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## ASX Announcement

7 July 2020

### Amended Isolation South Coal Quality Results Announcement

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Atrum Coal Ltd (ASX: ATU) provides the following amended Isolation South Coal Quality Results announcement originally released to ASX on 1 July 2020 (*Tier 1 HCC at Isolation South*). This amended version has been updated to include a Competent Persons statement and information required per the relevant sections of Table 1 of the JORC Code (2012).

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7 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 tenements<sup>1</sup>. 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."*

<sup>1</sup> 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)**

<b>Drill hole No. CoalTech Sample No.</b>	<b>ISLD20-02 110366</b>	<b>ISLD20-02 110367</b>	<b>ISLD20-02 110368</b>	<b>ISLD20-02 110369</b>	<b>ISLD20-02 110142</b>	<b>ISLD20-02 110143</b>	<b>ISLD20-02 110146</b>
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)**

<b>Drill hole No.</b> <b>CoalTech Sample No.</b>	<b>ISLD20-03</b> <b>110359</b>	<b>ISLD20-03</b> <b>110360</b>	<b>ISLD20-03</b> <b>110362</b>	<b>ISLD20-03</b> <b>110393</b>	<b>ISLD20-01A</b> <b>110395</b>	<b>ISLD19-01C</b> <b>109997</b>
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)**

<b>Drill hole No.</b>	<b>ISLD20-01A</b>	<b>ISLD20-01A</b>	<b>ISLD20-01A</b>	<b>ISLD20-01A</b>	<b>ISLD19-01C</b>	<b>ISLD20-01A</b>
<b>CoalTech Sample No.</b>	<b>110356</b>	<b>110358</b>	<b>110364</b>	<b>110365</b>	<b>109996</b>	<b>110398</b>
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)**

<b>ISOLATION SOUTH COAL BLEND – COKE PROPERTIES</b>	<b>DMT 1 ALTERNATIVE CARB. BLEND 1</b>	<b>DMT 2 ALTERNATIVE CARB. BLEND 2</b>	<b>INCAR 1 ALTERNATIVE CARB. BLEND 1</b>	<b>INCAR 2 ALTERNATIVE CARB. BLEND 2</b>
<b>Blend / Coke Properties</b>				
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 2 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:**

Andrew Caruso, Chief Executive Officer

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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.

## Competent Persons Statement

### Exploration Results

The information in this document that relates to laboratory testing results (Exploration Results) for the Isolation South project area is based on, and fairly represents, information and supporting documentation prepared by Mr Brad Willis, who is a Member of the Australasian Institute of Mining and Metallurgy (#205328) and is a full-time employee of Palaris Australia Pty Ltd.

Mr Willis has read and understands the requirements of the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Exploration Targets, Mineral Resources and Ore Reserves (JORC Code, 2012 Edition). Mr. Willis is a Competent Person as defined by the JORC Code, 2012 Edition, having twenty years' experience that is relevant to the style of mineralisation and type of deposit described in this document.

Neither Mr. Willis nor Palaris Australia Pty Ltd has any material interest or entitlement, direct or indirect, in the securities of Atrum or any companies associated with Atrum. Fees for the preparation of this report are on a time and materials basis. Mr. Willis has visited the Elan project site with Atrum coal personnel during the exploration programs in 2018 and 2019.

