Rocky Mountain High? – A Report on the Niobrara

Production Rising, Infrastructure Expansions Under Way

- **Crude oil, natural gas and NGL production in the Niobrara have risen to record levels as producers increased their understanding of the region's geology and focused on premium locations.**
- **The Niobrara's Denver-Julesburg Basin has accounted for most of the recent production gains, but exploration and production companies are increasingly bullish about the Powder River Basin too.**
- **Both the D-J and the Powder are currently hotbeds of activity, including development of new or expanded gathering systems and new gas processing capacity.**
- **Production growth has put pressure on the region's once sufficient pipeline takeaway capacity; a number of projects are under way to add new crude, gas and NGL pipeline capacity.**
- **2019-20 trends will depend on crude oil prices.**

1. Introduction

Production growth in the Permian Basin and the Marcellus/Utica shales has attracted most of the energy sector's attention in the second half of the 2010s, but important activity also is occurring in other hydrocarbon-rich areas of the U.S., particularly in the Niobrara's Denver-Julesburg and Powder River basins. As exploration and production companies zero in on the play's most promising counties — and parts of counties — in Colorado and Wyoming and fine-tune their drilling-and-completion techniques, they have been wringing increasing volumes of crude oil, natural gas and natural gas liquids (NGLs) from "the D-J" and "the Powder."

The left graph in Figure 1 shows the rapid pace of crude oil production growth in the Niobrara — led by the D-J (green layer) in northeastern Colorado and southeastern Wyoming — over the past seven-plus years. In early 2012, oil production in the D-J was hovering around 100 Mb/d; by early 2019, it was approaching 570 Mb/d. The D-J's gains in the past two years have been particularly impressive — a near-doubling in output, despite only a modest increase in the rig

count there — with Weld County, CO, being the epicenter of activity. As for the Powder River Basin in northeastern Wyoming, crude production there has risen by 140% since 2012, from about 50 Mb/d to 121 Mb/d in February 2019 (purple layer in left graph) — still 20 Mb/d below the 2015 peak of 141 Mb/d — after sliding to less than 80 Mb/d during parts of 2016 and early 2017. More growth may be on the way; indications are that production in Johnson County, WY – – the recent focus of exploration efforts in the Powder — is poised to increase significantly in 2019 and 2020.

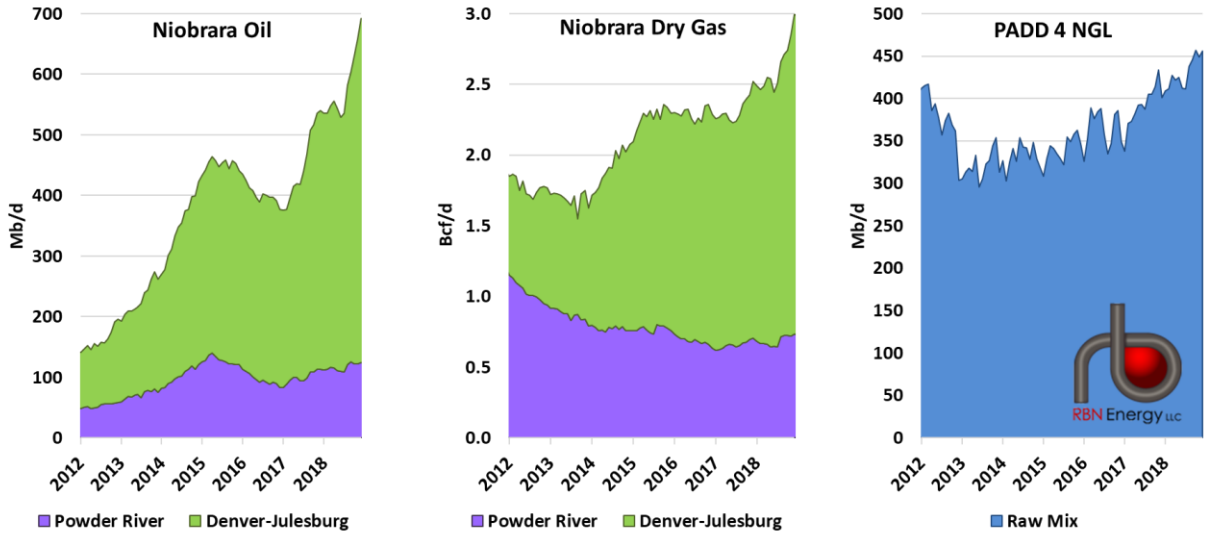

Figure 1 – Niobrara Production; Sources: OPIS PointLogic and Energy Information Administration

