FRUITLAND OUTCROP MONITORING REPORT

LA PLATA COUNTY, COLORADO

OCTOBER 2004

Prepared for:

THE GROUP
Durango, Colorado

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EXECUTIVE SUMMARY

Since 1997, LT Environmental, Inc. (LTE) has conducted methane seep monitoring on the Fruitland Formation (Kf) outcrop in La Plata County, Colorado. The study area is located along the northern rim of the San Juan Basin, north of the Southern Ute Indian Reservation. The objectives of the monitoring program are to observe and document the relative change in methane seepage from the Kf outcrop over time and space. The overriding goal of the program is to ensure the safety of the public and the environment.

The field methods of the monitoring program include methane seepage flow measurements from six gas flux chambers; periodic monitoring of gas concentration from 180 permanent monitoring probes; detailed mapping in known seep areas; and regional reconnaissance along the entire outcrop using infrared imagery (IR) and field verification (pedestrian survey). Regional reconnaissance is only performed every two years and is scheduled for May 2005. Therefore, the regional reconnaissance was not included as part of this monitoring event.

Results of flux chamber monitoring indicate that gas flow at the seep areas remains sporadic as documented since 1997. No increasing or decreasing trend has been noted at the flux chambers. As discussed in previous reports, the highest flows are recorded at the Texas Creek area. The lowest flows are recorded at the East Pine area.

The 2004 detailed mapping event was performed during the period from May 24, 2004 through May 29, 2004. An additional mapping event was performed on the Hoier Property on August 19, 2004 at the request of Debbie Baldwin with the Colorado Oil and Gas Conservation Commission (COGCC) in response to a recent complaint by Mrs. Hoier citing a new stressed/dead vegetation area in close proximity to the house.

In Basin Creek, construction activities limited access to large portions of the mapping area. The limited data collected during this mapping event noted the presence of methane seeps in areas consistent with previous mapping events.

At Carbon Junction, LTE collected more measurements during the 2004 mapping event as compared to previous years. Mapping results noted the presence of additional dead trees, particularly along the creek banks as compared to previous mapping events.

At Florida River, data suggests that many of the stressed/dead vegetation areas mapped in 2003 appear larger (of greater extent) in 2004. Methane concentrations in the subsurface measured in 2004 appear to be higher than concentrations measured in 2003 where comparable data exists.

At Texas Creek, several of the stressed/dead vegetation areas noted in 2003 appear larger in 2004, particularly along the western end of the mapping area. The seep area east of Texas Creek identified in the 2003 mapping event also appears to have increased in both concentration and extent in 2004, as compared to the 2003 data.

Data collected from the Hoier Property indicates an increase in the number and size of stressed/dead vegetation areas since the 2003 mapping event. The area of recent complaint (immediately east of the residence) has several large areas of stressed/dead vegetation. LTE did

not detect methane in any of the 20 subsurface methane locations measured in this area on August 19, 2004. The concentrations measured in the most active seep area (northeast of the residence) appear to be within the same magnitude as the 2003 mapping event even though there were more measurement points collected during the 2004 mapping event.

The most recent statistical evaluation of the permanent monitoring probe data determined that of the 180 probes, 81 probes reported measurable trends with the remaining 99 probes rarely reporting detectable methane, if ever. Of the 81 probes with measurable trends, 32 probes exhibited an upward or downward trend at the 95% confidence level. Upward trends at the 95% confidence level were noted at 21 probes and 11 probes exhibited downward trends at the 95% confidence level. Monitoring of the permanent monitoring probes should continue as planned.

LTE's recommendations for future work include continued detailed seep mapping which is scheduled for May 2005; IR imagery acquisition performed in late May 2005; and follow-up field verification of suspect areas identified in the IR imagery in July 2005. LTE also recommends that a natural spring survey (including literature review) be performed at the time of the field verification activities in order to catalog the location of springs along the outcrop for use in reservoir modeling applications and in defense of potential future complaints by landowners.

SECTION 1.0

INTRODUCTION

Since 1998, LT Environmental, Inc. (LTE) has conducted methane seep monitoring on the Fruitland Formation (Kf) outcrop in La Plata County, Colorado (Figure 1). The study area is located along the north rim of the San Juan Basin, north of the Southern Ute Indian Reservation. The objectives of the monitoring program are to observe and document the relative change in methane seepage from the Kf outcrop over time and space. The overriding goal of the program is to ensure the safety of the public and the environment.

This program is being conducted on behalf of BP, Inc. (BP); XTO Energy, Inc. (XTO); Pure Resources, Inc (Pure); ChevronTexaco Production Company (ChevronTexaco); the Bureau of Land Management (BLM); the Colorado Oil and Gas Conservation Commission (COGCC); and La Plata County. These companies and governmental agencies are collectively referred to as "The Group".

1.1 OBJECTIVES

The objectives of this monitoring event were to continue the Kf outcrop monitoring of the existing flux chamber systems, to continue detailed seep mapping in known methane seep areas, and to evaluate BLM probe data.

1.2 ORGANIZATION OF REPORT

This report is organized into six sections including this introduction, which presents the objective of the study and discusses background information related to the project. The field methods used to complete the scope of work are described in Section 2.0. Section 3.0 presents the results of the flux chamber monitoring. The results of the detailed mapping activities are summarized in Section 4.0. The evaluation of the BLM probe data is presented in Section 5.0. Section 6.0 presents the conclusions of this monitoring event and recommendations for continued monitoring. Tables, figures, and appendices follow the text in separate sections. Pertinent charts and photographs have been included in the text.

1.3 BACKGROUND INFORMATION

The study area consists of approximately 23 miles of the Kf outcrop extending from the Southern Ute Indian Reservation northern boundary near Basin Creek (southwest of Durango) north and eastward to an area three miles east of Pine River (Figure 1). There have been a number of previous and ongoing studies, which support the overall methane seepage evaluation. Some of the previous studies include:

- Ongoing detailed mapping, methane seepage data collection, and mitigation in the Pine River area by BP since 1994;

- Reconnaissance survey by BLM/Stonebrooke in 1995, which consisted of collection of over 1,100 surface and/or subsurface methane sample points. This survey identified four additional primary methane gas seepage areas besides Pine River including Basin Creek, Carbon Junction, Florida River, and South Fork Texas Creek (Texas Creek);

- Installation of 162 permanent soil gas monitoring probes by LTE in 1998, with 18 additional probes installed at various locations since that time, and ongoing monitoring of the points by the BLM. The probes are sampled approximately six to eight times per year;

- Installation and ongoing monitoring of six flux chambers in the primary seepage areas. The gas flux chambers measure gas flow on 10-minute intervals. Data are downloaded from the flux chambers every 45 days;

- Annual pedestrian reconnaissance surveys of the outcrop by LTE from 1998 through 2001;

- Flux chamber system modifications, detailed seep mapping, and infrared (IR) imagery pilot study performed in August 2002. The pilot study demonstrated that the IR imagery is useful in identifying suspect areas based on vegetation impacts, which can be subsequently field verified for the presence or absence of methane;

- Detailed seep mapping in the primary seep areas in May 2003; and

IR imagery and field verification (regional reconnaissance) of the entire 23-mile section of outcrop in July-August 2003. This evaluation has replaced the pedestrian surveys previously conducted as described in the COGCC Orders112-156, 112-157, and 112-161.

SECTION 2.0

FIELD METHODS

This section describes the approach and procedures used during flux chamber monitoring, detailed seep mapping, and permanent soil gas probe monitoring.

2.1 GAS FLUX CHAMBER MONITORING

Throughout the period from July 2003 through August 2004, LTE continued data collection and operation and maintenance (O&M) activities at the six gas flux chambers. The flux chamber at Basin Creek had to be removed to accommodate construction activities. Data are collected on 10-minute intervals and stored in a Datataker remote datalogger. Data are downloaded from each of the dataloggers approximately every 45 days and transferred to a database for evaluation. LTE personnel inspected each of the chambers for operational issues and made the necessary adjustments to maximize data collection. Power supply issues and mechanical problems are remedied during each inspection, as required. The modified flux chamber locations are presented in Figure 1. The data from the chambers are stored in a Microsoft® Access database to facilitate data retrieval using specified queries.

2.2 DETAILED METHANE GAS SEEP MAPPING

Detailed seep mapping was completed in the areas of Basin Creek (also known as Ridges Basin), Carbon Junction, Florida River, South Fork Texas Creek, the Hoier Property, and Beaver Creek Ranch. Detailed seep mapping was not performed in the Pine River area since BP frequently maps this area.

The stream bed in the Basin Creek area was not mapped due to construction activities. The construction of the dam, and removal of vegetation caused large quantities of sediment to accumulate in the stream bed, thus making the area inaccessible for seep mapping. The areas

Sediment in Basin Creek
View east.

adjacent to the stream bed were mapped as planned but based on recent observations, the construction area appears to be steadily increasing in size, reducing the observable seep features and further limiting access to map and monitor seep activity at Basin Creek.

Per our recommendations in the October 2003 report, the Hoier Property, a small seep area west of the Pine River, was added to the detailed seep mapping program during this monitoring event. Subsurface methane measurements were also collected on the outcrop in the Beaver Creek Ranch area (east of East Pine and up dip of the COGCC monitoring wells) at the request of Debbie Baldwin of the COGCC.

The detailed seep mapping was performed May 24, 2004 through May 29, 2004. Additional subsurface methane measurements from the Hoier Property were collected on August 19, 2004 at the request of Debbie Baldwin due to recent complaints of dead vegetation immediately east of the residence.

The LTE field crew was equipped with the aerial photographs (digital orthoquads and IR imagery), topographic maps, digital camera, sampling equipment (slide-hammer and probe), global positioning system (GPS), and an MSA GasPort® field meter capable of detecting methane, hydrogen sulfide (H_2S), oxygen (O_2), and carbon monoxide (CO).

The procedure of the detailed seep mapping program involved walking the known seep areas and vicinity and noting dead, stressed, and non-vegetated areas. Areas where visible seeps were occurring within surface water bodies were also identified and mapped. LTE mapped the dead or stressed trees and areas of dead or impacted grass using the GPS. Subsurface measurements of methane, H_2S, CO, and O_2 were collected, where appropriate.

When the surface water flow was relatively low enough, LTE waded through the creeks and walked along the banks looking for methane seep bubbles and dead or stressed vegetation. Since this mapping event was performed during spring runoff, visible seeps within the surface water bodies were limited. If wading was not possible, the banks of each waterway were traversed. Pertinent features on each side of the waterway were mapped in areas where property access was granted.

2.2.1 Types of Features Observed

The types of features noted during the mapping survey included the following:

- non-vegetated areas;
- dead vegetated areas;
- stressed vegetated areas;
- pertinent live vegetated areas;
- dead trees;
- pertinent live trees;
- stressed trees;
- bifurcated trees;
- methane seep points within surface water bodies;
- methane seep areas within surface water bodies; and
- general seep trend lines.

In the lowland areas, LTE focussed on non-vegetated areas that were adjacent to live vegetation areas. These areas were commonly located in the valley lowlands and appear to have been vegetated in the past but have since died off. The dead vegetated areas were observed as patches of dead bushes and/or grass. Stressed vegetation areas were defined as co-mingled sparsely vegetated areas and non-vegetated areas. The small dead or non-vegetated areas were mapped independently at each mapping area. Pertinent live vegetation features were mapped when they appeared as mappable surface areas coexisting with dead or non-vegetated areas.

The mapping results are presented in figures, which are contained in a separate section following the text. The subsurface methane measurement location symbols are graduated based on concentration. Trees and seeps are mapped as point features. Dead and stressed areas are mapped as polygon features.

2.2.2 Use of GPS

LTE used a Trimble GeoXT® GPS with a real-time correction processor to map each feature. The GeoXT® is a different unit from the GPS used in previous monitoring events, but the unit maintains the same survey accuracy. The methane measurements and other relevant field notes were stored as attributes in the GPS unit with the associated GPS mapped positions. The GPS data were later downloaded and grouped according to the type of feature, as points, lines, or polygons.

The data were collected with GPS in the WGS 84 coordinate system and converted to decimal degrees NAD 83 for use in the ArcView® project file developed by LTE in 2001. On average, 20 GPS readings were collected for each point feature in order to obtain more accurate positioning. The perimeter of each mapped area was slowly traversed collecting positioning data at a rate of approximately one logged point per foot.

2.2.3 GIS Project Update

LTE recently converted the GIS project from Arcview® Version 3.1 to Arcmap® Version 8.3. The new software is more flexible, more compatible with current technology, and more user-friendly. The advanced system will allow more efficient evaluation and presentation of mapped data during future monitoring events.

2.2.4 Gas Measurement Collection

A slide hammer was used to advance a half-inch diameter steel rod (probe) to a depth of approximately 36 inches during the seep mapping. Some probe holes were shallower than 36 inches due to the density of the ground surface. One-quarter inch diameter polyethylene tubing perforated at the bottom six inches was inserted into each probe hole to collect subsurface gas measurements. The MSA GasPort® field meter was utilized to measure the concentration of methane, H_2S, CO, and O_2 in each probe hole. After recording the gas reading, the tubing was removed and the probe hole was backfilled with native soil.

The MSA GasPort® is capable of detecting methane in concentrations from 0.0 parts per million (ppm) to 100 percent (%) methane. The field meter was calibrated to methane, H_2S, and CO each morning and again at midday to ensure the equipment was working properly.

2.3 BLM PERMANENT PROBE MONITORING

As discussed in previous monitoring reports for this project, the BLM collects data from the 180 permanent monitoring probes installed at or near the primary seep areas within the project area. Approximately six times per year, the BLM measures methane concentration from these probes and inputs the data into a database.

Considerable fluctuation has been observed in the subsurface methane concentrations. In order to investigate whether any statistically significant trends have been observed, the data was analyzed using the Mann-Kendall test for trend. This non-parametric test is useful in understanding time series data. It is also useful since missing values are allowed; it is not greatly affected by outliers; and no assumptions need to be made about the distribution of the data. The test is performed using the relative rankings of data points, rather than using their actual values. This report discusses the most recent results of the data that LTE acquired from the BLM database.

2.4 LIMITATIONS

The type of terrain that exists along the Kf outcrop presents difficulties for both the GPS unit and collection of subsurface methane samples with the slide hammer.

North-facing slopes and heavily wooded areas are difficult to obtain accurate positioning by the GPS. Satellite signals are frequently bounced among the trees or lost completely. When satellite signals are limited, positioning accuracy decreases. In some cases, it is not possible to map by GPS. Readings collected with the GPS unit can be located within one-meter radius of accuracy.

Soil probing in consolidated materials along the outcrop was limited. LTE used the slide hammer to probe to a maximum depth of 36 inches below ground surface (bgs). In some cases, probing depths of 18 inches bgs were laborious to achieve. If refusal occurred, measurements were taken at the depth bored. All probe holes were advanced to a depth ranging from 6 inches to 36 inches bgs depending on the type of surface cover present.

Methane measurements of the visible seeps within surface water bodies were not recorded because of the inaccuracy associated with collecting the readings. Ambient air mixing with the methane and dispersion caused skewing of the measurement. Some portions of the waterways had too many bubbles to map separately so they were grouped together as seep areas or seep trends.

Finally, LTE was restricted by property owners from accessing several areas within the project area. These areas are denoted on the maps presented in this report.

SECTION 3.0

FLUX CHAMBER MONITORING RESULTS

This section describes the results of the O&M and summarizes the data collected at each of the flux chamber locations from July 2003 through June 2004. Flux chamber data is presented in Appendix A. Flux chamber monitoring locations are illustrated on Figure 1.

3.1 BASIN CREEK

As previously reported, the flux chamber formerly located at Basin Creek has been removed and stored in a Durango storeroom during construction of the Animas-La Plata Project (ALP), a dam construction and water storage project. No data has been collected at this gas flux chamber location since August 2003.

3.2 CARBON JUNCTION

Gas flow is being recorded with flow rates typically between 50 and 200 standard cubic centimeters per minute (sccm). Peak flows between 200 sccm and 1000 sccm were noted on several occasions each month. Power supply problems during the period from March through June 2004 prohibited collection of flow data. Upon replacement of the unit, additional flow issues were observed that indicate the flow meter may be out of calibration. LTE recently removed the unit and returned it to the manufacturer for repair and/or recalibration. No discernable increasing or decreasing trend can be noted from the chart of flow data.

3.3 FLORIDA RIVER

Relatively low flow rates were recorded throughout the monitoring period. Flow rates typically ranged between 25 and 50 sccm with peak flows less than 100 sccm in most cases. In May 2004, it was determined that the flux chamber unit was slowly sinking into the pond due to erosion at the pond floor/bank. The flux chamber was placed off line from May 2004 through July 2004 so as not to cause further damage. In July 2004 when pond water levels subsided, LTE contracted a local excavator to remove the unit from the pond, re-level the pond floor and replace the unit. LTE personnel were on site to supervise these activities. The repaired unit was placed into service in early August 2004 and appears to be working properly.

3.4 TEXAS CREEK

The Texas Creek area has two flux chamber units, one set directly within the creek and another approximately 100 yards to the west on land. Flow recorded from the unit within the creek in January 2004 were some of the lowest flows recorded to date ranging from 100 sccm to 200 sccm. Flows recorded in late May 2004 and early June 2004 were some of the highest flows recorded to date ranging from 5,500 sccm to 6,500 sccm with a decreasing trend through August 2004. A similar decreasing trend was observed from April 2003 to August 2003 and is likely related to water flow rates within the creek. As water flow within the creek subsides, dilution by air and dispersion increase, which, decreases the measured flow at the flux chamber. Flow rates recorded during other portions of the year were consistent with previous year data.

The chamber located on land appears to be functioning properly and is recording flow in the range of 300 to 400 sccm with occasional flows of over 1,000 sccm. No increasing or decreasing flow trends were noted.

3.5 PINE RIVER

Flow at Pine River was relatively low during the latter portion of 2003. Starting in February 2004 and through June 2004, flows were relatively higher than in years past with peak flows typically ranging between 800 sccm and 1,000 sccm and often exceeding 1,000 sccm.

3.6 EAST PINE

The flow rates recorded at the East Pine flux chamber appear to be consistent with previous measurement periods with the exception of flow during the month of July 2004. Very erratic flows from 50 sccm to approximately 400 sccm were detected as compared to normal flows which are typically reported at rates less than 50 sccm. LTE is currently troubleshooting this flow meter and power supply to determine if the readings are the result of a mechanical error. Methane has been detected at low concentrations at the East Pine flux chamber in the past, however it is unlikely that such a dramatic change would be noticed in such a short time period.

During other parts of the year, flow is sporadic with peak flow rates rarely exceeding 50 sccm. In general, methane flow appears to be slightly more active during the period from March through October in comparison to the winter months.

3.7 WEATHER STATION DATA COMPARISON

LTE compared the flow data collected from the chambers to the barometric pressure data and temperature data collected by the weather station at Pine River. The comparison suggest a slight relationship between methane flow and daily temperature changes in that most peak flows occur in the afternoon hours when the temperature is highest. Flow rates decrease as temperatures decrease. This is not always consistent but proportional relationships are observed frequently throughout the data collection period. Charts illustrating the comparison between temperature and gas flow are included in Appendix A.

Based on the data collected, any relationship between gas flow and barometric pressure is difficult to determine because gas flow is not constant. Charts illustrating the comparison between barometric pressure and gas flow are included in Appendix A.

3.8 FLUX CHAMBER MONITORING SUMMARY

Overall, gas flow rates recorded at the gas flux chambers are consistent with previous years. While some monitoring periods have reported higher flow rates in comparison to previous years, others reported lower flow rates as compared to previous years. There does not appear to be an increasing trend in gas flux data at any of the monitoring locations. Most data suggests gas flow rates are remaining the same. Periodic intervals of decreasing gas flow have also been noted.

SECTION 4.0

DETAILED SEEP MAPPING RESULTS

The following sections summarize the observations made during the detailed seep mapping carried out from May 24, 2004 through May 29, 2004 and an additional limited event on August 19, 2004. This is the third detailed seep mapping event conducted in these areas, with the exception of the Hoier Property and Texas Creek East which have only been mapped twice. Previous detailed mapping events were conducted in August 2002 and May 2003.

The mapping followed the procedures outlined in Section 3.0. The sections are grouped by study area and frequently reference figures for illustration purposes. Figures are included in a separate section following the text. For each figure reference, LTE has designated a text reference label to easily identify the location discussed. Each label consists of a two-letter abbreviation for the mapping area followed by a number (i.e. BC-1). Aerial photographs used as the basemap in the figures for this report are dated September 1993. The aerial photos do not depict physical changes that may have occurred since that date, such as the ALP dam construction at Basin Creek. The geologic contacts depicted on the aerial photographic maps were derived from geologic maps prepared by the Colorado Geological Survey (CGS) and digitized at a scale of 1:25,000. Accuracy of the geologic contact location is reduced when aerial photographs are viewed at a smaller scale.

4.1 BASIN CREEK

The detailed seep mapping for Basin Creek was completed on May 29, 2004. The stream bed was not mapped during this mapping event due to access issues as discussed in Section 2.2. The mapping area was centered on Basin Creek and was approximately 0.45 miles in the east-west direction and 0.20 miles in the north-south direction. Figure 2 illustrates the results of the mapping in the Basin Creek area.

4.1.1 Observed Methane Seeps in Surface Water

Visible methane seeps were noted within a small portion of the creek in the area correlating to the lower portion of the Kf based on surface geology. Much of the creek did not contain surface water because of the severe sedimentation of the alluvial valley, so identifying visible seeps was difficult. In addition, most of the creek area could not be accessed due to construction activities.

4.1.2 Lowland Areas

Due to the construction activities and severe sedimentation in the alluvial valley of Basin Creek, there were no features mapped in lowland areas during this mapping event.

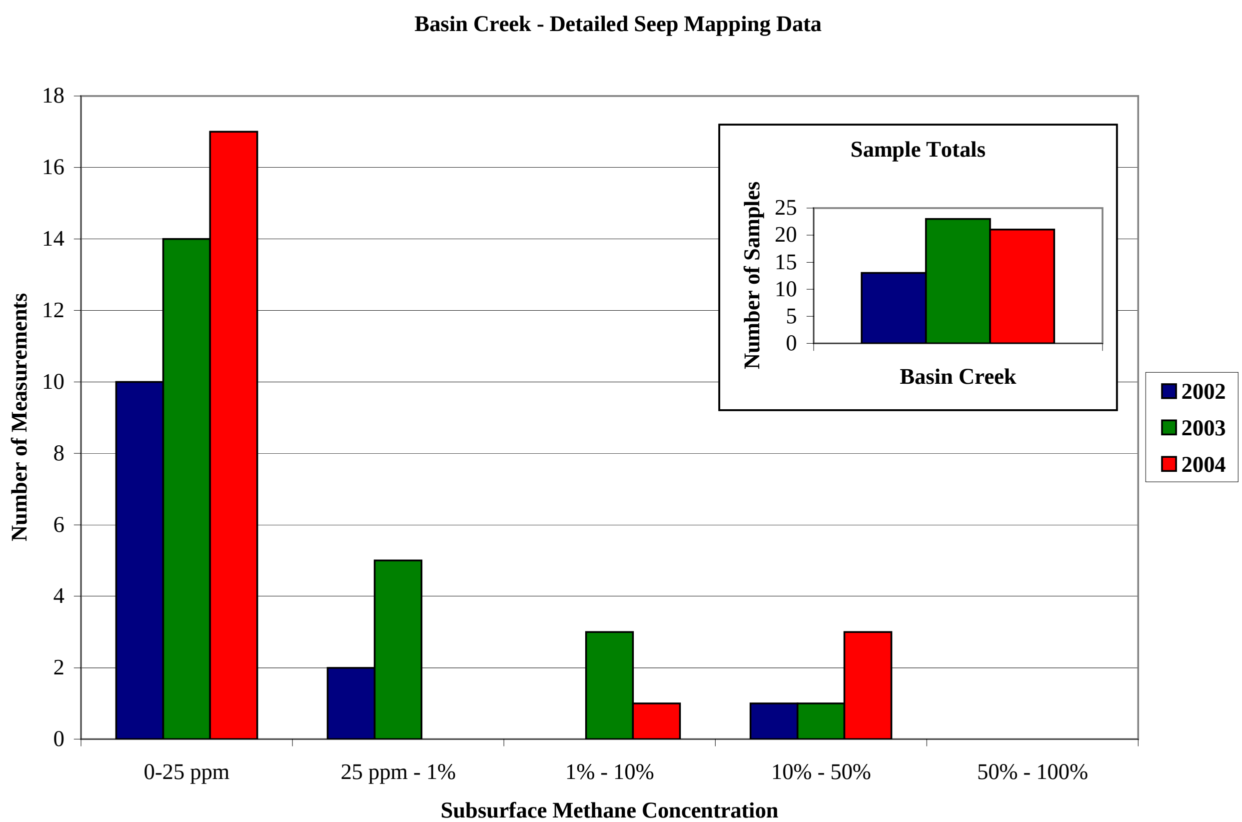
4.1.3 Upland Areas

LTE collected 21 subsurface methane measurements in the upland area on the south side of the creek. Four of the 21 measurements reported methane concentrations greater than 25 ppm. The highest methane concentration reported was 310,000 ppm (31%) (BC-1, Figure 2). Only one dead tree feature was mapped in the upland area.

4.1.4 Comparison to Previous Surveys

Based on the subsurface methane measurements collected annually since 2002 as part of the Basin Creek detailed mapping program, the most active seep area appears to be located on the south side of the creek. One area is located in the lowland valley near the contact between the Kpc and the Kf and the other is located 600 feet due south (BC-1, Figure 2).

The number of subsurface methane measurement locations in 2002 was less than the number collected in 2003 and 2004. When comparing concentrations collected in 2003 to those collected in 2004, the highest concentrations detected are relatively similar and occur in the same areas. The most recent data does not indicate the presence of new seep areas. The following chart illustrates the number of samples collected during each detailed mapping event and the distribution of the concentration values. Figure 3 illustrates the historical subsurface methane concentration data for Basin Creek.



No stressed/dead vegetation areas were mapped in 2004, due to access issues in the mapping area. Dead vegetation previously observed north of the creek is now gone due to excavation activities. Based on the data, there appears to be several stressed/dead vegetation areas in 2003 that were not mapped in 2002. According to historical data, 21 stressed/dead trees were mapped in 2002 with approximately 10 new stressed/dead trees mapped in 2003. Only one new stressed/dead tree was mapped in 2004. Figure 4 illustrates the distribution of stressed/dead trees and vegetation areas over time.

The ability to map visible seeps in surface water is strongly dependent on water levels within the surface water body at the time of mapping. Data collected between 2002 and 2004 indicate that more seeps were present in 2003 than in 2002 but water levels in 2002 were very low or not present whereas more water was noted in the creek in 2003. In 2004, the creek was filled with sediment from dam construction activities, therefore seeps could not be observed in the creek. Essentially, water was not present within Basin Creek at the time of the 2004 detailed mapping event due to severe sedimentation of the river from dam construction activities. Figure 5 illustrates the distribution of visible methane seeps in surface waters at Basin Creek and shows the areas that could not be accessed due to ALP construction activities.

4.2 CARBON JUNCTION

The mapping area at Carbon Junction is centered on the Animas River by the Wal-Mart shopping center on Highway 160 and extends approximately one-mile in the east-west direction and one-quarter of a mile in the north-south direction. The detailed mapping activities occurred on May 24, May 25, May 26, and May 29, 2004. The 2004 field data are illustrated on Figures 6 and 7.

Animas River at Carbon Junction, view north.

4.2.1 Observed Methane Seeps in Surface Water

The Animas River is a major river in Colorado, and therefore only the visible seeps along the banks were mapped due to the high water flow rates within the river at the time of mapping. Also, the high water flow rates and high turbidity made it difficult to observe methane seeps within the river. Observable methane seeps were sparsely distributed along both banks of the river downstream from the boat launch area for a distance of approximately 600 feet. Subsurface measurements were not recorded along the banks of the river due to the high water levels. The majority of the visible seep activity appears to be located over the lower portions of the Kf based on observed surface geology as mapped by the Colorado Geological Survey (CGS). However, several areas with visible seeps were noted in the upper portion of the Kf based on surface geology.

4.2.2 Lowland Areas

Tree stumps, dead cottonwood, pine, aspen, and juniper trees, and stressed cottonwood, pine, juniper, and scrub oak trees were noted along the banks of the Animas River during the detailed seep mapping conducted in May 2004. Four areas of stressed/dead vegetation were also mapped in the lowland area east of the river. Many of the subsurface readings collected at the base of these trees and from within the stressed areas reported the presence of methane at concentrations around 1,500 ppm (CJ-1, Figure 6). The maximum methane concentration reported in this area was 410,000 ppm (41%). This measurement was recorded approximately 150 feet to the northeast of the gas flux chamber.

In the area between the shooting range and the Animas River, approximately 20 stressed/dead vegetation areas were noted, many of which contain elevated concentrations of methane (CJ-2, Figure 6). Approximately 30 dead trees were mapped in this area. The maximum methane concentration reported in this area was 850,000 ppm (85%). Methane concentrations ranging around 500,000 ppm (50%) were most frequently reported in this area. This area has been noted as an active seep area during previous detailed mapping events.

No strong correlation could be found between stratigraphic location and methane concentrations during this monitoring event. Subsurface methane concentrations of 50% or greater were recorded in both the lower portion of the Kf and the middle to upper portion of the Kf based on surface geology.

4.2.3 Upland Areas

Four stressed/dead vegetation areas and 12 dead trees were mapped west of the shooting range (CJ-3, Figure 6). This seep area has been noted in previous detailed mapping events. Methane concentrations ranged from 1,500 ppm to 400,000 ppm (40%). Many of the readings collected from this area reported methane concentrations around 500,000 ppm (50%). Five of the 12 measurements reported methane concentrations of 150,000 ppm (15%) or greater.

Shooting Range and Text Reference Location CJ-3, view south.

In the upland area east of the Animas River (CJ-4, Figure 7), LTE mapped seven stressed/dead vegetated areas. During the 2003 regional reconnaissance, LTE determined that this area of mortality was due to Ips beetle infestation. No methane was detected in these stressed/dead vegetation areas during the 2004 mapping event. However, four dead pine trees were noted in close proximity to this area and slightly elevated concentrations of methane were detected.

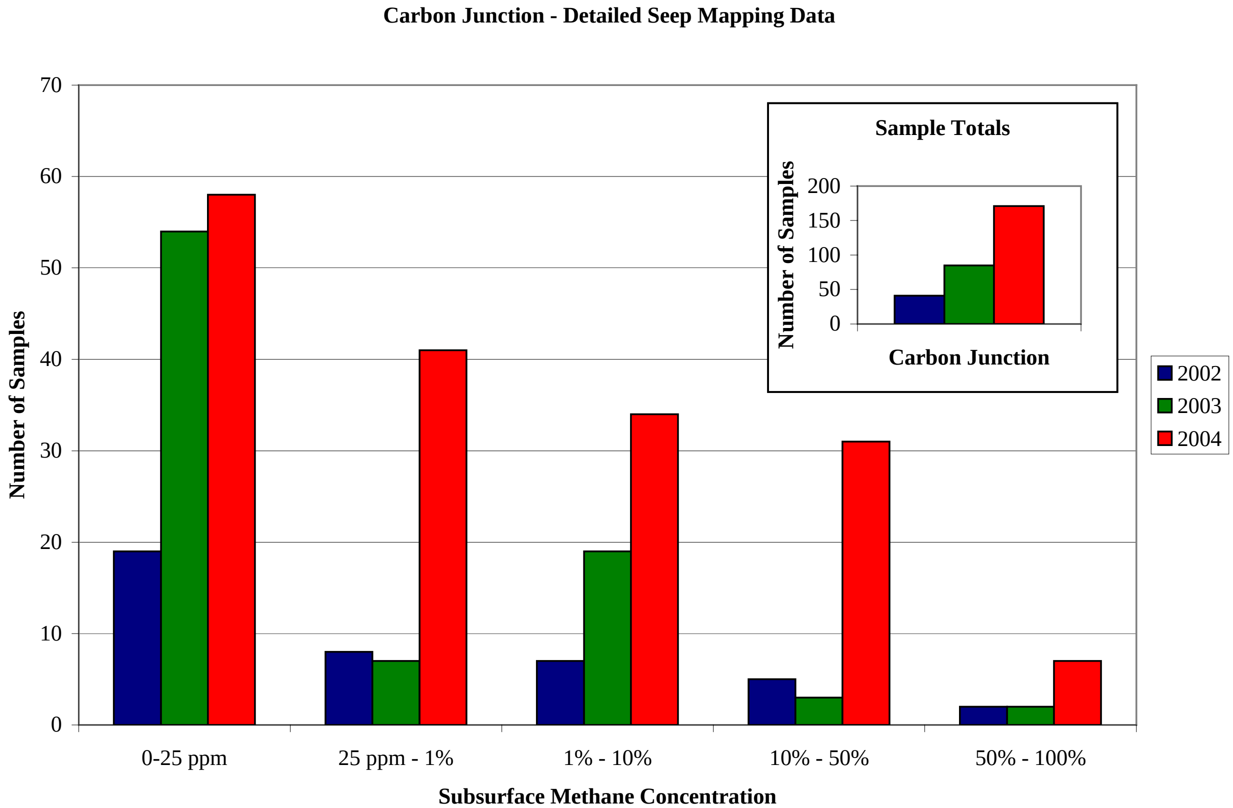
The other upland areas east of Highway 3 contain large areas of stressed/dead and non-vegetation areas, many dead trees, and very high concentrations of methane in the subsurface. The maximum methane concentration reported in this area was 940,000 ppm (94%). This area is a known active seep area and also contains two permanent monitoring probe lines (CJ-5, Figure 7).

Seep Areas at Text Reference CJ-5, View east.

4.2.4 Comparison to Previous Surveys

More subsurface methane measurements were made in 2004 than were made during the previous two years. This is primarily due to the number of new features, particularly dead trees, identified in the study area. In areas where measurements from 2003 were in close proximity to 2004 measurements, concentrations were generally reported to be higher in 2004 than previously detected. The data indicates that more subsurface measurements were present across all concentration categories. The chart below summarizes the concentration distribution of the subsurface methane measurements at Carbon Junction. Figure 8 illustrates the historic data comparison of subsurface methane measurements at Carbon Junction.

When comparing the number and extent of stressed/dead vegetation areas and stressed/dead trees, data suggest that impacts to vegetation have increased from the previous year, particularly along the west and east banks of the Animas River. Figure 9 illustrates the historic data comparison of stressed/dead vegetation at Carbon Junction.



Mapping of visible seeps in surface water appears to be related to stream flow conditions. In 2002, there were significantly more visible seeps mapped within the Animas River in comparison to the number of seeps identified in 2003 and 2004. Water levels in the Animas River were at historic lows in 2002. Moreover, 2002 mapping was performed in late fall whereas 2004 mapping was performed during spring runoff conditions. The seeps identified during each of the mapping events are located along known seep trends. Figure 10 illustrates the historic data comparison of visible methane seeps in the Animas River at Carbon Junction.

4.3 FLORIDA RIVER

The Florida River mapping area is approximately 0.67 miles in the east-west direction by 0.25 miles in the north-south direction from where the river transects the Kf. The mapping area also included mapping of visible seeps within the Florida River from the County Road 234 bridge crossing northward to the Florida Farmers Canal headgate. The headgate is located upstream of the Kf outcrop and stratigraphically lower in geologic section within the Lewis Formation (Kl). LTE mapped the river for methane seeps on May 25, 2004. The east and west sides of the Florida River were mapped on May 27 and May 28, 2004. Figures 11 and 12 illustrate the results of the detailed seep mapping performed at the Florida River mapping area.

4.3.1 Observed Methane Seeps in Surface Water

Numerous visible methane seeps were noted in the private pond located at Terry Palmer Ranch. The pond corresponds with the middle and upper portions of the Kf based on surface geology. Methane seeps were identified in the river north of the private pond, which stratigraphically correlates with the lower portion of the Kf based on surface geology. Methane seeps were noted for approximately 0.10 mile upstream of the private pond.

Methane seepage in the pond at Terry Palmer Ranch, View east. Note sinking flux chamber.

Water was observed in the bar ditch along the east and west sides of County Road 234. Visible seeps were mapped in the ditch for approximately 400 feet due west of the private pond (Figure 12). The seeps noted in the ditches correspond stratigraphically with the lower portion of the Kf based on surface geology. Only a few visible seeps were observed in the canal system along the west side of County Road 234.

4.3.2 Lowland Areas

Stressed/dead vegetation areas were mapped on the west, north, and east sides of the pond. Subsurface methane concentrations in the proximity of the pond were as high as 680,000 ppm (68%). Several stressed/dead vegetation areas were mapped northwest of the pond with reported subsurface methane concentrations of more than 500,000 ppm (50%) (FR-1, Figure 12). This area correlates stratigraphically with the middle Kf based on surface geology. Access issues prevented additional detailed seep mapping north of the private pond.

