Utica / Point Pleasant Shale Play Update

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Jefferies

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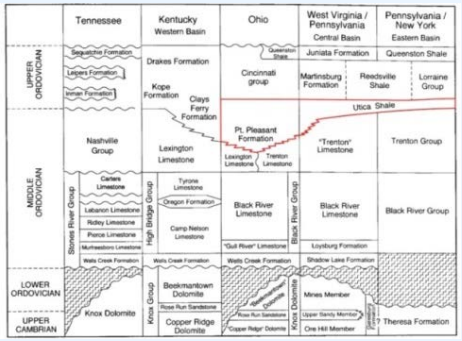
Utica Shale Play – Appalachian Basin

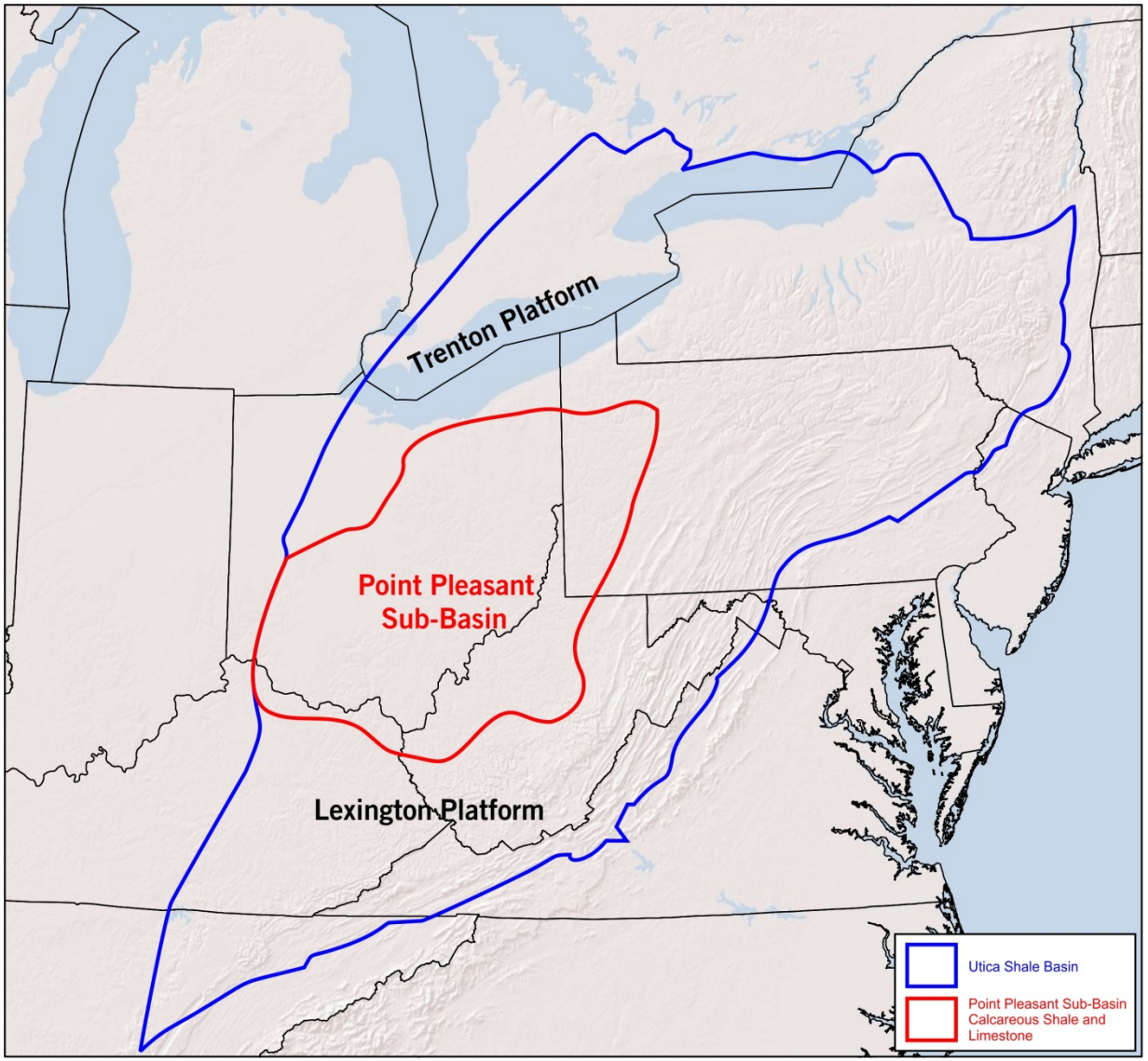
Geologic Overview

Key Points

- The Utica Shale covers most of the Appalachian Basin
  - Basal Upper to Middle Ordovician in age
- Current development activity is primarily focused in eastern Ohio where the Point Pleasant Formation is developed
  - Known to be a major source rock
  - Exhibits higher porosity and permeability and is the landing zone for laterals
  - High carbonate content enables effective fracture stimulations
- The play continues into Northwestern PA, where it is being tested, then onward into Southwestern NY
- The deepest portion of the Utica, as it approaches the Appalachian uplift, appears to be over-mature



From Ryder (2008)



