Phone: (801) 266-7700
Email: alslt.lab@alsglobal.com
Web: www.datachem.com

ALS Laboratory Group (formerly DataChem Laboratories, Inc.)
960 W Levoy Drive
Salt Lake City, Utah 84123

ANALYTICAL REPORT

Client Project ID: RMEC, Inc 070910
Purchase Order: PJ10E-2114
Workorder: 1019059
Project Manager Paul Pope

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS is accredited by ANSI/ACLASS (ISO 17025:2005) for specific fields of testing as documented in its current scope of accreditation (ID#AT-1421) which is available on request by contacting your project manager or view on the internet at http://www.aclasscorp.com. The quality systems implemented in the laboratory apply to all technologies performed by ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

Definitions

LOD = Limit of Detection = MDL = Method Detection Limit, A statistical estimate of method/media/instrument sensitivity.
LOQ = Limit of Quantitation = RL = Reporting Limit, A verified value of method/media/instrument sensitivity.
ND = Not Detected, Testing result not detected above the LOD or LOQ.
** No result could be reported, see sample comments for details.
< This testing result is less than the numerical value.
( ) This testing result is between the LOD and LOQ and has higher analytical uncertainty than values at or above the LOQ.

ANALYTICAL REPORT

Report Date July 19, 2010

Frank Derosso
RMEC, Inc.
2188 S Highland Dr. Suite 201
Salt Lake City, UT 84106

Phone: (801) 467-3661
Fax: (801) 583-1463
E-mail: fderosso@rmec.net

Client Project ID: RMEC, Inc. 071210
Purchase Order: PJ10E-2114
Workorder: 1019362
Project Manager Paul Pope

Analytical Results

Sample ID: **HR 6333** Media: 3M 3500 ORGANIC POVM Collected: 7/9/2010
Lab ID: 1019362001 Sampling Location: Red Butte Creek Spil Received: 7/12/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1445 Minutes Analyzed: 7/12/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0061	0.0010
Ethyl benzene	<0.010	<0.25	<0.058	0.010
Toluene	<0.010	<0.22	<0.059	0.010
Total Hydrocarbons	<0.010	<0.22	<0.061	0.010
Xylene	<0.010	<0.25	<0.058	0.010

Sample ID: **HR 6325** Media: 3M 3500 ORGANIC POVM Collected: 7/9/2010
Lab ID: 1019362002 Sampling Location: Red Butte Creek Spil Received: 7/12/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1470 Minutes Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.019	<0.0060	0.0010
Ethyl benzene	<0.010	<0.25	<0.057	0.010
Toluene	<0.010	<0.22	<0.058	0.010
Total Hydrocarbons	<0.010	<0.21	<0.060	0.010
Xylene	<0.010	<0.25	<0.057	0.010

Sample ID: **HR 6349** Media: 3M 3500 ORGANIC POVM Collected: 7/9/2010
Lab ID: 1019362003 Sampling Location: Red Butte Creek Spil Received: 7/12/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1460 Minutes Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.019	<0.0060	0.0010
Ethyl benzene	<0.010	<0.25	<0.058	0.010
Toluene	<0.010	<0.22	<0.058	0.010
Total Hydrocarbons	<0.010	<0.21	<0.061	0.010
Xylene	<0.010	<0.25	<0.058	0.010

ANALYTICAL REPORT

Client Project ID: RMEC, Inc. 071210
Purchase Order: PJ10E-2114
Workorder: 1019362
Project Manager Paul Pope

Analytical Results

Sample ID: **HM 5134** Media: 3M 3500 ORGANIC POVM Collected: 7/9/2010
Lab ID: 1019362004 Sampling Location: Red Butte Creek Spil Received: 7/12/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1455 Minutes Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.019	<0.0061	0.0010
Ethyl benzene	<0.010	<0.25	<0.058	0.010
Toluene	<0.010	<0.22	<0.058	0.010
Total Hydrocarbons	**0.013**	**0.28**	**0.079**	0.010
Xylene	<0.010	<0.25	<0.058	0.010

Sample ID: **HL 4262** Media: 3M 3500 ORGANIC POVM Collected: 7/9/2010
Lab ID: 1019362005 Sampling Location: Red Butte Creek Spil Received: 7/12/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1500 Minutes Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.019	<0.0059	0.0010
Ethyl benzene	<0.010	<0.24	<0.056	0.010
Toluene	<0.010	<0.21	<0.056	0.010
Total Hydrocarbons	<0.010	<0.21	<0.059	0.010
Xylene	<0.010	<0.24	<0.056	0.010

Sample ID: **HL 4217** Media: 3M 3500 ORGANIC POVM Collected: 7/9/2010
Lab ID: 1019362006 Sampling Location: Red Butte Creek Spil Received: 7/12/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1505 Minutes Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.019	<0.0059	0.0010
Ethyl benzene	<0.010	<0.24	<0.056	0.010
Toluene	<0.010	<0.21	<0.056	0.010
Total Hydrocarbons	**0.034**	**0.71**	**0.20**	0.010
Xylene	<0.010	<0.24	<0.056	0.010

Sample ID: **XP 6182** Media: 3M 3500 ORGANIC POVM Collected: 7/9/2010
Lab ID: 1019362007 Sampling Location: Red Butte Creek Spil Received: 7/12/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 0 Minutes Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	NA	NA	0.0010

Results Continued on Next Page

ANALYTICAL REPORT

Client Project ID: RMEC, Inc. 071210
Purchase Order: PJ10E-2114
Workorder: 1019362
Project Manager Paul Pope

Analytical Results

Sample ID: XP 6182 | Media: 3M 3500 ORGANIC POVM | Collected: 7/9/2010
Lab ID: 1019362007 | Sampling Location: Red Butte Creek Spil | Received: 7/12/2010

Method: 3M 3500/3520 POVM | Sampling Parameter: Exposure 0 Minutes | Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Ethyl benzene	<0.010	NA	NA	0.010
Toluene	<0.010	NA	NA	0.010
Total Hydrocarbons	<0.010	NA	NA	0.010
Xylene	<0.010	NA	NA	0.010

Sample ID: HL 4254 | Media: 3M 3500 ORGANIC POVM | Collected: 7/9/2010
Lab ID: 1019362008 | Sampling Location: Red Butte Creek Spil | Received: 7/12/2010

Method: 3M 3500/3520 POVM | Sampling Parameter: Exposure 360 Minutes | Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	**0.0023**	**0.18**	**0.056**	0.0010
Ethyl benzene	<0.010	<1.0	<0.23	0.010
Toluene	**0.020**	**1.8**	**0.47**	0.010
Total Hydrocarbons	**0.12**	**10**	**3.0**	0.010
Xylene	**0.013**	**1.3**	**0.31**	0.010

Workorder Comments

1019362 "Total Hydrocarbons" is the sumof all peaks in the chromatogram minus the solvent and requested analyte peaks and was quantitated against n-hexane.

Report Authorization

Method: 3M 3500/3520 POVM

Young Hee Yoon — Analyst
Thomas J. Masoian — Peer Review

Laboratory Contact Information

Phone: (801) 266-7700
Email: alslt.lab@alsglobal.com
Web: www.datachem.com

ALS Laboratory Group (formerly DataChem Laboratories, Inc.)
960 W Levoy Drive
Salt Lake City, Utah 84123

ANALYTICAL REPORT

Client Project ID: RMEC, Inc. 071210
Purchase Order: PJ10E-2114
Workorder: 1019362
Project Manager Paul Pope

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS is accredited by ANSI/ACLASS (ISO 17025:2005) for specific fields of testing as documented in its current scope of accreditation (ID#AT-1421) which is available on request by contacting your project manager or view on the internet at http://www.aclasscorp.com. The quality systems implemented in the laboratory apply to all technologies performed by ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

Definitions

LOD = Limit of Detection = MDL = Method Detection Limit, A statistical estimate of method/media/instrument sensitivity.
LOQ = Limit of Quantitation = RL = Reporting Limit, A verified value of method/media/instrument sensitivity.
ND = Not Detected, Testing result not detected above the LOD or LOQ.
** No result could be reported, see sample comments for details.
< This testing result is less than the numerical value.
( ) This testing result is between the LOD and LOQ and has higher analytical uncertainty than values at or above the LOQ.

ANALYTICAL REPORT

Report Date July 19, 2010

Frank Derosso
RMEC, Inc.
2188 S Highland Dr. Suite 201
Salt Lake City, UT 84106

Phone: (801) 467-3661
Fax: (801) 583-1463
E-mail: fderosso@rmec.net

Client Project ID: RMEC, Inc. 071210 3
Purchase Order: PJ10E-2114
Workorder: 1019364
Project Manager Paul Pope

Analytical Results

Sample ID: **HL 4240** Media: 3M 3500 ORGANIC POVM Collected: 7/10/2010
Lab ID: 1019364001 Sampling Location: Red Butte Creek Oil Received: 7/12/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1441 Minutes Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0061	0.0010
Ethyl benzene	<0.010	<0.25	<0.059	0.010
Toluene	<0.010	<0.22	<0.059	0.010
Total Hydrocarbons	<0.010	<0.22	<0.062	0.010
Xylene	<0.010	<0.25	<0.059	0.010

Sample ID: **HL 4288** Media: 3M 3500 ORGANIC POVM Collected: 7/10/2010
Lab ID: 1019364002 Sampling Location: Red Butte Creek Oil Received: 7/12/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1440 Minutes Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0061	0.0010
Ethyl benzene	<0.010	<0.25	<0.059	0.010
Toluene	<0.010	<0.22	<0.059	0.010
Total Hydrocarbons	<0.010	<0.22	<0.062	0.010
Xylene	<0.010	<0.25	<0.059	0.010

Sample ID: **HL 4221** Media: 3M 3500 ORGANIC POVM Collected: 7/10/2010
Lab ID: 1019364003 Sampling Location: Red Butte Creek Oil Received: 7/12/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1444 Minutes Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0061	0.0010
Ethyl benzene	<0.010	<0.25	<0.058	0.010
Toluene	<0.010	<0.22	<0.059	0.010
Total Hydrocarbons	<0.010	<0.22	<0.061	0.010
Xylene	<0.010	<0.25	<0.058	0.010

ANALYTICAL REPORT

Client Project ID: RMEC, Inc. 071210 3
Purchase Order: PJ10E-2114
Workorder: 1019364
Project Manager Paul Pope

Analytical Results

Sample ID: **HL 4287** Media: 3M 3500 ORGANIC POVM Collected: 7/10/2010
Lab ID: 1019364004 Sampling Location: Red Butte Creek Oil Received: 7/12/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1446 Minutes Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0061	0.0010
Ethyl benzene	<0.010	<0.25	<0.058	0.010
Toluene	<0.010	<0.22	<0.058	0.010
Total Hydrocarbons	<0.010	<0.22	<0.061	0.010
Xylene	<0.010	<0.25	<0.058	0.010

Sample ID: **XP 6212** Media: 3M 3500 ORGANIC POVM Collected: 7/10/2010
Lab ID: 1019364005 Sampling Location: Red Butte Creek Oil Received: 7/12/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1418 Minutes Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0062	0.0010
Ethyl benzene	<0.010	<0.26	<0.060	0.010
Toluene	<0.010	<0.23	<0.060	0.010
Total Hydrocarbons	<0.010	<0.22	<0.063	0.010
Xylene	<0.010	<0.26	<0.060	0.010

Sample ID: **XP 6218** Media: 3M 3500 ORGANIC POVM Collected: 7/10/2010
Lab ID: 1019364006 Sampling Location: Red Butte Creek Oil Received: 7/12/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1383 Minutes Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0064	0.0010
Ethyl benzene	<0.010	<0.27	<0.061	0.010
Toluene	<0.010	<0.23	<0.061	0.010
Total Hydrocarbons	**0.022**	**0.50**	**0.14**	0.010
Xylene	<0.010	<0.27	<0.061	0.010

Sample ID: **XP 6184** Media: 3M 3500 ORGANIC POVM Collected: 7/10/2010
Lab ID: 1019364007 Sampling Location: Red Butte Creek Oil Received: 7/12/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 0 Minutes Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	NA	NA	0.0010

Results Continued on Next Page

ANALYTICAL REPORT

Client Project ID: RMEC, Inc. 071210 3
Purchase Order: PJ10E-2114
Workorder: 1019364
Project Manager Paul Pope

Analytical Results

Sample ID: XP 6184	Media: 3M 3500 ORGANIC POVM	Collected: 7/10/2010
Lab ID: 1019364007	Sampling Location: Red Butte Creek Oil	Received: 7/12/2010

Method: 3M 3500/3520 POVM	Sampling Parameter: Exposure 0 Minutes	Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Ethyl benzene	<0.010	NA	NA	0.010
Toluene	<0.010	NA	NA	0.010
Total Hydrocarbons	<0.010	NA	NA	0.010
Xylene	<0.010	NA	NA	0.010

Workorder Comments

1019364 "Total Hydrocarbons" is the sumof all peaks in the chromatogram minus the solvent and requested analyte peaks and was quantitated against n-hexane.

One of the QC sample analyte(for n-hexane) was slightly higher than control limits. There was no impact on results.

Report Authorization

Method: 3M 3500/3520 POVM

Young Hee Yoon	Thomas J. Masoian
Analyst	Peer Review

Laboratory Contact Information

Phone: (801) 266-7700
Email: alslt.lab@alsglobal.com
Web: www.datachem.com

ALS Laboratory Group (formerly DataChem Laboratories, Inc.)
960 W Levoy Drive
Salt Lake City, Utah 84123

ANALYTICAL REPORT

Client Project ID: RMEC, Inc. 071210 3
Purchase Order: PJ10E-2114
Workorder: 1019364
Project Manager Paul Pope

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS is accredited by ANSI/ACLASS (ISO 17025:2005) for specific fields of testing as documented in its current scope of accreditation (ID#AT-1421) which is available on request by contacting your project manager or view on the internet at http://www.aclasscorp.com. The quality systems implemented in the laboratory apply to all technologies performed by ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

Definitions

LOD = Limit of Detection = MDL = Method Detection Limit, A statistical estimate of method/media/instrument sensitivity.
LOQ = Limit of Quantitation = RL = Reporting Limit, A verified value of method/media/instrument sensitivity.
ND = Not Detected, Testing result not detected above the LOD or LOQ.
** No result could be reported, see sample comments for details.
< This testing result is less than the numerical value.
( ) This testing result is between the LOD and LOQ and has higher analytical uncertainty than values at or above the LOQ.

ANALYTICAL REPORT

Report Date July 19, 2010

Frank Derosso
RMEC, Inc.
2188 S Highland Dr. Suite 201
Salt Lake City, UT 84106

Phone: (801) 467-3661
Fax: (801) 583-1463
E-mail: fderosso@rmec.net

Client Project ID: RMEC, Inc. 071210 2
Purchase Order: PJ10E-2114
Workorder: 1019363
Project Manager Paul Pope

Analytical Results

Sample ID: **XP 6162** Media: 3M 3500 ORGANIC POVM Collected: 7/11/2010
Lab ID: 1019363001 Sampling Location: Red Butte Creek Oil Received: 7/12/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1393 Minutes Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0063	0.0010
Ethyl benzene	<0.010	<0.26	<0.061	0.010
Toluene	<0.010	<0.23	<0.061	0.010
Total Hydrocarbons	<0.010	<0.22	<0.064	0.010
Xylene	<0.010	<0.26	<0.061	0.010

Sample ID: **XP 6216** Media: 3M 3500 ORGANIC POVM Collected: 7/11/2010
Lab ID: 1019363002 Sampling Location: Red Butte Creek Oil Received: 7/12/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1393 Minutes Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0063	0.0010
Ethyl benzene	<0.010	<0.26	<0.061	0.010
Toluene	<0.010	<0.23	<0.061	0.010
Total Hydrocarbons	<0.010	<0.22	<0.064	0.010
Xylene	<0.010	<0.26	<0.061	0.010

Sample ID: **XP 6206** Media: 3M 3500 ORGANIC POVM Collected: 7/11/2010
Lab ID: 1019363003 Sampling Location: Red Butte Creek Oil Received: 7/12/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1393 Minutes Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0063	0.0010
Ethyl benzene	<0.010	<0.26	<0.061	0.010
Toluene	<0.010	<0.23	<0.061	0.010
Total Hydrocarbons	<0.010	<0.22	<0.064	0.010
Xylene	<0.010	<0.26	<0.061	0.010

ANALYTICAL REPORT

Client Project ID: RMEC, Inc. 071210 2
Purchase Order: PJ10E-2114
Workorder: 1019363
Project Manager Paul Pope

Analytical Results

Sample ID: **XP 6223** Media: 3M 3500 ORGANIC POVM Collected: 7/11/2010
Lab ID: 1019363004 Sampling Location: Red Butte Creek Oil Received: 7/12/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1393 Minutes Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0063	0.0010
Ethyl benzene	<0.010	<0.26	<0.061	0.010
Toluene	<0.010	<0.23	<0.061	0.010
Total Hydrocarbons	<0.010	<0.22	<0.064	0.010
Xylene	<0.010	<0.26	<0.061	0.010

Sample ID: **XP 6231** Media: 3M 3500 ORGANIC POVM Collected: 7/11/2010
Lab ID: 1019363005 Sampling Location: Red Butte Creek Oil Received: 7/12/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1393 Minutes Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0063	0.0010
Ethyl benzene	<0.010	<0.26	<0.061	0.010
Toluene	<0.010	<0.23	<0.061	0.010
Total Hydrocarbons	<0.010	<0.22	<0.064	0.010
Xylene	<0.010	<0.26	<0.061	0.010

Sample ID: **HL 4289** Media: 3M 3500 ORGANIC POVM Collected: 7/11/2010
Lab ID: 1019363006 Sampling Location: Red Butte Creek Oil Received: 7/12/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1393 Minutes Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0063	0.0010
Ethyl benzene	<0.010	<0.26	<0.061	0.010
Toluene	<0.010	<0.23	<0.061	0.010
Total Hydrocarbons	**0.28**	**6.3**	**1.8**	0.010
Xylene	<0.010	<0.26	<0.061	0.010

Sample ID: **XP 6195** Media: 3M 3500 ORGANIC POVM Collected: 7/11/2010
Lab ID: 1019363007 Sampling Location: Red Butte Creek Oil Received: 7/12/2010

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1393 Minutes Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0063	0.0010

Results Continued on Next Page

ANALYTICAL REPORT

Client Project ID: RMEC, Inc. 071210 2
Purchase Order: PJ10E-2114
Workorder: 1019363
Project Manager Paul Pope

Analytical Results

Sample ID: XP 6195	Media: 3M 3500 ORGANIC POVM	Collected: 7/11/2010
Lab ID: 1019363007	Sampling Location: Red Butte Creek Oil	Received: 7/12/2010

Method: 3M 3500/3520 POVM | Sampling Parameter: Exposure 1393 Minutes | Analyzed: 7/13/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Ethyl benzene	<0.010	<0.26	<0.061	0.010
Toluene	<0.010	<0.23	<0.061	0.010
Total Hydrocarbons	<0.010	<0.22	<0.064	0.010
Xylene	<0.010	<0.26	<0.061	0.010

Workorder Comments

1019363 "Total Hydrocarbons" is the sumof all peaks in the chromatogram minus the solvent and requested analyte peaks and was quantitated against n-hexane.

Report Authorization

Method: 3M 3500/3520 POVM

Young Hee Yoon	Thomas J. Masoian
Analyst	Peer Review

Laboratory Contact Information

Phone: (801) 266-7700
Email: alslt.lab@alsglobal.com
Web: www.datachem.com

ALS Laboratory Group (formerly DataChem Laboratories, Inc.)
960 W Levoy Drive
Salt Lake City, Utah 84123

ANALYTICAL REPORT

Client Project ID: RMEC, Inc. 071210 2
Purchase Order: PJ10E-2114
Workorder: 1019363
Project Manager Paul Pope

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS is accredited by ANSI/ACLASS (ISO 17025:2005) for specific fields of testing as documented in its current scope of accreditation (ID#AT-1421) which is available on request by contacting your project manager or view on the internet at http://www.aclasscorp.com. The quality systems implemented in the laboratory apply to all technologies performed by ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

Definitions

LOD = Limit of Detection = MDL = Method Detection Limit, A statistical estimate of method/media/instrument sensitivity.
LOQ = Limit of Quantitation = RL = Reporting Limit, A verified value of method/media/instrument sensitivity.
ND = Not Detected, Testing result not detected above the LOD or LOQ.
** No result could be reported, see sample comments for details.
< This testing result is less than the numerical value.
( ) This testing result is between the LOD and LOQ and has higher analytical uncertainty than values at or above the LOQ.

