Form C Well Integrity Training Module
Opening Remarks
• Streamlining the Process
• Intent of Section 78.88

Inspections
• Form C Layout
• Summary of Form C Features and Use
• Examples by Well Type

Reporting
• Development of Greenport/OGRE Well Integrity Reporting Webpage
• Data Management Tools and Online Resources

Discussion/Q&A
• Time with Subsurface and Data Management & Compliance Staff
Streamlining the Process

• Keep it simple – take advantage of existing reporting options
• Avoid redundancy – don’t ask for data you already have
• Be flexible – allow multiple reporting formats (e.g., paper and GreenPort), but make them all look similar for ease of use
• Assume Integrity – the starting point should be that the inspected well does not have any problems
• Consistent Documentation – if potential problems are identified (fluids survey), a standard process allows these matters to be qualified immediately and consistently
Intent of Section 78.88

- To assemble records that verify operating wells are in compliance with the well construction and operating requirements of this chapter (78) and the act
- To ensure that wells are structurally sound and in compliance with Section 78.73(c)
- To annually indentify the compliance status of each operating well in the state
- To gather baseline data about a well so significant changes are evident

*To accomplish these objectives, key inspection elements have been defined*
## Open Flow or Shut-in Pressure Measurement

<table>
<thead>
<tr>
<th>Permit #</th>
<th>Farm name</th>
<th>Unconventional</th>
<th>Inspection Date</th>
<th>Primary Production Pressure (psig)</th>
<th>Primary Production Vent Flow as Required per 78.83(a)(1) or Other (cfpd)</th>
<th>Annular Production Pressure (psig)</th>
<th>Maximum Allowable Pressure Exceeded per 78.73(c) (Y/N/U)</th>
<th>Water Level or Other Measurement</th>
<th>Water Level or Other Unit</th>
</tr>
</thead>
</table>

**Open Flow (cfpd) or Shut-in Pressure on Production Annulus (psig)**

**Fluids Survey (Gas, Oil, or Brine)**

- Open Flow or Shut-in Pressure Measurement
- Open Flow or Shut-in Pressure Unit
- Any Fluids Noted (Y/N)
- Gas Outside Freshwater Casing (cfpd)
- Gas Outside Intermediate Casing (cfpd)
- Surface Wellhead Equipment Gas Emissions (cfpd)
- Any Liquids (Oil or Brine) to Surface or Outside Freshwater Casing (Y/N)
- Corrosion Problems (Y/N)
- No-inspection comments
- Text comments
## Summary of Form C Features and Use

### PRE-POPULATED IN GREENPORT ENVIRONMENT

<table>
<thead>
<tr>
<th>Permit #</th>
<th>Farm name</th>
<th>Unconventional</th>
<th>Inspection Date</th>
<th>Primary Production Pressure (psig)</th>
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</tr>
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</table>

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<table>
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<tr>
<th>Open Flow or Shut-in Pressure Measurement</th>
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<th>Any Fluids Noted (Y/N)</th>
<th>Gas Outside Freshwater Casing (cfpd)</th>
<th>Gas Outside Intermediate Casing (cfpd)</th>
<th>Surface Wellhead Equipment Gas Emissions (cfpd)</th>
<th>Any Liquids (Oil or Brine) to Surface or Outside Freshwater Casing (Y/N)</th>
<th>Corrosion Problems (Y/N)</th>
<th>No-inspection comments</th>
<th>Text comments</th>
</tr>
</thead>
</table>

### Fluids Survey (Gas, Oil, or Brine)

- Gas
- Oil
- Brine
# Summary of Form C Features and Use

## 4 Lines for Unconventional Wells (Date Required); 1 Line for Conventional Wells (Date Assigned: Can Be Updated With Actual Inspection Date)

<table>
<thead>
<tr>
<th>Inspection Date</th>
<th>Primary Production Pressure (psig)</th>
<th>Primary Production Vent Flow as Required per 78.83(a)(1) or Other (cfpd)</th>
<th>Annular Production Pressure (psig)</th>
<th>Maximum Allowable Pressure Exceeded per 78.73(c)(Y/N/U)</th>
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</table>

<table>
<thead>
<tr>
<th>Open Flow (cfpd) or Shut-in Pressure on Production Annulus (psig)</th>
<th>Fluids Survey (Gas, Oil, or Brine)</th>
<th>Any Fluids Noted (Y/N)</th>
<th>Gas Outside Freshwater Casing (cfpd)</th>
<th>Gas Outside Intermediate Casing (cfpd)</th>
<th>Surface Wellhead Equipment Gas Emissions (cfpd)</th>
<th>Any Liquids (Oil or Brine) to Surface or Outside Freshwater Casing (Y/N)</th>
<th>Corrosion Problems (Y/N)</th>
<th>No-inspection Comments</th>
<th>Text Comments</th>
</tr>
</thead>
</table>

- Open Flow or Shut-in Pressure Measurement
- Open Flow or Shut-in Pressure Unit
- Gas Outside Freshwater Casing (cfpd)
- Gas Outside Intermediate Casing (cfpd)
- Surface Wellhead Equipment Gas Emissions (cfpd)
- Any Liquids (Oil or Brine) to Surface or Outside Freshwater Casing (Y/N)
- Corrosion Problems (Y/N)
- No-inspection Comments
- Text Comments
IN SUMMARY

• ALL OPERATORS (conventional and unconventional) MUST INSPECT ALL OPERATING WELLS (conventional and unconventional) 4 TIMES PER YEAR
  – JAN 1 TO MAR 31
  – APR 1 TO JUNE 30
  – JULY 1 TO SEP 30
  – OCT 1 TO DEC 31

• Operating wells include ACTIVE wells and ABANDONED WELLS THAT HAVE NOT BEEN PLUGGED

• However, only ONE INSPECTION RESULT needs to be REPORTED FOR CONVENTIONAL WELLS, preferably the quarter closest to the reporting period; whereas 4 INSPECTION RESULTS need to be REPORTED FOR UNCONVENTIONAL WELLS for any Form used (Forms A, B or C)
### Summary of Form C Features and Use

