Field Report

Burch 10-17-29-12

J.M. Huber Corp.
Cherokee Basin
Elk County, Kansas

Submitted To:
J.M. Huber Corp.
1050 17th Street Suite 700
Denver, Colorado 80265

Attention: Mr. David May

Submitted By:
TICORA Geosciences, Inc.
19000 West Highway 72, Suite 100
Arvada, Colorado 80007
Office: (720) 898-8200
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Sept 23, 2003

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Field Report Summary

Table 1. Well Information	
Well Name: Burch 10-17-29-12	**Operator: J.M. Huber Corp.**
County: Elk	**State: Kansas**
Basin: Cherokee	**Field: Wildcat**
Groups: Marmaton / Cherokee	**Location: NW SE Sec 17 T29S R12E 1,981' FSL and 2,020' FEL**

Reservoir Properties	Units	Value
Cored Interval (Top)	feet	1,470.0
Cored Interval (Bottom)	feet	1,887.0
Total Thickness of Recovered Coal	feet	3.4
Amount of Coal Canistered	feet	3.1
Total Thickness of Prospective Carbonaceous Shale	feet	38.6
Amount of Carbonaceous Shale Canistered	feet	5.7
Reservoir Temperature range	°F	90
Reservoir Pressure (at Riverton horizon)	psia	795
Reservoir Pressure Gradient	psi/ft	0.433

1. **Introduction:** At the request of Mr. David May, Senior Staff Geoscientist, J.M. Huber Corporation (Huber), TICORA Geosciences, Inc. (TICORA) collected core samples from the Burch 10-17-29-12 well for determination of the gas content and resource evaluation of the Marmaton and Cherokee Group coals, Cherokee Basin, Elk County, Kansas. TICORA personnel were on location from 10 September to 15 September 2003. Nine desorption samples were collected during this period. Samples arrived back at TICORA's laboratory in Denver on 14 September 2003.

2. **Reservoir Temperature:** Temperature data was provided to TICORA on 10 September by Mr. Mike Allred (Huber wellsite geologist). This data was in the form of a bottom hole temperature recorded by Schlumberger Well Logging Services on the immediately adjacent Burch WDW 10-17-29-12. TICORA used the data to calculate reservoir temperatures at the subject well. All desorption experiments were carried out at a temperature of 90°F.

   During coring operations, monitoring of circulating fluid temperatures indicated temperatures throughout most of the well were consistent, with no abnormal increases (or decreases) in the assumed geothermal gradient.

For details on circulating temperature measurements, see Appendix v.

3. **Reservoir Pressure:** TICORA is currently using a pressure gradient of 0.433 psi/ft (assumed standard gradient) to calculate reservoir pressures. This gradient will be used until a different gradient is provided by Huber. This gradient will also be used to calculate the lost gas content of desorption samples collected at the subject well.
4. **Drilling Operations:** Layne Christensen Drilling (Calgary, Alberta) spudded the Burch 10-17-29-12 well at 20:00 hrs on 9 September 2003. A 12 ¼ inch surface hole was drilled to 138 ft., reaching TD at 01:00 hrs on 10 September. Surface casing (8 5/8 inch) was run to 138 ft. Cement was penetrated and drilling of a 7 7/8 inch new hole commenced at 12:30 hrs this same day. Core point was reached at a depth of 1,470 ft. at 13:45 hrs on 11 September. Core point was picked by Huber's wellsite geologist (M. Allred).
5. **Coring Operations:** A total of 44 wire-line retrievable core runs were made from 1,470.0 feet to 1,887.0 feet. Of the 417 feet of 3.0 inch core cut, approximately 416.5 feet were recovered (+99%). The bottom hole coring assembly included a 10.5-foot core barrel, wire-line retrievable inner-tube, and a PDC core bit. The average length of a core run was a little over 10.0 feet. Typically the driller would cut 10.2 to 10.5 feet of core per run, as Layne felt a full core barrel had better chances of complete recovery. Coring fluid was composed of fresh water mud with a density ranging from 8.4 to 8.5 lbs/gallon. Wireline retrieval times ranged from 6 minutes 20 seconds up to 10 minutes and 40 seconds with an average of approximately seven minutes. Table 2 below provides an overview of all core runs containing sampled intervals. See Appendix iii (Core Operations) for a more detailed account of coring operations and also Appendix iv (Daily Field Reports) for more detailed information on day-to-day activities.

Table 2. Core Operations – Burch 10-17-29-12

Core Run	From	To	Cored	Recovered	Desorption Samples	Fluid Density	Estimated Reservoir Temperature	Circulating Temperature Out	Core Depth Correction
	(feet)	(feet)	(feet)	(feet)		lbs/gal	(°F)	(°F)	(feet)
1	1,470	1,480	10.0	10.3	1	8.4	87.7	76.5	---
9	1,551	1,561	9.3	10.5	1	8.5	89.3	73.4	---
10	1,561	1,571	10.5	10.7	2	8.5	89.3	73.4	---
16	1,617	1,627	10.5	5.4	1	8.5	90.6	72.1	---
18	1,632	1,642	10.0	10.1	2	8.5	90.7	72.5	---
25	1,703	1,713	10.3	10.3	1	8.5	92.2	73.3	---
27	1,723	1,734	10.2	10.2	1	8.5	92.3	76.7	---

6. **Core-to-Log Correction:** At the time this report was written, a copy of the E-log was not available to the writer to make a determination of the core-to-log correction.

7. **Sampling Program:** Nine desorption core samples (3.0 inch diameter by one-foot in length) were collected from the Burch 10-17-29-12 well. Core samples were placed in a plastic liner inside 3.5 inch aluminum desorption canisters. Produced water from the Dart Operating Company South Williams Compressor Station (located in Sec 34 T33S R14E) was then added to the canister. This produced water comes from a series of Dart Cherokee Basin CBM wells producing in Montgomery County, Kansas that were completed in early November of 2002 (TICORA was in charge of collecting desorption samples from these wells). This water was preheated to reservoir temperature. This reduction in headspace volume increases the accuracy of desorption measurements and also improves the quality of gas samples collected for sorbed phase gas analysis by displacing atmospheric contamination. Desorption canisters were then placed in water baths at the appropriate reservoir temperature.

   All non-sampled core was described, photographed, boxed and transported to Triple O Slabbing, Denver, CO. Table 3 provides a brief account concerning the collection

of desorption samples from the Burch 10-17-29-12-9 well. See Appendix i for a detailed Summary of Desorption Samples.

Table 3. Desorption Samples – Burch 10-17-29-12

TICORA Number	Canister Number	From	To	Seam Designation	Time Core @ Surface	Time Canister Sealed	Desorption Temperature
		(feet)	(feet)		(hr:min:sec)	(hr:min:sec)	(°F)
290-1	GT-35	1,478.2	1,479.2	Mulberry	18:41:44	18:53:29	90
290-2	GT-58	1,551.7	1,552.7	Little Osage	00:08:10	00:14:46	90
290-3	GT-129	1,565.2	1,566.2	Excello Sh	00:49:40	00:58:52	90
290-4	GT-330	1,566.2	1,567.2	Mulky	00:49:40	01:00:37	90
290-5	GT-8	1,621.6	1,622.6	Bevier	04:50:40	05:02:28	90
290-6	GT-140	1,637.3	1,638.3	V Shale	06:02:45	06:09:38	90
290-7	GT-197	1,638.3	1,639.3	V Coal	06:02:45	06:10:49	90
290-8	GT-201	1,703.9	1,704.9	Mineral	12:45:30	12:54:28	90
290-9	GT-134	1,731.3	1,732.3	Tebo	14:03:20	14:11:17	90

8. **Special Testing:** Samples 290-4, 7, and 8 were selected for gas composition analysis. Gas composition samples (usually three to six) will be collected during the desorption life of these samples. In the field, two gas composition samples were collected from 290-4 and 290-7, and one gas composition sample was collected from 290-8. No temperature experiments were conducted due to the lack of twin samples of coal.

   Samples 290-1, 290-4, 290-6, and 290-8 were selected for ***RapidGas***^{SM} analysis. Table 4 provides a brief summary of the desorption experiments.

Table 4. Special Testing – Burch 10-17-29-12				
TICORA Number	Canister Number	RapidGas℠ Canisters	Gas Sample Canisters	Reservoir Temperature Experiment
290-1	GT-35	X		
290-4	GT-330	X	X	
290-6	GT-140	X		
290-7	GT-197		X	
290-8	GT-201	X	X	

9. **Comments on the Reservoir System**: Supplement II- Field Assessment of Reservoir System Thickness (Appendix ii) gives a brief summary of the various carbonaceous shale / coal reservoirs penetrated in the subject well. An attempt was made in the field to identify all recovered core that was giving any indication of visibly desorbing gas. This process is sometimes complicated by poor lighting conditions and / or weather factors. Also, some carbonaceous shales will desorb gas at such low rates or volumes that canistering the sample and capturing the gas is the only method to confirm that the shale is gas-bearing. Coloration and qualitative density assessment of the shale is also taken into account if no visibly desorbing gas is evident. Since all the core in this well was examined by the same person, the visual quality and density assessment will have a consistency throughout the cored section.

   This document should be used in conjunction with the analysis of reservoir thickness derived from the assessment of the density logs. For the Huber Burch 10-17-29-12 well, the field assessment of the reservoir thickness in both the Marmaton and Cherokee groups is estimated to include approximately **3.4 feet of coal and 38.6 feet of prospective carbonaceous shale**.

   A limited number of limestone intervals in the Burch 10-17-29-12 well were noted to have hydrocarbon shows. Appendix vi provides a tabulation of these show intervals and provides a brief description of each occurrence.

