

Development of a Prototype Airborne Remote Leak Detector

Description: To develop a prototype airborne remote leak detector for distribution mobile and walking surveys.

Status: Evaluation of technology for Distribution applications is underway.

BENEFITS

The advent of new technologies for remote leak detection, whether they are handheld or airborne, is changing the way gas pipelines are being surveyed. Laser-based gas sensors have the potential to provide high sensitivity to methane detection to effectively replace existing walking and mobile surveys typically performed by LDCs. It has been estimated that utilities could achieve over 25% cost reduction in survey operations if a reliable and sensitive remote detection system were available. Airborne surveys applied to transmission and/or gathering lines have shown that they

offer speed, mobility and area coverage unmatched by ground-based methods without sacrificing leak detection sensitivity.

BACKGROUND

LaSen, Inc. in 2000 received funding from the U.S. Department of Transportation to develop the Airborne Lidar Pipeline Inspection System (ALPIS®). Commercial operations of this technology started in 2003 and today LaSen operates several ALPIS® units surveying transmission pipelines using a helicopter as its delivery platform.

TECHNICAL APPROACH

Although ALPIS® was originally developed for the application on gas transmission and gathering lines, it has potential to become an effective tool for surveying distribution pipelines. NYSEARCH funders are evaluating whether the application can be extended to address the specific needs of distribution member utilities.

ALPIS® technology is based on mid-infrared Differential Absorption Lidar (DIAL) that

is tuned to detect leaks in natural gas and hazardous liquids pipelines. The laser beam is transmitted downwards from an optic sensor to illuminate the area above and around the buried pipeline. When the laser beam passes through a plume of hydrocarbon gas, some of the beam's energy will be absorbed by the gas molecules in the plume. As a result, the amount of light reflected from the ground back towards the sensor will be diminished. The amount of attenuation is measured by special detectors inside the sensor and can be used to ascertain the quantity of gas in the beam's path. The key factors that will determine the system's effectiveness in a distribution system application are: survey altitude, sensitivity, width of coverage and leak source identification capability.

Survey altitude. Currently, leak surveys over rural and unpopulated areas are performed from the relatively low altitude of 250 feet. The current system parameters are specifically optimized for this mode of operation. For distribution pipeline surveys, the altitude needs to be increased to a minimum of 500' to safely perform surveys.



Sensitivity: As a laser-based gas sensor, the sensitivity of the ALPIS[®] system is specified as the minimum detectable gas concentration expressed in the units of parts-per-million meter (ppm-m) of methane gas. The sensitivity level of 1 ppm-m is required to detect the smaller leaks found on distribution lines.

Width of coverage: Width of coverage for the ALPIS[®] system is determined by the flight altitude and the specific optics used. Typically this parameter varies between 20 and 40 ft. A wider coverage will be necessary to thoroughly inspect a typical distribution line corridor in a single pass.

Leak source identification: To maximize the effectiveness of airborne surveys on distribution lines which typically

run in congested areas, it is necessary to develop the capability to profile the gas distribution in the cross-track direction. Such capability will help pinpoint the origin of a gas plume and thereby will reduce the time needed on the ground for locating the source of the leak within the wide survey corridor.

PROGRAM STATUS

Technology upgrade of ALPIS will proceed in stages with clearly identified goals. The first phase will involve redesign of ALPIS for distribution applications. At the end of this Phase, LaSen aims to demonstrate detection of small distribution leaks from 500' above ground level. The beam spot on the ground will remain the same as in the current system.

HIGHLIGHTS

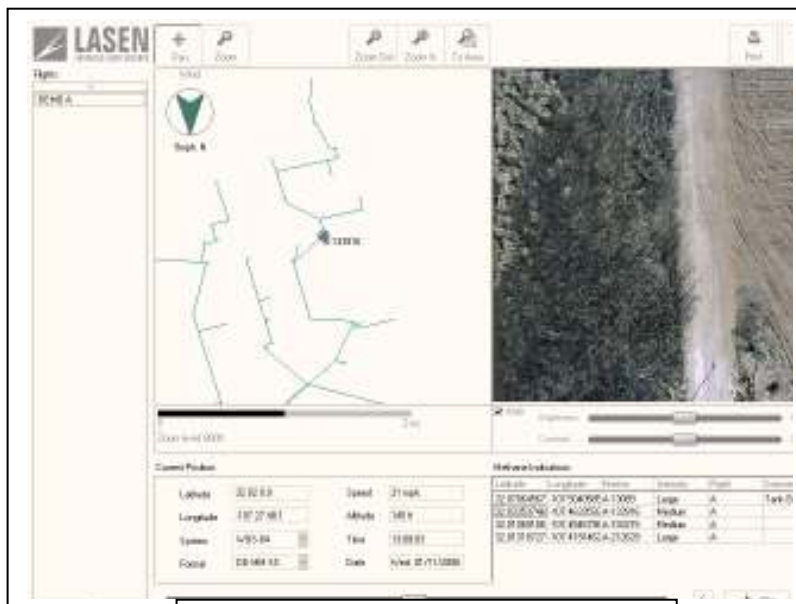
- Potential to achieve up to 25% cost savings on gas leak survey operations
- Remotely survey streets, sidewalks, front yards and buildings in a single pass on a helicopter platform
- Targeted goal is to remotely detect down to 1ppm-meter methane at a height of 500 feet while traveling at 100 mph.

If Phase I is successful, NYSEARCH will consider a future phase to address the beam scanning and leak pinpointing tasks.

FOR ADDITIONAL INFORMATION

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LaSen's User Geographic Interface