Appendix C

Downline Analysis Study Area and Train Characteristics

Introduction

This appendix describes how the Surface Transportation Board's (Board's), Office of Environmental Analysis (OEA) identified the study area for downline impact analysis and provides information on the characteristics of existing rail traffic in the downline study area. Appendix B, *Applicable Regulations*, summarizes regulations and guidance related to the downline impact analysis. The resource sections in Chapter 3, *Affected Environment and Environmental Consequences*, provide additional information describing the various downline analyses.

The Board's regulations establish thresholds for environmental review of potential downline impacts (49 Code of Federal Regulations [C.F.R.] § 1105.7(e)(11)(v)). The threshold for analysis of potential air quality impacts (C.F.R. § 1105.7(e)(5)) is generally an increase of at least eight trains per day in areas designated as in attainment under the Clean Air Act, or three trains per day in nonattainment areas. The threshold for analysis of potential noise impacts (C.F.R. § 1105.7(e)(6)) is generally an increase of at least eight trains per day combined with an incremental increase in noise levels, as measured by a day-night average noise level (DNL), of 3 A-weighted decibels (dBA) or more and an increase to a noise level of 65 DNL or more. The thresholds for analysis of potential energy impacts (C.F.R. § 1105.7(e)(4)) are specific to diversion of freight shipments from rail to motor carriage; therefore, they are not relevant in this case. Based on its experience applying the thresholds for air and noise on freight rail construction and operation projects, OEA has determined that these thresholds should also apply to freight rail safety and grade-crossing safety and delay.

As described in Chapter 2, Section 2.1, *Proposed Action,* the Seven County Infrastructure Coalition (Coalition) estimates that, on average, as few as 3.68 trains per day (low rail traffic scenario) or as many as 10.52 trains per day (high rail traffic scenario) could operate on the proposed rail line, depending on future market conditions. That estimate includes between 3.68 and 9.92 crude oil trains, including both unloaded trains entering the Uinta Basin (the Basin) and loaded trains leaving the Basin, and between 0 and 0.6 frac sand trains, including both loaded trains entering the Basin and unloaded trains leaving the Basin. This rail traffic would connect to the national freight rail network near Kyune, Utah, and from there could be transported to and from multiple destinations.

There are many factors that determine possible destinations for loaded crude oil trains originating in the Basin and the routes those trains could take within the national (downline) freight rail network to reach those destinations. The possible destinations and routes then determine where the estimated increase in rail traffic could warrant analysis based on the Board's thresholds. OEA determined the downline study area by first considering the likely destinations for crude oil that would be transported by the proposed rail line. OEA then considered potential routing to those destinations and where the estimated project-related rail traffic would exceed the analysis thresholds.

Destination Alternatives

Currently, most crude oil produced in the Basin (known as Uinta Basin crude oil) is transported by truck to refineries in the Salt Lake City area. If the Coalition were to construct and operate the proposed rail line, OEA does not expect that trains from the proposed rail line would transport Uinta Basin crude oil to Salt Lake City refineries because those refineries do not currently have the ability

to receive crude oil shipments by rail. OEA expects that trains originating on the proposed rail line would transport crude oil to markets in other regions of the United States. The final destinations of the trains would depend on the ability and willingness of refineries in other markets to receive rail cars carrying Uinta Basin crude oil and process the oil in their refineries. In November 2019, the Coalition confirmed the following refineries represent a reasonable list of potential target markets as identified in the *Pre-Feasibility Study of a Prospective Railroad Connecting the Uinta Basin to the National Rail Network* (R.L. Banks & Associates 2018) (R.L Banks study).

- Marathon in Anacortes, Washington
- Marathon in Catlettsburg, Kentucky
- Calumet in Shreveport, Louisiana
- Exxon Mobil in Baton Rouge, Louisiana
- Marathon in Garyville, Louisiana
- Chevron in Pascagoula, Mississippi
- ExxonMobil in Baytown, Texas
- Shell in Deer Park, Texas
- Marathon in Galveston Bay, Texas
- Valero in Port Arthur, Texas

The R.L. Banks study discussed with these refineries the possibility of purchasing and refining Uinta Basin crude oil. It is likely that some of these refineries would purchase Uinta Basin crude oil if they found the price attractive. Other refineries could also likely evaluate and potentially purchase Uinta Basin crude oil.

Because other refineries could be interested in processing Uinta Basin crude oil in addition to those identified in the R.L. Banks study, OEA elected to take a regional, refining, market-centered approach for considering the potential destinations for Uinta Basin crude oil. In doing so, OEA focused on the specific geographic refining market centers shown in Table C-1.

