MARCELLUS SHALE ENERGY AND ENVIRONMENT LABORATORY

MSEEL

The objective of the Marcellus Shale Energy and Environment Laboratory (MSEEL) is to provide a long-term collaborative field site to develop and validate new knowledge and technology to improve recovery efficiency and minimize environmental implications of unconventional resource development

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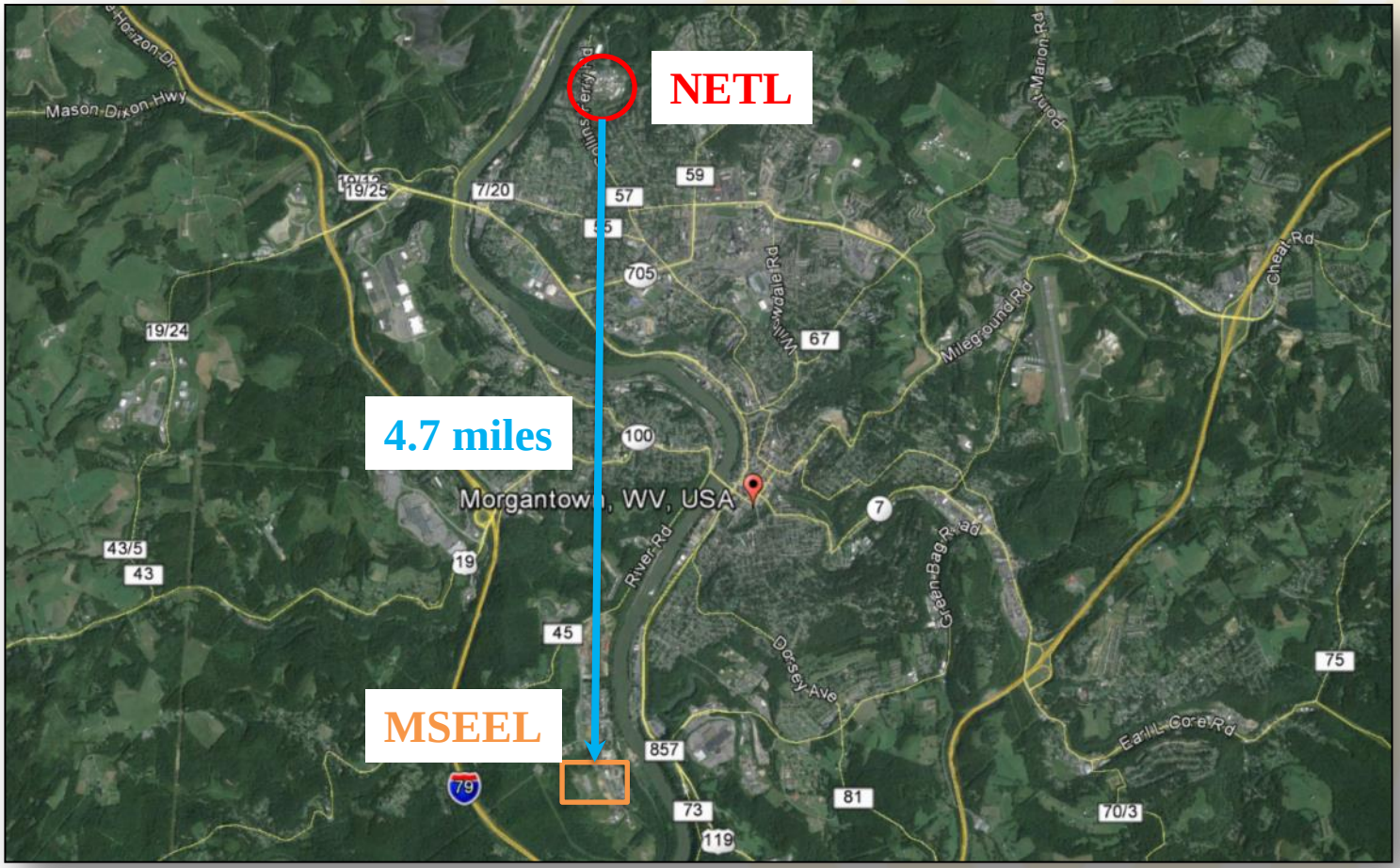
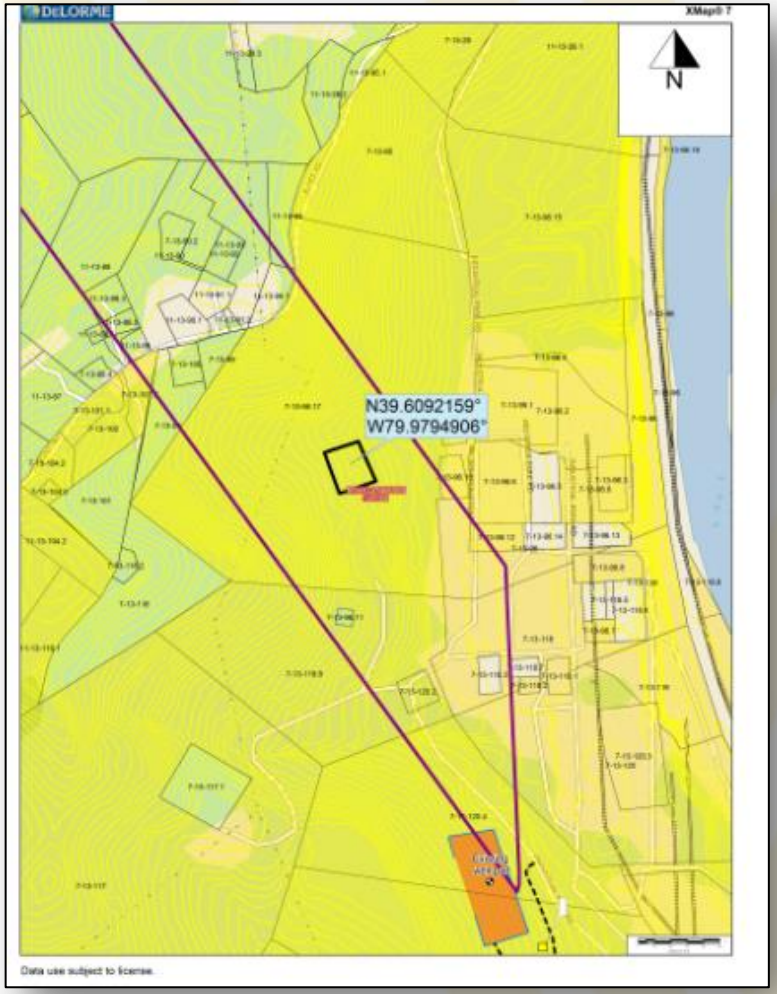
MSEEL MY BIASED VISION

