	GP Ene	ergy Ltd	
TEC	RP	081	10/09/2015
Department	Document Type	Number	Date
	TEC	RP.081	
		- Cannonbie Iment Report	



1. Licence information

Licence Number: PEDL159 Licence Round: Out of Round Licence Type: Land Block number/s: NY36, NY37 & NY47

2. Licence synopsis

GP Energy Ltd. (a subsidiary of Dart Energy (Europe) Ltd, hereinafter "Dart Energy") acquired PEDL159 in April 2012, through the acquisition of Greenpark Energy Ltd (hereinafter "Greenpark"). The licence acquired covered an area of 295 km². The location of the licence and exploration results available to Dart Energy are displayed in Figure 1. The licence was in its 2nd term.

The licence is located in the Canonbie Coalfield of the Pennine Coal Measures Basin straddling the Scotland/England Border at Dumfries and Galloway/Cumbria. The licence was considered prospective for CBM at the time of application due to the identification of numerous coal seams >1.5m thick and existing data identifying gas contents in the region of 10m³/t. The location of the licence and exploration results available to Dart Energy are displayed in Figure 1.

3. Work programme summary

The original work programme, agreed under the licensing terms, specified a drill or drop commitment to drill one vertical and three deviated horizontal wells. All commitments were met via drilling a total of seven wells across the licence. Greenpark licenced and obtained 160km of 2D seismic data from the UKOGL and Coal Authority.

4. Database

All available offset wells from the BGS and IHS and 2D seismic data purchased from the UKOGL and Coal Authority were used for geological analysis of the prospect. The DTi UK Onshore data initiative was also utilised.

Greenpark recovered continuous core for USBM desorption testing on three vertical wells, Canonbie 1 & 2 and Englishtown 1. The British Coal Gas Content database also provides some gas content data for the coalfield. Greenpark also drilled and tested four deviated wells, Canonbie 3/3z & 4/4z & 5/5z and Englishtown 1z. The wells and seismic used to evaluate the prospectivity of the licence are detailed in Figure 1.

Seismic reprocessing was carried out on all acquired 2D seismic across the licence by previous licence holders Greenpark but no new seismic data has been acquired by Dart Energy.

5. **Prospectivity update**

Seven wells have been drilled by Greenpark in recent times in PEDL159, details below in Table 1.



Well	Туре	Date Drilled
Canonbie 1	Vertical	April 2007
Canonbie 2	Vertical	May 2007
Canonbie 3/3Z	Deviated Horizontal	August 2008
Canonbie 4/4Z	Deviated Horizontal	October 2008
Canonbie 5/5Z	Deviated Horizontal	November 2008
Englishtown 1/1Z	Deviated Vertical	March 2009
Bruntons Hill Farm 1	Vertical	December 2008

Table 1 – PEDL159 Drilling

The Canonbie 1 well was cored and desorption tests were carried out for most of the major seams. A full modern suite of wireline logs were run and DFIT (diagnostic fracture injection test) and swab tests were run on key selected coal seams. The swab test results are shown in Table 2. The tests showed a gas presence in all the zones, with the highest recovery being from the Nine Foot and Six Foot coal seams. The air dry gas contents ranged from 3.0m³/t to 8.5m³/t between the depths of 550-750m for the Canonbie 1 well.

Seam	Water Recovered (Barrels)	Gas Recovered (m ³)	Days
Six Foot	20.5	67.05	1.2
Nine Foot	26.4	68.05	1.0
Five Foot	23.7	28.54	1.1
Black Top/Seven	61.4	13.56	1.7
Foot			

Table 2 – Canonbie 1 Swab Test Results

The Canonbie 2 well appraised the coals in the deepest portion of the field with most of the coals below 1000m. The well was cored, logged and tested with DFIT tests. Between the depths of 990-1330m, air-dry gas content ranges from 4.2m³/t to 11.32m³/t.

