

FRUITLAND OUTCROP MONITORING REPORT

LA PLATA COUNTY, COLORADO



JANUARY 2007



Prepared for:

THE GROUP
Durango, Colorado



FRUITLAND OUTCROP MONITORING REPORT
LA PLATA COUNTY, COLORADO

JANUARY 2007

Prepared for:

THE GROUP
Durango, Colorado

Prepared By:

LT ENVIRONMENTAL, INC.
4600 West 60th Avenue
Arvada, Colorado 80003
(303) 433-9788



TABLE OF CONTENTS

	<u>Page</u>
EXECUTIVE SUMMARY	vi
GAS FLUX CHAMBERS	vi
DETAILED SEEP MAPPING	vi
PERMANENT MONITORING PROBES	vii
NATURAL SPRING SURVEY	viii
RECOMMENDATIONS	viii
SECTION 1.0 INTRODUCTION	1-1
1.1 OBJECTIVES	1-1
1.2 ORGANIZATION OF REPORT	1-1
1.3 BACKGROUND INFORMATION	1-1
SECTION 2.0 FIELD METHODS	2-1
2.1 DETAILED METHANE GAS SEEP MAPPING	2-1
2.1.1 Types of Features Observed	2-2
2.1.2 Use of GPS	2-2
2.1.3 Gas Measurement Collection	2-3
2.1.4 Texas Creek Grid Mapping System	2-3
2.2 PERMANENT PROBE MONITORING	2-3
2.3 NATURAL SPRING SURVEY	2-4
2.4 LIMITATIONS	2-5
SECTION 3.0 DETAILED SEEP MAPPING RESULTS	3-1
3.1 BASIN CREEK	3-1
3.1.1 Observed Methane Seeps in Surface Water	3-1
3.1.2 Lowland Areas	3-2
3.1.3 Upland Areas	3-2
3.1.4 Comparison to Previous Surveys	3-3
3.2 CARBON JUNCTION	3-4
3.2.1 Observed Methane Seeps in Surface Water	3-4
3.2.2 Lowland Areas	3-5
3.2.3 Upland Areas	3-5
3.2.4 Comparison to Previous Surveys	3-6



TABLE OF CONTENTS (CONTINUED)

	<u>Page</u>
3.3 FLORIDA RIVER	3-8
3.3.1 Observed Methane Seeps in Surface Water	3-8
3.3.2 Lowland Areas	3-9
3.3.3 Upland Areas	3-10
3.3.4 Comparison to Previous Surveys	3-10
3.4 VOSBURG PIKE.....	3-12
3.4.1 Observed Methane Seeps in Surface Water	3-12
3.4.2 Lowland Areas	3-12
3.4.3 Upland Areas	3-12
3.4.4 Comparison to Previous Surveys	3-13
3.5 SOUTH FORK TEXAS CREEK.....	3-13
3.5.1 Observed Methane Seeps in Surface Water	3-14
3.5.2 Lowland Areas	3-14
3.5.3 Upland Areas	3-15
3.5.4 Comparison to Previous Surveys	3-16
3.6 HOIER PROPERTY	3-18
3.6.1 Observed Methane Seeps in Surface Water	3-18
3.6.2 Lowland Areas	3-18
3.6.3 Upland Areas	3-19
3.6.4 Comparison to Previous Surveys	3-19
3.7 PINE RIVER.....	3-20
3.7.1 Observed Methane Seeps in Surface Water	3-20
3.7.2 Lowland Areas	3-21
3.7.3 Upland Areas	3-21
3.7.4 Comparison to Previous Surveys	3-21
3.8 DETAILED MAPPING SUMMARY	3-22
SECTION 4.0 BLM PERMANENT MONITORING PROBES.....	4-1
4.1 BACKGROUND INFORMATION	4-1
4.2 STATISTICAL METHOD	4-1
4.3 2006 STATISTICAL EVALUATION	4-1
4.4 BLM PERMANENT MONITORING PROBE SUMMARY	4-2



TABLE OF CONTENTS (CONTINUED)

	<u>Page</u>
SECTION 5.0 NATURAL SPRING SURVEY RESULTS	5-1
SECTION 6.0 CONCLUSIONS AND RECOMMENDATIONS	6-1
6.1 GAS FLUX CHAMBERS	6-1
6.2 DETAILED SEEP MAPPING	6-1
6.3 PERMANENT MONITORING PROBES	6-2
6.4 NATURAL SPRING SURVEY	6-3
6.5 RECOMMENDATIONS	6-3

LIST OF TABLES

TABLE 1	STATISTICAL ANALYSIS SUMMARY
TABLE 2	STATISTICAL ANALYSIS OF TRENDS IN PERMANENT MONITORING PROBE DATA
TABLE 3	NATURAL SPRING WATER SAMPLE ANALYTICAL RESULTS

LIST OF FIGURES

FIGURE 1A	PROJECT AREA MAP
FIGURE 1B	PROJECT AREA MAP (detail)
FIGURE 2	2006 DETAILED SEEP MAPPING – BASIN CREEK
FIGURE 3	2006 DETAILED SEEP MAPPING – BASIN CREEK NORTH
FIGURE 4	HISTORICAL DATA COMPARISON – SUBSURFACE METHANE MEASUREMENTS – BASIN CREEK
FIGURE 5	HISTORICAL DATA COMPARISON – STRESSED/DEAD VEGETATION – BASIN CREEK
FIGURE 6	HISTORICAL DATA COMPARISON VISIBLE METHANE SEEPS – BASIN CREEK
FIGURE 7	2006 DETAILED SEEP MAPPING – CARBON JUNCTION WEST
FIGURE 8	2006 DETAILED SEEP MAPPING – CARBON JUNCTION EAST
FIGURE 9	HISTORICAL DATA COMPARISON – SUBSURFACE METHANE MEASUREMENTS – CARBON JUNCTION
FIGURE 10	HISTORICAL DATA COMPARISON – STRESSED/DEAD VEGETATION – CARBON JUNCTION
FIGURE 11	HISTORICAL DATA COMPARISON – VISIBLE METHANE SEEPS – CARBON JUNCTION
FIGURE 12	2006 DETAILED SEEP MAPPING – FLORIDA RIVER WEST
FIGURE 13	2006 DETAILED SEEP MAPPING – FLORIDA RIVER EAST

TABLE OF CONTENTS (continued)

FIGURE 14	HISTORICAL DATA COMPARISON – SUBSURFACE METHANE MEASUREMENTS – FLORIDA RIVER
FIGURE 15	HISTORICAL DATA COMPARISON – STRESSED/DEAD VEGETATION – FLORIDA RIVER
FIGURE 16	HISTORICAL DATA COMPARISON – VISIBLE METHANE SEEPS – FLORIDA RIVER
FIGURE 17	2006 DETAILED SEEP MAPPING – VOSBURG PIKE
FIGURE 18	HISTORICAL DATA COMPARISON – SUBSURFACE METHANE MEASUREMENTS – VOSBURG PIKE
FIGURE 19	2006 DETAILED SEEP MAPPING – SOUTH FORK TEXAS CREEK WEST
FIGURE 20	2006 DETAILED SEEP MAPPING – SOUTH FORK TEXAS CREEK (detail)
FIGURE 21	2006 DETAILED SEEP MAPPING – SOUTH FORK TEXAS CREEK CENTRAL
FIGURE 22	2006 DETAILED SEEP MAPPING – SOUTH FORK TEXAS CREEK EAST
FIGURE 23	HISTORICAL DATA COMPARISON – SUBSURFACE METHANE MEASUREMENTS – SOUTH FORK TEXAS CREEK WEST
FIGURE 24	HISTORICAL DATA COMPARISON – SUBSURFACE METHANE MEASUREMENTS – SOUTH FORK TEXAS CREEK (detail)
FIGURE 25	HISTORICAL DATA COMPARISON – SUBSURFACE METHANE MEASUREMENTS – SOUTH FORK TEXAS CREEK CENTRAL
FIGURE 26	HISTORICAL DATA COMPARISON – SUBSURFACE METHANE MEASUREMENTS – SOUTH FORK TEXAS CREEK EAST
FIGURE 27	HISTORICAL DATA COMPARISON – STRESSED/DEAD VEGETATION – SOUTH FORK TEXAS CREEK WEST
FIGURE 28	HISTORICAL DATA COMPARISON – STRESSED/DEAD VEGETATION – SOUTH FORK TEXAS CREEK - DETAIL
FIGURE 29	HISTORICAL DATA COMPARISON – STRESSED/DEAD VEGETATION – SOUTH FORK TEXAS CREEK CENTRAL
FIGURE 30	HISTORICAL DATA COMPARISON – STRESSED/DEAD VEGETATION – SOUTH FORK TEXAS CREEK EAST
FIGURE 31	HISTORICAL DATA COMPARISON – VISIBLE METHANE SEEPS – SOUTH FORK TEXAS CREEK (detail)
FIGURE 32	2006 DETAILED SEEP MAPPING – HOIER PROPERTY
FIGURE 33	HISTORICAL DATA COMPARISON – SUBSURFACE METHANE MEASUREMENTS – HOIER PROPERTY
FIGURE 34	HISTORICAL DATA COMPARISON – STRESSED/DEAD VEGETATION – HOIER PROPERTY
FIGURE 35	2005 DETAILED SEEP MAPPING – PINE RIVER
FIGURE 36	2005 DETAILED SEEP MAPPING - PINE RIVER (detail)
FIGURE 37	HISTORICAL DATA COMPARISON – SUBSURFACE METHANE MEASUREMENTS – PINE RIVER (detail)
FIGURE 38	HISTORICAL DATA COMPARISON – STRESSED/DEAD VEGETATION – PINE RIVER

TABLE OF CONTENTS (continued)

- FIGURE 39 HISTORICAL DATA COMPARISON – VISIBLE METHANE SEEPS – PINE RIVER
- FIGURE 40 2006 NATURAL SPRING SURVEY AND SUBSURFACE METHANE MEASUREMENTS – EDGEMONT RANCH
- FIGURE 41 2006 NATURAL SPRING SURVEY AND SUBSURFACE METHANE MEASUREMENTS – SOUTH FORK TEXAS CREEK
- FIGURE 42 2006 NATURAL SPRING SURVEY AND SUBSURFACE METHANE MEASUREMENTS – HOIER PROPERTY

APPENDICES

- APPENDIX A EQUIPMENT SPECIFICATIONS

EXECUTIVE SUMMARY

Since 1997, LT Environmental, Inc. (LTE) has conducted methane seep monitoring on the Fruitland Formation (Kf) outcrop north of the Southern Ute Indian Tribe (SUIT) Reservation boundary in La Plata County, Colorado. The study area is located along the northern rim of the San Juan Basin (SJB). 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 seep mapping in known seep areas; regional reconnaissance along the entire outcrop using infrared imagery (IR) and field verification (pedestrian survey); and a survey of natural springs along the Kf outcrop in La Plata County. The most recent regional reconnaissance of the entire outcrop was conducted in 2005 and was discussed in the previous monitoring report. The next regional reconnaissance is scheduled for 2008. Results of the other three monitoring tasks are presented below.

GAS FLUX CHAMBERS

The gas flux chamber monitoring has been discontinued indefinitely. As described in the 2005 report entitled *Fruitland Outcrop Monitoring Report*, LTE has identified several factors in the gas flux chamber monitoring program that support the termination of this monitoring method including: 1) data have shown no conclusive upward or downward trends during eight years of operation; 2) equipment is highly susceptible to weathering and corrosion from the elements; 3) power supply requirements cause frequent discharge of battery system despite solar powered assistance; and 4) cost of performing frequent O&M activities and extensive data manipulation outweighs value of data obtained. LTE believes that the detailed seep mapping, regional reconnaissance, and pedestrian surveys have been far more effective in assessing the changes in methane seepage over time.

DETAILED SEEP MAPPING

The 2006 detailed mapping event was performed between May 23, 2006 and June 10, 2006. This is the fifth detailed seep mapping event conducted, with the exception of the Hoier Property and South Fork Texas Creek (SFTC) East which have been mapped four times and Pine River which has been mapped once by LTE. This is the first time Vosburg Pike and the upland area north of Basin Creek have been mapped as part of the detailed seep mapping program. Previous detailed seep mapping events were conducted in October 2002, May 2003, May 2004, and June 2005. LTE employed a consistent mapping methodology during each of the five detailed mapping events conducted, with the exception of the mapping of SFTC during 2006. LTE implemented a grid mapping system to map the main seep area in the SFTC valley to evaluate the usefulness of this technique in mapping methane seepage along the Kf outcrop in La Plata County north of the Ute line.

Results of the 2006 detailed mapping program typically show that methane concentrations in historically active seep areas are relatively consistent with previous years. However, the 2006



data indicate slight decreases in methane concentrations more often than increases. These decreases are most evident in the lowland areas of Carbon Junction, the upland area west of County Road 234 at Florida River, the western portion of the SFTC valley, and within the main seep area at SFTC.

In general the areal extent of methane seepage over the majority of the mapping area appears relatively unchanged. Slight increases were noted in several areas, however, only limited historical data in these areas were available for comparison. Therefore, it is likely that these conditions existed prior to 2006.

When comparing the areal extent of stressed, dead, and non-vegetation features mapped from year to year, decreases are noted more often than increases. These decreases are most evident at Carbon Junction, Florida River, the western portion of the SFTC valley, the main seep area at SFTC, the Hoier Property, and Pine River.

In general, only two new areas of methane seepage were identified by the 2006 detailed seep mapping event. Methane seepage was identified for the first time in an upland area of Vosburg Pike and along the driveway north of the Kurtz residence at SFTC.

The grid mapping system used within the main seep area at SFTC appears to have been successful in identifying methane seep areas. Methane seep areas identified by the grid mapping system in 2006 appear to be consistent with previous years. LTE believes that this is a useful sampling technique in monitoring changes in methane concentration and areal extent of methane seepage over time.

PERMANENT MONITORING PROBES

LTE conducted a statistical analysis of the data collected by the Bureau of Land Management (BLM) from 152 of the 180 permanent monitoring probes located in the project area. Measurements have not been made from the Basin Creek probe line since November 2002 because the probes were destroyed by construction activities associated with the Animas La Plata Project (ALP). Therefore, no new trends were calculated for this transect.

Statistical analysis of the 152 permanent monitoring probes indicated that 33 probes currently exhibit trends at the 90 percent (%) significance level. Of those significant trends, 12 (36%) were upward, and 21 (64%) were downward. This shows a continuing decrease in the proportion of statistically significant upward trends as compared to the previous statistical evaluations, which reported 53% upward trends in 2003 and 42% upward trends in 2005.

Nearly all the statistically significant trends at the Carbon Junction east and west transects are downward. Both upward and downward trends were calculated at the Pine River, Florida River, and SFTC east and west transects. No statistically significant trends were calculated at the East Pine River east and west and Edgemont Ranch transects.

NATURAL SPRING SURVEY

This was the second natural spring survey conducted by LTE in La Plata County. The baseline data obtained in 2005 and 2006 will help in assessing any future changes to the identified natural springs.

Eight potential natural springs were identified on the Kf outcrop in La Plata County. LTE was able to field-verify and collect water samples from four of these springs. LTE was able to identify and collect a water sample from one additional natural spring not previously identified. Therefore, a total of five water samples were collected by LTE during the 2006 natural spring survey.

Dissolved methane was detected in three of the five natural springs surveyed in 2006. Dissolved methane was detected in the water samples collected from Darwin Rather Spring #2, Hoier Spring, and Rancho Durango LTD Spring at concentrations of 0.0017 milligrams per Liter (mg/L), 0.0017 mg/L, and 0.0016 mg/L, respectively. In general, methane concentrations and flow rates from 2006 are relatively consistent with 2005.

The dissolved methane concentrations detected during 2005 and 2006 are relatively low; therefore, it appears that the risk of dissolved methane entering a drinking water well or piping system, or creating a hazardous situation in a confined space is relatively low.

RECOMMENDATIONS

Based on the results of the 2006 detailed seep mapping, the permanent monitoring probe data, and the 2006 natural spring survey, LTE recommends the following:

- The implementation of the grid mapping system where practical during future detailed seep mapping events along the Kf in La Plata County north of the Ute line;
- Detailed mapping performed in May 2007;
- Conduct an updated IR aerial survey, suspect area identification, and field verification event in 2008;
- Conduct updated natural spring survey during the next detailed seep mapping event in 2007 to assess any changes in the number of springs, the flow rates, and/or the chemistry of natural springs on the Kf outcrop in La Plata County north of the Ute line. In addition to dissolved methane, water samples will be analyzed for major anions, cations, iron, manganese, selenium, and nitrate/nitrite per the request of the Colorado Oil and Gas Conservation Commission (COGCC); and
- Obtain color aerial photographs from La Plata County for use during future monitoring and reporting.

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 (Figures 1A and 1B). The study area is located along the north rim of the San Juan Basin (SJB), north of the Southern Ute Indian Tribe (SUIT) reservation boundary.

This program is being conducted on behalf of BP, Inc. (BP); XTO Energy, Inc. (XTO); Chevron Corporation (Chevron); 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 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.

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. The results of the detailed mapping activities are summarized in Section 3.0. The evaluation of the BLM probe data is presented in Section 4.0. The results of the natural spring survey are 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 SUIT reservation northern boundary near Basin Creek (southwest of Durango) north and eastward to the La Plata County and Archuleta County border (Figure 1B). There have been a number of previous and ongoing studies, which support the overall methane seepage evaluation. Some of these studies include:

- Detailed mapping, methane seepage data collection, and mitigation in the Pine River area by BP between 1994 and 2004;
- 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 (SFTC);



- Installation of 162 permanent soil gas monitoring probes by LTE in 1997, with additional probes installed at various locations since that time, and ongoing monitoring of the points by the BLM. The probes are sampled approximately six times per year;
- Installation and monitoring of six flux chambers in the primary seep areas from July 2004 to September 2005. The gas flux chambers measure gas flow on 10-minute intervals;
- Annual pedestrian reconnaissance surveys of the outcrop by LTE from 1998 through 2001;
- Flux chamber system modifications, detailed seep mapping, and infrared imagery (IR) 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 October 2002, May 2003, May 2004, June 2005, and this report;
- Regional reconnaissance of the 23-mile section of outcrop in the project area in July 2003 and September 2005; and
- Natural spring survey of the 23-mile outcrop north of the Ute line in La Plata County in September 2005 and this report.



SECTION 2.0

FIELD METHODS

This section describes the approach and procedures used during detailed seep mapping, permanent soil gas probe monitoring, and natural spring survey.

2.1 DETAILED METHANE GAS SEEP MAPPING

Detailed mapping is performed in the active seep areas on an annual basis. The detailed seep mapping was performed May 23, 2006 through June 10, 2006 in the areas of Basin Creek (also known as Ridges Basin), Carbon Junction, Florida River, Vosburg Pike, SFTC, the Hoier Property, and Pine River.

The streambed in the Basin Creek area was not mapped due to ALP dam 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 since 2004. The areas 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. A photograph of the Basin Creek mapping area is shown below.

The Pine River mapping area, previously mapped by BP since 1994, was added to the mapping program during the 2005 detailed mapping event. The COGCC requested that LTE add Pine River to the mapping program to maintain consistent monitoring techniques over the Kf outcrop in La Plata County north of the Ute line.

The Vosburg Pike mapping area and an upland area north of Basin Creek were added to the mapping program during the 2006 detailed mapping event after methane was detected in these areas during the 2005 regional reconnaissance activities.



Construction activities at Basin Creek, view northeast.

The LTE field crew was equipped with topographic maps, digital camera, sampling equipment (slide-hammer and probe), global positioning system (GPS), and a Mine Safety Appliances (MSA) GasPort[®] field meter capable of detecting methane, hydrogen sulfide (H₂S), oxygen (O₂), and carbon monoxide (CO).

The detailed seep mapping program involved walking the known seep areas and vicinity and noting dead, stressed, and non-vegetation 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 stressed grass using the GPS. Subsurface measurements of methane, H₂S, CO, and O₂ were collected, where appropriate.

When the surface water flow was relatively low, LTE waded through the streams looking for methane seep bubbles and stressed/dead 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.

2.1.1 Types of Features Observed

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

- non-vegetated areas;
- dead trees;
- dead vegetation areas;
- pertinent live trees;
- stressed vegetation areas;
- stressed trees; and
- pertinent live vegetation areas;
- methane seeps within surface water bodies.

In the lowland areas, LTE focused on non-vegetation 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 vegetation areas were observed as patches of dead bushes and/or grass. Stressed vegetation areas were defined as co-mingled sparsely vegetated 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 discussed in Section 4.0 and 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, stressed, and non-vegetation areas are mapped as polygon features.

2.1.2 Use of GPS

LTE used a Trimble GeoXT[®] GPS to map each feature during the 2006 detailed seep mapping event. The GPS used during field activities meets the specifications of the COGCC Rule 215. 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 specification sheet for the GPS is included in Appendix A.

The data were collected with a GPS in the 1984 World Geodetic System (WGS 84) and projected into the Universal Transverse Mercator coordinate system using the 1983 North American Datum (NAD 83). The data are input into the ArcView[®] project file developed by LTE in 2001. On average, 20 GPS readings were collected for each point feature 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 second.

2.1.3 Gas Measurement Collection

A slide hammer was used to advance a half-inch diameter steel rod (probe) to a depth of approximately 36 inches below ground surface (bgs) during the seep mapping. Some probe holes were shallower than 36 inches due to the hardness 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 used to measure the concentration of methane, H₂S, CO, and O₂ 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 specification sheet for the MSA GasPort[®] is included in Appendix A. The field meter was calibrated to methane, H₂S, and CO each morning and again at midday to ensure the equipment was working properly.

2.1.4 SFTC Grid Mapping System

LTE used a “grid mapping” system to survey the main seep area in the SFTC valley. This is the first time a grid mapping system has been employed in the detailed seep mapping program in La Plata County. LTE has used the grid mapping system to conduct methane seep surveys in other areas and the method has proven to be systematic, consistent, and successful in delineating the extent of seep areas.

The grid consisted of approximately 53 squares, each measuring approximately 6,400 square feet in area. LTE collected a soil gas measurement at the corners of each square in the grid. Each sample location was recorded using GPS. When methane was detected along the edges of the grid, additional measurements were collected outside of the grid to better define the extent of the seep area.

The grid system was used over a relatively flat area within the main seep area at SFTC. The traditional detailed seep mapping techniques previously described were used to survey the remainder of the SFTC valley, the Ward property, and SFTC East.

2.2 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 enters the data into a database. The permanent monitoring probes located in the Basin Creek study area were destroyed in November 2002 as a result of construction activities.

Considerable fluctuation has been observed in the subsurface methane concentrations. To investigate whether any statistically significant trends have been observed, the data were 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 monitoring probe data that LTE acquired from the BLM database.

2.3 NATURAL SPRING SURVEY

In 2005, LTE conducted a literature search to identify natural springs that had already been mapped. LTE interviewed regulatory agencies including the BLM, United States Forest Service (USFS), Colorado Division of Wildlife (CDOW), and the Office of the State Engineer (SEO) to identify the locations of any known natural springs on the Kf outcrop.

LTE prepared property boundary maps using aerial photography as a base map layer and the ownership parcel data from the La Plata County Assessor's office. The maps were sent to the landowners whose properties intersect the Kf outcrop. A letter requesting information about natural springs on the property was included. Landowners were asked to draw in the location of natural springs on their property and return the maps to LTE. LTE compiled the data and digitized the locations into the GIS. As a result, four potential natural springs were identified on the Kf outcrop in La Plata County prior to the 2005 field activities. LTE was able to field-verify and collect water samples from three of the four springs in September 2005.

The BLM conducted further research of natural springs in La Plata County in 2005 and 2006. The BLM identified an additional four natural springs on the Kf outcrop in La Plata County that were not identified during LTE's initial natural spring survey in 2005. A total of eight natural springs have been identified by LTE or the BLM prior to the 2006 field activities.

During the 2006 field-verification activities, LTE inspected the natural springs, located the position and elevation with the GPS, measured a flow rate, and collected water quality measurements of pH, total dissolved solids (TDS), conductivity, oxidation-reduction potential (ORP), and temperature. Water samples from each spring identified were also collected and submitted to an analytical laboratory. The samples were delivered to Summit Scientific of Golden, Colorado for analysis of dissolved methane in water using method RSK-175.

Spring flow rate estimates were measured by capturing surface water into a graduated container. The time required to fill the container was measured using a stop-watch. The flow rate was reported in gallons per minute and recorded in the GPS. A subsurface soil gas measurement was also collected in the vicinity of each natural spring visited.



2.4 LIMITATIONS

Readings collected with the GPS unit can be located within one-meter radius of accuracy. But the type of terrain that exists along the Kf outcrop can present 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, therefore, the GPS accuracy decreases. Satellite signals are frequently bounced among the trees or lost completely. When satellite signals are limited, positioning accuracy decreases. In some cases, the GPS unit can not obtain a signal. In these situations, LTE field personnel took subsurface methane measurements and noted the results on the maps.

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

The sampling of natural springs in La Plata County was limited due to regional drought conditions over the last nine years. When dry springs were encountered, LTE recorded the location of the spring and noted the absence of water.

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

SECTION 3.0

DETAILED SEEP MAPPING RESULTS

The following sections summarize the observations made during the detailed seep mapping conducted from May 23, 2006 through June 10, 2006. This is the fifth detailed seep mapping event conducted, with the exception of the Hoier Property and SFTC East, which have been mapped four times and Pine River, which has been mapped once by LTE. This is the first time Vosburg Pike and the upland area north of Basin Creek have been mapped as part of the detailed seep mapping program. Previous detailed seep mapping events were conducted in October 2002, May 2003, May 2004, and June 2005.

The mapping activities followed the procedures outlined in Section 2.0. The report 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 base map 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 formation contact location is reduced when aerial photographs are viewed at a smaller scale.

3.1 BASIN CREEK

The detailed seep mapping for Basin Creek was completed on June 10, 2006. 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 0.13 miles in the east-west direction and 0.09 miles in the north-south direction. Figures 2 and 3 illustrate the results of the mapping in the Basin Creek area.

3.1.1 Observed Methane Seeps in Surface Water

No surface water was observed in the Basin Creek mapping area during the 2006 detailed mapping event. The absence of water in the stream bed is most likely the result of drought and/or sedimentation associated with construction activities.



Sedimentation
in Basin Creek,
view east.

3.1.2 Lowland Areas

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

3.1.3 Upland Areas

LTE collected 25 subsurface methane measurements in the upland area located south of Basin Creek. Ten of the 25 measurements reported detectable methane concentrations. The highest methane concentration reported in this area was 21% (BC-1, Figure 2). A total of four measurements in this area reported methane concentrations that were greater than 5%.

The majority of the upland area south of Basin Creek was dominated by rocky soils and stressed scrub oak typical of the region during drought conditions. In general, the upland area south of BC-1 is extremely difficult to map due to the thickness of the scrub oak and the steep gradient. One dead cottonwood was mapped near the Quaternary Alluvium (Qa) – Kf contact.

The upland area located approximately 0.25 miles north of Basin Creek was added to the detailed mapping program during the 2006 field activities after methane was detected in this area during the 2005 regional reconnaissance activities (BC-2, Figure 3). LTE collected 17 subsurface measurements in this area and nine of the measurements indicated detectable concentrations of methane. The detectable methane concentrations in this area ranged from 1,000 ppm (0.1%) to 29%. A total of four measurements reported methane concentrations that were greater than 5%. Several stressed/dead pines and junipers were noted in this area. Rocky soil and evidence of beetle infestation were also observed in this upland area.



Stressed/dead
vegetation area
north of Basin
Creek, view
northwest.

3.1.4 Comparison to Previous Surveys

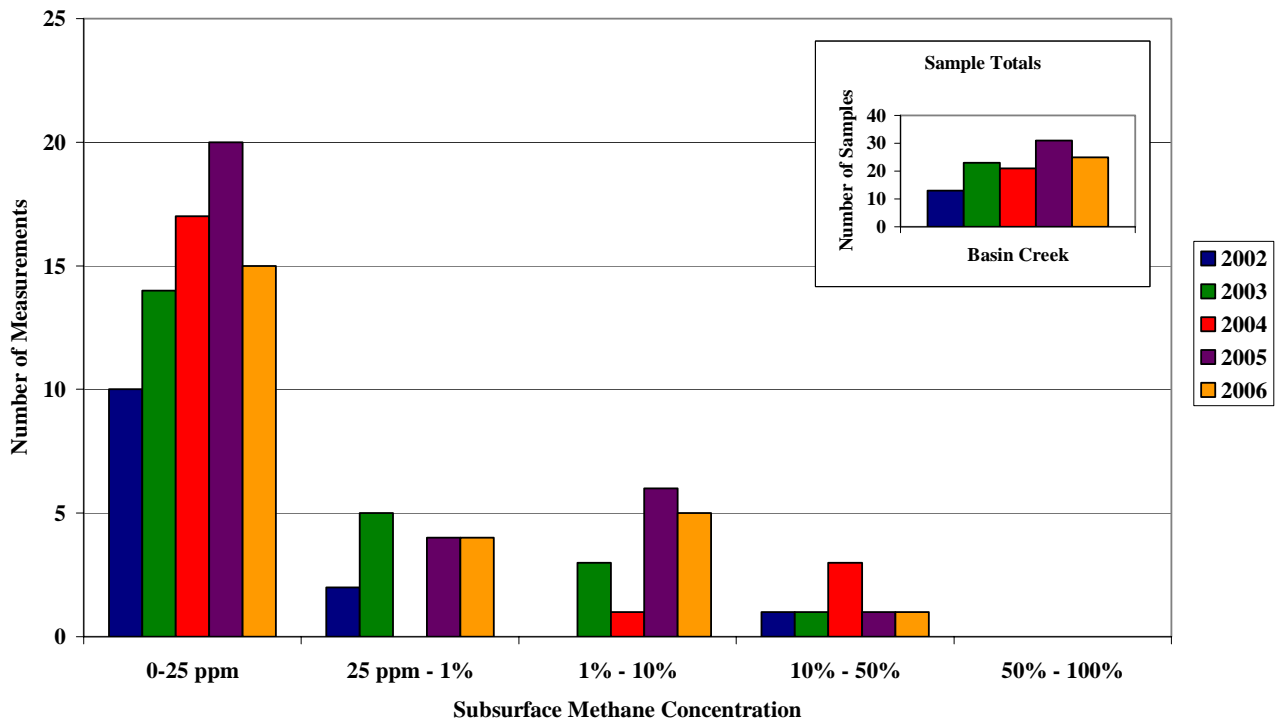
Methane continues to be detected in the upland area south of Basin Creek. The number of subsurface methane measurement locations in the upland area south of Basin Creek has remained relatively stable since 2003. When comparing concentrations collected from previous years to those collected in 2006, the highest concentrations detected are relatively similar and occur in the same areas in Basin Creek. Historically, the highest methane concentration reported in this area is 31% in 2004. Figure 4 illustrates the historical subsurface methane concentration data for Basin Creek. The chart below illustrates the number of samples collected during each detailed mapping event and the distribution of the concentration values.

The aerial extent of the seep area south of Basin Creek has remained relatively unchanged since mapping began in 2002. Methane has not been detected along the valley floor in Basin Creek since 2003. However, the majority of this area is no longer accessible due to construction activities. During the 2006 detailed seep mapping, methane was detected west of the historical seep area. However, this area had not been mapped during previous mapping events.

No new stressed/dead vegetation areas or stressed/dead trees were mapped in 2006. Based on historical data, it appears that the majority of the stressed/dead vegetation in the Basin Creek mapping area is most likely the result of drought conditions. Figure 5 illustrates the distribution of stressed/dead trees and vegetation areas over time.

The upland area north of Basin Creek was added to the detailed seep mapping program in 2006. Previous surveys of this area were conducted during the 2003 and 2005 regional reconnaissance events. Subsurface methane measurements collected during the 2006 detailed mapping event appear to be consistent with those collected during the regional reconnaissance events.

Basin Creek - Detailed Seep Mapping Data



As a result of drought and/or continued sedimentation, no surface water was observed in Basin Creek in 2006. Therefore, it was not possible to map visible methane seeps in the streambed. Figure 6 illustrates the historical distribution of visible methane seeps in surface waters at Basin Creek. As described earlier, the base photograph was taken in 1993, prior to the ALP dam construction activity.

3.2 CARBON JUNCTION

The mapping area at Carbon Junction is centered on the Animas River near the Wal-Mart shopping center on Highway 160 and extends approximately 0.5 miles in the east-west direction and 0.5 miles in the north-south direction. The detailed mapping activities occurred on June 4, 2006, June 8, 2006, and June 9, 2006. The 2006 field data are illustrated on Figures 7 and 8.

3.2.1 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, (Figure 7). Observable methane seeps were sparsely distributed along both banks of the river downstream from the boat launch area for a distance of approximately 680 feet.



3.2.2 Lowland Areas

Tree stumps along with stressed/dead cottonwood, pine, aspen, juniper, and scrub oak trees were noted along the banks of the Animas River during the detailed seep mapping conducted in June 2006. A total of seven areas of stressed/dead vegetation were mapped in the lowland area on the east side of Animas River. The maximum methane concentration reported along the east side of the Animas River was 14%, recorded in an area of stressed vegetation labeled CJ-1 on Figure 7 located approximately 560 feet south of the gas flux chamber. Methane was also detected at a concentration of 9% near a cluster of stressed/dead scrub oak located approximately 80 feet northeast of the gas flux chamber (CJ-2, Figure 7). A cluster of stressed/dead pines was observed near the southeastern edge of the mapping area. No methane was detected in this area during the 2006 detailed seep mapping event. LTE observed evidence of beetle infestation on the pine trees in this area.

In the area between the shooting range and the west bank of the Animas River, approximately 14 stressed/dead vegetation areas and seven stressed/dead trees were noted. Many of these areas recorded elevated concentrations of methane ranging between 1,000 ppm (0.1%) and 88% (CJ-3, Figure 7). The average detectable methane concentration in this area was 68%. The highest methane concentration was recorded along the eastern border of La Posta Road in an area dominated by stressed/dead sage brush.

3.2.3 Upland Areas

West of the shooting range, two stressed/dead vegetation areas and three stressed/dead trees were mapped (CJ-4, Figure 7). Dead scrub oak had been noted during previous detailed mapping events in this area. Detectable methane concentrations ranged between 3,000 ppm (0.3%) and 84% in this area. The average detectable methane concentration reported in this area was 27%. Three of the 12 measurements reporting detectable concentrations of methane were greater than 50%. H₂S was detected at two locations in this area at concentrations of 4 ppm and 50 ppm (Figure 7).



Stressed/dead scrub oak west of shooting range, text reference CJ-4, view west.

In the southern upland area east of Highway 3, LTE mapped two stressed/dead vegetation areas (CJ-5, Figure 8). During the 2003 regional reconnaissance, LTE determined that this area of mortality was due to beetle infestation. No methane was detected in this area during 2004, 2005, or 2006.

A relatively large area of stressed/dead vegetation was observed west of the meadow on the eastern portion of the mapping area (CJ-6, Figure 8). Evidence of beetle infestation was observed in this area. No methane has been detected in this area since surveying of Carbon Junction began in 2002.

Several large areas of stressed/dead vegetation, many stressed/dead trees, and relatively high concentrations of methane were noted in an upland area along the base of the Kf in a drainage near the Kpc – Kf contact (CJ-7, Figure 8). A relatively large coal outcrop was observed near the bottom of the drainage.

A total of 67 sample points were collected in the upland area east of Highway 3. Twenty-three of the 67 sample points reported detectable concentrations of methane and the maximum concentration reported was 88%. Thirteen of the 23 detectable concentrations were greater than 25%. The highest methane concentrations were recorded near the bottom of the drainage in the northern portion of the mapping area.

A strong H₂S odor was noted in several areas within the upland area east of Hwy 3. A total of three sample locations indicated the presence of H₂S in the subsurface at concentrations of 2 ppm, 50 ppm, and 50 ppm (Figure 8).



Coal outcrop in drainage near Kpc-Kf contact, view southeast.

3.2.4 Comparison to Previous Surveys

A greater number of subsurface methane measurements were collected in 2006 than were collected in 2005. In general, the methane concentrations collected in the lowland areas along the Animas River during 2006 appear to be slightly lower than those collected during previous mapping events. When comparing the methane concentrations collected in the upland areas of

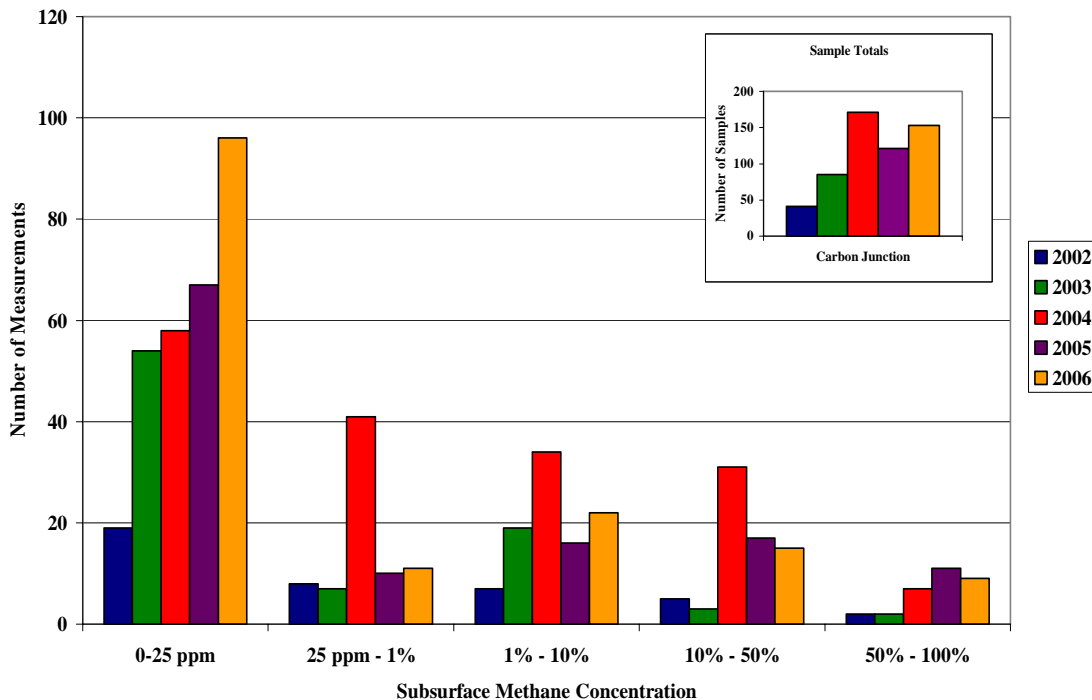
Carbon Junction during 2006 to previous years, the methane concentrations collected during 2006 appear to be consistent with previous years. The areal extent of methane seepage at Carbon Junction appears to be relatively consistent with previous years with the exception of the upland area east of Highway 3. The areal extent of methane seepage in this area appears to have increased towards the northeast, however, only limited historical data is available for comparison. The chart below summarizes the concentration distribution of the subsurface methane measurements at Carbon Junction. Figure 9 illustrates the historical data comparison of subsurface methane measurements at Carbon Junction.

Fewer vegetation features were mapped during 2006 than in previous years. In 2002, several trees were mapped in the southwestern portion of the mapping area that were not mapped between 2003 and 2006 due to activities at the shooting range. Additionally, several clusters of trees were mapped individually during previous years and were mapped as stressed/dead areas during 2005 and 2006, therefore, decreasing the total number of individual features mapped over the past two years.

In general, it appears that the areal extent of stressed/dead vegetation areas mapped during 2006 has decreased slightly from 2004 and 2005. This is most evident when comparing the stressed/dead vegetation features mapped between 2004 and 2006 along the lowland areas of the Animas River and the upland area east of the Animas River. Figure 10 illustrates the historical 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 between 2003 and 2006. Water levels in the Animas River were at historic lows in 2002. Moreover, 2002 mapping was performed in late fall whereas 2004, 2005, and 2006 mapping was performed during spring runoff conditions. The seeps identified during the most recent mapping event appear to be consistent with those mapped during 2004 and 2005. Figure 11 illustrates the historical data comparison of visible methane seeps in the Animas River at Carbon Junction.

Carbon Junction - Detailed Seep Mapping Data



H₂S was detected at three locations east of the Animas River and two locations west of the Animas River. Three of the sample locations reported H₂S concentrations of 50 ppm. These are the highest hydrogen sulfide concentrations that have been reported in La Plata County since LTE began the detailed seep mapping program. The maximum concentration of H₂S recorded during 2005 was 10 ppm.

3.3 FLORIDA RIVER

The Florida River mapping area is approximately 0.40 miles in the east-west direction by 0.30 miles in the north-south direction from where the river transects the Kf outcrop. 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 head gate. The head gate is located upstream of the Kf outcrop and stratigraphically lower in geologic section within the Lewis Formation (Kl). The Florida River mapping occurred on May 23, 2006. Figures 12 and 13 illustrate the results of the detailed seep mapping performed at the Florida River mapping area.

3.3.1 Observed Methane Seeps in Surface Water

Numerous visible methane seeps were noted in the private pond located at Terry Palmer Ranch. In general, the methane seeps appear to form trends in the east to west direction, roughly paralleling the strike of the Kf. Methane seeps were also identified in the Florida River east and north of the private pond. Methane seeps were noted for approximately 0.07 mile upstream (north) of the private pond.





Visible methane seeps in private pond, view east.

Water was observed in the bar ditches along the east and west sides of County Road 234. Visible seeps were mapped in the ditches over an extent of approximately 450 feet (FR-1, Figures 12 and 13). Seeps were not observed in the two irrigation canals west of County Road 234.

A relatively large area of saturated soil with standing surface water was observed southwest of the private pond on the Terry Palmer Ranch. The surface water was most likely the result of irrigation and/or recent precipitation in the area. Visible methane seeps were observed over two areas, measuring approximately 1,200 square feet and 1,500 square feet, within the standing water.

3.3.2 Lowland Areas

Stressed/dead vegetation areas were mapped in the vicinity of the private pond on the Terry Palmer Ranch. The majority of the stressed vegetation areas were comprised of stressed grasses and were located west and north of the private pond. A total of eight measurements in the area west and north of the pond reported methane concentrations of 26% or greater. A maximum subsurface methane concentration of 81% was reported in this area (FR-2, Figure 13). Methane concentrations of 43% and 19% were reported approximately 35 feet and 28 feet, respectively, from the Turner residence.

A relatively large stressed/dead vegetation area was mapped south of the pond (FR-3, Figure 12). However, no methane was detected in this area during the 2006 detailed seep mapping event. Based on observations made during field activities, it appears that the absence of vegetation in the area south of the pond is most likely due to the use of the area to graze horses.

3.3.3 Upland Areas

Due west of the Terry Palmer Ranch pond and canal system, numerous stressed/dead pine trees and stressed/dead vegetation areas were observed (FR-4, Figures 12 and 13). A total of 28 gas measurements were collected in this area and 11 of the measurements reported detectable concentrations of methane. The detectable concentrations of methane ranged between 1,500 ppm (0.15%) and 86% with four of the 11 concentrations greater than 15% methane. Existing permanent probes monitored by the BLM are located in this area.

Approximately 0.15 miles southwest of location FR-4, a second cluster of stressed/dead pine trees and stressed/dead vegetation areas were observed in a small open meadow bordered mostly by pine trees (FR-5, Figure 13). A total of 43 gas measurements were collected in the vicinity of the meadow and 12 of the measurements reported detectable concentrations of methane ranging between 2,500 ppm (0.25%) and 15%. Four of the 12 measurements obtained reported subsurface methane concentrations greater than 5%.

