

UPRR Graettinger Derailment  
Graettinger, IA  
Preliminary Summary of Air Monitoring Results  
March 15, 2017

*Prepared by*  
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*On Behalf of UPRR*

## *Introduction*

On March 10, 2017, Center for Toxicology and Environmental Health, LLC (CTEH®) was contacted by Union Pacific Railroad (UPRR) to initiate real-time air monitoring and analytical air sampling in support of activities following a train derailment in Graettinger, IA. This submittal summarizes real-time air monitoring data recorded on CTEH® instrumentation between March 10, 2017 09:15 and March 14, 2017 09:29. **Appendix A** contains the incident site location.

## *Real-time Air Monitoring*

CTEH® initiated real-time air monitoring efforts in the Community and Work Area at 09:15 on March 10, 2017. Manually-logged, real-time air monitoring was conducted for benzene, carbon monoxide, formaldehyde, atmospheric flammability as a percent of the lower explosive limit (%LEL), nitrogen oxide + nitrogen dioxide, nitrogen dioxide, oxygen, particulate matter (PM2.5), sulfur dioxide, toluene, total volatile organic compounds (VOCs), and xylene using handheld instruments such as the RAESystems® MultiRAE Plus/Pro photoionization detectors (PIDs; 10.6 eV) and electrochemical sensors, RAESystems® UltraRAE 3000 with a benzene-specific SEP tube, Gastec® pumps with chemical-specific colorimetric tubes, and SidePak™ AM510 Personal Aerosol Monitors. All instrumentation was calibrated at least once per day or per manufacturer's recommendations. **Table 1** summarizes air monitoring data for manually-logged real-time readings in the Community and Work Area. Real-time monitoring locations are included in **Appendix B**.

Table 1: Manually-Logged Real-Time Air Monitoring Summary<sup>1</sup>  
 March 10, 2017 09:15– March 14, 2017 09:29

Location	Analyte	Instrument	Number of Readings	Number of Detections	Action Level	Concentration Range of Detections <sup>3</sup>
Community	Benzene	UltraRAE 3000	122	0	Detection	< 0.05 ppm
	CO	MultiRAE Plus/Pro	188	0	25 ppm	< 1 ppm
	Formaldehyde	Gastec 91L	6	0	0.05 ppm	< 0.05 ppm
	%LEL	MultiRAE Plus/Pro	156	0	1 %	< 1.0 %
	NO+NO <sub>2</sub>	Gastec 11S	7	0	2 ppm	< 2 ppm
	NO <sub>2</sub>	Gastec 9L	5	0	0.1 ppm	< 0.1 ppm
	O <sub>2</sub>	MultiRAE Plus	5	5	< 19.5 %	20.9 %
	PM2.5	AM510	184	184	0.138mg/m <sup>3</sup> <sup>2</sup>	0.001 – 0.063 mg/m <sup>3</sup>
	SO <sub>2</sub>	Gastec #5Lb	3	0	0.01 ppm	< 0.01 ppm
	Toluene	Gastec #122	10	0	1 ppm	< 1 ppm
	VOC	MultiRAE Plus/Pro	210	0	10 ppm <sup>2</sup>	< 0.1 ppm
	Xylene	Gastec #123	8	0	1 ppm	< 1 ppm
Work Area	Benzene	UltraRAE 3000	3	2	0.5 ppm <sup>2</sup>	< 0.05 – 0.10 ppm
	CO	MultiRAE Pro	63	11	25 ppm <sup>2</sup>	< 1 - 125 ppm
	%LEL	MultiRAE Plus/Pro	227	0	5%	< 1.0 %
	PM2.5	AM510	23	23	0.351 mg/m <sup>3</sup> <sup>2</sup>	0.004 – 4.35 mg/m <sup>3</sup>
	VOC	MultiRAE Plus/Pro	239	129	33.0 ppm <sup>2</sup>	< 0.1 – 43.4 ppm

<sup>1</sup>Note: The data set displayed here has not undergone complete QA/QC analysis and is presented in a preliminary format.

