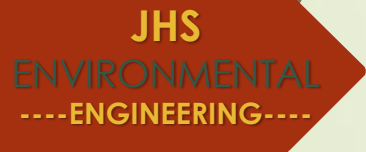


Benefits of Remote Monitoring for Landfill Operations



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JHS Environmental Engineering

July 30, 2019

Presentation Outline

- Introduction
- Unattended vs Remote Monitoring
- Benefits of Remote Monitoring
- What's the downside?
- System Components
- Case Study – Hernando County

If a Car can drive itself,
Why can't a landfill monitor itself?



Unattended vs Remote Monitoring

- Unattended and Remote Monitoring collect data continuously, with no human presence required.
- Remote Monitoring transmits the data collected to a remote “user”
- Remote Monitoring can be used for monitoring only, or monitoring and control, depending on system

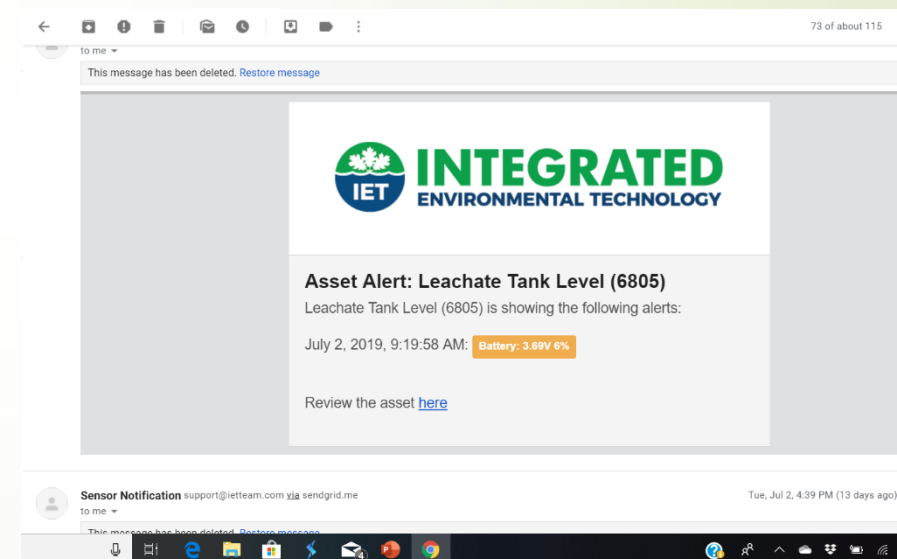
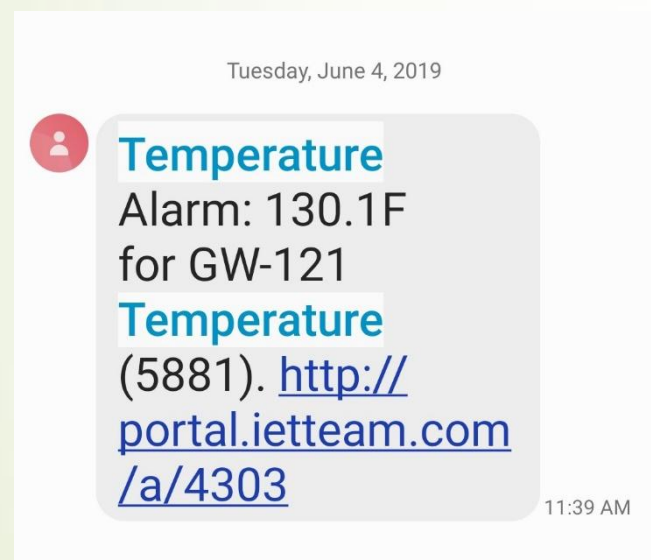
Benefits of Remote Monitoring

- “Continuous”, real time data
- Saves time associated with manual monitoring (Know Before You Go!)
- Increases data quality and quantity
- Reduces safety risks
- Supports Best Management Practices (BMP)



Benefits of Remote Monitoring

- Ability to monitor for and identify trends (Predictive Analysis)
- Immediate notification of problem or potential problem



- Can be used to trigger response action, directly or indirectly, depending on system

What's the downside?

- Still need to inspect site on a periodic basis
- Need to validate or verify instrumentation readings
- Compliance Considerations

System Components - Instrumentation

- Liquid Level
- Temperature
- Pressure
- Vacuum
- Pump Motor Current
- Flow Meters
 - Flow Rate
 - Totalizer
- Gas concentrations
- pH, conductivity, etc.

