COMPLIANCE / ENGINEERING / REMEDIATION

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April 22, 2010

Ms. Karen Spray
Colorado Oil and Gas Conservation Commission
P.O. Box 2651
Durango, CO 81302-2651

RE: Semi-annual 4M Operations and Maintenance Report

Ms. Spray:

LT Environmental, Inc. (LTE) is pleased to submit this Operations and Maintenance (O&M) Report for the 4M Outcrop Mitigation Project in La Plata County, Colorado to the Colorado Department of Natural Resources (DNR) Colorado Oil and Gas Conservation Commission (COGCC) for the period of September 22, 2009 to March 31, 2010.

Background

The objective of the 4M methane mitigation system is to demonstrate the economical and technical viability to recover and use the uncontrolled methane along the Outcrop. An additional system goal is to operate while helping protect the environment, which includes reducing carbon emissions and improving plant growth. To accomplish this objective, LTE designed and installed vapor collection and barrier systems for methane collection at both the South Fork Texas Creek site (Figure 1) and Pine River site (Figure 2). At the South Fork Texas Creek site, the recovered methane is being used to fuel a turbine, which is generating electricity to operate the collection system. The turbine is also returning any excess power to the local electrical grid for credit as a renewable energy resource. The design, installation, and startup of the 4M methane mitigation systems were completed in 2008 and 2009. Normal operations, including O&M activities, have occurred since May 2009 (post-startup). Previous O&M operations are detailed in the O&M report dated September 21, 2009.

Mitigation System Operation and Maintenance

Routine system operations consist of maintaining the equipment per manufacturer's instructions, collecting data used to evaluate system performance, and adjusting the operating parameters to optimize system effectiveness. Operational parameters recorded include: methane and oxygen concentrations in the incoming gas; operational hours for the blower and turbine generator; applied vacuum to the subsurface piping; and electrical generation of the turbine. O&M data are provided in Table 1 for the South Fork Texas Creek site, and in Table 2 for the Pine River site.

O&M activities conducted during the reporting period included:

- Completion of routine O&M checks to monitor and adjust system performance;
- Field screening the inlet gas quality;

- Collecting gas quality data stored in the data loggers for analysis;
- Snow removal for building access;
- Insulation of door vents on the buildings for winter;
- Troubleshooting of the weather station;
- Replacement of software/hardware on the turbine at the South Fork Texas Creek site (under warranty);
- Installation of a replacement methane sensor at the South Fork Texas Creek site;
- Safety inspection of the transformer by an electrical contractor following damage by ice falling from the building roof; and
- Methane mitigation system maintenance, which included changing oil and filters in the compressor system.

During normal operation, gas composition and flow remained fairly consistent at each site, with better gas quality recorded at the South Fork Texas Creek Site. Methane concentrations have remained relatively stable (approximately 80%) at the South Fork Texas Creek site (Figure 3). At the Pine River site methane concentrations have remained near 30% with fluctuations occurring with a low of 22% and a high of 44% (Figure 4). Gas was collected from all four collection zones at both sites. The methane flow rate was calculated using recorded methane concentrations, and a plot of the average flow rate and cumulative recovered methane over time for the South Fork Texas Creek site is provided on Figure 5. Typical methane gas flow ranged from 200 cubic feet per hour (cfh) to 350 cfh at the South Fork Texas Creek site and ranged from 250 cfh to 650 cfh at the Pine River site.

The Pine River site shut down frequently during the reporting period because of water accumulation in the methane sensor line. The accumulated water freezes and plugs the methane sensor line causing a low methane concentration alarm which subsequently shuts down the methane mitigation system. The system experienced downtime during the winter due to the fluid accumulation problem. The system will be retrofitted with a water trap and desiccant filter to prevent water accumulation in the methane sensor line.

The South Fork Texas Creek system produces the gas needed to operate the turbine, and excess gas is re-circulated within the compression system. The turbine was set at 10 kilowatts (kW) at the conclusion of startup. This setting was increased to attempt to optimize gas use during the reporting period, with operational settings between 10 kW and 14 kW. The operational setting of 12 kW appears to be the point at which sustained operation can be accomplished while maintaining high inlet gas quality. With normal system operation utilizing approximately 6 KW of electrical power, the remaining 6 KW are distributed back into the electrical grid for a net gain. The system operation commenced with a electrical meter reading of 51,540 kilowatt-hours

(KWH). From startup to March 23, 2010, the electrical meter reading was reduced to 35,364 kW-h (Figure 6) indicating 16,176 KWH has been returned to the grid.

