SURFACE HYDROCARBON GEOCHEMICAL APPLICATIONS TO THE STAGECOACH FIELDAND NEARBY PROSPECT IN SOUTHCENTRAL NEW YORK STATE

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Abstract and Key Words

Restructuring of the oil exploration industry has significantly altered the nature of the players in the industry and their approach to exploration, particularly in the U.S. The process of hydrocarbon exploration as conducted by the major multinational companies has become a technology driven, high capital cost strategy designed to locate mega-deposits worldwide. The notion that few, if any, such deposits are present in the continental U.S. has reduced the potential for discovery of untargeted but potentially profitable deposits as by-products of exploration and has thinned the ranks of explorationists. Further, the focus on the use of 3-D seismic diverts attention from a host of sophisticated technologies that require careful integration to be effective in complex environments.

The two most fundamental issues in hydrocarbon exploration are the identification of a trap and the existence of hydrocarbons in the trap. The use of paleogeomorphic mapping effectively adds fresh insights to the first question. The second question has been addressed by Surface Geochemical methods for more than 50 years. But, only in the past decade or so has there developed sampling, analytical, quality control, and computer techniques for evaluating the results of field studies. New analytical methods have developed significantly lower detection limits, so that hydrocarbons can be detected at low parts per billion and high part per trillion levels. This allows detection today of C_2-C_7+ hydrocarbons that were undetectable in the 1980s and C_5+ hydrocarbons that were not even known to exist in the natural environment. In addition, a variety of statistical techniques have been developed to afford better compound and mixture identification and comparison of complex mixtures. These permit sophisticated modeling of geochemical data that was not possible before the 1990s.

Surface geochemical data provides potentially three key pieces of information about a site or region. First, it provides broad-based evidence of petroleum hydrocarbon presence and variations in concentration. Second, using both generalized and site specific compositional data, it can yield valuable prospect specific information to target detailed investigations and drilling programs. Finally, under the proper conditions, it can suggest some structural character in areas of high fracturing and faulting. Knowledge of the presence and the types of hydrocarbons in an area provided a powerful basis for further investigation and exploitation. When the geochemical data are integrated with other low cost technologies, it can define favorable areas for development and the most productive wells in existing fields.

The benefit of these tools, especially when combined into a coherent exploration program, is that they are inexpensive (i.e., a fraction of the cost of commercially available 2-D seismic) and are accessible to even the smallest independent company. These data may be applied in either extremely small site-specific packages or on regional or basinal studies. Moreover, they can help answer the basic questions concerning the presence of petroleum and the existence of a trap. When properly used, they can enable virtually any size operator to enhance and support his drilling and development decision-making by a scientifically valid process. The result of the process is a valid and inexpensive exploration model that can be sized for a client's needs.

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1.0 Introduction

Restructuring of the oil exploration industry has significantly altered the nature of the players in the industry and their approach to exploration, particularly in the U.S. The process of hydrocarbon exploration as conducted by the major multinational companies has become a technology driven, high capital cost strategy designed to locate mega-deposits world-wide. The notion that few, if any, such deposits are present in the continental U.S. has reduced the potential for discovery of untargeted but potentially profitable deposits as by-products of exploration and has thinned the ranks of explorationists. Further, the focus on the use of 3-D seismic diverts attention from a host of sophisticated technologies that require careful integration to be effective in complex environments.

This situation is particularly applicable in the relatively mature found in the Lower 48 states. Independent explorationists require other technologies because they have less access to capital. Not coincidentally, the technologies that were utilized in this project (paleogeomorphic mapping, remote sensing, and especially surface geochemistry) are exactly the types of technologies that independents can afford. These tools provide answers to the questions that are routinely asked by independents (i.e., where are the hydrocarbons, how can I reduce my explorations costs and increase my success ratio, and how can I maximize my return on investment). Furthermore, these technologies are the types of tools that can be applied to field extension or in-fill development. They can also be used to model analog fields in a particular basin. Most importantly, these tools can be applied to both international concession work and to underdeveloped domestic basins, especially those basins with limited subsurface data, where the lack of competition allows the acquisition of huge, affordable lease blocks and where success will not be diluted by the "herd Mentality".

The two most fundamental issues in hydrocarbon exploration are the identification of a trap and the existence of hydrocarbons in the trap. The use of paleogeomorphic mapping effectively adds fresh insights to the first question. The second question has been addressed by Surface Geochemical methods for more than 50 years. But, only in the past decade or so has there developed sampling, analytical, quality control, and computer techniques for evaluating the results of field studies.

New analytical methods have developed significantly lower detection limits, so that hydrocarbons can be detected at low parts per billion and high part per trillion levels. This allows detection today of C_2-C_7+ hydrocarbons that were undetectable in the 1980s and C_5+ hydrocarbons that were not even known to exist in the natural environment. In addition, a variety of statistical techniques have been developed to afford better compound and mixture identification and comparison of complex mixtures. These permit sophisticated modeling of geochemical data that was not possible before the 1990s.

The benefit of these tools, especially when combined into a coherent exploration program, is that they are inexpensive (i.e., a fraction of the cost of commercially available 2-D seismic) and are accessible to even the smallest independent company. These data may be applied in either extremely small site-specific packages or on regional or basin studies. Moreover, they can help answer the basic questions concerning the presence of petroleum and the existence of a trap. When properly used, they can enable virtually any size operator to enhance and support his drilling and development decision-making by a scientifically valid process. The result of the process is a valid and inexpensive exploration model that can be sized for a client's needs.

2.0 Methodology

Direct Geochemical Services and Pyron Consulting, under the auspices of NYSERDA, completed a surface geochemical survey demonstration project in selected areas of Tioga County, NY, during the spring and summer of 1998. Hydrocarbons in free soil gas (passive collection) and soil were collected for analysis using two different and complementary methods: Gas Chromatography and UV Fluorescence. Samples were collected in two areas, a geologic (and therefore geochemical) model area and a prospect area as described below:

1. Model Area—Stagecoach Field in Tioga County, NY.
2. Prospect Region—Northern Tioga County, NY.

A regional location map is provided as Figure 1.0.

2.1 Field Methods

2.1.1. Site Selection

The Stagecoach Field was selected as a model area because it had readily accessible data. In addition, it is a relatively unique deposit, which, because of its size and productivity, makes it an analog for future fields that may be discovered in the Appalachian Basin. It promised to yield a potentially useful and definitive surface geochemical signature that could be used to develop an exploration model for the region.

The original "Prospect" area identified in the project proposal was in the Catskill region of New York. Initial investigation by the authors had indicated that permits for access would be reasonably available. Unfortunately, it was impossible to acquire permits, and physical access along public rights of way was not forthcoming. In addition, because much of this area is designated for zero development by state law and because it is within the environmentally sensitive watershed for New York City, it was determined that no future development of the resources would be permitted. This would mitigate the industry application of the technique if we were successful in our application.

Therefore, the investigators identified an alternative area in the vicinity of Spencer, NY, in Northern Tioga County. The area consists of approximately 15 square miles along the valley south of Spencer NY in a very loose grid of samples with an average spacing of approximately 0.5 miles. It was determined that for this type of survey, a sampling spacing of 0.25 mile would adequately represent the approach an explorationist might take in an effort to generate and evaluate larger scale prospects in a region. In the Stagecoach Field, the distribution of well bores, including productive wells, is concentrated within a 0.5-mile wide swath. This allowed the concentration of the sampling grid. It was intended from the beginning to acquire both a soil sample and a VaporTec™ passive sample at each location. All sampling was conducted within the road right-of-way to avoid private property, or in the vicinity of producing and dry wells

2.1.2 Summary of Field Events

Prior to the indication of fieldwork, a grid pattern was established over both the prospect area and the model area on the base maps. It was decided that a 0.25-mile spacing would be adequate for the initial survey. After completing this process, I received from Belden and Blake Corporation provided a newly created base map that precisely located the existing wells.

Two different field sampling methods were applied to the project: free soil gas analysis was completed using passive soil gas samplers (VaporTec™); and soil samples were collected for analysis of sorbed hydrocarbons. Sampling of the Stagecoach Field was conducted on 5/12, 5/13, and 5/14. Sampling of the prospect area was completed on 5/14 and 5/15. A total of 85 samplers and soil samples were collected from the Stagecoach Field. An additional 52 samplers were installed in the prospect area, between Spencer and West Candor, NY. Mud and inaccessible roads hampered fieldwork. The period before the field activities was marked by seven days of rain. Surface water was flowing over all of the area, and many of the locations were therefore inaccessible. Several of the existing well location roads were gated and locked and could not be accessed.

Both the model and prospect areas had a very poorly developed soil profiles with a lot of rocks and clay. In only a very few instances was there a soil profile that was deeper than 8.0 inches. This forced a field modification of sampling location and VaporTec™ sampler installation. Samplers were installed along the right of way of the road system. Preferential sampling locations were:

- Along a hill or roadcut above the drainage pattern of the area.
- In wooded (i.e., undeveloped) areas above the drainage of the area
- At remote locations along lightly traveled dirt roads
- Along access roads to wells

In all sampling, care was taken to avoid areas potentially contaminated by drilling or operating processes. Sampling avoided surface drainage and occurred primarily on undisturbed land. In addition, roadside bar ditches were avoided and sampling occurred on the far side of the ditches.

With the exception of actively producing wells, it was impossible to find abandoned wells. Apparently, the common practice is to "stub off" abandoned wells approximately 3.0 ft beneath the surface and to cover them to grade. There are no apparent markers for abandoned wells. Because these wells could not be found, and because all roads to the former wellhead had long since disappeared, it was impossible to sample directly at the wellhead. Instead, samplers were placed as close as possible to the presumed location along existing roads.

At existing wells, a VaporTec™ sampler was installed within a 50-foot radius of the wellbore, away from the existing surface equipment and away from the area in which the drilling rig was located during installation. The lack of soil profile precluded the proposed installation of a sampler at 3.0 feet. Whenever possible, the sampler was installed at the highest point locally, above the surface drainage. At each sampling location, a marker flag was installed. In areas in which high grass or trees were involved, ribbon flagging was also used to identify where the samplers were placed.

Each soil sample was taken from approximately 8.0" below surface. Rocks and pebbles were removed, as was loose organic matter (roots, grass, twigs, etc.). Eighty-five (85) locations were identified for sampling at the Stagecoach Field. VaporTec™ samplers were installed and soil samples collected from each location. Between the installation of VaporTec™ samplers and retrieval many were lost, allowing retrieval of only about 60 of them. In particular, locations near dry wells were lost preferentially to others. This minimized the effectiveness of the use of passive samplers. Most of the losses were due to human interference. The authors' experience is that this loss rate is unusual; normally the recovery rate is approximately 95%.

Subsequent to the initial field activity, a second sampling event was completed in late October-early November, 1998. An additional 8 soil samples were collected in the prospect area. Table 1.0 and 2.0 provide sample data for both the model and prospect areas.

2.2 Laboratory Analysis

Several steps are taken to assure the quality of the data reported from the lab. Among these are:

- Log-in procedure
- Sample holding and storage
- Instrument calibration, both initial and continuing
- Surrogates
- Duplicates
- Blanks

These procedures provide assurance that the samples are handled and analyzed in identical and defensible ways and that the interpretations are not related to variations in analysis, but variations present in the soil or soil vapor in the field.

2.2.1 Sample Handling protocols

Soil samples were received from the field in sealed glass jars. The VaporTec™ samplers were contained in sealed glass 40-ml vials. Both sample types were logged into the lab and each individual container was given a unique log in number. The log-in applies to all samples of any type received in the Direct Geochemical laboratory, and applies regardless of analytical method used. It is a tool to track all samples from receipt to final data delivery and interpretation.

All sample jars and the VaporTec™ samplers were intact without loss of sample or loss of seal.

2.2.2. Chemical methodology

Gas chromatography was run on all of the soil samples and on all of the VaporTec™ samplers received from the field. Two types of chemical analysis were run: Thermal Desorption-Gas Chromatography and UV Fluorescence. Gas chromatography operates on volatile or semi-volatile compounds in the vapor phase. To get the hydro-carbons into the vapor phase, it was necessary to heat the soil sample or the VaporTec™ sampler in a proprietary device to a temperature which will cause desorption of the hydrocarbons from the solid phase into the vapor phase, but not cause pyrolysis. An aliquot of the desorbed hydrocarbons is then injected directly onto the column for analysis on an HP 5890 Gas chromatograph.

Prior to running the analysis, the gas chromatograph is calibrated to identify and quantitate the compounds analyzed. Direct Geochemical selected a range of hydrocarbons from methane to hexane and performed a multi-point calibration. Following calibration, a system blank was run to assure that there was no carry-over and that the system was clean. Then, each sample was run in turn.

2.3 Free Soil Gas Analysis – Thermal Desorption

2.3.1. Methodology

Free soil gases are those that are actively migrating from subsurface sources and are trapped in the process. Absolute concentrations of free soil gases are generally lower in soils. In most cases, soil samples are taken at approximately 3.0-4.0 feet to minimize near surface losses. In both areas, soils were very shallow, preventing such sampling. Therefore, soil samples were taken from the upper 8.0" and placed in a 4 oz. (125 ml) jar equipped with a Teflon lined lid. The soil is packed into the jar to minimize the headspace and maximize the retention of volatile hydrocarbons. The jars are then packaged and returned to the lab for analysis.

Sampling of soils has the obvious advantage of simplicity and speed. It requires only a single trip to the field and can be accomplished with the simplest of tools. The primary disadvantage is the variability of soil and the processes that affect the concentration and composition of hydrocarbons. Coarse-grained or highly inorganic soils tend to sorb hydrocarbons less efficiently that those that are fine grained and/or contain larger amounts of organic carbon. Furthermore, significant variations in these properties can affect the absolute concentration of total hydrocarbons. Moreover, the moisture content of soils can impact the concentration hydrocarbons. These can adversely affect the interpretation of data, particularly the quantitative analysis.

2.3.2 Data Reporting

The data are presented in two formats: tabulated digital and analog. The tabulated digital data are included in this report in Appendix I. These tables present the absolute concentration of each identified hydrocarbon compound in the aliquot of headspace analyzed, with a lower limit of detection of about 5-10 parts per billion by volume (ppbv). The analog output is the chromatogram. Selected chromatograms also are shown in Appendix I. The chromatogram is a powerful visual tool for examining complex data.

2.3.3 Problems Encountered

No problems were encountered during the thermal desorption analysis phase of the project.

2.4 Fluorescence Methods

2.4.1. Methodology

UV Fluorescence analysis was performed on all of the soil samples. Each sample was carefully sieved for the silt and clay fraction to –60 mesh and then subjected to intense solvent extraction using a proprietary solvent. The extraction incorporated a proprietary process of temperature control and agitation, followed by gravity separation of the solvent from the soil. An aliquot of the solvent was then placed in the beam of UV light in a Perkin-Elmer MPF-44 Fluorescence Spectrophotometer. As with the gas chromatography, the instrument is first calibrated and then a blank is run to assure that there is no carryover.

The acquired data were tabulated across a scan range of 250-500 nanometers (nm). Emission and excitation are scanned synchronously. The resulting data are expressed in two formats. The first is digital, the results of which are shown in Appendix I, showing the Fluorescence intensity at 5 specific wavelengths. In addition, a Fluorescence Spectrum can be prepared showing the continuous variation in fluorescence intensity with wavelength. Example spectra also are shown in Appendix I.

The results from the soil analysis were placed into a database for processing and interpretation.

2.4.2 Data Reporting

The data are presented in two formats: tabulated digital and analog. The tabulated digital data are included in this report in Appendix I. These tables present the absolute concentration of each identified hydrocarbon compound in the aliquot of headspace analyzed, with a lower limit of detection of about 5-10 parts per billion by volume (ppbv). The analog output is the spectrum. Selected spectra are shown in Appendix I.

2.4.3 Problems Encountered

No problems were encountered during the UV Fluorescence analysis phase of the project.

2.5 Passive Soil Gas

2.5.1. Methodology

Instantaneous sampling of free soil gas often results in the reporting of methane through propane and little else. Because samples often contain such low concentrations of indicator compounds, they require sampling at depths of 5-20 feet. Passive gas sampling affords improved reporting because it allows the concentration of hydrocarbon gases on a non-polar sorbent (e.g., activated carbon).

The passive sampler employed in this project is the VaporTec™ sampler, manufactured by Direct Geochemical. It consists of an aluminum rod coated with granular, activated carbon, using an inert inorganic cement. The rod is sealed during manufacture within a clean glass housing (40 ml VOA vial) and shipped to the field. The cap is removed in the field and the vial is placed into a shallow (6") core hole in the soil. It is buried and left to trap and concentrate hydrocarbons over a two to three week period. They are then retrieved, sealed, and returned to the laboratory for analysis.

The primary advantage of the VaporTec™ sampler is that the trapping matrix of all samples is identical, and therefore, there is no variation in concentration due to sampling or sampler. The major disadvantage is that the sampler installation and retrieval are done on separate trips to the field, adding time and cost to the project. In areas with highly variable soils, especially tending toward granular types with little organic carbon, VaporTec™ samplers assure a high quality, uniform gas sample.

2.5.2 Data Reporting

The data are presented in two formats: tabulated digital and analog. The tabulated digital data are included in this report in Appendix I. These tables present the absolute concentration of each identified hydrocarbon compound in the aliquot of headspace analyzed, with a lower limit of detection of about 5-10 parts per billion by volume (ppbv). The analog output is the chromatogram. Selected chromatograms are shown in Appendix I. The chromatogram is a powerful visual tool for examining complex data.

2.5.3. Problems Encountered

Other than the recovery problems discussed above, no problems were encountered during the passive gas sampling analysis phase of the project.

3.0 Data Interpretation

The basic interpretation approach involved the assumption that an existing, relatively well defined and characterized producing field or accumulation, if properly sampled and interpreted, could be used to develop a geochemical model or analog. Therefore, it was necessary to be able to "map" the extent of the known accumulation or productive zone in order to validate the model.

The interpretation of the data involved two independent evaluations, followed by an integration of chemistry and geology. The first, and most traditional, approach was to evaluate and map the absolute concentration of individual and groups of hydrocarbon species (or classes in UV Fluorescence) identified in the survey. The second approach is to evaluate the compositional variation. Compositional interpretation largely discounts the absolute concentration of hydrocarbon species and concentrates on their relative abundance.

The results of analysis are shown in tabular form (Tables 3.0-8.0) in Appendix I. The analysis of both the soil and free soil gas trapped on VaporTec™ samplers revealed the presence in highly variable amounts of alkanes (paraffins) from methane through hexane (and beyond in very low concentrations). Concentrations ranged from hundreds of ppm to the low ppb levels. In addition, at least two olefin compounds (ethene and propene) were observed and quantified. Several unidentified chromatographic peaks were also observed consistently through the survey. These were tentatively identified as butene, benzene, toluene, pentene, hexene, and cycloalkanes of the $C_{5\text{-}6}$ range. These compounds were not quantitated.

To aid the analysis, Belden and Blake provided a representative sample of gas from the field. The results from the soil, VaporTec™, and Stagecoach Gas analyses were entered into a data base for processing and interpretation using a sophisticated statistical procedure.

3.1 Data Base Development and Management

3.1.1. QAQC

Each sample chromatogram or spectrum is visually inspected for quality assurance by the Laboratory Manager. Following inspection and approval, the digital data are entered into an Excel spreadsheet. The data entries are double-checked by one of the clerical staff in the lab. Chromatograms and spectra are printed and assembled into a file. Raw chromatographic, spectral, and digital data are backed up onto the server and onto floppy diskette.

The Excel file of light hydrocarbon data and UV Fluorescence data are then imported into a data-base for statistical treatment.

3.2 Statistical Analysis

3.2.1. Quantitative Interpretations

Historically, the primary interpretive approach that is used in projects of this type is to map variations in concentration of individual or groups of hydrocarbons. There is almost always a strong variation in concentrations across a survey area. It is vital to appreciate how that variation relates to the presence of a subsurface hydrocarbon accumulation. Ideally, deep soil samples are used for quantitative interpretation, minimizing surface effects. Due to lack of soil depth, shallow samples were used here. The proprietary thermal desorption process operated by Direct Geochemical, however, overcomes much of this disadvantage.

Two general models of the relationship between soil gas concentration and subsurface accumulation have been advanced through the years. The first, and most "logical", is that subsurface accumulations migrate vertically and produce greater than background surface soil gas concentrations above the accumulation. This implies a largely vertical migration from subsurface to surface. Thus, "anomalies" would be apical, lying immediately over the accumulation.

A second theory has also been advanced - the "halo" concept. Under the various manifestations of this theory, the migrating hydrocarbons can create a cementation of the soils in the shallow subsurface, reducing the rate of migration of residual hydrocarbons. Cementation is most effective over the center of the reservoir and least so at the edges, resulting in greater leakage at the edges. Therefore, the regions around the perimeter of the accumulation may actually exhibit higher concentrations that those over the accumulation. In addition, it is possible for somewhat depressed concentrations to appear over existing fields that have been produced and experienced pressure drops.

Direct Geochemical plotted concentrations of each individual hydrocarbon, groups of hydrocarbons, and ratios of hydrocarbon concentrations (wetness, dryness). Example maps from the Stagecoach Field model area are provided as Figures 2.0 through 6.0.

3.2.2 Compositional Analysis

Compositional analysis takes into account the presence, the absence, and the relative abundance of hydrocarbon species. It is possible to apply a variety of multivariate analytical techniques to evaluate the mixture of species, particularly in relation to mixtures that are representative of known geological conditions. While not essential, whenever it is possible, compositional analysis develops a chemical model or analog from existing production or at least a documented accumulation. The ideal chemical model incorporates geologic information (presence and termination of reservoir conditions), lithology (log analysis), reservoir fluid analysis, well control, structural analysis, and surface geochemical information. The objective is to develop a chemical model that allows the differentiation of potentially productive from demonstrably non-productive or non-commercial reservoirs.

Information on the boundaries of an accumulation, the geologic conditions that create them, and the chemical features in the data that are most diagnostic of that condition enable development of such a model. To start, examine the values in Table 9.0, which is a detailed analysis of the gas from the Stagecoach Field. Typical of dry gases, it is largely methane and ethane. Unlike most gas analyses for heating value purposes, when exploration is involved, it is vital to extend the range of analysis up to at least the C_6 level. In doing so, we observe detectable concentrations of C_3-C_5 hydrocarbons, with a trace of C_6. The presence of heavier hydrocarbons gives direct evidence of the presence of thermogenic subsurface accumulations. Typical surface geochemical results, as shown in Figure 7.0, contain all of those compounds and more.

Background conditions are ordinarily quite variable, both in concentration and com-position, resulting from a wide variety of influences and sources in the environment, including vegetative organics. Potentially productive conditions are more uniform in composition, reflecting a significant source of relatively uniform hydrocarbon character that compositionally, if not quantitatively, overwhelms the background.

The data set used to conduct compositional analysis is often very complex, involving 8-20 individually identified compounds. Conventional graphical methods can only display 2-3 variables at a time. And, traditional statistical methods cannot easily encompass such complex data and present it in an understandable format. Bi-variate analysis of data requires a large number of iterations and may yet be unable to explain the relationships in which 3-5 components are necessary.

Multivariate analysis processes a large number of variables at the same time, and can differentiate those variables that are related to known conditions and those that are not. The nature of these variables can be compared to the chemical features of known conditions (e.g., composition of natural gas). The technique can then be used to classify samples that are "unknown" as to their similarity to known conditions. Final classification was conducted using discriminant analysis.

To effect discriminant analysis, samples that were taken in the vicinity of either producing or dry wells (the known geologic conditions) were used to characterize the surface chemical features that best characterize production and are different from background (dry wells). All unknown samples are then compared to the matrix developed by the known samples and the residual probability calculated. The residual probability is plotted on the map as a "gas probability" and contoured. Figures 8.0 and 9.0 are the gas probability maps for the Stagecoach Field model area and the Northern Tioga County prospect area.

3.3 Analytical results

3.3.1 Quantitative Analysis

Examination of the data in Appendix I and the maps in this section reveal that, on average, the concentration of virtually all hydrocarbons in the Stagecoach Field are lower in the off-field areas (i.e., background) than those within the field. This appears to be along the lines of the "halo" concept described above. However, because sampling did not extend very far into background (it should have gone an additional mile or two), it is impossible to specifically interpret this as the case.

In addition, while the average concentration of hydrocarbons is somewhat lower than expected, there is quite a variation among individual compounds. Mapping of either groups or individual compounds allows a statistically significant variation that can accurately map the extent of gas accumulation in the Stagecoach Field. Therefore, the concentration data should not be used as a stand-alone, independent model for exploration for gas in the region.

Figures 2.0 through 6.0 illustrate this point. These figures, showing plots of absolute methane, ethane, and C_{2+} concentrations, exhibit similar, but not identical patterns. None of them (using either high or low concentration cut-offs) map the productive part of the field with better than 60% accuracy. Two possible and traditional enhancements of quantitative data are shown in Figures 5.0 and 6.0. Figure 5.0 depicts the percent methane, or gas dryness. Figure 6.0 shows percent wetness, which is the ratio of C_{2+} divided by C_{1+} hydrocarbons in the soil gas. Neither effectively maps the field. Other ratios were examined as well, exhibiting similar patterns.

The reason for this result is that methane (and, to a certain extent, ethane) are derived from both thermogenic and biogenic sources. In a gas province, it is vital to be able to utilize higher carbon number compounds, but in a compositional manner.

3.3.2 Compositional Analysis—Light Hydrocarbons

Both light-hydrocarbon data sets, soil and VaporTec™ were tested using the discriminant analysis. An evaluation of the correlation matrix, seen in Table 10 indicates that the C_3 to C_5 hydrocarbons, less the olefins, are the primary discriminants or chemical factors that define the gas prone areas. This is visually observed in Figure 10.0, which overlays the chromatograms from a background locations (dry well) and a producing location. The producing area exhibits a significantly higher relative abundance (using a cross-plot) of higher carbon number compounds than the background. This is a characteristic that is quite common in the experience of the authors. The identity of which hydrocarbons and what exact carbon number range is dependent on local conditions. After calculating gas probability values, the resultant maps are shown in Figures 8.0 and 9.0, for Stagecoach and North Tioga areas.

3.3.2.1 Soil Analysis for Light Hydrocarbons.

The residual gas probability for the Stagecoach Field, as based on the analysis of soil samples in the field and gas chromatography, is shown in Figure 8.0. The result is apical in nature and centered directly over the productive zones in the field. The accuracy, defined by well control, is very good, better than 90%. As shown below, it also correlates well with non-geochemical factors. The map also indicates some potential for additional drilling sites.

3.3.2.2 Free Soil Gas Analysis for Light Hydrocarbons.

The free soil gas compositional interpretation is shown in Figure 11.0. The results are similar to that from the soil analysis in the core of the field, but variations at the fringes diminish the overall accuracy to the 80% range. An evaluation of the data suggests that the primary reason is the very limited number of "known" background samples in the data set, with only 2-3 samples taken at dry wells. These results would be quite acceptable if used for reconnaissance or high-grading purposes; the soil analysis results would better serve for evaluating specific drilling locations.

3.3.3 Compositional Analysis—UV Fluorescence

In addition, the UV fluorescence data from soils was also evaluated using discriminant analysis, and using the same model parameters as the Light Hydrocarbons. Because the fluorescence responds largely to aromatic hydrocarbons, and the content of the gas is largely devoid of aromatics, it was not expected that the UV Fluorescence would be a direct indicator of gas accumulation, as the light hydrocarbon analysis is. However, it was appropriate to map the indicator (Figures 12.0 and 13.0).

The UV Fluorescence data appears to map the core of the Stagecoach Field, with less overall accuracy than the light hydrocarbons, but in a reasonable fashion for broad-scale reconnaissance. Without considering other, non-chemical factors, the causes for this reasonable correlation between high carbon number organics and dry gas accumulation are not obvious. In the experience of the authors, the primary chemical relationship is probably with a secondary alteration effect in the soil, perhaps related to vegetative interaction with migrating hydrocarbons. The authors have frequently observed the presence of mono- and sesqui-terpenes in areas with high gas leakage and abundant vegetation (both associated with petroleum and mineral exploration). This occurs in association with the intense faulting and fracturing.

Unfortunately, the scope of the present investigation did not allow for further inquiry and testing into the root causes of such UV Fluorescence observations.

4.0 Development of an Exploration Model

4.1 Stagecoach Field Model area

4.1.1 History of field development

The Stagecoach field was discovered by Quaker State in 1986 and is now owned and operated by Belden and Blake Corporation. The Stagecoach Field is located in southeastern Tioga County, New York. It was discovered in 1987 with the drilling of the Belden and Blake (Quaker State) #1 Fyock well. The field was confirmed with the drilling of the Belden and Blake (Quaker State) #1 Racht well. Operation of the productive wells in the field, and additional developmental drilling, was transferred to Belden and Blake Corporation in the early 1990's.

Currently, there are 15 productive wells and 18 dry holes in the Stagecoach Field area. As of early 1996, cumulative production from the field was 7.88 billion cubic feet of natural gas, with close to half of that production coming from two wells, the Belden and Blake W. Widell # 1 (2, 295.36 MMCF) and the Belden and Blake E. Campbell # 1 (1,792.65 MMCF).

4.1.2 Local geology

Tioga County was chosen because it is located at the transition of the Devonian Catskill Delta from marginal marine to deep marine depositional environments. The deeper Devonian basin lay to its south and east. Deposition in the proto-basin transitioned from carbonates in early Devonian time through clean sandstones in the middle Devonian though dark organic shales in the Middle through Upper Devonian as the Catskill Delta prograded into the basin proper.

Upper, Middle and Lower Devonian rocks of south central New York constitute one of the more complete Middle Paleozoic stratigraphic sections in North America. There are three general groupings of rocks: the Genesee Group, the Hamilton Group, and the Helderberg-Onondaga Group. The Genesee Group consists of a thick sequence of organically derived shales. In many studies, the Genesee is considered one of the more significant tongues of deposition that comprise the Catskill Delta. Locally eroded, the sequence is not completely present in Tioga County. At the base of this sequence lies the Tully Limestone. Based on the analysis by Heckel (1966), the Tully is a significant formation in that deposited on and represents a significant unconformity between Genesee and Hamilton sequences. In addition, the Tully also represents a significant lateral facies change from a clastic equivalent further east, to a carbonate over much of the Appalachian Basin province.

The Hamilton Group is considered by many observers to be the precursor of the Catskill Delta. It is composed on a thick sequence of black and gray organic shales that apparently represent a cyclical depositional cycle, as well as a perceived upward coarsening of sediments within a given cycle (Landing and Brett, 1991). Within this sequence of rock, two formations, the Cherry Valley Limestone and the Marcellus Shale have been identified as easily recognized markers within the Hamilton Group, and have been used for structural isopach mapping.

The last Devonian interval of significance in this investigation is the Helderberg Onondaga grouping. This interval includes a basal carbonate member (the Helderberg Group), a middle arenaceous sandstone member (the Oriskany Sandstone) and upper carbonate member (the Onondaga Limestone Group). These rocks were deposited in a near shore marginal marine transition zone. They are of importance in this study because the Helderberg and the Oriskany form significant reservoirs in the Appalachian Basin. As a result, there is a great deal of subsurface data on these intervals, especially as a result of exploratory drilling.

The Devonian rocks of Tioga County unconformably overlie Silurian evaporites of the Salina Group. A Silurian Age "salt basin" formed to the south of Tioga County, and allowed deposition of gypsum, anhydrite and halite. Rickard (1969) noted the similarity and uniformity of deposition of the evaporitic sequence in both the Appalachian and Michigan Basins, with the exception that the barrier reefs found in the Michigan Basin are not found rimming the Appalachian Basin.

There are numerous mapped anticlines and synclines in the study area. Many of these features are the result of Appalachian orogeny, and may have had minimal effect on the entrapment of hydrocarbons. The identified localized and regionalized faulting which apparently was contemporaneous with Middle and Upper Devonian deposition. The cause of this faulting is not well known, but is related to either deep basement readjustment, or adjustment associated with the post-Acadian orogeny.