***Flexible interfaces allow for
additional monitoring options***

***4-20ma
Modbus
Hart Protocol
Pulse Output
1-wire Digital Thermometer
Contact Closure Alarms***

System Components – Power Supply

- Electricity (Line Powered)
- Solar
 - Based on site suitability
 - Storage capacity of battery
- Battery
 - Long Life, Rechargeable Batteries
 - Extended Life Batteries

System Components – Data Transmission

- Land line / Wired
- Radio signal
- Cellular Telephone
- Satellite

System Components – Receptor / User Interface

- SCADA
- Data Logger
- Cloud
- Email / Cell Phone
- Laptop / Desktop

Case Study: Hernando County

Damaged Header



Excavated Waste



Damaged Lateral



Selected Vendor

Integrated Environmental Technology (IET)

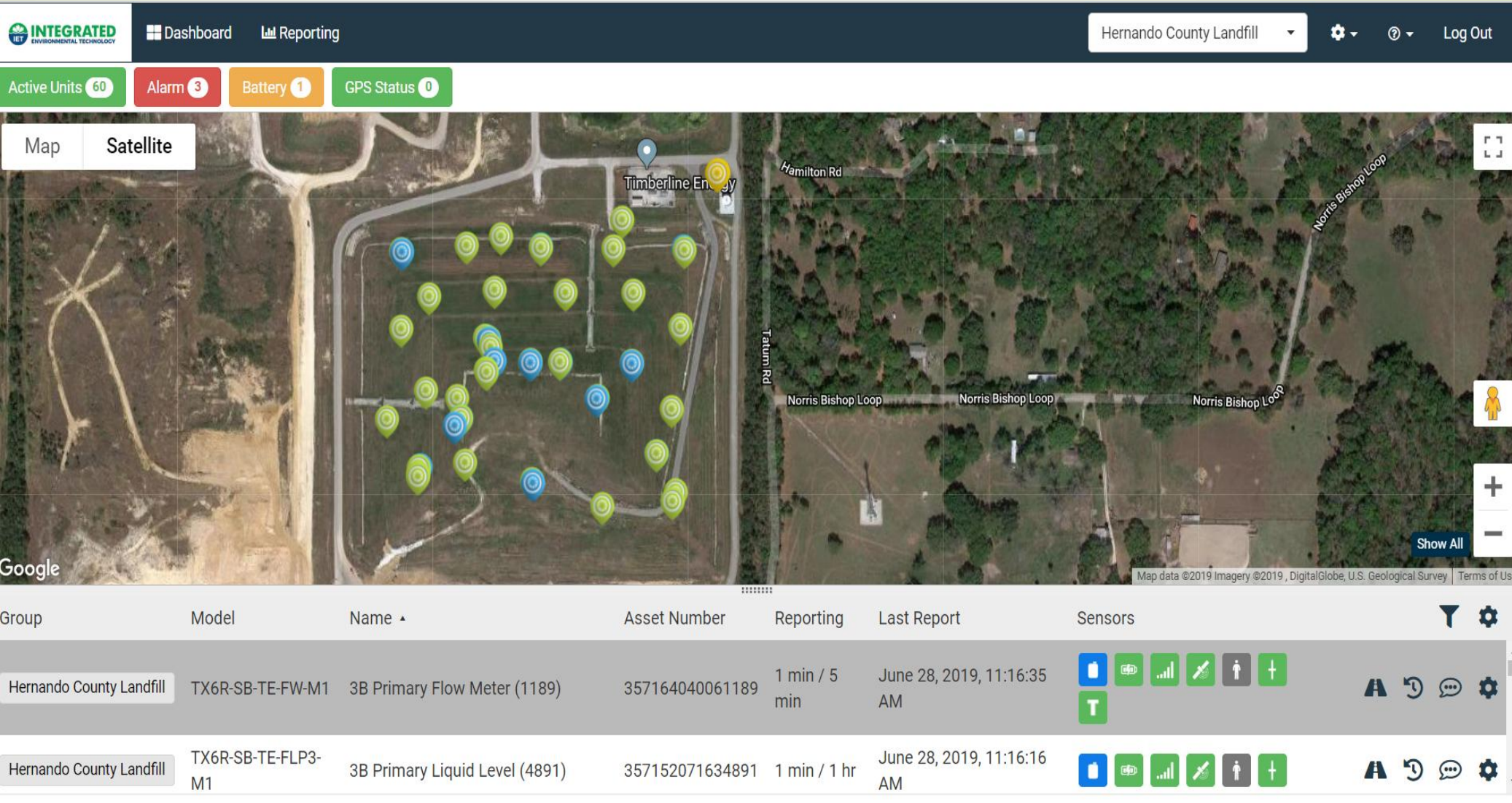
- The County had an existing relationship with IET
- IET field services team was assisting in investigation of elevated temperatures
- IET proposed a low power battery operated remote monitoring solution to collect and export data from the field to County staff as well as its consultants

Features

- Gateway packages installed and operational in days rather than months.
- Compact, durable, bolt-on solution that easily attaches to existing tanks, wellheads, control panels, etc.
- Unique ultra low power consumption - battery life lasting up to 2 years.
- Adaptable to existing systems
- Requires no electrical system upgrades or solar panels and external batteries.