4.3.3 Upland Areas

Due west of the Terry Palmer Ranch private pond and canal system, numerous dead pine, dead scrub oak, stressed scrub oak, and stressed pine trees were observed in a cluster (FR-2, Figure 12). Subsurface methane measurements were collected in this area next to the stressed/dead trees and in non-vegetated areas between the trees. Concentrations of subsurface methane in this area ranged from 500 ppm to 970,000 ppm (97%) with several of the concentrations above 100,000 ppm (10%). Existing permanent monitoring probes monitored by the BLM are located in this area.

Approximately 0.15 miles southwest of location FR-2, a second cluster of dead pine trees and stressed/dead vegetation areas were observed (FR-3, Figure 11). The stressed/dead vegetation areas were located in a small open meadow bordered mostly by pine trees. Subsurface methane measurements ranged from 500 ppm to 580,000 ppm (58%). Approximately half of the measurements collected in this area were 10,000 ppm (1%) or higher.

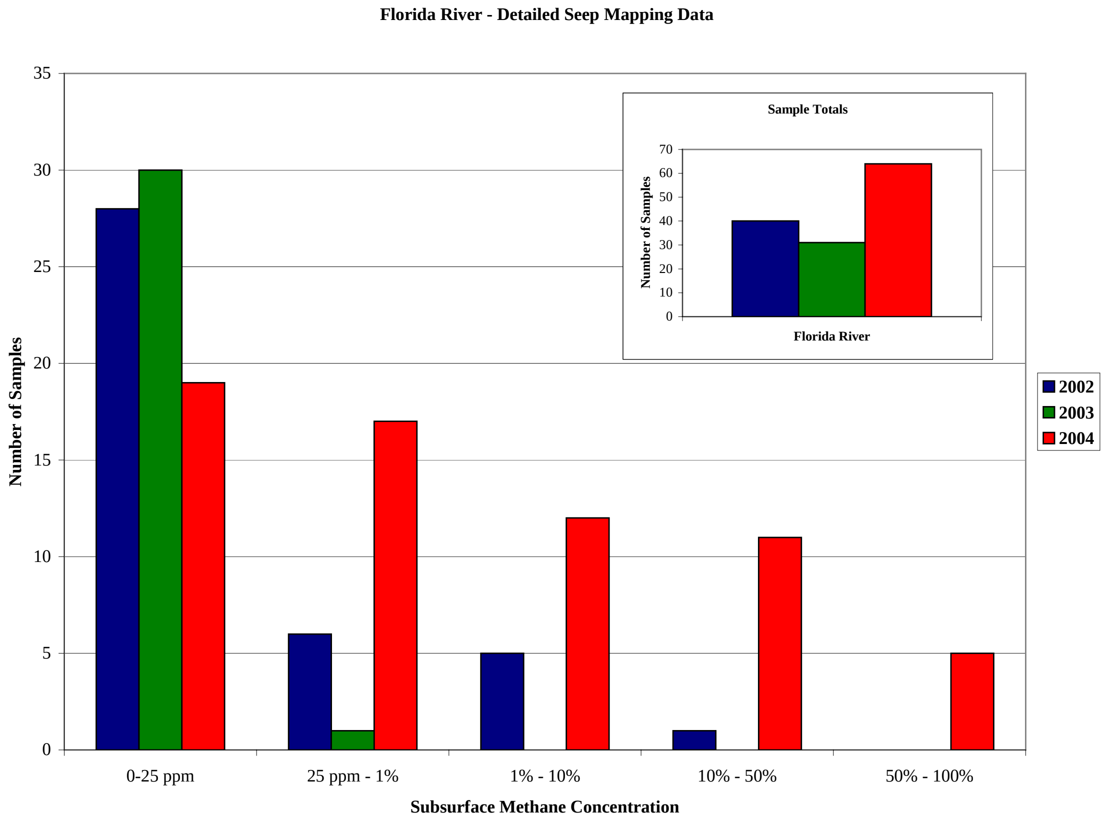
Location FR-3, view north

LTE had difficulty receiving a GPS signal during mapping activities on the east side of the Florida River. Only one stressed/dead area and four subsurface measurement locations could be mapped. In general, this area had relatively low concentrations of methane.

4.3.4 Comparison to Previous Surveys

With the exception of the east side of the Florida river, the 2004 mapping event collected more subsurface methane concentration samples than were collected in 2003. This is primarily due to the increased area of stressed/dead vegetation features located west of County Road 234 (BC-3). More features were also noted on the north side of the Palmer Ranch pond (BC-1). The methane concentration measurements reported in 2002 were slightly higher than the concentrations measured in 2003. Concentrations measured in 2004 were higher than methane concentration measurements from both the 2002 and 2003 mapping events. Figure 13 illustrates the historical data comparison of subsurface methane measurements at Florida River. The table below illustrates the distribution of the subsurface methane measurement data.

Data indicates that more stressed/dead vegetation areas were mapped in 2004 than in previous years. In general, those areas consistently noted between 2003 and 2004 mapping events report slightly larger areal coverage in 2004. In addition, the areas west of Florida River indicate



additional tree mortality since the last mapping event. Figure 14 illustrates the historical data comparison of stressed/dead vegetation at Florida River.

Due to the extremely wet conditions observed during the 2004 mapping event, significantly more methane seeps were noted in surface water bodies than were noted in previous years. The number of seeps observed directly in the Florida River was lower than the number identified in previous years. This is due to the high spring runoff levels within the river during the 2004 mapping as compared to levels during the 2002 and 2003 mapping events. Figure 15 illustrates the historical data comparison of visible methane seeps at Florida River.

4.4 SOUTH FORK TEXAS CREEK

The Texas Creek mapping area is located where the south fork of Texas Creek transects the Kf. A large alluvial grass covered valley parallels the strike of the outcrop and eventually transects the contact between the Kf and Kpc. The detailed mapping area was approximately one mile in the east to west direction and 0.2 miles in the north to south direction. The most recent detailed seep mapping at the Texas Creek area occurred on May 25 and 27, 2004. The field data are illustrated on Figures 16 through 18.

4.4.1 Observed Methane Seeps in Surface Water

The water level within the South Fork of Texas Creek was relatively high but not turbulent during the time of field activities which made methane seeps within the creek more visible. Numerous methane seeps were noted in the creek surrounding the gas flux chamber for approximately 200 feet north and south of the flux chamber (TC-1, Figure 17). Approximately 0.34 miles west of the main seep area a visible seep area (approximately 100 feet by 200 feet) was observed where the creek had flooded the meadow (TC-2, Figure 16).

Location TC-1, view east

4.4.2 Lowland Areas

Non-vegetated and stressed/dead vegetated patches were mapped throughout the valley floor of the Texas Creek study area. The patches of stressed/dead vegetation form linear trends in the east-southeast direction, paralleling the strike of the Kf.

The largest stressed/dead vegetation areas were noted in the center of the mapping area where the creek transects the Kf and Kpc contact (TC-1, Figure 17). Subsurface methane concentrations ranged from 500 ppm to 1,000,000 ppm (100%) in the stressed/dead vegetation areas in the northeast portion of the study area surrounding the gas flux chambers. The majority of the measurements were 100,000 ppm (10%) or greater.

Non-vegetated, stressed/dead vegetated areas, dead scrub oak, and two dead pine trees were mapped where the valley floor extends south (TC-3, Figure 17). These features correlate to the middle or upper portion of the Kf based on surface geology. Subsurface methane concentrations ranged from 20,000 ppm (2%) to 940,000 ppm (94%). Nine of the 15 measurements recorded in this area were 100,000 ppm (10%) or greater. These measurements are aligned in a predominantly southeast-northwest trend line parallel to the strike of the formation.

An active seep area was noted on the western end of the mapping area (TC-4, Figure 16). Several non-vegetated and stressed/dead vegetated areas were noted in a line and most were associated with very high methane concentrations. Subsurface methane concentrations in this area ranged from of 4,000 ppm to 850,000 ppm (85%). Seven of the nine measurements recorded in this area were 100,000 ppm (10%) or greater.

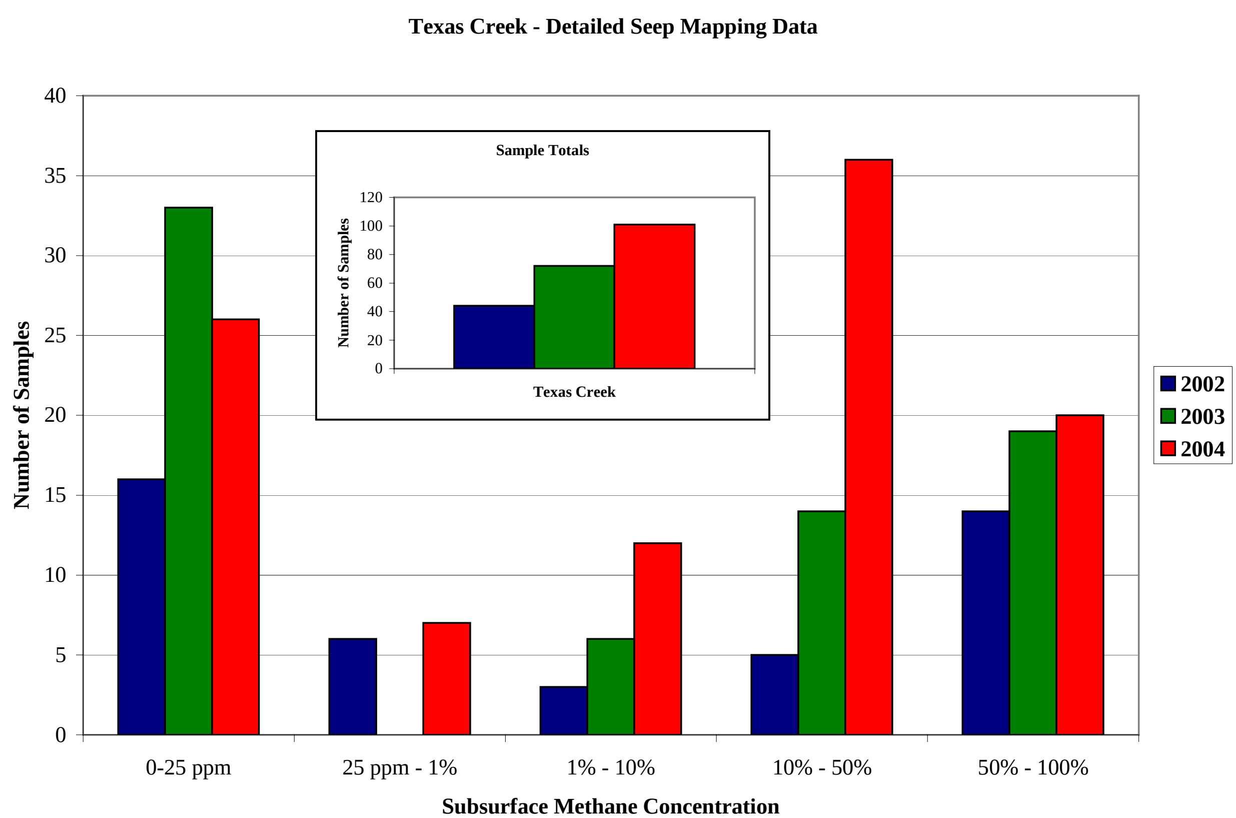
4.4.3 Upland Areas

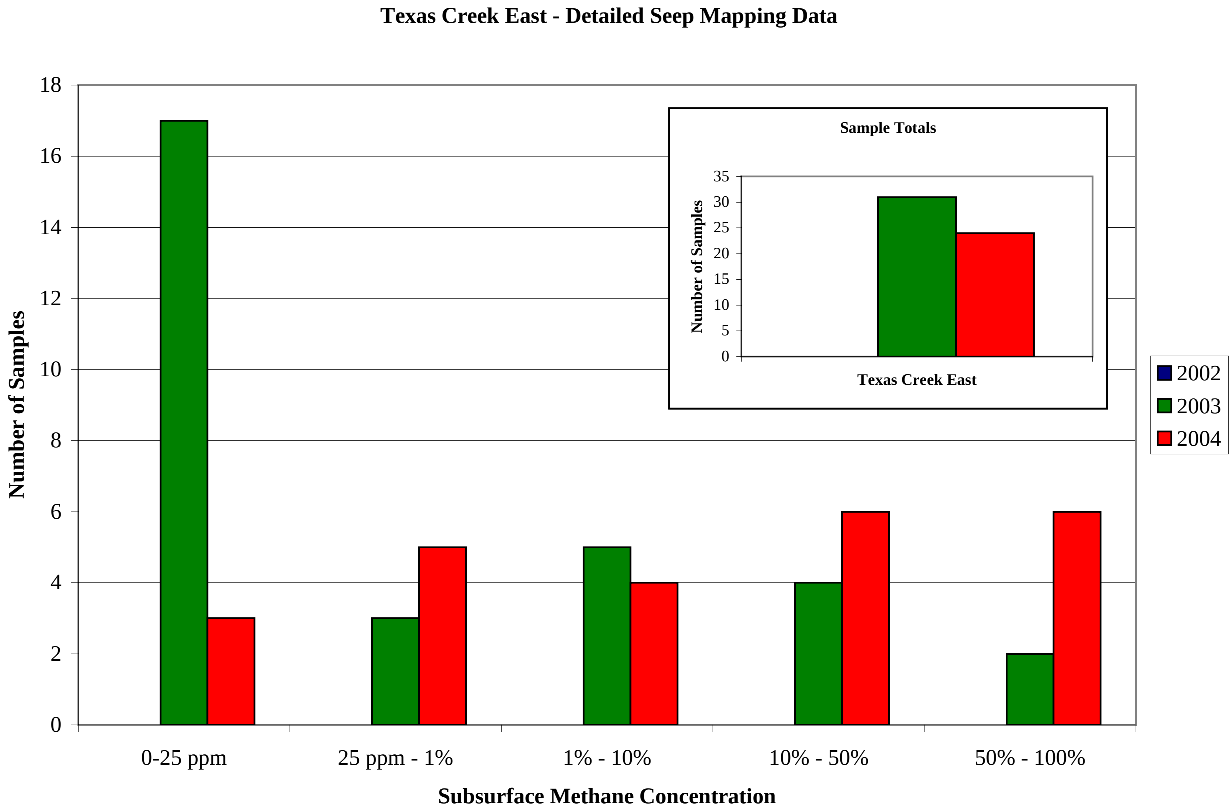
Access issues prevented mapping of upland areas during the 2004 detailed seep mapping event. The area immediately east of the main seep area has had high concentrations of methane detected in the past. Methane is also suspected to be present immediately west of the main seep area in the upland area on the north side of County Road 502, but has yet to be investigated.

An upland area, now referred to as Texas Creek East was also included in the 2004 detailed mapping program (Figure 18). This area was identified as a seep area during the IR imagery regional reconnaissance activities. Results of the most recent mapping report the presence of more than four relatively large stressed/dead vegetation areas, all containing elevated concentrations of methane in the subsurface soil. The methane concentrations ranged from 1,500 ppm to 320,000 ppm (32%). Approximately one half of the measurements recorded in this area were 100,000 ppm (10%) or greater.

4.4.4 Comparison to Previous Surveys

The number of subsurface measurement locations collected in 2004 is greater than the previous two years. This is primarily due to the higher number of mappable features, particularly stressed/dead vegetation areas, as compared to previous mapping events. A year by year comparison between points in close proximity to each other shows frequent occurrences of increasing concentrations. In addition, the area on the west end of the mapping area has shown an increase in the number of features mapped and the concentrations reported since 2002. Similar trends are noted in the area due south of the main seep area and the seep area at Texas





Creek East. Figures 19 and 20 illustrate the historical data comparison of subsurface methane measurements at Texas Creek. Charts illustrating the distribution of historical mapping data at Texas Creek and Texas Creek East are presented below.

When comparing stressed/dead vegetation areas over time, most known seep areas have remained relatively unchanged. There are several cases where stressed/dead vegetation areas noted in 2002 and 2003 were not noted in 2004. In addition, there are several stressed/dead area features noted southwest of the main seep area that were noted in 2004 but not during prior mapping events. The stressed/dead vegetation areas mapped on the west end of the study area have appeared to increase in extent since the 2003 mapping event even though the total number of samples collected during each event decreased. Figures 21 and 22 illustrate the historical data comparison for stressed/dead vegetation at Texas Creek.

LTE noted similar trends between 2003 and 2004 when mapping visible seeps along Texas Creek. In 2002, only four visible seeps were mapped within the creek, primarily because the creek was dry at the time of the mapping event. Figure 23 illustrates the historical data comparison for visible methane seeps.

4.5 HOIER PROPERTY

The Hoier Property was added to the detailed seep mapping program following the completion of the IR imagery regional reconnaissance mapping program. The Hoier Property is an upland area west of Pine River. According to the Hoiers, they have experienced increased areas of dead

Dead vegetation on Hoier property, view north.

vegetation over the past several years and have also complained about methane in one of their water supply wells, which is completed in the Kf. The field data from the 2004 detailed mapping event are illustrated on Figure 24.

4.5.1 Observed Methane Seeps in Surface Water

There is only one surface water body in the Hoier mapping area. A small pond is located approximately 500 feet east of the residence. No visible seeps were noted within the pond.

4.5.2 Lowland Areas

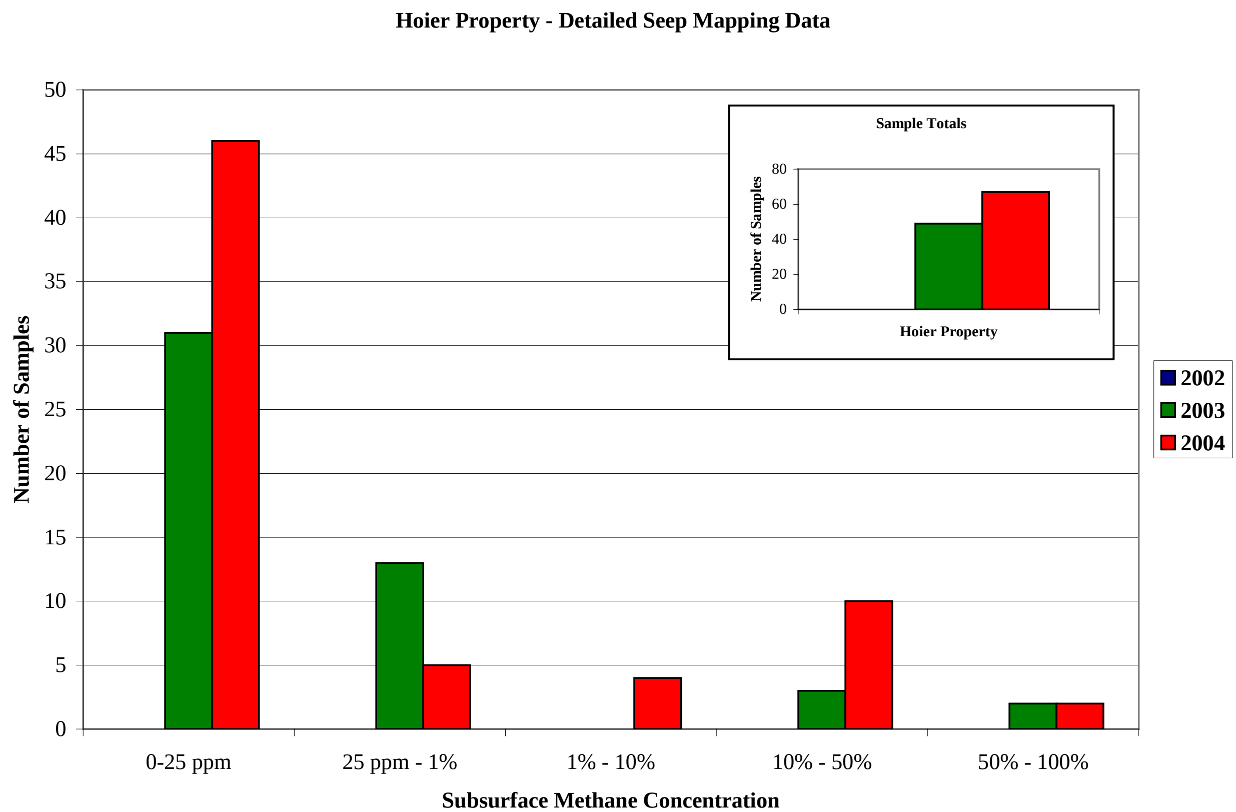
Relative to the topography of the other mapping areas included in this project, there are no lowland areas on the Hoier Property.

4.5.3 Upland Areas

Several stressed/dead vegetated and non vegetated areas were mapped in the area north of the pond on the Hoier property. Methane concentrations in this area ranged from 500 ppm to 660,000 ppm (66%). The majority of these measurements were 100,000 ppm (10%) or greater. A small area of stressed/dead vegetation was observed on the eastern end of the mapping area. The maximum methane concentration reported in this area was 175,000 ppm (17.5%) Five stressed/dead vegetation areas were mapped near the eastern side of the Hoier house. No methane was detected in these areas.

4.5.4 Comparison to Previous Surveys

Methane concentrations collected from 2003 and 2004 appear relatively unchanged. A slight increase in concentration was noted on the east end of the mapping area and a slight decrease in concentration was noted north of the residence nearest the water supply well. More features were mapped in 2004 than in 2003 but no new seep areas were noted. The increase in areal extent of dead vegetation and the re-inspection of the area east of the residence accounts for the higher number of subsurface methane measurements collected. Figure 25 illustrates the historic

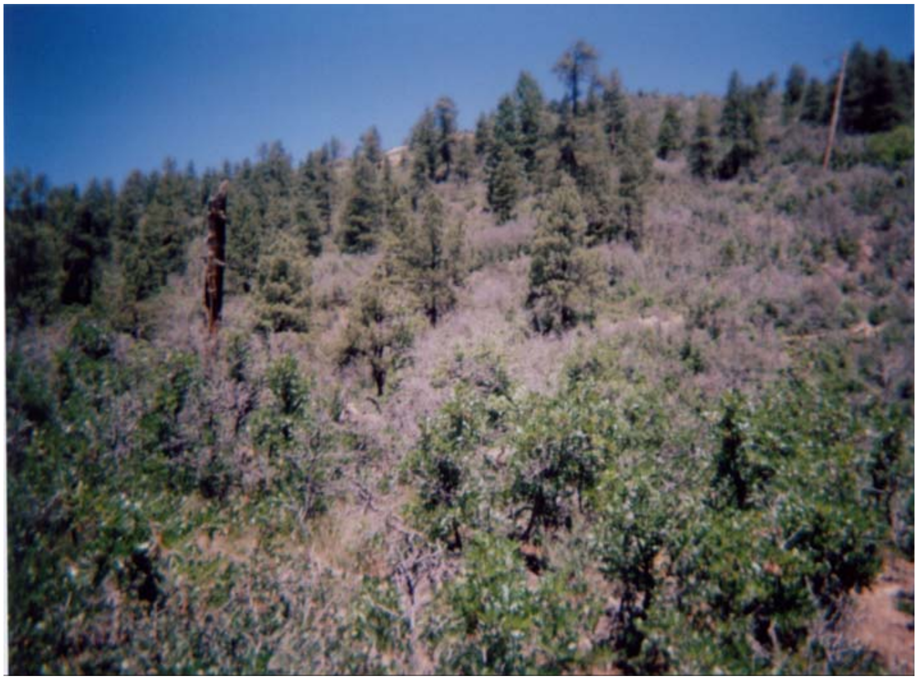


data comparison for the subsurface methane measurements. The chart below illustrates the distribution of the concentrations for the samples.

More stressed/dead vegetation features were mapped during the 2004 mapping event as compared to the 2003 mapping event. LTE noted more and larger stressed/dead vegetation around the most active seep area on the Hoier Property but, as previously mentioned, the concentrations measured remained relatively unchanged. Figure 26 illustrates the historic data comparison for the stressed/dead vegetation areas at the Hoier Property.

4.6 BEAVER CREEK RANCH

An additional mapping event was performed at the Beaver Creek Ranch (BCR) on May 28, 2004 at the request of Debbie Baldwin of the COGCC. BCR is located approximately 20 miles east of Durango on the northern side of Hwy 160. This area is in close proximity to the East Pine study area. The COGCC had requested the mapping of the area because of an existing COGCC monitoring wells (MW35-6-17-1 and MW35-6-17-2) located down-dip of the BCR mapping area. Monitoring well MW35-6-17-2 has consistently recorded high gas pressures at the well head.



Stressed Vegetation at Beaver Creek Ranch, view north.

Gas measurements were taken at several areas on the Kf within BCR, up-dip of the monitoring well. LTE personnel observed several areas of stressed/dead vegetation, but no methane was observed in any of the areas from which gas measurements were taken (BCR-1, Figure 27). Stressed vegetation noted in the photograph above is likely natural "die-back" of scrub oak due to drought conditions experienced in the area over the past several years. The field data from the 2004 detailed mapping of BCR are illustrated on Figure 27.

4.7 DETAILED MAPPING SUMMARY

The 2004 Detailed Mapping event was performed during the period from May 24, 2004 through May 29, 2004. An additional mapping event was performed on the Hoier Property on August 19, 2004 at the request of Debbie Baldwin, COGCC, in response to a recent complaint by Mrs. Hoier citing a new stressed/dead vegetation area in close proximity to the house.

Since this mapping event was performed in the early Spring, vegetation was in full bloom and the general landscape appeared much greener and wetter than in years past. Water levels in surface water bodies were noted to be at high levels. This facilitated the identification of gas seeps in water bodies that are usually dry at the end of the Summer. However, the high water also made it difficult to observe seeps in some of the fast moving waters of the Animas River and to some extent the Florida River.

In Basin Creek, construction activities limited access to large portions of the previous mapped area. Data collected during this mapping event noted the presence of methane seeps in areas consistent with previous mapping events.

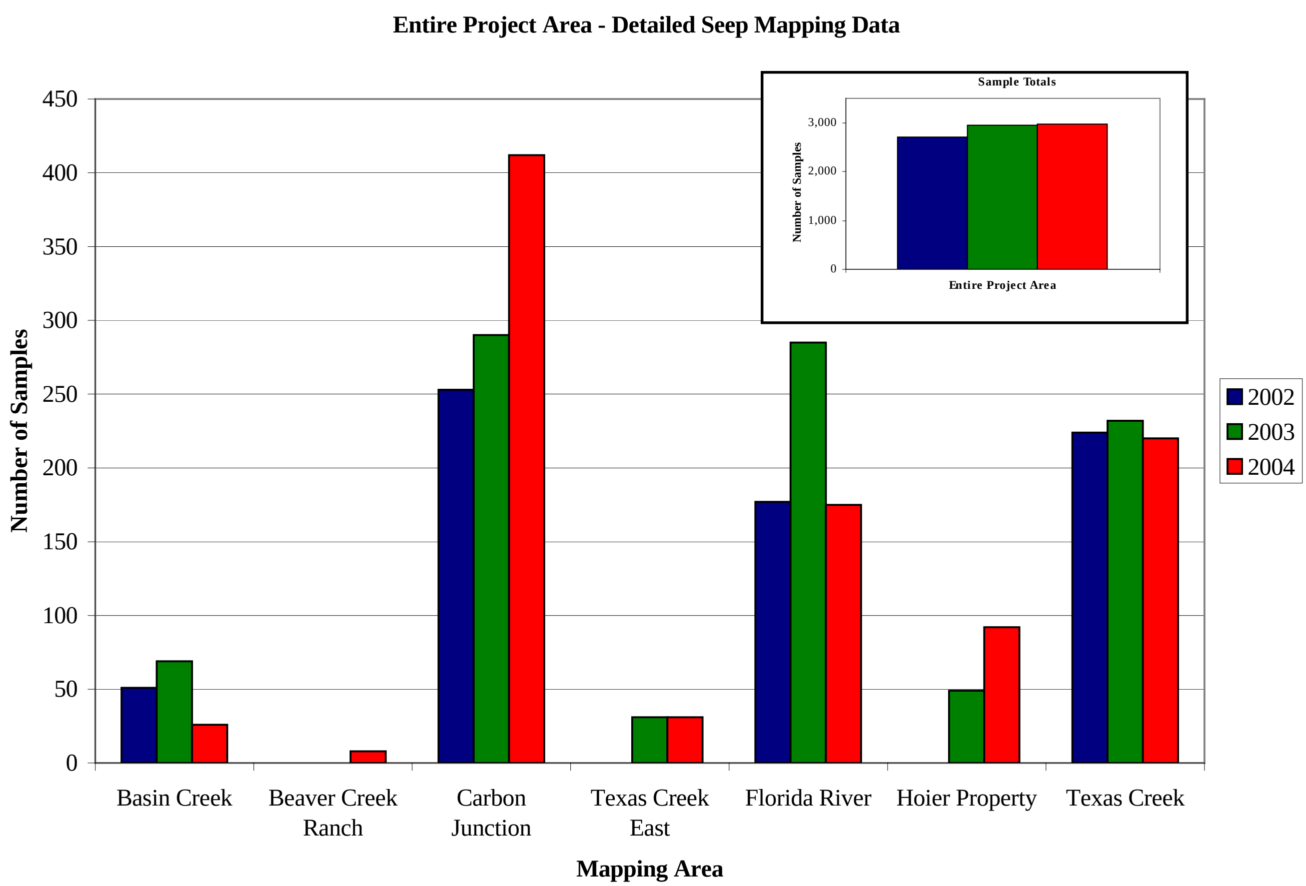
At Carbon Junction, LTE collected more measurements during the 2004 mapping event as compared to previous years. Mapping results noted the presence of additional dead trees, particularly along the creek banks.

At Florida River, data suggests that many of the stressed/dead vegetation areas mapped in 2003 appear larger in 2004. Methane concentrations in the subsurface measured in 2004 appear to be higher than concentrations measured in 2003, where comparable data exists.

At Texas Creek, several of the stressed/dead vegetation areas noted in 2003 appear larger in 2004, particularly along the western end of the mapping area. No significant change in extent was noted within the main active seep area. A new area of stressed/dead vegetation was noted in the southern portion of the mapping area between the main seep and the COGCC monitoring wells (MW35-7-8-1 and MW35-7-8-2). Methane was detected in the subsurface in this location. The seep area east of Texas Creek identified in the 2003 mapping event also appears to have increased in concentration value and areal extent based on the 2004 data.

Data collected from the Hoier Property indicates an increase in the number and size of stressed/dead vegetation areas since the 2003 mapping event. The area of recent complaint (immediately east of the residence) has several large areas of stressed/dead vegetation. LTE did not detect methane in any of the 20 subsurface methane locations measured in this area on August 19, 2004. The concentrations measured in the most active seep area (northeast of the residence) are within the same magnitude as the 2003 mapping event even though there were more measurement points collected during the 2004 mapping event.

At Beaver Creek Ranch, several areas of stressed/dead vegetation were noted, but no methane was detected from any of the gas readings collected.



The total number of features mapped (including visible seeps, trees, vegetation areas, and subsurface methane measurements) over the entire project area is consistent with the number of features mapped during the two previous mapping events (see chart above). On a site by site basis, the largest differences in the number of features mapped were noted at Carbon Junction and Florida River. Carbon Junction had many new dead trees noted in 2004, whereas Florida River had many new dead trees noted in 2003.

SECTION 5.0

BLM PERMANENT MONITORING PROBES

5.1 BACKGROUND INFORMATION

The BLM has been collecting subsurface methane concentrations from 180 permanent monitoring probes located along 12 transects running perpendicular to the Kf outcrop. Data collection began in September 1997, and measurements have been collected approximately every other month. The most recent data available to LTE at the time of this report was collected in September of 2003. The first and last dates contained in the dataset for each transect are shown on Table 1.

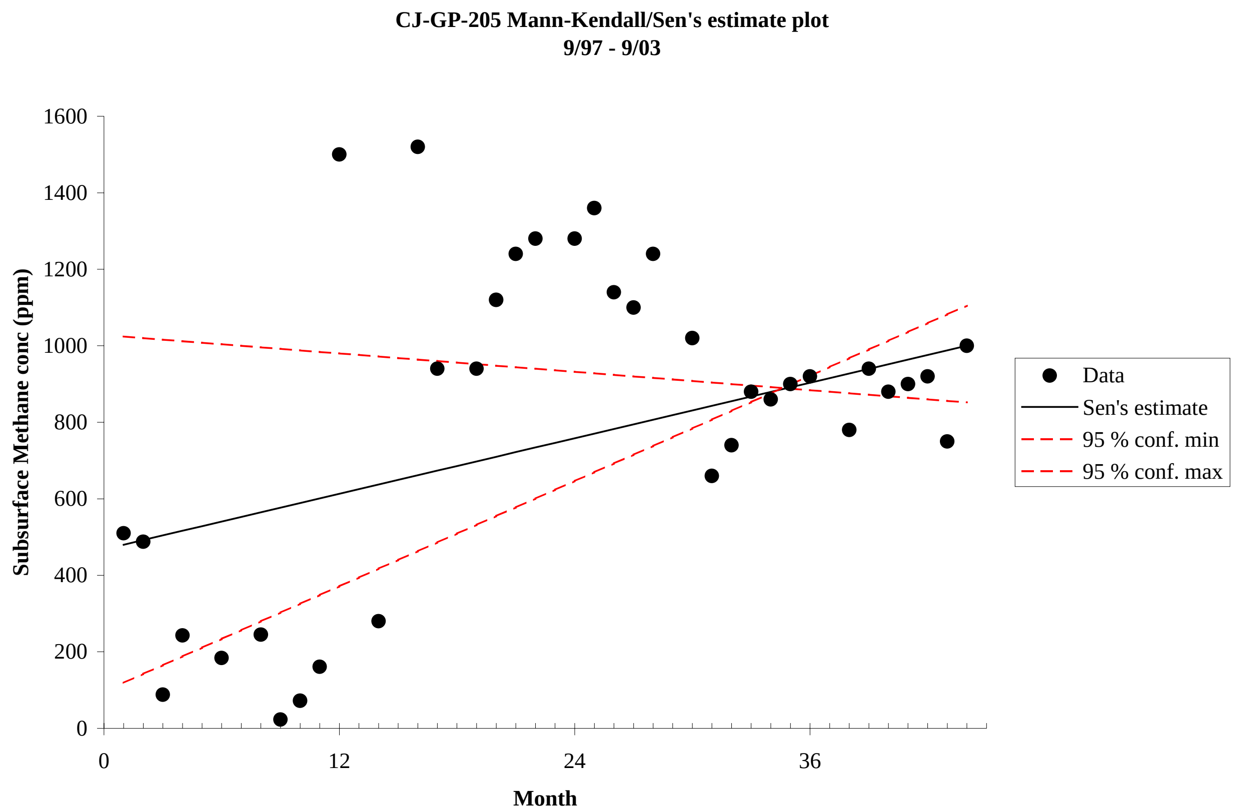
In April 2001, the BLM evaluated trends in the permanent monitoring probe data, using the Mann-Kendall and Sen non-parametric trend tests as stated in the BLM North San Juan Basin White Paper, December 1999 (http://oil-gas.state.co.us/Library/sanjuanbasin/blm_sjb.htm). At that time approximately 20 readings had been collected from each probe during the period from September 1997 through April 2001. The BLM calculated upward trends, significant at the 95% confidence level, at 39 of the 164 permanent monitoring probe locations existing in April 2001. Of these 39 locations with apparently significant upward trends, 15 were considered invalid due to measurement method modifications. A different field instrument was used to measure methane concentration prior to October 1998. The original instrument only measured concentrations as high as 110,000 ppm. At these 15 locations, readings up to October 1998 were in the 110,000 ppm range, therefore the true concentrations may have been higher, and no reliable trend could be calculated. The BLM accepted the remaining 24 locations with significantly upward trends.

5.2 STATISTICAL METHOD

LTE's analysis was performed using the Mann-Kendall test and Sen's Slope Estimates for detecting trends in time series data, the same tests used during the BLM's statistical analysis. For this study we used the Excel® template application MAKESENS. This template is documented in Publications on Air Quality, No. 31, Finnish Meteorological Institute, 2002, by Salmi, Maatta, Anttila, Ruoho-Airola, and Amnell. The template and the documentation were downloaded from the web at http://www.fmi.fi/organization/contacts_25.html. For this study, we tested the hypothesis that the data would demonstrate a monotonic trend (data consistently increases or decreases but does not oscillate in relative value) without considering any type of cyclical (seasonal) fluctuations. While there may be seasonal variations, the data does not conclusively show this, and the method used assumes a monotonic trend.