The electrical generation results, along with visual observations of vegetation growth suggest that the methane mitigation system is operating successfully. Considerable plant growth has occurred in areas previously prohibitive of vegetative growth at both sites.

Planned Activities

During the next reporting period, the South Fork Texas Creek system will be evaluated with the goal of expanding the methane capture zone adjacent to the creek to improve gas collection and optimize turbine operation. Well points will be installed next to the creek to capture additional methane and/or an additional vapor barrier/collection system will be installed. In addition, LTE will evaluate piping the existing infrastructure to an existing COGCC monitoring well located to the southwest of the current mitigation system. The turbine electrical output will be increased to use the additional gas captured, resulting in increased electrical generation.

To increase system operational time at the Pine River site, a water trap and desiccant filter will be installed before the methane meter. The trap and filter will eliminate water accumulation in the methane meter lines and decrease system shutdowns. Additionally, the weather station located at the Pine River site will be replaced and/or repaired. Operation of the remediation systems will continue with a focus on system optimization and data collection.

LTE appreciates the opportunity to provide services to the COGCC. Please call us at 303-433-9788 if you have any questions or comments regarding this report.

Sincerely,
LT ENVIRONMENTAL, INC.

Rob Rebel, P.E.
Staff Engineer

Christopher E. Shephard, P.E.
Principal/Group Manager

Attachments:

Table 1 – O&M Data South Fork Texas Creek
Table 2 – O&M Data Pine River

Figure 1 - South Fork Texas Creek Site Layout
Figure 2 – Pine River Site Layout
Figure 3 – South Fork Texas Creek Methane Concentrations
Figure 4 - Pine River Methane Concentrations
Figure 5 – South Fork Texas Creek Methane Gas Flow
Figure 6 - South Fork Texas Creek Electrical Meter Readings

TABLES

TABLE 1

OPERATIONS AND MAINTENANCE DATA
SOUTH FORK TEXAS CREEK
4M OUTCROP MITIGATION PROJECT
COLORADO OIL AND GAS CONSERVATION COMMISSION

Date	System Status Upon Arrival	Electric Meter (kw)	Turbine (hours)	Turbine Demand (kw)	Compressor (hours)	Methane (%)	Oxygen (% or ppm)	Calculated Methane Flow (scfh)	Cumulative Calculated Methane Recovered (mcf)
05/22/09	OFF	51,540	34	10	--	81.6	130	203	7
05/27/09	OFF	50,355	90	10	--	81.4	33	204	18
05/29/09	OFF	50,368	113	10	--	81.6	15.2	203	23
06/08/09	OFF	50,967	192	10	--	79.4	14.9	209	40
06/15/09	OFF	50,683	286	10	289	78.2	83	212	59
06/19/09	OFF	50,510	305	10	308	79	19.8	210	63
06/23/09	OFF	50,004	310	10	402	79.2	0.16	210	65
06/25/09	OFF	--	318	10	411	--	--	--	--
07/07/09	OFF	50,983	338	10	431	80.2	51.2	207	69
07/15/09	ON	--	523	10 to 12	620	--	--	--	--
07/22/09	OFF	50,519	558	12	659	79	48	265	127
07/24/09	OFF	50,365	600	12	700	--	--	--	--
08/05/09	ON	46,840	891	10	993	76	5.25	275	207
08/14/09	ON	45,536	1,106	12	1,208	76	3.25	275	266
08/20/09	ON	44,501	1,251	12	1,353	80	4.25	261	304
09/02/09	OFF	42,246	1,538	14	1,602	60	0.39	348	404
09/08/09	ON	41,236	1,666	14	1,779	82	0.1	255	436
09/21/09	ON	39,298	1,934	14 to 16	2,101	104	0.1	201	490
10/05/09	OFF	40,322	2,009	OFF	2,332	--	3	--	--
10/05/09	SYSTEM OFF FOR REPAIRS							--	--
11/19/09	ON	41,776	1	12	--	100	93 ppm	166	491
12/01/09	ON	39,960	286	12	2,623	84.5	1.9 ppm	196	546
12/11/09	OFF	38,941	495	12	2,866	89	2.0 ppm	187	585
12/16/09	ON	38,235	615	12	2,986	89.6	1.8 ppm	185	608
12/29/09	OFF	37,548	876	12	3,321	87	3.0 ppm	191	657
01/12/10	OFF	37,127	1,109	12	3,632	84.5	3.25 ppm	196	703
01/27/10	ON	35,875	1,469	12	3,993	79.2	0.1	210	779
03/02/10	TRANSFORMER DAMAGED BY ICE FALL							--	--
03/05/10	OFF	37,586	1,723	12	4,246	74	0.16	224	836
03/11/10	OFF	37,217	1,723	12	4,247	64	130 ppm	259	836
03/12/10	ON	37,172	1,747	12	4,271	80	23.2 ppm	208	841
03/23/10	ON	35,364	2,009	12	4,533	59	0.1	281	914

