

10-CODE



**Airborne Pipeline Inspection Proposal
Presented to North Dakota Oil and Gas
Research Program
January 5, 2015**

10-CODE, LLC

- Service Disabled Veteran Owned Small Business
- 92 years of combined of local Law Enforcement and Military experience
- Extensive command leadership experience
- Diversified operational backgrounds
 - Special Operations (VIP/Dignitary Protection, SWAT, Bomb Squad, Clandestine Drug Lab Team)
 - Criminal and Traffic Investigations
 - Training
 - Policy Development and Implementation
 - Homeland Security and Vulnerability Risk Assessments
 - Critical Infrastructure Protection and Counter Terrorism
 - Extensive Network of State and Local Law Enforcement Contacts



Steve Lundin



Steve Kilde



Cody Trom



DOUBLE M HELICOPTERS – MONTE MYERS

- 30 Years Military Flight Experience
- Over 9500 hours flight time
- Qualified in both Helicopters and Fixed Wing Multi Engine Aircraft
- Currently operating King Air 200 and Bell 206BIII
- President and Chief Pilot for Double M Helicopters FAA Part 135 Air Carrier
- Instructor Pilot/Instrument Flight Examiner
- Safety Officer
- Currently CW5 with NDARNG as the State Stan Instructor Pilot

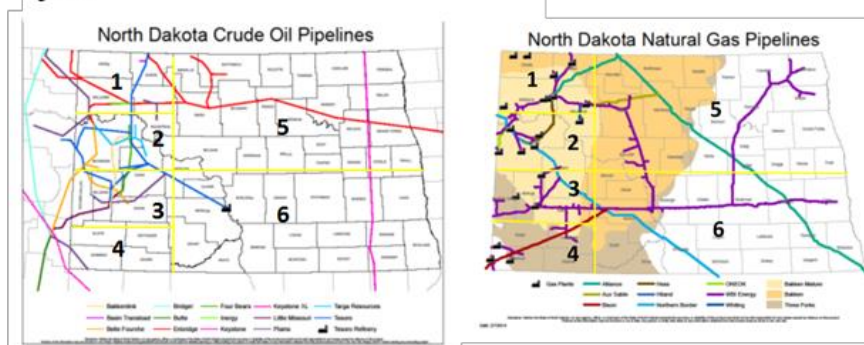


OBJECTIVE

- Use a helicopter aerial platform and advanced visual identification and monitoring equipment to improve accuracy of aerial inspection and reconnaissance of hazardous liquid and natural gas transmission pipelines in North Dakota as mandated by The United States Department of Transportation Pipeline and Hazardous Materials Safety Administration (49 CFR 192.613 and 49 CFR 195.442)