Previous published reports on the Stagecoach Field include papers by Pyron (1997, 1997b). A series of maps based upon both structural and isopachous thickness of select intervals is found in the first of these publications. The following generalizations were presented for the Stagecoach Field:

1. Without exception, the structural maps created on various formation tops were neither sensitive nor reliable enough to relate to cumulative production. As a result, these maps were not reliable indicators of production. The structure map based upon the Top of Devonian datum was interesting because it apparently shows the location of fault blocks under the field boundaries. Given this interpretation (which has not been verified either by seismic investigations or evaluation of published structure maps), it is easy to understand why faulted reservoirs are so significant to production in this field.

2. The isopach maps which were prepared are slightly more reliable indicators of production, but still not sensitive enough to equate to cumulative production histories. Of greater interest are the isopach maps showing thickness of the Oriskany Sandstone, and the thickness map of the Tully Limestone. In the former, the interpreted thickness of the Oriskany sand increases to greater than 90 feet along the center of the field. (It is important to recognize that sand thickness is not an indicator alone of reservoir quality; the presence of fractures is also very important). The Tully Limestone isopach map shows thinning of this interval over the top of the field.

3. Finally, a paleogeomorphic or synchronous high map was constructed for the field. This map identified interval thinning typical of a paleogeomorphic high. Thinning of the mapped interval can be correlated to hydrocarbon accumulation and production. Those wells that are proximate to the 600-foot thickness interval on this map show the best production, most probably because fractures intersected by the well bore tap the prime reservoir, which lies within the 600-foot interval.

As verification of this analysis, the production history of select wells in the field provided a good basis for appraising the validity of application. The Belden and Blake (Quaker State) #1 Widell well (cumulative production - 2.295 BCF) has a First Derivative Interval thickness of 644 feet, while the Belden and Blake (Quaker State) #1 Campbell well (cumulative production - 1.793 BCF) has a First Derivative Interval thickness of 645 feet. By comparison, the Belden and Blake (Quaker State) #1 Fyock (cumulative production - 8.9 MMCF) has a First Derivative Interval thickness of 718 feet. This corroborates the assumption that wells located closer to the paleogeomorphic thin (i.e., thinning of the interval) with well established fractures will host more economic production than similarly fractured wells located in thicker paleogeomorphic intervals.

4.1.3 Production data

Production in the Stagecoach field is listed by the state agency as being from the upper Helderberg Formation. Discussion with the field operators suggested that they believe that production is associated with a significant fracture that intersects the Oriskany Sandstone. Of even greater interest is that these wells are producing dry natural gas, with very little associated water. Based on review of NYDEC files, it appears as though many of these wells are producing through natural flow, with no completion or induced fracturing treatments.

4.1.4 Application of soil gas methods to field data

The use of geochemical methods in the exploration for hydrocarbons arose from the knowledge that there were surface manifestations of hydrocarbons at depth that could not easily be seen by skilled observers. The goal of explorationists and investors was to use the method to quantify and qualify those manifestations to maximize exploration success.

4.1.5 Integration of soil gas data with previous studies

In order to provide context to the geochemical analysis of the model area, previously published data on the Stagecoach Field were analyzed. In addition, data from a remote sensing study completed by one of the team members was provided to pro-vide further context. The discussion which follows is a shorten version of a detailed discussion.

4.1.5.1 Remote sensing

Remote sensing imagery analysis has been used with varying degrees of success to locate hydrocarbon reservoirs. Most applications involve site specific determinations as to whether hydrocarbons will be encountered when drilling occurs. A second use of remote sensing interpretation methodology (which has been little discussed) involves the strategic application of remote sensing interpretation methods to appraise the hydrocarbon potential of a country or region. Both methods enhance the accuracy of evaluation of hydrocarbon potential prior to the expenditure of large sums of investment capital. A more detailed analysis of the remote sensing data can be obtained by contacting Pyron Consulting.

The remote sensing analysis (Figure 14.0) is extracted from a larger study of the Central New York area. The extracted interpretation has been annotated by installing a layer of data that shows the location of wells in the Stagecoach Field. The interpretation of this image revealed a variety of well established NE-SW and NW-SE trending lineaments. In addition, during the interpretation, a bias to ignore prominent E-W features was imposed because this direction tracts the processing graining of the image. A series of N-S lineaments reflect local fault structures, or internal fracturing of the basement and overlying rocks associated with compressional and extensional tectonics. There are also two E-W lineaments that follow the trend the Elmira Anticline, a surface feature. Given the frequency of the lineaments, and the over-lapping nature of the patterns, it is logical to conclude that fracture porosity will enhance the productivity of reservoirs when they are encountered.

The observed tonal anomalies are very distinct, and have a bright character, which implies that the reservoir rocks are competently sealed, and that they host non-depleted accumulations of hydrocarbons. These reservoirs might be gas driven, and might host significant associated reserves of natural gas. Significantly, The existing production in the area does not account for the intensity or density of the tonal anomalies. This suggests that additional, non-developed reservoirs may exist below those currently developed.

4.1.5.2 Paleogeomorphic mapping

Based upon previously published data, one of the most diagnostic methods for analyzing the Stagecoach Field involves the application of paleogeomorphic mapping. Paleogeomorphic mapping involves the location of paleo-structures (ancient structures) which had reservoir parameters conducive to the entrapment and preservation of hydrocarbon source material during primary migration. Paleogeomorphic maps are created by stratigraphic interpretation of well logs, sample logs, and electric logs, and by mapping thicknesses of rock (stratigraphic sequence) indicative of depositional conditions. Thinning of the chosen map interval is directly related to the presence of hydrocarbon reservoirs and is related to porosity, permeability, high oil/low water content and a trapping mechanism (most often diagenetic).

In the model area, the paleogeomorphic map (Figure 15.0) for the Stagecoach Field identifies significant thinning of the map interval. The theory of the development of this map is discussed in Pyron (1997 b). Optimum reservoirs occur in and immediately proximate to the areas of thinning. Further, there are areas of thinning that have not been tested by the drill. Additional discussion of the paleogeomorphic mapping technique can be obtained by contacting Pyron Consulting.

4.2 North Tioga County Study area

4.2.1 Local geology

The stratigraphy of the Northern Tioga County Prospect Area is similar to that identified in the Stagecoach Field area. On a regional basis, Devonian strata begin to thin to the north, and thicken to the south and southwest. In addition, there is a pronounced facies change from a marine to marginal marine (delta) to continental from the west to the east.

Key formations on the regional evaluation of Tioga County included the Tully Limestone, the Onondaga Formation, the Oriskany Sandstone and the Helderberg Group. The base of data used in this investigation is limited to well logs which as a generalization do not completely penetrate the Helderberg Formation. Given this limited data, key structural, isopachous, and paleogeomorphic maps were prepared for the second study area.

Regional studies completed by Rickard (1969, 1973, 1989) were very useful in pro-viding a sense of the regional relationship of the various formations. They also provided information on regional faulting, especially in the Tioga County area. Sever-al pairs of normal faults form a series of downdrop structures across central and extreme northern Tioga County. These faults are apparently pre-Devonian in age, and seem to have effected the amount of deposition in the respective down-drop block.

The subsurface mapping of Northern Tioga County provided in Pyron (1997) pro-vides some subsurface clues as to the location of additional exploratory targets. Using these evaluation parameters, several interesting interpretations can be made based upon the subsurface data.

1. Without exception, the structural maps created on various datum suggested that structures formed within the individual downdrop blocks. These individual structure (which might be referred to as closures) seen to trend north-south, although this may be a result of the distribution of data points, or a bias in the method of contouring. A significant structure (identified as Target B) is located in the northwestern quadrant of Tioga County. This feature is located along the trend of the Van Etten Anticline, a surface feature identified by Williams, Tarr, and Kindle (1909).

2. The isopach maps that were prepared also suggested the presence of potential exploration targets in the downdrop block north and west of the stagecoach field. The isopach maps showing thickness of the Oriskany Sandstone, and the thickness map of the Tully Limestone. In Target B, the Oriskany Sandstone has an estimated thickness of 20 feet, and this may be more suggestive of the location of the ultimate trap.

3. The paleogeomorphic map based on the same mapping interval used in analyzing the Stagecoach Field suggests that significant interval thinning typical of a paleogeomorphic high may be present in an area near West Candor, NY. It appears that this high may be affected by a fault in the Upper Devonian. However, there are only three data points in the map area. There is a reported show of natural gas in the Oriskany Sand in the NYS Natural Gas W.E. Stevens well. This well offsets what should be the paleogeomorphic high. Using the Stagecoach Field experience as a model, thinning of the mapped interval is an effective indicator hydrocarbon accumulation and production.

Based upon the integration of the subsurface mapping, production data, and other subsurface information, it is apparent that several of the subsurface maps that were created can be directly applied to hydrocarbon exploration in Tioga County. Using the criteria established above, it appears that the paleogeomorphic map is an indicator of where economic amounts of hydrocarbons may be located. By analog to the Stagecoach Field, those wells which fall within a mapped thinning of the paleogeomorphic interval have a better than average change of holding hydrocarbons.

4.2.2 Previous exploration data

In Tioga County, outside of the wells located in on trend with the Stagecoach Field, there are a total of eleven identified exploratory wells. Within the Northern Tioga County Study Area there are four wells Information for two of these wells. One of these wells, the Sawyer well, which was drilled in 1888, had no available information in any of the data repositories checked. The following wells had complete information (i.e., well logs completion cards and associated information) and formed the basis for this evaluation:

- New York Natural Gas W.E. Stevens #1 (drilled in 1947),
- Fault Line Oil Van Riper Unit #1 and the Spencer et. al. Unit #1 (drilled in 1990)

None of these wells is drilled to a horizon deeper than the Helderberg.

4.2.3 Integration of soil gas data with previous studies

4.2.3.1 Remote sensing

The remote sensing analysis (Figure 16.0) is extracted from a larger study of the Central New York area. The extracted interpretation has been annotated by installing a layer of data that shows the location of wells in the Stagecoach Field. The interpretation of this image revealed a variety of well established NE-SW and NW-SE trending lineaments. In addition, during the interpretation, a bias to ignore prominent E-W features was imposed because this direction tracts the processing graining of the image. Several N-S lineaments reflect local fault structures, or internal fracturing of the basement and overlying rocks associated with compressional and extensional tectonics. There are also several E-W lineaments that follow the trend the Van Etten Anticline, a surface feature. Given the frequency of the lineaments, and the over-lapping nature of the patterns, it is logical to conclude that fracture porosity will enhance the productivity of reservoirs when they are encountered.

The observed tonal anomalies are very distinct, and have a bright character, which implies that the reservoir rocks are competently sealed, and that they host non-depleted accumulations of hydrocarbons. Review of the location of the tonal anomalies shows that they are isolated from other tonal anomaly swarms on the master map. These reservoirs might be gas driven, and might host significant associated reserves of natural gas. Significantly, The existing production in the area does not account for the intensity or density of the tonal anomalies. This suggests that additional, non-developed reservoirs may exist below those currently developed.

4.2.3.2 Paleogeomorphic mapping

In the model area, the paleogeomorphic map (Figure 17.0) identifies an area in which there is the potential for paleogeomorphic thinning in the same map interval used to model the Stagecoach Field. The theory of the development of this map is discussed in Pyron (1997 b). Optimum reservoirs may occur in and immediately proximate to the areas of thinning. Given that there is limited subsurface control information, the coincidence of the paleogeomorphic map, the Remote Sensing data, and the geochemical gas probability map suggests that some potential for the area exists. Because the NYS Stevens well had a reported show, an additional test well should be encouraged for the area. Additional discussion of the paleogeomorphic mapping technique can be obtained by contacting Pyron Consulting.

4.3 Discussion of a new exploration model

This study was designed to develop an exploration model that could provide a low cost, accurate tool (or combination of tools) that independent exploration and development companies could use in the Appalachian Basin. The exploration model we have developed for this basin is called the Integrated Exploration Technology (IET). IET incorporates several proprietary, but readily available, tools, including surface geochemical data (light and heavy hydrocarbon analysis of soils and/or free soil gas, as appropriate to the target), remote sensing, paleogeomorphic mapping, gravity and other synoptic data as available, and an electronic assimilation of geologic and historical production information. Each of these data sources is developed as a layer of information, which can then be added to other layers to form an information product.

Surface geochemical data provides potentially three key pieces of information about a site or region. First, it provides broad-based evidence of petroleum hydrocarbon presence and variations in concentration. Second, using both generalized and site specific compositional data, it can yield valuable prospect specific information to target detailed investigations and drilling programs. Most of the time, it is possible to specify if the study area appears to have accumulations of gas or oil or both. Finally, under the proper conditions, it can suggest some structural character in areas of high fracturing and faulting. Knowledge of the presence and the types of hydrocarbons in an area provided a powerful basis for further investigation and exploitation.

The remote sensing layer includes lineament and fracture trace analysis. It also includes tonal anomaly and vegetative stress analysis of LANDSAT MSS and TM or SPOT data. This information is integrated with a base map having well locations, field boundaries, topographic and geographic, culture, and similar data. It provides a basis for highlighting, on a regional basis, targets for exploration, including potential drilling locations. It can also provide strategic evaluations on the favorability of an area for hosting reserves.

The paleogeomorphic layer is a derivative subsurface mapping method that uses sequence stratigraphy to identify regional mapping intervals that can be related to economic accumulations of hydrocarbons. In addition, the precision of the methodology allows evaluation of new drilling locations by determining those areas with the best potential for hosting economic reserves, and those locations that could maximize the return on investment.

The final layers of information include electronically accessed geological information, including core data, local surface geology, mapped structural features, petrophysical analysis, shows of oil and gas, etc. These data can be managed either in spreadsheet, CA, or multiple graphical layers. The layer provides a basis for increasing the knowledge about a select area to aid decision-makers in making investment decisions.

When these elements are integrated, a solid indicator of the best wells in the Stagecoach Field are located in favorable positions relative to the paleogeomorphic map, the gas probability from soils map, and the regional LANDSAT lineament and tonal anomaly maps. A discussion of the integration of each element merits some additional discussion

The first map presented is the integration of the remote sensing data with the paleogeomorphic map (Figure 18.0). The paleogeomorphic thin is located within an area in which the tonal anomalies are overlapped. In addition, the frequency of cross lineaments suggests that the reservoirs may have enhanced fracture porosity.

The second map provides an integration of the remote sensing with the soil gas data (Figure 19.0). The areas that have the best potential, as based upon the geochemical data, coincide with the overlapping tonal anomalies. A third map (Figure 20.0) shows the paleogeomorphic map data overlying the geochemical gas probability data. Again there is a coincidence between the most favorable areas, as based upon the geochemical data, and the areas adjacent to or within the paleogeomorphic thin. Interesting, the best wells in the field are located in the areas in which the favorable positions on both the paleogeomorphic map and the geochemical data overlap.

When the data are integrated, the paleogeomorphic thins, overlie both the best areas as defined by the gas probability study and the areas in which tonal anomaly swarms are present (Figure 21.0). There is a coincidence of the integrated favorable areas and the most productive wells in the field. Further, our data suggest additional infill or developmental locations still exist within the field. Further, with the integration of select geophysical data, a complete exploration package could easily be assembled for a reasonable fee. Given that exploration programs must meet imposed budgetary constraints, the bulk of this study could have been completed for a relatively low fee which would not impact either out of pocket costs or the promotional fees associated with prospect development.

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Appendix 1
Tables, Figures

Field Notes Collected During Stagecoach Field Sampling Event

Sample ID	GPS Location			Passive Sampler	Soil Sampler	Soil pH	Install/ Collection Date	Recovery Date	Comments
	Latitude	Longitude	Elevation						
9801	41° 59. 92	76° 20.90		X	X	3.5	5/12/98	6/16/98	River Gravels. well mixed
9802	42°00.20	76°21.09		X	X	4.3	5/12/98	6/16/98	Silty clay with pebbles
9803	42°00.20	76°21.56		X	X	4.9	5/12/98	Lost	" "
9804	41°59.92	76°20.56		X	X	5.2	5/12/98	6/16/98	" "
9805	41°59.97	76°20.09		X	X	5.4	5/12/98	Lost	River Gravels well mixed with silt
9806	42°01.34	76°19.60		X	X	4.8	5/12/98	6/16/98	Yellow-brown clays with rock
9807	42°00.76	76°19.77		X	X	5.3	5/12/98	Lost	" "
9808	42°01.31	76°19.74		X	X	5.4	5/12/98	6/16/98	Red Brown Silty clay
9809	42°00.63	76°21.82		X	X	5.2	5/12/98	Lost	" "
9810	42°00.88	76°120.75		X	X	5.2	5/12/98	6/16/98	Black organic soil.intermixed with clay and rock
9811	42°00.22	76°19.39		X		5.6	5/12/98	6/16/98	Silty clay and rock
9812	41°59.60	76°19.34		X	X	5.8	5/12/98	Lost	Buff-brown clays with rock
9813	42°00. 06	76°18.99		X	X	5.6	5/12/98	6/16/98	Clay-gravel mixture
9814	42°00. 02	76°18.80		X	X	5.6	5/12/98	6/16/98	" "
9815	42°00.01	76°18.68		X		5.2	5/12/98	Lost	" "
9816	42°00.21	76°18.75		X	X	5.1	5/12/98	6/16/98	Buff-brown clays with rock
9817	42°00.21	76°18.75		X	X	5.0	5/12/98	6/16/98	Clay-gravel mixture
9818	42°00.71	76°18.25		X	X	5.2	5/12/98	6/16/98	Clay-gravel mixture
9819	42°01.05	76°18.36		X	X	5.3	5/12/98	6/16/98	Clay-gravel mixture
9820	42°00.49	76°19.60		X	X	5.3	5/12/98	6/16/98	Silty Clay
9821	42°00.68	76°19.04		X	X	5.7	5/12/98	6/16/98	" "
9822	42°01.17	76°17.45		X	X	5.4	5/12/98	Lost	Heavy Black Brown Clay
9823	42°01.34	76°19.60		X	X	5.6	5/12/98	6/16/98	Brown Clay and silt
9824	42°00.57	76°17.86		X		6.0	5/12/98	6/16/98	Heavy Brown Clay
9825	42°00.43	76°17.07		X	X	6.1	5/12/98	6/16/98	" "
9826	41°59.29	76°16.24		X	X	5.9	5/12/98	Lost	" "
9827	42°00.43	76°17.00		X	X	5.7	5/12/98	6/16/98	Heavy Brown Clay and rock
9828	42°00.78	76°16.28		X		5.5	5/12/98	6/16/98	" "
9829	42°00.51	76°16.30		X	X	6.1	5/12/98	6/16/98	" "
9830	42°00.45	76°15.43		X	X	5.8	5/12/98	6/16/98	" "

Comments: Sampler 9811 , passive sampler only, at Nichols-Mead well head
Sampler 9815, passive sampler only, at Latcher well head
Sampler 9824, passive sampler only, at Cooke well head
Sampler 9828, passive sampler only, at L Mead #1 well head

Field Notes Collected During Stagecoach Field Sampling Event

Sample ID	GPS Location			Passive Sampler	Soil Sampler	Soil pH	Install/ Collection Date	Recovery Date	Comments
	Latitude	Longitude	Elevation						
9831	42° 02.39	76° 14.16		X	X	5.2	05/13/1998	06/16/1998	Buff-brown clays with rock
9832	42°01.03	76°16.14		X	X	5.7	05/13/1998	06/16/1998	" ..
9833	42°01.63	76°16.34		X		5.4	05/13/1998	Lost	Buff-brown silty clays with rock
9834	42°01.37	76°16.30		X	X	5.8	05/13/1998	06/16/1998	" ..
9835	42°01.35	76°17.09		X	X	5.6	05/13/1998	06/16/1998	" ..
9836	42°01.75	76°17. 09		X	X	5.4	05/13/1998	06/16/1998	" ..
9837	42°02.14	76°19.77		X	X	5.8	05/13/1998	06/16/1998	" ..
9838	42°02.00	76°16.22		X	X	5.6	05/13/1998	06/16/1998	" ..
9839	42°01.54	76°17.71		X	X	8.7	05/13/1998	06/16/1998	" ..
9840	42°01.60	76°15.60		X		6.2	05/13/1998	06/16/1998	" ..
9841	42°01.65	76°15.70		X	X	5.5	05/13/1998	06/16/1998	" ..
9842	42°01.26	76°15.03		X	X	5.9	05/13/1998	06/16/1998	" ..
9843	42°01.45	76°14.08		X	X	4.2	05/13/1998	06/16/1998	" ..
9844	42°00.99	76°14.59		X	X	5.1	05/13/1998	06/16/1998	" ..
9845	42°00.99	76°15.13		X	X	4.9	05/13/1998	06/16/1998	" ..
9846	42°00.49	76°15.28		X	X	4.7	05/13/1998	06/16/1998	" ..
9847	42°01.00	76°14.84		X	X	4.6	05/13/1998	06/16/1998	" ..
9848	42°02.14	76°14.37		X	X	4.7	05/13/1998	06/16/1998	" ..
9849	42°02.59	76°14.70		X	X	4.8	05/13/1998	06/16/1998	" ..
9850	42°02.43	76°14.78		X	X	4.7	05/13/1998	Lost	" ..
9851	42°02.47	76°14.78		X	X	4.6	05/13/1998	06/16/1998	" ..
9852	42°02.11	76°15.38		X	X	4.7	05/13/1998	06/16/1998	" ..
9853	42°01.63	76°13.71		X	X	4.8	05/13/1998	06/16/1998	" ..
9854	42°00.98	76°14.00		X	X	4.7	05/13/1998	06/16/1998	" ..
9855	42°00.69	76°14.11		X	X	4.7	05/13/1998	Lost	" ..
9856	42°01.81	76°13.15		X	X	4.8	05/13/1998	06/16/1998	" ..
9857	42°02.03	76°13.46		X		4.7	05/13/1998	Lost	" ..
9858	42°01.93	76°13.13		X	X	4.6	05/13/1998	06/17/1998	" ..
9859	42°02.18	76°13.02		X		4.6	05/13/1998	06/17/1998	" ..
9860	42°01.49	76°12.89		X	X	4.7	05/13/1998	Lost	" "

Comments: Re-calibrated GPS unit. took measurement at location 30 Long 42° 00.22. Lat 76° 16. 32
Sampler 9833 , passive sampler only, at Owen #1 well head
Sampler 9840 , passive sampler only, at Barnhardt well head
Sampler 9857 , passive sampler only, at Racht well head
Sampler 9859 , passive sampler only, at Fyock well head

Sample ID	GPS Location			Passive Sampler	Soil Sampler	Soil pH	Install/ Collection Date	Recovery Date	Comments
	Latitude	Longitude	Elevation						
9861	42° 01.49	76° 12.184		X	X	4.6	5/13/98	6/17/98	Buff-brown clays with no rock
9862	42°00.,87	76°13.45		X	X	5.7	5/13/98	6/17/98	Buff-brown silty clays with rock
9863	42°01.29	76°17.85		X	X	5.4	5/13/98	Lost	" "
9864	42°00.77	76°11.71		X	X	5.8	5/13/98	Lost	" "
9865	42°01.25	76°11.99		X	X	5.6	5/13/98	Lost	" "
9866	42°01.77	76°12. 65		X	X	NA	5/14/98	6/17/98	Brown silty clays with rock
9867	42°02.58	76°12.17		X	X	NA	5/14/98	Lost	" "
9868	42°01.33	76°11.70		X	X	NA	5/14/98	Lost	" "
9869	42°02.63	76°11.78		X	X	NA	5/14/98	6/17/98	" "
9870	42°02.64	76°10.14		X	X	NA	5/14/98	6/17/98	" "
9871	42°03.11	76°10.62		X		NA	5/14/98	6/17/98	" "
9872	42°02.81	76°10.69		X	X	NA	5/14/98	6/17/98	" "
9873	42°02.61	76°11.37		X	X	NA	5/14/98	Lost	" "
9874	42°02.44	76°11.74		X	X	NA	5/14/98	6/16/98	" "
9875	42°01.87	76°12.18		X	X	NA	5/14/98	6/16/98	Heavy red brown clay, silt
9876	42°02.47	76°13.51		X	X	NA	5/14/98	6/16/98	Heavy red brown clay, silt , rocks
9877	42°02.77	76°13.77		X	X	NA	5/14/98	6/16/98	" "
9878	42°03.40	76°15.85		X	X	NA	5/14/98	6/16/98	" "
9879	42°03.31	76°13.730		X	X	NA	5/14/98	6/16/98	" "
9880	42°03.38	76°12.52		X	X	NA	5/14/98	Lost	" "
9881	42°03.46	76°12.06		X	X	NA	5/14/98	6/16/98	" "
9882	42°03.41	76°11.66		X	X	NA	5/14/98	6/16/98	" "
9883	42°03.48	76°11.00		X	X	NA	5/14/98	6/16/98	Brown Silt and gravel
9884				X	X	NA	5/14/98	Lost	" "
9885	42°03.16	76°10.00		X	X	NA	5/14/98	Lost	" "

Comments: pH meter broken 5/14
Sampler 9871 , passive sampler only, at Jones well head
GPS location accidentally missed at Location 9885

Field Notes Collected During North Tioga Co. Sampling Event

Sample ID	GPS Location			Passive Sampler	Soil Sampler	Soil pH	Install/ Collection Date	Recovery Date	Comments
	Latitude	Longitude	Elevation						
0598-01	42° 12.19	76° 31.84	NA	X	X	NA	5/14/98	Lost	Buff-brown clays with no rock
0598-02	42°12.31	76°31.33	NA	X	X	NA	5/14/98	Lost	Organic soil no rock
0598-03	42°11.84	76°32.09	NA	X	X	NA	5/14/98	6/18/98	Brown silty clays with rock
0598-04	42°11.88	76°31.32	NA	X	X	NA	5/14/98	Lost	" "
0598-05	42°11.75	76° 31.10	NA	X	X	NA	5/14/98	Lost	" "
0598-06	42°11.04	76° 31. 17	NA	X	X	NA	5/14/98	6/18/98	" "
0598-07	42°11.18	76° 30.26	NA	X	X	NA	5/14/98	6/18/98	Brown silty clays with rock
0598-08	42°11.30	76°29.58	NA	X	X	NA	5/14/98	6/18/98	" "
0598-09	42°11.38	76°29.43	NA	X	X	NA	5/14/98	Lost	" "
0598-10	42°11.78	76°29.72	NA	X	X	NA	5/14/98	6/18/98	" "
0598-11	42°12.25	76°29.67	NA	X	X	NA	5/14/98	Lost	Organic soil no rock
0598-12	42°11.84	76°30.19	NA	X	X	NA	5/14/98	Lost	" "
0598-13	42°12.27	76°30.69	NA	X	X	NA	5/14/98	Lost	Brown silty clays with rock
0598-14	42°12.15	76°30.13	NA	X	X	NA	5/14/98	Lost	" "
0598-15	42°12.21	76°29.78	NA	X	X	NA	5/14/98	Lost	Organic sandy soil no rock
0598-16	42°14.30	76° 28.18	NA	X	X	NA	5/14/98	6/18/98	Brown silty clays with rock
0598-17	42°13.53	76° 28.18	NA	X	X	NA	5/14/98	Lost	" "
0598-18	42°13.13	76°28.73	NA	X	X	NA	5/14/98	Lost	Organic sandy soil no rock
0598-19	42°13.41	76°28.86	NA	X	X	NA	5/14/98	6/18/98	Brown silty clays with rock
0598-20	42°12.64	76°28.90	NA	X	X	NA	5/15/98	Lost	" "
0598-21	42°12.19	76°28.42	NA	X	X	NA	5/15/98	Lost	" "
0598-22	42°11.89	76°28.36	NA	X	X	NA	5/15/98	6/18/98	" "
0598-23	42°11.31	76°28.37	NA	X	X	NA	5/15/98	Lost	" "
0598-24	42°10.72	76°27.84	NA	X	X	NA	5/15/98	Lost	" "
0598-25	42°11.29	76°27.819	NA	X	X	NA	5/15/98	6/18/98	" "
0598-26	42°11.97	76°27.07	NA	X	X	NA	5/15/98	Lost	" "
0598-27	42 12.43	76°27.13	NA	X	X	NA	5/15/98	Lost	" "
0598-28	42°12.59	76°27.11	NA	X	X	NA	5/15/98	6/18/98	" "
0598-29	42°12.56	76°27.29	NA	X	X	NA	5/15/98	Lost	" "
0598-30	42°12.32	76°27.94	NA	X	X	NA	5/15/98	6/18/98	Organic sandy soil no rock

Comments: pH meter broken 5/14

Field Notes Collected During North Tioga Co. Sampling Event

Sample ID	GPS Location			Passive Sampler	Soil Sampler	Soil pH	Install/ Collection Date	Recovery Date	Comments
	Latitude	Longitude	Elevation						
0598-01	42° 12.19	76° 31.84	NA	X	X	NA	5/14/98	Lost	Buff-brown clays with no rock
0598-02	42°12.31	76°31.33	NA	X	X	NA	5/14/98	Lost	Organic soil no rock
0598-03	42°11.84	76°32.09	NA	X	X	NA	5/14/98	6/18/98	Brown silty clays with rock
0598-04	42°11.88	76°31.32	NA	X	X	NA	5/14/98	Lost	" "
0598-05	42°11.75	76° 31.10	NA	X	X	NA	5/14/98	Lost	" "
0598-06	42°11.04	76° 31. 17	NA	X	X	NA	5/14/98	6/18/98	" "
0598-07	42°11.18	76° 30.26	NA	X	X	NA	5/14/98	6/18/98	Brown silty clays with rock
0598-08	42°11.30	76°29.58	NA	X	X	NA	5/14/98	6/18/98	" "
0598-09	42°11.38	76°29.43	NA	X	X	NA	5/14/98	Lost	" "
0598-10	42°11.78	76°29.72	NA	X	X	NA	5/14/98	6/18/98	" "
0598-11	42°12.25	76°29.67	NA	X	X	NA	5/14/98	Lost	Organic soil no rock
0598-12	42°11.84	76°30.19	NA	X	X	NA	5/14/98	Lost	" "
0598-13	42°12.27	76°30.69	NA	X	X	NA	5/14/98	Lost	Brown silty clays with rock
0598-14	42°12.15	76°30.13	NA	X	X	NA	5/14/98	Lost	" "
0598-15	42°12.21	76°29.78	NA	X	X	NA	5/14/98	Lost	Organic sandy soil no rock
0598-16	42°14.30	76° 28.18	NA	X	X	NA	5/14/98	6/18/98	Brown silty clays with rock
0598-17	42°13.53	76° 28.18	NA	X	X	NA	5/14/98	Lost	" "
0598-18	42°13.13	76°28.73	NA	X	X	NA	5/14/98	Lost	Organic sandy soil no rock
0598-19	42°13.41	76°28.86	NA	X	X	NA	5/14/98	6/18/98	Brown silty clays with rock
0598-20	42°12.64	76°28.90	NA	X	X	NA	5/15/98	Lost	" "
0598-21	42°12.19	76°28.42	NA	X	X	NA	5/15/98	Lost	" "
0598-22	42°11.89	76°28.36	NA	X	X	NA	5/15/98	6/18/98	" "
0598-23	42°11.31	76°28.37	NA	X	X	NA	5/15/98	Lost	" "
0598-24	42°10.72	76°27.84	NA	X	X	NA	5/15/98	Lost	" "
0598-25	42°11.29	76°27.819	NA	X	X	NA	5/15/98	6/18/98	" "
0598-26	42°11.97	76°27.07	NA	X	X	NA	5/15/98	Lost	" "
0598-27	42 12.43	76°27.13	NA	X	X	NA	5/15/98	Lost	" "
0598-28	42°12.59	76°27.11	NA	X	X	NA	5/15/98	6/18/98	" "
0598-29	42°12.56	76°27.29	NA	X	X	NA	5/15/98	Lost	" "
0598-30	42°12.32	76°27.94	NA	X	X	NA	5/15/98	6/18/98	Organic sandy soil no rock

