Atrum Coal
COAL FOR STEEL

ASX Release

2 April 2019

Initial High-Grade Anthracite Resource Defined at Panorama North

HIGHLIGHTS

- **Maiden Inferred JORC Resource estimate of 174Mt for Panorama North**
- **Multiple seams intersected in fully cored holes across 17 sites drilled over the past 3 years**
- **Approximately 50% of resource estimate at less than 100m depth and total resource conservatively limited to 200m depth for potential open cut mining**
- **Samples exhibit characteristics of a high-grade anthracite with reflectance (R_oMax) range of 2.6-3.3% and clean coal volatile matter (VM) of 5-7%**
- **A simplified high-level Scoping Study to be undertaken during 2019**
- **JOGMEC has now earned in to a 35% equitable interest in Panorama North following sole exploration funding of C$5 million**
- **Panorama North is adjacent to Atrum's 100%-owned Groundhog Project, which hosts a 1.02 billion tonne JORC Resource estimate**

Atrum Coal Ltd ("**Atrum**" or the "**Company**") (**ASX: ATU**) is pleased to announce an initial JORC Resource estimate for its Panorama North Project located in north-west British Columbia ("**BC**"), Canada.

Managing Director, Max Wang, commented: "*Successful drilling and field programs over the past three years, which were fully funded by our project partner at Panorama North, JOGMEC, have placed the JV in a position to announce this maiden JORC resource of high-grade anthracite. Atrum and JOGMEC now plan to undertake an early-stage development pathway study on Panorama North during 2019 in order to evaluate potential development options for the project.*

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Key Projects

Elan Coal	Ownership: 100%
Groundhog	Ownership: 100%
Bowron River	Ownership: 100%

"Although Atrum has its main focus on accelerating the exploration and development of the Elan Hard Coking Coal Project in Alberta, we will continue to explore opportunities to extract value from the large-scale anthracite development potential at Panorama, and our neighbouring Groundhog project, in northern BC."

About the Panorama North Anthracite Project

The Panorama North Project is located in north-west BC, Canada (refer Figure 1). It consists of 12 coal licences and covers an area of approximately 74km^2. The Company has a Joint Exploration Agreement over Panorama North ("**Panorama North JEA**") with Japan Oil, Gas and Metals National Corporation ("**JOGMEC**"). JOGMEC has now earned a 35% equitable interest in the Panorama North Project via the Panorama North JEA by sole spending C$5M in exploration expenditure across Panorama North over the past three years.

Panorama North is adjacent to Atrum's 100%-owned Groundhog Project (refer Figure 2), which hosts a 1.02 billion tonne JORC Resource estimate.

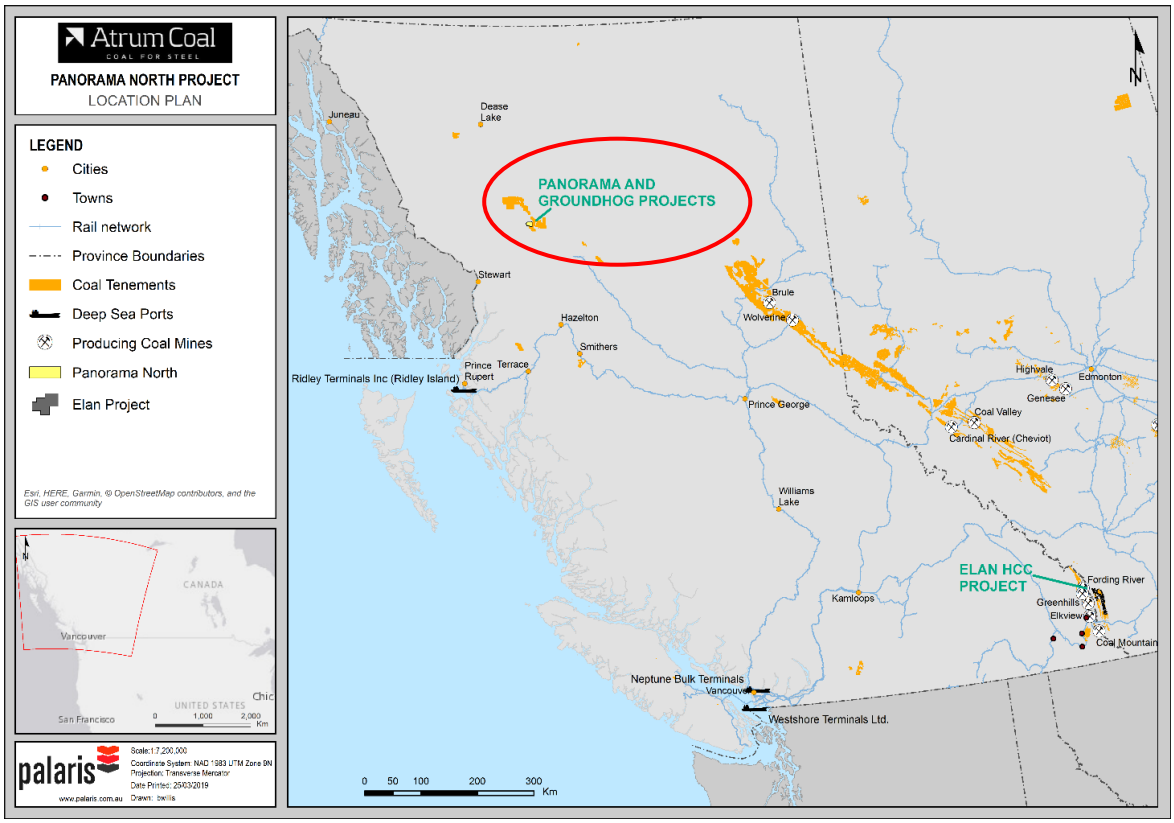

Figure 1. Location of Panorama and Groundhog Projects, British Columbia, Canada

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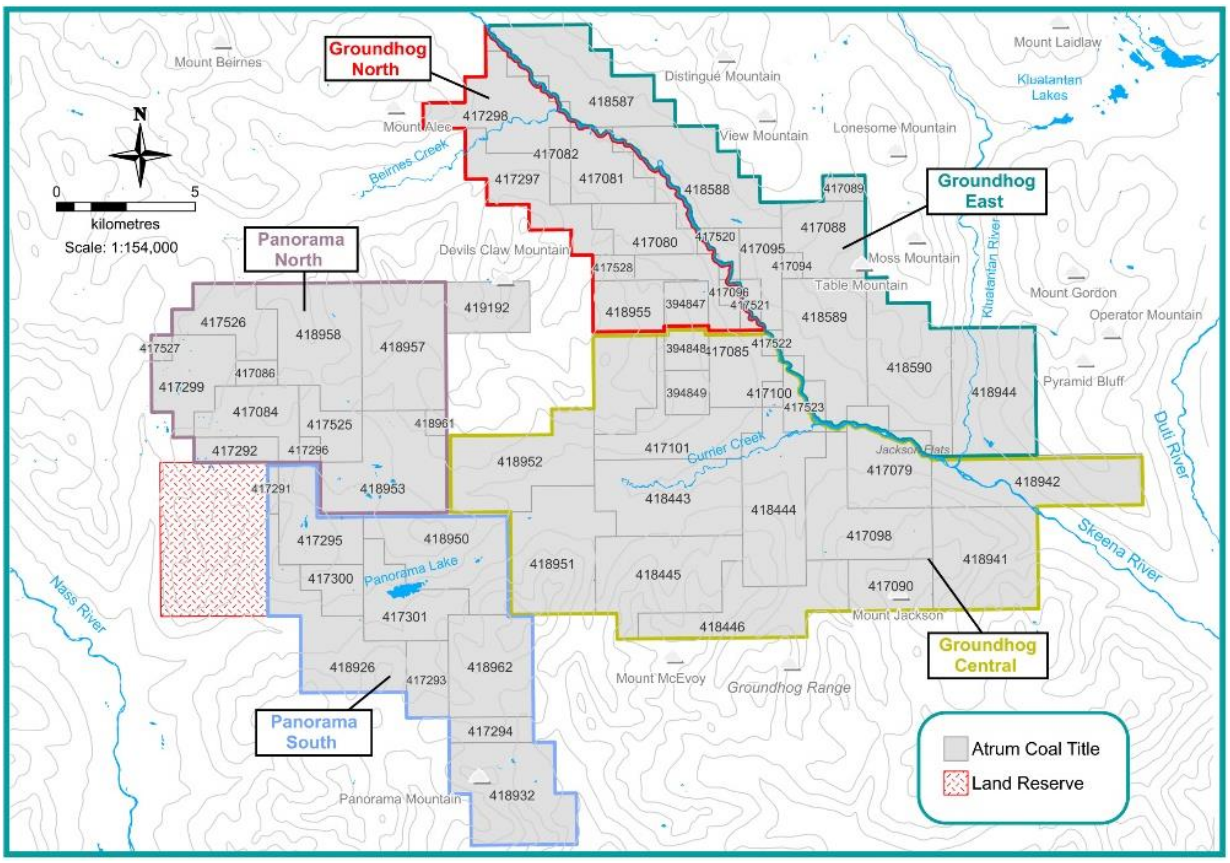

Figure 2. Panorama North and Groundhog Anthracite Projects

Exploration and JORC Resources

Atrum retained Palaris Australia Pty ("**Palaris**") to assist in interpreting and modelling the geology of the Panorama North Project site. This work has resulted in the definition of a maiden JORC Resource estimate of 174Mt at Inferred classification (refer Table 1 and Table 8 in Appendix A).