Figure 1

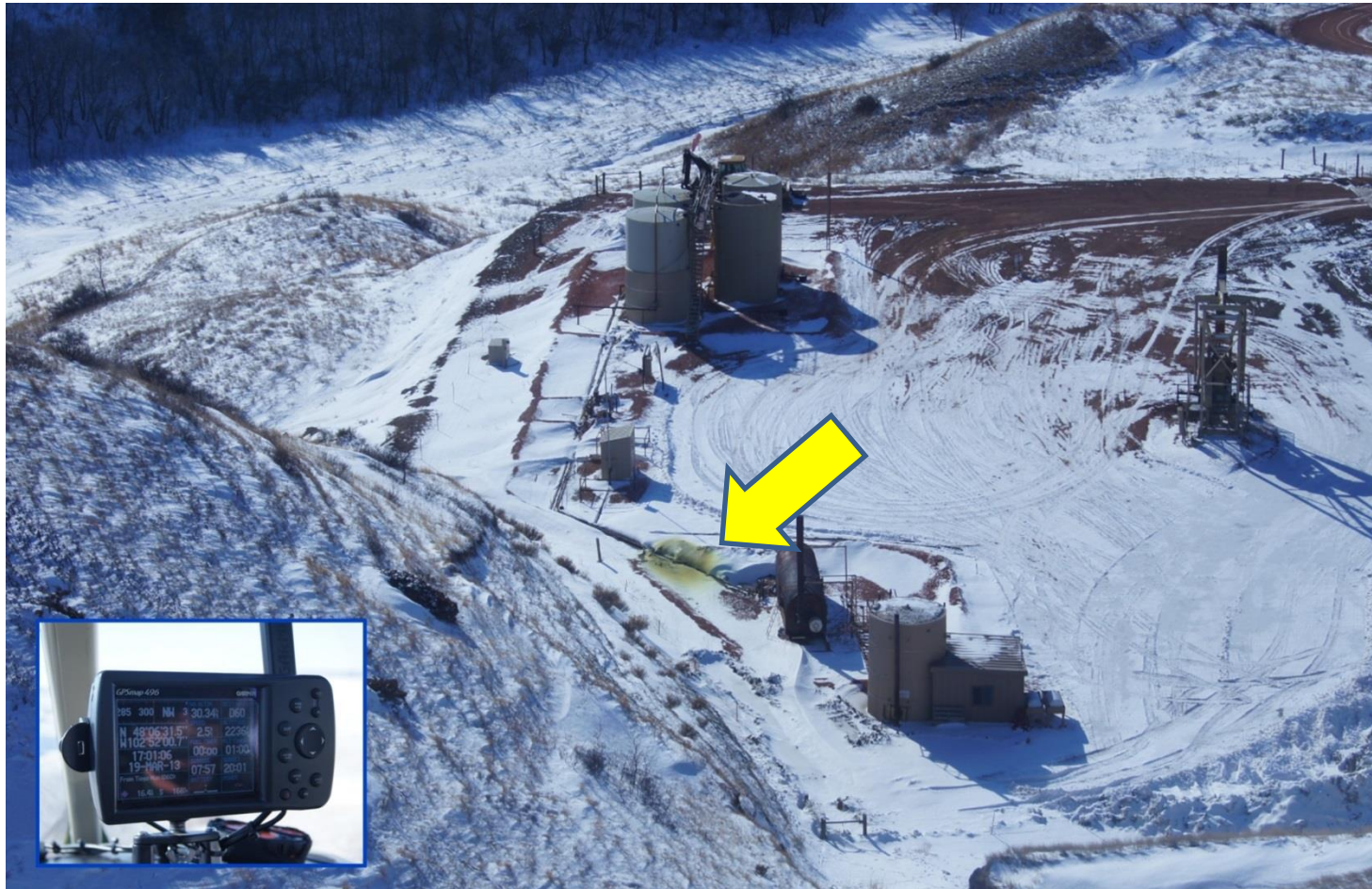


PROPOSAL

Project Associated Expense	NDIC's Share	Applicant's Share (Cash)	Applicant's Share (In-Kind)	Other Project Sponsor's Share
Bell 206 B3			\$600,000.00	
Office/Hangar			\$100,000.00	
Ground Equipment			\$200,000.00	
Bell 206 L IV	\$600,000.00			\$600,000.00
Flight hours	\$225,000.00			\$225,000.00
FLIR 8000E	\$187,500.00			\$187,500.00
Operator/Pilot/Data Analysis Salaries	\$100,000.00			\$100,000.00
Boreal GasFinder AB	\$50,000.00			\$50,000.00
OEM Training	\$12,500.00			\$12,500.00
Total	\$1,175,000.00		\$900,000.00	\$1,175,000.00



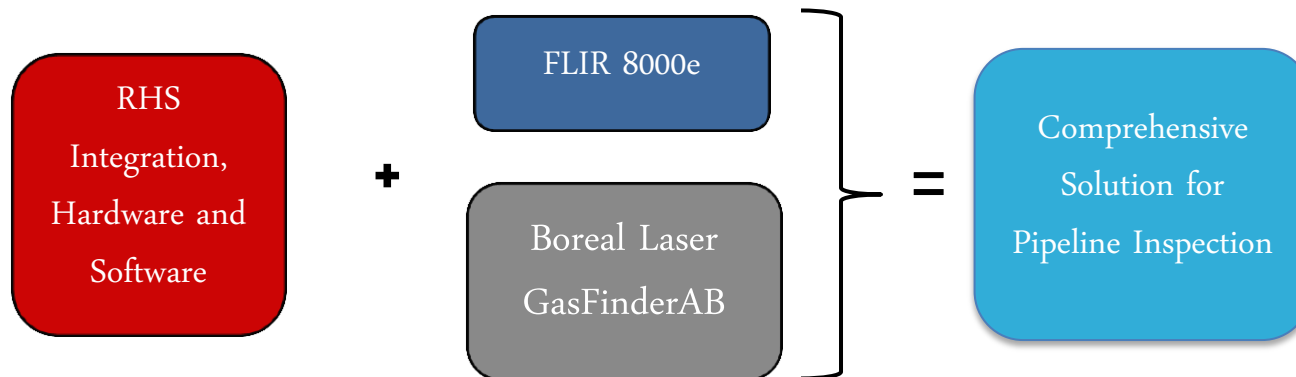
CURRENT VISUAL INSPECTION TECHNOLOGY



PIPE – I SYSTEM

Boreal + FLIR is a powerful methane emissions detection solution

- Two independent sensor systems that are highly complementary and reinforcing to minimize false-positive detections
- System integration and data analysis provided by Red Hen Systems, Fort Collins, CO