5.3 REEVALUATION OF EARLY STATISTICAL RESULTS

LTE first attempted to duplicate the results obtained in the early analysis, using the data collected between September 1997 and April 2001. We obtained similar results, with 29 locations with upward trends significant at the 95% level, and 7 locations with a downward trend significant at the 95% level. We did not attempt to calculate trends at locations where the maximum reading was 1,500 ppm (3% of the Lower Explosive Limit [LEL]) or less, or where more than 90% of the values were zeroes. We did find that some of the trends accepted by the BLM also reflect bias from the change in the instrument when a dramatic change was noted in the concentrations measured before and after October 1998. Essentially, when using data collected with the meter that was not capable of measuring high concentrations of methane, the trend analysis can result in an upward trend. The trend can be reversed when the data collected by the meter is omitted from the statistical analysis. This was particularly true at the Carbon Junction 200 series (CJ-GP-205 and CJ-GP-209). The chart below and on the next page for CJ-GP-205 shows an upward trend with the pre-October 1998 data and a decreasing trend without the pre-October 1998 data.

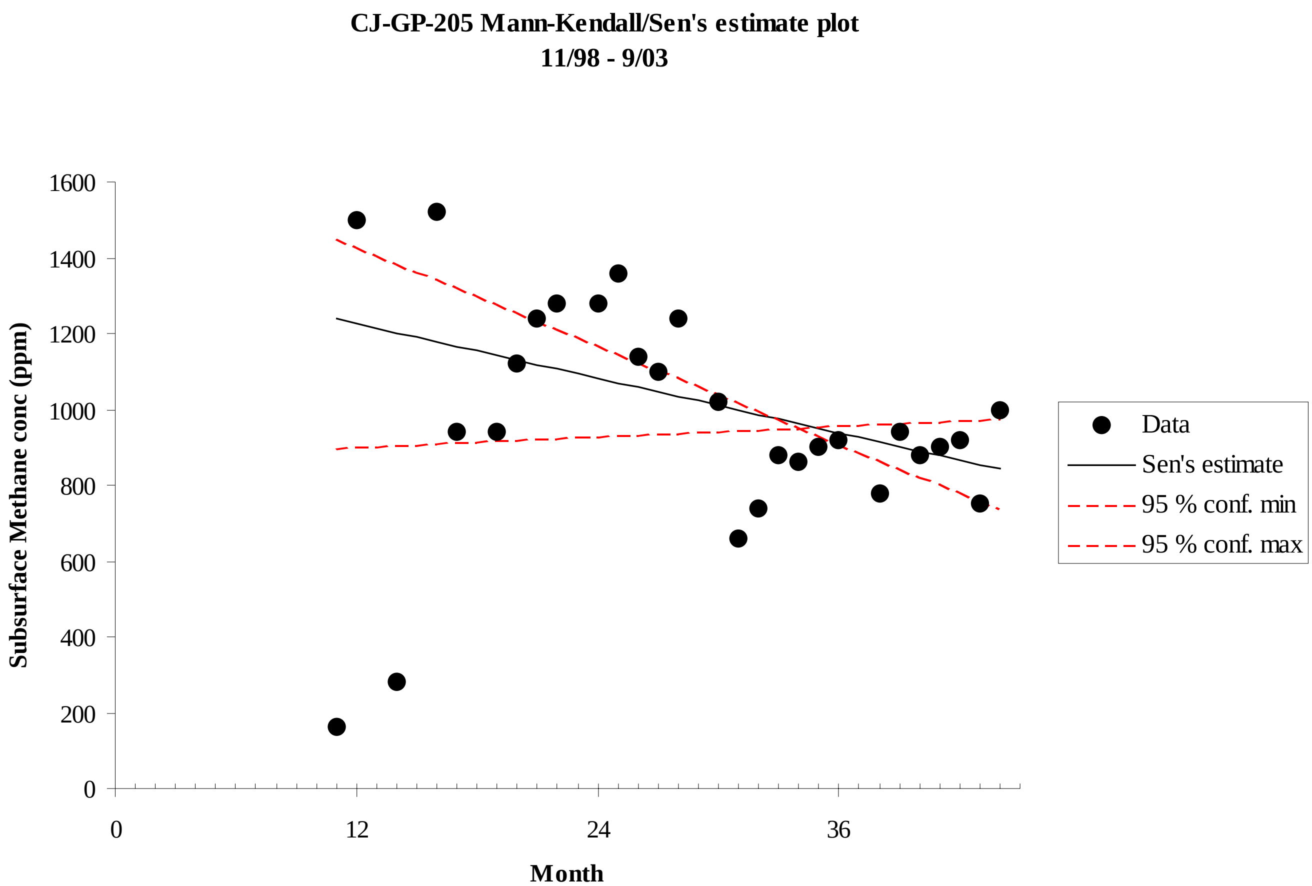


5.4 2004 STATISTICAL EVALUATION

At this time 27 to 37 measurements were available at each location, including the early data collected with the field meter that could not measure high concentrations. LTE repeated the statistical analysis using only data collected from November 1998 through September 2003 (approximately 30 data points in each series). Results indicated that both upward and downward trends were present and appeared to be clustered by transect.

Table 1 lists the number of locations at each transect, the number of locations where trends could be calculated, the number of data points available at each location, and the number of locations where significant upward or downward trends were calculated. The level of significance tested was 95 % on a two-tailed test. For a trend statistic indicating a 95% level of significance, there is a 95% chance that the estimated trend is indicative of a real trend in the data, and not an artifact of random scatter in the data.

At most of the transects, the results from this analysis were similar to those obtained in the earlier study. An exception to this was found at both of the Carbon Junction transects, where the upward trends found by the earlier study appear to be an artifact of the switch to the different instrument in November 1998. The chart below shows the downward trend calculated at the CJ-



GP-205 probe from Carbon Junction when the data prior to November 1998 is omitted. When the data series from November 1998 through September 2003 is analyzed, all of the locations in these two transects with significant trends are in fact showing downward trends.

This study reported upward trends at several probe locations at the Basin Creek, Florida River, Pine River, and both Texas Creek transects. Some downward trends were also noted at the Basin Creek transect, both Carbon Junction transects, and the Texas Creek East transects. Statistics by transect are summarized on Table 1.

Table 2 summarizes statistics at each individual location. Of the 180 locations, slightly over half have maximum readings of 1,500 ppm (3% LEL) or less, with zero concentrations for approximately 90% of the readings. No trend statistics could be calculated at these locations.

This 2004 statistical analysis does suggest that statistically significant trends of increasing concentration have been observed at some locations. Other locations show significant downward trends, and approximately half the locations show zero concentrations all or most of the time.

5.5 BLM PERMANENT MONITORING PROBE SUMMARY

LTE's re-evaluation of the BLM's statistical analysis is relatively consistent with their results with only a few exceptions. For example, LTE found it is invalid to incorporate data collected prior to November 1998 at Carbon Junction into the analysis because the field meter used at that time was not capable of detecting the existing elevated methane concentrations at many of the Carbon Junction probes. In addition, the BLM evaluation did not summarize the results completely and only reported those probes with increasing trends and seemed to discard the seven probes with downward trends and the fact that more than half of the probes do not report any trend because methane is rarely, if ever, detected in those probes.

The most recent evaluation determined that of the 180 probes, 81 probes had measurable trends with the remaining 99 probes rarely reporting detectable methane, if ever. Of the 81 probes with measurable trends, only 32 probes exhibited a trend at the 95% confidence level. Upward trends at the 95% confidence level were noted at 21 probes and 11 probes exhibited downward trends at the 95% confidence level.

SECTION 6.0

CONCLUSIONS AND RECOMMENDATIONS

6.1 GAS FLUX CHAMBERS

Gas flux chambers have shown sporadic flow but no discernable increasing or decreasing trend has been noted. LTE recommends that monitoring of the flux chamber system continue as planned. During the next monitoring period, LTE will evaluate the viability of using a statistical method to determine a trend in the gas flux data. Results of the statistical analysis will be presented in the 2005 monitoring report.

6.2 DETAILED SEEP MAPPING

Since this mapping event was performed in the early Spring, LTE found it much easier to identify dead and stressed vegetation as compared to previous mapping events. Vegetation was in full bloom and the general landscape appeared much greener and wetter than in years past. Water levels in surface water bodies were noted to be at high levels. This facilitated the identification of gas seeps in water bodies that are usually dry at the end of the summer. However, the high water also made it difficult to observe seeps in some of the fast moving waters of the Animas River and Florida River.

LTE noted that, for the most part, features mapped in previous years were being mapped consistently during this mapping event, particularly in the Texas Creek mapping area. However, LTE has recognized that, given the large project area and large number of potentially mappable features, there is the potential for maps to lack consistency from year to year. For example, it is possible for features mapped in 2003 to inadvertently be missed in 2004 and vice versa. This bias would probably be most noted on smaller features such as trees or very small stressed/dead vegetation areas. LTE has a strong degree of confidence that comparisons from year to year of large features accurately reflect field conditions. For example, if a large feature was mapped in 2003 and the same feature plus an additional large feature close by were mapped in 2004, it is reasonable to assume that the new feature did not exist during the 2003 mapping event.

In comparing the detailed mapping data from 2002 through 2004, LTE noted both increases and decreases in subsurface methane concentrations and extent of methane gas seeps. However, the general comparisons across the project area appear to show increases in methane concentration and/or seep extent more frequently than decreases. It is evident that the sample population for a given mapping event affects the general appearance of trends. It is important to only compare data in close proximity when evaluating trends. LTE's detailed mapping program focuses on vegetative features and other indicators of active seeps. Therefore, by practice, there is some validity to the fact that an increase in the number of features mapped suggests an increase in areal extent of methane seepage. However, the sample populations collected during detailed seep mapping events are not considered a random sample population and therefore have the potential to bias the interpretation of the results.

LTE believes that the methodology used for the detailed seep mapping program and the regional reconnaissance mapping program (regional mapping was not performed during 2004) are adequate tools to allow end-users to make land-use decisions in areas affected and/or potentially affected by methane seepage. The monitoring program is effective at identifying new seep areas and for monitoring changes over time at existing seep areas.

LTE recommends that the detailed seep mapping be performed in May 2005, approximately the same time the IR imagery is being collected.

6.3 BLM MONITORING PROBES

The most recent statistical evaluation of the permanent monitoring probe data determined that of the 180 probes, only 81 probes had measurable trends with the remaining 99 probes rarely reporting detectable methane, if ever. Of the 81 probes with measurable trends, only 32 probes exhibited a trend at the 95% confidence level. Upward trends at the 95% confidence level were noted at 21 probes and 11 probes exhibited downward trends at the 95% confidence level.

LTE recommends continued monitoring of the permanent monitoring probes. LTE will continue to maintain the data from the probe monitoring program as delivered by the BLM and statistically evaluate the data on a periodic basis.

6.4 REGIONAL RECONNAISSANCE

Regional reconnaissance was not performed in 2004 as part of the outcrop monitoring program. LTE recommends conducting an updated IR aerial survey, suspect area identification, and field verification event in 2005. LTE has tentatively scheduled these activities with the aerial flight to be performed in late May 2005 with subsequent suspect area identification and field verification in July 2005 and will be coordinated with regional reconnaissance efforts in Archuleta County.

The scope of work will include comparing the number and size of previous suspect areas from 2002 with the suspect areas identified in 2005. LTE will re-visit suspect areas that were shown to contain methane from the 2002 flight in addition to new areas identified in the 2005 imagery. LTE will not revisit stressed/dead vegetation areas that were found to contain insect infestations and were also absent of methane. The regional reconnaissance is a very useful method to monitor the upland areas along the outcrop and allows large scale monitoring of the entire outcrop to assist end-users in making land-use decisions.

6.5 NATURAL SPRING SURVEY

Over the past few years, the COGCC and Industry have received complaints about depleted water supply wells and natural springs. Often, it is difficult to determine exactly when a particular natural spring actually dried up and/or what may have caused it to dry up. Establishing the condition of nearby water supply wells is often performed as part of the production well permitting process including laboratory analysis of the water supply but an inventory of natural springs is often limited to sparse data on a USGS topographic map. LTE recommends the implementation of a reconnaissance effort to identify and survey natural springs along the Kf outcrop. This task could easily be added to the regional reconnaissance tasks and also help keep costs down since field crews will already be in the areas along the outcrop. The purpose of this survey would be to identify potential discharge points for use in reservoir modeling, but also to establish and maintain a record of active springs and historic dry springs such that future complaints of depleted springs by land owners will be able to be cross-referenced against the survey. The survey should include consultation with all available land owners; review of available USGS maps, and interviews with the resource managers from the BLM and USFS.

TABLES

TABLE 1

STATISTICAL ANALYSIS SUMMARY
FRUITLAND OUTCROP PERMANENT PROBE MONITORING DATA
LA PLATA COUNTY, COLORADO

THE GROUP

						Significant trends at 95% level				Significant trends at 90% level or below			
Transect Name	No. of Probes	No. of Trends	First Data	Last Data	Total No. of Sampling Events	Up 9/97-4/01	Down 9/97-4/01	Up 11/98-9/03	Down 11/98-9/03	Up 9/97-4/01	Down 9/97-4/01	Up 11/98-9/03	Down 11/98-9/03
Basin Creek	16	10	Sep-97	Nov-02	32	3	1	3	1	5	1	3	3
Beaver Meadows	9	0	Nov-01	Sep-03	9								
Carbon Junction - East transect	15	10	Sep-97	Sep-03	37	5	1		5	2	2	3	2
Carbon Junction - West transect	15	3	Sep-97	Sep-03	37	8			3			1	2
East Pine River - West transect	15	0	Sep-97	Sep-03	34								
East Pine River - East transect	15	0	Sep-97	Sep-03	36								
Edgemont Ranch	16	1	Sep-98	Sep-03	27						1		1
Florida River	17	13	Sep-97	Sep-03	36	6		7		4	1	4	2
Pine River	13	12	Sep-97	Sep-03	34	2	2	5		4	4	4	3
Texas Creek - West transect	25	15	Sep-97	Sep-03	30	2		4		10	2	5	6
Texas Creek - East transect	21	11	Sep-97	Sep-03	31	2	3	2	2	4	2	4	3
Yellow Jacket Pass	3	0	Nov-01	Sep-03	9								
					Totals	28	7	21	11	29	13	24	22

TABLE 2

STATISTICAL ANALYSIS OF TRENDS IN PERMANENT MONITORING PROBE DATA
FRUITLAND OUTCROP PERMANENT PROBE MONITORING DATA
LA PLATA COUNTY, COLORADO

THE GROUP

						Data Series from 9/97 - 4/01				Data Series from 11/98 - 9/03			
Site ID	First Data	Last Data	No. of Measurements	Maximum Concentration (ppm)	Percent of Samples that were Zero	Z	Direction	Slope	Significance	Z2	SignZ2	Q2	Significance
Basin Creek													
BC-GP-101	Sep-97	Nov-02	31	6,500	81%	-0.68	down	0.00		0.72	up	0.00	
BC-GP-102	Sep-97	Nov-02	31	3,500	74%	0.91	up	0.00		2.92	up	0.00	^^^
BC-GP-103	Sep-97	Nov-02	32	50,000	0%	1.27	up	0.71		-0.03	down	0.00	
BC-GP-104	Sep-97	Nov-02	32	3,000	91%								
BC-GP-105	Sep-97	Nov-02	32	17,500	3%	-3.58	down	-0.60	vvvv	-3.97	down	-0.50	vvvv
BC-GP-106	Sep-97	Nov-02	32	3,000	66%	0.03	up	0.00		-0.06	down	0.00	
BC-GP-107	Sep-97	Nov-02	32	2,000	69%	1.21	up	0.00		-0.28	down	0.00	
BC-GP-108	Sep-97	Nov-02	32	500	91%								
BC-GP-109	Sep-97	Nov-02	34	500	94%								
BC-GP-110	Sep-97	Nov-02	32	2,000	28%	4.63	up	0.13	^^^^	3.35	up	0.06	^^^^
BC-GP-111	Sep-97	Nov-02	32	910,000	0%	3.04	up	11.39	^^^	1.53	up	9.23	
BC-GP-112	Sep-97	Nov-02	32	44,500	6%	3.47	up	1.00	^^^^	2.25	up	0.78	^^
BC-GP-113	Sep-97	Nov-02	32	1,000	75%	1.52	up	0.00		1.24	up	0.00	
BC-GP-114	Sep-97	Nov-02	32	0									
BC-GP-115	Sep-97	Nov-02	32	500	97%								
BC-GP-116	Sep-97	Nov-02	31	0									
Beaver Meadows													
BM-GP-101	Nov-01	Sep-03	10	500	90%								
BM-GP-102	Jan-02	Sep-03	9	500	89%								
BM-GP-103	Nov-01	Sep-03	10	0									
BM-GP-104	Nov-01	Sep-03	10	0									
BM-GP-105	Jan-02	Sep-03	9	0									
BM-GP-106	Jan-02	Sep-03	9	500	78%								
BM-GP-107	Nov-01	Sep-03	10	500	80%								
BM-GP-108	Nov-01	Sep-03	10	500	90%								
BM-GP-109	Jan-02	May-02	3	0									
Carbon Junction													
CJ-GP-101	Sep-97	Sep-03	37	130,000	11%	-1.01	down	-0.17		1.17	up	0.33	
CJ-GP-102	Sep-97	Sep-03	37	160,000	32%	-2.40	down	-1.70	vv	-3.01	down	-0.07	vvv
CJ-GP-103	Sep-97	Sep-03	37	960,000	3%	0.90	up	8.50		-0.89	down	-10.91	
CJ-GP-104	Sep-97	Sep-03	37	70,000	22%	0.71	up	0.42		-3.99	down	-1.52	vvvv
CJ-GP-105	Sep-97	Sep-03	37	6,000	92%	-0.23	down	0.00		-2.08	down	0.00	vv
CJ-GP-106	Sep-97	Sep-03	37	1,030,000	0%	2.04	up	3.24	^^	-2.17	down	-5.05	vv
CJ-GP-107	Sep-97	Sep-03	37	1,030,000	0%	2.86	up	45.00	^^^	-2.63	down	-17.53	vvv
CJ-GP-108	Sep-97	Sep-03	37	60,000	3%	2.70	up	3.00	^^^	1.03	up	0.75	
CJ-GP-109	Sep-97	Sep-03	37	670,000	0%	2.22	up	21.92	^^	-1.56	down	-6.38	

TABLE 2 (continued)

STATISTICAL ANALYSIS OF TRENDS IN PERMANENT MONITORING PROBE DATA
FRUITLAND OUTCROP MONITORING
LA PLATA COUNTY, COLORADO

THE GROUP

						Data Series from 9/97 - 4/01				Data Series from 11/98 - 9/03			
Site ID	First Data	Last Data	No. of Measurements	Maximum Concentration (ppm)	Percent of Samples that were Zero	Z	Direction	Slope	Significance	Z2	SignZ2	Q2	Significance
CJ-GP-110	Sep-97	Sep-03	35	31,000	34%	3.46	up	0.50	^^^^	0.35	up	0.05	
CJ-GP-111	Sep-97	Sep-03	37	500	97%								
CJ-GP-112	Sep-97	Sep-03	36	500	94%								
CJ-GP-209	Sep-97	Sep-03	37	460,000	0%	2.83	up	7.13	^^^	-1.23	down	-2.81	
CJ-GP-210	Sep-97	Sep-03	37	90,000	0%	2.62	up	3.22	^^^	-0.53	down	-0.45	
CJ-GP-211	Sep-97	Sep-03	37	90,000	11%	3.13	up	1.67	^^^	1.13	up	0.62	
CJ-GP-212	Sep-97	Sep-03	37	500	97%								
CJ-GP-213	Sep-97	Sep-03	37	500	92%								
CJ-GP-214	Sep-97	Sep-03	37	1,000	84%								
CJ-GP-215	Sep-97	Sep-03	37	500	97%								
East Pine													
EP-GP-101	Sep-97	Sep-03	36	500	81%								
EP-GP-102	Sep-97	Sep-03	36	500	89%								
EP-GP-103	Sep-97	Sep-03	36	500	86%								
EP-GP-104	Sep-97	Sep-03	35	500	97%								
EP-GP-105	Sep-97	Sep-03	36	500	94%								
EP-GP-106	Sep-97	Sep-03	34	500	94%								
EP-GP-107	Sep-97	Sep-03	36	0									
EP-GP-108	Sep-97	Sep-03	35	500	97%								
EP-GP-109	Sep-97	Sep-03	35	2,500	83%								
EP-GP-206	Sep-97	Sep-03	35	500	97%								
EP-GP-207	Sep-97	Sep-03	36	500	89%								
EP-GP-208	Sep-97	Sep-03	36	500	92%								
EP-GP-209	Sep-97	Sep-03	36	500	72%								
EP-GP-210	Sep-97	Sep-03	36	500	94%								
EP-GP-211	Sep-97	Sep-03	36	500	53%								
EP-GP-212	Sep-97	Sep-03	36	3,000	31%								
EP-GP-213	Sep-97	Sep-03	35	500	91%								
EP-GP-214	Sep-97	Sep-03	36	500	94%								
EP-GP-215	Sep-97	Sep-03	36	500	89%								
Edgemont Ranch													
ER-GP-101	Sep-98	Sep-03	27	1,000	74%								
ER-GP-102	Sep-98	Sep-03	29	500	79%								
ER-GP-103	Sep-98	Sep-03	29	500	97%								
ER-GP-104	Sep-98	Sep-03	27	500	96%								
ER-GP-105	Sep-98	Sep-03	29	500	97%								
ER-GP-106	Sep-98	Sep-03	29	500	93%								

TABLE 2 (continued)

STATISTICAL ANALYSIS OF TRENDS IN PERMANENT MONITORING PROBE DATA
FRUITLAND OUTCROP MONITORING
LA PLATA COUNTY, COLORADO

THE GROUP

Site ID	First Data	Last Data	No. of Measurements	Maximum Concentration (ppm)	Percent of Samples that were Zero	Data Series from 9/97 - 4/01				Data Series from 11/98 - 9/03			
						Z	Direction	Slope	Significance	Z2	SignZ2	Q2	Significance
ER-GP-107	Sep-98	Sep-03	29	140,000	55%	-0.73	down	0.00		-0.53	down	0.00	
ER-GP-108	Sep-98	Sep-03	29	2,500	79%								
ER-GP-109	Sep-98	Sep-03	26	1,000	96%								
ER-GP-109A	Nov-00	Sep-03	14	500	64%								
ER-GP-110	Sep-98	Sep-03	29	500	97%								
ER-GP-111	Sep-98	Sep-03	24	500	96%								
ER-GP-112	Sep-98	Sep-03	28	1,000	68%								
ER-GP-113	Sep-98	Sep-03	27	500	74%								
ER-GP-114	Sep-98	Sep-03	27	500	93%								
ER-GP-115	Sep-98	Sep-03	27	0									
Florida River													
FR-GP-101	Sep-97	Sep-03	36	1,500	61%								
FR-GP-102	Sep-97	Sep-03	36	500	89%								
FR-GP-103	Sep-97	Sep-03	34	1,500	85%								
FR-GP-104	Sep-97	Sep-03	35	260,000	9%	1.78	up	0.60	^	-0.61	down	-0.25	
FR-GP-104A	Sep-97	Sep-03	36	780,000	8%	3.28	up	14.59	^^^	4.20	up	33.56	^^^^
FR-GP-105	Sep-97	Sep-03	33	960,000	0%	1.98	up	31.55	^^	-0.58	down	-7.46	
FR-GP-105A	Nov-00	Sep-03	11	25,000	9%			34.00		0.00	horizontal	0.00	
FR-GP-106	Sep-97	Sep-03	34	107,500	35%	-0.27	down	0.00		3.91	up	0.43	^^^^
FR-GP-107	Sep-97	Sep-03	36	280,000	14%	0.75	up	0.13		1.81	up	0.40	^
FR-GP-108	Sep-97	Sep-03	36	580,000	14%	3.03	up	1.39	^^^	2.46	up	1.34	^^
FR-GP-109	Sep-97	Sep-03	36	30,000	28%	0.00	horizontal	0.00		3.85	up	0.40	^^^^
FR-GP-110	Sep-97	Sep-03	36	1,500	83%	0.00	horizontal	0.00		0.81	up	0.00	
FR-GP-111	Sep-97	Sep-03	36	24,000	53%	2.51	up	0.00	^^	3.31	up	0.24	^^^^
FR-GP-112	Sep-97	Sep-03	36	500	78%	1.87	up	0.00	^	0.77	up	0.00	
FR-GP-113	Sep-97	Sep-03	36	9,000	33%	3.37	up	0.06	^^^^	4.17	up	0.23	^^^^
FR-GP-114	Sep-97	Sep-03	36	1,000	69%	2.41	up	0.00	^^	0.71	up	0.00	
FR-GP-115	Sep-97	Sep-03	35	5,500	77%	1.26	up	0.00		2.25	up	0.00	^^
Pine River													
PR-GP-101	Sep-97	Sep-03	33	500	91%	-0.17	down	0.00		-0.79	down	0.00	
PR-GP-102	Sep-97	Sep-03	35	1,000	77%	0.21	up	0.00		-0.64	down	0.00	
PR-GP-103	Sep-97	Sep-03	37	39,000	46%	-0.97	down	0.00		2.69	up	0.05	^^^
PR-GP-104	Sep-97	Sep-03	34	920,000	15%	3.01	up	62.96	^^^	0.91	up	10.79	
PR-GP-105	Sep-97	Sep-03	36	400,000	0%	-2.45	down	-7.70	vv	-1.13	down	-0.80	
PR-GP-106	Sep-97	Sep-03	35	990,000	9%	-0.85	down	-5.29		2.00	up	21.33	^^
PR-GP-107	Sep-97	Sep-03	36	925,000	11%	0.94	up	1.75		2.66	up	29.29	^^^
PR-GP-108	Sep-97	Sep-03	35	5,000	66%	-2.09	down	0.00	vv	2.47	up	0.00	^^

TABLE 2 (continued)

STATISTICAL ANALYSIS OF TRENDS IN PERMANENT MONITORING PROBE DATA
FRUITLAND OUTCROP MONITORING
LA PLATA COUNTY, COLORADO

THE GROUP

						Data Series from 9/97 - 4/01				Data Series from 11/98 - 9/03			
Site ID	**First Data**	**Last Data**	**No. of Measurements**	**Maximum Concentration (ppm)**	**Percent of Samples that were Zero**	**Z**	**Direction**	**Slope**	**Significance**	**Z2**	**SignZ2**	**Q2**	**Significance**
PR-GP-109	Sep-97	Sep-03	37	170,000	51%	0.37	up	0.00		5.04	up	0.06	^^^^
PR-GP-110	Sep-97	Sep-03	35	800,000	0%	3.09	up	18.40	^^^	1.92	up	6.79	^
PR-GP-111	Sep-97	May-01	25	12,500	84%	-1.64	down	0.00		0.32	up	0.00	
PR-GP-112	Sep-97	Sep-03	36	1,500	64%								
PR-GP-113	Sep-97	Sep-03	33	17,500	39%	0.41	up	0.00		0.49	up	0.00	
Texas Creek													
TC-GP-101	Sep-97	Sep-03	36	500	97%								
TC-GP-102	Sep-97	Sep-03	35	4,000	66%	2.67	up	0.00	^^^	3.18	up	0.07	^^^
TC-GP-103	Sep-97	Sep-03	34	129,500	21%	0.89	up	0.25		0.49	up	0.26	
TC-GP-104	Sep-97	Sep-03	35	740,000	0%	0.90	up	9.00		-0.81	down	-8.17	
TC-GP-105	Sep-97	Sep-03	33	365,000	3%	2.93	up	14.31	^^^	1.57	up	5.00	
TC-GP-106	Sep-97	Sep-03	36	20,500	83%								
TC-GP-107	Sep-97	Sep-03	36	120,000	14%	0.53	up	0.10		-1.78	down	-0.63	v
TC-GP-108	Sep-97	Sep-03	34	380,000	6%	1.24	up	9.49		1.17	up	4.62	
TC-GP-109	Sep-97	Sep-03	35	26,000	40%	0.19	up	0.00		2.78	up	0.15	^^^
TC-GP-110	Sep-97	Sep-03	36	3,500	75%	0.04	up	0.00		2.08	up	0.00	^^
TC-GP-111	Sep-97	Sep-03	36	2,000	83%					1.78	up	0.00	^
TC-GP-112	Sep-97	Sep-03	32	2,500	84%	-1.93	down	0.00	v	-1.04	down	0.00	
TC-GP-112A	Nov-00	Sep-03	8	0									
TC-GP-113	Sep-97	Sep-03	35	12,000	31%	1.00	up	0.00		2.61	up	0.43	^^^
TC-GP-114	Sep-97	Sep-03	32	3,000	91%	0.48	up	0.00		-0.63	down	0.00	
TC-GP-115	Sep-97	Sep-03	33	500	97%								
TC-GP-116	Sep-97	Sep-03	35	500	83%								
TC-GP-117	Sep-97	Jul-03	17	0									
TC-GP-118	Sep-97	Sep-03	32	860,000	9%	1.44	up	5.44		-0.65	down	-0.94	
TC-GP-119	Sep-97	Sep-03	34	9,000	94%								
TC-GP-120	Sep-97	Sep-03	29	1,000	97%								
TC-GP-121	Sep-97	Sep-03	32	0									
TC-GP-122	Sep-97	Sep-03	34	0									
TC-GP-123	Sep-01	Sep-03	11	1,140,000	0%	-1.25	down	-13.33		-1.25	down	-13.33	
TC-GP-124	Sep-01	Sep-03	11	850,000	0%	1.25	up	40.00		1.25	up	40.00	
TC-GP-201	Sep-97	Sep-03	33	1,000	85%								
TC-GP-202	Sep-97	Sep-03	34	500	91%								
TC-GP-203	Sep-97	Jan-02	25	420,000	8%	-2.31	down	-7.67	vv	-3.47	down	-22.60	vvvv
TC-GP-204	Sep-97	Sep-03	34	350,000	0%	-3.14	down	-11.63	vvv	1.08	up	5.33	
TC-GP-205	Sep-97	Sep-03	35	1,000	97%								
TC-GP-206	Sep-97	Sep-03	35	24,500	26%	0.31	up	0.00		-0.31	down	0.00	

TABLE 2 (continued)

STATISTICAL ANALYSIS OF TRENDS IN PERMANENT MONITORING PROBE DATA
FRUITLAND OUTCROP MONITORING
LA PLATA COUNTY, COLORADO

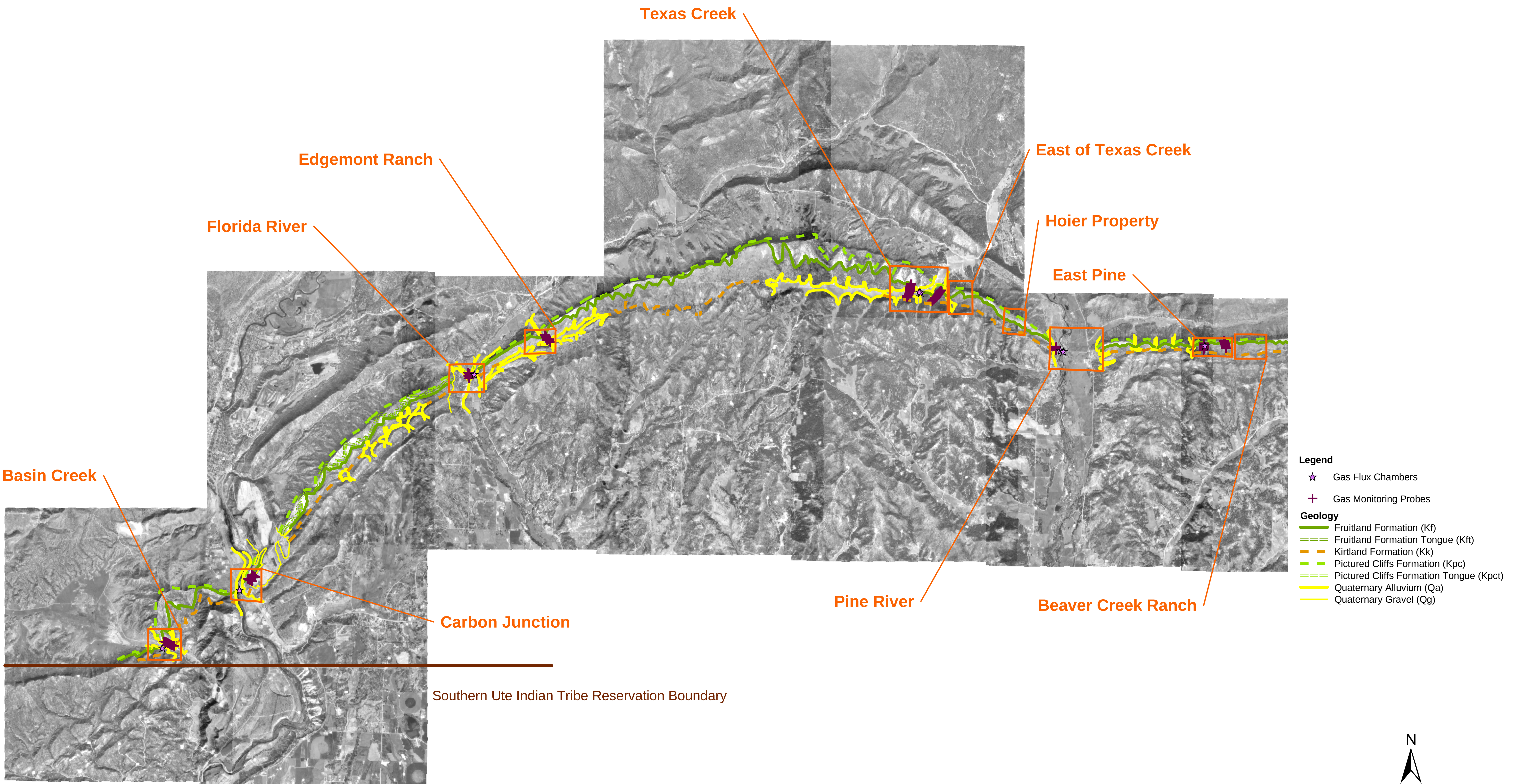
THE GROUP

						Data Series from 9/97 - 4/01				Data Series from 11/98 - 9/03			
Site ID	**First Data**	**Last Data**	**No. of Measurements**	**Maximum Concentration (ppm)**	**Percent of Samples that were Zero**	**Z**	**Direction**	**Slope**	**Significance**	**Z2**	**SignZ2**	**Q2**	**Significance**
TC-GP-207	Sep-97	Sep-03	33	12,500	12%	0.59	up	0.04		-0.49	down	0.00	
TC-GP-208	Sep-97	Sep-03	33	13,000	18%	2.47	up	0.71	^^	0.14	up	0.00	
TC-GP-209	Sep-97	Sep-03	34	9,500	32%	-0.35	down	0.00		3.73	up	0.12	^^^^
TC-GP-210	Sep-97	Sep-03	34	20,500	82%	-3.66	down	0.00	vvvv				
TC-GP-211	Sep-97	Sep-03	33	4,000	82%	0.28	up	0.00		-0.45	down	0.00	
TC-GP-212	Sep-97	Sep-03	35	890,000	3%	2.26	up	44.84	^^	-3.00	down	-21.82	vvv
TC-GP-213	Sep-97	Sep-03	35	6,000	80%	-0.57	down	0.00		2.42	up	0.00	^^
TC-GP-214	Sep-97	Sep-03	27	810,000	26%	1.09	up	0.36		1.82	up	11.05	^
TC-GP-214A	May-01	Sep-03	10	450,000	0%					0.09	up	9.00	
TC-GP-215	Sep-97	Sep-03	29	1,500	86%								
TC-GP-215A	Nov-00	Sep-03	12	0									
TC-GP-216	Sep-97	Sep-03	34	500	94%								
TC-GP-217	Sep-97	Sep-03	33	500	97%								
TC-GP-218	Sep-97	Sep-03	33	0									
TC-GP-219	Sep-97	Sep-03	34	0									
Yellow Jacket Pass													
YJ-GP-101	Nov-01	Sep-03	9	500	78%								
YJ-GP-102	Nov-01	Sep-03	9	1,000	67%								
YJ-GP-103	Nov-01	Sep-03	9	500	67%								

Notes:
Z: Mann-Kendall test statistic
Slope: Sen slope of trend
Direction: direction of trend (up or down)
Significance: Level of significance of trend (one tailed test)

^ or v	90%
^^ or vv	95%
^^^ or vvv	99%
^^^^ or vvvv	100%

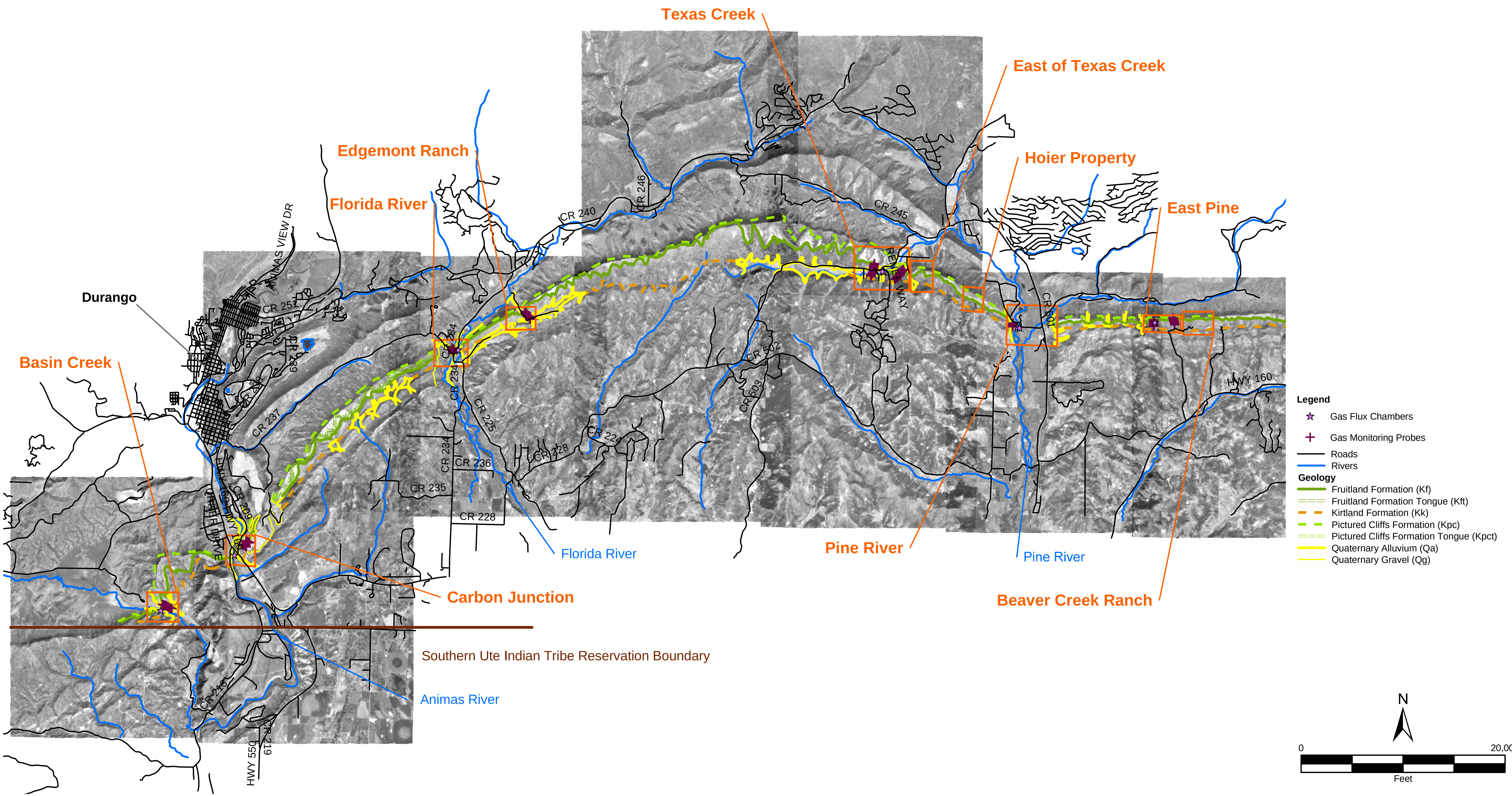
FIGURES



Aerial photos on subsequent maps have been faded to highlight data features.