Table C-1. Potential Geographic Refining Market Centers for Uinta Basin Crude Oil

Location	Number of Refineries	Capacity (b/d)
Texas Gulf Coast	15	4,137,000
Louisiana Gulf Coast	16	3,696,000
Puget Sound	5	651,700
Total	**36**	**8,484,000**

Notes:
b/d = barrels per day

OEA found these locations to be the most likely destinations for several reasons.

- The average size of the Gulf Coast refineries is about 250,000 barrels per day (b/d). This provides capability to blend in periodic unit trains of Uinta Basin crude oil into blended/heated storage at low percentages of total crude oil.

- There is already rail infrastructure in place along the Gulf Coast to receive Canadian and Permian Basin crude oil, although Uinta Basin crude oil may require some off-loading facilities to modify equipment.
- Four of the five Puget Sound refineries already receive unit trains of crude by rail and may be able to accommodate Uinta Basin crude oil with modifications to some storage and off-loading tanks and equipment.

In considering potential target geographic refining market centers, OEA also identified the following regions that appear to currently be unlikely viable markets.

- California refineries likely have the ability to process Uinta Basin crude oil. However, various project proponents' requests for permits for developing rail offloading facilities in California to unload Bakken or Canadian oil sands crudes have not been approved.
- Refineries on the East Coast, including Catlettsburg, Kentucky, are a significant distance from the Basin. It is likely these refineries would require a more significant cost discount than Gulf Coast or Puget Sound refineries to process Uinta Basin crude oil, leading Uinta producers to look for better return from the Gulf Coast or Puget Sound options.
- Refineries in Corpus Christi, Texas, have significant crude oil supply available to them from the Permian and Eagle Ford Basins via pipelines. Corpus Christi is also a key crude oil export hub. The currently available crude oil is two to three times the capacity of the Corpus Christi refineries, and it may be difficult for Uinta Basin crude oil to penetrate this market without offering a substantial price discount.

Outside Salt Lake City, refineries in the Rocky Mountain area (Petroleum Administration for Defense District [PADD] 4) (EIA 2012) and other relatively close refineries may have interest in Uinta Basin crude oil. These other markets, such as the Texas Inland, New Mexico, Oklahoma, Kansas, and North Louisiana/Mississippi refineries may also be able to process Uinta Basin crude oil. There are 39 refineries in these states (excluding Salt Lake City) with a total capacity of 2,531,000 b/d. However, the average size of these refineries is only 66,000 b/d, and most of these locations would need to invest in rail and processing equipment to handle the Uinta Basin crude, as Salt Lake City refiners did.

It is nevertheless possible that some of the larger refineries in these markets may be interested in processing Uinta Basin crude oil, since railcar transportation cost would be comparatively low, and larger refineries may be able to accommodate Uinta Basin crude oil by blending it with other crude oils. The Kansas/Oklahoma regional market has three refineries well over 100,000 b/d. This market also has two adjacent HollyFrontier refineries in Tulsa, Oklahoma and HollyFrontier also processes Uinta Basin crude oil in Salt Lake City.

OEA examined U.S Energy Information Agency (EIA) reporting of crude-by-rail movements for 2016 through 2018 and noted that the bulk of rail movements out of the Rocky Mountain region (PADD 4), including Utah, are to the PADD 3 (primarily Texas/Louisiana) market. These rail movements average about 30,000 b/d, with about 7,000 b/d moving to PADD 5 (West Coast) and about 1,000 b/d to PADD 2 (Midwest). These volumes are higher than surplus Uinta Basin crude oil production (volumes above what Salt Lake City refineries can process) because some other crude oils (e.g., Niobrara) also move by rail.

Based on these considerations and data, OEA concluded that a reasonable estimated distribution of destinations for Uinta Basin crude oil transported on the proposed rail line would be 50 percent to

Houston/Port Arthur, 35 percent to Louisiana Gulf Coast, 10 percent to Puget Sound, and 5 percent to PADD 2 refineries in Kansas and Oklahoma. EIA data trends for rail movements in recent years support these relative volumes. The Texas Gulf refineries are about 20 percent larger than the Louisiana Gulf Coast refineries on average, and also tend to have more direct rail access than some Louisiana Gulf Coast refineries. Therefore, the Texas refineries are likely to be more feasible outlets.

Table C-2 shows the estimated distribution of rail traffic to and from these geographic region refinery markets. To be conservative, OEA included the relatively small number of estimated of frac sand trains in the train count for the high rail traffic scenario. OEA recognizes that that the ultimate origins and destinations of frac sand trains would not be the same as crude oil trains, but both types would need to traverse the same existing rail line to which the proposed rail line would connect at Kyune.