**SOME FIELDS REQUIRED; OTHERS DEPENDENT UPON WELL DESIGN AND CONDITIONS**

<table>
<thead>
<tr>
<th>Permit #</th>
<th>Farm name</th>
<th>Unconventional</th>
<th>Date</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Open Flow (cfpd) or Shut-in Pressure on Production Annulus (psig)</th>
<th>Fluids Survey (Gas, Oil, or Brine)</th>
<th>Primary Production Pressure (psig)</th>
<th>Primary Production Vent Flow as Required per 78.83(a)(1) or Other (cfpd)</th>
<th>Annular Production Pressure (psig)</th>
<th>Maximum Allowable Pressure Exceeded per 78.73(c) (Y/N/U)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Open Flow or Shut-in Pressure Measurement</td>
<td>Open Flow or Shut-in Pressure Unit</td>
<td>Any Fluids Noted (Y/N)</td>
<td>Gas Outside Freshwater Casing (cfpd)</td>
<td>Gas Outside Intermediate Casing (cfpd)</td>
<td>Surface Wellhead Equipment Gas Emissions (cfpd)</td>
<td>Any Liquids (Oil or Brine) to Surface or Outside Freshwater Casing (Y/N)</td>
<td>Corrosion Problems (Y/N)</td>
</tr>
</tbody>
</table>
### Summary of Form C Features and Use

<table>
<thead>
<tr>
<th>Permit #</th>
<th>Farm name</th>
<th>Unconventional</th>
<th>Primary Production</th>
<th>Primary Production Vent Flow as Required per</th>
<th>Annular</th>
<th>Maximum Allowable Pressure Exceeded per 78.73(c) (Y/N/U)</th>
<th>Water Level or Other Measurement</th>
<th>Water Level or Other Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Open Flow (cfpd) or Shut-in Pressure on Production Annulus (psig)</th>
<th>Fluids Survey (Gas, Oil, or Brine)</th>
<th>No-inspection comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Flow or Shut-in Pressure Measurement</td>
<td>Open Flow or Shut-in Pressure Unit</td>
<td>Any Fluids Noted (Y/N)</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>------------------------------------</td>
<td>-----------------------</td>
</tr>
</tbody>
</table>

**STANDARD COMMENT MUST BE PROVIDED FOR EACH WELL NOT INSPECTED; E.G., “THIS IS NOT OUR WELL”**
### Summary of Form C Features and Use

<table>
<thead>
<tr>
<th>Permit #</th>
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<th>Water Level or Other Measurement</th>
<th>Water Level or Other Unit</th>
</tr>
</thead>
</table>

- **Open Flow (cfpd) or Shut-in Pressure on Production Annulus (psig)**
- **Fluids Survey (Gas, Oil, or Brine)**
- **Surface Wellhead Equipment Gas Emissions (cfpd)**
- **Surface or Outside Freshwater Casing (Y/N)**
- **Corrosion Problems (Y/N)**
- **No-inspection comments**

**OPTIONAL COMMENTS UP TO 255 CHARACTERS INCLUDING SPACES**

Text comments
Summary of Form C Features and Use

Primary Production Pressure Section

- Leave field BLANK if it does not apply to your well design and/or operating environment.
- NRM = Not Readily Measurable: this designates flows that can’t be constrained for measurement or are too small to measure.
- U = Unknown: this applies when gas is produced through surface/coal casing, but casing set depth is not known.

NOTE: IF YOU ANSWER “Y” UNDER “THE MAXIMUM ALLOWABLE PRESSURE EXCEEDED” FIELD, YOU MUST REPORT THIS CONDITION TO DISTRICT OGI SUPERVISOR WITHIN 24 HOURS AND IMPLEMENT MEASURES TO LOWER THE PRESSURE ON THE CASING SEAT.
Summary of Form C Features and Use

**Water Level or Other**

- Leave field BLANK if it does not apply to your well design and/or operating environment; e.g., any well equipped with separate production string

- **Unit Descriptions:**
  - ft: Feet (Water Level)
  - ppg: Pounds Per Gallon (Mud Scale Weight)
  - bbls/day: Barrels per Day (Avg. Daily Pumping Volume)
  - hrs/day: Hours per Day (Avg. Daily Pumping Rate)
  - TDS: Total Dissolved Solids (Produced Water Quality)
  - µS/cm: Microsiemens per Centimeter (Produced Water Quality)
  - NPW: No Produced Water (For wells that don’t produce fluids)
**Summary of Form C Features and Use**

<table>
<thead>
<tr>
<th>Open Flow or Shut-in Pressure Measurement</th>
<th>Open Flow or Shut-in Pressure Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole Number Starting at 0, 1, NRM OR blank</td>
<td>cfpd, psig OR blank</td>
</tr>
</tbody>
</table>

**Open Flow or Shut-in Pressure on Production Annulus**

- Leave field BLANK if it does not apply to your well design and/or operating environment; e.g., annulus is produced
- I = Inaccessible: wells constructed in a way that prevent access to the production annulus
- Unit Description:
  - cfpd: Cubic Feet per Day
  - psig: Pounds per Square Inch Gauge
### Summary of Form C Features and Use

**Fluids Survey**

- **“Any Fluids Noted” field MUST always be answered with Y or N, unless no inspection was completed and the appropriate no-inspection comment was selected.**
- If fluids are noted (Y), the other applicable fields MUST be completed in this section of the form.
- **Surface equipment is WELLHEAD EQUIPMENT; not separators, compressors, gathering lines, etc.**

<table>
<thead>
<tr>
<th>Any Fluids Noted (Y/N)</th>
<th>Gas Outside Freshwater Casing (cfpd)</th>
<th>Gas Outside Intermediate Casing (cfpd)</th>
<th>Surface Wellhead Equipment Gas Emissions (cfpd)</th>
<th>Any Liquids (Oil or Brine) to Surface or Outside Freshwater Casing (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y or N</td>
<td>Whole Number Starting at 0, 1, NRM OR blank</td>
<td>Whole Number Starting at 0, 1, NRM OR blank</td>
<td>Whole Number Starting at 0, NRM OR blank</td>
<td>Y, N OR blank</td>
</tr>
</tbody>
</table>

**Fluids Survey (Gas, Oil, or Brine)**
Examples of Fluids Leaks
Examples of Fluids Leaks
Summary of Form C Features and Use

Corrosion Problems

- This will ALWAYS be a Y or N, unless no inspection was completed and the appropriate no-inspection comment was selected.