List of Appendices:

Appendix i

Supplement I - Desorption Sample Summary

Supplement I –
Desorption Sample Summary
J. M. Huber Corp.
Burch 10-17-29-12

Submitted to: Mr. David May / Rod Prosceno

Submitted by: Randy Laney / Justin Christofferson

Well: Burch 10-17-29-12

Head Space Fluid: Produced water **Core Size:** 3.0"

		Depth interval						Gas Desorbed			
TICORA Number	Canister Number	Top	Bottom	Reservoir	Amount of Coal in 1.0 ft sample	Raw Sample Weight	Calc. Sample Density	First Hour	First 24 Hours	Bath Temp.	Additional Comments
		(ft)	(ft)		(ft)	(grams)	(gm/cm^3)	(cm^3)	(cm^3)	(^0F)	
290-1	GT-35	1,478.2	1,479.2	Mulberry	0.8	1,538	1.11 [1]	30	565	90	partial rubble
290-2	GT-58	1,551.7	1,552.7	Little Osage Sh	0.0	3,248	2.34	48	232	90	carb Sh
290-3	GT-129	1,565.2	1,566.2	Excello Sh	0.0	2,566	1.85	117	638	90	carb Sh
290-4 [2]	GT-330	1,566.2	1,567.2	Mulky	0.7	2,090	1.50	529	3,077	90	
290-5	GT-8	1,621.6	1,622.6	Bevier	0.5	2,450	1.76	442	1,774	90	
290-6	GT-140	1,637.3	1,638.3	V Shale	0.0	2,886	2.08	64	305	90	carb Sh
290-7 [2]	GT-197	1,638.3	1,639.3	V Coal	0.5	2,736	1.97	261	1,184	90	
290-8 [2]	GT-201	1,703.9	1,704.9	Mineral	0.3	3,122	2.25	132	754	90	shaly coal
290-9	GT-134	1,731.3	1,732.3	Tebo	0.3	3,428	2.47	36	320	90	coaly Sh
Approx. Net Feet of Canistered Coal = 3.1											

[1] Calculated Sample Density is based on a field measurement of sample weight and is figured on an intact cylinder of core 3.0" in diameter and 12.0" in length. When core samples are fragmented or rubblized, or the core is somewhat under gauge due to washing out of the exterior surface, calculated field densities can appear low.

[2] Gas samples being taken on canister to determine sorbed phase gas composition.

Abbreviations:
RGS – Rapid Gas Sample
DS - Density Spectrum
carb - carbonaceous
Sh - Shale

The table above briefly summarizes recent data acquired by TICORA for Marmaton and Cherokee Group Coals and carbonaceous shales in the subject well.

An Ohaus brand digital scale was used to weigh the canistered samples before sealing. The measured weights and calculated densities are given above. Since these are field measurements, the numbers are subject to revision once the samples are actually pulled and weighed back in the lab. One of the corrections to these measurements will be weight loss due to removal of water when the samples are air dried in the lab.

Supplement I –

Desorption Sample Summary

J. M. Huber Corp.

Burch 10-17-29-12

The weights and densities offered here are much better representations of what actually went into the canister than can be done on a verbal basis. Only minimal time was required to obtain the measurements (approx. 20 additional seconds per sample). They are given here to help judge the gross quality of the sample that went into the canister and how that relates to early time desorbed volumes.

Desorbed gas volumes are listed for the *'first hour'* and *'first 24 hrs'* of measurement. They are offered here as rough indications of core diffusivities and as an internal comparison between samples. Not enough data is available at this early date to utilize these numbers for an estimate of gas content.

Appendix ii

Supplement II- Field Assessment of Reservoir System Thickness

Supplement II-

Field Assessment of Reservoir System Thickness

Burch 10-17-29-12

Submitted To: David May / Rod Prosceno

Submitted By: Randy Laney

Well: Burch 10-17-29-12 **Core Size:** 3.0"

Head Space Fluid: produced water

NOTE: Estimates of *'Reservoir System Thickness'* given in this summary refers to the full extent of prospective (gas bearing) carbonaceous shale, coaly shale, shaly coal and coal observed when laid down in the core tray. For those intervals that have been designated as part of the reservoir system but were not sampled, the RST has been applied on the basis of similarities (i.e. coloration and density) to intervals that were sampled and found to have measurable gas contents. Densities generally range up to 2.1 – 2.2 gm/cm^3, but can occasionally run to higher values.

	Depth Interval							
TICORA Number	Top	Bottom	Reservoir	Coal Thickness	Prospective Carb Shale Thickness	Calc. Sample Density	volume desorbed in first 24 hrs	RESERVOIR SYSTEM THICKNESS
	feet	feet		decimal ft.	decimal ft	gm/cm^3	cm^3	decimal ft.
Marmaton Group								
290-1	1,478.2	1,479.2	Mulberry	0.8	---	1.11 [1]	565	0.8 coal
---	1,506.1	1,507.0	---		0.9	---	---	0.9 carb sh
---	1,550.5	1,551.7	Little Osage Shale	---	1.2	---	---	2.2 carb sh
290-2	1,551.7	1,552.7		---	1.0	2.34	232	
Cherokee Group								
	1,563.8	1,565.2	Excello Sh & Mulky Coal	---	1.4	---	---	0.7 coal 2.7 carb sh = 3.4
290-3	1,565.2	1,566.2		---	1.0	1.85	638	
290-4	1,566.2	1,567.2		0.7	0.3	1.50	3,077	

Supplement II-

Field Assessment of Reservoir System Thickness

Burch 10-17-29-12

	Depth Interval							
TICORA Number	Top	Bottom	Reservoir	Coal Thickness	Prospective Carb Shale Thickness	Calc. Sample Density	volume desorbed in first 24 hrs	RESERVOIR SYSTEM THICKNESS
	feet	feet		decimal ft.	decimal ft	gm/cm^3	cm^3	decimal ft.
---	1,618.1	1,621.6	Bevier	---	3.5	---	---	0.5 coal 4.0 carb sh = 4.5
290-5	1,621.6	1,622.6		0.5	0.5	1.76	1,774	
---	1,632.5	1,635.1	un-named	---	2.6	---	---	2.6 carb sh
---	1,636.8	1,637.3	V Coal & Shale	---	0.5	---	---	0.5 coal 2.2 carb sh = 2.7
290-6	1,637.3	1,638.3		---	1.0	2.08	305	
290-7	1,638.3	1,639.3		0.5	0.5	1.97	1,184	
---	1,639.3	1,639.5		---	0.2	---	---	
---	1,667.4	1,670.4	Croweburg	---	3.0	---	---	3.0 carb sh
---	1,689.6	1,689.8	un-named	---	0.2	---	---	0.2 carb sh
---	1,698.9	1,700.7	un-named	---	1.8	---	---	1.8 carb sh
290-8	1,703.9	1,704.9	Mineral	0.3	0.7	2.25	754	0.3 coal 0.7 carb sh = 1.0
290-9	1,731.3	1,732.3	Tebo	0.3	0.5	2.47	320	0.3 coal 0.5 carb sh = 0.8
---	1,762.2	1,766.7	Weir	---	4.5	---	---	4.5 carb sh
---	1,769.0	1,769.3	Weir	0.3	---	---	---	0.3 shaly coal

Supplement II-

Field Assessment of Reservoir System Thickness

Burch 10-17-29-12

	Depth Interval							
TICORA Number	Top	Bottom	Reservoir	Coal Thickness	Prospective Carb Shale Thickness	Calc. Sample Density	volume desorbed in first 24 hrs	RESERVOIR SYSTEM THICKNESS
	feet	feet		decimal ft.	decimal ft	gm/cm^3	cm^3	decimal ft.
---	1,771.0	1,773.7	Weir	---	2.7	---	---	2.7 carb sh
---	1,828.0	1,837.6	Riverton	---	9.6	---	---	9.6 carb sh
---	1,840.8	1,841.8	Riverton	---	1.0	---	---	1.0 carb sh
			Totals	**3.4**	**38.6**			

[1]Calculated Sample Density is based on a field measurement of sample weight and is figured on an intact cylinder of core 3.0" in diameter and 12" in length. When core samples are fragmented or rubblized, calculated field densities can appear low.

Note: Reservoir nomenclature has tried to adhere to the system given in *"The Stratigraphic Succession in Kansas"* State Geological Survey of Kansas Bulletin 189, edited by Doris E. Zeller.

Appendix iii

Core Operations

TICORA GEOSCIENCES, INC.

WIRELINE CORE OPERATIONS

CORE RUN: 1

Date: 9/11/2003

OPERATOR: J.M. Huber Corporation
WELL: Burch 10-17-29-12
FIELD/PROSPECT: Wildcat
COUNTY: Elk
STATE: Kansas

LOCATION: 1,981' FSL 2,020' FEL
SECTION: 17
TOWNSHIP: 29S
RANGE: 12E
ELEV. (FT.): G.L.: 1,196' K.B.: 1,205'
*Datum: KB

OPERATOR: **J.M. Huber Corp.** 1050 17th Street Suite 700 Denver, CO 80265
Mr David May Senior Staff Geoscientist off: (303) 825-7900 fax: (303) 825-8300
Mr. Rod Prosceno Engineer 1614 Cedar View Drive Cody, WY 82414 (307) 587-3489
RIG: **Layne Drilling** (Calgary, Alberta), Rig #232
SERVICE: **Mr. Mike Allred** Wellsite Geologist
Schlumberger E-logs Ft. Smith, Arkansas

			CORE RUN: 1						
			Footage	Start (h:mm:s)	End (h:mm:s)	ROP (h:mm:s)	Canister No.	Can Sealed (h:mm:s)	TICORA No.
Date/Time Start Core:	9/11/2003 17:51	1	1470-1471	17:51:20	17:53:25	0:02:05			
Date/Time End Core:	9/11/2003 18:12	2	1471-1472	17:53:25	17:55:45	0:02:20			
Date/Time Start TOH:	9/11/2003 18:35	3	1472-1473	17:55:45	17:58:08	0:02:23			
Date/Time Barrel @ Surface:	9/11/2003 18:41	4	1473-1474	17:58:08	18:00:08	0:02:00			
Core Barrel Trip Time:	0:06:12	5	1474-1475	18:00:08	18:02:13	0:02:05			
Fluid Density/Viscosity:	8.4 ppg	6	1475-1476	18:02:13	18:04:14	0:02:01			
Fluid Temp. In (°F):	75.6	7	1476-1477	18:04:14	18:06:19	0:02:05			
Fluid Temp. Out (°F):	76.5	8	1477-1478	18:06:19	18:08:25	0:02:06			
Pump Pressure (psig):	150	9	1478-1479	18:08:25	18:10:30	0:02:05	GT-35	18:53:29	290-1
Pump Rate (spm/gpm):	16 SPM	10	1479-1480	18:10:30	18:12:07	0:01:37			
Weight on Bit (lbs):	3,000	11							
RPM:	70	12							
Formation:	Marmaton Group	13							
Feet Cored:	10.0	14							
Feet Recovered:	10.3	15							
Reservoir Temp (°F):	90	16							
Surf. Temp/Press (°F/in-Hg):	62.3 / 28.90	17							
Reservoir Top:		18							
Reservoir Bottom:		19							
Coal Top:	1,478.2	20							
Coal Bottom:	1,479.2								

TICORA GEOSCIENCES, INC.

