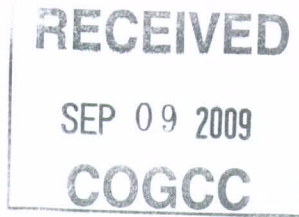


Form 31 attachment  
Fax # 159317  
Doc # 1905680



**Exploration & Production**  
1515 Arapahoe Street  
Tower 3, Suite 1000  
Denver, CO 80202  
303/572-3900  
303/629-8255 Fax

September 1, 2009

Colorado Oil and Gas Convention Commission  
1120 Lincoln Street, Suite 801  
Denver, CO 80203

Attn: Jane Stanczyk  
Regarding: UIC Permit Application For Federal 299-27-5 (api # 05-103-10624)  
Rio Blanco County, CO

Attached, please find the Williams Production Ryan Gulch LLC UIC permit application package for the Federal 299-27-5 well in Rio Blanco County, CO.

Gabe D'Arthenay (303-606-4287, gabe.darthenay@williams.com) is the Sr. Petroleum Engineer responsible for the technical portion of the package and Jennifer Head (303-606-4342, Jennifer.head@williams.com) is our Regulatory Affairs Manager working this project.

Please feel free to call either individual if there are any follow up questions, issues, or clarifications.

Thank you very much for your time and attention.

Regards,

Bruce Bunch  
Williams Piceance Highlands  
Petroleum Engineering Manager

Cc w/attachments:

Gabe D'Arthenay (Williams - Den)  
Jennifer Head (Williams - Den)

RECEIVED

SEP 09 2009

COGCC

Operator: Williams Production Ryan Gulch LLC

UIC "Dedicated Injection Well" Permit Application To COGCC Dated 9-1-09

Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO

Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

UIC Application for a "Dedicated" Injection Well:

Dedicated Injection Well - Any well as defined under 40 CFR 144.5B, 1992 edition (adopted by US EPA) used for the exclusive purpose of injecting fluids or gas from surface (excludes gas storage wells).

COGCC UIC Application Requirements are addressed as follows:

COGCC Rule 325, Item c, paragraph 1

- *Name, Description and Depth of Injection Formation(s):*

**Operator:** Williams Production Ryan Gulch LLC (operator # 10286)  
**Well:** Federal 299-27-5 (API# 05-103-10624)  
**Location:** SWNE Section 27, T2S, R99W, Rio Blanco County, CO  
**Lease:** Federal, COC-060757  
**Mineral Ownership:** 100% US Federal Government (BLM)  
**Well Ownership:** 100% Williams Production Ryan Gulch LLC  
**Injection Formation:** Mesaverde  
**Injection Depth:** 6220' - 6836' MD

- *Underground Sources of Drinking Water Which May Be Affected:*

Drinkable/potable water in the Piceance is generally considered to be present above the "Dissolution Surface". The lower limit of the Dissolution Surface is in the neighborhood of +/-1800 ft from surface. Consequently, the proposed injection interval is thousands of feet below interval where drinking water may exist.

- *Water Analysis of the Injection Formation:*

**Please See Attachment 1.**

- *Fracture Pressure or Fracture Gradient of the Injection Formation:*

**Formation Parting Pressure:** 3,600 psi  
**Formation Fracture Gradient:** 0.58 psi/ft

**Please See Attachment 2 for Step Rate Injection Test Results.**

COGCC Rule 325, Item c, paragraph 2

- *Base Plat Covering ½ mile Radius of the Proposed Disposal Well:*

**Please See Attachment 3.**



RECEIVED

SEP 09 2009

COGCC

Operator: Williams Production Ryan Gulch LLC

UIC "Dedicated Injection Well" Permit Application To COGCC Dated 9-1-09

Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO

Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

- *Names, Addresses, and Holdings of all Surface and Mineral Owners within ¼ mile of the Proposed Disposal Well, or all Owners of records in the field if a field wide system is proposed:*

**Please See Attachment 4.**

**All surface and mineral estate within ¼ mile of proposed disposal well is owned 100% by BLM, with 12.5% royalty interest**

- *List of all Domestic and Irrigation Wells within ¼ mile of the Proposed Disposal Well:*

**No Domestic and/or Irrigation water wells are within ¼ mile of the Proposed Disposal Well. (Information available at Colorado Division of Water Resources)**

- *Wells Needing Remedial Action That Penetrating Injection Zone within ¼ mile of the Proposed Disposal Well*

**No wells penetrating the injection zone within ¼ mile of Proposed Disposal Well need remedial work.**

- *Copy of Water Disposal Well System and Appurtenances Plans and Specifications:*

**Please See Attachment 5.**

COGCC Rule 325, Item c, paragraph 3

- *Resistivity Logs Run From Bottom of Surface Casing to TD for Disposal Well and All Other Wells Within 1 Mile of Disposal Well:*

**Please See Attachment 6.**

- *Cross Section of Disposal Well and All Other Wells within 1 Mile of Disposal Well:*

**Please See Attachment 7.**

COGCC Rule 325, Item c, paragraph 4

- *Full Description of Casing In The Disposal Well including Information On All Remedial Cement Work Performed:*

**Please See Attachment 8.**

- *Wellbore Diagram of Water Disposal Well (Present and Once Converted To Injector):*

Operator: Williams Production Ryan Gulch LLC  
UIC "Dedicated Injection Well" Permit Application To COGCC Dated 9-1-09  
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

Please See Attachment 9.

- *Surface Facility Diagram for Water Disposal Well:*

Please See Attachment 10.

- *Listing of All Leases Connected Directly By Pipelines to the Disposal Well:*

No leases will be connected directly via pipeline upon onset of disposal operations. Williams will notify COGCC before any future direct pipeline connections are implemented.

Please See Attachment 11.

COGCC Rule 325, Item c, paragraph 5

- *Listing of All Sources of Water, by Lease and Well To Be Injected Submitted On Form 26 (Source of Produced Water For Disposal):*

Please See Attachment 12.

Attachment 12 defines the scope for all potential sources of frac flowback and produced water (by well and lease) that constitute the "Greater Ryan Gulch" Area for wells operated by various Williams entities.

COGCC Rule 325, Item c, paragraph 6

- *Any Proposed Stimulation for the Disposal Well:*

No stimulation is proposed for the Disposal well.

COGCC Rule 325, Item c, paragraph 7

- *Estimated Minimum and Maximum Water To Be Injected Daily With Anticipated Injection Pressures:*

Estimated Maximum Water Injection Rate/Pressure: 5,000 bwpd at 3,400 psig \*  
Estimated Minimum Water Injection Rate/Pressure: 0 bwpd on vacuum

RECEIVED

SEP 09 2009

COGCC



SEP 09 2009

COGCC

Operator: Williams Production Ryan Gulch LLC  
UIC "Dedicated Injection Well" Permit Application To COGCC Dated 9-1-09  
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

*\* Surface pressure resulting from maximum bottom hole pressure less hydrostatic head plus frictional pressure drop. Frictional pressure drop calculated based upon 2-3/8" tubing, internally coated with HDPE type material with internal diameter of 1.710" ID.*

COGCC Rule 325, Item c, paragraph 8

- *Names and Addresses Of Those Persons Notified By The Applicant (As Required By Rule 325, item i) for (a) each Surface Owner and Owner within ¼ Mile and (b) Owners and Operators of Oil and Gas Wells Producing From The Injection Zone within ½ Mile of the Disposal Well:*

No notification was necessary under Rule 325 (i) based on the following:

- Surface owner is Bureau of Land Management
- The only producing MVRD wells within ½ mi. are Williams operated wells where Williams entities have 100% Working Interest.
- There are two additional wells within the ½ mile radius, however both are abandoned per COGCC data.

Miscellaneous Hardcopy Attachments To COGCC UIC Application Filing:

1. Cross Section of Well Logs: A large printout of the well log cross section in proximity to proposed Federal 299-27-5 injection/disposal well. This is a large version of the same cross section included in the body of this application as an 8-1/2" x 11".
2. Formation Evaluation Log: Copy of Schlumberger Platform Express well log for proposed Federal 299-27-5 injection/disposal well dated Nov 26, 2005.
3. USIT Cement Log (Post Squeeze): Copy of Schlumberger Ultrasonic Imaging Log, Gamma Ray, and CCL log for proposed Federal 299-27-5 run June 22, 2009 after cement squeeze. Cement squeezes were performed to achieve a minimum 200 ft of quality cement above upper most injection perforation. The production casing cement job was a Schlumberger 10.5 ppg "Litecrete" job pumped by previous operator. Conventional CBL would not be an appropriate tool for evaluating 10.5 ppg "Litecrete" since the acoustic impedance of "Litecrete" is sufficiently lower than standard cement. Consequently, Schlumberger recommended an Ultrasonic Imaging Tool (USIT) to evaluate the post squeeze cement sheath that contains both "Litecrete" and conventional squeeze cement material. Log was reviewed and cement squeeze accepted by Dave Andrews on July 2, 2009.

Operator: Williams Production Ryan Gulch LLC  
UIC "Dedicated Injection Well" Permit Application To COGCC  
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

RECEIVED

SEP 09 2009

COGCC

**Schlumberger**

Client:  
Well: Fed 299-27-5  
Date: 7/17/2009  
Tested By: Aida Vazquez

## **WATER ANALYSIS REPORT**

Collection date	7/16/2009	7/16/2009		
Temp (°F)	67	67		
pH	8.0	8.0		
Specific Gravity	1.009	1.009		
Chlorides (mg/l)	7100	6745		
Iron (mg/l)	0	0		
Bicarbs (mg/l)	0	0		
Carbonates (mg/l)	600	600		
Hydroxides (mg/l)	170	170		
Calcium (mg/l)	800	400		
Magnesium (mg/l)	480	480		
Sulfates (mg/l)	100	90		
Sodium (mg/l)	3481	3708		
Potassium (mg/l)	450	450		
TDS (mg/l)	11451	11313		
Percentage Chloride	1.5	1.4		
Resistivity	0.57	0.57		

COMMENTS:

**Water Analysis Of The Injected Formation**

Attachment 1



Operator: Williams Production Ryan Gulch LLC  
 UIC "Dedicated Injection Well" Permit Application To COGCC  
 Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
 Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

RECEIVED

SEP 09 2009

COGCC



## Water Analysis Report

Field : Ryan Gulch	Sample Date : 12/12/2006
County : Rio Blanco	Formation :
Location : RG 31-20	Rock Type :
Lab ID : Williams	Depth :
Comments : Mn - .50	

CATIONS	mg/l	meq/l	ANIONS	mg/l	meq/l
Potassium	189.0	4.83	Sulfate	10.0	0.21
Sodium	2,930.0	127.45	Chloride	3,500.0	98.72
Calcium	40.0	2.00	Carbonate	0.0	0.00
Magnesium	24.4	2.01	Bicarbonate	2,318.0	38.00
Iron	8.5	0.30	Bromide	0.0	0.00
Barium	25.0	0.36	Organic Acids	0.0	0.00
Strontium	0.0	0.00	Hydroxide	0.0	0.00
SUM +	3,216.9	136.95	SUM -	5,828.0	136.93

### Solids

Total Dissolved Solids @180°C	7,654 mg/l
Total Solids, Calc less CO <sub>2</sub>	7,654 mg/l
Total Solids, Calculated	9,045 mg/l
Total Solids, NaCl equivalents	7,310 mg/l
Chloride as NaCl	5,769 mg/l
NaCl% of Total Dissolved Solids	63.79 %
Accuracy	-0.01 Sigma

### Dissolved Gases

Bisulfide ion, HS	0.0 mg/l
Hydrogen Sulfide, H <sub>2</sub> S	0.0 mg/l
Total Sulfide	0.0 mg/l

### Other Properties

Calcium Hardness as CaCO <sub>3</sub>	99.9 mg/l
Magnesium Hardness as CaCO <sub>3</sub>	101.1 mg/l
Total Hardness as CaCO <sub>3</sub>	201.0 mg/l
Hardness, grains	11.70 grains/gallon

### Microbiological

Sulfate Reducing	nd
Aerobic Bacteria	nd

### Sample Conditions

pH, s.u. (Field)	7.80 s.u.
Sample Pressure	6.00 psia
Mole% CO <sub>2</sub> Gas	5.00 %
pH, s.u. (from CO <sub>2</sub> )	7.85 s.u.
Surface Temp	60 °F
Downhole Temp	125 °F
Ionic Strength	0.141 μ

Dissolved O <sub>2</sub> , aq	0.0 ppb
Measured CO <sub>2</sub> , aq	0.0 mg/l
Calculated CO <sub>2</sub> , aq	32.6 mg/l

Specific Gravity	1.006 measured
Specific Gravity	1.006 calculated
Resistivity, 68°F	1.065 ohm-cm
Conductivity 25°C	9,390 μmhos/cm

### Scaling Conditions

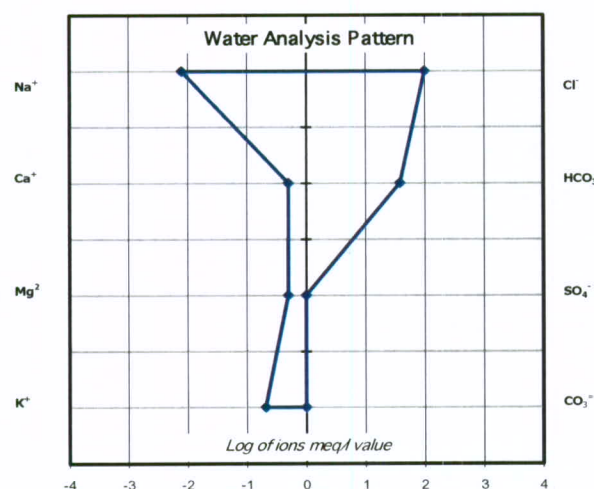
Calcium Carbonate	CaCO <sub>3</sub> +
Calcium Sulfate	CaSO <sub>4</sub> - - -
Barium Sulfate	BaSO <sub>4</sub> +
Strontium Sulfate	SrSO <sub>4</sub> -

### Probable Mineral Residue, Dry

Calculation error = 0 %

COMPOUND	mg/l
NaCl	5,497.9
NaHCO <sub>3</sub>	2,803.0
KCl	346.6
Ca(HCO <sub>3</sub> ) <sub>2</sub>	161.8
Mg(HCO <sub>3</sub> ) <sub>2</sub>	146.9
BaSO <sub>4</sub>	24.3

Note: nd denotes 'Not Determined'  
 Analyzed by: Creg Wilkins  
 Approved: Creg Wilkins  
 12/17/03 v947MDCarney



## Water Analysis Indicative of Low TDS Source Water Well

Attachment 1



Operator: Williams Production Ryan Gulch LLC  
 UIC "Dedicated Injection Well" Permit Application To COGCC  
 Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
 Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

RECEIVED

SEP 09 2009

COGCC



## Water Analysis Report

Field : Ryan Gulch	Sample Date : 2/7/2008
County : Rio Blanco	Formation :
Location : RG 12-10	Rock Type :
Lab ID : Williams	Depth :
Comments : Mn - .39 PPM	Recompletion

CATIONS	mg/l	meq/l	ANIONS	mg/l	meq/l
Potassium	3,305.0	84.53	Sulfate	27.0	0.56
Sodium	8,235.9	358.24	Chloride	16,300.0	459.76
Calcium	636.0	31.74	Carbonate	0.0	0.00
Magnesium	80.5	6.62	Bicarbonate	1,439.6	23.60
Iron	7.3	0.26	Bromide	0.0	0.00
Barium	174.0	2.53	Organic Acids	0.0	0.00
Strontium	0.0	0.00	Hydroxide	0.0	0.00
<b>SUM +</b>	<b>12,438.7</b>	<b>483.92</b>	<b>SUM -</b>	<b>17,766.6</b>	<b>483.92</b>

