SOUTHERN UTE INDIAN TRIBE

AMBIENT MONITORING UPDATE AND METHANE RANGER STUDY

Four Corners Air Quality Group Meeting, 2017

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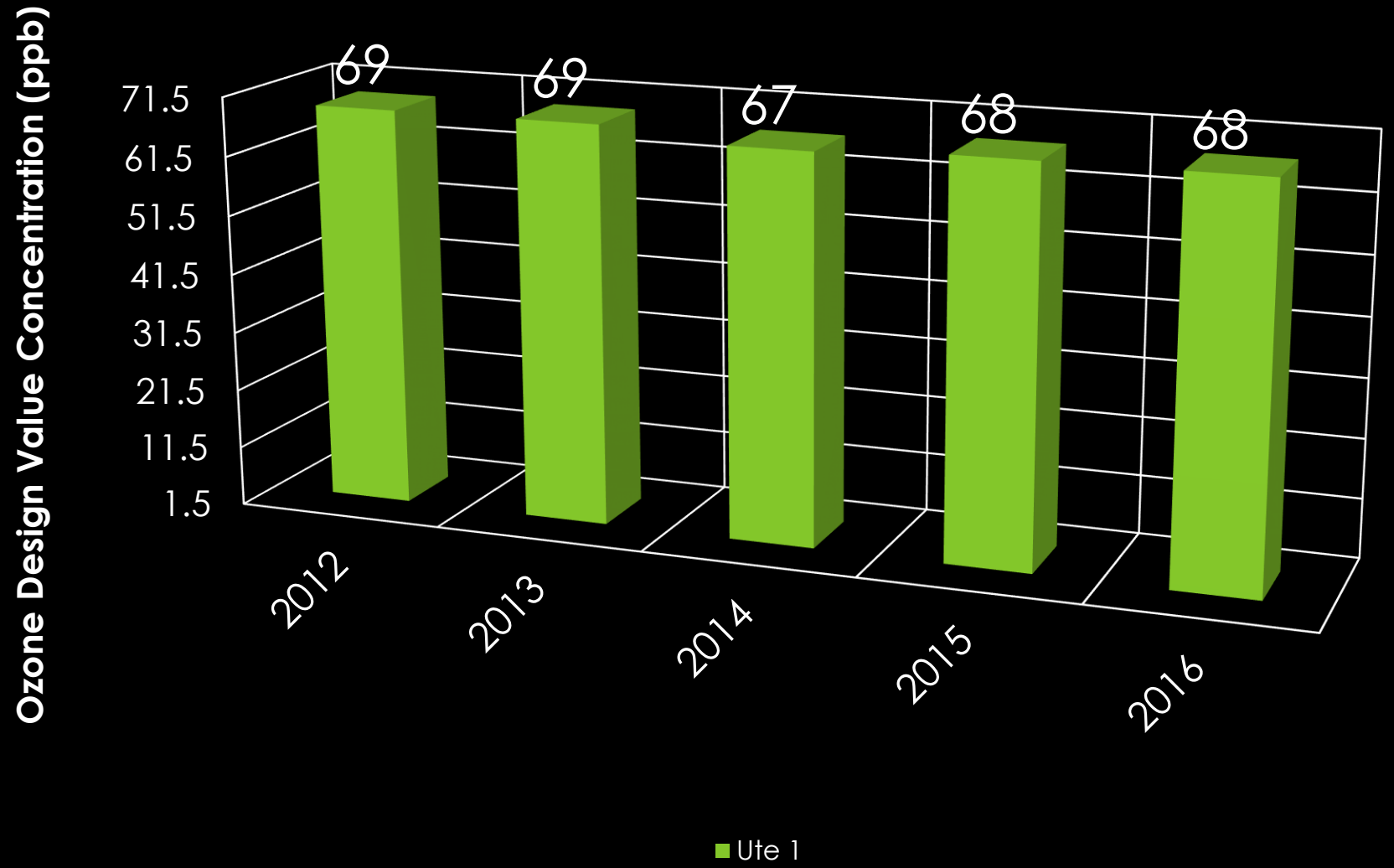
2017 AMBIENT MONITORING UPDATE

- Air monitoring stations:
  - **Ute 1** (Ignacio)
  - **Ute 3** (Bondad)
  - **Mobile Monitoring Station** (Lake Capote)
- Criteria pollutants measured:
  - Ozone
  - Nitrogen Dioxide
  - Carbon Monoxide (Ute 1 only)
  - Sulfur Dioxide (Lake Capote only)
  - PM10 (Ute 3 only)
  - PM2.5 (Ute 3 only)
- Meteorological conditions measured:
  - Wind speed and direction
  - Relative humidity
  - Ambient temperature
  - Solar radiation
  - Precipitation
  - Visibility (Ute 3 only)

AMBIENT MONITORING 2012 – 2016
UTE 1 OZONE DESIGN VALUES

- Ozone Design Values
  (Fourth highest maximum averaged over a three year period):
  - Design Values are calculated for each air monitoring station within a county. The highest values reported by an air monitoring station in that county is the Design Value for that county.

