

Prather Spring Site Investigation Phase 1 - Progress Report

COGCC and Joint Companies

November 24, 2008

Prepared for:



Nonsuch Natural Gas, Inc.

Prepared by:





Introductions and Agenda

- Sign in sheet
- Overview of Progress Report for 2008 activities
- Discussion of key points
- Questions

Overview of Phase I Investigation Activities

- Objectives - find source(s) of impacts to Prather Spring and Spring 2
 - Release to groundwater implied from well pad operations or reserve pits
 - Companies response included alternative water supply, fencing, surface water monitoring
- 1st Round of Drilling (July, in Prather drainage)
 - 5 shallow colluvial wells, 1 deep (50') bedrock well
 - Wells completed in colluvium only are dry
 - Only BTEX detect was in 11D
 - Spring 2 became impacted following first investigation
 - Interim investigation report submitted to COGCC in August

Overview of Phase I Investigation Activities

- Phase I Investigation activities (continued)
 - 2nd Round of Drilling (Aug and Sept)
 - Focused on bedrock zone
 - Prather drainage
 - 6 deep bedrock wells
 - 6 shallow bedrock wells (completed across colluvium)
 - Spring 2
 - 4 shallow wells, penetrated upper bedrock
 - 3 deep wells, completed in deeper bedrock
 - Groundwater sample analyses included VOCs, major ions, and trace metals

Overview of Phase I Investigation Activities

- Phase I Investigation activities (continued)
 - 3rd Round of Drilling (October)
 - EM-34 Survey
 - Soil Gas Survey (valleys and ridgeline)
 - Well Installation - Prather drainage
 - 17 monitoring wells
 - Screened in shallow flow zone (lower colluvium/bedrock)
 - Well Installation - Spring 2
 - 5 monitoring wells
 - Screened in shallow flow zone (lower colluvium/bedrock)
 - Groundwater sample analyses limited to VOCs by mobile lab; two water level measurements
 - One round of surveying for new wells

Overview of Phase I Investigation Activities

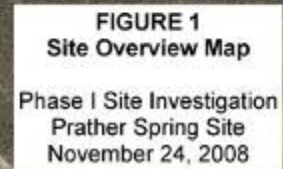
- Laboratories used include:
 - Evergreen, majority of samples collected
 - Chem Solutions, Field lab for 2nd/3rd round of drilling
 - Paragon (Ned Prather cistern samples)
- Surveying (multiple rounds by WHS and URS)
- Compilation of data from all parties into Access database
 - Reconciliation of sample location IDs
 - Electronic submittal of validated data to COGCC
- Vegetation Survey – August
- Cistern Sampling – October

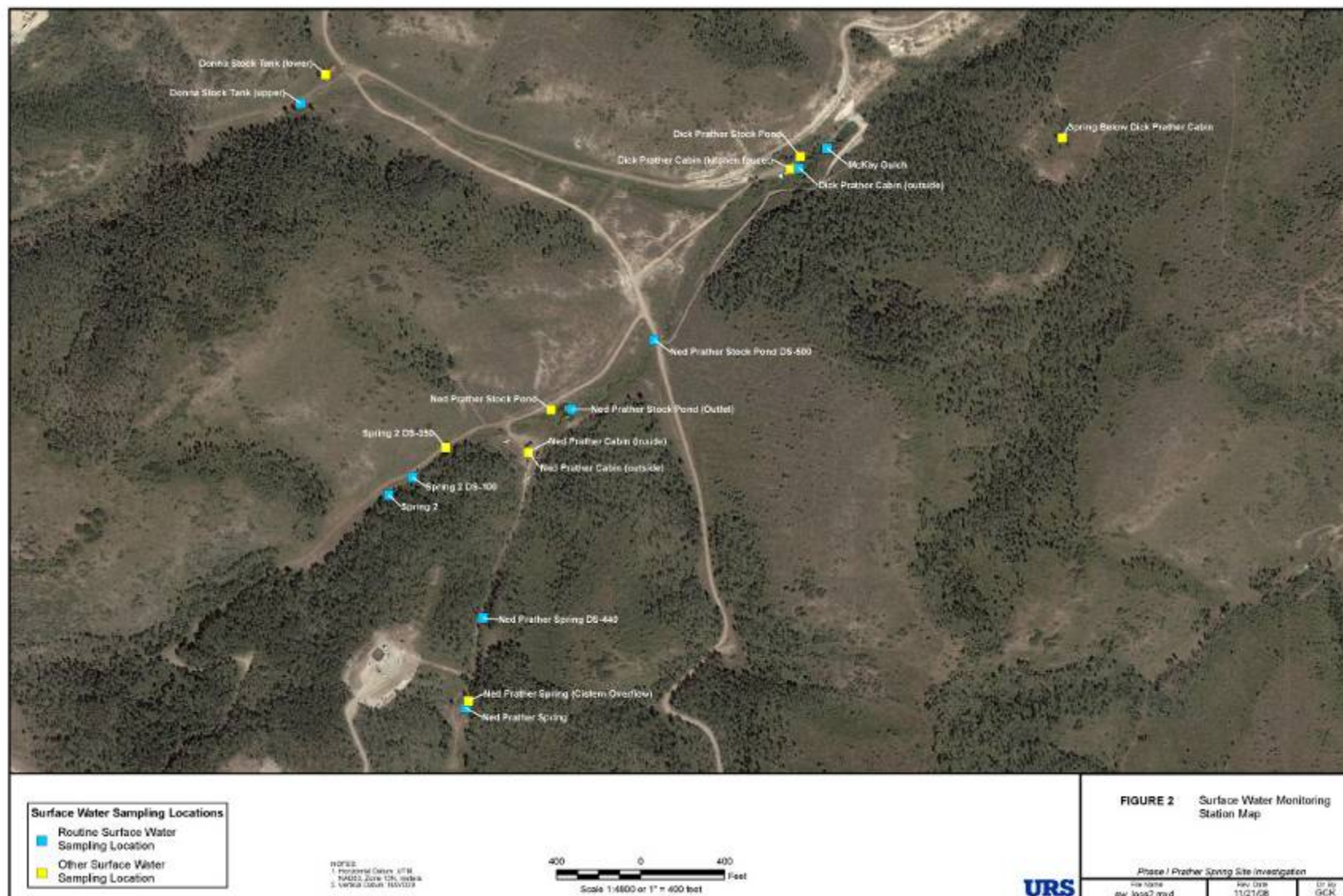
Table 1 – Phase I Field Activities Overview

