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Project 1913
yearly update

February 28, 2010

Mr. Peter Gintautas
Environmental Protection Specialist
Colorado Oil and Gas Conservation Commission
1120 Lincoln Street, Suite 801
Denver, Colorado 80203

RE: 2009 Annual Report for Red River Ranch Holdings, LLC Centralized E&P Waste Management Facility

Dear Mr. Gintautas:

Enclosed with this letter is the 2009 annual report for the Red River Ranch Holdings, LLC centralized E&P waste management facility (#292832).

Please let me know if you have any questions, comments, or require additional information concerning this report.

Sincerely,



Jack Sosebee

/Enclosure

Cc: B. Gonzales, RRRH
J. Killeen, Ireland Stapleton

RED RIVER RANCH HOLDINGS, LLC

**CENTRALIZED E&P WASTE MANAGEMENT
FACILITY**

ANNUAL REPORT

February 2010

Prepared for:

*Colorado Oil and Gas Conservation Commission
1120 Lincoln Street, Suite 801
Denver, Colorado 80203*

Submitted by:

*Red River Ranch Holdings, LLC
15850 County Road 13
Weston, Colorado 81091*

1.0 INTRODUCTION

Red River Ranch Holdings, LLC (RRRH) operates a coal bed methane (CBM) production and gas gathering project in the Raton Basin, approximately 35 miles west of Trinidad, Colorado in Las Animas County. The minerals are owned by the surface estate owner. The project is located in the following sections:

T35S, R67W, Section 18;

T35S, R68W, Sections 2, 10, 11, 12, 13, 14, 15, 17, and 18

T35S, R69W, Sections 12 and 13.

RRRH prepared and submitted a Form 28 (Centralized E&P Waste Management Facility Permit application) and accompanying documentation to the Colorado Oil and Gas Conservation Commission (COGCC) on August 28, 2007 with the intent of converting its four permitted multi-well production ponds into a single centralized E&P waste management facility. **Table 1** provides the name and location information of RRRH multi-well production ponds.

Table 1. Facility Locations

Multi-Well Production Pond Name	Legal Location	Latitude	Longitude
Pond A	SWNW, Sec.16, T35S, R68W	36.998011	-105.008615
Pond B	SWSE, Sec.11, T35S, R68W	37.008905	-104.964599
Pond D	SENE, Sec.13, T35S, R68W	36.999354	-104.939725
Pond E	SWNW, Sec.18, T35S, R67W	36.99791	-104.934684

After reviewing the application and supporting data package, conducting a site visit on October 19, 2007 and obtaining financial assurance from RRRH, COGCC granted a Centralized E&P Waste Management Facility Permit (#292832) to RRRH on November 5, 2007.

2.0 PERMIT LIMITATIONS AND CONDITIONS

Accompanying the permit were several permit limitations and conditions which are addressed in this annual report. Another permit condition not included in the initial permit limitations and conditions but discussed prior to issuance of the permit was quarterly sampling and analysis, for one calendar year, of all multi-well production pond inflows. The status of RRRH's compliance with those permit limitations and conditions is discussed in the following sections.

2.1 Soil Gas Surveys for Global Resources Lorencito #1 Well

RRRH was required to conduct soil gas surveys in calendar year 2008 around Pond E to ensure that the plugged and abandoned Global Resources Lorencito #1 Well is not leaking. The required survey was conducted in June 2008, and the soil gas survey report was included in the 2008 annual report. Methane was not detected in any of the 17 soil gas samples. An additional soil gas survey will be conducted upon facility closure.

2.2 CBM Produced Water Limitation

RRRH's centralized waste management facility manages only CBM produced water as described in the centralized E&P waste management facility permit application.

2.3 Irrigation water

Irrigation return water is not managed by RRRH's centralized E&P waste management facility.

2.4 Discharge permits

The Colorado Department of Public Health and Environment (CDPHE) has issued two minimal industrial discharge permits to allow RRRH to discharge produced water from its wells and from the four multi-well production ponds to Lorencito Canyon and its tributaries. Permit COG-600702 allows RRRH to discharge produced water from individual CBM wells, while Permit COG-600724 allows RRRH to discharge produced water from the four multi-well production ponds. Effluent discharge limitations under these two permits are presented in **Tables 2 and 3**.

