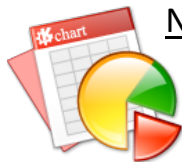




STATE OF ALASKA  
DEPARTMENT OF NATURAL RESOURCES

## Alaska Geologic Materials Center *Data Report No. 361*



**No. 361: X-ray Diffraction Analysis of: *Drew Point #1, East Simpson Test Well #1, East Simpson #2, Ikpikpuk #1, Seabee #1, W. Dease #1* wells.**



Received *June, 2009*

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TALISMAN ENERGY INC.

VARIOUS WELLS

X-RAY DIFFRACTION ANALYSIS

2008-09-26

52135-08-6055B



## X-RAY DIFFRACTION ANALYSIS

**COMPANY: TALISMAN ENERGY INC.**

**Well Name: Various Wells**

**Core Laboratories File No: 52135-08-6055B**

**September 26, 2008**

### **X-ray Diffraction:**

X-ray Diffraction (XRD) analysis detects only crystalline materials, which may or may not represent all components of the sample. Amorphous constituents cannot be identified or accounted for in the XRD analysis, although high proportions may produce significant background noise. This may potentially mask crystalline components. Detection limits of crystalline materials generally range from 5 to 15%, depending on background noise and sample quality. The results are semi-quantitative ( $\pm 5$  to 10%, but possibly up to 20% depending on the crystallinity of the sample). To ensure consistent accurate XRD results a quartz standard sample is analyzed on a weekly basis. It is then compared to a standard quartz XRD pattern in order to identify possible deviations in peak intensities/positions.

### **Sample Preparation:**

Samples submitted for whole rock and clay-fraction X-ray diffraction (XRD) mineral analyses are first cleaned of obvious drilling contaminants and then disaggregated in a mortar and pestle. Approximately 5 grams of each sample are mixed with isopropyl alcohol and pulverized using a McCrone micronising mill. The resultant powders are dried, disaggregated, and packed into stainless steel sample holders to produce random whole-rock mounts. A separate split of each sample is dispersed in a dilute sodium hexa-meta phosphate solution using a sonic probe. The suspensions are then centrifugally size fractioned to isolate clay-size ( $< 4\mu\text{m}$  ESD) materials for a separate



clay-fraction mount. The suspensions are then vacuum-deposited on a silver membrane filters to produce orientated clay mineral aggregates. Membrane mounts are attached to stainless steel slugs and exposed to ethylene glycol vapor for a minimum of 24 hours.

**Analytical Procedures:**

XRD analyses of the samples are performed using a Scintag<sup>®</sup> automated powder diffractometer equipped with a copper source and a solid state Peltier detector. The whole rock samples are analyzed over an angular range of 2-60 degrees  $2\theta$  at a scan rate of one degree/minute. The glycol-solvated clay-fraction mounts are analyzed over an angular range of 2-50 degrees  $2\theta$  at a rate of 1.5 degrees/minute.

Semi-quantitative determinations of whole rock and phyllosilicate mineral amounts are done using integrated peak areas (derived from peak-decomposition / profile-fitting methods) and empirical reference intensity ratio (RIR) factors determined specifically for the diffractometer used in the data collection.

Yours truly,

**CORE LABORATORIES CANADA LTD.**

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Brian Cumming,  
Project - Coordinator  
Geological Science

**TALISMAN ENERGY INC.**

**DREW POINT # 1**

**X-RAY DIFFRACTION ANALYSIS**

**2008-09-26**

**52135-08-6055B**

**X-Ray Diffraction Analysis  
(Combined Whole Rock and Clay)**



Company: Talisman Energy Inc.  
 File No: 52135-08-6055B  
 Analyst: MK  
 Well: Drew Point # 1

Sample ID	A2
Depth Interval (ft)	5905
Mineral	Whole Rock Weight %
Quartz	51
K-Feldspar	0
Plagioclase	6
Anhydrite	0
Calcite	8
Hematite	0
Dolomite	7
Gypsum	0
Halite	0
Siderite	1
Pyrite	0
Fluorapatite	0
Total Clay	27
<b>Total</b>	<b>100</b>
Clay Mineral	Relative Clay %
Smectite	0
Illite / Smectite *	12
Illite	41
Kaolinite	20
Chlorite	27
<b>Total</b>	<b>100</b>

**\* Illite / Smectite Mixed-Layer Clay**

The percentage of smectite layers in illite / smectite clay 20-30%

Due to inherent limitations in X-ray diffraction quantification, results must be considered semi-quantitative.