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Work Plan	Document Date	Field Activity	Purpose	Start Date	End Date	Data Reporting
Joint Work Plan (URS 2008a)	Draft 07-07-08 Final 07-30-08	First Round of Drilling	Collect soil samples from borings; install six shallow monitoring wells	07/15/08	07/17/08	Interim Prather Spring Phase I Site Investigation Drilling Report (URS 2008 XX)
Joint Work Plan Addendum #1 (Golder 2008)	07-10-08	Routine Surface Water Sampling	Twice-weekly sampling at 10 SFW stations, analysis for VOCs, to evaluate SFW quality trends; later addition of chloride, nitrate, and nitrite	07/15/08	10/31/08	9/29/08 Data Presentation Meeting to COGCC and this report
NA	NA	Vegetation Survey	Response to COGCC request to evaluate potential for stressed vegetation	07/30/08	07/30/08	URS Memorandum to Chris Canfield dated 10/3/08
Joint Work Plan Addendum #2 (URS 2008b)	08-28-08	Revised Surface Water Monitoring and Groundwater Monitoring	Reduce monitoring frequency for VOCs and methane; addition of major cations, anions, trace metals and other inorganic parameters	08/25/08	10/31/08	9/29/08 Data Presentation Meeting to COGCC and this report
Joint Work Plan Addendum #3 (URS 2008c)	08-21-08	Bedrock Monitoring Well Installation (second round of drilling and well installation)	Installation of 15 deep bedrock monitoring wells in both drainages with collection of continuous core	08/28/08	09/10/08	9/29/08 Data Presentation Meeting to COGCC and this report
Joint Work Plan Addendum #4 (URS 2008d)	09-11-08 with 10-02-08 revision	Cistern Evaluation	Collection of water samples from cistern and observation of cistern contents; response to COGCC directive for additional work	10/3/08	10/3/08	This report
Joint Work Plan Addendum #5 (URS 2008e)	10-07-08	Supplemental Field Activities (including third round of drilling and well installation)	EM-34 survey, soil gas survey in valley and ridgeline, installation of intermediate zone wells in the drainage valleys	10/13/08	10/24/08	This report