Comments: pH meter broken 5/14

Field Notes Collected During North Tioga Co. Sampling Event

Sample ID	GPS Location			Passive Sampler	Soil Sampler	Soil pH	Install/ Collection Date	Recovery Date	Comments
	Latitude	Longitude	Elevation						
0598-31	42°12.68	76°27.85	NA	X	X	NA	5/15/98	6/18/98	Brown silty clays with rock
0598-32	42°12.85	76°27.29	NA	X	X	NA	5/15/98	6/18/98	" "
0598-33	42°14.15	76°26.99	NA	X	X	NA	5/15/98	Lost	" "
0598-34	42°13.83	76° 26.84	NA	X	X	NA	5/15/98	6/18/98	" "
0598-35	42°13.11	76° 26. 58	NA	X	X	NA	5/15/98	Lost	" "
0598-36	42°13.29	76° 30.26	NA	X	X	NA	5/15/98	Lost	" "
0598-37	42°14.70	76°25.543	NA	X	X	NA	5/15/98	6/18/98	" "
0598-38	42°14.21	76°25.86	NA	X	X	NA	5/15/98	Lost	" "
0598-39	42°13.25	76°25.87	NA	X	X	NA	5/15/98	Lost	" "
0598-40	42°14.02	76°23.85	NA	X	X	NA	5/15/98	6/18/98	" "
0598-41	42°13.78	76°24.34	NA	X	X	NA	5/15/98	6/18/98	" "
0598-42	42°13.71	76°24.59	NA	X	X	NA	5/15/98	6/18/98	" "
0598-43	42°13.54	76°325.21	NA	X	X	NA	5/15/98	Lost	" "
0598-44	42°12.70	76° 26.53	NA	X	X	NA	5/15/98	6/18/98	" "
0598-45	42°12.82	76° 25.95	NA	X	X	NA	5/15/98	Lost	Organic sandy soil no rock
0598-46	42°13.60	76° 25.47	NA	X	X	NA	5/15/98	Lost	" "
0598-47	42°13.07	76°25.54	NA	X	X	NA	5/15/98	6/18/98	" "
0598-48	42°13.25	76°24.38	NA	X	X	NA	5/15/98	Lost	Brown silty clays with rock
0598-49	42°13.17	76°25.18	NA	X	X	NA	5/15/98	Lost	" "
0598-50	42°13.14	76°25.10	NA	X	X	NA	5/15/98	6/18/98	" "
0598-51	42°13.20	76°23.97	NA	X	X	NA	5/15/98	Lost	" "
0598-52	42°13.14	76°23.90	NA	X	X	NA	5/15/98	Lost	" "

Field Notes Collected During Stagecoach Field Sampling Event

Sample ID	GPS Location			Passive Sampler	Soil Sample	Soil pH	Install/ Collection Date	Recovery Date	Comments
	Latitude	Longitude	Elevation						
9801	41° 59. 92	76° 20.90		X	X	3.5	05/12/1998	06/16/1998	River Gravels. well mixed
9802	42°00.20	76°21.09		X	X	4.3	05/12/1998	06/16/1998	Silty clay with pebbles
9803	42°00.20	76°21.56		X	X	4.9	05/12/1998	Lost	" "
9804	41°59.92	76°20.56		X	X	5.2	05/12/1998	06/16/1998	" "
9805	41°59.97	76°20.09		X	X	5.4	05/12/1998	Lost	River Gravels well mixed with silt
9806	42°01.34	76°19.60		X	X	4.8	05/12/1998	06/16/1998	Yellow-brown clays with rock
9807	42°00.76	76°19.77		X	X	5.3	05/12/1998	Lost	" "
9808	42°01.31	76°19.74		X	X	5.4	05/12/1998	06/16/1998	Red Brown Silty clay
9809	42°00.63	76°21.82		X	X	5.2	05/12/1998	Lost	" "
9810	42°00.88	76°120.75		X	X	5.2	05/12/1998	06/16/1998	Black organic soil.intermixed with clay and rock
9811	42°00.22	76°19.39		X		5.6	05/12/1998	06/16/1998	Silty clay and rock
9812	41°59.60	76°19.34		X	X	5.8	05/12/1998	Lost	Buff-brown clays with rock
9813	42°00. 06	76°18.99		X	X	5.6	05/12/1998	06/16/1998	Clay-gravel mixture
9814	42°00. 02	76°18.80		X	X	5.6	05/12/1998	06/16/1998	" "
9815	42°00.01	76°18.68		X		5.2	05/12/1998	Lost	" "
9816	42°00.21	76°18.75		X	X	5.1	05/12/1998	06/16/1998	Buff-brown clays with rock
9817	42°00.21	76°18.75		X	X	5.0	05/12/1998	06/16/1998	Clay-gravel mixture
9818	42°00.71	76°18.25		X	X	5.2	05/12/1998	06/16/1998	Clay-gravel mixture
9819	42°01.05	76°18.36		X	X	5.3	05/12/1998	06/16/1998	Clay-gravel mixture
9820	42°00.49	76°19.60		X	X	5.3	05/12/1998	06/16/1998	Silty Clay
9821	42°00.68	76°19.04		X	X	5.7	05/12/1998	06/16/1998	" "
9822	42°01.17	76°17.45		X	X	5.4	05/12/1998	Lost	Heavy Black Brown Clay
9823	42°01.34	76°19.60		X	X	5.6	05/12/1998	06/16/1998	Brown Clay and silt
9824	42°00.57	76°17.86		X		6.0	05/12/1998	06/16/1998	Heavy Brown Clay
9825	42°00.43	76°17.07		X	X	6.1	05/12/1998	06/16/1998	" "
9826	41°59.29	76°16.24		X	X	5.9	05/12/1998	Lost	" "
9827	42°00.43	76°17.00		X	X	5.7	05/12/1998	06/16/1998	Heavy Brown Clay and rock
9828	42°00.78	76°16.28		X		5.5	05/12/1998	06/16/1998	" "
9829	42°00.51	76°16.30		X	X	6.1	05/12/1998	06/16/1998	" "
9830	42°00.45	76°15.43		X	X	5.8	05/12/1998	06/16/1998	" "

Comments: Sampler 9811 , passive sampler only, at Nichols-Mead well head
Sampler 9815, passive sampler only, at Latcher well head
Sampler 9824, passive sampler only, at Cooke well head
Sampler 9828, passive sampler only, at I, Mead #1 well head

Table 1

Field Notes Collected During Stagecoach Field Sampling Event

Sample ID	GPS Location			Passive Sampler	Soil Sampler	Soil pH	Install/ Collection Date	Recovery Date	Comments
	Latitude	Longitude	Elevation						
9831	42° 02.39	76° 14.16		X	X	5.2	05/13/1998	06/16/1998	Buff-brown clays with rock
9832	42°01.03	76°16.14		X	X	5.7	05/13/1998	06/16/1998	" ..
9833	42°01.63	76°16.34		X		5.4	05/13/1998	Lost	Buff-brown silty clays with rock
9834	42°01.37	76°16.30		X	X	5.8	05/13/1998	06/16/1998	" ..
9835	42°01.35	76°17.09		X	X	5.6	05/13/1998	06/16/1998	" ..
9836	42°01.75	76°17. 09		X	X	5.4	05/13/1998	06/16/1998	" ..
9837	42°02.14	76°19.77		X	X	5.8	05/13/1998	06/16/1998	" ..
9838	42°02.00	76°16.22		X	X	5.6	05/13/1998	06/16/1998	" ..
9839	42°01.54	76°17.71		X	X	8.7	05/13/1998	06/16/1998	" ..
9840	42°01.60	76°15.60		X		6.2	05/13/1998	06/16/1998	" ..
9841	42°01.65	76°15.70		X	X	5.5	05/13/1998	06/16/1998	" ..
9842	42°01.26	76°15.03		X	X	5.9	05/13/1998	06/16/1998	" ..
9843	42°01.45	76°14.08		X	X	4.2	05/13/1998	06/16/1998	" ..
9844	42°00.99	76°14.59		X	X	5.1	05/13/1998	06/16/1998	" ..
9845	42°00.99	76°15.13		X	X	4.9	05/13/1998	06/16/1998	" ..
9846	42°00.49	76°15.28		X	X	4.7	05/13/1998	06/16/1998	" ..
9847	42°01.00	76°14.84		X	X	4.6	05/13/1998	06/16/1998	" ..
9848	42°02.14	76°14.37		X	X	4.7	05/13/1998	06/16/1998	" ..
9849	42°02.59	76°14.70		X	X	4.8	05/13/1998	06/16/1998	" ..
9850	42°02.43	76°14.78		X	X	4.7	05/13/1998	Lost	" ..
9851	42°02.47	76°14.78		X	X	4.6	05/13/1998	06/16/1998	" ..
9852	42°02.11	76°15.38		X	X	4.7	05/13/1998	06/16/1998	" ..
9853	42°01.63	76°13.71		X	X	4.8	05/13/1998	06/16/1998	" ..
9854	42°00.98	76°14.00		X	X	4.7	05/13/1998	06/16/1998	" ..
9855	42°00.69	76°14.11		X	X	4.7	05/13/1998	Lost	" ..
9856	42°01.81	76°13.15		X	X	4.8	05/13/1998	06/16/1998	" ..
9857	42°02.03	76°13.46		X		4.7	05/13/1998	Lost	" ..
9858	42°01.93	76°13.13		X	X	4.6	05/13/1998	06/17/1998	" ..
9859	42°02.18	76°13.02		X		4.6	05/13/1998	06/17/1998	" ..
9860	42°01.49	76°12.89		X	X	4.7	05/13/1998	Lost	" "

Comments: Re-calibrated GPS unit. took measurement at location 30 Long 42° 00.22. Lat 76° 16. 32
Sampler 9833 , passive sampler only, at Owen #1 well head
Sampler 9840 , passive sampler only, at Barnhardt well head
Sampler 9857 , passive sampler only, at Racht well head
Sampler 9859 , passive sampler only, at Fyock well head

Field Notes Collected During Stagecoach Field Sampling Event

Sample ID	GPS Location			Passive Sampler	Soil Sampler	Soil pH	Install/ Collection Date	Recovery Date	Comments
	Latitude	Longitude	Elevation						
9861	42° 01.49	76° 12.184		X	X	4.6	05/13/1998	06/17/1998	Buff-brown clays with no rock
9862	42°00.,87	76°13.45		X	X	5.7	05/13/1998	06/17/1998	Buff-brown silty clays with rock
9863	42°01.29	76°17.85		X	X	5.4	05/13/1998	Lost	" "
9864	42°00.77	76°11.71		X	X	5.8	05/13/1998	Lost	" "
9865	42°01.25	76°11.99		X	X	5.6	05/13/1998	Lost	" "
9866	42°01.77	76°12. 65		X	X	NA	05/14/1998	06/17/1998	Brown silty clays with rock
9867	42°02.58	76°12.17		X	X	NA	05/14/1998	Lost	" "
9868	42°01.33	76°11.70		X	X	NA	05/14/1998	Lost	" "
9869	42°02.63	76°11.78		X	X	NA	05/14/1998	06/17/1998	" "
9870	42°02.64	76°10.14		X	X	NA	05/14/1998	06/17/1998	" "
9871	42°03.11	76°10.62		X		NA	05/14/1998	06/17/1998	" "
9872	42°02.81	76°10.69		X	X	NA	05/14/1998	06/17/1998	" "
9873	42°02.61	76°11.37		X	X	NA	05/14/1998	Lost	" "
9874	42°02.44	76°11.74		X	X	NA	05/14/1998	06/16/1998	" "
9875	42°01.87	76°12.18		X	X	NA	05/14/1998	06/16/1998	Heavy red brown clay, silt
9876	42°02.47	76°13.51		X	X	NA	05/14/1998	06/16/1998	Heavy red brown clay, silt , rocks
9877	42°02.77	76°13.77		X	X	NA	05/14/1998	06/16/1998	" "
9878	42°03.40	76°15.85		X	X	NA	05/14/1998	06/16/1998	" "
9879	42°03.31	76°13.730		X	X	NA	05/14/1998	06/16/1998	" "
9880	42°03.38	76°12.52		X	X	NA	05/14/1998	Lost	" "
9881	42°03.46	76°12.06		X	X	NA	05/14/1998	06/16/1998	" "
9882	42°03.41	76°11.66		X	X	NA	05/14/1998	06/16/1998	" "
9883	42°03.48	76°11.00		X	X	NA	05/14/1998	06/16/1998	Brown Silt and gravel
9884				X	X	NA	05/14/1998	Lost	" "
9885	42°03.16	76°10.00		X	X	NA	05/14/1998	Lost	" "

Comments: pH meter broken 5/14
Sampler 9871 , passive sampler only, at Jones well head
GPS location accidentally missed at Location 9885

Field Notes Collected During North Tioga Co. Sampling Event

Sample ID	GPS Location			Passive Sampler	Soil Sampler	Soil pH	Install/ Collection Date	Recovery Date	Comments
	Latitude	Longitude	Elevation						
0598-01	42° 12.19	76° 31.84	NA	X	X	NA	05/14/1998	Lost	Buff-brown clays with no rock
0598-02	42°12.31	76°31.33	NA	X	X	NA	05/14/1998	Lost	Organic soil no rock
0598-03	42°11.84	76°32.09	NA	X	X	NA	05/14/1998	06/18/1998	Brown silty clays with rock
0598-04	42°11.88	76°31.32	NA	X	X	NA	05/14/1998	Lost	" "
0598-05	42°11.75	76° 31.10	NA	X	X	NA	05/14/1998	Lost	" "
0598-06	42°11.04	76° 31. 17	NA	X	X	NA	05/14/1998	06/18/1998	" "
0598-07	42°11.18	76° 30.26	NA	X	X	NA	05/14/1998	06/18/1998	Brown silty clays with rock
0598-08	42°11.30	76°29.58	NA	X	X	NA	05/14/1998	06/18/1998	" "
0598-09	42°11.38	76°29.43	NA	X	X	NA	05/14/1998	Lost	" "
0598-10	42°11.78	76°29.72	NA	X	X	NA	05/14/1998	06/18/1998	" "
0598-11	42°12.25	76°29.67	NA	X	X	NA	05/14/1998	Lost	Organic soil no rock
0598-12	42°11.84	76°30.19	NA	X	X	NA	05/14/1998	Lost	" "
0598-13	42°12.27	76°30.69	NA	X	X	NA	05/14/1998	Lost	Brown silty clays with rock
0598-14	42°12.15	76°30.13	NA	X	X	NA	05/14/1998	Lost	" "
0598-15	42°12.21	76°29.78	NA	X	X	NA	05/14/1998	Lost	Organic sandy soil no rock
0598-16	42°14.30	76° 28.18	NA	X	X	NA	05/14/1998	06/18/1998	Brown silty clays with rock
0598-17	42°13.53	76° 28.18	NA	X	X	NA	05/14/1998	Lost	" "
0598-18	42°13.13	76°28.73	NA	X	X	NA	05/14/1998	Lost	Organic sandy soil no rock
0598-19	42°13.41	76°28.86	NA	X	X	NA	05/14/1998	06/18/1998	Brown silty clays with rock
0598-20	42°12.64	76°28.90	NA	X	X	NA	05/15/1998	Lost	" "
0598-21	42°12.19	76°28.42	NA	X	X	NA	05/15/1998	Lost	" "
0598-22	42°11.89	76°28.36	NA	X	X	NA	05/15/1998	06/18/1998	" "
0598-23	42°11.31	76°28.37	NA	X	X	NA	05/15/1998	Lost	" "
0598-24	42°10.72	76°27.84	NA	X	X	NA	05/15/1998	Lost	" "
0598-25	42°11.29	76°27.819	NA	X	X	NA	05/15/1998	06/18/1998	" "
0598-26	42°11.97	76°27.07	NA	X	X	NA	05/15/1998	Lost	" "
0598-27	42°12.43	76°27.13	NA	X	X	NA	05/15/1998	Lost	" "
0598-28	42°12.59	76°27.11	NA	X	X	NA	05/15/1998	06/18/1998	" "
0598-29	42°12.56	76°27.29	NA	X	X	NA	05/15/1998	Lost	" "
0598-30	42°12.32	76°27.94	NA	X	X	NA	05/15/1998	06/18/1998	Organic sandy soil no rock

Comments: pH meter broken 5/14

Field Notes Collected During North Tioga Co. Sampling Event

Sample ID	GPS Location			Passive Sampler	Soil Sampler	Soil pH	Install/ Collection Date	Recovery Date	Comments
	Latitude	Longitude	Elevation						
0598-31	42°12.68	76°27.85	NA	X	X	NA	05/15/1998	06/18/1998	Brown silty clays with rock
0598-32	42°12.85	76°27.29	NA	X	X	NA	05/15/1998	06/18/1998	" "
0598-33	42°14.15	76°26.99	NA	X	X	NA	05/15/1998	Lost	" "
0598-34	42°13.83	76° 26.84	NA	X	X	NA	05/15/1998	06/18/1998	" "
0598-35	42°13.11	76° 26. 58	NA	X	X	NA	05/15/1998	Lost	" "
0598-36	42°13.29	76° 30.26	NA	X	X	NA	05/15/1998	Lost	" "
0598-37	42°14.70	76°25.543	NA	X	X	NA	05/15/1998	06/18/1998	" "
0598-38	42°14.21	76°25.86	NA	X	X	NA	05/15/1998	Lost	" "
0598-39	42°13.25	76°25.87	NA	X	X	NA	05/15/1998	Lost	" "
0598-40	42°14.02	76°23.85	NA	X	X	NA	05/15/1998	06/18/1998	" "
0598-41	42°13.78	76°24.34	NA	X	X	NA	05/15/1998	06/18/1998	" "
0598-42	42°13.71	76°24.59	NA	X	X	NA	05/15/1998	06/18/1998	" "
0598-43	42°13.54	76°325.21	NA	X	X	NA	05/15/1998	Lost	" "
0598-44	42°12.70	76° 26.53	NA	X	X	NA	05/15/1998	06/18/1998	" "
0598-45	42°12.82	76° 25.95	NA	X	X	NA	05/15/1998	Lost	Organic sandy soil no rock
0598-46	42°13.60	76° 25.47	NA	X	X	NA	05/15/1998	Lost	" "
0598-47	42°13.07	76°25.54	NA	X	X	NA	05/15/1998	06/18/1998	" "
0598-48	42°13.25	76°24.38	NA	X	X	NA	05/15/1998	Lost	Brown silty clays with rock
0598-49	42°13.17	76°25.18	NA	X	X	NA	05/15/1998	Lost	" "
0598-50	42°13.14	76°25.10	NA	X	X	NA	05/15/1998	06/18/1998	" "
0598-51	42°13.20	76°23.97	NA	X	X	NA	05/15/1998	Lost	" "
0598-52	42°13.14	76°23.90	NA	X	X	NA	05/15/1998	Lost	" "

FREE SOIL GAS SPREA .ET STAGECOACH AREA

Direct Geochemical
Client: NYSERDA
Project Number: 7383
Project Name:

FREE SOIL GAS SPREADSHEET, REV. 10/26/98 CGP
DATE RECEIVED: May 17, 1996
INTERSTITIAL SOIL GAS DATA REPORT

G.C. FILE NO.	LAB ID#		Run Code	Client ID	X-Coord	-Coord.	Notes	Methane	Ethane	Ethene	Propane	Propene	iButane	nButane	nPentane	nHexane	Summation (through C6) C1+	C2+	%(C1/C1+)	%(C2/C2+)	%(C2+/C1+)	%(C3+/C2+)	C2/C1	C3/C1	nC4/C1	C3/C2	nC4/C2	nC5/C2
G16H0042	7383	1053		9801	-20	190		1906.7	384.68	1002.7	334.04	854.55	34.248	253.91	694.4	1006.7	4580.43	2673.73	41.627	14.38739	58.3729	85.61261	0.2018	0.1752	0.1332	0.8684	0.6601	1.8051
G16H0043	7383	1054		9802	50	172		1058	176.4	647.34	175.8	547.64	0	147.29	571.06	1676.6	3805.15	2747.15	27.804	6.42120	72.1956	93.57880	0.1667	0.1662	0.1392	0.9966	0.8350	3.2373
G17H0002	7383	1055		9803	125	92		9535.3	1807	6850.1	1916.1	6351	189.9	1201.8	1797.7	2801.2	19059.1	9523.8	50.030	18.97352	49.9698	81.02648	0.1895	0.2009	0.1260	1.0604	0.6651	0.9949
G17H0003	7383	1056		9804	-10	355		3284.7	295.65	6465.6	548.68	2449.5	29.356	364.04	587.07	986.04	6066.18	2781.48	54.148	10.62923	45.8522	89.37077	0.0900	0.1670	0.1108	1.8558	1.2313	1.9857
G17H0004	7383	1057		9805	32	411		7245.5	1645.3	4259.2	1564.2	5412.3	241.68	1507.5	1817.5	7182.5	20962.5	13717	34.564	11.99461	65.4359	88.00539	0.2271	0.2159	0.2081	0.9507	0.9162	1.1047
G17H0005	7383	1058		9806	160	485		3698.7	659.49	4929.9	564.84	2914.9	40.262	423.29	867.8	1536.8	7750.92	4052.22	47.719	16.27478	52.2805	83.72522	0.1783	0.1527	0.1144	0.8565	0.6418	1.3159
G17H0006	7383	1059		9807	270	460		976.51	223.6	2597.9	303.82	970.71	0	287.1	680.68	983.71	3455.42	2478.91	28.260	9.02009	71.7398	90.97991	0.2290	0.3111	0.2940	1.3588	1.2840	3.0442
G17H0007	7383	1060		9808	415	480		5171.2	602.21	8286.6	976.12	5938.8	68.803	500.45	816.47	2496.1	10562.55	5391.35	48.958	11.16993	51.0421	88.83007	0.1165	0.1888	0.0968	1.6209	0.8310	1.3558
G17H0008	7383	1061		9809	310	285		6121.9	684.88	3775.1	790.78	3398.3	87.762	657.03	1174.1	12404	21832.69	15710.79	28.040	4.35930	71.9599	95.64070	0.1119	0.1292	0.1073	1.1546	0.9593	1.7143
G17H0009	7383	1062		9810	219	230		8579.9	1481.8	6862.1	1586.9	6895.1	136.28	907.77	1972.4	12219	26747.77	18167.87	32.077	8.15616	67.9229	91.84384	0.1727	0.1850	0.1058	1.0709	0.6126	1.3311
	7383	1063		no sample	37	565																	ND	ND	ND	ND	ND	ND
G17H0010	7383	1064		9812	35	520		2203.8	257.8	3903.3	389.14	2204.8	0	266.03	604.95	1034.5	4756.22	2552.42					0.1170	0.1766	0.1207	1.5095	1.0319	2.3466
G17H0011	7383	1065		9813	15	615		2778.4	504.9	3492.4	550.15	7103.8	74.511	351.8	458.13	1412	6055.38	3276.98	45.883	15.40748	54.1168	84.59252	0.1817	0.1980	0.1266	1.0896	0.6968	0.9074
G17H0012	7383	1066		9814	-10	710		3914.3	816.28	1810.4	756.89	2460.2	108.05	647.86	724	7228.1	14087.43	10173.13	27.786	8.02388	72.2142	91.97612	0.2085	0.1934	0.1655	0.9272	0.7937	0.8870
	7383	1067		no sample	55	710											0	0					ND	ND	ND	ND	ND	ND
G17H0013	7383	1068		9816	50	725		6033.7	564.53	5425.2	925.15	4586.9	85.315	563.79	395.89	1047.4	9530.46	3496.76	63.310	16.14437	36.6904	83.85563	0.0936	0.1533	0.0934	1.6388	0.9987	0.7013
G17H0014	7383	1069		9817	145	810		2539	373.5	2651	471.99	2678.4	49.742	245.41	386.4	1611.1	5627.4	3088.4	45.119	12.09364	54.8815	87.90636	0.1471	0.1859	0.0967	1.2637	0.6571	1.0345
G17H0015	7383	1070		9818	210	816		8003.3	913.32	5046.5	964.73	6265.5	197.23	601.74	665.08	6865.2	18013.37	10010.07	44.430	9.12401	55.5702	90.87599	0.1141	0.1205	0.0752	1.0563	0.6588	0.7282
G17H0016	7383	1071		9819	315	815		2409.4	238.92	3786.3	372.34	2430	61.158	209.72	201.35	3060.4	6492.13	4082.73	37.113	5.85197	62.8874	94.14803	0.0992	0.1545	0.0870	1.5584	0.8778	0.8428
G17H0017	7383	1072		9820	145	550		1259.8	216.29	2382.7	442.5	1565.6	0	274.53	722.92	4538.6	7454.64	6194.84	16.900	3.49145	83.1005	96.50855	0.1717	0.3512	0.2179	2.0459	1.2693	3.3424
G17H0018	7383	1073		9821	350	715		1893.7	237.4	3972.4	441.49	1665.3	39.039	360.75	1016	2661.9	6611.24	4717.54	28.644	5.03228	71.3564	94.96772	0.1254	0.2331	0.1905	1.8597	1.5196	4.2797
G17H0019	7383	1074		9822	305	990		973.82	163.15	1610.2	242.28	1133.1	0	297.08	475.45	1419.5	3571.28	2597.46	27.268	6.28114	72.7319	93.71886	0.1675	0.2488	0.3051	1.4850	1.8209	2.9142
G17H0020	7383	1075		9823	215	1045		2121.4	329.47	2879.4	436.81	2175.8	0	465.33	811.5	2581.1	6745.61	4624.21	31.449	7.12489	68.5514	92.87511	0.1553	0.2059	0.2194	1.3258	1.4124	2.4630
	7383	1076		no sample	150	915																	ND	ND	ND	ND	ND	ND
G17H0021	7383	1077		9825	110	910		3042.6	455.07	3835.2	583.94	2638.1	29.458	469.07	1022.5	1453.4	7026.58	3983.98	43.301	11.42250	56.6987	88.57750	0.1496	0.1919	0.1542	1.2832	1.0308	2.2469
G17H0022	7383	1078		9826	125	1010		2056.9	330.85	3383.4	437.82	1838.3	25.279	453.66	760.64	4078.7	8118.57	6061.67	25.336	5.45807	74.6643	94.54193	0.1608	0.2129	0.2206	1.3233	1.3712	2.2990
G17H0024	7383	1079		9827	111	1140		3795.9	752.24	5535.1	865.63	3869.4	71.167	646.95	844.08	5196.6	12101.4	8305.5	31.367	9.05713	68.6326	90.94287	0.1982	0.2280	0.1704	1.1507	0.8600	1.1221
	7383	1080		no sample	180	1265		2056.9	330.85	3383.4	437.82	1838.3	25.279	453.66	760.64	4078.7	8118.57	6061.67	25.336	5.45807	74.6643	94.54193	0.1608	0.2129	0.2206	1.3233	1.3712	2.2990
G17H0025	7383	1081		9829	135	1240		564.05	40.166	486.84	59.607	296.94	0	68.887	185.29	273.78	1191.78	627.73	47.328	6.39861	52.6716	93.60139	0.0712	0.1057	0.1221	1.4840	1.7151	4.6131
G17H0026	7383	1082		9830	120	1362		971.8	157.63	963.11	160.54	862.51	0	148.99	529.57	2164.3	4132.83	3161.03	23.514	4.98667	76.4858	95.01333	0.1622	0.1652	0.1533	1.0185	0.9452	3.3596
G17H0027	7383	1083		9831	220	1355		3510.4	552.38	2758.4	668.72	2941.9	53.717	416.61	631.13	1717.3	7496.54	3986.14	46.827	13.85752	53.1731	86.14248	0.1574	0.1905	0.1187	1.2106	0.7542	1.1426
G17H0028	7383	1084		9832	340	1380		5486.9	874.67	2611.2	790.04	2551.6	96.426	727.39	793.04	5305.1	13977.14	8490.24	39.256	10.30206	60.7438	89.69794	0.1594	0.1440	0.1326	0.9032	0.8316	0.9067
	7383	1085		no sample	385	1235											0	0					ND	ND	ND	ND	ND	ND
G20H0003	7383	1086		9834	399	1245		10651	1021.1	16404	1588.8	9715.1	133.43	920.12	618.16	1002	15801.18	5150.18	67.406	19.82649	32.5936	80.17351	0.0959	0.1492	0.0864	1.5560	0.9011	0.6054
G20H0004	7383	1087		9835	380	1135		13832	1692.6	14072	2657.4	16478	253.09	1075.1	673.88	3760.4	23691.38	9859.38	58.384	17.16741	41.6159	82.83259	0.1224	0.1921	0.0777	1.5700	0.6352	0.3981
G20H0005	7383	1088		9836	500	1145		3974.8	211.46	6045.2	278.29	5728.4	69.414	224.11	107.22	453.26	5249.14	1274.34	75.723	16.59369	24.2771	83.40631	0.0532	0.0700	0.0564	1.3160	1.0598	0.5070
G20H0006	7383	1089		9837	626	1250		11187	1265.6	12689	2016.1	10719	137.3	1197.6	831.05	1838	18335.35	7148.35	61.013	17.70479	38.9867	82.29521	0.1131	0.1802	0.1071	1.5930	0.9463	0.6566
G20H0007	7383	1090		9838	510	1335		17356	2096.5	15047	2765.4	12583	228.73	1347.3	902.15	1608.6	26075.95	8719.95	66.559	24.04257	33.4406	75.95743	0.1208	0.1593	0.0776	1.3191	0.6426	0.4303
G20H0008	7383	1091		9839	440	1528		10460	1718.4	4872.2	1644	7207	193.26	910.26	577.69	1286.4	16596.75	6136.75	63.024	28.00179	36.9756	71.99821	0.1643	0.1572	0.0870	0.9567	0.5297	0.3362
	7383	1092		no sample	440	1632											0	0					ND	ND	ND	ND	ND	ND
G20H0009	7383	1093		9841	435	1620		2409.6	295.93	2978.9	385.1	12604	0	258.21	234.15	1987.2	3570.19	3160.59	43.259	9.36313	56.7412	90.63687	0.1228	0.1598	0.1072	1.3013	0.8725	0.7912
G20H0010	7383	1094		9842	431	1710		2600.6	252.17	2319.6	431.67	3853.5	0	255.27	293.48	1185	5018.19	2417.59	51.823	10.43064	48.1765	89.56936	0.0970	0.1660	0.0982	1.7118	1.0123	1.1638
G20H0011	7383	1095		9843	450	1844		13387	1283.1	4469.3	1335.8	9957.1	498.03	779.62	720.23	1762.7	19268.45	5881.45	69.476	21.81605	30.5237	78.18395	0.0958	0.0998	0.0582	1.0411	0.6076	0.5613
G20H0012	7383	1096		9844	360	1775		12210	1876.2	6567	2006.2	9354	262.57	1094.5	813.39	2344.9	20345.19	8135.19	60.014	23.06277	39.9858	76.93723	0.1537	0.1643	0.0896	1.0693	0.5834	0.4336
G20H0013	7383	1097		9845	250	1760		15101	2852.3	9410.4	2992.9	12416	271.85	1618.4	1369.8	2579.1	26513.5	11412.5	56.956	24.99277	43.0441	75.00723	0.1889	0.1982	0.1072	1.0493	0.5674	0.4802
G20H0014	7383	1098		9846	220	1622		8806	1325.5	7803.2	1508.3	103710	115.69	811.35	678.05	1474.1	14603.3	5797.3	60.301	22.86409	39.6986	77.13591	0.1505	0.1713	0.0921	1.1379	0.6121	0.5115
G20H0015	7383	1099		9847	340	1680		7126.2	692.34	7343.8	876.65	11961	107.54	506.91	432.41	1219.6	10854.11	3727.91	65.654	18.57180	34.3456	81.42820	0.0972	0.1230	0.0711	1.2662	0.7322	0.6246
G20H0016	7383	1100		9848	600	1800		15180	1860.3	12952	2201	17654	259.72	1240.1	845.51	1837.3	23164.21	7984.21	65.532	23.29974	34.4679	76.70026	0.1225	0.1450	0.0817	1.1831	0.6666	0.4545
G20H0017	7383	1101		9849	740	1805		6123.3	374.74	7807.7	597.17	5033.7	45.155	539.43	1017.6	1078.9	9731.14	3607.84	62.925	10.38682	37.0752	89.61318	0.0612	0.0975	0.0881	1.5936	1.4395	2.7155
G20H0018	7383	1102		9850	725	1692		6836.4	441.82	6122.6	914.03	6789.5	94.183	414.68	488.88	738.74	9834.55	2998.15	69.514	14.73642	30.4859	85.26358	0.0646	0.1337	0.0607	2.0688	0.9386	1.1065
G20H0019	7383	1103		9851	730	1570		31701	2323.3	16617	4172.8	30669	2054.1	1069.7	1103.9	1405.4	41776.1	10075.1	75.883	23.05982	24.1169	76.94018	0.0733	0.1316	0.0337	1.7961	0.4604	0.4731
G20H0020	7383	1104		9852	595	1580		12066	1438	14146	2048.5	11094	134.34	1078.5	861	3341.2	20833.2	8767.2	57.917	16.40204	42.0828	83.59796	0.1192	0.1698	0.0894	1.4245	0.7500	0.5987
G20H0021	7383	1105		9853	470	1980		11238	1843.6	9558.2	2244.8	9866.7	103.76	1929.4	3945.1	2220.9	23421.8	12183.8	47.981	15.13157	52.0191	84.86843	0.1641	0.1998	0.1717	1.2176	1.0465	2.1399
G20H0022	7383	1106		9854	310	1905		7217.1	1028.4	6388	1346.1	6170	80.117	712.44	773.72	1249.1	12326.86	5109.76	58.548	20.12619	41.4522	79.87381	0.1425	0.1865	0.0987	1.3089	0.6928	0.7524
G20H0023	7383	1107		9855	198	1850		8496.6	1231.1	6317.8	1599.6	7143.2	101.93	868.57	758.01	1699.6	14653.48	6156.88	57.983	19.99552	42.0165	80.00448	0.1449	0.1883	0.1022	1.2993	0.7055	0.6157
G20H0024	7383	1108		9856	510	2116		7693.1	1303	9344.5	1537.7	10189	91.227	899.16	790.18	1313.6	13536.74	5843.64	56.831	22.29775	43.1687	77.70225	0.1694	0.1999	0.1169	1.1801	0.6901	0.6064
G20H0025	7383	1109		9857	580	2060		5708.3	913.59	6912.3	929.46	9744.7	96.324	587.13	405.72	428.47	8972.67	3264.37	63.619	27.98672	36.3813	72.01328	0.1600	0.1628	0.1029	1.0174	0.6427	0.4441
	7383	1110		no sample	585	2075																	ND	ND	ND	ND	ND	ND
	7383	1111		no sample	630	2118																	ND	ND	ND	ND	ND	ND
G20H0026	7383	1112		9860	445	2165		9843.4	1065.6	10384	1211.9	19462	133.02	678.67	533.57	1289.3	14622.44	4779.04	67.317	22.29737	32.6829	77.70263	0.1083	0.1231	0.0689	1.1373	0.6369	0.5007
G20H0027	7383	1113		9861	175	2020		10398	1058.4	15689	1639.2	38058	190.61	1423.2	1191.4	2140.9	17851.1	7453.1	58.249	14.20080	41.7515	85.79920	0.1018	0.1576	0.1369	1.5488	1.3447	1.1257
G20H0028	7383	1114		9862	310	2075		13519	2546.3	10603	1864.7	16491	222.62	1048.6	1027	3772.9	23778.5	10259.5	56.854	24.81895	43.1461	75.18105	0.1883	0.1379	0.0776	0.7323	0.4118	0.4033
G20H0029	7383	1115		9863	240	2210		9063.5	740.23	8994.7	1417.3	28004	807.49	514.27	535.29	954.05	13224.64	4161.14	68.535	17.78912	31.4651	82.21088	0.0817	0.1564	0.0567	1.9147	0.6947	0.7231
G20H0030	7383	1116		9864	235	2425		9066	1010.9	9077.4	1359.7	18344	378.36	720.14	661.36	744.68	13562.78	4496.78	66.845	22.48053	33.1553	77.51947	0.1115	0.1500	0.0794	1.3450	0.7124	0.6542
G20H0031	7383	1117		9865	335	2355		6580.3	718.29	8052.5	2654.9	7375.2	1665.4	427.7	178.43	70.819	10630.439	4050.139	61.901	17.73495	38.0995	82.26505	0.1092	0.4035	0.0650	3.6961	0.5954	0.2484
G20H0032	7383	1118		9866	459	2335		9999.3	1210.1	8551.6	1516.5	11506	411.7	558.69	361.49	180.18	13826.26	3826.96	72.321	31.62040	27.6789	68.37960	0.1210	0.1517	0.0559	1.2532	0.4617	0.2987
G21H0003	7383	1119		9867	510	2475		12065	1666.5	8798.7	2169.4	11844	495.07	946.63	780.58	1356.7	18984.81	6919.81	63.551	24.08303	36.4492	75.91697	0.1381	0.1798	0.0785	1.3018	0.5680	0.4684
G21H0004	7383	1120		9868	590	2620		4706.1	366.18	6543.6	681.39	5777.7	51.679	338.43	255.41	720.64	7068.15	2362.05	66.582	15.50264	33.4182	84.49736	0.0778	0.1448	0.0719	1.8608	0.9242	0.6975
G21H0005	7383	1121		9869	682	2755		10401	1199.2	20170	20044.2	10860	126.7	737.93	645.3	1600.6	34628.23	24227.23	30.036	4.94980	69.9638	95.05020	0.1153	1.9271	0.0709	16.7106	0.6154	0.5381
G21H0006	7383	1122		9870	755	2812		1000.2	37.267	530.99	48.677	321.62	0	92.227	164.2	119.09	1461.661	461.461	68.429	8.07587	31.5710	91.92413	0.0373	0.0487	0.0922	1.3062	2.4748	4.4060
G21H0007	7383	1123		9871	866	2680		1872	143.96	3314	247.8	1927.7	0	199.98	116.93	500.93	3081.6	1209.6	60.748	11.90146	39.2523	88.09854	0.0769	0.1324	0.1068	1.7213	1.3891	0.8122
G21H0008	7383	1124		9872	910	2685		2529.2	192.82	2332	298.22	2214	0	147.63	169	534.47	3871.34	1342.14	65.331	14.36661	34.6686	85.63339	0.0762	0.1179	0.0584	1.5466	0.7656	0.8765
G21H0009	7383	1125		9873	775	2562		8242.6	1516.1	5723.1	1821.1	6586.1	118.34	880.69	599.52	1564.9	14624.91	6382.31	56.360	23.75472	43.6400	76.24528	0.1839	0.2209	0.1068	1.2012	0.5809	0.3954
G21H0010	7383	1126		9874	710	2410		5823.7	649	8803.6	1057.3	4690	67.478	510.99	445.56	1081.4	9567.95	3744.25	60.867	17.33324	39.1333	82.66676	0.1114	0.1816	0.0877	1.6291	0.7873	0.6865
G21H0011	7383	1127		9875	530	2285		3152.3	362.73	6299.3	534.81	2545.6	43.932	307.39	253.64	618.15	5229.02	2076.72	60.285	17.46649	39.7153	82.53351	0.1151	0.1697	0.0975	1.4744	0.8474	0.6993
G21H0012	7383	1128		9876	710	2015		5866	727.95	6910.7	982.73	3700.9	61.158	577.04	509.11	1462.3	10125.13	4259.13	57.935	17.09152	42.0649	82.90848	0.1241	0.1675	0.0984	1.3500	0.7927	0.6994
G21H0013	7383	1129		9877	872	1980		3689	317.05	2465.4	435.62	2237.6	35.064	596.08	868.31	12385	18291.06	14602.06	20.168	2.17127	79.8317	97.82873	0.0859	0.1181	0.1616	1.3740	1.8801	2.7387
G21H0014	7383	1130		9878	965	1965		3745.7	565.35	5637.2	840.16	3437.1	47.194	388.4	267.99	1191.8	6999	3253.3	53.518	17.37774	46.4824	82.62226	0.1509	0.2243	0.1037	1.4861	0.6870	0.4733
G21H0015	7383	1131		9879	990	2120		3522.2	496.89	3286.6	765.8	3440.4	43.014	440.85	438.41	1176.4	6840.55	3318.35	51.490	14.97401	48.5100	85.02599	0.1411	0.2174	0.1252	1.5412	0.8872	0.8823
G21H0016	7383	1132		9880	1000	2245		4767.2	609.11	3085.2	874.91	2927.6	47.805	420.12	579.64	1030.8	8281.78	3514.58	57.563	17.33095	42.4375	82.66905	0.1278	0.1835	0.0881	1.4364	0.6897	0.9516
G21H0017	7383	1133		9881	1040	2360		4331	666.25	4156.4	941.49	3650.2	68.089	495.81	544.09	944.37	7923.01	3592.01	54.664	18.54811	45.3364	81.45189	0.1538	0.2174	0.1145	1.4131	0.7442	0.8166
G21H0018	7383	1134		9882	995	2420		4850.5	1053.3	1524	902.18	2009.4	114.98	522.43	368.47	897.12	8594	3743.5	56.441	28.13677	43.5595	71.86323	0.2172	0.1860	0.1077	0.8565	0.4960	0.3498
G21H0019	7383	1135		9883	1000	2570		548.37	56.729	501.79	55.015	3376.4	0	0	0	159.46	819.574	271.204	66.909	20.91746	33.0908	79.08254	0.1035	0.1003	ND	0.9698	ND	ND
G21H0021	7383	1136		9884	960	2700		8325	1053.6	5125.8	1143.3	10840	502.21	543.51	321.48	995.51	11982.4	3657.4	69.477	28.80735	30.5231	71.19265	0.1266	0.1373	0.0653	1.0851	0.5159	0.3081
G21H0022	7383	1137		9885	935	2810		65056	6114.5	21581	5202.3	38353	1448	2646	1655.1	1554	82227.9	17171.9	79.117	35.60799	20.8833	64.39241	0.0940	0.0800	0.0407	0.8508	0.4327	0.2707
																							ND	ND	ND	ND	ND	ND

