

CX-LANTERMAN CK 85A

CONFIDENTIAL
COAL QUALITY DATA
(FROM ALL 3 COPIES
OF REPORT)

60(1)

060

IDEMITSU KOSAN CO., LTD.

ENERGY R&D LABORATORY

1280 KAMI-IZUMI, SODEGAURA,

PHONE: 0438-75-2311

KIMITSU, CHIBA, JAPAN, 292-01

CERTIFICATION OF ANALYSIS

Sample Name: ASH RIVER PLY1 (float 1.6) $\gamma = 64.8$
 Shipper, Country: CANADIAN OCCIDENTAL PETROLEUM LTD. CANADA
 Issue Date: DEC. 21. 1984 Ref. No.: T840085
 Analysis: Samples Were Analysed According To J.I.S. Method

ITEMS		BASIS	DATA	ITEMS		DATA
TOTAL MOISTURE %		AS		ASH FUSC	OXID I. D. T. H. T. F. T.	1380
CAL kcal/kg		CHB	5940			>1500
HGI		ADB	87			>1500
PRO %	MOISTURE	CHB	4.2	RED	I. D. T. H. T. F. T.	1120
	ASH	~	188.5			>1500
	VOL. MATTER	~	288.9			>1500
	FIXED CARBON	~	48.4			
ULT %	CARBON	DAF	79.1	ASH COMPOSITION %	ACID S 1 0 2 A 1 2 0 3 T i 0 2	35.71
	HYDROGEN	~	5.2			24.02
	NITROGEN	~	0.6			3.96
	OXYGEN	~	13.6		BASE F e 2 0 3 C a 0 0 M n 2 0 K 2 0	27.78
	SULFUR	~	1.5			1.64
	TOTAL SULFUR	DB	0.3			0.05
SOURCES	CHLORINE	~	0.03	MISC P 2 0 5 M n 0 5 V 2 0 5 S i 0	<0.10	
	~	~	~		0.33	
	~	~	~		0.14	
	~	~	~		<0.05	
	~	~	~		0.22	
	~	~	~		0.30	
	~	~	~			
	~	~	~			
	~	~	~			
	~	~	~			
~	~	~				
C. S. N.			0			

CHB: Equilibrium Moisture Basis of coal at
 75% Relative Humidity and Room Temp.

S. Sinozaki
 for S. Sinozaki, Manager
 SIGNATURE AND TITLE

IDEMITSU KOSAN CO., LTD.
ENERGY R&D LABORATORY

1280 KAMI-IZUMI, SODEGAURA,
 KIMITSU, CHIBA, JAPAN, 292-01

PHONE: 0438-75-2311

CERTIFICATION OF ANALYSIS

Sample Name: ASH RIVER PLY 3 (float 1.6) $\gamma = 34.6$
 Shipper, Country: CANADIAN OCCIDENTAL PETROLEUM LTD. CANADA
 Issue Date: DEC. 21. 1984 Ref. No.: T840085
 Analysis: Samples Were Analysed According To J.I.S. Method

I T E M S		B A S I S	D A T A	I T E M S		D A T A
TOTAL MOISTURE %		AS		A S H F U S E	O X I D I H : D : T . F : T :	> 1500
CAL kcal/kg		CHB	6110			> 1500
HGI		ADB	68			> 1500
P R O %	MOISTURE	CHB	3.0	R E D I H : D : T . F : T :	> 1500	
	ASH	"	19.3		> 1300	
	VOL. MATTER	"	26.6		> 1300	
	FIXED CARBON	"	51.1		> 1300	
U L T %	CARBON	DAF	80.3	A S H C O M P O S I T I O N %	A C I D S i O 2 S a l 2 O 3 T i O 2	48.18
	HYDROGEN	"	5.1			33.83
	NITROGEN	"	0.6			4.68
	OXYGEN	"	12.9		B A S E F e 2 O 3 C a O M g O N a 2 O K 2 O	6.99
	SULFUR	"	0.8			1.49
	TOTAL SULFUR	DB	0.8			< 0.2
CHLORINE	"	< 0.01	< 0.05			
S U L F U R %	50	ADB		M I S C P 2 O 5 M n 2 O 5 V 2 O 5 S N I O	0.37	
	25	"			< 0.05	
	15	"			0.24	
	10	"			0.20	
	5	"			0.20	
	2.5	"			0.20	
	0.25	"			0.20	
		"			0.20	
		"			0.20	
		"			0.20	
C . S . N .			0			

CHB: Equilibrium Moisture Basis of coal at
 75% Relative Humidity and Room Temp.

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1280 KAMI-IZUMI, SODEGAURA,
KIMITSU, CHIBA, JAPAN, 292-01

PHONE: 0438-75-2311

CERTIFICATION OF ANALYSIS

Sample Name: ASH RIVER PLY2 (float 1.6) Y= 31.8
 Shipper, Country: CANADIAN OCCIDENTAL PETROLEUM LTD. CANADA
 Issue Date: DEC. 21, 1984 Ref. No.: T840085
 Analysis: Samples Were Analysed According To J.I.S. Method

I T E M S		B A S I S	D A T A		I T E M S		D A T A						
TOTAL MOISTURE %		AS			A S H F U S C	O X I D	I . H . F .	D . T .	> 1500				
CAL kcal/kg		CHB	6580							> 1500			
HGI		ADB	70							> 1500			
P R O %	MOISTURE	CHB	2.5		R E D	I . H . F .	D . T .		1480				
	ASH	"	166.5										
	VOL. MATTER	"	288.1										
	FIXED CARBON	"	52.9										
U L T %	CARBON	DAF	83.4		A S H C O M P O S I T I O N %	A C I D	S 1 O 2	3	46.38				
	HYDROGEN	"	5.4							33.02			
	NITROGEN	"	0.6							4.49			
	OXYGEN	"	9.2			B A S E	F C M N K	e a a 2 O O 2 O	2 O 3	9.42			
	SULFUR	"	1.44										1.38
	TOTAL SULFUR	DB	1.21										< 0.10
CHLORINE	"	0.02						0.08					
S C R E E N I N G %	SO	ADB			M I S C	P M V S N	2 0 5 0 5 3 0		0.36				
	Si	"										< 0.05	
	Al	"										0.41	
	Fe	"										0.18	
	Mg	"											
	Ca	"											
	Mn	"											
	P	"											
	S	"											
	Other	"											
C . S . N .			1 1/2										

CHB: Equilibrium Moisture Basis of coal at
75% Relative Humidity and Room Temp.

S. Sinozaki
for S. Sinozaki, Manager
SIGNATURE AND TITLE



IDEMITSU KOSAN CO., LTD.

NEW ENERGY RESEARCH SECTION

1280, KAMI-IZUMI, SODEGAURA,
KIMITSU, CHIBA, JAPAN, 292-01

PHONE: 0438-75-2311

CERTIFICATION OF ANALYSIS

Sample Name : LANTERMAN CREEK 8508 CORE

Shipper, Country : _____

Issue date : 29.06.1985 Ref. No. : T850027

Analysis : Samples Were Analysed According to JIS Method

I T E M S		B A S I S	D A T A	I T E M S		D A T A
TOTAL MOISTURE %		AS	2.6	A S H F U S E	O X I D I H . D . T . F . T .	1230 1380 1410
CAL kcal/kg		CHB	6740			
HGI		ADB	69			
P R O O %	MOISTURE	CHB	1.6	C	R E D I H . D . T . F . T .	1170 1280 1390
	ASH	"	15.8			
	VOL. MATTER	"	30.4			
	FIXED CARBON	"	52.2			
U L T %	CARBON	DAF	83.4	A S H C O M P O S I T I O N %	A C I D S i O 2 A l 2 O 3 T i O 2	36.20 18.91 2.13
	HYDROGEN	"	4.8			
	NITROGEN	"	0.8			
	OXYGEN	"	9.6		B A S E F e 2 O 3 C a O M g O N a 2 O K 2 O	8.13 21.92 1.34 <0.10 0.11
	SULFUR	"	1.37			
	TOTAL SULFUR	DB	1.62			
S C R E E N I N G %	~ 50 mm	ADB		M I S C P 2 O 5 M n O 5 V 2 O 5 S O 3 N i O	0.09 0.10 0.20 7.30	
	~ 25 mm	"				
	~ 15 mm	"				
	~ 10 mm	"				
	~ 5 mm	"				
	~ 2 mm	"				
	~ 1 mm	"				
	~ .25 mm	"				
C . S . N .			4 1/2			

Yield: 28.4% (Floats 1.6)
CHB: Equilibrium Moisture Basis of Coal at
75% Relative Humidity and Room Temp.

S. Shinozaki

S. Shinozaki, Manager



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Shipper, Country : _____

Issue date : 29.06.1985 Ref. No. : T850027

Analysis : Samples Were Analysed According to JIS Method

I T E M S		B A S I S	D A T A	I T E M S		D A T A		
TOTAL MOISTURE %		AS	2.6	A S H F U S E R E D	O X I D I . D . T . H . T . F . T .	1230 1330 1410		
CAL kcal/kg		CHB	6740					
HGI		ADB	69					
P R O %	MOISTURE	CHB	1.6	A S H C O M P O S I T I O N %	A C I D B A S E M I S C	S i O 2 A l 2 O 3 T i O 2 F e 2 O 3 C a O M g O N a 2 O K 2 O P 2 O 5 M n O 5 V 2 O 5 S O 3 N i O		
	ASH	"	15.8				I . D . T . H . T . F . T .	1170 1280 1390
	VOL. MATTER	"	30.4					
	FIXED CARBON	"	52.2					
U L T %	CARBON	DAF	83.4	A S H C O M P O S I T I O N %	A C I D B A S E M I S C	S i O 2 A l 2 O 3 T i O 2 F e 2 O 3 C a O M g O N a 2 O K 2 O P 2 O 5 M n O 5 V 2 O 5 S O 3 N i O		
	HYDROGEN	"	4.8				36.20 18.91 2.13	
	NITROGEN	"	0.8					
	OXYGEN	"	9.6					
	SULFUR	"	1.37				8.13 21.92 1.34 <0.10 0.11	
TOTAL SULFUR	DB	1.62						
S C R E E N I N G %	50 mm	ADB		A S H C O M P O S I T I O N %	A C I D B A S E M I S C	S i O 2 A l 2 O 3 T i O 2 F e 2 O 3 C a O M g O N a 2 O K 2 O P 2 O 5 M n O 5 V 2 O 5 S O 3 N i O		
	25 mm	"						
	15 mm	"						
	10 mm	"						
	5 mm	"						
	2 mm	"						
	1 mm	"						
	.25 mm	"						
C . S . N .			4 1/2					

Yield: 28.4% (Floats 1.6)
CHB: Equilibrium Moisture Basis of Coal at
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Sample Name: ASH RIVER PLY1 (float 1.6) $\gamma = 64.8$
 Shipper, Country: CANADIAN OCCIDENTAL PETROLEUM LTD. CANADA
 Issue Date: DEC. 21, 1984 Ref. No.: T840085
 Analysis: Samples Were Analysed According To J.I.S. Method

I T E M S		B A S I S	D A T A	I T E M S		D A T A
TOTAL MOISTURE %		AS		A S H F U S E	O X I D I H F : D T : F T :	1380
CAL kcal/kg		CHB	5940			>1500
HGI		ADB	87			>1500
P R O %	MOISTURE	CHB	4.2	R E D I H F : D T : F T :	1120	
	ASH	~	188.9		>1500	
	VOL. MATTER	~	28.9		>1500	
	FIXED CARBON	~	48.4			
U L T %	CARBON	DAF	79.1	A S H C O M P O S I T I O N %	A C I D S i O 2 A l 2 O 3 T i O 2	35.71
	HYDROGEN	~	5.2			24.02
	NITROGEN	~	0.6			3.96
	OXYGEN	~	13.6		B A S E F e 2 O 3 C a O M g O N a 2 O K 2 O	27.78
	SULFUR	~	1.5			1.64
	TOTAL SULFUR	DB	2.3			0.05
CHLORINE	~	0.03	<0.10			
S O R E M I Z I O N %	~	ADB		M I S C P 2 O 5 M n O 5 V 2 O 5 S i O 3 N i O	0.14	
	~	~			<0.05	
	~	~			0.22	
	~	~			0.20	
	~	~				
C. S. N.			0			

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75% Relative Humidity and Room Temp.

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for S. Sinozaki, Manager
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CERTIFICATION OF ANALYSIS

Sample Name: ASH RIVER PLY2 (float 1.6) Y= 31.8
 Shipper, Country: CANADIAN OCCIDENTAL PETROLEUM LTD. CANADA
 Issue Date: DEC. 21, 1984 Ref. No.: T840085
 Analysis: Samples Were Analysed According To J.I.S. Method

ITEMS		BASIS	DATA	ITEMS		DATA
TOTAL MOISTURE %		AS		ASH OXID	I : D : T : H : T : F : T :	>1500 >1500 >1500
CAL kcal/kg		CHB	6580			
HGI		ADB	70			
P R O C E D U R E	MOISTURE	CHB	2.5	ASH R E D	I : D : T : H : T : F : T :	1480 >1500 >1500
	ASH	"	16.5			
	VOL. MATTER	"	288.1			
	FIXED CARBON	"	52.8			
U L T I M A T E R I A L	CARBON	DAF	83.4	ASH C O M P O S I T I O N %	A C I D	S 1 0 2 A 1 2 0 3 T 1 0 2
	HYDROGEN	"	5.6			
	NITROGEN	"	0.2			
	OXYGEN	"	9.2		B A S E	F e 2 0 3 M g 0 0 N a 2 0 K 2 0
	SULFUR	"	1.4			
	TOTAL SULFUR	DB	1.2			
CHLORINE	"	0.02	M I S C	P 2 0 5 M n 0 5 V 2 0 5 S 0 3 N i 0		
SORBITAN	ADB					
INGRS	"					
C. S. N.			1 1/2			

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75% Relative Humidity and Room Temp.

S. Sinozaki
for S. Sinozaki, Manager
SIGNATURE AND TITLE

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PHONE: 0438-75-2311

KIMITSU, CHIBA, JAPAN, 292-01

CERTIFICATION OF ANALYSIS

Sample Name: ASH RIVER PLY 3 (float 1.6) $\gamma = 34.6$
 Shipper, Country: CANADIAN OCCIDENTAL PETROLEUM LTD. CANADA
 Issue Date: DEC. 21, 1984 Ref. No.: T840085
 Analysis: Samples Were Analysed According To J.I.S. Method

ITEMS		BASIS	DATA	ITEMS		DATA
TOTAL MOISTURE %		AS		ASH FUSC	OXID I. D. T. H. F. T.	> 1500
CAL kcal/ke		CHB	6110			> 1500
HGI		ADB	68			> 1500
PRO %	MOISTURE	CHB	3.0	RED	I. D. T. H. F. T.	> 1500
	ASH	"	19.3			> 1500
	VOL. MATTER	"	26.6			> 1500
	FIXED CARBON	"	51.1			
ULT %	CARBON	DAF	80.3	ASH COMPOSITION %	ACID	SiO ₂ 48.18
	HYDROGEN	"	5.5			Al ₂ O ₃ 33.83
	NITROGEN	"	0.6			FeO 4.68
	OXYGEN	"	12.0		BASE	CaO 6.99
	SULFUR	"	1.0			MgO 1.49
	TOTAL SULFUR	DB	0.8			Na ₂ O 0.23
CHLORINE	"	< 0.01	K ₂ O < 0.10			
SCREENING %	50 mm	ADB		MISC	P 205	0.37
	25 mm	"				Mn 0.05
	15 mm	"				V 205
	10 mm	"				SO ₃ 0.34
	5 mm	"				N 10
	2.5 mm	"				
	.25 mm	"				
C. S. N.			0			

CHB: Equilibrium Moisture Basis of coal at
 75% Relative Humidity and Room Temp.

S. Sinozaki
 for S. Sinozaki, Manager



IDEMITSU KOSAN CO., LTD.

NEW ENERGY RESEARCH SECTION

1280, KAMI-IZUMI, SODEGAURA,
KIMITSU, CHIBA, JAPAN, 292-01

PHONE: 0438-75-2311

CERTIFICATION OF ANALYSIS

Sample Name : LANTERMAN CREEK 8508 CORE

Shipper, Country : _____

Issue date : 29.06.1985 Ref. No. : T850027

Analysis : Samples Were Analysed According to JIS Method

I T E M S		B A S I S	D A T A	I T E M S		D A T A						
TOTAL MOISTURE %		AS	2.6	A S H	O X I D I F I C A T I O N	I . D . T .	1230					
CAL kcal/kg		CHB	6740			H . T .	1330					
HGI		ADB	69			F . T .	1410					
P R O P O R T I O N %	MOISTURE	CHB	1.6	F U S I O N	R E D U C I O N	I . D . T .	1170					
	ASH	"	15.8			H . T .	1280					
	VOL. MATTER	"	30.4			F . T .	1390					
	FIXED CARBON	"	52.2									
U L T I M A T E %	CARBON	DAF	83.4	A S H	C O M P O S I T I O N %	S i O 2	36.20					
	HYDROGEN	"	4.8			A l 2 O 3	18.91					
	NITROGEN	"	0.8			T i O 2	2.13					
	OXYGEN	"	9.6			B A S E	F e 2 O 3	8.13				
	SULFUR	DB	1.37				C a O	21.92				
	TOTAL SULFUR	"	1.62				M g O	1.34				
S C R E E N I N G %	~ 50 mm	ADB		M I S C	N a 2 O	K 2 O	< 0.10					
	~ 25 mm	"				P 2 O 5	M n O	V 2 O 5	S O 3			
	~ 15 mm	"								N i O		
	~ 10 mm	"										
	~ 5 mm	"										
	~ 2 mm	"										
	~ 1 mm	"										
	~ .5 mm	"										
~ .25 mm	"											
C . S . N .			4 1/2									

Yield: 28.4% (Floats 1.6)
 CHB: Equilibrium Moisture Basis of Coal at
 75% Relative Humidity and Room Temp.

S. Shinozaki

S. Shinozaki, Manager

0041

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CERTIFICATION OF ANALYSIS

Sample Name: ASH RIVER PLY1 (float 1.6) $\gamma = 64.8$
 Shipper, Country: CANADIAN OCCIDENTAL PETROLEUM LTD. CANADA
 Issue Date: DEC. 21. 1984 Ref. No.: T840085
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I T E M S		B A S I S	D A T A	I T E M S		D A T A
TOTAL MOISTURE %		AS		A S H F U S E	O X I D I H . D . T . F . T .	1380
CAL kcal/kg		CHB	5940			>1500
HGI		ADB	87			>1500
P R O %	MOISTURE	CHB	4.2	R E D I H . D . T . F . T .	1120	
	ASH	~	18.5		>1500	
	VOL. MATTER	~	28.9		>1500	
	FIXED CARBON	~	48.4			
U L T %	CARBON	DAF	79.1	A S H C O M P O S I T I O N %	A C I D S A T I O 2 3	35.71
	HYDROGEN	~	5.2		A T I O 2 3	24.02
	NITROGEN	~	0.6			3.96
	OXYGEN	~	18.6		B A S E F C M N K 2 0 3	27.78
	SULFUR	DB	1.5			1.64
	TOTAL SULFUR	~	1.2			0.05
CHLORINE	~	0.03		<0.10		
S O L I D I Z I N G %	~	ADB		M I S C P 2 0 5 M n 0 5 V 2 0 5 S 0 3 N i 0	0.14	
	~	~			<0.05	
	~	~			0.22	
	~	~			0.30	
	~	~				
C . S . N .			0			

CHB: Equilibrium Moisture Basis of coal at 75% Relative Humidity and Room Temp.

CONFIDENTIAL

S. Sinozaki
 for S. Sinozaki, Manager
 SIGNATURE AND TITLE

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1280 KAMI-IZUMI, SODEGAURA,
KIMITSU, CHIBA, JAPAN, 292-01

PHONE: 0438-75-2311

CERTIFICATION OF ANALYSIS

Sample Name: ASH RIVER PLY2 (float 1.6) Y= 31.8
 Shipper, Country: CANADIAN OCCIDENTAL PETROLEUM LTD. CANADA
 Issue Date: DEC. 21. 1984 Ref. No.: T840085
 Analysis: Samples Were Analysed According To J.I.S. Method

ITEMS		BASIS	DATA	ITEMS		DATA
TOTAL MOISTURE %		AS		ASH FUSC	OXID I. D. T. H. F. T.	> 1500
CAL kcal/kg		CHB	6580			> 1500
HGI		ADB	70			> 1500
P P R O R %	MOISTURE	CHB	2.55	ASH FUSC	RED I. D. T. H. F. T.	1480
	ASH	"	16.55			> 1500
	VOL. MATTER	"	28.11			> 1500
	FIXED CARBON	"	52.9			
U L T %	CARBON	DAF	83.4	ASH C O M P O S I T I O N %	ACID S i O 2 A l 2 O 3 T i O 2	46.38
	HYDROGEN	"	5.4			33.02
	NITROGEN	"	0.6			4.49
	OXYGEN	"	9.2			
	SULFUR	"	1.4			
	TOTAL SULFUR	DB	0.21			
S O R T I N G % Z N O	CHLORINE	"	0.02	ASH C O M P O S I T I O N %	BASE F e 2 O 3 M g O N a 2 O K 2 O	9.42
	SO	"				1.38
	SiO2	"				0.15
	Al2O3	"			< 0.10	
	Fe2O3	"			0.08	
	MnO	"				
	P2O5	"			0.36	
	MgO	"			< 0.05	
	Na2O	"			0.41	
	K2O	"			0.18	
C. S. N.			1 1/2			

CHB: Equilibrium Moisture Basis of coal at
75% Relative Humidity and Room Temp.

S. Sinozaki
for S. Sinozaki, Manager
SIGNATURE AND TITLE

0021
1/20/84

IDEMITSU KOSAN CO., LTD.
ENERGY R&D LABORATORY

1280 KAMI-IZUMI, SODEGAURA, PHONE:0438-75-2311
KIMITSU, CHIBA, JAPAN, 292-01

CERTIFICATION OF ANALYSIS

Sample Name: ASH RIVER PLY3 (float 1.6) Y=34.6
 Shipper, Country: CANADIAN OCCIDENTAL PETROLEUM LTD. CANADA
 Issue Date: DEC.21.1984 Ref. No.: T840085
 Analysis: Samples Were Analysed According To J.I.S. Method

ITEMS		BASIS	DATA	ITEMS			DATA
TOTAL MOISTURE %		AS		ASH FUSC	OXID	I : D : T :	>1500
CAL kcal/kg		CHB	6110			H : F : T :	>1500
HGI		ADB	68			F : T :	>1500
PRO %	MOISTURE	CHB	3.0	RED	OXID	I : D : T :	>1500
	ASH	"	19.3			H : F : T :	>1500
	VOL. MATTER	"	26.6			F : T :	>1500
	FIXED CARBON	"	51.1				
ULT %	CARBON	DAF	80.3	ASHE	ACID	S i O 2	48.18
	HYDROGEN	"	5.1			A l 2 O 3	33.83
	NITROGEN	"	0.6			T i O 2	4.68
	OXYGEN	"	12.9		BASE	F e 2 O 3	6.99
	SULFUR	"	0.9			C a O	1.49
	TOTAL SULFUR	DB	0.8			M g O	0.23
CHLORINE	"	<0.01	MISC	N a 2 O	<0.10		
S O R T I N G %	~ 50	ADB			K 2 O	<0.05	
	~ 20	"			P 2 O 5	0.37	
	~ 10	"		M n O 5		<0.05	
	~ 5	"		V 2 O 5		0.24	
	~ 2.5	"		S i O 3	0.20		
	~ 1	"		N i O			
	~ 0.5	"					
	~ 0.25	"					
	~ 0.1	"					
	~ 0.05	"					
C. S. N.			0				

CHB:Equilibrium Moisture Basis of coal at
75% Relative Humidity and Room Temp.

S. Sinozaki
for S. Sinozaki, Manager

LANTERMAN CREEK
PHASE I DRILLING PROGRAM
APRIL/MAY 1985

COPY 1

Coal Licence No's. : 7822-7833
 : inclusive
 : 8011-8023
 : inclusive

Land Districts : Newcastle Land
 District
 : Alberni Land
 District

Latitude & Longitude: 49⁰N and 125⁰02"W

N.T.S. : Map C92F/6E
 : Map C92F/7W

Owner: Canadian Occidental Petroleum
 Ltd.

Operator: Canadian Occidental Petroleum
 Ltd.

Date Completed : August, 1985
Prepared By : R.A. Swaren
 : Yutaka Endoh

**GEOLOGICAL BRANCH
ASSESSMENT REPORT**

00 060(2)



Canadian
Occidental
Petroleum Ltd.

1500, 635 - 8th Avenue South West
Calgary, Alberta, Canada T2P 3Z1
(403) 234-6700 Telex 038-21516

January 7, 1986

Mr. A. Matheson
District Geologist
Geological Division
Ministry of Energy Mines and Petroleum Resources
Parliament Buildings
Victoria, British Columbia
V8V 1X4

Dear Alex:

Reference: LANTERMAN CREEK 1985 REPORT NEWCASTLE LAND DISTRICT

Attached are two copies of the above mentioned report with the changes you requested in your letter of November 1, 1985.

As we discussed over the phone, this was a very preliminary drilling program and all of the resulting work was plotted on a 1:50,000 map. If we intend to carry out further programs we will be flying over the property and generating larger scale topographic maps.

The licences on which holes were actually drilled are coal licences 8019, 8021, 7826, 7822, 7827, 7828, 7829, 7830, 7832 and 8013.