PIPE – I SYSTEM

- When methane emissions reach a predetermined threshold the GasFinderAB triggers an alarm that alerts the pilot and crew to investigate with the FLIR infrared camera
- System only finds points of emission. Actual leak determinations are for the regulatory entity or the pipeline company to investigate, verify, and classify
- Info presented post-mission to either private company or regulatory entity
- Backed-up data collection; user friendly post collection analysis process
- Results, with all data points are easily viewable on Google Earth
- **Option to store data for 5 years to meet EPA requirement to document repairs**



Boreal GasfinderAB



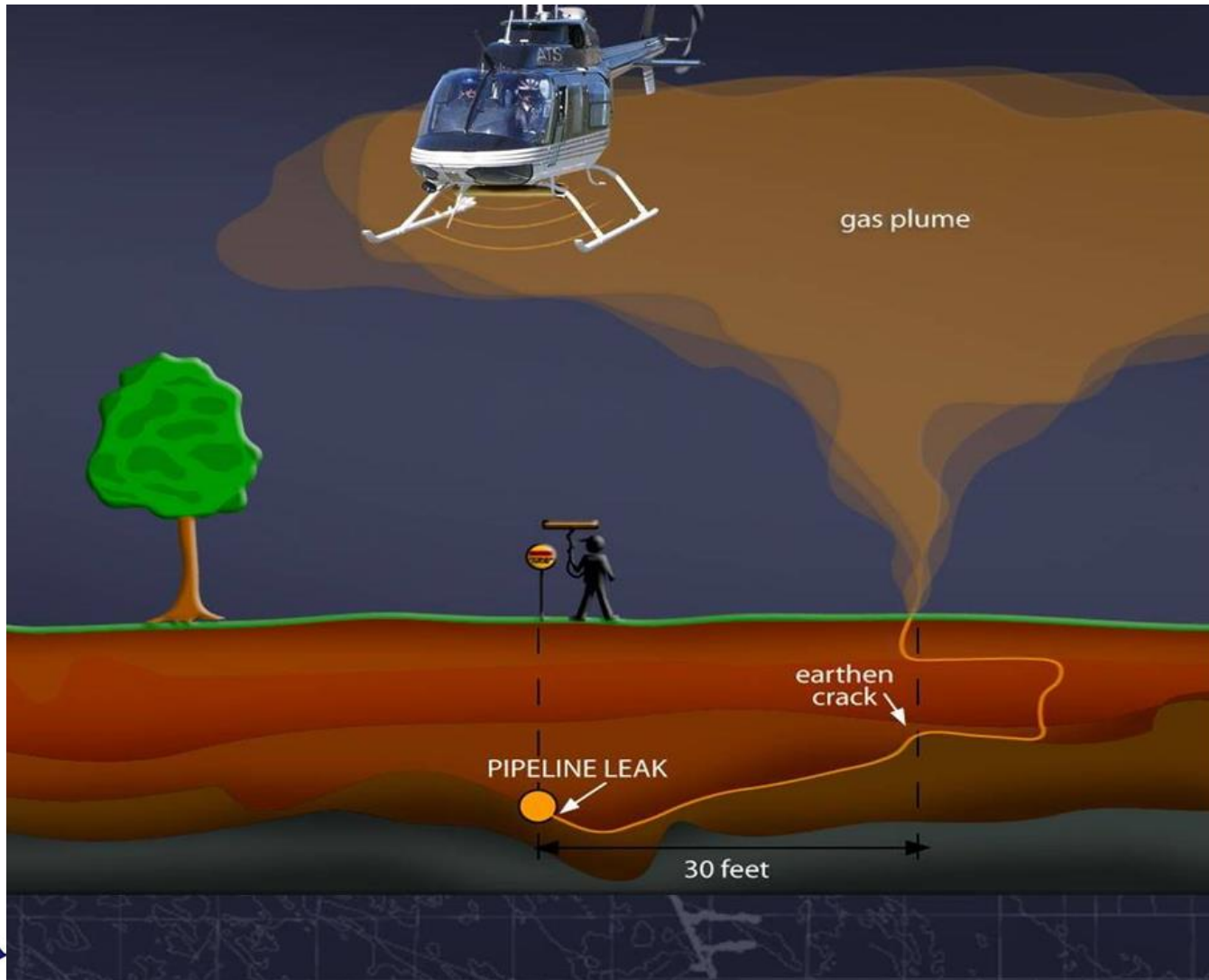
Leading methane detection sensor with a closed path tunable diode

- Hardware is compiled of multiple components
- Easily mountable on ground or aerial vehicles in a variety of configurations
- Accurately reads methane levels to as low as .2 ppm and can be adjusted to detect a range of methane levels, which provides a customizable color category for ranges of detection
- Other detectable gasses include:
 - Hydrogen Sulfide
 - Ammonia
 - Carbon Dioxide