- Demonstrate the Best Practices to Drill, Complete and Produce a New Horizontal Well That Minimizes Any Environmental/Societal Costs While Maximizing Economic Productivity
- Monitor and Document Impacts in a Controlled Environment
  - Greenhouse Gas Emissions
  - Local Air Pollution
  - Water Supply and Quality
  - Noise and Activity
  - Societal Impacts
- Develop New Technologies
  - Microseismic Monitoring
  - Production Monitoring
  - Advanced Logging
  - Simulation
- Develop New Scientific and Engineering Approaches to Apply to Multi-disciplinary and Multi-institutional Natural Resource Studies

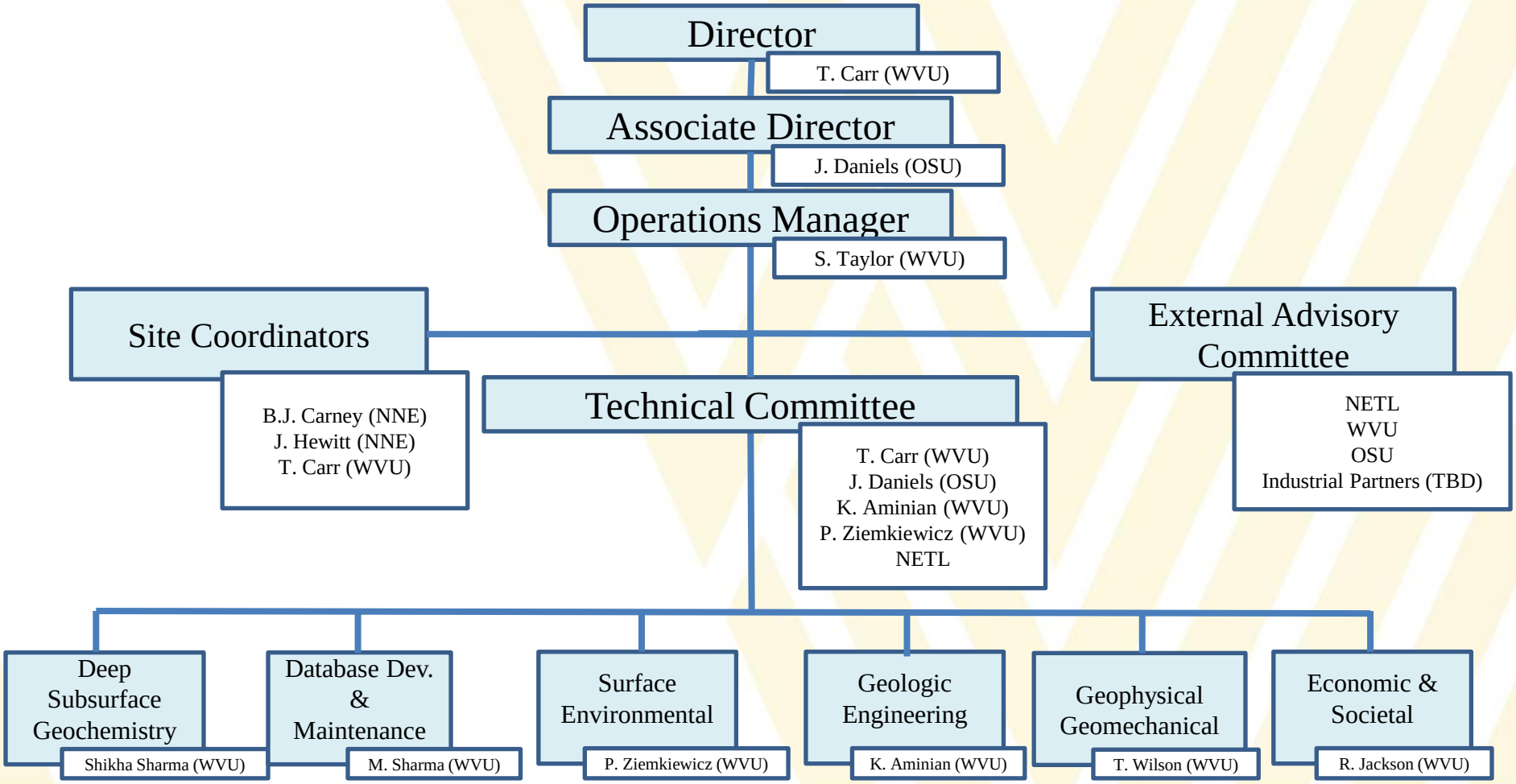
MARCELLUS SHALE ENERGY AND ENVIRONMENT LABORATORY - MSEEL



MSEEL SCIENCE WELL



MSEEL PROJECT ORGANIZATION



MSEEL SCHEDULE ACCELERATED

- Present Plans to External Advisory Committee – May 19
- Finalize Plans – June 15
- Drill Top Holes – Early July
- Drill Science Observation Well – Early August
- Drill Production Wells – Early October
- Complete Production Wells – Late October

AGENDA

- Review Past Discussions
  - Old Data
  - Safety
  - Surface Environmental - Water
  - Surface Environmental – Air / Noise / Traffic
  - Coring