ANALYTICAL REPORT

Report Date July 20, 2010

Frank Derosso
RMEC, Inc.
2188 S Highland Dr. Suite 201
Salt Lake City, UT 84106

Phone: (801) 467-3661
Fax: (801) 583-1463
E-mail: fderosso@rmec.net

Client Project ID: Red Butte Creek 071310
Purchase Order: PJ10E-2114
Workorder: 1019442
Project Manager Paul Pope

Analytical Results

Sample ID: XP 6696 Media: 3M 3500 ORGANIC POVM Received: 7/13/2010
Lab ID: 1019442001 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1425 Minutes Analyzed: 7/16/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0062	0.0010
Ethyl benzene	<0.010	<0.26	<0.059	0.010
Toluene	<0.010	<0.22	<0.059	0.010
Total Hydrocarbons	<0.010	<0.22	<0.062	0.010
Xylene	<0.010	<0.26	<0.059	0.010

Sample ID: XP 6759 Media: 3M 3500 ORGANIC POVM Received: 7/13/2010
Lab ID: 1019442002 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1410 Minutes Analyzed: 7/16/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0063	0.0010
Ethyl benzene	<0.010	<0.26	<0.060	0.010
Toluene	<0.010	<0.23	<0.060	0.010
Total Hydrocarbons	<0.010	<0.22	<0.063	0.010
Xylene	<0.010	<0.26	<0.060	0.010

Sample ID: XP 6680 Media: 3M 3500 ORGANIC POVM Received: 7/13/2010
Lab ID: 1019442003 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1420 Minutes Analyzed: 7/16/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0062	0.0010
Ethyl benzene	<0.010	<0.26	<0.059	0.010
Toluene	<0.010	<0.22	<0.060	0.010
Total Hydrocarbons	<0.010	<0.22	<0.062	0.010
Xylene	<0.010	<0.26	<0.059	0.010

ANALYTICAL REPORT

Client Project ID: Red Butte Creek 071310
Purchase Order: PJ10E-2114
Workorder: 1019442
Project Manager Paul Pope

Analytical Results

Sample ID: **XP 6755** Media: 3M 3500 ORGANIC POVM Received: 7/13/2010
Lab ID: 1019442004 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1420 Minutes Analyzed: 7/16/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0062	0.0010
Ethyl benzene	<0.010	<0.26	<0.059	0.010
Toluene	<0.010	<0.22	<0.060	0.010
Total Hydrocarbons	<0.010	<0.22	<0.062	0.010
Xylene	<0.010	<0.26	<0.059	0.010

Sample ID: **XP 6721** Media: 3M 3500 ORGANIC POVM Received: 7/13/2010
Lab ID: 1019442005 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1420 Minutes Analyzed: 7/16/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0062	0.0010
Ethyl benzene	<0.010	<0.26	<0.059	0.010
Toluene	<0.010	<0.22	<0.060	0.010
Total Hydrocarbons	<0.010	<0.22	<0.062	0.010
Xylene	<0.010	<0.26	<0.059	0.010

Sample ID: **XP 6770** Media: 3M 3500 ORGANIC POVM Received: 7/13/2010
Lab ID: 1019442006 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1425 Minutes Analyzed: 7/16/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0062	0.0010
Ethyl benzene	<0.010	<0.26	<0.059	0.010
Toluene	<0.010	<0.22	<0.059	0.010
Total Hydrocarbons	**1.2**	**26**	**7.5**	0.010
Xylene	**0.028**	**0.72**	**0.17**	0.010

Sample ID: **XP 6694** Media: 3M 3500 ORGANIC POVM Received: 7/13/2010
Lab ID: 1019442007 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure Not Applicable Analyzed: 7/16/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	NA	NA	0.0010

Results Continued on Next Page

ANALYTICAL REPORT

Client Project ID: Red Butte Creek 071310
Purchase Order: PJ10E-2114
Workorder: 1019442
Project Manager Paul Pope

Analytical Results

Sample ID: XP 6694 | Media: 3M 3500 ORGANIC POVM | Received: 7/13/2010
Lab ID: 1019442007 | Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM | Sampling Parameter: Exposure Not Applicable | Analyzed: 7/16/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Ethyl benzene	<0.010	NA	NA	0.010
Toluene	<0.010	NA	NA	0.010
Total Hydrocarbons	<0.010	NA	NA	0.010
Xylene	<0.010	NA	NA	0.010

Workorder Comments

1019442 "Total Hydrocarbons" is the sum of all peaks in the chromatogram minus the solvent and requested analyte peaks and was quantitated against n-hexane.

Report Authorization

Method: 3M 3500/3520 POVM

Young Hee Yoon — Analyst

Thomas J. Masoian — Peer Review

Laboratory Contact Information

Phone: (801) 266-7700
Email: alslt.lab@alsglobal.com
Web: www.datachem.com

ALS Laboratory Group (formerly DataChem Laboratories, Inc.)
960 W Levoy Drive
Salt Lake City, Utah 84123

ANALYTICAL REPORT

Client Project ID: Red Butte Creek 071310
Purchase Order: PJ10E-2114
Workorder: 1019442
Project Manager Paul Pope

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS is accredited by ANSI/ACLASS (ISO 17025:2005) for specific fields of testing as documented in its current scope of accreditation (ID#AT-1421) which is available on request by contacting your project manager or view on the internet at http://www.aclasscorp.com. The quality systems implemented in the laboratory apply to all technologies performed by ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

Definitions

LOD = Limit of Detection = MDL = Method Detection Limit, A statistical estimate of method/media/instrument sensitivity.
LOQ = Limit of Quantitation = RL = Reporting Limit, A verified value of method/media/instrument sensitivity.
ND = Not Detected, Testing result not detected above the LOD or LOQ.
** No result could be reported, see sample comments for details.
< This testing result is less than the numerical value.
( ) This testing result is between the LOD and LOQ and has higher analytical uncertainty than values at or above the LOQ.

ANALYTICAL REPORT

Report Date July 20, 2010

Frank Derosso
RMEC, Inc.
2188 S Highland Dr. Suite 201
Salt Lake City, UT 84106

Phone: (801) 467-3661
Fax: (801) 583-1463
E-mail: fderosso@rmec.net

Client Project ID: RMEC 071510
Purchase Order: PJ10E-2114
Workorder: 1019641
Project Manager Paul Pope

Analytical Results

Sample ID: XP 6744 Media: 3M 3500 ORGANIC POVM Received: 7/14/2010
Lab ID: 1019641001 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1425 Minutes Analyzed: 7/15/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0062	0.0010
Ethyl benzene	<0.010	<0.26	<0.059	0.010
Toluene	<0.010	<0.22	<0.059	0.010
Total Hydrocarbons	<0.010	<0.22	<0.062	0.010
Xylene	<0.010	<0.26	<0.059	0.010

Sample ID: XP 6678 Media: 3M 3500 ORGANIC POVM Received: 7/14/2010
Lab ID: 1019641002 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1424 Minutes Analyzed: 7/15/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0062	0.0010
Ethyl benzene	<0.010	<0.26	<0.059	0.010
Toluene	<0.010	<0.22	<0.059	0.010
Total Hydrocarbons	<0.010	<0.22	<0.062	0.010
Xylene	<0.010	<0.26	<0.059	0.010

Sample ID: XP 6728 Media: 3M 3500 ORGANIC POVM Received: 7/14/2010
Lab ID: 1019641003 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1420 Minutes Analyzed: 7/15/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0062	0.0010
Ethyl benzene	<0.010	<0.26	<0.059	0.010
Toluene	<0.010	<0.22	<0.060	0.010
Total Hydrocarbons	<0.010	<0.22	<0.062	0.010
Xylene	<0.010	<0.26	<0.059	0.010

ANALYTICAL REPORT

Client Project ID: RMEC 071510
Purchase Order: PJ10E-2114
Workorder: 1019641
Project Manager Paul Pope

Analytical Results

Sample ID: **XP 6841** Media: 3M 3500 ORGANIC POVM Received: 7/14/2010
Lab ID: 1019641004 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1430 Minutes Analyzed: 7/15/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0062	0.0010
Ethyl benzene	<0.010	<0.26	<0.059	0.010
Toluene	<0.010	<0.22	<0.059	0.010
Total Hydrocarbons	<0.010	<0.22	<0.062	0.010
Xylene	<0.010	<0.26	<0.059	0.010

Sample ID: **XP 6782** Media: 3M 3500 ORGANIC POVM Received: 7/14/2010
Lab ID: 1019641005 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1440 Minutes Analyzed: 7/16/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0061	0.0010
Ethyl benzene	<0.010	<0.25	<0.059	0.010
Toluene	<0.010	<0.22	<0.059	0.010
Total Hydrocarbons	<0.010	<0.22	<0.062	0.010
Xylene	<0.010	<0.25	<0.059	0.010

Sample ID: **XP 6819** Media: 3M 3500 ORGANIC POVM Received: 7/14/2010
Lab ID: 1019641006 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1460 Minutes Analyzed: 7/16/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.019	<0.0060	0.0010
Ethyl benzene	<0.010	<0.25	<0.058	0.010
Toluene	<0.010	<0.22	<0.058	0.010
Total Hydrocarbons	**0.35**	**7.5**	**2.1**	0.010
Xylene	<0.010	<0.25	<0.058	0.010

Sample ID: **XP 6679** Media: 3M 3500 ORGANIC POVM Received: 7/14/2010
Lab ID: 1019641007 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure Not Applicable Analyzed: 7/16/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	NA	NA	0.0010

Results Continued on Next Page

ANALYTICAL REPORT

Client Project ID: RMEC 071510
Purchase Order: PJ10E-2114
Workorder: 1019641
Project Manager Paul Pope

Analytical Results

Sample ID: XP 6679 | Media: 3M 3500 ORGANIC POVM | Received: 7/14/2010
Lab ID: 1019641007 | Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM | Sampling Parameter: Exposure Not Applicable | Analyzed: 7/16/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Ethyl benzene	<0.010	NA	NA	0.010
Toluene	<0.010	NA	NA	0.010
Total Hydrocarbons	<0.010	NA	NA	0.010
Xylene	<0.010	NA	NA	0.010

Workorder Comments

1019641 "Total Hydrocarbons" is the sum of all peaks in the chromatogram minus the solvent and requested analyte peaks and was quantitated against n-hexane.

Report Authorization

Method: 3M 3500/3520 POVM

Young Hee Yoon — Analyst
Thomas J. Masoian — Peer Review

Laboratory Contact Information

Phone: (801) 266-7700
Email: alslt.lab@alsglobal.com
Web: www.datachem.com

ALS Laboratory Group (formerly DataChem Laboratories, Inc.)
960 W Levoy Drive
Salt Lake City, Utah 84123

ANALYTICAL REPORT

Client Project ID: RMEC 071510
Purchase Order: PJ10E-2114
Workorder: 1019641
Project Manager Paul Pope

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS is accredited by ANSI/ACLASS (ISO 17025:2005) for specific fields of testing as documented in its current scope of accreditation (ID#AT-1421) which is available on request by contacting your project manager or view on the internet at http://www.aclasscorp.com. The quality systems implemented in the laboratory apply to all technologies performed by ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

Definitions

LOD = Limit of Detection = MDL = Method Detection Limit, A statistical estimate of method/media/instrument sensitivity.
LOQ = Limit of Quantitation = RL = Reporting Limit, A verified value of method/media/instrument sensitivity.
ND = Not Detected, Testing result not detected above the LOD or LOQ.
** No result could be reported, see sample comments for details.
< This testing result is less than the numerical value.
( ) This testing result is between the LOD and LOQ and has higher analytical uncertainty than values at or above the LOQ.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

ANALYTICAL REPORT
Amended

Report Date July 20, 2010

Frank Derosso
RMEC, Inc.
2188 S Highland Dr. Suite 201
Salt Lake City, UT 84106

Phone: (801) 467-3661
Fax: (801) 583-1463
E-mail: fderosso@rmec.net

Client Project ID: RMEC, Inc. 071510
Purchase Order: PJ10E-2114
Workorder: 1019658
Project Manager Paul Pope

Analytical Results

Sample ID: **XP 4412** Media: 3M 3500 ORGANIC POVM Received: 7/15/2010
Lab ID: 1019658001 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1195 Minutes Analyzed: 7/16/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.024	<0.0074	0.0010
Ethyl benzene	<0.010	<0.31	<0.071	0.010
Toluene	<0.010	<0.27	<0.071	0.010
Total Hydrocarbons	<0.010	<0.26	<0.074	0.010
Xylene	<0.010	<0.31	<0.071	0.010

Sample ID: **XP 6856** Media: 3M 3500 ORGANIC POVM Received: 7/15/2010
Lab ID: 1019658002 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1496 Minutes Analyzed: 7/16/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.019	<0.0059	0.0010
Ethyl benzene	<0.010	<0.25	<0.056	0.010
Toluene	<0.010	<0.21	<0.057	0.010
Total Hydrocarbons	<0.010	<0.21	<0.059	0.010
Xylene	<0.010	<0.25	<0.056	0.010

Sample ID: **XP 6791** Media: 3M 3500 ORGANIC POVM Received: 7/15/2010
Lab ID: 1019658003 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1488 Minutes Analyzed: 7/16/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.019	<0.0059	0.0010
Ethyl benzene	<0.010	<0.25	<0.057	0.010
Toluene	<0.010	<0.21	<0.057	0.010
Total Hydrocarbons	<0.010	<0.21	<0.060	0.010
Xylene	<0.010	<0.25	<0.057	0.010

ANALYTICAL REPORT
Amended

Client Project ID: RMEC, Inc. 071510
Purchase Order: PJ10E-2114
Workorder: 1019658
Project Manager Paul Pope

Analytical Results

Sample ID: **XP 6763** Media: 3M 3500 ORGANIC POVM Received: 7/15/2010
Lab ID: 1019658004 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1173 Minutes Analyzed: 7/16/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.024	<0.0075	0.0010
Ethyl benzene	<0.010	<0.31	<0.072	0.010
Toluene	<0.010	<0.27	<0.072	0.010
Total Hydrocarbons	<0.010	<0.27	<0.076	0.010
Xylene	<0.010	<0.31	<0.072	0.010

Sample ID: **XP 6769** Media: 3M 3500 ORGANIC POVM Received: 7/15/2010
Lab ID: 1019658005 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1161 Minutes Analyzed: 7/16/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.024	<0.0076	0.0010
Ethyl benzene	<0.010	<0.32	<0.073	0.010
Toluene	<0.010	<0.27	<0.073	0.010
Total Hydrocarbons	<0.010	<0.27	<0.076	0.010
Xylene	<0.010	<0.32	<0.073	0.010

Sample ID: **XP 6776** Media: 3M 3500 ORGANIC POVM Received: 7/15/2010
Lab ID: 1019658006 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1139 Minutes Analyzed: 7/16/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.025	<0.0077	0.0010
Ethyl benzene	<0.010	<0.32	<0.074	0.010
Toluene	<0.010	<0.28	<0.074	0.010
Total Hydrocarbons	**0.035**	**0.96**	**0.27**	0.010
Xylene	<0.010	<0.32	<0.074	0.010

Sample ID: **XP 7983** Media: 3M 3500 ORGANIC POVM Received: 7/15/2010
Lab ID: 1019658007 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 0 Minutes Analyzed: 7/16/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	NA	NA	0.0010

Results Continued on Next Page

ANALYTICAL REPORT
Amended

Client Project ID: RMEC, Inc. 071510
Purchase Order: PJ10E-2114
Workorder: 1019658
Project Manager Paul Pope

Analytical Results

Sample ID: **XP 7983** Media: 3M 3500 ORGANIC POVM Received: 7/15/2010
Lab ID: 1019658007 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 0 Minutes Analyzed: 7/16/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Ethyl benzene	<0.010	NA	NA	0.010
Toluene	<0.010	NA	NA	0.010
Total Hydrocarbons	<0.010	NA	NA	0.010
Xylene	<0.010	NA	NA	0.010

Workorder Comments

1019658 "Total Hydrocarbons" is the sum of all peaks in the chromatogram minus the solvent and requested analyte peaks and was quantitated against n-hexane.

Report Authorization

Method: 3M 3500/3520 POVM

Young Hee Yoon — Analyst

Thomas J. Masoian — Peer Review

Laboratory Contact Information

Phone: (801) 266-7700
Email: alslt.lab@alsglobal.com
Web: www.datachem.com

ALS Laboratory Group (formerly DataChem Laboratories, Inc.)
960 W Levoy Drive
Salt Lake City, Utah 84123

ANALYTICAL REPORT

Amended

Client Project ID: RMEC, Inc. 071510
Purchase Order: PJ10E-2114
Workorder: 1019658
Project Manager Paul Pope

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS is accredited by ANSI/ACLASS (ISO 17025:2005) for specific fields of testing as documented in its current scope of accreditation (ID#AT-1421) which is available on request by contacting your project manager or view on the internet at http://www.aclasscorp.com. The quality systems implemented in the laboratory apply to all technologies performed by ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

Definitions

LOD = Limit of Detection = MDL = Method Detection Limit, A statistical estimate of method/media/instrument sensitivity.
LOQ = Limit of Quantitation = RL = Reporting Limit, A verified value of method/media/instrument sensitivity.
ND = Not Detected, Testing result not detected above the LOD or LOQ.
** No result could be reported, see sample comments for details.
< This testing result is less than the numerical value.
( ) This testing result is between the LOD and LOQ and has higher analytical uncertainty than values at or above the LOQ.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

ANALYTICAL REPORT

Report Date July 23, 2010

Frank Derosso
RMEC, Inc.
2188 S Highland Dr. Suite 201
Salt Lake City, UT 84106

Phone: (801) 467-3661
Fax: (801) 583-1463
E-mail: fderosso@rmec.net

Client Project ID: RMEC, Inc 071610
Purchase Order: PJ10E-2114
Workorder: 1019739
Project Manager Paul Pope

Analytical Results

Sample ID: **HR 6734** Media: 3M 3500 ORGANIC POVM Received: 7/16/2010
Lab ID: 1019739001 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1770 Minutes Analyzed: 7/19/2020

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.016	<0.0050	0.0010
Ethyl benzene	<0.010	<0.21	<0.048	0.010
Toluene	<0.010	<0.18	<0.048	0.010
Total Hydrocarbons	<0.010	<0.18	<0.050	0.010
Xylene	<0.010	<0.21	<0.048	0.010

Sample ID: **HR 6727** Media: 3M 3500 ORGANIC POVM Received: 7/16/2010
Lab ID: 1019739002 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1770 Minutes Analyzed: 7/19/2020

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.016	<0.0050	0.0010
Ethyl benzene	<0.010	<0.21	<0.048	0.010
Toluene	<0.010	<0.18	<0.048	0.010
Total Hydrocarbons	<0.010	<0.18	<0.050	0.010
Xylene	<0.010	<0.21	<0.048	0.010

Sample ID: **HR 6731** Media: 3M 3500 ORGANIC POVM Received: 7/16/2010
Lab ID: 1019739003 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1774 Minutes Analyzed: 7/19/2020

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.016	<0.0050	0.0010
Ethyl benzene	<0.010	<0.21	<0.048	0.010
Toluene	<0.010	<0.18	<0.048	0.010
Total Hydrocarbons	<0.010	<0.18	<0.050	0.010
Xylene	<0.010	<0.21	<0.048	0.010

ANALYTICAL REPORT

Client Project ID: RMEC, Inc 071610
Purchase Order: PJ10E-2114
Workorder: 1019739
Project Manager Paul Pope

Analytical Results

Sample ID: **HR 5386** Media: 3M 3500 ORGANIC POVM Received: 7/16/2010
Lab ID: 1019739004 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1775 Minutes Analyzed: 7/20/2020

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.016	<0.0050	0.0010
Ethyl benzene	<0.010	<0.21	<0.048	0.010
Toluene	<0.010	<0.18	<0.048	0.010
Total Hydrocarbons	<0.010	<0.18	<0.050	0.010
Xylene	<0.010	<0.21	<0.048	0.010

Sample ID: **HR 5290** Media: 3M 3500 ORGANIC POVM Received: 7/16/2010
Lab ID: 1019739005 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1772 Minutes Analyzed: 7/20/2020

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.016	<0.0050	0.0010
Ethyl benzene	<0.010	<0.21	<0.048	0.010
Toluene	<0.010	<0.18	<0.048	0.010
Total Hydrocarbons	<0.010	<0.18	<0.050	0.010
Xylene	<0.010	<0.21	<0.048	0.010

Sample ID: **HR 5329** Media: 3M 3500 ORGANIC POVM Received: 7/16/2010
Lab ID: 1019739006 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1764 Minutes Analyzed: 7/20/2020

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.016	<0.0050	0.0010
Ethyl benzene	<0.010	<0.21	<0.048	0.010
Toluene	<0.010	<0.18	<0.048	0.010
Total Hydrocarbons	**0.12**	**2.1**	**0.60**	0.010
Xylene	<0.010	<0.21	<0.048	0.010

Sample ID: **HR 7958** Media: 3M 3500 ORGANIC POVM Received: 7/16/2010
Lab ID: 1019739007 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 0 Minutes Analyzed: 7/20/2020

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	NA	NA	0.0010

Results Continued on Next Page

ANALYTICAL REPORT

Client Project ID: RMEC, Inc 071610
Purchase Order: PJ10E-2114
Workorder: 1019739
Project Manager Paul Pope

Analytical Results

Sample ID: **HR 7958** Media: 3M 3500 ORGANIC POVM Received: 7/16/2010
Lab ID: 1019739007 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 0 Minutes Analyzed: 7/20/2020

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Ethyl benzene	<0.010	NA	NA	0.010
Toluene	<0.010	NA	NA	0.010
Total Hydrocarbons	<0.010	NA	NA	0.010
Xylene	<0.010	NA	NA	0.010

Workorder Comments

1019739 "Total Hydrocarbons" is the sum of all peaks in the chromatogram minus the solvent and requested analyte peaks and was quantitated against n-hexane.

Report Authorization

Method: 3M 3500/3520 POVM

Young Hee Yoon
Analyst

Thomas J. Masoian
Peer Review

Laboratory Contact Information

Phone: (801) 266-7700
Email: alslt.lab@alsglobal.com
Web: www.datachem.com

ALS Laboratory Group (formerly DataChem Laboratories, Inc.)
960 W Levoy Drive
Salt Lake City, Utah 84123

ANALYTICAL REPORT

Client Project ID: RMEC, Inc 071610
Purchase Order: PJ10E-2114
Workorder: 1019739
Project Manager Paul Pope

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS is accredited by ANSI/ACLASS (ISO 17025:2005) for specific fields of testing as documented in its current scope of accreditation (ID#AT-1421) which is available on request by contacting your project manager or view on the internet at http://www.aclasscorp.com. The quality systems implemented in the laboratory apply to all technologies performed by ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

Definitions

LOD = Limit of Detection = MDL = Method Detection Limit, A statistical estimate of method/media/instrument sensitivity.
LOQ = Limit of Quantitation = RL = Reporting Limit, A verified value of method/media/instrument sensitivity.
ND = Not Detected, Testing result not detected above the LOD or LOQ.
** No result could be reported, see sample comments for details.
< This testing result is less than the numerical value.
( ) This testing result is between the LOD and LOQ and has higher analytical uncertainty than values at or above the LOQ.