WIRELINE CORE OPERATIONS

Date: 9/11/2003

CORE RUN: 9

OPERATOR: J.M. Huber Corporation
WELL: Burch 10-17-29-12
FIELD/PROSPECT: Wildcat
COUNTY: Elk
STATE: Kansas

LOCATION: 1,981' FSL 2,020' FEL
SECTION: 17
TOWNSHIP: 29S
RANGE: 12E
ELEV. (FT.): G.L.: 1,196' K.B.: 1,205'
*Datum: KB

OPERATOR: **J.M. Huber Corp.** 1050 17th Street Suite 700 Denver, CO 80265
Mr David May Senior Staff Geoscientist off: (303) 825-7900 fax: (303) 825-8300
Mr. Rod Prosceno Engineer 1614 Cedar View Drive Cody, WY 82414 (307) 587-3489
RIG: **Layne Drilling** (Calgary, Alberta), Rig #232
SERVICE: **Mr. Mike Allred** Wellsite Geologist
Schlumberger E-logs Ft. Smith, Arkansas

			CORE RUN: 9						
			Footage	Start (h:mm:s)	End (h:mm:s)	ROP (h:mm:s)	Canister No.	Can Sealed (h:mm:s)	TICORA No.
Date/Time Start Core:	9/11/2003 23:30	1	1551-1552	23:30:54	23:32:22	0:01:28			
Date/Time End Core:	9/11/2003 23:45	2	1552-1553	23:32:22	23:33:48	0:01:26	GT-58	0:14:46	290-2
Date/Time Start TOH:	9/11/2003 23:58	3	1553-1554	23:33:48	23:35:13	0:01:25			
Date/Time Barrel @ Surface:	9/12/2003 0:08	4	1554-1555	23:35:13	23:36:35	0:01:22			
Core Barrel Trip Time:	0:09:43	5	1555-1556	23:36:35	23:38:07	0:01:32			
Fluid Density/Viscosity:	8.4 ppg	6	1556-1557	23:38:07	23:39:45	0:01:38			
Fluid Temp. In (°F):	72.9	7	1557-1558	23:39:45	23:41:10	0:01:25			
Fluid Temp. Out (°F):	73.4	8	1558-1559	23:41:10	23:42:32	0:01:22			
Pump Pressure (psig):	150	9	1559-1560	23:42:32	23:44:00	0:01:28			
Pump Rate (spm/gpm):	18	10	1560-1561	23:44:00	23:45:30	0:01:20			
Weight on Bit (lbs):	3,000	11							
RPM:	70	12							
Formation:	Marmaton Group	13							
Feet Cored:	9.3	14							
Feet Recovered:	10.5	15							
Reservoir Temp (°F):	90	16							
Surf. Temp/Press (°F/in-Hg):	61.8 / 28.85	17							
Reservoir Top:	1,550.5	18							
Reservoir Bottom:	1,552.7	19							
Coal Top:		20							
Coal Bottom:									

TICORA GEOSCIENCES, INC.

WIRELINE CORE OPERATIONS

Date: 9/12/2003

CORE RUN: 10

OPERATOR: J.M. Huber Corporation
WELL: Burch 10-17-29-12
FIELD/PROSPECT: Wildcat
COUNTY: Elk
STATE: Kansas

LOCATION: 1,981' FSL 2,020' FEL
SECTION: 17
TOWNSHIP: 29S
RANGE: 12E
ELEV. (FT.): G.L.: 1,196' K.B.: 1,205'
*Datum: KB

OPERATOR: **J.M. Huber Corp.** 1050 17th Street Suite 700 Denver, CO 80265
Mr David May Senior Staff Geoscientist off: (303) 825-7900 fax: (303) 825-8300
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RIG: **Layne Drilling** (Calgary, Alberta), Rig #232
SERVICE: **Mr. Mike Allred** Wellsite Geologist
Schlumberger E-logs Ft. Smith, Arkansas

Date/Time Start Core:	9/12/2003 12:25
Date/Time End Core:	9/12/2003 12:33
Date/Time Start TOH:	9/12/2003 0:42
Date/Time Barrel @ Surface:	9/12/2003 0:49
Core Barrel Trip Time:	0:06:49
Fluid Density/Viscosity:	8.4 ppg
Fluid Temp. In (°F):	72.9
Fluid Temp. Out (°F):	73.4
Pump Pressure (psig):	150
Pump Rate (spm/gpm):	16
Weight on Bit (lbs):	3,000
RPM:	70
Formation:	Cherokee Group
Feet Cored:	10.5
Feet Recovered:	10.7
Reservoir Temp (°F):	90
Surf. Temp/Press (°F/in-Hg):	61.8 / 28.90
Reservoir Top:	1,563.8
Reservoir Bottom:	1,567.2
Coal Top:	1,566.5
Coal Bottom:	1,567.2

CORE RUN: 10

	Footage	Start (h:mm:s)	End (h:mm:s)	ROP (h:mm:s)	Canister No.	Can Sealed (h:mm:s)	TICORA No.
1	1561-1562	0:25:00	0:25:49	0:00:49			
2	1562-1563	0:25:49	0:26:34	0:00:45			
3	1563-1564	0:26:34	0:27:28	0:00:54			
4	1564-1565	0:27:28	0:28:20	0:00:52			
5	1565-1566	0:28:20	0:29:08	0:00:48	GT-129	0:58:52	290-3
6	1566-1567	0:29:08	0:29:48	0:00:40	GT-330	1:00:37	290-4
7	1567-1568	0:29:48	0:30:29	0:00:41			
8	1568-1569	0:30:29	0:31:24	0:00:55			
9	1569-1570	0:31:24	0:32:18	0:00:54			
10	1570-1571	0:32:18	0:33:10	0:00:52			
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

TICORA GEOSCIENCES, INC.

WIRELINE CORE OPERATIONS

Date: 9/12/2003

CORE RUN: 16

OPERATOR: J.M. Huber Corporation
WELL: Burch 10-17-29-12
FIELD/PROSPECT: Wildcat
COUNTY: Elk
STATE: Kansas

LOCATION: 1,981' FSL 2,020' FEL
SECTION: 17
TOWNSHIP: 29S
RANGE: 12E
ELEV. (FT.): G.L.: 1,196' K.B.: 1,205'
*Datum: KB

OPERATOR: **J.M. Huber Corp.** 1050 17th Street Suite 700 Denver, CO 80265
Mr David May Senior Staff Geoscientist off: (303) 825-7900 fax: (303) 825-8300
Mr. Rod Prosceno Engineer 1614 Cedar View Drive Cody, WY 82414 (307) 587-3489
RIG: **Layne Drilling** (Calgary, Alberta), Rig #232
SERVICE: **Mr. Mike Allred** Wellsite Geologist
Schlumberger E-logs Ft. Smith, Arkansas

			CORE RUN: 16						
			Footage	Start (h:mm:s)	End (h:mm:s)	ROP (h:mm:s)	Canister No.	Can Sealed (h:mm:s)	TICORA No.
Date/Time Start Core:	9/12/2003 4:22	1	1617-1618	4:22:37	4:23:35	0:00:58			
Date/Time End Core:	9/12/2003 4:32	2	1618-1619	4:23:35	4:24:45	0:01:10			
Date/Time Start TOH:	9/12/2003 4:43	3	1619-1620	4:24:45	4:25:57	0:01:12			
Date/Time Barrel @ Surface:	9/12/2003 4:50	4	1620-1621	4:25:57	4:27:11	0:01:14			
Core Barrel Trip Time:	0:07:33	5	1621-1622	4:27:11	4:28:12	0:01:01			
Fluid Density/Viscosity:	8.4 ppg	6	1622-1623	4:28:12	4:29:02	0:00:50	GT-8	5:02:28	290-5
Fluid Temp. In (°F):	71.6	7	1623-1624	4:29:02	4:29:57	0:00:55			
Fluid Temp. Out (°F):	72.1	8	1624-1625	4:29:57	4:30:51	0:00:54			
Pump Pressure (psig):	150	9	1625-1626	4:30:51	4:31:50	0:00:59			
Pump Rate (spm/gpm):	16	10	1626-1627	4:31:50	4:32:19	0:00:29			
Weight on Bit (lbs):	3,000	11							
RPM:	60	12							
Formation:	Cherokee Group	13							
Feet Cored:	10.5	14							
Feet Recovered:	5.4	15							
Reservoir Temp (°F):	90	16							
Surf. Temp/Press (°F/in-Hg):	61.1 / 28.90	17							
Reservoir Top:	1,818.1	18							
Reservoir Bottom:	1,622.6	19							
Coal Top:	1,622.1	20							
Coal Bottom:	1,622.6								

TICORA GEOSCIENCES, INC.