    New Requests
- Logging
- Microseismic / Fiber-Optics
- Drilling and Completion Services
- Social/Economic Impact
- Presentation to External Advisory Committee
  - Monday 18th May
- Discussion

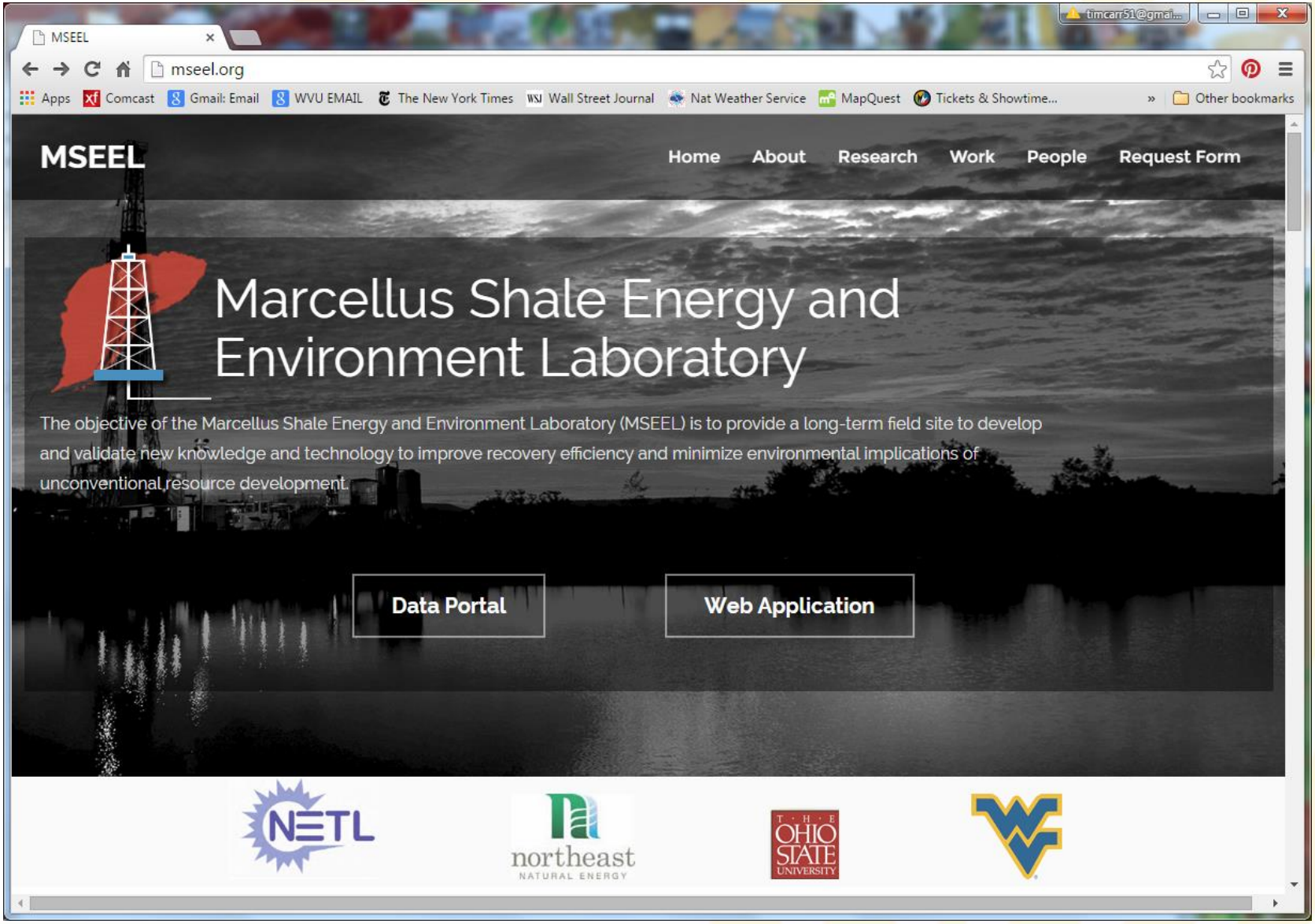
MSEEL DATA PORTAL

- Data portal will serve as central place to exchange and search for data. Sharing and Collaboration
- **CKAN** - Open source data portal software (www.ckan.org) will be used
  - EDX and Data.gov among several agencies use the same platform
  - Data Portal Features

