1990 FORT NORMAN \ NORTHWEST TERRITORIES
GEOLOGICAL FIELD TRIP
(PROGRAM NUMBER 9237-C4-5E)

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1990 FORT NORMAN / NORTHWEST TERRITORIES GEOLOGICAL FIELD PROGRAM

Introduction:

Chevron Canada Resources conducted a geological field program within the Ft Norman area of the Northwest Territories from August 22, 1990 to August 28, 1990. The locations of the sites visited are shown on the attached map (Figure #1).

The field party consisted of the following personnel:

Brian Grant	Geologist	Chevron Canada Resources
Dave Dalley	Geophysicist	Chevron Canada Resources
Louis Girard	Geologist	Chevron Canada Resources

The primary purpose of the field program was to collect shale samples for geochemical analysis and sandstone samples for reservoir characterization. Samples were obtained over a large stratigraphic interval from Tertiary to Proterozoic as well as over a large geographic area in order to obtain a regional perspective.

The results of geochemical analyses are contained in Table 1, reservoir parameters are contained in Table 2 and sample locations and descriptions are listed below.

STOP#- BG1-90 **FORMATION-** TERTIARY SUMMIT CK

CO-ORDINATES- 64°54'00"N LAT 125°29'00"W LONG **LOCALITY-** ON MACKENZIE RIVER EAST OF FT NORMAN

SAMPLES COLLECTED-

SAMPLE LG1-90: FG to MG lithic (qtz and cht) sandstone. Med. grey color, friable. Interbedded silty sands, silts and shales above. Trough x-bedding, but mainly parallel laminated sands. Abundant pebble lags.

STOP#- BG2-90 **FORMATION-** TERTIARY SUMMIT CK

CO-ORDINATES- 64°54'00"N LAT 125°23'00"W LONG **LOCALITY-** ON MACKENZIE RIVER EAST OF FT NORMAN

SAMPLES COLLECTED-

SAMPLE LG2-90: FG to MG lithic (qtz and cht) sandstone. Med. grey color, friable. (as above)

STOP#- BG3-90 **FORMATION- TERTIARY SUMMIT CK**

CO-ORDINATES- 64°53'30"N LAT 125°19'00"W LONG **LOCALITY-** ON MACKENZIE RIVER EAST OF FT NORMAN

SAMPLES COLLECTED-

SAMPLE LG3-90: Shaly siltstone, brown color, from an interbedded silt/shale sequence with minor coal laminae.

STOP#- BG4-90 **FORMATION- TERTIARY SUMMIT CK**

CO-ORDINATES- 64°53'45"N LAT 125°13'45"W LONG **LOCALITY-** ON MACKENZIE RIVER EAST OF FT NORMAN

SAMPLES COLLECTED-

NONE COLLECTED: Ignimbrite and fire clay.

STOP#- BG5-90 **FORMATION- ORDOVICIAN FR MTN**

CO-ORDINATES- 64°34'00"N LAT 125°32'00"W LONG **LOCALITY-** SE MACKAY RANGE

SAMPLES COLLECTED-

NONE COLLECTED

STOP#- BG6-90 **FORMATION- CAMBRIAN SALINE RV**

CO-ORDINATES- 64°36'00"N LAT 125°35'00"W LONG **LOCALITY-** SE MACKAY RANGE

SAMPLES COLLECTED-

SAMPLE LG4-90: Silty dolomite, reddish brown, found interbedded with fibrous anhydrite.

STOP#- BG7-90 **FORMATION- TERTIARY SUMMIT CK**

CO-ORDINATES- 64°28'30"N LAT 125°41'00"W LONG **LOCALITY-** ALONG CK DRAINING INTO W TATE LAKE

SAMPLES COLLECTED-

Sample LG5-90: MG to CG lithic (qtz and cht) sandstone, med grey color collected just above coal and ignimbrite layers. Extremely friable, parallel laminated with minor trough x-bedding and occasioanl pebbly layers. Sample LG5-90 taken near top of Section.

Sample LG6-90: Siltsone to VFG sandstone, lithic, brown colored well indurated. Obtained 50' lower in section than LG5-90 and just above coaly zone.

Sample LG7-90: MG to CG lithic sandstone, med grey, extremely friable, and down section from LG5-90. Taken from a thin sand zone within a chert pebble conglomerate.

