

ASX Announcement

1 July 2020

TIER 1 HCC AT ISOLATION SOUTH

HIGHLIGHTS

- Detailed clean coal and coking characteristics testwork completed on composite coal samples from four large diameter cored (LDC) holes drilled at Isolation South in early 2020.
- Results confirm historical testwork and indicate that Isolation South coal quality correlates well with globally-traded premium Hard Coking Coal (HCC) products.
- Clean coal characteristics include: low ash (7 – 9%) and sulphur (0.38 – 0.94%), favourable rank (RoMax) (1.08 – 1.26%), VM (22 – 28%) and CSN/FSI (4.0 – 9.0) ranges, and highly acidic ash chemistry resulting in low phosphorous, low total alkali and a low basicity index (0.02 – 0.15).
- Carbonisation testing has also confirmed high coke CSR values (CSR: 66 – 70%).
- These results are commensurate with the typical ranges observed at Atrum's Elan South deposit as well as Teck Resources' nearby Elk Valley production complex; the outcomes provide strong evidence of Tier 1 HCC quality at Isolation South.
- Further coal characterisation and 500kg movable wall oven carbonisation testing will be conducted on representative coal samples from the Isolation South 2020 exploration program.
- Comprehensive Stage 1 coal characterisation and carbonisation testwork results (from 22 planned LDC holes) are expected in 4Q 2020.

Atrum Coal Limited (ASX: ATU) (**Atrum** or the **Company**) is pleased to advise of further coal quality results, including coke quality and carbonisation testwork outcomes, for the Isolation South deposit at its 100%-owned Elan Hard Coking Coal Project (**Elan Project**) in southern Alberta, Canada.

These results are based on coal characterisation and carbonisation test work conducted on samples obtained from four (4) large diameter cored (**LDC**) drill holes completed in Isolation South during early 2020. Complemented by recent petrographic analysis of 51 RAB samples, the results supplement and bolster the already significant volumes of historical coal quality testwork conducted on the Isolation South deposit by previous owners of the Elan Project tenements¹. They are also additive to the significant coal and coke quality testwork results obtained for Elan South through the 2018 and 2019 exploration programs.

Commenting on the Isolation South results, Atrum CEO, Andy Caruso, said: *"We are naturally pleased that our initial testwork at Isolation South has demonstrated what historical testwork indicated that we should expect – Tier 1 hard coking coal. The coal and coke quality attributes of Isolation South are comparable to some of the best hard coking coal products on the global market today. Possessing a highly acidic ash chemistry that supports high coke CSRs, low ash and sulphur, and a rank range that fits well with most global coking blends, Isolation South has strong potential to be a sought-after hard coking coal source for the global blast furnace steel industry. We now look forward to the full 2020 coal quality program at Isolation South, which is planned to incorporate 32 large diameter cored holes drilled across two stages and a comprehensive testing program inclusive of large-scale movable wall oven testing."*

¹ For details of the coal quality testwork undertaken at IS by prior owners, see Atrum ASX release dated 22 January 2019.

Key conclusions and next steps

This release summarises the clean coal and coke quality results from initial Isolation South core samples recently tested by three different international laboratories as the final part of the 2019 program.

While representing only a small portion of the overall Isolation South resource, these initial results are readily comparable to the baseline coal and coke quality parameters established from Atrium's 2018 and 2019 exploration and testing programs for the Elan South area. They also confirm the close correlation of expected Isolation South coal and coke quality to globally traded Tier 1 Hard Coking Coal (**HCC**) products.

A comprehensive Isolation South coal-coke quality report is expected to be completed in 4Q 2020, following targeted completion of testwork on the planned 22 LDC holes that comprise Stage 1 of the 2020 coal quality drilling program at Isolation South. This is planned to incorporate individual coal seam and typical product blend characterisation and carbonisation testing, including large-scale (500+ kg) Moveable Wall Oven testing.

