EXHIBIT 2

Expert Rebuttal Report
on Millennium Bulk Terminals-Longview/Lighthouse

Prepared for Washington State Office of the Attorney General

by Ian Goodman

In the Matter of:

LIGHTHOUSE RESOURCES, INC., ET AL. V. JAY INSLEE, ET AL.
CASE NO. 3:18-cv-05005-RJB
BEFORE THE UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT TACOMA

the goodman group, ltd.
www.thegoodman.com

December 14, 2018

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1 Executive Summary

1.1 Key Findings Strengthened

Section 1.1 of the TGG Expert Report filed on November 14, 2018,[1] confirms **TGG's Central Finding that Washington State's permit denials for the Project do not significantly affect the US coal industry, nor US coal exports to Asian markets.** This Central Finding is based on the seven Key Findings for this report, also described in Section 1.1 of the TGG Expert Report.

After a careful review of the expert reports also filed on November 14, 2018 by Seth Schwartz, Mark Berkman and William Huneke respectively, I have not changed any of my opinions concerning the Central Finding or Key Findings. If anything, new developments that have occurred since the filing of the TGG Expert Report, as well as my review of the reports of the other experts, have further strengthened my opinions and findings.

1.2 New Developments as of Mid-November 2018 (SECTION 3)

A number of relevant new developments have occurred since the filing of TGG's Report in mid-November 2018, which further strengthen the conclusions of our report. These developments include the release of the World Energy Outlook 2018 (WEO 2018) by the International Energy Agency (IEA), the recent financial difficulties of both Millennium and Cloud Peak Energy, the Taiwanese Referendum, which strongly supports a shift away from coal, and Xcel Energy's commitment to 100% clean energy by 2050.

These recent developments further strengthen the conclusions of the TGG Report, particularly with respect to:

a. the IEA's continuing gloomy long-term outlook for US coal exports (emphasized in the TGG Report) and again confirmed by WEO 2018;

[1] "The TGG Report" refers to the Expert Report on Millennium Bulk Terminals Longview/Lighthouse prepared for Washington State Office of the Attorney General by Ian Goodman, President of The Goodman Group, Ltd. (TGG); and filed on November 14, 2018 in the current proceeding. "The TGG Rebuttal Report" refers to the current rebuttal evidence by Ian Goodman, to be filed in December 2018. Similarly, "The Schwartz Report" refers to the Expert Report of Seth Schwartz, filed on November 14, 2018 on behalf of BNSF Railway Company in the current proceeding. "The Berkman Report" refers to the Expert Report of Mark Berkman, filed on November 14, 2018 (as corrected on December 3, 2018) on behalf of Lighthouse Resources, Inc. et al. in the current proceeding. "The Huneke Report" refers to the Expert Report of William Huneke, filed on November 14, 2018 on behalf of BNSF Railway Company in the current proceeding.

b. the increasing financial difficulties of Millennium, and particularly Cloud Peak Energy, which further confirm the TGG Report's conclusion that these companies are low-value and high-risk;
c. the results of the recent Taiwanese referendum, which strongly supports a shift away from coal; the referendum results further validate TGG's conclusion that future coal imports in Taiwan (and elsewhere in Asia) are highly uncertain and under pressure given growing social opposition to coal; and
d. the recent Xcel Energy commitment to 100% clean energy, which is affected by the large-scale global shift towards renewables; as discussed in the TGG report this global shift has affected the long-term outlook for coal demand in Asia, as well as in the US.

1.3 Rebuttal of the Schwartz Report (SECTION 4)

TGG's rebuttal of the other expert reports, and the Schwartz Report in particular, is complex and detailed. To avoid excessive repetition with the body of the report, this Executive Summary is necessarily high level and provides the main points and themes. A detailed review of each rebuttal of each expert is required to fully understand TGG's conclusions.

1.3.1 Relevance to the TGG Report

The Schwartz Report is the expert report that is the most directly relevant report to the TGG Report. Both TGG and Schwartz focus their analysis on:

a. the need for Millennium to provide port capacity on the US West Coast to supply Western US coal exports to Asia
b. existing West Coast port capacity and port alternatives to Millennium
c. the potential for US thermal coal exports via Millennium and the long-term demand for these coal exports in the Asian market
d. structural challenges and the decline in the US coal industry.

1.3.2 Areas of Agreement with the TGG Report

TGG and Schwartz share a number of areas of agreement:

- Need for the Project should be analyzed based on long-term energy projections and not cyclical fluctuations.
- The US domestic coal industry is in decline. TGG and Schwartz generally agree on the reasons for this decline. (However, Schwartz fails to acknowledge that the global market for coal exports has peaked and will decline over the long term.)
- Incremental PRB exports enabled by the Project are small relative to full throughput of Millennium. (TGG and Schwartz disagree, however, on the total US

thermal coal exports (bituminous and sub-bituminous) that will be enabled and handled by Millennium.)

- Western US coal fields contain huge reserves of both bituminous and sub-bituminous coals. (TGG maintains however, that thermal coal exports from Western US production will not be generally economically competitive in Asian markets. These US coal exports will continue to be disadvantaged by relatively long transport distances and relatively high transport costs, with or without Millennium.)
- If the Project is built, some of the tonnage handled may be diverted from port alternatives.

1.3.3 Central Area of Disagreement and Field of Dreams Scenario

Despite these areas of agreement, TGG's overall conclusions differ significantly from Schwartz's. The Central Area of Disagreement relates to the need for the Project to supply coal to Asia. **TGG has conducted a rigorous and conservative analysis of the economics of US thermal coal exports via the Project and concluded that the Project is not needed to supply coal to Asia. Schwartz on the other hand has concluded the opposite: the Project is needed to provide port capacity on the US West Coast to enable coal exports from Western US coal fields to the Asian market.**

Schwartz's central opinion (i.e. that the Project is needed to supply coal to Asia) is based on three highly unlikely assumptions about market conditions (which would be very optimistic for US coal exports):

a. Substantial, ongoing and growing demand in Asian markets for US PRB exports;

b. Substantial, ongoing and growing demand in Asian markets for Western US bituminous coal exports;

c. Substantial diversion of coal to Millennium from other coal terminals, particularly Westshore.

Any one of these scenarios is unlikely, but the combination of all three assumptions actually occurring is highly unlikely and akin to a **Field of Dreams scenario: build it and they will come.**

1.3.4 Areas of Disagreement with the TGG Report

The Central Area of Disagreement (regarding the need for the Project to supply coal to Asia) can be broken down into the following subpoints of disagreement:

a. Long-Term Demand Projections for Thermal Coal Imports in Asia

b. Long-Term Demand for US Thermal Coal Exports via Millennium in Asia

c. Port Alternatives.

For each of the areas of disagreement, TGG restates the rigorous, conservative, comprehensive and well-supported findings of our expert report to rebut Schwartz's opinions. **Furthermore, the recently released WEO 2018 directly contradicts Schwartz's claims that there is a sizable and growing market in Asia for US thermal coal exported via West Coast ports.**

TGG has based its conclusions regarding: (a) the long-term outlook for the demand for thermal coal imports in Asia and (b) the long-term demand for US thermal coal exports in Asia, on reliable, mainstream and conservative sources (such as the IEA (with a focus on WEO 2017, Coal 2017, as well as WEO 2016) and the EIA's AEO 2017). In particular, TGG has focused on the most relevant and material information from these sources. These conclusions are also supported by a wide variety of industry sources as documented in TGG's Report.

1.3.5 Insufficient Explanation of the Underlying Model for Schwartz's Forecast and Other Technical Problems in the Schwartz Report

Schwartz, on the other hand, **has failed to provide a detailed explanation of the underlying model (along with related data and assumptions) for his forecast related to US Western coal exports. Without such an explanation, it is not possible for other experts (such as TGG) to effectively review the model. And absent an effective and detailed review of the model by other experts, it is impossible to determine why Schwartz's forecast is so divergent from other reliable, mainstream and conservative sources, such as IEA's WEO and EIA's AEO.**

This rebuttal report has also identified a number of other technical issues, which have further contributed to Schwartz's overstatement of potential exports informing his overstatement of need for the Project.

1.4 Rebuttal of the Berkman Report (SECTION 5)

1.4.1 Relevance to the TGG Report

In response to the Complaint, the TGG Report conducted a comprehensive evaluation of (a) employment impacts in Washington from Project construction in Section 10.4 (Jobs in Washington); and (b) out-of-state employment job impacts of the Project (notably mining jobs and spin-offs in Montana and Wyoming) in Section 10.5 (Jobs Outside Washington). Consistent with the EIS and the Complaint, TGG concluded that Montana and Wyoming would be the states of origin for most (if not all) of the coal to be exported from the Project.

There is only one section of the Berkman Report (as corrected December 3, 2013) that is directly relevant to the TGG Report: Section II.C Economic Consequences of Permit Denial (¶¶ 25-30), which focuses mainly on the out-of-state employment impacts of the Project (i.e. mining jobs and spin-offs) over the period of 2021-2040. Section II.C of Berkman is only relevant to Section 10.5 (Jobs Outside Washington) of the TGG Report, which evaluates the out-of-state employment impacts of the Project.

1.4.2 Lack of Comprehensive Expert Report Analysis to Support Complaint Claims on Jobs

The Plaintiffs (Lighthouse et al.) have failed to provide comprehensive expert report analysis to support the Complaint's claims regarding employment benefits of the Project. They have provided only the Berkman Report (which estimates out-of-state mining jobs and spin-offs) as expert report analysis to support the Complaint's claims. Berkman does not consider employment impacts in Washington from Project construction. The Complaint cites the BERK study, which does consider the employment impacts of the Project to jobs within Washington State. However the BERK study is unsupported by the expert report analysis filed in this case.

1.4.3 Employment Impact Estimates in Tables 1 to 3

Table 1 and Table 2 in this report summarize Berkman's out-of-state employment impact estimates for the Project, based on Berkman's "EIS Scenario" and Berkman's "Alternative Scenario" respectively. The "EIS Scenario" is based on total tonnage of exports via Millennium (and assumes an average of 31 MMTPY of exports over the period of 2021-2040).The "Alternative Scenario" is based on the incremental exports enabled by Millennium (and assumes an average of 20.3 MMTPY of exports over the period of 2021-2040). Given that the relevant employment impacts to be measured are those resulting from incremental exports enabled by Millennium, the Table 2 estimates are the most relevant Berkman estimates of the out-of-state mining jobs and spin-offs.

Table 3 (equivalent to Table 8 in the TGG Report, p. 220) summarizes the TGG Report's initial out-of-state incremental employment impact estimates of the Project (based on the initial assumption of full throughput of 44 MMTPY and on more accurate and reliable state-specific studies).

1.4.4 Areas of Agreement with the TGG Report

TGG and Berkman have some of areas of agreement:

- **Both estimate very small job impacts for incremental mining jobs and spin-offs enabled by Millennium.** Even based on Schwartz's overstated estimates of incremental export volumes enabled by the Project, Berkman estimates only 462 direct mining jobs spread across four states (Montana, Wyoming, Colorado and Utah); 1113 spin-off jobs (indirect and induced jobs) spread across the same four states and 1575 total jobs (equivalent to 0.0231% of the jobs in the four states, and 0.0008% of all US jobs). (Table 2)

  Based on the initial assumption of full throughput of 44 MMTPY and on more accurate and reliable state-specific studies, the TGG Report initially estimates 802 direct mining jobs in Montana and Wyoming; 1262 spin-off jobs (indirect and induced jobs) in Montana and Wyoming; 2063 total jobs in Montana and Wyoming (equivalent to 0.1921% of the jobs in Montana and Wyoming); 757 spin-off jobs in other states and 2820 total jobs in all of the US (equivalent to 0.0014% of all US jobs). (Table 3)

  Based on a more realistic throughput assumption range of 0 to 44 MMTPY, TGG concludes that total mining job impacts in Montana and Wyoming related to Millennium are also very small (to non-existent) in the context of these state economies, and tiny (to non-existent) in the context of the US economy. Even if Berkman's overstated out-of-state job estimates (in Table 2) were realistic, these estimates would still be (a) very small; (b) not significantly larger in terms of employment impacts compared to TGG's estimates (in Table 3).

- **Neither Berkman nor TGG assumes constant full throughput.** The TGG Report assumes that the Project is unlikely to consistently operate at levels close to 44 MMTPY, but that the range could vary between 0 and 44 MMTPY depending on market conditions. Berkman's "EIS Scenario" assumes an average of 31 MMTPY of exports via Millennium over the period of 2021-2040. Berkman's more relevant "Alternative Scenario" assumes an average of 20.3 MMTPY of incremental exports via Millennium over the period of 2021-2040.

1.4.5 Areas of Disagreement with the TGG Report

- The Central Area of Disagreement between TGG and Berkman (as corrected) is that TGG's overall conclusion regarding the importance of these very small estimates of out-of-state jobs differs dramatically from Berkman's. As indicated above, TGG concludes that total mining jobs in Montana and Wyoming related to Millennium are very small (to non-existent) in the context of these state economies, and tiny (to non-existent) in the context of the US economy. Despite the very small out-of-state employment estimates discussed above and summarized in Table 2, Berkman characterizes the importance of estimates as "substantial" and "widespread, affecting multiple mines in four states and many industrial and service sectors." TGG strongly disagrees with Berkman's conclusion that 462 direct jobs (which are overstated) across four states can be "substantial" or "affect multiple mines." And 1113 (overstated) spin-off jobs spread across four states are very small in the context of these state economies; and tiny in the context of the US economy.

- Even though the TGG Report estimates in Table 8 (Table 3 in this report) are somewhat similar to the Berkman Alternative Scenario estimates in Table 2, each report also differs significantly in how the estimates of these out-of-state employment impacts were obtained. There are a number of problems with Berkman's assumptions (based on Schwartz), which are discussed in this report.

- Even if all of the Berkman assumptions (based on Schwartz) were valid and the job impacts were the same as those summarized in Table 2, they would still be insignificant. These job impacts would be even more insignificant in the context of the economies of the four mining states, and the US economy.

1.5 Rebuttal of the Huneke Report (SECTION 6)

1.5.1 Relevance to the TGG Report

Huneke estimates potential economic impacts on BNSF as a result of coal traffic related to Millennium. To meaningfully estimate these impacts, an analysis must consider the following key elements: Millennium throughput, tonnage diverted from port alternatives; and rail transport attributes (notably, routing, distance, rail carriers (BNSF or UP), and revenues and costs for rail carriers. Analysis of these key elements is also central to the TGG Report and the current TGG Rebuttal Report. Hence, TGG evaluates the Huneke analysis and its determinations in regard to these key elements.

1.5.2 Areas of Agreement with the TGG Report

There are no significant areas of agreement between Huneke and TGG.

1.5.3 Areas of Disagreement with the TGG Report

The Huneke Report is seriously flawed, to a degree that it should not be relied upon to provide meaningful information in regard to potential economic impacts on BNSF. Huneke is substantially inconsistent with the TGG Report, other expert reports on behalf of BNSF and Lighthouse et al. (Schwartz and Berkman), as well as the EIS and other fundamental sources and information. Huneke greatly overstates the potential revenue to BNSF as a result of the Project and understates potentially sizable costs.

The key flaws in the Huneke Report relate to potential tonnage of coal traffic on BNSF as a result of Millennium. Huneke greatly overstates potential tonnage of coal traffic, and thus greatly overstates potential revenue to BNSF as result of Millennium.

To the extent that Millennium actually results in increased rail traffic, there could be sizable costs (to BNSF, shippers, and others) to expand rail capacity and/or owing to capacity exceedances. Therefore, compared with Huneke's estimates, rail traffic related to Millennium might actually result in few if any benefits for BNSF (and its shippers and other affected parties), owing to some combination of the following:

- substantially lower than estimated gross revenue (revenue from rail traffic prior to deduction of costs);
- substantially higher than estimated costs (expenses to handle rail traffic); and
- substantially lower than estimated net revenue (gross revenues minus costs).