Notes:
kw - kilowatts
% - percent
ppm - parts per million
scfh - standard cubic feet per hour
mcf - 1,000 cubic feet
-- - reading not collected/not applicable'

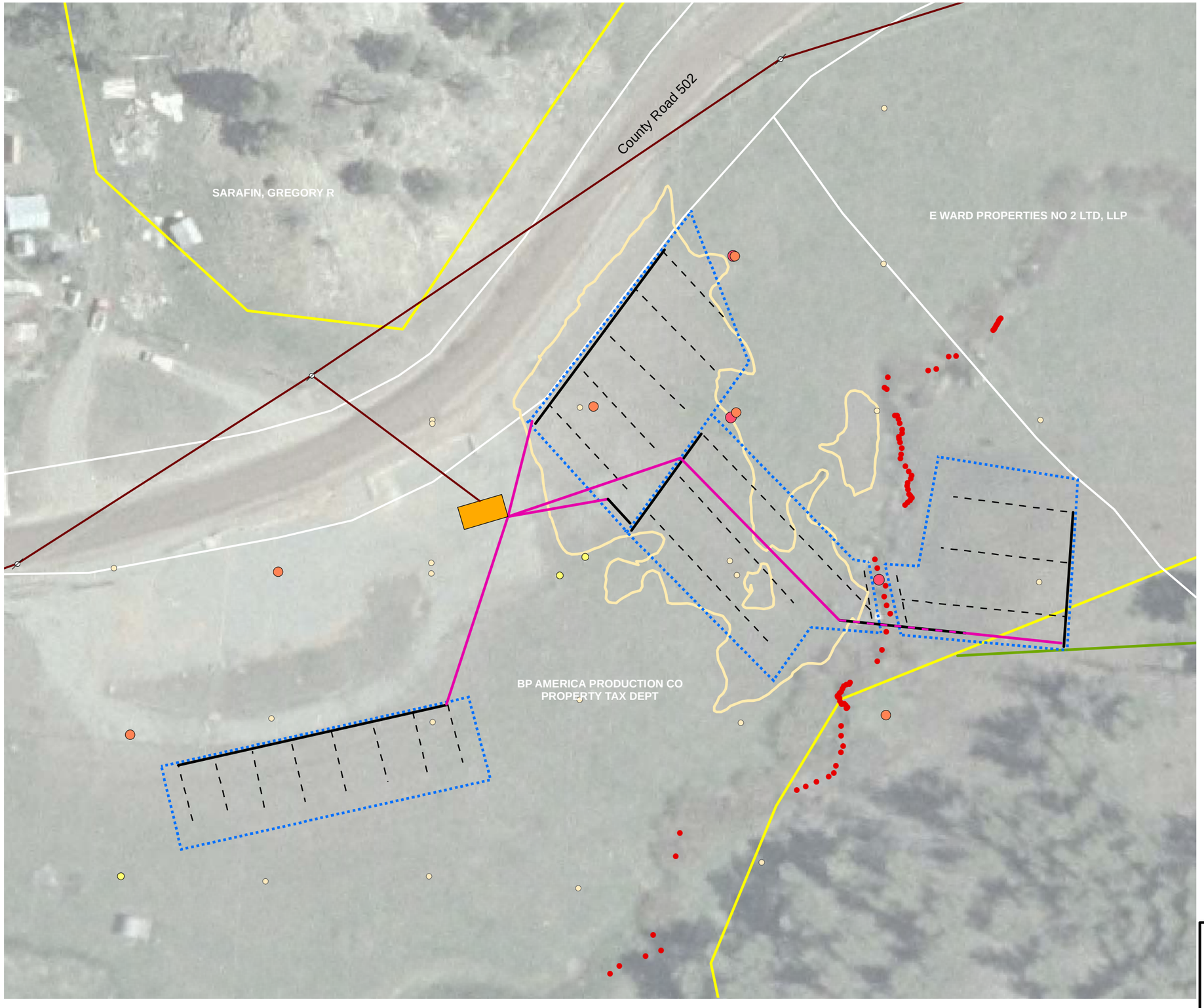
TABLE 2

OPERATIONS AND MAINTENANCE DATA
PINE RIVER
4M OUTCROP MITIGATION PROJECT
COLORADO OIL AND GAS CONSERVATION COMMISSION

Date	System Status Upon Arrival	Blower (hours)	Differential hrs	Blower Inlet Vacuum (" wc)	Calculated Methane Flow Rate (cfh)	Calculated Cumulative Methane Recovered (mcf)	Electric Meter (kW-h)	Methane (%)	Oxygen (%)
05/22/09	OFF	--	0	1	807	--	16	35	OFF
05/27/09	OFF	11	11	1	1,015	11	17	44	OFF
05/29/09	ON	60	49	1	600	40	39	26	OFF
06/15/09	OFF	440	380	1	807	347	293	35	3.21
06/23/09	ON	627	187	1	992	533	372	43	5.67
07/07/09	ON	963	336	1	969	858	425	42	3.86
07/22/09	OFF	1,306	343	1	530	1,040	662	23	2.76
07/24/09	--	1,354	48	1	--	--	--	--	--
08/05/09	OFF	1,363	9	1	1,015	1,049	686	44	7.57
08/14/09	OFF	1,368	5	1	738	1,053	698	32	3.98
09/02/09	OFF	1,500	132	1	258	1,087	1,056	11.2	3.35
09/08/09	ON	1,540	40	1	512	1,107	1,064	22.2	2.81
09/21/09	OFF	1,556	16	1	909	1,122	1,071	39.4	3.52
10/05/09	OFF	1,567	11	1	849	1,131	1,092	36.8	4
10/23/09	--	1,568	1	1	567	1,132	--	24.6	6.18
10/27/09	OFF	--	0	1	553	1,132	--	24	5.8
11/05/09	ON	1,775	207	1	392	1,213	--	17	6.54