    Publish and find datasets

    Store and manage data

    Private Workspaces and Federate
    - Store raw data and metadata
    - Add data directly through web interface
    - Harvesting – Using same data portal will allow to search data in different federal databases
    - Search and Discovery
    - Search and Display Geospatial Data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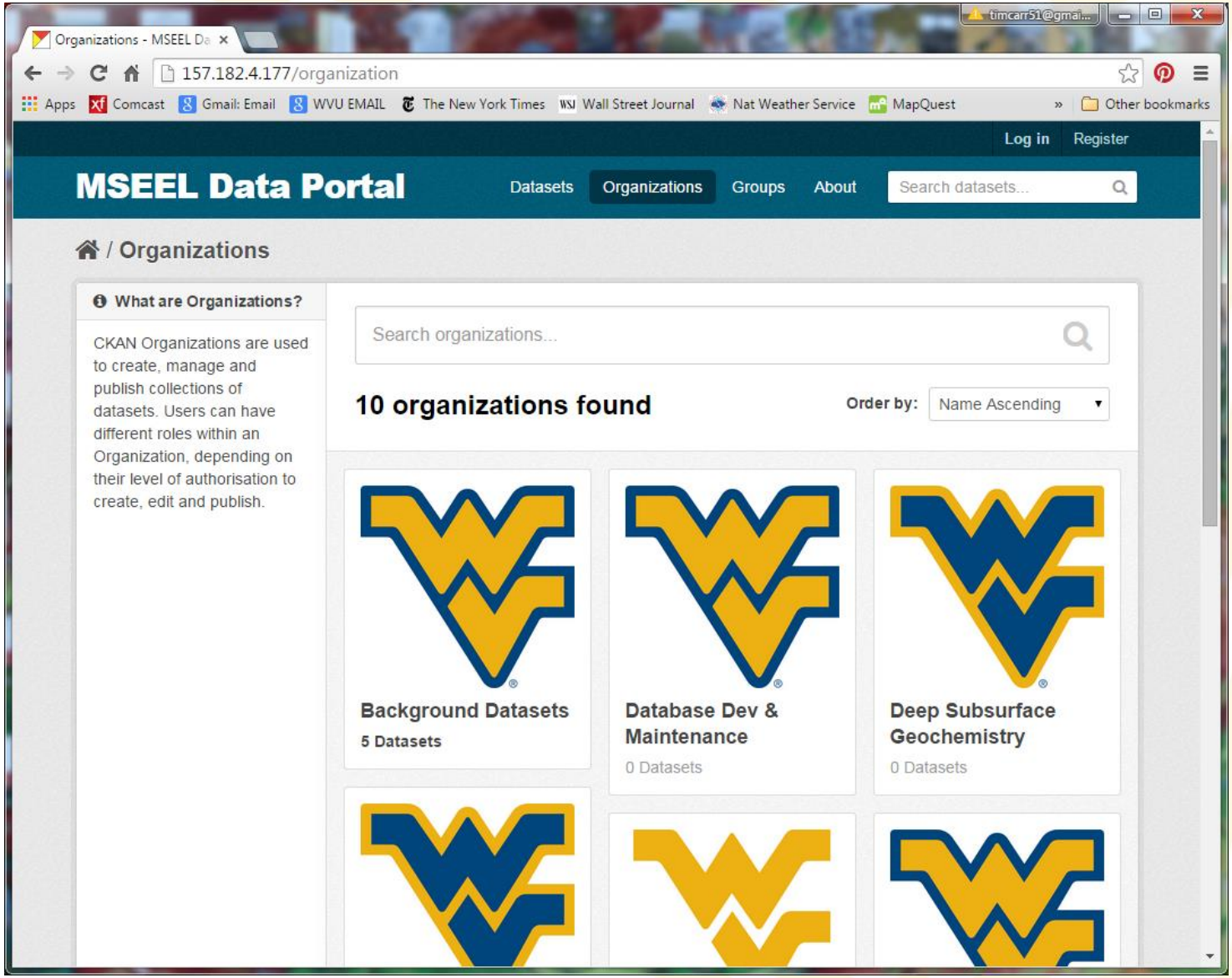
Marcellus Shale Energy and Environment Laboratory
The objective of the Marcellus Shale Energy and Environment Laboratory (MSEEL) is to provide a long-term field site to develop and validate new knowledge and technology to improve recovery efficiency and minimize environmental implications of unconventional resource development.
Data Portal
Web Application
NETL
northeast
NATURAL ENERGY
THE OHIO STATE UNIVERSITY


Organizations - MSEEL Da
157.182.4.177/organization
Apps
Comcast
Gmail: Email
WVU EMAIL
The New York Times
Wall Street Journal
Nat Weather Service
MapQuest
Other bookmarks
Log in
Register
MSEEL Data Portal
Datasets
Organizations
Groups
About
Search datasets...
/ Organizations
What are Organizations?
CKAN Organizations are used to create, manage and publish collections of datasets. Users can have different roles within an Organization, depending on their level of authorisation to create, edit and publish.
Search organizations...
10 organizations found
Order by:
Name Ascending
Background Datasets
5 Datasets
Database Dev & Maintenance
0 Datasets
Deep Subsurface Geochemistry
0 Datasets

MSEEL
SAFETY

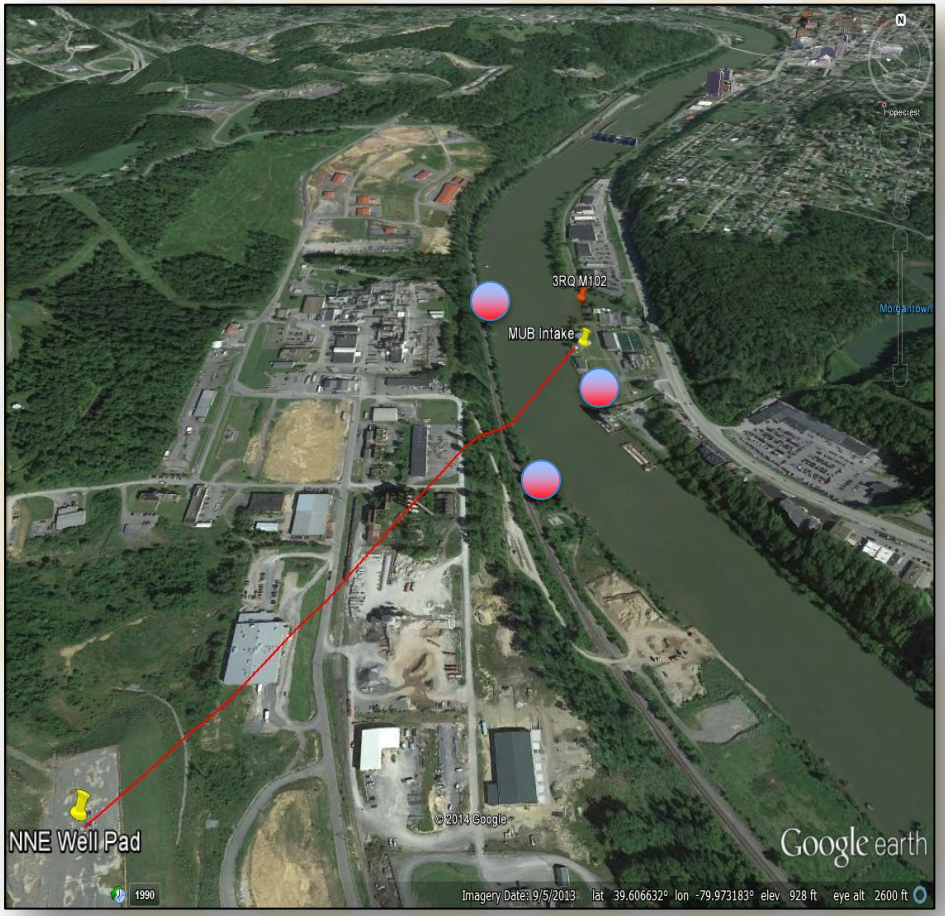
- Safety Protocols
  - Site Access
    - Tier 1 and Tier 2
    - Tightly Controlled Site Access
- Safety Training
  - Twenty People Passed SafeLand Training
  - Fourteen additional Individuals