ANALYTICAL REPORT

Report Date July 26, 2010

Frank Derosso
RMEC, Inc.
2188 S Highland Dr. Suite 201
Salt Lake City, UT 84106

Phone: (801) 467-3661
Fax: (801) 583-1463
E-mail: fderosso@rmec.net

Client Project ID: RMEC 071910
Purchase Order: PJ10E-2114
Workorder: 1020049
Project Manager Paul Pope

Analytical Results

Sample ID: HL 4089 | Media: 3M 3500 ORGANIC POVM | Received: 7/19/2010
Lab ID: 1020049001 | Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM | Sampling Parameter: Exposure 1380 Minutes | Analyzed: 7/23/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0064	0.0010
Ethyl benzene	<0.010	<0.27	<0.061	0.010
Toluene	<0.010	<0.23	<0.061	0.010
Total Hydrocarbons	<0.010	<0.23	<0.064	0.010
Xylene	<0.010	<0.27	<0.061	0.010

Sample ID: HL 4117 | Media: 3M 3500 ORGANIC POVM | Received: 7/19/2010
Lab ID: 1020049002 | Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM | Sampling Parameter: Exposure 1347 Minutes | Analyzed: 7/23/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.021	<0.0066	0.0010
Ethyl benzene	<0.010	<0.27	<0.063	0.010
Toluene	<0.010	<0.24	<0.063	0.010
Total Hydrocarbons	<0.010	<0.23	<0.066	0.010
Xylene	<0.010	<0.27	<0.063	0.010

Sample ID: HL 4064 | Media: 3M 3500 ORGANIC POVM | Received: 7/19/2010
Lab ID: 1020049003 | Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM | Sampling Parameter: Exposure 1335 Minutes | Analyzed: 7/23/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.021	<0.0066	0.0010
Ethyl benzene	<0.010	<0.27	<0.063	0.010
Toluene	<0.010	<0.24	<0.063	0.010
Total Hydrocarbons	<0.010	<0.23	<0.066	0.010
Xylene	<0.010	<0.27	<0.063	0.010

ANALYTICAL REPORT

Client Project ID: RMEC 071910
Purchase Order: PJ10E-2114
Workorder: 1020049
Project Manager Paul Pope

Analytical Results

Sample ID: **HL 4108** Media: 3M 3500 ORGANIC POVM Received: 7/19/2010
Lab ID: 1020049004 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1307 Minutes Analyzed: 7/23/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.022	<0.0068	0.0010
Ethyl benzene	<0.010	<0.28	<0.065	0.010
Toluene	<0.010	<0.24	<0.065	0.010
Total Hydrocarbons	<0.010	<0.24	<0.068	0.010
Xylene	<0.010	<0.28	<0.065	0.010

Sample ID: **HL 4082** Media: 3M 3500 ORGANIC POVM Received: 7/19/2010
Lab ID: 1020049005 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1295 Minutes Analyzed: 7/23/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.022	<0.0068	0.0010
Ethyl benzene	<0.010	<0.28	<0.065	0.010
Toluene	<0.010	<0.25	<0.065	0.010
Total Hydrocarbons	<0.010	<0.24	<0.069	0.010
Xylene	<0.010	<0.28	<0.065	0.010

Sample ID: **HL 4080** Media: 3M 3500 ORGANIC POVM Received: 7/19/2010
Lab ID: 1020049006 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1280 Minutes Analyzed: 7/23/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.022	<0.0069	0.0010
Ethyl benzene	<0.010	<0.29	<0.066	0.010
Toluene	<0.010	<0.25	<0.066	0.010
Total Hydrocarbons	**0.031**	**0.76**	**0.22**	0.010
Xylene	<0.010	<0.29	<0.066	0.010

Sample ID: **HL 4106** Media: 3M 3500 ORGANIC POVM Received: 7/19/2010
Lab ID: 1020049007 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure Not Applicable Analyzed: 7/24/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	NA	NA	0.0010

Results Continued on Next Page

ANALYTICAL REPORT

Client Project ID: RMEC 071910
Purchase Order: PJ10E-2114
Workorder: 1020049
Project Manager Paul Pope

Analytical Results

Sample ID: **HL 4106** Media: 3M 3500 ORGANIC POVM Received: 7/19/2010
Lab ID: 1020049007 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure Not Applicable Analyzed: 7/24/2010

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Ethyl benzene	<0.010	NA	NA	0.010
Toluene	<0.010	NA	NA	0.010
Total Hydrocarbons	<0.010	NA	NA	0.010
Xylene	<0.010	NA	NA	0.010

Workorder Comments

1020049 "Total Hydrocarbons" is the sum of all peaks in the chromatogram minus the solvent and requested analyte peaks and was quantitated against n-hexane.

Report Authorization

Method: 3M 3500/3520 POVM

Young Hee Yoon — Analyst

Thomas J. Masoian — Peer Review

Laboratory Contact Information

Phone: (801) 266-7700
Email: alslt.lab@alsglobal.com
Web: www.datachem.com

ALS Laboratory Group (formerly DataChem Laboratories, Inc.)
960 W Levoy Drive
Salt Lake City, Utah 84123

ANALYTICAL REPORT

Client Project ID: RMEC 071910
Purchase Order: PJ10E-2114
Workorder: 1020049
Project Manager Paul Pope

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS is accredited by ANSI/ACLASS (ISO 17025:2005) for specific fields of testing as documented in its current scope of accreditation (ID#AT-1421) which is available on request by contacting your project manager or view on the internet at http://www.aclasscorp.com. The quality systems implemented in the laboratory apply to all technologies performed by ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

Definitions

LOD = Limit of Detection = MDL = Method Detection Limit, A statistical estimate of method/media/instrument sensitivity.
LOQ = Limit of Quantitation = RL = Reporting Limit, A verified value of method/media/instrument sensitivity.
ND = Not Detected, Testing result not detected above the LOD or LOQ.
** No result could be reported, see sample comments for details.
< This testing result is less than the numerical value.
( ) This testing result is between the LOD and LOQ and has higher analytical uncertainty than values at or above the LOQ.

ANALYTICAL REPORT

Report Date July 23, 2010

Frank Derosso
RMEC, Inc.
2188 S Highland Dr. Suite 201
Salt Lake City, UT 84106

Phone: (801) 467-3661
Fax: (801) 583-1463
E-mail: fderosso@rmec.net

Client Project ID: RMEC, Inc 071910
Purchase Order: PJ10E-2114
Workorder: 1020032
Project Manager Paul Pope

Analytical Results

Sample ID: **HL4107** Media: 3M 3500 ORGANIC POVM Received: 7/19/2010
Lab ID: 1020032001 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1350 Minutes Analyzed: 7/20/2020

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.021	<0.0065	0.0010
Ethyl benzene	<0.010	<0.27	<0.063	0.010
Toluene	<0.010	<0.24	<0.063	0.010
Total Hydrocarbons	<0.010	<0.23	<0.066	0.010
Xylene	<0.010	<0.27	<0.063	0.010

Sample ID: **HG 4873** Media: 3M 3500 ORGANIC POVM Received: 7/19/2010
Lab ID: 1020032002 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1358 Minutes Analyzed: 7/20/2020

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.021	<0.0065	0.0010
Ethyl benzene	<0.010	<0.27	<0.062	0.010
Toluene	<0.010	<0.24	<0.062	0.010
Total Hydrocarbons	<0.010	<0.23	<0.065	0.010
Xylene	<0.010	<0.27	<0.062	0.010

Sample ID: **HG 4852** Media: 3M 3500 ORGANIC POVM Received: 7/19/2010
Lab ID: 1020032003 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1358 Minutes Analyzed: 7/20/2020

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.021	<0.0065	0.0010
Ethyl benzene	<0.010	<0.27	<0.062	0.010
Toluene	<0.010	<0.24	<0.062	0.010
Total Hydrocarbons	<0.010	<0.23	<0.065	0.010
Xylene	<0.010	<0.27	<0.062	0.010

ANALYTICAL REPORT

Client Project ID: RMEC, Inc 071910
Purchase Order: PJ10E-2114
Workorder: 1020032
Project Manager Paul Pope

Analytical Results

Sample ID: **HL 4053** Media: 3M 3500 ORGANIC POVM Received: 7/19/2010
Lab ID: 1020032004 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1360 Minutes Analyzed: 7/20/2020

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.021	<0.0065	0.0010
Ethyl benzene	<0.010	<0.27	<0.062	0.010
Toluene	<0.010	<0.23	<0.062	0.010
Total Hydrocarbons	**0.029**	**0.67**	**0.19**	0.010
Xylene	<0.010	<0.27	<0.062	0.010

Sample ID: **HL 4065** Media: 3M 3500 ORGANIC POVM Received: 7/19/2010
Lab ID: 1020032005 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1378 Minutes Analyzed: 7/20/2020

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.020	<0.0064	0.0010
Ethyl benzene	<0.010	<0.27	<0.061	0.010
Toluene	<0.010	<0.23	<0.061	0.010
Total Hydrocarbons	<0.010	<0.23	<0.064	0.010
Xylene	<0.010	<0.27	<0.061	0.010

Sample ID: **HL 7953** Media: 3M 3500 ORGANIC POVM Received: 7/19/2010
Lab ID: 1020032006 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure 1370 Minutes Analyzed: 7/20/2020

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	<0.021	<0.0064	0.0010
Ethyl benzene	<0.010	<0.27	<0.062	0.010
Toluene	<0.010	<0.23	<0.062	0.010
Total Hydrocarbons	<0.010	<0.23	<0.065	0.010
Xylene	<0.010	<0.27	<0.062	0.010

Sample ID: **HM 5348** Media: 3M 3500 ORGANIC POVM Received: 7/19/2010
Lab ID: 1020032007 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure Not Applicable Analyzed: 7/20/2020

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Benzene	<0.0010	NA	NA	0.0010

Results Continued on Next Page

ANALYTICAL REPORT

Client Project ID: RMEC, Inc 071910
Purchase Order: PJ10E-2114
Workorder: 1020032
Project Manager Paul Pope

Analytical Results

Sample ID: **HM 5348** Media: 3M 3500 ORGANIC POVM Received: 7/19/2010
Lab ID: 1020032007 Sampling Location: Red Butte Creek

Method: 3M 3500/3520 POVM Sampling Parameter: Exposure Not Applicable Analyzed: 7/20/2020

Analyte	mg/sample	mg/m³	ppm	RL (mg/sample)
Ethyl benzene	<0.010	NA	NA	0.010
Toluene	<0.010	NA	NA	0.010
Total Hydrocarbons	<0.010	NA	NA	0.010
Xylene	<0.010	NA	NA	0.010

Workorder Comments

1020032 "Total Hydrocarbons" is the sum of all peaks in the chromatogram minus the solvent and requested analyte peaks and was quantitated against n-hexane.

Report Authorization

Method: 3M 3500/3520 POVM

Young Hee Yoon — Analyst

Thomas J. Masoian — Peer Review

Laboratory Contact Information

Phone: (801) 266-7700
Email: alslt.lab@alsglobal.com
Web: www.datachem.com

ALS Laboratory Group (formerly DataChem Laboratories, Inc.)
960 W Levoy Drive
Salt Lake City, Utah 84123

ANALYTICAL REPORT

Client Project ID: RMEC, Inc 071910
Purchase Order: PJ10E-2114
Workorder: 1020032
Project Manager Paul Pope

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS is accredited by ANSI/ACLASS (ISO 17025:2005) for specific fields of testing as documented in its current scope of accreditation (ID#AT-1421) which is available on request by contacting your project manager or view on the internet at http://www.aclasscorp.com. The quality systems implemented in the laboratory apply to all technologies performed by ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

Definitions

LOD = Limit of Detection = MDL = Method Detection Limit, A statistical estimate of method/media/instrument sensitivity.
LOQ = Limit of Quantitation = RL = Reporting Limit, A verified value of method/media/instrument sensitivity.
ND = Not Detected, Testing result not detected above the LOD or LOQ.
** No result could be reported, see sample comments for details.
< This testing result is less than the numerical value.
( ) This testing result is between the LOD and LOQ and has higher analytical uncertainty than values at or above the LOQ.

APPENDIX D

Employee POVM Monitoring Results

Employee Name	Task	Date	Sample Number	Sample Duration (Minutes)	Analyte	Measured Concentration[1] (ppm)	Calculated 8-hr TWA[2]	OSHA PEL (ppm)
Johnny Fox Personal Sample	Chevron supervisor working with crew scrubbing creek	7/6/10	HM 5599	405	Benzene	<0.022	<0.033	1.0
					Ethyl benzene	<0.21	<0.32	100
					Toluene	<0.21	<0.32	200
					Total Hydrocarbons	**0.66**	**0.99**	300
					Xylene	<0.21	<0.32	100
Paul Freeman Personal Sample	Chevron safety supervisor working with crew pressure washing creek	7/6/10	HM5593	357	Benzene	<0.025	<0.038	1.0
					Ethyl benzene	<0.24	<.36	100
					Toluene	<0.24	<.36	200
					Total Hydrocarbons	<0.25	<.38	300
					Xylene	<0.24	<.36	100
Mike Eaton Personal Sample	Chevron safety supervisor working with crew pressure washing creek	7/7/10	HM 6184	687	**Benzene**	**0.026**	**0.039**	1.0
					Ethyl benzene	<0.12	<.18	100
					Toluene	**0.2**	**0.3**	200
					Total Hydrocarbons	**2.2**	**3.3**	300
					Xylene	**0.16**	**0.24**	100
Paul Freeman Personal Sample	Chevron safety supervisor working with crew scrubbing creek	7/7/10	HM 6139	615	Benzene	<0.014	<0.018	1.0
					Ethyl benzene	<0.14	<.18	100
					Toluene	<0.14	<.18	200
					Total Hydrocarbons	**0.45**	**0.58**	300
					Xylene	<0.14	<.18	100
Dan Tarlton Personal Sample	Chevron safety supervisor working with crew cutting and clearing wood at 1365 Harvard Ave.	7/7/10	HM 5626	567	Benzene	<0.016	<0.021	1.0
					Ethyl benzene	<0.15	<.23	100
					Toluene	<0.15	<.23	200
					Total Hydrocarbons	<0.16	<.24	300
					Xylene	<0.15	<.23	100
Caleb Hundersmark (Kodiak) Personal Sample	Contractor on wash crew pressure washing the creek	7/10/10	HL 4214	360	**Benzene**	**0.056**	**0.084**	1.0
					Ethyl benzene	<.23	<.35	100
					Toluene	**0.47**	**0.71**	200
					Total Hydrocarbons	**3**	**4.5**	300
					Xylene	**0.31**	**0.47**	100

1 The measured exposure during the sample period. Less than values (<) indicate that the analyte was below the laboratory detection limit.
2 The estimated 8-hr TWA exposures were calculated assuming that the employees were exposed to the measured concentration during the entire 12-hour workshift.

Annex D
Ecological Risk Assessment

- *Scoping Document*
- *Schedule*
- *Supplemental Sampling Summary*

Red Butte Creek

Evaluate the Status of Areas Using Ecological Risk Assessment Methodologies
Proposed Approach Outline

STEP 1: PROBLEM FORMULATION

- establish the scope of the evaluation using ecological risk assessment (ERA) methodologies
- ensure that ecological receptors likely to be exposed and exposure scenarios most likely to contribute to ecological risk are evaluated
- identify the major factors to be considered
- identify appropriate baseline conditions for comparisons

1. focus
    a. evaluate any areas where no remedial action(s) have been performed and concerns exist regarding potential exposures to residual chemical (= areas of interest)
    b. evaluate the sufficiency of the response
    c. use of screening-level ERA methods is anticipated to be sufficient to evaluate areas of interest
2. current understanding
    a. Red Butte Creek is primarily located in an urban setting, wherein there exist multiple sources/inputs of chemicals
    b. Red Butte Creek substrates include rocky cobble, gravel, and sandy sediment areas along its reach
    c. Red Butte Creek experiences episodic high flows and flash "flushing" events
    d. episodic high flows are likely to affect the transport/spatially distribution of chemicals as well as physically affect biotic communities
3. key products
    a. conceptual site model
    b. maps
        i. location(s) of areas of interest
        ii. location(s) of other contributing / confounding sources of contamination
        iii. location(s) of reference sites (if necessary) for the purposes of establishing baseline
    c. assessment endpoints[1] / measurement endpoints
    d. characterization of baseline: to provide context and point-of-reference for assessing release-related impacts
4. list of data needed to:
    a. characterize baseline
    b. characterize areas of interest
5. SMDP[2]: meet with Chevron and Agencies to review findings of problem formulation and to initially scope Step 2

[1] explicit expressions of the actual environmental value that is to be protected

[2] SMDP = science/management decision point

STEP 2: EVALUATION OF EXISTING DATA

❖ determine whether existing data are sufficient to apply ERA methods that supports decision-making

1. obtain existing relevant information from identified organization, including databases, maps, and reports
2. conduct data review / gaps analysis – sufficient data coverage (spatial, temporal, data types[3]), quality, and quantity (number of samples) to usefully apply ERA methods
3. SMDP: meet with Chevron and Agencies to review/discuss:
    a. given data in-hand, whether data are sufficient to meet objectives
    b. if necessary, scope of Step 3

STEP 3: FILL DATA NEEDS [if necessary]

❖ if critical data gaps are identified, acquire necessary data

1. expand search for existing data
2. if necessary, collect necessary data
3. evaluate existing data (see/re-visit Step 2)
4. SMDP: meet with Chevron and Agencies to review/discuss/finalize scope[4] of Step 4

STEP 4: APPLICATION OF ERA METHODOLOGIES

❖ evaluate the potential for adverse ecological impacts that may occur as a result of potential exposures to release-related chemicals to support decision-making

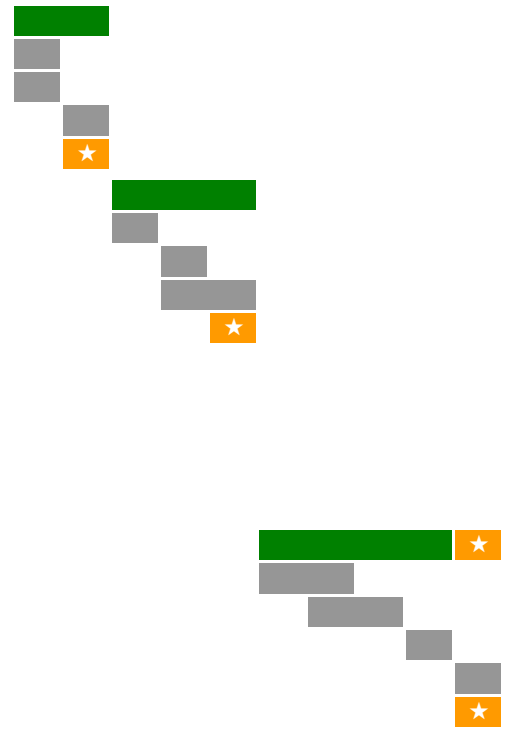
1. problem formulation
2. risk analysis
    a. exposure assessment
    b. toxicity assessment
3. risk characterization
4. net environmental benefit analyses (if necessary)
5. uncertainty analysis
6. SMDP: meet with Chevron and Agencies to review/discuss findings of the evaluation
7. prepare report and recommendations

[3] For example: sediment chemistry, water chemistry, biotic community metrics

[4] Including whether the use of screening-level ERA methodologies is likely to be sufficient to meet objectives

Table A.
Red Butte Creek
Risk Evaluation — Draft Proposed Schedule

Step	Period (weeks) Start	End	Duration	Schedule (weeks) 1 2 3 4 5 6 7 8 9 10
1. Problem Formulation	0	2	2	
a. prepare draft conceptual site model				
b. prepare draft assessment endpoints				
c. prepare list of data needs				
d. discuss w/ Agency to review Step 1 and finalize scope of Step 2				
2. Evaluation of Existing Data	2	5	3	
a. obtain existing data				
b. review quality/completeness of database				
c. evaluate types and coverage of data				
d. discuss w/ Agency to review Step 1 and finalize scope of Step 3				
3. Fill Data Needs[1]	5	5	0	
a. expand search for existing data				
b. collect additional data				
c. evaluate existing data				
d. discuss w/ Agency to review Step 3 and finalize scope of Step 4				
4. Conduct ERA	5	10	5	
a. conduct analysis				
b. prepare draft ERA				
c. submit draft ERA to client for review				
d. revise draft ERA				
e. submit draft ERA to the Agency				



Legend:

1 = if necessary

★ = milestone

Assumptions:

1. All data used in the evaluation are readily obtained from the client
2. All data are validated, georeferenced, and provided in electronic format
3. Data evaluated are predominantly water and sediment chemistry
5. Task 3 is not needed
6. Only a screening-level ERA is needed
7. Two calls with the Agencies

Summary of Supplemental Sampling Activities for HHRA and ERA

Creek	Sediment / Surface Water / Bank Soil Sample Location	Watershed Setting	Quarterly Sampling Locations[1]		Suplemental Sampling Locations	
			Surface Water, Sediment, and Bank Samples	Macro-invertebrate Samples	Surface Water, Sediment, and Bank Samples [2]	Macro-invertebrate Samples [3]
Red Butte Creek	Below 900 East	Urban			✓	
	Below 1100 East	Urban	✓			✓
	Below 1300 East	Urban	✓			✓
	Above 1500 East	Urban	✓	✓		
	At County Stream Gaging Station	Urban			✓	✓
	1731 East 900 South	Urban			✓	
	Above Sunnyside Ave.	Urban	✓			✓
	At Mt. Olivet Diversion	Urban			✓	✓
	Inlet to Mt. Olivet Reservoir (water only)	Urban			✓	
	Above Foothill Drive	Urban	✓			✓
	At University Park Marriott	Urban			✓	
	Below Chipeta Way	Urban	✓	✓		
	At Former Lower Underflow Dam	Natural			✓	
	Above Red Butte Amphitheater	Natural	✓	✓		
	Subtotal Red Butte Locations		*7*	*3*	*7*	*6*
Mill Creek	Below 700 East	Urban			✓	
	Below Highland Drive	Urban			✓	✓
	Below 2300 East	Urban	✓	✓		
	Above County Gage	Natural		✓	✓	
Parleys Creek	Below 1300 East	Urban	✓			
	Below 1700 East	Urban			✓	✓
	Above 2000 East	Urban			✓	
	Above I-215	Urban			✓	✓
Emigration Creek	Above 1300 East	Urban	✓			✓
	Above 1900 East	Urban		✓	✓	
	Above 2100 East	Urban			✓	
	At Donner Hill Marker	Natural		✓	✓	
City Creek	At Lower End of Natural Channel	Urban			✓	✓
	At North Canyon Road Footbridge	Urban			✓	✓
	Below North Canyon Road Loop	Natural			✓	
	Near Canyon Entrance Gate	Natural	✓	✓		
	Subtotal Comparison Creek Locations		*4*	*5*	*12*	*6*
	Total Sampling Locations		**11**	**8**	**19**	**12**

Notes:

[1] Monitoring to be performed quarterly at these locations per the *SLC Red ButteCreek Incident Water, Sediment and Macro-invertebrate Sampling Plan, Draft 15* .

[2] Supplemental surface water, sediment, and bank soil sampling was performed at these locations in August 2011 for the Human Health Risk Assessment.

[3] Suplemental macro-invertebrate sampling was performed at these locations in August 2011 for the Ecological Risk Assessment.