1.6 Errata in the TGG Expert Report Filed November 14, 2018 (SECTION 7)

The report provides a provides a list of Errata in the TGG Expert Report filed on November 14, 2018.

2 Introduction

2.1 Objectives of the TGG Expert Rebuttal Report

In relation to U.S.D.C. (West) No. 3:18-cv-05005-RJB (*Lighthouse Resources, Inc., et al. v. Jay Inslee, et al.*) and other potential litigation, the Washington State Office of the Attorney General (AGO) retained the services of The Goodman Group, Ltd. (TGG). Ian Goodman and Brigid Rowan of TGG were retained as experts to perform the following services for the AGO:

> Conduct research and analysis regarding the natural resource costs associated with construction and operation of the Millennium Bulk Terminals–Longview coal export terminal, and the burdens on the industry if the facility is not built, for purposes of comparing the costs against the burdens in the context of a commerce clause challenge to the denial of permits for the facility.

TGG's Expert Report, filed on November 14, 2018, focuses on the burdens on the industry if the facility is not built. The current Expert Report, entitled TGG Expert Rebuttal Report, constitutes a rebuttal of the following November 14, 2018 expert reports filed in this case:

- the Expert Report of Seth Schwartz on behalf of BNSF Railway Company (the Schwartz Report)
- the Expert Report of Mark Berkman on behalf of Lighthouse Resources Inc. et al. (the Berkman Report)
- the Expert Report of William Huneke on behalf of BNSF Railway Company (the Huneke Report).

The current report (TGG Expert Rebuttal Report) also includes a section on New Developments Since Mid-November 2018 as well as a section on Errata in the November TGG Expert Report.

Both of TGG's Export Reports have been prepared in collaboration with Brigid Rowan, TGG's Senior Economist. All work on the report has been overseen and reviewed by Ian Goodman.

2.2 Road Map for the Report

Section 1 is the **Executive Summary**.

Section 2, the Introduction, explains the objectives of the report (Section 2.1) and provides this road map for the document (Section 2.2).

TGG's Approach to Analysis in this rebuttal report is the same as the one described in Section 3 of the TGG Expert Report filed in November. Our approach relies on information sources that are most significant and material, high quality, and useful for an analysis that is rigorous and conservative. Section 3 of the TGG Expert Report also describes protocols for types of coal and units.

Section 3 (in the current report) discusses **New Developments since Mid-November 2018**, including the release of the World Energy Outlook 2018 (WEO 2018) by the International Energy Agency (IEA), the recent financial difficulties of both Millennium and Cloud Peak Energy, the Taiwanese Referendum, which strongly supports a shift away from coal, and Xcel Energy's commitment to 100% clean energy by 2050.

Sections 4 through 6 provide a **Rebuttal of the Schwartz Report, the Berkman Report** and the Huneke Report respectively. Each section contains the following:

- a summary of the relevance of the expert report in question to the TGG Report
- areas of agreement between the TGG Report and the expert report in question
- areas of disagreement between the TGG Report and the expert report in question.

Section 7 provides a list of **Errata in the TGG Expert Report** filed on November 14, 2018. **Section 8** contains the **Attestation of Ian Goodman**. Finally, **Section 9** is a **Technical Appendix**, providing supplemental technical information and analysis regarding Cloud Peak Energy and the Schwartz Report.

2.3 Rebuttal Report Prepared Based on Information Available at the Time of Filing

The TGG Rebuttal Report has been prepared based on the information provided to date by Schwartz, Berkman, and Huneke. This information includes the Expert Reports submitted on November 14, 2018, as well as the corrections and discovery responses

submitted by Berkman on December 3, 2018. Schwartz and Huneke have not yet provided workpapers for their November 14 reports.

3 New Developments Since Mid-November 2018

3.1 New Developments Further Strengthen Conclusions of TGG Report

This section discusses important new developments since mid-November 2018 of particular relevance to the TGG Report. These developments include the release of the World Energy Outlook 2018 (WEO 2018) by the International Energy Agency (IEA), the recent financial difficulties of both Millennium and Cloud Peak Energy, the Taiwanese Referendum, which strongly supports a shift away from coal, and Xcel Energy's commitment to 100% clean energy by 2050.

These recent developments further strengthen the conclusions of the TGG Report, particularly with respect to the following:

- the IEA's continuing gloomy long-term outlook for US coal exports, which are expected to decline by more than 40% in 2040 (from 2017 volumes), as confirmed by WEO 2018;
- the increasing financial difficulties of Millennium, and particularly Cloud Peak Energy, which further confirm the TGG Report's conclusion that these companies are low-value and high-risk;
- the results of the recent Taiwanese referendum, which strongly supports a shift away from coal; the referendum results further validate TGG's conclusion that future coal imports in Taiwan (and elsewhere in Asia) are highly uncertain and under pressure given growing social opposition to coal; and
- the recent Xcel Energy commitment to 100% clean energy, which is affected by the large-scale global shift towards renewables; as discussed in the TGG report this global shift has affected the long-term outlook for coal demand in Asia, as well as in the US.

These new developments are described in this section at the beginning of the current report because (a) they further strengthen the conclusions of the TGG Report; and (b) they inform TGG's rebuttal of the other experts, and particularly the rebuttal of the Schwartz, who claims that there is substantial, ongoing and growing demand in Asian markets for US coal exports.

3.2 WEO 2018 Released November 13, 2018

On November 13, 2018, the IEA released the World Energy Outlook (WEO 2018). WEO 2018 emphasizes that the US is a high-cost swing supplier of coal with a declining portion of a declining export market. US coal export volumes in 2040 will decline by more than 40% from volumes in 2017. This dramatic decline reflects that US exporters are disadvantaged by higher costs for both production and transport:

> United States coal exports increased by some 70% in 2017, but exporters are facing the challenge of being a high cost swing supplier in a stagnating trade market […]. Coking coal suppliers accounted for nearly two-thirds of coal exports in 2017 and have generally fared better than steam coal suppliers. Over the outlook period, US coal exports decline by more than 40% to around 45 Mtce, reflecting the challenges that exporters face in matching the prices of other suppliers due to high production costs, high transport costs, or both, in the various production basins. (WEO 2018, pp. 241-242, see also p. 224, Table 5.4).

3.3 Lighthouse Is Also Facing Increasing Financial Problems

On November 14, 2018, Millennium laid off 15% of its staff, including the Senior Vice President of Business Development.[2] Few details have been publicly disclosed, but staff lay-offs are typically a sign of financial problems and/or changing priorities regarding business activities and development. Given the findings in the TGG Report (Section 5), which concluded that Millennium and Lighthouse are low-value and high-risk, it is not surprising that there are financial problems and layoffs.

3.4 Cloud Peak Energy Facing Increasing Financial Problems

On November 15, Cloud Peak Energy (CPE) announced cuts to executive bonuses and worker benefits and is reviewing "strategic alternatives which include a potential sale of the company."[3] Since then, its stock has continued to decline significantly.

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[2] Lundy, Rose, "Millennium lays off 15 percent of employees," tdn.com, November 15, 2018. https://tdn.com/news/local/millennium-lays-off-percent-of-employees/article_e9f7ebd8-bb42-5ac5-ae5d-1c93bd7a5be5.html

[3] Cloud Peak Energy, Press Release, "Cloud Peak Energy Announces Strategic Alternatives Review," November 13, 2018. https://investor.cloudpeakenergy.com/press-release/corporate/cloud-peak-energy-

(footnote continued on next page)

Total market capitalization has now declined from about $110 million (as was reported in the TGG Report) to about $54 million, as the stock has plummeted from $1.44 (closing price on November 12) to $0.71 (closing price on December 11).[4] Cloud Peak stock prices and market valuation have declined by more than half in the last month, on top of even larger declines earlier in the 2018.

As concluded in the TGG Report, Lighthouse has much less value as a coal producer than the value of CPE, which is continuing to decline. These increasing financial problems are consistent with the findings in the TGG Report (Section 6), which concluded that potential thermal coal exporters via Millennium (including CPE) are low-value and high-risk.

3.5 Taiwan's Referendum Strongly Supports Shift Away from Coal

The results of Taiwan's November 24, 2018 referendum showed that a very large majority of Taiwanese voters (over 75%) supported (a) a reduction in the use of coal and (b) a halt to construction of coal-fired power stations.[5] These results provide further confirmation that a) the Asian coal boom is over, b) new developments (including concerns about air pollution and climate change in the case of Taiwan) are intensifying the shift away from coal, and c) the analysis in the Schwartz Report is incomplete, flawed and inadequately supported (as will be discussed in Section 4).

3.6 Xcel Energy: Large PRB and Rockies Coal Customer Commits To 100% Clean Energy By 2050

Section 5.5 of the TGG Report demonstrated that Black Butte and Decker were small, older, low-value mines. Section 5.5.4 (p. 59) discussed the John T. Boyd Powder River

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announces-strategic-alternatives-review; Wyoming Public Radio, "Cloud Peak Energy Considers Selling Company; Gives Executive Bonuses, Cuts Retirement Benefits," November 13, 2018 http://www.wyomingpublicmedia.org/post/cloud-peak-energy-considers-selling-company-gives-executive-bonuses-cuts-retirement-benefits#stream/0

[4] Technical Appendix, Section 9.1 provides additional updates for Cloud Peak, including Figure 1 showing market capitalization and Figure 2 showing stock price.

[5] Central Election Commission, Results of Case 7 referendum and Case 8 referendum questions pertaining to public support for coal, November 24, 2018. http://referendum.2018.nat.gov.tw/pc/en/00/m00000000000000000.html

(footnote continued on next page)

Basin Study (2011),[6] submitted in regulatory proceedings on behalf of Xcel Energy, one of the largest US electric utilities.

TGG indicated that:

> Xcel Energy is a regulated electric utility that has been a large customer for PRB coal, but is rapidly shifting to a cleaner energy mix.[7] Generation from coal is dropping from 56% of the total in 2005 to 37% in 2017 and 27% in 2022, while renewables (wind, solar, and other renewables) increase from 9% in 2005 to 26% in 2017 and 48% in 2022.

In addition to PRB coal, Xcel has also been a large customer for other Western US coal production, notably Rockies Uinta Basin bituminous coal.[8]

On December 4, 2018, Xcel Energy became the first major US utility committing to 100% clean energy. Xcel announced that it aims to deliver 100% zero-carbon electricity by 2050:[9]

> Xcel Energy, a national leader in renewable energy, rolled out a clean energy vision today in Denver that will deliver 100 percent carbon-free electricity to customers by 2050. As part of this vision, the company also announced plans to reduce carbon emissions 80 percent by 2030, from 2005 levels in the eight states it serves. The new goals are the most ambitious announced to date within the electric power industry.
>
> "This is an extraordinary time to work in the energy industry, as we're providing customers more low-cost clean energy than we could have imagined a decade ago" said Ben Fowke, chairman, president and CEO, Xcel Energy. "We're accelerating our carbon reduction goals because we're encouraged by advances in technology, motivated by customers

[6] Powder River Basin Coal Resource and Cost Study: Campbell, Converse and Sheridan Counties, Wyoming; Big Horn, Powder River, Rosebud and Treasure Counties, Montana, John T. Boyd, Company, Prepared for Xcel Energy, Report No. 3155.001, September 2011 https://www.xcelenergy.com/staticfiles/xe/Regulatory/Regulatory%20PDFs/PSCo-ERP-2011/8-Roberts-Exhibit-No-MWR-1.pdf
The Boyd analysis concluded that the Decker Mine is nearly depleted with strip ratios and production costs substantially higher than at competing mines. Boyd expected Decker to shut down soon after a limited amount of additional production.
[7] See endnote 79 in TGG Report for corresponding original endnote.
[8] See e.g., Schwartz Report, p. 26
[9] "Xcel Energy aims for zero-carbon electricity by 2050," Xcel Energy website, Press Release, December 4, 2018. https://www.xcelenergy.com/company/media_room/news_releases/xcel_energy_aims_for_zero-carbon_electricity_by_2050

> who are asking for it and committed to working with partners to make it happen."

This announcement is indicative of the increasing competitiveness of renewables in the US and the increasing demand for renewables from consumers. As discussed in Section 7.5.3 of the TGG Report, according to WEO 2017, one of the large-scale shifts in the global energy system is the rapid rise and falling costs of renewables and other clean energy technologies. This explosive growth spells the end of the global coal boom. Growth in renewables is expected to accelerate, while growth in coal slows. This large-scale global shift towards renewables has affected the long-term outlook for coal demand in Asia, as well as in the US. The recent Xcel announcement also exemplifies this global shift.

4 Rebuttal of the Schwartz Report

4.1 Relevance to the TGG Report

The Schwartz Report is the expert report that is the most directly relevant report to the TGG Report.

Both TGG and Schwartz focus their analysis on:

- the need for Millennium to provide port capacity on the US West Coast to supply Western US coal exports to Asia
- existing West Coast port capacity and port alternatives to Millennium
- the potential for US thermal coal exports via Millennium and the long-term demand for these coal exports in the Asian market
- structural challenges and the decline in the US coal industry.

As discussed below in Section 4.3, both reports contain a number of areas of agreement. However, TGG's overall conclusions differ significantly from Schwartz's. The Central Area of Disagreement relates to the need for the Project to supply coal to Asia.

TGG has conducted a rigorous and conservative analysis of the economics of US thermal coal exports via the Project and concluded that **the Project is not needed to supply coal to Asia.** This conclusion is based on (a) our review of widely respected and influential information sources that are most significant and material, and (b) our expert judgment and deep experience in economic analysis of large energy infrastructure projects. This Central Area of Disagreement can be subdivided into the following subpoints of disagreement: (a) long-term demand projections for thermal coal imports in Asia; (b) demand for US thermal coal exports via Millennium in Asia; (c) port alternatives. Each of these areas of disagreement between TGG and Schwartz will be discussed in Section 4.4.

Moreover, although both reports recognize the decline in the US domestic coal industry, Schwartz fails to acknowledge that the global market for thermal coal exports has peaked and will also decline over the long term. The Asian coal boom is over.

4.2 Schwartz's Central Opinion Based on Three Highly Unlikely Assumptions

Schwartz's central opinion (i.e. Millennium is needed to provide port capacity on the US West Coast to enable coal exports from Western US coal fields to the Asian market) is based on three highly unlikely assumptions about market conditions (which would be very optimistic for US coal exports):

a. Substantial, ongoing and growing demand in Asian markets for US PRB exports

b. Substantial, ongoing and growing demand in Asian markets for Western US bituminous coal exports

c. Substantial diversion of coal to Millennium from other coal terminals, particularly Westshore.

Market assumptions (a) and (b) are unlikely and contradict long-term IEA projections (especially WEO 2017 and WEO 2018) and other recent developments. Any one of these assumptions is unlikely, but the combination of all three is highly unlikely.

It should be understood that even if all of Schwartz's unlikely market assumptions were to actually occur, they would still not result in full throughput for Millennium (i.e. 44 MMTPY). Based on these assumptions, Exhibit 26 of the Schwartz Report (p. 34) projects that Millennium would ship 27 mmst (24.5 MMTPY) in 2025, 38.8 (35.2 MMTPY) in 2030 and 2035 respectively, and 42.5 (38.8 MMTPY) in 2040. So even the highest projected shipments (in 2040) would still be less than Millennium's full throughput of 44 MMTPY.

Furthermore, Schwartz and TGG agree that actual year-by-year exports will vary substantially from long-term projections. Hence in some years, even with the highly unlikely combination of Schwartz's three market assumptions, exports via Millennium could be considerably less than full throughput.