### The JORC Code (2012)

**Table 1 - Sampling Techniques and Data**

Criteria	JORC Code explanation	Commentary
Sampling techniques	<ul style="list-style-type: none"> <li>Nature and quality of sampling (eg cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.</li> <li>Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.</li> <li>Aspects of the determination of mineralisation that are Material to the Public Report.</li> </ul>	<ul style="list-style-type: none"> <li>Four cored drillholes were completed at three sites in February 2020 at Isolation South for the collection of large diameter (LD) samples which were logged and sampled for coal quality testwork</li> <li>Sampling has been undertaken on LD (150mm or 6" diameter) cored holes</li> <li>Samples are taken on ply intervals and are manually composited in the laboratory after results for raw light transmittance (LT) ash, ARD and IM are received from grab samples</li> <li>Atrum Coal provides the instructions to the laboratory for manually compositing individual ply samples</li> <li>In order to ensure representivity, coal seams sampled with &lt;80% linear core recovery are not tested at the laboratory</li> </ul>
Drilling techniques	<ul style="list-style-type: none"> <li>Drill type (eg core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).</li> </ul>	<ul style="list-style-type: none"> <li>The four LD holes were completed in February 2020</li> <li>The LD cored holes are drilled with PDC or tungsten bits and use double tube core barrels (triple tube core barrels with LD core are uncommon in Canada)</li> <li>The LD holes were geophysically logged to total depth in the open hole, with seam and sample intervals adjusted to the geophysical log depths (where necessary)</li> </ul>
Drill sample recovery	<ul style="list-style-type: none"> <li>Method of recording and assessing core and chip sample recoveries and results assessed.</li> <li>Measures taken to maximise sample recovery and ensure representative nature of the samples.</li> <li>Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.</li> </ul>	<ul style="list-style-type: none"> <li>The LD cored boreholes were geophysically logged and cored seam intervals have compared to the geophysical log data</li> <li>Core recoveries were recorded and cumulative tallies kept. Achieving consistently high core recoveries can be difficult due to the fractured and friable nature of the coal seams</li> <li>The LD coring programs at Elan have generally achieved better core recoveries than PQ or HQ cores, and appears to be a more suitable coring technique for this type of coal</li> <li>Core recoveries were recorded and cumulative tallies kept. Any samples from seams with less than 80% linear recovery (relative to geophysical log depths) are not tested by the laboratory</li> <li>Cored boreholes were geophysically logged to ensure recovered core lengths are representative of the full seam</li> </ul>
Logging	<ul style="list-style-type: none"> <li>Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.</li> <li>Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.</li> <li>The total length and percentage of the relevant</li> </ul>	<ul style="list-style-type: none"> <li>Core samples were logged in detail including lithology, brightness, sedimentary features and defects</li> <li>Boreholes were geophysically logged with geophysical sondes including density, caliper and gamma, deviation and dipmeter</li> </ul>