Boreal GasfinderAB

GasFinder AB			
Weight	12 kg	Gas	Sensitivity
Dimensions(WxDxH)	26 x 20 x 16 cm	CH ₄	<1ppm
Power requirements	< 2 A 12 VDC	HS ₂	20 ppm
Operating temp. range	-20°C to 40°C	NH ₃	1 ppm
Data format	Position and gas level data correlated via on board GPS	CO ₂	1000 ppm
Data collection	Rugged computer for subsequent offline processing. On board alarm.		
Hazardous area classification	N. America Class 1, Div 1, Groups A,B,C,D	Scan rate	3 sample/sec
Laser type	Semiconductor Laser 5-15mW	Dynamic range	1-100 ppm(CH ₄)
Recommended flying speed	60 - 100 knots	Recommended altitude	150 - 200 feet
Co-axial cable	RG 213/U (Belden 9880)		
Optical fibre	9 micron single mode fibre, with FC/APC terminations		
External Airborne Probe Weight: 11kg Dim. (L x W x H): 150cm x 28cm x 15cm Operating temperature range: -30°C to 50°C Transport Canada approvals for Eurocopter AS-355 TwinStar and Bell 206B JetRanger. Additional experience on Mi8 and Bell 206L LongRanger.			

Boreal GasfinderAB



FLIR Systems 8000e



- **FLIR gas finder infrared cameras enable the collection of information that can sometimes be missed through alternative sensors or sniffers**
- **Zoom optics from 9" compact gimbal allows detection of Volatile Organic Compound (VOC) gases from the air**
- **Stabilized to provide smooth imagery**
- **Captures thermal and visible imagery for real-time reporting or later analysis**
- **Only 4 systems currently in use in CONUS. None with Boreal integration capability.**