Table 2. Permit COG-600702 Effluent Limitations

Parameter	Discharge Limitation			Frequency	Sample Type
	30-day average	7-day average	Daily max.		
Flow, gpm	Report	NA	Report	Monthly	Instantaneous
Total Suspended Solids, mg/L	30	45	NA		Grab
pH, su (minimum-maximum)	NA	NA	6.5-9.0		Grab
Oil & Grease, mg/L	NA	NA	10		Visual
Boron, mg/L	0.75	NA	Report		Grab
Total Dissolved Solids, mg/L	Report	NA	3,500	Quarterly	Grab
Whole Effluent Toxicity, Acute	NA	NA	LC ₅₀ >100%		Grab

Table 3. Permit COG-600724 Effluent Limitations

Parameter	Discharge Limitation			Frequency	Sample Type
	30-day average	7-day average	Daily max.		
Flow, gpm	Report	NA	Report	Monthly	Instantaneous
Total Suspended Solids, mg/L	30	45	NA		Grab
pH, su (minimum-maximum)	NA	NA	6.5-9.0		Grab
Oil & Grease, mg/L	NA	NA	10		Visual
Total Dissolved Solids, mg/L	Report	NA	Report		Grab

The permits require monthly sampling and analysis of produced water discharged from wells and ponds to determine whether those discharges comply with the effluent discharge limitations. Because there were no discharges from individual wells to surface waters during 2009, monthly sampling and analysis of discharged water was limited to outfalls from Pond A (Outfall 001), Pond B (Outfall 002), Pond D (Outfall 003), and Pond E (Outfall 004). Analytical results for water quality parameters with effluent discharge limits are reported to CDPHE quarterly on Discharge Monitoring Reports (DMRs), and any excursions from the effluent discharge limits are also reported to CDPHE as required by the discharge permits. Water quality and flow data for each of the four outfalls is presented in **Appendix A**. A map showing locations of the ponds is presented in **Appendix C**.

Discharged water quality exceeded the effluent discharge limitation on several occasions. The pH was greater than 9.0 in water discharged from Outfall 003 (Pond D) in June 2009 (pH = 9.2), and the total suspended solids (TSS) exceeded the 30-day average discharge limitation in water discharged from Outfall 003 (Pond D) in June 2009 (TSS = 84.8 mg/L) and from Outfall 004

(Pond E) in June, July, September, and October 2009 (TSS = 98.0, 48.3, 39.3, and 31.7 mg/L, respectively). Pond E receives not only the water produced from Wells 13-6 and 13-7 but also surface water draining from a small valley that is tributary to Lorencito Canyon. Several years ago a forest fire burned a considerable portion of this valley, and the upland vegetation is still recovering from the effects of the fire. Because of the loss of ground cover in this valley, stormwater and snowmelt runoff have elevated concentrations of suspended solids. Native wetland vegetation has been planted in and adjacent to the pond, and the pond is retaining much of the sediment it receives in surface water runoff as evidenced by the formation of a sediment delta in the pond.

In order to improve the sediment-removing capacity of Pond E and reduce the frequency of effluent discharge limitation exceedances, RRRH has installed erosion control fabric anchored by grasses and forbs upstream of the pond. A new culvert has been installed in the road above the pond to divert most of the roadside flow away from the pond. In addition, a series of wattles has been installed in the roadside ditch below the culvert and at the brow of the hill above the ditch to trap any remaining sediment. Adjacent upland areas that are thinly vegetated have been reseeded using an enhanced mix containing a greater percent of dryland grasses.

These sediment control measures are having and will continue to have a positive effect on suspended solids concentrations in water discharged from this pond. Concentrations of total suspended sediments have declined since September 2008, and there were no exceedances in November or December 2009.

2.5 Spring and Seep Sampling

RRRH collects and analyzes water samples at five springs and four seeps each quarter unless snow cover or inadequate flows preclude sampling. Table 4 identifies the springs and seeps and the quarters in which samples could be obtained.

Table 4. Spring and Seep Sampling

Spring/Seep Name	Quarter Sampled	Comments
Canadian Spring	1, 2, 3, 4	
Spring Canyon Spring	1, 3, 4	No flow in second quarter
Middle Lorencito Spring	1, 2, 3, 4	
Lower Lorencito Spring	1, 2, 3, 4	
Vega Canyon Spring	1, 2, 3, 4	
Canadian River Seep	-	No flow all quarters
Middle Lorencito Seep	-	No flow all quarters
Spring Canyon Seep	-	No flow all quarters
Lower Lorencito Seep	-	No flow all quarters

Water quality data for the springs and seeps are presented in **Appendix B**. A map showing locations of the ponds is presented in **Appendix C**.

2.6 Annual Report

This annual report is presented in partial fulfillment of the permit limitations and conditions.

2.7 COGCC Audit

An audit of RRRH's centralized E&P waste management facility was conducted by Ms. Margaret Ash and Mr. Peter Gintautas in the summer of 2009. No matters requiring corrective action were identified in that audit.

2.8 Inflow Sampling

COGCC, subsequent to its issuance of RRRH's centralized E&P waste management facility permit, added a condition requiring quarterly sampling of all multi-well production pond inflows for one calendar year. RRRH conducted this additional sampling and analysis in 2008, and the results were reported to the COGCC in the annual report for that year.

