ATTACHMENT D

TerraTherm's Weekly ISTR Project Summary Reports

[provided on CD with hardcopies]

In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









Prepared by:

TERRATHERM

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1 SUMMARY

This report is intended to cover the operational time period of Friday May 16, 2014 through Friday May 30, 2014, with temperatures through Monday, June 3, 2014. Subsequent reports will be prepared and submitted weekly adding data from the previous week.

Table 1 provides a summary of the project operational status as of Friday, May 30, 2014.

Table 1. Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	05/30/14	
Last Temperature Data Update	06/01/14	
Estimated Days of Operation	195	days
Days of Operation	15	days
Days of Operation vs. Estimate	8	%
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	608,000	kWh
Used Electrical Energy vs. Estimate	3.8	%
Total Vapor Mass Removal (based on Oxidizer PID Readings)	59	lbs
Estimated Mass Removed as NAPL	0	lbs
Average Power Input Last 24 Hours	1,740	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	476	scfm
Average Condensate Production Rate Last 24 Hours	0.3	gpm

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.*

Table 2. Temperature Summary

Temperatures TTZ		
Type	**Value**	**Unit**
Date of Last Update	6/2/14	
Phase 1 Entire TTZ Average Temperature	36	°C
Phase 2 Entire TTZ Average Temperature (OFFLINE)	18	°C
Phase 1 Centroid Average Temperature	34	°C
Phase 2 Centroid Average Temperature (OFFLINE)	18	°C

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3 VAPOR EXTRACTION

Figure 1 below shows the vapor extraction rate from the wellfield. Currently, the majority of the vapor being extracted is non-condensable.

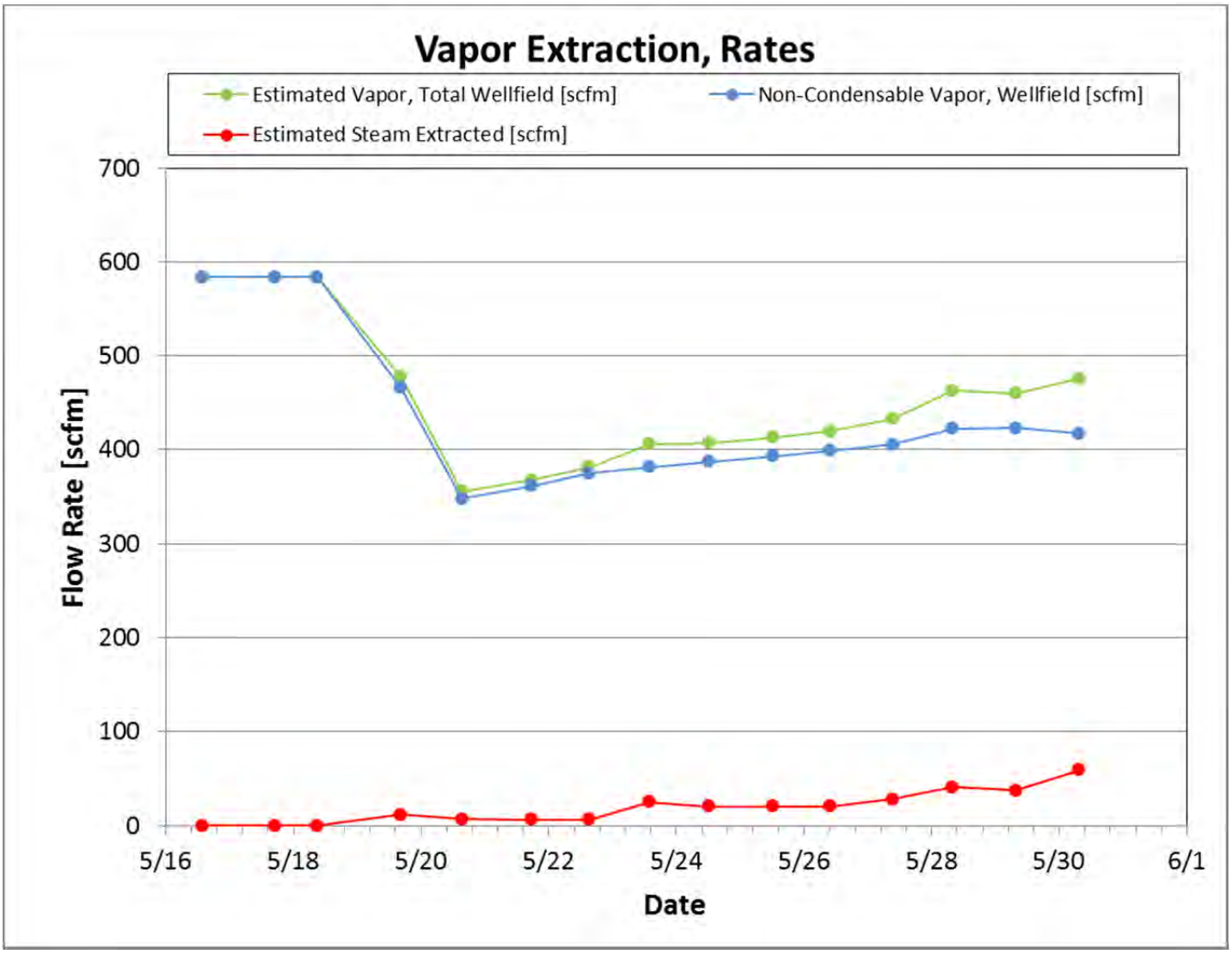


Figure 1. Vapor Extraction Rates

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4 LFL MONITORING

Figure 2 below depicts the Lower Flammability Limit (%LFL) (also known as the lower explosive limit (LEL)) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent one manual daily reading from the analyzer.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf. Currently, the vapors entering the oxidizer are low flammability (< approximately 1% LFL) and do not approach the contract limit.

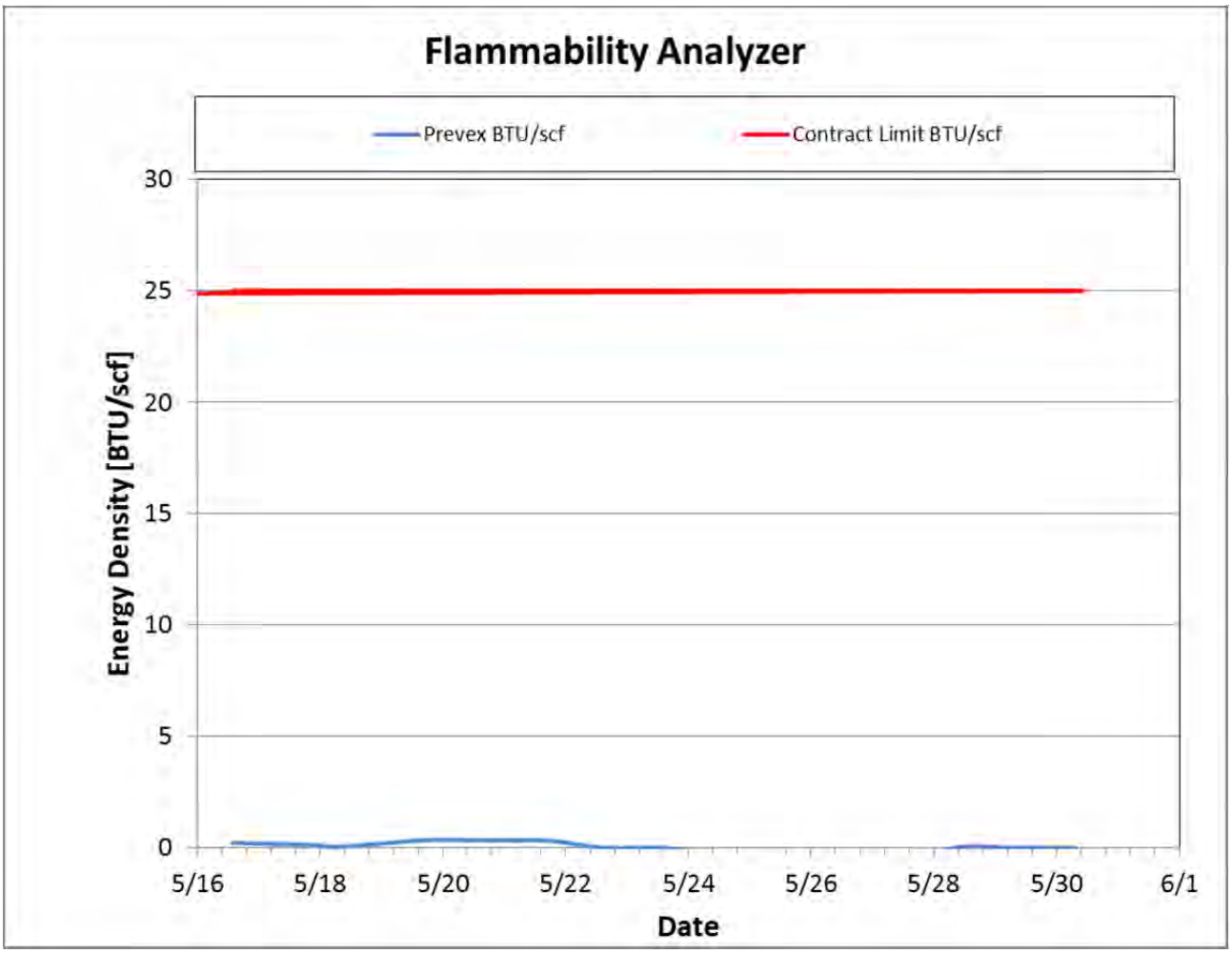


Figure 2. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removal based on daily photoionization detector (PID) readings and laboratory data are shown below in Figure 3. Figure 3 graphs the mass removed from Phase 1. Additional figures, including a total mass removed will be added once Phase 2 is online.

The below graph is prepared using laboratory data results from 5/16/14 and 5/20/14.

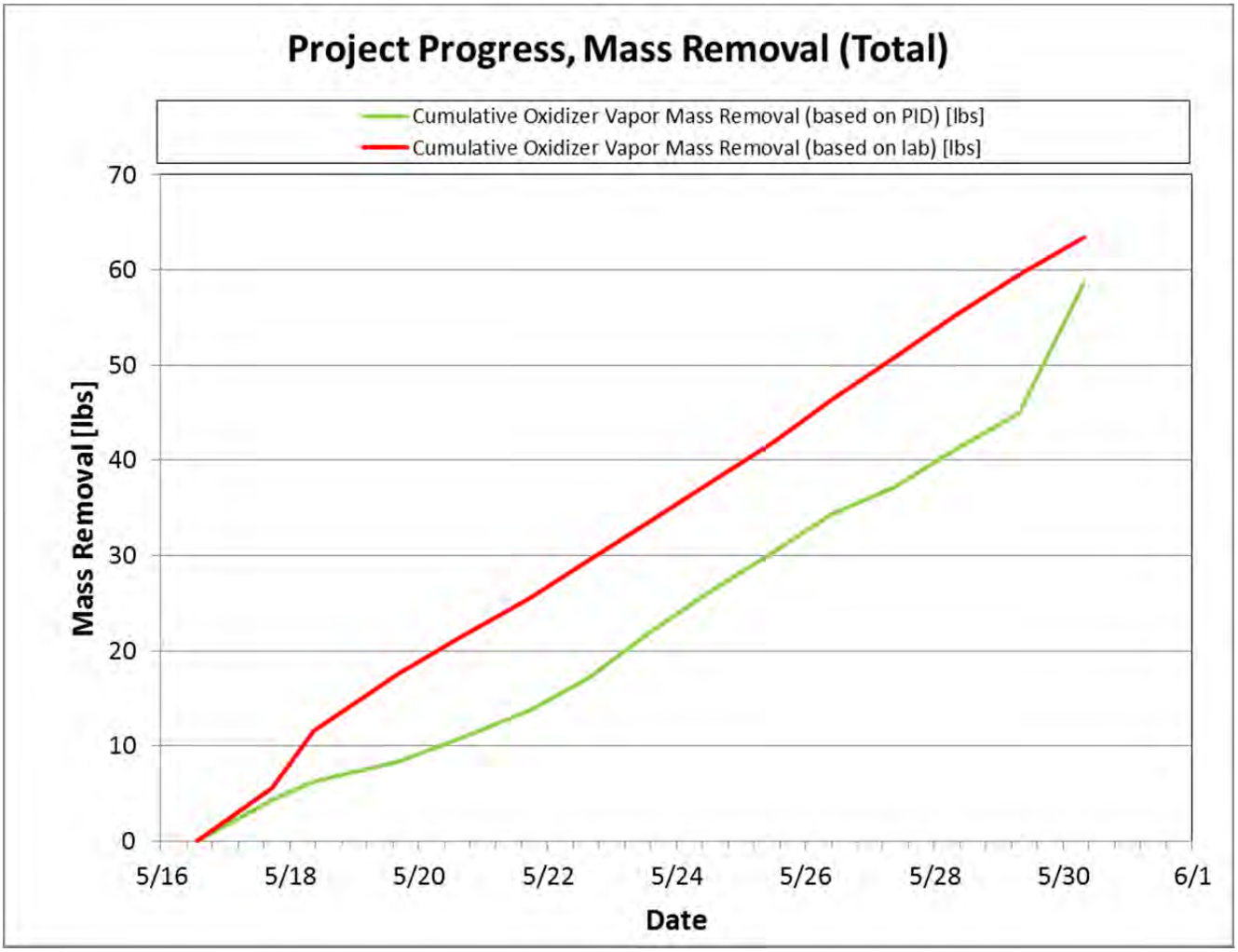


Figure 3. Project Progress, Mass Removal (Phase 1)

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Figure 4 below displays the daily PID readings collected at the oxidizer influent over time.

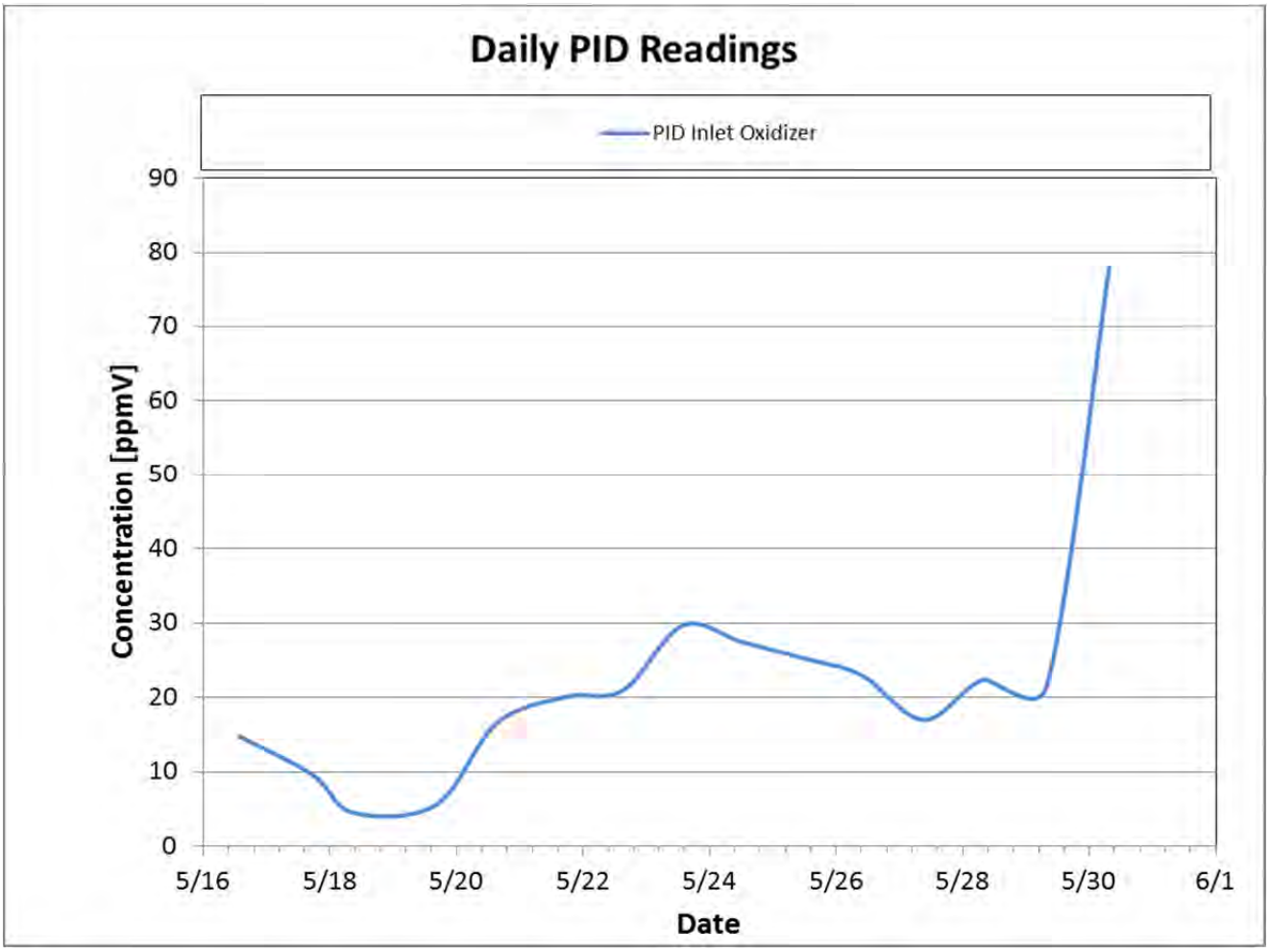


Figure 4. Daily PID Readings

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 5.

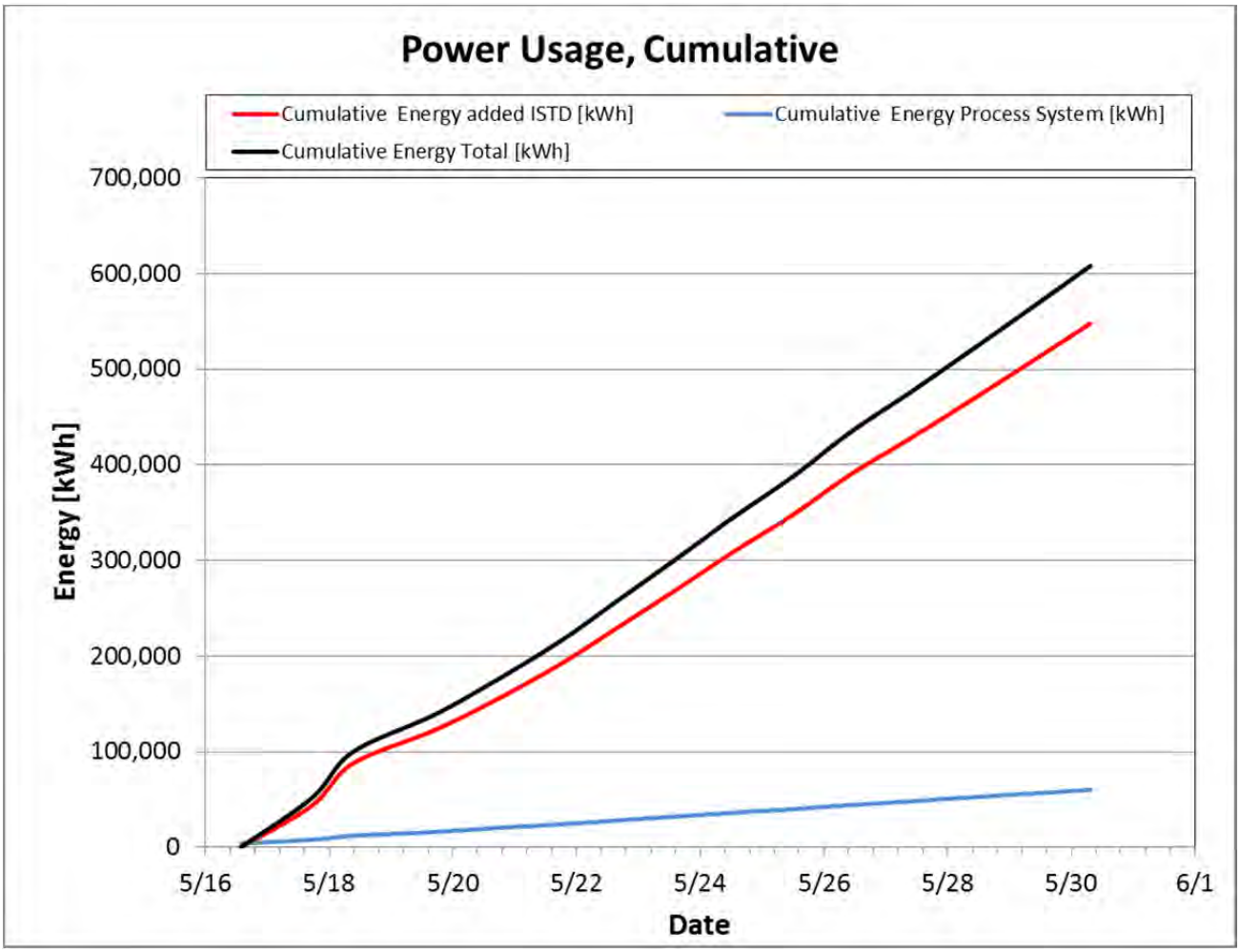


Figure 5. Power Usage, Cumulative

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The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 6.

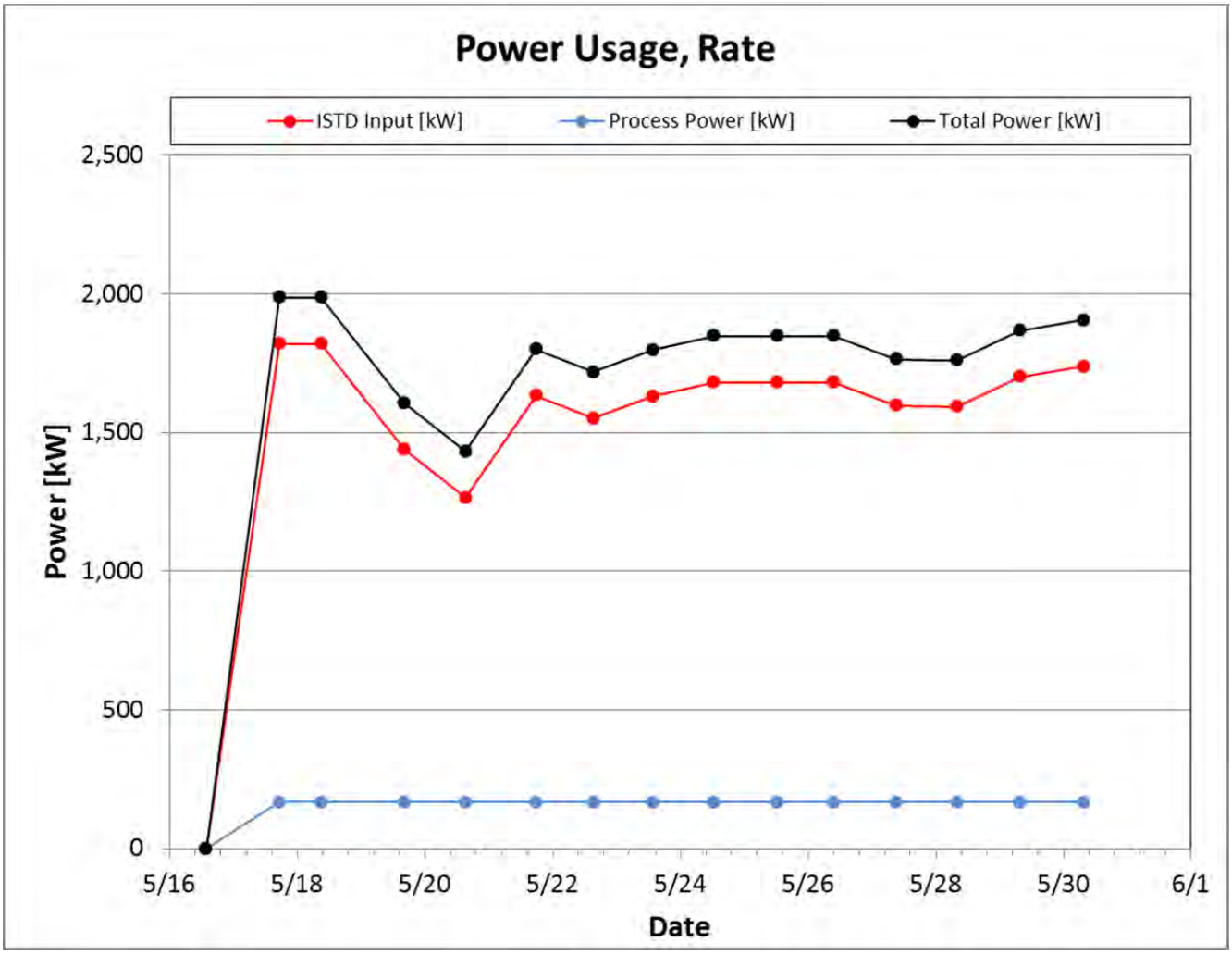


Figure 6. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 7 through 9.

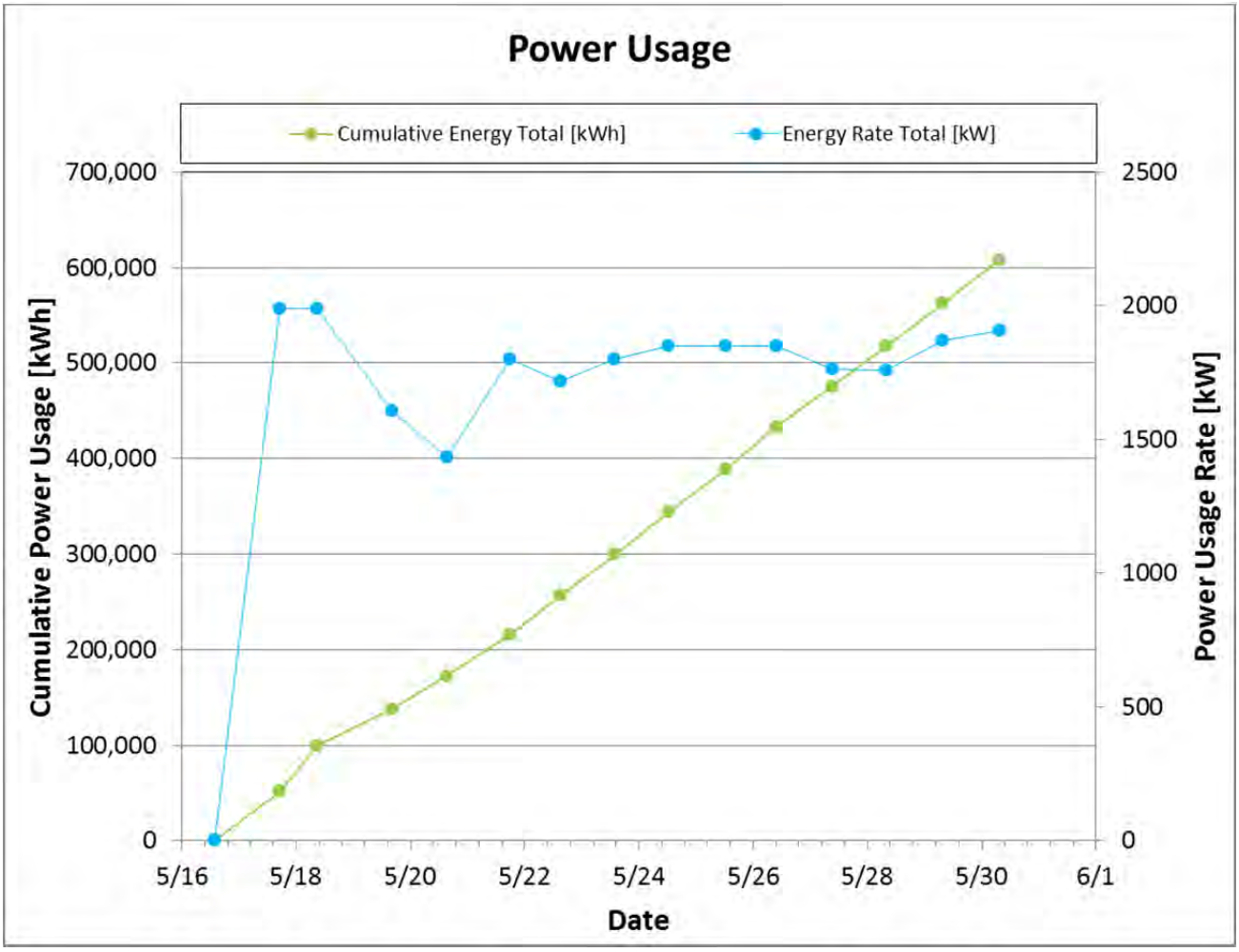


Figure 7. Power Usage

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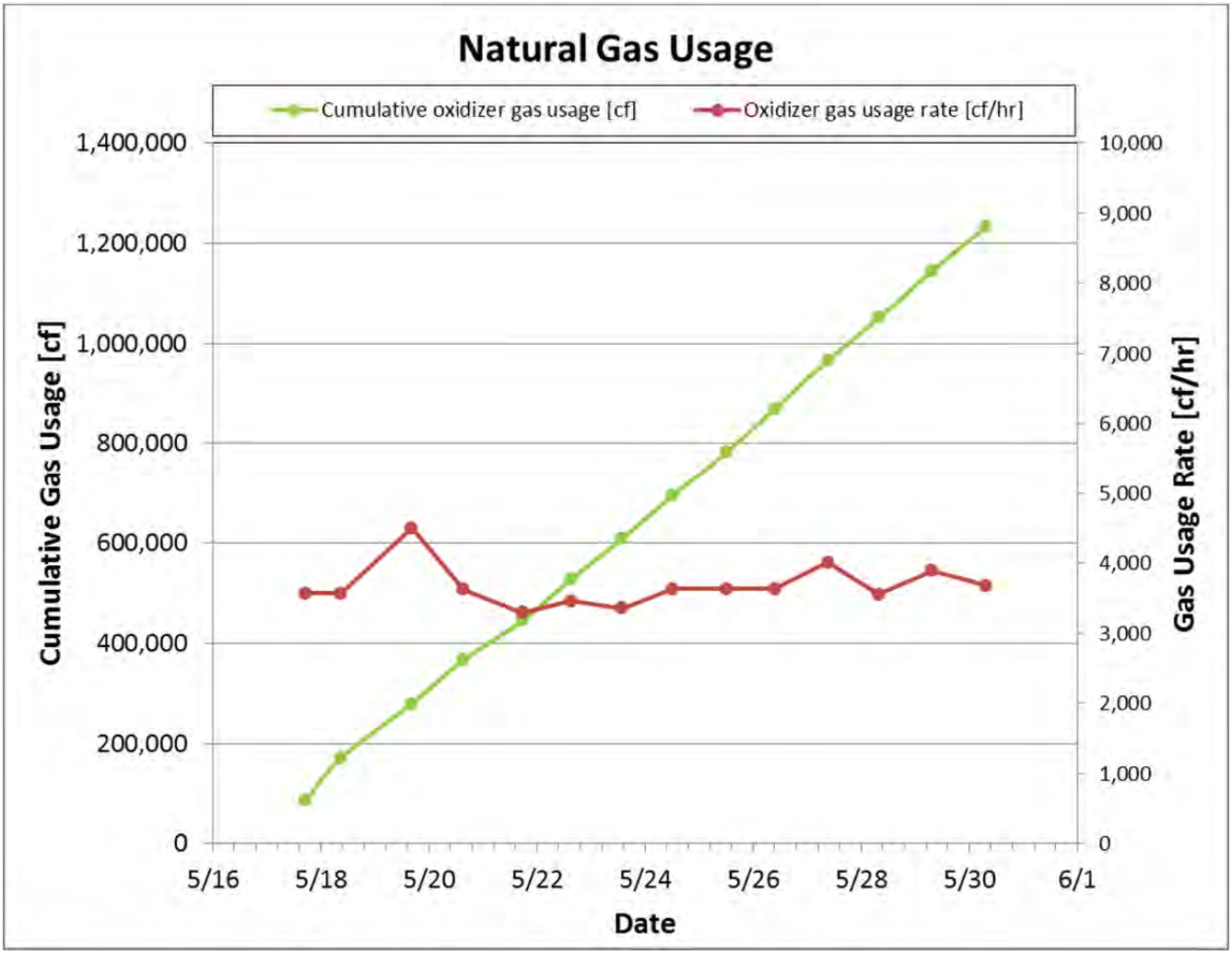


Figure 8. Natural Gas Usage

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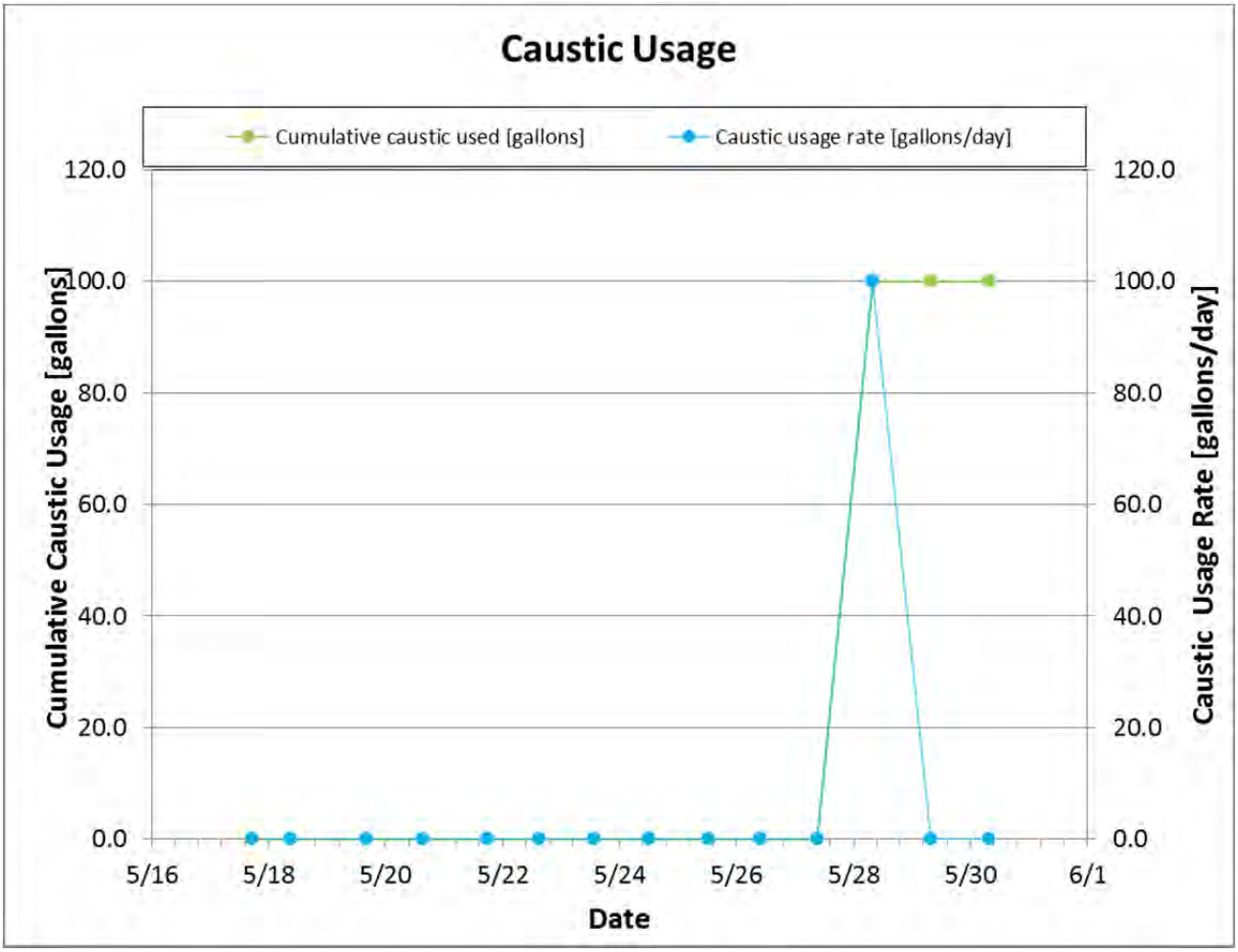


Figure 9. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 Treatment:

- 75% of thermocouples achieve 85C
- 80% of centroids achieves 100C
- 90% of centroids achieves 100C

Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 9. A table with percentages is also shown as it is often necessary to decrease energy to specific thermocouples after achieving 100C. Variations, or decreases, are often observed.

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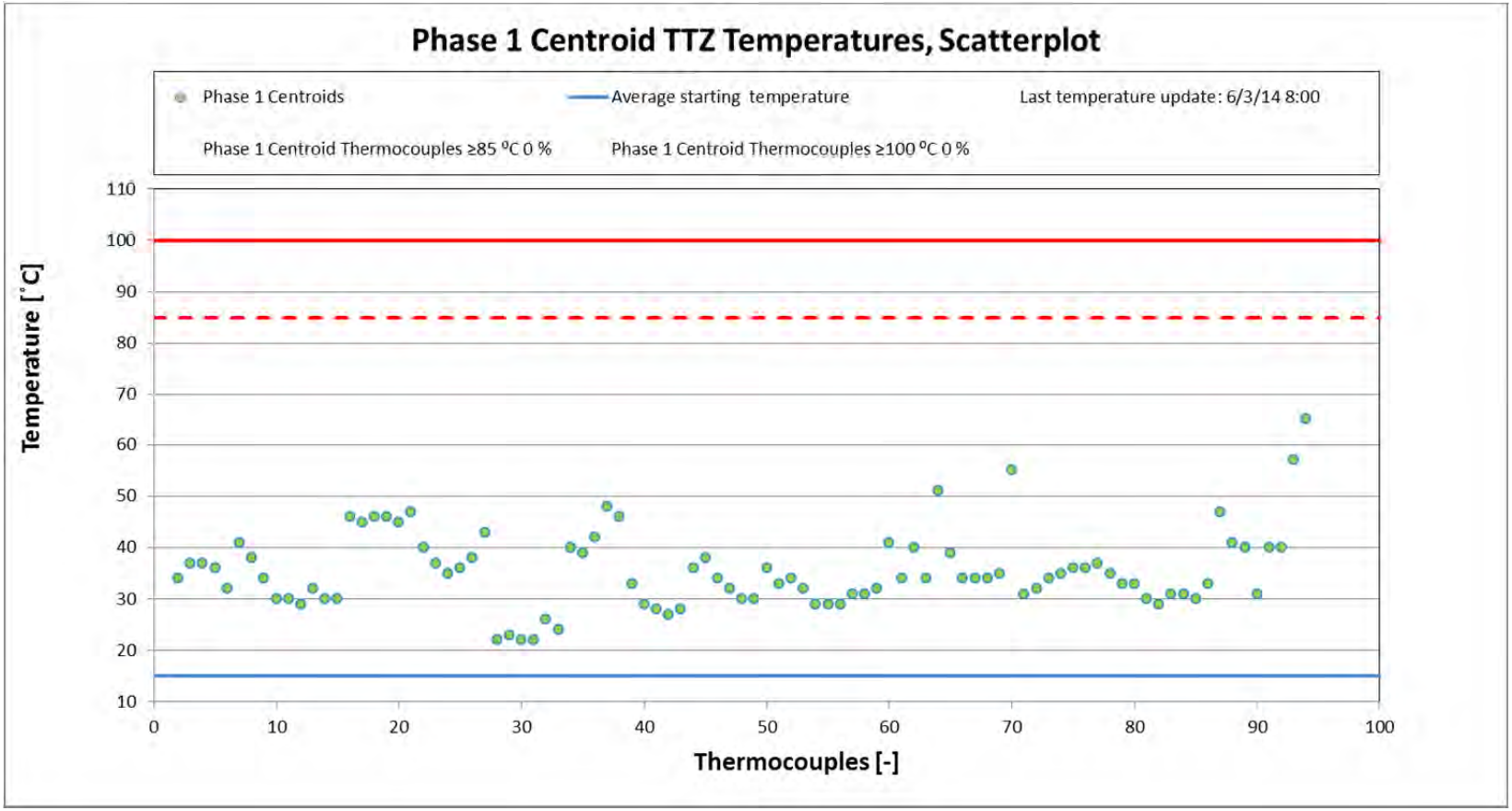


Figure 10. Phase 1 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples at Target Temperatures

Temperature Scatterplots

	Value	Unit
Date of Last Update	6/3/14	
Phase 1 Centroid Thermocouples ≥85 ^{0}C	0	%
Phase 1 Centroid Thermocouples ≥100 ^{0}C	0	%
Phase 2 Centroid Thermocouples ≥85 ^{0}C (OFFLINE)	0	%
Phase 2 Centroid Thermocouples ≥100 ^{0}C (OFFLINE)	0	%

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1 SUMMARY

This report is intended to cover the operational time period of Friday May 30, 2014 through Friday June 6, 2014.

Table 1 provides a summary of the project operational status as of Friday, June 6, 2014.

Table 1. Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	06/06/14	
Last Temperature Data Update	06/06/14	
Estimated Days of Operation (Total)	195	days
Days of Operation (Total)	22	days
Days of Operation vs. Estimate (Total)	11	%
Estimated Days of Operation Phase 1 (Day 1-134)	135	days
Days of Phase 1 Operation	22	days
Days of Phase 1 Operation vs. Estimate	17%	%
Estimated Days of Operation Phase 2 (Day 61-195)	135	days
Days of Phase 2 Operation	0	days
Days of Phase 2 Operation vs. Estimate	0	%
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	924,600	kWh
Used Electrical Energy vs. Estimate	5.9	%
Total Vapor Mass Removal (based on Oxidizer PID Readings)	124	lbs
Estimated Mass Removed as NAPL	0	lbs
Average Power Input Last 24 Hours	1,620	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	499	scfm
Average Condensate Production Rate Last 24 Hours	0.7	gpm

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.*

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	6/6/14	
Phase 1 Entire TTZ Average Temperature	42	°C
Phase 2 Entire TTZ Average Temperature (OFFLINE)	19	°C
Phase 1 Centroid Average Temperature	40	°C
Phase 2 Centroid Average Temperature (OFFLINE)	18	°C

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3 VAPOR EXTRACTION

Figure 1 below shows the vapor extraction rate from the wellfield. Currently, the majority of the vapor being extracted is non-condensable.

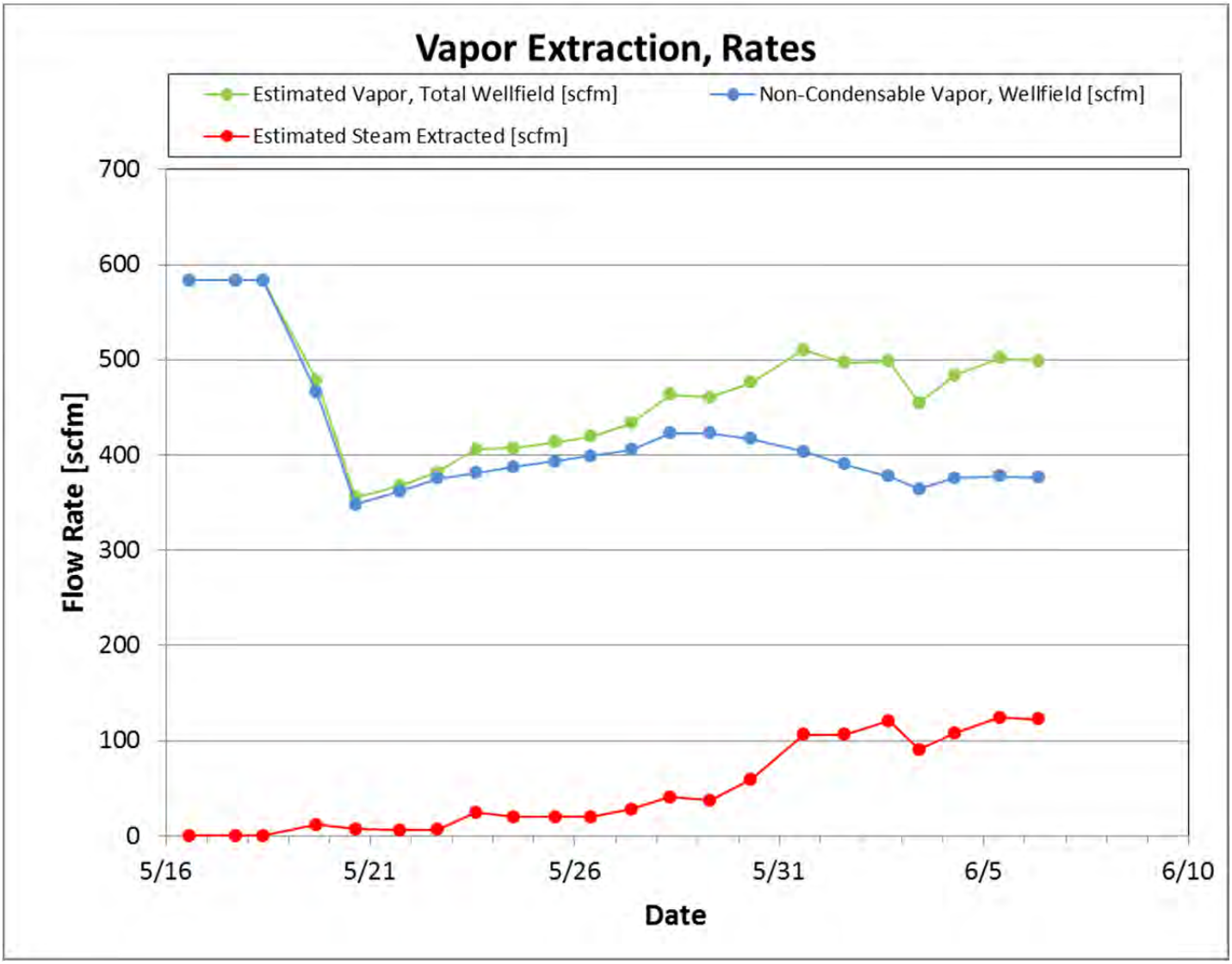


Figure 1. Vapor Extraction Rates

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Figure 2 below depicts the Lower Flammability Limit (%LFL) (also known as the lower explosive limit (LEL)) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent one manual daily reading from the analyzer.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf. Currently, the vapors entering the oxidizer are low flammability (< approximately 1% LFL) and do not approach the contract limit.

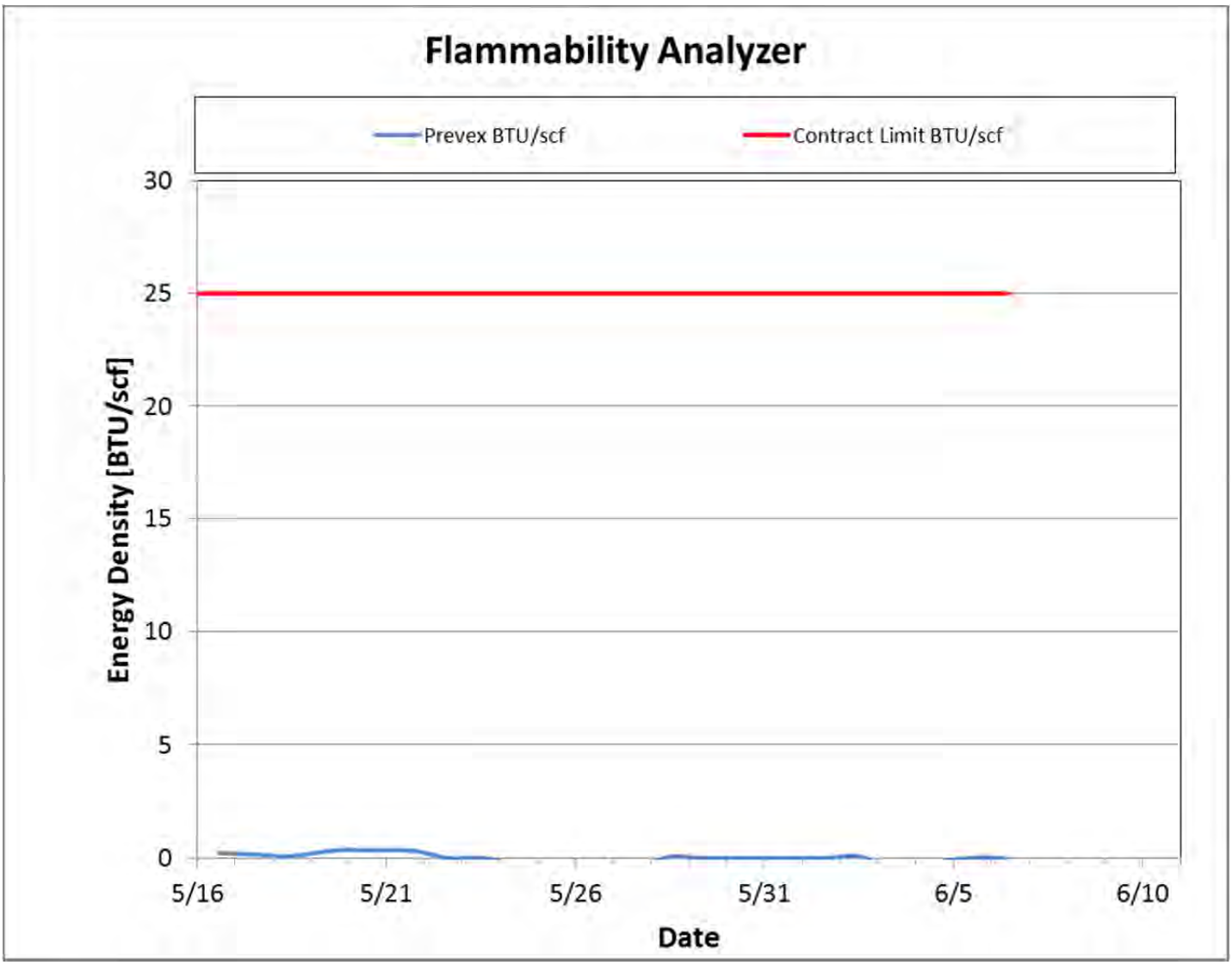


Figure 2. Flammability Analyzer

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Estimated mass removal based on daily photoionization detector (PID) readings and laboratory data are shown below in Figure 3. Figure 3 graphs the mass removed from Phase 1. Additional figures, including a total mass removed will be added once Phase 2 is online.

The below graph is prepared using laboratory data results from 5/16/14 and 5/20/14.

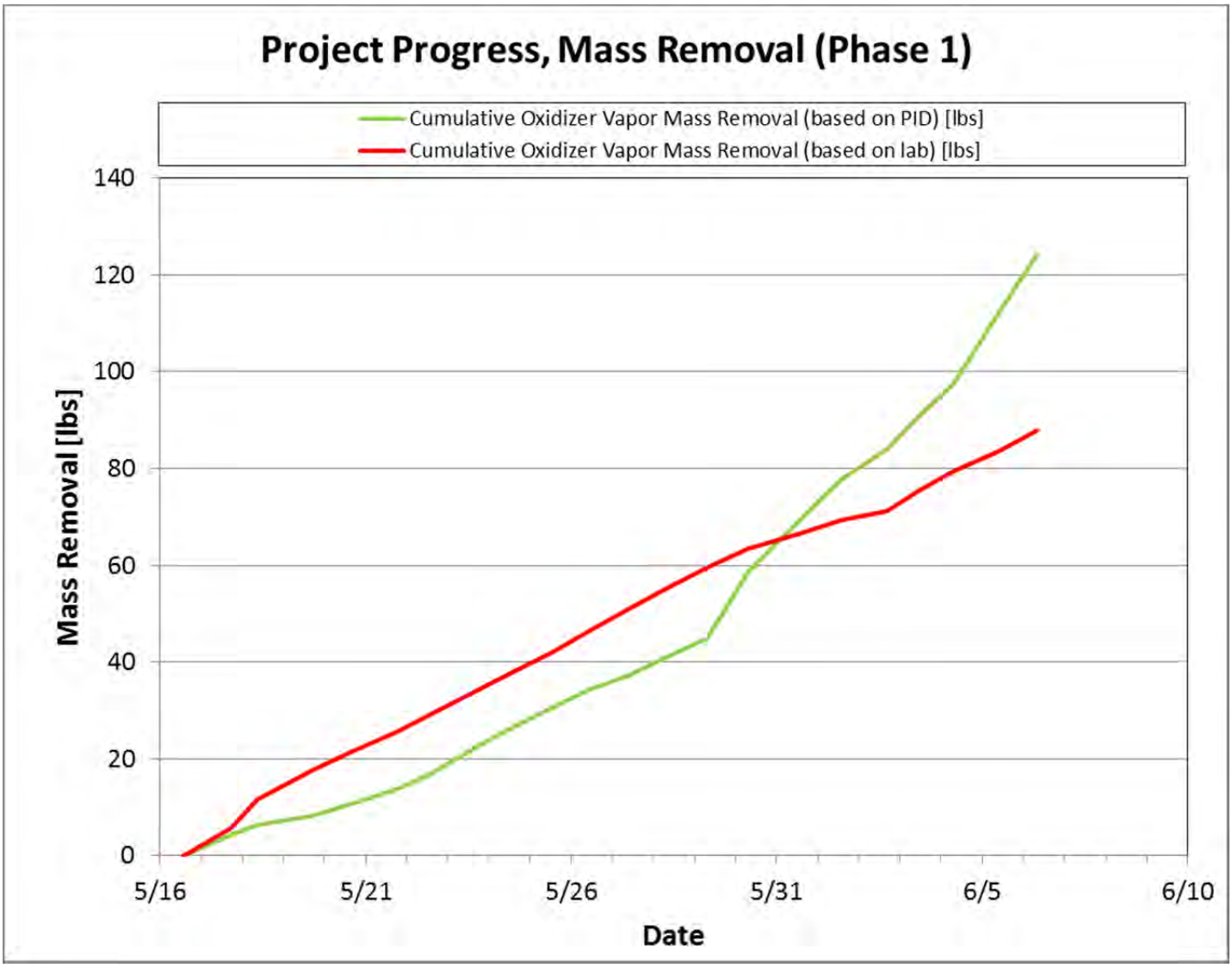


Figure 3. Project Progress, Mass Removal (Phase 1)

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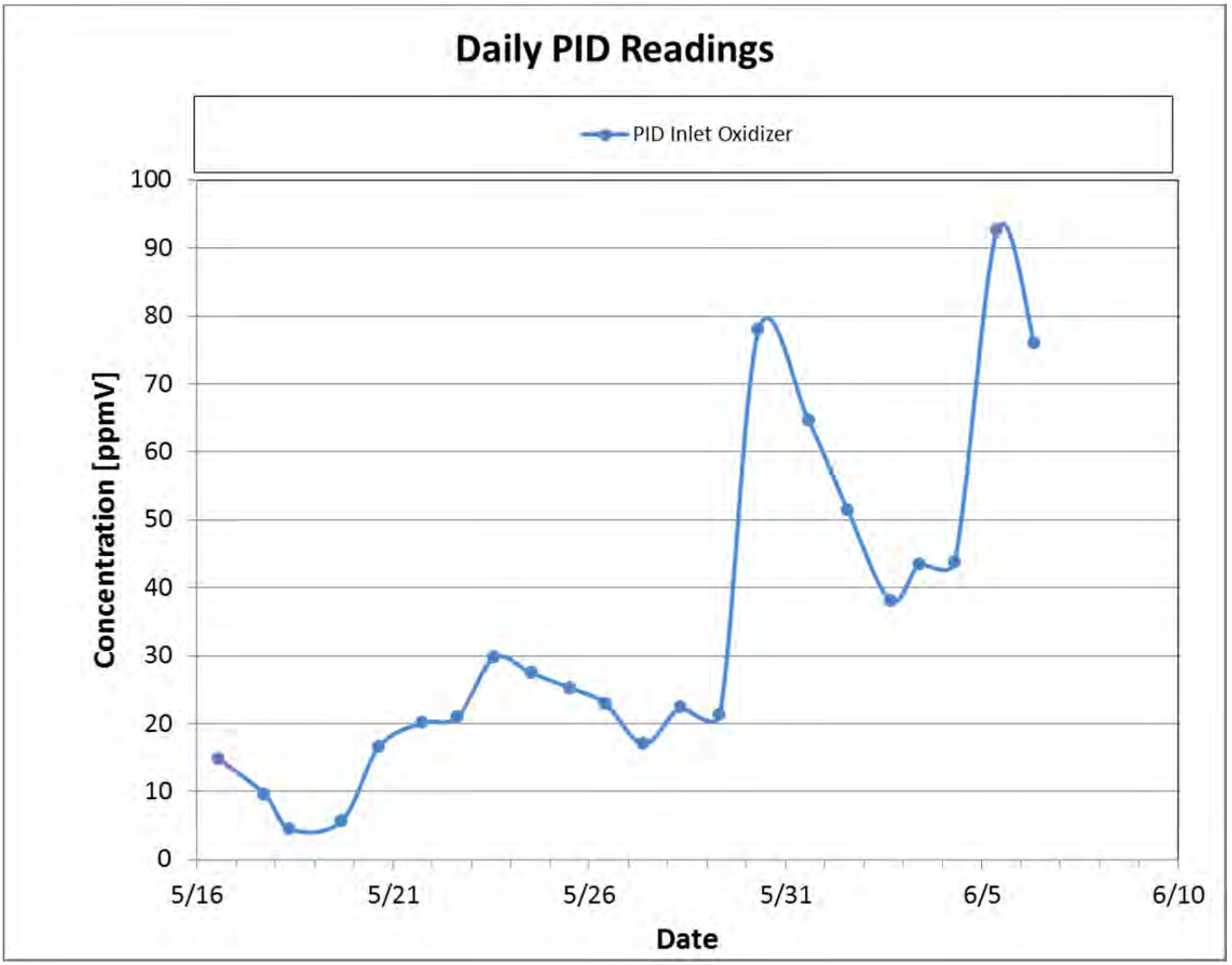


Figure 4. Daily PID Readings

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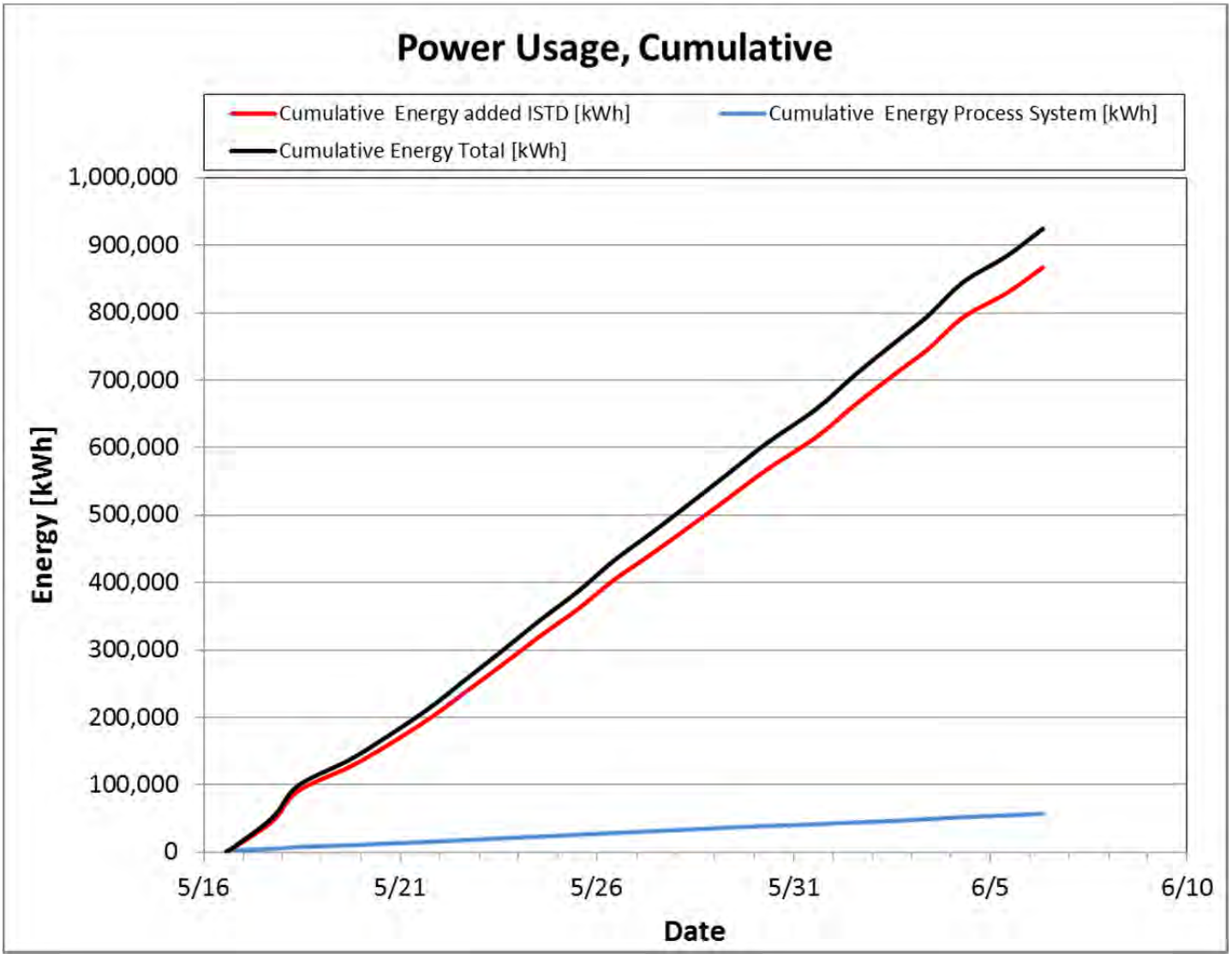


Figure 5. Power Usage, Cumulative

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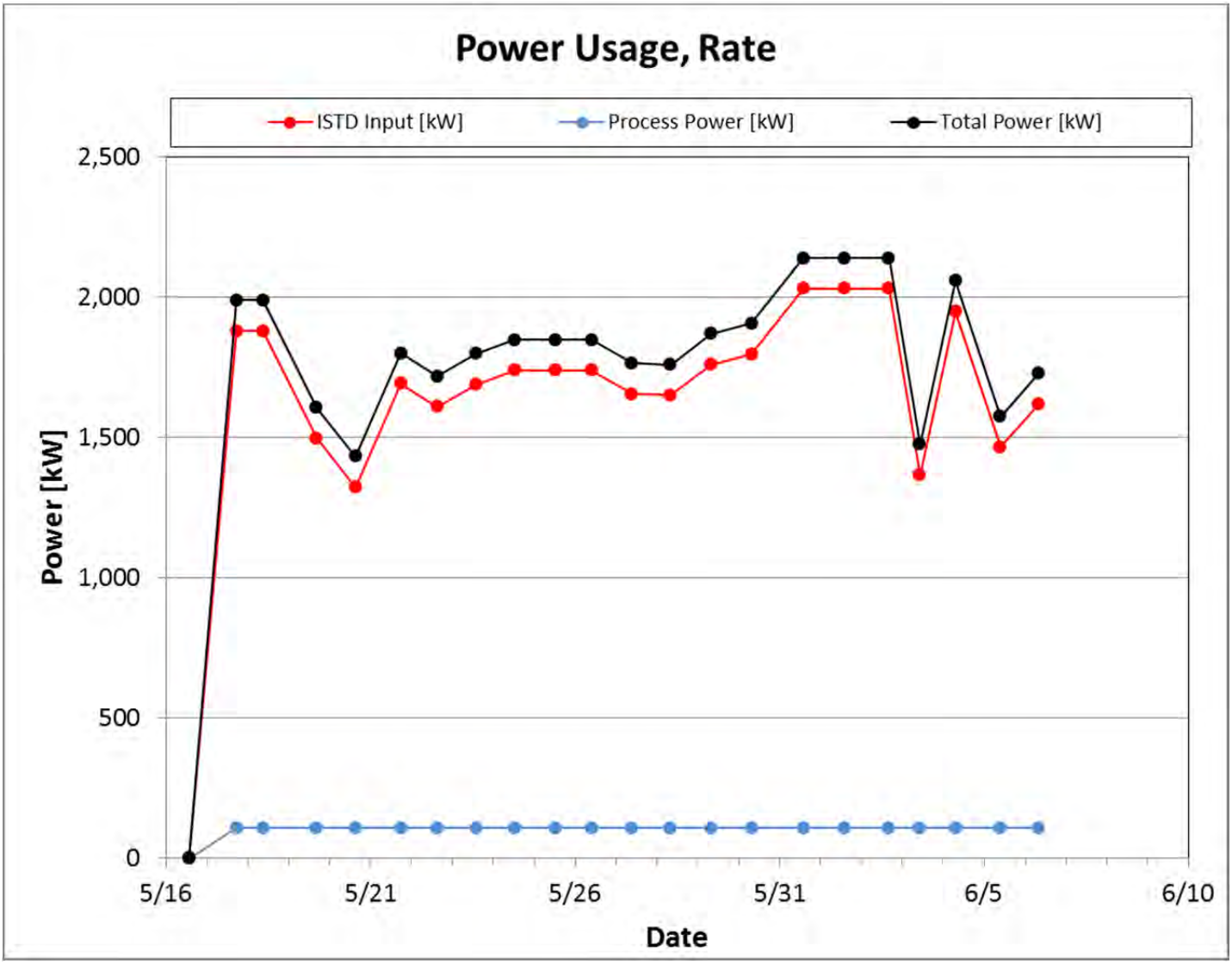


Figure 6. Power Usage, Rate

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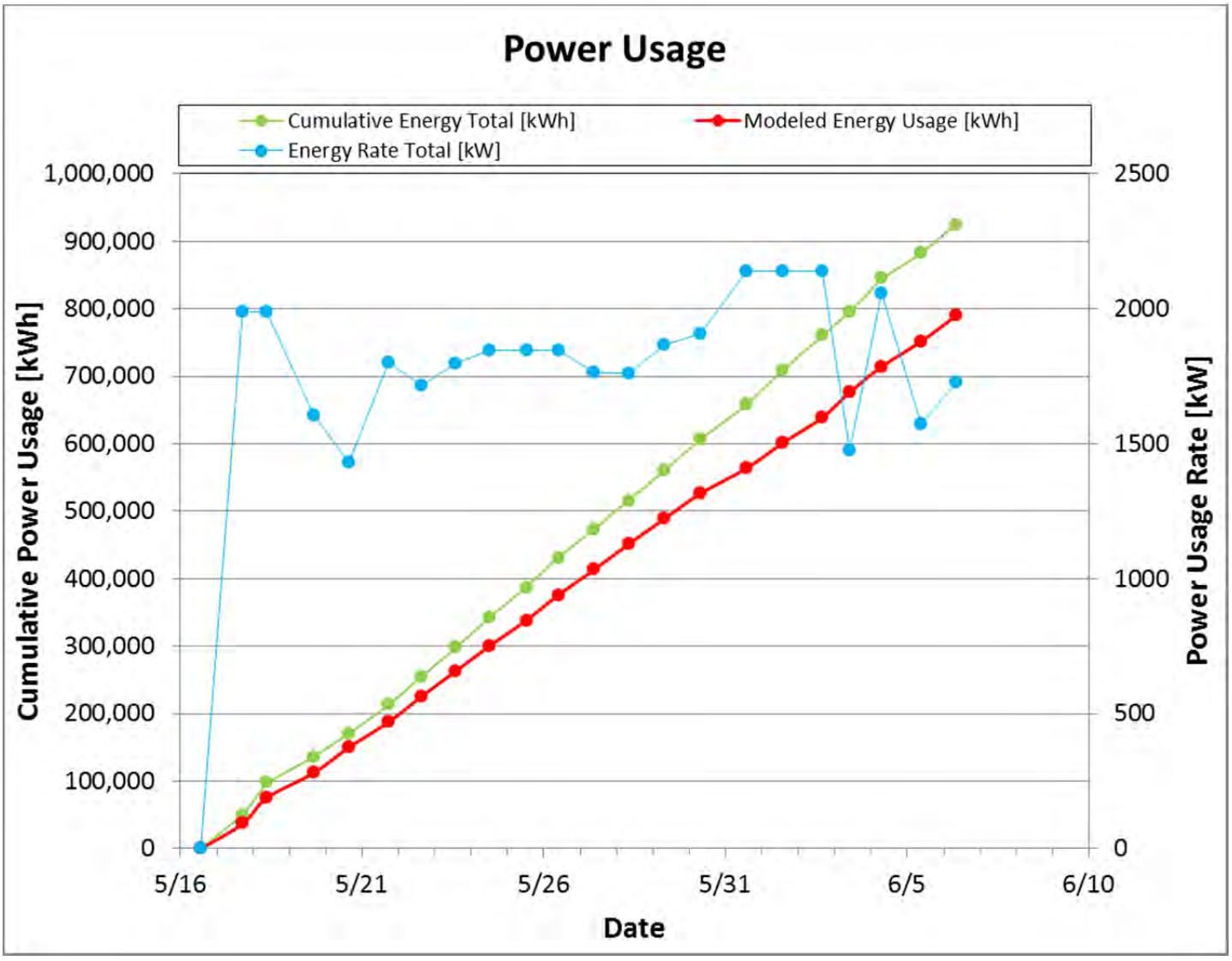


Figure 7. Power Usage

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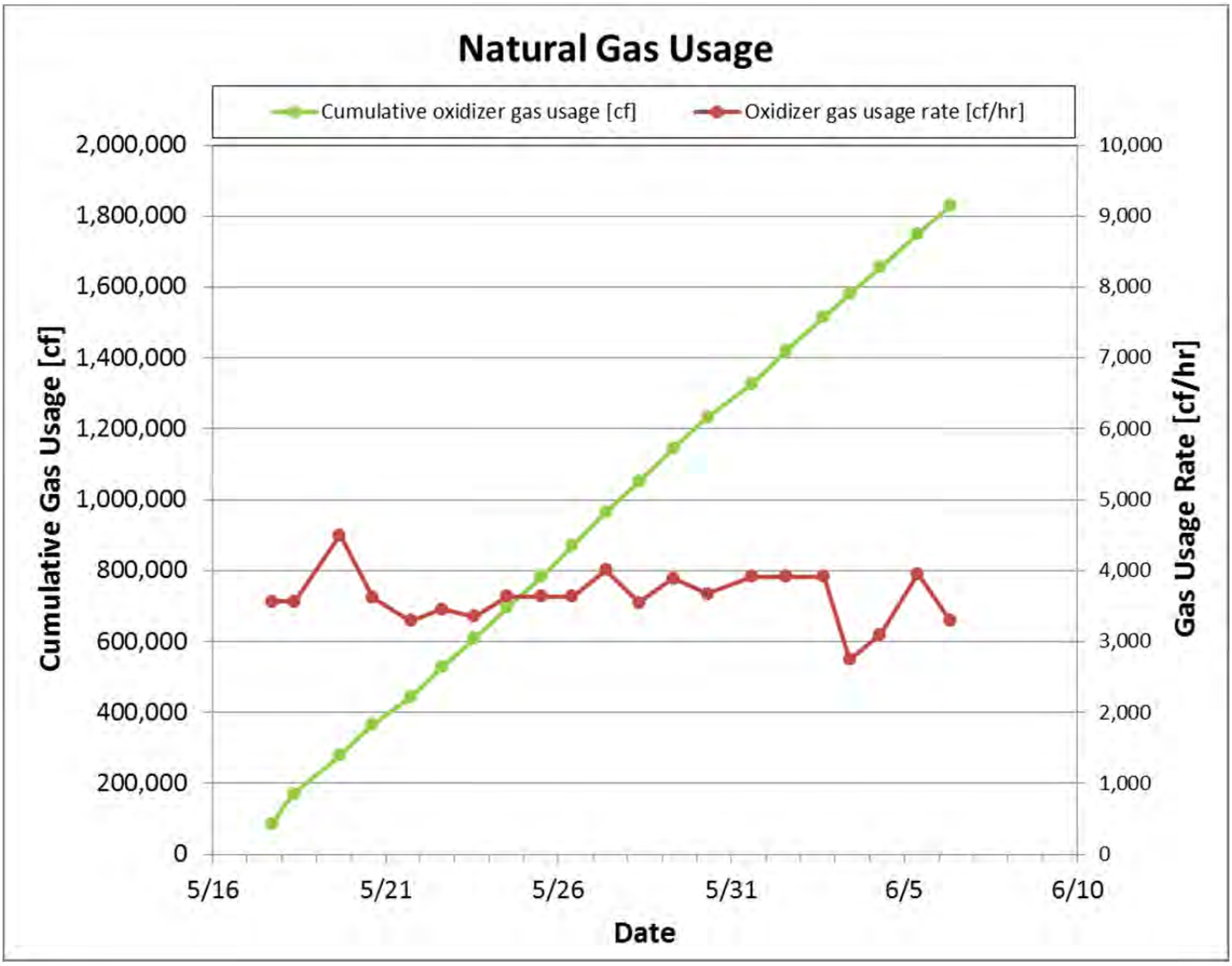


Figure 8. Natural Gas Usage

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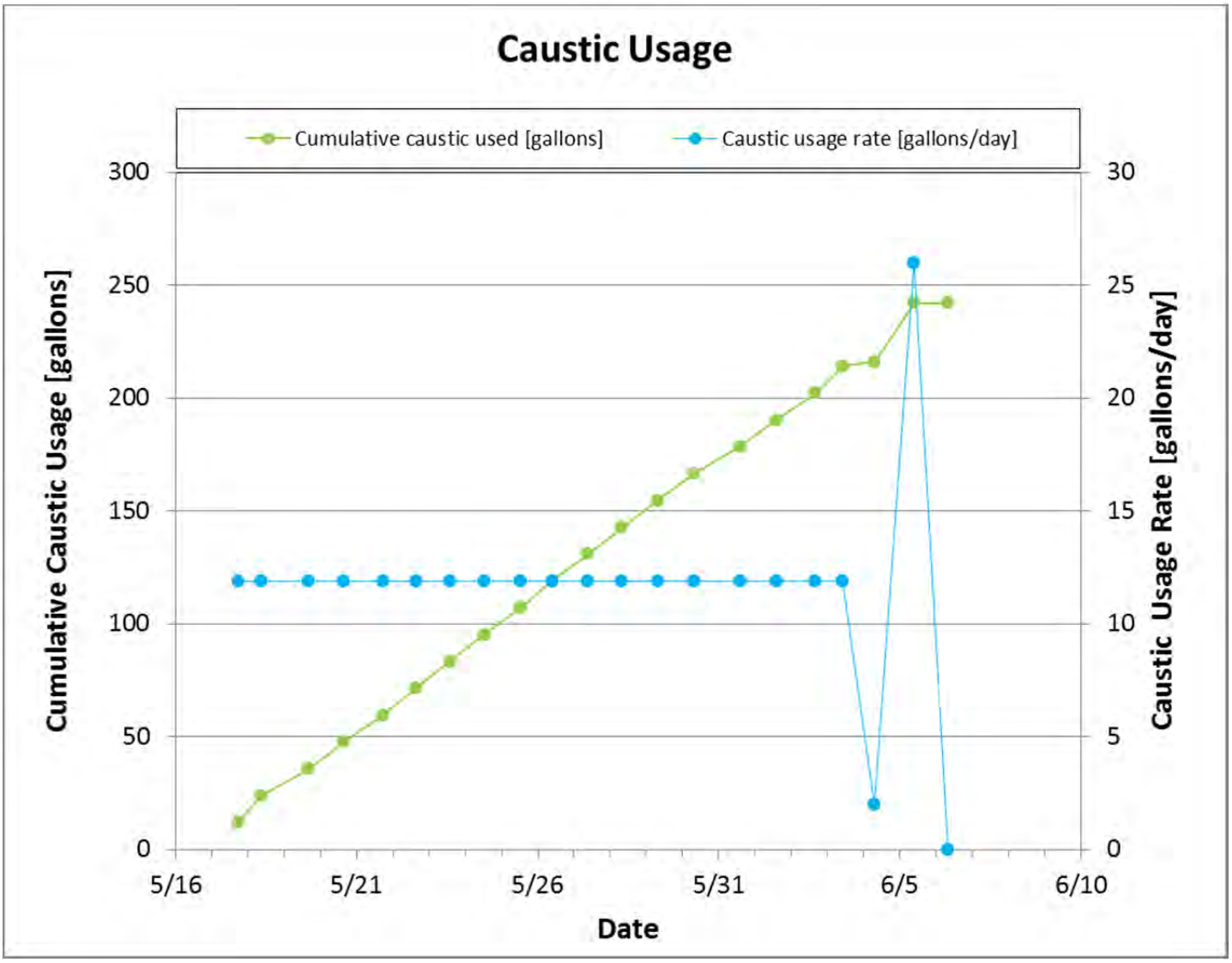


Figure 9. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 Treatment:

- 75% of thermocouples located at the centroids achieves 85C
- 80% of thermocouples located at the centroids achieves 100C
- 90% of thermocouples located at the centroids achieves 100C

Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 9. A table with percentages is also shown as it is often necessary to decrease energy to specific thermocouples after achieving 100C. Variations, or decreases, are often observed.

