APPENDIX S

Energy Resources Analysis Methods

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Acronyms and Abbreviations

BNSF	BNSF Railway Company
Board	Surface Transportation Board
Btu	British thermal unit
GIS	geographic information system
OEA	Office of Environmental Analysis
VMT	vehicle miles traveled

Appendix S

Energy Resources Analysis Methods

This appendix provides information regarding the assumptions and calculations that support the energy resources analysis.[1]

S.1 Diesel Fuel Consumption—Construction

This section describes the assumptions that the Surface Transportation Board's (Board) Office of Environmental Analysis (OEA) made in estimating diesel fuel consumption for each build alternative. OEA's estimate of energy consumption for construction of the proposed rail line focused on diesel fuel that would be consumed by earthwork activity, bridge construction, and supply train locomotives; diesel fuel that would be consumed for the relocation of roads; and diesel fuel and gasoline that would be consumed by construction workforce motor vehicles (e.g., vehicles used for worker transportation).

S.1.1 Construction Schedule

OEA estimated the construction schedule for each build alternative for the normal construction and winter construction scenarios. Under the normal construction scenario, rail line construction activities would be conducted 8 months per year with no construction activities in the winter months. Under the winter construction scenario, construction activities would be conducted 12 months per year, including 24-hour per day construction during the winter months. OEA assumed that the same number of labor hours would be expended for construction of each build alternative under either the normal or winter construction scenarios, but that under the winter construction scenario the labor hours would be expended over a shorter time span. Table S-1 shows the anticipated construction schedule for each build alternative.

[1] This appendix provides supporting information for Chapter 14, *Energy Resources*, of this *Draft Environmental Impact Statement for the Tongue River Railroad*. This information should not be interpreted as stand-alone information and must be read in combination with the associated chapter.

Table S-1. Anticipated Construction Schedule by Build Alternative for Normal (8 months/year) and Winter (12 months/year) Construction

Build Alternative	Right-of-Way (miles)	Construction Schedule			
		Normal Construction (Months)	Winter Construction (Months)	Normal Construction (Years)	Winter Construction (Years)
Tongue River	83.7	24.0	20.1	3.0	1.7
Tongue River East	86.3	38.0	30.4	4.7	2.5
Colstrip[a]	42.3	20.0	16.0	2.5	1.3
Colstrip East[a]	45.4	30.0	22.1	4.0	1.8
Tongue River Road	83.7	36.0	30.0	5.0	2.5
Tongue River Road East	85.9	45.2	36.2	5.6	3.0
Moon Creek	82.1	36.0	29.5	5.0	2.5
Moon Creek East	84.7	49.7	39.8	6.2	3.3
Decker	51.1	45.0	36.0	6.0	2.9
Decker East	49.6	45.0	36.0	6.0	2.9

Notes:
[a] Construction schedules do not include upgrades to the Colstrip Subdivision.

S.1.2 Earthworks

Table S-2 shows the estimated diesel fuel consumption for construction earthworks for each build alternative. Additional discussion of construction equipment and construction equipment operation hours for earthworks is included in Chapter 14, *Energy Resources*, Chapter 4, *Air Quality*, and Appendix E, *Air Quality, Emissions, and Modeling Data*.

Based on cut and fill estimates for the Colstrip alternative provided by TRRC and verified by OEA , OEA then estimated the hours of operation of specific types of earthmoving equipment and engine horsepower-hours for the cubic yards of cut and fill earthwork that would be required for construction of the Colstrip Alternative. OEA then applied equipment-specific diesel fuel consumption factors to estimate fuel consumption for each equipment type for the Colstrip Alternative. OEA applied the hours of operation and fuel consumption estimates for the Colstrip Alternative to estimate the hours of operation and fuel consumption for the other build alternatives using a ratio approach. OEA assumed that the equipment hours of operation and diesel fuel consumption for earthworks would be proportional to the amount of cut and fill that would be required for each build alternative. Table S-3 shows equipment hours and diesel fuel consumption for earthworks for the build alternatives based on the estimates for the Colstrip Alternative.