- **Corrosion Problem:** Severe corrosion that will lead to an imminent environmental release if not addressed, i.e., mechanical failure may occur before next quarterly inspection. Surface equipment designed to contain pressure and/or fluids should be focused on as part of this inspection.

- **Enter Y** if any severe corrosion problems are noted that, unless repaired, will result in the imminent failure of well components intended to contain pressure and/or produced fluids.

- **Enter N** if there is no corrosion or only minor surface corrosion observed as part of this inspection, as the presence of some surface oxidation is actually beneficial to the integrity of operating wells.

**NOTE:** IF YOU ANSWER “Y,” YOU MUST REPORT THIS CONDITION TO DISTRICT OGI SUPERVISOR WITHIN 24 HOURS
Summary of Form C Features and Use

Examples of Severe Corrosion Problems
Examples of Severe Corrosion Problems
## Summary of Form C Features and Use

### No-Inspection & Text Comments

<table>
<thead>
<tr>
<th>No-inspection comments</th>
<th>Text comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **No-inspection comments:**
  - Plugged Well
  - This is not our well
  - Gas storage well
  - Well spud, drilling not completed
  - Regulatory Inactive Well
  - Injection Well
  - Observation Well
  - Status validation underway

- **Status validation underway:** any wells that aren't inspected on paper forms or Form A and Form B will also be automatically qualified with this comment

- **Abandoned wells must still be inspected if they have not yet been plugged**

- **Text Comments**: should be used to note any significant observations during inspection: *don’t necessarily let DEP interpret data for you* – CLARIFY
BREAK – QUESTIONS?
**Casing Definitions: Wells Spud PRIOR TO February 5, 2011**

**CONDUCTOR PIPE:** A short string of large-diameter casing used to stabilize the top of the wellbore in shallow unconsolidated formations. It may be cemented, driven, or sanded in (this is not counted as a separate casing string if using Form A).

**SURFACE/COAL CASING:** In most cases, if ANY FRESHWATER ZONES or WORKABLE COAL SEAMS/MINE VOIDS are isolated over this depth interval, the casing is considered SURFACE/COAL CASING. Note that more than one surface or coal casing string may be used and brackish water/brine zones may also be isolated.

**INTERMEDIATE CASING:** In most cases, if ONLY BRACKISH WATER/BRINE ZONES are isolated over this depth interval, the casing is considered INTERMEDIATE CASING. This casing may also isolate non-target hydrocarbon zones. Intermediate casing is not used in every well and is only possible if separate coal/surface and production strings are present. Note that more than one intermediate string may be used.

**PRODUCTION CASING:** A string of pipe other than surface casing and coal protective casing which is run for the purpose of confining or conducting hydrocarbons and associated fluids from one or more producing horizons to the surface. Production casing may be anchored with cement or a packer, or cemented to surface, but MUST ISOLATE hydrocarbons from the next shallower casing string in the well completely to meet this definition, i.e., it cannot be free-hanging in the wellbore.
Casing Definitions: Wells Spud AFTER February 5, 2011

CONDUCTOR PIPE: A short string of large-diameter casing used to stabilize the top of the wellbore in shallow unconsolidated formations. It may be cemented or driven (this is not counted as a separate casing string if using Form A).

SURFACE/COAL CASING: In most cases, if ONLY FRESHWATER ZONES or WORKABLE COAL SEAMS/MINE VOIDS are isolated over this depth interval, the casing is considered SURFACE/COAL CASING. Note that more than one surface or coal casing string may be used and that the deepest fresh groundwater casing must be no more than 200 feet below the base of fresh groundwater.

INTERMEDIATE CASING: In most cases, if ONLY BRACKISH WATER/BRINE ZONES are isolated over this depth interval, the casing is considered INTERMEDIATE CASING. This casing may also isolate non-target hydrocarbon zones. Intermediate casing is not used in every well and is only possible if separate coal/surface and production strings are present. Note that more than one intermediate string may be used.

PRODUCTION CASING: A string of pipe other than surface casing and coal protective casing which is run for the purpose of confining or conducting hydrocarbons and associated fluids from one or more producing horizons to the surface. Production casing may be anchored with cement or a packer, or cemented to surface, but MUST ISOLATE hydrocarbons from the next shallower casing string in the well completely to meet this definition, i.e., it cannot be free-hanging in the wellbore.
Annulus Definitions

Outside Conductor Pipe (FRESH GROUNDWATER)
Surface/Coal (S/C) Annulus (FRESH GROUNDWATER)
Intermediate (I) Annulus
Production (P) Annulus
Production Casing Interior

View in Cross-Section
Overhead View
Examples by Well Type

- Single-String* Vented Oil Well
- Single-String* Combo Well
- Single-String* Gas Well
- Multi-String Oil Well
- Multi-String Gas Well
- Multi-String Combo Well
- Multi-String Gas Well, Annular Production
- Multi-String Combo Well, Annular Production

Each example will include a well with no leaks and one with identified leaks

Assume no lost circulation issues at wells with annular production inside surface casing

*Indicates well with only “freshwater” casing
Single-String Vented Oil Well Example

- Oil well (open-hole completion) equipped with surface casing (orange) and conductor pipe (dark blue) only
- Tubing used to recover oil, but not depicted
- Casing head gas is vented to the atmosphere to keep back pressure off of producing formation and casing seat
- The water level is not accessible
• Notes
  – For this well design, only the Primary Production Vent Flow in cfpd needs to be reported
  – All other fields are left BLANK in this section of the inspection report
### Single-String Vented Oil Well Example