Included with these two reports are two copies of the geophysical logs.

I trust the report has been altered to your satisfaction and that you will call if there are further questions.

Yours truly,

R.A. Swaren

R.A. Swaren, P. Geol.
Manager
Coal

RAS/slc

Att.

LOG NO: 01-28	K2
ACTION:	
FILE NO:	

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(ii)

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SUMMARY

SUMMARY AND RECOMMENDATIONS

From the information obtained during the 1985 Phase I drilling program it can be concluded that the Lanterman Creek coal seam is too thin over most of the property to be considered economically mineable by underground methods at the present time.

The following is a point form summary of the contents of each section of this report:

SUMMARY

A) Lanterman Creek consists of 5,189 hectares (10,525 acres) held as B.C. coal licences. This land is controlled 100% by Canadian Occidental Petroleum Ltd.

B) In April/May of 1985 Canadian Occidental drilled 10 holes and one core hole for a total of 1076.5 meters (3,532 feet) at a total cost of \$81,813.95. This was called the Phase I drilling program.

C) Geologically the Lanterman Creek property is a northeasterly dipping downdrop fault block. Beds dip at an average of 5° to 15° to the northeast along the western or outcrop edge of the property. Smaller associated faults were also indicated in the drilling program.

D) The major coal seam is found at the base of the Comox formation and varies from 0.6m (2.0 feet) to 5.5 meters (18 feet) in thickness.

E) Over most of the property except in the immediate vicinity of Outcrop No. 41 the coal is less than 0.9m (3.0 feet) thick and therefore there are no economically underground mineable seams of coal at Lanterman Creek.

(iv)

F) From the one core hole it was found that the quality was quite good except for a fairly high ash of 15.8% at 1.6 float and a low recovery of only 28.4%. The heat content is about 6740 kcal/Kg (12,132 BTU's/lb). This coal would have made a good export grade thermal coal and may have been amenable to blending with metallurgical grade coal.

RECOMMENDATIONS

It is recommended that Canadian Occidental retain these coal licences numbered 7822-7833 and 8011-8023 inclusive until May 1, 1986 as the work commitments and licence rental is paid in full up until that time.

If in the intervening time any favourable coal occurrences are encountered on these licences and Canadian Occidental wishes to retain them past 1986, the following expenditures would be required:

<u>To retain licences until May 1, 1987, from May 1, 1986</u>	
<u>Licences 7822-7833</u>	
Work commitment remaining	= 7,726.95
Licence rental	= <u>13,245.00</u>
Subtotal	\$ 20,971.95
<u>Licences 8011-8023</u>	
Work commitment remaining	= 19,512.50
Licence rental	= <u>7,805.00</u>
Subtotal	\$ 27,317.50
TOTAL	\$ <u>48,289.45</u>

The total cost to retain these licences from May 1, 1986 until May 1, 1987 is \$48,289.45 according to the present B.C. coal policy.

If the policy changes in the remaining time, work commitments will no longer be required but coal licence rental will double to \$10.00/hectare and the cost to retain the licences will be \$51,890.00.

(v)

If nothing happens prior to 1986 to make the Lanterman Creek property look more favourable it is recommended that Canadian Occidental allow the coal licences to lapse on May 1, 1986.

1.0 INTRODUCTION

In early 1984 the acreage known as "Lanterman Creek" was applied for by Canadian Occidental Petroleum Ltd. This acquisition was recommended in order to block off a possible underground mineable reserve of coal located near existing infrastructure and tide-water.

After acquiring the licences on the Lanterman Creek property a preliminary mapping program was carried out in May of 1984. This mapping program provided enough encouragement that it led to the execution of the Phase I drilling program. The purpose, scope and conclusions of this program are all contained in this, the resulting report.

1.1 Purpose and Scope

The Phase I drilling program was carried out in order to:

- A) Determine the thickness and extent of the coal measures at Lanterman Creek especially with respect to the major coal outcrop located in the north.
- B) Determine the quality of the coal if economically mineable thicknesses of coal were encountered.
- C) Determine the reserve potential of the property and possibly mineability.
- D) Decide on whether or not to proceed with the Phase II drilling program.

1.2 Location Extent and Access

The Lanterman Creek property is located in the west central portion of Vancouver Island, British Columbia. (Map No. 1) It is located mainly in the Newcastle Land District approximately 26 kilometers (16 miles) north of the town of Port Alberni.

The aerial extent of the property is approximately 5,189 hectares (10,525 acres). It extends approximately 18.5 kilometers (11.5 miles) in length and 3 kilometers (2 miles) width.

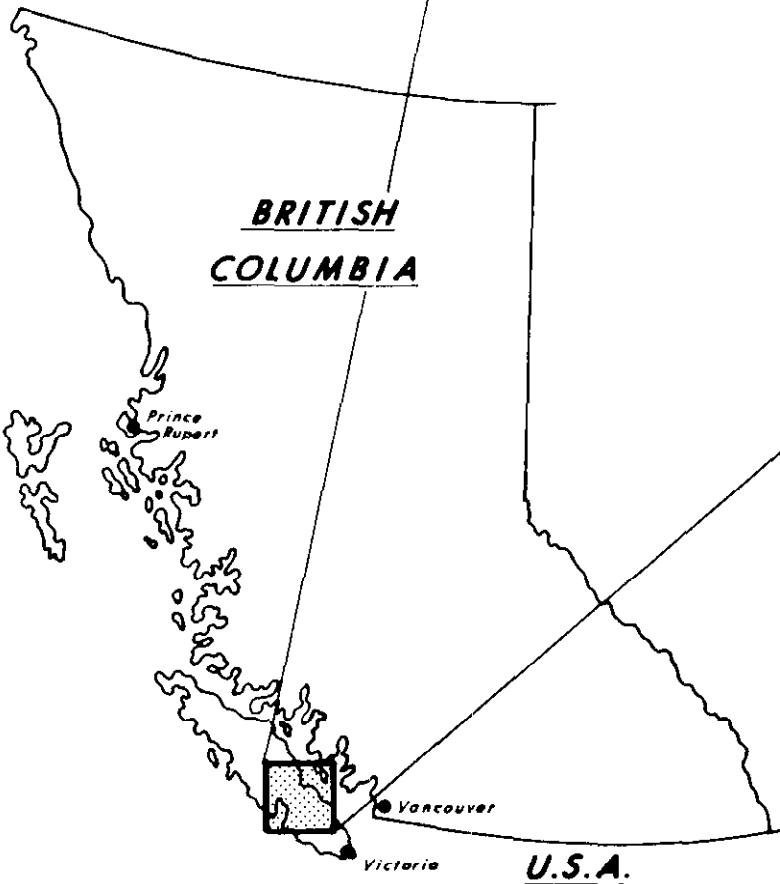
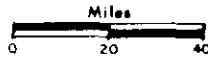
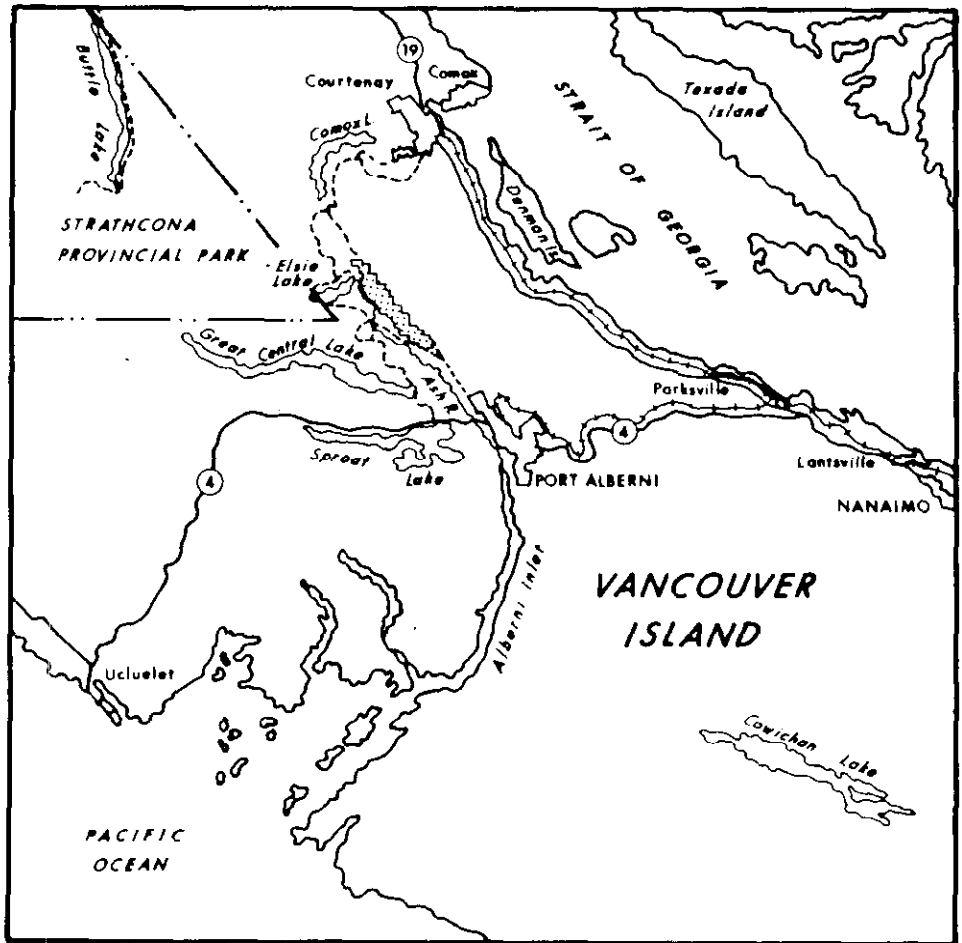
Two major roads provide access to the property. One route is by McMillan Bloedels all-weather logging road from Sproat Lake. This road can be reached by travelling west from Alberni via highway No. 4 for approximately 8 kilometers (5 miles) to the SPROAT LAKE PROVINCIAL PARK TURNOFF. This is a paved secondary highway which continues northwest for 8 kilometers (5 miles) to Great Central Lake. From Great Central Lake the gravelled logging road begins. The Ash River property is situated approximately 16 kilometers (10 miles) up this road. Accessibility throughout the lease block occurs on well maintained gravelled logging roads. The accessible roads are marked on Map No. 6


The second major access road is the Beaver Creek road. This road is a paved secondary road which runs northwest from Port Alberni for a distance of 14 kilometers (9 miles). The pavement turns into McMillan Bloedel logging roads on the property from this point north. This road provides good quick access to the southern and eastern portions of the property whereas the Sproat Lake road provides access to the west central and northwestern portions of the property. However either road can be used for access to the entire property.

The Beaver Creek road continues northwest and finally northeast from the property to the town of Courtenay. The author has not travelled this road but it appears to be passable.

1.3 Physiography

The Lanterman Creek property is situated in the Alberni Valley which is flanked to the east and west by mountains of the Beaufort Range.



Canadian Occidental Petroleum Ltd. 

Coal Exploration

Lanterman Creek Property

LOCATION MAP

Map No. 1

Date June 84 NYS	Compiled By R.A. Sworen
92F/6E 92F/7W	Drawn By L. Mackellar
Drawing AB-1 File	Revised Date

Relief in the valley is moderate, ranging from a low of 180 meters (600 feet) a.s.l. to a high of 420 meters (1,400 feet a.s.l.). Generally the valley is typified by gently rolling hills. In the northern end of the property the valley is narrower and hillier, broadening out to the south towards Port Alberni.

All of streams and major rivers drain towards the southeast. Several lakes in the area; most notably Elsie and Dickson Lake receive water from streams flowing from the west. Streams flowing from the eastern mountains flow into the Ash River. This river also drains the Lakes and then carries the water southeast into the Stamp River which then enters the Somass River and finally flows into the Alberni inlet at the town of Port Alberni.

The area has been forested once or probably twice in the past. Trees in the area vary in age, depending on when the logging took place. The oldest regenerated growth appears to be in the order of 30 to 40 years old.

Forest cover consists mainly of fir, spruce and cedar with some deciduous trees. Streams and marshy areas contain stands of Alder which is harvested by the public for fuel for fireplaces. Undergrowth is varied and heavy.

1.4 Mining History on Vancouver Island

Coal was first reported by natives on Vancouver Island in 1835. This coal was found in the Suquash coal field on the northern end of Vancouver Island.

In 1849 the Hudson's Bay Company imported 100 miners from England to mine coal in the Suquash coal field to supply fuel for steamships. In the same year (1849), Indians reported finding

coal in the Nanaimo area of Vancouver Island. The Hudson's Bay Company operated mines in the Nanaimo field from 1852 until 1862 when they sold their holdings to the Vancouver Coal Mining and Land Company. They mined until 1902 when they sold out to the Western Fuel Company of California. This company operated until 1928 when they were purchased by Canadian Collieries (Dunsmuir) Ltd.

Canadian Collieries (Dunsmuir) Ltd., also controlled all of the other coal mines on the Island and in 1888 the first coal mine was started up in the Comox coal field. This company then controlled all the coal lands on the east coast of Vancouver Island under the Esquimalt and Nanaimo railway land grant.

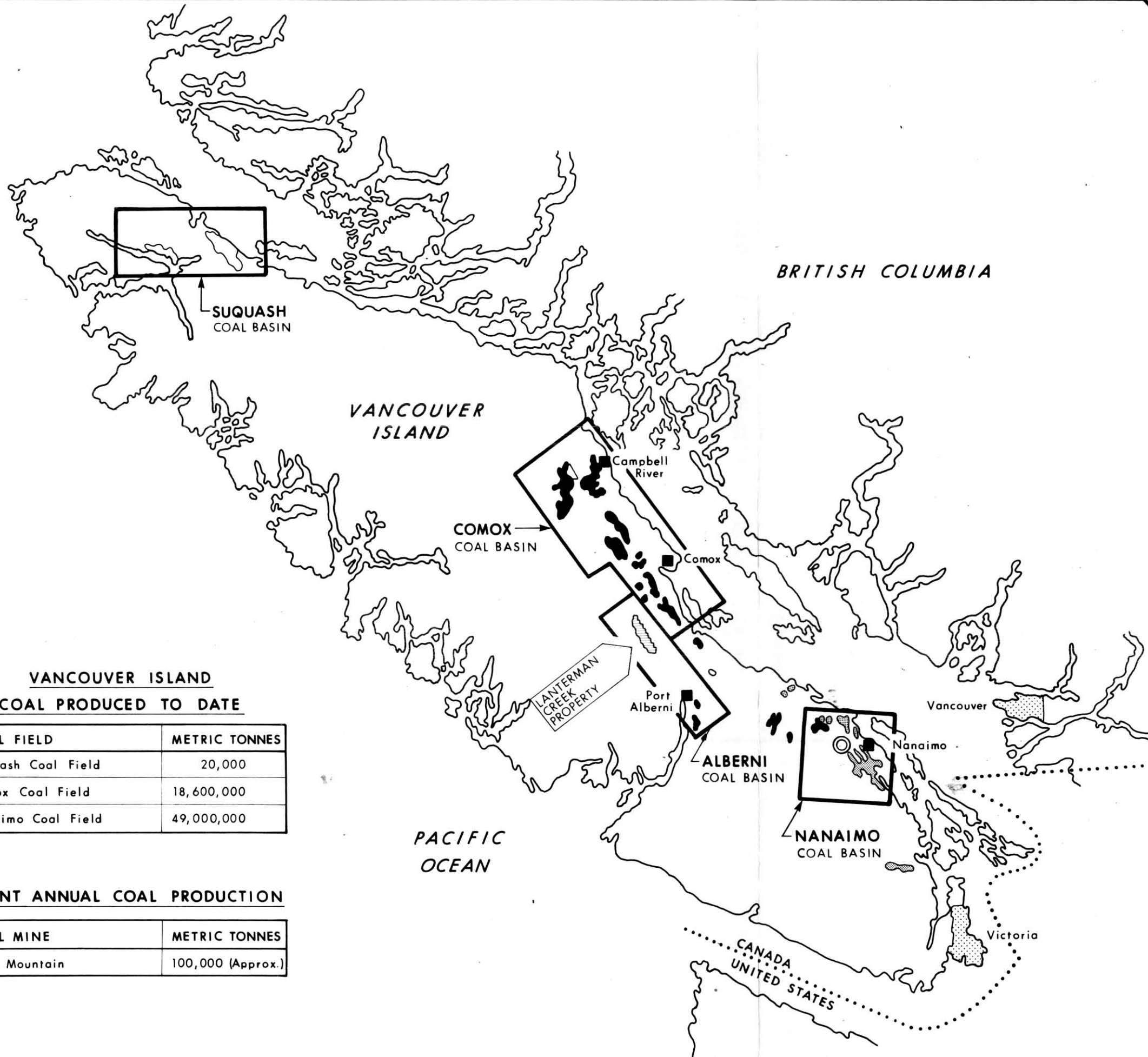
In the productive years from 1836 to 1968, a total of approximately 74,650,000 short tons of coal was produced from Vancouver Island's coal fields. Of this total, approximately 22,000 tons was produced from Suquamish, 54,087,860 tons from the Nanaimo field and 20,540,000 tons from the Comox coal field (Map No. 2).

There are three main seams which were mined in the Comox coal field in the past. Weldwood/Brinco, Quinsam Lake mine will be mining these three main seams.

At Lanterman Creek past exploration has only identified one and possibly two major seams in the Comox formation.

Excerpts from Buckham's original field diary Circa. 1920's indicates four main coal outcrops discovered in the early 1920's by H.A. Rose, J.E. Gill, R. Strachen, G. Hanney, and Dennis Harris. Of the four outcrops one was of mineable thickness and coal from this outcrop was sent to Union Bay for analysis in 1951.

No mining has occurred in the Lanterman Creek area to date.



**VANCOUVER ISLAND
COAL PRODUCED TO DATE**

COAL FIELD	METRIC TONNES
Suquash Coal Field	20,000
Comox Coal Field	18,600,000
Nanaimo Coal Field	49,000,000

PRESENT ANNUAL COAL PRODUCTION

COAL MINE	METRIC TONNES
Wolf Mountain	100,000 (Approx.)

Lanternman Creek Property

Vancouver Island

LEGEND

COAL BEARING FORMATIONS

UPPER CRETACEOUS	NANAIMO GROUP	CEDAR DISTRICT FM.	NANAIMO COAL FIELD
		EXTENSION PROTECTION FM.	
		HASLAM FM.	COMMOX COAL FIELD
		COMOX FM.	
TRIA-SSIC		KARMUTSEN FM.	

- △ PROPOSED QUINSAM LAKE SURFACE MINE
- ⊙ OPERATING WOLFE MOUNTAIN UNDERGROUND MINE

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Canadian Occidental Petroleum Ltd.



Title/Map No.

**COAL BASINS/
VANCOUVER ISLAND**

1.5 Exploration to Date

The first work was documented by Buckham in his personal diaries in the 1920's. Since the finding of the four outcrops described in the preceding section, little mapping work had been carried out until 1984.

In 1979, Hudson's Bay Oil and Gas carried out an Exploratory Drilling Program on the Lanterman Creek Property. This program was part of an option agreement with the owners of the coal licences; RAMM VENTURES. In 1979 HBOG drilled 14 holes for a total of 1,280 meters (4,200 feet) and a cost of \$115,000.00. One of the holes was a core hole but it only cored a thin 3 foot seam and no analysis was carried out on the coal.

As a result of this drilling program, Hudson's Bay Oil and Gas dropped their options with Ramm Ventures.

Subsequently, in 1982 Ramm Ventures dropped the coal licences on the Lanterman Creek area, since they did not have the available funds to carry out the work committment and since no other companies wished to option the land after HBOG's dicouraging report.

In 1984, Canadian Occidental applied for the coal licences for the area and carried out a preliminary reconnaissance and mapping program. The program provided enough encouragement to lead to proposal for a drilling program.

In April and May of 1985 Canadian Occidental drilled 10 holes and one core hole for a total of 1076.5 meters (3,532 feet). This program provides the basis for this report and the conclusions contained within.

1.6 Regional Development

To date there are only two other coal developments on Vancouver Island. One, is the Wolfe Mountain Coal Mine on Wolfe Mountain just west of the town of Nanaimo (Map No. 2). This mine is underground and is built to produce up to 100,000 tonnes/year of thermal coal. The coal is shipped out by barge to supply local cement and other companies. This mine started production in 1984.

The second mine is the Brinco/Weldwood Quinsam Lake Mine, located near Quinsam Lake west of the town of Campbell River. This mine is to be a surface operation which would produce approximately 900,000 tonnes/year of bituminous thermal coal. Final approval was given in May of 1984, however, it is not known as to when the mine would actually begin construction or production.

1.7 Existing Infrastructure

The Lanterman Creek property is situated in close proximity to major roads, rail, seaport, utilities and services as illustrated on Map No. 3. The TransCanada Highway No. 4, the main highway serving the region passes within 8 kilometers (5 miles) of the southern boundary of the property. This highway runs from highway No. 19 at Parksville to the east, westwards to Tofino on the west coast of Vancouver Island. There are two other paved roads in the area. Both of these run north towards Lanterman Creek from highway No. 4. One road runs to the fish hatchery at Great Central Lake and the other is the Beaver Creek Road which passes Stamp Falls Provincial Park. Other main roads are McMillan Bloedel logging roads which provide excellent access throughout the area.

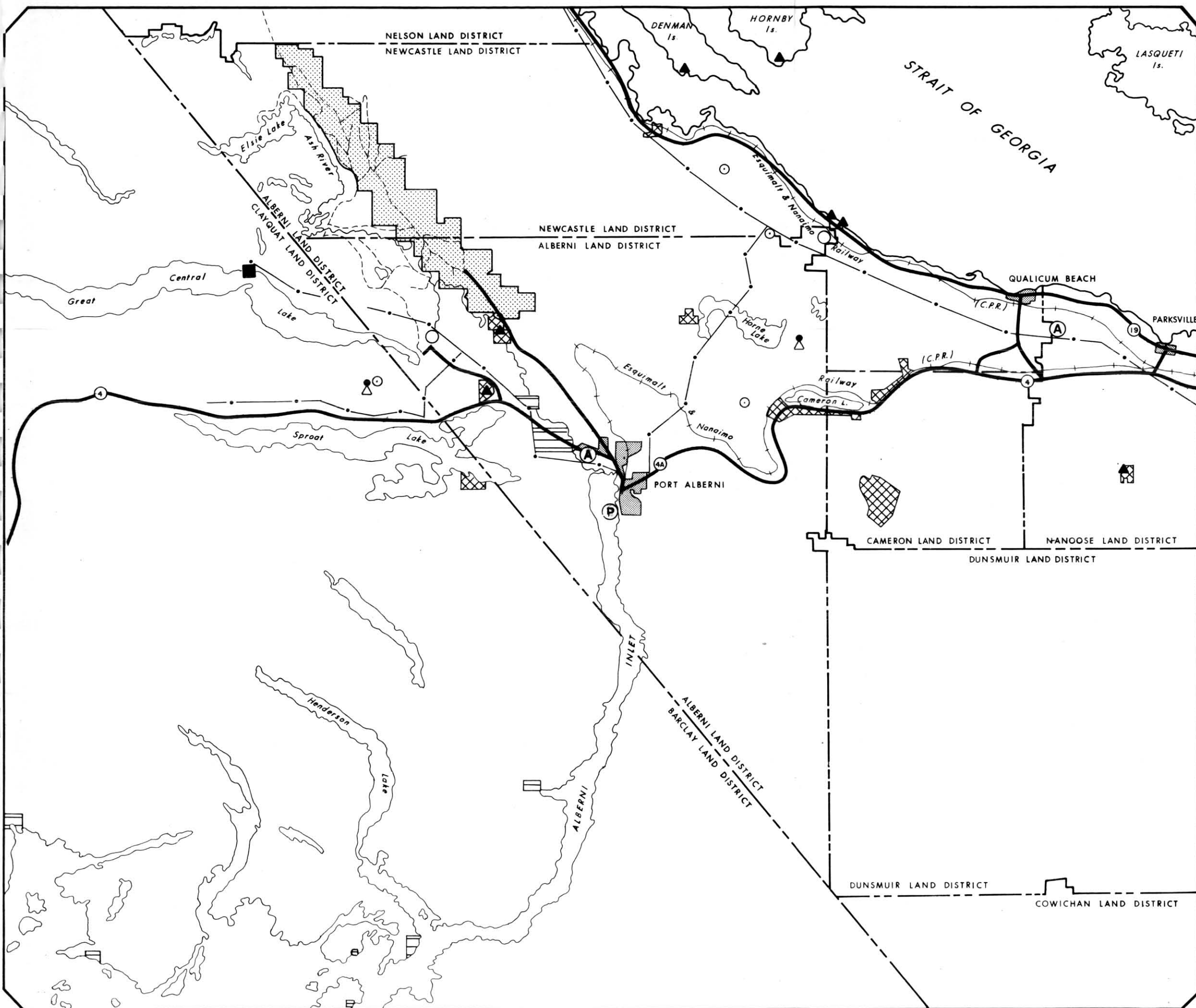
A Canadian Pacific Railway line (old Esquimalt & Nanaimo Railways) runs from the mainline at Parksville to Port Alberni, passing within 8 Km (5 miles) of the southern boundary of the property.

A deepwater port at Port Alberni is a first class harbour at the end of the 'fiord-like' Alberni Inlet which provides access 48 km. (30 miles) to the open Pacific Ocean and the Pacific Rim trading Countries. The Alberni Inlet averages 1.6 kilometers (1 mile) in width encountering depths of 200 fathoms (366 meters) (1,200 feet). The port is serviced by three stevedoring companies and is governed by the Port Alberni Harbour Commission. The Harbour Commission owns and operates three deep sea berths capable of handling ships up to 315 meters (1,050 feet) in length.

