Atrum Coal
COAL FOR STEEL

ASX Release

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Additional Clean Coal Quality Results Reinforce Premium Hard Coking Coal Quality at Elan South

HIGHLIGHTS

- **Detailed analyses of clean coal properties and coking characteristics have been completed by CoalTech on the composite samples from the remaining two large diameter core holes at Elan South.**
- **The latest results indicate similar or better key coking coal properties relative to the first two cored holes (results of which were announced on 4 February 2019).**
- **These include a higher FSI range (7 - 8 vs. 4 - 8), higher reactive macerals (63 - 75% vs. 51 - 70%), and lower basicity indices (0.06 - 0.18 vs 0.14 - 0.31).**
- **Samples from these two cores are expected to yield even higher coke strength after reaction (CSR) values than the first two holes.**
- **The new results also show lower phosphorous content, with most values returned at less than 0.040%.**
- **Further coke characterisation testing, including CSR tests on small carbonisation samples and large movable-wall pilot oven samples, is being conducted by INCAR of Spain and DMT of Germany. Final results are expected in late March.**

Atrum Coal Ltd ("**Atrum**" or the "**Company**") (**ASX: ATU**) is pleased to provide a further coal quality update for the flagship Elan South area of its 100%-owned Elan Hard Coking Coal Project in southwest Alberta, Canada ("**Elan Project**" or "**Elan**").

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Detailed Clean Coal Analysis and Coking Property Testing

Detailed results of coal characterisation tests conducted by CoalTech Petrographic Associates, Inc. (USA) on clean coal composite samples from the remaining two large diameter cored holes at Elan South, Hole ESLD18-02A (Composites No. 8 to 12) and Hole ESLD18-02B (Composites No. 15 to 20), are shown in Tables 1 and 2.

These results indicate the strong potential for even higher CSR and lower phosphorous values relative to the previously announced results from the first two large diameter cored holes at Elan South (ESLD18-01A & 01B; previously announced results are presented in Table 3).

These latest results further reinforce Atrum's confidence in Elan South as a Tier One hard coking coal asset.

Table 1. Clean coal analysis results and coking properties at CF1.45 from CoalTech (Composite samples from cored hole ESLD18-02A)

CF1.45 Parameters	COMP-08	COMP-09	COMP-10	COMP-11	COMP-12
Ash % (adb)	6.5	5.1	6.5	7.0	8.4
Volatile Matter % (adb)	26.1	26.9	26.6	26.2	26.1
Fixed Carbon % (adb)	66.8	67.3	66.7	66.5	65.3
LT Oxidation Test %	98.1	97.3	98.0	98.7	98.6
Calorific Value kcal/kg (adb)	7,984	8,138	7,972	7,920	7,752
Chlorine % adb)	0.03	0.03	0.02	0.02	0.02
Total Sulphur % (adb)	0.72	0.65	0.77	0.77	0.88
Phosphorous % (adb)	0.033	0.014	0.050	0.074	0.028
Gieseler Fluidity (max ddpm)	102	415	392	197	181
FSI (CSN)	7.5	8.0	8.0	8.0	7.5
Hardgrove Grindability Index	97.6	92.3	83.0	88.8	90.2
Basicity Index (base acid ratio)	0.14	0.07	0.14	0.13	0.12
Vitrinite	62.1	58.8	57.5	60.1	58.5
Reactive Semifusinite	11.6	12.3	12.2	9.0	11.3
Total Reactives	74.7	72.6	70.4	70.1	70.6
Inert Semifusinite	11.5	12.2	12.2	9.0	11.3
Micrinite	8.6	10.2	12.4	14.2	12.4
Fusinite	1.5	2.1	1.3	2.6	0.8
Mineral Matter	3.7	2.9	3.7	4.1	4.9
Total Inerts	25.3	27.4	29.6	29.9	29.4
Mean Max. Vitrinite Reflectance %	1.13	1.12	1.14	1.15	1.15

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Table 2. Clean coal analysis results and coking properties at CF1.45 from CoalTech (Composite samples from cored hole ESLD18-02B)

