Scott McCallum, MS

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GEOSCIENCE ADVISOR | PETROPHYSICAL LEAD

- ❑ **Data Analysis Expertise**: Leverages a 15+ track record of aligning exploratory data science with geoscience needs for well log normalization and petrophysical property prediction using water chemistry / core data, statistical analysis, and dashboard building for EQT Corporation – a publicly traded oil & gas company.

- ❑ **Geoscience Strengths:** Combines MS and BS degrees in Geoscience and a pending MS in Computational Mathematics with experience optimizing a 100+ well drilling program (130+ horizontals / 50+ verticals) while identifying 120+ new drilling locations via petrophysical modeling as Senior Geologist & Petrophysical Lead.

- ❑ **Regional Experience:** Led sequence stratigraphic frameworks, log normalization, petrophysical modeling, and petrophysical assessments for assets across the Appalachian Basin (Utica & Marcellus formations), Alliance Basin, DJ Basin, Michigan Basin (Collingwood formation), Permian Basin, and Mississippian Lime.

TECHNICAL COMPETENCIES

- ❑ **Version Control Tools**: Git and GitHub
- ❑ **Software**: Petrel, Studio, Kingdom, Geographix, PowerLog
- ❑ **Model Development:** petrophysical, geocellular, and geologic core calibrated modeling
- ❑ **Programming**: Python, Excel VBA, R, Knime, Octave, SQL, C
- ❑ **Analytical Methods**: statistics, multivariate analyses, clustering, genetic algorithms, neural networks, random forest, and Monte Carlo methods

PROFESSIONAL WORK HISTORY

MCCALLUM PETROPHYSICS AND DATA ANALYTICS (MPDA)   9/2019 to Present

Founder | Geoscience Advisor & Petrophysical Lead

Launched an independent company after the Rice Energy contingent acquired EQT and replaced management. Consult for EQT, SpiralGen, and the Municipal Authority of Westmoreland County to deliver quantitative solutions with full transparency of workflows and code development using geoscience, petrophysics, and data analytics skills.

SpiralGen

- Consult under a long-term contract for SpiralGen documenting GAP code due to Python expertise.
- Build Python scripts replicating signal processing, machine learning, and physics applications to optimize algorithms for high performance computing (i.e., Poisson Algorithm, Hockney Algorithm, Synthetic Aperture Radar, Space Time Adaptive Processing, and Convolutional Neural Network).
- Update grid cells based on Pseudo Spectral Analytical Time Domain using Maxwell's equations.
- Apply only polynomial operations to implement Brakerski, Gentry, Vaikuntanathan (BGV) methods.

Municipal Authority of Westmoreland County

- Estimate sample size by analyzing 67 years of water chemistry data using parametric / non-parametric methods.

EQT Corporation

- Execute 4 EQT contracts to update petrophysical, Petrel, and mineral (core data) models for reservoir modeling, freshwater casing depth identification, and 2 major acquisitions (CVX and Alta).

EQT CORPORATION   7/2006 to 9/2019

Geoscience Advisor & Petrophysical Lead (9/2016 to 9/2019)

Promoted 4+ times over a 13-year tenure with EQT, culminating in a 2016 promotion to Geoscience Advisor – the highest technical title awarded within the Geology department. Built a Marcellus and Utica Petrel database from the ground up and wrote complex Python scripts for a large data centralization project comprising 27K files and 250M rows of data for a Completions Engineering group. Released after the Rice Energy contingent acquired EQT.

- Selected as the Geoscience representative to understand geologic and engineering controls on production data.
- Saved $100K by generating an in-house workflow to merge seismic surfaces from multiple surveys.
- Helped Operations teams track drilling and geosteering metrics by using Python to build a set of dashboards.
- Guided type curves by developing a fuzzy k-means and k-nearest neighbor method for defining geologic areas.
- Built structural / geocellular models with petrophysical and geomechanical properties.
- Migrated a key Petrel project to Studio, which protected and centralized the Petrel data.
- Modified GIP models via "Ambrose" correction after using total uptake and pressurized core data for gas testing.
- Tested new logging methods, including Petromar, Fracture ID, and Cordax.
- Characterized well depletion by writing a Python script to estimate horizontal well spacing via well survey data.
- Built a predictive model to classify the formation source of XRF data from cuttings using k-nearest neighbor, fuzzy k-means, and random forest classification algorithms.
- Created a lithologic model using a k-means analysis approach and user-defined centroids.
- Delineated fresh and saltwater using geophysical data and an Archie-based petrophysical model.
- Determined electro facies using two methods: ANOVA and a logistic neural network.
- Evaluated Utica gas storage mechanisms via adsorption isotherms using core data from low / high pressure regimes, with core NMR, gas density, and pressurized sidewall core.
- Streamlined a mineral model by learning neural networks mathematics and coding NN from the ground up using Octave, including forward and backward propagation to update weights.
- Extended a 2015 script used to estimate chemical composition to apply to any elemental data input.
- Used Python to generate batch log filtering / projection, standardize formation names, build an automated top-picker using cross-correlation, compile geologic and engineering data, perform statistical analyses, and deploy quality control projection methods for vertical / horizontal GR data via Monte Carlo simulations.
- Reduced batch log projection time from ~200 hours to 5 hours by writing a Python script for vertical data to horizontal wells (1,300+ wells per batch).