Appendix A

CBM Produced Water Quality Data

Outfall 001 (Pond A) Water Quality Data

Analyte	Units	Sample Date											
		01/26/09	02/06/09	03/20/09	04/27/09	05/13/09	06/04/09	07/13/09	08/10/09	09/29/09	10/26/09	11/23/09	12/22/09
Field													
Flow, mean monthly	gpm	67.0	61.6	34.5	66.7	63.2	66.3	61.8	59.0	43.6	38.6	37.0	40.4
Oil and grease		0	0	0.0	0	0	0	0	0	0	0	0	0
Laboratory													
pH	s.u.	8.6	8.8	8.7	8.6	8.7	8.8	8.6	8.7	8.6	8.7	8.6	8.7
Alkalinity (as CaCO ₃)	mg/L	873	743	821.0	698	585	643	575	673	532	587	550	540
Bicarbonate (as CaCO ₃)	mg/L	842	725	803.0	687	579	632	563	662	525	580	550	540
Specific conductance	µs/cm	929	1,015	1,162	930	906	1,059	871	939	1,087	1,154	1,105	1,080
Chlorine	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ammonia (as NH ₃)	mg/L	0.000	0.266	0.000	0.000	0.000	0.000	0.335	0.000	0.0000	0.000	0.000	0.562
Total dissolved solids	mg/L	823	623	755	527	648	640	298	477	632	691	672	662
Total suspended solids	mg/L	0.6	4.7	8.4	ND	ND	12.2	52.9	5.4	<4.0	3.2	5.5	7.0
Total solids	mg/L	823.6	627.7	763.4	527	648	651.7	350.9	481.9	632	693	677.5	669.0
Sodium	mg/L	336	298	320.0	278	236	259	223	277	245	243	304	251
Potassium	mg/L	1.6	0.9	1.6	0.8	1.0	0.9	0.79	1.3	0.49	0.59	<1.0	1.7
Calcium	mg/L	3.7	3.6	4.0	4.2	4.4	5.0	2.5	2.8	1.3	1.1	3.3	2.2
Magnesium	mg/L	0.48	0.39	0.6	0.57	0.48	1.1	0.60	0.65	0.44	0.82	0.3	0.3
SAR		43.6	39.7	110.0	93.9	28.5	67.2	32.8	38.9	47.8	44.1	42.5	42.5
Hardness (as CaCO ₃)	mg/L	53	9	38	9	63	17	8	8	9	13	30	28
Barium, dissolved	mg/L	0.05	0.02	0.22	0.07	0.06	0.05	0.04	0.05	0.04	0.07	0.08	0.10
Boron, dissolved	mg/L	0.16	0.15	0.22	0.15	0.14	0.13	0.14	0.17	0.15	0.19	0.21	0.22
Iron, dissolved	mg/L	0.22	0.11	0.18	0.69	0.64	0.59	0.21	0.20	0.15	0.14	0.39	0.57
Iron, total	mg/L	1.4	1.29	1.28	0.74	1.9	1.0	4.1	0.41	4.0	0.55	0.94	0.66
Manganese, dissolved	mg/L	0.02	0.01	0.01	0.03	0.01	0.01	<0.01	<0.01	0.01	<0.01	0.05	<0.01
Manganese, total	mg/L	0.05	0.05	0.07	0.04	0.06	0.05	0.12	0.10	0.01	0.03	0.07	0.05
Chloride	mg/L	19.3	19.8	21.5	18.3	17.5	18.3	6.3	28.0	115.0	10.5	17.7	11.6
Sulfate	mg/L	26.7	22.2	19.8	27.9	25.9	66.6	23.1	27.50	30.9	42.0	4.3	25.7
Fluoride	mg/L	1.8	1.7	2.7	2.3	3.2	2.8	2.4	2.50	3.4	2.8	2.4	2.1

