TESTING UNMANNED AERIAL SYSTEMS (UAS) APPLICABILITY FOR THE OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT

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OUTLINE

- What have we done?
- What did we do with the data collected?
- What did we discover?
- What are the limitations?
- What are the plans for the future?
2011 - PILOT PROJECT

- 2011 - Proof of concept project
  - 1 site, 2 days, different cameras
2012

- 2012- Inspection tool project
- 8 sites, 3 days, for cost benefit analysis
2013- IMPOUNDMENTS

7 permits over 3 days- looking at the downstream face of the dam for seeps
2014- KENTUCKY AND WEST VIRGINIA
WHAT WE DID WITH THE DATA?
WHAT CAN WE DO WITH THE DATA?

- Color Infra-red-
  - Plants, soil moisture and water clarity
- NDVI images
  - *Intensity and density of vegetation*
### INITIAL COST BENEFIT RESULTS

<table>
<thead>
<tr>
<th></th>
<th>Helicopter</th>
<th>Inspection w/out UAS</th>
<th>Inspection with UAS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost</strong></td>
<td>$16,800</td>
<td>$0</td>
<td>$3100</td>
</tr>
<tr>
<td><strong>Sites inspected</strong></td>
<td>15</td>
<td>3</td>
<td>8</td>
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INITIAL COST BENEFIT

Comparing actual hours
Inspection with UAS vs. without

Acres inspected = 5680

Total # of hours onsite without the UAS = 38 hours

Total # of hours onsite with the UAS = 16 hours
PROJECT FINDINGS

- View large areas in a short time
- Prioritize inspectors time in the field
- Can view remote/potentially dangerous areas from a safe distance- decreasing risk of injury to people and vehicles
- Save on equipment repairs
- The potential to increase inspection numbers.
PROJECT FINDINGS CONT.

- Better image quality
- Time on site reduced
- Accuracy of the data allows for measurements on imagery
ADDITIONAL BENEFITS

- UAS operations can collect much more information
- UAS create a historical record of the site, that we now only capture by camera
- Different camera types are available when using UAS
WHAT ARE THE CURRENT MAJOR LIMITATIONS?

- FAA regulations-
  - 2 person operation
  - Maintain line of sight
- No Trained operators within OSMRE
- No UAS readily available
- Minimum 2 months to plan and coordinate fights
- We need Office of Aviation Service approval for any UAS that is not currently approved
- Possible decommissioning of previously used airframes
WHAT ARE THE PLANS FOR THE FUTURE?

- Train OSMRE personnel
- Train locally
- Proposed rulemaking in process
- Ongoing review for available UAS for testing and approval.
- Reduction of lead time from Months to Days for UAS mission
THANK YOU FOR YOUR ATTENTION!

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