The City and area of Port Alberni contains a population of approximately 32,560 persons (1983). The services provided in this area for the people, such as recreation, education, medical, shopping, etc. are adequate to handle an increased population due to the possible construction of a mine.

The economic base at Port Alberni has developed mainly around the forestry and fishing industries. McMillan Bloedel Ltd. operates Canada's largest integrated forest products complex. This includes two sawmills, a plywood plant and a pulp and paper mill. Most of the products produced are exported.

More than 300 fishing vessels operate in the District. These account for 20% of British Columbia's Salmon yield. Fish processing is carried out and two companies rear Salmon on the inlet for commercial marketing. Secondary manufacturing in support of the above two industries supports the bulk of the population of the area.

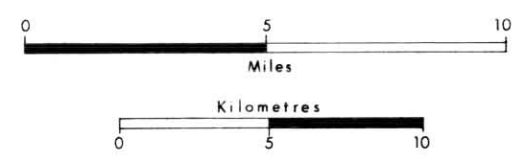


Lanterman Creek Property

Vancouver Island

LEGEND

- ELECTRICAL TRANSMISSION LINE
- (A)— PROVINCIAL HIGHWAYS (PAVED)
- - - LAND DISTRICT BOUNDARIES
- - - MAJOR LOGGING ROADS (COAL LICENCE AREA)
- MAJOR TOWNS
- ⊠ PROVINCIAL PARKS
- ▭ INDIAN RESERVE
- ▨ LANTERMAN CREEK COAL LICENCE BOUNDARY (CDN OXY)
- FISH HATCHERY
- COMMUNICATIONS TOWER
- (A) AIRFIELD
- ▲ CAMPGROUND
- POWER STATION
- ⚓ FORESTRY LOOKOUT TOWER
- (P) DEEP WATER SEA PORT



Prepared For
Canadian Occidental Petroleum Ltd. 

Title/Map No

EXISTING INFRASTRUCTURE

Tourism is fast becoming another industry of the area. This was sparked by the opening of the Pacific Rim National Park on the west coast in 1971.

Utilities in the area include power supplied by the B.C. Hydro and Power authority and Natural Gas is supplied by pipeline by Cigas Products Ltd. and Valley Rock Gas.

In summary the area contains all of the desirable infrastructure required to support a coal mine with the added advantage of a deep sea port.

2.0 LAND
DISPOSITION

2.0 LAND DISPOSITIONS

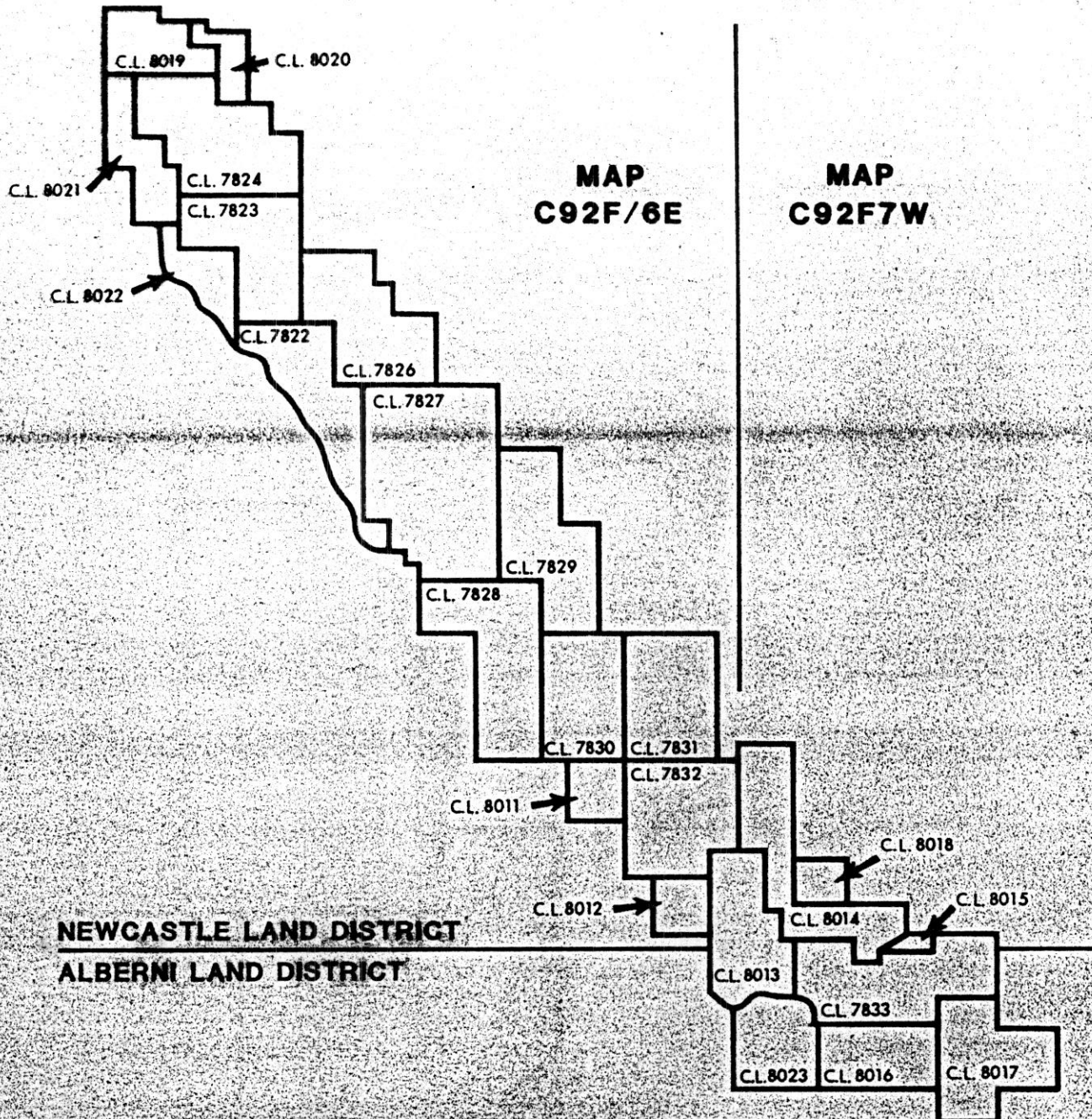
In 1977, Ramm Venture Corporation first acquired coal licences in the Ash River area. They carried out very minimal work and finally optioned their acreage to HudBay Coal Company in 1979. After completing the 14 hole drilling program in 1979, HudBay subsequently decided not to exercise their option and the land reverted wholly back to Ramm Venture Corporation.

By 1982 work commitments were again required on the Ash River property. Since Ramm Venture Corporation could not find more partners to option the land and did not want to expend the money themselves they dropped their coal licences.

On February 7, 1984, Canadian Occidental Petroleum Ltd. made application on 3,628 hectares (9,700 acres) of land in the Lanterman Creek area. Coal licences were granted on 2,649 hectares (6,622 acres) on May 1, 1984. These licences were numbered 7822 - 7833 inclusive (Map No. 4).

On May 1, 1985 coal licences were granted on a further 1,561 hectares (3,903 acres) of land. These licences numbered 8011 to 8023 inclusive covered the remaining land from the first application as well as additional acreage applied for in late 1984.

Therefore, the total acreage held by Canadian Occidental in Lanterman Creek is 5,189 hectares (10,525 acres).




**MAP
C92F/6E**

**MAP
C92F7W**

NEWCASTLE LAND DISTRICT
ALBERNI LAND DISTRICT

C.L. 8022 Canadian Occidental Petroleum Ltd.
Coal Licence



Canadian Occidental Petroleum Ltd. 	
Coal Exploration	
Lanternman Creek Property	
Land Dispositions	
Map No. 4	
Date July 85	NYB
Checked by E. SWAREN	
Drawn by M. E.	
Drawing F.A.	Revised Date

3.0 GEOLOGY

3.1 Regional Stratigraphy

The Upper Cretaceous sediments of the Nanaimo Group outcrop along the east coast of Vancouver Island from south of Nanaimo, for approximately 200 kilometers (125 miles) to a point north of Campbell River (Map No. 2). The coal bearing Nanaimo Group comprises a succession of Lithologies, which with the exception of coal seams, are clastic and range from boulder conglomerate to shale with most of the intervening spectrum presented.

There are five clearly defined basins composed of the Nanaimo Group of sediments. These are; from south to north; Cowichan, Nanaimo, Comox, Suquash and the one we are concerned with, the Alberni Basin. All of the basins have some indications of coal, but only the Comox, Nanaimo and possibly the Alberni Basins are believed to have coal reserves of economic importance.

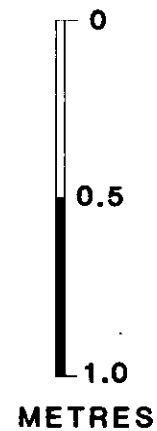
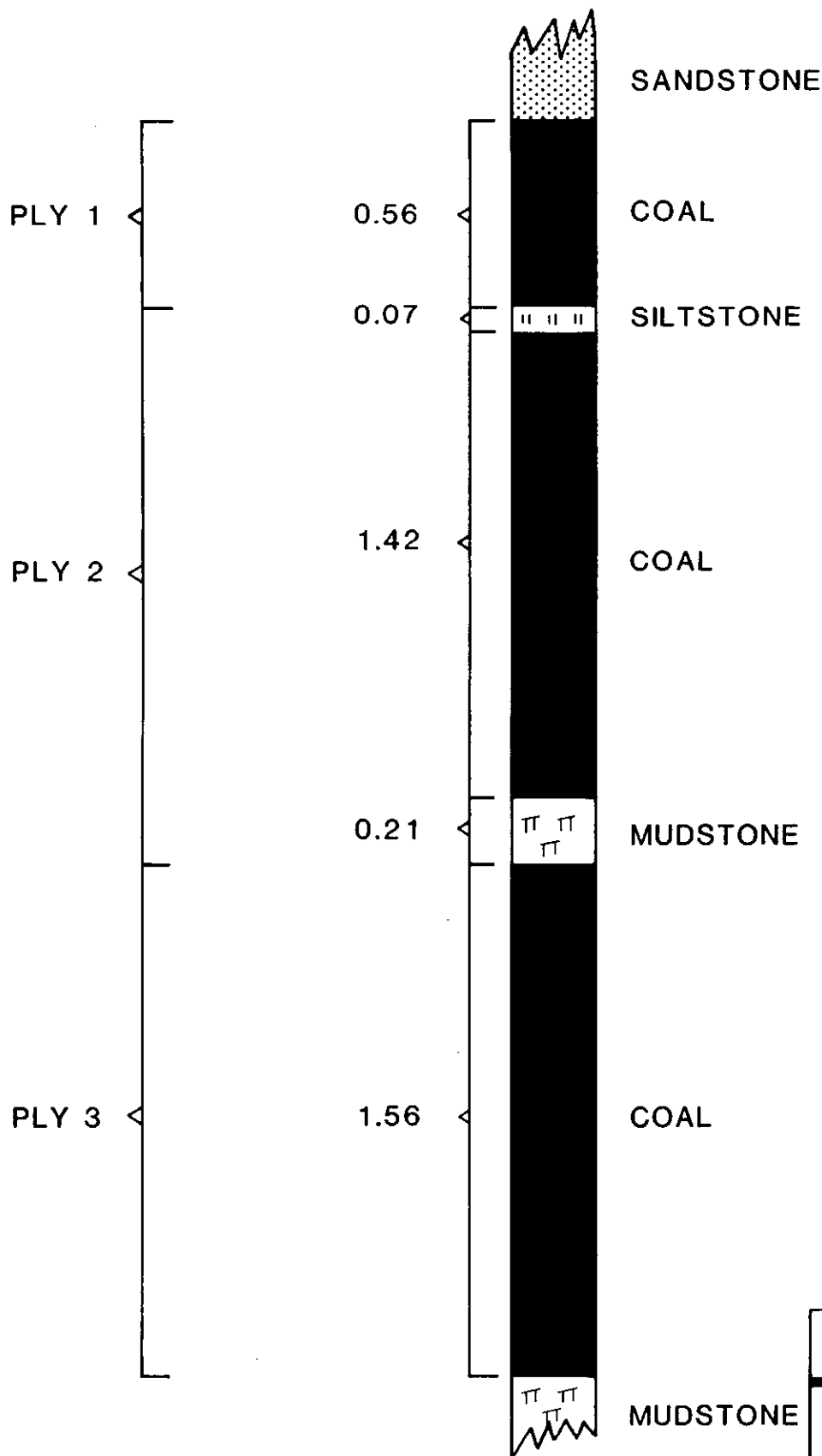
The sediments of the Nanaimo Group rest unconformably on metavolcanics and argillites of the Jurassic and Triassic Vancouver Group. The main formation of this group in the Comox and Alberni coal fields being the basic volcanic rocks of the Triassic Karmutsen formation. This formation forms the eastern and western boundaries of the Alberni Basin as well as the basement.


The Nanaimo group is about 2,150 meters (7,000 feet) thick in the Nanaimo basin; 600 meters (2,000 feet) in the Comox basin and an estimated 600 meters (2,000 feet) in the Alberni basin where the Lanterman Creek property is located. Within this thickness of sediments are two main formations which are coal bearing. These formations are the Comox and Extension-Protection formations. Both are found in the Nanaimo and Comox coal basins but only the former is coal bearing in the Comox basin and the latter in the

SAMPLE NUMBER

METREAGE

LITHOLOGY



Canadian Occidental Petroleum Ltd. 

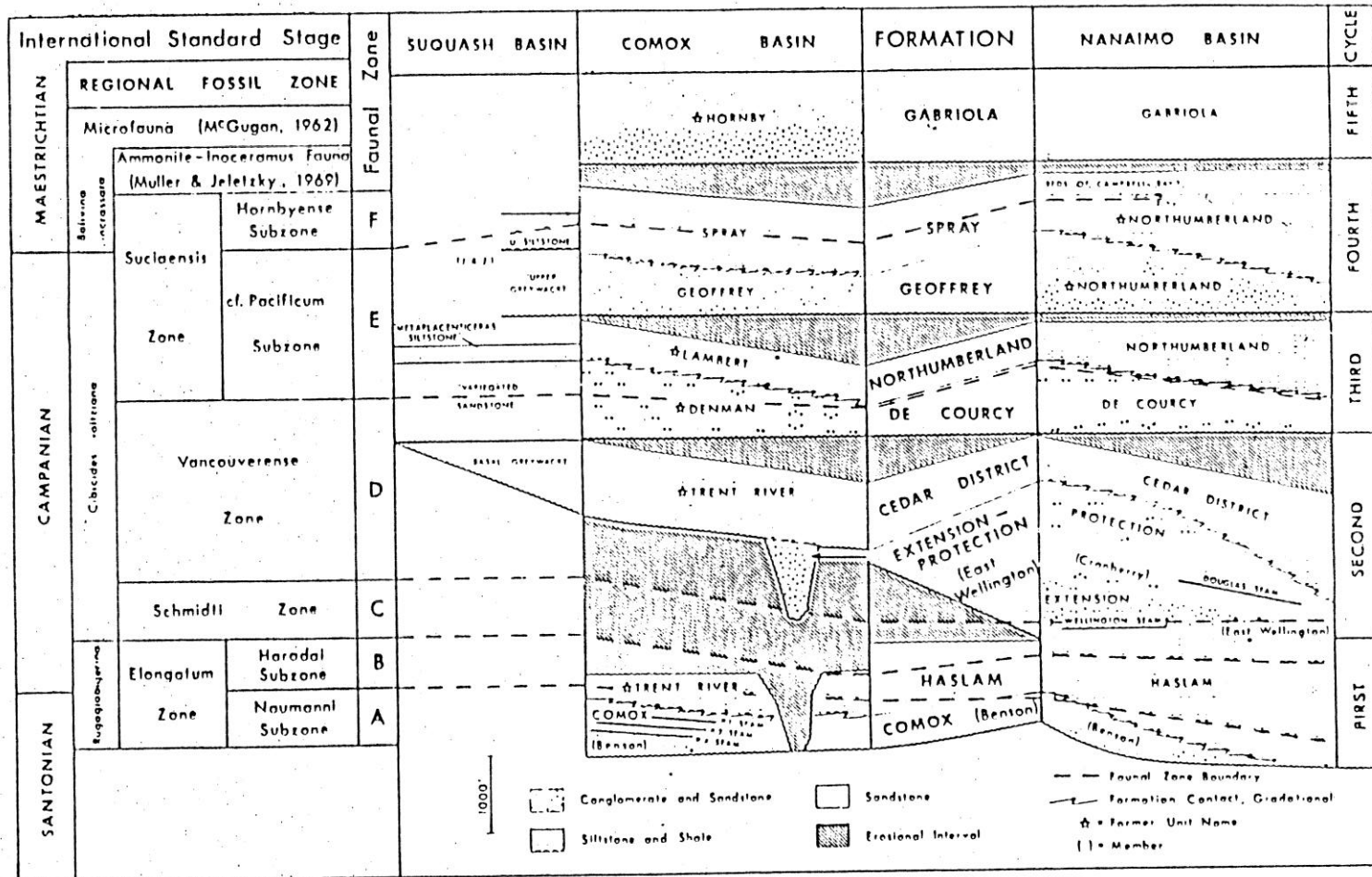
Coal Exploration

Figure 2
Lanternman Creek
Lithology and Sample
Intervals
Outcrop No. 41

Date July 85	NTS	Compiled By R. SWAREN
		Drawn By M. P.
Drawing	File	Revised Date



ASH RIVER PROPERTY - TABLE OF FORMATIONS



Biochronological and lithological divisions of Nanaimo Group (after Muller and Jeletzky, 1970).

Nanaimo basin. In the Alberni basin only the Comox and Haslam formations were encountered in the field, however, the Extension-Protection may be present. The Comox formation is the coal bearing formation at Lanterman Creek in the Alberni basin. Although both formations are of late Cretaceous age, the Extension-Protection is younger than the Comox (Figure 1).

The Nanaimo Group coal seams were probably deposited in a paralic-basin (i.e. a coal basin formed in a coastal lowland area), and the environment was probably a lagoon, separated from the sea by sand bars (Mueller-1971).

What we are concerned with in this report is the possible economic importance of the coal seams present in the Comox formation in the Alberni coal basin.

3.2 Regional Structure

The Nanaimo strata in the Comox coal field and to some extent in the Alberni coal field are contained by down faulting depression and tilting to the north east.

Linear faults trend northeast and northwest with oblique faults of intermediate trends. The dominant faults are linear.

These linear faults have greater displacement overall, and they exerted major control over the distribution of outcrops. The tectonic pattern is one of block faulting in response to the prevailing northeast tilt.

The Lanterman Creek property exhibits this prevailing northeast tilt as seen on the Geology Map No. 5.

3.3 Lanterman Creek Surficial Deposits

The Lanterman Creek property is overlain by a mantle of glacial and fluvioglacial deposits of clay, silts, gravels and till.

In this drilling program the 10 holes encountered till thickness varying from 0 meters to 38 meters. The drilling program showed that till cover is particularly thick in the centre of the property. These deposits cover most of the outcrop on the property. The majority of the outcrop was found in river and creek beds; in steep road cuts and on the steep hill sides in the northern end of the property.

As can be seen on Map 5., the area covered by the Haslam Shales is quite barren of outcrop. This is probably due to the low flat hills which were formed due to the poorly resistant shales and silty shales and the ease with which they are eroded.

3.4 Lanterman Creek Stratigraphy

The stratigraphic units of interest in the Lanterman Creek property area are those clastic continental rocks contained within the Nanaimo Group. This group represents four transgressive cycles grading upwards from non-marine coarse clastic to marine fine clastic sediments and a fifth cycle with only non-marine coarse clastics.

It has been stated that the three units within the Lanterman Creek areas are the Comox, Haslam and Extension-Protection formations from the base upwards. The field mapping program only encountered the Comox and Haslam formations which represent the first depositional cycle. However, there may be some evidence of the Extension-Protection formation on the eastern edge of the property which is covered by glacial till and where outcrops are scarce Map No. 5.

COMOX FORMATION

In the Lanterman Creek coal field this formation has been deposited directly upon the pre-Cretaceous unconformity with the Karmutsen Volcanics which forms the boundary of the basin as well as the basement (Map No. 5).

As can be seen in the cross-sections in the Appendix, the Comox formation varies in thickness, thinning from south to north.

The Comox formation has a basal fluvial conglomerate called the Benson member. However this conglomerate is usually of only local extent and is found in low areas and stream channels of the paleotopographic relief of the erosional surface of the Karmutsen Volcanics. This Benson member was only found in the southern end of property on the Ash River at outcrop No. 32 and No. 34 on Map No. 5. In the drilling program it was encountered in holes L.C. 85-02, 06, 07, 08 and 09. The conglomerate which is dark green and brown coloured and poorly bedded, varied in thickness, but at one point it forms water falls on the river and the stratigraphic thickness was at least 5 meters. The components of the conglomerate are unsorted subangular boulders, pebbles and grit composed mainly of pre-Cretaceous material.

The sandstones overlying this conglomerate at Outcrop No. 31 also contained widely scattered boulders and pebbles inclusions formed by pre-Cretaceous basement rocks.

These sandstones are quartz feldspathic in nature and vary in hardness and grain size. Within these sandstone units are beds of coal, shale and conglomerate.

It is this formation which contains the coal seam within the Lanterman Creek property area.

Lying directly and conformably upon the Comox formation, is the Haslam formation.

HASLAM FORMATION

This formation varies from 200 - 300 meters in thickness on the property.

As can be seen on Map No. 5, the formation is confined to the east-central portion of the property since it has been eroded away in the north and the south. The formation was located at Outcrop No. 5 and possibly at Outcrop No. 6. However, Outcrop 6 has been called Comox formation in this report.

The Haslam formation is composed of sandy shales and shaley sandstones which are thinly bedded and soft to medium hard.

One drill hole, L.C. 85-07 has a thick sandy shale zone (60.9 meters thick) above the sandstone zone. This sandy shale seems to be the Haslam formation. Immediately above this formation is supposed to exist the EXTENSION-PROTECTION formation.

EXTENSION-PROTECTION

This formation is the basal portion of the second deposited cycle. It was not encountered in the field reconnaissance or the drilling program, but some of the formation may be present in the far east-central portions of the property. As with the Comox basin this formation would be barren of coal in this, the Alberni Basin.

This formation is usually composed of coarse clastic facies where conglomerate, pebbly sandstone and arkosic sandstones are interbedded.

3.5 Lanterman Creek Structure

It appears that the Alberni valley is a downdrop fault block which has protected much of the basal portion of the Nanaimo Group from erosion.

The western edge of the basin does not appear to be fault controlled as indicated by J.E. Muller's 1977 geologic map of the southern half of Vancouver Island. Outcrop 34 on the Ash River shows the unconformable contact of the Basal Benson conglomerate with the Karmutsen volcanics. Faulting is not in evidence.

To the north, the coal seam at outcrop No. 41 is in the very basal portion of the Comox formation and is located very near the unconformable Karmutsen contact. Faulting again does not appear to be evident.

The eastern edge of the basin appears to be fault controlled. The basin is a downdrop block and the entire basin dips, on the average, to the northeast. This structural feature is common in the Comox and Nanaimo coal basins of the east side of the Island.

In the far northern portion of the property a synclinal feature was identified by Field Mapping, however the southern 3/4 of the property did not contain surface evidence of this structure (cross sections).

Dips along the western edge of the property average 10° to 15° to the northeast. These dips shallow out in the central and eastern portions of the basin to 5° to 10° .

Strikes are variable suggesting smaller fault blocks in the Nanaimo Group sediments. One such fault has been postulated in the central portion of the basin. This fault brings the Comox formation and Haslam formation up again causing a widening in the basin east wards.

3.6 Coal Measures

The drilling program of 1985 identified the existence of one coal zone. This zone was encountered in three drill holes; L.C. 85-06, L.C. 85-07 and L.C. 85-08. The thickness of this zone varies from 0.6 to 0.8 meters and was taken from the geophysical logs. The following summarizes the drill holes which encountered the coal zone.

Hole No.	From	To	Thickness
L.C. 85-06	154.0m	154.6m	0.6m
L.C. 85-07	171.8m	172.4m	0.6m
L.C. 85-08	77.2m	78.0m	0.8m

According to the observations of drill chips and the one core sample, the coal zone measurements include stone bands such as carbonaceous shale or coaly shale. These dirty bands make up to 50% of the coal zone. The coal zone is thin and dirty.

In this drilling program continuity of the coal zone was recognized only between holes L.C. 85-06 and L.C. 8507, a distance of approximately 2 kilometers. (see cross-sections in Appendix)

4.0 DRILLING
SUMMARY

4.0 DRILLING SUMMARY

During April and May of 1985, 11 drill holes for 1,076.5 meters (3,532 feet) were completed on the Lanterman Creek property. The drilling consisted of 10 rotary drill holes to define the structure and stratigraphy and one core hole to core the coal zone.

All holes were drilled with air using a down hole hammer. In all cases gravel cover was cased with steel casing. The casing was set using a casing hammer.

From the information available before drilling, the coal zone appeared to be located near the bottom of the formation or near the volcanic basement. Therefore, all of the drill holes were intended to drill into the volcanic basement.

