DEVELOPMENT OF APPLICATION MANUALS FOR INTEGRATED EXPLORATION TECHNOLOGIES (IET) FOR NATURAL GAS EXPLORATION

Example Field Studies for Hydrothermal and Fractured Carbonate Reservoirs and Fractured Shale Reservoirs

Contract Agreement 6610

Prepared for

THE NEW YORK STATE
ENERGY RESEARCH AND DEVELOPMENT AUTHORITY

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July, 2002

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Example Field Studies for Hydrothermal Dolomite and Fractured Shale Reservoirs

NOTICE

Abstract and Key Words

Over the last several years, the Trenton-Black River has emerged as a significant reservoir in the Appalachian Basin of New York and West Virginia. Because information on the reservoir has been limited and because of the relative newness of exploration success in this reservoir, the characteristics of this pay and the exploration models have only been indirectly discussed in the literature. As a result, the play has not developed quickly and efficiently.

It has long been suspected that the fractured Devonian shales of the Appalachian Basin could become a viable reservoir. Only limited development of that reservoir has occurred in New York State. Given the age of the play, no new modern exploration or development tools have ever been used to evaluate the reservoirs or to characterize the potential of the pay. A total of 11 wells were drilled in the Genegantslet Field area, our "model" field. Of these, three wells were dry holes with shows of natural gas, four wells were dry holes with no shows, and four wells would be considered productive. Of the productive wells, three were strong producers with established production in excess of 1.7 MMCFPD. These data suggest that the application of modern techniques should be able to enhance development in the Devonian shales.

Direct Geochemical and Pyron Consulting applied its Integrated Exploration Technology (IET) methodology to the development of a model for this pay to provide a set of tools for more efficiently and effectively finding and developing Trenton-Black River fields. The IET methodology involves the application of a variety of geologic, geochemical, and non-seismic geophysical technologies to the evaluation and identification of hydrocarbon producing reservoirs. The ideal exploration and development program integrates both seismic and non-seismic technologies as appropriate to the play and prospect conditions. By appropriate technologies, we mean that individual technologies are applied to answering questions they are best suited to address in such a manner as to fully integrate all sources and types of data into a coherent whole. The emphasis in IET on non-seismic technologies is two-fold:

1) The costs of the technologies are generally a small fraction of that of seismic, even when combined; and
2) The technologies can be readily integrated into a coherent, whole interpretation.

This makes the package very powerful as a complement to the appropriate use of seismic methods. Furthermore, it can dramatically reduce overall costs while enhancing success rates. Thus, IET is readily used by small and medium sized independents who have little staff or technical resources, as well as by majors.

The technologies used in IET vary depending on the type of project, play, amount of existing data, and the budget of the operator. In lightly drilled or frontier areas, IET will involve not only geochemical and some subsurface geology, but remote sensing, fracture trace analysis, gravity, magnetics, and other non-seismic methods, both airborne and ground. An infill-drilling project might focus more on subsurface geology and geochemistry. The operator can design the project to address specific needs and questions.

Most importantly, the tools very effectively identify areas that are gas hydrocarbon prone, and provide additional collaborative data on geology and structure that enable operators to begin development.

The specific tasks in this project were designed ultimately to produce an application manual that can be used as a guideline for operators to use IET technologies (singly or combined). By using the manual, the operator will understand where to apply the methods and how to begin the design of projects using different technologies.

In this case, the two manuals show that surface hydrocarbon geochemical data and paleogeomorphic data strongly correlate with the production (or known location) of both Trenton-Black River (hydrothermal dolomite) gas and Devonian fractured shale gas accumulations. In addition, the remote sensing data correlates well with the Devonian gas accumulation. As a result of the models developed, it is clear how to select and integrate these types of data into an exploration or development program.

Acknowledgements

The investigators would like to thank the following individuals:

- John Martin, NYSERDA
- Rich Nyahay, NY State Geological Survey
- Randy Nemechek, Bill Glenn, and the staff of the NYS DEC, Mineral Resources Division, Avon NY
- Tom Austin, Austin Exploration, Inc. Houston, TX
- Kevin Cruz, Impact Exploration, Norwich, NY
- Staff of the Texas Railroad Commission, Austin TX
- Several anonymous operators and explorationists, for their enlightening discussions on the Trenton-Black River and Devonian shale plays

1.0 Introduction

Over the last several years, the Trenton-Black River has emerged as a significant reservoir in the Appalachian Basin of New York, West Virginia, and parts of Canada. Because information on the reservoir has been limited and because of the relative newness of exploration success in this reservoir, the characteristics of this pay and the exploration models have only been indirectly discussed in the literature. As a result, the play has not developed quickly and efficiently.

It has long been suspected that the fractured Devonian shales of the Appalachian Basin could become a viable reservoir. Only limited development of that reservoir has occurred in New York State. Given the age of the play, no new modern exploration or development tools have ever been used to evaluate the reservoirs or to characterize the potential of the pay. A total of 11 wells were drilled in the Genegantslet Field area, our "model" field. Of these, three wells were dry holes with shows of natural gas, four wells were dry holes with no shows, and four wells would be considered productive. Of the productive wells, three were strong producers with established production in excess of 1.7 MMCFPD. These data suggest that the application of modern techniques should be able to enhance development in the Devonian shales.

Direct Geochemical and Pyron Consulting applied its The Integrated Exploration Technology (IET) methodology to the development of a model for this pay to provide a set of tools for more efficiently and effectively finding and developing Trenton-Black River fields. IET methodology involves the application of a variety of geologic, geochemical, and non-seismic geophysical technologies to the evaluation and identification of hydrocarbon producing reservoirs. The ideal exploration and development program integrates both seismic and non-seismic technologies as appropriate to the play and prospect conditions. By appropriate technologies, we mean that individual technologies are applied to answering questions they are best suited to address in such a manner as to fully integrate all sources and types of data into a coherent whole. The emphasis in IET on non-seismic technologies is two-fold:

1) The costs of the technologies are generally a small fraction of that of seismic, even when combined; and
2) The technologies can be readily integrated into a whole interpretation.

This makes the package very powerful as a complement to the appropriate use of seismic methods. Furthermore, it can dramatically reduce overall costs while enhancing success rates. Thus, IET is readily used by small and medium sized independents who have little staff or technical resources, as well as by majors.

The technologies used in IET vary depending on the type of project, play, amount of existing data, and the budget of the operator. In lightly drilled or frontier areas, IET will involve not only geochemical and some subsurface geology, but remote sensing, fracture trace analysis, gravity, magnetics, and other non-seismic methods, both airborne and ground. An infill-drilling project might focus more on subsurface geology and geochemistry. The operator can design the project to address specific needs and questions.

Most importantly, the tools very effectively identify areas that are gas hydrocarbon prone, and provide additional collaborative data on geology and structure that enable operators to begin development.

2.0 Objectives

The objectives of the project were twofold:

- Demonstrate that the IET method could effectively be used to characterize an existing accumulation of either Trenton-Black River or Devonian Fracture gas, identifying the principal tools that would be useful in each play. This would provide a real "model," which could be used in exploration.
- Prepare a Manual for using the model developed above, with a simplified, generic set of instructions so that most independents (and all majors) would be capable of adapting the principles to normal exploration and development programs.

The primary deliverable was to be a Manual for each play, which are included in this report.

3.0 Data Acquisition and Interpretation

The details of the sampling, analytical and interpretation, as conducted in each model, are provided in the manual. This part of the report contains only general comments to support the specific methods described.

3.1 Field Operations

Field operations included sample grid design, identification of sample medium (soil, whole soil gas, passive soil gas, etc.), model sampling array, and permitting. The decisions are directly related to the specific objectives of the investigation (reconnaissance, detail, in-fill drilling, etc.). The two model studies were finalized and the field operations conducted. The Trenton model at Glodes corner was subject to two rounds of soil sampling and analysis: the first was reconnaissance; the second was detail. In the second round, whole soil gas samples were taken and analyzed for O2 and CO2. The Devonian fracture was conducted in a single reconnaissance round of sampling.

Soil samples were placed into 4 oz. jars, equipped with Teflon lined caps, and sealed with minimum headspace. These were placed in coolers for transport to the lab.

3.2 Laboratory Analysis

As with sampling, numerous choices exist for laboratory analysis, and are the subject of the early stage project design. Among the choices are as follows: Hydrocarbons (light hydrocarbons C1-C6; extended range hydrocarbons C6-C17; and heavy hydrocarbons by UV fluorescence); trace elements; Redox indicators (O2/CO2; ferrous/ferric ratios, etc.). In both the Trenton and Devonian fracture models, soil samples were analyzed for petroleum hydrocarbons in the range of C1-C6, including iso- and normal alkanes, plus ethene and propene. In addition, the whole gas samples taken at Glodes Corner were analyzed for O2 and CO2 in order to characterize oxidation-reduction potential (Redox). The C1-C6 analysis was conducted by GC-FID, with a detection limit of approximately 10 ppbv. The O2/CO2 analysis was conducted in the field using a GEM-500 Gas Meter, with a detection limit of approximately 0.1%.

3.3 Data Interpretation

The data were placed into a spreadsheet for treatment, along with location information. Maps and statistical evaluations were prepared, using both quantitative treatments and "compositional" evaluations. The multivariate statistical methods are detailed in Appendix A and include general examples of compositional models.

3.4 Paleogeomorphic and Remote Sensing Operation

Both the paleogeomorphic and remote sensing mapping operations were conducted in the office after a scheduled data collection trip to the NY DEC office in Avon NY, and after contact with commercial suppliers of remote sensing and aerial photography. For the paleogeomorphic mapping phase, unique, per well, files were established as both hard copy and digital formats once the data were collected. A well analysis sheet was prepared for each well. The sheet included not only information on the well name and location, but also engineering parameters and geologic analysis of formation tops, as based upon the interpretation of the professional. The digital format was scanned and preserved in Adobe PDF format as was stored on CD-ROM disks for ease of use and further investigation. After the data collection was completed, the geologic analyst used the established base map as a basis for subsurface analysis.

A detailed remote sensing study of the area was completed as part of this investigation. For this project, the remote sensing data (a film positive paper reproduction) was obtained from commercial and federal sources. The follwing interpretation process was used on both LANDSAT and aerial photography data. After the boundaries of the study area, well control, and other physical features were defined on an overlay, interpreted observation s of straight line, curved line, and hazy tonal signatures were mapped. Surface water, including rivers and associated tributaries, along with selected cultural features, were included in this interpretation.

After the interpretation was completed, the original interpretation was transferred directly to the established base map (USGS 1° x 2° topographic map) as a basis for analysis. Following transfer, the portion of the map that covers the study area was scanned into a digital format, as was the portion of the remote sensing image that corresponded to the field area. This data was then digitally sized so that it could overly on the geochemical fairway map. The paleogeomorphic and remote sensing interpreted results were overlaid onto the hydrocarbon geochemistry maps for integration.

3.5 Final Product Preparation

The ultimate "product" of the interpretation includes a series of maps showing interpreted geochemical, geological, and geophysical data and overlays, along with a brief narrative describing how to integrate the data into an exploration program.

4.0 Application Manuals

Two application manuals are provided in this report. They are designed for operators and explorationists to apply directly to their exploration and development programs, taking most of the mystery out of applying the IET methods, either singly or in combination.

4.1 Application Manual

Application of IET Methodology
to the Search for Hyrdrothermal/Fractured
Carbonate Reservoirs

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Application of IET Methodology to the Search for Hyrdothermal/Fractured Carbonate Reservoirs

INTRODUCTION

Direct Geochemical and Pyron Consulting are pleased to provide a manual that describes the application of the Integrated Exploration Technology methodology (IET) to the problem of fractured carbonate reservoirs. Our IET methodology involves the application of a variety of geologic, non-seismic geophysics and geochemical methods to the evaluation and identification of hydrocarbon producing reservoirs. IET was developed as a tool for medium and small size independent oil and gas exploration companies who might not have access to well-staffed R&D or exploration departments. Our goal in applying IET to exploration and development projects is to enhance exploration analysis so that investment capital can be used more effectively.

The tools that are used under the IET methodology can vary depending upon the type of project and the budget available for the given project. If exploration was being considered in a lightly drilled area, the IET method will involve not only geochemical and subsurface geological analysis, but would also include remote sensing analysis, fractured trace analysis, and gravity and magnetic studies. If our project involved infill or expansion and developmental extension drilling, then the IET method would involve a different set of investigative tools. The beauty of the IET method is that a client can design his project to address his questions within his budget.

DISCUSSION OF THE GLODES CORNER FIELD MODEL

Direct Geochemical and Pyron Consulting developed the Glodes Corner Field model with the support of the New York State Energy Research and Development Authority (NYSERDA). Our goal was to provide a model of a new natural gas field that is located in dolomite pay of Trenton-Black River (Middle Ordovician) age. Glodes Corner Field is a significant new field in the State in New York. It has produced five (5) billion cubic feet (BCF) of natural gas in less than five years. Initial flows from this zone can often exceed 2 million cubic feet (MMCF) per day per well.

The Glodes Corner Field reservoir has been identified as a highly dolomitized and possibly fractured pay located in the upper Black River interval. The Trenton-Black River reservoir is considered by many geologists to be an example of a hydrothermal dolomite reservoir. In this model, hydrothermal fluids are flushed through a fractured carbonate causing pervasive dolomitization and formation of new reservoir. These reservoirs are often identified by the presence of a collapse pressure at their upper levels. The key to drilling this type of reservoir is to identify where the fractures intersect with entrapped hydrocarbon (in this case, natural gas).

Direct Geochemical and Pyron Consulting are familiar with this type of reservoir and designed an evaluation program that imitated the type of program that an independent company might use. Not only did this model provide confirmation of the hydrocarbon potential but it also provided an indicator of where hydrocarbon might be located within the pre-established field boundaries. Our goal was to complete rigorously sound science and reproduce the decision-making process that independent oil and gas companies might use in deciding whether or where they would drill if this same data set were presented to them.

A type log of the Trenton Black River pay is provided in Figure 1; the productive zone is identified in yellow. Analysis of the type log shows a great deal of porosity in the pay zone; this porosity is associated with a slight washout in the caliper log. Both of these features suggest that fractures in this interval may have acted as conduits for the dolomitizing fluids; this implies that the reservoir formed simultaneously or slightly after dolomitization.

Figure 2 shows the distribution of sample results from the geochemical soil survey. This data is also quantified in the attached tables in Appendix A. In order to expedite the integration of this data, we have developed a dot rating system. In this dot system, red and orange dots are indicators of the highest concentrations of our geochemical indicator while blue and green dots are lower concentrations. Based upon the distribution of these colored dots relative to our sampling grid, a contour map is prepared. The contour map (Figure 2) reveals a "fairway", or zone in which there is the highest potential for hydrocarbons in the subsurface, as based upon the geochemical data.

Because Glodes Corner Field study involves a developmental geology problem, the application of soil geochemistry and our subsurface of mapping technique were sufficient to allow the modeling of the field. Prior to our fieldwork, industry sources indicated that hydrocarbons were exclusively located along a central "graben" feature, which in reality is a collapse feature associated with the dolomitization. The location of wells and their associated data sets provided suitable information to allow very detailed subsurface mapping to be completed. A map interval was chosen for modeling the field's geology. Upon application and contouring, the map interval provided a highly accurate model of production for the field. Figure 2 was integrated with the subsurface map to provide an integrated model for the Glodes Corner Field (Figure 3).

Detailed analysis of this figure shows a direct correlation between the areas of high geochemical potential, thinning of the mapped interval, and the production history of the field. The model can be used to direct developmental drilling and exploration for new analog fields in this basin and in areas with similar potential and similar reservoir types in other basins

DETAILED DISCUSSION OF THE METHODOLOGY

The goal of a geologic study is to collect data that is both accurate and precise. This adds to the applicability and it reproducibility of the data sets. Therefore, Direct Geochemical and Pyron Consulting have as our fundamental operational methodology the use of the scientifically valid methods to direct data collection in an efficient and professional manner. The following discussion provides information on how Direct Geochemical and Pyron Consulting complete their field and office studies to develop models similar to that shown in the Glodes Corner Field example.

Geochemical Data Collection

When completing a field study of this type, we are reliant on the existence of an accurate base map. Without a base map, it is difficult (but not impossible) to develop a strategic sample grid. In any geochemical study, the sample grid is integral in determining the spread of samples, the number of samples necessary to adequately model a field, and the estimated duration of the sampling event. For this project, we used 7.5 minute USGS topographic maps in combination with other public data provided to us by the New York State DEC, Division of Mineral Resources, Oil and Gas permitting group based in Avon, New York. On our base map, we identified the pre-existing well locations, public access road systems, any public utilities, and other features which might help us identify the best locations to collect soil gas samples. We then establish a theoretical sampling grid for this field area. The purpose of our sampling grid is to provide us with a gross estimate of the number of samples needed to adequately complete the study. It also allows us to estimate the number of the field days needed to complete the field activity and to mobilize field materials, like sample bottles, that might be needed during field operations.

On this project, we had limited access (only public right of way areas). In a typical industry project, we would request access to private (i.e., leased) property, but this was beyond the scope of our Glodes Corner Field project. We established sample points that were roughly 0.25 mi. apart; our sampling grid extended at least 1.0 mi. to the north and 1.0 mi. to the south of the identified graben feature. Our sample grid therefore includes both north-south and east-west locations and transverses the entire length of the Glodes Corner Field. In addition, we also collected multiple samples at each individual wellhead. These samples were important to provide a control of the data generated by sampling.

It was understood that field adjustment of the sample locations might be necessary to ensure that representative samples were collected and that our field personnel remained safe. The following field procedure was used at each location:

- Upon arrival, the sample team would identify the best sample location and would enter the sample number and the GPS location on our field tally sheet; also recorded were any observable soil changes or other geologic or geographic information that might prove critical to the analysis of the data.
- After the location was established a sampler would take approximately 250 mg of sample from approximately six to 8 in. beneath the surface. Care was taken to remove organic materials like root structures, insects or worms, or other materials that might contaminate the sample.
- After the sample was collected, the sample jar was closed, the sample number and other identifying information were completed on a label and the sample was stored in a cooler for preservation during the field activities and for shipment back to our laboratory.

A copy of the field tally sheet is provided in Appendix B.

At the laboratory. A chain of custody procedure was followed as the samples were logged in and pre-prepared for treatment and testing. After the samples were properly logged in, a laboratory technician would select aliquots of the soil sample for analysis by mass spectrometry or other method. Duplicates samples were included for quality control analysis at roughly one every 10 field samples.

After the samples were run and the data collected, laboratory quality-control procedures were followed by a senior professional. Quality checked data were transferred to the data analysis team for plotting on the base map. Using proprietary method exclusive to Direct Geochemical, the data was analyzed and interpreted. The final result of the interpretation process is a series of maps, the best of which is chosen as the most representative model of the study area. The result of our analysis is a figure, i.e., like Figure 2.

Geological Data Collection

Simultaneously with the field investigation, a geologist is tasked with the collection and analysis of subsurface information. For this particular project, the subsurface information was obtained after a scheduled data collection trip to the DEC office in Avon, New York. There are multiple ways in which data can be collected; however, Direct Geochemical and Pyron Consulting have always attempted to obtain the most original data, and that often involves going to a state or federal permitting agency and collecting their data. Once the data was collected, unique per well files were established as both hard copy and digital formats. The digital format data was scanned and preserved in Adobe PDF™ format and was stored on CD-ROM discs for ease of use and further investigation.

For each well, a well analysis sheet was prepared. Then she included not only information on the wall name and location and also engineering parameters and see logic analysis of formation tops as based upon the interpretation of our professional. Each of these data sheets was prepared and a digital format and included with the individual well data set.

After the data collection was completed, the geologic analyst used the established base map as a basis for subsurface analysis. In this particular project, we used a method of subsurface mapping known as paleogeomorphic mapping. We identified a map interval that has proven to be typical of production from of the investigated reservoir. Using this map interval and the existing well data set, we were able to prepare a paleogeomorphic subsurface map, contour that mapped interval, and overlay it over the geochemical fairway map.

If the project were an exploration project in a lightly explored area, we would also integrate other data, including gravity and magnetic analysis, lineament and fracture trace studies, tonal anomaly analysis studies, and similar data. All this data would be scaled to the project base map, and integrated with the subsurface mapping and geochemical data to provide a complete analysis of the potential of the area.

CONCLUSION

The IET method provides a thorough analysis of the hydrocarbon potential of both developmental and exploration areas. The goal of this approach is to minimize the risk that investors realize by layering data sets until sufficient information is collected to allow thorough analysis of the project. This approach promotes the risk ranking of projects and more importantly reduces the risk associated with exploration. Our goal is to provide a service to our clients in which they can maximize the available risk capital and in the minimize the risk inherent in the exploration/development process.

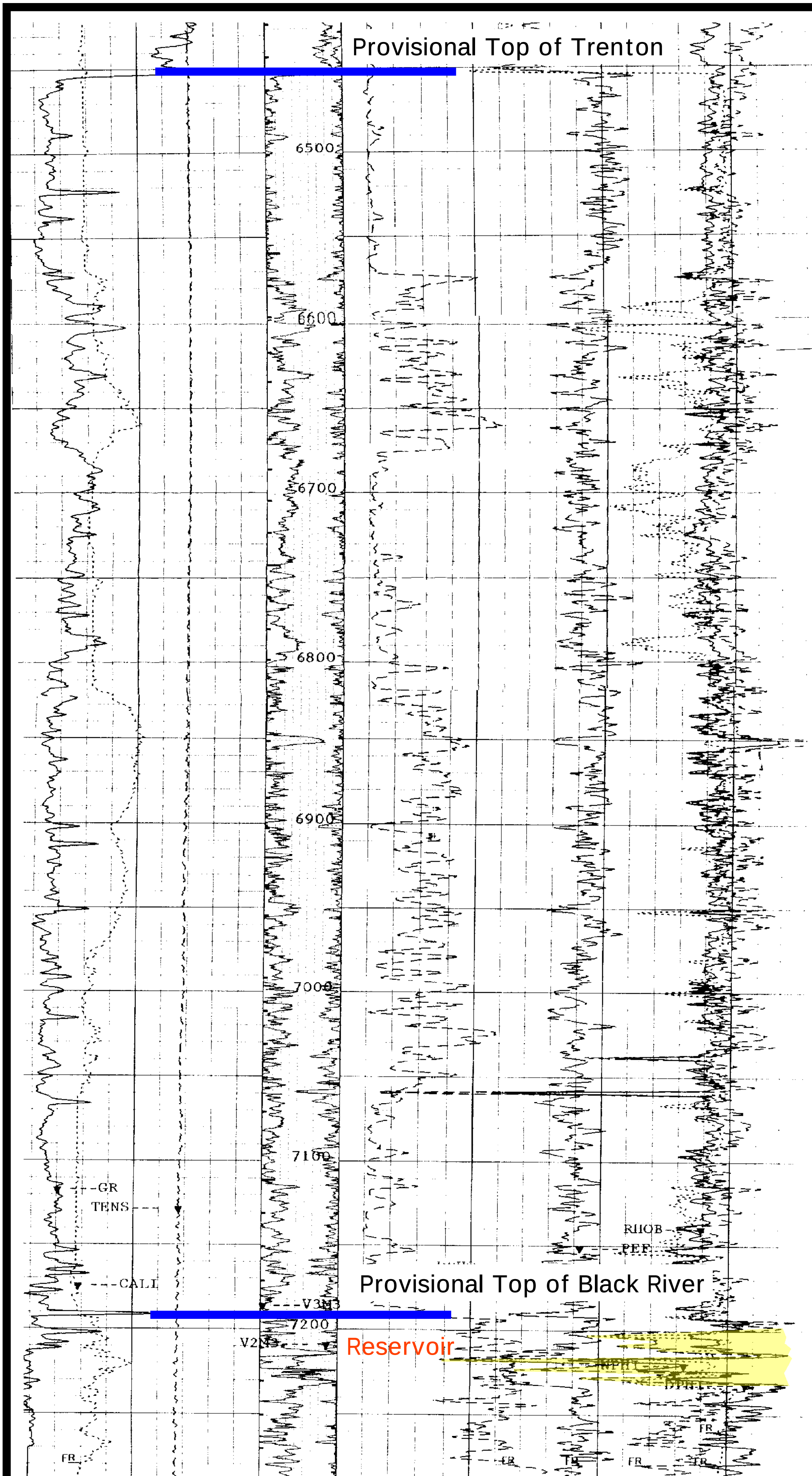

Figure 1.

