MLBC/IRWA

Oil & Gas Seminar

February 12, 2015

Bridgeport Conference Center

Bridgeport, WV

MLBC/IRWA Seminar
Thursday, February 12, 2015

TIME	SPEAKER/COMPANY	TOPIC
8:30 - 9:00	***Registration & Continental Breakfast***	
9:00 - 9:10	***Welcome & Opening Comments***	
9:10 - 10:00	John Farmer, Landman II, Leasing EQT Production Company	Abstracting & Title Basics
10:00 - 10:50	Jeremy White, Regional Land Supervisor, Drilling EQT Production Company	Surface Issues in Drilling Operations
10:50 - 11:00	***Coffee Break***	
11:00 - 11:50	Donald Teter Professional Surveyor	Precise Survey Measurements: Stairway to Heaven or Path to Purgatory?
11:50 - 1:00	***Luncheon***	
1:00 - 1:50	Shawn Grushecky, Ph.D Coordinator Energy Land Management West Virginia University	Basics of GIS
1:50 - 2:40	Kathy Beckett, Esq. Steptoe & Johnson	From an Environmental Perspective: How to Build a Petrochemical Project
2:40 - 3:30	Tracey Janis, Manager, Right of Way Services First Energy Service Company Natalie Jefferis, Esq., Land Director EQT Midstream Greg Cunningham, District Land Manager, CNX Moderator: Mark Mudrick, Esq., RPL Project Manager Percheron	Coexistence Among Producers, Pipelines, Roads & Railways
3:30 - 3:40	***Afternoon Break***	
3:40 - 4:30	Mark Spears, Asset Manager, Appalachia Stone Energy Corporation	A Multidisciplinary Approach to Efficiently Developing Shale Resources
4:30 - 5:00	Anthony Farr, Vice President, Operations Tioga Resources & MLBC President	Ethics

2015 MLBC/IRWA Seminar Advisory Committee

Christa Dotson
EQT Production Company
Cheryl Davis, Esq.
Steptoe & Johnson, PLLC
Bruce Turner, CPL
Steptoe & Johnson, PLLC

Thank You!

Abstracting Basics

John Farmer, RPL

Beginning Questions

- Where do I start?
- What does my client want?
- Am I to research only certain tracts?
- Am I to do just lease/title updates?
- Do I research a defined area?
- How far back do I go?

The answers to these questions are all client dependent.
Some clients want a full title.
Some want a "quick and dirty" title.
Some want from the current lease forward.

The Most Involved – The Full Title Abstract

Start at the latest surface ownership and go backwards.
Look at the Map Card in the assessor's office.
Each Parcel will have a Map Card.
This will you give you the current surface owner and the book/page where the conveyance document is located.

There are three ways to convey real property

- By Deed
- By Will
- By Intestate Succession

Examining Documents

Deeds

a. Parties
b. Dates
c. Conveying clause
d. Warranty
e. Property description
f. Reservation
g. Derivation
h. Execution
i. Acknowledgement

Examining Documents

Wills

a. Look for specific bequests
b. Real property is not personal property
c. Rest, residue and remainder clause
d. Check execution and witness acknowledgement
e. Check appraisal – see if property in question is included in the estate assets

Examining Documents

Leases

a. Parties
b. Dates
c. Conveying clause
d. Watershed
e. Property description/bounders
f. Rights under lease: production, storage, etc.
g. Lease term
g. Royalty rate; flat rate?
h. Execution
i. Acknowledgement

Intestate Succession

The decedent had no will.

Real property is passed down to the decedent's heirs at law.

The Intestate Succession laws of the state where the real property is located control.

Reservations

What happens when you find a reservation?

Do you stop or keep going?

One has to be certain that the earliest reservation has been located.

The earliest reservation effects all later reservations.

Oil & Gas in Place vs. Oil & Gas Royalty

a. **There are two components to oil & gas ownership.**
   i. Oil & Gas in place
   ii. Royalty
b. Oil & gas in place means just that. The minerals are in the ground – down deep in the ground.
c. Royalty doesn't really come into play until the oil & gas are coming out of the ground.
d. A problem occurs when the term "royalty" is used interchangeably with "oil & gas in place". This occurred regularly in the early part of the 20th Century and has continued in some areas.
d. If someone doesn't specify royalty in a reservation, all interest the person had, oil & gas in place and royalty, is reserved.
e. Why would someone only reserved a royalty interest?
   i. The royalty was where the money was to be made.
   ii. Bonus payments were extremely low. A dollar an acre was not uncommon.
   iii. As late as 2007, bonus payments were commonly $5.00 per acre.

Reservation Examples

a. "All oil, gas and other minerals" – it is what it says.
b. "1/2 all minerals" – in WV, this includes oil & gas. In PA, this does not include oil & gas.
c. "all the oil" – at one time gas was nuisance to some, so the oil may have been all they wanted to keep.
d. "1/16 of the oil and ½ of the gas royalty in and underlying" – in WV, "in and underlying" have been viewed as magic words. Although the reservation says "royalty", "in and underlying" usually means oil & gas in place.
e. "This conveyance is made subject to all prior exceptions, reservations, restrictions, conditions, rights-of-way, easements, adverse conveyances, and other servitudes, if any, made retained, or created in prior deeds of record in the chain of title to the property herein conveyed." What is reserved? Nothing.

Reservation Examples

f. "1/2 of the oil and gas produced" – usually viewed as a royalty reservation.
g. "the moneys for the oil and gas produced" – when "money" is used, it's usually considered to be royalty.
h. "the proceeds from the well now on the property" – "proceeds" is viewed similar to "money".
i. "grants and conveys the surface of"—in WV, "surface" means "surface".

The wording of a reservation may not be what the reservation actually means. If it appears that the reservation reserves only a royalty, one must look at when the reservation was made and one must examine how that reservation was treated to determine whether the reservation excepted only royalty or excepted oil and gas in place. SEE HOW IT IS TREATED: see who subsequently leased the property, see how the interest has been taxed, see if the interest was included in wills or appraisements, see if the grantor later conveyed the interest, etc.

Adversing – the most important element of abstracting

a. If adversing isn't done, the abstract is next to worthless.
b. Adverse every individual in the title chain, including spouses.
c. Start a few years (5 or 10) before the individual receives the interest and continue until a few years (5 or 10) after the interest goes to another.
d. Look for deeds, leases, wills, etc. Look in Grantor Index. Review fiduciary records.
e. Sometimes the Grantee Index will be helpful, especially when you don't know how someone received their interest.
f. Don't forget about the other indices. Check the Fiduciary Index, the Delinquent Tax Index, the Miscellaneous Index, the Lease Index.
g. If you think you should look in a certain index, then do it.