Hernando County Monitoring Program



Hernando County Monitoring Program

- 27 Gas Wells
 - 12 Wells with Temperature and Pressure
 - 15 Wells with Temperature only
- 7 Gas Valve Vaults
 - 3 with Temperature and Pressure
 - 4 with Temperature Only
- 1 Tank Farm/Flow Control Skid
 - Tank Level
 - Flow Rate & Flow Total
 - Pump Motor Current
- 1 Leachate Riser Panel
 - Primary & Secondary Riser Liquid Level
 - Primary & Secondary Pump Flow Rate & Flow Total
 - Primary & Secondary Pump Motor Current

Gas Wells

Gas Well – Temperature Only

GW-101	GW-105	GW-110	GW-114	GW-117
GW-102	GW-107	GW-111R	GW-115	GW-125
GW-103	GW-109	GW-113	GW-116	GW-127



Typical Gas Well Temperature Only Installation

Gas Wells

Gas Wells – Temperature & Pressure

GW-104	GW-112	GW-120	GW-123
GW-106	GW-118	GW-121	GW-124
GW-108	GW-119	GW-122	GW-126



Typical Gas Well Temperature & Pressure Installation

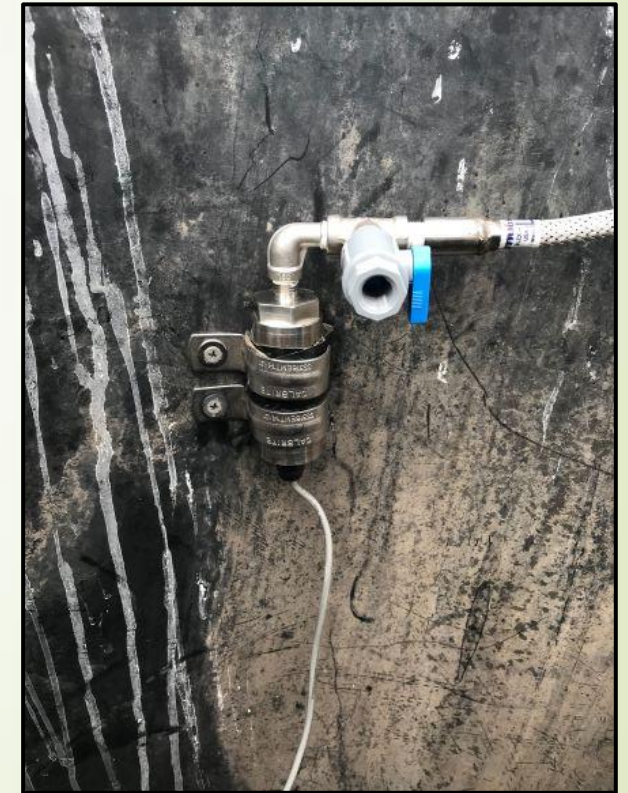
Gas Valve Vaults

Gas Valve Vaults – Temperature & Pressure

GV-09

GV-10

GV-11



Typical Gas Valve Vault Temperature & Pressure Installation

Leachate Collection Riser

Leachate Collection Riser

Primary & Secondary Liquid Level

Primary & Secondary Flow Total

Primary & Secondary Pump Current

Primary & Secondary Flow Rate



Leachate Collection Riser Installation

Tank Farm/Flow Control Skid

Tank Farm / Flow Control Skid

Tank Level

Flow Total

Pump Motor Current

Flow Rate



Tank Farm / Flow Control Skid Installation

Data Features

- Data capture / collection rates and automated reporting frequency are specified for each site and parameter.
- Email and text alerts have been set up for user defined critical parameters.
- Data is sent via cellular to secure cloud-based storage and can be accessed through the web portal with any browser on laptop or mobile device.
- Data can be downloaded for additional analysis.
- Data dashboard can be customized to user preferences.

Alarm Notification

Tuesday, June 4, 2019

 **Temperature**
Alarm: 130.1F
for GW-121
Temperature
(5881). <http://portal.ietteam.com/a/4303>

11:39 AM

SWANA Conference Presentation x Dashboard x Password Reset Confirmation x Remote Monitoring Solutions x +

https://portal.ietteam.com/dashboard/520

Apps Kelsi's Notebook -... (5) Roundcube Web... IET













































INTEGRATED ENVIRONMENTAL TECHNOLOGY Dashboard Reporting Hernando County Landfill

Active Units 60 Alarm 3 Battery 1 GPS Status 0

Map Satellite

Google

Map data ©2019 Terms of Use

Group	Model	Name	Asset Number	Reporting	Last Report	Sensors
Hernando County Landfill	TX2DS-SB-TE-ET-M2	GW-121 Temperature (5881)	357164040575881	12 hr / 12 hr	June 28, 2019, 12:38:33 AM	          
Hernando County Landfill	TX2DS-SB-TE-ET-M2	GW-121 Temperature -1ft (5955)	357152071635955	6 hr / 12 hr	June 28, 2019, 7:18:28 AM	          
Hernando County Landfill	TX2DS-SB-TE-ET-M2	GW-121 Temperature -7ft (8555)	357152071468555	6 hr / 12 hr	June 28, 2019, 7:22:56 AM	          
Hernando County Landfill	TX2DS-SB-TE-VC-M2	GW-121 Vacuum (6656)	357152071636656	12 hr / 12 hr	June 28, 2019, 1:30:57 AM	          