Type Log
Trenton Black River Pay
Glodes Corner Field
Steuben County, NY

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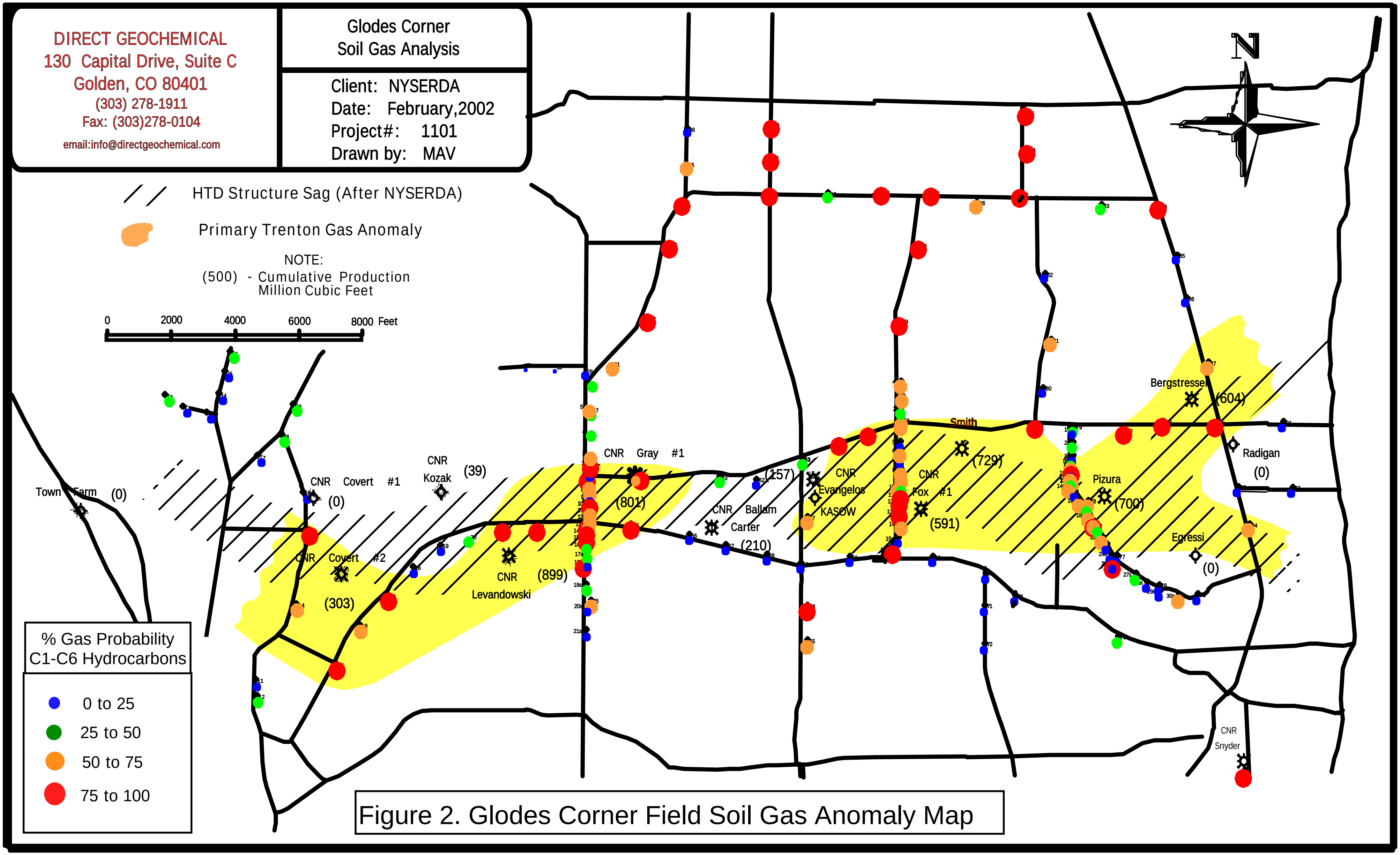

Figure 3.0 - Map showing the Results of Soil Gas Study in Glodes Corner Field Area, Steuben County, NY

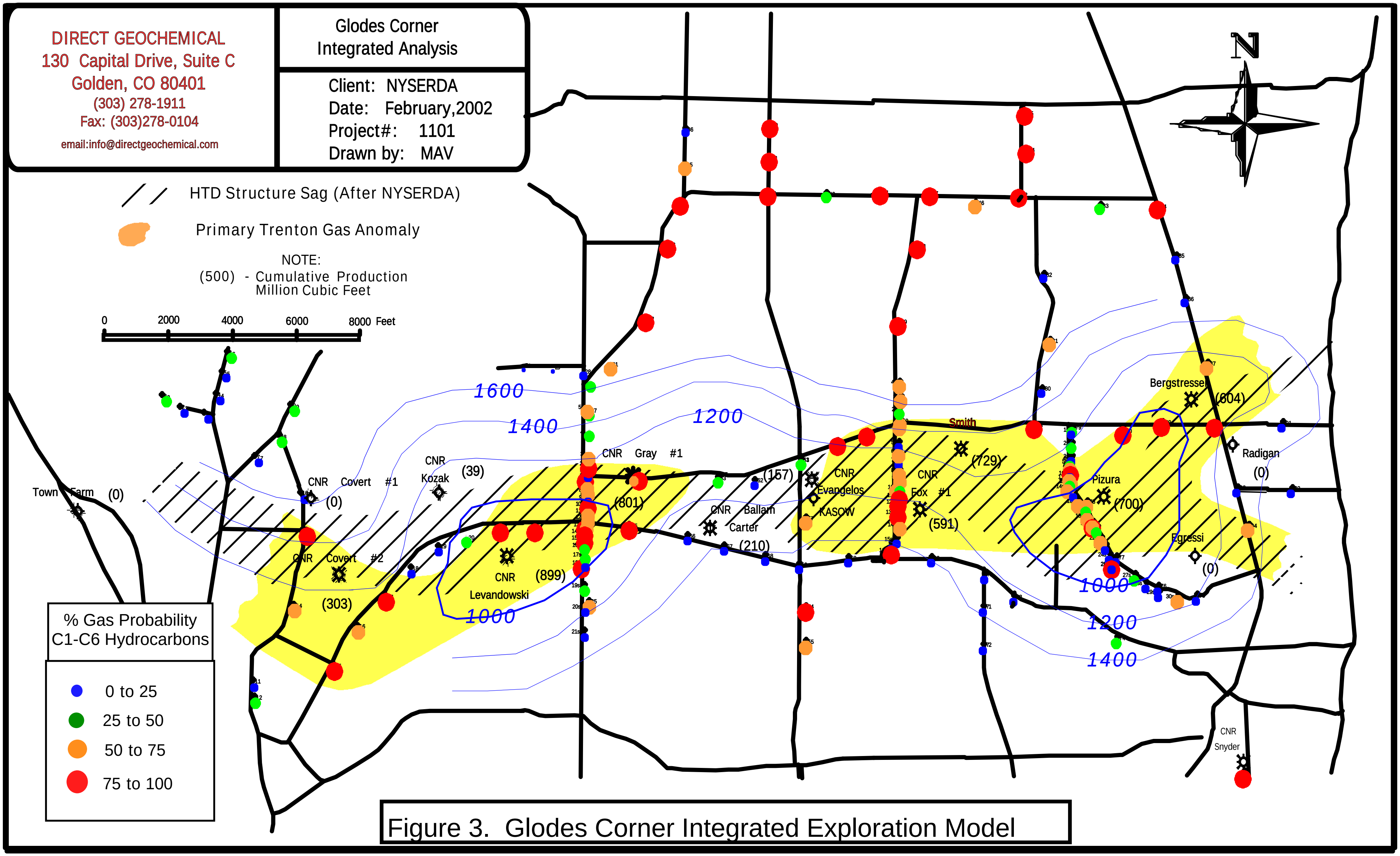

Figure 3. Glodes Corner Integrated Exploration Model

Figure 4.0 - Integrated Model of Glodes Corner Field, Steuben County, NY

4.2 Application Manual

Application of IET Methodology
to the Search for
Fractured Organic Shale Reservoirs

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Application of IET Methodology to the Search for Fractured Organic Shale Reservoirs

INTRODUCTION

This manual, prepared by Direct Geochemical and Pyron Consulting, describes the application of the Integrated Exploration Technology methodology (IET) to the problem of fractured carbonate reservoirs. The IET methodology involves the application of a variety of geologic, non-seismic geophysics and geochemical methods to the evaluation and identification of hydrocarbon producing reservoirs. IET was developed as a tool for medium and small size independent oil and gas exploration companies who might not have access to well-staffed R&D or exploration departments. The goal in applying IET to exploration and development projects is to enhance exploration analysis so that investment capital will be used more effectively.

The tools that are used under the IET methodology can vary depending upon the type of project and the budget available for the given project. If exploration was being considered in a lightly drilled area, the IET method will involve not only geochemical and subsurface geological analysis, but would also include remote sensing analysis, fractured trace analysis, and gravity and magnetic studies. If the project involved infill or expansion and developmental extension drilling, then the IET method would involve a different set of investigative tools. The beauty of the IET method is that a client can design his project to address his questions within his budget.

The manual is set up to illustrate, with a actual Case History, how the various methods are chosen, how a project is designed and carried out, and how data can be used in decision-making. The Manual will allow an independent operator or a project manager with a major company to understand which technical factors are of importance and how to select and guide contractors through the process. It also provides a basis for working with contractors to most effectively **integrate** IET data into your own database. In the case of fractured organic shale reservoirs, the Geneganslet field was chosen as a type-Case History. The process is to develop a “model” or “analog” so that the key indicators and design criteria can be observed as if it were a real exploration program.

Discussion of the Geneganslet Field Model

The Geneganslet Field model was developed with the support of the New York State Energy Research and Development Authority (NYSERDA). The goal was to provide a model of a natural gas field that is located in organic shale pay of Marcellus (Middle Devonian) age. The Geneganslet Field is representative of shale gas fields in the State in New York. Since the inception of oil and gas exploration in New York, geologists have long speculated on the potential of the fractured Upper and Middle Devonian shale and siltstone of the Appalachian Basin. Most of the fields that were discovered were identified prior to 1930; therefore, electric log records, as well as production histories, have not been preserved. Lost data and the complexity of fractured reservoirs have limited the development of successful reservoirs in this pay, although numerous shows of oil and natural gas have been reported.

The Genegantslet Field of Smithville and Green Townships, Chenango County, NY is the one fractured shale field in which subsurface data was available. This study integrated subsurface mapping techniques, petrophysical analysis, remote-sensing analysis, fracture trace analysis, production history, and surface soil geochemistry to analyze the field. The study developed a model that can be used by the industry to explore for and develop reservoirs of this type in the Appalachian Basin.

Previously established models for the Genegantslet Field suggested that successful wells were drilled along pre-existing fractures. The apparent random drilling pattern identified three wells with significant shows of natural gas (i.e., between 1.9-2.2 MMCFPD). There is no evidence to suggest that these wells were flow tested or produced. A detailed study of the Genegantslet Field was initiated in June 2001 in order to develop an IET model. The objective was to apply the methodology to a known field in the anticipation that it would provide a consistent model that could guide exploration and lead to additional fractured shale and siltstone reservoir fields.

The Geneganslet Field reservoir has been described as fractured Marcellus Shale member of the Hamilton Group. The Hamilton Group is a part of a massive deltaic complex known as Catskill Delta. The Catskill Delta was a prograding buildup of mostly clastic sedimentary rocks that extended seaward from the Adirondak positive area. Most of these clastics are highly organic shales and have numerous shows of natural gas and oil. The key to drilling this type of reservoir is to identify where the fractures intersect with entrapped hydrocarbon (in this case, natural gas).

Due to familiarity and experience with this type of reservoir, an evaluation program was defined that imitated the type of program that an independent company might use. Not only did this model provide confirmation of the hydrocarbon potential but it also provided an indicator of where hydrocarbons might be located within the pre-established field boundaries. The goal was to complete rigorously sound science and reproduce the decision-making process that independent oil and gas companies might use in deciding whether or where they would drill if this same data set were presented to them.

Unfortunately, there were no electric well logs for the productive wells. A paleogeomorphic map (Figure 1) was generated from subsurface data. The sampling grid was prepared by studying completion reports and sample logs prepared from driller's reports, and available access.

Figure 2 displays the results of the multivariate analysis of the soil gas data. In order to expedite the integration of this data, a “bubble” or “dot” rating system was employed. In this dot system, red and orange dots are indicators of the samples that best correlate with the positive (productive) model, while blue and green dots correlate with the negative (non-productive) model. The orange and red dots, therefore, represent the areas most anomalous for gas emplacement. Based upon the distribution of these colored dots relative to the sampling grid, a contour map is prepared highlighting areas that better match the productive model. The contour map (Figure 2) reveals a "fairway", or zone in which there is the highest potential for hydrocarbons in the subsurface, as based upon the geochemical data.

Because Geneganslet Field study involves a more complex developmental geology problem, the application of soil geochemistry and our subsurface of mapping technique were supplemented by a remote sensing lineament study and an aerial photography fracture trace study. Prior to fieldwork, industry sources predicted that hydrocarbons would be associated with fractures in the pay zone. A map interval was chosen for modeling the field's geology, as based upon completion reports and sample logs, as well as regional mapping in nearby areas. The thinning represented in the paleogeomophology and well locations are shown in Figure 1. Application of the multivariate statistics (Figure 2) resulted in a highly accurate model of production for the field. Figures 1 & 2 were integrated with other data including the air photo interpretation to provide an integrated model (Figure 3) for the Geneganslet Field.

Detailed analysis of the integrated model (Figure 3) shows a direct correlation between the areas of high geochemical potential, thinning of the mapped interval, observed fractures, and the minimal production history of the field. The model can be used to direct developmental drilling and exploration for new analog fields in this basin and in areas with similar potential and similar reservoir types in other basins

Detailed Discussion of the Methodology

The goal of a geologic study is to collect data that is both accurate and precise. This adds to the applicability and it reproducibility of the data sets. The fundamental operational methodology uses scientifically valid methods to direct data collection in an efficient and professional manner. The following discussion provides information on how to complete field and lab/office studies to develop models similar to that shown in the Geneganslet Field example.

Geochemical Data Collection

In any geochemical study, the sample grid is integral in determining the geometry and spacing of samples, the number of samples necessary to adequately model a field, and the estimated duration of the sampling event. This project used 7.5 minute USGS topographic maps in combination with other public data provided to us by the New York State DEC, Division of Mineral Resources, Oil and Gas permitting group based in Avon, New York. On the base map, the pre-existing well locations were identified, along with public access road systems, any public utilities, and other features, which might help identify the best locations to collect soil gas samples. A theoretical sampling grid was then established for the field area.

The grid design involves both spacing and geometry. Both are dependent on three major factors, all of which need identification in advance:

- Access, including roads, trails, utilities, lease and land ownership, etc.
- Size and shape of targeted reservoirs
- Variability in producibility of targeted reservoirs
- Objective of the investigation

Regardless of what is known about a reservoir, access limits where and how sampling can be done. If access is no particular issue, then the spacing and grid shape will depend on the next three issues. The size, shape, and variability of the targeted reservoir are, of course, variable. It is essential to identify some boundaries, based on the economics of the basin, in order to start the grid planning process. The objective is critical because spacing and detail are different between a reconnaissance survey and one designed to aid development or in-fill drilling.

It is important to generate multi-point anomalies, whether in reconnaissance to locate prospective areas for more detail or associated with development drilling to identify porosity/permeability zones. Ideally, one has available a nearby analog field that one can use to develop a multi-component model to use for further exploration. This is particularly important in reconnaissance investigations; in-fill drilling usually can rely on data developed from the field being developed.

The purpose of the sampling plan is to provide a gross estimate of the number of samples needed to adequately complete the study. It also allows estimation of the number of the field days needed to complete the field activity and to mobilize field materials, like sample bottles, that might be needed during field operations.

On this Geneganslet model project, only limited access (public right of way areas) was available. In a typical industry project, mapping would occur extensively on leased land, but this was beyond the scope of the Geneganslet Field project. The reconnaissance sample points were roughly 0.25 mi. apart. This is sufficient to “locate” a Geneganslet size and type field, but not map it in any detail. No detailed sampling occurred, but detailed sampling points would have to be 250-500 feet apart to generate sufficient density to observe fracture bundles and related hydrocarbon accumulation. There is sufficient variability in such fractured reservoirs to warrant such detail. Under commercial project conditions, additional lines or a semi-grid system would have been employed. The sampling grid extended at least 1.0 mi. outside of the identified drilled feature. It is vital to get out into known background. In addition, multiple samples were also collected near a series of individual wellheads, both productive and dry. These samples were important to provide a control of the chemical data generated by sampling.

It is also understood that field adjustment of the sample locations might be necessary to ensure that representative samples were collected and that field personnel remained safe. The following field procedure was used at each location:

- Upon arrival, the sample team would identify the best sample location and would enter the sample number and the GPS location on the field tally sheet; also recorded were any observable soil changes or other geologic or geographic information that might prove critical to the analysis of the data.
- After the location was established a sampler would take approximately 250 mg (4 ounces)of sample from approximately six to 8 in. beneath the surface. Care was taken to remove organic materials like root structures, insects or worms, or other materials that might contaminate the sample.
- After the sample was collected, the sample jar was closed, the sample number and other identifying information were completed on a label and the sample was stored in a cooler for preservation during the field activities and for shipment back to the laboratory.

A copy of the field tally sheet is provided in Appendix B.

At the laboratory, a chain of custody procedure was followed as the samples were logged in and pre-prepared for treatment and testing. After the samples were properly logged in, a laboratory technician would select aliquots of the soil sample for analysis by gas chromatography, mass spectrometry, or other method. Duplicates samples were included for quality control analysis at roughly one every 10 field samples.

After the samples were run and the data collected, laboratory quality-control was checked prior to data processing. Quality checked data were transferred to the data analysis team for plotting on the base map. Using a combination of quantitative and compositional technologies proprietary to Direct Geochemical, the data was analyzed and interpreted. The final result of the interpretation process is a series of maps, the best of which is chosen as the most representative model of the study area. The result of the analysis is a figure (i.e., like Figure 2.0).

Geological Data Collection

Simultaneously with the field investigation, a geologist is tasked with the collection and analysis of subsurface information. For this particular project, the subsurface information was obtained after a scheduled data collection trip to the DEC office in Albany, New York. There are multiple ways in which data can be collected; however, Direct Geochemical and Pyron Consulting have always attempted to obtain the most original data, and that often involves going to a state or federal permitting agency and collecting their data. Once the data was collected, unique per well files were established as both hard copy and digital formats. The digital format data was scanned and preserved in Adobe .pdf ™ format and was stored on CD-ROM discs for ease of use and further investigation.

For each well, a well analysis sheet was prepared. This included not only information on the wall name and location, but also engineering parameters, and incorporated logic analysis of formation tops as based upon the interpretation of our professional. Each of these data sheets was prepared and a digital format and included with the individual well data set.

After the data collection was completed, the geologic analyst used the established base map as a basis for subsurface analysis. This particular project used a method of subsurface mapping known as paleogeomorphic mapping. This first identified a map interval that has proven to be typical of production from of the investigated reservoir. A paleogeomorphic subsurface map was prepared using this map interval and the existing well data set, which was then contoured and overlaid on the geochemical fairway map

Remote Sensing/ Fracture Trace Analysis Data Collection

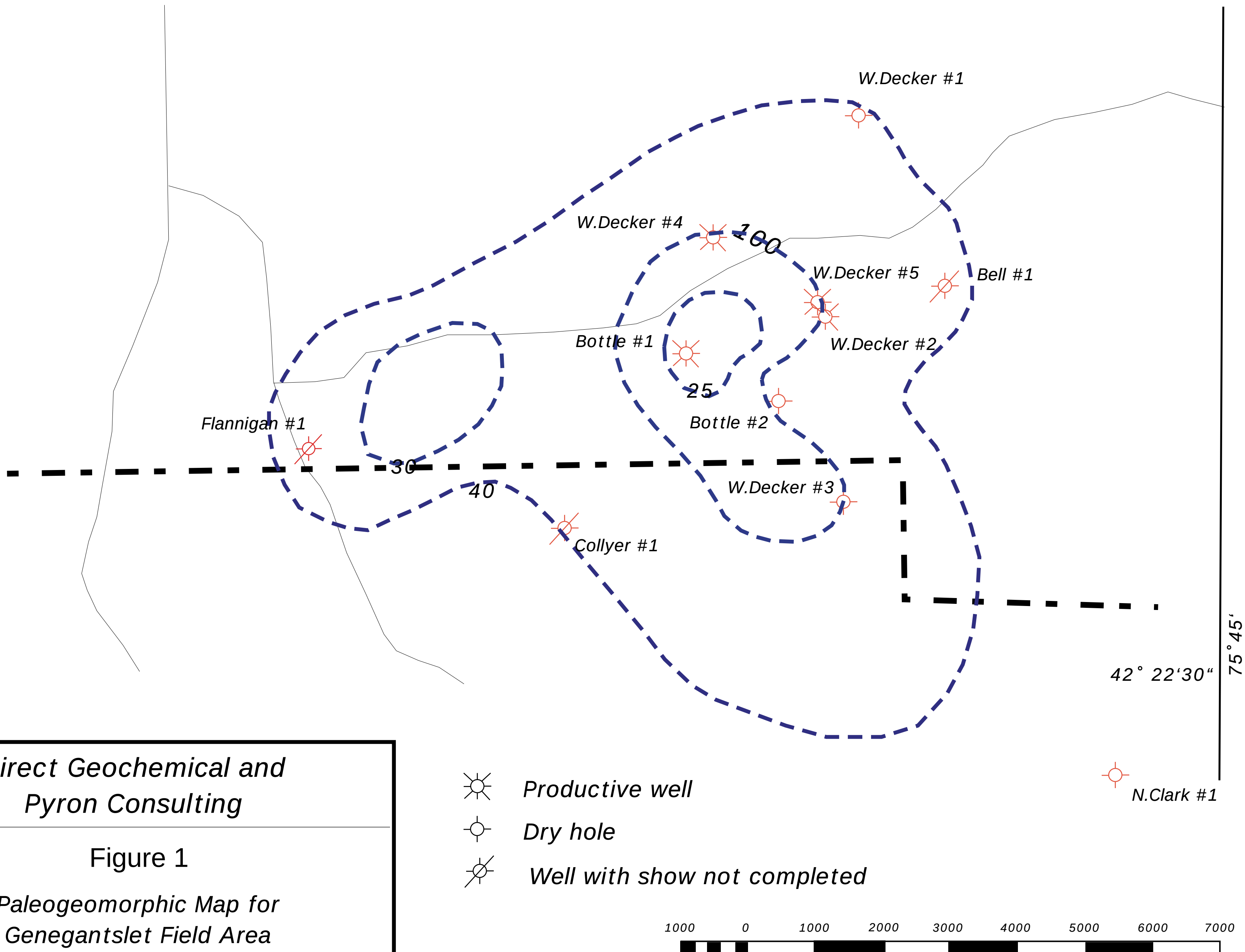
A detailed remote sensing study of the area was completed as part of this investigation. Historically, the remote sensing methodology used here is similar to the type of studies successfully applied to other prospects of this type (i.e., carbonate pay zones). Remote sensing studies can be broken down into two components: Lineament analysis and tonal anomaly analysis. Lineaments can be generally correlated with fractures in the source and reservoir rocks. Based on the study of the prospect area, it appears as though significant fractured reservoirs could be encountered during drilling. These will enhance the production for the respective reservoir if properly treated.

The theory of tonal anomaly analysis is somewhat controversial, but has been proven to these investigators in a variety of basins worldwide. Tonal changes are mottled colored areas associated with reflectance distortions, which have been attributed to micro-seepages of one or more pathfinder com-pounds, or the geo-botanical affect that these compounds have on vegetation overlying oil and natural gas reservoirs. Twenty+ years of involvement with remote sensing applications have documented the correlation between the presence of tonal anomalies and the existence of potentially economic reserves at depth. The tonal anomalies seen in this prospect are suggestive of source and reservoir rocks in the prospect area.

In areas with fractured reservoir potential, especially in those areas in which the subsurface information is sparse, a fracture trace study is strongly recommended. This process involves the use of aerial photographs of high resolution (usually 1:2000 scale). At this scale, a skilled interpreter is able to identify subtle fracture features and trends. Completing an unbiased study and then integrating this data with other data sets allows one to identify potentially productive fractures from healed or water logged fracture systems.

CONCLUSION

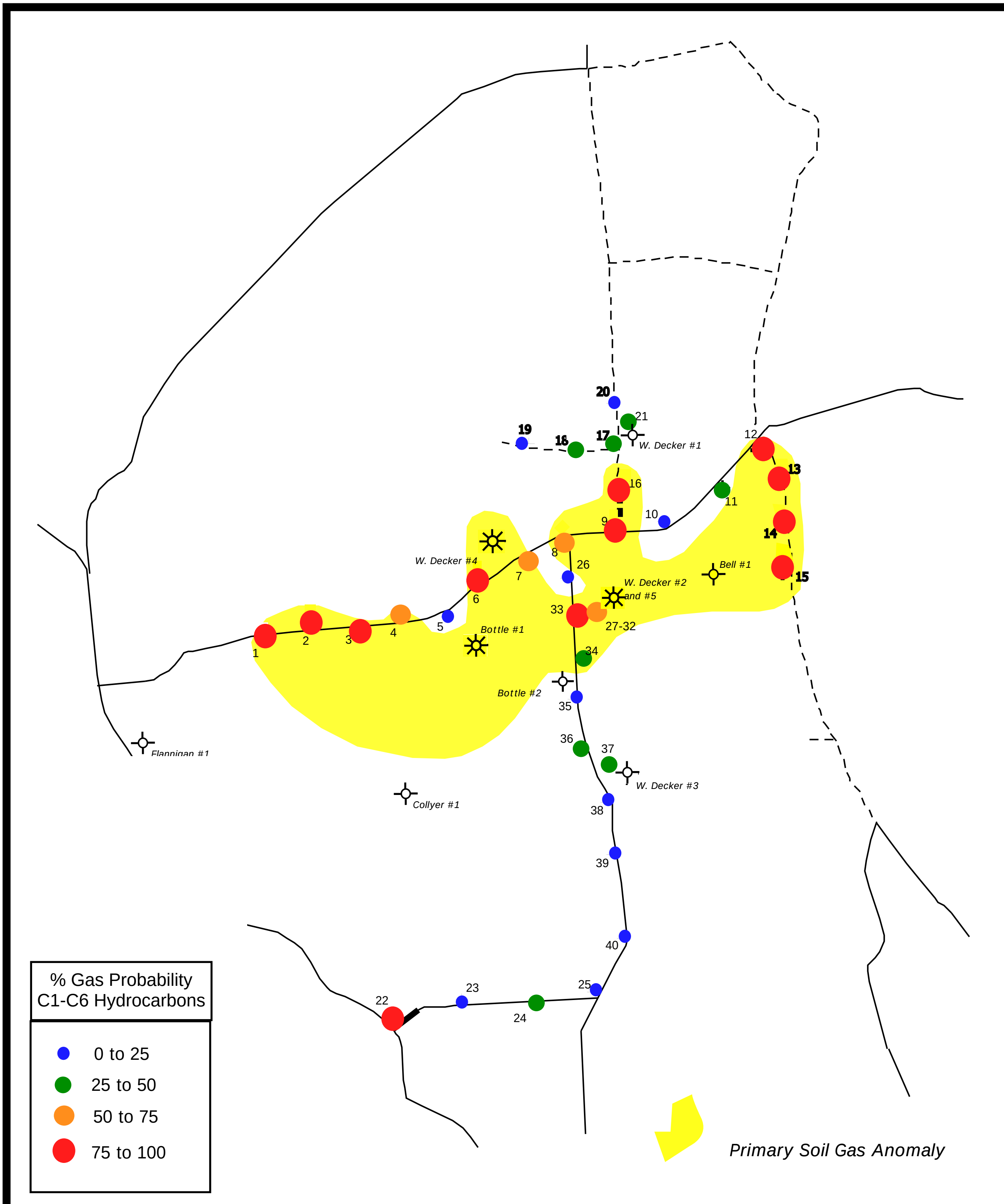
The IET method provides a thorough analysis of the hydrocarbon potential of both developmental and exploration areas. The goal of this approach is to minimize the risk that investors realize by layering data sets until sufficient information is collected to allow thorough analysis of the project. This approach promotes the risk ranking of projects and more importantly reduces the risk associated with exploration. The goal is to provide a service, which explorationists can use to maximize the available risk capital and minimize the risk inherent in the exploration/development process.