Canonbie 4 was drilled as a horizontal pilot production test well into the Nine Foot Seam. Canonbie 5 was drilled as a horizontal pilot production test well into the Six Foot Seam. Both wells were drilled with a 200 metre lateral, structural complexity capped the length of each lateral. They were pump tested using jet pumps for approximately 6 months with the produced gas vented. The Canonbie 4 well was pump tested at rates up to 250,000 scfd but generally produced at a rate of 100,000 scfd. The Canonbie 5 well was pump tested at rates up to 100,000 scfd but generally produced at a rate of 30,000 scfd. Gas and water profiles for these wells are shown in Appendix 2. It is understood that this well was constrained by hole conditions. Canonbie 3 was drilled as a horizontal pilot production test well into the Nine Foot Seam but was never tested.

The Englishtown 1/1z well represents a moderate to deep portion of the Canonbie coal field and the Englishtown 1 was drilled as a vertical cored well which was logged and tested with DFIT tests. The well was then side-tracked out of the upper casing and Englishtown 1z well was drilled to allow for a future horizontal production test well. The well bore was cased and suspended. The air dry gas contents ranged from 4.2m³/t to 9.91m³/t over a depth range of 800-1000m.



The Bruntons Hill Farm 1 well was drilled as an exploration well to test the areal limit of the coal field. No Coal Seams were intersected. The well was logged but not cored.

All seven wells within PEDL159 have been plugged and abandoned. Abandonment schematics are located in Appendix 3. Table 3 below summarizes the abandonment of each well.

Well	Туре	Date Abandoned
Canonbie 1	Vertical	July 2014
Canonbie 2	Vertical	July 2014
Canonbie 3/3Z	Deviated Horizontal	June 2014
Canonbie 4/4Z	Deviated Horizontal	May 2014
Canonbie 5/5Z	Deviated Horizontal	June 2014
Englishtown 1/1Z	Deviated Vertical	July 2014
Bruntons Hill Farm 1	Vertical	December 2008

Table 3 – PEDL159 Abandonments

Methane content acquired from coal samples taken from vertical core wells ranged from 83% to 88% and gas saturations demonstrated an average value of 95%. Coal Seam permeability results ranged from 3.0mD to 35.4mD across the three vertical exploration wells.

No Shale or Conventional Oil and Gas Resources have been identified across the licence. There are no oil and gas wells within the licenced area.

6. Further technical work undertaken

No further technical work has been undertaken on the licence by Dart Energy since the previous licence holder, Greenpark.

7. Resource and risk summary

An assessment of CBM resources has been carried out for PEDL159. The CBM net reserves in PEDL159 are estimated to be zero as there are no commercially recoverable quantities that have been justified for development. Resources in the licence were classified as contingent. A table with the gross estimates is included in Appendix 1.

Structural complexity is considered to be the greatest risk to this project. As with elsewhere in Europe the low coal permeability and surface management issues pushes CBM completions in the direction of horizontal wells which become increasingly risky as the degree of structural complexity increases.

Figure 2 provides examples of structural mapping provided indicate a series of E-W faults at approximately 1km spacing running across the acreage. In addition to this major faulting and E-W seismic line through the Canonbie 1 (Broadmeadows) well location indicates dense faulting with relatively large throws on a spacing of between 100 and 500m.



Similarly in the southern area, which appears relatively benign based on Greenpark's mapping, a seismic line in Figure 3 shows a relatively complex structural picture around the Canonbie 2 (Becklees) well location.

8. Conclusion

PEDL159 is being relinquished due to the complex structures within the Carboniferous strata making the area unsuitable for CBM development. Current economic and geopolitical conditions would also limit the viability and pace of a field development.