The data examined included that obtained from three years of JOGMEC-funded field exploration (2016 to 2018), including field mapping, geological surveying and fully cored diamond drilling. Fully cored holes have been completed at 17 sites, with HQ3 (61.1mm diameter) coring undertaken to an aggregate depth of 4,458m (refer Figure 3 and Figure 7 in Appendix A). Information from historical exploration by different parties (primarily surface mapping and sampling) was also used to aid the geological interpretation and modelling.

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Table 1. Panorama North Coal Resources by Seam (at 31 March 2019)

CLASS	SEAM	RESOURCES (Mt)	SEAM THICK (m)
INFERRED	CLAW A2	10	1.01
INFERRED	CLAW B1	14	1.13
INFERRED	CLAW B2	4	0.62
INFERRED	CLAW B3	7	0.52
INFERRED	CLAW B4	8	0.61
INFERRED	CLAW C1	39	1.73
INFERRED	CLAW C2	7	0.51
INFERRED	CLAW C3	5	0.49
INFERRED	CLAW D1	40	1.87
INFERRED	CLAW D2	12	0.58
INFERRED	CLAW D3	9	0.83
INFERRED	CLAW E1	7	0.72
INFERRED	CLAW E2	7	0.57
INFERRED	CLAW F1	7	0.63
TOTAL		**174**	

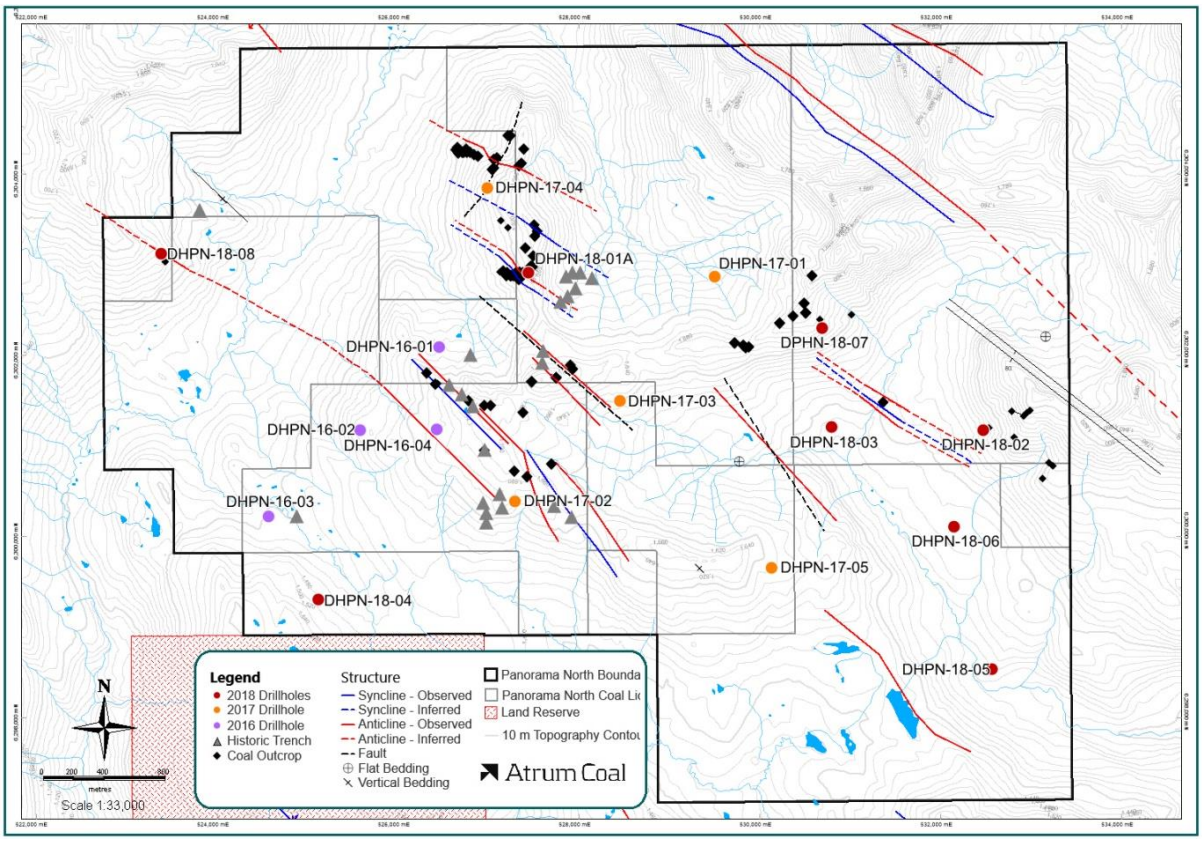

Figure 3. Panorama North drillhole locations and interpreted structural features

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All but two drillholes were geophysically logged by Century Wireline Services with a suite of tools including natural gamma, caliper, long and short spaced density, resistivity, deviation and dipemter. Coal samples from each of the three exploration programs were sent to an independent laboratory (GWIL Birtley Coal Laboratory) in Calgary, Canada, for testing and analysis. The samples from different drillholes collected over the past three years display similar coal quality characteristics. Tables 4 and 5 in Appendix A list details of all drillholes and intersections.

Geology and Stratigraphy

The Panorama North Project is located in the Groundhog Coalfield within the Bowser Basin, containing coal deposits that are Late Jurassic to Early Cretaceous in age.

The Bowser Basin sedimentary sequence experienced two major deformational events. The former (F1), being of higher intensity, resulted from northeast-southwest compression during the uplift of the Coast Crystalline Belt, resulting in the northwest-southeast trending Beirnes Synclinorium as the dominant regional structure with associated folding and thrust-faulting. The latter, less intense phase of northwest-southeast compressional deformation (F2) resulted in broad, open folds and flat-lying thrusts. Refer to Figures 3 and 4 for interpreted structural features and stratigraphy.

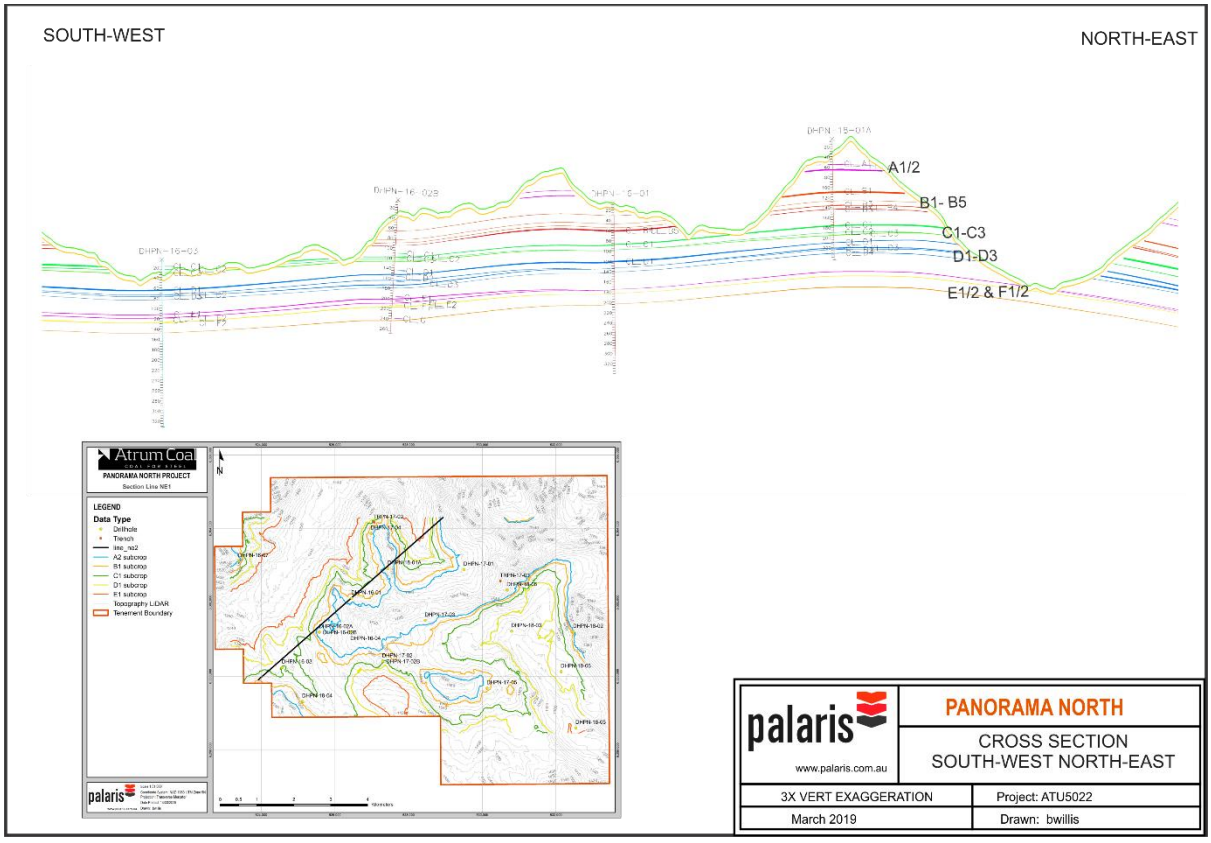

Figure 4. Panorama North cross section (south-west to north-east)

Target Seams and Resource Cut-Off Limits

The target coal seams at the Panorama North Project are located within the Jurassic to early Cretaceous Currier Formation of the Bowser Lake Group. The coal seams are anthracitic with high rank indicated by vitrinite reflectance (RoMax) ranging from 2.6% to 3.3%. The coal seams are laterally persistent but show variability in terms of the thickness, number of partings and coal quality attributes. A borehole profile type section is shown in Figure 5.