Direct Geochemical and
Pyron Consulting

Figure 1

Paleogeomorphic Map for Genegantslet Field Area with Well Locations



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Client: NYSERDA
Date: August,2002
Project#: 1101.3
Drawn by: MAV

Figure 2

Geneganslet
Sample Location Map
with Soil Gas Analysis

Gas Probability based on C1-C6 Gas Composition

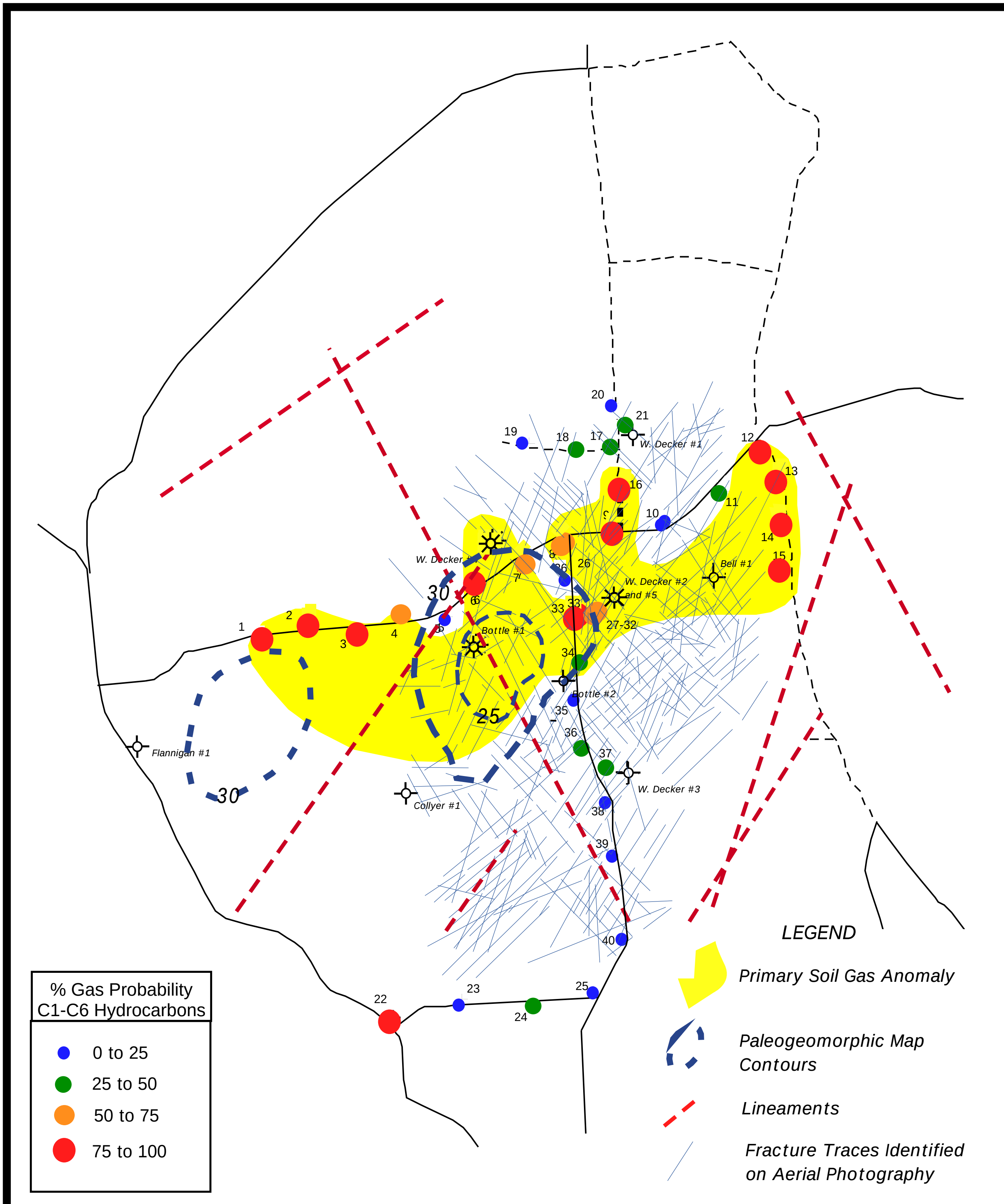

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Figure 3

Geneganslet Field Integrated Model

APPENDIX A

STATISTICAL METHODS USED IN INTEGRATED EXPLORATION TECHNOLOGY (IET)

APPENDIX A

STATISTICAL METHODS USED IN INTEGRATED EXPLORATION TECHNOLOGY (IET)

The IET Methodolgy used in these manuals is based upon the application of multivariate statistical methods and core techniques developed over two decades. This appendix provides a discussion of the statistical methods used in the IET approach.

INTERPRETATION OF GEOCHEMICAL DATA

This document describes Direct Geochemical's strategies for interpretation of geochemical data. This includes conventional hydrocarbon (C1-C6) data, Synchronous Scanning Fluorescence data, Heavy Hydrocarbon (C6-C18) data (when appropriate), trace element data, including iodine, and oxidation/reduction conditions (O2/CO2, ferric/ferrous, etc.). The data can be used as somewhat independent data sets or can be fully integrated into a single data set.

Two independent methods are used to interpret geochemical data:

- Quantitative
- Compositional

Quantitative Interpretation

The absolute concentration of individual or groups of hydrocarbons is often directly related to the subsurface accumulation of hydrocarbons, especially in simply stratified environments. Ratios of hydrocarbons provide additional information on source types. These include wetness and dryness ratios, plus hydrocarbon ratios that indicate whether the samples are in the oil, gas, or background window. Ratios, as well as raw data, can be mapped directly. Most regions exhibit "apical" anomalies, but "halos" are not unknown. Multiple productive horizons, presence of intense fracturing or faulting, and other factors can make interpretation difficult and are the cause of both false positive and negative anomalies.

Compositional Interpretation

The composition of soil gas can reflect the character of subsurface accumulations. It is important to identify and correlate the numerous near-surface compounds with their sources—particularly petroleum accumulations. Many compounds, including methane and ethane (plus such obvious ones as ethene and propene), have vegetative or biogenic origins. It is vital to separate the petroleum related compounds from the others. In addition, different accumulations yield different near-surface compositional signatures, which can be used to determine if the accumulation is in the oil or gas range.

STATISTICAL METHODS

Two primary statistical methods are generally applied to compositionally evaluate geochemical data:

- Principal Component (Factor) Analysis
- Discriminant Analysis

Both Factor and Discriminant Analysis are multivariate statistical tools that allow the evaluation of large numbers of data variables simultaneously. The use of these multivariate tools permits the user to appreciate the existence of complex factors, comprised of multiple individual variables in the data set. In oil and gas exploration, this is important because the presence of oil or gas in the subsurface is rarely imaged by one or two variables.

The basic statistical method summarizes the data set in a series of mathematical “vectors” or “factors,” which are combinations of co-varying hydrocarbon species. The Factors (when combined together) account for all of the variation in the dataset, but in fewer variables than are in the data set. For example, there may be 15 variables measured in a dataset, but there may be only 5 Factors of significance.

Factor Analysis identifies and ranks these factors in descending order of the amount of variance in the dataset that is accounted for. Factor 1 accounts for the most variance, Factor 2 the second greatest, and so on. For each Factor, it is possible to identify the mixture of variables (components) and their relative importance. An examination of the chemistry of each Factor may allow for the identification of the **source** (or cause or origin) of the mixture in the Factor.

It is very common for Factor Analysis to result in at least one Factor reflecting a mixture of light hydrocarbons (that can be related to “gas,” and at least one reflecting a mixture of heavy hydrocarbons (that can be related to “oil,” depending on the basin and environment. The other factors can be related to environmental characteristics, soil changes, or contamination, or sampling and laboratory procedural noise. Each Factor represents a group of correlated hydrocarbon components.

Correlated components are important, because they describe compounds that vary together, meaning they relate to one another genetically, and belong together. As a result, they are probably **sourced** together. Thus, a Factor can allow the user to describe the spatial and chemical relationship of surface chemistry with subsurface chemistry.

Discriminant Analysis is a form of pattern recognition and matching, in which statistically significant groups of samples are used as “models” of known geologic conditions, and then compared against grid or unknown samples. The method calculates the probability of an unknown sample being like the model composition for a given geologic condition. This method is usable under two circumstances:

- o There is a sufficient number of model samples to generate a representative or statistically significant population
- o The quality of the model area is appropriate

The objective of modeling is to identify two key phenomena for each known geologic condition (e.g., an oil or gas field). The first is to identify the chemical signature, which is most diagnostic of the geochemistry over oil (or gas) production. The second is to identify the **range** of chemical signature that is representative of that oil or gas production. To do so requires a potentially large number of samples, with experience showing that at least 20-25 samples per class of geologic condition being the minimum. If, however, reservoir, soil, or other conditions are variable, then a larger number of samples may be needed.

Once the statistical analysis is performed, whether using Factor Analysis or Discriminant Analysis, it is essential to evaluate the results in terms of both geology and chemistry. Both the Factor and Discriminant analyses of petroleum related geochemistry surveys reveal a compositional relationship among a number of co-varying hydrocarbon components. It is this group of components and their relative abundances that must make chemical sense when used to map a geologic phenomenon to be considered valid.

The notion that a Factor relates surface geochemistry to a subsurface accumulation is critical to its use in exploration. It is necessary to be able to relate the composition of a Factor to the chemistry of a subsurface accumulation in each basin. Figure 1 illustrates the principle that there is a

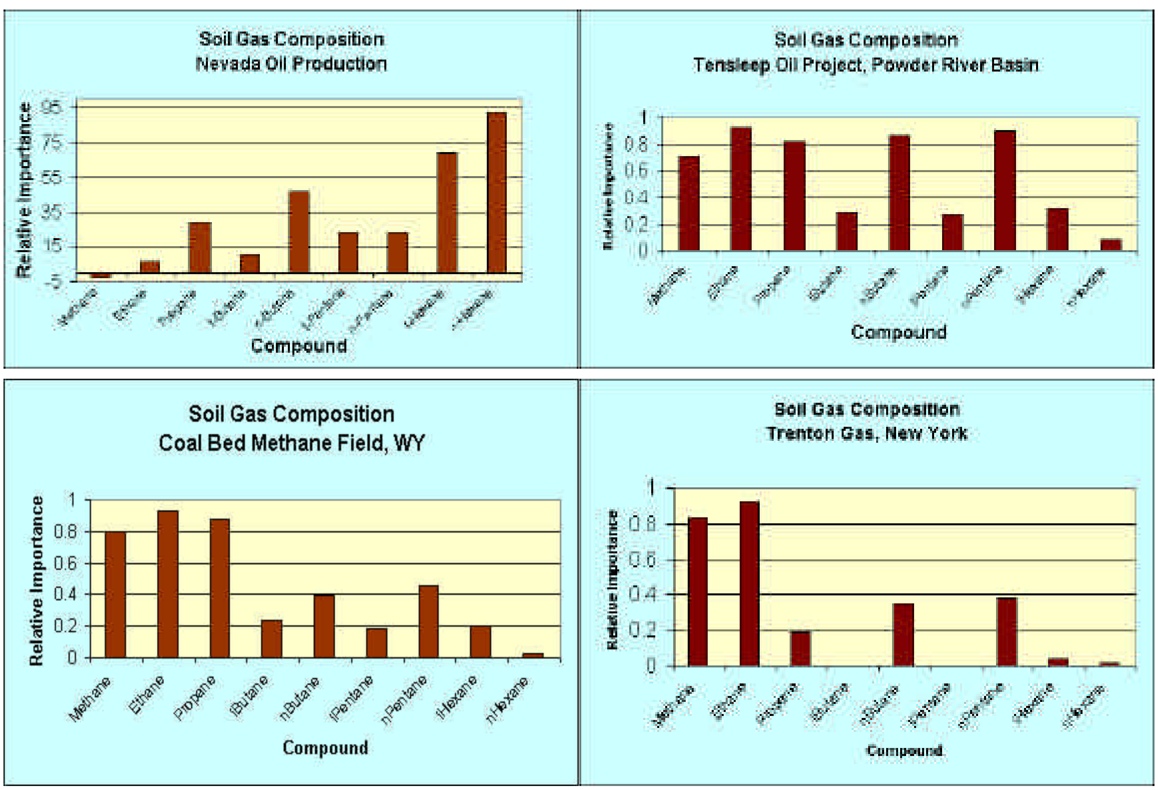


Figure 1: Factor Spectra from Various Basins and Targets Hydrocarbons. Equally important is the evaluation of compounds that are potential sources of false anomalies. The presence and high significance of biologically sourced compounds in the anomalous signature requires either re-modeling or explanation. For example, if terpene (pinene, limonene, caryophyllene, etc.), alcohols, ketones or aldehydes appear as "anomalous" components, they must be explained. None are direct indicators of oil or gas. The same is true of anomalously high molecular weight components associated with gas or condensate production

meaningful chemical relationship between surface geochemistry and source by showing 4 different Factors and four known accumulations in different regions. Here, for example, is the Factor 2 (Oil Factor) at Grant Canyon, representing a nearly gas-free oil (virtually no contribution from C1-C3). Contrast that with the Trenton-Black River gas accumulation in New York: an oil-free region, whose Gas Factor exhibits virtually no contribution from the C5+ hydrocarbons. The other examples are both from the Powder River basin, where it was necessary to separate the "gas" factor of coal bed methane from the oil rich environment and then to separate the "oil" factor of Tensleep Fm production (underlying major coal seams) from the mix.

COMBINING QUANTITATIVE AND COMPOSITIONAL DATA

The application of both quantitative and compositional data as described above should be done together. Most projects benefit by integrating the two data evaluations, and further integrating the geochemical data with other (geologic, well control, paleogeomorphic, Landsat, remote sensing, seismic, etc.) information.

In context, quantitative data can reveal information about at least three issues:

1. Charge
2. Structure
3. Fluid migration

When a gas or oil compositional character is defined, the next step is to determine if there appears to be an actual accumulation. Quantitative data can be very instrumental in determining if a structure or trap is charged with hydrocarbons. The quantitation can be oriented specifically toward the types of components diagnostic of the targeted fluid type.

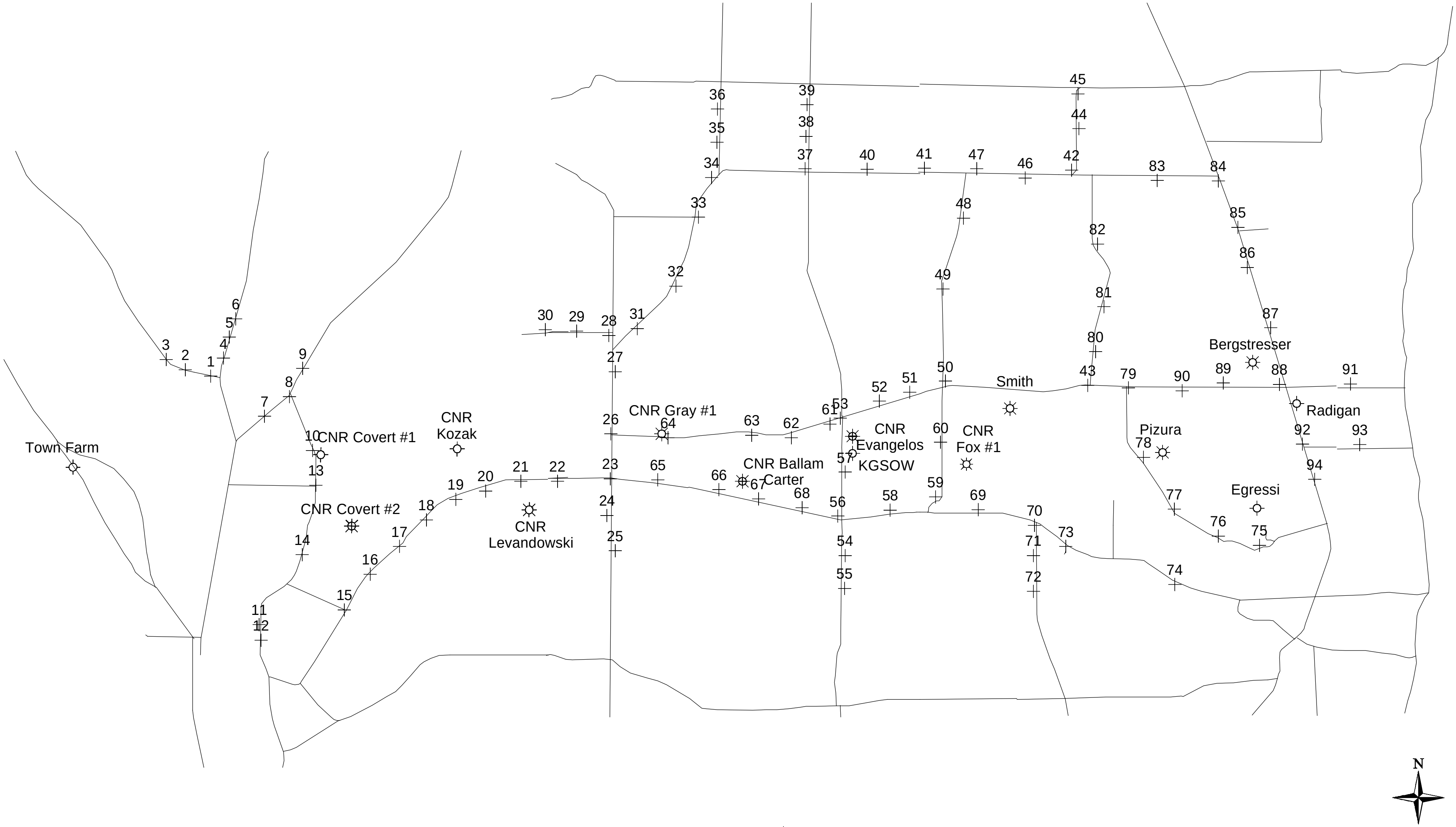
Quantitative data can also be useful in determining some structural qualities, particularly the existence and trend of faulting and fracturing. In many cases, tightly spaced geochemical data allow the mapping of faults and fractures and can allow inference of trap edges.

Within prospective traps—inside the geochemical anomalies—it is often possible to track fluid migration trends by examining the changes in chemistry or variation in anomalous signature or changes in oxidation/reduction characteristics.

The combination of quantitative information with compositional aids significantly in the understanding both of the present position of hydrocarbons and the processes that generated the geochemical signature.

APPENDIX B

GLODES CORNER SOIL GAS DATA AND SAMPLE LOCATION MAP



+ Sample Location

0 2000 4000 6000 8000 Feet

Base Map
Glodes Corner

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Client: NYSERDA
Date: February, 2002
Project #: 1101.03
Drawn by: MAV

Glodes Corner Detail

Sample Location Map

C_1-C_6 HYDROCARBON DATA REPORT

SAMPLE METHOD: SURFACE SOILS
ANALYTICAL METHOD: THERMAL DESORPTION
Analysis Completed: July 16 and AUGUST 7, 2001

		SOIL GAS CONCENTRATIONS (Parts per Billion by Volume)											Summations			
Lab Project ID #	Client ID#	Methane	Ethane	Ethene	Propane	Propene	iButane	nButane	I-Pentane	nPentane	I-Hexane	nHexane	C1+	C2+	C3+	C4+
1101.1	S-01	12046	1927	7364	1941	7104	286	837	253	644	310	327	18571	6525	4598	2657
1101.1	S-02	40179	7776	23084	7606	24862	566	2473	203	1664	542	1058	62068	21888	14112	6506
1101.1	S-03	43744	6636	22445	7381	32032	1360	3585	397	1705	795	1060	66664	22920	16283	8902
1101.1	S-04	56287	9622	28293	11379	59204	1557	5064	948	3538	1607	2106	92109	35822	26199	14821
1101.1	S-05	50777	12035	42340	14551	78815	2341	7198	1377	4186	2334	2824	97624	46846	34812	20260
1101.1	S-06	33705	5398	18644	5548	45734	791	2490	466	1630	683	1175	51885	18180	12782	7234
1101.1	S-07	42873	6757	28679	8693	70840	1508	4245	433	2287	762	1805	69364	26491	19733	11040
1101.1	S-08	115216	22495	53959	22991	107073	3159	11919	2046	7274	3296	4570	192967	77751	55256	32265
1101.1	S-09	43921	5634	25219	5112	77966	1010	2134	344	1796	835	3378	64163	20243	14608	9496
1101.1	S-10	59913	10870	33290	13739	97145	2919	6373	945	5348	1461	3992	105561	45648	34778	21039
1101.1	S-11	55198	11253	32532	12200	45885	2007	5982	1271	3682	1624	2687	95904	40706	29453	17253
1101.1	S-12	104213	12438	43023	13136	110439	1620	5400	1130	3799	1732	6414	149882	45668	33231	20095
1101.1	S-13	46958	5326	24283	4436	107459	901	2093	416	1462	938	4860	67390	20432	15105	10669
1101.1	S-14	56094	7558	30992	7784	92391	948	3685	367	2800	674	1704	81615	25520	17962	10178
1101.1	S-15	121264	23057	50850	23718	141532	5410	13018	2528	6756	4262	7445	207458	86194	63137	39419
1101.1	S-16	49161	10829	29870	11566	126971	2463	6193	1248	3353	2184	3259	90255	41095	30266	18699
1101.1	S-17	31450	7223	15898	7413	37765	1246	3749	731	1926	830	1392	55960	24510	17286	9873
1101.1	S-18	57022	8821	35495	10702	72837	1506	5102	953	3432	1185	1795	90518	33496	24675	13973
1101.1	S-19	42419	5259	30969	6533	205821	1422	3337	550	2011	507	1645	63684	21265	16006	9472
1101.1	S-20	73937	8944	42086	10398	189411	1069	4810	786	3301	922	7542	111709	37772	28828	18431
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1101.1	S-22	38148	4118	13889	4452	39965	695	2188	184	835	356	443	51419	13272	9154	4702
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1101.1	S-36	69631	11589	32239	13485	162880	3309	6320	976	3331	1774	1891	112305	42674	31085	17600
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1101.1	S-48	26752	3777	11127	3464	79552	1018	1930	595	989	790	2129	41444	14691	10915	7451
1101.1	S-49	24450	3446	10334	3014	82752	800	1612	451	757	566	1224	36320	11870	8424	5410
1101.1	S-50	30013	3121	13302	3258	101346	1012	1446	509	924	495	1146	41925	11912	8791	5533
1101.1	S-51	32063	3528	13461	3741	88760	825	1802	362	1028	419	1124	44892	12829	9301	5560
1101.1	S-52	22795	3810	8663	3242	86003	783	1719	450	766	764	1040	35369	12574	8764	5521
1101.1	S-53	48947	10710	25863	11856	115262	4372	6676	2329	3512	3039	2723	94163	45215	34505	22650
1101.1	S-54	28989	5575	13689	5711	79707	1399	3072	731	1488	1402	1503	49868	20880	15305	9594
1101.1	S-55	33190	5844	15115	6160	86492	2468	3248	1020	1625	1627	1601	56783	23593	17749	11589
1101.1	S-56	22501	3978	9817	3593	74334	822	1985	489	1035	839	925	36167	13666	9689	6096

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1101.1	S-58	36310	4777	15671	5646	95204	1959	2892	1039	1605	1273	1295	56797	20487	15710	10064
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1101.1	S-60	23618	1849	12602	2104	93675	1036	1044	318	551	341	640	31502	7884	6035	3931
1101.1	S-61	36106	3842	14832	4642	92417	1027	2182	524	1156	770	1605	51852	15746	11905	7263
1101.1	S-62	26043	2478	13767	2285	62892	511	1054	804	2122	257	1526	37079	11036	8558	6274
1101.1	S-63	71634	6562	27745	6110	143547	1264	2976	2179	3882	998	3655	99261	27626	21064	14954
1101.1	S-64	38191	3633	18978	2641	109730	650	1302	643	5701	378	2266	55404	17213	13580	10940
1101.1	S-65	67425	8566	25909	6796	118772	1506	3673	2369	5326	1209	6831	103699	36275	27709	20913
1101.1	S-66	42874	7382	22650	9338	30133	1034	4632	529	2722	605	1690	70805	27931	20549	11211
1101.1	S-67	58233	7520	23277	7148	123553	1370	3983	2305	8320	1165	7000	97046	38813	31292	24144
1101.1	S-68	40516	3448	24046	4358	133962	933	2214	944	8570	315	2031	63328	22812	19364	15007
1101.1	S-69	52580	8276	23770	8839	146500	3386	4936	2418	6119	2286	3230	92070	39489	31213	22374
1101.1	S-70	21287	1708	10969	2104	116887	949	1103	490	4210	223	444	32519	11232	9524	7420
1101.1	S-71	20408	1596	10010	1740	137116	682	903	436	3528	249	879	30420	10012	8417	6677
1101.1	S-72	21320	1359	9176	1565	125461	653	533	294	3157	242	814	29938	8617	7259	5694
1101.1	S-73	35715	5764	16321	5948	83402	1090	2832	1611	2302	936	2727	58924	23210	17446	11498
1101.1	S-74	22110	2506	7539	1866	101121	466	890	448	2767	296	954	32302	10192	7686	5820
1101.1	S-75	14930	2006	5836	1863	63174	568	794	318	2111	336	657	23584	8653	6647	4784
1101.1	S-76	22349	3872	14182	4145	61325	774	2098	1458	1592	564	1089	37940	15591	11719	7574
1101.1	S-77	39229	4313	17610	5185	135076	1311	2370	1448	3046	809	1404	59115	19886	15573	10388
1101.1	S-78	13729	2457	5518	2463	79078	259	1034	256	857	459	1496	23011	9282	6825	4362
1101.1	S-79	38311	4998	17045	5663	106152	768	2460	258	1344	574	700	55074	16763	11766	6102
1101.1	S-80	51904	3786	31780	9165	115646	3063	3411	1251	2428	1027	1127	77162	25258	21471	12306
1101.1	S-81	30040	4544	16122	4493	31953	783	1886	253	618	397	441	43455	13415	8871	4379
1101.1	S-82	60990	10363	27701	12547	78326	1551	5857	634	4829	1176	3004	100951	39961	29598	17051
1101.1	S-83	39829	5417	19106	6830	111149	1220	3539	395	2115	614	1708	61666	21837	16419	9589
1101.1	S-84	31079	6053	20140	5975	101082	1211	3144	527	1663	725	1086	51463	20384	14331	8356
1101.1	S-85	68041	11641	29951	14496	62506	2037	6736	1222	4794	1364	3433	113762	45721	34080	19585
1101.1	S-86	33477	5628	19134	6993	78919	1060	3473	368	1932	529	2134	55594	22117	16489	9496
1101.1	S-87	42783	6451	14364	6999	99580	744	2749	274	1956	438	412	62806	20023	13572	6572
1101.1	S-88	22686	3664	11149	3758	85179	876	1751	324	806	392	525	34781	12095	8431	4674
1101.1	S-89	13523	2797	8862	2626	99019	616	1450	357	646	385	278	22679	9157	6359	3733
1101.1	S-90	19239	3792	8668	3195	124374	728	1568	414	902	606	318	30762	11523	7731	4536
1101.1	S-91	29152	3664	21852	4610	136963	583	1907	145	1172	271	818	42322	13170	9507	4897
1101.1	S-92	62307	7995	28282	8654	139746	860	3268	383	2377	566	1637	88048	25741	17746	9091
1101.1	S-93	35570	4810	20213	5862	142761	991	2210	166	1417	331	773	52130	16560	11750	5888
1101.1	S-94	16068	1409	5162	1327	99859	607	769	388	1512	203	1213	23495	7427	6018	4692
1101.1	S-95	40017	2392	13236	2662	70888	302	1138	199	1140	457	1282	49589	9572	7180	4518
1101.1	S-96	19410	1265	6975	1761	110726	484	1049	37	599	163	2867	27634	8224	6959	5198
1101.1	S-97	21503	1722	6816	2432	82919	306	1210	104	670	189	1536	29673	8170	6447	4015
1101.1	S-98	58023	6124	18570	7058	214713	901	3882	374	3625	588	2634	83209	25186	19062	12003
1101.1	S-99	14949	1241	4903	1179	58604	367	670	199	618	134	969	20326	5376	4135	2957
1101.1	S-100	51002	4259	18306	5098	76877	563	2529	342	2614	648	3600	70655	19653	15394	10296
1101.1	S-101	70586	5795	23448	7456	194760	903	3559	251	2775	767	3205	95298	24712	18917	11461
1101.1	S-102	59266	3706	22982	4808	372738	625	1676	233	2913	444	1910	75581	16316	12610	7802
1101.1	S-103	53123	3859	23623	5149	196410	557	2659	551	3290	388	3688	73264	20141	16281	11132
1101.1	S-104	43571	3475	18042	3930	189961	394	1966	88	1672	284	1463	56843	13272	9797	5867
1101.1	S-105	55591	4474	22321	5718	235614	636	3092	245	2840	425	2535	75556	19965	15491	9772
1101.1	S-106	10545	724	4379	815	126868	274	514	3	212	42	1879	15009	4463	3739	2924
1101.1	S-107	34997	2694	15439	2803	146160	310	1387	19	1278	291	3845	47623	12627	9933	7129
1101.1	S-108	43722	3750	16641	4577	192130	530	2384	186	1613	380	3083	60225	16503	12753	8176
1101.1	S-109	41191	3768	13881	4366	34728	394	2101	463	2948	358	2213	57802	16611	12843	8477
1101.1	TOWN FARM COMP 1	47444	15114	40952	18839	121754	17236	8074	3935	7129	6987	34367	159124	111680	96567	77727
1101.1	TOWN FARM COMP 3	38416	5798	20397	7666	47149	1322	3476	509	2268	960	1956	62372	23956	18158	10492
1101.1	EVAN COMP	36098	8994	33213	9762	137613	1221	3964	844	2449	1593	1694	66618	30520	21526	11764
1101.1	BERG COMP	42944	8467	28284	6086	106370	1052	2350	241	1550	765	684	64140	21195	12728	6642