HHRA = Human Health Risk Assessment

ERA = Ecological Risk Assessment

Annex E
Liberty Park Lake Fish Summary

Chevron Pipe Line (CPL) evaluated potential options for management of the fish community in conjunction with the draining of Liberty Park Lake in November 2010. Salt Lake City has historically allowed the fish to die when the lake is drained on an annual basis. Utah Division of Wildlife Resources (UDWR) would not allow CPL to capture and relocate the fish as they were concerned about disrupting other fish communities and the spread of potential diseases that may be unique to the Liberty Lake population. UDWR requested that the fish be captured and euthanized.

CPL retained BIO-WEST Inc. (BIO-WEST) to collect and euthanize the fish community in a humane manner. These activities were conducted by a BIO-WEST fishery biologist under a special permit and authorization issued by the UDWR. Initial capture and euthanization was conducted on November 4th and 5th of 2010. An additional trout was captured and euthanized on November 12, 2010 after it was observed near the Liberty Park Lake outlet.

During the draining of Liberty Park Lake, two 4 by 15 foot seines (one was used as a block seine while the other was an active seine) were used to collect fish. The collected fish were placed in coolers with lake water and then transported to an enclosed trailer. The fish were then placed in a water bath containing a mix of clove oil/ethanol at a ratio of 1:9 and a concentration of 70 mL/L. Euthanasia took approximately five minutes. After the fish were euthanized in the bath they were enumerated and measured for total length. The euthanized fish were then placed in black garbage bags and transported under chain of custody by CPL's remediation contractor ENTACT to the Wasatch Regional Non-Hazardous Waste Landfill in Tooele County for pre-arranged permitted disposal; no euthanized fish were left at, or disposed of, at Liberty Park.

A total of ten species were collected that resulted in the handling and euthanasia of 495 individuals (Table 1). No June sucker (*Chasmistes liorus*) were observed at Liberty Park during these efforts. Only one pure Bonneville cutthroat *(Oncorhynchus clarkii utah*) was identified; however, 28 rainbow (*Oncorhynchus mykiss*) /cutthroat hybrids (Cutbow trout) were observed during these efforts (Table 1). The Bonneville cutthroat had a total length of 450 mm (Table 1). The cutbow hybrids averaged 243 mm and the largest was 420 mm (Table 1).

Common carp (*Cyprinus carpio*) was the most abundant species. The average total length was 385 millimeters (mm) and the largest carp collected was 705 mm (Table 2). Brown trout (*Salmo trutta*) was the second most abundant fish collect with a total of 174 individuals. The average size brown trout was 154 mm with the largest being 205 mm (Table 2).

Table 1: Fish Species Count and Length
Collected at Liberty Park Lake on November 4th, 5th, and 12th, 2010

Species	Count	Average Length (mm)	Maximum Length (mm)
Bonneville cutthroat trout (*O. clarki utah*)	1	450	450
Rainbow trout (*O. mykiss*)	17	232	355
Brown trout (*Salmo trutta*)	174	154	205
Cutbow Hybrid (*O. clarki utah*/ *O. mykiss*)	28	243	420
White bass (*Morone chrysops*)	2	76	76
Common carp (*Cyprinus carpio*)	232	385	705
Channel catfish (*Ictalurus punctatus*)	2	365	385
Black bullhead (*Ameiurus melas*)	13	271	475
Oriental weather fish (*Misgurnus anguillicauclatus*)	17	70	105
Fathead minnow (*Pimephales promelas*)	9	47	70
TOTAL	**495**		

Annex F
Riparian Vegetation Survey Work Plan

Red Butte Creek Post-Oil Release Stream Channel, Physical Habitat, and Riparian Vegetation Evaluation

Introduction

The June 2010 oil release affected Red Butte Creek between the University of Utah and Liberty Park Lake. The total approximate affected stream length is 2.5 miles. Initial release impacts involved oil contamination of streambed sediment, streambank soil, and near-stream vegetation. Cleanup efforts entailed cutting or removal of contaminated branches, roots, and in channel logs/woody debris; rolling/wiping contaminated rocks; and churning/power-washing streambed and bank substrates to mobilize oil to the water surface where it could be collected. Also during the cleanup and assessment process, the stream corridor received heavy foot traffic for several months, and significant amounts of vegetation and woody debris were removed from bank areas to facilitate access and mitigate fire risk. While the cleanup efforts were successful in removing much of the oil contamination from the corridor, they also affected the condition of the in-stream sediments, streambanks, and riparian vegetation.

Potential negative impacts to stream and riparian resources from the combined effects of the oil release and cleanup work may include:

- stressed or diseased riparian vegetation
- increase in bare soil areas and erosion/weed potential at stream access points
- increased presence of invasive plant species associated with heavy foot traffic and associated transmittal of weed seeds
- increased presence of invasive plants due to vegetation clearing/ creation of sunny areas prone to weed colonization
- reduced understory vegetation cover due to compaction of soil from foot traffic
- reduced shading of the stream channel due to removal of overhanging plants/ branches
- streambank instability associated with impacts to near-stream woody vegetation or dislodging of large rocks
- streambank instability associated with bank undercutting/soil loss caused by pressure washing
- reduction in the amount of in-channel woody debris, and associated reduction in aquatic habitat complexity
- siltation of streambed gravels (increased embeddedness)
- filling of pools with fine sediments and reduction in pool volume
- accelerated/excessive depositional bar formation
- areas of deep, soft, unstable fine-grained substrate sediments

The proposed evaluation approach is intended to assess the extent of any such impacts to Red Butte Creek, monitor recovery from the impacts, and recommend measures to facilitate recovery from impacts. Specific elements of the evaluation approach are described below.

Evaluation Approach

Task 1: Existing Information/Fieldwork Preparation

This task involves compiling and reviewing available information about pre-oil release channel condition, riparian vegetation, and invasive species. Information about the locations, types, and intensity of cleanup activities (e.g., areas where the most power-washing occurred) and relative extent of contamination (e.g., how long it took for certain reaches to go from "red/oiled" to "green/clean" etc.) will also be assembled and reviewed. This information will provide useful context regarding portions of the creek that had issues with bank stability or invasive species prior to the oil release. However, it should be emphasized that it will often not be possible to definitively establish or distinguish the cause of specific channel or vegetation issues, as various factors other than the oil release have contributed to the current conditions that will be monitored. These factors include the chronic water quality effects of urbanized stormwater runoff inputs to the creek and erosion associated with storm events and springtime flood flows that have occurred since the oil release and cleanup.

Available information will be assembled in a GIS and printed on hardcopy field maps. Known data sources include data collected by BIO-WEST in fall 2008 for the Salt Lake City Riparian Corridor Study (RCS) and data collected by Salt Lake County in spring 2008 for their Stream Function Index (SFI). The Salt Lake City data set does not include complete information for the privately-owned portions of Red Butte Creek but does include data for the University of Utah, Veteran's Administration Medical Center (VA), Sunnyside Park, and Miller Park reaches. Relevant data from the Salt Lake City study include:

- GIS data on riparian vegetation composition and understory, shrub, and canopy cover
- GIS data on invasive species composition and percent cover
- GIS data on areas of significant bank erosion
- GIS data on in-channel woody debris
- GIS data on areas of significant trash
- streambed substrate composition (pebble count results)
- photos of channel and streambanks at established cross section photo points
- qualitative assessment of relative abundance of depositional bars (by reach)
- qualitative assessment of relative abundance of in-channel woody debris (by reach)

Relevant data from the Salt Lake County study (only available for University of Utah, VA, and Sunnyside Park reaches) include:

- number of pools by reach
- number and types of in-channel habitat structures (e.g. woody debris, boulders, root wads etc.) by reach

Available information on the type and extent of post-oil release cleanup activities will be obtained from Earthfax/Chevron, ideally in GIS format. Areas known to have received the most intensive power-washing treatment and the most extensive vegetation and root cutting will be noted on field maps. If available, information on the lateral extent of oil release-related activities such as vegetation and brush-clearing will also be obtained to help determine how much of the riparian corridor may have been

affected. Information on when SCAT assessments found specific reaches to be “clean/green” will be compiled as an indication of the relative extent of contamination and duration of cleanup work. Available data on the amount of trash removed from various reaches during cleanup work will also be compiled.

Once compiled, the various types of existing data listed above will be organized for use during the field monitoring tasks described below. Specifically, field maps and photos will be printed and GIS data will be assembled and loaded onto GPS data collection units. Draft field data forms and GPS data dictionaries will also be prepared.

A final component of this task will involve identifying appropriate stream reach designations to use for data collection. Reach designations used to direct oil cleanup efforts divided the stream into fewer segments than those used for the Salt Lake City RCS and County studies, so it is anticipated that some discussions and adjustments will be needed to determine the most useful reach breaks for this proposed effort. It is expected that the affected portion of Red Butte Creek will be divided into a total of approximately 10 study reaches to facilitate assessments.

Task 2: Reconnaissance Visit

Prior to initiating detailed evaluations, staff will perform a reconnaissance visit of the Red Butte Creek corridor to generally assess current riparian and channel conditions, identify areas that may require extra focus, and refine proposed evaluation methods if needed. Another component of the reconnaissance task will entail visiting and establishing monitoring sites in the proposed reference/control reaches on upper Red Butte Creek and Emigration Creek. It is estimated that the reconnaissance effort will require two days --one day to walk lower Red Butte Creek, and one day to visit the control sites.

Task 3: Riparian Vegetation Conditions and Stream Access Impacts

Healthy riparian vegetation serves a variety of important functions in stream ecosystems. Stream-side shrubs and trees provide shade to maintain cool water temperatures during summer months when flows are low. Woody riparian vegetation also increases streambank stability and provides nutrients and habitat complexity to the aquatic environment in the form of leaf litter and woody debris. Dense understory and shrub cover on streambanks protects water quality by filtering runoff, trapping sediment, and taking up pollutants. The proposed riparian vegetation assessment task is intended to evaluate post-oil release vegetation conditions, identify any areas of concern, and recommend measures to restore vegetation health in impacted areas.

One component of this task will involve assessing the condition and health of the riparian vegetation in areas that were directly contaminated with oil or where plants were clipped, cut, or cleared. Staff will walk the creek corridor and, for each study reach, qualitatively assess the vigor of re-growth of cut plants as poor, fair, or good. Any localized areas of poor re-growth will be noted on field maps, photographed, and mapped with a hand-held GPS unit. The specific plant species of concern will also be identified. Similarly, GPS data, field map notes, species information, and photographs will be collected

for any areas where near-stream plants show evidence of stress or disease. Notes will also be taken to indicate the relative need to replace the plant (e.g., a dying/dead tree with roots that are holding the streambank together would be high priority for replacement).

A second component of this task will entail identifying areas where vegetation cover has been impacted by cleanup-related foot traffic and access trails. For reaches where RCS vegetation information is available, any generalized impacts will be assessed by comparing the RCS understory percent cover values from 2008 with observations of current conditions. For any areas where a significant reduction in cover is observed, information on current percent cover and species composition will be collected and the location noted on field maps. For areas of more localized impacts (e.g., compacted/bare pathways paralleling or accessing the stream), GPS data, field map notes, data on the length/width of the bare area, and photos will be collected. Any associated erosion concerns will also be noted along with recommendations for revegetation and/or trail stabilization. Quantity and cost information for recommended improvements will also be prepared.

A third element of this task will involve evaluating invasive plant species. The main focus will be to document any invasive weed problems in areas where assessments indicate vegetation cover has been impacted by the oil release and/or cleanup activities (foot traffic, access trails, etc.). For reaches where RCS vegetation information is available, current observations of densities and types of invasive species will be compared to the RCS results from 2008. Where oil release/spill cleanup-related weed problems are observed, the specific weed species and estimated percent cover of weeds will be documented and recommendations for control, removal, and replanting with native species will be noted.

Another component of this task will involve matching photos of the channel and banks taken at established cross sections during the 2008 RCS study. One cross section was established for each RCS reach, and upstream, downstream, left bank, and right bank photos were taken. These cross sections will be re-occupied and comparable photos will be taken to provide qualitative information on any changes in riparian canopy cover and vegetation density. In addition, available sources of aerial and satellite imagery will be searched for any imagery flown in late summer or early fall 2010. Ideally, such imagery would indicate vegetation conditions along the corridor after the cleanup was substantively complete but prior to seasonal leaf-off. Imagery dated June 18, 2010 is known to be available but is of limited use because much of the vegetation clearing associated with cleanup efforts occurred after that date. If useful imagery from later in 2010 is found, vegetation canopy density visible in the imagery will be compared to the density visible in 2009 (pre-spill) imagery.

Task 4: Stream Channel and Physical Habitat Conditions

As discussed previously, oil cleanup activities in Red Butte Creek caused significant disturbance to streambed sediments. Foot traffic, power-washing, and rock cleaning disrupted the natural “armor” layer of coarser surface rocks and mobilized the finer sediments below. Power washing of streambanks likely added additional fine sediment, and heavy foot traffic likely increased the potential for erosion-related sediment inputs from streambank areas. Overall, the net effect of these activities was to increase the amount of mobile fine sediment in the channel, at least temporarily.

Streambed substrate condition is important for the health of aquatic ecosystems in a variety of ways. Patches of heterogeneous gravel and cobble substrate provide the physical habitat to support a high abundance and diversity of macroinvertebrates. However, the habitat quality of these substrates is reduced when they become buried or surrounded by fine sediment that clogs interstitial spaces. Fine sediment can also reduce longitudinal habitat complexity by filling in pools and limiting the range of available water depths. Increased sedimentation can reduce channel stability through excessive formation of sand and gravel bars that may deflect flows and cause bank erosion or clog culverts. Elevated turbidity levels reduce light penetration into the water column, reducing photosynthesis and primary production.

Because of these potential consequences of fine sediment pollution, many states including Montana, New Mexico, Colorado, and Idaho have developed monitoring protocols to assess sediment impacts (NMED 2002, CWQCC 2005, MTDEQ 2010, Burton and Harvey 1990). Our proposed stream channel assessment task includes some similar methods to evaluate streambed substrate conditions on Red Butte Creek.

Task 4 Phasing

The amount and distribution of fine-grained streambed sediments are affected by high flows associated with storm events or snowmelt runoff and therefore tend to vary seasonally and year- to-year. In 2011 in northern Utah, spring runoff flows have been unusually high because of an extremely large snowpack and some of the wettest springtime weather on record. On Red Butte Creek, flows have consistently been higher than 22 cfs (the average annual high flow value) since mid-April, and briefly reached more than 100 cfs at the County gage near 1600 East. These high flows have undoubtedly mobilized and redistributed significant amounts of streambed sediment, and the “flushing” effect of these high flows may have largely mitigated the increases in fine sediment associated with cleanup efforts. Therefore, we have proposed two separate phases of monitoring to assess stream channel and physical habitat conditions. Phase 1 will focus on woody debris and bank erosion monitoring. Phase 2 monitoring efforts will only be completed if it is determined that concerns about excess fine sediment persist. The decision about whether or not to complete Phase 2 will be based primarily on reconnaissance visit observations and review of the most recent macroinvertebrate sampling results. The decision will be made in close coordination with the Utah Division of Water Quality, Salt Lake County, Salt Lake City, Salt Lake Valley Health, and other relevant stakeholders. Careful review of the available macroinvertebrate data will be important because fine sediment pollution has been linked to poor macroinvertebrate density and diversity (Chapman and Mcleod 1987). If macroinvertebrate data indicate that abundance and species diversity are recovering, that will be a “surrogate” indication that streambed sediment conditions are also recovering, and the Phase 2 sediment monitoring may not be needed or could be scaled back if appropriate.

Phase 1: Woody Debris Assessment

Part of Salt Lake County’s SFI monitoring involves tallying the number of in-stream woody habitat structures (imbedded logs, log jams, or root wads as defined by County protocols) within each assessment reach (SLCO 2010). We propose to conduct repeat tallies to assess whether debris removal

associated with oil cleanup efforts has significantly reduced woody debris abundance. Woody debris locations mapped and photographed during the 2008 RCS work will also be revisited, and the qualitative RCS information on debris abundance will be compared to existing (2011) conditions. If notable reductions are observed, recommendations for repeat monitoring will be proposed and described in the evaluation report prepared during Task 6.

Phase 1: Bank Erosion Assessment

This task involves walking the channel and taking GPS locations, photos, and notes about bank erosion areas that appear to be related to pressure washing, rock dislodging, or vegetation removal associated with oil cleanup efforts. City and County assessments noted significant amounts of bank erosion on Red Butte Creek prior to the oil release, and the creek is currently experiencing unusually high springtime flood flows. To help focus the bank erosion assessment and provide context, the field crew will bring maps and photos compiled during Task 1 (e.g. SCAT results, information on oil "hot spots", areas known to have received heavy cleanup focus, maps of RCS banks erosion etc.). For each bank erosion area that appears to be related to the oil cleanup, a field sheet will be completed noting observations regarding evidence of residual oil contamination, the apparent type of cleanup-related impact (pressure washing, rock dislodging, vegetation removal), and recommendations for stabilization and further monitoring. Other information including estimated height and length of bare bank, bank angle, composition (silt, cobble etc.), vegetation type/density, and apparent hydraulic cause (e.g. flow deflection from sediment or woody debris deposit, lateral erosion at outside of meander bend, low bank scour associated with flashy urban runoff, etc.) will also be noted on the field sheet.

Phase 2: Riffle Assessment (if needed)

Pebble counts (Wolman 1954) will be conducted to determine streambed particle size distributions in riffle habitats. One hundred rocks will be measured in each of four different riffles for each study reach, for a total of 400 counts per reach. During each count, particles that are difficult to dislodge due to being surrounded by fine sediment will be noted as embedded and total percent embeddedness will be tallied. In reaches where pebble counts were completed as part of the 2008 RCS project, the same riffle used for the 2008 RCS pebble count will be re-measured to allow comparison. Pebble counts will also be conducted in the riffles being used for macroinvertebrate sampling. The remaining riffle monitoring locations will be established during the reconnaissance visit.

At each riffle where pebble counts are completed, grid toss measurements will be conducted to assess the amount of fine sediment present in riffle habitats. This technique involves placing a 12"x12" grid with 1.5" squares on the streambed and counting the number of grid intersections that overlay sediment 6.35mm or smaller in diameter, as per the MTDEQ (2010) "Fine Sediment in Riffles" protocol.

A final component of the riffle assessment effort will entail determining the riffle stability index (RSI, Kappesser 2002) at each riffle where pebble counts and grid toss measurements are conducted. Specifically, the closest point bar to each study riffle will be located and the size of 15 freshly moved dominant large particles on the bar will be measured, as per the MTDEQ (2010) "Riffle Stability Index" protocol. The RSI has been found to be an indicator of impacts from increased sedimentation (Kappesser

2002). GPS locations and photographs will be taken at each riffle monitoring site, and each site will be flagged/marked to allow repeat measurements at the same location in case follow up monitoring is desired.

Where available, 2008 RCS pebble count results will be compared to the newly collected data to assess whether trends toward increased amounts of fine sediment or embeddedness are apparent. All three types of riffle assessment measurements (pebble count, grid toss, RSI) should be made when flows are low (< 10 cfs) and the water is clear. Because comprehensive pre-oil release streambed sediment data are not available to allow temporal comparison, we propose to establish control monitoring sites in the stream reach above Red Butte Garden that was unaffected by the oil release, in two reaches on Emigration Creek, and in one reach on City Creek. These four control sites will be located in the reaches where macroinvertebrate monitoring sites have been established. Red Butte Creek results will be compared to the control site results to evaluate potential impacts related to the oil release and cleanup. If this comparison suggests that additional follow-up streambed monitoring is warranted, recommendations for the type and frequency of monitoring will be proposed in the evaluation report prepared under Task 6.

Phase 2: Pool Assessment (if needed)

Part of Salt Lake County's Stream Function Index (SFI) monitoring involves tallying the number of pools within each assessment reach, where a pool is defined as a feature longer than the average stream width with a water depth of one foot or greater at low flow (SLCO 2010). We propose to conduct repeat pool tallies to assess whether the number of pools has been reduced due to sediment infilling and reduced water depth. While conducting the tallies, the locations of any pools noted as having significant amounts of loose silt deposits should be recorded with a GPS to allow for possible follow-up monitoring.

In addition to pool tallies, measurements of V* (Hilton and Lisle 1993) will be collected in one to three pools per assessment reach. The V* parameter represents the ratio of fine sediment volume to total (water plus fine sediment) pool volume, and provides a quantitative, flow-independent means to track pool sedimentation through time. The methodology involves assessing pool bathymetry by measuring water depth to the top and bottom of accumulated fine sediments at multiple cross sections. GPS locations, photographs, and notes on pool type (e.g. formed by scour, plunge, boulder, or woody debris) will be taken at each pool V* monitoring site, and each site will be flagged/marked to allow repeat measurements if follow-up monitoring is desired. If possible, pools used for V* monitoring should be located in naturally formed pools rather than scour pools below culvert outlets or concrete weir structures. As with riffle measurements, pool V* measurements will also be collected in the established control sites on upper Red Butte Creek, Emigration Creek, and City Creek.

Phase 2: Depositional Bar Assessment (if needed)

Although quantitative data are not available, qualitative assessments completed during the RCS study indicate that gravel and sand bar deposits were relatively rare on Red Butte Creek in 2008. To assess post-oil release bar abundance, all bar deposits of significant size (bar length or width equal or greater than half the average low flow channel width) will be tallied. The location of each bar will be

documented with a photo and GPS point, and notes will be taken on estimated width, length, and dominant particle size (sand, fine gravel, coarse gravel, cobble, etc.). Notes will also be taken to indicate whether or not the bar deposit appears likely to cause flow deflection and bank erosion problems.

During the bar tally effort, any notable (e.g. areas larger than typical/expected channel margin deposits) underwater deposits or longer stream sections of deep, soft, unstable fine-grained sediments will also be noted and tallied under a separate feature category. Because of their instability, such areas provide poor habitat for macroinvertebrates and pose water turbidity concerns.

Task 5. Assessment of Restored Spill Site Area

Approximately 75 linear feet of streambed and streambank material immediately adjacent to the pipeline leak were directly contaminated with oil and had to be removed. Several heavily contaminated mature trees were also removed from the immediate spill site area. The affected area was reconstructed in fall 2010. The reconstruction/restoration activities included rebuilding the streambed and streambank with clean materials, installing rock weir and floodplain shelf habitat features, and implementing a comprehensive revegetation effort. As part of this proposed assessment, the individual components of the restoration effort will be quantified and summarized and the current (post-restoration) stream channel and riparian conditions will be compared to pre-oil release conditions documented during the 2008 RCS evaluation. Changes in bank stability, vegetation structure and species diversity, and habitat complexity will specifically be addressed.