Criteria	JORC Code explanation	Commentary
	<i>intersections logged.</i>	
<i>Sub-sampling techniques and sample preparation</i>	<ul style="list-style-type: none"> <li>▪ If core, whether cut or sawn and whether quarter, half or all core taken.</li> <li>▪ If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.</li> <li>▪ For all sample types, the nature, quality and appropriateness of the sample preparation technique.</li> <li>▪ Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.</li> <li>▪ Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling.</li> <li>▪ Whether sample sizes are appropriate to the grain size of the material being sampled.</li> </ul>	<ul style="list-style-type: none"> <li>▪ All core sampled is sent to the testing lab (no slabbing or splitting of core is undertaken)</li> <li>▪ The LD cores are subject to drop shatter testing, sizing analysis and subjected to float sink testing by size fraction (31.5mm x 1mm, 1.0mm x 0.25mm and -0.25mm), with raw coal analysis being undertaken after completion of the initial drop shatter and dry sizing.</li> <li>▪ Clean coal composites are typically prepared at selected cut points for each size fraction as directed by Atrum Coal, for detailed coal quality and carbonisation testing.</li> <li>▪ Carbonisation samples are generally seam blend composites, with varying proportions of each seam group, as directed by Atrum Coal</li> <li>▪ The LD core provides a much better representation of size fractions relative to smaller diameter core samples and is preferred for coal preparation design</li> </ul>
<i>Quality of assay data and laboratory tests</i>	<ul style="list-style-type: none"> <li>▪ The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.</li> <li>▪ For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.</li> <li>▪ Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Analytical testwork (raw, washability and initial clean coal testing) undertaken by nationally accredited laboratory GWIL Birtley of Calgary, generally to ASTM standards. The lab participates in International Canadian Coal Laboratories Round Robin series (CANSPEX) and test results are consistently ranked in preferred groupings.</li> <li>▪ The Competent Person undertook a site visit and tour of the GWIL Birtley laboratory in 2018</li> <li>▪ Drop shatter, sizing analysis and float sink testing is undertaken on LD samples according to testing protocols designed by Atrum Coal</li> <li>▪ Clean coal composites are prepared by Birtley and forwarded to COALTECH Petrographic Associates, USA (for clean coal characterisation tests)</li> <li>▪ Blended products are designed by Atrum and prepared by Birtley for delivery to two world-class coal carbonisation laboratories in Europe; DMT Coal Coke Group (Germany) and INCAR (Spain)</li> </ul>
<i>Verification of sampling and assaying</i>	<ul style="list-style-type: none"> <li>▪ The verification of significant intersections by either independent or alternative company personnel.</li> <li>▪ The use of twinned holes.</li> <li>▪ Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.</li> <li>▪ Discuss any adjustment to assay data.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Geological data is collected in line with Atrum Coal's exploration procedures and guidelines</li> <li>▪ Sample interval depths are as measured by the field geologist (drillers depths), and adjusted to align with geophysical log depths, while measured sample interval thicknesses are retained</li> <li>▪ GWIL Birtley undertakes preliminary checks of assay data using regression analysis, and the data is checked by Atrum Coal and Palaris geologists</li> <li>▪ All data has been encoded, collated and cross checked by Atrum Coal, and later by Palaris</li> <li>▪ Twinning of existing rotary air blast (RAB) holes is used for targeted coring of coal seams in the LD cored holes. The twinned cored holes are also geophysically logged</li> <li>▪ Reported results in this announcement have not been adjusted in any way, shape or form</li> </ul>
<i>Location of data points</i>	<ul style="list-style-type: none"> <li>▪ Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.</li> <li>▪ Specification of the grid system used.</li> <li>▪ Quality and adequacy of topographic control.</li> </ul>	<ul style="list-style-type: none"> <li>▪ The collar locations of the LD boreholes have been surveyed using DGPS (Trimble)</li> <li>▪ The co-ordinate system is UTM projected grid NAD83 Zone 11N</li> <li>▪ The topographical surface is sourced from a LiDAR survey and has a reasonable correlation with borehole collars</li> </ul>
<i>Data spacing and distribution</i>	<ul style="list-style-type: none"> <li>▪ Data spacing for reporting of Exploration Results.</li> <li>▪ Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.</li> <li>▪ Whether sample compositing has been applied.</li> </ul>	<ul style="list-style-type: none"> <li>▪ The four LD holes at three sites presented in this announcement are located on Cabin Ridge, the dip slope of Isolation South, located north of Oldman River</li> <li>▪ Resource classification and estimation will be revisited at the end of this year's drilling program</li> <li>▪ Sample compositing (into seam intervals) is generally manually undertaken in the laboratory after instructions are provided by Atrum Coal.</li> <li>▪ Additional compositing is undertaken in Minex software and requires 80% linear recovery as specified in the Minex BHDB settings, while composite values are mass weighted using both thickness and true RD as weighting variables</li> </ul>
<i>Orientation of data in</i>	<ul style="list-style-type: none"> <li>▪ Whether the orientation of sampling achieves unbiased sampling of possible structures and the</li> </ul>	<ul style="list-style-type: none"> <li>▪ The four LD holes completed have been drilled vertically, twinning existing vertical RAB holes</li> <li>▪ Electronic deviation data from each hole is imported into</li> </ul>

Criteria	JORC Code explanation	Commentary
<i>relation to geological structure</i>	<p><i>extent to which this is known, considering the deposit type.</i></p> <ul style="list-style-type: none"> <li><i>If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.</i></li> </ul>	<p>the Minex borehole database. The geological modelling software captures the downhole inclination and deviation, and structural modelling assists in correcting the apparent seam thicknesses to true thicknesses in model grids</p>
<i>Sample security</i>	<ul style="list-style-type: none"> <li><i>The measures taken to ensure sample security.</i></li> </ul>	<ul style="list-style-type: none"> <li>The LD core was photographed, sampled, labelled and bagged before being submitted to the testing laboratories</li> <li>Samples have a unique sample number that is provided on tags in the bag, outside the bag and in separate digital and hard copy sample advice. Each item of advice lists project name, borehole, top and base of sample and sample number</li> <li>The laboratory records provided include sample identification numbers and weighed sample mass</li> <li>All measures are taken to ensure sample security represents best practice by industry standards</li> </ul>
<i>Audits or reviews</i>	<ul style="list-style-type: none"> <li><i>The results of any audits or reviews of sampling techniques and data.</i></li> </ul>	<ul style="list-style-type: none"> <li>Palaris representatives visited the site in 2018 and 2019 to oversee the drilling program, and ensure a high standard of geological data is provided by Atrum Coal's geologists</li> <li>Processing consultants Sedgman have reviewed and provided input into the sizing and washability components of the testing program</li> </ul>

