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Turning to smart birds can sniff out natural gas leaks

BY GARY BEERS • FOR ENERGY PIPELINE

What do a turkey vulture and the new advanced “Raven” drone have in common?

Yes, they both can fly and have a bird’s name – but the more interesting answer is that they are airborne tools for rapidly detecting leaks from natural gas pipelines.

TURKEY VULTURES LOCATE GAS LEAKS FROM PIPELINE FOR OIL COMPANY

In 1938, the Union Oil Company of California was having difficulty locating a number of leaks in a 12-inch natural gas pipeline that extended 42 miles through rough terrain in coastal California. One of their field engineers suggested an approach that was applied in Texas and involved wild, turkey vultures, who are well-known for their sense of smell. A high concentration of ethyl mercaptan (a gas



with a pungent, garlic or skunk-like odor) should be introduced into the pipeline and then personnel patrol the route and observe where concentrations

of turkey vultures circling or sitting on the ground in the vicinity of the pipeline. This procedure was tried at the California location and several leaks were readily located.

On the basis of these field experiences, researchers have proceeded to conduct numerous scientific field trials using this chemical as an attractant to confirm this bird’s unique ability to detect this odorous chemical (The Role of Olfaction in Food Location by the Turkey Vulture – Cathartes aura, K.E Stager, Contributions in Science, Los Angeles County Museum, June 1964)

RAVEN: A SMART DRONE TO DETECT EMISSIONS IN OILFIELDS

About 78 years later, the Raven, a prototype drone engineered to detect methane emissions from leaking pipeline, flare stacks, or valves, was introduced during the October 2016 opening of GE’s new Oil and Gas Technology Center Oklahoma City.

The drone is equipped with a laser-based sensor that store and concurrently can send real-time methane data to computer held by worker on the ground. Other specifics of the drone include:

- four sets of helicopter blades.
- weight is less than 20 pounds.
- can fly up to 50 mph for up to 40 minutes on a single charge (six batteries).
- can provide data on the severity of the leak as opposed

to infrared camera which can only detect the presence of a leak.

- custom software that allows planning its own flight



For over 50 years, **GARY BEERS**, has worked in numerous fields of environmental science as a consultant, regulator and educator. This career included senior management position with major consulting, nonprofit and public organizations. He has founded several successful firms to capture emerging resource management markets. One of his latest ventures, EnviroScienceINFO, provides content for public media.

and with an application the user can draw a new flight path.

GE projects methane inspections with the drone will be three times faster than human inspections. A promotional video showing



the Raven drone and an example of programmed flight path for inspections at tank battery can be seen online (www.youtube.com/watch?v=GHDyHALZ3EQ).

Incidentally, GE partnered with Oklahoma State University's Aerospace Program to develop the prototype drone (GE Drones Are Coming to Squeeze More Savings From the Oil Patch, D. Wethe, Bloomberg.com, October 10, 2016)

Earlier in July, Southwestern Energy Company conducted a test run in the Fayetteville shale play (Arkansas) where the Raven drone detected gas leaking from a pair of well sites located about a half mile apart (GE Oil & Gas Unveils Drone for Aerial Inspection of Methane Leaks, Clean Oil & Gas Foundation, October 2016).

GE is currently improving the hardware, including increasing the size of the drone, and finalizing a software package that will bring integrate all the data

Concurrently, NASA's Jet Propulsion Laboratory with funding from Pipeline Research Council International has been developing a mini-drone for detecting leaks from natural gas pipelines (Mini NASA Methane Sensor Makes Successful Flight Test, JPL/NASA News, March 28, 2016). NASA developed methane sensing equipment for the Curiosity rover, a land-based drone, which landed on Mars in 2012, and has been advancing this technology (NASA Open Path Laser Spectrometer) for other uses – such as leak detection, in parts per billion, by airborne drones.

The variety of use for smart drones has exploded during the past few years – with hundreds of application in oilfields. A unique example is the use of micro-drones to inspect the conditions of internal wall surfaces of oil storage tanks. Certainly, drones are the popular answer for doing work involving the "4 Ds"- dirty, distant, dull, and dangerous (GE Raven Sniffs Out Oilfield Savings, Drone Business Center, October 2016). ♦

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