

Final Report

**SUMMIT CREEK EL397 2005 2D SEISMIC PROGRAM
NORTHWEST TERRITORIES**

**HUSKY OIL OPERATIONS LIMITED
N.E.B. Authorization # 9229-H006-002E
LAND USE PERMIT S05B-003**

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ENCLOSURES

PROJECT MAP

FINAL PLAN MAP

SEISMIC LINE MAP

STATIC GRADIENTS

300/ A28 64-10 125-00 /0

300/ E19 64-10 125-00 /0

300/ B30 64-20 125-15 /0

300/ K29 64-10 125-30 /0

TIME STRUCTURE MAPS

Upper Little Bear Time Structure

SubCretaceous Unconformity Time Structure

Top Devonian Carbonate to Upper Little Bear Isochron

Top Devonian Carbonate to SubCretaceous Unconformity
Isochron

Top Devonian Carbonate Time Structure

SubCretaceous to Upper Little Bear Isochron

SEISMIC LINE PRESTACK TIME MIGRATION DATA

H-307

H-308

H-309

H-310

H-311

H-312

H-313

H-314

H-315

H-321

H-322

DATA CD'S

Summit Creek EL 397 2005 Final Map / SEG P1 Files

Summit Creek Data

Word Docs

Static Gradients

Time Structure Maps

Seismic Line Prestack Time Migration Data

1. INTRODUCTION

The 2005 Summit Creek, Keele River, EL 397 2D heli-portable seismic program was located in the Central Mackenzie Valley 80km South of Tulita. It was operated by Husky Energy from the Little Smith Camp located adjacent to KP 160. The program was comprised of 11 seismic lines totaling 197 linear kilometers. The program was operated from July 15 to September 18. The program employed up to 124 people at any one time. All personal were transported to and from the work area via helicopter daily. Northern EnviroSearch Ltd., handled the compilation of the Sahtu Land and Water Board applications, conducted the environmental assessment and TEK studies, and monitored the regulations. Public consultations were held in Tulita and Norman Wells and met with positive feedback. The purpose of the program was to further evaluate the structures on EL397 and M38 lands.

2. LOGISTICS & SUMMARY

Mr. Bob Dreaver, of ECL Canada and Mr. Brian Creamer, of B. Creamer Seismic Services, were the Project Managers situated in the base camp at the Keele River Staging Area, and were responsible for all logistical aspects of the field operation.

Barging of the camp and fuel was one of the main concerns that took very careful planning. The camp was barged from Ft Simpson and was set up at Little Smith located at the intersection of the Keele River and the MacKenzie River. The fuel, along with enviro-tanks and a large number of 205 liter drums were barged from Ft Simpson to support the camp and the helicopters.

The Little Smith camp required a portable sewage treatment plant equipped with an Effluent Pump Chamber allowing the disposal of output to be released onto the ground. Prior to discharge, samples were tested at a lab in Edmonton. Water for utilities was pumped from the Mackenzie River. Drinking and cooking water was brought in via air support and jet boat.

All disposable items from camp was incinerated at site and the non-disposable items were air lifted back to Tulita for disposal at the land fill site.

Communications consisted of a satellite system for voice and data transmission. Repeaters were required in numerous locations through out the program. By having repeaters, two-way radio communications could be utilized through out the program and at camp.

Mr. Murray Place, was the expeditor in Norman Wells, arranging personnel movements, purchasing fuel, foods and other essential supplies to ensure ongoing operations of the field

crews. Canadian North Airlines was used to transport personnel, equipment and supplies from the south.

Local fixed wing support, for chartering local personnel and handling of emergencies, was primarily provided by North-Wright Airways Ltd. of Norman Wells.

3. SAFETY, HEALTH & ENVIRONMENT

Health & Safety concerns were monitored by Mr. Rob Smith for Husky Oil, based at the Little Smith camp. The advisor conducted safety audits and morning safety meetings, and trained the local hires in WHIMS, H2S safety, Bear Awareness, Mountain Safety and First Aid. Safety was a major concern on this program due to the distance to a major hospital and the possible evacuation of a worker. Two Paramedics from Medic North were utilized during all phases of the program.

A continuously updated safety hazard map for the program area was maintained at the Little Smith Camp.

Mr. Bob Raina & Ms. Sandra Lukas-Amulung of Northern Envirosearch Ltd., monitored the application of all environmental regulations on the program. The program utilized two local Wildlife Monitors, and two local Environmental Monitors, reporting to Mr. Bob Dreaver, Project Manager. There were no reportable spills or wildlife encounters. The lines were hand cut to a maximum 1.0 meter line widths causing minimal disturbance and almost zero line visibility from the air.

