IR LASERS

for methane leak detection

HEATH CONSULTANTS

RMLD

Remote Methane Leak Detector

PSI

HEATH CONSULTANTS

REM

REMOTE EMISSIONS MONITOR

PSI

HEATH CONSULTANTS

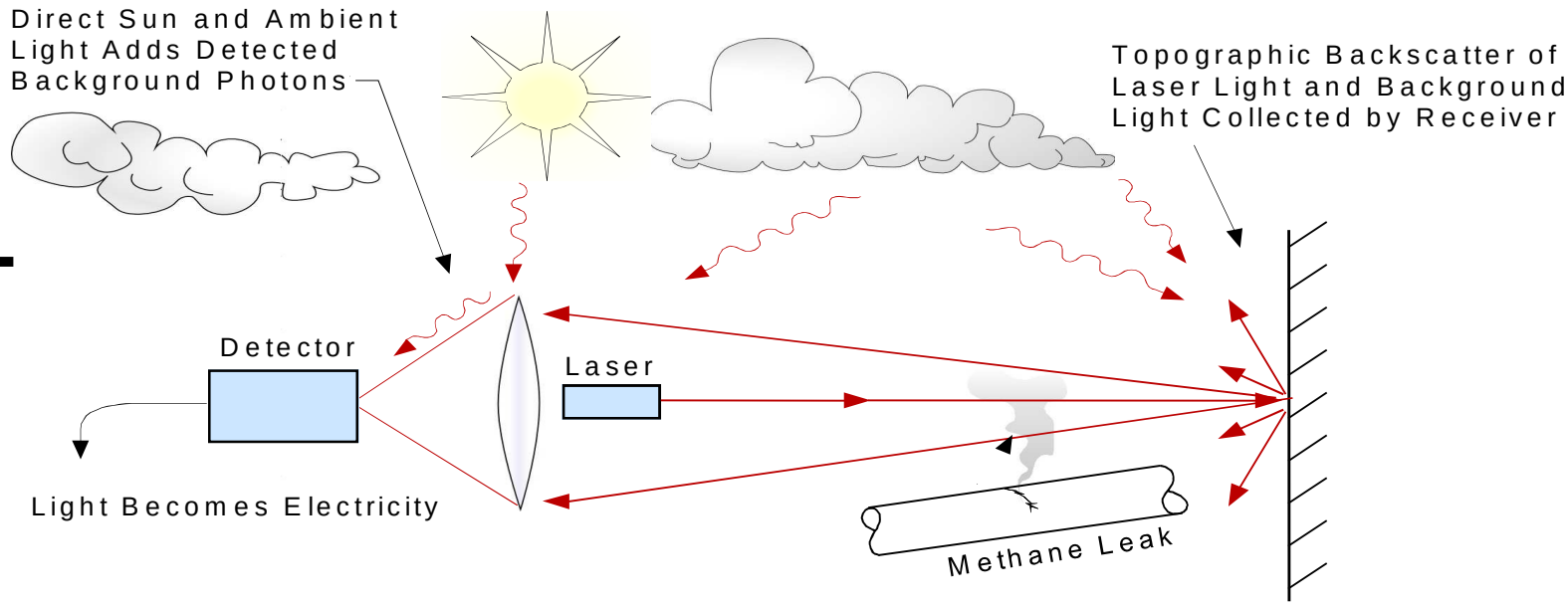
RMLD-UAV

Fast, reliable leak detection for site level LDAR

HOW DOES IT WORK

T TUNABLE
D DIODE
L LASER
A ABSORPTION
S SPECTROSCOPY

TECHNICAL APPROACH