WIRELINE CORE OPERATIONS

Date: 9/12/2003

CORE RUN: 18

OPERATOR: J.M. Huber Corporation
WELL: Burch 10-17-29-12
FIELD/PROSPECT: Wildcat
COUNTY: Elk
STATE: Kansas

LOCATION: 1,981' FSL 2,020' FEL
SECTION: 17
TOWNSHIP: 29S
RANGE: 12E
ELEV. (FT.): G.L.: 1,196' K.B.: 1,205'
*Datum: KB

OPERATOR: **J.M. Huber Corp.** 1050 17th Street Suite 700 Denver, CO 80265
Mr David May Senior Staff Geoscientist off: (303) 825-7900 fax: (303) 825-8300
Mr. Rod Prosceno Engineer 1614 Cedar View Drive Cody, WY 82414 (307) 587-3489
RIG: **Layne Drilling** (Calgary, Alberta), Rig #232
SERVICE: **Mr. Mike Allred** Wellsite Geologist
Schlumberger E-logs Ft. Smith, Arkansas

			CORE RUN: 18						
			Footage	Start (h:mm:s)	End (h:mm:s)	ROP (h:mm:s)	Canister No.	Can Sealed (h:mm:s)	TICORA No.
Date/Time Start Core:	9/12/2003 5:33	1	1632-1633	5:33:30	5:34:39	0:01:09			
Date/Time End Core:	9/12/2003 5:45	2	1633-1634	5:34:39	5:36:01	0:01:22			
Date/Time Start TOH:	9/12/2003 5:54	3	1634-1635	5:36:01	5:37:20	0:01:19			
Date/Time Barrel @ Surface:	9/12/2003 6:02	4	1635-1636	5:37:20	5:38:29	0:01:09			
Core Barrel Trip Time:	0:07:55	5	1636-1637	5:38:29	5:39:44	0:01:15			
Fluid Density/Viscosity:	8.4 ppg	6	1637-1638	5:39:44	5:40:49	0:01:05	GT-140	6:09:38	290-6
Fluid Temp. In (°F):	71.2	7	1638-1639	5:40:49	5:41:51	0:01:02	GT-197	6:10:49	290-7
Fluid Temp. Out (°F):	72.5	8	1639-1640	5:41:51	5:42:56	0:01:05			
Pump Pressure (psig):	150	9	1640-1641	5:42:56	5:44:19	0:01:23			
Pump Rate (spm/gpm):	16	10	1641-1642	5:44:19	5:45:00	0:00:41			
Weight on Bit (lbs):	3,000	11							
RPM:	50	12							
Formation:	Cherokee Group	13							
Feet Cored:	10.0	14							
Feet Recovered:	10.1	15							
Reservoir Temp (°F):	90	16							
Surf. Temp/Press (°F/in-Hg):	60.7 / 28.80	17							
Reservoir Top:	1,636.8	18							
Reservoir Bottom:	1,639.5	19							
Coal Top:	1,638.8	20							
Coal Bottom:	1,639.3								

TICORA GEOSCIENCES, INC.

WIRELINE CORE OPERATIONS

Date: 9/12/2003

CORE RUN: 25

OPERATOR: J.M. Huber Corporation
WELL: Burch 10-17-29-12
FIELD/PROSPECT: Wildcat
COUNTY: Elk
STATE: Kansas

LOCATION: 1,981' FSL 2,020' FEL
SECTION: 17
TOWNSHIP: 29S
RANGE: 12E
ELEV. (FT.): G.L.: 1,196' K.B.: 1,205'
*Datum: KB

OPERATOR: **J.M. Huber Corp.** 1050 17th Street Suite 700 Denver, CO 80265
Mr David May Senior Staff Geoscientist off: (303) 825-7900 fax: (303) 825-8300
Mr. Rod Prosceno Engineer 1614 Cedar View Drive Cody, WY 82414 (307) 587-3489
RIG: **Layne Drilling** (Calgary, Alberta), Rig #232
SERVICE: **Mr. Mike Allred** Wellsite Geologist
Schlumberger E-logs Ft. Smith, Arkansas

			CORE RUN: 25						
			Footage	Start (h:mm:s)	End (h:mm:s)	ROP (h:mm:s)	Canister No.	Can Sealed (h:mm:s)	TICORA No.
Date/Time Start Core:	9/12/2003 12:15	1	1703-1704	12:15:10	12:16:16	0:01:06			
Date/Time End Core:	9/12/2003 12:26	2	1704-1705	12:16:16	12:17:17	0:01:01	GT-201	12:54:28	290-8
Date/Time Start TOH:	9/12/2003 12:38	3	1705-1706	12:17:17	12:18:26	0:01:09			
Date/Time Barrel @ Surface:	9/12/2003 12:45	4	1706-1707	12:18:26	12:19:38	0:01:12			
Core Barrel Trip Time:	0:07:15	5	1707-1708	12:19:38	12:20:48	0:01:10			
Fluid Density/Viscosity:	8.4 ppg	6	1708-1709	12:20:48	12:21:50	0:01:02			
Fluid Temp. In (°F):	72.3	7	1709-1710	12:21:50	12:22:53	0:01:03			
Fluid Temp. Out (°F):	73.3	8	1710-1711	12:22:53	12:24:05	0:01:12			
Pump Pressure (psig):	150	9	1711-1712	12:24:05	12:25:20	0:01:15			
Pump Rate (spm/gpm):	16	10	1712-1713	12:25:20	12:26:10	0:00:50			
Weight on Bit (lbs):	3,000	11							
RPM:	70	12							
Formation:	Cherokee Group	13							
Feet Cored:	10.3	14							
Feet Recovered:	10.3	15							
Reservoir Temp (°F):	90	16							
Surf. Temp/Press (°F/in-Hg):	60.2 / 28.90	17							
Reservoir Top:	1,703.9	18							
Reservoir Bottom:	1,704.9	19							
Coal Top:		20							
Coal Bottom:									

TICORA GEOSCIENCES, INC.

WIRELINE CORE OPERATIONS

Date: 9/12/2003

CORE RUN: 27

OPERATOR: J.M. Huber Corporation
WELL: Burch 10-17-29-12
FIELD/PROSPECT: Wildcat
COUNTY: Elk
STATE: Kansas

LOCATION: 1,981' FSL 2,020' FEL
SECTION: 17
TOWNSHIP: 29S
RANGE: 12E
ELEV. (FT.): G.L.: 1,196' K.B.: 1,205'
*Datum: KB

OPERATOR: **J.M. Huber Corp.** 1050 17th Street Suite 700 Denver, CO 80265
Mr David May Senior Staff Geoscientist off: (303) 825-7900 fax: (303) 825-8300
Mr. Rod Prosceno Engineer 1614 Cedar View Drive Cody, WY 82414 (307) 587-3489
RIG: **Layne Drilling** (Calgary, Alberta), Rig #232
SERVICE: **Mr. Mike Allred** Wellsite Geologist
Schlumberger E-logs Ft. Smith, Arkansas

			CORE RUN: 27						
			Footage	Start (h:mm:s)	End (h:mm:s)	ROP (h:mm:s)	Canister No.	Can Sealed (h:mm:s)	TICORA No.
Date/Time Start Core:	9/12/2003 13:30	1	1723-1724	13:30:10	13:31:32	0:01:22			
Date/Time End Core:	9/12/2003 13:43	2	1724-1725	13:31:32	13:32:47	0:01:15			
Date/Time Start TOH:	9/12/2003 13:54	3	1725-1726	13:32:47	13:34:21	0:01:34			
Date/Time Barrel @ Surface:	9/12/2003 14:03	4	1726-1727	13:34:21	13:35:53	0:01:32			
Core Barrel Trip Time:	0:09:10	5	1727-1728	13:35:53	13:37:11	0:01:18			
Fluid Density/Viscosity:	8.4 ppg	6	1728-1729	13:37:11	13:38:40	0:01:29			
Fluid Temp. In (°F):	76.7	7	1729-1730	13:38:40	13:39:58	0:01:18			
Fluid Temp. Out (°F):	76.7	8	1730-1731	13:39:58	13:41:15	0:01:17			
Pump Pressure (psig):	150	9	1731-1732	13:41:15	13:42:31	0:01:16	GT-134	14:11:17	290-9
Pump Rate (spm/gpm):	16 SPM	10	1732-1733	13:42:31	13:43:50	0:01:19			
Weight on Bit (lbs):	3,000	11							
RPM:	75	12							
Formation:	Cherokee Group	13							
Feet Cored:	10.2	14							
Feet Recovered:	10.2	15							
Reservoir Temp (°F):	90	16							
Surf. Temp/Press (°F/in-Hg):	73.6 / 28.90	17							
Reservoir Top:	1,731.3	18							
Reservoir Bottom:	1,732.3	19							
Coal Top:		20							
Coal Bottom:									

Appendix iv

Daily Field Reports

Daily Field Report - 1

J.M. Huber Corp.
Burch 10-17-29-12

Submitted To: Mr. David May / Mr. Rod Prosceno
Submitted By: Randy Laney / Justin Christofferson

Start Time / Date: 07:00 9/11/03 **Finish Time / Date:** 07:00 9/12/03
Well: Burch 10-17-29-12
Surface Location: NW SE Sec 17 T29S R12E **GL:** 1,196' **KB:** 1,205.0'
County / State: Elk Co., Kansas **Field:** Wildcat

Start Depth (coring):	1,470.0'	**Finish Depth (coring):**	1,652.0'
Total Feet Cored:	182.0' **Rec:** 181.8'	**% Recovered:**	~100%
Group:	Marmaton / Cherokee		
Core Diameter:	3.0"	**Drilling Fluid:**	chem mud
Head Space Filler :	produced water – from Dart Operating Co's South Williams Compressor Station- Sec 34 T33S R14E		

Recent Activity: Cement was penetrated and drilling of a new 7 7/8 inch hole began at 12:30 hrs on 9/10/03. Reached core point of 1,470' at 13:45 hrs on 9/11/03. T.O.O.H and pick up core barrel and trip in hole at 16:00 hrs. Begin Core Run #1 at 17:51 hrs on 9/11. Normal core operations continued to the end of this report period. Last core run was # 19 from 1,642' – 1,652'. Core recovery is very good.

		Depth	Interval				
TICORA Number	**Canister Number**	**Top**	**Bottom**	**Amount of COAL in 1.0' sample**	**Reservoir**	**Calc. Sample Density**	**Bath Temperature**
		(feet)	**(feet)**	**(feet)**		**(gm/cc)**	**(°F)**
290-1	GT-35	1,478.2	1,479.2	0.8	Mulberry	1.11	90
290-2	GT-58	1,551.7	1,552.7	0.0	Little Osage Sh	2.34	90
290-3	GT-129	1,565.2	1,566.2	0.0	Excello Sh	1.85	90
290-4	GT-330	1,566.2	1,567.2	0.7	Mulky	1.50	90
290-5	GT-8	1,621.6	1,622.6	0.5	Bevier	1.76	90
290-6	GT-140	1,637.3	1,638.3	0.0	V Shale	2.08	90
290-7	GT-197	1,638.3	1,639.3	0.5	V Coal	1.97	90

Comments: Seven canisters were taken during this report period. The first coal of the well was the Mulberry Coal of the Marmaton Group. A total of 0.8 ft. of coal was present and was canistered. Bounding shales were non-prospective.