Outfall 002 (Pond B) Water Quality Data

Analyte	Units	Sample Date											
		01/26/09	02/06/09	03/20/09	04/27/09	05/13/09	06/04/09	07/13/09	08/10/09	09/29/09	10/26/09	11/23/09	12/22/09
Field													
Flow, mean monthly	gpm	9.9	15.8	10.9	21.3	19.9	18.7	8.5	6.6	6.1	8.7	17.0	15.8
Oil and grease		0	0	---	0	0	0	0	0	0	0	0	0
Laboratory													
pH	s.u.	8.6	8.7	---	8.8	8.9	9.0	7.9	7.8	8.7	8.6	8.5	8.6
Alkalinity (as CaCO ₃)	mg/L	993	874	---	892	705	753	291	275	585	611	629	650
Bicarbonate (as CaCO ₃)	mg/L	982	866	---	887	695	744	283	260	576	601	625	650
Specific conductance	µs/cm	1,022	1,126	---	1,102	1,046	1,095	415	442	1,235	1,221	1,180	1,212
Chlorine	mg/L	ND	ND	---	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ammonia (as NH ₃)	mg/L	0.047	0.000	---	0.000	0.000	0.000	0.449	0.000	0.0573	0.000	0.000	0.518
Total dissolved solids	mg/L	727	725	---	730	763	741	401	305.0	746.0	760	771	755
Total suspended solids	mg/L	3.4	4.1	---	ND	ND	6.1	<4	1.0	<4	<4	<4	1.9
Total solids	mg/L	730.4	729.1	---	730	763	747.1	401	306.0	746	760	770.5	756.9
Sodium	mg/L	367	334	---	348	271	283	35.7	47.1	276	252	331	279
Potassium	mg/L	3.6	2.4	---	1.6	1.7	1.7	1.4	2.0	0.73	0.69	2.1	2.2
Calcium	mg/L	15.7	12.9	---	10.7	10.8	10.6	49.6	31.3	1.6	1.3	7.7	9.2
Magnesium	mg/L	7.5	5.4	---	4.4	3.6	5.9	17.9	19.1	1.3	1.3	3.6	3.5
SAR		19.0	19.6	---	33.6	18.2	17.2	1.1	1.6	39.1	37.2	24.7	19.9
Hardness (as CaCO ₃)	mg/L	70	34	---	32	71	60	187	185	14	18	29	39
Barium, dissolved	mg/L	0.09	0.08	---	0.10	0.05	0.09	0.15	0.16	0.09	0.09	0.16	0.19
Boron, dissolved	mg/L	0.26	0.25	---	0.29	0.28	0.21	0.02	0.04	0.25	0.22	0.25	0.30
Iron, dissolved	mg/L	0.04	0.02	---	0.42	0.23	0.38	0.01	<0.01	0.22	0.15	0.11	0.36
Iron, total	mg/L	1.2	0.60	---	1.2	0.97	0.61	0.79	0.12	10.5	0.37	0.13	0.40
Manganese, dissolved	mg/L	0.01	0.01	---	0.04	0.01	0.01	0.01	<0.01	0.01	<0.01	0.02	0.06
Manganese, total	mg/L	0.04	0.03	---	0.05	0.05	0.04	0.02	0.01	0.02	0.02	0.03	0.07
Chloride	mg/L	15.9	10.9	---	27.1	18.4	19.5	5.9	7.3	55.8	8.4	1.4	2.2
Sulfate	mg/L	45.0	51.0	---	36.4	36.3	30.2	36.0	37.8	56.1	50.7	44.0	31.7
Fluoride	mg/L	1.3	1.4	---	3.7	3.5	3.1	2.6	2.00	3.1	2.5	1.3	1.2

Outfall 003 (Pond D) Water Quality Data

Analyte	Units	Sample Date											
		01/26/09	02/06/09	03/20/09	04/27/09	05/13/09	06/04/09	07/13/09	08/10/09	09/29/09	10/26/09	11/23/09	12/22/09
Field													
Flow, mean monthly	gpm	29.4	32.5	21.6	30.3	26.7	23.7	19.2	21.2	16.7	17.9	17.3	18.1
Oil and grease		0	0	0.0	0	0	0	0	0	0	0	0	0
Laboratory													
pH	s.u.	8.6	8.5	8.7	8.6	8.7	9.2	8.7	9.0	8.7	8.5	8.4	8.5
Alkalinity (as CaCO ₃)	mg/L	1,232	1,020	1,021	1,062	983	775	795	937	593	661	630	640
Bicarbonate (as CaCO ₃)	mg/L	1,220	1,012	1,016	1,052	970	763	781	921	586	652	630	640
Specific conductance	µs/cm	1,283	1,344	1,486	1,320	1,432	1,069	1,232	1,426	1,322	1,302	1,194	1,212
Chlorine	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ammonia (as NH ₃)	mg/L	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.2260	0.452	0.000	0.387
Total dissolved solids	mg/L	884	872	963	877	1,049	768	902	950	794	797	779	787
Total suspended solids	mg/L	7.6	4.4	11.4	11.9	3.8	84.8	21.9	5.5	<4	<4	11.4	2.8
Total solids	mg/L	891.6	876.4	974.4	889	1052.8	852.8	923.9	955.5	794	797	790.4	789.8
Sodium	mg/L	436	374	387.0	359	348	276	347	395	283	256	301	272
Potassium	mg/L	3.8	2.6	3.1	2.6	2.0	2.7	1.6	2.6	1.0	0.97	2.2	2.3
Calcium	mg/L	28.3	25.0	11.9	31.8	21.0	12.3	6.3	7.2	5.8	5.4	10.5	10.6
Magnesium	mg/L	16.1	13.2	5.0	18.1	9	8.1	4.50	4.4	9	8.5	5.2	4.6
SAR		16.1	15.0	33.3	10.1	15.9	14.9	25.7	28.5	17.1	15.9	18.9	17.6
Hardness (as CaCO ₃)	mg/L	---	116	35	121	81	102	29	29	61	64	39	52
Barium, dissolved	mg/L	0.20	0.18	0.33	0.24	0.18	0.13	0.21	0.23	0.22	0.20	0.19	0.21
Boron, dissolved	mg/L	0.31	0.30	0.33	0.29	0.32	0.16	0.34	0.38	0.31	0.27	0.26	0.33
Iron, dissolved	mg/L	0.16	0.21	0.18	2.00	0.42	3.10	0.13	0.04	0.05	0.01	0.09	0.21
Iron, total	mg/L	2.9	2.29	2.57	2.49	3.1	5.2	2.1	0.15	0.30	0.34	0.66	0.42
Manganese, dissolved	mg/L	0.03	0.01	0.01	0.07	0.02	0.06	<0.01	<0.01	0.01	<0.01	0.03	<0.01
Manganese, total	mg/L	0.08	0.08	0.10	0.09	0.07	0.16	0.08	0.04	0.01	0.01	0.05	0.01
Chloride	mg/L	51.0	45.1	27.2	28.8	19.3	15.4	80.8	71.2	95.6	21.2	3.3	5.6
Sulfate	mg/L	34.2	36.9	21.9	34.8	26.4	21.3	33.9	39.90	48.9	40.2	36.9	37.1
Fluoride	mg/L	2.1	2.1	2.4	3.4	2.8	3.4	2.9	2.80	3.2	2.7	1.5	1.5