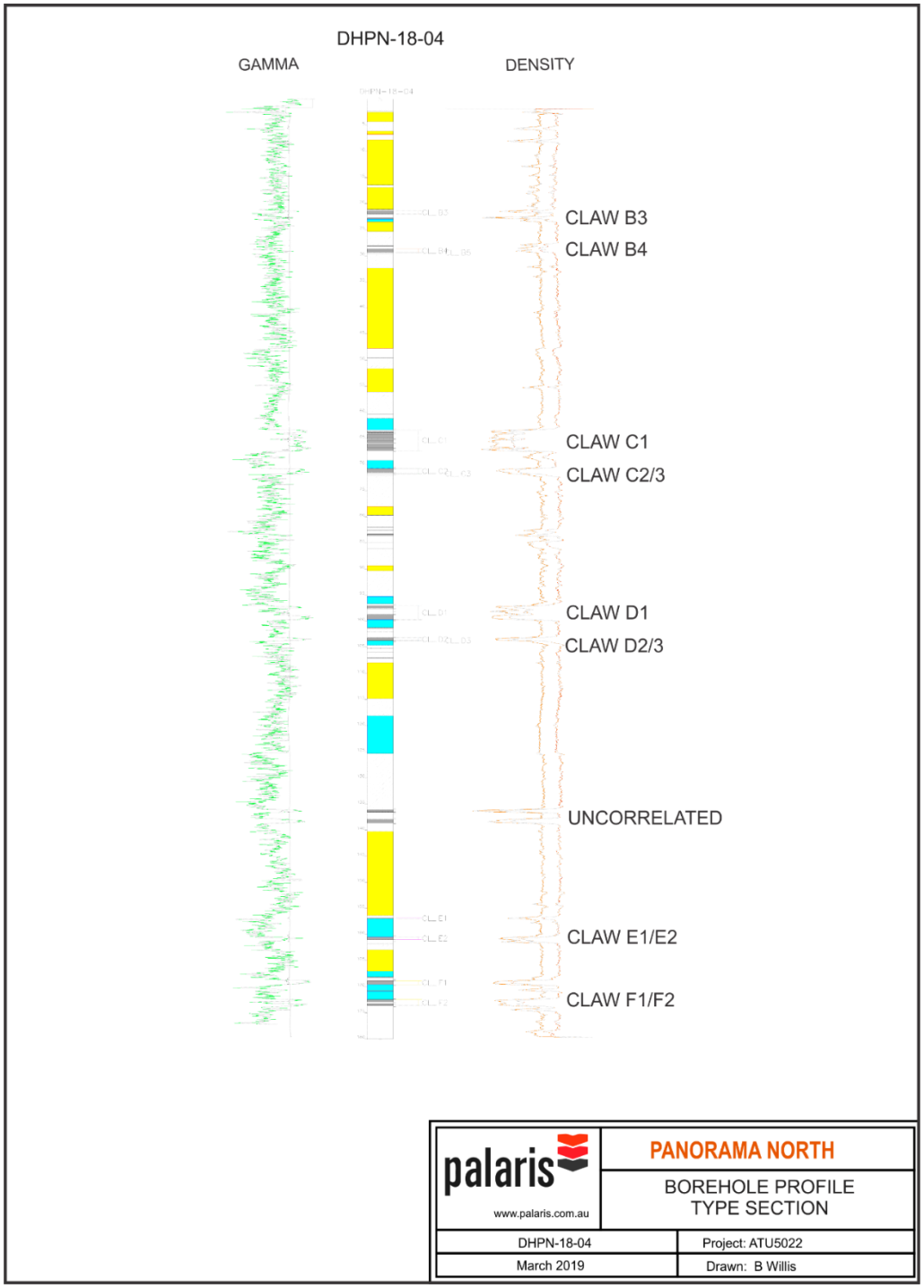

Figure 5. Borehole profile type section

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Through the central part of the ridgeline at higher elevations, all of the seams in the sequence are present. In a north-westerly direction heading towards Biernes Creek, and in the areas of lower elevation, the seams sequentially subcrop / outcrop on the northern slope of the ridgeline.

Coal seams CLAW B1, C1 and D1 are the thickest and most well developed seams in the Panorama North area. CLAW B1 reaches up to 2.47m thick and has an average thickness of 1.32m. CLAW C1 reaches a maximum of 3.96m (possibly inclined) with an average thickness of 1.68m. CLAW D1 achieves a maximum thickness of 3.8m (possibly inclined) with an average thickness of 1.7m.

The remainder of the seams are generally quite thin (mostly < 1m thick), however have potential for open cut mining. The resource estimates are all conservatively limited to 200m depth for potential open cut mining, although several seams (B1, C1 and D1) may have the potential for underground extraction as well. The minimum thickness of a coal seam included in the resource estimate is 0.3m. Table 2 lists the estimate of resources at various depth of cover subsets, showing 87Mt of the Inferred resource occurs at depths of less than 100m.

Table 2. Panorama North resources by depth of cover subsets

Depth Range	Resources (Mt)
0 – 50	36
50 – 100	51
100 – 150	51
150 – 200	36
Total	**174**

Coal Quality

The coal seams of the Cretaceous Currier Formation are anthracitic with vitrinite reflectance (R_oMax) values ranging from 2.6% to 3.3%. Coal rank is known to significantly increase towards the base of the sequence in line with Hilt's Law.

A total of 134 individual ply samples of HQ3 (61.1mm diameter) core, representative of selected coal units and their associated partings from the 2016, 2017 and 2018 drilling programs were dispatched to GWIL Birtley, an ASTM accredited laboratory in Calgary, Alberta, for quality analysis. Tables 6 and 7 in Appendix A show the quality results for raw coal and clean coal, respectively. The coal seams exhibit raw ash values that generally range between 20 - 40% (ad), with some outliers noted. Petrography and maceral analysis are currently being carried out at CoalTech (USA) laboratories on clean coal composite samples provided by Birtley. A historical sample tested by Gulf Canada Resources for maceral analysis showed a high vitrinite content of 83.6%, with 5.1% semi-fusinite, 1.1% macrinite and 9.9% mineral matter.

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Testing of clean coal composites at CF1.70 shows moderate yield (39-76%) with moderate ash content (6.4-19.2%, with the majority being 10-17%) for anthracite, while total sulphur is considered low at mostly within 1% and phosphorous is considered high at mostly above 0.1%. Total sulphur content is vastly improved through washing.

The clean coal results at CF1.70 also show low volatiles (5 - 7%) and high calorific value generally ranging from 6,700 to 7,500 kcal/kg (ad). The clean coal VM of 5 – 7% could classify this coal as high-grade anthracite.

Next Steps

Further coal quality results for Panorama North (petrography and maceral analysis) are expected to be received in the coming weeks.

JOGMEC has now earned in to a 35% equitable interest in the Panorama North Project following its sole spending of C$5 million on the project. As a result, Atrum (65%) and JOGMEC (35%) are now fully contributing exploration joint venture partners on Panorama North going forward.

Current planning is for a simplified high-level Scoping Study to be undertaken on Panorama North over the course of 2019. This is targeted to evaluate various development options for the project including infrastructure solutions, capital expenditure requirements and expected mining economics.

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APPENDIX A: GEOLOGICAL, DRILLHOLE AND COAL QUALITY DATA

Target Seams and Resource Cut-off Limits

Resource classification has been undertaken by a defined set of maximum distances from seam intersections in cored boreholes for Inferred resources. The distances (in metres) that may represent the maximum distances between points of observation for the resource classification are shown in Table 3 below. The minimum thickness of a coal seam included in the resource estimate is 0.3m, while the maximum depth of the resource estimate is conservatively limited to 200m.

A resource classification plan showing Inferred resource polygons for the C1 seam is shown in Figure 6 below. Coal resources were estimated by Palaris using Dassault Systems' GEOVIA Minex (version 6.5.2) software. Coal seams included in the resource estimate are those seams with an adequate quantity and distribution of data points (structure and coal quality), and that are considered to meet the 'reasonable prospects' assessment.