11/05/09	ON	1,777	2	7	700	1,214	--	33	11
11/06/09	ON	1,797	20	7	603	1,226	--	28.4	4
11/12/09	ON	1,942	145	7	577	1,310	1,142	27.2	2.42
11/19/09	ON	1,988	47	7	594	1,338	1,188	28	3.56
12/01/09	OFF	2,167	179	7	441	1,417	1,522	20.8	5.61
12/16/09	OFF	2,224	56	7	815	1,463	2,104	38.4	4.6
12/29/09	OFF	2,245	21	1	--	--	2,641	--	--
01/12/10	OFF	2,245	0	8	986	1,463	3,120	48.6	4.3
01/27/10	OFF	2,267	22	1	--	--	3,610	--	--

Notes:
" wc - inches water column
kw - kilowatts
% - percent
< - less than
cfh - cubic feet per hour

FIGURES



LEGEND

- 2006 Visible Methane Seeps in Surface Water
- Gas Monitoring Probes
- Process Equipment Footprint
- Overhead Electrical Line

2009 Methane Flux Location (mol/m ^{2} • day)

- 0.0000
- 0.0001 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 10.0000
- 10.0001 - 50.0000
- 50.0001 - 100.0000
- 100.0001 - 775.0000
- 15 mil Impervious Membrane
- Parcel Boundary & Owner (white)
- Stressed Vegetation

Piping

- 3" SCH 40 PVC
- 3" SCH 80 PVC
- 4" ADS Corrugated Piping (Slotted)
- 4" ADS Corrugated Piping (Solid)

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)

0 50 100
Feet

N

FIGURE 1
SITE LAYOUT
SOUTH FORK TEXAS CREEK
4M OUTCROP MITIGATION PROJECT
DURANGO, COLORADO
COLORADO OIL AND GAS CONSERVATION COMMISSION