Outfall 004 (Pond E) Water Quality Data

Analyte	Units	Sample Date											
		01/26/09	02/06/09	03/20/09	04/27/09	05/13/09	06/04/09	07/13/09	08/10/09	09/29/09	10/26/09	11/23/09	12/22/09
Field													
Flow, mean monthly	gpm	8.6	5.8	0.1	5.6	6.5	6.3	5.0	0.3	0.3	0.3	0.3	0.4
Oil and grease		0	0	0.0	0	0	0	0	*	0	0	0	0
Laboratory													
pH	s.u.	8.6	8.7	8.7	8.6	8.7	9.0	8.7	*	8.8	8.9	8.7	8.8
Alkalinity (as CaCO ₃)	mg/L	947	853	725	772	645	772	708	*	486	753	680	695
Bicarbonate (as CaCO ₃)	mg/L	920	842	717	768	636	761	699	*	479	741	680	695
Specific conductance	µs/cm	1,035	1,148	1,015	1,045	936	1,085	1,114	*	1,046	1,453	1,244	1,477
Chlorine	mg/L	ND	ND	ND	ND	ND	ND	ND	*	ND	ND	ND	ND
Ammonia (as NH ₃)	mg/L	0.267	0.100	0.000	0.110	0.000	0.000	0.000	*	0.3910	0.000	0.000	0.316
Total dissolved solids	mg/L	745	723	717	611	696	754	817	*	680	941	792	931
Total suspended solids	mg/L	7.8	5.4	12.1	13.5	5.5	98.0	48.3	*	39.3	31.7	19.8	14.7
Total solids	mg/L	752.8	728.4	729.1	625	701.5	852	865.3	*	719.3	973	811.8	945.2
Sodium	mg/L	373	343	250.0	309	222	277	299	*	236	290	331	360
Potassium	mg/L	2.4	1.4	2.5	1.6	2.1	2.7	1.5	*	0.80	0.72	1.7	1.1
Calcium	mg/L	4.1	8.3	27.0	10.7	21.4	12.8	6.3	*	4.6	3.4	11.4	1.1
Magnesium	mg/L	2.1	1.9	11.4	2.7	8.4	8.0	3.8	*	3.2	2.5	3.0	2.3
SAR		37.2	27.9	9.5	35.4	10.3	14.9	23.1	*	20.6	29.0	22.5	26.3
Hardness (as CaCO ₃)	mg/L	65	10	100	25	37	154	32	*	32	20	27	48
Barium, dissolved	mg/L	0.10	0.08	0.17	0.08	0.11	0.12	0.18	*	0.08	0.09	0.10	0.12
Boron, dissolved	mg/L	0.05	0.06	0.17	0.06	0.17	0.15	0.22	*	0.06	0.09	0.11	0.14
Iron, dissolved	mg/L	0.39	0.15	0.08	0.91	1.60	3.00	0.22	*	0.32	0.31	0.58	0.30
Iron, total	mg/L	2.5	2.94	4.40	1.54	7.2	5.0	3.9	*	0.35	2.30	1.07	0.72
Manganese, dissolved	mg/L	<0.01	<0.01	<0.01	0.03	0.02	0.06	<0.01	*	0.01	0.01	0.03	0.07
Manganese, total	mg/L	0.72	0.09	0.15	0.08	0.23	0.15	0.13	*	0.10	0.18	0.16	0.14
Chloride	mg/L	16.3	12.5	32.7	23.9	17.4	15.1	47.7	*	97.8	25.4	26.0	2.3
Sulfate	mg/L	55.5	50.7	24.6	46.5	27.9	23.7	39.2	*	6.2	5.7	<1.0	4.7
Fluoride	mg/L	1.1	1.8	2.1	3.9	2.9	3.5	2.9	*	2.9	3.1	2.0	2.5