The results of this comprehensive testwork are planned to feed directly into the Elan Project Pre-Feasibility Study (PFS), targeted for completion in mid-2021.

Clean coal quality outcomes

Detailed results of coal characterisation tests conducted by CoalTech Petrographic Associates, Inc. (USA) on clean coal composite seam samples from four LDC holes at Isolation South (Holes ISLD20-01A, 01C, 02 and 03) are shown in Tables 1, 2 and 3 below.

Key outcomes of this testwork include:

- Medium to lower volatile coal seams as indicated by a mean maximum vitrinite reflectance (RoMax) range of 1.08 – 1.26%, allowing multiple saleable product alternatives.
- Low to moderate product ash content (7.0 – 9.0% @ CF 1.45 – 1.50) that fits well with all coke makers while maximising plant yields.
- Low to moderate total sulphur (0.38 – 0.94%).
- Very low phosphorous content (0.01 – 0.10%).
- Very low deleterious elements (chlorine: 0.02 – 0.05%, mercury 0.03 – 0.10%).
- Typical Western Canadian fluidity range commensurate with the rank range.
- High reactive maceral content ranging from 50% to 90%.
- Attractively highly acidic ash chemistry, hence very low basicity index (0.02 – 0.15) supporting high CSRs.
- Very low wall pressures during carbonisation (0.44 – 0.70 psi) and excellent volume contraction (-20%).
- Favorable Coke Drum Indices (M40: 76 – 79, DI 150/15: 80 – 83%).

**Table 1. Actual Clean Coal analysis results and coking properties from CoalTech
(Composite individual seam samples from Large Diameter Core Hole ISLD20-02)**

Drill hole No. CoalTech Sample No.	ISLD20-02 110366	ISLD20-02 110367	ISLD20-02 110368	ISLD20-02 110369	ISLD20-02 110142	ISLD20-02 110143	ISLD20-02 110146
Volatile Matter (% db)	24.51	26.05	25.18	23.59	26.31	26.96	26.54
Ash (% db)	8.31	7.55	8.54	8.66	6.84	7.27	7.34
Fixed Carbon (% db)	67.18	66.40	66.28	66.75	66.85	65.77	66.12
Sulfur (db)	0.56	0.65	0.75	0.46	0.66	0.88	0.92
LT Oxidation Test (%)	98.3	98.5	98.5	98.9	99.8	99.4	99.2
BTU/lb, (% db)	14,074	14,225	14,138	14,000	14,303	14,211	14,327
Chlorine (%)	NR	0.02	NR	0.05	0.02	0.02	0.04
Mercury (%)	NR	0.030	NR	0.037	0.101	0.076	0.040
Base/Acid Ratio	0.02	0.03	0.04	0.14	0.13	0.05	0.03
Phos In Coal (% db)	0.011	0.011	0.060	0.053	0.168	0.017	0.004
Total Alkali in Coal (% db)	0.03	0.08	0.07	0.09	0.03	0.09	0.07
Max. Gieseler Fluidity, ddpm	6	297	580	5	78	835	751
Plastic Range, C	45	65	76	39	57	73	77
FSI	3.5	8.5	7.5	4.5	8.0	8.0	8.5
HGI (%)	60.5	75.3	75.3	74.9	75.3	na	74.1
Total Vitrinite (%)	34.3	72.2	57.1	50.2	60.2	75.2	73.8
Reactive Semifusinite (%)	19.2	6.0	13.2	13.6	11.7	5.8	6.6
Total Reactives (%)	54.3	78.7	57.1	50.2	73.1	81.7	81.0
Inert Semifusinite (%)	19.2	6.0	13.3	13.6	11.7	5.9	6.7
Micrinite (%)	20.6	9.2	10.2	14.3	10.0	7.4	6.4
Fusinite (%)	1.2	1.8	0.9	2.9	1.3	0.8	1.6
Mineral Matter (%)	4.7	4.3	4.9	4.9	3.9	4.2	4.3
Total Inerts (%)	45.7	21.3	29.3	35.1	26.9	18.3	19.0
Mean Max Reflectance (%)	1.16	1.17	1.14	1.15	1.13	1.15	1.09
Arnu Max. Contraction, %	-11	-21	-17	-13	-17	-23	-23
Arnu Max. Dilatation, %	-11	98	91	-13	38	167	170
AFT Initial	2700	2700	2700	2570	2690	2700	2700
AFT Softening	2700	2700	2700	2700	2700	2700	2700
AFT Hemispherical	2700	2700	2700	2700	2700	2700	2700
AFT Fluid	2700	2700	2700	2700	2700	2700	2700