C_1-C_6 HYDROCARBON DATA REPORT

SAMPLE METHOD: SURFACE SOILS
ANALYTICAL METHOD: THERMAL DESORPTION
Analysis Completed: July 16 and AUGUST 7, 2001

Lab Project ID #	Client ID#	Normalized from C1+										
		Methane	Ethane	Propane	iButane	nButane	I-Pentane	nPentane	I-Hexane	nHexane	Ethene	Propene
1101.1	S-01	64.86	10.38	10.45	1.54	4.51	1.36	3.47	1.67	1.76	39.65	38.25
1101.1	S-02	64.73	12.53	12.25	0.91	3.98	0.33	2.68	0.87	1.70	37.19	40.06
1101.1	S-03	65.62	9.95	11.07	2.04	5.38	0.60	2.56	1.19	1.59	33.67	48.05
1101.1	S-04	61.11	10.45	12.35	1.69	5.50	1.03	3.84	1.74	2.29	30.72	64.28
1101.1	S-05	52.01	12.33	14.91	2.40	7.37	1.41	4.29	2.39	2.89	43.37	80.73
1101.1	S-06	64.96	10.40	10.69	1.52	4.80	0.90	3.14	1.32	2.26	35.93	88.15
1101.1	S-07	61.81	9.74	12.53	2.17	6.12	0.62	3.30	1.10	2.60	41.35	102.13
1101.1	S-08	59.71	11.66	11.91	1.64	6.18	1.06	3.77	1.71	2.37	27.96	55.49
1101.1	S-09	68.45	8.78	7.97	1.57	3.33	0.54	2.80	1.30	5.26	39.30	121.51
1101.1	S-10	56.76	10.30	13.02	2.77	6.04	0.90	5.07	1.38	3.78	31.54	92.03
1101.1	S-11	57.56	11.73	12.72	2.09	6.24	1.32	3.84	1.69	2.80	33.92	47.84
1101.1	S-12	69.53	8.30	8.76	1.08	3.60	0.75	2.53	1.16	4.28	28.70	73.68
1101.1	S-13	69.68	7.90	6.58	1.34	3.11	0.62	2.17	1.39	7.21	36.03	159.46
1101.1	S-14	68.73	9.26	9.54	1.16	4.52	0.45	3.43	0.83	2.09	37.97	113.20
1101.1	S-15	58.45	11.11	11.43	2.61	6.28	1.22	3.26	2.05	3.59	24.51	68.22
1101.1	S-16	54.47	12.00	12.82	2.73	6.86	1.38	3.71	2.42	3.61	33.10	140.68
1101.1	S-17	56.20	12.91	13.25	2.23	6.70	1.31	3.44	1.48	2.49	28.41	67.49
1101.1	S-18	63.00	9.74	11.82	1.66	5.64	1.05	3.79	1.31	1.98	39.21	80.47
1101.1	S-19	66.61	8.26	10.26	2.23	5.24	0.86	3.16	0.80	2.58	48.63	323.19
1101.1	S-20	66.19	8.01	9.31	0.96	4.31	0.70	2.96	0.83	6.75	37.67	169.56
1101.1	S-21	68.02	8.98	9.25	2.09	4.76	1.11	2.85	1.39	1.57	23.84	90.51
1101.1	S-22	74.19	8.01	8.66	1.35	4.26	0.36	1.62	0.69	0.86	27.01	77.72
1101.1	S-23	63.87	10.15	10.63	1.81	5.82	0.71	3.29	1.54	2.18	16.63	37.22
1101.1	S-24	63.14	10.38	10.65	1.71	6.20	1.07	3.38	1.48	1.99	29.57	84.90
1101.1	S-25	65.58	9.48	10.13	1.63	5.21	1.13	3.15	1.63	2.06	30.17	108.48
1101.1	S-26	62.13	10.30	10.73	1.89	5.63	1.23	3.43	1.66	2.99	24.42	74.94
1101.1	S-27	58.55	11.78	13.26	1.62	6.32	1.00	3.32	1.74	2.42	24.45	57.74
1101.1	S-28	65.21	8.05	11.83	1.85	5.78	0.58	3.48	0.82	2.39	35.45	146.87
1101.1	S-29	64.09	9.54	12.28	1.42	5.41	0.36	3.33	0.89	2.67	33.33	135.16
1101.1	S-30	62.44	9.41	11.59	2.09	5.18	0.84	4.29	0.94	3.21	25.10	133.11
1101.1	S-31	59.08	10.81	11.45	1.68	6.03	1.40	3.60	2.38	3.56	24.47	44.61
1101.1	S-32	59.98	11.13	11.90	1.66	6.09	0.99	3.06	1.80	3.39	22.16	72.54
1101.1	S-33	60.12	11.35	11.34	1.74	5.79	1.13	3.28	1.94	3.30	18.83	32.22
1101.1	S-34	61.12	10.98	11.01	1.54	5.40	0.85	2.96	1.54	4.61	21.50	74.26
1101.1	S-35	62.59	9.66	10.67	1.56	4.72	0.56	3.02	1.30	5.92	24.68	118.00
1101.1	S-36	62.00	10.32	12.01	2.95	5.63	0.87	2.97	1.58	1.68	28.71	145.03
1101.1	S-37	63.58	10.73	10.78	1.65	5.29	0.92	3.33	1.42	2.30	20.08	90.88
1101.1	S-38	66.27	9.63	9.16	1.93	4.88	0.90	3.46	1.04	2.73	28.73	47.87
1101.1	S-39	63.70	10.23	10.42	2.09	5.43	0.94	2.79	1.45	2.94	29.66	58.40
1101.1	S-40	63.22	10.02	11.08	1.98	5.50	1.13	2.82	1.50	2.76	34.58	69.08
1101.1	S-41	64.25	10.06	9.59	2.13	5.14	1.32	2.51	1.81	3.19	26.40	76.86
1101.1	S-42	63.20	9.46	9.85	1.50	4.87	1.07	3.20	1.75	5.10	23.88	64.70
1101.1	S-43	60.60	10.66	10.42	2.32	5.55	1.50	2.63	2.30	4.01	28.54	95.12
1101.1	S-44	63.69	9.53	9.74	1.52	4.92	1.04	2.87	1.53	5.16	32.02	75.13
1101.1	S-45	62.31	10.65	9.92	1.87	5.24	1.21	2.57	1.72	4.51	25.89	73.97
1101.1	S-46	61.01	10.55	10.87	2.19	5.46	1.47	3.11	1.87	3.47	27.75	94.33
1101.1	S-47	68.55	8.09	7.73	1.31	3.93	0.90	2.68	0.98	5.81	33.64	140.49
1101.1	S-48	64.55	9.11	8.36	2.46	4.66	1.44	2.39	1.91	5.14	26.85	191.95
1101.1	S-49	67.32	9.49	8.30	2.20	4.44	1.24	2.08	1.56	3.37	28.45	227.84
1101.1	S-50	71.59	7.44	7.77	2.42	3.45	1.21	2.20	1.18	2.73	31.73	241.73
1101.1	S-51	71.42	7.86	8.33	1.84	4.01	0.81	2.29	0.93	2.50	29.98	197.72
1101.1	S-52	64.45	10.77	9.17	2.21	4.86	1.27	2.17	2.16	2.94	24.49	243.16
1101.1	S-53	51.98	11.37	12.59	4.64	7.09	2.47	3.73	3.23	2.89	27.47	122.41
1101.1	S-54	58.13	11.18	11.45	2.80	6.16	1.47	2.98	2.81	3.01	27.45	159.83
1101.1	S-55	58.45	10.29	10.85	4.35	5.72	1.80	2.86	2.87	2.82	26.62	152.32
1101.1	S-56	62.21	11.00	9.93	2.27	5.49	1.35	2.86	2.32	2.56	27.14	205.53

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C_1-C_6 HYDROCARBON DATA REPORT

SAMPLE METHOD: SURFACE SOILS
ANALYTICAL METHOD: THERMAL DESORPTION
Analysis Completed: July 16 and AUGUST 7, 2001

Lab Project ID #	Client ID#	Normalized from C1+										
		Methane	Ethane	Propane	iButane	nButane	I-Pentane	nPentane	I-Hexane	nHexane	Ethene	Propene
1101.1	S-57	60.50	10.15	11.13	2.80	5.97	1.36	2.61	2.14	3.33	32.27	184.14
1101.1	S-58	63.93	8.41	9.94	3.45	5.09	1.83	2.83	2.24	2.28	27.59	167.62
1101.1	S-59	64.63	6.26	9.87	5.93	4.54	2.36	2.07	2.30	2.05	53.74	283.72
1101.1	S-60	74.97	5.87	6.68	3.29	3.32	1.01	1.75	1.08	2.03	40.00	297.36
1101.1	S-61	69.63	7.41	8.95	1.98	4.21	1.01	2.23	1.48	3.10	28.60	178.23
1101.1	S-62	70.24	6.68	6.16	1.38	2.84	2.17	5.72	0.69	4.11	37.13	169.62
1101.1	S-63	72.17	6.61	6.16	1.27	3.00	2.20	3.91	1.01	3.68	27.95	144.62
1101.1	S-64	68.93	6.56	4.77	1.17	2.35	1.16	10.29	0.68	4.09	34.25	198.06
1101.1	S-65	65.02	8.26	6.55	1.45	3.54	2.28	5.14	1.17	6.59	24.98	114.54
1101.1	S-66	60.55	10.43	13.19	1.46	6.54	0.75	3.84	0.85	2.39	31.99	42.56
1101.1	S-67	60.01	7.75	7.37	1.41	4.10	2.38	8.57	1.20	7.21	23.99	127.31
1101.1	S-68	63.98	5.44	6.88	1.47	3.50	1.49	13.53	0.50	3.21	37.97	211.54
1101.1	S-69	57.11	8.99	9.60	3.68	5.36	2.63	6.65	2.48	3.51	25.82	159.12
1101.1	S-70	65.46	5.25	6.47	2.92	3.39	1.51	12.95	0.69	1.37	33.73	359.44
1101.1	S-71	67.09	5.25	5.72	2.24	2.97	1.43	11.60	0.82	2.89	32.91	450.75
1101.1	S-72	71.22	4.54	5.23	2.18	1.78	0.98	10.55	0.81	2.72	30.65	419.07
1101.1	S-73	60.61	9.78	10.09	1.85	4.81	2.73	3.91	1.59	4.63	27.70	141.54
1101.1	S-74	68.45	7.76	5.78	1.44	2.75	1.39	8.57	0.92	2.95	23.34	313.05
1101.1	S-75	63.31	8.51	7.90	2.41	3.37	1.35	8.95	1.42	2.79	24.75	267.87
1101.1	S-76	58.91	10.21	10.93	2.04	5.53	3.84	4.20	1.49	2.87	37.38	161.64
1101.1	S-77	66.36	7.30	8.77	2.22	4.01	2.45	5.15	1.37	2.37	29.79	228.49
1101.1	S-78	59.66	10.68	10.70	1.13	4.50	1.11	3.72	1.99	6.50	23.98	343.65
1101.1	S-79	69.56	9.07	10.28	1.39	4.47	0.47	2.44	1.04	1.27	30.95	192.74
1101.1	S-80	67.27	4.91	11.88	3.97	4.42	1.62	3.15	1.33	1.46	41.19	149.87
1101.1	S-81	69.13	10.46	10.34	1.80	4.34	0.58	1.42	0.91	1.02	37.10	73.53
1101.1	S-82	60.42	10.27	12.43	1.54	5.80	0.63	4.78	1.16	2.98	27.44	77.59
1101.1	S-83	64.59	8.78	11.08	1.98	5.74	0.64	3.43	1.00	2.77	30.98	180.24
1101.1	S-84	60.39	11.76	11.61	2.35	6.11	1.02	3.23	1.41	2.11	39.14	196.42
1101.1	S-85	59.81	10.23	12.74	1.79	5.92	1.07	4.21	1.20	3.02	26.33	54.94
1101.1	S-86	60.22	10.12	12.58	1.91	6.25	0.66	3.47	0.95	3.84	34.42	141.96
1101.1	S-87	68.12	10.27	11.14	1.18	4.38	0.44	3.11	0.70	0.66	22.87	158.55
1101.1	S-88	65.22	10.53	10.80	2.52	5.03	0.93	2.32	1.13	1.51	32.05	244.90
1101.1	S-89	59.63	12.33	11.58	2.72	6.40	1.57	2.85	1.70	1.23	39.07	436.61
1101.1	S-90	62.54	12.33	10.39	2.37	5.10	1.35	2.93	1.97	1.03	28.18	404.31
1101.1	S-91	68.88	8.66	10.89	1.38	4.51	0.34	2.77	0.64	1.93	51.63	323.62
1101.1	S-92	70.76	9.08	9.83	0.98	3.71	0.44	2.70	0.64	1.86	32.12	158.72
1101.1	S-93	68.23	9.23	11.24	1.90	4.24	0.32	2.72	0.63	1.48	38.77	273.85
1101.1	S-94	68.39	6.00	5.65	2.58	3.27	1.65	6.44	0.86	5.16	21.97	425.02
1101.1	S-95	80.70	4.82	5.37	0.61	2.30	0.40	2.30	0.92	2.58	26.69	142.95
1101.1	S-96	70.24	4.58	6.37	1.75	3.79	0.13	2.17	0.59	10.38	25.24	400.69
1101.1	S-97	72.47	5.80	8.20	1.03	4.08	0.35	2.26	0.64	5.18	22.97	279.44
1101.1	S-98	69.73	7.36	8.48	1.08	4.67	0.45	4.36	0.71	3.17	22.32	258.04
1101.1	S-99	73.55	6.11	5.80	1.80	3.30	0.98	3.04	0.66	4.77	24.12	288.32
1101.1	S-100	72.19	6.03	7.22	0.80	3.58	0.48	3.70	0.92	5.10	25.91	108.81
1101.1	S-101	74.07	6.08	7.82	0.95	3.73	0.26	2.91	0.81	3.36	24.60	204.37
1101.1	S-102	78.41	4.90	6.36	0.83	2.22	0.31	3.85	0.59	2.53	30.41	493.16
1101.1	S-103	72.51	5.27	7.03	0.76	3.63	0.75	4.49	0.53	5.03	32.24	268.09
1101.1	S-104	76.65	6.11	6.91	0.69	3.46	0.16	2.94	0.50	2.57	31.74	334.18
1101.1	S-105	73.58	5.92	7.57	0.84	4.09	0.32	3.76	0.56	3.35	29.54	311.84
1101.1	S-106	70.26	4.82	5.43	1.82	3.43	0.02	1.41	0.28	12.52	29.18	845.29
1101.1	S-107	73.49	5.66	5.89	0.65	2.91	0.04	2.68	0.61	8.07	32.42	306.91
1101.1	S-108	72.60	6.23	7.60	0.88	3.96	0.31	2.68	0.63	5.12	27.63	319.02
1101.1	S-109	71.26	6.52	7.55	0.68	3.63	0.80	5.10	0.62	3.83	24.01	60.08
1101.1	TOWN FARM COMP 1	29.82	9.50	11.84	10.83	5.07	2.47	4.48	4.39	21.60	25.74	76.51
1101.1	TOWN FARM COMP 3	61.59	9.30	12.29	2.12	5.57	0.82	3.64	1.54	3.14	32.70	75.59
1101.1	EVAN COMP	54.19	13.50	14.65	1.83	5.95	1.27	3.68	2.39	2.54	49.86	206.57
1101.1	BERG COMP	66.95	13.20	9.49	1.64	3.66	0.38	2.42	1.19	1.07	44.10	165.84

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C_1-C_6 HYDROCARBON DATA REPORT

SAMPLE METHOD: SURFACE SOILS
ANALYTICAL METHOD: THERMAL DESORPTION
Analysis Completed: July 16 and AUGUST 7, 2001

		Normalized from C2+									
Lab Project ID #	**Client ID#**	**Ethane**	**Propane**	**iButane**	**nButane**	**I-Pentane**	**nPentane**	**I-Hexane**	**nHexane**	**Ethene**	**Propene**
1101.1	S-01	29.53	29.75	4.39	12.83	3.88	9.87	4.75	5.01	112.9	108.9
1101.1	S-02	35.53	34.75	2.58	11.30	0.93	7.60	2.48	4.83	105.5	113.6
1101.1	S-03	28.95	32.20	5.94	15.64	1.73	7.44	3.47	4.62	97.9	139.8
1101.1	S-04	26.86	31.77	4.35	14.14	2.65	9.88	4.49	5.88	79.0	165.3
1101.1	S-05	25.69	31.06	5.00	15.37	2.94	8.94	4.98	6.03	90.4	168.2
1101.1	S-06	29.69	30.52	4.35	13.69	2.56	8.96	3.76	6.46	102.6	251.6
1101.1	S-07	25.51	32.82	5.69	16.02	1.64	8.63	2.88	6.81	108.3	267.4
1101.1	S-08	28.93	29.57	4.06	15.33	2.63	9.35	4.24	5.88	69.4	137.7
1101.1	S-09	27.83	25.25	4.99	10.54	1.70	8.87	4.12	16.69	124.6	385.2
1101.1	S-10	23.81	30.10	6.39	13.96	2.07	11.72	3.20	8.74	72.9	212.8
1101.1	S-11	27.64	29.97	4.93	14.70	3.12	9.04	3.99	6.60	79.9	112.7
1101.1	S-12	27.23	28.76	3.55	11.82	2.48	8.32	3.79	14.04	94.2	241.8
1101.1	S-13	26.07	21.71	4.41	10.25	2.03	7.15	4.59	23.79	118.9	525.9
1101.1	S-14	29.62	30.50	3.72	14.44	1.44	10.97	2.64	6.68	121.4	362.0
1101.1	S-15	26.75	27.52	6.28	15.10	2.93	7.84	4.94	8.64	59.0	164.2
1101.1	S-16	26.35	28.15	5.99	15.07	3.04	8.16	5.31	7.93	72.7	309.0
1101.1	S-17	29.47	30.25	5.09	15.29	2.98	7.86	3.38	5.68	64.9	154.1
1101.1	S-18	26.33	31.95	4.50	15.23	2.85	10.25	3.54	5.36	106.0	217.5
1101.1	S-19	24.73	30.72	6.69	15.69	2.59	9.46	2.38	7.74	145.6	967.9
1101.1	S-20	23.68	27.53	2.83	12.73	2.08	8.74	2.44	19.97	111.4	501.5
1101.1	S-21	28.06	28.91	6.52	14.88	3.46	8.92	4.34	4.89	74.5	283.0
1101.1	S-22	31.03	33.55	5.24	16.49	1.39	6.29	2.68	3.34	104.7	301.1
1101.1	S-23	28.10	29.41	5.02	16.11	1.95	9.11	4.27	6.03	46.0	103.0
1101.1	S-24	28.16	28.89	4.64	16.82	2.91	9.17	4.02	5.40	80.2	230.3
1101.1	S-25	27.53	29.44	4.73	15.14	3.30	9.16	4.72	5.97	87.7	315.2
1101.1	S-26	27.19	28.34	4.99	14.87	3.26	9.06	4.40	7.90	64.5	197.9
1101.1	S-27	28.42	31.99	3.91	15.24	2.40	8.00	4.21	5.83	59.0	139.3
1101.1	S-28	23.15	34.01	5.32	16.63	1.66	10.00	2.36	6.88	101.9	422.1
1101.1	S-29	26.58	34.19	3.96	15.07	1.00	9.27	2.49	7.44	92.8	376.4
1101.1	S-30	25.04	30.87	5.56	13.80	2.25	11.43	2.50	8.55	66.8	354.4
1101.1	S-31	26.43	27.98	4.10	14.74	3.42	8.81	5.83	8.70	59.8	109.0
1101.1	S-32	27.81	29.74	4.15	15.23	2.47	7.64	4.50	8.47	55.4	181.3
1101.1	S-33	28.45	28.43	4.36	14.53	2.85	8.23	4.86	8.28	47.2	80.8
1101.1	S-34	28.23	28.32	3.96	13.88	2.20	7.60	3.96	11.85	55.3	191.0
1101.1	S-35	25.81	28.52	4.18	12.61	1.51	8.08	3.47	15.83	66.0	315.4
1101.1	S-36	27.16	31.60	7.75	14.81	2.29	7.81	4.16	4.43	75.5	381.7
1101.1	S-37	29.45	29.60	4.52	14.52	2.53	9.15	3.91	6.32	55.1	249.5
1101.1	S-38	28.54	27.17	5.73	14.47	2.67	10.25	3.07	8.09	85.2	141.9
1101.1	S-39	28.18	28.70	5.77	14.97	2.60	7.69	3.99	8.10	81.7	160.9
1101.1	S-40	27.24	30.12	5.38	14.95	3.08	7.66	4.07	7.51	94.0	187.8
1101.1	S-41	28.14	26.84	5.96	14.37	3.68	7.03	5.06	8.92	73.9	215.0
1101.1	S-42	25.72	26.76	4.07	13.22	2.92	8.70	4.75	13.86	64.9	175.8
1101.1	S-43	27.07	26.46	5.90	14.08	3.82	6.68	5.83	10.17	72.4	241.4
1101.1	S-44	26.25	26.83	4.18	13.55	2.85	7.89	4.22	14.21	88.2	206.9
1101.1	S-45	28.25	26.32	4.96	13.89	3.22	6.81	4.57	11.98	68.7	196.3
1101.1	S-46	27.06	27.87	5.63	13.99	3.76	7.98	4.81	8.91	71.2	241.9
1101.1	S-47	25.74	24.57	4.16	12.51	2.87	8.54	3.13	18.48	107.0	446.7
1101.1	S-48	25.71	23.58	6.93	13.14	4.05	6.73	5.38	14.49	75.7	541.5
1101.1	S-49	29.03	25.39	6.74	13.58	3.80	6.38	4.77	10.32	87.1	697.2
1101.1	S-50	26.20	27.35	8.50	12.14	4.27	7.76	4.16	9.62	111.7	850.8
1101.1	S-51	27.50	29.16	6.43	14.04	2.82	8.01	3.27	8.76	104.9	691.9
1101.1	S-52	30.30	25.79	6.23	13.67	3.58	6.09	6.07	8.27	68.9	684.0
1101.1	S-53	23.69	26.22	9.67	14.76	5.15	7.77	6.72	6.02	57.2	254.9
1101.1	S-54	26.70	27.35	6.70	14.71	3.50	7.13	6.72	7.20	65.6	381.7
1101.1	S-55	24.77	26.11	10.46	13.77	4.32	6.89	6.90	6.79	64.1	366.6
1101.1	S-56	29.11	26.29	6.02	14.53	3.58	7.58	6.14	6.77	71.8	543.9

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C_1-C_6 HYDROCARBON DATA REPORT

SAMPLE METHOD: SURFACE SOILS
ANALYTICAL METHOD: THERMAL DESORPTION
Analysis Completed: July 16 and AUGUST 7, 2001