The Niobrara's production of natural gas and raw-mix NGLs has been increasing too. As of February 2019, production of dry gas in the region is close to 3 Bcf/d, a gain of more than 30% in the past 24 months. As with crude, the D-J has led the way — dry gas output (green layer in center graph) there is fast-approaching 2.3 Bcf/d, more than three times what it was in early 2012. Gas production in Powder River Basin (purple layer in center graph) is a different story altogether. Through the 2000s, the basin was the U.S.'s leading source of coal-bed methane gas, producing well over 1 Bcf/d of dry gas, and it was a primary impetus for the development of the 1.8-Bcf/d Rockies Express Pipeline (REX) to eastern Ohio. But the Powder's dry-gas output peaked at about 1.5 Bcf/d 10 years ago this month (February 2009) and by early 2017 it had fallen by nearly 60%, to just over 600 MMcf/d. In the past two years, though, Powder River gas production has been on the gradual rebound and has topped 700 MMcf/d each and every month since last summer.

We have a good understanding of NGL production in the Niobrara, but it is not based on publicly available data, so for this report we will turn to EIA statistics on raw-mix NGL production in Petroleum Administration for Defense District (PADD) 4. This data tracks mixed NGLs from the U.S. Rockies as a whole that are piped, railed or trucked away, not counting ethane that is "rejected" into natural gas. Raw-mix production now averages about 450 Mb/d, up nearly 50% from early 2015 (right graph in Figure 1). Recently, with Niobrara NGL production rising and demand for ethane, propane and other NGL purity products increasing along the Gulf Coast, new NGL pipeline capacity out of the Niobrara is being developed — that will allow increasing volumes of ethane to be removed at gas processing plants in the D-J and Powder and transported by pipe to fractionation centers in Conway, KS, and Mont Belvieu, TX.

We should note that there are differing views of the boundaries of the Niobrara — and the D-J and the Powder within it — and we should explain how RBN defines it. The Niobrara can mean at least three things: (1) a geological formation that underlies much of the Great Plains of the U.S. and Canada, (2) a shale producing basin in northeastern Colorado, northwestern Kansas, southwestern Nebraska and southeastern Wyoming, and (3) a geographic area that includes the D-J and the Powder. For our purposes here, Figure 2 shows how RBN models the extent of the Niobrara surface geography, with the D-J Basin including most of northeastern Colorado (dark orange area) and four counties in southeastern Wyoming (dark pink area). The Powder, in turn, includes six counties in northeastern Wyoming and two in southern Montana (green area).