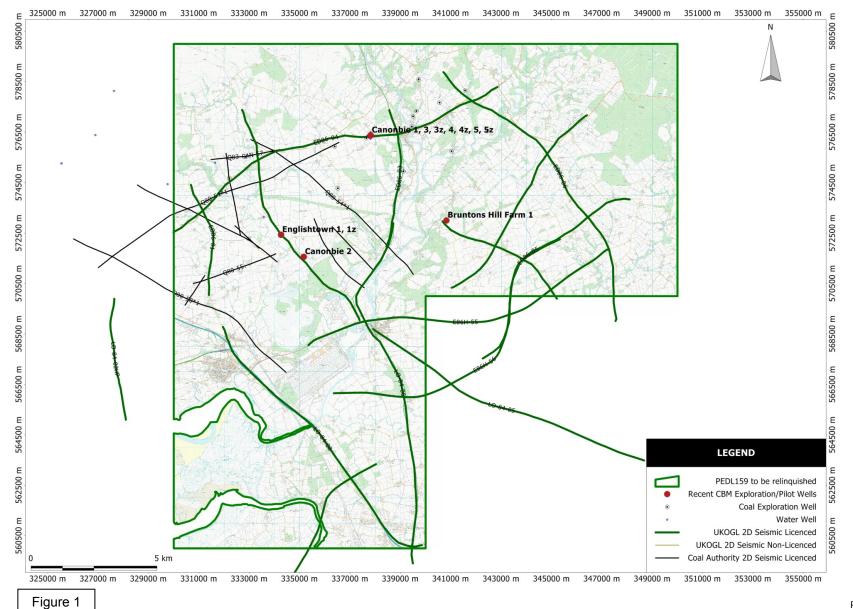
Oil and gas exploration in the region has, by-in-large, proved unsuccessful.

The recent BGS Shale Gas Study did not consider this area prospective for shale gas.

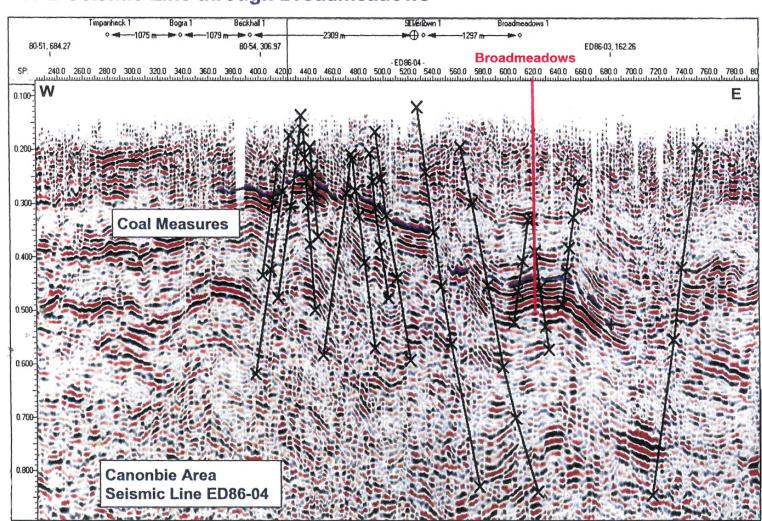
9. Clearance

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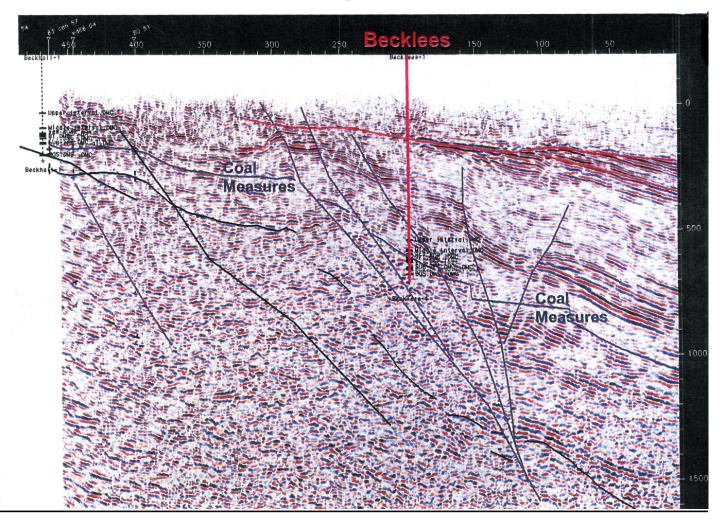