Lab Project ID #	Client ID#	Normalized from C2+									
		Ethane	Propane	iButane	nButane	I-Pentane	nPentane	I-Hexane	nHexane	Ethene	Propene
1101.1	S-57	25.71	28.19	7.09	15.11	3.44	6.61	5.41	8.44	81.7	466.2
1101.1	S-58	23.32	27.56	9.56	14.12	5.07	7.84	6.22	6.32	76.5	464.7
1101.1	S-59	17.71	27.90	16.75	12.83	6.66	5.85	6.50	5.80	151.9	802.2
1101.1	S-60	23.45	26.69	13.15	13.25	4.03	6.99	4.33	8.11	159.8	1188.1
1101.1	S-61	24.40	29.48	6.52	13.85	3.32	7.34	4.89	10.19	94.2	586.9
1101.1	S-62	22.45	20.70	4.63	9.55	7.29	19.23	2.33	13.82	124.7	569.9
1101.1	S-63	23.75	22.12	4.58	10.77	7.89	14.05	3.61	13.23	100.4	519.6
1101.1	S-64	21.10	15.34	3.78	7.56	3.74	33.12	2.20	13.16	110.3	637.5
1101.1	S-65	23.61	18.74	4.15	10.12	6.53	14.68	3.33	18.83	71.4	327.4
1101.1	S-66	26.43	33.43	3.70	16.58	1.89	9.74	2.17	6.05	81.1	107.9
1101.1	S-67	19.38	18.42	3.53	10.26	5.94	21.44	3.00	18.04	60.0	318.3
1101.1	S-68	15.11	19.10	4.09	9.71	4.14	37.57	1.38	8.90	105.4	587.2
1101.1	S-69	20.96	22.38	8.57	12.50	6.12	15.49	5.79	8.18	60.2	371.0
1101.1	S-70	15.21	18.73	8.45	9.82	4.37	37.48	1.99	3.95	97.7	1040.7
1101.1	S-71	15.94	17.37	6.81	9.02	4.35	35.23	2.49	8.78	100.0	1369.5
1101.1	S-72	15.77	18.16	7.58	6.19	3.41	36.64	2.81	9.44	106.5	1455.9
1101.1	S-73	24.83	25.63	4.70	12.20	6.94	9.92	4.03	11.75	70.3	359.3
1101.1	S-74	24.59	18.31	4.57	8.73	4.39	27.15	2.90	9.36	74.0	992.2
1101.1	S-75	23.19	21.53	6.56	9.18	3.68	24.39	3.88	7.59	67.4	730.1
1101.1	S-76	24.83	26.59	4.96	13.46	9.35	10.21	3.61	6.99	91.0	393.3
1101.1	S-77	21.69	26.08	6.59	11.92	7.28	15.32	4.07	7.06	88.6	679.2
1101.1	S-78	26.47	26.53	2.79	11.15	2.76	9.23	4.94	16.12	59.4	852.0
1101.1	S-79	29.81	33.78	4.58	14.67	1.54	8.01	3.42	4.17	101.7	633.2
1101.1	S-80	14.99	36.29	12.13	13.50	4.95	9.61	4.06	4.46	125.8	457.9
1101.1	S-81	33.87	33.49	5.84	14.06	1.89	4.61	2.96	3.29	120.2	238.2
1101.1	S-82	25.93	31.40	3.88	14.66	1.59	12.08	2.94	7.52	69.3	196.0
1101.1	S-83	24.81	31.28	5.58	16.21	1.81	9.68	2.81	7.82	87.5	509.0
1101.1	S-84	29.70	29.31	5.94	15.42	2.59	8.16	3.56	5.33	98.8	495.9
1101.1	S-85	25.46	31.70	4.45	14.73	2.67	10.48	2.98	7.51	65.5	136.7
1101.1	S-86	25.45	31.62	4.79	15.70	1.66	8.73	2.39	9.65	86.5	356.8
1101.1	S-87	32.22	34.96	3.72	13.73	1.37	9.77	2.19	2.06	71.7	497.3
1101.1	S-88	30.29	31.07	7.24	14.48	2.68	6.67	3.24	4.34	92.2	704.2
1101.1	S-89	30.55	28.68	6.73	15.84	3.90	7.05	4.21	3.04	96.8	1081.4
1101.1	S-90	32.90	27.73	6.32	13.61	3.59	7.83	5.26	2.76	75.2	1079.4
1101.1	S-91	27.82	35.00	4.43	14.48	1.10	8.90	2.06	6.21	165.9	1039.9
1101.1	S-92	31.06	33.62	3.34	12.70	1.49	9.23	2.20	6.36	109.9	542.9
1101.1	S-93	29.05	35.40	5.98	13.34	1.00	8.56	2.00	4.67	122.1	862.1
1101.1	S-94	18.97	17.86	8.17	10.35	5.22	20.36	2.73	16.33	69.5	1344.5
1101.1	S-95	24.99	27.81	3.15	11.89	2.08	11.91	4.78	13.39	138.3	740.6
1101.1	S-96	15.38	21.42	5.88	12.75	0.44	7.28	1.98	34.87	84.8	1346.4
1101.1	S-97	21.08	29.77	3.74	14.81	1.28	8.20	2.32	18.80	83.4	1015.0
1101.1	S-98	24.31	28.03	3.58	15.41	1.49	14.39	2.33	10.46	73.7	852.5
1101.1	S-99	23.08	21.92	6.82	12.47	3.69	11.49	2.50	18.03	91.2	1090.0
1101.1	S-100	21.67	25.94	2.87	12.87	1.74	13.30	3.30	18.32	93.1	391.2
1101.1	S-101	23.45	30.17	3.65	14.40	1.02	11.23	3.11	12.97	94.9	788.1
1101.1	S-102	22.71	29.47	3.83	10.27	1.43	17.86	2.72	11.70	140.9	2284.5
1101.1	S-103	19.16	25.57	2.77	13.20	2.73	16.33	1.93	18.31	117.3	975.2
1101.1	S-104	26.19	29.61	2.96	14.82	0.66	12.60	2.14	11.02	135.9	1431.3
1101.1	S-105	22.41	28.64	3.18	15.49	1.23	14.22	2.13	12.69	111.8	1180.1
1101.1	S-106	16.22	18.27	6.13	11.52	0.07	4.74	0.94	42.11	98.1	2842.5
1101.1	S-107	21.34	22.20	2.46	10.99	0.15	10.12	2.30	30.45	122.3	1157.6
1101.1	S-108	22.73	27.73	3.21	14.44	1.13	9.77	2.30	18.68	100.8	1164.2
1101.1	S-109	22.68	26.28	2.37	12.65	2.79	17.75	2.16	13.32	83.6	209.1
1101.1	TOWN FARM COMP 1	13.53	16.87	15.43	7.23	3.52	6.38	6.26	30.77	36.7	109.0
1101.1	TOWN FARM COMP 3	24.20	32.00	5.52	14.51	2.13	9.47	4.01	8.16	85.1	196.8
1101.1	EVAN COMP	29.47	31.99	4.00	12.99	2.77	8.02	5.22	5.55	108.8	450.9
1101.1	BERG COMP	39.95	28.71	4.96	11.09	1.14	7.31	3.61	3.23	133.4	501.9

C_1-C_6 HYDROCARBON DATA REPORT

SAMPLE METHOD: SURFACE SOILS
ANALYTICAL METHOD: THERMAL DESORPTION
Analysis Completed: July 16 and AUGUST 7, 2001

		Dryness Ratios		Wetness Ratios				Iso/Normal Ratios		
Lab Project ID #	Client ID#	%C1/C1+	%C2/C2+	%C2+/C1+	%C3+/C2+	%C4+/C1+	%C4+/C2+	C4	C5	C6
1101.1	S-01	64.9	29.5	35.1	70.5	14.3	40.7	0.3421	0.3930	0.9492
1101.1	S-02	64.7	35.5	35.3	64.5	10.5	29.7	0.2288	0.1222	0.5120
1101.1	S-03	65.6	29.0	34.4	71.0	13.4	38.8	0.3795	0.2328	0.7505
1101.1	S-04	61.1	26.9	38.9	73.1	16.1	41.4	0.3075	0.2680	0.7632
1101.1	S-05	52.0	25.7	48.0	74.3	20.8	43.2	0.3252	0.3290	0.8265
1101.1	S-06	65.0	29.7	35.0	70.3	13.9	39.8	0.3177	0.2860	0.5813
1101.1	S-07	61.8	25.5	38.2	74.5	15.9	41.7	0.3552	0.1895	0.4220
1101.1	S-08	59.7	28.9	40.3	71.1	16.7	41.5	0.2651	0.2813	0.7212
1101.1	S-09	68.5	27.8	31.5	72.2	14.8	46.9	0.4734	0.1914	0.2471
1101.1	S-10	56.8	23.8	43.2	76.2	19.9	46.1	0.4580	0.1767	0.3661
1101.1	S-11	57.6	27.6	42.4	72.4	18.0	42.4	0.3355	0.3451	0.6044
1101.1	S-12	69.5	27.2	30.5	72.8	13.4	44.0	0.3001	0.2976	0.2700
1101.1	S-13	69.7	26.1	30.3	73.9	15.8	52.2	0.4303	0.2843	0.1930
1101.1	S-14	68.7	29.6	31.3	70.4	12.5	39.9	0.2573	0.1309	0.3955
1101.1	S-15	58.5	26.7	41.5	73.3	19.0	45.7	0.4156	0.3742	0.5724
1101.1	S-16	54.5	26.4	45.5	73.6	20.7	45.5	0.3978	0.3722	0.6703
1101.1	S-17	56.2	29.5	43.8	70.5	17.6	40.3	0.3325	0.3794	0.5958
1101.1	S-18	63.0	26.3	37.0	73.7	15.4	41.7	0.2952	0.2777	0.6598
1101.1	S-19	66.6	24.7	33.4	75.3	14.9	44.5	0.4261	0.2736	0.3081
1101.1	S-20	66.2	23.7	33.8	76.3	16.5	48.8	0.2223	0.2382	0.1223
1101.1	S-21	68.0	28.1	32.0	71.9	13.8	43.0	0.4383	0.3885	0.8872
1101.1	S-22	74.2	31.0	25.8	69.0	9.1	35.4	0.3178	0.2203	0.8044
1101.1	S-23	63.9	28.1	36.1	71.9	15.3	42.5	0.3115	0.2145	0.7081
1101.1	S-24	63.1	28.2	36.9	71.8	15.8	43.0	0.2757	0.3179	0.7432
1101.1	S-25	65.6	27.5	34.4	72.5	14.8	43.0	0.3122	0.3596	0.7911
1101.1	S-26	62.1	27.2	37.9	72.8	16.8	44.5	0.3357	0.3596	0.5563
1101.1	S-27	58.6	28.4	41.4	71.6	16.4	39.6	0.2566	0.3003	0.7216
1101.1	S-28	65.2	23.1	34.8	76.9	14.9	42.8	0.3201	0.1658	0.3432
1101.1	S-29	64.1	26.6	35.9	73.4	14.1	39.2	0.2628	0.1079	0.3342
1101.1	S-30	62.4	25.0	37.6	75.0	16.6	44.1	0.4029	0.1966	0.2918
1101.1	S-31	59.1	26.4	40.9	73.6	18.7	45.6	0.2784	0.3889	0.6700
1101.1	S-32	60.0	27.8	40.0	72.2	17.0	42.5	0.2725	0.3230	0.5312
1101.1	S-33	60.1	28.5	39.9	71.5	17.2	43.1	0.3004	0.3455	0.5871
1101.1	S-34	61.1	28.2	38.9	71.8	16.9	43.4	0.2850	0.2891	0.3345
1101.1	S-35	62.6	25.8	37.4	74.2	17.1	45.7	0.3316	0.1862	0.2192
1101.1	S-36	62.0	27.2	38.0	72.8	15.7	41.2	0.5236	0.2929	0.9380
1101.1	S-37	63.6	29.5	36.4	70.5	14.9	40.9	0.3113	0.2768	0.6188
1101.1	S-38	66.3	28.5	33.7	71.5	14.9	44.3	0.3960	0.2606	0.3796
1101.1	S-39	63.7	28.2	36.3	71.8	15.6	43.1	0.3853	0.3376	0.4927
1101.1	S-40	63.2	27.2	36.8	72.8	15.7	42.6	0.3596	0.4012	0.5418
1101.1	S-41	64.2	28.1	35.8	71.9	16.1	45.0	0.4151	0.5238	0.5677
1101.1	S-42	63.2	25.7	36.8	74.3	17.5	47.5	0.3081	0.3355	0.3426
1101.1	S-43	60.6	27.1	39.4	72.9	18.3	46.5	0.4191	0.5718	0.5738
1101.1	S-44	63.7	26.3	36.3	73.7	17.0	46.9	0.3083	0.3616	0.2970
1101.1	S-45	62.3	28.2	37.7	71.8	17.1	45.4	0.3570	0.4730	0.3814
1101.1	S-46	61.0	27.1	39.0	72.9	17.6	45.1	0.4021	0.4719	0.5395
1101.1	S-47	68.6	25.7	31.4	74.3	15.6	49.7	0.3326	0.3366	0.1693
1101.1	S-48	64.6	25.7	35.4	74.3	18.0	50.7	0.5273	0.6020	0.3711
1101.1	S-49	67.3	29.0	32.7	71.0	14.9	45.6	0.4961	0.5957	0.4622
1101.1	S-50	71.6	26.2	28.4	73.8	13.2	46.4	0.7004	0.5509	0.4319
1101.1	S-51	71.4	27.5	28.6	72.5	12.4	43.3	0.4580	0.3518	0.3726
1101.1	S-52	64.4	30.3	35.6	69.7	15.6	43.9	0.4554	0.5871	0.7340
1101.1	S-53	52.0	23.7	48.0	76.3	24.1	50.1	0.6549	0.6632	1.1159
1101.1	S-54	58.1	26.7	41.9	73.3	19.2	46.0	0.4553	0.4909	0.9333
1101.1	S-55	58.5	24.8	41.5	75.2	20.4	49.1	0.7597	0.6280	1.0159
1101.1	S-56	62.2	29.1	37.8	70.9	16.9	44.6	0.4141	0.4723	0.9079

C_1-C_6 HYDROCARBON DATA REPORT

SAMPLE METHOD: SURFACE SOILS
ANALYTICAL METHOD: THERMAL DESORPTION
Analysis Completed: July 16 and AUGUST 7, 2001

		Dryness Ratios		Wetness Ratios				Iso/Normal Ratios		
Lab Project ID #	Client ID#	%C1/C1+	%C2/C2+	%C2+/C1+	%C3+/C2+	%C4+/C1+	%C4+/C2+	C4	C5	C6
1101.1	S-57	60.5	25.7	39.5	74.3	18.2	46.1	0.4693	0.5194	0.6407
1101.1	S-58	63.9	23.3	36.1	76.7	17.7	49.1	0.6775	0.6474	0.9830
1101.1	S-59	64.6	17.7	35.4	82.3	19.2	54.4	1.3060	1.1383	1.1211
1101.1	S-60	75.0	23.5	25.0	76.5	12.5	49.9	0.9923	0.5763	0.5340
1101.1	S-61	69.6	24.4	30.4	75.6	14.0	46.1	0.4708	0.4530	0.4795
1101.1	S-62	70.2	22.5	29.8	77.5	16.9	56.8	0.4848	0.3790	0.1684
1101.1	S-63	72.2	23.8	27.8	76.2	15.1	54.1	0.4249	0.5614	0.2731
1101.1	S-64	68.9	21.1	31.1	78.9	19.7	63.6	0.4994	0.1128	0.1668
1101.1	S-65	65.0	23.6	35.0	76.4	20.2	57.7	0.4100	0.4448	0.1769
1101.1	S-66	60.6	26.4	39.4	73.6	15.8	40.1	0.2232	0.1944	0.3579
1101.1	S-67	60.0	19.4	40.0	80.6	24.9	62.2	0.3440	0.2771	0.1665
1101.1	S-68	64.0	15.1	36.0	84.9	23.7	65.8	0.4212	0.1101	0.1550
1101.1	S-69	57.1	21.0	42.9	79.0	24.3	56.7	0.6859	0.3952	0.7077
1101.1	S-70	65.5	15.2	34.5	84.8	22.8	66.1	0.8606	0.1165	0.5023
1101.1	S-71	67.1	15.9	32.9	84.1	21.9	66.7	0.7550	0.1235	0.2836
1101.1	S-72	71.2	15.8	28.8	84.2	19.0	66.1	1.2251	0.0932	0.2974
1101.1	S-73	60.6	24.8	39.4	75.2	19.5	49.5	0.3848	0.6999	0.3432
1101.1	S-74	68.4	24.6	31.6	75.4	18.0	57.1	0.5240	0.1617	0.3103
1101.1	S-75	63.3	23.2	36.7	76.8	20.3	55.3	0.7150	0.1509	0.5114
1101.1	S-76	58.9	24.8	41.1	75.2	20.0	48.6	0.3688	0.9159	0.5174
1101.1	S-77	66.4	21.7	33.6	78.3	17.6	52.2	0.5531	0.4755	0.5763
1101.1	S-78	59.7	26.5	40.3	73.5	19.0	47.0	0.2505	0.2988	0.3066
1101.1	S-79	69.6	29.8	30.4	70.2	11.1	36.4	0.3122	0.1918	0.8200
1101.1	S-80	67.3	15.0	32.7	85.0	15.9	48.7	0.8980	0.5152	0.9107
1101.1	S-81	69.1	33.9	30.9	66.1	10.1	32.6	0.4155	0.4098	0.8986
1101.1	S-82	60.4	25.9	39.6	74.1	16.9	42.7	0.2647	0.1313	0.3914
1101.1	S-83	64.6	24.8	35.4	75.2	15.6	43.9	0.3446	0.1867	0.3593
1101.1	S-84	60.4	29.7	39.6	70.3	16.2	41.0	0.3852	0.3170	0.6674
1101.1	S-85	59.8	25.5	40.2	74.5	17.2	42.8	0.3024	0.2549	0.3974
1101.1	S-86	60.2	25.4	39.8	74.6	17.1	42.9	0.3052	0.1905	0.2481
1101.1	S-87	68.1	32.2	31.9	67.8	10.5	32.8	0.2707	0.1401	1.0640
1101.1	S-88	65.2	30.3	34.8	69.7	13.4	38.6	0.5004	0.4020	0.7464
1101.1	S-89	59.6	30.6	40.4	69.4	16.5	40.8	0.4248	0.5530	1.3845
1101.1	S-90	62.5	32.9	37.5	67.1	14.7	39.4	0.4644	0.4588	1.9074
1101.1	S-91	68.9	27.8	31.1	72.2	11.6	37.2	0.3058	0.1239	0.3319
1101.1	S-92	70.8	31.1	29.2	68.9	10.3	35.3	0.2632	0.1612	0.3457
1101.1	S-93	68.2	29.0	31.8	71.0	11.3	35.6	0.4485	0.1168	0.4278
1101.1	S-94	68.4	19.0	31.6	81.0	20.0	63.2	0.7897	0.2565	0.1673
1101.1	S-95	80.7	25.0	19.3	75.0	9.1	47.2	0.2651	0.1749	0.3568
1101.1	S-96	70.2	15.4	29.8	84.6	18.8	63.2	0.4612	0.0611	0.0569
1101.1	S-97	72.5	21.1	27.5	78.9	13.5	49.1	0.2528	0.1559	0.1232
1101.1	S-98	69.7	24.3	30.3	75.7	14.4	47.7	0.2321	0.1033	0.2232
1101.1	S-99	73.5	23.1	26.5	76.9	14.5	55.0	0.5470	0.3214	0.1385
1101.1	S-100	72.2	21.7	27.8	78.3	14.6	52.4	0.2227	0.1308	0.1799
1101.1	S-101	74.1	23.4	25.9	76.6	12.0	46.4	0.2537	0.0905	0.2395
1101.1	S-102	78.4	22.7	21.6	77.3	10.3	47.8	0.3731	0.0800	0.2325
1101.1	S-103	72.5	19.2	27.5	80.8	15.2	55.3	0.2096	0.1674	0.1052
1101.1	S-104	76.7	26.2	23.3	73.8	10.3	44.2	0.2001	0.0528	0.1942
1101.1	S-105	73.6	22.4	26.4	77.6	12.9	48.9	0.2055	0.0863	0.1678
1101.1	S-106	70.3	16.2	29.7	83.8	19.5	65.5	0.5321	0.0149	0.0224
1101.1	S-107	73.5	21.3	26.5	78.7	15.0	56.5	0.2236	0.0146	0.0757
1101.1	S-108	72.6	22.7	27.4	77.3	13.6	49.5	0.2224	0.1156	0.1233
1101.1	S-109	71.3	22.7	28.7	77.3	14.7	51.0	0.1878	0.1571	0.1618
1101.1	TOWN FARM COMP 1	29.8	13.5	70.2	86.5	48.8	69.6	2.1348	0.5520	0.2033
1101.1	TOWN FARM COMP 3	61.6	24.2	38.4	75.8	16.8	43.8	0.3804	0.2247	0.4910
1101.1	EVAN COMP	54.2	29.5	45.8	70.5	17.7	38.5	0.3079	0.3447	0.9404
1101.1	BERG COMP	67.0	39.9	33.0	60.1	10.4	31.3	0.4476	0.1557	1.1189

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C_1-C_6 HYDROCARBON DATA REPORT

SAMPLE METHOD: SURFACE SOILS
ANALYTICAL METHOD: THERMAL DESORPTION
Analysis Completed: July 16 and AUGUST 7, 2001

Lab Project ID #	Client ID#	Hydrocarbon Ratios														
		C2/C1	C3/C1	C4/C1	C5/C1	C6/C1	C3/C2	C4/C2	C5/C2	C6/C2	C4/C3	C5/C3	C6/C3	C5/C4	C6/C4	C6/C5
1101.1	S-01	0.1600	0.1612	0.0695	0.0535	0.0271	1.0074	0.4344	0.3341	0.1610	0.4312	0.3317	0.1683	0.7692	0.3904	0.5075
1101.1	S-02	0.1935	0.1893	0.0615	0.0414	0.0263	0.9782	0.3180	0.2140	0.0697	0.3251	0.2188	0.1391	0.6729	0.4279	0.6359
1101.1	S-03	0.1517	0.1687	0.0819	0.0390	0.0242	1.1122	0.5401	0.2570	0.1198	0.4856	0.2310	0.1435	0.4757	0.2956	0.6213
1101.1	S-04	0.1710	0.2022	0.0900	0.0629	0.0374	1.1825	0.5263	0.3677	0.1670	0.4451	0.3109	0.1851	0.6986	0.4159	0.5953
1101.1	S-05	0.2370	0.2866	0.1418	0.0824	0.0556	1.2091	0.5981	0.3478	0.1939	0.4947	0.2877	0.1941	0.5815	0.3923	0.6747
1101.1	S-06	0.1602	0.1646	0.0739	0.0484	0.0348	1.0278	0.4612	0.3019	0.1265	0.4488	0.2938	0.2117	0.6546	0.4718	0.7207
1101.1	S-07	0.1576	0.2028	0.0990	0.0533	0.0421	1.2865	0.6281	0.3385	0.1127	0.4883	0.2631	0.2076	0.5389	0.4253	0.7892
1101.1	S-08	0.1952	0.1996	0.1035	0.0631	0.0397	1.0221	0.5299	0.3233	0.1465	0.5184	0.3164	0.1988	0.6102	0.3834	0.6284
1101.1	S-09	0.1283	0.1164	0.0486	0.0409	0.0769	0.9072	0.3788	0.3187	0.1481	0.4175	0.3513	0.6608	0.8415	1.5828	1.8810
1101.1	S-10	0.1814	0.2293	0.1064	0.0893	0.0666	1.2640	0.5864	0.4920	0.1345	0.4639	0.3893	0.2905	0.8391	0.6263	0.7464
1101.1	S-11	0.2039	0.2210	0.1084	0.0667	0.0487	1.0842	0.5316	0.3272	0.1443	0.4904	0.3018	0.2203	0.6154	0.4492	0.7299
1101.1	S-12	0.1193	0.1260	0.0518	0.0364	0.0615	1.0561	0.4342	0.3054	0.1392	0.4111	0.2892	0.4883	0.7034	1.1877	1.6885
1101.1	S-13	0.1134	0.0945	0.0446	0.0311	0.1035	0.8328	0.3930	0.2744	0.1761	0.4719	0.3295	1.0956	0.6982	2.3217	3.3253
1101.1	S-14	0.1347	0.1388	0.0657	0.0499	0.0304	1.0299	0.4876	0.3705	0.0892	0.4734	0.3598	0.2189	0.7599	0.4623	0.6083
1101.1	S-15	0.1901	0.1956	0.1074	0.0557	0.0614	1.0287	0.5646	0.2930	0.1848	0.5489	0.2848	0.3139	0.5189	0.5719	1.1020
1101.1	S-16	0.2203	0.2353	0.1260	0.0682	0.0663	1.0681	0.5718	0.3096	0.2017	0.5354	0.2899	0.2817	0.5414	0.5262	0.9720
1101.1	S-17	0.2297	0.2357	0.1192	0.0612	0.0443	1.0263	0.5190	0.2666	0.1149	0.5057	0.2597	0.1878	0.5137	0.3714	0.7231
1101.1	S-18	0.1547	0.1877	0.0895	0.0602	0.0315	1.2133	0.5784	0.3891	0.1343	0.4767	0.3207	0.1677	0.6727	0.3519	0.5230
1101.1	S-19	0.1240	0.1540	0.0787	0.0474	0.0388	1.2422	0.6346	0.3823	0.0964	0.5108	0.3078	0.2518	0.6025	0.4929	0.8181
1101.1	S-20	0.1210	0.1406	0.0651	0.0447	0.1020	1.1625	0.5378	0.3691	0.1031	0.4626	0.3175	0.7254	0.6864	1.5681	2.2846
1101.1	S-21	0.1320	0.1359	0.0700	0.0419	0.0230	1.0301	0.5304	0.3178	0.1547	0.5148	0.3085	0.1693	0.5992	0.3288	0.5488
1101.1	S-22	0.1079	0.1167	0.0574	0.0219	0.0116	1.0813	0.5314	0.2028	0.0865	0.4915	0.1876	0.0995	0.3817	0.2024	0.5304
1101.1	S-23	0.1589	0.1664	0.0911	0.0515	0.0341	1.0468	0.5731	0.3240	0.1520	0.5475	0.3096	0.2050	0.5654	0.3745	0.6623
1101.1	S-24	0.1644	0.1686	0.0982	0.0535	0.0315	1.0258	0.5973	0.3256	0.1426	0.5822	0.3174	0.1870	0.5451	0.3212	0.5893
1101.1	S-25	0.1445	0.1545	0.0795	0.0481	0.0313	1.0694	0.5501	0.3328	0.1716	0.5144	0.3112	0.2028	0.6050	0.3943	0.6518
1101.1	S-26	0.1658	0.1728	0.0907	0.0552	0.0482	1.0421	0.5468	0.3332	0.1616	0.5248	0.3197	0.2788	0.6092	0.5313	0.8720
1101.1	S-27	0.2012	0.2265	0.1079	0.0566	0.0413	1.1255	0.5360	0.2815	0.1479	0.4762	0.2501	0.1822	0.5251	0.3825	0.7285
1101.1	S-28	0.1235	0.1815	0.0887	0.0533	0.0367	1.4693	0.7183	0.4319	0.1020	0.4889	0.2940	0.2023	0.6013	0.4138	0.6881
1101.1	S-29	0.1489	0.1916	0.0844	0.0520	0.0417	1.2865	0.5671	0.3489	0.0935	0.4408	0.2712	0.2176	0.6153	0.4936	0.8021
1101.1	S-30	0.1506	0.1857	0.0830	0.0688	0.0515	1.2327	0.5511	0.4566	0.0997	0.4471	0.3704	0.2771	0.8284	0.6198	0.7482
1101.1	S-31	0.1831	0.1938	0.1021	0.0610	0.0602	1.0586	0.5577	0.3332	0.2205	0.5268	0.3148	0.3109	0.5975	0.5901	0.9876
1101.1	S-32	0.1855	0.1984	0.1016	0.0510	0.0565	1.0697	0.5477	0.2747	0.1618	0.5120	0.2568	0.2848	0.5016	0.5562	1.1087
1101.1	S-33	0.1887	0.1886	0.0964	0.0546	0.0549	0.9993	0.5107	0.2894	0.1709	0.5111	0.2896	0.2913	0.5667	0.5700	1.0059
1101.1	S-34	0.1796	0.1802	0.0883	0.0484	0.0754	1.0033	0.4915	0.2694	0.1404	0.4899	0.2685	0.4183	0.5480	0.8539	1.5582
1101.1	S-35	0.1543	0.1705	0.0754	0.0483	0.0946	1.1050	0.4885	0.3133	0.1344	0.4421	0.2835	0.5551	0.6413	1.2555	1.9579
1101.1	S-36	0.1664	0.1937	0.0908	0.0478	0.0272	1.1636	0.5453	0.2874	0.1531	0.4686	0.2470	0.1402	0.5271	0.2993	0.5678
1101.1	S-37	0.1687	0.1696	0.0832	0.0524	0.0362	1.0051	0.4928	0.3106	0.1327	0.4903	0.3090	0.2134	0.6302	0.4352	0.6905
1101.1	S-38	0.1453	0.1383	0.0737	0.0522	0.0412	0.9518	0.5071	0.3592	0.1076	0.5328	0.3774	0.2979	0.7083	0.5591	0.7893
1101.1	S-39	0.1606	0.1635	0.0853	0.0438	0.0462	1.0184	0.5310	0.2728	0.1416	0.5214	0.2679	0.2823	0.5137	0.5414	1.0538
1101.1	S-40	0.1585	0.1752	0.0869	0.0446	0.0437	1.1057	0.5487	0.2813	0.1493	0.4962	0.2544	0.2492	0.5127	0.5022	0.9794
1101.1	S-41	0.1566	0.1493	0.0799	0.0391	0.0496	0.9536	0.5105	0.2499	0.1798	0.5353	0.2620	0.3322	0.4894	0.6206	1.2680
1101.1	S-42	0.1497	0.1558	0.0770	0.0506	0.0807	1.0407	0.5142	0.3381	0.1846	0.4941	0.3249	0.5179	0.6576	1.0481	1.5939
1101.1	S-43	0.1759	0.1720	0.0915	0.0434	0.0661	0.9777	0.5201	0.2468	0.2155	0.5319	0.2524	0.3842	0.4746	0.7223	1.5220
1101.1	S-44	0.1497	0.1530	0.0773	0.0450	0.0810	1.0220	0.5162	0.3007	0.1608	0.5051	0.2942	0.5297	0.5826	1.0489	1.8004
1101.1	S-45	0.1709	0.1592	0.0840	0.0412	0.0725	0.9317	0.4918	0.2412	0.1617	0.5278	0.2589	0.4551	0.4904	0.8622	1.7582
1101.1	S-46	0.1730	0.1781	0.0894	0.0510	0.0569	1.0298	0.5170	0.2948	0.1776	0.5020	0.2862	0.3197	0.5702	0.6367	1.1168
1101.1	S-47	0.1181	0.1127	0.0574	0.0392	0.0848	0.9544	0.4861	0.3317	0.1215	0.5093	0.3475	0.7521	0.6823	1.4768	2.1643
1101.1	S-48	0.1412	0.1295	0.0721	0.0370	0.0796	0.9172	0.5110	0.2619	0.2092	0.5571	0.2855	0.6145	0.5125	1.1030	2.1524
1101.1	S-49	0.1409	0.1233	0.0659	0.0310	0.0501	0.8748	0.4679	0.2196	0.1642	0.5349	0.2511	0.4062	0.4694	0.7594	1.6179
1101.1	S-50	0.1040	0.1086	0.0482	0.0308	0.0382	1.0439	0.4631	0.2961	0.1586	0.4436	0.2836	0.3518	0.6392	0.7930	1.2405
1101.1	S-51	0.1100	0.1167	0.0562	0.0321	0.0351	1.0604	0.5107	0.2913	0.1187	0.4816	0.2747	0.3005	0.5705	0.6240	1.0939
1101.1	S-52	0.1671	0.1422	0.0754	0.0336	0.0456	0.8510	0.4512	0.2010	0.2004	0.5302	0.2362	0.3208	0.4455	0.6051	1.3583
1101.1	S-53	0.2188	0.2422	0.1364	0.0717	0.0556	1.1070	0.6233	0.3279	0.2837	0.5631	0.2962	0.2297	0.5261	0.4079	0.7754
1101.1	S-54	0.1923	0.1970	0.1060	0.0513	0.0518	1.0243	0.5510	0.2670	0.2516	0.5379	0.2606	0.2631	0.4845	0.4891	1.0096
1101.1	S-55	0.1761	0.1856	0.0979	0.0489	0.0482	1.0541	0.5558	0.2780	0.2784	0.5273	0.2637	0.2600	0.5001	0.4930	0.9858
1101.1	S-56	0.1768	0.1597	0.0882	0.0460	0.0411	0.9032	0.4990	0.2603	0.2110	0.5525	0.2882	0.2573	0.5216	0.4658	0.8930