Data Revised 10/26/98

DIRECT GEOCHEMICAL — **SYNCHRONOUS SCANNED UV FLUORESCENCE SPECTRA DATA**

Client:NYSERDA — **STAGECOACH FIELD AREA, TIOGA COUNTY, NY**

Method:Client collected surface samples. D99 solvent extracted

Date Received: May 28,1998

X-Coord.	Y-Coord.	LAB ID#	SPIKE CODE	DILU FCTR	CLIENT ID#	FLUORESCENCE INTENSITIES (Relative Fluorescence Intensity Units) 290nm	320nm	350nm	410nm	440nm	480nm	Total
50	172	1053	Dilution	200	9802	2436	15760	59477	138291	134238	76922	58577.2
50	172	1054	Dilution	50	9802	574	2353	8624	13209	10306	6493	6250.6
125	92	1055	Dilution	200	9803	3203	17010	73147	131368	104046	82659	61477.3
-10	355	1056	Dilution	10	9804	207	981	3944	5321	3502	2138	2518.2
32	411	1057	Dilution	1000	9805	14008	71555	264450	394383	284495	222408	193360.8
160	485	1058	Dilution	10	9806	290	807	3604	3776	2300	1287	1952.6
270	460	1059	Dilution	10	9807	189	666	2414	3070	2014	1218	1511.4
415	480	1060	Dilution	10	9808	144	297	916	1202	748	411	594.1
310	285	1061	Dilution	20	9809	521	3483	12111	17406	11245	7408	8185.6
219	230	1062	Dilution	50	9810	2181	8859	22999	27644	16718	7914	14119.3
35	520	1064	Neat	1	9812	76	150	355	267	144	89	187.5
15	615	1065	Neat	1	9813	57	165	599	674	386	213	341.5
-10	710	1066	Dilution	200	9814	3253	18435	77767	133405	101341	79640	62510.0
50	725	1068	Dilution	2	9816	133	508	1442	1571	956	557	842.3
145	810	1069	Dilution	10	9817	215	1124	3514	4590	2788	1547	2197.8
210	816	1070	Neat	1	9818	35	58	183	75	40	24	74.9
315	815	1071	Neat	1	9819	35	59	178	76	38	23	74.2
145	550	1072	Dilution	4	9820	110	699	2032	2472	1420	713	1305.4
350	715	1073	Dilution	2	9821	66	257	805	771	457	217	423.3
305	990	1074	Neat	1	9822	60	214	706	463	240	142	317.2
215	1045	1075	Dilution	10	9823	260	1599	5015	5549	3288	1796	2843.6
110	910	1077	Dilution	2	9825	74	177	510	549	339	159	293.9
125	1010	1078	Dilution	50	9826	872	5761	23094	35336	24457	16164	16245.2
111	1140	1079	Dilution	20	9827	364	1671	5666	7028	4081	2453	3436.2
135	1240	1081	Dilution	50	9829	4709	19553	10575	747	229	197	7155.9
120	1362	1082	Dilution	10	9830	1834	8707	6130	3428	2062	1293	4278.4
220	1355	1083	Dilution	100	9831	1112	4773	16331	23864	15061	9886	11193.2
340	1380	1084	Dilution	100	9832	2785	15729	55665	81419	54464	36408	38401.2
399	1245	1086	Neat	1	9834	68	222	641	701	380	210	368.3
380	1135	1087	Dilution	50	9835	844	4412	18539	31045	22893	11939	13355.6
500	1145	1088	Neat	1	9836	62	69	51	34	19	13	46.2
626	1250	1089	Dilution	10	9837	232	831	3162	3910	2538	1625	1952.0
510	1335	1090	Neat	1	9838	71	227	640	621	355	182	348.2
440	1528	1091	Dilution	10	9839	317	646	2267	3674	2465	1404	1661.8
435	1620	1093	Dilution	50	9841	1690	5439	3240	508	304	257	2226.8
431	1710	1094	Dilution	2	9842	79	287	1245	1586	1035	647	768.8
450	1844	1095	Dilution	100	9843	1668	10063	54090	73050	54883	39898	35753.8
360	1775	1096	Dilution	100	9844	1640	7656	33128	51551	36102	24704	23735.7
250	1760	1097	Dilution	200	9846	3851	19598	73824	127350	99201	76056	60135.6
220	1622	1098	Dilution	10	9846	178	679	2797	4517	3232	2023	2039.0
340	1680	1099	Dilution	2	9847	80	164	364	264	139	94	193.2
600	1800	1100	Dilution	10	9848	188	728	2867	4123	3040	1758	1932.7
740	1805	1101	Dilution	10	9849	164	477	2122	1516	921	571	970.0
725	1692	1102	Dilution	2	9850	122	187	658	618	354	225	362.3
730	1570	1103	Dilution	20	9851	418	1657	5743	8687	5994	3893	4079.6
595	1580	1104	Dilution	20	9852	402	1554	5669	8838	6123	3824	4057.3
470	1980	1105	Dilution	50	9853	670	2958	11410	18880	13828	9580	8699.3
310	1905	1106	Dilution	2	9854	73	164	502	708	459	256	340.7
198	1850	1107	Dilution	10	9855	135	543	2268	4086	2952	1836	1773.6
510	2116	1108	Dilution	20	9856	335	1557	6149	9666	6851	4476	4436.6
580	2060	1109	Neat	1	9857	83	79	187	43	19	14	81.0
445	2165	1112	Dilution	2	9860	89	270	872	1192	762	378	560.3
175	2020	1113	Neat	1	9861	79	96	213	133	61	41	112.5
310	2075	1114	Neat	1	9862	86	111	95	68	34	25	77.1
240	2210	1115	Dilution	20	9863	337	1296	4865	7126	4817	3094	3343.6
235	2425	1116	Neat	1	9864	49	96	271	257	152	105	155.5
335	2355	1117	Neat	1	9865	59	64	43	23	12	7	39.3
459	2335	1118	Dilution	10	9866	200	348	1149	1546	957	520	752.8
510	2475	1119	Dilution	50	9867	760	3422	13166	23800	18220	11732	10575.9
590	2620	1120	Neat	1	9868	87	128	300	140	80	58	142.9
682	2755	1121	Dilution	20	9869	316	1112	4674	7229	5191	3512	3368.6
755	2812	1122	Dilution	10	9870	190	536	2464	3246	2272	1383	1563.7
866	2680	1123	Neat	1	9871	88	95	114	32	17	12	68.4
910	2685	1124	Neat	1	9872	37	60	110	96	55	35	67.4
775	2562	1125	Dilution	200	9873	3276	18932	71973	126326	96703	78936	59888.5
710	2410	1126	Dilution	10	9874	175	621	2302	3168	2138	1182	1489.4
530	2285	1127	Dilution	2	9875	61	188	820	890	546	275	446.7
710	2015	1128	Dilution	10	9876	212	535	1814	2386	1589	927	1174.8
872	1980	1129	Dilution	10	9877	180	703	2283	2587	1623	1017	1354.2
965	1965	1130	Dilution	10	9878	464	447	1484	1866	1092	645	981.2
990	2120	1131	Dilution	2	9879	73	202	625	608	369	182	338.0
1000	2245	1132	Dilution	10	9880	156	456	1456	2139	1442	860	1013.3
1040	2360	1133	Dilution	20	9881	373	1887	8493	13241	9567	6322	6063.1
995	2420	1134	Dilution	500	9882	8445	43407	158862	265858	198266	155895	126493.3
1000	2570	1135	Dilution	10	9883	813	523	1626	1566	909	597	1025.0
960	2700	1136	Neat	1	9884	39	322	1000	1000	1000	1000	672.2
935	2810	1137	Dilution	50	9885	851	5188	23577	41533	31759	22344	18898.4
935	2810	1137	Dilution	100	9885	1282	6791	30090	50605	38268	28144	23382.2

Table 4

Passive Soil Gas Data adsheet, Stagecoach Field

Direct Geochemical
Client: NYSERDA
Project Number: 7383 DATE RECEIVED: May 17, 1997
Project Nam Interstitial Soil Gas Data Report, Stagecoach Field Area

G.C. FILE NO.	LAB ID#	Run Cod	Client ID	X-Coord	Y-Coord	Notes	Methane	Ethane	Ethene	Propane	Propene	iButane	nButane	nPentane	nHexane	SUMMATION (through C1+	C2+)	%(C1/C1+)	%(C2/C2+)	%(C2+/C1+)	%(C3+/C2+)	C2/C1	C3/C1	nC4/C1	C3/C2	nC4/C2	nC5/C2
H06H0003	7383 1200		9801	-20	190		881.31	0	0	0	0	0	0	0	0	881.31	0	100		0		ND	ND	ND	ND	ND	ND
H06H0004	7383 1201		9802	50	172		624.69	0	0	0	0	0	0	0	0	624.69	0	100		0		ND	ND	ND	ND	ND	ND
			NOSAMPLE	125	92																						
H06H0005	7383 1203		9804	-10	355		176.73	0	0	0	0	0	0	0	0	176.73	0	100		0		ND	ND	ND	ND	ND	ND
			NOSAMPLE	32	411																						
H06H0006	7383 1205		9806	160	485		956.48	44.65	0	40.816	0	0	71.328	0	0	1113.274	156.794	85.915956	28.47685498	14.084044	71.52314502	0.0467	0.0427	0.0746	0.9141	1.5975	ND
			NOSAMPLE	270	460																	ND	ND	ND	ND	ND	ND
H07H0002	7383 1207		9808	415	480		2699.3	102.12	0	49.186	0	213.09	1544	0	111.93	4506.536	1807.236	59.89744673	5.65061785	40.10255327	94.34938215	0.0378	0.0182	0.5720	0.6816	15.1195	ND
			NOSAMPLE	310	285																	ND	ND	ND	ND	ND	ND
H07H0003	7383 1209		9810	219	230		844.78	63.301	0	0	0	0	91.562	0	0	999.643	154.863	84.50816942	40.87548349	15.49183058	59.12451651	0.0749	ND	0.1084	ND	1.4465	ND
H07H0004	7383 1210		9811	37	565		1290.4	61.214	0	0	156.08	0	121.18	0	0	1472.794	182.394	87.61578333	33.56141101	12.38421667	66.43858899	0.0474	ND	0.0939	ND	1.9796	ND
			NOSAMPLE	35	520																	ND	ND	ND	ND	ND	ND
H07H0005	7383 1212		9813	15	615		414.97	0	0	0	0	0	87.04	0	0	502.01	87.04	82.66169997	0	17.33830003	100	ND	ND	0.2098	ND	ND	ND
H07H0006	7383 1213		9814	-10	710		1653.3	61.353	0	34.138	66.421	80.678	1084.7	15.14	73.278	2921.909	1268.609	56.58287099	4.8362419	43.41712901	95.1637581	0.0371	0.0206	0.6561	0.5564	17.6797	0.2668
			NOSAMPLE	55	710																	ND	ND	ND	ND	ND	ND
H07H0007	7383 1215		9816	50	725		1662.7	72.483	0	0	0	0	163.79	0	0	1898.973	236.273	87.55785364	30.67764831	12.44214636	69.32235169	0.0436	ND	0.0985	ND	2.2597	ND
H07H0008	7383 1216		9817	145	810		2023.7	95.299	207.18	0	230.37	0	0	0	0	2118.999	95.299	95.50264063	100	4.497359366	0	0.0471	ND	ND	ND	ND	ND
H07H0009	7383 1217		9818	210	816		1790	95.021	0	67.242	0	282.03	1268.5	0	0	3220.763	1430.763	55.5764928	6.64128161	44.4235072	93.35871839	0.0531	0.0376	0.7087	0.7077	13.3497	ND
H07H0010	7383 1218		9819	315	815		837.7	0	0	0	0	265.53	0	0	0	837.7	0	100	#DIV/0!	0	#DIV/0!	ND	ND	ND	ND	ND	ND
H07H0012	7383 1219		9820	145	550		1474.2	62.082	0	0	0	49.091	160.06	0	0	1716.342	242.142	85.89197258	33.89829109	14.10802742	66.10170891	[illegible]	ND	0.1086	ND	[illegible]	ND
H07H0011	7383 1220		9821	350	715		1589.2	52.588	0	0	0	0	89.979	0	0	1731.767	142.567	91.76754148	36.88651652	8.232458524	63.11348348	0.0331	ND	0.0566	ND	1.7110	ND
			NOSAMPLE	305	990																	ND	ND	ND	ND	ND	ND
H07H0013	7383 1222		9823	215	1045		3419.2	105.32	84.648	34.515	249.16	36.183	229.92	0	0	3788.955	369.755	90.24124066	28.48372571	9.758759341	71.51627429	0.0308	0.0101	0.0672	0.3277	2.1831	ND
H07H0014	7383 1223		9824	150	915		3745.3	224.13	0	60.847	0	1.76	178.94	0	0	4209.217	463.917	88.97854399	48.31252142	11.02145601	51.68747858	0.0598	0.0162	0.0478	0.2715	0.7984	ND
H07H0015	7383 1224		9825	110	910		6085.5	239.29	89.602	87.368	236.06	501.86	4096.5	0	0	10508.658	4423.158	57.90939243	5.409935616	42.09060757	94.59006438	0.0393	0.0144	0.6732	0.3651	17.1194	ND
			NOSAMPLE	125	1010																	ND	ND	ND	ND	ND	ND
H07H0016	7383 1226		9827	111	1140		3504	236.51	0	296.43	98.891	309.9	1199.2	0	0	5236.14	1732.14	66.91952469	13.65420809	33.08047531	86.34579191	0.0675	0.0846	0.3422	1.2534	5.0704	ND
H07H0017	7383 1227		9828	180	1265		4479.8	268.37	0	48.715	0	26.218	187.42	0	0	4984.305	504.505	89.87812744	53.19471561	10.12187256	46.80528439	0.0599	0.0109	0.0418	0.1815	0.6984	ND
H10H0003	7383 1228		9829	135	1240		3875.5	236.6	0	45.242	0	0	0	0	0	4157.342	281.842	93.22062029	83.94774377	6.779379709	16.05225623	0.0611	0.0117	ND	0.1912	ND	ND
H10H0004	7383 1229		9830	120	1362		6533.7	286.52	0	84.628	0	0	98.535	0	0	7003.383	469.683	93.29348402	61.0028466	6.706515979	38.9971534	0.0439	0.0130	0.0151	0.2954	0.3439	ND
H10H0005	7383 1230		9831	220	1355		3758.5	226.12	0	0	0	0	0	0	0	3984.62	226.12	94.32518032	100	5.674819682	0	0.0602	ND	ND	ND	ND	ND
H10H0006	7383 1231		9832	340	1380		6608.5	301.77	0	113.15	0	256.98	477.43	0	0	7500.85	892.35	88.10334829	33.81744831	11.89665171	66.18255169	0.0457	0.0171	0.0722	0.3750	1.5821	ND
H10H0007	7383 1232		9833	385	1215		6795.3	302.47	0	66.21	0	0	1135	0	0	8298.98	1503.68	81.88114684	20.11531709	18.11885316	79.88468291	0.0445	0.0097	0.1670	0.2189	3.7524	ND
H10H0008	7383 1233		9834	399	1245		6470	286.52	0	87.462	0	767.63	2702	0	0	9545.982	3075.982	67.77720721	9.314740916	32.22279279	90.68525108	0.0443	0.0135	0.4176	0.3053	9.4304	ND
H10H0009	7383 1234		9835	380	1135		4703.2	298.13	0	80.85	73.591	875.14	3367.7	0	0	8449.86	3746.68	55.65996203	7.957170808	44.34003797	92.04282191	0.0634	0.0172	0.7160	0.2712	11.2961	ND
H10H0010	7383 1235		9836	310	1145		4779.4	340.78	0	198.25	0	299.14	1129.7	0	0	6448.11	1668.73	74.12071407	20.42151816	25.87928593	79.57848184	0.0713	0.0415	0.2364	0.5818	3.3150	ND
H10H0030	7383 1236		9837	626	1250		6433.9	328.06	0	87.273	0	150.07	956.09	0	0	7805.323	1371.423	82.42964449	23.92113085	17.57035551	76.07886115	0.0510	0.0136	0.1486	0.2660	2.9144	ND
H10H0012	7383 1237		9838	510	1335		4759.4	337.15	0	129.11	0	182.54	927.73	0	0	6153.39	1393.99	77.34598327	24.18596977	22.65401673	75.81403023	0.0708	0.0271	0.1949	0.3829	2.7517	ND
H10H0011	7383 1238		9839	440	1528		4598.5	306.8	0	61.11	0	29.175	163.89	0	0	5130.3	531.8	89.63413446	57.69086123	10.36586554	42.30913877	0.0667	0.0133	0.0356	0.1992	0.5342	ND
H10H0013	7383 1239		9840	440	1632		4907	330.29	0	63.188	0	0	105.082	0	0	5405.56	498.56	90.77690378	66.24879653	9.223096219	33.75120347	0.0673	0.0129	0.0214	0.1913	0.3182	ND
H10H0014	7383 1240		9841	435	1620		3293.8	196.05	0	31.83	0	0	64.345	0	0	3586.025	292.225	91.85100494	67.08871589	8.148995057	32.91128411	0.0595	0.0097	0.0195	0.1624	0.3282	ND
H10H0015	7383 1241		9842	431	1710		4072	244.71	0	48.076	0	84.526	121.29	0	0	4486.076	414.076	90.76975067	59.09784677	9.230249331	40.90215323	0.0601	0.0118	0.0298	0.1965	0.4956	ND
H10H0016	7383 1242		9843	450	1844		5710.4	209.89	0	33.625	0	0	102.46	0	0	6056.375	345.975	94.28742441	60.66623311	5.712575592	39.33376689	0.0368	0.0059	0.0179	0.1602	0.4882	ND
H10H0017	7383 1243		9844	360	1775		4319	277.16	0	43.164	0	45.36	102.01	0	0	4741.334	422.334	91.09250688	65.62578433	8.907493123	34.37421567	0.0642	0.0100	0.0236	0.1557	0.3681	ND
H10H0018	7383 1244		9845A	250	1760		4080.5	278.97	0	46.753	80.561	0	235.41	136.21	0	4777.843	697.343	85.40464808	40.00470357	14.59535192	59.99529643	0.0684	0.0115	0.0577	0.1676	0.8439	0.4883
H10H0031	7383 1245		9845B	250	1760		6664.1	331.41	0	61.393	0	0	331.36	0	0	7388.263	724.163	90.19846749	45.76455853	9.801532512	54.23544147	0.0497	0.0092	0.0497	0.1852	0.9998	ND
			NOSAMPLE	220	1622																	ND	ND	ND	ND	ND	ND
H10H0019	7383 1247		9847	340	1680		4562.7	319.39	0	139.79	0	136.18	1043.1	0	0	6064.98	1502.28	75.23025632	21.26035093	24.76974368	78.73964907	0.0700	0.0306	0.2286	0.4377	3.2659	ND
H10H0020	7383 1248		9848	600	1800		4201.3	293.66	0	67.627	0	45.56	365.33	0	0	4927.917	726.617	85.25508851	40.41468889	14.74491149	59.58531111	0.0699	0.0161	0.0870	0.2303	1.2441	ND
H10H0021	7383 1249		9849	740	1805		6710.4	314.07	0	47.603	0	0	118.15	0	0	7190.223	479.823	93.32672992	65.45538667	6.673270078	34.54461333	0.0468	0.0071	0.0176	0.1516	0.3762	ND
			NOSAMPLE	725	1692																	ND	ND	ND	ND	ND	ND
H10H0023	7383 1251		9851	730	1570		6232	288.48	0	73.577	75.19	76.333	1107.9	271.55	446.7	8420.207	2188.207	74.01243224	13.18339627	25.98756776	86.81660373	0.0463	0.0118	0.1778	0.2551	3.8405	0.9413
H10H0024	7383 1252		9852	595	1580		6702.1	316.59	0	88.595	110.5	191.83	2261.8	32.68	134.99	9536.755	2834.655	70.27652468	11.1685549	29.72347532	88.8314451	0.0472	0.0132	0.3375	0.2798	7.1443	0.1032
H10H0025	7383 1253		9853	470	1980		4350.6	277.02	0	45.242	0	19.483	160.3	36.12	0	4869.282	518.682	89.34787511	53.40844679	10.65212489	46.59155321	0.0637	0.0104	0.0368	0.1633	0.5787	0.1304
H10H0026	7383 1254		9854	310	1905		4640.5	317.99	0	60.732	0	0	204.36	0	0	5223.582	583.082	88.83750652	54.53606868	11.16249348	45.46393132	0.0685	0.0131	0.0440	0.1910	0.6427	ND
			NOSAMPLE	198	1850																	ND	ND	ND	ND	ND	ND
H10H0027	7383 1256		9856	510	2116		6104.1	263.17	0	43.54	0	0	94.499	0	0	6505.309	401.209	93.8325912	65.59424141	6.167408804	34.40575859	0.0431	0.0071	0.0155	0.1654	0.3591	ND
			NOSAMPLE	580	2060																	ND	ND	ND	ND	ND	ND
H10H0028	7383 1258		9858	585	2075		4486.7	293.1	0	62.999	0	30.873	271.73	0	0	5114.529	627.829	87.72459791	46.68468644	12.27540209	53.31531356	0.0653	0.0140	0.0606	0.2149	0.9271	ND
H10H0029	7383 1259		9859	630	2118		4522.3	318.69	0	101.53	0	172.85	757.56	13.98	38.969	5753.029	1230.729	78.6072867	25.89440892	21.3927133	74.10559108	0.0705	0.0225	0.1675	0.3186	2.3771	0.0439
H10H0028			NOSAMPLE	445	2165																						
			NOSAMPLE	445	2165																	ND	ND	ND	ND	ND	ND
H10H0032	7383 1261		9861	175	2020		4461.9	295.47	0	69.327	0	0	392.91	0	0	5219.607	757.707	85.48344732	38.99528446	14.51655268	61.00471554	0.0662	0.0155	0.0881	0.2346	1.3298	ND
H10H0033	7383 1262		9862	310	2075		6115	257.86	0	35.537	0	83.027	2386.8	625.77	9	9449.967	3334.967	64.70922068	7.732010542	35.29077932	92.26798946	0.0422	0.0091	0.3903	0.2154	9.2562	2.4268
			NOSAMPLE	240	2210																	ND	ND	ND	ND	ND	ND
			NOSAMPLE	235	2425																	ND	ND	ND	ND	ND	ND
			NOSAMPLE	335	2355																	ND	ND	ND	ND	ND	ND
H10H0034	7383 1266		9866	459	2335		5566.1	230.59	0	33.554	0	28.475	207.16	0	0	6057.404	491.304	91.88919874	46.93428102	8.110801261	53.06571898	0.0414	0.0096	0.0372	0.2322	0.8984	ND
			NOSAMPLE	510	2475																	ND	ND	ND	ND	ND	ND
			NOSAMPLE	590	2620																	ND	ND	ND	ND	ND	ND
H10H0035	7383 1269		9869	682	2755		4937.5	189.76	0	35.514	0	0	0	0	0	5162.774	225.274	95.63657057	84.23519803	4.363429428	15.76480197	0.0384	0.0072	ND	0.1872	ND	ND
H10H0036	7383 1270		9870	755	2812		6579.7	327.92	44.691	106.26	181.23	177.15	1291.6	132.539	182.76	8620.779	2041.079	76.32372898	16.06601214	23.67627102	83.93398786	0.0498	0.0161	0.1963	0.3248	3.9388	0.4042
H10H0037	7383 1271		9871	866	2680		6387.2	303.86	0	83.684	130.84	148.47	991.4	190.798	488.71	8445.652	2058.452	75.62708006	14.76157812	24.37291994	85.23842188	0.0476	0.0131	0.1552	0.2754	3.2627	0.6279
H10H0038	7383 1272		9872	910	2685		7647.5	321.9	120.49	72.538	544.96	42.163	519.58	675.629	4904.1	14141.247	6493.747	54.07938918	4.9570764	45.92061082	95.0429236	0.0421	0.0095	0.0679	0.2253	1.6141	2.0989
			NOSAMPLE	775	2562																						
H10H0039	7383 1274		9874	710	2410		6478.9	302.61	0	57.048	0	53.453	363.87	80.397	132.95	7415.775	936.875	87.36645866	32.29993329	12.63354134	67.70006671	0.0467	0.0088	0.0562	0.1885	1.2024	0.2657
H11H0003	7383 1275		9875	530	2285		4352.16	269.56	98.528	49.463	153.39	0	81.966	0	0	4753.149	400.989	91.56371913	67.22378918	8.436280874	32.77621082	0.0619	0.0114	0.0188	0.1835	0.3041	ND
H11H0007	7383 1276		9876	710	2015		6508.5	298.12	0	51.703	0	48.615	82.299	0	0	6940.622	432.122	93.77401622	68.98977604	6.225983781	31.01022396	0.0458	0.0079	0.0126	0.1734	0.2761	ND
H11H0004	7383 1277		9877	872	1980		5284.005	286.2	145.2	68.221	342.26	0	57.721	0	0	5696.147	412.142	92.76454768	69.44208549	7.235452315	30.55791451	0.0542	0.0129	0.0109	0.2384	0.2017	ND
H11H0008	7383 1278		9878	965	1965		9566.643	287.31	276.57	98.739	991.85	135.12	830.67	44.762	0	10828.124	1261.481	88.34995794	22.77561057	11.65004206	77.22438943	0.0300	0.0103	0.0868	0.3437	2.8912	0.1558
H11H0005	7383 1279		9879	990	2120		7717.5	288.41	165.65	86.886	692.49	205.48	1848.7	18.11	0	9959.606	2242.106	77.48800505	12.86335258	22.51199495	87.13664742	0.0374	0.0113	0.2395	0.3013	6.4100	0.0628
H11H0009			NOSAMPLE	1000	2215																						
H11H0006	7383 1281		9881	1040	2360		6367.3	305.19	0	84.647	126.1	105.99	707.11	35.475	0	7499.722	1132.422	84.90048031	26.95020054	15.09951969	73.04979946	0.0479	0.0133	0.1111	0.2774	2.3170	0.1162
H11H0010	7383 1282		9882	995	2420		38673.797	318.09	511.22	128.98	1918.2	211.58	2111.6	438.97	2418.2	44089.637	5415.84	87.71629714	5.873327129	12.28370286	94.12667287	0.0082	0.0033	0.0546	0.4055	6.6384	1.3800
H11H0011	7383 1283		9883	1000	2570		10954	287.03	254.53	85.86	1065.6	130.3	1951.2	771.34	5603.8	19653.23	8699.23	55.73638532	3.299487426	44.26361468	96.70051257	0.0262	0.0078	0.1781	0.2991	6.7979	2.6873
			NOSAMPLE	960	2700																						
			NOSAMPLE	935	2810																						
			STAGECOACH																								

