# APPENDIX I – ORISKANY SANDSTONE PETROGRAPHY, WOOD COUNTY, WEST VIRGINIA

# ORISKANY SANDSTONE PETROGRAPHY, WOOD COUNTY, WEST VIRGINIA

The Darrell Matheny #2 (API No. 4710701266) is located about 25 mi north of the Southern Prospect in Wood County, West Virginia (Figure 1). In the Southern Prospect, the Elk-Poca (Sissonville) Field (highlighted yellow in Figure 1) produced natural gas for decades before a portion of the area (Ripley Field – highlighted orange in Figure 1) was converted to natural gas storage.

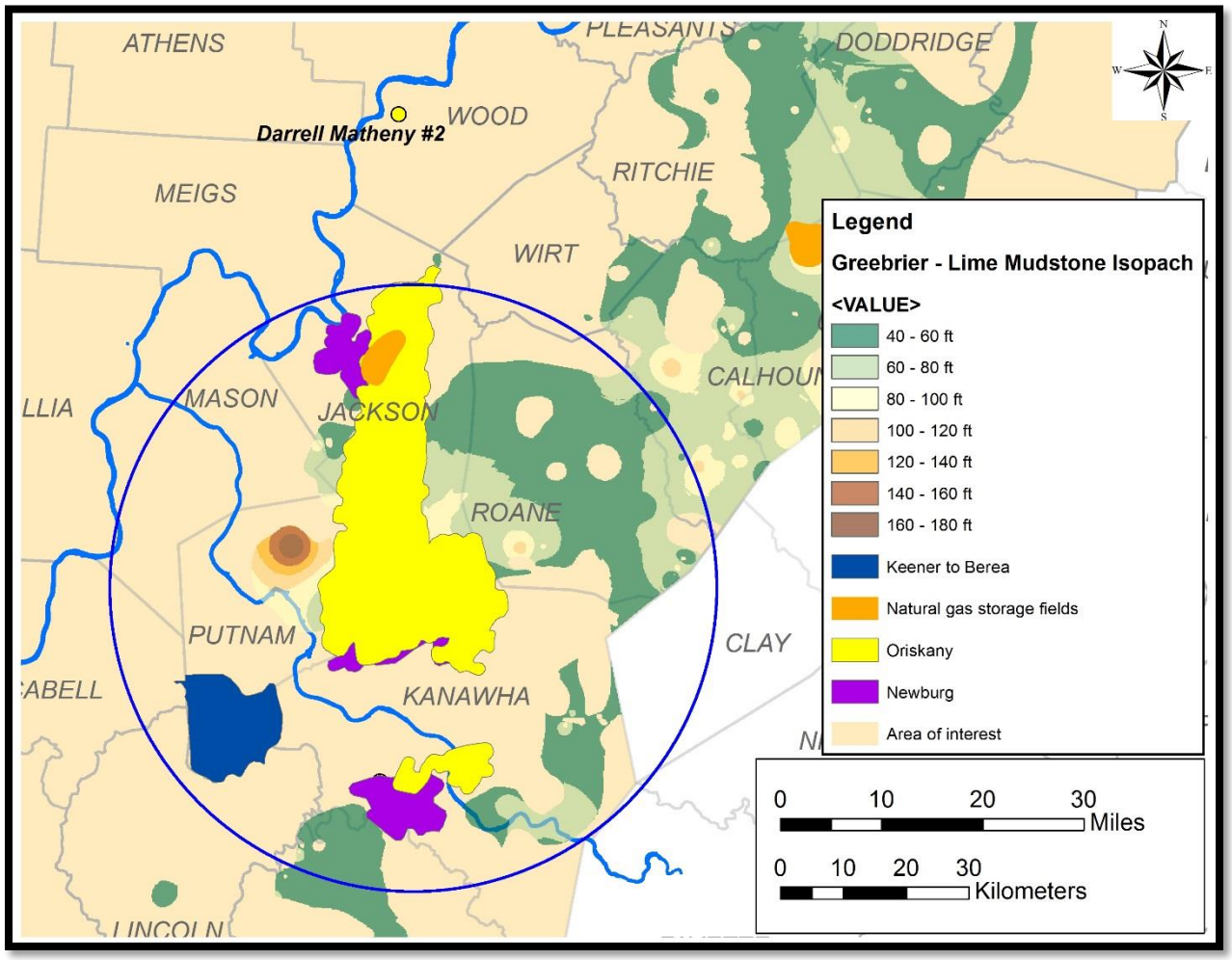



**Figure 1. Location of the Darrell Matheny #2 relative to the Southern Prospect.**

Thin sections were analyzed using a Leica DM 4500 P microscope, fitted with a Leica DFC400 camera, using a magnification of 10x power under both plane and polarized light (PL and XN, respectively). Photomicrographs were taken using the Leica DCF400 camera affixed to the microscope. The analysis included the following steps: (1) identify and estimate the percentage of mineral groups present; (2) examine textures and grain properties; (3) analyze the cementing materials that hold the rock matrix together; and (4) prepare a visual estimate of porosity

(porosity is indicated with blue epoxy in these sections). Observations were made using Ulmer-Scholle and others (2014) as a guide, and visual estimates of mineral composition and porosity were based on the comparison chart for visual percentage estimation by Terry and Chilingar (1955).

Thin section WD-1 was sampled from the Onondaga Limestone, the caprock above the Oriskany Sandstone (Figure 2). Notable are the lack of porosity and abundance of calcite cement. Homogeneous calcite grains are approximately 50 microns in size. Larger grains exhibit minor deformity.




**Figure 2. Thin section WD-1, 4197.1 ft (PL).**

Thin section WD-5 is typical of the Oriskany Sandstone (Figures 3 and 4). Grains are subangular to subrounded, moderately sorted and are comprised of monocrystalline quartz. Both quartz and calcite cement are present. Porosity in this thin section is intergranular and estimated at about 11 percent.