C_1-C_6 HYDROCARBON DATA REPORT

SAMPLE METHOD: SURFACE SOILS
ANALYTICAL METHOD: THERMAL DESORPTION
Analysis Completed: July 16 and AUGUST 7, 2001

Lab Project ID #	Client ID#	Hydrocarbon Ratios														
		C2/C1	C3/C1	C4/C1	C5/C1	C6/C1	C3/C2	C4/C2	C5/C2	C6/C2	C4/C3	C5/C3	C6/C3	C5/C4	C6/C4	C6/C5
1101.1	S-57	0.1678	0.1840	0.0987	0.0432	0.0551	1.0964	0.5879	0.2573	0.2104	0.5362	0.2346	0.2995	0.4376	0.5586	1.2767
1101.1	S-58	0.1316	0.1555	0.0796	0.0442	0.0357	1.1819	0.6053	0.3360	0.2666	0.5122	0.2843	0.2294	0.5551	0.4480	0.8069
1101.1	S-59	0.0969	0.1527	0.0702	0.0320	0.0317	1.5757	0.7246	0.3304	0.3672	0.4598	0.2097	0.2079	0.4559	0.4521	0.9915
1101.1	S-60	0.0783	0.0891	0.0442	0.0233	0.0271	1.1379	0.5648	0.2981	0.1847	0.4964	0.2620	0.3039	0.5278	0.6123	1.1601
1101.1	S-61	0.1064	0.1286	0.0604	0.0320	0.0445	1.2083	0.5678	0.3008	0.2004	0.4700	0.2490	0.3458	0.5297	0.7358	1.3890
1101.1	S-62	0.0951	0.0877	0.0405	0.0815	0.0586	0.9220	0.4253	0.8564	0.1037	0.4613	0.9288	0.6678	2.0134	1.4476	0.7190
1101.1	S-63	0.0916	0.0853	0.0415	0.0542	0.0510	0.9311	0.4535	0.5915	0.1521	0.4870	0.6353	0.5983	1.3044	1.2284	0.9417
1101.1	S-64	0.0951	0.0691	0.0341	0.1493	0.0593	0.7270	0.3583	1.5694	0.1041	0.4929	2.1588	0.8581	4.3797	1.7409	0.3975
1101.1	S-65	0.1270	0.1008	0.0545	0.0790	0.1013	0.7934	0.4288	0.6217	0.1411	0.5404	0.7836	1.0052	1.4500	1.8600	1.2827
1101.1	S-66	0.1722	0.2178	0.1080	0.0635	0.0394	1.2650	0.6274	0.3687	0.0819	0.4960	0.2914	0.1809	0.5876	0.3648	0.6208
1101.1	S-67	0.1291	0.1228	0.0684	0.1429	0.1202	0.9505	0.5296	1.1064	0.1549	0.5572	1.1640	0.9793	2.0889	1.7574	0.8413
1101.1	S-68	0.0851	0.1076	0.0547	0.2115	0.0501	1.2638	0.6422	2.4855	0.0913	0.5082	1.9666	0.4661	3.8701	0.9172	0.2370
1101.1	S-69	0.1574	0.1681	0.0939	0.1164	0.0614	1.0680	0.5964	0.7393	0.2762	0.5585	0.6922	0.3654	1.2396	0.6543	0.5278
1101.1	S-70	0.0802	0.0988	0.0518	0.1978	0.0209	1.2316	0.6459	2.4649	0.1306	0.5244	2.0014	0.2111	3.8164	0.4025	0.1055
1101.1	S-71	0.0782	0.0852	0.0443	0.1729	0.0431	1.0902	0.5660	2.2108	0.1563	0.5192	2.0278	0.5055	3.9059	0.9736	0.2493
1101.1	S-72	0.0637	0.0734	0.0250	0.1481	0.0382	1.1519	0.3925	2.3236	0.1781	0.3407	2.0171	0.5199	5.9203	1.5260	0.2578
1101.1	S-73	0.1614	0.1665	0.0793	0.0644	0.0764	1.0320	0.4914	0.3993	0.1624	0.4761	0.3869	0.4585	0.8126	0.9630	1.1850
1101.1	S-74	0.1133	0.0844	0.0402	0.1252	0.0431	0.7446	0.3550	1.1043	0.1181	0.4768	1.4831	0.5110	3.1103	1.0717	0.3446
1101.1	S-75	0.1344	0.1248	0.0532	0.1414	0.0440	0.9284	0.3958	1.0521	0.1675	0.4263	1.1332	0.3527	2.6580	0.8272	0.3112
1101.1	S-76	0.1732	0.1855	0.0939	0.0712	0.0487	1.0706	0.5420	0.4111	0.1455	0.5062	0.3840	0.2627	0.7585	0.5190	0.6842
1101.1	S-77	0.1099	0.1322	0.0604	0.0776	0.0358	1.2024	0.5496	0.7062	0.1876	0.4571	0.5874	0.2707	1.2849	0.5921	0.4608
1101.1	S-78	0.1790	0.1794	0.0753	0.0624	0.1090	1.0023	0.4210	0.3488	0.1867	0.4200	0.3480	0.6076	0.8285	1.4465	1.7459
1101.1	S-79	0.1304	0.1478	0.0642	0.0351	0.0183	1.1332	0.4922	0.2688	0.1148	0.4343	0.2372	0.1236	0.5462	0.2845	0.5209
1101.1	S-80	0.0729	0.1766	0.0657	0.0468	0.0217	2.4207	0.9009	0.6412	0.2711	0.3722	0.2649	0.1230	0.7118	0.3305	0.4643
1101.1	S-81	0.1512	0.1495	0.0628	0.0206	0.0147	0.9888	0.4150	0.1361	0.0873	0.4197	0.1377	0.0982	0.3280	0.2340	0.7135
1101.1	S-82	0.1699	0.2057	0.0960	0.0792	0.0493	1.2108	0.5652	0.4660	0.1135	0.4668	0.3848	0.2394	0.8244	0.5129	0.6222
1101.1	S-83	0.1360	0.1715	0.0889	0.0531	0.0429	1.2609	0.6533	0.3903	0.1133	0.5182	0.3096	0.2500	0.5975	0.4825	0.8076
1101.1	S-84	0.1948	0.1922	0.1012	0.0535	0.0350	0.9871	0.5194	0.2747	0.1198	0.5262	0.2783	0.1818	0.5290	0.3455	0.6533
1101.1	S-85	0.1711	0.2130	0.0990	0.0705	0.0504	1.2452	0.5786	0.4118	0.1172	0.4647	0.3307	0.2368	0.7117	0.5096	0.7161
1101.1	S-86	0.1681	0.2089	0.1037	0.0577	0.0637	1.2426	0.6171	0.3433	0.0941	0.4966	0.2763	0.3052	0.5563	0.6144	1.1046
1101.1	S-87	0.1508	0.1636	0.0642	0.0457	0.0096	1.0850	0.4261	0.3032	0.0679	0.3927	0.2795	0.0588	0.7117	0.1497	0.2104
1101.1	S-88	0.1615	0.1656	0.0772	0.0355	0.0231	1.0255	0.4778	0.2201	0.1069	0.4659	0.2146	0.1396	0.4606	0.2996	0.6506
1101.1	S-89	0.2069	0.1942	0.1073	0.0478	0.0206	0.9388	0.5185	0.2308	0.1377	0.5523	0.2459	0.1059	0.4452	0.1918	0.4308
1101.1	S-90	0.1971	0.1661	0.0815	0.0469	0.0165	0.8426	0.4135	0.2380	0.1599	0.4907	0.2824	0.0995	0.5756	0.2028	0.3523
1101.1	S-91	0.1257	0.1581	0.0654	0.0402	0.0281	1.2583	0.5204	0.3200	0.0741	0.4136	0.2543	0.1774	0.6148	0.4290	0.6977
1101.1	S-92	0.1283	0.1389	0.0525	0.0381	0.0263	1.0824	0.4088	0.2973	0.0708	0.3777	0.2746	0.1891	0.7272	0.5008	0.6887
1101.1	S-93	0.1352	0.1648	0.0621	0.0398	0.0217	1.2187	0.4594	0.2946	0.0688	0.3770	0.2418	0.1319	0.6414	0.3499	0.5456
1101.1	S-94	0.0877	0.0826	0.0478	0.0941	0.0755	0.9413	0.5455	1.0732	0.1440	0.5795	1.1401	0.9141	1.9673	1.5775	0.8018
1101.1	S-95	0.0598	0.0665	0.0284	0.0285	0.0320	1.1126	0.4758	0.4764	0.1912	0.4276	0.4281	0.4816	1.0012	1.1261	1.1248
1101.1	S-96	0.0652	0.0907	0.0540	0.0308	0.1477	1.3927	0.8290	0.4732	0.1290	0.5953	0.3398	1.6278	0.5708	2.7346	4.7907
1101.1	S-97	0.0801	0.1131	0.0563	0.0311	0.0714	1.4122	0.7024	0.3888	0.1099	0.4974	0.2753	0.6316	0.5535	1.2698	2.2940
1101.1	S-98	0.1055	0.1217	0.0669	0.0625	0.0454	1.1526	0.6339	0.5919	0.0960	0.5500	0.5135	0.3731	0.9337	0.6784	0.7266
1101.1	S-99	0.0830	0.0788	0.0448	0.0413	0.0648	0.9498	0.5400	0.4977	0.1082	0.5686	0.5240	0.8225	0.9216	1.4465	1.5696
1101.1	S-100	0.0835	0.1000	0.0496	0.0513	0.0706	1.1970	0.5938	0.6138	0.1521	0.4961	0.5128	0.7062	1.0337	1.4235	1.3771
1101.1	S-101	0.0821	0.1056	0.0504	0.0393	0.0454	1.2867	0.6142	0.4789	0.1324	0.4773	0.3722	0.4298	0.7798	0.9005	1.1548
1101.1	S-102	0.0625	0.0811	0.0283	0.0492	0.0322	1.2975	0.4523	0.7861	0.1198	0.3486	0.6059	0.3972	1.7379	1.1392	0.6555
1101.1	S-103	0.0726	0.0969	0.0500	0.0619	0.0694	1.3343	0.6889	0.8525	0.1005	0.5163	0.6389	0.7162	1.2375	1.3872	1.1210
1101.1	S-104	0.0798	0.0902	0.0451	0.0384	0.0336	1.1307	0.5658	0.4811	0.0817	0.5004	0.4255	0.3722	0.8503	0.7439	0.8748
1101.1	S-105	0.0805	0.1029	0.0556	0.0511	0.0456	1.2780	0.6911	0.6346	0.0951	0.5407	0.4966	0.4432	0.9183	0.8197	0.8926
1101.1	S-106	0.0687	0.0773	0.0487	0.0201	0.1782	1.1260	0.7099	0.2922	0.0581	0.6305	0.2595	2.3053	0.4116	3.6562	8.8839
1101.1	S-107	0.0770	0.0801	0.0396	0.0365	0.1099	1.0406	0.5150	0.4742	0.1080	0.4949	0.4557	1.3715	0.9208	2.7712	3.0094
1101.1	S-108	0.0858	0.1047	0.0545	0.0369	0.0705	1.2204	0.6355	0.4300	0.1013	0.5208	0.3523	0.6736	0.6765	1.2935	1.9119
1101.1	S-109	0.0915	0.1060	0.0510	0.0716	0.0537	1.1586	0.5575	0.7823	0.0951	0.4812	0.6752	0.5070	1.4033	1.0537	0.7509
1101.1	TOWN FARM COMP 1	0.3186	0.3971	0.1702	0.1503	0.7244	1.2465	0.5342	0.4717	0.4623	0.4286	0.3784	1.8242	0.8829	4.2566	4.8209
1101.1	TOWN FARM COMP 3	0.1509	0.1996	0.0905	0.0590	0.0509	1.3222	0.5996	0.3912	0.1656	0.4535	0.2958	0.2551	0.6524	0.5625	0.8623
1101.1	EVAN COMP	0.2492	0.2704	0.1098	0.0678	0.0469	1.0854	0.4407	0.2723	0.1771	0.4061	0.2509	0.1735	0.6178	0.4273	0.6916
1101.1	BERG COMP	0.1972	0.1417	0.0547	0.0361	0.0159	0.7188	0.2776	0.1831	0.0904	0.3862	0.2547	0.1123	0.6595	0.2909	0.4411

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C_1-C_6 HYDROCARBON DATA REPORT

SAMPLE METHOD: SURFACE SOILS
ANALYTICAL METHOD: THERMAL DESORPTION
Analysis Completed: July 16 and AUGUST 7, 2001

Lab Project ID #	Client ID#	Log Data												
		Methane	Ethane	Ethene	Propane	Propene	iButane	nButane	I-Pentane	nPentane	I-Hexane	nHexane	C1+	C2+
1101.1	S-01	4.0808	3.2849	3.8671	3.2881	3.8515	2.4569	2.9228	2.4032	2.8088	2.4916	2.5142	4.2688	3.8146
1101.1	S-02	4.6040	3.8908	4.3633	3.8812	4.3955	2.7526	3.3932	2.3082	3.2212	2.7339	3.0246	4.7929	4.3402
1101.1	S-03	4.6409	3.8219	4.3511	3.8681	4.5056	3.1337	3.5544	2.5988	3.2318	2.9005	3.0251	4.8239	4.3602
1101.1	S-04	4.7504	3.9833	4.4517	4.0561	4.7723	3.1923	3.7045	2.9768	3.5488	3.2061	3.3235	4.9643	4.5541
1101.1	S-05	4.7057	4.0804	4.6268	4.1629	4.8966	3.3694	3.8572	3.1390	3.6218	3.3681	3.4509	4.9896	4.6707
1101.1	S-06	4.5277	3.7322	4.2705	3.7441	4.6602	2.8982	3.3961	2.6685	3.2121	2.8343	3.0699	4.7150	4.2596
1101.1	S-07	4.6322	3.8298	4.4576	3.9392	4.8503	3.1783	3.6278	2.6368	3.3593	2.8818	3.2565	4.8411	4.4231
1101.1	S-08	5.0615	4.3521	4.7321	4.3616	5.0297	3.4996	4.0762	3.3110	3.8617	3.5180	3.6600	5.2855	4.8907
1101.1	S-09	4.6427	3.7509	4.4017	3.7086	4.8919	3.0044	3.3292	2.5362	3.2543	2.9215	3.5286	4.8073	4.3063
1101.1	S-10	4.7775	4.0362	4.5223	4.1380	4.9874	3.4653	3.8044	2.9755	3.7282	3.1648	3.6012	5.0235	4.6594
1101.1	S-11	4.7419	4.0513	4.5123	4.0864	4.6617	3.3026	3.7769	3.1040	3.5661	3.2106	3.4293	4.9818	4.6097
1101.1	S-12	5.0179	4.0947	4.6337	4.1185	5.0431	3.2096	3.7324	3.0532	3.5796	3.2385	3.8071	5.1757	4.6596
1101.1	S-13	4.6717	3.7264	4.3853	3.6470	5.0312	2.9546	3.3209	2.6186	3.1648	2.9721	3.6867	4.8286	4.3103
1101.1	S-14	4.7489	3.8784	4.4912	3.8912	4.9656	2.9769	3.5665	2.5642	3.4472	2.8286	3.2314	4.9118	4.4069
1101.1	S-15	5.0837	4.3628	4.7063	4.3751	5.1509	3.7332	4.1146	3.4028	3.8297	3.6296	3.8719	5.3169	4.9355
1101.1	S-16	4.6916	4.0346	4.4752	4.0632	5.1037	3.3915	3.7919	3.0962	3.5254	3.3393	3.5130	4.9555	4.6138
1101.1	S-17	4.4976	3.8587	4.2013	3.8700	4.5771	3.0957	3.5739	2.8636	3.2846	2.9189	3.1437	4.7479	4.3893
1101.1	S-18	4.7560	3.9455	4.5502	4.0295	4.8624	3.1778	3.7077	2.9792	3.5356	3.0735	3.2541	4.9567	4.5250
1101.1	S-19	4.6276	3.7209	4.4909	3.8151	5.3135	3.1529	3.5234	2.7405	3.3034	2.7049	3.2162	4.8040	4.3277
1101.1	S-20	4.8689	3.9515	4.6241	4.0169	5.2774	3.0290	3.6821	2.8957	3.5187	2.9648	3.8775	5.0481	4.5772
1101.1	S-21	4.8775	3.9979	4.4221	4.0108	5.0016	3.3642	3.7225	3.0894	3.5000	3.1875	3.2395	5.0448	4.5498
1101.1	S-22	4.5815	3.6146	4.1427	3.6486	4.6017	2.8423	3.3401	2.2648	2.9218	2.5518	2.6463	4.7111	4.1229
1101.1	S-23	5.2163	4.4176	4.6320	4.4374	4.9818	3.6693	4.1758	3.2596	3.9282	3.5994	3.7493	5.4110	4.9689
1101.1	S-24	4.7062	3.9221	4.3768	3.9331	4.8348	3.1386	3.6982	2.9369	3.4347	3.0762	3.2051	4.9059	4.4724
1101.1	S-25	4.6524	3.8123	4.3153	3.8414	4.8710	3.0472	3.5527	2.8904	3.3345	3.0468	3.1486	4.8357	4.3725
1101.1	S-26	5.0182	4.2377	4.6127	4.2556	5.0996	3.5014	3.9755	3.3161	3.7603	3.4462	3.7008	5.2249	4.8032
1101.1	S-27	4.8777	4.1814	4.4984	4.2327	4.8717	3.3198	3.9106	3.1084	3.6308	3.3515	3.4932	5.1102	4.7277
1101.1	S-28	4.6127	3.7043	4.3481	3.8715	4.9653	3.0660	3.5606	2.5593	3.3398	2.7129	3.1774	4.7984	4.3399
1101.1	S-29	4.6641	3.8370	4.3802	3.9465	4.9881	3.0103	3.5907	2.4129	3.3798	2.8080	3.2840	4.8573	4.4125
1101.1	S-30	4.6258	3.8038	4.2301	3.8946	4.9546	3.1502	3.5451	2.7568	3.4633	2.8024	3.3373	4.8304	4.4051
1101.1	S-31	4.8607	4.1233	4.4779	4.1480	4.7387	3.3142	3.8696	3.2358	3.6459	3.4666	3.6405	5.0892	4.7012
1101.1	S-32	5.0657	4.3340	4.6333	4.3633	5.1482	3.5079	4.0725	3.2821	3.7729	3.5430	3.8178	5.2876	4.8899
1101.1	S-33	5.2428	4.5186	4.7385	4.5183	4.9719	3.7044	4.2268	3.5186	3.9801	3.7514	3.9827	5.4638	5.0645
1101.1	S-34	5.0586	4.3129	4.6048	4.3143	5.1431	3.4593	4.0044	3.2042	3.7432	3.4602	3.9358	5.2724	4.8621
1101.1	S-35	4.9266	4.1149	4.5225	4.1583	5.2020	3.3244	3.8038	2.8809	3.6108	3.2434	3.9026	5.1302	4.7032
1101.1	S-36	4.8428	4.0641	4.5084	4.1298	5.2119	3.5197	3.8007	2.9892	3.5226	3.2489	3.2767	5.0504	4.6302
1101.1	S-37	5.0440	4.2712	4.5434	4.2734	5.1992	3.4570	3.9639	3.2056	3.7634	3.3941	3.6026	5.2407	4.8021
1101.1	S-38	4.8218	3.9840	4.4588	3.9625	4.6805	3.2868	3.6891	2.9553	3.5393	3.0158	3.4366	5.0005	4.5285
1101.1	S-39	4.6624	3.8681	4.3304	3.8761	4.6247	3.1790	3.5932	2.8324	3.3040	3.0193	3.3267	4.8582	4.4181
1101.1	S-40	4.8243	4.0243	4.5623	4.0679	4.8628	3.3194	3.7636	3.0769	3.4735	3.1983	3.4645	5.0235	4.5890
1101.1	S-41	4.5583	3.7531	4.1721	3.7325	4.6362	3.0793	3.4611	2.8699	3.1508	3.0080	3.2539	4.7505	4.3038
1101.1	S-42	4.7459	3.9211	4.3232	3.9385	4.7560	3.1210	3.6323	2.9759	3.4502	3.1875	3.6527	4.9451	4.5109
1101.1	S-43	4.5355	3.7808	4.2084	3.7710	4.7313	3.1193	3.4969	2.9305	3.1732	3.1143	3.3556	4.7530	4.3484
1101.1	S-44	4.7977	3.9729	4.4991	3.9823	4.8694	3.1746	3.6856	3.0092	3.4510	3.1791	3.7064	4.9936	4.5536
1101.1	S-45	4.7728	4.0055	4.3915	3.9748	4.8473	3.2499	3.6973	3.0627	3.3878	3.2143	3.6329	4.9783	4.5545
1101.1	S-46	4.8053	4.0432	4.4631	4.0560	4.9946	3.3610	3.7567	3.1866	3.5127	3.2927	3.5607	5.0199	4.6109
1101.1	S-47	4.6970	3.7692	4.3878	3.7489	5.0086	2.9779	3.4559	2.8171	3.2899	2.8539	3.6252	4.8610	4.3586
1101.1	S-48	4.4274	3.5771	4.0464	3.5396	4.9006	3.0076	3.2855	2.7748	2.9952	2.8976	3.3281	4.6175	4.1671
1101.1	S-49	4.3883	3.5373	4.0143	3.4792	4.9178	2.9030	3.2075	2.6540	2.8790	2.7528	3.0879	4.5601	4.0744
1101.1	S-50	4.4773	3.4943	4.1239	3.5130	5.0058	3.0054	3.1600	2.7068	2.9657	2.6947	3.0593	4.6225	4.0760
1101.1	S-51	4.5060	3.5475	4.1291	3.5730	4.9482	2.9165	3.2557	2.5582	3.0119	2.6221	3.0509	4.6522	4.1082
1101.1	S-52	4.3578	3.5809	3.9377	3.5109	4.9345	2.8937	3.2353	2.6528	2.8841	2.8828	3.0171	4.5486	4.0995
1101.1	S-53	4.6897	4.0298	4.4127	4.0739	5.0617	3.6406	3.8245	3.3672	3.5455	3.4827	3.4350	4.9739	4.6553
1101.1	S-54	4.4622	3.7462	4.1364	3.7567	4.9015	3.1457	3.4874	2.8637	3.1727	3.1469	3.1768	4.6978	4.3197
1101.1	S-55	4.5210	3.7667	4.1794	3.7896	4.9370	3.3923	3.5116	3.0087	3.2107	3.2113	3.2045	4.7542	4.3728
1101.1	S-56	4.3522	3.5996	3.9920	3.5555	4.8712	2.9149	3.2978	2.6894	3.0151	2.9240	2.9660	4.5583	4.1357