One drill hole, L.C. 85-07 could not reach the basement due to the fact that the hole was making more water than the air compressor on the rig could handle. However, this hole reached what is believed to be the basal Benson conglomerates and it is assumed that there would be very little sediments between these conglomerates and the volcanic basement.

Of the 10 drill holes, 2 failed to reach sediments because it was impossible to hammer the casing through the gravel cover due to large boulders. This happened in drill holes L.C. 85-04 and L.C. 85-10.

All of the drill holes were logged geophysically with Gamma, Neutron, Density, Resistivity and caliper tools. The resistivity didn't work well in holes L.C. 85-05, L.C. 85-06 and L.C. 85-07 due to the presence to large amounts of salt water. Two drill holes, L.C. 85-05 and L.C. 85-07 had considerable amounts of salt

water. Calcite in the chip samples indicated fracture zones. This salt water probably travelled along these fracture zones from depth. The fracture zones are summarized as follows:

<u>Drill hole</u>	<u>Approximate depth of Fracture (m)</u>
L.C. 85-05	113m and 129m
L.C. 85-07	46m and 130m

The fracture zones are also recognizable on the caliper log, especially drill hole L.C. 85-05. A large chip sample from the 129 meter depth in this hole had slickensides which indicates faulting.

Drill hole L.C. 85-05 reached the volcanic basement, but this volcanic rock was different than that encountered in the other holes. In L.C. 85-05 the basement was acid plutonic rock which can often be seen in the creeks as float. It is white in colour with hornblende crystals. On the other hand, the other drill holes encountered basic volcanic rock which is green in colour. This seems to indicate the intrusion of acid plutonic rock into the basic volcanic rock in the vicinity of L.C. 85-05.

The correlation of sediments between drill holes is very difficult because of the lack of a key marker bed. Most of the sediments are sandstone which seems to be of three major kinds; light grey; greenish and off white. Of these three colour types the greenish coloured one is used for correlations.

The drilling is summarized on the drill hole summary sheets, Lithologic logs and cross-sections found in the Appendix.

5.0 RESERVES

The thickest coal interval encountered on the Lanterman Creek property was 0.8m (2.6 feet) thick and was located in hole L.C. 85-08. This hole is less than 1/2 mile from the major coal outcrop on the property at outcrop No. 41, where 5.5 meters (18 feet) of coal and shale was found. This coal seems to shale out and thin out considerably in every direction.

In looking for economic reserves of coal, especially for underground mining a cutoff of 1.5 meters (5.0 feet) was arbitrarily agreed on. If the coal seams encountered were less than this thickness they would not be considered mineable.

Using the thickness criteria to differentiate between mineable and non-mineable reserves of coal, Lanterman Creek has no underground mineable reserve potential except perhaps of very limited extent in the immediate vicinity of Outcrop No. 41. Therefore, no attempt has been made to assign reserve figures to the Lanterman Creek property.

6.0 QUALITY

6.0 QUALITY

The first quality information on the Lanterman Creek property comes from Mr. Buckham's Field Diary. The outcrop sampled was the coal seam encountered at Outcrop No. 41 on Map No. 5.

At this outcrop a 6 meter (20 foot) seam was encountered which consisted of interbedded coal, bony coal and shale. It is not know how the seam was sampled so the coal may or may not be oxidized. Also, the sampler may have high graded the sample and taken only the good bright coal for analysis.

A Mr. Geo Hanney took a sample from this outcrop, which was received at Union Bay, June 1, 1951 and analyzed June 7 by P.F. Grundy; No. 51-770. The results of that analysis are as follows:

Report Marked "Air Dry Sample"
As Received

H ₂ O	=	1.22%
Volatile Matter	=	29.06%
Fixed Carbon	=	39.81%
Ash	=	29.91%
TOTAL	=	100.00%

Heat Content	=	9,548 BTU's/lb.
Sulphur	=	1.07%

Coke Dense-Free Swelling Index	=	3
Dry Mineral Matter Free Fixed Carbon	=	60.6%
Moist Mineral Matter Free BTU's	=	14,250 BTU's/lb.
Rank = High Volatile "A" Bituminous		

In 1984, Idemitsu Kosan carried out a field reconnaissance of the Lanterman Creek Property. Their geologists took 3 samples from Outcrop No. 41. These samples were numbered PLY 1 (0.56m) PLY 2 (1.7m) and PLY 3 (1.56m) and were obtained from a hand dug trench of approximately 0.15 to 0.20 meters depth. The litholog and sample intervals are shown in Figure 2. These samples were sent

to Idemitsu's lab in Tokyo for analysis. It was found that the upper 0.56 meters of the seam was the cleanest coal with 64.8% recovery at 1.6 float. The lab sheets which include all of the analysis including Ash analysis are at the back of this section (6.0) of the report.

The following table is the average weighted quality for the 3.82 meter interval at Outcrop No. 41 on Lanterman Creek.

TABLE 1
Average Weighted Quality for Outcrop No. 41

Samples are at 1.6 float

<u>ITEM</u>	<u>BASIS</u>	<u>DATA</u>
HEAT CONTENT	C.H.B.	6,294 Kcal/Kgm (11,329 BTU's/lb.)
H.G.I.	A.D.B.	72
PROXIMATE ANALYSIS		
MOISTURE	C.H.B.	3.0%
ASH	C.H.B.	17.9%
VOLATILE MATTER	C.H.B.	27.9%
FIXED CARBON	C.H.B.	51.5%
ULTIMATE ANALYSIS		
CARBON	D.A.F.	81.5%
HYDROGEN	D.A.F.	5.3%
NITROGEN	D.A.F.	0.6%
OXYGEN	D.A.F.	11.4%
SULFUR	D.A.F.	1.31%
TOTAL SULFUR	D.B.	1.08%
CHLORINE	D.B.	0.02%
RECOVERY	1.6 FLOAT	37.8%

NOTE: C.H.B. = Equilibrium Moisture Basis of Coal at 75%
Relative Humidity and Room temperature.

During the 1985 Drilling Program one core hole was drilled. This hole numbered L.C. 85-08 core was drilled in the northern portion of the Lanterman Creek property approximately 0.5 miles northeast of Outcrop No. 41. The interval sampled was from 77.25 meters to 78.01 meters for 0.76 meters (2.49 feet). Of this 0.76 meters there was 0.11 meters (0.36 feet) of core loss. The lost sample in both cases was coal. The litholog, lithologic description and core photos for this hole are all in Appendix I of this report. The following table lists the quality for hole L.C. 85-08 on core Lanterman Creek. The sample was also analyzed by Idemitsu Kosan in Tokyo.

TABLE II
Quality Analysis for hole L.C. 85-08 core

Samples are at 1.6 float

<u>ITEM</u>	<u>BASIS</u>	<u>DATA</u>
TOTAL MOISTURE	A.S.	2.6%
HEAT CONTENT	C.H.B.	6740 Kcal/kg. (12,132 BTU's/lb.)
H.G.I.	A.D.B.	69
C.S.N.	-	4.5
PROXIMATE ANALYSIS		
MOISTURE	C.H.B.	1.6%
ASH	C.H.B.	15.8%
VOLATILE MATTER	C.H.B.	30.4%
FIXED CARBON	C.H.B.	32.2%
ULTIMATE ANALYSIS		
CARBON	D.A.F.	83.4%
HYDROGEN	D.A.F.	4.8%
NITROGEN	D.A.F.	0.8%
OXYGEN	D.A.F.	9.6%
SULFUR	D.A.F.	1.37%
TOTAL SULFUR	D.B.	1.62%
RECOVERY	1.6 float	28.4%

NOTE: C.H.B. = Equilibrium Moisture Basis of Coal at 75% Relative Humidity and Room Temperature.

If the coal interval were thicker and if the Recovery was greater this would be quite a good thermal coal product. With an F.S.I. of 4.5 this coal possibly could be used as a blend for metallurgical coal also.

7.0 COST SUMMARY

From April 17, 1985 until April 23, 1985 time was spent preparing the drill sites, showing MacMillan Bloedel the access to be used and setting up accounts.

Actual drilling commenced on April 24, 1985 and continued without a break until May 17, 1985 for a total of 24 days. The drilling company used was Drillwell Enterprises out of Cowichan Bay and the logging company was Davies Exploration Logging Ltd. out of Blairmore, Alberta. The program was carried out smoothly and efficiently with a minimum of delays, mainly due to minor mechanical problems.

All of the drill holes were surveyed in at the end of the program by Ker Priestman out of Victoria, B.C.

The following is a breakdown of the cost:

<u>ITEM</u>		<u>COST</u>
Road Rental (MacMillan Bloedel)	= \$	1,000.00
Expenses	= \$	2,050.81
Accomodation	= \$	1,196.29
Fuel/Oil/Repairs	= \$	2,428.14
Supervisor Wages (292 hours @ 28.4090/hour)	= \$	8,295.43
Payroll Burden = 16.9% of	= \$	1,401.93
Drilling Costs	= \$	41,192.50
Logging Costs	= \$	9,022.88
Quality Analysis	= \$	973.89
Surveying Costs	= \$	6,814.45
	SUBTOTAL = \$	74,376.32
	10% Overhead = \$	7,437.63
	TOTAL = \$	81,813.95

The total cost of the April/May 1985 Phase I exploratory drilling program on Lanterman Creek is \$ 81,813.95.

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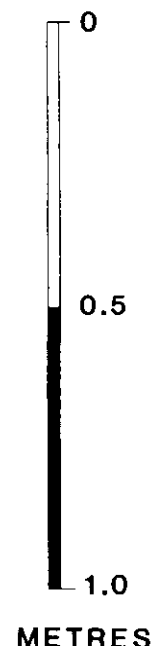
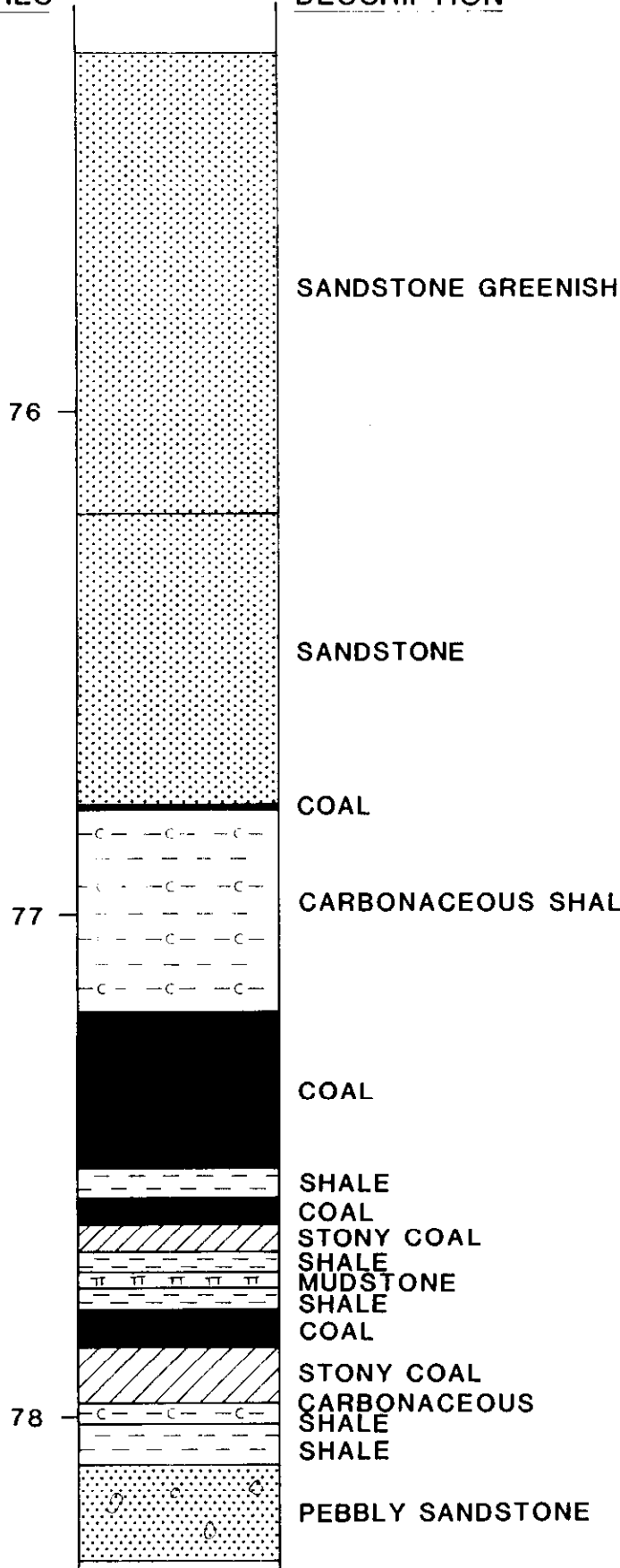



PLATE 1: Core Hole L.C. 85-08 core. Top of cored interval is in the top left hand corner and the base is at the bottom right hand corner. Each core box is 0.76 meters (2.5 feet) in length.

HOLE NO. L.C.85-08 CORE

METRES

DESCRIPTION



Canadian Occidental Petroleum Ltd.		
Coal Exploration		
Figure 2 Lanterman Creek Log of Core Hole L.C.85-08 Core		
Date July 85	NTS	Compiled By R SWAREN
		Drawn By M. P.
Drawing	File	Revised Date

**LITHOLOGIC LOGS
LANTERMAN CREEK
CORE DESCRIPTION**

Page 1 of 1

HOLE NO: : L.C. 85-08 Core
 DATE COMMENCED: 85/05/13
 DATE COMPLETED: 85/05/15
 TOTAL DEPTH : 78.8 M
 LOGGED BY : Y. ENDOH, IDEMITSU KOSAN

DEPTH (m)	THICKNESS (m)	SAMPLE NO.	DESCRIPTION
75.29			
76.20	0.91	-	SANDSTONE: Quartz lithic, light green grey, hard, solid core, sub vertical jointing, CORED, medium grained, calcite in veins, coaly wisps are sparse.
76.78	0.58	-	SANDSTONE: Quartz lithic, light grey, hard, solid core, sub vertical jointing, cored, medium grained, calcite in veins, common bioturbation, accessory pyrite lenses.
76.79	0.01	-	COAL: Undifferentiated, black, <u>CORE LOSS</u> .
77.19	0.40	-	CARBONACEOUS SHALE: Dark brown black, broken core.
77.25	0.06	1	COAL: Black, <u>CORE LOSS</u>
77.50	0.25	1	COAL: Black, accessory calcite in cleats.
77.56	0.06	2	SHALE: Dark brown grey.
77.61	0.05	2	COAL: Black, <u>CORE LOSS</u> , accessory calcite in cleats.
77.67	0.07	2	SOOTY COAL: Black.
77.71	0.04	2	SHALE: Dark brown grey.
77.74	0.03	2	MUD: Calcareous, green cream color, very hard.
77.78	0.04	3	SHALE: Dark brown grey.
77.86	0.08	3	COAL: UNDIFFERENTIATED, black, accessory calcite in cleats.
77.97	0.11	3	SOOTY COAL: Black.
78.01	0.04	3	CARBONACEOUS SHALE: Dark brown black, core very broken.
78.09	0.08	-	SHALE: Dark brown grey, <u>CORE LOSS</u> sparse coaly wisps, accessory pyrite lenses.
78.28	0.19	-	SANDSTONE: Pebbly, light grey.

APPENDIX II



PLATE 2: Hole L.C. 85-08. Chip samples of hole 08. Top of holes is upper left and bottom is lower right. Note the three dark piles of coal and shale at bottom right. Each pile of chips represents approximately one meter of drilling.

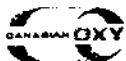


PLATE 3: Logging Drill Hole L.C. 85-08.



PLATE 4: Drilling Hole L.C. 85-07 at southern end of Lanterman Creek.

APPENDIX III

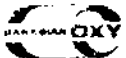


DRILL HOLE SUMMARY SHEET

PROJECT: LANTERMAN CREEK

HOLE NO	Incl deg	AZ DEG	COORDINATES		TRUE LLEV	TOTAL DPLTH	ELECTRIC LOGS										SEAM DESCRIPTION				Elevation Top of coal zone	Hole Dia (cm)	RW	RIG			FLUID			COMMENTS			
			SOUTH	WEST			G	D	H	N	S	C	DATE	DPLTH	D	TILL (M)	H2O level	NO	DEPTH TOP	DEPTH BOTTOM				THICK (m)	CORE DATA	Depth Top	CDT	REC.	B		S	B	WT
LC85 01	90		5480578.284N 349107.820 E	325.5	25.8	x	x	x	x	x	x	x	x	25/85	25.5	x	3.5	5.6	19.8	20.7	0.9												Coal seam is very shaly. Basement at 23.8 meters.
LC85 02	90		5482677.225N 347801.289 E	401.0	51.8	x	x	x	x	x	x	x	x	26/85	51.5	x	3.5	13.3	NO	COAL												Basement at 49.1 meters V.T.M. metric co-ordinates.	
LC85 03	90		5479581.921N 350259.650 E	323.5	10.8	x	x	x	x	x	x	x	x	27/85	100	x	5.6	13.4	NO	COAL												Basement at 96 meters.	
LC85 04	90		5477719.269N 351415.723 E	349.5	38.5											x	38.1		NO	COAL												Hole abandoned due to extremely thick till and large rocks.	
LC85 05	90		5475890.899N 352650.307 E	301.72	179.8	x	x	x	x	x	x	x	x	2/5/85	178.5	x	26.7	49.2	NO	COAL												Basement at 176.8 meters	
LC85 06	90		5474607.597N 353764.431 E	232.77	166.2	x	x	x	x	x	x	x	x	5/5/85	166.0	x	23.5	33.3	NO	COAL												Basement at 158.5 meters.	
LC85 07	90		5473002.373N 355489.640 E	139.62	243.8	x	x	x	x	x	x	x	x	12/5/85	243.5	x	143	83.9	171.8	172.4	0.6										Ended hole in conglomerates.		
LC85 08	90		5481227.620N 349200.405 E	335.12	86.8	x	x	x	x	x	x	x	x	13/5/85	86.0	x	4.8	6.7	77.8	79.1	1.3										Basement at 85.3 meters.		

EX 203
-047
44 01



PROJECT LANTERMAN CREEK

DRILL HOLE SUMMARY SHEET

PAGE 2

HOLE NO	Incl deg	AZ DEG	COORDINATES		TRIC LLEV	TOTAL DEPTH	ELECTRIC LOGS						D U	TTL (M)	H2O level	SEAM DESCRIPTION						Elevation Top of coal zone	Hole Dia (cm)	Rw	RIG					FLUID			COMMENTS		
			SOUTH	WEST			G	D	H	N	S	C				DATE	DEPTH	NO	DEPTH TOP	DEPTH BOTTOM	Thick-ness(m)				CONF DATA			COR	S	D	W	M			
																									Depth Top	CUT	REC								
LC 85 08 CORE	90		5481227	620 N 349200.405 E	335.12	78.8	x	x	x	x	x	15/5/85	78.5	x	4.5	65.3	76.78	76.79	0.01								15.24				x				
LC85 09	90		5484210	474N 347611.729 E	411.88	78.0	x	x	x	x	x	15/5/85	77.5	x	1.7	7.8	NO	COAL									15.24				x				Basement at 70.7 meters.
LC85 10	90		5477392	093N 351445.979 E	332.97	26.2								x	26.2		NO	COAL									15.24				x				Hole abandoned due to thick till and large rocks.

EX 203
- 047
44 01

LITHOLOGIC LOG
LANTERMAN CREEK

HOLE NO : L.C. 85-01
DATE COMMENCED: 85/04/24
DATE COMPLETED: 85/04/24
TOTAL DEPTH : 25.8M
LOGGED BY : Y. ENDOH

Page 1 of 1

DEPTH (m)	THICKNESS (m)	DESCRIPTION
1.0	1.0	GRAVEL
4.0	3.0	SANDSTONE: Quartz lithic, light grey fresh colour, hard coarse grained.
6.0	2.0	SANDSTONE: Quartz lithic, light grey fresh colour, hard, medium grained.
8.0	2.0	SANDSTONE: Quartz lithic, light grey fresh colour, hard, fine grained.
12.0	4.0	SANDSTONE: Quartz lithic, light grey fresh colour, hard, coarse grained.
19.8	7.8	SANDSTONE: Quartz lithic, light grey fresh colour, hard, medium grained.
20.7	0.9	COALY SHALE: Soft
23.8	2.9	SANDSTONE: Light grey, soft, fine grained.
25.8	2.0	VOLCANICS: Green

**LITHOLOGIC LOG
LANTERMAN CREEK**

HOLE NO : L.C. 85-02
 DATE COMMENCED: 85/04/25
 DATE COMPLETED: 85/04/25
 TOTAL DEPTH : 52.1M
 LOGGED BY : Y. ENDOH

Page 1 of 1

DEPTH (m)	THICKNESS (m)	DESCRIPTION
7.9	7.9	SANDSTONE: Light grey, medium grained.
11.0	3.1	SANDSTONE: Light grey fresh colour, hard, coarse grained.
14.0	3.0	SANDSTONE: Quartz lithic, light grey, hard, medium grained.
15.5	1.5	SANDSTONE: Quartz lithic, grey, hard, medium grained.
17.1	1.6	SANDSTONE: Quartzose, grey, hard, coarse grained.
18.6	1.5	CONGLOMERATIC: Quartzose, hard.
23.2	4.6	SANDSTONE: Granular, light grey, hard, coarse grained.
24.7	1.5	SANDSTONE: Quartzose, light grey, hard, medium grained.
29.3	4.6	SHALE: Black, soft.
35.4	6.1	SANDSTONE: Dark brown, very fine grained, few coaly laminae.
36.9	1.5	SANDSTONE: Dark brown, fine grained, common coaly laminae.
38.4	1.5	SANDSTONE: Dark brown, fine grained, Top 50% has common coaly laminae, pyrite accessory in cleats. Bottom 50% is Quartzose, light grey, hard, medium grained.
41.5	3.1	SANDSTONE: Grey, hard, fine grained.
43.0	1.5	SILTSTONE: Grey, hard, common coaly fragments.
44.5	1.5	SANDSTONE: Grey, hard, very fine grained.
46.0	1.5	SANDSTONE: Grey, hard, fine grained.
47.5	1.5	SANDSTONE: Dark grey, fine grained.
49.1	1.6	CONGLOMERATE: Granular, light grey, hard.
52.1	3.0	VOLCANICS: GREEN, hard.

LITHOLOGIC LOG
LANTERMAN CREEK

HOLE NO : L.C. 85-03
 DATE COMMENCED: 85/04/26
 DATE COMPLETED: 85/04/26
 TOTAL DEPTH : 99.1 M
 LOGGED BY : Y. ENDOH

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DEPTH (m)	THICKNESS (m)	DESCRIPTION
5.5	5.5	GRAVEL
6.1	0.6	SANDSTONE
9.1	3.0	SANDSTONE: Lithic, light grey, hard, fine grained.
27.4	18.3	SANDSTONE: Light grey, hard, medium grained.
47.2	19.3	SANDSTONE: Light grey, hard, medium grained.
48.8	1.6	SANDSTONE: Quartz lithic, light green grey, hard coarse to medium grained.
51.8	3.0	SANDSTONE: Quartz lithic, light green grey, hard coarse grained.
57.9	6.1	SANDSTONE: Quartz lithic, light green grey, hard, medium grained.
59.4	1.5	SANDSTONE: Quartz lithic, light green grey, hard, coarse to medium grained.
61.0	1.6	SANDSTONE: Quartz lithic, light green grey, hard, medium grained.
70.1	9.1	SANDSTONE: Lithic, light green grey, hard, medium grained.
74.7	4.6	SANDSTONE: Quartz lithic, light green grey, hard, medium grained.
76.2	1.5	SANDSTONE: Lithic quartz, light grey, hard, coarse grained.
77.7	1.5	SANDSTONE: Lithic quartz, light grey, hard, coarse grained, intermixed in the top 50% with brown shale, soft, which forms bottom 50%.
82.3	4.6	SANDSTONE: Quartz lithic, light grey, hard, coarse grained.
86.9	4.6	SANDSTONE: Quartz lithic, light grey, hard, medium grained.
88.4	1.5	SANDSTONE: Quartz lithic, light grey, hard, coarse grained, intermixed with soft, light grey siltstone in upper 90%. Siltstone forms bottom 10% with common plant impressions.
89.9	1.5	SANDSTONE: Light grey, hard, coarse grained, intermixed with soft brown siltstone in top 70%. Siltstone forms bottom 30%.
91.4	1.5	SANDSTONE: Quartz lithic, light grey, hard coarse to medium grained, intermixed with soft cream coloured shale in top 50%. Shale forms bottom 50% of interval.
93.0	1.6	SANDSTONE: Light grey, hard, medium grained.
94.5	1.5	SANDSTONE: Dark green, very hard, medium grained.
96.0	1.5	SANDSTONE: Light green, very hard, secondary calcite in veins.
99.1	3.1	VOLCANICS: Light green, very hard.