Senior Geologist, Petrophysicist & Petrophysical Lead (9/2013 to 9/2016)

Promoted from the Exploration group to the Reservoir Technology group and assigned the role of Petrophysicist due to expertise in writing custom code using VBA in Excel (macros), Octave, R, and Python. Supported technical and petrophysical aspects for Operations and Exploration groups while providing geologic model output for reservoir modeling as the point of contact for Reservoir Engineering groups.

- Compiled data for 126 cores for statistical analysis, petrophysical modeling, and model quality control (QC).
- Supported Operations groups across multiple basins by developing methods / models from geologic modeling software using Permian Basin data, testing software remotely for geosteering purposes.
- Saved $230K by normalizing 589 logs in-house rather than using a third-party contractor.
- Applied a Monte Carlo method for modeling thin bedded sands closely matching core data in the Weir sandstone.
- Estimated accurate bubble point and dew point for Utica hydrocarbons via PVT oil sample data analysis.
- Identified the source of flowback water in horizontal Marcellus wells by modeling water saturation using cation exchange data available in core measurements.
- Selected as Innovation Coach for helping EQT staff advance their ideas, holding office hours once per week.

- Improved operations by building a macro for projecting MS data onto a second plane (microseismic projection).
- Upgraded a VBA macro to run 85% faster for vertical to horizontal log projections over hundreds of wells.
- Used R to perform multiple regression analysis on geologic variables impacting production.
- Generated Permian Basin stochastic and Monte Carlo mineral models for the Operations group.
- Built Marcellus petrophysical models calibrated to core data (i.e., mineral models, TOC, porosity, and GIP).
- Updated a Utica petrophysical model with newly acquired data for 60+ Utica cores.
- Reduced the number of geographically specific models from 9 area specific models to 1 general model by accurately evaluating the accuracy of the Marcellus petrophysical models utilizing all available core data.
- Standardized a method to determine chemical composition using elemental and mineralogical data.
- Normalized 140+ logs for neutron porosity and bulk density logs in both the Utica and Marcellus intervals.
- Refined Marcellus and Utica petrophysical models based on additional core data and methods.

Senior Exploration Geologist (9/2010 to 9/2013)

Promoted to lead petrophysical assessments for business development in the Appalachian, Alliance, DJ, Michigan, Mississippian Lime, and Permian basins. Facilitated the acquisition and development of Utica assets / acreage.

- Wrote and presented on numerous data sets used for understanding devonian gas migration.
- Developed the Utica asset via a petrophysical model and a playbook used for acreage evaluation.
- Built a tight-sand ranked playlist from Cambrian through the Silurian (Appalachian Basin).
- Performed multiple regressions of Lower Huron and Lower Huron Siltstone wells using geology / engineering parameters as independent variables and EUR as the dependent variable, and presented findings to EQT President.
- Presented evaluation based on diagenetic modeling of the Silurian Medina formation to the Pennsylvania Council of Professional Geologists.
- Built a 2D seismic stratigraphic framework for assets in the Marcellus formation.

Geologist II & III (9/2006 to 9/2010)

Initially hired in a Geologist II operations role and promoted to focus on Exploration Geology technical projects. Awarded Team Lead in 2007 and Project Lead in 2009 for a large-scale and multi-disciplinary project investigating gas recovery from horizontal drilling in a variety of Devonian formations.

- Built 2nd and 3rd order sequence stratigraphic frameworks in the Appalachian Basin (Utica and Marcellus).
- Led operations geology in southern West Virginia, including 51 vertical, 8 CBM, and 9 horizontal wells.
- Oversaw a 128 horizontal well drilling program in the Lower Huron (shale).
- Identified 120 drilling locations by mapping targets for horizontal drilling in the Ravencliff, Big Lime, Big Injun, Weir, and Lower Huron Siltstone formations.
- Generated millions in revenue by proposing horizontal tests in the Lower Huron Siltstone.

EDUCATION

Master of Science (MS) in Computational Math (*pending completion*), Duquesne University
Master of Science (MS) in Geoscience, Southern Illinois University
Bachelor of Science (BS) in Geoscience, Indiana University of Pennsylvania