Table 2. Actual Clean Coal analysis results and coking properties from CoalTech
(Composite individual seam samples from Large Diameter Core Holes ISLD20-03, 1A and 1C)

Drill hole No. CoalTech Sample No.	ISLD20-03 110359	ISLD20-03 110360	ISLD20-03 110362	ISLD20-03 110393	ISLD20-01A 110395	ISLD19-01C 109997
Volatile Matter (% db)	27.03	27.93	22.34	26.09	24.83	25.31
Ash (% db)	8.08	8.49	7.82	7.59	8.99	6.99
Fixed Carbon (% db)	64.89	63.58	69.84	66.32	66.18	67.70
Sulfur (db)	0.70	0.89	0.40	0.94	0.64	0.51
LT Oxidation Test (%)	98.9	98.6	99.2	98.6	99.300	98.6
BTU/lb, (% db)	14,152	14,166	14,037	13,996	14,004	14,320
Chlorine (%)	NR	NR	NR	NR	NR	0.04
Mercury (%)	NR	NR	NR	NR	NR	0.040
Base/Acid Ratio	0.03	0.04	0.09	0.12	0.02	0.07
Phos In Coal (% db)	0.025	0.003	0.013	0.057	0.002	0.002
Total Alkali in Coal (% db)	0.05	0.08	0.061	0.03	0.11	0.09
Max. Gieseler Fluidity, ddpm	858	3770	0	103	434	85
Plastic Range, C	76	84	NA	58	70	57
FSI	8.0	8.0	2.5	8.0	7.5	7.5
HGI (%)	70.5	77.4	85.3	68.1	79.4	74.1
Total Vitrinite (%)	64.6	76.8	45.5	57.2	46.7	63.1
Reactive Semifusinite (%)	9.6	5.4	16.3	11.4	13.0	9.4
Total Reactives (%)	75.4	83.1	62.1	70.1	59.8	72.9
Inert Semifusinite (%)	9.5	5.2	16.1	11.4	13.0	9.4
Micrinite (%)	9.7	6.0	15.7	12.6	20.5	12.0
Fusinite (%)	0.8	0.8	1.7	1.5	1.6	1.8
Mineral Matter (%)	4.6	4.9	4.4	4.4	5.1	3.9
Total Inerts (%)	24.6	16.9	37.9	29.9	40.2	27.1
Mean Max Reflectance (%)	1.11	1.09	1.26	1.16	1.15	1.20
Arnu Max. Contraction, %	-21	-24	-17	-18	-18	-19
Arnu Max. Dilatation, %	138	270	-17	29	42	26
AFT Initial	2700	2700	2700	2700	2700	2700
AFT Softening	2700	2700	2700	2700	2700	2700
AFT Hemispherical	2700	2700	2700	2700	2700	2700
AFT Fluid	2700	2700	2700	2700	2700	2700

Table 3. Actual Clean Coal analysis results and coking properties from CoalTech
(Composite individual seam samples from Large Diameter Core Holes ISLD20-1A and 1C)