LITHOLOGIC LOG
LANTERMAN CREEK

HOLE NO : L.C. 85-04
DATE COMMENCED: 85/04/27
DATE COMPLETED: 85/04/28
TOTAL DEPTH : 39.1M
LOGGED BY : D. SLADE, DRILLER

DEPTH (m)	THICKNESS (m)	DESCRIPTION
2.5	2.5	Brown gravelly soil with boulders.
24.0	22.5	Light grey till with boulders of Volcanic basement rock.
25.6	3.1	Gravelly till.
38.1	12.5	Tight grey till.
39.1	1.0	SANDSTONE:

HOLE ABANDONED

LITHOLOGIC LOG
LANTERMAN CREEK

HOLE NO : 85-05
 DATE COMMENCED: 85/04/29
 DATE COMPLETED: 85/05/03
 TOTAL DEPTH : 179.8M
 LOGGED BY : Y. ENDOH

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DEPTH (m)	THICKNESS (m)	DESCRIPTION
25.9	25.9	GRAVEL
32.0	6.1	SANDSTONE: Quartz lithic, light grey, hard, medium grained.
33.5	1.5	SANDSTONE: Lithic quartz, light grey, hard, coarse to medium grained.
35.1	1.6	SANDSTONE: Lithic quartz, light grey, hard, coarse to medium grained, intermixed with 10% shale, dark grey, and soft.
38.1	3.1	SANDSTONE: Lithic, dark grey, hard and fine grained.
44.2	6.1	SANDSTONE: Quartz lithic, light grey, hard, medium grained.
45.7	1.5	SANDSTONE: Quartz lithic, light grey, hard, medium grey intermixed with 10% sandstone: lithic, dark grey, hard and fine grained.
48.8	3.1	SANDSTONE: Quartz lithic, light grey, hard, medium grained.
50.3	1.5	SANDSTONE: Lithic, dark grey, very hard, very fine grained.
53.3	3.0	SANDSTONE: Quartz lithic, light grey, hard, medium grained.
54.9	1.6	SANDSTONE: Quartz lithic, light grey, hard, medium grained, intermixed with 10% 20% SANDSTONE; lithic, dark green grey, hard and very fine grained.
56.4	1.5	SANDSTONE: Quartz lithic, light green, hard, medium grained.
61.0	4.6	SANDSTONE: Quartz lithic, light green, hard, coarse grained.
62.5	1.5	SANDSTONE: Quartz lithic, light green grey, hard, medium grained.
64.0	1.5	SANDSTONE: Quartz lithic, light grey, hard, medium grained, intermixed with 30% SANDSTONE; lithic, dark grey, hard, fine grained.
67.1	3.1	SANDSTONE: Quartz lithic, light green grey, hard, medium grained.
68.6	1.5	SANDSTONE: Quartz lithic, light green grey, hard, coarse to medium grained, disseminated abundant biotite.
70.1	1.5	SANDSTONE: Quartz lithic, light green grey, hard, very coarse to coarse grained intermixed with 5% SANDSTONE; lithic dark grey, hard, very fine grained.
73.2	3.1	SANDSTONE: Quartz lithic, light green grey, hard, coarse grained, abundant disseminate biotite.

**LITHOLOGIC LOG
LANTERMAN CREEK**

HOLE NO: L.C. 85-05

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DEPTH (m)	THICKNESS (m)	DESCRIPTION
74.7	1.5	SANDSTONE: Quartz lithic, light green grey, coarse to medium grained.
76.2	1.5	SANDSTONE: Quartz lithic, light grey, medium grained, intermixed with 50% SANDSTONE; lithic, dark grey, hard, fine grained.
77.7	1.5	SANDSTONE: Quartz lithic, light grey, hard, medium grained, sparse calcite in veins, intermixed with 30% SANDSTONE; lithic, dark grey, hard, very fine grained.
79.2	1.5	SANDSTONE: Quartz lithic, light green grey, coarse to very coarse grained, intermixed with 20% SANDSTONE; lithic, dark grey, hard, fine grained
80.8	1.5	SANDSTONE: Quartz lithic, light green grey, hard, coarse to medium grained, intermixed 30% with SANDSTONE; lithic, dark grey, hard, very fine grained.
82.3	1.5	SANDSTONE: Quartz lithic, light green grey, hard, coarse to medium grained.
83.8	1.5	SANDSTONE: Quartz lithic, light grey, hard, medium grained, intermixed with 20% SANDSTONE; lithic, dark grey, hard, very fine grained.
85.3	1.5	SANDSTONE: Lithic, dark grey, hard, very fine grained, intermixed with 10% CONGLOMERATE, granular, volcanolithic, dark grey, hard.
86.9	1.6	SANDSTONE: Lithic, dark grey, hard, very fine grained, intermixed with 30% pebble conglomerate, hard.
88.4	1.5	PEBBLE CONGLOMERATE: Volcanolithic, hard, intermixed with 40% lithic sandstone; dark grey, soft and fine grained.
89.9	1.5	SANDSTONE: Quartz lithic, light green grey, hard, medium grained, intermixed with 5% SANDSTONE; lithic, dark grey, hard, very fine grained.
91.4	1.5	SANDSTONE: Quartz lithic, light green grey, hard, medium grained.
94.5	3.1	SANDSTONE: Quartz lithic, grey, very hard, medium grained.
96.0	1.5	SANDSTONE: Quartz lithic, light grey, very hard, medium grained, intermixed with 5% sandstone; lithic, dark grey, hard, very fine grained.
97.5	1.5	SANDSTONE: Quartz lithic, light grey, hard, medium grained, intermixed with 40% sandstone; lithic, dark grey, hard, very fine grained.
100.6	3.1	SANDSTONE: Quartz lithic, light grey, hard, medium grained.
102.1	1.5	SANDSTONE: Lithic, grey, hard, fine grained.

**LITHOLOGIC LOG
LANTERMAN CREEK**

DRILL HOLE: L.C. 85-05

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DEPTH (m)	THICKNESS (m)	DESCRIPTION
105.2	3.1	SANDSTONE: Quartz lithic, light grey, hard medium grained.
108.2	3.0	SANDSTONE: Quartz lithic, light grey, hard, coarse to medium grained.
109.7	1.5	SANDSTONE: Quartz lithic, light grey, hard, coarse grained, intermixed with 60% sandstone, lithic, dark grey, hard, very fine grained.
125.0	15.3	SANDSTONE: Quartz lithic, light grey, hard, coarse to medium grained, secondary calcite in veins.
126.5	1.5	SANDSTONE: Quartz lithic, light grey, hard, coarse to medium grained, intermixed with 50% sandstone; lithic, dark grey, hard, fine grained.
129.5	3.0	SANDSTONE: Quartz lithic, light grey, hard, coarse to medium grained, secondary calcite in veins, intermixed with 60% sandstone; lithic, dark grey, hard, fine grained.
FAULTED - MAKING LARGE AMOUNTS OF SALT WATER		
160.0	30.5	SANDSTONE: Light grey, hard, medium coarse, secondary calcite in veins.
164.6	4.6	SANDSTONE: Light brown grey, hard medium grained.
175.3	10.7	SANDSTONE: Grey, hard medium grey.
176.2	0.9	VOLCANICS: Dark grey, hard.
176.8	0.6	SANDSTONE: Light grey, hard, medium grained intermixed with 30% VOLCANICS, dark grey and hard.
179.8	3.0	IGNEOUS ROCK: Green and off white, hard.

**LITHOLOGIC LOGS
LANTERMAN CREEK**

HOLE NO : L.C. 85-06
 DATE COMMENCED: 85/05/03
 DATE COMPLETED: 85/05/05
 TOTAL DEPTH : 166.1
 LOGGED BY : Y. ENDOH

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DEPTH (m)	THICKNESS (m)	DESCRIPTION
22.9	22.9	GRAVEL
33.5	10.6	SANDSTONE: Lithic quartz, light green grey, hard, coarse to medium grained, disseminated accessory biotite.
35.1	1.6	SANDSTONE: Lithic quartz, light green grey, hard, medium grained, disseminated accessory biotite.
41.1	6.0	SANDSTONE: Lithic quartz, light green, coarse to medium grained, disseminated accessory biotite.
42.7	1.6	SANDSTONE: Lithic quartz, light green grey, hard, coarse grained, disseminated accessory biotite.
44.2	1.5	SANDSTONE: Lithic quartz, light green grey, hard, medium grained, disseminated accessory biotite.
47.2	3.0	SANDSTONE: Lithic quartz, light green grey, hard, coarse to medium grained, disseminated, accessory biotite.
48.8	1.6	SANDSTONE: Lithic quartz, light grey, hard, medium grained, intermixed with 30% SANDSTONE; lithic, dark grey, very fine grained, secondary calcite in veins.
50.3	1.5	SANDSTONE: Lithic quartz, light grey, very hard, coarse to medium grained.
51.8	1.5	SANDSTONE: Lithic quartz, light grey, hard, coarse to very coarse grained, secondary calcite in veins, intermixed with 40% lithic sandstone; dark grey, hard, very fine grained.
53.3	1.5	SANDSTONE: Lithic, dark grey, hard, very fine grained.
54.9	1.6	SANDSTONE: Lithic quartz, light grey, soft, medium grained, accessory disseminated biotite, intermixed with 10% sandstone; lithic, dark grey, hard fine grained.
56.4	1.5	SANDSTONE: Lithic quartz, light grey, hard, medium grained.
57.9	1.5	SANDSTONE: Quartz lithic, light grey, hard, very fine grained, intermixed with 50% sandstone, lithic, dark grey, hard, very fine grained.

**LITHOLOGIC LOGS
LANTERMAN CREEK**

HOLE NO: L.C. 85-06

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DEPTH (m)	THICKNESS (m)	DESCRIPTION
59.4	1.5	SANDSTONE: Lithic quartz, light grey, hard, medium grained, accessory disseminated biotite.
61.0	1.6	SANDSTONE: Quartz lithic, light grey, hard, medium grained, accessory disseminated biotite intermixed with 40% lithic sandstone, dark grey, soft and very fine grained.
62.5	1.5	SANDSTONE: Lithic quartz, light grey, hard, medium grained, accessory disseminated biotite.
64.0	1.5	SANDSTONE: Lithic quartz, light grey, hard, medium grained, accessory disseminated biotite intermixed with 30% lithic sandstone, dark grey, soft very fine grained.
65.5	1.5	SANDSTONE: Lithic quartz, light grey, hard, medium grained, accessory disseminated biotite intermixed with 10% lithic sandstone, dark grey, soft and very fine grained.
67.1	1.6	SANDSTONE: Lithic, dark grey, soft, very fine grained, intermixed with 40% sandstone quartz lithic,, light grey , hard, fine grained.
68.6	1.5	SANDSTONE: Quartz lithic, light grey, hard, medium to fine grained, secondary calcite in veins.
73.2	4.6	SANDSTONE: Lithic quartz, light grey, hard, coarse to medium grained, accessory disseminated biotite.
74.7	1.5	SANDSTONE: Quartz lithic, light grey, hard, medium grained accessory disseminated biotite, intermixed with 10% sandstone; lithic, dark grey, hard and very fine grained.
76.2	1.5	SANDSTONE: Lithic, dark grey, hard, very fine grained.
77.7	1.5	SANDSTONE: Lithic quartz, light grey, hard, coarse to medium grained, accessory disseminated biotite intermixed with 10% lithic sandstone, dark grey hard and very fine grained.
79.2	1.5	SANDSTONE: Lithic quartz, light grey, hard, coarse to medium grained, accessory disseminated biotite.
80.8	1.6	SANDSTONE: Quartz lithic, light grey, hard, fine grained intermixed with 50% sandstone; lithic dark grey, hard and very fine grained.

**LITHOLOGIC LOGS
LANTERMAN CREEK**

HOLE NO: L.C. 85-06

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DEPTH (m)	THICKNESS (m)	DESCRIPTION
83.3	3.0	SANDSTONE: Lithic quartz, light grey, hard, medium grained, accessory disseminated biotite, intermixed with 40% lithic sandstone, dark grey, hard and very fine grained.
85.3	1.5	SANDSTONE: Quartz lithic, light grey, hard and medium to fine grained, accessory disseminated biotite intermixed with 50% Lithic Sandstone, dark grey, hard and very fine grained.
86.9	1.6	SANDSTONE: Lithic quartz, light grey, hard, coarse to medium grained, accessory disseminated biotite.
88.4	1.5	SANDSTONE: Lithic quartz, light grey, hard, coarse to medium grained, accessory disseminated biotite intermixed with 30% dark grey shale, hard and and very fine grained.
89.9	1.5	SANDSTONE: Lithic quartz, light grey, hard, coarse grained.
93.0	3.1	SANDSTONE: Lithic quartz, light green grey, hard, medium grained, accessory disseminated biotite.
94.5	1.5	SANDSTONE: Lithic quartz, light grey, hard, coarse to medium grained, secondary calcite in veins.
96.0	1.5	SANDSTONE: Quartz lithic, light grey, hard, medium to fine grained, accessory disseminated biotite.
97.5	1.5	SANDSTONE: Lithic quartz, coarse to medium grained, light grey, hard, coaly laminae, accessory disseminated biotite.
99.1	1.6	SANDSTONE: Lithic quartz, light grey, hard, coarse to very coarse, coal laminae accessory disseminated biotite.
100.6	1.5	SANDSTONE: Quartz lithic, brown grey, hard, coarse to medium grained.
102.1	1.5	SANDSTONE: Shaly, dark grey, soft, very fine grained.
105.2	3.1	SANDSTONE: Quartz lithic, light grey, hard, coarse to medium grained, accessory disseminated biotite.
106.7	1.5	SANDSTONE: Quartz lithic, light grey, hard, medium grained, intermixed with 40% lithic sandstone, dark grey, soft and very fine grained.
111.3	4.6	SANDSTONE: Shaly, dark grey, soft, very fine grained.
112.8	1.5	SANDSTONE: Shaly, dark brown grey, soft, very fine grained, secondary calcite in veins.

LITHOLOGIC LOGS
LANTERMAN CREEK

HOLE NO: L.C. 85-06

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DEPTH (m)	THICKNESS (m)	DESCRIPTION
114.3	1.5	SANDSTONE: Quartz lithic, light grey, hard, medium grained, secondary calcite in veins.
115.8	1.5	SANDSTONE: Quartz lithic, light grey, hard, fine grained secondary calcite in veins.
117.3	1.5	SANDSTONE: Quartz lithic, light green grey, hard, fine grained.
118.9	1.6	SANDSTONE: Lithic quartz, light green grey, hard medium grained, accessory disseminated biotite.
120.4	1.5	SANDSTONE: Lithic quartz, light green grey, hard, medium grained, intermixed with 40% lithic sandstone, dark grey, soft and fine grained.
125.0	4.6	SANDSTONE: Quartz lithic, dark grey, soft, fine grained.
131.1	6.1	SANDSTONE: Lithic quartz, light green grey, hard, coarse to medium grained, accessory disseminated biotite.
132.6	1.5	SANDSTONE: Lithic quartz, light grey, hard coarse to very coarse grained, intermixed with 10% lithic sandstone, dark grey, hard, very fine grained.
134.1	1.5	SANDSTONE: Lithic quartz, light grey, hard, coarse to very coarse.
137.2	3.1	SANDSTONE: Lithic quartz, light grey, hard, coarse to very coarse grained, intermixed with 10% lithic sandstone, dark grey, soft, very fine grained.
138.7	1.5	SANDSTONE: Lithic quartz, light grey, hard, coarse grained.
139.4	0.7	SANDSTONE: Lithic quartz, light grey, hard, coarse grained, intermixed with 50% shale, dark brown, soft.
141.7	2.3	SHALE: Dark brown, soft, accessory pyrite fragments.
142.5	0.8	SANDSTONE: Lithic, dark grey, soft, very fine grained.
143.3	0.8	SANDSTONE: Lithic quartz, light grey, hard, coarse to medium grained.
146.3	3.0	SANDSTONE: Quartz lithic, light grey, hard, coarse to medium grained, interbedded with 20% lithic sandstone, dark grey, hard, and very fine grained.
152.4	6.1	SANDSTONE: Quartz lithic, light green grey, hard, coarse to very coarse.
154.4	0.5	SANDSTONE: Quartz lithic, light grey, soft, fine grained.

LITHOLOGIC LOGS
LANTERMAN CREEK

HOLE NO: L.C. 85-06

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DEPTH (m)	THICKNESS (m)	DESCRIPTION
155.4	1.0	SANDSTONE: Quartz lithic, light grey, soft, fine grained, interbedded with 30% <u>COAL</u> UNDIFFERENTIATED black, soft.
157.0	1.6	SANDSTONE: Quartz lithic, calcareous, cream color, soft medium grained.
158.5	1.5	GRANULE CONGLOMERATE: Green grey, soft.
61	5	WBS@d

**LITHOLOGIC LOGS
LANTERMAN CREEK**

HOLE NO : L.C. 85-07
 DATE COMMENCED: 85/05/05
 DATE COMPLETED: 85/05/11
 TOTAL DEPTH : 243.8 M
 LOGGED BY : Y. ENDOH

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DEPTH (m)	THICKNESS (m)	DESCRIPTION
13.7	13.7	GRAVEL
15.2	1.5	SANDSTONE: Quartz lithic, light grey, hard, coarse to medium grained, few coaly laminae.
16.8	1.6	SANDSTONE: Quartz lithic, light grey, hard, medium grained, few coaly laminae.
18.3	1.5	SANDSTONE: Quartz lithic, light grey, hard, coarse to medium grained, secondary calcite in veins.
22.9	4.6	SHALE: Sandy, dark grey, soft.
24.4	1.5	SHALE: Sandy, dark grey, soft, intermixed with 5% PEBBLE CONGLOMERATE
30.5	6.1	SHALE: Sandy, dark grey, soft.
32.0	1.5	SHALE: Sandy, dark grey, soft, intermixed with 5% pebble conglomerate.
36.6	4.6	SHALE: Sandy, dark grey, hard,
38.1	1.5	SHALE: Sandy, dark grey, hard, intermixed with 5% pebble conglomerate.
41.1	3.0	SHALE: Sandy, dark grey, hard.
42.7	1.6	SHALE: Sandy, dark grey, hard, intermixed with 5% pebble conglomerate.
45.7	3.0	SHALE: Sandy, dark grey, hard.
48.8	3.1	SANDSTONE: Lithic, dark grey, hard, fine to very fine grained.
80.8	32.0	SHALE: Sandy, dark grey, hard.
82.3	1.5	SANDSTONE: Lithic quartz, light grey, hard coarse to medium grained, intermixed with 50% sandy shale, dark grey, hard.
83.8	1.5	SHALE: Sandy, dark grey, hard, intermixed with 20% lithic quartz sandstone; light grey, hard, and coarse to medium grained.
88.4	4.6	SANDSTONE: Lithic, grey, hard, medium grained.
89.9	1.5	SANDSTONE: Lithic, light grey, hard, coarse grained, secondary calcite in veins
94.5	4.6	SANDSTONE: Quartz lithic, light grey, hard, medium grained.
96.0	1.5	SANDSTONE: Quartz lithic, light grey, hard, medium grained, intermixed with 30% lithic sandstone, dark grey, hard, very fine grained.
112.8	16.8	SANDSTONE: Quartz lithic, light grey, hard, medium grained.
115.8	3.0	SANDSTONE: Quartz lithic, dark grey, hard, medium grained.

**LITHOLOGIC LOGS
LANTERMAN CREEK**

HOLE NO: :.C. 85-07

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DEPTH (m)	THICKENSS (m)	DESCRIPTION
121.1	5.3	SANDSTONE: Quartz lithic, light grey, hard, medium grained.
123.4	2.3	SANDSTONE: Quartz lithic, light grey, hard, medium grained, secondary calcite in veins.
125.0	1.6	GRANULE CONGLOMERATE: Quartzose, light off white grey, hard, secondary calcite in veins.
128.0	3.0	SANDSTONE: Quartz lithic, light grey, hard, coarse grained, secondary calcite in veins.
129.5	1.5	SANDSTONE: Quartz lithic, light grey, hard, medium grained, secondary calcite in veins.
131.1	1.6	SANDSTONE: Quartz lithic, dark grey, hard, fine grained, secondary calcite in veins.
134.1	3.0	SANDSTONE: Quartzose, light off white grey, hard, coarse to very coarse grained
135.6	1.5	SANDSTONE: Quartzose, light off white grey, hard, coarse to very coarse grained intermixed with 30% lithic sandstone, grey, soft, medium to fine grained.
146.3	10.7	SANDSTONE: Quartzose, light off white grey, hard, coarse to very coarse grained
152.4	6.1	SANDSTONE: Lithic quartz, light green grey, hard, coarse to medium grained.
155.4	3.0	SANDSTONE: Quartzose, light off white grey, hard, coarse to medium grained.
157.0	1.6	SANDSTONE: Lithic quartz, light grey, hard, medium grained intermixed with 50% lithic sandstone, dark grey, soft fine grained.
160.0	3.0	SANDSTONE: Quartzose, light off white grey, hard, coarse to medium grained.
166.1	6.1	SANDSTONE: Lithic quartz, light grey, hard, coarse to medium grained.
170.7	4.6	SANDSTONE: Quartz lithic, grey, hard, medium grained.
171.5	0.8	SANDSTONE: Lithic quartz, light green grey, hard, coarse to medium grained.
171.6	0.1	COAL: Black, soft.
172.2	0.6	CARBONACEOUS SHALE: Soft.
173.4	1.2	SHALE: Brown, soft.
173.7	0.3	SANDSTONE: Lithic, dark grey, soft, fine grained.
174.5	0.8	SANDSTONE: Lithic quartz, light grey, hard, medium grained. SHALE: Sandy, dark grey, soft.
176.8	2.3	SANDSTONE: Quartz lithic, hard, medium to fine grained.

LITHOLOGIC LOGS
LANTERMAN CREEK

HOLE NO: L.C. 85-07

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DEPTH (m)	THICKNESS (m)	DESCRIPTION
178.3	1.5	SANDSTONE: Quartz lithic, grey, hard, fine grained.
179.8	1.5	SANDSTONE: Quartz lithic, dark brown grey, hard, fine to very fine grained.
182.9	3.1	SANDSTONE: Quartz lithic, light grey, hard, medium coarse grained.
185.9	3.0	SANDSTONE: Quartzose, light grey, very hard coarse to very coarse grained.
195.1	9.2	SANDSTONE: Quartzose, light grey, very hard, coarse to medium grained.
199.6	4.5	SANDSTONE: Quartzose, light grey, hard, coarse to very coarse grained.
201.2	1.6	SANDSTONE: Quartzose, light grey, hard, coarse to medium grained.
205.7	4.5	SANDSTONE: Quartzose, light grey, hard, coarse to very coarse grained.
221.0	15.3	SANDSTONE: Quartzose, pebbly, light grey, hard, coarse to very coarse grained.
225.5	1.5	SANDSTONE: Lithic quartz, light brown grey, hard, coarse to medium grained.
237.7	15.2	SANDSTONE: Lithic quartz, pebbly, light grey, hard, coarse to very coarse grained.
243.8	6.1	CONGLOMERITIC:

**LITHOLOGIC LOGS
LANTERMAN CREEK**

HOLE NO : L.C. 85-08
 DATE COMMENCED: 85/05/12
 DATE COMPLETED: 85/05/13
 TOTAL DEPTH : 86.9M
 LOGGED BY : Y. ENDOH

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DEPTH (m)	THICKNESS (m)	DESCRIPTION
6.1	6.1	GRAVEL
7.6	1.5	SANDSTONE:
13.7	6.1	SANDSTONE: Lithic, light green grey, hard, medium grained.
15.2	1.5	SANDSTONE: Lithic, light green grey, hard, medium grained secondary calcite in veins, intermixed with 20% lithic sandstone, light yellow grey, hard medium grained.
21.3	6.1	SANDSTONE: Lithic, light green grey, hard, medium grained.
24.4	3.1	SANDSTONE: Lithic, grey, hard, medium grained.
25.9	1.5	SANDSTONE: Lithic, light grey, hard, medium grained.
26.7	0.8	SANDSTONE: Lithic, grey, very hard, medium grained.
27.4	0.7	SANDSTONE: Quartz lithic, light grey, very hard, coarse grained.
32.0	4.6	SANDSTONE: Quartzose, light off white grey, hard, coarse to very coarse grained
33.5	1.5	GRANULE CONGLOMERATE: Off white grey, soft.
35.1	1.6	SANDSTONE: Quartz lithic, pebbly, light off white grey, hard, coarse to medium grained.
36.6	1.5	SANDSTONE: Lithic quartz, light off white grey, hard, medium grained.
38.1	1.5	SANDSTONE: Quartz lithic, light grey, hard, medium grained.
39.6	1.5	CONGLOMERATE: Pebbly.
48.8	9.2	SANDSTONE: Quartzose, granular, light off white grey, hard, coarse to very coarse grained.
50.3	1.5	SANDSTONE: Lithic quartz, light green off white, hard coarse to very coarse grained.
53.3	3.0	SANDSTONE: Quartz lithic, light brown grey, hard, coarse to medium grained.
54.9	1.6	SANDSTONE: Quartz lithic, pebbly, light grey, hard, coarse to very coarse grained.
57.9	3.0	SANDSTONE: Lithic quartz, light grey, hard, very coarse grained.
59.4	1.5	SANDSTONE: Lithic quartz, light brown grey, hard, coarse to medium grained.
62.5	3.1	SANDSTONE: Lithic quartz, light green grey, hard, coarse grained.

LITHOLOGIC LOGS
LANTERMAN CREEK

HOLE NO: L.C. 85-08

Page 2 of 2

DEPTH (m)	THICKNESS (m)	DESCRIPTION
67.1	4.6	SANDSTONE: Lithic quartz, light grey, hard, coarse to medium grained.
71.6	4.5	SANDSTONE: Quartz lithic, dark grey, hard, medium grained.
73.2	1.6	SANDSTONE: Quartz lithic, light grey, hard, medium grained.
74.7	1.5	SANDSTONE: Quartz lithic, light grey, hard fine grained, intermixed with 50% lithic sandstone, dark grey, hard, very fine grained.
77.7	3.0	SANDSTONE: Quartz lithic, light grey, hard, medium grained, secondary calcite in veins.
79.6	1.9	CARBONACEOUS SHALE: Brown, soft, intermixed with 30% <u>COAL</u> UNDIFFERENTIATED, black, soft, accessory pyrite in cleats.
85.3	5.7	CONGLOMERATES: Hard.
86.9	1.6	VOLCANICS: Green, hard.