### Solids

Total Dissolved Solids @180°C	29,342 mg/l
Total Solids, Calc less CO <sub>2</sub>	29,342 mg/l
Total Solids, Calculated	30,205 mg/l
Total Solids, NaCl equivalents	25,243 mg/l
Chloride as NaCl	20,937 mg/l
NaCl% of Total Dissolved Solids	69.31 %
Accuracy	0.00 Sigma

### Dissolved Gases

Bisulfide Ion, HS	1.7 mg/l
Hydrogen Sulfide, H <sub>2</sub> S	0.3 mg/l
Total Sulfide	2.0 mg/l

### Other Properties

Calcium Hardness as CaCO <sub>3</sub>	1,587.9 mg/l
Magnesium Hardness as CaCO <sub>3</sub>	331.1 mg/l
Total Hardness as CaCO <sub>3</sub>	1,919.0 mg/l
Hardness, grains	111.74 grains/gallon

### Microbiological

Sulfate Reducing	nd
Aerobic Bacteria	nd

### Sample Conditions

pH, s.u. (Field)	7.80 s.u.
Sample Pressure	6.00 psia
Mole% CO <sub>2</sub> Gas	3.00 %
pH, s.u. (from CO <sub>2</sub> )	7.82 s.u.
Surface Temp	60 °F
Downhole Temp	125 °F
Ionic Strength	0.520 μ

Dissolved O <sub>2</sub> , aq	0.0 ppb
Measured CO <sub>2</sub> , aq	0.0 mg/l
Calculated CO <sub>2</sub> , aq	18.3 mg/l

Specific Gravity	1.021 measured
Specific Gravity	1.021 calculated
Resistivity, 68°F	0.250 ohm-cm
Conductivity 25°C	40,000 μmhos/cm

### Scaling Conditions

Calcium Carbonate	CaCO <sub>3</sub> +
Calcium Sulfate	CaSO <sub>4</sub> - - -
Barium Sulfate	BaSO <sub>4</sub> +
Strontium Sulfate	SrSO <sub>4</sub> -

### Probable Mineral Residue, Dry

Calculation error = 0 %

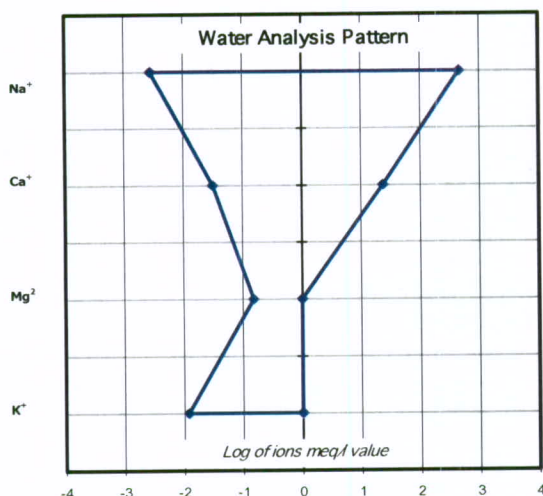
COMPOUND	mg/l
NaCl	20,936.6
KCl	6,301.9
Ca(HCO <sub>3</sub> ) <sub>2</sub>	1,881.2
CaCl <sub>2</sub>	473.0
MgCl <sub>2</sub>	315.4
BaSO <sub>4</sub>	65.6

Note: nd denotes 'Not Determined'

Analyzed by: Creg Wilkins

Approved: Creg Wilkins

12/17/03 v947MDCarney



**Water Analysis Indicative of Typical Sego-Mesaverde Source Water Well**

Attachment 1

Operator: Williams Production Ryan Gulch LLC  
UIC "Dedicated Injection Well" Permit Application To COGCC  
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

RECEIVED

SEP 09 2009

COGCC

Proposed Injection Program

The Williams Production RMT injection program is required for disposal of produced and used workover fluids that are in excess of the storage capacity in the field. Fluids will be trucked to the injection facility where they are filtered and subsequently injected into the disposal well. Please refer to the surface facility diagram attached to this application for a detailed explanation. Surface pressures will not exceed 3,400 psi for an injection rate of 5,000 bwpd. These values were derived from the Injection Test Analysis that follows.

Williams Production RMT estimates that the injection program will operate at a lower rate at startup but may increase to the upper injection rate of 5,000 bwpd over time.

RECEIVED

SEP 09 2009

COGCC

Operator: Williams Production Ryan Gulch LLC

UIC "Dedicated Injection Well" Permit Application To COGCC

Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO

Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

The existing well casing was first hydrotested to 1500 psig prior to initiating Step Rate Injection Test (SRIT). Per Dave Andrews on July 2, 2009 a witnessed Mechanical Integrity Test (MIT) was not required prior to placing the final injection/disposal well Bottom Hole Assembly (BHA).

The Step Rate Injection Test (SRIT) was performed on July 15, 2009. SRIT pressures and rates were recorded at surface and was pumped using a tubing and packer configuration. Injection was conducted upon the fractured interval with the following perforations:

Perf Top (ft)	Perf Base (ft)	# Holes	Hole Dia. (in)
6220	6354	42	0.32
6458	6570	45	0.32
6626	6681	27	0.32
6758	6836	36	0.32

A standard Step Rate Injection Test (SRIT) is presented below by plotting the rate of each step vs. the Bottom Hole Pressure (BHP). Figure 1 shows the Pressure vs. Rate plot.

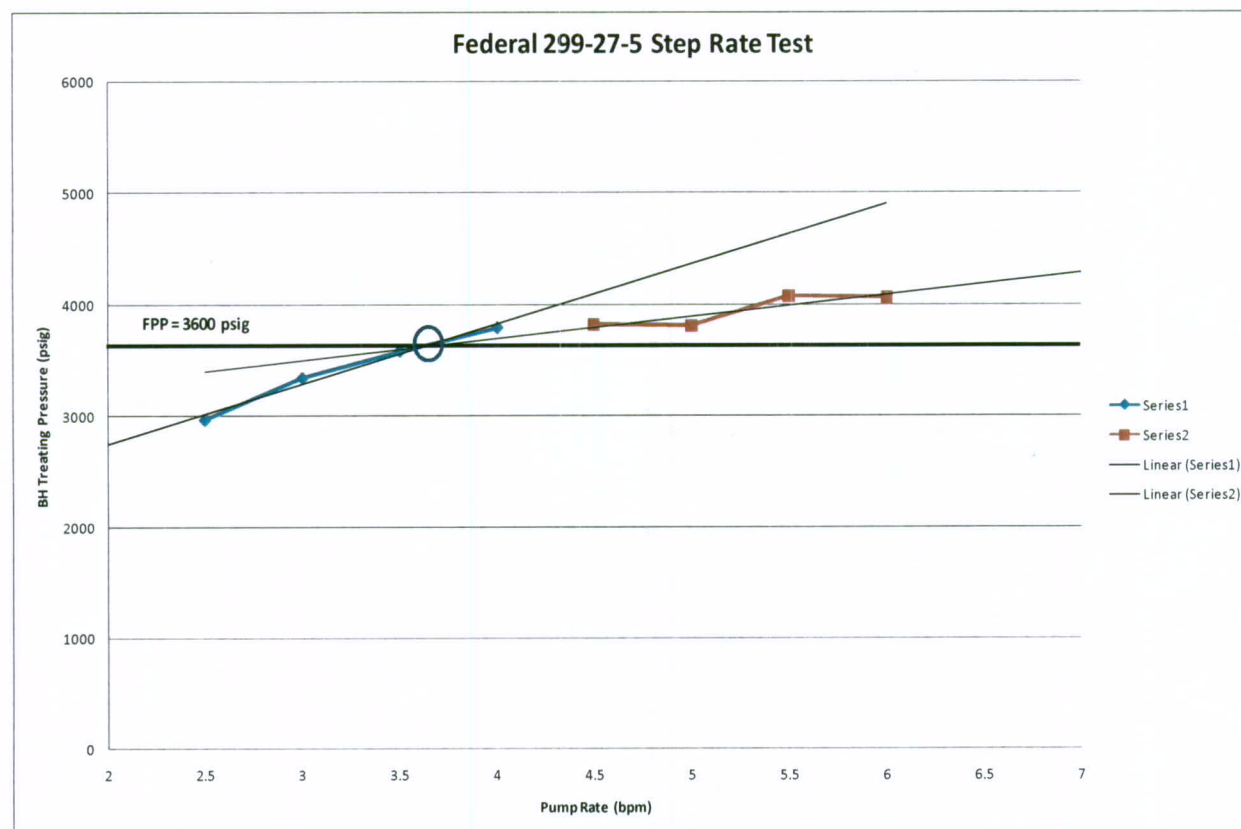


Fig. 1

## Step Rate Injection Test Results

Attachment 2



Operator: Williams Production Ryan Gulch LLC  
UIC "Dedicated Injection Well" Permit Application To COGCC  
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

RECEIVED

SEP 09 2009

COGCC

A best fit line is projected through the group of low rate points and another is projected through the high rate points. The intersection of these lines defines the Formation Parting Pressure (FPP) which is the BHP above which the formation breaks down. The FPP is the upper limit on the BHP for injection at matrix conditions.

The FPP for the injection zones is calculated to be 3,600 psi.

Using the top perforation of 6,220 ftmd, a frac gradient of 0.579 psi/ft is obtained.

#### Proposed Injection Pressures

Based on the SRIT analysis and the calculated pipe friction, the following conditions are proposed to determine the maximum allowable surface pressure.

#### Assumptions:

2-3/8" Tubing, Internally Coated w/HDPE Type Material (1.710" ID)

Density of Fluid: 8.43 ppg

Top Injection perf: 6,220 ftmd

#### Calculations:

Max BH Pressure = FPP = 3,600 psi

Hydrostatic Pressure =  $6,220 \text{ ft} \times 8.43 \text{ ppg} \times 0.052 = 2,727 \text{ psi}$

Max Surface Pressure =  $3,600 \text{ psi} - 2,727 \text{ psi} + \text{Friction at Rate}$

Max Surface Pressure =  $873 \text{ psi} + \text{Friction at Rate}$

During the SRT a BHP of approximately 3,600 psi was measured at 3.5 bpm (5,040 bwpd). The pipe friction was calculated to be 2,543 psi at 3.5 bpm. The max surface pressure at 3.5 bpm would be:

Max Surface Pressure =  $873 \text{ psi} + 2,543 \text{ psi} = 3,416 \text{ psi}$

According to the test results, the max injection rate would be approximately 5,000 bwpd. However, actual injection rates would be subject to not exceeding the maximum surface pressure.

## **Step Rate Injection Test Results**

Attachment 2

RECEIVED

SEP 09 2009

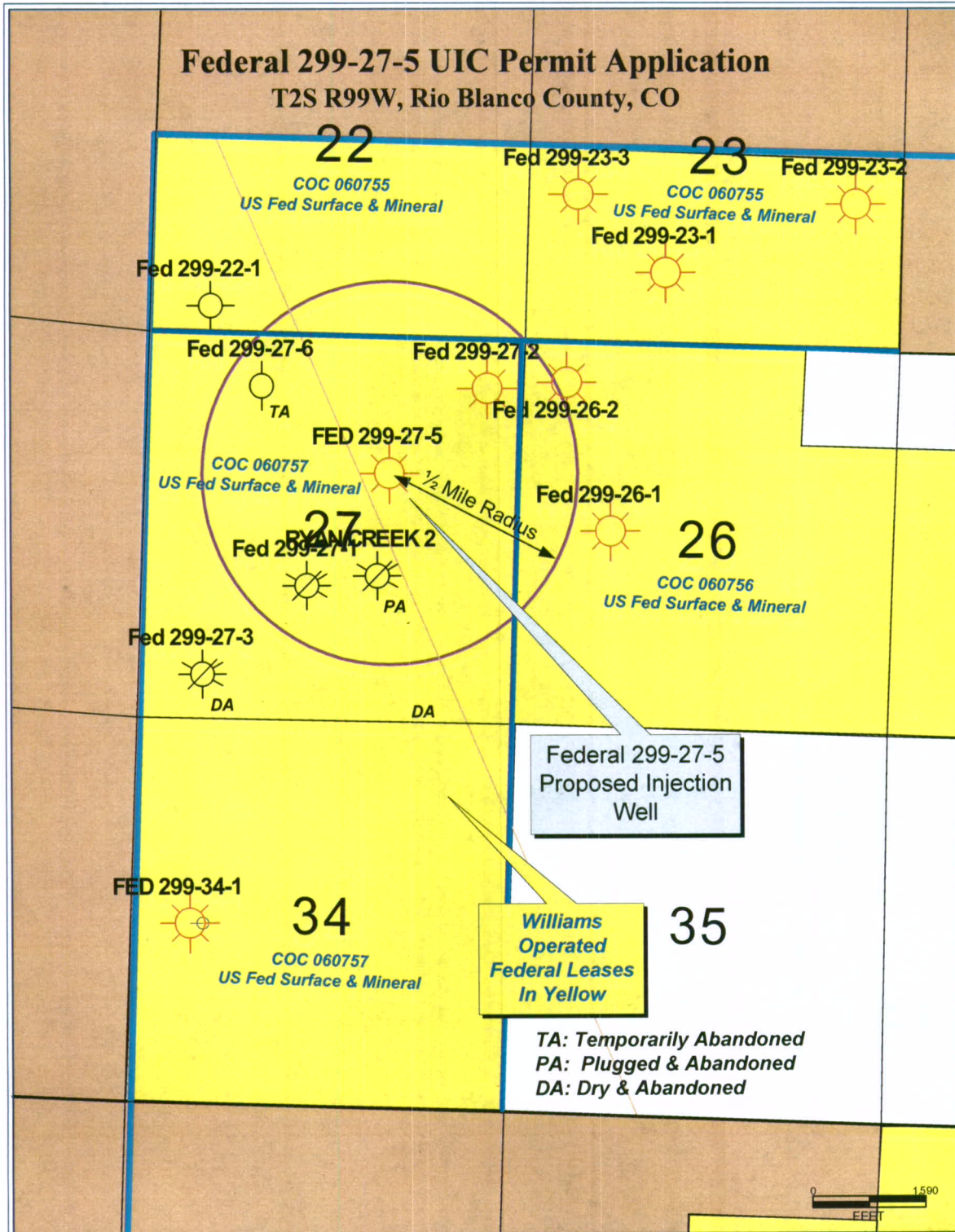
COGCC

Operator: Williams Production Ryan Gulch LLC

UIC "Dedicated Injection Well" Permit Application To COGCC

Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO

Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area



PETRA 9/18/2009 7:29:28 AM

### Base Plat of the Proposed Injection Well

Attachment 3



Operator: Williams Production Ryan Gulch LLC  
UIC "Dedicated Injection Well" Permit Application To COGCC  
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

RECEIVED

SEP 09 2009

COGCC

The US Federal Government is the surface and mineral owner for all properties within ½ mile of the proposed injection/disposal well. US Federal ownership in the land is managed through the US Department of Interior, Bureau of Land Management.