Consistent with the EIS and the Complaint, the TGG Report has determined that: **All or almost all of the coal that might be exported via the Project would be lower quality thermal coal from Powder River Basin mines in Montana and Wyoming.** And consistent with the TGG Report, Schwartz's projections of the incremental PRB exports enabled by the Project would be not be sufficiently large to result in high throughput for the Project. So in order to achieve high throughput, there would also have to be substantial, ongoing and growing demand in Asian markets for US

bituminous coal exports, as well as substantial diversion of coal to the Project from other coal terminals (i.e. assumptions (b) and (c)). The combination of all three assumptions actually occurring is highly unlikely and akin to a **Field of Dreams scenario: build it and they will come.**

4.3 Areas of Agreement with the TGG Report

4.3.1 Focus on Long-Term Projections

Like the IEA's World Energy Outlook (WEO), TGG considers long-term energy projections for the global energy sector. Our focus is on secular trends, rather than cyclical and other shorter-term fluctuations. Schwartz also notes that his focus in on the long term and not cyclical fluctuations. We both agree that actual year-by-year exports will vary substantially from long-term projections.

4.3.2 Decline in Domestic Coal Industry

TGG and Schwartz agree that the domestic coal industry is in decline and generally agree on the reasons for this decline. The TGG Report has discussed the weak financial situation in the US coal market and among US coal producers. However, as will be discussed in Areas of Disagreement, Schwartz fails to acknowledge that the global market for coal exports has peaked and will decline over the long term.

As discussed in Section 7.5.3 of the TGG Report and in Section 3.6 above, according to WEO 2017, one of the large-scale shifts in the global energy system is the rapid rise and falling costs of renewables and other clean energy technologies. This explosive growth spells the end of the global coal boom. Growth in renewables is expected to accelerate, while growth in coal slows. This large-scale global shift towards renewables has affected the long-term outlook for coal demand in Asia, as well as in the US.

4.3.3 Incremental PRB Exports Enabled by the Project Are Small Relative to Full Throughput of Millennium

Schwartz is projecting substantial, ongoing and growing demand in Asian markets for US PRB exports; but he is not, in effect, projecting a very large increase in PRB exports as a result of Millennium. TGG has concluded that the incremental PRB exports enabled by the Project would be relatively small and agrees with Schwartz that these incremental PRB exports, by themselves, would not result in high throughput for the Project. Schwartz estimates that Millennium will enable an incremental increase of 13.5

mmst (11.8 MMTPY) of PRB coal exports. This tonnage would only represent about 25% of Millennium's full throughput. **Hence, incremental PRB exports enabled by the Project are small relative to the full throughput of Millennium.**

As discussed in Section 7 of the TGG Report and again below in Section 4.4, the US will not export large volumes of thermal coal to Asia via Millennium because supply from the US will not be generally economically competitive in destination markets. And there are a number of other port alternatives that can meet the intermittent and shrinking Asian demand for US thermal coal exports. **As such, TGG has concluded that the Project is unlikely to consistently operate at levels close to these maximum throughput assumptions.** As discussed above in Section 4.2, even if the highly unlikely combination of Schwartz's three market assumptions to actually occur, Schwartz projects that Millennium would not consistently operate at full throughput over its lifetime.

TGG and Schwartz disagree, however, on the total US thermal coal exports (bituminous and sub-bituminous) that will be enabled and handled by Millennium (to be discussed in Areas of Disagreement (Section 4.4)).

4.3.4 Western US Coal Fields Contain Huge Reserves

TGG agrees with Schwartz that Western US coal fields contain huge reserves of both bituminous and sub-bituminous coals. And some of that coal may be coal quality that is desired by existing and potential customers in Asia. However, not all reserves are economically viable to produce, owing to high costs and other factors. TGG has determined for instance that the production profiles of both the Lighthouse mines (Decker and Black Butte) reflect that these are older mines where the economically viable coal resources are depleted, and the remaining resources have substantially higher production costs than costs at competing mines. And as will be discussed below (Section 4.4), thermal coal exports from Western US production will not be generally economically competitive in Asian markets. These US coal exports will continue to be disadvantaged by relatively long transport distances and relatively high transport costs, with or without Millennium.

4.3.5 Diversion of Tonnage from Port Alternatives

Schwartz assumes that sizable tonnage (approximately one-third of the total) that would be exported via Millennium would be diverted from Westshore; Schwartz also assumes a small diversion (1 mmst) from Guaymas (in Mexico).

TGG has also concluded that to the extent that Millennium is constructed and operates, some (and possibly all) of the tonnage handled may be diverted from port alternatives. Tonnage diverted to Millennium from port alternatives will not require additional US coal production. The coal that would have been produced, even without Millennium, would still be produced. All that would change is how this coal is shipped from the mine to market, such that coal is shipped via Millennium instead of a port alternative. **Tonnage diverted to Millennium from port alternatives would not result in additional mining jobs.**[10]

This scenario of no additional mining jobs is consistent with the assumption in the Plaintiffs' BERK Study (as discussed in TGG Report Section10.4.3.1). According to BERK, the coal handled by the Project would be produced even without the Project; hence, the jobs and business activity associated with mining and transportation of the coal are likely to occur regardless.

The diversion of tonnage from other ports (if the Project is built) has no overall significant positive impact on the US coal industry or on coal jobs. But this diversion could have benefits specifically for Lighthouse (developer and owner of the Project, as well as owner of one and a half small, older low-value mines).

4.4 Areas of Disagreement with the TGG Report

The Central Area of Disagreement between TGG and Schwartz concerns the need for the Project to supply coal to Asia. This central disagreement (regarding the need for the Project) directly relates to **the effect of the permit denials for the Project on the US coal industry and on US coal exports to Asian markets.** This central disagreement appears on page 1 of each expert report.

According to TGG Key Finding 3: The Project is not needed to supply coal to Asia. Countries that could conceivably be served by exports from Millennium can easily meet their coal requirements from other sources, including Australia and Indonesia. The US will not export large volumes of thermal coal to Asia via Millennium because supply from the US will not be generally economically competitive in destination markets. (p. 1)

[10] This finding is consistent with the Alternative Scenario (based on Schwartz) in the Berkman Report, as corrected December 3, 2018. This Alternative Scenario assumes incremental tonnage of Western US thermal coal exports enabled by Millennium (Schwartz Exhibit 26 minus Exhibit 25). See Section 5.4 and Table 2.

According to Schwartz's Opinion 1): "MBTL is needed to provide port capacity on the U.S. West Coast to enable coal exports from western U.S. coal fields to the Asian market." (p. 1)

The Central Area of Disagreement can be broken down into the following subpoints of disagreement:

- Long-Term Demand Projections for Thermal Coal Imports in Asia
- Long-Term Demand for US Thermal Coal Exports via Millennium in Asia
- Port Alternatives.

Each of these subpoints is described in Sections 4.4.1 to 4.4.3 below.

4.4.1 Long-Term Demand Projections for Thermal Coal Imports in Asia

According to TGG, large-scale shifts in the global energy system have affected the long-term outlook for coal demand in Asia, particularly in Millennium's key export markets: market conditions will be unfavorable overall given the shrinkage of imports in most mature Asian markets, which may only be partially offset by growth in emerging Asian markets. WEO 2017 and 2018 confirm that the Asian coal boom is over.

According to Schwartz (p. 1)

> 6) […] thermal coal demand in Asia has been growing rapidly and will continue to grow with the construction of new coal-fired power plants to meet the growing demand for electricity. Almost all of the increased coal demand in Asia will be supplied by imports of coal from the world market because Asian countries produce little or no coal themselves, except China and India.

In particular, **Schwartz claims that there will be a strong ongoing demand for bituminous coal imports in Asia.**[11]

TGG disagrees with Schwartz's claims related to long-term demand projections for Asian thermal coal imports for the following reasons:

i. TGG Report did not focus on demand for bituminous coal imports in Asia. Consistent with the EIS and the Complaint, the TGG Report has determined that: All or almost all of the coal that might be exported via the Project would be lower

[11] Schwartz, Opinions 4, 7, 8, pp. 1-2, pp. 28-34.

quality thermal coal from Powder River Basin mines in Montana and Wyoming.

ii. The TGG Report concludes that the overall demand for thermal coal imports (including bituminous and sub-bituminous) is shrinking in Asian markets. As indicated above, this is because of the large-scale shifts in the world energy system have affected the long-term outlook for coal demand in Asia, particularly in Millennium's key export markets (South Korea and Japan): market conditions will be unfavorable overall given the shrinkage of imports in most mature Asian markets, which may only be partially offset by growth in emerging Asian markets.

iii. TGG has based its conclusions on the long-term outlook for the demand for thermal coal imports in Asia from reliable, mainstream and conservative sources such as the IEA (with a focus on WEO 2017, Coal 2017, as well as WEO 2016) and the EIA's AEO 2017. In particular, TGG has focused on the most relevant and material information from these sources. These conclusions are also supported by a wide variety of industry sources as documented in TGG's Report.

Schwartz has not provided a sufficiently detailed or specific basis for his projections related to the Asian coal trade.[12] His opinion regarding strong continuing demand for thermal coal imports in Asia is outdated and exemplifies the lags in analysis noted in the TGG Report (Section 7.5.4).

iv. Consistent with the IEA (as well as the EIS), TGG is careful to differentiate between mature Asian markets (e.g. South Korea and Japan) and emerging Asian markets (e.g. India, Southeast Asia). This differentiation is important because thermal coal demand in Asia is shifting from the more mature markets (which are more proximate to Millennium) to emerging Asian markets (which are more distant from Millennium and supplied by structurally advantaged competitors). Moreover, the decline in the mature markets may only be partially offset by growth in emerging Asian markets, which is also very uncertain.

Schwartz does not generally differentiate between mature and emerging Asian markets. The Schwartz Report mainly presents Asia as a single, uniform and potentially large, market for US exports. In reality, Asia includes numerous distinct and highly differentiated markets, spread over a very large geographic area.

[12] The insufficient documentation of the basis for Schwartz's projections is further discussed in Section 4.5.

v. The shift in Asian thermal coal demand away from more mature markets to emerging Asian markets especially disadvantages exports of Western US bituminous coal. The mature markets which are more proximate to Millennium (notably South Korea and Japan, but also Taiwan) mainly import higher quality coal (notably bituminous coal from Australia). The emerging markets which are more distant from Millennium (notably India and Southeast Asia) mainly import lower quality coal (notably sub-bituminous coal from Indonesia).

   This shift in Asian thermal coal demand (away from mature markets, which mainly import higher quality bituminous coal, to emerging markets, which mainly import lower quality sub-bituminous) is acknowledged by Schwartz (pp. 17, 20).[13]

   But despite this acknowledgment, Schwartz claims there will be strong continuing demand in Asia for thermal coal imports, both bituminous and sub-bituminous.

4.4.2 Long-Term Demand for US Thermal Coal Exports Via Millennium in Asia

According to the TGG Report, US thermal coal exports in general and PRB exports in particular are faced with a number of economic challenges and structural disadvantages, which are intensifying. WEO 2017 and 2018[14] project that the global market for coal exports has peaked and will decline over the long term. Neither the IEA nor the EIA projects that there will be a high volume of US thermal coal exports to Asia.

As discussed above, overall demand for thermal coal imports (including bituminous and sub-bituminous) will be shrinking in Asian markets, and particularly in more mature economies such as South Korea and Japan, the key markets for Millennium. This shrinkage may be only partially offset by growth in demand in emerging Asian markets. However, these markets are less proximate to Millennium and supplied by more structurally advantaged competitors.

According to Schwartz (pp. 1-2):

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[13] According to Schwartz,
Under the [WEO 2017] "New Policies" scenario, all of the world growth in coal consumption is projected to be in India and Southeast Asia, offsetting declines in coal demand elsewhere. (p. 17)
[…]
New power plants in India and Southeast Asia are being designed for subbituminous coal, but existing power plants in traditional markets (Japan, South Korea, Taiwan, and Hong Kong) still require higher-rank bituminous coal […]. (p. 20)

[14] WEO 2018 was released on November 13, 2018 and further confirms that the global market for coal exports is in decline. Relevant findings in WEO 2018 are discussed in Section 3.2.

> 4) U.S. western coal fields contain huge reserves of both bituminous and subbituminous coals with coal quality that is desired by existing and potential customers in Asia. […]
>
> 6) […] thermal coal demand in Asia has been growing rapidly and will continue to grow with the construction of new coal-fired power plants to meet the growing demand for electricity. Almost all of the increased coal demand in Asia will be supplied by imports of coal from the world market because Asian countries produce little or no coal themselves, except China and India. […]
>
> 8) Exports of thermal coal that would be shipped through MBTL will displace higher-cost and lower-quality coals that would have been produced in other countries, primarily Indonesia and China.
>
> 9) […] world thermal coal prices have increased and are well above the level which would be needed for U.S. thermal coal exports to be economic in world markets. […]

In particular, Schwartz maintains that there will be strong long-term markets for Western US bituminous coal exports in Asia.

TGG disagrees with Schwartz's claims related to Asian demand for US thermal coal exports via Millennium for the following reasons:

i. WEO 2017 and 2018 project that the global market for thermal coal exports has peaked and will decline over the long term. Neither the IEA nor the EIA projects that there will be a high volume of US thermal coal exports to Asia.

ii. TGG has based its conclusions on the long-term outlook for the demand for US thermal coal exports in Asia from reliable, mainstream and conservative sources such as the IEA (with a focus on WEO 2017, WEO 2016, and more recently WEO 2018). In particular, TGG has focused on the most relevant and material information from these sources. These conclusions are also supported by a wide variety of industry sources as documented in TGG's Report.

iii. WEO 2018 directly contradicts Schwartz's claims that there is a sizable and growing market in Asia for US thermal coal exported via West Coast ports. IEA WEO 2018 concludes that the US is a high cost swing supplier in a stagnating trade market, such that US exports will decline by more than 40% from 2017 to 2040, reflecting the challenges that exporters face in matching the prices of other suppliers due to high production costs, high transport costs, or both, in the

various production basins.[15] In particular, PRB sub-bituminous coal has low production costs, but high transport costs (both generally and specifically as a supplier to Asia). Western US bituminous coal (notably Uinta) has at least somewhat high production costs and high transport costs (both generally and specifically as a supplier to Asia).

iv. Finally, as indicated above (Section 4.4.1 and footnote 13), Schwartz does acknowledge the shift in Asian thermal coal demand (away from more mature markets to emerging Asian markets). However, he fails to acknowledge that this shift will especially disadvantage exports of Western US bituminous coal (from Millennium) because emerging markets, which are more distant from Millennium (notably India and Southeast Asia), mainly import lower quality coal (notably sub-bituminous coal from Indonesia). Instead Schwartz claims there will be a strong and continuing demand for Western US bituminous and sub-bituminous coal.

4.4.3 Port Alternatives

According to TGG Report **Key Finding 4,** a number of other port alternatives exist that can meet the intermittent and shrinking Asian demand for US thermal coal exports. (p. 1)

According to Schwartz's Opinions (p. 1),

> 2) Existing West Coast port capacity for coal exports is extremely limited, consisting of just three small California ports which together can transfer less than 5 million tons per year. […]
>
> 3) Most western U.S. thermal coal exports to Asia ship through the Westshore Terminal in Vancouver, Canada. This port terminal has little remaining capacity to handle additional U.S. coal exports. Other potential coal ports in Canada and Mexico are not available for U.S. coal exports or have such long rail distances from the U.S. coal fields as to make it uneconomic to incur the additional freight costs.