**LITHOLOGIC LOGS
LANTERMAN CREEK**

HOLE NO : L.C. 85-09
 DATE COMMENCED: 85/05/14
 DATE COMPLETED: 85/05/04
 TOTAL DEPTH : 78.0M
 LOGGED BY : Y. ENDOH

Page 1 of 2

DEPTH (m)	THICKNESS (m)	DESCRIPTION
2.4	2.4	GRAVEL
4.6	2.2	SANDSTONE:
12.2	7.6	SANDSTONE: Quartz lithic, light grey, hard, coarse to medium grained.
16.8	4.6	SANDSTONE: Lithic, grey, hard, medium grained.
18.3	1.5	SANDSTONE: Lithic quartz, light grey, hard, coarse to medium grained.
19.8	1.5	SANDSTONE: Quartz lithic, light brown grey, hard, medium grained.
21.3	1.5	SANDSTONE: Quartz lithic, light grey, hard, coarse to medium grained.
24.4	3.1	SANDSTONE: Lithic quartz, light grey, hard, coarse to medium grained.
26.9	1.5	SANDSTONE: Lithic quartz, light grey, hard, medium grained.
27.4	1.5	SANDSTONE: Lithic, grey, hard, medium grained.
32.8	5.4	SANDSTONE: Lithic, light grey, hard, medium grained.
33.5	0.7	SHALE: Black, soft.
35.1	1.6	SANDSTONE: Lithic quartz, light grey, hard, coarse to medium grained.
35.8	0.7	SANDSTONE: Quartzose, light grey, hard, medium grained.
39.6	3.8	SHALE: Black, soft.
42.7	3.1	SANDSTONE: Lithic, dark grey, hard, medium grained.
44.2	1.5	SANDSTONE: Lithic quartz, light grey, hard, medium grained.
47.2	3.0	SHALE: Black, soft, secondary calcite in veins.
48.8	1.6	SANDSTONE: Lithic quartz, light grey, hard, coarse to medium grained, intermixed with 50% lithic sandstone, dark grey, hard, very fine grained.
50.3	1.5	SANDSTONE: Quartz lithic, light grey, hard, medium grained.
51.8	1.5	SANDSTONE: Quartz lithic, light grey, hard, medium grained, intermixed with 30% lithic sandstone dark grey, hard, fine to very fine grained.
54.9	3.1	SANDSTONE: Quartz lithic, granular, light grey, hard, very coarse.
56.4	1.5	SANDSTONE: Quartz lithic, pebbly, light grey, hard, very coarse grained.
57.9	1.5	SANDSTONE: Quartz, lithic, granular, light grey, hard, very coarse grained.
58.7	0.8	SANDSTONE: Quartz lithic, light grey, hard, coarse to very coarse.
59.4	0.7	SHALE: Black, soft.

LITHOLOGIC LOGS
LANTERMAN CREEK

HOLE NO : L.C. 85-09

Page 2 of 2

DEPTH (m)	THICKNESS (m)	DESCRIPTION
54.9	0.7	SHALE: Black, soft.
62.5	3.1	SANDSTONE: Quartz lithic, light grey, hard, coarse to medium grained.
63.2	0.7	SANDSTONE: Quartz lithic, granular, light grey, hard, coarse to very coarse.
63.4	0.2	SANDSTONE: Lithic, dark grey, hard, fine to very fine grained.
65.5	2.1	CONGLOMERATE: Hard.
67.1	1.6	SANDSTONE: Lithic quartz, light grey, hard, very coarse grained.
68.6	1.5	SHALE: Black, soft.
70.7	2.1	CONGLOMERATE: Very hard.
78.0	7.3	VOLCANICS: Green, very hard.

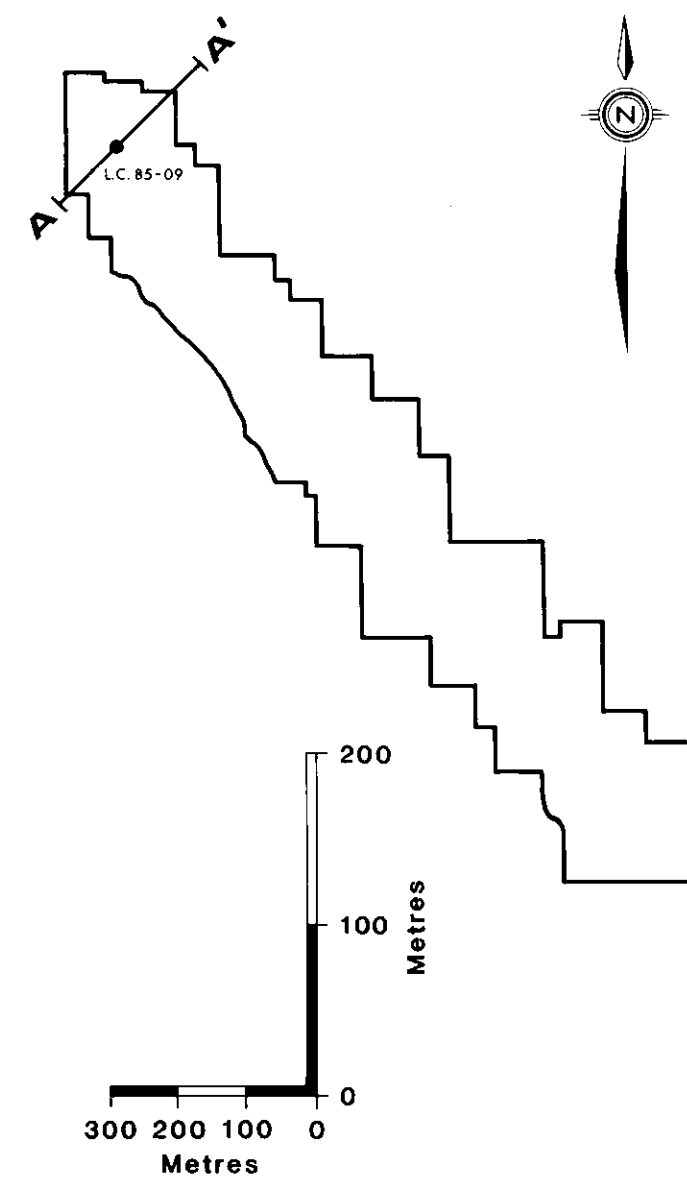
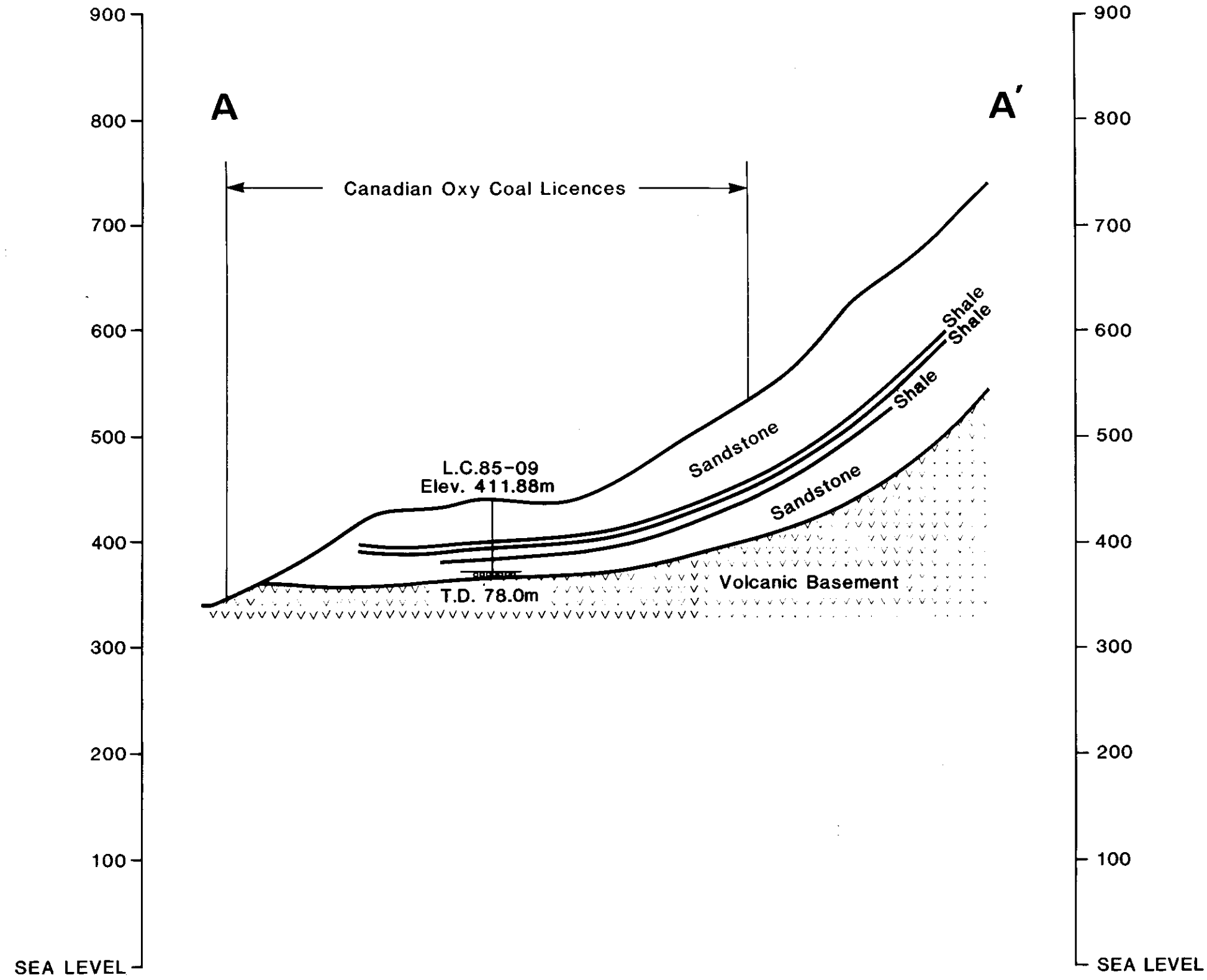
LITHOLOGIC LOGS
LANTERMAN CREEK

HOLE NO : L.C. 85-10
DATE COMMENCED: 85/050/15
DATE COMPLETED: 85/05/16
TOTAL DEPTH :
LOGGED BY : D. SLADE, DRILLWELL ENTERPRISES

Page 1 of 1

DEPTH (m)	THICKNESS (m)	DESCRIPTIONS
26.2	26.2	Tight grey till with volcanic boulders.

HOLE ABANDONED IN TILL



Canadian Occidental Petroleum Ltd.

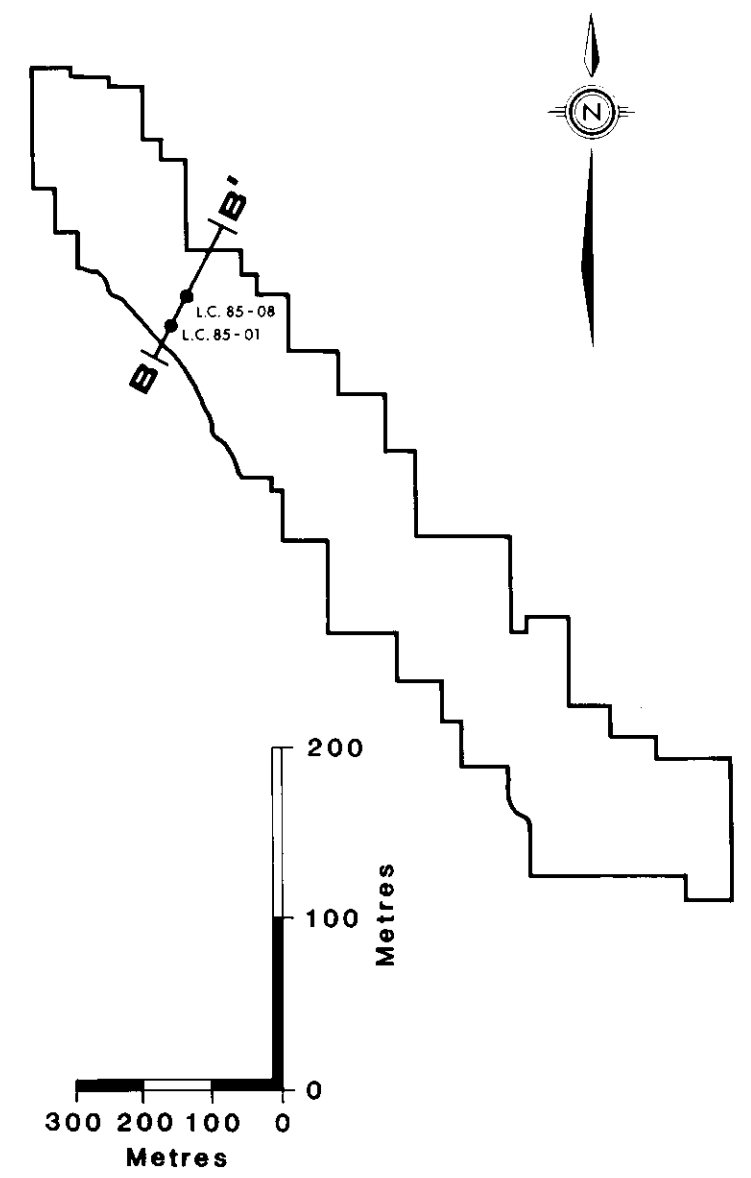
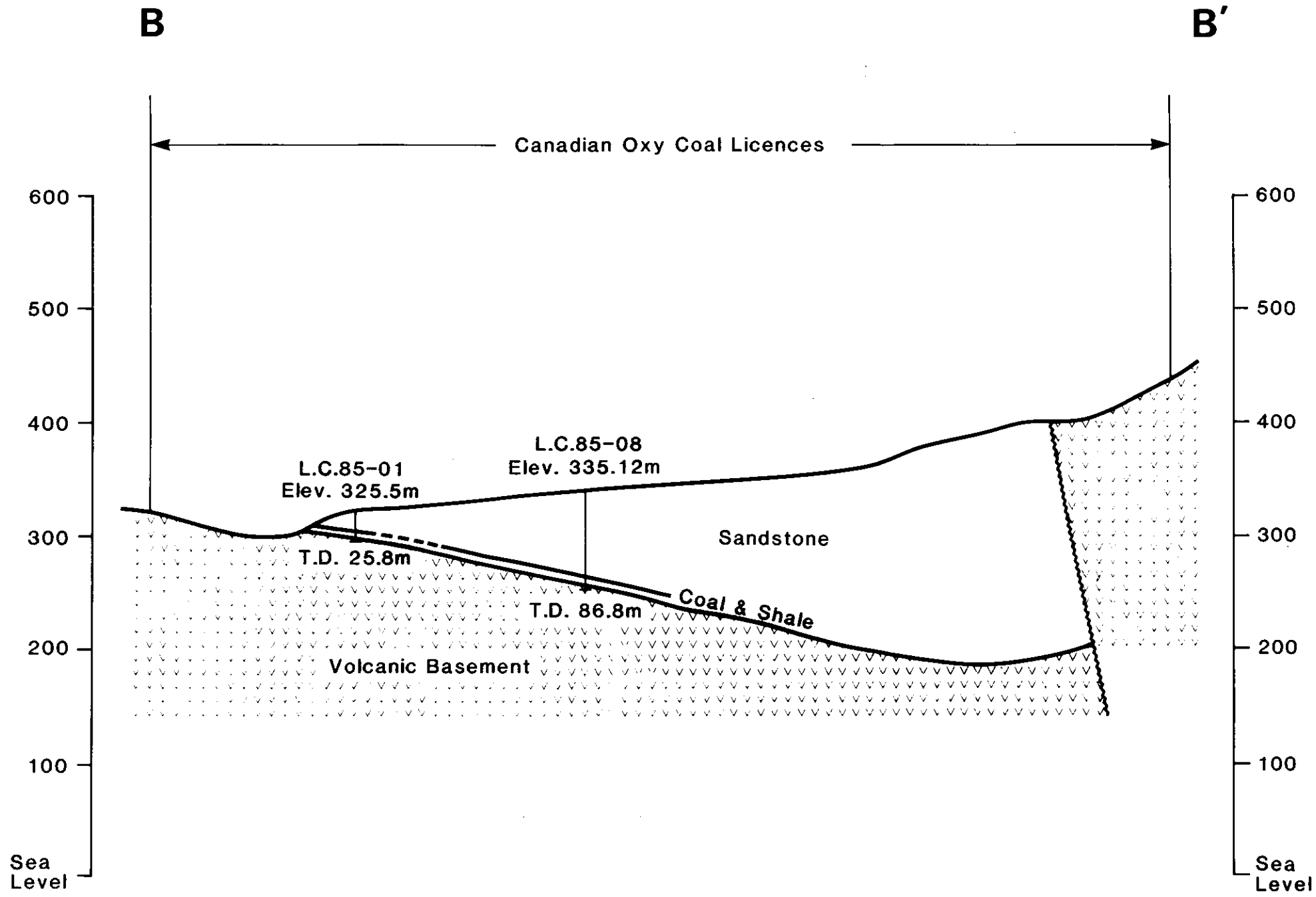
Coal Exploration


Lanternman Creek Property

GEOLOGIC CROSS-SECTION

A-A'

Date: JULY 85	N.T.S.	Compiled By R. SWAREN
		Drawn By M.P.
Drawn By	File:	Revised Date



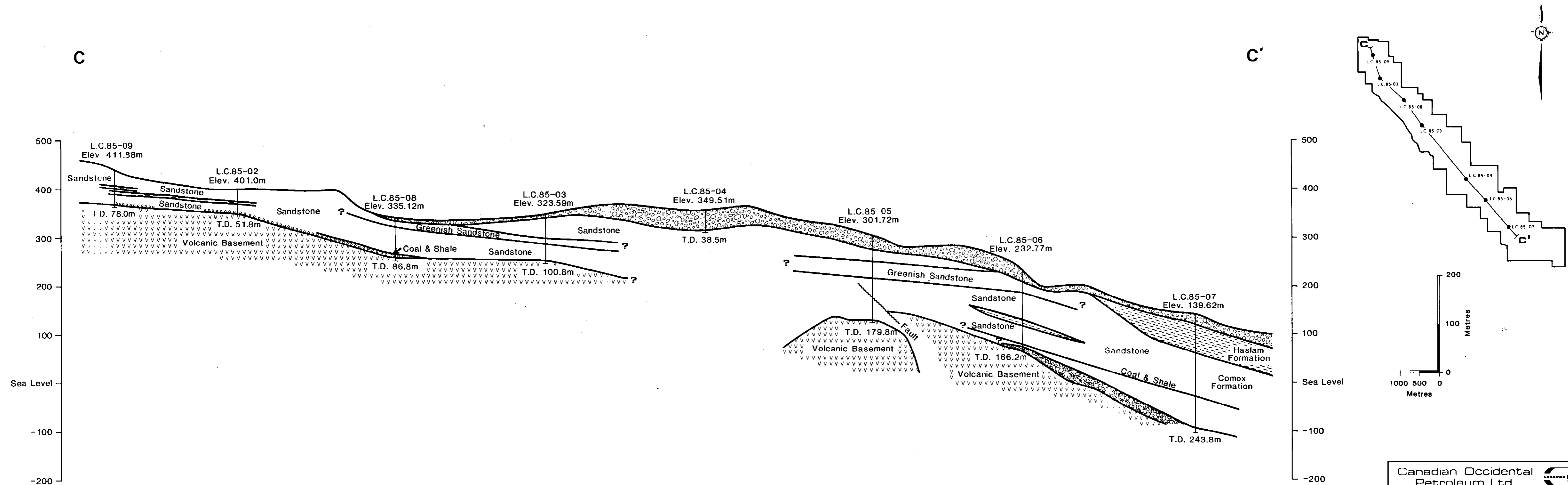
Canadian Occidental Petroleum Ltd. 


Coal Exploration

Lanterman Creek Property

GEOLOGIC CROSS-SECTION B-B'

Date	JULY 85	NTS	Compiled By	R. SWAREN
			Drawn By	M.P.
Drawing		File	Revised Date	



Canadian Occidental Petroleum Ltd.  Coal Exploration

Lanterman Creek Property

GEOLOGIC CROSS-SECTION

C-C'

Date	JULY 85	NTS	Compiled By	Y. ENDOH
Drawing		File	Drawn By	M.P.
			Revised Date	

APPENDIX VI

85-05
Ox Lanherman Ck 85(3)A *10



DAVIES EXPLORATION LOGGING LTD.

COMPANY: CARIBBEAN OCCIDENTAL PETROLEUM
HOLE NUMBER: L.C. - 85 - 05

LOCATION: Lanherman Creek
PROVINCE: B.C.

ELEVATION:

LOG TYPE: CALPER, NATURAL GAMMA, RESISTIVITY, DENSITY

DATE: MAY 2 1985

DRILLED DEPTH: 179.8

LOGGED DEPTH: 179

ZERO DATUM: G.L.

HOLE DIAMETER: 6"

CASING LENGTH: 26.7ft

REMARKS: Note: No Resistivity due to salt water

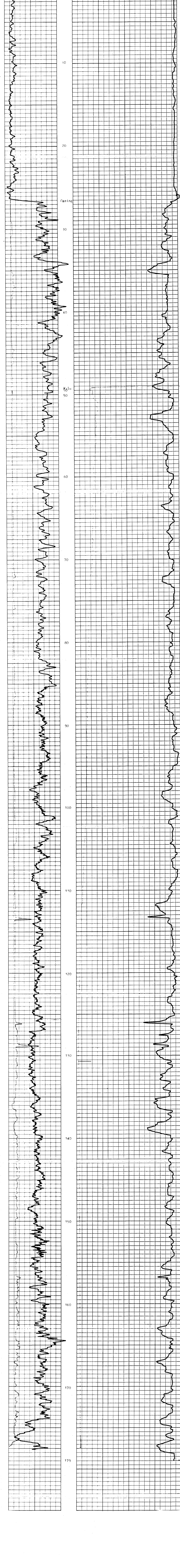
60 (2)

CALPER 10 API

NATURAL GAMMA

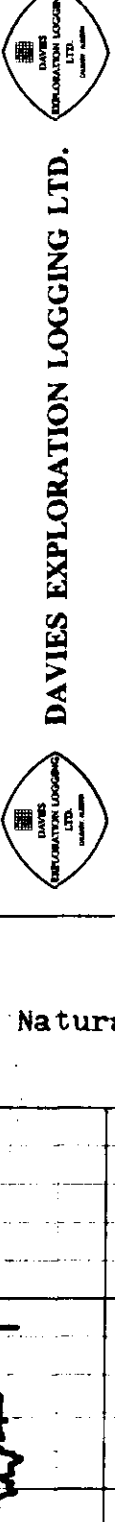
RESISTIVITY 20

DENSITY



8505

Cl. Lamberman Ok 85(3)A *11



DAVIES EXPLORATION LOGGING LTD.

COMPANY Canadian Occidental Petroleum

HOLE NUMBER L.C. - 45 - 05

LOCATION Lamberman Creek

PROVINCE B.C.

ELEVATION

LOG TYPE Natural Gamma & Neutron

DATE May 2 1955

DRILLED DEPTH 179.8

LOGGED DEPTH 174.5

ZERO DATUM C.L.

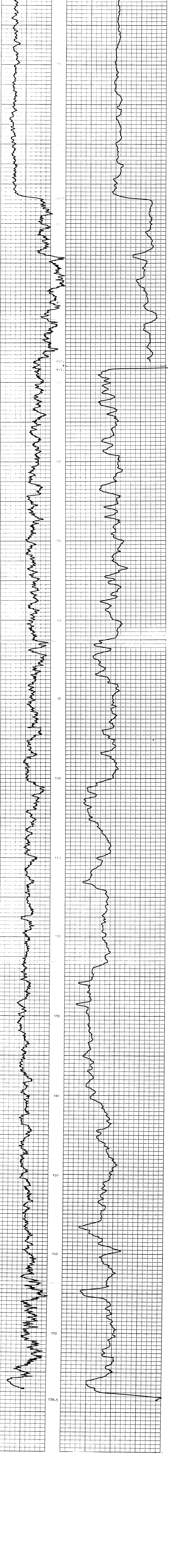
HOLE DIAMETER 6"

LOGGING LENGTH 26.7

REMARKS

60
L2

0 Natural Gamma 100API 0 Neutron 1K



85-01

Cx. Lanterman (K 85(3)A * (1))



DAVIES EXPLORATION LOGGING LTD.



COMPANY Canadian Occidental Petroleum

HOLE NUMBER L.C.-85-01

LOCATION Lanterman Creek

PROVINCE B.C.

ELEVATION

LOG TYPE: CALIPER, NATURAL GAMMA, RESISTIVITY, DENSITY

DATE April 25 1985

DRILLED DEPTH 25.8

LOGGED DEPTH 25.5

ZERO DATUM G.L.