The pertinent regional BLM office for the subject land is located as follows:

**Name/Address:**

United States Dept. of the Interior  
Bureau of Land Management  
Colorado State Office  
2850 Youngfield St.  
Lakewood, CO 80125-7093

**Surface and Mineral Interest Owners Within ½ Mile**

Attachment 4

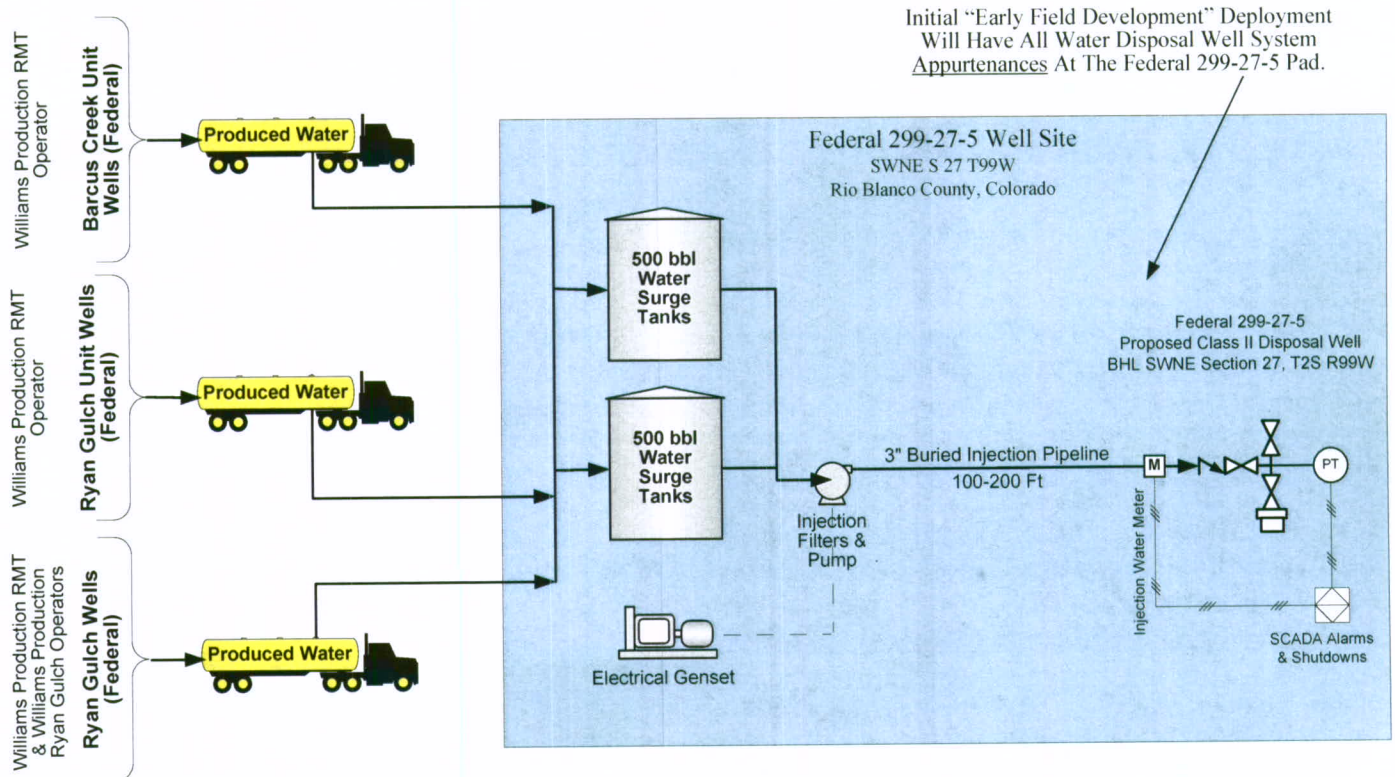


Operator: Williams Production Ryan Gulch LLC  
 UIC "Dedicated Injection Well" Permit Application To COGCC  
 Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
 Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

RECEIVED  
 SEP 09 2009  
 COGCC

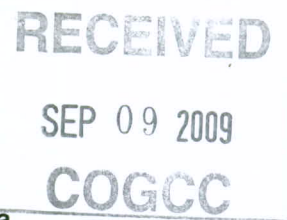
Williams Production RMT & Williams Production Ryan Gulch LLC Operator  
COGCC UIC Permit Application For "Dedicated Injection Well"  
Simplified Water Disposal Well "System & Appurtenances Diagram"

Initial "Early Field Development" Deployment Of Water Disposal Facility For Federal 299-27-5 Disposal Well



In The Future As Pipeline Infrastructure Builds Out The Above Will Be Replaced With A Disposal Water Pipeline System From A Central Site.

**Water Disposal Well System & Appurtenances Plans & Specifications.**  
 Attachment 5



Operator: Williams Production Ryan Gulch LLC  
UIC "Dedicated Injection Well" Permit Application To COGCC  
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

<b>Federal 299-27-5 Log Information (Proposed Injection Well)</b>		05-103-10624
<u><b>Type</b></u>	<u><b>Location</b></u>	
Borehole	See COGCC website	
Variable Density	See COGCC website	
CBL	See COGCC website	
Caliper Print	See COGCC website	
Array Induction	See COGCC website	
Gamma Ray	See COGCC website	
Density Porosity	See COGCC website	
<b>Federal 299-27-6 Log Information (Offset Within 1-Mile)</b>		05-103-10644
<u><b>Type</b></u>	<u><b>Location</b></u>	
Cement Volume	See COGCC website	
Array Induction	See COGCC website	
Field Dip Print	See COGCC website	
Density Porosity	See COGCC website	
<b>Federal 299-27-2 Log Information (Offset Within 1-Mile)</b>		05-103-10496
<u><b>Type</b></u>	<u><b>Location</b></u>	
Platform Express	See COGCC website	
GPIT	See COGCC website	
<b>Federal 299-26-2 Log Information (Offset Within 1-Mile)</b>		05-103-10538
<u><b>Type</b></u>	<u><b>Location</b></u>	
PE-AI/GR	See COGCC website	
CNL/LD/GR	See COGCC website	
PE-CAL/GR	See COGCC website	
FE	See COGCC website	
CBL/GR/CCL	See COGCC website	
<b>Federal 299-26-1 Log Information (Offset Within 1-Mile)</b>		05-103-10364
<u><b>Type</b></u>	<u><b>Location</b></u>	
CBL/GR/Array Induction/Density-Neutron	See COGCC website	
<b>Federal 299-23-1 Log Information (Offset Within 1-Mile)</b>		05-103-10488
<u><b>Type</b></u>	<u><b>Location</b></u>	
GR	See COGCC website	
SCMT	See COGCC website	
RST	See COGCC website	
Cased Hole Gyroscope	See COGCC website	

Attachment 6

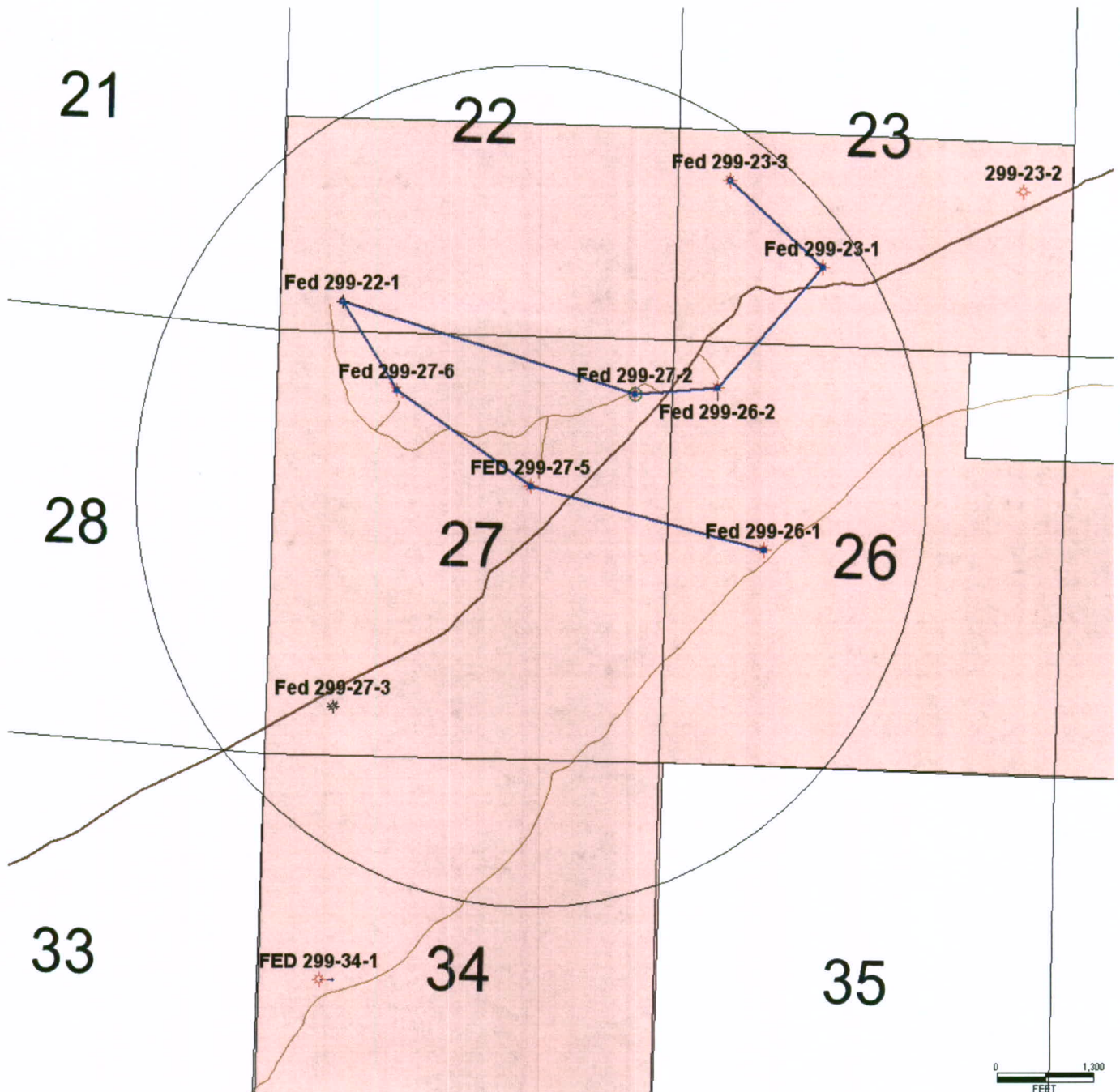
**Resistivity Logs for Injection/Disposal Well & All Other Wells Within 1 Mile**

Attachment 6



Operator: Williams Production Ryan Gulch LLC  
UIC "Dedicated Injection Well" Permit Application To COGCC  
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

RECEIVED  
SEP 09 2009  
COGCC



Cross Section of Injection/Disposal Well & All Other Wells Within 1 Mile  
Attachment 7



RECEIVED

SEP 09 2009

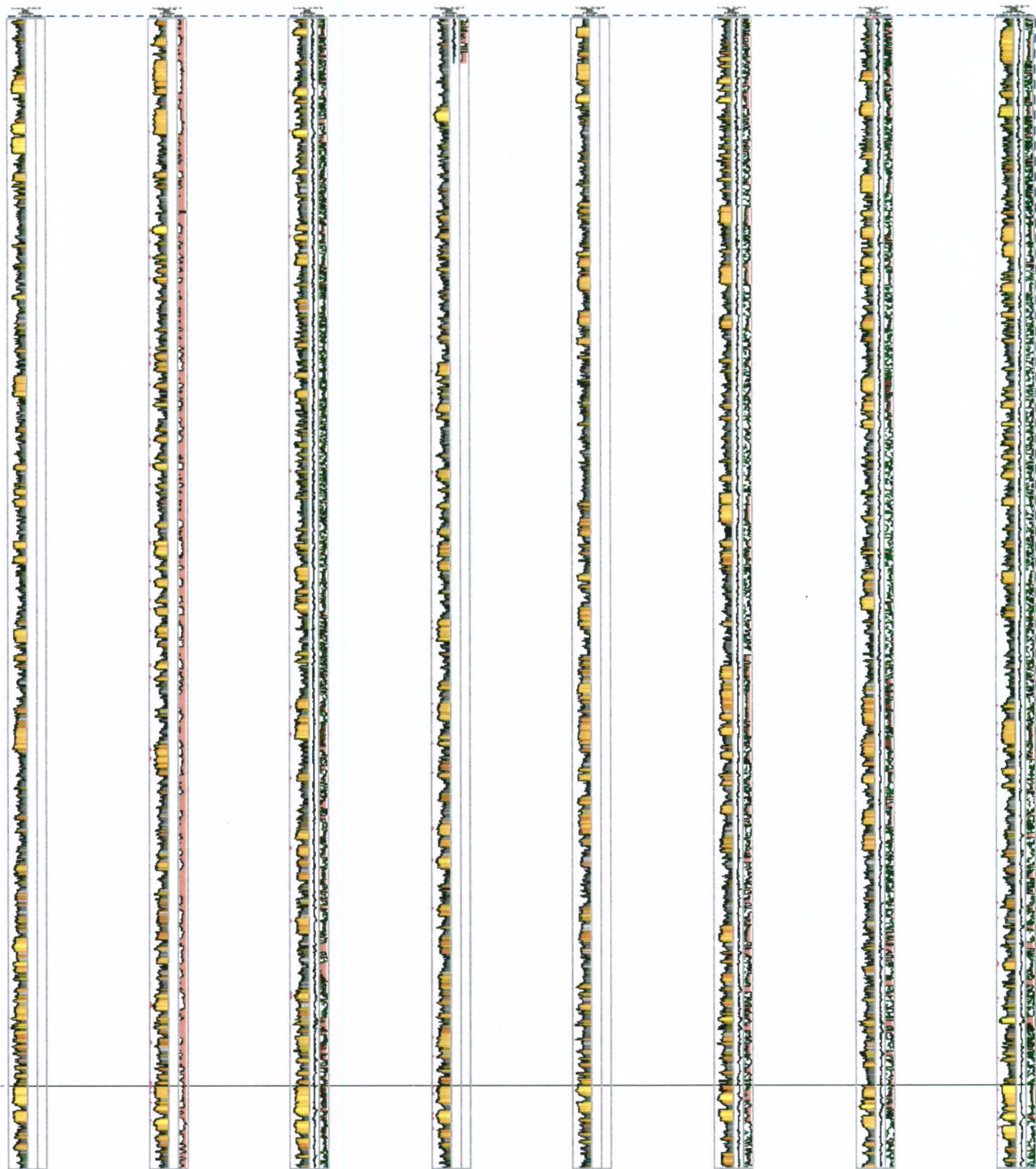
COGCC

Operator: Williams Production Ryan Gulch LLC

UIC "Dedicated Injection Well" Permit Application To COGCC

Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO

Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area



### Cross Section of Injection/Disposal Well & All Other Wells Within 1 Mile

Attachment 7

(Note - A Large Printout Of The Above Cross-Section Is Attached To The Back Of The UIC Application.)