STOP#- BG8-90 **FORMATION- TERTIARY SUMMIT CK**

CO-ORDINATES- 64°28'10"N LAT 125°34'15"W LONG **LOCALITY-** ALONG CK DRAINING INTO W TATE LAKE

SAMPLES COLLECTED-

Sample LG8-90: MG sandstone, med grey to brown and silty, somewhat friable. Sample taken from thin sand lens within overall massive chert pebble conglomerate.

Sample LG9-90: FG sandstone, med grey brown, silty, mod well indurated.

STOP#- BG9-90 **FORMATION- U CRETACEOUS SLATER RIVER**

CO-ORDINATES- 64°03'20"N LAT 124°46'00"W LONG **LOCALITY-** ALONG REDSTONE RIV

SAMPLES COLLECTED-

Sample LG10-90: Shale, black, blocky. Extremely poorly exposed.

STOP#- BG10-90

FORMATION- CRET. LITTLE BEAR

CO-ORDINATES- 64°09'30"N LAT
124°40'30"W LONG

LOCALITY- ALONG REDSTONE RIV

SAMPLES COLLECTED-

Sample LG11-90: FG sandstone, lt grey with abundant carbonaceous laminae. Ripple x-bedded with large re-activation surfaces and minor bioturbation.

Sample LG12-90: Parallel bedded to massive FG sandstone, lt grey, minor bioturbation and carbonaceous material.

STOP#- BG11-90

FORMATION- CRET. LITTLE BEAR

CO-ORDINATES- 64°13'30"N LAT
124°41'00"W LONG

LOCALITY- ALONG REDSTONE RIV

SAMPLES COLLECTED-

Sample LG13-90: MG lithic Sandstone, lt grey, massive, approx. 25-30' thick.

Sample LG14-90: FG to MG lithic sandstone as above.

STOP#- BG12-90

FORMATION-Tertiary Summit Ck

CO-ORDINATES- 64°31'30"N LAT
124°53'30"W LONG

LOCALITY- Mackenzie River
South of Big Smith Creek

SAMPLES COLLECTED-

NONE COLLECTED

STOP#- BG13-90 **FORMATION- ORD. FRANKLIN MTN CHERTY MEMBER**

CO-ORDINATES- 64°35'30"N LAT 124°49'00"W LONG **LOCALITY- BIC SMITH CREEK**

SAMPLES COLLECTED-

Sample LG15-90: Poorly sorted, pebbly sandstone.

STOP#- BG14-90 **FORMATION- Ord Franklin Mtn**

CO-ORDINATES- 63°45'15"N LAT 124°51'00"W LONG **LOCALITY- BIG SMITH RIVER**

SAMPLES COLLECTED-

NONE COLLECTED

STOP#- BG15-90 **FORMATION- CRET. UNNAMED**

CO-ORDINATES- 64°36'00"N LAT 125°34'30"W LONG **LOCALITY- S.E. MACKAY RANGE**

SAMPLES COLLECTED-

Sample LG16-90: VFG lithic sandstone from sequence of interbedded shales, siltsones and VFG sands.

Sample LG17-90: Shale adjacent to LG17-90

Sample LG18-90: MG massive sandstone. 100' up section from LG17-90.

Sample LG19-90: Shale from a sequence of grey weathering sands and shales.

Sample LG20-90: MG sandstone, adjacent to LG19-90. Lt grey lithic, massive, minor bioturbation.

STOP#- BG16-90

FORMATION- U CRET??
??SLATER RIVER??

CO-ORDINATES- 65°20'20"N LAT
125°09'00"W LONG

LOCALITY- S MAHONEY LAKE

SAMPLES COLLECTED-

Sample LG21-90: Black extremely fissile, sulfur stained shale. Very poorly exposed.

Sample LG22-90: CG lithic sandstone, massive, and very poorly exposed heavily vegetated section.

STOP#- BG17-90

FORMATION- ORD. FRANKLIN MTN

CO-ORDINATES- 65°26'30"N LAT
126°05'00"W LONG

LOCALITY- N. KELLY LAKE

SAMPLES-

Sample LG23-90: VFG Sandstone, green grey.

Sample LG24-90: Pebbly sandstone, brown.