Table C-2. Estimated Distribution of Uinta Rail Traffic by Geographic Region

Production Scenario	Average Trains per Day[a]				
	Total	Puget Sound	Houston/ Port Arthur	Louisiana Gulf Coast	PADD 2
High rail traffic	10.52	1.05	5.26	3.68	0.53
Low rail traffic	3.68	0.37	1.84	1.29	0.18

Notes:
[a] Includes loaded and empty trains.
PADD = Petroleum Administration for Defense District

Potential Rail Routes

OEA used PC Rail Miler's routing program to develop route mileage using Union Pacific Railway (UP) and BNSF Railway (BNSF) rail lines as originating carriers to the example refineries in each of the geographic markets identified above that are located to the east of Kyune (OEA 2020). OEA did not analyze route mileage and refinery locations west of Kyune because project-related traffic to/from western destinations is estimated to be approximately one train per day or less and, thus, far lower than the Board's analysis thresholds.

OEA used two PC Rail Miler routing functions to identify the shortest route and the "most practical" route from the Basin to example refineries, where the most practical routing simulates the most likely movement of general merchandise train traffic with preference given to main lines over branch lines. All rail traffic moving from Kyune to destinations in the east would travel over the existing rail line between Kyune and Denver, Colorado. From Denver, many different routings could be used for rail traffic to/from the identified refining regions. For this analysis, OEA elected to use the most practical routing results from the PC Miler analysis to estimate the rail traffic distribution percentages (Table C-3).

Table C-3. Estimated Distribution of Uinta Rail Traffic East of Denver

Direction to/from Denver	Route Distribution by Region (%)		
	Houston/Port Arthur	Louisiana	PADD 2
North	60	100	86
East	20	--	--
South	20	--	14

Notes:
PADD = Petroleum Administration for Defense District

OEA applied the percentages shown in Table C-3 to the project-related train traffic levels shown in Table C-2 to calculate the estimated train traffic distribution east of Denver (Table C-4).

Table C-4. Estimated Project-Related Uinta Rail Traffic East of Denver

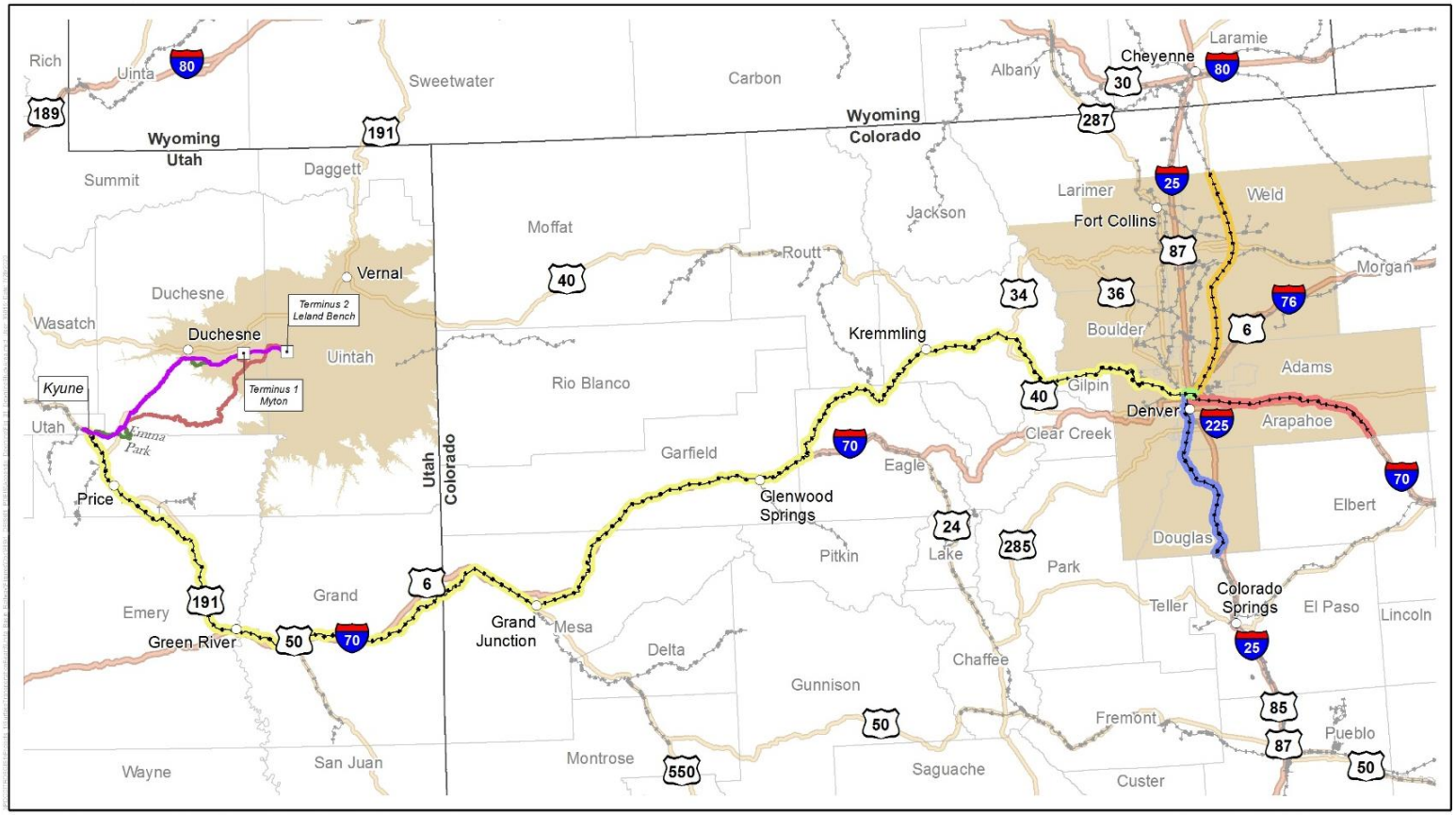
Direction to/from Denver	Average Trains per Day[a]			
	Houston/Port Arthur	Louisiana	PADD 2	Total
High Rail Traffic Scenario				
North	3.16	3.68	0.45	7.29
East	1.05	--	0.08	1.13
South	1.05	--	--	1.05
Total	5.26	3.68	0.53	9.47
Low Rail Traffic Scenario				
North	1.10	1.29	0.16	2.55
East	0.37	--	0.03	0.39
South	0.37	--	--	0.37
Total	1.84	1.29	0.18	3.31