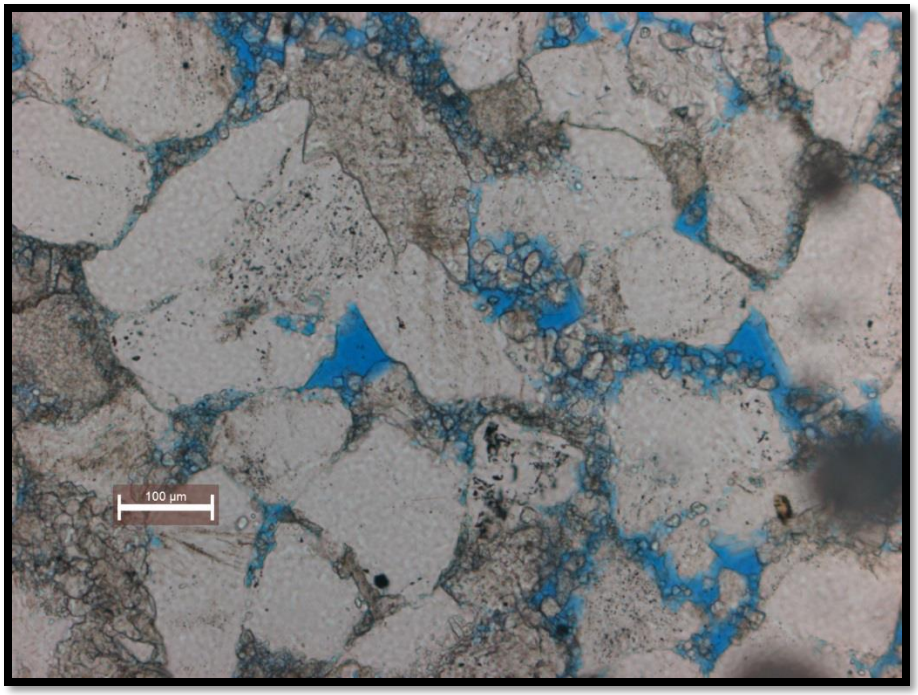



**Figure 3. Thin section WD-5, 4212.1 ft (PL).**

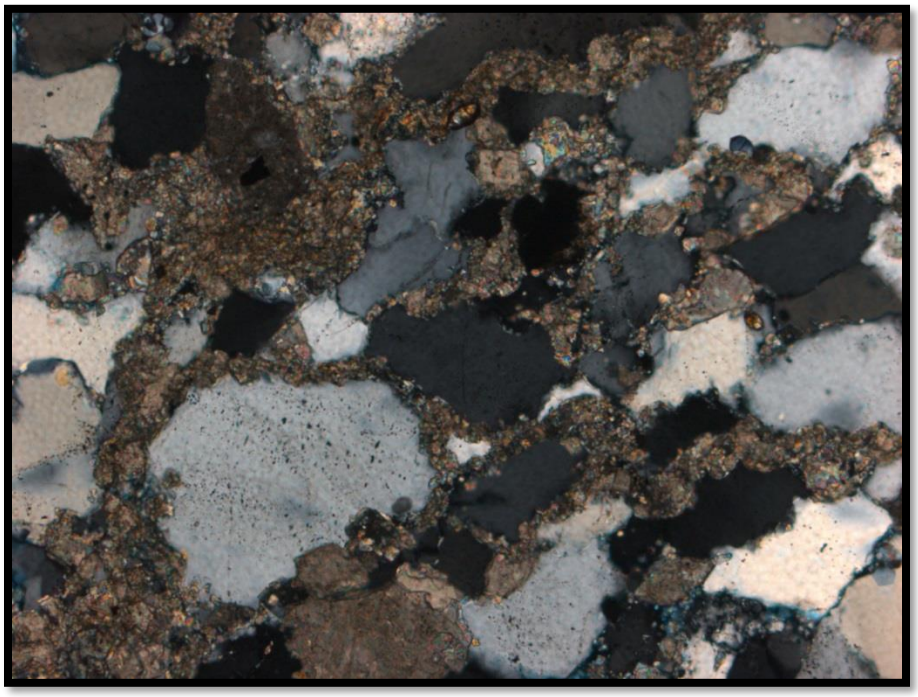


**Figure 4. Thin section WD-5 (XN). Note the calcite cement between quartz grains.**

Thin section WD-7 (Figure 5) exhibits lower intergranular porosity (approximately 8 percent) than the previously presented sample (WD-5), due to more complete cementation of quartz grains. Both quartz and carbonate cement are present. Grain size remains fairly uniform at 300-400 microns.