STOP#- BG18-90

FORMATION- CRET. LITTLE BEAR

CO-ORDINATES- 64°39'45"N LAT
126°21'00"W LONG

LOCALITY- LITTLE BEAR RIVER
S OF BLUEBERRY CREEK

SAMPLES-

Sample LG25-90: FG to MG massive lithic sandstone, minor horizontal laminations, poorly exposed interbedded with silts and shales.

Sample LG26-90: Shale , black, subfissile.

Sample LG27-90: Shale from a predominantly sandy portion of outcrop, and laterally adjacent to samples LG 25 & 26-90.

Sample LG28-90: FG sandstone, lt grey, ripple laminated with reactivation surfaces, abundant carbonaceous material and possible rooting.

Sample LG29-90: FG sandstone as above.

Sample LG30-90: Chert pebble conglomerate with coal fragments up to 20 cm long.

Sample LG31-90: FG sandstone lt grey, heavily bioturbated.

STOP#- BG19-90

FORMATION- CRET. LITTLE BEAR

CO-ORDINATES- 64°40'00"N LAT
126°21'00"W LONG

LOCALITY- LITTLE BEAR RIVER
SOUTH OF BLUEBERRY CREEK

SAMPLES-

Sample LG32-90: MG, lt grey lithic sandstone from predominantly coaly shale portion of outcrop.

Sample LG33-90: Shale, dk grey subfissile.

Sample LG34-90: Coal from coal seam.

STOP#- BG20-90

FORMATION- CRET. LITTLE BEAR

CO-ORDINATES- 64°45'30"N LAT
126°27'00"W LONG

LOCALITY- LITTLE BEAR RIVER
N OF BLUEBERRY CREEK

SAMPLES-

Sample LG35-90: MG sandstone, lt grey, up section from stop BG19-90

STOP#- BG21-90

FORMATION- CRET LITTLE BEAR

CO-ORDINATES- 64°47'00"N LAT
126°26'00"W LONG

LOCALITY- LITTLE BEAR RIVER
N OF BLUEBERRY CREEK

SAMPLES-

Sample LG36-90: MG lithic sandstone, lt grey.

STOP#- BG22-90 **FORMATION-** DEV IMPERIAL CANYON CREEK MBR

CO-ORDINATES- 65°15'00"N LAT 126°29'00"W LONG **LOCALITY-** CANYON CREEK S OF NORMAN RGE

SAMPLES-

Sample LG37-90: VFG silty sandstone from interbedded sands, siltsones and shales.

STOP#- BG23-90 **FORMATION-** ORDOVICIAN TO PROTEROZOIC?

CO-ORDINATES- 65°03'45"N LAT 127°44'00"W LONG **LOCALITY-** GRAFE CANYON

SAMPLES-

Sample LG38-90: Red sandstone, MG-CG, quartzose. Prot?

Sample LG39-90: Quartzite, MG-CG. Proterozoic

Sample LG40-90: MG-CG trough cross bedded sandstone, possible Mt. Clark Formation.

Sample LG41-90: Black Shale from top of quartzite beds possible Franklin Mtn Formation.

Sample LG42-90: Red sandstone. MG-CG quartzose. Prot?

Sample LG43-90: Franklin Mtn dolomite.

STOP#- BG24-90 **FORMATION-** PROTEROZOIC

CO-ORDINATES- 64°56'45"N LAT 127°17'00"W LONG **LOCALITY-** DODO CANYON

SAMPLES-

Sample LG44-90: Quartzite, reddish color.

STOP#- BG25-90 FORMATION- CRET. SLATER RIVER

CO-ORDINATES- 64°57'00"N LAT LOCALITY- SLATER RIVER
126°15'00"W LONG

SAMPLES-

Sample LG45-90: Black organic rich shale, sulphur stained, minor silty laminae.

STOP#- BG26-90 FORMATION- CRET LITTLE BEAR

CO-ORDINATES- 64°48'00"N LAT LOCALITY- LITTLE BEAR RIVER
126°05'00"W LONG W OF E LITTLE BEAR

SAMPLES-

Sample LG46-90: Shaly VFG sandstone heavily bioturbated.

Sample LG47-90: As above.

Sample LG48-90: FG-MG lithic sandstone, lt grey, heavily bioturbated.

STOP#- BG27-90 (6084) FORMATION- BASAL CRET.