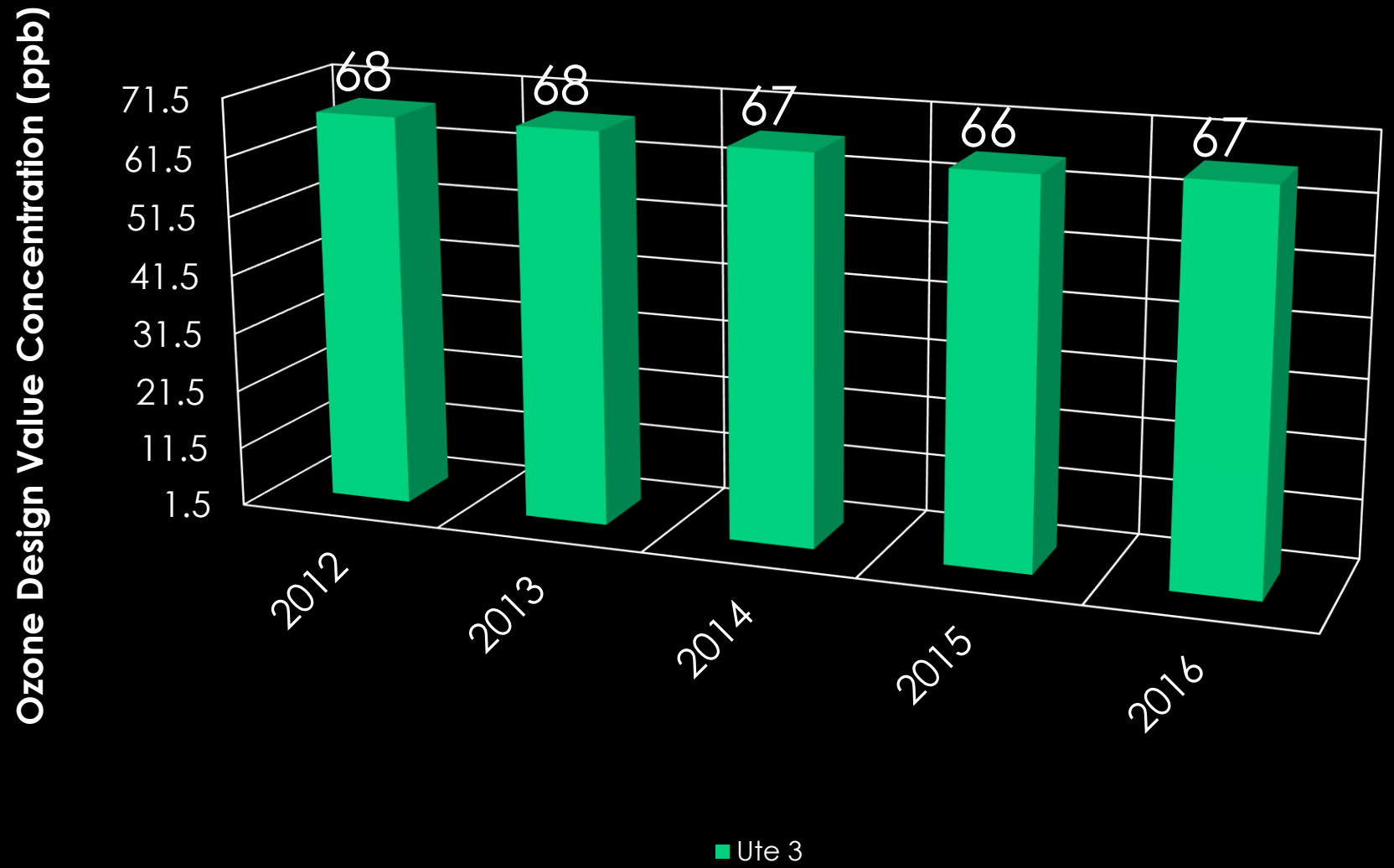
- Design values for Ute1 are listed below:
  - **2016: 68**
  - **2015: 68**
  - **2014: 67**
  - **2013: 69**
  - **2012: 69**