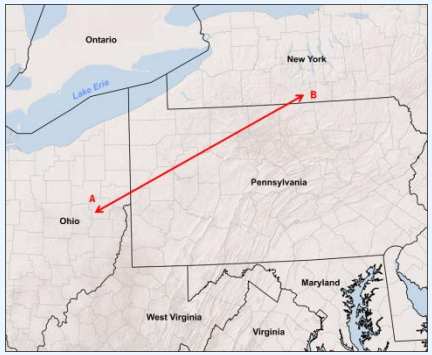
Modified From ODNR and Federal Sources

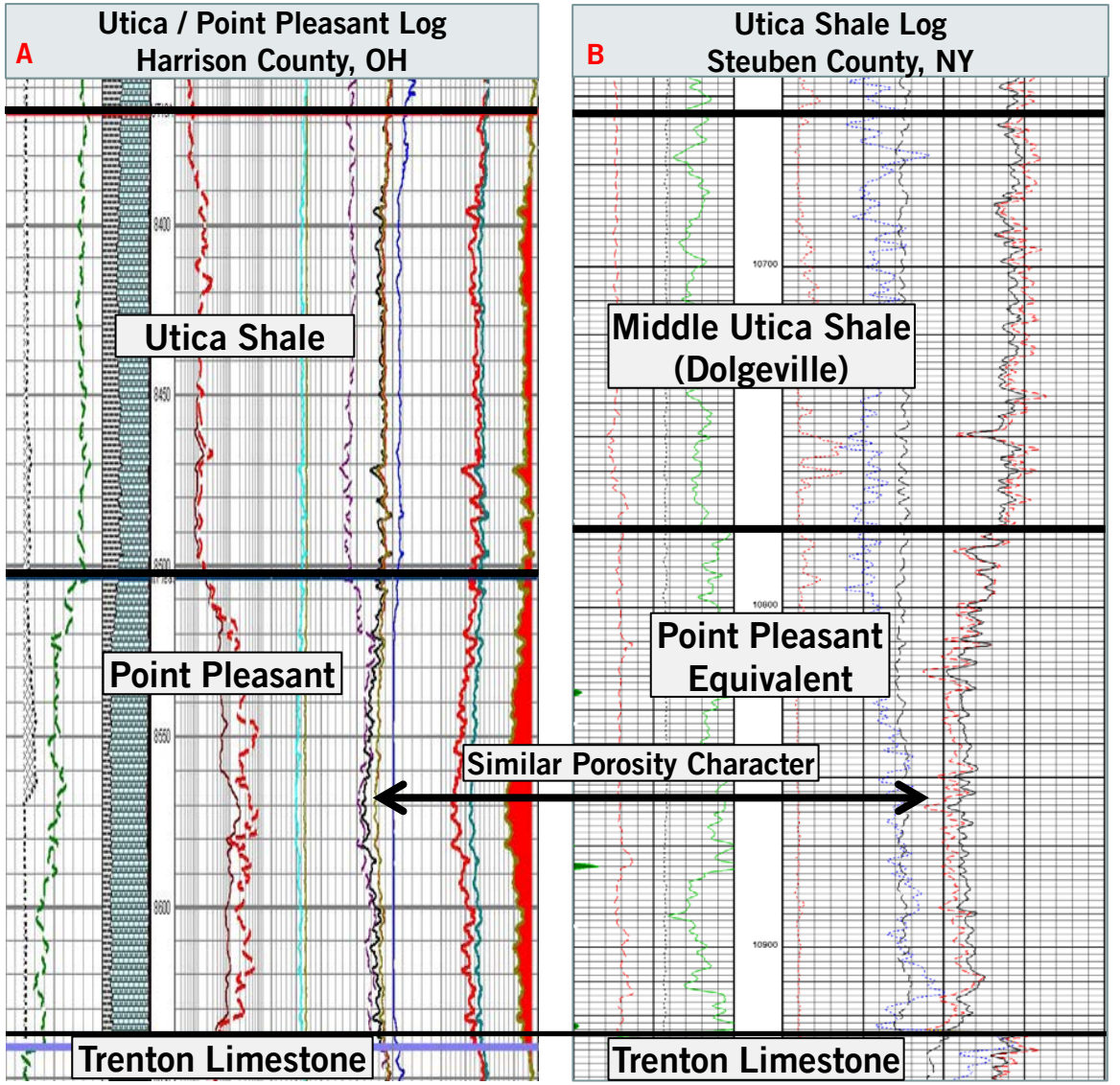
Utica / Point Pleasant Shale Potential – Appalachian Basin

Continuous Deposition Across a Large Area

Key Points

- Comparison of two Utica Shale logs, separated by 200+ miles
  - Harrison County Ohio log in the heart of the Utica / Point Pleasant wet gas window, ~ 7,600' deep
  - Steuben County, NY log 10,800' deep, most likely in the dry gas window
- Both logs look very similar with a 140-150' thick lower member with similar porosity, and a 100' – 130' lesser quality Utica Shale upper member
- Both wells also have similar porosity character with bulk density averaging between 2.5 and 2.55 g/cm^3
- Other wells drilled between these two exhibit very similar log character, which indicates a continuous deposition of the Utica across a large area