**Table 1 – Reporting of Exploration Results**

Criteria	JORC Code explanation	Commentary
<i>Mineral tenement and land tenure status</i>	<ul style="list-style-type: none"> <li><i>Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.</i></li> <li><i>The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.</i></li> </ul>	<ul style="list-style-type: none"> <li>The Isolation South coal agreements were granted to Elan Coal Ltd in 2012/13, Elan Coal was acquired by Atrum Coal in March 2018. Coal Lease agreements provide the right to exclusively explore the land within the boundaries of the lease and are granted for a term of 15 years (with an option to extend at expiry)</li> <li>The Property falls within the Rocky Mountain Forest Reserve, which is managed by the Alberta Government</li> <li>An Exploration Permit for Isolation South was granted to Atrum Coal by the Alberta Energy Regulator (AER) covering exploration activities undertaken in February 2020 (as reported to the ASX on 29 July 2019)</li> </ul>
<i>Exploration by other parties</i>	<ul style="list-style-type: none"> <li><i>Acknowledgment and appraisal of exploration by other parties.</i></li> </ul>	<ul style="list-style-type: none"> <li>Scurry-Rainbow Oil Limited (Scurry) undertook exploration of the Isolation South area in the 1970s, then referred to as the Oldman River prospect.</li> <li>Exploration activities included bulldozer assisted trenching, establishment of access roads, numerous adits and 19 HQ size fully cored holes for a total of 3,286m of coring.</li> <li>The cored holes were accompanied by geophysical logging and seam intervals interpreted from geophysical log depths</li> </ul>
<i>Geology</i>	<ul style="list-style-type: none"> <li><i>Deposit type, geological setting and style of mineralisation.</i></li> </ul>	<ul style="list-style-type: none"> <li>Atrum Coal's Elan project is located in the province of Alberta, in the Crowsnest Pass area of the Crowsnest Coalfield, on the Front Ranges of the Canadian Rocky Mountains</li> <li>Coal-bearing sedimentary sequences occur within the Mist Mountain Formation of the Late Jurassic to Early Cretaceous aged Kootenay Group, which was strongly deformed during the Late Cretaceous Laramide Orogeny. This resulted in the development of north to northwest-trending folds and steeply dipping reverse faults. The project is located within the Rocky Mountain Thrust Belt, west of the Livingstone Thrust fault and the project extent encompasses the McConnell thrust sheet</li> <li>Major folds regionally trend in a northerly direction. Secondary local thrusts typically occur within the area, generally determining the distribution and outcrop of coal seams along the thrust fault zones. In many areas of the Crowsnest Coalfield, structure is principally the controlling factor in resource development.</li> </ul>
<i>Drill hole Information</i>	<ul style="list-style-type: none"> <li><i>A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all</i></li> </ul>	<ul style="list-style-type: none"> <li>This information is provided for the four LD boreholes completed in February 2020 at Isolation South as summarised below.</li> </ul>