Table 3. Borehole spacing (radii) for resource classification

Class	Measured	Indicated	Inferred
Between Boreholes	NA	NA	1,000 m
Extrapolated	NA	NA	750 m

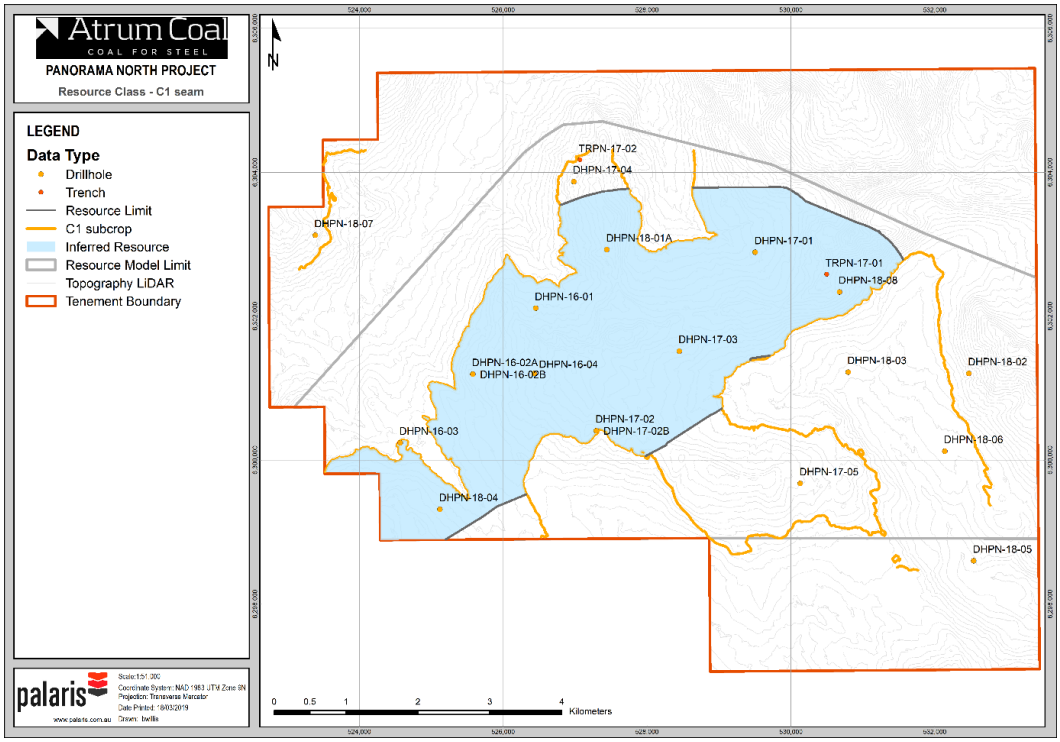

Figure 6. Inferred resource classification polygon (C1 seam)

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Drillhole Data

Table 4. Borehole & trench details of the 2016, 2017 and 2018 drilling programs

Year	Type	Hole Name	Easting	Northing	Elevation	TD	Azimuth	Dip
2016	Drillhole	DHPN-16-01	526,453	6,302,112	1,523	335.4	0	-90
2016	Drillhole	DHPN-16-02A	525,578	6,301,194	1,528	41.0	0	-90
2016	Drillhole	DHPN-16-02B	525,578	6,301,194	1,528	263.5	0	-90
2016	Drillhole	DHPN-16-03	524,570	6,300,241	1,411	326.0	0	-90
2016	Drillhole	DHPN-16-04	526,431	6,301,202	1,637	269.0	0	-90
2017	Drillhole	DHPN-17-01	529,504	6,302,889	1,537	317.0	0	-90
2017	Drillhole	DHPN-17-02	527,296	6,300,409	1,646	219.5	0	-90
2017	Drillhole	DHPN-17-02B	527,296	6,300,409	1,646	16.5	0	-90
2017	Drillhole	DHPN-17-03	528,451	6,301,514	1,600	286.5	0	-90
2017	Drillhole	DHPN-17-04	526,983	6,303,870	1,564	156.0	40	-70
2017	Drillhole	DHPN-17-05	530,131	6,299,677	1,581	248.5	0	-90
2017	Trench	TRPN-17-01	530,496	6,302,583	1,762	2.4	0	-90
2017	Trench	TRPN-17-02	527,066	6,304,173	1,513	1.6	0	-90
2018	Drillhole	DHPN-18-01A	527,442	6,302,925	1,646	239.4	0	-90
2018	Drillhole	DHPN-18-02	532,474	6,301,205	1,528	178.7	0	-90
2018	Drillhole	DHPN-18-03	530,798	6,301,223	1,369	242.8	0	-90
2018	Drillhole	DHPN-18-04	525,122	6,299,316	1,480	272.8	0	-90
2018	Drillhole	DHPN-18-05	532,542	6,298,601	1,276	291.4	0	-90
2018	Drillhole	DHPN-18-06	532,141	6,300,125	1,373	259.4	0	-90
2018	Drillhole	DHPN-18-07	523,389	6,303,124	1,515	224.0	0	-90
2018	Drillhole	DHPN-18-08	530,676	6,302,337	1,691	253.8	0	-90

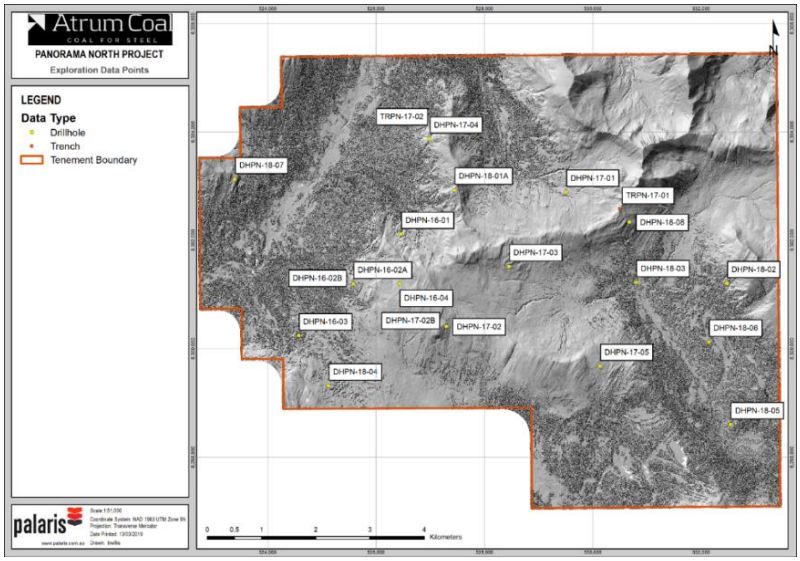

Figure 7. Panorama North drillhole locations

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Table 5. Coal seam statistics from borehole intersections

Borehole	Seam	From (m)	To (m)	Thick (m)	Borehole	Seam	From (m)	To (m)	Thick (m)
DHPN-16-01	CL_B4	55.32	55.85	0.53	DHPN-17-03	CL_F2	266.20	266.31	0.11
DHPN-16-01	CL_B5	56.32	57.13	0.81	DHPN-17-05	CL_B1	16.99	17.18	0.19
DHPN-16-01	CL_C1	82.14	83.36	1.22	DHPN-17-05	CL_B2	22.69	22.76	0.07
DHPN-16-01	CL_D1	114.91	117.25	2.34	DHPN-17-05	CL_B4	59.44	60.05	0.61
DHPN-16-02B	CL_C1	105.32	105.74	0.42	DHPN-17-05	CL_C1	83.63	84.21	0.58
DHPN-16-02B	CL_C2	110.50	110.60	0.10	DHPN-17-05	CL_C2	107.63	107.78	0.15
DHPN-16-02B	CL_C3	113.85	114.54	0.69	DHPN-17-05	CL_D1	127.69	128.74	1.05
DHPN-16-02B	CL_D1	138.96	139.98	1.02	DHPN-17-05	CL_D2	154.47	154.69	0.22
DHPN-16-02B	CL_D2	151.35	151.97	0.62	DHPN-17-05	CL_D3	162.49	162.72	0.23
DHPN-16-02B	CL_D3	160.27	161.32	1.05	DHPN-18-01A	CL_A1	50.32	50.56	0.24
DHPN-16-02B	CL_E1	190.92	192.03	1.11	DHPN-18-01A	CL_A2	60.01	62.01	2.00
DHPN-16-02B	CL_E2	199.54	200.03	0.49	DHPN-18-01A	CL_B1	104.06	106.53	2.47
DHPN-16-02B	CL_F1	207.39	208.23	0.84	DHPN-18-01A	CL_B3	131.35	131.96	0.61
DHPN-16-02B	CL_G	233.98	234.64	0.66	DHPN-18-01A	CL_B4	139.13	139.47	0.34
DHPN-16-03	CL_C1	12.43	14.73	2.30	DHPN-18-01A	CL_C1	171.27	173.11	1.84
DHPN-16-03	CL_C2	19.08	19.62	0.54	DHPN-18-01A	CL_C2	185.35	185.57	0.22
DHPN-16-03	CL_C3	25.68	26.57	0.89	DHPN-18-01A	CL_C3	190.65	191.26	0.61
DHPN-16-03	CL_D1	58.83	60.94	2.11	DHPN-18-01A	CL_D1	205.58	206.24	0.66
DHPN-16-03	CL_D2	68.69	68.88	0.19	DHPN-18-01A	CL_D2	215.65	216.70	1.05
DHPN-16-03	CL_D3	72.06	72.17	0.11	DHPN-18-01A	CL_D3	219.08	219.24	0.16
DHPN-16-03	CL_E1	107.32	107.95	0.63	DHPN-18-01A	CL_D4	226.66	227.11	0.45
DHPN-16-03	CL_E2	114.10	114.61	0.51	DHPN-18-02	CL_A2	6.08	8.24	2.16
DHPN-16-03	CL_F1	123.44	123.95	0.51	DHPN-18-02	CL_B1	33.50	35.33	1.83
DHPN-16-04	CL_A2	27.89	28.43	0.54	DHPN-18-02	CL_B3	51.82	51.99	0.17
DHPN-16-04	CL_B1	58.44	59.54	1.10	DHPN-18-02	CL_B4	69.37	70.42	1.05
DHPN-16-04	CL_B2	77.19	77.47	0.28	DHPN-18-02	CL_C1	95.91	98.26	2.35
DHPN-16-04	CL_B3	83.18	84.20	1.02	DHPN-18-02	CL_C2	110.87	111.06	0.19
DHPN-16-04	CL_B4	88.15	88.97	0.82	DHPN-18-02	CL_C3	112.18	112.33	0.15
DHPN-16-04	CL_B5	92.99	93.43	0.44	DHPN-18-02	CL_D1	126.57	127.82	1.25
DHPN-16-04	CL_C1	111.42	111.72	0.30	DHPN-18-02	CL_D2	149.97	150.71	0.74
DHPN-16-04	CL_C2	120.88	121.58	0.70	DHPN-18-02	CL_D3	156.76	156.79	0.03
DHPN-16-04	CL_C3	125.00	125.20	0.20	DHPN-18-03	CL_E1	50.22	50.67	0.45
DHPN-16-04	CL_D1	143.08	145.19	2.11	DHPN-18-03	CL_E2	55.54	55.86	0.32
DHPN-16-04	CL_D2	155.94	156.13	0.19	DHPN-18-03	CL_F1	67.87	68.37	0.50
DHPN-16-04	CL_D3	158.70	159.49	0.79	DHPN-18-03	CL_F2	76.37	77.42	1.05
DHPN-16-04	CL_E1	202.16	203.27	1.11	DHPN-18-03	CL_G	98.26	99.00	0.74
DHPN-16-04	CL_E2	205.02	206.16	1.14	DHPN-18-04	CL_B3	21.41	22.00	0.59
DHPN-16-04	CL_F1	212.04	212.68	0.64	DHPN-18-04	CL_B4	28.69	29.40	0.71
DHPN-16-04	CL_F2	213.60	214.57	0.97	DHPN-18-04	CL_C1	63.38	67.34	3.96
DHPN-16-04	CL_G	233.14	234.03	0.89	DHPN-18-04	CL_C2	70.75	71.75	1.00
DHPN-17-01	CL_A2	47.00	47.25	0.25	DHPN-18-04	CL_D1	97.02	99.72	2.70
DHPN-17-01	CL_B1	66.07	67.10	1.03	DHPN-18-04	CL_D2	103.20	103.72	0.52
DHPN-17-01	CL_B2	81.82	82.51	0.69	DHPN-18-04	CL_E1	156.85	156.97	0.12
DHPN-17-01	CL_B3	91.01	91.34	0.33	DHPN-18-04	CL_E2	160.49	161.02	0.53
DHPN-17-01	CL_B4	97.19	98.00	0.81	DHPN-18-04	CL_F1	168.86	169.60	0.74
DHPN-17-01	CL_C1	109.75	112.87	3.12	DHPN-18-04	CL_F2	172.49	173.66	1.17
DHPN-17-01	CL_C2	129.18	129.73	0.55	DHPN-18-04	CL_G	188.70	189.10	0.40

