

# Small Unmanned Aerial Systems (sUAS) Regulator & Technology Assessment

**Description:** A regulatory and technology assessment to determine if sUAS based inspections and surveys provide advantages and improvements to maintenance and operations

**Status:** Multiple sUAS based inspections performed on various gas utility pipeline assets while meeting the FAA's evolving compliance regulations

## BENEFITS

Incorporation of sUAS platforms will improve effectiveness, increase overall safety and decrease the time involved in performing routine field inspections and surveys. Additionally, it will provide new methods for inspections and surveys with the advantage of aerial imaging. Adaptations of sUAS devices will change the way some routine inspections and surveys are performed. Having “eyes in the sky” using simple and relatively low cost sUAS will provide an effective alternative tool for routine and emergency assessments.

## BACKGROUND

Unmanned aerial systems have been in wide use for military applications for over two decades. More recently, smaller military sUAS platforms have been developed and proven to be robust, reliable and capable of independent flight. Lately, there is increasing interest for commercial applications. Adaptation has already been seen with Homeland Security (security and monitoring), earth science (forest fire monitoring), and land management (vegetation, growth studies). However, the need for regulatory approval by the FAA and evolving FAA requirements make it necessary to focus and work carefully through a lengthy approval process.

## TECHNICAL APPROACH

The project objective is to evaluate regulatory issues and the technology offerings for small unmanned aerial systems (sUAS) devices as applied to gas industry inspections and surveys. Further, NYSEARCH aims to identify or develop a methane leak detection module capable of mounting onto a sUAS.

This project is investigating multiple applications of the sUAS platform to perform surveys and inspections while providing live and recorded aerial images, both still and video. Figure 1 illustrates the tight inspection navigation around a suspended pipe section where the sUAS is flown in close to the pipe to gather inspection information.



Figure 1: Close-up sUAS inspection of a pipeline crossing, difficult for routine inspection methods.

Due to the complexity of applying and gaining FAA approval, in this project, NYSEARCH has hired specialists who have experience in working with FAA. They have helped to focus our application and have aided the regulatory approval process. As a result, NYSEARCH has gained the FAA's Certificate of Authorization (COA) and an Exemption 333 to conduct flights.

NYSEARCH Staff have evaluated various test scenarios and with its contractors and its member

hosts, we have carefully selected test sites not only that have beneficial applications but that meet the constraints that are inherent to the FAA approval.

After succeeding in mid-2015 to gain FAA approval, the NYSEARCH funders have since been evaluating various applications through multiple test flights. Lessons learned from each flight are being incorporated into subsequent tests. As we progress, it is envisioned that gas maps will be integrated into flight profiles for survey images of specific areas of interest or entire right-of-way inspection.

### PROGRAM STATUS

NYSEARCH has flown sUAS based inspections at four funding gas company sites and those flights have revealed the value of high definition photos and video imaging for performing maintenance assessments. Figure 2 shows the sUAS pilot preparing the sUAS unit to perform inspections of pipeline assets. To date, completed NYSEARCH inspections include: 1) pipe exposed on bridge structures and suspended supports, 2) right-of-way assessments of encroachment, vegetation as well as (simulated) leak surveys, 3) gate/district regulation equipment integrity assessment, and, 4) investigation of capabilities for emergency response.

For the evaluation of methane detection, there is consideration being given to payload capacity and operational integration. Various technologies are being examined to perform effective methane leak detection. The ultimate goal is for the sUAS to fly over mains and services to automatically detect and map suspected leak locations.

To date, the sUAS based inspections of actual and simulated piping assets met test requirements. Inspections have been performed at multiple facilities and inspections are planned for Spring 2016 at several more funder sites.

Post-inspection evaluation of the sUAS inspections are revealing and have illustrated multiple benefits to aerial imaging performed faster and imaging perspectives never before available before the sUAS device.



Figure 2: Setup for sUAS inspection

NYSEARCH funders are planning additional inspections including flights with functionality for methane detection.

The results of these sUAS based inspections will be compiled to fully assess all the potential sUAS applications within current and evolving regulatory framework.

### Highlights

#### Applying approved sUAS to gas operations provides:

- An “Eyes-in-the-sky” perspective for inspections and survey
- Data rich imagery compatible with GIS records
- A proactive tool for difficult inspections and emergency response

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