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C_1-C_6 HYDROCARBON DATA REPORT

SAMPLE METHOD: SURFACE SOILS
ANALYTICAL METHOD: THERMAL DESORPTION
Analysis Completed: July 16 and AUGUST 7, 2001

Lab Project ID #	Client ID#	Log Data												
		Methane	Ethane	Ethene	Propane	Propene	iButane	nButane	I-Pentane	nPentane	I-Hexane	nHexane	C1+	C2+
1101.1	S-57	4.4202	3.6451	4.1473	3.6851	4.9036	3.0859	3.4144	2.7710	3.0555	2.9682	3.1615	4.6385	4.2351
1101.1	S-58	4.5600	3.6792	4.1951	3.7517	4.9787	3.2921	3.4612	3.0167	3.2055	3.1049	3.1124	4.7543	4.3115
1101.1	S-59	4.4512	3.4375	4.3710	3.6349	5.0936	3.4135	3.2975	3.0127	2.9564	3.0024	2.9527	4.6407	4.1893
1101.1	S-60	4.3732	3.2670	4.1004	3.3231	4.9716	3.0155	3.0189	2.5020	2.7413	2.5334	2.8058	4.4983	3.8968
1101.1	S-61	4.5576	3.5845	4.1712	3.6667	4.9658	3.0116	3.3388	2.7190	3.0628	2.8863	3.2055	4.7148	4.1972
1101.1	S-62	4.4157	3.3941	4.1388	3.3588	4.7986	2.7084	3.0228	2.9054	3.3267	2.4099	3.1835	4.5691	4.0428
1101.1	S-63	4.8551	3.8170	4.4432	3.7860	5.1570	3.1019	3.4736	3.3383	3.5890	2.9993	3.5629	4.9968	4.4413
1101.1	S-64	4.5820	3.5602	4.2782	3.4217	5.0403	2.8129	3.1145	2.8082	3.7559	2.5776	3.3553	4.7435	4.2359
1101.1	S-65	4.8288	3.9328	4.4135	3.8323	5.0747	3.1777	3.5650	3.3745	3.7264	3.0823	3.8345	5.0158	4.5596
1101.1	S-66	4.6322	3.8682	4.3551	3.9703	4.4790	3.0145	3.6658	2.7234	3.4348	2.7816	3.2278	4.8501	4.4461
1101.1	S-67	4.7652	3.8762	4.3669	3.8542	5.0919	3.1368	3.6002	3.3627	3.9201	3.0664	3.8451	4.9870	4.5890
1101.1	S-68	4.6076	3.5376	4.3810	3.6393	5.1270	2.9697	3.3453	2.9748	3.9330	2.4980	3.3077	4.8016	4.3582
1101.1	S-69	4.7208	3.9178	4.3760	3.9464	5.1658	3.5297	3.6934	3.3835	3.7867	3.3590	3.5092	4.9641	4.5965
1101.1	S-70	4.3281	3.2325	4.0402	3.3229	5.0678	2.9774	3.0426	2.6906	3.6243	2.3484	2.6474	4.5121	4.0504
1101.1	S-71	4.3098	3.2029	4.0004	3.2405	5.1371	2.8337	2.9558	2.6390	3.5475	2.3969	2.9442	4.4832	4.0005
1101.1	S-72	4.3288	3.1331	3.9627	3.1945	5.0985	2.8151	2.7269	2.4686	3.4993	2.3838	2.9105	4.4762	3.9354
1101.1	S-73	4.5528	3.7607	4.2128	3.7744	4.9212	3.0374	3.4521	3.2071	3.3620	2.9713	3.4357	4.7703	4.3657
1101.1	S-74	4.3446	3.3990	3.8773	3.2709	5.0048	2.6686	2.9493	2.6508	3.4421	2.4711	2.9793	4.5092	4.0083
1101.1	S-75	4.1741	3.3024	3.7661	3.2702	4.8005	2.7542	2.8999	2.5031	3.3245	2.5263	2.8175	4.3726	3.9372
1101.1	S-76	4.3493	3.5879	4.1517	3.6175	4.7876	2.8887	3.3219	3.1637	3.2019	2.7509	3.0371	4.5791	4.1929
1101.1	S-77	4.5936	3.6348	4.2458	3.7148	5.1306	3.1176	3.3748	3.1608	3.4837	2.9079	3.1472	4.7717	4.2986
1101.1	S-78	4.1376	3.3904	3.7418	3.3914	4.8981	2.4135	3.0147	2.4085	2.9330	2.6617	3.1750	4.3619	3.9676
1101.1	S-79	4.5833	3.6988	4.2316	3.7531	5.0259	2.8853	3.3909	2.4110	3.1282	2.7588	2.8450	4.7409	4.2244
1101.1	S-80	4.7152	3.5782	4.5022	3.9621	5.0631	3.4861	3.5329	3.0972	3.3852	3.0114	3.0520	4.8874	4.4024
1101.1	S-81	4.4777	3.6574	4.2074	3.6525	4.5045	2.8940	3.2754	2.4039	2.7913	2.5983	2.6447	4.6380	4.1276
1101.1	S-82	4.7853	4.0155	4.4425	4.0986	4.8939	3.1905	3.7677	2.8021	3.6838	3.0704	3.4777	5.0041	4.6016
1101.1	S-83	4.6002	3.7338	4.2812	3.8344	5.0459	3.0862	3.5489	2.5963	3.3252	2.7879	3.2324	4.7900	4.3392
1101.1	S-84	4.4925	3.7820	4.3041	3.7763	5.0047	3.0831	3.4974	2.7219	3.2209	2.8604	3.0360	4.7115	4.3093
1101.1	S-85	4.8328	4.0660	4.4764	4.1612	4.7959	3.3089	3.8284	3.0871	3.6807	3.1349	3.5356	5.0560	4.6601
1101.1	S-86	4.5247	3.7503	4.2818	3.8447	4.8972	3.0253	3.5407	2.5659	3.2860	2.7238	3.3292	4.7450	4.3447
1101.1	S-87	4.6313	3.8096	4.1573	3.8450	4.9982	2.8716	3.4391	2.4379	3.2914	2.6413	2.6144	4.7980	4.3015
1101.1	S-88	4.3557	3.5640	4.0472	3.5749	4.9303	2.9426	3.2432	2.5107	2.9065	2.5928	2.7198	4.5413	4.0826
1101.1	S-89	4.1311	3.4468	3.9475	3.4193	4.9957	2.7897	3.1615	2.5528	2.8101	2.5857	2.4444	4.3556	3.9617
1101.1	S-90	4.2842	3.5788	3.9379	3.5045	5.0947	2.8622	3.1953	2.6170	2.9554	2.7827	2.5023	4.4880	4.0616
1101.1	S-91	4.4647	3.5639	4.3395	3.6637	5.1366	2.7657	3.2803	2.1619	3.0690	2.4337	2.9127	4.6266	4.1196
1101.1	S-92	4.7945	3.9028	4.4515	3.9372	5.1453	2.9346	3.5143	2.5834	3.3760	2.7528	3.2140	4.9447	4.4106
1101.1	S-93	4.5511	3.6822	4.3056	3.7680	5.1546	2.9961	3.3443	2.2189	3.1515	2.5196	2.8883	4.7171	4.2191
1101.1	S-94	4.2060	3.1490	3.7128	3.1227	4.9994	2.7832	2.8858	2.5887	3.1796	2.3073	3.0837	4.3710	3.8708
1101.1	S-95	4.6022	3.3788	4.1217	3.4252	4.8506	2.4797	3.0562	2.2994	3.0567	2.6602	3.1078	4.6954	3.9810
1101.1	S-96	4.2880	3.1020	3.8435	3.2459	5.0443	2.6845	3.0206	1.5630	2.7771	2.2127	3.4575	4.4414	3.9151
1101.1	S-97	4.3325	3.2361	3.8335	3.3860	4.9187	2.4855	3.0827	2.0186	2.8258	2.2771	3.1864	4.4724	3.9122
1101.1	S-98	4.7636	3.7870	4.2688	3.8487	5.3319	2.9547	3.5891	2.5733	3.5593	2.7692	3.4205	4.9202	4.4012
1101.1	S-99	4.1746	3.0938	3.6905	3.0714	4.7679	2.5642	2.8262	2.2978	2.7907	2.1279	2.9865	4.3080	3.7305
1101.1	S-100	4.7076	3.6293	4.2626	3.7074	4.8858	2.7507	3.4030	2.5340	3.4173	2.8113	3.5563	4.8491	4.2934
1101.1	S-101	4.8487	3.7630	4.3701	3.8725	5.2895	2.9557	3.5513	2.4000	3.4433	2.8850	3.5058	4.9791	4.3929
1101.1	S-102	4.7728	3.5689	4.3614	3.6820	5.5714	2.7962	3.2244	2.3676	3.4644	2.6474	3.2810	4.8784	4.2126
1101.1	S-103	4.7253	3.5865	4.3733	3.7117	5.2932	2.7460	3.4246	2.7410	3.5172	2.5887	3.5668	4.8649	4.3041
1101.1	S-104	4.6392	3.5410	4.2563	3.5943	5.2787	2.5950	3.2937	1.9457	3.2232	2.4534	3.1652	4.7547	4.1229
1101.1	S-105	4.7450	3.6507	4.3487	3.7573	5.3722	2.8031	3.4903	2.3893	3.4533	2.6287	3.4039	4.8783	4.3003
1101.1	S-106	4.0231	2.8598	3.6414	2.9113	5.1034	2.4370	2.7110	0.4996	2.3254	1.6242	3.2740	4.1763	3.6497
1101.1	S-107	4.5440	3.4304	4.1886	3.4477	5.1648	2.4918	3.1422	1.2699	3.1064	2.4638	3.5849	4.6778	4.1013
1101.1	S-108	4.6407	3.5741	4.2212	3.6606	5.2836	2.7243	3.3772	2.2705	3.2075	2.5798	3.4890	4.7798	4.2176
1101.1	S-109	4.6148	3.5761	4.1424	3.6400	4.5407	2.5960	3.3223	2.6656	3.4695	2.5541	3.3451	4.7619	4.2204
1101.1	TOWN FARM COMP 1	4.6762	4.1794	4.6123	4.2751	5.0855	4.2364	3.9071	3.5949	3.8530	3.8443	4.5361	5.2017	5.0480
1101.1	TOWN FARM COMP 3	4.5845	3.7633	4.3096	3.8846	4.6735	3.1214	3.5411	2.7071	3.3556	2.9823	3.2913	4.7950	4.3794
1101.1	EVAN COMP	4.5575	3.9540	4.5213	3.9895	5.1387	3.0866	3.5981	2.9264	3.3890	3.2022	3.2288	4.8236	4.4846
1101.1	BERG COMP	4.6329	3.9277	4.4515	3.7843	5.0268	3.0220	3.3711	2.3825	3.1903	2.8837	2.8349	4.8071	4.3262

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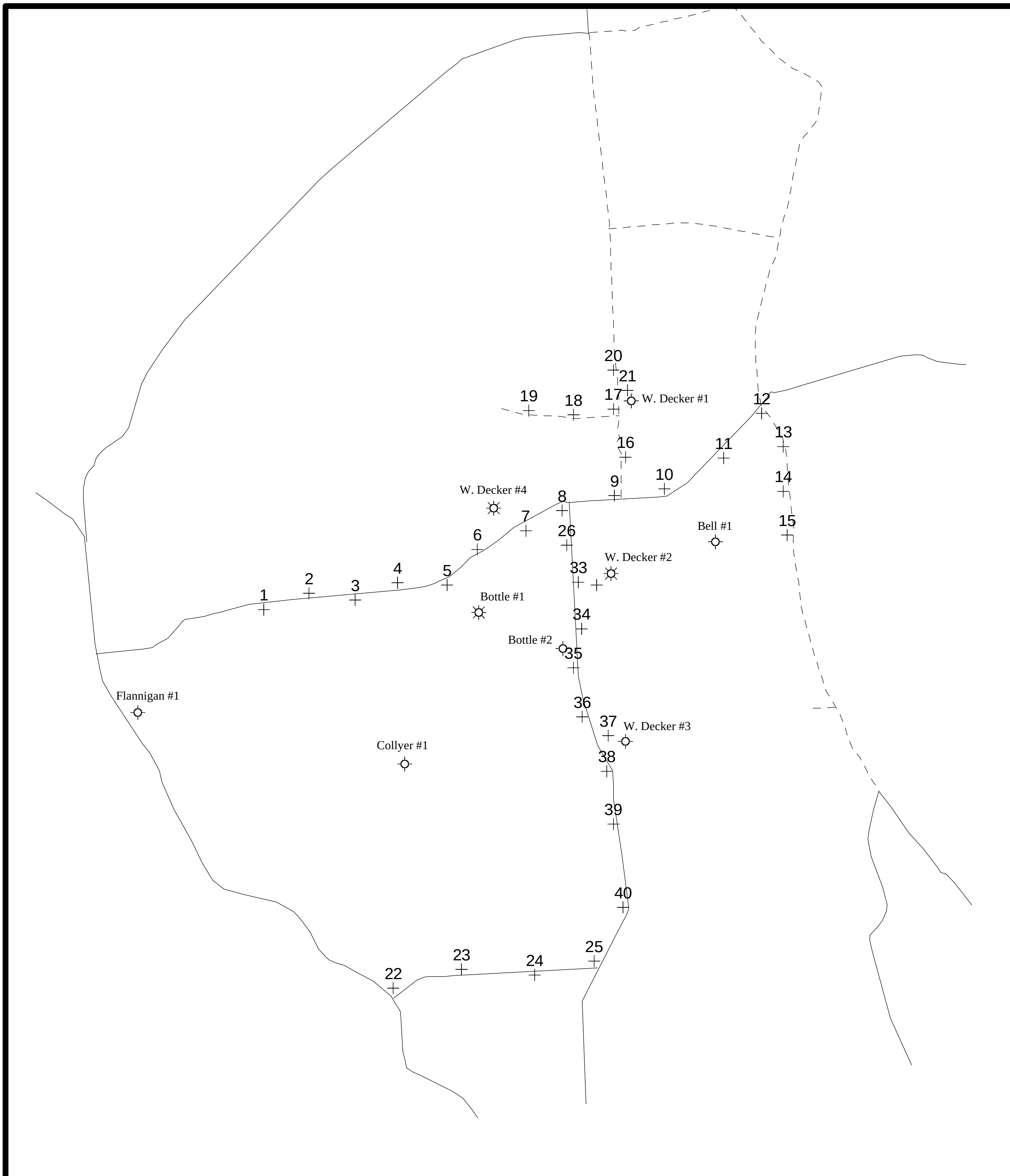
APPENDIX C

GENEGANSLET SOIL GAS DATA AND SAMPLE LOCATION MAP



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Client:

Project #: 1101.3

Date: August, 2001

Drawn by: MAV

GENEGANSLET

Sample Location

C_1-C_6 HYDROCARBON DATA REPORT--Devonian Fractured Shale

SAMPLE METHOD: SURFACE SOILS
ANALYTICAL METHOD: THERMAL DESORPTION
Analysis Completed: July 16, 2001

Lab Project ID #	Client ID#	C1-C6 Hydrocarbons (ppb in headspace)											Summations			
		Methane	Ethane	Ethene	Propane	Propene	iButane	nButane	I-Pentane	nPentane	I-Hexane	nHexane	C1+	C2+	C3+	C4+
1101.3	G-01	33462	3569	16753	4674	43808	485	2062	187	1071	302	825	46636	13173	9605	4931
1101.3	G-02	50508	5321	25765	7661	51342	796	3228	448	1919	475	1488	71844	21336	16015	8354
1101.3	G-03	57112	5813	25088	7632	68990	1109	3115	519	1953	575	3951	81781	24668	18855	11223
1101.3	G-04	61977	7396	28588	8799	83761	900	3515	384	2285	645	1322	87223	25246	17850	9051
1101.3	G-05	54823	7233	24691	8388	76129	919	3895	282	2464	621	1278	79902	25079	17846	9458
1101.3	G-06	34739	3990	18907	5725	81456	522	2407	256	1488	361	1049	50538	15798	11808	6084
1101.3	G-07	77274	10195	27623	12639	91183	1562	5766	522	3888	1239	2966	116051	38777	28582	15943
1101.3	G-08	45449	4252	22951	5251	111023	517	2099	321	1577	427	470	60363	14914	10662	5411
1101.3	G-09	27949	3188	17658	4400	45797	502	2041	419	1619	259	1057	41434	13485	10297	5897
1101.3	G-10	118417	20591	39504	23607	140715	3955	12122	1839	6801	3180	8473	198986	80569	59977	36370
1101.3	G-11	55513	6731	23891	8045	116802	827	3438	409	2099	677	1797	79536	24023	17292	9247
1101.3	G-12	54249	5716	24030	7364	114720	691	3064	284	1824	742	3175	77109	22860	17143	9779
1101.3	G-13	43059	4265	18206	5335	115351	536	1979	269	1221	494	1131	58290	15230	10965	5630
1101.3	G-14	49288	4593	20560	5864	67675	449	2158	333	1480	379	1149	65692	16404	11811	5948
1101.3	G-15	43216	4767	22296	6531	76541	672	2740	177	1594	507	1451	61655	18439	13672	7141
1101.3	G-16	51654	5509	24095	7712	122336	749	3165	350	2027	565	3931	75662	24008	18499	10787
1101.3	G-17	48775	5041	24470	6012	139322	675	2599	227	1541	444	1221	66535	17759	12719	6707
1101.3	G-18	40104	4551	20015	5544	128828	481	2605	182	1763	345	1042	56617	16513	11962	6417
1101.3	G-19	31802	2968	17439	3121	112535	206	1168	209	877	395	1193	41939	10137	7169	4048
1101.3	G-20	33337	3138	18333	3360	153265	414	1659	168	1495	339	1250	45160	11823	8685	5325
1101.3	G-21	34850	3590	20909	4354	89984	377	1995	217	1304	384	1981	49052	14202	10612	6258
1101.3	G-22	45721	4426	25431	6042	156372	549	2522	281	1617	421	1590	63168	17447	13021	6979
1101.3	G-23	73964	11233	28400	12939	155578	1904	5626	752	3122	1929	3043	114513	40549	29316	16376
1101.3	G-24	65601	9014	25465	10472	155298	998	4422	432	2433	881	2344	96597	30996	21982	11510
1101.3	G-25	79191	8939	34036	8473	68326	1176	3639	1277	2764	948	2806	109211	30020	21082	12609
1101.3	G-26	71208	7756	37079	7290	105156	1056	3101	373	1799	543	2052	95179	23971	16214	8924
1101.3	G-27	63915	6699	39379	9289	158787	1413	3890	2104	2256	568	2830	92964	29049	22350	13060
1101.3	G-28	56519	6290	32742	8000	152668	1485	3551	1813	2579	560	1367	82163	25644	19354	11354
1101.3	G-29	50065	4448	36213	5790	151750	2303	2513	1430	3480	511	1618	72159	22094	17645	11856
1101.3	G-30	20703	5851	41771	7616	179923	1411	3127	1478	2534	456	1233	44409	23706	17855	10240
1101.3	G-31	71788	7911	36460	9536	170657	2580	4161	2019	2503	860	2017	103375	31586	23676	14140
1101.3	G-32	48711	6410	35089	9104	44477	1532	4337	328	5243	788	4622	81074	32364	25953	16850
1101.3	G-33	44015	4747	36002	7455	49861	1134	3497	587	5569	592	4334	71929	27915	23167	15713
1101.3	G-34	51270	6101	28394	7925	41752	1200	3753	586	5760	694	5354	82643	31373	25272	17347
1101.3	G-35	106154	12806	51978	14029	141203	4687	7476	5166	11410	2510	15610	179848	73694	60887	46858
1101.3	G-36	67032	9286	39837	11416	93917	1796	5095	644	6444	875	4007	106595	39563	30278	18861
1101.3	G-37	51949	5667	33895	7074	107220	1230	3404	270	4457	455	5109	79614	27665	21999	14925
1101.3	G-38	50407	5857	26338	7312	73763	1079	3350	375	4119	725	10918	84141	33734	27878	20565
1101.3	G-39	54530	6085	30556	7606	70973	990	3712	320	4848	602	10094	88788	34258	28173	20566
1101.3	G-40	64287	9475	42055	11643	81797	2211	6207	1140	7942	1827	10627	115358	51071	41596	29953

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C_1-C_6 HYDROCARBON DATA REPORT--Devonian Fractur

SAMPLE METHOD: SURFACE SOILS
ANALYTICAL METHOD: THERMAL DESORPTION
Analysis Completed: July 16, 2001

		Normalized from C1+										
Lab Project ID #	Client ID#	Methane	Ethane	Propane	iButane	nButane	I-Pentane	nPentane	I-Hexane	nHexane	Ethene	Propene
1101.3	G-01	71.75	7.65	10.02	1.04	4.42	0.40	2.30	0.65	1.77	35.92	93.94
1101.3	G-02	70.30	7.41	10.66	1.11	4.49	0.62	2.67	0.66	2.07	35.86	71.46
1101.3	G-03	69.84	7.11	9.33	1.36	3.81	0.63	2.39	0.70	4.83	30.68	84.36
1101.3	G-04	71.06	8.48	10.09	1.03	4.03	0.44	2.62	0.74	1.52	32.78	96.03
1101.3	G-05	68.61	9.05	10.50	1.15	4.88	0.35	3.08	0.78	1.60	30.90	95.28
1101.3	G-06	68.74	7.90	11.33	1.03	4.76	0.51	2.95	0.71	2.08	37.41	161.18
1101.3	G-07	66.59	8.78	10.89	1.35	4.97	0.45	3.35	1.07	2.56	23.80	78.57
1101.3	G-08	75.29	7.04	8.70	0.86	3.48	0.53	2.61	0.71	0.78	38.02	183.93
1101.3	G-09	67.45	7.70	10.62	1.21	4.93	1.01	3.91	0.63	2.55	42.62	110.53
1101.3	G-10	59.51	10.35	11.86	1.99	6.09	0.92	3.42	1.60	4.26	19.85	70.72
1101.3	G-11	69.80	8.46	10.12	1.04	4.32	0.51	2.64	0.85	2.26	30.04	146.86
1101.3	G-12	70.35	7.41	9.55	0.90	3.97	0.37	2.37	0.96	4.12	31.16	148.78
1101.3	G-13	73.87	7.32	9.15	0.92	3.39	0.46	2.09	0.85	1.94	31.23	197.89
1101.3	G-14	75.03	6.99	8.93	0.68	3.29	0.51	2.25	0.58	1.75	31.30	103.02
1101.3	G-15	70.09	7.73	10.59	1.09	4.44	0.29	2.59	0.82	2.35	36.16	124.14
1101.3	G-16	68.27	7.28	10.19	0.99	4.18	0.46	2.68	0.75	5.20	31.84	161.69
1101.3	G-17	73.31	7.58	9.04	1.01	3.91	0.34	2.32	0.67	1.83	36.78	209.40
1101.3	G-18	70.83	8.04	9.79	0.85	4.60	0.32	3.11	0.61	1.84	35.35	227.54
1101.3	G-19	75.83	7.08	7.44	0.49	2.79	0.50	2.09	0.94	2.84	41.58	268.33
1101.3	G-20	73.82	6.95	7.44	0.92	3.67	0.37	3.31	0.75	2.77	40.60	339.38
1101.3	G-21	71.05	7.32	8.88	0.77	4.07	0.44	2.66	0.78	4.04	42.63	183.45
1101.3	G-22	72.38	7.01	9.57	0.87	3.99	0.44	2.56	0.67	2.52	40.26	247.55
1101.3	G-23	64.59	9.81	11.30	1.66	4.91	0.66	2.73	1.68	2.66	24.80	135.86
1101.3	G-24	67.91	9.33	10.84	1.03	4.58	0.45	2.52	0.91	2.43	26.36	160.77
1101.3	G-25	72.51	8.18	7.76	1.08	3.33	1.17	2.53	0.87	2.57	31.17	62.56
1101.3	G-26	74.81	8.15	7.66	1.11	3.26	0.39	1.89	0.57	2.16	38.96	110.48
1101.3	G-27	68.75	7.21	9.99	1.52	4.18	2.26	2.43	0.61	3.04	42.36	170.80
1101.3	G-28	68.79	7.66	9.74	1.81	4.32	2.21	3.14	0.68	1.66	39.85	185.81
1101.3	G-29	69.38	6.16	8.02	3.19	3.48	1.98	4.82	0.71	2.24	50.18	210.30
1101.3	G-30	46.62	13.17	17.15	3.18	7.04	3.33	5.71	1.03	2.78	94.06	405.15
1101.3	G-31	69.44	7.65	9.22	2.50	4.03	1.95	2.42	0.83	1.95	35.27	165.09
1101.3	G-32	60.08	7.91	11.23	1.89	5.35	0.40	6.47	0.97	5.70	43.28	54.86
1101.3	G-33	61.19	6.60	10.36	1.58	4.86	0.82	7.74	0.82	6.03	50.05	69.32
1101.3	G-34	62.04	7.38	9.59	1.45	4.54	0.71	6.97	0.84	6.48	34.36	50.52
1101.3	G-35	59.02	7.12	7.80	2.61	4.16	2.87	6.34	1.40	8.68	28.90	78.51
1101.3	G-36	62.88	8.71	10.71	1.68	4.78	0.60	6.05	0.82	3.76	37.37	88.11
1101.3	G-37	65.25	7.12	8.89	1.54	4.28	0.34	5.60	0.57	6.42	42.57	134.68
1101.3	G-38	59.91	6.96	8.69	1.28	3.98	0.45	4.89	0.86	12.98	31.30	87.67
1101.3	G-39	61.42	6.85	8.57	1.12	4.18	0.36	5.46	0.68	11.37	34.41	79.93
1101.3	G-40	55.73	8.21	10.09	1.92	5.38	0.99	6.88	1.58	9.21	36.46	70.91