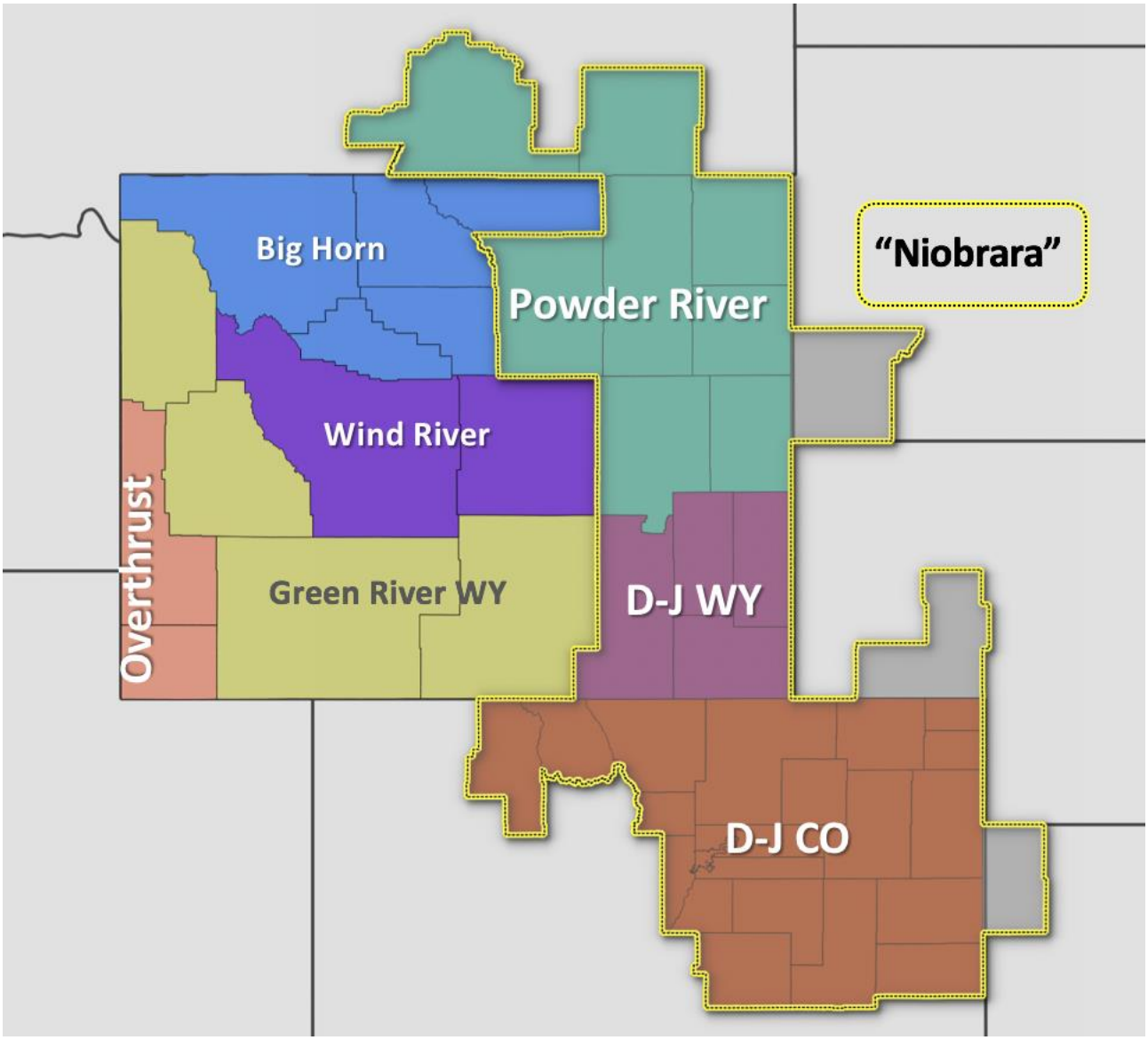

Figure 2 – RBN's Boundaries for the Niobrara, D-J Basin and Powder River Basin; Source: RBN

The Energy Information Administration (EIA), which tracks Niobrara oil and gas production (and new-well production per rig), gives the region a slightly different shape — adding four counties in western Colorado, for instance, and not counting four others that RBN does in southern Montana,

the northeastern corner of Wyoming and the southwestern corner of South Dakota. The point is, the vast majority of Niobrara oil and gas production is in the counties where EIA's view of the boundaries and RBN's overlap.

Rising production of crude oil, natural gas and NGLs — and the prospect of continued growth – – have put a spotlight on the Niobrara in recent months. Also, a number of E&Ps — EOG Resources and Chesapeake Energy among them — have been talking up their improved well productivity, their efforts to hold down or even reduce drilling and completion costs (despite inflationary pressures), and their plans for expanded drilling activity in the D-J and/or the Powder this year and next. This report will discuss Niobrara production; existing gas processing plants, takeaway pipelines and other infrastructure, as well as the need for additional processing and pipeline capacity and the plans by midstream companies to make those additions.

The Table of Contents for "Rocky Mountain High? – A Report on the Niobrara" is included on the following page.

Table of Contents