<sup>2</sup>Detection must be sustained for action to be taken

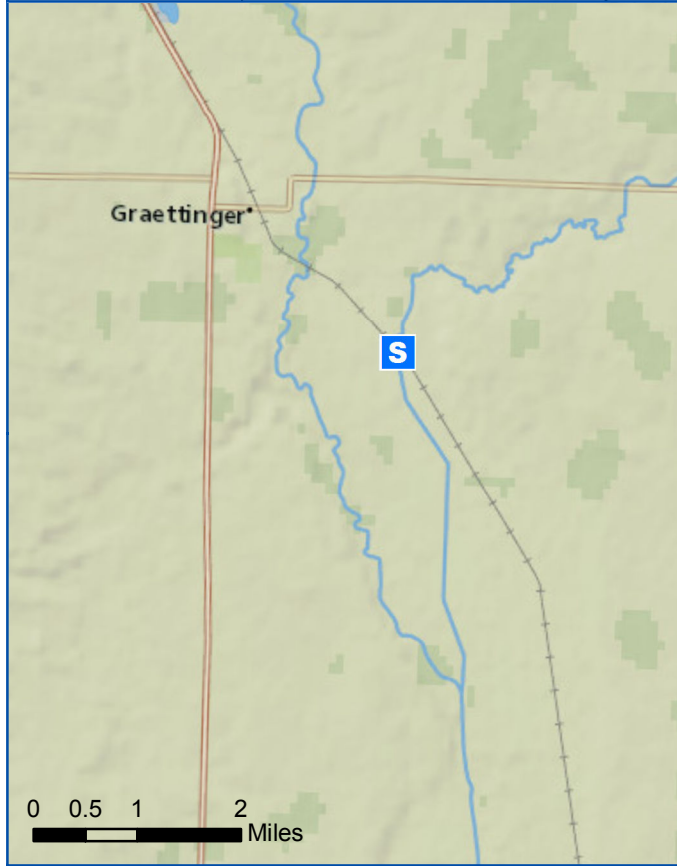
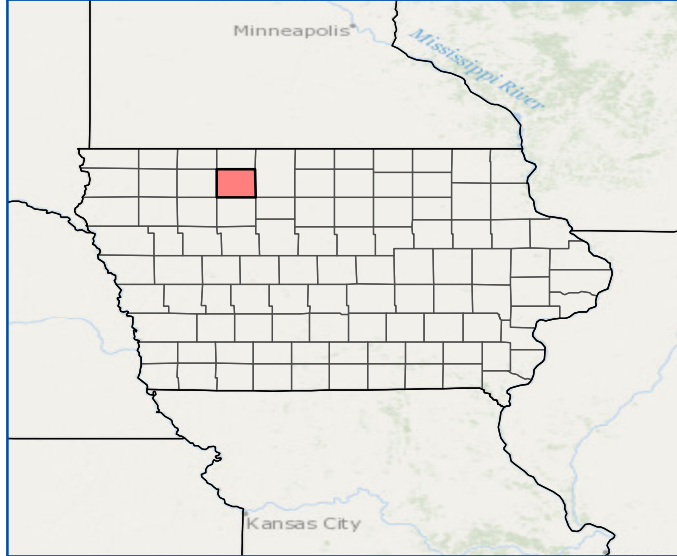
<sup>3</sup>If detections were not observed, analyte concentration is shown as less than the instrument detection limit

### Analytical Air Sampling

CTEH® positioned four Passive Badges for analysis of BTEX, hexane and ethanol in the Community. All analytical samples will be submitted to Galson Laboratory, an American Industrial Hygiene Association-accredited laboratory for analysis of BTEX and ethanol in accordance with NIOSH 1500/1501 and NIOSH 1400 Methods. A map indicating the location of these analytical air sampling stations is provided in Appendix C.

# Appendix A:

## Site Location Maps



**Legend**

- Incident Site
- UPRR Rail Line

# Appendix B:

## Real-time Sampling Locations and Measurements

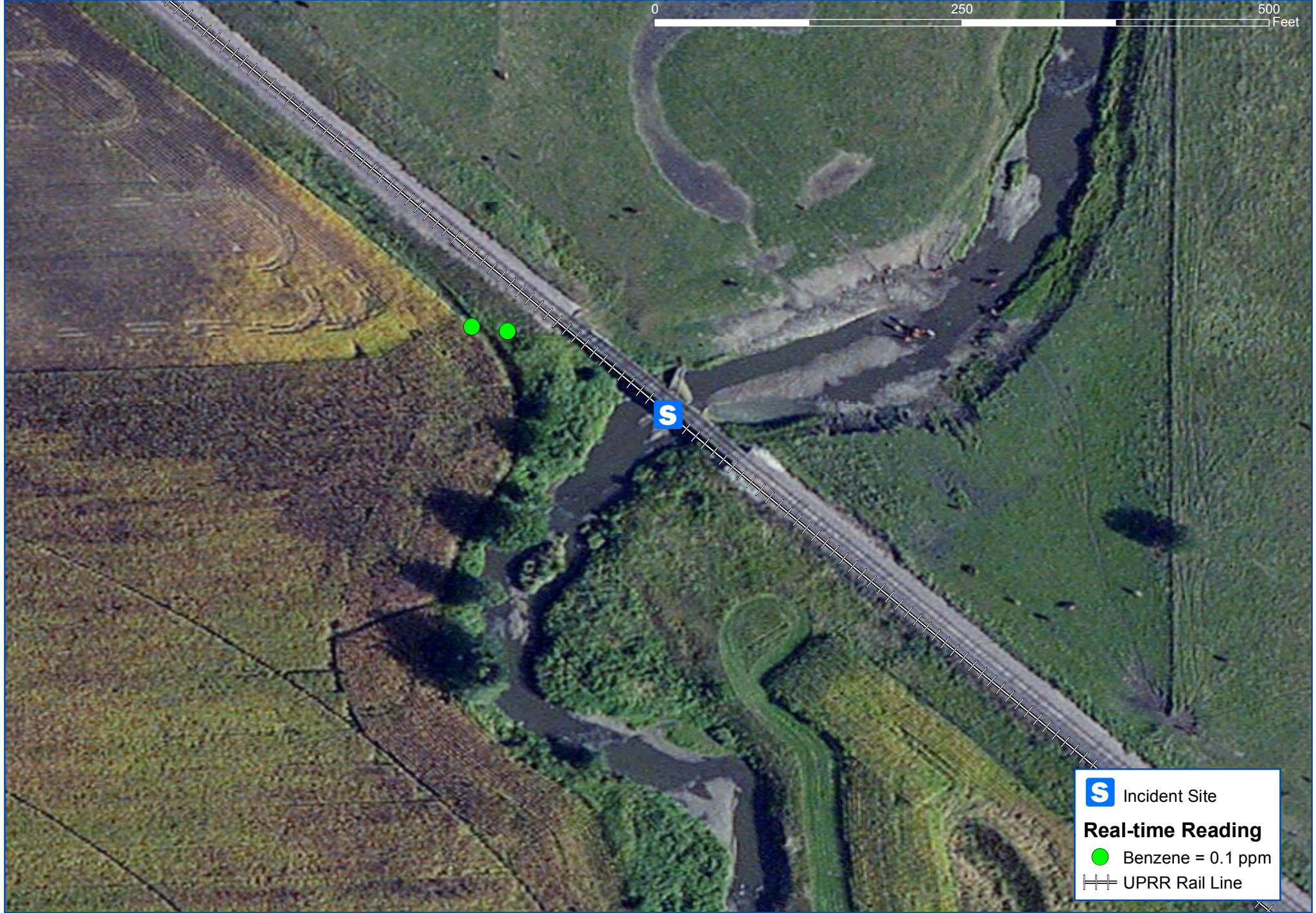
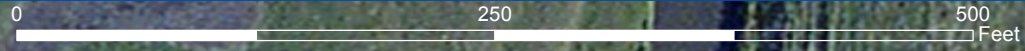