CF1.45 Parameters	COMP-15	COMP-16	COMP-17	COMP-18	COMP-19	COMP-20
Ash % (adb)	7.6	7.8	6.8	7.2	7.4	6.5
Volatile Matter % (adb)	25.8	26.0	26.2	26.1	25.9	25.9
Fixed Carbon % (adb)	65.6	65.2	65.8	65.8	65.6	66.2
LT Oxidation Test %	97.6	98.0	97.6	97.8	98.1	96.8
Calorific Value kcal/kg (adb)	7,777	7,791	7,893	7,886	7,797	7,907
Chlorine % (adb)	0.05	0.04	0.02	0.02	0.02	0.02
Total Sulphur % (adb)	0.53	0.61	0.52	0.61	0.65	0.57
Phosphorous % (adb)	0.015	0.030	0.015	0.033	0.018	0.025
Gieseler Fluidity (max ddpm)	96	137	90	257	76	104
FSI (CSN)	7.0	7.5	7.5	7.5	7.0	7.0
Hardgrove Grindability Index	96.8	105.5	97.8	88.9	92.9	97.7
Basicity Index (base acid ratio)	0.06	0.07	0.06	0.09	0.10	0.18
Vitrinite	45.6	56.5	53.4	55.5	55.7	53.4
Reactive Semifusinite	15.4	11.3	13.2	11.3	12.0	12.0
Total Reactives	62.6	69.0	67.8	67.6	69.0	67.1
Inert Semifusinite	15.3	11.1	13.2	11.1	12.0	12.0
Micrinite	16.8	14.4	13.6	16.2	13.6	16.1
Fusinite	0.9	1.0	1.5	1.0	1.2	1.1
Mineral Matter	4.4	4.5	3.9	4.1	4.2	3.7
Total Inerts	37.4	31.0	32.2	32.4	31.0	17.8
Mean Max. Vitrinite Reflectance %	1.15	1.15	1.17	1.16	1.15	1.16

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Table 3. Previously reported clean coal analysis results and coking properties at CF1.45 from CoalTech (Composite samples from cored holes ESLD18-01A and ESLD18-01B)

CF1.45 Parameters	COMP-01	COMP-02	COMP-03	COMP-04	COMP-05	COMP-06
Ash % (adb)	7.5	5.8	5.4	9.4	4.9	6.0
Volatile Matter % (adb)	24.0	24.0	25.1	25.1	26.7	25.9
Fixed Carbon % (adb)	68.4	70.0	69.3	65.2	68.2	67.9
LT Oxidation Test %	99.2	98.9	99.1	98.4	97.5	98.1
Calorific Value kcal/kg (adb)	7,926	8,090	8,166	7,675	8,230	8,062
Chlorine % (adb)	0.01	0.01	0.01	0.02	0.02	0.02
Total Sulphur % (adb)	0.68	0.65	0.74	0.70	0.75	0.73
Phosphorous % (aab)	0.055	0.063	0.139	0.009	0.126	0.086
Gieseler Fluidity (max ddpm)	31	28	1,560	581	1,700	1,550
FSI (CSN)	3.5	5.0	5.5	4.5	8.0	7.0
Hardgrove Grindability Index	80.9	76.7	74.1	82.8	82.8	81.3
Basicity Index (base acid ratio)	0.16	0.14	0.22	0.31	0.23	0.23
Vitrinite	29.8	28.4	40.9	44.8	54.2	52.1
Reactive Semifusinite	23.4	21.4	16.3	16.4	15.1	14.6
Total Reactives	54.2	50.6	57.7	62.0	69.7	67.2
Inert Semifusinite	23.3	21.4	16.3	16.6	15.2	14.6
Micrinite	17.5	23.7	21.8	14.5	11.8	13.5
Fusinite	0.7	1.0	1.1	1.5	0.5	1.2
Mineral Matter	4.3	3.3	3.1	5.4	2.8	3.5
Total Inerts	45.8	49.4	42.3	38	30.3	32.8
Mean Max. Vitrinite Reflectance %	1.21	1.16	1.17	1.17	1.14	1.16

Note: Table 3 is a copy of Table 6 from the Company's 4 February 2019 ASX announcement entitled "*Initial Coal Quality Results Confirm Premium Hard Coking Coal at Elan South*" for reference purposes. Composites 1 to 3 are from cored hole ESLD18-01A and Composites 4 to 6 from ESLD18-01B.

Further Coal Quality Testing

The final phase of the current coal quality program involves further coke characterisation test work on the 2018 cored coal samples, including more testing on coke strength after reaction (CSR) via both small scale carbonisation and movable-wall pilot oven tests. These tests are currently being conducted by INCAR of Spain and DMT of Germany. Final results are expected in the second half of March.

At that time, Atrum plans to provide a comprehensive update, including final detailed test results and an analysis of potential preliminary product specifications for Elan South coal.

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Additional Information

The large diameter core samples being analysed were taken from two drill sites at Elan South during the 2018 exploration program. They provide key information relating to coal quality and potential product specification. The results should be taken as a potential representation of likely coal quality attributes and are a substantial step forward in Atrum's exploration and development effort at the Elan Project.

Further drilling, sampling and testing is planned to be undertaken in order to fully confirm coal quality and coking properties from a wider range of locations at Elan South. In conjunction with consideration of optimal processing design, a final product specification can then be established for Elan South coal.

Further Details and Competent Persons Statement

For further details of the Elan South Exploration Results and the Competent Persons Statement as related to that update, refer to the Company's announcement to ASX on 4 February 2019 entitled *"Initial Coal Quality Results Confirm Premium Hard Coking Coal at Elan South"* .

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