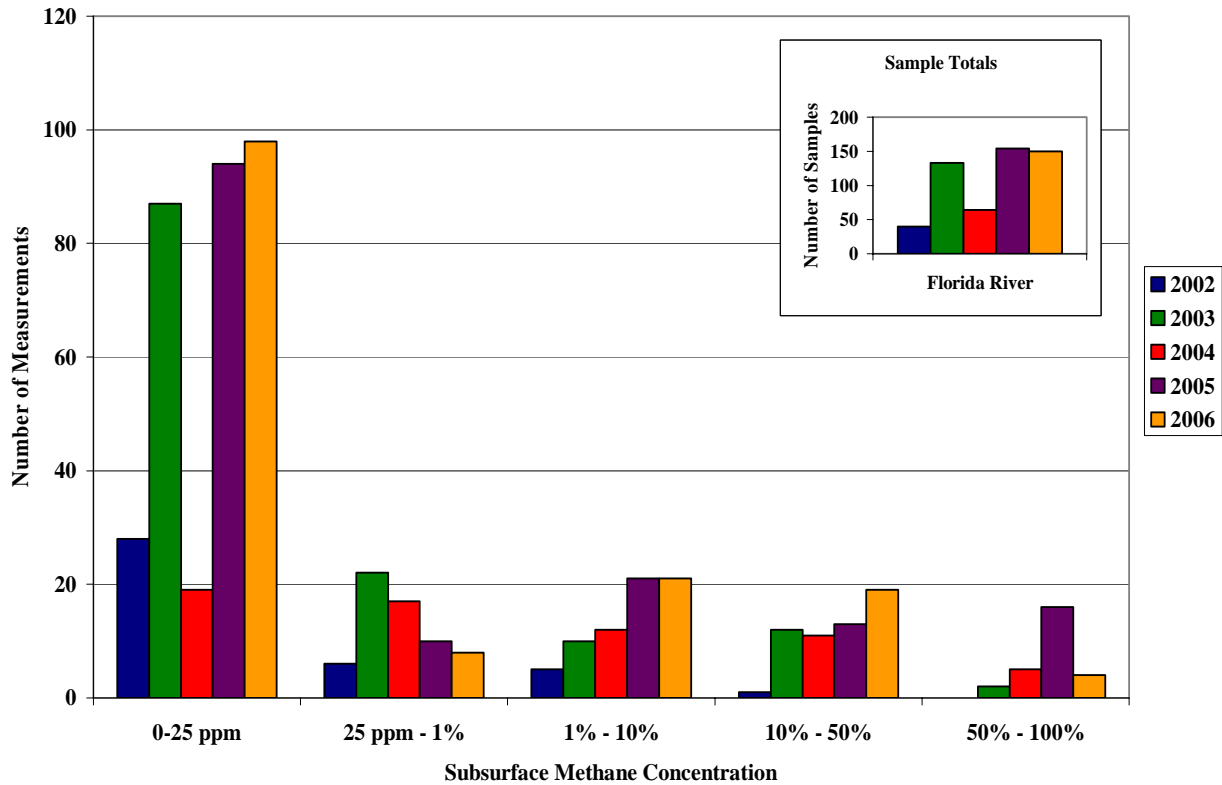
LTE mapped one stressed/dead vegetation area east of the Florida River (FR-6, Figure 12). This area was predominately stressed/dead scrub oak and tree stumps located near the top of a ridge. Three of the nine measurements collected indicated detectable methane concentrations and the maximum methane concentration recorded in this area was 3.6%.

3.3.4 Comparison to Previous Surveys

More subsurface methane measurements were collected during the 2005 and 2006 mapping events than in previous years. In 2006, the number of samples collected southwest of the pond increased due to the observed visible seeps in the surface water. Additionally, the number of measurements collected north of the pond has increased over the past two years due to a concern of elevated methane concentrations in the vicinity of the Turner residence.

In general, methane concentrations collected in 2006 appear to be consistent with previous years. However, the number of concentrations recorded between 50% and 100% was greater in 2005 than in 2006. This decrease in methane concentration is most evident in the small open meadow west of CR 234 (FR-5, Figure 13). When comparing the areal extent of methane seepage at Florida River over time, the 2006 data appear to be consistent with previous years. Figure 14 illustrates the historical data comparison of subsurface methane measurements at Florida River. The chart below illustrates the distribution of the subsurface methane measurement data.

Florida River - Detailed Seep Mapping Data



In general, the number of stressed/dead vegetation areas mapped in 2006 appears to be relatively consistent with the number of vegetation features mapped between 2003 and 2005. More stressed/dead vegetation areas were mapped southwest of the private pond on the Terry Palmer Ranch in 2006 than in previous years. However, fewer stressed/dead vegetation features were mapped east of the pond in 2006 than in previous years. When comparing the areal extent of stressed/dead vegetation features mapped at Florida River from year to year, a slight decrease is noted in the meadow west of CR 234 and in the upland area north of CR 237. However, a slight increase in the areal extent of stressed/dead vegetation features is noted in the area north of the pond near the Turner residence. Figure 15 illustrates the historical data comparison of stressed/dead vegetation at the Florida River mapping area.

In general, data indicate that fewer visible methane seeps were noted in the Florida River during 2006 than in previous years. This may be the result of high water levels in the Florida River limiting the number of visible seeps observed. More visible methane seeps were observed in 2002 than in other years. The greater number of visible methane seeps during 2002 may be due to a lower water level in the river at the time of mapping.

In general, it appears that a greater number of visible methane seeps were observed in the private pond on the Terry Palmer Ranch during 2006 than in previous years. Additionally, a greater number of visible seeps were observed in the standing water southwest of the private pond



during 2006 field activities. Several visible methane seeps were observed in this area during 2005. Figure 16 illustrates the historical data comparison of visible methane seeps at the Florida River mapping area.

3.4 VOSBURG PIKE

The Vosburg Pike mapping area is an upland portion of the Kf outcrop, located approximately half way between the Florida River mapping area and the SFTC mapping area. The detailed mapping area covers approximately 0.8 miles in the east to west direction and 0.4 miles in the north to south direction (Figure 17). The detailed seep mapping at the Vosburg Pike mapping area occurred on June 5, 2006.

3.4.1 Observed Methane Seeps in Surface Water

LTE did not observe surface water within the Vosburg Pike mapping area.

3.4.2 Lowland Areas

LTE does not consider any of the mapped areas within the Vosburg Pike mapping area to be “lowland” areas.

3.4.3 Upland Areas

LTE observed several dead pines along with one area of stressed/dead vegetation in an upland area near the Kpc - Kf contact (VP-1, Figure 17). The area of stressed/dead vegetation was predominately stressed/dead scrub oak and dead pines. Methane was detected in this area at concentrations of 14,000 ppm (1.4%) and 5%. The methane seep detected at location VP-1 is located on the Kf based on surface geology, despite the location of the Kpc - Kf contact depicted on Figure 17. The geologic contacts generated on the maps were digitized at a large scale. When these areas are presented on a small scale, the accuracy of the contact line is reduced.

LTE observed a stressed/dead vegetation area located approximately 0.25 miles east of VP-1 (VP-2, Figure 17). This area is a topographically low area within an upland area of the Kf outcrop. Methane and H₂S were detected in this area at a concentration of 5%, and four ppm, respectively. Four subsurface gas measurements were collected around the perimeter of the stressed/dead vegetation area. Methane and H₂S were not detected in any of the sample points located around the perimeter of the stressed/dead vegetation area.

Methane was detected in a drainage located approximately 0.35 miles east of VP-2 (VP-3, Figure 17). This area is also a topographically low area within an upland area of the Kf outcrop. Methane was detected in this area at a concentration of 5%.



Stressed/dead
vegetation area,
text reference
VP-2, view
south.

3.4.4 Comparison to Previous Surveys

The June 5, 2006 mapping event was the first detailed seep mapping event in the Vosburg Pike mapping area. Therefore, there is only limited historical data available for comparison. This area was previously mapped during the 2005 regional reconnaissance activities. Methane was detected in the vicinity of VP-1 during the 2005 regional reconnaissance and during this 2006 detailed seep mapping event at similar concentrations. When comparing the data collected in the vicinity of VP-3 during 2005 and 2006, it appears that methane was detected in a greater number of sample points during the 2005 reconnaissance survey than in the 2006 detailed seep mapping event. The methane concentration detected during the 2006 mapping event (5%) was relatively consistent with the maximum concentration detected during the 2005 mapping event (3.4%). Figure 18 illustrates the historical data comparison of methane seepage.

3.5 SOUTH FORK TEXAS CREEK

The SFTC mapping area is located where the south fork of SFTC transects the Kf. A large alluvial grass covered valley parallels the strike of the outcrop and eventually turns northward and transects the contact between the Kf and Kpc. The entire SFTC detailed mapping area covers approximately 1.3 miles in the east to west direction and 0.4 miles in the north to south direction (Figures 19 through 22). The seep area located approximately 0.1 miles east of the creek has been labeled SFTC Central and includes the Ward and Kurtz properties (Figure 21). The seep area located approximately 0.25 miles east of the creek has been labeled as SFTC East (Figure 22). The most recent detailed seep mapping at the SFTC mapping area occurred on May 25, 2006, June 2, 2006, and June 5, 2006. The field data from the 2006 detailed mapping event are illustrated on Figures 19 through 22.

3.5.1 Observed Methane Seeps in Surface Water

The water level within the SFTC was relatively high, but not turbulent, 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 19). Numerous seeps were also noted in an area of standing water located approximately 0.25 miles west of the main seep area (TC-2, Figure 19).

3.5.2 Lowland Areas

Stressed/dead and non-vegetation patches were mapped throughout the valley floor of the SFTC study area. The largest stressed/dead and non-vegetation areas were noted in the center of the mapping area where the creek transects the Fruitland Formation and Pictured Cliffs Formation contact (TC-3, Figure 20). A grid mapping system was used in this area as previously discussed in Section 2.2.4. LTE advanced a total of 82 subsurface probes across this area, covering approximately 10 acres. Results of the survey indicate that elevated methane was detected in the main seep area covering approximately 3.5 acres. Methane was detected in 28 of the 82 subsurface probes. Detectable concentrations of methane in this area ranged from 140 ppm (0.014%) to 100%. The average concentration of detectable methane was 57% and 13 of the 28 detectable methane concentrations were greater than 50%. Methane concentrations of 100% were recorded in four of the subsurface probes. H₂S was reported at three locations in the vicinity of the gas flux chamber at concentrations of ranging from 1.0 to 2.0 ppm



Non-vegetated area east of gas flux chamber, text reference TC-3, view east.

Stressed/dead vegetation areas and dead scrub oak were mapped where the valley floor extends south (TC-4, Figure 20). Methane was detected at a concentration of 19% in this area. These

stressed/dead vegetation areas were aligned in a predominantly southeast-northwest trend line parallel to the strike of the Kf.

An active seep area was noted on the western end of the mapping area (TC-5, Figure 19). Several stressed/dead areas and a non-vegetated area were noted and most were associated with elevated methane concentrations. These stressed/dead vegetation areas were also aligned in a predominately southeast to northwest trend line parallel to the strike of the Kf. A total of 42 gas measurements were recorded in this area and 19 of the measurements reported detectable concentrations of methane. Detectable methane concentrations in this area ranged between 3,500 ppm (0.3%) and 26%. Twelve of the 19 detectable methane concentrations were 5% or greater. Methane was not detected in the vicinity of the Nygard residence during the 2006 detailed seep mapping event (TC-6, Figure 19).

3.5.3 Upland Areas

The Ward property, located east of the main seep area, was mapped as part of the detailed seep mapping program for the first time during the 2006 field activities (TC-7, Figure 21). A total of 22 subsurface gas measurements were collected in this area and 11 of the measurements indicated detectable concentrations of methane. Methane concentrations collected in the vicinity of the Ward residence ranged from 2,000 ppm (0.2%) to 95%. Four of the 11 detectable methane concentrations were greater than 90%. The methane seepage in the vicinity of the Ward residence appears to be most active north of the residence. Methane was detected along the driveway north of the Kurtz residence for the first time. The concentrations of methane detected along the driveway in 2006 were relatively low.

Several stressed/dead grass areas were observed in the meadow located east of the Ward residence (TC-8, Figure 21). The stressed/dead vegetation areas form linear trends in the east to west direction, paralleling the strike of the Kf. A total of 17 subsurface gas measurements were collected in this meadow and seven of the 17 measurements indicated detectable concentrations of methane. Detectable concentrations of methane in this area ranged from 5% to 52%.

Several stressed/dead vegetation areas were noted in the upland area referred to as SFTC East (Figure 22). A total of 62 subsurface gas measurements were collected in this area and 24 of the measurements reported detectable concentrations of methane. Where methane was detected, concentrations ranged between 3,000 ppm (0.3%) and 90%. Sixteen of the 24 detectable methane concentrations were 5% or greater.

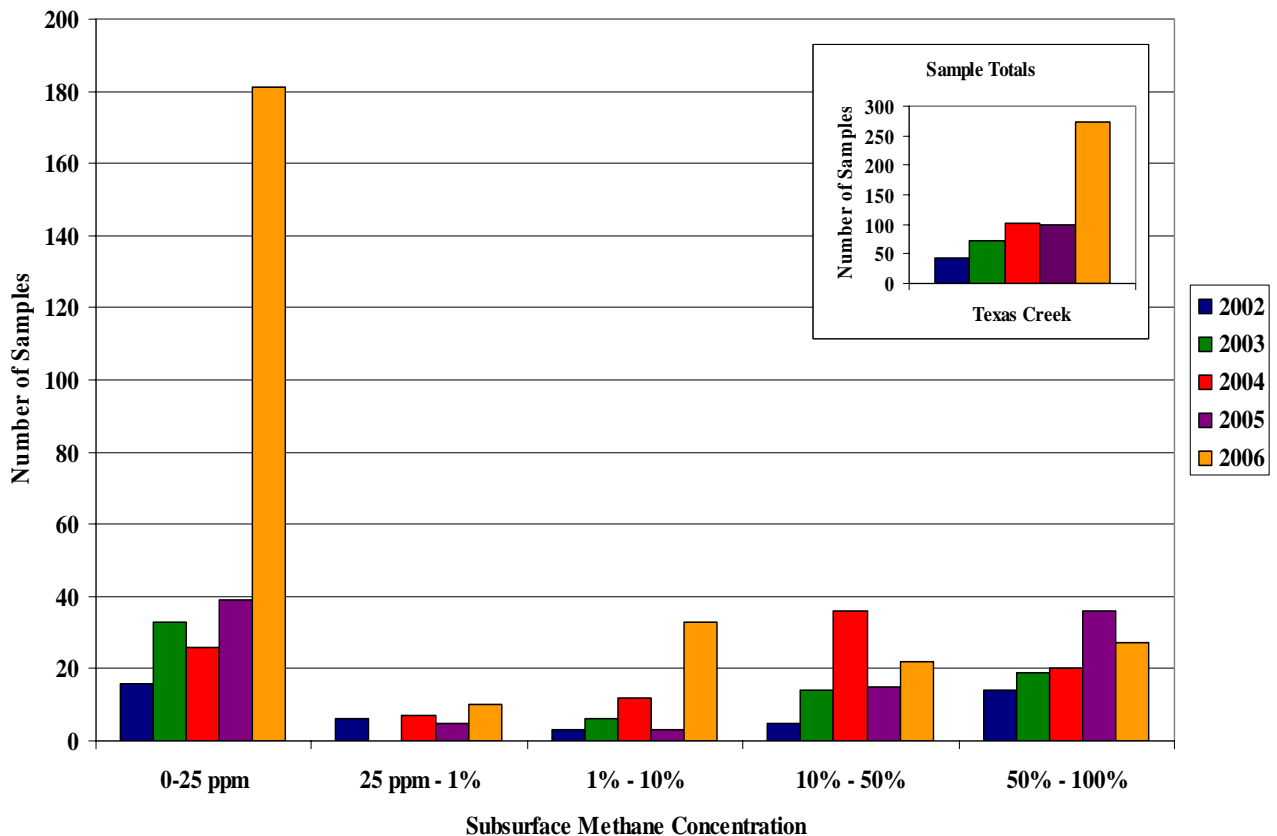
A stressed/dead vegetation area including dead scrub oak and pine trees was noted along a topographically low area in the northwest portion of the SFTC East mapping area (TC-9, Figure 22). A total of eight subsurface gas measurements were collected in this area, all of which contained elevated concentrations of methane. A strong H₂S odor was noted in this area during field activities. H₂S was reported at two locations in this area at concentrations of 4.0 ppm.

3.5.4 Comparison to Previous Surveys

The number of subsurface methane measurements collected at SFTC in 2006 increased from previous years. This increase is most likely the result of the grid mapping system. However, data from the most recent mapping event indicate a slight decrease in the number of sample locations with methane concentrations ranging between 50% and 100%. This decrease is most evident within the main seep area and the valley west of the main seep area. Additionally, a greater number of sample locations reported non-detectable concentrations of methane during 2006 than in previous years. The greater number of non-detectable methane concentrations is also most likely the result of the grid mapping system in the main seep area.

When comparing the areal extent of methane seepage at the SFTC valley and the Ward residence, it appears that the extent of methane seepage has increased slightly east of the main seep area. However, due to access issues, only limited historical data are available for comparison. Therefore, it is possible that this condition existed prior to the 2006 detailed seep mapping event. Figures 23 and 24 illustrate the historical data comparison of methane concentrations at SFTC. A chart illustrating the distribution of historical mapping data at SFTC is presented below.

Texas Creek - Detailed Seep Mapping Data



When comparing the areal extent of stressed/dead and non-vegetation areas at SFTC over time, it appears that decreases in the areal extent of vegetation features are noted more often than increases. These decreases are most evident in the western portion of the SFTC valley and within the main seep area. Additionally, several areas mapped within the main seep area during previous years were not mapped during 2006. However, a greater number of vegetation areas were mapped on the Ward property in 2006 than in previous years. LTE was only granted access to map the Ward Property in 2002 and 2006. In general, the areal extent of stressed/dead vegetation areas mapped on the Ward property in 2006 appears greater than the areal extent of the same areas mapped in 2002.

Methane was detected along the driveway north of the Kurtz residence for the first time in 2006. The concentrations detected along the driveway were relatively low. No methane was reported in 2002 along the driveway. Only limited historical data are available in this area because the area appeared to be on the Kpc based on surface geology. As described in Section 3.0, the accuracy of the geologic contacts is reduced when the aerial photographs are viewed at a small scale. This area was mapped during 2006 due to a concern of methane seepage on the Kurtz property.

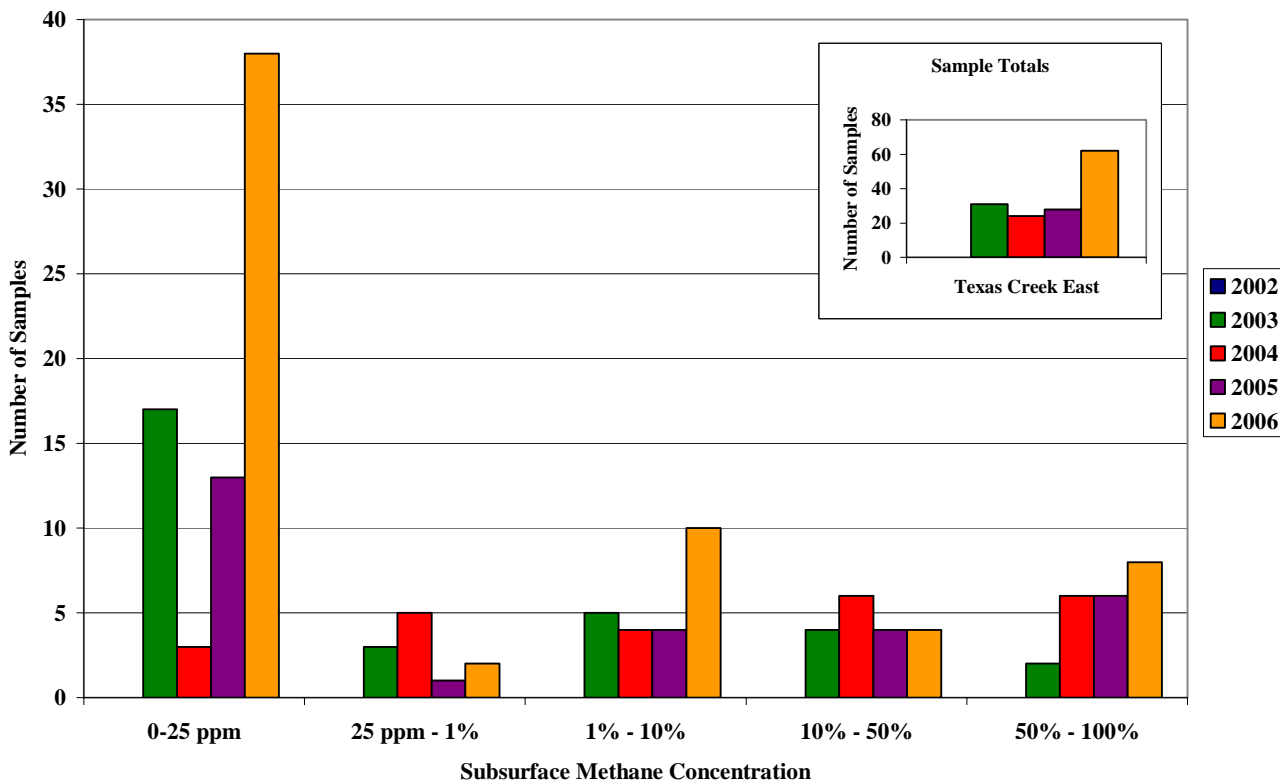
The number of subsurface methane measurements collected at SFTC East in 2006 was greater than the number collected during previous mapping events. In general, the methane concentration measurements collected at SFTC East during 2006 appear to be consistent with concentration measurements collected from previous mapping events.

The areal extent of methane seepage at SFTC East during 2006 appears to be consistent with previous years. The areal extent of methane seepage in the northern drainage within the mapping area is slightly larger in the northeast direction than during previous years. However, no historical data in this area is available for comparison. Therefore, it is possible that this condition existed prior to the 2006 detailed seep mapping event. Figure 26 illustrates the distribution of historical subsurface methane measurements at the SFTC East study area. A chart illustrating the distribution of historical mapping data at SFTC East is presented below.

When comparing the areal extent of stressed/dead vegetation areas mapped at SFTC East over time, increases are noted as often as decreases. Figure 30 illustrates the historical data comparison of vegetation features at SFTC East.

The visible seeps mapped in 2003, 2004, and 2005 remain relatively consistent. The number of visible seeps mapped in 2002 was low because the creek was relatively dry. However, several seeps were noted to the northeast of the main seep area during the 2002 mapping event (blue circles on Figure 31). This area around the visible seeps was not mapped during the 2003, 2004, or 2005 mapping events due to restricted access. Several visible seeps were mapped in 2006 in an area of standing water west of the main seep area that were not mapped during previous mapping events (TC-2, Figure 31). Figure 31 illustrates the historical data comparison of visible methane seeps.

Texas Creek East - Detailed Seep Mapping Data



3.6 HOIER PROPERTY

The Hoier Property was added to the detailed seep mapping program following the completion of the IR regional reconnaissance mapping in 2003. The Hoier Property is an upland area west of Pine River. According to Mr. Hoier, over several years they had noted an increase in areas of dead vegetation over the past several years and had also complained about methane in one of their water supply wells, which is completed in the Kf. The field data from the 2006 detailed mapping event are illustrated on Figure 32.

3.6.1 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 during the 2006 mapping event or during previous mapping events.

3.5.2 Lowland Areas

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

3.6.3 Upland Areas



Stressed/dead
vegetation on
Hoier
property,
view east.

Several stressed/dead vegetation areas were mapped in the area north of the pond on the Hoier property (HR-1, Figure 32). A total of 50 gas measurements were collected at the Hoier property and 12 of the measurements reported detectable concentrations of methane. The detectable methane concentrations in this area ranged between 6,000 ppm (0.6%) and 76%. Nine of the 12 detectable methane concentrations were 5% or greater. Two areas of stressed/dead vegetation were mapped along the driveway east of the pond (HR-2, Figure 32). However, no methane was detected in these areas.

3.6.4 Comparison to Previous Surveys

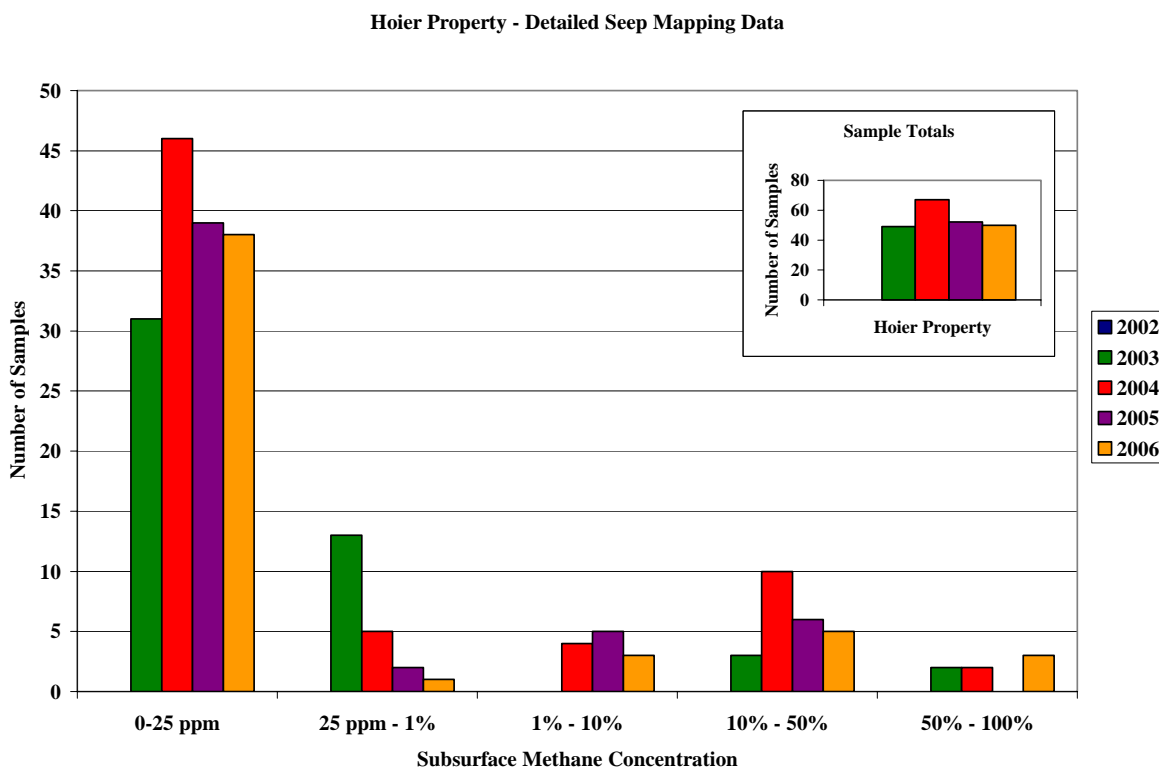
Methane concentrations collected between 2003 and 2006 appear relatively unchanged. More subsurface methane measurements were collected during 2004 than in 2003, 2005, and 2006. The areal extent of methane seepage at the Hoier Property also appears relatively unchanged. Figure 33 illustrates the historical data comparison for the subsurface methane measurements. The chart below illustrates the distribution of the concentrations for the samples.

When comparing stressed/dead vegetation areas over time, it appears that the areal extent of the stressed/dead vegetation areas mapped north of the pond during 2006 (HR-1, Figure 32) has decreased slightly from previous years.

Several areas located east and south of the Hoier residence were mapped in 2004 and 2005 and were not mapped in 2006. Results of the 2004 and 2005 mapping indicated that no methane was present in these areas of stressed vegetation. The observed die back associated with the scrub oak in these areas was most likely the result of drought conditions in the region. Therefore, these

areas were not mapped as stressed/dead vegetation areas during 2006. However, LTE collected subsurface methane measurements in these areas during 2006 and no methane was detected.

The areal extent of the stressed/dead vegetation areas located along the driveway east of the pond appear smaller than the areal extent mapped during previous years. Methane was detected in this area during 2004, but no methane was detected in this area during 2003, 2005, or 2006. Figure 34 illustrates the historical data comparison of vegetation features.



3.7 PINE RIVER

The Pine River mapping area is located where the Pine River transects the Kf (Figure 1A). The mapping area, monitored by BP was added to the detailed mapping program in 2005 in order to maintain consistent mapping procedures across all areas of the outcrop in La Plata County north of the SUIT line. The mapping area covers approximately one mile in the east-west direction and 0.5 miles in the north-south direction. The 2006 detailed mapping event occurred between May 29, 2006 and May 31, 2006. Figures 35 and 36 illustrate the results of the detailed seep mapping performed at the Pine River mapping area.

3.7.1 Observed Methane Seeps in Surface Water

Methane seeps were observed along both sides of the Pine River from the gas flux chamber for a distance of approximately 1,000 feet. High flow made it difficult to observe methane seeps in the middle of the river. Methane seeps were also observed in standing water along the western bank of the Pine River and along a ditch east of the gas flux chamber.



3.7.2 Lowland Areas

Several areas of stressed/dead vegetation, tree stumps, stressed/dead cottonwood trees, dead willows, and stressed/dead pine trees were observed in the lowland areas on both sides of the Pine River (PR-1, Figure 35 and 36). This is a known area of methane seepage and contains two gas flux chambers and a row of permanent gas monitoring probes. A total of 168 sample points were collected in this area and 67 of the sample points reported detectable concentrations of methane. Detectable methane concentrations in this area ranged from 22 ppm (0.0022%) to 97%. A total of 47 of the detectable methane concentrations were 5% or greater and nine of the detectable methane concentrations were 75% or greater. Several stressed/dead vegetation areas were noted within the mapping area but did not have detectable methane in the subsurface (PR-2, Figure 35 and 36).

Several areas of stressed/dead grasses were observed in the field located east of Pine River (PR-3, Figure 35). Detectable methane concentrations in this area ranged from 1,500 ppm (0.15%) to 90%. In general, methane was detected within the stressed/dead vegetation areas and was not detected outside the stressed/dead vegetation areas.

3.7.3 Upland Areas

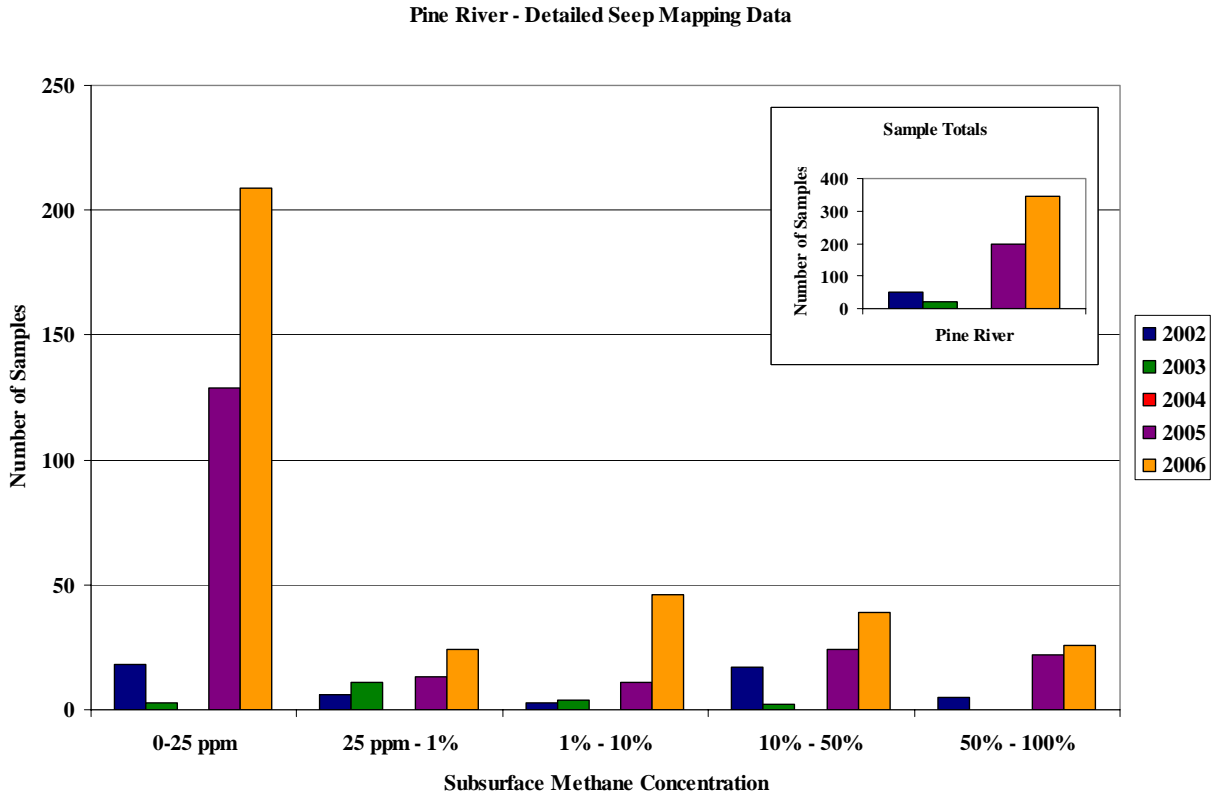
Several stressed/dead vegetation areas, stressed/dead pines, and tree stumps were observed in the upland area located west of Pine River. The majority of these areas of stressed/dead vegetation were dominated by stressed/dead scrub oak and were located in a topographically low area between two ridges (PR-4, Figure 35). A total of 138 subsurface methane measurements were collected in this area and 50 of the measurements reported detectable concentrations of methane. Methane was detected at concentrations ranging from 1,500 ppm (0.15%) to 91% in this area. A strong H₂S odor was noted in this area and H₂S was detected at concentrations of 4.0 ppm and 11 ppm in two of the 138 sample points. Methane was also detected at a relatively low concentration near the Kpc - Kf contact (PR-5, Figure 35). This seep area is located on the Kf based on surface geology, despite the location of the Kpc - Kf contact depicted on Figure 35. As previously mentioned in Section 3.0, the accuracy of the geologic contacts is reduced when the aerial photographs are viewed at a small scale.

It appears that the majority of the methane seepage in this upland area was confined to the southern side of the east-west trending drainage located west of Pine River. Several measurements collected on the northern side of the drainage reported non-detectable concentrations of methane. Additionally, methane was not detected on the western edge of the mapping area near an area of dead pines (PR-6, Figure 35)

3.7.4 Comparison to Previous Surveys

The Pine River mapping area was added to the detailed seep mapping program in 2005. Prior to 2005, there is only limited data available for survey comparison. More subsurface methane measurements were recorded in 2006 than in 2005. This is primarily due to the increased number of stressed/dead vegetation areas mapped in the upland area west of Pine River during 2006. The methane concentrations collected in 2006 appear to be relatively consistent with 2005.

When compared to previous years, methane seepage was detected further northwest of the upland area west of Pine River. However, no historical data in this area is available for comparison. Therefore, it is possible that this condition existed prior to the 2006 detailed seep mapping event. Figure 37 illustrates the historical data comparison of methane concentrations. A chart illustrating the distribution of historical mapping data at Pine River is presented below.



When comparing the areal extent of stressed/dead vegetation features mapped in 2005 and 2006, decreases are noted more often than increases. In general, more individual trees were mapped east of the Pine River in 2005 than in 2006. The majority of this area was noted to be covered by standing water during the 2006 mapping event. Figure 38 illustrates the historical data comparison of vegetation features at Pine River.

Visible methane seeps observed in the Pine River appear to be consistent with previous years. Visible seeps were noted west of the Pine River in 2006 and no seeps were noted in this area during previous years. No standing water was observed in the field east of Pine River during 2006, therefore no visible seeps were mapped. Figure 39 illustrates the historical data comparison of visible methane seeps at Pine River.

3.8 DETAILED MAPPING SUMMARY

The 2006 detailed mapping event was performed during the period from May 23, 2006 through June 10, 2006. The Vosburg Pike area and an area north of Basin Creek were added to the



detailed seep mapping program following the results of the 2005 regional reconnaissance activities.

Since this mapping event was performed in the spring, vegetation was in full bloom and the general landscape appeared relatively green, making stressed/dead vegetation areas more easily visible. 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 the Pine River.

In Basin Creek, ongoing construction activities during 2006 limited access to large portions of the previous mapped area. Additionally, relatively steep slopes and dense vegetation prohibited the mapping of certain areas. Data collected during this mapping event noted the presence of methane seeps in areas relatively consistent with previous mapping events. No new areas of methane seepage or vegetation stress were identified during the most 2006 detailed mapping event. However, the changing surface in the Basin Creek mapping area makes it difficult to map consistently the areas in the creek and area north of the creek.

At Carbon Junction, a slight decrease in methane concentrations was noted in the lowland areas along the Animas River during the 2006 field activities. Methane concentrations recorded in the upland areas of Carbon Junction during the 2006 field activities appear to be relatively consistent with previous years. The areal extent of methane seepage at Carbon Junction is relatively consistent with previous years with the exception of the upland area east of Highway 3 which appears to have increased slightly. However, only limited historical data are available for comparison. In general, the areal extent of stressed/dead vegetation features mapped at Carbon Junction appear to have decreased slightly from previous years. No new areas of methane seepage were identified in 2006.

At Florida River, data indicate that methane concentrations reported during 2006 appear to be consistent with methane concentrations reported during previous years, with the exception of the meadow in the upland area west of CR 234 which showed a slight decrease in methane concentrations. A greater number of measurements reporting methane concentrations between 50% and 100% were recorded in 2005 than in 2006. The areal extent of methane seepage at Florida River appears relatively unchanged. Data suggest that more stressed/dead vegetation features were mapped in 2006 than in 2005. This is primarily due to the increased number of vegetation features mapped southwest of the pond. When comparing the areal extent of vegetation features mapped in 2006 with previous years, more decreases were noted than increases. However, an increase in the areal extent of vegetation features mapped north of the pond in the vicinity of the Turner residence was noted during 2006. No new areas of methane seepage were identified during the 2006 mapping event. The Turner residence is currently undergoing renovation and La Plata County has required a methane seep mitigation plan as part of the renovation process. The mitigation plan includes a barrier and passive venting system and a methane detection system.

Vosburg Pike was added to the detailed mapping program in 2006. Therefore, only limited data are available for comparison. One new area of methane seepage was noted (VP-2, Figure 17).

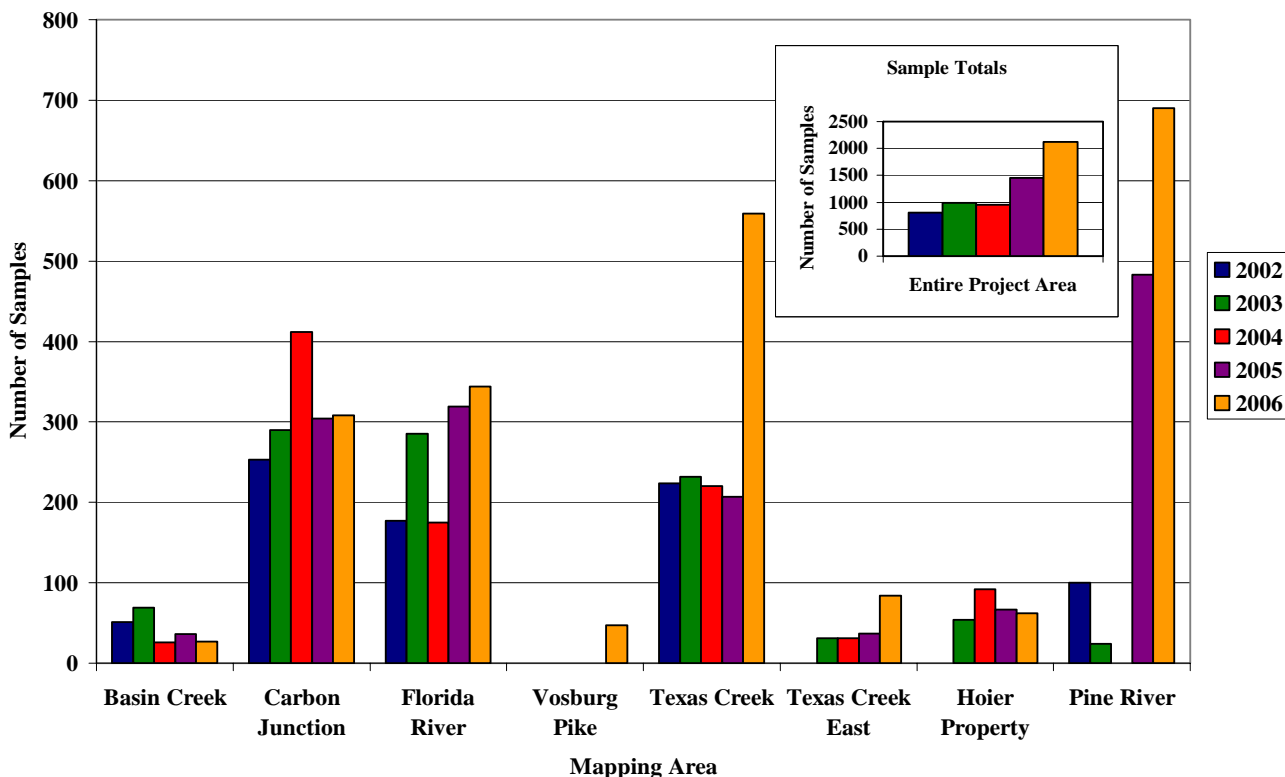
The detailed mapping in this area is focused on areas where seepage is occurring and extends outward to define the extent of seepage as practical.

At SFTC, a slight decrease in the number of methane concentrations ranging from 50% to 100% was observed in the main seep area and the valley west of the main seep area. Additionally, the areal extent of vegetation features mapped in the western portion of the valley and within the main seep area appears to have decreased. The areal extent of methane seepage in the SFTC Valley and the Ward residence appears to have increased slightly east of the main seep area. However, only limited data is available for comparison. Therefore, this condition may have existed prior to 2006. The number and areal extent of vegetation features mapped in the vicinity of the Ward residence increased during the 2006 mapping event. The methane concentrations and areal extent of vegetation features at SFTC East appear to be consistent with previous mapping events. Methane was detected along the driveway of the Kurtz residence for the first time during the 2006 field activities.

Data collected from the Hoier Property indicate that the concentration and areal extent of methane seepage has remained relatively unchanged. However, the areal extent of vegetation features appears to have decreased from previous years. Methane has not been detected along the driveway east of the pond since 2004. No new areas of methane seepage were identified during the 2006 detailed seep mapping event.

At the Pine River mapping area, an increase in the number of stressed/dead vegetation features was observed in the upland area west of the river. The majority of these features and the elevated methane concentrations associated with them, were not mapped during previous years. The concentrations of methane in areas that were mapped in 2006 and during previous years appear unchanged. When comparing the areal extent of vegetation features at Pine River from year to year, decreases are noted more often than increases.

Entire Project Area - Detailed Seep Mapping Data



The total number of features mapped (including visible seeps, trees, vegetation areas, and subsurface methane measurements) over the entire project area in 2006 was higher than the previous mapping events. LTE collected 805 features in 2002, 985 in 2003, 956 in 2004, 1453 in 2005, and 2121 in 2006. This is primarily due to the use of a grid mapping system at the SFTC mapping area and the addition of Vosburg Pike and the area north of Basin Creek to the detailed seep mapping program. On a site by site basis, the largest difference in the number of features mapped was noted at Pine River. LTE mapped 483 features at Pine River in 2005 and 690 features in 2006. This increase is primarily due to the increased number of features mapped in the upland area between Pine River and the Hoier property, but may also be attributed to an increase in the methane seepage.

Methane seepage is most evident in the lowland areas where a river or other surface water drainage transects the Kf outcrop in La Plata County north of the SUIT line. At Pine River, these seeps appear to be discharge seeps. However, since 2004, detailed mapping events have indicated the presence of methane seepage in topographic low areas within upland areas (i.e. a small valley near the top of a hill). This can be observed in the upland drainage located east of the Animas River at Carbon Junction (CJ-7, Figure 8), two upland areas at Vosburg Pike (VP-2 and VP-3, Figure 17), an upland area at SFTC East (TC-9, Figure 22), the Hoier property, and an upland area west of the Pine River (PR-4, Figure 35). These topographically low areas on the upland portions of the Kf outcrop correlate as small-scale representations of larger stream valleys



in the project area where methane seepage appears most prominent. These topographic features may be associated with subsurface fractures and/or groundwater discharge points.