Drill hole No.	ISLD20-01A	ISLD20-01A	ISLD20-01A	ISLD20-01A	ISLD19-01C	ISLD20-01A
CoalTech Sample No.	110356	110358	110364	110365	109996	110398
Volatile Matter (% db)	25.75	24.27	28.17	27.59	23.83	29.00
Ash (% db)	8.93	8.90	8.63	8.88	7.34	8.35
Fixed Carbon (% db)	65.32	66.83	63.20	63.53	68.83	62.65
Sulfur (db)	0.86	0.64	0.79	0.79	0.38	0.87
LT Oxidation Test (%)	97.2	98.6	98.5	98.6	98.7	98.4
BTU/lb, (% db)	14,152	14,094	14,073	13,996	14,198	14,209
Chlorine (%)	NR	NR	NR	NR	0.05	0.02
Mercury (%)	NR	NR	NR	NR	0.030	0.034
Base/Acid Ratio	0.05	0.03	0.04	0.06	0.13	0.04
Phos In Coal (% db)	0.002	0.002	0.006	0.004	0.006	0.001
Total Alkali in Coal (% db)	0.11	0.14	0.14	0.03	0.12	0.075
Max. Gieseler Fluidity, ddpm	2160	524	5040	2370	2	30000
Plastic Range, C	88	71	43	85	20	105
FSI	9.0	5.5	9.0	8.0	4.5	9
HGI (%)	80.2	75.0	78.6	NA	NR	75
Total Vitrinite (%)	66.7	43.9	76.5	75.6	45.9	88.4
Reactive Semifusinite (%)	7.7	16.6	5.4	7.0	16.4	1
Total Reactives (%)	74.4	60.8	83.0	83.4	62.6	90.7
Inert Semifusinite (%)	7.8	16.6	5.3	6.9	16.2	1.1
Micrinite (%)	10.3	16.0	3.7	4.0	14.7	3.3
Fusinite (%)	2.4	1.5	3.0	0.6	2.4	0.1
Mineral Matter (%)	5.1	5.1	5.0	5.1	4.1	4.8
Total Inerts (%)	25.6	39.2	17.0	16.6	37.4	9.3
Mean Max Reflectance (%)	1.09	1.14	1.13	1.13	1.22	1.08
Arnu Max. Contraction, %	-24	-17	-24	-24	-13	-24
Arnu Max. Dilatation, %	201	41	267	229	-13	300
AFT Initial	2700	2700	2700	2700	2700	2700
AFT Softening	2700	2700	2700	2700	2700	2700
AFT Hemispherical	2700	2700	2700	2700	2700	2700
AFT Fluid	2700	2700	2700	2700	2700	2700

Coal product and coke quality outcomes

Isolation South mid-volatile hard coking product(s) are expected to be comparable to coking coal products currently produced and exported from the nearby Teck Resources' Elk Valley mines. Teck's coking coals are well renowned for their characteristics and strong coking propensity, which include low ash content, low to moderate fluidity, low basicity index and high CSR. The highly refractory nature of the Mist Mountain coals (high in kaolinite and silica) is an important marketing advantage for western Canadian hard coking coal exports.

The primary product(s) from Isolation South are expected to be Tier 1 mid-volatile hard coking coals with favourable coal quality attributes. Based on the existing coal quality results, the expected attributes of a typical Isolation South mid-vol HCC product can be summarised as follows:

- Mid volatile coking coal(s) with mean maximum vitrinite reflectance (RoMax) ranging from 1.10 to 1.24%.
- Low to moderate ash content (7 – 9 %) that fits well with all coke makers, with potential to evaluate optimisation of product yield and ash.
- Low total sulphur content (0.50 – 0.70%) of almost all organic form, hence lower blast furnace loading.
- Low phosphorus levels in coal (<0.050 %) compared with existing Western Canadian production HCC mines.
- FSI (CSN) expected to be in the range of 7 – 8 in blended product(s)

All ultimate saleable product specifications will be based on final mine plans and coal release as well as prevailing market and customer demands.