W-E Seismic Line through Broadmeadows

Figure 2



NW-SE Seismic Line ED86-02 through Becklees





Appendix 1 – Resource and Risk Summary Tables

	Estimates of Gross Oil and Gas Reserves								
		Oil (bbl)		Gas (bscf)					
Stratigraphic Level	Proved	Proved + Probable	Proved + Probable + Possible	Proved	Prove Proved + Probab				
Westphalian,									
Carboniferous	0	0	0	0	0	0			

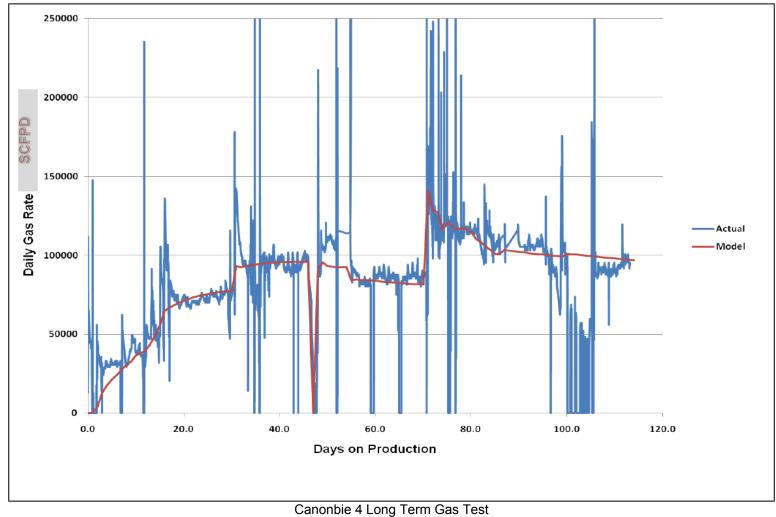
			Resource a	nd Risk Summa	ary				
	Estimates of Gross Oil and Gas Contingent Resources								
Stratigraphic		Oil (bbl)			Gas (bscf)		Risk		
Level	Low	Best	High	Low	Best	High	Factor		
Westphalian,									
Carboniferous	0	0	0	116	127	138	0.20		

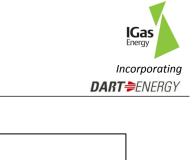
Resource and Risk Summary									
	Estimates of Gross Oil and Gas Prospective Resources								
Stratigraphic		Oil (bbl)				Risk			
Level	Low	Best	High	Low	Best	High	Factor		
Westphalian,									
Carboniferous	0 0 0 39 45 51								

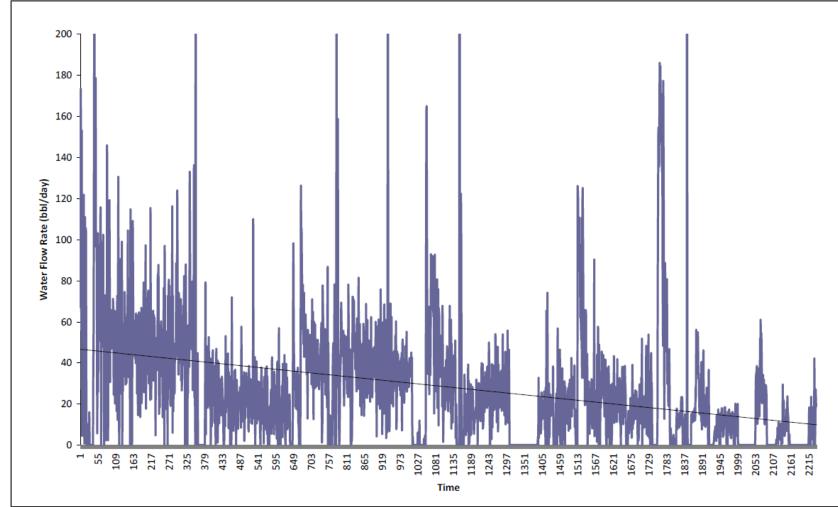
Independently verified by NSAI, July 2012.