In general, only two new areas of methane seepage were identified by the 2006 detailed seep mapping event. Methane seepage was identified for the first time at an upland area in the Vosburg Pike mapping area (VP-2, Figure 17). This area was not identified during the 2005 regional reconnaissance activities. Therefore, it is possible that methane seepage was present at this location prior to 2006. Methane was also detected for the first along the driveway northeast of the Ward residence and north of the Kurtz residence. These concentrations were relatively low and this area had not been mapped during previous mapping events. Therefore, it is possible that methane seepage was also present at this location prior to 2006.

Recent data indicate that H₂S was detected in isolated areas at Carbon Junction, Vosburg Pike, SFTC, SFTC East, and the upland area west of Pine River. The maximum concentration of H₂S detected was 50 ppm and was recorded at Carbon Junction. H₂S has been detected at Carbon Junction, SFTC East, and the upland area west of Pine River during previous mapping events, however, H₂S has not been detected at SFTC or Vosburg Pike in the past. Vosburg Pike has only limited historical data for comparison. In general, the H₂S concentrations recorded during the 2006 mapping event were the highest concentrations recorded since the beginning of the detailed seep mapping program.

The grid mapping system used within the main seep area at SFTC appears to have been successful in identifying methane seep areas. In general, methane seep areas identified by the grid mapping system in 2006 appear to be consistent with previous years. LTE believes that this is a useful technique to document the monitoring changes in methane concentration and areal extent of methane seepage over time.

SECTION 4.0

BLM PERMANENT MONITORING PROBES

4.1 BACKGROUND INFORMATION

The BLM has been collecting subsurface methane concentrations from permanent monitoring probes located along several 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 June 2006.

Data collected prior to November 1998 was obtained using a different field instrument to measure methane concentration. The original instrument could not measure concentrations greater than 110,000 ppm, therefore under reporting those concentrations. Only measurements obtained since November 1998 have been included in this analysis. For a discussion and analysis of trends based on the earlier data, see the previous Fruitland Outcrop Monitoring Report (LT Environmental, Inc., October 2004). The first and last dates contained in the current dataset for each transect are shown on Table 1.

4.2 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.

4.3 2006 STATISTICAL EVALUATION

The 2006 statistical evaluation used all the measurements collected after October 1998. Statistics were recalculated for probes where additional data have been collected since the previous study in August 2005. No new evaluations were performed at the Basin Creek transect since no new data have been collected there since November 2002. At each individual probe where new data have been collected, between 24 and 43 measurements were available for analysis.

Table 1 lists the number of probes on each transect, the number of probes where statistics could be calculated, the number of measurements since November 1998, and the number of probes where significant upward or downward trends were calculated. In most cases all measured concentrations were near zero, and no trends could be calculated for those probes. The number of significant upward and downward trends previously calculated using the data series from

November 1998 through September 2003, and for the data series from November 1998 through August 2005 are included for comparison purposes. The level of significance tested was 90 % on a two-tailed test. For a trend statistic indicating a 90% level of significance, there is a 90% chance that the estimated trend is indicative of a real trend in the data and not an artifact of random scatter in the data.

Statistical analysis of the 152 permanent monitoring probes indicated that 33 probes currently exhibit trends at the 90% significance level. Of those significant trends, 12 (36%) were upward and 21 (64%) were downward. This shows a continuing decrease in the proportion of statistically significant upward trends as compared to the previous statistical evaluations, which reported 53% upward trends in 2003 and 42% upward trends in 2005.

Table 2 summarizes statistics at each individual probe location. Trends could be calculated at only 57 of the 152 probes. The remaining probes did not have enough positive readings to make the calculation possible. Only 33 of the 57 trends were statistically significant at the 90% level. Of these, 12 were upward and 21 were downward.

4.4 BLM PERMANENT MONITORING PROBE SUMMARY

The most recent data available at the Basin Creek probe line was collected in November 2002, so no new trends were calculated for this transect. Nearly all the statistically significant trends at the Carbon Junction east and west transects are downward. Both upward and downward trends were calculated at the Pine River, Florida River, and SFTC east and west transects. No statistically significant trends were calculated at the East Pine River east and west and Edgemont Ranch transects.



SECTION 5.0

NATURAL SPRING SURVEY RESULTS

During LTE's literature and interview research, eight potential natural springs were identified on the Kf outcrop in La Plata County north of the SUTC line. Five of the springs were located in the vicinity of SUTC, one spring was located in the Edgemont Ranch mapping area, one spring was located in the area west of Florida River, and one spring was located on the Hoier property, west of Pine River. All eight natural springs identified through research were located in accessible areas. However, LTE was only able to field-verify five of the eight natural springs. LTE was not granted access to collect samples from two of the five natural springs located in the vicinity of SUTC (Wilbourn Spring #1 and Wilbourn Spring #2). LTE was unable to locate one of the springs in the vicinity of SUTC or the spring was possibly dry (Wilbourn Spring #6).

Two additional springs, not identified during LTE's literature and research, were observed during field activities in the Edgemont Ranch mapping area. These springs were located north and northeast of the Rancho Durango LTD spring. All three of the natural springs in this area are tributaries to the stream flowing north from the valley. A flow was not observed in the surface water associated with the eastern-most spring (Rancho Durango East) until the spring reached the stream. Therefore, water samples were only collected from the two natural springs in which a flow was observed (Rancho Durango LTD and Rancho Durango North). Locations of the natural springs are noted on Figures 40 through 42.

A total of five water samples were collected by LTE during the 2006 natural spring survey. Two water samples were collected at the Darwin Rather property in the vicinity of the SUTC valley, two samples were collected at the Rancho Durango LTD property near the Edgemont Ranch mapping area, and one sample was collected at the Hoier property west of Pine River.

The COGCC currently uses 2 milligrams per liter (mg/L) as the action level guideline for methane in water systems. The COGCC guideline for water systems containing dissolved methane concentrations above 2 mg/L is that there is an increased risk for methane to come out of solution from the water and create potentially explosive conditions in confined spaces. Analytical results indicate that the dissolved methane concentrations in water samples collected from the five natural springs were below the COGCC threshold value of 2 mg/L. Dissolved methane was detected in the water samples collected from Darwin Rather Spring #2, Hoier Spring, and Rancho Durango LTD Spring at concentrations of 0.0017 mg/L, 0.0017 mg/L, and 0.0016 mg/L, respectively. The dissolved methane concentrations in the other two water samples collected were below the laboratory method detection limits.

When comparing the dissolved methane concentrations in the three natural springs sampled in 2005 and 2006, data indicate that the dissolved methane concentrations are relatively consistent from 2005 and 2006. Dissolved methane in the water sample collected from Rancho Durango LTD Spring was below the laboratory detection limit of 0.0005 mg/L during 2005, but was detected at a concentration of 0.0016 mg/L during 2006. The dissolved methane concentration in Darwin Rather Spring # 2 also increased slightly from 2005. The dissolved methane concentration in the water sample collected from Darwin Rather Spring #1 remains below the

laboratory detection limit. The dissolved methane concentrations from 2005 and 2006 are relatively consistent.

When comparing the flow rates of the three natural springs that were sampled in 2005 and 2006, it appears that the three springs indicated similar flows during the two years. However, LTE personnel noted that the first sign of flow associated with the Rancho Durango LTD Spring in 2006 was observed downgradient of the first flow observed in 2005, though flow measurements were consistent between the two years.

Field measurements for temperature, pH, conductivity, ORP, TDS, and flow as well as the reported methane concentration from the springs identified on the Kf outcrop in La Plata County north of the SUIT line are summarized in Table 3.

SECTION 6.0

CONCLUSIONS AND RECOMMENDATIONS

6.1 GAS FLUX CHAMBERS

The gas flux chamber monitoring has been discontinued indefinitely. As described previously, LTE has identified several factors in the gas flux chamber monitoring program that support the termination of this monitoring method including: 1) data have shown no conclusive upward or downward trends during eight years of operation; 2) equipment is highly susceptible to weathering and corrosion from the elements; 3) power supply requirements cause frequent discharge of battery system despite solar powered assistance; and 4) cost of performing frequent O&M activities and extensive data manipulation outweighs value of data obtained. LTE believes that the detailed seep mapping, regional reconnaissance, and pedestrian surveys have been far more effective in assessing the changes in methane seepage over time.

LTE plans to remove the gas flux chambers and stockpile the equipment in May 2007.

6.2 DETAILED SEEP MAPPING

When comparing the detailed seep mapping data from 2002 through 2006, LTE noted both increases and decreases in subsurface methane concentrations, areal extent of methane seepage, and areal extent of historical vegetation features. As of 2005, general comparisons of historical seeps from year to year showed slight increases in methane concentrations more frequently than decreases. However, data collected during the 2006 detailed seep mapping event show slight decreases in methane concentrations more often than increases. Although methane concentrations collected during 2006 are relatively consistent with previous years over the majority of the mapping area, slight decreases were observed at the lowland area of Carbon Junction, the meadow west of CR 234 at Florida River, the western portion of the SFTC valley, and within the main seep area at SFTC.

In general, the areal extent of methane seepage over the majority of the study area appears relatively unchanged. Where changes were noted, only limited historical data were available for comparison. Therefore, these conditions may have existed prior to the 2006 detailed seep mapping event.

When comparing the areal extent of vegetation features from year to year, 2006 data appear to indicate slight decreases more often than increases. These decreases are most evident in both the lowland and the upland areas of Carbon Junction, in the upland areas mapped west of CR 234 and north of CR 237 at Florida River, in the western portion of the SFTC valley, in the main seep area of SFTC, at the Hoier property, and in both the lowland and the upland areas of Pine River. The areal extent of vegetation features mapped at Basin Creek and SFTC East appear relatively unchanged.

Based on the 2006 detailed seep mapping data, areas that showed decreases in both methane concentrations and areal extent of vegetation features include the lowland area of Carbon



Junction, the meadow in the upland area west of CR 234 at Florida River, the western portion of the SFTC valley, and in the main seep area at SFTC.

H₂S concentrations reported during 2006 were greater than in previous years. H₂S was reported at Carbon Junction, Vosburg Pike, SFTC, SFTC East, and the upland area west of Pine River during the 2006 detailed seep mapping event. LTE will continue to monitor H₂S in the subsurface soil along the Kf in La Plata County.

When comparing methane seepage to topography, historical data indicate that methane seepage is most commonly observed in the lowland areas (groundwater discharge areas) and stream valleys where the Kf is overlain by alluvium in La Plata County. However, recent data also indicate the presence of methane seepage in topographically low areas of upland areas. These areas, similar to the stream valleys, are most likely at topographic lows due to variation in the subsurface bedrock, stratigraphy, or underlying fracture and/or fault systems providing preferential flow paths.

It is evident that the sample population for a given mapping event affects the general appearance of trends. It is important to compare only proximal data when evaluating trends. LTE's detailed mapping program focuses on vegetation 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

Based on the results of the detailed seep mapping conducted at SFTC using the grid mapping system, LTE recommends the implementation of the grid mapping system at the majority of the mapping areas in La Plata County. The grid mapping system will allow for a more systematic and consistent approach to methane seep mapping. Additionally, the grid mapping system makes comparison of methane concentrations and areal extent of methane seepage over time easier. But, the grid mapping system should only be used in areas where practical. The grid mapping system will not be used for mapping areas where the areal extent of methane seepage is relatively small, such as Vosburg Pike.

The grid mapping system has proven to be successful at larger known seep areas such as SFTC and during other methane seep mapping activities in the San Juan Basin and Raton Basin. Therefore, LTE recommends the increased use of the grid mapping system during future detailed seep mapping events in La Plata County.

6.3 PERMANENT MONITORING PROBES

The most recent data available at the Basin Creek probe line was collected in November 2002, so no new trends were calculated for this transect. Nearly all the statistically significant trends at the Carbon Junction east and west transects are downward. Both upward and downward trends were calculated at the Pine River, Florida River and SFTC east and west transects. No statistically significant trends were calculated at the East Pine River east and west and Edgemont transects.

6.4 NATURAL SPRING SURVEY

Dissolved methane was detected in the water samples collected from Darwin Rather Spring #2, Hoier Spring, and Rancho Durango Spring LTD at concentrations of 0.0017 mg/L, 0.0017 mg/L, and 0.0016 mg/L, respectively. In general, the dissolved methane concentrations are consistent from 2005 and 2006. These dissolved methane concentrations are considered low.

The COGCC has established a methane concentration of 2.0 mg/L as the threshold limit for which there is an increased risk of creating a hazardous atmosphere in a water well or residential water piping system. The methane concentrations currently detected in these three natural springs are below the 2.0 mg/L threshold limit.

In general, flow rates measured during 2006 were consistent with flow rates measured in 2005. The 2006 natural spring survey was useful in collecting baseline flow rates and methane concentrations at two additional natural springs located on the Kf. The survey was also useful in evaluating changes in methane concentration and flow rates of natural springs over time. LTE recommends continuing the natural spring survey during future mapping events of the Kf in La Plata County north of the SUIT line.

6.5 RECOMMENDATIONS

Based on the results of the 2006 detailed seep mapping, the permanent monitoring probe data, and the 2006 natural spring survey, LTE recommends the following:

- The implementation of the grid mapping where practical during future detailed seep mapping events along the Kf in La Plata County north of the SUIT line;
- Detailed mapping performed in May 2007;
- Conduct an updated IR aerial survey, suspect area identification, and field verification event in 2008;
- An updated natural spring survey should be conducted during the next detailed seep mapping event in 2007 to assess any changes in the number of springs, the flow rates, and/or the chemistry of natural springs on the Kf outcrop in La Plata County north of the SUIT line. In addition to dissolved methane, water samples will also be analyzed for major anions, cations, iron, manganese, selenium, and nitrate/nitrite per the request of the COGCC; and
- Obtain color aerial photographs from La Plata County for use during future monitoring and reporting.

TABLES



TABLE 1
STATISTICAL ANALYSIS SUMMARY
FRUITLAND OUTCROP PERMANENT MONITORING PROBE DATA
LA PLATA COUNTY, COLORADO

THE GROUP

Transect Name	No. of Probes	No. of Probes with Trends*	First Data	Last Data	Average No. of Sampling Events	90% Significance					
						Up 11/98-9/03	Down 11/98-9/03	Up 11/98-8/05	Down 11/98-8/05	Up 11/98-6/06	Down 11/98-6/06
Carbon Junction - East transect	15	9	Nov-98	Jun-06	42	3	2	0	6	0	8
Carbon Junction - West transect	15	10	Nov-98	Jun-06	42	1	2	0	6	1	7
East Pine River - West transect	15	0	Nov-98	Jun-06	37	0	0	0	0	0	0
East Pine River - East transect	15	1	Nov-98	Jun-06	40	0	0	0	0	0	0
Edgemont Ranch	16	1	Nov-98	Jun-06	38	0	1	0	0	0	0
Florida River	17	11	Nov-98	Jun-06	38	4	2	5	2	4	1
Pine River	13	6	Nov-98	Jun-06	38	4	3	5	0	3	1
Texas Creek - West transect	25	9	Nov-98	Jun-06	33	5	6	1	1	2	1
Texas Creek - East transect	21	9	Nov-98	Jun-06	34	4	3	3	4	2	3
Totals	152	56			342	21	19	14	19	12	21
Percentage						52.5%	47.5%	42.4%	57.6%	36.4%	63.6%

No. of Probes with Trends* Probes where z values could be calculated using the Mann Kendall method.



TABLE 2

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

THE GROUP

Site ID	First Data	Last Data	No. of Months	Maximum Conc (ppm)*	Percent months with LEL <3	Data Series from 11/98 - 6/06			
						Z3	SignZ3	Q3	Significance
Basin Creek									
BC-GP-101	Nov-98	Nov-02	23	500	97%	No new data			
BC-GP-102	Nov-98	Nov-02	24	2,500	96%	No new data			
BC-GP-103	Nov-98	Nov-02	21	50,000	0%	No new data			
BC-GP-104	Nov-98	Nov-02	24	500	97%	No new data			
BC-GP-105	Nov-98	Nov-02	21	16,000	42%	No new data			
BC-GP-106	Nov-98	Nov-02	24	3,000	88%	No new data			
BC-GP-107	Nov-98	Nov-02	24	2,000	96%	No new data			
BC-GP-108	Nov-98	Nov-02	24	500	100%	No new data			
BC-GP-109	Nov-98	Nov-02	26	500	100%	No new data			
BC-GP-110	Nov-98	Nov-02	21	2,000	88%	No new data			
BC-GP-111	Nov-98	Nov-02	21	910,000	0%	No new data			
BC-GP-112	Nov-98	Nov-02	21	44,500	6%	No new data			
BC-GP-113	Nov-98	Nov-02	24	500	100%	No new data			
BC-GP-114	Nov-98	Nov-02	24	0	100%	No new data			
BC-GP-115	Nov-98	Nov-02	24	500	100%	No new data			
BC-GP-116	Nov-98	Nov-02	23	0	100%	No new data			
Carbon Junction (East transect)									
CJ-GP-101	Nov-98	Jun-06	42	230,000	56%	-2.09	down	-0.07	vv
CJ-GP-102	Nov-98	Jun-06	42	160,000	86%	-3.43	down	0.00	vvvv
CJ-GP-103	Nov-98	Jun-06	41	960,000	14%	-4.70	down	-33.96	vvvv
CJ-GP-104	Nov-98	Jun-06	42	70,000	60%	-4.12	down	-0.43	vvvv
CJ-GP-105	Nov-98	Jun-06	43	6,000	98%				
CJ-GP-106	Nov-98	Apr-06	37	1,030,000	5%	-2.51	down	-3.64	vv
CJ-GP-107	Nov-98	Jun-06	36	1,030,000	0%	-2.97	down	-18.01	vvv
CJ-GP-108	Nov-98	Jun-06	42	60,000	33%	-2.40	down	-1.89	vv
CJ-GP-109	Nov-98	Jun-06	42	810,000	0%	0.77	up	3.03	
CJ-GP-110	Nov-98	Jun-06	40	31,000	54%	-2.31	down	-0.17	vv
CJ-GP-111	Nov-98	Jun-06	43	500	100%				
CJ-GP-112	Nov-98	Jun-06	42	1,000	100%				
CJ-GP-113	Nov-98	Jun-06	43	500	100%				
CJ-GP-114	Nov-98	Jun-06	41	500	100%				
CJ-GP-115	Nov-98	Jun-06	42	1,000	100%				



TABLE 2

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

THE GROUP

Site ID	First Data	Last Data	No. of Months	Maximum Conc (ppm)*	Percent months with LEL <3	Data Series from 11/98 - 6/06			
						Z3	SignZ3	Q3	Significance
Carbon Junction (West transect)									
CJ-GP-201	Nov-98	Jun-06	36	0	100%				
CJ-GP-202	Nov-98	Jun-06	43	1,440,000	33%	-4.65	down	-29.17	vvvv
CJ-GP-203	Nov-98	Jun-06	44	1,020,000	0%	-3.65	down	-11.25	vvvv
CJ-GP-204	Nov-98	Jun-06	48	1,220,000	9%	-2.74	down	-18.37	vvv
CJ-GP-205	Nov-98	Jun-06	45	800,000	0%	-1.73	down	-12.00	v
CJ-GP-206	Nov-98	Jun-06	42	380,000	5%	-1.65	down	-5.33	v
CJ-GP-207	Jan-99	Jun-06	45	460,000	48%	-1.86	down	-0.16	v
CJ-GP-208	Nov-98	Jun-06	47	1,350,000	0%	-1.06	down	-4.52	
CJ-GP-209	Nov-98	Jun-06	42	460,000	2%	-3.31	down	-3.18	vvvv
CJ-GP-210	Nov-98	Jun-06	38	160,000	0%	2.64	up	2.54	^^^
CJ-GP-211	Nov-98	Jun-06	42	870,000	5%	1.53	up	0.52	
CJ-GP-212	Nov-98	Jun-06	43	500	100%				
CJ-GP-213	Nov-98	Jun-06	43	2,000	98%				
CJ-GP-214	Nov-98	Jun-06	41	500	100%				
CJ-GP-215	Nov-98	Jun-06	43	500	100%				
East Pine (West transect)									
EP-GP-101	Nov-98	Jun-06	40	1,000	100%				
EP-GP-102	Nov-98	Jun-06	41	500	100%				
EP-GP-103	Nov-98	Jun-06	34	500	100%				
EP-GP-104	Nov-98	Jun-06	40	500	100%				
EP-GP-105	Nov-98	Jun-06	40	500	100%				
EP-GP-106	Mar-99	Jun-06	38	500	100%				
EP-GP-107	Nov-98	Jun-06	41	500	100%				
EP-GP-108	Nov-98	Jun-06	33	500	100%				
EP-GP-109	Nov-98	Jun-06	39	1,000	98%				
EP-GP-110	Nov-98	Jun-06	40	500	98%				
EP-GP-111	Nov-98	Jun-06	35	1,000	97%				
EP-GP-112	Nov-98	Jun-06	32	500	97%				
EP-GP-113	Nov-98	Jun-06	38	500	98%				
EP-GP-114	Nov-98	Jun-06	34	500	100%				
EP-GP-115	Mar-99	Jun-06	36	500	100%				



TABLE 2
STATISTICAL ANALYSIS OF TRENDS IN FRUITLAND OUTCROP
PERMANENT MONITORING PROBE DATA
LA PLATA COUNTY, COLORADO

THE GROUP

Site ID	First Data	Last Data	No. of Months	Maximum Conc (ppm)*	Percent months with LEL <3	Data Series from 11/98 - 6/06			
						Z3	Sign/Z3	Q3	Significance
East Pine (East transect)									
EP-GP-201	Nov-98	Jun-06	38	500	100%				
EP-GP-202	Nov-98	Jun-06	40	500	100%				
EP-GP-203	Nov-98	Jun-06	42	10,000	98%				
EP-GP-204	Nov-98	Jun-06	42	1,000	100%				
EP-GP-205	Nov-98	Jun-06	39	500	100%				
EP-GP-206	Nov-98	Jun-06	41	500	100%				
EP-GP-207	Nov-98	Jun-06	35	500	100%				
EP-GP-208	Nov-98	Apr-06	41	500	100%				
EP-GP-209	Nov-98	Jun-06	41	500	100%				
EP-GP-210	Nov-98	Jun-06	41	12,000	98%				
EP-GP-211	Nov-98	Jun-06	42	500	100%				
EP-GP-212	Nov-98	Jun-06	41	50,000	80%	-1.55	down	0.00	
EP-GP-213	Nov-98	Jun-06	39	500	100%				
EP-GP-214	Nov-98	Jun-06	42	500	100%				
EP-GP-215	Nov-98	Jun-06	41	500	100%				
Edgemont Ranch									
ER-GP-101	Nov-98	Jun-06	38	1,000	100%				
ER-GP-102	Nov-98	Jun-06	43	1,000	100%				
ER-GP-103	Nov-98	Jun-06	43	500	100%				
ER-GP-104	Nov-98	Jun-06	40	500	100%				
ER-GP-105	Nov-98	Jun-06	43	1,000	100%				
ER-GP-106	Nov-98	Jun-06	43	1,000	100%				
ER-GP-107	Nov-98	Jun-06	41	880,000	66%	1.18	up	0.00	
ER-GP-108	Nov-98	Jun-06	42	2,500	98%				
ER-GP-109	Nov-98	Jun-06	38	1,000	100%				
ER-GP-109A	Nov-00	Sep-03	14	500	100%				
ER-GP-110	Nov-98	Jun-06	43	500	100%				
ER-GP-111	Nov-98	Jun-06	31	500	100%				
ER-GP-112	Nov-98	Jun-06	40	1,000	100%				
ER-GP-113	Nov-98	Jun-06	37	500	100%				
ER-GP-114	Nov-98	Jun-06	34	3,000	97%				
ER-GP-115	Nov-98	Jun-06	40	500	100%				



TABLE 2

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

THE GROUP

Site ID	First Data	Last Data	No. of Months	Maximum Conc (ppm)*	Percent months with LEL <3	Data Series from 11/98 - 6/06			
						Z3	Sign/Z3	Q3	Significance
Florida River									
FR-GP-101	Nov-98	Aug-05	38	5,300,000	97%				
FR-GP-102	Nov-98	Aug-05	43	5,500	95%				
FR-GP-103	Nov-98	Jun-06	43	1,500	100%				
FR-GP-104	Nov-98	Jun-06	42	260,000	10%	1.64	up	0.67	
FR-GP-104A	Nov-98	Jun-06	41	1,070,000	10%	5.89	up	50.00	^^^^
FR-GP-105	Nov-98	Jun-06	36	960,000	17%	-3.74	down	-37.13	vvvv
FR-GP-105A	Nov-00	Sep-03	11	25,000	64%	0.00	horizontal	0.00	
FR-GP-106	Nov-98	Jun-06	42	40,000	74%	0.38	up	0.00	
FR-GP-107	Nov-98	Jun-06	43	340,000	47%	0.05	up	0.00	
FR-GP-108	Nov-98	Jun-06	42	580,000	36%	-1.51	down	-0.14	
FR-GP-109	Nov-98	Jun-06	42	30,000	57%	1.17	up	0.00	
FR-GP-110	Nov-98	Jun-06	43	150,000	95%				
FR-GP-111	Nov-98	Jun-06	36	190,000	46%	5.44	up	1.67	^^^
FR-GP-112	Nov-98	Jun-06	41	8,000	98%				
FR-GP-113	Nov-98	Jun-06	34	9,000	63%	3.65	up	0.21	^^^^
FR-GP-114	Nov-98	Jun-06	43	1,000	100%				
FR-GP-115	Nov-98	Feb-06	36	60,000	88%	3.48	up	0.00	^^^^
Pine River									
PR-GP-101	Jan-99	Jun-06	37	500	100%				
PR-GP-102	Jan-99	Jun-06	38	1,000	100%				
PR-GP-103	Nov-98	Jun-06	40	39,000	88%	0.08	up	0.00	
PR-GP-104	Nov-98	Jun-06	37	920,000	14%	-2.50	down	37.78	vv
PR-GP-105	Nov-98	Jun-06	39	490,000	33%	-1.50	down	-0.46	
PR-GP-106	Nov-98	Jun-06	36	1,210,000	11%	2.63	up	26.67	^^^
PR-GP-107	Nov-98	Jun-06	40	925,000	23%	1.66	up	9.66	^
PR-GP-108	Nov-98	Jun-06	40	1,000	100%				
PR-GP-109	Nov-98	Jun-06	42	490,000	90%				
PR-GP-110	Nov-98	Jun-06	42	1,030,000	0%	2.05	up	7.21	^^
PR-GP-111	Nov-98	Jun-06	24	1,500	100%				
PR-GP-112	Nov-98	Jun-06	41	1,500	100%				
PR-GP-113	Jan-99	Jun-06	37	17,500	95%				



TABLE 2

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

THE GROUP

Site ID	First Data	Last Data	No. of Months	Maximum Conc (ppm)*	Percent months with LEL <3	Data Series from 11/98 - 6/06			
						Z3	SignZ3	Q3	Significance
Texas Creek (West transect)									
TC-GP-101	Nov-98	Jun-06	42	1,000	100%				
TC-GP-102	Nov-98	Jun-06	41	21,000	71%	3.59	up	0.11	^^^
TC-GP-103	Nov-98	Jun-06	38	129,500	26%	-0.52	down	-0.11	
TC-GP-104	Nov-98	Jun-06	34	900,000	0%	2.16	up	25.56	^^
TC-GP-105	Nov-98	Dec-05	31	365,000	6%	1.45	up	3.08	
TC-GP-106	Nov-98	Jun-06	42	4,500	95%				
TC-GP-107	Nov-98	Jun-06	41	220,000	37%	-2.94	down	-0.37	vvv
TC-GP-108	Jan-99	Jun-06	38	410,000	15%	-1.26	down	-4.21	
TC-GP-109	Jan-99	Jun-06	40	14,500	73%	-0.05	down	0.00	
TC-GP-110	Nov-98	Jun-06	42	5,500	93%				
TC-GP-111	Nov-98	Jun-06	42	2,500	90%				
TC-GP-112	Nov-98	Jun-06	30	1,500	93%				
TC-GP-112A	Nov-00	Sep-03	8	0	100%				
TC-GP-113	Nov-98	Jun-06	40	12,000	55%	-0.64	down	0.00	
TC-GP-114	Nov-98	Jun-06	38	3,000	97%				
TC-GP-115	Nov-98	Jun-06	38	1,500	98%				
TC-GP-116	Nov-98	Jun-06	38	1,000	100%				
TC-GP-117	Nov-98	Jul-03	10	0	100%				
TC-GP-118	Nov-98	Jun-06	36	860,000	19%	0.76	up	0.32	
TC-GP-119	Jan-99	Jun-06	35	4,500	97%				
TC-GP-120	May-99	Jun-06	29	500	100%				
TC-GP-121	May-99	Jun-06	36	500	100%				
TC-GP-122	Jan-99	Jun-06	37	500	100%				
TC-GP-123	Sep-01	Jun-04	12	1,160,000	0%				
TC-GP-124	Sep-01	Jun-04	12	850,000	0%				
Texas Creek (East transect)									
TC-GP-201	Jan-99	Jun-06	38	2,500	95%				
TC-GP-202	Jan-99	Jun-06	38	500	100%				
TC-GP-203	Nov-98	Jun-06	24	940,000	8%	0.89	up	33.48	
TC-GP-204	Jan-99	Jun-06	40	350,000	23%	-0.86	down	-1.03	
TC-GP-205	Nov-98	Jun-06	41	1,000	100%				
TC-GP-206	Jan-99	Jun-06	39	24,500	43%	-1.18	down	-0.08	
TC-GP-207	Jan-99	Jun-06	39	12,500	85%	-2.80	down	-0.05	vvv
TC-GP-208	Nov-98	Jun-06	37	13,000	41%	-2.75	down	-0.39	vvv
TC-GP-209	Jan-99	Jun-06	38	2,500	92%	0.38	up	0.00	
TC-GP-210	Jan-99	Jun-06	40	0	86%				
TC-GP-211	Jan-99	Jun-06	37	1,000	98%				



TABLE 2

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

THE GROUP

Site ID	First Data	Last Data	No. of Months	Maximum Conc (ppm)*	Percent months with LEL <3	Data Series from 11/98 - 6/06			
						Z3	SignZ3	Q3	Significance
Texas Creek (East transect)									
TC-GP-212	Nov-98	Jun-06	35	890,000	17%	-4.92	down	-54.00	vvvv
TC-GP-213	Nov-98	Jun-06	41	6,000	88%				
TC-GP-214	May-99	Jun-06	30	1,200,000	17%	4.29	up	63.64	^^^^
TC-GP-214A	May-01	Sep-03	10	450,000	0%	0.09	up	9.00	
TC-GP-215	Mar-99	Jun-06	33	5,000	79%	4.66	up	0.11	^^^^
TC-GP-215A	Nov-00	Sep-03	12	0	100%				
TC-GP-216	Jan-99	Jun-06	38	2,000	97%				
TC-GP-217	Jan-99	Jun-06	37	500	100%				
TC-GP-218	Jan-99	Jun-06	37	500	100%				
TC-GP-219	Jan-99	Jun-06	37	500	100%				

Notes:

Z: Mann-Kendall test statistic

Max conc = Max LEL * 500

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%



TABLE 3

**NATURAL SPRING WATER SAMPLE ANALYTICAL RESULTS
FRUITLAND FORMATION OUTCROP MONITORING 2005
LA PLATA COUNTY, COLORADO**

Spring ID	Description	Location	Inspection Date	Water Quality Measurements						Laboratory Result
				Conductivity (uS)	pH	ORP (mV)	Temperature (C)	TDS (ppm)	Estimated Flow (gal/min)	CH ₄ (mg/L)
Darwin Rather Spring #1	Tributary spring located on southern side of Texas Creek valley.	NWNW, Sec 07U, T35N, R7W	9/17/2005	479.9	7.20	59	10.6	329.2	0.5	<0.0005
			5/24/2006	425.9	7.76	52	12.3	288.4	1	<0.0010
Darwin Rather Spring #2	Tributary spring located approximately 650 feet south of Texas Creek valley.	SESE, Sec 07U, T35N, R7W	9/17/2005	271.4	7.50	45	14.4	178.3	<0.25	0.002
			5/24/2006	344	7.69	-62	13.0	222.9	<1.0	0.0017
Hoier Spring	Spring located west of pond on Hoier property.	NENW, Sec 15, T35N, R7W	5/24/2006	670.5	7.24	35	17.5	453.9	NM	0.0017
Rancho Durango LTD Spring	Tributary spring located on western portion of Edgemont Ranch valley approximately 0.5 miles southeast of Florida River.	NESW, Sec 17U, T35N, R8W	9/14/2005	494.1	8.05	66	14.6	338.0	>1	<0.0005
			5/24/2006	524.5	7.38	77	19.3	345.9	1.5	0.0016
Rancho Durango North Spring	Tributary spring located on the western portion of Edgemont Ranch valley, north of Ranch Durango LTD Spring.	NESW, Sec 17U, T35N, R8W	5/24/2006	533.2	7.67	87	13.4	360.7	2	<0.0010

Notes:

uS = microSiemens

ORP = oxidation reduction potential

mV = millivolts

C = celsius

NM = not measured

TDS = total dissolved solids

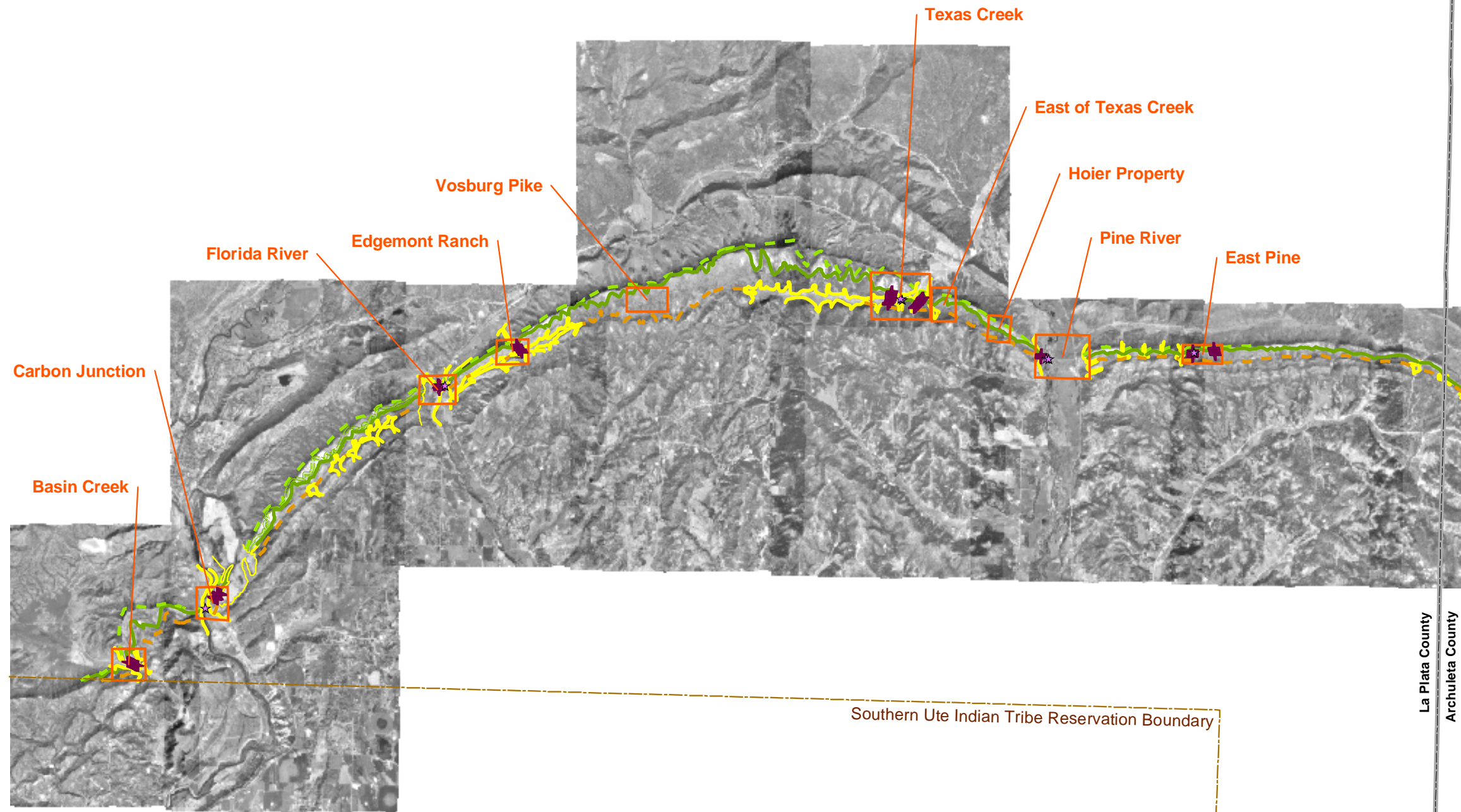
ppm = parts per million

gal/min = gallons per minute

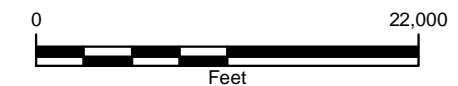
< = less than the stated laboratory method detection limit

FIGURES





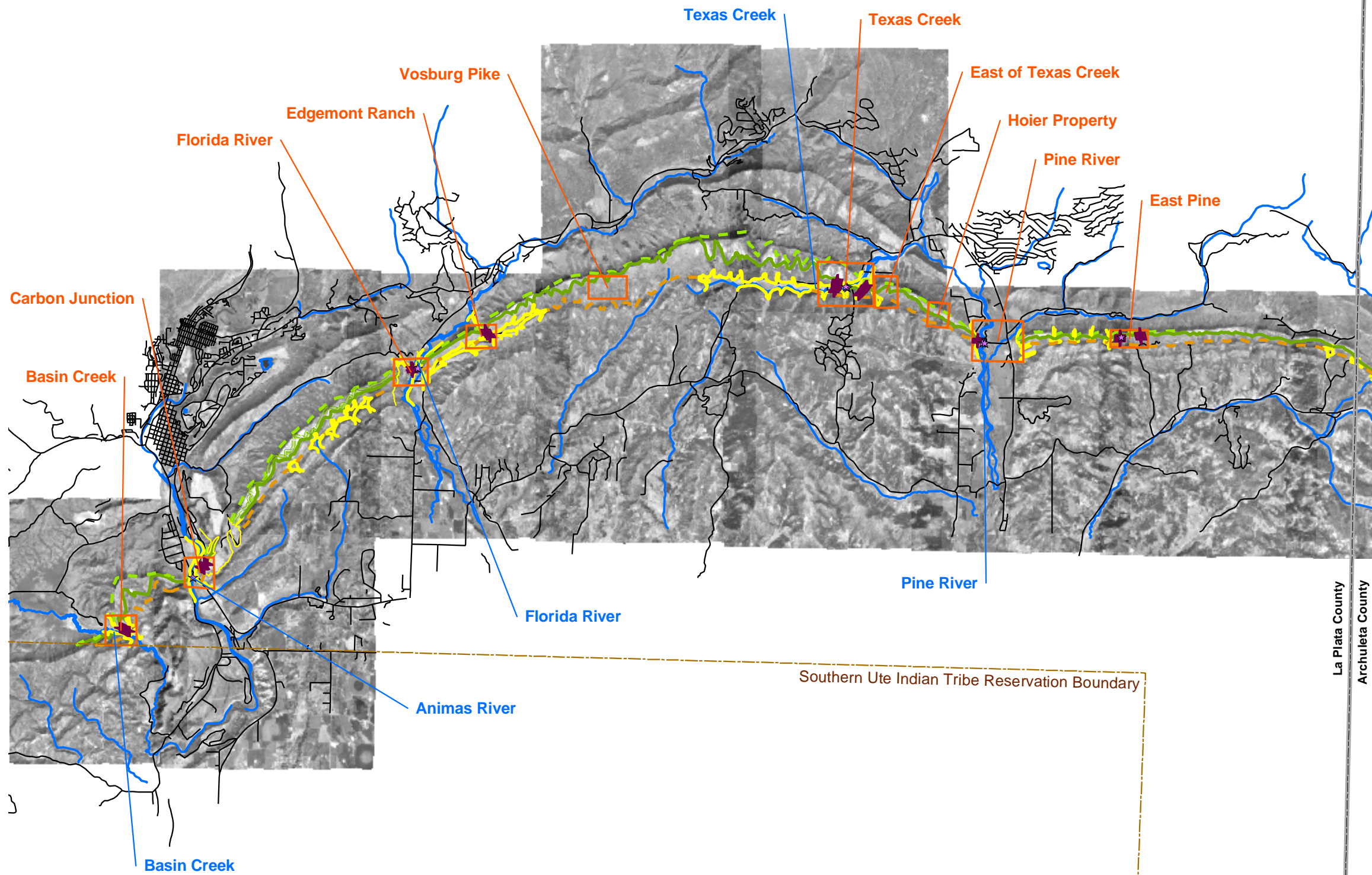
- Legend**
- ☆ Gas Flux Chambers
 - ⊕ Gas Monitoring Probes
 - Geology**
 - Fruitland Formation (Kf)
 - - - Fruitland Formation Tongue (Kft)
 - - - Kirtland Formation (Kk)
 - - - Pictured Cliffs Formation (Kpc)
 - - - Pictured Cliffs Formation Tongue (Kpct)
 - Quaternary Alluvium (Qa)
 - Quaternary Gravel (Qg)
 - Area of Interest
 - ▭ County Line Boundary
 - - - Southern Ute Indian Tribe Reservation Boundary



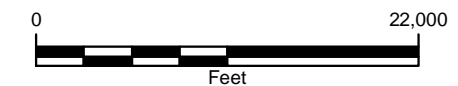
**FIGURE 1A
PROJECT AREA MAP
LA PLATA COUNTY, CO**

THE GROUP





- Legend**
- ☆ Gas Flux Chambers
 - + Gas Monitoring Probes
 - Rivers
 - Roads
 - Geology
 - Fruitland Formation (Kf)
 - Fruitland Formation Tongue (Kft)
 - Kirtland Formation (Kk)
 - Pictured Cliffs Formation (Kpc)
 - Pictured Cliffs Formation Tongue (Kpct)
 - Quaternary Alluvium (Qa)
 - Quaternary Gravel (Qg)
 - Area of Interest
 - County Line Boundary
 - Southern Ute Indian Tribe Reservation Boundary

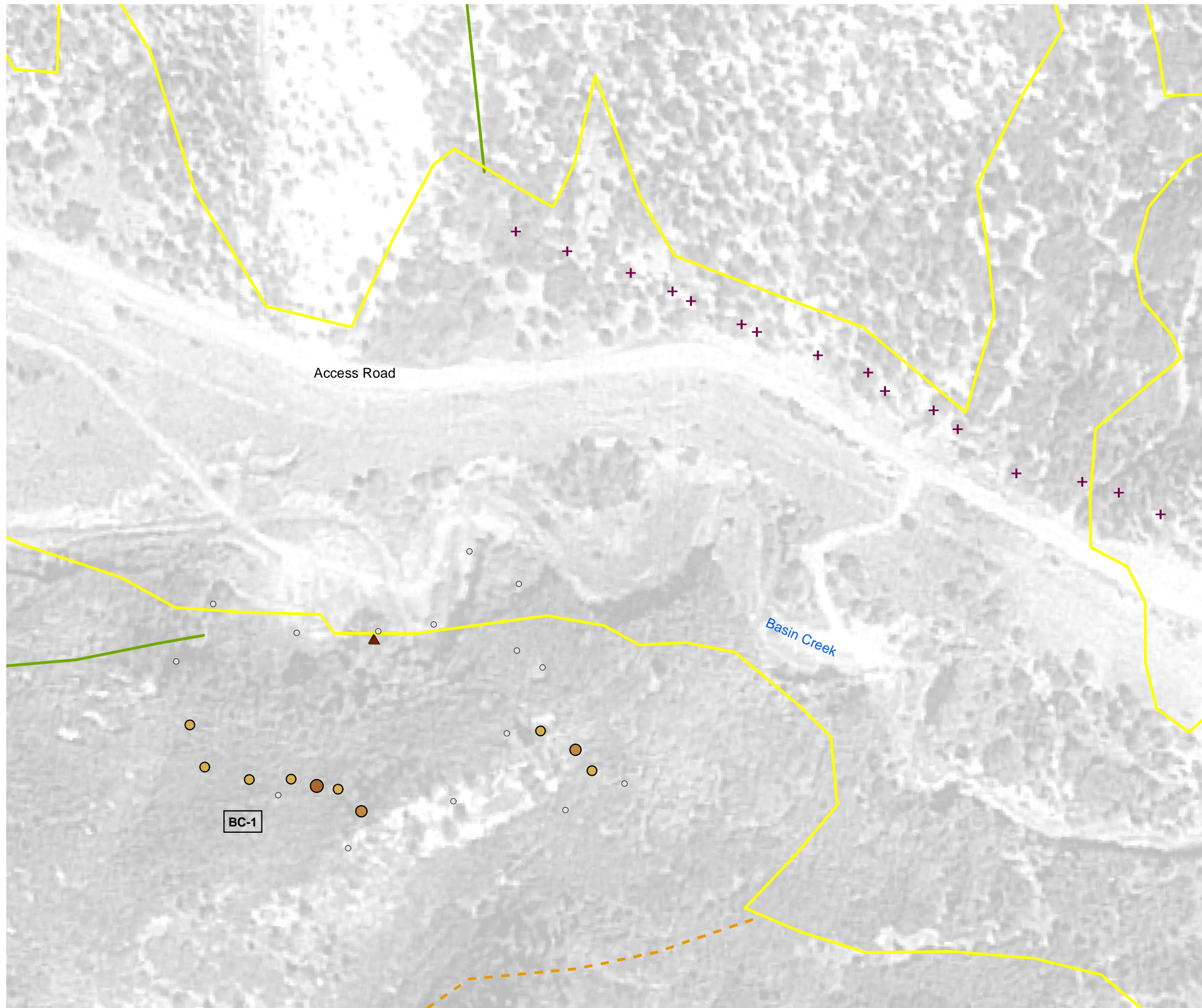


La Plata County
Archuleta County

FIGURE 1B
PROJECT AREA MAP - DETAIL
LA PLATA COUNTY, CO

THE GROUP





LEGEND

- ✚ Gas Monitoring Probes
- ☆ Gas Flux Chambers
- Visible Methane Seeps in Surface Water

Subsurface Methane Measurements

- 0 ppm
- 1ppm - 500 ppm
- 500 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

Subsurface methane measurements collected from temporary soil probes advanced with slide hammer.