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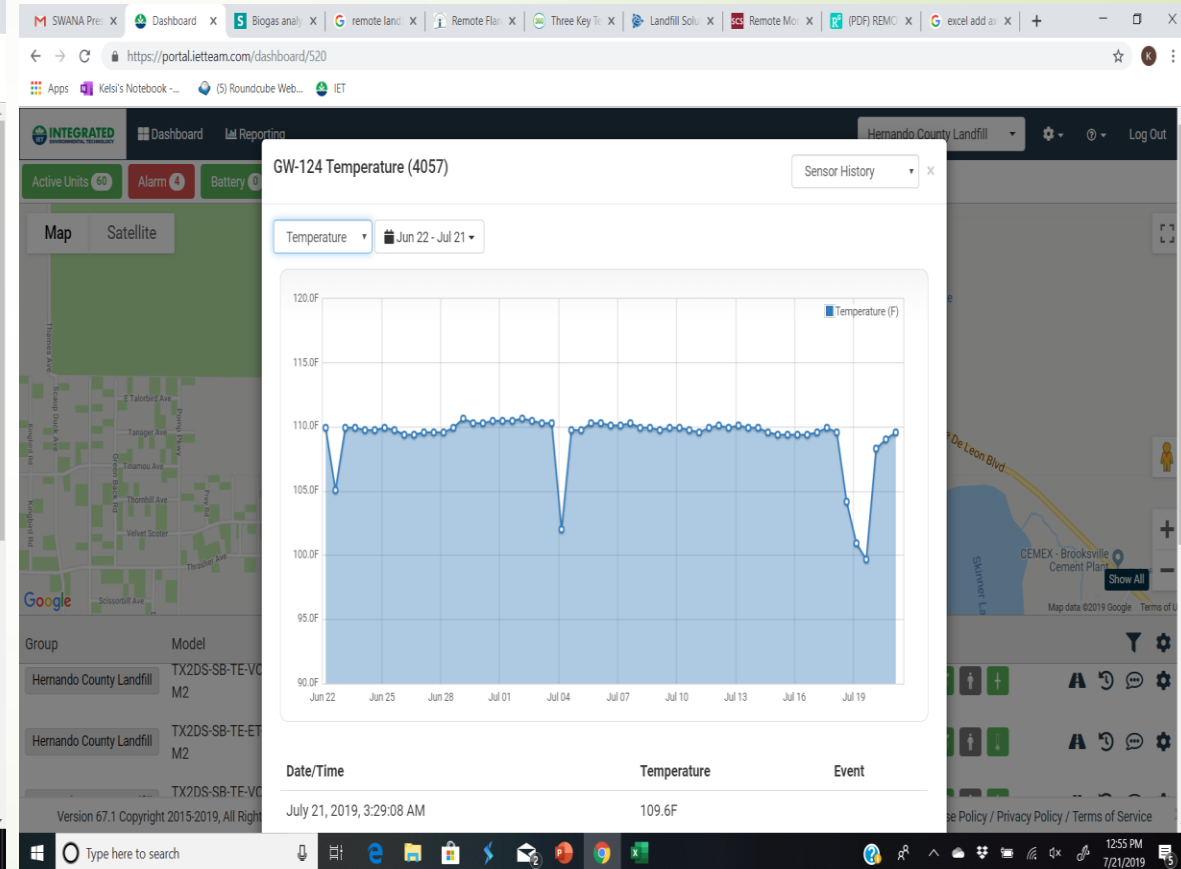
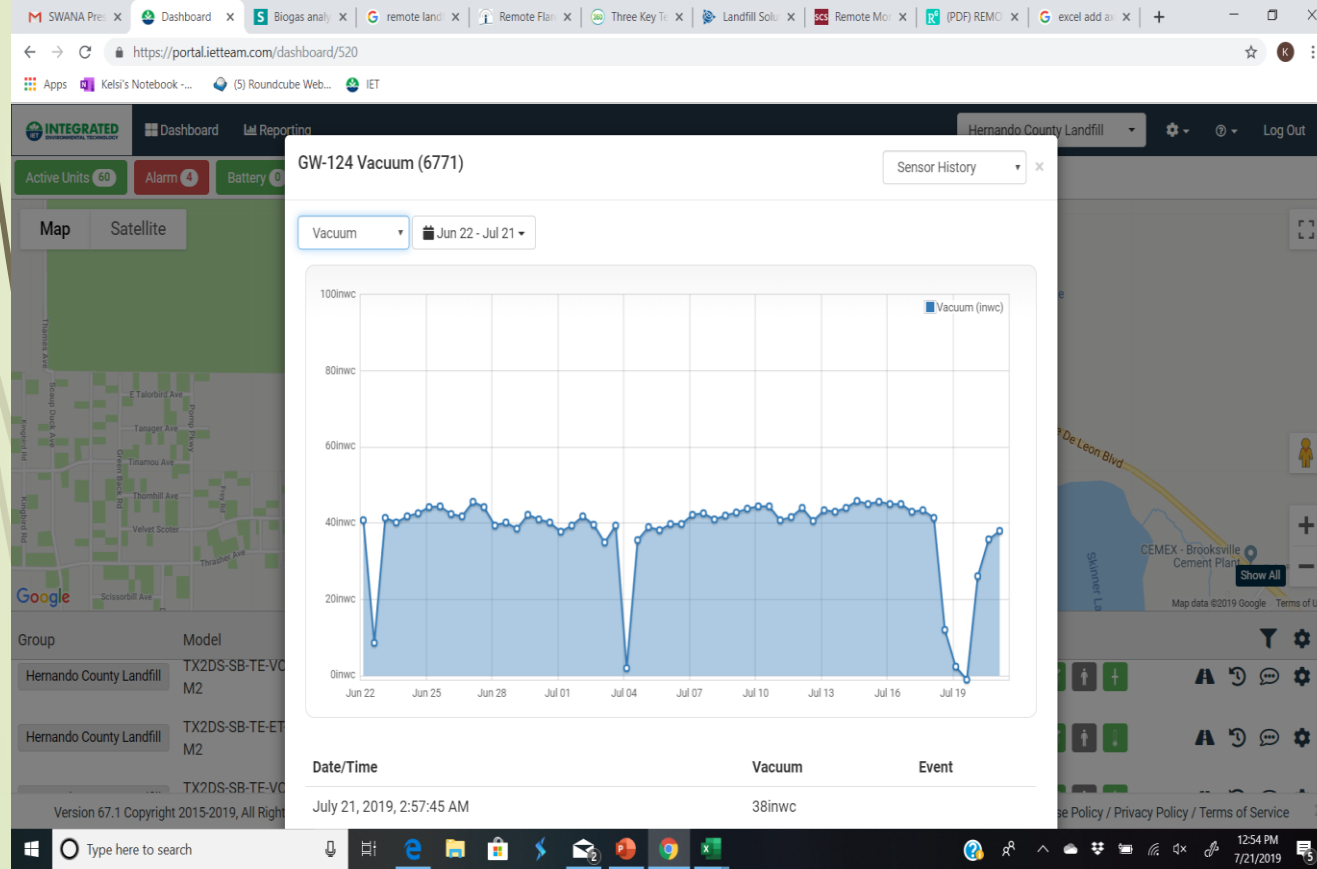
Acceptable Use Policy / Privacy Policy / Terms of Service

