GIS IN OIL & GAS: HISTORIC MAP DIGITIZING IN THE MARCELLUS SHALE

Lacey Selvoski – GIS Technician II, PA

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Overview

Topics of Today

- Personal Bio
- Range Resources/Marcellus Shale Background
- Project Background
  - Georeferencing
  - Digitizing Farmlines
  - Digitizing Historic Oil & Gas Wells
- Results/Benefits of the Project
- Questions
Personal Bio

- 2010 Graduate of California University of Pennsylvania
  - B.A. in Geography - Concentration in GIS & Emergency Management
- Employee at Range for 5 years
  - Canonsburg, PA office
  - 30 minutes southeast of Pittsburgh
Range Resources

- Headquarters in Ft. Worth, Texas
- Offices
  - Abingdon, Virginia
  - Canonsburg, Pennsylvania
  - Field offices
- Originally formed in 1976 as Lomak Petroleum Inc.
- Became Range Resources Corporation in 1998
- First successful vertical well in the Marcellus Shale drilled in 2004 – Renz #1
- Currently have about 1,000 successful Marcellus Shale wells currently producing
Marcellus Shale

- Currently the largest natural gas field in the United States
  - Potential to be largest in the world
- Range holds almost 1 million net acres across the formation
Project: Plan

What were we asked to do?
- Georeference maps from the early 1900’s
- Digitize the farm line boundaries
- Digitize the historic wells
- Make this data accessible
Project: Purpose

- Farmlines
  - Land Department
  - Clear Title & Validate Ownership
    - Research back to 1850’s for ownership
      - Result of the Drake well being drilled in 1858
    - Save time spent searching hand drawn maps
Project: Purpose

- Historic Wells
  - Land Department
    - Production of old wells aids in leasing
    - Lets them know if a lease is HBP
  - Geology & Drilling Departments
    - Aids in the planning process of new wells
Project: Step 1 – Light Table for Farmlines

- **Process**
  - Print out farm line map
    - Already scanned
    - Some were already georeferenced
    - Quarter quad
  - Print tax parcel map
  - Overlay on the light table
Project: Step 1 – Light Table for Farmlines

- Hand color/highlight farm boundaries
Project: Step 2 - Georeferencing

• Scan in the colored map and georeference

• Georeference by:
  • Topo Maps
  • Aerial Imagery
  • Tax Parcels
Project: Step 3 - Digitizing Farmlines

- Digitizing the Farmline – Create Polygon
Project: Step 3 - Digitalizing Farmlines

- Digitalizing the Farmlines – By Copy/Paste
Project: Step 4 - Digitizing Historic Oil & Gas Wells

• Use the non-colored, georeferenced map

• Create point features anywhere there is a historic well

• Assign attributes such as: Well status, well code, quad, farm name & editor

• Did this for every quad in our operating area (and then some)

• Light table could be used for this as well
Project: Step 4 - Digitizing Historic Oil & Gas Wells

Field Searches

- GIS staff provides our digitized coordinates to field crew
  - Currently anything within 1000’ of a planned Marcellus Well Surface Location
    - We also provide coordinates for any wells already identified by the PA-DEP
- Field crew performs property search on foot to locate the historic wells
  - Results can vary!
- Field crew provides search results and any updated coordinates if a well was found
- GIS staff then edits well spots
Project: Step 4 Digitizing Historic Oil & Gas Wells
Results: Farmlines

- Georeferenced over 250 maps
- Digitized over 4,600 farms
Results: Historic Wells

Digitized over 64,000 wells
Results

- Finished? NEVER!
  - Several map sets, from several sources
  - Digitized multiple points per well, due to multiple source maps
    - Future project is to decide which to keep/remove from our data
- Effective digital layers for our operating area
- Utilized by various departments via the GeoCortex Web Map Service
Benefits

- Starting point for title clearing
- Historic wells can tell production status of lease
- Easier to view than hand drawn maps
- Accessible via the web map
  - No longer have to come to GIS for simple map requests!
- Significant cost savings on title fees
- Helps a considerable amount in planning for future development
Questions?

Lacey M. Selvoski
GIS Technician II PA
lselvoski@rangeresources.com

Range Resources
3000 Town Center Boulevard
Canonsburg, PA 15317