1 of 1

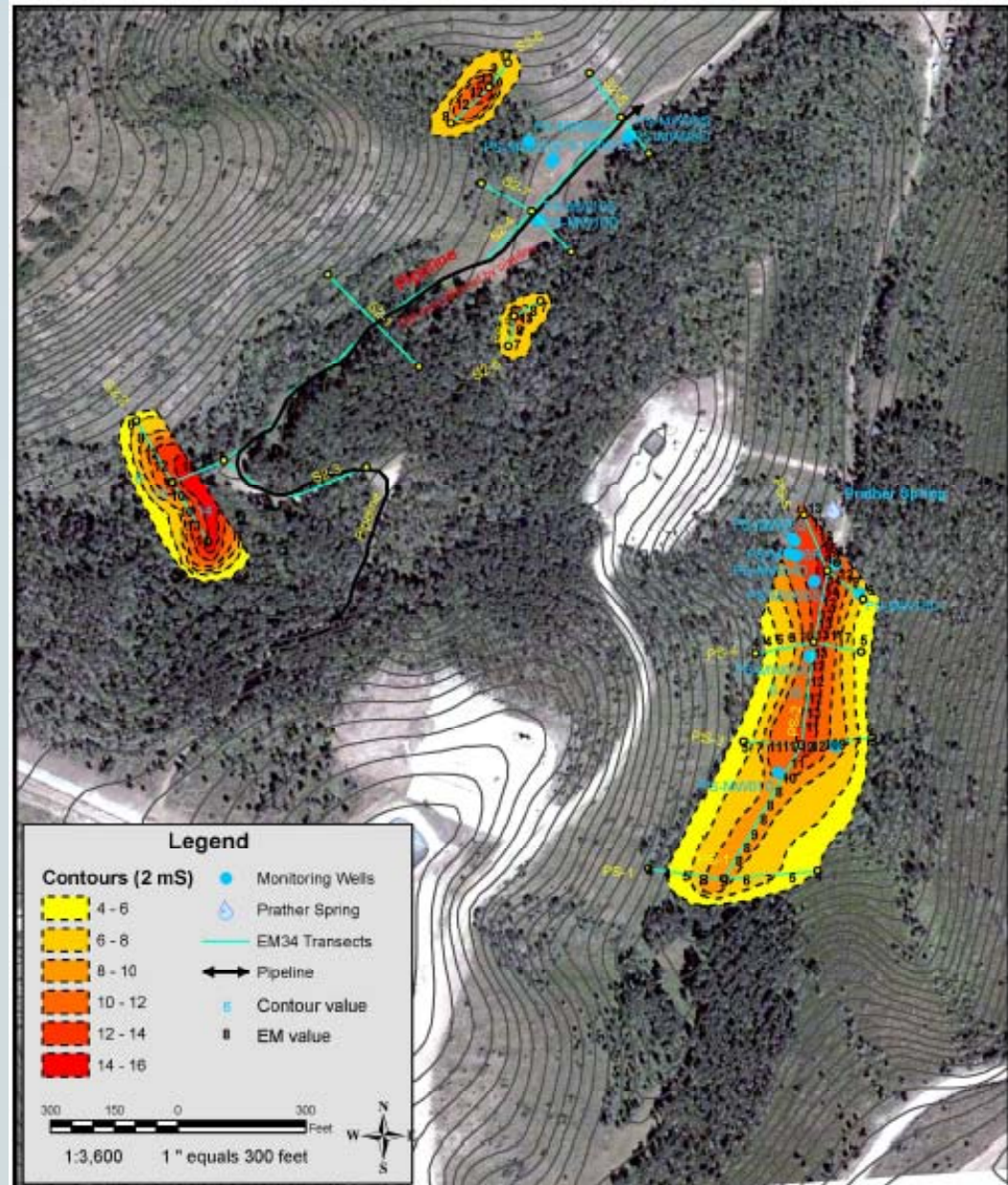




Report Section 3

- EM-34 Survey
 - Natural gas pipeline
- Soil Gas Survey
 - All results non-detect
- Monitoring Well Installations
 - 21 wells installed in shallow flow zone
 - Auger methods (no core)

EM-34 Map



Soil Gas Probes

■ PID Results

Table 6 – Soil Gas Probe Completion and PID Values

Prather Spring					
Location	Coordinates¹		Elevation	Total Depth (feet bgs)	PID Reading
	Northing	Easting			
PS-SGNS01	1624268.27	2240618.64	8257.88	20	6.1
PS-SGNS02	1624235.84	2240625.55	8256.62	15	4.5
PS-SGNS03	1624197.09	2240710.10	8251.78	19	14.6
PS-SGNS04	1624192.36	2240684.36	8252.65	17	4.2
PS-SGNS05	1624251.78	2240650.44	8255.14	15	4.2
PS-SGNS06	1624206.33	2240682.04	8253.72	16	6.7
PS-SGNS07	1624190.56	2240674.73	8258.26	17	7.2
PS-SGNS08	1624181.64	2240652.57	8256.64	16	2.7
PS-SGNS09	1624203.91	2240644.88	8255.88	18	3.6
PS-SGNS10	1624189.69	2240614.98	8259.13	18	3.0
PS-SGNS11	1624207.99	2240622.21	8257.87	18	3.2
PS-SGNS12	1624169.49	2240628.06	8259.03	18	2.6
Spring Two					
Location	Coordinates¹		Elevation	Total Depth (feet bgs)	PID Reading
	Northing	Easting			
PS-SGST01	1625257.00	2240297.64	8219.12	8.5	0.0
PS-SGST02	1625210.26	2240232.09	8230.75	11.3	0.0
PS-SGST03	1625194.30	2240243.60	8232.68	11.3	0.0
PS-SGST04	1625181.63	2240255.13	8237.50	12.2	0.0
PS-SGST05	1625113.40	2240144.42	8235.98	12.8	0.0
PS-SGST06	1625153.58	2240122.17	8230.97	13.6	0.0
PS-SGST07	1625047.42	2240023.61	8238.15	13.0	0.0
PS-SGST08	1625014.49	2240077.81	8239.77	13.5	0.0
PS-SGST09	1625018.91	2240104.97	8241.53	9.2	0.0
PS-SGST10	1625091.96	2240163.59	8240.55	9.5	0.0
PS-SGST11	1625121.33	2240180.67	8237.07	4.7	0.0
PS-SGST12	1625151.52	2240224.23	8237.83	10.0	0.0
PS-SGST13	1625236.51	2240308.85	8220.82	7.9	0.0
PS-SGST14	1625220.23	2240317.06	8225.1	9.3	0.0
PS-SGST15	1625250.92	2240169.14	8233.57	9.4	0.0
Condensate Tanks					
Location	Coordinates²		Elevation	Total Depth (feet bgs)	PID Reading
	UTM X	UTM Y			
PS-SGCT01	225309	4378379	NA	9	2.4
PS-SGCT02	225313	4378362	NA	9	7.5
PS-SGCT03	225318	4378346	NA	8	4.1
PS-SGCT04	225325	4378331	NA	9	4.8
PS-SGCT05	225329	4378320	NA	8	3.6
PS-SGCT06	225245	4378692	NA	9	0.7
PS-SGCT07	225256	4378687	NA	9	0.0
PS-SGCT08	225231	4378676	NA	8	0.1
PS-SGCT09	225245	4378673	NA	9	0.8
PS-SGCT10	225256	4378677	NA	8	0.6

¹ Based on field GPS measurements (State Plane, NAVD83) bgs = below ground surface

² Based on field sketch map, digitized into GIS (UTM, WGS NA = not available

PID readings are initial purge values from each soil probe. PID = photoionization detector

PID used was a MiniRae with a 10.6 eV bulb.