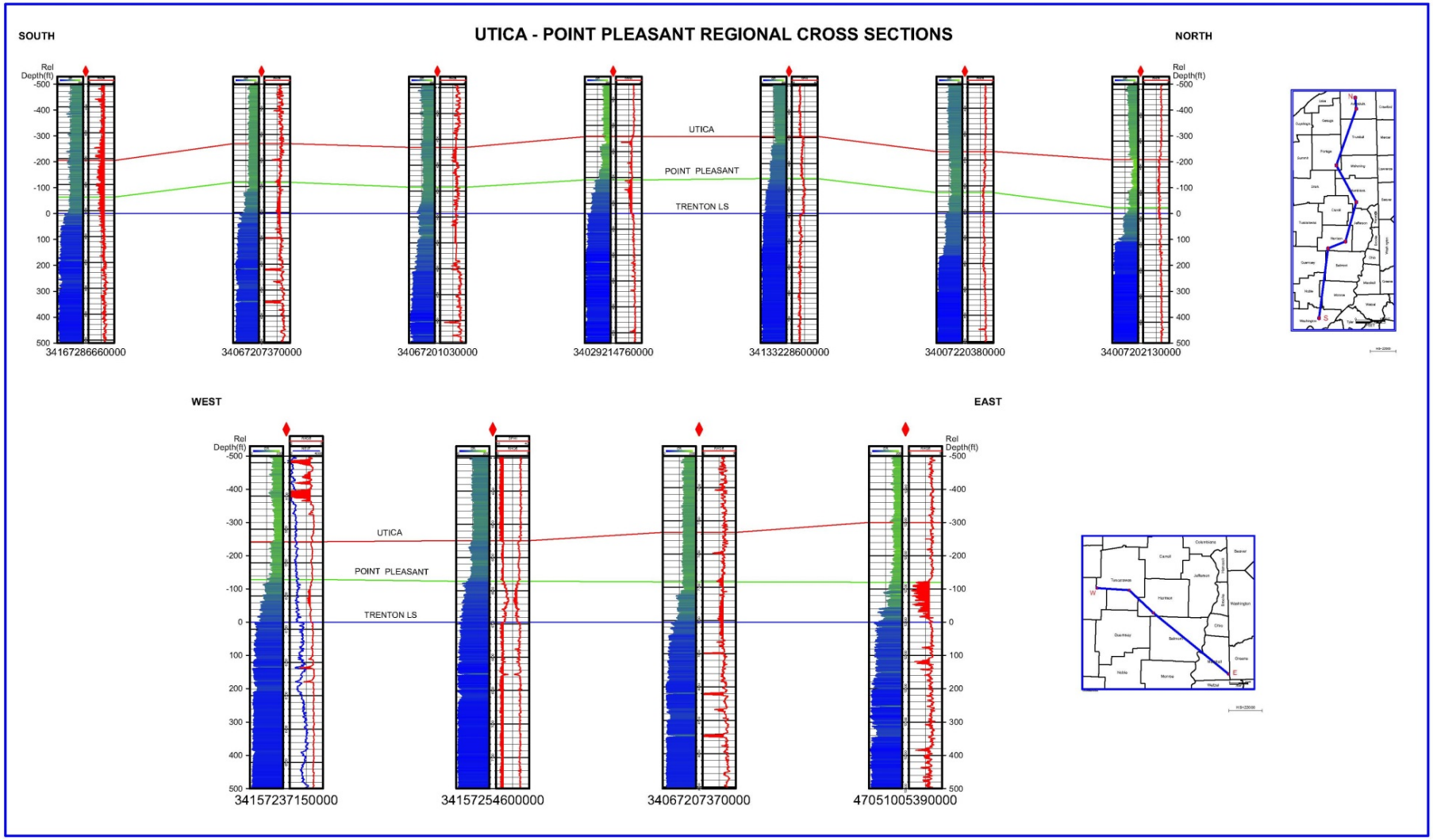




Source: Publicly Available Log Data

Stratigraphic Cross Sections

Point Pleasant Thickness Relatively Constant in High Activity Areas



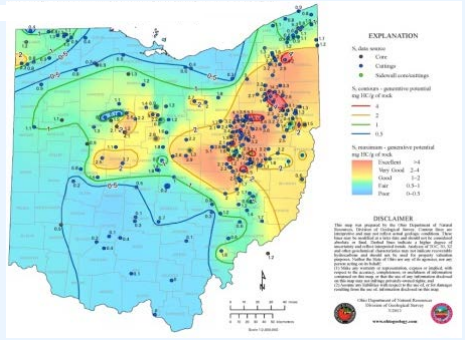
Source: Publicly Available Log Data

Utica and Point Pleasant Bulk Density Isopach Maps

Varying Rock Characteristics Within the Play

Key Points

- Bulk Density, the mass of a material divided by the total volume, is inversely proportional to the porosity; thus the more pore space in a rock the lower the density
- Pore space in these rocks is directly related to organics (kerogen)
- State TOC map shows amount of organics decreasing to south-southwest
- Bulk density is increasing to the south – southwest, which also coincides with a slight increase in clay percentage
- Lower TOCs (and porosities) combined with increasing clay content in the Utica may help contain fracture stimulations in the Point Pleasant as you move south in the play



Ohio Geologic Survey

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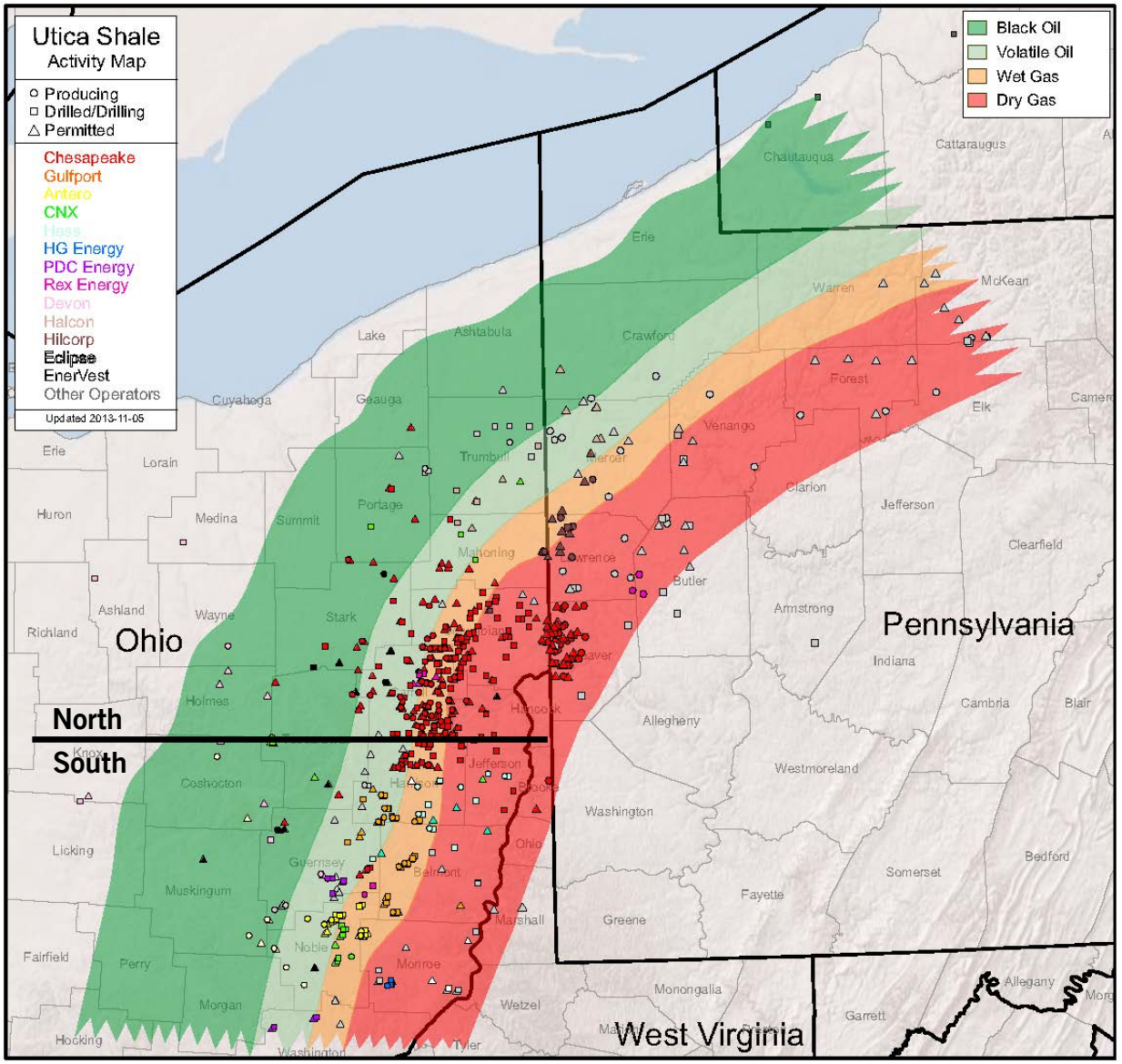
GRAPHICS AVAILABLE FOR VIEWING BY PROJECTION ONLY

Utica / Point Pleasant – Reported Drilling and Completion Results

Key Points

- Drilling has been concentrated in the wet gas "ribbon" (colored light green and tan on the accompanying map)
  - Low gas price intensified the quest for liquids-rich plays
  - Uninspiring results in the oil window have helped to narrow the focus in the play to the wet gas regions
- The Utica Shale / Point Pleasant play can easily be divided into three separate areas:
  - Southern Ohio – Characterized by eye-popping IP rates, but extended flow data has been limited by the lack of gathering and processing infrastructure
  - Northern Ohio – Dominated by Chesapeake drilling activity, which is focused in Carroll and Columbiana Counties
  - Pennsylvania – The upper Utica becomes much better developed as the play progresses eastward and northward, where the Utica becomes the primary target outside of the Point Pleasant sub-basin