The top of the Little Osage Shale came in at a core depth of 1,550.5 ft and a sample of this carbonaceous shale was canistered. Visible desorption was not evident.

Daily Field Report - 1

J.M. Huber Corp.
Burch 10-17-29-12

The Excello Shale / Mulky Coal interval was encountered at a core depth of 1,563.8 ft. and was approximately 3.4 feet thick. The interval consisted of 2.7 ft. of carb shale and 0.7 ft. of coal. Two canisters were taken from this interval. Weak visible desorption was evident in the coal.

The Bevier Coal came in at a core depth of 1,621.6' and consisted of 0.5 feet of coal. Approximately 3.5 ft of bounding carbonaceous shale was cored above the coal seam. One canister was taken from this interval.

A coal and carbonaceous shale interval (The 'V' Coal ?) was encountered at a core depth of 1,636.8' and extended to 1,639.5'. Approximately 0.5 feet of coal was cored, along with 2.2 feet of overlying carbonaceous shale. Two canisters were recovered.

Intervals of light to medium brown oil bleeding from limestones (the Pawnee, Higginsville, and the Blackjack Creek) were noted during today's activity. The occurrences were mainly associated with near-vertical fracturing in the limestones.

Daily Field Report - 2

J.M. Huber Corp.
Burch 10-17-29-12

Submitted To: Mr. David May / Mr. Rod Prosceno
Submitted By: Randy Laney / Justin Christofferson

Start Time / Date: 07:00 9/12/03 **Finish Time / Date:** 07:00 9/13/03
Well: Burch 10-17-29-12
Surface Location: NW SE Sec 17 T29S R12E **GL:** 1,196' **KB:** 1,205.0'
County / State: Elk Co., Kansas **Field:** Wildcat

Start Depth (coring):	1,652.0'	**Finish Depth (coring):**	1,887.0' (TD)
Total Feet Cored:	235.0' **Rec:** 234.7'	**% Recovered:**	~100%
Group:	Cherokee		
Core Diameter:	3.0"	**Drilling Fluid:**	chem mud
Head Space Filler :	produced water – from Dart Operating Co's South Williams Compressor Station- Sec 34 T33S R14E		

Recent Activity: Coring activity for this report period began with Core Run #20 (1,652.0' – 1,662.0'). Coring proceeded with mechanical difficulties. At approximately 02:45 hrs on 9/13, a core TD of 1,887.0' was reached. Coring was halted by the Huber representative (Mr. May) approximately 4 feet into clean Mississippian Ls.

		Depth	Interval				
TICORA Number	**Canister Number**	**Top**	**Bottom**	**Amount of COAL in 1.0' sample**	**Reservoir**	**Calc. Sample Density**	**Bath Temperature**
		(feet)	**(feet)**	**(feet)**		**(gm/cc)**	**(°F)**
290-8	GT-201	1,703.9	1,704.9	0.3	Mineral	2.25	90
290-9	GT-134	1,731.3	1,732.3	0.3	Tebo	2.47	90

Comments: Two canisters were taken during this report period, one from the Mineral seam and one from the Tebo seam. Both coals were poorly developed and were bounded by very limited amounts of prospective carbonaceous shale.

The cherty bed associated with the Mississippian Unconformity (encountered at a core depth of 1,869.0 ft.) displayed medium to dark brown oil bleeding from irregular fractures throughout the interval.

Appendix v

Table of Circulating Fluid Temperatures

Circulating Fluid Temperatures

J.M. Huber Corp.
Burch 10-17-29-12

Circulating Temperature Table – Burch 10-17-29-12				
Depth (ft.)	**Mud Temp In (^{0}F)**	**Mud Temp Out (^{0}F)**	***Anticipated Reservoir Temp (^{0}F)**	**Ambient Temp (^{0}F)**
1,470	75.6	76.5	88.0	75.1
1,505	73.5	73.9	88.8	64.2
1,560	72.9	73.4	89.3	58.2
1,598	72.8	73.1	90.2	55.2
1,635	71.2	72.5	90.7	53.1
1,705	72.3	73.3	92.2	69.8
1,753	76.7	76.7	93.1	75.2
1,808	75.0	75.3	94.3	68.8
1,850	75.6	75.9	95.1	61.5

Appendix vi

Limestone Show Intervals

Limestone Show Intervals

J.M. Huber Corp.
Burch 10-17-29-12

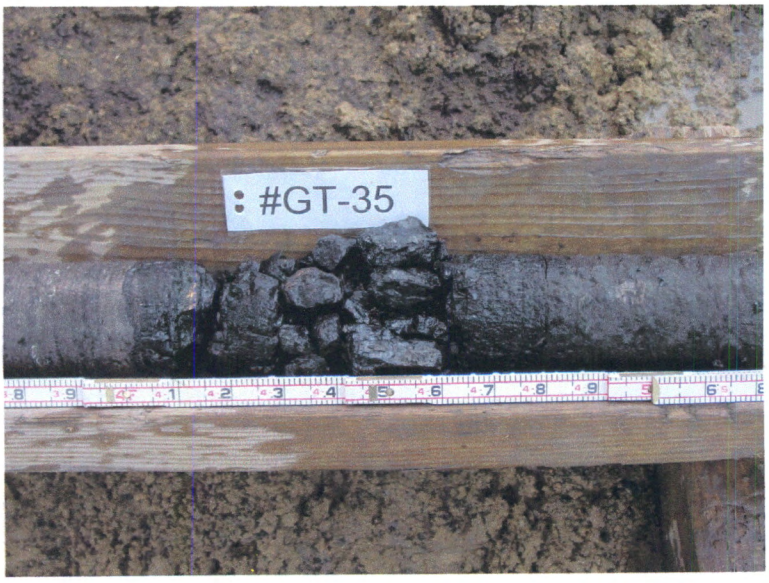
Limestone Show Intervals – Burch 10-17-29-12		
Show Depth	**Formation**	**Comments**
(feet)		
1,494.5 – 1,497.4 1,502.5 – 1,504.6	Pawnee	A light to medium brown oil observed to be emanating from relatively short near- vertical fractures and thin, irregular low-angle shaly partings.
1,537.7 – 1,545.6	Higginsville	A light to medium brown oil bleeding from near-vertical to vertical fractures.
1,555.5 – 1,555.8	Blackjack Creek	Patchy zone of oil bleeding from limestone matrix-fracturing not apparent.
1,869.0 – 1,883.3	Mississippian Unconformity	Majority of chert-rich section displayed a medium to dark brown oil emanating out of irregular fractures and vugular cavities. Some gas in solution with oil.

Appendix vii

Core Report

J.M. Huber Corp.
Burch 10-17-29-12
Core Report

INTERVAL (feet)	LITHOLOGY	DESCRIPTION & COMMENTS
1,470.0 – 1,475.6:	Shale-	Shale is dark grey, fairly firm, most separates in even poker chip fashion (1/2 to 2 inch pieces). Core surfaces display some slight erosion (washing out). Interval also interspersed with thin (less than 1/4 inch thick) medium brown shaly lenses and streaks. Shale is slightly calcareous and non-carbonaceous.
1,475.6 – 1,478.2:	Limestone-	Limestone is light tan-brown, very firm, microcrystalline to finely crystalline. Gradational contact at top (very shaly) with an abrupt contact with underlying coal. Scattered small brachiopod fossils throughout and more abundant at top. Limestone is non-fractured and no show.
1,478.2 – 1,479.0:	**Coal-**	Coal is a thin sub-vitreous coal, competent in upper 2 inches and becomes slightly rubblized in remainder. Poor face and butt cleat development- face cleats on 1/4 to 3/8 inch spacing, off-white secondary calcite in cleat system. Weak visible desorption from coal before canistering. **Canister GT-35** contains the interval from 1,478.2' – 1,479.2' and consists of 0.8 feet of coal and 0.2 feet of slightly carbonaceous underclay (non-prospective). **The Reservoir System Thickness (RST) is confined to the coal interval (0.8 ft. thick).**



INTERVAL (feet)	LITHOLOGY	DESCRIPTION & COMMENTS

***NOTE**: Estimates of **'Reservoir System Thickness'** given in this report refers to the full extent of prospective (gas bearing) carbonaceous shale, coaly shale, shaly coal and coal observed when laid down in the core tray. Densities generally range up to 2.1 – 2.2 gm/cm^3, but can occasionally run to higher values.*

1,479.0 – 1,483.1: Shale-

Shale is dark blackish grey in upper 6 inches becoming dark grey and then dark greenish grey to base. Non-prospective shale at top of interval (no visible desorption). Somewhat soft shale in upper part with eroded core surface. Interval contains some slightly lighter hued calcareous nodules. Lower part of interval is slightly firmer and displays some low-angle, rough – surfaced slicks, slightly calcareous throughout.