Chaining/Flow Charts

Everyone seems to have their own style, but some elements are essential to a good chart.

- Book/page reference
- Dates of execution and recording
- Brief description
- Reservations
- If will/fiduciary record, date of death

Chart Example

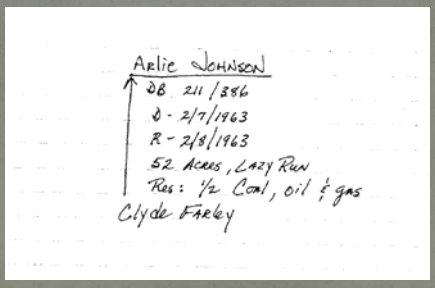


Chart Example

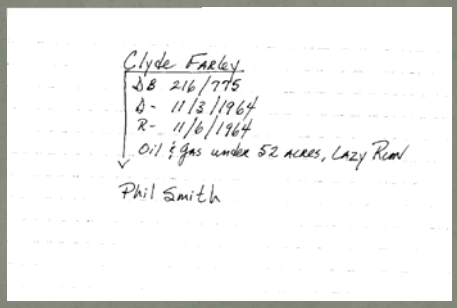
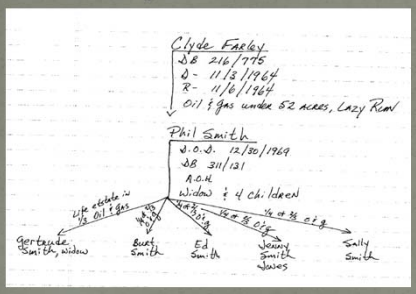
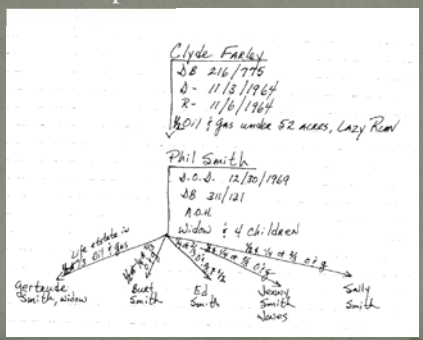


Chart Example



Does anyone see the mistake?

Chart Example



Tax Assessments

a. The Land Books DO *NOT* determine ownership.
b. The Tax Assessor DOES NOT determine ownership.
c. Tax assessments and Land books can be a helpful too to determine ownership and to give you a clue when you're stuck. However, the documents in the record room determine the owners of record.
d. Spot check the Land Books for the chain of title. This helps you determine if taxes have gone delinquent, if the property has been sold for taxes, if the interest has been sold to the state, etc.
e. Even after an interest has been sold for taxes, check to see if that assessment came off the Land Books, and if not, whether taxes are still being paid for that assessment.
f. Check the Delinquent Land Books to see if your tract is included there.
g. ALWAYS CHECK TO SEE IF TAXES ARE CURRENT AND HAVE BEEN PAID.

Maps and Plats

Deed description plats

a. Always a good idea to make sure your deed description matches what has been mapped.
b. Platting programs and apps make it easy.

Maps

a. Tax maps
b. Farm line maps
c. Well spot maps
d. Prospect maps from your client – keep them confidential. Protect these maps. Don't leave these out in the open.

Courthouse Etiquette

- **Be courteous. The deputy clerks are not employe**d by abstractors. Show respect.
- Be quiet. The Record Room should be treated like a library.
- Use as little space as possible. Others need room to work, too. If you need to spread out your file, find a quiet spot somewhere else.
- The public tax dollars pay for the upkeep of the Record Room. Always yield to members of the public. They're usually only in the record room for a few minutes.
- Open one book at a time and put away your books. No one likes it when books are not in their proper place.
- Treat the books as ancient, delicate manuscripts, because many of them are just that, ancient, delicate manuscripts.
- Talk on the phone outside of the record room. It doesn't matter how softly you speak, telephone calls in the record room annoy everyone. Silence your cell phone.
- Dress appropriately. You're not at the beach...or at the club...or at the prom...
- Music others can hear is not appropriate in the record room. No matter how catchy the tune is, your singing and dancing will bring disharmony among others working there.

Questions?

Surface Issues in Drilling Operations

Jeremy M. White, RPL
Regional Land Supervisor
EQT Production Company – Bridgeport, WV

Overview

- **What obstacles are there?**
  - Public Opinion
  - Terrain / Topography / Access Road Grade
  - Existing Infrastructure
  - Regulatory Agencies
    - Wetlands
    - Streams
    - Endangered Species
    - Water
  - Surface Owners
- **Case Studies**
- **Of what do we need to be aware? How would we handle?**
- **Food For Thought**
- **Questions**

- So what do we think of first?

Stupid People

Public Opposition

Public Opinion

Celebrity Influence

Public

Super Glue
Electrical Tape
Banners

Local Examples

Natural Opposition

- Terrain
- Coal Activity
- Wetlands
- Streams
- Flood Plains
- Endangered Species

Early Horizontal Pad

Current Marcellus Pad

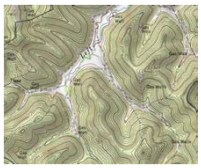
…there's more.

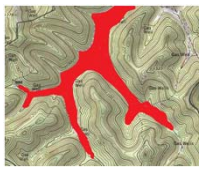
Terrain

How does the increased footprint affect our approach?

- Where do we start?
- How do we evaluate a site?
- What are we looking for?

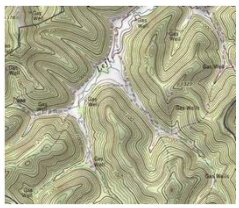
In House Review





- Streams / Wetlands
- Topography / Grade
- Aerial Photography

Real Example



A Potential Site is Found

- How are you going to get there?
- Road grade
- ROW needed?
- Stream Crossing?
- How much stream are you going to impact?
  - (What kind of permit is needed?)
- Can you balance the pad?
  - Where is the excess material going?
- Enough room for a completion pit? Move water from another location?

Regulatory Spacing Considerations

- WV - 100' from disturbance to stream (perennial, lake , pond, etc.) PA – 300'
- WV – 300' for natural trout stream
- WV & PA – 1000' from any public water intake / supply.
- WV - 250' from wellhead to a water well or spring. PA – 500'
- WV – 625' from center of pad to Occupied Dwelling or Agricultural Buildings larger than 2500 sq/ft. PA – 500'
- Spacing waivers?
- Water well plugging?

