D2F Report

Company	**Northeast Natural Energy LLC**
Well	**Boggess 1H & 3H**
Formation	**Marcellus**
Location	**Monongalia, WV**

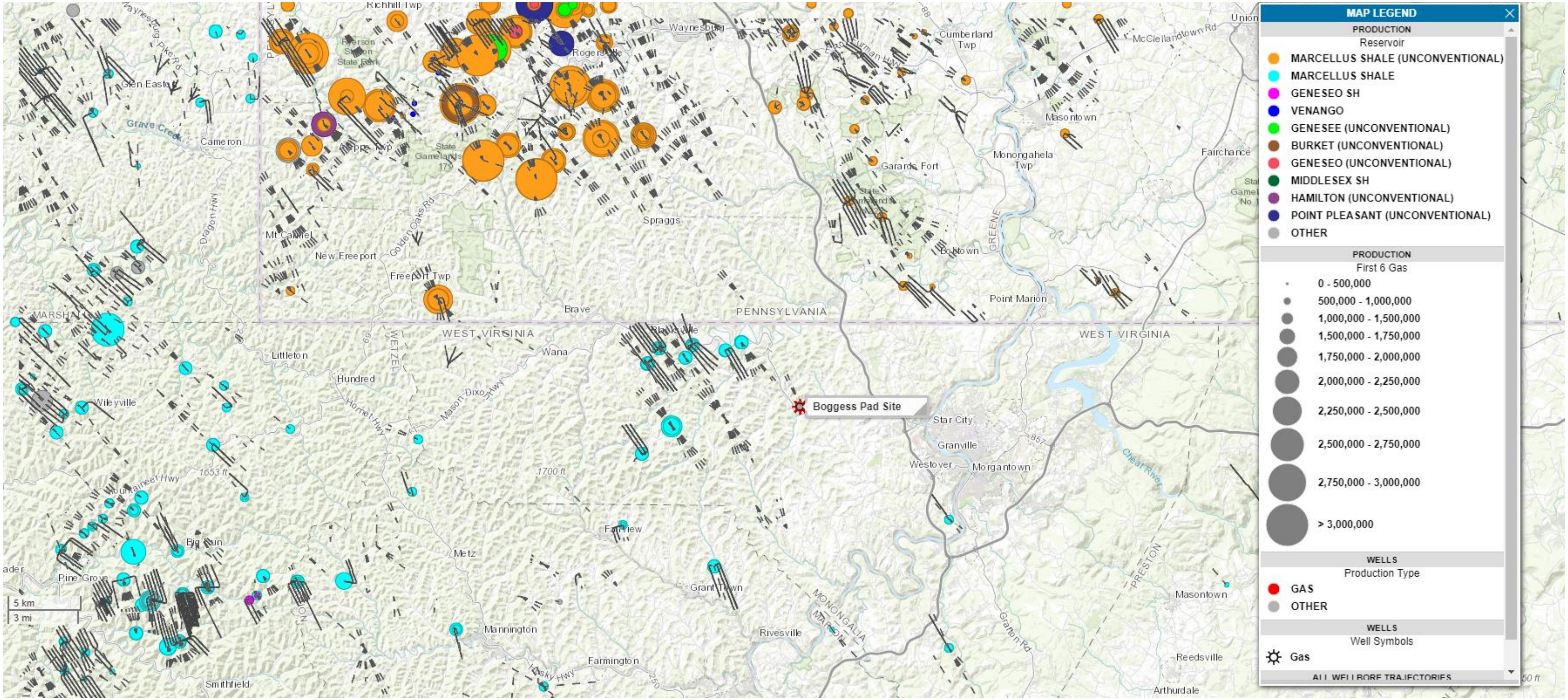
Customer has full responsibility for use of this report and any accompanying diagrams inclusive of any data analysis, interpretation and recommendations. All analysis, reports and recommendations provided are opinions based on inferences, judgment, and empirical relationships with respect to which competent specialists may differ and Drill2Frac LLC does not warrant the accuracy and completeness of the analysis provided. Customer is fully responsible for any and all decisions that may arise out of data analysis and recommendations provided and Drill2Frac shall not be liable for any losses or damages that may arise by reason of Customer's use of deliverables.