HOLE DIAMETER 6"

CASING LENGTH 3.5m

REMARKS:

60(2)
L3

CALIPER

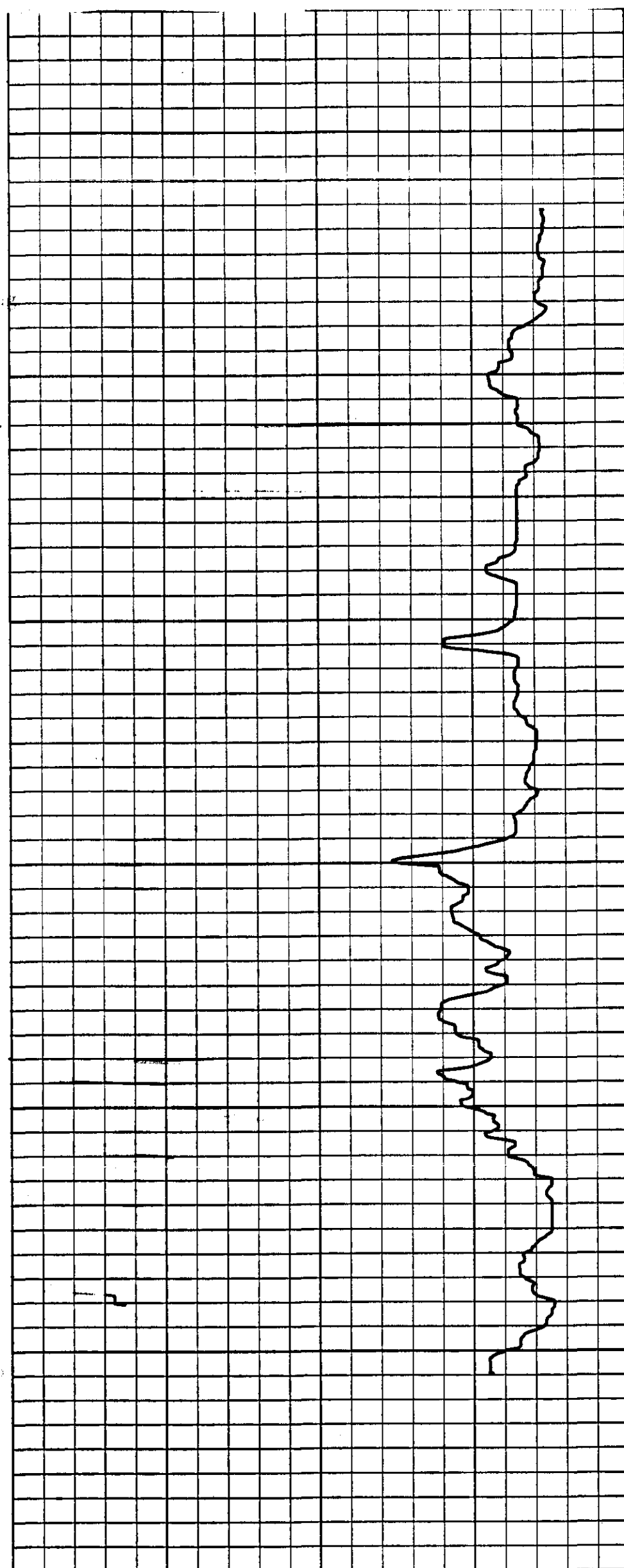
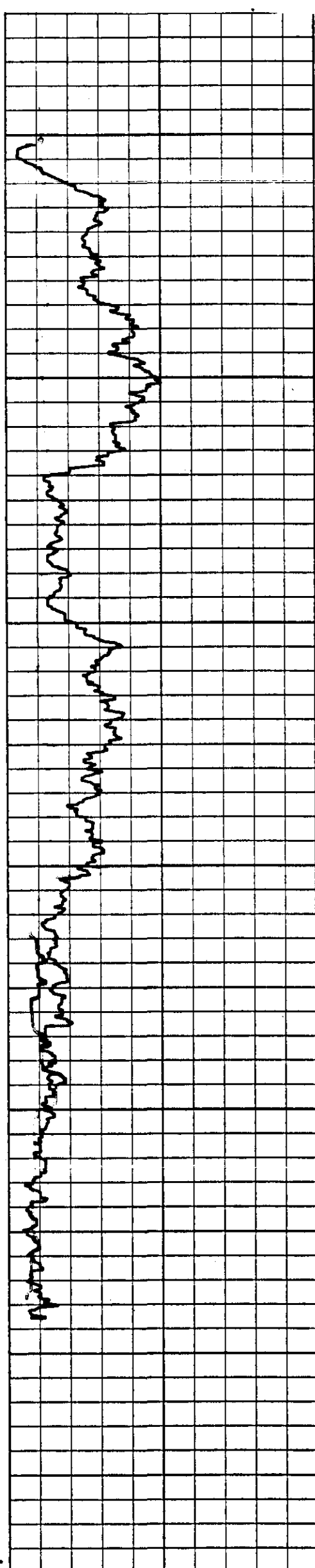
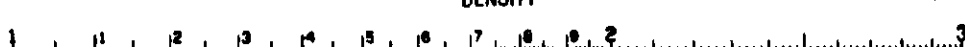
NATURAL GAMMA

RESISTIVITY

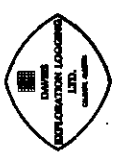
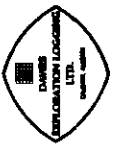
20

DENSITY

3

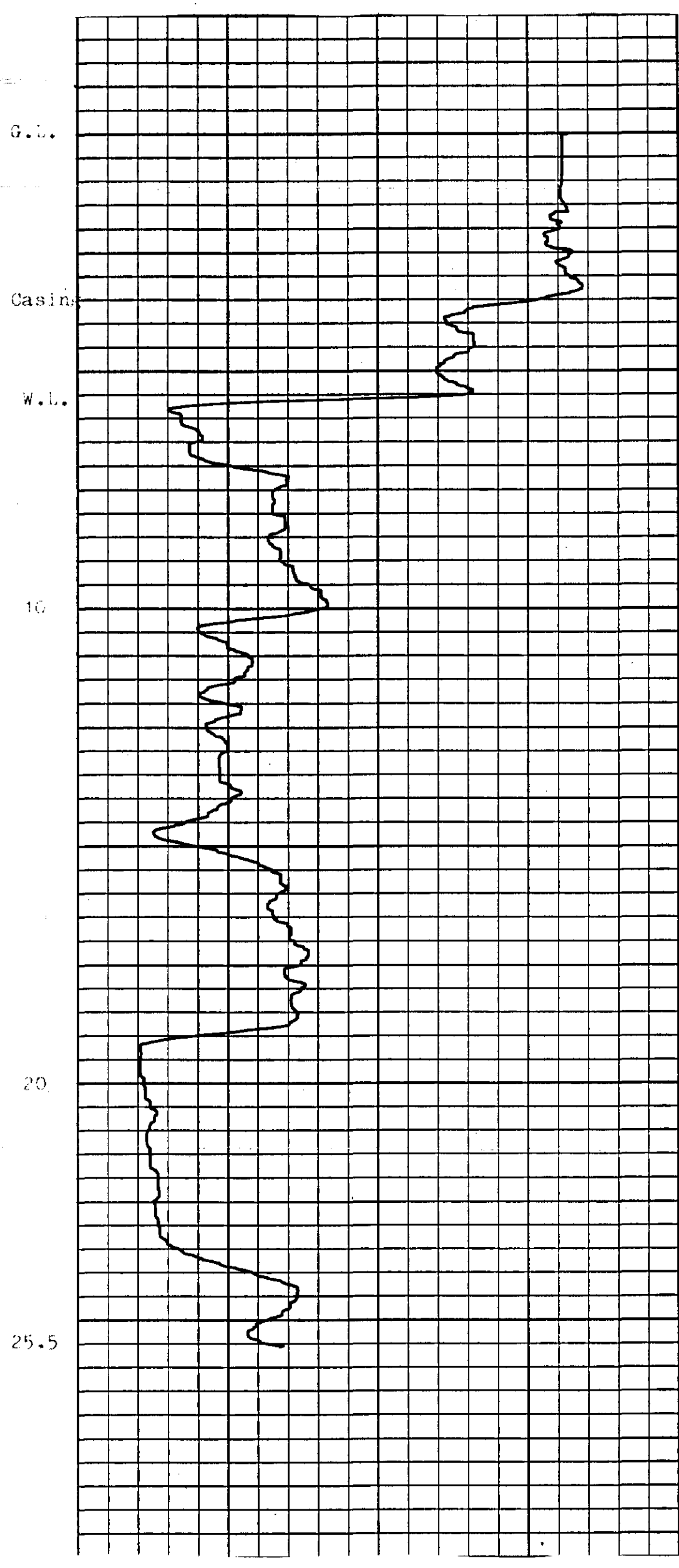
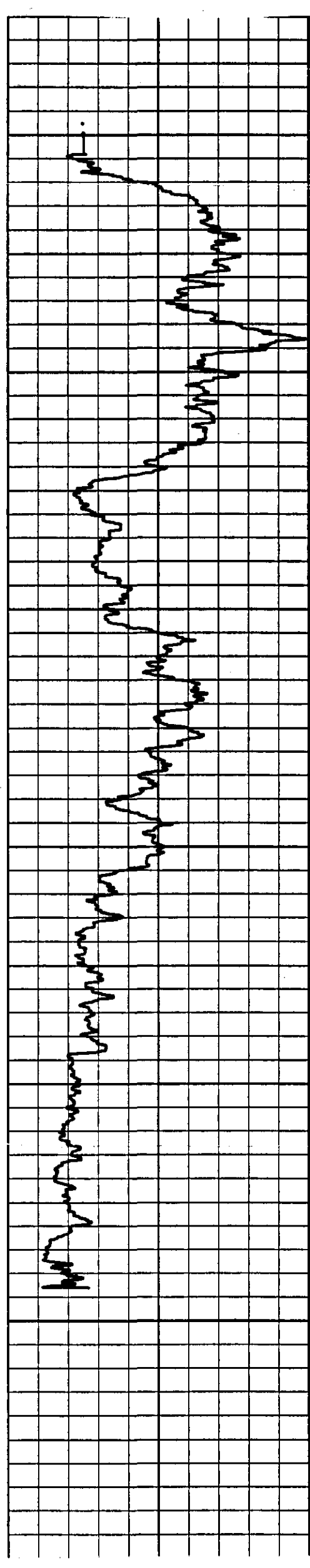


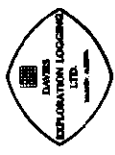
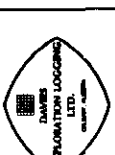
85-02
 CX-Lanterman CK 85(3)A*(1)

 DAVIES EXPLORATION LOGGING LTD. 	
COMPANY	Canadian Occidental Petroleum
HOLE NUMBER	L.C.-85-01
LOCATION	Lanterman Creek
PROVINCE	B.C.
ELEVATION	
LOG TYPE:	Natural Gamma & Neutron
DATE	April 25 1985
DRILLED DEPTH	25.8
LOGGED DEPTH	25.5
ZERO DATUM	G.L.
HOLE DIAMETER	6"
CASING LENGTH	3.5m
REMARKS:	

60⁽²⁾
 LH

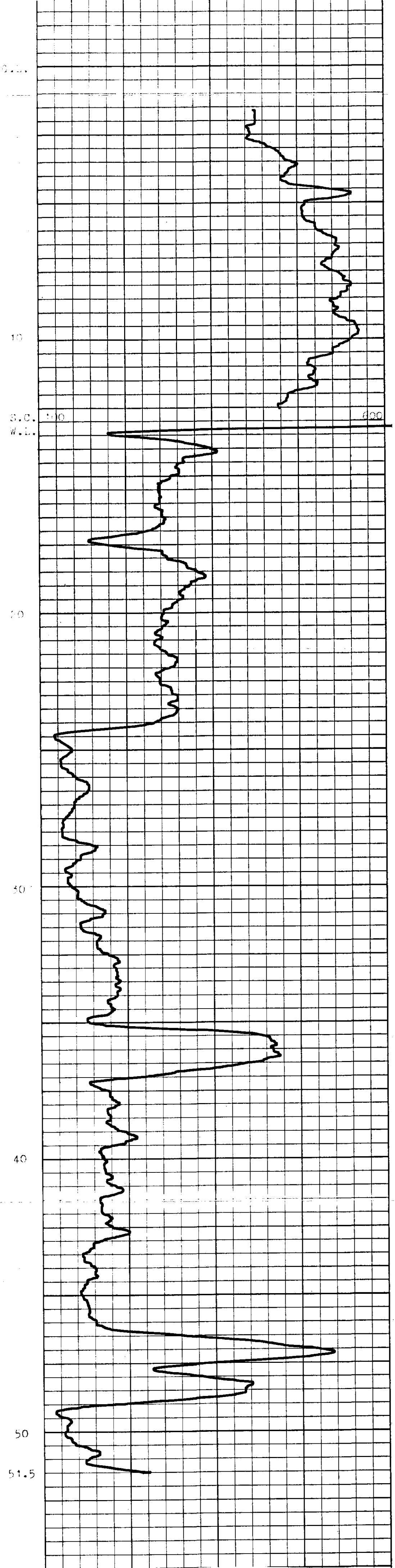
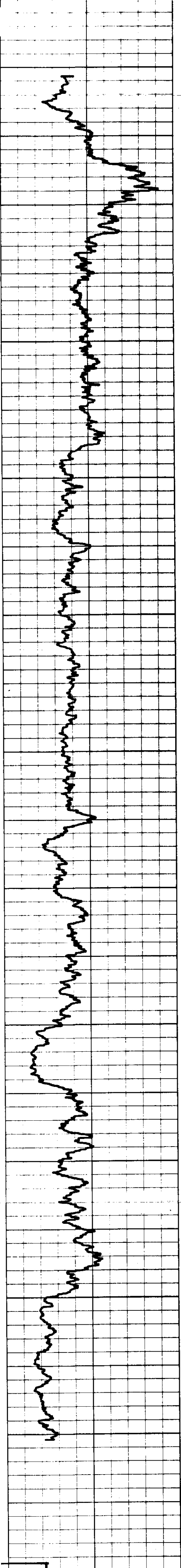
0 Natural Gamma 30 0 Neutron 1K



 DAVIES EXPLORATION LOGGING LTD. 	
COMPANY	Canadian Occidental Petroleum
HOLE NUMBER	D.C.-85-02
LOCATION	Lanterman
PROVINCE	B.C.
ELEVATION	
LOG TYPE:	Natural Gamma & Neutron
DATE	April 26 1985
DRILLED DEPTH	51.8
LOGGED DEPTH	51.5
ZERO DATUM	G.L.
HOLE DIAMETER	6"
CASING LENGTH	3.5m
REMARKS:	

(2)
LS

0 Natural Gamma 30 0 Neutron 1K



85-02

Cy. Lanterman (K 85(3)A*) (1)



COMPANY

HOLE NUMBER

LOCATION

PROVINCE

ELEVATION

LOG TYPE: CALIPER, NATURAL GAMMA, RESISTIVITY, DENSITY

DATE

DRILLED DEPTH

LOGGED DEPTH

ZERO DATUM

HOLE DIAMETER

CASING LENGTH

REMARKS:

LC 85 02

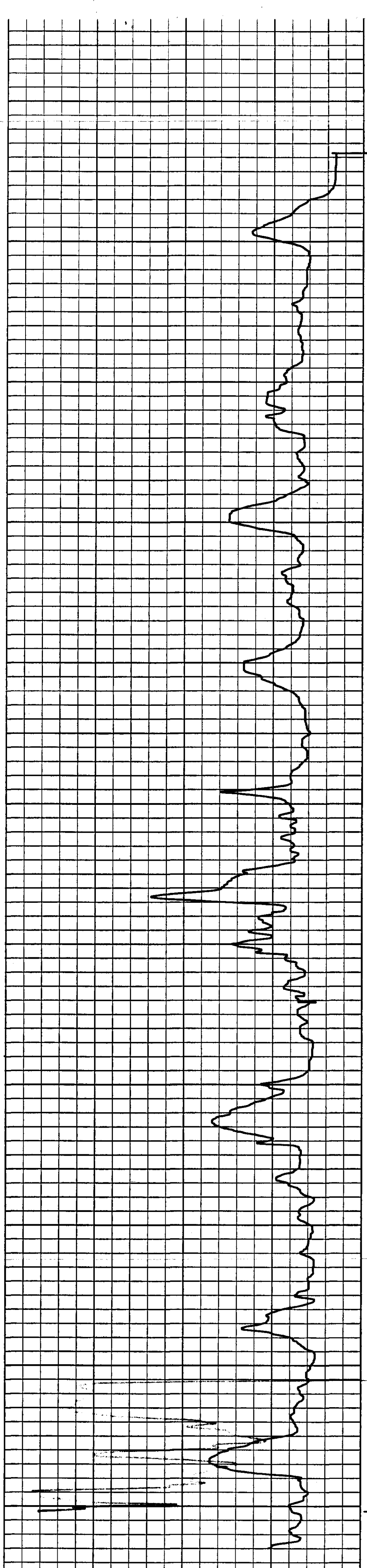
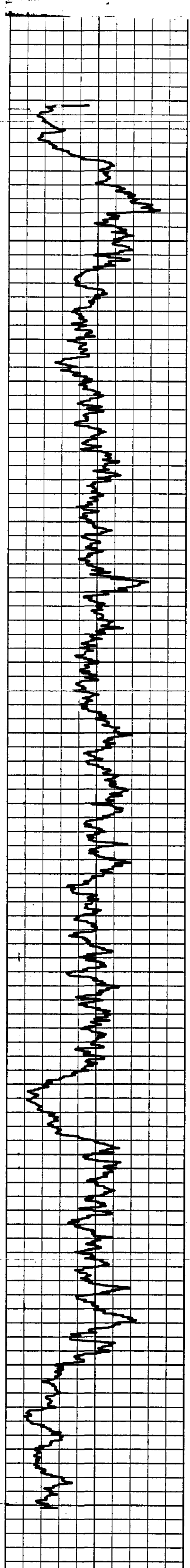
60 (2)
L6

CALIPER

NATURAL GAMMA

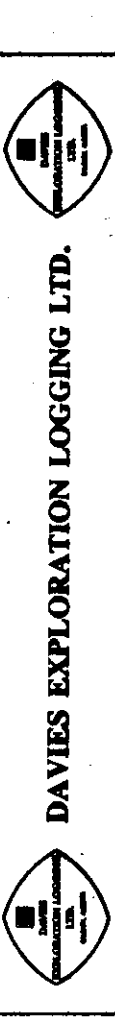
RESISTIVITY

DENSITY



85-03

CX-Interman Ck 85(3)A*(1)



DAVIES EXPLORATION LOGGING LTD.

COMPANY Canadian Occidental Petroleum

HOLE NUMBER I.C.-85-03

LOCATION Interman Creek

PROVINCE B.C.

ELEVATION

LOG TYPE CALPER, NATURAL GAMMA, RESISTIVITY, DENSITY

DATE April 27 1985

DRILLED DEPTH 100.8

LOGGED DEPTH 100

ZERO DATUM G.L.

HOLE DIAMETER 6"

CASING LENGTH 5.6

REMARKS

60
L7
(2)

CALPER

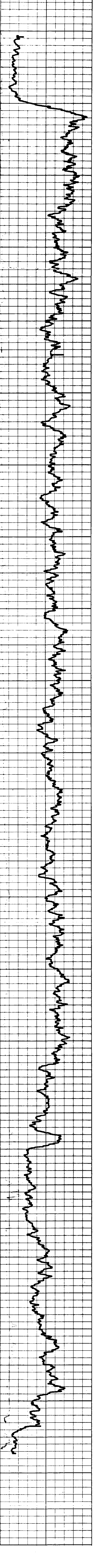
NATURAL GAMMA

RESISTIVITY 20

DENSITY

3

3



G.L.

Casing

10

W.L.

20

30

40

50

60

70

80

90

100

85-03

Cx. Lanterman Ck 85(3)A7(2)

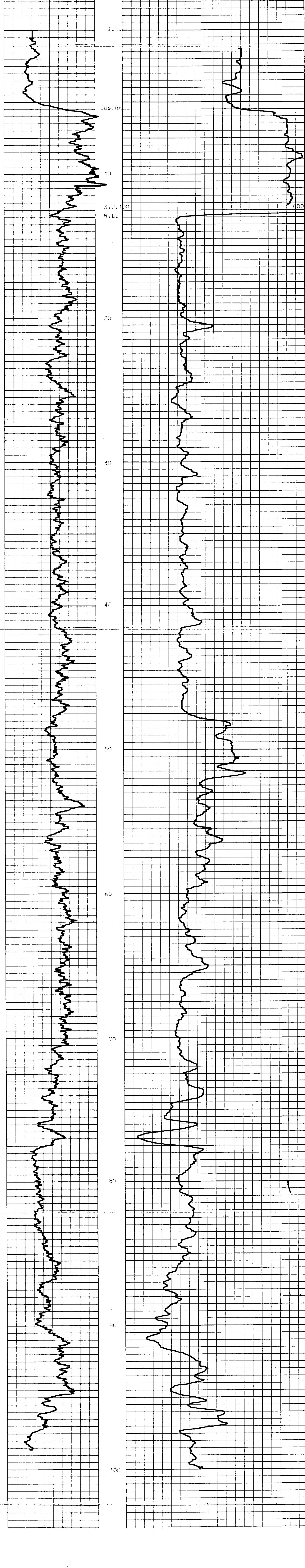


COMPANY Canadian Occidental Petroleum
 HOLE NUMBER L.C.-85-03
 LOCATION Lanterman Creek
 PROVINCE B.C.
 ELEVATION

LOG TYPE: Natural Gamma & Neutron
 DATE April 27 1985
 DRILLED DEPTH 100.8
 LOGGED DEPTH 100
 ZERO DATUM G.L.
 HOLE DIAMETER 6"
 CASING LENGTH 5.6
 REMARKS:

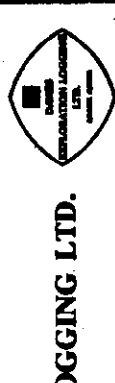
60 (2)
L₉

0 Natural Gamma 30 0 Neutron 1K



85-06

CL-LOGS/LOGS/CL-85(2)270



DAVIES EXPLORATION LOGGING LTD.

COMPANY Canadian Occidental Petroleum
HOLE NUMBER I.C. - 85 - 06

LOCATION Lantzembai Creek
PROVINCE B.C.

ELEVATION

LOG TYPE: CALIPER, NATURAL GAMMA, RESISTIVITY, DENSITY

DATE May 5 1985

DRILLED DEPTH 166.2

LOGGED DEPTH 166

ZERO DATUM G.I.

HOLE DIAMETER 6"

CASING LENGTH 23.5

REMARKS

60
1.9

CALIPER NATURAL GAMMA

RESISTIVITY 5

DENSITY

10 API

G.I.

10

20

Casing

30

40

50

60

70

80

90

100

110

120

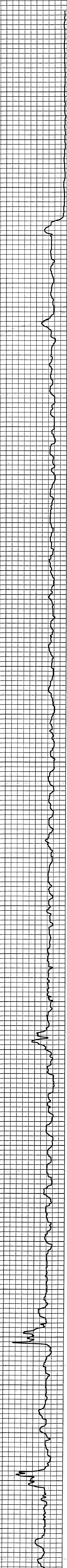
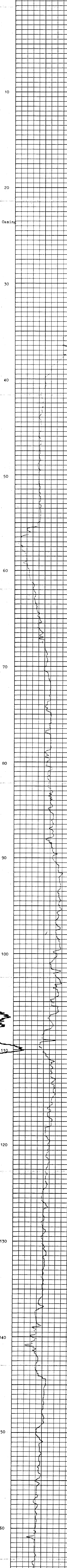
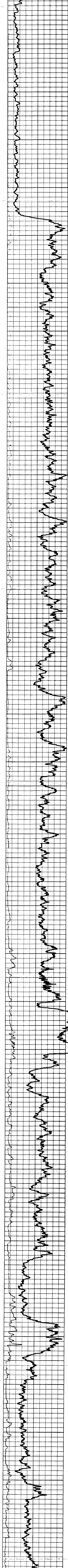
130

140

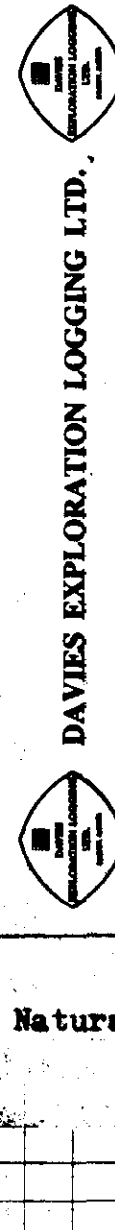
150

160

166



85-06
OK-Lanternman CK 85(3)



DAVIES EXPLORATION LOGGING LTD.

COMPANY Canadian Occidental Petroleum

WELL NUMBER L.C. - 85 - 06

LOCATION Lanternman Creek

PROVINCE R.C.

ELEVATION

LOG TYPE Natural Gamma & Neutron

DATE May 5 1985

DRILLED DEPTH 166.2

LOGGED DEPTH 166

ZERO DATUM G.L.

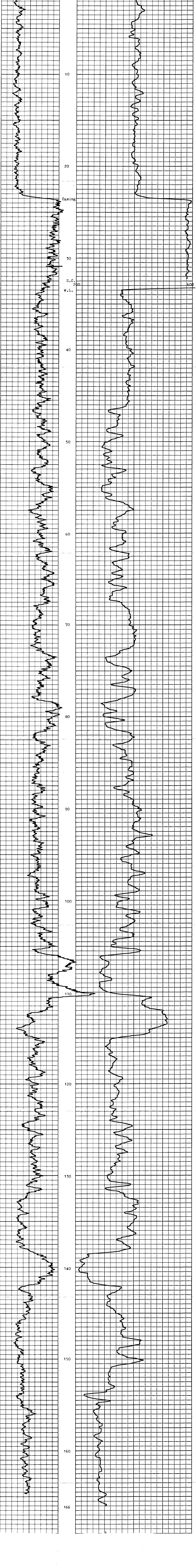
WELL DIAMETER 6"

CASING LENGTH 23.5

REMARKS

60
LID

0 Natural Gamma 100API 0 Neutron 1K



8507

CK-10710000 (K 10319 702)



DAVIES EXPLORATION LOGGING LTD.