RECEIVED

SEP 09 2009

COGCC

Operator: Williams Production Ryan Gulch LLC

UIC "Dedicated Injection Well" Permit Application To COGCC

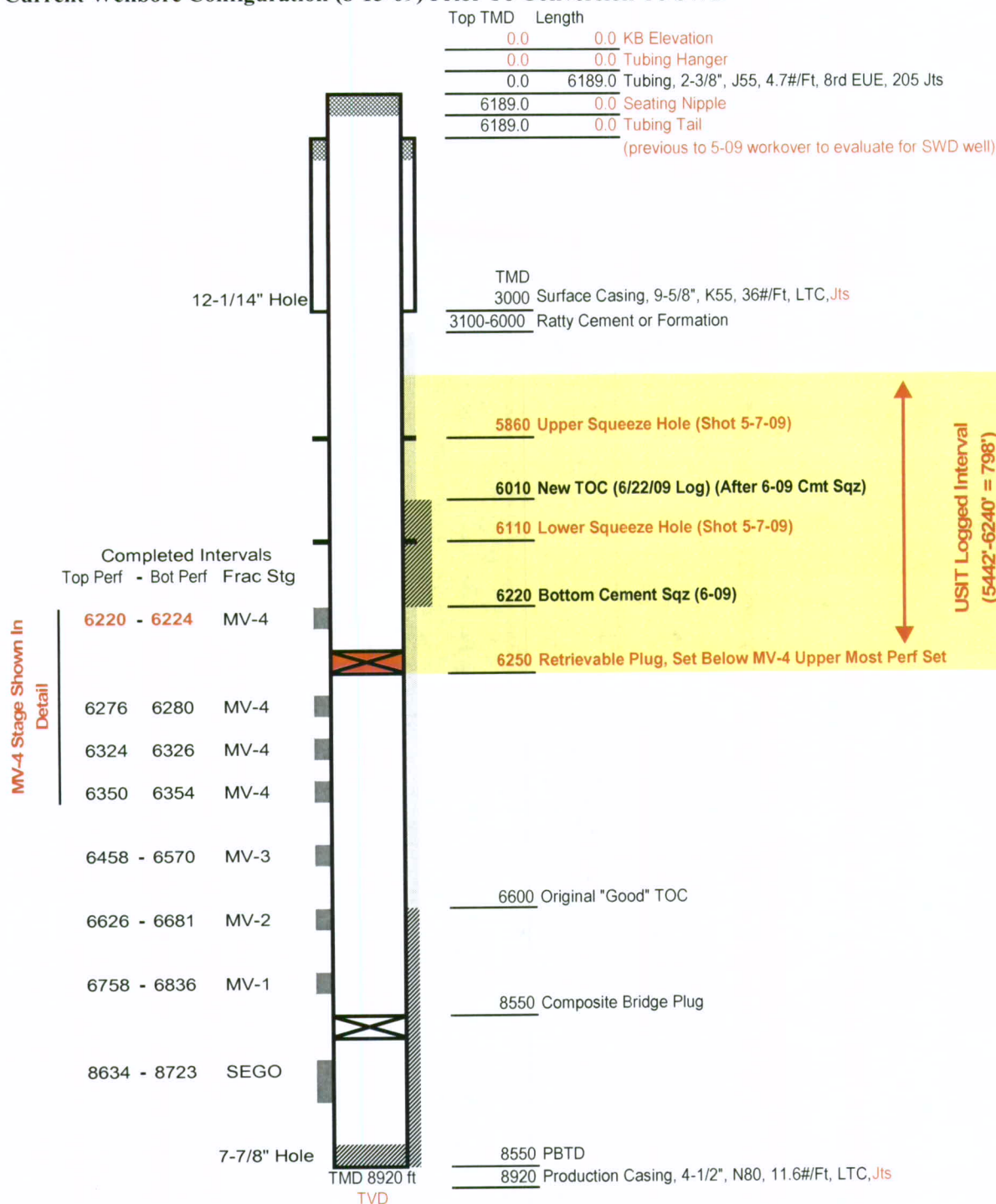
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO

Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

# Well: Federal 299-27-5

Operator: Williams Production Ryan Gulch LLC

Current Wellbore Configuration (8-15-09) Prior To Conversion To SWD



Wellbore Diagram of Water Injection/Disposal Well – Current Configuration  
Attachment 8

Operator: Williams Production Ryan Gulch LLC  
 UIC "Dedicated Injection Well" Permit Application To COGCC  
 Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
 Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

RECEIVED

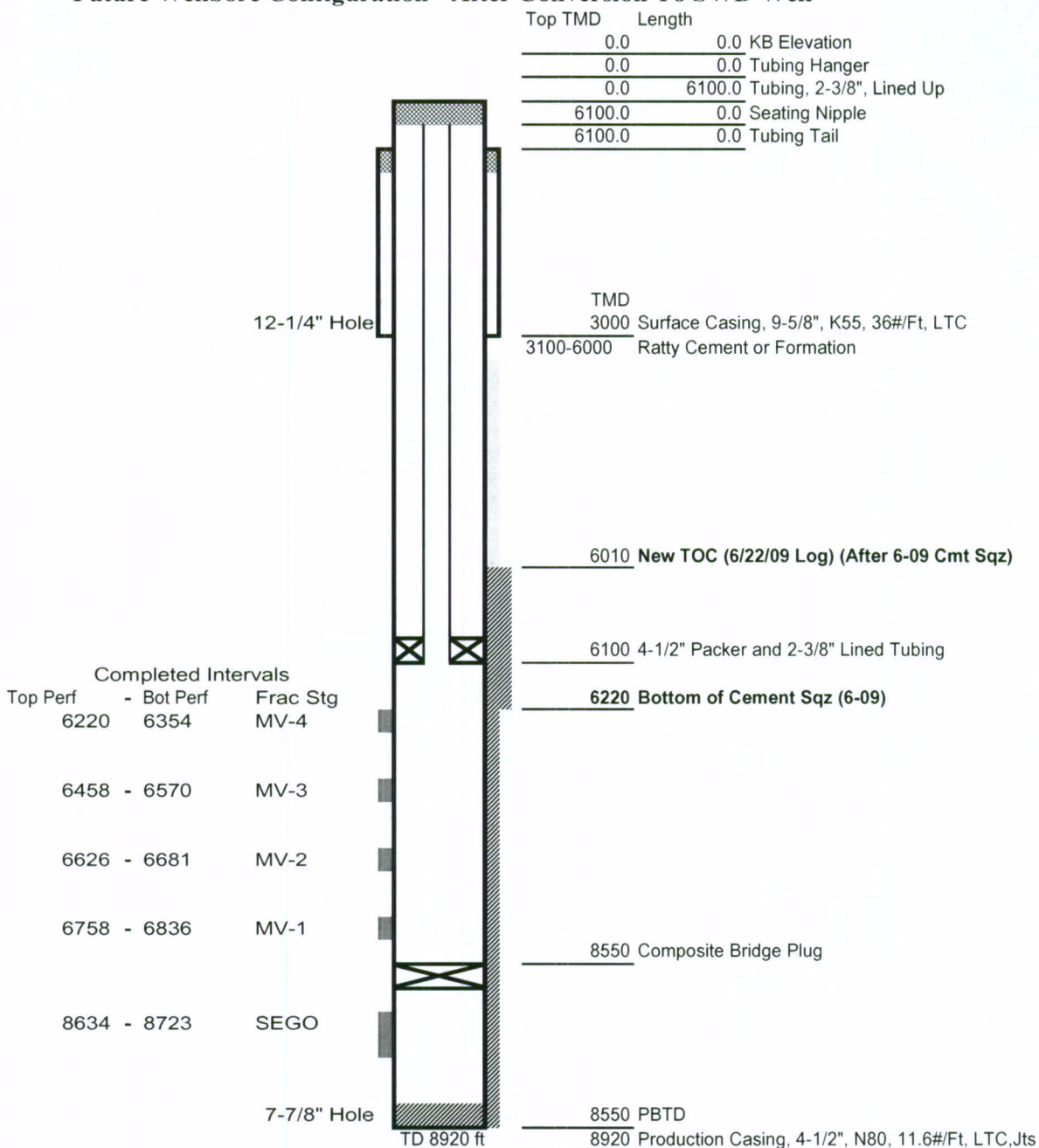
SEP 09 2009

COGCC

### Well: Federal 299-27-5

Operator: Williams Production Ryan Gulch LLC

#### Future Wellbore Configuration - After Conversion To SWD Well



### Wellbore Diagram of Water Injection/Disposal Well – After Conversion

Attachment 9



Operator: Williams Production Ryan Gulch LLC  
 UIC "Dedicated Injection Well" Permit Application To COGCC  
 Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
 Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

RECEIVED  
 SEP 09 2009  
 COGCC



Rev	Description	Date	Williams			
			Williams Production RMT, Piceance Highlands Asset			
			Water Injection Configuration			
			Federal 299-27-5			
			SWNE, Sec. 27, 2S, 99W			
			Rio Blanco County, Colorado			
0	Draft For Review and Comment	7/28/2009	Drn By: GJD	7/28/2009	Scale: 1in = 100ft. 0in.	Dwg No: 1 Rev 0

Surface Facility Plot Plan For Injection/Disposal Well  
 Attachment 10

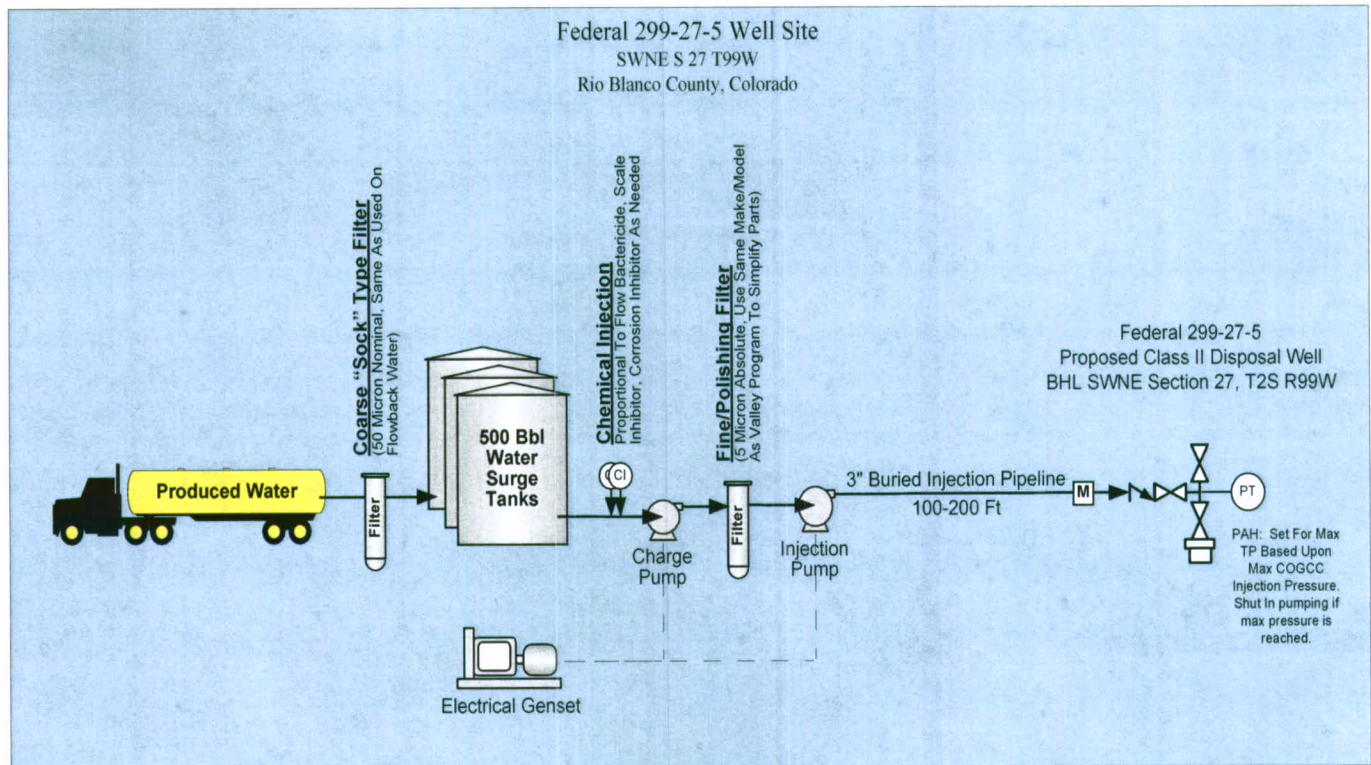


Operator: Williams Production Ryan Gulch LLC  
 UIC "Dedicated Injection Well" Permit Application To COGCC  
 Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
 Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

RECEIVED  
 SEP 09 2009  
 COGCC

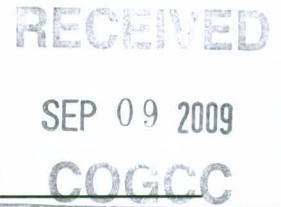
Williams Production Ryan Gulch LLC - Federal 299-27-5  
 COGCC UIC Permit Application For "Dedicated Injection Well"  
Simplified Flow Diagram For Injection Facilities

Initial "Early Field Development" Deployment Of Water Disposal Facility For Federal 299-27-5 Disposal Well



In The Future As Pipeline Infrastructure Builds Out The Above Will Be Replaced With A Disposal Water Pipeline System From A Central Site.

Operator: Williams Production Ryan Gulch LLC  
UIC "Dedicated Injection Well" Permit Application To COGCC  
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area



No leases will be connected directly via pipeline upon onset of injection/disposal operations.

As of August 2009 Williams is developing plans for a future water disposal pipeline system but the plans tentative without hard details.

Williams will notify COGCC before any future direct pipeline connections are implemented.