4. CONTRACTORS

The tendering process was bid out using the EL 397 Registry List. The successful tenders were:-

Acquisition – Yamoria Geophysical (Veritas DGC Land)

Air Support - North Wright Air

Camps - Caribou Camp Services (Shanco Camp Services)

Catering - Bushmasters

Communications - Aurora Technologies

Drilling - Bertram/Begahzhu (Bertram Drilling)

Explosives - Ace Explosives

Line Clearing - Willowlake Enviromental

Paramedics - Medic North

Helicopters - Sahtu Helicopters/Sahtu Canadian

Survey - Stone Lake Surveys (Seisland Survey)

Fuel / Fuel Sloops - Norman Wells Petroleum

5. SURVEY AND LINE CUT OPERATIONS

Mr. Peter Adams and Mr. Jimmy Mendo, of Willowlake Environmental/Stonelake Surveys, supervised the survey and slashing operation. Survey and slashing consisted of six 4 man-slashing crews each working with one surveyor; a seventh slashing crew was used for heli pads. Training was required for all slashing crews.

The slashing/survey averaged 8.0 kilometers per day clearing line (1.30 kms per crew) at a maximum 1.0 meter line width.

Survey and slashing crews were housed in the Little Smith camp and utilized a medium and an A-Star B-2 helicopters for support. These crews worked for a continuous 30 days with out encountering weather.

Survey accuracy and productivity was influenced with the aid of a pre-flown 2,500 sq. km LIDAR licensed from Martin Maric of Mosaic Mapping in Calgary. The final digital elevation model, of this data, is supposed to be accurate to a 30cm vertical resolution.

6. DRILLING OPERATIONS

Bertram/Begahzhu (a JV with Bertram Drilling), consisting of 2 heli portable crews with 14 men on each crew and 10 drills on line with 1 spare drill for each crew in Tulita conducted the shot hole drilling. Three medium drill helicopters were utilized for the program, two for moving drills and equipment, the third being used for support in moving fuel from the Keele to the Stewart Lake heli-drill staging area.

The average production per day for both crews was at 40 SP's per crew for a average total of 80 SP's (weather not included).

7. RECORDING OPERATIONS

Yamoria Geophysical Ltd (a joint venture with Veritas DGC Land) conducted the recording portion of the operation. The system for recording was the Sercel 408, with OYO 10 Hz marsh geophones. The main recording crew consisted of 32 men, and 1000 channels.

The recording crew averaged 8.5 kilometers per day and encountered 1 weather days to record the program in 22 days. Data quality was fair to good.

Two A-Star B2 helicopters were used for deploying the equipment, recorder, shooters and troubleshooters. A medium helicopter was used for deploying personnel.

The recording crew removed all flagging, lath and survey markers upon completion of their operations on the project.

Total Kilometers Surveyed		197.3
Number of Shotpoints		1313
Number of Stations		7880
Number of Recording Days		21 days excluding weather day
Kilometers Recorded per Day		8.5
Days Lost Due to Weather		1 day
Days Lost Due to Equipment Failure		none

8. RECORDING PARAMETERS

Instruments	Sercel 408
Number of Traces	360 channels
Geophone Type	Oyo Marsh
Geophone Frequency	10 Hz
Geophone Array	6 geophones over 25 m (spacing)
Sample Rate	2 milliseconds
Record Length	8 seconds
Anti-Alias Filter (high cut)	3/4 Nyquist
Low Cut Filter	out
Preamp Gain	12 db
Receiver Interval (group interval)	25 metres
Source Interval (shot point)	150 metres
Fold	3000%
Spread	4500m – 0m – 4500m
Source	Dynamite
Number of Shotholes	Single hole
Shothole Depth	15 meters
Shothole Charge Size	6 kilograms

9. RECORDING PRODUCTION SUMMARY

DATE	LINE NUMBER	NO. of SHOTS	KMS	HR S	COMMENTS
Aug 28					Mob/Safety
Aug 29	H-311	8	1.00	12.5	
Aug 30	H-311/H-312	44	6.50	12	
Aug 31	H-311/H-312	97	14.55	13	
Sep 1	H-311/H-312	90	13.35	13	
Sep 2	H-312/H-313	61	9.00	13	
Sep 3	H-312/H-313	74	11.10	13	
Sep 4	H-313/H-314	59	8.70	13	
Sep 5	H-313/H-314	96	14.40	13	
Sep 6	H-314/H-315	68	10.05	13	
Sep 7	H-314/H-315	68	10.20	13	
Sep 8					Weather Day
Sep 9	H-315	61	9.00	13	
Sep 10	H-315/H-321	85	12.60	13	
Sep 11	H-321	26	3.75	13	
Sep 12	H-321/H-322	103	15.60	13	
Sep 13	H-322/H-309/H-310	89	12.90	13	
Sep 14	H-309/H-310/H-308	103	15.15	13	
Sep 15	H-308/H-307	90	13.50	13	
Sep 16	H-307	107	16.10	13	
Sep 17	P/U equipment			13	
Sep 18	P/U equipment			13	Demob

