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28 July 2022

Kyle Siesser
Cottonwood Consulting
PO Box 1653
Durango, CO 81302
RE: Rule 615

Enclosed are the results of analyses for samples received by the laboratory on 07/15/22 15:16. The data to follow was performed, in whole or in part, by Green Analytical Laboratories. Any data that was performed by a subcontract laboratory is included within the GAL report, or with an additional report attached.

If you need any further assistance, please feel free to contact me.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Jeremy D. Allen', is written in a cursive style.

Jeremy D Allen For Brenna Kampf
Project Manager

All accredited analytes contained in this report are denoted by an asterisk (*). For a complete list of accredited analytes please do not hesitate to contact us via any of the contact information contained in this report. All of our certifications can be viewed at <http://greenanalytical.com/certifications/>

Green Analytical Laboratories is NELAP accredited through the Texas Commission on Environmental Quality. Accreditation applies to drinking water and non-potable water matrices for trace metals and a variety of inorganic parameters. Green Analytical Laboratories is also accredited through the Colorado Department of Public Health and Environment and EPA region 8 for trace metals, Cyanide, Fluoride, Nitrate, and Nitrite in drinking water. TNI Certificate Number: T104704514-22-14

Our affiliate laboratory, Cardinal Laboratories, is also NELAP accredited through the Texas Commission on Environmental Quality for a variety of organic constituents in drinking water, non-potable water and solid matrices. Cardinal is also accredited for regulated VOCs, TTHM, and HAA-5 in drinking water through the Colorado Department of Public Health and Environment and EPA region 8. TNI Certificate Number: T104704398-22-15



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Cottonwood Consulting
PO Box 1653
Durango CO, 81302

Project: Rule 615
Project Name / Number: Bryce (OWP) #1-X
Project Manager: Kyle Siesser

Reported:
07/28/22 11:01

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
Bryce (OWP) 1-X Wellbore Fluid	2207181-01	Water	07/15/22 14:00	07/15/22 15:16	

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Jeremy D Allen For Brenna Kampf, Project Manager

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Project: Rule 615
Project Name / Number: Bryce (OWP) #1-X
Project Manager: Kyle Siesser

Reported:
07/28/22 11:01

Bryce (OWP) 1-X Wellbore Fluid**2207181-01 (Water)**

Analyte	Result	RL	MDL	Units	Dilution	Analyzed	Method	Notes	Analyst
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General Chemistry

Alkalinity, Bicarbonate as CaCO ₃ *	3420	10.0	2.27	mg/L	20	07/25/22 14:45	2320 B		VJW
Alkalinity, Carbonate as CaCO ₃ *	<10.0	10.0	2.27	mg/L	20	07/25/22 14:45	2320 B		VJW
Alkalinity, Hydroxide as CaCO ₃ *	<10.0	10.0	2.27	mg/L	20	07/25/22 14:45	2320 B		VJW
Alkalinity, Total as CaCO ₃ *	3420	10.0	2.27	mg/L	20	07/25/22 14:45	2320 B		VJW
Bromide	4.45	0.800	0.219	mg/L	8	07/26/22 15:26	EPA300.0		AES
Chloride*	881	8.00	0.444	mg/L	8	07/26/22 15:26	EPA300.0		AES
Conductivity*	7500	1.00		umho/cm @ 25.0°C	1	07/15/22 16:41	2510 B		QEB
Fluoride*	0.936	0.800	0.0777	mg/L	8	07/26/22 15:26	EPA300.0		AES
Nitrate/Nitrite as N*	<0.100	0.100	0.059	mg/L as N	5	07/19/22 12:10	EPA353.2		HTB
pH*	7.01			pH Units	1	07/15/22 16:41	EPA150.1		QEB
pH Temperature, degrees C	20.3			pH Units	1	07/15/22 16:41	EPA150.1		QEB
Phosphorus, Total	<0.250	0.250	0.0819	mg P/L	5	07/20/22 09:28	EPA365.1		HTB
SAR	47.8			No Unit	1	07/26/22 17:09	Calculation		AES
Total Dissolved Solids*	4870	10.0		mg/L	1	07/21/22 16:22	EPA160.1		VJW
Sulfate*	<8.00	8.00	0.992	mg/L	8	07/26/22 15:26	EPA300.0		AES