# Manually-Logged Real-time Readings

March 11, 2017 07:34 - March 11, 2017 09:02



Project: 108960  
Client: UPRR  
City: Graettinger, IA  
County: Palo Alto



**S** Incident Site

**Real-time Reading**

- Benzene = 0.1 ppm
- UPRR Rail Line

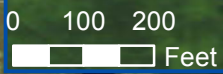
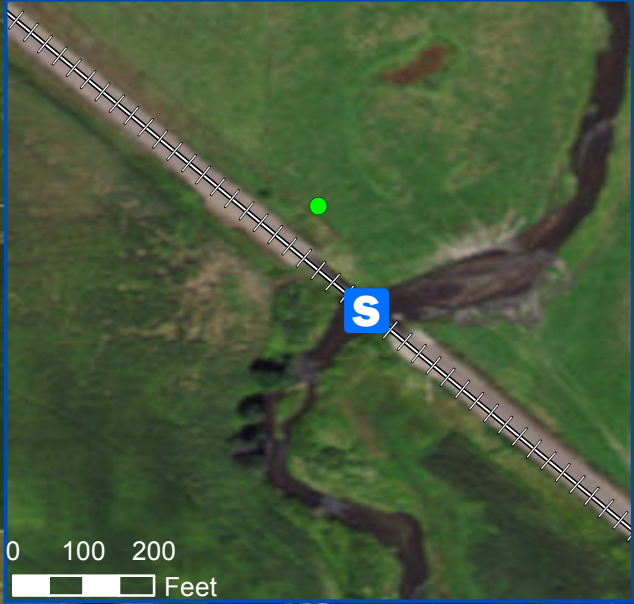
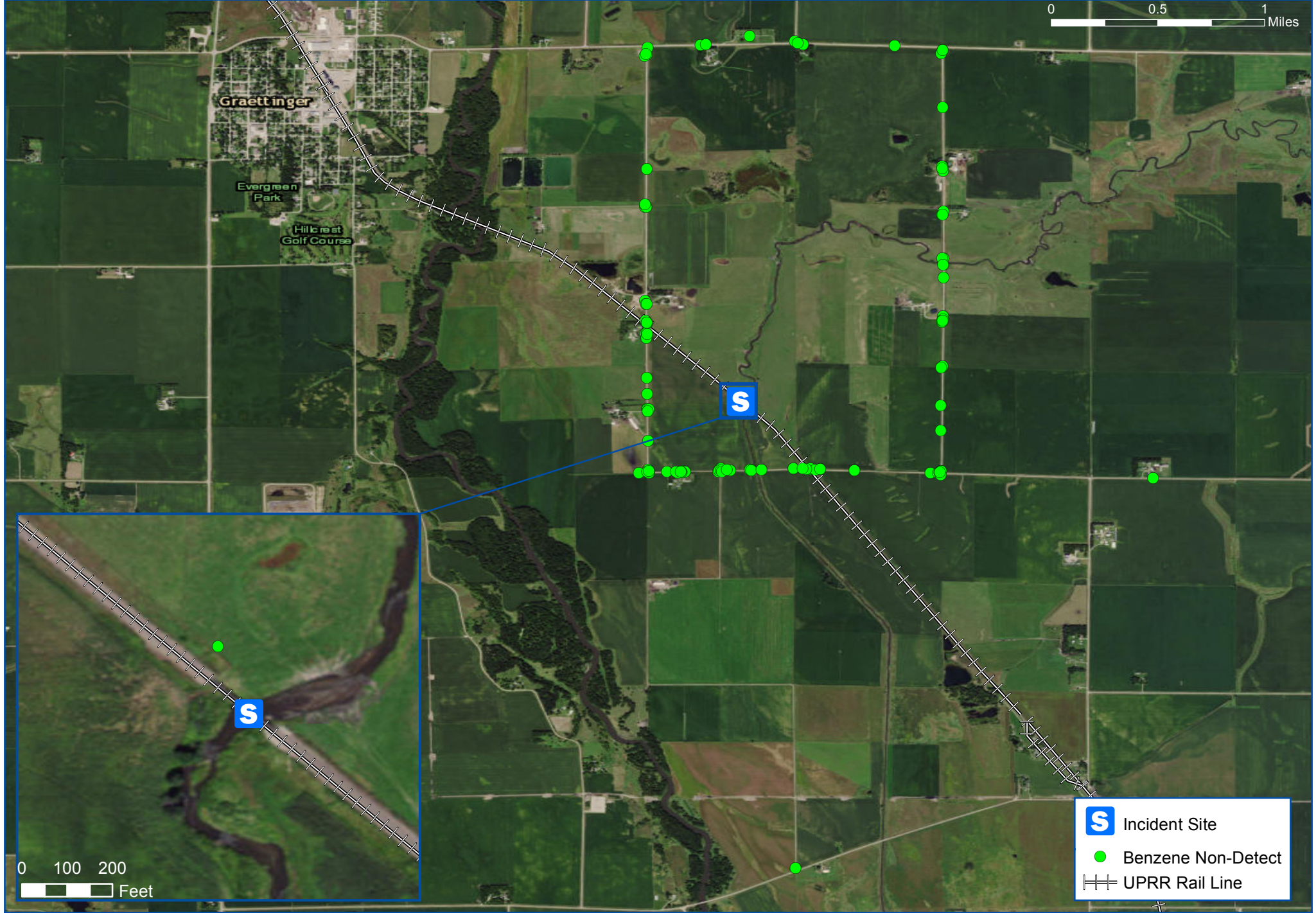