Free Soil Gas Spreadsheet, North Tioga Study Area

Direct Geochemical
Client: NYSERDA
Project Number: 7383
Project Name:

FREE SOIL GAS / HEAD-SPACE GAS SPREADSHEET, REV. 8/11/98 CGP

G.C. FILE NO.	AB ID#	Run Code	Client ID	X-Coord.	Y-Coord.	Methane	Ethane	Ethene	Propane	Propene	iButane	nButane	nPentane	nHexane	Summation (through C6 C1+	C2+	%(C1/C1+)	%(C2/C2+)	%(C2+/C1+)	%(C3+/C2+)	C2/C1	C3/C1	nC4/C1	C3/C2	nC4/C2	nC5/C2
G15H0003	7383 1001		0598-01	672	100	3747.90	705.30	3603.50	895.02	3302.10	74.80	497.62	482.53	3592.60	9921	6173	37.78	11.43	62.22	88.57	0.1882	0.2388	0.1328	1.2690	0.7055	0.6841
G15H0004	7383 1002		0598-02	695	267	7160.00	1398.20	6259.80	1543.80	4834.80	143.62	1139.20	1030.30	5593.60	17865	10705	40.08	13.06	59.92	86.94	0.1953	0.2156	0.1591	1.1041	0.8148	0.7369
G15H0005	7383 1003		0598-03	552	118	3294.70	515.53	4321.60	638.59	2440.20	20.25	463.63	712.57	2625.80	8251	4956	39.93	10.40	60.07	89.60	0.1565	0.1938	0.1407	1.2387	0.8993	1.3822
G15H0006	7383 1004		0598-04	585	275	2678.10	421.94	1958.80	496.61	1706.70	64.32	306.71	437.21	2190.20	6531	3853	41.01	10.95	58.99	89.05	0.1576	0.1854	0.1145	1.1770	0.7269	1.0362
G15H0007	7383 1005		0598-05	420	310	16761.00	1266.40	11565.00	1252.80	33197.00	256.97	441.00	351.26	767.08	20840	4079	80.43	31.05	19.57	68.95	0.0756	0.0747	0.0263	0.9893	0.3482	0.2774
G15H0008	7383 1006		0598-06	310	322	1823.80	147.41	552.70	110.03	1591.70	0.00	81.24	31.61	288.28	2482	659	73.47	22.38	26.53	77.62	0.0808	0.0603	0.0445	0.7464	0.5511	0.2144
G15H0009	7383 1007		0598-07	345	480	1397.50	98.55	883.99	136.94	475.18	0.00	149.56	41.49	221.35	2045	648	68.32	15.21	31.68	84.79	0.0705	0.0980	0.1070	1.3895	1.5176	0.4210
G15H0010	7383 1008		0598-08	340	610	1178.70	100.48	270.92	92.85	254.46	0.00	84.07	32.81	461.68	1951	772	60.43	13.02	39.57	86.98	0.0852	0.0788	0.0713	0.9241	0.8367	0.3265
G15H0011	7383 1009		0598-09	430	700	1330.10	164.25	1240.10	202.33	923.47	0.00	129.50	90.76	295.06	2212	882	60.13	18.62	39.87	81.38	0.1235	0.1521	0.0974	1.2318	0.7884	0.5526
G15H0012	7383 1010		0598-10	535	605	1236.50	115.11	1282.30	126.47	444.20	0.00	102.31	82.76	537.69	2201	964	56.18	11.94	43.82	88.06	0.0931	0.1023	0.0827	1.0987	0.8888	0.7[illegible]
G15H0013	7383 1011		0598-11	620	605	1523.10	245.20	374.29	196.82	582.94	0.00	283.37	189.06	2018.00	4456	2932	34.18	8.36	65.82	91.64	0.1610	0.1292	0.1860	0.8027	1.1557	0.7[illegible]
G15H0014	7383 1012		0598-12	580	450	3554.50	561.77	1183.40	511.57	1388.10	52.49	378.65	261.53	2134.10	7402	3848	48.02	14.60	51.98	85.40	0.1580	0.1439	0.1065	0.9106	0.6740	0.46[illegible]
G15H0015	7383 1013		0598-13	715	375	7246.00	547.41	2678.20	581.01	1925.10	60.95	397.57	327.60	2449.50	11549	4303	62.74	12.72	37.26	87.28	0.0755	0.0802	0.0549	1.0614	0.7263	0.5985
G15H0016	7383 1014		0598-14	642	500	2619.60	399.17	4747.30	526.27	2370.00	43.12	326.76	592.10	2077.00	6541	3921	40.05	10.18	59.95	89.82	0.1524	0.2009	0.1247	1.3184	0.8186	1.4833
G16H0003	7383 1015		0598-15	700	640	4110.20	527.26	6292.80	670.83	3488.10	58.20	418.42	645.53	2902.40	9275	5164	44.32	10.21	55.68	89.79	0.1283	0.1632	0.1018	1.2723	0.7936	1.2243
G16H0004	7383 1016		0598-16	1200	972	27072.00	4551.00	5054.20	3426.40	3837.00	827.57	1677.90	864.54	3705.90	41298	14226	65.55	31.99	34.45	68.01	0.1681	0.1266	0.0620	0.7529	0.3687	0.1900
G16H0005	7383 1017		0598-17	1055	965	5501.70	635.19	6952.00	898.60	5358.40	69.01	498.30	528.48	4181.20	12243	6742	44.94	9.42	55.06	90.58	0.1155	0.1633	0.0906	1.4147	0.7845	0.8320
G16H0006	7383 1018		0598-18	1035	815	4855.20	1113.50	3033.50	1282.60	3548.70	106.01	884.54	550.26	2159.40	10846	5990	44.77	18.59	55.23	81.41	0.2293	0.2642	0.1822	1.1519	0.7944	0.4942
G16H0008	7383 1019		0598-19	920	840	9966.60	1793.20	4364.70	1673.70	6071.80	346.56	1017.00	484.71	2486.80	17422	7455	57.21	24.05	42.79	75.95	0.1799	0.1679	0.1020	0.9334	0.5671	0.2703
G16H0009	7383 1020		0598-20	780	810	18690.00	2291.20	10608.00	3105.40	11206.00	254.32	1564.50	838.13	2841.50	29331	10641	63.72	21.53	36.28	78.47	0.1226	0.1662	0.0837	1.3554	0.6828	0.3658
G16H0010	7383 1021		0598-21	745	917	14610.00	2260.00	5814.90	2324.30	7276.90	265.94	1259.10	688.17	1591.90	22733	8123	64.27	27.82	35.73	72.18	0.1547	0.1591	0.0862	1.0285	0.5571	0.3045
G16H0011	7383 1022		0598-22	590	935	5521.60	527.26	1367.20	557.68	1717.80	80.32	369.93	155.74	370.33	7503	1981	73.60	26.62	26.40	73.38	0.0955	0.1010	0.0670	1.0577	0.7016	0.2954
G16H0012	7383 1023		0598-23	450	935	8724.70	1786.60	5255.30	1749.90	6132.50	137.71	1091.70	823.90	3995.80	18173	9448	48.01	18.91	51.99	81.09	0.2048	0.2006	0.1251	0.9795	0.6110	0.4612
G16H0013	7383 1024		0598-24	200	1065	12328.00	1802.50	10248.00	1935.20	11117.00	158.09	1153.90	690.63	3113.10	21023	8695	58.64	20.73	41.36	79.27	0.1462	0.1570	0.0936	1.0736	0.6402	0.3832
G16H0014	7383 1025		0598-25	355	1210	19025.00	2889.80	11552.00	3577.20	16232.00	349.62	1945.30	1200.10	2729.90	31367	12342	60.65	23.41	39.35	76.59	0.1519	0.1880	0.1022	1.2379	0.6732	0.4153
G16H0015	7383 1026		0598-26	540	1210	6664.90	1271.60	5559.20	1532.10	5219.00	176.95	776.79	634.90	3182.10	14062	7397	47.40	17.19	52.60	82.81	0.1908	0.2299	0.1165	1.2049	0.6109	0.4993
G16H0016	7383 1027		0598-27	725	1220	4817.80	1124.90	3476.40	1160.30	4059.50	123.84	772.71	597.75	2853.70	11327	6509	42.53	17.28	57.47	82.72	0.2335	0.2408	0.1604	1.0315	0.6869	0.5314
G16H0017	7383 1028		0598-28	805	1230	3261.40	603.17	4424.70	715.56	2935.60	55.65	489.12	590.27	2746.30	8406	5144	38.80	11.72	61.20	88.28	0.1849	0.2194	0.1500	1.1863	0.8109	0.9786
G16H0018	7383 1029		0598-29	755	1135	7488.90	936.92	4764.20	1171.10	4251.80	73.90	708.70	595.01	2064.40	12965	5476	57.76	17.11	42.24	82.89	0.1251	0.1564	0.0946	1.2499	0.7564	0.6351
G16H0019	7383 1030		0598-30	715	1040	10501.00	1078.50	17018.00	1595.70	7200.10	148.21	939.72	1509.40	2417.10	18041	7540	58.20	14.30	41.80	85.70	0.1027	0.1520	0.0895	1.4796	0.8713	1.3995
G16H0020	7383 1031		0598-31	805	1080	5925.30	1173.40	2323.50	1062.80	2976.60	129.65	573.30	734.00	1610.20	11079	5154	53.48	22.77	46.52	77.23	0.1980	0.1794	0.0968	0.9057	0.4886	0.6255
G16H0021	7383 1032		0598-32	880	1228	7844.70	1885.70	4432.90	2101.10	5376.20	187.14	1170.60	662.68	2889.80	16555	8710	47.39	21.65	52.61	78.35	0.2404	0.2678	0.1492	1.1142	0.6208	0.3514
G16H0022	7383 1033		0598-33	1255	1250	5561.20	709.31	5118.30	854.33	4473.90	71.66	495.47	691.77	1248.20	9560	3999	58.17	17.74	41.83	82.26	0.1275	0.1536	0.0891	1.2045	0.6985	0.9753
G16H0023	7383 1034		0598-34	1100	1280	30518.00	2262.10	26860.00	3005.70	75148.00	3350.10	768.75	658.16	1553.30	38766	8248	78.72	27.43	21.28	72.57	0.0741	0.0985	0.0252	1.3287	0.3398	0.2910
G16H0024	7383 1035		0598-35	935	1310	345840.00	23375.00	123150.00	19551.00	155740.00	16584.00	7872.90	3827.90	5497.70	405965	60125	85.19	38.88	14.81	61.12	0.0676	0.0565	0.0228	0.8364	0.3368	0.1638
G16H0025	7383 1036		0598-36	980	1420	50601.00	4123.10	28091.00	3944.60	50714.00	3232.00	1630.20	894.43	1289.70	62483	11882	80.98	34.70	19.02	65.30	0.0815	0.0780	0.0322	0.9567	0.3954	0.2169
G16H0026	7383 1037		0598-37	1245	1485	53754.00	4364.20	30522.00	3055.10	52199.00	1457.60	1248.70	682.11	2304.10	65408	11654	82.18	37.45	17.82	62.55	0.0812	0.0568	0.0232	0.7000	0.2861	0.1563
G16H0027	7383 1038		0598-38	1130	1496	55018.00	4244.80	44356.00	5156.80	115160.00	1996.00	1872.40	929.86	1614.00	68836	13818	79.93	30.72	20.07	69.28	0.0772	0.0937	0.0340	1.2149	0.4411	0.21[illegible]
G16H0028	7383 1039		0598-39	1473	1010	54022.00	5087.90	28989.00	4482.10	62744.00	4220.90	1597.10	1091.50	3130.50	69411	15389	77.83	33.06	22.17	66.94	0.0942	0.0830	0.0296	0.8809	0.3139	0.21[illegible]
G16H0029	7383 1040		0598-40	1230	1910	709670.00	74822.00	401120.00	61747.00	479240.00	14820.00	26311.00	4342.90	5574.80	882468	172798	80.42	43.30	19.58	56.70	0.1054	0.0870	0.0371	0.8253	0.3516	0.058[illegible]
G16H0030	7383 1041		0598-41	1155	1835	41916.00	3998.60	32419.00	2949.10	74346.00	556.64	1394.40	549.80	1107.00	51915	9999	80.74	39.99	19.26	60.01	0.0954	0.0704	0.0333	0.7375	0.3487	0.1375
G16H0031	7383 1042		0598-42	1096	1730	19121.00	1548.40	11669.00	1192.50	21002.00	200.39	559.25	375.15	643.08	23439	4318	81.58	35.86	18.42	64.14	0.0810	0.0624	0.0292	0.7701	0.3612	0.2423
G16H0032	7383 1043		0598-43	1071	1626	24291.00	1445.30	17325.00	1865.60	69819.00	634.31	487.42	440.81	347.69	28878	4587	84.12	31.51	15.88	68.49	0.0595	0.0768	0.0201	1.2908	0.3372	0.3050
G16H0033	7383 1044		0598-44	845	1330	10783.00	1434.20	5750.00	1390.50	10683.00	434.43	797.19	713.20	1900.90	17019	6236	63.36	23.00	36.64	77.00	0.1330	0.1290	0.0739	0.9695	0.5558	0.4973
G16H0034	7383 1045		0598-45	860	1470	5952.20	842.65	3453.90	1046.00	4287.70	94.39	657.37	73.89	1470.90	10043	4091	59.27	20.60	40.73	79.40	0.1416	0.1757	0.1104	1.2413	0.7801	0.0877
G16H0035	7383 1046		0598-46	770	1540	6080.70	875.36	4779.10	1234.30	7502.50	857.74	1146.90	676.28	2605.00	12619	6538	48.19	13.39	51.81	86.61	0.1440	0.2030	0.1886	1.4100	1.3102	0.7726
G16H0036	7383 1047		0598-47	940	1577	5239.90	717.46	2911.60	611.77	3378.40	88.68	391.23	409.04	2313.70	9683	4443	54.11	16.15	45.89	83.85	0.1369	0.1168	0.0747	0.8527	0.5453	0.5701
G16H0037	7383 1048		0598-48	855	1725	343.04	71.50	852.11	79.54	370.30	0.00	68.43	144.82	354.10	1061	718	32.32	9.95	67.68	90.05	0.2084	0.2319	0.1995	1.1125	0.9572	2.0255
G16H0038	7383 1049		0598-49	975	1680	1636.40	306.97	1008.80	322.46	788.61	31.50	250.85	530.66	1163.70	4211	2575	38.86	11.92	61.14	88.08	0.1876	0.1971	0.1533	1.0505	0.8172	1.7287
G16H0039	7383 1050		0598-50	990	1733	1178.30	261.42	305.05	185.98	363.44	0.00	166.10	195.12	609.73	2597	1418	45.38	18.43	54.62	81.57	0.2219	0.1578	0.1410	0.7114	0.6354	0.7464
G16H0040	7383 1051		0598-51	870	1960	578.60	175.57	1515.20	191.86	664.70	0.00	213.91	608.84	1380.30	3149	2570	18.37	6.83	81.63	93.17	0.3034	0.3316	0.3697	1.0928	1.2184	3.4678
			0598-52	1020	1915	1845.30	467.91	2403.30	522.50	1380.90	48.62	435.08	1443.70	1761.70	6476	4631	28.49	10.10	71.51	89.90	0.2536	0.2832	0.2358	1.1167	0.9298	3.0854
			0598-53	1060	2000	15392	1652	4618	1390	7435	683	568	171	130	19303	3911	79.74	42.24	20.26	57.76	0.1073	0.0903	0.0369	0.8414	0.3438	0.1035
			0598-54	1110	2075	19878	2700	10052	2270	15311	1729	1228	502	269	26847	6969	74.04	38.74	25.96	61.26	0.1358	0.1142	0.0618	0.8407	0.4548	0.1859
			0598-55	1142	2165	5268	599	2869	622	3059	111	274	136	51	6950	1682	75.80	35.61	24.20	64.39	0.1137	0.1181	0.0520	1.0384	0.4574	0.2270
			0598-56	1165	2250	44393	3747	11484	3233	26791	6591	902	486	641	53402	9009	83.13	41.59	16.87	58.41	0.0844	0.0728	0.0203	0.8628	0.2407	0.1297
			0598-57	1240	2250	37398	3039	18763	2299	37277	401	1308	503	446	44993	7595	83.12	40.01	16.88	59.99	0.0813	0.0615	0.0350	0.7565	0.4304	0.1655
			0598-58	1312	2246	3916	495	2432	684	2088	56	488	315		5898	1982	66.40	24.97	33.60	75.03	0.1264	0.1747	0.1246	1.3818	0.9859	0.6364
			0598-59	1270	2135	22843	2143	8806	2095	17108	883	931	468	348	28828	5985	79.24	35.81	20.76	64.19	0.0938	0.0917	0.0408	0.9776	0.4344	0.2184
			0598-60	1235	2054	13256	1234	994	786	1685	382	360	149	187	15972	2716	83.00	45.43	17.00	54.57	0.0931	0.0593	0.0272	0.6370	0.2917	0.1207

Table 6

Scanned UV Fluoresecence Intensity Spreadsheet, North Tioga Study Area

DIRECT GEOCHEMICAL **SYNCHRONOUS SCANNED UV FLUORESCENCE SPECTRA DATA**

Client:NYSERDA   Date Received: May 28 1999   DGI Job#: 7383

Method:Client collected surface samples, D99 solvent extracted   FLUORESCENCE SPREADSHEET, REV 06-24-98

Date Received: May 28 1998

SPECTRUM FILE#	LAB ID#	X-Coord.	Y-Coord.	SPIKE CODE	RUN CODE	DILU FCTR	CLIENT ID#	FLUORESCENCE INTENSITIES (Relative Fluorescence Intensity Units) 290nm	320nm	350nm	410nm	440nm	480nm	Total	FLUORESCENCE INTENSITY RATIOS 320/290	350/290	410/290	480/290	350/320	410/320	480/320	410/350	480/350	480/440
F01F0006.SPM	1001	672	100	Dilution	0	100	0598-01	2033	9548	23366	42915	34135	21920	19956.2	4.696	11.493	21.109	10.782	2.447	4.495	16.791	1.837	0.938	0.642
F01F0008.SPM	1002	695	267	Dilution	0	200	0598-02	3664	16155	64826	134044	114328	84861	60709.9	4.409	17.691	36.581	23.159	4.013	8.298	31.200	2.068	1.309	0.742
F01F0011.SPM	1003	552	118	Dilution	0	10	0598-03	223	741	3157	4079	3037	1869	2013.7	3.326	14.170	18.310	8.389	4.260	5.505	13.631	1.292	0.592	0.615
F01F0014.SPM	1004	585	275	Dilution	0	30	0598-04	661	3065	11781	21528	17181	11570	9720.7	4.640	17.833	32.588	17.514	3.843	7.023	26.009	1.827	0.982	0.673
F01F0016.SPM	1005	420	310	Dilution	0	10	0598-05	252	842	2586	3887	2811	1754	1864.0	3.347	10.284	15.455	6.973	3.073	4.618	11.177	1.503	0.678	0.624
F01F0017.SPM	1006	310	322	Neat	0	1	0598-06	61	181	358	286	169	90	195.2	2.952	5.849	4.674	1.475	1.981	1.583	2.763	0.799	0.252	0.534
F01F0021.SPM	1007	345	480	Dilution	0	20	0598-07	314	682	6720	427	243	200	1668.6	2.174	21.428	1.363	0.638	9.857	0.627	0.774	0.064	0.030	0.824
F01F0022.SPM	1008	340	640	Neat	0	1	0598-08	46	116	521	243	153	73	199.9	2.524	11.336	5.287	1.587	4.491	2.095	3.326	0.466	0.140	0.477
F01F0023.SPM	1009	430	700	Neat	0	1	0598-09	123	237	360	361	233	104	237.2	1.923	2.922	2.930	0.842	1.519	1.523	1.886	1.003	0.288	0.447
F01F0024.SPM	1010	535	605	Neat	0	1	0598-10	38	132	551	764	501	267	350.4	3.452	14.382	19.936	6.972	4.166	5.775	13.081	1.386	0.485	0.533
F01F0026.SPM	1011	620	605	Dilution	0	200	0598-11	3210	14114	52466	100215	82041	64009	46802.7	4.397	16.345	31.219	19.941	3.717	7.100	25.558	1.910	1.220	0.780
F01F0028.SPM	1012	580	450	Dilution	0	200	0598-12	3877	17202	64276	119249	96596	73148	55550.6	4.437	16.577	30.756	18.866	3.737	6.932	24.913	1.855	1.138	0.757
F01F0031.SPM	1013	715	375	Dilution	0	100	0598-13	1487	7701	23497	57407	52603	30122	24042.8	5.181	15.807	38.619	20.264	3.051	7.454	35.387	2.443	1.282	0.573
F01F0033.SPM	1014	642	500	Dilution	0	50	0598-14	820	3067	10486	17533	13453	8622	8105.4	3.741	12.793	21.390	10.519	3.419	5.717	16.413	1.672	0.822	0.641
F01F0034.SPM	1015	700	640	Dilution	0	50	0598-15	775	2992	8570	14687	11373	7328	6870.5	3.863	11.066	18.963	9.462	2.864	4.909	14.684	1.714	0.855	0.644
F01F0035.SPM	1016	1200	972	Dilution	0	100	0598-16	1702	6998	27318	51590	40928	29270	23375.5	4.113	16.055	30.320	17.202	3.904	7.372	24.054	1.889	1.071	0.715
F01F0037.SPM	1017	1055	965	Dilution	0	10	0598-17	197	610	1690	2558	1838	1104	1231.7	3.100	8.588	12.996	5.609	2.770	4.192	9.341	1.513	0.653	0.600
F01F0039.SPM	1018	1035	815	Dilution	0	200	0598-18	4246	17482	73227	145262	122787	94101	66863.6	4.117	17.246	34.211	22.162	4.189	8.309	28.918	1.984	1.285	0.766
F01F0040.SPM	1019	920	840	Dilution	0	2	0598-19	81	371	1142	1236	784	356	637.4	4.574	14.070	15.219	4.389	3.076	3.328	9.658	1.082	0.312	0.454
F01F0042.SPM	1020	780	810	Dilution	0	200	0598-20	4065	14530	53430	110409	95260	69109	50308.7	3.574	13.143	27.159	17.000	3.677	7.599	23.432	2.066	1.293	0.725
F01F0044.SPM	1021	745	947	Dilution	0	100	0598-21	1479	8129	25379	58053	47733	30331	24674.0	5.496	17.159	39.251	20.508	3.122	7.142	32.274	2.287	1.195	0.635
F01F0045.SPM	1022	590	935	Dilution	0	100	0598-22	1574	4713	11341	17756	14498	11013	9279.3	2.994	7.205	11.281	6.997	2.406	3.767	9.211	1.566	0.971	0.760
F01F0046.SPM	1023	450	935	Dilution	0	50	0598-23	1130	4962	20007	37799	29638	20670	16913.4	4.393	17.713	33.465	18.300	4.032	7.617	26.240	1.889	1.033	0.697
F01F0048.SPM	1024	200	1065	Dilution	0	50	0598-24	848	2606	7205	10354	8151	5537	5309.7	3.075	8.501	12.217	6.533	2.765	3.974	9.618	1.437	0.768	0.679
F01F0050.SPM	1025	355	1210	Dilution	0	20	0598-25	1774	9864	11759	18919	15183	10801	10623.0	5.561	6.630	10.667	6.090	1.192	1.918	8.561	1.609	0.919	0.711
F01F0051.SPM	1026	540	1210	Dilution	0	100	0598-26	2345	9950	31527	65668	51712	39356	29768.9	4.244	13.447	28.008	16.786	3.168	6.600	22.056	2.083	1.248	0.761
F01F0053.SPM	1027	725	1220	Dilution	0	100	0598-27	2477	10592	35830	68111	53312	36981	30798.2	4.276	14.465	27.497	14.930	3.383	6.430	21.523	1.901	1.032	0.694
F01F0054.SPM	1028	805	1230	Dilution	0	10	0598-28	293	1406	5175	9840	7602	4835	4309.8	4.804	17.681	33.621	16.521	3.681	6.999	25.976	1.902	0.934	0.636
F01F0055.SPM	1029	755	1135	Dilution	0	50	0598-29	947	3306	5097	7488	5131	2995	3966.4	3.493	5.385	7.911	3.164	1.542	2.265	5.421	1.469	0.588	0.584
F01F0056.SPM	1030	715	1040	Dilution	0	50	0598-30	638	2133	5727	10534	8888	7250	5256.2	3.345	8.978	16.515	11.366	2.684	4.938	13.935	1.839	1.266	0.816
F01F0057.SPM	1031	805	1080	Dilution	0	100	0598-31	1945	9941	36397	88489	75451	58448	39043.7	5.112	18.716	45.503	30.055	3.661	8.901	38.799	2.431	1.606	0.775
F02F0004.SPM	1032	880	1228	Dilution	0	200	0598-32	3794	14954	60021	145601	135918	109044	66682.9	3.942	15.820	38.377	28.741	4.014	9.736	35.824	2.426	1.817	0.802
F02F0006.SPM	1033	1255	1250	Dilution	0	50	0598-33	616	1659	4235	8419	7323	5967	4179.1	2.695	6.880	13.678	9.695	2.553	5.075	11.897	1.988	1.409	0.815
F02F0008.SPM	1034	1100	1280	Dilution	0	20	0598-34	717	3484	5706	10648	9343	7539	5618.9	4.857	7.953	14.843	10.509	1.638	3.056	13.024	1.866	1.321	0.807
F02F0009.SPM	1035	935	1310	Dilution	0	100	0598-35	1554	5826	19291	42734	38727	31424	20165.7	3.749	12.413	27.499	20.221	3.311	7.335	24.921	2.215	1.629	0.811
F02F0011.SPM	1036	980	1420	Dilution	0	200	0598-36	2978	11513	45338	100230	92219	72696	46550.8	3.867	15.227	33.662	24.415	3.938	8.706	30.972	2.211	1.603	0.788
F02F0012.SPM	1037	1245	1485	Dilution	0	50	0598-37	728	2652	7229	15235	11585	11071	7382.9	3.642	9.930	20.927	15.207	2.726	5.745	15.914	2.107	1.531	0.956
F02F0015.SPM	1038	1130	1496	Dilution	0	10	0598-38	138	276	1005	641	578	418	495.4	2.000	7.278	4.641	3.025	3.638	2.320	4.188	0.638	0.416	0.722
F02F0017.SPM	1039	1473	1010	Dilution	0	100	0598-39	1589	7584	27227	56563	45671	32565	25105.4	4.774	17.140	35.607	20.501	3.590	7.458	28.751	2.077	1.196	0.713
F02F0018.SPM	1040	1230	1940	Dilution	0	10	0598-40	214	759	3395	5792	4573	3102	2652.4	3.544	15.851	27.043	14.483	4.473	7.631	21.349	1.706	0.914	0.678
F02F0019.SPM	1041	1155	1835	Dilution	0	2	0598-41	65	243	1220	1946	1520	962	887.2	3.706	18.630	29.712	14.697	5.028	8.018	23.213	1.595	0.789	0.633
F02F0022.SPM	1042	1096	1730	Dilution	0	50	0598-42	748	2299	6987	12685	10349	7794	6102.6	3.073	9.341	16.959	10.420	3.040	5.518	13.836	1.815	1.115	0.753
F02F0024.SPM	1043	1071	1626	Neat	0	1	0598-43	67	102	385	461	346	194	241.7	1.536	5.788	6.929	2.915	3.769	4.512	5.196	1.197	0.504	0.561
F02F0026.SPM	1044	845	1330	Dilution	0	200	0598-44	3957	15062	57064	114898	95815	75348	53265.9	3.806	14.420	29.034	19.040	3.789	7.628	24.212	2.013	1.320	0.786
F03F0004.SPM	1045	860	1470	Dilution	0	50	0598-45	723	3748	16340	27286	20076	13857	12390.7	5.183	22.600	37.740	19.166	4.360	7.281	27.768	1.670	0.848	0.690
F03F0006.SPM	1046	770	1540	Dilution	0	2	0598-46	64	293	854	1003	547	260	494.8	4.552	13.268	15.594	4.038	2.915	3.426	8.503	1.175	0.304	0.475
F03F0007.SPM	1047	940	1577	Dilution	0	50	0598-47	583	2679	8779	15695	12053	7096	6966.3	4.599	15.067	26.938	12.180	3.276	5.858	20.687	1.788	0.808	0.589
F03F0008.SPM	1048	855	1725	Dilution	0	10	0598-48	184	662	2483	3630	2397	1432	1678.2	3.598	13.492	19.728	7.783	3.750	5.483	13.025	1.462	0.577	0.598
F03F0010.SPM	1049	975	1680	Dilution	0	200	0598-49	2714	14525	56590	93933	69436	52238	43999.9	5.353	20.855	34.617	19.251	3.896	6.467	25.589	1.660	0.923	0.752
F03F0012.SPM	1050	990	1733	Dilution	0	400	0598-50	5427	30598	124613	229542	188270	145914	107218.8	5.639	22.963	42.299	26.888	4.073	7.502	34.693	1.842	1.171	0.775
F03F0013.SPM	1051	870	1960	Dilution	0	10	0598-51	225	1256	4993	7912	5612	3809	3638.8	5.582	22.196	35.173	16.935	3.976	6.301	24.948	1.585	0.763	0.679
F03F0014.SPM	1052	1020	1915	Dilution	0	50	0598-52	752	3719	15188	27010	20778	14823	12298.4	4.946	20.196	35.917	19.712	4.084	7.262	27.630	1.778	0.976	0.713
		1060	2000				0598-53																	
		1110	2075				0598-54																	
		1142	2165				0598-55																	
		1165	2250				0598-56																	
		1240	2250				0598-57																	
		1312	2246				0598-58																	
		1270	2135				0598-59																	
		1235	2054				0598-60																	
					MEAN			1368.5874	5912.9719	21042.42	41214.836	34242.451	25610.067	19029.8	3.948	13.634	23.372	13.362	3.487	5.689	18.807	1.682	0.949	0.688
					MAXIMUM			5426.667	30598.29	124612.8	229542.3	188270	145913.7	107218.8	5.639	22.963	45.503	30.055	9.857	9.736	38.799	2.443	1.817	0.956
					MINIMUM			38.3075	102.1275	357.82	243.1317	152.9625	72.98167	195.2	1.536	2.922	1.363	0.638	1.192	0.627	0.774	0.064	0.030	0.447
					STANDARD DEVIATION			1392.9492	6473.3475	25709.168	51124.195	43321.46	33578.307	23536.0	1.025	5.097	11.899	7.832	1.266	2.248	10.232	0.501	0.423	0.112