[15] See Section 3.2. Based on WEO 2018 Table 5.4, US coal exports will decline by 42% 2017 to 2040 (from 76 Mtce to 44 Mtce). Based on the same type of analysis as that of the TGG Report (e.g., p. 168 regarding share of thermal coal exports in the WEO 2017 projections), if thermal coal exports decline at the same rate as all exports, US thermal coal exports would decline by 15.9 MMTPY from the 2017 volumes (37.8 MMTPY) to 21.9 MMTPY in 2040. Moreover, these results for thermal coal are conservative and may overstate 2040 volumes, since the decline in coal exports may be weighted toward thermal coal. In other words, metallurgical coal exports may decline by less than 42% and thermal coal exports may decline by more than 42%.

TGG disagrees with Schwartz's claims related to port alternatives for the following reasons:

i. TGG has shown that based on AEO 2018 and WEO 2017 (and earlier versions of these projections), port capacity will not be a major constraint on US coal exports and specifically coal exports to Asia. Projected coal export volumes are generally below peak volumes in recent years, which have been achieved via existing ports and other logistics.

ii. Several existing ports/logistics can and do provide alternatives to Millennium for the export of PRB coal. These include Westshore Terminals (Metro Vancouver, BC); Ridley Terminals (Prince Rupert, BC); and ports on the US Gulf Coast and Great Lakes.[16] Westshore, in particular, is a good nearby substitute for Millennium enabling sizable volumes of PRB exports when market conditions are favorable. By itself, Westshore has capacity for approximately 11 MMTPY of PRB exports. And together with Ridley, BC terminals could provide even more West Coast export capacity for PRB coal.

   Furthermore, in Section 9.4.2.2, TGG refutes Lighthouse's claim that there is not sufficient economic West Coast coal export capacity for Lighthouse to fulfill its contracts with Asian customers. We discuss how existing port alternatives (including Westshore) enable a large volume of US coal exports.

Despite Schwartz's Opinions 2) and 3), many of Schwartz's findings regarding West Coast port capacity are overall consistent with TGG's Key Finding 4 (i.e. that a number of other port alternatives exist that can meet the intermittent and shrinking Asian demand for US thermal coal exports):

- Schwartz and TGG agree that:
  - it can sometimes be lower cost to ship PRB and bituminous exports via Westshore; and
  - shippers using larger Capesize ships will continue to export via Westshore (as Millennium cannot accommodate Capesize).

[16] Schwartz (pp. 28-29 and Exhibit 24) discusses port alternatives for Rockies/Uinta Western Bituminous coal exports to Asia. As shown in Exhibit 24, costs via California ports are very similar to costs via Millennium. So while the California ports have limited capacity, they are not otherwise disadvantaged relative to Millennium (and Westshore). And Schwartz (p. 33) forecasts no change tonnage at California ports due to Millennium. In other words, Millennium would not divert any tonnage of Rockies coal exports from the California ports.

- Schwartz (Exhibit 25, p. 32) projects that without Millennium, Westshore could handle a sizable and growing level of US thermal coal exports: 12.5 mmst (PRB) + 7.2 mmst (Rockies) = 19.7 mmst by 2025. As projected by Schwartz, US thermal coal exports via Westshore will grow by 7.5 mmst from 2017 to 2025 (without Millennium).

- The combination of Westshore, the California ports and the Mexican port would provide significant and growing capacity for US thermal coal exports without Millennium. This is consistent with TGG's finding that the existing West Coast ports enable (now and in the future) a high volume of thermal coal exports to Asia. Schwartz projects that by 2025, these exports would total 25.7 mmst (23.3 MMTPY), which is more than half of Millennium at full throughput (44 MTPY):

    - Westshore: 19.7 mmst
    - California ports: 4.5 mmst
    - Mexican port: 1.5 mmst
    - **Total West Coast ports: 25.7 mmst (23.3 MMTPY)**

As projected by Schwartz, US thermal coal exports via West Coast ports will grow by 9.0 mmst from 2017 to 2025 (without Millennium).

As discussed in Section 4.2, Schwartz is much more optimistic about (a) incremental PRB exports, (b) potential for Western US bituminous coal exports; (c) diversion of US exports shipped through Westshore.

4.5 Insufficient Explanation of the Underlying Model for Schwartz's Forecast (Black Box Model)

As indicated in Section 4.4.1 above, Schwartz has not provided a sufficiently detailed or specific basis for the projections in his report related to the Asian coal trade. The description of the inputs for Schwartz's forecast of Western US Thermal Coal Exports is less than half a page.[17] Only the first four bullets on page 30 are directly relevant to the global coal trade:

[17] See Schwartz, Section F, p 29 to the end of the fourth bullet on p. 30. Of this half page, much of the modeling description is related to the US domestic market.

F. Forecast of Western U.S. Thermal Coal Exports

We have prepared a forecast of western U.S. coal exports with and without construction of the MBTL terminal. This forecast is based upon EVA's analysis of world coal demand and economic

(footnote continued on next page)

- Demand for thermal coal by country;
- Cost of thermal coal production by country and coal quality;
- Transportation costs for inland freight and ocean vessel rates from origin coal basin to destination region; and
- Economics of delivered coal costs by origin region and destination.

Any one of these four inputs is a complex topic in and of itself that would require a lengthy and detailed explanation in order to be transparent about the Schwartz's forecasts. There is a stark contrast between Schwartz's explanation of his forecasts and the explanation of projections related to the Asian coal trade in other reliable, mainstream and conservative sources such as the IEA's WEO or the EIA's AEO.[18] Likewise, the Millennium EIS Coal Market Assessment provides extensive documentation and was subject to an extensive review and comment process.[19]

In an effort to be transparent about the derivation of their projections, these publications provide lengthy and detailed explanations of their models. TGG spent considerable time

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supply options to meet that demand. The projection of western U.S. coal exports includes the following factors:
    - Production capacity and reserves at existing U.S. mines and potential new mine projects;
    - Domestic U.S. demand for thermal coal using an economic dispatch model, which considers:
- Demand forecast for electricity;
- Existing generating capacity by fuel type and units in advanced development;
- Announced retirements of existing plants;
- Dispatch cost for each generating unit;
- Capacity forecast by ISO region;
- The model projects:
- New builds and retirements;
- Generation by unit;
- Fuel consumption by unit;
- Demand for thermal coal by country;
- Cost of thermal coal production by country and coal quality;
    - Transportation costs for inland freight and ocean vessel rates from origin coal basin to destination region; and
    - Economics of delivered coal costs by origin region and destination.

[18] US Energy Information Administration (EIA) publishes the Annual Energy Outlook (AEO). See Technical Appendix, Section 9.2 for model documentation and other information for WEO, AEO, and the Millennium EIS Coal Market Assessment.
[19] As explained in the Technical Appendix (Section 9.2.3), it should be understood that the EIS Coal Market Analysis is explicitly **not a forecast** of likely actual throughput for the Project. The EIS analysis **assumes** that throughput at full build-out will be 44 MMTPY, based on the Proponent's definition of the Project. Nonetheless, the EIS Coal Market Analysis involved extensive modeling of energy markets in the US and globally (notably in Asia).
(footnote continued on next page)

reviewing numerous IEA publications (particularly WEO 2016, 2017 and 2018) as well at EIA publications. Even to summarize and integrate the projections from these sources into the TGG report required over 80 pages of detailed explanation and lengthy technical analysis.[20]

Schwartz has failed to provide a detailed explanation of the underlying model (along with related data and assumptions) for his forecast related to Western US coal exports. Without such an explanation, it is not possible for other experts (such as TGG) to effectively review the model. And absent an effective and detailed review of the model by other experts, it is impossible to determine why Schwartz's forecast is so divergent from other reliable, mainstream and conservative sources, such as IEA's WEO and EIA's AEO.

It has been particularly challenging for TGG to review Schwartz's forecast in the context of this rebuttal report with (a) a tight timeline and (b) no response to discovery from Schwartz regarding the details of the underlying model at the time of filing this report.[21]

Effectively, the description Schwartz's model for the forecast related to Western US coal exports (and more broadly the Asian coal trade), as described in his expert report, is a black box. And it is highly problematic for expert report analysis to rely on a black box, which is (by definition) non-transparent.

4.6 Other Technical Issues in the Schwartz Report

4.6.1 Rail distances to Millennium, Westshore and other Port Alternatives

As noted by Schwartz and the Complaint, rail distances are shorter to Millennium than to Westshore for various Western US mines (notably in Montana). But Schwartz overestimates the rail distance advantage of Millennium compared with Westshore; and thus overestimates the costs of exporting via Westshore, as compared with Millennium.[22] Hence, even more than already acknowledged by Schwartz, Westshore provides a cost-competitive port alternative to Millennium.

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[20] See TGG Report, Section 7 Potential for Coal Exports via Millennium (which examines in detail the long-term demand for coal imports in Asian and the long-term demand projections for US coal exports to Asia); and Section 8 Key Export Markets and Drivers (which provides detailed long-term demand projections for coal imports by country in the key markets and key market drivers for the Project).
[21] See Section 2.3.
[22] Schwartz estimates that rail distances to Millennium are almost 300 miles shorter than to Westshore (Schwartz, pp. 33-34; discovery responses submitted by Berkman on December 3, 2018 providing data from Schwartz on rail distances and export volumes for each port and mine). The FEIS estimates that the
(footnote continued on next page)

Schwartz also claims that for bituminous coal mines in South Wyoming, Millennium would provide a shorter rail haul for exports; hence Millennium would make this South Wyoming coal (notably from Lighthouse's Black Butte mine) more economic to export than via current routes to California ports.[23] In fact, for mines in South Wyoming, the rail distance via California ports are similar to the rail distances via Millennium.[24]

4.6.2 Capacity available at Westshore and Ridley for US Thermal Coal Exports

In his forecasts (Exhibits 25 and 26), Schwartz overestimates utilization and understates port capacity at Westshore and Ridley. Hence, Schwartz underestimates capacity available at Westshore and Ridley for exports of US thermal coal. In the context of this Rebuttal Testimony, TGG's review of these issues was constrained by both the limited information provided by Schwartz and the limited time available. Technical Appendix, Section 9.3 provides additional information on these issues, confirming that substantial capacity will actually be available at these port alternatives to meet the intermittent and shrinking Asian demand for US thermal coal exports.

difference between Millennium and Westshore is only about 125 miles (see TGG Report, endnote 282). As explained in the FEIS (Section 5.1), typical routings for loaded BNSF coal trains (to both Millennium and Westshore) are via the Columbia River Gorge and Longview; typical routings for unloaded BNSF coal trains (from Millennium and possibly Westshore) are via Stampede Pass and Yakima. Hence, the rail distance to Millennium for loaded coal is substantially shorter than to Westshore, but the difference is much smaller for unloaded coal trains. And in some cases, unloaded coal trains may be routed via Stevens Pass and Wenatchee, providing an even shorter and more advantageous routing for Westshore, as compared with Millennium.

[23] Schwartz (p. 34, last sentence); discovery responses submitted by Berkman on December 3, 2018 providing data from Schwartz on rail distances and export volumes for each port and mine.

[24] For exports from South Wyoming, rail distances via Millennium are either slightly longer or slightly shorter than rail distances via California ports, depending upon which California port and routing is compared with Millennium.

5 Rebuttal of the Berkman Report

5.1 Relevance to the TGG Report

There is only one section of the Berkman Report (as corrected December 3, 2013) that is directly relevant to the TGG Report: Section II.C Economic Consequences of Permit Denial (¶¶ 25-30), which focuses mainly on the out-of-state employment impacts of the Project (i.e. mining jobs and spin-offs) over the period of 2021-2040.

In Section I.C Summary of Opinions (¶10c), Berkman provides his overall opinion with respect to the mining jobs and spin-offs:

> c. Denial of the Terminal affects multiple firms in states well beyond Washington – especially Wyoming and Montana, where in addition to Lighthouse mines, 15 other mines are or are likely to look to export. Additional mines in Colorado and Utah will do the same. Secondary firms – suppliers, professional service providers, and vendors rely upon these mines. My analysis shows that Ecology's action will not only affect mining jobs, it will also affect indirect and induced jobs tied to these secondary firms.

In Section 10 (Project Has Few Jobs) of the TGG Report, we have conducted a comprehensive analysis to respond to the Complaint's claims. The Complaint in federal litigation refers to jobs and other benefits in:

- Washington (and specifically Cowlitz County), from Project construction and operations (¶¶72-74); and
- throughout the US (and specifically in Montana and Wyoming) relating to coal exports (¶¶75-77).

In response to the Complaint, the TGG Report has evaluated employment impacts in Washington from Project construction in Section 10.4, as well as out-of-state employment impacts in Section 10.5. As indicated above in Section 4.4, consistent with the EIS and the Complaint, the TGG Report (Section 4.7) has determined that:
All or almost all of the coal that might be exported via the Project would be lower quality thermal coal from Powder River Basin mines in Montana and Wyoming.

Our review of jobs outside Washington (in Section 10.5) evaluates mining job impacts in Montana and Wyoming, the states of origin for most (if not all) of the coal to be exported from the Project.

The Berkman Report (Section II.C Economic Consequences of Permit Denial (¶¶ 25-30)) is therefore only relevant to Section 10.5 (Jobs Outside Washington) of the TGG Report, which evaluates the out-of-state employment impacts of the Project (i.e. mining jobs and spin-offs).

As discussed below in Sections 5.4 and 5.5, both reports estimate very small out-of-state employment impacts. However, TGG's overall conclusion regarding the importance of these very small numbers differs dramatically from Berkman's.

As further discussed in Section 5.5, each report also differs significantly in how these out-of-state employment impacts were estimated.

5.2 Lack of Comprehensive Expert Report Analysis to Support Complaint Claims on Jobs

As explained above, **TGG has conducted a comprehensive analysis to respond to the Complaint's claims regarding employment benefits of the Project.** These claims include employment impacts in Washington from Project construction and operations (¶¶72-74); and employment impacts outside Washington and throughout the US (and specifically in Montana and Wyoming) relating to coal exports (¶¶75-77). **Conversely, the Plaintiffs (Lighthouse et al.) have failed to provide comprehensive expert report analysis to support the Complaint's claims regarding employment benefits of the Project.**

The TGG Report has evaluated employment impacts in Washington from Project construction (Section 10.4), as well as out-of-state employment impacts (Section 10.5). Section 10.5 not only evaluates the mining jobs and spin-offs in Montana and Wyoming (the states of origin for most (if not all) of the coal to be exported from the Project), it also considers the spin-off jobs in other states (again in response to the Complaint).[25]

However, the Plaintiffs have provided only the Berkman Report (which estimates out-of-state mining jobs and spin-offs) as expert report analysis to support the Complaint's claims regarding jobs and other economic benefits of the Project.

[25] See Table 8 in the TGG Report, p. 223. Also reproduced for ease of reference as Table 3 in Section 5.3 below.

Berkman evaluates only mining jobs and spin-offs in the four mining states of Montana, Wyoming, Colorado and Utah. Berkman's analysis considers each state as a separate unconnected economy. He does not estimate spin-off jobs outside these states. Spin-off jobs in other states could include spin-off jobs in mining states from other mining states, as well as spin-off jobs in the rest of the US from the mining jobs in the mining states.

More significantly, Berkman does not consider employment impacts in Washington from Project construction. The Complaint cites the BERK study, which does consider the employment impacts of the Project to jobs within Washington State. However the BERK study is unsupported by the expert report analysis filed in this case.

A number of other job issues identified in the Complaint (¶¶72-77) are not considered in the Berkman Report or in any of the Plaintiffs' expert reports. These job claims are unsupported by any expert report analysis in this case.

The Plaintiffs' expert reports in general, and Berkman in particular, are lacking in comprehensiveness and fail to support many of the employment impact claims in the Complaint.