Table S-2. Estimated Diesel Fuel Consumption for Construction Earthwork by Build Alternative

	Estimated Earthwork Needed for Construction			Diesel Fuel Consumption	
Build Alternative	**Cut (million cubic yards**	**Fill (million cubic yards)**	**Total (million cubic yards)**	**Ratio to Colstrip Alternative**	**Diesel Fuel (million gallons)**
Tongue River	21.32	20.33	41.66	1.26	12.14
Tongue River East	32.41	30.40	62.81	1.90	18.31
Colstrip[a]	17.81	15.27	33.09	1.00	9.64
Colstrip East[a]	25.57	20.07	45.64	1.38	13.3
Tongue River Road	31.51	30.43	61.94	1.87	18.05
Tongue River Road East	39.94	34.81	74.76	2.26	21.79
Moon Creek	30.85	30.20	61.05	1.85	17.79
Moon Creek East	41.94	40.27	82.20	2.48	23.96
Decker	35.71	37.32	73.03	2.21	21.29
Decker East	35.29	37.87	73.16	1.26	21.32

Notes:
[a] Earthwork fuel consumption does not include upgrades to the Colstrip Subdivision

Table S-3. Equipment Operating Hours and Fuel Consumption for Earthworks Equipment: Colstrip Alternative

Construction Equipment	Engine Horsepower (hp)	Total Operation (hours)[a]	Pieces of Equip.	VMT (onroad only)	Fuel Rate (gal/VMT or gal/hr/piece of equip.)	Diesel Fuel Consumption (Gallons)
CAT 777 (100-ton haul trucks)	1000	38,000	7	n.a.	26.76	7,118,178
CAT 992 Front-end loader	1000	5,500	1	n.a.	26.71	146,892
CAT D10 dozer	600	5,500	1	n.a.	13.11	72,115
CAT D9 dozer	600	5,500	1	n.a.	13.11	72,115
CAT D8 dozers	300	7,000	2	n.a.	7.26	101,645
CAT 14G motor graders	300	12,500	3	n.a.	7.13	267,292
CAT 825 compactor	300	5,500	1	n.a.	6.69	36,795
CAT 10,000 gal. water wagons	300	14,500	3	n.a.	7.53	327,627
Smooth drum roller	300	5,500	1	n.a.	6.69	36,795
CAT 637 scrapers	600	7,500	3	n.a.	13.03	293,074
CAT 345 excavators	600	10,600	1	n.a.	12.66	134,181
CAT 966 front-end loaders	600	10,600	2	n.a.	12.93	274,114
Generator sets	100	8,000	3	n.a.	2.14	51,250
Rock drills	300	8,000	3	n.a.	5.32	127,599
4,000 gal. water trucks	n.a.	7,000	2	210,000	0.11	22,226
Fuel trucks	n.a.	20,000	2	600,000	0.11	63,504
Mechanics service trucks	n.a.	13,000	6	210,000	0.28	328,945
Pickup Trucks	n.a.	2,500	15	600,000	0.30	169,041
Total						9,643,391

Notes:
[a] Operating hours and fuel consumption in this table are for Colstrip Alternative; operating hours and fuel consumption for other build alternatives are proportional to the amount of cut and fill earthwork for each build alternative.
VMT= vehicle miles traveled

S.1.3 Bridge Construction

OEA estimated the hours of operation for construction cranes and tractor-trailer vehicles that would be required to construct bridges for each build alternative. OEA then applied equipment-specific diesel fuel consumption factors for each equipment type to estimate diesel fuel consumption for bridge construction for each build alternative. OEA estimated the hours of operation for equipment for bridge construction based on the number of bridge crossings required for each build alternative. OEA estimated diesel fuel consumption for the crane operation based on an equipment-specific fuel consumption factor of 9.16 gallons diesel fuel per hour of operation. OEA estimate diesel fuel consumption for the tractor-trailer delivery trucks based on the vehicle-miles traveled and average fuel efficiency for tractor-trailer trucks of 0.127 gallon per mile. Diesel fuel consumption for bridge

construction is shown in Table S-4. Bridge crossings include crossings of surface water bodies that would need to be constructed along the right-of-way and crossings of surface water bodies that would need to be constructed outside of the right-of-way for relocation of roads (Chapter 9, Section 9.2, *Surface Water*).