# Manually-Logged Real-time Readings

March 10, 2017 17:23 - March 11, 2017 07:35



Project: 108960  
Client: UPRR  
City: Graettinger, IA  
County: Palo Alto



- Incident Site
- Benzene Non-Detect
- UPRR Rail Line



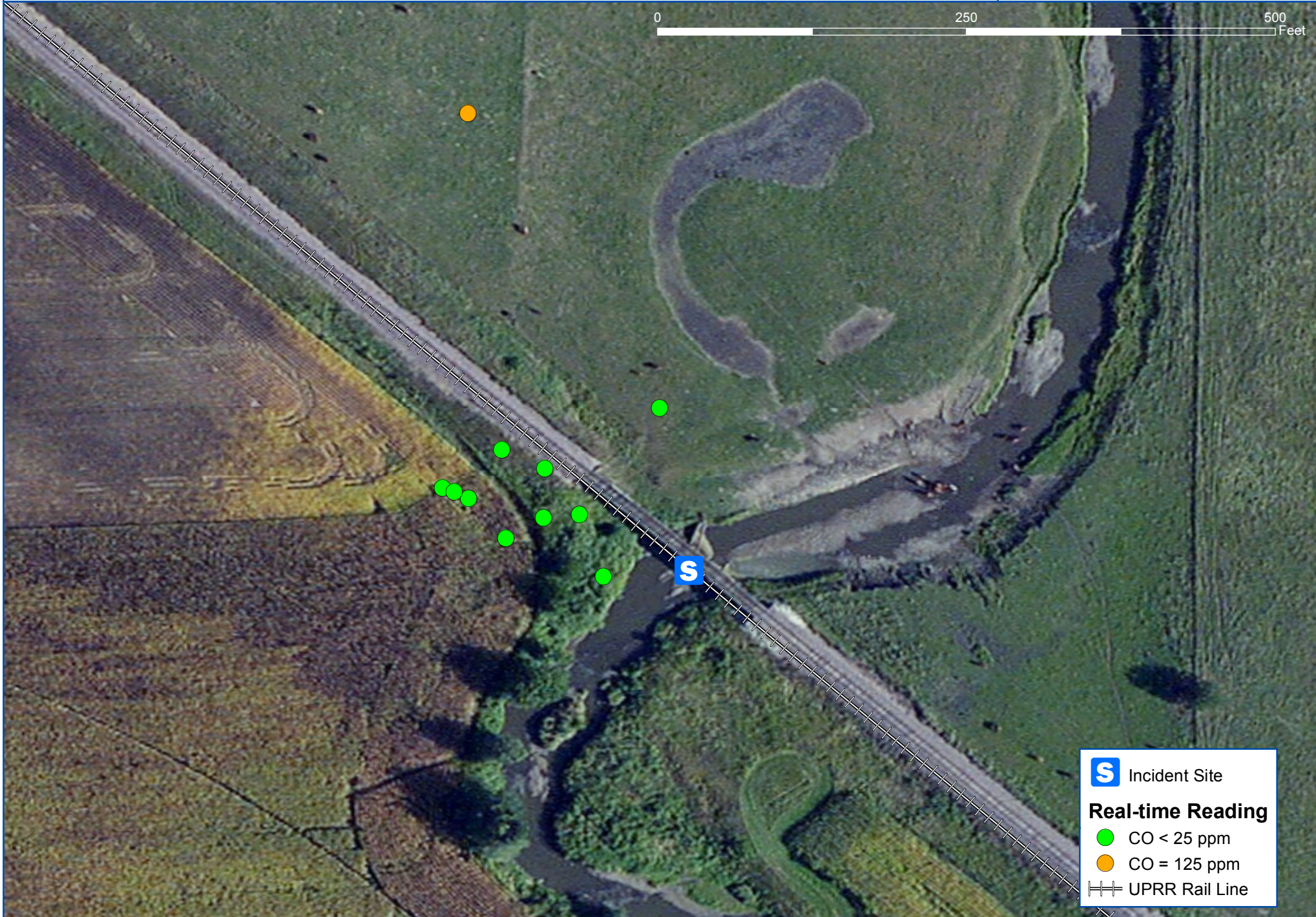


# Manually-Logged Real-time Readings

March 11, 2017 01:24 - March 12, 2017 12:40



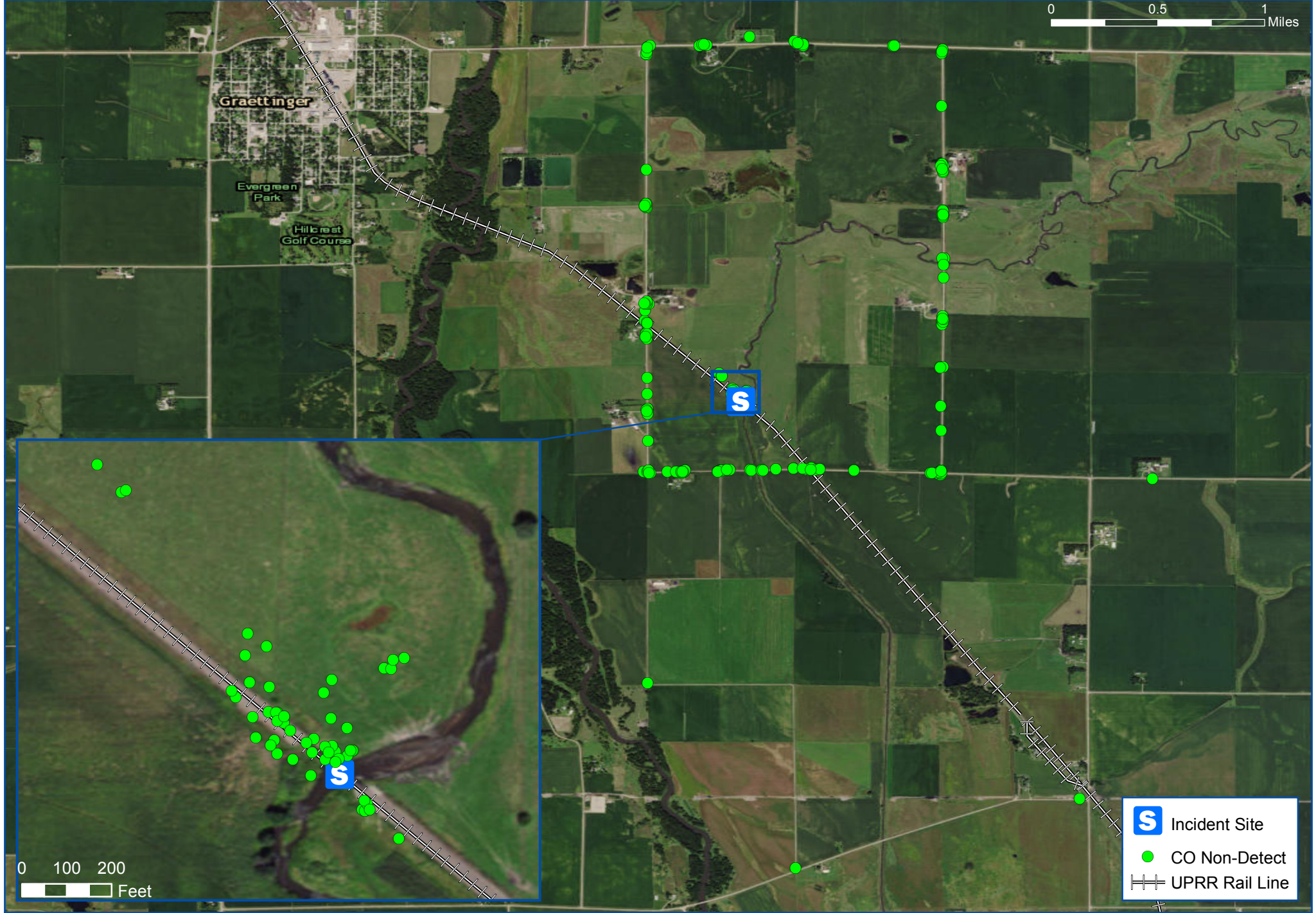
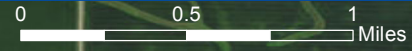
Project: 108960  
Client: UPRR  
City: Graettinger, IA  
County: Palo Alto