Borehole	Seam	From (m)	To (m)	Thick (m)		Borehole	Seam	From (m)	To (m)	Thick (m)
DHPN-17-01	CL_D1	147.25	149.68	2.43		DHPN-18-06	CL_C2	21.58	22.75	1.17
DHPN-17-01	CL_D2	155.37	156.00	0.63		DHPN-18-06	CL_D1	38.60	39.95	1.35
DHPN-17-01	CL_D3	156.25	158.28	2.03		DHPN-18-06	CL_D2	65.71	67.61	1.90
DHPN-17-02	CL_C1	19.50	20.02	0.52		DHPN-18-06	CL_E1	117.98	118.52	0.54
DHPN-17-02	CL_C2	25.56	25.84	0.28		DHPN-18-07	CL_A2	10.58	12.16	1.58
DHPN-17-02	CL_C3	31.77	32.34	0.57		DHPN-18-07	CL_B1	51.43	53.67	2.24
DHPN-17-02	CL_D2	60.21	60.99	0.78		DHPN-18-07	CL_C1	85.75	88.72	2.97
DHPN-17-02	CL_E1	101.01	101.98	0.97		DHPN-18-07	CL_C2	108.15	108.90	0.75
DHPN-17-02	CL_E2	104.30	105.10	0.80		DHPN-18-07	CL_C3	111.76	112.08	0.32
DHPN-17-02	CL_F1	113.46	114.29	0.83		DHPN-18-07	CL_D1	132.38	133.44	1.06
DHPN-17-03	CL_A2	38.84	40.72	1.88		DHPN-18-07	CL_D2	139.29	139.66	0.37
DHPN-17-03	CL_B1	72.33	73.03	0.70		DHPN-18-07	CL_D3	142.56	143.00	0.44
DHPN-17-03	CL_B2	81.34	81.50	0.16		DHPN-18-07	CL_E1	187.44	187.86	0.42
DHPN-17-03	CL_B3	89.32	89.84	0.52		DHPN-18-07	CL_E2	194.84	195.68	0.84
DHPN-17-03	CL_B4	96.70	96.94	0.24		DHPN-18-07	CL_F1	199.29	199.42	0.13
DHPN-17-03	CL_B5	98.36	98.56	0.20		DHPN-18-08	CL_A1	69.70	70.04	0.34
DHPN-17-03	CL_C1	124.15	126.07	1.92		DHPN-18-08	CL_A2	77.33	77.84	0.51
DHPN-17-03	CL_C2	138.61	138.85	0.24		DHPN-18-08	CL_B1	97.83	98.86	1.03
DHPN-17-03	CL_C3	142.93	143.21	0.28		DHPN-18-08	CL_B2	104.00	104.78	0.78
DHPN-17-03	CL_D1	172.22	176.02	3.80		DHPN-18-08	CL_B3	112.22	112.72	0.50
DHPN-17-03	CL_D2	192.30	192.69	0.39		DHPN-18-08	CL_B4	118.60	119.65	1.05
DHPN-17-03	CL_D3	194.94	195.30	0.36		DHPN-18-08	CL_C1	137.00	137.38	0.38
DHPN-17-03	CL_D4	206.69	207.46	0.77		DHPN-18-08	CL_C2	149.00	149.28	0.28
DHPN-17-03	CL_E1	250.66	250.74	0.08		DHPN-18-08	CL_D1	177.32	177.52	0.20
DHPN-17-03	CL_E2	254.31	254.83	0.52		DHPN-18-08	CL_D2	200.32	200.60	0.28

Coal Quality Results

Table 6. Raw quality results from core samples – seam composite values

Seam	Value	Boreholes Sampled	ARD	RD	ASH % (ad)	IM % (ad)	VM % (ad)	FC % (ad)	TS %	CV kcal/ kg(ad)
CLAW B1	Mean value:	2	1.82		44.9	1.66	7.3	46.2	2.36	4,111
CLAW B1	Max value:	2	1.96		49.9	1.83	7.9	59.4	3.11	5,329
CLAW B1	Min value:	2	1.53		33.0	1.6	5.7	40.6	0.56	3,603
CLAW B3	Mean value:	1	1.6		37.8	1.01	6.2	55.0	0.73	4,871
CLAW B3	Max value:	1	1.64		37.8	1.01	6.2	55.0	0.73	4,871
CLAW B3	Min value:	1	1.54		37.8	1.01	6.2	55.0	0.73	4,871
CLAW C1	Mean value:	4	1.63	1.41	29.7	1.27	8.1	61.0	0.62	5,411
CLAW C1	Max value:	4	1.67	1.41	35.7	1.4	11.1	63.0	0.72	5,745
CLAW C1	Min value:	4	1.58	1.41	25.1	0.85	6.8	56.1	0.53	4,891
CLAW C2	Mean value:	1	1.62		23.6	1.93	5.0	69.5	0.99	6,052
CLAW C2	Max value:	1	1.62		23.6	1.93	5.0	69.5	0.99	6,052
CLAW C2	Min value:	1	1.62		23.6	1.93	5.0	69.5	0.99	6,052
CLAW C3	Mean value:	1	1.64	1.58	25.5	0.94	8.3	65.3	4.90	5,880
CLAW C3	Max value:	1	1.64	1.58	25.5	0.94	8.3	65.3	4.90	5,880

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CLAW C3	Min value:	1	1.64	1.58	25.5	0.94	8.3	65.3	4.90	5,880
CLAW D1	Mean value:	4	1.61	1.48	39.8	1.32	8.1	50.8	1.76	4,778
CLAW D1	Max value:	4	1.66	1.54	41.8	1.65	10.9	56.8	2.20	5,192
CLAW D1	Min value:	4	1.58	1.45	32.4	0.8	6.3	49.3	1.51	4,405
CLAW D2	Mean value:	2	1.63		29.8	1.34	6.7	62.2	2.49	5,514
CLAW D2	Max value:	2	1.67		34.7	1.36	7.5	70.3	2.76	6,234
CLAW D2	Min value:	2	1.54		22.7	1.33	5.7	56.5	2.10	5,008
CLAW E1	Mean value:	1	1.59	1.42	25.9	1.21	5.8	67.2	1.17	6,023
CLAW E1	Max value:	1	1.59	1.42	25.9	1.21	5.8	67.2	1.17	6,023
CLAW E1	Min value:	1	1.59	1.42	25.9	1.21	5.8	67.2	1.17	6,023
CLAW F1	Mean value:	1	1.65	1.72	29.7	1.66	9.3	59.3	0.73	5,376
CLAW F1	Max value:	1	1.65	1.72	29.7	1.66	9.3	59.3	0.73	5,376
CLAW F1	Min value:	1	1.65	1.72	29.7	1.66	9.3	59.3	0.73	5,376
CLAW F2	Mean value:	1			38.5	1.12	7.1	53.3	1.43	4,643
CLAW F2	Max value:	1			38.5	1.12	7.1	53.3	1.43	4,643
CLAW F2	Min value:	1			38.5	1.12	7.1	53.3	1.43	4,643