MSEEL
SURFACE ENVIRONMENTAL WATER & GAS

WVU, NETL, USGS, OSU

Surface water, liquid, solid waste sampling

- Parameters: Inorganic/organic/NORM
- Baseline Monongahela River- Compare to historic record
- Drilling-cuttings/mud/flowback precipitates
- Completion-Flowback
- Production-Produced water
- Coordination with NNE, NETL, OSU, USGS and other researchers
- Sampling Schedule



Water Treatment

- Water treatment endpoints: HF fluid makeup, discharge
- Priority-treatment to discharge standards
- Evaluation of water treatment technologies
- Identify critical research needs: e.g. conservative ion removal
- Electrically assisted salt precipitation: low-cost desalination treatment
- Collaboration with OSU and other Organizations

GAS ANALYSIS- KEY RESEARCH QUESTIONS

Does hydraulic fracturing create new pathways for gas migration?

- **Gas production**
- **Contamination of shallow formations**

How does the gas chemistry change over time?

- **Assessing free/adsorbed gas**
- **Residual hydrocarbon fluids-in-place**
- **Characterizing hydrocarbon migration**
- **Understanding biogeochemical reactions in sub-surface**
- **Constraining rates of biogenic methane and sulfide generation**
- ***Noble gases***

Current Work Examples:
Sharma et. al., 2014 *Applied Geochemistry*
Darrah et. al., *2014 Proc. National Acad. Sciences*

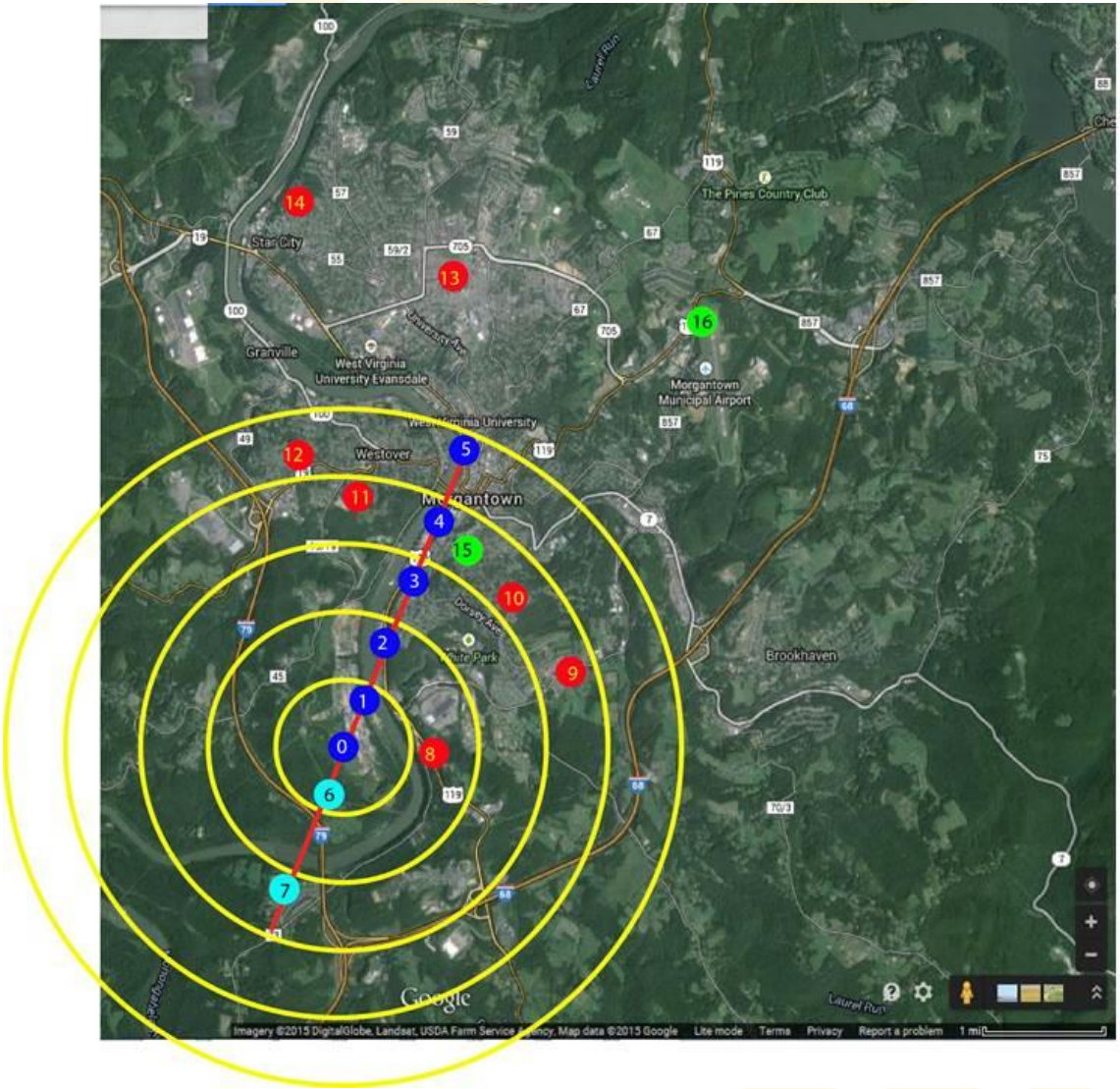
MSEEL
AREA SURFACE ENVIRONMENTAL AIR/ TRAFFIC / NOISE

WVU, WVU-CAFEE, Pitt and NETL

Environmental Monitoring

- Area PM2.5, PM0.1
- Area VOCs (on site/remote sensing)
- Area Gases
- Area Diesel and Point Source
- Area Noise
- Meteorological (Wind speed, direction)
- Traffic Counts

- Not Involved with Individual Monitoring or Toxicology



Location of Air Sampling Stations

Navy dots – WVU Downwind in-valley transit from well site.