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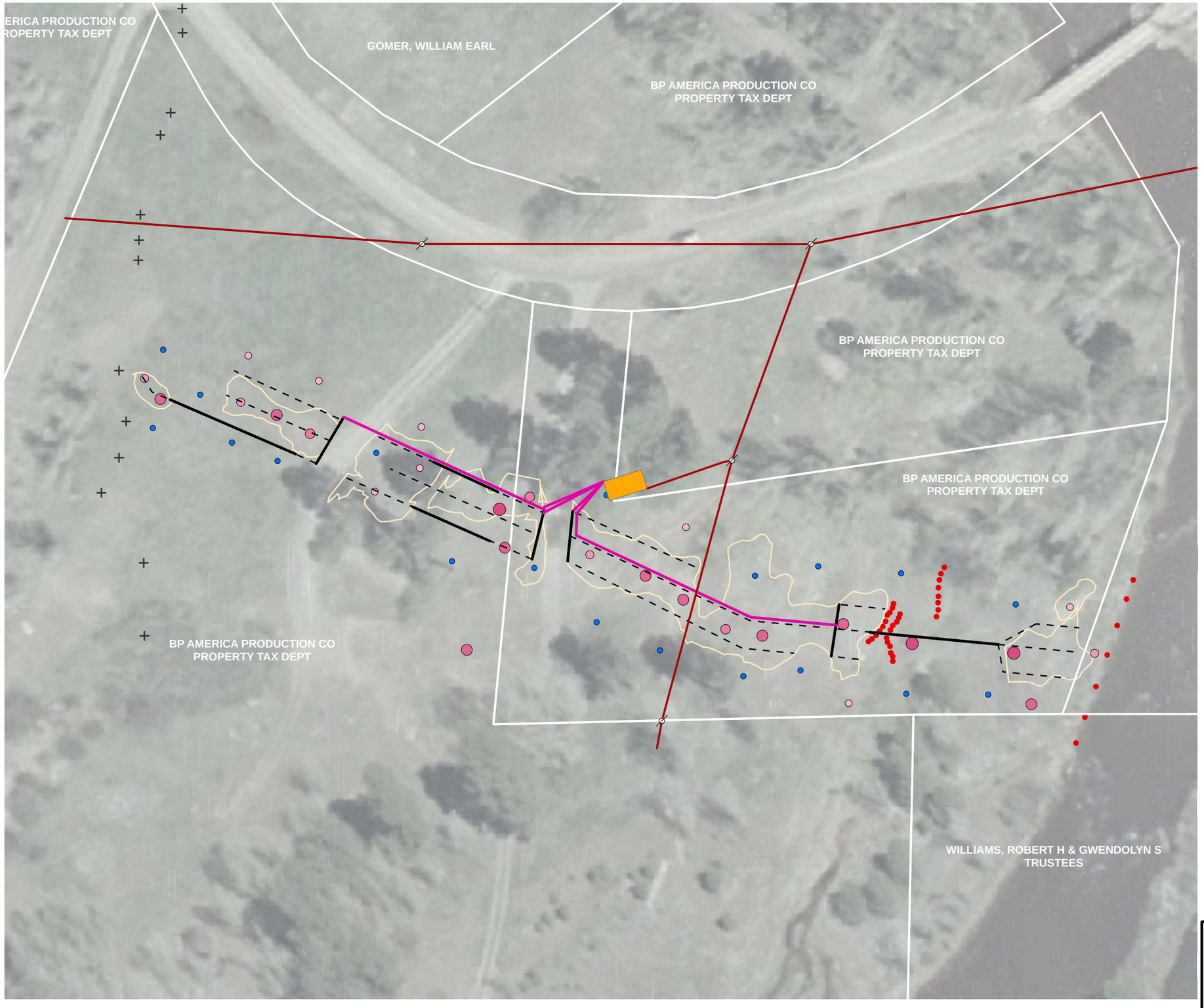

LEGEND

- Visible Methane Seeps in Surface Water
- Gas Monitoring Probes
- Power Pole
- Process Equipment Footprint
- Stressed Vegetation
- Parcel Boundary & Owner (white)
- Power Line

Methane Flux Results (mole/m^2/day)

- 0.00000
- 0.00140 - 0.10000
- 0.16615 - 0.50000
- 0.52514 - 1.00000
- 1.09969 - 10.00000
- 10.98770 - 50.00000
- 100.00000
- 1175.00000