Trees

- ▲ Dead Aspen
- ▲ Dead Cottonwood
- ▲ Dead Juniper
- ▲ Dead Pine
- ▲ Dead Scrub Oak
- ▲ Dead Willow
- ▲ Stressed Cottonwood
- ▲ Stressed Juniper
- ▲ Stressed Aspen
- ▲ Stressed Pine
- ▲ Stressed Scrub Oak
- ▲ Tree Stump

Vegetation

- ▭ Stressed/Dead Vegetation
- ▭ Non-Vegetative Area
- ▭ Live Aspen Grove

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

TC-4 Text Reference

Photograph taken prior to ALP dam construction.

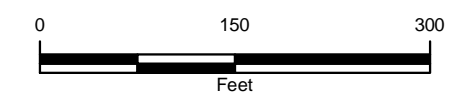
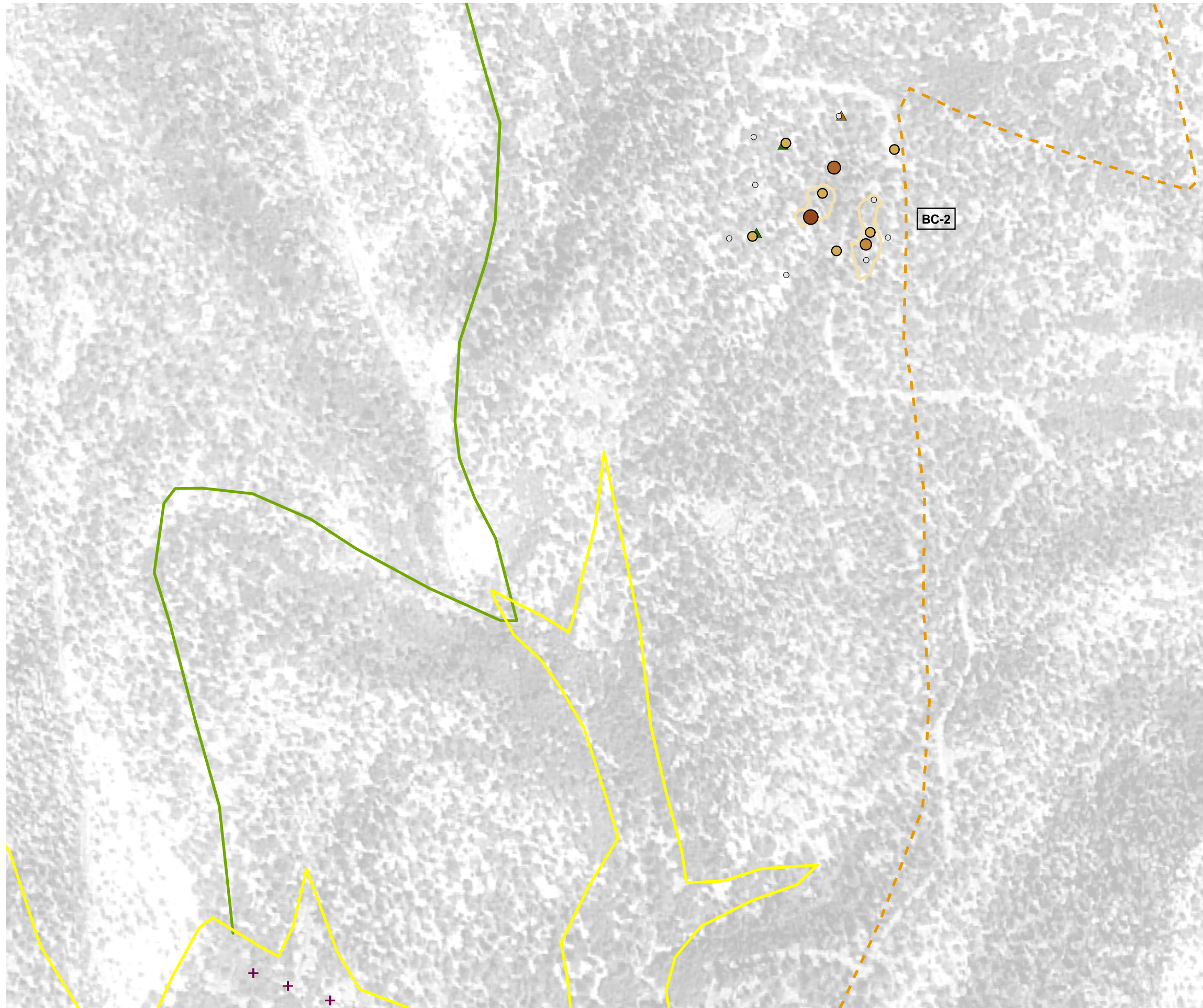


FIGURE 2
2006 DETAILED SEEP MAPPING
BASIN CREEK

THE GROUP





LEGEND

- + Gas Monitoring Probes
- ☆ Gas Flux Chambers
- Visible Methane Seeps in Surface Water

Subsurface Methane Measurements

- 0 ppm
- 1ppm - 500 ppm
- 500 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

Subsurface methane measurements collected from temporary soil probes advanced with slide hammer.

Trees

- ▲ Dead Aspen
- ▲ Dead Cottonwood
- ▲ Dead Juniper
- ▲ Dead Pine
- ▲ Dead Scrub Oak
- ▲ Dead Willow
- ▲ Stressed Cottonwood
- ▲ Stressed Juniper
- ▲ Stressed Aspen
- ▲ Stressed Pine
- ▲ Stressed Scrub Oak
- ▲ Tree Stump

Vegetation

- Stressed/Dead Vegetation
- Non-Vegetative Area
- Live Aspen Grove

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

TC-4 Text Reference

Photograph taken prior to ALP dam construction.

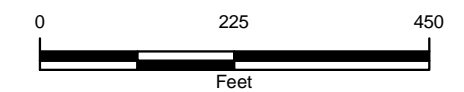
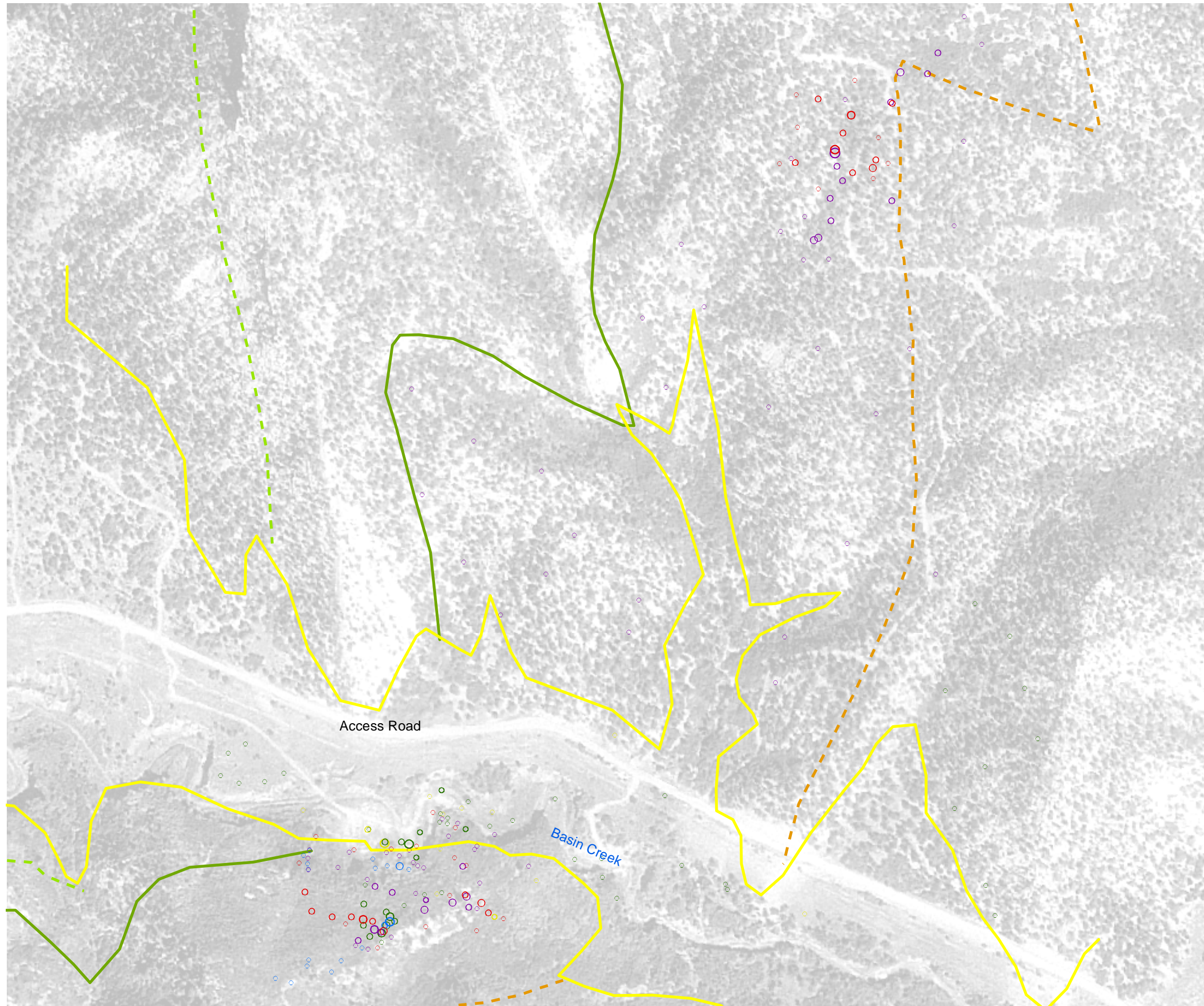


FIGURE 3
2006 DETAILED SEEP MAPPING
BASIN CREEK NORTH - DETAIL

THE GROUP





LEGEND

- | | | |
|------------------|---|------------------|
| 2006 | ○ 0 ppm | ○ 0 ppm |
| ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm |
| ○ 500 ppm - 5% | ○ 500 ppm - 5% | ○ 500 ppm - 5% |
| ○ 6% - 15% | ○ 6% - 15% | ○ 6% - 15% |
| ○ 16% - 25% | ○ 16% - 25% | ○ 16% - 25% |
| ○ 26% - 50% | ○ 26% - 50% | ○ 26% - 50% |
| ○ 51% - 75% | ○ 51% - 75% | ○ 51% - 75% |
| ○ 76% - 100% | ○ 76% - 100% | ○ 76% - 100% |
| 2005 | ○ 0 ppm | ○ 0 ppm |
| ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm |
| ○ 500 ppm - 5% | ○ 500 ppm - 5% | ○ 500 ppm - 5% |
| ○ 6% - 15% | ○ 6% - 15% | ○ 6% - 15% |
| ○ 16% - 25% | ○ 16% - 25% | ○ 16% - 25% |
| ○ 26% - 50% | ○ 26% - 50% | ○ 26% - 50% |
| ○ 51% - 75% | ○ 51% - 75% | ○ 51% - 75% |
| ○ 76% - 100% | ○ 76% - 100% | ○ 76% - 100% |
| 2004 | ○ 0 ppm | |
| ○ 1ppm - 500 ppm | | |
| ○ 500 ppm - 5% | | |
| ○ 6% - 15% | | |
| ○ 16% - 25% | | |
| ○ 26% - 50% | | |
| ○ 51% - 75% | | |
| ○ 76% - 100% | | |
| | Geology | |
| | — Fruitland Formation (Kf) | |
| | - - - Fruitland Formation Tongue (Kft) | |
| | - - - Kirtland Formation (Kk) | |
| | - - - Pictured Cliffs Formation (Kpc) | |
| | - - - Pictured Cliffs Formation Tongue (Kpct) | |
| | — Quaternary Alluvium (Qa) | |
| | — Quaternary Gravel (Qg) | |

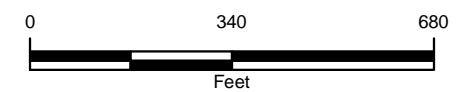
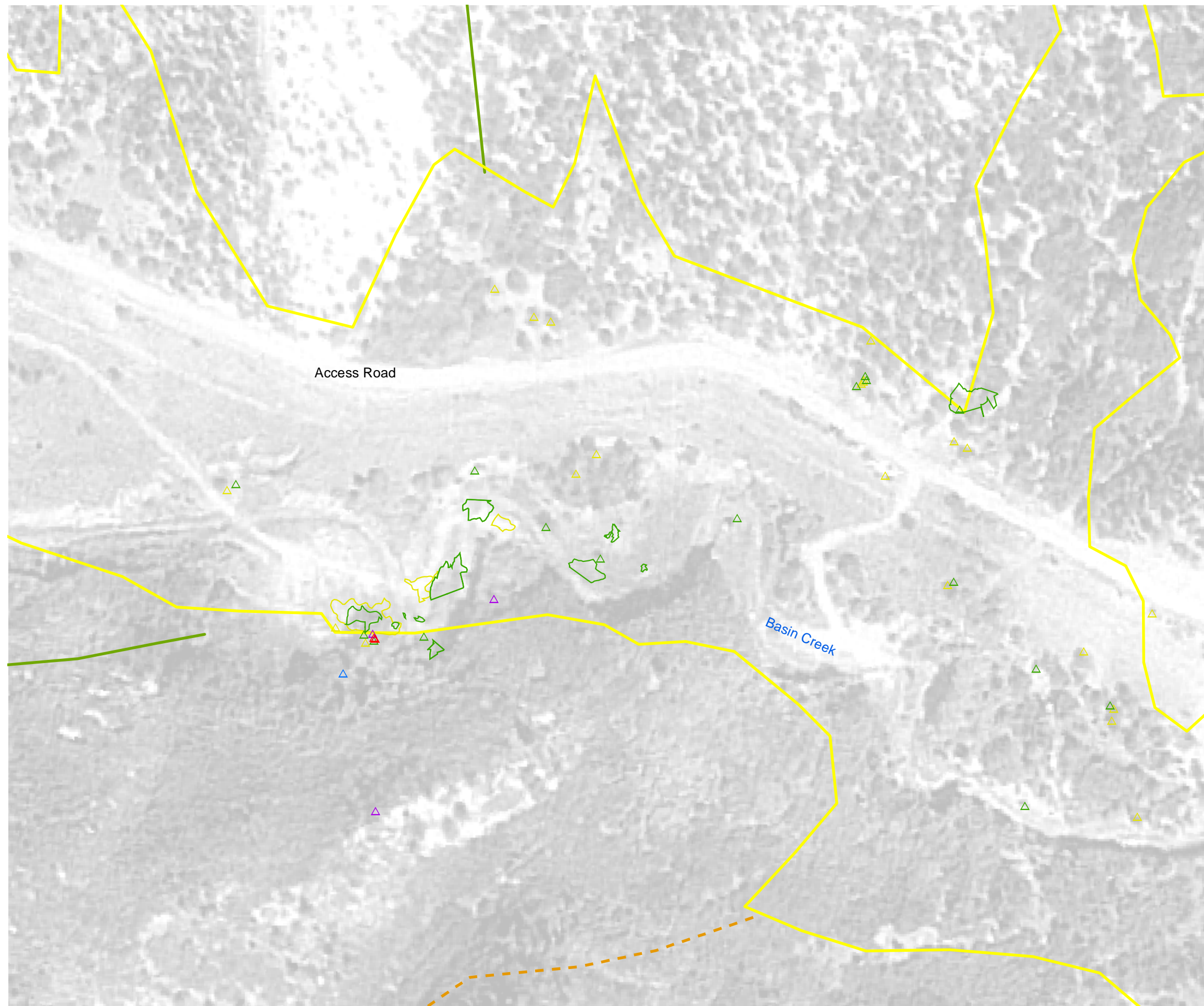


FIGURE 4
HISTORICAL DATA COMPARISON
SUBSURFACE METHANE MEASUREMENTS
BASIN CREEK
 THE GROUP





LEGEND

- △ Stressed/Dead Trees 2006
- △ Stressed/Dead Trees 2005
- △ Stressed/Dead Trees 2004
- △ Stressed/Dead Trees 2003
- △ Stressed/Dead Trees 2002
- Stressed/Dead Veg 2006
- Stressed/Dead Veg 2005
- Stressed/Dead Veg 2004
- Stressed/Dead Veg 2003
- Stressed/Dead Veg 2002

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- - - Kirtland Formation (Kk)
- - - Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

Photograph taken prior to ALP dam construction.

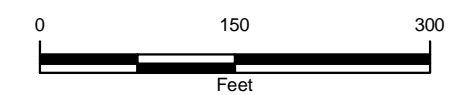
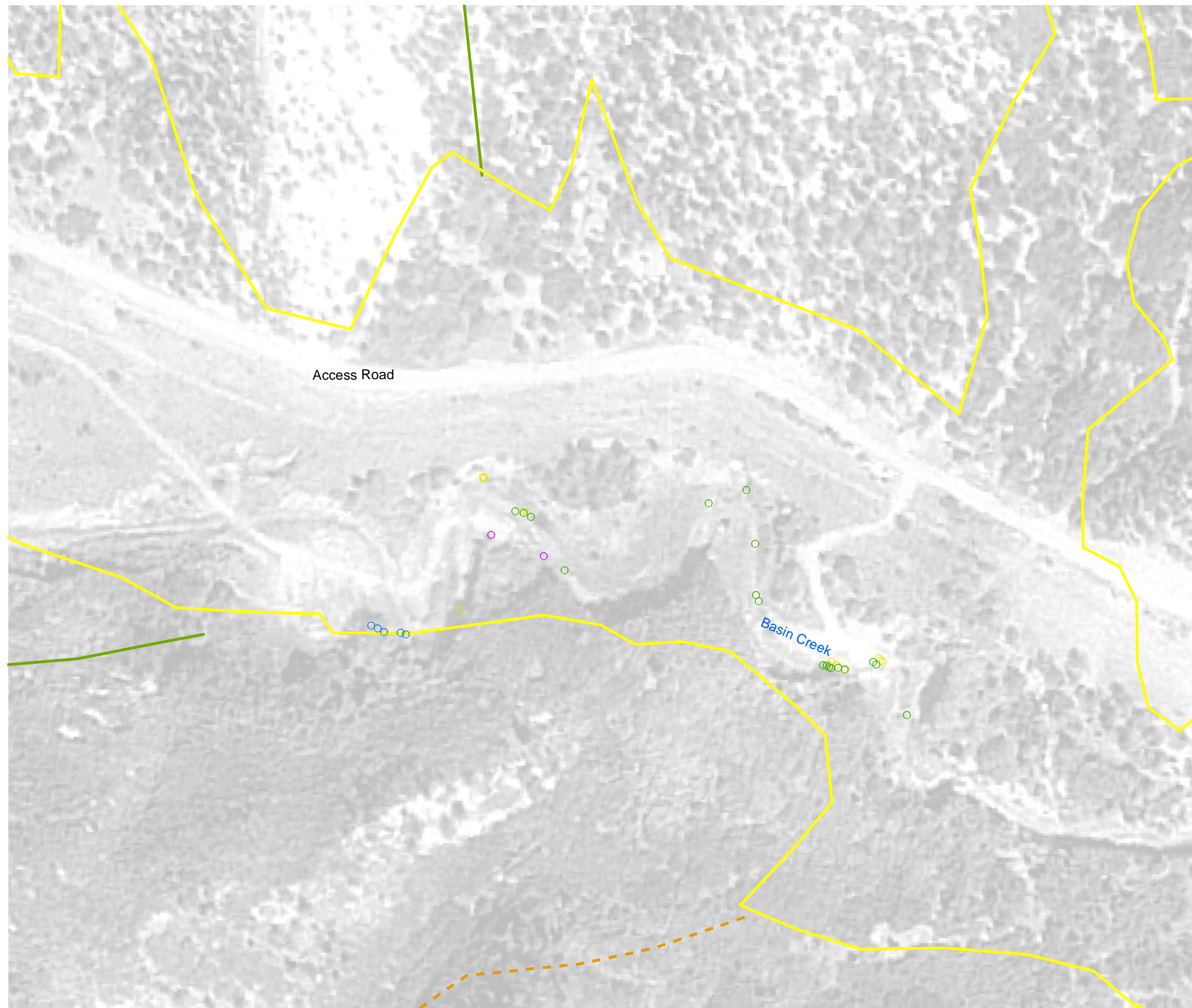


FIGURE 5
HISTORICAL DATA COMPARISON
STRESSED/DEAD VEGETATION
BASIN CREEK

THE GROUP





LEGEND

- Methane Seeps 2006
- Methane Seeps 2005
- Methane Seeps 2004
- Methane Seeps 2003
- Methane Seeps 2002

Geology

- Fruitland Formation (Kf)
- - - Fruitland Formation Tongue (Kft)
- - - Kirtland Formation (Kk)
- - - Pictured Cliffs Formation (Kpc)
- - - Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

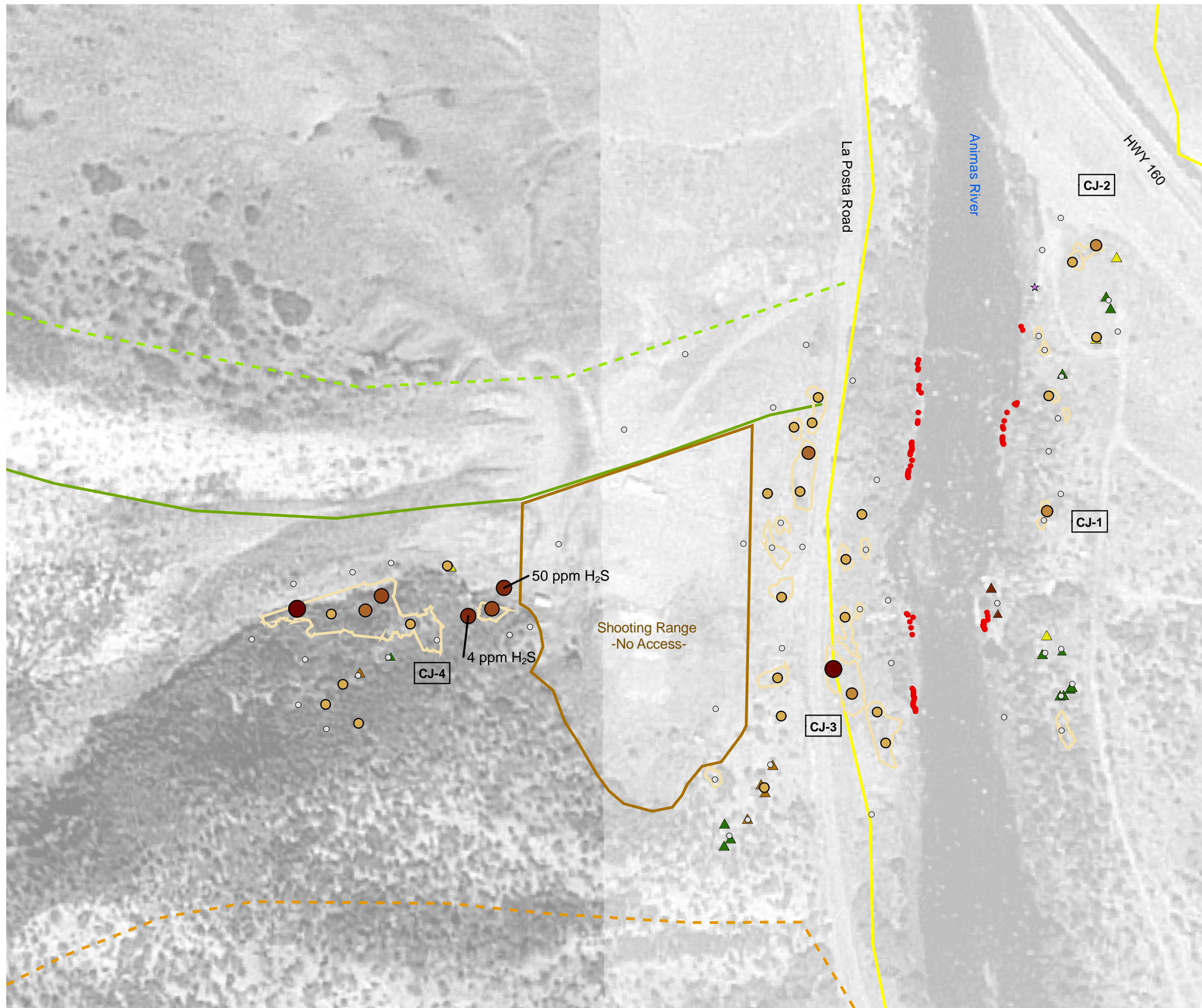
Photograph taken prior to ALP dam construction.
No surface water was observed in 2006.



FIGURE 6
HISTORICAL DATA COMPARISON
VISIBLE METHANE SEEPS IN SURFACE WATER
BASIN CREEK

THE GROUP





LEGEND

- + Gas Monitoring Probes
- ☆ Gas Flux Chambers
- Visible Methane Seeps in Surface Water

Subsurface Methane Measurements

- 0 ppm
- 1ppm - 500 ppm
- 500 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

Subsurface methane measurements collected from temporary soil probes advanced with slide hammer.

Trees

- ▲ Dead Aspen
- ▲ Dead Cottonwood
- ▲ Dead Juniper
- ▲ Dead Pine
- ▲ Dead Scrub Oak
- ▲ Dead Willow
- ▲ Stressed Cottonwood
- ▲ Stressed Juniper
- ▲ Stressed Aspen
- ▲ Stressed Pine
- ▲ Stressed Scrub Oak
- ▲ Tree Stump

Vegetation

- Stressed/Dead Vegetation
- Non-Vegetative Area
- Live Aspen Grove

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)
- TC-4 Text Reference

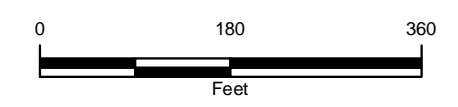
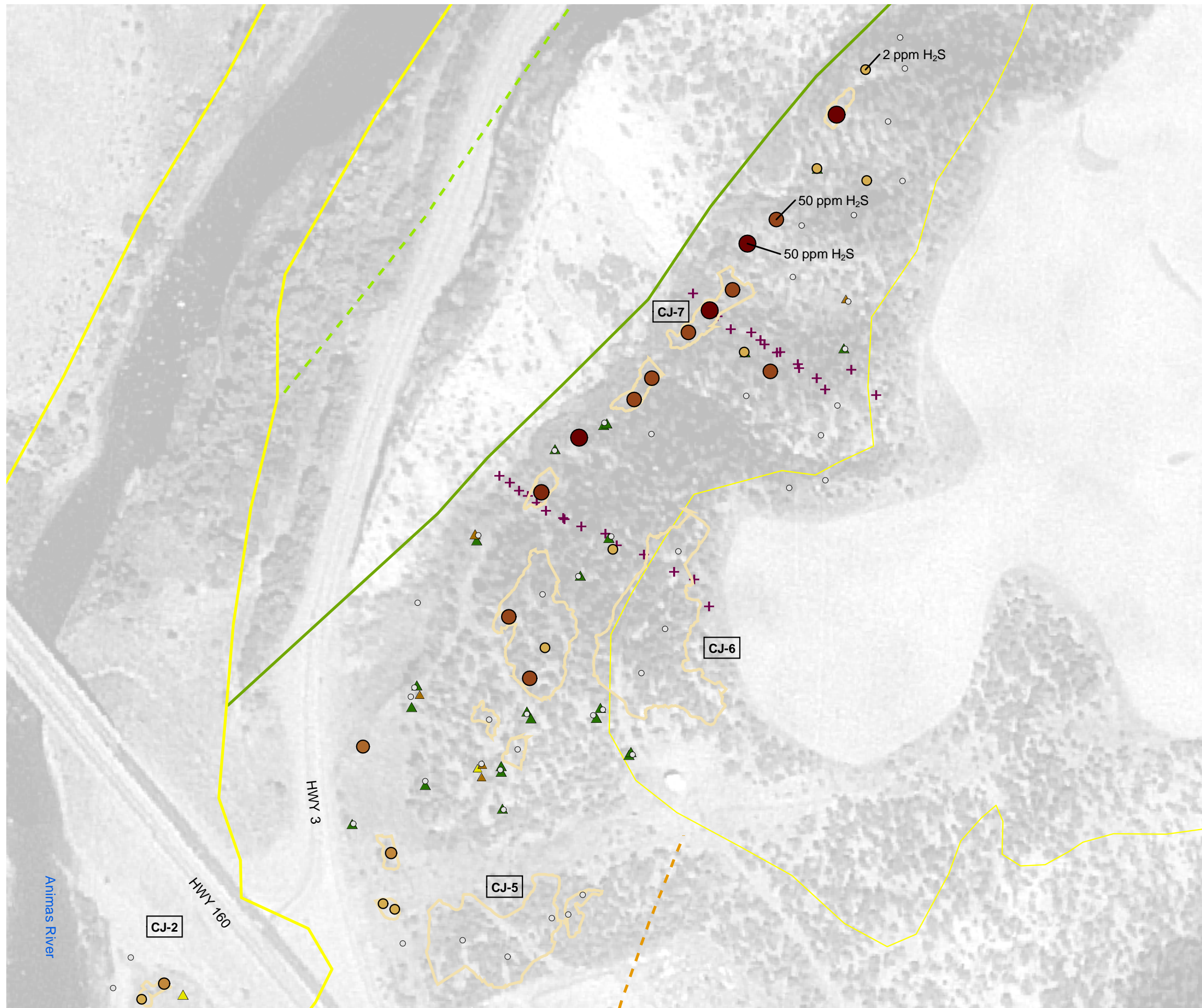


FIGURE 7
2006 DETAILED SEEP MAPPING
CARBON JUNCTION WEST - DETAIL
 THE GROUP





LEGEND

- + Gas Monitoring Probes
- ☆ Gas Flux Chambers
- Visible Methane Seeps in Surface Water

Subsurface Methane Measurements

- 0 ppm
- 1ppm - 500 ppm
- 500 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

Subsurface methane measurements collected from temporary soil probes advanced with slide hammer.

Trees

- ▲ Dead Aspen
- ▲ Dead Cottonwood
- ▲ Dead Juniper
- ▲ Dead Pine
- ▲ Dead Scrub Oak
- ▲ Dead Willow
- ▲ Stressed Cottonwood
- ▲ Stressed Juniper
- ▲ Stressed Aspen
- ▲ Stressed Pine
- ▲ Stressed Scrub Oak
- ▲ Tree Stump

Vegetation

- Stressed/Dead Vegetation
- Non-Vegetative Area
- Live Aspen Grove

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

TC-4 Text Reference

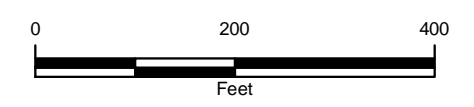
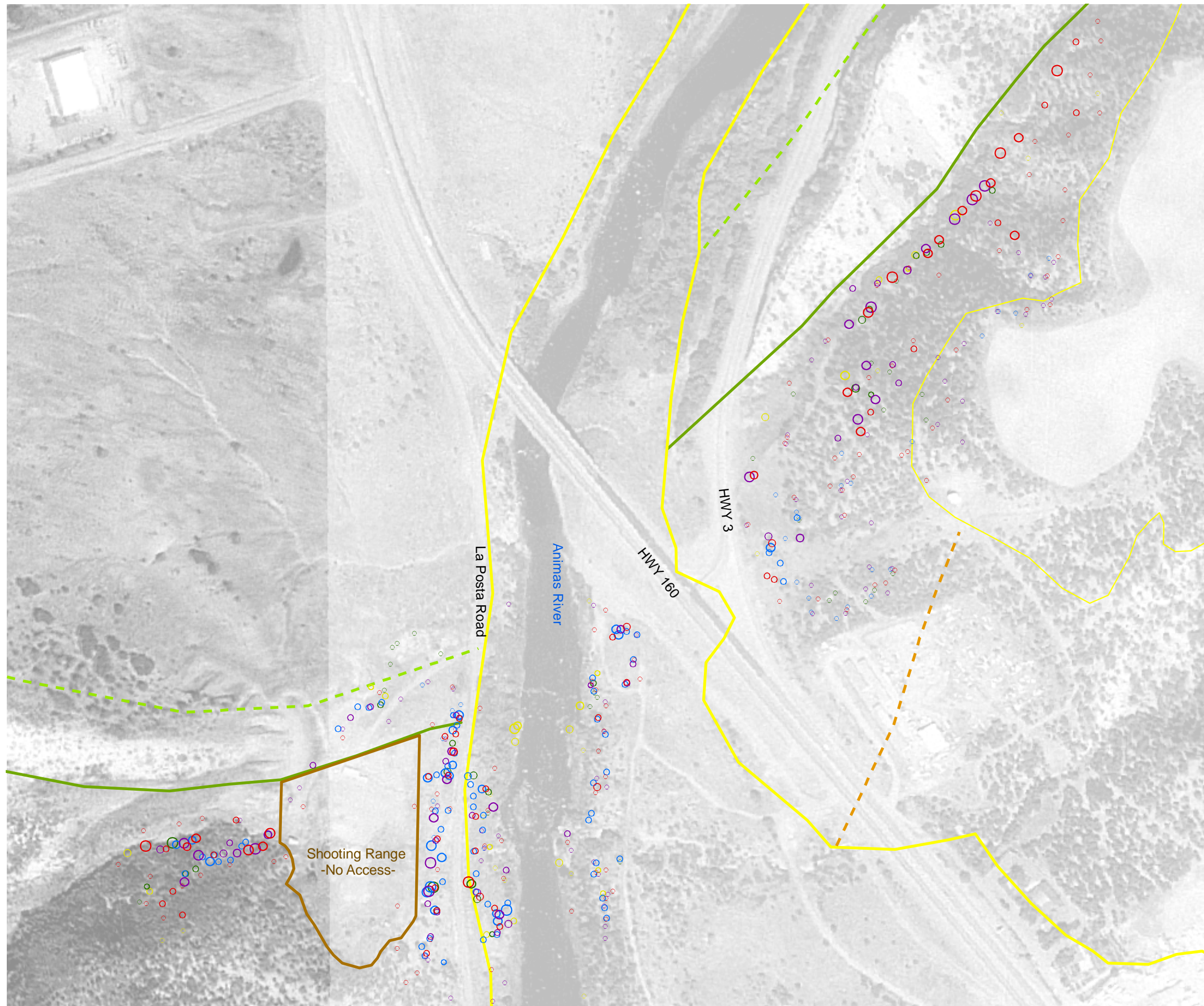


FIGURE 8
2006 DETAILED SEEP MAPPING
CARBON JUNCTION EAST - DETAIL

THE GROUP





LEGEND

- | | | |
|------------------|---|------------------------------------|
| 2006 | ○ 0 ppm | ○ 0 ppm |
| ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm |
| ○ 500 ppm - 5% | ○ 500 ppm - 5% | ○ 500 ppm - 5% |
| ○ 6% - 15% | ○ 6% - 15% | ○ 6% - 15% |
| ○ 16% - 25% | ○ 16% - 25% | ○ 16% - 25% |
| ○ 26% - 50% | ○ 26% - 50% | ○ 26% - 50% |
| ○ 51% - 75% | ○ 51% - 75% | ○ 51% - 75% |
| ○ 76% - 100% | ○ 76% - 100% | ○ 76% - 100% |
| 2005 | ○ 0 ppm | ○ 0 ppm |
| ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm |
| ○ 500 ppm - 5% | ○ 500 ppm - 5% | ○ 500 ppm - 5% |
| ○ 6% - 15% | ○ 6% - 15% | ○ 6% - 15% |
| ○ 16% - 25% | ○ 16% - 25% | ○ 16% - 25% |
| ○ 26% - 50% | ○ 26% - 50% | ○ 26% - 50% |
| ○ 51% - 75% | ○ 51% - 75% | ○ 51% - 75% |
| ○ 76% - 100% | ○ 76% - 100% | ○ 76% - 100% |
| 2004 | ○ 0 ppm | ○ 0 ppm |
| ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm |
| ○ 500 ppm - 5% | ○ 500 ppm - 5% | ○ 500 ppm - 5% |
| ○ 6% - 15% | ○ 6% - 15% | ○ 6% - 15% |
| ○ 16% - 25% | ○ 16% - 25% | ○ 16% - 25% |
| ○ 26% - 50% | ○ 26% - 50% | ○ 26% - 50% |
| ○ 51% - 75% | ○ 51% - 75% | ○ 51% - 75% |
| ○ 76% - 100% | ○ 76% - 100% | ○ 76% - 100% |
| Geology | — Fruitland Formation (Kf) | — Fruitland Formation Tongue (Kft) |
| | — Kirtland Formation (Kk) | — Pictured Cliffs Formation (Kpc) |
| | — Pictured Cliffs Formation Tongue (Kpct) | — Quaternary Alluvium (Qa) |
| | — Quaternary Gravel (Qg) | |

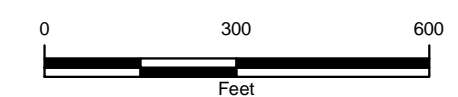
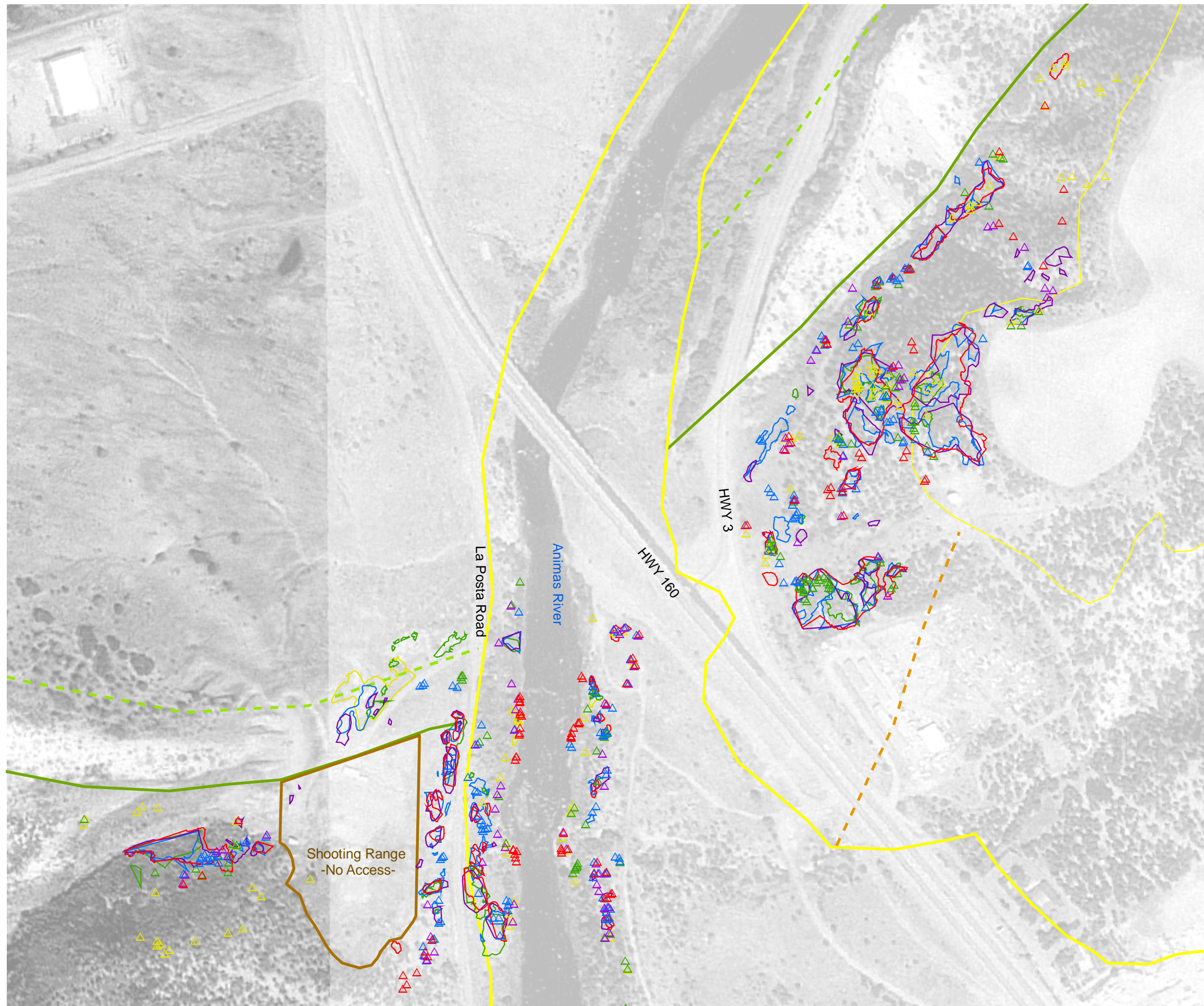


FIGURE 9
HISTORICAL DATA COMPARISON
SUBSURFACE METHANE MEASUREMENTS
CARBON JUNCTION
THE GROUP





LEGEND

- △ Stressed/Dead Trees 2006
- △ Stressed/Dead Trees 2005
- △ Stressed/Dead Trees 2004
- △ Stressed/Dead Trees 2003
- △ Stressed/Dead Trees 2002
- Stressed/Dead Veg 2006
- Stressed/Dead Veg 2005
- Stressed/Dead Veg 2004
- Stressed/Dead Veg 2003
- Stressed/Dead Veg 2002

Geology

- Fruitland Formation (Kf)
- - - Fruitland Formation Tongue (Kft)
- - - Kirtland Formation (Kk)
- - - Pictured Cliffs Formation (Kpc)
- - - Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

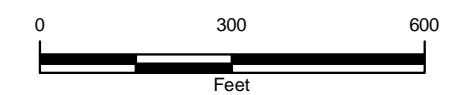


FIGURE 10
HISTORICAL DATA COMPARISON
STRESSED/DEAD VEGETATION
CARBON JUNCTION

THE GROUP





LEGEND

- Methane Seeps 2006
- Methane Seeps 2005
- Methane Seeps 2004
- Methane Seeps 2003
- Methane Seeps 2002

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

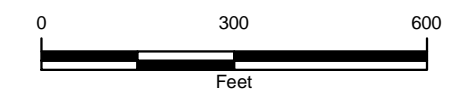
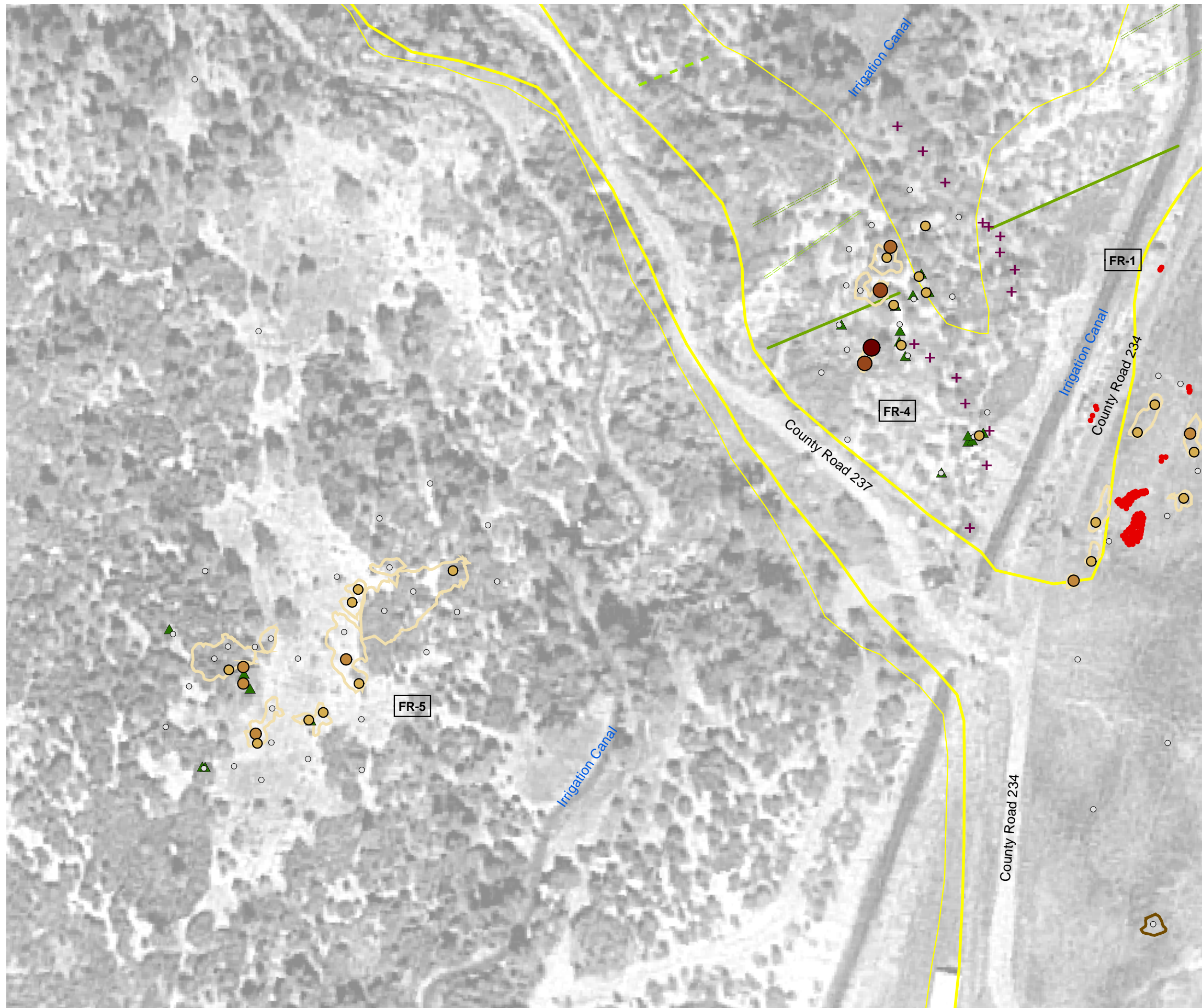


FIGURE 11
HISTORICAL DATA COMPARISON
VISIBLE METHANE SEEPS IN SURFACE WATER
CARBON JUNCTION

THE GROUP





LEGEND

- ✚ Gas Monitoring Probes
- ☆ Gas Flux Chambers
- Visible Methane Seeps in Surface Water

Subsurface Methane Measurements

- 0 ppm
- 1ppm - 500 ppm
- 500 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

Subsurface methane measurements collected from temporary soil probes advanced with slide hammer.