Cyan dots – WVU Upwind in-valley transit from well site.

Red dots – WVU background/traffic-only source air sites

Green dots – WVDEP sampling sites

Yellow Circles are half mile incremental radii centered on the well pad.

MSEEL Transect

Legend

Sampling Posts

Analysis

- Concentration
- Isotope
- Transect

N

W E

S

Created by: Justin Coughlin

Proposed Sampling Array in Morgantown, WV

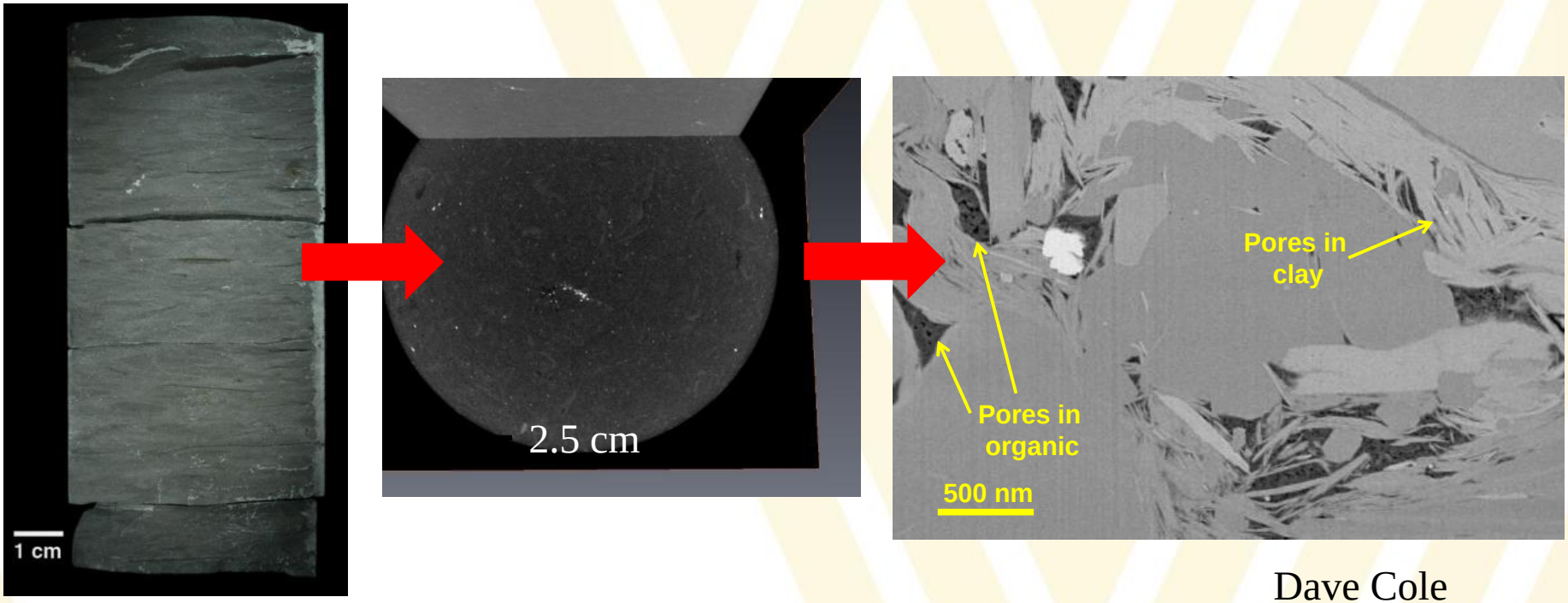
0 100 200 400

Meters

MEASURING GASEOUS EMISSIONS FROM THE EXHAUST

MSEEL
CORE AND SIDEWALL SAMPLES

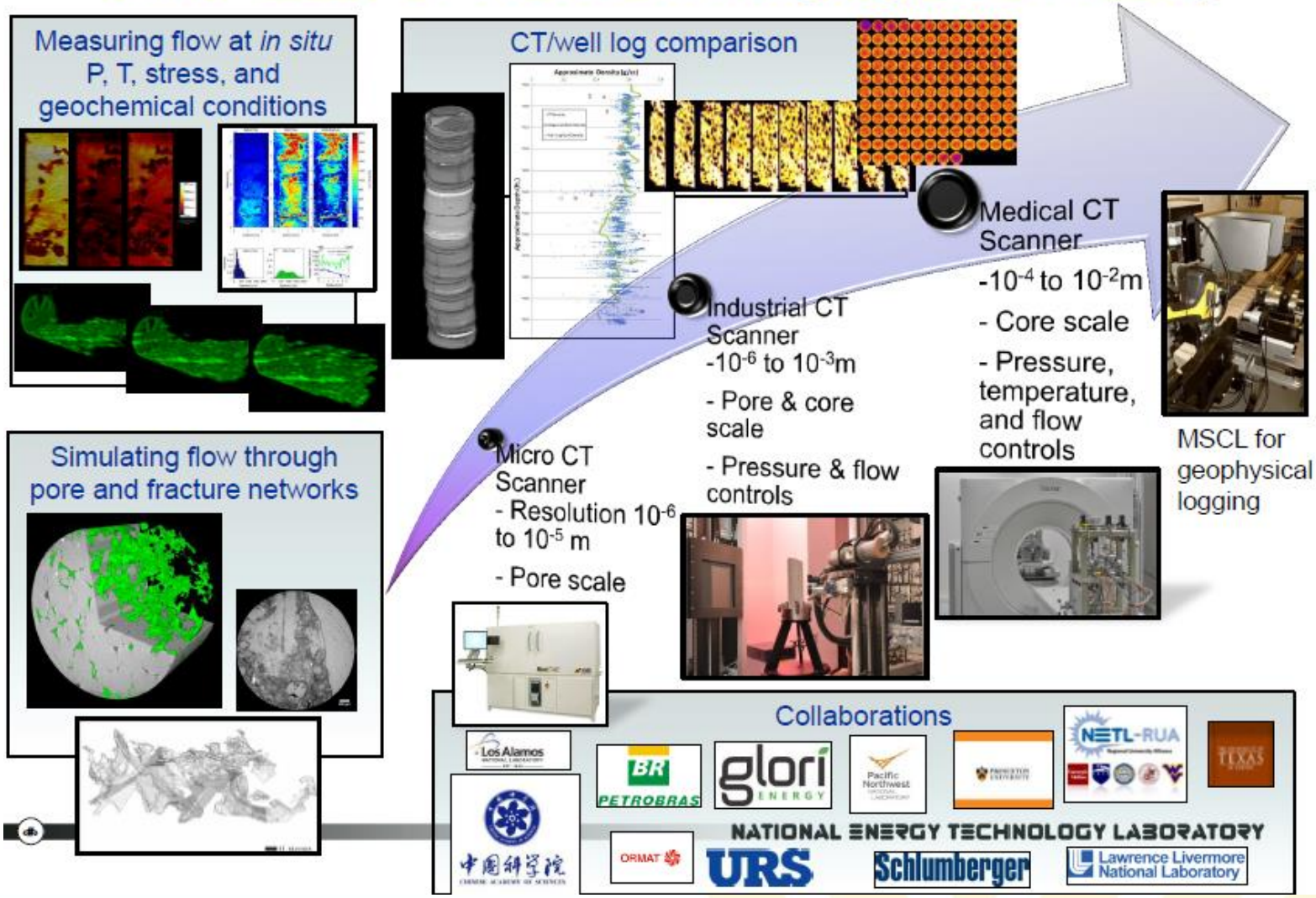
WVU, OSU, NETL



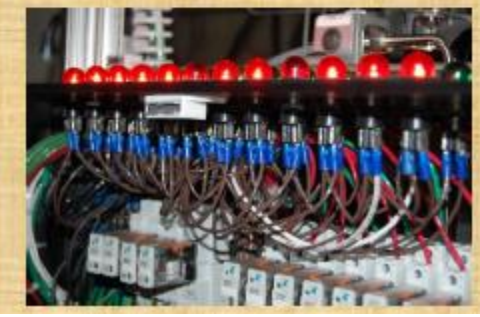
Dave Cole