Contents

- OmniLog Overview
  - Introduction
  - Color Reference Index
  - Quality Reference
  - Trajectory Plot
  - Well Overview – OmniLog with GR
  - Geosteering Interpretation
  - OmniLog Observations

- D2F Summary
  - Summary conclusions
  - Next steps

Area Map – First 6 months Gas by Reservoir


MAP LEGEND
PRODUCTION
Reservoir
MARCELLUS SHALE (UNCONVENTIONAL)
MARCELLUS SHALE
GENESEO SH
VENANGO
GENESEE (UNCONVENTIONAL)
BURKET (UNCONVENTIONAL)
GENESEO (UNCONVENTIONAL)
MIDDLESEX SH
HAMILTON (UNCONVENTIONAL)
POINT PLEASANT (UNCONVENTIONAL)
OTHER
PRODUCTION
First 6 Gas
0 - 500,000
500,000 - 1,000,000
1,000,000 - 1,500,000
1,500,000 - 1,750,000
1,750,000 - 2,000,000
2,000,000 - 2,250,000
2,250,000 - 2,500,000
2,500,000 - 2,750,000
2,750,000 - 3,000,000
> 3,000,000
WELLS
Production Type
GAS
OTHER
WELLS
Well Symbols
Gas
ALL WELLBORE TRAJECTORIES
Boggess Pad Site
PENNSYLVANIA
WEST VIRGINIA
WEST VIRGINIA
Richhill Twp
Waynesburg
Cumberland Twp
McClellandtown Rd
Union
Rogersville
Ryerson Station State Park
Glen Easton
Grave Creek
Cameron
Aleppo Twp
State Gamelands 179
Masontown
Monongahela Twp
Fairchance
Garards Fort
Spraggs
Mt Carmel
New Freeport
Freeport Twp
Golden Oaks Rd
Bobtown
Point Marion
Brave
MARSHALL
Littleton
Wana
Blacksville
Hundred
Wileyville
Mason-Dixon Hwy
Star City
Granville
Westover
Morgantown
Cheat River
1653 ft
1700 ft
Mountaineer Hwy
Big Run
Fairview
Metz
Pine Grove
Grant Town
Mannington
Rivesville
Farmington
Smithfield
Masontown
Reedsville
Arthurdale
PRESTON
MONONGALIA
MARION
Grafton Rd
5 km
3 mi

Input Data Provided

- Drilling data inclusive of standard parameters such as WOB, ROP, Torque, RPM etc.

- Directional data for well trajectory definition.

- Drilling report summary

- GR (drilling)

- Geosteering interpretation

OmniLog Overview

Introduction

- Drilling data is used to generate a RockMSE profile.

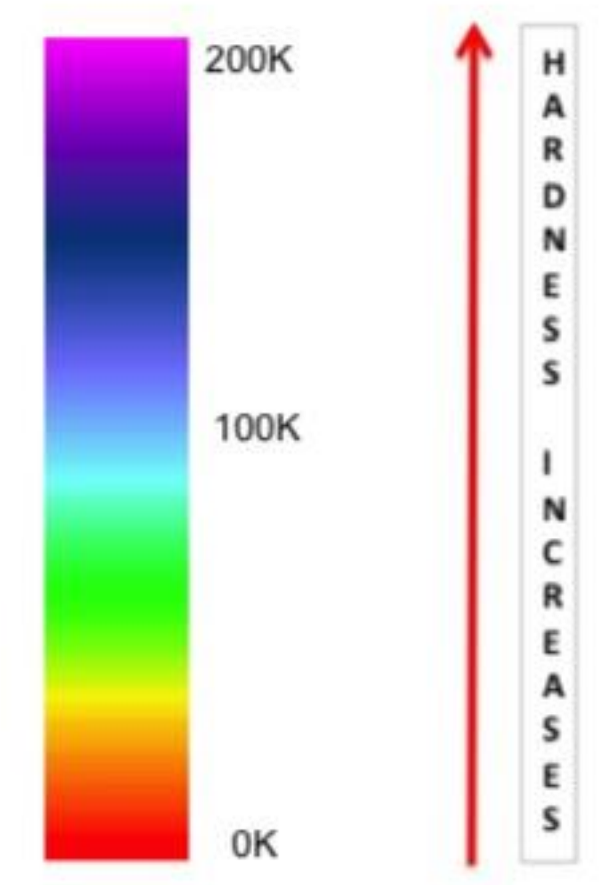
- Correction methodologies and algorithms (beyond the typical filtering, smoothing and de-spiking) are used to generate a RockMSE profile that more accurately represents the formation.