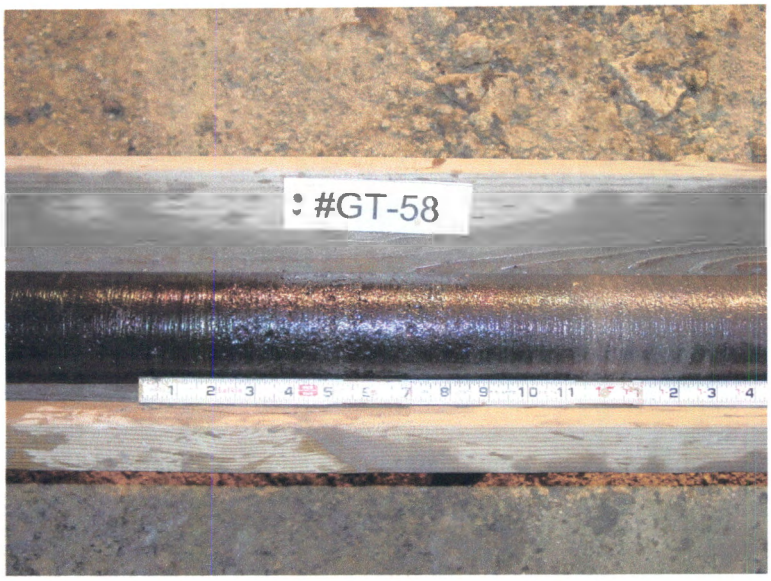
1,483.1 – 1,505.5: Limestone-

A somewhat gradational shaly limestone from top of interval to 1,485.0'. Coloration is a mottled light grey and greenish grey but becomes a cleaner greyish tan limestone from 1,485.0' – 1,487.4'. The limestone from 1,487.4' – 1,490.4' is slightly darker hued and more shaly. From 1,490.4' to base the limestone is very light grey to off-white and displays thin irregular and low-angle shaly partings.

Limestone is moderately firm and microcrystalline with trace small bi-valve shells in lighter part. **The limestone from 1,494.5' – 1,497.4' and 1,502.5' – 1,504.6' displays a light to medium brown oil bleeding mainly from low-angle, irregular shaly partings and near-vertical fractures.** These fractures range from short (1/2 inch) to several inches in length. Small amounts of gas observed to bleed along with the oil. A shaly interbed occurs at 1,498.3' – 1,499.1'. Fairly abrupt lower contact with a 1 to 2 inch fossiliferous shale at base.

INTERVAL (feet)	LITHOLOGY	DESCRIPTION & COMMENTS
1,505.5 – 1,519.6:	Shale-	Shales ranges from black to medium – dark grey and taking on a mottled dark grey to dark green coloration at base. The shale from 1,506.1' – 1,507.0' is moderately carbonaceous **(the RST is confined to this interval).** Shale is moderately fossiliferous in the upper 2 inches of interval, at the base of the carbonaceous shale (1,507.0' – 1,507.2') and also from 1,518.0' – 1,518.4'. Most of the interval is firm and competent but becomes softer with separations along low-angle slicks in the basal 18 inches. Most of shale parts in even poker chip fashion. Has some calcareous content throughout but becoming less so to base. One high-angle curving fracture noted at 1,510.8' – 1,511.1'.
1,519.6 – 1,532.4:	Shale-	This shale is distinctly lighter hued in shades of greyish green to medium olive green, somewhat softer than above and much less calcareous overall, except in the basal 18 inches of the interval. Low to medium angle slicks with a slight polish found throughout. Somewhat gradational and interbedded lower contact with limestone.
1,532.4 – 1,546.1:	Limestone-	Limestone is off white to mottled light grey to some brownish grey where shaly. Very finely microcrystalline to finely crystalline with scattered small bi-valve shells. Limestone contains thin irregular shaly partings but less than above limestone. **The interval from 1,537.7' – 1,545.6' displayed a light to medium brown oil bleeding predominately from near-vertical to vertical fractures (some intersecting)**. Remainder of limestone appears tight.
1,546.1 – 1,550.5:	Ls & Sh-	Interbedded limestone and shale. Mottled light to dark grey with some blackish grey. An inter-gradational sequence of thinly bedded shale and limes at top (1/2 to 3 inches thick) developing thicker interbeds (8 to 9 inches) at base. Shale is slightly fossiliferous from 1,549.0' – 1,549.8'.
1,550.5 – 1,554.6:	Shale-	Coloration ranges from black at top of interval to light greenish grey at base. Moderately carbonaceous **from 1,550.5' – 1,552.7' (RST is equal to 2.2 feet).** This shale is firm and competent. Minor amount of fossil shells occurred in a 2 inch interval below canistered sample. Shale from 1,552.7' to base is non-prospective and softer with minor erosion of core surfaces. Shale separates on un-even, sub-horizontal partings with some slicks. **Canister GT-58** contains the interval 1,551.7' – 1,552.7' and consists of 12 inches of carbonaceous shale. Visible desorption could not be confirmed from shale before canistering.

INTERVAL (feet)	LITHOLOGY	DESCRIPTION & COMMENTS



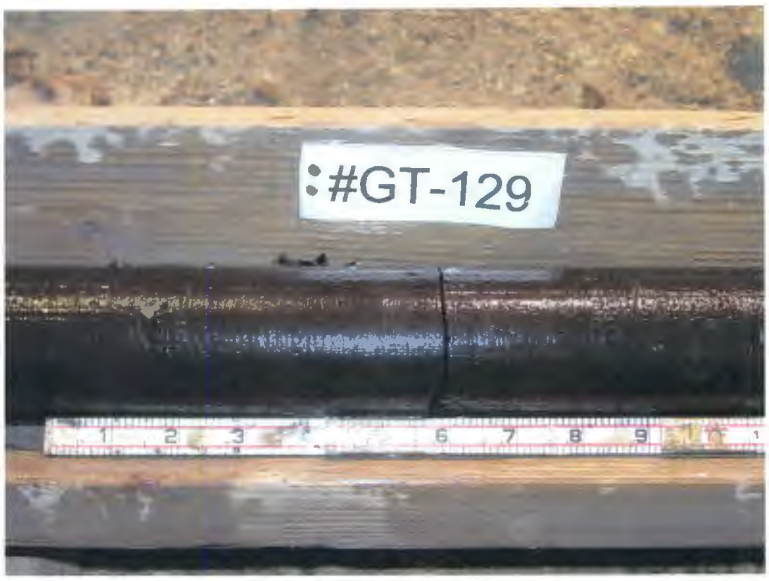
1,554.6 – 1,561.7: Limestone- Upper five and one-half feet of interval is very light grey to light tan, microcrystalline and moderately firm. Basal part of interval is mottled tannish-grey and becomes increasingly shalier with depth. Scattered fossil shell material in bottom 2 feet. **From 1,555.4' – 1,555.8' the limestone displays patches of oil bleeding from limestone matrix- no fracturing apparent.**

1,561.7 – 1,563.1: Sh & Ls- Interbedded shale and limestone. Shale is medium brownish grey and non-carbonaceous. Limestone is tannish-grey, microcrystalline and tight, fairly fossiliferous from top of interval to 1,562.4'.

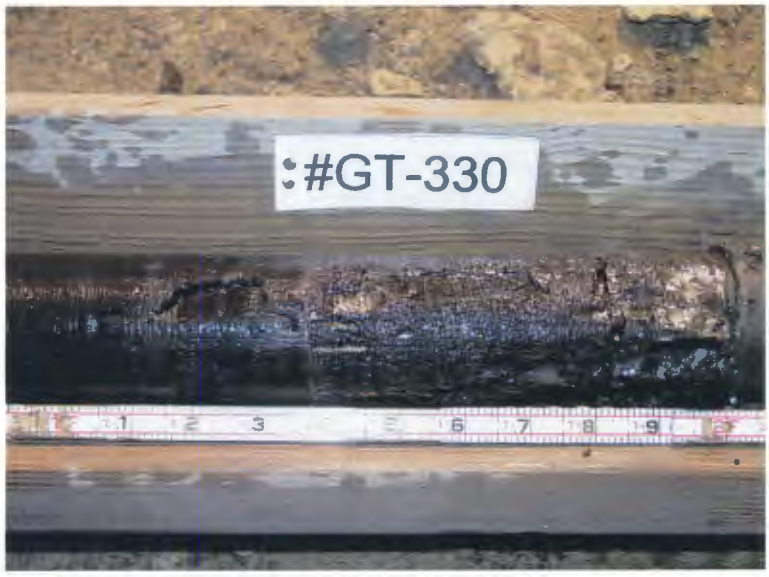
1,563.1 – 1,567.2: Shale & **Coal-** Shale is very dark greyish black to jet black in lower three feet of interval- basal part is very carbonaceous and separates on poker chip surfaces. Several vertical fractures cut interval. Coal displays a thin sub-vitreous banding with some conchoidal fracturing and poor development of face cleats (on approx. 1/2 inch spacing). Secondary calcite visible in cleat system.

Canister GT-129 contains the interval 1,565.2' – 1,566.2' and consists of 12 inches of carbonaceous shale with traces of visible desorption.

INTERVAL (feet)	LITHOLOGY	DESCRIPTION & COMMENTS



Canister GT-330 contains the interval from 1,566.2' – 1,567.2' and consists of 0.7 feet of coal (entire Mulky Coal interval) along with 0.3 feet of overlying carbonaceous shale. Coal displayed weak visible desorption before canistering. **The RST of the interval extends from 1,563.8' – 1,567.2'.**



1,567.2 – 1,570.9: Shale- Shale is very dark grey to medium greenish grey at base. Interval is moderately firm and slightly calcareous throughout, non-carbonaceous, separates on low-angle, rough-surfaced slicks.

1,570.9 – 1,571.9: Limestone- Limestone is light grey, microcrystalline, firm and hard, becomes shalier toward base.