CG-COR-GEOCa01

**TALISMAN ENERGY INC.**

**EAST SIMPSON # 1**

**X-RAY DIFFRACTION ANALYSIS**

**2008-09-26**

**52135-08-6055B**

**X-Ray Diffraction Analysis  
(Combined Whole Rock and Clay)**



Company: Talisman Energy Inc.  
 File No: 52135-08-6055B  
 Analyst: MK  
 Well: East Simpson#1

Sample ID	A3
Depth Interval (ft)	5129
<b>Mineral</b>	
Quartz	50
K-Feldspar	1
Plagioclase	9
Anhydrite	0
Calcite	7
Hematite	0
Dolomite	5
Gypsum	0
Halite	0
Siderite	1
Pyrite	1
Fluorapatite	0
Total Clay	26
Total	100
<b>Clay Mineral</b>	
Smectite	0
Illite / Smectite *	14
Illite	31
Kaolinite	27
Chlorite	28
Total	100

**\* Illite / Smectite Mixed-Layer Clay**

The percentage of smectite layers in illite / smectite clay is 20-30%.

Due to inherent limitations in X-ray diffraction quantification, results must be considered semi-quantitative.

CG-COR-GEOCa01



**TALISMAN ENERGY INC.**

**EAST SIMPSON # 2**

**X-RAY DIFFRACTION ANALYSIS**

**2008-09-26**

**52135-08-6055B**

**X-Ray Diffraction Analysis  
(Combined Whole Rock and Clay)**



Company: Talisman Energy Inc.  
 File No: 52135-08-6055B  
 Analyst: MK  
 Well: East Simpson#2

Sample ID	A5	A7	A9	A11	A13	A15
Depth Interval (ft)	2388	2395.5	2405	6066.5	6073	6076
<b>Mineral</b>						
Quartz	60	54	53	58	59	61
K-Feldspar	1	2	0	2	0	1
Plagioclase	10	11	10	13	14	13
Anhydrite	0	0	0	0	0	0
Calcite	Trace	1	Trace	Trace	1	Trace
Hematite	0	0	0	0	0	0
Dolomite	1	5	4	3	3	2
Gypsum	0	0	0	0	0	0
Halite	0	0	0	0	0	0
Siderite	Trace	Trace	Trace	1	Trace	Trace
Pyrite	1	1	0	0	0	0
Fluorapatite	0	0	0	0	0	0
<b>Total Clay</b>	27	26	33	23	23	23
<b>Total</b>	100	100	100	100	100	100
<b>Clay Mineral</b>						
Smectite	0	0	0	0	0	0
Illite / Smectite *	11	12	12	15	15	14
Illite	35	39	40	40	37	38
Kaolinite	23	18	19	20	21	19
Chlorite	31	31	29	25	27	29
<b>Total</b>	100	100	100	100	100	100

**\* Illite / Smectite Mixed-Layer Clay**

The percentage of smectite layers in illite / smectite clay      20-30%      20-30%      20-30%      20-30%      20-30%      20-30%

Due to inherent limitations in X-ray diffraction quantification, results must be considered semi-quantitative.  
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**TALISMAN ENERGY INC.**

**IKPIKPUK # 1**

**X-RAY DIFFRACTION ANALYSIS**

**2008-09-26**

**52135-08-6055B**

**X-Ray Diffraction Analysis  
(Combined Whole Rock and Clay)**



Company: Talisman Energy Inc.  
 File No: 52135-08-6055B  
 Analyst: MK  
 Well: lkpikpuk#1

Sample ID	A17
Depth Interval (ft)	7142.5
Mineral	
Quartz	65
K-Feldspar	0
Plagioclase	8
Anhydrite	0
Calcite	1
Hematite	0
Dolomite	3
Gypsum	0
Halite	0
Siderite	1
Pyrite	0
Fluorapatite	0
Total Clay	22
Total	100
Clay Mineral	
Smectite	0
Illite / Smectite *	15
Illite	45
Kaolinite	15
Chlorite	25
Total	100

**\* Illite / Smectite Mixed-Layer Clay**

The percentage of smectite layers in illite / smectite clay 20-30%

Due to inherent limitations in X-ray diffraction quantification, results must be considered semi-quantitative.  
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**TALISMAN ENERGY INC.**