- The OmniLog comprises the final computed RockMSE along with any other available data (GR from the MWD, Mud Log Lithology, Gas shows from Mud Logs, Casing tally information etc.) and provides an insight to the geomechanical heterogeneity along the lateral.

- The OmniLog is presented on Driller’s Depth.

OmniLog Color and Quality Reference

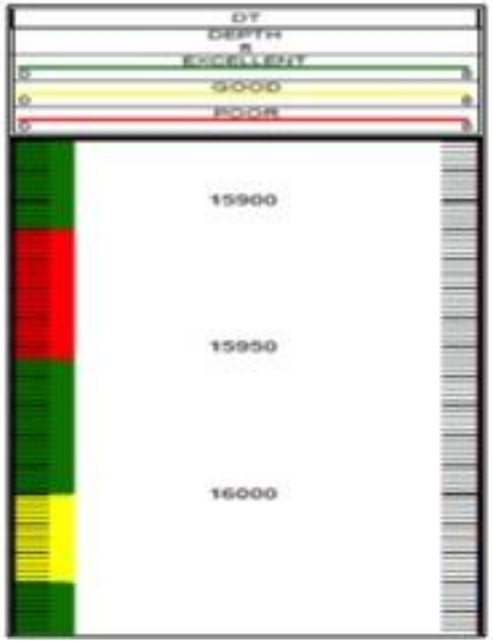
RockMSE Color Reference Index



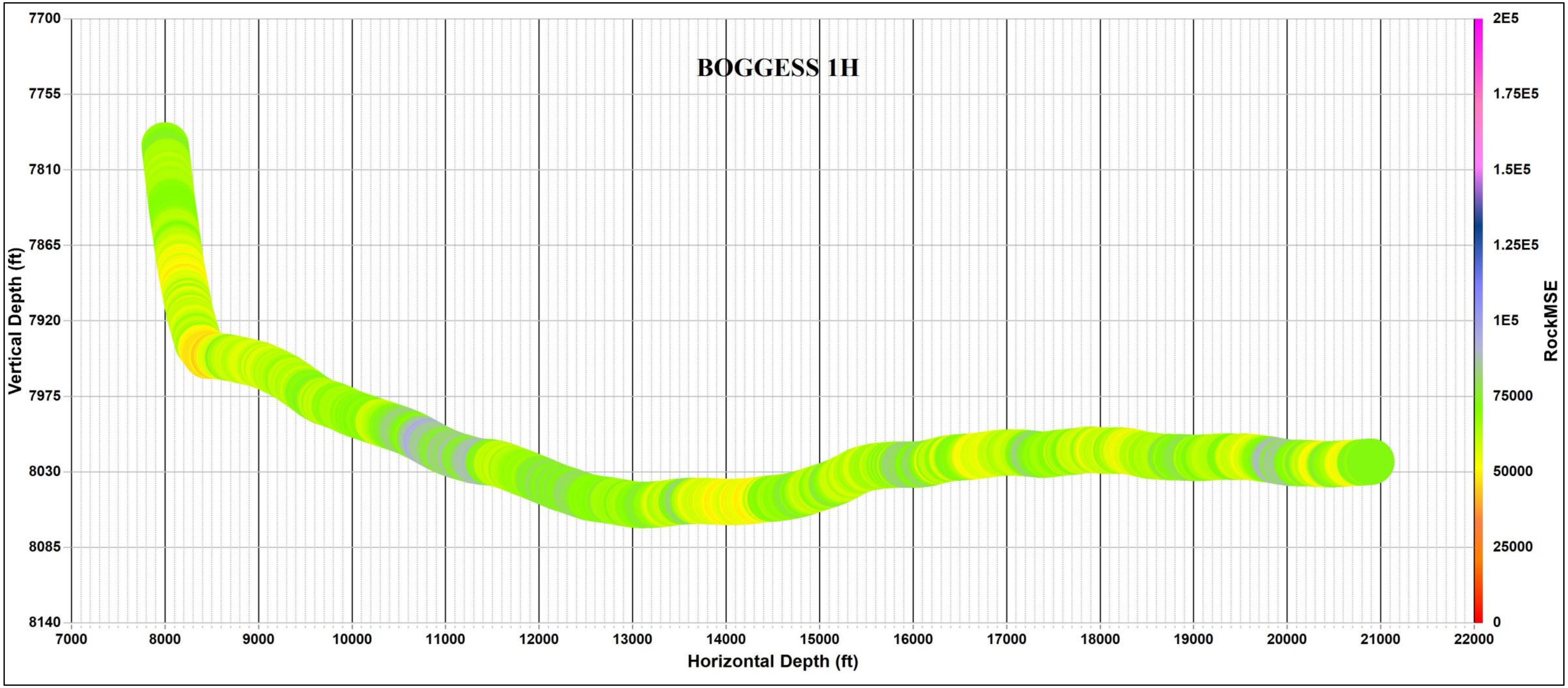
Quality Reference Table

Color Code	Quality Reference	Description
🟩	Excellent	No Data Editing Required; High Level of Confidence in RockMSE Results
🟨	Good	Some level of Data Editing Required; Good level of Confidence in RockMSE Results
🟥	Poor	Quality of data is poor across large sections; Significant data editing required; Low confidence of results in RockMSE; Use with caution