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C_1-C_6 HYDROCARBON DATA REPORT--Devonian Fr

SAMPLE METHOD: SURFACE SOILS
ANALYTICAL METHOD: THERMAL DESORPTION
Analysis Completed: July 16, 2001

		Normalized from C2+									
Lab Project ID #	Client ID#	Ethane	Propane	iButane	nButane	I-Pentane	nPentane	I-Hexane	nHexane	Ethene	Propene
1101.3	G-01	27.09	35.48	3.68	15.65	1.42	8.13	2.29	6.26	127.2	332.6
1101.3	G-02	24.94	35.91	3.73	15.13	2.10	8.99	2.23	6.98	120.8	240.6
1101.3	G-03	23.57	30.94	4.50	12.63	2.10	7.92	2.33	16.02	101.7	279.7
1101.3	G-04	29.29	34.85	3.56	13.92	1.52	9.05	2.56	5.24	113.2	331.8
1101.3	G-05	28.84	33.45	3.66	15.53	1.12	9.82	2.48	5.09	98.5	303.6
1101.3	G-06	25.26	36.24	3.30	15.24	1.62	9.42	2.28	6.64	119.7	515.6
1101.3	G-07	26.29	32.59	4.03	14.87	1.35	10.03	3.20	7.65	71.2	235.1
1101.3	G-08	28.51	35.21	3.47	14.08	2.15	10.57	2.86	3.15	153.9	744.4
1101.3	G-09	23.64	32.63	3.72	15.13	3.11	12.00	1.92	7.84	130.9	339.6
1101.3	G-10	25.56	29.30	4.91	15.05	2.28	8.44	3.95	10.52	49.0	174.7
1101.3	G-11	28.02	33.49	3.44	14.31	1.70	8.74	2.82	7.48	99.5	486.2
1101.3	G-12	25.01	32.21	3.02	13.40	1.24	7.98	3.25	13.89	105.1	501.8
1101.3	G-13	28.00	35.03	3.52	12.99	1.77	8.01	3.24	7.43	119.5	757.4
1101.3	G-14	28.00	35.74	2.74	13.16	2.03	9.02	2.31	7.00	125.3	412.6
1101.3	G-15	25.85	35.42	3.64	14.86	0.96	8.65	2.75	7.87	120.9	415.1
1101.3	G-16	22.95	32.12	3.12	13.18	1.46	8.44	2.35	16.37	100.4	509.6
1101.3	G-17	28.38	33.85	3.80	14.64	1.28	8.68	2.50	6.87	137.8	784.5
1101.3	G-18	27.56	33.58	2.91	15.78	1.10	10.67	2.09	6.31	121.2	780.2
1101.3	G-19	29.28	30.79	2.03	11.52	2.06	8.65	3.90	11.77	172.0	1110.1
1101.3	G-20	26.54	28.42	3.51	14.03	1.42	12.64	2.87	10.57	155.1	1296.4
1101.3	G-21	25.28	30.66	2.66	14.04	1.53	9.18	2.71	13.95	147.2	633.6
1101.3	G-22	25.37	34.63	3.15	14.45	1.61	9.27	2.41	9.11	145.8	896.3
1101.3	G-23	27.70	31.91	4.70	13.87	1.85	7.70	4.76	7.51	70.0	383.7
1101.3	G-24	29.08	33.78	3.22	14.27	1.39	7.85	2.84	7.56	82.2	501.0
1101.3	G-25	29.78	28.22	3.92	12.12	4.25	9.21	3.16	9.35	113.4	227.6
1101.3	G-26	32.36	30.41	4.40	12.94	1.55	7.51	2.26	8.56	154.7	438.7
1101.3	G-27	23.06	31.98	4.86	13.39	7.24	7.77	1.95	9.74	135.6	546.6
1101.3	G-28	24.53	31.20	5.79	13.85	7.07	10.06	2.18	5.33	127.7	595.3
1101.3	G-29	20.13	26.21	10.42	11.37	6.47	15.75	2.31	7.32	163.9	686.8
1101.3	G-30	24.68	32.13	5.95	13.19	6.23	10.69	1.93	5.20	176.2	759.0
1101.3	G-31	25.04	30.19	8.17	13.17	6.39	7.92	2.72	6.38	115.4	540.3
1101.3	G-32	19.81	28.13	4.73	13.40	1.01	16.20	2.43	14.28	108.4	137.4
1101.3	G-33	17.01	26.71	4.06	12.53	2.10	19.95	2.12	15.53	129.0	178.6
1101.3	G-34	19.45	25.26	3.83	11.96	1.87	18.36	2.21	17.06	90.5	133.1
1101.3	G-35	17.38	19.04	6.36	10.14	7.01	15.48	3.41	21.18	70.5	191.6
1101.3	G-36	23.47	28.86	4.54	12.88	1.63	16.29	2.21	10.13	100.7	237.4
1101.3	G-37	20.48	25.57	4.45	12.31	0.98	16.11	1.64	18.47	122.5	387.6
1101.3	G-38	17.36	21.68	3.20	9.93	1.11	12.21	2.15	32.36	78.1	218.7
1101.3	G-39	17.76	22.20	2.89	10.84	0.93	14.15	1.76	29.46	89.2	207.2
1101.3	G-40	18.55	22.80	4.33	12.15	2.23	15.55	3.58	20.81	82.3	160.2

C_1-C_6 HYDROCARBON DATA REPORT--Devonian Frac

SAMPLE METHOD: SURFACE SOILS
ANALYTICAL METHOD: THERMAL DESORPTION
Analysis Completed: July 16, 2001

Lab Project ID #	Client ID#	Dryness Ratios		Wetness Ratios				Iso/Normal Ratios		
		%C1/C1+	%C2/C2+	%C2+/C1+	%C3+/C2+	%C4+/C1+	%C4+/C2+	C4	C5	C6
1101.3	G-01	71.8	27.1	28.2	72.9	10.6	37.4	0.2352	0.1745	0.3658
1101.3	G-02	70.3	24.9	29.7	75.1	11.6	39.2	0.2467	0.2333	0.3194
1101.3	G-03	69.8	23.6	30.2	76.4	13.7	45.5	0.3559	0.2655	0.1456
1101.3	G-04	71.1	29.3	28.9	70.7	10.4	35.9	0.2560	0.1680	0.4879
1101.3	G-05	68.6	28.8	31.4	71.2	11.8	37.7	0.2358	0.1143	0.4864
1101.3	G-06	68.7	25.3	31.3	74.7	12.0	38.5	0.2167	0.1722	0.3438
1101.3	G-07	66.6	26.3	33.4	73.7	13.7	41.1	0.2709	0.1342	0.4179
1101.3	G-08	75.3	28.5	24.7	71.5	9.0	36.3	0.2464	0.2035	0.9067
1101.3	G-09	67.5	23.6	32.5	76.4	14.2	43.7	0.2458	0.2588	0.2454
1101.3	G-10	59.5	25.6	40.5	74.4	18.3	45.1	0.3263	0.2704	0.3753
1101.3	G-11	69.8	28.0	30.2	72.0	11.6	38.5	0.2405	0.1949	0.3766
1101.3	G-12	70.4	25.0	29.6	75.0	12.7	42.8	0.2257	0.1555	0.2336
1101.3	G-13	73.9	28.0	26.1	72.0	9.7	37.0	0.2710	0.2208	0.4366
1101.3	G-14	75.0	28.0	25.0	72.0	9.1	36.3	0.2079	0.2246	0.3295
1101.3	G-15	70.1	25.9	29.9	74.1	11.6	38.7	0.2451	0.1108	0.3492
1101.3	G-16	68.3	22.9	31.7	77.1	14.3	44.9	0.2365	0.1727	0.1437
1101.3	G-17	73.3	28.4	26.7	71.6	10.1	37.8	0.2597	0.1472	0.3638
1101.3	G-18	70.8	27.6	29.2	72.4	11.3	38.9	0.1845	0.1035	0.3308
1101.3	G-19	75.8	29.3	24.2	70.7	9.7	39.9	0.1764	0.2380	0.3314
1101.3	G-20	73.8	26.5	26.2	73.5	11.8	45.0	0.2498	0.1125	0.2711
1101.3	G-21	71.0	25.3	29.0	74.7	12.8	44.1	0.1892	0.1664	0.1940
1101.3	G-22	72.4	25.4	27.6	74.6	11.0	40.0	0.2177	0.1737	0.2648
1101.3	G-23	64.6	27.7	35.4	72.3	14.3	40.4	0.3385	0.2409	0.6338
1101.3	G-24	67.9	29.1	32.1	70.9	11.9	37.1	0.2257	0.1776	0.3757
1101.3	G-25	72.5	29.8	27.5	70.2	11.5	42.0	0.3233	0.4621	0.3377
1101.3	G-26	74.8	32.4	25.2	67.6	9.4	37.2	0.3405	0.2071	0.2645
1101.3	G-27	68.8	23.1	31.2	76.9	14.0	45.0	0.3633	0.9325	0.2006
1101.3	G-28	68.8	24.5	31.2	75.5	13.8	44.3	0.4183	0.7029	0.4094
1101.3	G-29	69.4	20.1	30.6	79.9	16.4	53.7	0.9165	0.4109	0.3155
1101.3	G-30	46.6	24.7	53.4	75.3	23.1	43.2	0.4512	0.5832	0.3703
1101.3	G-31	69.4	25.0	30.6	75.0	13.7	44.8	0.6201	0.8066	0.4263
1101.3	G-32	60.1	19.8	39.9	80.2	20.8	52.1	0.3532	0.0626	0.1705
1101.3	G-33	61.2	17.0	38.8	83.0	21.8	56.3	0.3242	0.1054	0.1366
1101.3	G-34	62.0	19.4	38.0	80.6	21.0	55.3	0.3198	0.1017	0.1297
1101.3	G-35	59.0	17.4	41.0	82.6	26.1	63.6	0.6270	0.4528	0.1608
1101.3	G-36	62.9	23.5	37.1	76.5	17.7	47.7	0.3524	0.1000	0.2183
1101.3	G-37	65.3	20.5	34.7	79.5	18.7	53.9	0.3613	0.0607	0.0890
1101.3	G-38	59.9	17.4	40.1	82.6	24.4	61.0	0.3220	0.0912	0.0664
1101.3	G-39	61.4	17.8	38.6	82.2	23.2	60.0	0.2668	0.0660	0.0597
1101.3	G-40	55.7	18.6	44.3	81.4	26.0	58.6	0.3561	0.1436	0.1719

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C_1-C_6 HYDROCARBON DATA REPORT--Devonian Fractured Shale

SAMPLE METHOD: SURFACE SOILS
ANALYTICAL METHOD: THERMAL DESORPTION
Analysis Completed: July 16, 2001

		Hydrocarbon Ratios														
Lab Project ID #	Client ID#	C2/C1	C3/C1	C4/C1	C5/C1	C6/C1	C3/C2	C4/C2	C5/C2	C6/C2	C4/C3	C5/C3	C6/C3	C5/C4	C6/C4	C6/C5
1101.3	G-01	0.1067	0.1397	0.0616	0.0320	0.0246	1.3096	0.5778	0.3000	0.0845	0.4412	0.2291	0.1765	0.5192	0.4000	0.7704
1101.3	G-02	0.1053	0.1517	0.0639	0.0380	0.0295	1.4398	0.6066	0.3606	0.0893	0.4213	0.2505	0.1943	0.5945	0.4612	0.7758
1101.3	G-03	0.1018	0.1336	0.0545	0.0342	0.0692	1.3128	0.5359	0.3360	0.0990	0.4082	0.2559	0.5177	0.6270	1.2682	2.0227
1101.3	G-04	0.1193	0.1420	0.0567	0.0369	0.0213	1.1898	0.4753	0.3090	0.0872	0.3994	0.2597	0.1503	0.6501	0.3762	0.5786
1101.3	G-05	0.1319	0.1530	0.0711	0.0449	0.0233	1.1598	0.5386	0.3407	0.0859	0.4644	0.2937	0.1523	0.6325	0.3280	0.5185
1101.3	G-06	0.1149	0.1648	0.0693	0.0428	0.0302	1.4347	0.6033	0.3730	0.0904	0.4205	0.2600	0.1833	0.6184	0.4359	0.7049
1101.3	G-07	0.1319	0.1636	0.0746	0.0503	0.0384	1.2398	0.5656	0.3813	0.1216	0.4562	0.3076	0.2346	0.6742	0.5143	0.7629
1101.3	G-08	0.0935	0.1155	0.0462	0.0347	0.0103	1.2351	0.4938	0.3709	0.1003	0.3998	0.3003	0.0896	0.7511	0.2241	0.2983
1101.3	G-09	0.1141	0.1574	0.0730	0.0579	0.0378	1.3800	0.6401	0.5077	0.0814	0.4638	0.3679	0.2403	0.7931	0.5180	0.6531
1101.3	G-10	0.1739	0.1994	0.1024	0.0574	0.0716	1.1465	0.5887	0.3303	0.1545	0.5135	0.2881	0.3589	0.5610	0.6990	1.2459
1101.3	G-11	0.1212	0.1449	0.0619	0.0378	0.0324	1.1954	0.5107	0.3119	0.1006	0.4273	0.2609	0.2234	0.6107	0.5228	0.8562
1101.3	G-12	0.1054	0.1357	0.0565	0.0336	0.0585	1.2883	0.5359	0.3191	0.1298	0.4160	0.2477	0.4312	0.5954	1.0365	1.7408
1101.3	G-13	0.0990	0.1239	0.0459	0.0283	0.0263	1.2510	0.4639	0.2862	0.1158	0.3708	0.2288	0.2120	0.6169	0.5718	0.9269
1101.3	G-14	0.0932	0.1190	0.0438	0.0300	0.0233	1.2767	0.4700	0.3223	0.0825	0.3681	0.2524	0.1960	0.6857	0.5323	0.7763
1101.3	G-15	0.1103	0.1511	0.0634	0.0369	0.0336	1.3700	0.5748	0.3344	0.1063	0.4196	0.2441	0.2222	0.5819	0.5296	0.9102
1101.3	G-16	0.1067	0.1493	0.0613	0.0392	0.0761	1.3999	0.5745	0.3679	0.1025	0.4104	0.2628	0.5097	0.6404	1.2420	1.9393
1101.3	G-17	0.1033	0.1233	0.0533	0.0316	0.0250	1.1928	0.5157	0.3057	0.0881	0.4323	0.2563	0.2030	0.5928	0.4696	0.7922
1101.3	G-18	0.1135	0.1382	0.0650	0.0439	0.0260	1.2182	0.5724	0.3872	0.0757	0.4699	0.3179	0.1879	0.6765	0.3998	0.5910
1101.3	G-19	0.0933	0.0981	0.0367	0.0276	0.0375	1.0513	0.3935	0.2953	0.1332	0.3743	0.2809	0.3823	0.7506	1.0214	1.3609
1101.3	G-20	0.0941	0.1008	0.0498	0.0448	0.0375	1.0709	0.5288	0.4763	0.1080	0.4937	0.4448	0.3719	0.9008	0.7531	0.8361
1101.3	G-21	0.1030	0.1249	0.0572	0.0374	0.0568	1.2127	0.5556	0.3632	0.1071	0.4581	0.2995	0.4550	0.6538	0.9931	1.5191
1101.3	G-22	0.0968	0.1322	0.0552	0.0354	0.0348	1.3653	0.5698	0.3653	0.0951	0.4173	0.2676	0.2631	0.6411	0.6304	0.9833
1101.3	G-23	0.1519	0.1749	0.0761	0.0422	0.0411	1.1519	0.5008	0.2780	0.1717	0.4348	0.2413	0.2352	0.5550	0.5410	0.9747
1101.3	G-24	0.1374	0.1596	0.0674	0.0371	0.0357	1.1617	0.4906	0.2699	0.0977	0.4223	0.2324	0.2238	0.5502	0.5299	0.9631
1101.3	G-25	0.1129	0.1070	0.0459	0.0349	0.0354	0.9478	0.4071	0.3092	0.1060	0.4294	0.3262	0.3312	0.7596	0.7712	1.0153
1101.3	G-26	0.1089	0.1024	0.0435	0.0253	0.0288	0.9399	0.3998	0.2320	0.0700	0.4253	0.2468	0.2815	0.5803	0.6619	1.1406
1101.3	G-27	0.1048	0.1453	0.0609	0.0353	0.0443	1.3867	0.5807	0.3368	0.0847	0.4188	0.2428	0.3046	0.5799	0.7274	1.2544
1101.3	G-28	0.1113	0.1415	0.0628	0.0456	0.0242	1.2718	0.5645	0.4100	0.0890	0.4438	0.3224	0.1708	0.7264	0.3849	0.5299
1101.3	G-29	0.0889	0.1156	0.0502	0.0695	0.0323	1.3015	0.5649	0.7824	0.1148	0.4340	0.6011	0.2795	1.3850	0.6440	0.4650
1101.3	G-30	0.2826	0.3679	0.1511	0.1224	0.0595	1.3017	0.5346	0.4331	0.0780	0.4107	0.3328	0.1619	0.8103	0.3942	0.4864
1101.3	G-31	0.1102	0.1328	0.0580	0.0349	0.0281	1.2055	0.5261	0.3164	0.1087	0.4364	0.2625	0.2115	0.6014	0.4846	0.8057
1101.3	G-32	0.1316	0.1869	0.0890	0.1076	0.0949	1.4201	0.6765	0.8179	0.1229	0.4764	0.5759	0.5078	1.2089	1.0659	0.8817
1101.3	G-33	0.1079	0.1694	0.0795	0.1265	0.0985	1.5704	0.7367	1.1731	0.1247	0.4691	0.7470	0.5814	1.5922	1.2392	0.7783
1101.3	G-34	0.1190	0.1546	0.0732	0.1123	0.1044	1.2989	0.6151	0.9441	0.1138	0.4736	0.7268	0.6755	1.5349	1.4265	0.9294
1101.3	G-35	0.1206	0.1322	0.0704	0.1075	0.1470	1.0955	0.5837	0.8909	0.1960	0.5329	0.8133	1.1127	1.5263	2.0881	1.3681
1101.3	G-36	0.1385	0.1703	0.0760	0.0961	0.0598	1.2295	0.5487	0.6940	0.0942	0.4463	0.5645	0.3510	1.2648	0.7864	0.6218
1101.3	G-37	0.1091	0.1362	0.0655	0.0858	0.0983	1.2483	0.6008	0.7866	0.0802	0.4812	0.6301	0.7222	1.3093	1.5007	1.1462
1101.3	G-38	0.1162	0.1451	0.0665	0.0817	0.2166	1.2485	0.5720	0.7032	0.1237	0.4582	0.5633	1.4931	1.2294	3.2589	2.6508
1101.3	G-39	0.1116	0.1395	0.0681	0.0889	0.1851	1.2500	0.6101	0.7967	0.0990	0.4880	0.6373	1.3270	1.3059	2.7190	2.0821
1101.3	G-40	0.1474	0.1811	0.0965	0.1235	0.1653	1.2288	0.6551	0.8382	0.1928	0.5331	0.6821	0.9127	1.2795	1.7121	1.3381

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C_1-C_6 HYDROCARBON DATA REPORT--Devonian Fractured Shale

SAMPLE METHOD: SURFACE SOILS
ANALYTICAL METHOD: THERMAL DESORPTION
Analysis Completed: July 16, 2001

		Log Data											
Lab Project ID #	Client ID#	Methane	Ethane	Ethene	Propane	Propene	iButane	nButane	I-Pentane	nPentane	I-Hexane	nHexane	C1+	C2+
1101.3	G-01	4.5246	3.5525	4.2241	3.6697	4.6416	2.6857	3.3143	2.2715	3.0296	2.4796	2.9163	4.6687	4.1197
1101.3	G-02	4.7034	3.7260	4.4110	3.8843	4.7105	2.9011	3.5089	2.6510	3.2830	2.6770	3.1727	4.8564	4.3291
1101.3	G-03	4.7567	3.7644	4.3995	3.8826	4.8388	3.0449	3.4935	2.7148	3.2908	2.7600	3.5967	4.9126	4.3921
1101.3	G-04	4.7922	3.8690	4.4562	3.9444	4.9230	2.9541	3.5459	2.5841	3.3589	2.8096	3.1213	4.9406	4.4022
1101.3	G-05	4.7390	3.8593	4.3925	3.9237	4.8816	2.9632	3.5905	2.4495	3.3916	2.7933	3.1064	4.9026	4.3993
1101.3	G-06	4.5408	3.6010	4.2766	3.7578	4.9109	2.7174	3.3815	2.4087	3.1727	2.5572	3.0209	4.7036	4.1986
1101.3	G-07	4.8880	4.0084	4.4413	4.1017	4.9599	3.1938	3.7609	2.7176	3.5897	3.0932	3.4721	5.0646	4.5886
1101.3	G-08	4.6575	3.6285	4.3608	3.7202	5.0454	2.7136	3.3221	2.5064	3.1978	2.6299	2.6725	4.7808	4.1736
1101.3	G-09	4.4464	3.5036	4.2469	3.6435	4.6608	2.7003	3.3098	2.6221	3.2092	2.4139	3.0241	4.6174	4.1299
1101.3	G-10	5.0734	4.3137	4.5966	4.3730	5.1483	3.5972	4.0836	3.2646	3.8326	3.5025	3.9280	5.2988	4.9062
1101.3	G-11	4.7444	3.8281	4.3782	3.9056	5.0675	2.9173	3.5363	2.6119	3.3221	2.8304	3.2546	4.9006	4.3806
1101.3	G-12	4.7344	3.7571	4.3808	3.8671	5.0596	2.8397	3.4862	2.4528	3.2610	2.8703	3.5018	4.8871	4.3591
1101.3	G-13	4.6341	3.6299	4.2602	3.7272	5.0620	2.7294	3.2963	2.4305	3.0865	2.6937	3.0536	4.7656	4.1827
1101.3	G-14	4.6927	3.6621	4.3130	3.7682	4.8304	2.6521	3.3341	2.5218	3.1703	2.5782	3.0603	4.8175	4.2149
1101.3	G-15	4.6356	3.6783	4.3482	3.8150	4.8839	2.8272	3.4378	2.2470	3.2026	2.7048	3.1617	4.7900	4.2657
1101.3	G-16	4.7131	3.7411	4.3819	3.8872	5.0876	2.8742	3.5004	2.5441	3.3069	2.7520	3.5945	4.8789	4.3804
1101.3	G-17	4.6882	3.7025	4.3886	3.7790	5.1440	2.8293	3.4149	2.3556	3.1878	2.6474	3.0866	4.8230	4.2494
1101.3	G-18	4.6032	3.6581	4.3014	3.7438	5.1100	2.6819	3.4159	2.2611	3.2461	2.5373	3.0177	4.7529	4.2178
1101.3	G-19	4.5025	3.4725	4.2415	3.4943	5.0513	2.3139	3.0675	2.3194	2.9429	2.5970	3.0767	4.6226	4.0059
1101.3	G-20	4.5229	3.4966	4.2632	3.5264	5.1854	2.6175	3.2199	2.2255	3.1745	2.5298	3.0968	4.6548	4.0727
1101.3	G-21	4.5422	3.5551	4.3203	3.6389	4.9542	2.5768	3.2998	2.3364	3.1153	2.5847	3.2969	4.6907	4.1524
1101.3	G-22	4.6601	3.6460	4.4054	3.7812	5.1942	2.7396	3.4017	2.4483	3.2086	2.6243	3.2013	4.8005	4.2417
1101.3	G-23	4.8690	4.0505	4.4533	4.1119	5.1919	3.2797	3.7502	2.8763	3.4945	3.2853	3.4834	5.0589	4.6080
1101.3	G-24	4.8169	3.9549	4.4060	4.0200	5.1912	2.9992	3.6456	2.6357	3.3862	2.9448	3.3699	4.9850	4.4913
1101.3	G-25	4.8987	3.9513	4.5319	3.9280	4.8346	3.0705	3.5609	3.1062	3.4415	2.9766	3.4481	5.0383	4.4774
1101.3	G-26	4.8525	3.8897	4.5691	3.8627	5.0218	3.0236	3.4915	2.5712	3.2551	2.7347	3.3123	4.9785	4.3797
1101.3	G-27	4.8056	3.8260	4.5953	3.9680	5.2008	3.1502	3.5900	3.3230	3.3533	2.7541	3.4518	4.9683	4.4631
1101.3	G-28	4.7522	3.7987	4.5151	3.9031	5.1837	3.1718	3.5503	3.2584	3.4115	2.7478	3.1356	4.9147	4.4090
1101.3	G-29	4.6995	3.6482	4.5589	3.7627	5.1811	3.3623	3.4002	3.1554	3.5416	2.7081	3.2091	4.8583	4.3443
1101.3	G-30	4.3160	3.7672	4.6209	3.8817	5.2551	3.1495	3.4952	3.1697	3.4038	2.6594	3.0909	4.6475	4.3749
1101.3	G-31	4.8561	3.8982	4.5618	3.9794	5.2321	3.4117	3.6192	3.3051	3.3984	2.9344	3.3046	5.0144	4.4995
1101.3	G-32	4.6876	3.8069	4.5452	3.9592	4.6481	3.1852	3.6372	2.5162	3.7196	2.8965	3.6649	4.9089	4.5101
1101.3	G-33	4.6436	3.6764	4.5563	3.8724	4.6978	3.0546	3.5437	2.7686	3.7457	2.7723	3.6369	4.8569	4.4458
1101.3	G-34	4.7099	3.7854	4.4532	3.8990	4.6207	3.0792	3.5744	2.7679	3.7604	2.8416	3.7286	4.9172	4.4966
1101.3	G-35	5.0259	4.1074	4.7158	4.1470	5.1498	3.6709	3.8736	3.7132	4.0573	3.3996	4.1934	5.2549	4.8674
1101.3	G-36	4.8263	3.9678	4.6003	4.0575	4.9727	3.2542	3.7072	2.8091	3.8092	2.9419	3.6028	5.0277	4.5973
1101.3	G-37	4.7156	3.7533	4.5301	3.8496	5.0303	3.0899	3.5320	2.4322	3.6491	2.6576	3.7083	4.9010	4.4419
1101.3	G-38	4.7025	3.7677	4.4206	3.8640	4.8678	3.0329	3.5251	2.5745	3.6148	2.8602	4.0381	4.9250	4.5281
1101.3	G-39	4.7366	3.7842	4.4851	3.8812	4.8511	2.9958	3.5696	2.5054	3.6855	2.7799	4.0040	4.9484	4.5348
1101.3	G-40	4.8081	3.9766	4.6238	4.0661	4.9127	3.3445	3.7929	3.0570	3.8999	3.2617	4.0264	5.0620	4.7082

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