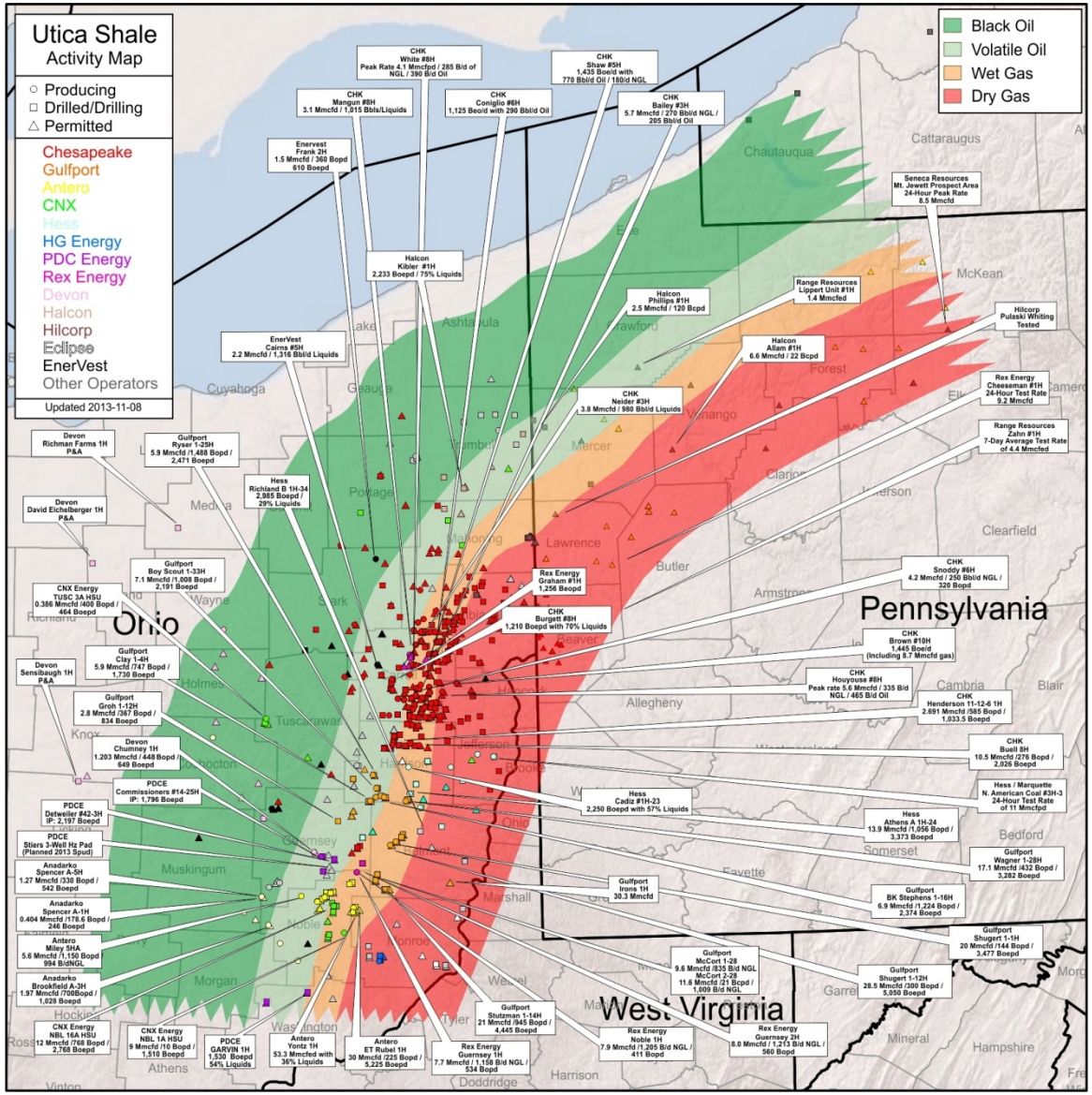


Source: Jefferies Evaluation and PA, OH and WV Regulatory Websites

Utica / Point Pleasant – Significant Drilling Activity Is Beginning to Define the Play

Key Points

- The past year has seen a significant ramp in activity in the play:
  - Rig count has increased from 29 to 39 rigs across three states
  - Total well count now stands at about 684 wells with 232 producing wells
  - Total daily production is estimated to be 200 to 300 MMcf/d and 10,000 to 15,000 barrels/day of condensate (see footnote 1)
  - Activity is beginning to expand into Pennsylvania with more than 90 wells drilled to date
- Chesapeake is the primary operator in the play with 379 wells
  - Hess and CNX, who have a Utica joint venture, have drilled a total of 48 wells
  - Gulfport and Antero round out the top operators with 49 and 34 wells, respectively
  - Shell is the leading operator in Pennsylvania, after Chesapeake, with 21 wells drilled to date



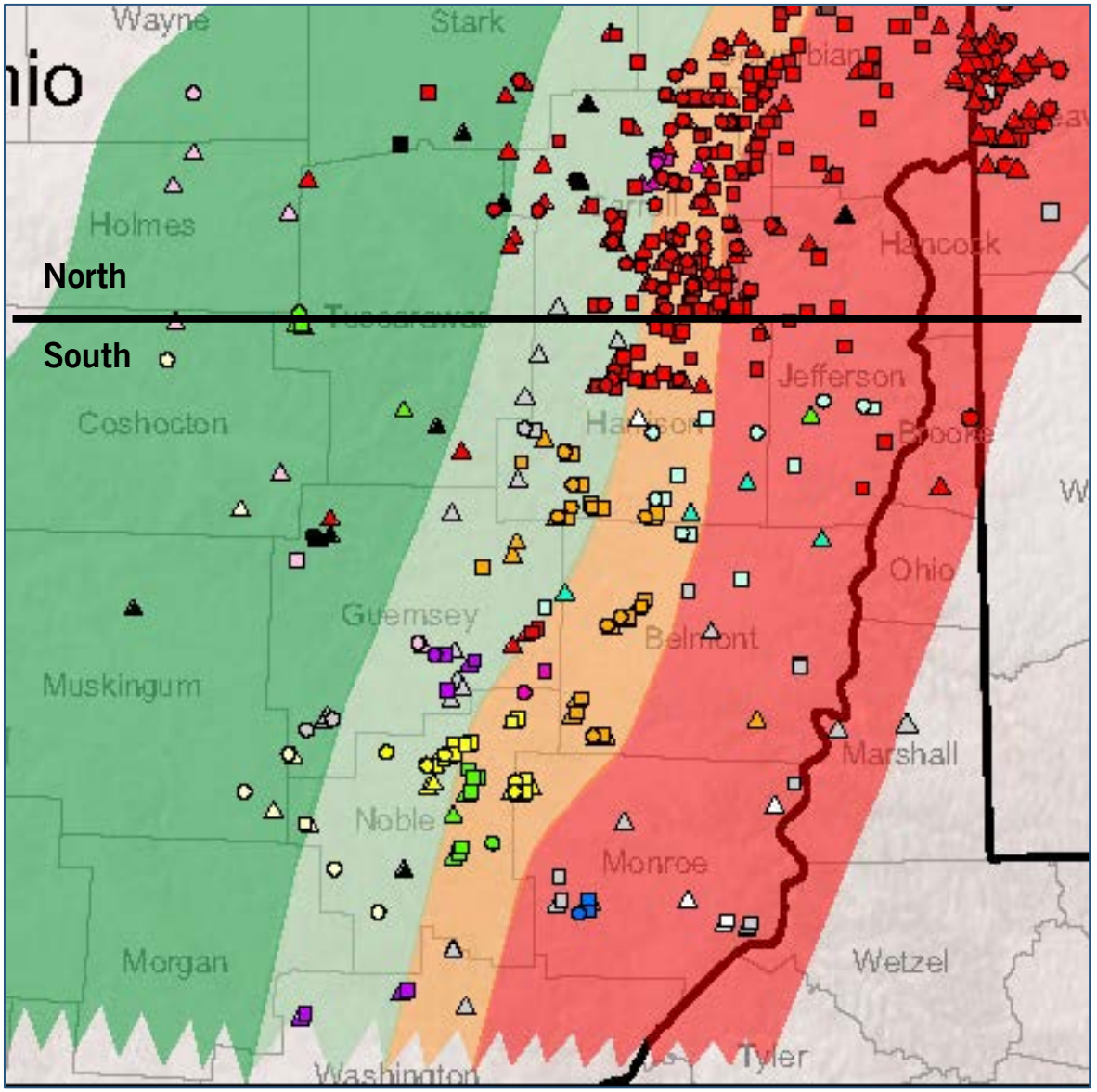
Source: Jefferies Evaluation, PA, OH and WV Regulatory Websites, Press Releases and Company IR Presentations