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Table 7. Clean coal parameters from core samples (clean coal composites at CF1.70)

Borehole-ID	Seam	From (m)	To (m)	Yield %	IM % (db)	Ash % (db)	VM % (db)	FC % (db)	CV kcal/kg (ad)	TS % (ad)	Phos % (db)	HGI
PN-17-04	Claw B1	126.21	127.23	75.70	0.7	12.3	7.5	79.5	7,262	1.54	0.100	45
DHPN-18-01A	Claw B1	104.06	105.84	36.55	1.7	15.0	7.3	76.0	6,861	1.40	0.078	
DHPN-18-07	Claw B1	52.49	52.93	63.60	1.2	6.7	7.2	85.0	7,653	0.50	0.106	
DHPN-18-08	Claw B1	97.83	99.37	45.60	1.3	17.0	6.7	75.1	6,788	0.55	0.128	
PN-16-01	Claw B4	55.38	55.73	38.70	1.0	19.2	5.7	74.1	6,670	2.20		
PN-16-01	Claw B5	56.32	57.13	53.10	0.8	10.2	6.0	83.0	7,514	0.83		
PN-17-03	Claw C1	125.12	126.07	46.20	0.9	16.1	7.2	75.8	6,847	0.48	0.152	46
PN-16-01	Claw C1	82.14	83.36	44.70	1.0	18.9	6.0	74.1	6,659	0.81		
PN-16-02B	Claw C1	105.32	105.74	64.20	1.0	10.2	7.5	81.3	7,415	0.83		
PN-16-03	Claw C1	13.83	14.33	59.50	0.9	15.1	5.5	78.5	7,059	0.45		
DHPN-18-01A	Claw C1	171.27	173.11	48.40	1.3	12.4	7.4	78.9	7,149	0.61	0.178	
DHPN-18-02	Claw C1	95.91	98.15	54.62	1.6	10.5	7.2	80.7	7,213	0.52	0.080	
DHPN-18-04	Claw C1	63.59	66.90	53.96	1.8	10.6	7.6	80.0	7,161	0.48	0.101	
DHPN-18-07	Claw C1	85.75	87.55	48.72	1.4	17.4	6.8	74.5	6,675	0.46	0.134	
DHPN-18-04	Claw C2	70.80	71.55	46.74	1.4	14.7	6.6	77.4	6,865	2.53	0.045	
DHPN-18-06	Claw C2	21.58	22.75	67.53	0.8	10.3	4.9	84.1	7,406	0.76	0.103	
PN-17-01	Claw D1	148.25	149.68	64.40	0.9	12.5	6.7	79.9	7,156	0.65	0.129	39
PN-17-03	Claw D1	172.83	175.39	54.40	1.0	16.4	7.8	74.8	6,761	1.05	0.121	46
PN-16-01	Claw D1	114.91	117.25	38.90	1.1	14.9	6.4	77.6	6,996	1.23		
DHPN-18-04	Claw D1	97.02	97.55	50.94	0.8	8.3	6.2	84.7	7,604	0.52	0.083	
DHPN-18-04	Claw D1	98.83	99.72	65.20	1.4	6.4	7.8	84.4	7,586	0.51	0.104	
PN-17-01	Claw D3	156.25	157.15	56.90	0.9	16.4	6.4	76.4	6,851	0.53	0.136	40
PN-16-04	Claw E1	202.16	203.12	63.30	0.9	11.5	5.8	81.8	7,381	0.57		
PN-17-02	Claw F1	113.46	114.29	56.50	0.9	15.4	6.6	77.1	6,782	0.73	0.239	41

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JORC Resource Estimate by Seam with Coal Quality Attributes

Table 8. Panorama North Coal Resources by seam with raw coal quality attributes

SEAM	RESOURCE (Mt)	ARD	ASH %	VM %	FC %	TS %	IM %	CV KCAL/KG
CLAW A2	10	-	-	-	-	-	-	-
CLAW B1	14	1.82	44.9	7.3	46.2	2.36	1.66	4,111
CLAW B2	4	-	-	-	-	-	-	-
CLAW B3	7	1.60	37.8	6.2	55.0	0.73	1.01	4,871
CLAW B4	8	-	-	-	-	-	-	-
CLAW C1	39	1.63	29.7	8.1	61.0	0.62	1.27	5,411
CLAW C2	7	1.62	23.6	5.0	69.5	0.99	1.93	6,052
CLAW C3	5	1.64	25.5	8.3	65.3	4.9	0.94	5,880
CLAW D1	40	1.61	39.8	8.1	50.8	1.76	1.32	4,778
CLAW D2	12	1.63	29.8	6.7	62.2	2.49	1.34	5,514
CLAW D3	9	-	-	-	-	-	-	-
CLAW E1	7	1.59	25.9	5.8	67.2	1.17	1.21	6,023
CLAW E2	7	-	-	-	-	-	-	-
CLAW F1	7	1.65	29.7	9.3	59.3	0.73	1.66	5,376
TOTAL	**174**							

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APPENDIX B: COMPETENT PERSON'S STATEMENT

JORC Competent Person Declaration

This resource estimate is based on information compiled by Mr Brad Willis, who is a Member of the Australasian Institute of Mining and Metallurgy (205328). Brad Willis is Principal Geologist at Palaris. He has sufficient experience relevant to the style of mineralisation and type of deposit under consideration and to the activity he is undertaking to qualify as a Competent Person, as defined in the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr Willis has 20 years' experience in exploration and mining of coal deposits. Mr Willis consents to the inclusion of this Resource Estimate in reports disclosed by the Company in the form in which it appears.

Neither Mr Willis nor Palaris has a direct or indirect financial interest in, or association with Atrum Coal, the properties and tenements reviewed in this report, apart from standard contractual arrangements for the preparation of this report and other previous independent consulting work. In preparing this report, Palaris has been paid a fee for time expended on this report. The present and past arrangements for services rendered to Atrum Coal do not in any way compromise the independence of Palaris with respect to this estimate.

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APPENDIX C: CHECKLIST OF ASSESSMENT AND REPORTING CRITERIA

The JORC Code (2012) Table 1 – Reporting of Exploration Results

Sampling Techniques and Data

Criteria	JORC Code explanation	Commentary
Sampling techniques	▪ *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.* ▪ *Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.* ▪ *Aspects of the determination of mineralisation that are Material to the Public Report.*	▪ Sampling has been undertaken on HQ3 (61mm diameter) cored holes on a ply by ply basis. ▪ For the 2016, 2017 and 2018 exploration programs, all coal seams intersected were sampled. Coal plies were sampled discretely based on lithological characteristics and quality. All non-coal material and partings were sampled separately and noted in the lithological description. The immediate roof and floor samples were collected for geotechnical testing. ▪ Apart from one borehole (DHPN-17-04) all sampling was completed with geophysical logs to determine core and coal loss and allocate accordingly. The qualified and depth corrected samples were then transported to the laboratory via courier. ▪ Coal quality samples from the Atrum Coal Panorama North Drilling program were sent to Birtley Coal and Mineral Testing in Calgary, Canada. ▪ Identified seams which have potential to become economic targets were composited and analysed for clean coal quality, in representative working sections, which were generally full-seam analysis (samples were taken on ply intervals and composited in the laboratory)
Drilling techniques	▪ *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).*	▪ Almost all boreholes were drilled vertically and were fully cored from the surface. ▪ All coal quality holes were fully cored using a HQ3 size core barrel producing a 61.1 mm core diameter ▪ Almost all of the boreholes completed between 2016 and 2018 were geophysically logged to total depth in the open hole ▪ Trenching has also been utilised but is considered as a lower confidence data point relative to drill holes
Drill sample recovery	▪ *Method of recording and assessing core and chip sample recoveries and results assessed.* ▪ *Measures taken to maximise sample recovery and ensure representative nature of the samples.* ▪ *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.*	▪ Core recoveries were recorded and cumulative tallies kept ▪ Coal seam recoveries were typically greater than 80%. Observations suggest that core loss is concentrated on the more fragile coal bands, particularly when interbedded with claystone ▪ The 2018 program achieved higher core recoveries (>90%) ▪ Samples were weighed at the testing laboratory and compared against calculated volumetric recovery. ▪ Boreholes were mostly geophysically logged to ensure recovered core lengths are representative of the full seam
Logging	▪ *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.*	▪ Core samples were logged in detail including lithology, brightness, sedimentary features and defects ▪ Cored holes have detailed lithological and geophysical logs. All core descriptions are encoded in a digital lithology database on a hole by hole basis. Coal seams correlated