Task 6. Reporting

Following the initial round of monitoring in spring/early summer 2011, results will be analyzed and compiled into a comprehensive report. Streambed, streambank, and riparian vegetation conditions will be summarized for each study reach, along with descriptions of any issues or “hot spots” of concern. To the extent possible, observed conditions will be compared to pre-oil release conditions and changes in how well the corridor is serving various riparian functions (habitat, shading, aesthetics, organic matter inputs, streambank stability, flood and storm flow conveyance, recreation etc.) will be described. Results of the riffle and pool assessments on lower Red Butte Creek will be compared to the results at the control sites to help determine the extent to which the streambed has recovered from any cleanup-related sediment impacts. Beneficial aspects of the oil cleanup such as trash removal will also be quantified and summarized. Maps and action lists of recommendations (e.g. replanting, trail stabilization, etc.) will be prepared for each study reach along with quantity and cost estimates. Where observed conditions warrant further study, recommendations for follow-up monitoring will be included. Spatial data will be compiled into a geodatabase in GIS and provided as a deliverable in addition to the written report. Draft versions of the written report (electronic *.pdf and 2 hardcopies) and GIS data will be provided for review prior to preparing the final report (electronic *.pdf and 2 hardcopies) and final GIS data.

Schedule

We propose to complete the field monitoring effort (Tasks 2 through 5) in summer 2011, once high spring flows have receded. Collecting data during base flow conditions will facilitate comparison with available pre-oil release data that was collected during low flow periods in 2008. If the Phase 2 streambed monitoring proposed in Task 4 is pursued, it is particularly important that those measurements be completed when flows are low (< 10 cfs on Red Butte Creek) and the water is clear. The data compilation effort (Task 1) would be completed prior to field work. The draft evaluation report and GIS data would be provided three months after the start of field work. Final deliverables would be provided within one month of receiving comments on the draft deliverables.

References

Burton T., Harvey G. 1990. Estimating intergravel salmonid living space using the cobble embeddedness sampling procedure. Water quality monitoring protocols – Report No. 2. Boise (ID): Idaho Division of Environmental Quality, Water Quality Bureau. 39 p.

Chapman, D.W. and K.P. McLeod. 1987. Development of Criteria for Fine Sediment in Northern Rockies Ecoregion. United States Environment Protection Agency, Water Division, Report 910/9-87-162, Seattle, Washington, USA.

[CWQCC] Colorado Water Quality Control Commission. 2005. Implementation guidance for determining sediment deposition impacts to aquatic life in streams and rivers (revised May 2005). Commission Policy 98-1, developed in conjunction with the Colorado sediment task force. Denver (CO): Colorado Department of Public Health and Environment Water Quality Control Commission. 42 p.

Hilton S., Lisle T. 1993. Measuring the fraction of pool volume filled with fine sediment. Res. Note PSW-RN-414. Albany (CA): Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture. 11p.

Kappesser G. 2002. A riffle stability index to evaluate sediment loading to streams. Journal of the American Water Resources Association 38(4): 1069-1081.

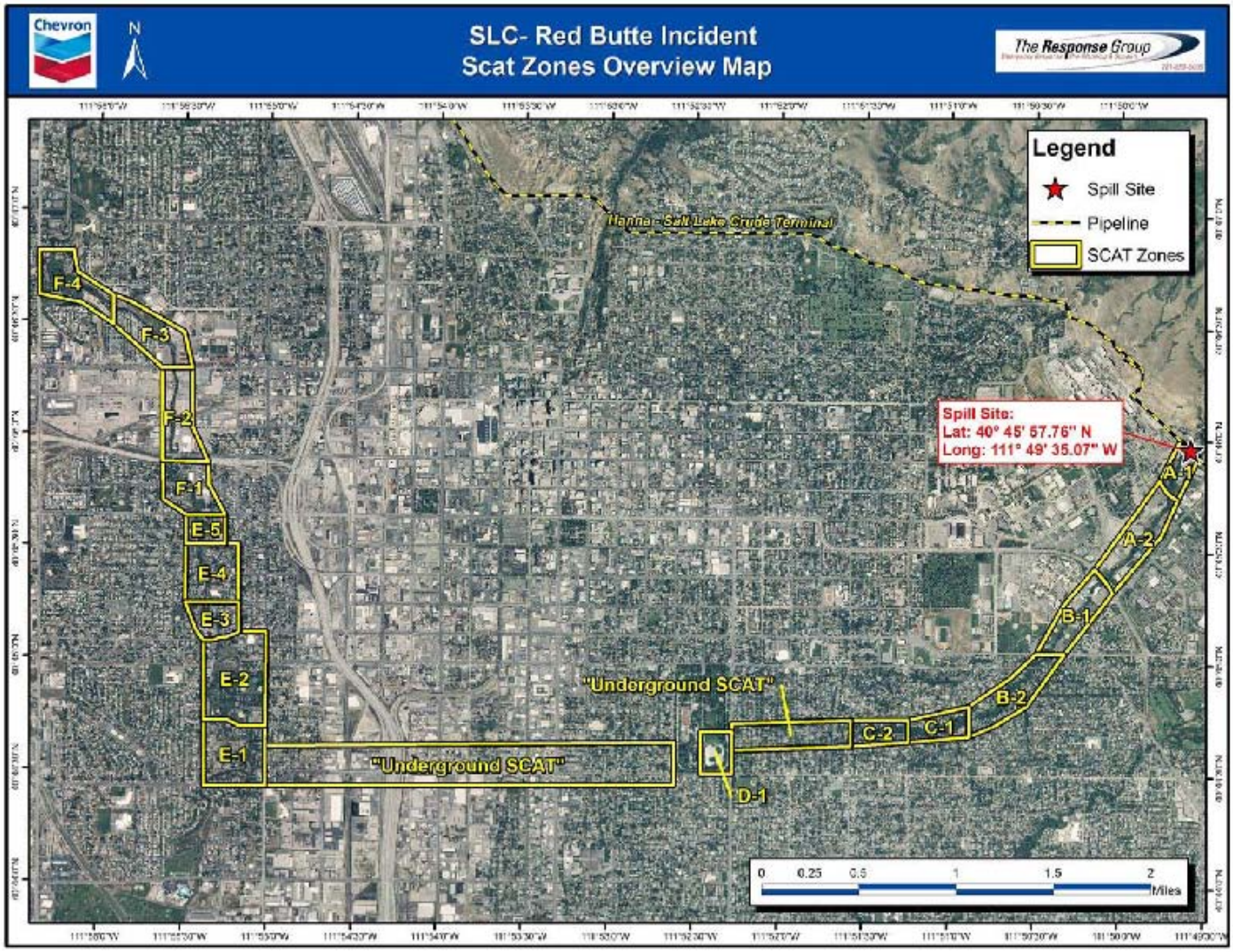
[MTDEQ] Montana Department of Environmental Quality. 2010. Field methodology for the assessment of TMDL sediment and habitat impairments (WQPBWMSSOP-03). Helena (MT): Montana Department of Environmental Quality. 40 p.

[NMED] New Mexico Environment Department. 2002. Protocol for the assessment of stream bottom deposits on wadable streams. Santa Fe (NM): New Mexico Environment Department, Surface Water Quality Bureau. 16 p.

[SLCO] Salt Lake County. 2010. Salt Lake Countywide Water Quality Stewardship Plan addendum: Stream function index main report. Salt Lake City (UT): Salt Lake County Flood Control and Water Quality Division. 75 p.

Wolman M.G. 1954. A method of sampling coarse river-bed material. Transactions, American Geophysical Union 35(6): 951–956.

Annex G
Red Butte Creek Crude Oil Spill – Water, Sediment and Macro-invertebrate Sampling Plan



Red Butte Creek Crude Oil Spill
Water, Sediment and Macro-invertebrate Sampling Plan

Chevron Pipe Line
Salt Lake City, Utah

November 2011

Final 17

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

This document describes the water, sediment and macro-invertebrate sampling plan for the Red Butte Creek (RBC) crude oil spill in June 2010. The sampling plan is a cooperative effort among state and federal trustees and Chevron Pipe Line personnel.

The focus is on hydrocarbons attributable to the spilled crude oil. Data collected are intended for comparison to water quality benchmarks and sediment quality benchmarks developed for ecological receptors. Macro-invertebrates are one component of the aquatic life of Red Butte Creek.

At least four sampling events () are planned over 2011-2012 to cover the annual flow cycle of Red Butte Creek. The actual number and timing of sampling events may be adjusted depending on the analytical results and weather.

Samples of the fresh and weathered crude oil were collected early in the response and were submitted by the FOSC for analysis at the US Coast Guard Marine Safety Lab.
Water, sediment and macro-invertebrate samples will be collected at both background and impacted sites as part of this plan. Proposed possible sampling areas include:

- Red Butte Creek upstream of the spill site (representative of wildland stormwater but not representative of urban stormwater),
- Divisions A, B, and C of Red Butte Creek downstream of the spill site, but above Liberty Pond,
- Jordan River sampling sites upstream of 1300 South and below 900 South, (under consideration for water and sediment but possibly not macro-invertebrates due to the historic nature of the Jordan River as an industrial waterway)
- Emigration Creek, Parleys Creek, City Creek and/or Mill Creek.

Emigration Creek, Parleys Creek, City Creek and Mill Creek are considered potentially representative of the background levels of hydrocarbons present in Red Butte Creek.

Water and sediment sampling will be done by a contractor under the sampling procedures described in this document and under the Unified Command (UC) safety plan.

Macro-invertebrate sampling will be done by Department of Water Quality (DWQ) following DWQ sampling protocols and safety plan. Sampling protocols and safety plan will be submitted as separate documents by DWQ.

The intent is to sample water, sediment and marco-invertebrate at or nearly the same time to compare water and sediment chemistry to macro-invertebrate populations.

1.0 INTRODUCTION

1.1 Purpose, Objectives, Scope, and Background

Introduction: This plan is for the monitoring of the potential impacts of the Salt Lake City (SLC) Red Butte Creek (RBC) crude oil spill in June 2010 (incident). The focus is on assessing potential residual hydrocarbons (e.g., BTEX, PAHs and TPH) in the water and sediment, and the macro-invertebrates associated with the incident. The proposed sampling sites are in the RBC and Jordan River. Sites representing background conditions for the RBC segments with wildland or urban watersheds are upstream of the spill site on RBC, Emigration Creek, Parleys Creek, City Creek and/or Mill Creek. Background sampling for the Jordan River (if needed) is upstream of 1300 South culvert on the Jordan River. At least four sampling events are planned over the next four quarters to cover the annual flow cycle of Red Butte Creek. The actual number and timing of sampling events may vary depending on the analytical results and weather.

Purpose: To assess potential hydrocarbon impacts to Red Butte Creek and the Jordan River from the SLC RBC incident.

Objectives:

1) Collect and fingerprint source oil.
2) Collect water and sediment samples.
3) Analyze water and sediment samples for total and speciated hydrocarbon content.
4) Collect macro-invertebrates.
5) Analyze macro-invertebrates for population density and diversity.

Scope: A sampling team composed of agency representatives and Chevron Pipe Line personnel will cooperatively collect the water, sediment and macro-invertebrates in approximately four events over 2011-2012. A contract lab will analyze the water and sediment samples. The USU Bug Lab (or equivalent laboratory) will analyze the macro-invertebrate samples. The sampling team will review the data.

Background: The Salt Lake City Red Butte Creek incident released approximately 800 barrels of a 33 API (= sp. gr. 0.825) crude oil on June 12, 2010. About 400 barrels were picked up at the spill site on land and about 400 barrels entered the Red Butte Creek. The cause of the incident is under investigation. As of September 9, 2010, a total of 778 of the 800 barrels are accounted for through recovery from water, soil removal and evaporation. For the purposes of the response, both impacted and additional downstream reaches of Red Butte Creek and the Jordan River have been divided into Divisions (Figure 1; Divisions A-F) and further divided into smaller geographically connected areas designated sequentially by number (e.g. Division A1, A2, …F5)

Red Butte Creek is a narrow rocky creek with a normal flow of about 5 cubic feet per second (cfs). The impacted reach drops about 750 feet over a reach of 18,000 feet, averaging approximately a 4% average drop (Figure 2). Flow is regulated by the dam at Red Butte Reservoir.

One function of the impacted portion of Red Butte Creek is as an urban stormwater/irrigation

water conveyance system. There are campus parking lots and roadways immediately adjacent to the spill site. For this reason, it is important that suitable background or reference sites be selected for comparison with the data to be obtained in this study. Sites at Emigration, Parley's and Mills Creeks have been identified as having land uses and land covers similar to Red Butte Creek. Like Red Butte Creek, all have lengthy wildland reaches in the Wasatch front range, and then flow through residential/urban reaches before entering the Jordan River (Figure 3).

Figure 1 – Map of Red Butte Creek Incident Response Showing Division Designations. Divisions A, B, C are daylight reaches identified sequentially downstream from the release site. Division D is Liberty Park pond. Divisions E and F are the Jordan River reaches.

Figure 2. Elevation Profile of Red Butte Creek. Diagram from SLC Riparian Corridor Restoration Study Final Red Butte Creek Management Plan.

Figure 3. Map of Jordan River, and Red Butte, Emigration, City and Parleys Creeks. Map annotated based on original from the "Salt Lake City Riparian Corridor Study."

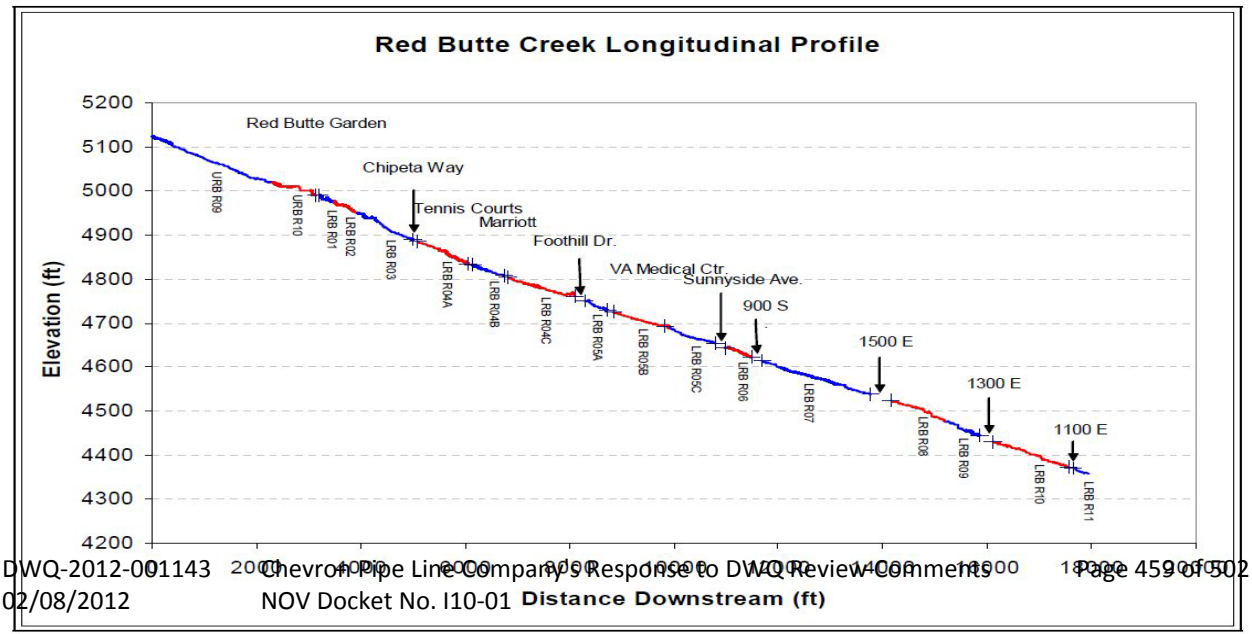


Figure 4. Map of Salt Lake City Watershed. Map annotated based on original from the "Salt Lake City Watershed Management Plan."

2.0 PLAN IMPLEMENTATION

2.1 Plan Initiation

The agencies and Chevron Pipe Line will assign personnel to the environmental monitoring team. The team is then responsible for finalizing the plan details, arranging the necessary logistics for sampling and analysis, completing the field collection, and preparing a final report summarizing the results.

Key steps for finalization of the environmental monitoring plan are shown in Table 1.

Table 1. Plan Initiation

Task	Assignment	Proposed Schedule
Form Sampling Team	Trustees, Chevron Pipe Line	August 2011
Review and finalize draft environmental monitoring sampling plan	Team	August 2011
Identify sampling sites (GPS coordinates)	Team	August 2011
Contract analytical laboratory and possible alternates	Team	August 2011
Finalize sampling schedule	Team	September 2011
Develop contact list	Team	August 2011
Write safety plan (JSSP) for field sampling activities	Team	August 2011

2.2 Reporting Relationship to Unified Command

2.2.1 Sampling Team

Sampling team members will be selected by the Environmental Unit leader in consultation with the key trustee agencies, and with the concurrence of the Unified Command (UC) for the response. Each sampling team member will identify a single point of contact within each of their respective organization for reporting purposes (Appendix 1; Forms 1, 2).

Initially, the sampling team will report to the Unified Command for as long as the UC is active in the response. UC may delegate reporting duties.

After the UC stands down, the sampling team members will continue to report to their respective point of contact.

3.0 WATER AND SEDIMENT SAMPLING PROCEDURES

3.1 Overview

This section describes methods for collecting source oil, water and sediment samples. The methods described below are guidelines. Changes can be made as necessary. Any changes in the collection methods should be documented and agreed within the team. The macro-invertebrate sampling will be done by DWQ under DWQ sampling protocols and the DWQ safety plan.

3.2 Safety

Safety is the most important consideration when implementing this sampling plan. All field team members will read and perform all work in accordance with the incident-specific job site safety plan (JSSP), and they will receive a daily safety briefing before going into the field.

All individuals responding in the field must have appropriate HAZWOPER training and documentation.

Individuals involved in field sampling activities must wear the appropriate Personal Protective Equipment (PPE) as specified in the JSSP or by the designated Safety Officer. This will generally include: safety glasses, hard hat, steel toed boots and some type of protective clothing. In some cases higher levels of protection including fire-resistant clothing (e.g. Nomex), chemical protective clothing (e.g., Tyvek suits or rain gear), rubber boots or waders, sunscreen, and gloves may be necessary.

Nitrile or other suitable gloves must be worn by persons collecting samples. They should also be worn by anyone who may have incidental contact with oil or contaminated materials. More substantial gloves may be required for obtaining source crude oil samples or if continuous contact with oil is expected. Gloves should be changed regularly when contaminated to avoid chemical exposure as well as avoiding cross-contamination between samples.

Local conditions should be evaluated before and during field operations. By definition, field sampling events are considered non-essential and should be terminated immediately if local conditions warrant.

- Sampling should be terminated during inclement weather. The response guideline is to terminate operations during lightning storms and for 30 minutes after the last bolt.
- No sampling should be conducted from after sunset or before sunrise.
- While working on the shorelines or uneven terrain, be mindful of slippery surfaces and sharp objects.

Any incident or injury must be promptly reported to the designated Safety Officer and individual management immediately, and in accordance with the site-specific site safety plan.

Field team members collecting samples by boat will receive a boat safety briefing by the boat operator prior to leaving the dock. When on the water, all persons onboard will wear personal floatation devices at all times.

3.3 General Sampling Guidance

This plan refers to sample "areas" and sample "sites". A sample "area" is the general vicinity where the sample is to be collected (e.g., RBC Division A1, Jordan River, etc). A sample "site" is precise geographic point specified by latitude/longitude coordinates where samples are collected (e.g., RBC Division A1 lat/long).

An overview of the sampling procedures applicable to all samples collected as part of this plan is summarized in Table 2. More specific details for sampling each media (source crude oil, water, sediments) are provided later in this plan.

3.4 Field Sampling

The Sampling Team may collect samples as a group or designate a third-party service to collect the samples. If a third-party is used, agency and Chevron personnel should be on-hand during the sampling events to witness the sample collection procedures. If needed, team members or designees may split into two groups to collect the samples.

Table 2. Procedures Applicable to Water and Sediment Sample Collection Events

Procedure	Details
Recordkeeping	At the start of each sampling day, record the following information in a permanent field log book • Date • Sampling team members and contractors participating • Sample sites to be visited • Persons designated to fill the roles: o sample collector, o sample processor, and o record keeper for the sampling day.
Labeling	• Use permanent marker for filling out labels. • Prior to collecting a sample, fill out the container labels with the following information: • sample number, • sample type (e.g., source oil), • date and time, • sample site. GPS positions should be recorded as follows: lat NDD.ddddd; long WDD.ddddd; WGS 84 datum. • collector and processor's name(s). • After the sample is collected, clean the outside of the container with a disposable wipe. • Affix the completed sample label, and cover label with clear tape. • Check the label it is readable and correct.
Cross contamination and decontamination	• Change gloves between sample collections. • If tools or sampling devices are re-used at multiple collections (even between duplicates at the same site), clean the equipment with Alconox® and rinse with distilled water between each sample collection. Methanol may also be used to clean equipment, but appropriate precautions must be taken due to the flammability and

	toxicity of this solvent. When decontaminating sampling equipment, wash and rinse over a labeled plastic bucket with a lid for later disposal.
Sample Storage	• Water and sediment samples should be immediately placed in an ice chest. Store at 4 degrees C until delivery at the lab. • Source oil sample(s) should be placed in a separate container. Chilling is not required, but recommended. Keep source oil samples away from any other samples.
Waste Handling	• Store all oily rags and materials in a plastic bag. • Dispose of accumulated wastes in accordance with the waste management plan prepared by the Environmental Unit.
Other Documentation	• Make a sketch in the field book showing the sampling sites. Record weather conditions, creek/river elevation, and any other pertinent information. • Photograph each sampling site and source. Prior to any sampling, and after marking the station, photograph or video the sampling site. Take video and/or the photos in both directions along the shore as well as from the waterline toward the backshore, and from the backshore to the waterline. Try to get permanent and distinctive landmarks in some photos and/or videos for future reference. • Keep a photo log so each photograph can be properly identified. • Take photographs as the samples are being collected to document the procedure.
Chain of Custody	Chain-of-custody must be maintained at all times. Chain-of-custody means that the sample or data are under the possession and control of the person identified on the form for the period specified on the form. Possession and control can mean literally in possession, within sight, or in secure storage where the access is limited to the person in possession. The person taking possession and the person relinquishing possession need to sign the form when the transfer takes place.
Sequencing	Samples must be collected to avoid disturbing the integrity of subsequent samples. Sampling proceeds in an upstream direction. Water samples are collected first, followed by the macroinvertebrate samples (where applicable), and then the sediment samples. Exceptions can be made provided they are documented and are clearly unlikely to disturb the integrity of subsequent samples.