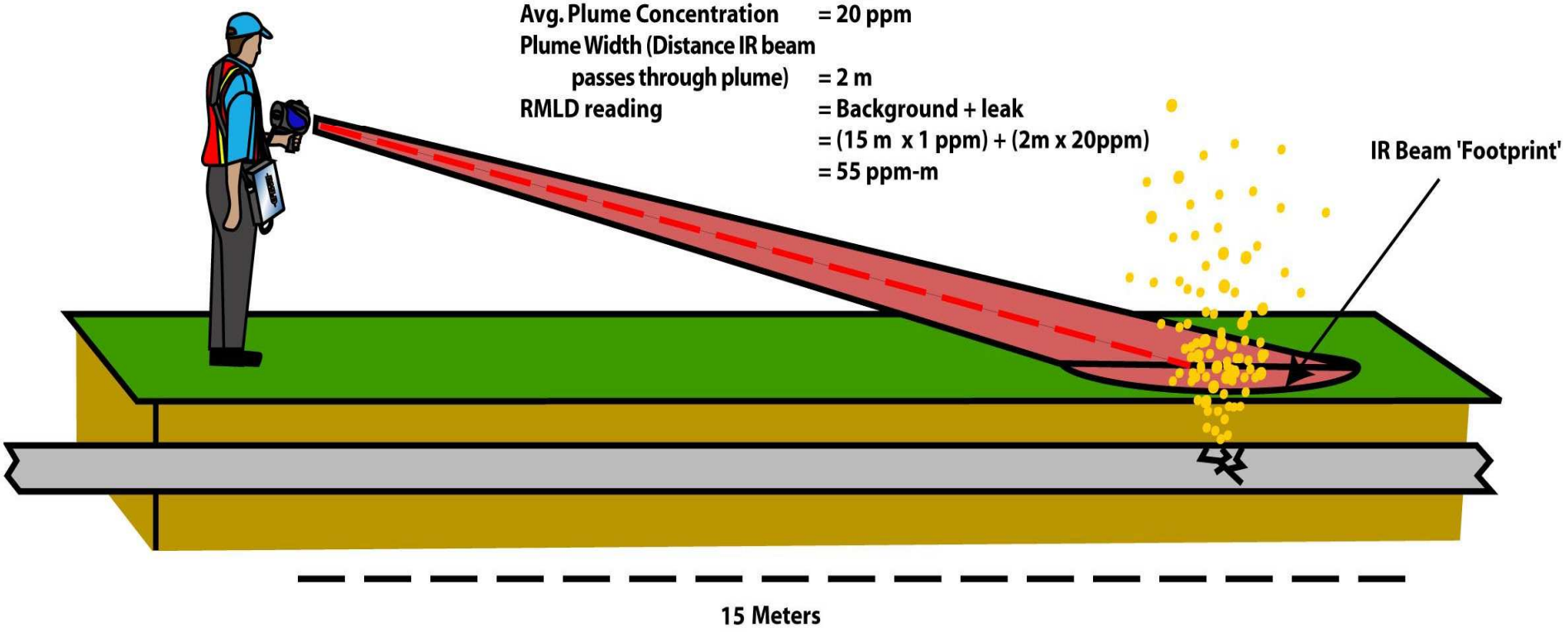


- Infrared Laser Light is Remotely Projected onto a target (e.g., grass, wall, etc.)
- A fraction of the beam is scattered from the target surface and returned to the source
- Returned light is collected and focused onto a detector
- The detector processes the data to measure the amount of absorption
- Methane readings are displayed in ppm-m