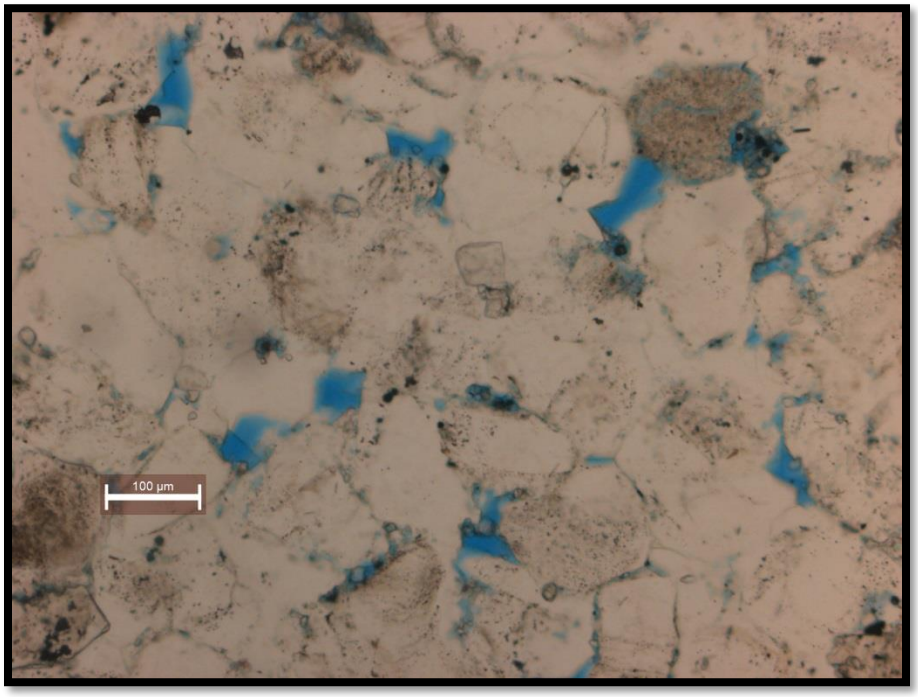



**Figure 5. Thin Section WD-7, 4215.8 ft (PL).**

Thin section WD-10 shows quartz overgrowths (Figures 6 and 7). Grains are subangular to subrounded, moderately sorted and comprised of monocrystalline quartz. Quartz grains average 500 microns in size. Intergranular porosity in this thin section is partially occluded by quartz cementation, but still estimated to be about 10 percent.