CO-ORDINATES- 64°54'30"N LAT LOCALITY- N ST CHARLES CREEK
124°08' "W LONG

SAMPLES-

Interbedded sand/silt/shale heavily bioturbated. Mainly sandy at base of exposure and shaly at top. Interbedded sands are FG silty with abundant siderite nodules in layers.

Sample LG49-90: Shale from base of outcrop.

Sample LG50-90: Heavily bioturbated VFG lithic sandstone, light grey color.

Sample LG51-90: FG sandstone as above.

STOP#- BG28-90 **FORMATION- BASAL CRET.**

CO-ORDINATES- 64°41'00"N LAT **LOCALITY- S ST CHARLES CK**
124°17'00"W LONG

SAMPLES-

Sample LG52-90: Heavily bioturbated , light grey vfg sandstone.

Sample LG53-90: Shale, grey subfissile.

Sample LG54-90: Sandstone from base of outcrop. Entire sequence is about 140' thick and mainly FG silty sands,(with minor FG to MG sands), shales and siltsones.

STOP#- BG29-90 **FORMATION- CRET. BASAL**

CO-ORDINATES- 64°41'00"N LAT **LOCALITY- BIG SMITH CREEK**
124°17'00"W LONG

SAMPLES-

Sample LG55-90: MG-CG quartzose sandstone, cross bedded.

Sample LG56-90: Shale, dark grey fissile.

Sample LG57-90: FG-MG quartzose sandstone. Heavily bioturbated with minor cross bedding.

STOP#- BG30-90 **FORMATION- CAMBRIAN TO PROTEROZOIC**

CO-ORDINATES- 64°26'15"N LAT **LOCALITY- N FLANK MT CLARK**
124°16'00"W LONG

SAMPLES-

Sample LG58-90: FG-MG Quartzite, trough cross bedded. Proterozoic?

Sample LG59-90: Shale/slate, black. Proterozoic?

Sample LG60-90: Shale, dark grey to black Cambrian?

Sample LG61-90: Shale as above. Cambrian?

Sample LG62-90: Silstone, quartzose lt grey. Cambrian?

STOP#- BG31-90 **FORMATION-** PROTEROZOIC MT CAP

CO-ORDINATES- 64°03'00"N LAT **LOCALITY-** SE TWIN PEAKS
123°27'00"W LONG

SAMPLES-

Sample LG63-90: Quartzite, light grey.

Sample LG64-90: Siltsone, lt grey brown.

STOP#- BG32-90 **FORMATION-** ORD. FRANKLIN MTN

CO-ORDINATES- 64°35'30"N LAT **LOCALITY-** BIG SMITH CREEK
124°50'00"W LONG

SAMPLES-

Sample LG65-90: Franklin Mtn limestone.

STOP#- BG33-90 **FORMATION-** Dev Imperial
Canyon Creek Member

CO-ORDINATES- 65°02'00"N LAT **LOCALITY-** Jungle Ridge Ck
125°59'00"W LONG

SAMPLES- NONE TAKEN

STOP#- BG34-90 **FORMATION-** DEV IMPERIAL
CANYON CK MBR

CO-ORDINATES- 65°07'30"N LAT **LOCALITY-** VERMILLION CREEK
126°06'00"W LONG

SAMPLES-

Sample LG66-90: Siltsone, lt grey brown.