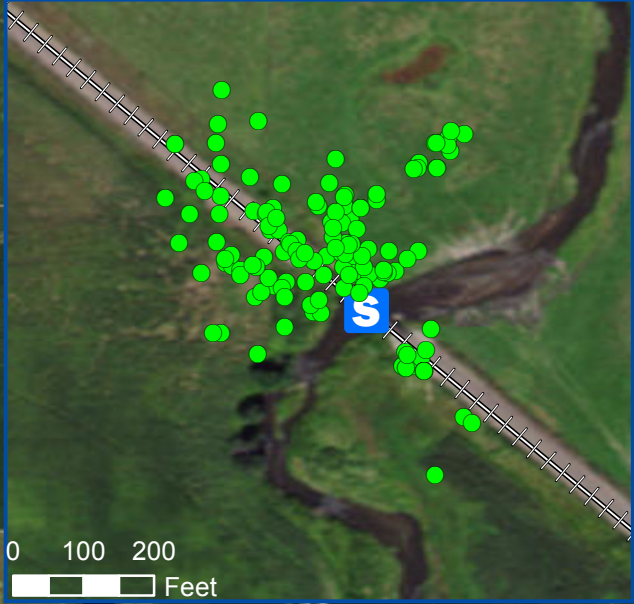
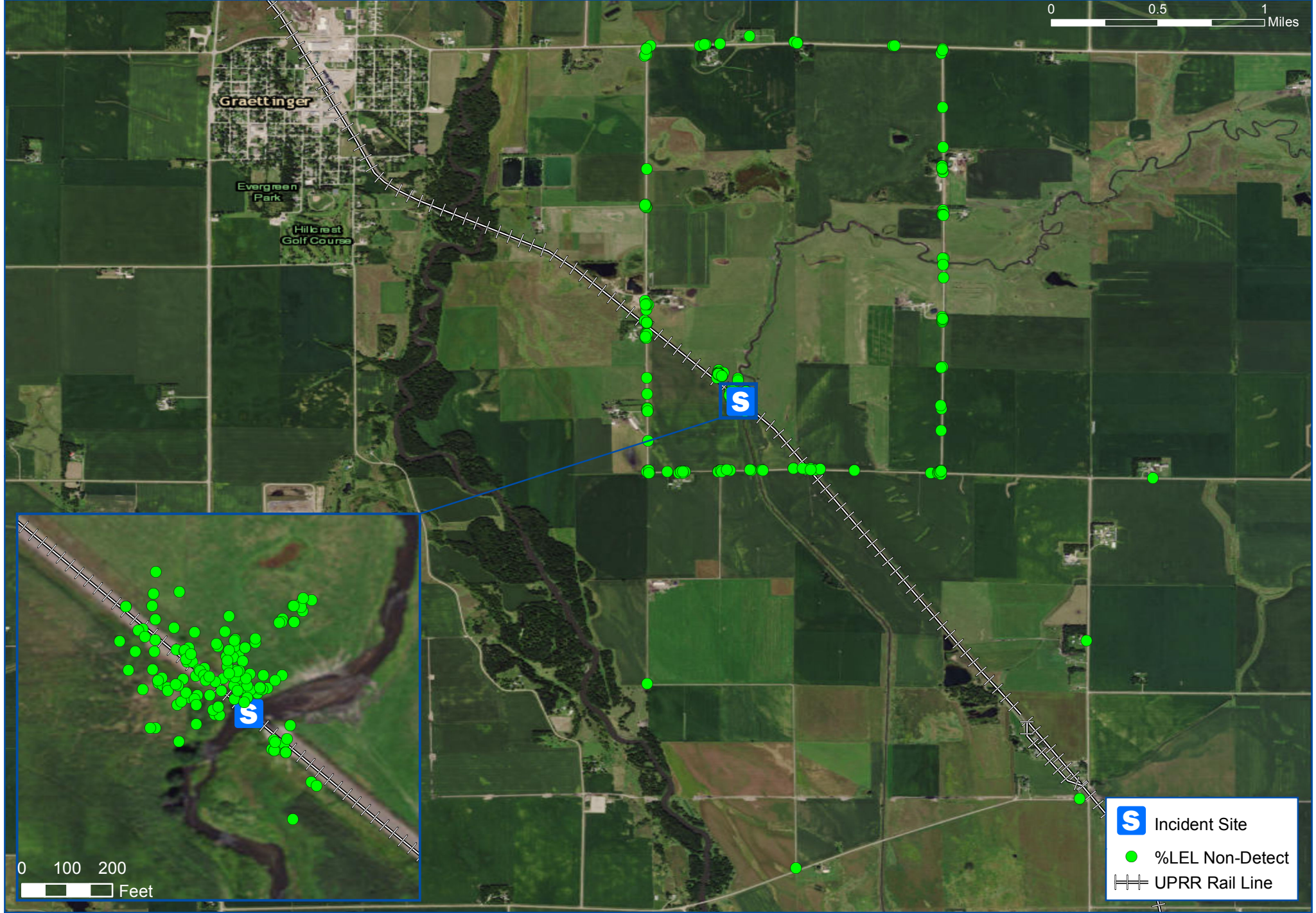
**S** Incident Site