(1) Estimated production is based on an average rate of 1.0 to 1.5 MMcf/d per well and 50 Bbl/MMcf condensate ratio

Utica / Point Pleasant – Southern Ohio Well Results

Key Points

- Southern Ohio Utica development has been driven by a Antero, Gulfport and Chesapeake, and has focused on five counties
  - Harrison County – 94 wells drilled, 20 wells on production, has seen the most activity
  - Guernsey, Belmont, Noble and Monroe Counties have had a total of 135 wells drilled and 28 wells put on production
- Drilling activity has been focused on the liquids-rich condensate window
  - Some drilling for dry gas continues as operators drill to hold acreage
  - Drilling results in the oil window have been somewhat better than in the north, but have still been sub-economic
- Reported IP rates have been much higher in the south compared to the north, indicating more effective well completions in the south
  - A likely explanation is variation in local geology which helps better contain the frac within the more porous and permeable Point Pleasant
  - The Trenton Limestone provides a good downward barrier to fracture growth
  - Increasing clay content in the southern portion of the Utica makes it more difficult to fracture treat, and may also provide an upper barrier that better contains frac energy in the Point Pleasant

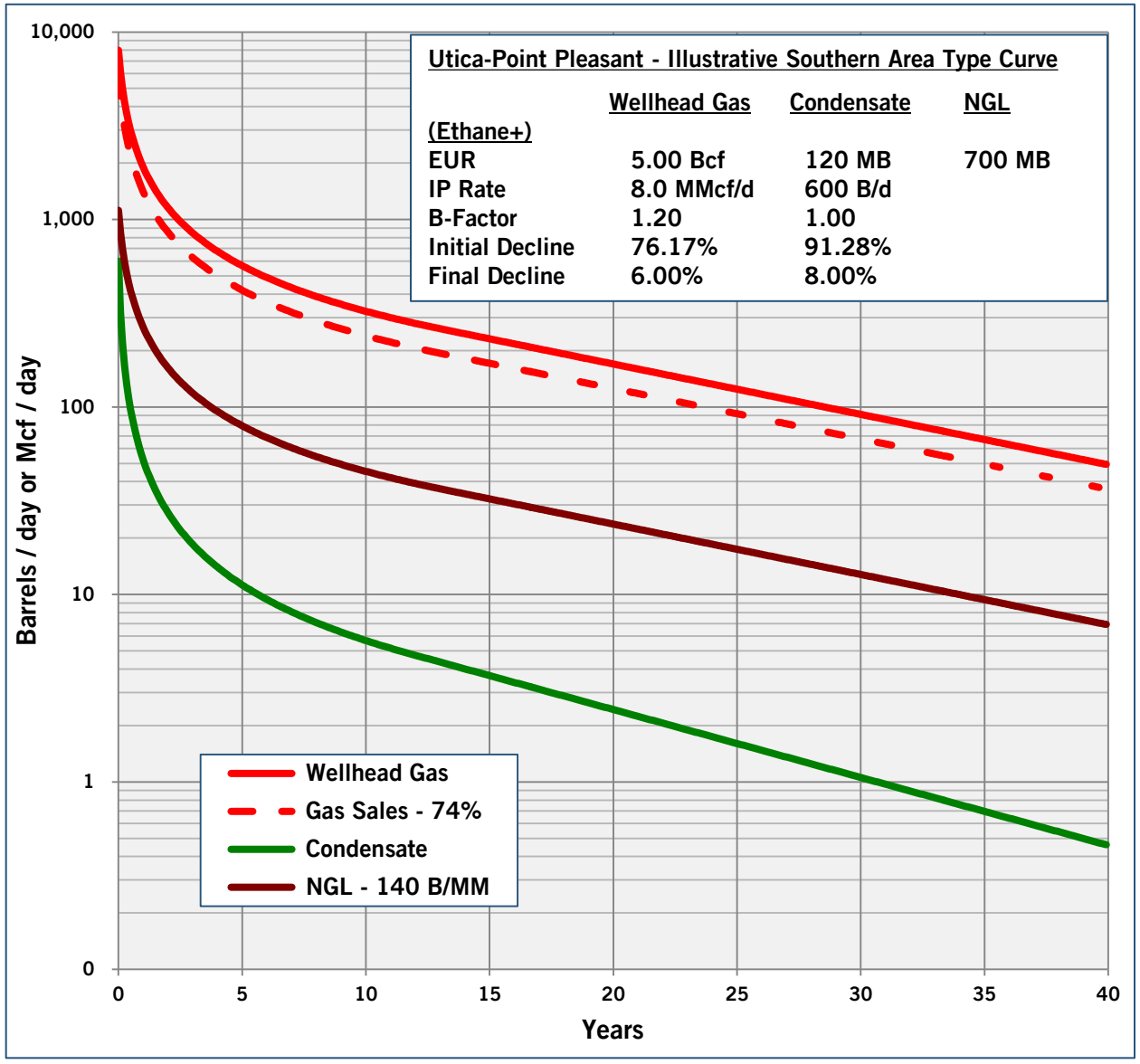


Source: Jefferies Evaluation and PA, OH and WV Regulatory Websites

Illustrative Southern Area Type Curve - Ohio Utica / Point Pleasant

Key Points

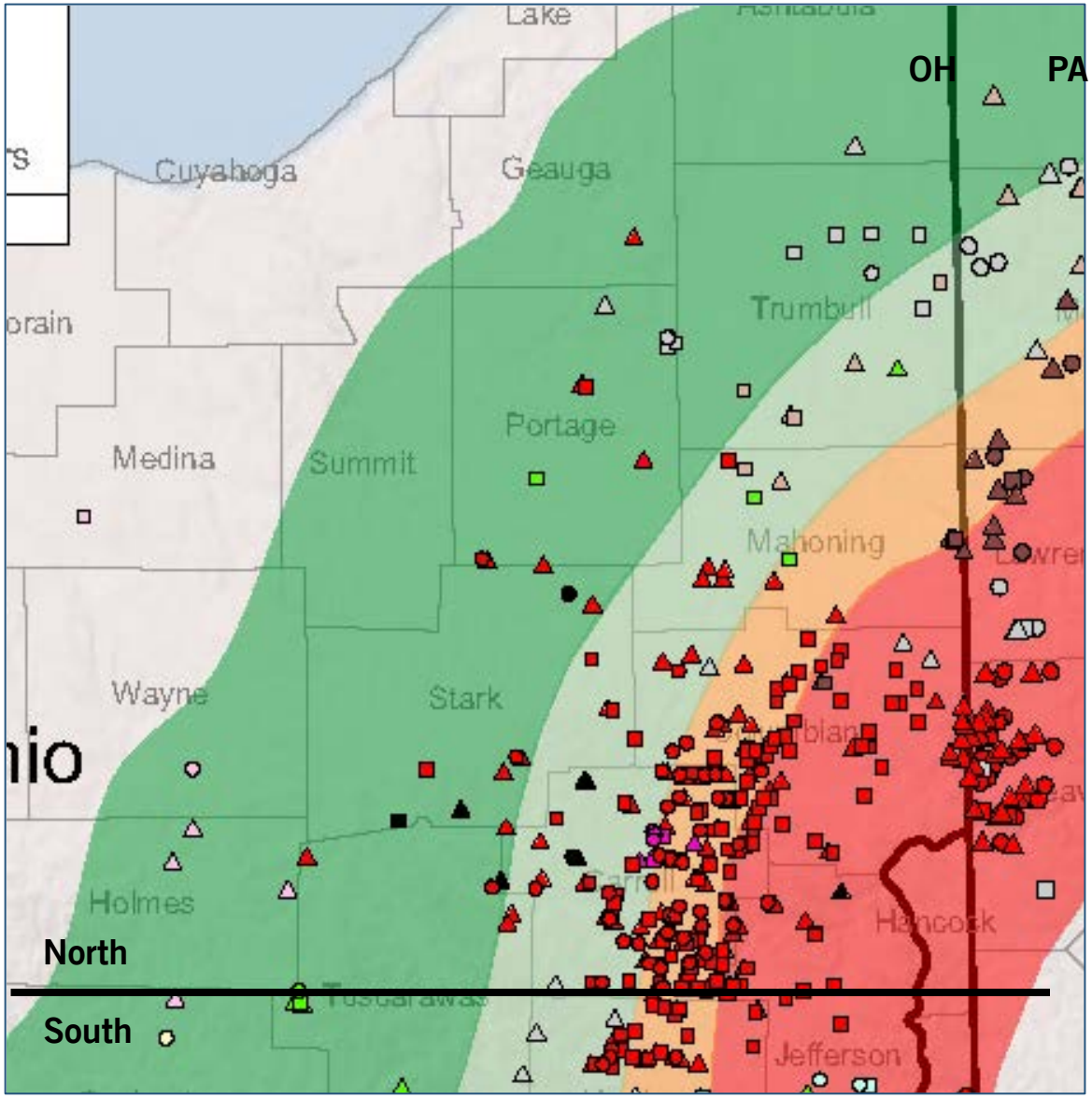
- As in the north, the slow progress of processing infrastructure has delayed production starts in many wells, and has caused delays in drilling plans for nearly all operators