* No flow. No sample collected.

Appendix B

Spring and Seep Water Quality Data

Canadian Spring Water Quality Data

Analyte	Units	Sample Date			
		01/26/09	04/28/09	07/13/09	10/26/09
Laboratory					
pH	s.u.	7.7	8.3	8.1	8.7
Alkalinity (as CaCO ₃)	mg/L	264	225	232	56.4
Bicarbonate (as CaCO ₃)	mg/L	256	207	224	54.1
Specific conductance	µs/cm	322	269	302	336.0
Chlorine	mg/L	ND	ND	ND	ND
Ammonia (as NH ₃)	mg/L	0.000	0.000	0.000	0.000
Total dissolved solids	mg/L	210	161	159	209
Total suspended solids	mg/L	0.6	ND	16.1	7.0
Total solids	mg/L	211	161	175.1	216.0
Sodium	mg/L	15	12.3	22.2	20.1
Potassium	mg/L	7.6	1.0	1.6	2.86
Calcium	mg/L	43.3	39.8	35.3	16.4
Magnesium	mg/L	19.7	14.4	16.8	10.2
SAR		0.5	0.3	0.8	1.0
Hardness (as CaCO ₃)	mg/L	215	127	158	148
Barium, dissolved	mg/L	0.07	0.04	0.07	0.05
Boron, total	mg/L	0.010	0.01	0.01	0.01
Iron, dissolved	mg/L	0.29	0.45	0.02	0.01
Iron, total	mg/L	0.77	0.60	1.3	0.95
Manganese,dissolved	mg/L	<0.01	<0.01	<0.01	<0.01
Manganese, total	mg/L	0.02	0.06	0.07	0.14
Chloride	mg/L	5.0	4.2	5.5	3.9
Sulfate	mg/L	15.6	11.1	16.8	77.7
Fluoride	mg/L	0.4	1.2	2.9	1.5

Lower Lorencito Spring Water Quality Data

Analyte	Units	Sample Date			
		01/26/09	04/28/09	07/13/09	10/26/09
Laboratory					
pH	s.u.	0.9	7.8	8.8	8.7
Alkalinity (as CaCO ₃)	mg/L	775	695	563	459
Bicarbonate (as CaCO ₃)	mg/L	756	680	554	450
Specific conductance	µs/cm	881	870	859	884
Chlorine	mg/L	ND	ND	ND	ND
Ammonia (as NH ₃)	mg/L	0.000	0.000	0.469	0.000
Total dissolved solids	mg/L	662	539	345	540
Total suspended solids	mg/L	2.1	50.6	104.5	139.6
Total solids	mg/L	664.1	589.6	449.5	679.6
Sodium	mg/L	297	245	235	175
Potassium	mg/L	2.0	2.1	1.1	0.73
Calcium	mg/L	5.5	18.0	4.0	5.3
Magnesium	mg/L	3.2	7.0	1.6	4.7
SAR		24.8	14.4	25.0	13.3
Hardness (as CaCO ₃)	mg/L	50	50	18	44
Barium, dissolved	mg/L	0.05	0.12	0.4	0.07
Boron, total	mg/L	0.15	0.14	0.15	0.09
Iron, dissolved	mg/L	0.47	3.4	0.22	0.23
Iron, total	mg/L	4.3	3.67	9.0	1.60
Manganese,dissolved	mg/L	0.01	0.09	<0.01	<0.01
Manganese, total	mg/L	0.14	0.13	0.19	0.09
Chloride	mg/L	19.8	17.3	30.9	13.4
Sulfate	mg/L	26.7	26.1	29.7	25.5
Fluoride	mg/L	1.6	2.9	3.0	2.0