Table S-4. Diesel Fuel Consumption for Bridge Construction

	Number of Bridge Crossings[a]		Bridge Construction Equipment Hours		Diesel Fuel Consumption for Bridge Construction		
Build Alternative	Road Relocation	Rail Line Right-of-Way	Crane	Tractor Trailer	Crane	Tractor Trailer	Total
Tongue River	0	2	1,000	600	0.026	0.003	0.029
Tongue River East	1	2	1,000	600	0.039	0.005	0.044
Colstrip	0	4	2,250	1,350	0.021	0.003	0.023
Colstrip East	1	3	2,250	1,350	0.028	0.004	0.032
Tongue River Road	0	7	2,750	1,650	0.039	0.005	0.043
Tongue River Road East	1	7	2,750	1,650	0.047	0.006	0.052
Moon Creek	0	4	2,000	1,200	0.038	0.005	0.043
Moon Creek East	1	4	2,000	1,200	0.051	0.006	0.058
Decker	0	1	1,000	600	0.045	0.006	0.051
Decker East	0	1	1,000	600	0.046	0.006	0.051

Notes:
[a] Each build alternative would have one bridge crossing of the Tongue River; all but the Decker Alternatives would also have bridge crossings of other rivers and streams along the right-of-way.

S.1.4 Construction Supply Trains

Supply trains would be required to transport rails, ties, and ballast to rail line construction locations. As the rail line is constructed, the newly constructed line would be used to transport supplies to support further construction. OEA estimated the number of construction supply trains that would be required for each build alternative and estimated the loaded and unloaded weight of each supply train. OEA assumed that, on average, each loaded and unloaded supply train would travel 50 percent of the total (completed) length of the rail line right-of-way for each build alternative. OEA applied a locomotive diesel fuel consumption factor (834 ton-mile per gallon of diesel fuel) to estimate the diesel fuel consumption for supply trains for each build alternative. Construction of the Colstrip Alternative, with a 42.3-mile right-of-way (not including the Colstrip Subdivision), would require approximately seven rail trains each holding 64,000 linear feet of rail, 12 tie trains each holding 10,000 ties, and 62 ballast trains each holding 5,000 tons of ballast. The number of rail, tie, and ballast trains for the other build alternatives would vary based on the length of the right-of-way for the build alternative. Diesel fuel consumption for construction supply trains is shown in Table S-5.

Table S-5. Diesel Fuel Consumption for Construction Supply Trains

Build Alternative	Average One-Way Trip[b] (Miles)	Construction Supply Trains			Diesel Fuel Consumption (million gallons)
		Rail	Tie	Ballast	
Tongue River	41.85	14	22	123	0.08
Tongue River East	43.15	16	23	127	0.09
Colstrip[a]	36.00	7	12	62	0.04
Colstrip East[a]	37.55	9	13	66	0.04
Tongue River Road	41.85	14	22	121	0.08
Tongue River Road East	42.95	16	23	125	0.09
Moon Creek	41.05	14	22	121	0.08
Moon Creek East	42.35	16	23	125	0.09
Decker	25.55	9	14	75	0.03
Decker East	24.80	11	15	79	0.03

Notes:
[a] Construction supply trains do not include supplies needed for upgrades to the Colstrip Subdivision
[b] Train travel distance includes travel over the Colstrip Subdivision for the Colstrip Alternatives

S.1.5 Construction Workforce Vehicles

OEA estimated the construction workforce that would be required for construction of each build alternative. OEA assumed that each construction worker, on average, would travel 100 miles per day to and from the construction site in a single-occupant vehicle. OEA estimated the diesel fuel consumption for construction workforce vehicles for each build alternative based on the total vehicle miles traveled. OEA first estimated diesel fuel consumption for the vehicle miles traveled for the Colstrip Alternative using the U.S. Environmental Protection Agency MOVES Model. This model estimates an average fuel efficiency for passenger trucks of 0.15 gallon per mile. OEA then estimated workforce vehicles and diesel fuel consumption for the other build alternatives based on the ratio of earthworks required for each build alternative to the earthworks required for the Colstrip Alternative. Diesel fuel consumption for construction workforce vehicles is shown in Table S-6.