Endangered Species

- Indiana Bats
- Freshwater Mussels
- Procedures?

Indiana Bat

- The main causes, as cited by the U.S. Fish & Wildlife Service are "due to episodes of people disturbing hibernating bats in caves during winter. Other threats that have contributed to the Indiana bat's decline include commercialization of caves, **loss of summer habitat**,…."

Indiana Bat

- Summer Roosting:
  - Summer months - bark of dead and dying trees.
  - Trees such as the Shagbark Hickory are preferred.
  - The US Fish and Wildlife Service regulates tree clearing in states that are home to Indiana Bats.
- Winter Hibernation:
  - Hibernate in caves and abandoned mines.
- Regulations on Tree Clearing
  - When 17 acres of forest or more are to be cleared there are two different sets of regulations that may apply:
  - **Summer Clearing Regulations**: April 1st to November 14th
  - **Winter Clearing Regulations**: November 15th to March 31st
- What's the problem?

Indiana Bat – Summer Clearing

- 1)Initial consultation with Environmental service company
- 2)Send Mist Net study plan to Fish and Wildlife Service
- 3)Await approval (Up to 30 days)
- 4)Conduct Mist Net Survey (May 15th- August 15th)
- 5)Send report to Fish and Wildlife with data and wait for their concurrence (Up to 30 days)

Mist Net?

- Nets
  - Nets are placed in the tree canopy. They are meant to capture bats that roost in the area.
- Location
  - Placement of the nets is determined by which areas bats are more likely to fly such as open corridors and near wet areas where bugs congregate.
- Time
  - Must have 24 net nights.
  - Example: Use six sites, two nets per site, for a period of two nights
    - Each must last 5 hours at a time.

What if…

- You catch a bat Mist Net Survey:
  - A transmitter is placed on the bat and if the roosting location is identified, a 2.5 mile radius buffer is placed around the roosting location.
  - If roosting spot is not identified, then a 5 mile radius buffer is placed around the location of the capture.
  - Summer tree removal is forbidden in the buffer area.
- You don't catch a bat:
  - Send report to Fish and Wildlife with data and wait for their concurrence (Up to 30 days)

Winter Clear?

- 1)Initial consultation with Fish and Wildlife Service
- 2) Complete habitat assessment to see if any roosting trees would be affected
- 3)Submit assessment report and gain Fish and Wildlife concurrence
- 4)Clear trees
- 5)Conduct mitigation and girdle trees to replace habitat

- Once the potential roosts are identified, contractors must mitigate the tree removal by creating a new roosting habitat equal to the amount of suitable roosting trees removed. This is done by girdling trees.

Artificial Bat Roosting

Freshwater Mussels

- Some of Appalachia's endangered mussels:
  - Pink Mucket Pearly
  - Tuberculed-Blossom Pearly Mussel
  - James Spinymussel
  - Fanshell
  - Northern Riffleshell
  - Clubshell
- All mussels are protected.

- Bridges, culverts, low water crossings, pipelines, etc.
- Looking for running water, high oxygen content.
- Combination of silt, sand, gravel w/ little sedimentation.
- US drainage area > 10 square miles?
- Mussel Survey May 1 – October 1

What is a wetland?

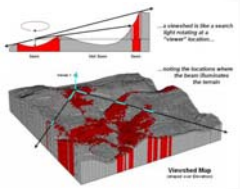
- USACE & USEPA: "Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

Additional Concerns

- What is the status of coal?
- Utilities - power lines, gas lines, etc.
- Floodplain? County floodplain permit.
- Obtain USACE jurisdictional determination. (Huntington / Pittsburgh)
- Impacting any stream or wetland? NWP39 & NWP14 (access)
- More than 1/10 acre/100'? – UCACE Preconstruction notice.
- More than ½ acre / 300'? – UCACE Individual Permit
- Tier 3 stream? More than 200'? WVDEP 401 Individual.
- Warm Water stream? No construction April 1 – June 30.
- Trout stream? No construction Sept. 15 – March 31.

Cultural Sites?

- Viewshed Analysis per Section 106 of National Historic Preservation Act
- *"…our records indicate one known archaeological resource…we are concerned that other unknown sites are located within the proposed project area…request a Phase 1 Study…"*
- Pedestrian survey entire area with shovel probe on all undisturbed landforms with less than 20% slope.
- Additionally some form of deep testing in areas likely to contain alluvial soils.



Surface Owners

Surface Owners

- West Virginia – Active areas 90% don't own O&G.
- Pennsylvania – Active areas 90% do own O&G.
- Ohio - ?

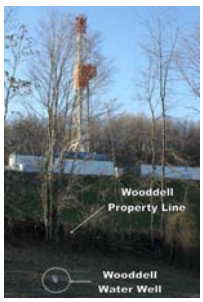
- Different circumstances – different discussions.

WVSORO

- "You can probably refuse or block a horizontal well on your land."
- Drilling water wells
- Coal objections

Example From WVSORO

Lesson: Document



1/100th Acre

Respect the Hay!

Trees

What Do You Do With the Trees?

Keep Contractors Honest

Be proactive in making sure construction is being carried out properly.

Since It's a IRWA Seminar…

Know What Landowner's Concerns Are

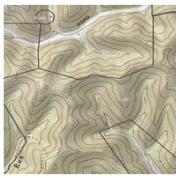
Know What You Are Buying - and - Be Clear About It!

Temporary Water Line

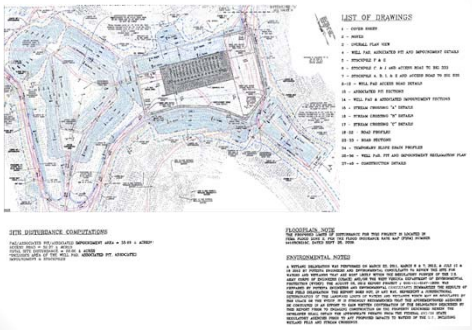
The Army Has Invaded

Real World Example

Preliminary Check




Design Phase



11 Streams & Indiana Bats

Finished Product

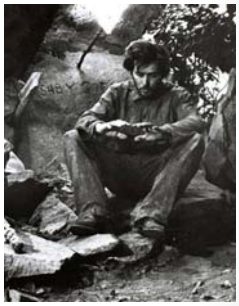
What Would You Do?

Multiple Water Wells + Structure

No Drums, No Bugles?

Ashby Gatrell

Martin Sheen…really?