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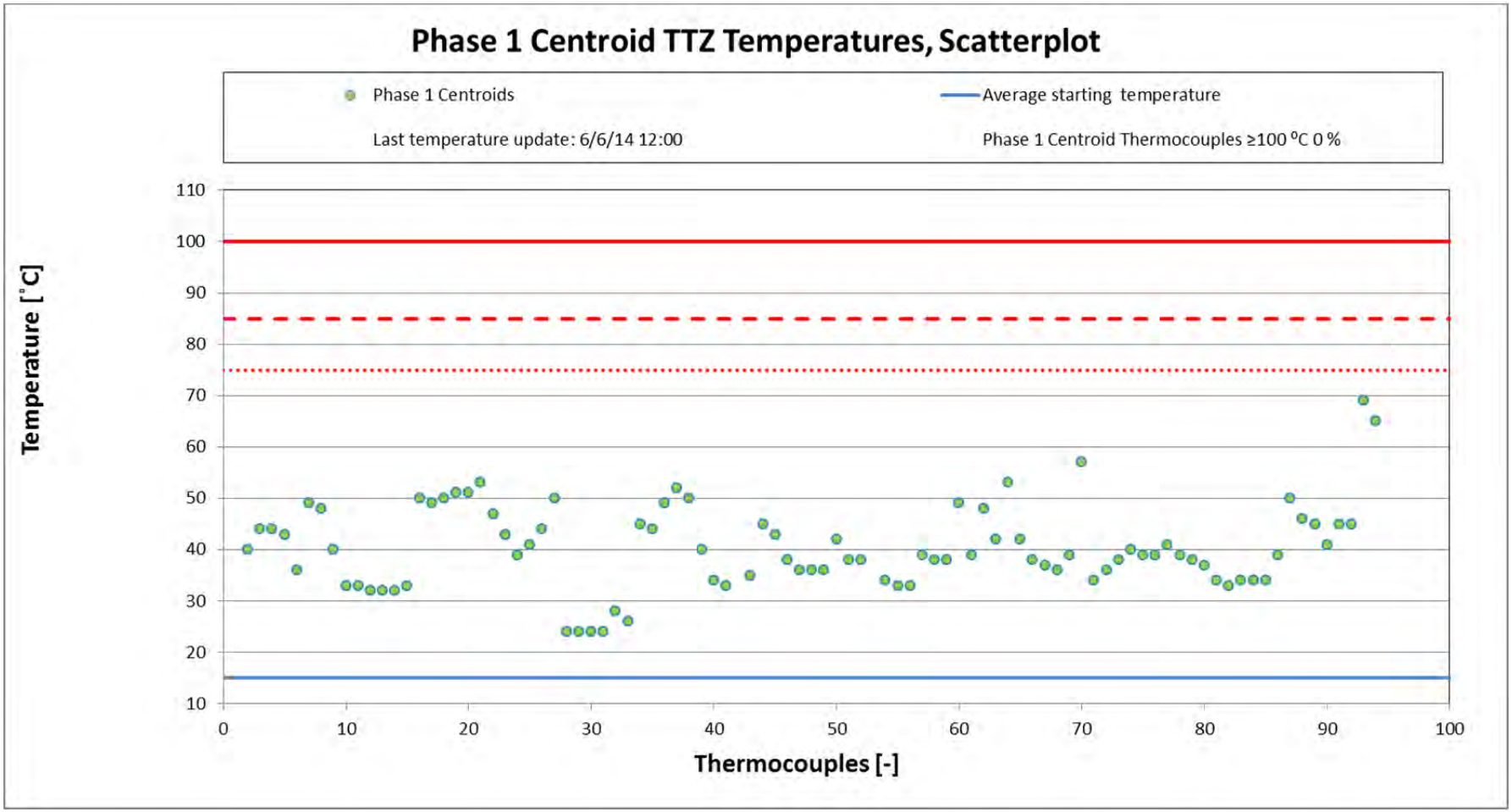


Figure 10. Phase 1 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples at Target Temperatures

Temperature Scatterplots

	Value	Unit
Date of Last Update	6/6/14	
Phase 1 Centroid Thermocouples ≥75 ^{0}C	0	%
Phase 1 Centroid Thermocouples ≥85 ^{0}C	0	%
Phase 1 Centroid Thermocouples ≥100 ^{0}C	0	%
Phase 2 Centroid Thermocouples ≥75 ^{0}C (OFFLINE)	0	%
Phase 2 Centroid Thermocouples ≥85 ^{0}C (OFFLINE)	0	%
Phase 2 Centroid Thermocouples ≥100 ^{0}C (OFFLINE)	0	%

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1 SUMMARY

This report is intended to cover the operational time period of Friday June 6, 2014 through Friday June 13, 2014, with temperatures updated through Monday June 16, 2014.

Table 1 provides a summary of the project operational status as of Friday, June 13, 2014.

Table 1. Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	06/13/14	
Last Temperature Data Update	06/15/14	
Estimated Days of Operation (Total)	195	days
Days of Operation (Total)	29	days
Days of Operation vs. Estimate (Total)	15	%
Estimated Days of Operation Phase 1 (Day 1-134)	135	days
Days of Phase 1 Operation	29	days
Days of Phase 1 Operation vs. Estimate	22%	%
Estimated Days of Operation Phase 2 (Day 61-195)	135	days
Days of Phase 2 Operation	0	days
Days of Phase 2 Operation vs. Estimate	0	%
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	1,217,900	kWh
Used Electrical Energy vs. Estimate	7.7	%
Total Vapor Mass Removal (based on Oxidizer PID Readings)	144	lbs
Estimated Mass Removed as NAPL	0	lbs
Average Power Input Last 24 Hours	1,740	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	571	scfm
Average Condensate Production Rate Last 24 Hours	1.1	gpm

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1 displays the average target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling. As of June 15, 2014, Figure 1 shows that the actual temperature is ahead of the predicted temperature by approximately 5 degrees Celsius.

Table 2. Temperature Summary

Temperatures TTZ		
Type	**Value**	**Unit**
Date of Last Update	6/15/14	
Phase 1 Entire TTZ Average Temperature	55	°C
Phase 2 Entire TTZ Average Temperature (OFFLINE)	21	°C
Phase 1 Centroid Average Temperature	53	°C
Phase 2 Centroid Average Temperature (OFFLINE)	20	°C

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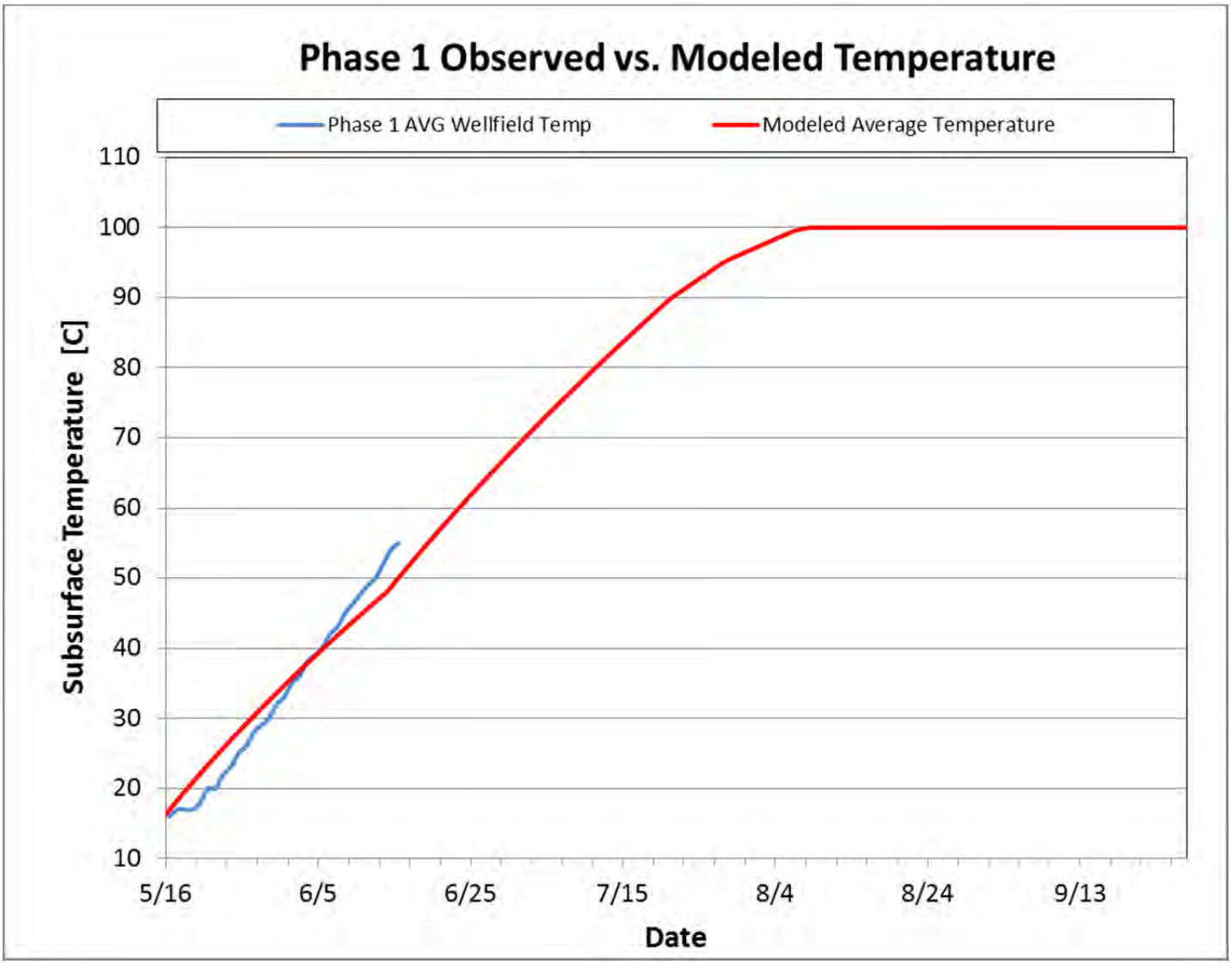


Figure 1. Phase 1 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield.

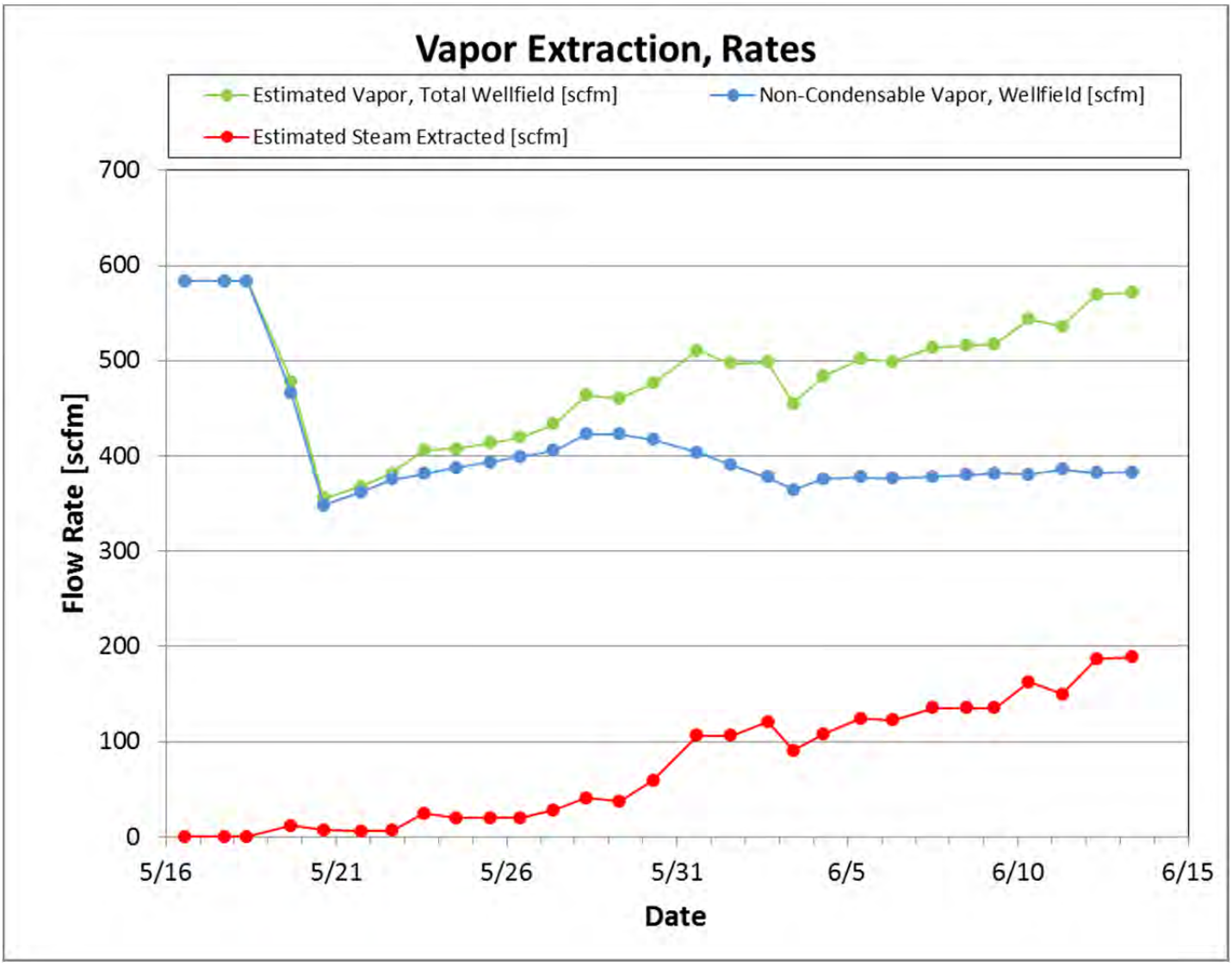


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) (also known as the lower explosive limit (LEL)) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent one manual daily reading from the analyzer. This value is collected after dilution air is introduced into the system.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf. Currently, the vapors entering the oxidizer are low flammability (< approximately 1% LFL) and do not approach the contract limit.

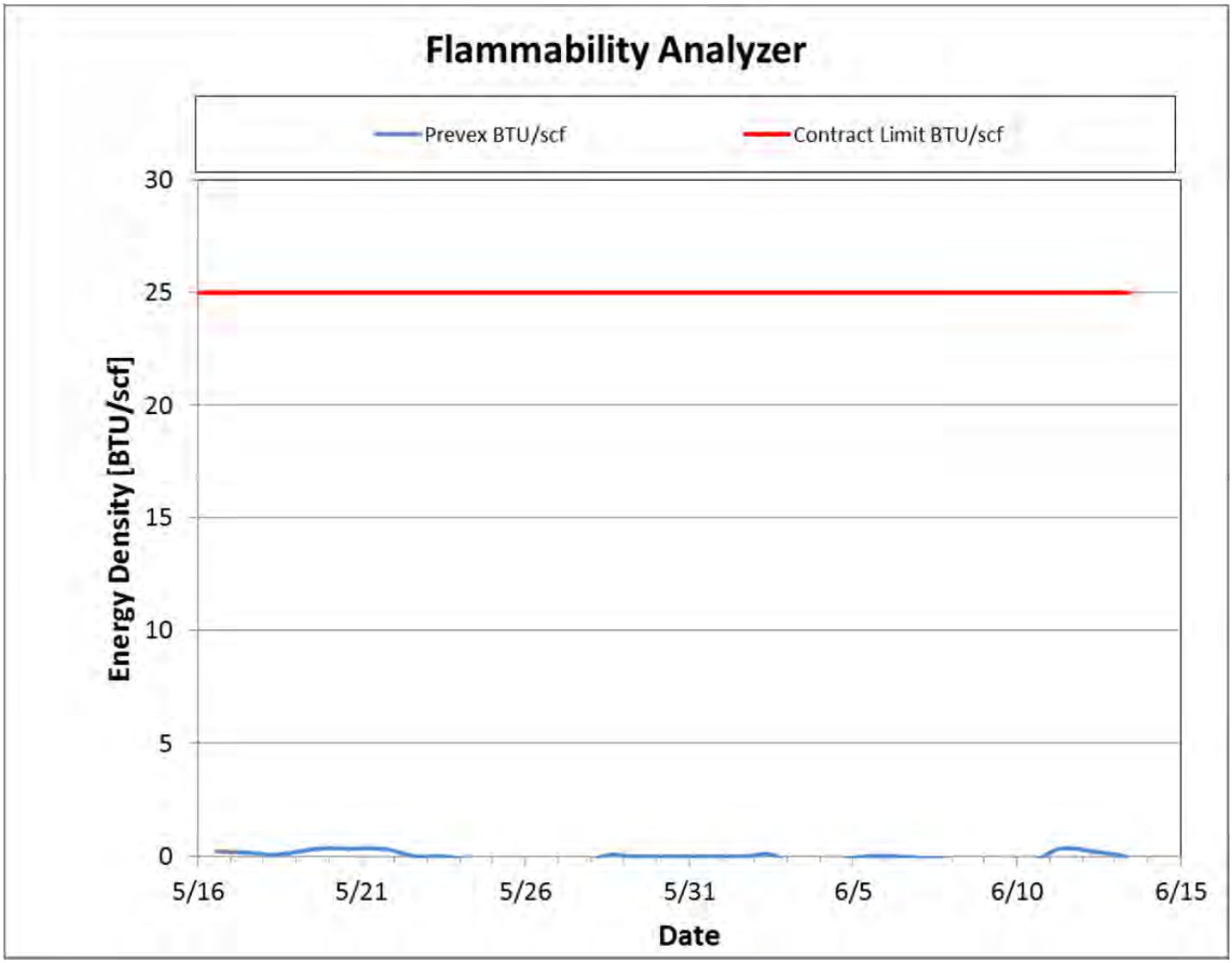


Figure 3. Flammability Analyzer

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Estimated mass removal based on daily photoionization detector (PID) readings and laboratory data are shown below in Figure 4. Figure 4 graphs the mass removed from Phase 1. Additional figures, including a total mass removed will be added once Phase 2 is online.

The below graph is prepared using laboratory data results from 5/16/14, 5/20/14, and 5/27/14.

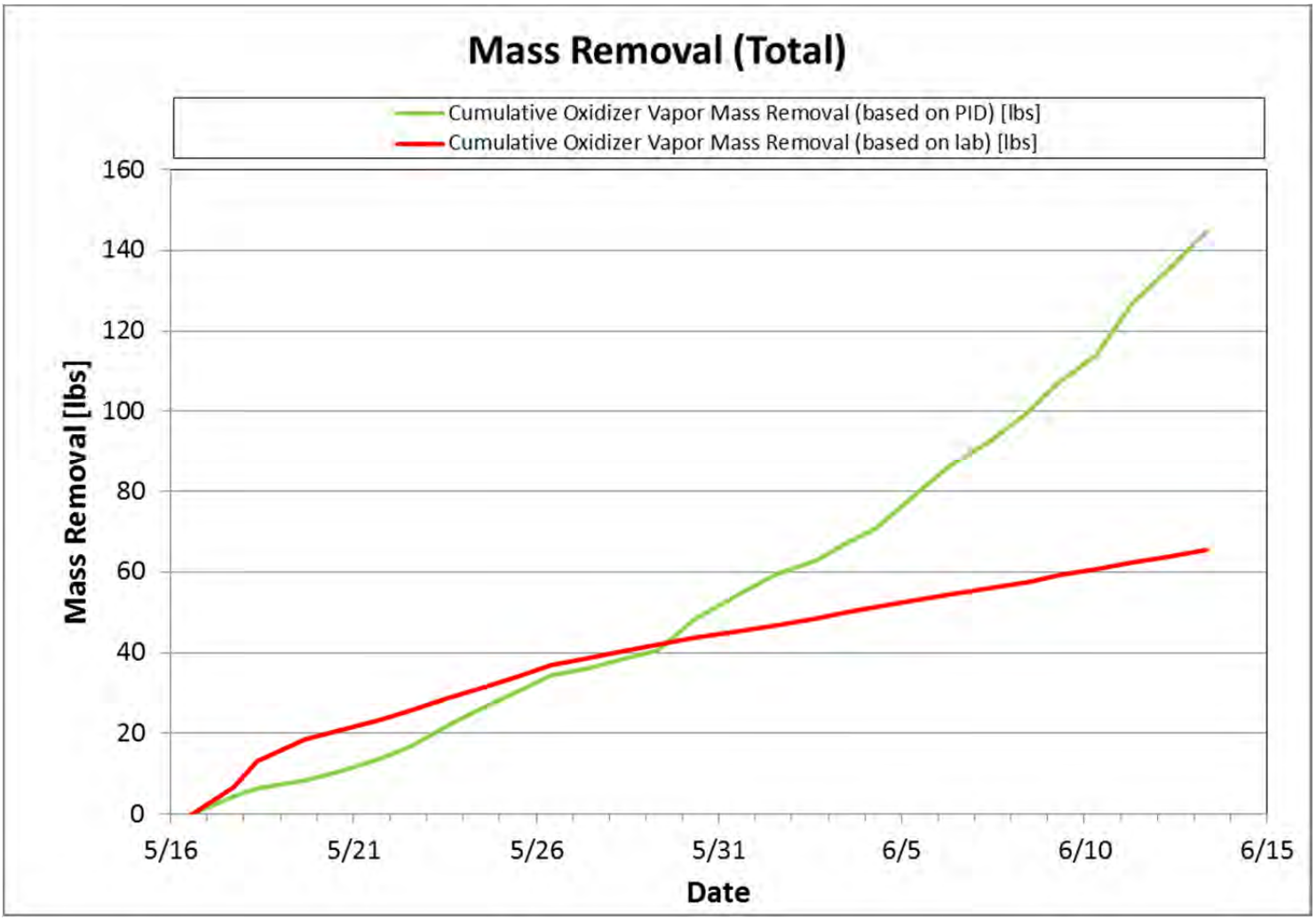


Figure 4. Project Progress, Mass Removal (Phase 1)

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Figure 5 below displays the daily PID readings collected at the oxidizer influent over time.

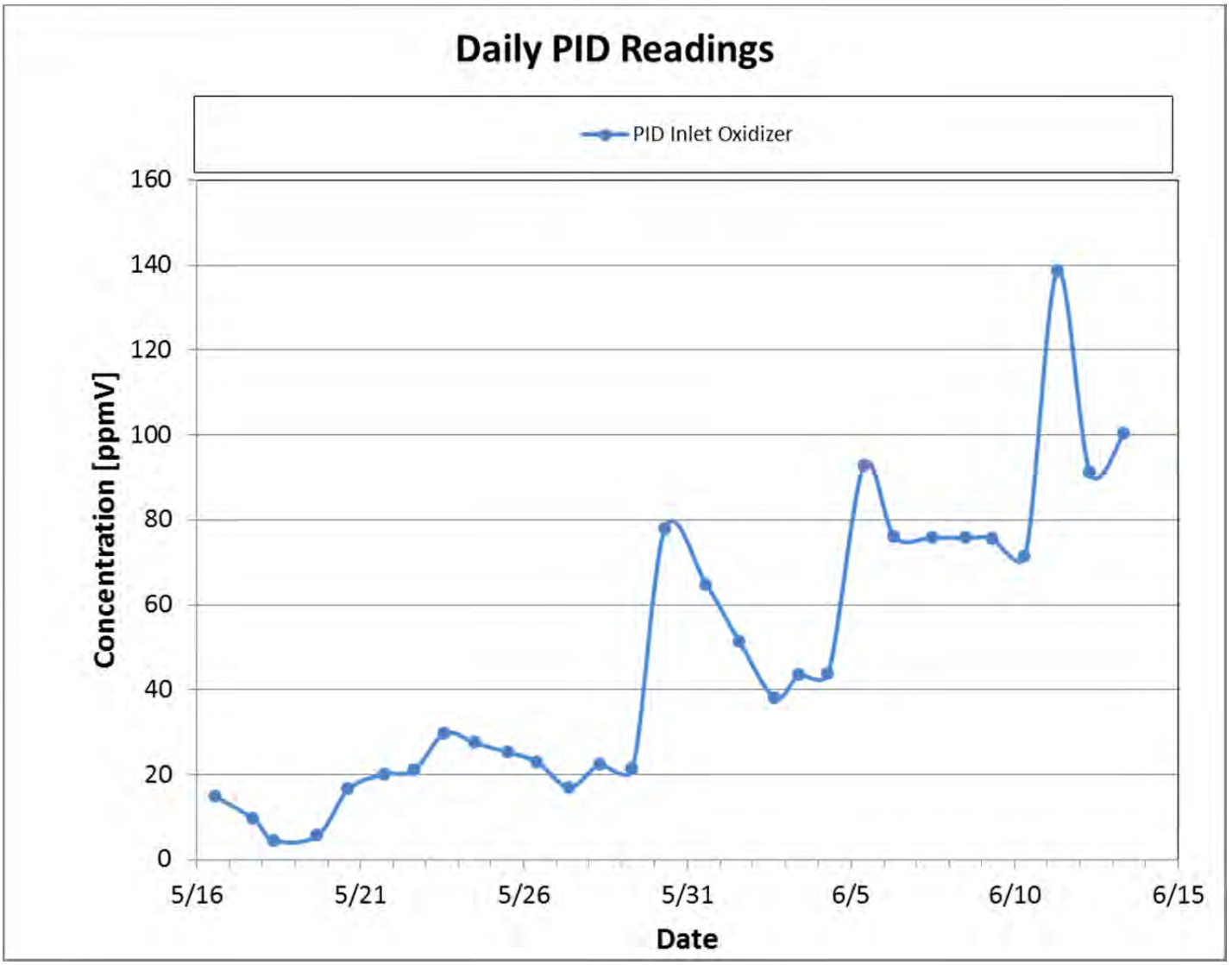


Figure 5. Daily PID Readings

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 6.

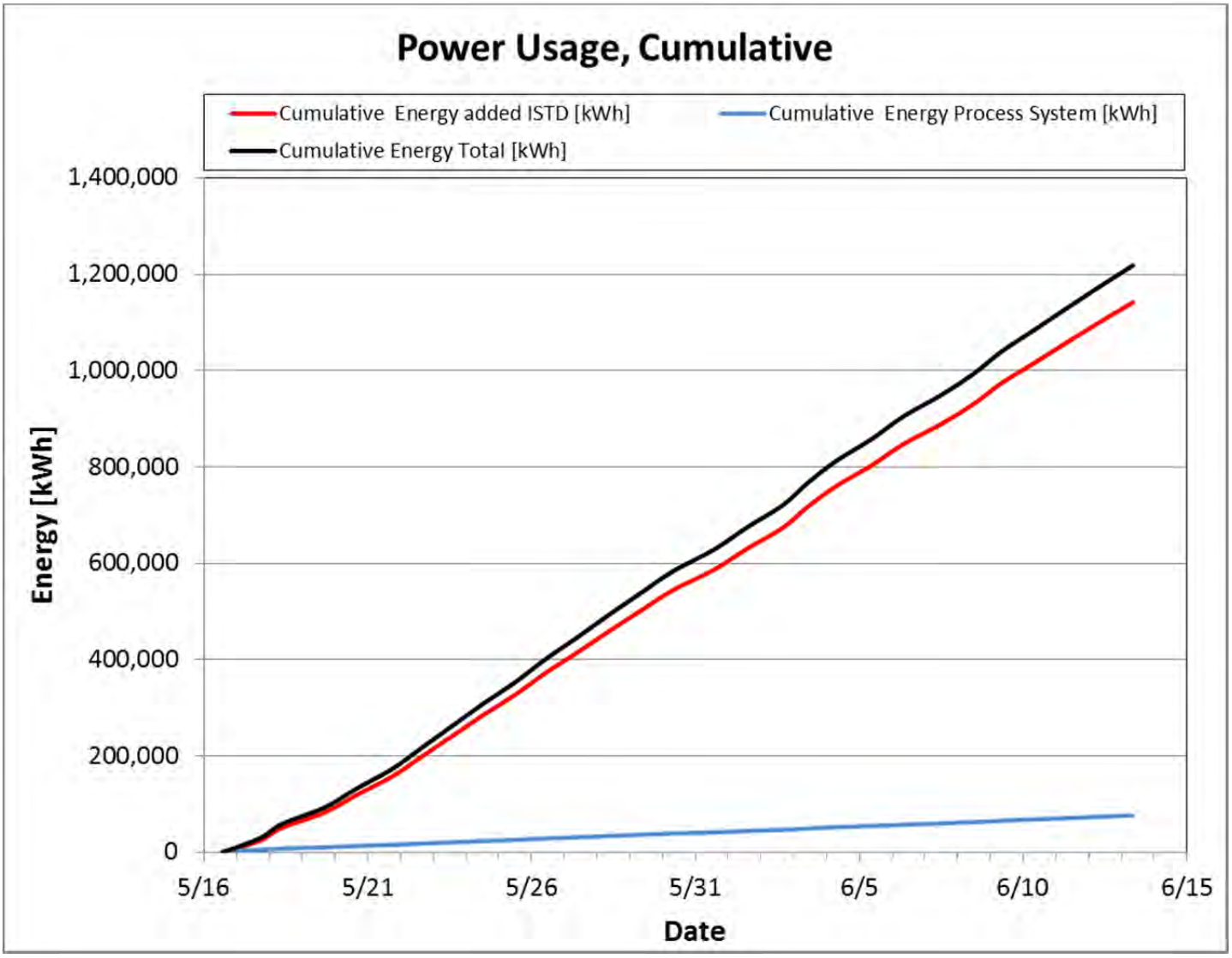


Figure 6. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 7.

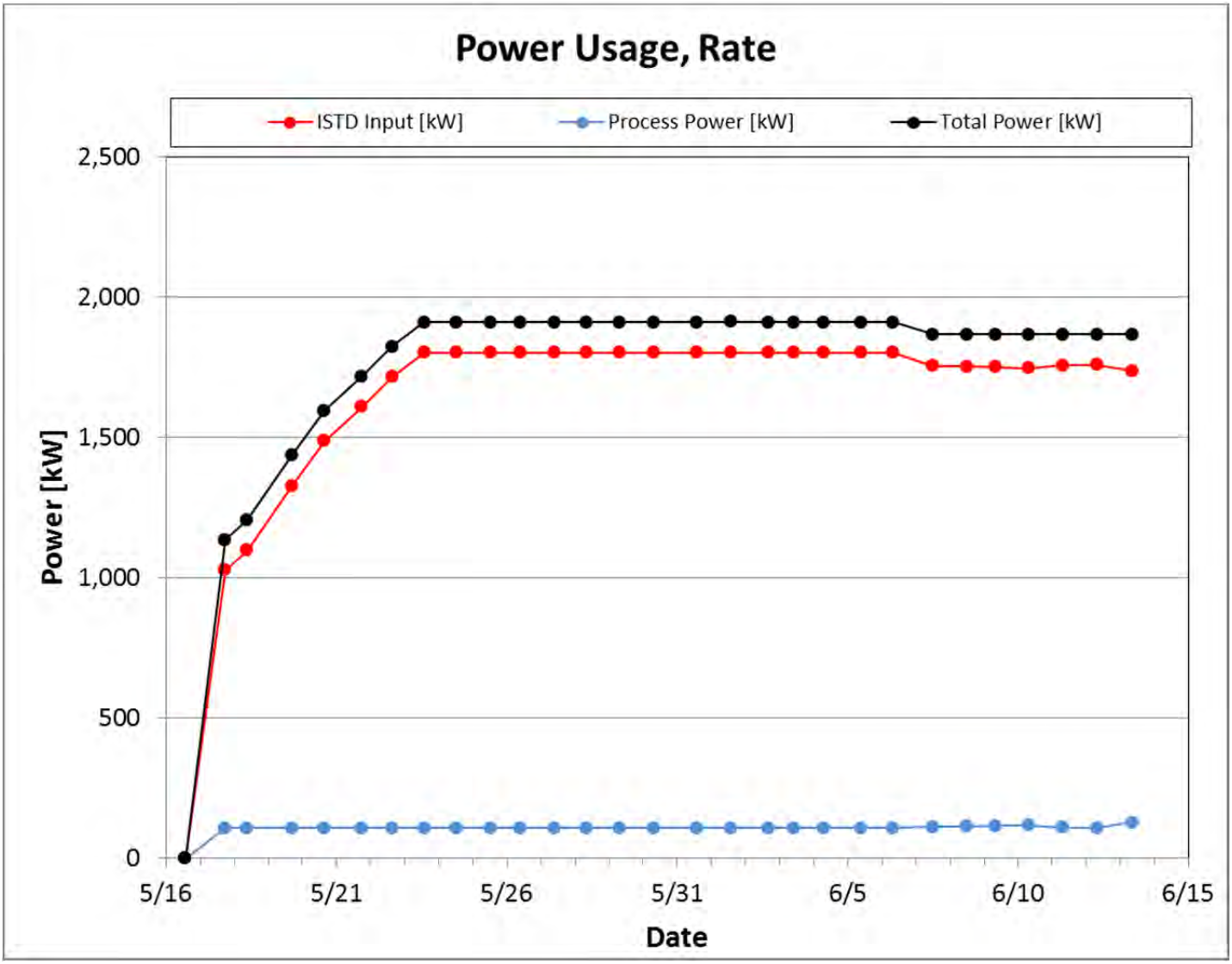


Figure 7. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 8 through 10.

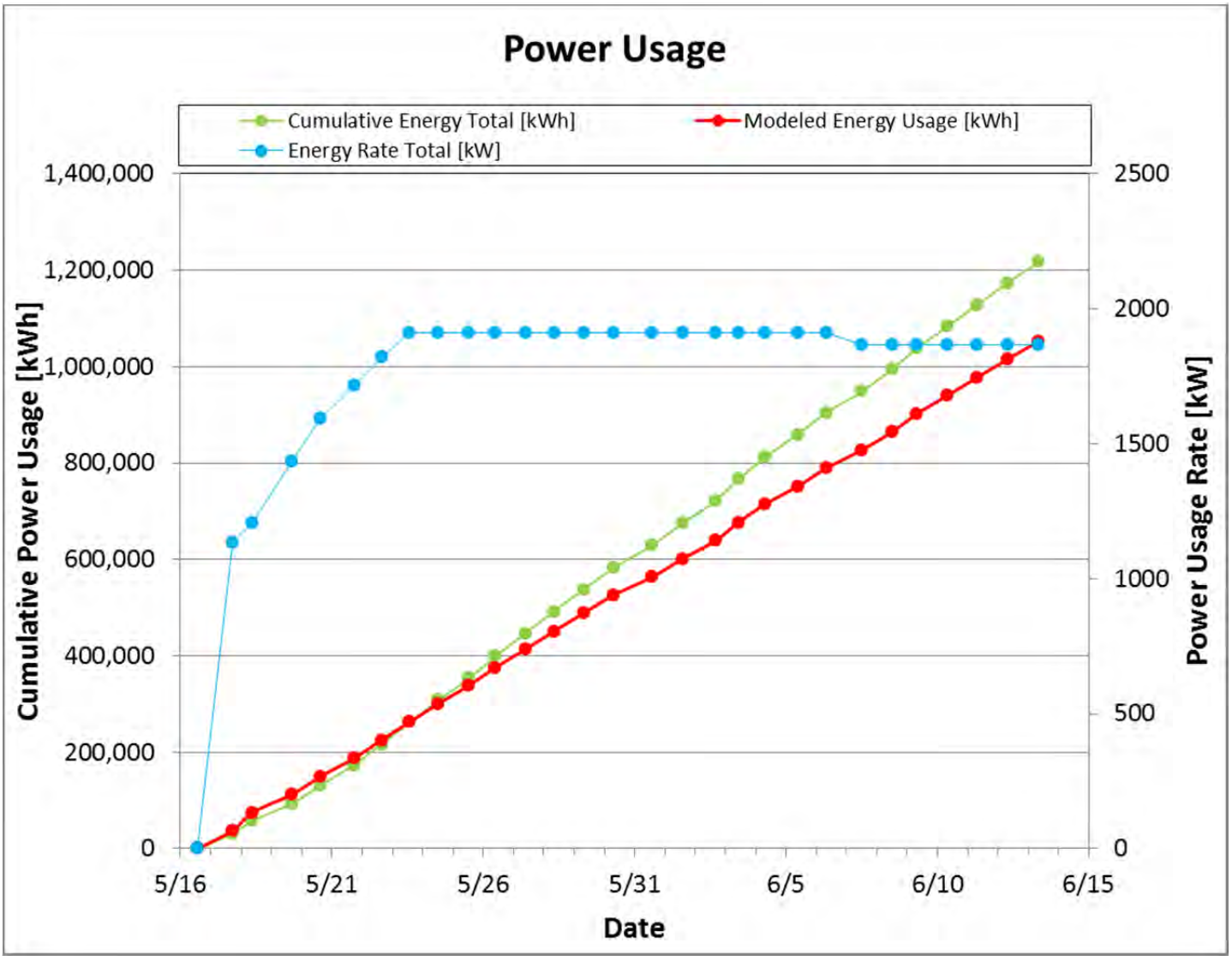


Figure 8. Power Usage

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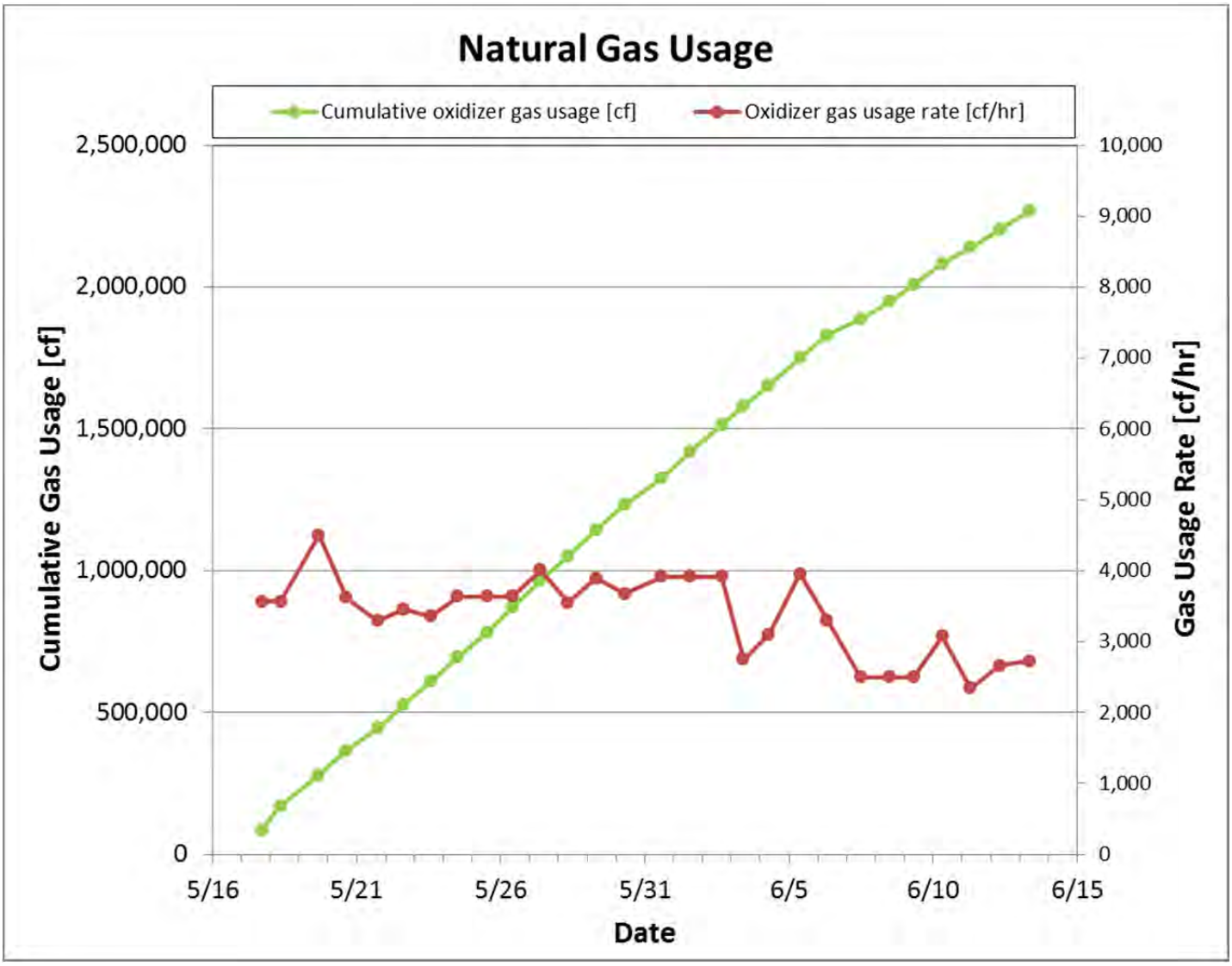


Figure 9. Natural Gas Usage

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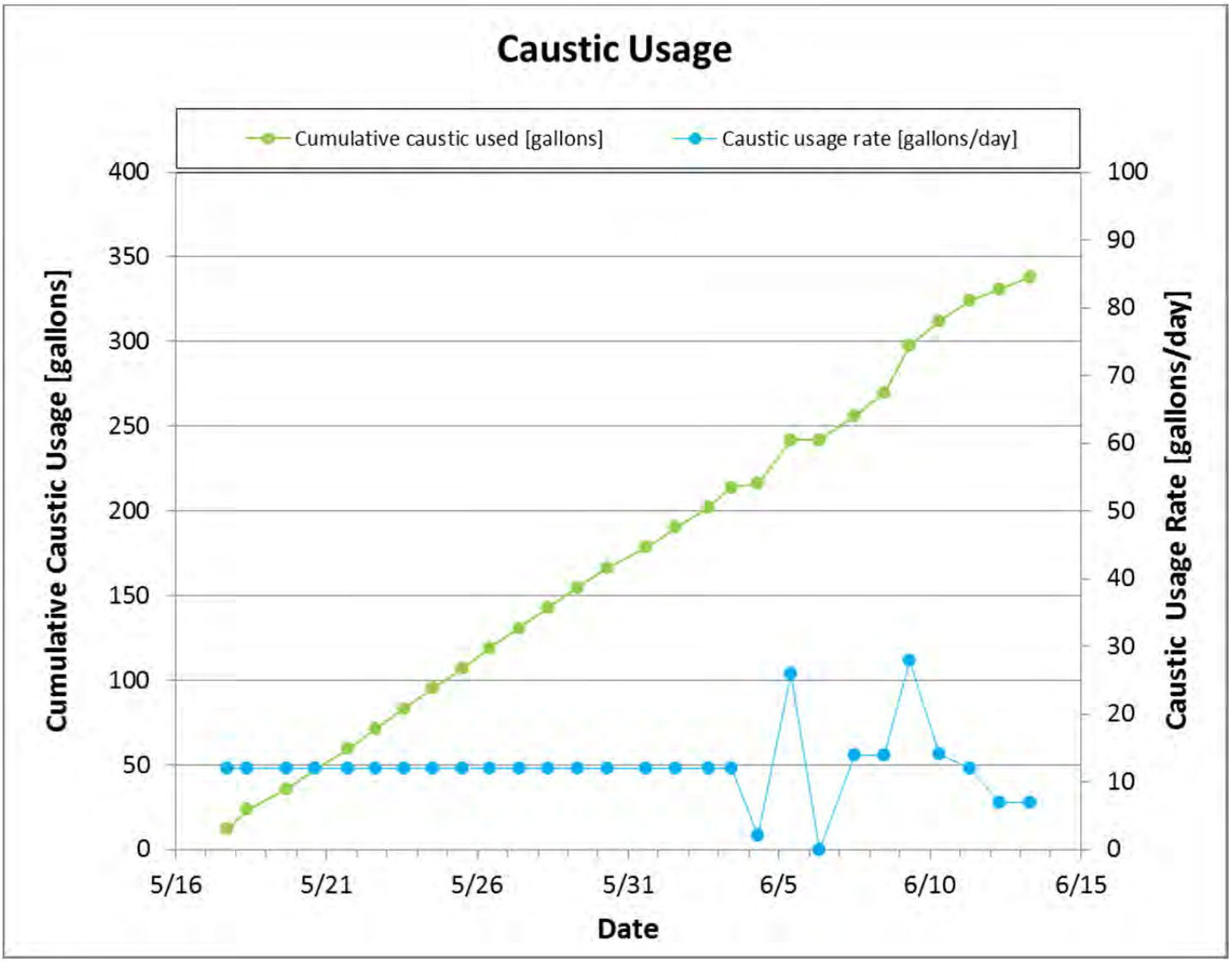


Figure 10. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12. A table with percentages is also shown (Table 3) as it is often necessary to decrease energy to specific thermocouples after achieving 100°C. Variations, or decreases, are often observed.

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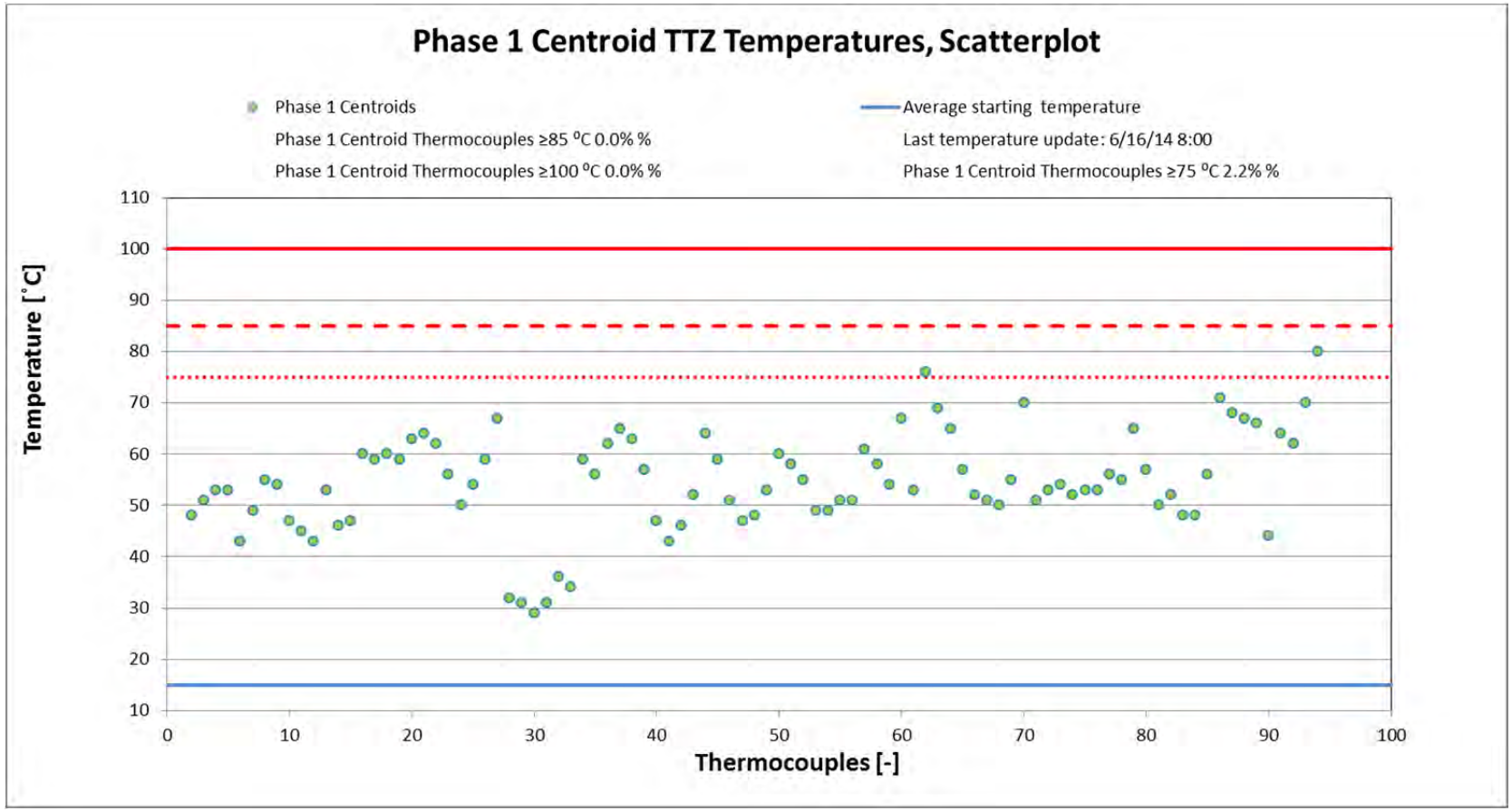


Figure 11. Phase 1 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples at Target Temperatures

Temperature Scatterplots

	Value	Unit	
Date of Last Update	6/16/14		
Phase 1 Centroid Thermocouples ≥75 ^{0}C	2.2%	%	
Phase 1 Centroid Thermocouples ≥85 ^{0}C	0.0%	%	
Phase 1 Centroid Thermocouples ≥100 ^{0}C	0.0%	%	
Phase 2 Centroid Thermocouples ≥75 ^{0}C (OFFLINE)	0.0%	%	
Phase 2 Centroid Thermocouples ≥85 ^{0}C (OFFLINE)	0.0%	%	
Phase 2 Centroid Thermocouples ≥100 ^{0}C (OFFLINE)	0.0%	%	

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday June 13, 2014 through Friday June 20, 2014, with temperatures updated through Sunday June 22, 2014.

Table 1 provides a summary of the project operational status as of Friday, June 20, 2014.

Table 1. Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	06/20/14	
Last Temperature Data Update	06/22/14	
Estimated Days of Operation (Total)	195	days
Days of Operation (Total)	36	days
Days of Operation vs. Estimate (Total)	19	%
Estimated Days of Operation Phase 1 (Day 1-134)	135	days
Days of Phase 1 Operation	36	days
Days of Phase 1 Operation vs. Estimate	27%	%
Estimated Days of Operation Phase 2 (Day 61-195)	135	days
Days of Phase 2 Operation	0	days
Days of Phase 2 Operation vs. Estimate	0	%
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	1,530,800	kWh
Used Electrical Energy vs. Estimate	9.7	%
Total Vapor Mass Removal (based on Oxidizer PID Readings)	836	lbs
Estimated Mass Removed as NAPL	0	lbs
Average Power Input Last 24 Hours	1,740	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	593	scfm
Average Condensate Production Rate Last 24 Hours	1.5	gpm

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Treatment of Phase 1 is proceeding as expected. The average wellfield temperature is 64C, approximately 5C ahead of our temperature model (Figure 1). Average wellfield temperatures are expected to reach 70C within the next two weeks. Thermocouples in Phase 1 are heating up relatively uniformly with the exception of TMP-20. Because of its location along the Phase 1/Phase 2 line, the heaters located directly east of this sensor were energized. A figure of energized heaters has been posted to ThinkThermal for your reference.

Mass removed to date is approximately 800 lbs (based on PID).

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1 displays the average target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling. As of June 15, 2014, Figure 1 shows that the actual temperature is ahead of the predicted temperature by approximately 5 degrees Celsius.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	6/22/14	
Phase 1 Entire TTZ Average Temperature	64	°C
Phase 2 Entire TTZ Average Temperature (OFFLINE)	21	°C
Phase 1 Centroid Average Temperature	62	°C
Phase 2 Centroid Average Temperature (OFFLINE)	20	°C

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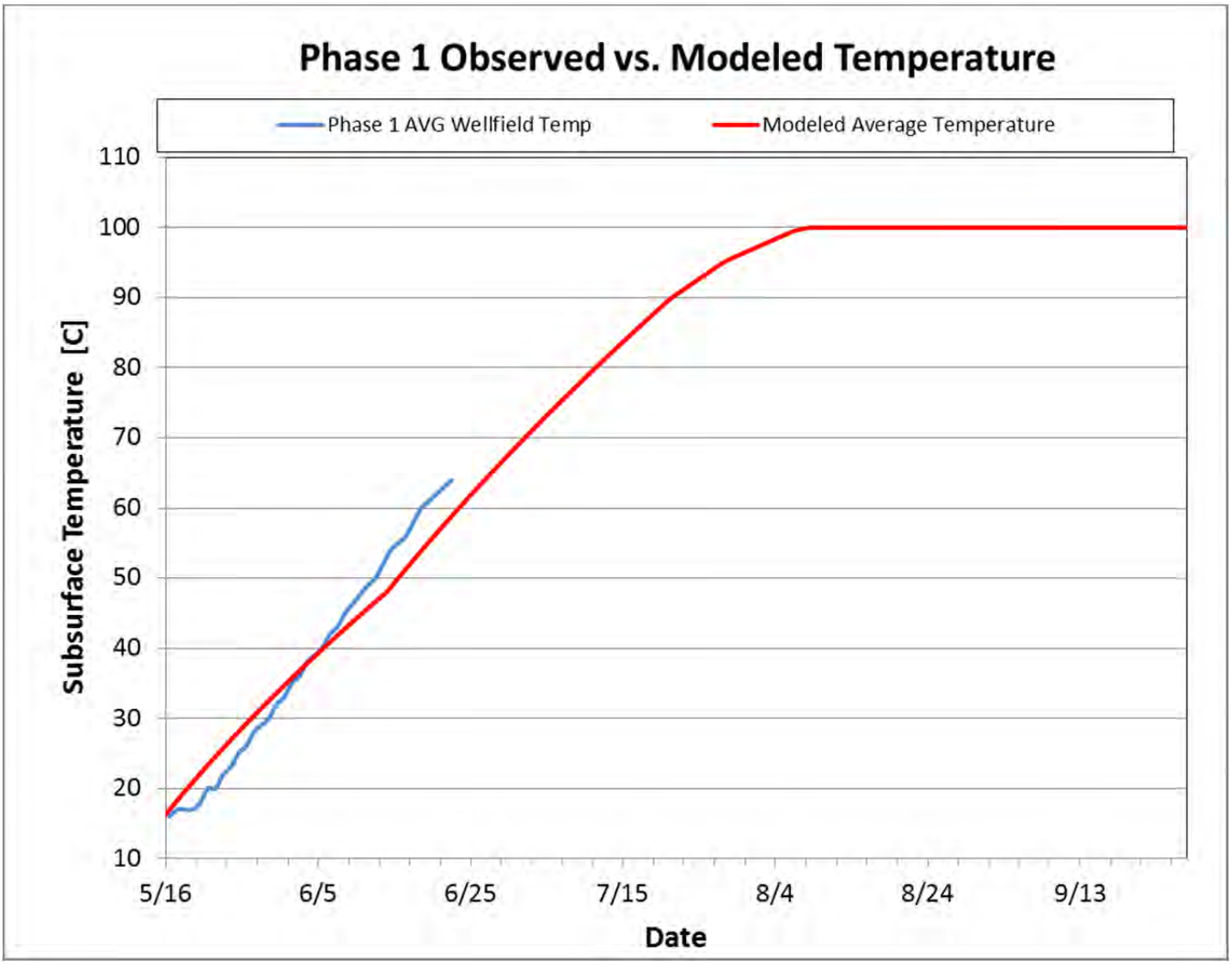


Figure 1. Phase 1 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield.

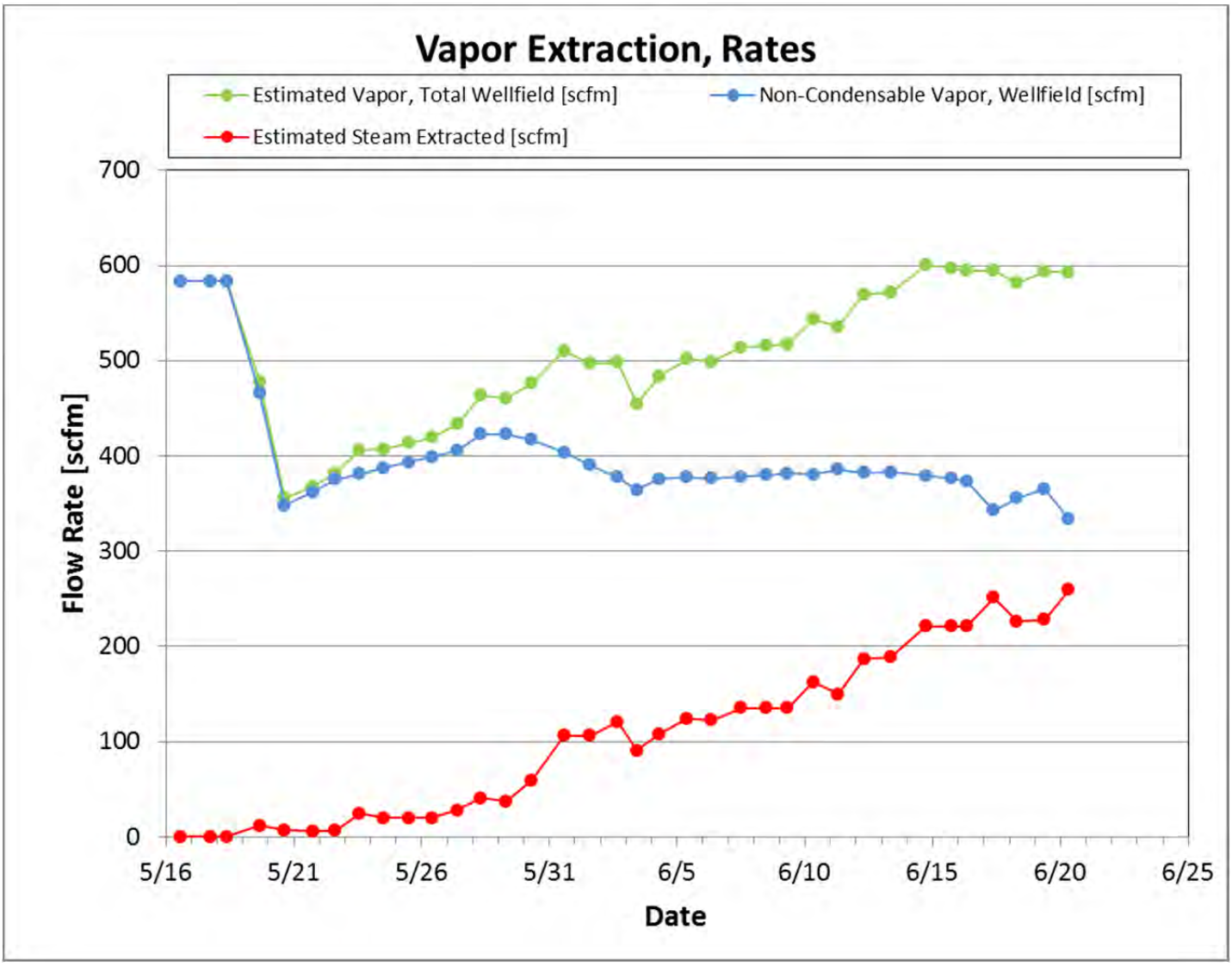


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) (also known as the lower explosive limit (LEL)) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent one manual daily reading from the analyzer. This value is collected after dilution air is introduced into the system.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf. Currently, the vapors entering the oxidizer are low flammability (< approximately 1% LFL) and do not approach the contract limit.