Piping

- 3" SCH 40 PVC
- 4" ADS Corrugated Piping (Slotted)
- 4" ADS Corrugated Piping (Solid)

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)

0 60 120
Feet

N

FIGURE 2
SITE LAYOUT
PINE RIVER
4M OUTCROP MITIGATION PROJECT
DURANGO, COLORADO
COLORADO OIL AND GAS CONSERVATION COMMISSION

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Figure 3
South Fork Texas Creek Methane Concentrations
4M Outcrop Mitigation Project
Colorado Oil and Gas Conservation Commission

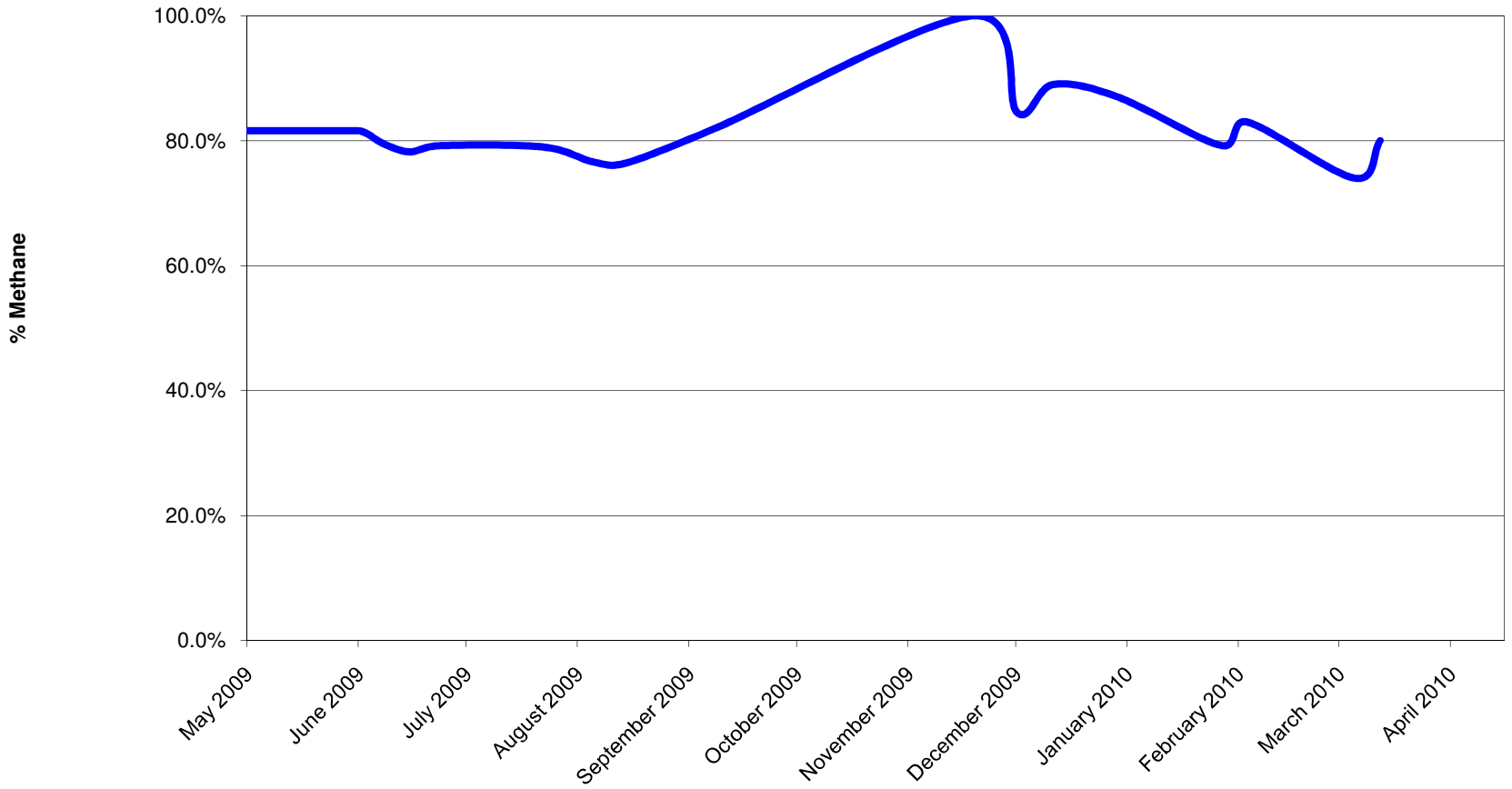

Figure 4
Pine River Methane Concentrations
4M Outcrop Mitigation Project
Colorado Oil and Gas Conservation Commission