FIGURE 1A
PROJECT AREA MAP
LA PLATA COUNTY, CO

THE GROUP



Aerial photos on subsequent maps have been faded to highlight data features.

FIGURE 1B
PROJECT AREA MAP
LA PLATA COUNTY, CO

THE GROUP

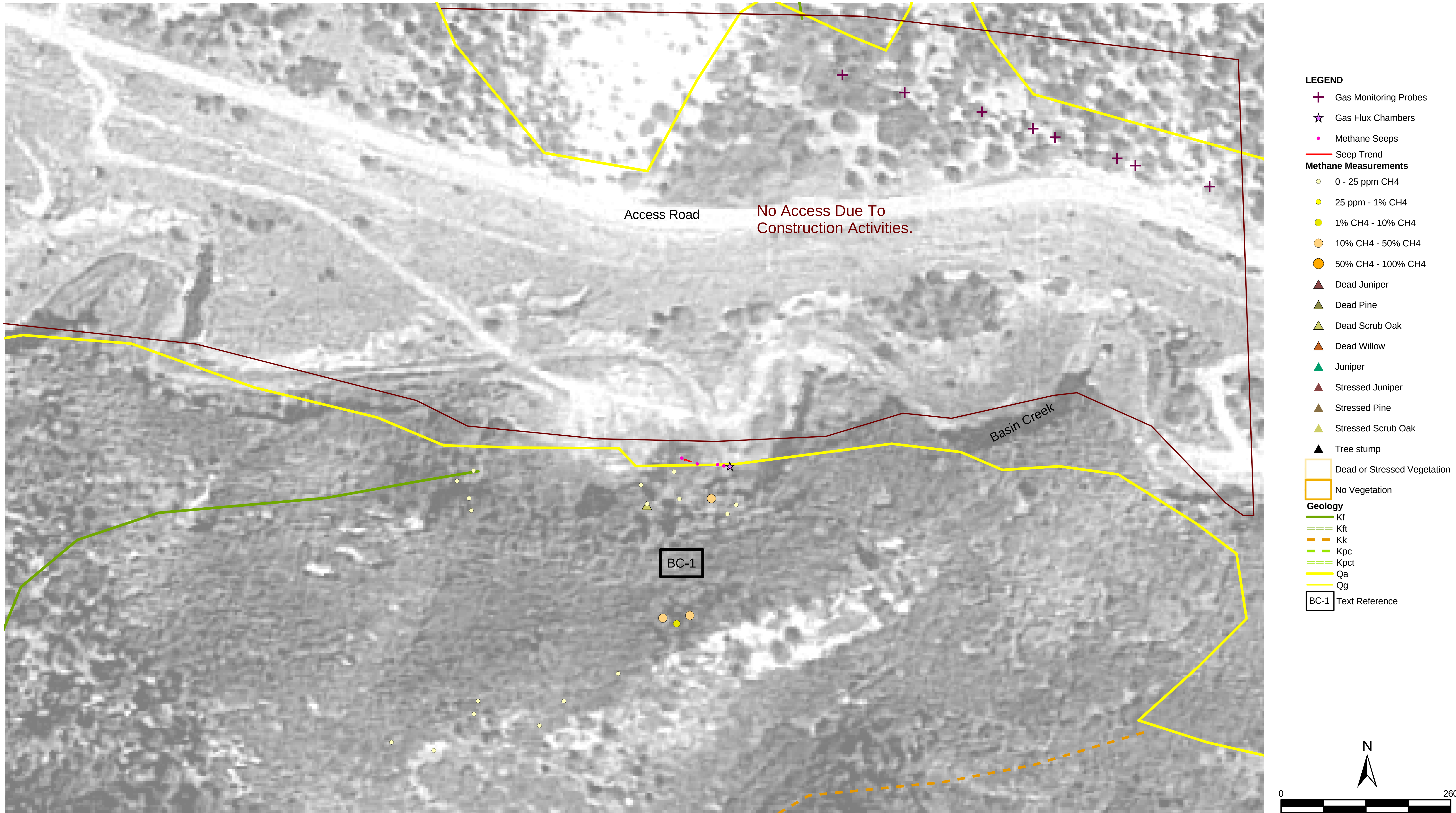


FIGURE 2
2004 DETAILED SEEP MAPPING
BASIN CREEK

THE GROUP

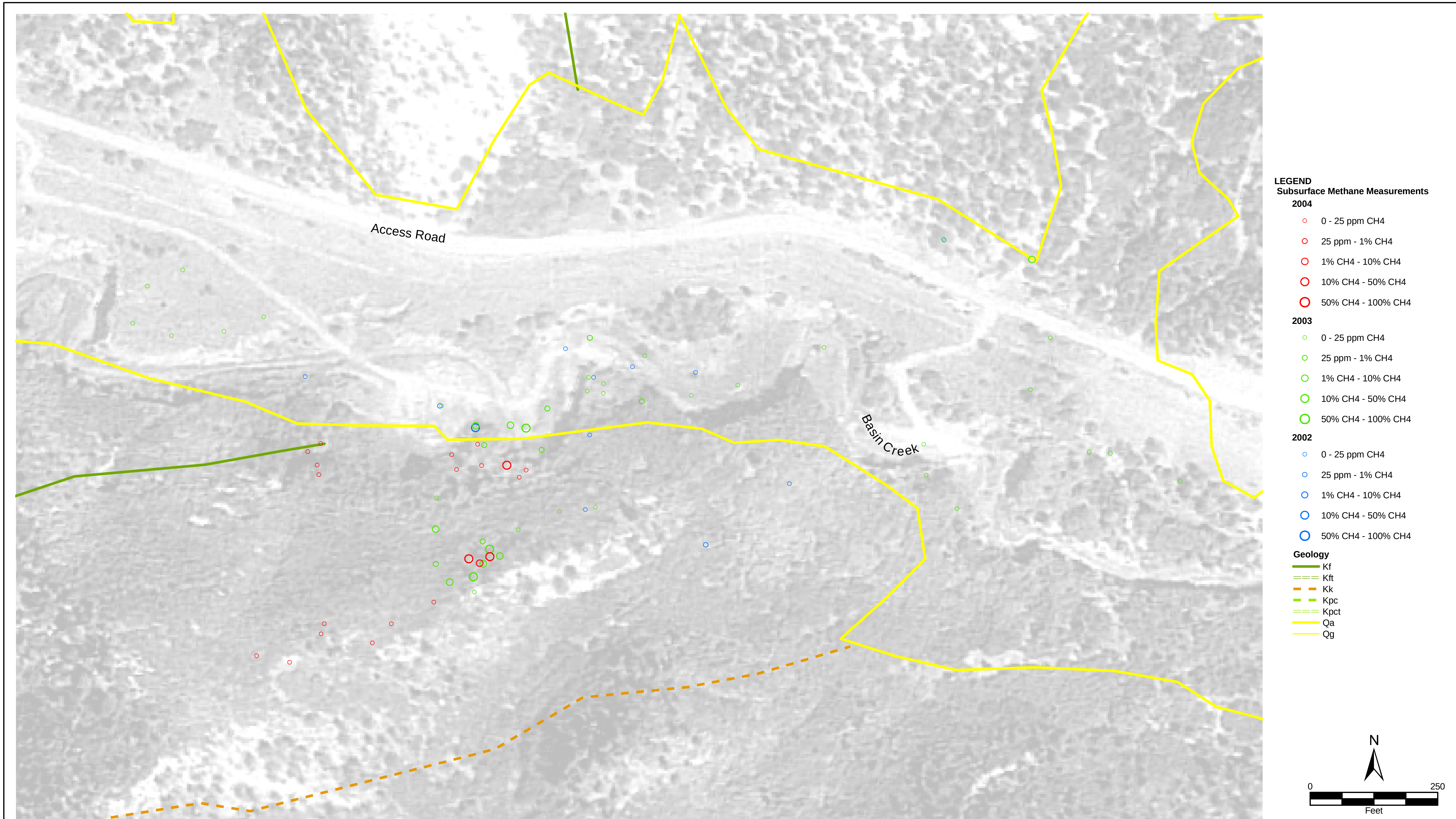


FIGURE 3
HISTORICAL DATA COMPARISON
SUBSURFACE METHANE MEASUREMENTS
BASIN CREEK

THE GROUP

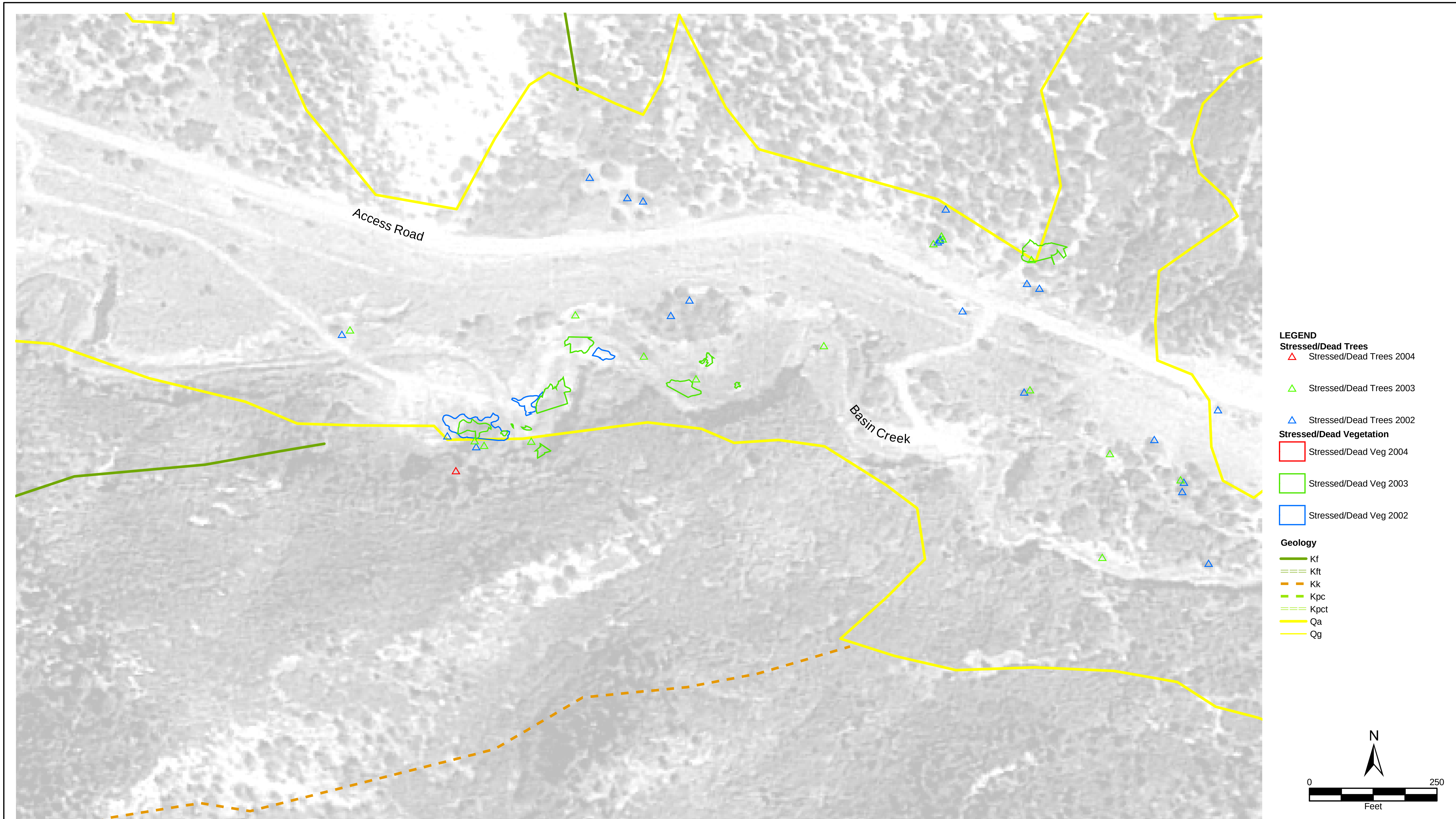
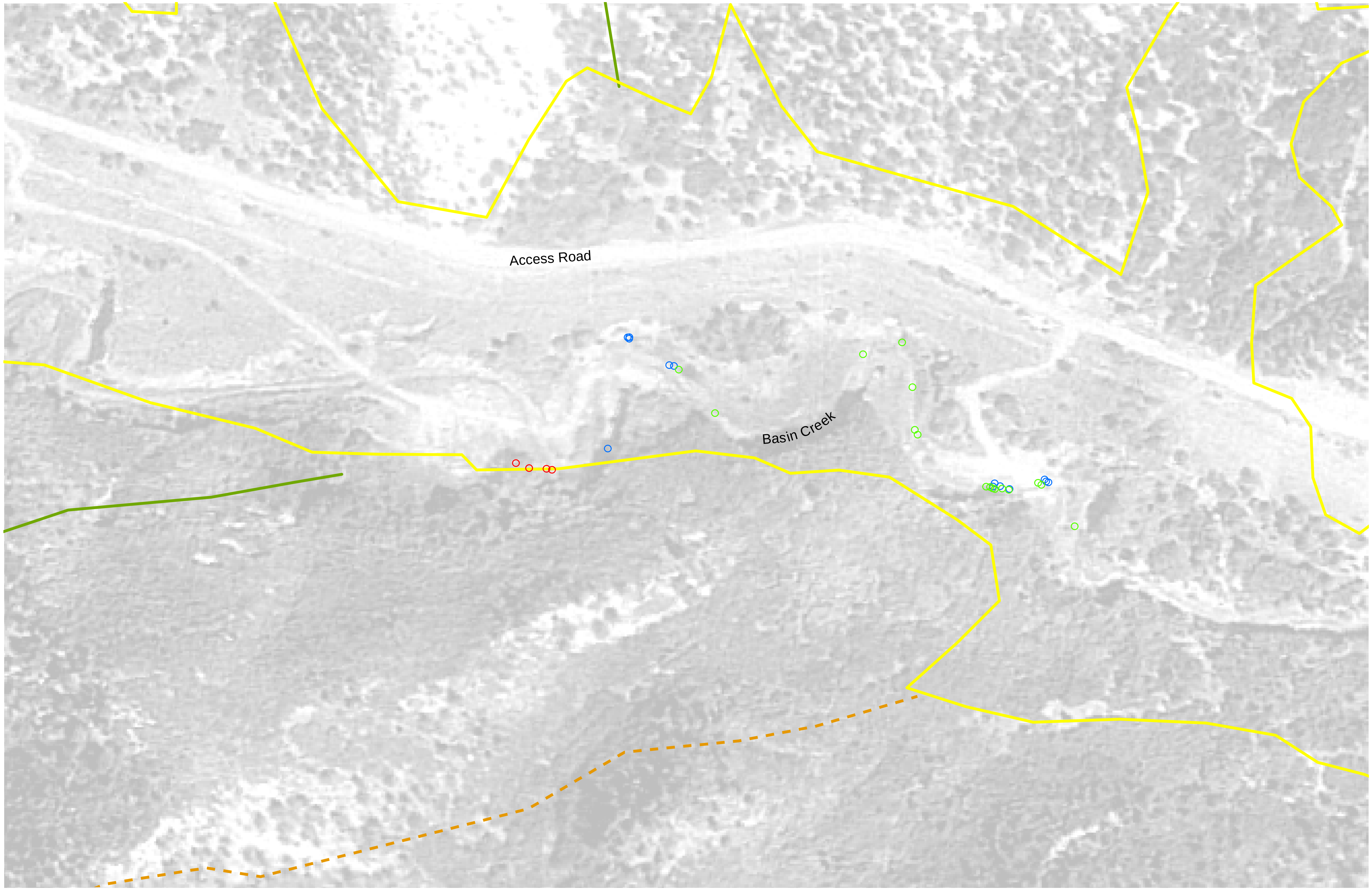


FIGURE 4
HISTORICAL DATA COMPARISON
STRESSED/DEAD VEGETATION
BASIN CREEK

THE GROUP



LEGEND
Visible Methane Seeps
Methane Seeps 2004
Methane Seeps 2003
Methane Seeps 2002
Geology
Kf
Kft
Kk
Kpc
Kpct
Qa
Qg

N

0 250
Feet

FIGURE 5
HISTORICAL DATA COMPARISON
VISIBLE METHANE SEEPS
BASIN CREEK
THE GROUP

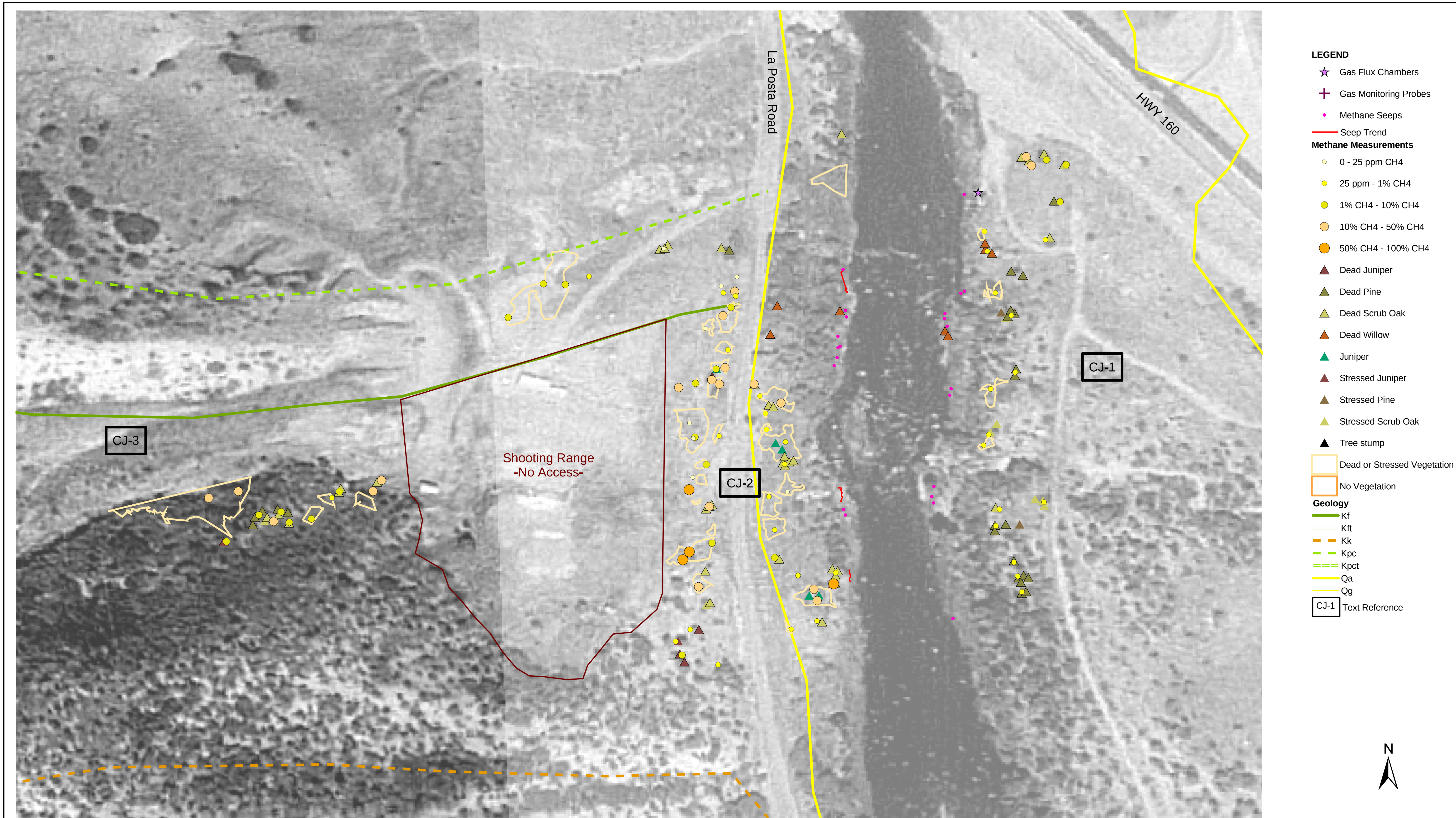


FIGURE 6
2004 DETAILED SEEP MAPPING
CARBON JUNCTION WEST

THE GROUP

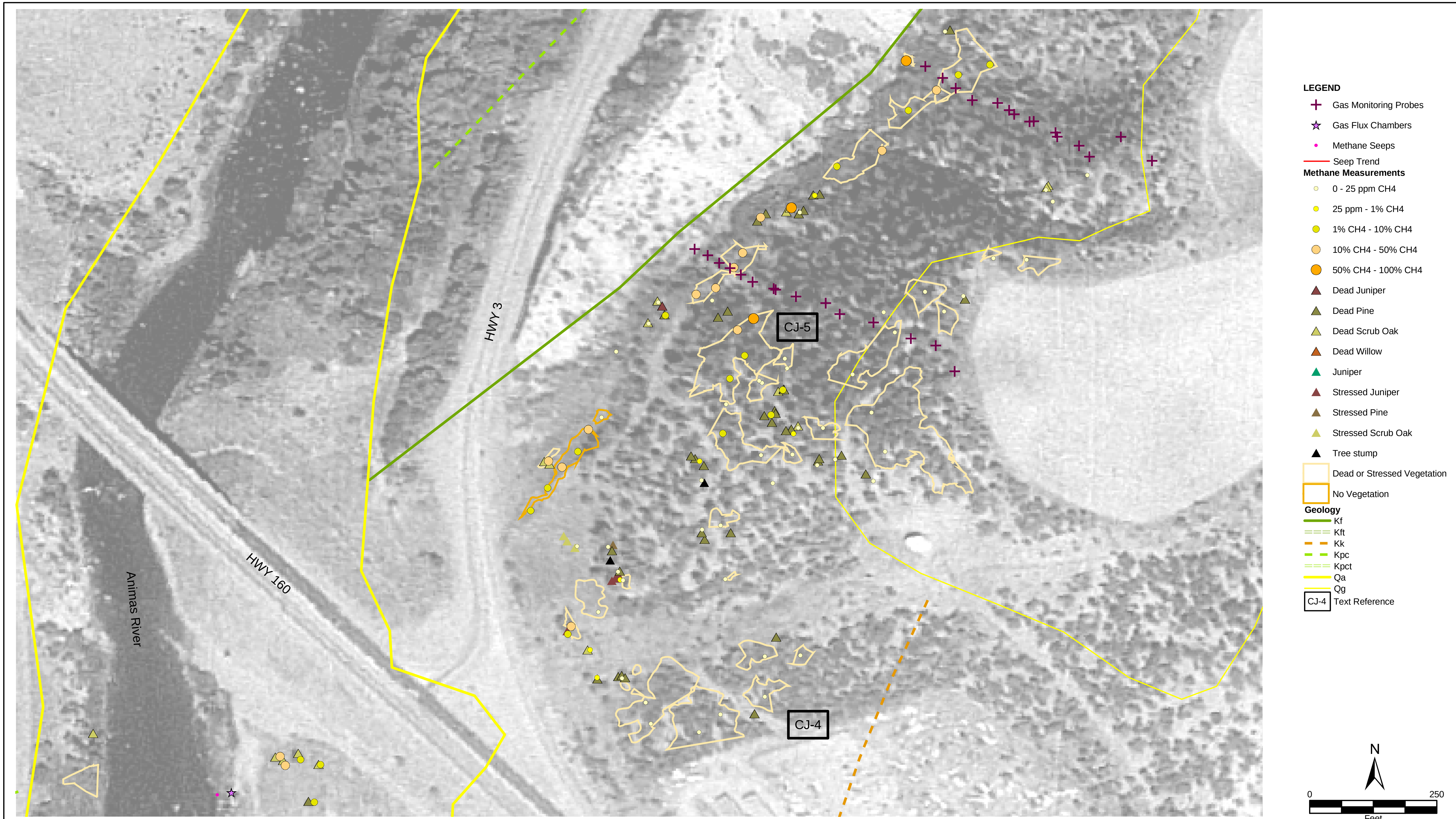
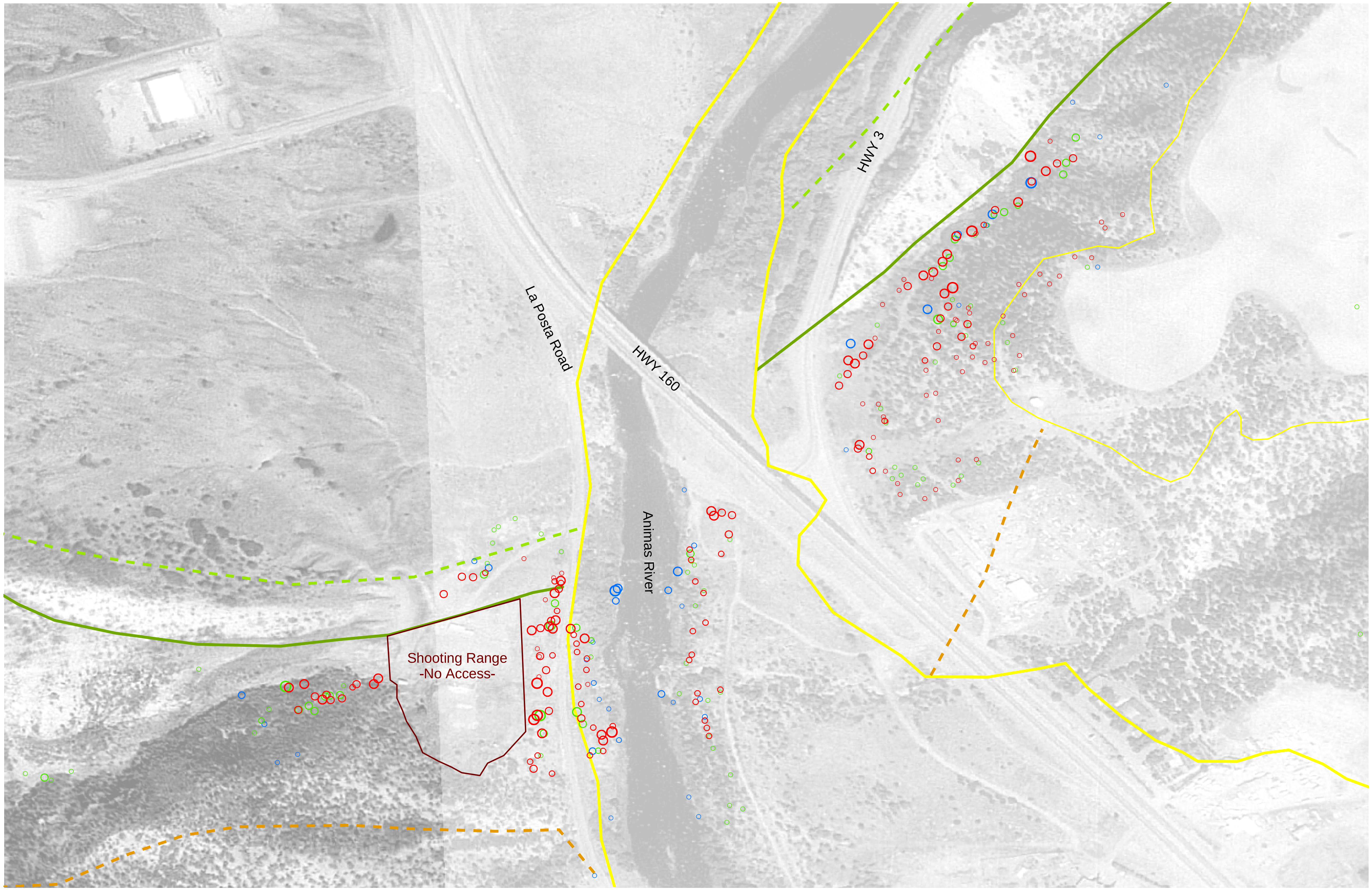


FIGURE 7
2004 DETAILED SEEP MAPPING
CARBON JUNCTION EAST

THE GROUP



LEGEND
Subsurface Methane Measurements

2004
- 0 - 25 ppm CH4
- 25 ppm - 1% CH4
- 1% CH4 - 10% CH4
- 10% CH4 - 50% CH4
- 50% CH4 - 100% CH4

2003
- 0 - 25 ppm CH4
- 25 ppm - 1% CH4
- 1% CH4 - 10% CH4
- 10% CH4 - 50% CH4
- 50% CH4 - 100% CH4

2002
- 0 - 25 ppm CH4
- 25 ppm - 1% CH4
- 1% CH4 - 10% CH4
- 10% CH4 - 50% CH4
- 50% CH4 - 100% CH4