FIGURE#1

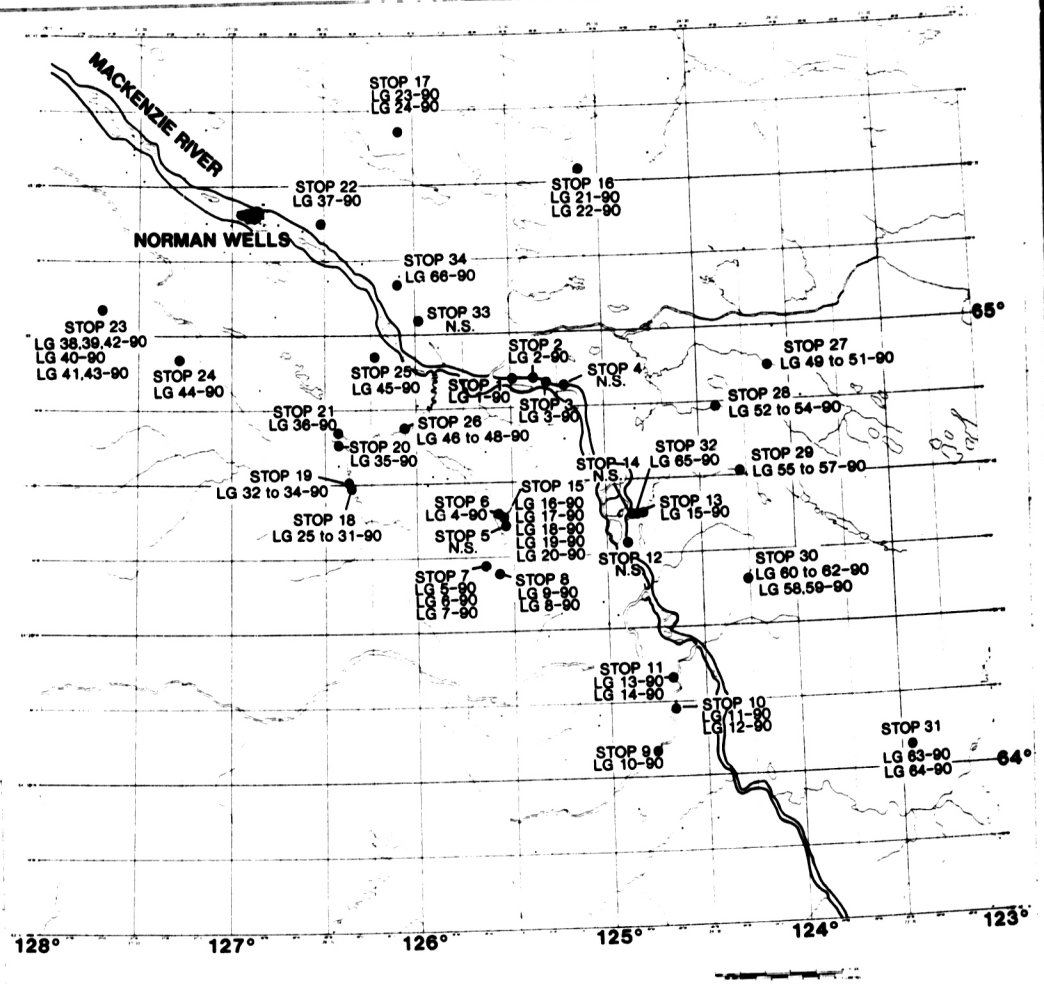
MACKENZIE RIVER
NORMAN WELLS
STOP 17
LG 23-90
LG 24-90
STOP 22
LG 37-90
STOP 16
LG 21-90
LG 22-90
STOP 34
LG 66-90
STOP 33
N.S.
STOP 23
LG 38,39,42-90
LG 40-90
LG 41,43-90
STOP 24
LG 44-90
STOP 25
LG 45-90
STOP 1
LG 1-90
STOP 2
LG 2-90
STOP 4
N.S.
STOP 3
LG 3-90
STOP 27
LG 49 to 51-90
STOP 28
LG 52 to 54-90
STOP 21
LG 36-90
STOP 26
LG 46 to 48-90
STOP 20
LG 35-90
STOP 14
N.S.
STOP 32
LG 65-90
STOP 29
LG 55 to 57-90
STOP 19
LG 32 to 34-90
STOP 18
LG 25 to 31-90
STOP 6
LG 4-90
STOP 5
N.S.
STOP 15
LG 16-90
LG 17-90
LG 18-90
LG 19-90
LG 20-90
STOP 13
LG 15-90
STOP 12
N.S.
STOP 30
LG 60 to 62-90
LG 58,59-90
STOP 7
LG 5-90
LG 6-90
LG 7-90
STOP 8
LG 9-90
LG 8-90
STOP 11
LG 13-90
LG 14-90
STOP 10
LG 11-90
LG 12-90
STOP 31
LG 63-90
LG 64-90
STOP 9
LG 10-90
65°
64°
128°
127°
126°
125°
124°
123°