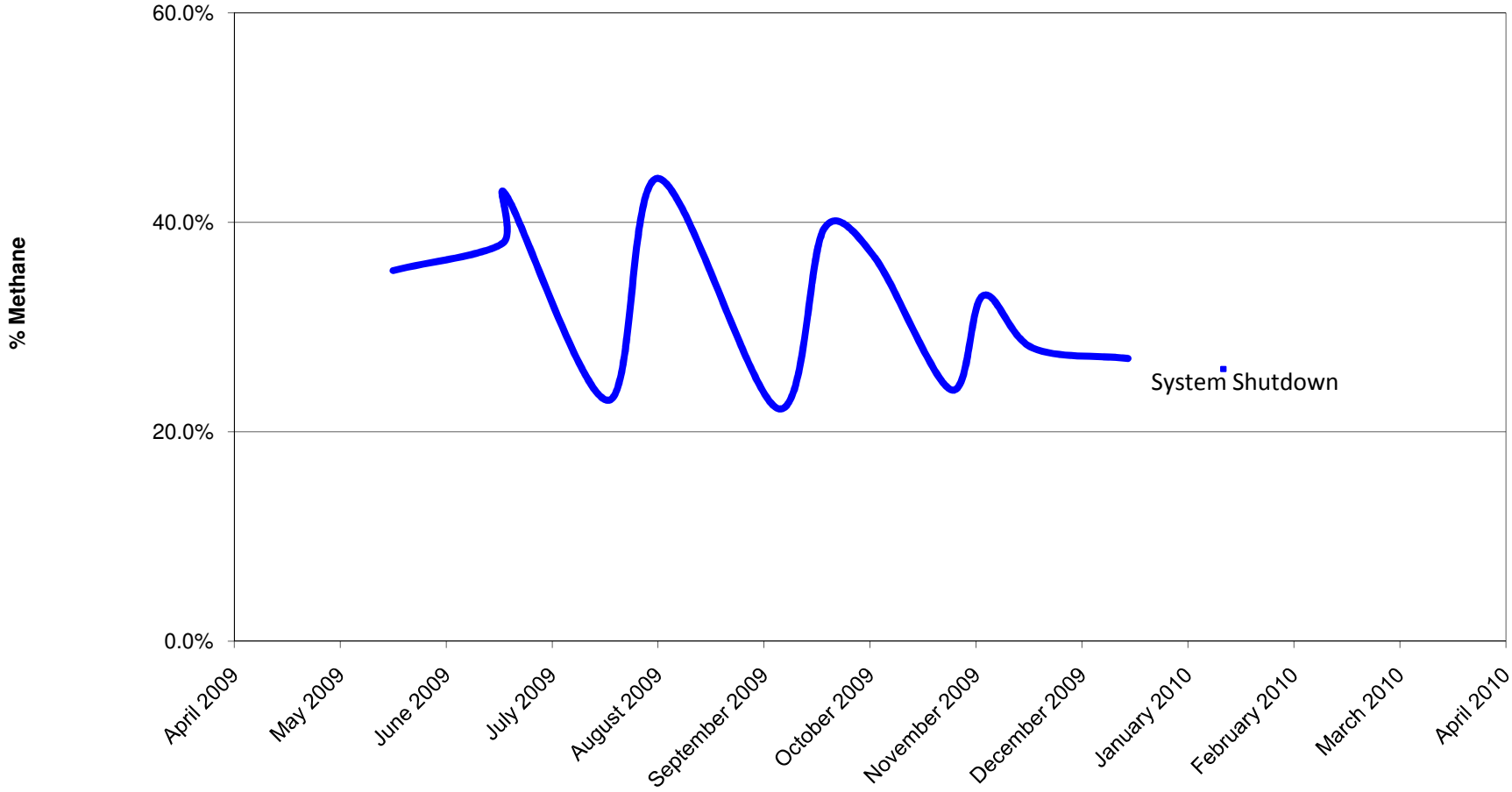

Figure 5
South Fork Texas Creek Methane Gas Flow
4M Outcrop Mitigation Project
Colorado Oil and Gas Conservation Commission