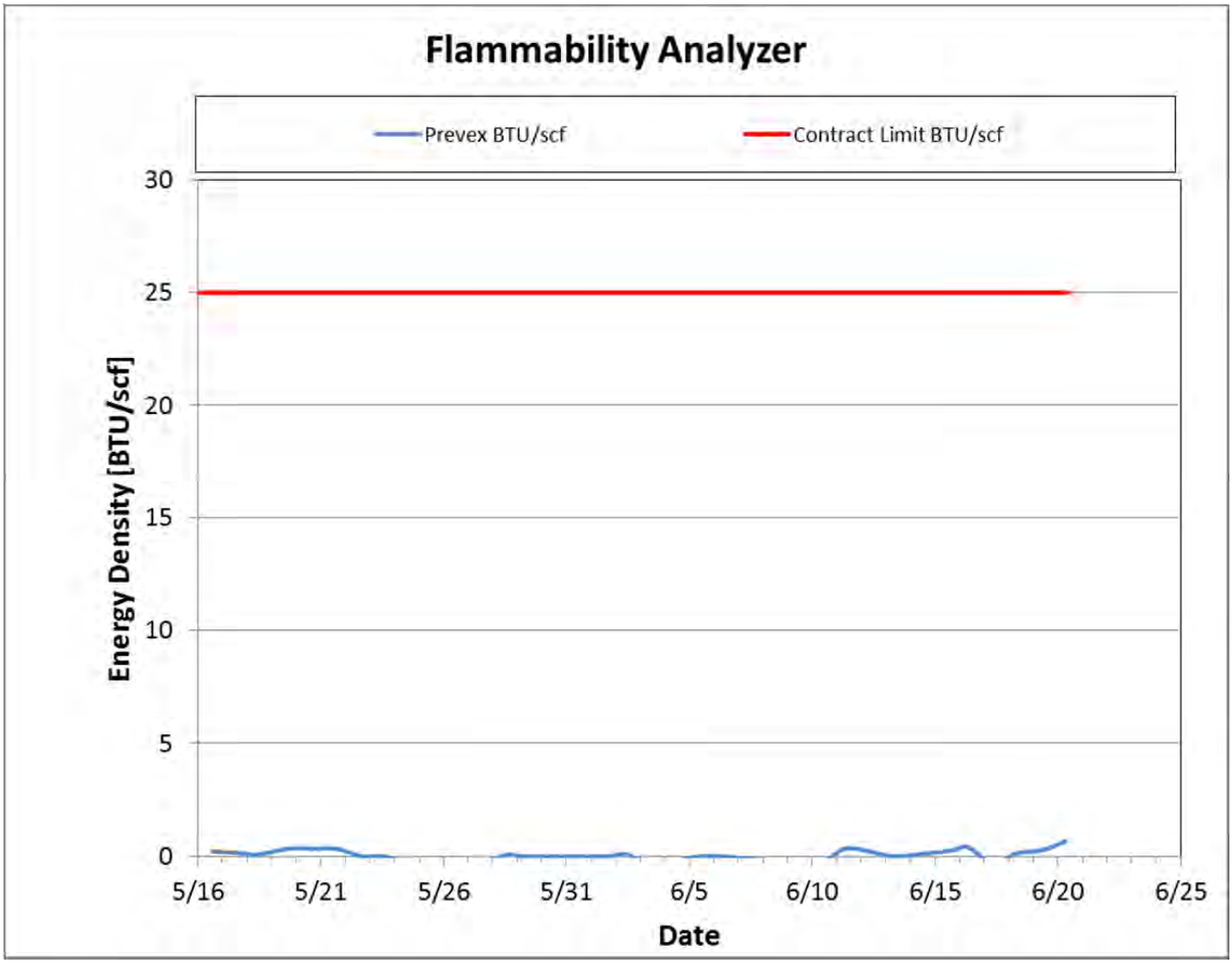


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removal based on daily photoionization detector (PID) readings and laboratory data are shown below in Figure 4. Figure 4 graphs the mass removed from Phase 1. Additional figures, including a total mass removed will be added once Phase 2 is online.

The below graph is prepared using laboratory data results from 5/16/14, 5/20/14, 5/27/14, and 6/4/14.

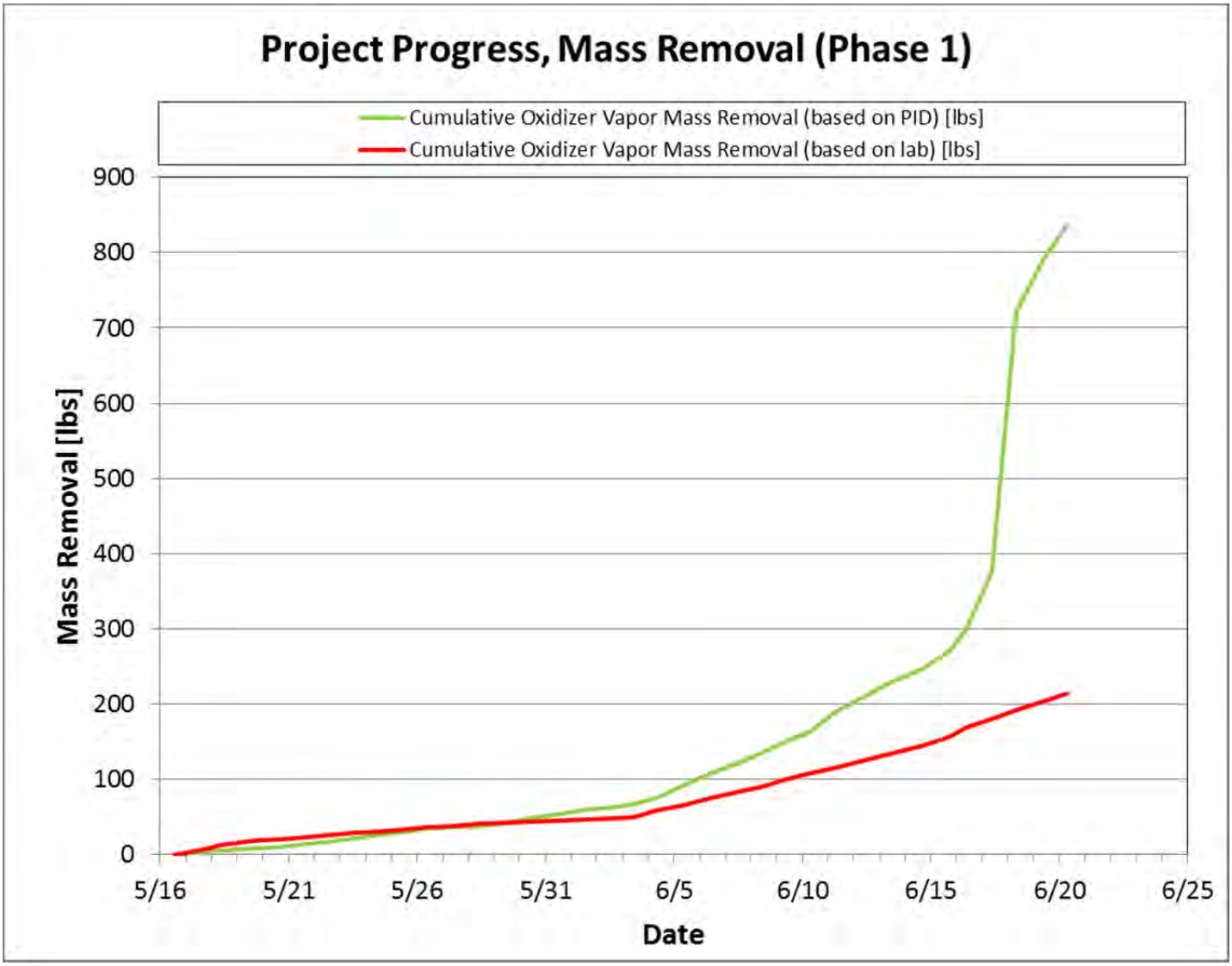


Figure 4. Project Progress, Mass Removal (Phase 1)

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Figure 5 below displays the daily PID readings collected at the oxidizer influent over time.

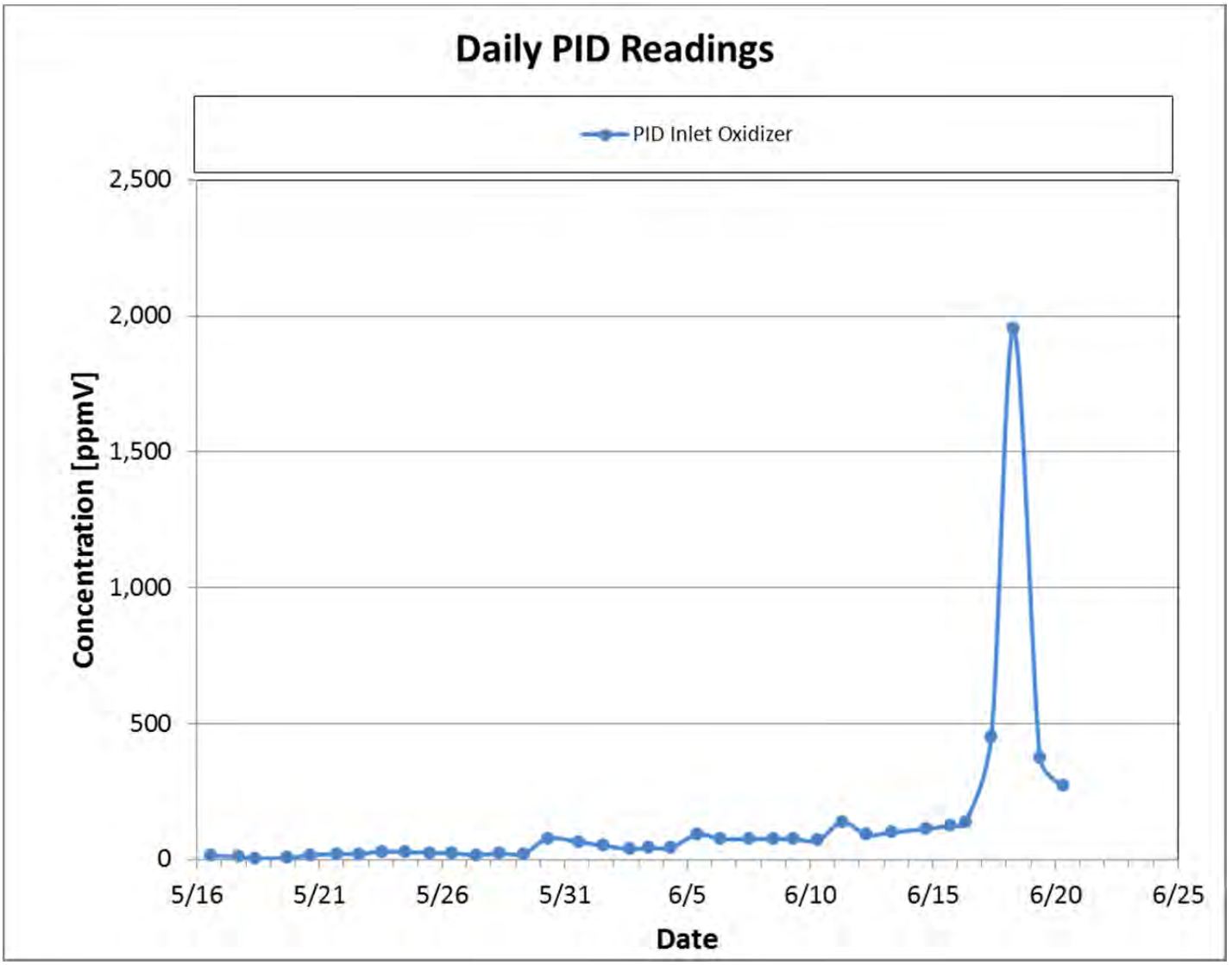


Figure 5. Daily PID Readings

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations will become closer to 100%.

To date, there is one laboratory influent/effluent pair sampling result plotted on the graph. Others will be added as they become available. Influent and effluent paired samples are collected during heatup, then weekly thereafter.

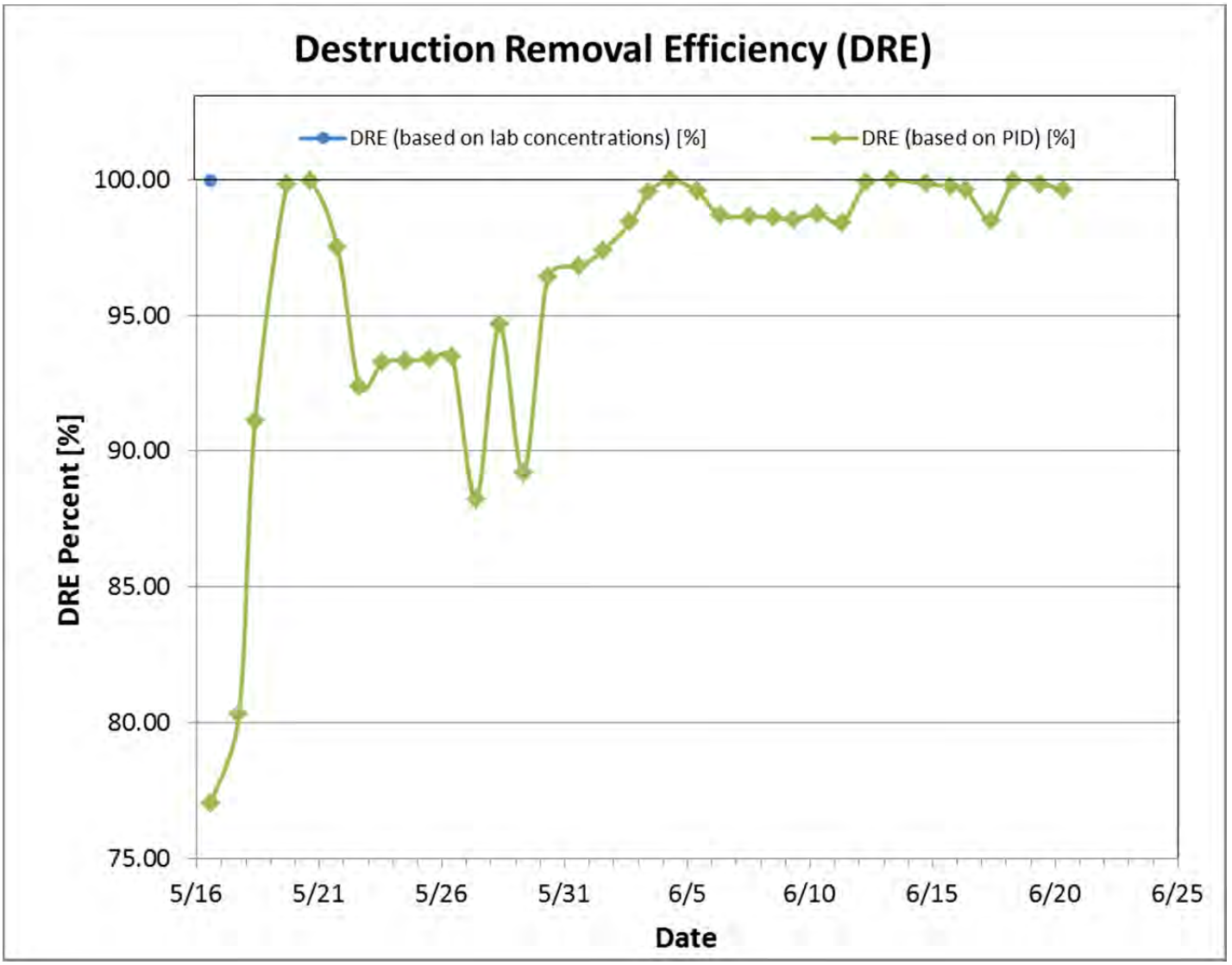


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7.

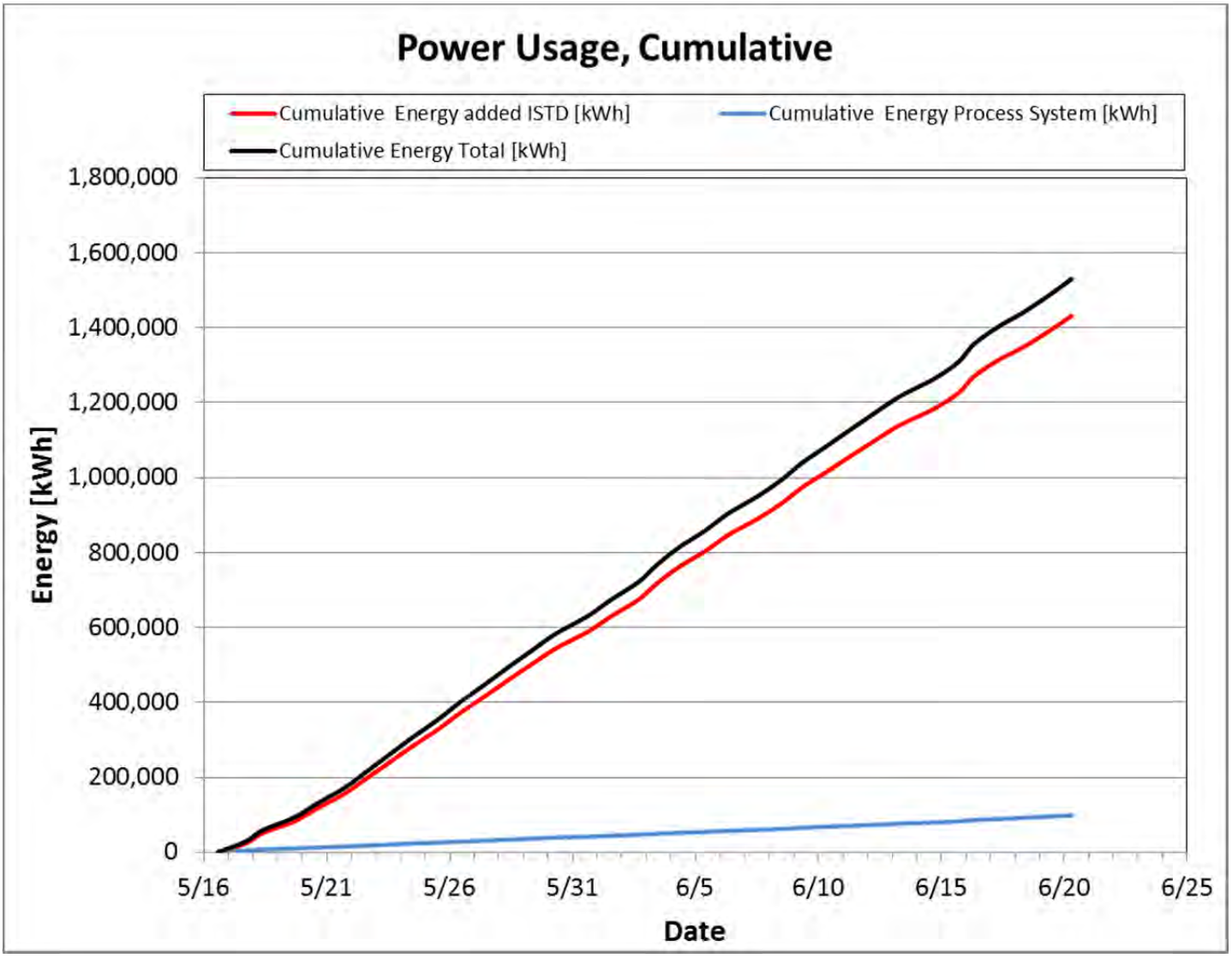


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8. Note that the reduced power input rates on 6/18/14 reflect the site power outage due to a nearby car accident with a utility pole (per CL&P).

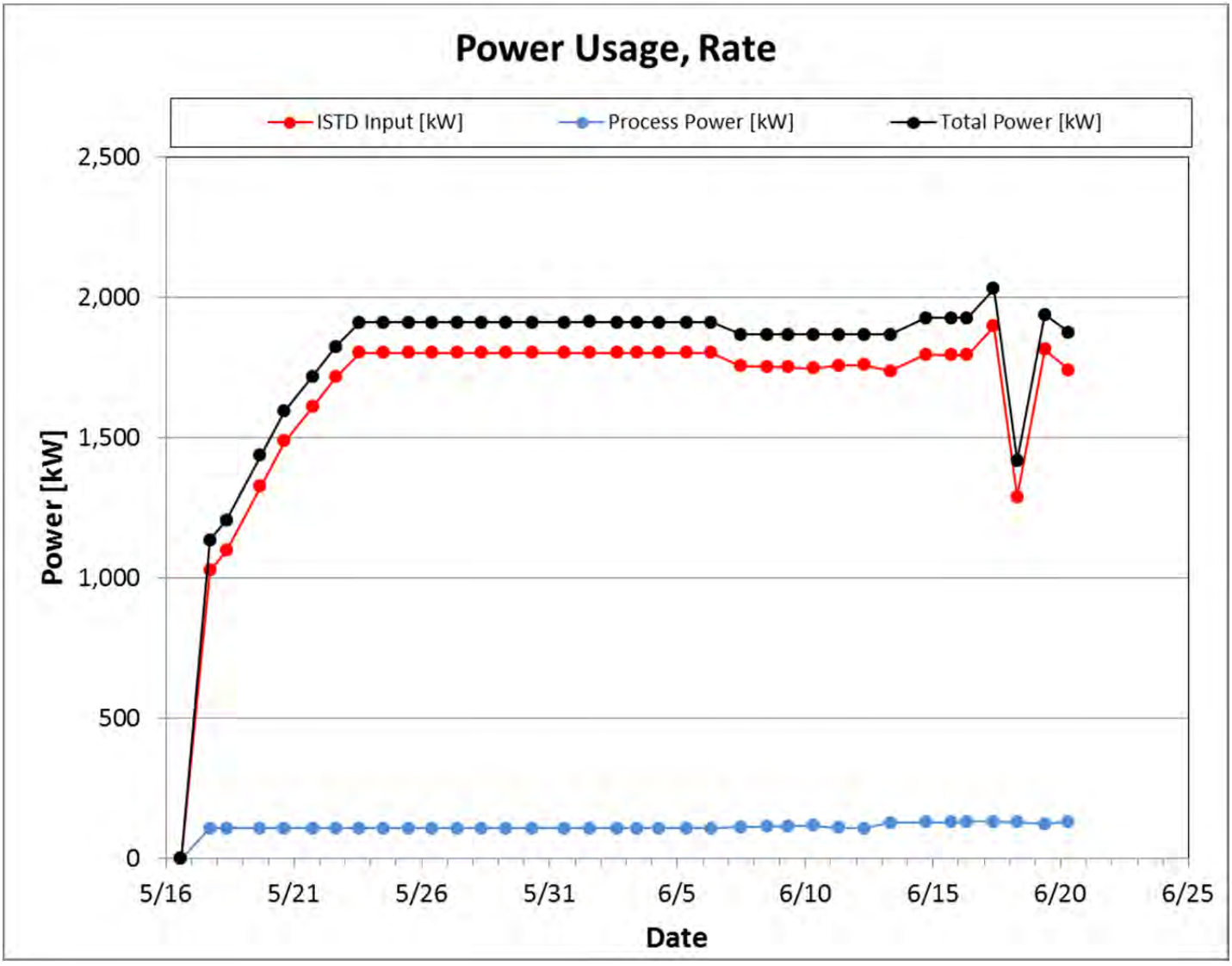


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

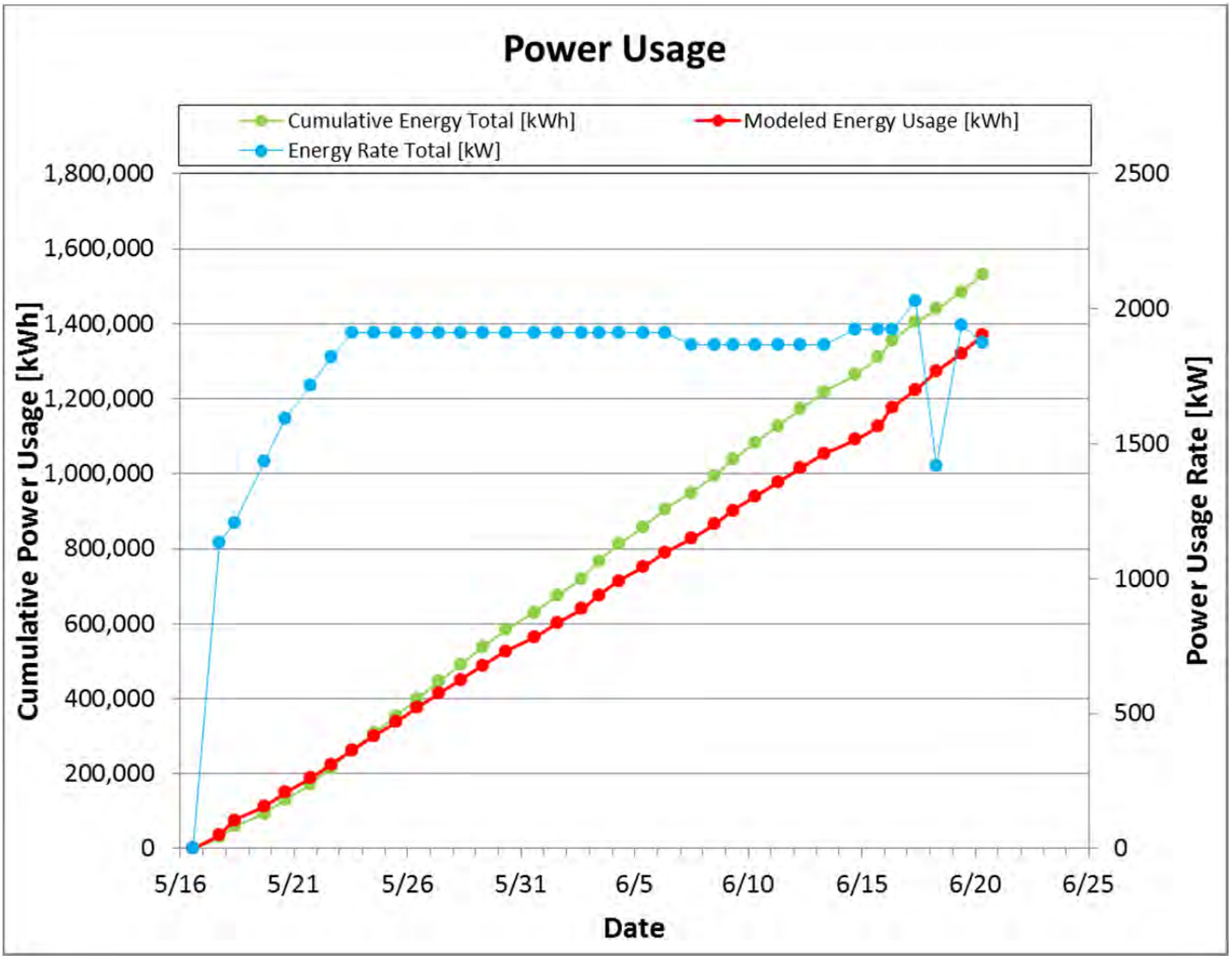


Figure 9. Power Usage

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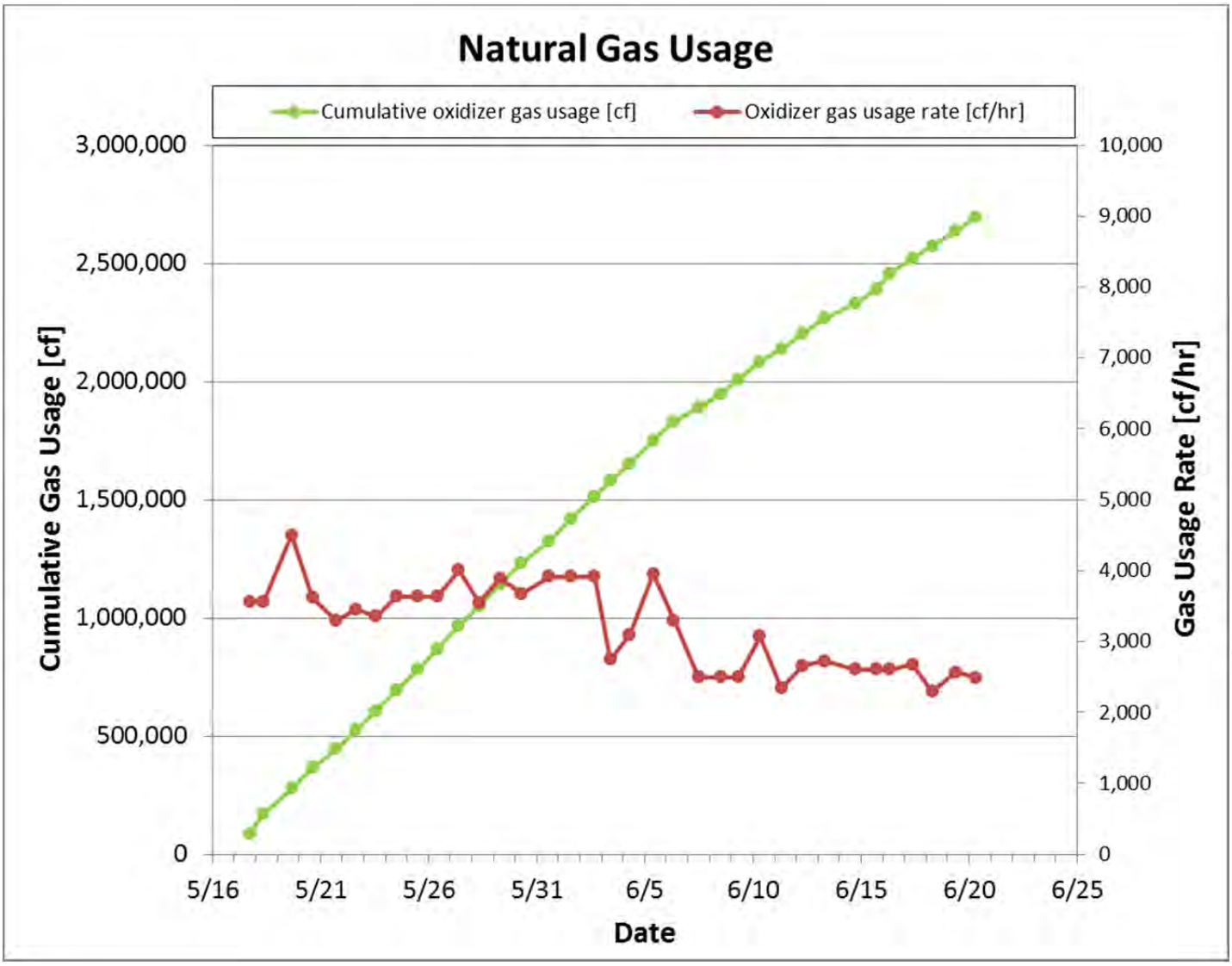


Figure 10. Natural Gas Usage

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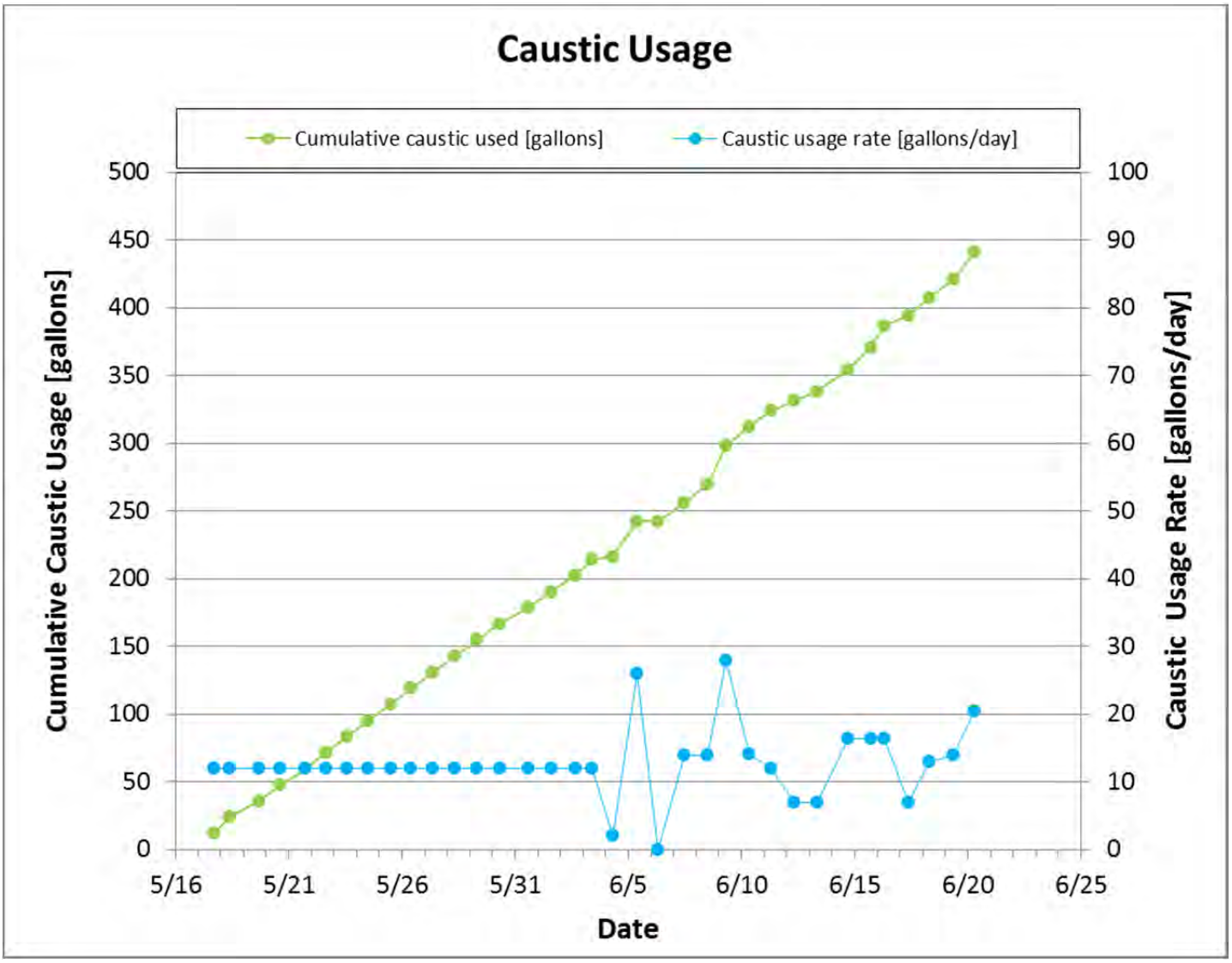


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12. A table with percentages is also shown (Table 3) as it is often necessary to decrease energy to specific thermocouples after achieving 100°C. Variations, or decreases in temperature, are often observed; however there is significant energy that remains in the subsurface to continue to treat contaminants.

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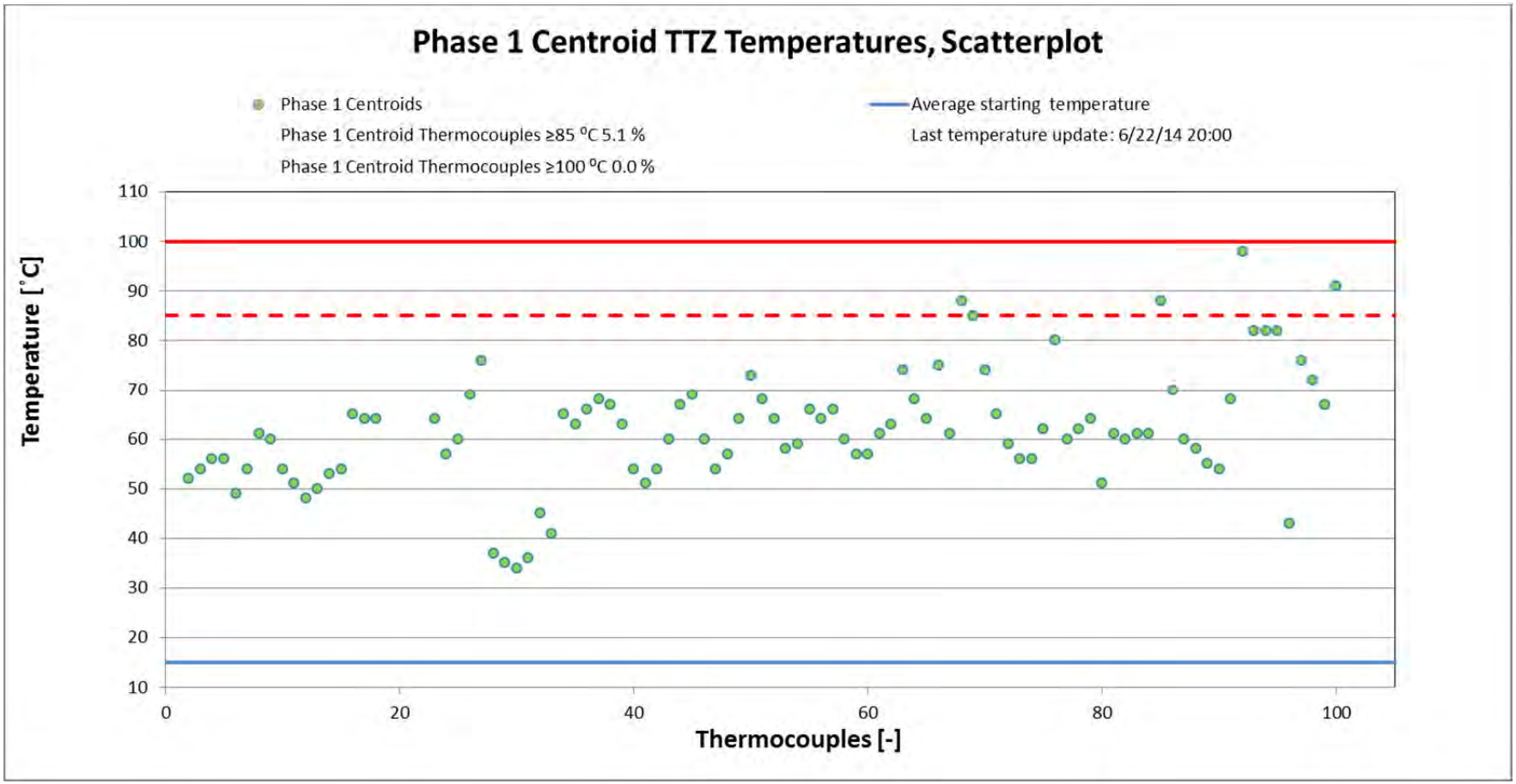


Figure 12. Phase 1 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples at Target Temperatures

Temperature Scatterplots

	Value	Unit
Date of Last Update	6/22/14	
Phase 1 Centroid Thermocouples ≥85 ^{0}C	5.1	%
Phase 1 Centroid Thermocouples ≥100 ^{0}C	0.0	%
Phase 2 Centroid Thermocouples ≥85 ^{0}C (OFFLINE)	0.0	%
Phase 2 Centroid Thermocouples ≥100 ^{0}C (OFFLINE)	0.0	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday June 20, 2014 through Friday June 27, 2014, with temperatures updated through Monday June 30, 2014.

Table 1 provides a summary of the project operational status as of Friday, June 27, 2014.

Table 1. Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	06/27/14	
Last Temperature Data Update	06/29/14	
Estimated Days of Operation (Total)	195	days
Days of Operation (Total)	43	days
Days of Operation vs. Estimate (Total)	22	%
Estimated Days of Operation Phase 1 (Day 1-134)	135	days
Days of Phase 1 Operation	43	days
Days of Phase 1 Operation vs. Estimate	32	%
Estimated Days of Operation Phase 2 (Day 61-195)	135	days
Days of Phase 2 Operation	0	days
Days of Phase 2 Operation vs. Estimate	0	%
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	1,875,300	kWh
Used Electrical Energy vs. Estimate	11.9	%
Total Vapor Mass Removal (based on Oxidizer PID Readings)	1,736	lbs
Estimated Mass Removed as NAPL	0	lbs
Average Power Input Last 24 Hours	2,020	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,449	scfm
Average Condensate Production Rate Last 24 Hours	2.5	gpm

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Treatment of Phase 1 is progressing as expected. The average wellfield temperature is 72C, approximately 4C ahead of our temperature model (Figure 1). Thermocouples in Phase 1 are heating up relatively uniformly with the exception of the TMP-20 string and a few shallow depth sensors (74, 75 and 67) which appear to be losing temperature with time. At this time, we have no explanation for this behavior. Although unlikely, it could be an isolated increase in the water table. We will continue to evaluate these thermocouples for additional trends/insights over the next couple days.

Mass removed to date is approximately 1,400 lbs (based on PID).

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1 displays the average target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling. As of June 29, 2014, Figure 1 shows that the actual temperature is ahead of the predicted temperature by approximately 4 degrees Celsius.

Table 2. Temperature Summary

Temperatures TTZ		
Type	**Value**	**Unit**
Date of Last Update	6/29/14	
Phase 1 Entire TTZ Average Temperature	72	°C
Phase 2 Entire TTZ Average Temperature (OFFLINE)	23	°C
Phase 1 Centroid Average Temperature	71	°C
Phase 2 Centroid Average Temperature (OFFLINE)	21	°C

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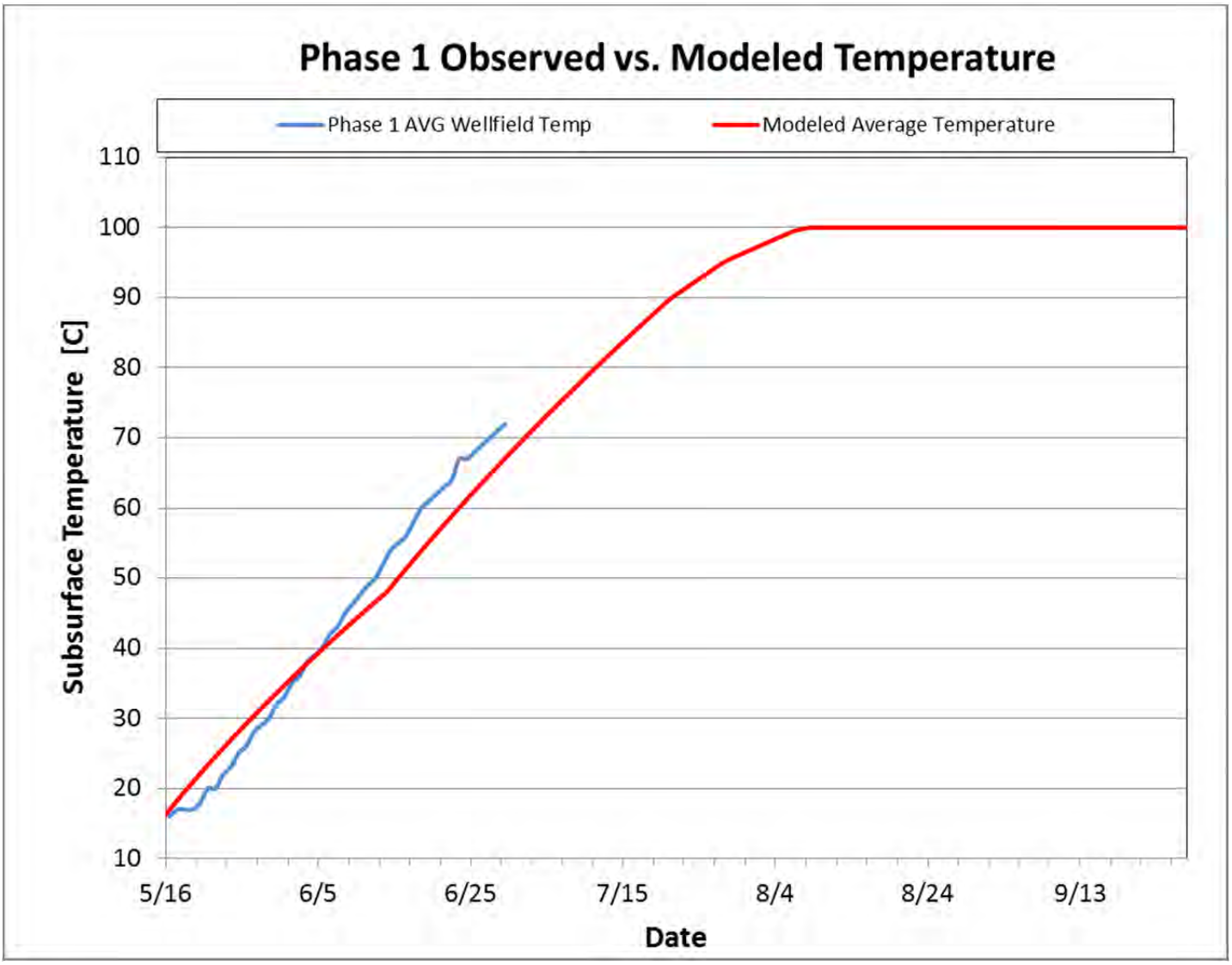


Figure 1. Phase 1 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Please note that the non-condensable flow, and subsequently the total flow, has increased from previous reports as we neglected to include the flow from the air stripper, approximately 600 cfm.

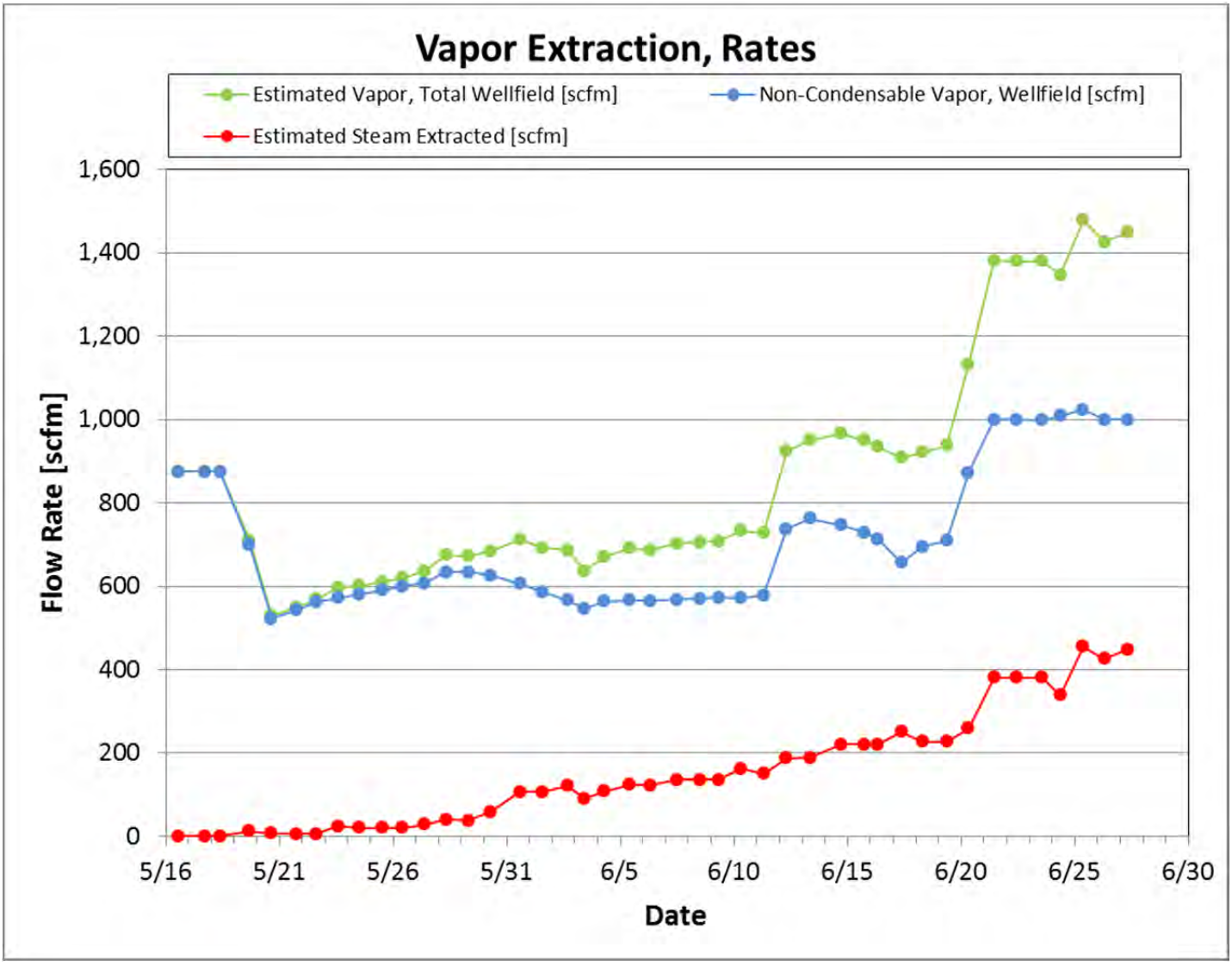


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) (also known as the lower explosive limit (LEL)) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent one manual daily reading from the analyzer. This value is collected after dilution air is introduced into the system.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf. Currently, the vapors entering the oxidizer are low flammability (<5% LFL) and do not approach the contract limit, although an increase in flammability can be seen after the dilution air valve was closed on June 20, 2014.

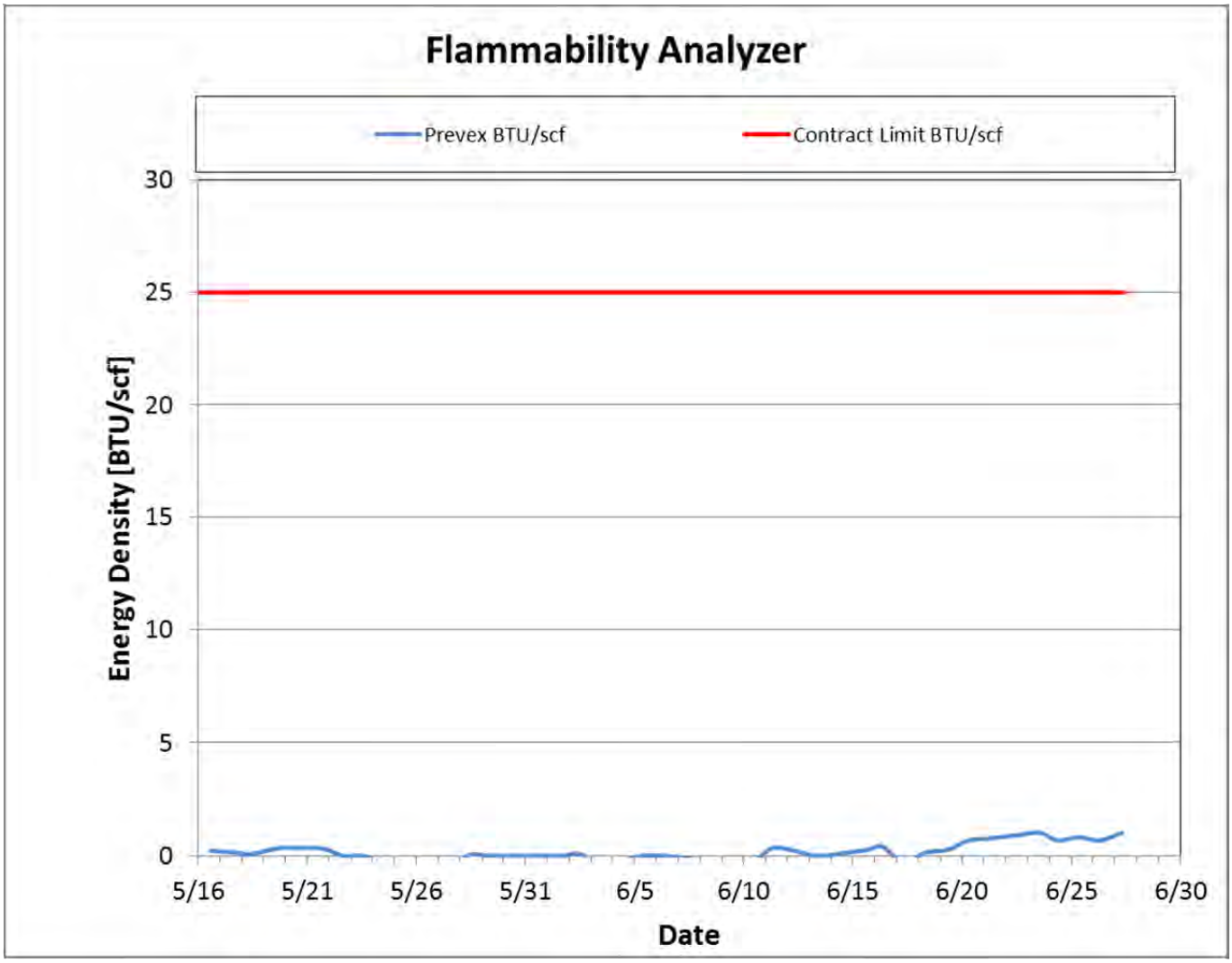


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removal based on daily photoionization detector (PID) readings and laboratory data are shown below in Figure 4. Figure 4 graphs the mass removed from Phase 1. Additional figures, including a total mass removed will be added once Phase 2 is online.

The below graph is prepared using laboratory data results from 5/16/14, 5/20/14, 5/27/14, 6/4/14, and 6/11/14. Please note that the total mass removed has increased from the previous weekly progress report, due to the increased flow rate described in Section 3.

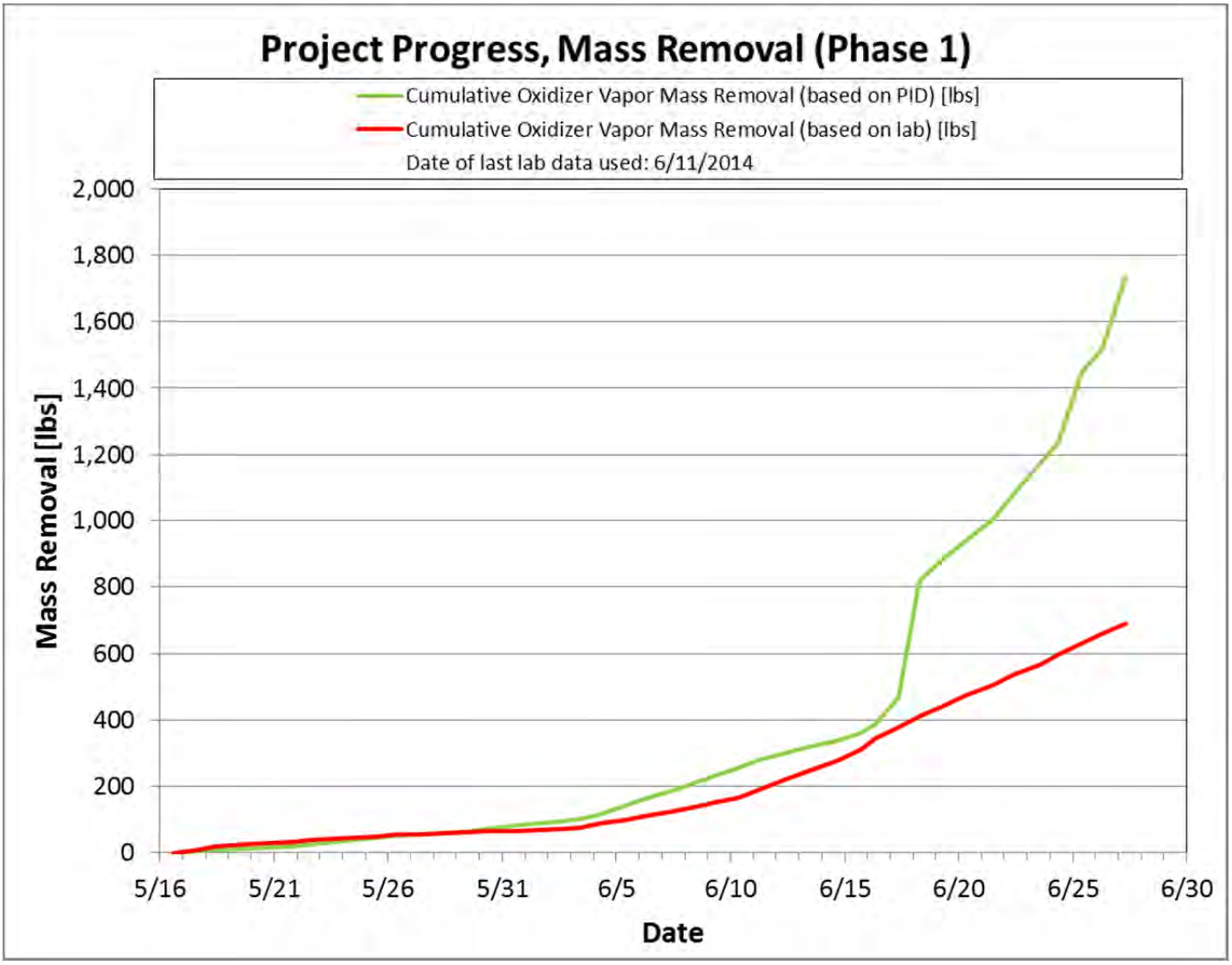


Figure 4. Project Progress, Mass Removal (Phase 1)

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Figure 5 below displays the daily PID readings collected at the oxidizer influent over time.

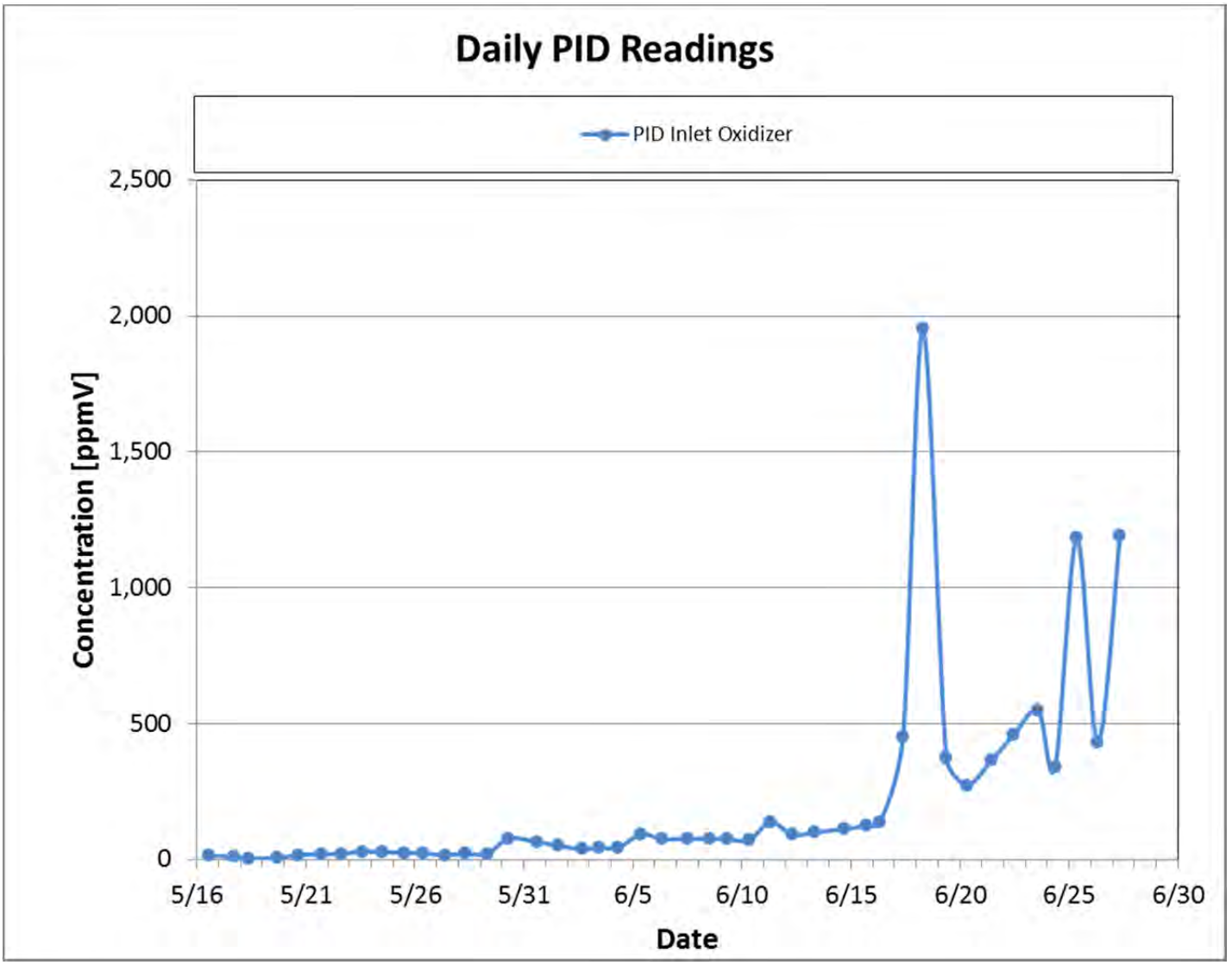


Figure 5. Daily PID Readings

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations become closer to 100%.

To date, there is one laboratory influent/effluent pair sampling result plotted on the graph. Others will be added as they become available. Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

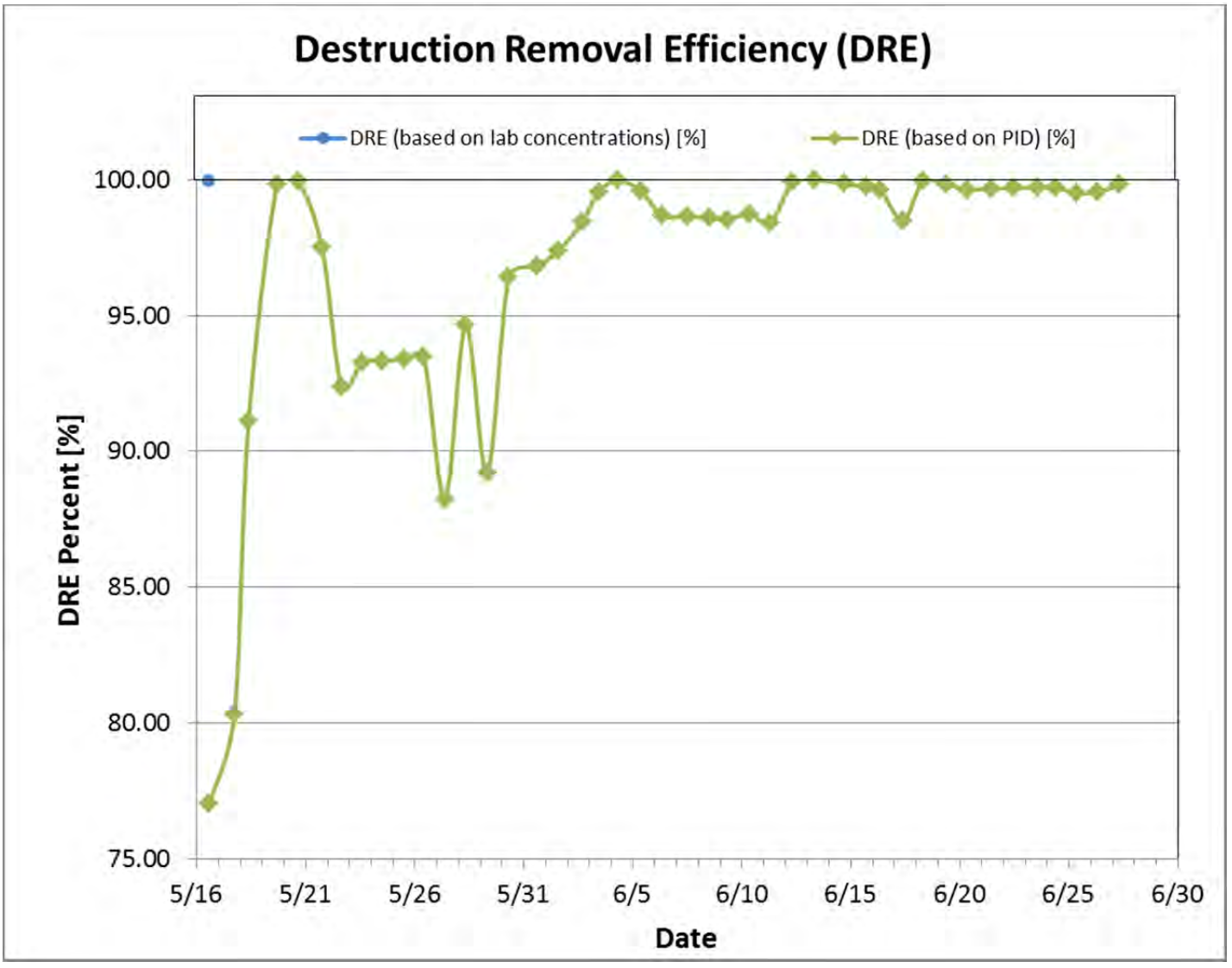


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7.

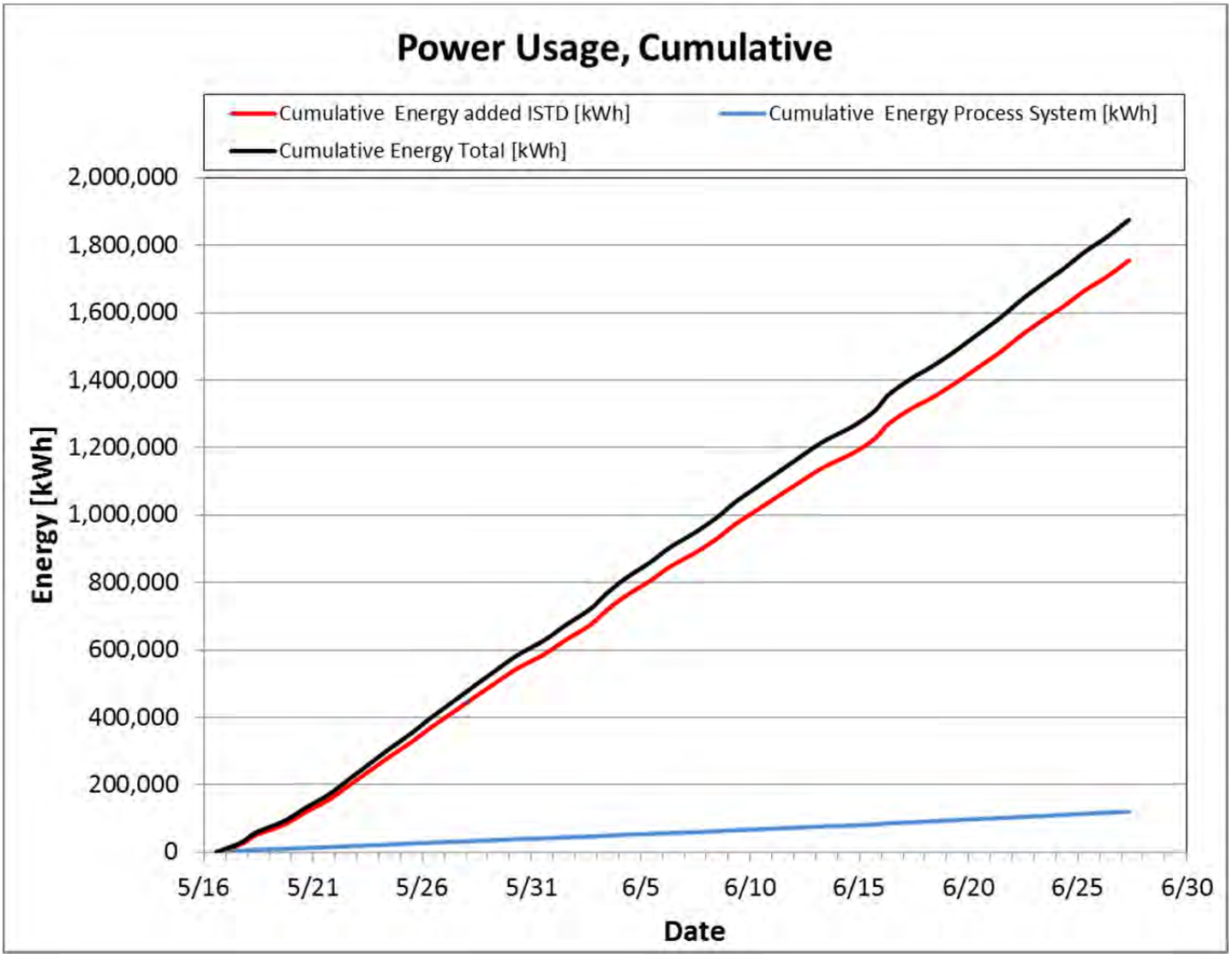


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflect the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24 is a result of maintenance being done to the treatment system (i.e., a controlled shutdown). On 6/25, as we enter into the next phase of heating, several SCRs were increased by approximately 10% and adjusted over the next couple days.