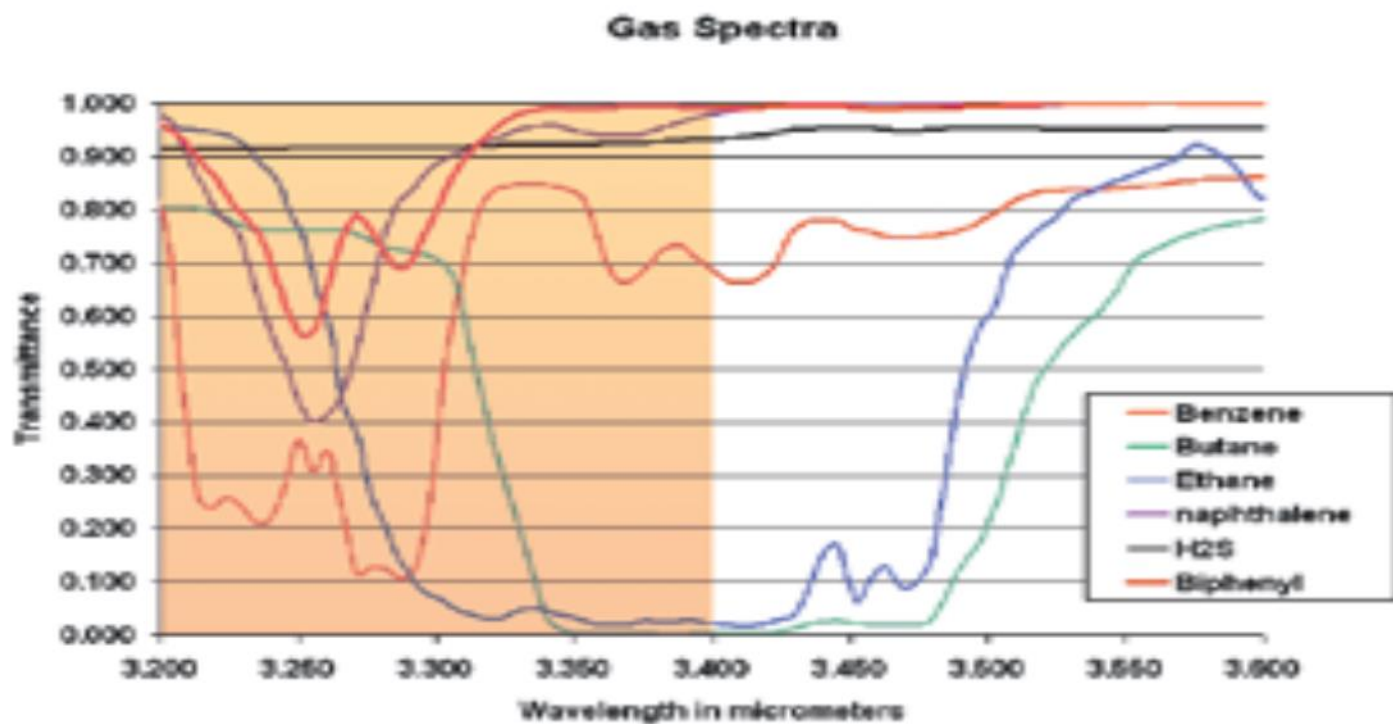
FLIR Systems 8000e

Detectable Gases

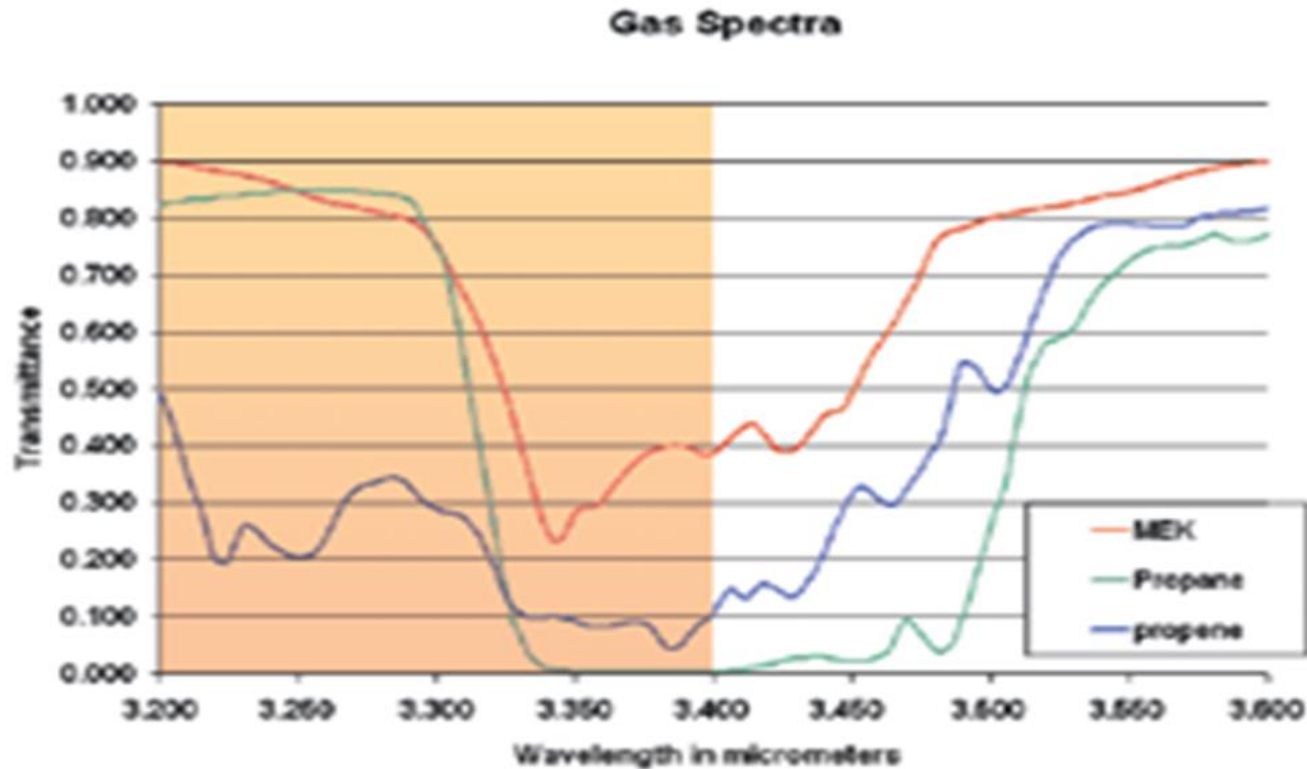
Benzene	Heptane
Toluene	Ethyl benzene
Pentane	Propylene
1-Pentene	Ethylene
Octane	Propane
MIBK	Methane
MEK	Ethane
Methanol	Butane
Isoprene	Xylene
Hexane	Hydrogen Sulfide