Sampling Locations

- Prather Spring drainage



Sampling Locations

- Spring 2 drainage







Report Section 4

- Geological and Hydrogeological Conceptual Model
- Geology
- Hydrogeology



Preliminary Findings - Geology

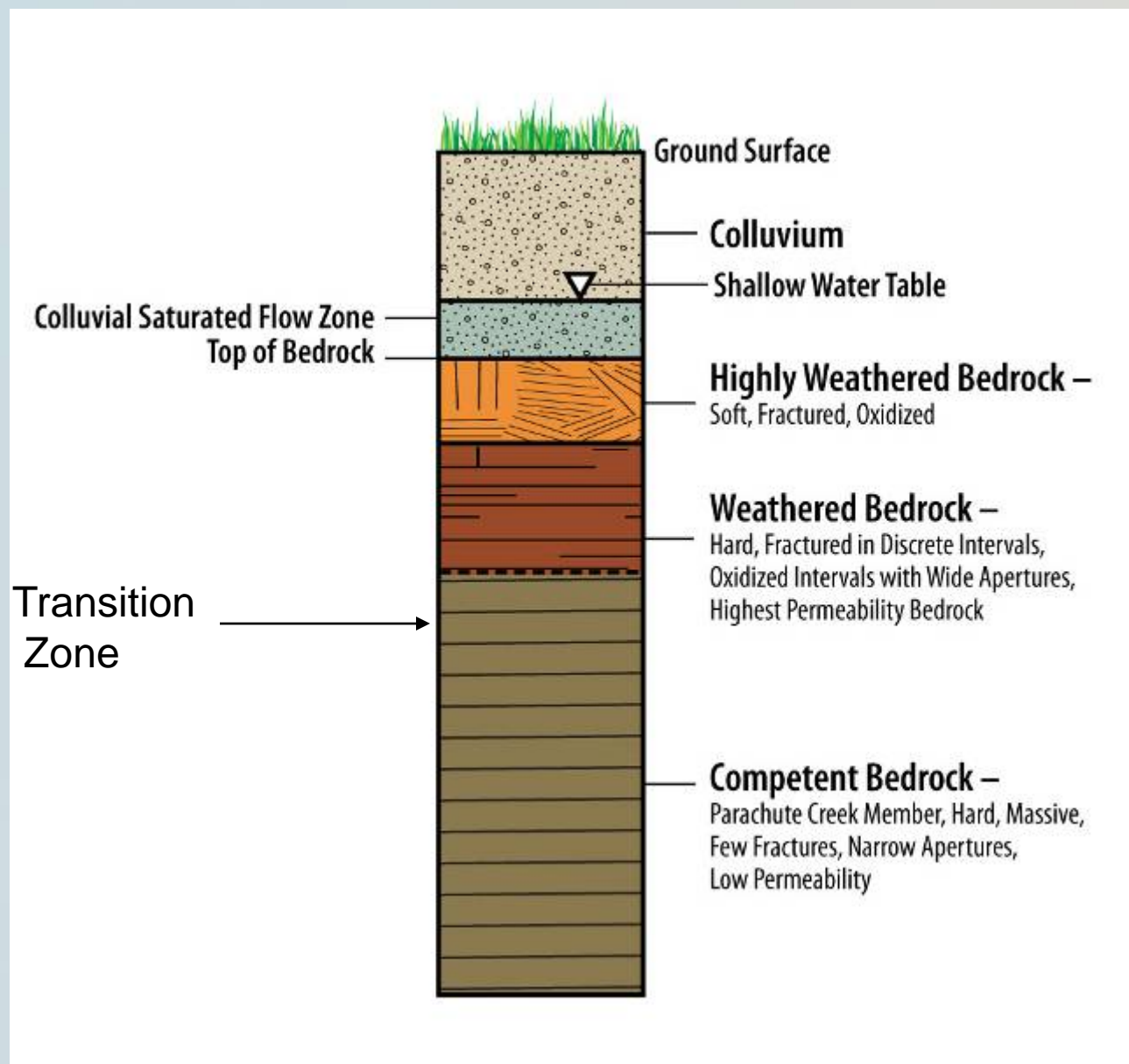
- Geologic Conditions
 - Uinta Formation (Unit D)
 - Siltstone and sandstone
 - Present at top of watershed (well pads)
 - Green River Formation (Parachute Creek Member)
 - Shale, marlstone, oil shale, carbonate rich zones
 - Encountered at all wells in valleys
 - Colluvium in valley and on slopes
 - Sandy clay matrix with shale and siltstone clasts
 - Encountered at all wells



Preliminary Findings - Geology

- Geologic Conditions
 - Well total depth
 - Prather Drainage – 15 to 61 feet
 - Spring 2 – 18 to 49 feet
 - Well screen length – 5 to 20 feet
 - Depth to bedrock (colluvium thickness)
 - Prather Drainage – 6 to 22 feet
 - Spring 2 – 12 to 18 feet