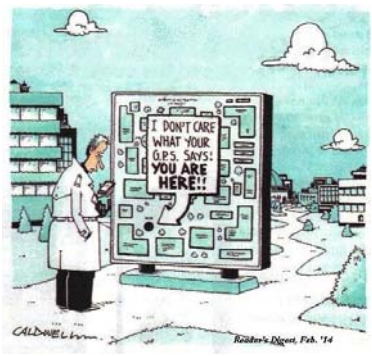
Questions?

Precise Survey Measurements,

Stairway to Heaven,

Or Path to Purgatory?

Presented by Don Teter,
Professional Surveyor



A measurement is not the only way to tell you've arrived!

Heaven

… place of great beauty and pleasure …
a state of great happiness …
Webster's Dictionary

Purgatory

… any state or place of temporary suffering …
Webster's Dictionary

Landman's Heaven

The resource is there,
Access is adequate,
The title is good,
And
The boundaries appear to be precisely measured.

What Could Go Wrong?

The Role of Measurement

Precision is getting easier and cheaper.

It's a great tool when data is important.
(Roads, topo, infrastructure management)

When competent boundary surveys are made,
precision makes them more
easily retraceable in the future.

Precision Can Mislead

Precise measurements are usually not
a good tool for boundary control.

Boundaries are controlled by evidence.

Measurements are one of the tools used
in seeking and finding the evidence.

**Boundaries are more complex
than measurements**

Careful analysis and judgment
are often needed.

Why Don't the Measurements Work?

Different measurements are the norm
when retracing old lines.

Much old equipment was not precise,
bearings were often to ¼ degree or larger.
Magnetic anomalies pulled the needle.

Chains were unwieldy,
tough to use climbing cliffs and crossing rivers.

Many surveyors were not skilled.

Good flunkies were real hard to find.

The woods were thick, hills steep,
natives sometimes hostile,
shelter scarce,
chow poor and skimpy,
pay low.

Distances estimated,
shot with stadia,
or measured on slope,
or haphazardly corrected.

Losing tally, transposing numbers
transcription errors

Paper, pencils and literacy were scarce.

No slide rules or calculators,

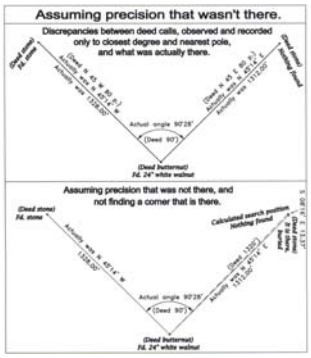
Calculations by longhand, errors common.

Mathematic tables scarce,

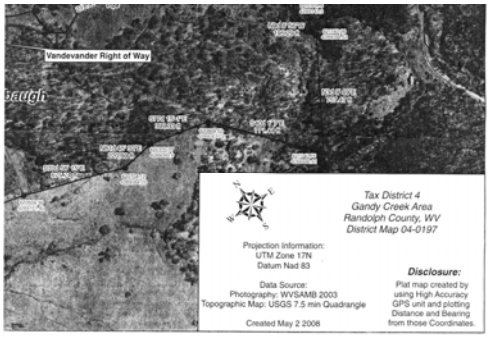
Acreage especially subject to large errors.

Writing sloppy, smudged

The Hazards of Relying on Measurement To Control Boundaries



The Path to Purgatory;
A Case Study of Precisely Measured Mayhem



Steps on the Purgatorial Pathway

The heirs needed a partition,

They decided they couldn't afford a survey,

One owner borrowed GPS from work,

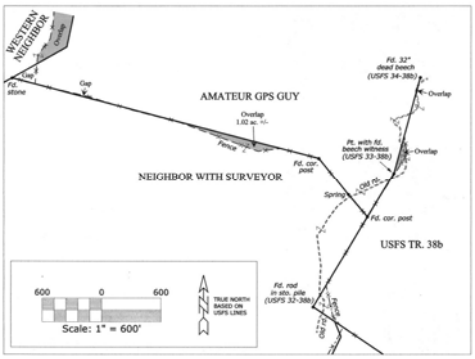
Collected precise fence line data,

Had a buddy in GIS create a plat and descriptions.

Lawyer reviewed and OK'd,

Deeds signed and recorded.

Then the Neighbor Got a Survey



Purgatory

Unlicensed Practice

Overlap With Forest Service

Overlap With "Neighbor With Survey"

Overlap With Western Neighbor

Various Gaps

Potential Litigation

Purgatory is temporary, but it's hell till its over!

Very Precisely

From An Environmental Perspective: How to Build A Petrochemical Project

Kathy G. Beckett
Steptoe & Johnson, PLLC
February, 2015

STEPTOE & JOHNSON ATTORNEYS AT LAW

Opportunities/Challenges

Opportunities

- Transportation
- Real Estate
- Utilities
- US History of Manufacturing, E&P Production, Reliable Power Generation, etc.

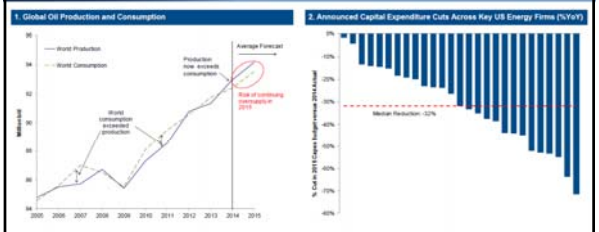
Challenges

- Economy
- Water
- Air
- Surface Soil (past contamination)
- Protected Species
- Cultural Resources
- Surprises

2

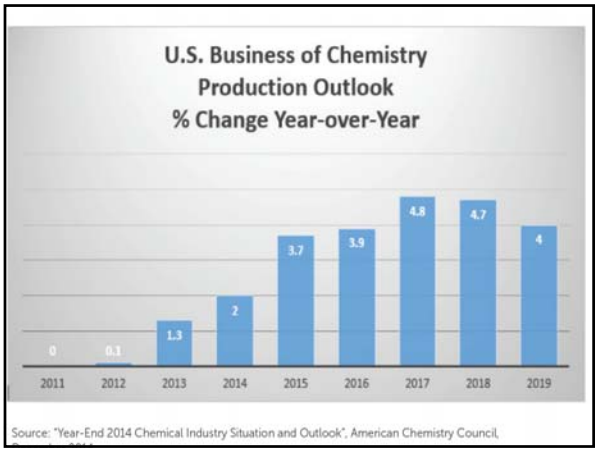
Oil: Short-Term Disruption but Long-Term GDP and Consumption Benefit