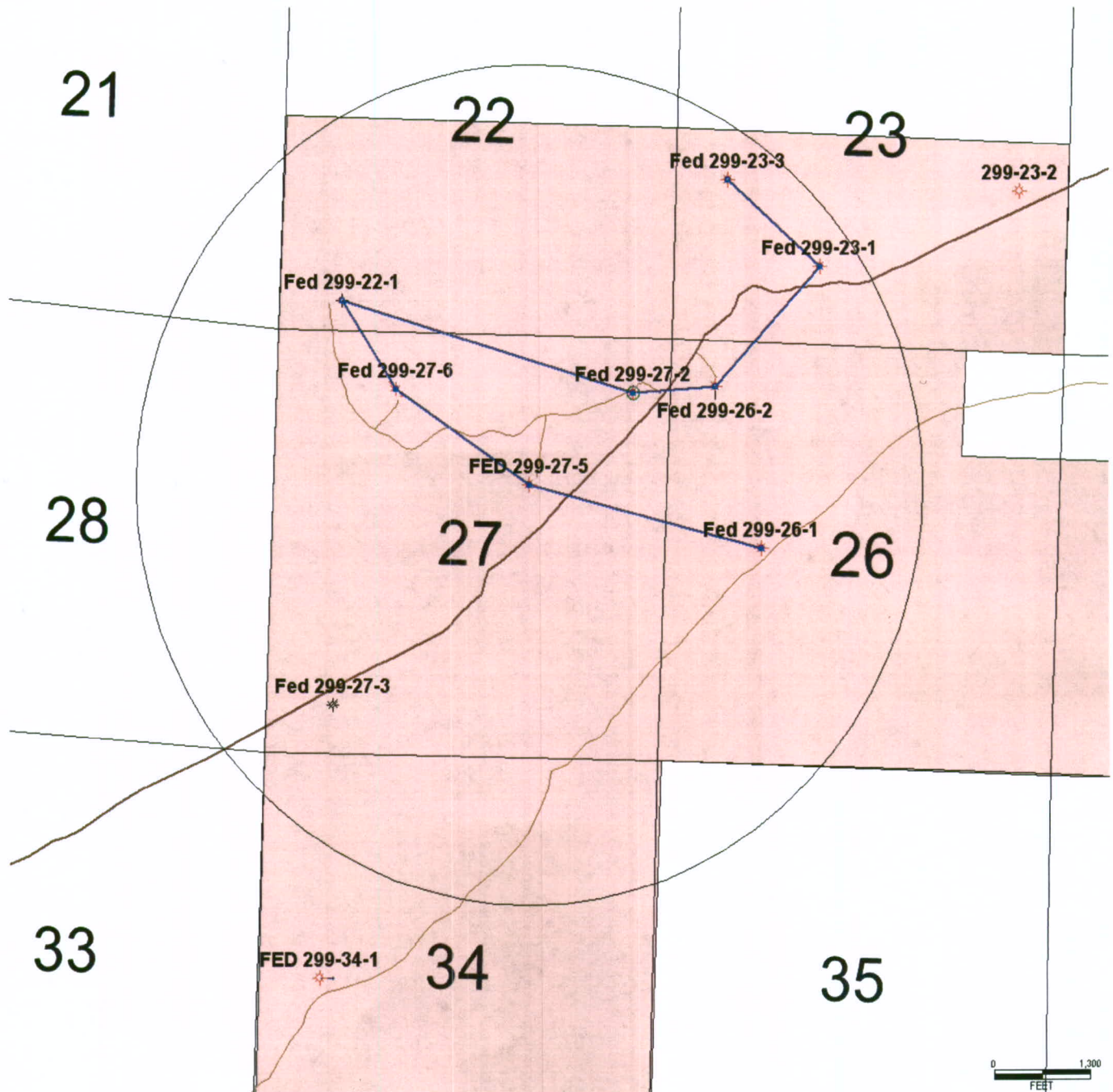


# Index Map For Log Cross Section "A-A"

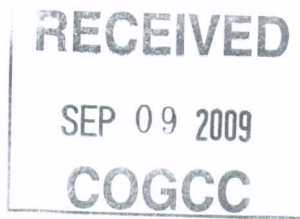
RECEIVED

SEP 09 2009

COGCC



Form 31 attachment  
Fax # 159317  
Doc # 1905680



**Exploration & Production**  
1515 Arapahoe Street  
Tower 3, Suite 1000  
Denver, CO 80202  
303/572-3900  
303/629-8255 Fax

September 1, 2009

Colorado Oil and Gas Convention Commission  
1120 Lincoln Street, Suite 801  
Denver, CO 80203

Attn: Jane Stanczyk  
Regarding: UIC Permit Application For Federal 299-27-5 (api # 05-103-10624)  
Rio Blanco County, CO

Attached, please find the Williams Production Ryan Gulch LLC UIC permit application package for the Federal 299-27-5 well in Rio Blanco County, CO.

Gabe D'Arthenay (303-606-4287, gabe.darthenay@williams.com) is the Sr. Petroleum Engineer responsible for the technical portion of the package and Jennifer Head (303-606-4342, Jennifer.head@williams.com) is our Regulatory Affairs Manager working this project.

Please feel free to call either individual if there are any follow up questions, issues, or clarifications.

Thank you very much for your time and attention.

Regards,

Bruce Bunch  
Williams Piceance Highlands  
Petroleum Engineering Manager

Cc w/attachments:

Gabe D'Arthenay (Williams - Den)  
Jennifer Head (Williams - Den)

RECEIVED

SEP 09 2009

COGCC

Operator: Williams Production Ryan Gulch LLC

UIC "Dedicated Injection Well" Permit Application To COGCC Dated 9-1-09

Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO

Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

UIC Application for a "Dedicated" Injection Well:

Dedicated Injection Well - Any well as defined under 40 CFR 144.5B, 1992 edition (adopted by US EPA) used for the exclusive purpose of injecting fluids or gas from surface (excludes gas storage wells).

COGCC UIC Application Requirements are addressed as follows:

COGCC Rule 325, Item c, paragraph 1

- *Name, Description and Depth of Injection Formation(s):*

**Operator:** Williams Production Ryan Gulch LLC (operator # 10286)  
**Well:** Federal 299-27-5 (API# 05-103-10624)  
**Location:** SWNE Section 27, T2S, R99W, Rio Blanco County, CO  
**Lease:** Federal, COC-060757  
**Mineral Ownership:** 100% US Federal Government (BLM)  
**Well Ownership:** 100% Williams Production Ryan Gulch LLC  
**Injection Formation:** Mesaverde  
**Injection Depth:** 6220' - 6836' MD

- *Underground Sources of Drinking Water Which May Be Affected:*

Drinkable/potable water in the Piceance is generally considered to be present above the "Dissolution Surface". The lower limit of the Dissolution Surface is in the neighborhood of +/-1800 ft from surface. Consequently, the proposed injection interval is thousands of feet below interval where drinking water may exist.

- *Water Analysis of the Injection Formation:*

**Please See Attachment 1.**

- *Fracture Pressure or Fracture Gradient of the Injection Formation:*

**Formation Parting Pressure:** 3,600 psi  
**Formation Fracture Gradient:** 0.58 psi/ft

**Please See Attachment 2 for Step Rate Injection Test Results.**

COGCC Rule 325, Item c, paragraph 2

- *Base Plat Covering ½ mile Radius of the Proposed Disposal Well:*

**Please See Attachment 3.**



RECEIVED

SEP 09 2009

COGCC

Operator: Williams Production Ryan Gulch LLC

UIC "Dedicated Injection Well" Permit Application To COGCC Dated 9-1-09

Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO

Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

- *Names, Addresses, and Holdings of all Surface and Mineral Owners within ¼ mile of the Proposed Disposal Well, or all Owners of records in the field if a field wide system is proposed:*

**Please See Attachment 4.**

**All surface and mineral estate within ¼ mile of proposed disposal well is owned 100% by BLM, with 12.5% royalty interest**

- *List of all Domestic and Irrigation Wells within ¼ mile of the Proposed Disposal Well:*

**No Domestic and/or Irrigation water wells are within ¼ mile of the Proposed Disposal Well. (Information available at Colorado Division of Water Resources)**

- *Wells Needing Remedial Action That Penetrating Injection Zone within ¼ mile of the Proposed Disposal Well*

**No wells penetrating the injection zone within ¼ mile of Proposed Disposal Well need remedial work.**

- *Copy of Water Disposal Well System and Appurtenances Plans and Specifications:*

**Please See Attachment 5.**

COGCC Rule 325, Item c, paragraph 3

- *Resistivity Logs Run From Bottom of Surface Casing to TD for Disposal Well and All Other Wells Within 1 Mile of Disposal Well:*

**Please See Attachment 6.**

- *Cross Section of Disposal Well and All Other Wells within 1 Mile of Disposal Well:*

**Please See Attachment 7.**

COGCC Rule 325, Item c, paragraph 4

- *Full Description of Casing In The Disposal Well including Information On All Remedial Cement Work Performed:*

**Please See Attachment 8.**

- *Wellbore Diagram of Water Disposal Well (Present and Once Converted To Injector):*

Operator: Williams Production Ryan Gulch LLC  
UIC "Dedicated Injection Well" Permit Application To COGCC Dated 9-1-09  
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

Please See Attachment 9.

- *Surface Facility Diagram for Water Disposal Well:*

Please See Attachment 10.

- *Listing of All Leases Connected Directly By Pipelines to the Disposal Well:*

No leases will be connected directly via pipeline upon onset of disposal operations. Williams will notify COGCC before any future direct pipeline connections are implemented.

Please See Attachment 11.

COGCC Rule 325, Item c, paragraph 5

- *Listing of All Sources of Water, by Lease and Well To Be Injected Submitted On Form 26 (Source of Produced Water For Disposal):*

Please See Attachment 12.

Attachment 12 defines the scope for all potential sources of frac flowback and produced water (by well and lease) that constitute the "Greater Ryan Gulch" Area for wells operated by various Williams entities.

COGCC Rule 325, Item c, paragraph 6

- *Any Proposed Stimulation for the Disposal Well:*

No stimulation is proposed for the Disposal well.

COGCC Rule 325, Item c, paragraph 7

- *Estimated Minimum and Maximum Water To Be Injected Daily With Anticipated Injection Pressures:*

Estimated Maximum Water Injection Rate/Pressure: 5,000 bwpd at 3,400 psig \*  
Estimated Minimum Water Injection Rate/Pressure: 0 bwpd on vacuum

RECEIVED

SEP 09 2009

COGCC



SEP 09 2009

COGCC

Operator: Williams Production Ryan Gulch LLC  
UIC "Dedicated Injection Well" Permit Application To COGCC Dated 9-1-09  
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

*\* Surface pressure resulting from maximum bottom hole pressure less hydrostatic head plus frictional pressure drop. Frictional pressure drop calculated based upon 2-3/8" tubing, internally coated with HDPE type material with internal diameter of 1.710" ID.*

COGCC Rule 325, Item c, paragraph 8

- *Names and Addresses Of Those Persons Notified By The Applicant (As Required By Rule 325, item i) for (a) each Surface Owner and Owner within ¼ Mile and (b) Owners and Operators of Oil and Gas Wells Producing From The Injection Zone within ½ Mile of the Disposal Well:*

No notification was necessary under Rule 325 (i) based on the following:

- Surface owner is Bureau of Land Management
- The only producing MVRD wells within ½ mi. are Williams operated wells where Williams entities have 100% Working Interest.
- There are two additional wells within the ½ mile radius, however both are abandoned per COGCC data.

Miscellaneous Hardcopy Attachments To COGCC UIC Application Filing:

1. Cross Section of Well Logs: A large printout of the well log cross section in proximity to proposed Federal 299-27-5 injection/disposal well. This is a large version of the same cross section included in the body of this application as an 8-1/2" x 11".
2. Formation Evaluation Log: Copy of Schlumberger Platform Express well log for proposed Federal 299-27-5 injection/disposal well dated Nov 26, 2005.
3. USIT Cement Log (Post Squeeze): Copy of Schlumberger Ultrasonic Imaging Log, Gamma Ray, and CCL log for proposed Federal 299-27-5 run June 22, 2009 after cement squeeze. Cement squeezes were performed to achieve a minimum 200 ft of quality cement above upper most injection perforation. The production casing cement job was a Schlumberger 10.5 ppg "Litecrete" job pumped by previous operator. Conventional CBL would not be an appropriate tool for evaluating 10.5 ppg "Litecrete" since the acoustic impedance of "Litecrete" is sufficiently lower than standard cement. Consequently, Schlumberger recommended an Ultrasonic Imaging Tool (USIT) to evaluate the post squeeze cement sheath that contains both "Litecrete" and conventional squeeze cement material. Log was reviewed and cement squeeze accepted by Dave Andrews on July 2, 2009.

Operator: Williams Production Ryan Gulch LLC  
UIC "Dedicated Injection Well" Permit Application To COGCC  
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

RECEIVED

SEP 09 2009

COGCC

**Schlumberger**

Client:  
Well: Fed 299-27-5  
Date: 7/17/2009  
Tested By: Aida Vazquez

### **WATER ANALYSIS REPORT**

	7/16/2009	7/16/2009		
Collection date	7/16/2009	7/16/2009		
Temp (°F)	67	67		
pH	8.0	8.0		
Specific Gravity	1.009	1.009		
Chlorides (mg/l)	7100	6745		
Iron (mg/l)	0	0		
Bicarbs (mg/l)	0	0		
Carbonates (mg/l)	600	600		
Hydroxides (mg/l)	170	170		
Calcium (mg/l)	800	400		
Magnesium (mg/l)	480	480		
Sulfates (mg/l)	100	90		
Sodium (mg/l)	3481	3708		
Potassium (mg/l)	450	450		
TDS (mg/l)	11451	11313		
Percentage Chloride	1.5	1.4		
Resistivity	0.57	0.57		

COMMENTS:

**Water Analysis Of The Injected Formation**

Attachment 1



Operator: Williams Production Ryan Gulch LLC  
 UIC "Dedicated Injection Well" Permit Application To COGCC  
 Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
 Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

RECEIVED

SEP 09 2009

COGCC



## Water Analysis Report

Field : Ryan Gulch	Sample Date : 12/12/2006
County : Rio Blanco	Formation :
Location : RG 31-20	Rock Type :
Lab ID : Williams	Depth :
Comments : Mn - .50	

CATIONS	mg/l	meq/l	ANIONS	mg/l	meq/l
Potassium	189.0	4.83	Sulfate	10.0	0.21
Sodium	2,930.0	127.45	Chloride	3,500.0	98.72
Calcium	40.0	2.00	Carbonate	0.0	0.00
Magnesium	24.4	2.01	Bicarbonate	2,318.0	38.00
Iron	8.5	0.30	Bromide	0.0	0.00
Barium	25.0	0.36	Organic Acids	0.0	0.00
Strontium	0.0	0.00	Hydroxide	0.0	0.00
SUM +	3,216.9	136.95	SUM -	5,828.0	136.93

### Solids

Total Dissolved Solids @180°C	7,654 mg/l
Total Solids, Calc less CO <sub>2</sub>	7,654 mg/l
Total Solids, Calculated	9,045 mg/l
Total Solids, NaCl equivalents	7,310 mg/l
Chloride as NaCl	5,769 mg/l
NaCl% of Total Dissolved Solids	63.79 %
Accuracy	-0.01 Sigma

### Dissolved Gases

Bisulfide ion, HS	0.0 mg/l
Hydrogen Sulfide, H <sub>2</sub> S	0.0 mg/l
Total Sulfide	0.0 mg/l

### Other Properties

Calcium Hardness as CaCO <sub>3</sub>	99.9 mg/l
Magnesium Hardness as CaCO <sub>3</sub>	101.1 mg/l
Total Hardness as CaCO <sub>3</sub>	201.0 mg/l
Hardness, grains	11.70 grains/gallon

### Microbiological

Sulfate Reducing	nd
Aerobic Bacteria	nd

### Sample Conditions

pH, s.u. (Field)	7.80 s.u.
Sample Pressure	6.00 psia
Mole% CO <sub>2</sub> Gas	5.00 %
pH, s.u. (from CO <sub>2</sub> )	7.85 s.u.
Surface Temp	60 °F
Downhole Temp	125 °F
Ionic Strength	0.141 μ

Dissolved O <sub>2</sub> , aq	0.0 ppb
Measured CO <sub>2</sub> , aq	0.0 mg/l
Calculated CO <sub>2</sub> , aq	32.6 mg/l

Specific Gravity	1.006 measured
Specific Gravity	1.006 calculated
Resistivity, 68°F	1.065 ohm-cm
Conductivity 25°C	9,390 μmhos/cm

### Scaling Conditions

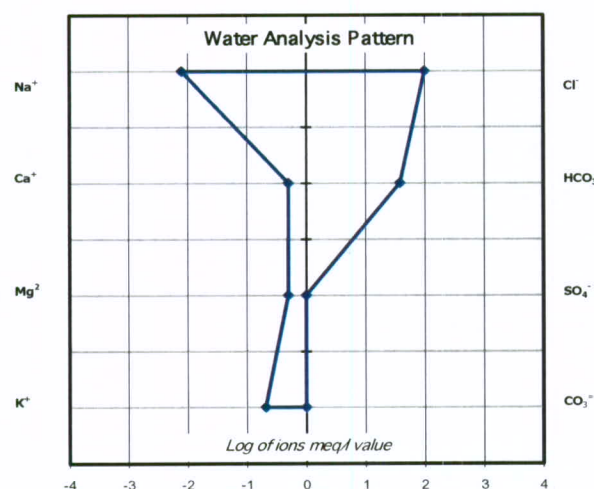
Calcium Carbonate	CaCO <sub>3</sub> +
Calcium Sulfate	CaSO <sub>4</sub> - - -
Barium Sulfate	BaSO <sub>4</sub> +
Strontium Sulfate	SrSO <sub>4</sub> -