  - Type curves are based on volumetric estimates of gas-in-place
  - IP rates are generally based on reported IP rates, adjusted for early time transient flow
- The attached type curve is based on a modeled average well in the wet gas window of the southern Utica
  - The type curve assumes a 5,000' effective lateral
  - 138-acre statutory well drilling unit
  - 36% recovery of gas-in-place
  - The recovery efficiency of gas-in-place is based on a reservoir analysis of the northern Utica, adjusted for superior IP rates



Utica /Point Pleasant – Northern Ohio Well Results

Key Points

- Northern Ohio Utica development has been driven by Chesapeake activity in Carroll and Columbiana Counties
  - 347 wells drilled in the northern area, 313 by Chesapeake
  - Only 115 wells on production
- Drilling activity has focused on the liquids-rich wet gas window due to favorable economics
  - Some drilling to hold acreage continues in the dry gas window
  - Drilling results in the oil window have been spotty and generally unsatisfactory
- Reported IP rates are not as good as in the south, indicating differences in completion efficiency
  - The Trenton Limestone still provides a good barrier to downward fracture growth
  - The difference in completion efficiency raises the question of whether the frac is being contained within the Point Pleasant
  - Better Utica rock quality in the north may provide some additional gas-in-place, but the Utica is probably not a barrier to vertical frac growth
  - Operators are experimenting with fluids, proppants, pump rates, spacing and intensity of frac stages and perf clusters and well completion techniques in an effort to maximize frac performance