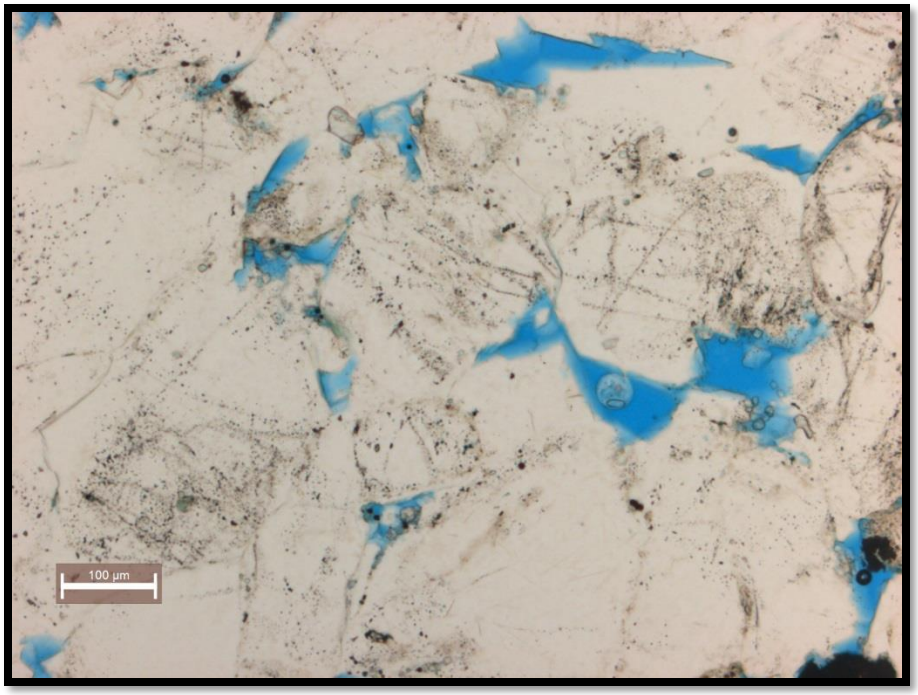



**Figure 6. WD-10, 4222.5 ft (PL).**

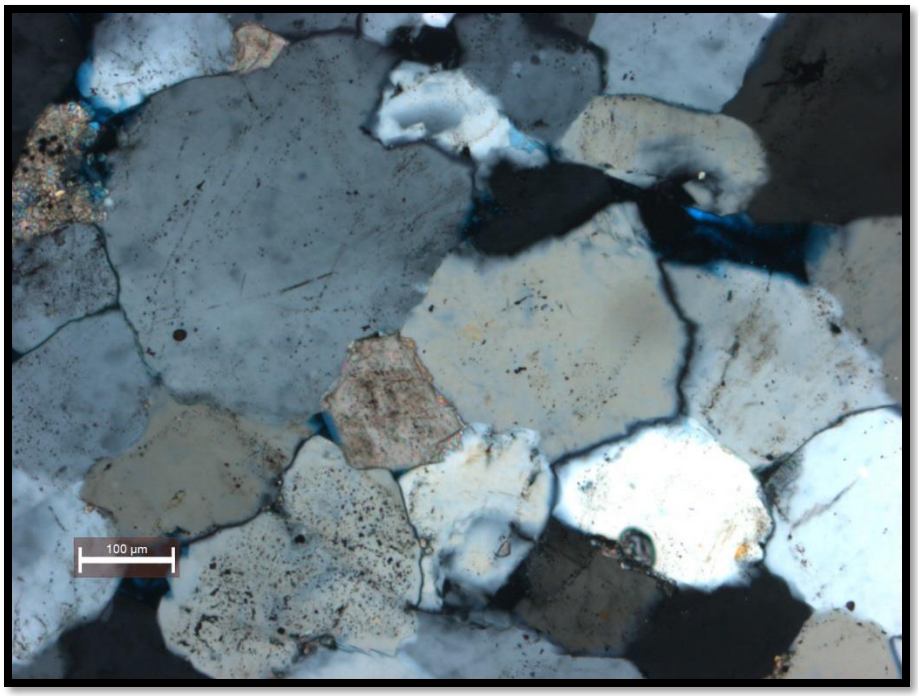



**Figure 7. WD-10, 4222.5 ft (XN).**

Overall, the Oriskany Sandstone thin sections from the Darrell Matheny #2 (API No. 4710701266) were observed to contain clean quartz sand (70 percent or more) with uniform grain size and shape and minimal inclusions. Calcite was observed as the primary cementing material.