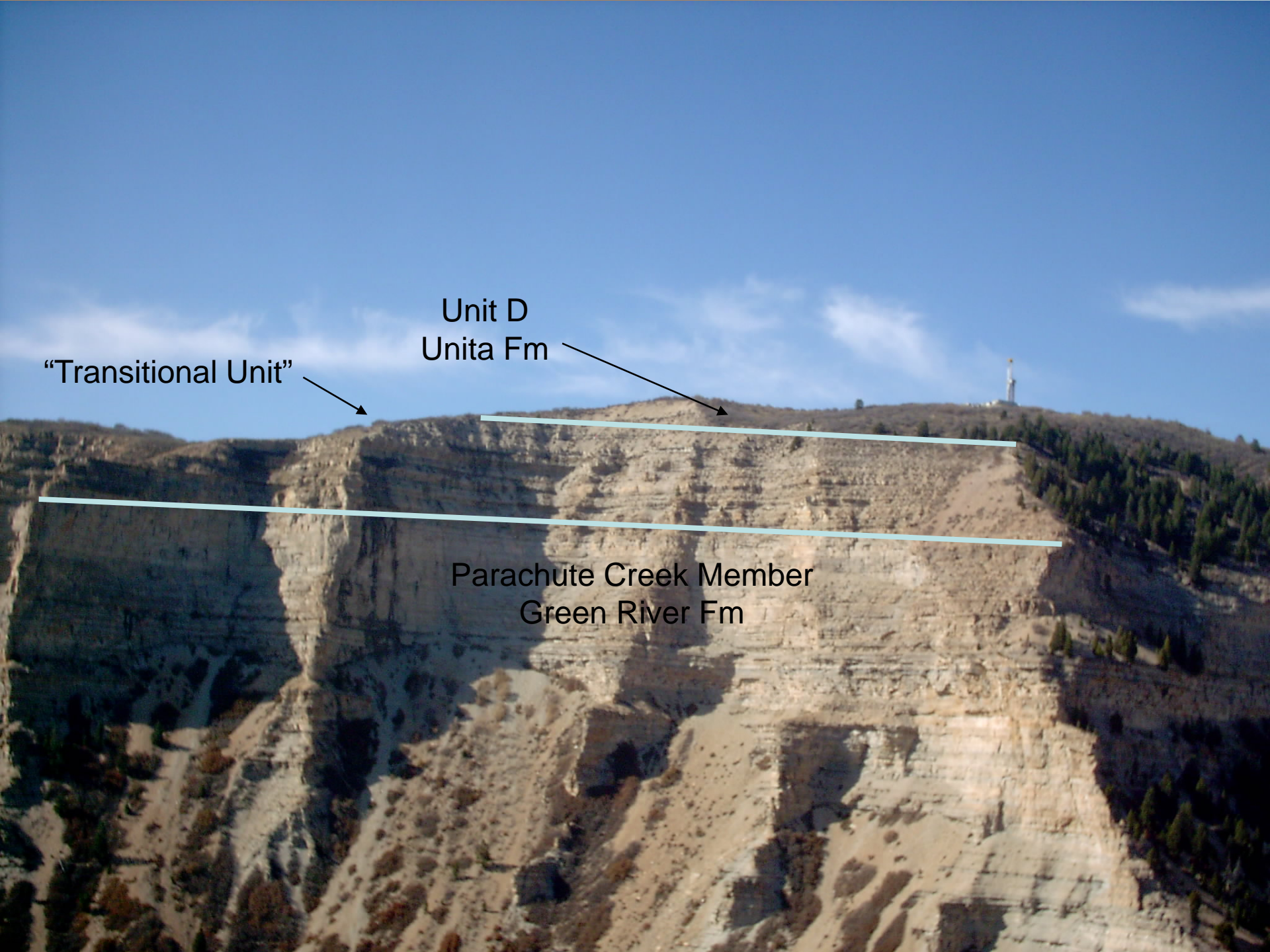
- One explanation for observed fracture pattern variations with depth



“Transitional Unit”