Table S-6. Diesel Fuel Consumption for Construction Workforce Vehicles

	Construction Workforce				Diesel Fuel Consumption
Build Alternative	Total Workforce Vehicles	VMT per vehicle	Ratio to Colstrip Alternative	Vehicle Miles Traveled	(million gallons)
Tongue River	283	100	1.26	28,327	0.004
Tongue River East	427	100	1.90	42,713	0.006
Colstrip	225	100	1.00	22,500	0.003
Colstrip East	310	100	1.38	31,034	0.003
Tongue River Road	421	100	1.87	42,121	0.005
Tongue River Road East	508	100	2.26	50,836	0.008
Moon Creek	415	100	1.85	41,513	0.006
Moon Creek East	559	100	2.48	55,899	0.008
Decker	497	100	2.21	49,664	0.007
Decker East	497	100	2.21	49,749	0.007

Notes:
[a] Assuming one vehicle per worker and 100 vehicle miles traveled per day
VMT= vehicle miles traveled

S.1.6 Colstrip Subdivision Upgrades

OEA anticipates that upgrades to the existing Colstrip Subdivision would be needed if either of the Colstrip Alternatives is licensed. Upgrades would include replacement of railroad ties, relaying of rail with a 6-inch rail base to replace segments of the subdivision with a rail base of 5.5 inches, and minor repairs to timber structures. Existing ties would be replaced over the entire length of the Colstrip Subdivision. BNSF Railway Company (BNSF) has indicated that upgrades to the Colstrip Subdivision would be incremental and that upgrades may not be conducted concurrently with construction of the proposed rail line, if either of the Colstrip Alternatives is licensed. Upgrades to the subdivision could take place incrementally after the proposed rail line begins operation. The extent of upgrades needed would depend upon routine inspections of the existing track and structures. OEA anticipates that energy consumption for upgrades to the Colstrip Subdivision would be minor compared to the energy consumption for construction of either of the Colstrip Alternatives.

S.1.7 Road Relocation

OEA estimated the linear miles of roads that would need to be relocated for each build alternative based on geographic information system (GIS) analysis of the right-of-way of each build alternative. Fuel consumption for road relocation would depend on the total length of road that would be relocated, which would vary by build alternative. OEA estimated fuel consumption for road relocation by multiplying the total length of roads that would be relocated by a fuel consumption factor for paved road construction. OEA obtained the fuel consumption from a recent compilation of life-cycle analyses of asphalt road

construction (Muench 2010). The compilation found that life-cycle energy consumption is typically 3 to 7 terajoules per lane mile (at an average energy consumption factor of 5 terajoules per lane mile, equivalent to 4,739 million British thermal units (Btu) per lane mile).[2] Life-cycle energy consumption studies cited in the compilation typically considered only the roadway's pavement structure. For asphalt pavement of 1 mile of relocated road, assuming an average of 1.5 lane-equivalents for each road, the total life-cycle energy consumption would be approximately 7,108 million Btu per mile, equivalent to 51,254 gallons of diesel fuel per mile at a conversion factor of 138,700 Btu per gallon of diesel fuel.

Based on data from Muench (2010), approximately 2.5 percent of the total life-cycle energy consumption for road paving is associated with road construction activities, 16 percent is associated with construction-related transportation activities, and 18.5 percent is associated with road maintenance activities. The remainder of the life-cycle energy consumption includes energy consumed in production of the raw materials (e.g., asphalt), activities that would occur outside of the study area.

Most roads that would be relocated to construct the proposed rail line are currently unpaved or gravel roads. OEA anticipates that most of the relocated roads would remain unpaved or as gravel roads and would not be paved with asphalt. OEA estimated the amount of energy that would be needed to relocate roads by applying an energy consumption factor assuming that the roads would be paved with asphalt. This assumption provides a conservative estimate of the energy requirements for road relocation because the process of relocating a paved road would consume more energy than relocating an unpaved or gravel road.

Table S-7 summarizes the road lengths and equivalent rode lane-miles that would be relocated for each build alternative. Table S-7 also shows OEA's estimates of the amount of fuel that would be consumed by equipment used in road relocation.