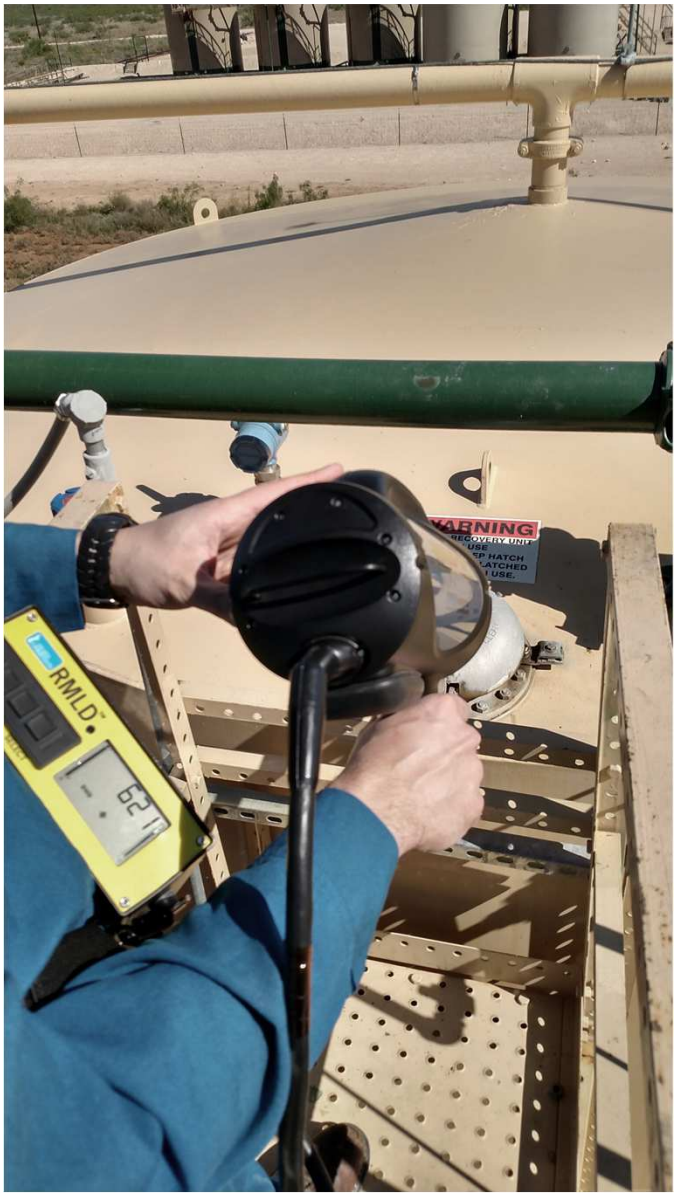
PPM-Meter vs PPM

Example

Scan Distance	= 15 m (50 ft)
IR Beam 'Footprint'	= 4.9 m (16 ft) x .3 m (11 inches) @ 15 m (50 ft)
Background Methane	= 1 ppm
Avg. Plume Concentration	= 20 ppm
Plume Width (Distance IR beam passes through plume)	= 2 m
RMLD reading	= Background + leak = (15 m x 1 ppm) + (2m x 20ppm) = 55 ppm-m



RMLD
6203


WARNING
RMLD
621

RMLD
572
SELECT

EQUIVALENCY TO OGI

PASSIVE VS ACTIVE

OPTIMIZED COVERAGE

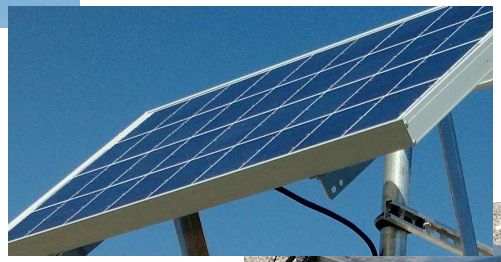
RMLD-REM
SAMSUNG

FIELD APPLICATION

- HCA (HIGH CONSEQUENCE AREA) PIPELINE
- BRIDGE CROSSINGS
- ONSHORE & OFFSHORE PRODUCTION
- GAS PLANTS
- TRANSMISSION/GATHERING STATIONS
- INACCESSIBLE AREAS
- LNG TANKERS

COMPONENTS

- LASER TRANSCIEVER
  - REMOTELY MOUNTED AS REQUIRED
- REFLECTOR
- CONTROL ELECTRONICS
  - LASER & CONTROLLER
  - Iot WIRELESS ACCESS POINT
  - CELLULAR MODEM
  - ULTRASONIC WIND SENSOR
- POWER
  - AC with BATTERY BACKUP
  - SOLAR with BATTERY BACKUP



