



Alberta Methane Field Challenge

Rocky Mountain House, Alberta, Canada

Inspection Dates: June 10th – 21st, 2019

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Revision	Date	Change
Rev 0	17-July-2019	Document Creation
Rev 1	25-July-2019	Edits by Brendan Smith



OBJECTIVE

SeekOps staff traveled to the Rocky Mountain House region of Alberta, Canada to support data collection and reporting of controlled emissions measurements at production facilities for local oil and gas operators from 10th – 21st June 2019. SeekOps brought a 3-person field team (remote pilot, ground control operator, safety observer) and all associated equipment necessary for Unmanned Aerial System (UAS) methane inspection operations. Equipment included the standard mobile operations field kit, consisting of a commercial drone platform, SeekIR[®] UAS methane sensor, and weather station (Figure 1).



Figure 1. SeekOps field kit consisting of Weather Station, Drone and Associated HW.

TECHNOLOGY DESCRIPTION

SeekOps has uniqueness in the emissions characterization space by providing UAS field services with capabilities for methane detection, localization, and quantification. These end-to-end services include data collection through data analysis and reporting. Data is collected by flying discrete profiles shown below (Figure 2). Localization is achieved by flying proximal to equipment while maintaining position outside of the intrinsic safety zone. Quantification is done by flying vertical curtain profiles downwind of facilities and equipment. Data products are produced rapidly using SeekOps proprietary data analytics methods.

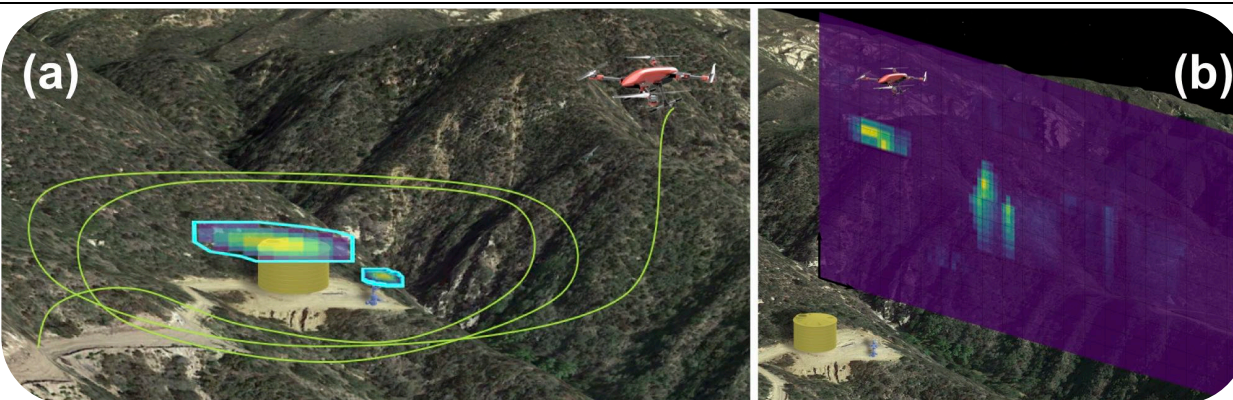


Figure 2. SeekOps typical data products for (a) Localization and (b) Quantification.



AMFC PARTICIPATION

SeekOps participated in the Alberta Methane Field Challenge (AMFC) that took place in the Rocky Mountain House Region of Alberta over the course of 12 days. Of the 12 days, 10 were spent conducting SeekIR® UAS methane surveys on local oil and gas well pads operated by Cenovus, CNRL, and NAL. A total of 50 sites were surveyed, with 10 sites available each day. SeekOps surveyed 46 of the 50 sites at least once, with 56 total surveys (including repeat visits). The distribution of site visits over the course of the study can be seen in Table 1 and shown graphically by Figure 3.