Middle Lorencito Spring Water Quality Data

Analyte	Units	Sample Date			
		01/26/09	04/28/09	07/13/09	10/26/09
Laboratory					
pH	s.u.	8.8	8.9	8.8	8.9
Alkalinity (as CaCO ₃)	mg/L	807	691	672	461
Bicarbonate (as CaCO ₃)	mg/L	799	684	564	452
Specific conductance	µs/cm	925	876	867	899
Chlorine	mg/L	ND	ND	ND	ND
Ammonia (as NH ₃)	mg/L	0.000	0.000	0.000	0.000
Total dissolved solids	mg/L	640	614	567	562
Total suspended solids	mg/L	0.5	22.2	89.4	42.2
Total solids	mg/L	640.5	636	656.4	604.2
Sodium	mg/L	323	260	240	183
Potassium	mg/L	1.7	1.4	0.85	0.69
Calcium	mg/L	4.2	12.4	2.5	3.8
Magnesium	mg/L	0.62	4.1	0.94	3.1
SAR		38.8	23.5	32.7	16.8
Hardness (as CaCO ₃)	mg/L	35	33	9	32
Barium, dissolved	mg/L	0.02	0.08	0.03	0.05
Boron, total	mg/L	0.15	0.14	0.16	0.11
Iron, dissolved	mg/L	0.24	2.1	0.30	0.24
Iron, total	mg/L	1.4	2.83	7.6	2.6
Manganese,dissolved	mg/L	0.01	0.05	0.01	<0.01
Manganese, total	mg/L	0.06	0.10	0.19	0.08
Chloride	mg/L	21.5	18.4	30.5	16.2
Sulfate	mg/L	26.7	27.2	26.1	26.4
Fluoride	mg/L	1.8	3.3	3.1	2.4

Spring Canyon Spring Water Quality Data

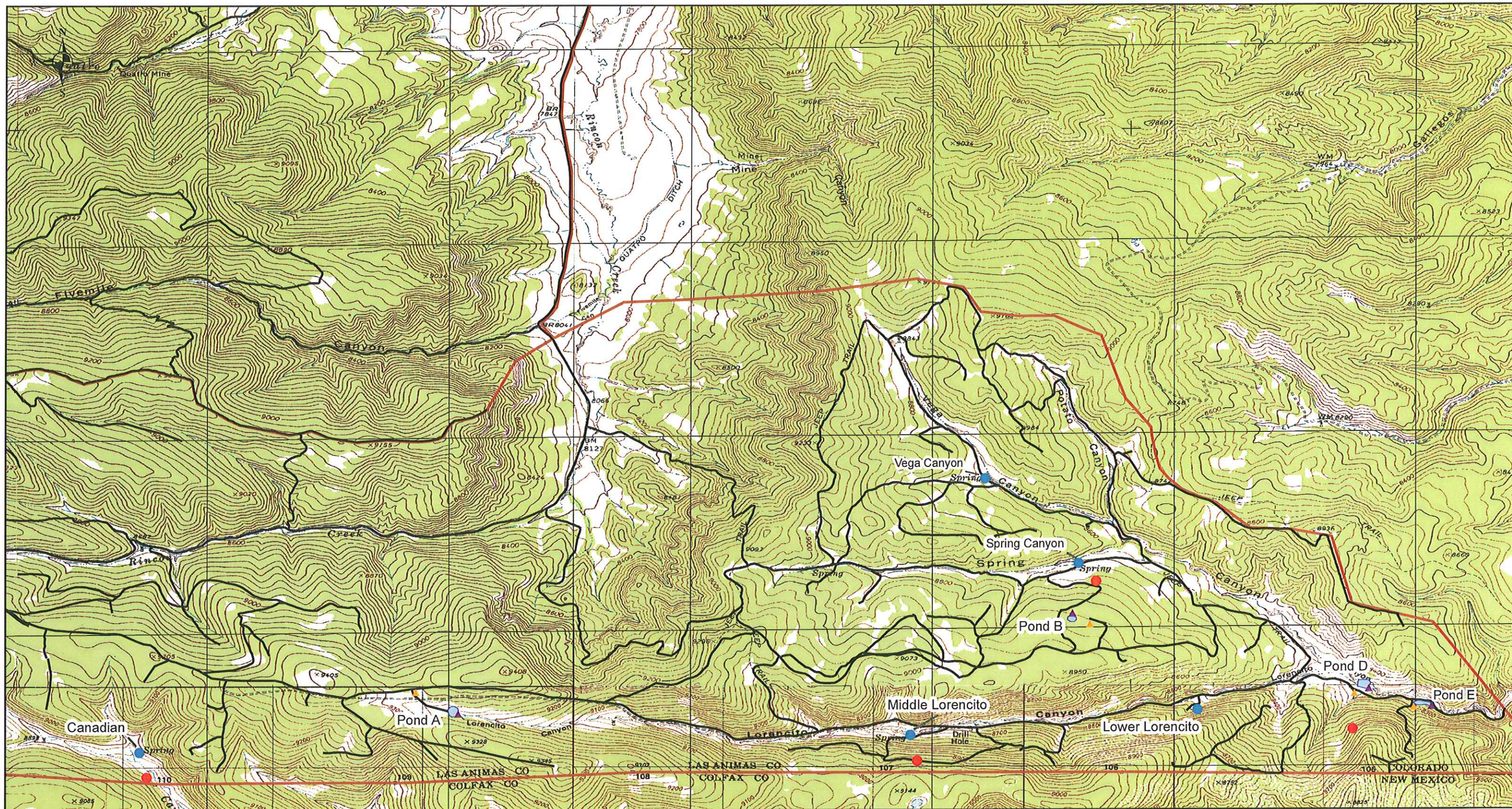
Analyte	Units	Sample Date			
		01/26/09	04/28/09	07/13/09	10/26/09
Laboratory					
pH	s.u.	8.2	---	8.7	8.7
Alkalinity (as CaCO ₃)	mg/L	275	---	605	251
Bicarbonate (as CaCO ₃)	mg/L	262	---	596	243
Specific conductance	µs/cm	381	---	859	512
Chlorine	mg/L	ND	---	ND	ND
Ammonia (as NH ₃)	mg/L	0.000	---	0.000	0.000
Total dissolved solids	mg/L	250	---	630	342
Total suspended solids	mg/L	ND	---	28.7	473.3
Total solids	mg/L	250	---	658.7	815.3
Sodium	mg/L	20.6	---	225	71.4
Potassium	mg/L	1.5	---	1.7	1.01
Calcium	mg/L	49.3	---	13.5	15.0
Magnesium	mg/L	24.1	---	7.9	11.1
SAR		0.6	---	12.0	3.4
Hardness (as CaCO ₃)	mg/L	197	---	56	134
Barium, dissolved	mg/L	0.08	---	0.10	0.09
Boron, total	mg/L	0.01	---	0.21	0.05
Iron, dissolved	mg/L	0.05	---	0.13	0.01
Iron, total	mg/L	0.17	---	2.5	114
Manganese,dissolved	mg/L	0.01	---	<0.01	<0.01
Manganese, total	mg/L	0.02	---	0.12	0.18
Chloride	mg/L	3.3	---	16.8	4.6
Sulfate	mg/L	49.2	---	43.1	33.3
Fluoride	mg/L	0.3	---	2.6	1.9