Trees

- ▲ Dead Aspen
- ▲ Dead Cottonwood
- ▲ Dead Juniper
- ▲ Dead Pine
- ▲ Dead Scrub Oak
- ▲ Dead Willow
- ▲ Stressed Cottonwood
- ▲ Stressed Juniper
- ▲ Stressed Aspen
- ▲ Stressed Pine
- ▲ Stressed Scrub Oak
- ▲ Tree Stump

Vegetation

- ▭ Stressed/Dead Vegetation
- ▭ Non-Vegetative Area
- ▭ Live Aspen Grove

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

- ▭ TC-4 Text Reference

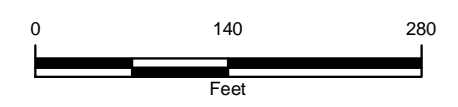
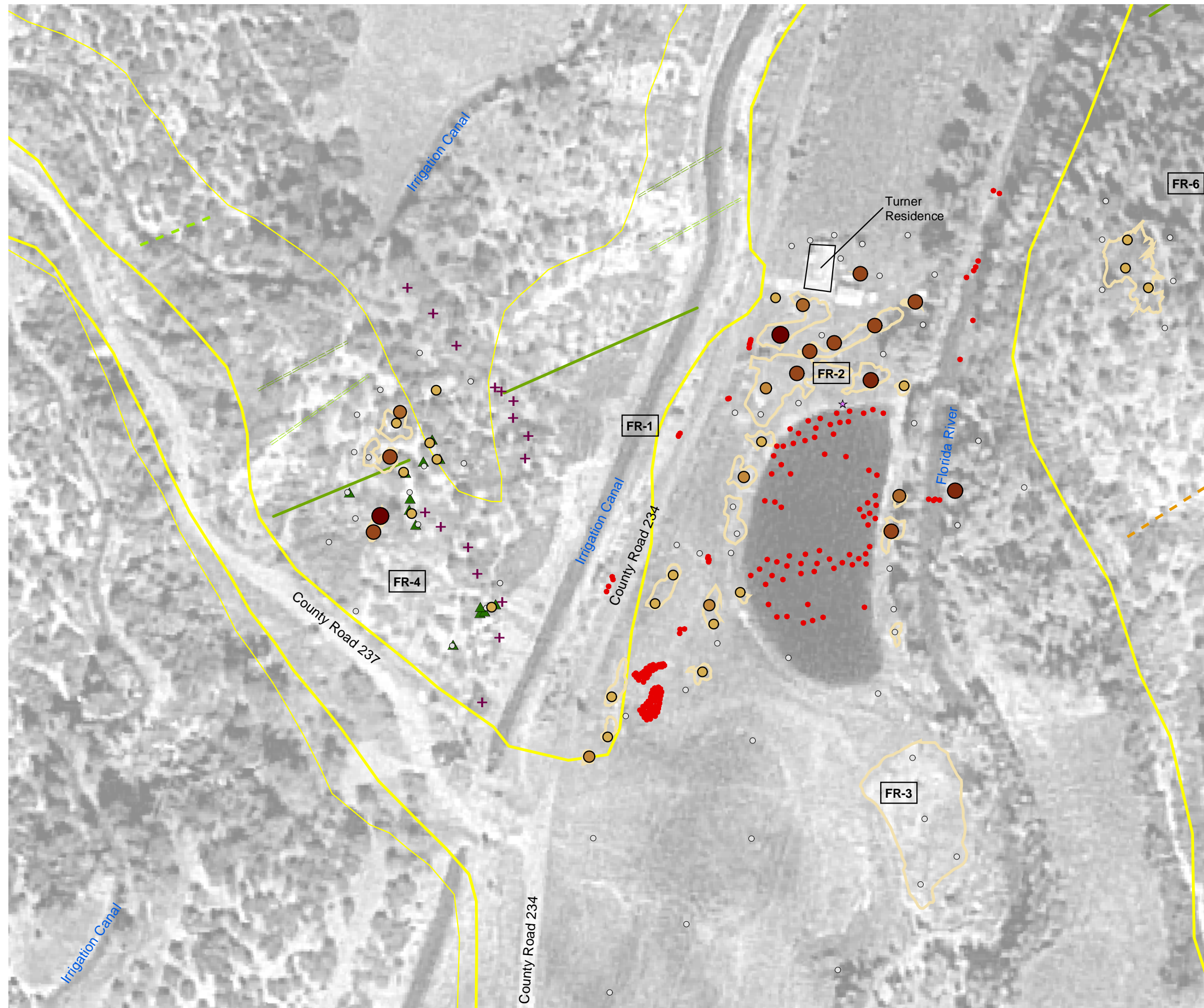


FIGURE 12
2006 DETAILED SEEP MAPPING
FLORIDA RIVER WEST - DETAIL

THE GROUP





LEGEND

- + Gas Monitoring Probes
- ☆ Gas Flux Chambers
- Visible Methane Seeps in Surface Water

Subsurface Methane Measurements

- 0 ppm
- 1ppm - 500 ppm
- 500 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

Subsurface methane measurements collected from temporary soil probes advanced with slide hammer.

Trees

- ▲ Dead Aspen
- ▲ Dead Cottonwood
- ▲ Dead Juniper
- ▲ Dead Pine
- ▲ Dead Scrub Oak
- ▲ Dead Willow
- ▲ Stressed Cottonwood
- ▲ Stressed Juniper
- ▲ Stressed Aspen
- ▲ Stressed Pine
- ▲ Stressed Scrub Oak
- ▲ Tree Stump

Vegetation

- Stressed/Dead Vegetation
- Non-Vegetative Area
- Live Aspen Grove

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

TC-4 Text Reference

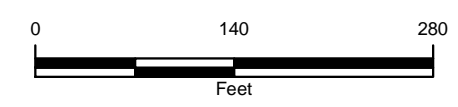
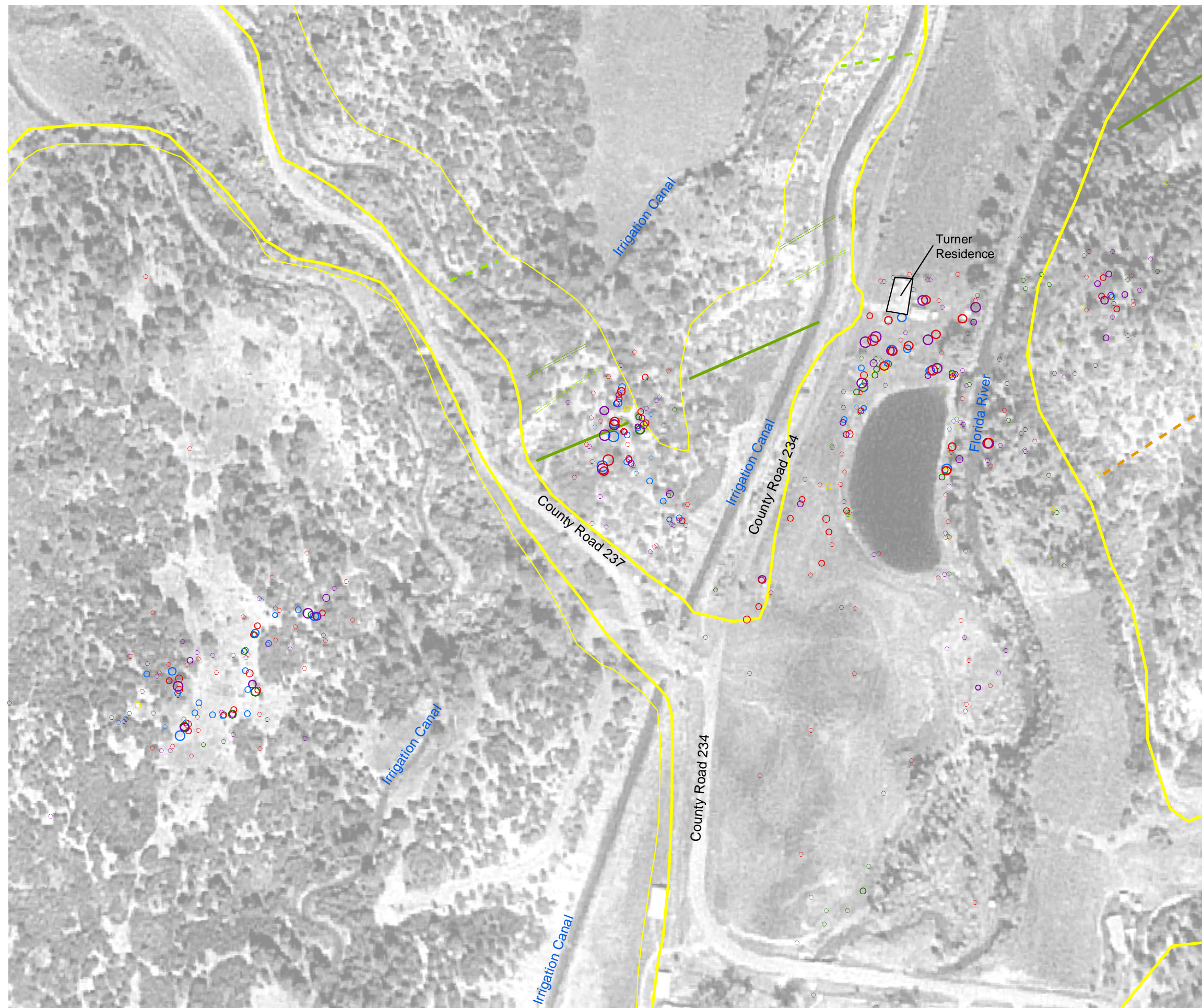


FIGURE 13
2006 DETAILED SEEP MAPPING
FLORIDA RIVER EAST - DETAIL

THE GROUP





LEGEND

- | | | |
|-------------|---|------------------|
| 2006 | ○ 0 ppm | ○ 0 ppm |
| | ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm |
| | ○ 500 ppm - 5% | ○ 500 ppm - 5% |
| | ○ 6% - 15% | ○ 6% - 15% |
| | ○ 16% - 25% | ○ 16% - 25% |
| | ○ 26% - 50% | ○ 26% - 50% |
| | ○ 51% - 75% | ○ 51% - 75% |
| | ○ 76% - 100% | ○ 76% - 100% |
| 2005 | ○ 0 ppm | ○ 0 ppm |
| | ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm |
| | ○ 500 ppm - 5% | ○ 500 ppm - 5% |
| | ○ 6% - 15% | ○ 6% - 15% |
| | ○ 16% - 25% | ○ 16% - 25% |
| | ○ 26% - 50% | ○ 26% - 50% |
| | ○ 51% - 75% | ○ 51% - 75% |
| | ○ 76% - 100% | ○ 76% - 100% |
| 2004 | ○ 0 ppm | |
| | ○ 1ppm - 500 ppm | |
| | ○ 500 ppm - 5% | |
| | ○ 6% - 15% | |
| | ○ 16% - 25% | |
| | ○ 26% - 50% | |
| | ○ 51% - 75% | |
| | ○ 76% - 100% | |
| | Geology | |
| | — Fruitland Formation (Kf) | |
| | --- Fruitland Formation Tongue (Kft) | |
| | - - - Kirtland Formation (Kk) | |
| | — Pictured Cliffs Formation (Kpc) | |
| | --- Pictured Cliffs Formation Tongue (Kpct) | |
| | — Quaternary Alluvium (Qa) | |
| | — Quaternary Gravel (Qg) | |

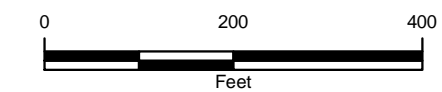
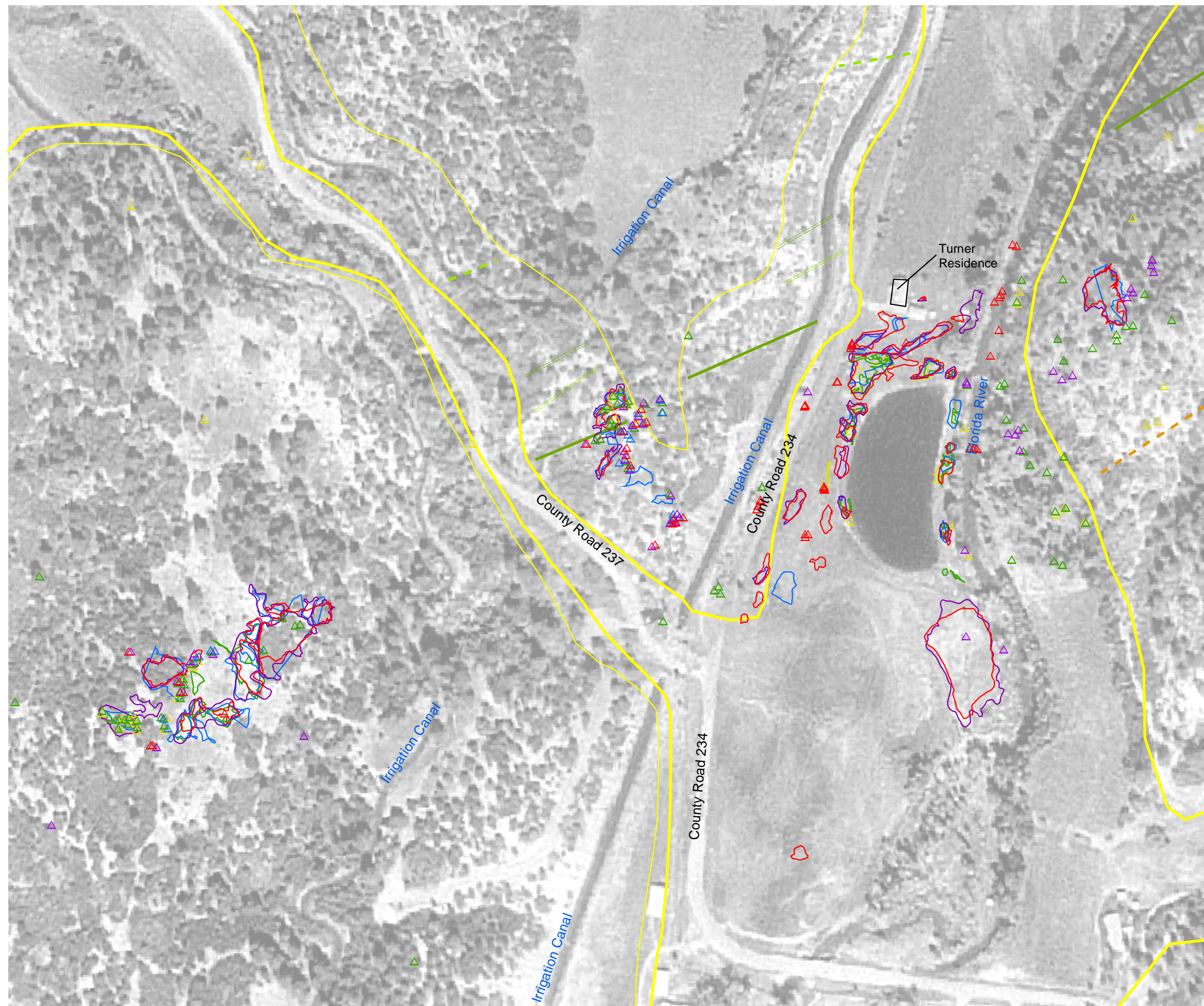


FIGURE 14
HISTORICAL DATA COMPARISON
SUBSURFACE METHANE MEASUREMENTS
FLORIDA RIVER

THE GROUP





LEGEND

- △ Stressed/Dead Trees 2006
- △ Stressed/Dead Trees 2005
- △ Stressed/Dead Trees 2004
- △ Stressed/Dead Trees 2003
- △ Stressed/Dead Trees 2002
- Stressed/Dead Veg 2006
- Stressed/Dead Veg 2005
- Stressed/Dead Veg 2004
- Stressed/Dead Veg 2003
- Stressed/Dead Veg 2002

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

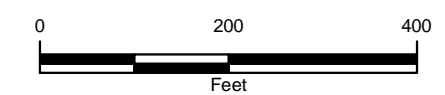
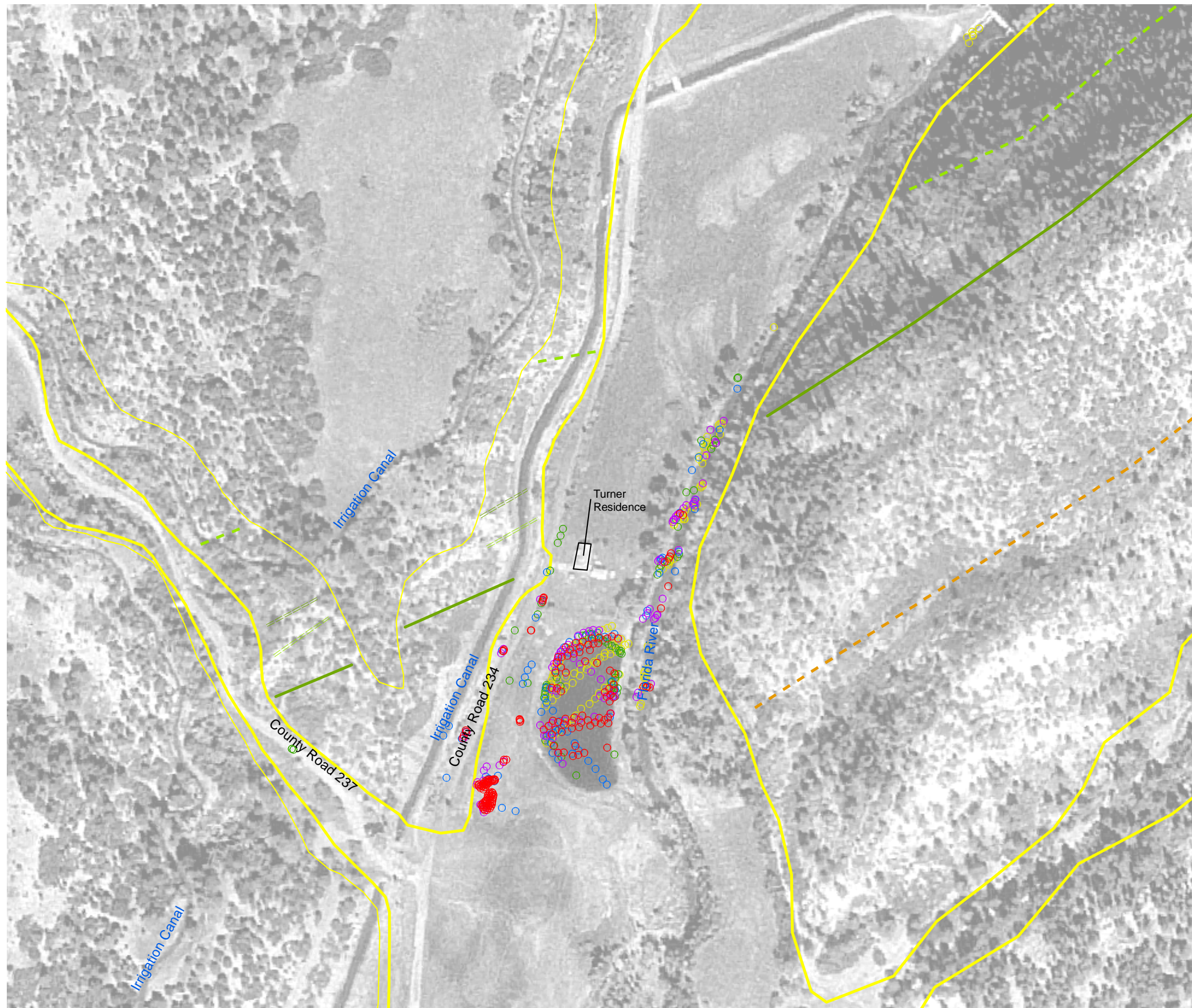


FIGURE 15
HISTORICAL DATA COMPARISON
STRESSED/DEAD VEGETATION
FLORIDA RIVER

THE GROUP





LEGEND

- Methane Seeps 2006
- Methane Seeps 2005
- Methane Seeps 2004
- Methane Seeps 2003
- Methane Seeps 2002

Geology

- Fruitland Formation (Kf)
- - - Fruitland Formation Tongue (Kft)
- - - Kirtland Formation (Kk)
- - - Pictured Cliffs Formation (Kpc)
- - - Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

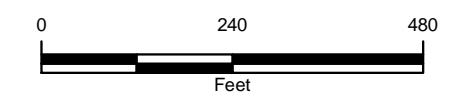
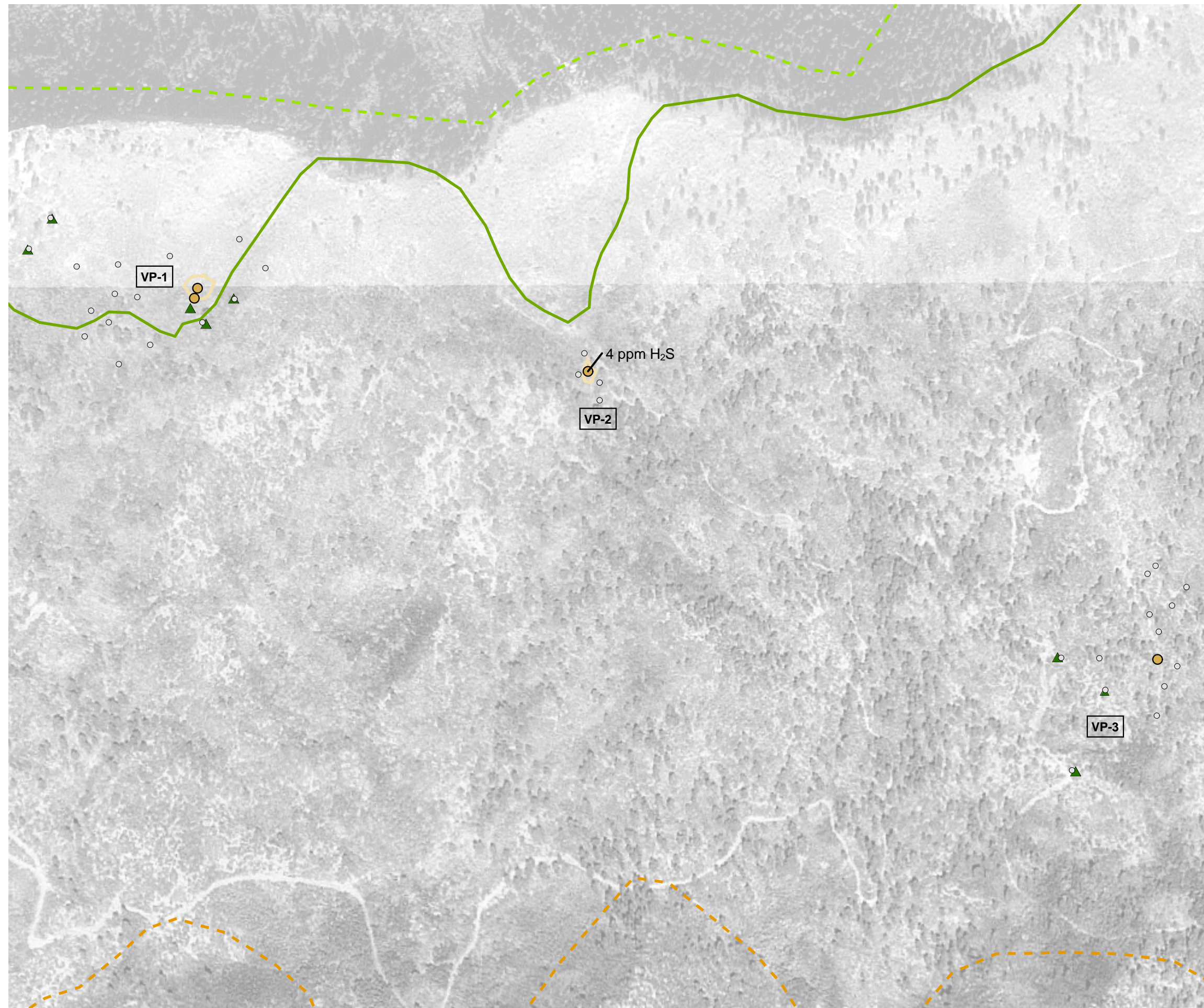


FIGURE 16
HISTORICAL DATA COMPARISON
VISIBLE METHANE SEEPS IN SURFACE WATER
FLORIDA RIVER

THE GROUP





LEGEND

- + Gas Monitoring Probes
- ☆ Gas Flux Chambers
- Visible Methane Seeps in Surface Water

Subsurface Methane Measurements

- 0 ppm
- 1ppm - 500 ppm
- 500 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

Subsurface methane measurements collected from temporary soil probes advanced with slide hammer.

Trees

- ▲ Dead Aspen
- ▲ Dead Cottonwood
- ▲ Dead Juniper
- ▲ Dead Pine
- ▲ Dead Scrub Oak
- ▲ Dead Willow
- ▲ Stressed Cottonwood
- ▲ Stressed Juniper
- ▲ Stressed Aspen
- ▲ Stressed Pine
- ▲ Stressed Scrub Oak
- ▲ Tree Stump

Vegetation

- Stressed/Dead Vegetation
- Non-Vegetative Area
- Live Aspen Grove

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

TC-4 Text Reference

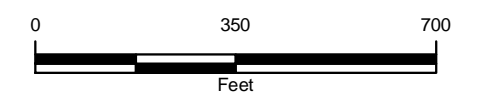
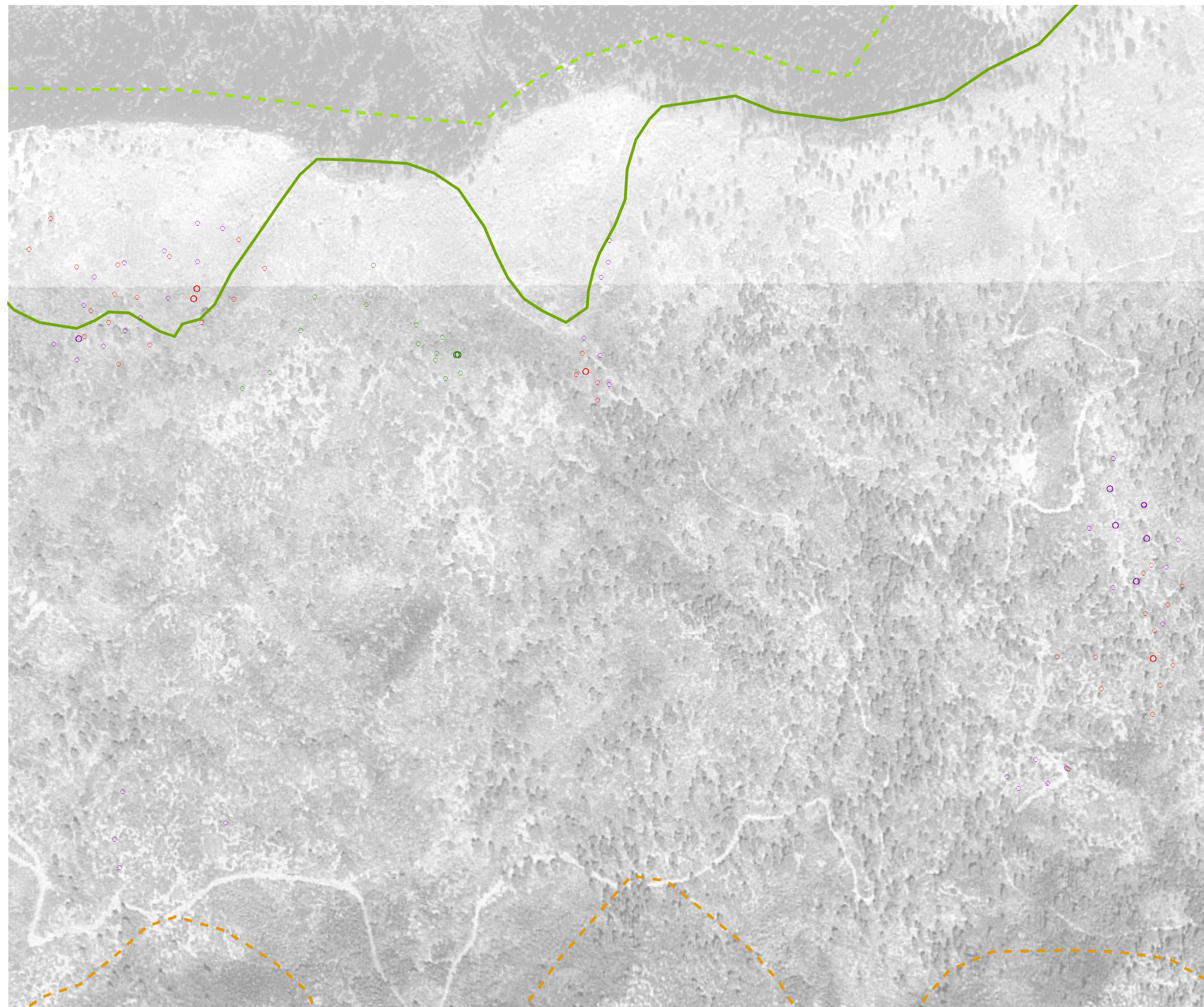


FIGURE 17
2006 DETAILED SEEP MAPPING
VOSBURG PIKE

THE GROUP





LEGEND

- | | | | | | | | | |
|----------------|---------|---|----------------|------------|-------------|-------------|-------------|--------------|
| 2006 | ○ 0 ppm | ○ 1ppm - 500 ppm | ○ 500 ppm - 5% | ○ 6% - 15% | ○ 16% - 25% | ○ 26% - 50% | ○ 51% - 75% | ○ 76% - 100% |
| 2005 | ○ 0 ppm | ○ 1ppm - 500 ppm | ○ 500 ppm - 5% | ○ 6% - 15% | ○ 16% - 25% | ○ 26% - 50% | ○ 51% - 75% | ○ 76% - 100% |
| 2004 | ○ 0 ppm | ○ 1ppm - 500 ppm | ○ 500 ppm - 5% | ○ 6% - 15% | ○ 16% - 25% | ○ 26% - 50% | ○ 51% - 75% | ○ 76% - 100% |
| 2003 | ○ 0 ppm | ○ 1ppm - 500 ppm | ○ 500 ppm - 5% | ○ 6% - 15% | ○ 16% - 25% | ○ 26% - 50% | ○ 51% - 75% | ○ 76% - 100% |
| 2002 | ○ 0 ppm | ○ 1ppm - 500 ppm | ○ 500 ppm - 5% | ○ 6% - 15% | ○ 16% - 25% | ○ 26% - 50% | ○ 51% - 75% | ○ 76% - 100% |
| Geology | | <ul style="list-style-type: none"> — Fruitland Formation (Kf) - - - Fruitland Formation Tongue (Kft) - - - Kirtland Formation (Kk) - - - Pictured Cliffs Formation (Kpc) - - - Pictured Cliffs Formation Tongue (Kpct) — Quaternary Alluvium (Qa) — Quaternary Gravel (Qg) | | | | | | |

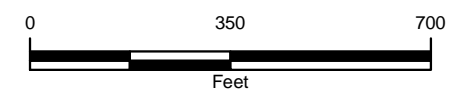
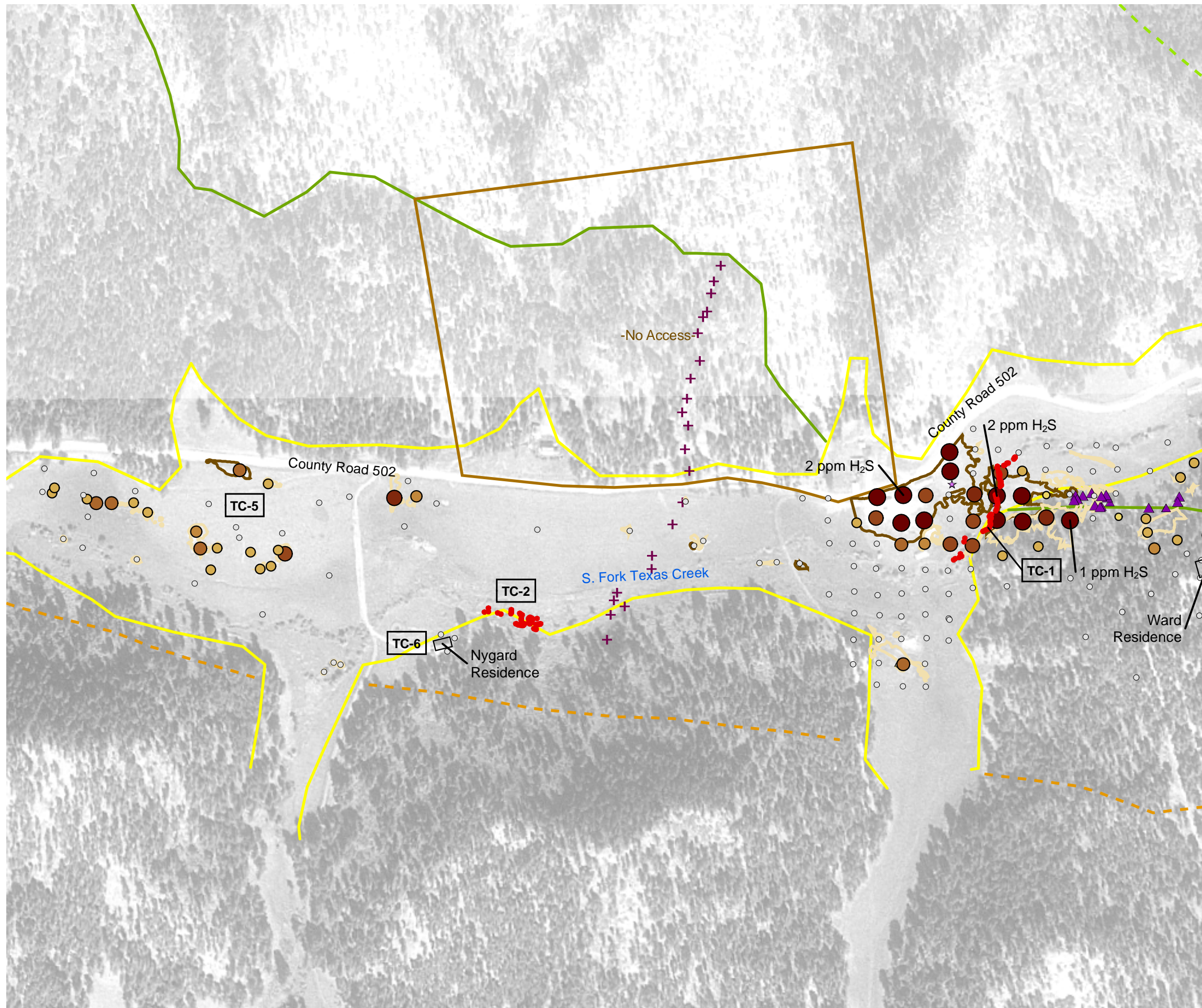


FIGURE 18
HISTORICAL DATA COMPARISON
SUBSURFACE METHANE MEASUREMENTS
VOSBURG PIKE
 THE GROUP





LEGEND

- ✚ Gas Monitoring Probes
- ☆ Gas Flux Chambers
- Visible Methane Seeps in Surface Water

Subsurface Methane Measurements

- 0 ppm
- 1ppm - 500 ppm
- 500 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

Subsurface methane measurements collected from temporary soil probes advanced with slide hammer.

Trees

- ▲ Dead Aspen
- ▲ Dead Cottonwood
- ▲ Dead Juniper
- ▲ Dead Pine
- ▲ Dead Scrub Oak
- ▲ Dead Willow
- ▲ Stressed Cottonwood
- ▲ Stressed Juniper
- ▲ Stressed Aspen
- ▲ Stressed Pine
- ▲ Stressed Scrub Oak
- ▲ Tree Stump

Vegetation

- Stressed/Dead Vegetation
- Non-Vegetative Area
- Live Aspen Grove

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

TC-4 Text Reference

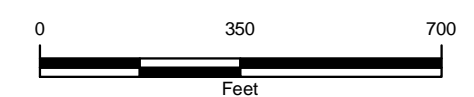
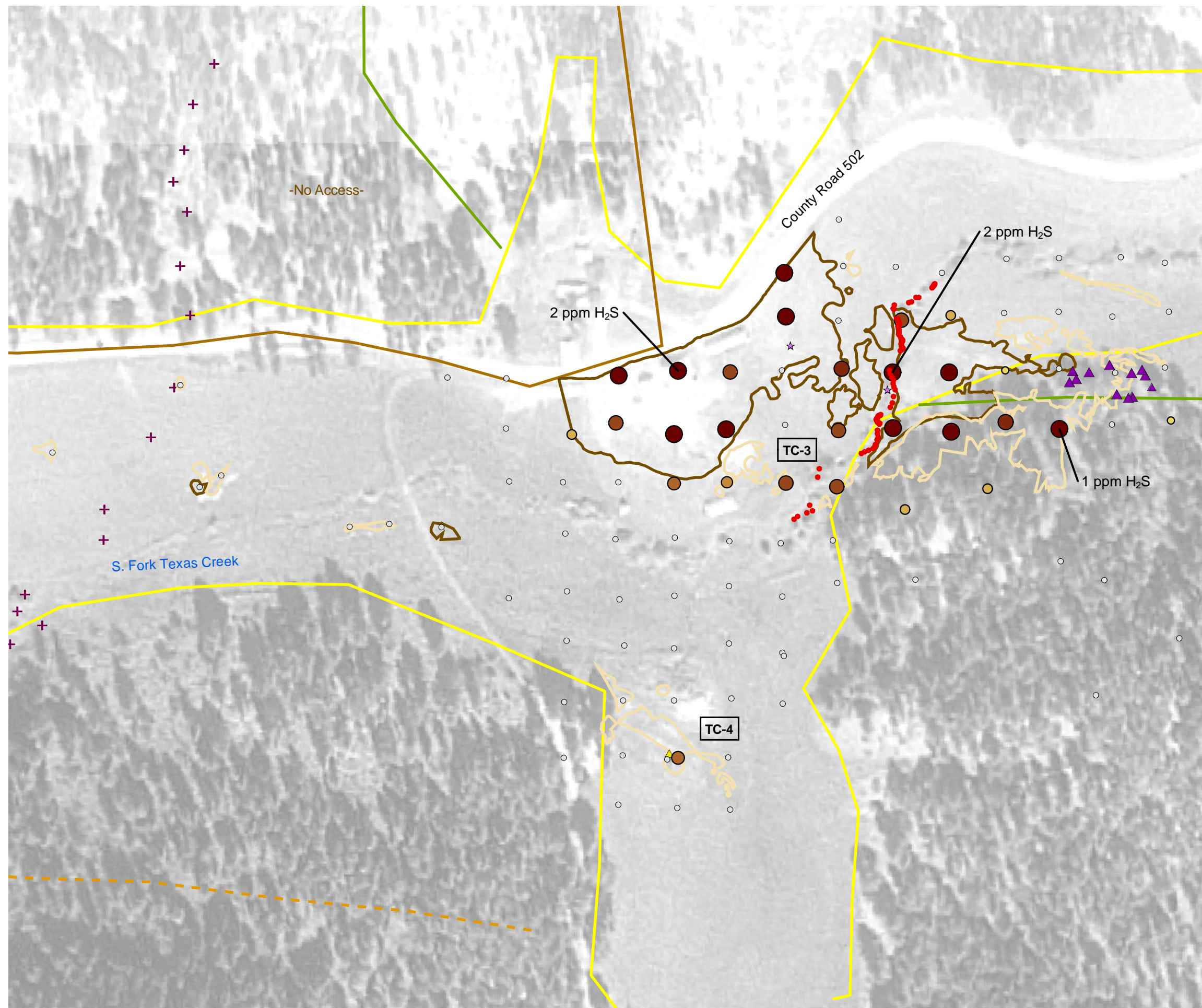


FIGURE 19
2006 DETAILED SEEP MAPPING
TEXAS CREEK WEST - DETAIL

THE GROUP





LEGEND

- ✚ Gas Monitoring Probes
- ★ Gas Flux Chambers
- Visible Methane Seeps in Surface Water

Subsurface Methane Measurements

- 0 ppm
- 1ppm - 500 ppm
- 500 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

Subsurface methane measurements collected from temporary soil probes advanced with slide hammer.