Table 1. Summary of SeekOps daily activity during AMFC

Date	Sites Surveyed by Identifier									Count
10-June	AMFC Orientation – No sites surveyed									0
11-June	1	2	11							3
12-June	42	8	5	9	4	7	6			7
13-June	10	12	3	20						4
14-June	15	16	22	32	14					5
15-June	47	49	39	40	27	18	44			7
16-June	27	18	44	46	21	34	48			7
17-June	21	34	48	41	17	30	31			7
18-June	50	17	24	30	31	33	19	37	25	9
19-June	25	33	19	37						4
20-June	13	23	38							3
21-June	Unable to fly due to rain – No Sites surveyed									0
Total Sites Surveyed										56

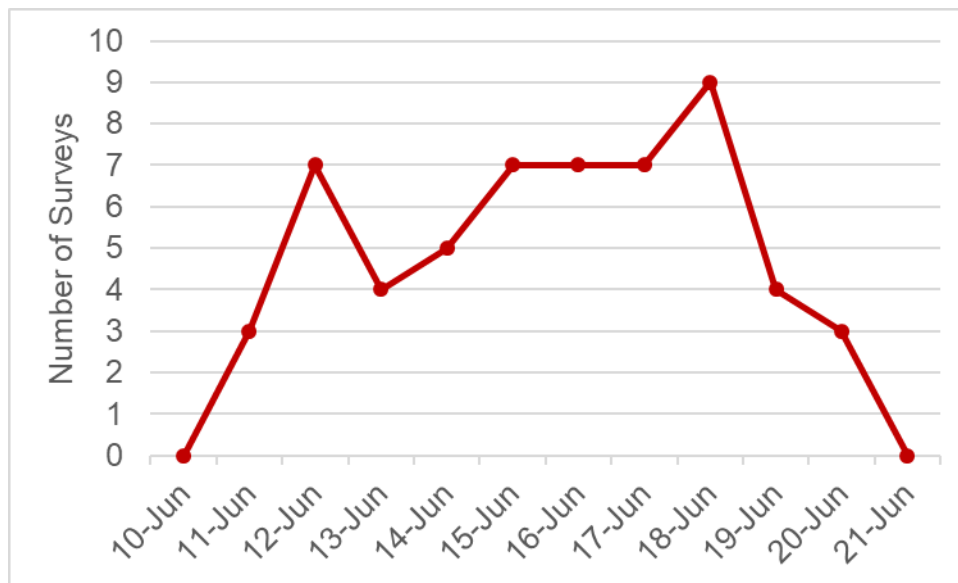


Figure 3. SeekOps daily activity during AMFC



LEARNINGS FROM PARTICIPATION

The AMFC provided an opportunity to interact with both Alberta Energy Regulators (AER) as well as local operators. These interactions were valuable in establishing connections with local operators and regulators. SeekOps was able to demonstrate the technology and services that are currently offered and utilized to identify and reduce methane emissions for customers around the world.

Participation in the AMFC was the first instance where SeekOps operated in Canada, which aligns well with corporate strategy. Through these efforts, SeekOps now bolsters an impressive dataset that can be leveraged in the application for equivalency through the AER – specifically pertaining to the AER Directive 60.

Using what was learned over the course of the Alberta Methane Field Challenge, the solutions SeekOps already provides for its customers can be further refined to create more products and services that are efficient, cost effective, and universally available.

AREAS OF IMPROVEMENT FOR TECHNOLOGY

Working on production pads in the Rocky Mountain House region further validated previously identified areas of deployment in need of improvement. Currently, SeekOps field teams can complete between 5 and 10 well pads a day depending on size and proximity. With some slight modifications to operational procedures and software, 15 to 24 site surveys per day is attainable. The main areas of operations that are in the process of being improved are:

Autonomy – The Alberta Methane Field Challenge confirmed a need to increase the amount of autonomous flight used for SeekOps UAS surveys. Though data quality remains the same, autonomous flight tends to be a faster and more efficient data acquisition technique. It allows for all the necessary flight patterns to be completed quickly and precisely while the remote pilot observes from a single location on the pad. For autonomous flight to be a viable and cost-effective solution, it is necessary for customers to commit to a level of preparation as well as inspection longevity – multi-year inspection schedule. This is due to the level of effort necessary to establish “flyable” zones and standard drone routes. In the interim, flight planning is integrated into the SeekOps data acquisition software, which allows for autonomous flight plans to be created quickly upon arrival at each site.