Geology
- Kf
- Kft
- Kk
- Kpc
- Kpct
- Qa
- Qg

N

0 550
Feet

FIGURE 8
HISTORICAL DATA COMPARISON
SUBSURFACE METHANE MEASUREMENTS
CARBON JUNCTION

THE GROUP

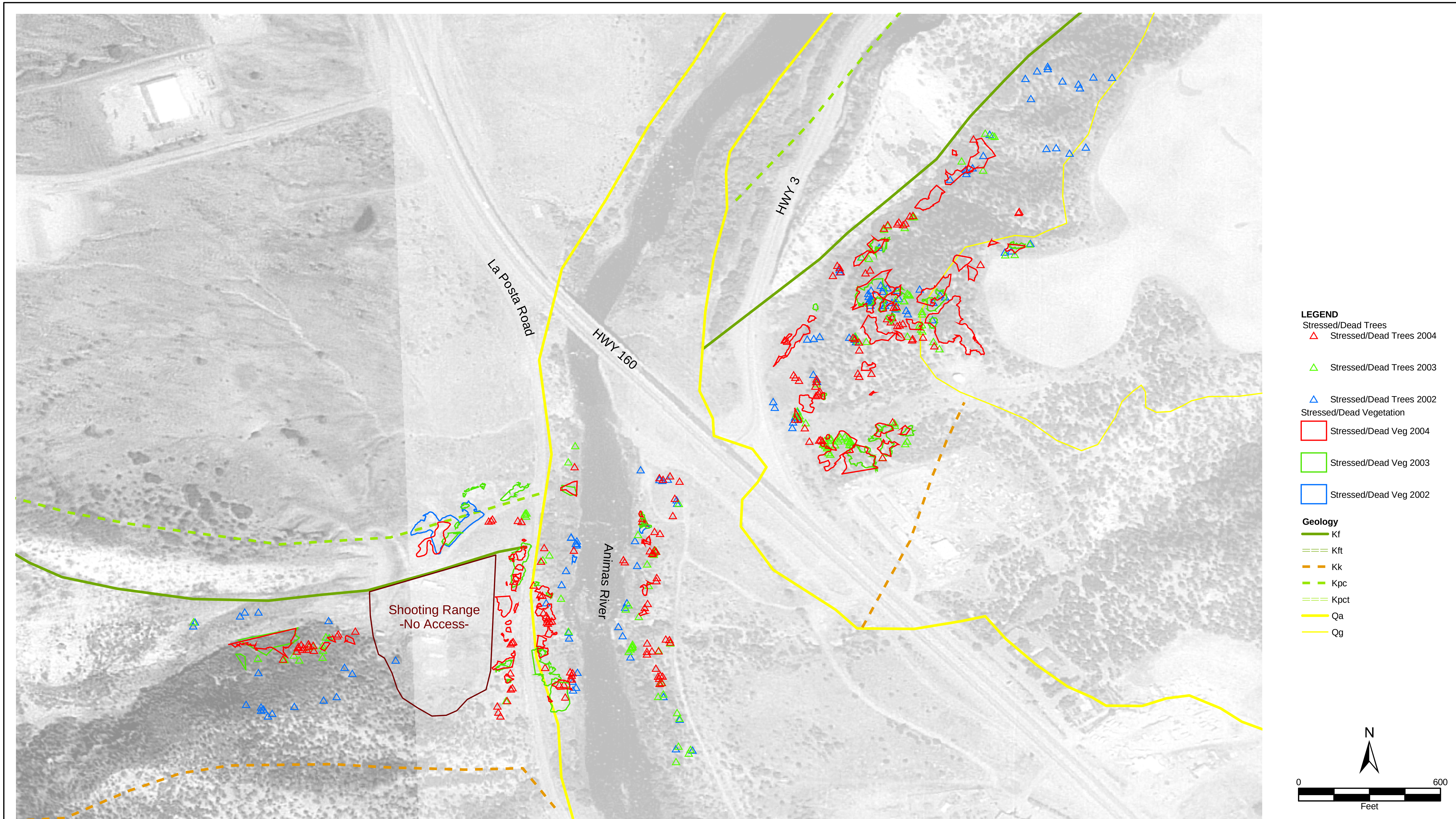


FIGURE 9
HISTORICAL DATA COMPARISON
STRESSED/DEAD VEGETATION
CARBON JUNCTION

THE GROUP

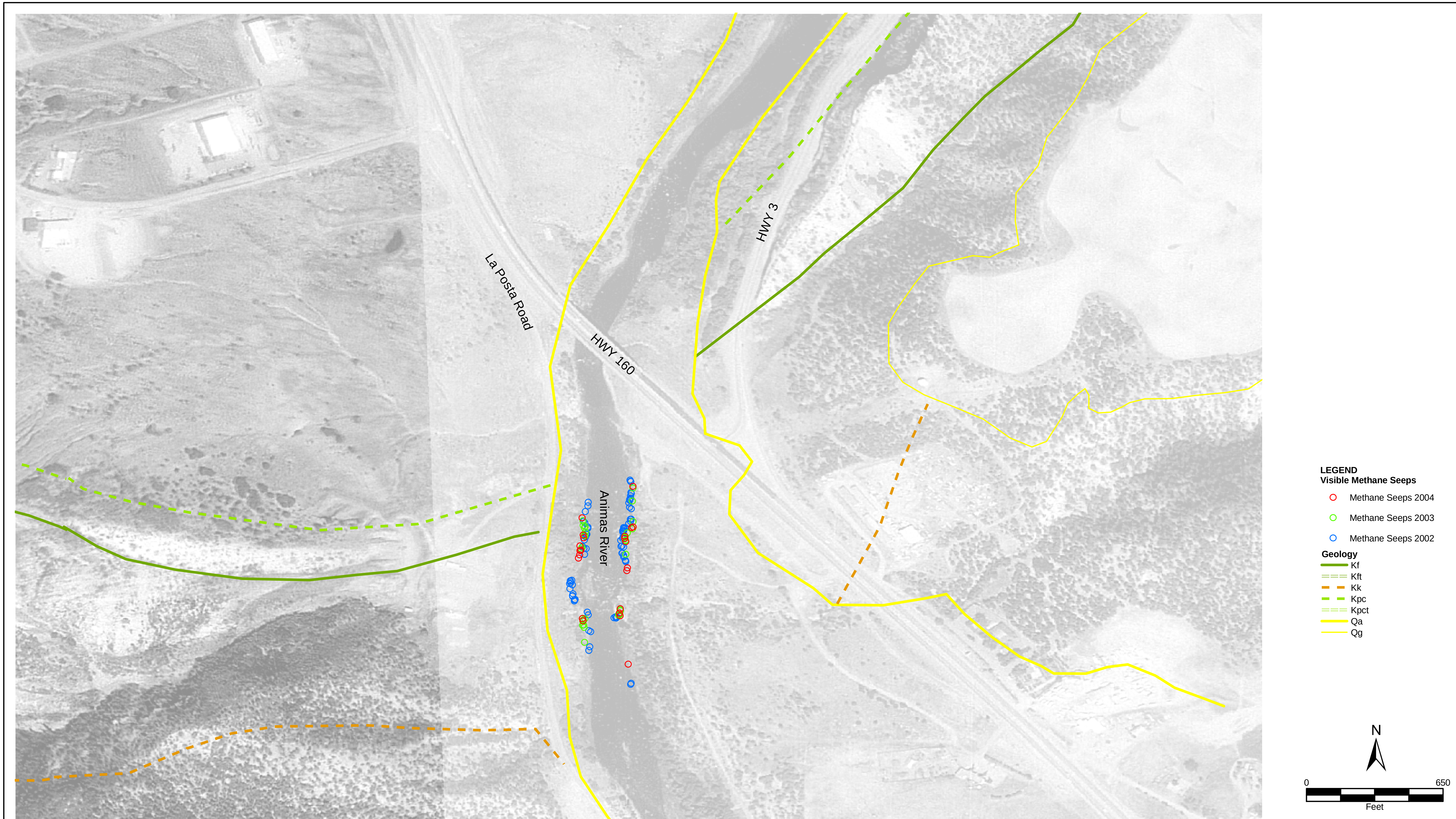


FIGURE 10
HISTORICAL DATA COMPARISON
VISIBLE METHANE SEEPS
CARBON JUNCTION

THE GROUP

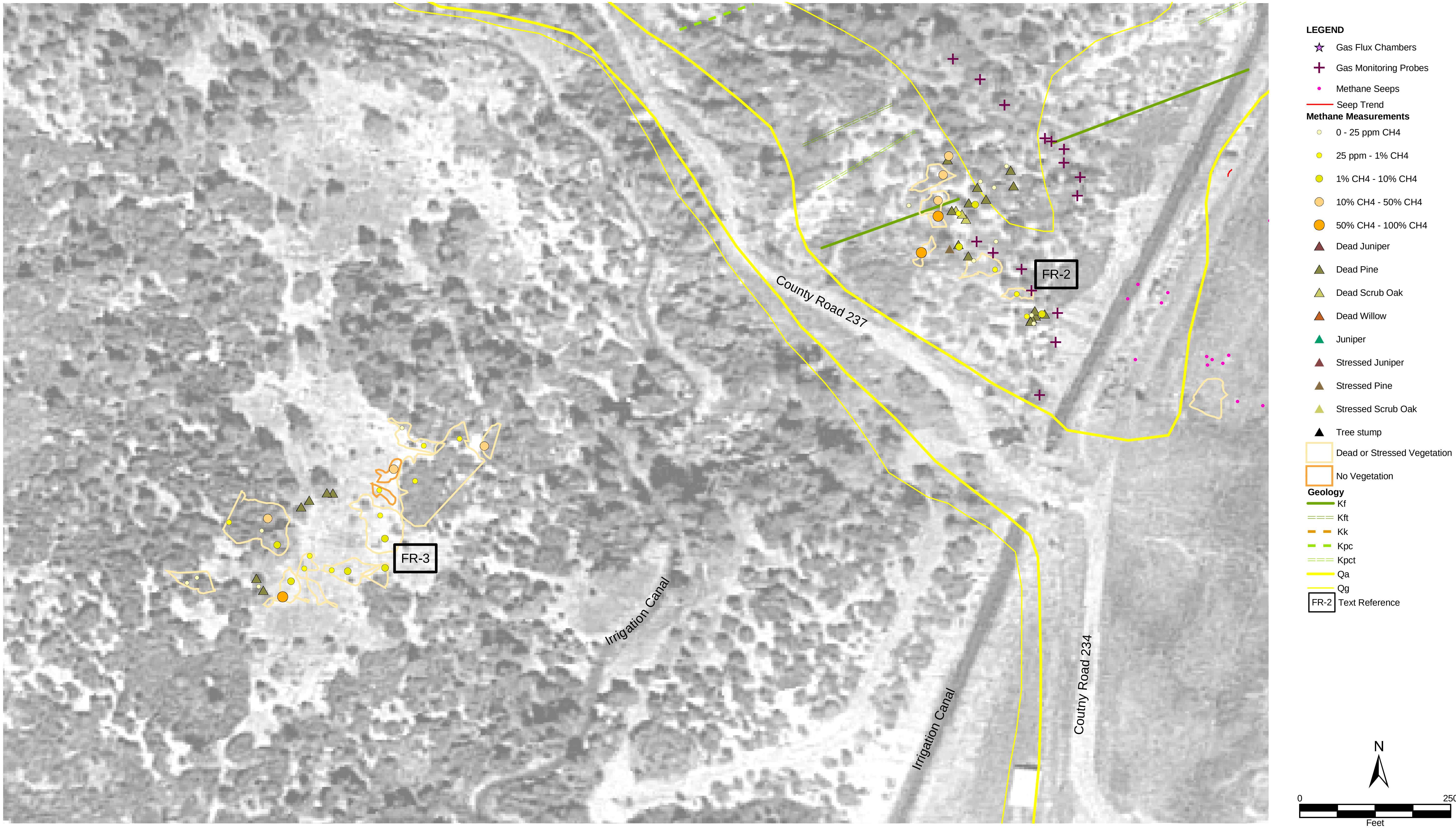


FIGURE 11
2004 DETAILED SEEP MAPPING
FLORIDA RIVER WEST

THE GROUP

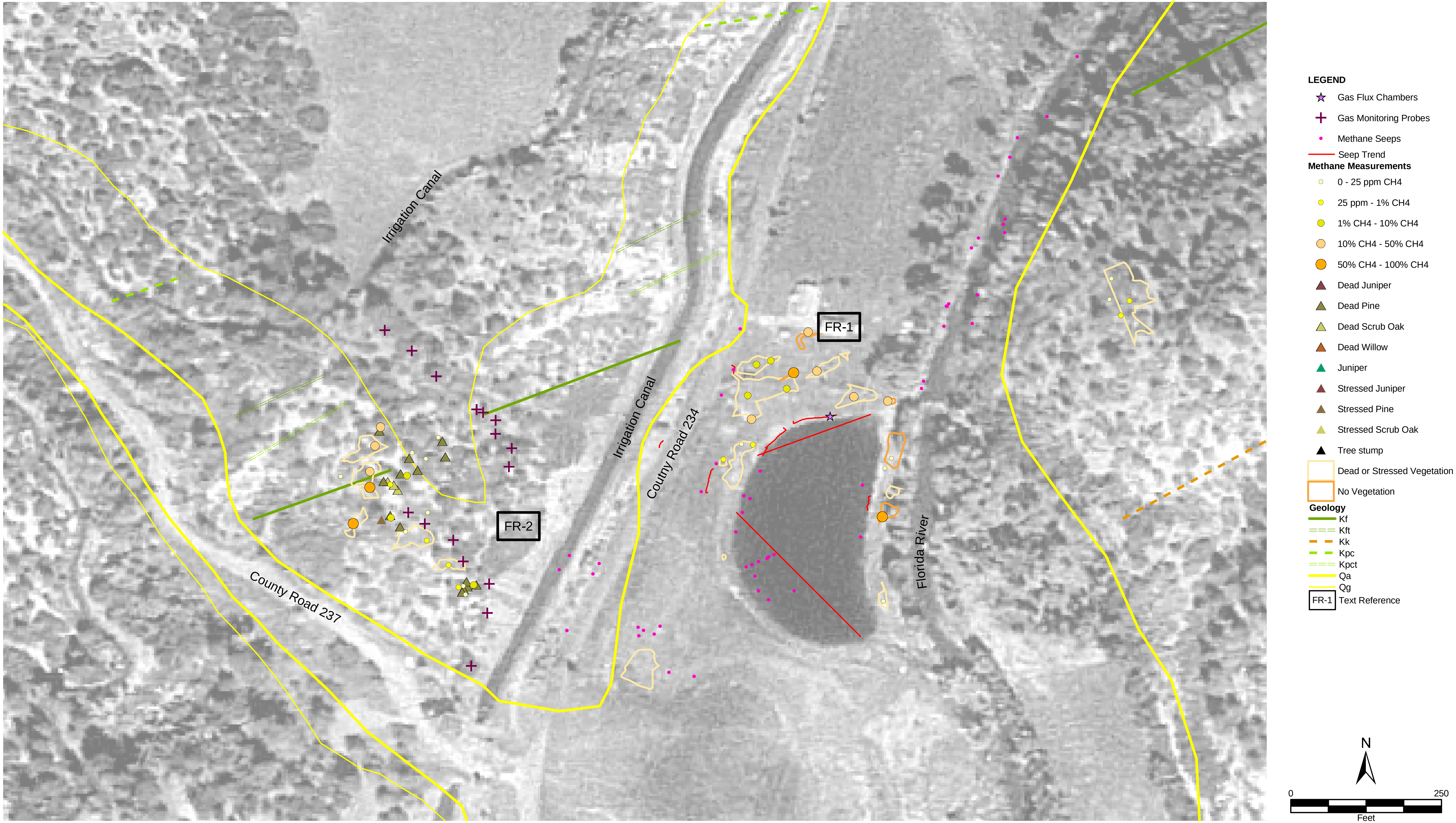


FIGURE 12
2004 DETAILED SEEP MAPPING
FLORIDA RIVER EAST

THE GROUP

FIGURE 13
HISTORICAL DATA COMPARISON
SUBSURFACE METHANE MEASUREMENTS
FLORIDA RIVER

THE GROUP

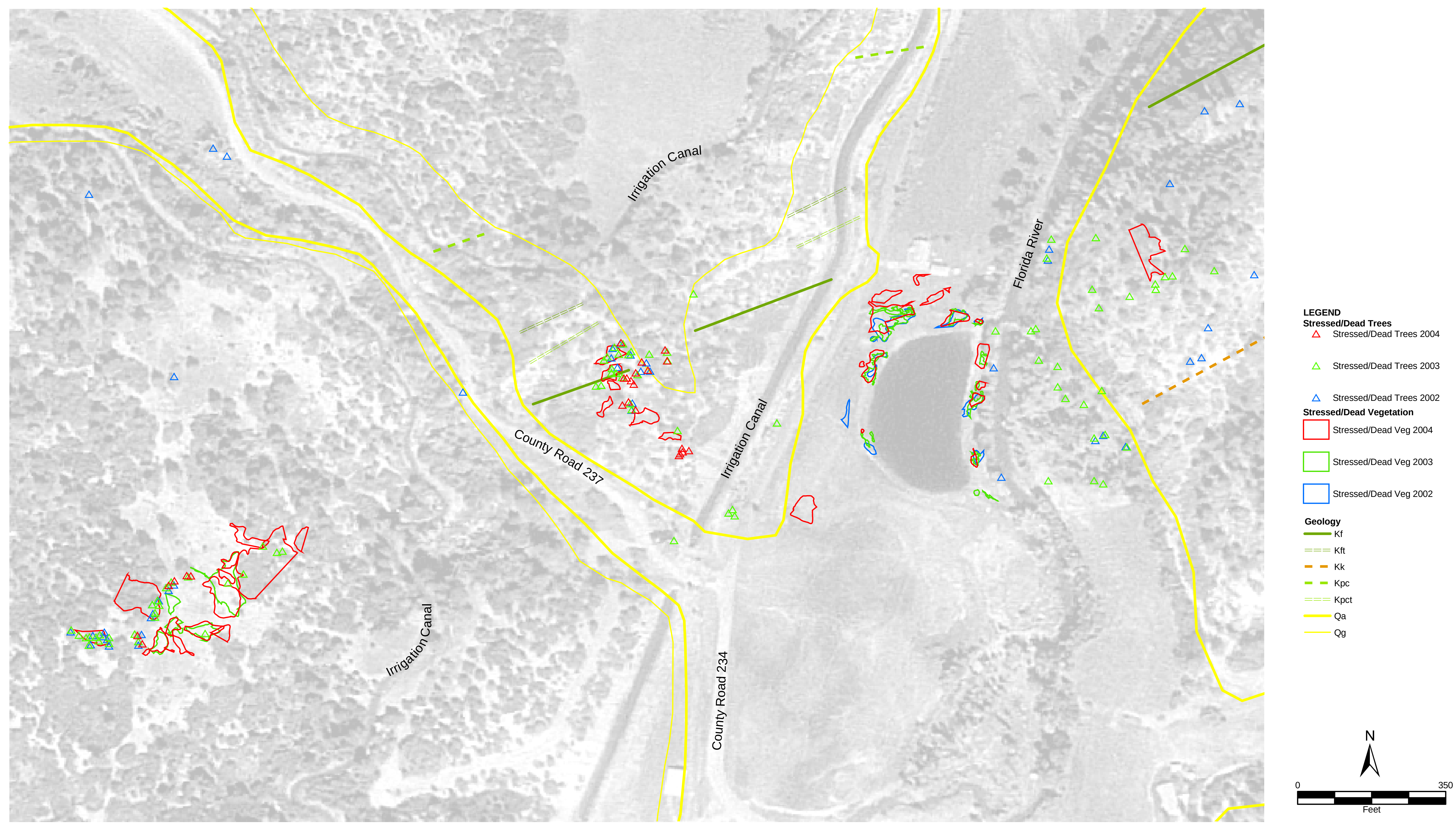


FIGURE 14
HISTORICAL DATA COMPARISON
STRESSED/DEAD VEGETATION
FLORIDA RIVER

THE GROUP

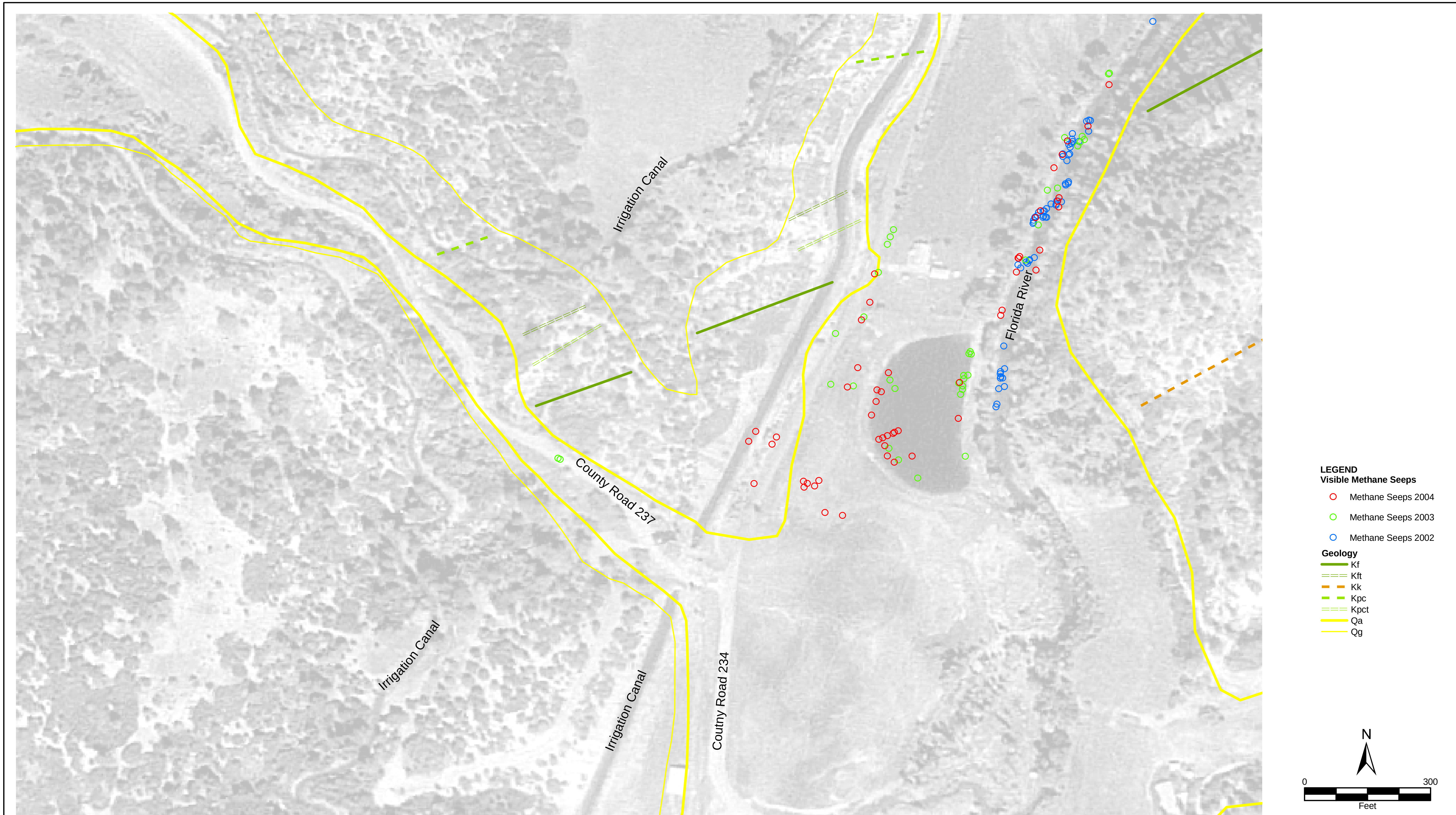


FIGURE 15
HISTORICAL DATA COMPARISON
VISIBLE METHANE SEEPS
FLORIDA RIVER
THE GROUP

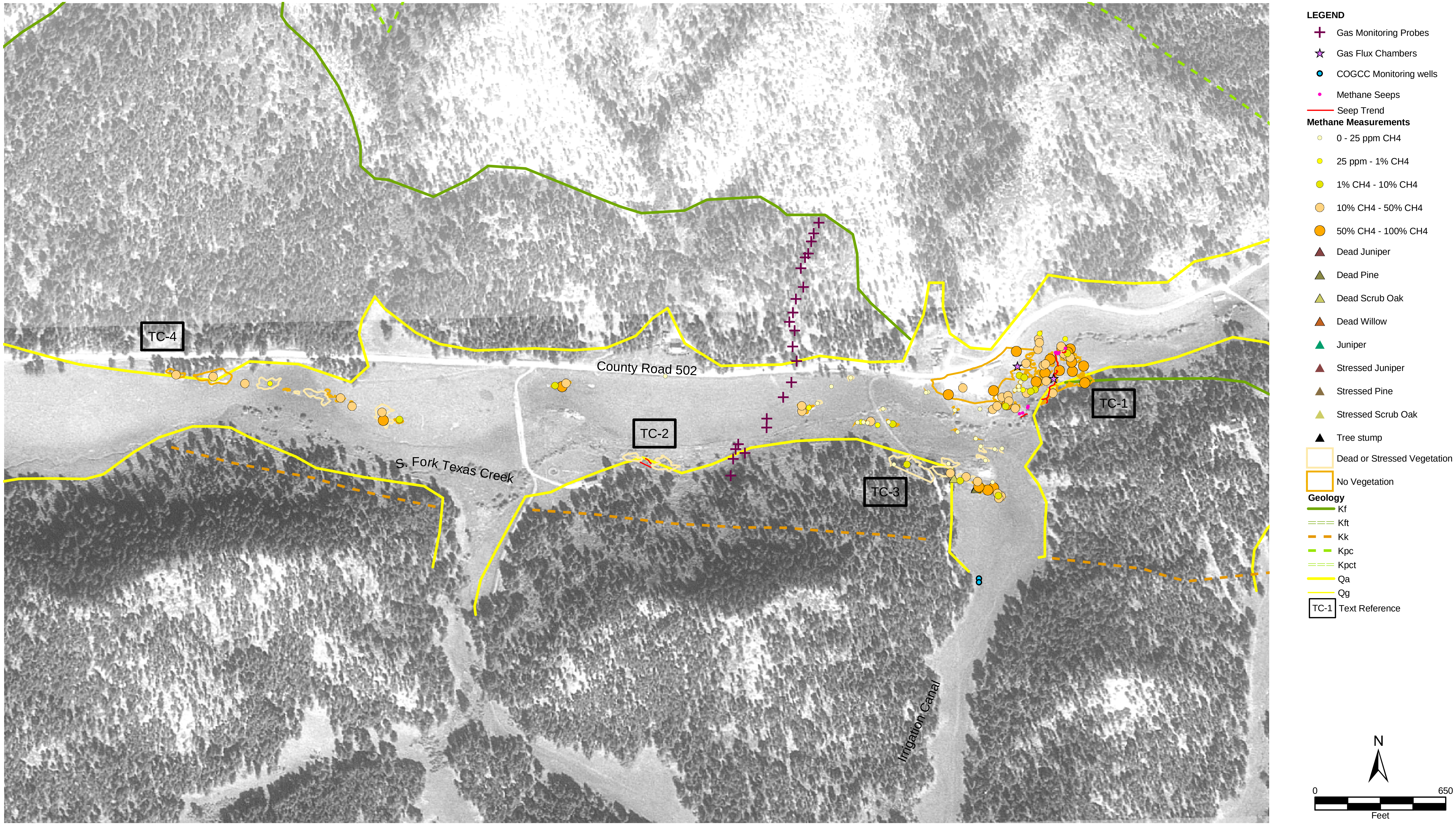


FIGURE 16
2004 DETAILED SEEP MAPPING
TEXAS CREEK WEST

THE GROUP

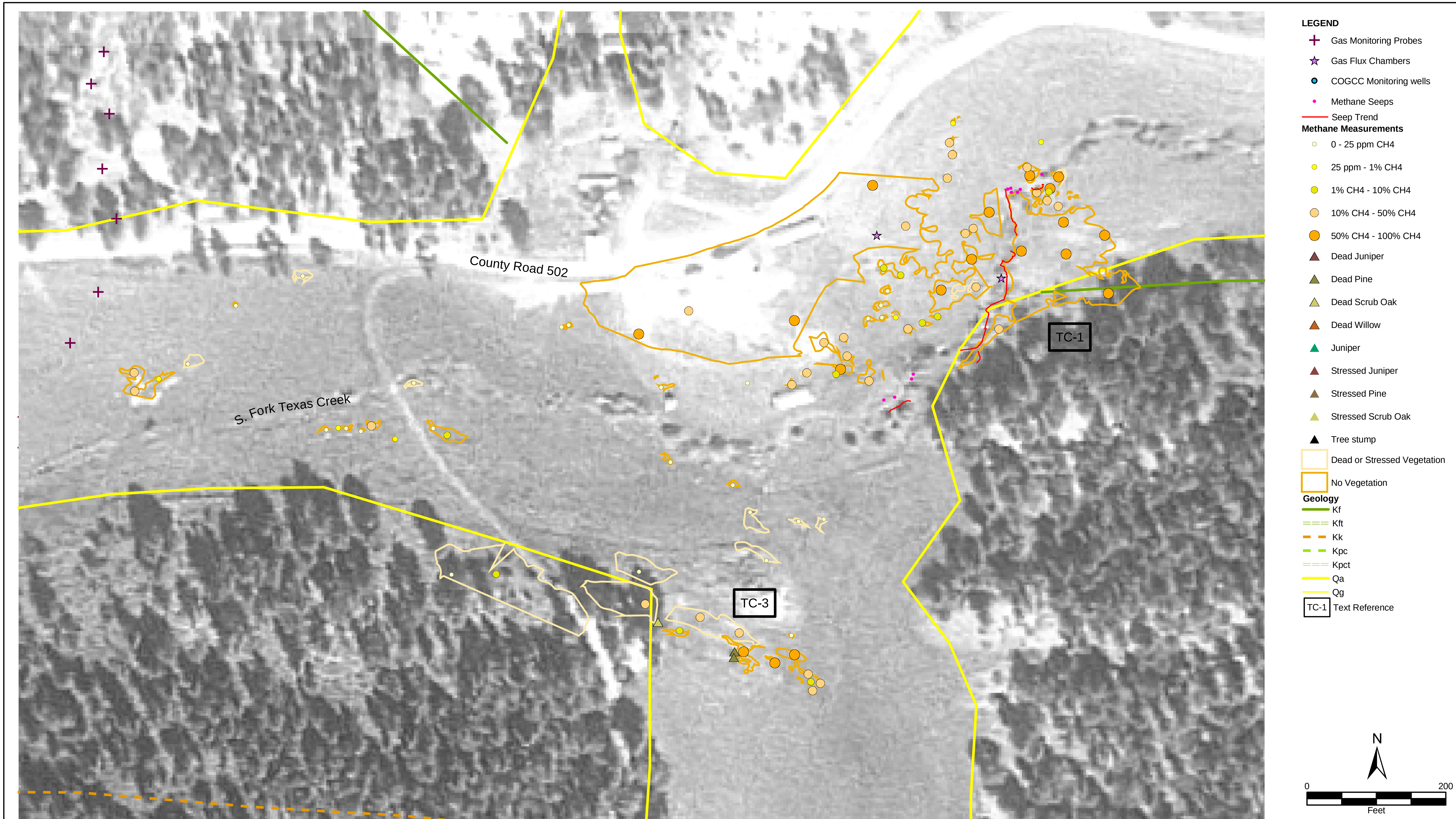
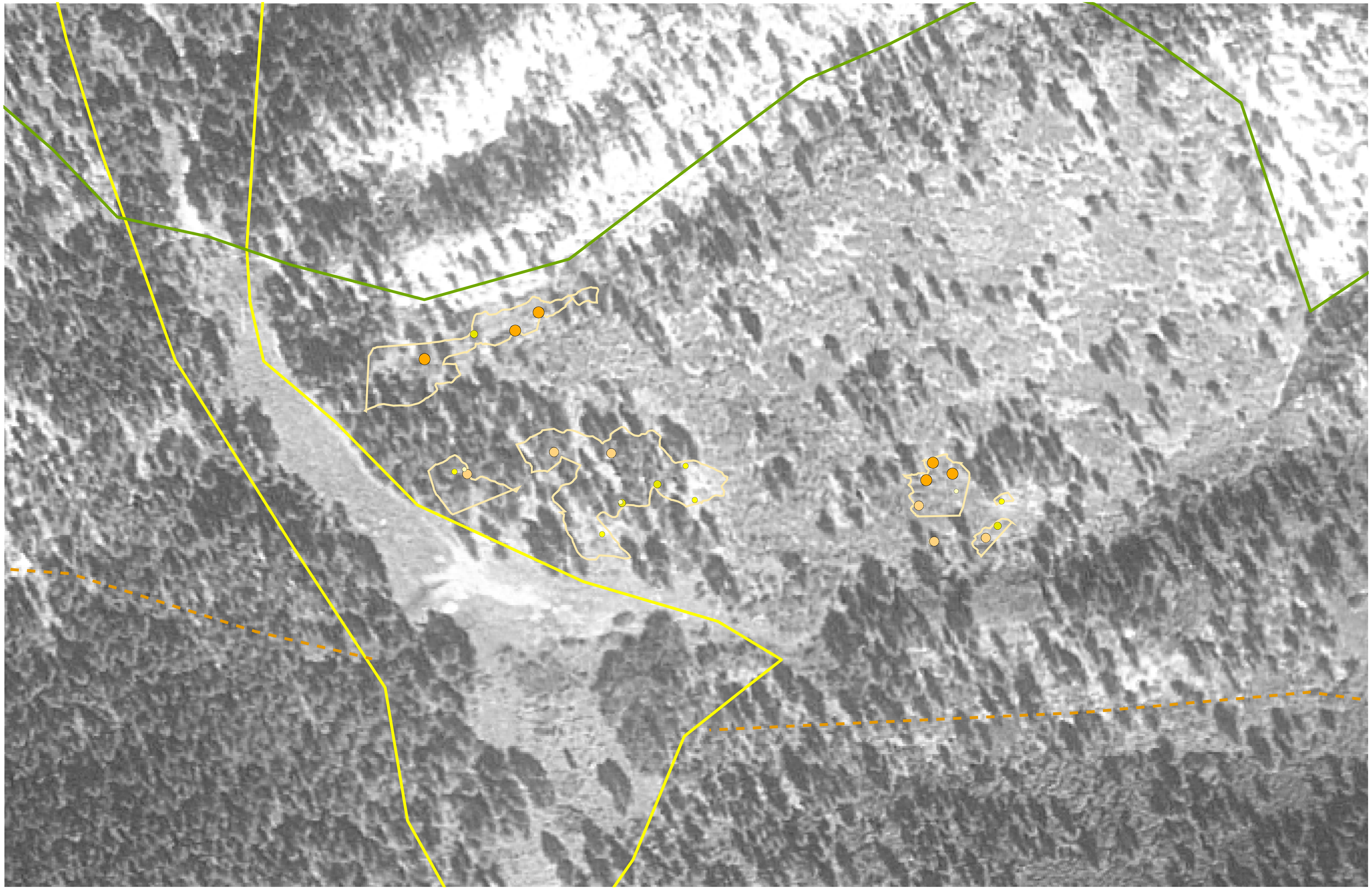


FIGURE 17
2004 DETAILED SEEP MAPPING
TEXAS CREEK (detail)

THE GROUP



LEGEND

- Gas Monitoring Probes
- Gas Flux Chambers
- Methane Seeps
- Seep Trend

Methane Measurements

- 0 - 25 ppm CH4
- 25 ppm - 1% CH4
- 1% CH4 - 10% CH4
- 10% CH4 - 50% CH4
- 50% CH4 - 100% CH4
- Dead Juniper
- Dead Pine
- Dead Scrub Oak
- Dead Willow
- Juniper
- Stressed Juniper
- Stressed Pine
- Stressed Scrub Oak
- Tree stump
- Dead or Stressed Vegetation
- No Vegetation

Geology

- Kf
- Kft
- Kk
- Kpc
- Kpct
- Qa
- Qg

N

0 250

Feet

FIGURE 18
2004 DETAILED SEEP MAPPING
TEXAS CREEK EAST

THE GROUP

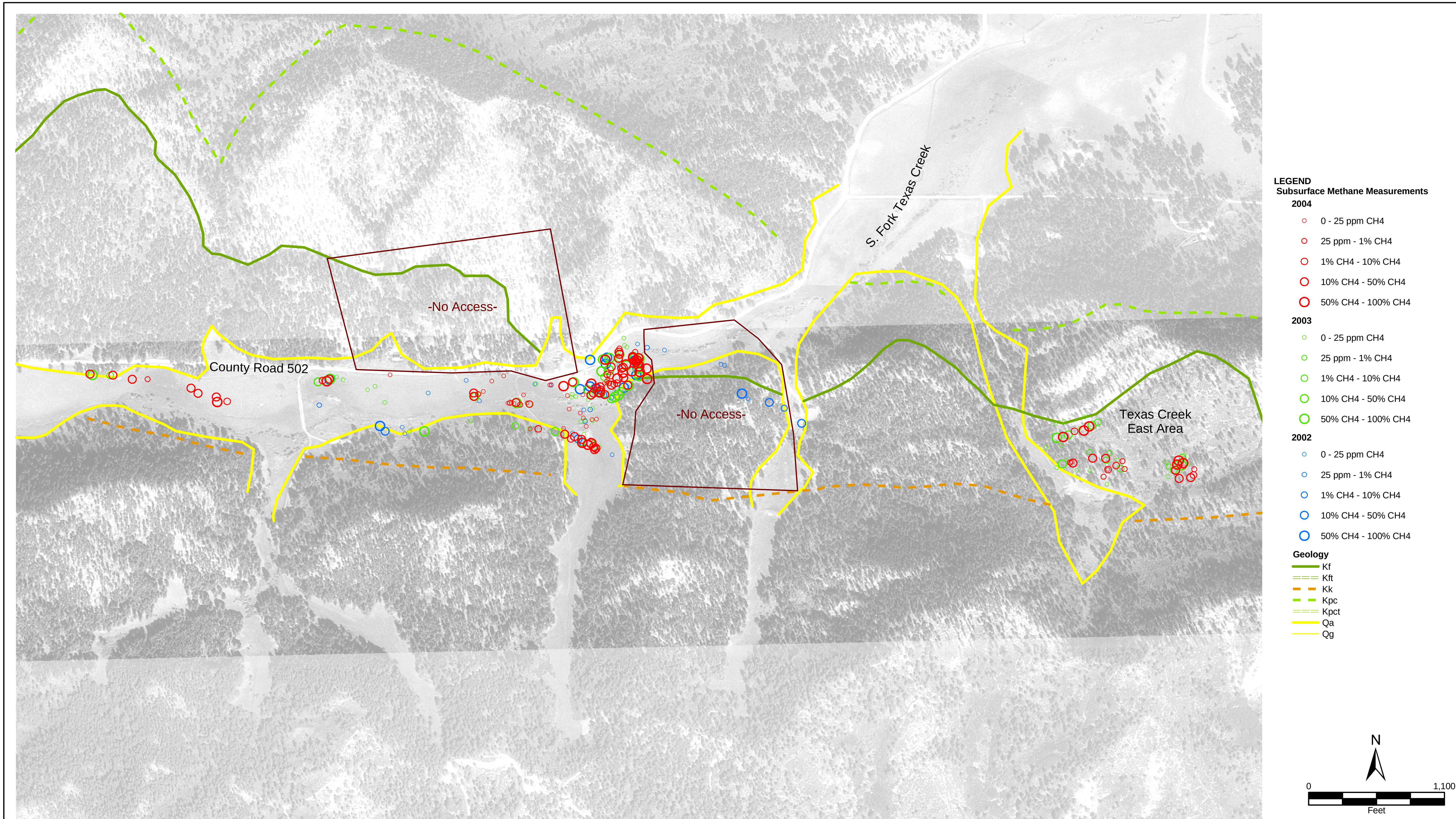


FIGURE 19
HISTORICAL DATA COMPARISON
SUBSURFACE METHANE MEASUREMENTS
TEXAS CREEK

THE GROUP

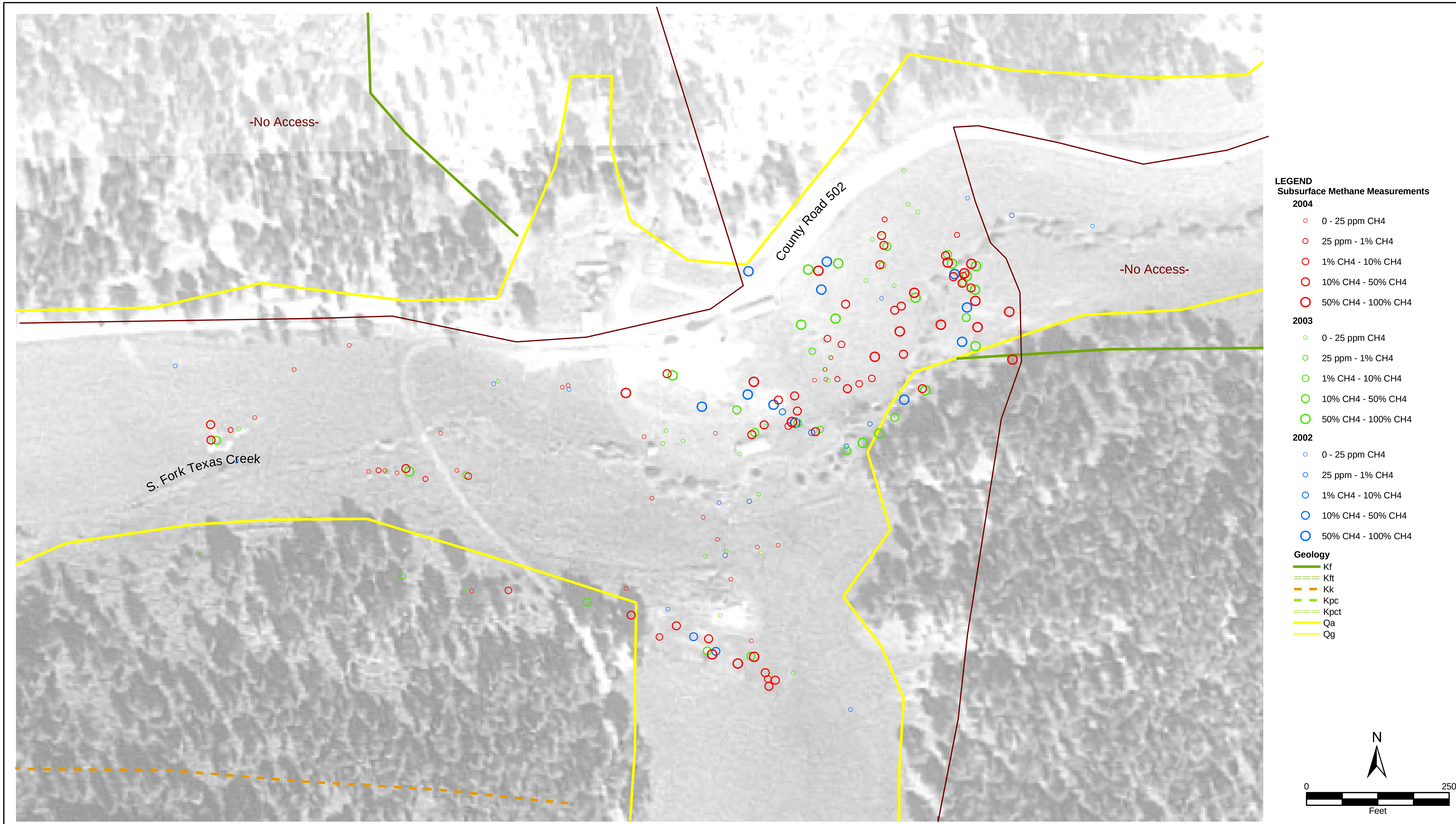


FIGURE 20
HISTORICAL DATA COMPARISON
SUBSURFACE METHANE MEASUREMENTS
TEXAS CREEK (detail)