FEATURES

- METHANE SPECIFIC FIXED OPEN PATH LASER
  - 10+ YEARS OF RMLD TECHNOLOGY
- UP TO 250m PATH LENGTH
- ALERT NOTIFICATION OF HIGH EMISSION EVENTS
- NO FALSE ALARMING ON FOG, RAIN, SNOW, VIBRATION HIGH WINDS, PARTIAL OBSTUCTION
- WIDE OPERATING TEMPERATURE RANGE
- EASY INSTALL AND ALIGNMENT
  - SINGLE TRANSCIEVER
  - NO PRECISION REQUIRED
- EMISSION FLUX QUANTIFICATION
- INTERNET of THINGS (IoT) CLOUD DATABASE

RMLD-REM SPECIFICATION

REM Technical specification	
Theory of Operation	Tunable Diode Laser Absorption Spectroscopy (TDLAS)
Detectable Gases	Methane. Others available on special order
Range	0 to 99,999 ppm.m
Sensitivity	< 10 ppm.m
Path Lengths	Up to 250 m
Speed of Response	T90 < 1 sec.
Digital Output	RS235, Wi-Fi, Cellular
Data Storage and access	Web portal to cloud based storage
EMC Standards	In progress
Safety Approvals	In progress CLASS I IR laser
IP Rating	IP 66
Alignment	± 25°
Operating temperature	-17° to 50° C