There is only one portion of the Berkman Report that is relevant to TGG's comprehensive evaluation of the employment impact claims in the Complaint: Section II.C Economic Consequences of Permit Denial (¶¶ 25-30). Section II.C evaluates the out-of-state employment impacts of the Project (i.e. mining jobs and spin-offs) related to four mining states. Section II.C in Berkman is specifically relevant to Section 10.5 (Jobs Outside Washington) of the TGG Report. The following sections will consider areas of agreement and disagreement between these two sections.

5.3 Employment Impact Estimates in Tables 1 to 3

This section contains Tables 1 to 3, which are referred to frequently throughout Section 5. Table 1 and Table 2 summarize Berkman's out-of-state employment impact estimates for the Project, based on Berkman's "EIS Scenario" and Berkman's "Alternative Scenario" respectively. As explained below, the Table 2 estimates are the most relevant Berkman estimates of the out-of-state mining jobs and spin-offs. **Table 3** (equivalent to Table 8 in the TGG Report, p. 220) summarizes the TGG Report's initial out-of-state incremental employment impact estimates of the Project (based on the initial assumption of full throughput of 44 MMTPY and on more accurate and reliable state-specific studies).

Table 1 is entitled "Berkman Job Estimates Based on Schwartz (Exports via Millennium)." The lengthy subtitle of Table 1 is "Mining-related jobs for exports (average annual jobs (FTE-years), 2021-2040) Berkman EIS Scenario, corrected December 3, 2018, assumes total tonnage Western US thermal coal exports via Millennium (Schwartz Exhibit 26)."

As further explained in Section 5.5.2.1, Berkman's "EIS Scenario" is actually based on the export volumes in Schwartz Exhibit 26 (and not on the EIS as the name implies). Berkman's "EIS Scenario" assumes an average of 31 MMTPY of exports via Millennium over the period of 2021-2040. Berkman's estimates of mining jobs and spin-offs in Montana, Wyoming, Colorado and Utah, based on his "EIS Scenario" are summarized in Table 1.

Table 2 is entitled "Berkman Job Estimates Based on Schwartz (Incremental Exports Enabled by Millennium)." The lengthy subtitle of Table 2 is "Mining-related jobs for exports (average annual jobs (FTE-years), 2021-2040) Berkman Alternative Scenario, corrected December 3, 2018, assumes incremental tonnage Western US thermal coal exports via Millennium (Schwartz Exhibit 26 – Exhibit 25)."

As further explained in Section 5.5.2.1, Berkman's "Alternative Scenario" is based on the export volumes in Schwartz Exhibit 26 **minus** the export volumes in Schwartz Exhibit 25. In other words, the "Alternative Scenario" is based on the incremental exports enabled by Millennium. Berkman's "Alternative Scenario" assumes an average of 20.3 MMTPY of exports enabled by Millennium over the period of 2021-2040. Berkman's estimates of mining jobs and spin-offs in Montana, Wyoming, Colorado and Utah, based on his "Alternative Scenario" are summarized in Table 2. **Given that the relevant employment impacts to be measured are those resulting from incremental exports enabled by Millennium, the Table 2 estimates are the most relevant Berkman estimates of the out-of-state mining jobs and spin-offs.**

Finally, **Table 3** (equivalent to Table 8 in the TGG Report, p. 220) is entitled "TGG Report (Table 8) Initial Lower Job Impact Estimates Based on State-Specific Coal Studies for Montana Wyoming." This table from the TGG Report is reproduced in this section for ease of reference and comparison with the Berkman estimates in Table 1 and Table 2. **Table 3** is based on the TGG Report's initial assumption of full throughput of 44 MMTPY and on more accurate and reliable state-specific studies (as explained in Section 10.5.6 of the TGG Report). This table provides the summary of TGG's initial lower job impacts estimates for mining jobs and spin-offs in Montana and Wyoming. These estimates are based on two state-specific studies for Montana and Wyoming respectively: the BBER and CEE Studies. **As further explained in Section 5.4.1 below, the job estimates in Table 3 (Table 8 of the TGG Report) are the most**

relevant TGG estimates (at full throughput) for the evaluation of the out-of-state employment impacts of the Project. Nonetheless, as discussed below and in Sections 10.5.8 and 10.5.9 of the TGG Report, these very small employment impact estimates are overstated due to (a) approaches in the state-specific studies that may tend to overstate job impacts in a tight economy; and (b) the initial maximum throughput assumption (44 MMTPY).

Table 1: Berkman Job Estimates Based on Schwartz (Exports via Millennium)

Mining-related Jobs for exports (Average Annual Jobs (FTE-years), 2021-2040)
Berkman EIS Scenario, corrected December 3, 2018, assumes Total Tonnage
Western US Thermal Coal Exports via Millennnium (Schwartz Exhibit 26)

	Exports MMTPY	Direct	Indirect & Induced	Total	All Jobs BEA 2017	Mining Jobs as % of All Jobs: Direct Mining	Total Mining
Montana	20.1	384	860	1244	675,904	0.0568%	0.1841%
Wyoming	2.9	32	59	91	398,199	0.0082%	0.0230%
Colorado	2.4	88	238	326	3,743,025	0.0023%	0.0087%
Utah	5.7	167	435	601	1,987,836	0.0084%	0.0303%
Total (MT+WY+CO+UT)	31.1	671	1592	2263	6,804,964	0.0099%	0.0333%
All US	31.1	671	1592	2263	196,132,200	0.0003%	0.0012%

Jobs per MMTPY

	Direct	Indirect & Induced	Total	Multiplier Total/Direct
Montana	19	43	62	3.24
Wyoming	11	20	31	2.81
Colorado	37	101	138	3.72
Utah	29	76	106	3.61
Total (MT+WY+CO+UT)	22	51	73	3.37
All US	22	51	73	3.37

Sources: Berkman Report (as corrected December 3, 2013), Table 1; sources for that table;[26] BEA.[27]

[26] Berkman's responses to discovery provided on December 6, 2018; Schwartz Report, Exhibit 26.
[27] See TGG Report, Endnote 416 regarding BEA employment data.

Table 2: Berkman Job Estimates Based on Schwartz (Incremental Exports Enabled by Millennium)

Mining-related Jobs for exports (Average Annual Jobs (FTE-years), 2021-2040)
Berkman Alternative Scenario, corrected December 3, 2018, assumes Incremental Tonnage
Western US Thermal Coal Exports enabled by Millennium (Schwartz Exhibit 26-Exhibit 25)

	Exports					Mining Jobs as % of All Jobs	
			Indirect &		All Jobs	Direct	Total
	MMTPY	Direct	Induced	Total	BEA 2017	Mining	Mining
Montana	10.3	203	454	656	675,904	0.0300%	0.0971%
Wyoming	2.9	32	59	91	398,199	0.0082%	0.0230%
Colorado	2.4	88	238	326	3,743,025	0.0023%	0.0087%
Utah	4.8	139	363	502	1,987,836	0.0070%	0.0252%
Total (MT+WY+CO+UT)	20.3	462	1113	1575	6,804,964	0.0068%	0.0231%
All US	20.3	462	1113	1575	196,132,200	0.0002%	0.0008%

Jobs per MMTPY

		Indirect &		Multiplier
	Direct	Induced	Total	Total/Direct
Montana	20	44	64	3.24
Wyoming	11	20	31	2.81
Colorado	37	101	138	3.72
Utah	29	76	105	3.61
Total (MT+WY+CO+UT)	23	55	77	3.41
All US	23	55	77	3.41

Sources: Berkman Report (as corrected December 3, 2013), Table 2; sources for that table;[28] BEA.[29]

[28] Berkman's responses to discovery provided on December 6; Schwartz Report, Exhibits 25 and 26,
[29] See TGG Report, Endnote 416 regarding BEA employment data.

Table 3: TGG Report (Table 8) Initial Lower Job Impact Estimates Based on State-Specific Coal Studies for Montana Wyoming

Mining-related Jobs for exports (44 MMTPY)

	Exports MMTPY	Direct	Indirect & Induced	Total	All Jobs BEA 2017	Mining Jobs as % of All Jobs: Direct Mining	Mining Jobs as % of All Jobs: Total Mining
Montana	33	590	981	1571	675,904	0.0872%	0.2324%
Wyoming	11	212	281	493	398,199	0.0532%	0.1237%
Montana+Wyoming	44	802	1262	2063	1,074,103	0.0746%	0.1921%
Other States	44	0	757	757	195,058,097	0.0000%	0.0004%
All US	44	802	2019	2820	196,132,200	0.0004%	0.0014%

Jobs per MMTPY

	Direct	Indirect & Induced	Total	Multiplier Total/Direct
Montana	18	30	48	2.66
Wyoming	19	25	44	2.32
Montana+Wyoming	18	29	47	2.57
Other States	0	17	17	N/A
All US	18	46	64	3.52

Source: TGG Report, Table 8, sources in original: BBER Study (Montana) and CEE Study (Wyoming).[30]

5.4 Areas of Agreement with the TGG Report

5.4.1 Berkman and TGG Out-of-State Job Estimates are Very Small

Berkman and TGG both estimate very small job impacts for incremental direct mining jobs and spin-offs enabled by Millennium. Based on Schwartz's overstated estimates of incremental export volumes enabled by Millennium (which have already been critiqued in Section 4), Berkman estimates incremental annual mining job impacts as follows (summarized in Table 2 above[31]):

[30] Details regarding the data, assumptions, and methodology underlying the estimates in Table 8 are provided in the TGG Report, endnote 457. See also endnotes 444-445 and 456.

[31] As indicated in Section 5.3, Table 2 Berkman Job Estimates Based on Schwartz from Incremental Exports Enabled by Millennium (Berkman's Alternative Scenario) are the most relevant Berkman estimates of the out-of-state employment impacts of the Project. These estimates will be further discussed in Section 5.5.2. Table 2 is based on the assumption of 20.3 MMTPY of exports enabled by Millennium, which is less than 50% of the full throughput assumption (i.e. 44 MMTPY) of the TGG's initial (footnote continued on next page)

- 462 direct mining jobs spread across four states (Montana, Wyoming, Colorado and Utah)
- 1113 spin-off jobs (indirect and induced jobs) spread across the same four states
- 1575 total jobs (equivalent to 0.0231% of the jobs in the four states, and 0.0008% of all US jobs)
- 77 total jobs per MMTPY in the four mining states.

Based on the initial assumption of full throughput of 44 MMTPY and on more accurate and reliable state-specific studies, the TGG Report initially estimated incremental direct mining jobs and spin-offs as follows (see Table 8 in the TGG Report (Table 3 in this report)):

- 802 direct mining jobs in Montana and Wyoming
- 1262 spin-off jobs (indirect and induced jobs) in Montana and Wyoming
- 2063 total jobs in Montana and Wyoming (equivalent to 0.1921% of the jobs in Montana and Wyoming)
- 757 spin-off jobs in other states
- 2820 total jobs in all of the US (equivalent to 0.0014% of all US jobs)
- 47 jobs per MMTPY in the two mining states
- 64 total jobs per MMTPY in all of the US.

As explained in the TGG Report, estimates in Table 8 (Table 3 in this report) were based on state-specific studies, which are more accurate and reliable for estimating the mining job impacts in Montana and Wyoming. These are the most relevant TGG estimates (at full throughput) for the evaluation of the out-of-state employment impacts of the Project. Nonetheless as discussed in Section 10.5.8 of the TGG Report, both state-specific studies are based on approaches that may tend to overstate job impacts in a tight economy.

Furthermore, as discussed in Section 10.5.9 of the TGG Report, the very small mining job estimates (in Table 8 (Table 3 in this report)) are even further overstated due to the initial maximum throughput assumption (44 MMTPY). Given that the Project is unlikely to consistently operate at levels close to 44 MMTPY, TGG's initial estimates based on full throughput in Table 8 considerably overstate of the out-of-state mining job impacts. Based on a more realistic throughput assumption range of 0 to 44 MMTPY, TGG concludes that total mining job impacts in Montana and Wyoming related to Millennium

estimates in Table 8 (Table 3 in this report). This largely accounts for the slightly higher job impact estimates in Table 8 (Table 3 in this report) compared with Table 2.

are also very small **(to non-existent)** in the context of these state economies, and tiny **(to non-existent)** in the context of the US economy.

However, even accepting Berkman's overstated out-of-state job estimates (in Table 2), these estimates would still be (a) very small; (b) not significantly larger in terms of employment impacts compared to TGG's estimates in Table 8 (Table 3 in this report).

5.4.2 Neither Berkman nor TGG Assumes Consistent Full Throughput

Another area of agreement is that neither Berkman nor TGG assumes constant full throughput. As indicated above, the TGG Report assumes that the Project is unlikely to consistently operate at levels close to 44 MMTPY, but that the range could vary between 0 and 44 MMTPY depending on market conditions.

Berkman's "EIS Scenario" (summarized in Table 1) assumes an average of 31 MMTPY of exports via Millennium over the period of 2021-2040. Berkman's more relevant "Alternative Scenario" from incremental exports enabled by Millennium (summarized in Table 2) assumes an average of 20.3 MMTPY of exports via Millennium over the period of 2021-2040.

5.5 Areas of Disagreement with the TGG Report

5.5.1 Characterization of Importance of Similar Very Small Out-of-State Job Impacts

The Central Area of Disagreement between TGG and Berkman (as corrected) is that TGG's overall conclusion regarding the importance of these very small estimates of out-of-state jobs differs dramatically from Berkman's.

According to the TGG Report (p. 201):

> Finding 4: Potential mining job impacts outside Washington (in Montana and Wyoming) related to the project are very small (to non-existent) in the context of these state economies; and tiny (to non-existent) in the context of the US.

However, despite the very small out-of-state employment estimates discussed above and summarized in Table 2, Berkman's provides his overall opinion with respect to these mining jobs and spin-offs in Section I.C Summary of Opinions (¶10c) is as follows:

> b. The proposed Terminal would support coal exports from multiple mines owned by different companies -- the burden of permit denial is not limited to a single

> firm. Ecology's study identified 34 domestic mines in western coal regions. As domestic demand for coal falls, many of the mines may remain viable by export to Asia. Without the Terminal, many of these mines likely will not remain viable.
>
> c. Denial of the Terminal affects multiple firms in states well beyond Washington – especially Wyoming and Montana, where in addition to Lighthouse mines, 15 other mines are or are likely to look to export. Additional mines in Colorado and Utah will do the same. Secondary firms – suppliers, professional service providers, and vendors rely upon these mines. My analysis shows that Ecology's action will not only affect mining jobs, it will also affect indirect and induced jobs tied to these secondary firms.

Furthermore, in ¶30, Berkman also states:

> Under either scenario[32], the positive economic impacts on interstate and international commerce attributable to preventing [sic][33] construction of the Terminal are substantial. They are also widespread, affecting multiple mines in four states and many industrial and service sectors.

TGG strongly disagrees with Berkman's conclusion that 462 direct jobs (which are overstated) across four states (203 in Montana, 32 in Wyoming, 88 in Colorado and 139 in Utah) can be "substantial" or "affect multiple mines." Moreover, even if the spin-off jobs estimates were not overstated, the 1113 spin-off jobs spread across four states are very small in the context of these state economies; and tiny in the context of the US economy.

The Berkman Report claims that as domestic demand falls, many mines may remain viable as a result of Millennium and exports to Asia, In fact, **Washington State's permit denials for the Project do not significantly affect the US coal industry, nor US coal exports to Asian markets.** As disclosed in the discovery responses submitted by Berkman on December 3, 2018, Berkman (based on Schwartz) is actually estimating that exports to Asia are from only a few mines, owned by a few companies, in four states, with or without Millennium.[34] Notably, Millennium and exports would have

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[32] Referring to Berkman's EIS Scenario or Berkman's Alternative Scenario.