THE GROUP

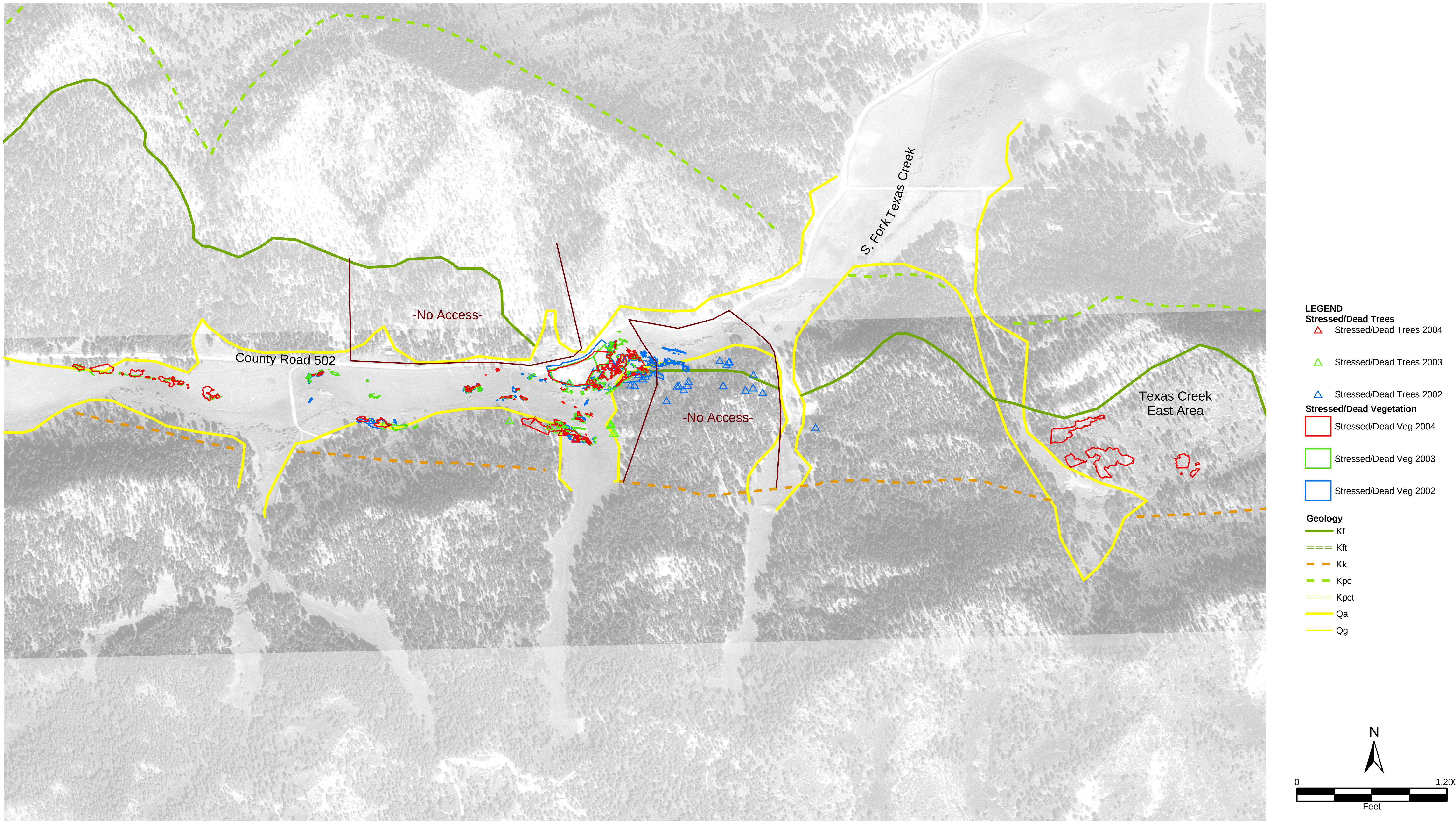


FIGURE 21
HISTORICAL DATA COMPARISON
STRESSED/DEAD VEGETATION
TEXAS CREEK

THE GROUP

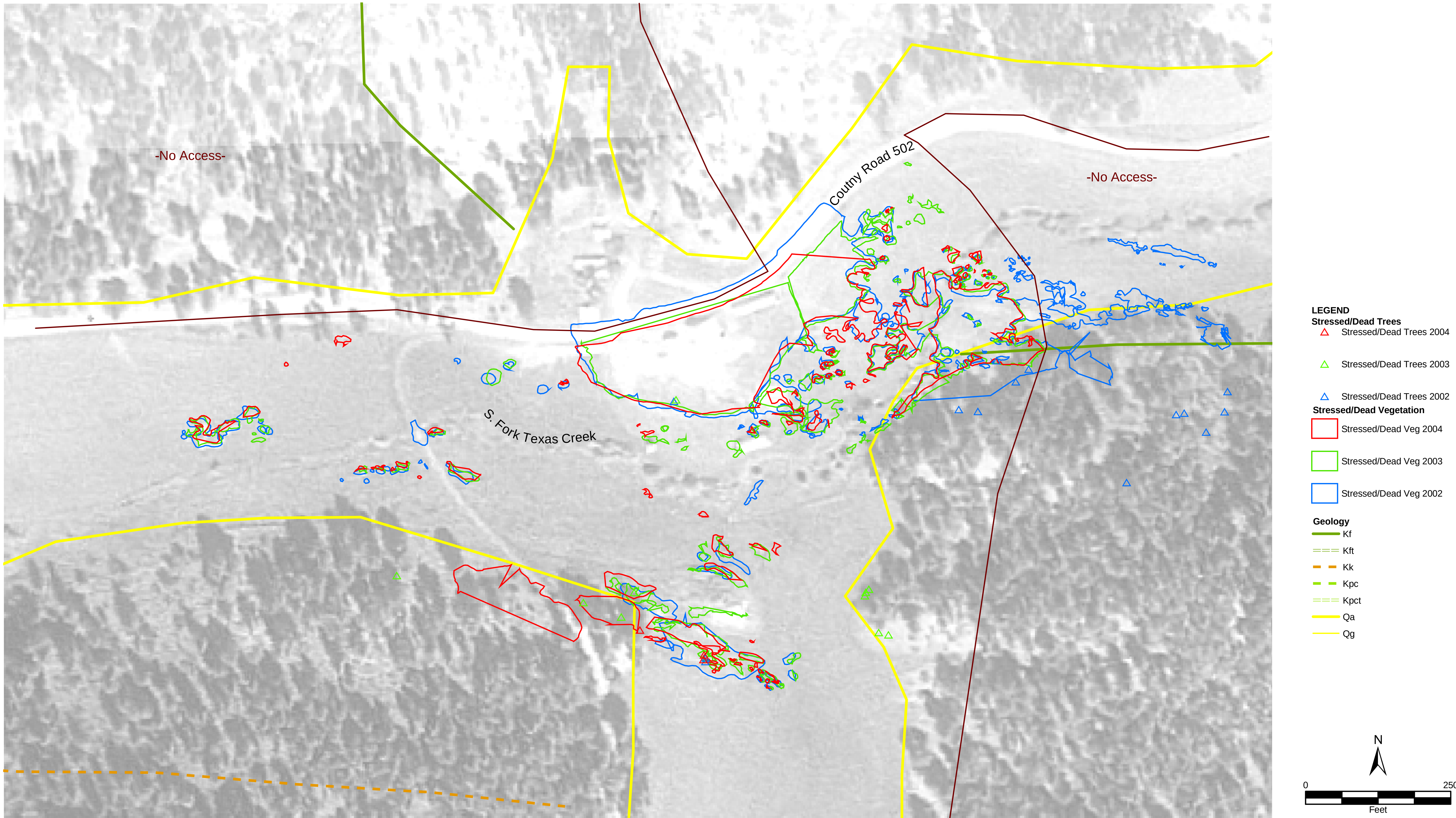


FIGURE 22
HISTORICAL DATA COMPARISON
STRESSED/DEAD VEGETATION
TEXAS CREEK (detail)

THE GROUP

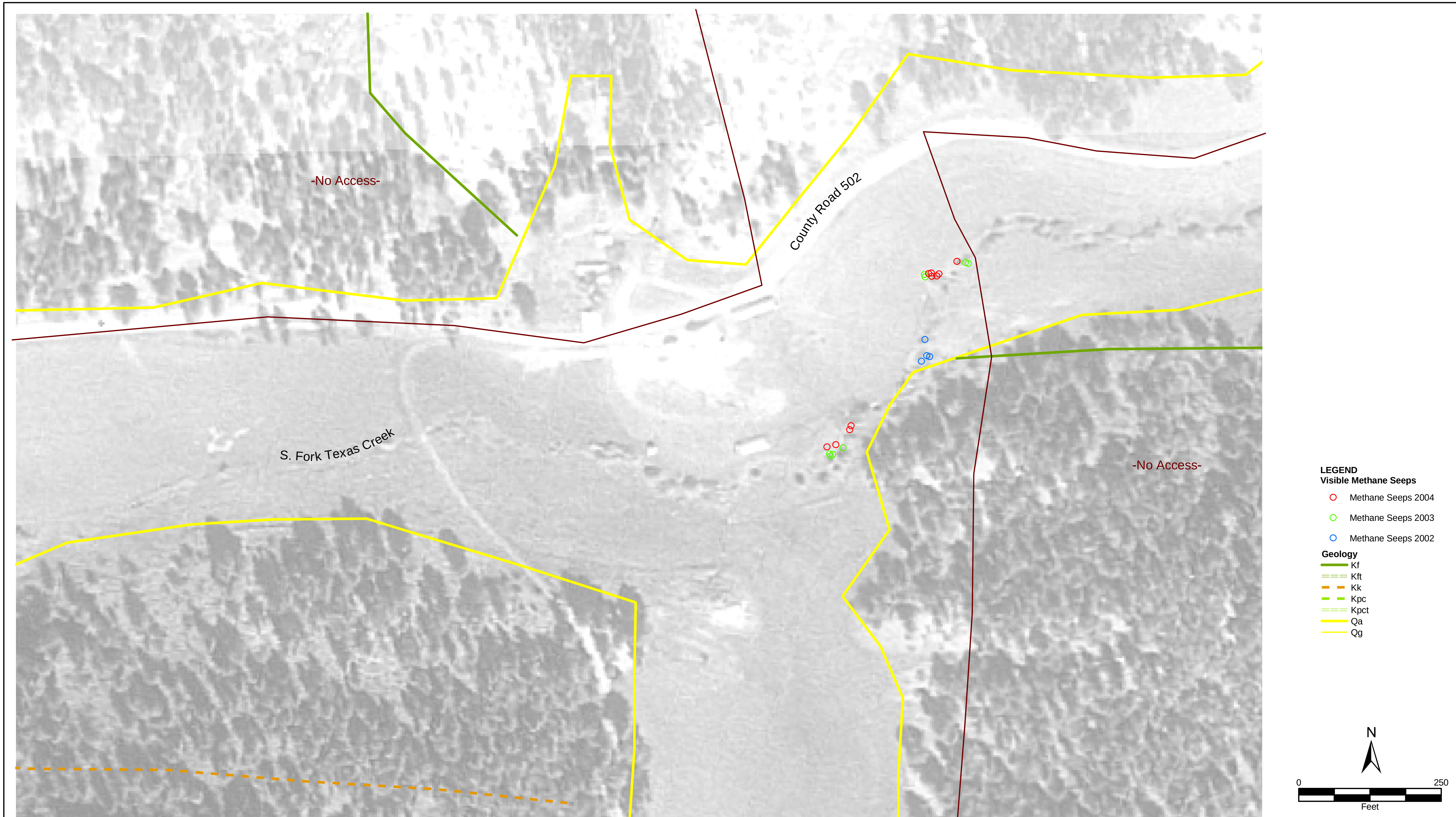


FIGURE 23
HISTORICAL DATA COMPARISON
VISIBLE METHANE SEEPS
TEXAS CREEK (detail)
THE GROUP

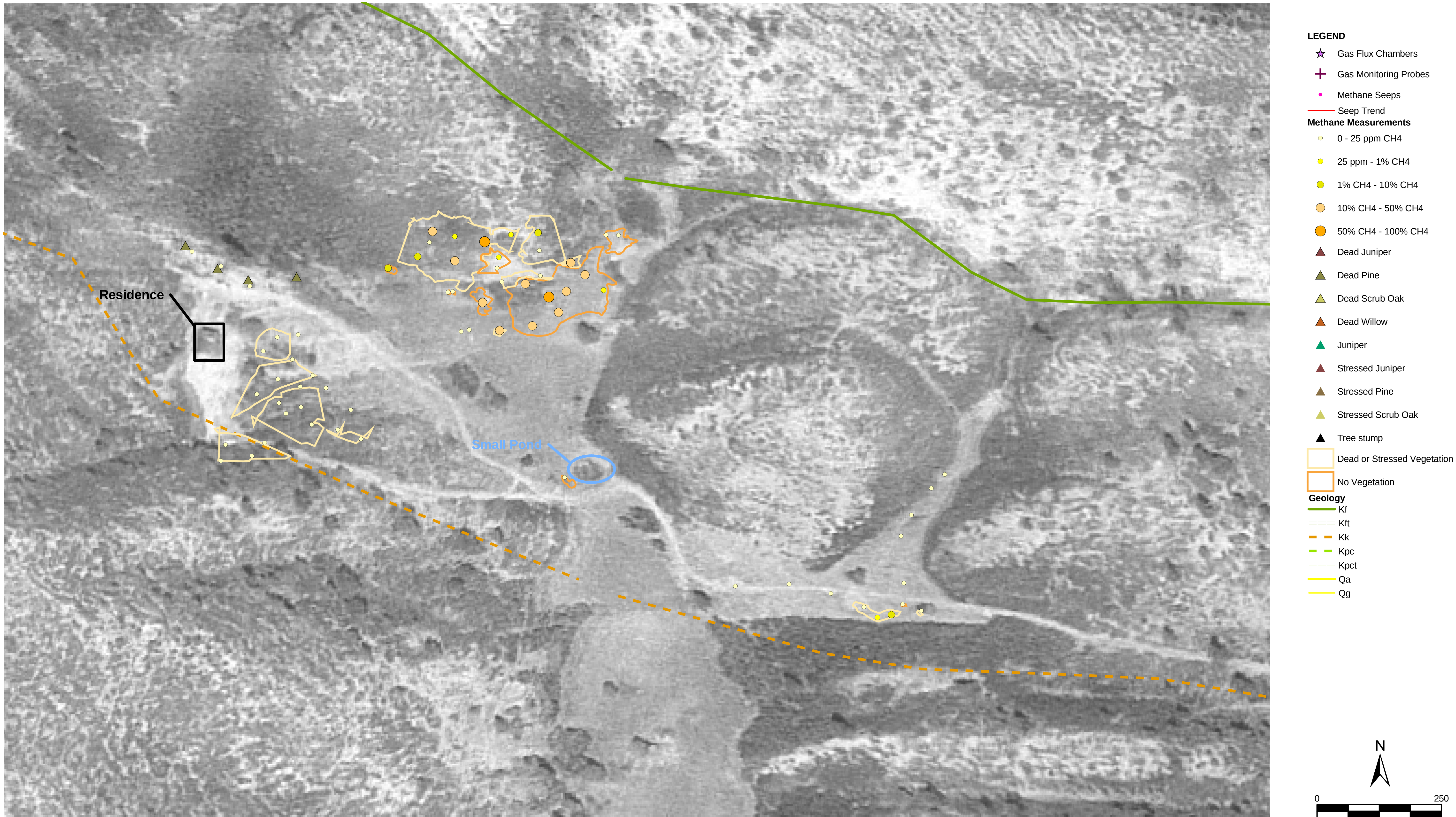


FIGURE 24
2004 DETAILED SEEP MAPPING
HOIER PROPERTY

THE GROUP

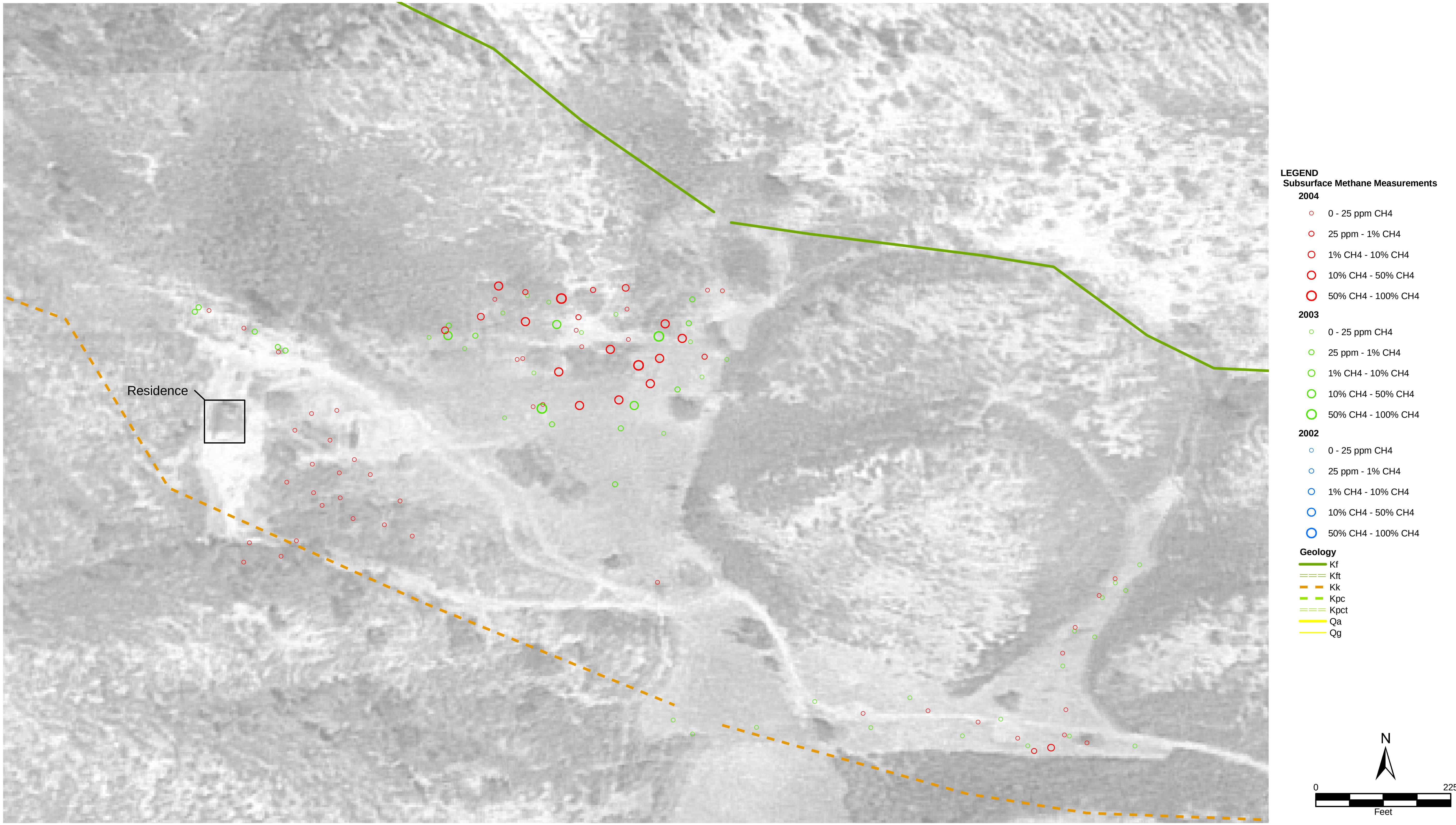


FIGURE 25
HISTORICAL DATA COMPARISON
SUBSURFACE METHANE MEASUREMENTS
HOIER PROPERTY

THE GROUP

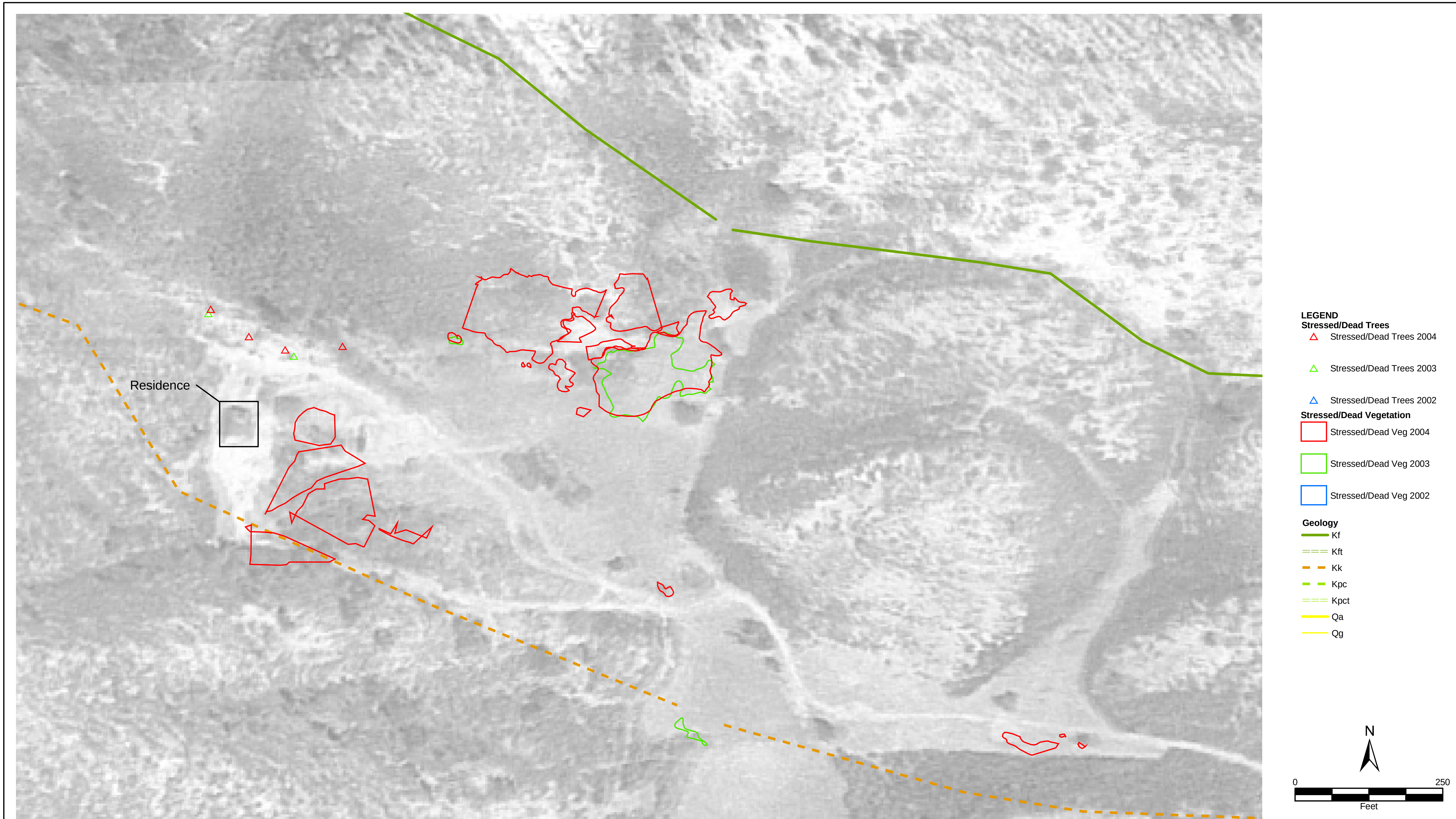


FIGURE 26
HISTORICAL DATA COMPARISON
STRESSED/DEAD VEGETATION
HOIER PROPERTY

THE GROUP

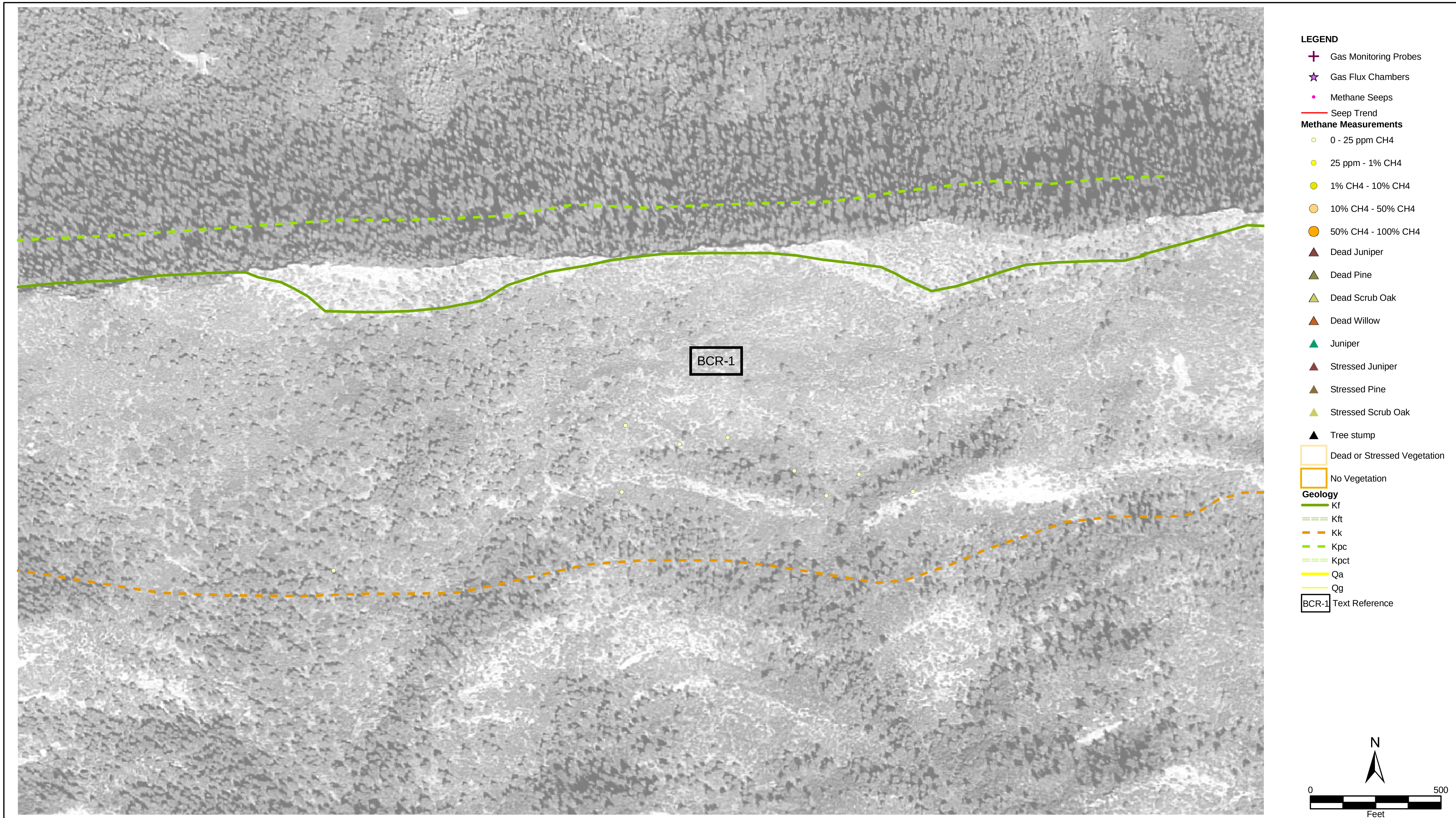
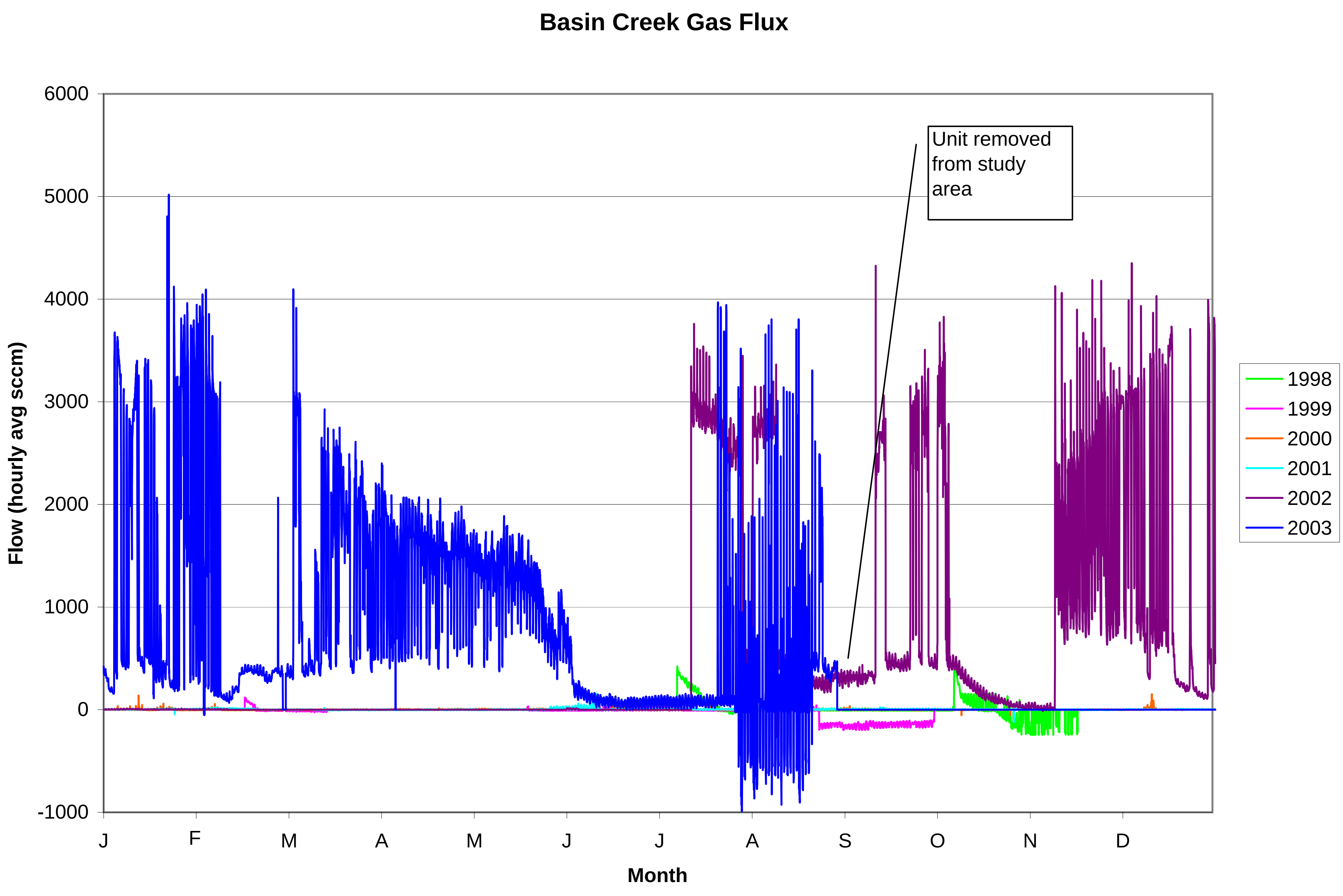