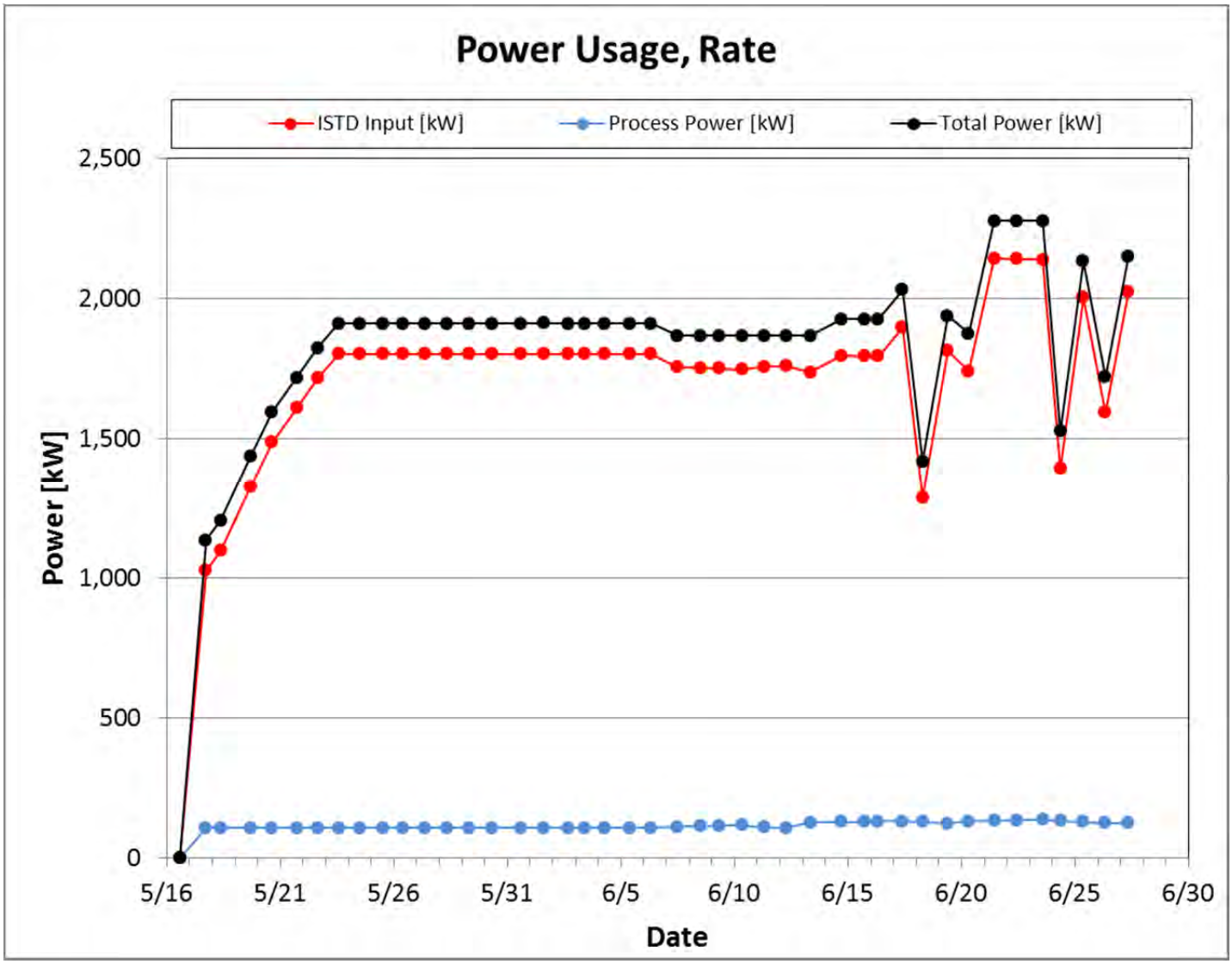


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

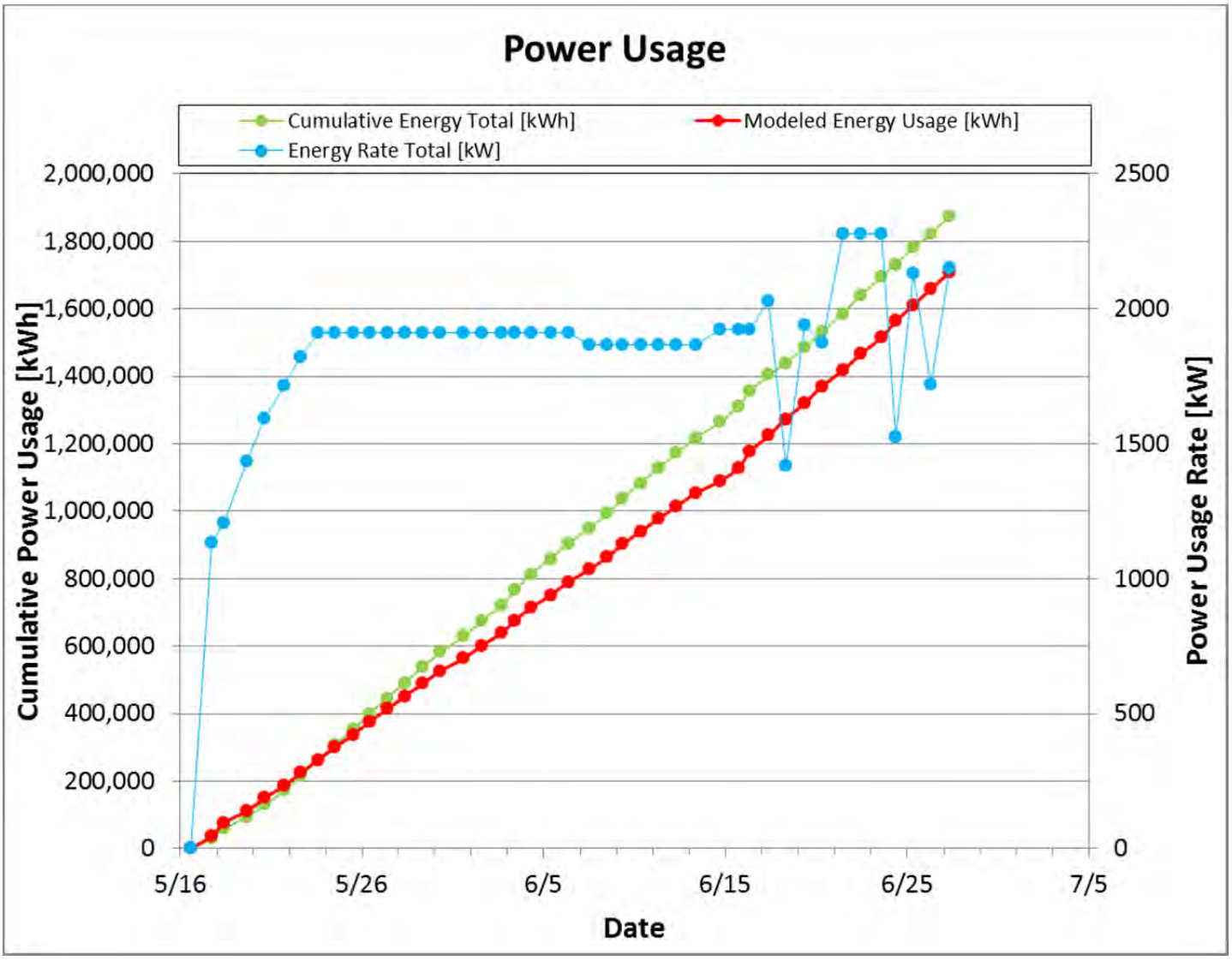


Figure 9. Power Usage

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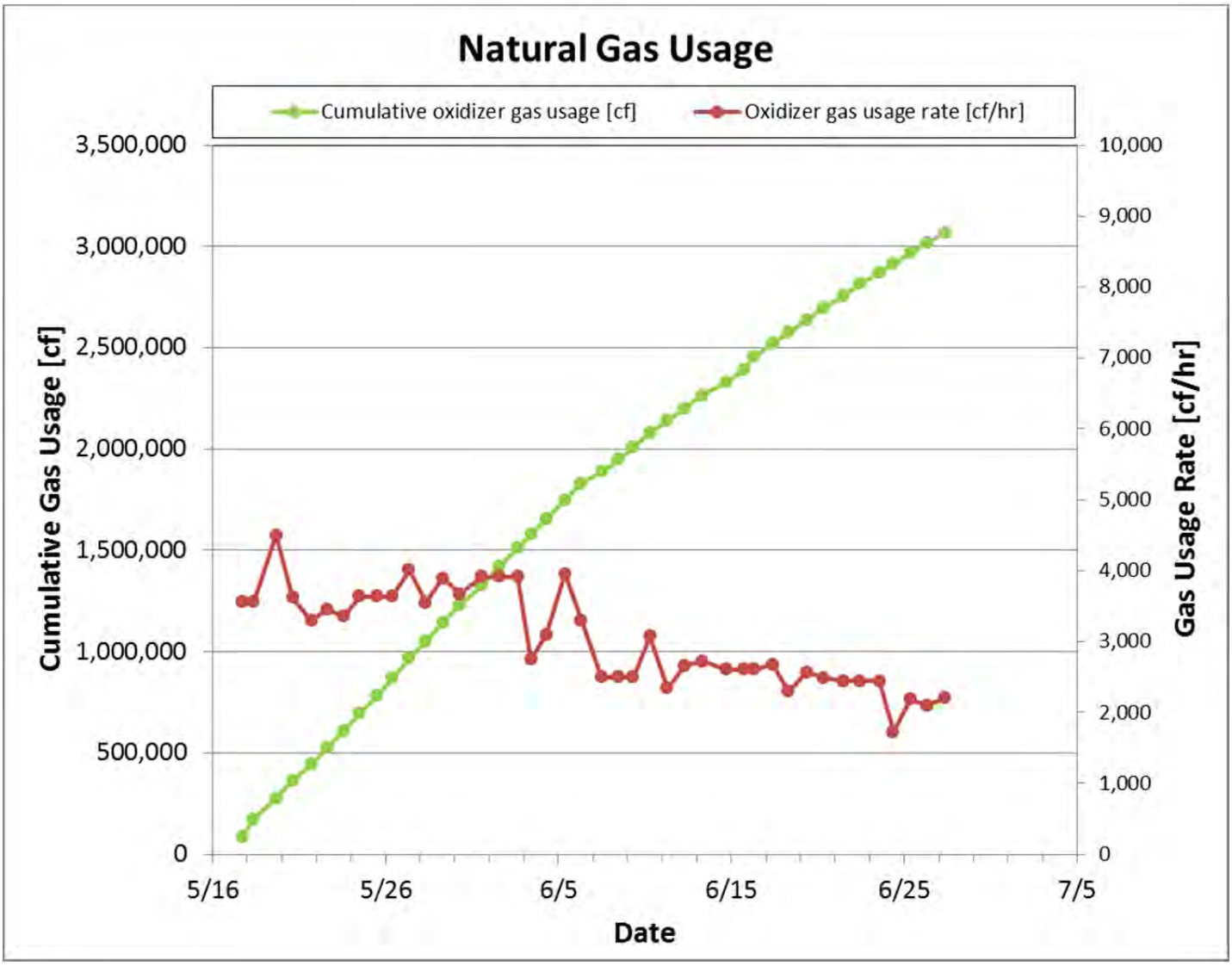


Figure 10. Natural Gas Usage

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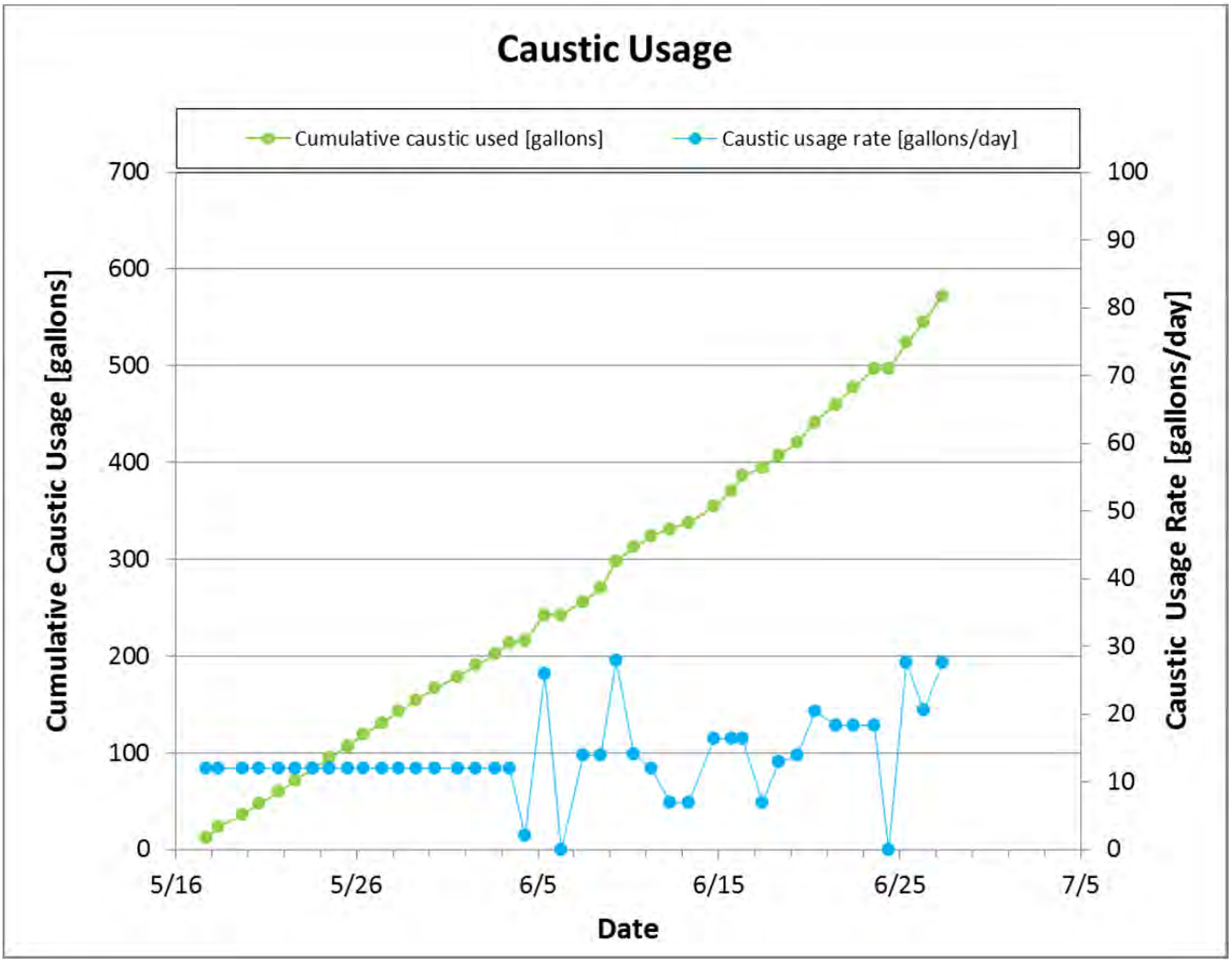


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12. A table with percentages is also shown (Table 3) as it is often necessary to decrease energy to specific thermocouples after achieving 100°C. Variations, or decreases in temperature, are often observed; however there is significant energy that remains in the subsurface to continue to treat contaminants.

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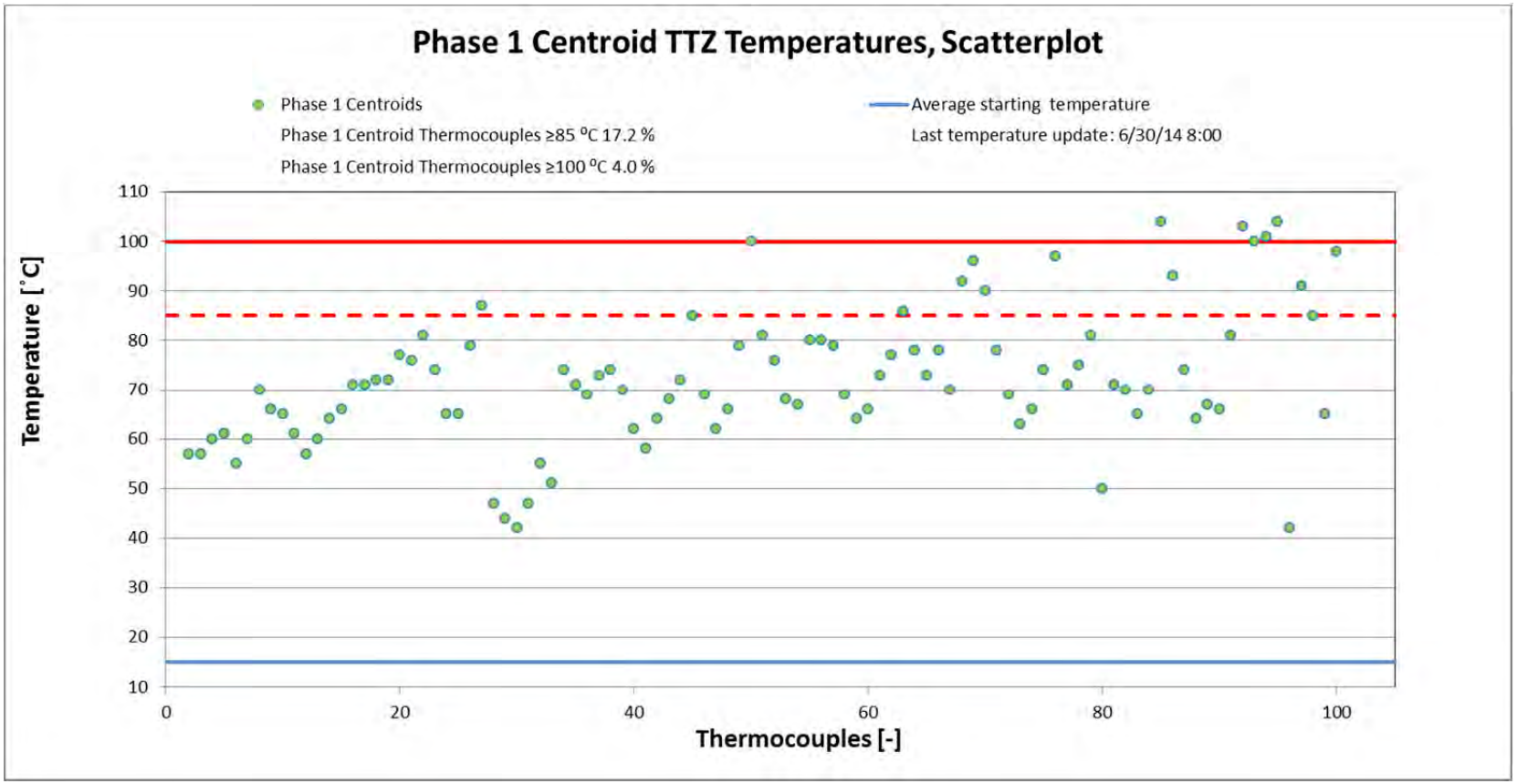


Figure 12. Phase 1 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples at Target Temperatures

Temperature Scatterplots		
	Value	Unit
Date of Last Update	6/30/14	
Phase 1 Centroid Thermocouples ≥85 ^{0}C	17.2	%
Phase 1 Centroid Thermocouples ≥100 ^{0}C	4.0	%
Phase 2 Centroid Thermocouples ≥85 ^{0}C (OFFLINE)	0.0	%
Phase 2 Centroid Thermocouples ≥100 ^{0}C (OFFLINE)	0.0	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday June 27, 2014 through Friday July 4, 2014, with temperatures updated through Monday July 7, 2014.

Table 1 provides a summary of the project operational status as of Friday, July 4, 2014.

Table 1. Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	07/04/14	
Last Temperature Data Update	07/06/14	
Estimated Days of Operation (Total)	195	days
Days of Operation (Total)	50	days
Days of Operation vs. Estimate (Total)	26	%
Estimated Days of Operation Phase 1 (Day 1-134)	135	days
Days of Phase 1 Operation	50	days
Days of Phase 1 Operation vs. Estimate	37	%
Estimated Days of Operation Phase 2 (Day 61-195)	135	days
Days of Phase 2 Operation	0	days
Days of Phase 2 Operation vs. Estimate	0	%
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	2,230,700	kWh
Used Electrical Energy vs. Estimate	14.1	%
Total Vapor Mass Removal (based on Oxidizer PID Readings)	1,392	lbs
Estimated Mass Removed as NAPL	0	lbs
Average Power Input Last 24 Hours	2,040	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,773	scfm
Average Condensate Production Rate Last 24 Hours	3.2	gpm

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Treatment of Phase 1 is progressing as expected. The average wellfield temperature is 79C, approximately 2C ahead of our temperature model (Figure 1). Thermocouples in Phase 1 are heating up relatively uniformly (as seen on Figure 12). The TMP-20 strand has increased in temperature over the past week between 10-20C. Modifications to (depth installed) and around (insulated cover) TMP-74, -75, and -67 were made late last week and today. We expect to see temperature increases in those strings within the week.

Mass removed to date is approximately 1,400 lbs (based on PID).

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1 displays the average target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling. As of July 6, 2014, Figure 1 shows that the actual temperature is ahead of the predicted temperature by approximately 2 degrees Celsius.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	7/6/14	
Phase 1 Entire TTZ Average Temperature	79	°C
Phase 2 Entire TTZ Average Temperature (OFFLINE)	24	°C
Phase 1 Centroid Average Temperature	77	°C
Phase 2 Centroid Average Temperature (OFFLINE)	22	°C

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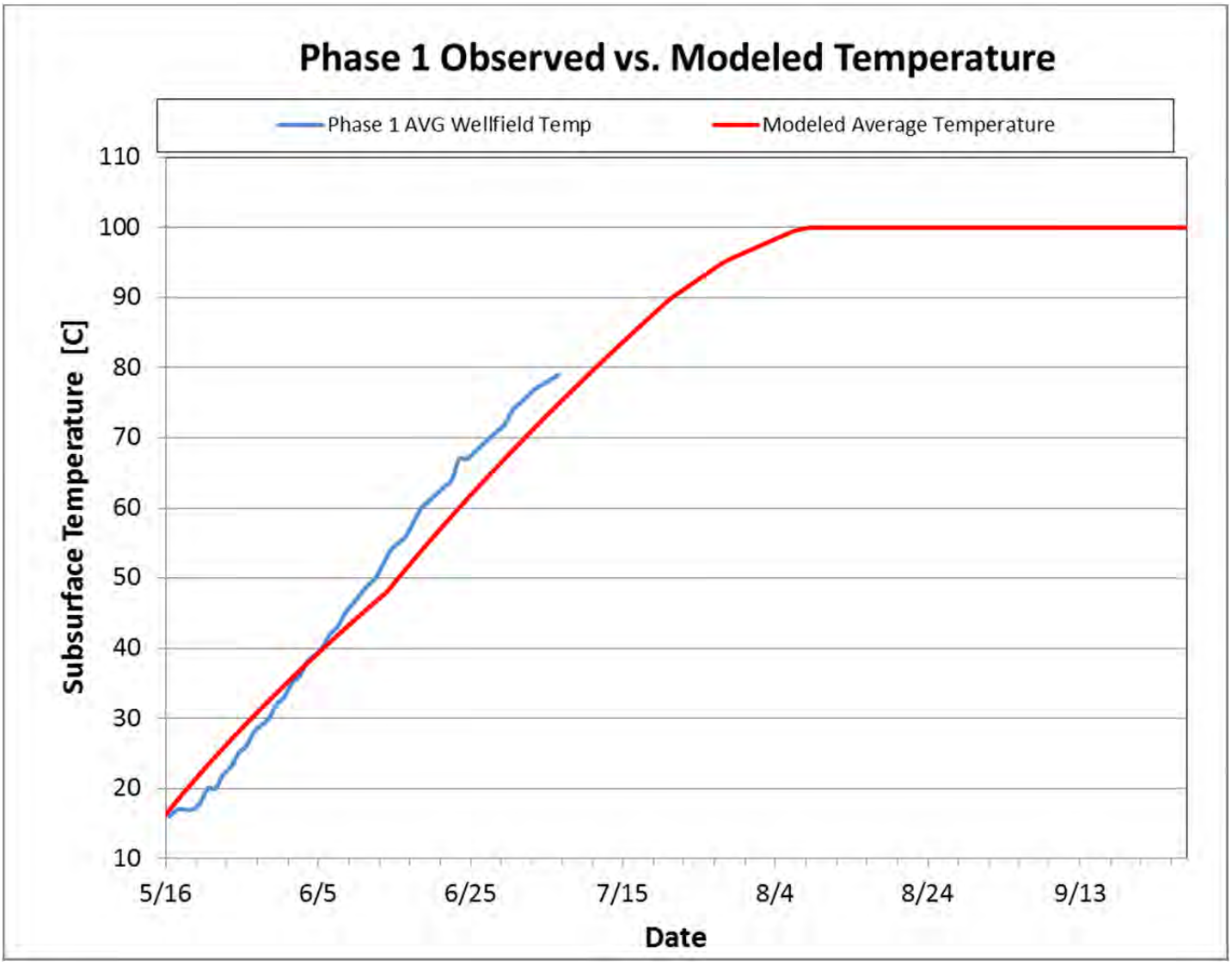


Figure 1. Phase 1 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield.

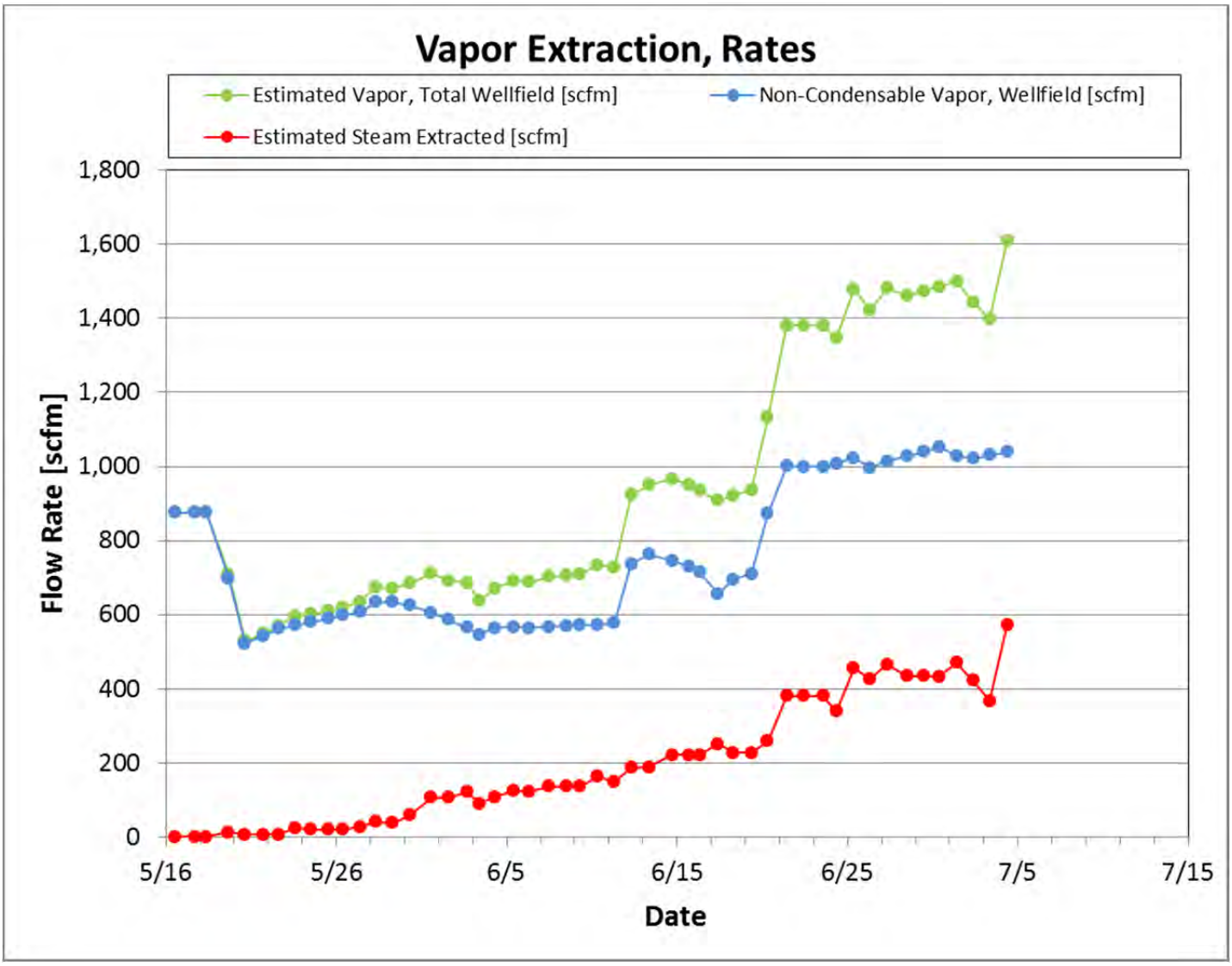


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) (also known as the lower explosive limit (LEL)) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent one manual daily reading from the analyzer. This value is collected after dilution air is introduced into the system.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf. Currently, the vapors entering the oxidizer are low flammability (<5% LFL) and do not approach the contract limit, although an increase in flammability can be seen after the dilution air valve was closed on June 20, 2014.

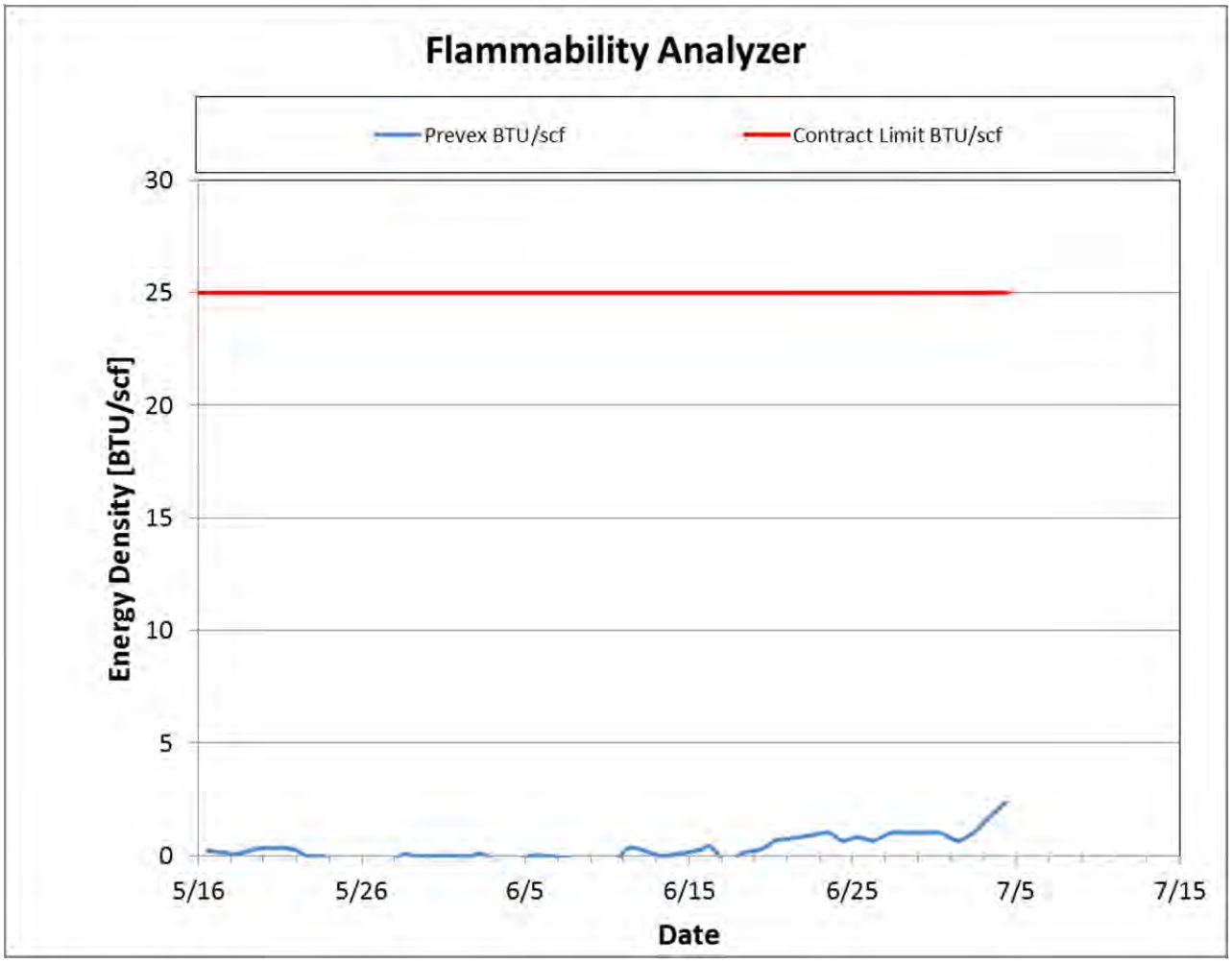


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removal based on daily photoionization detector (PID) readings and laboratory data are shown below in Figure 4. Figure 4 graphs the mass removed from Phase 1. Additional figures, including a total mass removed will be added once Phase 2 is online.

The below graph is prepared using laboratory data results from 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, and 6/17/14.

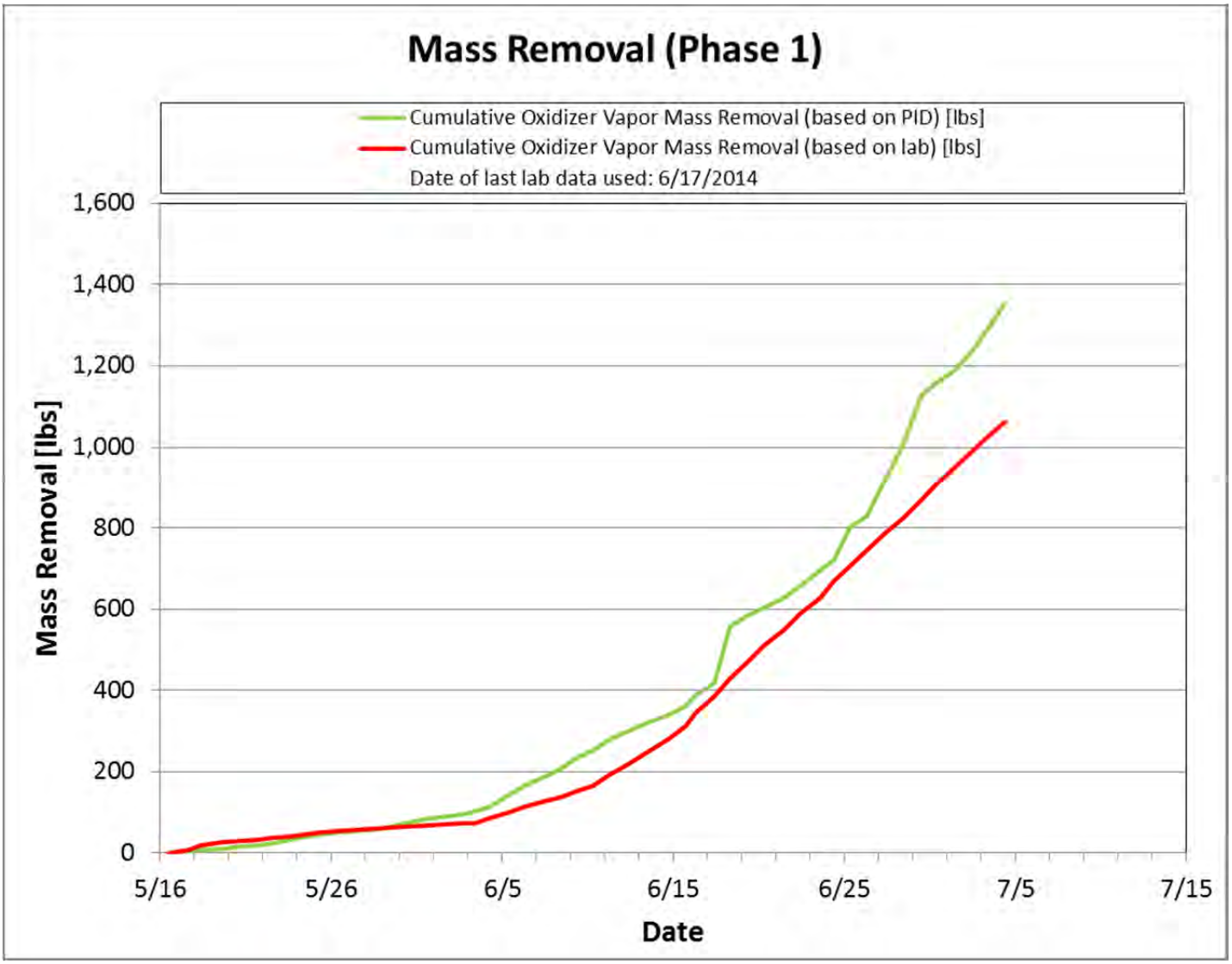


Figure 4. Project Progress, Mass Removal (Phase 1)

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Figure 5 below displays the daily PID readings collected at the oxidizer influent over time.

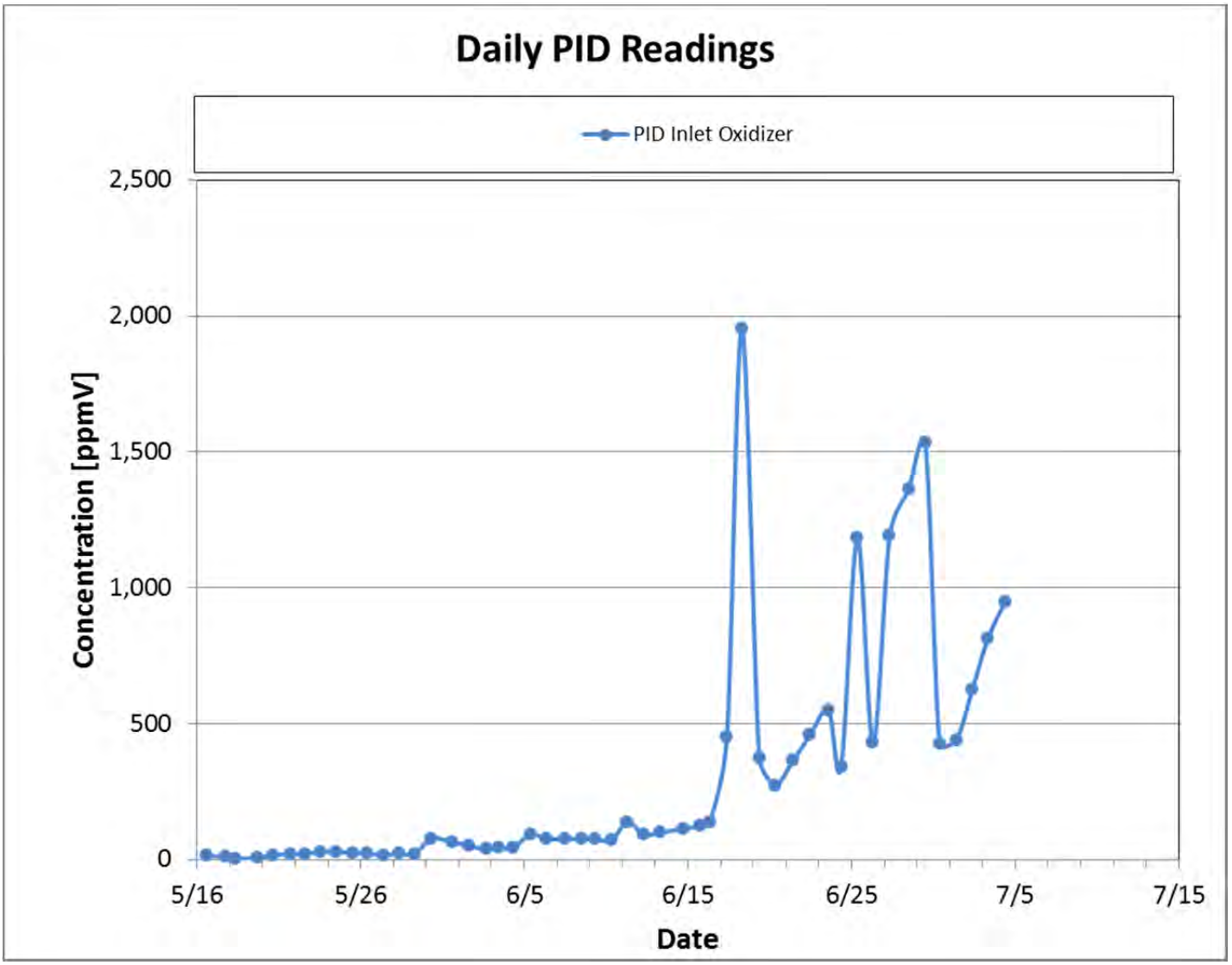


Figure 5. Daily PID Readings

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations will become closer to 100%.

A second laboratory influent/effluent data set has been added to the graph, confirming >99.5% removal efficiency in the vapor treatment system. Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

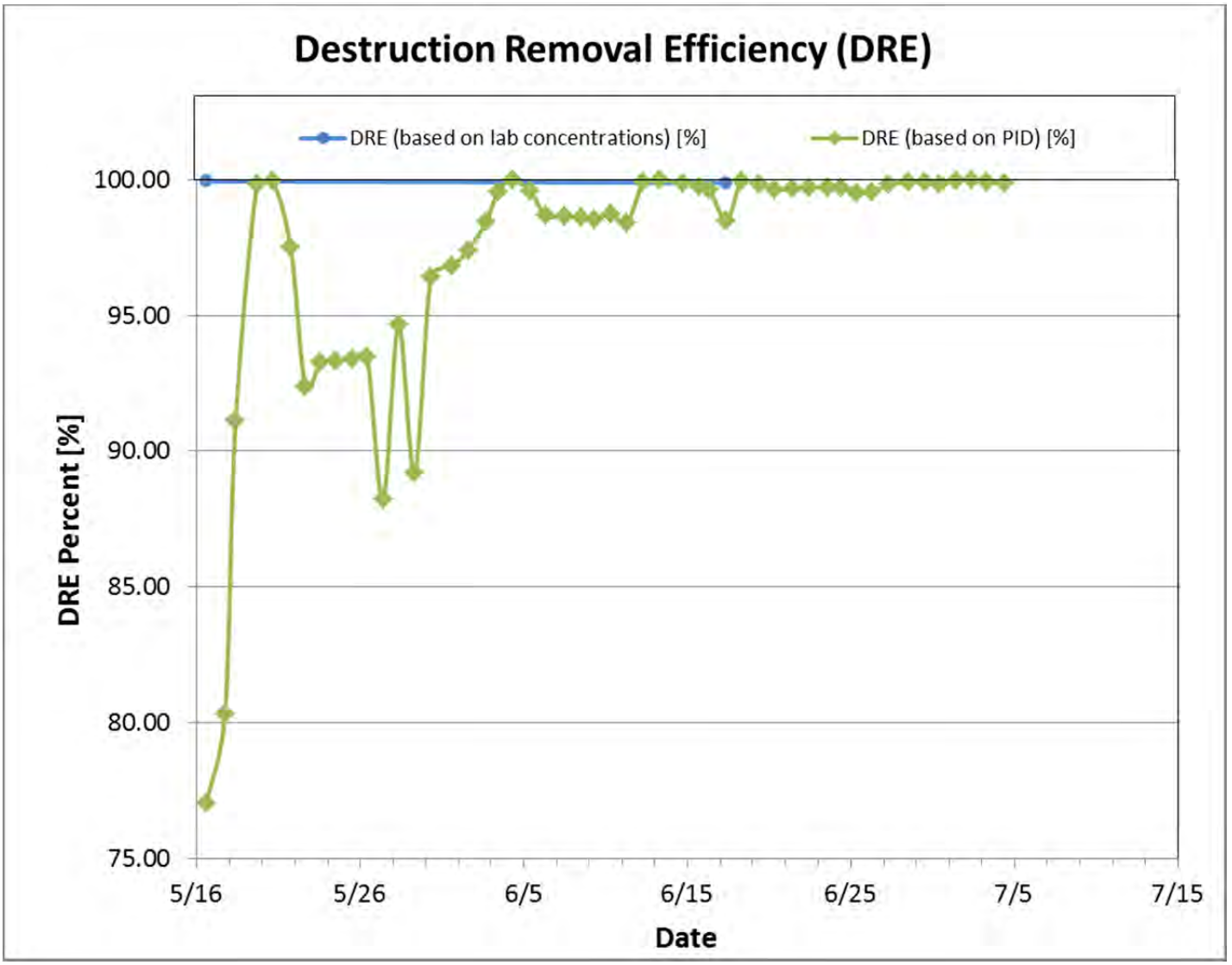


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7.

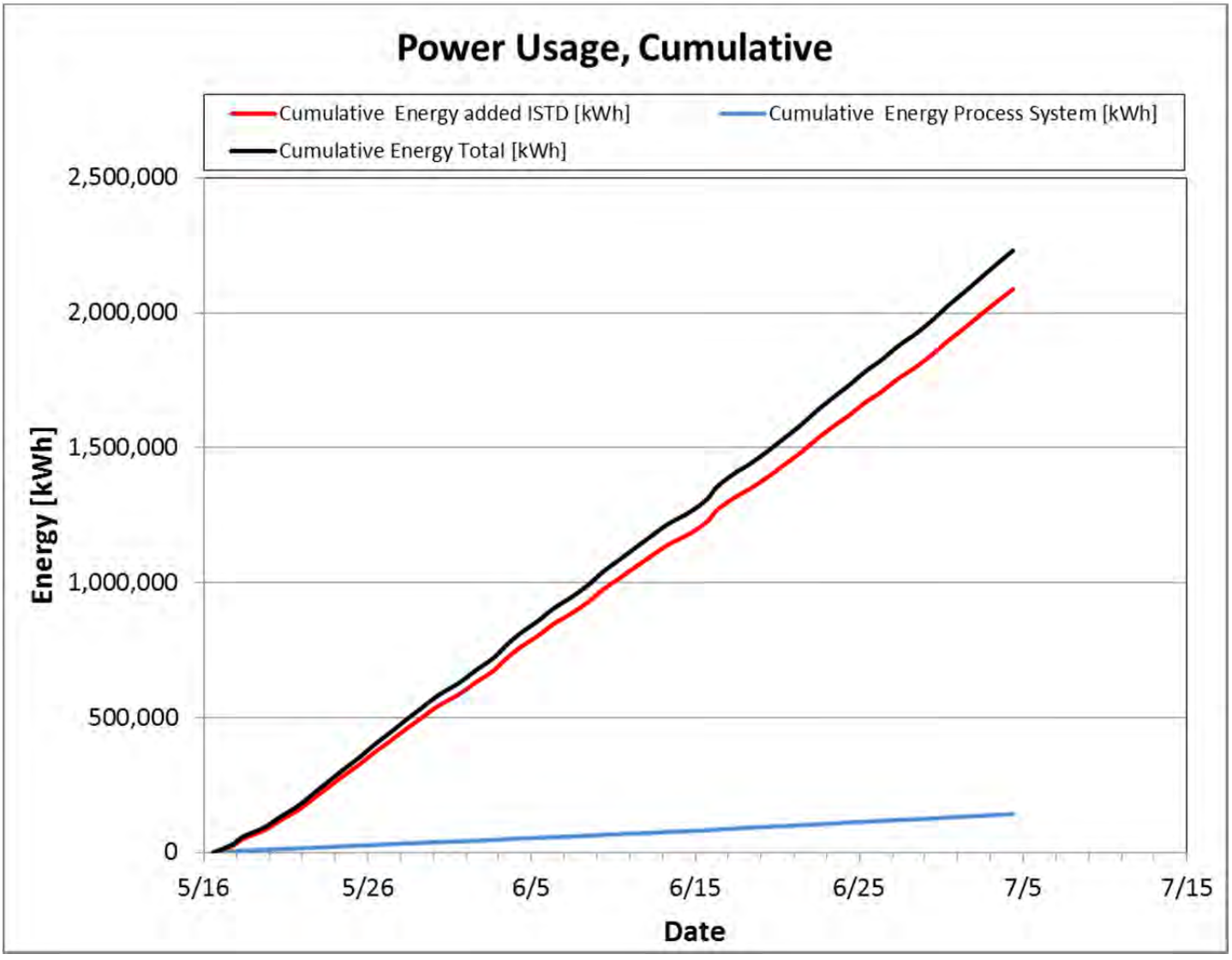


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days.

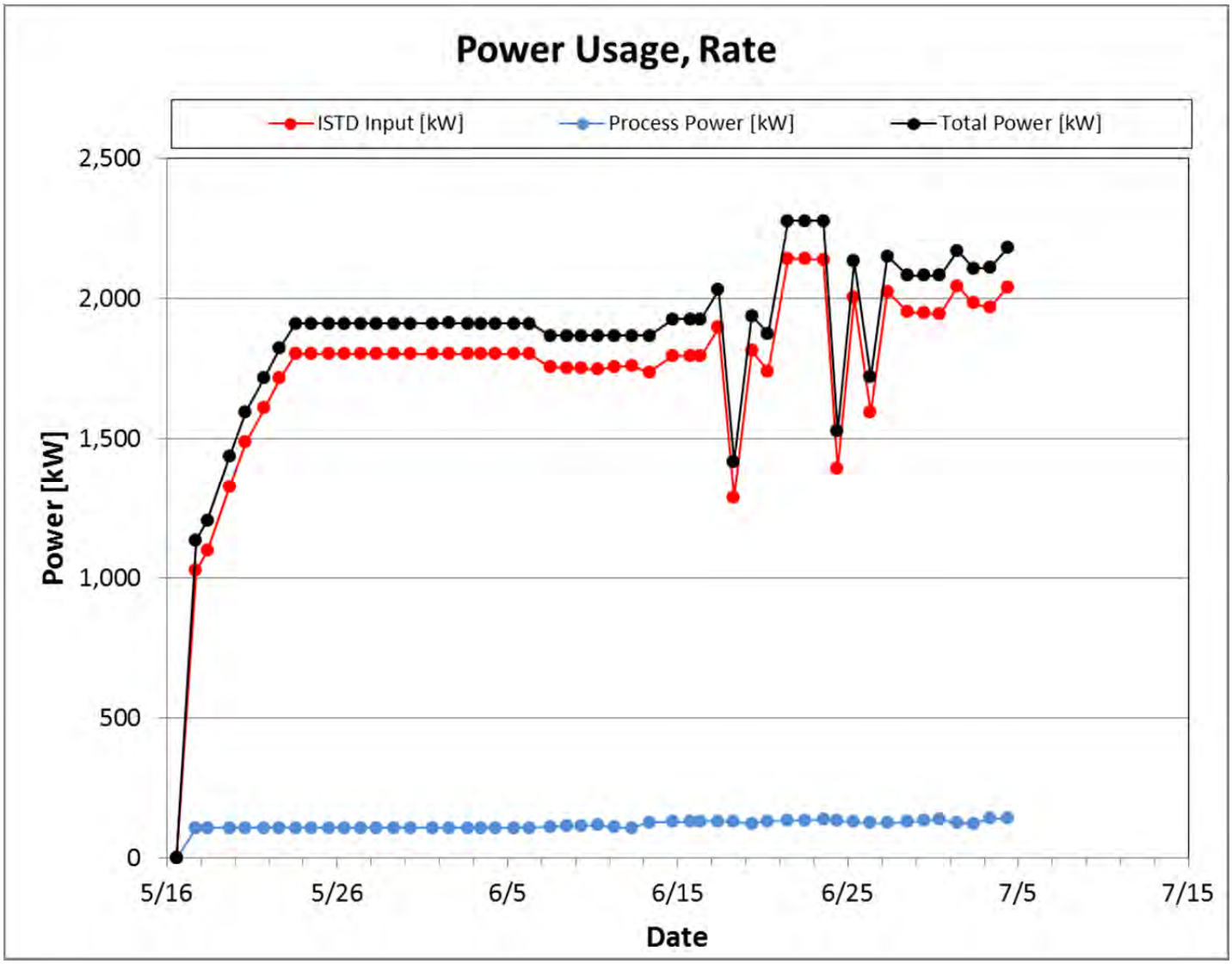


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

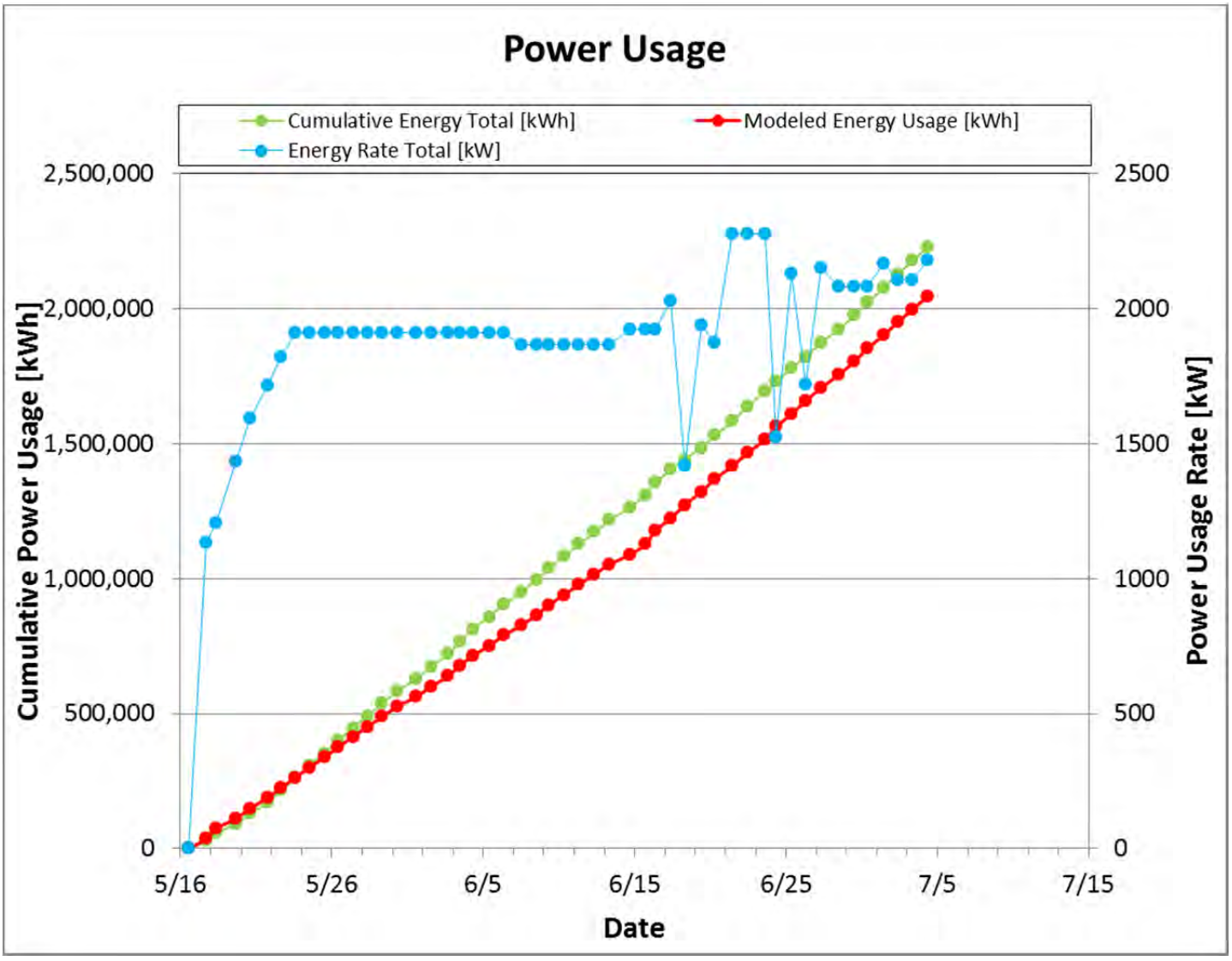


Figure 9. Power Usage

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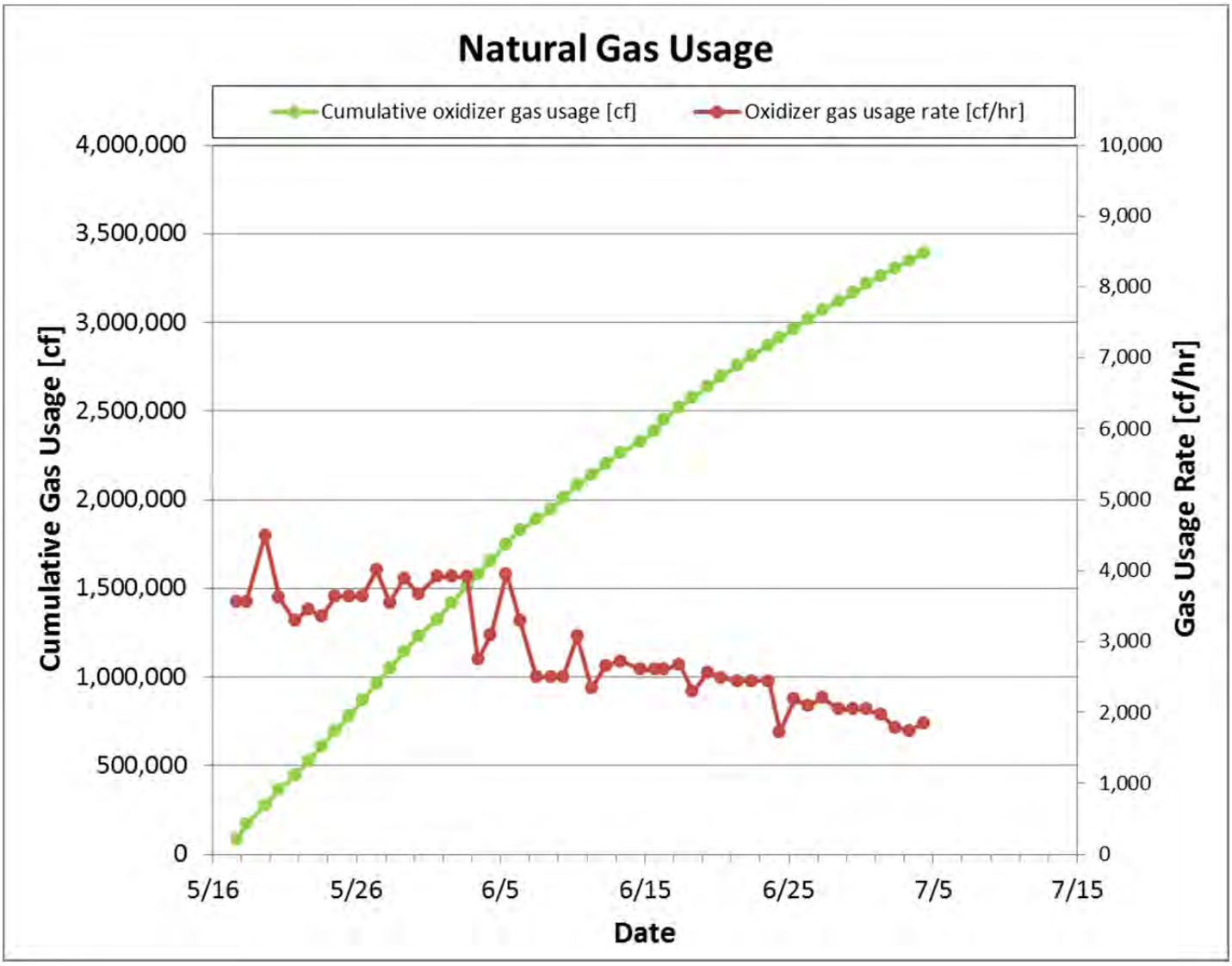


Figure 10. Natural Gas Usage

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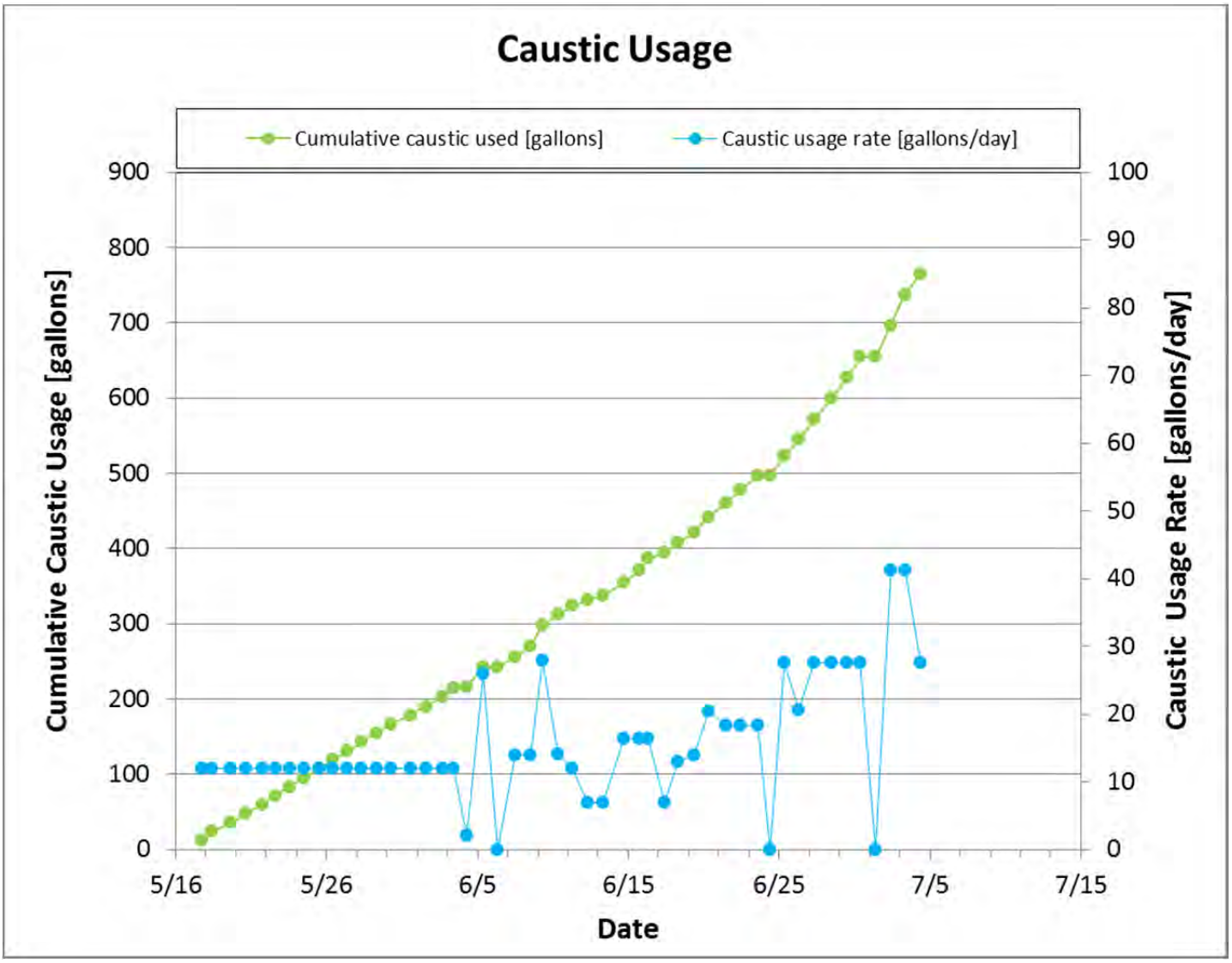


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12. A table with percentages is also shown (Table 3) as it is often necessary to decrease energy to specific thermocouples after achieving 100°C. Variations, or decreases in temperature, are often observed; however there is significant energy that remains in the subsurface to continue to treat contaminants.

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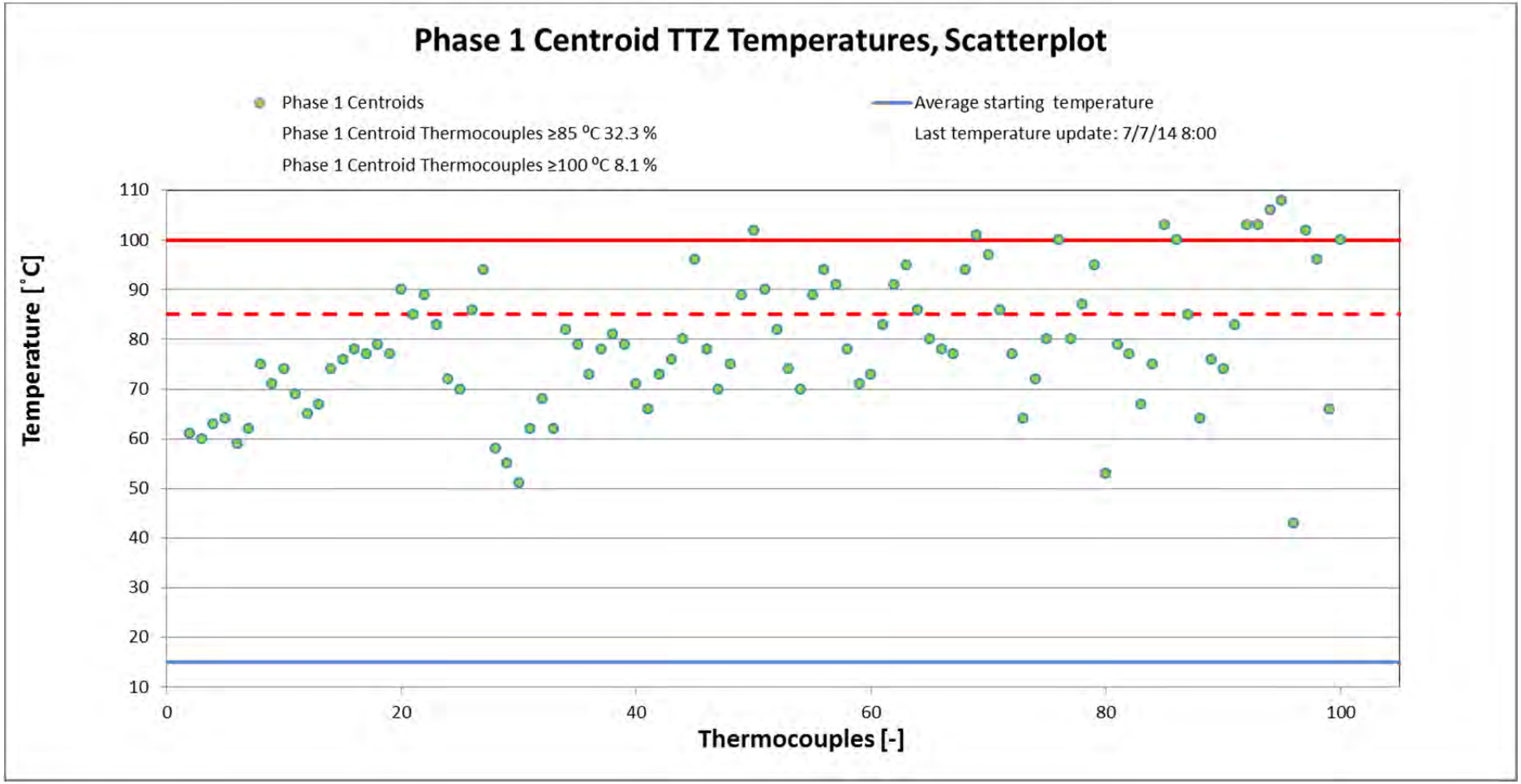


Figure 12. Phase 1 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples at Target Temperatures

Temperature Scatterplots

	Value	Unit
Date of Last Update	7/7/14	
Phase 1 Centroid Thermocouples ≥85 ^{0}C	32.3	%
Phase 1 Centroid Thermocouples ≥100 ^{0}C	8.1	%
Phase 2 Centroid Thermocouples ≥85 ^{0}C (OFFLINE)	0.0	%
Phase 2 Centroid Thermocouples ≥100 ^{0}C (OFFLINE)	0.0	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday July 4, 2014 through Friday July 11, 2014, with temperatures updated through Monday July 14, 2014.

Table 1 provides a summary of the project operational status as of Friday, July 11, 2014.

Table 1. Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	07/11/14	
Last Temperature Data Update	07/13/14	
Estimated Days of Operation (Total)	195	days
Days of Operation (Total)	57	days
Days of Operation vs. Estimate (Total)	29	%
Estimated Days of Operation Phase 1 (Day 1-134)	135	days
Days of Phase 1 Operation	57	days
Days of Phase 1 Operation vs. Estimate	42	%
Estimated Days of Operation Phase 2 (Day 61-195)	135	days
Days of Phase 2 Operation	0	days
Days of Phase 2 Operation vs. Estimate	0	%
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	2,594,800	kWh
Used Electrical Energy vs. Estimate	16.4	%
Total Vapor Mass Removal (based on Oxidizer PID Readings)	6,473	lbs
Estimated Mass Removed as LNAPL	148	lbs
Average Power Input Last 24 Hours	2,140	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,313	scfm
Average Condensate Production Rate Last 24 Hours	1.6	gpm

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Treatment of Phase 1 is progressing as expected. The average wellfield temperature is 85C, approximately 3C ahead of our temperature model (Figure 1). Thermocouples in Phase 1 are heating up relatively uniformly (as seen on Figure 12). The TMP-20 strand has increased in temperature by approximately 15C over the past week. Modifications to TMP-74 & 75 (2' and 5' depths) have resulted in temperature increases of approximately 20C and 40C respectively. TMP-67 (2' depth) continues to rise at a rate of approximately 2-3C per week.

Mass removed to date is approximately 6,600lbs (combined vapor [based on PID] and LNAPL).

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1 displays the average target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling. As of July 13, 2014, Figure 1 shows that the actual temperature is ahead of the predicted temperature by approximately 3 degrees Celsius.