**Real-time Reading**

- CO < 25 ppm
- CO = 125 ppm
- ||| UPRR Rail Line



- Incident Site
- CO Non-Detect
- UPRR Rail Line



- Incident Site
- %LEL Non-Detect
- UPRR Rail Line

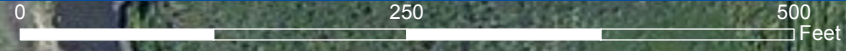


# Manually-Logged Real-time Readings

March 10, 2017 15:18 - March 13, 2017 18:03



Project: 108960  
Client: UPRR  
City: Graettinger, IA  
County: Palo Alto



**S** Incident Site

**Real-time Reading**

- VOC < 33 ppm
- VOC > 33 ppm
- ⚡ UPRR Rail Line

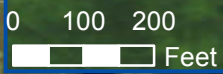
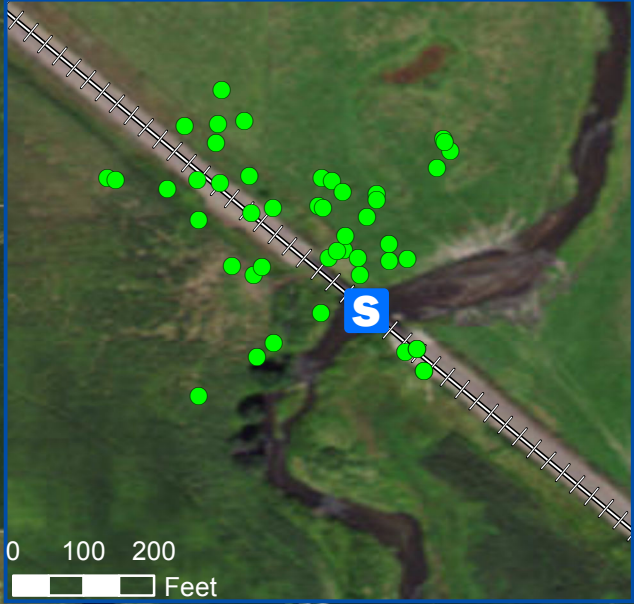
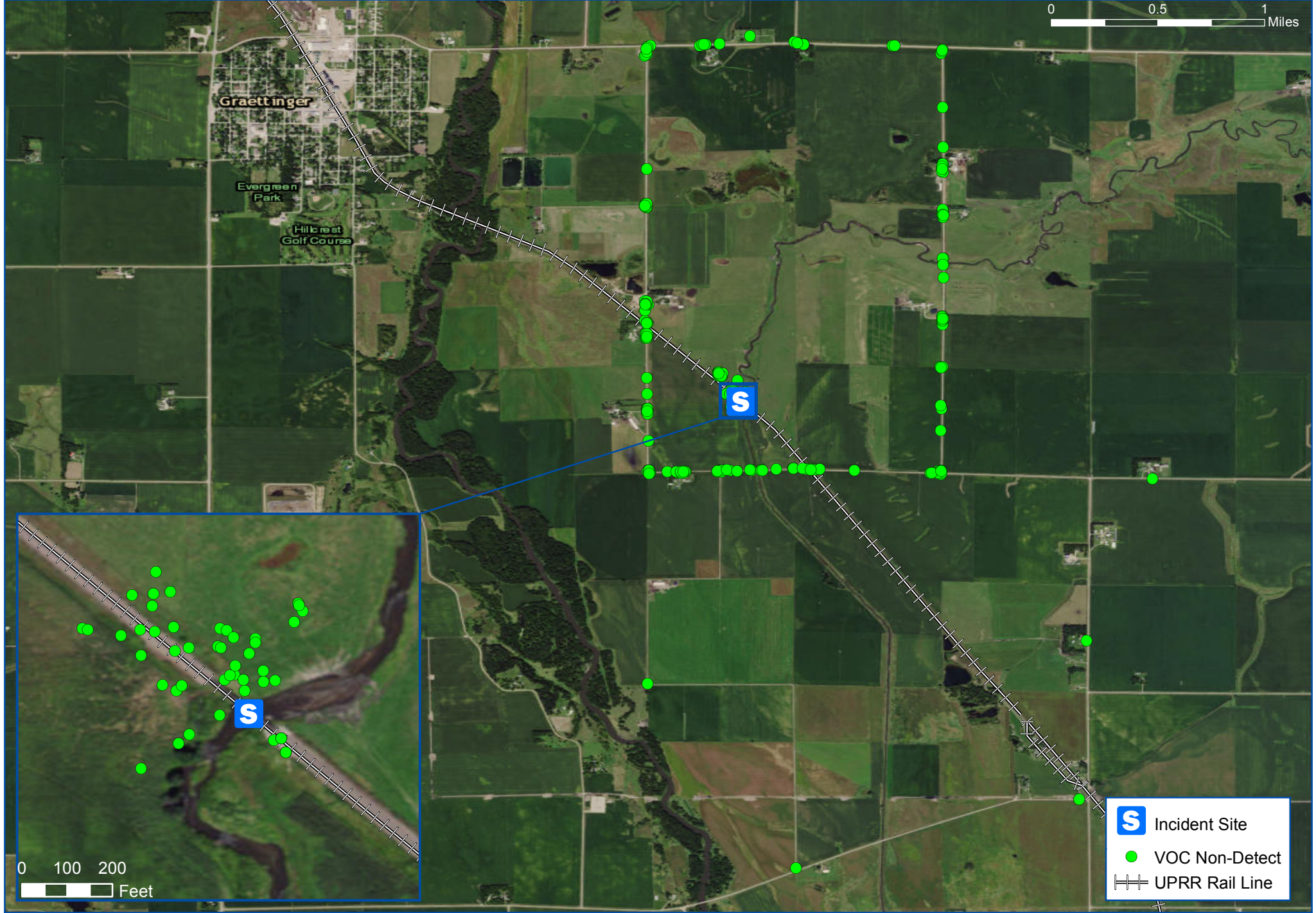
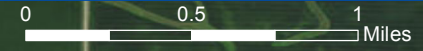


# Manually-Logged Real-time Readings

March 10, 2017 09:15 - March 14, 2017 09:29



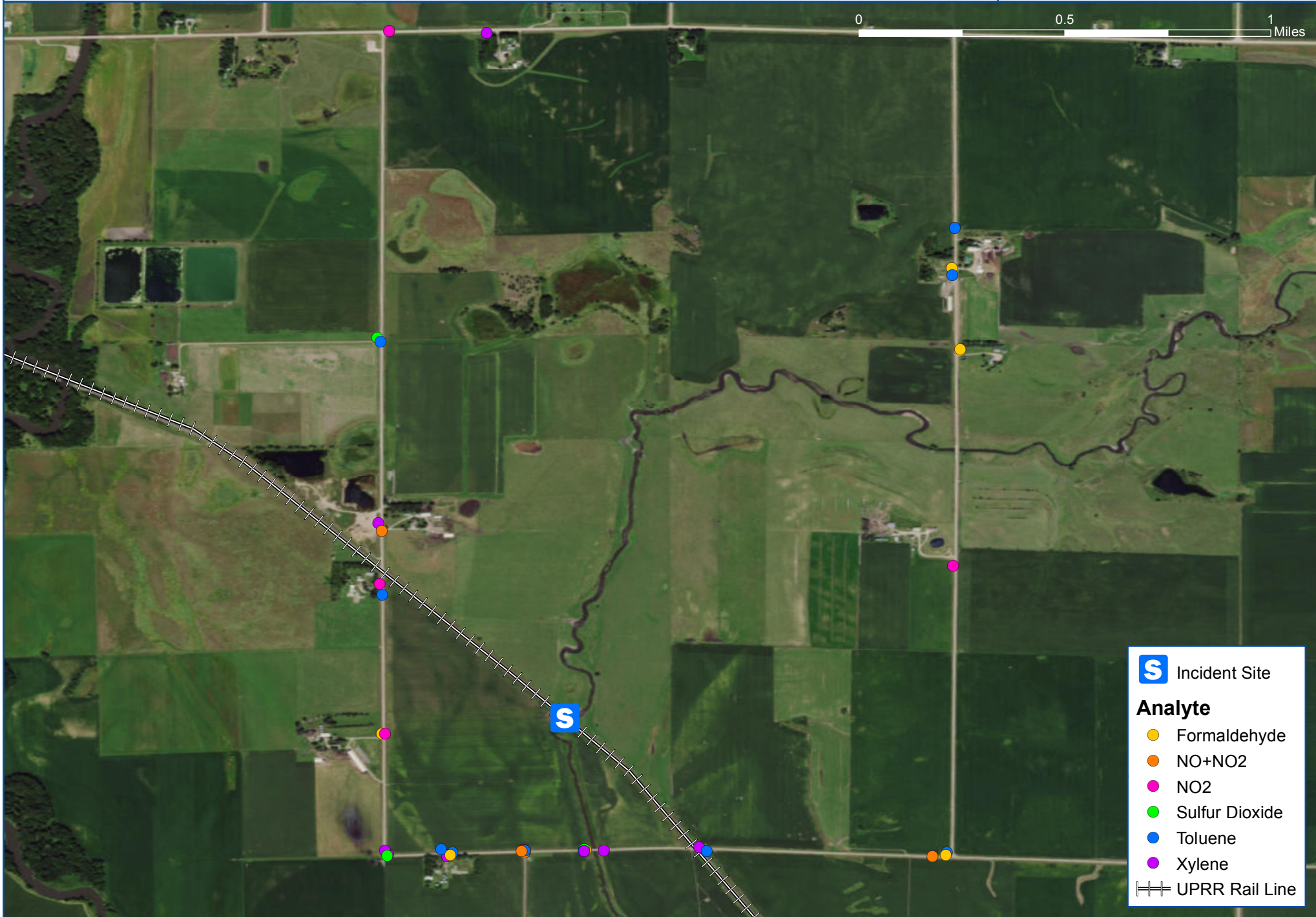
Project: 108960  
Client: UPRR  
City: Graettinger, IA  
County: Palo Alto