Total Recoverable Metals by ICP (E200.7)

Boron	<1.50	1.50	0.465	mg/L	5	07/26/22 17:09	EPA200.7		AES
Calcium*	96.7	0.500	0.192	mg/L	5	07/26/22 17:09	EPA200.7		AES
Hardness as CaCO ₃	262	3.31	1.09	mg/L	5	07/26/22 17:09	2340 B		AES
Iron*	155	0.250	0.189	mg/L	5	07/26/22 17:09	EPA200.7		AES
Magnesium*	5.08	0.500	0.148	mg/L	5	07/26/22 17:09	EPA200.7		AES
Potassium*	5.70	5.00	0.888	mg/L	5	07/26/22 17:09	EPA200.7		AES
Sodium*	1780	5.00	0.380	mg/L	5	07/26/22 17:09	EPA200.7		AES
Strontium*	7.65	0.500	0.091	mg/L	5	07/26/22 17:09	EPA200.7		AES

Total Recoverable Metals by ICPMS (E200.8)

Barium*	8.77	0.0025	0.0015	mg/L	5	07/19/22 15:20	EPA200.8		AES
Manganese*	1.11	0.0100	0.0009	mg/L	5	07/19/22 15:20	EPA200.8		AES
Selenium*	<0.0050	0.0050	0.0035	mg/L	5	07/19/22 15:20	EPA200.8		AES

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Project: Rule 615
Project Name / Number: Bryce (OWP) #1-X
Project Manager: Kyle Siesser

Reported:
07/28/22 11:01

Bryce (OWP) 1-X Wellbore Fluid

2207181-01 (Water)

Analyte	Result	RL	MDL	Units	Dilution	Analyzed	Method	Notes	Analyst
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Other

Iron-Related Bacteria	High			CFU/mL	1	07/15/22 16:00	Lab Procedure		LLG
	Aggressivity								
Slime-Forming Bacteria	Medium			CFU/mL	1	07/15/22 16:00	Lab Procedure		LLG
	Aggressivity								
Sulfate-Reducing Bacteria	High			CFU/mL	1	07/15/22 16:00	Lab Procedure		LLG
	Aggressivity								

Subcontracted -- Cardinal Laboratories 101 East Marland Hobbs, NM 88240

Volatile Organic Compounds by EPA Method 8021

Benzene*	2.69	0.050	0.004	mg/L	50	07/21/22 11:01	8021B		JH/
Toluene*	<0.050	0.050	0.006	mg/L	50	07/21/22 11:01	8021B		JH/
Ethylbenzene*	0.137	0.050	0.008	mg/L	50	07/21/22 11:01	8021B		JH/
Total Xylenes*	0.220	0.150	0.016	mg/L	50	07/21/22 11:01	8021B		JH/
Total BTEX	3.06	0.300	0.049	mg/L	50	07/21/22 11:01	8021B		JH/

Surrogate: 4-Bromofluorobenzene (PID) 97.6 % 77.1-124 07/21/22 11:01 8021B JH/

Petroleum Hydrocarbons by GC FID

GRO C6-C10*	5.72	1.00	0.295	mg/L	0.1	07/22/22 11:23	8015B		MS
DRO >C10-C28*	5.31	1.00	0.670	mg/L	0.1	07/22/22 11:23	8015B		MS
EXT DRO >C28-C36	1.39	1.00	0.670	mg/L	0.1	07/22/22 11:23	8015B		MS

Surrogate: 1-Chlorooctane 76.0 % 44.9-146 07/22/22 11:23 8015B MS

Surrogate: 1-Chlorooctadecane 81.5 % 39.8-162 07/22/22 11:23 8015B MS

Subcontracted -- SunStar Laboratories, Inc. 25712 Commercentre Drive Lake Forest, CA 92630