Unit D
Unita Fm

Parachute Creek Member
Green River Fm



Seeps

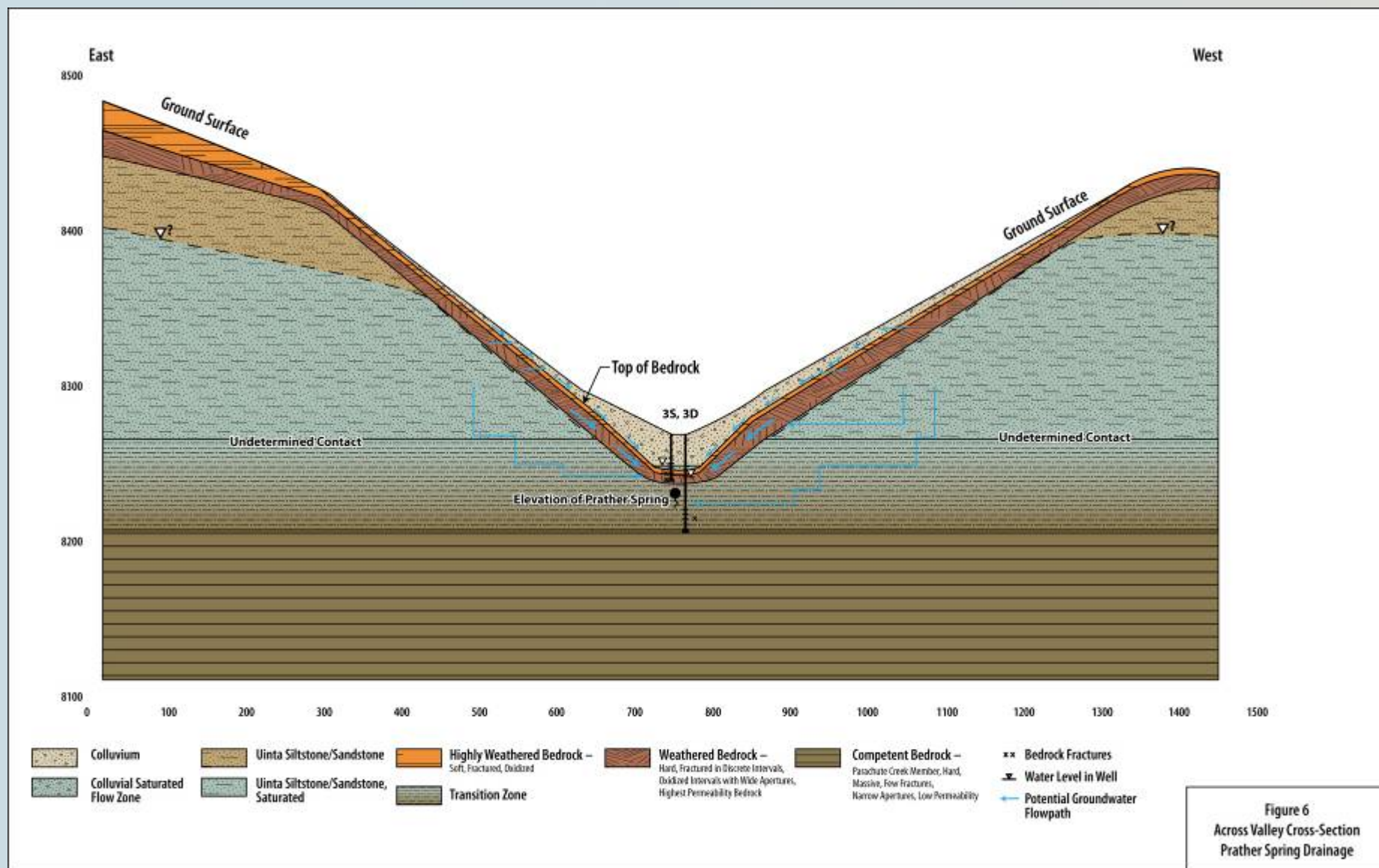




Garden Gulch

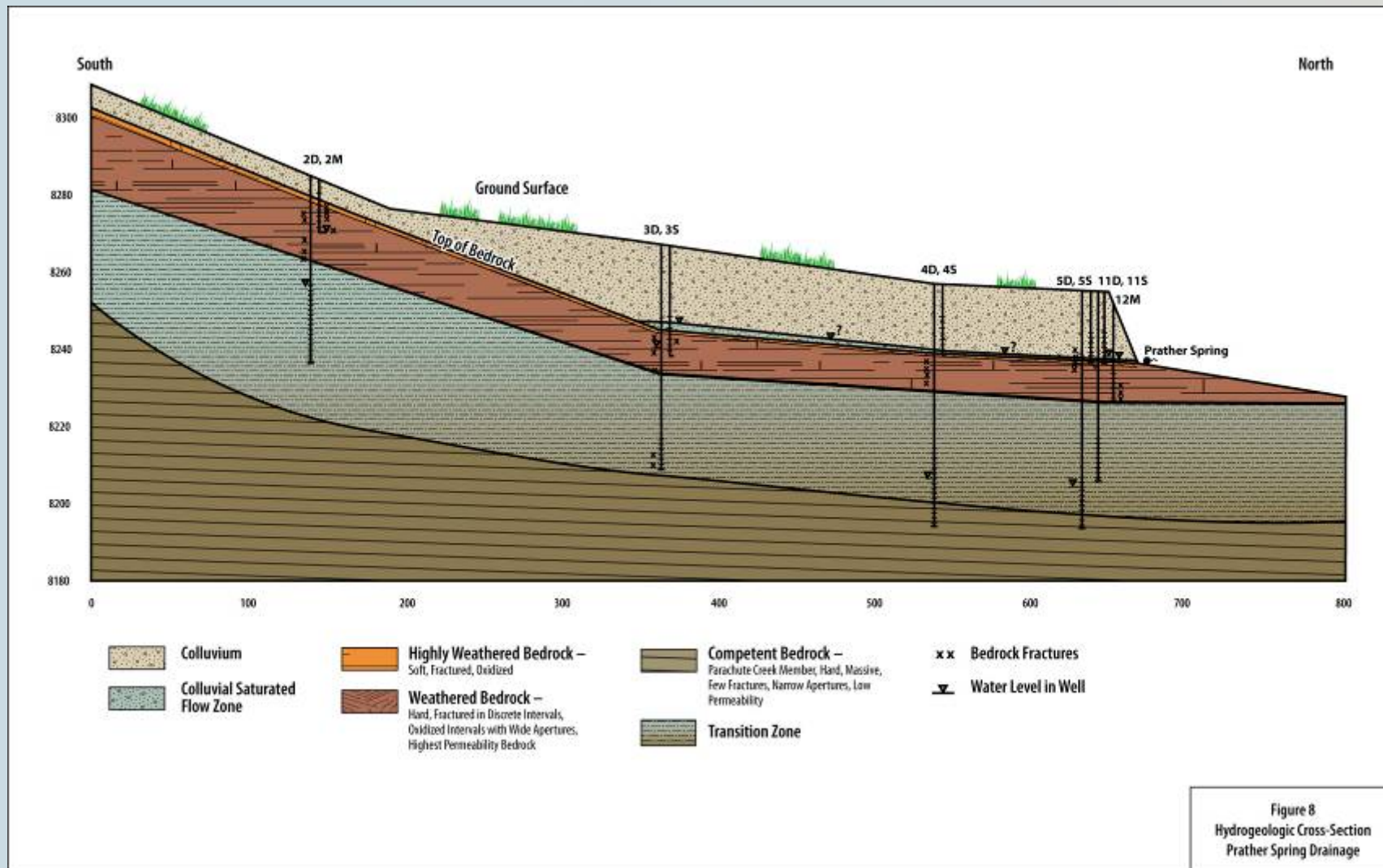
Prather Spring

From Williams Puckett 22-23 Pad, Looking N-NE









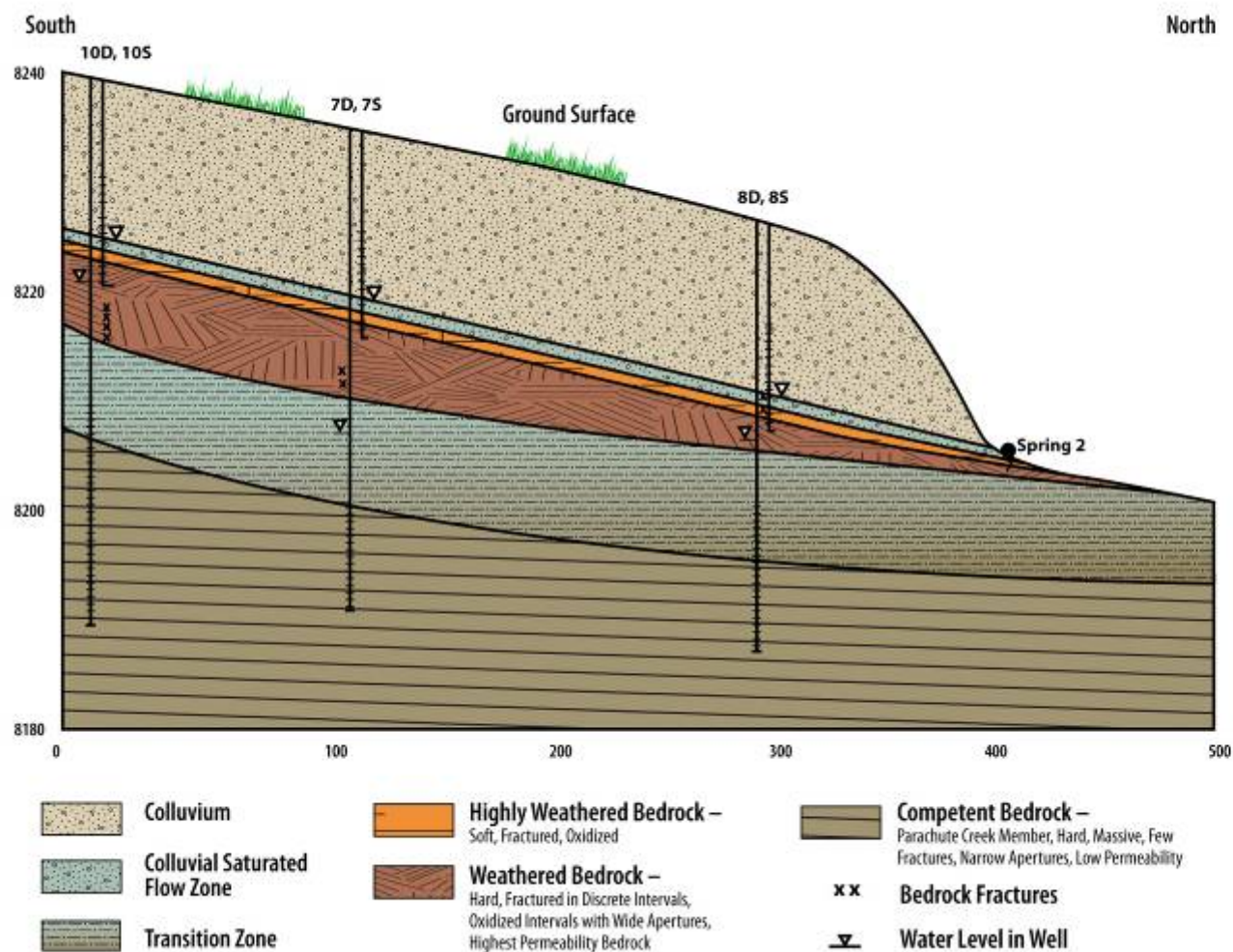


Figure 9
Hydrogeologic Cross-Section
Spring 2 Drainage









Well Construction Summary

Table 7 - Well Construction Summary

Prather Spring											
Monitoring Well	Date Completed	Coordinates		Screen Interval		Filter Pack		Bentonite		Grout	
		Northing	Easting	Top	Bottom	Top	Bottom	Top	Bottom	Top	Bottom
PS-MW02D	9/10/2008	1623759.00	2240673.00	34.0	54.0	32.0	54.0	21.0	32.0	1.0	21.0
PS-MW02M	9/10/2008	1623752.61	2240670.19	10.0	20.0	9.6	34.6	6.0	9.6	0.0	6.0
PS-MW03D	8/28/2008	1623971.27	2240623.66	51.0	61.0	49.2	61.0	24.0	49.2	2.0	24.0
PS-MW03S	7/16/2008	1623963.76	2240621.29	8.6	28.6	7.0	29.0	0	7	NA	NA
PS-MW04D	9/5/2008	1624145.32	2240645.47	41.1	61.1	39.1	61.5	22.0	39.1	1.0	22.0
PS-MW04S	7/16/2008	1624139.81	2240644.82	8.0	18.0	7.0	18.0	0.0	7.0	NA	NA
PS-MW06R	9/3/2008	1624205.31	2240603.90	6.0	21.0	4.0	21.0	0.0	4.0	NA	NA
PS-MW06S	7/16/2008	1624209.74	2240591.06	7.0	17.0	6.0	17.0	0.0	6.0	NA	NA
PS-MW05D	9/5/2008	1624240.50	2240603.97	51.0	61.0	49.0	61.2	20.0	49.0	2.0	20.0
PS-MW05S	7/15/2008	1624243.00	2240599.58	8.6	13.6	8.0	15.0	0.0	8.0	NA	NA
PS-MW11D	7/17/2008	1624177.78	2240696.31	39.0	49.0	28.6	49.0	0.0	29.0	NA	NA
PS-MW11S	7/17/2008	1624175.90	2240701.56	9.0	19.0	7.0	19.0	0.0	7.0	NA	NA