**SEABEE # 1**

**X-RAY DIFFRACTION ANALYSIS**

**2008-09-26**

**52135-08-6055B**

**X-Ray Diffraction Analysis  
(Combined Whole Rock and Clay)**



**Company:** Talisman Energy Inc.

**File No:** 52135-08-6055B

**Analyst:** MK

<b>Well:</b>	Seabee#1
<b>Sample ID</b>	A21
<b>Depth Interval (ft)</b>	5394
<b>Mineral</b>	
Quartz	56
K-Feldspar	0
Plagioclase	10
Anhydrite	0
Calcite	0
Hematite	0
Dolomite	2
Gypsum	0
Halite	0
Siderite	1
Pyrite	1
Fluorapatite	0
<b>Total Clay</b>	30
<b>Total</b>	100
<b>Clay Mineral</b>	
Smectite	0
Illite / Smectite *	11
Illite	47
Kaolinite	20
Chlorite	22
<b>Total</b>	100

**\* Illite / Smectite Mixed-Layer Clay**

The percentage of smectite layers in illite / smectite clay 20-30%

Due to inherent limitations in X-ray diffraction quantification, results must be considered semi-quantitative.

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**TALISMAN ENERGY INC.**

**W.DEASE # 1**

**X-RAY DIFFRACTION ANALYSIS**

**2008-09-26**

**52135-08-6055B**

**X-Ray Diffraction Analysis  
(Combined Whole Rock and Clay)**



Company: Talisman Energy Inc.  
 File No: 52135-08-6055B  
 Analyst: MK  
 Well:

W. Dease#1

Sample ID	A25
Depth Interval (ft)	1917.5
Mineral	
Quartz	50
K-Feldspar	3
Plagioclase	11
Anhydrite	0
Calcite	1
Hematite	0
Dolomite	4
Gypsum	0
Halite	0
Siderite	1
Pyrite	0
Fluorapatite	0
Total Clay	30
Total	100
Clay Mineral	
Smectite	0
Illite / Smectite *	12
Illite	36
Kaolinite	22
Chlorite	30
Total	100

**\* Illite / Smectite Mixed-Layer Clay**

The percentage of smectite layers in illite / smectite clay 20-30%

Due to inherent limitations in X-ray diffraction quantification, results must be considered semi-quantitative.  
 CG-COR-GEOcal01



**X-Ray Diffraction Analysis  
(Combined Whole Rock and Clay)**



Company: Talisman Energy Inc.  
File No: 52135-08-6055B  
Analyst: MK

Well:	DREW Point#1	East Simpson#1	East Simpson#2					Ikpikpuk#1	Seabee#1	W. Dease#1	
Sample ID	A2	A3	A5	A7	A9	A11	A13	A15	A17	A21	A25
Depth Interval (ft)	5905	5129	2388	2395.5	2405	6066.5	6073	6076	7142.5	5394	1917.5
Mineral	Whole Rock Weight %										
Quartz	51	50	60	54	53	58	59	61	65	56	50
K-Feldspar	0	1	1	2	0	2	0	1	0	0	3
Plagioclase	6	9	10	11	10	13	14	13	8	10	11
Anhydrite	0	0	0	0	0	0	0	0	0	0	0
Calcite	8	7	Trace	1	Trace	Trace	1	Trace	1	0	1
Hematite	0	0	0	0	0	0	0	0	0	0	0
Dolomite	7	5	1	5	4	3	3	2	3	2	4
Gypsum	0	0	0	0	0	0	0	0	0	0	0
Halite	0	0	0	0	0	0	0	0	0	0	0
Siderite	1	1	Trace	Trace	Trace	1	Trace	Trace	1	1	1
Pyrite	0	1	1	1	0	0	0	0	0	1	0
Fluorapatite	0	0	0	0	0	0	0	0	0	0	0
Total Clay	27	26	27	26	33	23	23	23	22	30	30
Total	100	100	100	100	100	100	100	100	100	100	100
Clay Mineral	Relative Clay %										
Smectite	0	0	0	0	0	0	0	0	0	0	0
Illite / Smectite *	12	14	11	12	12	15	15	14	15	11	12
Illite	41	31	35	39	40	40	37	38	45	47	36
Kaolinite	20	27	23	18	19	20	21	19	15	20	22
Chlorite	27	28	31	31	29	25	27	29	25	22	30
Total	100	100	100	100	100	100	100	100	100	100	100

**\* Illite / Smectite Mixed-Layer Clay**

The percentage of smectite layers in illite / smectite clay

	20-30%	20-30%	20-30%	20-30%	20-30%	20-30%	20-30%	20-30%	20-30%	20-30%	20-30%
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Due to inherent limitations in X-ray diffraction quantification, results must be considered semi-quantitative.

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