[2] One terajoule is equal to 947.82 million British thermal units.

Table S-7. Estimated Energy Consumption for Road Relocation by Build Alternative

Build Alternative	Total Length of Roads Relocated (miles)	Average Road Width (lane equivalents)	Roads Relocated (lane miles)	Diesel Fuel Consumption (Gallons)	
				Construction [c]	Operation (Maintenance)
Tongue River	12.65	1.5	18.97	119,840	59,920
Tongue River East	6.56	1.5	9.84	62,168	31,084
Colstrip[a]	17.90	1.5	26.84	169,581	84,791
Colstrip East[a]	11.81	1.5	17.72	111,910	55,955
Tongue River Road	14.45	1.5	21.67	136,892	68,446
Tongue River Road East	8.36	1.5	12.54	79,221	39,610
Moon Creek	15.75	1.5	23.62	149,195	74,597
Moon Creek East	9.66	1.5	14.49	91,523	45,762
Decker	6.55	1.5	9.82	62,030	31,015
Decker East	4.93	1.5	7.40	46,727	23,363

Notes:
[a] A lane-mile is the number of lanes of a road multiplied by the number of miles of a road. A 1-mile road that has two lanes is the equivalent of two lane-miles.
[b] Not including upgrades to the Colstrip Subdivision
[c] Includes road paving and road construction-related transportation

S.2 Diesel Fuel Consumption—Operation

Diesel fuel consumption for operation for each build alternative would depend on the length of the right-of-way and the number of trains that would operate under each build alternative coal production scenario.[3] OEA estimated the gross ton-miles that would be associated with each build alternative for each coal production scenario. Gross ton-miles account for the total weight of the train including the locomotives and the loaded, or unloaded, rail cars. Table S-8 shows the assumptions used in estimating diesel fuel consumption for operation of the proposed rail line for each build alternative, excluding downline operation.

Table S-8. Tongue River Railroad Operating Factors (Low Production Scenario)

Operating Element	Value
Number of run years	4
Number of total years (2018–2037)	20
Tons of coal per car	118
Cars per train	125
Tons of coal per train	14,750

Source: Appendix C, *Coal Production and Markets*

[3] The high, medium, and low production scenarios are described in Appendix C, *Coal Production and Markets*. The implications of these scenarios for rail traffic are summarized in Chapter 2, Section 2.3.3, *Rail Traffic*.

Table S-9 illustrates the calculations of the gross weight of a loaded train (18,835 tons) and an unloaded train (4,085 tons). The average gross weight of one loaded train and one unloaded train is 11,460 tons,[4] corresponding to the gross tons that would traverse the alignment for two-way operation of each train. OEA assumed that each train would depart the terminus completely loaded and return to the terminus completely empty.

OEA assumed that operation of the proposed rail line would consume an average of 1 gallon of diesel fuel for each 834 gross ton-miles. This is the average value for current BNSF operation (BNSF Railway Company 2012). OEA did not include diesel fuel consumption for operation of trains on sidings and in terminal areas in this analysis. The analysis for the low production scenario is based on operation of 7.4 trains per day (3.7 trains per day in each direction) assumed to traverse the entire length of the build alternative right-of-way 365 days per year. The analysis for the medium production scenario is based on operation of 11.9 trains per day, 365 days per year. The analysis for the high production scenario is based on operation of 18.6 trains per day for the northern alternatives and 26.7 trains per day for the southern alternatives, 365 days per year.

Table S-9. Gross Weight of Locomotives, Loaded Rail Cars, and Unloaded Rail Cars

Element	Gross Weight per Unit (pounds)	Number of Units	Total Gross Weight (pounds)	Total Gross Weight (pounds)	Total Gross Weight (tons)
Locomotive	480,000	4	1,920,000	—	—
Loaded rail car	286,000	125	35,750,000	—	—
Coal load	236,000	125	29,500,000	—	—
Unloaded rail car	50,000	125	6,250,000	—	—
Unloaded train	—	—	—	8,170,000	4,085
Loaded train	—	—	—	37,670,000	18,835
Average two-way	—	—	—	22,920,000	11,460