<table>
<thead>
<tr>
<th>Water Level or Other Measurement</th>
<th>Water Level or Other Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.20</td>
<td>bbls/day</td>
</tr>
</tbody>
</table>

**Notes**

- To monitor for leaks in the surface casing, which is serving as production casing, the operator has chosen to monitor the produced water volume in bbls/day instead of measuring the water level.
• Notes
  – The annular space between the surface casing and conductor pipe is inspected for the presence of escaping gas (downhole leak), which is reported in cfpd since this space is open to the atmosphere.
**Single-String Vented Oil Well Example**

### Notes

- If no fluids (gas, oil, or brine) are noted, “N” is entered and all other fields in the Fluids Survey section are left BLANK.
- When fluids are noted, first two columns to right of “Y” indicate downhole casing leaks, third column indicates any surface wellhead equipment leaks, and last column indicates discharges of oil or brine to surface from wellhead equipment or flowing to surface outside of freshwater casing.
- In the red-shaded example, a faulty valve has allowed a small volume of oil/brine to discharge to the surface and all other applicable portions of the Fluids Survey section must be completed: note that “Gas Outside Freshwater Casing” refers to outside the conductor pipe for this design.
Single-String Vented Oil Well Example

• Notes
  – No corrosion problems are noted

• Notes
  – The reason for the leak and the repair is documented in the comments field for the red-shaded example

Corrosion Problems (Y/N)

N

Text comments

Oil/brine leak to surface from faulty valve: valve replaced
• Combo well (open-hole completion) equipped with surface casing (orange) and conductor pipe (dark blue) only
• Tubing is used to recover oil, but not depicted
• Gas is produced inside of the surface casing
• The water level is not accessible
### Single-String Combo Well Example

<table>
<thead>
<tr>
<th>Primary Production Pressure (psig)</th>
<th>Primary Production Vent Flow as Required per 78.83(a)(1) or Other (cfpd)</th>
<th>Annular Production Pressure (psig)</th>
<th>Maximum Allowable Pressure Exceeded per 78.73(c) (Y/N/U)</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td></td>
<td></td>
<td>N</td>
</tr>
</tbody>
</table>

#### Notes
- For this well design, the Primary Production Pressure in psig needs to be reported.
- The pressure, whether shut-in or flowing, is compared to 80% x 0.433 psi/ft x surface casing set depth (ft) – it is below this benchmark.
- All other fields are left BLANK in this section of the inspection report.
Notes

- To monitor for leaks in the surface casing, which is serving as production casing, the operator has chosen to monitor the produced water quality in Total Dissolved Solids (TDS) instead of measuring the water level.
• Notes

– The annular space between the surface casing and conductor pipe is inspected for the presence of escaping gas (downhole leak), which is reported in cfpd since this space is open to the atmosphere
**Single-String Combo Well Example**

- **Notes**
  - If no fluids (gas, oil, or brine) are noted, “N” is entered and all other fields in the Fluids Survey section are left BLANK.
  - When fluids are noted, first two columns to right of “Y” indicate downhole casing leaks, third column indicates any surface wellhead equipment leaks, and last column indicates discharges of oil or brine to surface from wellhead equipment or flowing to surface outside of freshwater casing.
  - In the red-shaded example, a minor thread leak has allowed a small volume of gas to escape at the surface and all other applicable portions of the Fluids Survey section must be completed: please note - although a leak is noted, NRM (not readily measureable) is recorded in the “Surface Equipment Gas Emissions” because the amount could not be quantified.
Single-String Combo Well Example

- Notes
  - No corrosion problems are noted

- Notes
  - The reason for the leak of gas at the surface is documented in the comments field for the red-shaded example

Minor thread leak noted
Single-String Gas Well Example

- Gas well (open-hole completion) equipped with surface casing (orange) and conductor pipe (dark blue) only
- Gas is produced inside of the surface casing
Notes

- For this well design, the Primary Production Pressure in psig needs to be reported.
- The pressure, whether shut-in or flowing, is compared to 80% x 0.433 psi/ft x surface casing set depth (ft) – it is above this benchmark (IMMEDIATE DEP REPORTING REQUIRED).
- All other fields are left BLANK in this section of the inspection report.
• Notes
  – Nothing is recorded for this inspection element due to the fact that it is not required for gas wells – it is only required for oil or combo wells
Single-String Gas Well Example

Notes

- The annular space between the surface casing and conductor pipe is inspected for the presence of escaping gas (downhole leak), which is reported in cfpd since this space is open to the atmosphere.
**Single-String Gas Well Example**

- **Notes**
  - If no fluids (gas, oil, or brine) are noted, “N” is entered and all other fields in the Fluids Survey section are left BLANK.
  - When fluids are noted, first two columns to right of “Y” indicate downhole casing leaks, third column indicates any surface wellhead equipment leaks, and last column indicates discharges of oil or brine to surface from wellhead equipment or flowing to surface outside of freshwater casing.
  - In the red-shaded example, a small volume of gas was escaping outside the conductor casing and all other applicable portions of the Fluids Survey section must be completed: NRM is recorded in the “Gas Outside Freshwater Casing” because the amount could not be quantified.
Single-String Gas Well Example

• Notes
  – No corrosion problems are noted

Corrosion Problems (Y/N)
N

• Notes
  – Overpressuring of the casing seat and the observation of gas outside of freshwater casing are documented in the comments field for the example
Multi-String Oil Well Example

- Multi-string oil well (cased-hole completion) equipped with production casing (light blue), intermediate casing (green), surface casing (orange), and conductor pipe (dark blue)
- Tubing used to recover oil, but not depicted
- Casing head gas is vented to the atmosphere because no pipeline is available
• Notes
  – For this well design, only the Primary Production Vent Flow in cfpd needs to be reported
  – All other fields are left BLANK in this section of the inspection report