Notes:
[a] Includes loaded and empty trains.
PADD = Petroleum Administration for Defense District

Downline Study Area

Based on the estimated distribution of project-related rail traffic described in Table C-4, OEA anticipates that project related rail traffic could exceed the Board's downline analysis threshold of eight trains per day for project-related rail traffic between Kyune and Denver. Because the Denver metropolitan area is an air quality nonattainment area where the analysis threshold is three trains per day, the Board's downline analysis threshold would also be exceeded for the high rail traffic scenario within the Denver Metro/North Front Range air quality nonattainment area on the northbound route to/from Denver that runs through Greeley, Colorado. Given that there is some uncertainty associated with the estimated distribution of rail traffic and that the estimated traffic is close to the three-trains-per-day threshold on the northbound route for the low rail traffic scenario, OEA has elected in this case to examine potential downline impacts associated with all estimated project-related rail traffic between and Kyune, Utah, and Denver, Colorado, and within the Denver Metro/North Front Range air quality nonattainment area shown in Figure C-1.

Figure C-1. Downline Study Area Rail Segments



Train Characteristics

Analysis of some potential downline impacts requires information on the characteristics—both train volume and the number of cars and locomotives—of existing rail traffic on existing rail lines. Chapter 2, *Proposed Action and Alternatives*, of this EIS describes the average characteristics of project-related trains. For information on the average daily volume of rail traffic on the existing rail lines in the downline study area, OEA used the information included in the Federal Railroad Administration (FRA) database of road-rail crossings in Colorado and Utah (FRA 2020).

The FRA data show that rail traffic on some rail lines in the downline study area includes both passenger and freight traffic. The existing passenger traffic is the Amtrak California Zephyr, with an average of one train per day in each direction. OEA estimated the characteristics of these passenger trains based on information from Amtrak. The existing freight traffic includes trains operated by UP and BNSF. Competitive consideration limit the availability of public information on the specific composition of freight trains. For this analysis, OEA used information provided for a previous case by BNSF on the average characteristics of freight trains in the Northwest and Upper Midwestern United States (Hudak pers. comm.). OEA recognizes that the characteristics of current freight trains in the downline study area may be different, but believes this information is reasonable and the most appropriate information available.

For several grade crossings to the west and east of Denver, the freight rail lines OEA used for Amtrak and freight rail traffic are adjacent to a Denver Regional Transportation District (RTD) transit line; the A Line on the east side and the G Line on the west side. Because this transit line traffic is also relevant to some analyses, OEA characterized the transit traffic based on information from RTD. Table C-5 summarizes the resulting characteristics of existing freight (BNSF and UP), passenger (Amtrak), and transit (RTD) traffic in the downline study area.

Table C-5. Existing Rail Traffic Characteristics in the Downline Study Area

Train Type	Number of Locomotives	Number of Cars	Total Train Length (feet)
Freight	2.2	114	6,135
Amtrak	2	13	1,245
RTD A line	NA	4	340
RTD G line	NA	2	170

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