[33] TGG assumes that there is a typo here and that Berkman meant the following: Under either scenario, the positive economic impacts on interstate and international commerce attributable to ~~preventing~~ construction of the Terminal are substantial. They are also widespread, affecting multiple mines in four states and many industrial and service sectors.

[34] As explained in Section 5.3, Berkman's "Alternative Scenario" is based on a comparison of exports with and without Millennium (Schwartz's Exhibit 26 (Exports with Millennium) – Exhibit 25 (Exports without Millennium)). Without Millennium, six mines in the four states would export via West Coast ports. With Millennium, these six mines, plus two additional mines, would export. Hence, Millennium enables exports at only two additional mines: Lighthouse Black Butte and Arch Black Thunder, both in Wyoming.

virtually no impact on Wyoming PRB mines, which comprise the large majority of Western US coal production.

5.5.2 Problems with Berkman Assumptions (based on Schwartz)

Even though the TGG Report estimates in Table 8 (Table 3 in this report) are somewhat similar to the Berkman Alternative Scenario estimates summarized in Table 2, each report differs significantly in how the estimates of these out-of-state employment impacts were produced. There are a number of problems with Berkman's Assumptions (based on Schwartz). In particular, TGG disagrees with a number of Berkman's assumptions related to his EIS Scenario (summarized in Table 1) and his Alternative Scenario (summarized in Table 2).

5.5.2.1 Berkman's Opaque Explanation of his "EIS Scenario" and "Alternative Scenario"

According to the Berkman Report (¶25, pp. 15-16):

> To estimate economic consequences of permit denial with respect to lost coal production, I have utilized IMPLAN, a widely used and accepted macroeconomic model of Montana, Wyoming, Colorado, and Utah, the states that would see increased mining activity but for the permit denial. I compare economic activity in these states from coal production with and without the Terminal. I have developed two scenarios for this analysis. The first scenario is consistent with Ecology's no action alternative, which assumes the permit denial would result in a loss of all 39 million metric tons per year that the Terminal would have handled. The second scenario accounts for the possibility that some of the tonnage that would have gone to the Terminal could be exported from alternative terminals as a consequence of permit denial. This scenario assumes that coal production from the western US (Montana, Wyoming, Colorado, and Utah) would increase by approximately 18 million metric tons annually if the Terminal is constructed, rather than 39 million tons.

This explanation of Berkman's "EIS Scenario" and his "Alternative Scenario," is opaque and confusing. As disclosed in Berkman's responses to discovery provided on December 6, Berkman's "EIS Scenario" is actually based on the export volumes in Schwartz Exhibit 26 (and not on the EIS as the name implies). The out-of-state employment impacts based on the EIS Scenario are summarized in Table 1.

The "Alternative Scenario" is based on the export volumes in Schwartz Exhibit 26 **minus** the export volumes in Schwartz Exhibit 25. In other words, "Alternative Scenario" is based on the incremental exports enabled by Millennium, and "accounts for the

possibility that some of the tonnage that would have gone to the Terminal could be exported from alternative terminals as a consequence of permit denial." The out-of-state employment impacts based on the Alternative Scenario are summarized in Table 2. Given that the relevant employment impacts to be measured are those resulting from incremental exports enabled by Millennium, the Table 2 estimates are the most relevant ones.

5.5.2.2 Schwartz Export Volume Estimates

Section 4 has already provided TGG's rebuttal of Schwartz's study and explained why his export volume estimates are overly optimistic and unlikely. Given that Berkman's two Scenarios are based on Schwartz's export volume estimates, they are also overstated and unlikely.

5.5.2.3 Consideration of Colorado and Utah

As discussed in Section 5.1 above, consistent with the EIS and the Complaint, the TGG Report (Section 4.7) has determined that:

> **All or almost all of the coal that might be exported via the Project would be lower quality thermal coal from Powder River Basin mines in Montana and Wyoming.**

The TGG Report's review of jobs outside Washington (in Section 10.5) therefore evaluates mining job impacts in Montana and Wyoming, the states of origin for most (if not all) of the coal to be exported from the Project.

Nonetheless, as discussed above, consideration of Colorado and Utah does not change the fact that the direct mining job impacts are tiny even if these states are included (88 direct jobs in Colorado and 139 in Utah).

5.5.2.4 IMPLAN Overstates Spin-off Jobs

Section 10.4.4.4 of the TGG Reports explains why I-O models tend to overstate employment impacts in a tighter labor market, especially for spin-offs. When the economy is closer to full utilization of available workers and other resources, overall economic activity and employment are constrained. In Section 10.5.8.2 we discussed how estimates from the state-specific studies that are the sources of TGG's Table 8 (Table 3 in this report) may overstate employment in a tight economy (particularly for Montana). Berkman uses IMPLAN studies for the Montana, Wyoming, Colorado, and Utah, and his results are likely also overstated. This is particularly true for estimates of spin-off jobs in Colorado and Utah.

Compared with Montana and especially Wyoming, Colorado and Utah have various characteristics, such that Berkman's estimates of spin-off jobs are likely to be especially overstated in these states:

- tight economies and low unemployment rates, which are currently and typically among the best in the US;
- populations and economies that are large, growing, diverse, and highly urbanized;
- coal production that is small overall, comprising a very small portion of overall economic activity;
- the spin-off jobs estimated by Berkman would be dispersed throughout large state economies including in sectors and areas where the economy is already closer to full utilization;

Mining spin-off jobs comprise over 70% of the total mining-related jobs estimated by Berkman in both Colorado and Utah.

In light of the above characteristics of these two states, the very high level of spin-offs estimated by Berkman is unlikely to occur given strong overall economic conditions.

5.5.3 Berkman's Overstated Out-of-State Job Impacts Would Not Affect the US Economy or the Coal Industry

Even if all of the Berkman assumptions (based on Schwartz) were valid and the job impacts were the same as those summarized in Table 2, they would still be insignificant. These job impacts would be even more insignificant in the context of the economies of the four mining states, and the US economy.

This is consistent with TGG's Finding 4 (p. 201), which determined that:

> Potential mining job impacts outside Washington (in Montana and Wyoming) related to the project are very small **(to non-existent)** in the context of these state economies; and tiny **(to non-existent)** in the context of the US economy.

The Project would at most create very few jobs in the mining states and would represent a tiny proportion of jobs in the US economy.

6 Rebuttal of the Huneke Report

6.1 Relevance to the TGG Report

Huneke estimates potential economic impacts on BNSF as a result of coal traffic related to Millennium. As explained in Section 6.3, a meaningful analysis must consider the following key elements in regard to potential tonnage of coal exports as a result of Millennium:

- Millennium throughput;
- tonnage diverted from port alternatives; and
- rail transport attributes (notably, routing, distance, rail carriers (BNSF or UP), and revenues and costs for rail carriers; these rail transport attributes are (to a large extent) determined by origins (the mines supplying the coal) and destinations (the ports handling the coal).

Meanwhile, analysis of the above key elements (Millennium throughput, tonnage diverted, and rail transport attributes) are central to the TGG Report, filed in November 2018, and the current TGG Rebuttal Report. Hence, TGG evaluates the Huneke analysis and its determinations in regard to these key elements.

6.2 Areas of Agreement with the TGG Report

There are no significant areas of agreement between Huneke and TGG.

6.3 Areas of Disagreement with the TGG Report

The Huneke Report is seriously flawed, to a degree that it should not be relied upon to provide meaningful information in regard to potential economic impacts on BNSF. Huneke is substantially inconsistent with the TGG Report, other expert reports on behalf of BNSF and Lighthouse et al. (Schwartz and Berkman), as well as the EIS and other fundamental sources and information. Huneke greatly overstates the potential revenue to BNSF as a result of the Project and understates potentially sizable costs.

6.3.1 Revenues to BNSF Overstated

The key flaws in the Huneke Report relate to potential tonnage of coal traffic on BNSF as a result of Millennium. Huneke greatly overstates potential tonnage of coal traffic, and thus greatly overstates potential revenue to BNSF as result of Millennium.

Huneke (¶¶50, 56) estimates potential revenue to BNSF as a result of Millennium ($771 million per year) based on coal tonnage and revenue per ton. Huneke assumes Millennium will result in 48.5 mmst per year (44 MMTPY) of coal traffic on BNSF, based on Millennium throughput at full build-out. Huneke estimates revenue per ton based on the average for all BNSF coal traffic in 2017 ($15.90, rounded to $16 in ¶¶50, 56).[35] Huneke calculates potential annual revenue to BNSF as follows:

> 48.5 mmst per year * $15.90/ton = $771 million annual revenue

Huneke's assumption of potential tonnage of coal traffic on BNSF (48.5 million tons per year) is greatly overstated for multiple reasons and directly contradicted by the TGG Report, as well as the Schwartz and Berkman Reports:

- Huneke claims that according to the EIS, Millennium will likely operate at full throughput and generate 48.5 mmst per year (44 MMTPY) of coal traffic.[36] However, as explained in the Technical Appendix (Section 9.2.3), the EIS analysis is explicitly **not a forecast** of likely actual throughput for the Project. The EIS analysis **assumes** that throughput at full build-out will be 44 MMTPY, based on the Proponent's definition of the Project.
- Millennium is unlikely to consistently operate at full throughput. The Expert Report analyses by TGG, Schwartz and Berkman all estimate that Millennium throughput would be substantially below 44 MMTPY.

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[35] In 2017, BNSF hauled 228.768 million tons of coal, and this traffic generated $3.638 billion of revenue for BNSF; hence average revenue per ton = $15.90 ($3.638 billion/228.768 million tons. See source in Huneke footnote 45:
https://www.stb.gov/econdata.nsf/FCStatistics?OpenView&Start=1&Count=300&Expand=1.1#1.1
In Huneke Report (¶42, 50, and 56), these figures are rounded to 229 million tons, $3.6 billion of revenue, and $16/ton.

[36] Huneke (¶50): According to the State's own EIS, the Terminal will likely generate 48.5 million tons of coal traffic at full build-out. [footnote 63 in original: EIS 2017, cover memo. 44 million metric tons translates into 48.5 million short tons […].]
(footnote continued on next page)

- Potential coal tonnage as a result of Millennium may not all be transported on BNSF. Any tonnage from mines in Colorado and Utah (Uinta Basin) and South Wyoming would be transported on UP, rather than BNSF.[37]
- Some (and possibly all) of the tonnage via Millennium would be diverted from port alternatives and would result in the same (or possibly significantly less) rail traffic and revenue for BNSF.
- Based on the Schwartz and Berkman analyses of exports relating to Millennium, TGG concludes that revenue to BNSF would be only about 23% of the revenue estimated by Huneke for the following reasons:[38]
- incremental coal traffic on BNSF enabled by Millennium would be about 12 MMTPY (less than 30% of Millennium full throughput and the BNSF tonnage assumed by Huneke);
- about 10 MMTPY of BNSF coal traffic would be diverted from Westshore to Millennium; revenue to BNSF for this tonnage would be reduced by about 20% (owing to the shorter rail distance to Millennium).
- Relative to TGG estimates above based on Schwartz and Berkman, Millennium could result in even less revenue to BNSF. As concluded by TGG, to the extent that Millennium is constructed and operates:
- the Project is unlikely to consistently operate at levels close to 44 MMTPY; a more realistic throughput assumption is that the range could vary between 0 and 44 MMTPY, depending on market conditions;
- the US will not export large volumes of thermal coal to Asia via Millennium because supply from the US will not be generally economically competitive in destination markets; and
- some (and possibly all) of the tonnage handled by Millennium may be diverted from port alternatives (and thus result in the same (or possibly significantly less) rail traffic and revenue for BNSF).

6.3.2 Costs to BNSF Understated

Huneke's analysis and claims are opaque and not clearly explained or supported. But Huneke also seems to be claiming that coal traffic related to Millennium would enable

[37] The coal mines served by BNSF and UP are identified in multiple sources, including Millennium EIS, expert report analyses (Schwartz and TGG) and the Berkman discovery responses, and the websites of BNSF and UP.

[38] This estimate of potential to BNSF is based on the information provided to date by Schwartz, Berkman, and Huneke. This information includes the Expert Reports submitted on November 14, 2018, as well as the corrections and discovery responses submitted by Berkman on December 3, 2018. Schwartz and Huneke have not yet provided workpapers for their November 14 reports. See Section 2.3.
(footnote continued on next page)

BNSF to have lower rates (costs to customers) than would otherwise be possible.[39] And Huneke appears to base this claim on his estimates that BNSF has costs of $10 per ton to transport coal, which is substantially less than his estimates of average revenue for coal traffic ($15.90 per ton).[40]

Huneke's claims are apparently based on average revenue and cost per ton for all BNSF coal traffic in 2017. Hence, it is unclear to what extent these data would be representative of revenues and costs for potential future coal traffic as a result of Millennium.

Moreover, as concluded in the EIS (Section 5.1), BNSF coal traffic as a result of Millennium would be on rail corridors within and outside of Washington that are already heavily utilized and where substantial growth in rail traffic is projected (even without Millennium). This growth in rail traffic (especially with Millennium) is projected to result in capacity exceedances, unless capacity is expanded. It is expected that BNSF would make the necessary investments or operating changes to accommodate the rail traffic growth, but it is unknown when these actions would be taken or permitted. If improvements to increase capacity were not made, Project-related trains would contribute to these capacity exceedances and could result in an unavoidable and significant adverse impact on rail transportation.

Hence, to the extent that Millennium actually results in increased rail traffic, there could be sizable costs (to BNSF, shippers, and others) to expand rail capacity and/or owing to capacity exceedances. Therefore, compared with Huneke's estimates, rail traffic related to Millennium might actually result in few if any benefits for BNSF (and its shippers and other affected parties), owing to some combination of the following:

- substantially lower than estimated gross revenue (revenue from rail traffic prior to deduction of costs);
- substantially higher than estimated costs (expenses to handle rail traffic); and
- substantially lower than estimated net revenue (gross revenues minus costs).

[39] Huneke, ¶¶51-52, stating that absent Millennium, BNSF could have to raise rates to compensate for higher average costs.
[40] Huneke, ¶47, 50, 56; footnotes 60, 67; see also footnote 35 in this report.

7 Errata in the TGG Expert Report Filed November 14, 2018

- p. 4 (last paragraph before Section 1.3)

Lighthouse is not now, nor has ever been, a significant US coal producer. Lighthouse thermal coal production since late 2014 is from one and a half mines: Decker (100% ownership) and Black Butte (50% ownership). **In 2016, Lighthouse production was only 4.3 million short tons (3.9 million metric tons per year), which is less than ~~0.06%~~0.6% of overall US coal production and 1.3% of combined coal production of Wyoming and Montana.**

- p. 49 (second paragraph)

Lighthouse production since late 2014 is from one and a half mines: Decker (100% ownership) and Black Butte (50% ownership). **In 2016, Lighthouse production was only 4.3 million short tons (3.9 MMTPY): Lighthouse comprised less than ~~0.06%~~0.6% of overall US coal production**.[57] In 2015, Lighthouse production was also only 4.3 million short tons (3.9 MMTPY), comprising less than 0.06% of overall US coal production.

- p. 49 (last paragraph)

Lighthouse mines produced only 4.3 mmst in 2016, comprised ~~0.06%~~0.6% of overall US coal production and 1.3% of overall coal production in Wyoming and Montana. Lighthouse has one mine (Decker) in the Powder River Basin, comprising about 1% of overall Powder River Basin production.[63]

- p. 156 (last paragraph before and title for Section 7.7.5.1)

~~Ambre US Gulf Coast Terminal Projects (Port of Corpus Christi)~~

7.7.5.1 Ambre US Gulf Coast Terminal Projects (Port of Corpus Christi)

- p. 197 (second and third paragraph in Section 9.4.2.2.1)

Moreover, the Lighthouse Complaint claims that the lack of sufficient West Coast coal export capacity resulted in contracts with South Korean utilities being amended in December 2015.