Investment Management Division

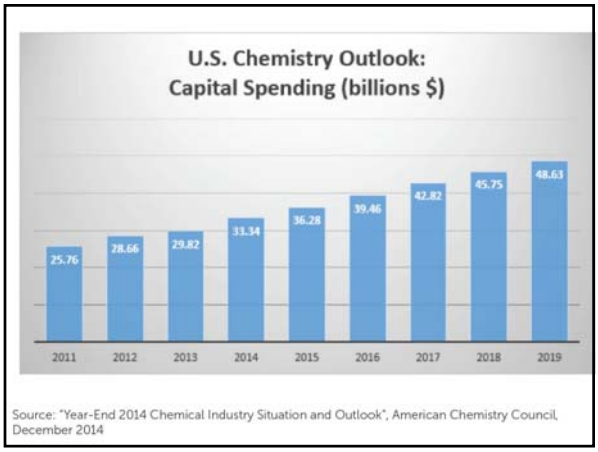


- Strong US production growth coupled with fewer international disruptions have led to an oversupplied oil market.
- This oversupply requires either a supply reduction or a demand increase to stabilize prices.
- With Saudi Arabia and other OPEC members maintaining production, US producers have started cutting their capital expenditures.
- These adjustments should help oil prices stabilize into our expected $60-80 range this year.

22



Source: "Year-End 2014 Chemical Industry Situation and Outlook", American Chemistry Council,



Source: "Year-End 2014 Chemical Industry Situation and Outlook", American Chemistry Council, December 2014

Significant USEPA Regulatory Actions Are Ongoing

1. Clean Air Act
   a. Clean Power Plan (Proposed)
   b. Transport rule and Mercury/HAPs (electric power) (Ongoing)
   c. NAAQS revisions (ozone and PM) (Imminent)
2. Clean Water Act
   a. Proposed new definition of "Waters of the United States" (Wow!)
   b. Intake structures 316(b) (Ongoing)
   c. Effluent guidelines
      (Unconventional oil and gas extraction; steam electric power generation)
3. Resource Conservation and Recovery Act (RCRA)
   a. Coal combustion residuals (CCR) (electric power)

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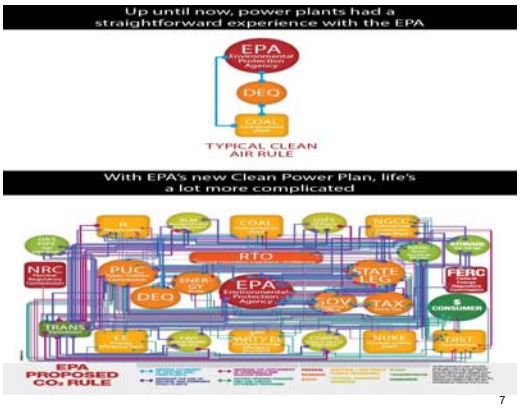

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Source: National Rural Electric Cooperative Association

Industrial Boiler MACT
Emissions targets for CO, Mercury and PM

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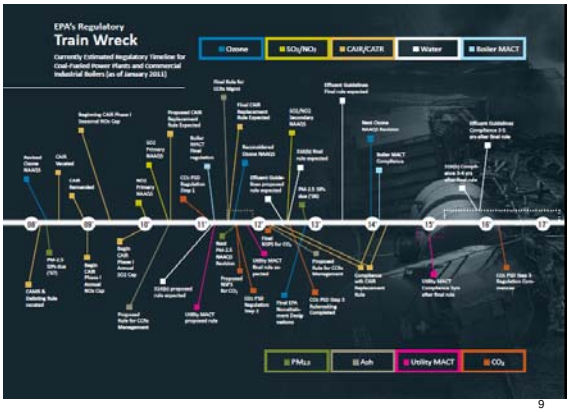

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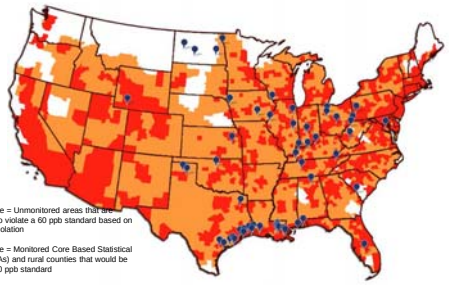
ACC Map Showing Impact of Revised Ozone Standard



- Light Orange = Unmonitored areas that are anticipated to violate a 60 ppb standard based on spatial interpolation
- Dark Orange = Monitored Core Based Statistical Areas (CBSAs) and rural counties that would be violating a 60 ppb standard
- Blue Markers = chemical industry projects announced as of September 2014

Source: American Chemistry Council

10

Source: EPA

NAAQS Review and Implementation February 12, 2014

	PM	Ozone	Lead	NO2 (primary)	SO2 (primary)	NO2/SO2 (secondary)
Current NAAQS Review	TBD	TBD	NPR July 2014 NFR TBD	**NPR Sept 2016 NFR June 2017**	NPR Feb 2017 NFR Nov 2017	NPR May 2017 NFR Feb 2018
NAAQS Level	Dec 14, 2012: REVISED Primary 2.5 annual 12 µg/m³ RETAINED 2.5 24-hr 35 µg/m³, 15 µg/m³ (secondary only) PM10 24-hr 150 µg/m³	March 2008: REVISED 0.075 ppm 8-hr (1997: 0.08 ppm 8-hr, effectively 0.084 with rounding)	Oct 2008: REVISED 0.15 µg/m³ rolling 3-month (revised previous 1.5 µg/m³ standard)	Jan 2010: REVISED 100 ppb 1-hr (triggers implementation) RETAINED 53 ppb annual (no triggers)	June 2010: REVISED 75 ppb 1-hr (triggers implementation) REVOKED 140 ppb 24-hr, 30 ppb annual	Mar 20, 2012: RETAINED NO2 0.053 ppm annual & SO2 0.5 ppm 3-hour
State, Tribe & Territories Recommendations Due	Dec 13, 2013 (Friday)	Mar 2009	1st group Oct 15, 2009 2nd group Dec 15, 2010	Jan 2011	Jun 3, 2011	Does Not Apply (retained std)
Designations	Dec 12, 2014 (Friday) effective early 2015	Effective July 20, 2012	1st group effective Dec 31, 2010 2nd group effective Dec 31, 2011	Feb 29, 2012 Redesignations TBD	1st group eff Oct 4, 2013 2nd 12/2017 3rd 12/2020	DNA
Attainment Demonstration Due	Mid-2016 (impl rule expected 12/14)	TBD (schedule to be set by SIP Req'ts Rule)	1st June 30, 2012 (NE LA County) 2nd June 30, 2013 (None in R9)	DNA to 2012 designations, all areas uncl/att	Eff date + 18 mo 1st group April 2015	DNA
[Infrastructure	[Dec 14, 2015]	[Mar 12, 2011]	[Oct 15, 2011]	[Jan 22, 2013]	[June 3, 2013]	[DNA]

Air Issues

- Clean Air Act permitting – To obtain a Clean Air Act permit it can take 1 – 3 years. Plan to initiate discussions with the state air regulatory agency early. The air permit can take longest time commitment to obtain. Begin early.
- Understand the design of the proposed facility and the state and federal emissions regulations for your source. (BACT and LAER).