10. DATES OF OPERATIONS

Line Commenced	Clearing		July 15th, 2005
Line Demobilized	Clearing		August 26th, 2005
Surveying Commenced			July 19th, 2005
Surveying Demobilized			August 26th, 2005
Heli-Drills Commenced			August 9th, 2005
Heli-Drills Demobilized			August 27th, 2005
Recording Mobilized			August 28th, 2005
Recording Demobilized			September 18th, 2005

11. PERSONNEL

Recording	1	Recording Crew Manager
	1	Field Clerk
	1	HSE Advisor
	1	Observer
	2	Shooters
	2	Shooters Helpers
	6	LTD/Line Boss
	12	Line Crew Helpers
	1	Mechanic
	1	Junior Observer
	4	Trouble Shooter/Clean up
	1	Expeditor
Camp	2	Cooks
	4	Camp Staff
	2	Cook's Helpers
Medic	2	Paramedics
Surveying	1	QC Supervisor
	1	Mapper
	5	Surveyor's
Line Clearing	1	Supervisor
	24	Hand Cutters
Helicopters	8	Pilots
	8	Engineers
Drilling	1	Drill push
	2	Drill Mechanics
	2	Drill Coordinators
	10	Drillers
	10	Drill Helpers
Monitors	5	2 Wildlife / 2 Enviro / 1 Security
Camp Maintenance	2	
Cat Loader Operator	1	Little Smith
TOTAL PERSONNEL	124	

12. EQUIPMENT

Helicopters	3	A-Star 350B2
	4	Bell 212
	1	A-Star 350 BA
Recording	1	Heli Recorder Unit
	1	Heli Charging Unit
	1000	Recording Channels
Camp	1	Camp Cat / Little Smith
	1	Loader / Little Smith
	2	Camp Quads
	1	Water Truck / Tulita
	1	Vacuum Truck / Tulita
	1	Fuel Delivery Truck / Tulita
Support Units	3	2 Vans / 1 Pick up - Tulita
	1	Pick Up Norman Wells

13. SEISMIC PROCESSING

The seismic data was processed by Mr. Randy Cameron, of Veritas Geoservices Ltd, Calgary, Alberta.

Deconvolution of the data was carried out by using a surface consistent minimum phase operator, followed by a spectral balancing, to whiten the bandwidth.

The data was corrected with both the weathering and elevation statics, to a seismic datum of 1100m ASL, using a replacement velocity of 3000 m/sec.

Due to near surface velocity problems, a tomographic approach to the static solution was preferred.

Due to the complex nature of the observed structures, the data was migrated pre-stack, using a Kirchhoff algorithm.

Slant stack noise attenuation was applied to the data, followed by a 1000ms AGC to image the data below the over thrust.

For a detailed processing sequence refer to the side labels on the accompanying sections.

14. SEISMIC INTERPRETATION

The program was designed to map the areas between the Keele and Stewart Lake and south of the Keele River to the south boundary of EL 397. The data was tied to the previous Husky and Northrock operated surveys, which had been interpreted using synthetic seismograms created from B30, E19, A28 and K29. The key seismic reflectors of the Cretaceous Little Bear Sands, Cretaceous Unconformity and the Devonian Hume platform, were interpreted from the combined seismic and well data.

Three key time structure maps were produced from the Cretaceous Little Bear, Cretaceous Unconformity and the Devonian Hume. Isochron maps were made between these horizons approximating thicknesses and paleo-topography of the intervening formations.

The data has defined two basins separated by a high, caused by the North- South Mackay normal Fault. It has demonstrated a NW/SE trending Ridge heading southeast away from the B30 well. Also a structural highs exist on the high-side of the Mackay normal fault trending North-South. These structural features appear to have a Laramide component because the Phanerozoic section up to the Tertiary unconformity is involved. The monocline on the west side of the basins has taken a turn to a more North-South orientation south of the Keele River.

15. LINE BREAKDOWN BY BLOCK

HSE line #	EL-397	M-38	Length
			Meters
H-307	17440		17440
H-308	12368	4482	16850
H-309	11860		11860
H-310	3694	7456	11150
H-311	21960		21960
H-312	20930		20930
H-313	21060		21060
H-314	23040		23040
H-315	20700		20700
H-321	16500		16500
H-322	15550		15550
	185102	11938	197040
Percentage	94%	6%	100%