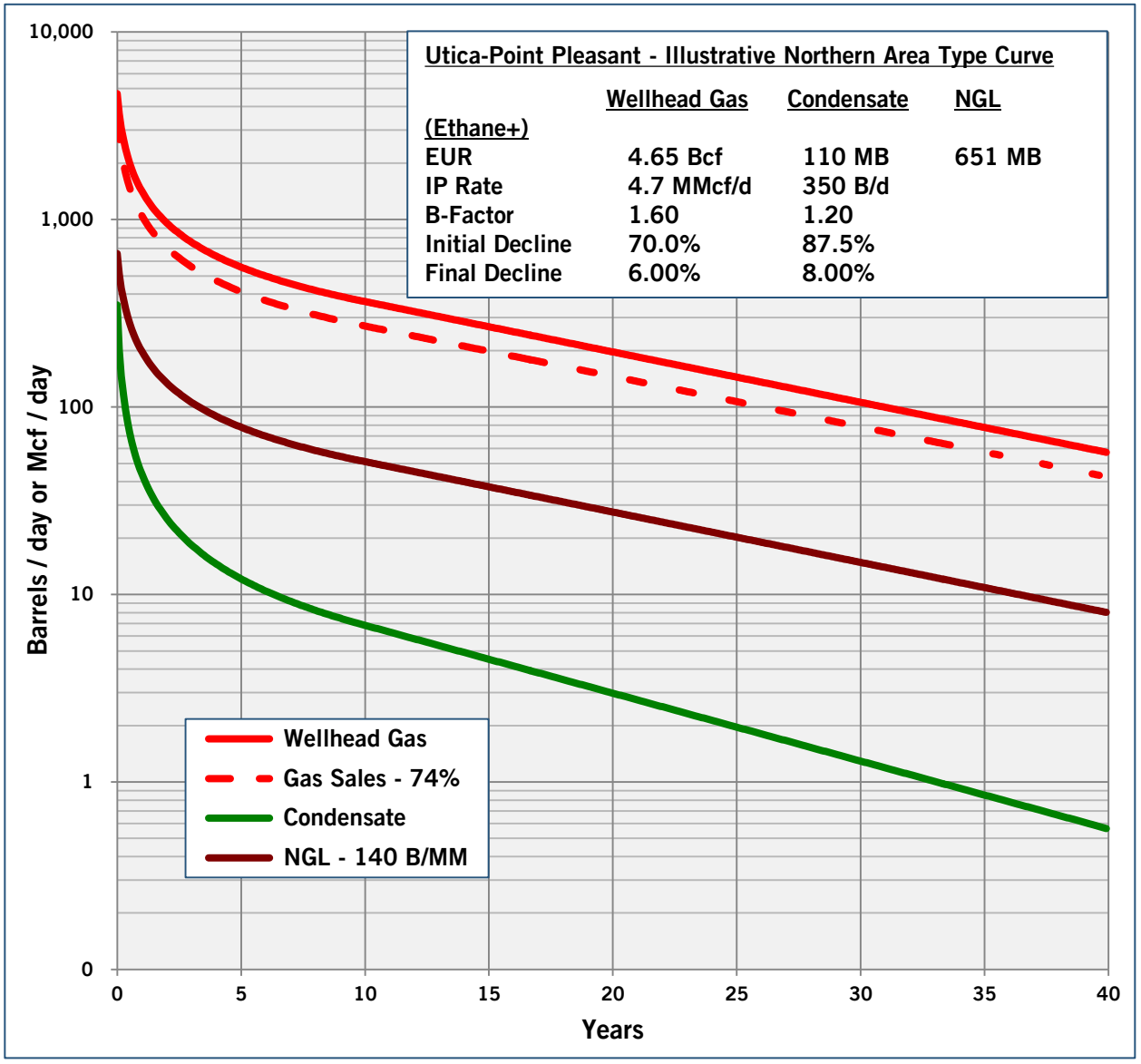


Source: Jefferies Evaluation and PA, OH and WV Regulatory Websites

Illustrative Northern Area Type Curve - Ohio Utica / Point Pleasant

Key Points

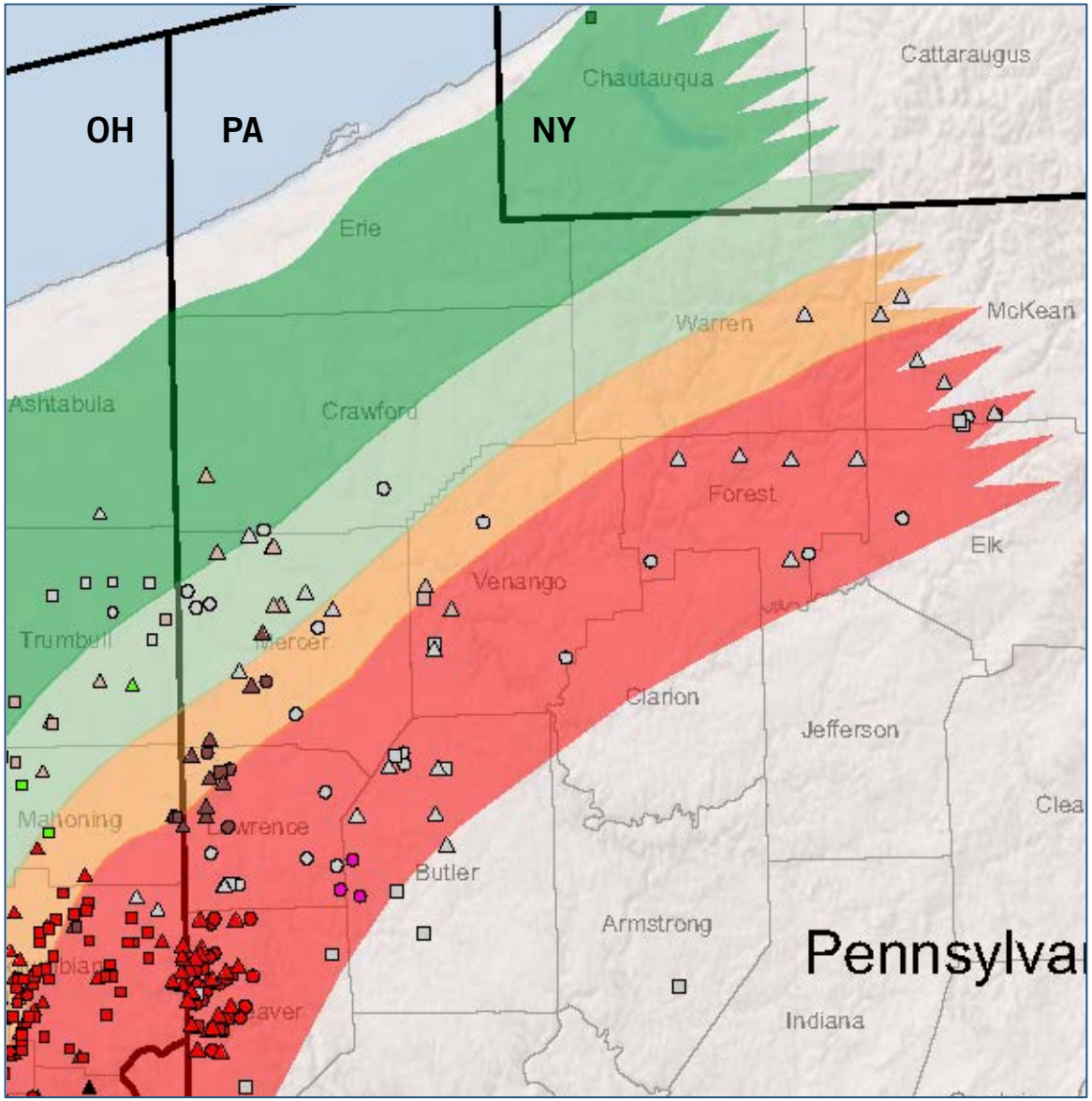
- Slow progress of processing infrastructure has delayed production starts for many wells, and caused rate curtailment of existing producers
  - Standard decline curve analysis has been of limited use in the assessment of well quality and the generation of type curves
  - EUR estimates have been typically adjusted upward with each successive decline curve extrapolation due to increasing choke size and falling flowing pressures
  - More sophisticated analysis which accounted for flowing tubing pressure was needed to assess EUR
- The attached type curve is based on a modeled average well in the wet gas window of the northern Utica
  - The type curve assumes a 5,000' effective lateral
  - 138-acre statutory well drilling unit
  - 32% recovery of gas-in-place