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Criteria	JORC Code explanation	Commentary
	▪ *Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.* ▪ *The total length and percentage of the relevant intersections logged.*	between holes with corrections to database made using lithological and geophysical characteristics ▪ Boreholes were usually logged with geophysical sondes including density, caliper and gamma, deviation and dipmeter ▪ The calibration of the geophysical tools was conducted by the geophysical logging company, Century Wireline Services ▪ Core sample photographs are taken on all core runs and kept on file for reference
Sub-sampling techniques and sample preparation	▪ *If core, whether cut or sawn and whether quarter, half or all core taken.* ▪ *If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.* ▪ *For all sample types, the nature, quality and appropriateness of the sample preparation technique.* ▪ *Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.* ▪ *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.* ▪ *Whether sample sizes are appropriate to the grain size of the material being sampled.*	▪ Core samples were typically crushed to – 19mm mesh and subsampled for raw coal analyses. Ply samples were composited on Atrum's instructions in the lab. ▪ Birtley Coal & Minerals Testing comply with Canadian and International Standards for sample preparation and sub sampling. ▪ Large wash samples were pre-treated and dry sized before sample splitting and analysis. Proximate analysis was completed on a portion of the original sample ▪ Sub-sampling techniques used are commonly adopted in the coal industry and are not expected to result in non-representative raw or clean coal samples
Quality of assay data and laboratory tests	▪ *The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.* ▪ *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.* ▪ *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.*	▪ Testwork is undertaken by a 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. ▪ The Competent Person undertook a site visit and tour of the GWIL Birtley laboratory in 2018 ▪ Sizing and float sink testing is being undertaken on HQ3 samples according to testing protocols designed by metallurgical consultants A&B Mylec ▪ A&B Mylec have also reviewed and validated the lab results from GWIL Birtley
Verification of sampling and assaying	▪ *The verification of significant intersections by either independent or alternative company personnel.* ▪ *The use of twinned holes.* ▪ *Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.* ▪ *Discuss any adjustment to assay data.*	▪ Geological data is collected in line with Atrum Coal's exploration procedures and guidelines ▪ Sample interval depths and thicknesses are as measured by the field geologist (drillers depths), and adjusted to align with geophysical log depths ▪ GWIL Birtley undertakes preliminary checks of assay data using regression analysis, and checked by Atrum Coal and Palaris geologists ▪ All data has been encoded, collated and cross checked by Atrum Coal, and later by Palaris ▪ Twinned holes have not been used in any of the drilling programs.
Location of data points	▪ *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.*	▪ The 2016, 2017 and 2018 surveyed locations of boreholes and trenches have been surveyed using DGPS (Trimble) ▪ The co-ordinate system is UTM projected grid NAD83 Zone 9N ▪ The topographical surface is sourced from a

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Criteria	JORC Code explanation	Commentary
	▪ *Specification of the grid system used.* ▪ *Quality and adequacy of topographic control.*	LiDAR survey and has a reasonable correlation with borehole collars.
Data spacing and distribution	▪ *Data spacing for reporting of Exploration Results.* ▪ *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.* ▪ *Whether sample compositing has been applied.*	▪ The majority of sites have a HQ cored borehole through seams, and are point of observation for coal quality determination ▪ Borehole spacing is typically around 1km and ranging from 500m to 1.5 km between boreholes (where resources are reported in the central parts of the project area) ▪ Grade continuity is quite variable between data points. The borehole spacings used and rationalisation of resource classification polygons has defined resources with geological confidence are Inferred status and generally reflects the lower level of confidence ▪ Sample compositing is undertaken in the geological model, weighted by thickness and RD (a default RD of 1.45 was applied in the absence of RD data). ▪ Seam compositing requires 80% linear recovery as specified in the Minex BHDB settings
Orientation of data in relation to geological structure	▪ *Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.* ▪ *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.*	▪ Boreholes have been drilled vertically (with one drilled inclined) ▪ Reported borehole thicknesses are apparent thickness. Significant portions of each drillhole exhibit consistent relatively flat bedding ▪ Almost every borehole has electronic deviation data available that has been imported into the Minex borehole database. The geological modelling software captures the borehole inclination and deviation, and structural modelling assists in correcting the apparent seam thicknesses to true thicknesses in model grids ▪ The orientation of data in relation to geological structure is not believed to have introduced any sampling bias, however, the structural understanding of the sub-surface is at a preliminary status
Sample security	▪ *The measures taken to ensure sample security.*	▪ Core was sampled, labelled and bagged before being submitted to the testing laboratories ▪ 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 ▪ The laboratory records provided include sample identification numbers and weighed sample mass ▪ As the exploration was undertaken a long time ago, it is difficult to confirm whether measures to ensure sample security represented best practice by today's standards
Audits or reviews	▪ *The results of any audits or reviews of sampling techniques and data.*	▪ Metallurgical consultants have reviewed and audited the laboratory test results ▪ Metallurgical consultants have also been involved in the design of sampling and testing protocols for the analytical testing programs

Reporting of Exploration Results

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	▪ *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.* ▪ *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.*	▪ Coal tenure relates to the Panorama North project, which is a joint venture between Atrum Coal Panorama Inc. (Atrum Coal) and Japan Oil, Gas and Metals National Corporation (JOGMEC). As of March 31st, 2019 JOGMEC holds 35% ownership of each coal licence, with Atrum Coal holding the remaining 65% ▪ The project consists of 12 granted coal licences totalling 7,359 hectares. Security of tenure is not compromised and there are no known impediments ▪ The eight boreholes completed in 2018 were drilled in Coal Licences 417526, 417525, 417084, and 418958.
Exploration by other parties in Panorama North Area	▪ *Acknowledgment and appraisal of exploration by other parties.*	▪ Gulf Canada Resources Inc. conducted exploration programs in 1980 and 1981 at Panorama, consisting of helicopter-supported mapping at 1:10,000 scale and hand-trenching. The hand trenching was implemented to prove the thickness of coal seams and to collect coal quality samples. In total, 96 trenches were logged: 42 from 1980 and 54 from 1981 ▪ All coal seams with a trench thickness greater than 0.50 m were sampled for coal analyses. Samples from both exploration programs underwent vitrinite reflectance analysis by David E. Pearson & Associates Ltd. in Victoria, B.C. The examined coals were concluded to be of anthracite grade (Gulf Canada Resources Inc., 1981). The trench data was utilized to assist in targeting exploration drill holes
Geology	▪ *Deposit type, geological setting and style of mineralisation.*	▪ The Panorama North project lies within the Bowser Basin, which is the largest contiguous basin in the Canadian Cordillera, developed because of tectonic compression and uplift of the Coast Mountains during the Upper Jurassic. ▪ The dominant structural feature is the NW/SE trending Biernes Synclinorium that resulted from northeast-southwest compression during the first phase of deformation ("F1"). Thrusting related to the F1 deformation is more intense in the southern part of the Groundhog Coalfield than in the northern part. The second, less intense, phase of deformation ("F2") resulted from NW/SE compression. The F2 deformation is superimposed on the broad, open type of F1 folding. The F2 imprint is visible in a series of plunge changes in the F1 folds in the order of up to 5°. F2 thrusts are generally flat lying and related to the hanging wall of drag folds. ▪ It is apparent that the structure of the Groundhog Coalfield can range from benign to complex in localised zones due to the two phases of deformation. In broad terms, Panorama's structure is characterised by broad, gentle synclines spanning distances up to 4 km with tightly folded zones on the syncline flanks. It is estimated that the tight folding occurs over narrow zones approximately 500 m to 700 m in width. Strata within these tightly folded zones features complex thrusting, blind thrusts and recumbent folding ▪ Exploration targets within this structural regime are likely to occur in the flat lying synclines between thrusts, however, more complex small deposits of thicker fault accumulated anthracite may also exist in the folded zones.
Drill hole Information	▪ *A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:* o *easting and northing of the drill hole collar* o *elevation or RL (Reduced Level –*	▪ This information is provided for all boreholes completed in 2018 at Panorama North, in the Appendix of this report

Criteria	JORC Code explanation	Commentary
	elevation above sea level in metres) of the drill hole collar o *dip and azimuth of the hole* o *down hole length and interception depth* o *hole length.*	
Data aggregation methods	▪ *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.* ▪ *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.* ▪ *The assumptions used for any reporting of metal equivalent values should be clearly stated.*	▪ When reporting coal quality results on a seam by seam basis, seam values with raw ash greater than 50% have been excluded ▪ No seams have been excluded from the resource estimate on the basis of high ash content or other coal quality considerations ▪ Individual coal core samples (HQ3 size) have been submitted for analytical testing at GWIL Birtley coal laboratory (Calgary)
Relationship between mineralisation widths and intercept lengths	▪ *These relationships are particularly important in the reporting of Exploration Results.* ▪ *If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.* ▪ *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').*	▪ Discrepancies between apparent and true seam thickness are not considered a significant concern for reporting of exploration results at Panorama North ▪ In 2018, all boreholes were drilled vertically (with the exception of DHPN-18-02) and coal seams intersected in boreholes are close to true thickness of the coal seams
Diagrams	▪ *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.*	▪ Borehole locations plans are provided along with drill hole locations and seam intersects from the 2016, 2017 and 2018 programs ▪ This report also includes floor structure contour plans and cross sections
Balanced reporting	▪ *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.*	▪ To ensure balanced reporting of Exploration Results, the Appendix contains seam intervals and coal quality data for all boreholes completed
Other substantive exploration data	▪ *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.*	▪ Atrum Coal geologists have undertaken a surface mapping program in 2018, collecting data points from outcrops. ▪ Gulf Canada Resources also undertook significant trenching and petrography work between 1980 and 1981
Further work	▪ *The nature and scale of planned further work (e.g. tests for lateral extensions or depth extensions or large-scale step-out drilling).* ▪ *Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.*	▪ The 2018 program has been completed. The Company is currently planning an additional drilling program in 2019 aimed at testing the continuity of the coal resources across the Panorama North project area ▪ The company is aiming to undertake a high level scoping study in 2019 ▪ The HQ cores sampled during the 2018 program will be subjected to detailed raw quality sizing and washability test work, including comprehensive testing of clean coal composites