AMBIENT MONITORING 2012 – 2016
UTE 3 OZONE DESIGN VALUES

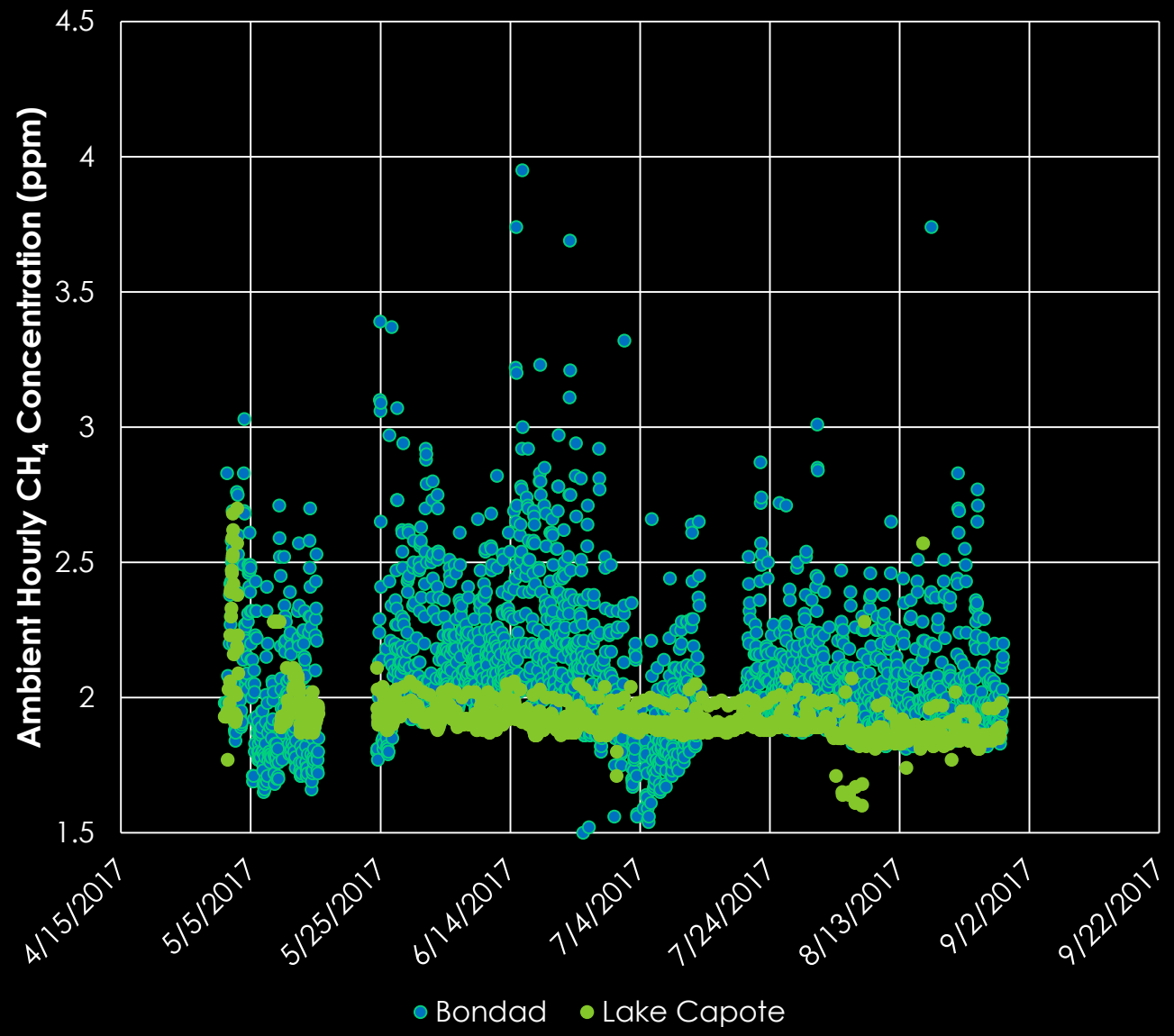
- Ozone Design Values
  (Fourth highest maximum averaged over a three year period)

- Design values for Ute 3 are listed below:
  - **2016: 67**
  - **2015: 66**
  - **2014: 67**
  - **2013: 68**
  - **2012: 68**