<table>
<thead>
<tr>
<th>Primary Production Pressure (psig)</th>
<th>Primary Production Vent Flow as Required per 78.83(a)(1) or Other (cfpd)</th>
<th>Annular Production Pressure (psig)</th>
<th>Maximum Allowable Pressure Exceeded per 78.73(c) (Y/N/U)</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
• Notes
  – Nothing is recorded for this inspection element due to the fact that oil is not produced inside a surface or coal string (tubing is used to recover oil and the well is equipped with a separate, perforated production casing)
Multi-String Oil Well Example

Notes

- The annular space between the production casing and intermediate casing is inspected for the presence of escaping gas (downhole leak), which is reported in psig since this space is shut-in.
### Multi-String Oil Well Example

#### Fluids Survey (Gas, Oil, or Brine)

<table>
<thead>
<tr>
<th>Any Fluids Noted (Y/N)</th>
<th>Gas Outside Freshwater Casing (cfpd)</th>
<th>Gas Outside Intermediate Casing (cfpd)</th>
<th>Surface Wellhead Equipment Gas Emissions (cfpd)</th>
<th>Any Liquids (Oil or Brine) to Surface or Outside Freshwater Casing (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>0</td>
<td>25</td>
<td>0</td>
<td>N</td>
</tr>
</tbody>
</table>

#### Notes
- If no fluids (gas, oil, or brine) are noted, “N” is entered and all other fields in the Fluids Survey section are left BLANK.
- When fluids are noted, first two columns to right of “Y” indicate downhole casing leaks, third column indicates any surface wellhead equipment leaks, and last column indicates discharges of oil or brine to surface from wellhead equipment or flowing to surface outside of freshwater casing.
- In the red-shaded example, escaping gas was noted outside the intermediate casing. It was discovered that a shallow gas zone was not completely isolated in the intermediate hole section of the well.
### Multi-String Oil Well Example

#### Notes
- No corrosion problems are noted

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#### Notes
- The observation and estimated flow of annular gas outside the intermediate casing are documented in the comments field for the red-shaded example

<table>
<thead>
<tr>
<th>Corrosion Problems (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
</tr>
</tbody>
</table>

**Text comments**

Annular gas flow noted outside intermediate string estimated at 25 cfpd
Multi-String Gas Well Example

- Gas well (cased-hole completion) equipped with production casing (light blue), surface casing (orange), and conductor pipe (dark blue)
### Multi-String Gas Well Example

<table>
<thead>
<tr>
<th>Primary Production Pressure (psig)</th>
<th>Primary Production Vent Flow as Required per 78.83(a)(1) or Other (cfpd)</th>
<th>Annular Production Pressure (psig)</th>
<th>Maximum Allowable Pressure Exceeded per 78.73(c) (Y/N/U)</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes**
- For this well design, the Primary Production Pressure in psig needs to be reported
- All other fields are left BLANK in this section of the inspection report
• Notes
  – Nothing is recorded for this inspection element due to the fact that it is not required for gas wells – it is only required for single-string oil or combo wells
Notes

- The annular space between the production casing and surface casing is inspected for the presence of escaping gas (downhole leak), which is reported in cfpd since this space is open to the atmosphere.
### Multi-String Gas Well Example

<table>
<thead>
<tr>
<th>Fluids Survey (Gas, Oil, or Brine)</th>
<th>Any Fluids Noted (Y/N)</th>
<th>Gas Outside Freshwater Casing (cfpd)</th>
<th>Gas Outside Intermediate Casing (cfpd)</th>
<th>Surface Wellhead Equipment Gas Emissions (cfpd)</th>
<th>Any Liquids (Oil or Brine) to Surface or Outside Freshwater Casing (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>0</td>
<td>NRM</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Y</td>
<td>0</td>
<td>NRM</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

- **Notes**
  - If no fluids (gas, oil, or brine) are noted, “N” is entered and all other fields in the Fluids Survey section are left BLANK.
  - When fluids are noted, first two columns to right of “Y” indicate downhole casing leaks, third column indicates any surface wellhead equipment leaks, and last column indicates discharges of oil or brine to surface from wellhead equipment or flowing to surface outside of freshwater casing.
  - In the red-shaded example, a small volume of escaping gas was noted in association with the surface well equipment and all other applicable portions of the Fluids Survey section must be completed: although a leak is noted, NRM is recorded in the “Surface Equipment Gas Emissions” field because the amount could not be quantified.
Multi-String Gas Well Example

- Notes
  - No corrosion problems are noted

- Notes
  - The reason for the leak of gas at the surface is documented in the comments field for the red-shaded example

Minor thread leak noted
Multi-String Combo Well Example

• Combo well (open-hole completion) equipped with production casing (light blue), surface casing (orange), and conductor pipe (dark blue)
• Tubing is used to recover oil, but not depicted
• Frac pipe (production casing) has been left in the well to prevent overpressuring of the surface casing seat
• Associated gas is produced inside of the production casing
### Multi-String Combo Well Example

<table>
<thead>
<tr>
<th>Primary Production Pressure (psig)</th>
<th>Primary Production Vent Flow as Required per 78.83(a)(1) or Other (cfpd)</th>
<th>Annular Production Pressure (psig)</th>
<th>Maximum Allowable Pressure Exceeded per 78.73(c) (Y/N/U)</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

- For this well design, the Primary Production Pressure in psig needs to be reported.
- All other fields are left BLANK in this section of the inspection report.
Notes

– Nothing is recorded for inspection element due to production pipe being set on a packer, which effectively serves as a separate production casing
**Multi-String Combo Well Example**