Handheld Sensor – Currently the SeekIR® UAS data output can deliver a data product outlining the equipment or general area in which emissions sources are likely to be found. Coupling the UAS survey with a handheld sensor would allow for field personnel to locate fugitive emissions down to the component level with minimal extra time on site. SeekIR® Handheld sensors are currently being developed in both intrinsically safe and non-intrinsically safe configurations.



COST IMPLICATIONS

SeekOps aims to increase the efficiency and effectiveness of oil & gas customer emissions inspections, ensure safe operating environments, and reduce product loss across all operations. The goal is to continually provide customers with a catalog of cost-effective solutions for emission reduction and environmental compliance.

SeekOps service offerings are at a comparable price-point as current OGI inspection methods, at a fraction of the time (1/4 the time) with automated, quantitative reporting. By using SeekOps technology, a tangible benefit (aside from ensuring regulatory compliance and reducing risk of incurred fines) is the early identification of product loss with zero false positives. This allows for operators to make the necessary corrective actions to retain and sell their natural gas. These savings are outlined in Table 2, where it is assumed that for 250 well pads each will possess, on average, 150SCFH total emissions. The value of 150SCFH per wellpad is derived through empirical and anonymized data gathered across all SeekOps Customers. Typical wellpad size contains 4 wellheads per pad with phase separation equipment on site.

Table 2. Cost Implication Estimate (USD)			
Economic Benefits (gas savings potential)	\$1,192,500	\$/year	<ul style="list-style-type: none"> • Assume 4 wellheads per well pad (250 well pads) • SCF/Hr = (150 SCFH/Well Pad) * (250 Well Pads) • MCF/Yr = (SCFH/Hr) * (1 MCF/1000 SCF) * 24 * 365 • Annual \$\$ = (MCF/Yr) * (\$/MCF) • Assume natural gas prices of \$5/MCH