Appendix 2 – Gas and Water Production Profiles

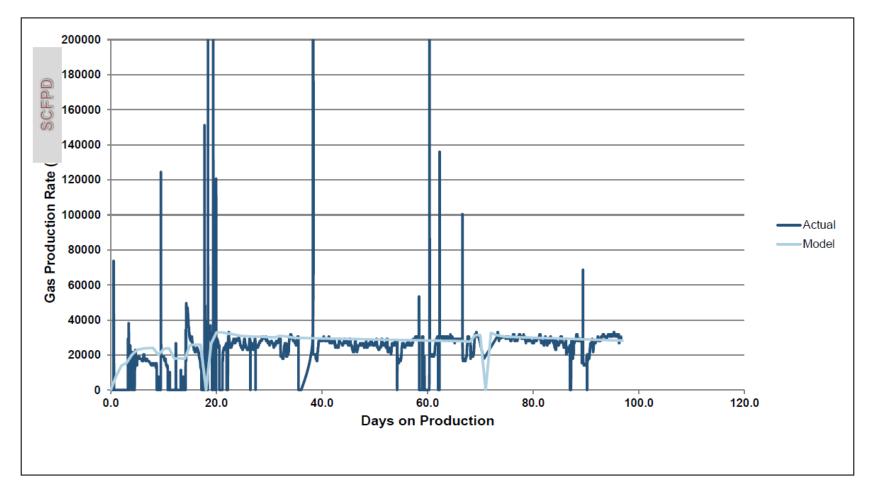






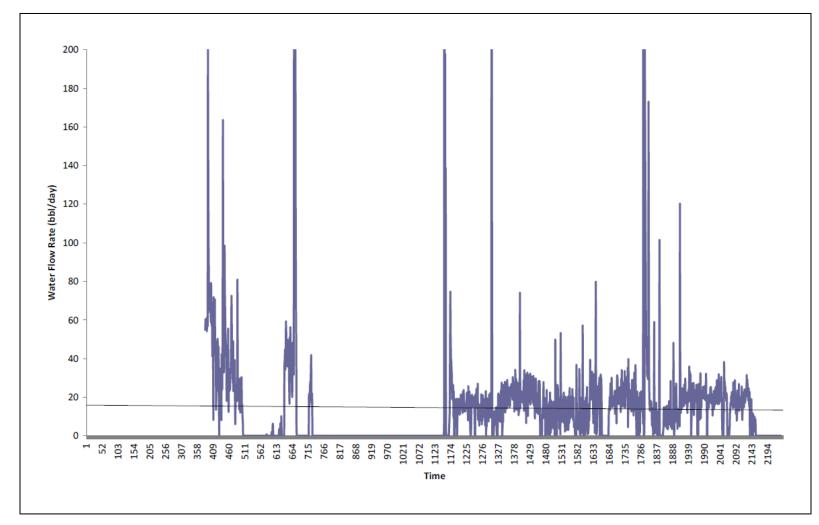


Canonbie 4 Water Production



Canonbie 5 Long Term Gas Test



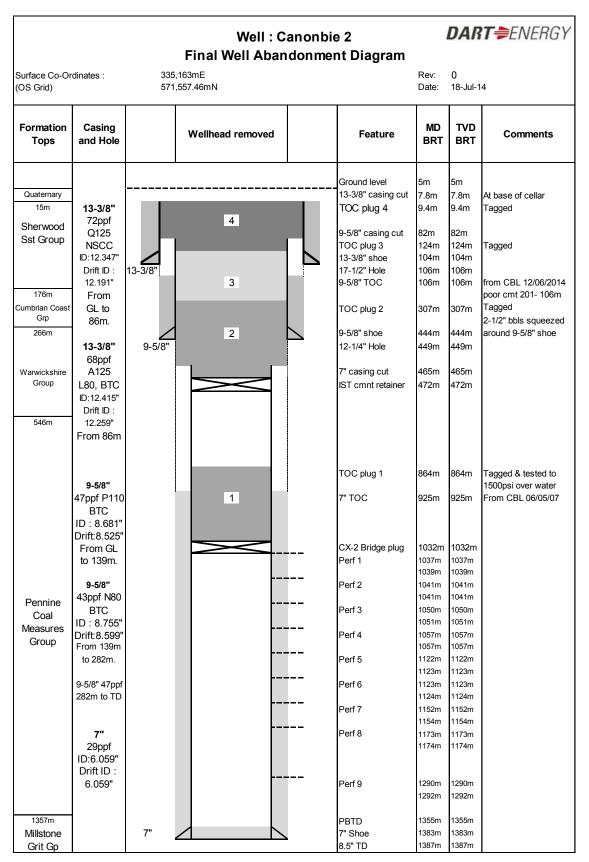


Canonbie 5 Water Production

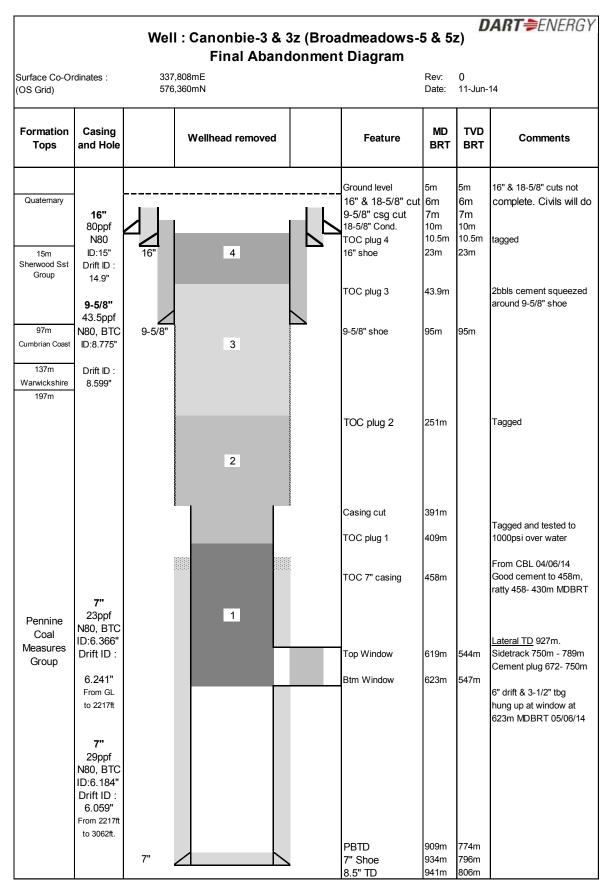


		V	Vell : Canonbie-1 (B Final Abandonm		2)	DAR	T ≢ENERG`
Surface Co-Or (OS Grid)	dinates :	Rev: 0 Date: 18/070/2014					
Formation Tops	Casing and Hole		Wellhead removed	Feature	MD BRT	TVD BRT	Comments
Quaternary 15m Sherwood Sst Group	18-5/8"	18-5/8"	4	Ground level TOC plug 4 18-5/8" casing cut 13-3/8" casing cut	5m 6.4m 7.6m 7.8m	5m 6.4m 7.6m 7.8m	TOC at base of cel 18-5/8" not recover
		10-0/0		TOC plug 3	44m	44m	tagged
97m Cumbrian Coast 137m	13-3/8" 68ppf A125 NSCC ID:12.415"	13-3/8"	3	13-3/8" shoe 17-1/2" Hole	78m 85m	78m 85m	TOC at surface from CBL 18/06/2014