- **Notes**
  - The annular space between the frac pipe (production casing) and surface casing is inspected for the presence of escaping gas (downhole leak), which is reported in cfpd since this space is open to the atmosphere
• Notes
  – If no fluids (gas, oil, or brine) are noted, “N” is entered and all other fields in the Fluids Survey section are left BLANK.
  – When fluids are noted, first two columns to right of “Y” indicate downhole casing leaks, third column indicates any surface wellhead equipment leaks, and last column indicates discharges of oil or brine to surface from wellhead equipment or flowing to surface outside of freshwater casing.
  – In the red-shaded example, a small volume of escaping gas was noted during the inspection due to a thread leak and all other applicable portions of the Fluids Survey section must be completed: please note - NRM is recorded in the “Surface Equipment Gas Emissions” because the amount could not be quantified.
Multi-String Combo Well Example

- Notes
  - No corrosion problems are noted

- Notes
  - The reason for the leak of gas at the surface is documented in the comments field for the red-shaded example

Minor thread leak noted
Multi-String Gas Well, Annular Production Example

• Gas well (cased-hole completion) equipped with production casing (light blue), intermediate casing (green), surface casing (orange), and conductor pipe (dark blue)

• Annular gas is produced inside of the intermediate casing
## Multi-String Gas Well, Annular Production Example

**Notes**

- For this well design, the Primary Production Pressure in psig needs to be reported.
- The Annular Production Pressure in psig also needs to be reported.
- All other fields are left BLANK in this section of the inspection report.

<table>
<thead>
<tr>
<th>Primary Production Pressure (psig)</th>
<th>Primary Production Vent Flow as Required per 78.83(a)(1) or Other (cfpd)</th>
<th>Annular Production Pressure (psig)</th>
<th>Maximum Allowable Pressure Exceeded per 78.73(c) (Y/N/U)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600</td>
<td></td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>
• Notes
  – Nothing is recorded for inspection element due to because it is not required for multi-string wells (it is only required for single-string oil or combo wells)
• Notes
  – This section is left blank as the production annulus is being produced and was reported in the primary production section of the form
Multi-String Gas Well, Annular Production Example

**Notes**
- If no fluids (gas, oil, or brine) are noted, “N” is entered and all other fields in the Fluids Survey section are left BLANK.
- When fluids are noted, first two columns to right of “Y” indicate downhole casing leaks, third column indicates any surface wellhead equipment leaks, and last column indicates discharges of oil or brine to surface from wellhead equipment or flowing to surface outside of freshwater casing.
- In the red-shaded example, a small volume of escaping gas was noted at the wellhead and all other applicable portions of the Fluids Survey section must be completed: NRM is recorded in the “Surface Equipment Gas Emissions” because the amount could not be quantified.
Multi-String Gas Well, Annular Production Example

- Notes
  - No corrosion problems are noted

- Notes
  - The reason for the leak of gas at the surface is documented in the comments field for the red-shaded example

Leak around tubing hanger bolt
Multi-String Combo Well, Annular Production Example

- Combo well (cased-hole completion) equipped with production casing (light blue), surface casing (orange), and conductor pipe (dark blue)
- Tubing used to recover oil, but not depicted – associated gas is produced inside production casing
- Annular gas from a shallow zone is also produced inside of the surface casing
Notes

- For this well design, the Primary Production Pressure in psig needs to be reported.
- Annular Production Pressure in psig also needs to be reported.
- Since the annulus is produced inside of surface casing, the pressure is compared to $80\% \times 0.433 \text{ psi/ft} \times \text{surface casing set depth (ft)}$ – it is below this benchmark.
- The Primary Production Vent Flow field is left BLANK in this section of the inspection report.
• Notes
  – Nothing is recorded for this inspection element due to the fact that oil is not produced inside a surface or coal string (tubing is used to recover oil and the well is equipped with a separate, perforated production casing)
• Notes

– This section is left blank as the production annulus is being produced and was reported in the primary production section of the form
### Multi-String Combo Well, Annular Production Example

<table>
<thead>
<tr>
<th>Fluids Survey (Gas, Oil, or Brine)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any Fluids Noted (Y/N)</td>
</tr>
<tr>
<td>Gas Outside Freshwater Casing (cfpd)</td>
</tr>
<tr>
<td>Gas Outside Intermediate Casing (cfpd)</td>
</tr>
<tr>
<td>Surface Wellhead Equipment Gas Emissions (cfpd)</td>
</tr>
<tr>
<td>Any Liquids (Oil or Brine) to Surface or Outside Freshwater Casing (Y/N)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>N</th>
<th>0</th>
<th>NRM</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Notes**
  - If no fluids (gas, oil, or brine) are noted, “N” is entered and all other fields in the Fluids Survey section are left BLANK.
  - When fluids are noted, first two columns to right of “Y” indicate downhole casing leaks, third column indicates any surface wellhead equipment leaks, and last column indicates discharges of oil or brine to surface from wellhead equipment or flowing to surface outside of freshwater casing.
  - In the red-shaded example, a small volume of escaping gas was noted at the wellhead and all other applicable portions of the Fluids Survey section must be completed: although a leak is noted, NRM is recorded in the “Surface Equipment Gas Emissions” because the amount could not be quantified.
• Notes
  – No corrosion problems are noted

• Notes
  – The reason for the leak of gas at the surface is documented in the comments field for the red-shaded example.
BREAK – QUESTIONS?
Development of GreenPort/OGRE Well Integrity Reporting Webpage

• The reporting site will go live on January 1, 2015
• All inspection forms must be filed with the Department by February 15, 2015
• You may use either Form A, Form B, or Form C; but you MAY NOT use combinations of these forms
• This training module covers the Form C process
Development of GreenPort/OGRE Well Integrity Reporting Webpage

• Electronic reporting is required for many operators

• For companies with 10 or fewer conventional wells in their inventories, paper forms may be completed and mailed to the Department

MAILING ADDRESS:
PA DEP
Bureau of Oil & Gas Planning & Program Management
PO Box 8765
Harrisburg, PA 17105-8765
Paper Form (OOGM126) and Instructions Now Available on E-Library

http://www.elibrary.dep.state.pa.us/dsweb/HomePage

Select “Forms” → “Office of Oil and Gas Management” → “Mechanical Integrity Assessment Report-Form C”
GreenPort/OGRE Reporting

• PADEP, Bureau of Information Technology will provide Well Integrity access to the users who have a role in OGRE for production/waste reporting.