Sources: BNSF Railway Company 2013, Association of American Railroads 2008

OEA calculated the diesel fuel consumption for operation of each build alternative for each year from 2018 through 2037. Coal from each proposed and potentially induced mine would travel a different distance on the rail line based on the relationship of the mine to the terminus of the build alternative. For the northern alternatives, the coal from the proposed Otter Creek Mine would travel over the Terminus 2 rail but not the Terminus 1 rail, and the coal from the potentially induced Poker Jim Creek–O'Dell Creek Mine would travel over the Terminus 1 rail but not the Terminus 2 rail. For the southern alternatives, the coal from the potentially induced Canyon Creek Mine would not travel over either the Terminus 1 or the Terminus 2 rail, both of which would be located north of the potentially induced Canyon Creek Mine. The calculated train travel distances for the Colstrip Alternatives include travel

[4] Calculated as (18.835 + 4,085)/2.

over the Colstrip Subdivision. Train travel distances for the other build alternatives include only travel over newly constructed track and do not include travel over any existing track.

OEA also based the rail mile traveled calculations for each build alternative and each proposed and potentially induced mine on the anticipated schedule for commencement of operation of each mine. OEA assumed that the proposed Otter Creek Mine would commence operation after the railroad construction is completed, and that the potentially induced Poker Jim Creek–O'Dell Creek Mine would commence operation in 2023 and the potentially induced Canyon Creek Mine (for the southern alternatives) in 2028. OEA assumed that each proposed and potentially induced mine would produce 60 percent of full operation capacity in the first year of operation and 80 percent of full operation capacity in the second year of full operation, and would produce 100 percent of full operation in all subsequent years through 2037. OEA based the operation start dates for the Otter Creek Mine on the winter construction schedule and assumed that the Otter Creek Mine would commence operation in 2018 for all build alternatives.

All build alternatives have a winter construction schedule of 3 calendar years or less except for the Moon Creek East Alternative, for which the winter construction schedule is 3.3 years. Construction of the Moon Creek East Alternative would extend into 2018 if construction commenced in 2015. OEA assumed, for consistency with the other build alternative calculations, that if the Moon Creek East Alternative is licensed that the proposed Otter Creek Mine would still commence operation in 2018 and would still produce 60 percent of its full capacity in 2018.

Tables S-10 through S-15 show diesel fuel consumption for railroad operation for the low production scenario (7.4 trains per day), medium production scenario (11.9 trains per day), and high production scenario (18.6 trains per day and 26.7 trains per day) for the northern and southern alternatives.

Table S-10. Estimated Diesel Fuel Consumption for the Operation of Each Build Alternative (Low Production Scenario)

Build Alternative	Otter Creek Train Travel Length (miles)	Otter Creek Ton-Miles per train (one-way)	Otter Creek Diesel fuel consumption per one-way train (gallons)	2018 Diesel fuel consumption (million gallons)	2019 Diesel fuel consumption (million gallons)	2020-2037 Diesel fuel consumption (million gallons per year)	Total Diesel Fuel Consumption 2018-2037 (million gallons)
Tongue River	75.70	867,522	1,040	1.69	2.26	2.82	54.73
Tongue River East	77.30	885,858	1,062	1.73	2.30	2.88	55.88
Colstrip[a]	64.00	733,440	879	1.43	1.91	2.38	46.27
Colstrip East[a]	66.10	757,506	908	1.48	1.97	2.46	47.79
Tongue River Road	75.70	867,522	1,040	1.69	2.26	2.82	54.73
Tongue River Road East	76.90	881,274	1,057	1.72	2.29	2.87	55.59
Moon Creek	74.10	849,186	1,018	1.66	2.21	2.76	53.57
Moon Creek East	75.70	867,522	1,040	1.69	2.26	2.82	54.73
Decker	51.10	585,606	702	1.14	1.52	1.90	36.94
Decker East	49.60	568,416	682	1.11	1.48	1.85	35.86

Notes:
[a] Includes the Colstrip Subdivision

Table S-11. Estimated Diesel Fuel Consumption for the Operation of Each Build Alternative (Medium Production Scenario, 2018, 2019)[a]