COMPANY Canadian Occidental Petroleum

WELL NUMBER I.C. - 85 - 07

LOCATION Lanierman Creek

PROMISE B.C.

ELEVATION

LOG TYPE Natural Gamma & Neutron

DATE May 12 1985

DRILLER DEPTH 243.8

LOGGED DEPTH 243.5

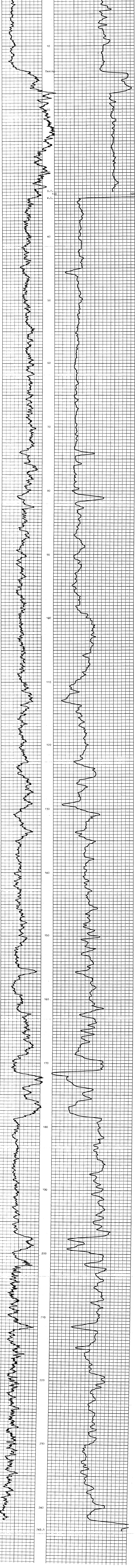
RECORD DEPTH G.L.

WELL DIAMETER 6"

CASING DEPTH 14.3

REMARKS

60 (2)
L 11



85-07

OK - Lamination Ct 85 (84-85)



DAVIES EXPLORATION LOGGING LTD.

COMPANY Canadian Occidental Petroleum

WELL NUMBER L.C. - 85 - 07

LOCATION Janterman Creek

PROVINC B.C.

ELEVATION

LOG TYPE CALPER NATURAL GAMMA RESISTIVITY DENSITY

DATE May 12 1985

DRILLED DEPTH 243.8

LOGGED DEPTH 243.5

ZERO DATUM 8' L.

HOSE DIAMETER 6"

CASING LENGTH 14.5

REMARKS

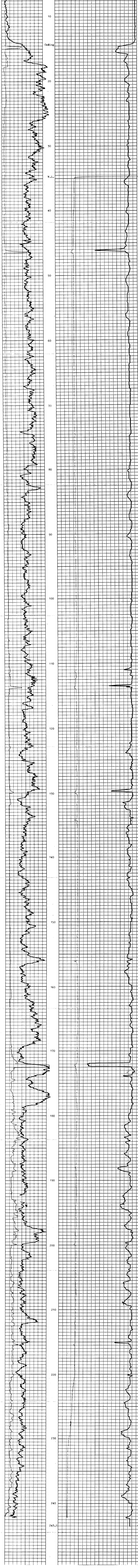
60
L12

CALPER

NATURAL GAMMA

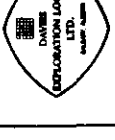
RESISTIVITY

DENSITY

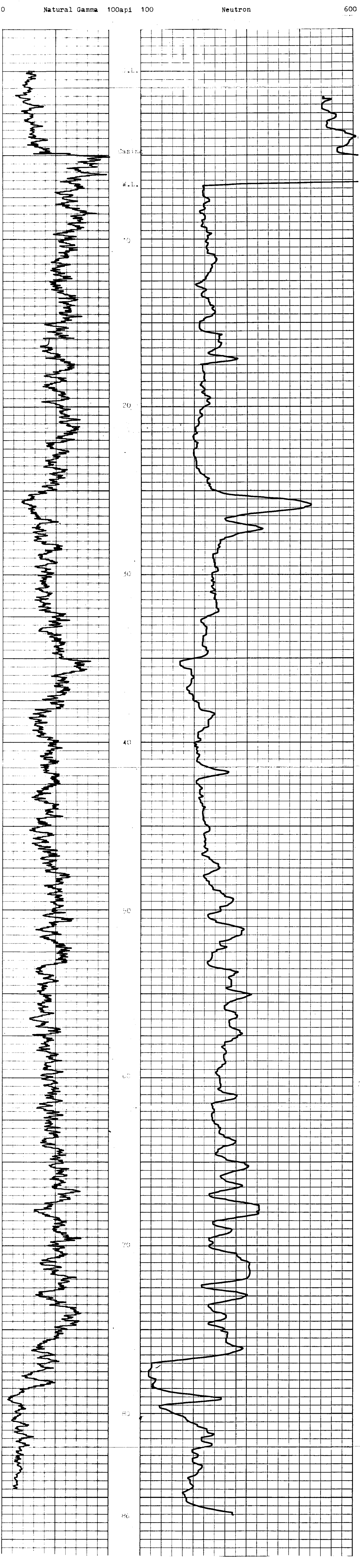


85-08

Ck. Lanterman Ck 85(3)A #1

 DAVIES EXPLORATION LOGGING LTD.	
COMPANY	Canadiag Occidental Petroleum
HOLE NUMBER	L.L. - 85 - 08
LOCATION	Lanterman Creek
PROVINCE	B.C.
ELEVATION	
LOG TYPE	Natural Gamma & Neutron
DATE	May 15 1985
DRILLED DEPTH	86.8
LOGGED DEPTH	86
ZERO DATUM	C.L.
HOLE DIAMETER	6"
CASING LENGTH	4.8
REMARKS:	

60
L13



0

Natural Gamma 100api 100

Neutron 600

600

85-08

Cl-Lanterman-Ck 85(3)A *11)



COMPANY Canadian Occidental Petroleum
 HOLE NUMBER L.C. - 85 - 08

LOCATION Lanterman Creek
 PROVINCE B.C.

ELEVATION

LOG TYPE: CALIPER, NATURAL GAMMA, RESISTIVITY, DENSITY

DATE May 13 1985

DRILLED DEPTH 86.8

LOGGED DEPTH 86

ZERO DATUM G.I.

HOLE DIAMETER 6"

CASING LENGTH 4.8

REMARKS

60
L14
(2)

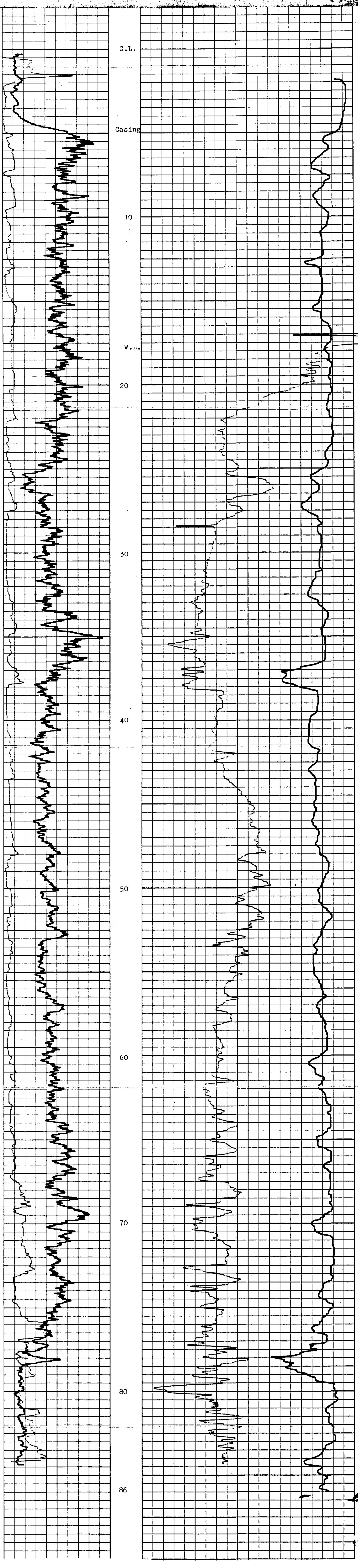
CALIPER

NATURAL GAMMA

RESISTIVITY 10


DENSITY

10 API

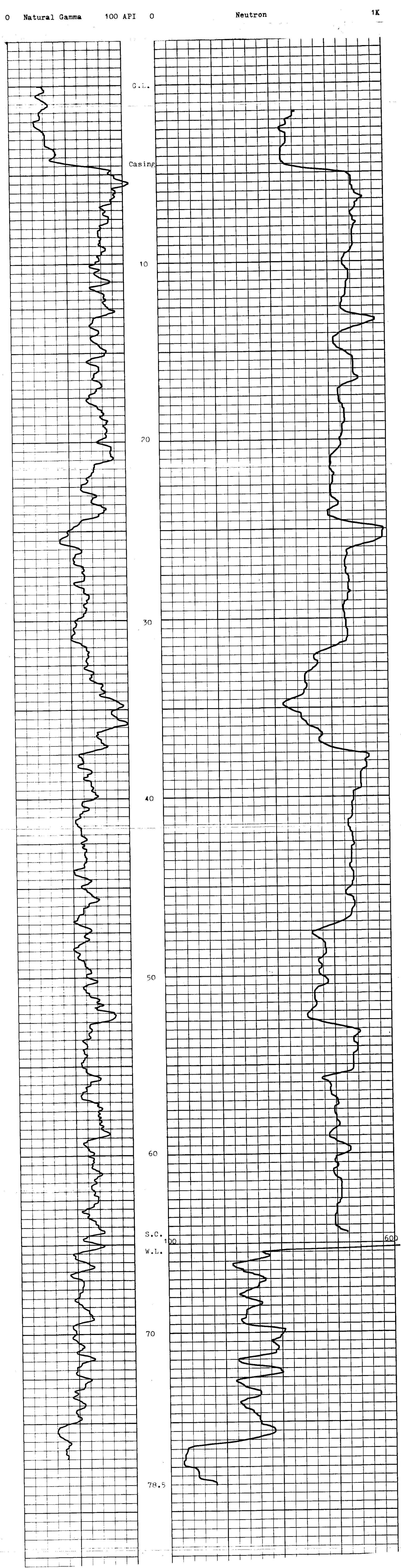


85-08

CX-Lanternman Ck 85(3)A (1)

 DAVIES EXPLORATION LOGGING LTD.	
COMPANY	Canadian Occidental Petroleum
HOLE NUMBER	I.C. - 85 - 08 Core Hole
LOCATION	Lanternman Creek
PROVINCE	B.C.
ELEVATION	
LOG TYPE:	Natural Gamma & Neutron
DATE	May 15 1985
DRILLED DEPTH	78.8
LOGGED DEPTH	78.5
ZERO DATUM	G.L.
HOLE DIAMETER	6"
CASING LENGTH	4.5
REMARKS:	

60
L15




0 Natural Gamma

100 API

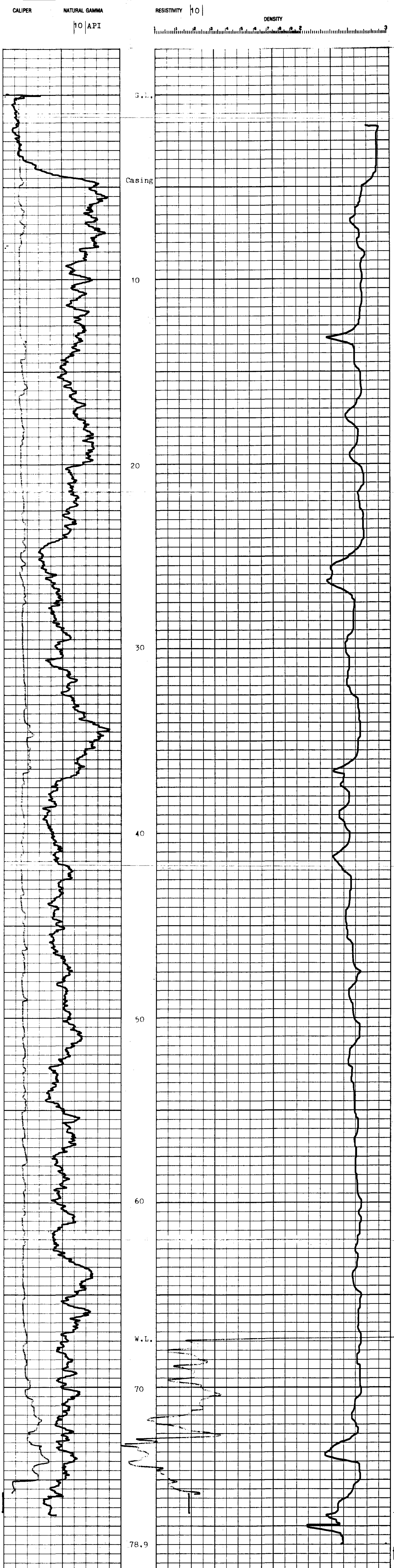
0 Neutron

1K

05-08
 CX-Lanternman Ck 85(3)A *11

 DAVIES EXPLORATION LOGGING LTD.	
COMPANY	Canadian Occidental Petroleum
HOLE NUMBER	L.C. - 85 - 08 Core Hole
LOCATION	Lanternman Creek
PROVINCE	B.C.
ELEVATION	
LOG TYPE	CALIPER, NATURAL GAMMA, RESISTIVITY, DENSITY
DATE	May 15 1985
DRILLED DEPTH	78.8
LOGGED DEPTH	78.5
ZERO DATUM	G.I.
HOLE DIAMETER	6"
CASING LENGTH	4.5
REMARKS	

60⁽²⁾
 L16



85-09

CX-Lanterman Ck 85(3)A *11)



DAVIES EXPLORATION LOGGING LTD.



COMPANY Canadian Occidental Petroleum

HOLE NUMBER L.C. - 85 - 09

LOCATION Lanterman Creek

PROVINCE B.C.

ELEVATION

LOG TYPE: CALIPER, NATURAL GAMMA, RESISTIVITY, DENSITY

DATE May 15 1985

DRILLED DEPTH 78

LOGGED DEPTH 77.5

ZERO DATUM G.L.

HOLE DIAMETER 6"

CASING LENGTH 1.7

REMARKS:

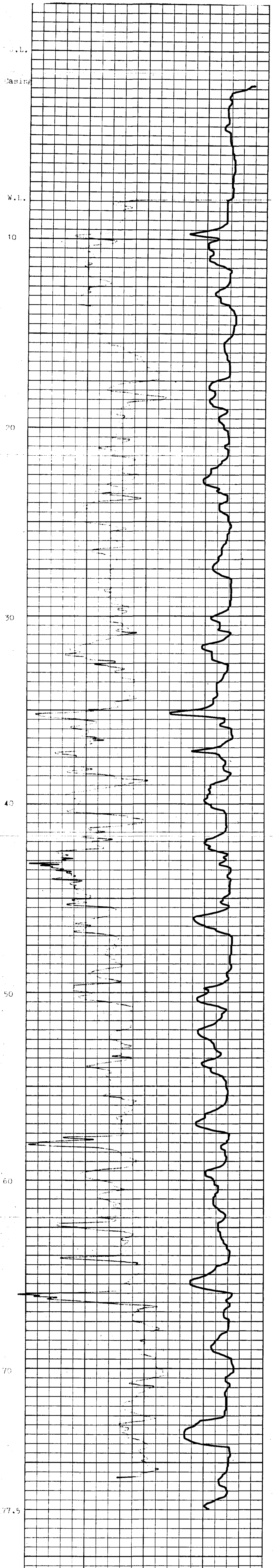
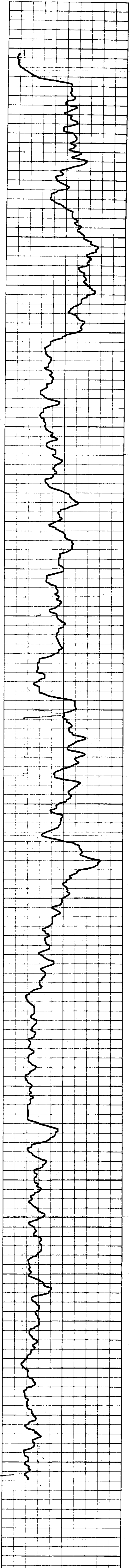
60⁽²⁾
L17

CALIPER

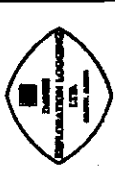
NATURAL GAMMA
10 API

RESISTIVITY 10

DENSITY



Cx Lanterman Ck 85(31A)(1)



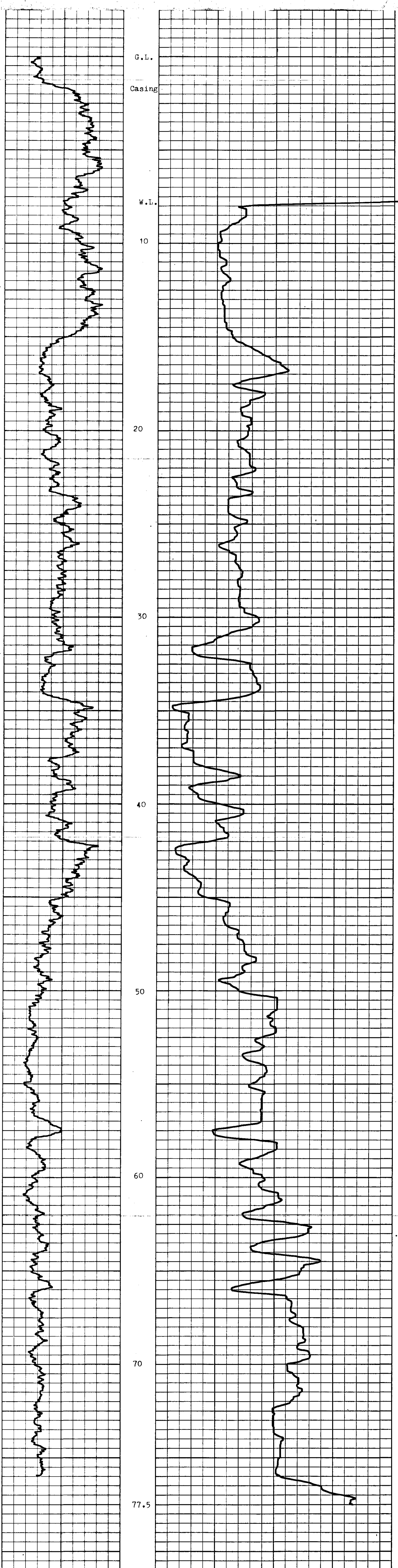
DAVIES EXPLORATION LOGGING LTD.

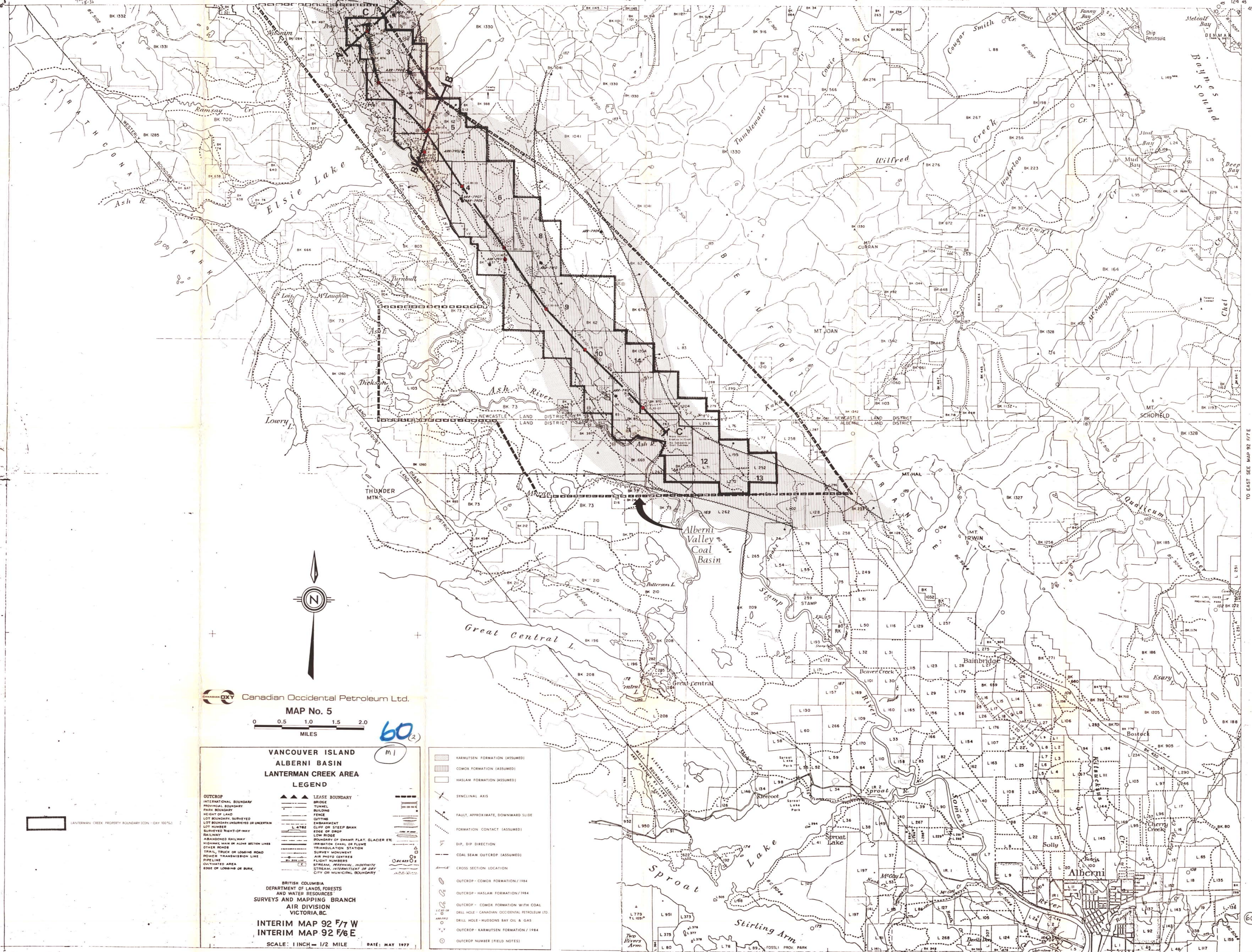


COMPANY	Canadian Occidental Petroleum
HOLE NUMBER	L.C. - 85 - 09
LOCATION	Lanterman Creek
PROVINCE	B.C.
ELEVATION	
LOG TYPE	Natural Gamma & Neutron
DATE	May 15 1985
DRILLED DEPTH	78
LOGGED DEPTH	77.5
ZERO DATUM	G.L.
HOLE DIAMETER	6"
CASING LENGTH	1.7
REMARKS	

60(2)
L18

0 Natural Gamma 100API 100 Neutron 600





Canadian Occidental Petroleum Ltd.
MAP No. 5
 0 0.5 1.0 1.5 2.0
 MILES

**VANCOUVER ISLAND
 ALBERNI BASIN
 LANTERMAN CREEK AREA
 LEGEND**

OUTCROP
 INTERNATIONAL BOUNDARY
 PROVINCIAL BOUNDARY
 PARK BOUNDARY
 HEIGHT OF LAND
 LOT BOUNDARY - SURVEYED
 LOT BOUNDARY - UNSURVEYED OR UNCERTAIN
 LOT NUMBER
 SURVEYED RIGHT-OF-WAY
 RAILWAY
 ABANDONED RAILWAY
 HIGHWAY, MAIN OR ALTERNATE SECTION LINES
 OTHER ROADS
 TRAIL, TRUCK OR LOGGING ROAD
 POWER TRANSMISSION LINE
 PIPELINE
 CULTIVATED AREA
 EDGE OF LOGGING OR BURN

LEASE BOUNDARY
 BRIDGE
 TUNNEL
 BUILDING
 FENCE
 CUTTING
 EMBANKMENT
 CLIFF OR STEEP BANK
 EDGE OF DROP
 LOW RIDGE
 BOUNDARY OF SWAMP FLAT, GLACIER ETC.
 IRRIGATION CANAL OR FLOWE
 TRIANGULATION STATION
 SURVEY MONUMENT
 AIR PHOTO CENTER
 FLIGHT NUMBERS
 STREAM, PERMANENT, INTERMITTENT OR DRY
 CITY OR MUNICIPAL BOUNDARY

BRITISH COLUMBIA
 DEPARTMENT OF LANDS, FORESTS
 AND WATER RESOURCES
 SURVEYS AND MAPPING BRANCH
 AIR DIVISION
 VICTORIA, B.C.
**INTERIM MAP 92 F/7 W
 INTERIM MAP 92 F/6 E**
 SCALE: 1 INCH = 1/2 MILE DATE: MAY 1977

KARMUTSEN FORMATION (ASSUMED)
 COMOX FORMATION (ASSUMED)
 HASLAM FORMATION (ASSUMED)
 SYNCLINAL AXIS
 FAULT, APPROXIMATE, DOWNWARD SLIDE
 FORMATION CONTACT (ASSUMED)
 DIP, DIP DIRECTION
 COAL SEAM OUTCROP (ASSUMED)
 CROSS SECTION LOCATION
 OUTCROP - COMOX FORMATION / 1984
 OUTCROP - HASLAM FORMATION / 1984
 OUTCROP - COMOX FORMATION WITH COAL
 DRILL HOLE - CANADIAN OCCIDENTAL PETROLEUM LTD.
 DRILL HOLE - HUDSONS BAY OIL & GAS
 OUTCROP - KARMUTSEN FORMATION / 1984
 OUTCROP NUMBER (FIELD NOTES)

60 (2)
 M1

CX-Lanterman, CK-85(2)A (1)

TO EAST SEE MAP 92 F/7 E

49.15