FIGURE 27
2004 DETAILED SEEP MAPPING
BEAVER CREEK RANCH

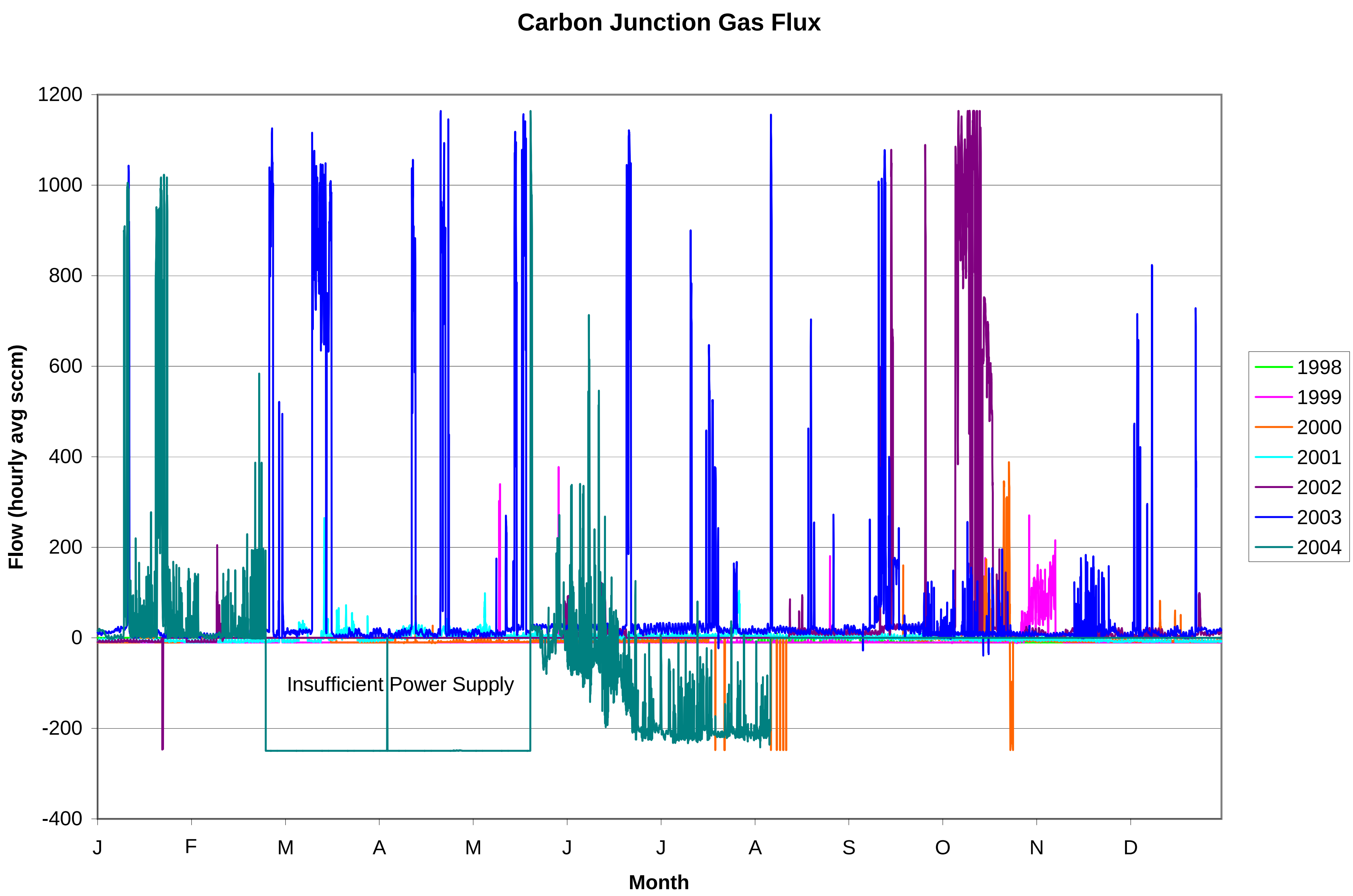
THE GROUP

APPENDIX A

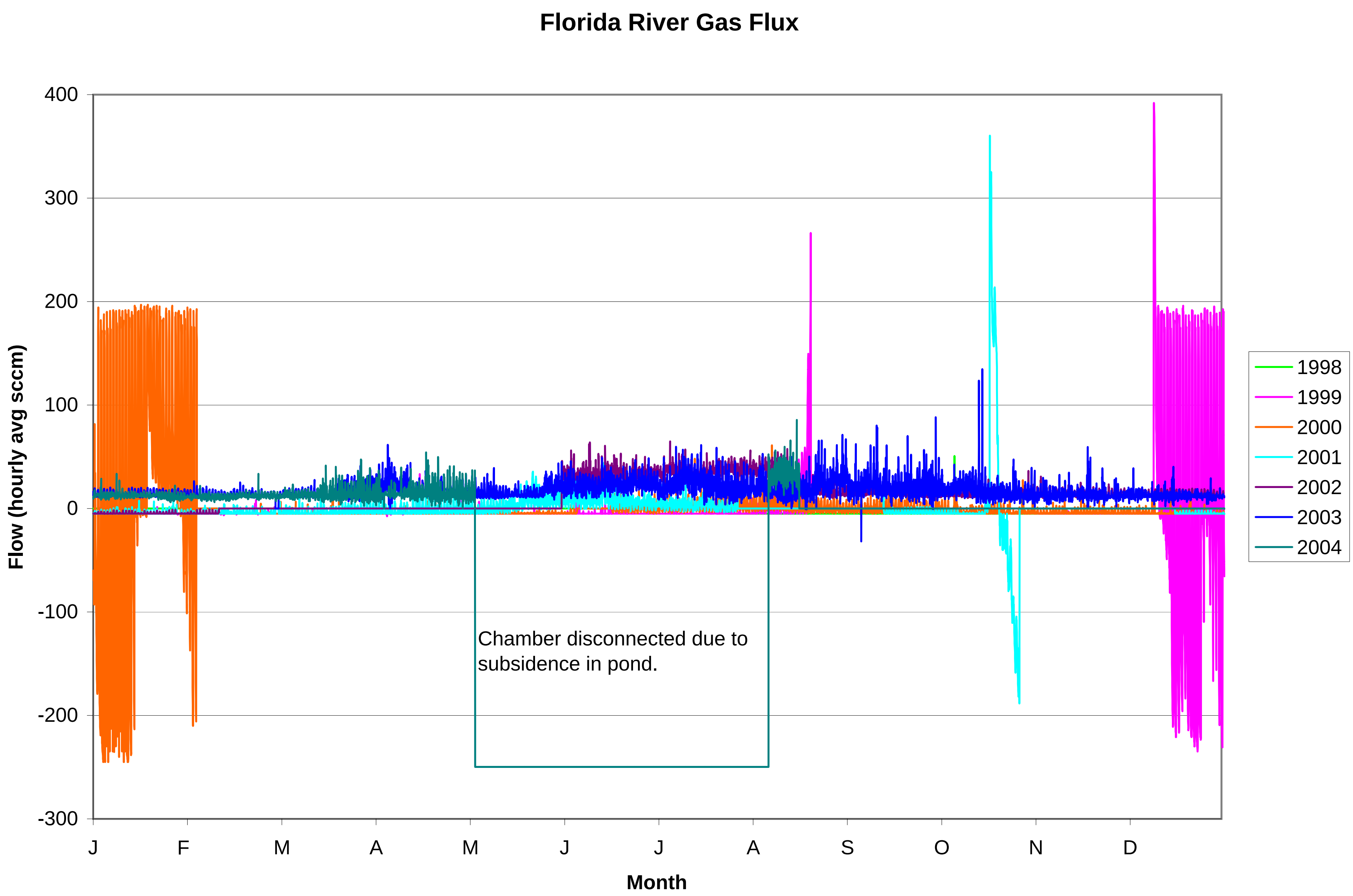
FLUX CHAMBER DATA



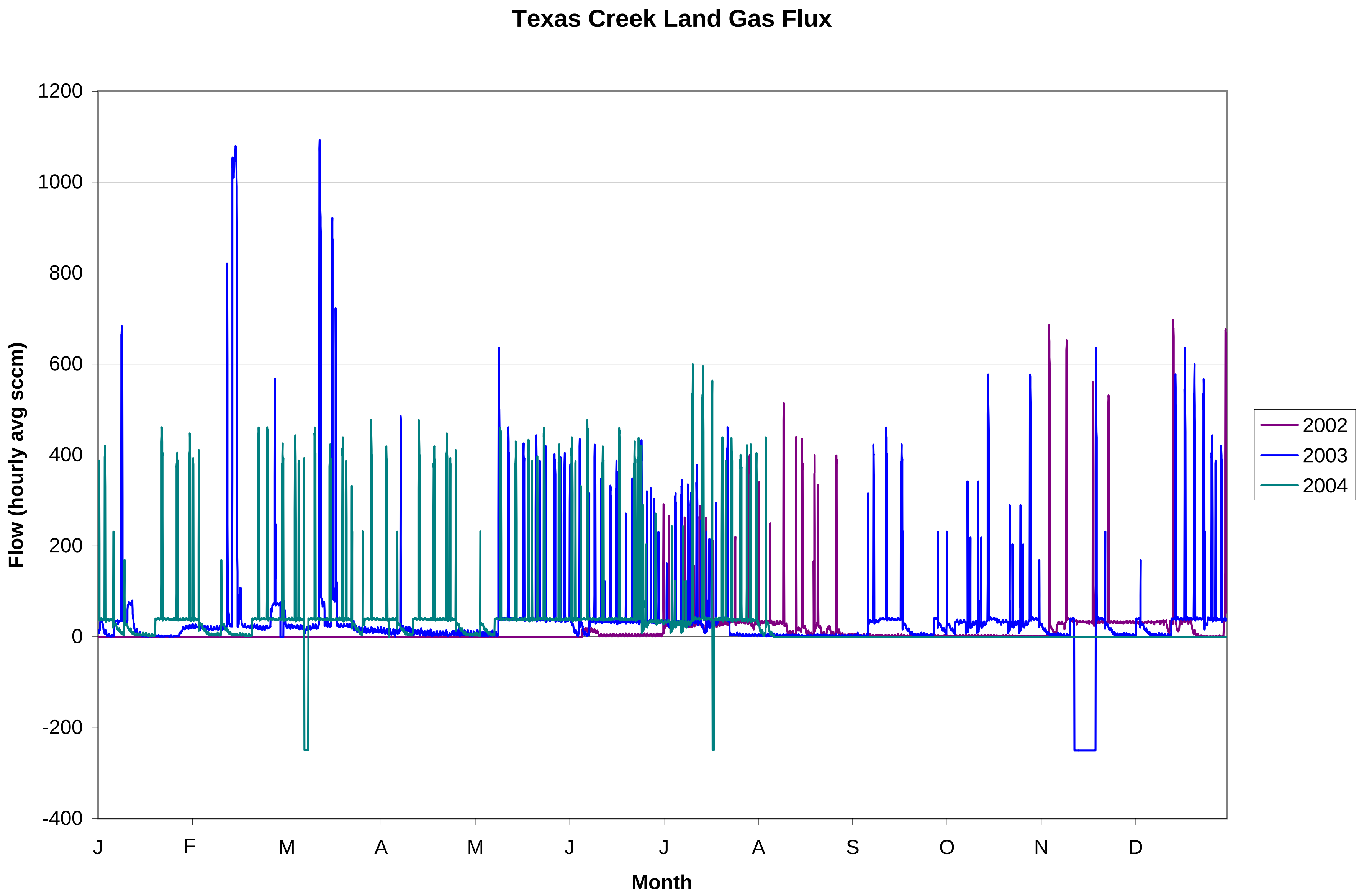
FlowCht_100404 chtBC
10/15/2004



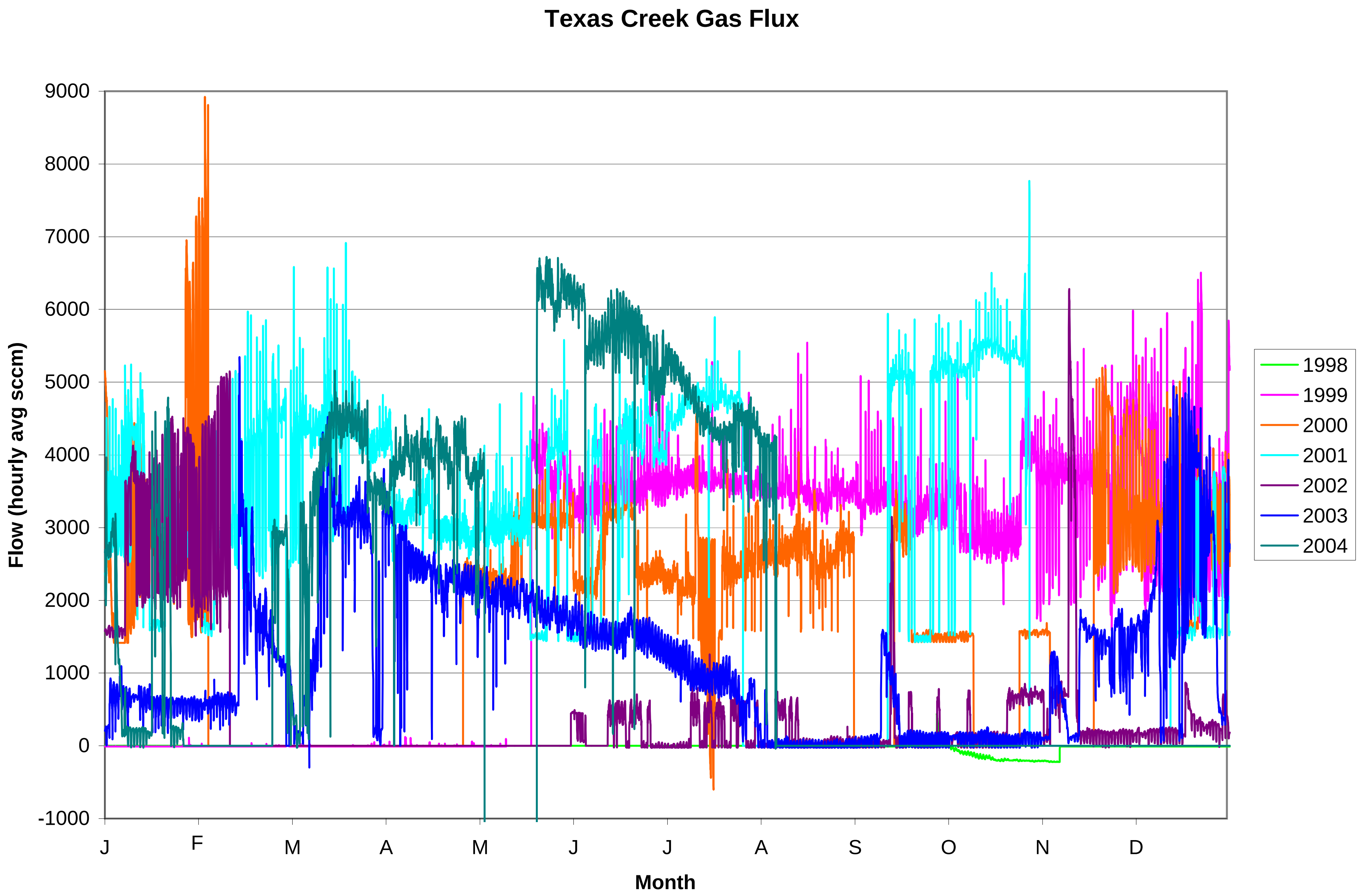
FlowCht_100404 chtCJ
10/15/2004



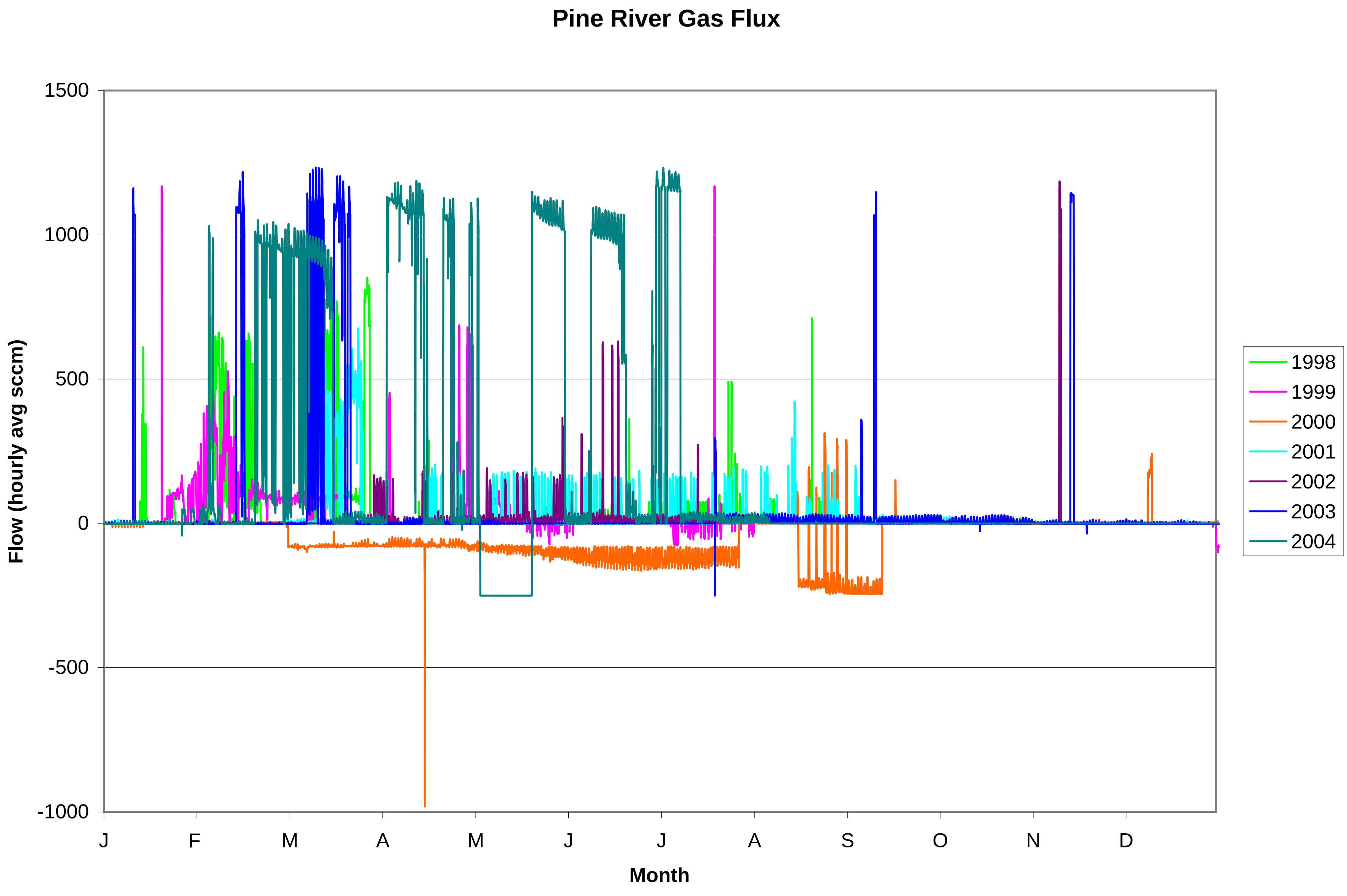
FlowCht_100404 chtFR
10/15/2004



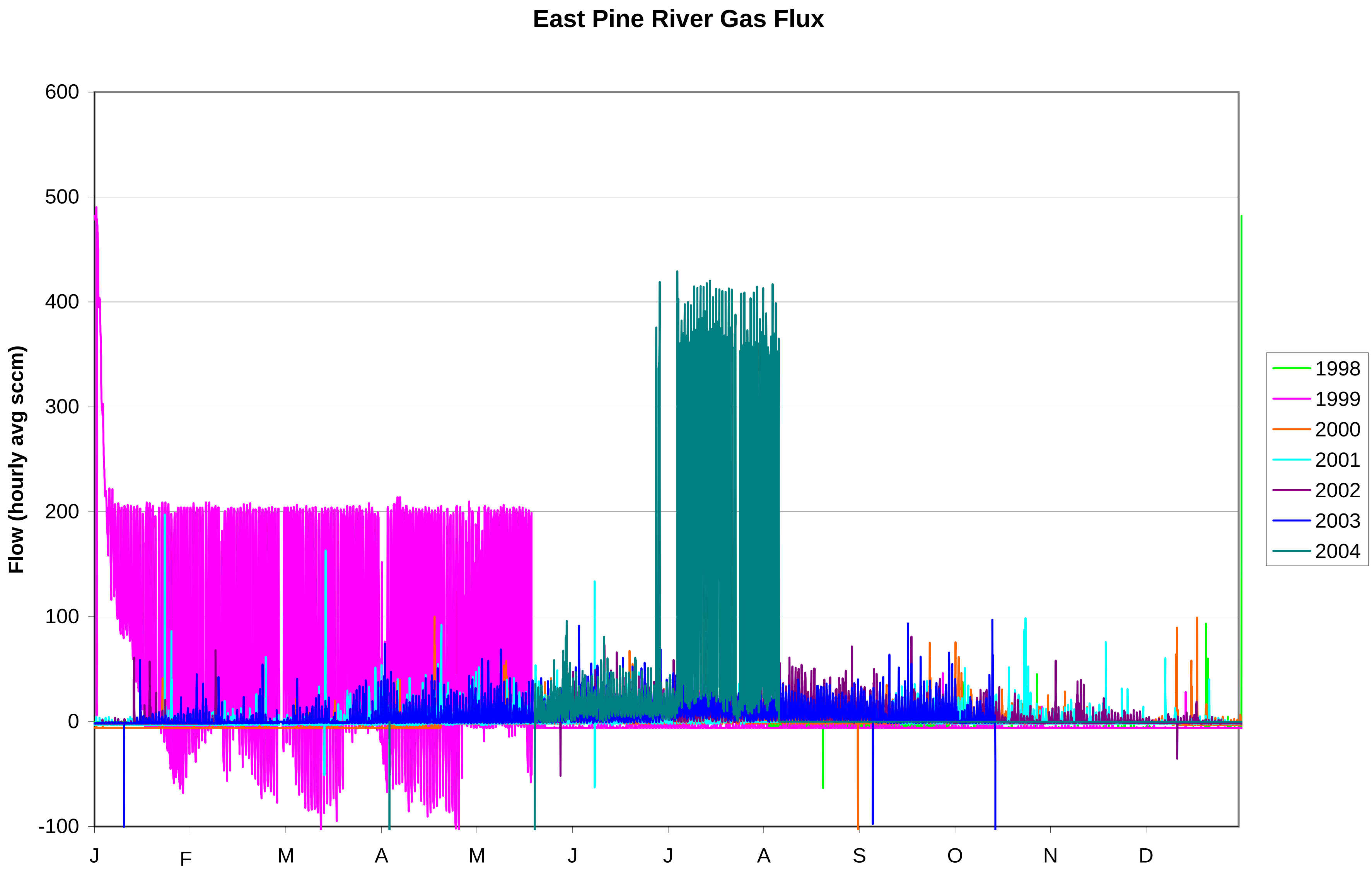
FlowCht_100404 chtTL
10/15/2004



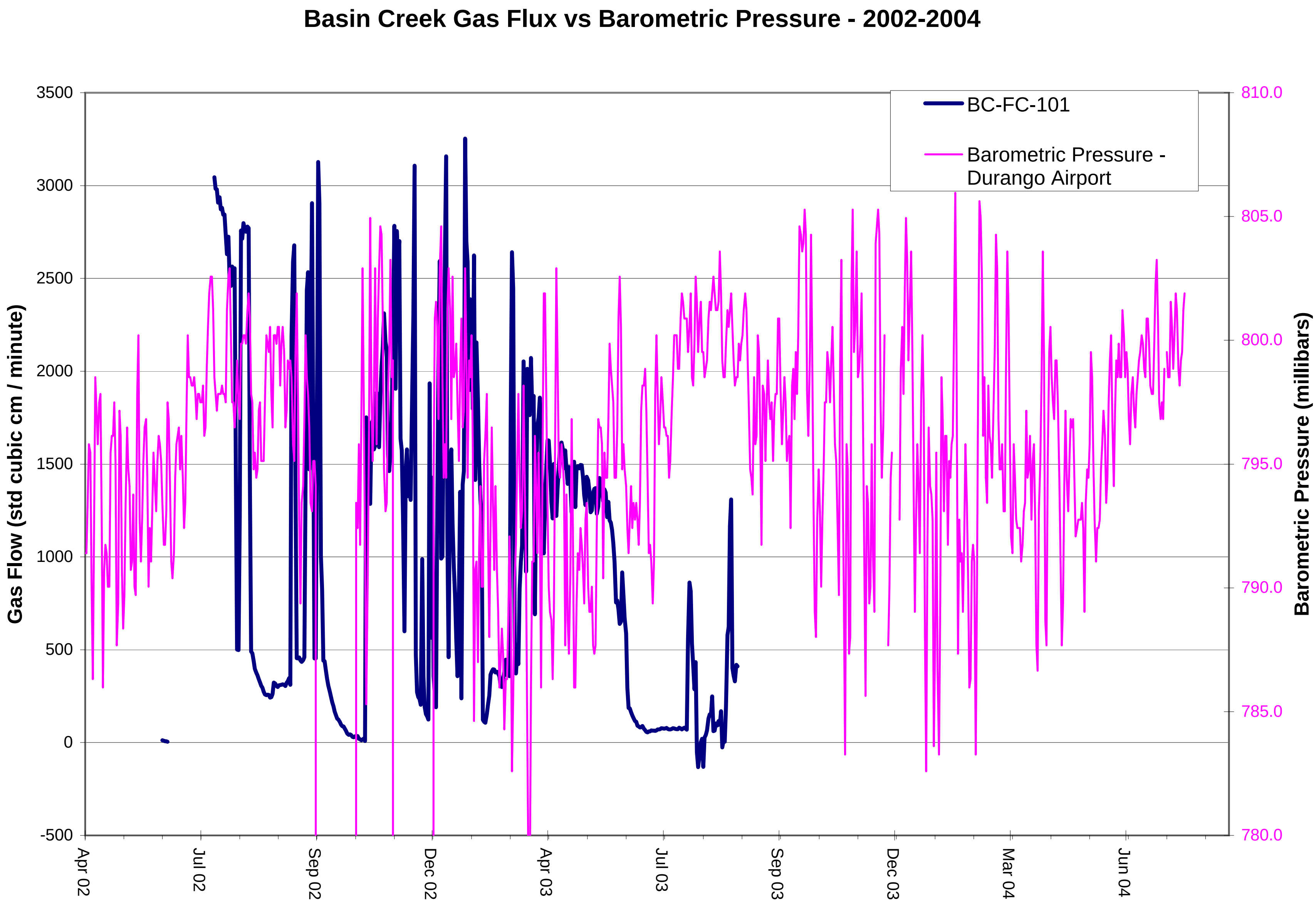
FlowCht_100404 chtTC
10/15/2004



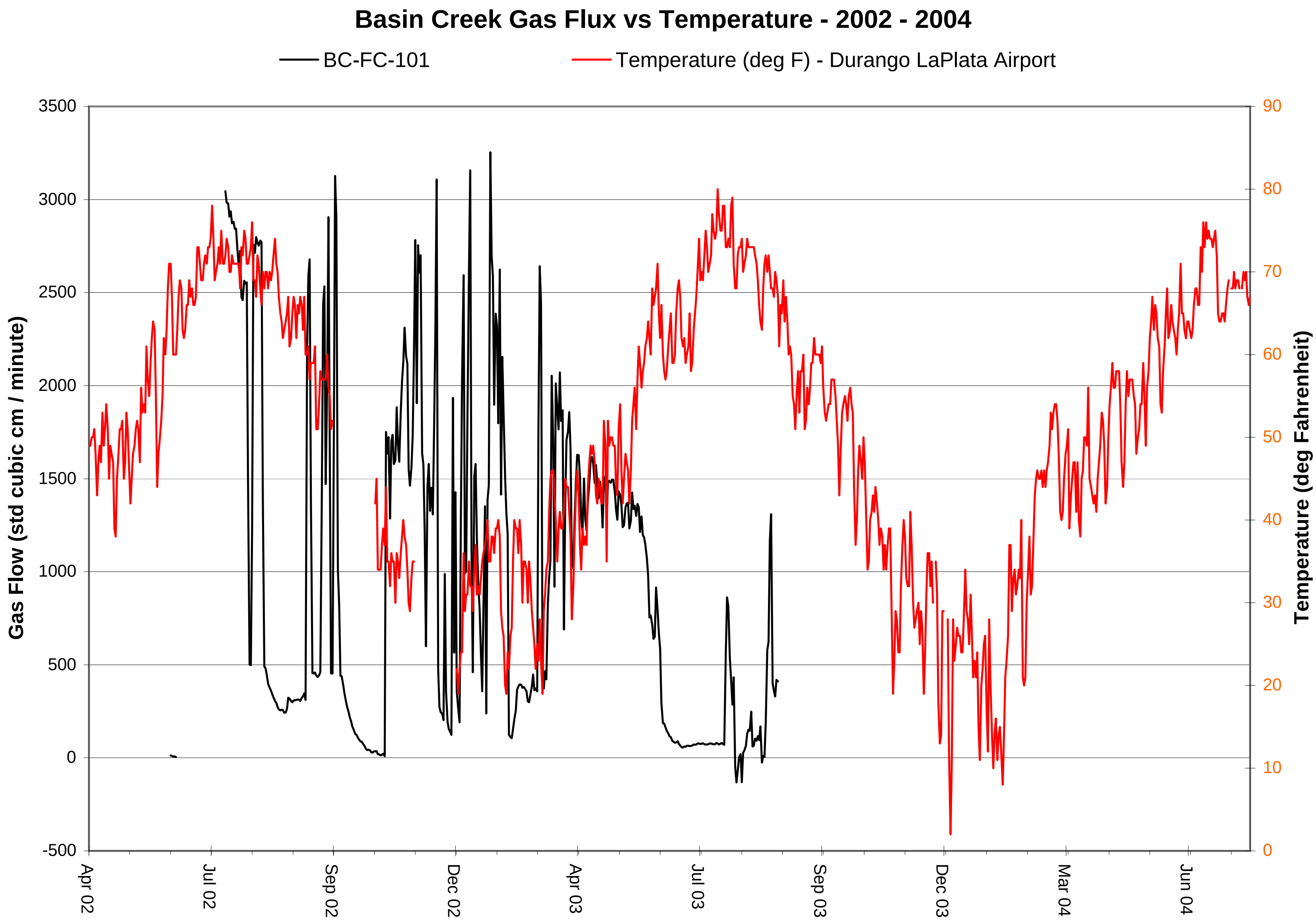
FlowCht_100404 chtPR
10/14/2004



FlowCht_100404 chtEP
10/14/2004

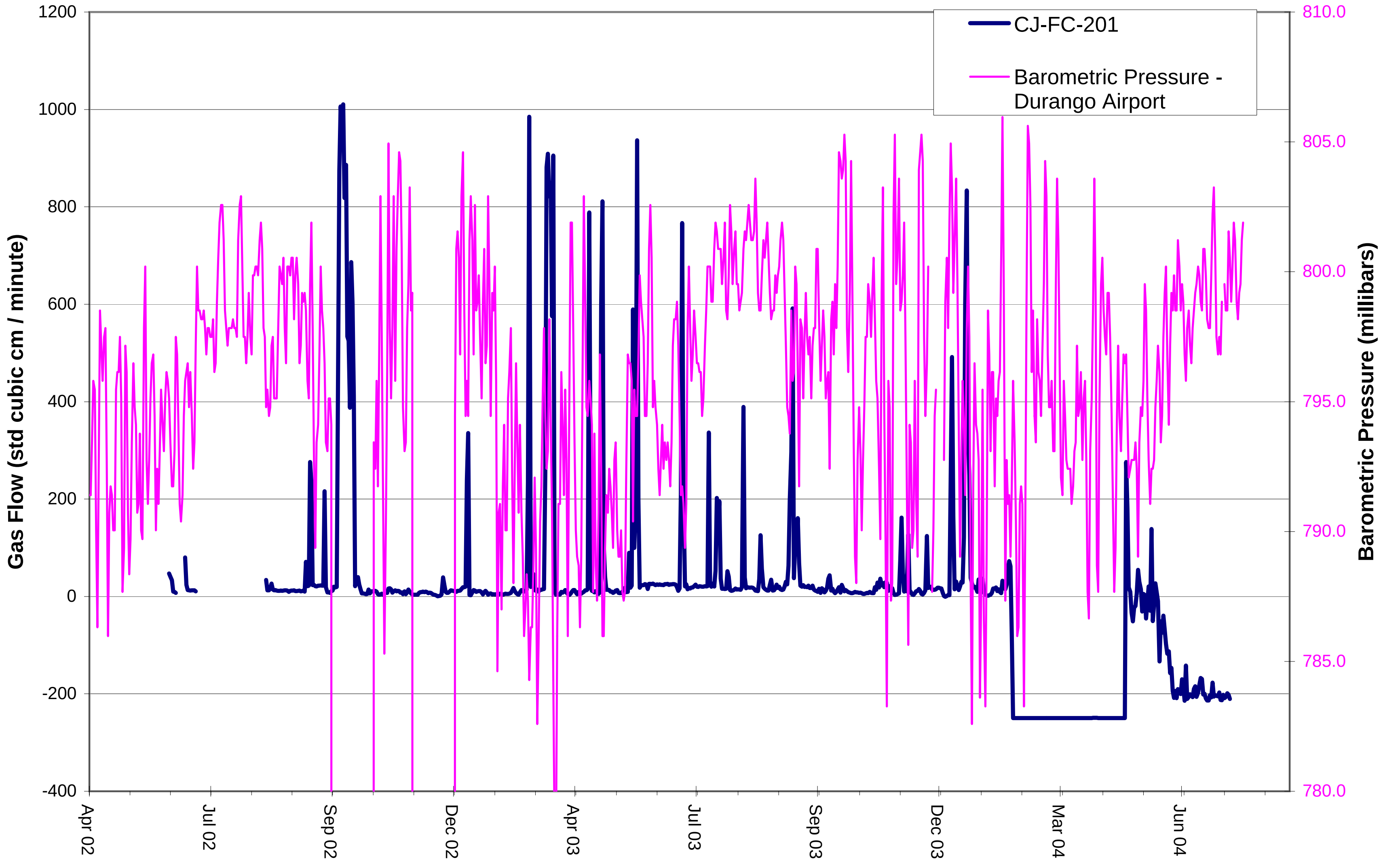


FlowCht_100404 chtBCFlowVsBar 10/15/2004

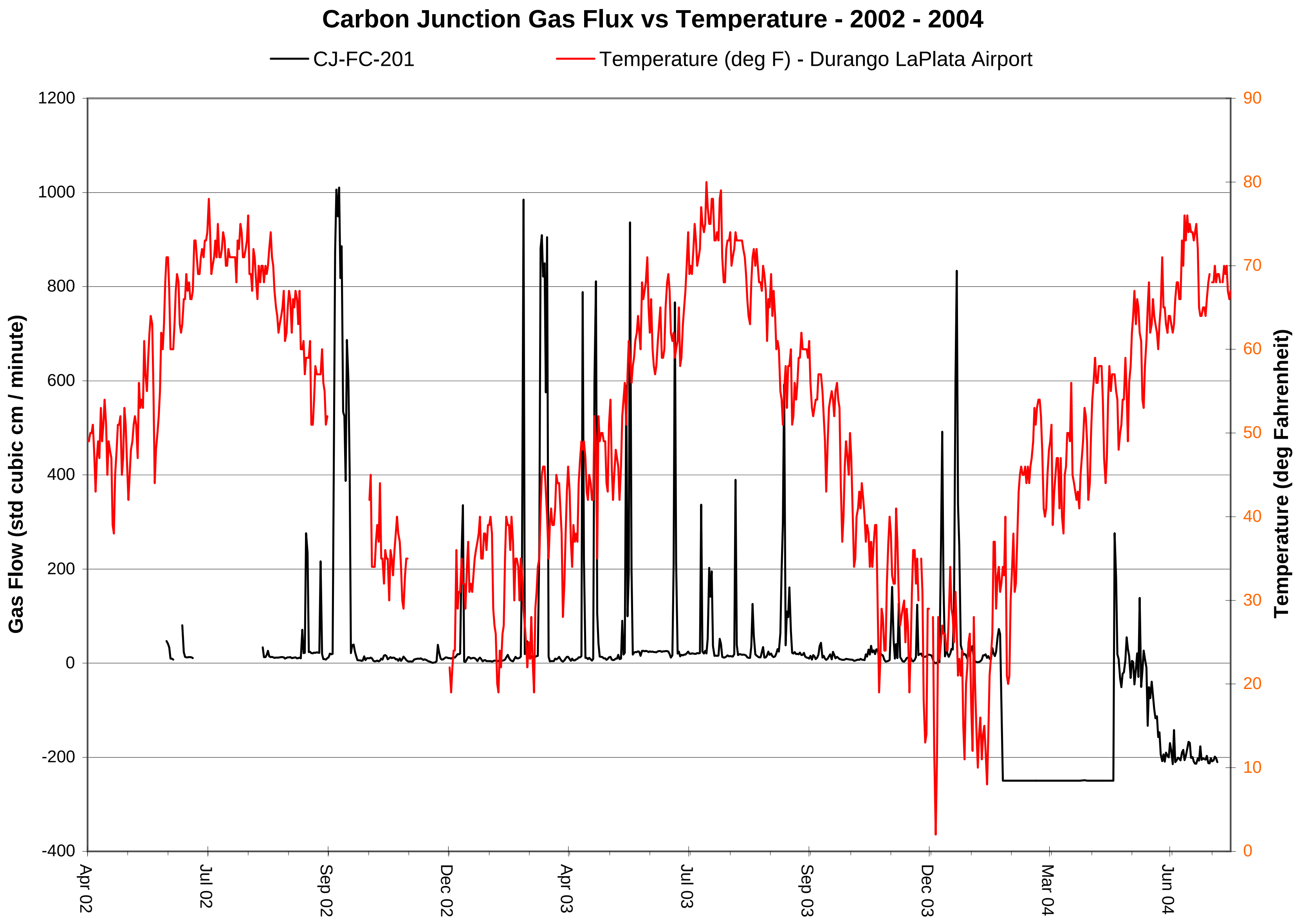


FlowCht_100404 chtBCFlowVsTemp 10/15/2004

Carbon Junction Gas Flux vs Barometric Pressure - 2002-2004

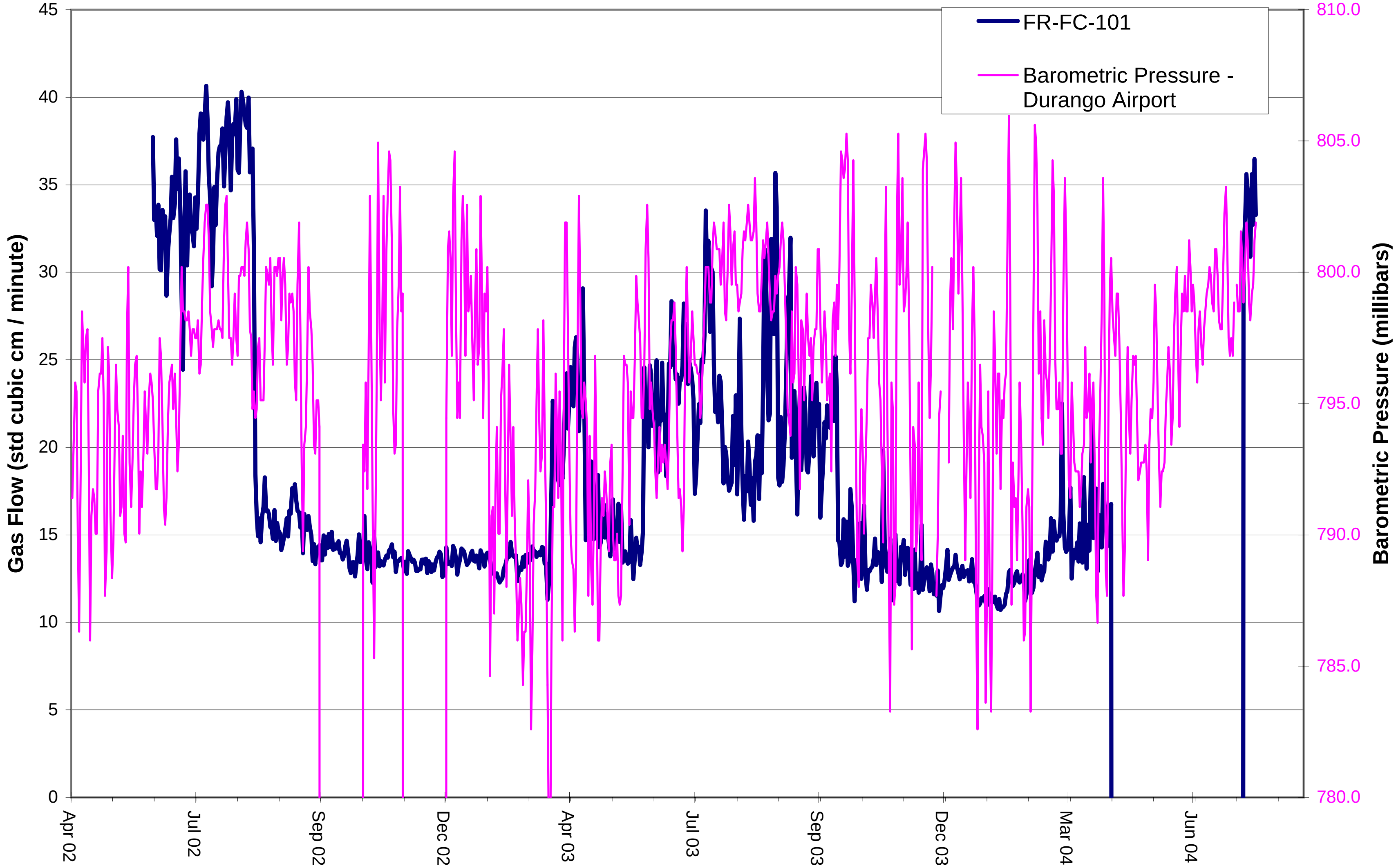


FlowCht_100404 chtCJFlowVsBar 10/15/2004

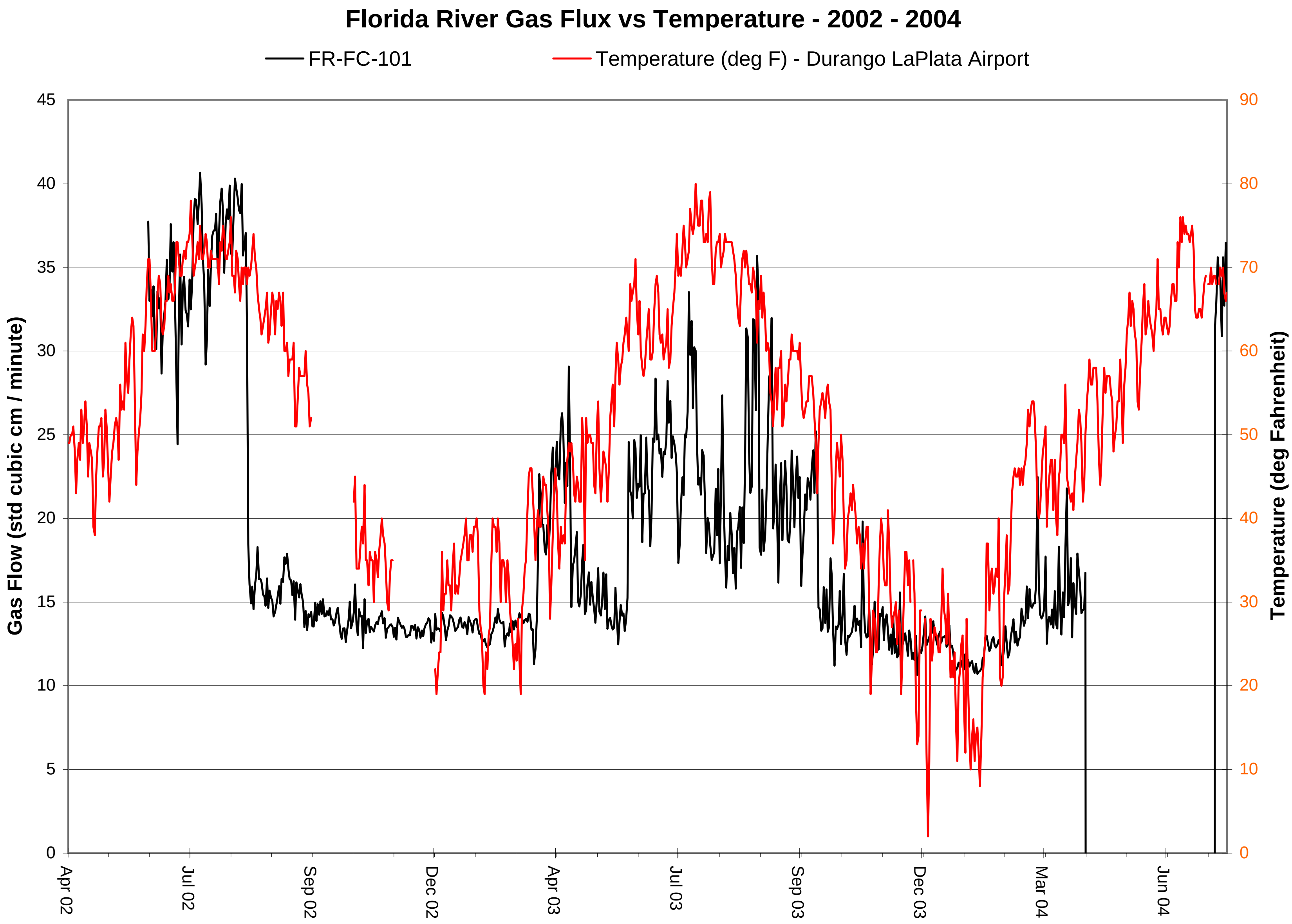


FlowCht_100404 chtCJFlowVsTemp 10/15/2004