Example Quality Reference Track



Trajectory Plot – Boggess 1H

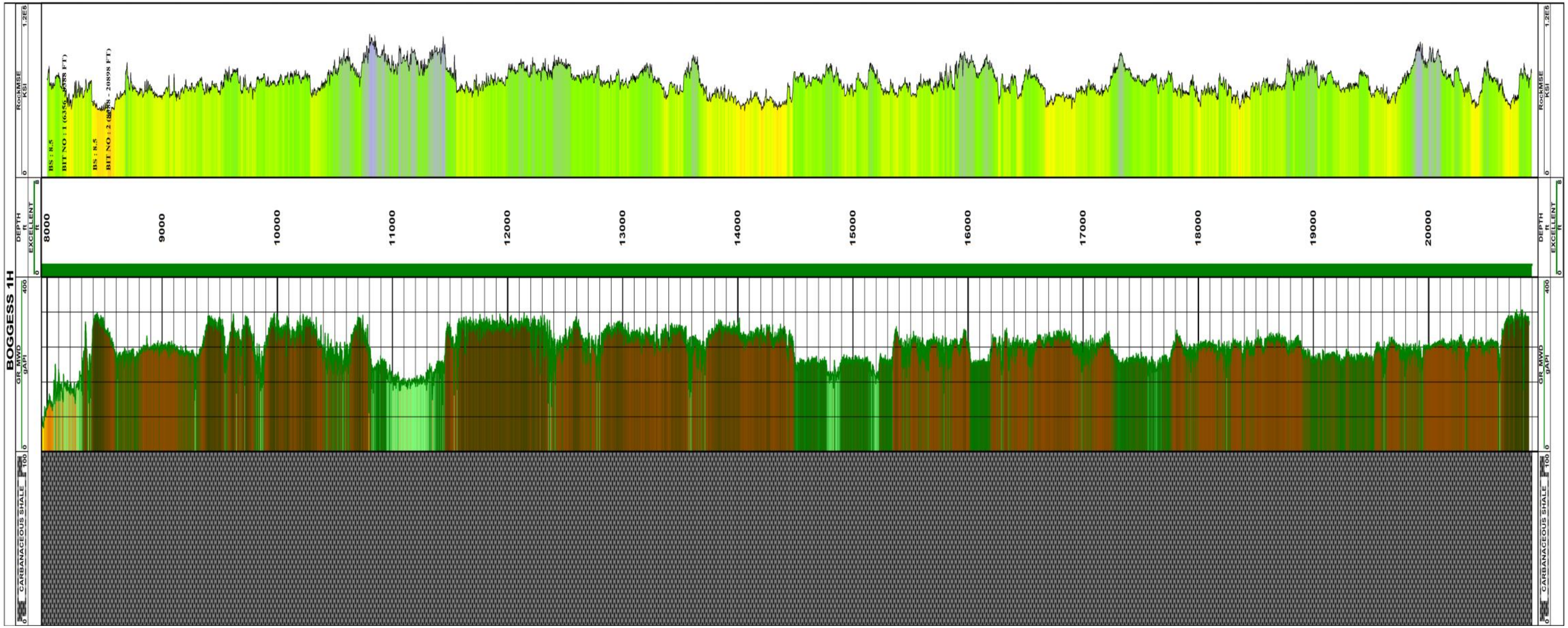


Well Overview – OmniLog/GR – Boggess 1H

OmniLog Lateral Profile

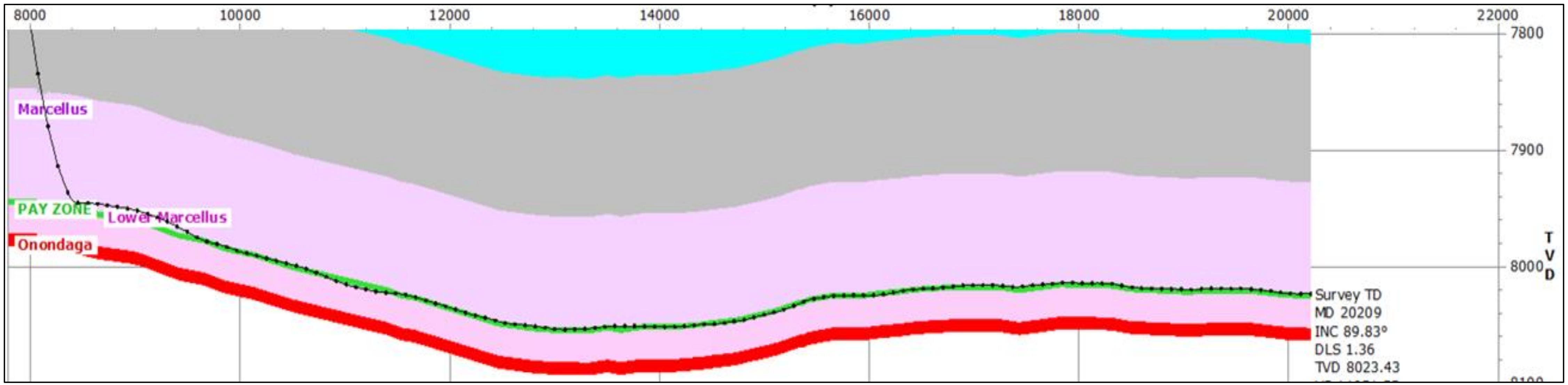
GR MWD

Mudlog Lithology



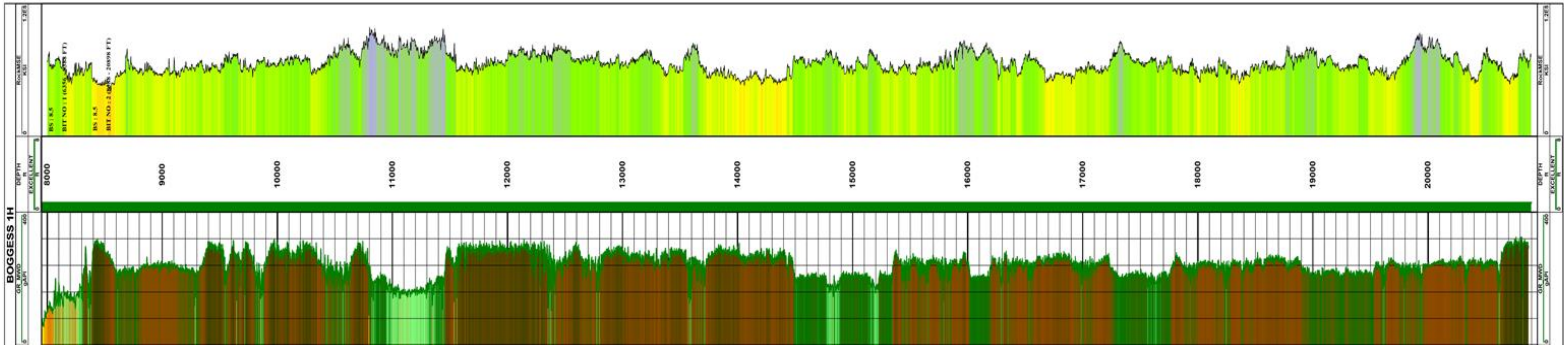
Geosteering Interpretation – Boggess 1H