• The Electronic Filing Administrator (EFA) for the company can then provide additional access to people if they want other staff/consultants to submit their integrity forms. Each user must have their own GreenPort account.

• The only time a new registration will be required is if an operator is not currently registered in GreenPort. In this case, they will need to self-register in OGRE & submit paperwork to become an EFA.

• If GreenPort or an application is not working, call the PA DEP Help Desk: 717.705.3768
Welcome to the Pennsylvania DEP Oil & Gas website for Operators to electronically report production, waste and provide DEP with notification information. Unconventional well production and waste is required to be reported electronically to DEP using this website by February 15th and August 15th of each year. All other Conventional well production and waste is required to be reported annually by February 15th.

**Production/Waste Reporting** allows Operators to select a reporting period to create a production report, and/or to make modifications to unsubmitted reports for production and waste data. A status is noted for each created report.

**SPUD Notification:** Section 201(f) of the Pennsylvania Oil and Gas Act requires well operators to provide the Department with a least 24 hours notice of the date on which drilling of a permitted well will commence. In addition, each Well Permit issued by the Department specifically requires the well operator to notify the DEP Oil and Gas inspector identified on the permit at least 24 hours prior to commencement of drilling activities for that well. Operators should submit the required notification to the assigned DEP Oil and Gas inspector for a permitted well prior to commencement of drilling activities.

**DEP Notifications:** As of April 13, 2012, the Site Menu link, DEP Notifications, passes control over to the DEP Notification system where operators can submit various notifications to DEP. Your user context is preserved, and you can freely move between this well production reporting site and the notification system without the need to login separately. See also the What’s New release notes.
## Summary of Form C Features and Use

**PRE-POPULATED IN GREENPORT ENVIRONMENT**

<table>
<thead>
<tr>
<th>Permit #</th>
<th>Farm name</th>
<th>Unconventional</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Open Flow (cfpd) or Shut-in Pressure on Production Annulus (psig)</th>
<th>Fluids Survey (Gas, Oil, or Brine)</th>
<th>Open Flow or Shut-in Pressure Measurement</th>
<th>Open Flow or Shut-in Pressure Unit</th>
<th>Any Fluids Noted (Y/N)</th>
<th>Gas Outside Freshwater Casing (cfpd)</th>
<th>Gas Outside Intermediate Casing (cfpd)</th>
<th>Surface Wellhead Equipment Gas Emissions (cfpd)</th>
<th>Any Liquids (Oil or Brine) to Surface or Outside Freshwater Casing (Y/N)</th>
<th>Corrosion Problems (Y/N)</th>
<th>No-inspection comments</th>
<th>Text comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pennsylvania Department of Environmental Protection
Reporting Template in OGRE

- Permit (API) Number, Farm Name, and Unconventional indicator will be pre-populated.
- 4 lines for all Unconventional assets (date MUST be provided by operator) and 1 line for each Conventional asset (a default inspection date of 1/1/INSPECTION YEAR will be pre-populated in form).
- For conventional wells, it is recommended that default date be replaced with the actual inspection date, although this is NOT REQUIRED.
OGRE Well Integrity Reporting Inventory

- If a well appears in your inventory, but you did not inspect it, you MUST select one of the No-Inspection Standard Comments THIS YEAR (next year these will be pre-populated):
  - Plugged well
  - This is not our well
  - Gas storage well
  - Observation well
  - Well spud, drilling not completed
  - Regulatory Inactive Well
  - Injection Well
  - Status validation underway

- Note that abandoned wells must still be inspected up until the quarter in which they are plugged.
OGRE Well Integrity Reporting Inventory

• If you have inspected a well, but that API Number does not appear in the template downloaded through GreenPort, it is important that you take steps to help PADEP update our records:
  – Contact the District Oil and Gas Operations Office to correct any paperwork issues regarding well ownership
  – Retain all integrity inspection records at your office for the required timeframe
  – If you need more assistance, contact Myron Sucholdoski: 717.772.2199
Well Transfers

OGRE Well Integrity Reporting Inventory

• Well permit or registration transfer establishes a new permittee and is not complete until PA DEP approves the transfer (application 5500-PM-OG0010).

• The date of authorization by the agency is the effective date of the change in well ownership no matter what the legal agreement between the two parties involved in the transaction states.

• If the well permit transfer was not successfully executed, the well will not appear on the pre-populated list downloaded through GreenPort.

• If a transfer is completed by December 31st at midnight, the new permittee is responsible for reporting all well integrity data for the inspection year.

• If a well is transferred to you, be sure to obtain all the necessary information from the former permittee to complete integrity reporting for that well.

• This process is identical for Production Reporting as well.
Report Submittal

Development of GreenPort/OGRE Well Integrity Reporting Webpage

- After the spreadsheet template form is populated, you will upload the file through OGRE
- Data validation will take place overnight as part of a batch process: make sure you fill out the form correctly!
- Note that there are some drop-down boxes (e.g., standard measurement units) to assist with validation, but most operators will be copying and pasting their data directly into the template instead of entering it well-by-well
- If the form was not filled out correctly, errors will be flagged and you will have to correct them and resubmit the form in its entirety
Coming Next Year

- If you used Form C to report in 2015, the spreadsheet template will be pre-populated with inspection data from the previous year when you download it to report inspection results in 2016, so only information that has changed will need to be updated.