TABLE #1: Geochemical analyses of Ft Norman Area outcrop samples

SAMPLE	LITHOLOGY	FORMATION	LOCALITY	SAMPLE #	S2	T MAX	TOC	HI
Ld10-90 Dd	SHALE DK GY	CRET.SL RIV	REDSTONE RIV	10	0.47	442	1.01	46
Ld17-90 D	SHALE	CRET.	SE MACKAY BGE	17	0.04		0.66	6
Ld19-90 Dd	SHALE	CRET.	SE MACKAY BGE	19	0.31		1.76	17
Ld21-90 Dd	SHALE	CRET. SL RIVER	S MAHONEY LK	21	70.35	435	9.43	746
Ld21-90 Dd	SHALE	CRET. SL RIVER	S MAHONEY LK	21(31.2g)*	2.78	417	14.17	412
Ld26-90 D	SHALE	CRET. L BEAR	SOUTH LITTLE BEAR RIV	26	0.38	439	1.09	34
Ld27-90 Dd	SHALE	CRET. L BEAR	"	27	0.76	435	1.11	68
Ld33-90 Dd	SHALE	CRET. L BEAR	"	33	0.59	437	0.95	62
Ld41-90 Dd	SHALE	ORD. FR MTN	GRAPE CANYON	41	0.24		0.71	34
Ld45-90 Dd	SHALE	CRET. SL RIV	SLATER RIVER	45	10.78	411	3.96	272
Ld49-90 Dd	SHALE	BASAL CRET.	N BT CHARLES CK	49			0.01	
Ld53-90 Dd	SHALE	BASAL CRET.	S BT CHARLES CK	53	0.49	442	0.42	116
Ld56-90 Dd	SHALE	BASAL CRET.	E BIG SMITH CK	56	0.32		0.42	76
Ld59-90 D	SH/SLATE/	PROTEROZOIC	MT CLARK	59	0.43	441	1.41	30
Ld60-90 D	SHALE	CAMB/MT CAP	"	60	0.05		0.07	71
Ld61-90 D	SHALE	CAMB/MT CAP	"	61	0.03		0.17	17

TABLE#2

COMPANY: CHEVRON CANADA RESOURCES
WELL: LG-90
LOCATION: OUTCROP SAMPLES
FORMATION:
DRILLING FLUID:

AGAT LABORATORIES

W/O No: RC2886
Date: 01-10-90

FINAL CORE ANALYSIS DATA

Sample	Interval (m) Top	Base	Rep Thick (m)	Sample Length (m)	-----Gas Permeability----- Kmax (mD)	K90 (mD)	Vertical (mD)	Porosity	Density (kg/m3) Bulk	Grain	Residual Saturation Oil	Water	Remarks
SP01	-	-	-	-	9830.	-	-	.441	1480	2640	-	-	LG-2-90
SP02	-	-	-	-	2.24	-	-	.492	1210	2380	-	-	LG-6-90
SP03	-	-	-	-	.28	-	-	.078	2460	2660	-	-	LG-11-90
SP04	-	-	-	-	306.	-	-	.204	2120	2660	-	-	LG-13-90
SP05	-	-	-	-	566.	-	-	.275	1940	2670	-	-	LG-18-90
SP06	-	-	-	-	293.	-	-	.248	2000	2660	-	-	LG-20-90
SP07	-	-	-	-	>10000.	-	-	.273	1910	2630	-	-	LG-22-90
SP08	-	-	-	-	.05	-	-	.079	2600	2830	-	-	LG-23-90
SP09	-	-	-	-	17.1	-	-	.104	2520	2810	-	-	LG-24-90
SP10	-	-	-	-	71.8	-	-	.231	2020	2630	-	-	LG-28-90
SP11	-	-	-	-	1020.	-	-	.262	1960	2660	-	-	LG-35-90
SP12	-	-	-	-	.04	-	-	.043	2530	2650	-	-	LG-39-90
SP13	-	-	-	-	23.1	-	-	.110	2350	2650	-	-	LG-40-90
SP14	-	-	-	-	2240.	-	-	.296	1870	2650	-	-	LG-48-90
SP15	-	-	-	-	3.81	-	-	.178	2190	2660	-	-	LG-51-90
SP16	-	-	-	-	599.	-	-	.217	2100	2680	-	-	LG-57-90
SP17	-	-	-	-	.08	-	-	.045	2580	2700	-	-	LG-63-90
SP18	-	-	-	-	.02	-	-	.095	2460	2720	-	-	LG-64-90