Utica / Point Pleasant – Pennsylvania Well Results

Key Points

- Pennsylvania Utica development has been driven by Chesapeake, Shell, Hilcorp and Seneca
  - Chesapeake has drilled 28 drilled wells centered in Beaver County
  - Shell has drilled 14 wells and Seneca seven wells all along the Utica Trend from Lawrence through McKean Counties
  - Hilcorp has drilled eight wells in Mercer and Lawrence Counties
- Announced well results have been spotty
  - Initial indications suggest that the Pennsylvania Utica production quality will be similar to the northern Utica / Point Pleasant play
  - Drilling in the oil window has been minimal with no reported well tests
  - The Trenton Limestone is still present as a barrier to downward frac propagation

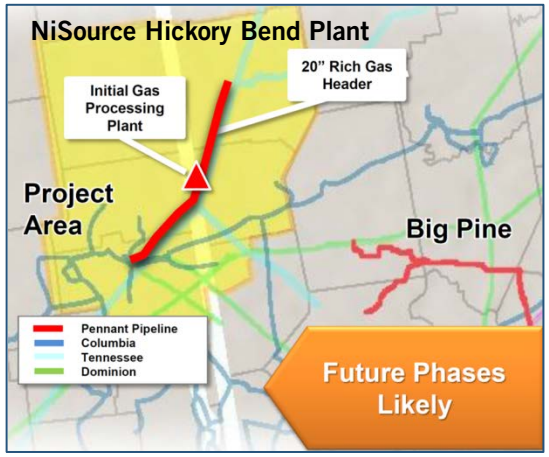


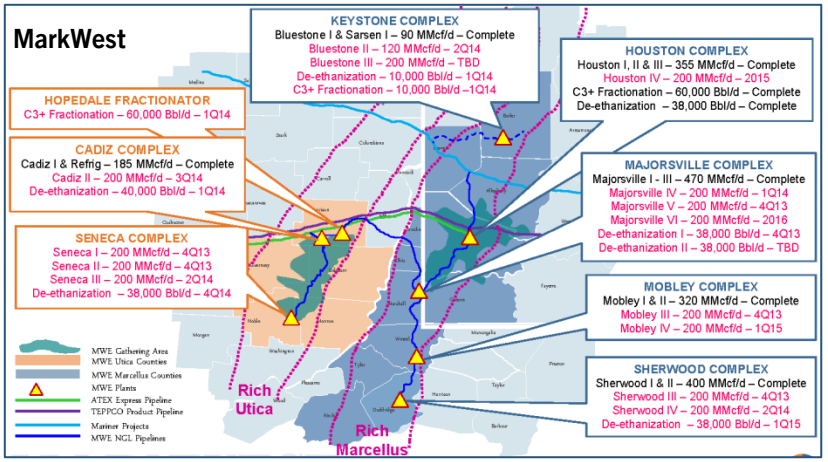
Source: Jefferies Evaluation and PA, OH and WV Regulatory Websites

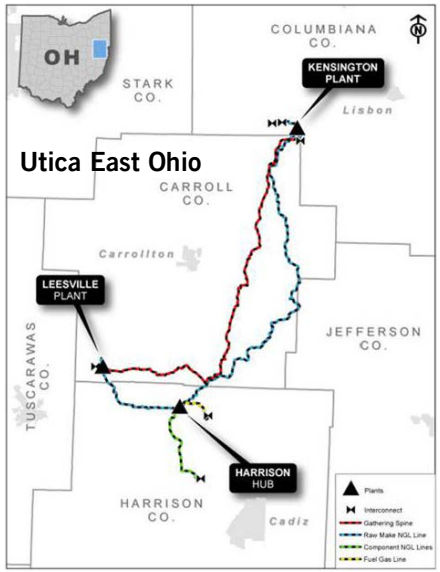
Gathering, Processing, and Fractionation Expanding Rapidly

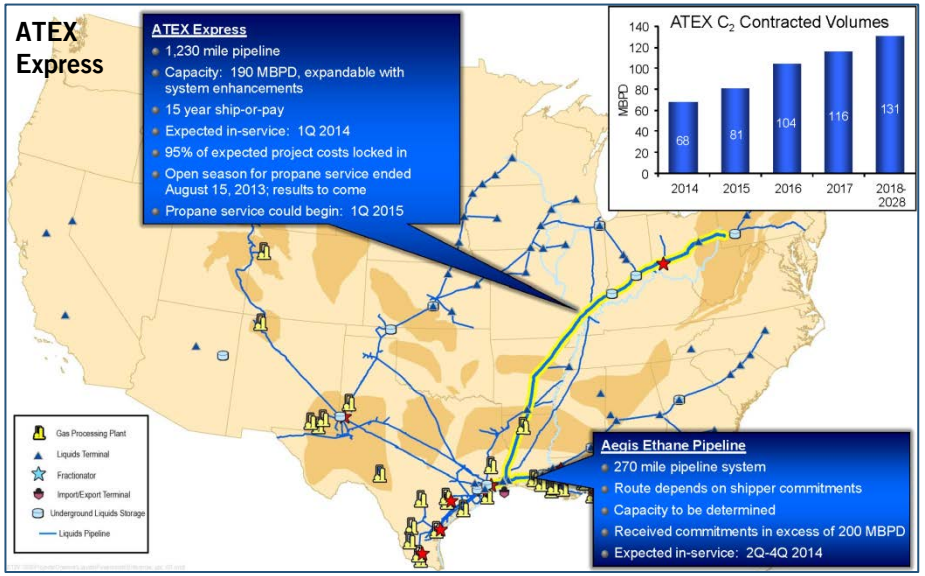
Key Points

- Processing bottlenecks are already being eased
- Utica dedicated gas processing capacity being increased by 2.0 Bcf/d
  - 1.6 Bcf of processing capacity on line by the end of 2013
  - An additional 0.4 Bcf/d in 2014
- Northern Utica processing capacity
  - Utica East Ohio Kensington Plant, Columbiana County – 600 MMcf/d
  - Utica East Ohio Leesville Plant, Carroll County – 200 MMcf/d
  - NiSource Hickory Bend Plant in Lawrence County PA on the state line with Trumbull County OH – 200 MMcf/d
- MarkWest is taking the lead in building processing capacity in the Southern Utica
  - MarkWest Cadiz Plant , Harrison County – 385 MMcf/d
  - MarkWest Seneca Plant, Noble County – 600 MMcf/d
- ATEX Express pipeline to transport ethane to processing facilities along the Gulf Coast will be on line by early 2014









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