3.5 Source Oil Sampling

It is critical that all sources of spilled oil be identified and sampled to enable forensics analyses and toxicity testing of the source oil, as well as, comparison to oil that may be detected in samples collected from various media.

3.5.1 Source Oil Sampling Details

Sampling site: The source oil was collected at the spill site on Red Butte Creek from the pipeline drainage. A sample of weathered oil recovered at Liberty Park pond was collected

from the recovered oil tanks as well.

Timing: Both the source crude oil sample and the recovered oil samples were held at the Chevron Salt Lake City Refinery until transferred to the custody of the USEPA START contractor. Both samples were submitted to the USCG Marine Safety Lab for analysis. Preliminary analysis of the samples were received from the USEPA and distributed by email on July 29, 2010 to Chevron and the agencies.

Additional samples of crude oil from the same oilfield will be analyzed. While the crude oil in these samples will not be identical to the spilled crude, they should be similar. A total of 2-4 samples will be collected over 2 months to characterize the variability in crude oil from this oilfield.

3.6 Water and Sediment Sampling

Water and sediment samples are collected for two primary reasons: 1) to determine baseline (un-impacted) conditions, and 2) the concentration of petroleum hydrocarbons in the water as a result of the release in impacted area(s). Petroleum hydrocarbons (both baseline and post release) enter the water column from physical processes such as mixing, dispersion, dissolution, as well as by adsorption on suspended particles or other materials.

No baseline data for hydrocarbons in RBC are available. This incident involved an uncontrolled accidental release into a fast-moving narrow creek. That scenario made collection of a representative baseline (pre-impact) water or sediment samples problematic as there was not sufficient time before the impact spread downstream.

Baseline sampling in this incident is further complicated by the fact that the release occurred virtually at the wildland/urban interface. Immediately upstream of the spill site are wildland and preserved areas while immediately downstream the creek flows through the University of Utah campus and through heavily residential and light commercial areas. Thus, the immediate upstream areas have limited value as proxy baseline sites for the urban reaches of RBC.

However, the nearby Emigration Creek and Parley's Creek both run through urban areas. Appropriate sampling sites in those creeks will be evaluated to serve as proxy for the pre-impact baseline of Red Butte Creek.

The petroleum hydrocarbons of interest in this spill include volatile aromatic compounds (e.g., benzene, toluene, ethylbenzene, and xylenes; BTEX), low molecular-weight PAHs, and other PAHs that may contribute to chronic toxicity (e.g., benzo[a]pyrene).

3.6.1 Sampling Areas

Water, bottom sediment and bank soil samples will be collected from the following areas except the Jordan which will be sampled for water only:

- Upstream of spill site on Red Butte Creek (Figure 6)
  (above amphitheater)
- Red Butte Creek Divisions A, B and C (see Figure 1)
  (below 1100 East, above 1500 East and above Foothill Drive)

- Jordan River (Figure 7)

(above 800 South and above 1700 South)

- Emigration Creek (Figure 3)
  (above 1300 East, above 1900 East and at Donner Hill Marker)
- Parleys Creek (Figure 3)
  (below 1300 East, below 1700 East and above IH-80)
- Mill Creek (Figure 4)
  (below 700 East, 2300 East and above County Gage)
- City Creek (Figure 4)
  (at lower end of natural channel, below North Canyon Road Loop and near Canyon entrance gate)

Stretches of various creeks have different land uses and land covers. The Sampling Team may include or exclude proposed sampling locations based on land uses and land covers. The intent is to sample a fair representation of Red Butte Creek and other Salt Lake City area creeks. Western creeks are dynamic. Each flow event can change the distribution of sediment and cobbles. Some adjustments on sampling locations may be expected.

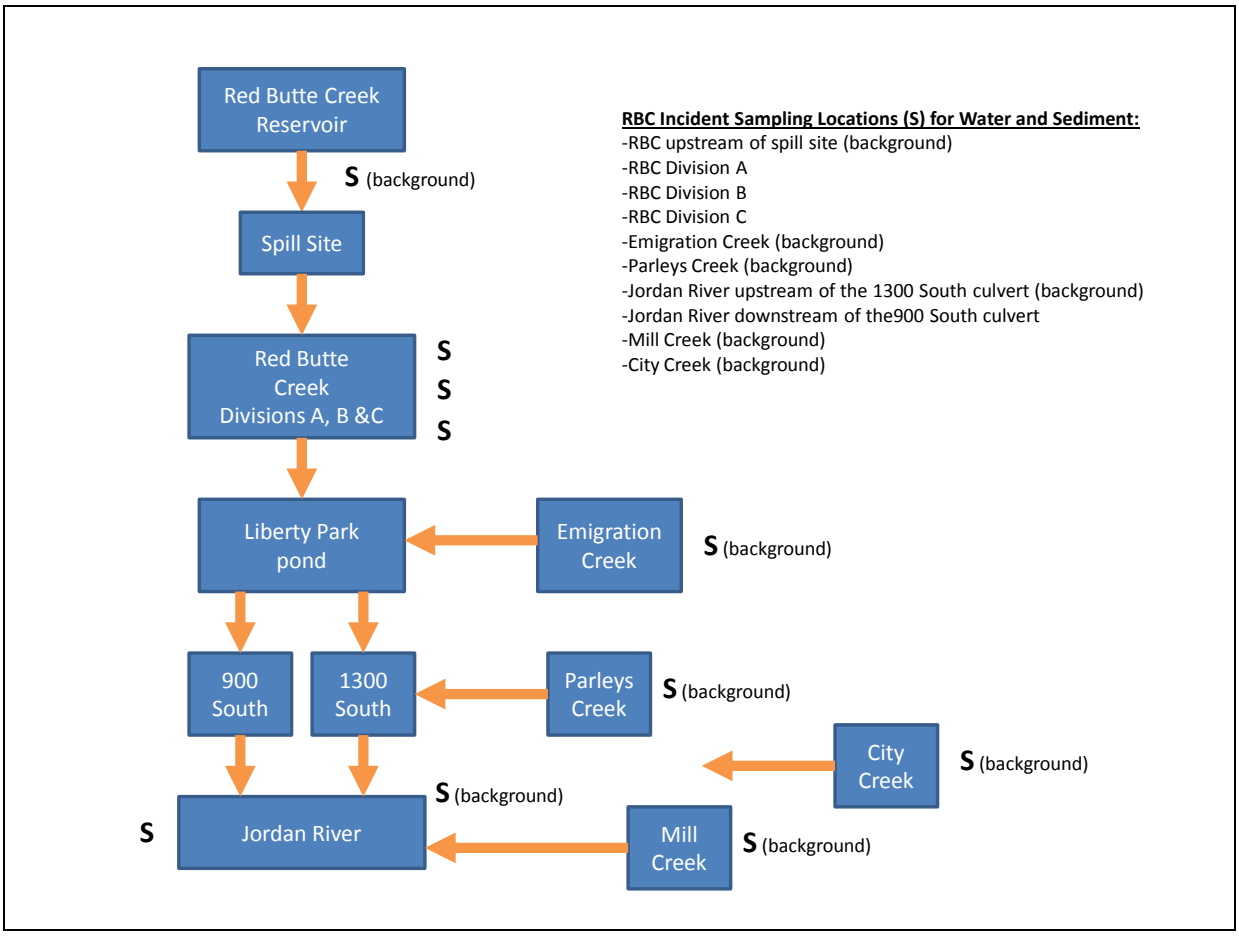


Figure 5. Conceptual Diagram for Water and Sediment Sampling Sites. Emigration, Parleys City and Mill Creek will be sampled at one site upstream of the urban area and at two sites in the urban area. The sampling locations will be based on what is considered representative of the creeks. See Table 8 for STORETS GPS locations.

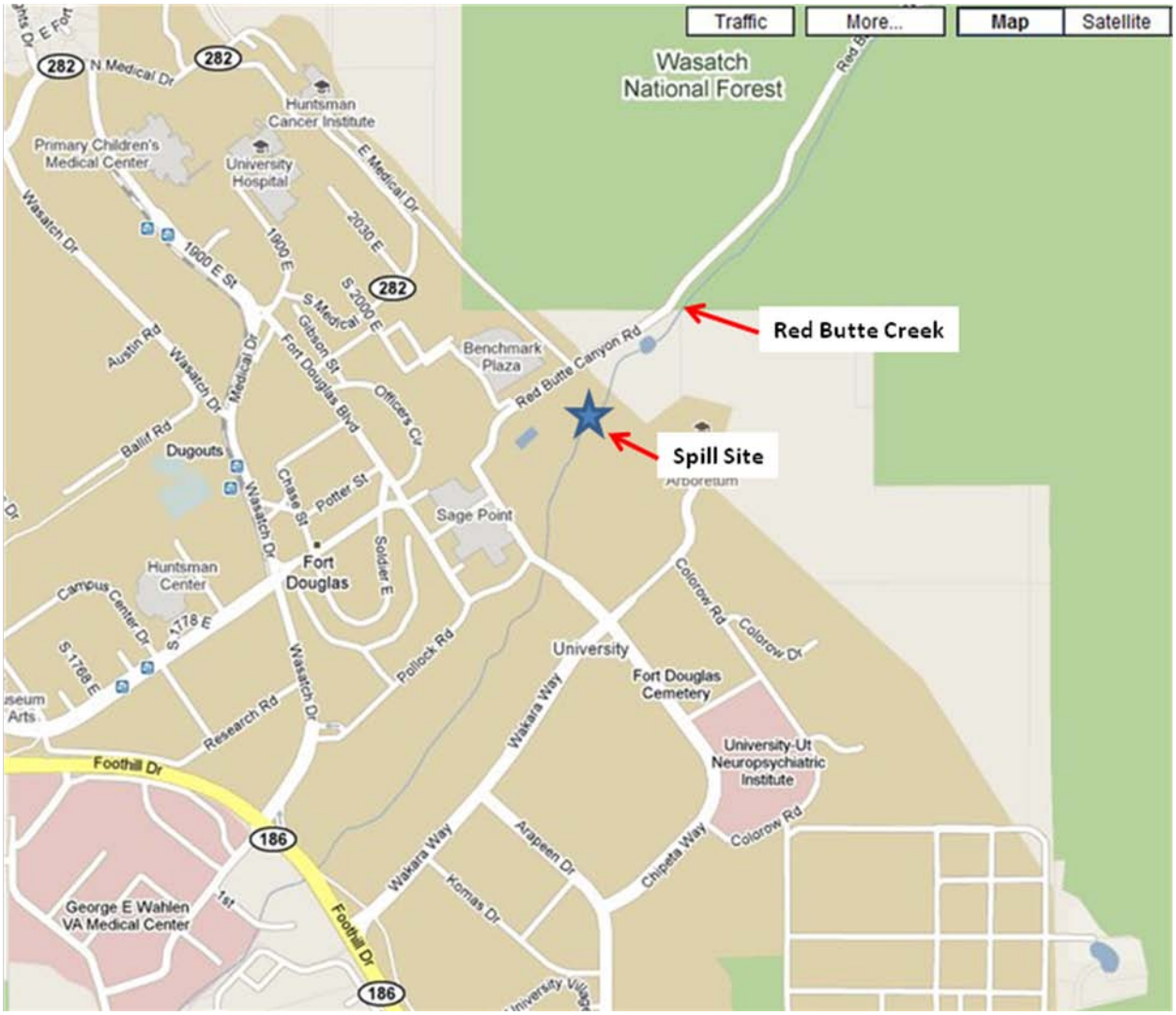

Traffic
More...
Map
Satellite
Wasatch National Forest
Red Butte Creek
Spill Site
Red Butte Canyon Rd
Benchmark Plaza
Sage Point
Fort Douglas
Huntsman Cancer Institute
Primary Children's Medical Center
University Hospital
N Medical Dr
E Medical Dr
1900 E St
2030 E
S 2000 E
S Medical Dr
Gibson St
Fort Douglas Blvd
Officers Cir
Medical Dr
Wasatch Dr
Austin Rd
Ballif Rd
Dugouts
Chase St
Potter St
Soldier E
Huntsman Center
Campus Center Dr
S 1718 E
S 1768 E
Research Rd
Pollock Rd
Foothill Dr
186
George E Wahlen VA Medical Center
1st
Wakara Way
Komas Dr
Arapeen Dr
Chipeta Way
University
Fort Douglas Cemetery
Colorow Rd
Colorow Dr
University-Ut Neuropsychiatric Institute
Arboretum
282

Figure 6. Map of Red Butte Creek Upstream of Spill Site. Upstream of the spill site on Red Butte Creek is the boundary for The University of Utah and the beginning of the Wasatch National Forest. Downstream of the spill site is urban

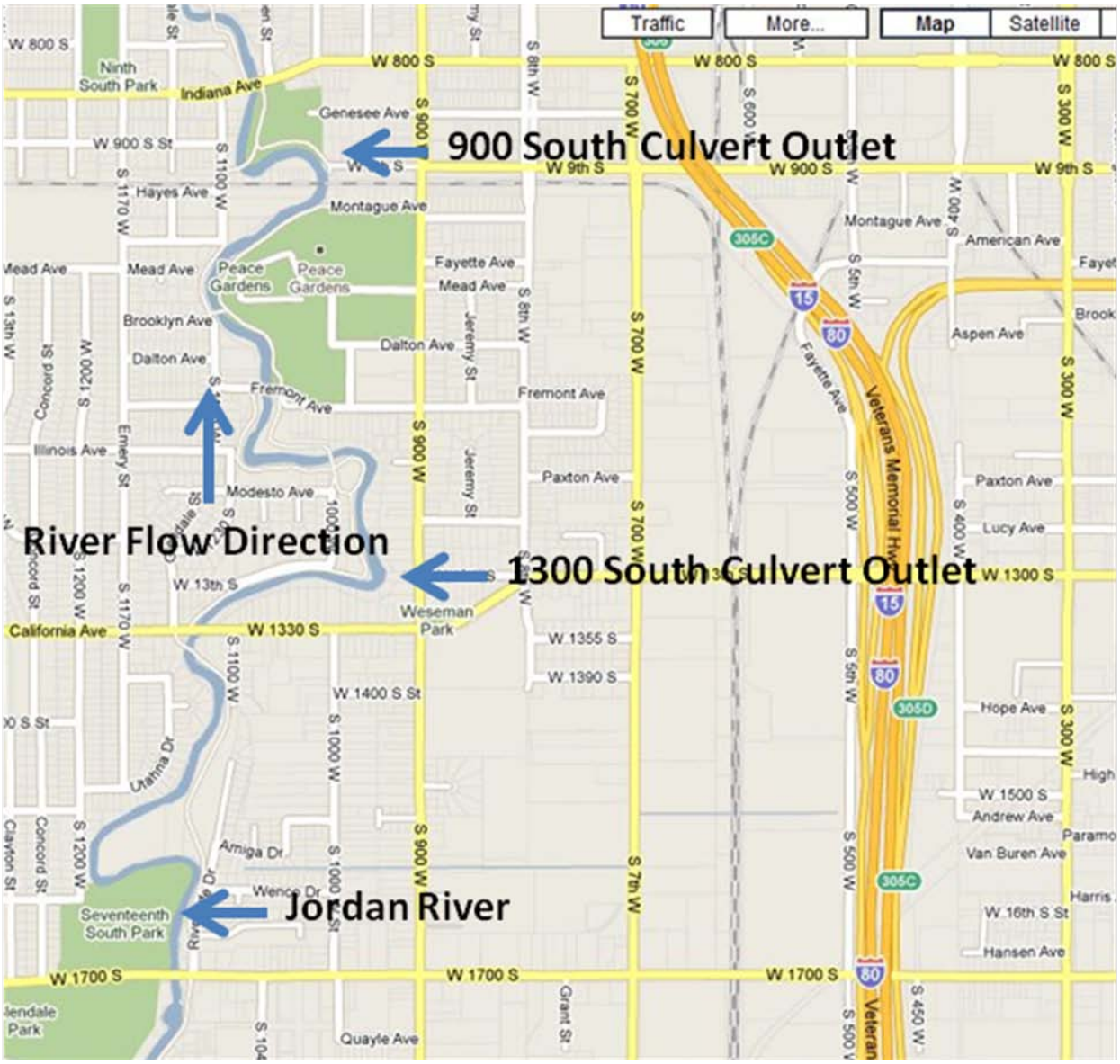


Figure 7. Map of Jordan River Culvert Outlets. Red Butte Creek and Liberty Park have several outfalls into the Jordan River. The Jordan River flows northward into the Great Salt Lake.

3.6.2 Detailed Water Sampling Procedure

Table 4 summarizes the details for conducting water sampling for this plan.

3.6.3 Detailed In-stream Sediment and Bank Soil Sampling Procedures

In-stream sediment samples will be collected in both impacted and unimpacted areas. Bank sediment samples will be collected from impacted areas only. The purpose of sampling in unoiled areas is to determine baseline conditions of oil components. The sampling of impacted areas is intended to determine what portion of the petroleum hydrocarbon mixture present in the sediments is a result of the spill by comparison to baseline conditions. If oil is present in samples, fingerprinting or other techniques may be conducted to determine the source.

Table 4 summarizes the in-stream sediment sampling procedure and Table 5 summarizes the bank soil sampling procedure.

Table 3. Detailed Water Sampling Procedure

Collection Site	In creek or river
Number and volume of sample containers	7- 1 L bottles for hydrocarbon testing 10-1 L bottles for MS/MSD 3 – 40 mL VOA vials with HCL Additional bottles and vials for field duplicates and matrix spike samples based on the total samples collected each day.
Collection method	• Fill 1-liter (or 2.5-liter), amber glass wide-mouth bottle directly from the shoreline by dipping the jar into water about two feet deep. Avoid disturbing bottom material during sample collection. If there is any visible floating oil, collect a sub-surface sample by lowering the jar beneath the surface, removing the lid and allowing the jar to fill completely, and replacing the lid while the jar is still under water. Attempt to keep the bottle at least one-foot beneath the surface while collecting the sample to prevent surface oil from entering the jar. (If oil is seen, sample the oil separately, document the location, notify UC/Chevron Pipeline and provide UC with the sample. UC/Chevron Pipeline will investigate and take appropriate action.) • For river samples, the recommended sampler is the Ben Meadows Sub-Surface Grab Sampler with precleaned 1-liter (or 2.5-liter), amber-glass wide-mouth bottles. • Samplers will note if a slick or sheen is present. Sheens are not anticipated and if encountered, the sampling crew should attempt to identify the source.
Sample processing	• After collecting the 1-liter (or 2.5-liter) sample, gently pour water into VOA bottle to avoid bubble formation. Fill vial until meniscus forms over lip of vial. Cover with screw-cap lid, tighten lid and invert the bottle and tap end to check for air bubbles. If bubbles are present, pour out the sample and resample with a new VOA vial. • After decanting water from bottle for VOA sample, cover with screw-cap lid and tighten.
Sample storage	Immediately after collection, samples should be placed in a cooler and

	stored at 4° C until delivered to the analytical laboratory.
Quality control - trip blank	Before leaving for the field, the field team should prepare one trip blank and one field blank by filling two, 2.5 liter, wide-mouth amber sampling bottles and two 40 mL VOA bottles with distilled water. Trip blanks are to remain sealed and in the ice chest during sample collection. A third, empty bottle to hold the field blank should be taken along as well
Quality control - field blank	The field team will open their water-filled field blank at one sampling site of their choosing while samples are collected at that site exposing the sample to any airborne contaminates that could be present. After all the samples at that site are collected, the field blank jar will be poured into the empty field blank jar and seal the now-filled third jar. The filled jar will be sealed and placed in the ice chest with the rest of the samples.
Quality control - field duplicate and matrix spike samples	A minimum of two additional samples should be collected each day at a single site. One of these will serve as the field duplicate. The other will be used for a matrix spike. Additional samples for field duplicates and matrix spikes should be collected at the rate of one for every twenty (20) field samples.

Table 4. Detailed In-stream Sediment Sampling Procedure

Collection site	Collect from creek or river edge
Number and volume of sample containers	**TPH** – pre-cleaned 500 mL (16-oz) wide-mouth glass jars, screw-cap with PTFE liner. **VOCs** 3 grabs to be composited at the laboratory **SVOCs** – pre-cleaned 500 mL wide-mouth glass jars, screw-cap with PTFE liner. **TOC** – pre-cleaned 250 mL (8-oz) wide-mouth glass jars, screw-cap with PTFE liner. **Grain size** – pre-cleaned 250 mL wide-mouth glass jars, screw-cap with PTFE liner. Additional containers are needed for field duplicates (one for every twenty samples, with minimum of one per day) **Total:** 6 – 4 oz CWM jars plus field duplicate(s)
Collection method	• At each site, select an area of mid-channel with sediments, and avoid gravel or cobble. Collect a composite sample from within a 20-ft stretch of mid-channel stream segment to make sure that sufficient volume has been collected. • Where practical, collect samples in areas with fine-grained sediments and avoid gravel or cobble beaches. If samples must be collected in areas with coarse-grained materials, remove the overlying gravel/cobble layer and sample the underlying finer-grained sediment. • Collect sediment with a pre-cleaned stainless steel spoon, removing only the top 2 cm. Place sediment into a pre-cleaned stainless steel bowl, collecting enough sediment to fill the four containers listed above ¾ full. • Field teams should be prepared to us Best Professional Judgment based on existing site-specific conditions regarding collection of sediment for chemical analysis.
Sample processing	• Form single composite sample by homogenizing samples. Once enough sediment has been collected, mix the subsamples thoroughly until the sediment appears homogeneous. Remove rocks and debris that are not representative of the typical sediment type being sampled. Use the spoon to fill the jars from the composite sample in the bowl. Grab samples for VOC analysis are not composited by the sampling team. The laboratory will composite the samples.
Sample storage	Immediately after collection, samples should be placed in a cooler and stored at 4° C until delivered to the analytical laboratory.
Quality control - field duplicate	Generally, a duplicate sample should be collected for every twenty samples.