Passive Soil Gas Spreadsheet
North Tioga Study Area

Direct Geochemical
Client: NYSERDA
Project Number: 7383 DATE RECEIVED: May 17, 1997
Project Name: Interstitial Soil Gas Data Report, N. Tioga Study Area

G.C. FILE NO.	LAB ID#		Run Cod	Client ID	X-Coord.	Y-Coord.	Notes	Methane	Ethane	Ethene	Propane	Propene	iButane	nButane	nPentan	nHexane	TION (through C6) C1+	TION (through C6) C2+	%(C1 /C1+)	%(C2 /C2+)	%(C2+ /C1+)	%(C3+ /C2+)	C2/C1	C3/C1	nC4/C1	C3/C2	nC4/C2	nC5/C2
G15H0003	7383	1001		0598-01	672	100																						
G15H0004	7383	1002		0598-02	695	267																						
G15H0005	7383	1003		0598-03	552	118		5439.90	279.96	139.44	54.69	119.25	31.98	246.01	117.39	225.93	6363.881	923.979	85.48089	30.29939	14.51911	69.70061	0.0515	0.0101	0.0452	0.1953	0.8787	0.4193
G15H0006	7383	1004		NO SAMPLE	585	275																	ND	ND	ND	ND	ND	ND
G15H0007	7383	1005		NO SAMPLE	420	310																	ND	ND	ND	ND	ND	ND
G15H0008	7383	1006		0598-06	310	322		7282.13	318.09	247.33	79.89	1912.10	124.39	1753.00	351.35	1910.80	11695.261	4413.127	62.26568	7.207814	37.73432	92.79219	0.0437	0.0110	0.2407	0.2511	5.5110	1.1
G15H0009	7383	1007		0598-07	345	480		6082.68	225.32	272.54	54.97	734.26	161.79	1427.40	119.75	726.76	8636.876	2554.199	70.42682	8.821552	29.57318	91.17845	0.0370	0.0090	0.2347	0.2440	6.3350	0.5
G15H0010	7383	1008		0598-08	340	640		5774.10	186.61	126.94	51.35	152.27	75.10	67.34	0.00	0.00	6079.405	305.305	94.97804	61.12248	5.021955	38.87752	0.0323	0.0089	0.0117	0.2752	0.3609	ND
G15H0011	7383	1009		NO SAMPLE	430	700																	ND	ND	ND	ND	ND	ND
G15H0012	7383	1010		0598-10	535	605		4802.90	283.33	107.94	61.91	526.07	54.28	852.95	13.47	76.70	6091.259	1288.359	78.84905	21.99154	21.15095	78.00846	0.0590	0.0129	0.1776	0.2185	3.0104	0.0475
G15H0013	7383	1011		NO SAMPLE	620	605																	ND	ND	ND	ND	ND	ND
G15H0014	7383	1012		NO SAMPLE	580	450																	ND	ND	ND	ND	ND	ND
G15H0015	7383	1013		NO SAMPLE	715	375																	ND	ND	ND	ND	ND	ND
G15H0016	7383	1014		NO SAMPLE	642	500																	ND	ND	ND	ND	ND	ND
G16H0003	7383	1015		NO SAMPLE	700	640																	ND	ND	ND	ND	ND	ND
G16H0004	7383	1016		0598-16	1200	972		3372.40	202.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3574.76	202.36	94.3392	100	5.6608	0	0.0600	ND	ND	ND	ND	ND
G16H0005	7383	1017		NO SAMPLE	1055	965																	ND	ND	ND	ND	ND	ND
G16H0006	7383	1018		NO SAMPLE	1035	815																	ND	ND	ND	ND	ND	ND
G16H0008	7383	1019		0598-19	920	840		4134.80	300.61	0.00	104.12	103.97	145.76	550.03	0.00	0.00	5089.56	954.76	81.24081	31.4854	18.75919	68.5146	0.0727	0.0252	0.1330	0.3464	1.8297	ND
G16H0009	7383	1020		NO SAMPLE	780	810																	ND	ND	ND	ND	ND	ND
G16H0010	7383	1021		0598-21	745	947		4393.80	312.32	65.92	76.80	176.07	40.07	313.89	42.45	36.37	5175.623	781.823	84.89413	39.94766	15.10587	60.05234	0.0711	0.0175	0.0714	0.2459	1.0050	0.1359
G16H0011	7383	1022		NO SAMPLE	590	935																	ND	ND	ND	ND	ND	ND
G16H0012	7383	1023		NO SAMPLE	450	935																	ND	ND	ND	ND	ND	ND
G16H0013	7383	1024		0598-24	200	1065		4104.90	293.92	0.00	48.15	0.00	0.00	63.02	0.00	0.00	4509.993	405.093	91.01788	72.55618	8.98212	27.44382	0.0716	0.0117	0.0154	0.1638	0.2144	ND
G16H0014	7383	1025		NO SAMPLE	355	1210																	ND	ND	ND	ND	ND	ND
G16H0015	7383	1026		NO SAMPLE	540	1210																	ND	ND	ND	ND	ND	ND
G16H0016	7383	1027		0598-27	725	1220		1714.00	91.67	0.00	0.00	56.22	0.00	189.30	30.22	0.00	2025.195	311.195	84.63383	29.45838	15.36617	70.54162	0.0535	ND	0.1104	ND	2.0649	0.3297
G16H0017	7383	1028		NO SAMPLE	805	1230																	ND	ND	ND	ND	ND	ND
G16H0018	7383	1029		NO SAMPLE	755	1135																	ND	ND	ND	ND	ND	ND
G16H0019	7383	1030		0598-30	715	1040		2392.50	153.99	0.00	37.38	0.00	0.00	84.68	0.00	64.51	2733.063	340.563	87.53915	45.2163	12.46085	54.7837	0.0644	0.0156	0.0354	0.2428	0.5499	ND
G16H0020	7383	1031		0598-31	805	1080		3362.50	266.02	0.00	84.69	248.44	174.67	2597.00	18.95	1376.90	7706.057	4343.557	43.63451	6.124474	56.36549	93.87553	0.0791	0.0252	0.7723	0.3183	9.7624	0.0712
G16H0021	7383	1032		0598-32	880	1228		3709.40	279.20	211.43	79.92	274.63	45.65	134.82	21.27	0.00	4224.607	515.207	87.80462	54.19181	12.19538	45.80819	0.0753	0.0215	0.0363	0.2862	0.4829	0.0762
G16H0022	7383	1033		NO SAMPLE	1255	1250																	ND	ND	ND	ND	ND	ND
G16H0023	7383	1034		0598-34	1100	1280		3289.80	244.16	0.00	53.41	0.00	37.73	183.48	28.57	0.00	3799.414	509.614	86.58704	47.91077	13.41296	52.08923	0.0742	0.0162	0.0558	0.2187	0.7515	0.117
G16H0024	7383	1035		NO SAMPLE	935	1310																	ND	ND	ND	ND	ND	ND
G16H0025	7383	1036		NO SAMPLE	980	1420																	ND	ND	ND	ND	ND	ND
G16H0026	7383	1037		0598-37	1245	1485		3088.80	160.24	0.00	44.09	74.83	46.97	347.37	0.00	0.00	3640.5	551.7	84.84549	29.04477	15.15451	70.95523	0.0519	0.0143	0.1125	0.2751	2.1678	ND
G16H0027	7383	1038		NO SAMPLE	1130	1496																	ND	ND	ND	ND	ND	ND
G16H0028	7383	1039		NO SAMPLE	1473	1010																	ND	ND	ND	ND	ND	ND
G16H0029	7383	1040		0598-40	1230	1940		2739.70	147.61	0.00	40.44	133.70	23.03	245.03	132.27	0.00	3305.045	565.345	82.89448	26.10972	17.10552	73.89028	0.0539	0.0148	0.0894	0.2739	1.6600	0.8961
G16H0030	7383	1041		0598-41	1155	1835		2735.90	207.63	0.00	138.57	116.49	574.33	1008.90	0.00	55.11	4146.113	1410.213	65.98711	14.72331	34.01289	85.27669	0.0759	0.0506	0.3688	0.6674	4.8591	ND
G16H0031	7383	1042		0598-42	1096	1730		2260.20	154.54	0.00	43.30	0.00	18.97	130.49	0.00	0.00	2588.526	328.326	87.3161	47.06907	12.6839	52.93093	0.0684	0.0192	0.0577	0.2802	0.8444	ND
G16H0032	7383	1043		NO SAMPLE	1071	1626																	ND	ND	ND	ND	ND	ND
G16H0033	7383	1044		0598-44	845	1330		6794.20	206.95	556.69	51.78	556.25	0.00	0.00	46.16	0.00	7099.097	304.897	95.70513	67.87538	4.29487	32.12462	0.0305	0.0076	ND	0.2502	ND	0.2231
G16H0034	7383	1045		NO SAMPLE	860	1470																	ND	ND	ND	ND	ND	ND
G16H0035	7383	1046		NO SAMPLE	770	1540																	ND	ND	ND	ND	ND	ND
G16H0036	7383	1047		0598-47	940	1577		2049.50	129.69	0.00	0.00	0.00	0.00	133.00	0.00	0.00	2312.19	262.69	88.63891	49.36998	11.36109	50.63002	0.0633	ND	0.0649	ND	1.0255	ND
G16H0037	7383	1048		NO SAMPLE	855	1725																	ND	ND	ND	ND	ND	ND
G16H0038	7383	1049		NO SAMPLE	975	1680																	ND	ND	ND	ND	ND	ND
G16H0039	7383	1050		0598-50	990	1733		2651.90	196.36	0.00	47.87	0.00	0.00	0.00	0.00	0.00	2896.134	244.234	91.5669	80.39831	8.433104	19.60169	0.0740	0.0181	ND	0.2438	ND	ND
G16H0040	7383	1051		NO SAMPLE	870	1960																	ND	ND	ND	ND	ND	ND
G16H0041	7383	1052		0598-52	1020	1915		NR	NR	NR	NR	NR	NR	NR	NR	NR												

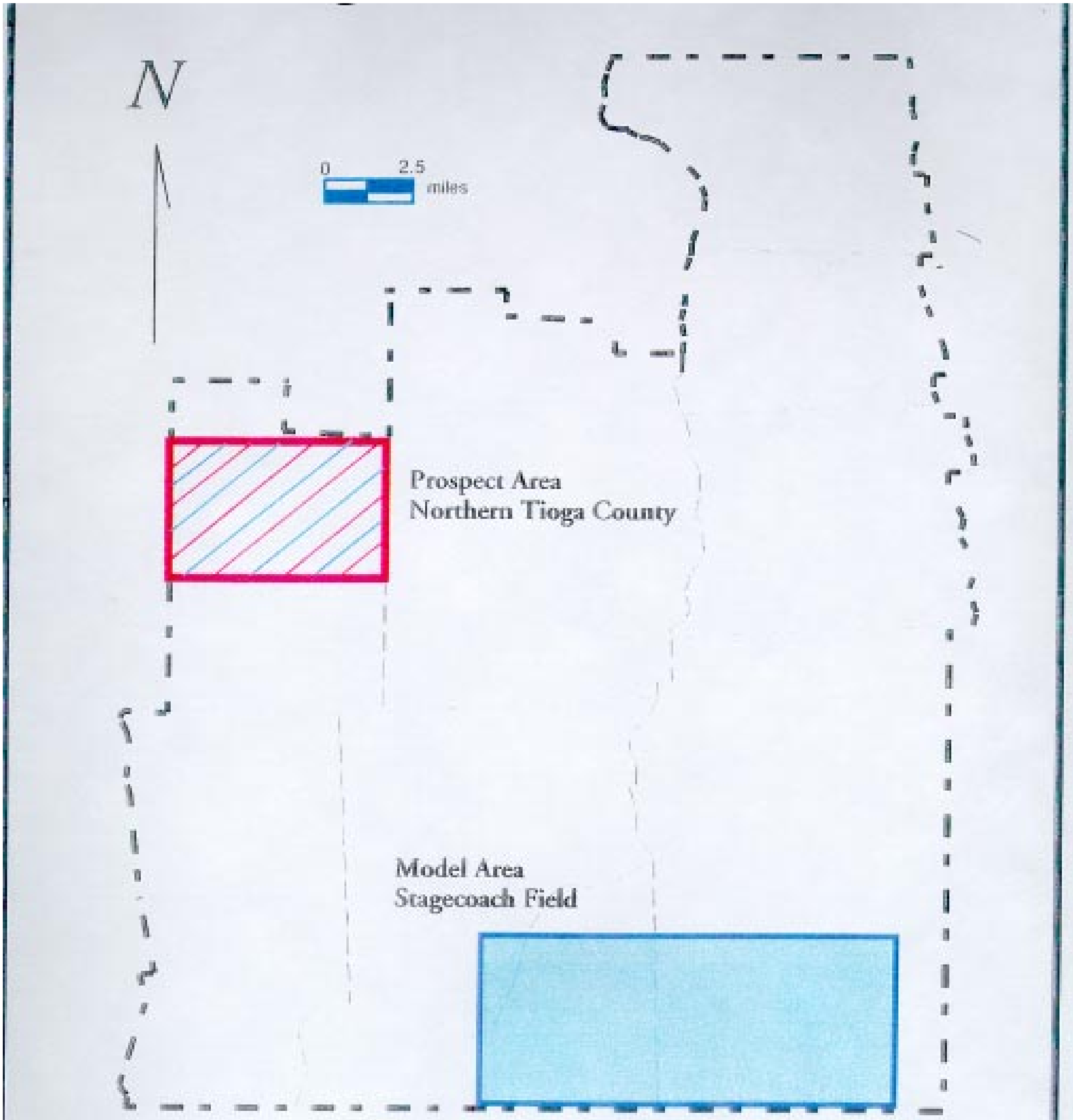
Gas Composition
Stagecoach Field, NY

Compound	%Composition
Methane	98.7312384%
Ethane	1.1908819%
Ethene	0.0000000%
Propane	0.0776618%
Propene	0.0000000%
I-Butane	0.0000635%
N-Butane	0.0001272%
I-Pentane	0.0000183%
N-Pentane	0.0000065%
I-Hexane	0.0000019%
N-Hexane	0.0000004%

Table 9

Correlation Matrix -- TD Soil Samples

Variable	Methane	Ethane	Ethene	Propane	I-Butane	N-Butane	Pentane
Ethane	1.00	-0.26	0.55	-0.39	0.03	0.64	0.13
Ethene		1.00	0.13	-0.51	0.01	-0.06	-0.04
Propane			1.00	-0.45	0.78	0.26	-0.08
Propene				1.00	-0.06	-0.76	-0.59
I-Butane					1.00	-0.13	-0.20
N-Butane						1.00	0.72
Pentane							1.00



Location of Model and Prospect Area, Tioga County, NY

DIRECT GEOCHEMICAL, INC

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924 Hale Street
Pottstown, PA 19464

Figure 1

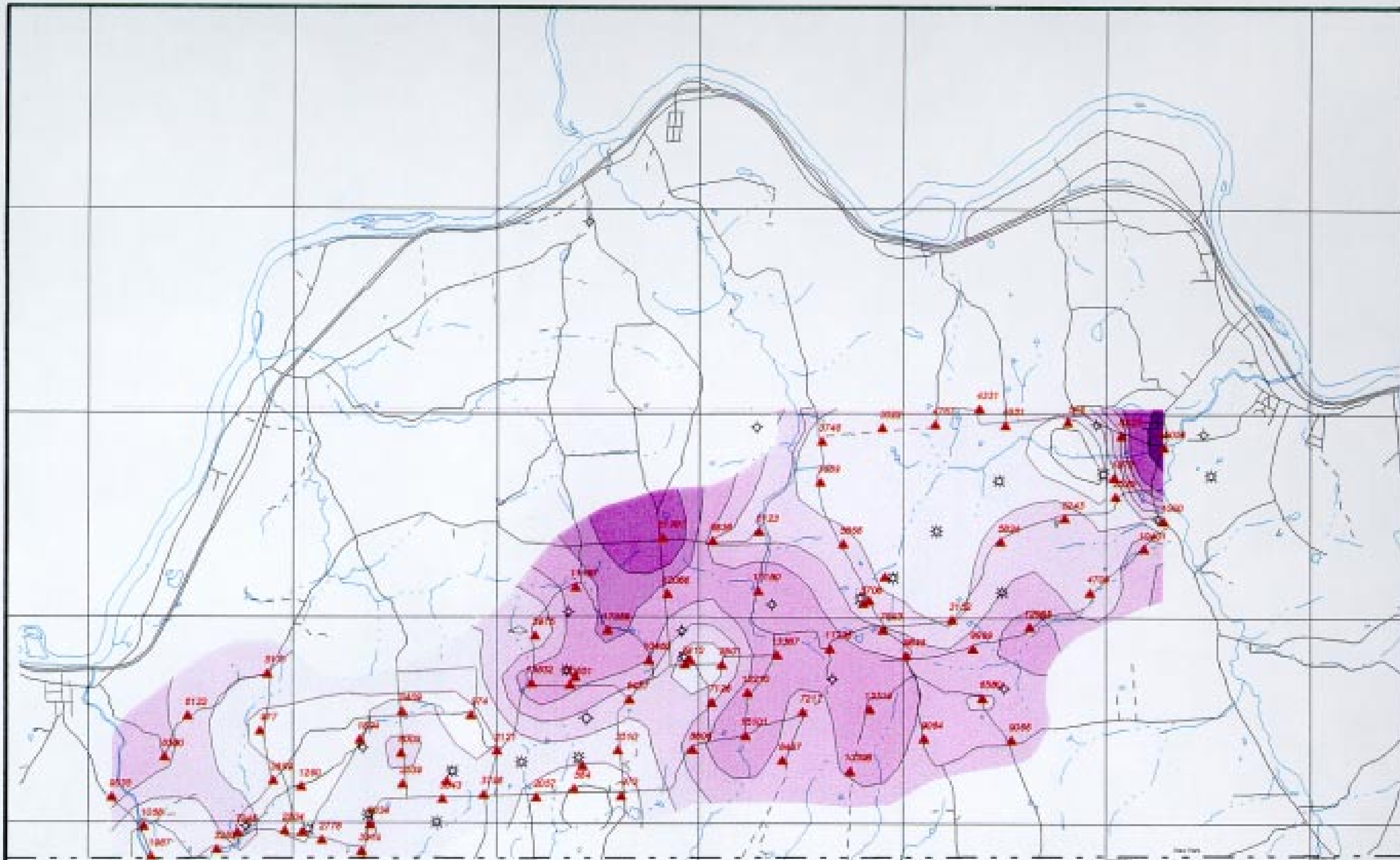

Figure 2

Methane in Soils

Stagecoach Field, New York

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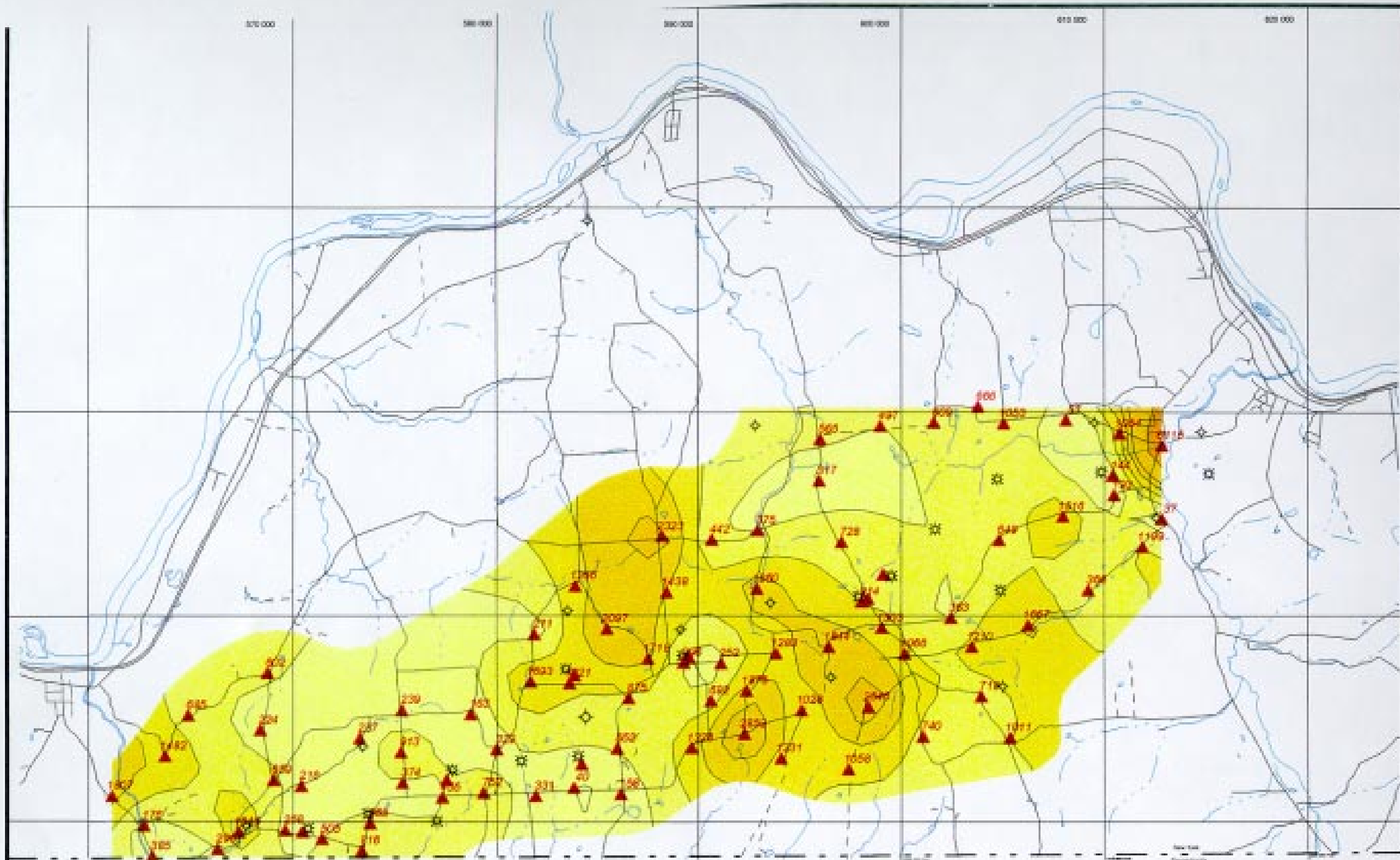

Figure 3

Ethane in Soils

Stagecoach Field, New York

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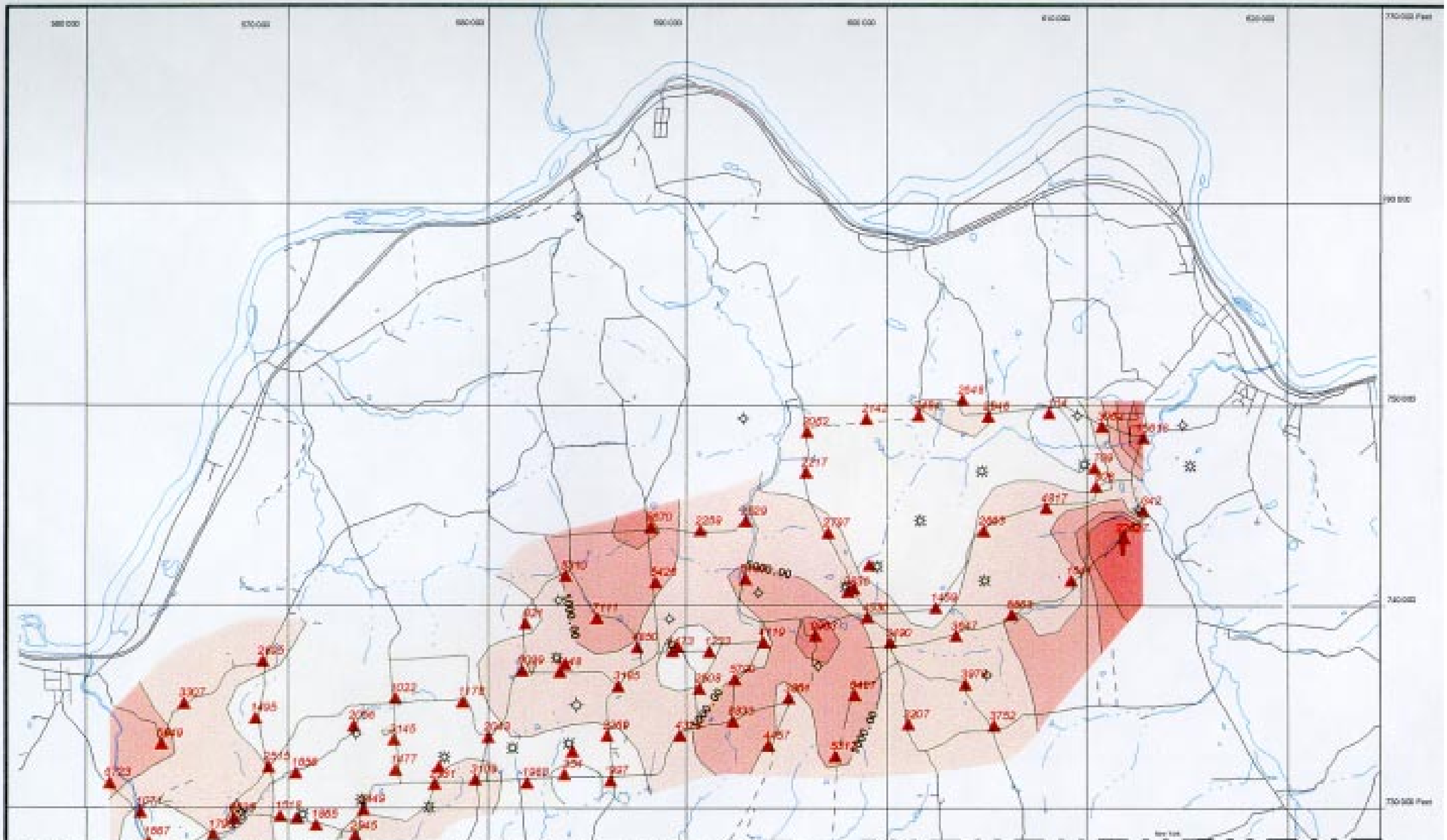

Figure 4

C2+ Hydrocarbons in Soil

Stagecoach, New York

DIRECT GEOCHEMICAL

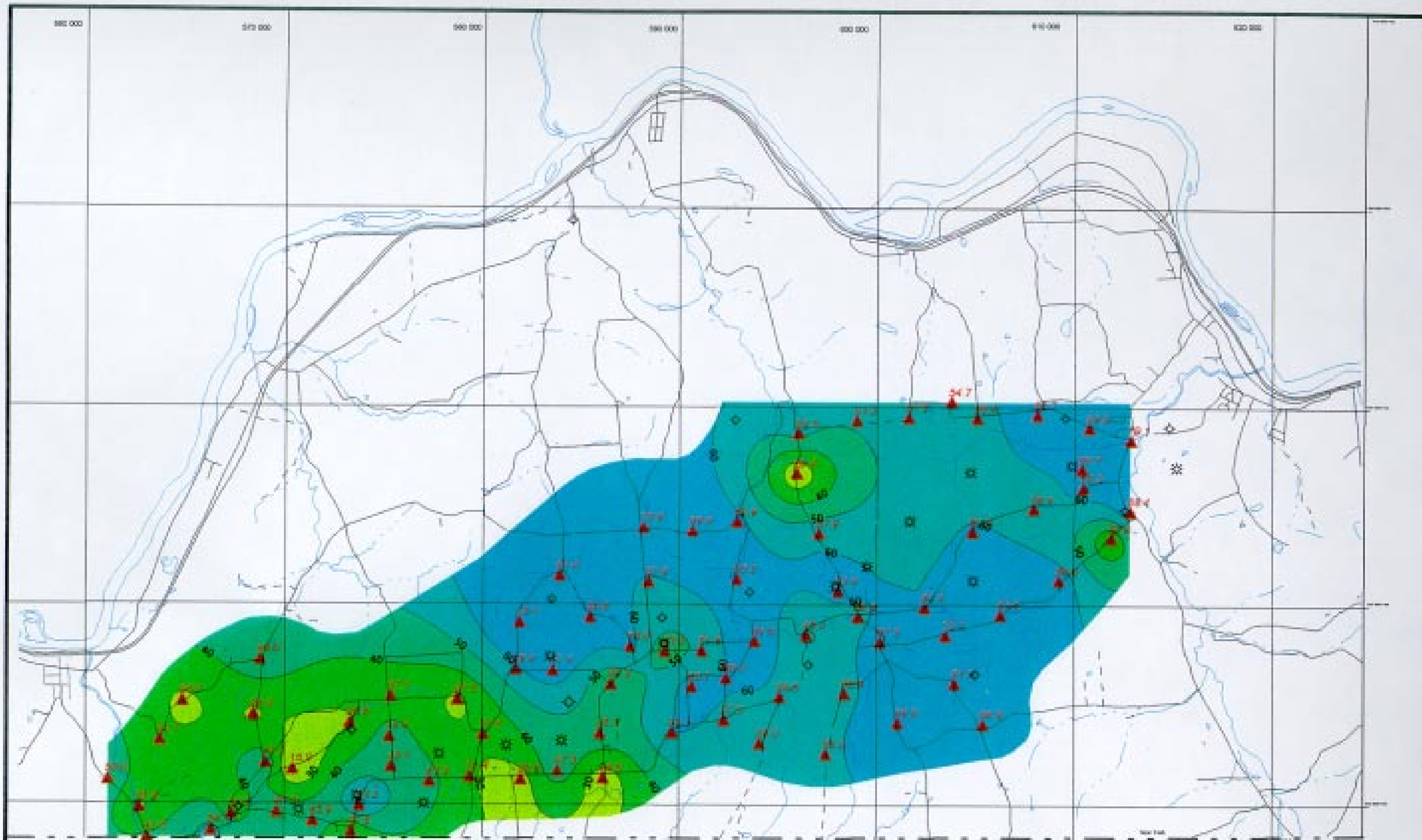

Figure 5

Percent Methane (Gas Dryness)