### Probable Mineral Residue, Dry

Calculation error = 0 %

COMPOUND	mg/l
NaCl	5,497.9
NaHCO <sub>3</sub>	2,803.0
KCl	346.6
Ca(HCO <sub>3</sub> ) <sub>2</sub>	161.8
Mg(HCO <sub>3</sub> ) <sub>2</sub>	146.9
BaSO <sub>4</sub>	24.3

Note: nd denotes 'Not Determined'  
 Analyzed by: Creg Wilkins  
 Approved: Creg Wilkins  
 12/17/03 v947MDCarney



## Water Analysis Indicative of Low TDS Source Water Well

Attachment 1



Operator: Williams Production Ryan Gulch LLC  
 UIC "Dedicated Injection Well" Permit Application To COGCC  
 Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
 Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

RECEIVED

SEP 09 2009

COGCC



## Water Analysis Report

Field : Ryan Gulch	Sample Date : 2/7/2008
County : Rio Blanco	Formation :
Location : RG 12-10	Rock Type :
Lab ID : Williams	Depth :
Comments : Mn - .39 PPM	Recompletion

CATIONS	mg/l	meq/l	ANIONS	mg/l	meq/l
Potassium	3,305.0	84.53	Sulfate	27.0	0.56
Sodium	8,235.9	358.24	Chloride	16,300.0	459.76
Calcium	636.0	31.74	Carbonate	0.0	0.00
Magnesium	80.5	6.62	Bicarbonate	1,439.6	23.60
Iron	7.3	0.26	Bromide	0.0	0.00
Barium	174.0	2.53	Organic Acids	0.0	0.00
Strontium	0.0	0.00	Hydroxide	0.0	0.00
SUM +	12,438.7	483.92	SUM -	17,766.6	483.92

### Solids

Total Dissolved Solids @180°C	29,342 mg/l
Total Solids, Calc less CO <sub>2</sub>	29,342 mg/l
Total Solids, Calculated	30,205 mg/l
Total Solids, NaCl equivalents	25,243 mg/l
Chloride as NaCl	20,937 mg/l
NaCl% of Total Dissolved Solids	69.31 %
Accuracy	0.00 Sigma

### Dissolved Gases

Bisulfide Ion, HS	1.7 mg/l
Hydrogen Sulfide, H <sub>2</sub> S	0.3 mg/l
Total Sulfide	2.0 mg/l

### Other Properties

Calcium Hardness as CaCO <sub>3</sub>	1,587.9 mg/l
Magnesium Hardness as CaCO <sub>3</sub>	331.1 mg/l
Total Hardness as CaCO <sub>3</sub>	1,919.0 mg/l
Hardness, grains	111.74 grains/gallon

### Microbiological

Sulfate Reducing	nd
Aerobic Bacteria	nd

### Sample Conditions

pH, s.u. (Field)	7.80 s.u.
Sample Pressure	6.00 psia
Mole% CO <sub>2</sub> Gas	3.00 %
pH, s.u. (from CO <sub>2</sub> )	7.82 s.u.
Surface Temp	60 °F
Downhole Temp	125 °F
Ionic Strength	0.520 μ

Dissolved O <sub>2</sub> , aq	0.0 ppb
Measured CO <sub>2</sub> , aq	0.0 mg/l
Calculated CO <sub>2</sub> , aq	18.3 mg/l

Specific Gravity	1.021 measured
Specific Gravity	1.021 calculated
Resistivity, 68°F	0.250 ohm-cm
Conductivity 25°C	40,000 μmhos/cm

### Scaling Conditions

Calcium Carbonate	CaCO <sub>3</sub> +
Calcium Sulfate	CaSO <sub>4</sub> - - -
Barium Sulfate	BaSO <sub>4</sub> +
Strontium Sulfate	SrSO <sub>4</sub> -

### Probable Mineral Residue, Dry

Calculation error = 0 %

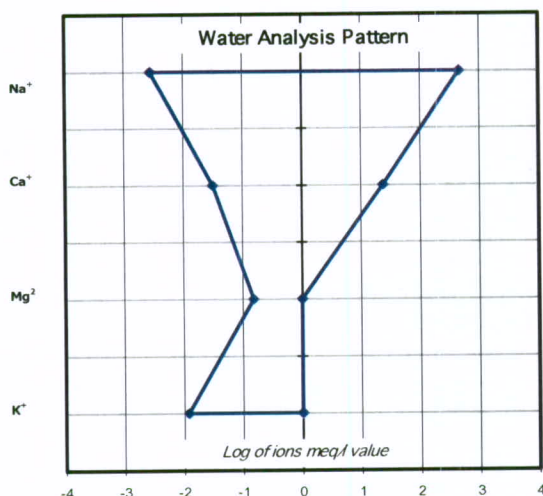
COMPOUND	mg/l
NaCl	20,936.6
KCl	6,301.9
Ca(HCO <sub>3</sub> ) <sub>2</sub>	1,881.2
CaCl <sub>2</sub>	473.0
MgCl <sub>2</sub>	315.4
BaSO <sub>4</sub>	65.6

Note: nd denotes 'Not Determined'

Analyzed by: Creg Wilkins

Approved: Creg Wilkins

12/17/03 v947MDCarney



**Water Analysis Indicative of Typical Sego-Mesaverde Source Water Well**

Attachment 1

Operator: Williams Production Ryan Gulch LLC  
UIC "Dedicated Injection Well" Permit Application To COGCC  
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

RECEIVED

SEP 09 2009

COGCC

Proposed Injection Program

The Williams Production RMT injection program is required for disposal of produced and used workover fluids that are in excess of the storage capacity in the field. Fluids will be trucked to the injection facility where they are filtered and subsequently injected into the disposal well. Please refer to the surface facility diagram attached to this application for a detailed explanation. Surface pressures will not exceed 3,400 psi for an injection rate of 5,000 bwpd. These values were derived from the Injection Test Analysis that follows.

Williams Production RMT estimates that the injection program will operate at a lower rate at startup but may increase to the upper injection rate of 5,000 bwpd over time.



RECEIVED

SEP 09 2009

COGCC

Operator: Williams Production Ryan Gulch LLC

UIC "Dedicated Injection Well" Permit Application To COGCC

Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO

Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

The existing well casing was first hydrotested to 1500 psig prior to initiating Step Rate Injection Test (SRIT). Per Dave Andrews on July 2, 2009 a witnessed Mechanical Integrity Test (MIT) was not required prior to placing the final injection/disposal well Bottom Hole Assembly (BHA).

The Step Rate Injection Test (SRIT) was performed on July 15, 2009. SRIT pressures and rates were recorded at surface and was pumped using a tubing and packer configuration. Injection was conducted upon the fractured interval with the following perforations:

Perf Top (ft)	Perf Base (ft)	# Holes	Hole Dia. (in)
6220	6354	42	0.32
6458	6570	45	0.32
6626	6681	27	0.32
6758	6836	36	0.32

A standard Step Rate Injection Test (SRIT) is presented below by plotting the rate of each step vs. the Bottom Hole Pressure (BHP). Figure 1 shows the Pressure vs. Rate plot.

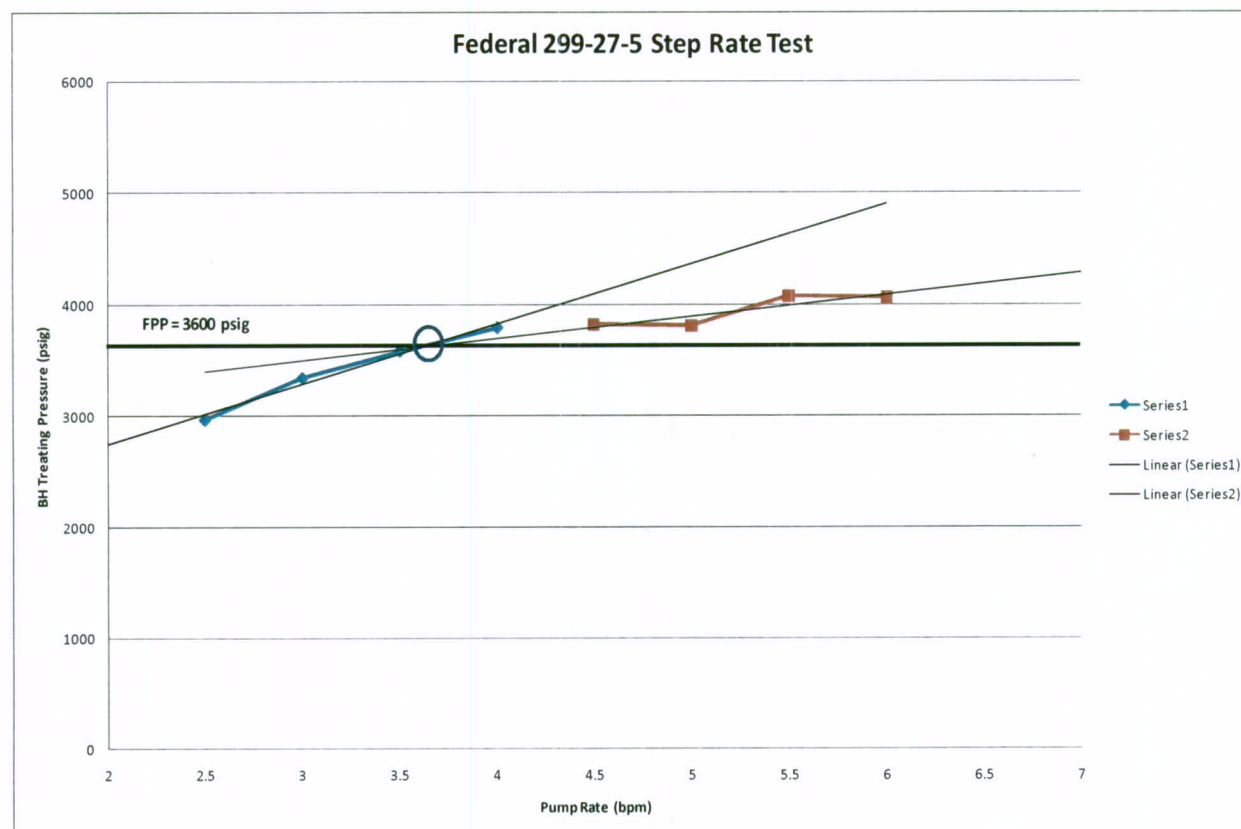


Fig. 1

## Step Rate Injection Test Results

Attachment 2

Operator: Williams Production Ryan Gulch LLC  
UIC "Dedicated Injection Well" Permit Application To COGCC  
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

RECEIVED

SEP 09 2009

COGCC

A best fit line is projected through the group of low rate points and another is projected through the high rate points. The intersection of these lines defines the Formation Parting Pressure (FPP) which is the BHP above which the formation breaks down. The FPP is the upper limit on the BHP for injection at matrix conditions.

The FPP for the injection zones is calculated to be 3,600 psi.

Using the top perforation of 6,220 ftmd, a frac gradient of 0.579 psi/ft is obtained.

#### Proposed Injection Pressures

Based on the SRIT analysis and the calculated pipe friction, the following conditions are proposed to determine the maximum allowable surface pressure.

#### Assumptions:

2-3/8" Tubing, Internally Coated w/HDPE Type Material (1.710" ID)

Density of Fluid: 8.43 ppg

Top Injection perf: 6,220 ftmd

#### Calculations:

Max BH Pressure = FPP = 3,600 psi

Hydrostatic Pressure =  $6,220 \text{ ft} \times 8.43 \text{ ppg} \times 0.052 = 2,727 \text{ psi}$

Max Surface Pressure =  $3,600 \text{ psi} - 2,727 \text{ psi} + \text{Friction at Rate}$

Max Surface Pressure =  $873 \text{ psi} + \text{Friction at Rate}$

During the SRT a BHP of approximately 3,600 psi was measured at 3.5 bpm (5,040 bwpd). The pipe friction was calculated to be 2,543 psi at 3.5 bpm. The max surface pressure at 3.5 bpm would be:

Max Surface Pressure =  $873 \text{ psi} + 2,543 \text{ psi} = 3,416 \text{ psi}$

According to the test results, the max injection rate would be approximately 5,000 bwpd. However, actual injection rates would be subject to not exceeding the maximum surface pressure.

## **Step Rate Injection Test Results**

Attachment 2



RECEIVED

SEP 09 2009

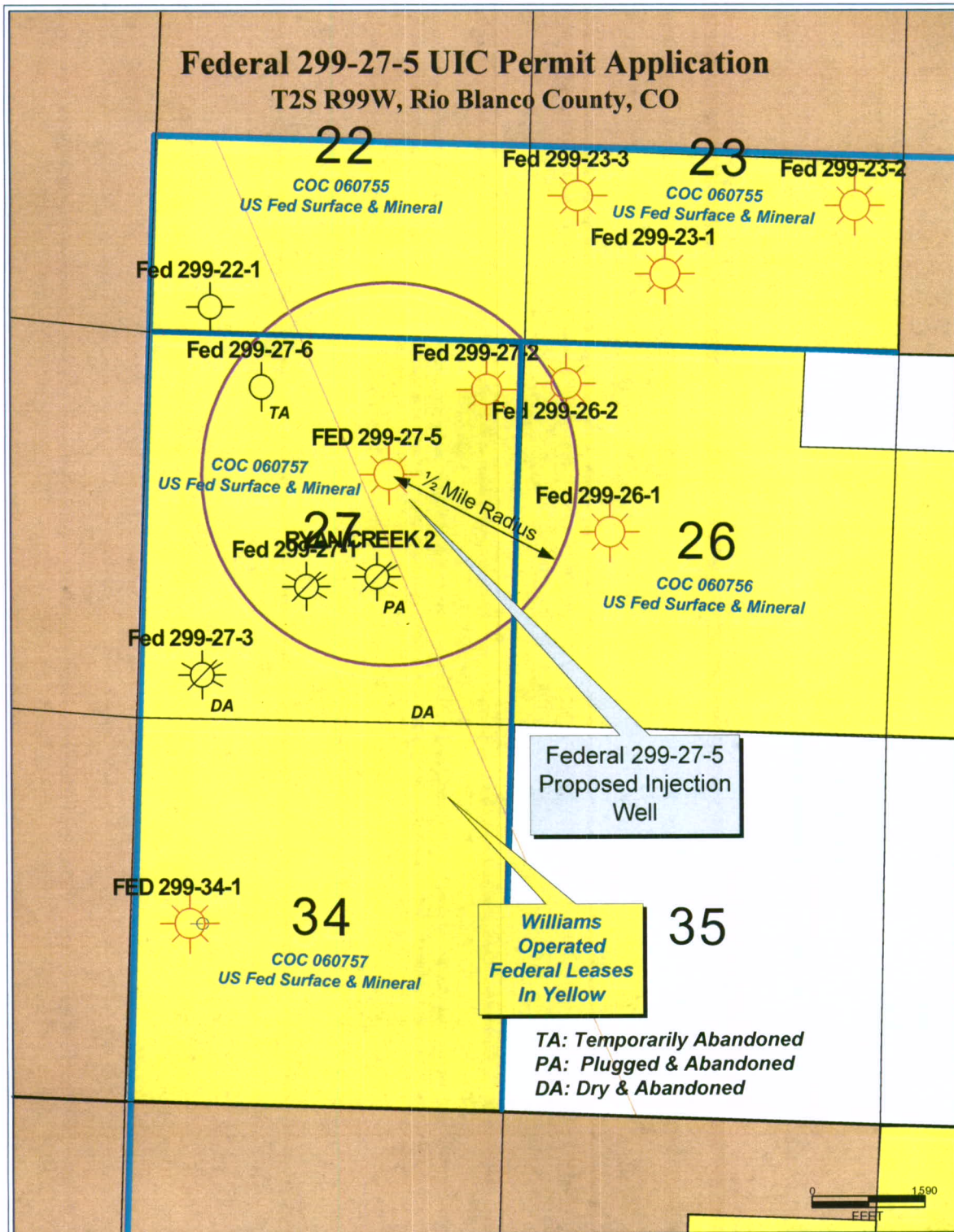
COGCC

Operator: Williams Production Ryan Gulch LLC

UIC "Dedicated Injection Well" Permit Application To COGCC

Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO

Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area



PETRA 9/18/2009 7:29:28 AM

### Base Plat of the Proposed Injection Well

Attachment 3

Operator: Williams Production Ryan Gulch LLC  
UIC "Dedicated Injection Well" Permit Application To COGCC  
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

RECEIVED

SEP 09 2009

COGCC

The US Federal Government is the surface and mineral owner for all properties within ½ mile of the proposed injection/disposal well. US Federal ownership in the land is managed through the US Department of Interior, Bureau of Land Management.