FLIR Systems 8000e



FLIR Systems 8000e



FLIR Systems 8000e

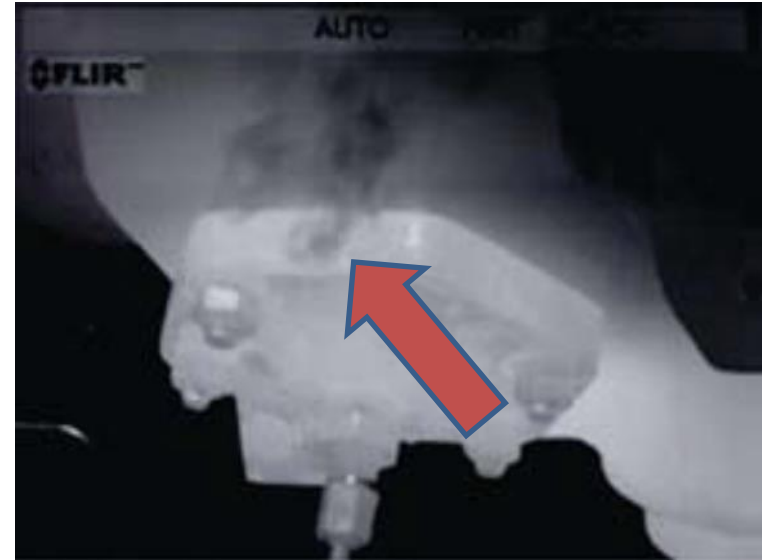


- Fugitive gas emission from a pipeline represented by dark grey anomaly on infrared display

FLIR Systems 8000e



**Fugitive emission not obvious
within visible light spectrum**



**Fugitive emission visible using FLIR
8000e Infrared Camera**

RED HEN SYSTEMS VMS-333

- The integrator in the Pipe-I solution—plug in cameras, sensors, connect to power source and go
- Collects data from the laser, infrared camera, and other cameras/sensors simultaneously
- Once decoded you can click on a point and see all relevant information along with FLIR imagery and video
- Easily geotags the patrol to view locations on Google Earth



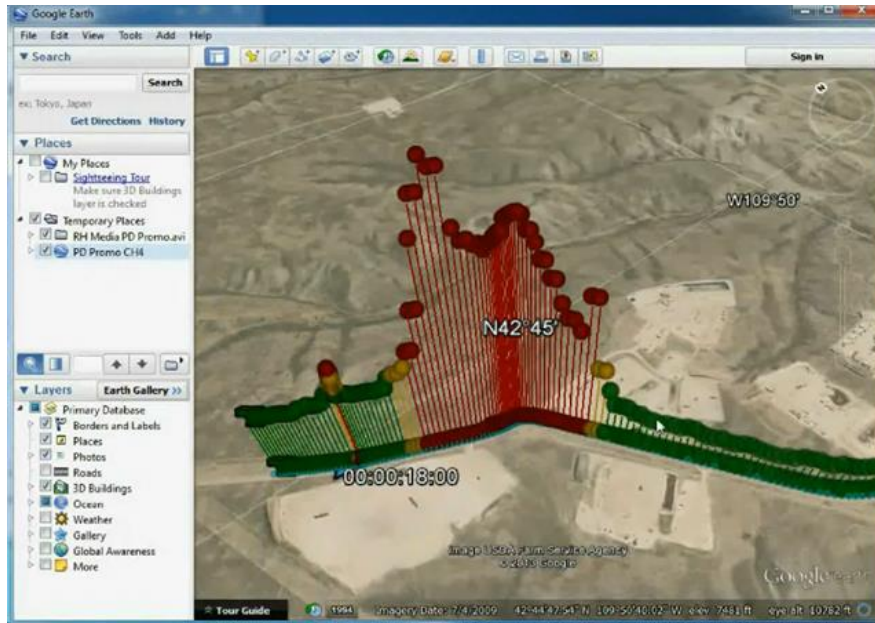
- Multiplexes data from the Boreal GasFinder AB, GPS and Red Hen Systems' video mapping system and encodes this metadata into FLIR full motion creating MP4, MOV or MTS video formats running at 8 MB rate.
- This spatialized full motion video of the patrol can be decoded and viewed on Google Earth, or, with ESRI ArcGIS via their Full Motion Video plugin.