INTERVAL (feet)	LITHOLOGY	DESCRIPTION & COMMENTS
1,571.9 – 1,574.8:	Shale-	Shale is medium grey to medium greenish grey, fairly firm and competent, fairly even horizontal separations, non-carbonaceous, very slightly calcareous.
1,574.8 – 1,575.7:	Limestone-	Upper part of interval is gradational with some interfingering with overlying shale. Limestone is mottled light grey with scattered small fossil shells throughout.
1,575.7 – 1,577.2:	Shale-	Shale is medium grey, firm and competent, non-carbonaceous and non-calcareous.
1,577.2 – 1,579.7:	Sandstone-	with some shale. A finely laminated to thinly interbedded sequence of sandstone and shale. Sandstone at top of interval is off-white, medium grained, well cemented with silica. Remainder of interval composed of off-white, fine grained sandstone thinly interbedded to thinly laminated (1/16 inch thick) with medium to dark grey shale. Sandstone displays some very low-angle cross-bedding features.
1,579.7 – 1,584.2:	Shale-	with some minor sandy lenses. Shale is medium to dark grey, firm, slightly silty throughout with some very thin sandy lenses occurring from 1,582.6' – 1,583.6'. Shale is non-carbonaceous, no slicks observed.
1,584.2 – 1,601.8:	Shale-	Shale is very dark grey, fairly firm and uniform-appearing throughout. Very few natural separations and usually on sub-horizontal surfaces. Interval contains very thin (1/8 – 1/16 inch thick) very fine grained discontinuous sandy lenses and very thin laminae. Shale is non-carbonaceous and non-calcareous.
1,601.8 – 1,612.2:	Shale-	This shale has similar coloration to above shale but taking on slightly darker hues to base (especially 1,609.0' – 1,610.4'). Interval is firm with poker chip separations slightly more common. Thin sandy lenses are much less common and are absent in the basal six feet. Shale is generally non-carbonaceous and non-fractured.
1,612.2 – 1,622.6;	Shale & **Coal**-	Shale is blackish grey to black and becomes nearly jet black and moderately carbonaceous near base. Shale parts on poker chip surfaces (1/2 to 2 inches thick). Coal is fairly competent with poorly developed face cleats, secondary calcite mineralization observed. Canistered interval cut by high-angle fracture. **Canister GT-8** contains the interval from 1,621.6' – 1,622.6' and consists of approx. 0.5 feet of Bevier Coal, along with 0.3 feet of carbonaceous shale and 0.2 feet of very dirty and coaly sandstone. Displayed weak visible desorption before canistering. **The RST of the interval extends from 1,618.1' – 1,622.6'.**

INTERVAL (feet)	LITHOLOGY	DESCRIPTION & COMMENTS

1,622.6 – 1,627.7: Shale- Shale is medium to dark greenish grey, softer than above with core erosion visible especially in the underclay interval. All of shale is non-carbonaceous and contains some irregular nodules and veins of much firmer, dark brown shale. Low angle slicks observed with some secondary calcite mineralization.

1,627.7 – 1,635.1: Shale- This shale is dark blackish grey to black, becoming carbonaceous in bottom 2 1/2 feet of interval. This shale is also softer textured that above carbonaceous shales. Thin limy and fossiliferous layers in basal 12 inches. Visible desorption could not be confirmed from shale. Based on appearance and organic content, **RST extends from 1,632.5' – 1,635.1'.**

1,635.1 – 1,636.8: Limestone- Limestone is medium brown-tan, microcrystalline and very firm. Limestone becomes somewhat shaly and is in gradational contact with underlying shale. Some small bi-valve shells scattered throughout.

1,636.8 – 1,639.5: Shale & **Coal-** Shale is greyish black to jet black and slightly to moderately carbonaceous throughout. Partings are rough-surfaced and horizontal. Large vertical fracture cuts interval and displays secondary calcite mineralization. The coal is a thinly banded coal with greasy to sub-vitreous luster. Fair development of face cleats on 1/4 inch and less spacing, butt cleating generally absent, sample is competent. Secondary calcite in cleat system.

Canister GT-140 contains the interval from 1,637.3' – 1,638.3' and consists of 12 inches of carbonaceous shale.

INTERVAL (feet)	LITHOLOGY	DESCRIPTION & COMMENTS

Canister GT-197 contains the interval from 1,638.3' – 1,639.3' and consists of 0.5 feet of coal and 0.5 feet of overlying carbonaceous shale. **The RST of the interval extends from 1,636.8' – 1,639.5'.**

1,639.5 – 1,642.7: Shale- Shale is dark greyish brown in 3 inch underclay zone, then becomes a pewter grey shale with a very soft and flaky texture to base. Interval contains rough-surfaced, low-angle slicks. Shale is non-carbonaceous but with some black organic-rich patches throughout.

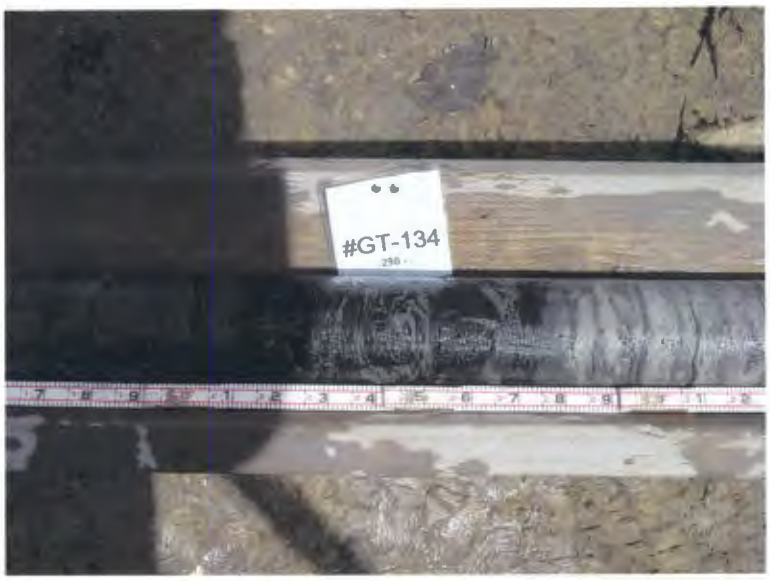
1,642.7 – 1,646.0: Ls & Sh- Interbedded sequence of shaly limestone and shale. Coloration is a mottled light grey and green and also very dark grey. Shaly limestone at top of interval becomes a shale with discreet limestone nodules toward base and most bed contacts are very irregular. Most of interval displays an eroded core surface

INTERVAL (feet)	LITHOLOGY	DESCRIPTION & COMMENTS
		(soft) with low angle separations.
1,646.0 – 1,655.2:	Shale-	with minor limestone. Shale is mottled dark green to very dark grey in upper 15 inches of interval and has the appearance of being brecciated. Also some green shale appears as 'plumes' or vertical veins into overlying shale. Shale is darker hued with limy interbeds from 1,647.4' – 1,649.5' and 1,652.1' to base. All shale non-carbonaceous.
1,655.2 – 1,670.8:	Shale-	Coloration ranges from medium brownish grey to very dark greyish black and jet black. Upper four feet of interval is rather soft with a flaky to splintery texture (especially from 1,656.6' – 1,659.0'). Remainder is firmer and separates in very uniform poker chip fashion. Scattered small bi-valve shells in the interval from 1,669.3' – 1,670.3'. Basal five feet of the interval becoming somewhat carbonaceous with **the RST extending from 1,667.4' – 1,670.4',** visible desorption could not be confirmed from this shale.
1,670.8 – 1,678.4:	Sandstone-	Sandstone is a light greyish white, generally medium grained, moderately well sorted and fairly well cemented. Some irregular bedding features near top of interval with remainder massively bedded. Interval contains thin, slightly carbonaceous, mostly vertically-oriented streaks randomly scattered throughout. Sand is non-fractured with no show or bleeding gas.
1,678.40 – 1,678.45	Shale-	to shaly coal. Interval is very slightly coaly shale to shaly coal, dull black, no visible cleating, competent. Trace visible desorption but no canister taken because of non-prospective bounding lithologies. No RST assigned.
1,678.45 – 1,680.3:	Shale-	Shale is medium greyish brown to medium greenish brown, moderately soft and somewhat splintery-textured, non-carbonaceous.
1,680.3 – 1,684.9:	Sh & Ls-	Interbedded sequence of limestone and shale. Shales are light greenish grey to medium grey and moderately firm. Limestone is off-white to very light grey and microcrystalline. Very gradational relationships in upper 2 and one-half feet (no defined bedding) with some limestone nodules. Interval becomes more interbedded and inter-laminated from 1,683.0' to base. Some slightly carbonaceous black shale lenses near base.
1,684.9 – 1,687.9:	Shale-	Shale is mottled medium greenish grey and dark grey, moderately firm. Interval cut by several moderate-angle, rough-polished slicks. Thin fossiliferous limestone occurs from 1,686.8' – 1,687.0'.
1,687.9 – 1,689.8:	Shale-	This shale is dark greyish brown with a soft and flaky-texture, non-calcareous. A thin zone (0.2 feet thick) of coaly-carbonaceous shale at base which had a trace of visible desorption. This shale contained a very thin limestone interbed. Bounding shales are non-prospective. **RST extends from 1,689.6' – 1,689.8'.**

INTERVAL (feet)	LITHOLOGY	DESCRIPTION & COMMENTS
1,689.8 – 1,696.4:	Shale-	Shale is very soft and easily crumbled, coloration is medium to dark brownish grey. From top of interval to 1,692.6' several low-angle, irregular slicks produced some rubble when core was laid down. Remainder of shale is mottled medium green to dark grey. This shale interval is firm and competent and non-carbonaceous.
1,696.4 – 1,698.9:	Ss & Sh-	Very thinly interbedded to very finely laminated sand and shale sequence. Sand-shale laminae are very regular and almost varve-like (rhythmites). Sandstone is off-white and fine grained, shales are medium grey and non-carbonaceous. Some soft sediment deformation features associated with shale drapes around sand lenses.
1,698.9 – 1,700.3:	Shale-	Shale is very dark greyish black to black, slightly carbonaceous and becomes more so to base, slightly flaky textured. RST assigned on the basis of organic content **(RST extends from 1,698.9' – 1,700.7')**. Visible desorption not evident from shale.
1,700.3 – 1,703.7:	Ss & Sh-	Interbedded sandstone and shale. Sand predominates in upper 12 inches and becomes increasingly shalier to base. Sandstone is light whitish grey to off-white and very fine grained. Bedding patterns are very uniform and horizontal to core. Shales are very dark grey to blackish grey.
1,703.7 – 1,704.9:	Sh & **Coal-**	Interbedded sequence of non-prospective dark grey shale, shaly coal, carbonaceous shale and minor coaly sandstone. **Canister GT-201** contains the interval from 1,703.9' – 1,704.9' and consists of 0.3 feet of shaly coal, 0.6 feet of carbonaceous & coaly shale and 0.1 feet of coaly sandstone. Interval displayed weak visible desorption. **RST is approximated by canister interval (1.0 feet).**