Stagecoach Field, New York

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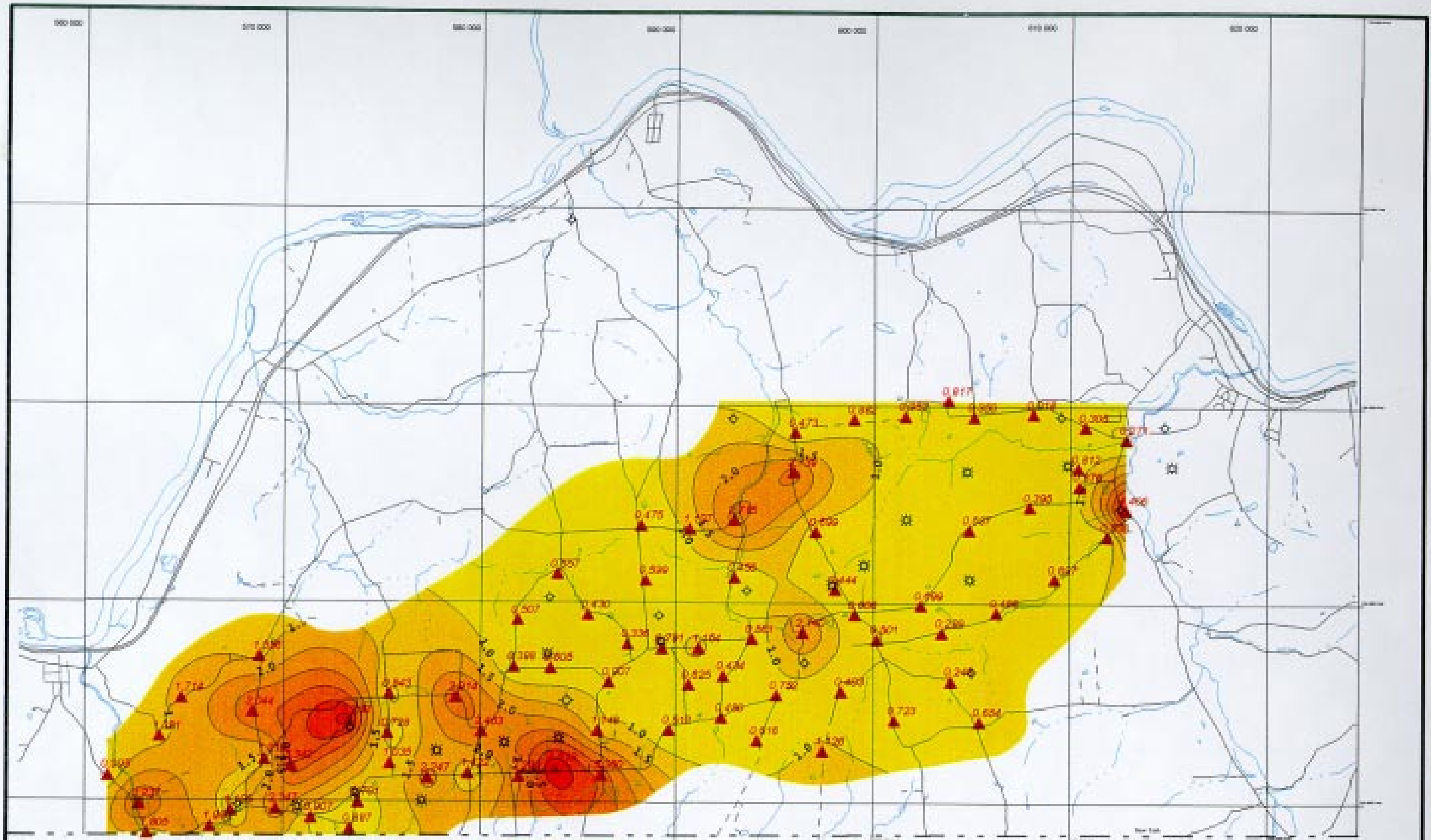

Figure 6

Gas Wetness Ratio: nC5/C2

Stagecoach Field, New York

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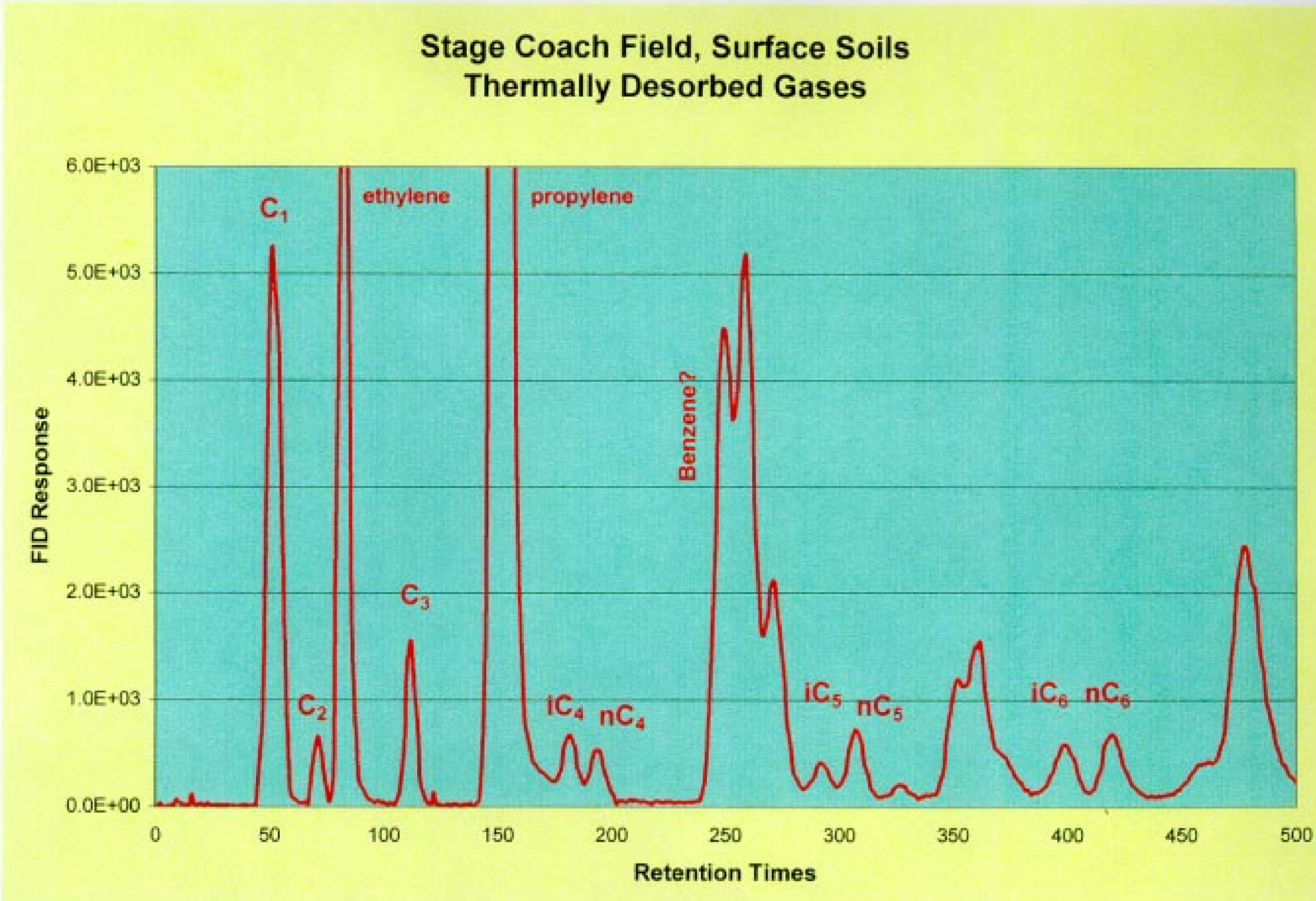
Stage Coach Field, Surface Soils
Thermally Desorbed Gases
FID Response
6.0E+03
5.0E+03
4.0E+03
3.0E+03
2.0E+03
1.0E+03
0.0E+00
C1
C2
ethylene
C3
propylene
iC4
nC4
Benzene?
iC5
nC5
iC6
nC6
0
50
100
150
200
250
300
350
400
450
500
Retention Times

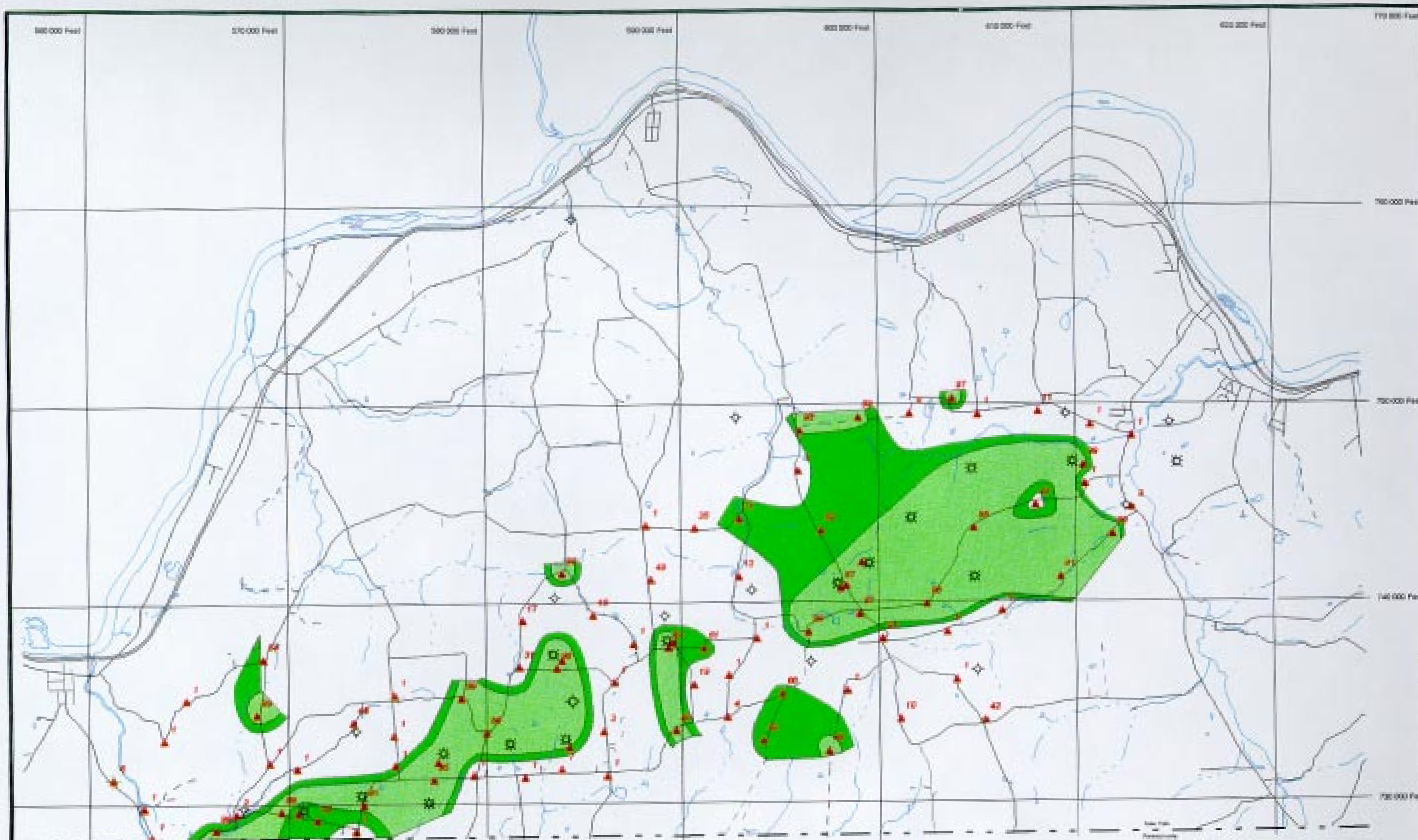

Figure 8

Gas Probability

Thermal Desorption

Stagecoach Field, New York

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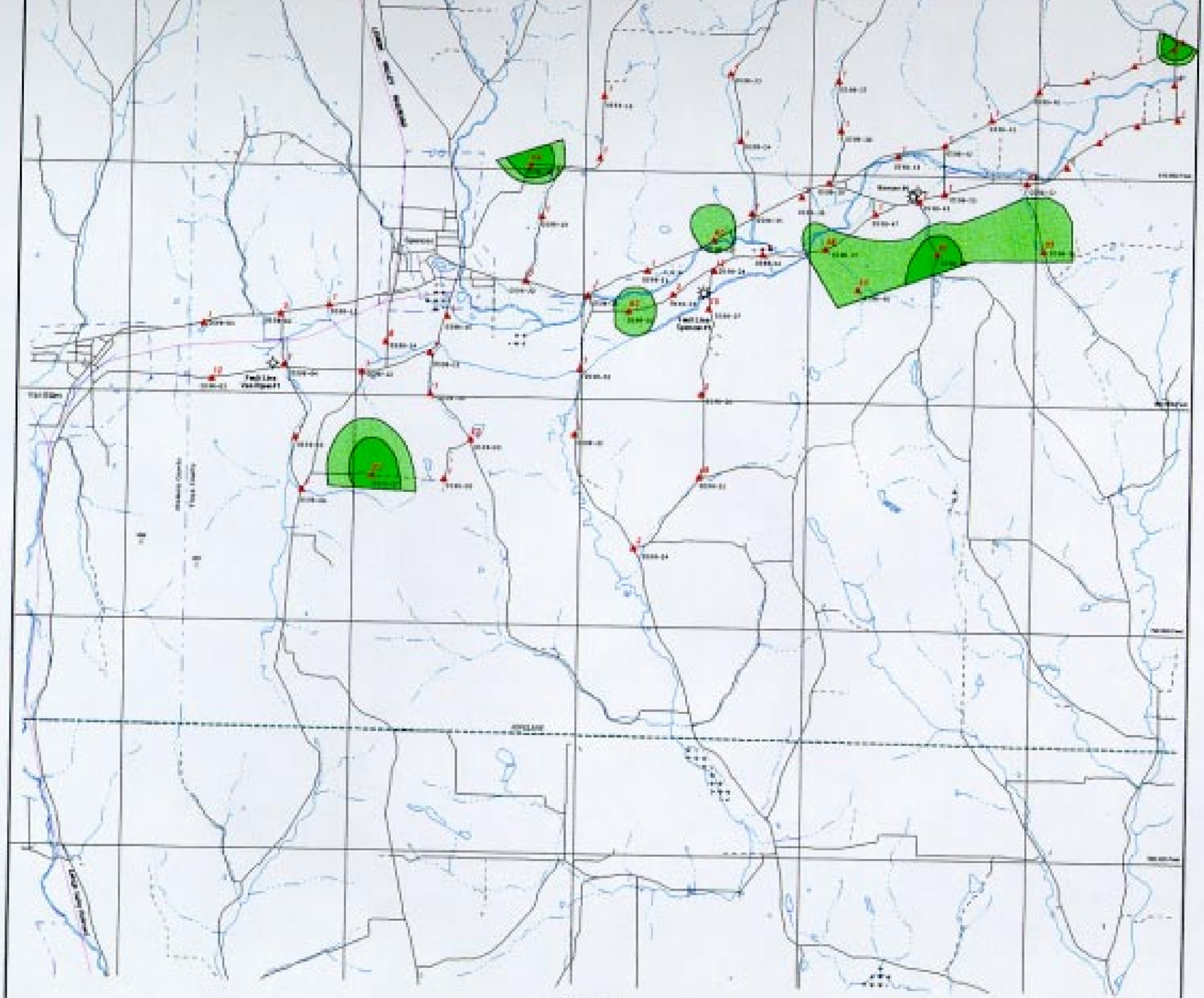

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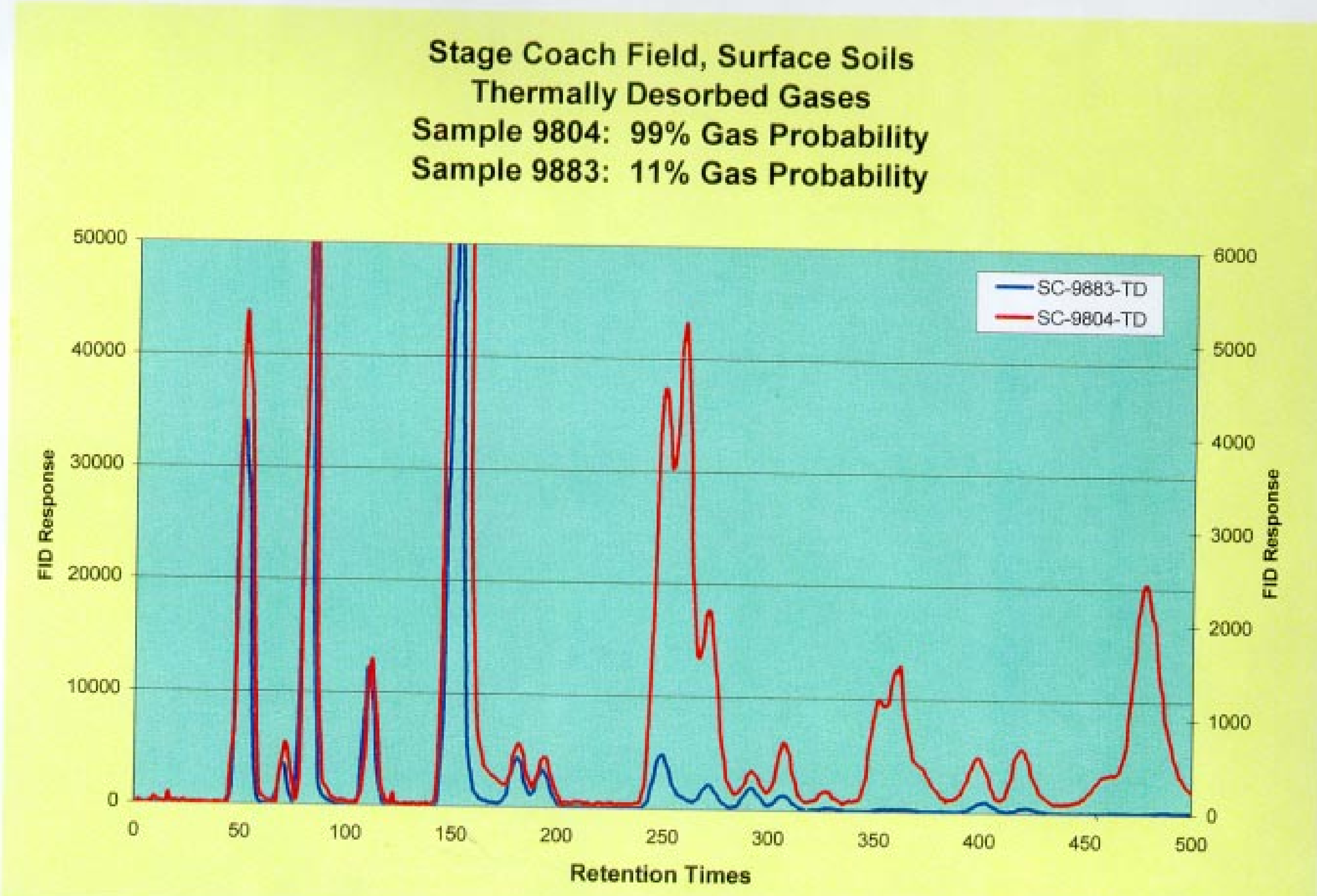
Figure 9
Gas Probability
Thermal Desorption
North Tioga County, New York



Stage Coach Field, Surface Soils
Thermally Desorbed Gases
Sample 9804: 99% Gas Probability
Sample 9883: 11% Gas Probability
FID Response
FID Response
Retention Times
SC-9883-TD
SC-9804-TD
0
10000
20000
30000
40000
50000
0
1000
2000
3000
4000
5000
6000
0
50
100
150
200
250
300
350
400
450
500

Figure 10

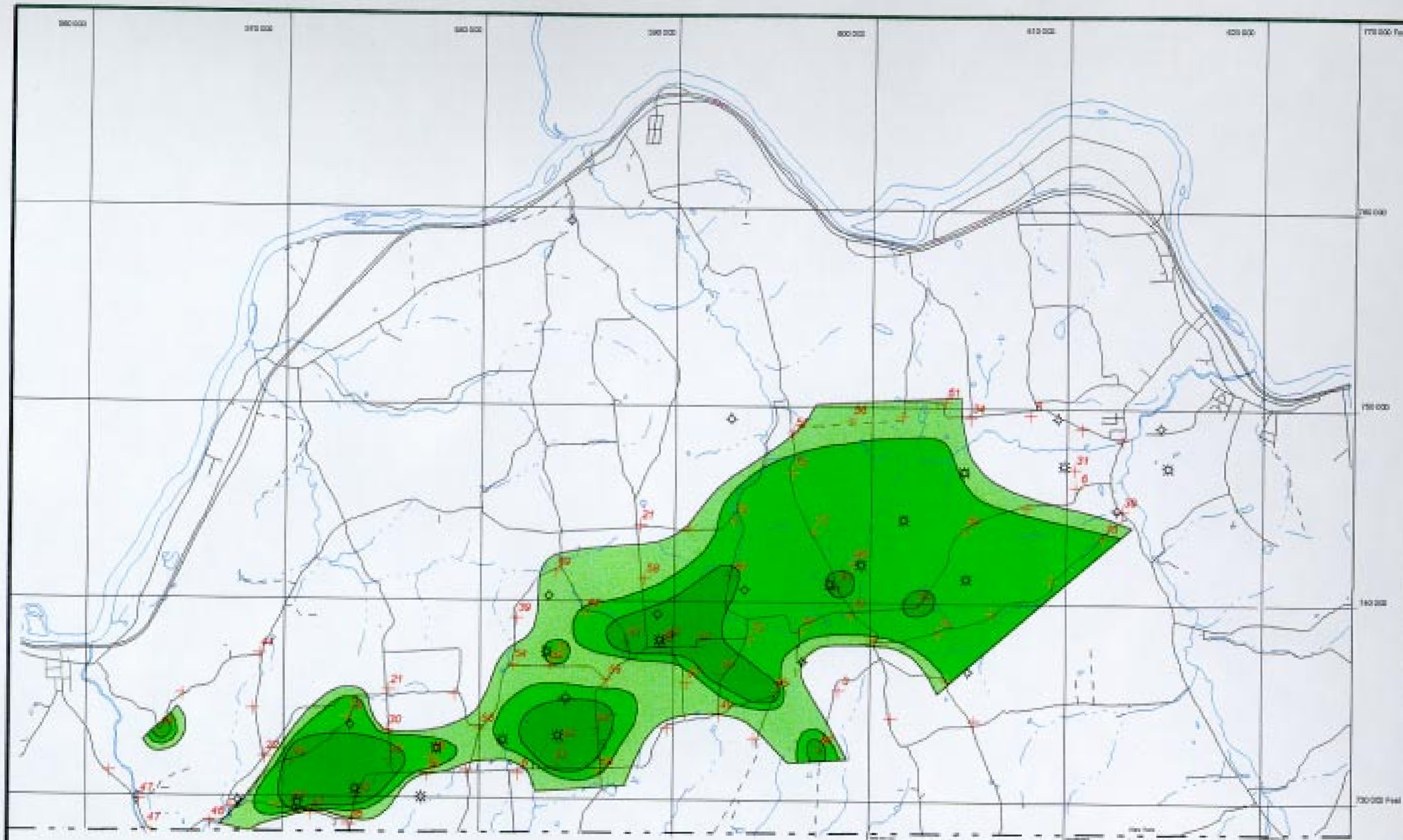


Figure 11

Free Soil Gas - VaporTec

Stagecoach Field, New York

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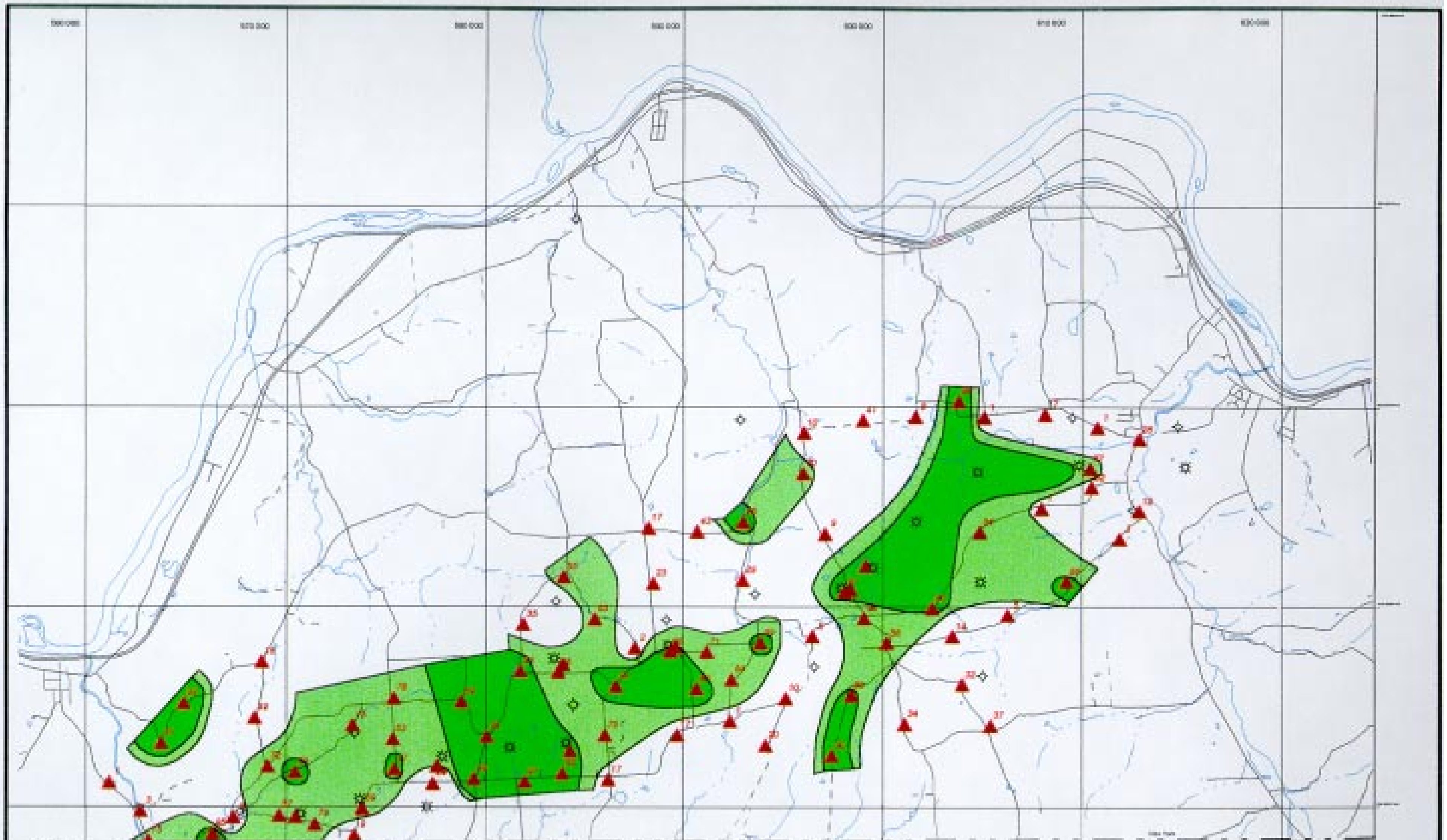

Figure 12

Gas Probability - UV Fluorescence

Stagecoach Field, New York

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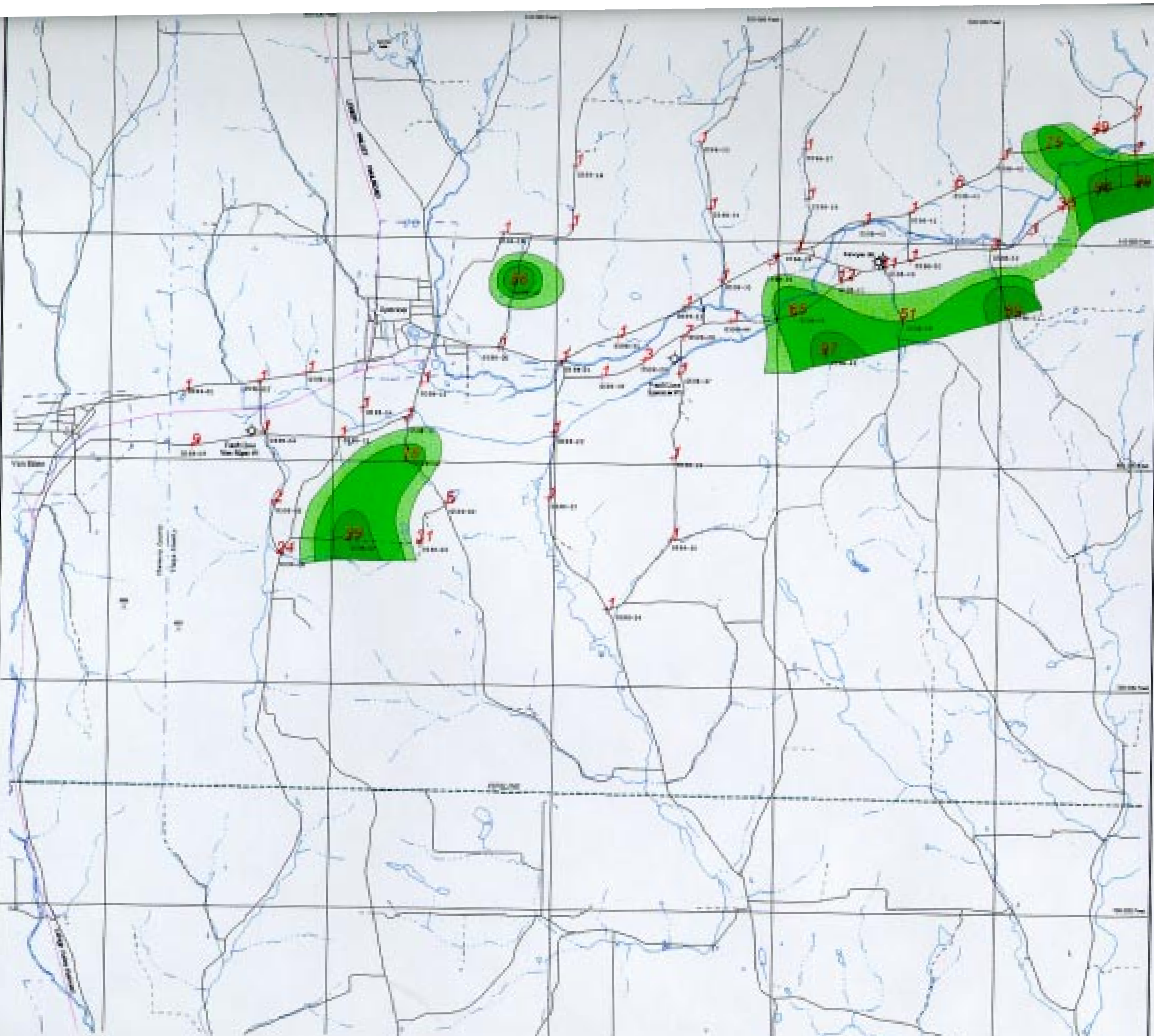
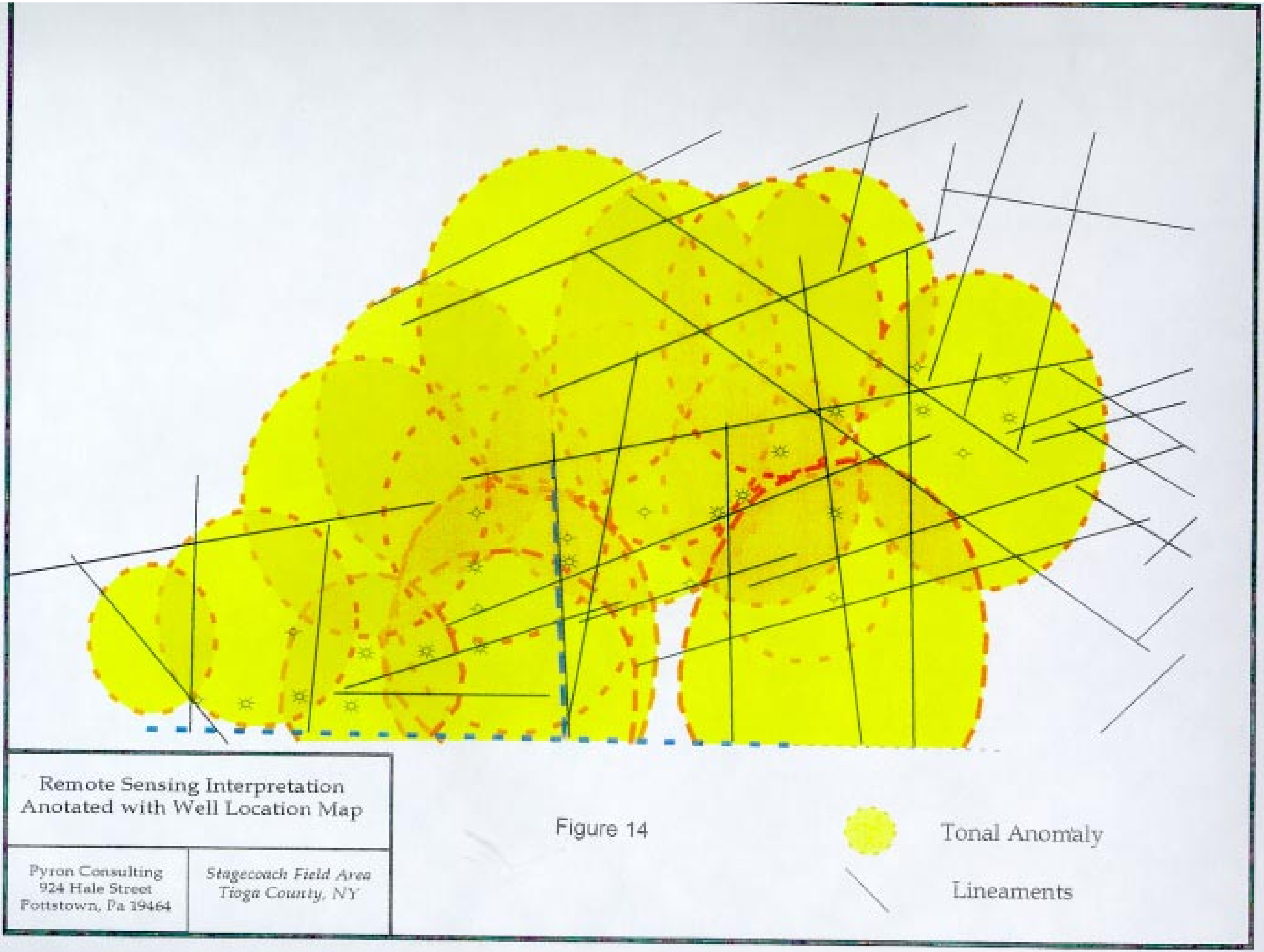