Table 5. Detailed Bank Soil Sampling Procedure

Collection site	Collect from river bank at or below bankful height
Number and volume of sample containers	**TPH** – pre-cleaned 500 mL (16-oz) wide-mouth glass jars, screw-cap with PTFE liner. **VOCs** **SVOCs** – pre-cleaned 500 mL wide-mouth glass jars, screw-cap with PTFE liner. **TOC** – pre-cleaned 250 mL (8-oz) wide-mouth glass jars, screw-cap with PTFE liner. **Grain size** – pre-cleaned 250 mL wide-mouth glass jars, screw-cap with PTFE liner. Additional containers are needed for field duplicates (one for at least every twenty samples, with minimum of one per day) **Total:** 4 – 500 mL (16 oz) jars plus field duplicate(s) 4 – 250 mL (8 oz) jars plus field duplicate(s)
Collection method	• At each site, select a depositional area on the bank at or below bankful height with fine sediment present, and avoid gravel, cobble, and abundant vegetation. Collect a composite sample from a pre-defined, representative stream segment to make sure that sufficient volume has been collected for the data quality objectives. • Where practical, collect samples in depositional areas with fine-grained sediments. If samples must be collected in areas with coarse-grained materials, remove the overlying gravel/cobble layer and sample the underlying subsurface layer that may be more finer-grained. • Collect sediment with a pre-cleaned stainless steel spoon, removing the entire surface layer (2 - 4 cm). Place sediment into a pre-cleaned stainless steel bowl, collecting enough sediment to fill the four containers listed above ¾ full (leaving about 2 cm between sample and lid). Where deemed appropriate, instead of using a scoop device, collect sediment with a hand plunge corer and empty core into collection container. • Field teams should be prepared to use Best Professional Judgment based on existing site-specific conditions regarding collection of sediment for chemical analysis.
Sample processing	• Form single composite sample by homogenizing samples. Once enough sediment has been collected, mix the subsamples thoroughly until the sediment appears homogeneous. Remove rocks and debris. Use the spoon to fill the jars from the composite sample in the bowl. Grab samples for VOC analysis are not composited by the sampling team. The laboratory will composite the samples.
Sample storage	Immediately after collection, samples should be placed in a cooler

	and stored at 4° C until delivered to the analytical laboratory.
Quality control - field duplicate	A duplicate sample should be collected for every twenty samples. A lab prepared trip blank and field rinsate equipment blank should accompany each trip.
Decontamination	Field equipment, including stainless steel bowl, spoons, and any other collection & processing equipment shall be decontaminated between each sample site using the decontamination procedure outlined in the attached Bank Sediment Sampling SOP.

4.0 CHEMICAL ANALYSES

The sampling team will select a qualified analytical laboratory for the water and sediment samples.

4.1 Analytical Laboratory

American West Analytical Laboratories (AWAL) (or other laboratory) will supply sample collection kits with appropriate preservatives, sample bottles, sample collection instructions, and chain of custody forms. The analytical laboratory will process samples in accordance with normal holding and turnaround times.

4.2 Analytical methods

Table 6 summarizes the sample matrices expected and required for each. Table 7 lists each analytical test method along with the number of required sample containers and sample volumes.

Table 6. Summary of Analytical Methods

Analyte	Test method	Source Crude Oil*	Water	In-stream Sediment and Bank Soil
TPH	EPA 8015D GC/FID, ext. range		**X**	**X**
VOCs	EPA 8260C GC/MS/ to MDL	**X**	**X**	**X**
SVOCs	EPA 8270D GC/MS/SIM with TICs	**X**	**X**	**X**
TOC	Walkley Black			**X**
Grain size	ASTM D422			**X**
Total Solids	SM 2540B			**X**
Moisture	SM 2540 B			**X**
Distillation	ASTM D2887	**X**		
SARA	ASTM D2007	**X**		
Density	ASTM D4052-09 (alt ASTM D287)	**X**		

*No true source oil. We will use a current oilfield crude oil sample for fingerprinting.

Table 7. Sample Containers and Volumes Required for Each Matrix

Matrix	Method	Sample Volume	Containers per Site
Source crude oil	EPA 8270 mod-GC/MS/SIM	250 mL	1
	EPA 8260 GC/MS/to MDL	40 mL with HCl	3
Water	EPA 8270D GC/MS/SIM	1 L	3 (fill 4 for MS/MSD)
	EPA 8015D GC/FID, ext. range (DRO)	1 L	2 (fill 3 for MS/MSD)
	EPA 8015D GC/FID, ext. range (ORO)	1 L	2 (fill 3 for MS/MSD)
	EPA 8260C GC/MS/SIM	40 mL with HCl	3
Sediment	EPA 8015D GC/FID, ext. range	4 oz CWM jar	1
	EPA 8270D GC/MS/SIM	4 oz CWM jar	1
	Walkley Black	4 oz CWM jar	1
	ASTM D422	4 oz CWM jar	1
	SM 2540B	4 oz CWM jar	1
	ASTM D2216-10	4 oz CWM jar	1

As shown in Table 6, the laboratory will be instructed to perform a library search and report tentatively identified compounds (TICs). The purpose is to identify non-target (not part of the

method) hydrocarbon analytes if present. The requirement that TICs be reported may be dropped with DWQ approval if for instance, hydrocarbon TICs are insignificant and likely to remain insignificant.

4.3 Quality Control Samples

In addition to collection of primary samples for characterizing field conditions (see Section 3.0), there are six types of samples that are considered quality control (QC) samples.

These QC samples are:

- Field replicates are unknown to the laboratory and are independently collected samples at the same station as the primary field sample (i.e., they are two separate composites collected at the same station and at the same time).
- Laboratory duplicate samples to check on the precision of the analyses.
- Matrix spike needed to verify recovery of the chemicals requested for analysis from the particular medium being tested.
- Rinsate from equipment to determine if there is contamination of equipment that might be carried over to another set of samples. Collection of equipment rinsates is discretionary and is only a concern with cross-contamination, which can be avoided by using disposable sampling gear when available, strictly adhering to decontamination procedures described in Section 3.0, and changing gear entirely when moving from a contaminated area to another area.
- "Trip" blanks simply accompany the samples in the cooler and require no handling. They are provided by the laboratory samples when BTEX samples are being collected for the analysis of volatile organic compound (VOC). Trip blanks are unnecessary for other kinds of analyses.
- Field blanks assess whether the opening, filling, and sealing of containers in the field result in contamination at levels relevant to the measurements.

For laboratory QC testing, QC samples are typically collected at five percent of the total number of samples. For example, if 40 sites are to be sampled, extra material is needed from two stations for laboratory duplicate samples and from two other stations for laboratory matrix spike samples. These QC samples are in addition to any field replicate samples.

4.4 Chain-of-Custody

Chain-of-custody (COC) must be maintained at all times. Chain-of-custody means that the sample or data are under the possession and control of the person identified on the form for the period specified on the form. Possession and control can mean literally in possession, within sight, or in secure storage where the access is limited to the person in possession. The person taking possession and the person relinquishing possession need to sign the form when the transition takes place.

Before shipping samples:

- Make sure that each chain-of-custody form is filled out completely and properly,
- Check that the sample identification on sample bottles matches the sample identification on the chain-of-custody, and
- Ensure that the date, time, type, matrix, container types, and analyses requested are clearly indicated.

After the chain-of-custody has been checked and verified, sign where indicated in the "Relinquish By" box at the bottom of the form. The original COC form always goes with the samples. Make sure that the date and time that you relinquished the samples are recorded on the COC form. Put the COC forms in a zip lock bag and place or tape the bag in the ice chest. Remember to put ice in the ice chest and tape the lid shut with duct tape. Ship the samples to the lab via over-night service.

When the ice chest is received at the lab, the person accepting the samples will sign his or her name in the "Received By" box on the bottom of the COC form. Request the laboratory to send a copy of the signed chain-of-custody back to the sender.

5.0 MACRO-INVERTEBRATES

The macro-invertebrate sampling will be done according DWG sampling protocol and under the DWQ safety plan. DWQ will provide documents on sampling protocol and safety plan. This section is a brief overview on macro-invertebrate sampling. The Sampling Team will select sites for macro-invertebrate sampling from Red Butte Creek and nearby background creeks with urban and rural stretches. The intent is to use the same (or close proximity) water and sediment sampling sites as the macro-invertebrate sampling sites so that water, sediment and macro-invertebrate data may be compared. Macro-invertebrate sampling techniques may by necessity cover a larger sampling area than the water and sediment sampling. Macro-invertebrate populations can be highly dependent on the physical size of substrate and stream velocity.

5.1 Sampling Team

The Sampling Team will consist of samplers and observers. DWQ (or a qualified contractor if needed) will collect the samples send the samples to the Utah State University (USU) Bug Lab (or another qualified laboratory if needed) for analyses. When possible the water, sediment and macro-invertebrate samples will be collected during the same sampling event (same day). Observers may include personnel from city, state, and federal agencies, Chevron Pipeline and/or designated contractors.

5.2 Sampling Locations

The proposed sampling locations along with GPS coordinates are listed in Table 8. These locations include Red Butte Creek locations upstream and downstream of the spill site and other nearby creeks in Salt Lake City area as background.

Table 8. Proposed Macro-invertebrate Sampling Locations

No.	SITE NAME	LAT	LONG	STORET
1	Red Butte Creek above Red Butte Amphitheater	40 45 59	111 49 34.6	4992095
2	Red Butte Creek below Chipeta Way Xing (below gardens)	40 45 42.7	111 49 42.9	4992085
3	Red Butte Creek @ 1500 E (Miller Park)	40 44 46.3	111 50 48	4992084
4	Mill Creek above County Gage near Fee Station	40 41 21.5	111 46 57.9	4992635
5	Mill Creek below 2300 E Xing	40 41 44.1	111 49 32.6	4992625
6	City Creek near Entrance Gate to Canyon	40 47 30.7	111 52 40.6	4991930
7	Emigration Creek above 1900 East Xing	40 44 22	111 50 9.7	4992137
8	Emigration Creek (Upper)-Name Not Complete	40 45 5	111 48 3.8	4992147

5.3 Sampling Procedure

The macro-invertebrate sampling will be conducted following the DWQ protocol which is a slight modification of “Environmental Monitoring and Assessment Program-Surface Water: Western Pilot Study Manual Field Operations Manual for Wadeable Streams” (EWWSM) by

USEPA. Sampling is done with a kick net (Figure 8). The DWQ modification involves the number of kicks. Macro-invertebrates kicked up from the sediment are captured in the net, sieved (500 µm) to remove trash, placed in a jar (0.5 to 1.0 L) half full, and then preserved with 95% ethanol to a final concentration of 70%. Following the modified procedure is a good practice, because the DWQ state database on macro-invertebrates was collected by the modified procedure. Using a different procedure would introduce another variable into assessing the recovery of Red Butte Creek.

Figure 8. Example of Kick Net. Macro-invertebrates released into the water column are carried by current through the mouth of the kick net and collected into the detachable bucket or sewed end of the net.

5.3 Data Analysis

The collected and preserved macro-invertebrate samples will be analyzed in a laboratory for counts of population and diversity. DWQ, USU or a contract laboratory will perform the analysis.

6.0 Acronyms

ASTM	American Society for Testing and Materials
AWAL	America West Analytical Laboratories
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CFS	cubic feet per second
COC	Chain of custody
CPL	Chevron Pipe Line
DEQ	Department of Environmental Quality
DWQ	Department of Water Quality
EPA	Environmental Protection Agency
FOSC	Federal On-scene Coordinator
g	grams
GC/MS/SIM	Gas Chromatography/Mass spectroscopy/Selective Ion Monitoring
GC/FID	Gas Chromatography/ Flame Ionization Detector
HAZWOPER	Hazardous Waste Operations (OSHA 33CFR1910.120)
HCl	hydrochloric acid
L	liters
mL	milliliters
PAH	Polycyclic Aromatic Hydrocarbons
PTFE	polytetrafluoroethylene (aka Teflon®)
RBC	Red Butte Creek
SARA	Saturates, aromatics, resins, asphaltenes
SOP	Standard Operating Procedure
START	Superfund Technical Assessment & Response Team
SVOC	Semi-volatile Organic Compound
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USU	Utah State University
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound

Appendix 1 – Contacts and Schedule for Sampling Events

Form 1. Sampling Team Members and Point of Contact list

Organization	Team Member(s)	Point of Contact
USEPA		
USFWS		
Utah DEQ		
Utah DEQ		
Salt Lake City		
(County?)		
Chevron		
Chevron		

Form 2. Detailed contact information for Sampling Team member and Point of Contact

Organization		
	Sampling Team Member	**Point of Contact**
Name		
Title		
Office Phone		
FAX		
Cell Phone		
E-Mail		

Form 3. Sampling Events

Event	Date Collected	Date Shipped	Date Received by Lab
No. 1			
No. 2			
No. 3			
No. 4			

Form 4. Analytical Laboratory contact information

	Primary lab	Alternate lab
Facility name		
Address		
Phone		
Fax		
Business contact		
Technical contact		

Annex H
Long-Term Cleanup Work Plan

Version 4

Chevron Pipe Line Company

Long-Term Cleanup Work Plan

Red Butte Creek Crude-oil Spill
Salt Lake City, Utah

January 2012

TABLE OF CONTENTS

1.0 INTRODUCTION

This Long-Term Cleanup Work Plan (Plan) has been prepared on behalf of Chevron Pipe Line Company (CPL) to address potential impacts associated with the oil release originating at a crude oil pipeline operated by CPL that crosses Red Butte Creek near the mouth of Red Butte Canyon in Salt Lake City. CPL received a Notice of Violation and Compliance Order (NOV/CO) that was issued by the Utah Water Quality Board (Board) on July 13, 2010 for the release.

The purpose of this Plan is to address Section E (Order), Comment 5 of the NOV. Comment 5 of the NOV states the following:

> *Submit to the EXECUTIVE SECRETARY, within 30 days of receipt of this NOV/CO, a long-term cleanup plan for the impacted area that details Chevron's cleanup and remediation of impacted water bodies, including water column, sediment, and hard surfaces, such as rocks, concrete banks, culverts, ditches and ponds. The plan shall also address spill site soils cleanup, groundwater contamination, and remediation of biological impacts to fish, waterfowl, and aquatic food chain organisms.*

A previous version of this Plan was submitted to the Utah Department of Environmental Quality (UDEQ) Division of Water Quality (DWQ) in August 2010. DWQ has also previously provided comments on the Plan. This version of the Plan has been updated to reflect the current status of the project and to address DWQ comments.

1.1 OBJECTIVES

The goal of this Plan is to identify the current cleanup status and detail the long-term cleanup activities that are planned to address any remaining impacted areas. This Plan outlines the areas to be addressed, the cleanup methods and procedures, and the methods to be used to confirm that cleanup has been completed.

1.2 BACKGROUND

On June 12, 2010, a crude-oil leak was discovered on the Salt Lake Crude Pipeline at milepost (MP) 174.5, adjacent to the Red Butte Creek in Salt Lake City, Utah. The pipeline, owned and operated by CPL, supplies crude oil to the Chevron Salt Lake Refinery from oil fields east of Salt Lake City.

Extensive cleanup, testing, sampling, inspection, monitoring, and restoration activities have been conducted to date. These activities have been performed under the oversight of a multiple-agency Unified Command structure which includes representatives from the US Environmental Protection Agency (EPA), UDEQ, Salt Lake City, Salt Lake Valley Health Department, as well as other local, county, state, and federal authorities. It is anticipated that Unified Command will eventually stand down and transfer its responsibilities and regulatory oversight authority to the DWQ which will oversee this long-term cleanup and restoration activities and verify that established cleanup criteria are met.

The response to the spill included the following key tasks:

- Emergency response (ER) and creation of the Unified Command;
- ER approach under Unified Command: Safety, Source Control and then Cleanup;
- Conducting site safety assessment;
- Stopping the oil leak and repairing the pipeline;
- Containing and removing free oil;
- Protecting areas from further degradation with containment barriers (e.g., booms, absorbent pads, and sandbags);
- Responding to impacted parties, including wildlife rescue/treatment and providing a temporary clean water supply for irrigation;
- Cordoning off impacted areas from public access;
- Providing information to the public (town hall presentations, a website, and other public information notifications);
- Assessing impacts to natural and manmade structures, and in some cases, cleaning and restoring impacted features or materials;
- Performing remediation of known soil and sediment impacts; and
- Conducting ongoing monitoring and sampling to evaluate for potential additional impacts.

To date, all known impacts have been addressed with the exception of minor impacts (e.g., stained tree roots and patchy petroleum sheen) in four areas along Red Butte Creek as designated in Figure 1 (see attached) and described below:

- Immediately upstream of the waterfall (near the Red Butte Creek Garden greenhouses): east bank from approximately 50 feet upstream of waterfall to waterfall. Patchy metallic sheen when sediment and vegetation disturbed;

- 50 Feet downstream of culvert (near the University Park Marriot Hotel): northwest bank approximately 50 to 100 feet downstream of culvert. Patchy metallic sheen when sediment and vegetation disturbed;

- Immediately upstream of culvert (near the University Park Marriot Hotel): northwest bank 10 to 30 feet upstream of culvert. Patchy metallic sheen when root mass disturbed ; and

- Approximately 400 feet upstream of waterfall (near Miller Park): East bank approximately 50 foot along a gravel bar. Patchy silver sheen when deeper sediments disturbed.

SCAT teams indicated that further cleaning activities in these areas would likely cause significant ecological damage and recommended that the remaining impacts be left in place to allow natural attenuation to complete the remediation. In response to NOV Comment 4.a.ii, a screening level Ecological Risk Assessment is being prepared to further evaluate these areas.

CPL is committed to addressing any impacts associated with the release. CPL should be contacted immediately if issues are identified by calling 866-752-6340. Members of the public have also been invited to contact appropriate agencies directly in the event that they identify any oil residue (see Section 3.0 of this document).

2.0 SUMMARY OF CLEANUP ACTIONS AND PROPOSED LONG-TERM CLEANUP PLAN

2.1 SOIL

2.1.1 Completed Activities

Some soil within the spill site was impacted during the release. Detailed investigation activities were conducted to evaluate the extent of these impacts and excavation and removal of the impacted soil has been completed. A summary of these activities is provided in the response to NOV Comment 3.c (Annex B). A more detailed technical report describing these actions is being developed and will be submitted to the DWQ upon completion of all final activities.

The concrete lined ditch at Mt. Olivet Cemetery Pond was removed and impacted soil beneath the ditch was removed. Following these activities the excavation was backfilled and a new concrete ditch was constructed in accordance with guidance from the Cemetery Board and the State Historic Preservation Office. At the April 2011 Unified Command meeting, it was agreed that work at Mt. Olivet Cemetery was completed to the satisfaction of the Unified Command. A summary of these activities is provided in the response to NOV Comment 3.c (Annex B). A more detailed technical report describing these actions is being developed and will be submitted to DWQ upon completion of all final activities.

The perimeter curbing at the Liberty Park was removed in the late fall of 2010. Any underlying impacted soil was removed and replaced as needed and a new concrete curb wall and sidewalk was constructed. Following the performance of confirmation sampling, this area was backfilled and a new concrete curb wall was constructed, completing the Liberty Park restoration activities. A summary of these activities is provided in the response to NOV Comment 3.c (Annex B). A more detailed technical report describing these actions is being developed and will be submitted to the DWQ upon completion of all final activities.

Impacted soil identified along Red Butte Creek at 1096 South 1100 East was excavated and disposed of off site. Clean imported fill was placed to the original lines and grades at the property. The noted exception was in an area adjacent to the creek where the owner had constructed a concrete retaining wall. Adjacent to the wall is a wooden utility pole surrounding which visually impacted soil was identified during the SCAT surveys. The impacted soil was excavated to a depth where no visual staining was observed and organic vapors were low. This area was backfilled before

the confirmation sample results were obtained due to safety issues. Analytical results identified Total Petroleum Hydrocarbons at concentrations slightly exceeding action levels within approximately six inches of the utility pole at a depth of four feet. It was determined that further excavation of impacted soil in this area would require removal of the new engineered fill, the utility pole, and the concrete retaining wall. On March 31, 2011, DWQ issued a memorandum wherein they agreed that the most effective alternative was to leave the impacted soil in place and allow the hydrocarbons to degrade naturally. Other Unified Command members concurred with DWQ's conclusion. A more detailed summary of these activities is provided in the response to NOV Comment 3.c (Annex B).

2.1.2 Current and Future Activities

Cleanup of all known impacted soil has been completed and no additional soil cleanup activities are currently planned. Ongoing monitoring and sampling activities will be conducted in accordance with the *Work Plan for Short and Long-Term Monitoring* and the *Water, Sediment and Macro-invertebrate Sampling Plan* (see response to NOV Comment 4.c). Although it is not anticipated that any additional soil impacts will be identified, CPL remains committed to take appropriate actions to address any additional impacts if identified.

In March 2011, CPL agreed with the University of Utah to fund a project that includes site engineering and landscape design services to remediate the west edge of the Red Butte Garden Amphitheatre, Bonneville Shoreline Trail and adjacent areas. These activities have largely been completed.

2.2 SURFACE WATER

2.2.1 Completed Activities

Surface water within Red Butte Creek, Liberty Park Lake, the Jordan River, and Mt. Olivet Cemetery Pond was impacted by the release. The following activities were completed to address impacted surface water from the release:

- A Storm Water Pollution Prevention Plan (SWPPP) was prepared for and has been implemented at the spill site.
- Free oil was removed from Red Butte Creek and Liberty Park Lake using booms, absorbent pads, and vacuum trucks.

- Water samples collected from Red Butte Creek by various agencies after the first several days following the release showed no signs of dissolved phase impacts (samples were non-detect for TPH and BTEX).

- Oil booms were maintained at various strategic locations along Red Butte Creek and the Jordan River until residual oil was removed.

- Inspected Mt. Olivet Cemetery Pond for free oil, oil-impacted vegetation, and soil. Shoreline Cleanup Assessment Technique Team (SCAT) surveys of pond found no visible oily impacts. SCAT is the standard method for conducting surveys of oil-affected shorelines during an oil spill response.

- Maintained booms, and changed out absorbent material as necessary at Mt. Olivet Cemetery Pond.

- SCAT surveys were completed throughout the project. A summary of the SCAT survey activities and associated findings is included as part of CPL's January 11, 2011 response to the Review Comments, Corrected Notice of Violation & Order Docket No. I10-01.

- Water samples (sample IDs RBOPWA01 and RBOPWA02) were collected from Mt. Olivet Cemetery Pond on June 25, 2010 to confirm cleanup is complete. Samples collected by USEPA were reported to be clean. It was determined that the pond was suitable for irrigation use and no further action was recommended and agreed upon at a Unified Command meeting. Laboratory results from this sampling event are available on the DWQ website (http://www.deq.utah.gov/Issues/redbuttespill/index.htm) and the USEPA website.