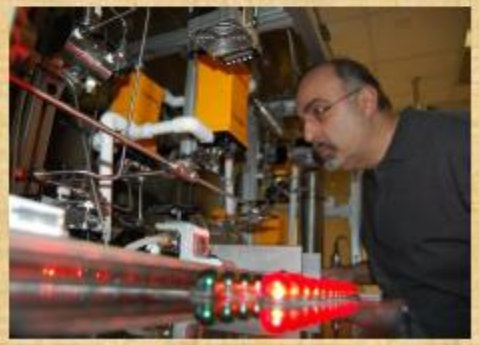
- 120 Foot Whole Core
  - Micro CT Scan - NETL
  - 1/3 – 2/3 Split
    - Porosity-Permeability Measurements WVU/NETL
    - Mineralogy (XRD) - WVU
    - Geomechanical Analysis – WVU
    - Organic Content – WVU, NETL
  - Depositional Processes - WVU
  - FIB-SEM and other Analyses WVU-OSU
- 60 Sidewall Cores
  - Molecular, Isotopic and Geochemical and Microbial and Other Detailed Geochemical Analysis – WVU-OSU-NETL - 30
  - Geomechanical – WVU - 20
  - Outside Requests - 10
    - Ding Zhu, Texas A&M – REPSEA 11122-07 10 8” X 3” Blocks
    - Hongwu Xu, Los Alamos
    - Hugh Daigle UT-Austin – 6 Preserved
    - Bill Carey Los Alamos