Based on the~~The~~ analysis in Section 7.7.3.3 (Westshore vs. Millennium), ~~demonstrates that overall transport costs via Westshore are likely similar to transport costs via Millennium (~~Section 9.4.2.2.2~~). The analysis in **Section Error! Reference source not found.** d emonstrates that existing ports and infrastructure (including Westshore) enable the US to export large volumes of both thermal and metallurgical coal to South Korea. The analysis in Section 7.7.3.3 (Westshore vs. Millennium) demonstrates that overall transport costs via Westshore are likely similar to transport costs via~~ explains why Westshore provides a cost-effective port alternative to Millennium.

[third paragraph as corrected: Based on the analysis in Section 7.7.3.3 (Westshore vs. Millennium), Section 9.4.2.2.2 explains why Westshore provides a cost-effective port alternative to Millennium.]

- p. 222 (first paragraph)

While small job impacts have been estimated based on both the NMA Study (Table 7) and the state-specific studies (Table 8), TGG concludes that the state-specific studies are more accurate and reliable sources for estimating the mining job impacts of the Project in Montana and ~~Washington~~Wyoming.

- p. 223 (last paragraph before Section 10.5.7)

As indicated above, TGG concludes that the state-specific studies are more accurate and reliable sources for estimating the mining job impacts of the Project in Montana and ~~Washington~~Wyoming. Nonetheless, as will be discussed in Section 10.5.8, both the state-specific studies include approaches that may tend to overstate job impacts in a tight economy.

- p. 239 (endnote 57)

This endnote provides information for the entire paragraph. See endnotes 55, 56, and Table 3.

2016: Lighthouse production = 4.28 MMst = 3.20 MMst (Decker Mine 100% ownership) + 1.08 MMst (Black Butte Mine 50% ownership). Lighthouse production as % of overall US production = ~~.059%~~0.59% = 4.28 MMst/728.36 MMst.

2017: Lighthouse production = 5.44 MMst = 4.16 MMst (Decker Mine 100% ownership) + 1.28 MMst (Black Butte Mine 50% ownership). Lighthouse production as % of overall US production = ~~.070%~~0.70% = 5.44 MMst/774.61 MMst.

- p. 240 (endnote 64)

EIA, Annual Coal Report 2016, Table 9 (highlighting added for emphasis): 16 major mines in Wyoming and Montana (notably Powder River Basin), ranked #1-6, 10, 12, 15, 17-18, 21, 27, 29, 41, 44.
https://www.eia.gov/coal/annual/archive/05842016.pdf
See also endnotes 55 and 61~~**Error! Bookmark not defined.**~~, and EIA, Annual Coal ~~R eport~~Report 2017, Table 9. ~~16 major mines in Wyoming and Montana (notably Powder River Basin), ranked #1-6, 10, 12, 15, 17-18, 21, 27, 29, 41, 44.~~

- p. 333 (endnote 462, first two sentences)

It is also possible that Millennium operations could potentially alter the export of US coal from the East and Midwest (in addition to Western US production), although any such impacts are likely to be small. Depending on market conditions, some US thermal coal has been and could be exported to Asian markets (especially India, but also including South Korea) via ports on the East and Gulf Coast (see Sections 4.6, 7.5.2, and ~~**Error! Reference source not found.**~~9.4.2.2.2).

8 Attestation

I declare under penalty of perjury that the foregoing (this report including Technical Appendix) is true and correct to the best of my knowledge. Executed this 14th day of December, 2018, at Berkeley, California.

Ian Goodman,
President, The Goodman Group, Ltd.

9 Technical Appendix

9.1 Cloud Peak Energy Market Capitalization and Stock Price (2010-2018)

Figure 1 shows Cloud Peak Energy market capitalization over the period of 2010-2018. Figure 2 shows Cloud Peak stock price over the period of 2010-2018. Cloud Peak shares began on trading on the New York Stock Exchange on November 20, 2009, under the ticker symbol "CLD". See also TGG November 2014 Report, Section 6.4.1 and endnote 183.

As shown in Figure 1 and Figure 2, CPE market capitalization is $54.83 million on December 11, 2018, based on closing stock price of $0.7104 per share and 75,778,186 shares. Cloud Peak has lost 87% of its value since January 11, 2018 (when the closing stock price was $5.50).

Figure 1: Cloud Peak Energy Market Capitalization (2010-2018)

Source: Zacks website:
https://www.zacks.com/stock/chart/CLD/fundamental/market-cap

Figure 2: Cloud Peak Stock Price (2010-2018)

Source: Cloud Peak Energy website:
https://investor.cloudpeakenergy.com/stock-information

9.2 Energy Market Modeling for WEO, AEO, and EIS Coal Market Assessment

9.2.1 WEO

IEA Website: https://www.iea.org/weo/weomodel/

> Since 1993, the IEA has provided medium to long-term energy projections using the World Energy Model (WEM) – a large-scale simulation model designed to replicate how energy markets function. The WEM is the principal tool used to generate detailed sector-by-sector and region-by-region projections for the WEO scenarios. Download the WEM Methodology document for an in depth description of the overall approach and features of the model.

IEA World Energy Model Documentation, 2018 Version
https://www.iea.org/media/weowebsite/energymodel/WEM2018.pdf

IEA World Energy Model Documentation, 2017 Version
https://www.iea.org/media/weowebsite/2017/WEM_Documentation_WEO2017.pdf

See also TGG Report, including various endnotes (notably 245) in regard to WEO.

9.2.2 AEO

EIA website, AEO documentation, especially Coal Market Module:

https://www.eia.gov/outlooks/aeo/nems/documentation/
https://www.eia.gov/outlooks/aeo/assumptions/
https://www.eia.gov/outlooks/aeo/nems/documentation/coal/pdf/m060(2018).pdf
https://www.eia.gov/outlooks/aeo/assumptions/pdf/coal.pdf
https://www.eia.gov/outlooks/aeo/pdf/info_nems_archive.pdf

AEO 2018 estimates US coal exports based, in part, on estimates of world coal import demand, incorporating the projections in EIA International Energy Outlook (IEO) 2017 (released September 2017).

EIA website, IEO documentation, especially Coal Module:

https://www.eia.gov/outlooks/ieo/weps/documentation/

https://www.eia.gov/outlooks/ieo/weps/documentation/pdf/wepsplus2017_coalmodule.pdf
https://www.eia.gov/outlooks/ieo/ieowepsplus_sourcecode.php

See also TGG Report, including various endnotes (notably 23, 81, and 235), in regard to AEO and IEO.

9.2.3 EIS Coal Market Assessment

The Millennium EIS Coal Market Assessment provides extensive documentation and was subject to an extensive review and comment process.

See SEPA Coal Market Assessment Technical Report, especially Chapter 4 (Model Framework, Methods, and Key Assumptions), as well as other chapters in regard to EIS coal market modeling inputs, data, assumptions, and results.

See also TGG Report (including various endnotes) regarding EIS coal market modeling.

In regard to the review and comment process for the EIS Coal Market Assessment, see FEIS Vol. IV: Responses to Comments on the Draft EIS; Sections 1.3.4, 1.3.12, 5.8.1; pp. 1-8, 1-20—1-22, 5.8-1—5.8-73.
http://www.millenniumbulkeiswa.gov/assets/volume-iv-responses-to-comments-on-the-draft-eis2.pdf

It should be understood that the EIS Coal Market Assessment is explicitly **not a forecast** of likely actual throughput for the Project. The EIS analysis **assumes** that throughput at full build-out will be 44 MMTPY, based on the Proponent's definition of the Project. The Proposed Action is a private project. As such, under SEPA the proposal and project objective(s) are defined by the Applicant and the proposal is evaluated as submitted. And this was clearly explained in both the Coal Market Assessment Technical Report and in the review and comment process:

> The following project-specific assumptions were provided by the Applicant.
> - The proposed coal export terminal would export 44 million metric tons of coal per year.
> - The proposed coal export terminal would begin operating in 2021 and ramp up to exporting 44 million metric tons of coal by 2028 […][41]

[41] SEPA Coal Market Assessment Technical Report, p. 4-4.

The Proposed Action would export a maximum of 44 million metric tons of coal per year. The modeling was not intended to determine the viable volume of coal exports under the Proposed Action, but to evaluate the Proposed Action under a range of possible future market conditions. As stated in the SEPA Coal Market Assessment Technical Report presented in the Draft EIS, the analysis assumed operation of the Proposed Action at full capacity in 2028.[42]

The Proposed Action is a private project. As such, under SEPA the proposal and project objective(s) are defined by the Applicant and the proposal is evaluated as submitted.[43]

9.3 Schwartz Report Westshore and Ridley Analysis

9.3.1 Overview

In his forecasts (Exhibits 25 and 26), Schwartz overestimates utilization and understates port capacity at Westshore and Ridley. Hence, Schwartz underestimates capacity available at Westshore and Ridley for exports of US thermal coal. In the context of this Rebuttal Testimony, TGG's review of these issues was constrained by both the limited information provided by Schwartz and the limited time available. Section 9.3 provides additional information on these issues, further confirming that substantial capacity will actually be available at these port alternatives to meet the intermittent and shrinking Asian demand for US thermal coal exports.

9.3.2 Westshore

Schwartz (Exhibit 25) forecasts that without Millennium, capacity at Westshore will be fully utilized from 2025 onward. The Schwartz forecast is based on the following assumptions, which likely overestimate Westshore utilization and understate capacity:

- Schwartz (p. 30) assumes "Shipments by Teck reduced after contract expires in 2021", but the reduction in Teck's contracted capacity at Westshore may be even greater than assumed by Schwartz. See Section 9.3.4.

[42] FEIS Vol. IV: Responses to Comments on the Draft EIS, p. 5.8-30 (bold added for emphasis).
[43] Id, p. 1-8.

- Schwartz (p. 31) assumes "Shipments from new Canadian metallurgical coal mine developed by Riversdale Resources in 2021, under existing contract with Westshore for 4.5 million tonnes per year." This mine would be located in South-Central Alberta (Blairmore, Crowsnest Pass), near the Teck's existing metallurgical coal mines in Southeast BC. Development of this mine (by current and previous owners) has been under consideration for many years, but has been repeatedly delayed owing to unfavorable market conditions and other factors. Hence, actual shipments via Westshore may be less than assumed by Schwartz. See Section 9.3.6.
- Westshore has been in service since 1970 and is currently undergoing a major modernization program. When this program is completed in 2019, annual throughput capacity is estimated to rise from 33 MMTPY to at least 35 MMTPY.[44] Schwartz (p. 30) assumes Westshore capacity will be 35 MMTPY, while Teck (the largest shipper at Westshore) assumes capacity will be 35-36 MMTPY.
- In light of the above, compared with Schwartz's forecast, there is likely to be less Canadian coal exported through Westshore and potentially somewhat more actual capacity at Westshore. Hence, Westshore capacity (35-36 MMTPY) would not otherwise be fully utilized, and the capacity available at Westshore for US thermal coal exports will be greater than assumed by Schwartz.

9.3.3 Ridley

Schwartz assumes existing capacity at Ridley will be fully utilized from 2030 onward based on the following assumptions:

- growth in Canadian thermal coal exports (from 2.2 mmst in 2017 to 6.6 mmst in 2025 through 2040);
- growth in metallurgical coal exports (from 4.4 mmst in 2017 to 11.6 mmst in 2030 through 2040);
- existing Ridley capacity will not be further expanded.

Any one of these assumptions is uncertain and perhaps unlikely, but the combination of all three is unlikely and perhaps highly unlikely:

- Schwartz's projected growth in Canadian thermal coal exports via Ridley is based on development of the new Cline Resources Vista thermal coal mine before 2025. This mine would be located in Hinton, Alberta and is thus proximate to Ridley, as well as

[44] See TGG Report, Section 7.7.3.2 and endnote 279.

to Westshore. Vista would produce bituminous coal for export to Asia and would thus compete with Western US bituminous coal for export to Asia (via Millennium and other West Coast ports). Development of this mine (by Cline Resources and previous owners has been under consideration for many years, but has been repeatedly delayed owing to unfavorable market conditions. Future development of the Vista Mine is highly uncertain given evolving markets conditions, including:
    - the projections of shrinking thermal coal import market in Asia;
    - the shift in Asian coal demand away from more mature markets (notably South Korea and Japan, but also Taiwan) that are more proximate (to the North America West Cost and especially Pacific Northwest) and which mainly import higher quality coal (notably bituminous coal from Australia), towards developing markets (notably in Southeast Asia and India) that are less proximate and which mainly import lower quality coal (notably subbituminous coal from Indonesia).
- The Canadian metallurgical coal exports projected by Schwartz are at or above the higher end of volumes projected by Canadian producers. Schwartz's projected growth in Canadian metallurgical coal exports is based on reopening on Northeast BC mines.
    - Conuma has restarted 3 mines, following acquisition from the previous owner (Walter Energy, a US-based mining company, then in bankruptcy). See Section 9.3.5.
    - Other Northeast BC mines remain closed with no current plans for reopening, notably Teck's Quintete mine. See Section 9.3.4.
- Hence, compared with Schwartz's forecast, there is likely to be less coal exported through Ridley, such that the existing capacity of Ridley (18 MMTPY) will not be fully utilized. In turn, there will likely be capacity available at Ridley for US thermal coal exports, or for Canadian metallurgical coal exports shifted from other BC terminals (notably Westshore), thus freeing up capacity at those other terminals for US thermal coal exports.
- In scenarios where Ridley does operate at (or close) to full utilization, capacity is likely to be further expanded:
    - Ridley had previously planned to increase capacity from 12 MMTPY up to 24 MMTPY. Expansion to 18 MMTPY was completed, but further expansion was then put on hold, since actual utilization was far below even the 18 MMTPY already available.[45]

[45] As shown in Schwartz Exhibits 25 and 26, exports via Ridley were only 8.3 mmst (7.5 MMTPY in 2017), and are forecast to increase to 19.4 mmst (17.6 MMTPY) in 2030.
(footnote continued on next page)

  - Ridley is currently owned by the Canadian federal government. Divestiture had been previously planned, but these efforts were put on hold when actual utilization was far below capacity. The Canadian federal government has recently restarted the divestiture process.[46] Under new ownership, it may be even more likely that Ridley capacity will be further expanded, especially Ridley does in the future operate at (or close) to full utilization of current 18 MMTPY of capacity.
- In light of all of the above, it is likely that there will be substantial capacity available at Ridley for US thermal coal exports, or for Canadian metallurgical coal exports shifted from other BC terminals (notably Westshore), thus freeing up capacity at those other terminals for US thermal coal exports.

9.3.4 Teck

Teck is the largest Canadian metallurgical coal producer, with key information summarized in Figure 3 and Figure 4.