The pertinent regional BLM office for the subject land is located as follows:

**Name/Address:**

United States Dept. of the Interior  
Bureau of Land Management  
Colorado State Office  
2850 Youngfield St.  
Lakewood, CO 80125-7093

**Surface and Mineral Interest Owners Within ½ Mile**

Attachment 4

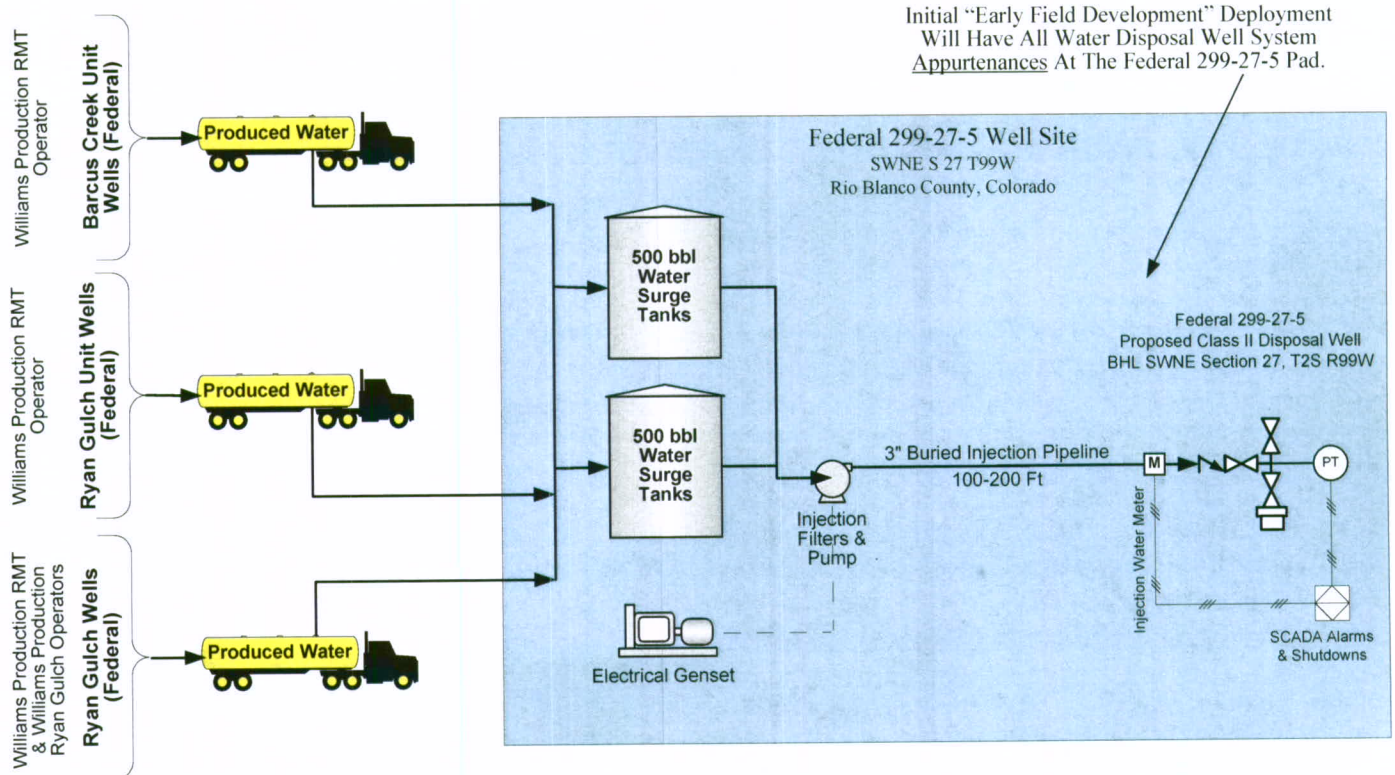


Operator: Williams Production Ryan Gulch LLC  
UIC "Dedicated Injection Well" Permit Application To COGCC  
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

RECEIVED  
SEP 09 2009  
COGCC

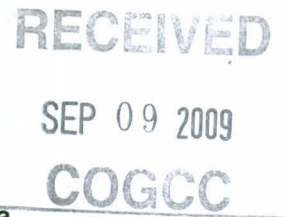
Williams Production RMT & Williams Production Ryan Gulch LLC Operator  
COGCC UIC Permit Application For "Dedicated Injection Well"  
**Simplified Water Disposal Well "System & Appurtenances Diagram"**

Initial "Early Field Development" Deployment Of Water Disposal Facility For Federal 299-27-5 Disposal Well



In The Future As Pipeline Infrastructure Builds Out The Above Will Be Replaced With A Disposal Water Pipeline System From A Central Site.

**Water Disposal Well System & Appurtenances Plans & Specifications.**  
Attachment 5



Operator: Williams Production Ryan Gulch LLC  
UIC "Dedicated Injection Well" Permit Application To COGCC  
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

<b>Federal 299-27-5 Log Information (Proposed Injection Well)</b>		05-103-10624
<u>Type</u>		<u>Location</u>
Borehole		See COGCC website
Variable Density		See COGCC website
CBL		See COGCC website
Caliper Print		See COGCC website
Array Induction		See COGCC website
Gamma Ray		See COGCC website
Density Porosity		See COGCC website
<b>Federal 299-27-6 Log Information (Offset Within 1-Mile)</b>		05-103-10644
<u>Type</u>		<u>Location</u>
Cement Volume		See COGCC website
Array Induction		See COGCC website
Field Dip Print		See COGCC website
Density Porosity		See COGCC website
<b>Federal 299-27-2 Log Information (Offset Within 1-Mile)</b>		05-103-10496
<u>Type</u>		<u>Location</u>
Platform Express		See COGCC website
GPIT		See COGCC website
<b>Federal 299-26-2 Log Information (Offset Within 1-Mile)</b>		05-103-10538
<u>Type</u>		<u>Location</u>
PE-AI/GR		See COGCC website
CNL/LD/GR		See COGCC website
PE-CAL/GR		See COGCC website
FE		See COGCC website
CBL/GR/CCL		See COGCC website
<b>Federal 299-26-1 Log Information (Offset Within 1-Mile)</b>		05-103-10364
<u>Type</u>		<u>Location</u>
CBL/GR/Array Induction/Density-Neutron		See COGCC website
<b>Federal 299-23-1 Log Information (Offset Within 1-Mile)</b>		05-103-10488
<u>Type</u>		<u>Location</u>
GR		See COGCC website
SCMT		See COGCC website
RST		See COGCC website
Cased Hole Gyroscope		See COGCC website

Attachment 6

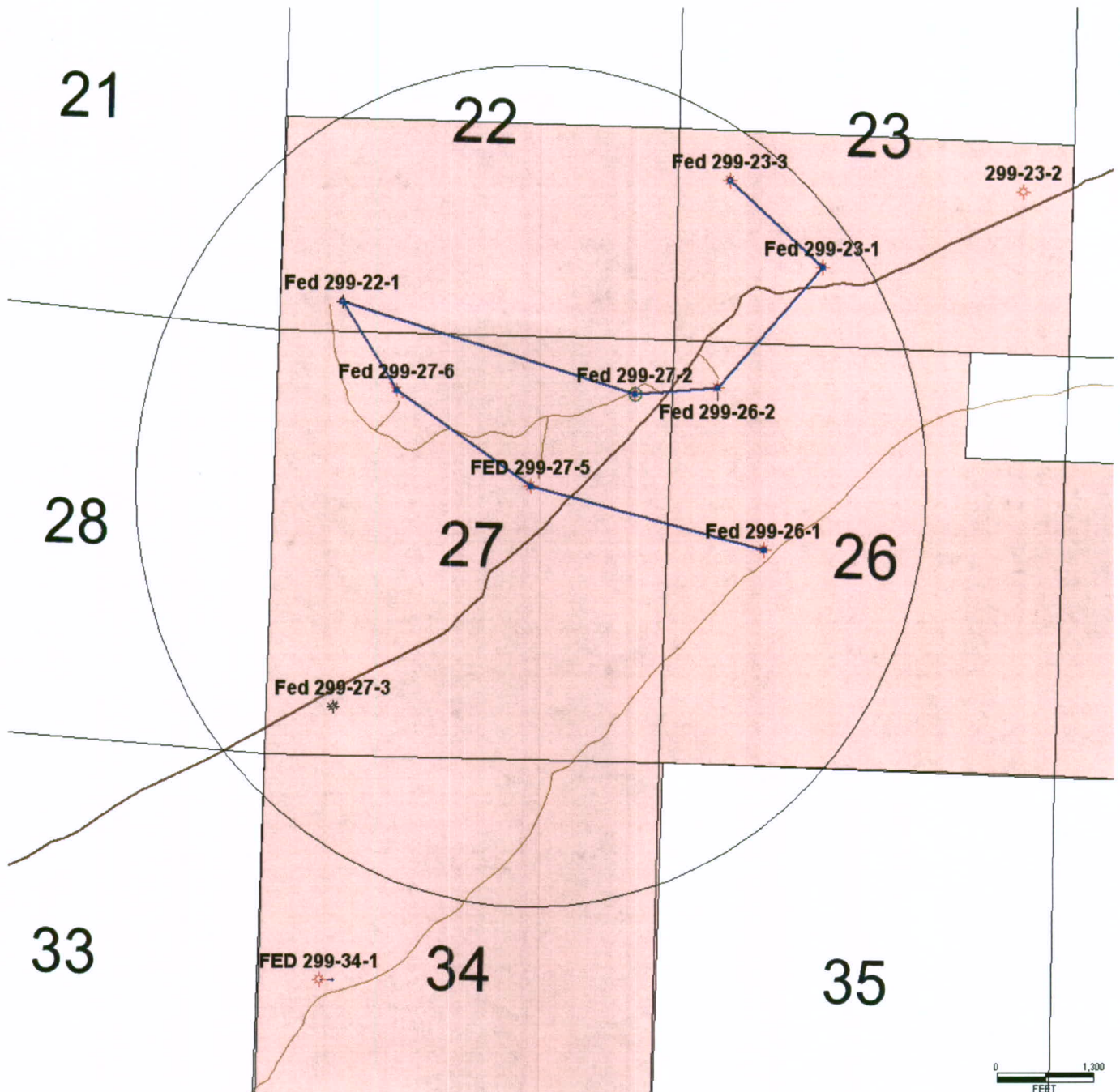
**Resistivity Logs for Injection/Disposal Well & All Other Wells Within 1 Mile**

Attachment 6



Operator: Williams Production Ryan Gulch LLC  
UIC "Dedicated Injection Well" Permit Application To COGCC  
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

RECEIVED  
SEP 09 2009  
COGCC



Cross Section of Injection/Disposal Well & All Other Wells Within 1 Mile  
Attachment 7

RECEIVED

SEP 09 2009

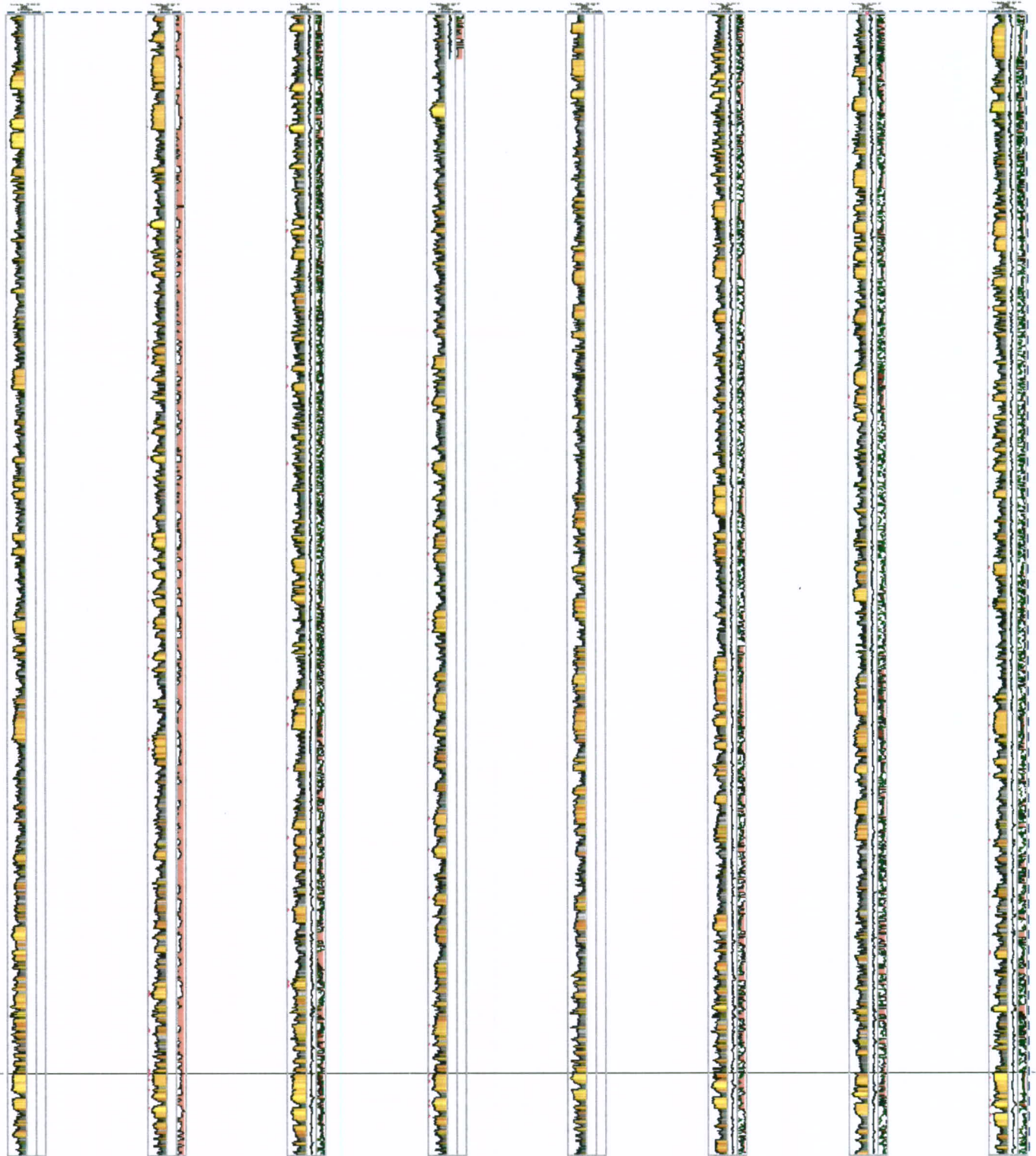
COGCC

Operator: Williams Production Ryan Gulch LLC

UIC "Dedicated Injection Well" Permit Application To COGCC

Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO

Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area



### Cross Section of Injection/Disposal Well & All Other Wells Within 1 Mile

Attachment 7

(Note - A Large Printout Of The Above Cross-Section Is Attached To The Back Of The UIC Application.)