RSK-175

Methane	9200	3.28	0.364	ug/l	1	07/22/22 10:57	RSK-175		TL
Ethane	689	6.15	1.16	ug/l	1	07/22/22 10:57	RSK-175		TL
Propane	245	9.02	0.577	ug/l	1	07/22/22 10:57	RSK-175		TL

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Project: Rule 615
Project Name / Number: Bryce (OWP) #1-X
Project Manager: Kyle Siesser

Reported:
07/28/22 11:01

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B221915 - General Prep - Wet Chem										
Reference (B221915-SRM1)				Prepared & Analyzed: 07/15/22						
pH	7.03		pH Units	7.00		100	98.57-101.42			
Batch B221916 - General Prep - Wet Chem										
Reference (B221916-SRM1)				Prepared & Analyzed: 07/15/22						
Conductivity	1030	1.00	umho/cm @ 25.0°C	1000		103	90-110			
Batch B221921 - Total Recoverable by ICP										
Blank (B221921-BLK1)				Prepared: 07/18/22 Analyzed: 07/26/22						
SAR	0.00		No Unit							
Batch B221938 - Lachat										
Blank (B221938-BLK1)				Prepared & Analyzed: 07/19/22						
Nitrate/Nitrite as N	ND	0.020	mg/L as N							
LCS (B221938-BS1)				Prepared & Analyzed: 07/19/22						
Nitrate/Nitrite as N	1.06	0.020	mg/L as N	1.00		106	90-110			
LCS Dup (B221938-BSD1)				Prepared & Analyzed: 07/19/22						
Nitrate/Nitrite as N	1.06	0.020	mg/L as N	1.00		106	90-110	0.254	20	
Batch B221943 - Lachat										
Blank (B221943-BLK1)				Prepared: 07/19/22 Analyzed: 07/20/22						
Phosphorus, Total	ND	0.0500	mg P/L							
LCS (B221943-BS1)				Prepared: 07/19/22 Analyzed: 07/20/22						
Phosphorus, Total	2.67	0.0500	mg P/L	2.50		107	90-110			
LCS Dup (B221943-BSD1)				Prepared: 07/19/22 Analyzed: 07/20/22						
Phosphorus, Total	2.68	0.0500	mg P/L	2.50		107	90-110	0.628	20	
Batch B221982 - General Prep - Wet Chem										
Blank (B221982-BLK1)				Prepared & Analyzed: 07/21/22						
Total Dissolved Solids	ND	10.0	mg/L							
Reference (B221982-SRM1)				Prepared & Analyzed: 07/21/22						

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Project: Rule 615
Project Name / Number: Bryce (OWP) #1-X
Project Manager: Kyle Siesser

Reported:
07/28/22 11:01

**General Chemistry - Quality Control
(Continued)**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B221982 - General Prep - Wet Chem (Continued)

Reference (B221982-SRM1) (Continued)

Prepared & Analyzed: 07/21/22

Total Dissolved Solids	380	10.0	mg/L	380	100	85-115
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Batch B222004 - General Prep - Wet Chem

Blank (B222004-BLK1)

Prepared & Analyzed: 07/25/22

Alkalinity, Total as CaCO ₃	ND	10.0	mg/L
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LCS (B222004-BS1)

Prepared & Analyzed: 07/25/22

Alkalinity, Bicarbonate as CaCO ₃	104	10.0	mg/L	100	104	85-115
Alkalinity, Total as CaCO ₃	104	10.0	mg/L	100	104	85-115

LCS Dup (B222004-BSD1)

Prepared & Analyzed: 07/25/22

Alkalinity, Bicarbonate as CaCO ₃	107	10.0	mg/L	100	107	85-115	2.84	20
Alkalinity, Total as CaCO ₃	107	10.0	mg/L	100	107	85-115	2.84	20

Batch B222013 - IC- Ion Chromatograph

Blank (B222013-BLK1)

Prepared & Analyzed: 07/26/22

Bromide	ND	0.100	mg/L
Chloride	ND	1.00	mg/L
Fluoride	ND	0.100	mg/L
Sulfate	ND	1.00	mg/L