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11:39 AM 6/28/2019

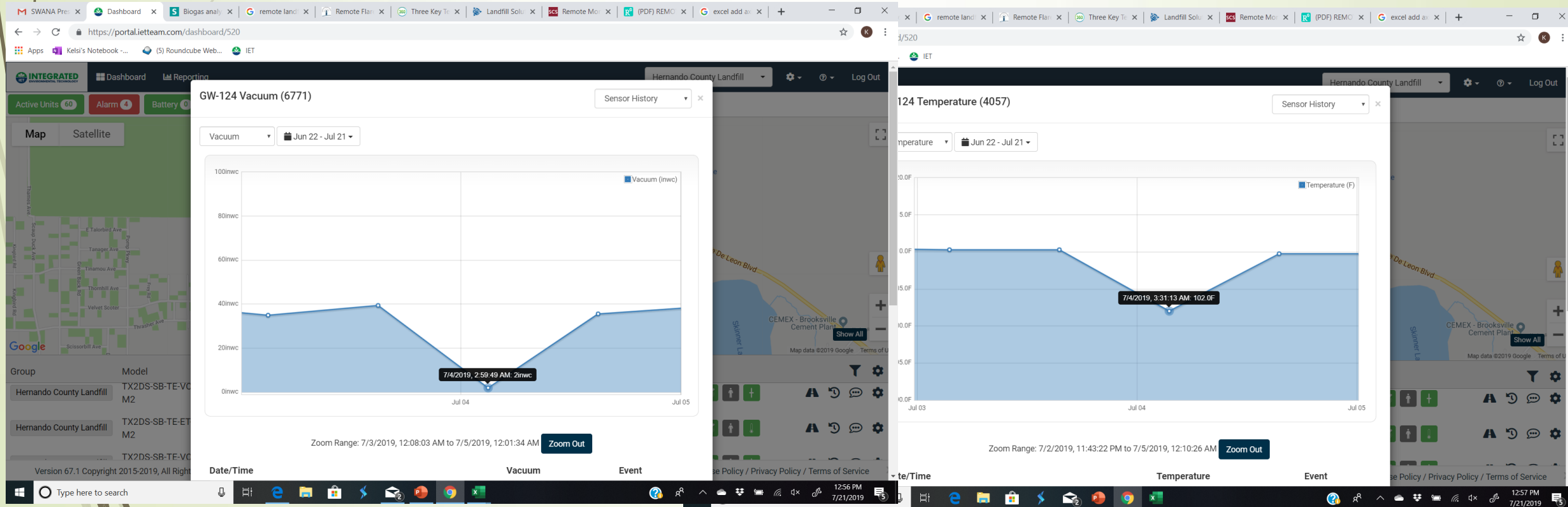
Graphical Data Display

- Data is time stamped - correlation with other data enables analysis.