DATA PRODUCT EXAMPLE

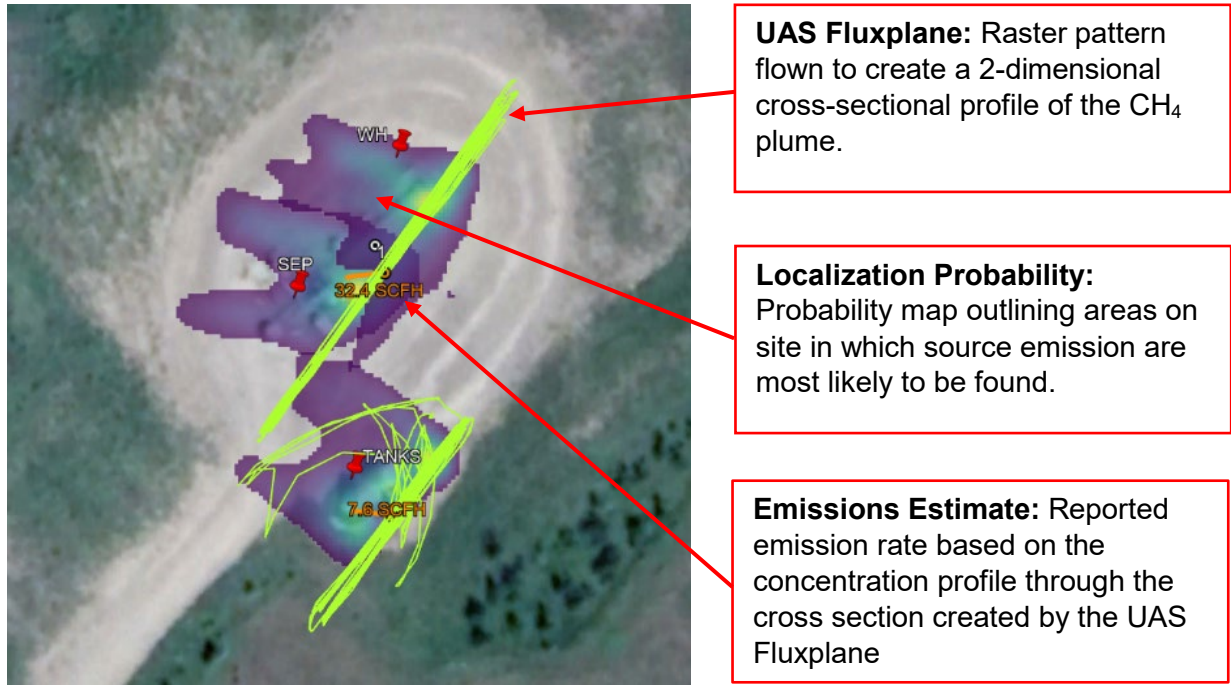


Figure 4. Site Overview Example

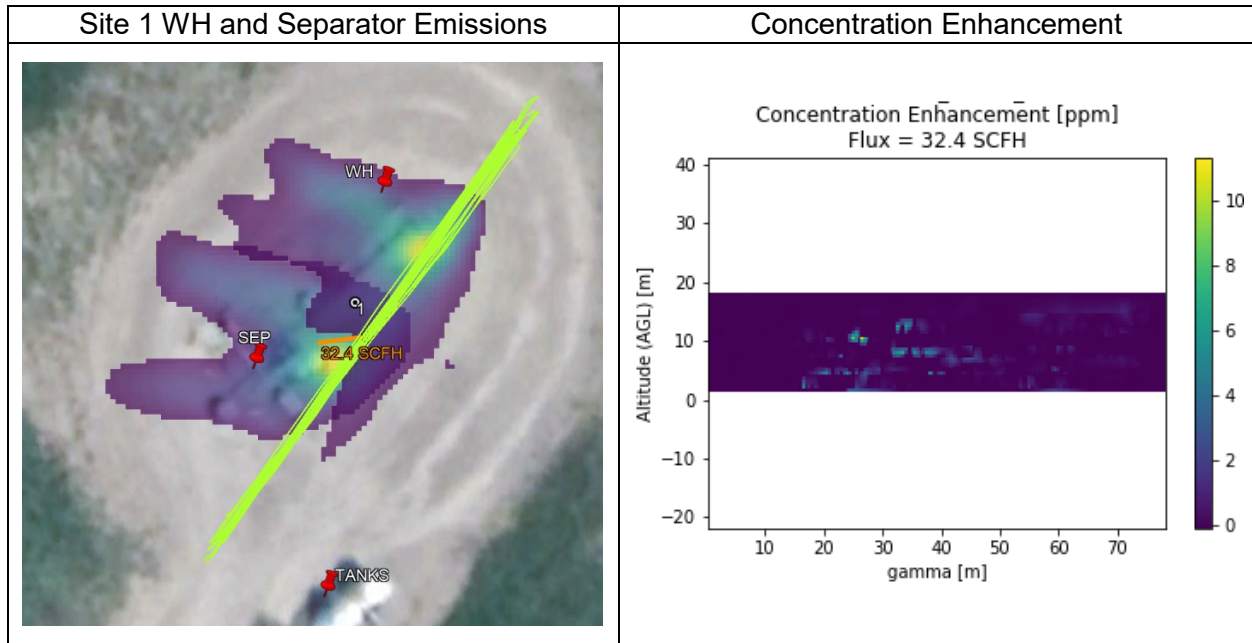


Figure 5. Concentration profile figures for Site 1 wellhead and separator emissions