Build Alternative	Otter Creek Train Travel Length (miles)	Poker Jim Creek – O'Dell Creek Train Travel Length (miles)	Otter Creek Ton-Miles per train (one-way)	Poker Jim/O'Dell Creek Ton-Miles per train (one-way)	Otter Creek Diesel fuel consumption per one-way train (gallons)	Poker Jim Creek – O'Dell Creek diesel fuel consumption per one-way train (gallons)	2018 Diesel fuel consumption (million gallons)	2019 Diesel fuel consumption (million gallons)
Tongue River	75.7	77.7	867,522	890,442	1,040	1,068	1.69	2.25
Tongue River East	77.3	82.3	885,858	943,158	1,062	1,131	1.72	2.30
Colstrip[b]	64	66	733,440	756,360	879	907	1.43	1.90
Colstrip East[b]	66.1	71.1	757,506	814,806	908	977	1.47	1.96
Tongue River Road	75.7	77.7	867,522	890,442	1,040	1,068	1.69	2.25
Tongue River Road East	76.9	81.9	881,274	938,574	1,057	1,125	1.71	2.28
Moon Creek	74.1	76.1	849,186	872,106	1,018	1,046	1.65	2.20
Moon Creek East	75.7	80.7	867,522	924,822	1,040	1,109	1.69	2.25
Decker	51.1	37.1	585,606	425,166	702	510	1.14	1.52
Decker East	49.6	36.6	568,416	419,436	682	503	1.10	1.47

Notes:
[a] 11.9 trains per day
[b] Includes the Colstrip Subdivision

Table S-12. Estimated Diesel Fuel Consumption for the Operation of Each Build Alternative (Medium Production Scenario, 2020-2037)[a]

Build Alternative	2020 Diesel fuel consumption (million gallons)	2021 Diesel fuel consumption (million gallons)	2022 Diesel fuel consumption (million gallons)	2023 Diesel fuel consumption (million gallons)	2024 Diesel fuel consumption (million gallons)	2025-2037 Diesel fuel consumption (million gallons per year)	Total Diesel Fuel Consumption 2018-2037 (million gallons)
Tongue River	2.81	2.81	2.81	3.85	4.19	4.56	79.66
Tongue River East	2.87	2.87	2.87	3.97	4.34	4.72	82.29
Colstrip[b]	2.38	2.38	2.38	3.26	3.55	3.86	67.45
Colstrip East[b]	2.45	2.45	2.45	3.40	3.72	4.05	70.60
Tongue River Road	2.81	2.81	2.81	3.85	4.19	4.56	79.66
Tongue River Road East	2.85	2.85	2.85	3.95	4.31	4.70	81.88
Moon Creek	2.75	2.75	2.75	3.77	4.11	4.46	77.99
Moon Creek East	2.81	2.81	2.81	3.89	4.25	4.63	80.62
Decker	1.90	1.90	1.90	2.39	2.56	2.73	48.83
Decker East	1.84	1.84	1.84	2.33	2.49	2.67	47.59

Notes:
[a] 11.9 trains per day
[b] Includes the Colstrip Subdivision

Table S-13. Estimated Diesel Fuel Consumption by Build Alternative for Operation of the Proposed Rail Line (High Production Scenario)[a]

Build Alternative	Otter Creek Train Travel Length (miles)	Poker Jim Creek – O'Dell Creek Train Travel Length (miles)	Canyon Creek Train Travel Length (miles)	Otter Creek Ton-Miles per train (one-way)	Poker Jim Creek – O'Dell Creek Ton-Miles per train (one-way)	Canyon Creek Ton-Miles per train (one-way)	Otter Creek Diesel fuel consumption per one-way train (gallons)	Poker Jim Creek – O'Dell Creek diesel fuel consumption per one-way train (gallons)
Tongue River	75.7	77.7	—	867,522	890,442	—	1,040.19	1,067.68
Tongue River East	77.3	82.3	—	885,858	943,158	—	1,062.18	1,130.88
Colstrip[b]	64	66	—	733,440	756,360	—	879.42	906.91
Colstrip East[b]	66.1	71.1	—	757,506	814,806	—	908.28	976.99
Tongue River Road	75.7	77.7	—	867,522	890,442	—	1,040.19	1,067.68
Tongue River Road East	76.9	81.9	—	881,274	938,574	—	1,056.68	1,125.39
Moon Creek	74.1	76.1	—	849,186	872,106	—	1,018.21	1,045.69
Moon Creek East	75.7	80.7	—	867,522	924,822	—	1,040.19	1,108.90
Decker	51.1	37.1	27.42	585,606	425,166	314,233	702.17	509.79
Decker East	49.6	36.6	29.28	568,416	419,436	335,549	681.55	502.92