Estimation and Reporting of Mineral Resources

Criteria	JORC Code explanation	Commentary
Database integrity	▪ *Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.* ▪ *Data validation procedures used.*	▪ Geological data was collated by Atrum Coal, who undertook validation checks on each hole before they were finalised ▪ Geological data has been cross checked by Palaris and used in the construction of geological models ▪ Historical data has not been used as points of observation or in geological modelling ▪ Borehole seam profiles with lithology, seam intervals and coal quality results are produced to check validity of data ▪ Metallurgical consultants have been engaged to provide oversight of the laboratory testing and to validate the results ▪ Coal quality data points are checked for outliers and any potential anomalies are omitted
Site visits	▪ *Comment on any site visits undertaken by the Competent Person and the outcome of those visits.* ▪ *If no site visits have been undertaken indicate why this is the case.*	▪ The Competent Person has not yet undertaken a site visit to the Panorama project to inspect the site, but plans to in 2019 ▪ The Competent Person has visited the Atrum Coal office in Calgary to ensure alignment between Atrum Coal's geological data and Palaris' modelling and resource estimation processes ▪ The visits have been in relation to exploration assistance, geological modelling, and assisting with data QA/QC for model updates, and JORC resource estimates
Geological interpretation	▪ *Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit.* ▪ *Nature of the data used and of any assumptions made.* ▪ *The effect, if any, of alternative interpretations on Mineral Resource estimation.* ▪ *The use of geology in guiding and controlling Mineral Resource estimation.* ▪ *The factors affecting continuity both of grade and geology.*	▪ Confidence in the geological data is considered moderate, based on the level of structural complexity in the deposit ▪ Correlations can be difficult, especially where seams are fault thickened or affected. Seam correlation has been a joint exercise between Atrum Coal and Palaris ▪ Coal seam correlations have been cross checked by geophysical logging and identifying characteristic signatures, which decreases the chance of miscorrelation. It is recommended that vitrinite reflectance be undertaken on core and chip samples to assist in seam correlation ▪ Control of the coal seams at depth is limited in some parts of the project where there is a paucity of data
Dimensions	▪ *The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.*	▪ Panorama North project is around 8.5km north to south and around 11km from west to east. The bedding strikes broadly NW to SE. ▪ The 2018 Panorama North coal resource occurs over a zone which extends 4km from north to south and 6km from west to east, associated with elevated topography in the ridgeline ▪ The upper limit of the resource is the limit of weathering surface (BHWE-10), which is the topographical surface minus 10 metres ▪ The lower limit of the resource is at a maximum depth of 200m below topography.
Estimation and modelling techniques	▪ *The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen*	▪ Geovia Minex (version 6.5.2) software was used to create structural and coal quality grids, which are based on 50m mesh (grid cell) size with a scan distance of 2,000 metres. ▪ Resource classification was undertaken using a radii of 1km for Inferred resources, but the maximum extrapolation was reduced beyond the final borehole to approximately 750m ▪ There is limited extrapolated resources beyond the

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	include a description of computer software and parameters used. ▪ *The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.* ▪ *The assumptions made regarding recovery of by-products.* ▪ *Estimation of deleterious elements or other non-grade variables of economic significance (eg sulphur for acid mine drainage characterisation).* ▪ *In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed.* ▪ *Any assumptions behind modelling of selective mining units.* ▪ *Any assumptions about correlation between variables.* ▪ *Description of how the geological interpretation was used to control the resource estimates.* ▪ *Discussion of basis for using or not using grade cutting or capping.* ▪ *The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.*	furthest boreholes located in the down-dip areas ▪ Grade cut-offs were not applied globally as blending and / or coal beneficiation would be used to generate a saleable product ▪ A default ARD value of 1.45 was used to estimate resource tonnes ▪ The estimate has been internally audited and deemed reproducible
Moisture	▪ *Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.*	▪ All quality parameters are reported on an air-dried basis unless stated otherwise
Cut-off parameters	▪ *The basis of the adopted cut-off grade(s) or quality parameters applied.*	▪ Grade cut-offs were not applied globally as blending and / or coal processing would be used to manage product quality attributes
Mining factors or assumptions	▪ *Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential mining methods, but the assumptions made regarding mining methods and parameters when estimating Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the mining assumptions made.*	▪ The potential mining method used is considered to be open cut, although there is potential for underground mining in the B1, C1 and D1 seams ▪ Open cut resources are limited by a minimum 0.3m seam thickness, between the base of weathering and 200m depth ▪ Open cut resources have not been limited by stripping ratios ▪ No surface constraints have been identified or used to limit or constrain the extent of the resource estimate ▪ Coal resources are defined in areas of ridgeline / elevated topography and are generally distanced from rivers and streams (the seams outcrop and are not present through the areas of lower elevation) ▪ Mining losses and dilution has not been factored in to the resource estimate
Metallurgical factors or assumptions	▪ *The basis for assumptions or predictions regarding metallurgical amenability. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential metallurgical methods, but the assumptions*	▪ Section 4.2 provides an explanation of washability and clean coal quality ▪ The primary product is expected to be a mid to low volatile hard coking coal suitable for the export market. ▪ Some volumes of secondary thermal or PCI product may also be produced for the export market.

Criteria	JORC Code explanation	Commentary
	regarding metallurgical treatment processes and parameters made when reporting Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the metallurgical assumptions made.	▪ Detailed sizing, washability and clean coal composite testing is underway after completion of four large diameter boreholes. Metallurgical consultants A&B Mylec will be providing a coal quality report on completion of this program
Environmental factors or assumptions	▪ *Assumptions made regarding possible waste and process residue disposal options. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider the potential environmental impacts of the mining and processing operation. While at this stage the determination of potential environmental impacts, particularly for a greenfields project, may not always be well advanced, the status of early consideration of these potential environmental impacts should be reported. Where these aspects have not been considered this should be reported with an explanation of the environmental assumptions made.*	▪ The Panorama North project is considered to be an early stage exploration project and therefore no conceptual mining studies have been undertaken ▪ Environmentally sensitive areas will need to be considered upon commencement of mine planning or studies ▪ Any coal mine development would need to go through the process of preparing an Environmental Impact Assessment (EIA) and submission of an application to the Alberta Energy Regulator (AER) under the Environmental Protection and Enhancement Act (EPEA) and Canadian Environmental Assessment Act 2012 (CEAA).
Bulk density	▪ *Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples.* ▪ *The bulk density for bulk material must have been measured by methods that adequately account for void spaces (vugs, porosity, etc), moisture and differences between rock and alteration zones within the deposit.* ▪ *Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.*	▪ All coal quality parameters are reported on an air-dried basis unless otherwise stated ▪ A regression between raw ash (ad) and laboratory tested ARD (air-dried) has been used to estimate ARD from raw ash. The ARD is assumed to be largely representative of in-situ RD ▪ Bulk density assumptions have not been made
Classification	▪ *The basis for the classification of the Mineral Resources into varying confidence categories.* ▪ *Whether appropriate account has been taken of all relevant factors (i.e. relative confidence in tonnage/grade estimations, reliability of input data, confidence in continuity of geology and metal values, quality, quantity and distribution of the data).* ▪ *Whether the result appropriately reflects the Competent Person's view of the deposit.*	▪ Panorama North resource polygons were rationalised according to the distribution and variability in coal quality data points, and the classification downgraded if coal quality data was sparse or highly variable. ▪ Any extrapolated coal typically exists down-dip to the west of existing data points, or in the eastern zone as the coal seams approach the surface ▪ The factors used in the rationalisation and determination of final resource classification polygons included: age and reliability of the data, consideration of 3D representivity and removal of isolated points of observation, quantity and location of coal quality data points, variability shown in continuity and grade, and likelihood of the coal seams being mined ▪ In the view of the Competent Person, the Inferred to Indicated resource classification reflects the moderate level of confidence within the deposit, highlighting the project requires further exploration to improve the level of geological

Criteria	JORC Code explanation	Commentary
		confidence
Audits or reviews	▪ *The results of any audits or reviews of Mineral Resource estimates.*	▪ Resource estimates were undertaken in three passes to ensure repeatability, with previous versions saved for reference ▪ The resource estimate has been internally peer reviewed
Discussion of relative accuracy/ confidence	▪ *Where appropriate a statement of the relative accuracy and confidence level in the Mineral Resource estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the resource within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors that could affect the relative accuracy and confidence of the estimate.* ▪ *The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.* ▪ *These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	▪ The drill spacing is relatively tight along the seam outcrop zones and supported by trench and outcrop measurements. ▪ The level of confidence in the exploration and data acquisition is moderate based on the level of structural complexity and limitations in achieving high core recoveries