Water Compatibility in San Juan Basin

- The San Juan basin has productive siliciclastic reservoirs (Pictured Cliffs, Blanco Mesaverde, Basin Dakota, etc.) and a productive coalbed methane reservoir (Basin Fruitland Coal).
- These siliciclastic and coalbed methane reservoirs are commingled extensively throughout the basin in many different combinations with no observed damage from clay swelling due to differing formation waters.
- The Basin Fruitland Coal and Blanco Mesaverde/Basin Dakota samples (attached) both show fresh water with low TDS.

Lambe Com #200 Water Sample

This is a representative Fruitland Coal standalone water sample.

Green Analytical Laboratories
dzufelt@greenanalytical.com p: 970.247.4220 f: 970.247.4227 75 Suttle Street Durango, CO 81303
www.GreenAnalytical.com

Hilcorp	Project: API - Oil Field "Complete Water"	
382 Road 3100	Project Name / Number: Comingle Water Testing	**Reported:**
Aztec NM, 87410	Project Manager: Kevin Fredrickson	11/05/19 14:13

Lambe Com 200

1910302-01 (Produced Water)

Analyte	Result	RL	MDL	Units	Dilution	Analyzed	Method	Notes	Analyst
General Chemistry									
Alkalinity, Bicarbonate as CaCO3*	**150**	10.0		mg/L	10	10/30/19 10:30	2320 B		VJL
Alkalinity, Carbonate as CaCO3*	<10.0	10.0		mg/L	10	10/30/19 10:30	2320 B		VJL
Alkalinity, Hydroxide as CaCO3*	<10.0	10.0		mg/L	10	10/30/19 10:30	2320 B		VJL
Alkalinity, Total as CaCO3*	**150**	10.0	3.06	mg/L	10	10/30/19 10:30	2320 B		VJL
Chloride*	**22.8**	25.0	4.82	mg/L	25	10/30/19 21:05	EPA300.0		AES
Conductivity*	**272**	10.0		umho/cm @ 25.0°C	1	10/30/19 13:50	2510 B		FGH
pH*	**7.04**			pH Units	1	10/30/19 13:50	EPA150.1	H4	FGH
Resistivity	**3680**			ohm/cm	1	11/01/19 13:24	2510 B		FGH
Total Dissolved Solids*	**700**	100		mg/L	10	10/30/19 16:10	EPA160.1		VJL
Specific Gravity	**0.9990**	0.8000		No Unit	1	10/30/19 12:15	ASTM D1429-03		VJL
Sulfate*	<7.38	25.0	7.38	mg/L	25	10/30/19 21:05	EPA300.0		AES

Lambe #3M Water Sample

This is a representative Blanco Mesaverde/Basin Dakota water sample.

Green Analytical Laboratories
dzufelt@greenanalytical.com p: 970.247.4220 f: 970.247.4227 75 Suttle Street Durango, CO 81303
www.GreenAnalytical.com

Hilcorp	Project: API - Oil Field "Complete Water"	
382 Road 3100	Project Name / Number: Comingle Water Testing	**Reported:**
Aztec NM, 87410	Project Manager: Kevin Fredrickson	11/05/19 14:13

Lambe 3M

1910302-02 (Produced Water)

Analyte	Result	RL	MDL	Units	Dilution	Analyzed	Method	Notes	Analyst
General Chemistry									
Alkalinity, Bicarbonate as CaCO3*	**60.0**	10.0		mg/L	10	10/30/19 10:30	2320 B		VJL
Alkalinity, Carbonate as CaCO3*	<10.0	10.0		mg/L	10	10/30/19 10:30	2320 B		VJL
Alkalinity, Hydroxide as CaCO3*	<10.0	10.0		mg/L	10	10/30/19 10:30	2320 B		VJL
Alkalinity, Total as CaCO3*	**60.0**	10.0	3.06	mg/L	10	10/30/19 10:30	2320 B		VJL
Chloride*	**2570**	100	19.3	mg/L	100	10/30/19 21:23	EPA300.0		AES
Conductivity*	**9300**	10.0		umho/cm @ 25.0°C	1	10/30/19 13:50	2510 B		FGH
pH*	**5.70**			pH Units	1	10/30/19 13:50	EPA150.1	H4	FGH
Resistivity	**108**			ohm/cm	1	11/01/19 13:24	2510 B		FGH
Total Dissolved Solids*	**4550**	100		mg/L	10	10/30/19 16:10	EPA160.1		VJL
Specific Gravity	**0.9990**	0.8000		No Unit	1	10/30/19 12:15	ASTM D1429-03		VJL
Sulfate*	<29.5	100	29.5	mg/L	100	10/30/19 21:23	EPA300.0		AES