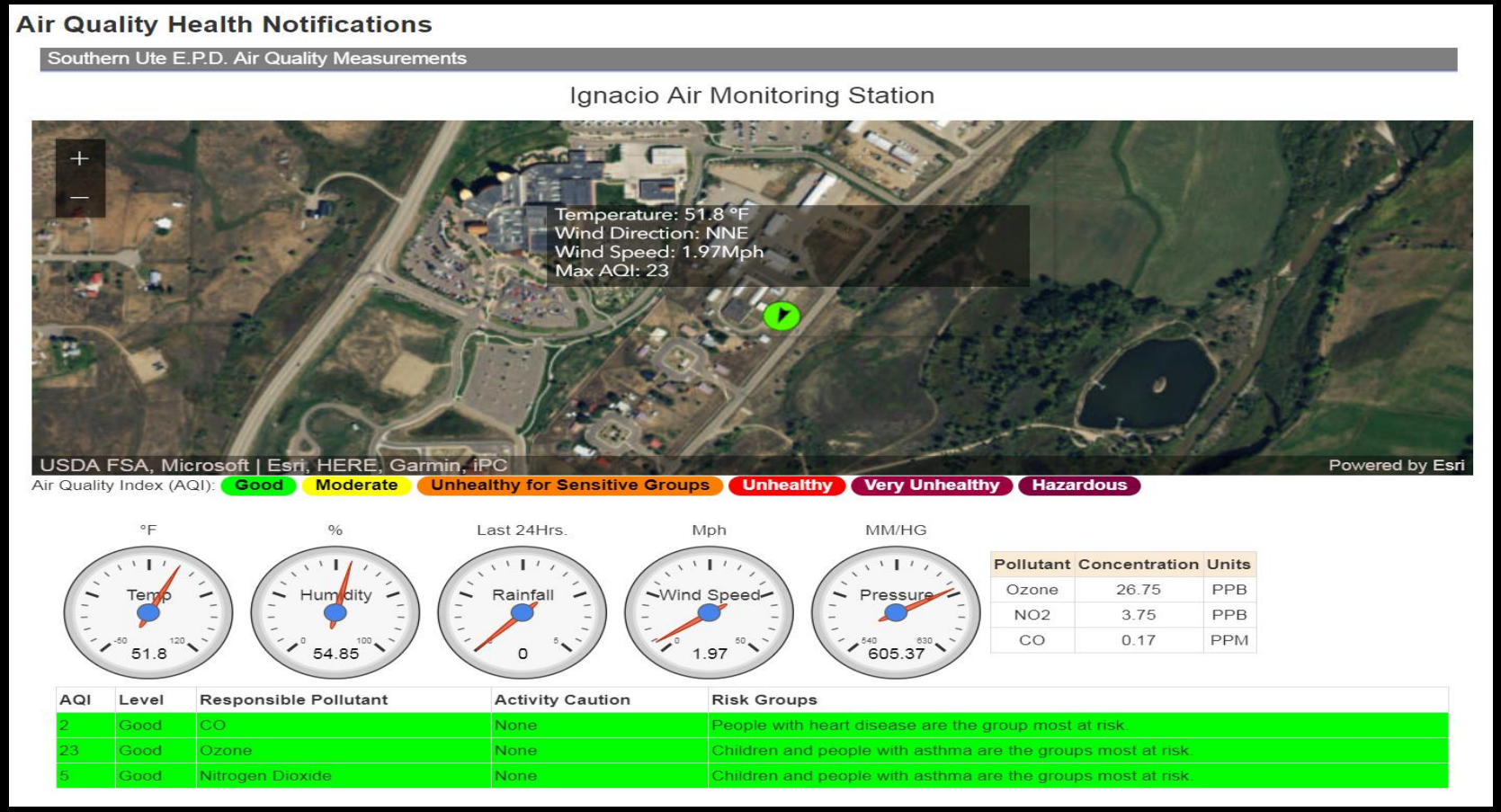


AMBIENT METHANE MONITORING UPDATE

- **Ambient methane is measured at two locations**:
  - Ute 3 air monitoring Station
  - Lake Capote air monitoring station.
    - The lake capote station was setup May 1, 2017.
- Ambient concentrations at both stations are measured using Thermo Scientific methane and non-methane gas analyzers.
- Average Methane concentrations measured:
  - **Bondad:** 2.1ppm
  - **Lake Capote:** 1.9ppm



SOUTHERN UTE INDIAN RESERVATION REAL-TIME AQI AND WEATHER



https://www.southernute-nsn.gov/environmentalprograms/airquality/ambient/

Methane Ranger

METHANE RANGER STUDY

- Study of mobile methane detection methods on the Southern Ute Indian Reservation.
- Vehicle mounted mobile methane detection system.
- Utilizes a Boreal laser and Red Hen Systems, LLC technology.
- Calculates methane concentrations, GPS location, and wind direction once every 2 seconds.

STUDY GOALS

- Evaluate the performance of mobile monitoring equipment.
  - Accuracy, reliability, practicality
- Measure ambient methane concentrations on the Reservation and assess diurnal methane concentrations and trends.
- Evaluate the effectiveness of the equipment for easily locating methane emission sources.

STUDY GOALS CONTINUED….

- Determine if a statistical correlation can be found between methane concentrations measured with mobile methane detection system and methane emissions identified with optical gas imaging (OGI) camera.
  - Is there a methane concentration that can be a reliable indicator of methane leaks?
  - Is there an "action signal" or methane concentration that warrants further investigation?
- Determine which factors (equipment type, location, facility age, etc) correlate to the presence of leaks.
- Assess the usefulness of mobile monitoring equipment for development of air programs.

COULD THIS TYPE OF EQUIPMENT BE USED FOR AIR PROGRAMS?

- Could equipment be used to develop simplified equivalency program to federally mandated methane leak detection and repair programs?
    - New Source Performance Standard OOOOa
    - BLM Onshore Order 9