LCS (B222013-BS1)

Prepared & Analyzed: 07/26/22

Bromide	2.40	0.100	mg/L	2.50	96.0	90-110
Chloride	24.8	1.00	mg/L	25.0	99.2	90-110
Fluoride	2.39	0.100	mg/L	2.50	95.6	90-110
Sulfate	24.3	1.00	mg/L	25.0	97.2	90-110

LCS Dup (B222013-BSD1)

Prepared & Analyzed: 07/26/22

Bromide	2.42	0.100	mg/L	2.50	96.6	90-110	0.623	20
Chloride	24.8	1.00	mg/L	25.0	99.1	90-110	0.101	20
Fluoride	2.39	0.100	mg/L	2.50	95.6	90-110	0.00	20
Sulfate	24.3	1.00	mg/L	25.0	97.1	90-110	0.148	20

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Project Manager: Kyle Siesser

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Total Recoverable Metals by ICP (E200.7) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B221921 - Total Recoverable by ICP

Blank (B221921-BLK1)

Prepared: 07/18/22 Analyzed: 07/26/22

Boron	ND	0.300	mg/L
Calcium	ND	0.100	mg/L
Iron	ND	0.050	mg/L
Magnesium	ND	0.100	mg/L
Potassium	ND	1.00	mg/L
Sodium	ND	1.00	mg/L
Strontium	ND	0.100	mg/L

LCS (B221921-BS1)

Prepared: 07/18/22 Analyzed: 07/26/22

Boron	1.97	0.300	mg/L	2.00	98.7	85-115
Calcium	1.96	0.100	mg/L	2.00	97.8	85-115
Iron	1.98	0.050	mg/L	2.00	98.8	85-115
Magnesium	9.95	0.100	mg/L	10.0	99.5	85-115
Potassium	3.93	1.00	mg/L	4.00	98.2	85-115
Sodium	1.63	1.00	mg/L	1.62	100	85-115
Strontium	1.96	0.100	mg/L	2.00	98.0	85-115

LCS Dup (B221921-BS1)

Prepared: 07/18/22 Analyzed: 07/26/22

Boron	1.98	0.300	mg/L	2.00	99.0	85-115	0.389	20
Calcium	1.95	0.100	mg/L	2.00	97.5	85-115	0.317	20
Iron	1.99	0.050	mg/L	2.00	99.3	85-115	0.453	20
Magnesium	9.95	0.100	mg/L	10.0	99.5	85-115	0.0363	20
Potassium	3.97	1.00	mg/L	4.00	99.3	85-115	1.06	20
Sodium	1.62	1.00	mg/L	1.62	99.8	85-115	0.602	20
Strontium	1.96	0.100	mg/L	2.00	98.1	85-115	0.135	20

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Reported:
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Total Recoverable Metals by ICPMS (E200.8) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B221923 - Total Recoverable by ICPMS

Blank (B221923-BLK1)

Prepared: 07/18/22 Analyzed: 07/19/22

Barium	ND	0.0005	mg/L							
Manganese	ND	0.0020	mg/L							
Selenium	ND	0.0010	mg/L							

LCS (B221923-BS1)

Prepared: 07/18/22 Analyzed: 07/19/22

Barium	0.0496	0.0005	mg/L	0.0500		99.2	85-115			
Manganese	0.0474	0.0020	mg/L	0.0500		94.7	85-115			
Selenium	0.248	0.0010	mg/L	0.250		99.2	85-115			

LCS Dup (B221923-BSD1)

Prepared: 07/18/22 Analyzed: 07/19/22

Barium	0.0483	0.0005	mg/L	0.0500		96.7	85-115	2.62	20	
Manganese	0.0489	0.0020	mg/L	0.0500		97.8	85-115	3.19	20	
Selenium	0.245	0.0010	mg/L	0.250		98.1	85-115	1.17	20	

RSK-175 - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 22G0308 - EPA 3810m Headspace

Blank (22G0308-BLK1)