12

BACT – Technology Standard

- EPA determines what air pollution control technology such as energy consumption, total source emission, regional environmental impact, and economic costs are taken into account. It is the current EPA standard for all polluting sources that fall under the New Source Review guidelines and is determined on a case-by-case basis.

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LAER – Technology Standard

- **Lowest Achievable Emissions Rate** is used by EPA to determine if emissions from a new or modified major stationary source are acceptable under SIP guidelines.
- "LAER" standards are required when a new, stationary source is located in a non-attainment air-quality region. It is the most stringent air pollution standard above the Best Available Control Technology (BACT) and Reasonably Available Control Technology (RACT) standards.

14

Ambient Air Quality Standards

- Keep in mind pending ambient air quality standards modifications and attainment status of the region.

15

Air

- Understand the air quality modeling that will be necessary to predict the impact of the proposed facility on ambient air quality. (If in an attainment area = assess potential for significant deterioration “PSD” or if in a non attainment area = conduct new source review “NSR.”)
- Visibility (referred to as regional haze) can also be a regulatory goal incorporated into the air permit.

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Source: EPA

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Surface Water

- If the design of the facility will discharge industrial waste water:
  - Assess quality of the proposed receiving stream. Understand if it is achieving state water quality standards or regionally established water quality standards (i.e. river-basin or coastal established standards). Determine if the stream is subject to an improvement plan if it is not achieving state water quality standards.
    - CWA 303(d) state generated list of water quality limited streams
    - TMDL “total maximum daily load” watershed permitting limits for dischargers

18

Water Quality Standards

- Educate yourself on the current status of applicable water quality standards relative to EPA recommendations and State action in that regard.

19

Surface Water

- Assess what regulated pollutants other sources in vicinity are discharging to the stream.
- Know the regulatory significance of what pollutants are in the “intake” water. Does the permitting authority allow for netting or intake credits of regulated pollutants.

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Surface Water Permitting

- U.S. EPA/State NPDES (“National Pollutant Discharge Elimination System”) 402 Permit.
  - Surface discharge permitting for industrial wastewater discharges and for construction activity stormwater discharges (mud, silt, etc.)
- U.S. Army Corps of Engineers 404 Permit for Disturbance of wetlands (“Dredge and Fill”).
  - Impacts on streambeds, banks, and wetlands.

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Groundwater

- State driven regulatory programs designed to protect groundwater quality.
- If the site has historical contamination the hazardous waste (RCRA) and the superfund (CERCLA) programs may be implemented to manage clean-up or in-situ management.

22

Water Quantity

- State law manages the use of water relative to quantity.
  - statutory water rights (western states), common law riparian water rights (eastern states).
- Assessment of the needs of the facility relative to regulatory and statutory ownership of surface water is a must.

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Significant US Fish & Wildlife Service Rulemakings/Listings

http://www.fws.gov/endangered/improving_ESA/listing_workplan_FY13-18.html

24

Revised ESA Regulation

- U.S. Fish & Wildlife Service is in the process of revising regulations.
- For example, the definition of “critical habitat” has recently been proposed for revision to expand the scope of what is considered “critical habitat.”

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Endangered Species

- Federal and state programs must be consulted to determine whether there are species that may or will be impacted by the project. (think: air, water, soil).
- Not all states have the same type of program or same list of species.
- The federal Endangered Species Act is triggered when there is a federal action that is required to approve the project. (“Federal Nexus”).

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Endangered Species

- Example: If seeking US Army Corps of Engineers authorization that creates federal nexus and they will “consult” with their federal partners, the US Fish & Wildlife Service, to determine whether the project will impact or potentially will impact a certain species.
- Independent of “federal nexus,” if there is a “take” of an endangered or protected species, that action is subject to federal criminal enforcement.

27

Cultural Impacts

- Federal authorizations require consultation with state historical preservation agencies to assure cataloguing and preservation of cultural and historical aspects of the impacted surface.

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Surprises

- Unexpected finds – develop a strategy for managing those unanticipated events that will require regulatory action but for which you hope will not to change the construction schedule.
  - Work with state to engage in a voluntary remediation plan that describes how to manage unexpected finds (i.e. buried treasure, buried waste, buried kings?).

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Simultaneously Work All The Environmental Issues

- ❑ Air is complex, begin early discussion with state agency. Non attainment means increased costs in construction.
- ❑ Water is easier, but learn the background and meet with all agencies early.
- ❑ Know your endangered and protected species and those expected to be listed.
- ❑ Do not wait to study the cultural resources at the site.
- ❑ Assess site history for industrial activities early and work to manage known and unknown past contamination.
- ❑ Communicate early and often with state and local government. They can be a valuable ally.

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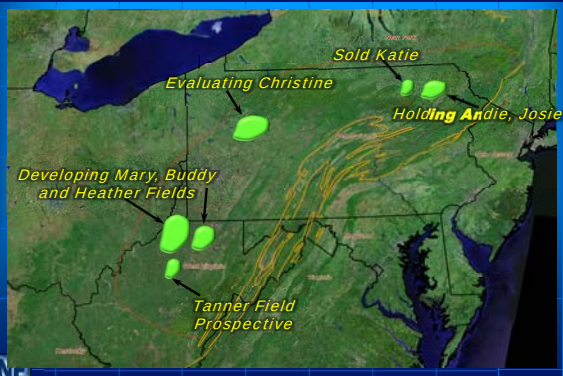
A Multi-Disciplinary Approach to Efficiently Developing Shale Resources