Table 2. Temperature Summary

Temperatures TTZ		
Type	**Value**	**Unit**
Date of Last Update	7/13/14	
Phase 1 Entire TTZ Average Temperature	85	°C
Phase 2 Entire TTZ Average Temperature (OFFLINE)	27	°C
Phase 1 Centroid Average Temperature	84	°C
Phase 2 Centroid Average Temperature (OFFLINE)	22	°C

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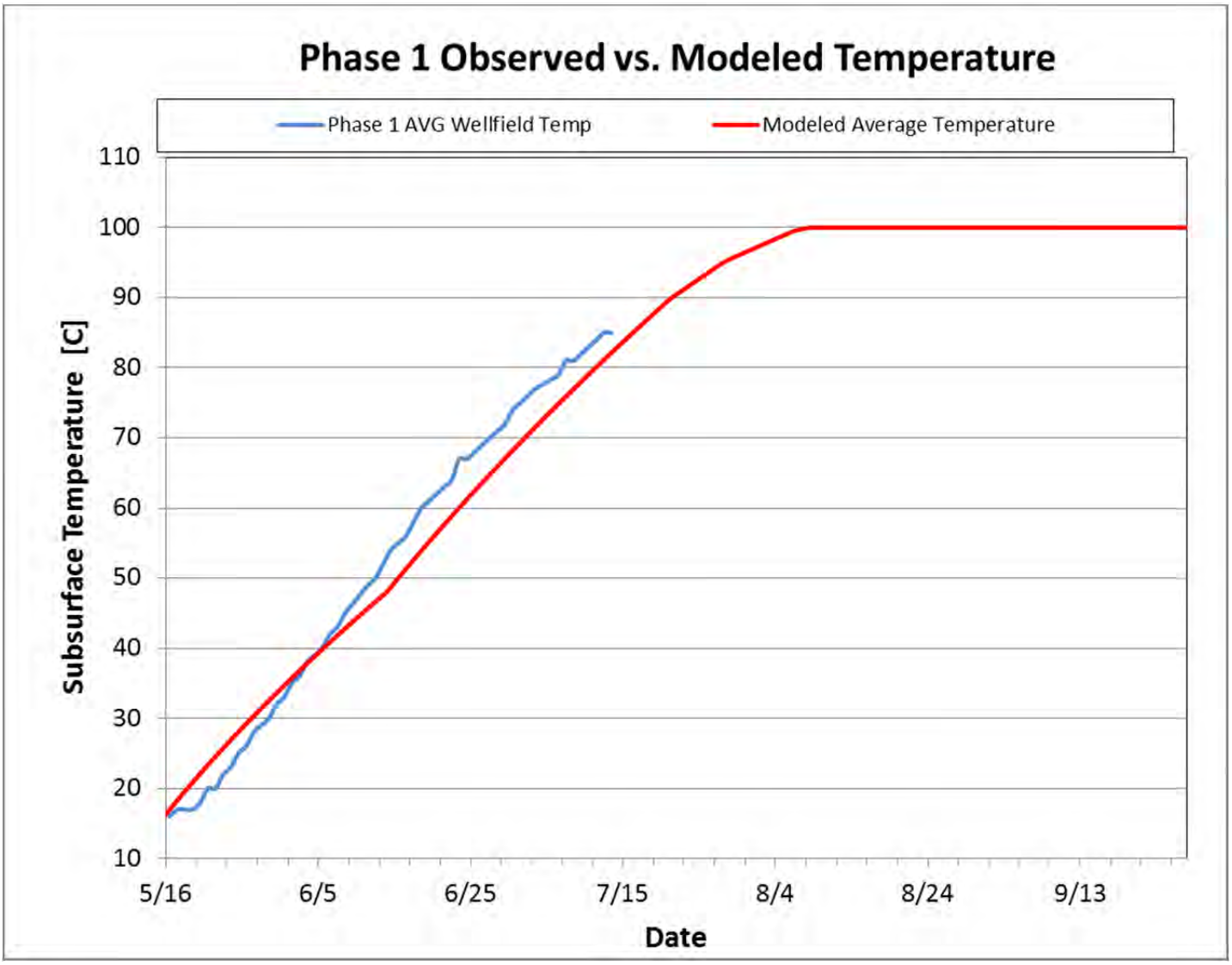


Figure 1. Phase 1 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield.

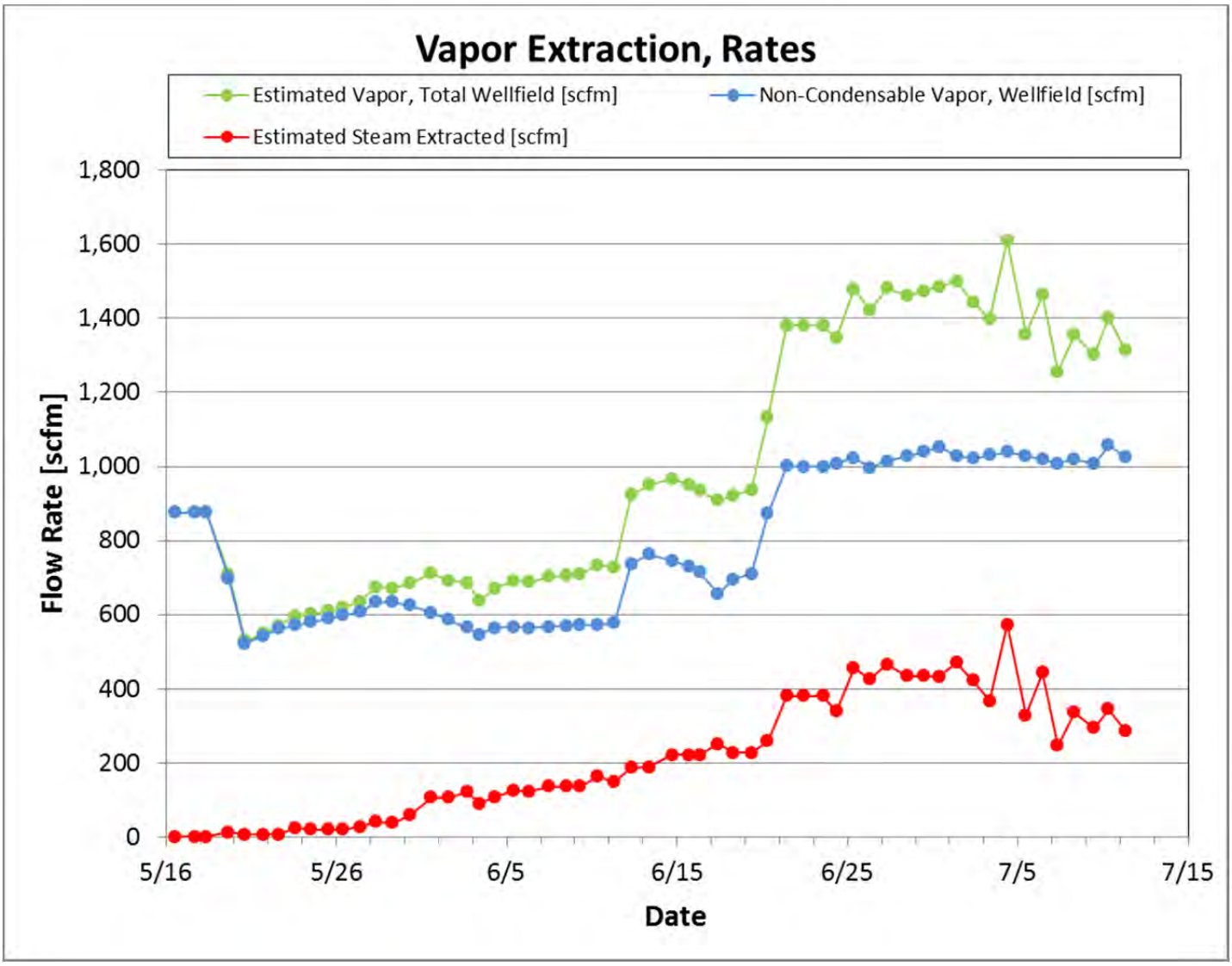


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) (also known as the lower explosive limit (LEL)) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent one manual daily reading from the analyzer. This value is collected after dilution air is introduced into the system.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf. Currently, the vapors entering the oxidizer are low flammability (<5% LFL) and do not approach the contract limit, although an increase in flammability can be seen after the dilution air valve was closed on June 20, 2014.

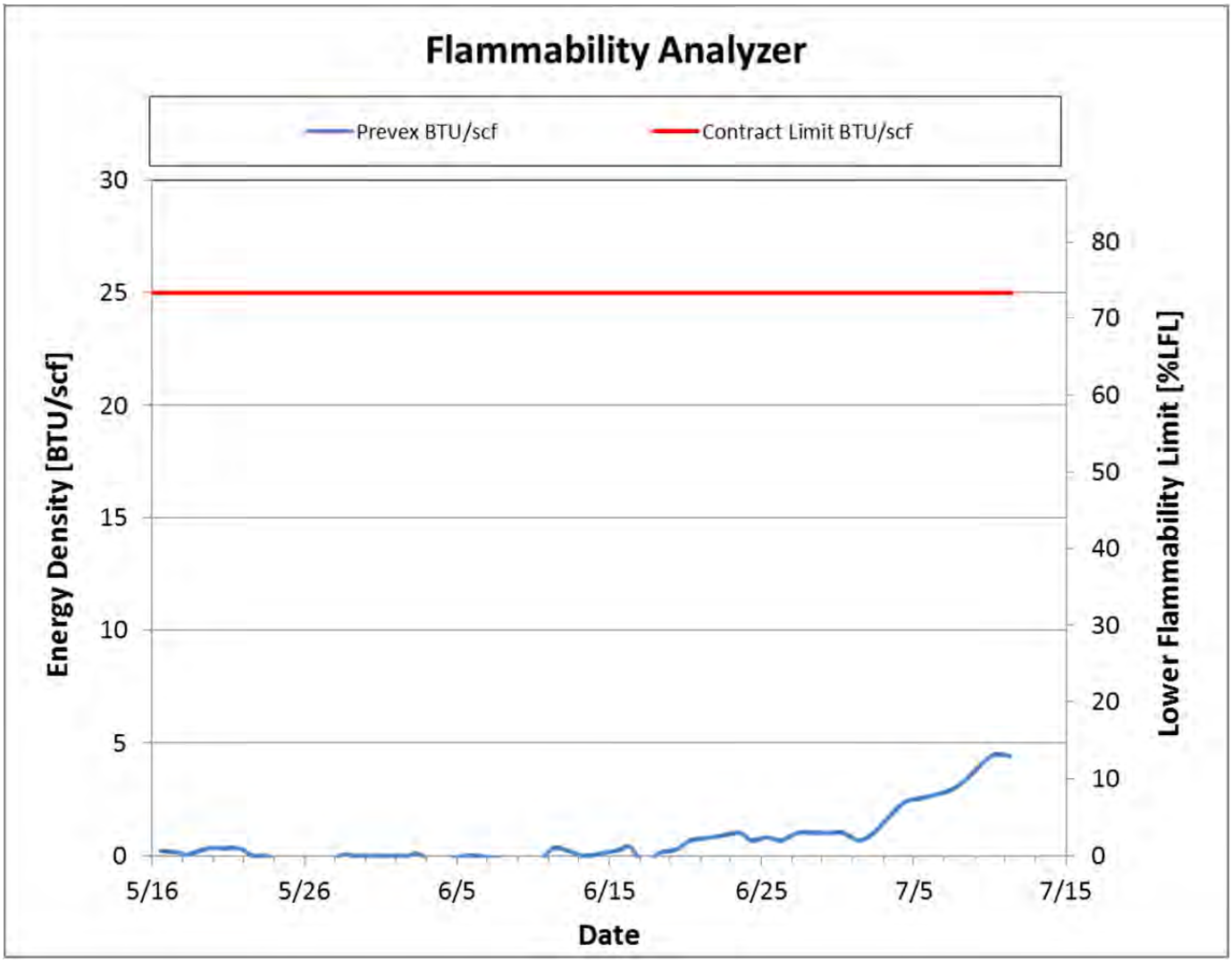


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removal based on daily photoionization detector (PID) readings and laboratory data are shown below in Figure 4. Figure 4 graphs the mass removed from Phase 1. Additional figures, including a total mass removed will be added once Phase 2 is online.

The below graph is prepared using laboratory data results from 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, and 6/24/14. In addition to the vapor mass removal showing in Figure 4, light non-aqueous phase liquid (LNAPL) has been recovered during this week, totaling approximately 148 lbs. Cumulative NAPL recovery will be shown on the total mass removal graph.

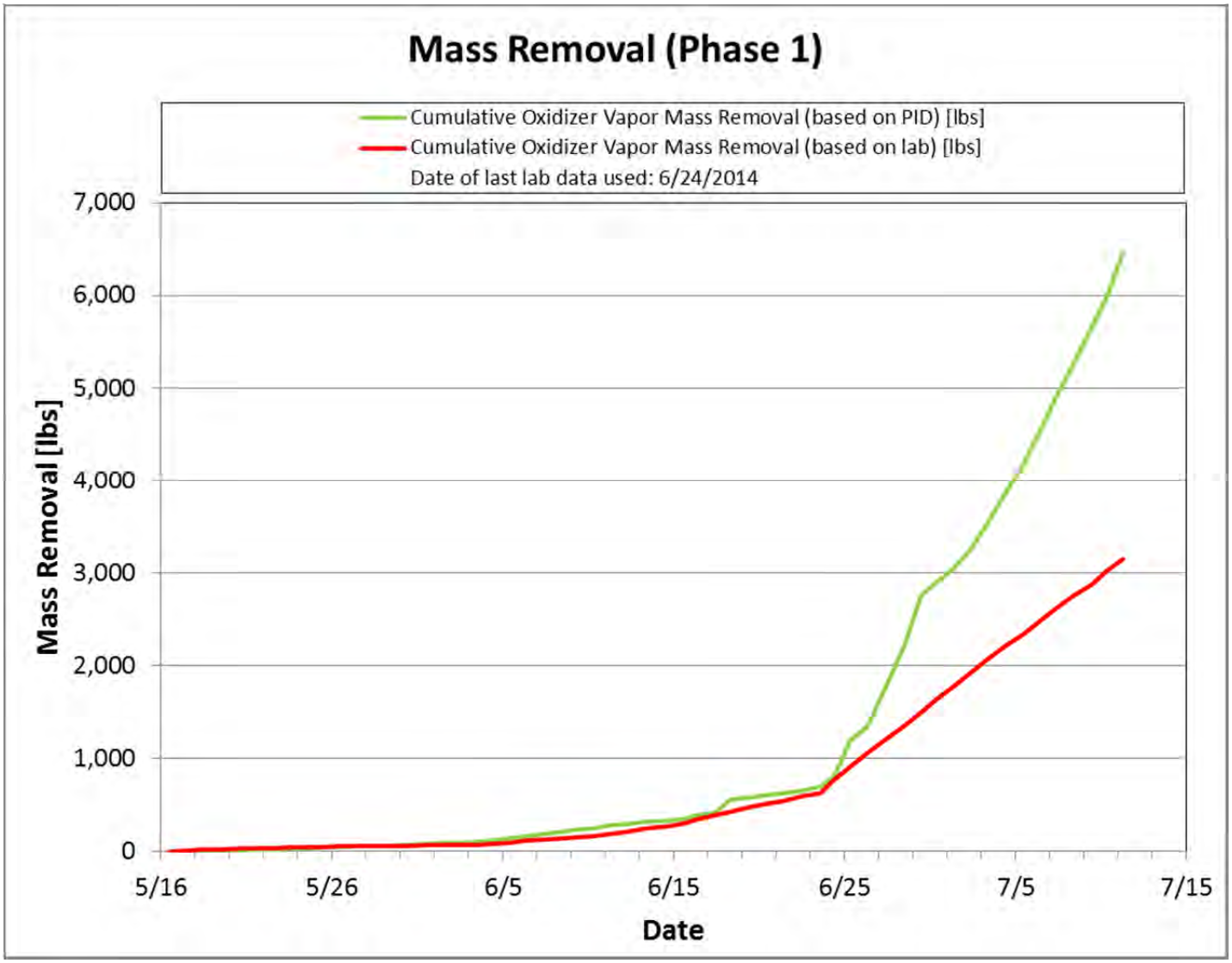


Figure 4. Project Progress, Mass Removal (Phase 1)

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Figure 5 below displays the daily PID readings collected at the oxidizer influent over time.

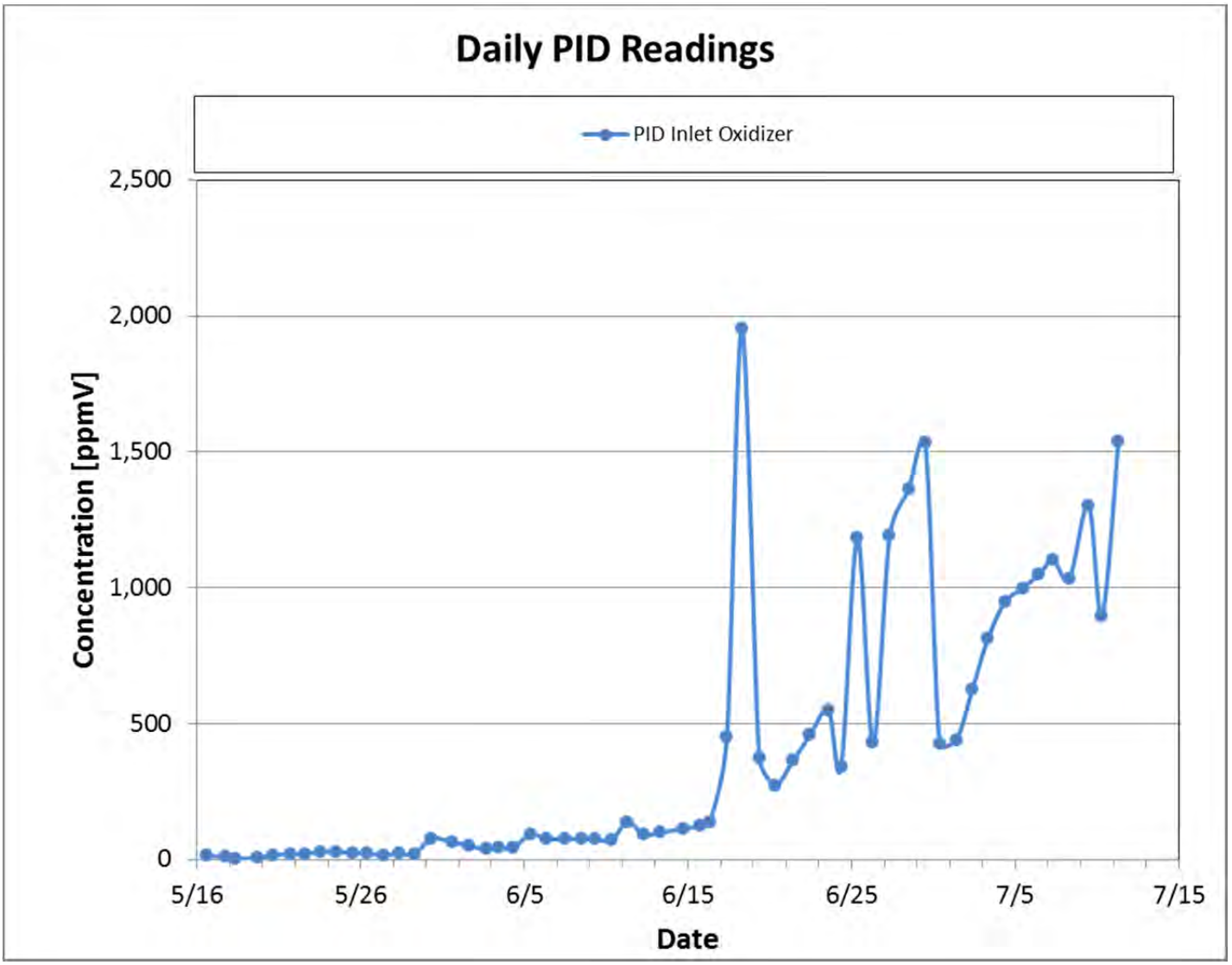


Figure 5. Daily PID Readings

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations will become closer to 100%.

A third laboratory influent/effluent data set has been added to the graph, confirming >99.5% removal efficiency in the vapor treatment system. Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

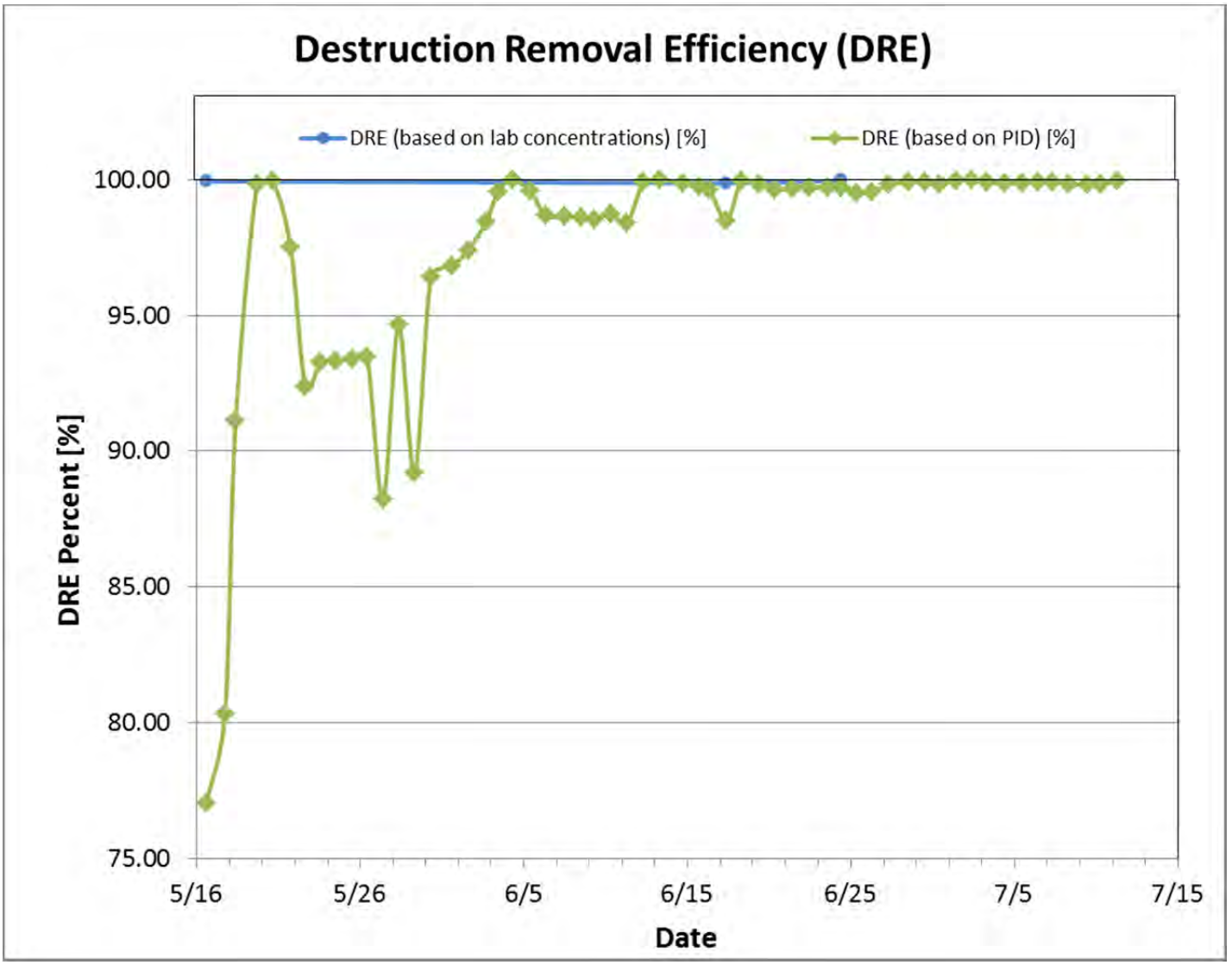


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7.

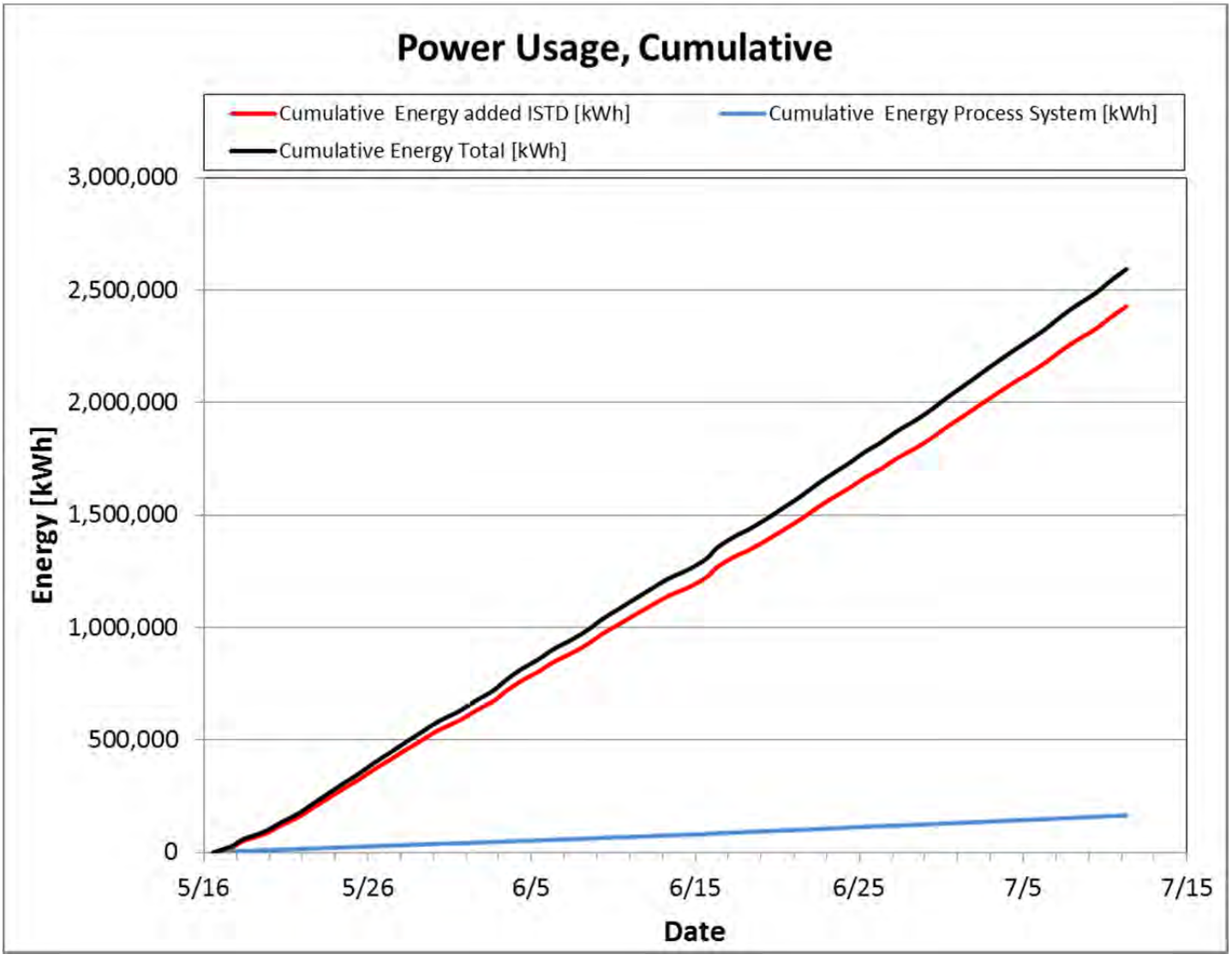


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days.

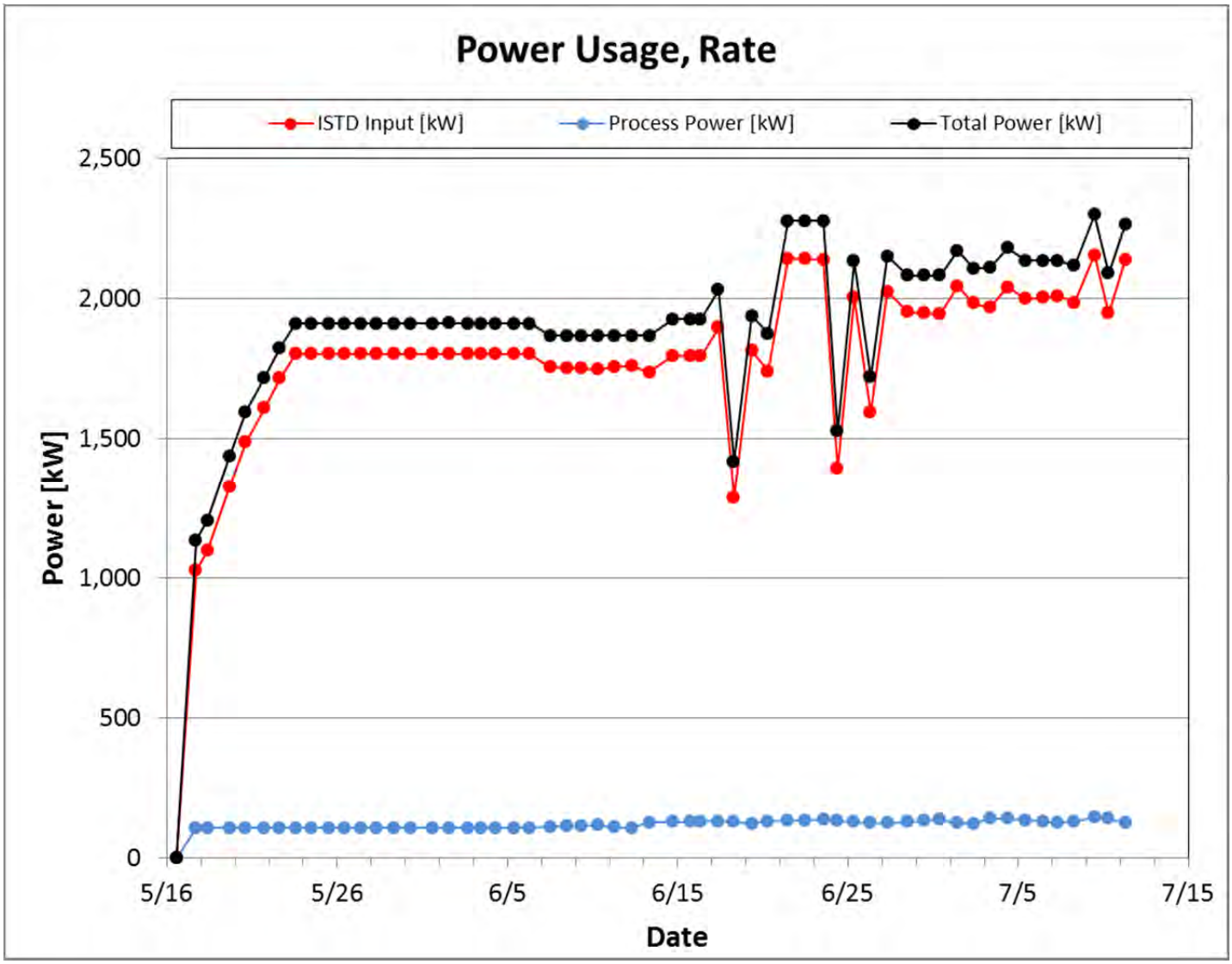


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

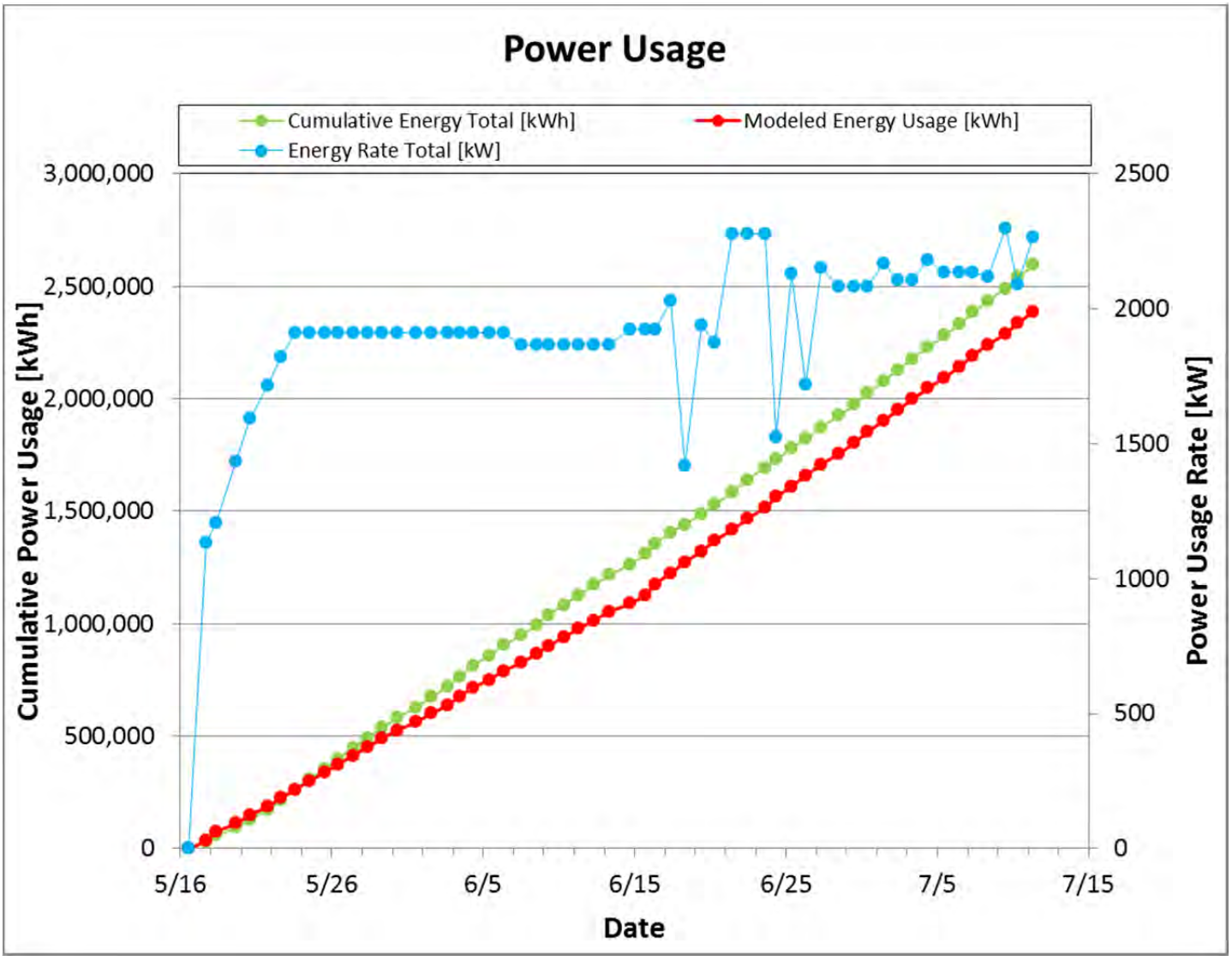


Figure 9. Power Usage

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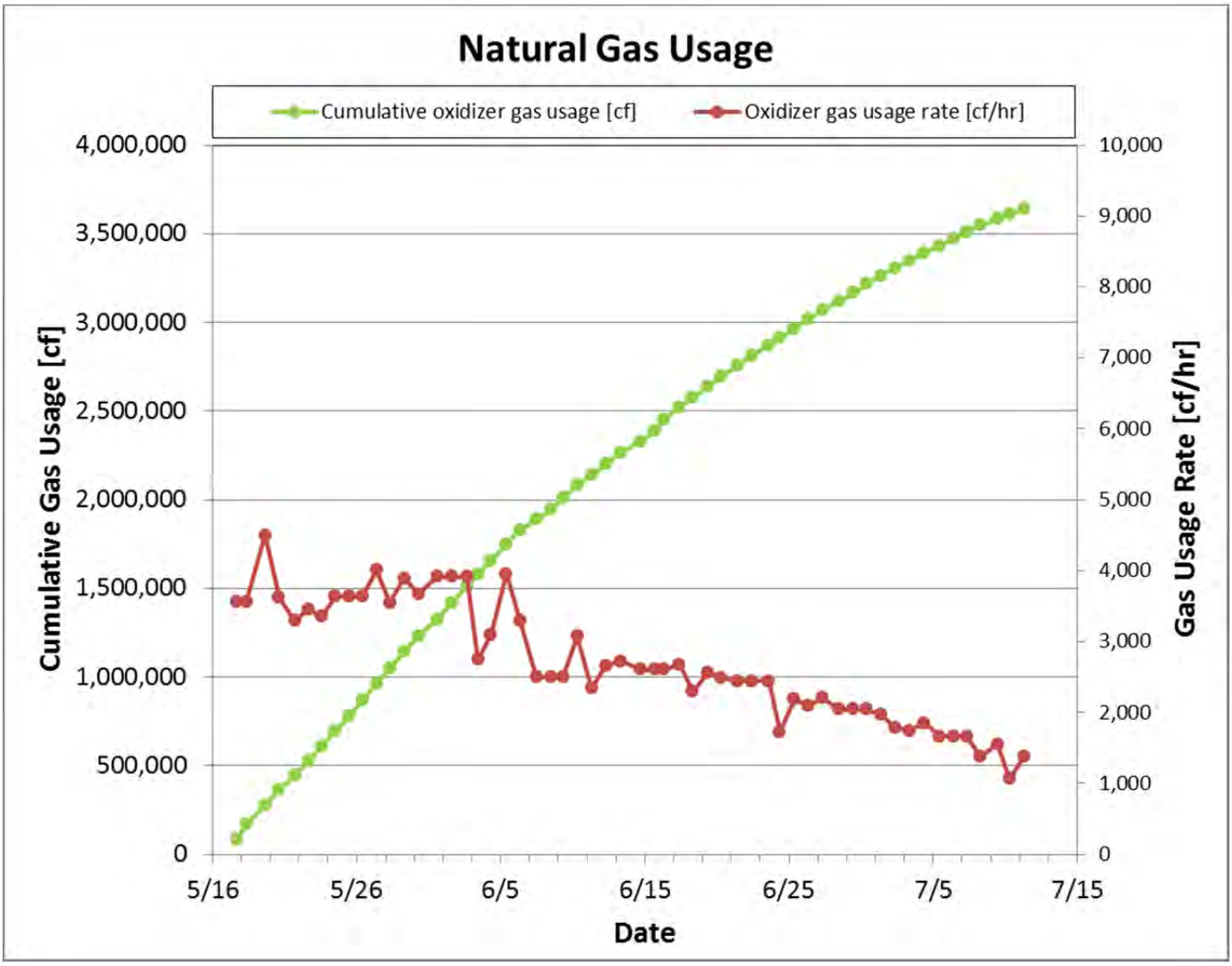


Figure 10. Natural Gas Usage

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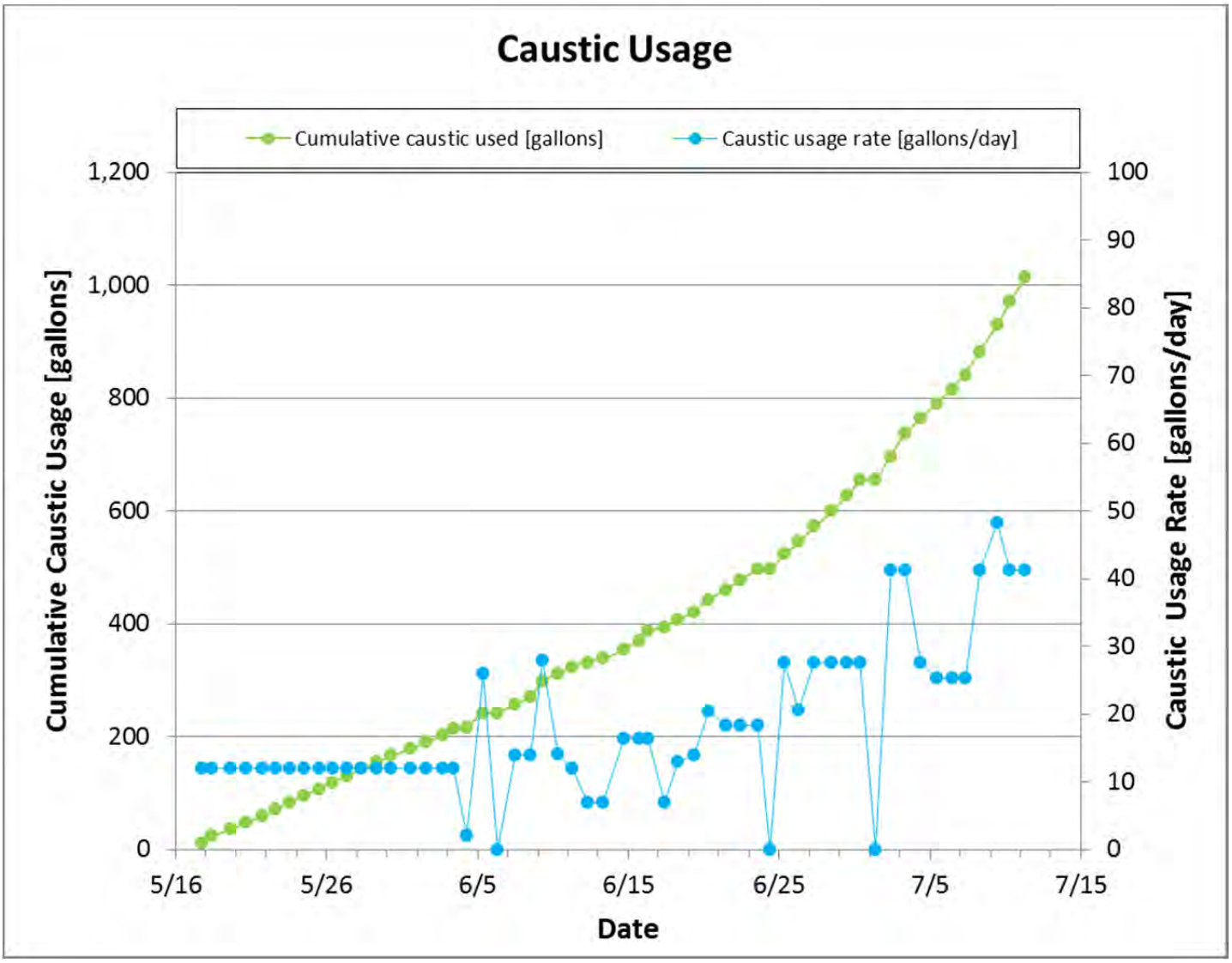


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12. The scatterplot has been updated to show the centroids grouped by depth, with each depth range shown as a different color. A table with percentages is also shown (Table 3) as it is often necessary to decrease energy to specific thermocouples after achieving 100°C. Variations, or decreases in temperature, are often observed; however there is significant energy that remains in the subsurface to continue to treat contaminants.

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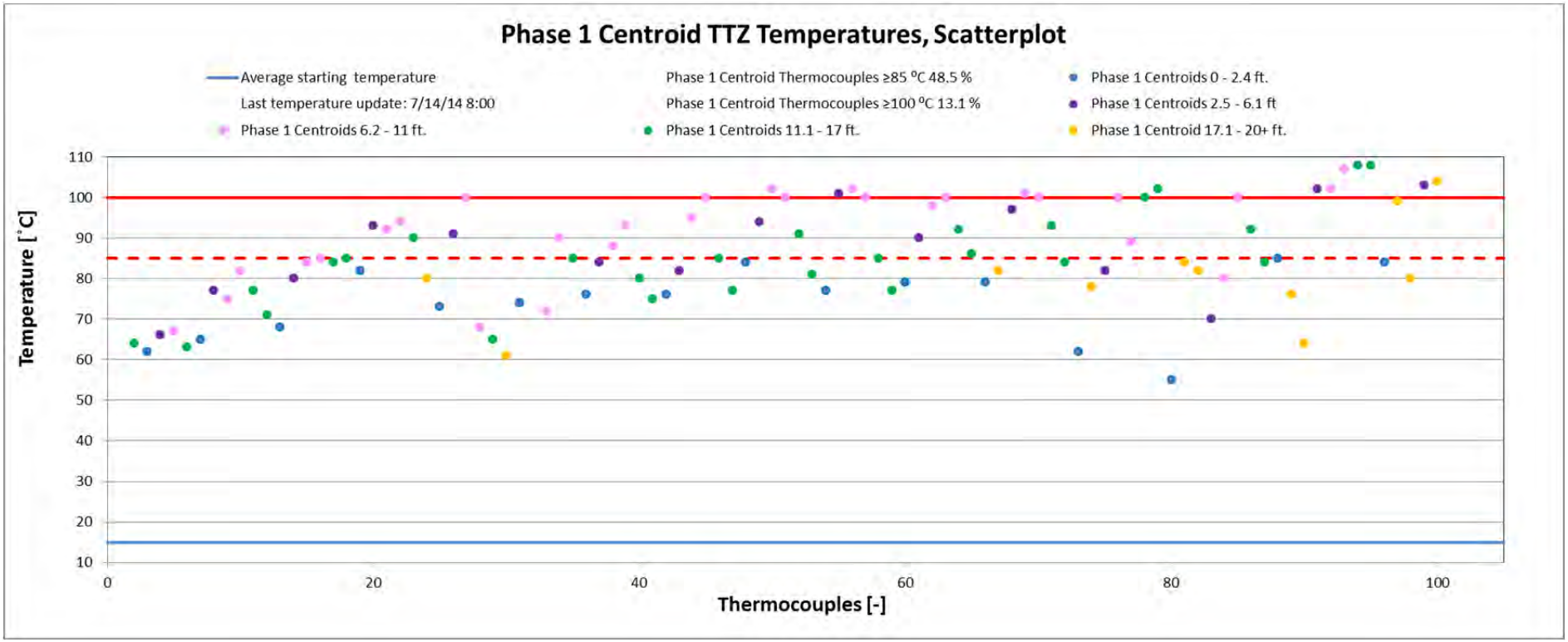


Figure 12. Phase 1 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples at Target Temperatures

Temperature Scatterplots

	Value	Unit
Date of Last Update	7/14/14	
Phase 1 Centroid Thermocouples ≥85 ^{0}C	48.5	%
Phase 1 Centroid Thermocouples ≥100 ^{0}C	13.1	%
Phase 2 Centroid Thermocouples ≥85 ^{0}C (OFFLINE)	0.0	%
Phase 2 Centroid Thermocouples ≥100 ^{0}C (OFFLINE)	0.0	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday July 11, 2014 through Friday July 18, 2014, with temperatures updated through Monday July 21, 2014.

Table 1 provides a summary of the project operational status as of Friday, July 18, 2014.

Table 1. Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	07/18/14	
Last Temperature Data Update	07/20/14	
Estimated Days of Operation (Total)	195	days
Days of Operation (Total)	64	days
Days of Operation vs. Estimate (Total)	33	%
Estimated Days of Operation Phase 1 (Day 1-134)	135	days
Days of Phase 1 Operation	64	days
Days of Phase 1 Operation vs. Estimate	48	%
Estimated Days of Operation Phase 2 (Day 61-195)	135	days
Days of Phase 2 Operation	2	days
Days of Phase 2 Operation vs. Estimate	1.7	%
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	3,011,100	kWh
Used Electrical Energy vs. Estimate	19.1	%
Total Vapor Mass Removal (based on Oxidizer PID Readings)	11,442	lbs
Estimated Mass Removed as LNAPL	529	lbs
Average Power Input Last 24 Hours	2,720	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	2,157	scfm
Average Condensate Production Rate Last 24 Hours	4.1	gpm

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Treatment of Phase 1 is progressing as expected. The average wellfield temperature is 89C, which is on track with our temperature model (Figure 1). Thermocouples in Phase 1 are heating up relatively uniformly (as seen on Figure 12).

Phase 2 was initiated on 7/16/14. The heating of Phase 2 will progress using the same ramp up heater schedule, except over double the duration of Phase 1.

Mass removed to date is approximately 11,971lbs (combined vapor [based on PID] and LNAPL). In next week's report, we expect to be able to report the mass with the Phase 1 / Phase 2 differentiation.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1 displays the average target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling. As of July 20, 2014, Figure 1 shows that the actual temperature is equal to the predicted temperature.

Phase 2 heating began on 7/16/14. The heating of Phase 2 will progress using the same ramp up heater schedule, except over double the duration of Phase 1.

Table 2. Temperature Summary

Temperatures TTZ		
Type	**Value**	**Unit**
Date of Last Update	7/20/14	
Phase 1 Entire TTZ Average Temperature	89	°C
Phase 2 Entire TTZ Average Temperature	30	°C
Phase 1 Centroid Average Temperature	89	°C
Phase 2 Centroid Average Temperature	24	°C

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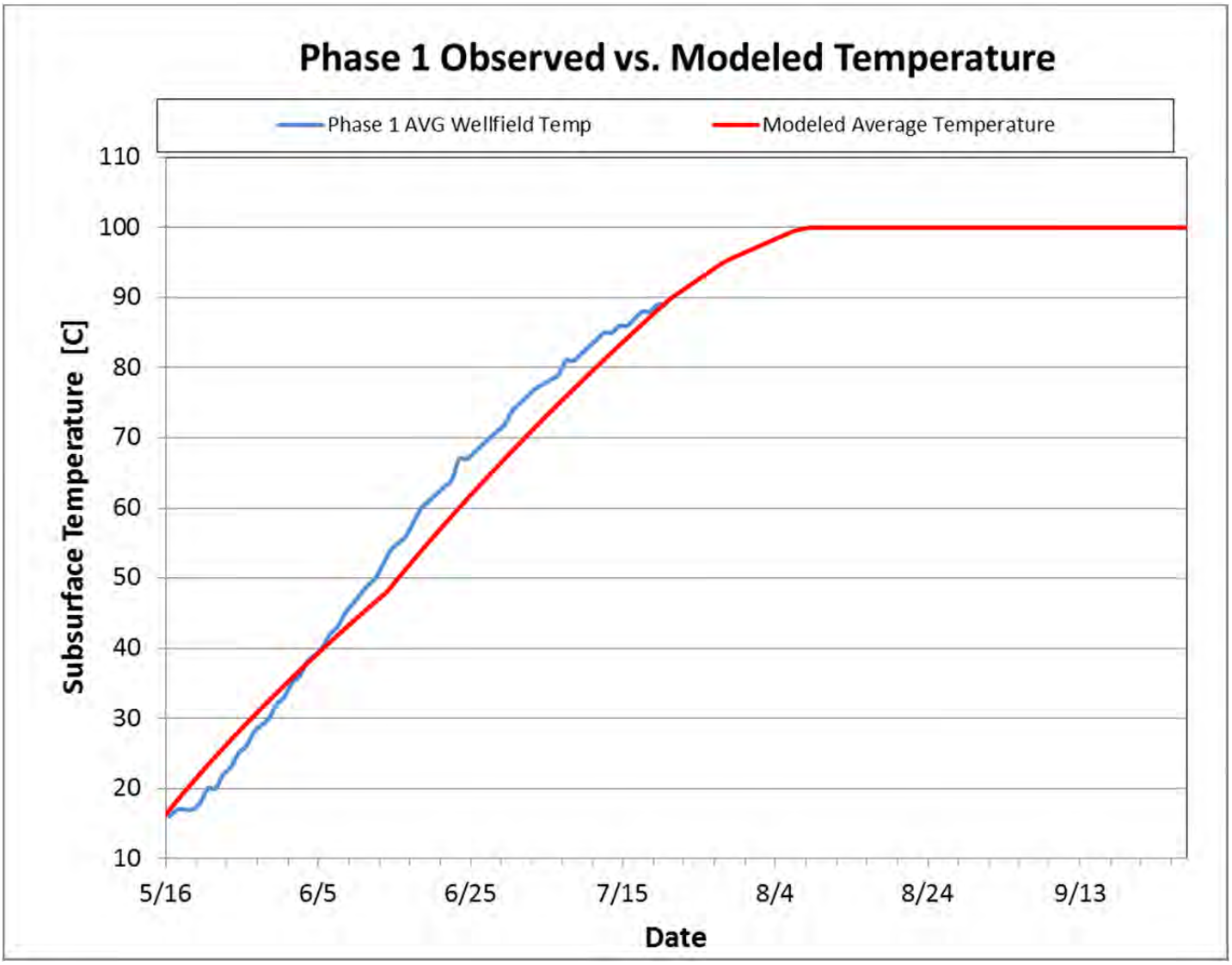


Figure 1. Phase 1 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area.

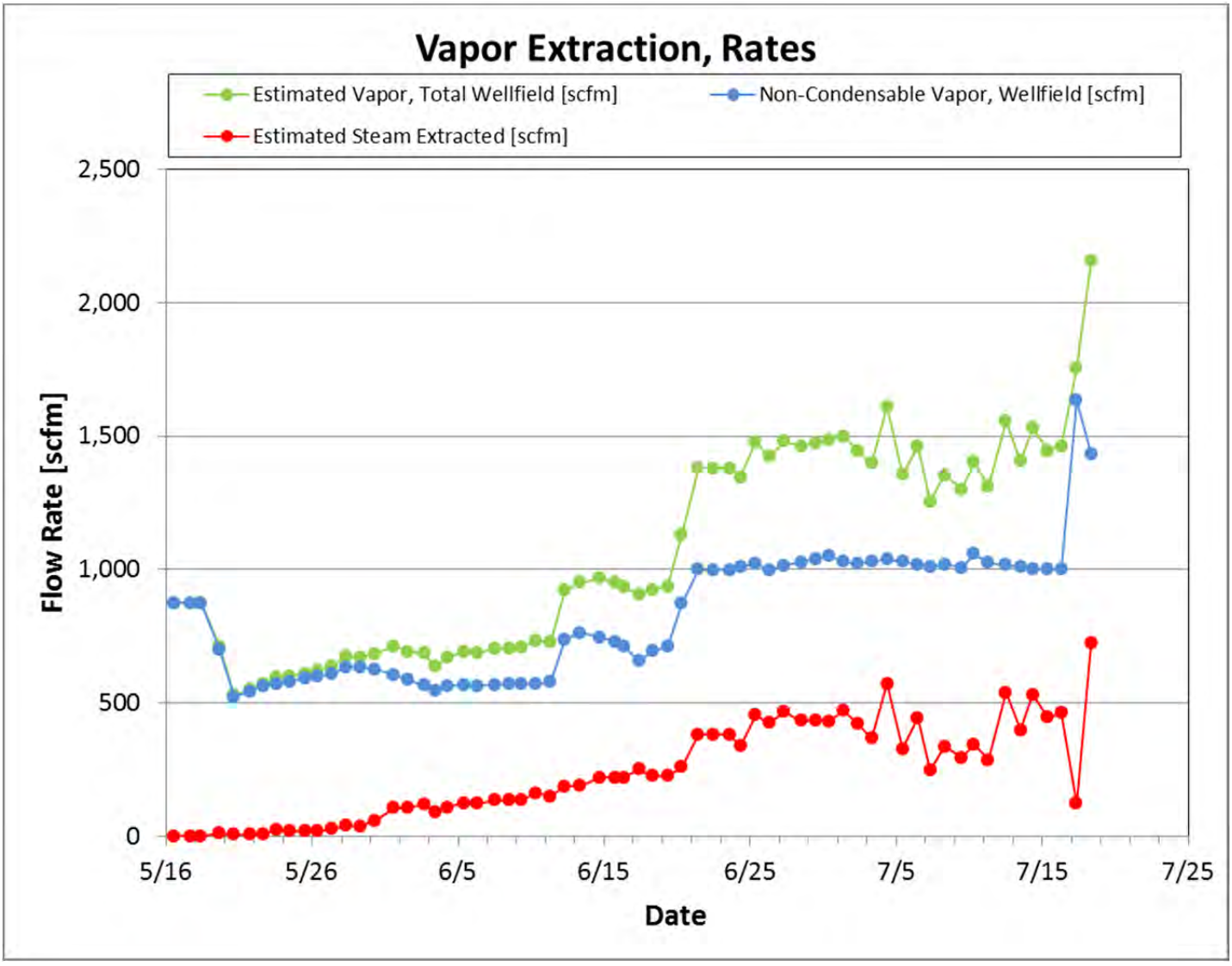


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) (also known as the lower explosive limit (LEL)) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent one manual daily reading from the analyzer. This value is collected after dilution air is introduced into the system.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf. Currently, the vapors entering the oxidizer are low flammability (<5% LFL) and do not approach the contract limit, although an increase in flammability can be seen after the dilution air valve was closed on June 20, 2014.

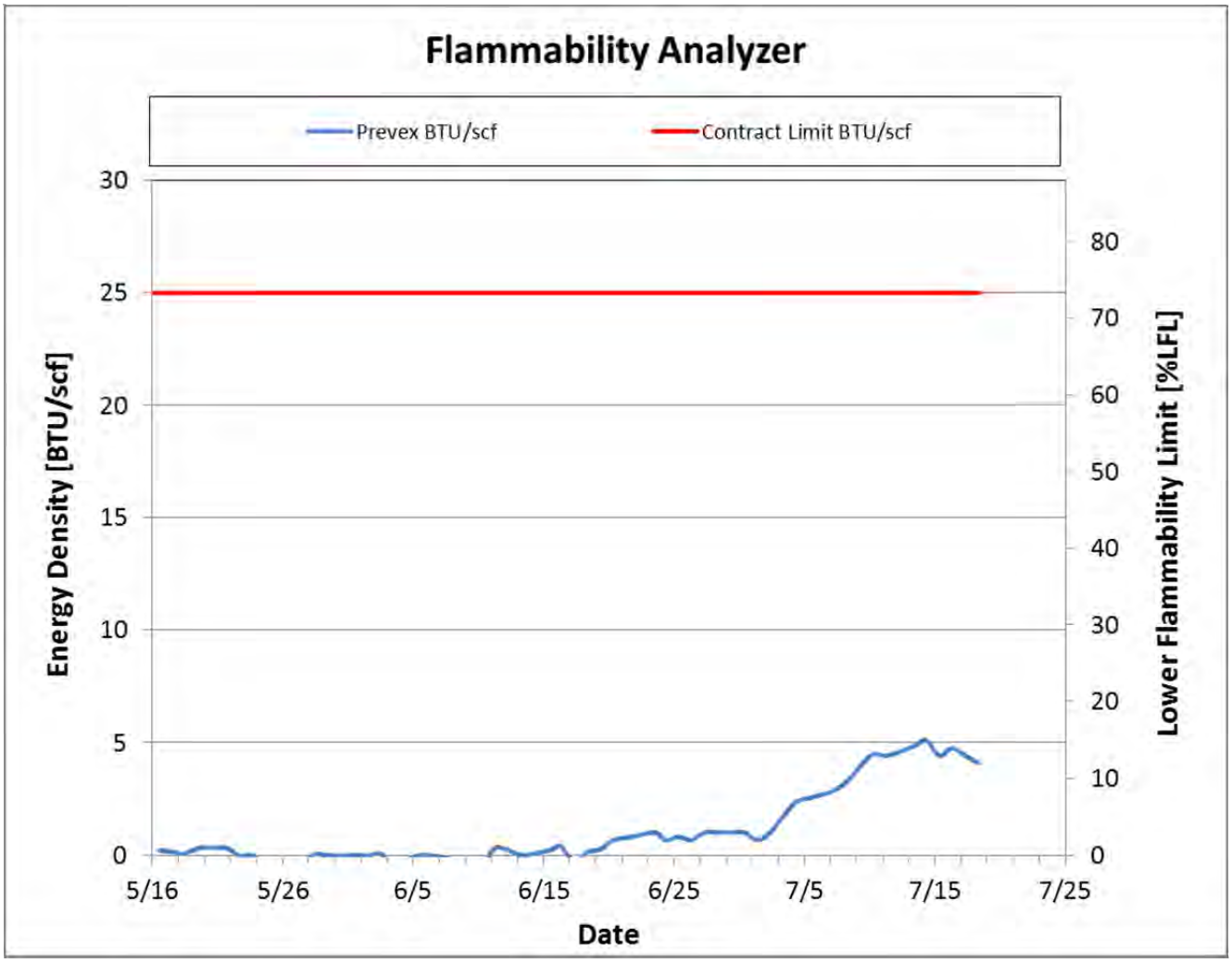


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removal based on daily photoionization detector (PID) readings and laboratory data are shown below in Figure 4. Figure 4 graphs the mass removed from Phase 1. Additional figures, including a total mass removed will be added to next week's report now that Phase 2 is online.

The below graph is prepared using laboratory data results from 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, and 7/1/14. In addition to the vapor mass removal showing in Figure 4, light non-aqueous phase liquid (LNAPL) has been recovered during this week, totaling approximately 529 lbs. Cumulative NAPL recovery will be shown on the total mass removal graph.

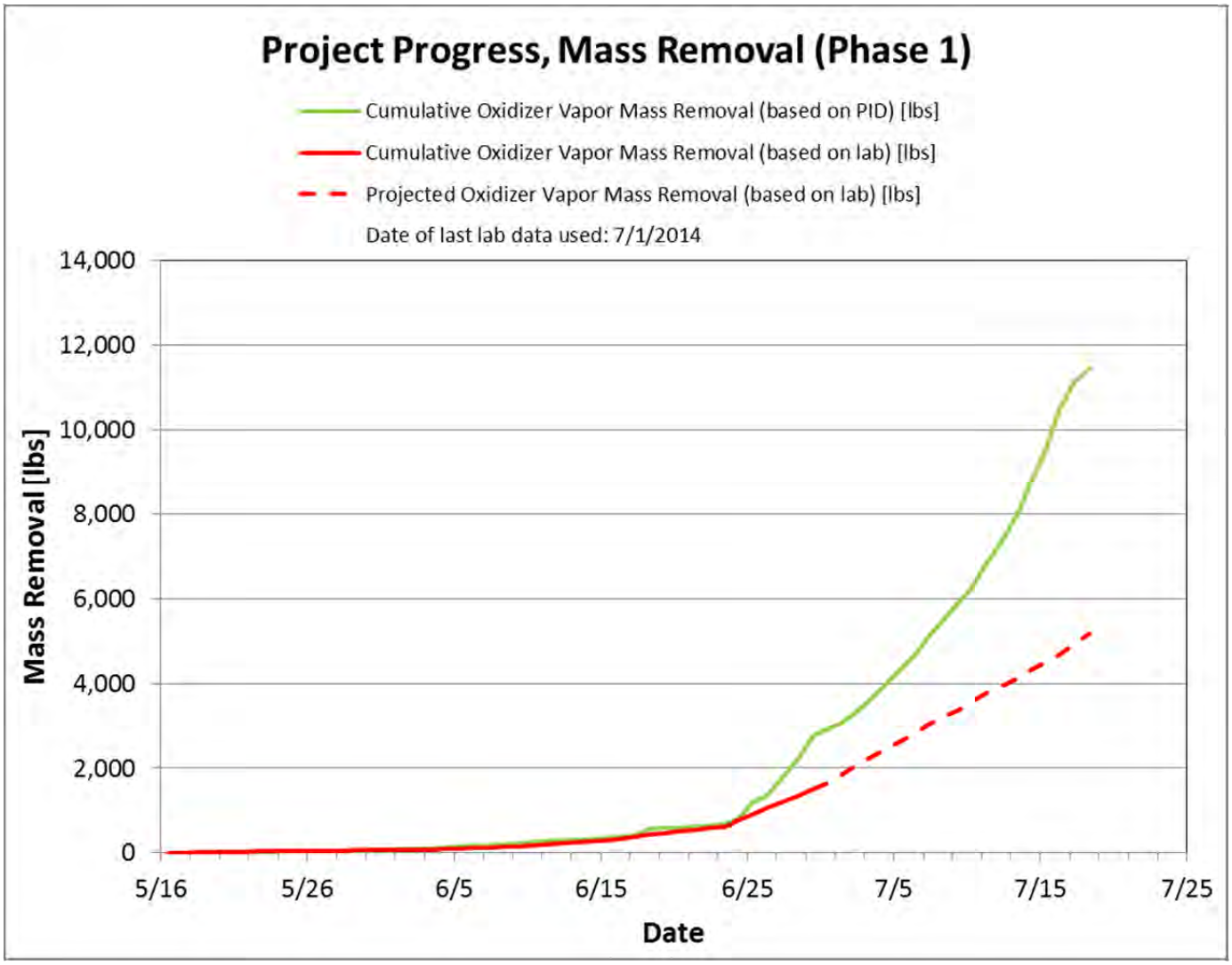


Figure 4. Project Progress, Mass Removal (Phase 1)

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Figure 5 below displays the daily PID readings collected at the oxidizer influent over time. It should be noted that the PID reading from 7/16/14 was obtained with a PID with a 10.6 eV lamp, instead of the 11.7 eV lamp which had reached the upper concentration limit of 2000 ppmV.

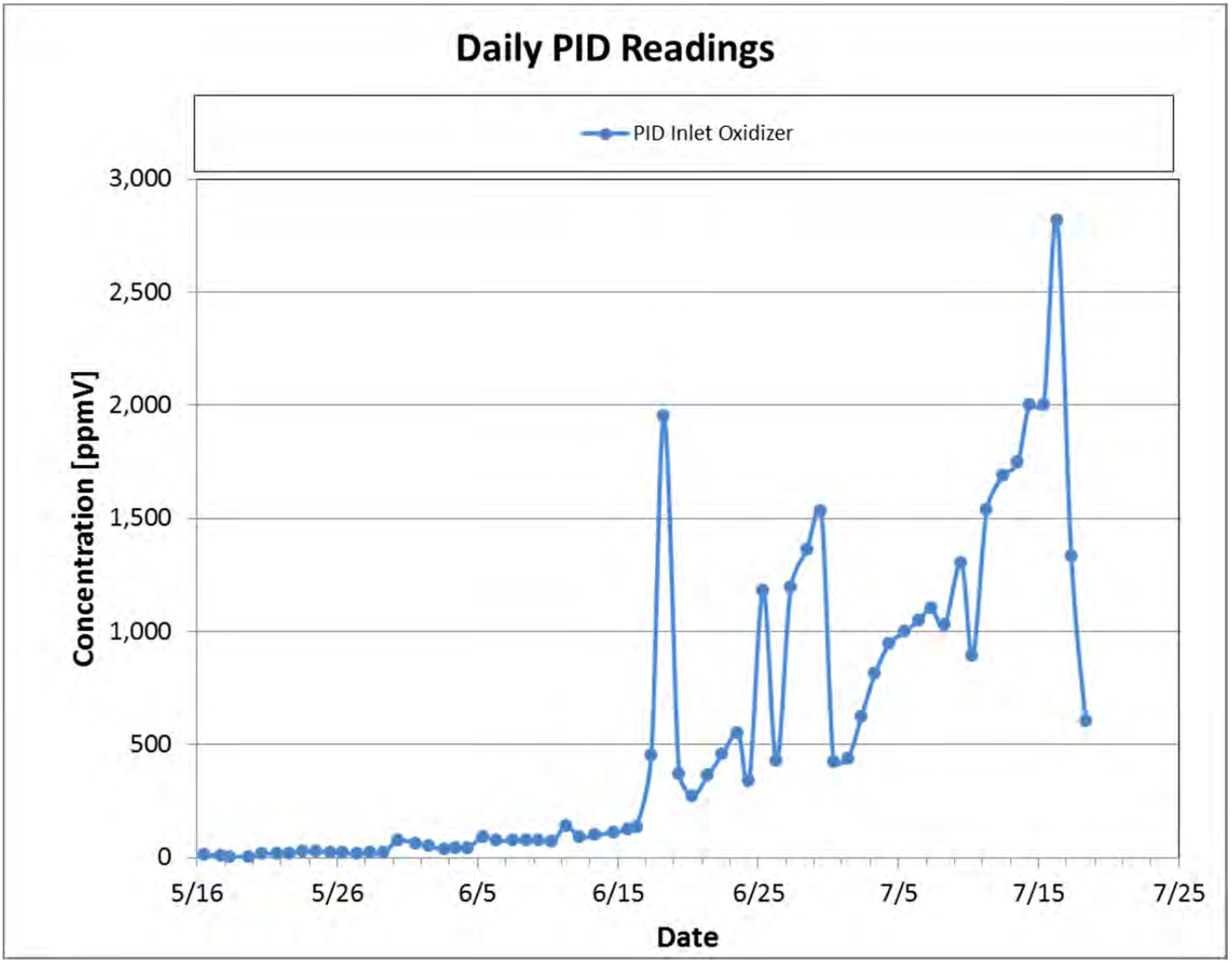


Figure 5. Daily PID Readings

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations will become closer to 100%.

