Legacy Well Detection Technology

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NETL Airborne Well Location Methods
Salt Creek Oilfield Study with Anadarko Petroleum (2005)
**NETL Airborne Well Location Methods**

Salt Creek Oilfield Study with Anadarko Petroleum (2005)

<table>
<thead>
<tr>
<th>Completion Date</th>
<th>Wells Found</th>
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<tbody>
<tr>
<td>1912-1926</td>
<td>100%</td>
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<tr>
<td>1965-1990</td>
<td>82%</td>
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<tr>
<td>Overall</td>
<td>93%</td>
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Helicopter Well Location in Wyoming Oilfields (2005-2007)

Helicopter Magnetic Surveys of Salt Creek Oilfield and Naval Petroleum Reserve No. 3

Salt Creek Oilfield

NPR No. 3
NETL’s Helicopter Magnetic Surveys in Pennsylvania
Marcellus Site, Washington County, PA
How Accurate are Locations in State Well Databases?
NETL’s Helicopter Magnetic Surveys in Pennsylvania

Hillman State Park – Washington County, PA
NETL’s Helicopter Magnetic Surveys in Pennsylvania

Susquehannock State Forest, Potter County, PA
Helicopter Magnetic Surveys in Pennsylvania
Oil Creek State Park, Venango County, PA
What about Wells without Steel Casing?

What if Casing is Missing?
- This well with no casing still exhibits magnetic and conductive signatures at ground level.
Drone LiDAR for Well Location

Oil Creek State Park
LiDAR Comparison – Oil Creek State Park
State Data vs NETL Data
Wells Missed by Magnetic Surveys
Micro Fabricated Atomic Magnetometer (MFAM)
Demonstration Survey for Ohio DNR
Demonstration Survey for Ohio DNR
Collaboration with Pennsylvania Turnpike Commission
Methods for Locating Upstream Pipelines

Motivation

Firestone, Colorado 2017

Metal Pipeline Location Methods
Methods for Locating Upstream Pipelines

Drone Magnetics and Ground-Based EM from Ron Bell

Total Magnetic Field – Heat Map
ElectroMagnetics - Profiles
Methods for Locating Upstream Pipelines

ElectroMagnetics
Methods for Locating Upstream Pipelines

Electromagnetics
Methods for Locating Upstream Pipelines

Drone Magnetics and Electromagnetics
Methods for Locating Upstream Pipelines

Drone Magnetics and Electromagnetics
Methods for Locating Upstream Pipelines

Drone Ground Penetrating Radar – Plastic Pipelines