Multi-Scale CT Flow and Imaging User Facility

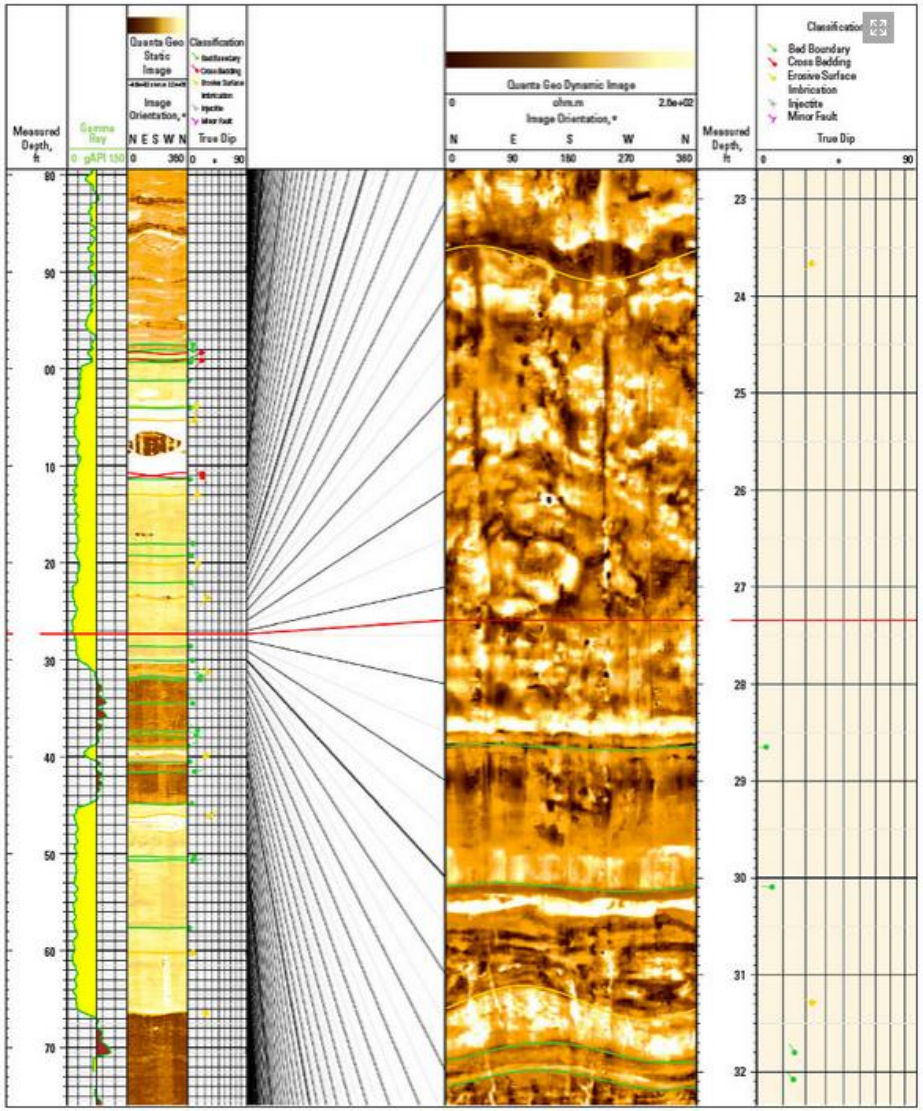


Precision Petrophysical Analysis Laboratory





MSEEL
LOGGING



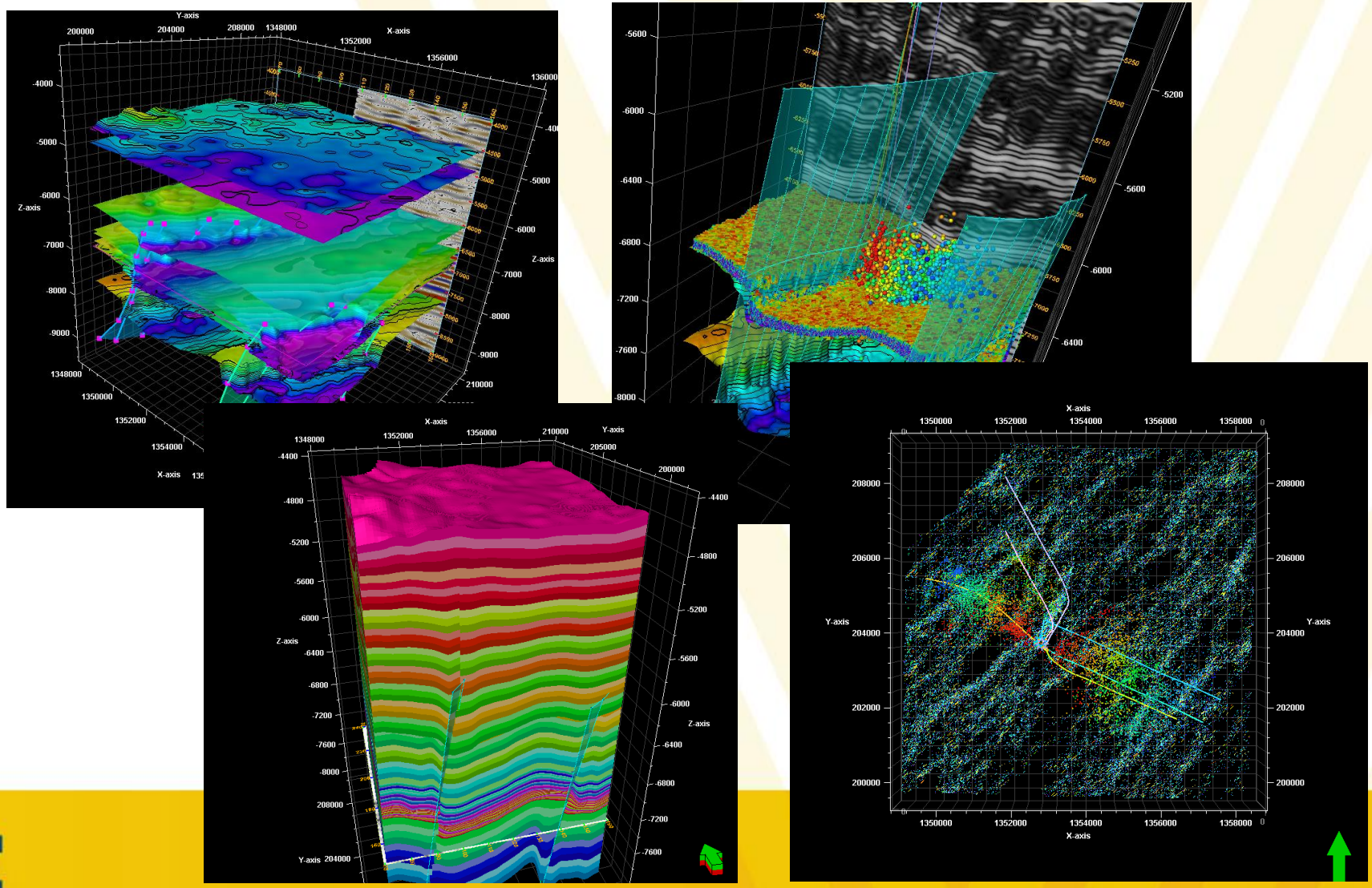
Schlumberger

MSEEL
GEOPHYSICAL AND GEOMECHANICAL

MSEEL
MICROSEISMIC AND FIBER OPTICS

Pinnacle

SOME MICROSEISMIC PERSPECTIVES FOR THE MORGANTOWN MSEEL SITE



MSEEL
DRILLING AND COMPLETION SERVICES

FTSI

MSEEL
ECONOMIC AND SOCIETAL IMPACT