- A web-based form reporting option will also be developed by 2016: this will be useful for operators who have small well inventories and have access to the web, but do not own Microsoft Excel.
Oil & Gas Management Reports Page

Understanding the geology of the Marcellus Formation helps us predict where it is most likely to be developed.
There are instructions on how to run the SPUD Report posted on the Mechanical Integrity Assessment web page.
OIL & GAS SPUD Report

Needed Information for Report

- **Spud Begin Date**: Always enter 01/01/1800
- **Spud End Date**

**Operator Name**

- "No" = Conventional & Unconventional Wells

Run Report

Use the default Spud Begin Date of **01/01/1800** to ensure all active wells are included in your inventory.
### OIL & GAS Spud Report

**DEP OFFICE OF OIL AND GAS MANAGEMENT**

**SPUD DATA**

11/3/2014 10:49:45 AM

**SPUD Date Range:** 1/1/1800 - 8/1/2014

**County:** All

**Municipality:** All

**Region:** All

**Operator:** KEYSTONE ENERGY OIL & GAS INC (6231)

**Unconventional Only:** No

**Well Count:** 93

<table>
<thead>
<tr>
<th>SPIED DATE</th>
<th>API / PERMIT</th>
<th>OGO #</th>
<th>OPERATOR</th>
<th>REGION</th>
<th>COUNTY</th>
<th>MUNICIPALITY</th>
<th>FARM NAME</th>
<th>WELL TYPE</th>
<th>WELL STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/1/1800</td>
<td>063-26280</td>
<td>OGO-24997</td>
<td>KEYSTONE ENERGY OIL &amp; GAS INC</td>
<td>EP DOGO SWDO Dstr Off</td>
<td>Indiana</td>
<td>Burrell Twp</td>
<td>KENDALL 2A</td>
<td>GAS</td>
<td>Active</td>
</tr>
<tr>
<td>1/1/1800</td>
<td>063-26215</td>
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<td>KEYSTONE ENERGY OIL &amp; GAS INC</td>
<td>EP DOGO SWDO Dstr Off</td>
<td>Indiana</td>
<td>Burrell Twp</td>
<td>KENDALL 3A</td>
<td>GAS</td>
<td>Active</td>
</tr>
<tr>
<td>1/1/1800</td>
<td>063-28219</td>
<td>OGO-24997</td>
<td>KEYSTONE ENERGY OIL &amp; GAS INC</td>
<td>EP DOGO SWDO Dstr Off</td>
<td>Indiana</td>
<td>Burrell Twp</td>
<td>STEVE S YOSCHAK 1</td>
<td>GAS</td>
<td>Active</td>
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<td>EP DOGO SWDO Dstr Off</td>
<td>Indiana</td>
<td>Cherryhill Twp</td>
<td>FRANK L ERWIN 1</td>
<td>GAS</td>
<td>Active</td>
</tr>
<tr>
<td>1/1/1800</td>
<td>065-22395</td>
<td>OGO-24997</td>
<td>KEYSTONE ENERGY OIL &amp; GAS INC</td>
<td>EP DOGO NWDO Dstr Off</td>
<td>Jefferson</td>
<td>Bell Twp</td>
<td>CLIFFORD BUFFINGTON 1</td>
<td>GAS</td>
<td>Active</td>
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<tr>
<td>1/1/1800</td>
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<td>CLIFFORD BUFFINGTON 2</td>
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</tbody>
</table>

**WELL STATUS**

<table>
<thead>
<tr>
<th>WELL STATUS</th>
<th>LATITUDE</th>
<th>LONGITUDE</th>
<th>CONFIGURATION</th>
<th>UNCONVENTIONAL</th>
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<tbody>
<tr>
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<td>40.455608</td>
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<td>Active</td>
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<td>Vertical Well</td>
<td>No</td>
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<tr>
<td>Active</td>
<td>40.489998</td>
<td>-79.182582</td>
<td>Vertical Well</td>
<td>No</td>
</tr>
</tbody>
</table>
## OIL & GAS SPUD Report Download

### XML file with report data
- CSV (comma delimited)
- PDF
- MHTML (web archive)
- Excel
- TIFF file
- Word

### Table Example

<table>
<thead>
<tr>
<th>SPUD_DATE</th>
<th>API</th>
<th>OGO_NUM</th>
<th>OPERATOR</th>
<th>REGION</th>
<th>COUNTY</th>
<th>MUNICIPALITY</th>
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</thead>
<tbody>
<tr>
<td>1/1/1800</td>
<td>063</td>
<td>26280</td>
<td></td>
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<td>Indiana</td>
<td>Burrell Twp</td>
</tr>
<tr>
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<td>Indiana</td>
<td>Burrell Twp</td>
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<tr>
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<td>28219</td>
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<td>Burrell Twp</td>
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<td>Cherryhill Twp</td>
</tr>
<tr>
<td>1/1/1800</td>
<td>065</td>
<td>22365</td>
<td></td>
<td>EP DOGO NWDO Dstr Off</td>
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<td>Bell Twp</td>
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</tbody>
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### Additional Table

<table>
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<th>WELL_STATUS</th>
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<th>LONGITUDE</th>
<th>CONFIGURATION</th>
<th>UNCONVENTIONAL</th>
</tr>
</thead>
<tbody>
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<td>KENDALL 2A</td>
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<td>Active</td>
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<td>-79.22511</td>
<td>Vertical Well</td>
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<td>STEVE S YOSCHAK 1</td>
<td>GAS</td>
<td>Active</td>
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<td>-79.182582</td>
<td>Vertical Well</td>
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<td>FRANK L ERWIN 1</td>
<td>GAS</td>
<td>Active</td>
<td>40.64556</td>
<td>-79.047663</td>
<td>Vertical Well</td>
<td>No</td>
</tr>
</tbody>
</table>
Understanding the geology of the Marcellus Formation helps us predict where it is most likely to be developed.
Oil & Gas Mapping Tool
Oil & Gas Mapping Tool

Well Selection Displayed on Map

Locate on Map

Search for Oil and Gas Wells
- Search by Permit Number
- Search by County
- Search by County and Operator
- Search by County and Municipality
- Search by County, Municipality and Operator
- Search by Operator
- Search by Operator and County
- Search by Operator, County and Municipality
Oil & Gas Mapping Tool
Oil & Gas Mapping Tool
Discussion/Q&A
Thanks!

Questions?

Seth Pelephko, P.G.
Subsurface Activities Section Chief
Bureau of Oil and Gas Planning and Program Management
717.772.2199
(mipelephko@pa.gov)