Prepared: 07/20/22 Analyzed: 07/22/22

Ethane	ND	6.15	ug/l							
Ethene	ND	5.74	ug/l							
Methane	ND	3.28	ug/l							
Propane	ND	9.02	ug/l							

LCS (22G0308-BS1)

Prepared: 07/20/22 Analyzed: 07/22/22

Ethane	1140	6.15	ug/l	1230		92.6	75-125			
Ethene	1090	5.74	ug/l	1150		94.5	75-125			
Methane	661	3.28	ug/l	656		101	75-125			

Duplicate (22G0308-DUP1)

Source: T222076-04 Prepared: 07/20/22 Analyzed: 07/22/22

Ethane	ND	6.15	ug/l		ND				20	
Ethene	ND	5.74	ug/l		ND				20	
Methane	9.67	3.28	ug/l		8.27			15.6	20	
Propane	ND	9.02	ug/l		ND				20	

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Project Manager: Kyle Siesser

Reported:
07/28/22 11:01

Volatile Organic Compounds by EPA Method 8021 - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
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Batch 2071924 - Volatiles

Blank (2071924-BLK1)

Prepared: 07/19/22 Analyzed: 07/20/22

Surrogate: 4-Bromofluorobenzene (PID)	0.0499		mg/L	0.0500		99.7	77.1-124		
Benzene	ND	0.001	mg/L						
Ethylbenzene	ND	0.001	mg/L						
Toluene	ND	0.001	mg/L						
Total BTEX	ND	0.006	mg/L						
Total Xylenes	ND	0.003	mg/L						

LCS (2071924-BS1)

Prepared: 07/19/22 Analyzed: 07/20/22

Surrogate: 4-Bromofluorobenzene (PID)	0.0501		mg/L	0.0500		100	77.1-124		
Benzene	0.020	0.001	mg/L	0.0200		97.8	94.7-118		
Ethylbenzene	0.020	0.001	mg/L	0.0200		97.8	94-114		
m,p-Xylene	0.041	0.002	mg/L	0.0400		102	94.6-114		
o-Xylene	0.020	0.001	mg/L	0.0200		99.1	94.6-114		
Toluene	0.019	0.001	mg/L	0.0200		96.8	89-115		
Total Xylenes	0.061	0.003	mg/L	0.0600		101	94.6-114		

LCS Dup (2071924-BSD1)

Prepared: 07/19/22 Analyzed: 07/20/22

Surrogate: 4-Bromofluorobenzene (PID)	0.0496		mg/L	0.0500		99.2	77.1-124		
Benzene	0.018	0.001	mg/L	0.0200		92.4	94.7-118	5.67	3.83 BS-3, QR-04
Ethylbenzene	0.018	0.001	mg/L	0.0200		92.0	94-114	6.05	3.79 BS-3, QR-04
m,p-Xylene	0.039	0.002	mg/L	0.0400		96.6	94.6-114	5.70	3.91 QR-04
o-Xylene	0.019	0.001	mg/L	0.0200		93.2	94.6-114	6.06	3.91 BS-3, QR-04
Toluene	0.018	0.001	mg/L	0.0200		90.4	89-115	6.85	3.48 QR-04
Total Xylenes	0.057	0.003	mg/L	0.0600		95.5	94.6-114	5.82	3.91 QR-04

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Jeremy D Allen For Brenna Kampf, Project Manager

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Cottonwood Consulting
PO Box 1653
Durango CO, 81302

Project: Rule 615
Project Name / Number: Bryce (OWP) #1-X
Project Manager: Kyle Siesser

Reported:
07/28/22 11:01

Petroleum Hydrocarbons by GC FID - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 2072210 - General Prep - Organics

Blank (2072210-BLK1)

Prepared & Analyzed: 07/22/22

Surrogate: 1-Chlorooctadecane	4.31		mg/L	5.00		86.2	39.8-162			
Surrogate: 1-Chlorooctane	3.66		mg/L	5.00		73.2	44.9-146			
DRO >C10-C28	ND	1.00	mg/L							
EXT DRO >C28-C36	ND	1.00	mg/L							
GRO C6-C10	ND	1.00	mg/L							