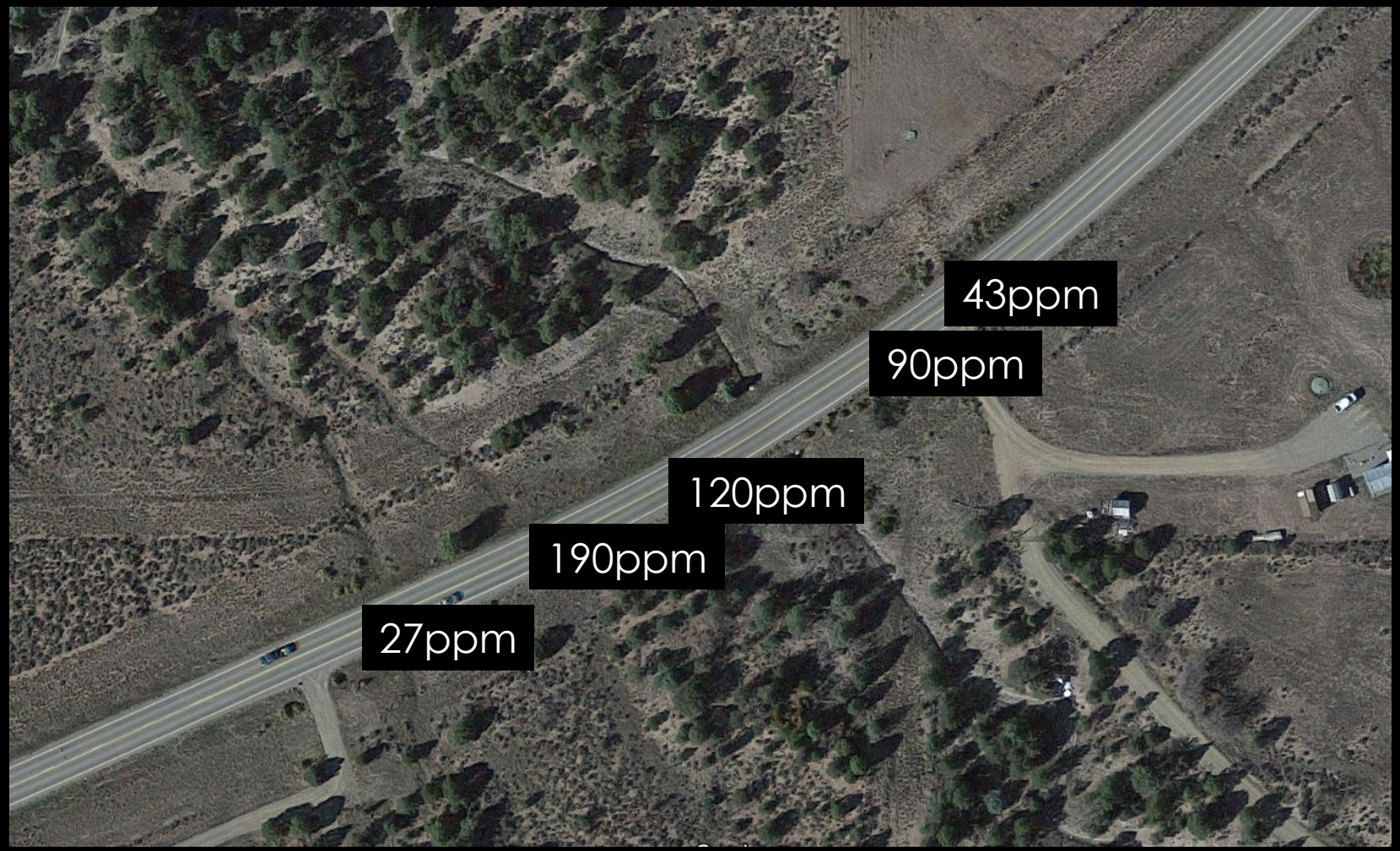
- Possibility for the development of Leak Detection and Repair (LDAR) Programs?
    - If no abnormal methane concentrations are discovered using mobile monitoring equipment, an OGI survey would not be needed.
    - If abnormal methane concentrations were discovered, an OGI survey would be conducted.

- Has the potential to reduce the time needed to complete LDAR surveys for large numbers of facilities.

METHANE RANGER STUDY CHALLENGES

- Every facility / site has a methane concentration that is considered normal.
  - Distinguishing between normal and abnormal concentrations can be difficult.
- Methane emissions can be found from many types of oil and gas equipment (pneumatics, tanks, engines, separators, etc).
- To detect some emissions with mobile equipment, some facilities must be:
  - In production, or
  - Equipment must be situated in a favorable wind direction.

CASE STUDY #1



- Methane Ranger vehicle traveled along this highway over multiple days.
- Increased methane concentrations detected.
- Wind directions suggested a methane source was located on north side of road.