- Teck has about 27 MMTPY of production, with over 90% from Southeast BC mines (proximate to ports in metro Vancouver) and the remainder at the Cardinal Mine in west-central Alberta (proximate to ports in metro Vancouver, as well as to Ridley). Output from Teck's Western Canadian metallurgical coal mines is exported, virtually all via ports in metro Vancouver, including Westshore and Neptune. Teck has also contracted for 3 MMTPY of capacity at Ridley.
- Teck is currently planning to maintain Canadian metallurgical coal production, at around 27 MMTPY.
  - Plans are to maintain and possibly slightly expanding production at Southeast BC mines. The Cardinal River Mine in Alberta now produces about 2 MMTPY, and plans are being developed to potentially extend the life of this mine beyond 2020 at about 1.8 MMTPY.
  - The Quintete Mine in Northeast BC previously operated for nearly 18 years up until 2000. Reopening of the Quintete Mine was evaluated and permitted in 2012-2013, but was then deferred owing to unfavorable market conditions. Reopening of Quintete is not currently planned, but it remains a growth option if future market conditions are sufficiently favorable.
- Based on current contracts and terminal expansion projects now underway, Teck currently has 34.5 MMTPY of port capacity at existing BC terminals with a total

[46] https://www.newswire.ca/news-releases/cdev-announces-launch-of-sale-process-for-ridley-terminals-inc-699645981.html

capacity of 63.5 MMTPY; Teck will soon have over 40 MMTPY of about 75 MMTPY total capacity at expanded BC export terminals:
    - Westshore: current capacity of 33 MMTPY increasing to 35-36 MMTPY in 2018 with completion of current modernization project; Teck is the single largest shipper at Westshore and has long-standing contractual relationships; current contract for 19 MMTPY of capacity expires March 2021;
    - Neptune: 46% owned by Teck, recently expanded to 12.5 MMTPY of capacity but is now underutilized (as noted above, Teck has 19 MMTPY take-or-pay commitment at Westshore expiring March 2021); Neptune is now in the process of being expanded to capacity of about 18.5 MMTPY, with upside exceeding 20 MMTPY;
    - Ridley: existing capacity of 18 MMTPY, with 3 MMTPY contracted by Teck.
- Teck will soon have over 40 MMTPY of port capacity, which substantially exceeds existing, planned, and potential growth in production (even if the Quintete Mine in northeast BC is eventually reopened). Teck's current contract at Westshore for 19 MMTPY of capacity expires in March 2021, and Teck will then substantially reduce its contracted capacity at Westshore and shift exports to Neptune (which is partially owned by Teck and now being expanded). Schwartz (p. 30) assumes "Shipments by Teck reduced after contract expires in 2021", but the reduction in Teck's contracted capacity at Westshore may be even greater than assumed by Schwartz.
    - Schwartz assumes Neptune capacity will increase to 18 MMTPY. But Teck's own analyses are substantially more favorable for Neptune:
    - after the current expansion is completed (in 2020), Neptune capacity will be at least 18.5 MMTPY but actual capacity may exceed 20 MMTPY;
    - costs via Neptune will be substantially lower than via Westshore; and
    - Neptune will provide flexibility, including sprint capacity (surge and recovery) to capitalize on price volatility.

Sources:

TGG Report, Sections 4.6, 7.7.3, and 7.74, especially pp. 38-39, 148, and 152-153, endnotes 37 and 302. See also Schwartz Report, pp. 30-31 and the following sources:

Teck website, especially:

https://www.teck.com/products/steelmaking-coal/
https://www.teck.com/operations/canada/operations/cardinal-river/
https://www.teck.com/operations/canada/projects/quintette/

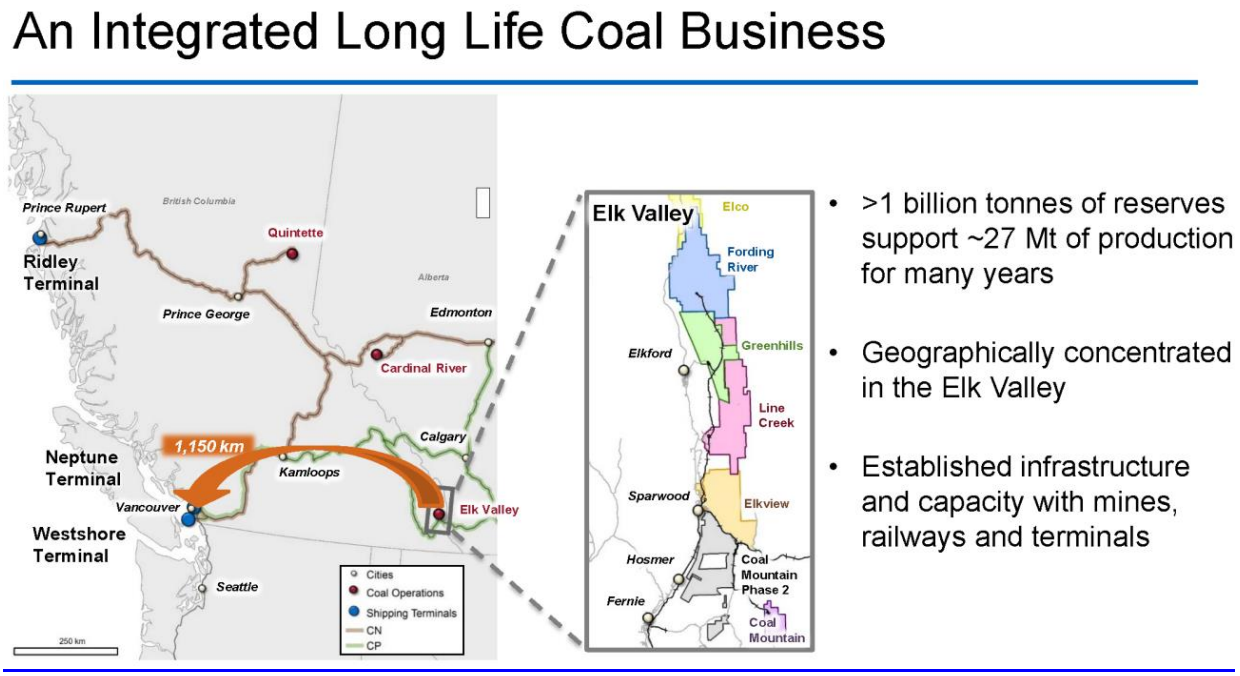
Teck Resources Ltd, Q1 2018 Results - Earnings Call Edited Transcript, APRIL 24, 2018, especially pp. 4, 12, 15-19 https://www.teck.com/investors/financial-reports/quarterly-reports/2018/q1-2018-financial-report

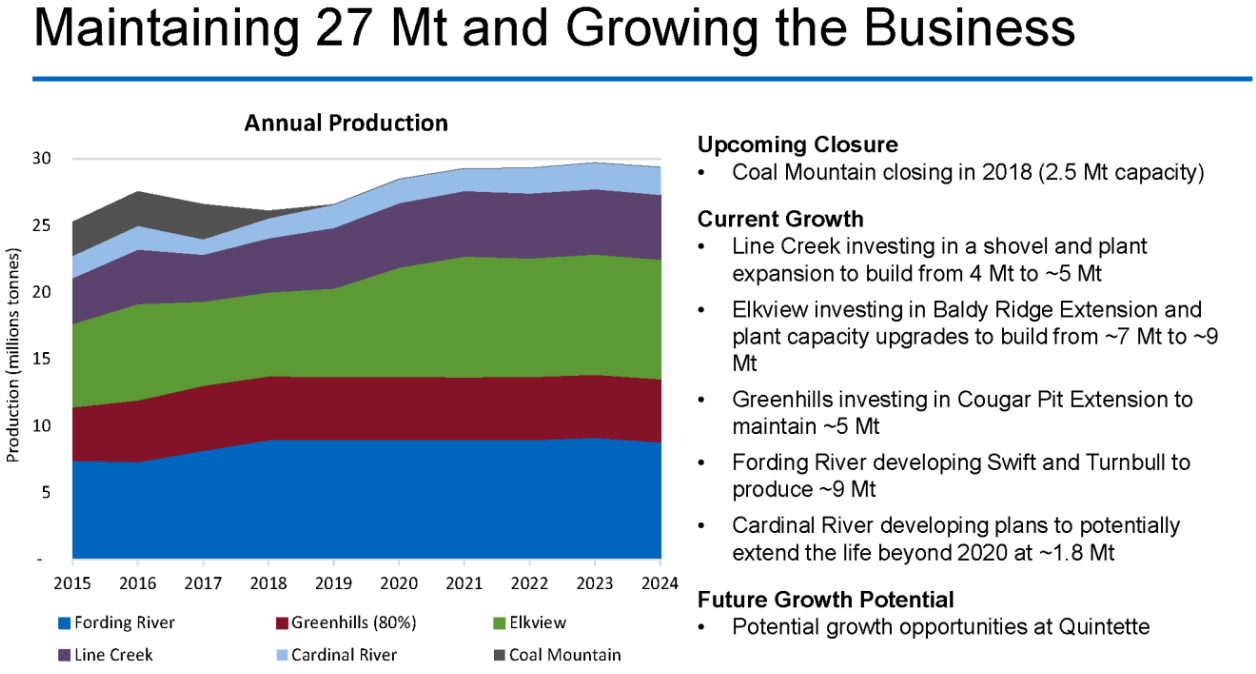
Teck Investor Presentations, especially Deutsche Bank Leveraged Finance Conference, October 2, 2018 (cited in TGG Report endnote 37), pp. 68-69, 79-80: https://www.teck.com/media/Deutsche-Bank-Leveraged-Finance-Conference.pdf

White Crane Capital Westshore and Teck analysis:

https://www.capitalizeforkids.org/2018/05/10/westshore-terminals-tsxwte-the-short-case-for-a-canadian-terminal/

Figure 3: Teck Western Canadian Metallurgical Coal Exports





Source: Teck Investor Presentation, Deutsche Bank Leveraged Finance Conference, October 2, 2018, pp. 68-69: https://www.teck.com/media/Deutsche-Bank-Leveraged-Finance-Conference.pdf

Figure 4: Teck West Coast Port Capacity

~75 Mt of West Coast Port Capacity Planned

Our portion is >40 Mt; exceeds current production plans, including Quintette

Westshore Terminals

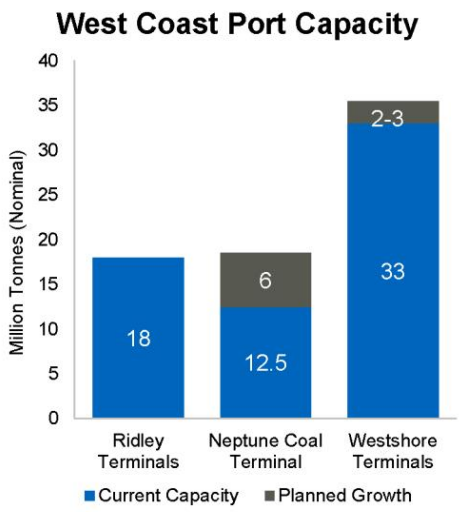
- Teck is largest customer at 19 Mt
- Large stockpile area
- Currently 33 Mt
- $275M project for expansion to 35-36 Mt by 2019
- Contract expires March 2021

Neptune Coal Terminal

- Teck Canpotex Joint Venture
- Recently expanded to 12.5 Mt
- Planned growth to >18.5 Mt

Ridley Terminals

- Current capacity: 18 Mt
- Teck contracted at 3 Mt



Neptune Facility Upgrade

Optimizing the footprint to allow for >18.5 Mtpa

- All permits in place, final project funds sanctioned in Q2 2018, with project completion in H1 2020
- Work has commenced on the overpass and dumper vault; major construction and fabrication contracts awarded
- The investment enhances the quality of the entire steelmaking coal portfolio
  - Ensures globally competitive port rates
  - Ownership of primary berth will ensure access to market
  - Will provide sprint capacity (surge and recovery) to capitalize on price volatility

Improvements include:

1. Overpass to improve site access
2. Investments to enhance environmental monitoring and performance
3. Improved train handling with addition of tandem coal dumper and track to land second coal train on site
4. West coal shiploader replacement to increase capacity and reach

Securing a long-term, reliable and globally competitive supply chain solution for our steelmaking coal business

Source: Teck Investor Presentation, Deutsche Bank Leveraged Finance Conference, October 2, 2018, pp. 79-80: https://www.teck.com/media/Deutsche-Bank-Leveraged-Finance-Conference.pdf

9.3.5 Conuma and Walter Energy

Conuma website https://www.conumacoal.com especially https://www.conumacoal.com/operations

http://resourceclips.com/2018/09/21/community-spirit/ (September 9, 2018 article linked from Conuma website):

> […] says Conuma president Mark Bartkoski […] "We mined 3.5 million tonnes last year, we'll mine approximately five million tonnes this year, next year we're projected to do six million tonnes and, by the time we get to 2021, we should be at about 7.5 million tonnes."

https://www.spglobal.com/platts/en/market-insights/latest-news/coal/080118-feature-canadas-conuma-expects-met-coal-export-rise-from-prince-rupert

Walter Energy bankruptcy http://www.kccllc.net/walterenergy

9.3.6 Riversdale Resources Grassy Mountain Metallurgical Coal Mine Project

The new Canadian metallurgical coal mine being developed by Riversdale Resources is under existing contract with Westshore for 4.5 million tonnes per year. This mine would be located in South-Central Alberta (Blairmore, Crowsnest Pass), near the Teck's existing metallurgical coal mines in Southeast BC. Development of this mine (by current and previous owners) has been under consideration for many years, but has been repeatedly delayed owing to unfavorable market conditions and other factors.

The current owner (Riversdale Resources) acquired the mine development project in 2014 and then contracted for capacity at Westshore. As reported by Westshore (Westshore Terminals Investment Corporation, Annual Report, March 21, 2018, pp 6-7: http://www.westshore.com/pdf/finance/2018/aif.pdf

> In 2014, Westshore entered into an agreement with Riversdale Resources Limited ("Riversdale"), which is developing a steel-making coal mine in Blairmore, Alberta. Under the terms of the agreement, which has since been amended, Riversdale is paying Westshore an annual reservation fee to hold 4.5 million tonnes of capacity at the Terminal. The agreement provides for an annual throughput commitment at fixed rates from commencement of production to 2030. Production is expected to start in 2020 or 2021 and ramp up thereafter.

The Grassy Mountain Mine Project, as now defined by Riversdale:

http://www.rivresources.com/site/content/default.aspx
http://www.rivresources.com/site/Projects/grassy-mountain-project2/overview3 :

- the Grassy Mountain Project (the Project) is expected to have peak production of 4.5 MMTPY, which would all be metallurgical coal;
- the Project is projected to produce around 93 million tonnes of coal over its currently proposed 24-year mine life; hence production would average about 3.9 MMTPY;
- the Project is subject to review and permitting by federal and provincial (Alberta) regulators.

Riversdale reports in November 2018 that development of this mine is further delayed, with permitting by a Joint (federal and provincial) Review Panel just commenced and earliest possible production now in late 2021:
http://www.rivresources.com/site/PDF/1409_1/RiversdaleResourcesCorporatePresentation

- the Grassy Mountain Project (the Project) has only just started the joint federal and provincial review and permitting process, which is projected by Riversdale to continue until late 2019,
- construction would then require approximately two years,
- mining could commence in late 2021, and
- commission and ramp-up of production would extending to 2023 (and possibly later).

Additional sources:

https://www.canada.ca/en/environmental-assessment-agency/news/2018/08/grassy-mountain-coal-project-establishment-of-joint-review-panel.html

https://www.ceaa-acee.gc.ca/050/evaluations/document/125951?culture=en-CA

https://www.ceaa-acee.gc.ca/050/evaluations/document/115577?culture=en-CA

http://www.rivresources.com/site/PDF/1373_1/shareholderupdateaug18

http://www.rivresources.com/site/content/

http://www.rivresources.com/site/PDF/1409_1/RiversdaleResourcesCorporatePresentation

http://resourceglobalnetwork.com/portfolio_page/riversdale-resources/

Opposition to Development of mine

https://calgaryherald.com/business/local-business/australian-company-proposes-700m-coal-mine-reviving-historic-industry-in-crowsnest-pass

Resource Capital Funds (RCF) is an owner/investor in both Riversdale and Lighthouse

http://www.resourcecapitalfunds.com/current-portfolio

> Riversdale Resources Limited is a public, unlisted coking coal development company headquartered in Sydney, Australia with a flagship asset, Grassy Mountain, located in southwestern Alberta, Canada. The Company's primary focus is to continue to de-risk and advance the development of the project.

http://www.rivresources.com/site/About-Us/board-of-directors1