Full results of carbonisation tests conducted by DMT GmbH & Co. KG in Germany on two Isolation South HCC blends are summarised in Table 4 below. Partial results from the carbonisation testing of two further HCC blends at the INCAR laboratories in Spain are also contained in Table 4 (residual results remain pending).

The most significant positive attributes of the tested coal blends were low ash, low sulphur, very low phosphorous, high coke yield and very good CSR potential. All blends resulted in low ash, low sulphur, low reactivity and high Coke Strength After-Reaction (CSR) coke products. These favorable properties contribute to reduction in coke consumption and increased blast furnace productivity.

Table 4. Isolation South Alternative Medium Volatile Hard Coking Coal Product Blends
Actual Coal Blend Carbonization Test Results (DMT – Germany; INCAR – Spain)

ISOLATION SOUTH COAL BLEND – COKE PROPERTIES	DMT 1 ALTERNATIVE CARB. BLEND 1	DMT 2 ALTERNATIVE CARB. BLEND 2	INCAR 1 ALTERNATIVE CARB. BLEND 1	INCAR 2 ALTERNATIVE CARB. BLEND 2
Blend / Coke Properties				
Blend Romax (%)	1.13	1.10	1.18	1.18
Blend VM (db)	23.2	26.9	22.7	22.7
Blend Ash (db)	7.60	7.10	8.00	8.10
Blend S (db)	0.48	0.66	0.50	0.50
Blend FSI (CSN) (*)	4.5	8.0	4.5	TBD
Blend Phosphorus	0.027	0.056	0.031	TBD
Coke Yield (%)	79.2	76.4	-	-
Coke Ash (%)	9.60	9.29	-	-
Coke S (%)	0.41	0.51	-	-
M 40 (%)	76.1	78.9	-	-
M 10 (%)	8.3	7.3	-	-
I 40 (%)	51.0	55.3	-	-
I 10 (%)	23.1	20.9	-	-
JIS 15/150	80.5	82.6	-	-
Coke Phos (%)	0.034	0.062	-	-
Base/Acid Ratio	0.09	0.06	0.11	TBD
SHO Volume Change (%)	-	-	-19.3	-20.3
Wall Pressure (MWO) (psi)	-	0.44	0.69	0.50
Coke CRI (%)	28.7	17.2	23.0	25.0
Coke CSR (%)	66.3	69.1	70.0	67.0

(*) Carbonization Blends DMT 1 and INCAR 22 contained lower-rheology coal samples.

TBD: Coal characterization tests are ongoing at time of release.

This ASX release was authorised on behalf of the Atrum Coal Board by:

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About Atrum Coal

Atrum Coal (ASX: ATU) is a metallurgical coal developer. The Company's flagship asset is the 100%-owned Elan Hard Coking Coal Project in southern Alberta, Canada. Elan hosts large-scale, shallow, thick, hard coking coal (HCC) deposits with a current resource estimate of 454Mt (142Mt Indicated and 312Mt Inferred). Comprehensive coal quality testing from the 2018 and 2019 exploration programs, combined with review of substantial historical testwork data for the broader Elan Project, has confirmed Tier 1 HCC quality.

Elan is located approximately 13 km from an existing rail line with significant excess capacity, providing direct rail access to export terminals in Vancouver and Prince Rupert. It shares its southern boundary with Riversdale Resources' Grassy Mountain Project, which is in the final permitting stage for a 4.5Mtpa (saleable) open-cut HCC operation. Around 30km to the west, Teck Resources operates four mines (the Elk Valley complex) producing approximately 25Mtpa of premium HCC for the seaborne market.

Atrum completed a Scoping Study in April 2020 which demonstrated the strong technical and economic viability of development of the Elan Project. For full Scoping Study and resource details refer to Atrum ASX release dated 16 April 2020, *Elan Project Scoping Study*. Atrum confirms that all material assumptions underpinning the production target and forecast financial information within the Scoping Study, and the resource estimate outlined above, continue to apply and have not materially changed.