Geosteering

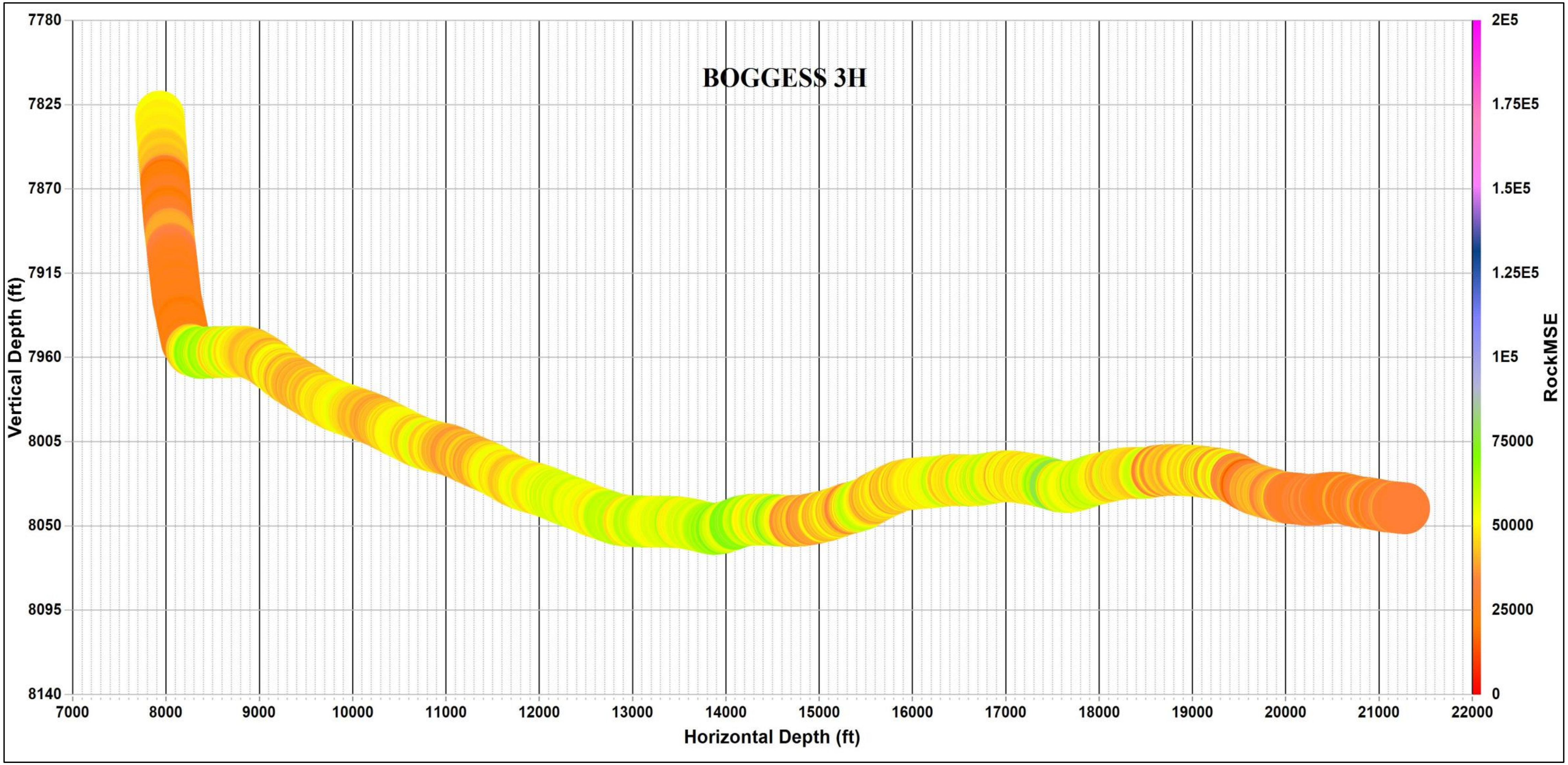


RockMSE

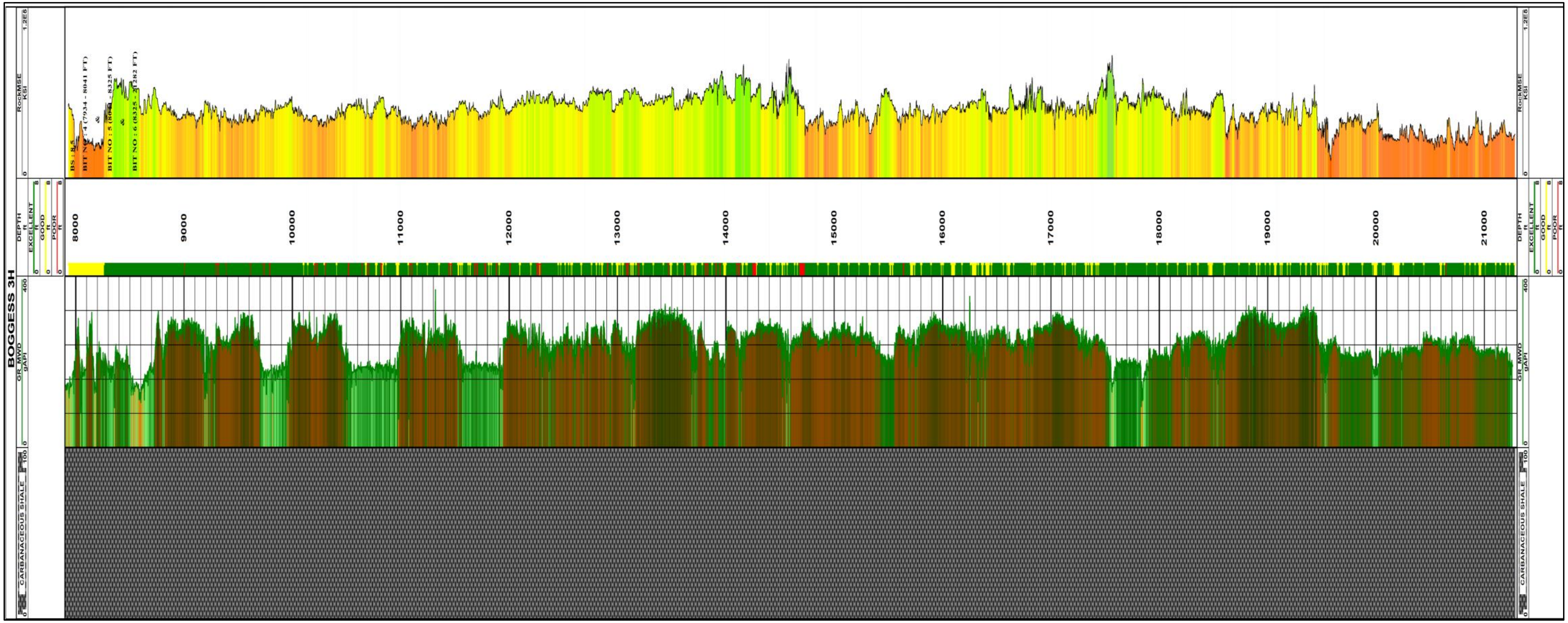
GR MWD



Trajectory Plot – Boggess 3H



Well Overview – OmniLog/GR - Boggess 3H



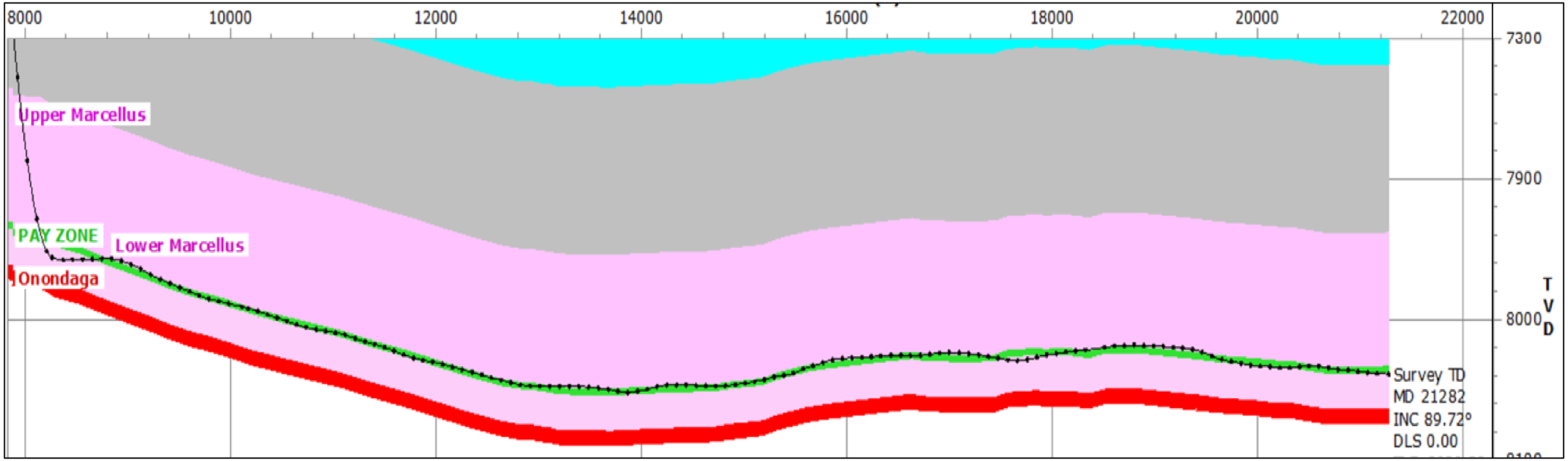
OmniLog Lateral Profile

GR MWD

Mudlog Lithology

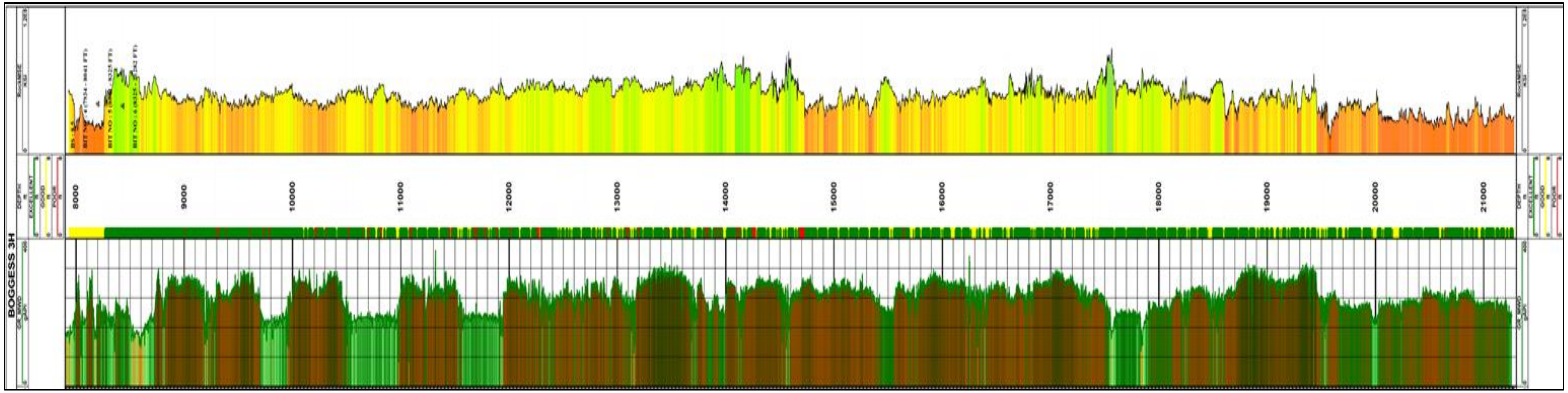
Geosteering Interpretation - Boggess 3H

Geosteering



RockMSE

GR MWD



OmniLog Observations & Summary

- Data was of reasonably good quality across both wells, though there were several sections impacted by null values, missing data and spikes.
- With our modeling workflow we were still able to generate a high quality OmniLog model for both wells
- Hardness levels and Heterogeneity are consistent with other Marcellus wells.
- There is generally good correlation with GR across most of the laterals.

Conclusions & Discussion

- Data quality & results are appropriate for intended purposes - Optimizing stage & perf placement & Comparison with other data sources

- Next steps for PerfAct completion design using OmniLog
    1. Confirm baseline completion design – stage length, clusters per stage, etc.
    2. Establish tolerances for optimization on above
    3. Identify additional data to include in optimization
    4. Establish timelines for complation