CASE STUDY #1

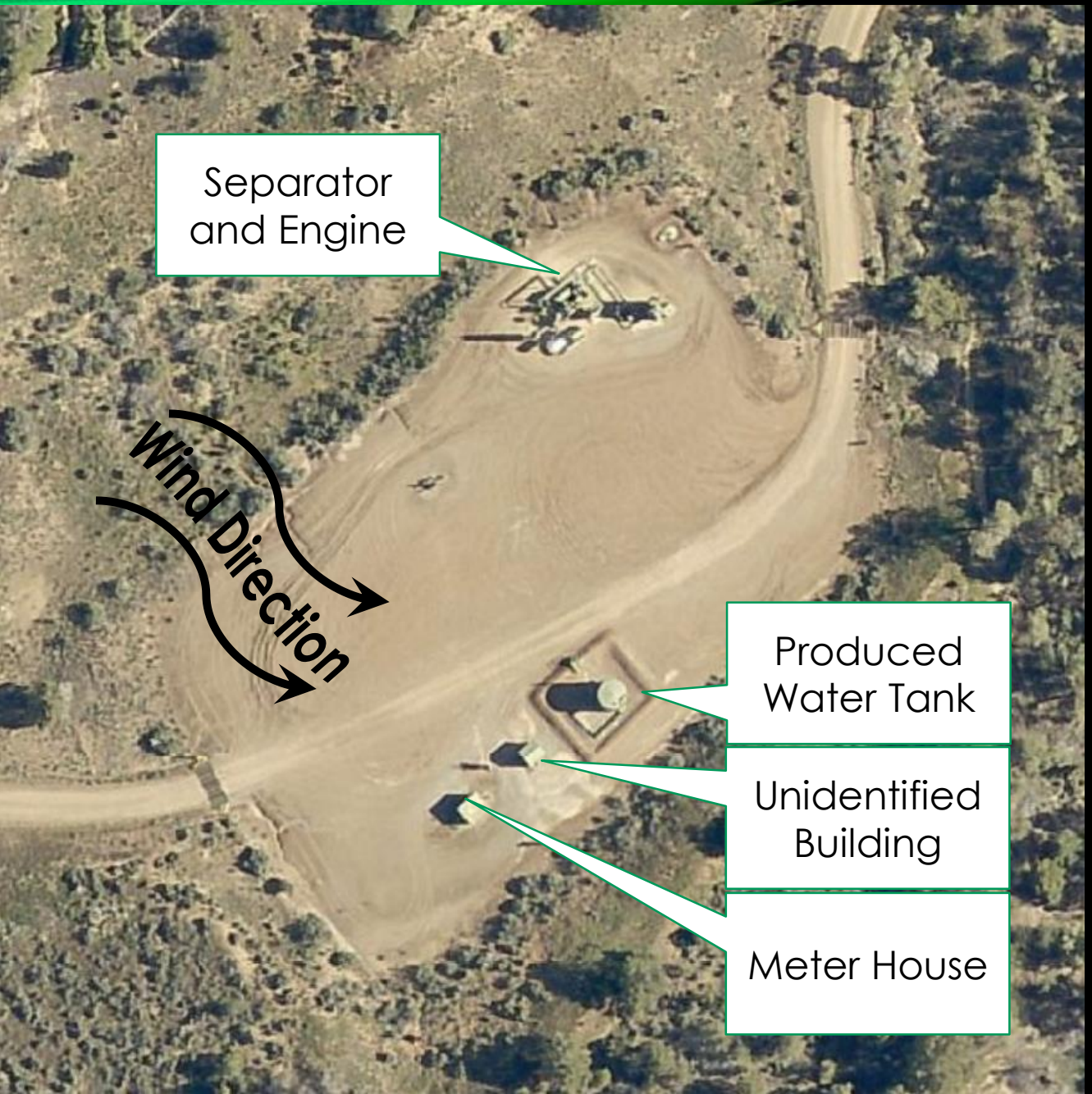
- The Air Quality Program deployed an OGI camera to determine the source of the methane.
- A possible source was located at the bottom of a wash.

CASE STUDY #1

CASE STUDY #1

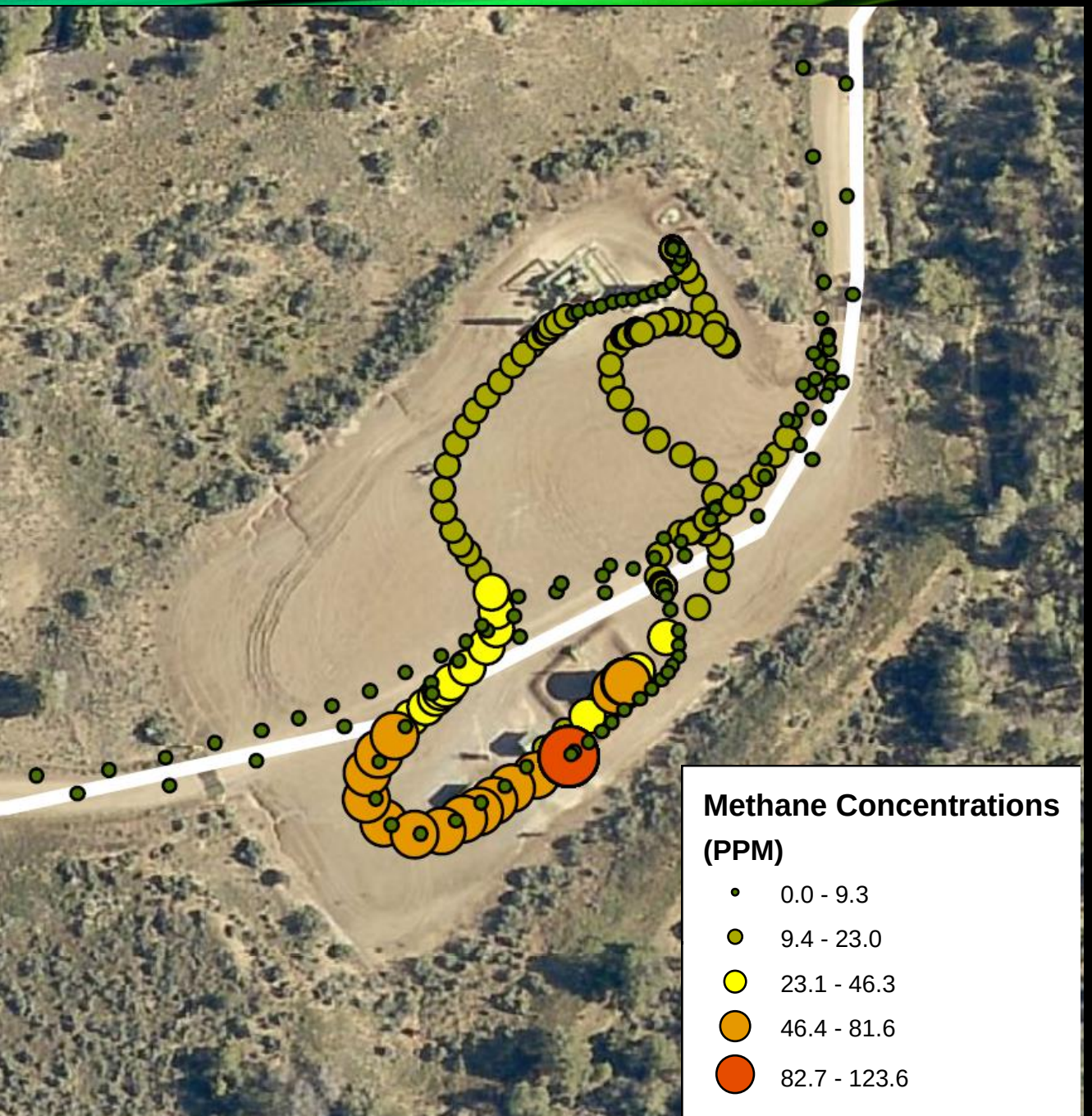
- The Air Quality Program contacted pipeline operators.
- Operator determined the leak was from a pipeline and promptly shut down the pipeline.
- The Air Quality Program has reinvestigated and determined the pipeline leak has been repaired.