Warwickshire 197m	Drift ID : 12.259"			TOC 'T' plug	218m	218m	Tagged
				7" casing cut	330m	330m	
			2	тос	370m	370m	From CBL 16/06/20
				TOC plug 1	411m	411m	Tagged and tested
				Top of stinger Perforations	415m	415m	1000psi over water
				6ft Coal	563m 565m	563m 565m	
				9ft Coal	586m	586m	
Pennine Coal Measures				5ft Coal	590m 608m	590m 608m	
Group			1	BT Coal	610m	610m	
				7ft Coal	617m 618m	617m 618m	
					622m 623m	622m 623m	
	7" 29ppf L80, BTC			Lower L2	744m 745m	744m 745m	
	ID:6.184" Drift ID :			Lower L3	745m 746m 748m	746m 748m	
	6.059"			Lower L4	750m 751m	750m 751m	
		7"		PBTD 7" Shoe	776m 804m	776m 804m	Drift run 15/06/2014
		· 2		8.5" TD	805m	805m	











		Well	: Canonbie-4 & 4z (E Final Abandonr		3 & 3z	DA 2)	ART ≢ENERGY	
Surface Co-C OS Grid)	ordinates :	337, 576,		Rev: 2 Date: 19-May-14				
Formation Tops	Casing and Hole		Wellhead removed	Feature	MD BRT	TVD BRT	Comments	