Mark Spears
Stone Energy Corporation

February 12, 2015

Stone Energy Appalachia Properties



Stone Energy Appalachia Operations Snapshot

- **Historical Perspective:**
  - **2008 - 2009 Began acquiring Marcellus shale leasehold in PA and WV, drilled vertical test wells and collected core data.**
  - **2010 -2011 Drilled and completed 10 to 14 horizontal wells per year to: a) evaluate various prospects, b) start booking reserves, c) establish safety and environmental protocols, d) begin water system infrastructure**
  - **2012 - 2013 Drilled 18 to 22 Marcellus wells per year, focusing on improving operational efficiencies, solving liquids handling issues, establishing a 3-year development plan, and optimizing reserves growth**
  - **2014 Drilled 38 Marcellus wells - focus on process improvements to implement Gantt process, address takeaway capacity, establish a 5-year development plan, and tested 1st Utica Shale well**
- **Region Office located in Morgantown, WV with field office in New Martinsville, WV. Have 42 full-time Stone Energy employees in WV.**

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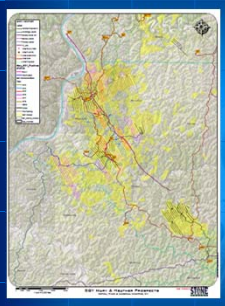
Mary Field – Wetzel, Marshall and Tyler Co., WV



Stone Leasehold is approximately 60K net acres

Stone has drilled 90 Marcellus wells in the Mary Field since 2011 (72 wells on production)

Drilled 38 Marcellus wells and 1 Utica Shale well in Mary Field in 2014

Inventory of over 250 undrilled Marcellus well laterals identified under full development scenario

Pipeline takeaway capacity improving after early difficulties; Net pricing has deteriorated recently

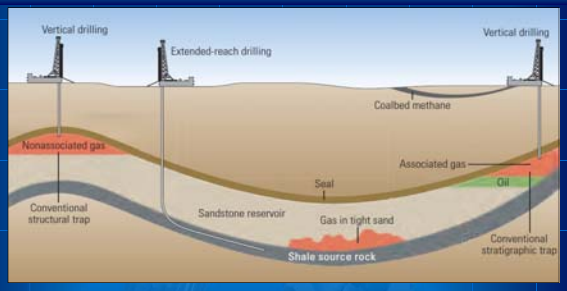
Huge upside potential in Utica Shale using existing roads, water and gas pipeline infrastructure

Mary Field Development

Key Disciplines Involved in Development Planning:

- Land and Legal
- Geology and Reservoir Engineering
- Well Planning (Recon) and Permitting
- Construction
- Drilling and Completions
- Production and Operations

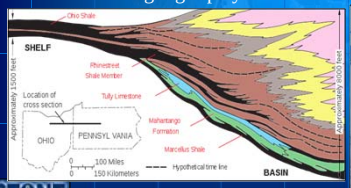
Unconventional Paradigm Shift

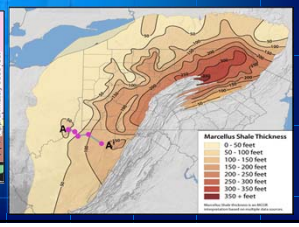


Horizontal drilling and large-scale hydraulic fracturing unlocked the unconventional potential of the Marcellus Shale. This shift in thinking led to the search for other organic shales, including the Utica Shale. **The Appalachian Basin remains the most drilled and under-explored basin in the world.**

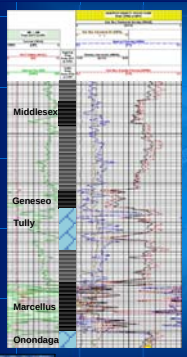
Marcellus Shale Basic Geology

- Marcellus Shale deposited ~385Mya in basin setting with water depths from 150-500' deep. Entered oil window ~340Mya, gas window ~200Mya
- Anoxic (very low oxygen) conditions prevailed during deposition.
- Marcellus formation gets deeper and more thermally mature to the east.
- The Marcellus is the source, seal and trap of hydrocarbons.
- Marcellus Shale was most likely the source rock for Upper Devonian conventional tight gas plays.





Shale Attributes that Matter for a Successful Shale Play

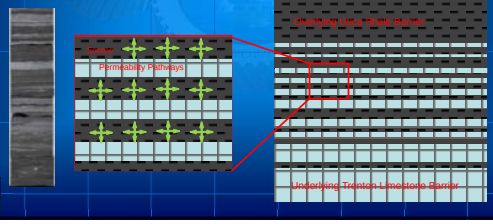


- Hydrocarbon Potential (Gas-in-Place) -TOC, thermal maturity, thickness, porosity, reservoir pressure, permeability, a seal that prevents leak-off of HC's, and, ideally, contains the hydraulic fracture within formation
- Rock brittleness or "crackability": enhances effectiveness of hydraulic fracture process
- Structural complexity, faults and natural fractures – some may be good, but too much can be very bad

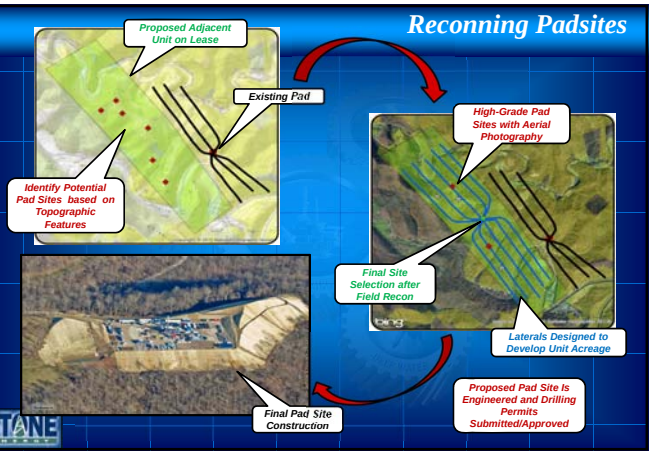
Geology of the Utica Shale

Hydrocarbon Maturation and Over-pressuring:

- Mud logging gas shows up to 4x as strong as the Marcellus
- Maturation of shale stringers sandwiched by carbonate barriers causes reservoir to be over-pressured
- Thin limestone stringers act as permeability pathways after stimulation
- Resistivity indicates a relatively dry gas formation in West Virginia
- Approx. 4000' deeper than Marcellus