Trees

- ▲ Dead Aspen
- ▲ Dead Cottonwood
- ▲ Dead Juniper
- ▲ Dead Pine
- ▲ Dead Scrub Oak
- ▲ Dead Willow
- ▲ Stressed Cottonwood
- ▲ Stressed Juniper
- ▲ Stressed Aspen
- ▲ Stressed Pine
- ▲ Stressed Scrub Oak
- ▲ Tree Stump

Vegetation

- ▭ Stressed/Dead Vegetation
- ▭ Non-Vegetative Area
- ▭ Live Aspen Grove

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

TC-4 Text Reference

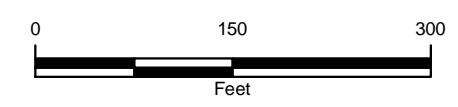
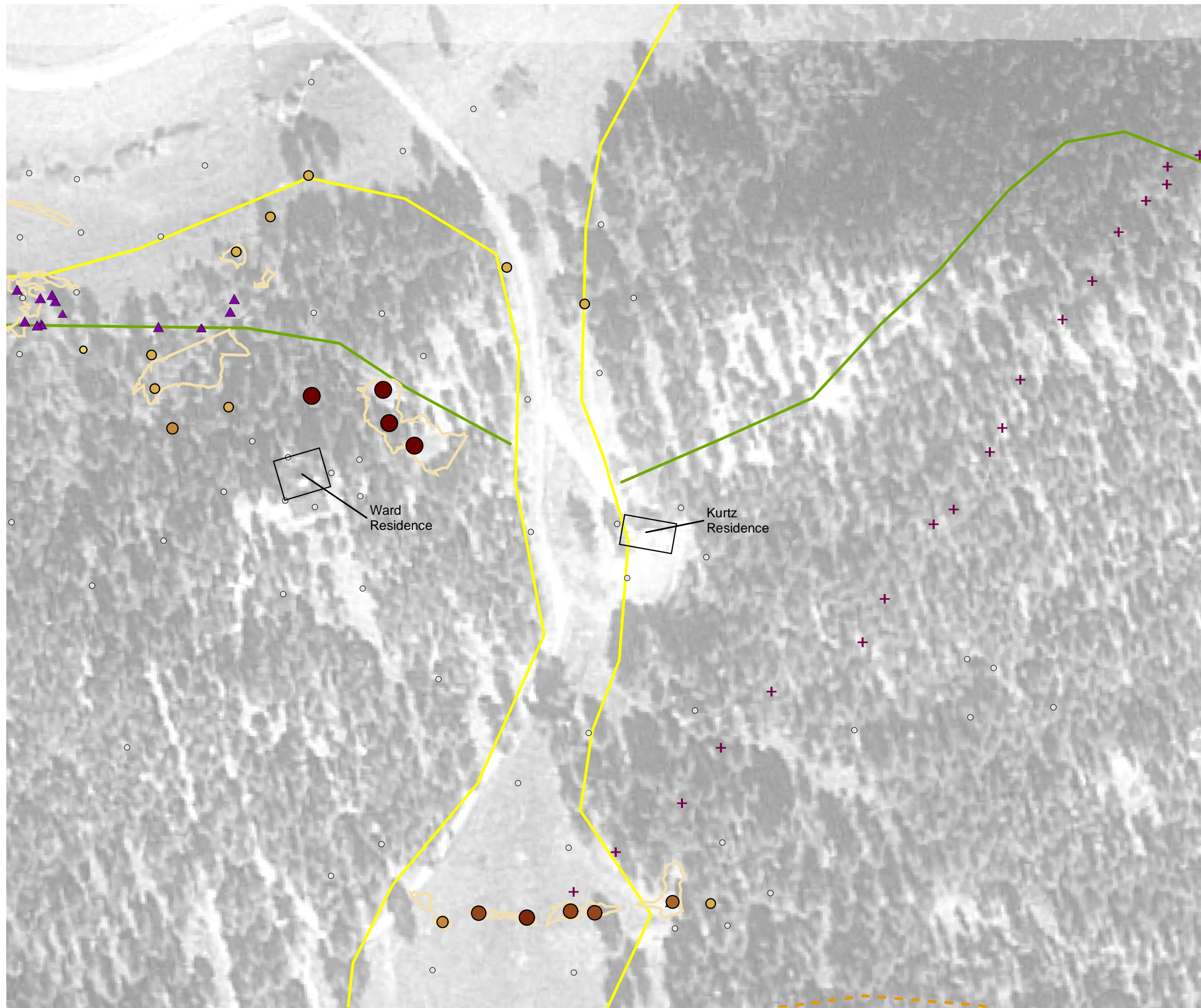


FIGURE 20
2006 DETAILED SEEP MAPPING
TEXAS CREEK - DETAIL

THE GROUP





LEGEND

- ✚ Gas Monitoring Probes
- ☆ Gas Flux Chambers
- Visible Methane Seeps in Surface Water

Subsurface Methane Measurements

- 0 ppm
- 1ppm - 500 ppm
- 500 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

Subsurface methane measurements collected from temporary soil probes advanced with slide hammer.

Trees

- ▲ Dead Aspen
- ▲ Dead Cottonwood
- ▲ Dead Juniper
- ▲ Dead Pine
- ▲ Dead Scrub Oak
- ▲ Dead Willow
- ▲ Stressed Cottonwood
- ▲ Stressed Juniper
- ▲ Stressed Aspen
- ▲ Stressed Pine
- ▲ Stressed Scrub Oak
- ▲ Tree Stump

Vegetation

- ▭ Stressed/Dead Vegetation
- ▭ Non-Vegetative Area
- ▭ Live Aspen Grove

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)
- TC-4 Text Reference

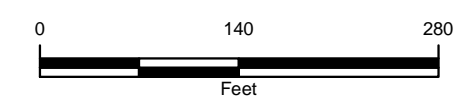
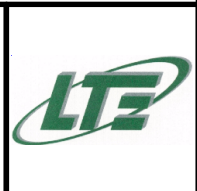
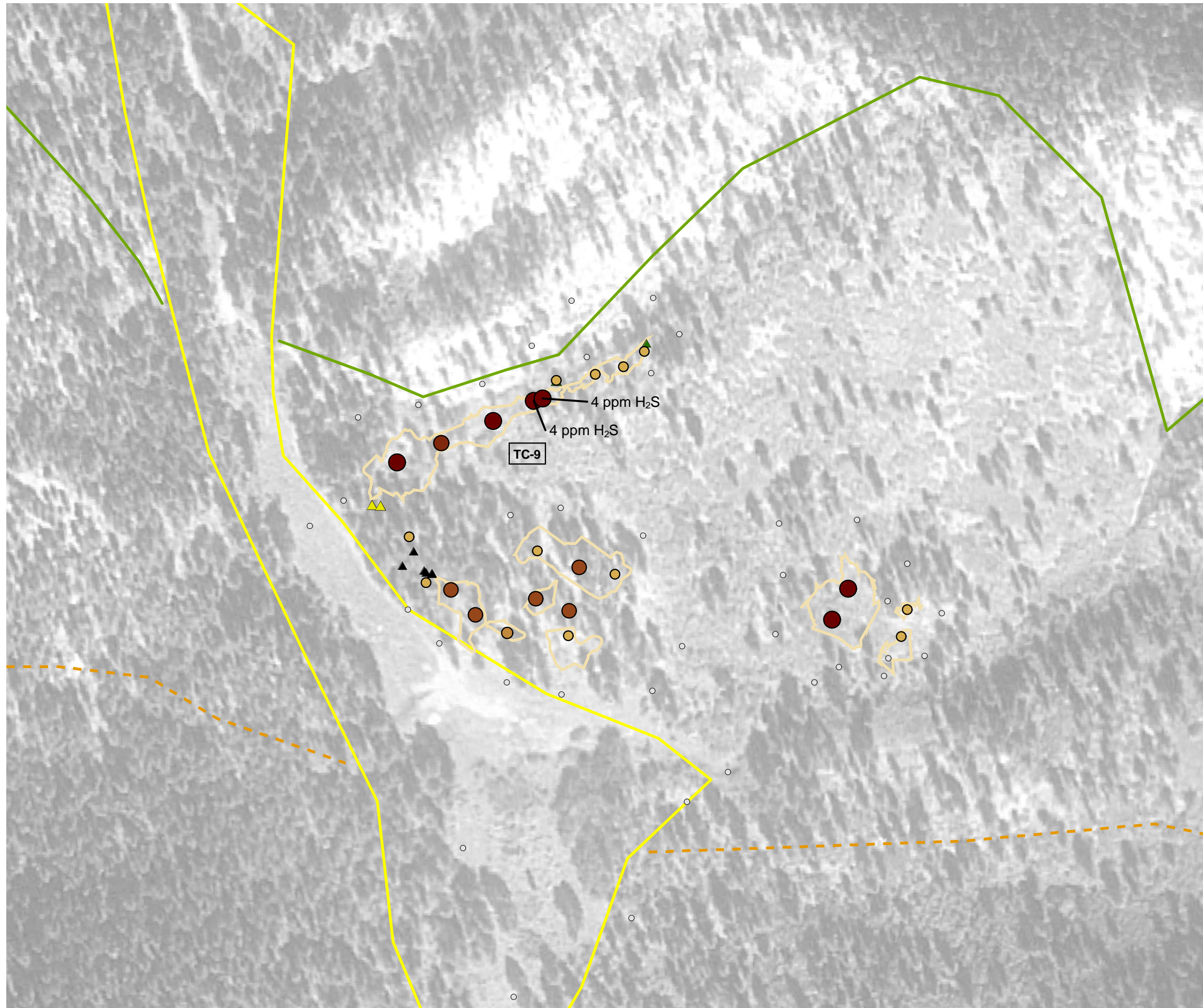


FIGURE 21
2006 DETAILED SEEP MAPPING
TEXAS CREEK CENTRAL - DETAIL

THE GROUP





LEGEND

- ✚ Gas Monitoring Probes
- ☆ Gas Flux Chambers
- Visible Methane Seeps in Surface Water

Subsurface Methane Measurements

- 0 ppm
- 1ppm - 500 ppm
- 500 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

Subsurface methane measurements collected from temporary soil probes advanced with slide hammer.

Trees

- ▲ Dead Aspen
- ▲ Dead Cottonwood
- ▲ Dead Juniper
- ▲ Dead Pine
- ▲ Dead Scrub Oak
- ▲ Dead Willow
- ▲ Stressed Cottonwood
- ▲ Stressed Juniper
- ▲ Stressed Aspen
- ▲ Stressed Pine
- ▲ Stressed Scrub Oak
- ▲ Tree Stump

Vegetation

- Stressed/Dead Vegetation
- Non-Vegetative Area
- Live Aspen Grove

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

- TC-4 Text Reference

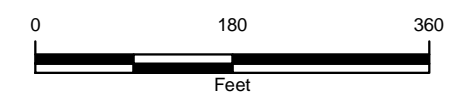
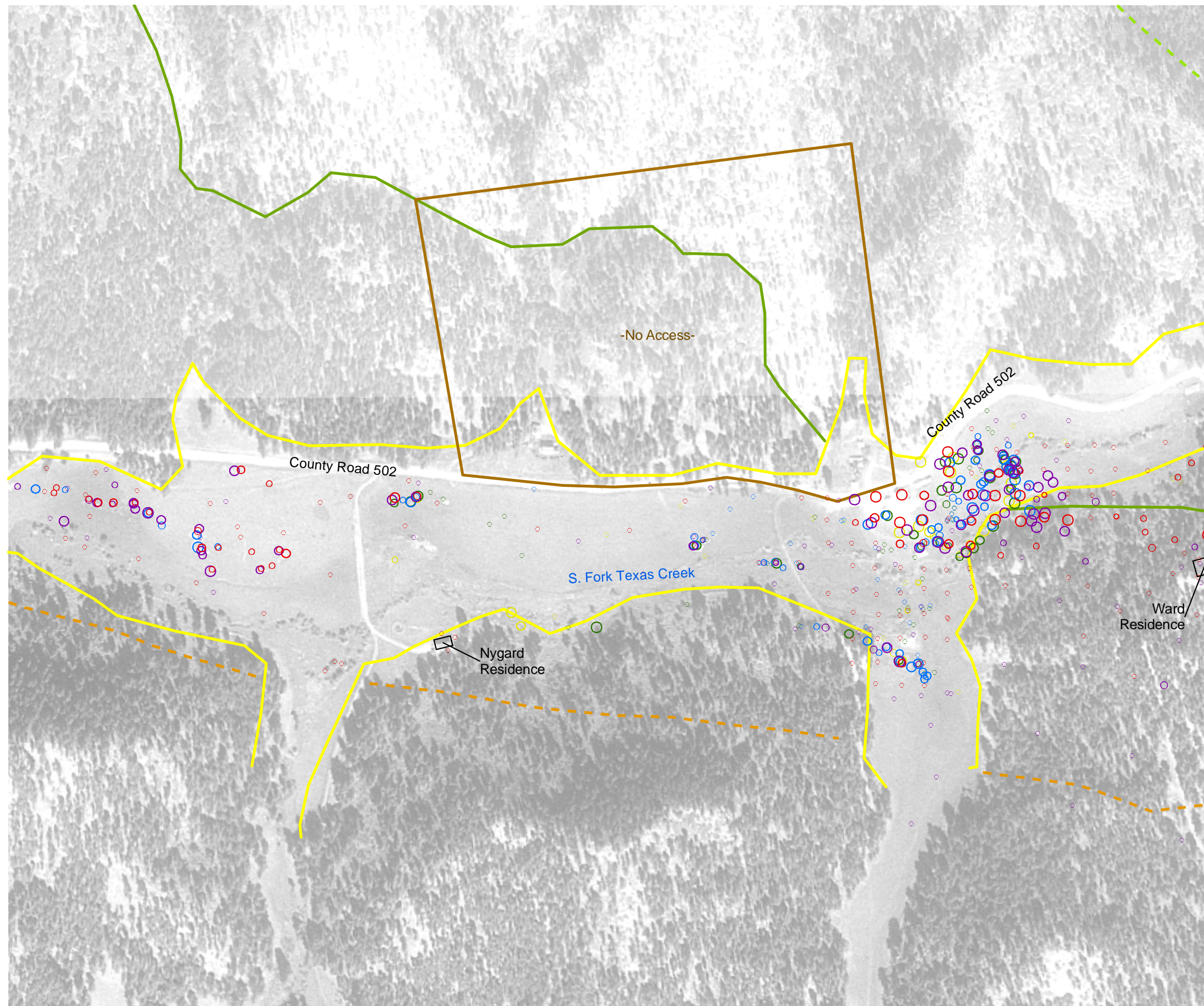


FIGURE 22
2006 DETAILED SEEP MAPPING
TEXAS CREEK EAST - DETAIL

THE GROUP





LEGEND

2006	○ 0 ppm	○ 0 ppm	2003	○ 0 ppm
○ 1ppm - 500 ppm	○ 1ppm - 500 ppm	○ 1ppm - 500 ppm	○ 1ppm - 500 ppm	○ 1ppm - 500 ppm
○ 500 ppm - 5%	○ 500 ppm - 5%	○ 500 ppm - 5%	○ 500 ppm - 5%	○ 500 ppm - 5%
○ 6% - 15%	○ 6% - 15%	○ 6% - 15%	○ 6% - 15%	○ 6% - 15%
○ 16% - 25%	○ 16% - 25%	○ 16% - 25%	○ 16% - 25%	○ 16% - 25%
○ 26% - 50%	○ 26% - 50%	○ 26% - 50%	○ 26% - 50%	○ 26% - 50%
○ 51% - 75%	○ 51% - 75%	○ 51% - 75%	○ 51% - 75%	○ 51% - 75%
○ 76% - 100%	○ 76% - 100%	○ 76% - 100%	○ 76% - 100%	○ 76% - 100%
2005	○ 0 ppm	○ 0 ppm	2002	○ 0 ppm
○ 1ppm - 500 ppm	○ 1ppm - 500 ppm	○ 1ppm - 500 ppm	○ 1ppm - 500 ppm	○ 1ppm - 500 ppm
○ 500 ppm - 5%	○ 500 ppm - 5%	○ 500 ppm - 5%	○ 500 ppm - 5%	○ 500 ppm - 5%
○ 6% - 15%	○ 6% - 15%	○ 6% - 15%	○ 6% - 15%	○ 6% - 15%
○ 16% - 25%	○ 16% - 25%	○ 16% - 25%	○ 16% - 25%	○ 16% - 25%
○ 26% - 50%	○ 26% - 50%	○ 26% - 50%	○ 26% - 50%	○ 26% - 50%
○ 51% - 75%	○ 51% - 75%	○ 51% - 75%	○ 51% - 75%	○ 51% - 75%
○ 76% - 100%	○ 76% - 100%	○ 76% - 100%	○ 76% - 100%	○ 76% - 100%
2004	○ 0 ppm	○ 0 ppm	Geology	— Fruitland Formation (Kf)
○ 1ppm - 500 ppm	○ 1ppm - 500 ppm	○ 1ppm - 500 ppm	— Fruitland Formation Tongue (Kft)	
○ 500 ppm - 5%	○ 500 ppm - 5%	○ 500 ppm - 5%	— Kirtland Formation (Kk)	
○ 6% - 15%	○ 6% - 15%	○ 6% - 15%	— Pictured Cliffs Formation (Kpc)	
○ 16% - 25%	○ 16% - 25%	○ 16% - 25%	— Pictured Cliffs Formation Tongue (Kpct)	
○ 26% - 50%	○ 26% - 50%	○ 26% - 50%	— Quaternary Alluvium (Qa)	
○ 51% - 75%	○ 51% - 75%	○ 51% - 75%	— Quaternary Gravel (Qg)	
○ 76% - 100%	○ 76% - 100%	○ 76% - 100%		

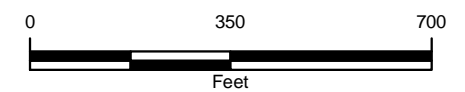
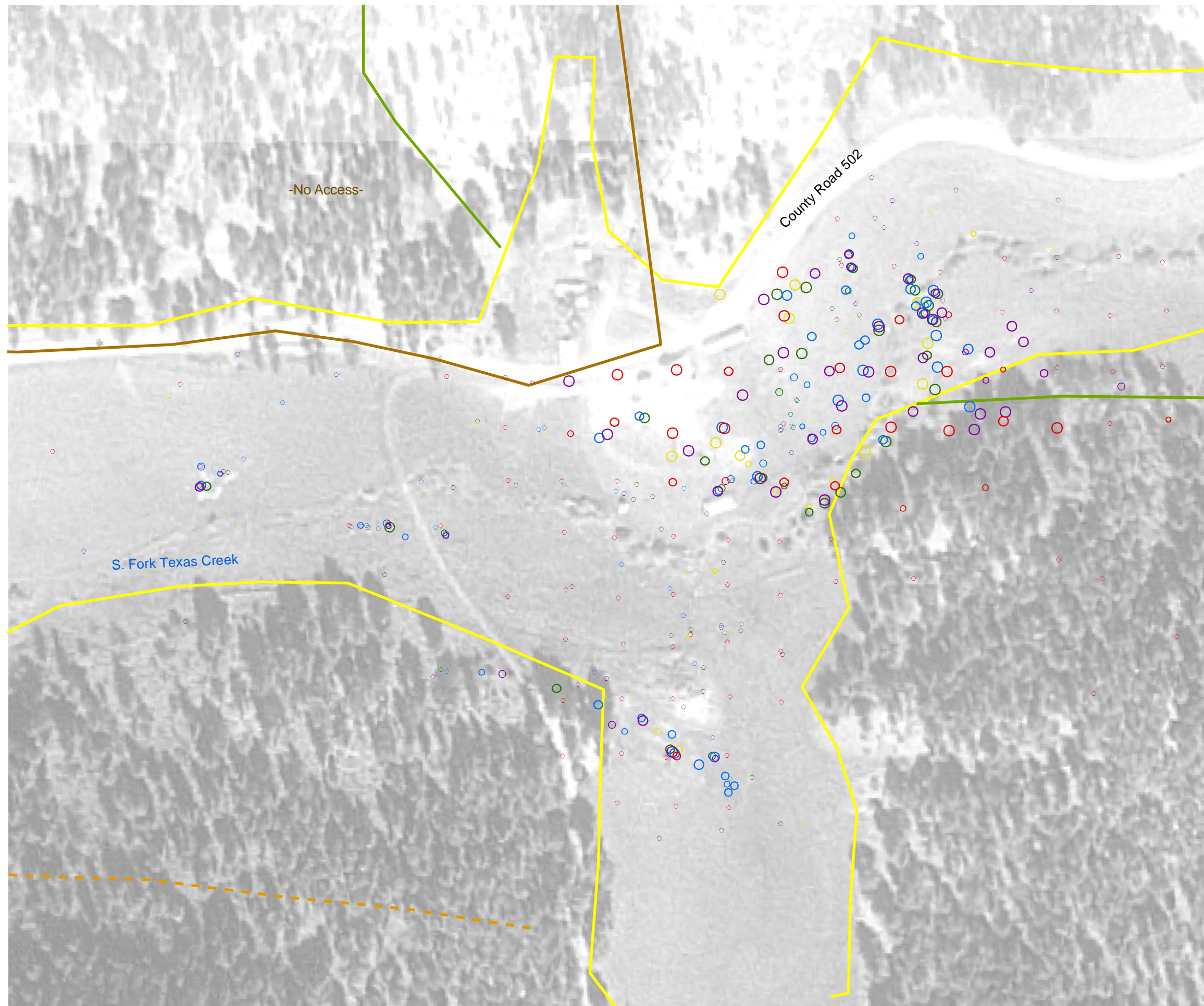


FIGURE 23
HISTORICAL DATA COMPARISON
SUBSURFACE METHANE MEASUREMENTS
TEXAS CREEK WEST - DETAIL
 THE GROUP





LEGEND

- | | | | | | | | | |
|----------------|---------|---|----------------|------------|-------------|-------------|-------------|--------------|
| 2006 | ○ 0 ppm | ○ 1ppm - 500 ppm | ○ 500 ppm - 5% | ○ 6% - 15% | ○ 16% - 25% | ○ 26% - 50% | ○ 51% - 75% | ○ 76% - 100% |
| 2005 | ○ 0 ppm | ○ 1ppm - 500 ppm | ○ 500 ppm - 5% | ○ 6% - 15% | ○ 16% - 25% | ○ 26% - 50% | ○ 51% - 75% | ○ 76% - 100% |
| 2004 | ○ 0 ppm | ○ 1ppm - 500 ppm | ○ 500 ppm - 5% | ○ 6% - 15% | ○ 16% - 25% | ○ 26% - 50% | ○ 51% - 75% | ○ 76% - 100% |
| 2003 | ○ 0 ppm | ○ 1ppm - 500 ppm | ○ 500 ppm - 5% | ○ 6% - 15% | ○ 16% - 25% | ○ 26% - 50% | ○ 51% - 75% | ○ 76% - 100% |
| 2002 | ○ 0 ppm | ○ 1ppm - 500 ppm | ○ 500 ppm - 5% | ○ 6% - 15% | ○ 16% - 25% | ○ 26% - 50% | ○ 51% - 75% | ○ 76% - 100% |
| Geology | | <ul style="list-style-type: none"> — Fruitland Formation (Kf) — Fruitland Formation Tongue (Kft) — Kirtland Formation (Kk) — Pictured Cliffs Formation (Kpc) — Pictured Cliffs Formation Tongue (Kpct) — Quaternary Alluvium (Qa) — Quaternary Gravel (Qg) | | | | | | |

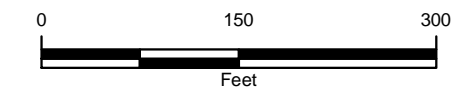
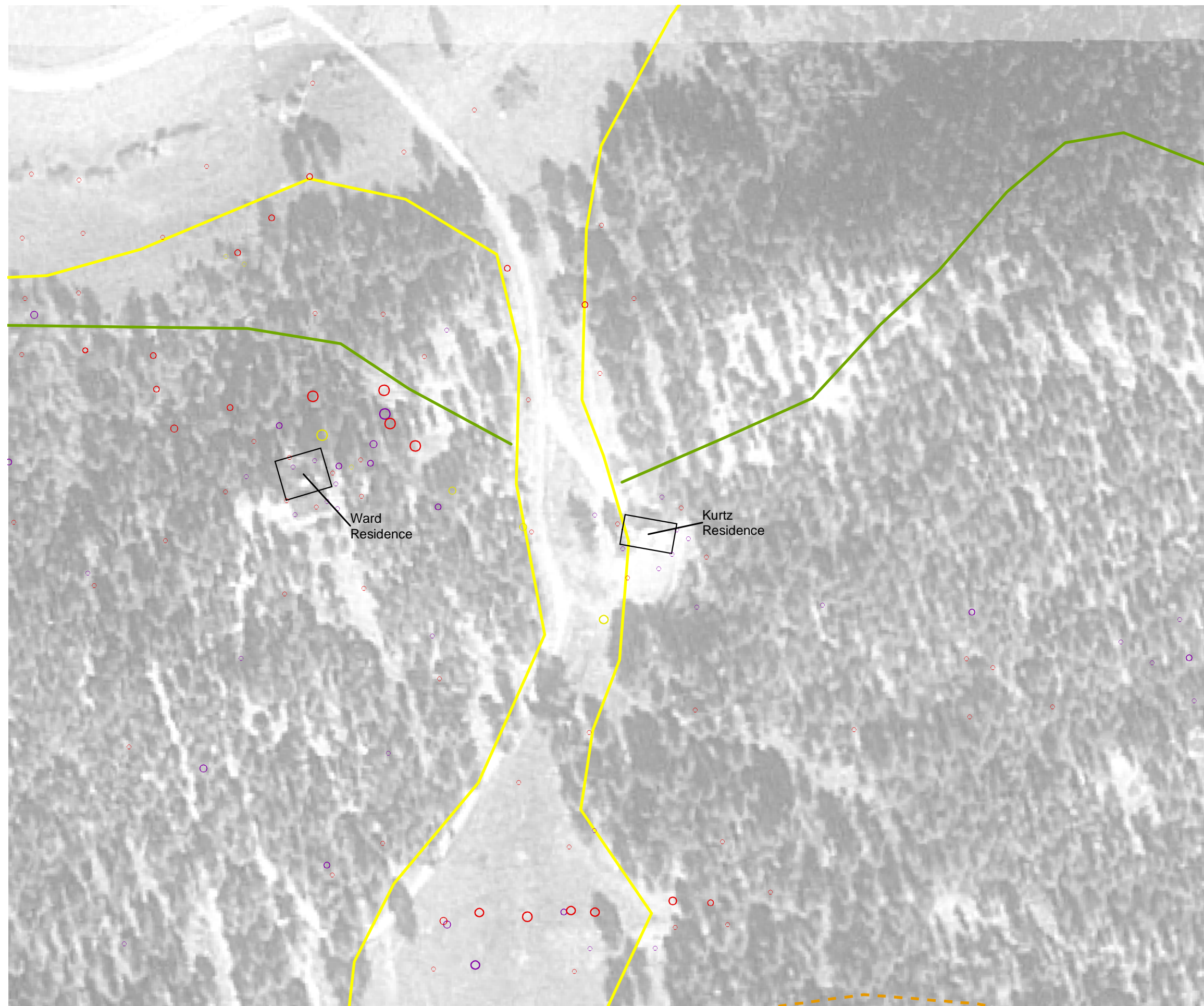


FIGURE 24
HISTORICAL DATA COMPARISON
SUBSURFACE METHANE MEASUREMENTS
TEXAS CREEK - DETAIL

THE GROUP





LEGEND

- | | | | | | | | | |
|----------------|---------|---|----------------|------------|-------------|-------------|-------------|--------------|
| 2006 | ○ 0 ppm | ○ 1ppm - 500 ppm | ○ 500 ppm - 5% | ○ 6% - 15% | ○ 16% - 25% | ○ 26% - 50% | ○ 51% - 75% | ○ 76% - 100% |
| 2005 | ○ 0 ppm | ○ 1ppm - 500 ppm | ○ 500 ppm - 5% | ○ 6% - 15% | ○ 16% - 25% | ○ 26% - 50% | ○ 51% - 75% | ○ 76% - 100% |
| 2004 | ○ 0 ppm | ○ 1ppm - 500 ppm | ○ 500 ppm - 5% | ○ 6% - 15% | ○ 16% - 25% | ○ 26% - 50% | ○ 51% - 75% | ○ 76% - 100% |
| 2003 | ○ 0 ppm | ○ 1ppm - 500 ppm | ○ 500 ppm - 5% | ○ 6% - 15% | ○ 16% - 25% | ○ 26% - 50% | ○ 51% - 75% | ○ 76% - 100% |
| 2002 | ○ 0 ppm | ○ 1ppm - 500 ppm | ○ 500 ppm - 5% | ○ 6% - 15% | ○ 16% - 25% | ○ 26% - 50% | ○ 51% - 75% | ○ 76% - 100% |
| Geology | | <ul style="list-style-type: none"> — Fruitland Formation (Kf) — Fruitland Formation Tongue (Kft) — Kirtland Formation (Kk) — Pictured Cliffs Formation (Kpc) — Pictured Cliffs Formation Tongue (Kpct) — Quaternary Alluvium (Qa) — Quaternary Gravel (Qg) | | | | | | |

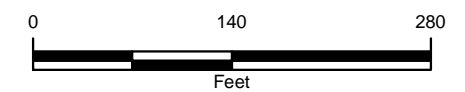
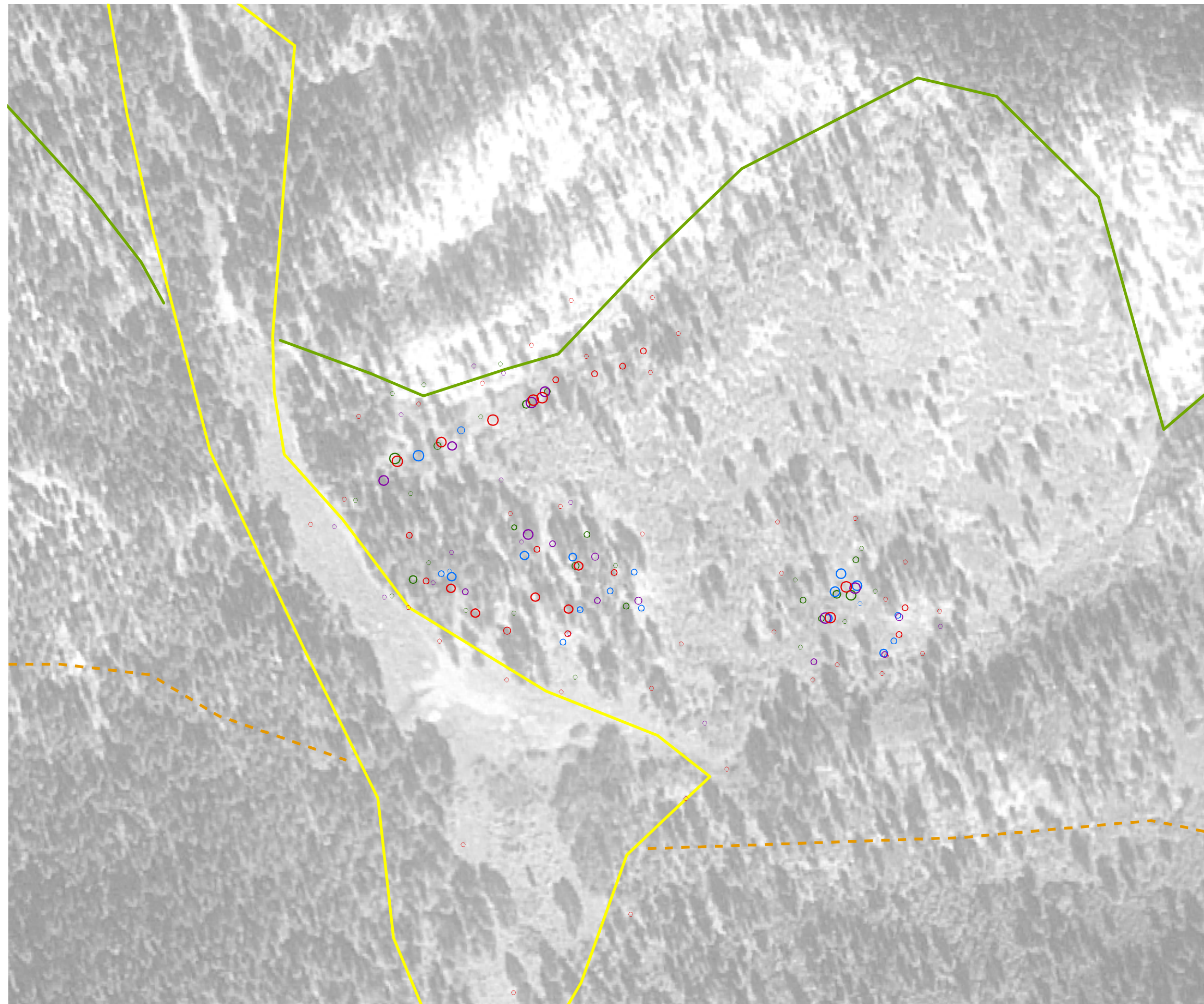


FIGURE 25
HISTORICAL DATA COMPARISON
SUBSURFACE METHANE MEASUREMENTS
TEXAS CREEK CENTRAL- DETAIL

THE GROUP





LEGEND

- | | | |
|------------------|---|------------------------------------|
| 2006 | ○ 0 ppm | ○ 0 ppm |
| ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm |
| ○ 500 ppm - 5% | ○ 500 ppm - 5% | ○ 500 ppm - 5% |
| ○ 6% - 15% | ○ 6% - 15% | ○ 6% - 15% |
| ○ 16% - 25% | ○ 16% - 25% | ○ 16% - 25% |
| ○ 26% - 50% | ○ 26% - 50% | ○ 26% - 50% |
| ○ 51% - 75% | ○ 51% - 75% | ○ 51% - 75% |
| ○ 76% - 100% | ○ 76% - 100% | ○ 76% - 100% |
| 2005 | ○ 0 ppm | ○ 0 ppm |
| ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm |
| ○ 500 ppm - 5% | ○ 500 ppm - 5% | ○ 500 ppm - 5% |
| ○ 6% - 15% | ○ 6% - 15% | ○ 6% - 15% |
| ○ 16% - 25% | ○ 16% - 25% | ○ 16% - 25% |
| ○ 26% - 50% | ○ 26% - 50% | ○ 26% - 50% |
| ○ 51% - 75% | ○ 51% - 75% | ○ 51% - 75% |
| ○ 76% - 100% | ○ 76% - 100% | ○ 76% - 100% |
| 2004 | ○ 0 ppm | ○ 0 ppm |
| ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm |
| ○ 500 ppm - 5% | ○ 500 ppm - 5% | ○ 500 ppm - 5% |
| ○ 6% - 15% | ○ 6% - 15% | ○ 6% - 15% |
| ○ 16% - 25% | ○ 16% - 25% | ○ 16% - 25% |
| ○ 26% - 50% | ○ 26% - 50% | ○ 26% - 50% |
| ○ 51% - 75% | ○ 51% - 75% | ○ 51% - 75% |
| ○ 76% - 100% | ○ 76% - 100% | ○ 76% - 100% |
| Geology | — Fruitland Formation (Kf) | — Fruitland Formation Tongue (Kft) |
| | — Kirtland Formation (Kk) | — Pictured Cliffs Formation (Kpc) |
| | — Pictured Cliffs Formation Tongue (Kpct) | — Quaternary Alluvium (Qa) |
| | — Quaternary Gravel (Qg) | |

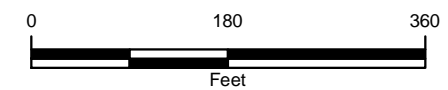
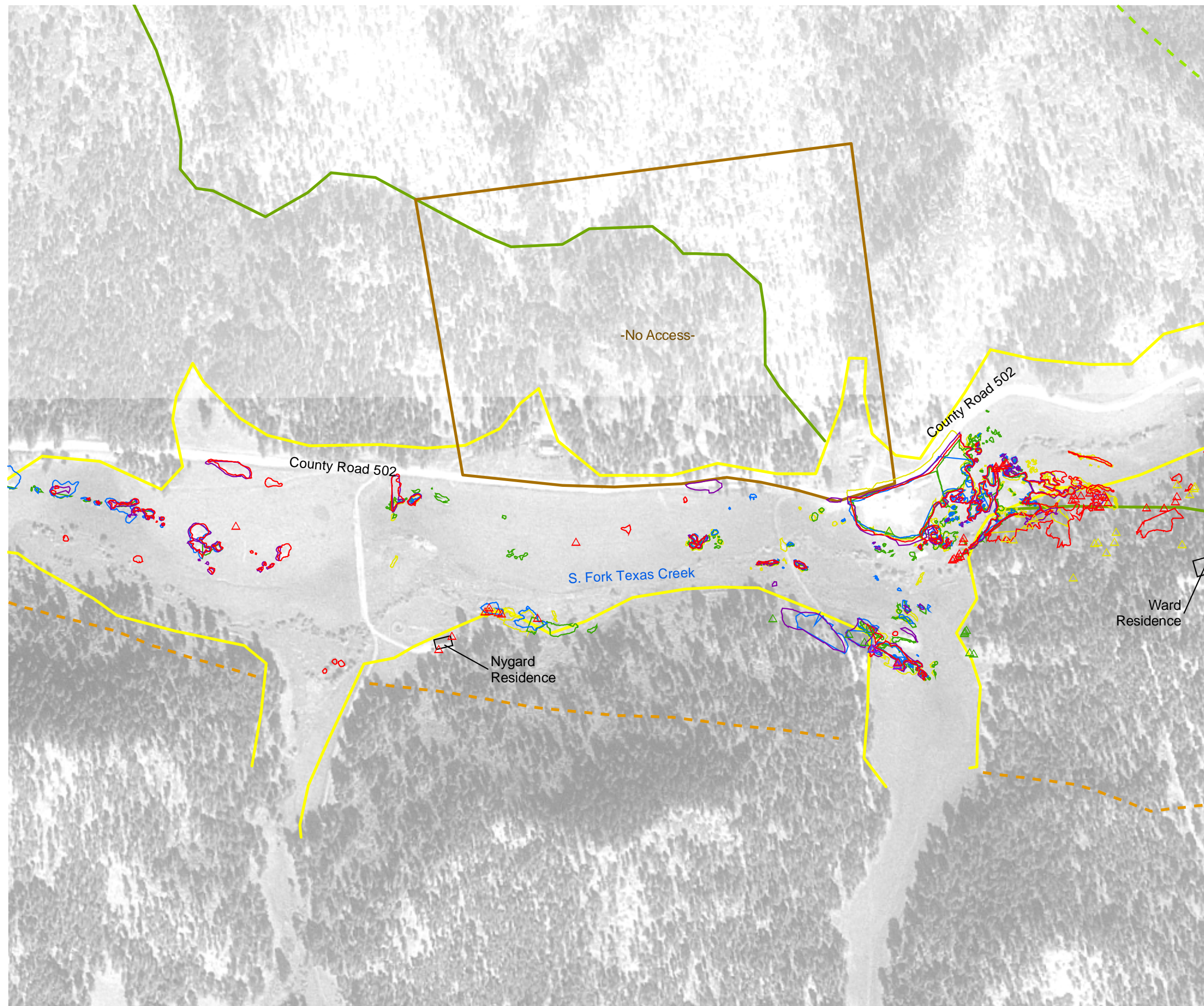


FIGURE 26
HISTORICAL DATA COMPARISON
SUBSURFACE METHANE MEASUREMENTS
TEXAS CREEK EAST - DETAIL

THE GROUP





LEGEND

- △ Stressed/Dead Trees 2006
- △ Stressed/Dead Trees 2005
- △ Stressed/Dead Trees 2004
- △ Stressed/Dead Trees 2003
- △ Stressed/Dead Trees 2002
- Stressed/Dead Veg 2006
- Stressed/Dead Veg 2005
- Stressed/Dead Veg 2004
- Stressed/Dead Veg 2003
- Stressed/Dead Veg 2002

Geology

- Fruitland Formation (Kf)
- - - Fruitland Formation Tongue (Kft)
- - - Kirtland Formation (Kk)
- - - Pictured Cliffs Formation (Kpc)
- - - Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

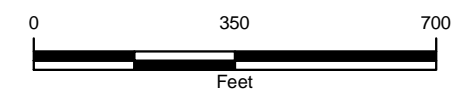
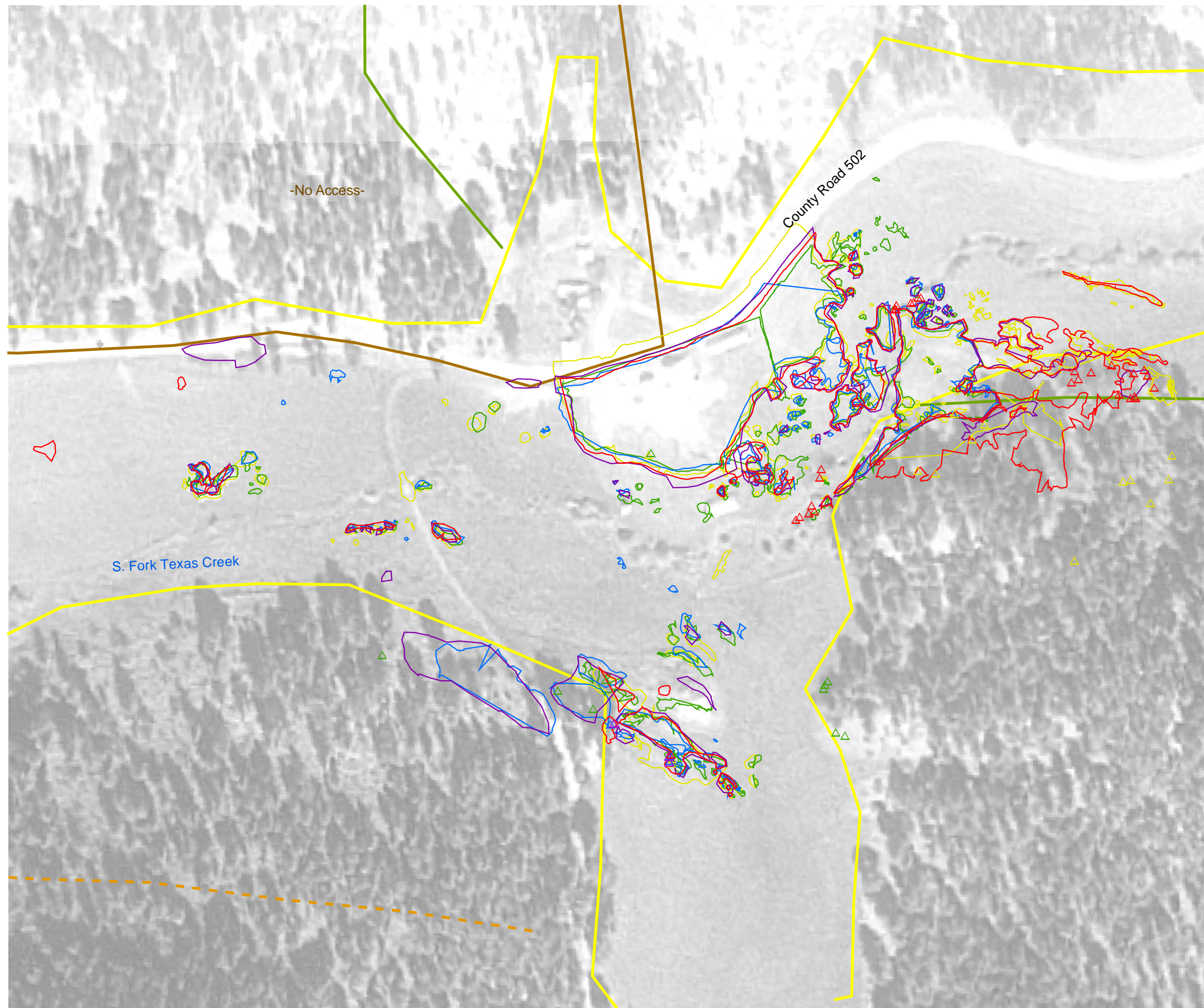