PS-MW12M	9/8/2008	1624177.78	2240696.31	24.0	29.0	24.0	29.0	19.0	24.0	1.0	19.0
PS-MW13D	9/8/2008	1624109.81	2240750.13	34.0	54.0	32.0	54.0	19.0	32.0	1.0	19.0
PS-MW14	10/14/2008	1624191.78	2240668.29	10.0	20.0	20.0	8.0	2.0	8.0	NA	NA
PS-MW15	10/14/2008	1624132.74	2240665.78	10.0	20.0	20.0	8.0	2.0	8.0	NA	NA
PS-MW16	10/15/2008	1624018.81	2240662.17	15.0	25.0	25.0	13.0	2.0	13.0	NA	NA
PS-MW17	10/15/2008	1623952.74	2240673.88	22.0	32.0	32.0	20.0	2.0	20.0	NA	NA
PS-MW18	10/16/2008	1623956.13	2240631.44	19.0	29.0	29.0	17.0	2.0	17.0	NA	NA
PS-MW19	10/16/2008	1624021.60	2240635.56	14.0	24.0	24.0	12.0	2.0	12.0	NA	NA
PS-MW20	10/16/2008	1624075.38	2240642.05	16.0	26.0	26.0	14.0	2.0	14.0	NA	NA
PS-MW21	10/16/2008	1624086.99	2240671.31	14.0	24.0	24.0	12.0	2.0	12.0	NA	NA
PS-MW22	10/16/2008	1624282.96	2240630.71	16.0	26.0	26.0	14.0	2.0	14.0	NA	NA
PS-MW28	10/21/2008	1624209.14	2240736.88	15.0	25.0	25.0	13.0	2.0	13.0	NA	NA
PS-MW29	10/22/2008	1624200.28	2240719.29	12.0	22.0	22.0	10.0	2.0	10.0	NA	NA
PS-MW30	10/22/2008	1624187.82	2240800.36	27.0	47.0	47.0	24.5	2.0	24.5	NA	NA
PS-MW31	10/22/2008	1624154.91	2240778.30	25.0	45.0	45.0	22.5	2.0	22.5	NA	NA
PS-MW32	10/22/2008	1624196.97	2240688.17	13.0	23.0	23.0	11.0	2.0	11.0	NA	NA
PS-MW33	10/22/2008	1624192.13	2240652.35	13.0	23.0	23.0	11.0	2.0	11.0	NA	NA
PS-MW34	10/22/2008	1624220.50	2240644.35	12.5	22.5	22.5	10.5	2.0	10.5	NA	NA
Spring 2											
Monitoring Well	Date Completed	Coordinates		Screen Interval		Filter Pack		Bentonite		Grout	