INTERVAL (feet)	LITHOLOGY	DESCRIPTION & COMMENTS
1,704.9 – 1,706.6:	Shale-	Shale is greyish brown and very soft and flaky underclay interval beneath coal and contains some carbonaceous-coaly rootlets and organic patches. Interval cut by near-vertical fracture which terminates at 1,706.0'.
1,706.6 – 1,708.7:	Limestone-	Limestone has a slightly mottled light to medium grey coloration, firm and microcrystalline. Gradational upper and lower contacts with both shale and sandstone. Limestone is non-fractured with no show.
1,708.7 – 1,718.2:	Ss & Sh-	Interbedded and inter-laminated sequence of sandstone and shale. Sand predominates to 1,714.0' and is light whitish grey, very fine grained and well cemented. From 1,714.0' to base shale becomes the major lithology and is predominately medium to dark grey. Sand and shale laminae are extremely thin and regularly spaced. Interval is firm and competent with one short, near-vertical fracture at 1,716.2' – 1,716.4'.
1,718.2 – 1,722.6:	Shale-	Interval is predominately shale with very minor sandy streaks near top. Shale is dark grey to blackish grey, but becomes especially dark hued from 1,720.0' to base. Most of shale is firm while the darker part is slightly flaky. Organic content of basal two feet does not appear to warrant a RST (no visible desorption). A high-angle, slightly curving fracture occurs from 1,719.0' to 1,719.4'
1,722.6 – 1,731.0:	Shale-	A small (0.3 feet thick) interval of shaly sand occurs at the very top of the interval and gives way to a medium greyish-green shale to 1,726.0'. From that point to base the shale becomes medium grey to light brownish grey to base. Some fine sandy lenses occur from 1,726.5' – 1,729.5'. All of shale is generally firm and competent, non-calcareous and non-carbonaceous. Basal three feet of interval contains medium-angle polished slicks, some with secondary calcite mineralization.
1,731.0 – 1,732.3:	Sh, **Coal**, & Ss-	**Canister GT-134** contains the interval from 1,703.9' – 1,704.9' and is composed of 0.3 feet of shaly coal, 0.5 feet of coaly and sandy carbonaceous shale and 0.2 feet of somewhat coaly sandstone. Sand 'plumes' evident throughout sample. **The RST of the interval is limited to canistered amount.**

INTERVAL (feet)	LITHOLOGY	DESCRIPTION & COMMENTS



1,732.3 – 1,732.6:	Sandstone-	Sand is off-white, fine to medium grained, poorly sorted, very well cemented and tight, streaked with carbonaceous and coaly shale.
1,732.6 – 1,736.4:	Shale-	Underclay (12 inches thick) is medium greyish brown, soft and flaky-textured. Gives way to a rather dramatic appearing mottled reddish-ocher to brownish grey and olive grey shale. The mottled and vari-colored section occurs from 1,734.7' to base. Grey shale part is very soft and flaky textured, all is non-calcareous.
1,736.4 – 1,737.3:	Ss & Sh-	Interbedded sequence of sand and shale. Coloration is a light greenish grey and has a somewhat gradational upper contact. Lower contact is very irregular and probably erosional.
1,737.3 – 1,749.0:	Shale-	Shale is brick red to light purplish red with some medium grey mottling at base. Shale is firm in part with some displaying a splintery to flaky texture. Shale partings are un-even and at low angle to core. Low-angle compound slicks scattered throughout- some displaying a high polish.
1,749.0 – 1,757.8:	Sandstone-	with minor shale interbeds. Sand is light greyish white, fine grained and well cemented. Sand ranges from massively bedded to some bedding displaying high-angle cross-beds. Basal two feet of section is finely laminated with shale. Shales are dark grey and non-carbonaceous. Sand interval is tight and non-fractured, no show.
1,757.8 – 1,760.5:	Shale-	Coloration is medium greenish grey to olive green with slight brown tinge at top of interval. Most shale is firm and competent, non-calcareous and non-carbonaceous. Very slightly sandy in upper several inches.

INTERVAL (feet)	LITHOLOGY	DESCRIPTION & COMMENTS
1,760.5 – 1,769.3:	Shale & **Coal-**	Shale ranges in coloration from medium blackish grey at top to some blackish brown and black. Hardness varies from firm and competent to some fissile and flaky textured shale. Most natural partings are poker chip. Several very low angle slicks noted. Part of interval is somewhat carbonaceous and a **RST assigned from 1,762.2' – 1,766.7'** (no visible desorption noted). At the very base of the interval (1,769.0' – 1,769.3') occurs a shaly coal bed with large pyrite nodules. Face cleating in coal is on 1/4 and less spacing and all calcite filled. Weak visible desorption noted in coal.
1,769.3 – 1,773.7:	Shale-	Shale is light brownish grey in upper 10 inches of interval then becoming greyish black to black throughout the remainder. Shale is moderately firm and displays somewhat un-even poker chip surfaces. No visible desorption observed, but based on organic content an **RST has been assigned from 1,771.0' – 1,773.7'.**
1,773.7 – 1,775.2:	Limestone-	Limestone is off-white and microcrystalline and appears as a breccia with interclast material composed of greenish grey shale.
1,775.2 – 1,783.3:	Shale-	Shale is medium brownish grey in upper 18 inches of interval giving way to a mottled brick red and medium greenish grey shale association similar to the above mottled and vari-colored shale. From 1,777.4' – 1,779.0' the shale displays a vertically-veined and mosaic-like appearance. From 1,779.0' – 1,781.0' the shales are more horizontally-bedded. From 1,781.0' to base, shales again become vari-colored and vertically veined.
1,783.3 – 1,784.0:	Limestone-	Limestone is off-white to pinkish tinged, upper part is thinly and irregularly interbedded (and streaked) with dark grey shale. Limestone is microcrystalline and tight, no show.
1,784.0 – 1,791.0:	Shale-	Shale is dark grey with some faint reddish mottling near top of interval and becomes medium reddish grey to base. Most is moderately firm with even poker chip separations. Several bright ocher-colored shale clasts from 1,787.2' – 1,790.3' (shale rip-ups?).
1,791.0 – 1,804.4:	Shale-	Predominately a duller greyish red coloration- not as vibrant hued as overlying brick red shales. Shale takes on a very dull reddish purple color in basal 18 inches. A minor interbed of medium greenish grey shale occurs at 1,795.4' – 1,797.0'. Most natural separations are slightly rough-surfaced and sub-horizontal to core.
1,804.4 – 1,808.5:	Shale-	Shale is dark olive green to greyish black near base and generally firm. Interfingering with reddish purple shale at upper contact and gradually becomes darker hued to base. Poker chip separations in basal two feet of interval. Does not contain enough organic material to warrant a RST assignment.
1,808.5 – 1,814.7:	Shale-	Shale is soft to brittle textured and brownish-grey in upper two feet of interval with a highly eroded core surface. Irregular veins

INTERVAL (feet)	LITHOLOGY	DESCRIPTION & COMMENTS
		of reddish-purple shale continue to 1,812.2'. Remainder of shale is medium to dark grey and medium brownish grey. All shale is non-calcareous and non-carbonaceous.
1,814.7 – 1,841.8:	Shale-	Shale is light blackish grey to some dark greyish brown at top of interval extending to 1,828.0'. Shale is moderately soft to flaky-textured with some erosion of core surfaces. From 1,827.3' – 1,828.0' occurs zones of very gummy and pliable claystone with some swelling clay component. Finger pressure alone allows penetration of the shale sample. Partings are somewhat un-even and organic content does not warrant a RST assignment. Shales occurring in the intervals from 1,828.0' – 1,837.6' and 1,840.8' – 1,841.8' are darker hued and somewhat carbonaceous. These shales are firm and generally in gauge. Good poker chip separations occur on 1/2 to 2 inch spacing. No visibly desorbing gas could be detected from any of these shales but RST assigned based on organic content **(RST extends from 1,828.0' – 1,837.6' and 1,840.8' – 1,841.8'- net of 10.6 feet).** The non-prospective shale intervals in this lower part are lighter hued and softer and flaky-textured. All shale is non-calcareous.
1,841.8 – 1,845.4:	Siltstone-	Siltstone is light grey with some pale greenish mottling, firm to moderately hard with very fine micaceous grains. Abrupt upper contact and gradational into underlying shale.
1,845.4 – 1,851.1:	Shale-	This shale is somewhat mottled medium grey with shades of light brown to light green. Most of interval is soft with flaky to splintery texture and non-carbonaceous. Very upper part is slightly silty and basal 12 inches appears slightly silty to very finely sandy. Some brownish grey shale rip-ups near base. Interval is cut by rough-surfaced, low-angle slicks.
1,851.1 – 1,860.5:	Shale-	Shale is various hues of black to greyish black- not as dark or as organic-rich as above black shales and does not warrant a RST assignment. Shale is firm and in gauge with most partings of poker chip quality. Some very low-angle, highly polished slicks throughout. In erosional contact with underlying sandstone.
1,860.5 – 1,866.7:	Sandstone-	Sand is very light grey to off-white in upper part but takes on a more greenish grey coloration toward base. Mostly medium grained, moderately well sorted, silica cemented and tight. From 1,865.0' to base the interval becomes somewhat shaly with some shale rip-ups in the vicinity of 1,866.0'. No show (Burgess Ss).
1,866.7 – 1,869.0:	Sh & Ss-	A greyish black, very firm and somewhat sandy shale at top of interval becoming more sandy with irregular shale stringers to base.

INTERVAL (feet)	LITHOLOGY	DESCRIPTION & COMMENTS
		Top – Mississippian Unconformity
1,869.0 – 1,883.3:	Conglomerate-	A deposit consisting of light tan to light brownish grey chert and soft, pale green to light grey shale. Overall a very irregular and chaotic mix- all fragments are angular and almost appears brecciated in part. Some shales show compound slicks with a fair amount of polish. **Majority of interval observed to bleed a medium to dark brown oil. Most of oil was emanating from irregular fractures but also from some fair-sized vugular cavities. Some of the oil occurrences displayed small amounts of gas coming out of solution with the oil.**
		Top – Mississippian Limestone
1,883.3 – 1,887.0:	Limestone-	Limestone is a mottled greyish brown, medium crystalline, fairly hard with no visible porosity and no oil show.
		Core TD = 1,887.0 feet