FIGURE 27
HISTORICAL DATA COMPARISON
STRESSED/DEAD VEGETATION
TEXAS CREEK WEST - DETAIL

THE GROUP





LEGEND

- △ Stressed/Dead Trees 2006
- △ Stressed/Dead Trees 2005
- △ Stressed/Dead Trees 2004
- △ Stressed/Dead Trees 2003
- △ Stressed/Dead Trees 2002
- Stressed/Dead Veg 2006
- Stressed/Dead Veg 2005
- Stressed/Dead Veg 2004
- Stressed/Dead Veg 2003
- Stressed/Dead Veg 2002

Geology

- Fruitland Formation (Kf)
- - - Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- - - Pictured Cliffs Formation (Kpc)
- - - Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

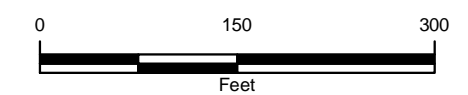
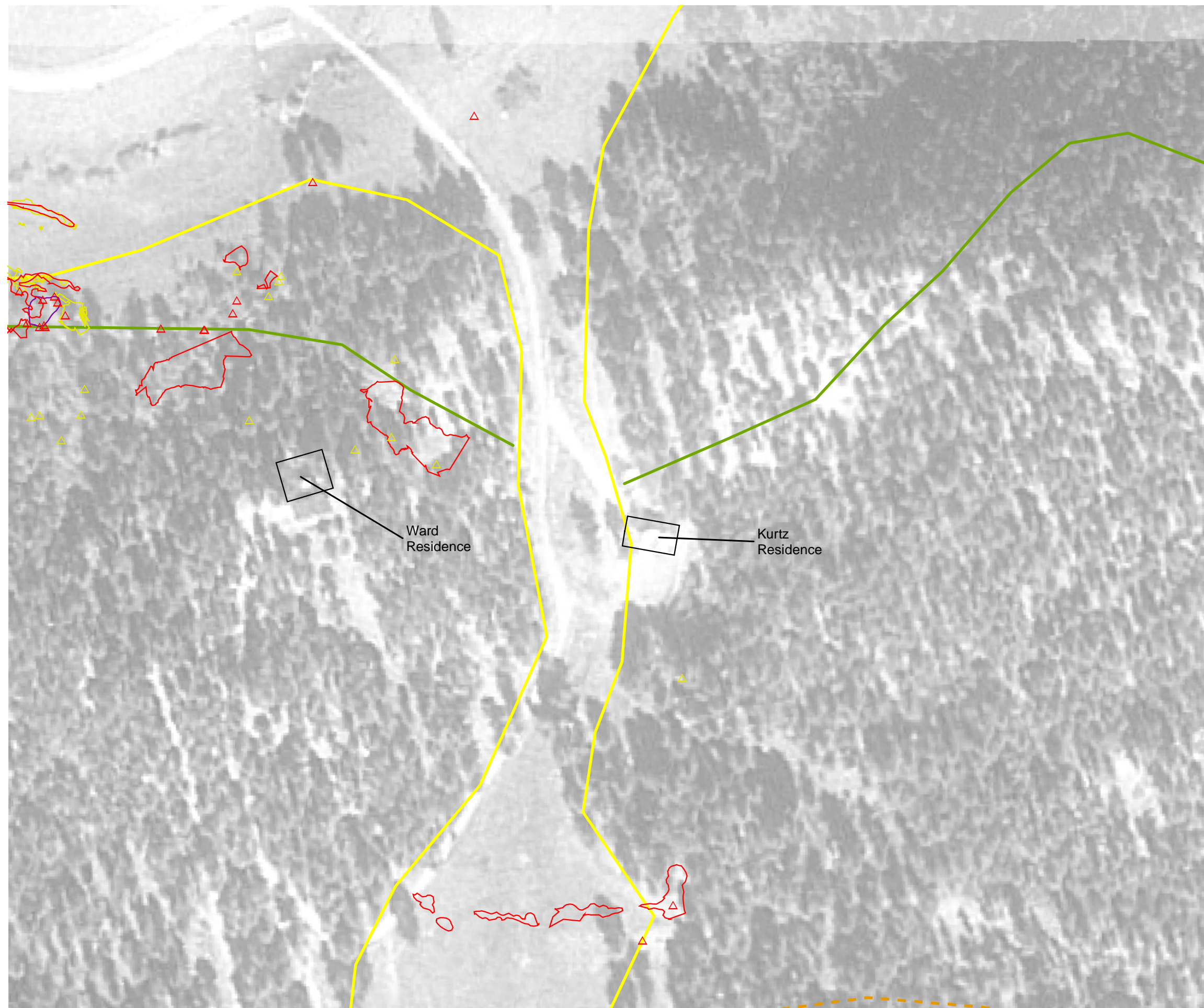


FIGURE 28
HISTORICAL DATA COMPARISON
STRESSED/DEAD VEGETATION
TEXAS CREEK - DETAIL

THE GROUP





LEGEND

- △ Stressed/Dead Trees 2006
- △ Stressed/Dead Trees 2005
- △ Stressed/Dead Trees 2004
- △ Stressed/Dead Trees 2003
- △ Stressed/Dead Trees 2002
- Stressed/Dead Veg 2006
- Stressed/Dead Veg 2005
- Stressed/Dead Veg 2004
- Stressed/Dead Veg 2003
- Stressed/Dead Veg 2002

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

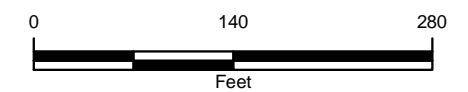
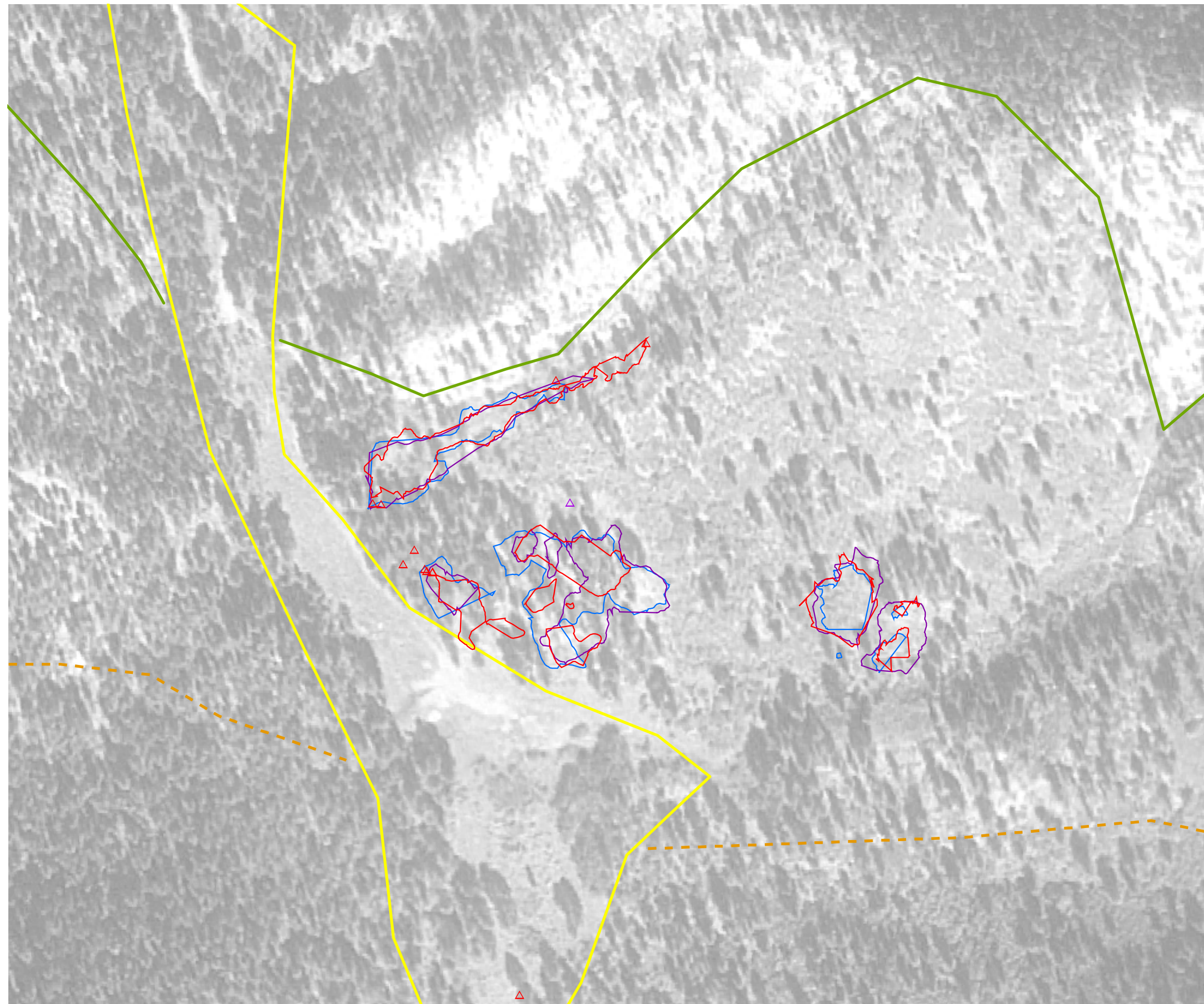


FIGURE 29
HISTORICAL DATA COMPARISON
STRESSED/DEAD VEGETATION
TEXAS CREEK CENTRAL - DETAIL

THE GROUP





LEGEND

- △ Stressed/Dead Trees 2006
- △ Stressed/Dead Trees 2005
- △ Stressed/Dead Trees 2004
- △ Stressed/Dead Trees 2003
- △ Stressed/Dead Trees 2002
- Stressed/Dead Veg 2006
- Stressed/Dead Veg 2005
- Stressed/Dead Veg 2004
- Stressed/Dead Veg 2003
- Stressed/Dead Veg 2002

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

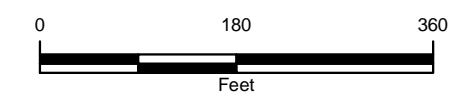
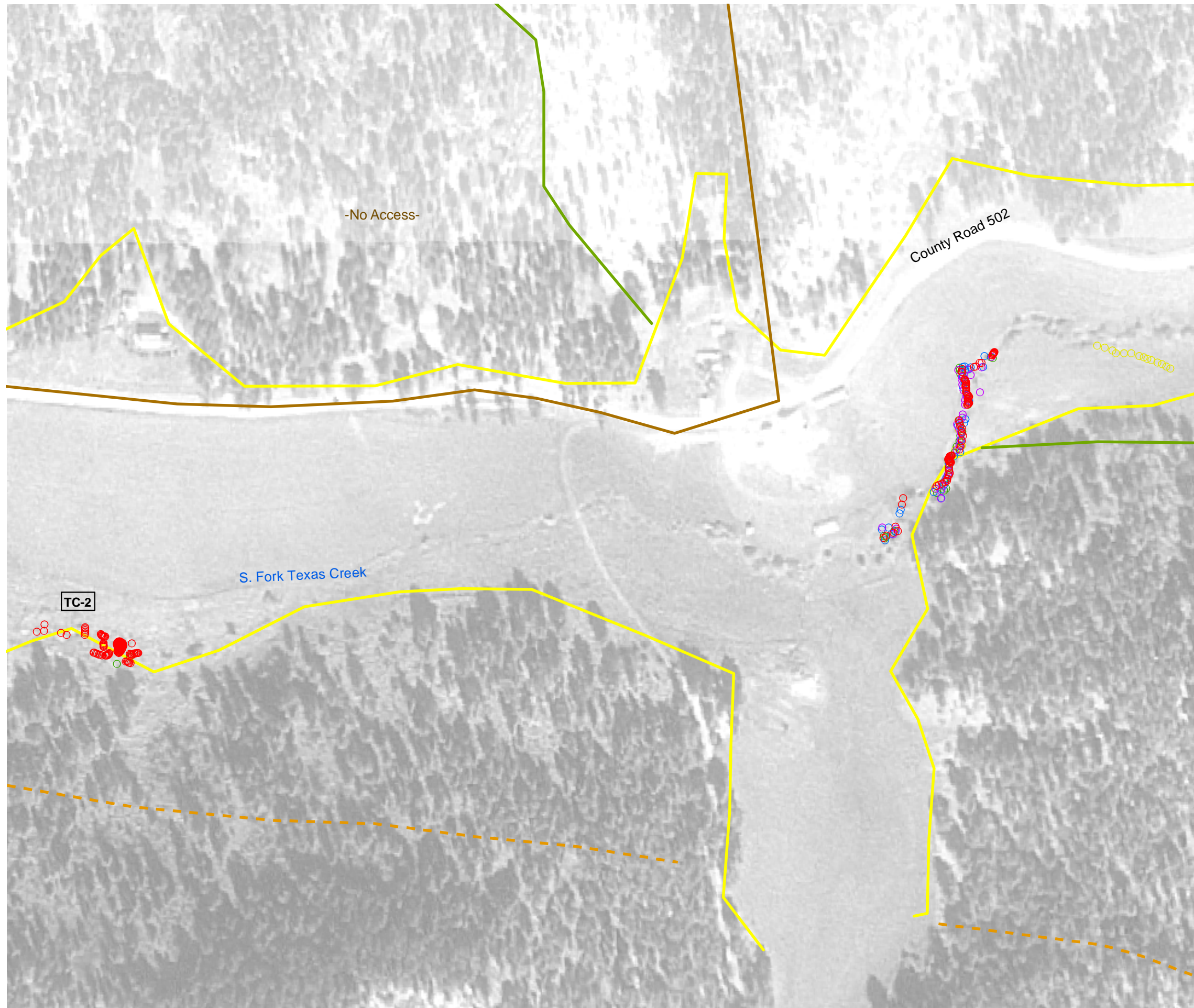


FIGURE 30
HISTORICAL DATA COMPARISON
STRESSED/DEAD VEGETATION
TEXAS CREEK EAST - DETAIL

THE GROUP





-No Access-

County Road 502

S. Fork Texas Creek

TC-2

LEGEND

- Methane Seeps 2006
- Methane Seeps 2005
- Methane Seeps 2004
- Methane Seeps 2003
- Methane Seeps 2002

Geology

- Fruitland Formation (Kf)
- === Fruitland Formation Tongue (Kft)
- - - Kirtland Formation (Kk)
- - - Pictured Cliffs Formation (Kpc)
- === Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

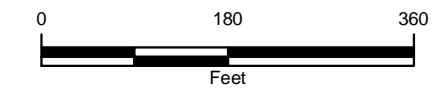
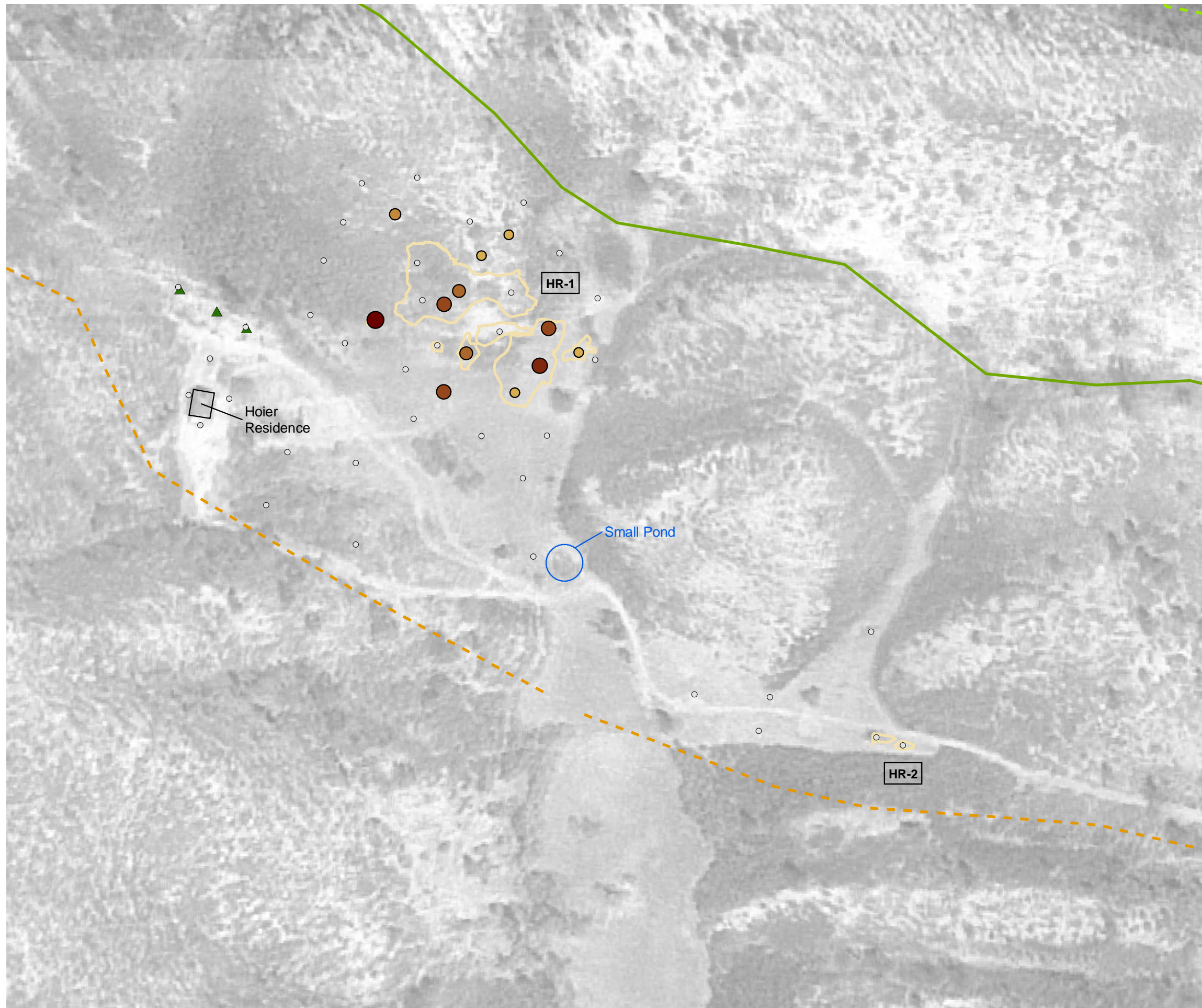


FIGURE 31
HISTORICAL DATA COMPARISON
VISIBLE METHANE SEEPS IN SURFACE WATER
TEXAS CREEK
 THE GROUP





LEGEND

- + Gas Monitoring Probes
- ☆ Gas Flux Chambers
- Visible Methane Seeps in Surface Water

Subsurface Methane Measurements

- 0 ppm
- 1ppm - 500 ppm
- 500 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

Subsurface methane measurements collected from temporary soil probes advanced with slide hammer.

Trees

- ▲ Dead Aspen
- ▲ Dead Cottonwood
- ▲ Dead Juniper
- ▲ Dead Pine
- ▲ Dead Scrub Oak
- ▲ Dead Willow
- ▲ Stressed Cottonwood
- ▲ Stressed Juniper
- ▲ Stressed Aspen
- ▲ Stressed Pine
- ▲ Stressed Scrub Oak
- ▲ Tree Stump

Vegetation

- Stressed/Dead Vegetation
- Non-Vegetative Area
- Live Aspen Grove

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

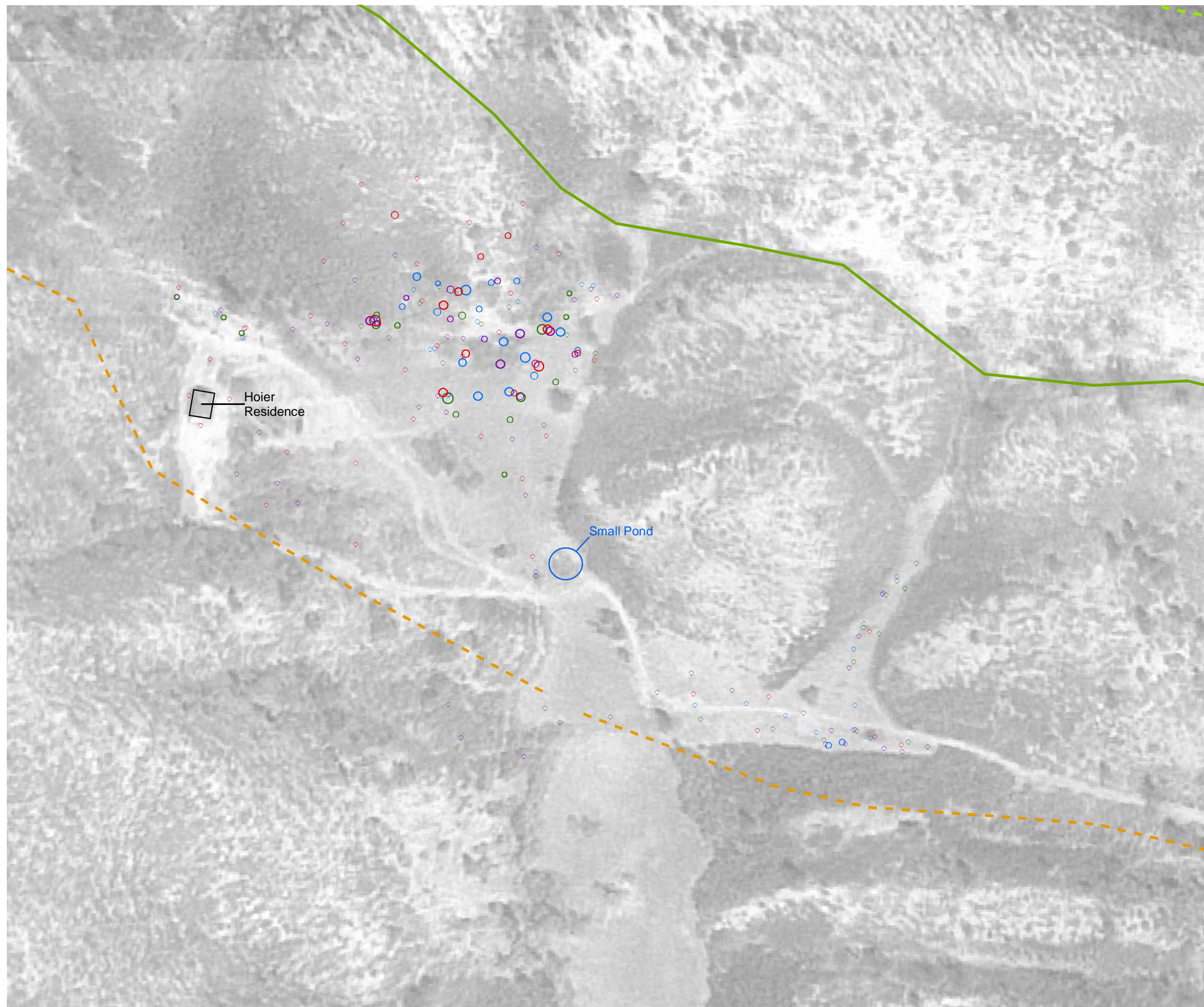
TC-4 Text Reference



FIGURE 32
2006 DETAILED SEEP MAPPING
HOIER PROPERTY

THE GROUP





LEGEND

- | | | |
|------------------|---|------------------|
| 2006 | ○ 0 ppm | ○ 0 ppm |
| ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm |
| ○ 500 ppm - 5% | ○ 500 ppm - 5% | ○ 500 ppm - 5% |
| ○ 6% - 15% | ○ 6% - 15% | ○ 6% - 15% |
| ○ 16% - 25% | ○ 16% - 25% | ○ 16% - 25% |
| ○ 26% - 50% | ○ 26% - 50% | ○ 26% - 50% |
| ○ 51% - 75% | ○ 51% - 75% | ○ 51% - 75% |
| ○ 76% - 100% | ○ 76% - 100% | ○ 76% - 100% |
| 2005 | ○ 0 ppm | ○ 0 ppm |
| ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm | ○ 1ppm - 500 ppm |
| ○ 500 ppm - 5% | ○ 500 ppm - 5% | ○ 500 ppm - 5% |
| ○ 6% - 15% | ○ 6% - 15% | ○ 6% - 15% |
| ○ 16% - 25% | ○ 16% - 25% | ○ 16% - 25% |
| ○ 26% - 50% | ○ 26% - 50% | ○ 26% - 50% |
| ○ 51% - 75% | ○ 51% - 75% | ○ 51% - 75% |
| ○ 76% - 100% | ○ 76% - 100% | ○ 76% - 100% |
| 2004 | ○ 0 ppm | |
| ○ 1ppm - 500 ppm | | |
| ○ 500 ppm - 5% | | |
| ○ 6% - 15% | | |
| ○ 16% - 25% | | |
| ○ 26% - 50% | | |
| ○ 51% - 75% | | |
| ○ 76% - 100% | | |
| | Geology | |
| | — Fruitland Formation (Kf) | |
| | — Fruitland Formation Tongue (Kft) | |
| | — Kirtland Formation (Kk) | |
| | — Pictured Cliffs Formation (Kpc) | |
| | — Pictured Cliffs Formation Tongue (Kpct) | |
| | — Quaternary Alluvium (Qa) | |
| | — Quaternary Gravel (Qg) | |

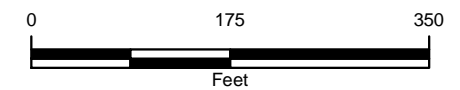
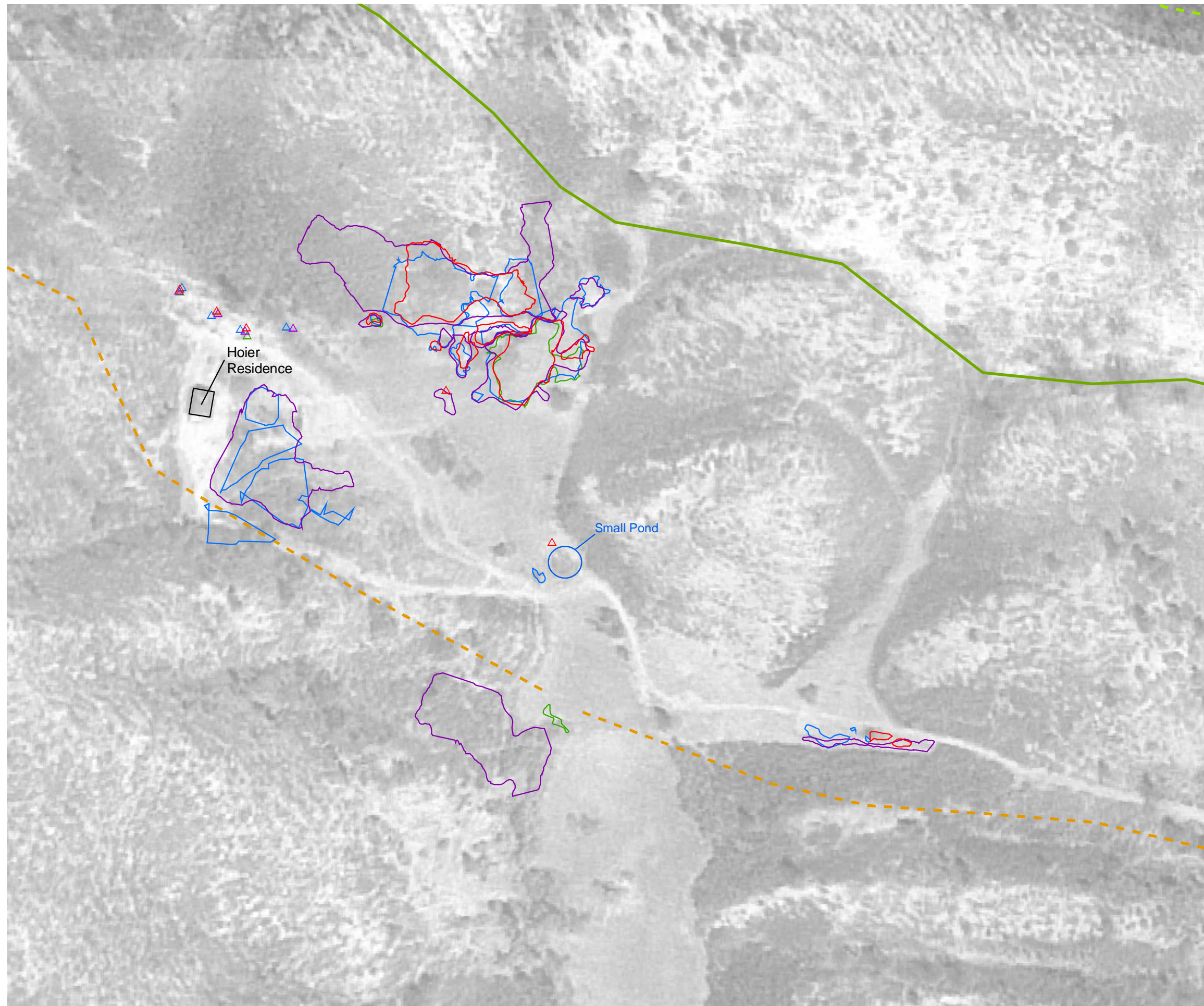


FIGURE 33
HISTORICAL DATA COMPARISON
SUBSURFACE METHANE MEASUREMENTS
HOIER PROPERTY
 THE GROUP





LEGEND

- ▲ Stressed/Dead Trees 2006
- ▲ Stressed/Dead Trees 2005
- ▲ Stressed/Dead Trees 2004
- ▲ Stressed/Dead Trees 2003
- ▲ Stressed/Dead Trees 2002
- ▭ Stressed/Dead Veg 2006
- ▭ Stressed/Dead Veg 2005
- ▭ Stressed/Dead Veg 2004
- ▭ Stressed/Dead Veg 2003
- ▭ Stressed/Dead Veg 2002

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

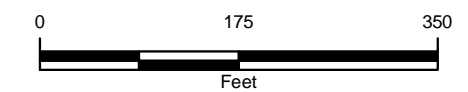
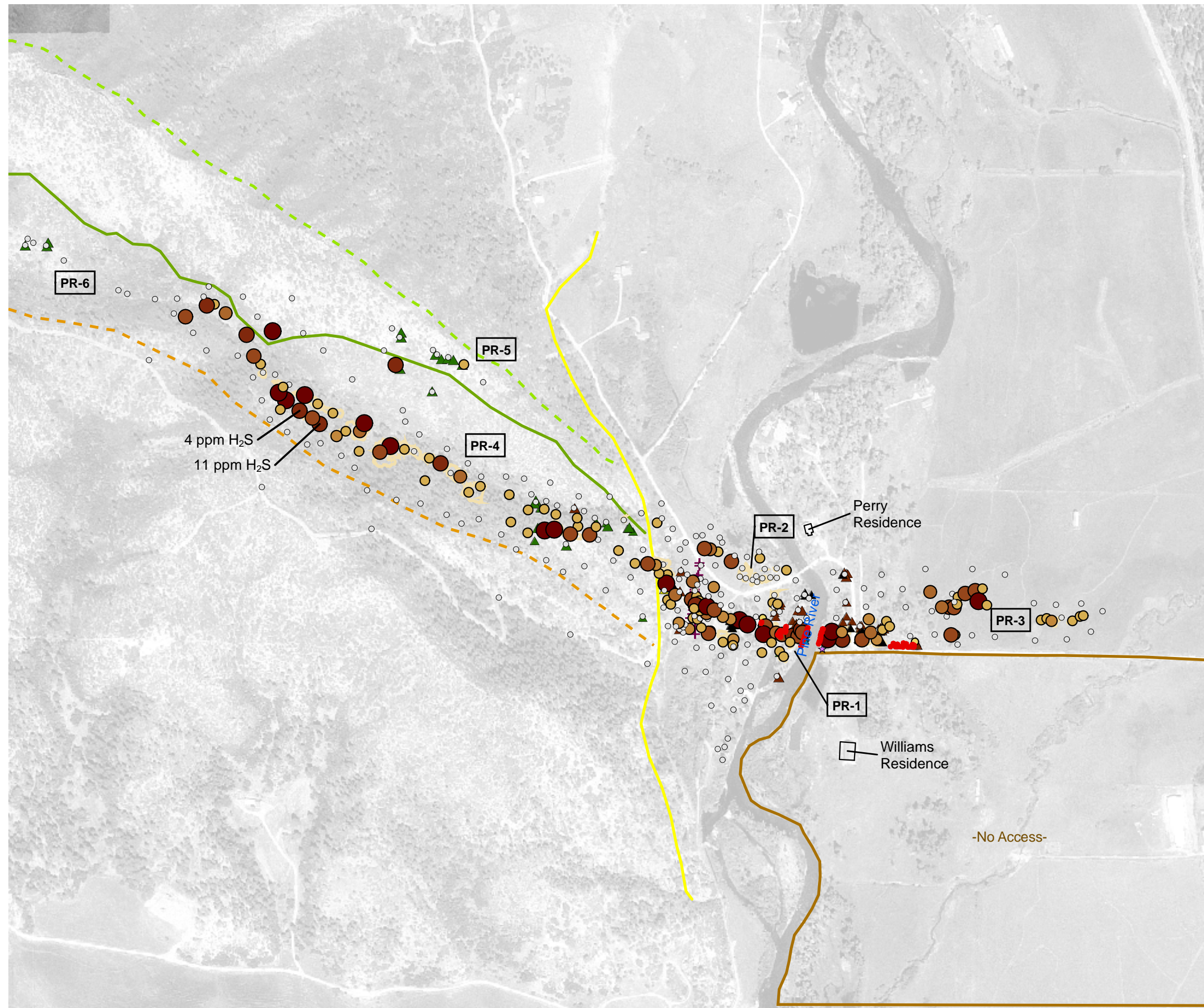


FIGURE 34
HISTORICAL DATA COMPARISON
STRESSED/DEAD VEGETATION
HOIER PROPERTY

THE GROUP





LEGEND

- ✦ Gas Monitoring Probes
- ☆ Gas Flux Chambers
- Visible Methane Seeps in Surface Water

Subsurface Methane Measurements

- 0 ppm
- 1ppm - 500 ppm
- 500 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

Subsurface methane measurements collected from temporary soil probes advanced with slide hammer.

Trees

- ▲ Dead Aspen
- ▲ Dead Cottonwood
- ▲ Dead Juniper
- ▲ Dead Pine
- ▲ Dead Scrub Oak
- ▲ Dead Willow
- ▲ Stressed Cottonwood
- ▲ Stressed Juniper
- ▲ Stressed Aspen
- ▲ Stressed Pine
- ▲ Stressed Scrub Oak
- ▲ Tree Stump

Vegetation

- ▭ Stressed/Dead Vegetation
- ▭ Non-Vegetative Area
- ▭ Live Aspen Grove

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

TC-4 Text Reference

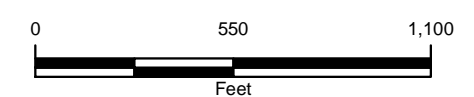
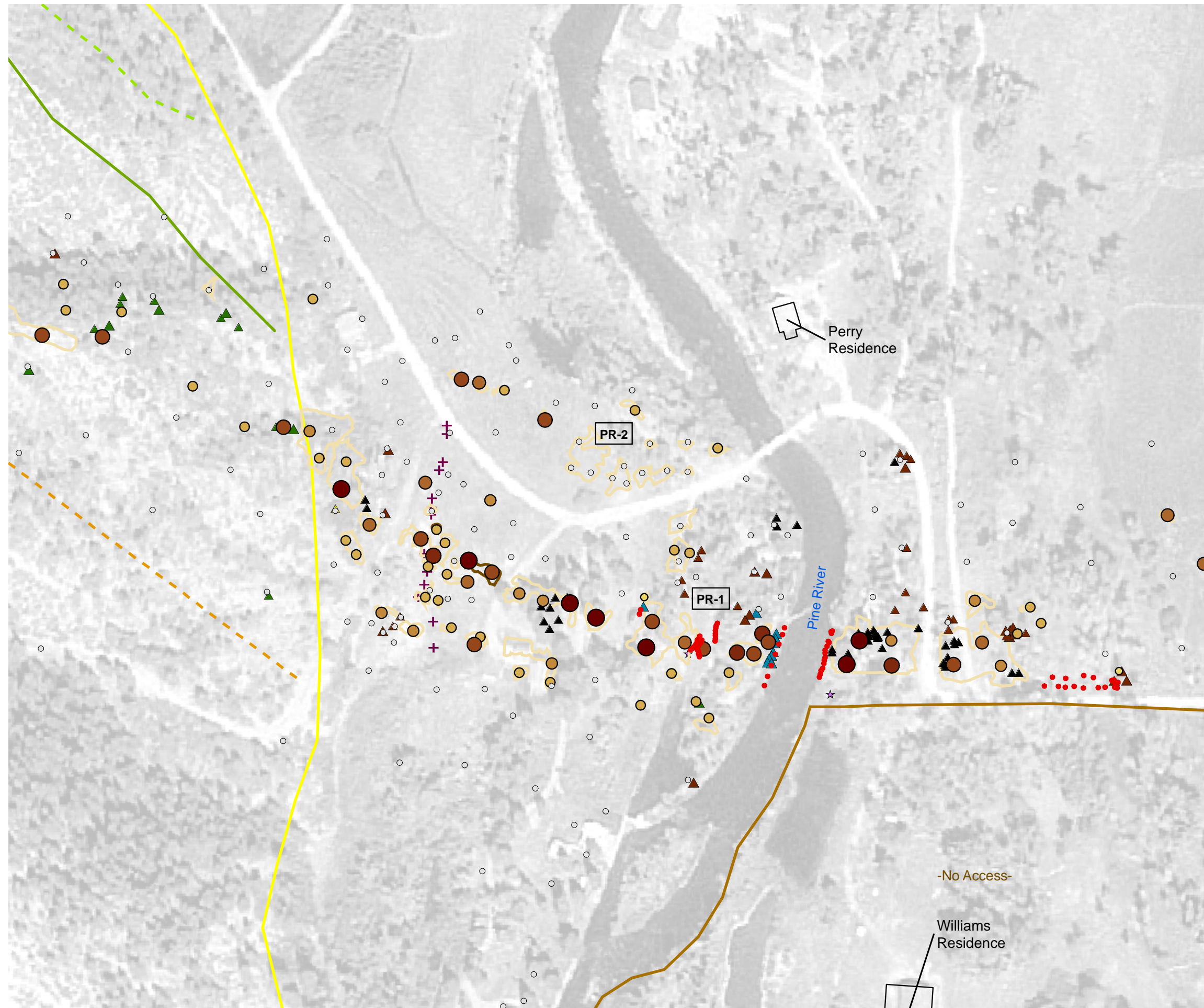


FIGURE 35
2006 DETAILED SEEP MAPPING
PINE RIVER

THE GROUP





LEGEND

- ✚ Gas Monitoring Probes
- ☆ Gas Flux Chambers
- Visible Methane Seeps in Surface Water

Subsurface Methane Measurements

- 0 ppm
- 1ppm - 500 ppm
- 500 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

Subsurface methane measurements collected from temporary soil probes advanced with slide hammer.