Vega Canyon Spring Water Quality Data

Analyte	Units	Sample Date			
		01/26/09	04/28/09	07/13/09	10/26/09
Laboratory					
pH	s.u.	8.9	8.2	8.6	8.1
Alkalinity (as CaCO ₃)	mg/L	940	275	593	210
Bicarbonate (as CaCO ₃)	mg/L	933	256	587	198
Specific conductance	µs/cm	889	419	847	663
Chlorine	mg/L	ND	ND	ND	ND
Ammonia (as NH ₃)	mg/L	0.000	0.000	0.000	0.000
Total dissolved solids	mg/L	645	259	633	430
Total suspended solids	mg/L	2.8	ND	37.7	101.1
Total solids	mg/L	647.8	259	670.7	531.1
Sodium	mg/L	301	21.6	221	44.7
Potassium	mg/L	3.5	1.3	1.8	2.08
Calcium	mg/L	45.3	51.2	13.4	31.7
Magnesium	mg/L	11.4	24.3	8.1	25.0
SAR		10.3	0.4	11.7	1.4
Hardness (as CaCO ₃)	mg/L	49	189	62	274
Barium, dissolved	mg/L	0.03	0.12	0.11	0.12
Boron, total	mg/L	0.16	0.03	0.24	0.02
Iron, dissolved	mg/L	0.42	0.13	0.14	<0.01
Iron, total	mg/L	4.3	0.27	2.2	2.4
Manganese,dissolved	mg/L	<0.01	0.02	<0.01	<0.01
Manganese, total	mg/L	0.16	0.02	0.10	0.03
Chloride	mg/L	20.2	9.5	17.2	5.2
Sulfate	mg/L	23.4	52.2	42.3	109
Fluoride	mg/L	1.3	3.8	2.6	1.7

Appendix C

Site Map

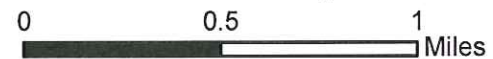


Legend

- ▲ Outflow Sampling Location
- ▲ Inflow Sampling Location
- Springs
- Seeps
- Ponds
- Roads
- Lease Boundary
- Section Boundary

Red River Ranch Holdings, LLC
Centralized E&P Waste Management Facility

Las Animas County, CO



1:30,000

Datum: NAD 83
Creator: A. Jarolimek
File Path: R:\Projects\126 Red River
Ranch\Maps\EP_annual report



PROJECT	DRAWING	SCALE	DATE	REVISION
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