Quatemary 15m Sherwood Sst Group	copp.	13-3/8"	5	Ground level Casing Cut TOC plug 5 13-3/8" shoe	5m 7m 24m 21m	5m 7m 24m 21m	All csg cut & removed Tagged Plug 5: 3bbls cement squeezed around 9-5/8" shoe	
97m Cumbrian Coast 137m	9-5/8" 43.5ppf N80 BTC	9-5/8"	4	9-5/8" shoe 12-1/4" Hole TOC plug 4	92m 96m 105m	92m 96m 105m	9-5/8"cement to surface Tagged	
Warwickshire 197m	Drift ID : 8.599"		3	TOC plug 3 Fresh/ saline aquit	200m [;] er ~235m	200m	Tagged From Canonbie 1 logs	
				Casing Cut 7" csg TOC Cement retainer	300m 315m 350m		From CBL 11/05/14 Coretrax CX2 plug	
Pennine Coal Measures Group			2	TOC plug 2	493m		tag & test 1000psi	
				TOC plug 1 Top Window	603m 653m	595m	tagged Lateral TD: 950m	
	7"		1	Btm Window	657m	597m	4.5" slotted liner 655- 733m MDBGL	
	23ppf N80, BTC ID:6.366" Drift ID :		\geq	Cement retainer	672m		Coretrax CX2 plug	
	6.241"			PBTD	878m	746m	drift run 11/05/14	
		7"		7" Shoe 8.5" TD	983m 991m	826m 833m		