Notes:
[a] 18.6 trains per day for the northern alternatives; 26.7 trains per day for the southern alternatives
[b] Includes the Colstrip Subdivision

Table S-14. Estimated Diesel Fuel Consumption by Build Alternative for Operation of the Proposed Rail Line (High Production Scenario, 2018-2023)[a]

Build Alternative	Canyon Creek Diesel fuel consumption per one-way train (gallons)	2018 Diesel fuel consumption (million gallons)	2019 Diesel fuel consumption (million gallons)	2020 Diesel fuel consumption (million gallons)	2021 Diesel fuel consumption (million gallons)	2022 Diesel fuel consumption (million gallons)	2023 Diesel fuel consumption (million gallons)
Tongue River	—	2.87	3.82	4.78	4.78	4.78	6.16
Tongue River East	—	2.93	3.90	4.88	4.88	4.88	6.34
Colstrip[b]	—	2.42	3.23	4.04	4.04	4.04	5.21
Colstrip East[b]	—	2.50	3.34	4.17	4.17	4.17	5.44
Tongue River Road	—	2.87	3.82	4.78	4.78	4.78	6.16
Tongue River Road East	—	2.91	3.88	4.85	4.85	4.85	6.31
Moon Creek	—	2.81	3.74	4.68	4.68	4.68	6.03
Moon Creek East	—	2.87	3.82	4.78	4.78	4.78	6.21
Decker	376.78	1.93	2.58	3.22	3.22	3.22	3.89
Decker East	402.34	1.88	2.50	3.13	3.13	3.13	3.78

Notes:
[a] 18.6 trains per day for the northern alternatives; 26.7 trains per day for the southern alternatives
[b] Includes the Colstrip Subdivision

Table S-15. Estimated Diesel Fuel Consumption by Build Alternative for Operation of the Proposed Rail Line (High-Production Scenario, 2024-2037)[a]

Build Alternative	2024 Diesel fuel consumption (million gallons)	2025 Diesel fuel consumption (million gallons)	2026 Diesel fuel consumption (million gallons)	2027 Diesel fuel consumption (million gallons)	2028 Diesel fuel consumption (million gallons)	2029 Diesel fuel consumption (million gallons)	2030-2037 Diesel fuel consumption (million gallons per year)	Total Diesel Fuel Consumption 2018-2037 (million gallons)
Tongue River	6.62	7.11	7.11	7.11	7.11	7.11	7.11	126.25
Tongue River East	6.83	7.35	7.35	7.35	7.35	7.35	7.35	130.19
Colstrip[b]	5.61	6.02	6.02	6.02	6.02	6.02	6.02	106.87
Colstrip East[b]	5.86	6.31	6.31	6.31	6.31	6.31	6.31	111.64
Tongue River Road	6.62	7.11	7.11	7.11	7.11	7.11	7.11	126.25
Tongue River Road East	6.80	7.31	7.31	7.31	7.31	7.31	7.31	129.53
Moon Creek	6.48	6.96	6.96	6.96	6.96	6.96	6.96	123.60
Moon Creek East	6.69	7.20	7.20	7.20	7.20	7.20	7.20	127.54
Decker	4.11	4.33	4.33	4.33	5.00	5.22	5.47	89.11
Decker East	4.00	4.22	4.22	4.22	4.22	5.17	5.43	87.05

Notes:
[a] 18.6 trains per day for the northern alternatives; 26.7 trains per day for the southern alternatives
[b] Includes the Colstrip Subdivision

S.3 References

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