RECEIVED

SEP 09 2009

COGCC

Operator: Williams Production Ryan Gulch LLC

UIC "Dedicated Injection Well" Permit Application To COGCC

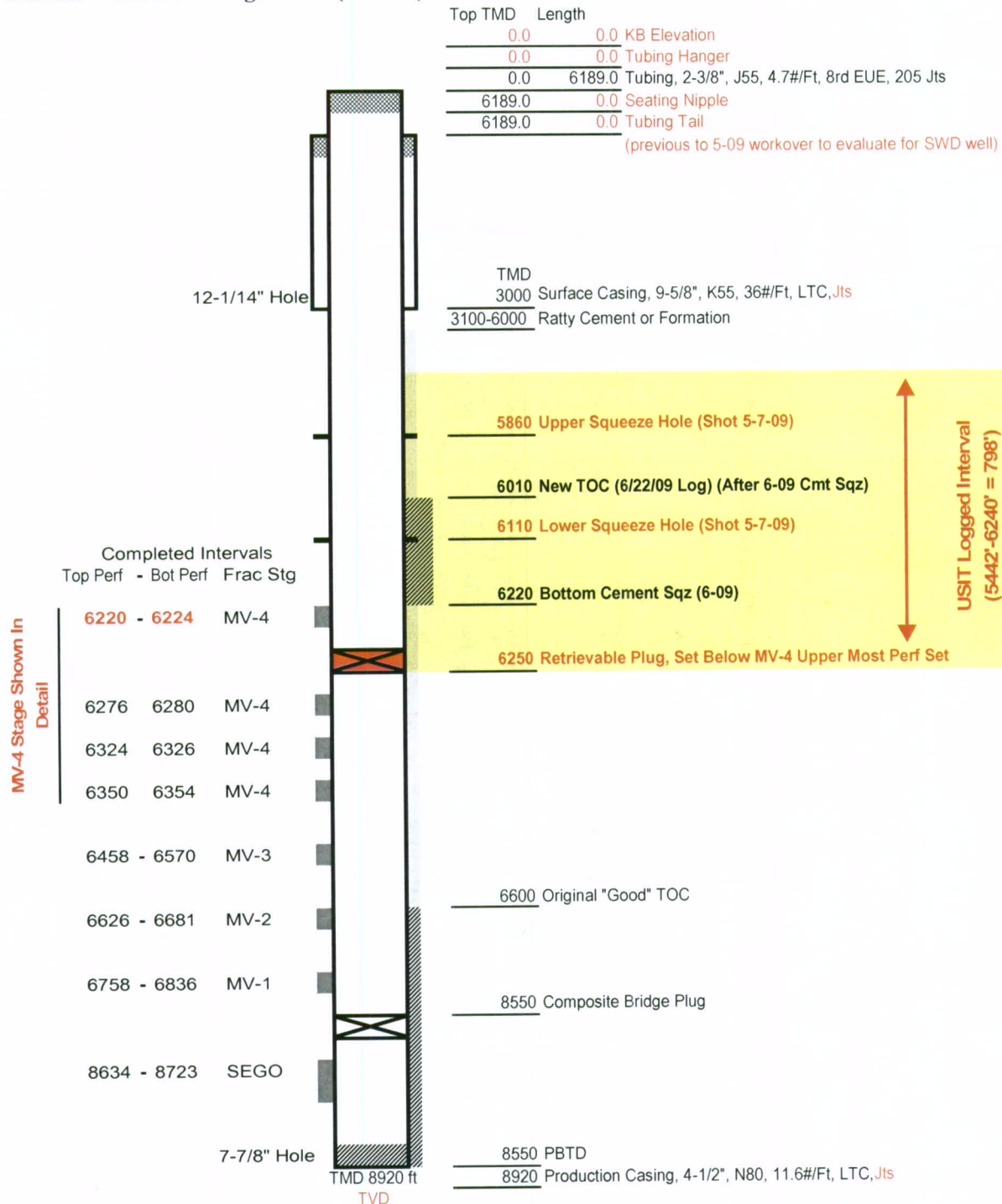
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO

Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

### Well: Federal 299-27-5

Operator: Williams Production Ryan Gulch LLC

Current Wellbore Configuration (8-15-09) Prior To Conversion To SWD



Wellbore Diagram of Water Injection/Disposal Well – Current Configuration  
Attachment 8

Operator: Williams Production Ryan Gulch LLC  
 UIC "Dedicated Injection Well" Permit Application To COGCC  
 Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
 Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

RECEIVED

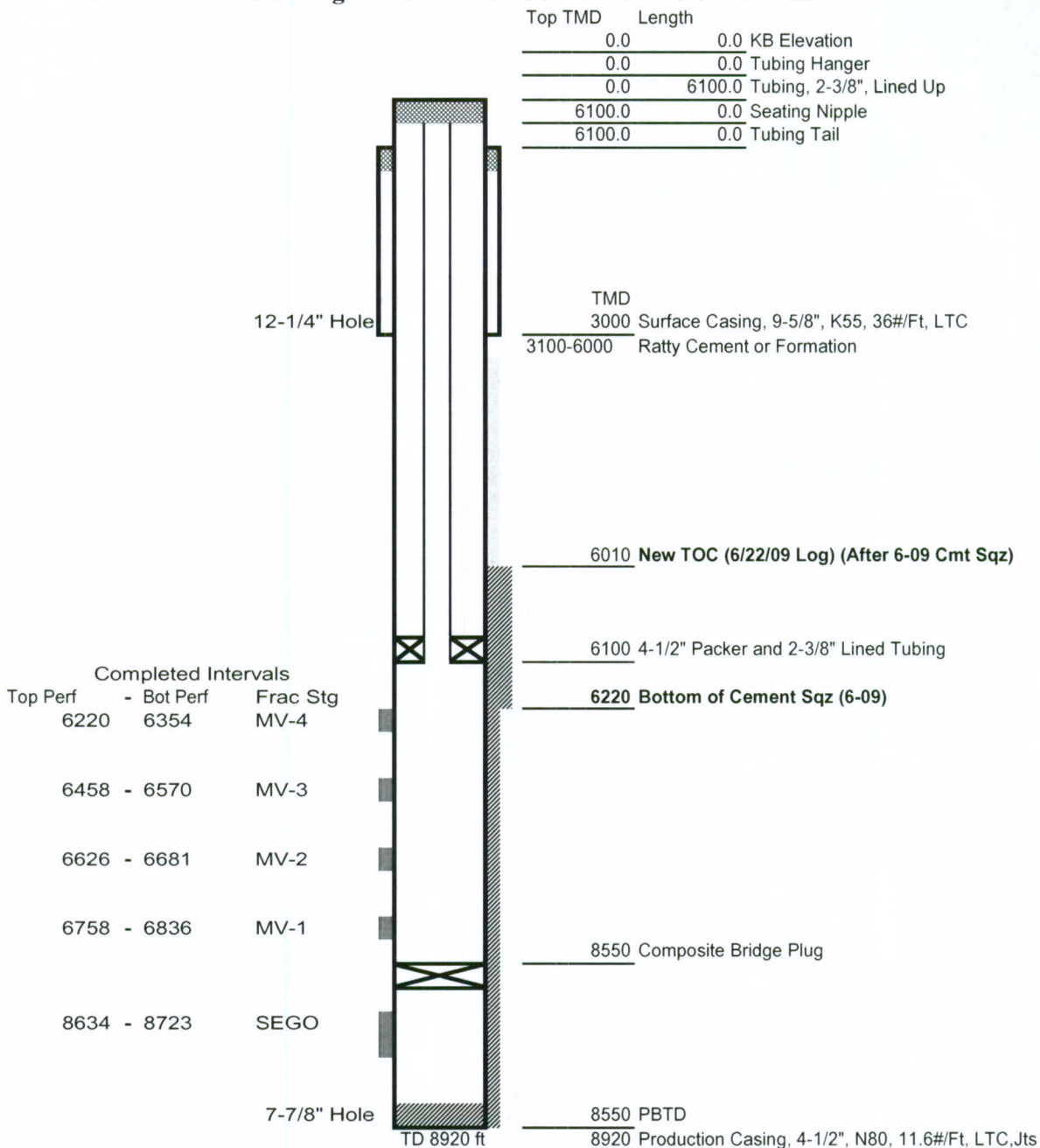
SEP 09 2009

COGCC

### Well: Federal 299-27-5

Operator: Williams Production Ryan Gulch LLC

#### Future Wellbore Configuration - After Conversion To SWD Well



### Wellbore Diagram of Water Injection/Disposal Well – After Conversion

Attachment 9



Operator: Williams Production Ryan Gulch LLC  
 UIC "Dedicated Injection Well" Permit Application To COGCC  
 Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
 Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area

RECEIVED  
 SEP 09 2009  
 COGCC

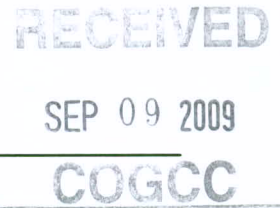


Rev	Description	Date	Williams			
			Williams Production RMT, Piceance Highlands Asset			
			Water Injection Configuration			
			Federal 299-27-5			
			SWNE, Sec. 27, 2S, 99W			
			Rio Blanco County, Colorado			
0	Draft For Review and Comment	7/28/2009	Drn By: GJD	7/28/2009	Scale: 1in = 100ft. 0in.	Dwg No: 1 Rev 0

Surface Facility Plot Plan For Injection/Disposal Well  
 Attachment 10

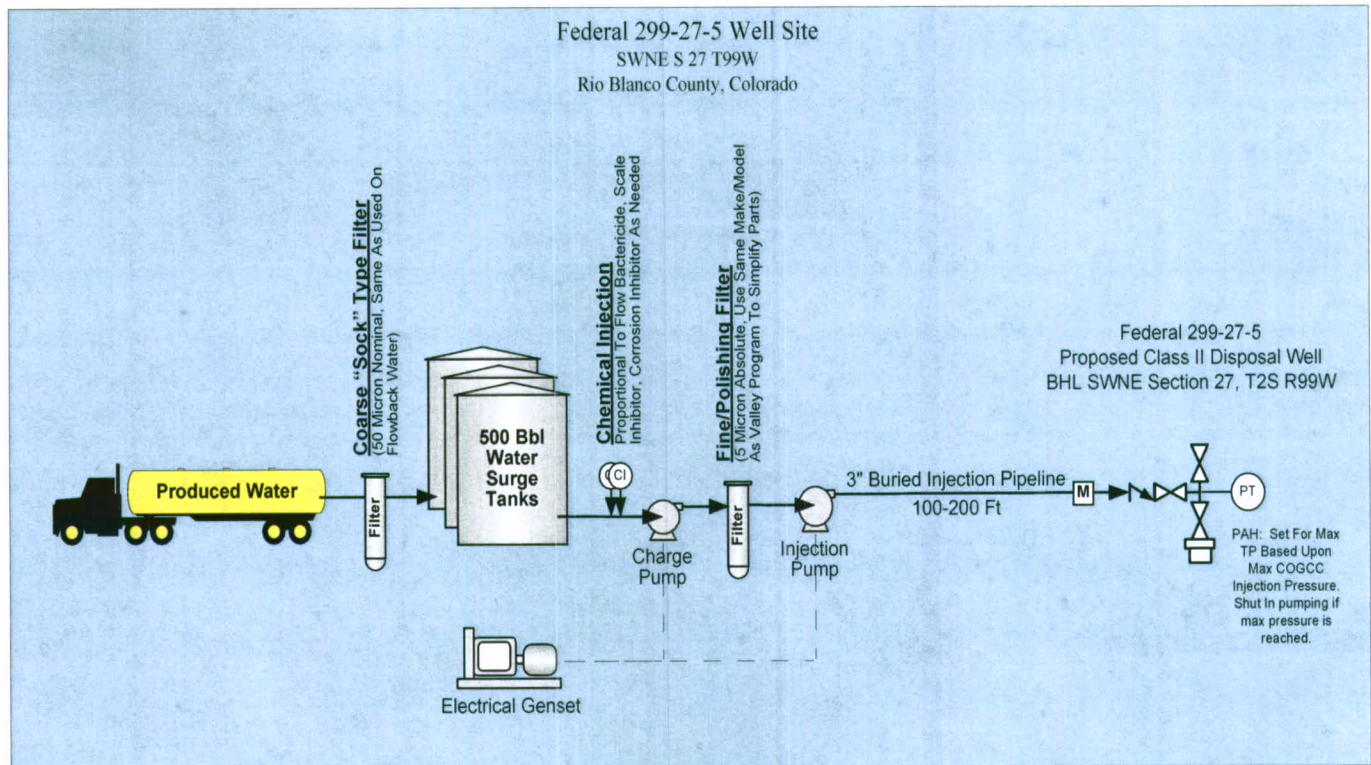


Operator: Williams Production Ryan Gulch LLC  
UIC "Dedicated Injection Well" Permit Application To COGCC  
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area



Williams Production Ryan Gulch LLC - Federal 299-27-5  
COGCC UIC Permit Application For "Dedicated Injection Well"  
**Simplified Flow Diagram For Injection Facilities**

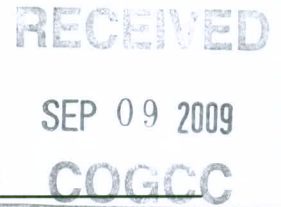
Initial "Early Field Development" Deployment Of Water Disposal Facility For Federal 299-27-5 Disposal Well



In The Future As Pipeline Infrastructure Builds Out The Above Will Be Replaced With A Disposal Water Pipeline System From A Central Site.



Operator: Williams Production Ryan Gulch LLC  
UIC "Dedicated Injection Well" Permit Application To COGCC  
Well: Federal 299-27-5 (API # 05-103-10624), S27-T2S-R99W, Rio Blanco County, CO  
Project: Convert Federal 299-27-5 To Class II SWD Servicing Greater Ryan Gulch Area



No leases will be connected directly via pipeline upon onset of injection/disposal operations.

As of August 2009 Williams is developing plans for a future water disposal pipeline system but the plans tentative without hard details.

Williams will notify COGCC before any future direct pipeline connections are implemented.

# Index Map For Log Cross Section "A-A"

RECEIVED

SEP 09 2009

COGCC