		Well	: Canonbie-5 & 5z Final Abandor	-4 & 4	z) DA	\RT ≢ENERG`\		
Surface Co-Ordinates : 337,809mE (OS Grid) 576,370mN) 11-Jun-14	
Formation Tops	Casing and Hole		Wellhead removed	Feature	MD BRT	TVD BRT	Comments	
Quaternary 15m Sherwood Sst Group	16'' 80ppf N80 ID:15''			Ground level 16" csg cut 9-5/8" csg cut TOC plug 4 18-5/8" 16" shoe	5m 6m 7m 6.5m 11m 30m	5m 6m 7m 6.5m 11m 30m	Tagged Tagged	
	Drift ID : 14.9"	16"	4	TOC plug 3	47m	47m	Tagged 1bbl cement squeeze around 9-5/8" shoe	
97m Cumbrian Coast 137m	9-5/8'' 43.5ppf N80 BTC ID:8.775'' Drift ID :	9-5/8"	3	9-5/8" shoe	96m	96m	9-5/8"cement to surface	
Narwickshire 197m	8.599"		J	Fresh/ saline aquife	er ~235m		From Canonbie 1 logs	
	7" 23ppf N80, BTC		2	TOC plug 2	252m		Tagged	
	ID:6.366" Drift ID: 6.241"			Start of build section	349m	349m	'S' Shaped Wellbore Survey available.	
	From GL to 680m			Casing Cut 7" Csg TOC	377m 397m		from CBL 23/05/2014	
	7"			TOC plug 1	434m		Tagged & tested to 1000psi over water	
	29ppf N80, BTC ID:6.184"		1	Top Window	633m	574m	Lateral TD: 891m 4.5" slotted liner	
	Drift ID : 6.059" From 680m		\sim	Btm Window	636m	580m	643- 687m MDBGL	
	to 937m			CX2 bridge plug	645m			
		7"		PBTD 7" Shoe	914m 937m	778m 800m		
				8.5" TD	948m	810m		



			Well : Englishtowi Final Abandonn	DART≥ ENERGY				
urface Co-Or OS Grid)	dinates :		341.32mE 450.11mN		Rev: 0 Date: 18-Jul-14			
Formation Tops TVD BGL	Casing and Hole		Wellhead Removed	Feature	MD BRT	TVD BRT	Comments	
Quaternary 5m Sherwood Sst Group	13-3/8"	13-3/8"	4	Ground level Csg cut TOC plug 4 13-3/8" shoe	5m 7m 10m 15m	5m 7m 10m 15m	All casing cut at base of cellar 13-3/8" TOC: surface	
	9-5/8"	9-5/8"	3	TOC plug 3 9-5/8" shoe 12-1/4" Hole	40m 67m 71m	67m 71m	Tagged Squeezed 7bbls past 9-5/8" casing shoe	
35m Cumbrian Coast Group				TOC plug 2	156m		Tagged	
265m Warwickshire Group 445m			2	TOC 'T' plug	301m		Tagged	
				Casing Cut CX2 bridge plug	478m 490m			
ennine Coal Measures Group				CBL hang up	486m		CBL 21/05/14. No cement behind csg to 486m MDBRT	
Croup				7" TOC			Not known "S" profile. Max inc. 61° at 968m 25° inc at TD	
	7" 29ppf (Prob N80) BTC ID:6.184" Drift ID :							
fillstone Grit Group	6.059"	7"		Float 7" Shoe 8.5" TD	1292m	1134m 1156m 1162m		



Surface Co-Or	dinates :	340,815 573,032	mE	atus Dia	gram		23rd Nov	2008 ember 2008
DS Grid)		573,032	min					th December 2008
Formation Tops	Casing		Schematic		Feature	MD BGL	TVD BGL	Comments
					Ground Level	0m	0m	
18-5	18-5/8"			k	Cut Casing & Cap 18-5/8" Shoe	6m	6m	Casing 9-5/8" Casing was cut jus below ground level and
					Top Plug 6	68m	68m	capped.
	9-5/8"	12-1/4" Hole S	6	\rangle	9-5/8" Shoe 12-1/4" Hole	99m 102m	99m 102m	
				\rangle	Top Plug 5	197m	197m	Abandonment Plugs
			5	\rangle				Plug 6 was tagged at 68 MD BGL and pressure tested to 500psi / 10 mins.
				\rangle	Top Plug 4	358m	358m	All plugs 16ppg Class G cement.
		$\langle \rangle$	4	\rangle				
				\rangle	Top Plug 3	524m	524m	
			3))				
))	Top Plug 2	689m	689m	
)				
			2)				
)	Top Plug 1	847m	847m	
			1)				
))				
		8-1/2" Hole)	8-1/2" TD	1002m	1002m	