Criteria	JORC Code explanation	Commentary																																			
	<p><i>Material drill holes:</i></p> <ul style="list-style-type: none"><li>o <i>easting and northing of the drill hole collar</i></li><li>o <i>elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar</i></li><li>o <i>dip and azimuth of the hole</i></li><li>o <i>down hole length and interception depth</i></li><li>o <i>hole length.</i></li></ul>	<table><tr><th>Drillhole ID</th><th>Easting</th><th>Northing</th><th>Elevation</th><th>Total Depth</th><th>Azi</th><th>Dip</th></tr><tr><td>ISLD20-01A</td><td>683,141</td><td>5,537,859</td><td>1,823</td><td>81.1</td><td>0</td><td>-90</td></tr><tr><td>ISLD20-01C</td><td>683,139</td><td>5,537,861</td><td>1,823</td><td>60.1</td><td>0</td><td>-90</td></tr><tr><td>ISLD20-02</td><td>682,676</td><td>5,538,951</td><td>1,899</td><td>116.8</td><td>0</td><td>-90</td></tr><tr><td>ISLD20-03</td><td>682,498</td><td>5,538,425</td><td>1,775</td><td>113.7</td><td>0</td><td>-90</td></tr></table>	Drillhole ID	Easting	Northing	Elevation	Total Depth	Azi	Dip	ISLD20-01A	683,141	5,537,859	1,823	81.1	0	-90	ISLD20-01C	683,139	5,537,861	1,823	60.1	0	-90	ISLD20-02	682,676	5,538,951	1,899	116.8	0	-90	ISLD20-03	682,498	5,538,425	1,775	113.7	0	-90
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Data aggregation methods	<ul style="list-style-type: none"><li>▪ <i>In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (eg cutting of high grades) and cut-off grades are usually Material and should be stated.</i></li><li>▪ <i>Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.</i></li><li>▪ <i>The assumptions used for any reporting of metal equivalent values should be clearly stated.</i></li></ul>	<ul style="list-style-type: none"><li>▪ No cut-off grades were applied to the exploration results in this announcement</li><li>▪ Coal quality results presented in this announcement are laboratory results for clean coal composites (combined samples) and blended seam composites for carbonisation testing</li><li>▪ The seam blends are not intended to be weighted according to the contribution of each seam to the resource tonnes</li></ul>																																			
Relationship between mineralisation widths and intercept lengths	<ul style="list-style-type: none"><li>▪ <i>These relationships are particularly important in the reporting of Exploration Results.</i></li><li>▪ <i>If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.</i></li><li>▪ <i>If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (eg ‘down hole length, true width not known’).</i></li></ul>	<ul style="list-style-type: none"><li>▪ The results tabulated in this announcement are apparent thicknesses as recorded in drill holes and may be different to the true thickness of the seams, although seam dips are generally moderate (25 degrees) at Isolation South</li></ul>																																			
Diagrams	<ul style="list-style-type: none"><li>▪ <i>Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.</i></li></ul>	<ul style="list-style-type: none"><li>▪ Previous ASX announcements have provided progressive updates on Exploration Results and Coal Resources at Isolation South</li></ul>																																			
Balanced reporting	<ul style="list-style-type: none"><li>▪ <i>Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.</i></li></ul>	<ul style="list-style-type: none"><li>▪ To ensure balance reporting of Exploration Results, the coal quality results include all clean coal composites tested at Isolation South in 2020</li></ul>																																			
Other substantive exploration data	<ul style="list-style-type: none"><li>▪ <i>Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.</i></li></ul>	<ul style="list-style-type: none"><li>▪ Previous ASX announcements have provided progressive updates on Exploration Results and Coal Resources at Isolation South</li></ul>																																			
Further work	<ul style="list-style-type: none"><li>▪ <i>The nature and scale of planned further work (e.g. tests for lateral extensions or depth extensions or large-scale step-out drilling).</i></li><li>▪ <i>Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.</i></li></ul>	<ul style="list-style-type: none"><li>▪ The drilling of LD cored holes will be continued as part of the current exploration program, with 32 LD holes to be completed at Isolation South in 2020</li><li>▪ The cores will be subjected to detailed raw quality, sizing and washability test work, including comprehensive testing of clean coal composites</li><li>▪ Cored boreholes will be a main priority in 2020 to support geotechnical, coal quality and washability requirements to support the planned PFS</li><li>▪ Palaris continues with the interpretation of data and updating 3D geological models of Isolation South, with an update to the resource estimate planned for Q4 2020.</li></ul>																																			