STORAGE

PRODUCTION

CSU test site

DOE ARPA-e MONITOR PROJECT

RMLD-UAV

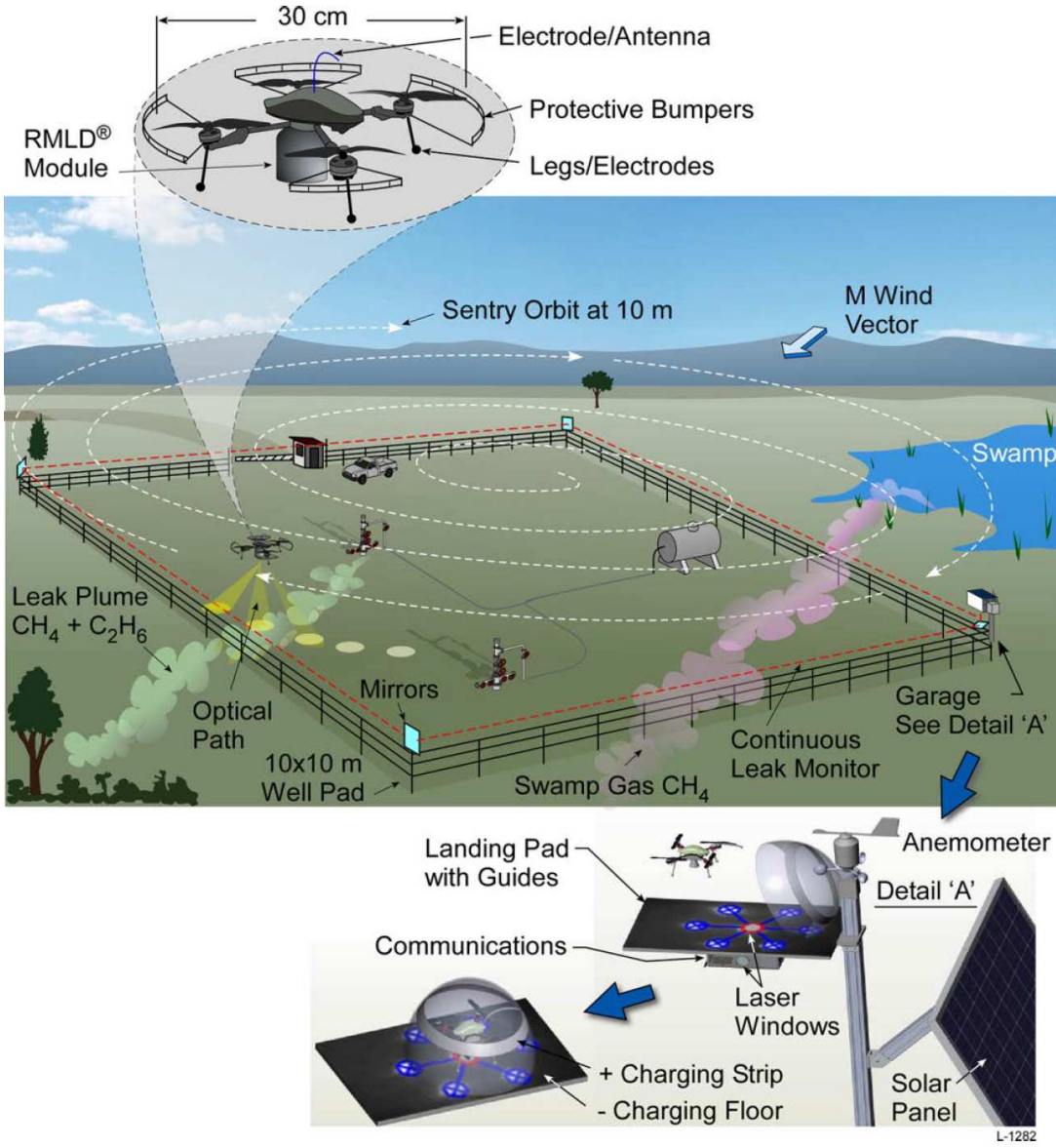
ARPA-e MONITOR PROGRAM

- Advanced Research Program Administration – Energy (ARPA-E)
- 10 Projects funded to develop advanced systems to continuously monitor for methane emissions
  - FIRST FOCUS IS IN PRODUCTION
  - 6 SCFH EMISSION RATE DETECTION
  - CONTINOUS MONITORING
  - FLUX ESTIMATION
  - SPECTIATION
  - LOW COST OF OPERATION

THE TEAM

- Physical Science Inc (PSI);
  - System Prime and Lead Technologist
- Heath Consultants;
  - Leak Detection, Field Testing, Marketing, Commercialize
- University of Houston
  - Environmental Studies
- Princeton University
  - Laser Technology, Environmental Studies
- Maxion Inc
  - Laser Technology

Concept


30 cm
Electrode/Antenna
Protective Bumpers
RMLD®
Module
Legs/Electrodes
Sentry Orbit at 10 m
M Wind
Vector
Swamp
Leak Plume
$CH_4 + C_2H_6$
Optical
Path
Mirrors
10x10 m
Well Pad
Swamp Gas CH_4
Continuous
Leak Monitor
Garage
See Detail 'A'
Landing Pad
with Guides
Anemometer
Detail 'A'
Communications
Laser
Windows
+ Charging Strip
- Charging Floor
Solar
Panel
L-1282

project status

BF51
WARNING
GAS PIPELINE
CARBON MONOXIDE
FLAMMABLE

emergency response

disaster zones
leak inspections

Summary of FAA 14 CFR part 107

- Max altitude 400 ft
- Max speed 100 mph
- Max weight 55 lbs
- Must yield right of way to manned aircraft
- Must keep unmanned aircraft in visual line of sight
- Must not operate over people
- Must not operate from a moving vehicle
- Must not operate from a moving aircraft
- Must not operate from a moving vehicle unless in a sparsely populated area
- Must not operate from a moving aircraft unless in a sparsely populated area
- Must not operate from a moving vehicle unless in a sparsely populated area and avoid

best practices

sh

information
B4UFLY
www.faa.gov/uas

thank you

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