Figure 13

DIRECT GEOCHEMICAL

Gas Probability - UV Fluorescence

North Tioga County, New York


Remote Sensing Interpretation
Anotated with Well Location Map
Pyron Consulting
924 Hale Street
Pottstown, Pa 19464
Stagecoach Field Area
Tioga County, NY
Figure 14
Tonal Anomaly
Lineaments

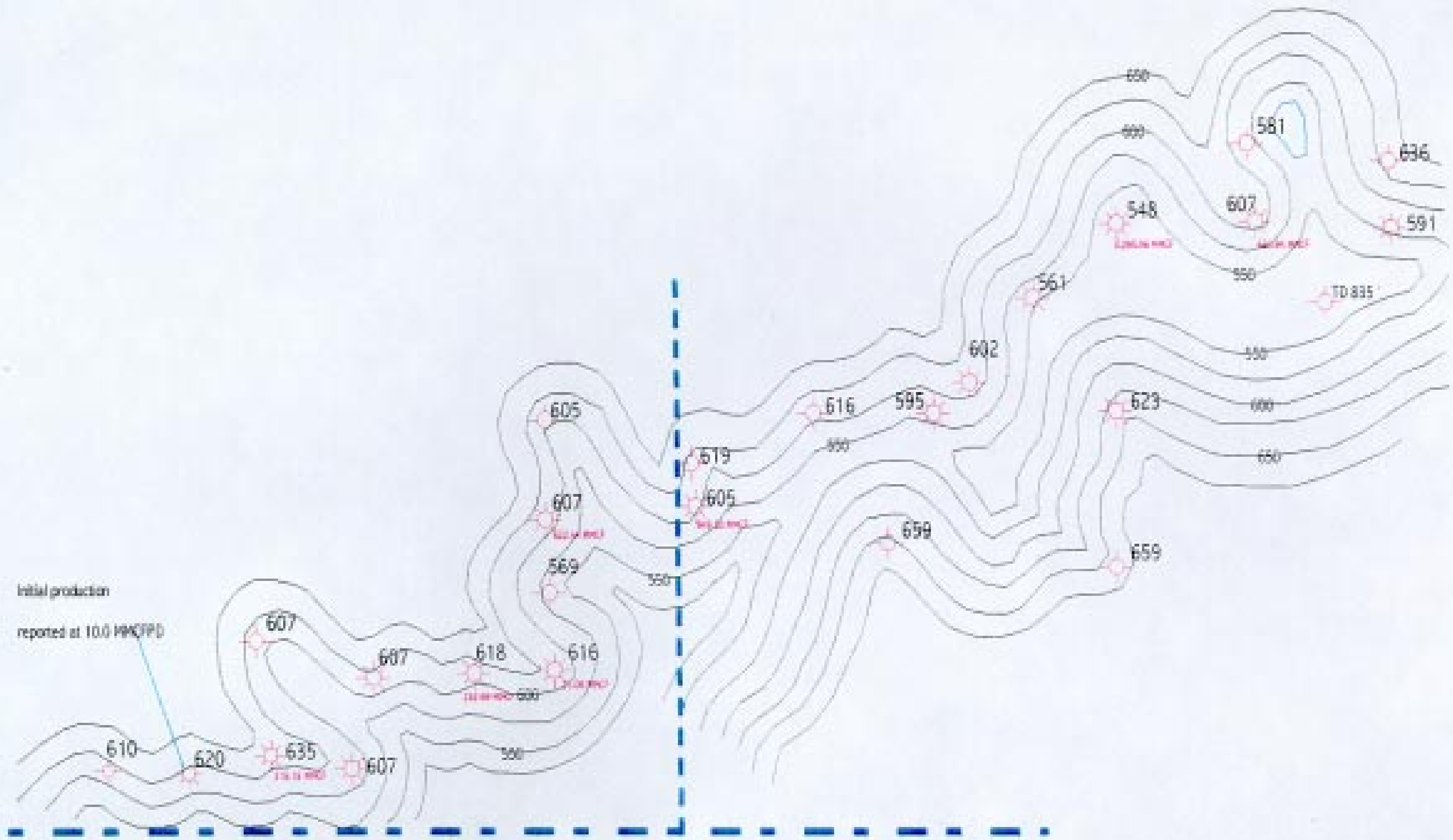


Figure 15

Paleogeomorphic Map
Annotated with 1996 Production Data

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Stagecoach Field Area
Tioga County, NY

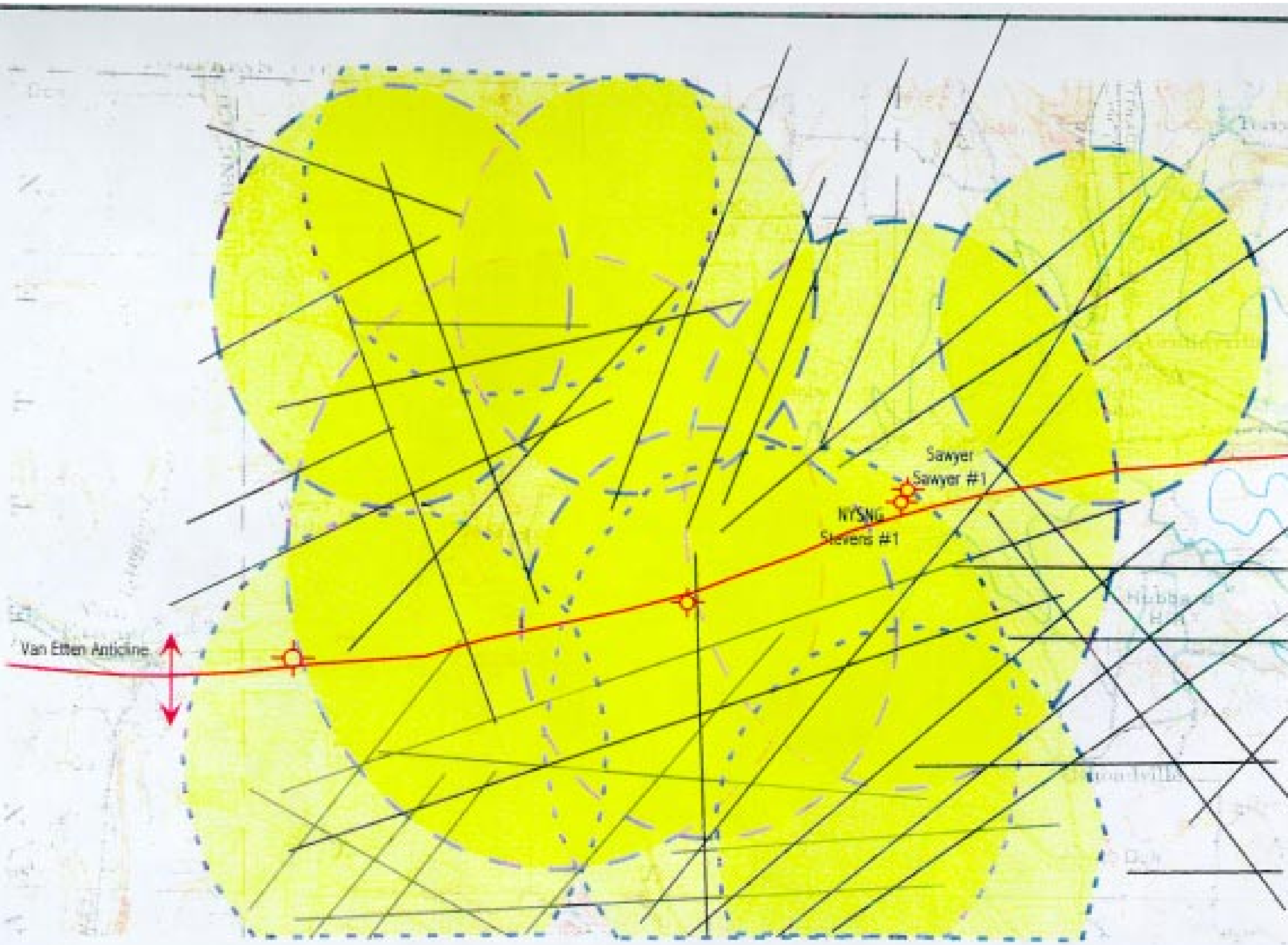


Figure 16

Remote Sensing Interpretation Anotated with Well Location Map	
Pyron Consulting 924 Hale Street Pottstown, Pa 19464	*Northern Tioga County* *Prospect Area* *Tioga County, NY*

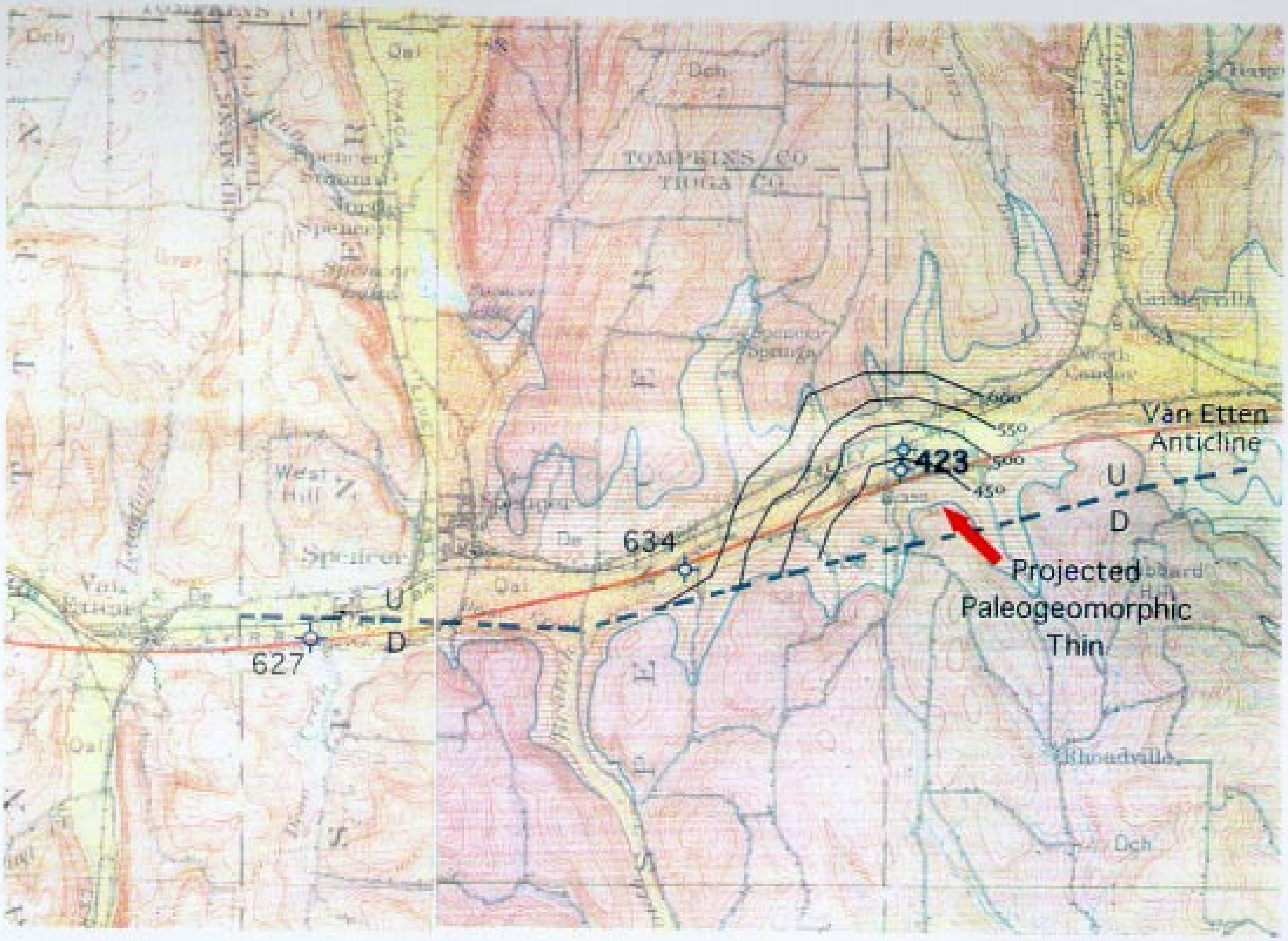
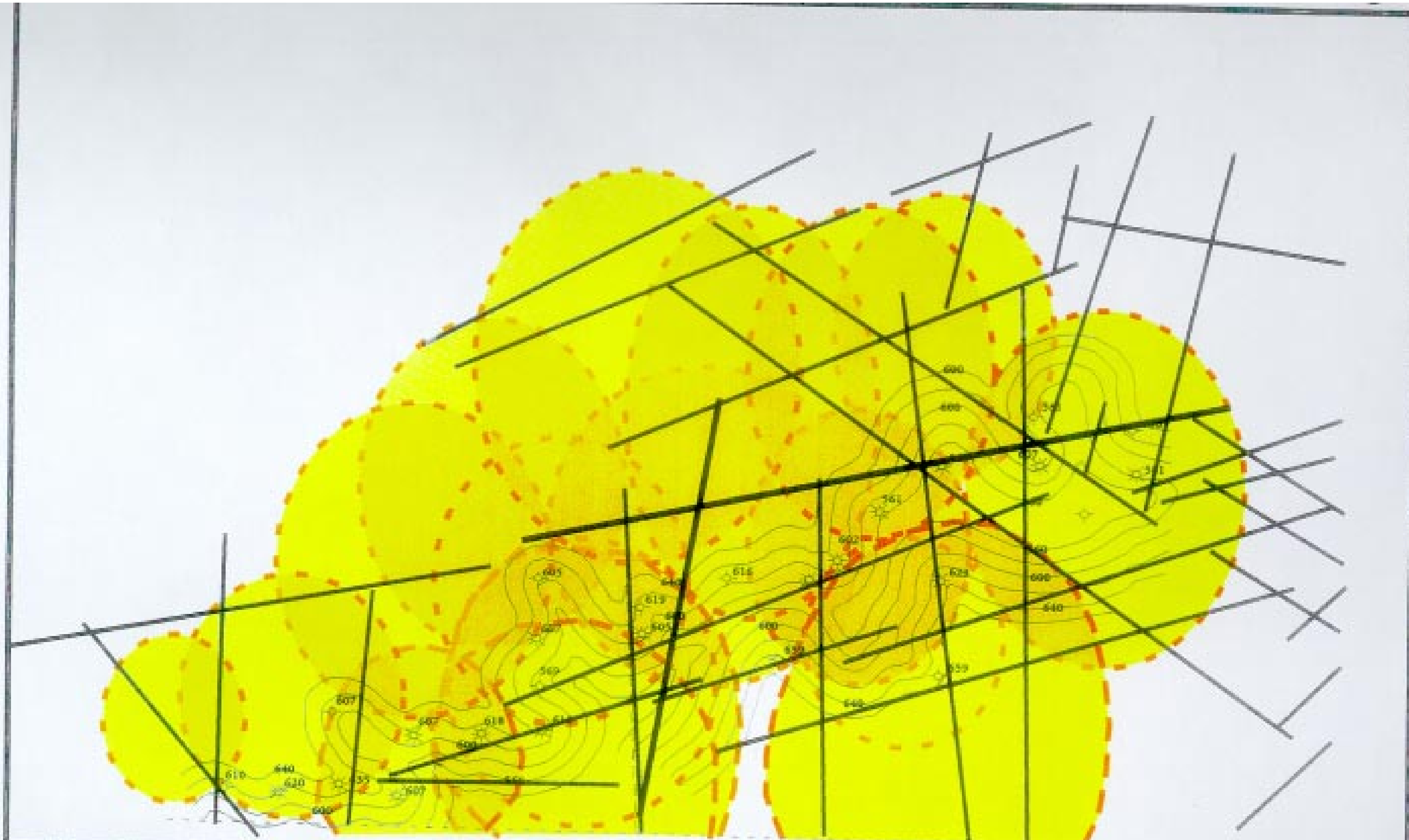


Figure 17

Paleogeomorphic Map Showing
Projected Paleogeomorphic Thin

Pyron Consulting
924 Hale Street
Pottstown, Pa 19464

Northern Tioga County Prospect Areaa
Tioga County, NY



COMPOSITE MAP
Remote Sensing Interpretation
Integrated with Paleogeomorphic
Map

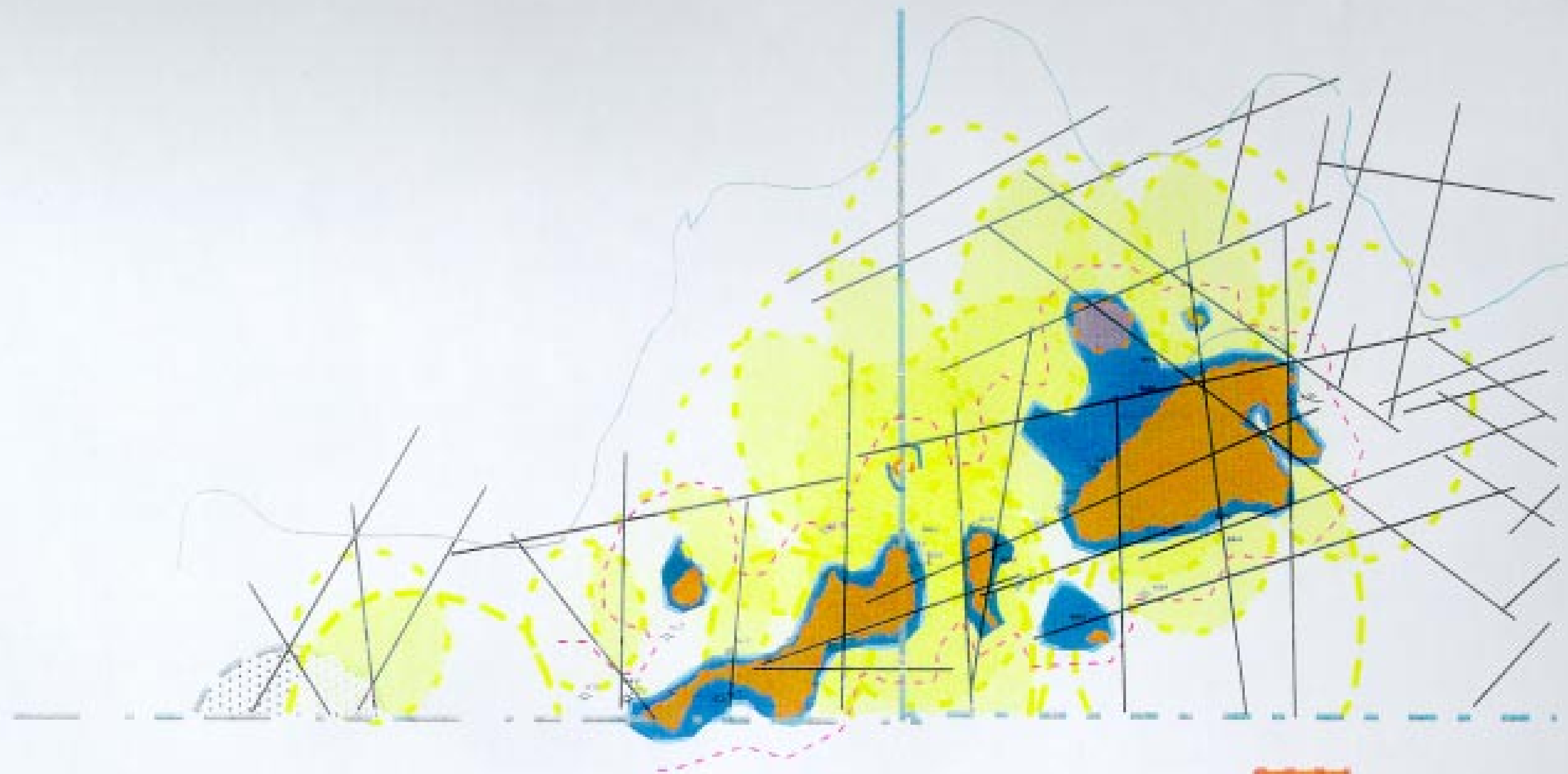
Pyron Consulting
924 Hale Street
Pottstown, Pa 19464

Stagecoach Field Area
Tioga County, NY

Figure 18

Tonal Anomaly

Lineaments



COMPOSITE MAP Remote Sensing Interpretation Integratedwith Soil Gas Survey	
Pyron Consulting 924 Hale Street Pottstown, Pa 19464	*Stagecoach Field Area* *Tioga County, NY*

Figure 19

Legend
>70 units
>50 units
>1 units
Tonal Anomaly
Lineaments

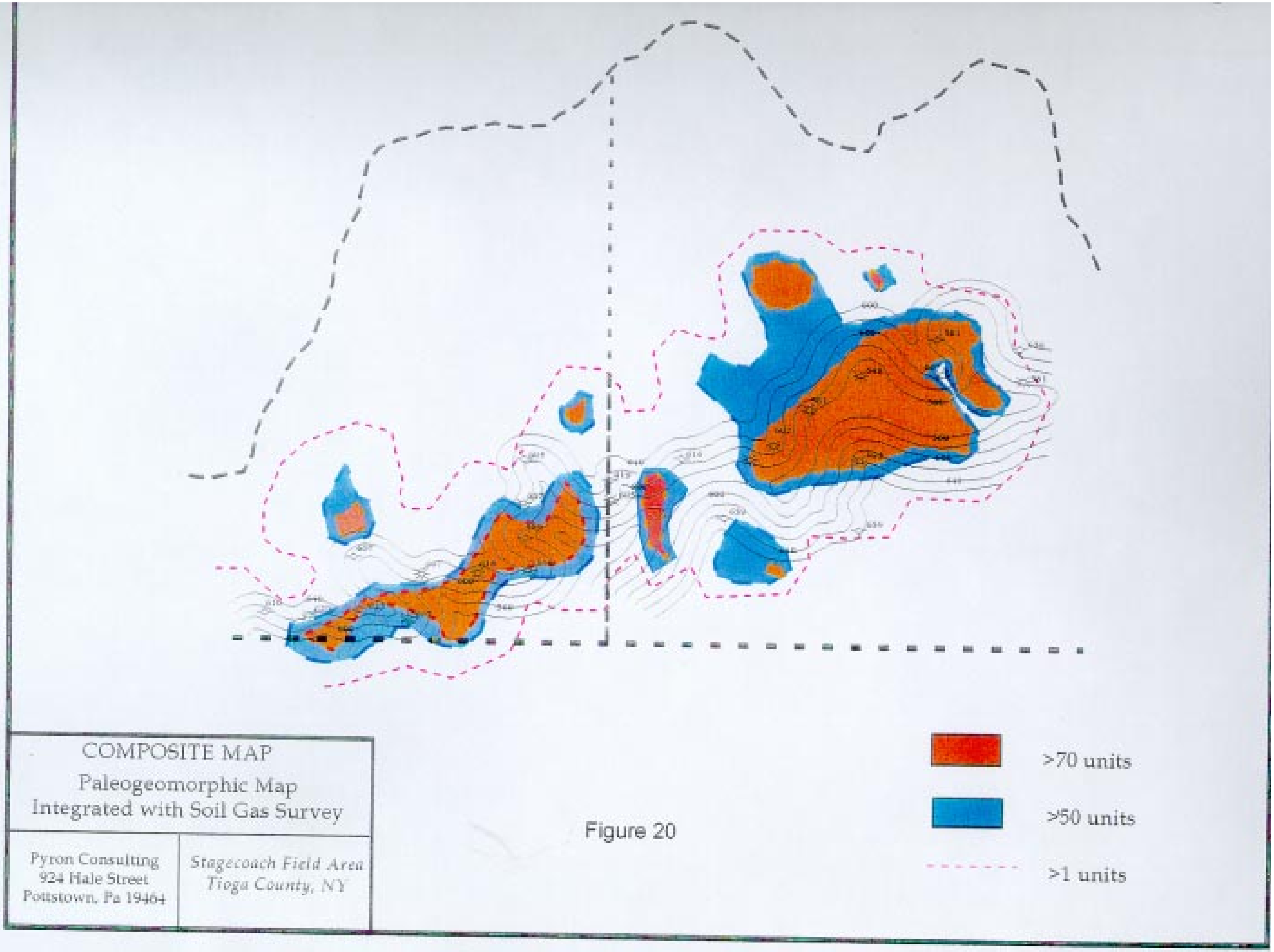
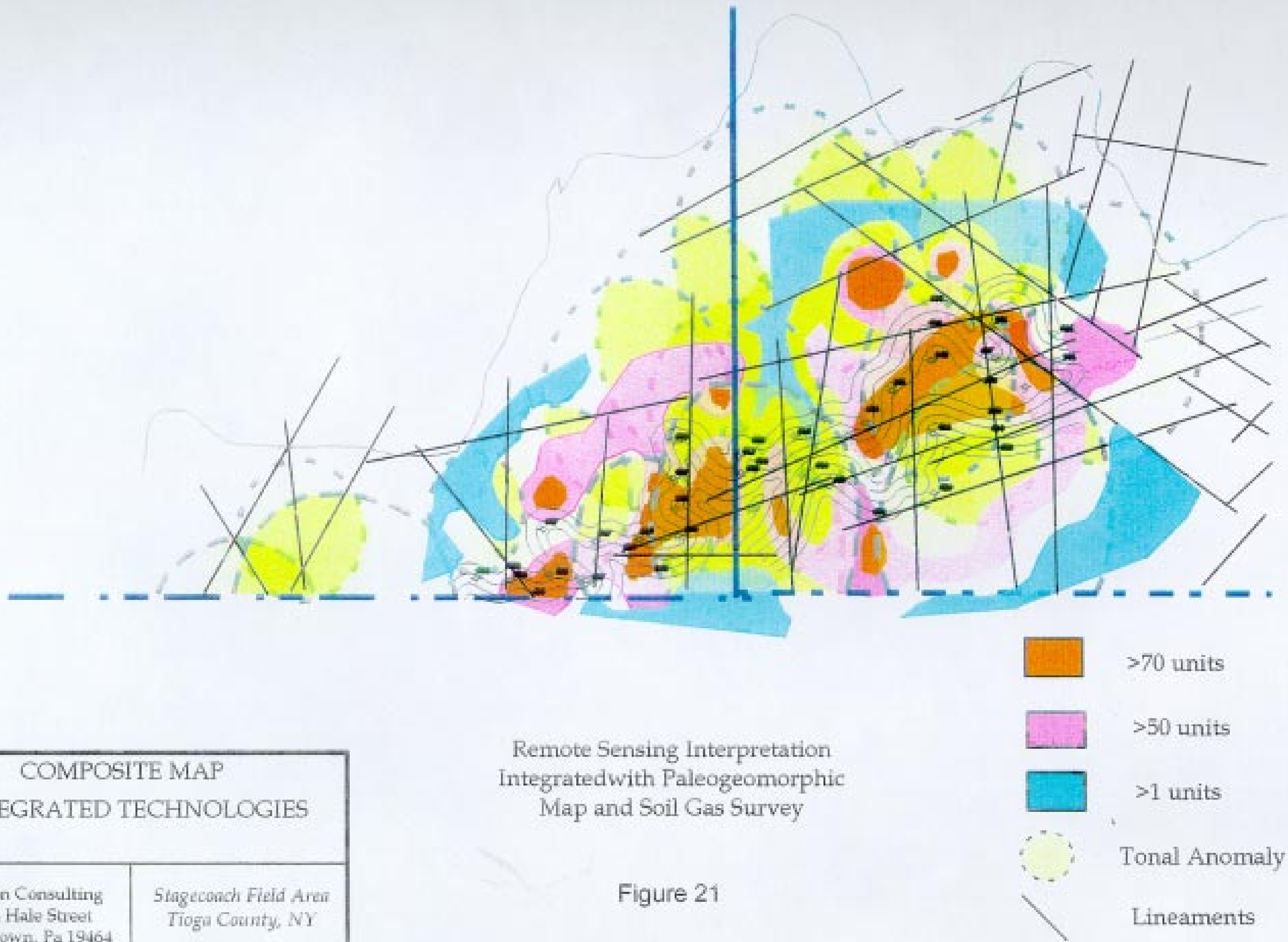

COMPOSITE MAP
Paleogeomorphic Map
Integrated with Soil Gas Survey
Pyron Consulting
924 Hale Street
Pottstown, Pa 19464
Stagecoach Field Area
Tioga County, NY
>70 units
>50 units
>1 units

Figure 20



COMPOSITE MAP
INTEGRATED TECHNOLOGIES

Pyron Consulting
924 Hale Street
Pottstown, Pa 19464

Stagecoach Field Area
Tioga County, NY

Remote Sensing Interpretation Integratedwith Paleogeomorphic Map and Soil Gas Survey

Figure 21