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02/28/2010
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. Killean, 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 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 |
| 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

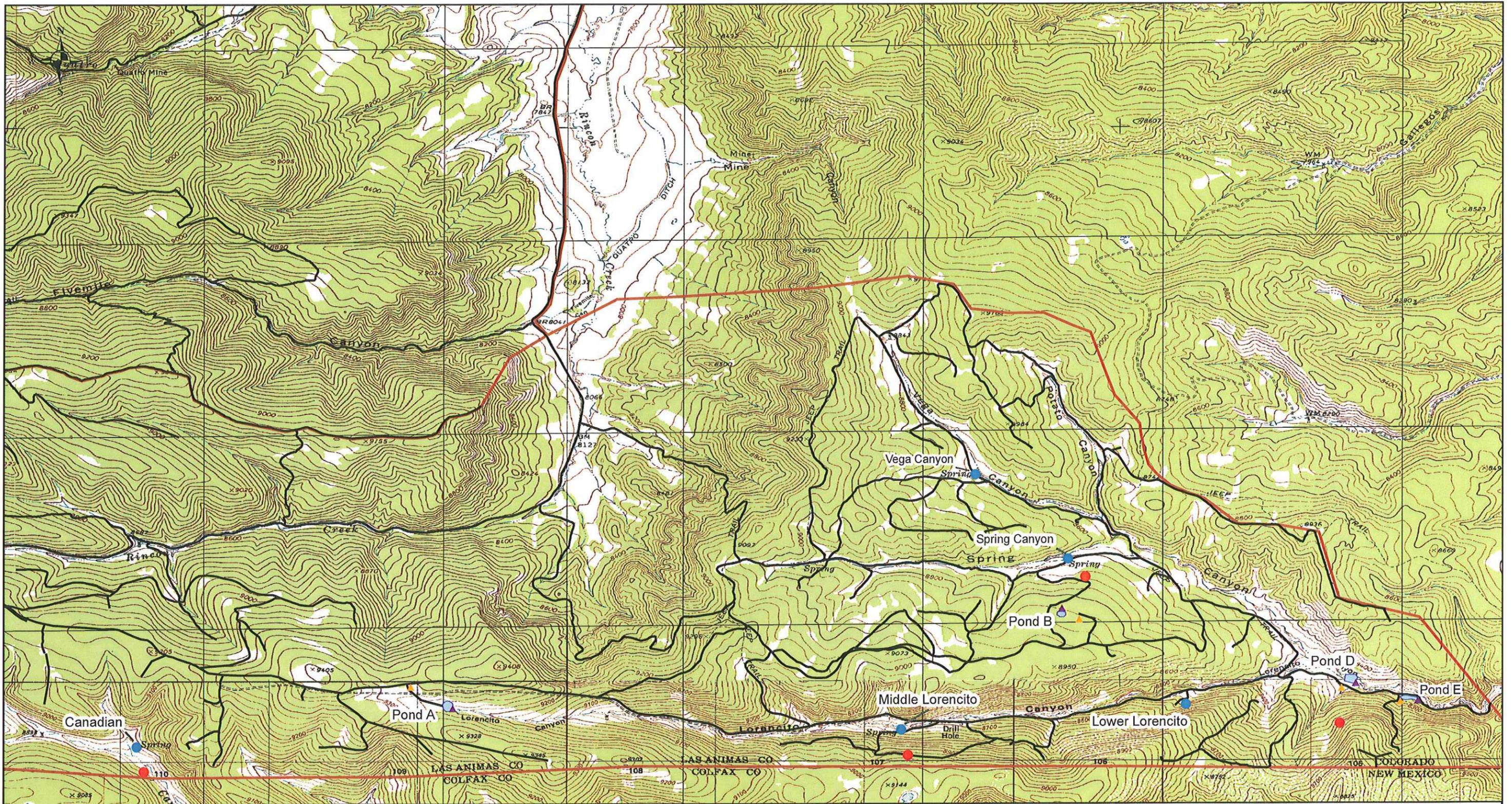
| Analyte | Units | Sample Date | | | |
|-------------------------------------|-------|-------------|----------|----------|----------|
| | | 01/26/09 | 04/28/09 | 07/13/09 | 10/26/09 |
| Laboratory | | | | | |
| pH | s.u. | 8.2 | --- | 8.7 | 8.7 |
| Alkalinity (as CaCO ₃) | mg/L | 275 | --- | 605 | 251 |
| 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

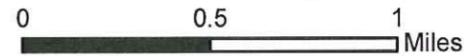


Legend

- ▲ 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 |
|------------------------|---------|----------|----------|----------|
| Red River Ranch 126 | N/A | 1:30,000 | 20080227 | 1.0 |