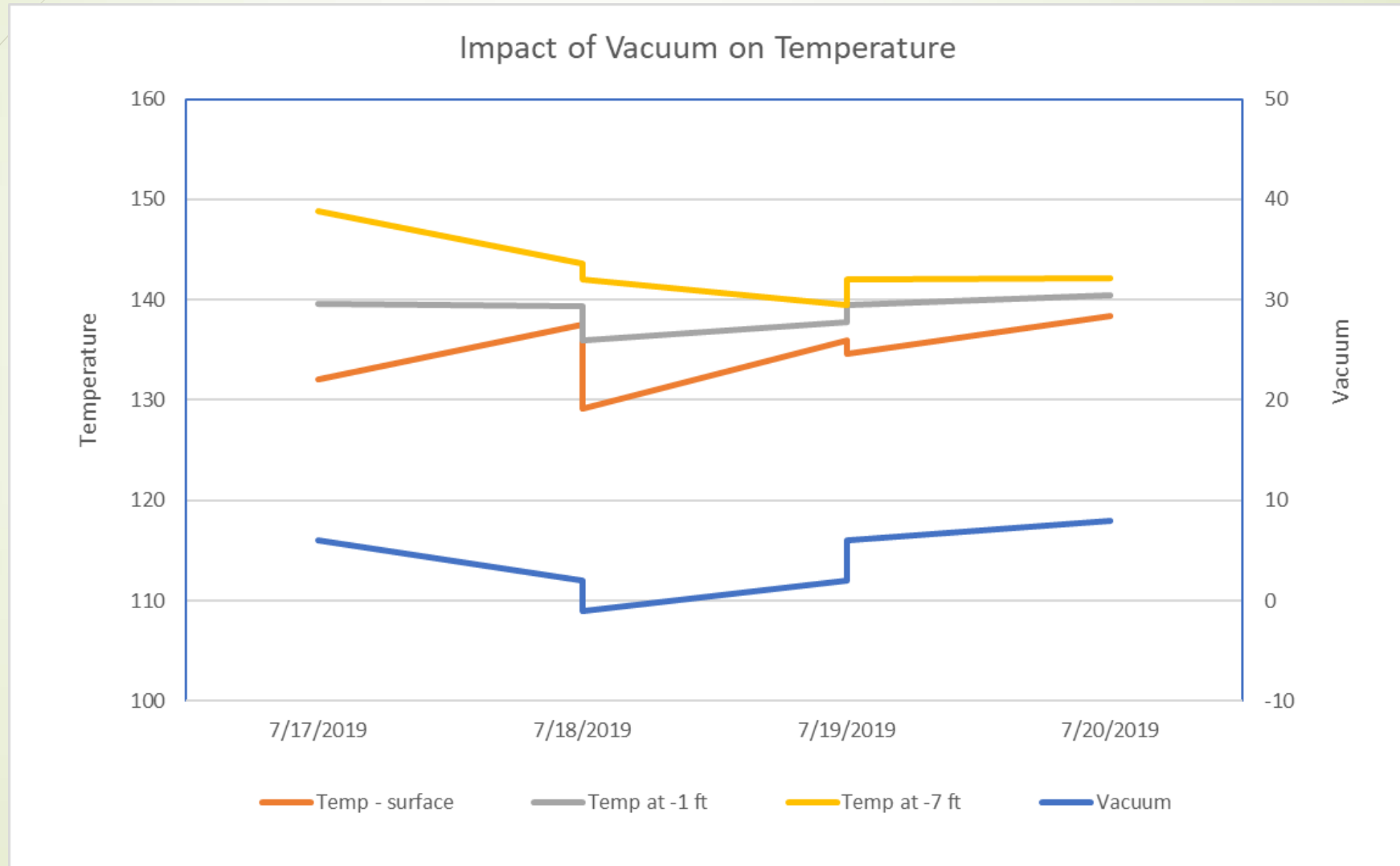


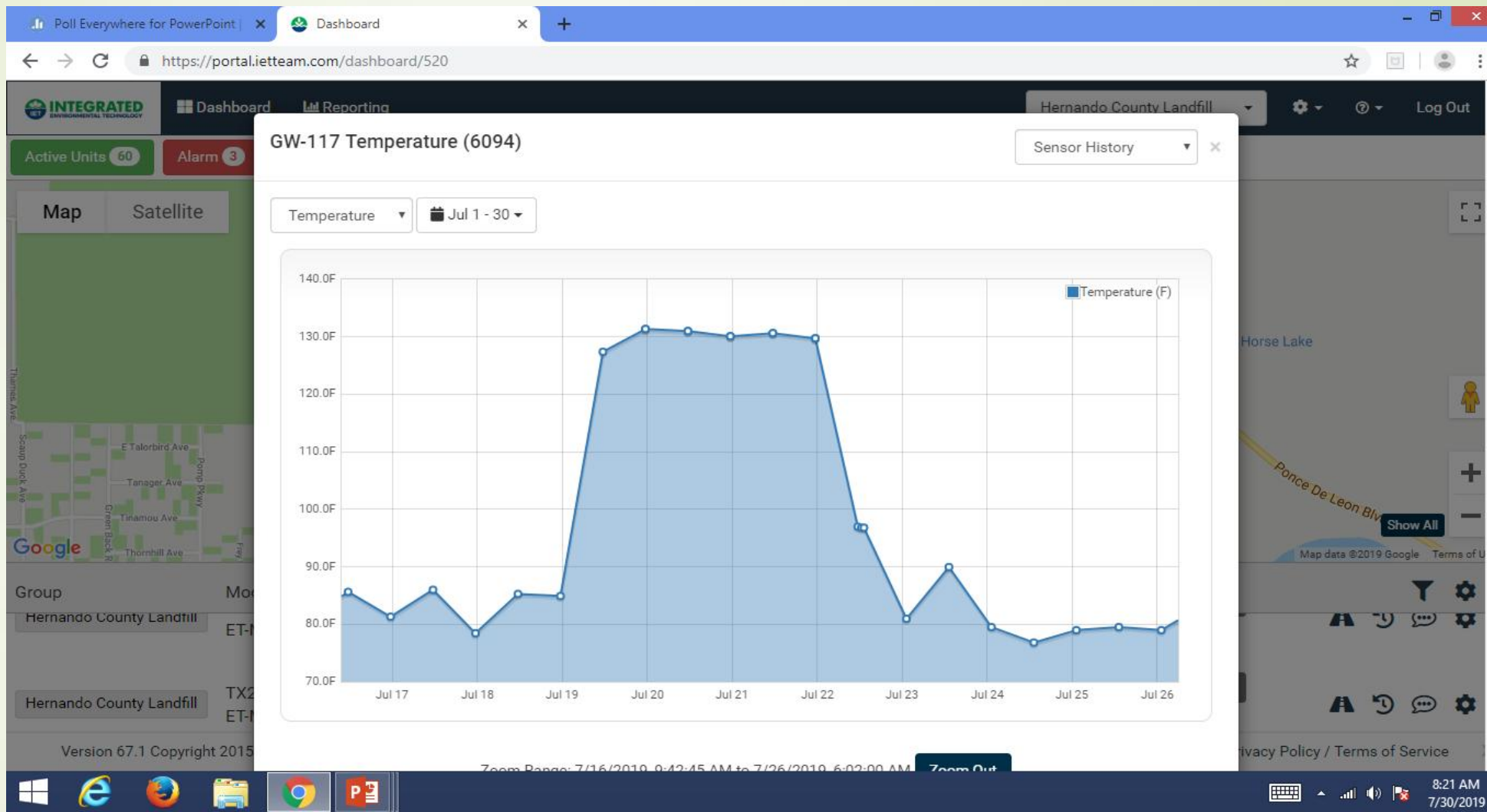
Comparative Data Analysis

- Data can be viewed for different time intervals for evaluation purposes.
- Data can be easily downloaded for analysis in other applications