A fourth laboratory influent/effluent data set has been added to the graph, confirming >99.5% removal efficiency in the vapor treatment system. Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

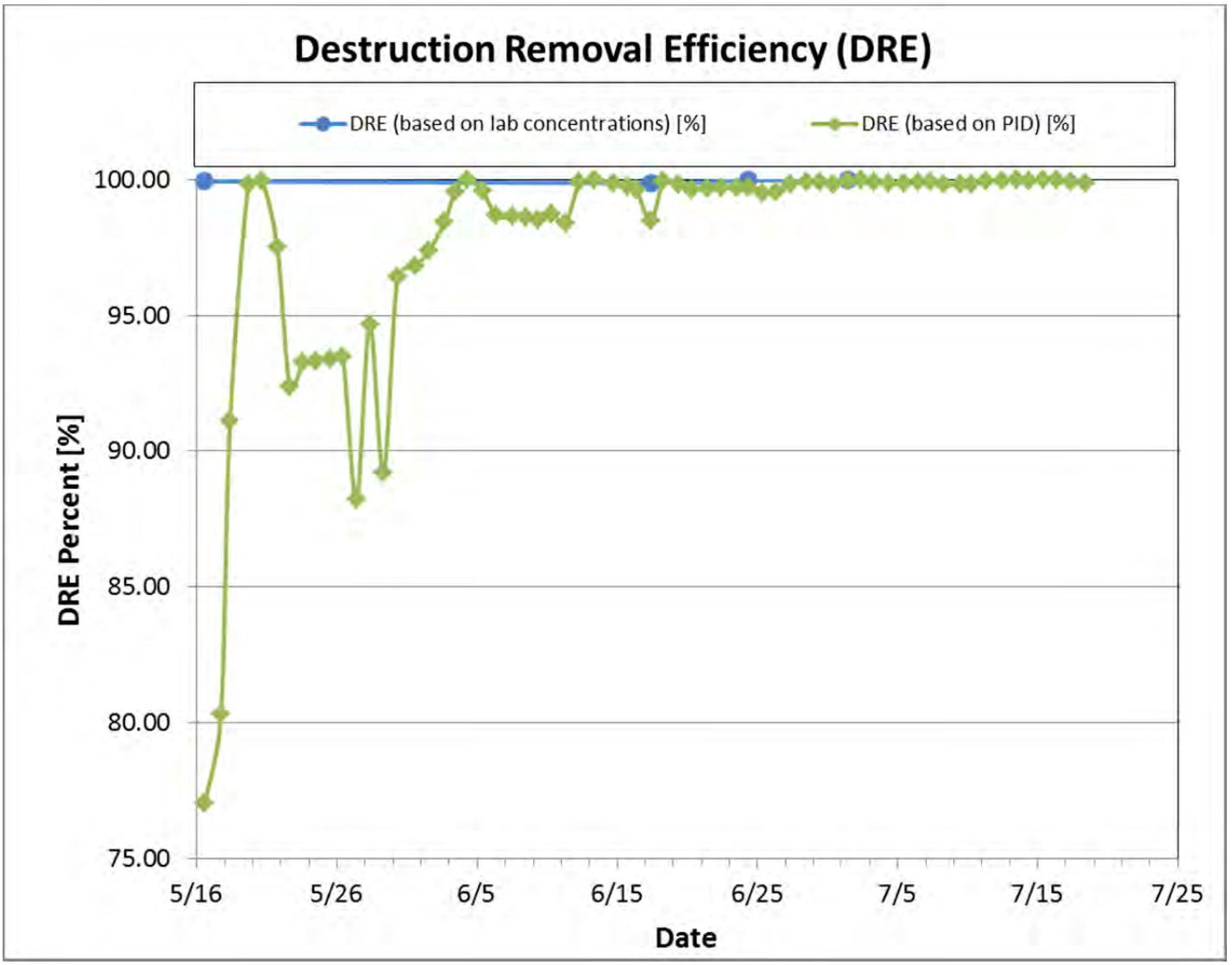


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7.

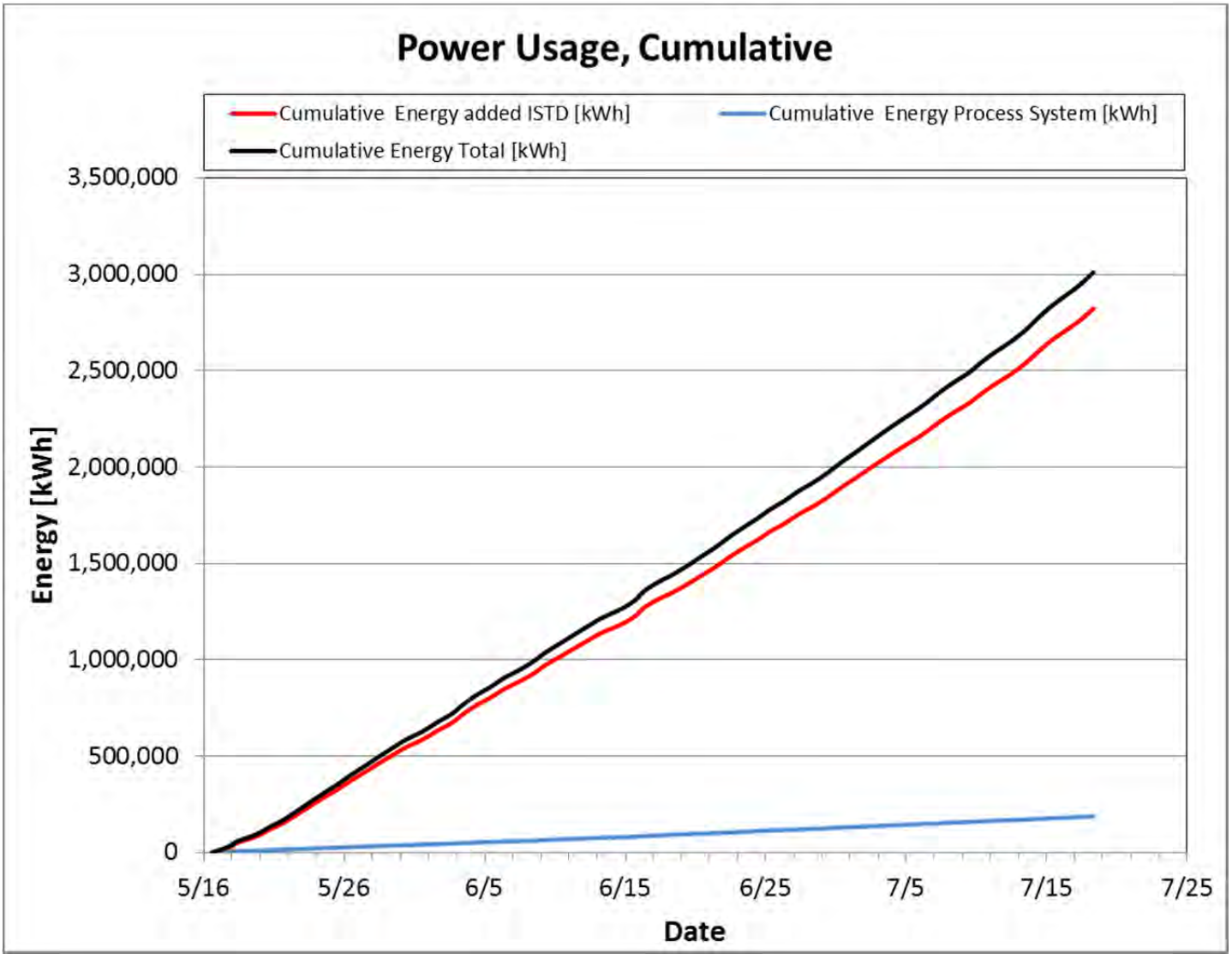


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days.

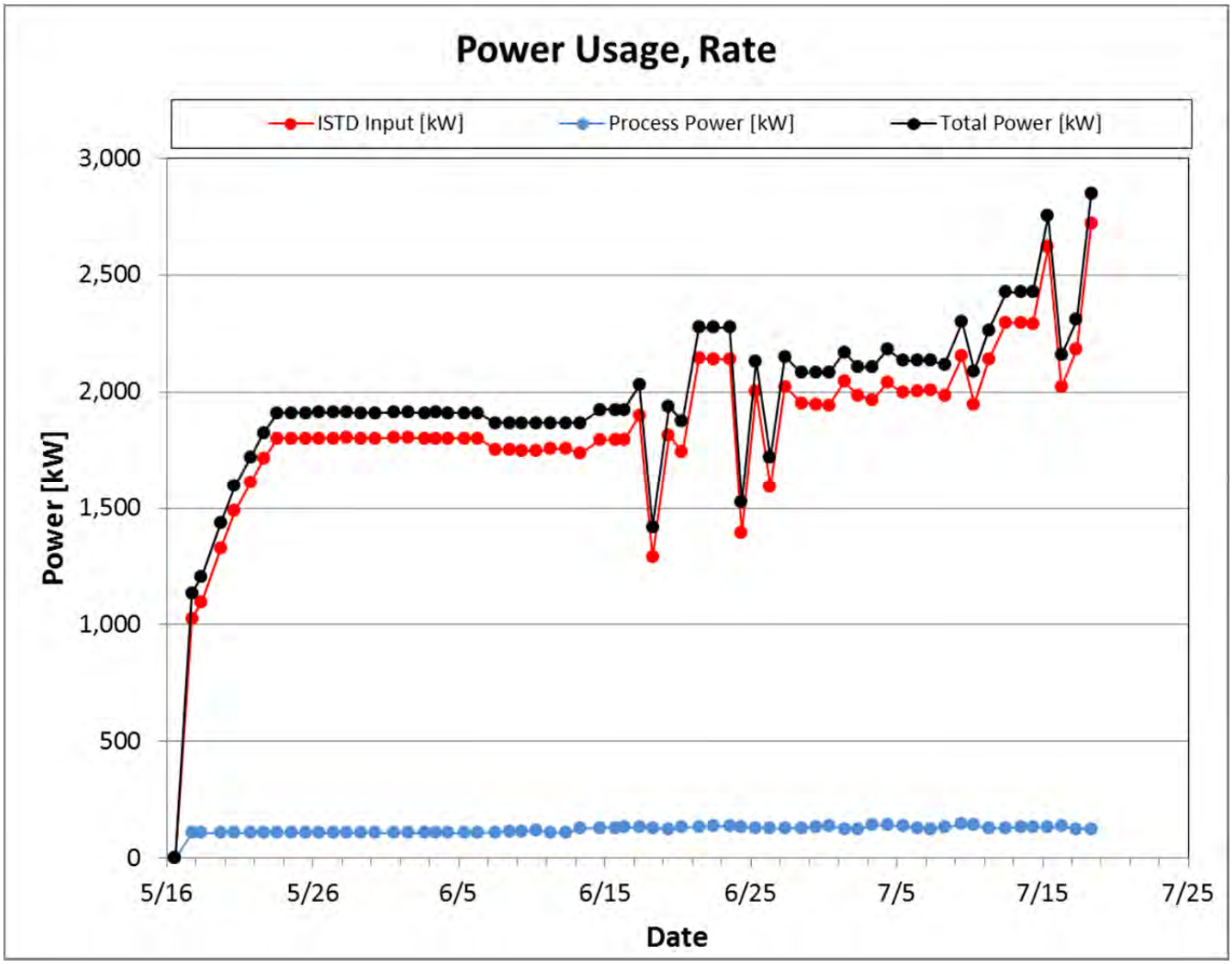


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

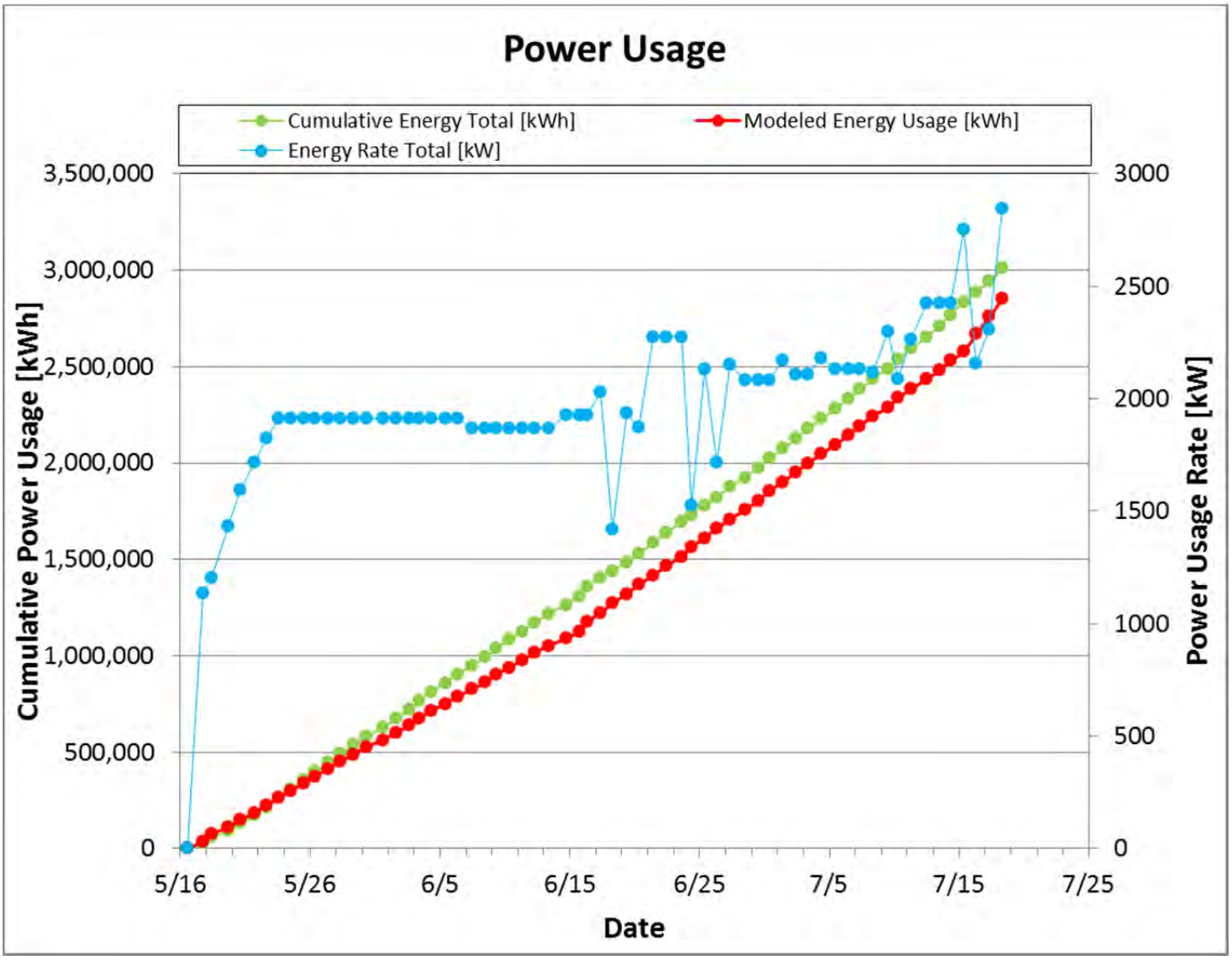


Figure 9. Power Usage

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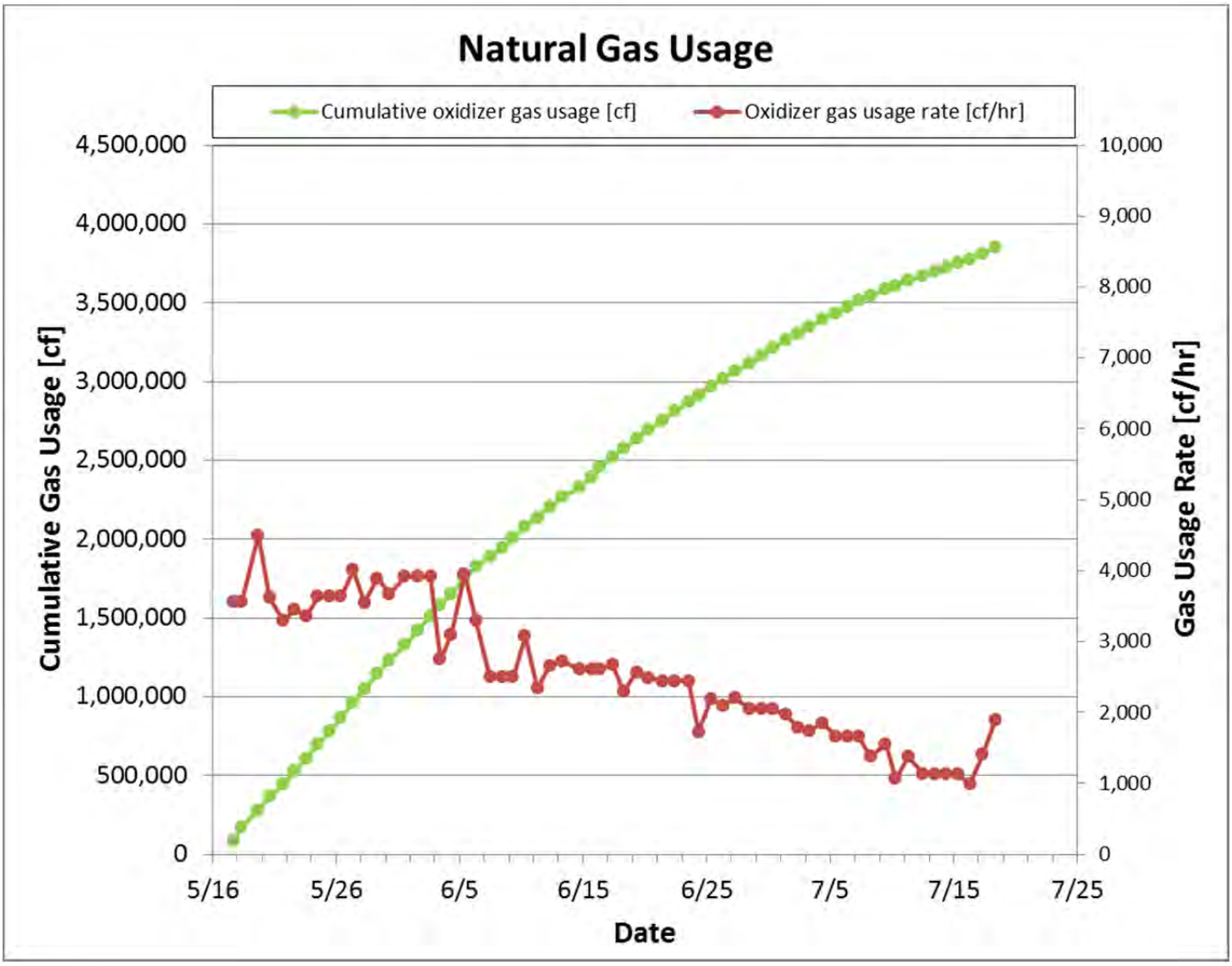


Figure 10. Natural Gas Usage

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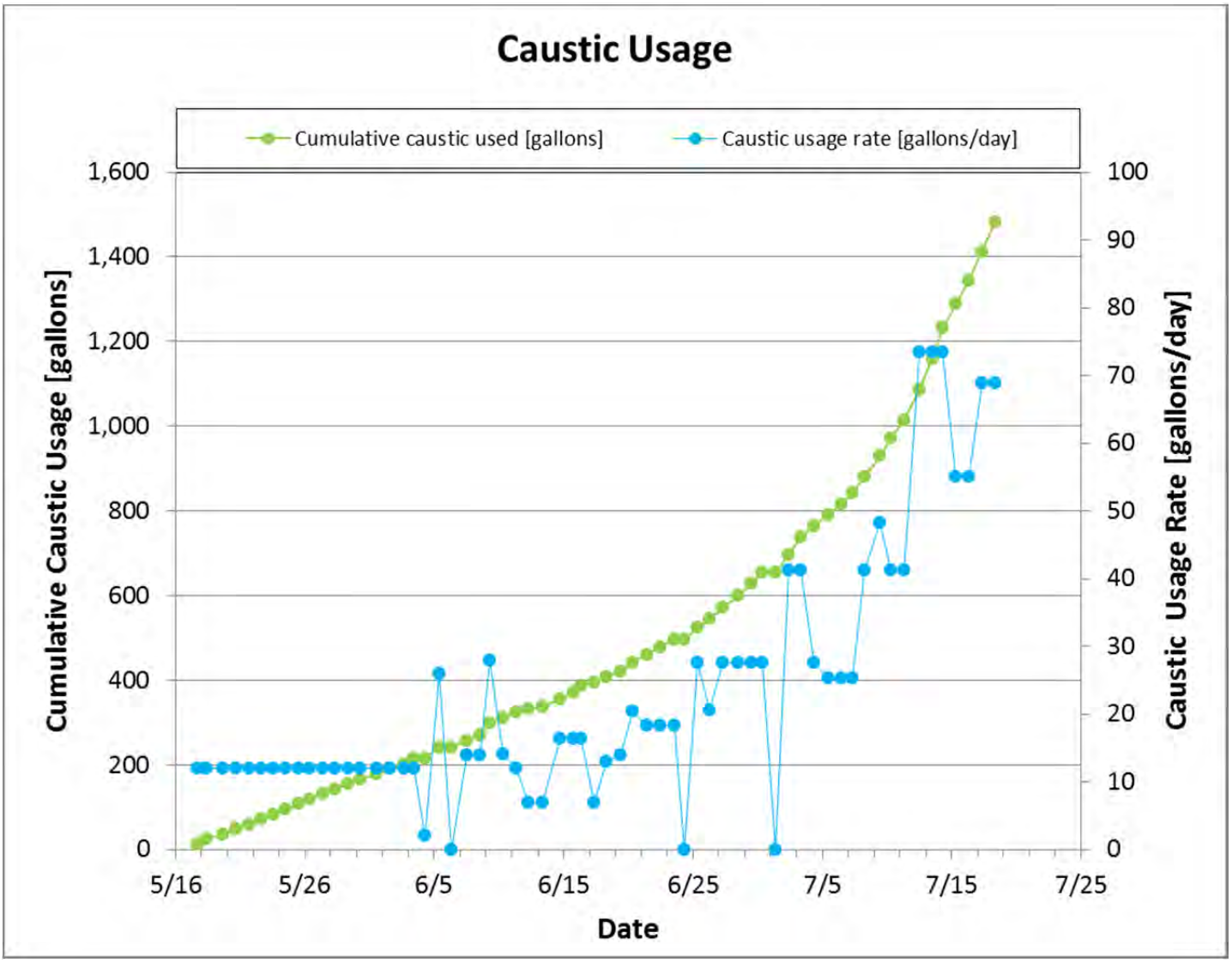


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12. Phase 2 centroids are shown in Figure 13. The scatterplots have been updated to show the centroids grouped by depth, with each depth range shown as a different color. A table with percentages is also shown (Table 3) as it is often necessary to decrease energy to specific thermocouples after achieving 100°C. Variations, or decreases in temperature, are often observed; however there is significant energy that remains in the subsurface to continue to treat contaminants.

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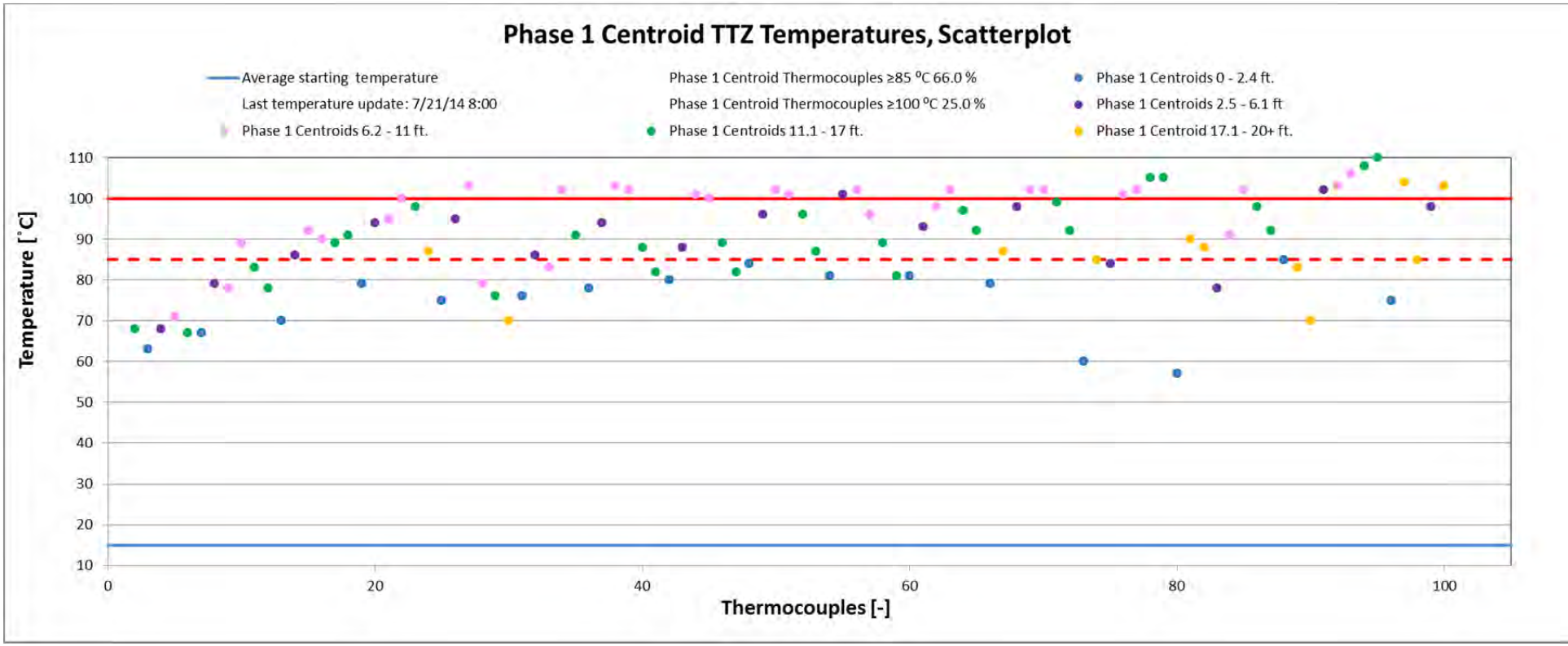


Figure 12. Phase 1 Centroid TTZ Temperatures, Scatterplot

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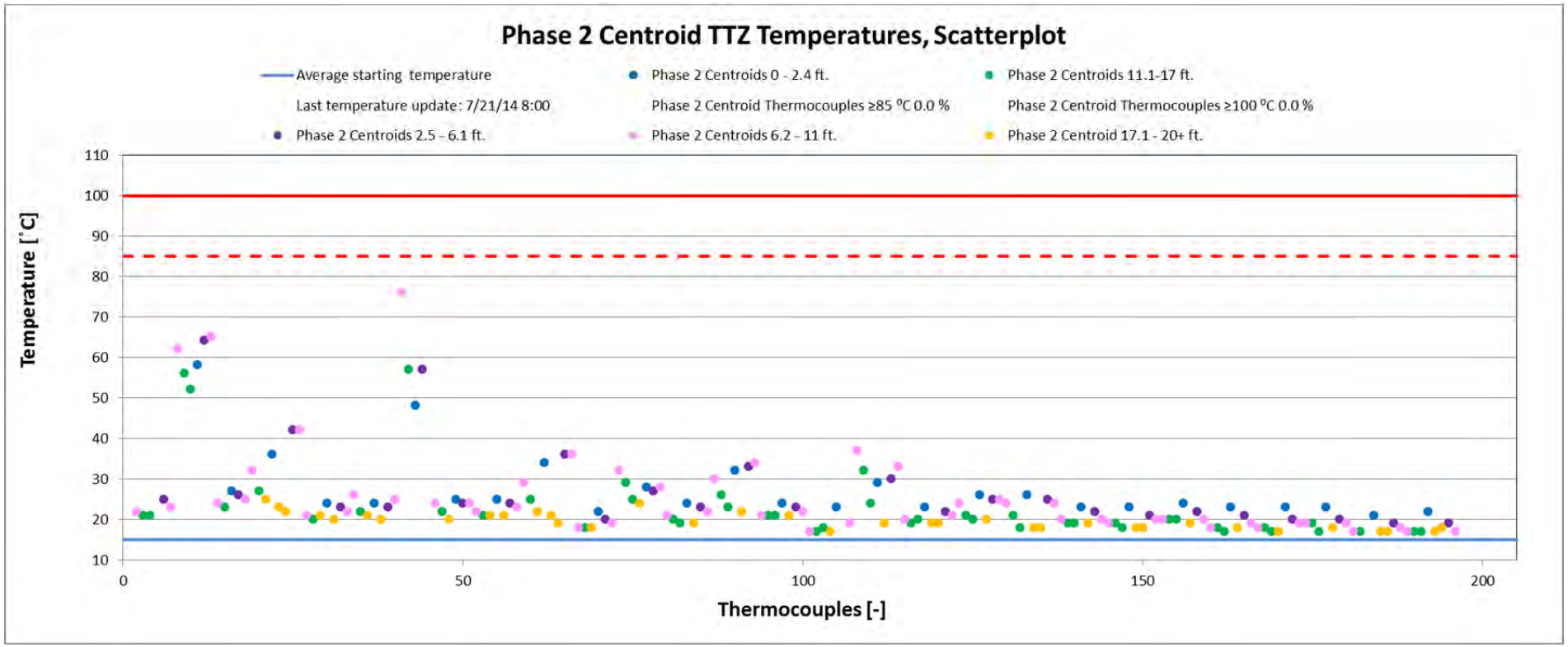


Figure 13. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples at Target Temperatures

Temperature Scatterplots

	Value	Unit
Date of Last Update	7/21/14	
Phase 1 Centroid Thermocouples ≥85 ^{0}C	66.0	%
Phase 1 Centroid Thermocouples ≥100 ^{0}C	25.0	%
Phase 2 Centroid Thermocouples ≥85 ^{0}C	0.0	%
Phase 2 Centroid Thermocouples ≥100 ^{0}C	0.0	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday July 18, 2014 through Friday July 25, 2014, with temperatures updated through Monday July 28, 2014.

Table 1 provides a summary of the project operational status as of Friday, July 25, 2014.

Table 1. Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	07/25/14	
Last Temperature Data Update	07/27/14	
Estimated Days of Operation (Total)	195	days
Days of Operation (Total)	71	days
Days of Operation vs. Estimate (Total)	37	%
Estimated Days of Operation Phase 1 (Day 1-134)	135	days
Days of Phase 1 Operation	71	days
Days of Phase 1 Operation vs. Estimate	53	%
Estimated Days of Operation Phase 2 (Day 61-195)	135	days
Days of Phase 2 Operation	9	days
Days of Phase 2 Operation vs. Estimate	6.9	%
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	3,524,600	kWh
Used Electrical Energy vs. Estimate	22.3	%
Total Vapor Mass Removal (based on Oxidizer PID Readings)	17,570	lbs
Estimated Mass Removed as LNAPL	1,051	lbs
Average Power Input Last 24 Hours	3,400	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,745	scfm
Average Condensate Production Rate Last 24 Hours	2.3	gpm

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Treatment of Phase 1 is progressing as expected. Phase 1 average wellfield temperature is 93C, and Phase 2 average wellfield temperature is 36C, both of which are on track with our temperature model (Figure 1a). Thermocouples in Phase 1 are heating up relatively uniformly (as seen on Figure 12).

Phase 2 was energized on 7/16/14. The heating of Phase 2 will progress using the same ramp up heater schedule, except over double the duration of Phase 1.

Total mass removed to date is approximately 18,621 lbs (combined vapor [based on PID] and LNAPL). Phase 1/Phase 2 differentiation readings were collected in the wellfield on 7/24/14. The ratio of mass coming from Phase 1:Phase 2 on that date was nearly 1:1 (0.51 for Phase 1, 0.49 for Phase 2). These ratios were applied to the total combined vapor flow/concentration data to estimate the amount from each phase.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling. As of July 27, 2014, Figure 1a shows that the actual Phase 1 average temperature is less than the predicted temperature by approximately 1C. We believe this is due to the cooler air introduced from Phase 2.

Phase 2 heating began on 7/16/14. The heating of Phase 2 will progress using the same ramp up heater schedule, except over double the duration of Phase 1. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling. As of July 27, 2014, Figure 1b shows that the actual Phase 2 average temperature is approximately 6C above the predicted temperature.

Table 2. Temperature Summary

Temperatures TTZ		
Type	**Value**	**Unit**
Date of Last Update	7/27/14	
Phase 1 Entire TTZ Average Temperature	93	°C
Phase 2 Entire TTZ Average Temperature	36	°C
Phase 1 Centroid Average Temperature	92	°C
Phase 2 Centroid Average Temperature	29	°C

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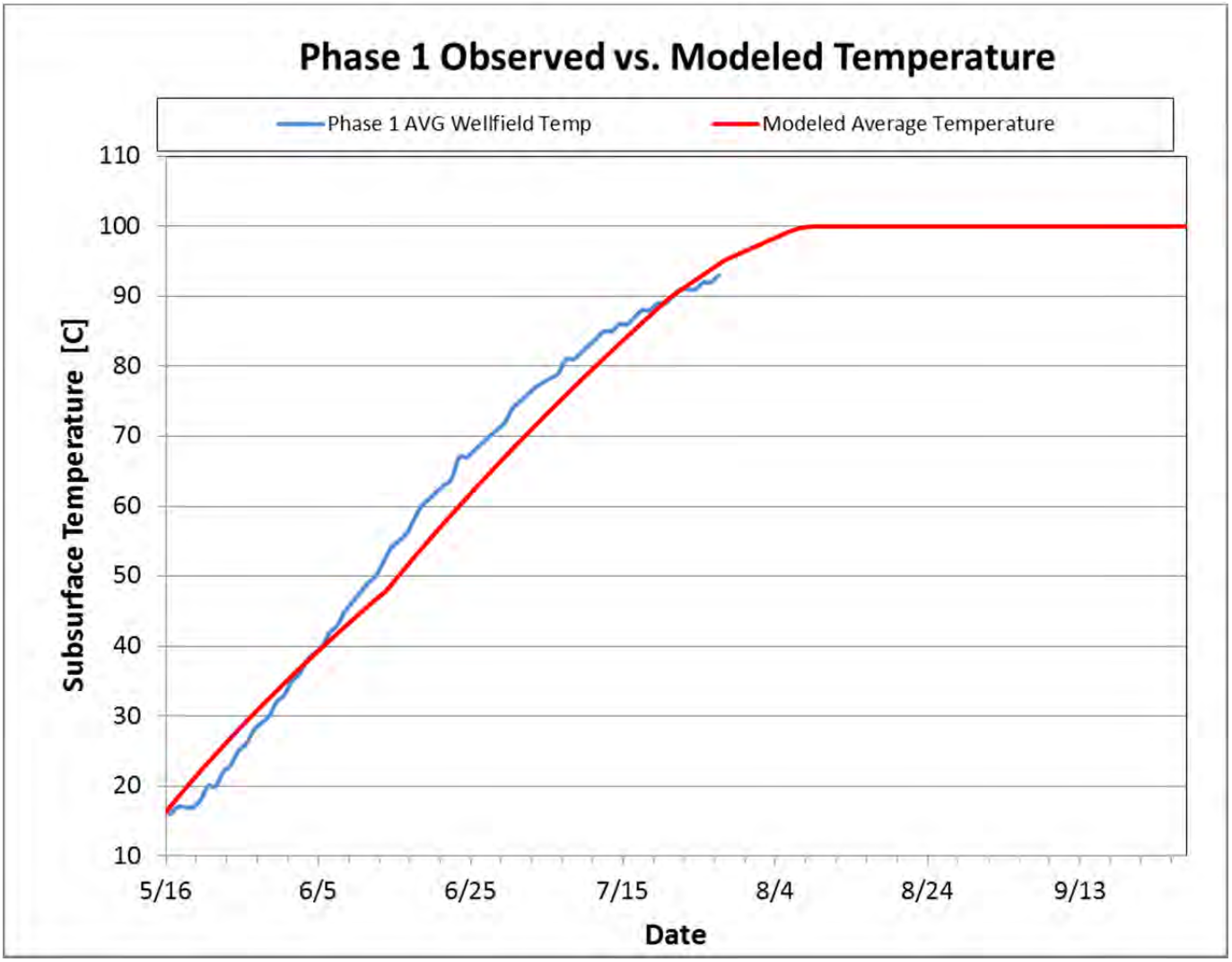


Figure 1a. Phase 1 Observed vs. Modeled Temperatures

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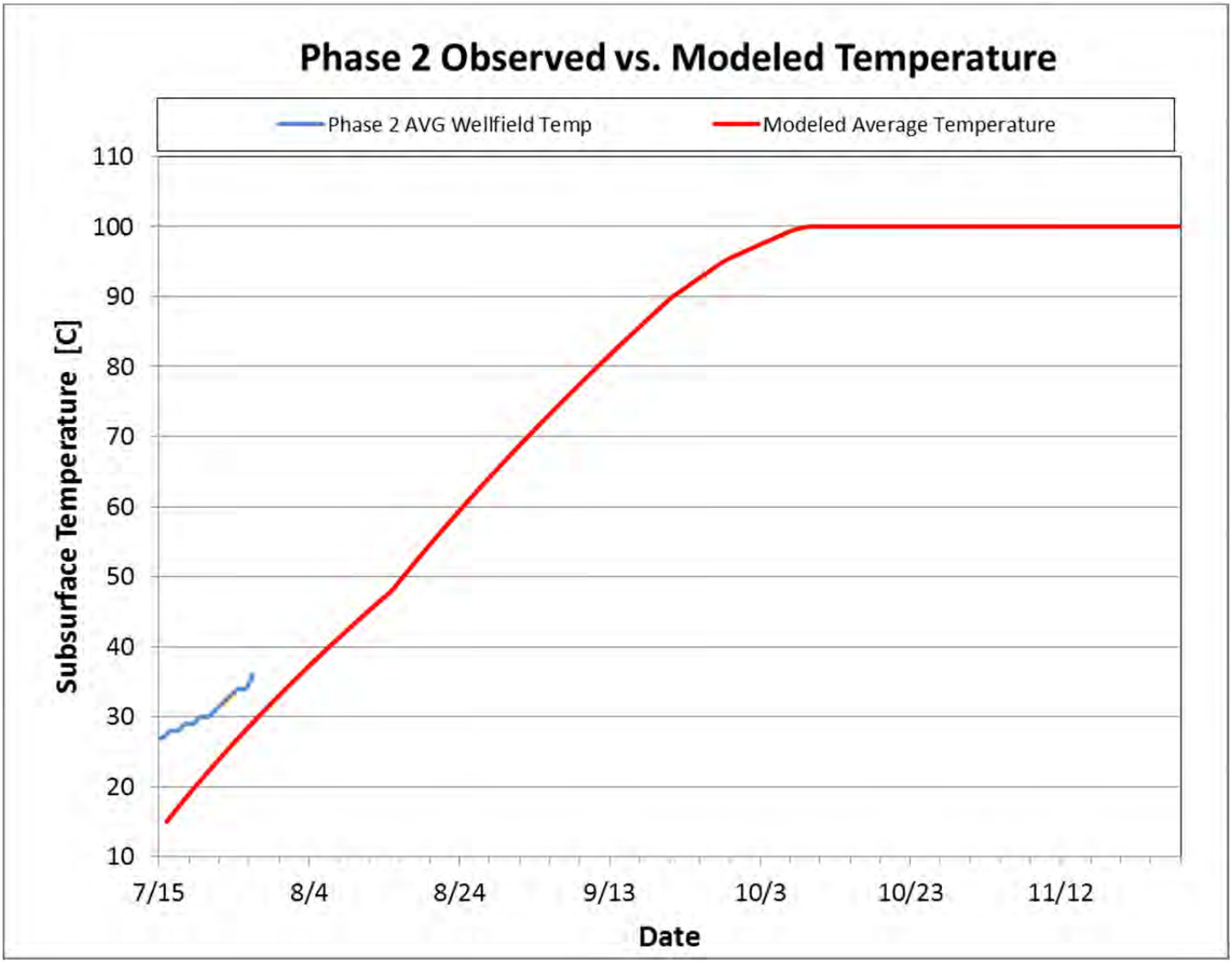


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area.

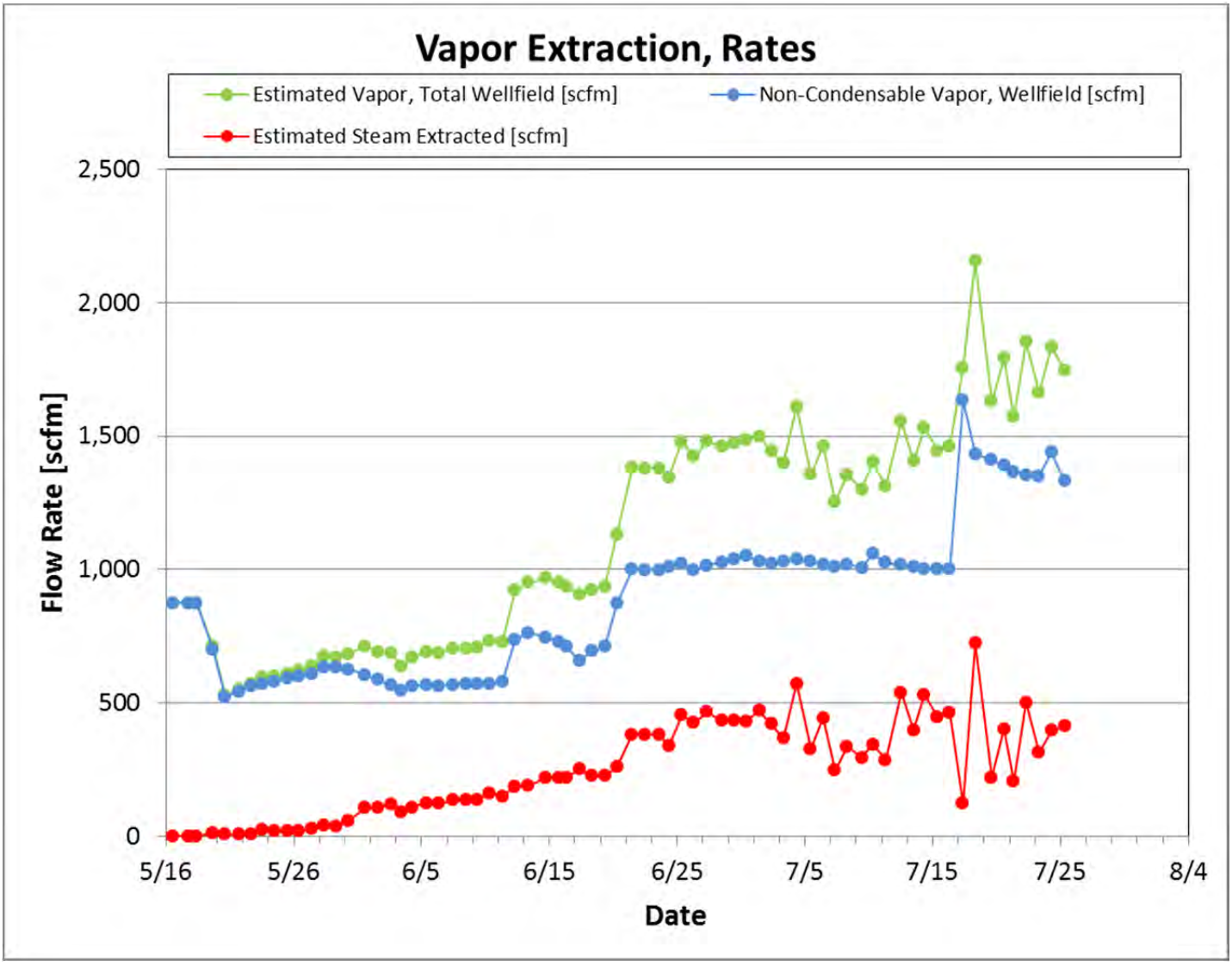


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) (also known as the lower explosive limit (LEL)) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent one manual daily reading from the analyzer. This value is collected after dilution air is introduced into the system.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf. Currently, the vapors entering the oxidizer are low flammability (<5% LFL) and do not approach the contract limit, although an increase in flammability can be seen after the dilution air valve was closed on June 20, 2014.

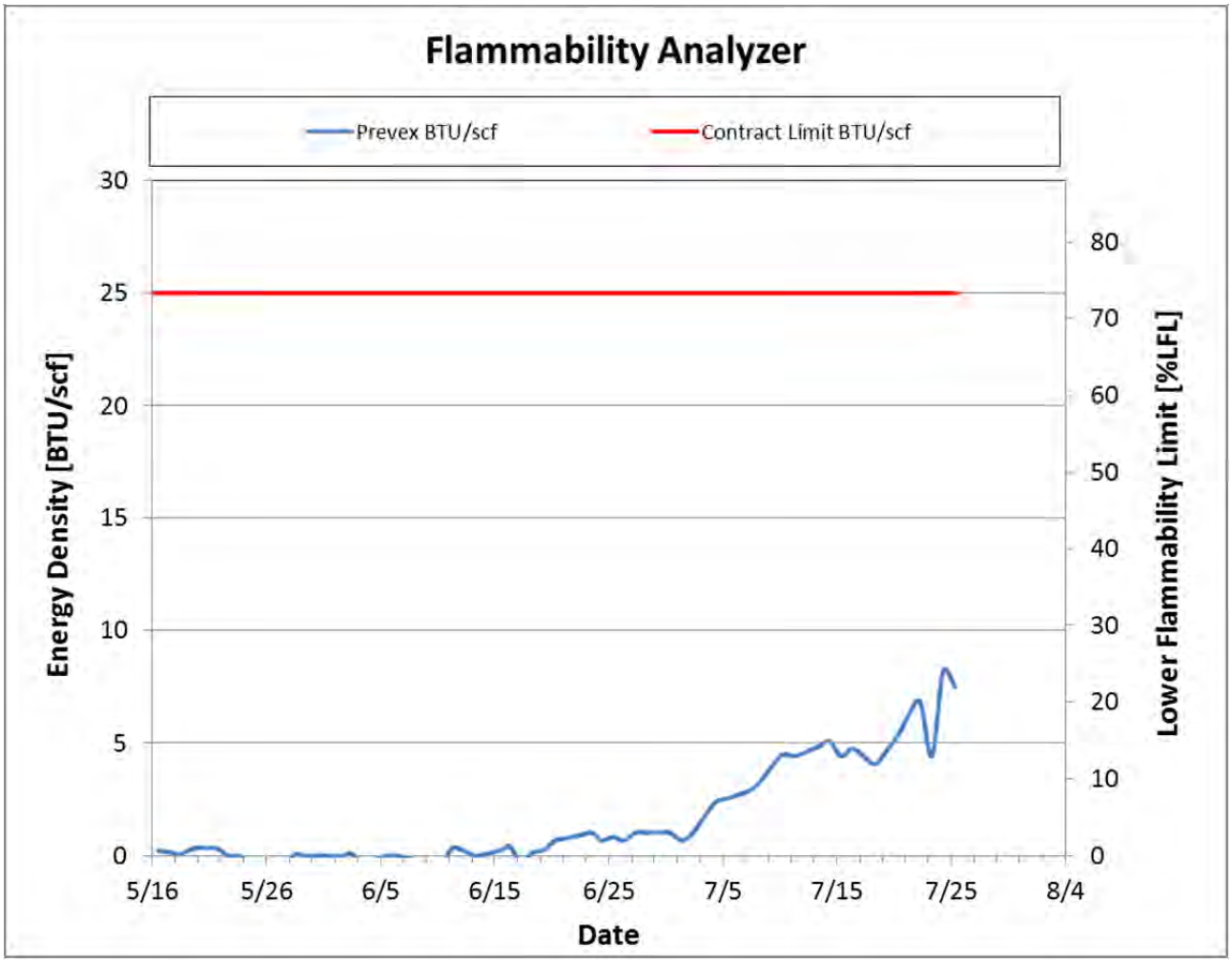


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated total mass removal based on daily photoionization detector (PID) readings and laboratory data (total of Phase 1 and Phase 2) and LNAPL are shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2.

The below graphs are prepared using laboratory data results from 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, and 7/8/14.

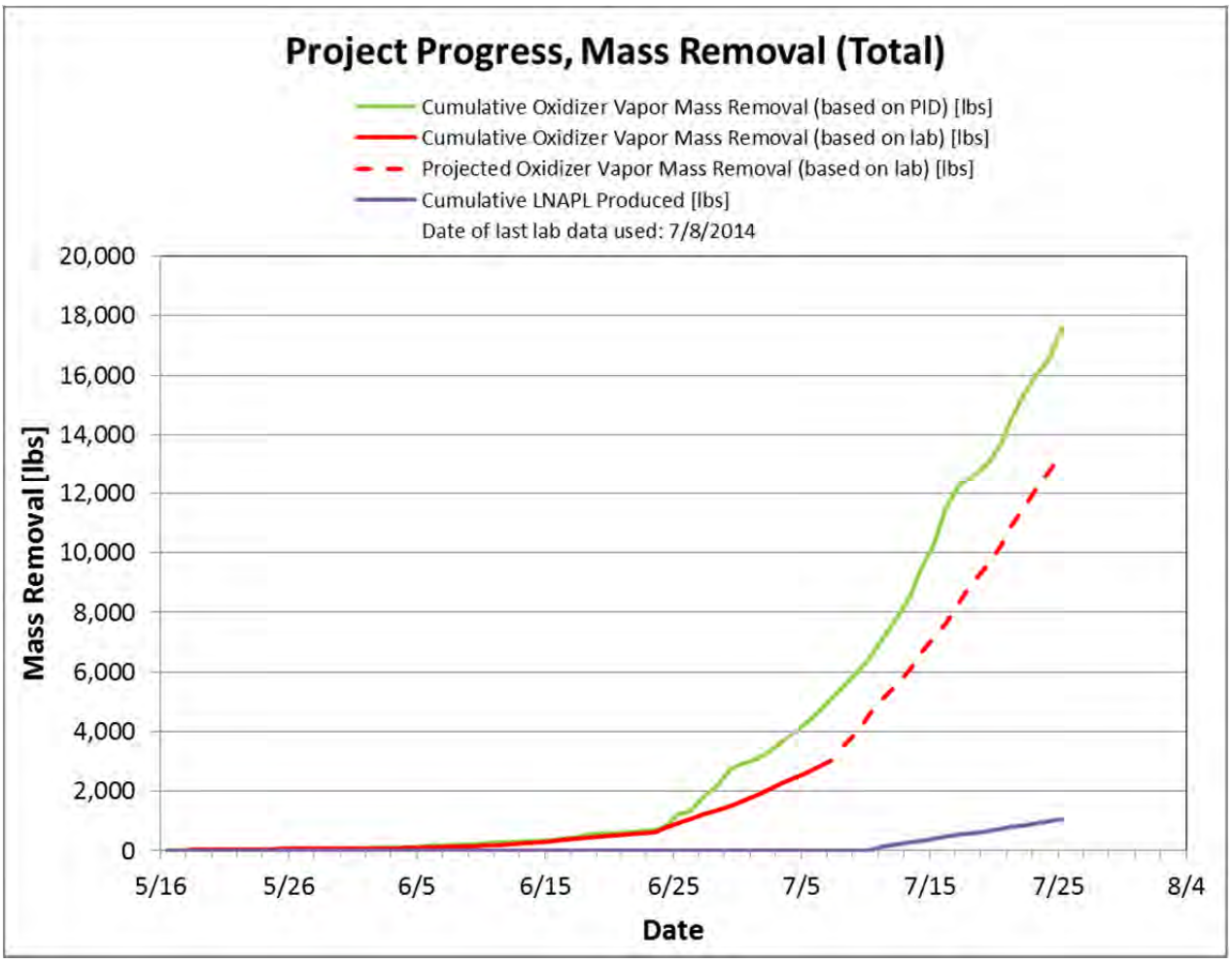


Figure 4a. Project Progress, Mass Removal (Total)

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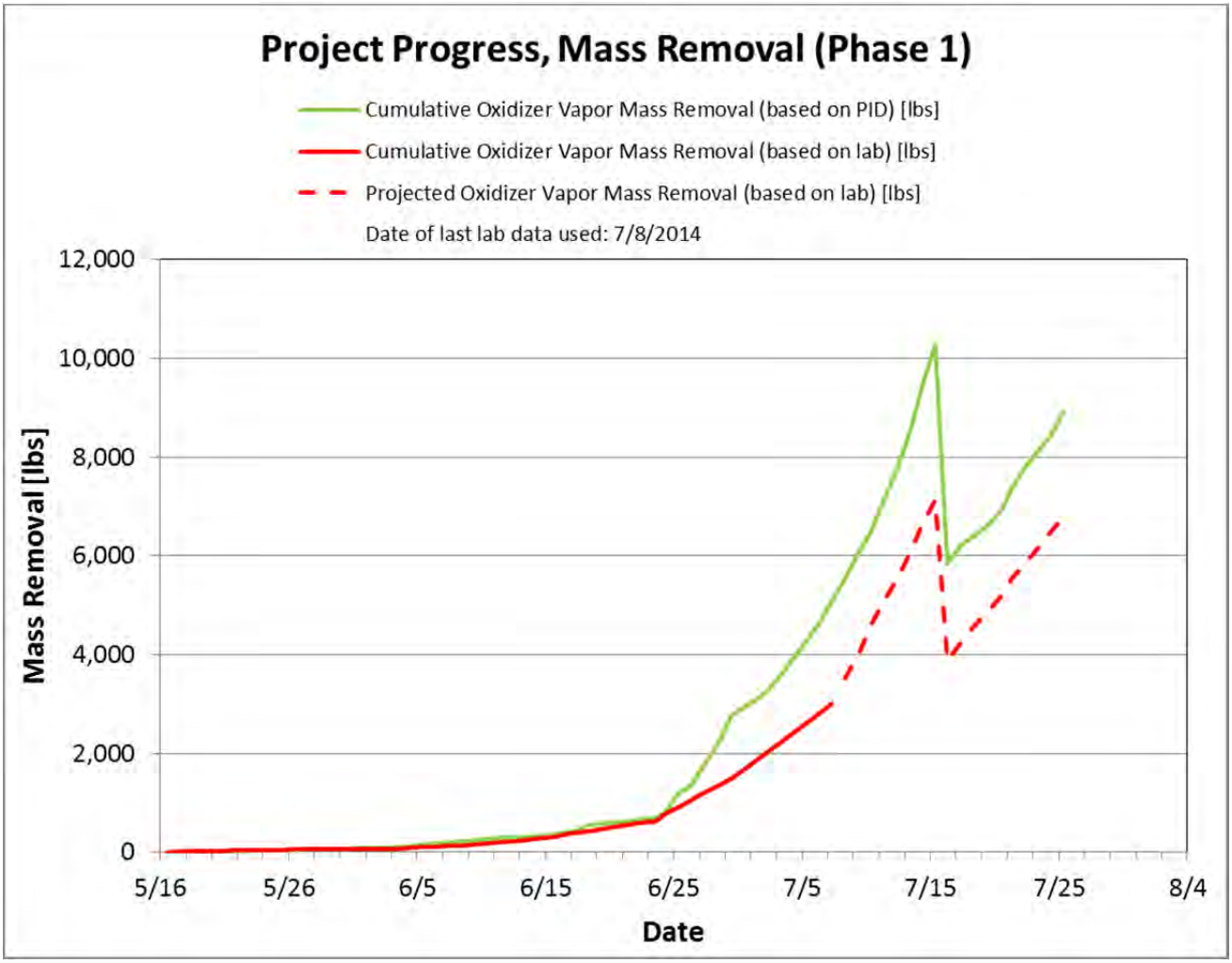


Figure 4b. Project Progress, Mass Removal (Phase 1)

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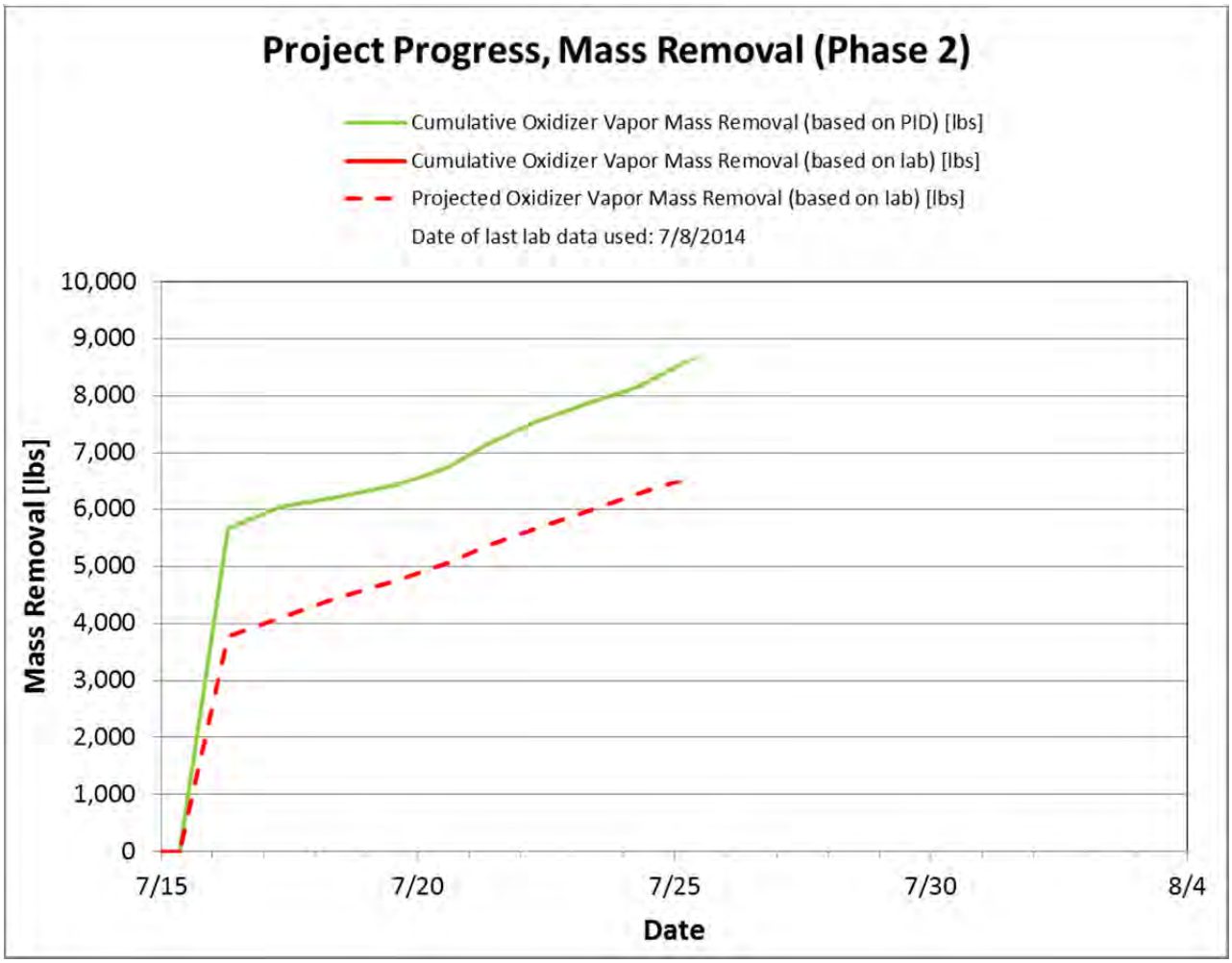


Figure 4c. Project Progress, Mass Removal (Phase 2)

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Figure 5 below displays the daily PID readings collected at the oxidizer influent over time. It should be noted that the PID reading from 7/16/14 was obtained with a PID with a 10.6 eV lamp, instead of the 11.7 eV lamp which had reached the upper concentration limit of 2000 ppmV.

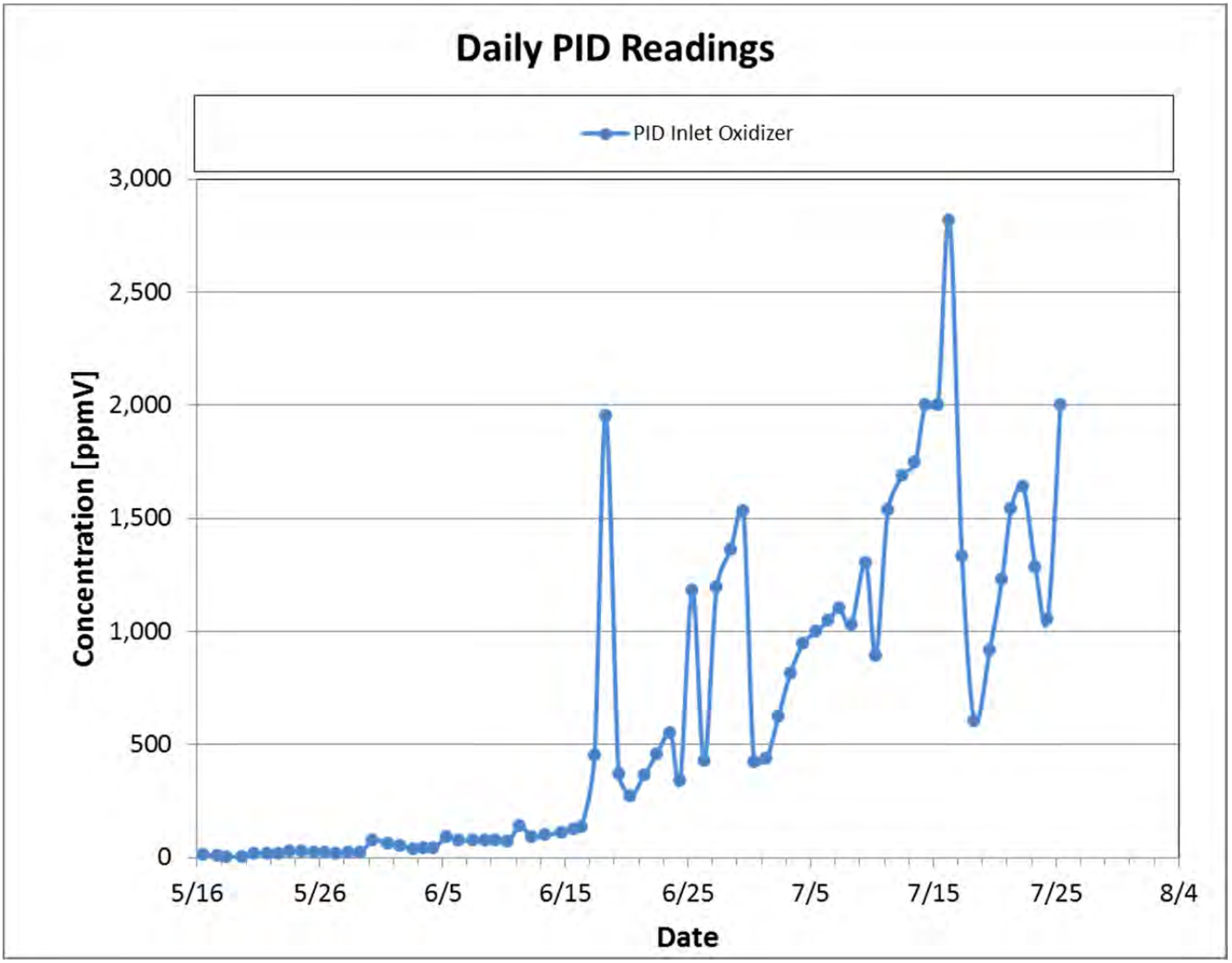


Figure 5. Daily PID Readings

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations will become closer to 100%.

A fifth laboratory influent/effluent data set has been added to the graph, confirming >99.5% removal efficiency in the vapor treatment system. Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

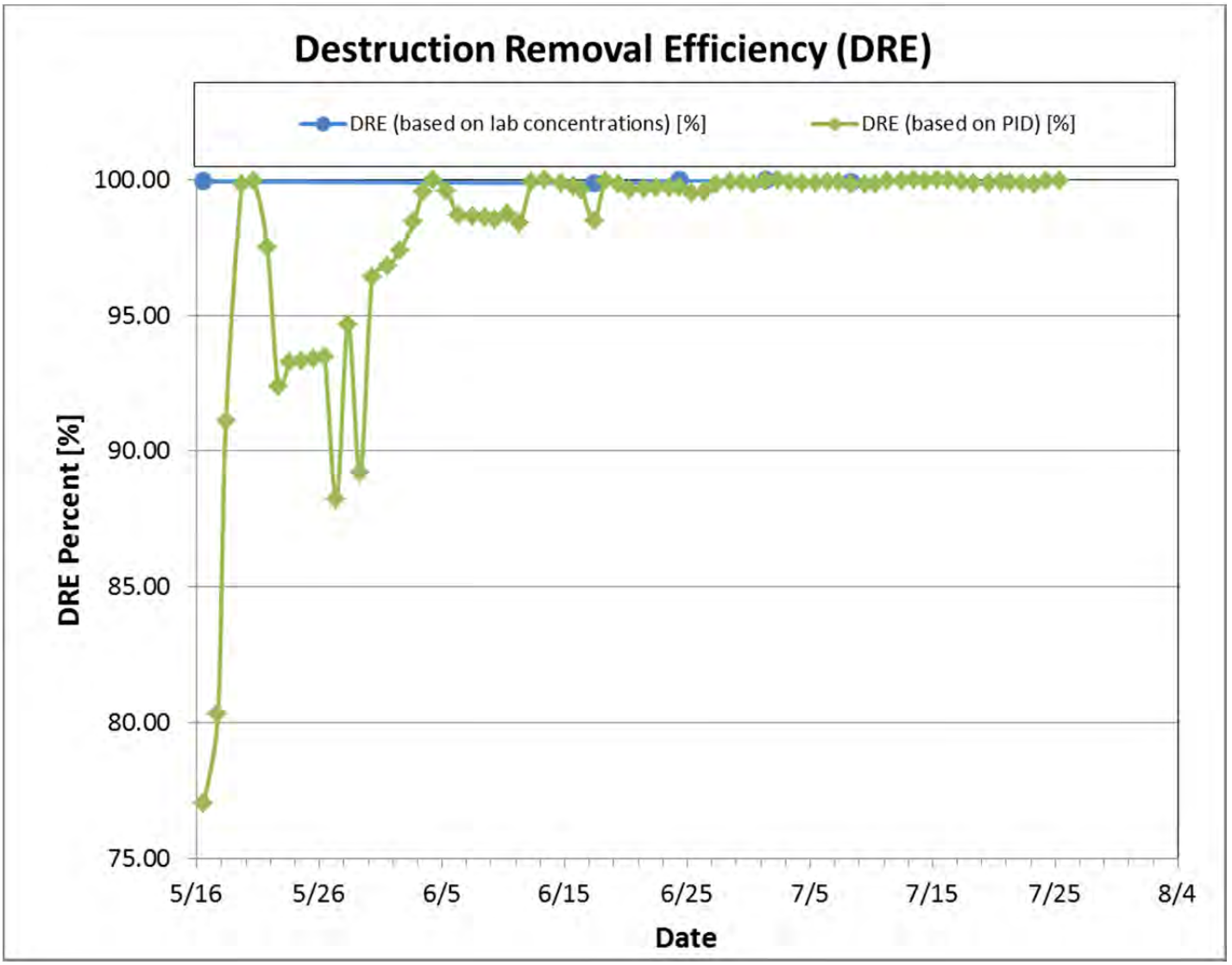


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7.