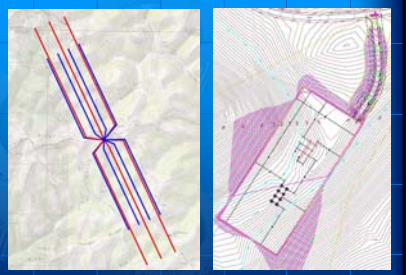
Reconning Padsites



Multi-Well Pad Construction

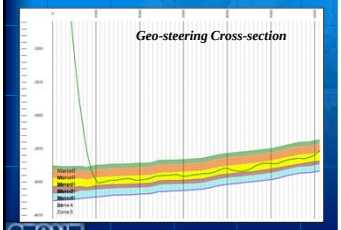
- New pad sites designed to accommodate 14 to 16 wells (8 to 10 Marcellus and 6 to 8 Utica wells).
- Site selection is key to minimizing construction costs and slips. Pre-engineering and soils testing is required prior to finalizing permit.
- 120 day construction window
- $1.0 MM - $2.0+ MM pad costs - engineering, design, permitting and construction, including access roads.
- Current design attempts to allow for drilling and producing 8 wells initially, then for drilling and completing 6 to 8 additional wells later w/o shutting in original 8 wells

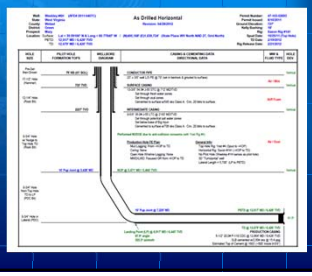
New Pad Layout



Drilling Overview

Horizontal rig drills curve and 8-1/2" horizontal lateral to TD
Oil-Based or Salt Water Mud: 12 –14 ppg MW, closed loop system
Lateral lengths from 5000' - 8000', MD's from 11,000' – 16,000'
Set and cement 5-1/2" casing in place.





Well Completions Overview

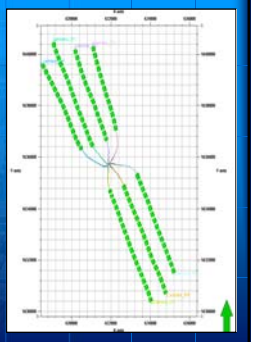
Typically 20 to 40 frac stages per well - 150' (RSC) to 250' Stage Spacing "plug to plug"; zipper fracs enhance interference and SRV

Typical slickwater stage consists of 300K – 400K lbs sand utilizing 350,000 gals water pumped at +/- 80 bpm

Flow-thru composite plugs for stage isolation

Drill-outs performed after flowback with either coil or stick tubing

Run 2-3/8" tubing to 70 to 80 degrees in curve after cleanout



Efficient Development Characteristics

- 10 Competing Goals for Resource Play Development:

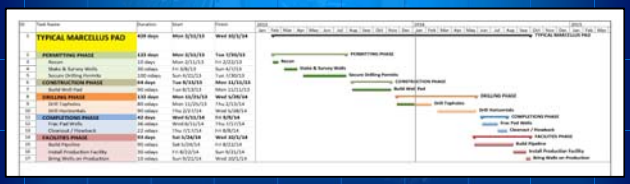
A) Maximize Production Rates
B) Maximize Booked Proved Reserves
C) Maximize Operating Cash Flows and Earnings
D) Maximize ROR on Capital Investment
E) Evaluate Characteristics from the Producing Reservoir
F) Develop and Hold as much Leasehold as possible
G) Utilize existing Infrastructure, wherever possible
H) Minimize negative impacts to the Local Community
I) Reduce Development Capital Costs per Well

J) There can be NO compromises on Safety, Environmental Compliance or Regulatory Compliance

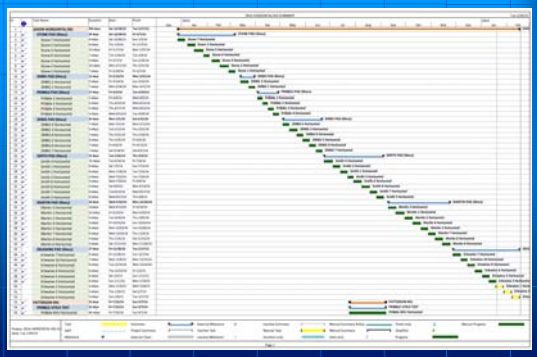
A Multi-Disciplinary Approach Requires a Goal and a Process

Without a specific Goal and a Process in place, competing priorities get in the way of each other. **Conflicts and Critical Path Items need to be identified and communicated across disciplines early in the planning process!**

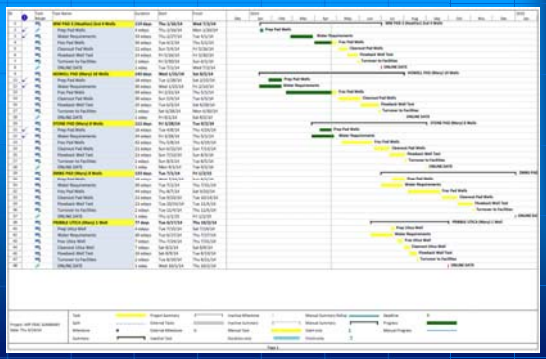
The Gantt Process – a detailed schedule of events for each part in well planning process – Leasing, Recon, Permitting, ROW, Pad Construction, Top-hole Rig, Horizontal Rig, Completions, Production Facilities and TIL Date



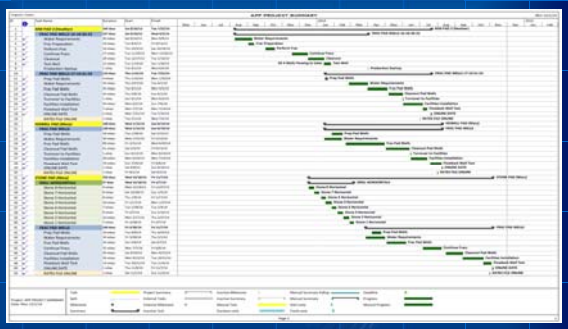
Gantt for Horizontal Rig Schedule



Gantt for Frac to TIL Schedule



Master Gantt Chart



The Gantt Process Maintains FOCUS

- Increased focus on "Who Will Do What By When". Each discipline responsible for executing their part on time.
- Separate Gantt Chart created for each step in the Process and then rolled into a Master Gantt Chart for Annual Development Plan
- Requires advanced planning, communication and cooperation from various disciplines – each discipline may not get exactly what they want, but each has a say in getting what they really need.
- Identifies gaps, overlaps and barriers to meeting the Plan
- Provides increased clarity on critical leasing needs, permitting, timing for pad builds, rig schedule, infrastructure needs, capital requirements, etc.
- Focuses efforts of all disciplines toward meeting a common goal and identifies areas where additional resources are needed early on

Questions?

Thank You