Trees

- ▲ Dead Aspen
- ▲ Dead Cottonwood
- ▲ Dead Juniper
- ▲ Dead Pine
- ▲ Dead Scrub Oak
- ▲ Dead Willow
- ▲ Stressed Cottonwood
- ▲ Stressed Juniper
- ▲ Stressed Aspen
- ▲ Stressed Pine
- ▲ Stressed Scrub Oak
- ▲ Tree Stump

Vegetation

- ▭ Stressed/Dead Vegetation
- ▭ Non-Vegetative Area
- ▭ Live Aspen Grove

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

TC-4 Text Reference

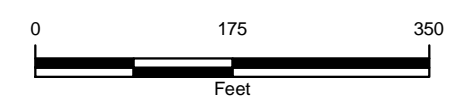
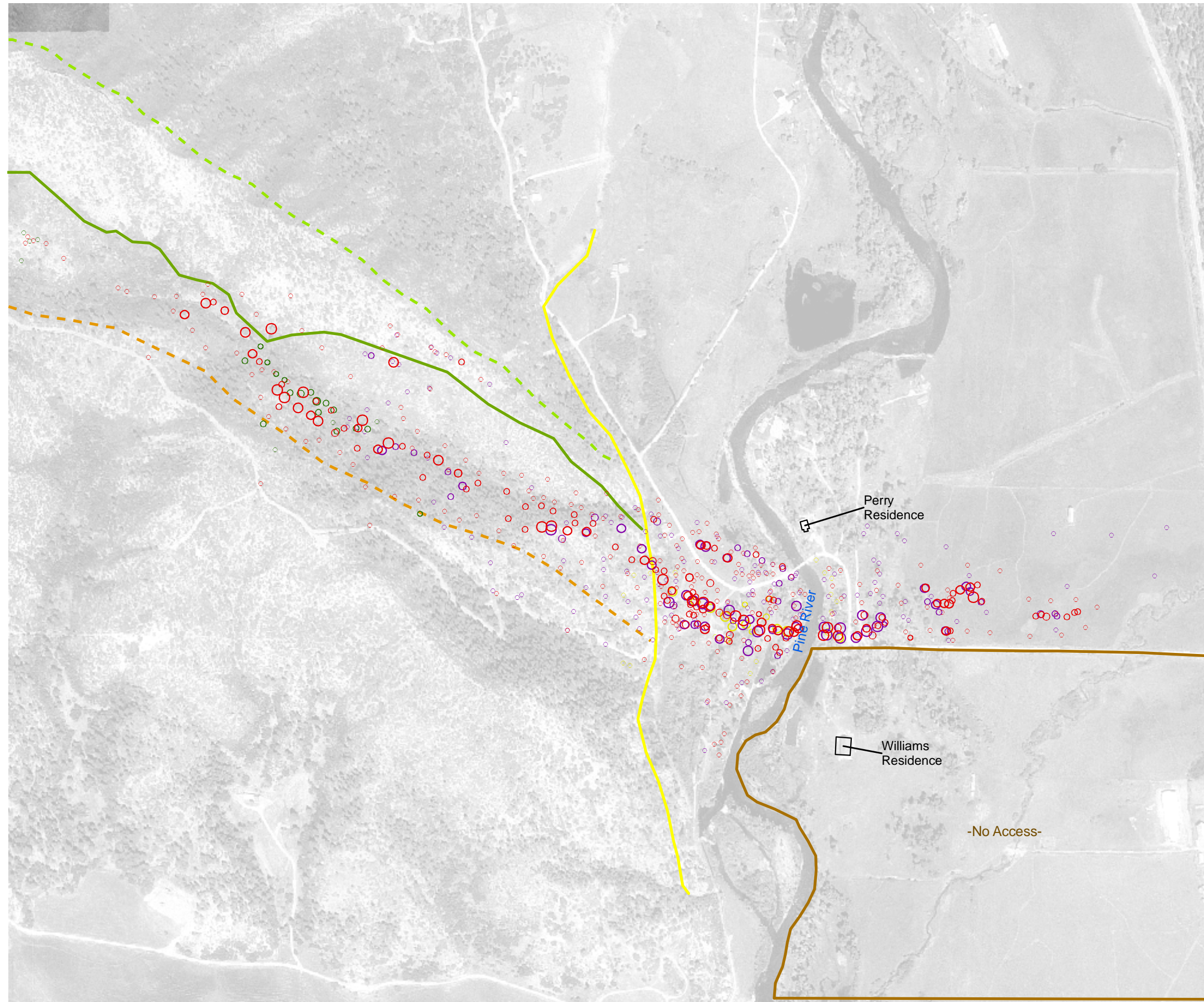


FIGURE 36
2006 DETAILED SEEP MAPPING
PINE RIVER - DETAIL

THE GROUP





LEGEND

2006	○ 0 ppm	○ 1ppm - 500 ppm	○ 500 ppm - 5%	○ 6% - 15%	○ 16% - 25%	○ 26% - 50%	○ 51% - 75%	○ 76% - 100%
2005	○ 0 ppm	○ 1ppm - 500 ppm	○ 500 ppm - 5%	○ 6% - 15%	○ 16% - 25%	○ 26% - 50%	○ 51% - 75%	○ 76% - 100%
2004	○ 0 ppm	○ 1ppm - 500 ppm	○ 500 ppm - 5%	○ 6% - 15%	○ 16% - 25%	○ 26% - 50%	○ 51% - 75%	○ 76% - 100%
2003	○ 0 ppm	○ 1ppm - 500 ppm	○ 500 ppm - 5%	○ 6% - 15%	○ 16% - 25%	○ 26% - 50%	○ 51% - 75%	○ 76% - 100%
2002	○ 0 ppm	○ 1ppm - 500 ppm	○ 500 ppm - 5%	○ 6% - 15%	○ 16% - 25%	○ 26% - 50%	○ 51% - 75%	○ 76% - 100%
Geology	<ul style="list-style-type: none"> — Fruitland Formation (Kf) - - - Fruitland Formation Tongue (Kft) - - - Kirtland Formation (Kk) - - - Pictured Cliffs Formation (Kpc) - - - Pictured Cliffs Formation Tongue (Kpct) — Quaternary Alluvium (Qa) — Quaternary Gravel (Qg) 							

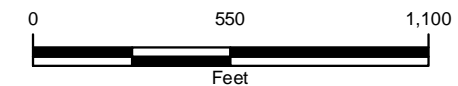
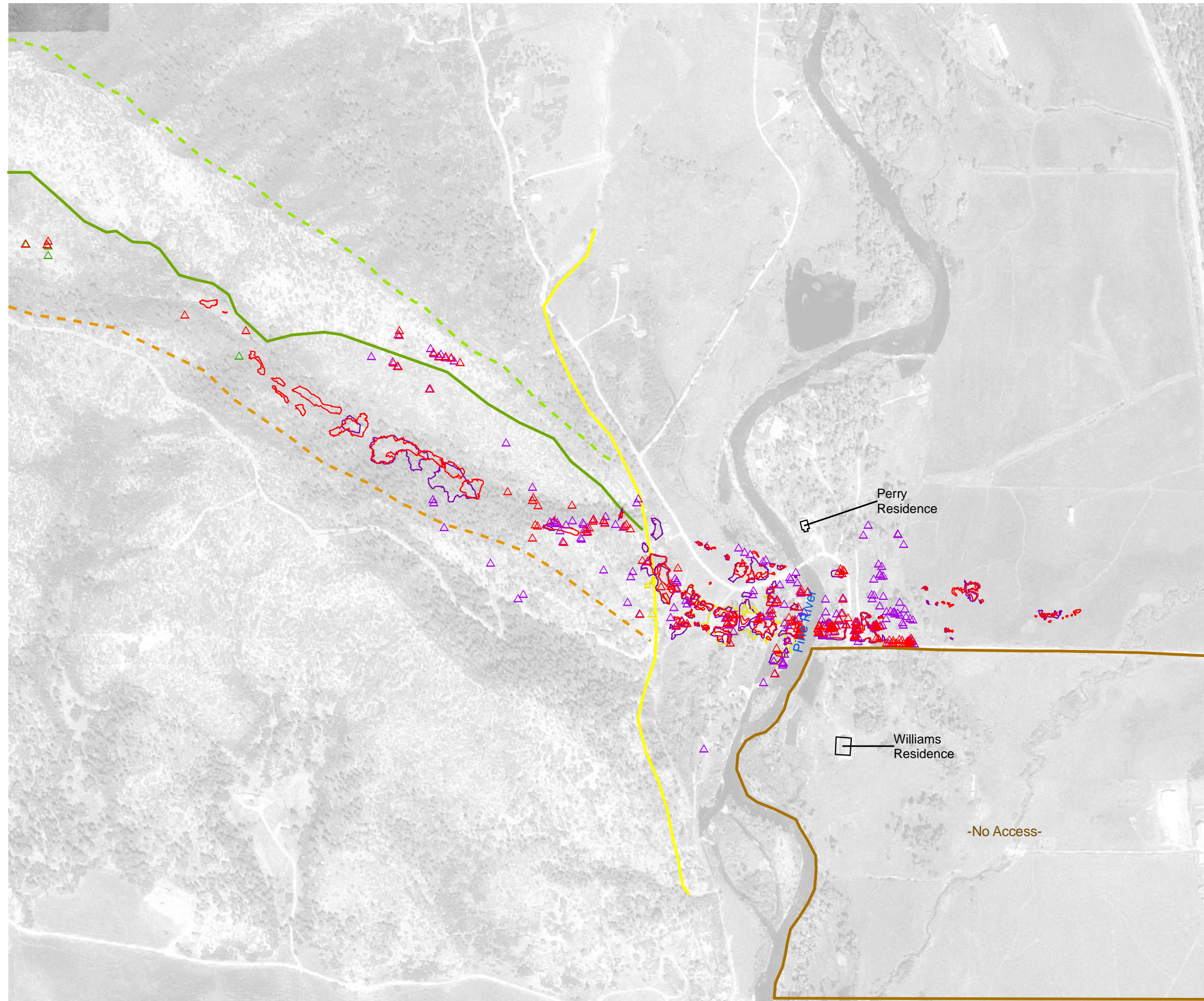


FIGURE 37
HISTORICAL DATA COMPARISON
SUBSURFACE METHANE MEASUREMENTS
PINE RIVER

THE GROUP





LEGEND

- △ Stressed/Dead Trees 2006
- △ Stressed/Dead Trees 2005
- △ Stressed/Dead Trees 2004
- △ Stressed/Dead Trees 2003
- △ Stressed/Dead Trees 2002
- ▭ Stressed/Dead Veg 2006
- ▭ Stressed/Dead Veg 2005
- ▭ Stressed/Dead Veg 2004
- ▭ Stressed/Dead Veg 2003
- ▭ Stressed/Dead Veg 2002

Geology

- Fruitland Formation (Kf)
- - - Fruitland Formation Tongue (Kft)
- - - Kirtland Formation (Kk)
- - - Pictured Cliffs Formation (Kpc)
- - - Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

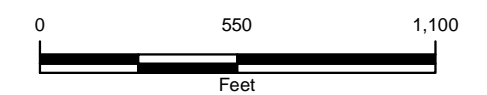
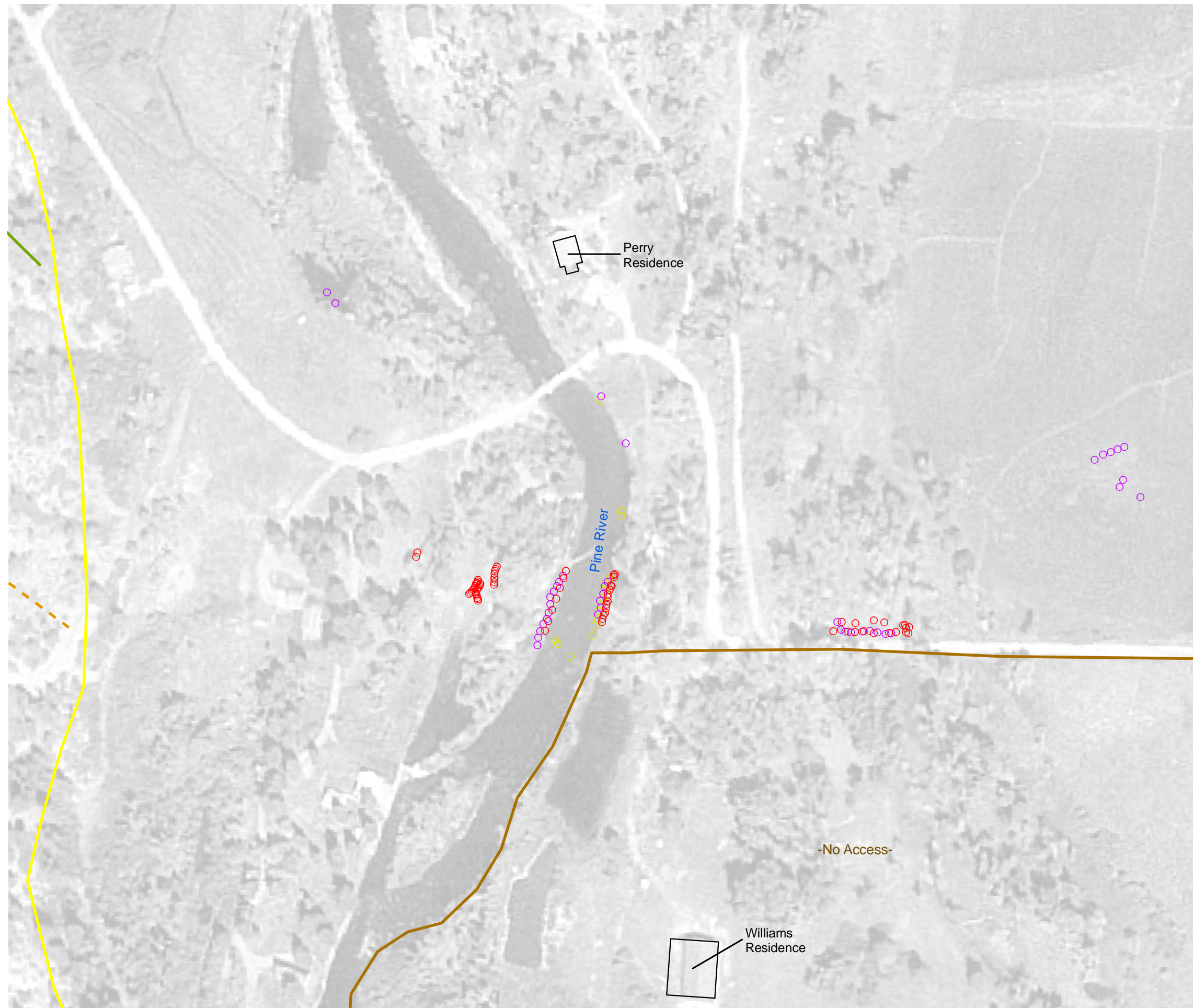


FIGURE 38
HISTORICAL DATA COMPARISON
STRESSED/DEAD VEGETATION
PINE RIVER

THE GROUP





LEGEND

- Methane Seeps 2006
- Methane Seeps 2005
- Methane Seeps 2004
- Methane Seeps 2003
- Methane Seeps 2002

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)

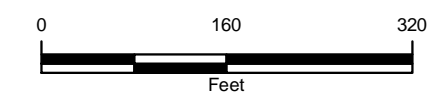
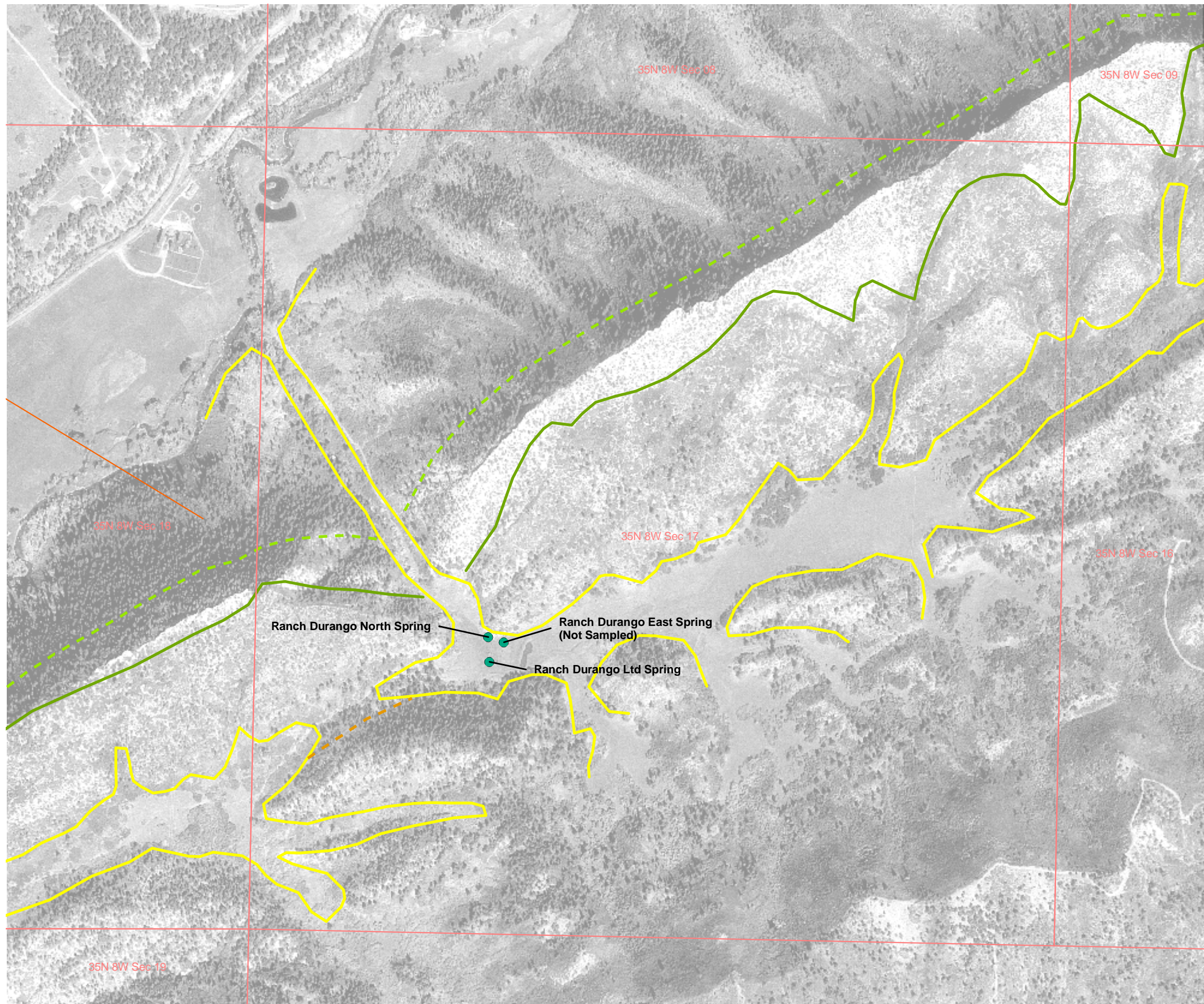


FIGURE 39
HISTORICAL DATA COMPARISON
VISIBLE METHANE SEEPS IN SURFACE WATER
PINE RIVER
THE GROUP





LEGEND

- Spring
- Geology**
- Fruitland Formation (Kf)
- - - Fruitland Formation Tongue (Kft)
- - - Kirtland Formation (Kk)
- - - Pictured Cliffs Formation (Kpc)
- - - Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)
- Township, Range, Section

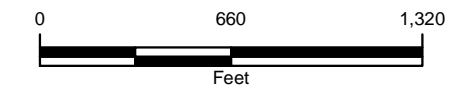
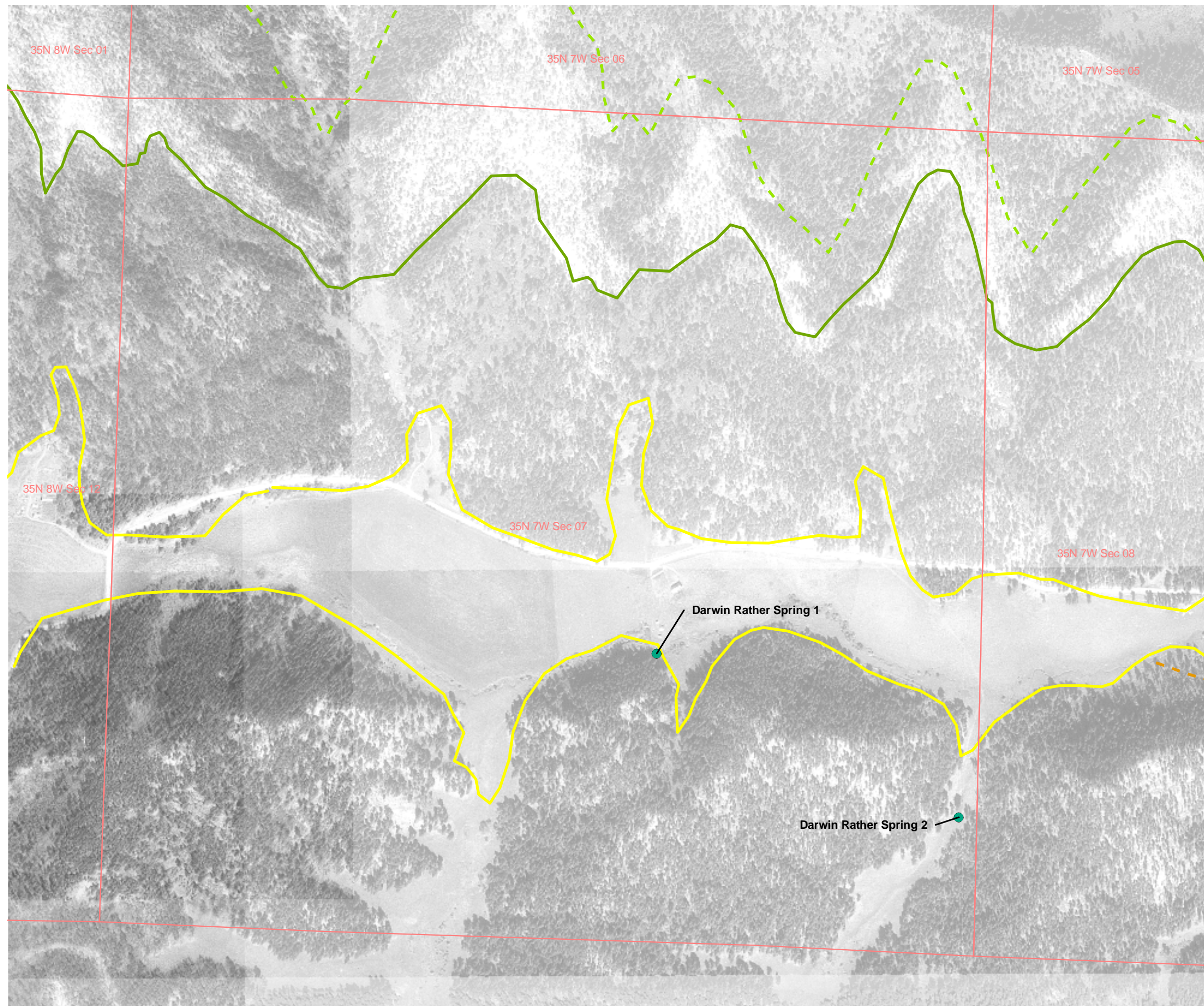


FIGURE 40
2006 NATURAL SPRING SURVEY AND
SUBSURFACE METHANE MEASUREMENTS
EDGEMONT RANCH
 THE GROUP





LEGEND

- Spring
- Geology**
- Fruitland Formation (Kf)
- - - Fruitland Formation Tongue (Kft)
- Kirtland Formation (Kk)
- - - Pictured Cliffs Formation (Kpc)
- - - Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)
- Township, Range, Section

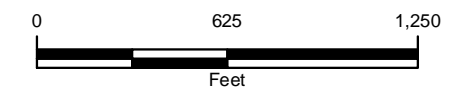
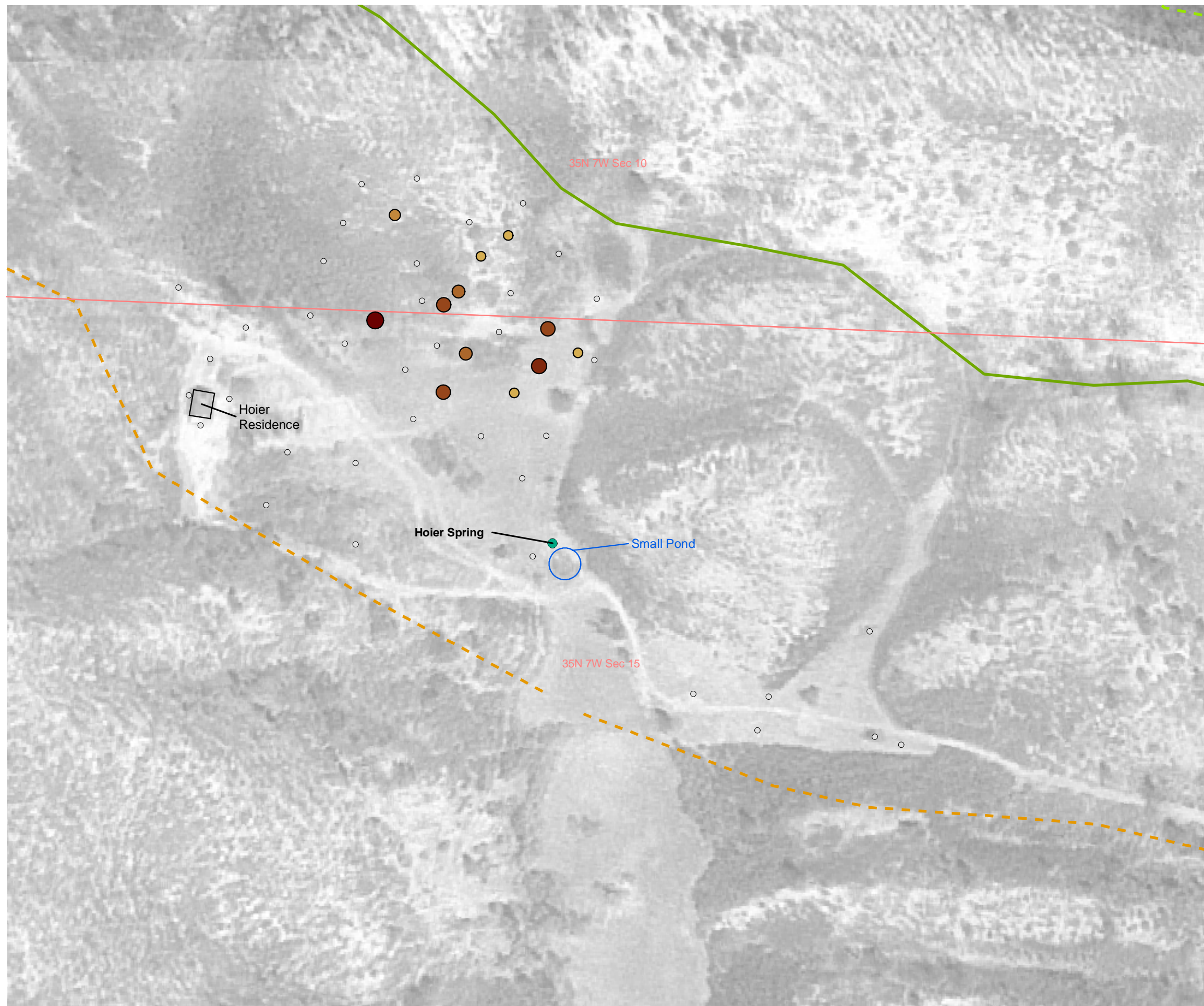


FIGURE 41
2006 NATURAL SPRING SURVEY AND
SUBSURFACE METHANE MEASUREMENTS
TEXAS CREEK
 THE GROUP





LEGEND

● Spring

Subsurface Methane Measurements

- 0 ppm
- 1ppm - 500 ppm
- 500 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

Subsurface methane measurements collected from temporary soil probes advanced with slide hammer.

Geology

- Fruitland Formation (Kf)
- Fruitland Formation Tongue (Kft)
- - - Kirtland Formation (Kk)
- - - Pictured Cliffs Formation (Kpc)
- Pictured Cliffs Formation Tongue (Kpct)
- Quaternary Alluvium (Qa)
- Quaternary Gravel (Qg)
- Township, Range, Section

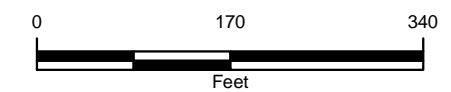


FIGURE 42
2006 NATURAL SPRING SURVEY AND
SUBSURFACE METHANE MEASUREMENTS
HOIER PROPERTY

THE GROUP



APPENDIX A
EQUIPMENT SPECIFICATIONS



The Gasport Gas Tester is designed for gas utility workers to detect methane and certain toxic gases. It is a reliable, simple, versatile tool to help your service technicians get the job done quickly! With multiple ranges and sensing capabilities built into one rugged housing, the Gasport Tester simplifies your work by reducing the number of meters you have to carry on the job.



Applications

The Gasport Tester's poison-tolerant methane sensor provides three measurement ranges for your daily service needs:

- Open air, safety sampling
- Small, in-home leak detection
- Street/outdoor service line leak detection



Features and Benefits

- **Proven in field use—rugged and reliable**
Less costly to maintain, less time in repair
- **Multiple functions in one instrument**
No need to buy, carry & maintain multiple instruments
- **New, poison-tolerant combustible gas sensor**
Reduces meter ownership costs
- **User-selectable, “silent” operation mode**
Reduces customer disturbances and worries
- **Fast warm up time**
Fastest warm up time in industry saves time
- **Can monitor up to four gases at a time**
Fewer instruments to carry
- **Show all gas concentrations simultaneously**
Eliminates guesswork on what reading is displayed
- **Autoranging methane sensor**
Automatically switches between 0-5% and 5-100% methane ranges
- **Gas readings recorded for later retrieval**
Can double check readings after job is done
- **Simple manual or automated calibration options**
Reduces training time and helps ensure accuracy
- **Intrinsically safe**
Meets safety standards for work in hazardous areas
- **Lifetime warranty on case and electronics**
Reduced maintenance and lifetime costs

Specifications

Gas	Range	Resolution
Methane	0–5000 ppm	50 ppm
Methane	0–100% LEL or 0–5% CH ₄	1 % LEL or 0.1% CH ₄
Methane	5–100% CH ₄	1% CH ₄
Oxygen	0–25%	0.1%
Carbon Monoxide	0–1000 ppm	1 ppm
Hydrogen Sulfide	0–100 ppm	1 ppm

- Battery types:** NiCd and Alkaline
- Case material:** Impact resistant, stainless-steel-fiber-filled polycarbonate
- Operating temperature:** normal -10 to 40°C; extended -20 to 50°C
- Operating humidity:** Continuous: 15-95% RH, non-condensing
Intermittent duty: 5-95% RH, non condensing
- Warm up time:** Less than 20 seconds to initial readings
- Datalog capacity:** 12 hours
- Input:** 3 clearly marked, metal domed keys
- Warranty:** Case and Electronics: Lifetime
Sensors and consumable parts: 1 year

The answer for gas utilities' gas detection needs

Ordering Information

Battery Chargers

Part No.	Description
494716	Omega 120 VAC 50/60Hz
495965	Omega 220 VAC 50/60Hz
801759	Omega 110/220 VAC, Five Unit, 50/60Hz
800525	Omega 8 - 24VDC for vehicle use

Battery Packs

Part No.	Description
496990	Standard NiCd Rechargeable
800526	Alkaline, Type C
711041	Alkaline, with Thumbscrews
800527	Heavy Duty NiCd Rechargeable

Sensors

Part No.	Description
813693	Combustible Gas
480566	O ₂
812389	CO
812390	H ₂ S

Protective Boots

Part No.	Description
804955	Black, for NiCd Battery Packs
802806	Orange, for NiCd Battery Packs
806751	Black, for Alkaline Battery Packs
806750	Orange, for Alkaline Battery Packs
806749	Black, for HD NiCd Battery Packs
806748	Orange, for HD NiCd Battery Packs
812833	Yellow Soft Carrying Case with Harness
711022	Black padded Vinyl Carrying Case with Harness

Sampling Equipment

Part No.	Description
800332	Probe - 1 ft., plastic
800333	Probe - 3 ft., plastic
803561	Probe - 3 ft., plastic (holes 2" from end) (bar hole probe)
803962	Probe - 3 ft., plastic (holes 2" from handle) (solid probe)
803848	Probe - Hot Gas Sampler
710465	Sampling Line - 5 ft., coiled
497333	Sampling Line - 10 ft.
497334	Sampling Line - 15 ft.
497335	Sampling Line - 25 ft.

Sampling Accessories

Part No.	Description
801582	Replacement Filter, Probe, pkg. of 10
801291	External Filter Holder
014318	Charcoal Filter
711039	Line Scrubber Filter Holder
711059	Line Scrubber Replacement Cartridges, Box of 12
808935	Dust Filter, Pump Module
802897	Water Trap (Teflon) Filter, Pump Module

Calibration Check Equipment

Part No.	Description
477149	Calibration Kit Model RP with 0.25 lpm Regulator
491041	Calibration Gas - methane, 2.5%
473180	Calibration Gas - 300 ppm CO
813718	Calibration Gas - methane, 2.5% oxygen, 15% 60 ppm CO
813720	Calibration Gas - methane, 2.5% oxygen, 15% 300 ppm CO 10 ppm H ₂ S
710288	Gasmiser™ Demand Regulator 0 - 3.0 lpm

Accessories

Part No.	Description
804679	Data Docking Module Kit. Includes the Data Docking Module, MSA Link Software and Instruction Manual

Approvals

The Gasport Gas Tester has been designed to meet intrinsic safety testing requirements in certain hazardous atmospheres.

The Gasport Gas Tester is approved by MET (an OSHA Nationally Recognized Testing Laboratory [NRTL]) for use in Class I, Division I, Groups A, B, C, D; Class II, Division I, Groups E, F, G; and Class III Hazardous locations. Gasport tGas Testers sold in Canada are approved by CSA for use in Class I, Division I, Groups A, B, C, and D locations.

Contact MSA at 1-800-MSA-2222 for more information or with questions regarding the status of approvals.

Gasport Gas Tester Kits

	LEL Display	O ₂	CO	H ₂ S	Alarms Always	Alarms Optional	Leak Detect Page Peak	Alkaline Battery	NiCd Battery	5ft Coiled Line	1ft Probe	Part No.
4-Gas, Selectable, NiCd	•	•	•	•	•	•	•	•	•	•	•	711489
4-Gas, Selectable, Alkaline	•	•	•	•	•	•	•	•	•	•	•	711490
3-Gas, Selectable, NiCd	•	•	•		•	•	•	•	•	•	•	711493
3-Gas, Selectable, Alkaline	•	•	•		•	•	•	•	•	•	•	711494
2-Gas, Selectable, NiCd	•		•		•	•	•	•	•	•	•	711495
2-Gas, Selectable, Alkaline	•		•		•	•	•	•	•	•	•	711496
4-Gas, Alarms On, NiCd	•	•	•	•	•	•	•	•	•	•	•	711491
4-Gas, Alarms On, Alkaline	•	•	•	•	•	•	•	•	•	•	•	711492

Assemble-to-Order (ATO) System: You Make the Choices

The ATO System makes it easy to "custom order" the Gasport Gas Tester, configured exactly the way you want it. You can choose from an extensive line of base instrument components and accessories. To obtain a copy of the "ATO System and Price Information for the Gasport Gas Tester," call toll-free 1-800-MSA-2222, and request Bulletin 0804-28. To obtain a copy of the ATO via FAX, call MSA QuickLit Information Service at 1-800-672-9010. At the prompt, request QuickLit Document #2345 (ATO for Gasport Gas Tester).

Note: This Data Sheet contains only a general description of the products shown. While uses and performance capabilities are described, under no circumstances shall the products be used by untrained or unqualified individuals and not until the product instructions including any warnings or cautions provided have been thoroughly read and understood. Only they contain the complete and detailed information concerning proper use and care of these products.

ID 08-04-27-MC / May 2000
© MSA 2000 Printed in U.S.A.



Corporate Headquarters
P.O. Box 426
Pittsburgh, PA 15230 USA
Phone (412) 967-3000
www.MSAnet.com

U.S. Customer Service Center
1-800-MSA-2222

MSA International
Phone (412) 967-3354
FAX (412) 967-3451

Offices and representatives worldwide
For further information:



GeoXT

The total GPS platform for all your GIS field requirements

The GeoXT™ handheld, from the GeoExplorer® series, is an essential tool for maintaining your GIS. It's all you need to collect location data, keep existing GIS information up to date, and even mobilize your GIS.

The unique GeoExplorer series combines a Trimble® GPS receiver with a rugged field-ready handheld computer running the Microsoft® Windows Mobile™ 2003 software for Pocket PCs. Plus there's an internal battery that easily lasts for a whole day of GPS operation. The result is tightly integrated, tough, and incredibly powerful.

High-accuracy integrated GPS

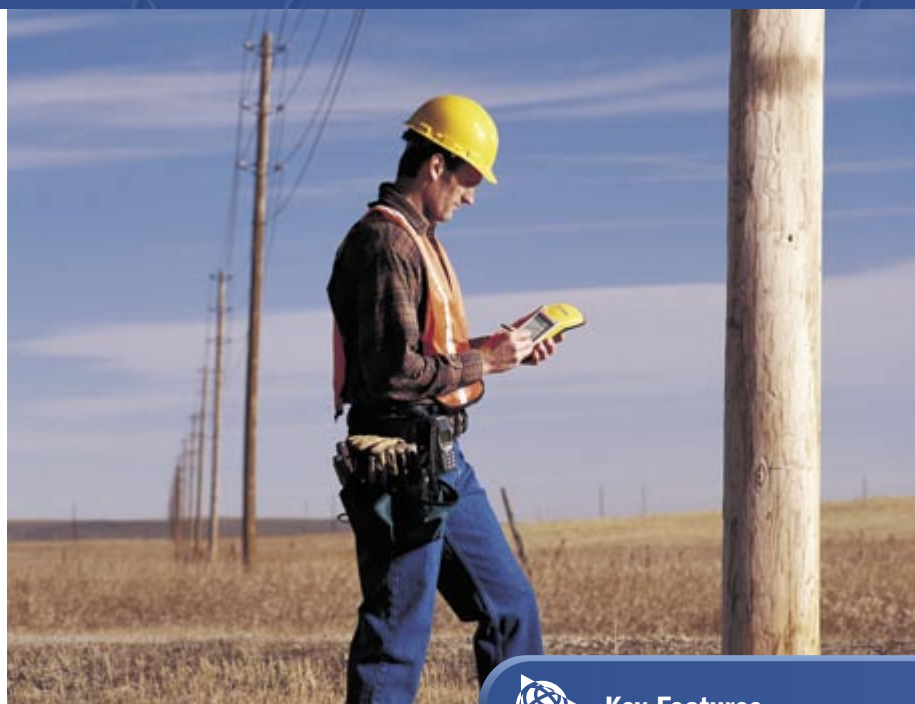
The GeoXT is optimized to provide the reliable, high-accuracy location data you need. Advanced features like EVEREST™ multipath rejection technology let you work under canopy, in urban canyons, or anywhere where accuracy is crucial.

Need submeter accuracy in real-time? Use corrections from a satellite-based augmentation system (SBAS) like WAAS¹ or EGNOS². Want to get that extra edge in precision? Collect data with Trimble's TerraSync™ or GPSCorrect™ software, and then postprocess back in the office.

Because the GPS receiver and antenna are built into the handheld computer, it's never been easier to use GPS in your application. The system is more than just cable-free: it's a totally integrated solution.

Optimized productivity

Take advantage of the power and flexibility of Windows Mobile software for Pocket PCs by choosing from the most comprehensive range of field software available—whether off-the-shelf or purpose-built. Whatever your needs, Windows



Key Features

- High-performance submeter GPS with integrated WAAS/EGNOS
- Windows Mobile 2003 software for Pocket PCs, allowing maximum flexibility in software choice
- Rugged handheld with all-day battery
- Advanced color TFT display with backlight
- Integrated Bluetooth for wireless connectivity

Mobile lets you choose a software solution to match your workflow.

Windows Mobile includes familiar Microsoft productivity tools, including Pocket Word, Pocket Excel, and Pocket Outlook®. Pocket Outlook lets you synchronize e-mails, contacts, appointments, and data with your office computer, so whether you're in the office or in the field, you're always up to date.

Go wireless with integrated Bluetooth®* for connection to other Bluetooth-enabled devices, including cell phones and PCs. You also have the option to use the USB support module to connect to a desktop computer, or use the optional serial clip for cabled connections in the field.

Receive a free copy of Microsoft Streets & Trips** 2004 software with your GeoXT handheld, and take advantage of comprehensive map and travel information for easy navigation and route planning.

All the memory you need

There's plenty of storage space in the GeoXT for all your GIS data. The fast processor and large memory mean even big graphics files load quickly—and they're crisp and crystal-clear on the advanced TFT outdoor color screen.

From data collection to data maintenance, to mobile GIS and beyond ... the GeoXT is the handheld of choice.

* Bluetooth type approvals are country specific. GeoExplorer series handhelds are approved for use with Bluetooth in the USA. For a complete list of other countries with Bluetooth approval please refer to:

www.trimble.com/geo_bluetooth.html.
** Microsoft Streets & Trips 2004 software available in US/Canada; Microsoft AutoRoute® 2004 in Europe.



The total GPS platform for all your GIS field requirements

Standard features

System

- Microsoft Windows Mobile 2003 software for Pocket PCs
- 206 MHz Intel StrongARM processor
- 512 MB non-volatile Flash data storage
- Outdoor color display
- Ergonomic cable-free handheld
- Rugged and water-resistant design
- All-day internally rechargeable battery
- Bluetooth wireless

GPS

- Submeter accuracy
- Integrated WAAS¹/EGNOS²
- RTCM real-time correction support
- NMEA and TSIP protocol support
- EVEREST multipath rejection technology

Software

- GPS Controller for control of integrated GPS and in-field mission planning
- GPS Connector for connecting integrated GPS to external ports
- File Explorer, Internet Explorer, Pocket Outlook (Inbox, Calendar, Contacts, Tasks, Notes), Sprite Pocket Backup, Transcriber, Pocket Word, Pocket Excel, Pictures, Windows[®] Media Player, Bluetooth File Transfer, Calculator, ActiveSync[®]
- Microsoft Streets & Trips/AutoRoute 2004 software

Accessories

- Support module with power supply and USB data cable
- Getting Started Guide
- Companion CD includes Outlook 2002 and ActiveSync 3.7.1
- Hand strap
- Pouch
- Stylus

Optional Features

Software

- TerraSync
- GPScorrect for ESRI[®] ArcPad[®]
- GPS Pathfinder[®] Tools Software Development Kit (SDK)
- GPS Pathfinder Office
- Trimble GPS Analyst extension for ArcGIS[®]

Accessories

- Serial clip for field data and power input
- Vehicle power adaptor³
- Portable power kit³
- Hurricane antenna
- External patch antenna
- Pole-mountable ground plane
- Baseball cap with antenna sleeve
- Beacon-on-a-Belt (BoB[™]) differential correction receiver³
- Hard carry case
- Null modem cable³
- Backpack kit

Technical specifications

Physical

Size	21.5 cm × 9.9 cm × 7.7 cm (8.5 in × 3.9 in × 3.0 in)
Weight	0.72 kg (1.59 lb) with battery
Processor	206 MHz Intel StrongARM SA-1110
Memory	64 MB RAM and 512 MB internal Flash disk
Power	
Low (no GPS)	0.6 Watts
Normal (with GPS)	1.4 Watts
High (with GPS, backlight, and Bluetooth)	2.5 Watts
Battery	Internal lithium-ion, rapidly rechargeable in unit, 21 Watt-hours

Environmental

Temperature	
Operating	-10 °C to +50 °C (14 °F to 122 °F)
Storage	-20 °C to +70 °C (-4 °F to 158 °F)
Humidity	99% non-condensing
Casing	Wind-driven rain and dust-resistant per IP 54 standard Slip-resistant grip, shock- and vibration-resistant

Input/output

Communications	Bluetooth for wireless connectivity USB via support module, serial via optional DE9 serial clip adaptor
----------------	--

Bluetooth

Certification	Bluetooth type approvals are country specific. GeoExplorer series handhelds are approved for use with Bluetooth in the USA. For a complete list of other countries with Bluetooth approval please refer to www.trimble.com/geoxt_ts.asp .
---------------	---

Profiles

Both client and host support	Serial Port, File Transfer (using OBEX)
Client support only	Dial-Up Networking, Lan Access
Host support only	Basic Imaging, Object Push
Display	Advanced outdoor TFT, 240 × 320 pixel, 65,536 colors, with backlight
Audio	Microphone and half duplex speaker, record and playback utilities
Interface	Anti-glare coated touch screen, Soft Input Panel (SIP) virtual keyboard 2 hardware control keys plus 4 programmable permanent touch buttons
Handwriting recognition software, Audio system events, warnings, and notifications	

GPS

Channels	12
Integrated real-time	WAAS ¹ or EGNOS ²
Update rate	1 Hz
Time to first fix	30 sec (typical)
Protocols	NMEA (GGA, VTG, GLL, GSA, ZDA, GSV, RMC), TSIP (Trimble Standard Interface Protocol)

Accuracy (RMS)⁴ after differential correction

Postprocessed ⁵	Submeter
Carrier postprocessed ⁶	
With 10 minutes tracking satellites	30 cm
Real-time	Submeter

1 WAAS (Wide Area Augmentation System). Available in North America only.

For more information, see <http://gps.faa.gov/programs/index.htm>.

2 EGNOS (European Geostationary Navigation Overlay System). Available in Europe only.

For more information, see <http://www.esa.int/export/esaSA/navigation.html>.

3 Serial clip also required.

4 Horizontal accuracy. Requires data to be collected with minimum of 4 satellites, maximum PDOP of 6, minimum SNR of 4, minimum elevation of 15 degrees, and reasonable multipath conditions. Ionospheric conditions, multipath signals or obstruction of the sky by buildings or heavy tree canopy may degrade precision by interfering with signal reception. Accuracy varies with proximity to base station by +1 ppm for postprocessing and real-time, and by +5 ppm for carrier postprocessing.

5 Postprocessing with GPS Pathfinder Office software or GPS Analyst extension for ArcGIS.

6 Requires collection of carrier data. (Only available with the GPS Pathfinder Office software).

Specifications subject to change without notice.

NORTH & SOUTH AMERICA

Trimble Navigation Limited
7403 Church Ranch Blvd • Suite 100
Westminster, CO 80021 • USA
+1-720-887-4374 Phone • +1-720-887-8019 Fax

EUROPE, AFRICA & MIDDLE EAST

Trimble GmbH
Am Prime Parc 11 • 65479 Raunheim • GERMANY
+49-6142-2100-0 Phone • +49-6142-2100-550 Fax

ASIA-PACIFIC

Trimble Navigation Australia Pty. Ltd
Level 1 • 123 Gotha St • Fortitude Valley
Queensland 4006 • AUSTRALIA
+61-7-3216-0044 Phone • +61-7-3216-0088 Fax



YOUR LOCAL TRIMBLE OFFICE OR REPRESENTATIVE

www.trimble.com