CASE STUDY #2



- Morning survey with the Methane Ranger.
- Favorable wind direction blowing from Northwest to Southeast.

CASE STUDY #2

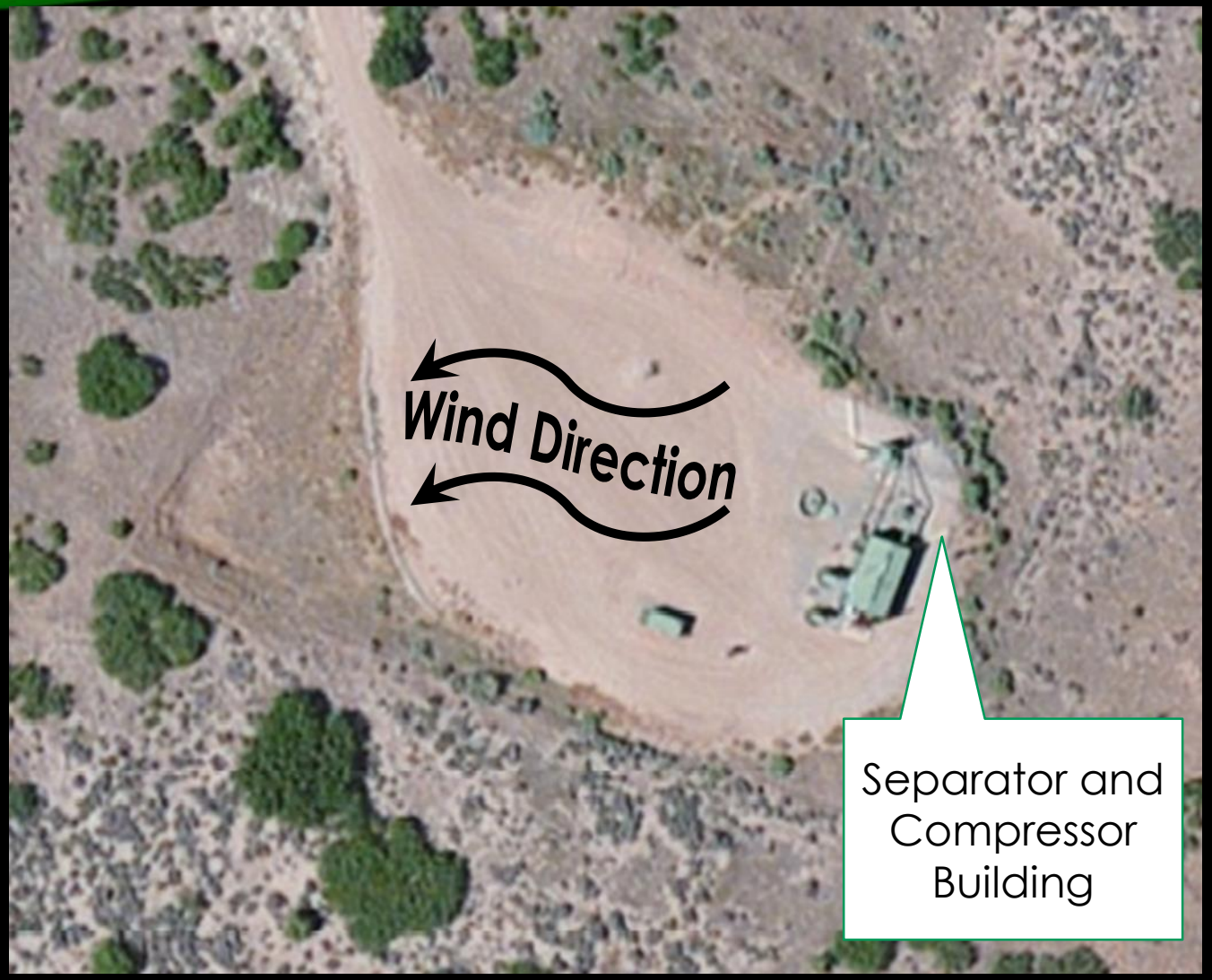


- Highest methane concentration found was 123.7ppm.
- OGI camera deployed
- Two sources found:
  - 1.) Venting Tank
  - 2.) Building between tank and meter house