- S Incident Site
- VOC Non-Detect
- UPRR Rail Line



0 0.5 1 Miles



**S** Incident Site

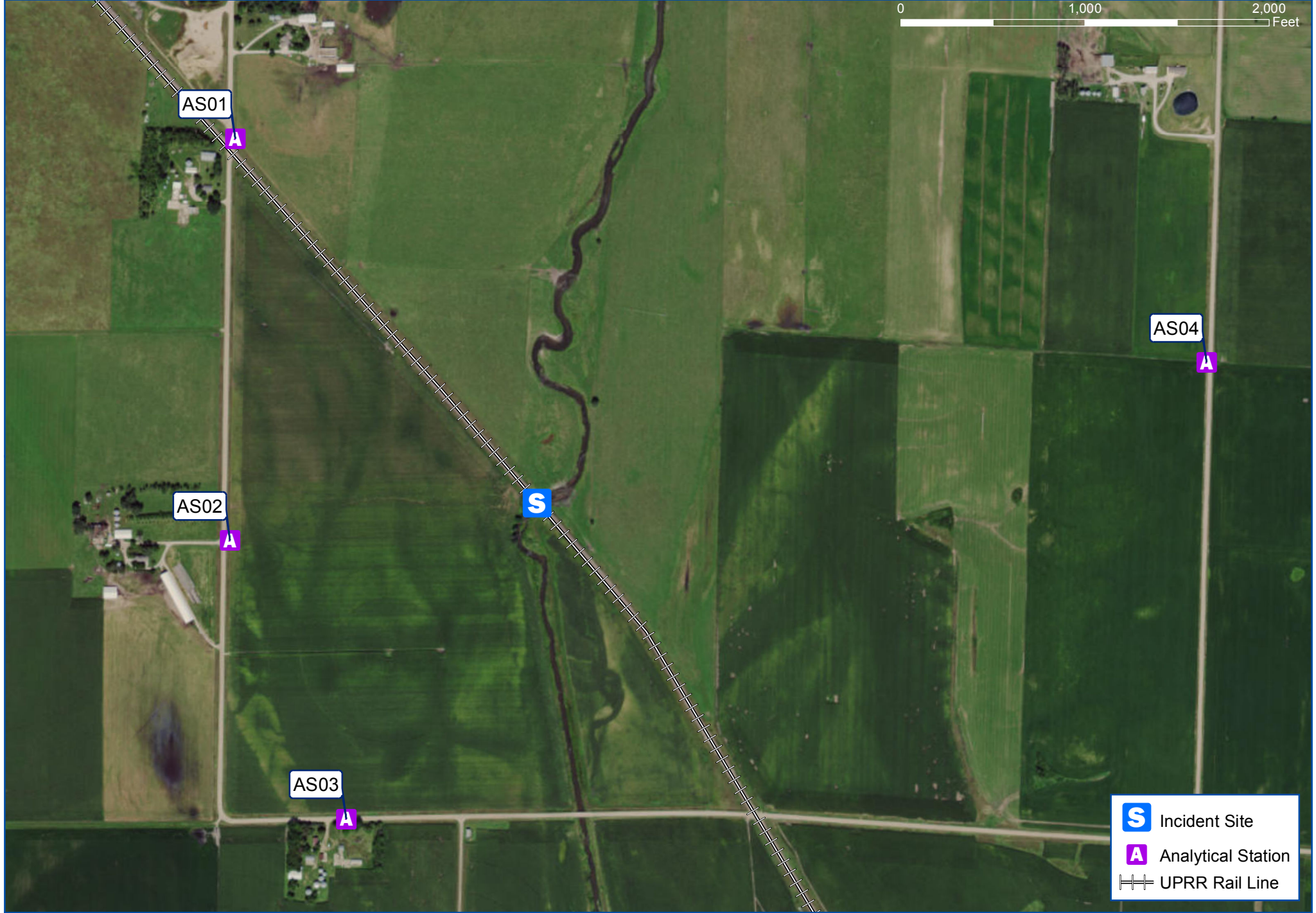
**Analyte**

- Formaldehyde
- NO+NO2
- NO2
- Sulfur Dioxide
- Toluene
- Xylene

⊃⊃⊃ UPRR Rail Line

# Appendix C:

## Analytical Stations



- Incident Site
- Analytical Station
- UPRR Rail Line