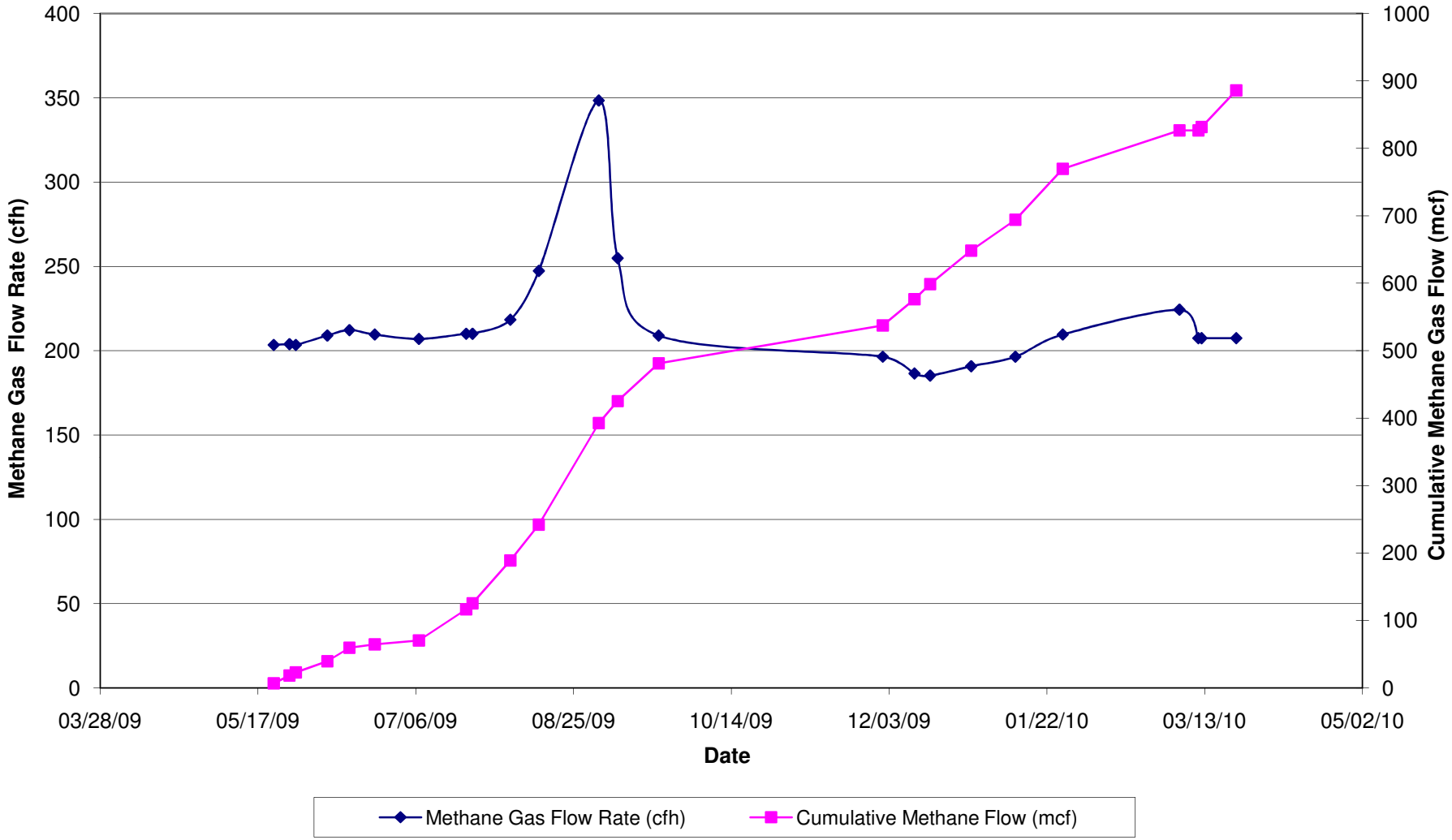

Figure 6
South Fork Texas Creek Electrical Meter Readings
4M Outcrop Mitigation Project
Colorado Oil and Gas Conservation Commission