2.2.2 Current and Future Activities

No remaining surface water impacts associated with the release are known to exist and no additional cleanup activities are currently planned. Ongoing monitoring and sampling activities will be conducted in accordance with the *Work Plan for Short and Long-Term Monitoring* and the *Water, Sediment and Macro-invertebrate Sampling Plan* (see response to NOV Comment 4.c). In addition, a Human Health Risk Assessment and an Ecological Risk Assessment are being prepared under the supervision and direction of DWQ to evaluate residual risk from any potential hydrocarbon-impacted soil, sediment and/or surface water remaining in the Red Butte Creek.

CPL remains committed to take appropriate actions to address additional impacts, if any, that are identified during the ongoing monitoring and sampling activities.

2.3 SEDIMENT

2.3.1 Completed Activities

Sediment within the Red Butte Creek, Liberty Park Lake, and Mt. Olivet Cemetery Pond was impacted by the release. The following cleanup activities have been conducted to address potentially impacted sediment:

- Two high energy flushes of the Red Butte Creek were completed with water from the Red Butte Reservoir on June 19, 2010 and July 15, 2010. This process loosened sediment and flushed oil contaminants downstream for capture into Liberty Lake where it could be recovered.

- Portable pumps were used to manually water wash impacted areas of Red Butte Creek to remove oil from sediment.

- Five sediment samples (sample IDs RBOPSD01 to RBOPSD05) were collected from Mt. Olivet Cemetery Pond by USEPA on June 24, 2010 to confirm cleanup was complete. Supplemental sediment samples were also collected on November 2, 2011. The samples were all reported to be clean (non-detect for TRPH). It was determined that the pond was suitable for irrigation use and no further action was recommended and agreed upon at a Unified Command meeting. Laboratory results from this sampling event are available on the DWQ website (http://www.deq.utah.gov/Issues/redbuttespill/index.htm) and the USEPA website.

- Sediment was excavated and removed from Liberty Park Lake. Several track mounted excavators were used to remove pre-event sediment that had been accumulating in the lake over the previous five to seven years (since Salt Lake County last made an effort to remove the sediment). Approximately 9,500 cubic yards of sediment was removed. Following the removal activities, the lake bottom was re-contoured, new retaining walls were constructed, and the Liberty Park restoration activities were completed. A summary of these activities is provided in the response to NOV Comment 3.c (Annex B). A more detailed technical report describing these actions is being developed and will be submitted to the DWQ upon completion of all final activities.

2.3.2 Current and Future Activities

Any remaining sediment impacts associated with the release will be identified by the ongoing monitoring and sampling activities to be conducted in accordance with the *Work Plan for Short and Long-Term Monitoring* and the *Water, Sediment and Macro-invertebrate Sampling Plan* (see response *to* NOV Comment 4.c) as well as citizen reports/complaints (see section 3.0 for process). Individual sites where sediment cleanup is completed will include verification sampling to demonstrate the cleanup has been successful.

In addition, a Human Health Risk Assessment and an Ecological Risk Assessment are being prepared under the supervision and direction of DWQ to evaluate residual risk from any potentially hydrocarbon-impacted sediment and/or surface water remaining in the Red Butte Creek.

CPL will take appropriate actions to address additional impacts, if any, that are identified during the ongoing monitoring and sampling activities.

2.4 IMPACTED HARD SURFACES

2.4.1 Completed Activities

- Identified impacted hard surfaces (e.g., storm drain culverts, concrete lined structures and ditches, curbing, etc.) along Red Butte Creek have been manually water washed with portable pumps and water.

- Storm drain culverts and other hard surfaces have been cleaned as directed by the Salt Lake City Department of Public Utilities.

- The concrete lined ditch at Mt. Olivet Cemetery Pond was removed to facilitate soil excavation. Following these activities, a new concrete ditch was constructed in accordance with guidance from the Cemetery Board and the State Historic Preservation Office. Two small prominent water features of historic significance were cleaned and the new concrete channel segments were constructed to match these features. At the April 2011 Unified Command meeting, it was agreed that work at Mt. Olivet Cemetery was completed to the satisfaction of that regulatory body. A summary of these activities is provided in the response to NOV Comment 3.c (Annex B). A more detailed technical report describing these actions is being developed and will be submitted to the DWQ upon completion of all final activities.

- The perimeter curbing at the Liberty Park was removed in the late fall of 2010, impacted soil were removed and replaced as needed and a new concrete curb wall and sidewalk was constructed. The Liberty Park executive summary included in the response to NOV Comment 3.c. describes the cleanup activities and current status of work at the park. A summary of these activities is provided in the response to NOV Comment 3.c (Annex B). A more detailed technical report describing these actions is being developed and will be submitted to the DWQ upon completion of all final activities.

- At the LDS Garden Park church, conveyance lines beneath the pond, stained rocks, and concrete were cleaned. A summary of these activities is provided in the response to NOV Comment 3.c (Annex B). A more detailed technical report describing these actions is being developed and will be submitted to the DWQ upon completion of all final activities.

2.4.2 Current and Future Activities

No additional activities are planned in relation to impacted hard surfaces. CPL will work with agency and property owners to address any impacted hard surfaces that may be identified in the future. If determined necessary, future cleanup of storm drain culverts and other hard surfaces will be conducted under the direction of the Salt Lake City Department of Public Utilities.

2.5 GROUNDWATER

2.5.1 Completed Activities

No groundwater impacts have been identified to date that are known to be associated with the release. As described in previous sections of this Plan, corrective measures have been implemented to capture oil as well as remove impacted sediment and soil from all of the impacted areas. No potential ongoing source(s) of groundwater impact associated with the release are known to exist.

A secondary groundwater contamination plume was identified at the Red Butte spill site. As discussed in previous meetings with USEPA and DWQ, the identified plume originates from another source and is not associated with the release. Additional information about the sampling conducted and how it was determined that the plume originates from another source will be presented in the final *Site Remediation & Restoration Report.*

2.5.2 Current and Future Activities

As no impacted groundwater has been identified to be associated with the release, there are no current plans to conduct any groundwater cleanup activities. If groundwater impacts are identified to be associated with the release, CPL will implement responsible and appropriate assessment and cleanup actions.

Confirmation sampling conducted following remediation of the spill site verified that impacted soil had been removed. It is also noted that groundwater was not encountered at depths exceeding 25 feet, well beyond any impacted soil.

Salt Lake City conducts routine groundwater monitoring for potential impacts at wells and springs along the corridor. Based on the corrective measures that have been implemented, knowledge of the low mobility of crude oil, and the type of release that occurred (single pulse release of a buoyant material that was quickly cleaned up), groundwater impacts associated with the release are not anticipated to be present. There are no known pathways for the crude oil to enter the groundwater.

2.6 BIOLOGICAL SPECIES

2.6.1 Completed Cleanup

Wildlife was oiled by the release. Impacts to avian wildlife were tracked by the U.S. Fish and Wildlife Service. A detailed summary of these impacts is provided in the response to NOV Comment 4.a.iii. The number of impacted fish and macro-invertebrates were estimated based on samples taken above the release zone because it was not practical to count or estimate dead fish and macro-invertebrates within the release zone as they had been washed downstream and were no longer present.

The following activities were completed to minimize oiling and to mitigate the impacts of oiled wildlife:

- A *Wildlife Management Plan* was developed to coordinate and manage the care and rehabilitation activities of oiled wildlife.
- U.S. Fish and Wildlife Service and Utah Department of Wildlife Resources (UDWR) provided oversight for the care and rehabilitation for oiled wildlife.
- Responders and the public were advised to contact the UDWR and/or local Animal Control for oiled wildlife rescue and rehab.

2.6.2 Current and Future Activities

CPL anticipates that between the completed remedial efforts and natural processes, that there will be no long-term impacts to the macro-invertebrates of Red Butte Creek. Any impacts are expected to be short-term and temporary, because mountain creeks are naturally restocked with macro-invertebrates from upstream locations by normal water flows. Confirmation of the absence of long-term impacts to macro-invertebrates will be verified through macro-invertebrate sampling to be conducted by DWQ personnel. This sampling will be performed for Red Butte Creek and nearby background creeks in accordance with the *Water, Sediment and Macro-invertebrate Sampling Plan* (see response to NOV Comment 4.c).

Fish restocking activities will be conducted by the UDWR. The number of fish to be restocked to return to baseline conditions was based on estimates upstream of the release area. UDWR will restock 3,000 Bonneville Cutthroat Trout in a three mile stretch of Red Butte Creek in the fall of 2011 and 2012 (the first restocking event was conducted by UDWR on November 22, 2011). Restocking will take place at the following five locations: Red Butte Reservoir Gate, Fort Douglas, Sunnyside Park, Bonneville Glen Park, and the LDS Garden Park church area. Fish count sampling will be conducted in August 2013 in order to verify fish survival. An evaluation will be done in the fall of 2014 and 2015 to determine if spawning has taken place. UDWR will provide an annual summary report of these activities with comparisons of pre and post–spill fish populations.

CPL has established a 24-hour/7 day per week hotline for claims, complaints, reports and questions associated with the Red Butte crude oil spill. The hotline phone number is 866-718-1943.

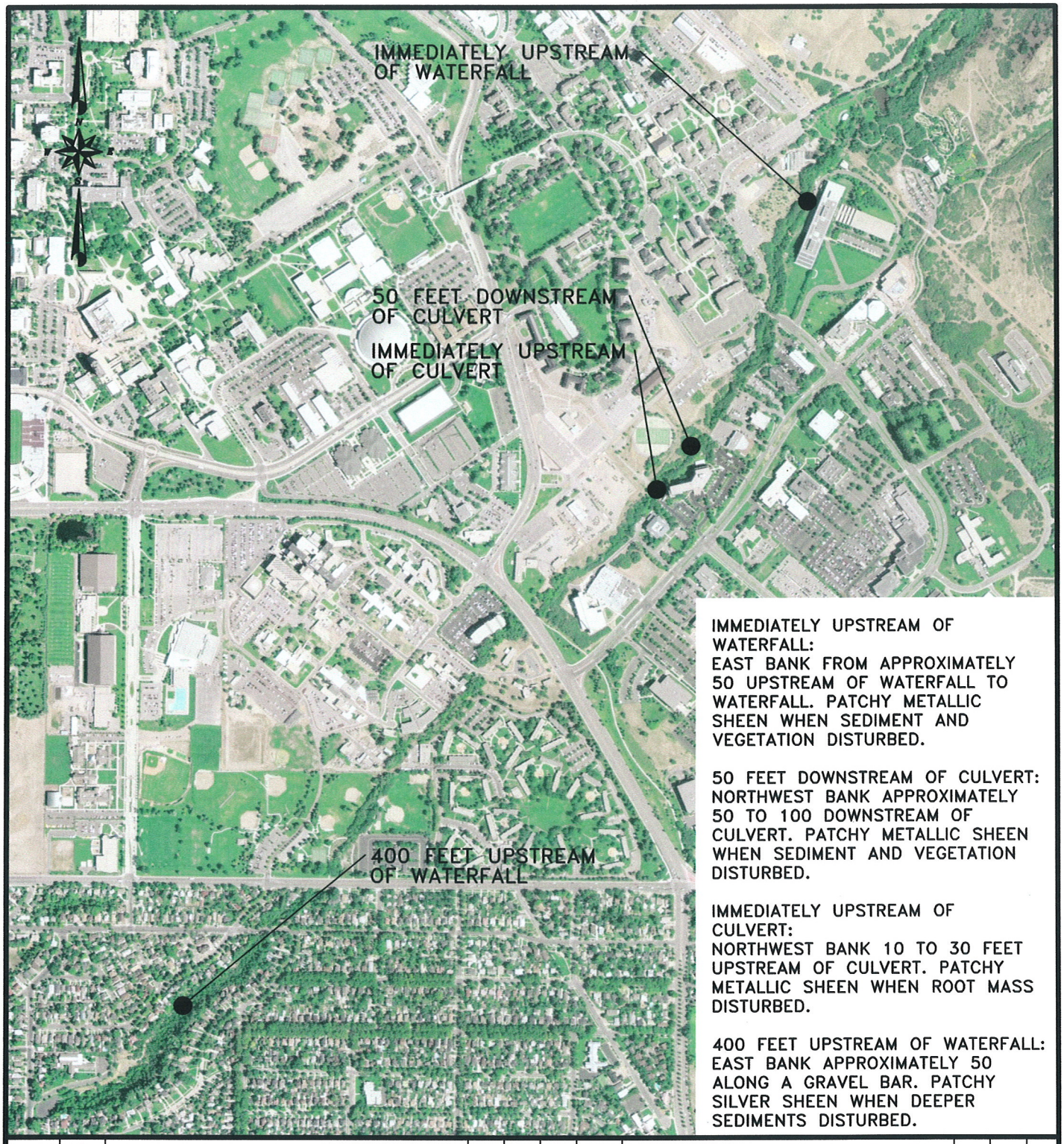
Public input can also be provided directly to the following agencies:

Utah Department of Environmental Quality (UDEQ)
RedButteOilSpill-input@utah.gov

Salt Lake Valley Health Department
801-313-6700

Salt Lake City
801-535-7171 or oil@slcgov.com

A formal process has been developed and approved by Unified Command to document and track information and public input received via the CPL and other hotlines. This process is outlined in Figure 2 and has been reviewed and approved by Unified Command. As indicated in Figure 2, procedures for addressing any identified issues have been established and a tracking spreadsheet has been developed and is available to the public on the DEQ website (http://www.deq.utah.gov/Issues/redbuttespill/).



IMMEDIATELY UPSTREAM OF WATERFALL:
EAST BANK FROM APPROXIMATELY 50 UPSTREAM OF WATERFALL TO WATERFALL. PATCHY METALLIC SHEEN WHEN SEDIMENT AND VEGETATION DISTURBED.

50 FEET DOWNSTREAM OF CULVERT:
NORTHWEST BANK APPROXIMATELY 50 TO 100 DOWNSTREAM OF CULVERT. PATCHY METALLIC SHEEN WHEN SEDIMENT AND VEGETATION DISTURBED.

IMMEDIATELY UPSTREAM OF CULVERT:
NORTHWEST BANK 10 TO 30 FEET UPSTREAM OF CULVERT. PATCHY METALLIC SHEEN WHEN ROOT MASS DISTURBED.

400 FEET UPSTREAM OF WATERFALL:
EAST BANK APPROXIMATELY 50 ALONG A GRAVEL BAR. PATCHY SILVER SHEEN WHEN DEEPER SEDIMENTS DISTURBED.

REV

EarthFax

Chevron Red Butte Creek Pipe Line

DR TAJ CH. GWW
DR APP. GWW
ENGR.
DPR'G. DEPT. APPROVED
ENG'R. DEPT.

AREAS WITH REMAINING HYDROCARBONS DUE TO POSSIBLE ECOLOGICAL DAMAGE FROM FURTHER CLEANING.

SCALE 1" = 1000' DATE 4-27-11

C. C.
S. D.

FIGURE 1

Figure 2 - Oil Hotspot Process

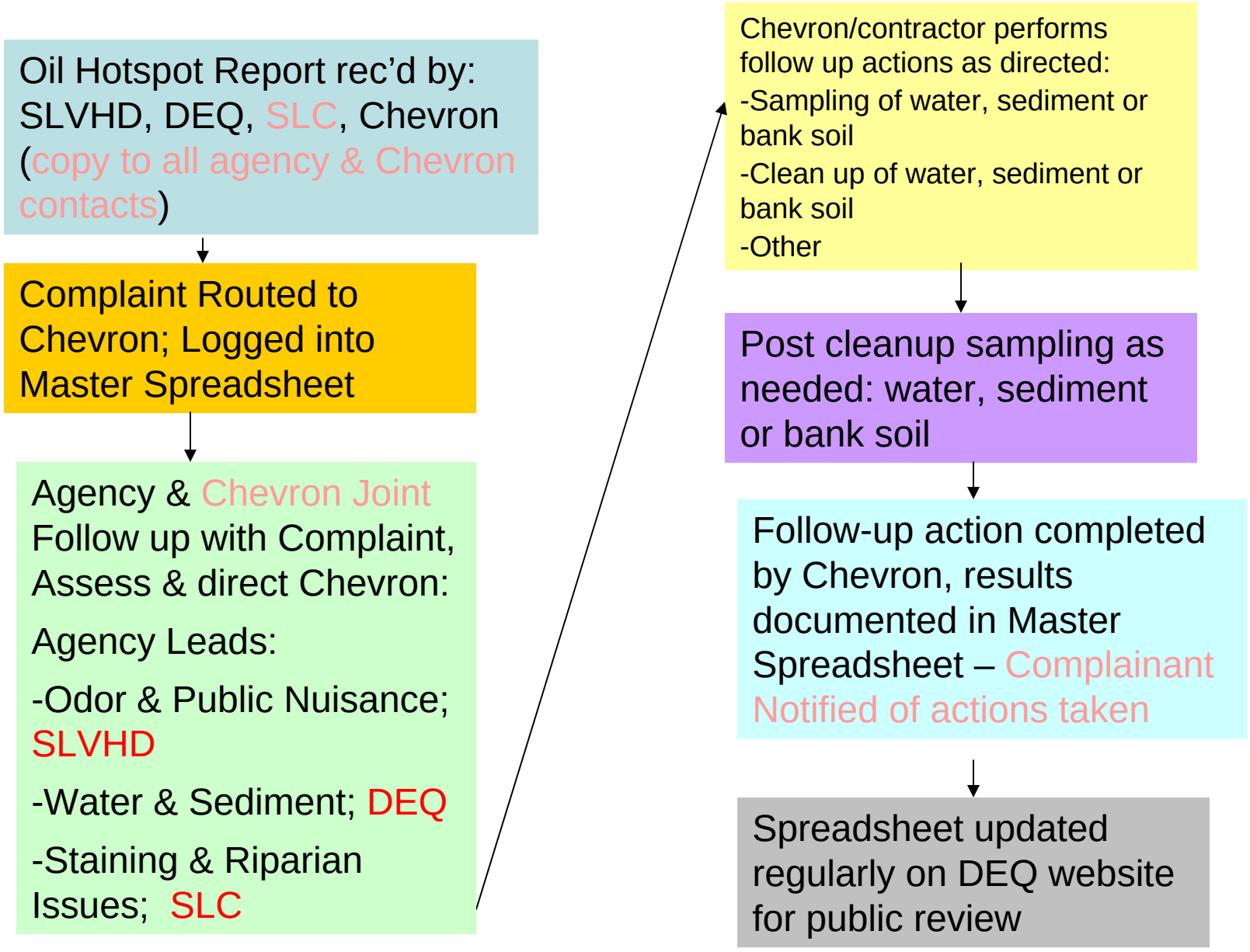


Figure 2 - Oil Hotspot Process (Continued)

Contact List for report/complaint distribution

- Method of initial notification is e-mail as all have smartphone equipment
  - John Whitehead (DWQ) - JWHITEHEAD@utah.gov
  - Amy Dickey (DWQ) - adickey@utah.gov
  - Stewart, Brad (SLC) - Brad.Stewart@slcgov.com
  - Renee Zollinger (SLC) - Renee.Zollinger@slcgov.com
  - Rolf Larson (SLVHD) - relarsen@slco.org
  - Ron Lund (SLVHD) - rlund@slco.org
  - Tommy Shuler (CPL) - TShuler@chevron.com
  - Lloyd Watkins (CPL) - LLMW@chevron.com
  - Melissa Horiuchi (CPL) - Melissahoriuchi@chevron.com

Annex I
Human Health Risk Assessment – Supplemental Sampling Summary

Summary of Supplemental Sampling Activities for HHRA and ERA

Creek	Sediment / Surface Water / Bank Soil Sample Location	Watershed Setting	Quarterly Sampling Locations[1]		Suplemental Sampling Locations	
			Surface Water, Sediment, and Bank Samples	Macro-invertebrate Samples	Surface Water, Sediment, and Bank Samples [2]	Macro-invertebrate Samples [3]
Red Butte Creek	Below 900 East	Urban			✓	
	Below 1100 East	Urban	✓			✓
	Below 1300 East	Urban	✓			✓
	Above 1500 East	Urban	✓	✓		
	At County Stream Gaging Station	Urban			✓	✓
	1731 East 900 South	Urban			✓	
	Above Sunnyside Ave.	Urban	✓			✓
	At Mt. Olivet Diversion	Urban			✓	✓
	Inlet to Mt. Olivet Reservoir (water only)	Urban			✓	
	Above Foothill Drive	Urban	✓			✓
	At University Park Marriott	Urban			✓	
	Below Chipeta Way	Urban	✓	✓		
	At Former Lower Underflow Dam	Natural			✓	
	Above Red Butte Amphitheater	Natural	✓	✓		
	Subtotal Red Butte Locations		*7*	*3*	*7*	*6*
Mill Creek	Below 700 East	Urban			✓	
	Below Highland Drive	Urban			✓	✓
	Below 2300 East	Urban	✓	✓		
	Above County Gage	Natural		✓	✓	
Parleys Creek	Below 1300 East	Urban	✓			
	Below 1700 East	Urban			✓	✓
	Above 2000 East	Urban			✓	
	Above I-215	Urban			✓	✓
Emigration Creek	Above 1300 East	Urban	✓			✓
	Above 1900 East	Urban		✓	✓	
	Above 2100 East	Urban			✓	
	At Donner Hill Marker	Natural		✓	✓	
City Creek	At Lower End of Natural Channel	Urban			✓	✓
	At North Canyon Road Footbridge	Urban			✓	✓
	Below North Canyon Road Loop	Natural			✓	
	Near Canyon Entrance Gate	Natural	✓	✓		
	Subtotal Comparison Creek Locations		*4*	*5*	*12*	*6*
	Total Sampling Locations		**11**	**8**	**19**	**12**

Notes:

[1] Monitoring to be performed quarterly at these locations per the *SLC Red ButteCreek Incident Water, Sediment and Macro-invertebrate Sampling Plan, Draft 15* .

[2] Supplemental surface water, sediment, and bank soil sampling was performed at these locations in August 2011 for the Human Health Risk Assessment.

[3] Suplemental macro-invertebrate sampling was performed at these locations in August 2011 for the Ecological Risk Assessment.

HHRA = Human Health Risk Assessment

ERA = Ecological Risk Assessment