CASE STUDY #2

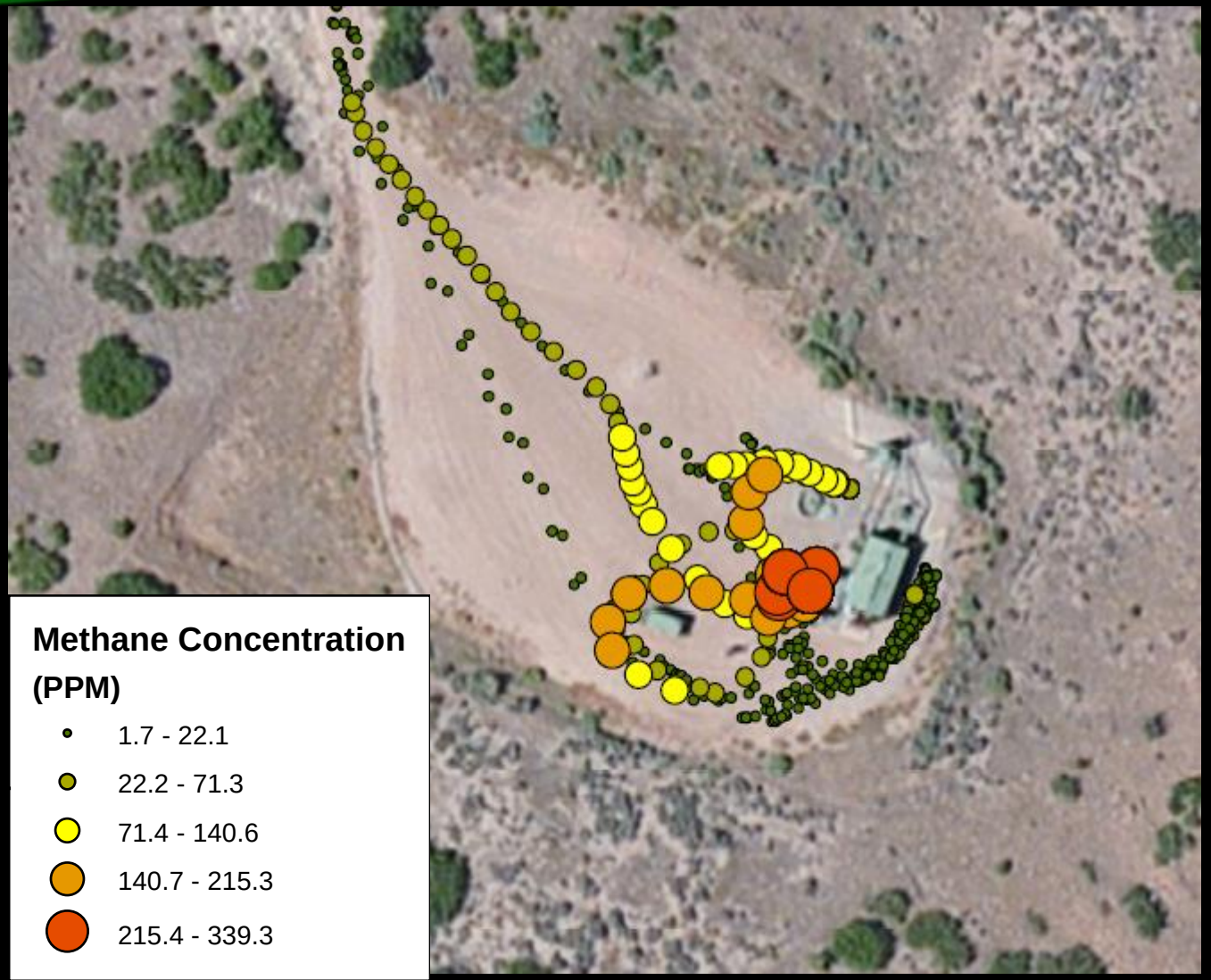
- OGI video of emissions
- Contacted well pad operator
- Operator confirmed the presence of a leak
- Operator determined cause to be a bad dry seal and a open valve.

CASE STUDY #3



- Methane Ranger on an early morning survey.
- Favorable wind direction blowing from East to West

CASE STUDY #3



- Increasing ambient concentrations were noticed while approaching the well site.
- Highest methane concentration: 339ppm.
- Suspected location: Compressor Building

CASE STUDY #3

- The Air Quality Program recorded OGI camera video from a distance with a telephoto lens.
- Downwind OGI video
- OGI video confirmed emissions originating from the Compressor Building.
- Unable to determine exact source of emissions.

CASE STUDY #3

- From the upwind side of the well pad, an open door can be seen.
- The OGI camera showed a noticeable emission source.
- The Southern Ute Department of Energy contacted the well pad operator.
- Operator determined the source was from a loose compressor / engine union and was promptly repaired.

MOVING FORWARD

- For the remainder of 2017, the study will continue to evaluate the equipment performance and effectiveness in mobile methane detection.

- Over the next year, evaluating data to set an "action signal" which can be correlated with methane emissions.
  - Work with industry on air program development ideas

- Following year, evaluate equivalency with LDAR requirements and network with industry.

THE SOUTHERN UTE INDIAN TRIBE AIR QUALITY PROGRAM THANKS YOU FOR YOUR TIME

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