Florida River Gas Flux vs Barometric Pressure - 2002-2004

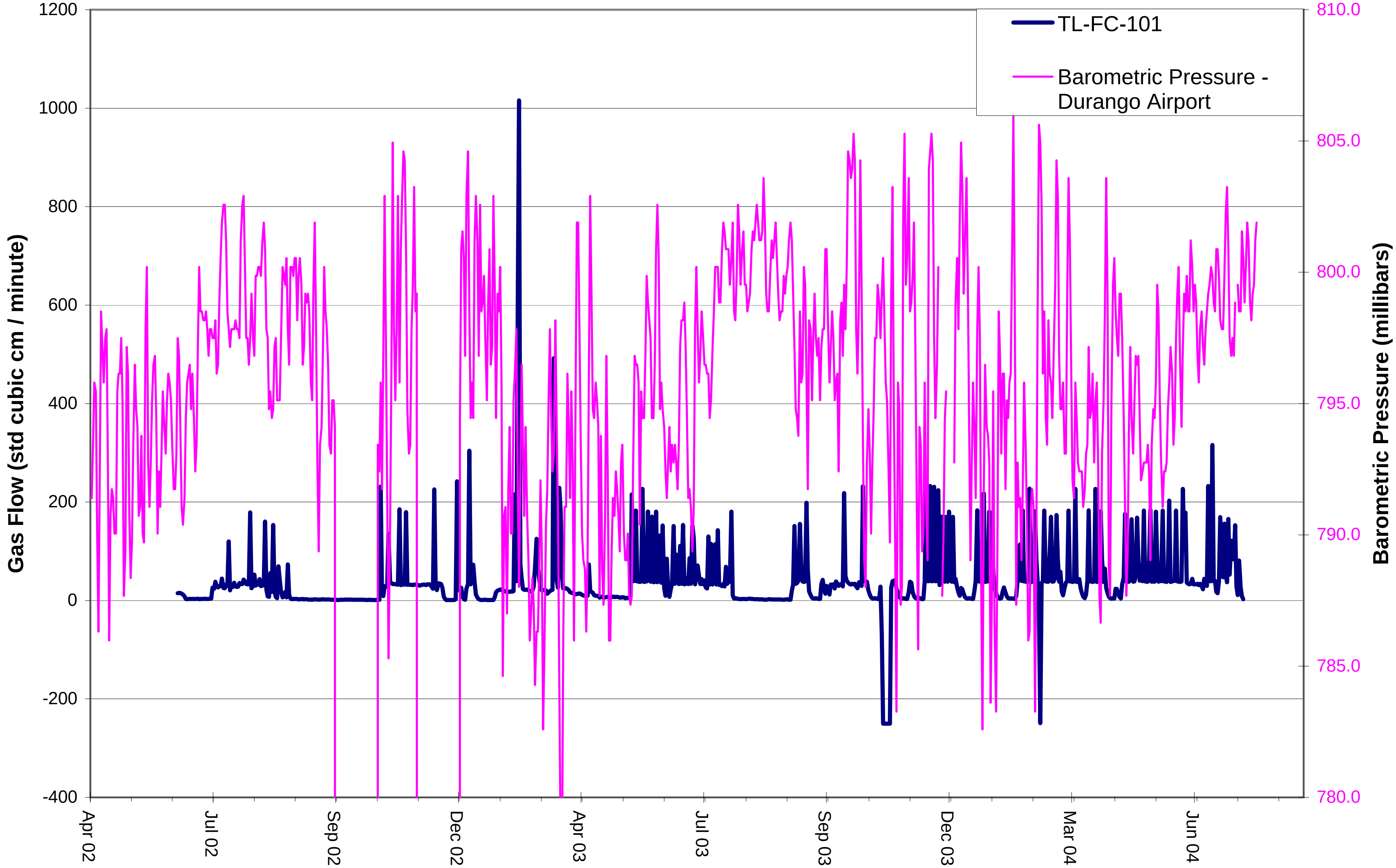


FlowCht_100404 chtFRFlowVsBar 10/15/2004

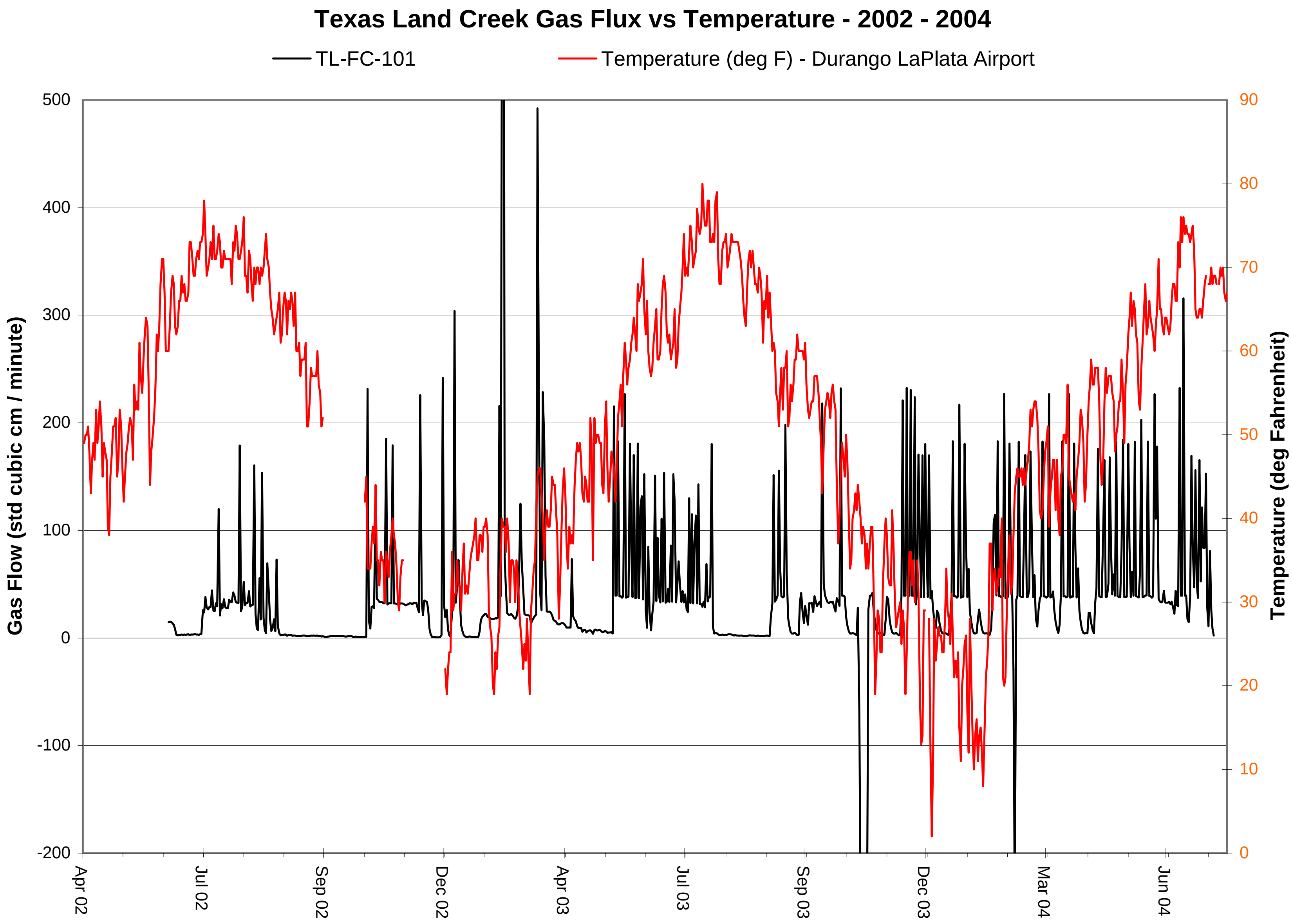


FlowCht_100404 chtFRFlowVsTemp 10/15/2004

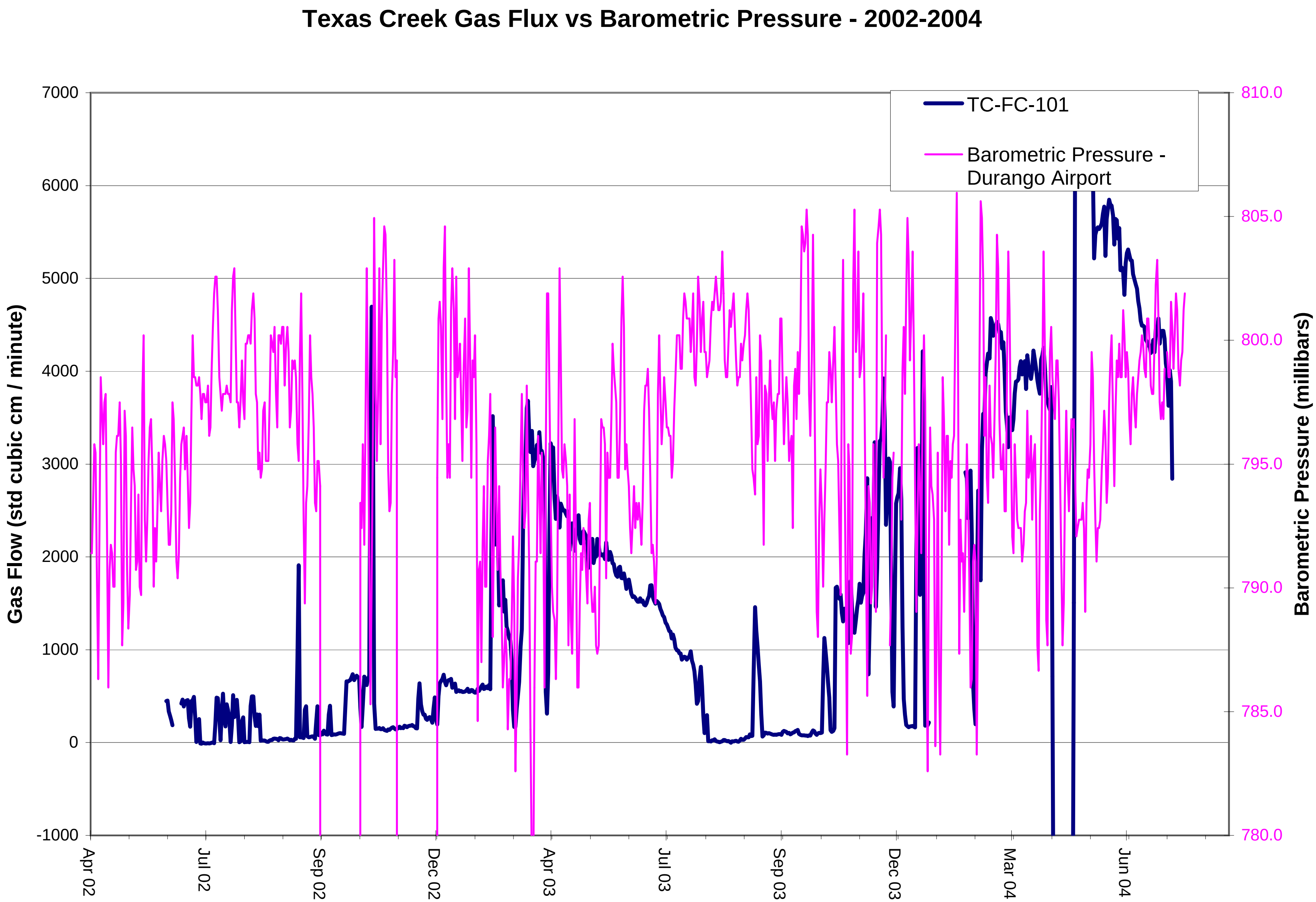
Texas Creek Land Gas Flux vs Barometric Pressure - 2002-2004



FlowCht_100404 chtTLFlowVsBar 10/15/2004

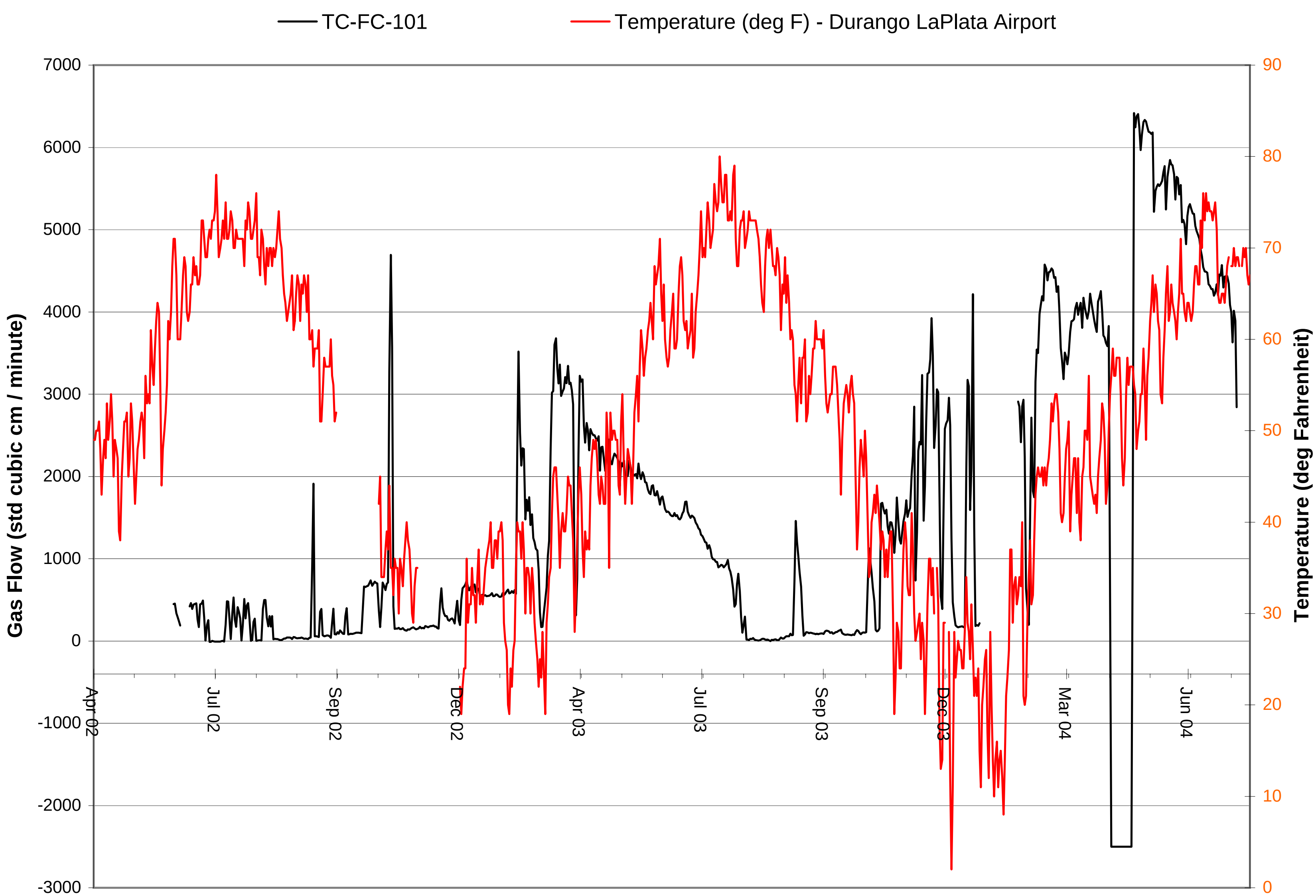


FlowCht_100404 chtTLFlowVsTemp 10/15/2004



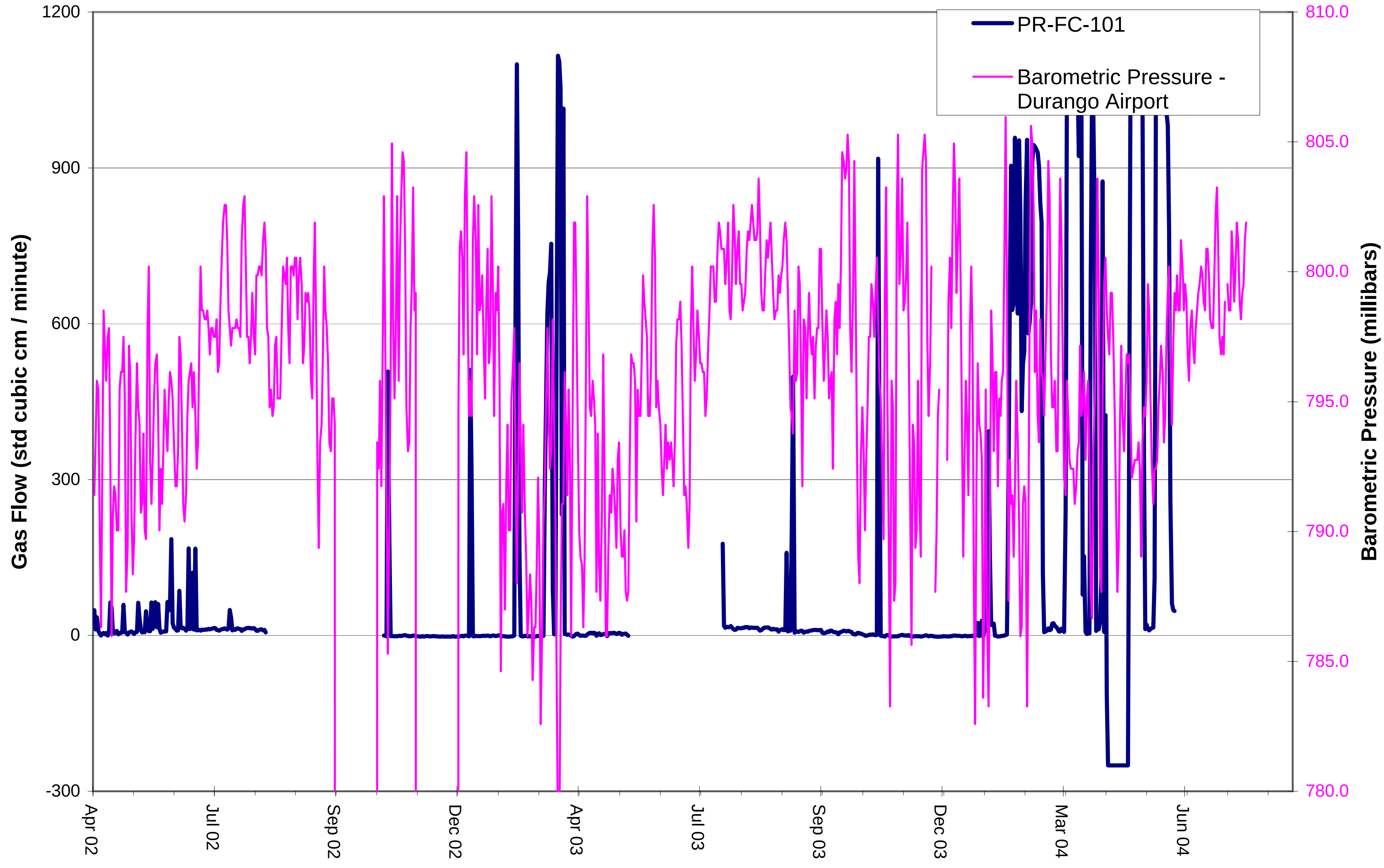
FlowCht_100404 chtTCFlowVsBar 10/15/2004

Texas Creek Gas Flux vs Temperature - 2002 - 2004

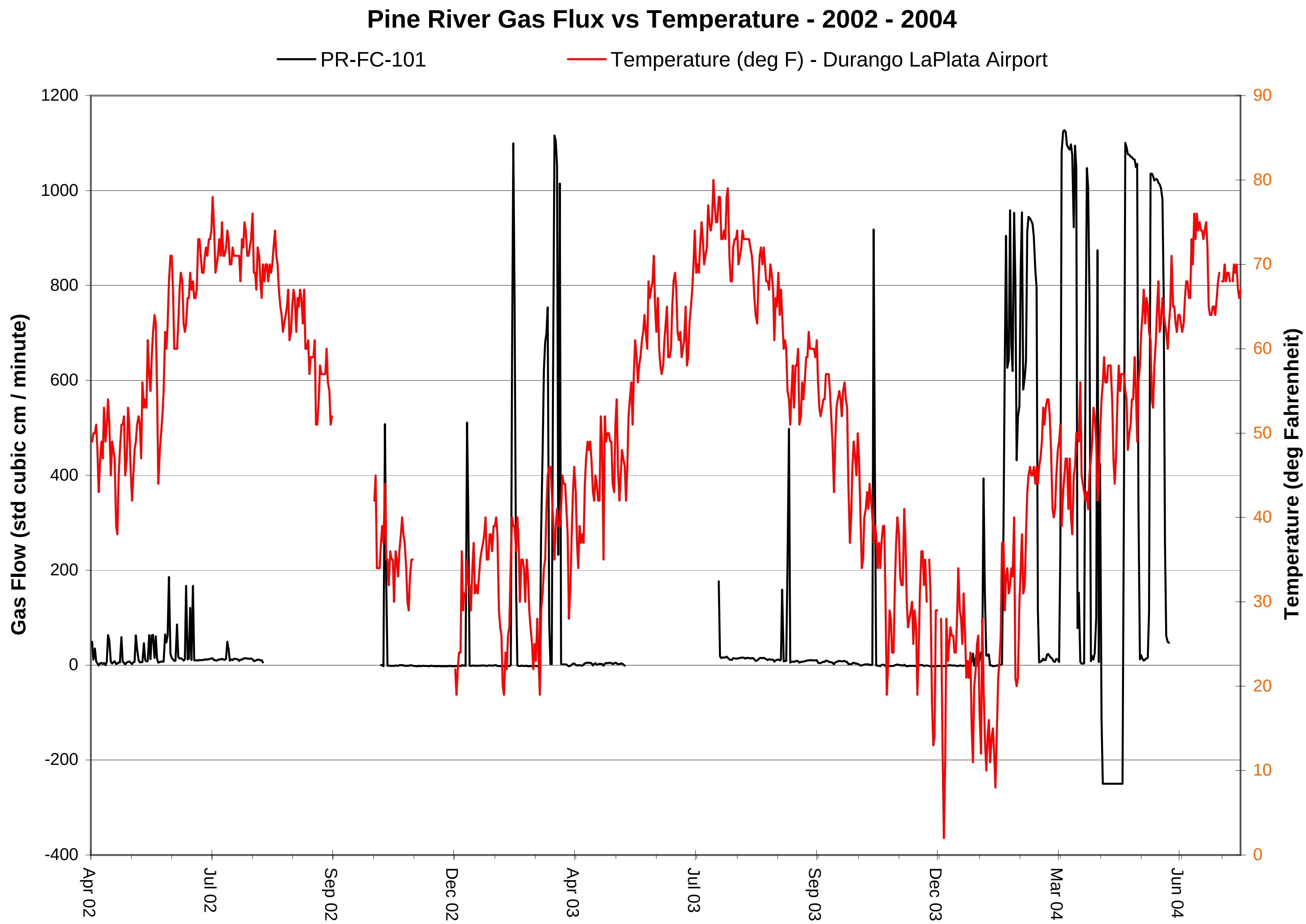


FlowCht_100404 chtTCFlowVsTemp 10/15/2004

Pine River Gas Flux vs Barometric Pressure - 2002-2004

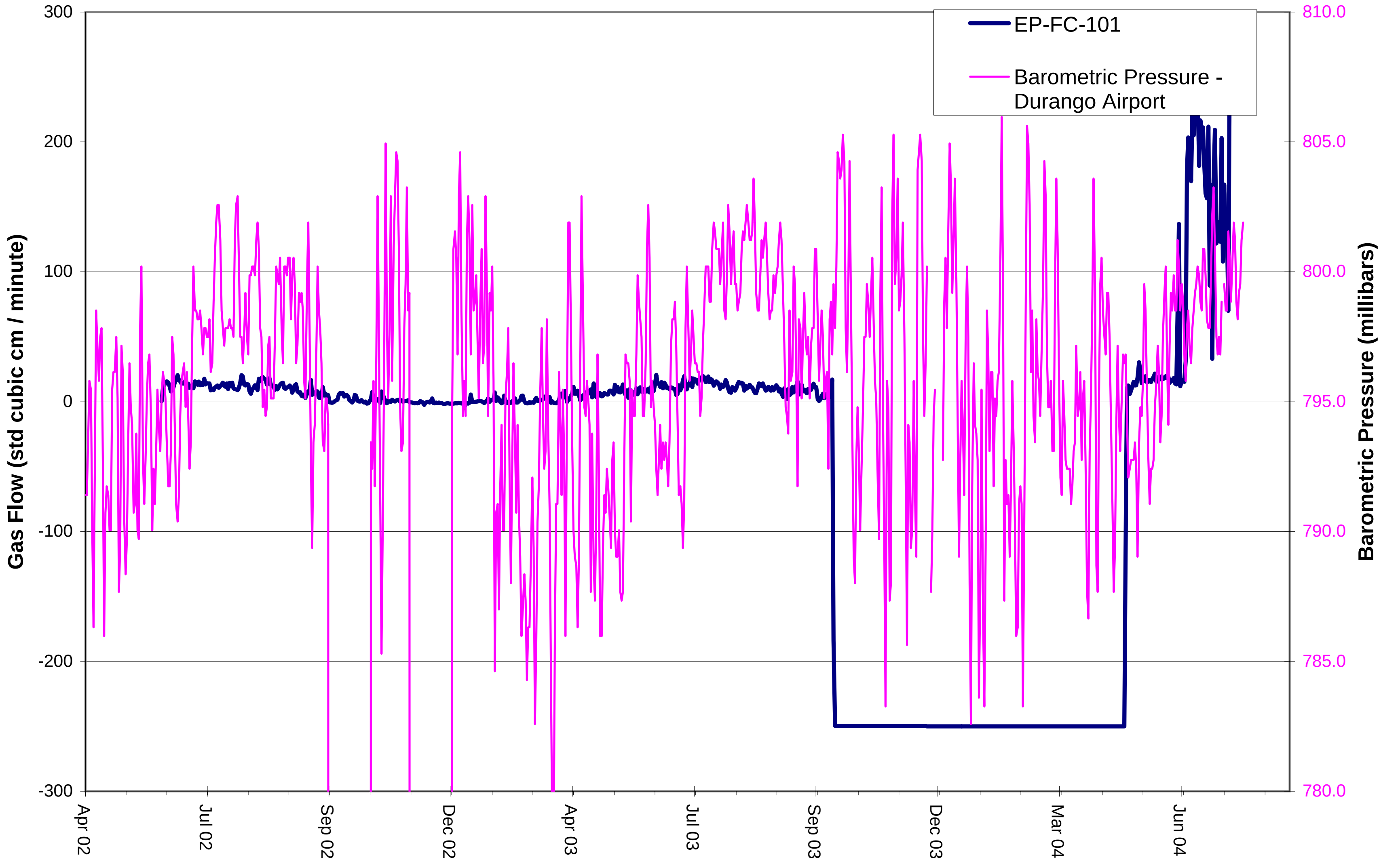


FlowCht_100404 chtPRFlowVsBar 10/15/2004

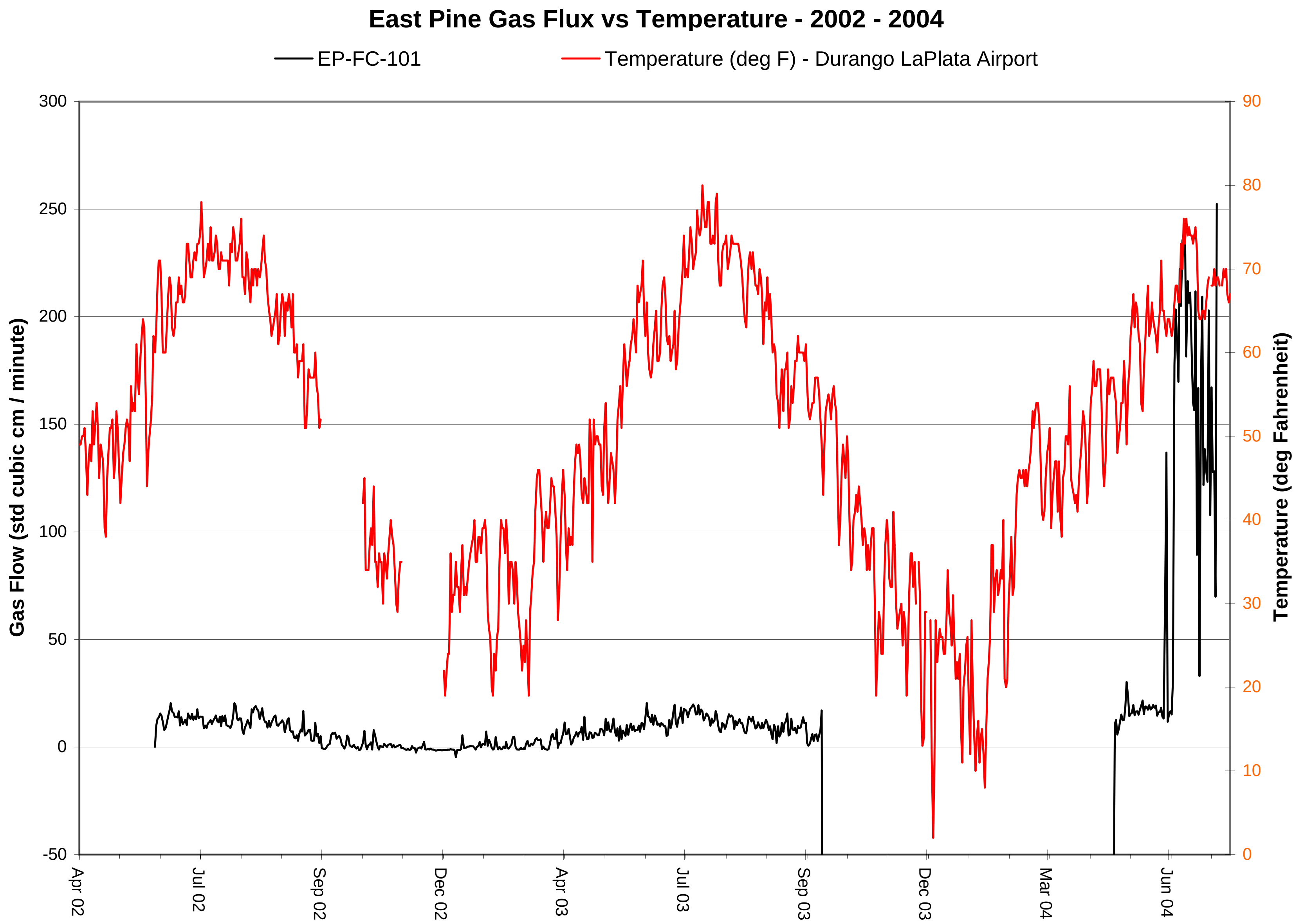


FlowCht_100404 chtPRFlowVsTemp 10/15/2004

East Pine Gas Flux vs Barometric Pressure - 2002-2004



FlowCht_100404 chtEPFlowVsBar 10/15/2004



FlowCht_100404 chtEPFlowVsTemp 10/15/2004