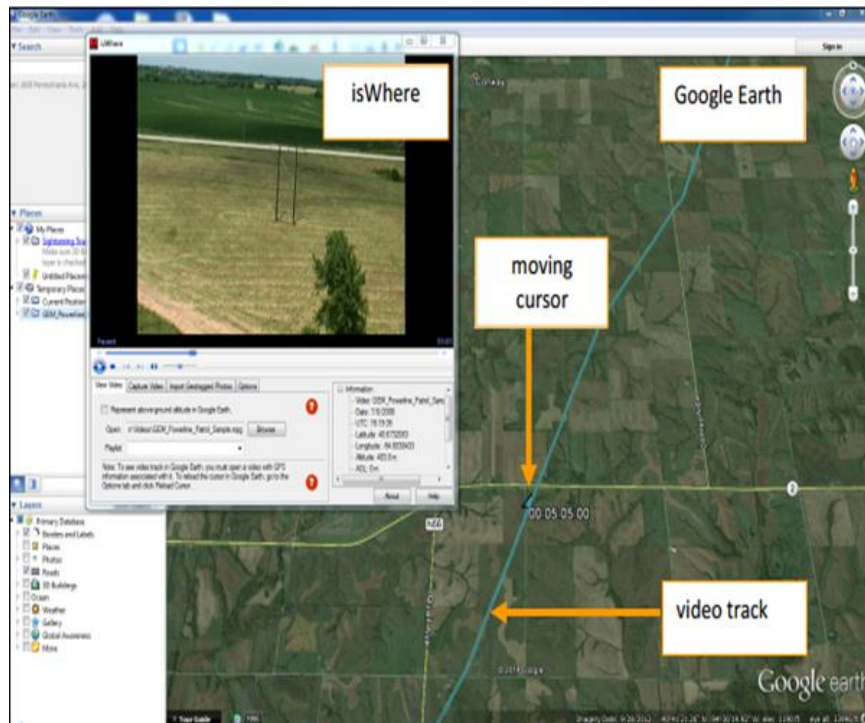
FUGITIVE EMISSIONS DATA ANALYSIS

Red Hen Systems software streamlines post corridor patrol analysis:

- Specifically designed to map every point of collection from ambient areas to sections of high concern
- Indexes all collected data and provides critical insight on the patrol
- Produces easily exported files (either in a shape file or .kml) to be viewed in Google Earth in a simple color-coded marking pattern
- User is able to see the entire path of the patrol, with all points of detection categorized and understandable
- Typically available within 24 hours of submission



IsWhere SOFTWARE APPLICATION



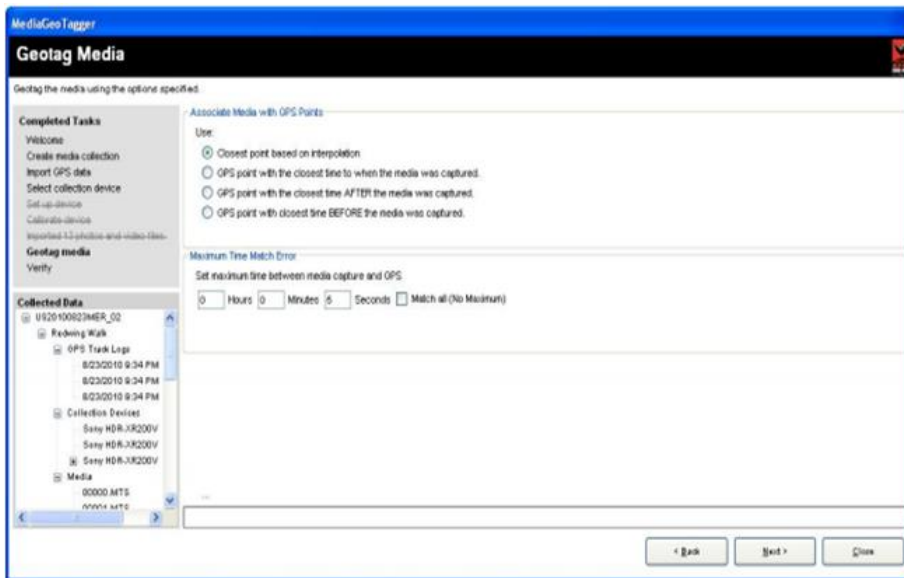
Windows application that provides data importation, visualization, and query capabilities for survey data collected during missions

- Play all existing video formats both Standard and High Definition
- Decode geospatially-encoded media (GEM) videos and create the associate sidecar KML and XML companion files
- Pairs with Google Earth to easily track exact video frame on satellite map side-by-side and observe the route of the video

MEDIA GEOTAGGER

First and only desktop software solution for syncing GPS track log with photos, videos and audio commentary

- Allows user to find out the exact location of where a video or photo was taken
- MediaGeotagger takes the GPS track log from any GPS devices and syncs it with videos and photos that were captured while the device recorded the location track log
- With the software, GPS information is synced to the media based on a time stamp and produces geo-tagged media that can be viewed with isWhere, GeoVideo, and MediaMapper Server