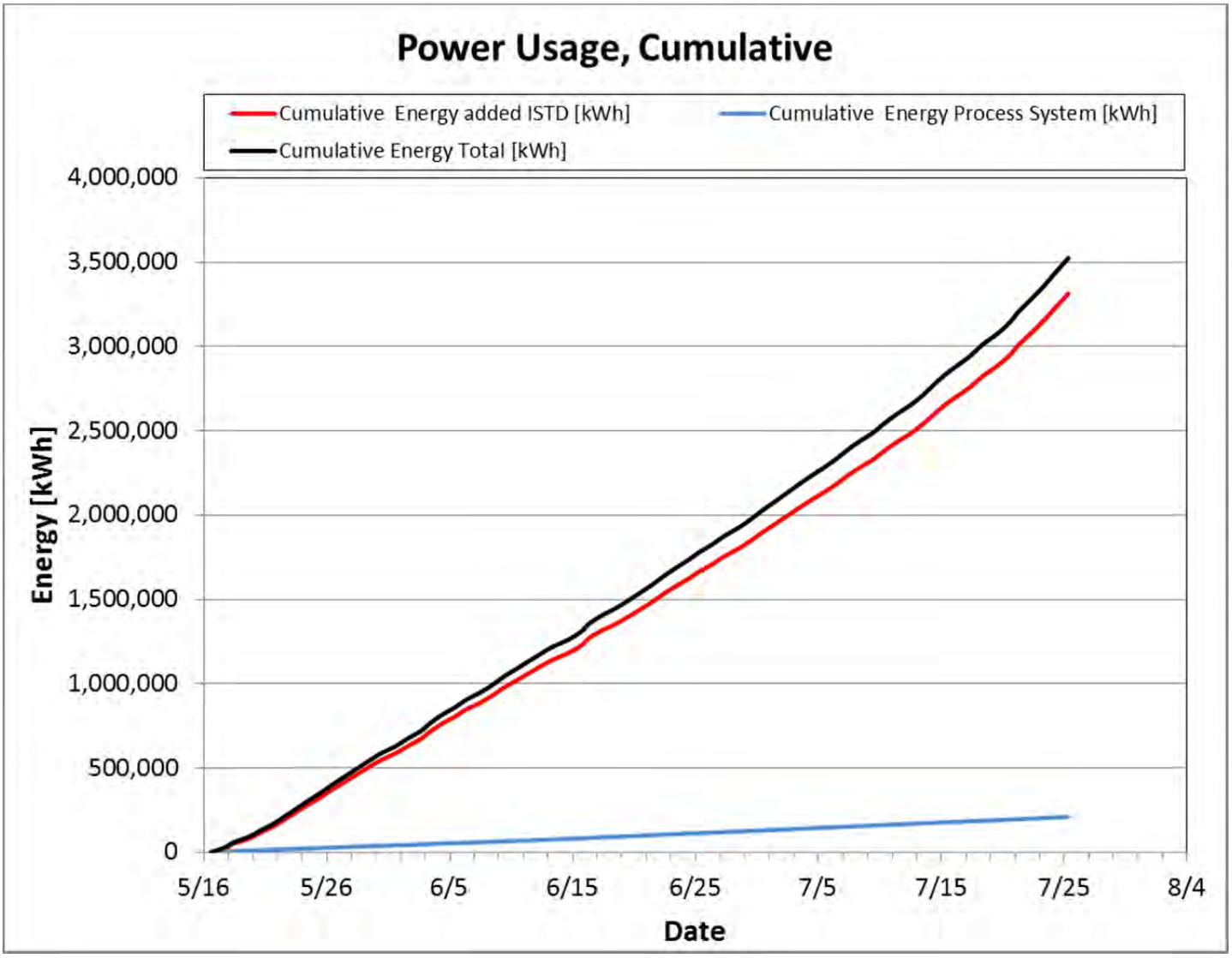


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days.

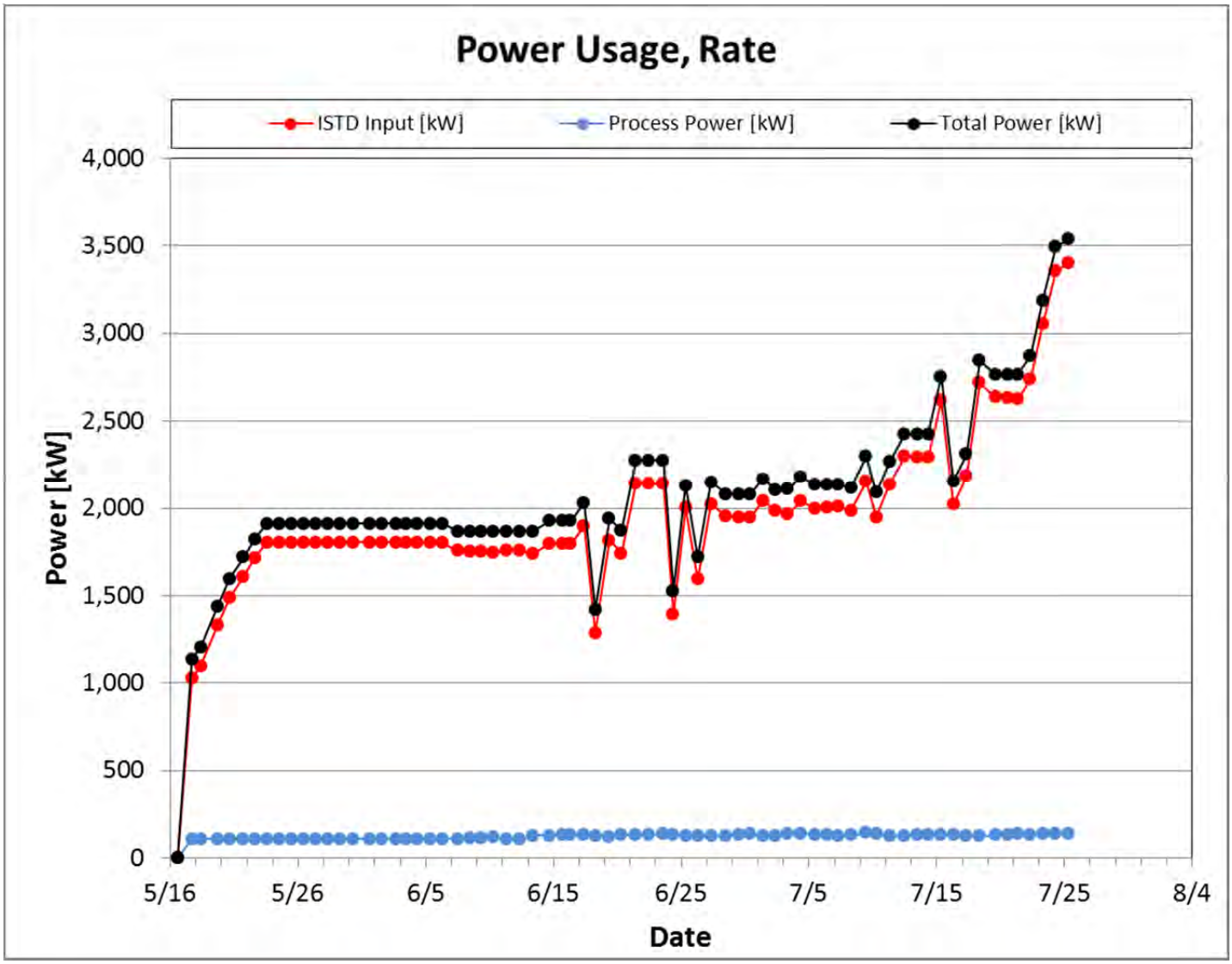


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

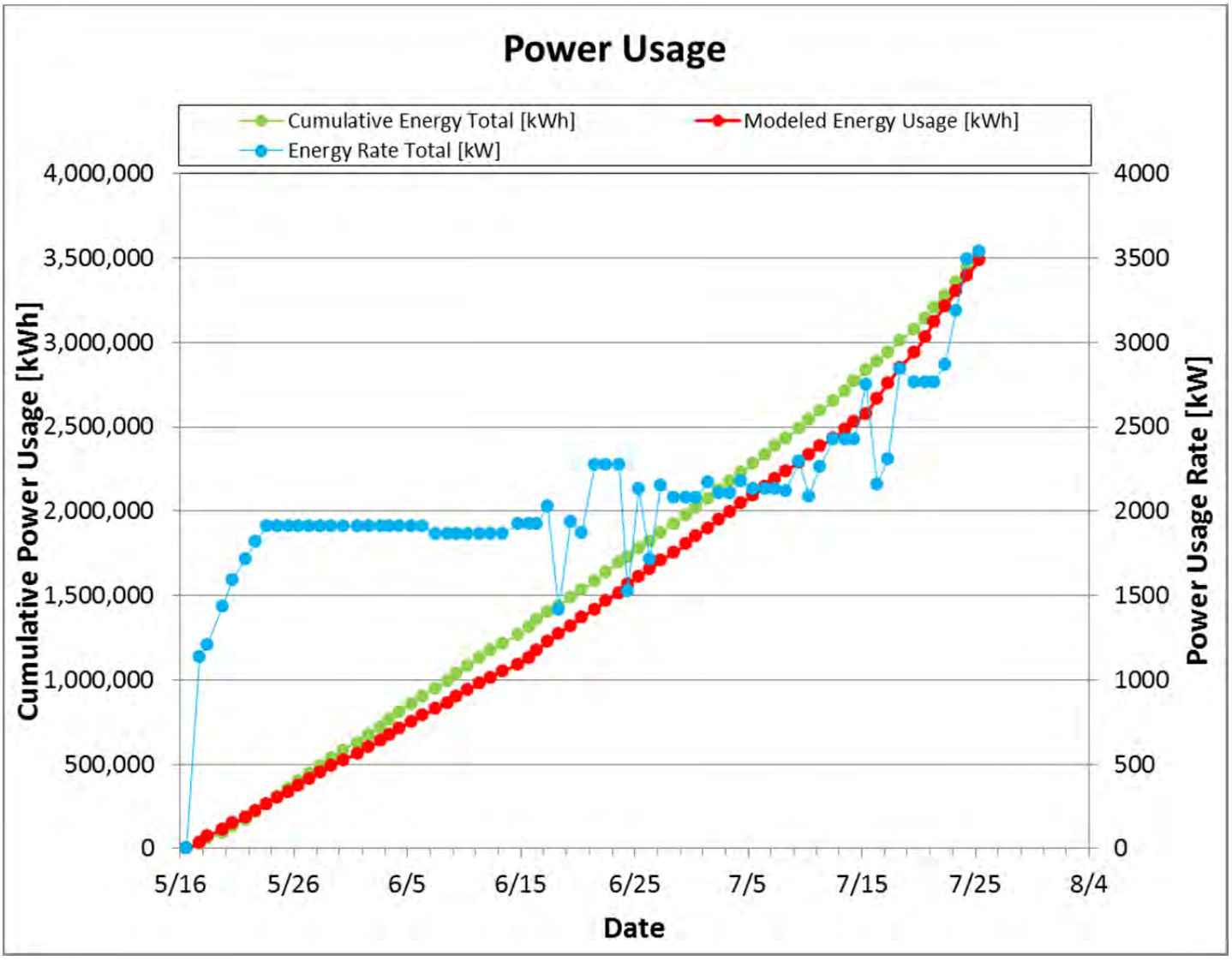


Figure 9. Power Usage

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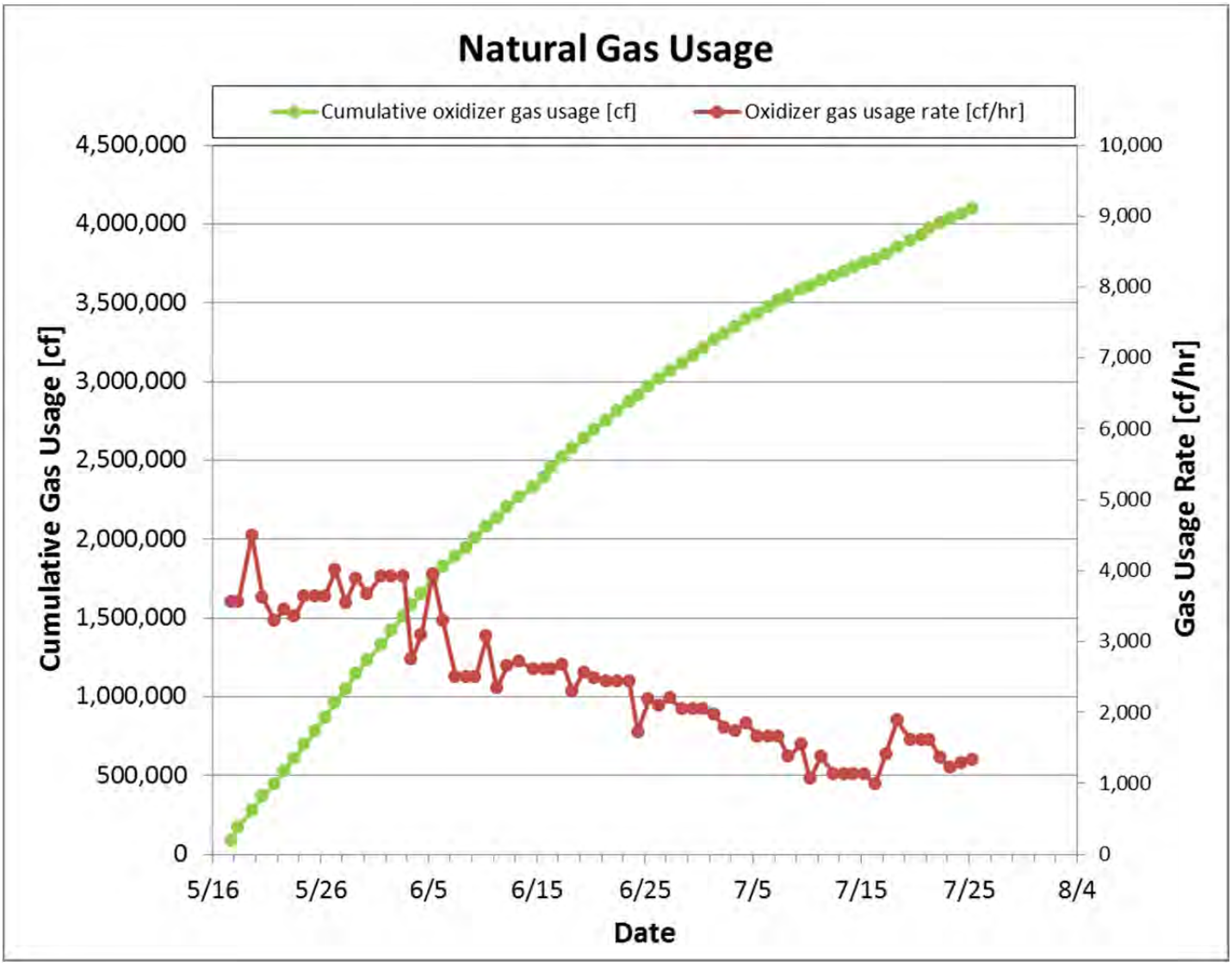


Figure 10. Natural Gas Usage

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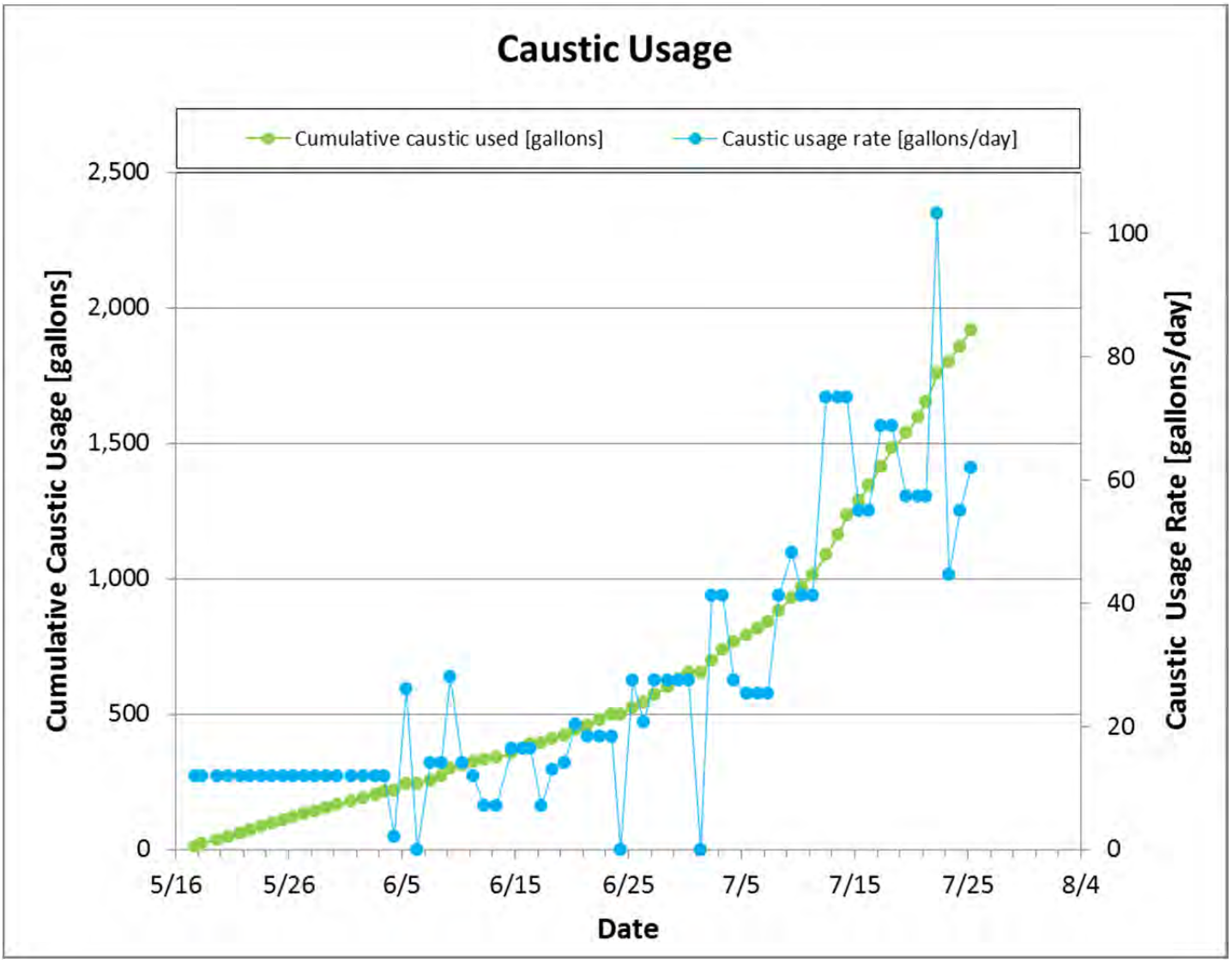


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12. As of 7/25/14, we have reached the first payment milestone for Phase 1.

Phase 2 centroids are shown in Figure 13. The scatterplots have been updated to show the centroids grouped by depth, with each depth range shown as a different color. A table with percentages is also shown (Table 3) as it is often necessary to adjust energy to specific thermocouples after achieving 100°C. Variations, or decreases in temperature, are often observed; however there is significant energy that remains in the subsurface to continue to treat contaminants.

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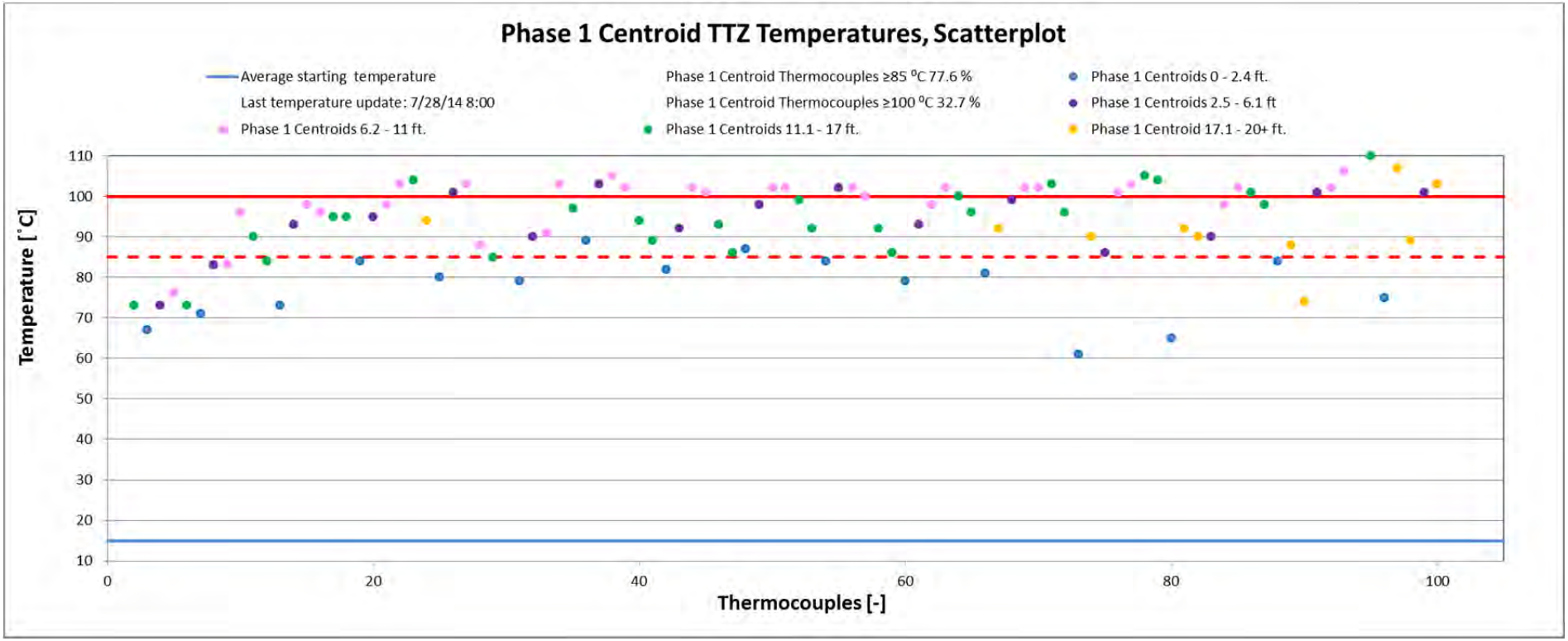


Figure 12. Phase 1 Centroid TTZ Temperatures, Scatterplot

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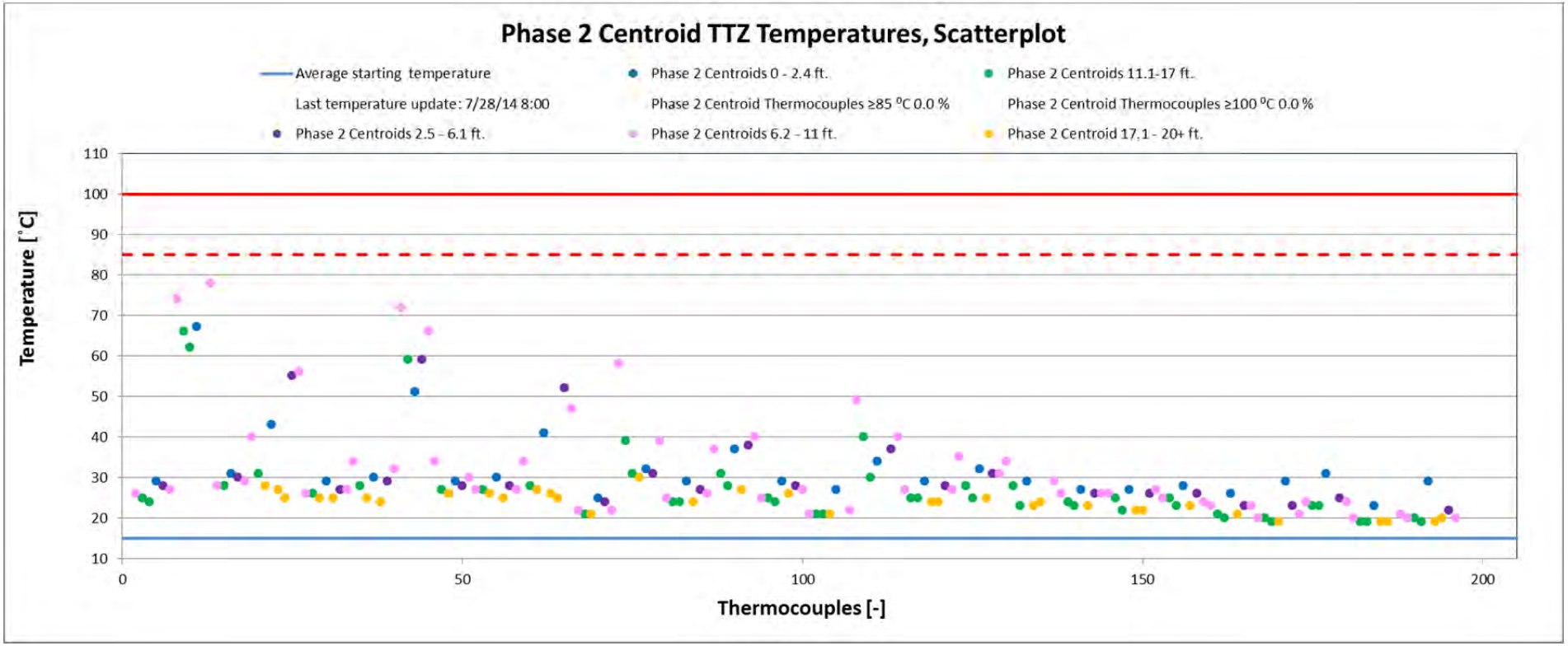


Figure 13. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples at Target Temperatures

Temperature Scatterplots

	Value	Unit
Date of Last Update	7/28/14	
Phase 1 Centroid Thermocouples ≥85 ^{0}C	77.6	%
Phase 1 Centroid Thermocouples ≥100 ^{0}C	32.7	%
Phase 2 Centroid Thermocouples ≥85 ^{0}C	0.0	%
Phase 2 Centroid Thermocouples ≥100 ^{0}C	0.0	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday July 25, 2014 through Friday August 1, 2014, with temperatures updated through Monday August 4, 2014.

Table 1 provides a summary of the project operational status as of Friday, August 1, 2014.

Table 1. Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	08/01/14	
Last Temperature Data Update	07/31/14	
Estimated Days of Operation (Total)	195	days
Days of Operation (Total)	78	days
Days of Operation vs. Estimate (Total)	40	%
Estimated Days of Operation Phase 1 (Day 1-134)	135	days
Days of Phase 1 Operation	78	days
Days of Phase 1 Operation vs. Estimate	58	%
Estimated Days of Operation Phase 2 (Day 61-195)	135	days
Days of Phase 2 Operation	16	days
Days of Phase 2 Operation vs. Estimate	12.1	%
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	4,112,600	kWh
Used Electrical Energy vs. Estimate	26.0	%
Total Vapor Mass Removal (based on Oxidizer PID Readings)	14,840	lbs
Estimated Mass Removed as LNAPL	1,576	lbs
Average Power Input Last 24 Hours	3,540	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,917	scfm
Average Condensate Production Rate Last 24 Hours	3.5	gpm

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As of 8/01/14, phase 1 has operated for 78 days and phase 2 for 16 days. Treatment of both Phase 1 and phase 2 is progressing as expected. Phase 1 average wellfield temperature is 95C, and Phase 2 average wellfield temperature is 45C, both of which are on track with our temperature model (Figures 1a and 1b). Thermocouples in both phases continue to heat up relatively uniformly (as seen on Figures 12a/b). Temperatures in the shallow zone appear to be constant (neither increase nor decrease).

Total mass removed to date is approximately 16,416 lbs (combined vapor [based on PID] and LNAPL). Note that this total has decreased from the estimate reported in last week's report due to a lower response factor established for the 7/15/14 laboratory data results. Also note that LNAPL has been added to the figure as total. It is not possible to differentiate LNAPL removal between phase 1 and Phase 2.

Phase 1/phase 2 differentiation readings were collected in the wellfield on 7/24/14. The ratio of mass coming from Phase 1:Phase 2 on that date was nearly 1:1 (0.51 for Phase 1, 0.49 for Phase 2). These ratios were applied to the total combined vapor flow/concentration data to estimate the amount from each phase.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Phase 2 heating began on 7/16/14. The heating of Phase 2 will progress using the same ramp up heater schedule, except over double the duration of Phase 1. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ		
Type	**Value**	**Unit**
Date of Last Update	8/3/14	
Phase 1 Entire TTZ Average Temperature	95	°C
Phase 2 Entire TTZ Average Temperature	45	°C
Phase 1 Centroid Average Temperature	94	°C
Phase 2 Centroid Average Temperature	37	°C

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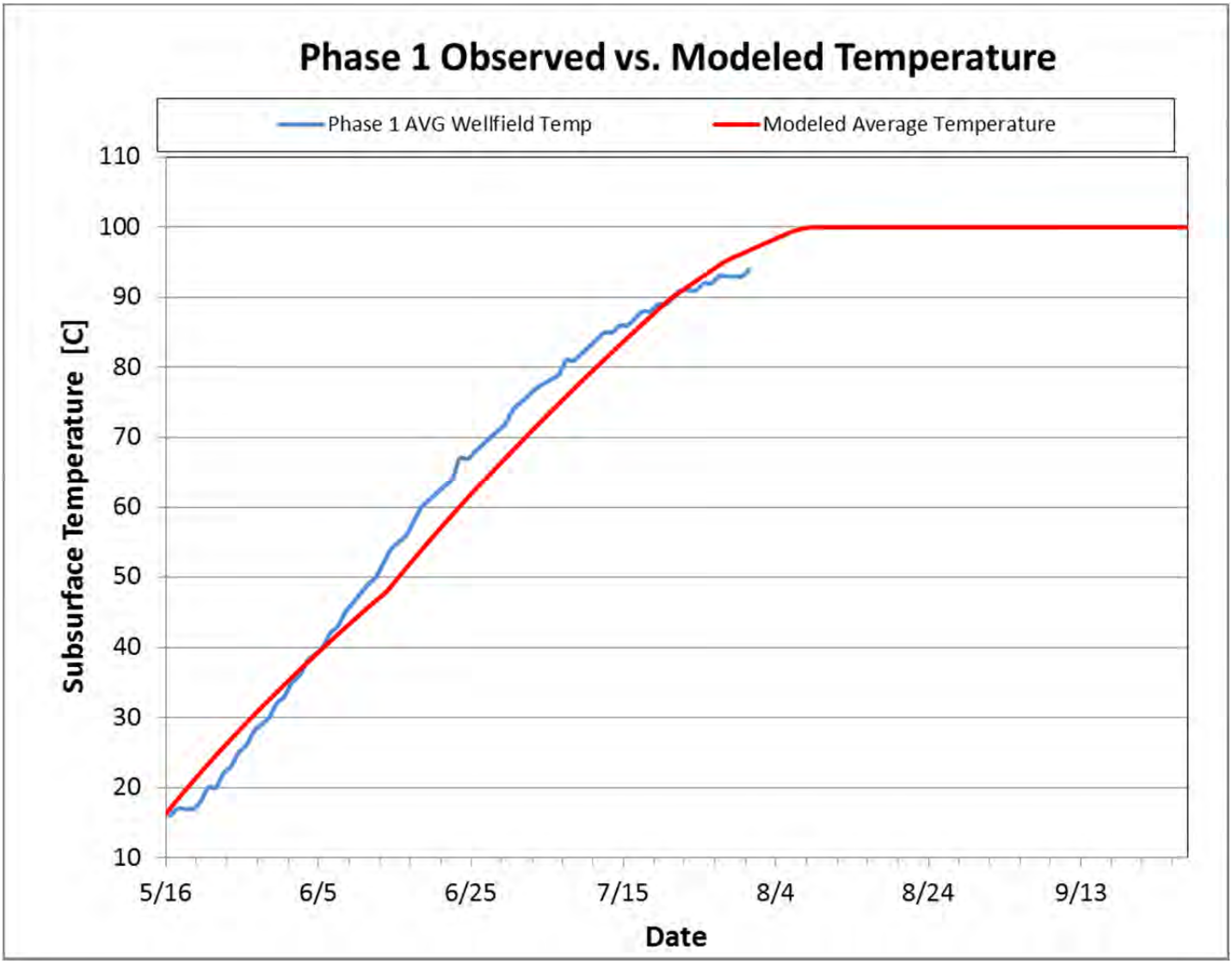


Figure 1a. Phase 1 Observed vs. Modeled Temperatures

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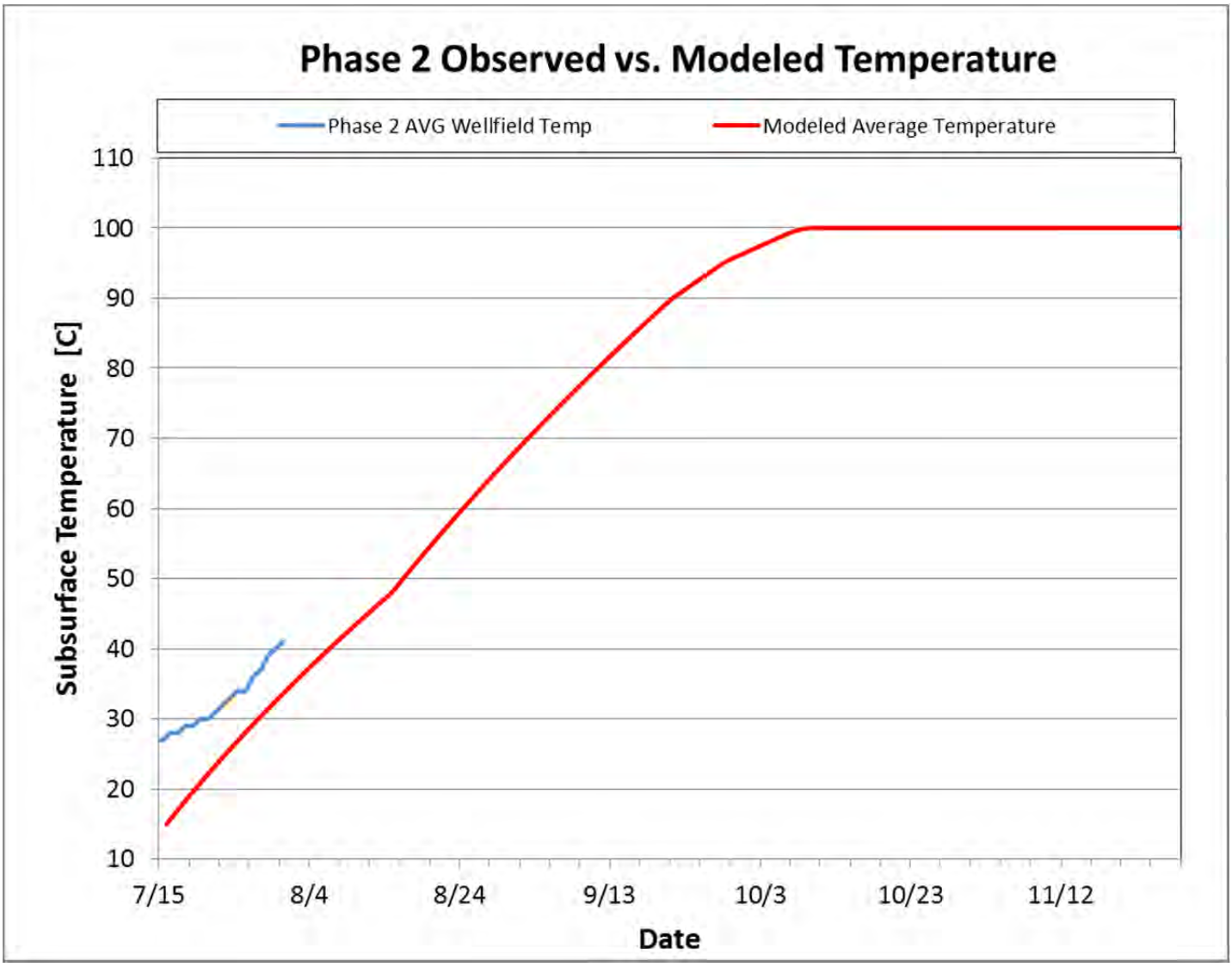


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the phase 2 area.

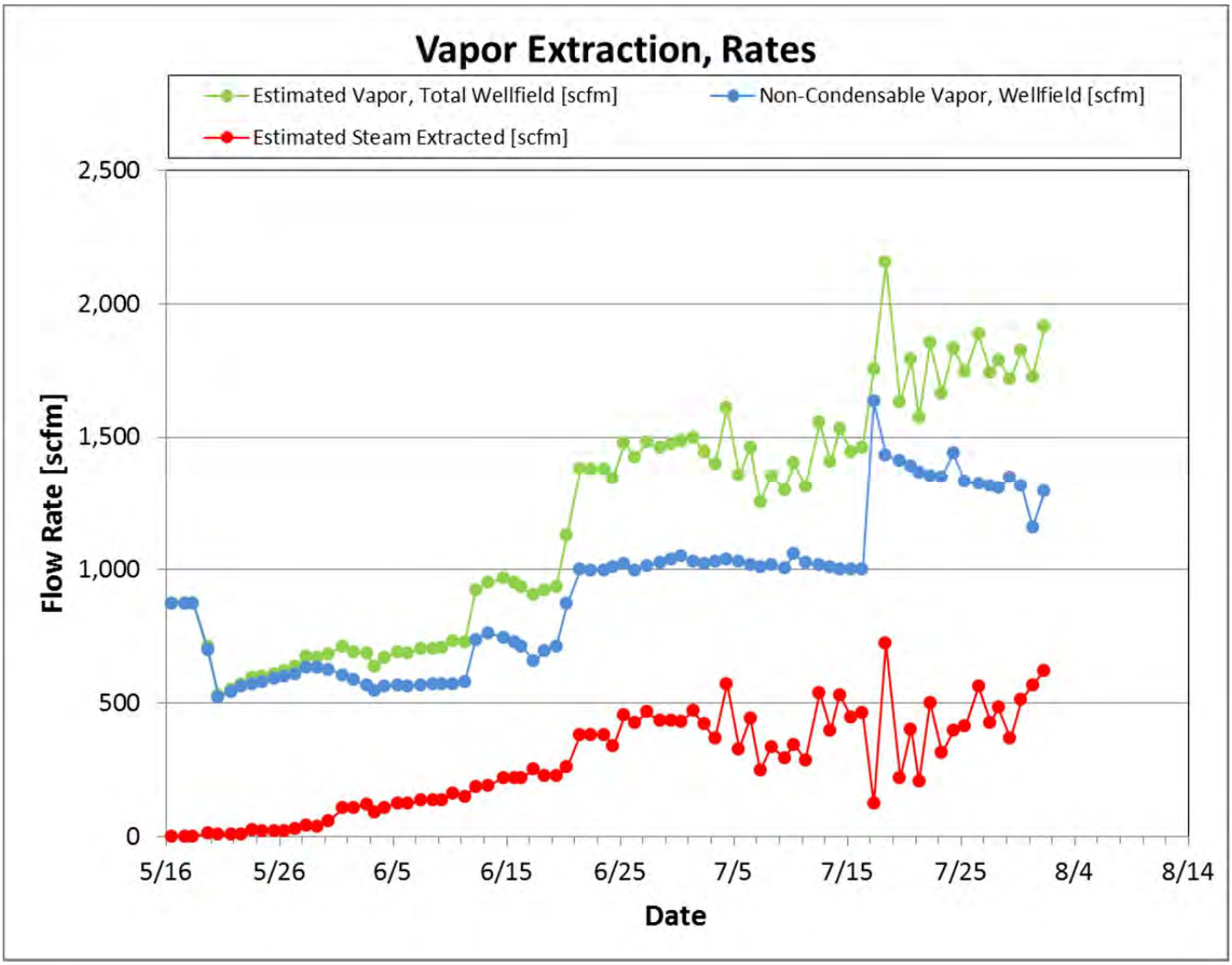


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent one manual daily reading from the analyzer. This value is collected after dilution air is introduced into the system.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf. Currently, the vapors entering the oxidizer are low flammability (<5% LFL) and do not approach the contract limit, although an increase in flammability can be seen after the dilution air valve was closed on June 20, 2014. Dilution air has been reintroduced to the system last week as BTU values have increased.

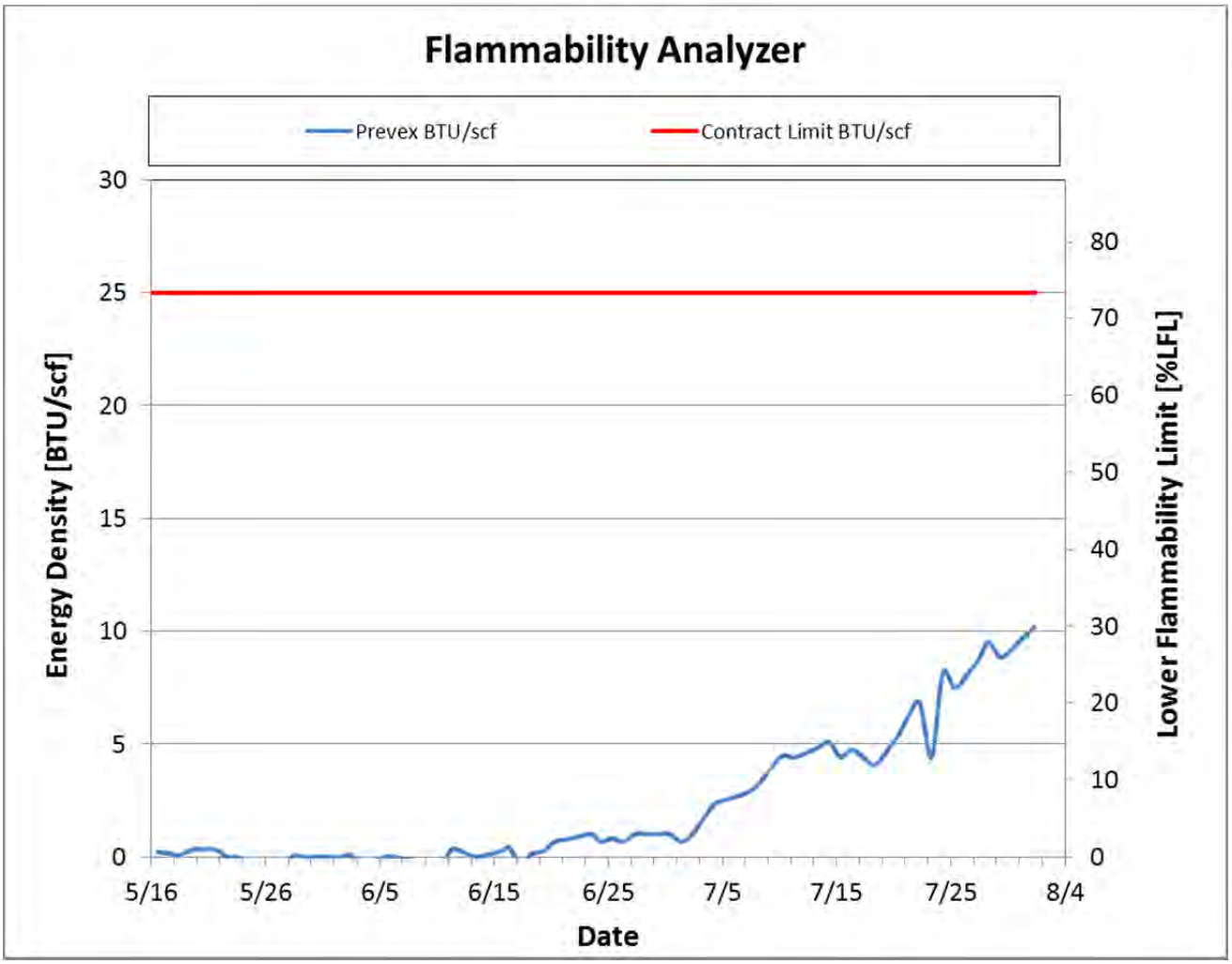


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated total mass removed based on daily photoionization detector (PID) readings and laboratory data (total of Phase 1 and Phase 2) and LNAPL are shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d and 4e were added this week to show the mass removal rates per day for Phase 1 and Phase 2, respectively.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, and 7/15/14.

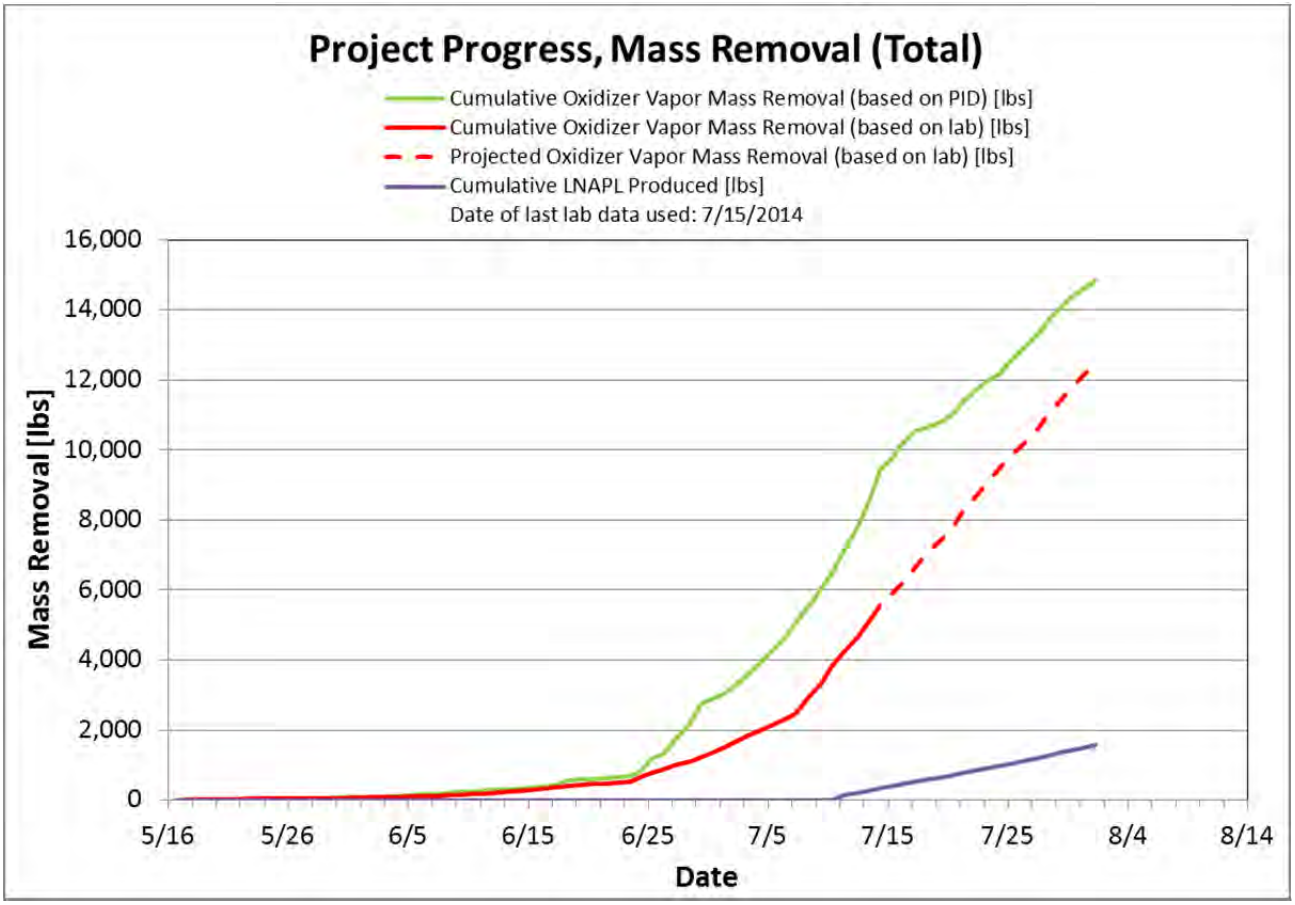


Figure 4a. Project Progress, Mass Removal (Total)

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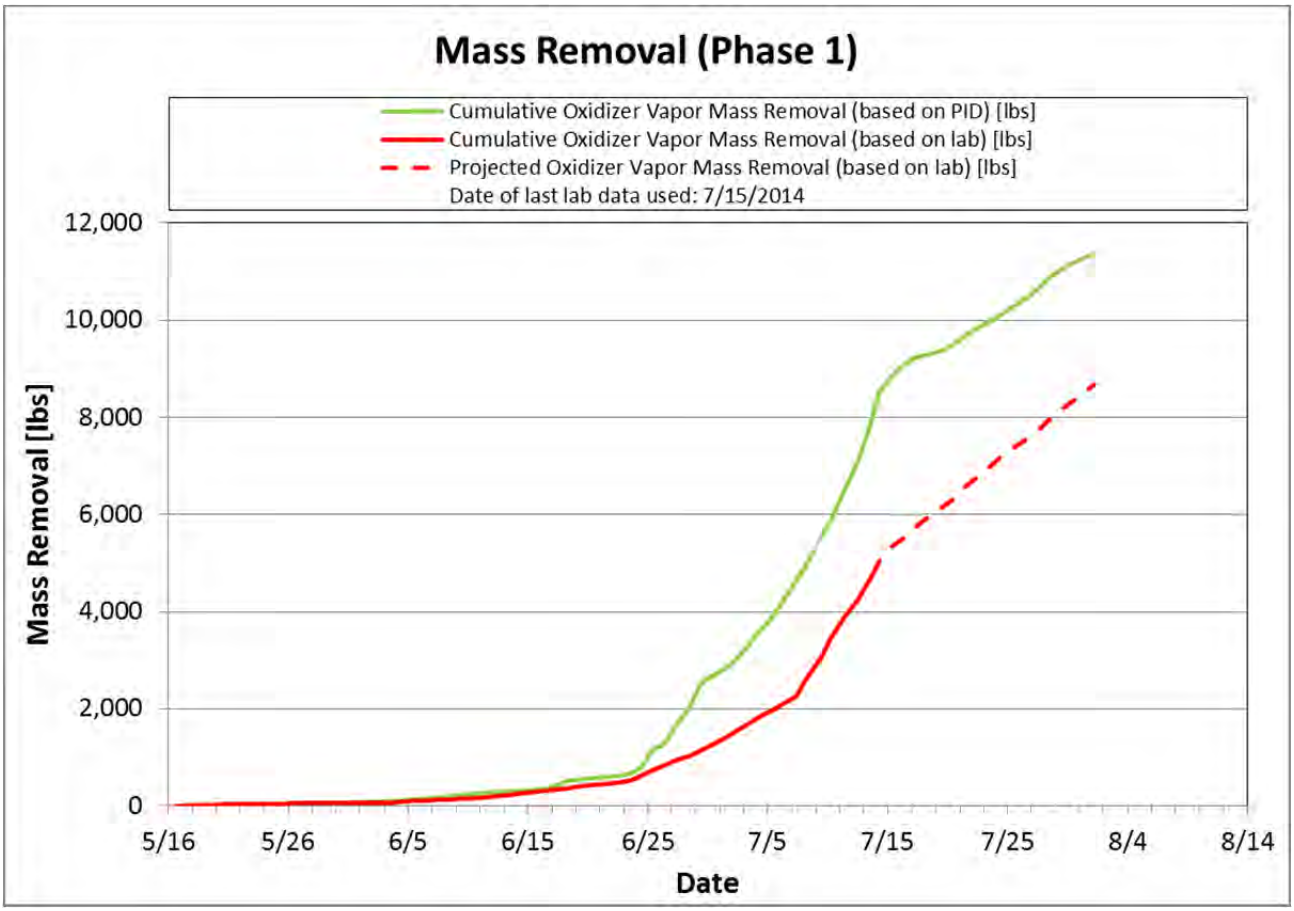


Figure 4b. Project Progress, Mass Removal (Phase 1)

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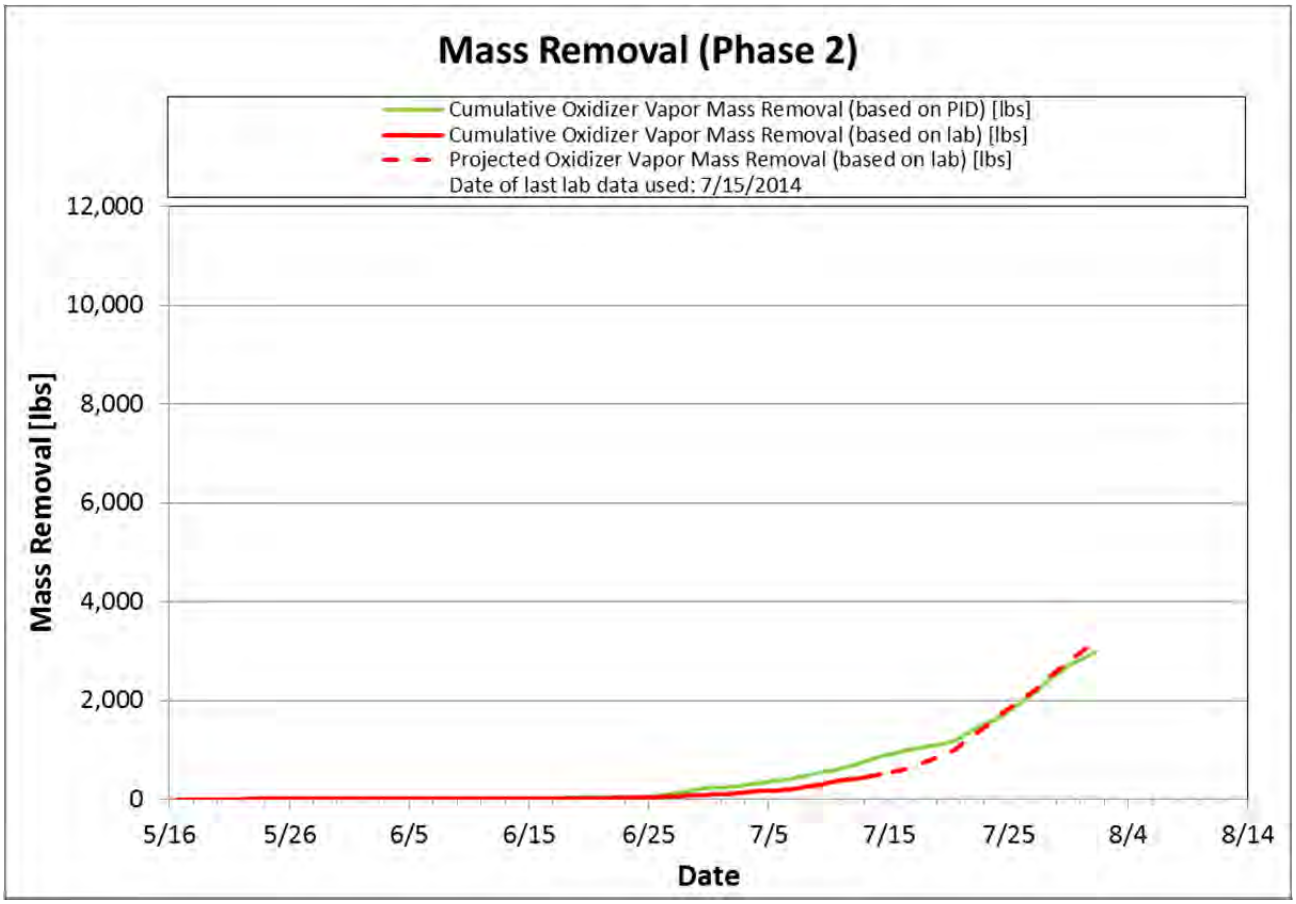


Figure 4c. Project Progress, Mass Removal (Phase 2)

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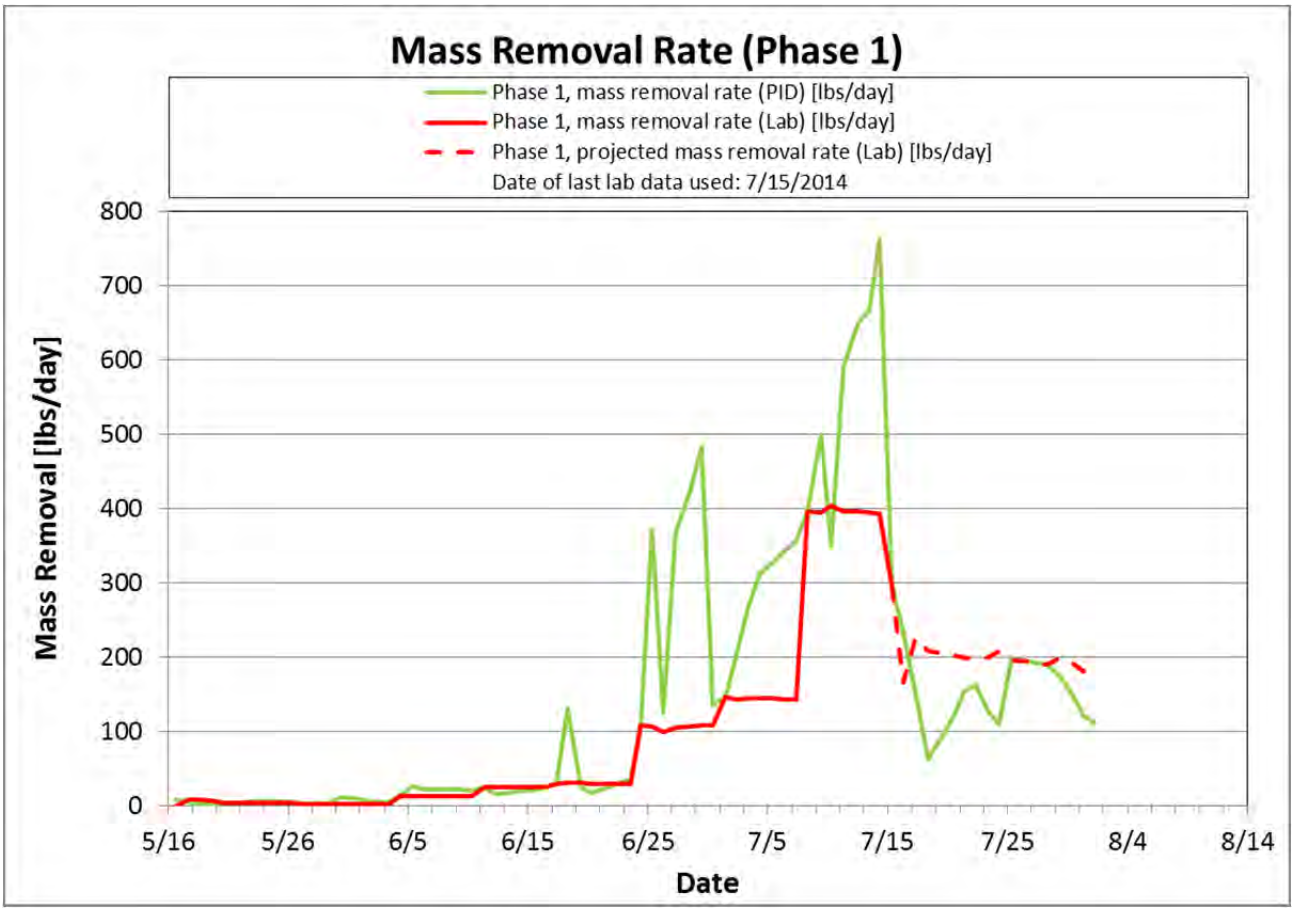


Figure 4d. Mass Removal Rate (Phase 1)

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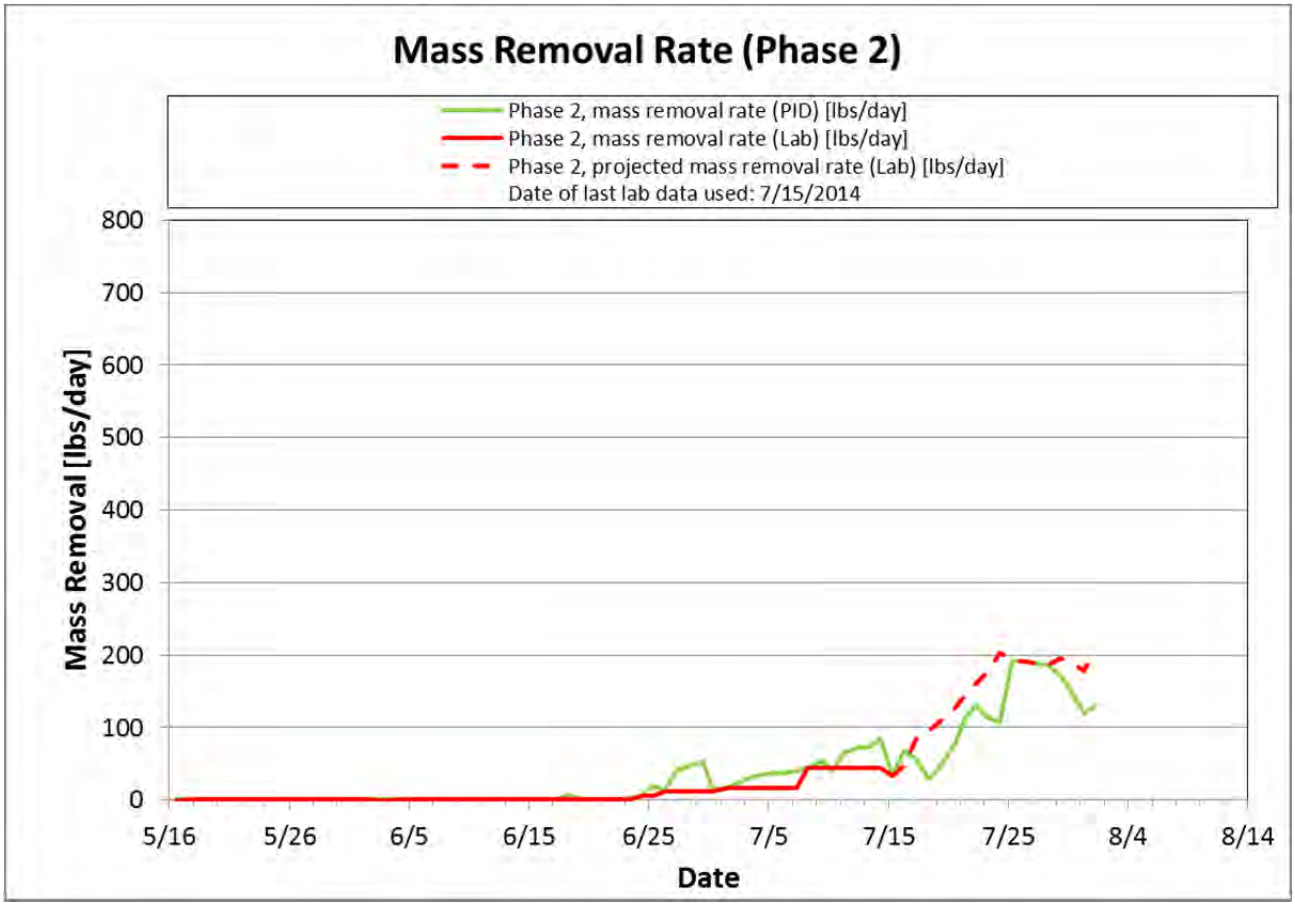


Figure 4e. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID readings collected at the oxidizer influent over time. It should be noted that the PID reading from 7/16/14 was obtained with a PID with a 10.6 eV lamp, instead of the 11.7 eV lamp which had reached the upper concentration limit of 2000 ppmV. Similarly, data collected on 07/25-07/28 were first collected with an 11.7 eV lamp resulting in exceeding of the upper limit. The influent concentrations were collected with the 10.6 eV lamp with values lower than the 11.7 eV upper limit (2000 ppm). Therefore, the maximum 11.7 eV lamp is reported.

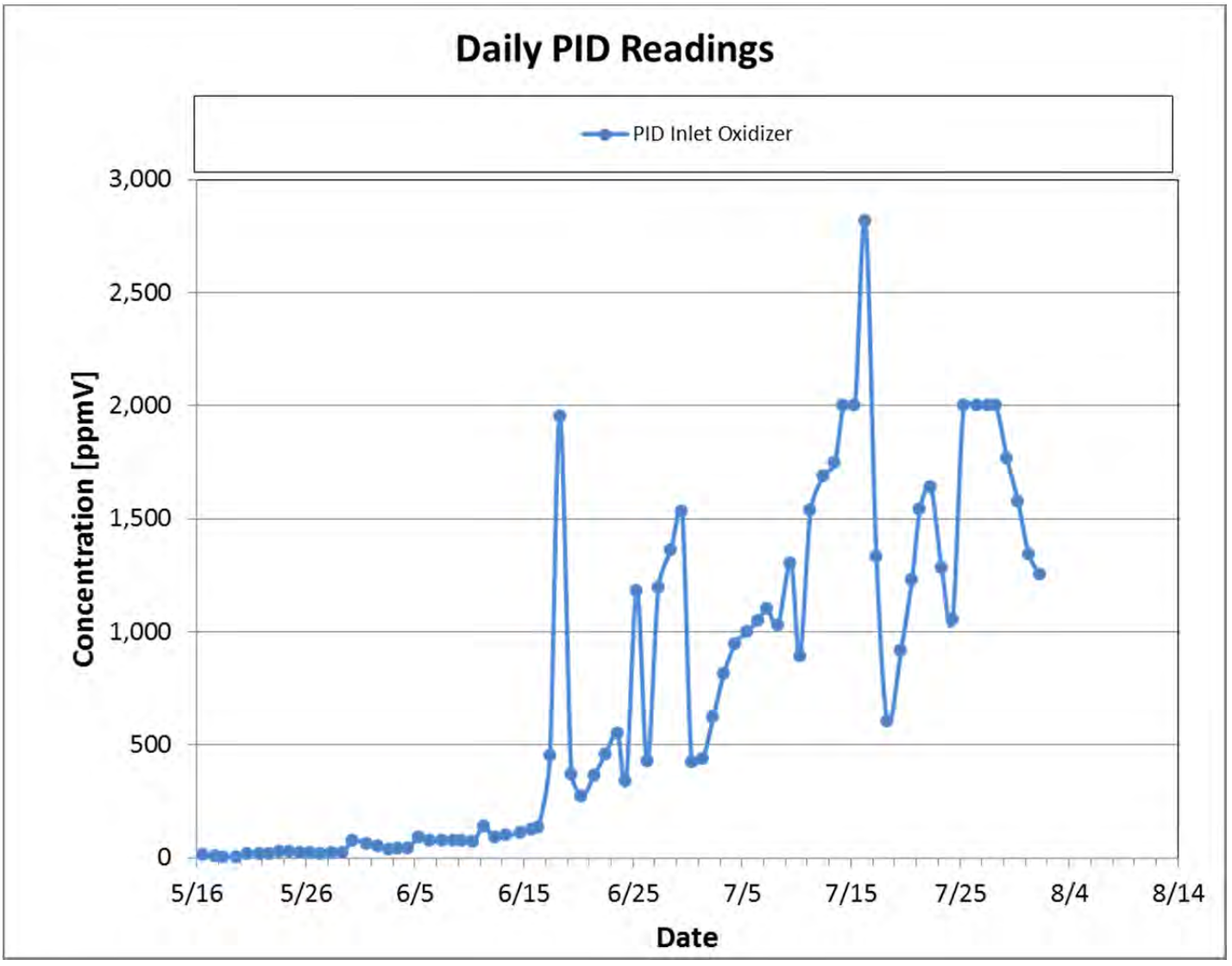


Figure 5. Daily PID Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase.

The 7/15/14 effluent laboratory sampling container (Summa canister) was deemed to be leaking upon receipt at the laboratory. Therefore, analysis of this sample was cancelled and no DRE data for this sampling date is available. DRE based on PID readings during this time has been acceptable.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

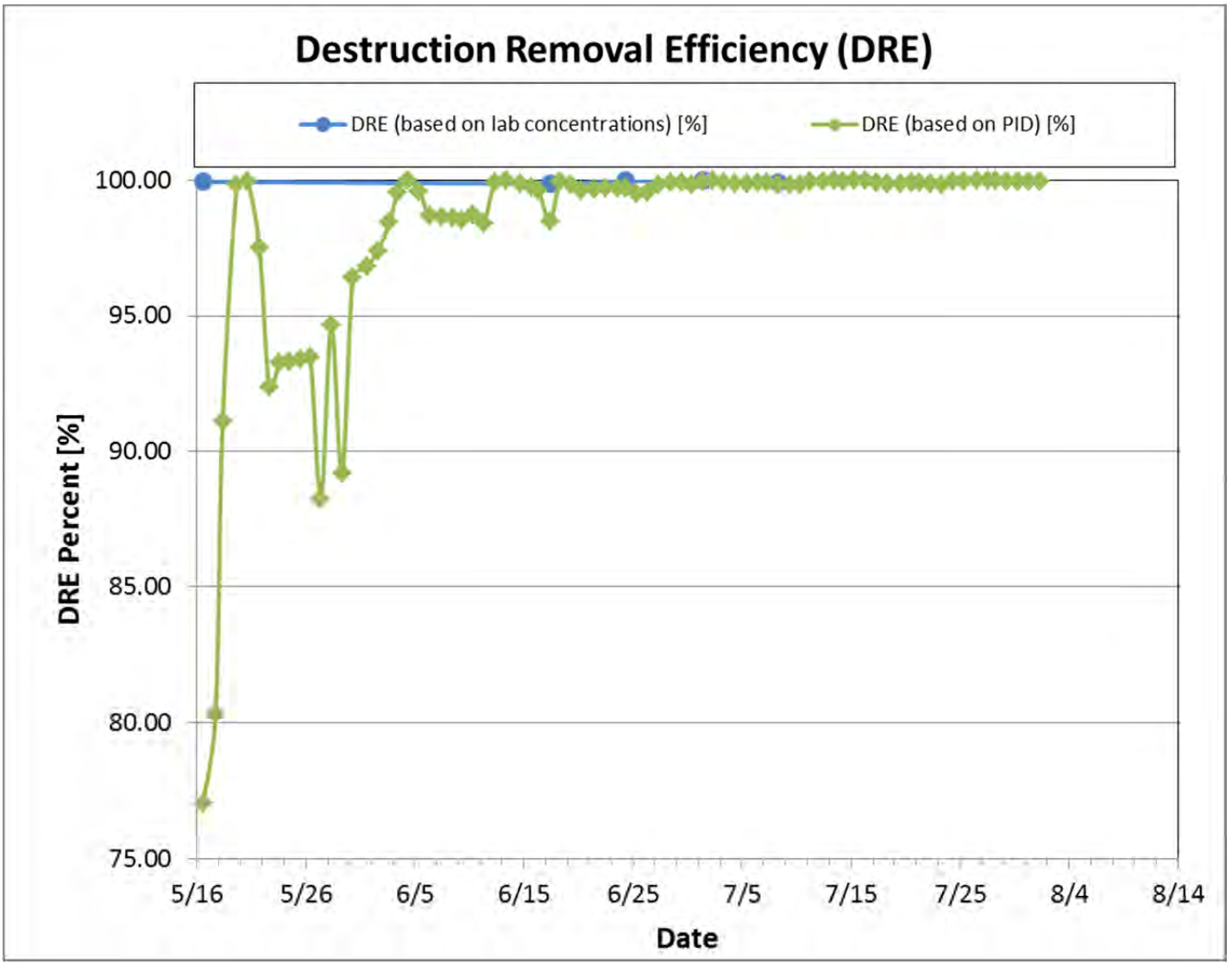


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7.