LCS (2072210-BS1)

Prepared & Analyzed: 07/22/22

Surrogate: 1-Chlorooctadecane	4.22		mg/L	5.00		84.5	39.8-162			
Surrogate: 1-Chlorooctane	4.44		mg/L	5.00		88.7	44.9-146			
DRO >C10-C28	45.5	1.00	mg/L	50.0		91.0	70-121			
GRO C6-C10	43.3	1.00	mg/L	50.0		86.6	72.4-116			

LCS Dup (2072210-BSD1)

Prepared & Analyzed: 07/22/22

Surrogate: 1-Chlorooctadecane	4.25		mg/L	5.00		85.0	39.8-162			
Surrogate: 1-Chlorooctane	4.48		mg/L	5.00		89.6	44.9-146			
DRO >C10-C28	45.2	1.00	mg/L	50.0		90.4	70-121	0.617	24.8	
GRO C6-C10	43.0	1.00	mg/L	50.0		86.0	72.4-116	0.749	8.73	

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Reported:
07/28/22 11:01

Notes and Definitions

QR-04 The RPD for the BS/BSD was outside of historical limits.

BS-3 Blank spike recovery outside of lab established statistical limits, but still within method limits. Data is not adversely affected.

DET Analyte DETECTED

ND Analyte NOT DETECTED at or above the reporting limit

NR Not Reported

dry Sample results reported on a dry weight basis
 *Results reported on as received basis unless designated as dry.

RPD Relative Percent Difference

LCS Laboratory Control Sample (Blank Spike)

RL Report Limit

MDL Method Detection Limit

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Laboratory Sample ID: 2207-181-01

Start Date: 07/15/22

Sample Name: Bryce (OWP) 1-X Wellbore Fluid

BART Type :**APB**

Purple

(Acid Producing Bacteria)

Time Lag (days)	1	2	3	4	5	6	7	8	9	10
Approx. Population	475,000	82,000	14000	4500	450	75	10	< 2	n/a	n/a
Reaction Code										

IRB

Red

(Iron Related Bacteria)

	07/16	07/17	07/18	07/19	07/20	07/21	7/22	7/23	7/24	7/25
Time Lag (days)	1	2	3	4	5	6	7	8	9	10
Approx. Population	570,000	140,000	35,000	9000	2200	500	150	25	8	< 1
Reaction Code	A	A	A	BR	BR	FO/BR	FO/BR	FO/BR	FO/BR/BC	FO/BR/BC

SLYM

Green

(Slime Forming Bacteria)

	07/16	07/17	07/18	07/19	07/20	07/21	7/22	7/23	7/24	7/25
Time Lag (days)	1	2	3	4	5	6	7	8	9	10
Approx. Population	1,750,000	440,000	67,000	13,000	2500	500	100	< 20	n/a	n/a
Reaction Code	A	A	A	A	PB	PB	PB	PB	PB	PB

SRB

Black

(Sulfate Reducing Bacteria)

	07/16	07/17	07/18	07/19	07/20	07/21	7/22	7/23	7/24	7/25
Time Lag (days)	1	2	3	4	5	6	7	8	9	10
Approx. Population	2,200,000	500,000	115,000	27,000	6,000	1400	325	75	20	< 5
Reaction Code	A	A	A	A	BB	BB	BB	BB	BB	BB

Aggressivity:	High	Medium	Low
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Reaction Code Summary: APB

Purple

ABSENT = A**IRB**

FO - Foam

BR - Brown Ring

BG - Brown Gel

BC - Brown Clouds

GC - Green Cloudy

RC - Red Cloudy

CL - Cloudy

BL - Black

SLYM

DS - Dense Slime

SR - Slime Ring

CL - Cloudy

CP - Cloudy Layered Plates

PB - Pale Blue Glowing

BL - Blackened Liquid

TH - Thread Like Strands

SRB

BB - Black Base

BT - Black Ball/Top

BT/BB - Black Top & Base

Cloudy

*n/a - Not Aggressive

+

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January 2015

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