Airborne Pipeline Inspection Project

Period Highlight: 1



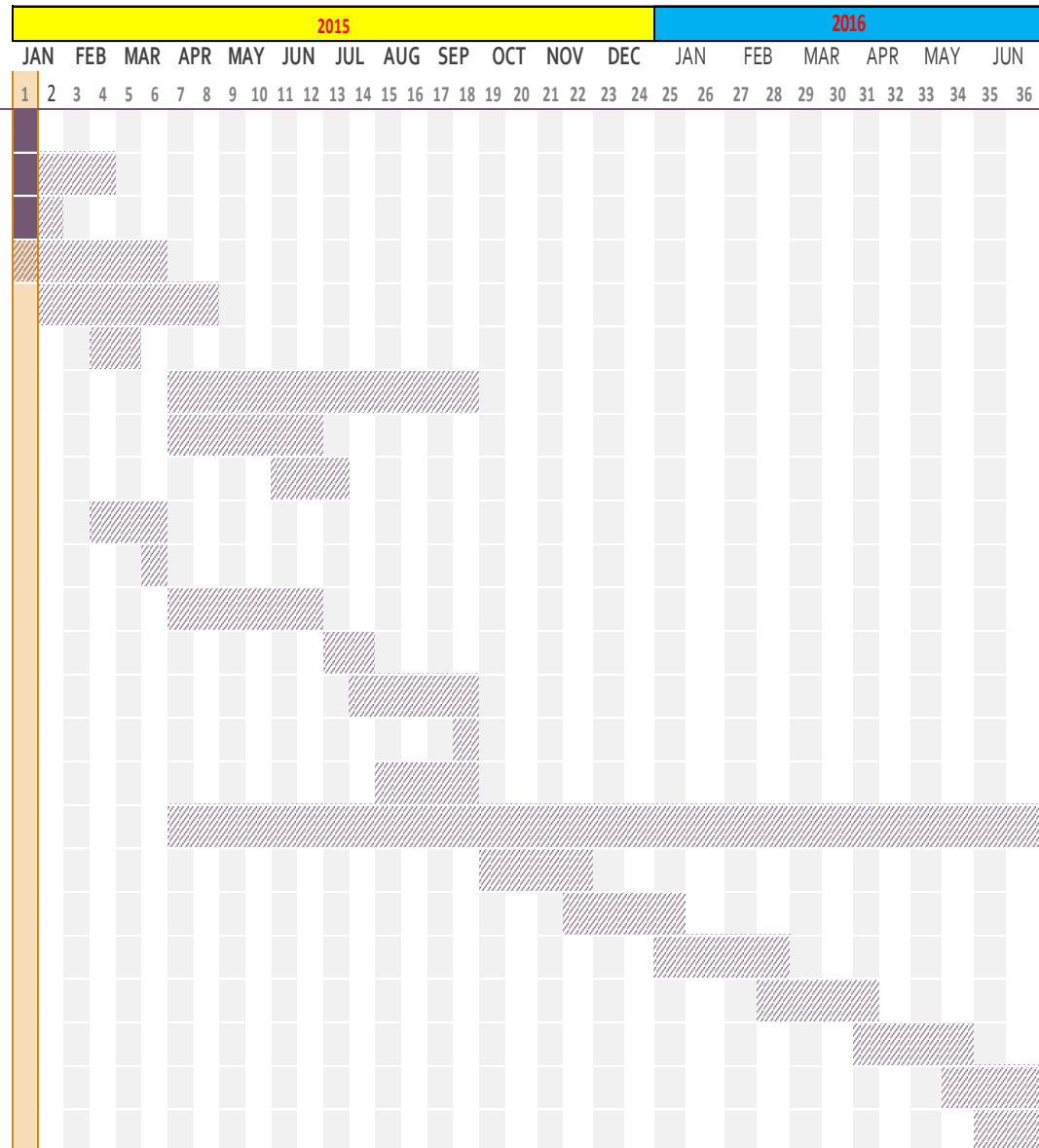
Actual (beyond plan)



% Complete (beyond plan)

ACTIVITY	PLAN START	PLAN DURATION	ACTUAL START	ACTUAL DURATION	PERCENT COMPLETE
Identify OEM Technology Partners	1	1	1	1	100%
Receive OGRP Grant Funding	1	4	1		25%
Consolidate Business Entity	1	2	1		50%
Secure Matching Funds	2	5	1		0%
Confirm Data Reporting Protocols	2	7			0%
Acquire Boreal GasfinderAB	4	2			0%
Acquire FLIR 8000e	7	12			0%
Acquire Bell 206LIV	7	6			30%
Hire Additional Pilot/Training	11	3			25%
Verify Pipeline GIS Locator Data	4	3			0%
OEM Training on Boreal	6	1			0%
Beta Phase (Bell 206 B3/Boreal)	7	6			0%
Mount Boreal on Bell 206 LIV	13	2			0%
Beta Phase (Bell 206 LIV/Boreal)	14	5			0%
OEM Training on FLIR System	18	1			0%
Verify Project Flight Schedule	15	4			0%
OEM Helo Scheduled Maintenance	7	30			0%
Patrol Sector 1	19	4			0%
Patrol Sector 2	22	4			0%
Patrol Sector 3	25	4			0%
Patrol Sector 4	28	4			0%
Patrol Sector 5	31	4			0%
Patrol Sector 6	34	3			0%
Submit Final Project Summary	35	2			0%

PERIODS



HELO RESPONSE TIMES

1 Hour 30 Minutes

1 Hour

30 Minutes

DOUBLE
HELICOPTERS
Mandan, ND

IO-CODE

10-CODE



QUESTIONS