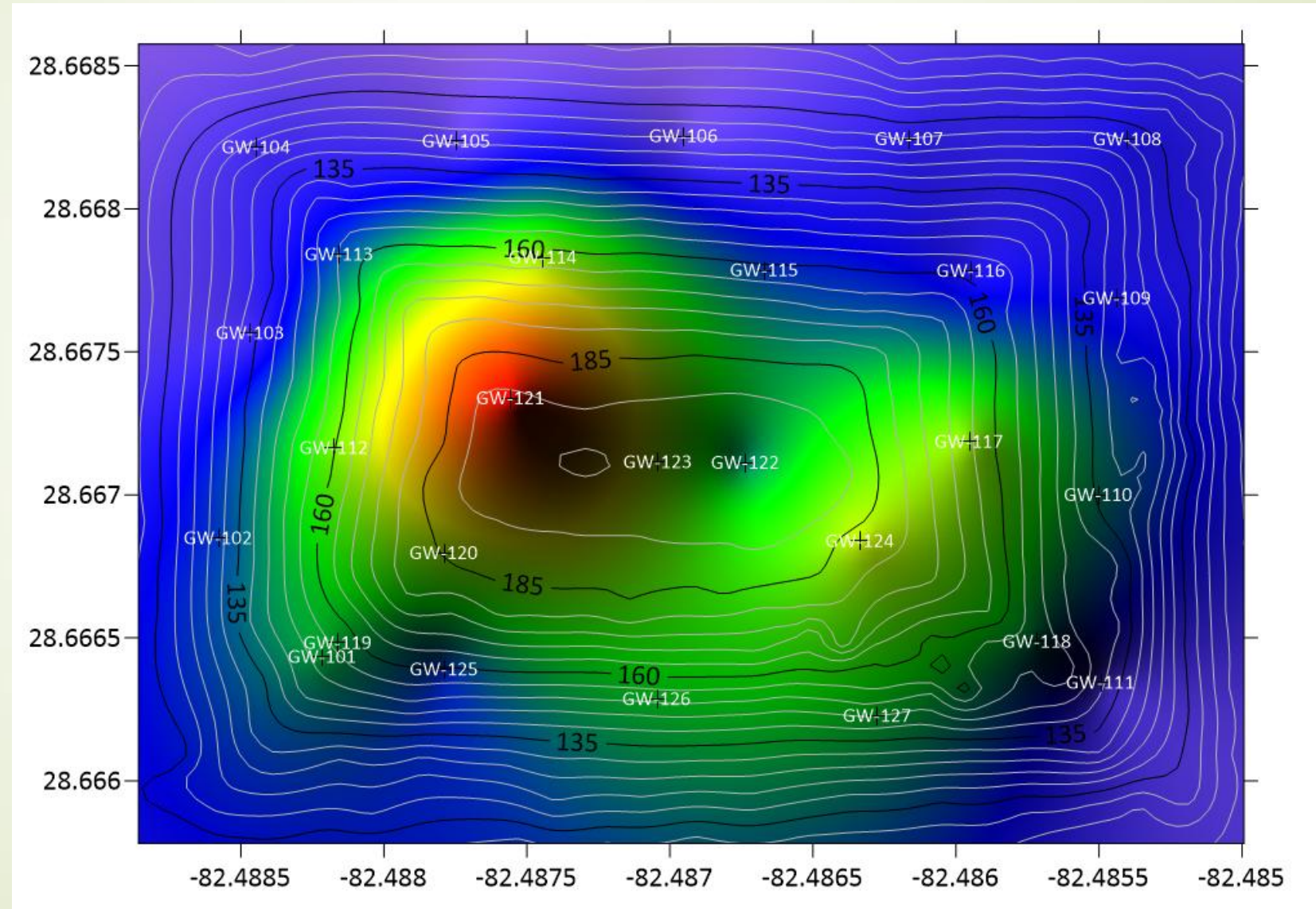


Comparative Data Analysis

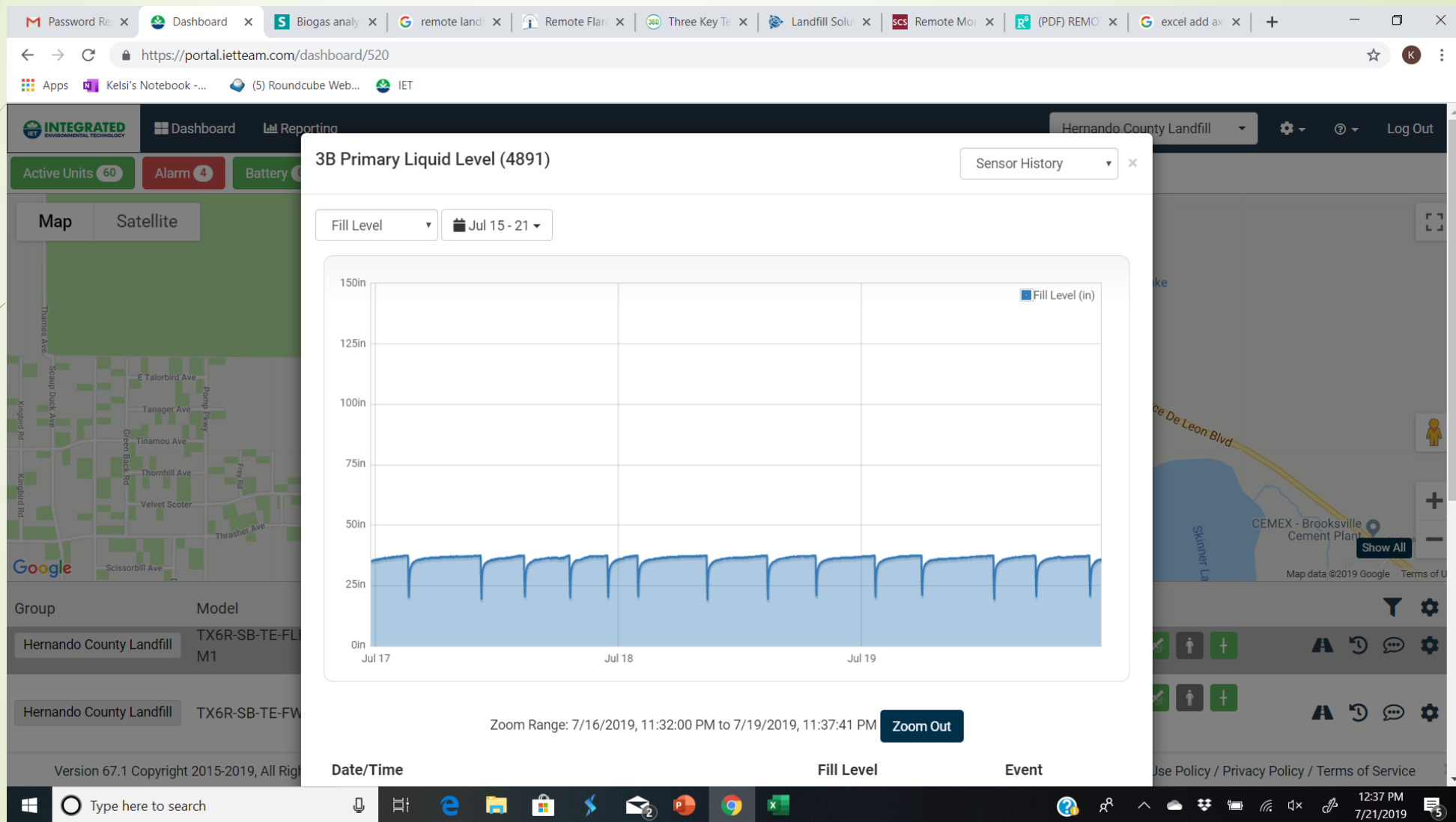




Comparative Data Analysis



Operational Control / Assessment



Conclusions

- Higher temperatures are associated with the depth of waste
- Clear correlation between vacuum and temperature
 - Reducing vacuum will reduce temperature

Closing

- Remote monitoring can save time and money
- Remote monitoring systems are customizable based on your site conditions and monitoring needs
- Remote monitoring improves knowledge and control of site operations
- Remote monitoring may reduce the potential for compliance issues

Thank You

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