		Northing	Easting	Top	Bottom	Top	Bottom	Top	Bottom	Top	Bottom
PS-MW07D	9/4/2008	1625166.49	2240094.52	34.0	44.0	32.0	44.0	7.0	32.0	0.0	7.0
PS-MW07S	9/4/2008	1625170.93	2240097.57	9.0	19.0	7	19.0	2.0	7.0	NA	NA
PS-MW08D	9/5/08	1625213.66	2240275.35	24.0	39.0	23.0	39.0	14.0	23.0	0.0	14.0
PS-MW08S	9/3/2008	1625217.44	2240279.21	8.0	18.0	6	18.0	0.0	6.0	NA	NA
PS-MW09S	9/7/2008	1625218.23	2240041.46	11.0	21.0	9.0	21.0	5.0	9.0	1.0	5.0
PS-MW10D	9/7/2008	1625030.64	2240053.28	29.0	49.0	27.0	49.0	23.0	27.0	1.0	23.0
PS-MW10S	9/7/2008	1625027.53	2240050.05	8.4	18.4	6.5	18.4	4.5	6.5	0.5	4.5
PS-MW23	10/20/2008	1625132.98	2240152.70	12	22	22.0	10.0	2	10	NA	NA
PS-MW24	10/20/2008	1625235.58	2240065.43	13	23	23.0	11.0	2	11	NA	NA
PS-MW25	10/21/2008	1624917.65	2239924.31	12.5	22.5	22.5	10.5	2	10.5	NA	NA
PS-MW26	10/21/2008	1624957.71	2240061.83	4	14	14.0	2.0	2	2	NA	NA
PS-MW27	10/21/2008	1625214.66	2240314.30	7.5	17.5	17.5	5.5	2	5.5	NA	NA
NA = not available											



Preliminary Findings - Geology

- Geologic Conditions
 - Fractures prevalent in upper 10 feet of bedrock
 - Bedrock becomes more competent with depth
 - Review of core

PSMW3D

- 24' to 34.5'
- Highly fractured core interval



PSMW4D

- 19.5' to 29.5'
- Fracture dip approx 30-40 degrees
- Close-up of mud and clast-filled fracture apertures



PSMW3D

- 55.5' to 60'
- Bedding plane fractures
- Carbonaceous seam



PSMW10D

- 20' to 30'
- Highly fractured from 20' to 23'
- Carbon seam at 28'