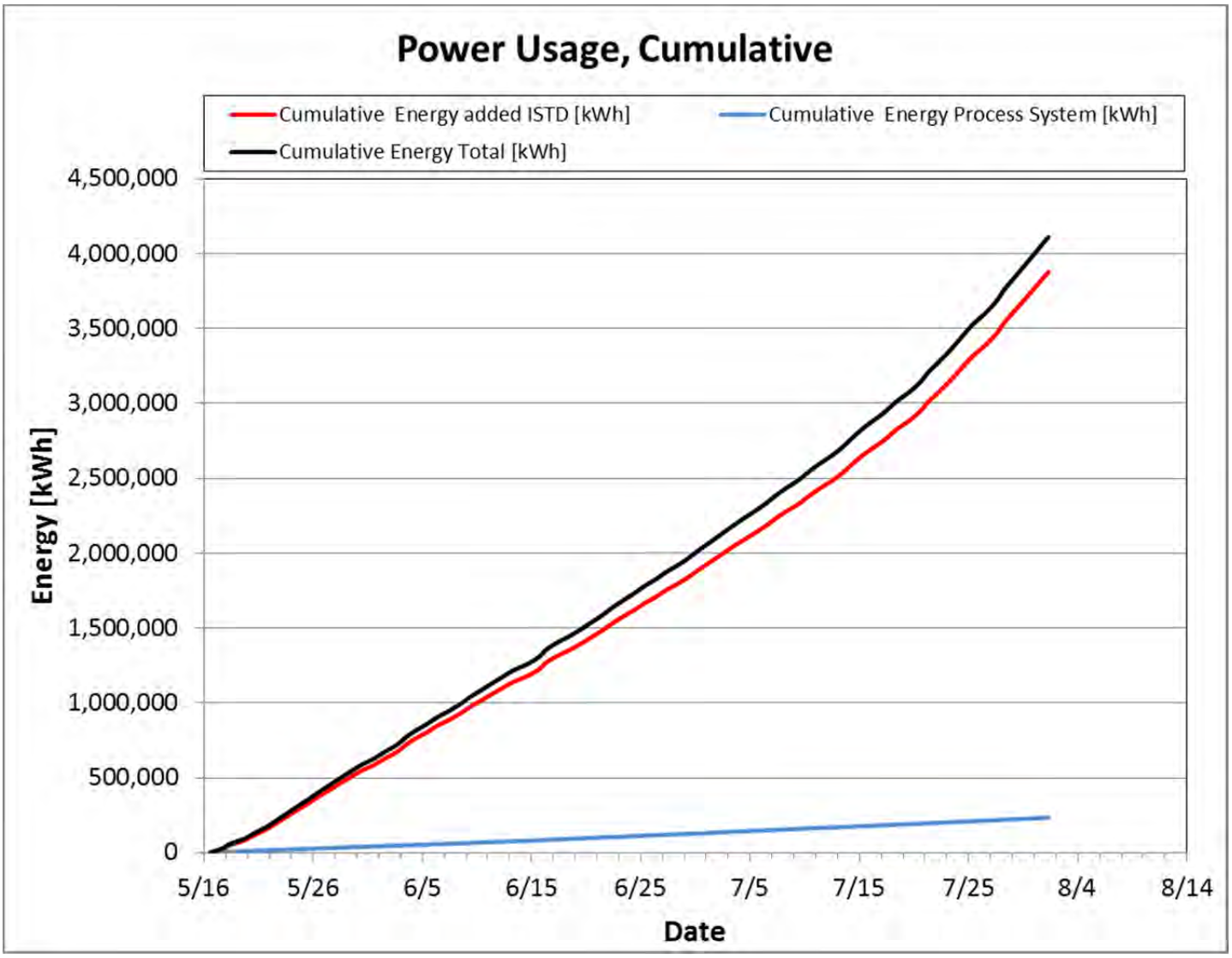


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

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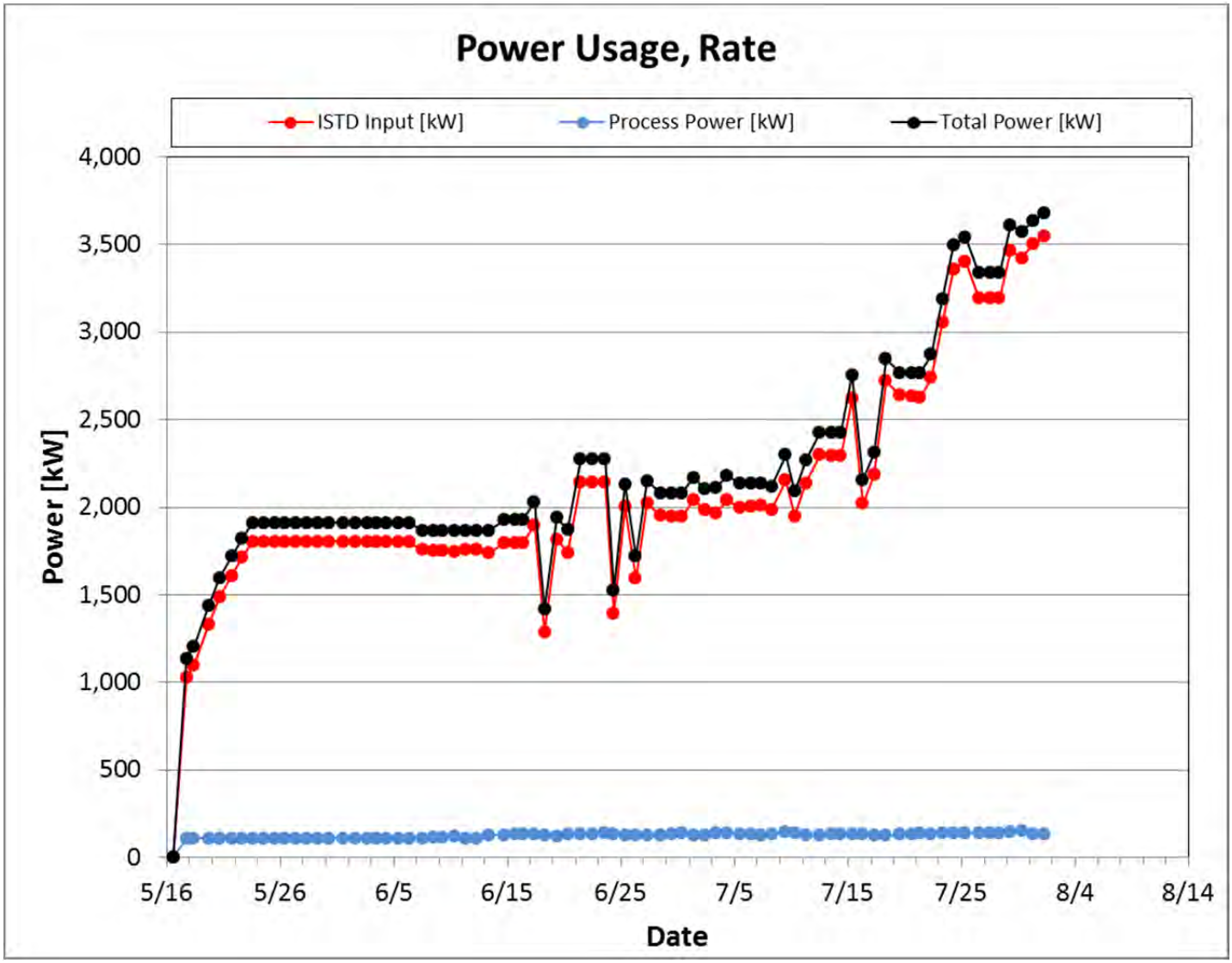


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

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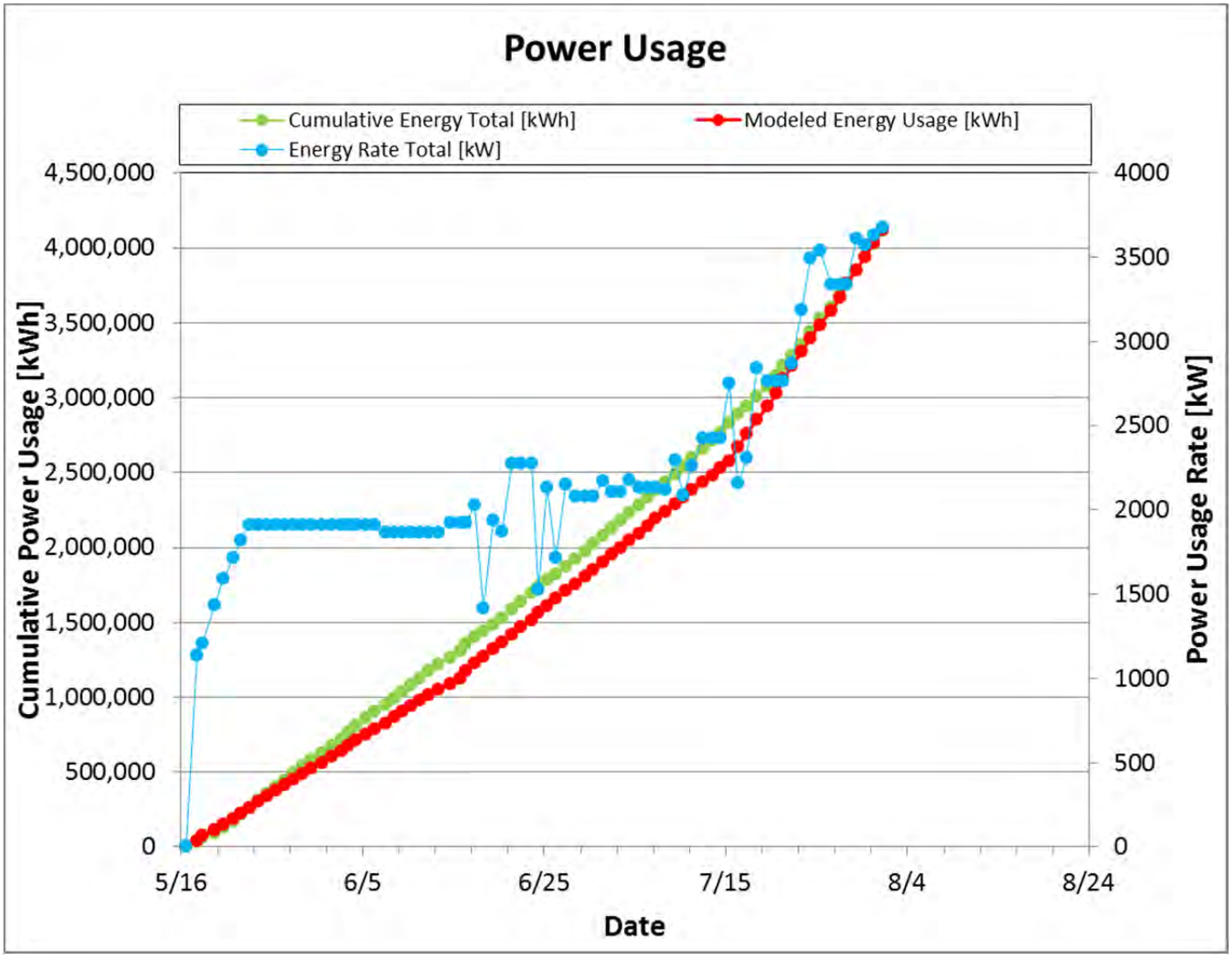


Figure 9. Power Usage

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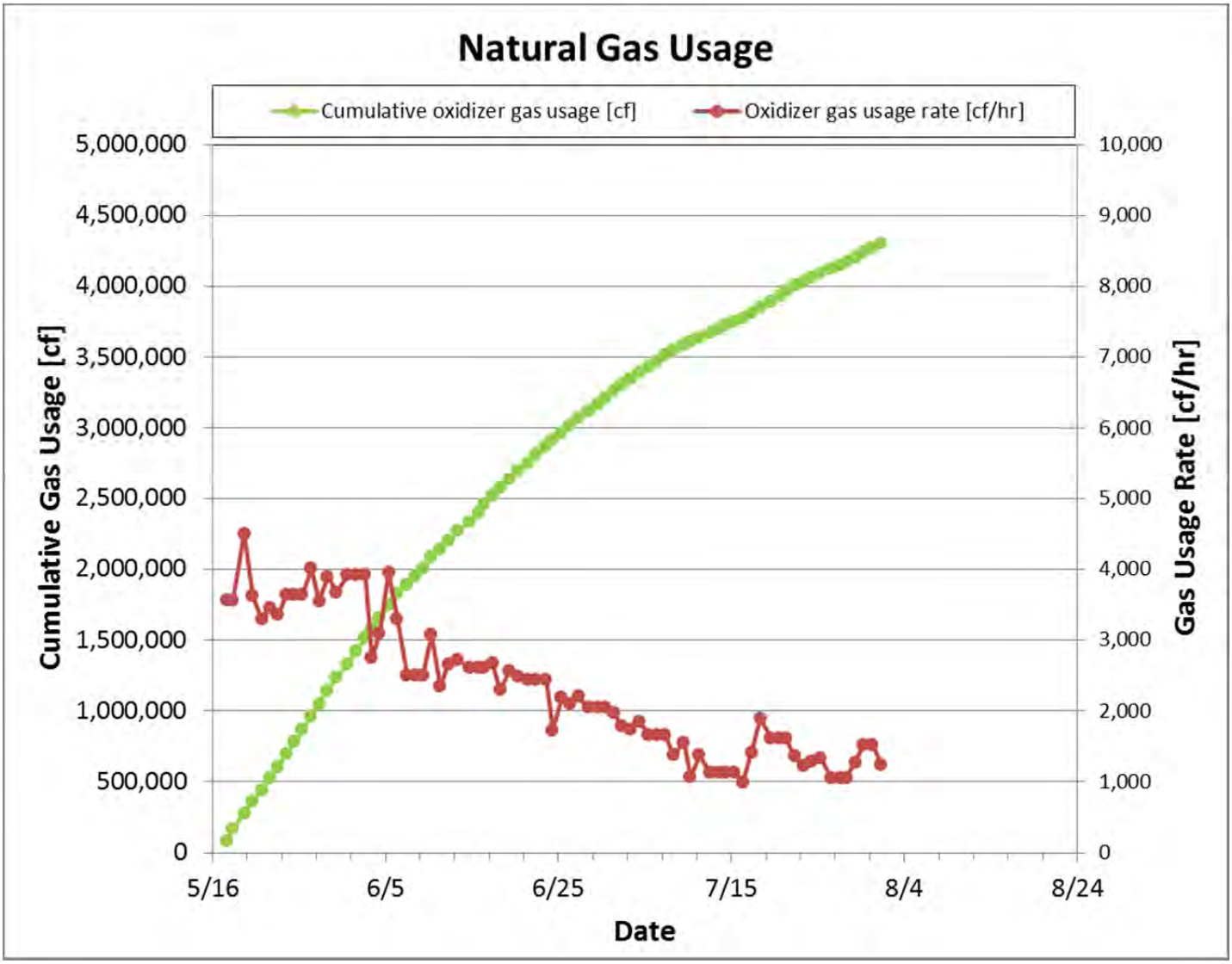


Figure 10. Natural Gas Usage

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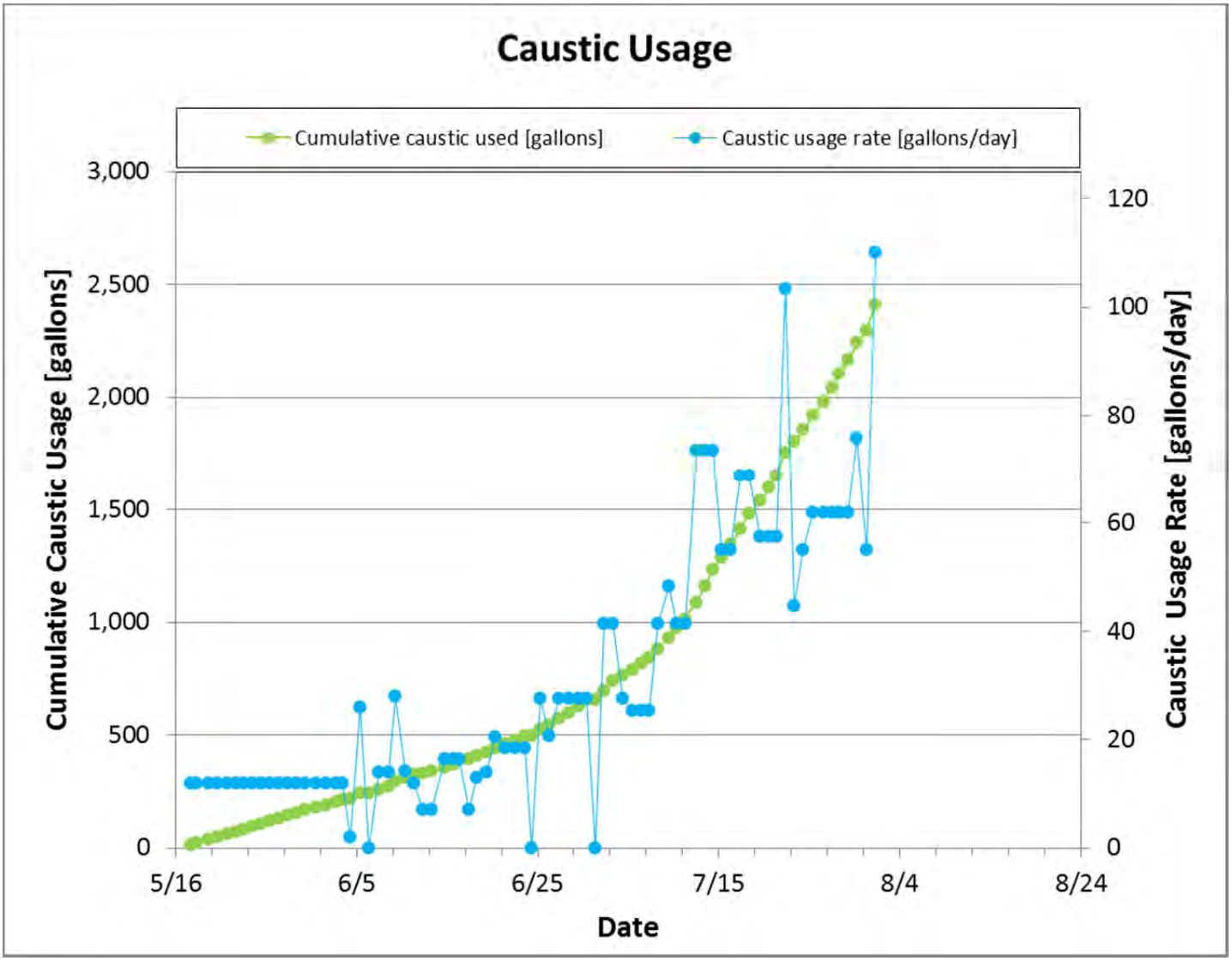


Figure 11. Caustic Usage

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Phase 2 centroids are shown in Figure 12b. The scatterplots have been updated to show the centroids grouped by depth, with each depth range shown as a different color. A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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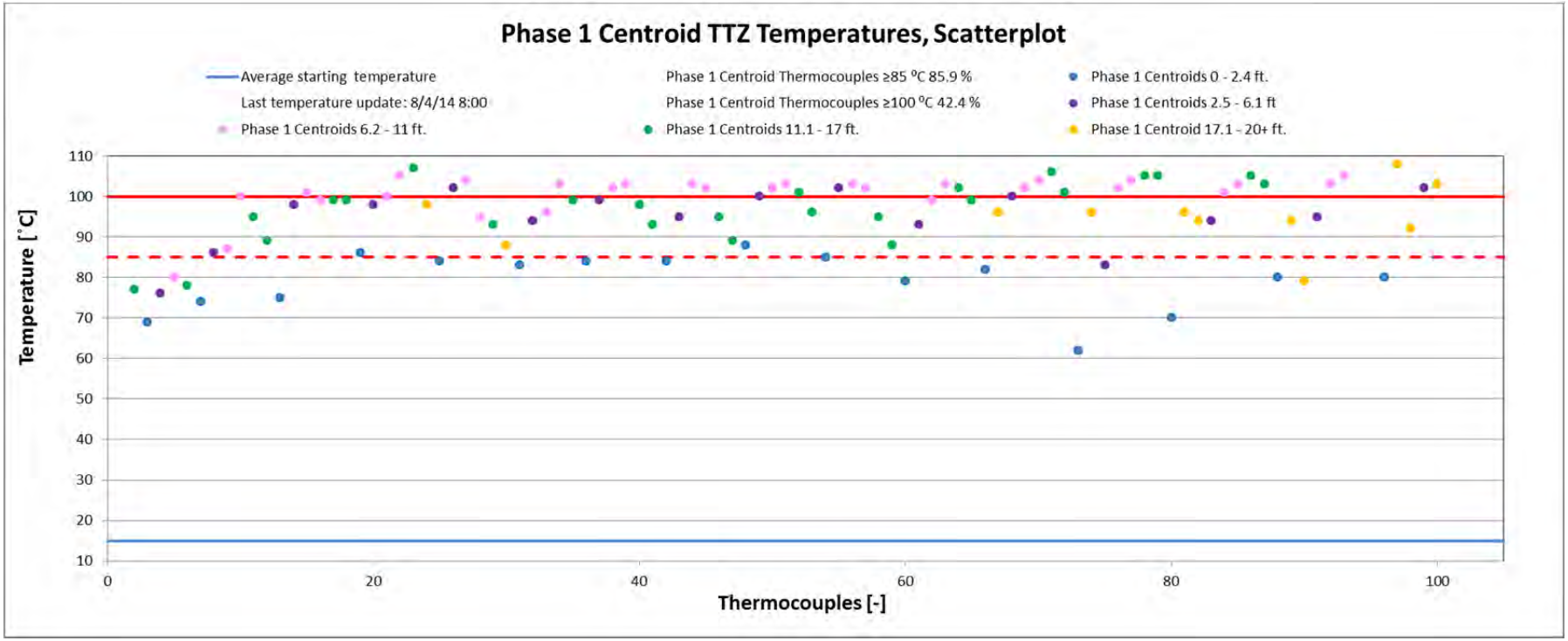


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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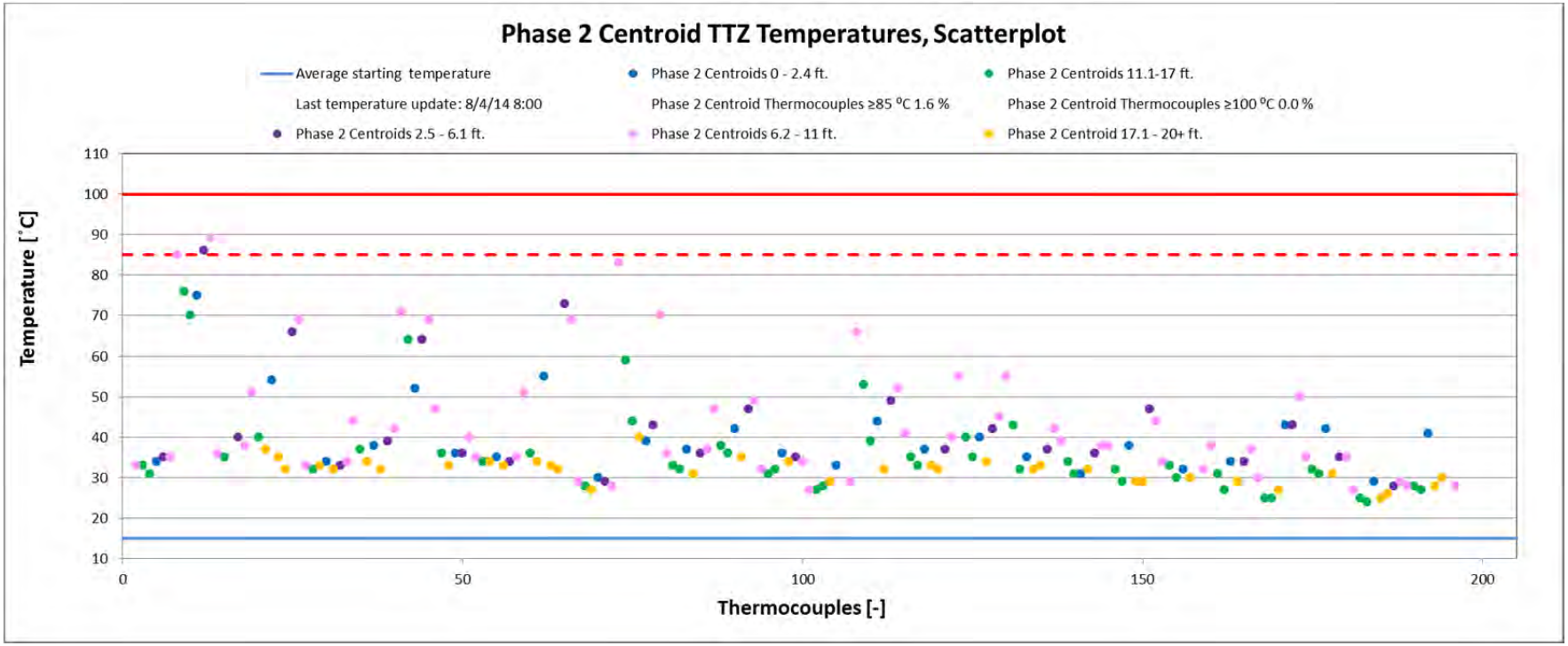


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots

	Value	Unit
Date of Last Update	8/4/14	
Phase 1 Centroid Thermocouples ≥85 ^{0}C	85.9	%
Phase 1 Centroid Thermocouples ≥100 ^{0}C	42.4	%
Phase 2 Centroid Thermocouples ≥85 ^{0}C	1.6	%
Phase 2 Centroid Thermocouples ≥100 ^{0}C	0.0	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday August 1, 2014 through Friday August 8, 2014, with temperatures updated through Sunday August 10, 2014.

Table 1 provides a summary of the project operational status as of Friday, August 8, 2014.

Table 1. Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	08/08/14	
Last Temperature Data Update	08/10/14	
Estimated Days of Operation (Total)	195	days
Days of Operation (Total)	85	days
Days of Operation vs. Estimate (Total)	44	%
Estimated Days of Operation Phase 1 (Day 1-134)	135	days
Days of Phase 1 Operation	85	days
Days of Phase 1 Operation vs. Estimate	63	%
Estimated Days of Operation Phase 2 (Day 61-195)	135	days
Days of Phase 2 Operation	23	days
Days of Phase 2 Operation vs. Estimate	17.3	%
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	4,756,900	kWh
Used Electrical Energy vs. Estimate	30.1	%
Total Vapor Mass Removal (based on Oxidizer PID Readings)	18,160	lbs
Estimated Mass Removed as LNAPL	2,628	lbs
Average Power Input Last 24 Hours	4,030	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,318	scfm
Average Condensate Production Rate Last 24 Hours	2.8	gpm

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As of 8/08/14, phase 1 has operated for 85 days and phase 2 for 23 days. Treatment of both Phase 1 and phase 2 is progressing as expected. Phase 1 average wellfield temperature is 98C, and Phase 2 average wellfield temperature is 57C, both of which are on track with our temperature model (Figures 1a and 1b). Thermocouples in both phases continue to heat up relatively uniformly (as seen on Figures 12a and 12b).

Estimated mass removed to date is reported four different ways. The first, using the combined vapor stream, based on PID, is 18,160 lbs. The second, using the laboratory data, is 15,250 lbs. The third and fourth using the flammability analyzer and a 9,000 BTU/lbs and 13,000 BTU/lbs constant, is 51,600 and 74,500 lbs respectively. There is an additional 2,628 lbs removed as NAPL, assuming the density of toluene. We do not have recent BTU content data on vapor samples, so are assuming values from previous liquid NAPL samples analyzed (13,000 BTU/lbs) combined with an estimate of the BTU value of the vapor fraction of the NAPL mix (9,000 BTU/lbs).

Analytical data and treatment system behavior suggest that other compounds are being removed from the subsurface that are not detected in the TO-15 analyses but that are being recorded by the flammability analyzer. We have requested a BTU content analysis to be performed on influent vapor samples submitted to the lab to assist with future estimated mass removed flammability analyzer calculations.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 8/07/14. The ratio of mass coming from Phase 1:Phase 2 on that date was 0.74:0.26. These ratios were applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Phase 2 heating began on 7/16/14. The heating of Phase 2 will progress using the same ramp up heater schedule, except over double the duration of Phase 1. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	8/10/14	
Phase 1 Entire TTZ Average Temperature	98	°C
Phase 2 Entire TTZ Average Temperature	57	°C
Phase 1 Centroid Average Temperature	98	°C
Phase 2 Centroid Average Temperature	49	°C

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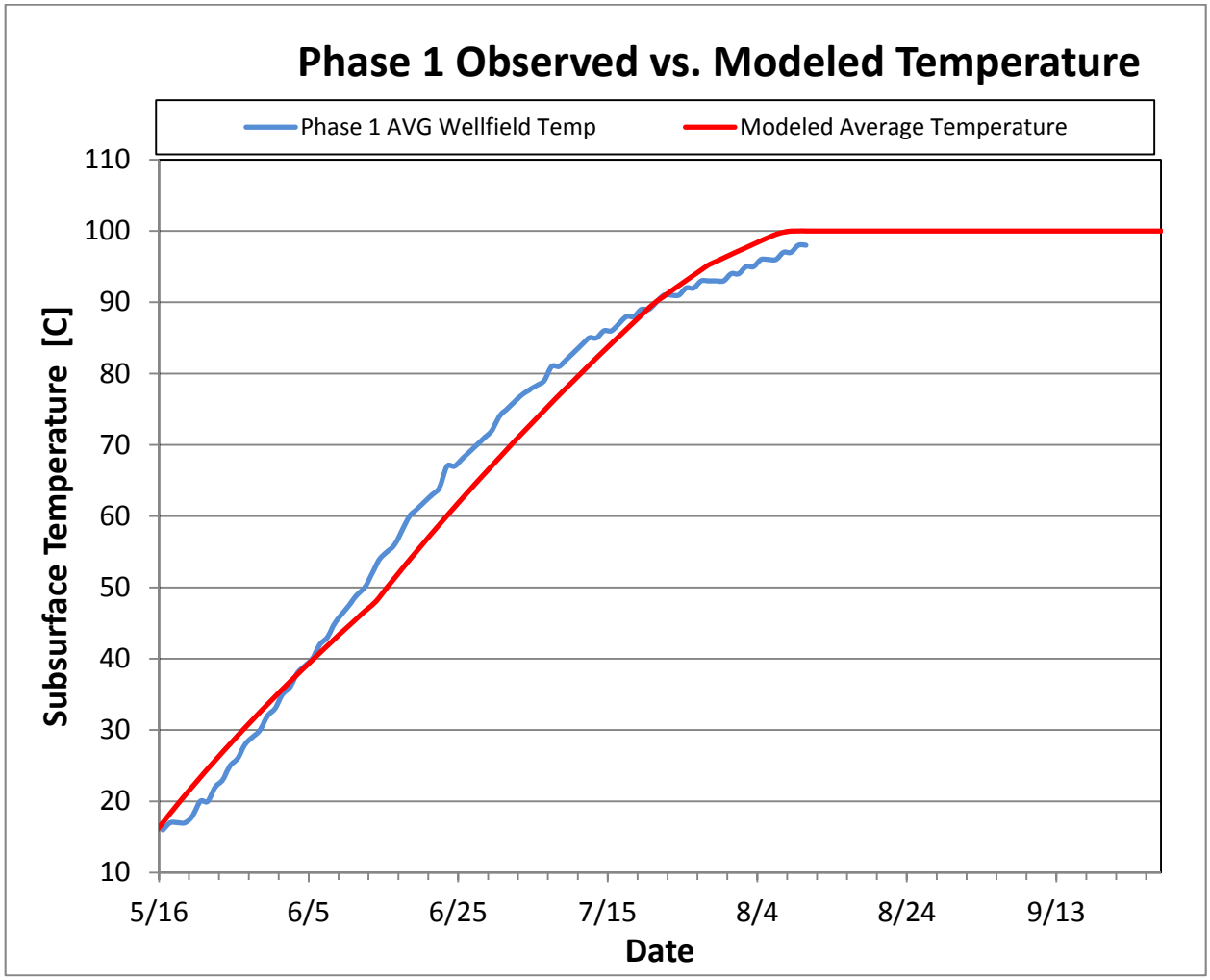


Figure 1a. Phase 1 Observed vs. Modeled Temperatures

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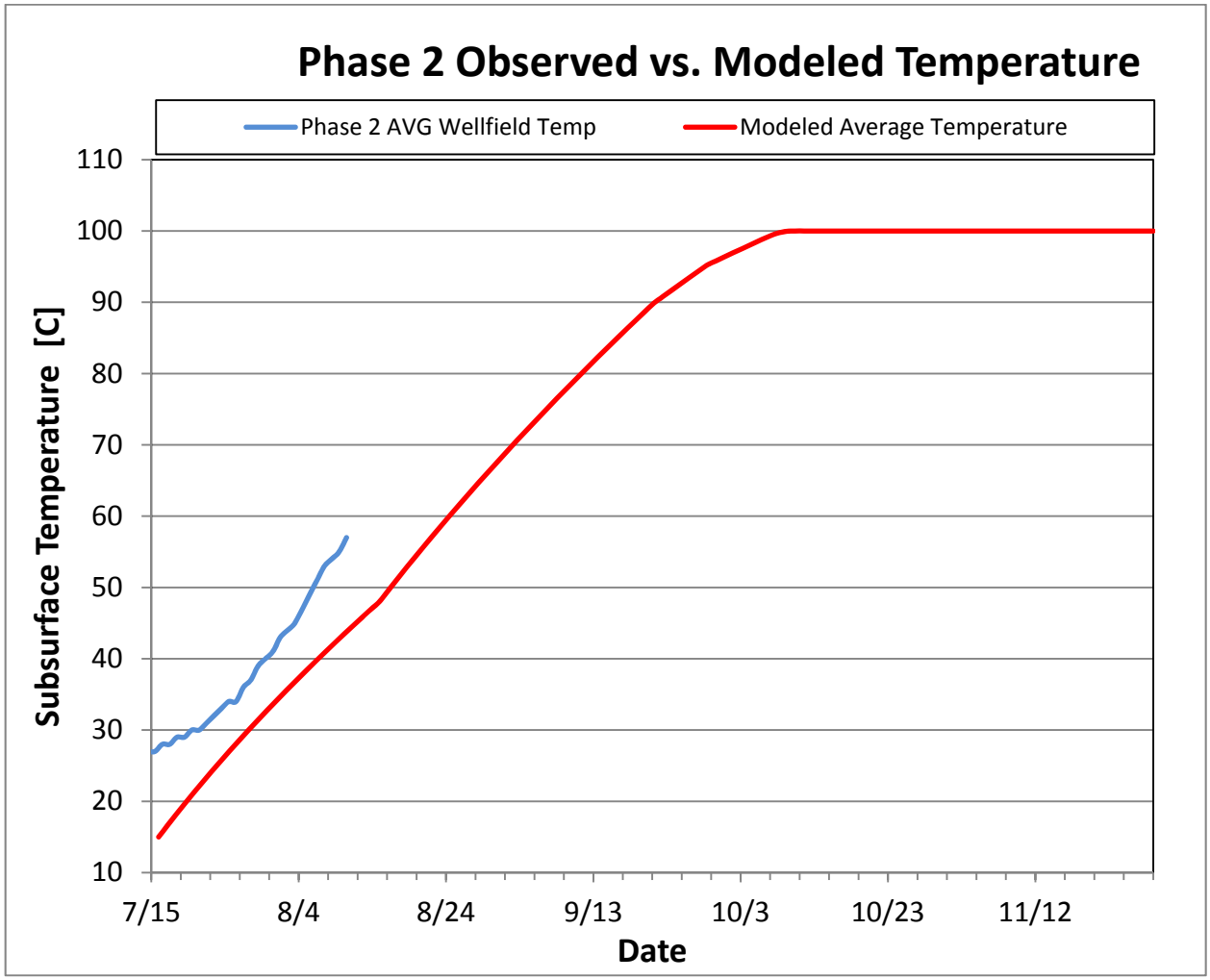


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area.

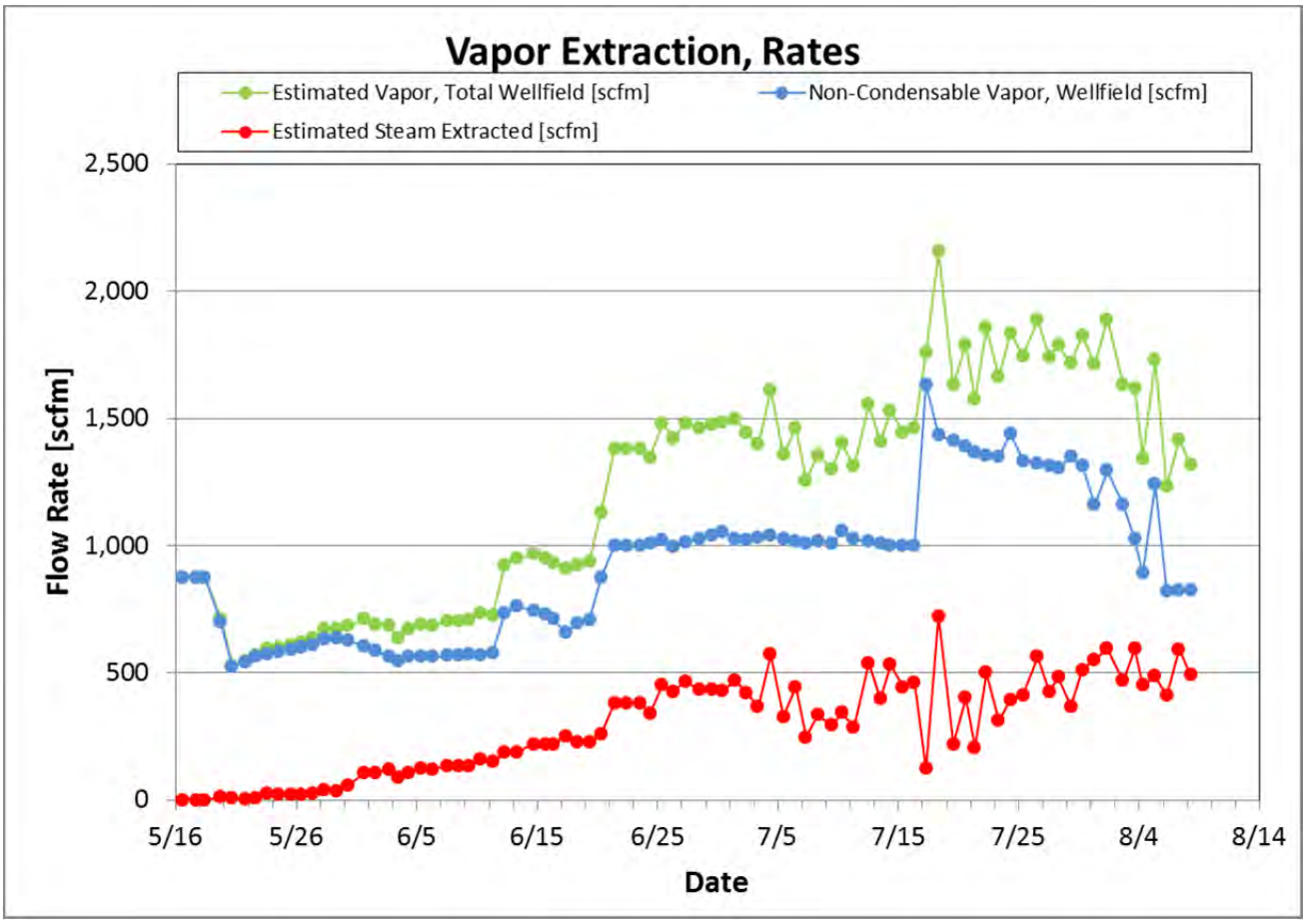


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent one manual daily reading from the analyzer. This value is collected after dilution air is introduced into the system.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf. Currently, the vapors entering the oxidizer are low flammability (<50% LFL) and do not approach the contract limit, although an increase in flammability can be seen after the dilution air valve was closed on June 20, 2014. Dilution air has been reintroduced to the system to assist with current mass being removed (higher removal rate) from the subsurface.

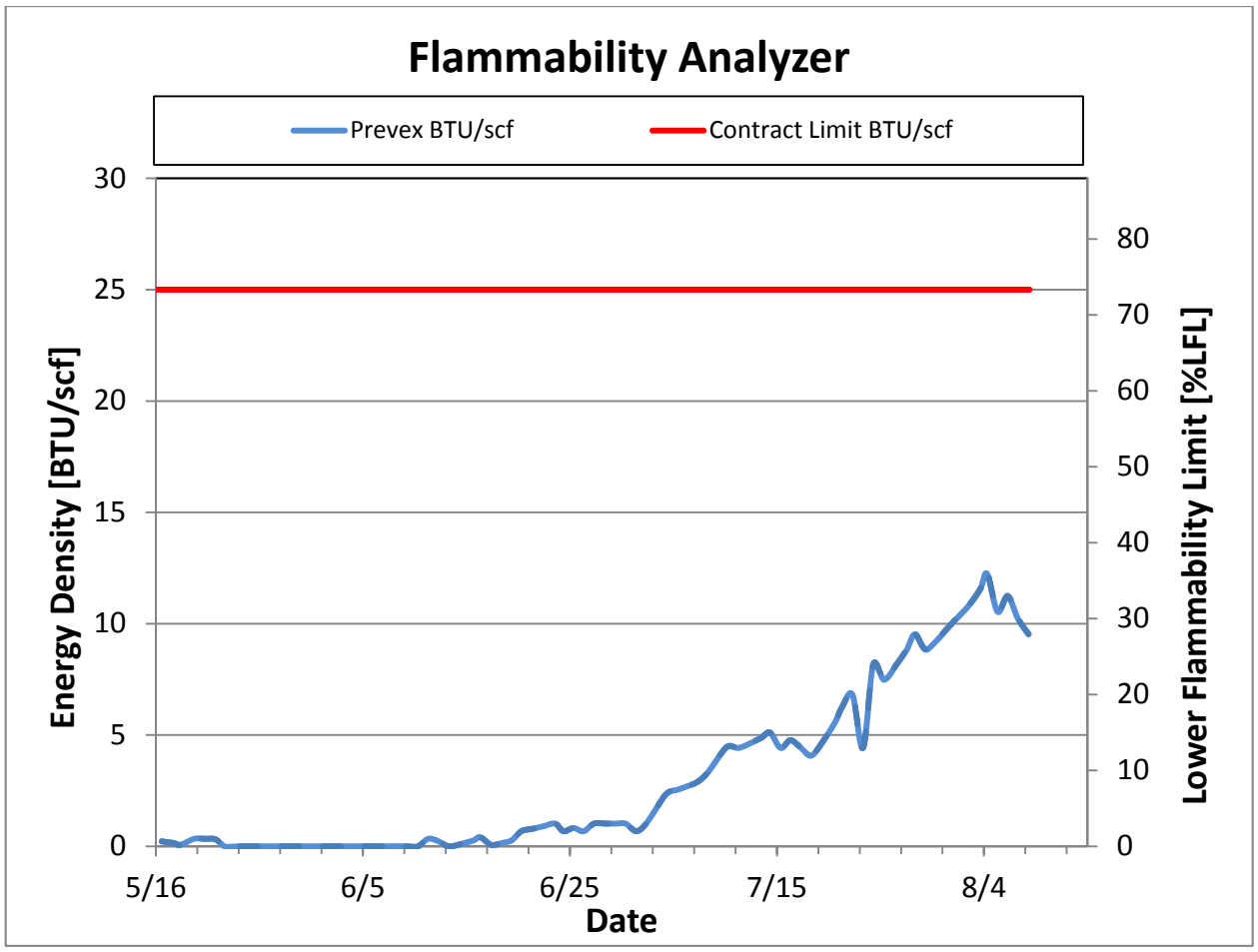


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated total mass removed based on daily photoionization detector (PID) readings and laboratory data (total of Phase 1 and Phase 2) and LNAPL are shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d and 4e were added to show the mass removal rates per day for Phase 1 and Phase 2, respectively.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, and 7/22/14.

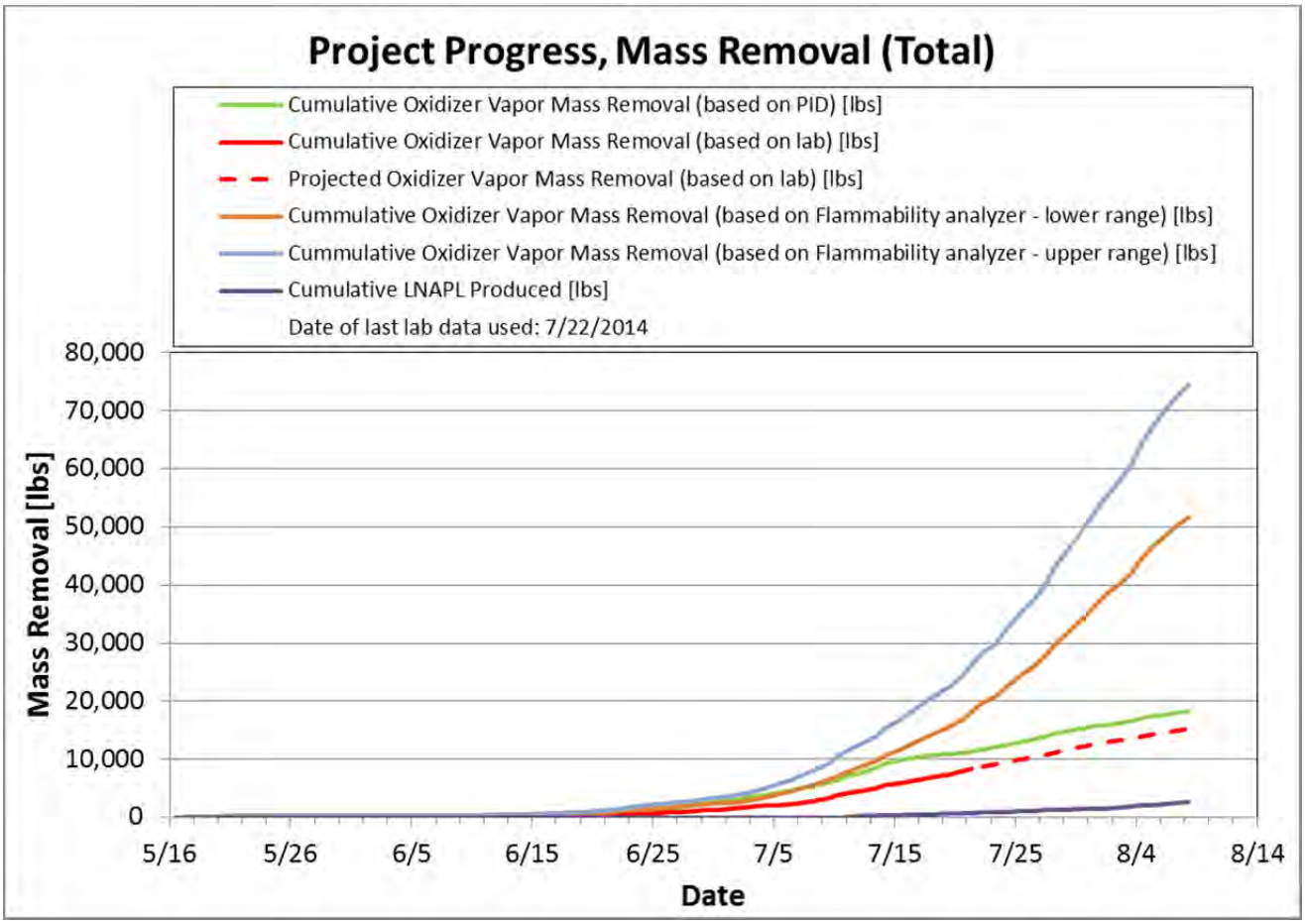


Figure 4a. Project Progress, Mass Removal (Total)

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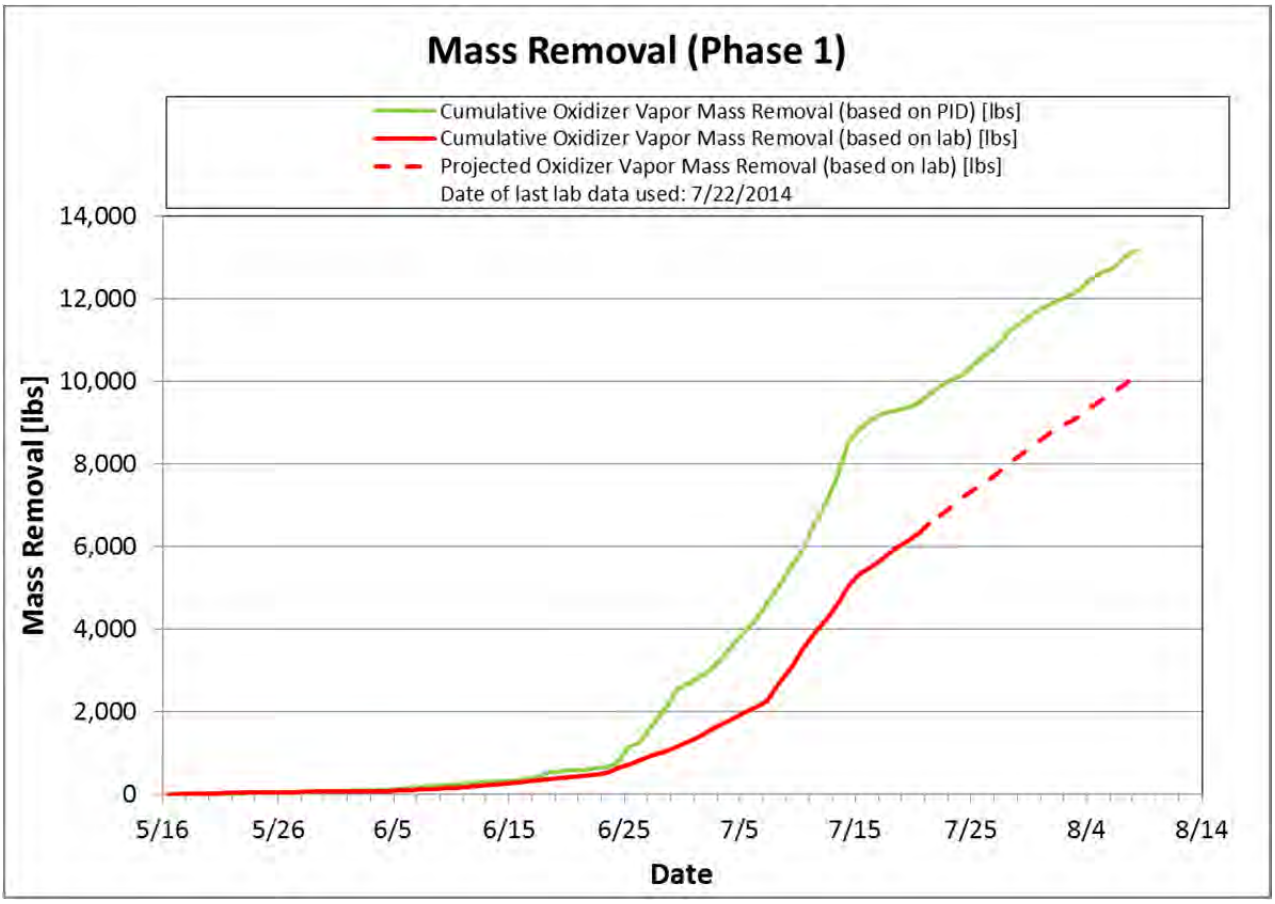


Figure 4b. Project Progress, Mass Removal (Phase 1)

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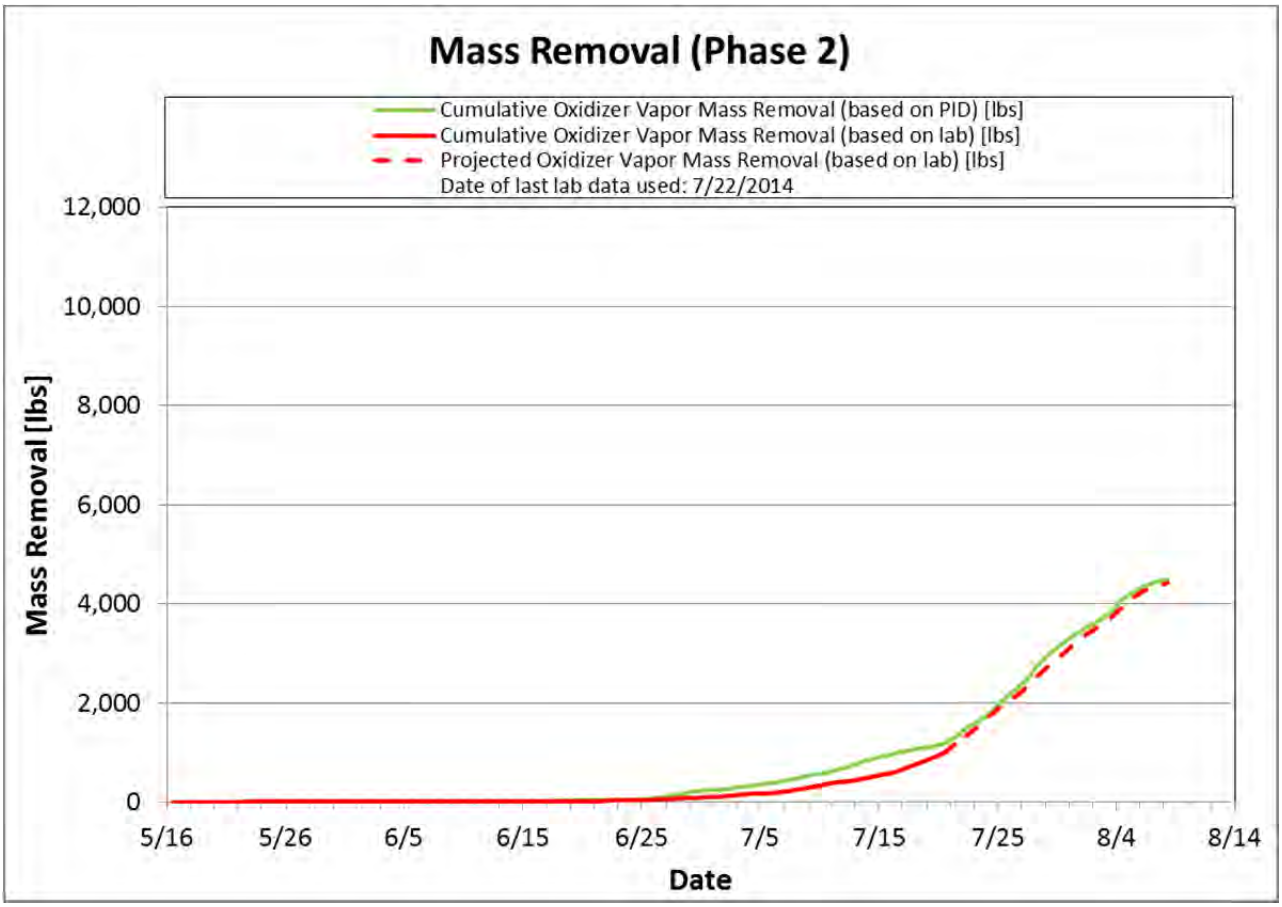


Figure 4c. Project Progress, Mass Removal (Phase 2)

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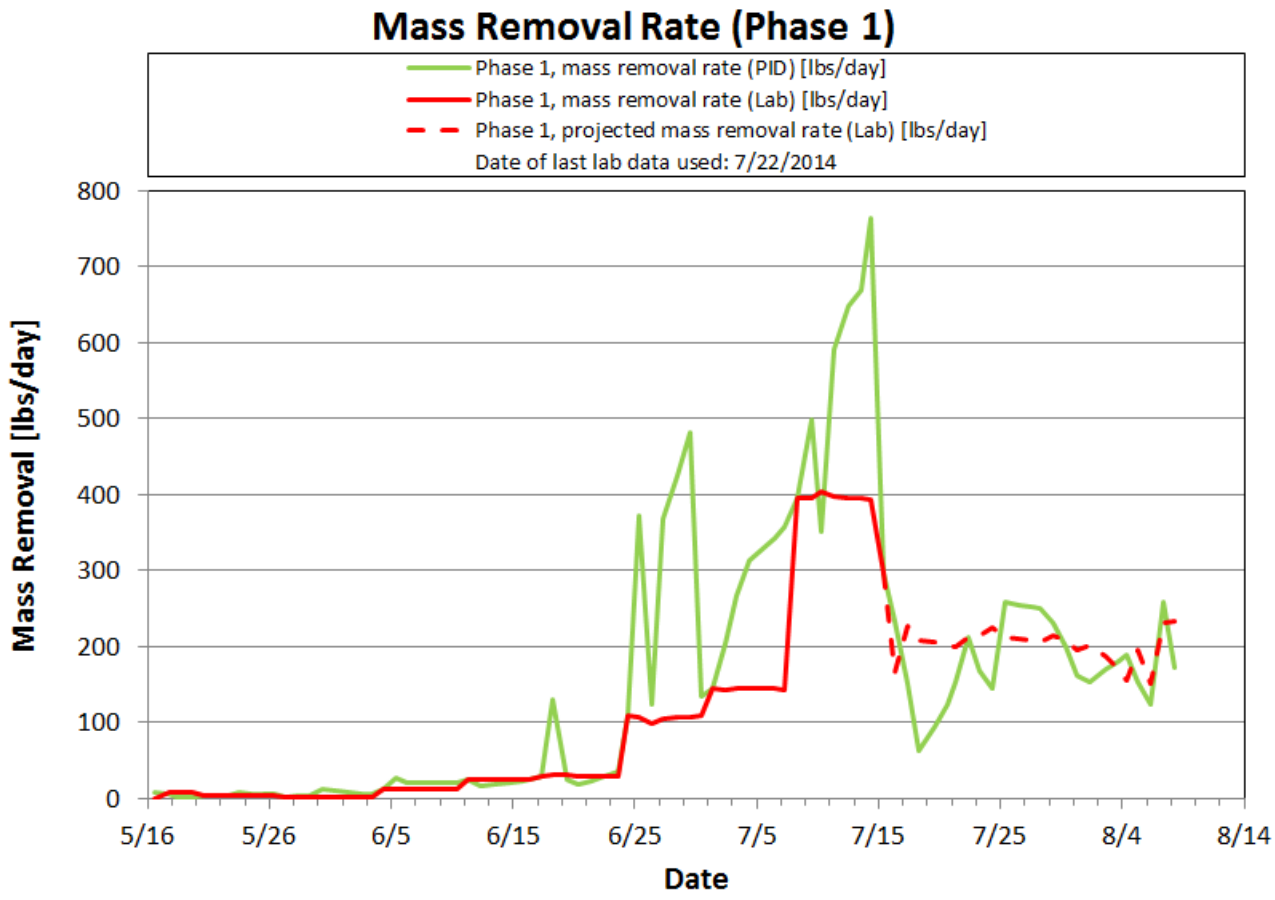


Figure 4d. Mass Removal Rate (Phase 1)

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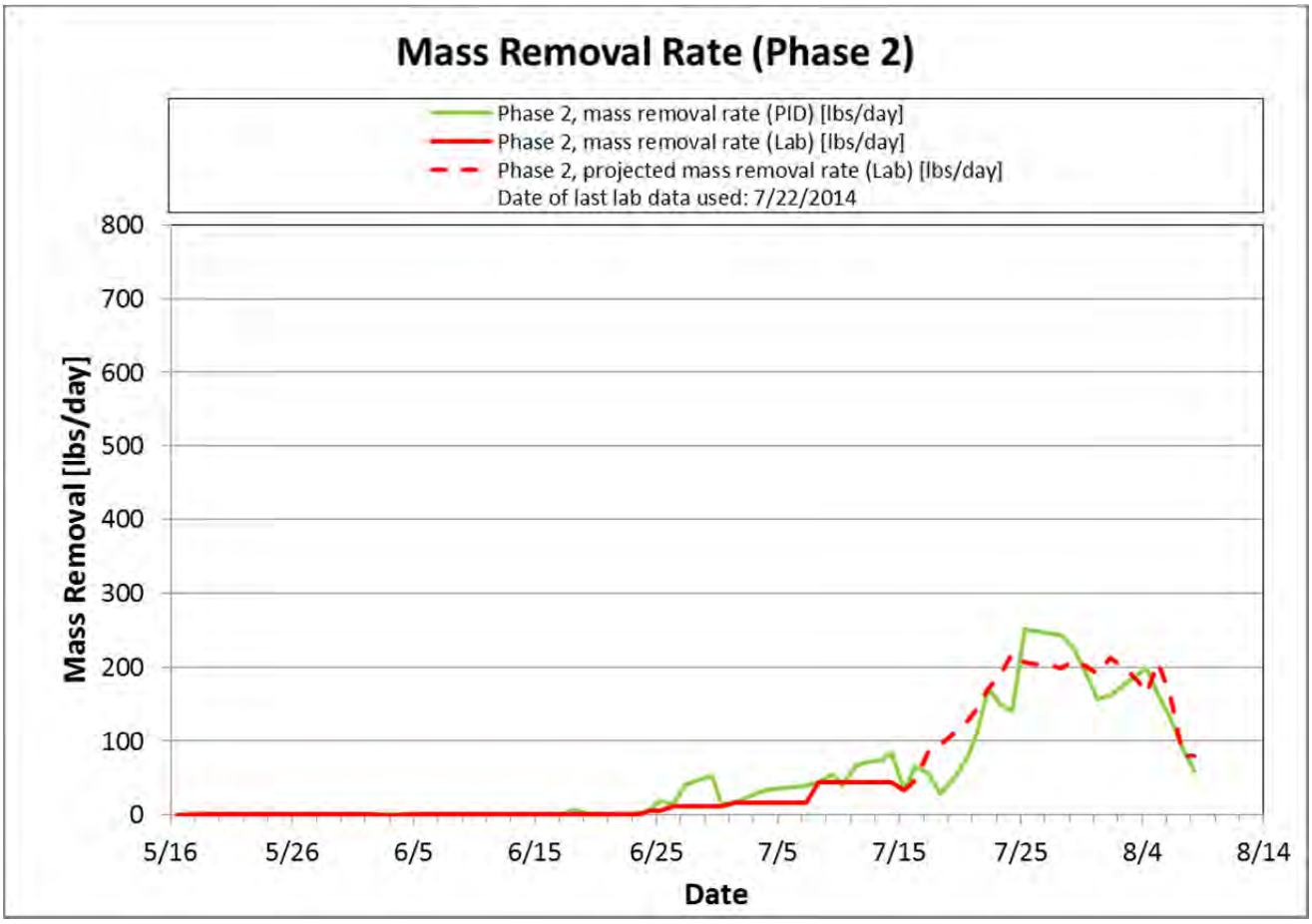


Figure 4e. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID readings collected at the oxidizer influent over time. It should be noted that the PID reading from 7/16/14 was obtained with a PID with a 10.6 eV lamp, instead of the 11.7 eV lamp which had reached the upper concentration limit of 2,000 ppmV. Similarly, data collected on 07/25-07/28 were first collected with an 11.7 eV lamp with values exceeding the upper limit. The influent concentrations were then collected with the 10.6 eV lamp with values lower than the 11.7 eV upper limit (2,000 ppm). Therefore, the maximum 11.7 eV lamp is reported.

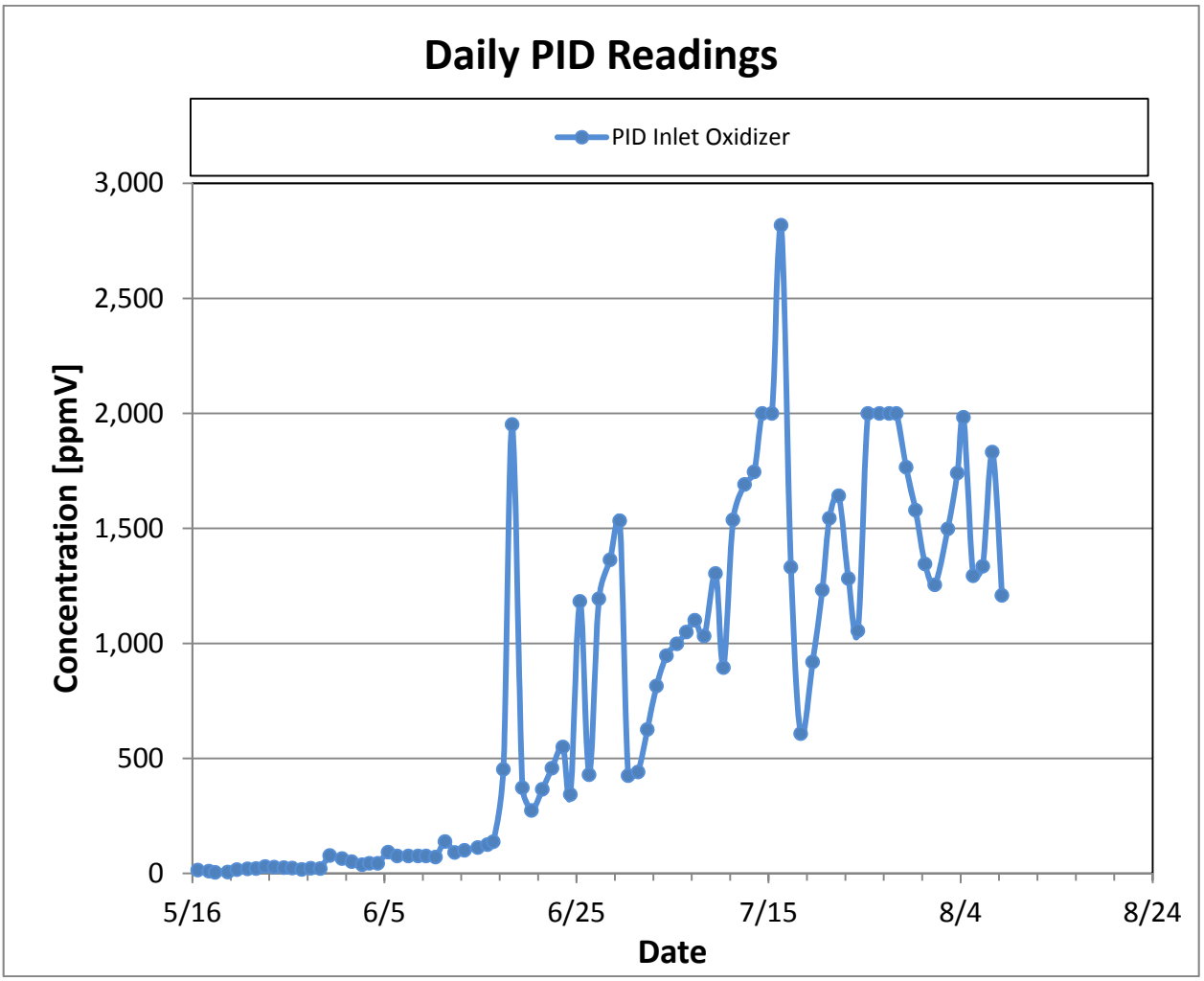


Figure 5. Daily PID Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

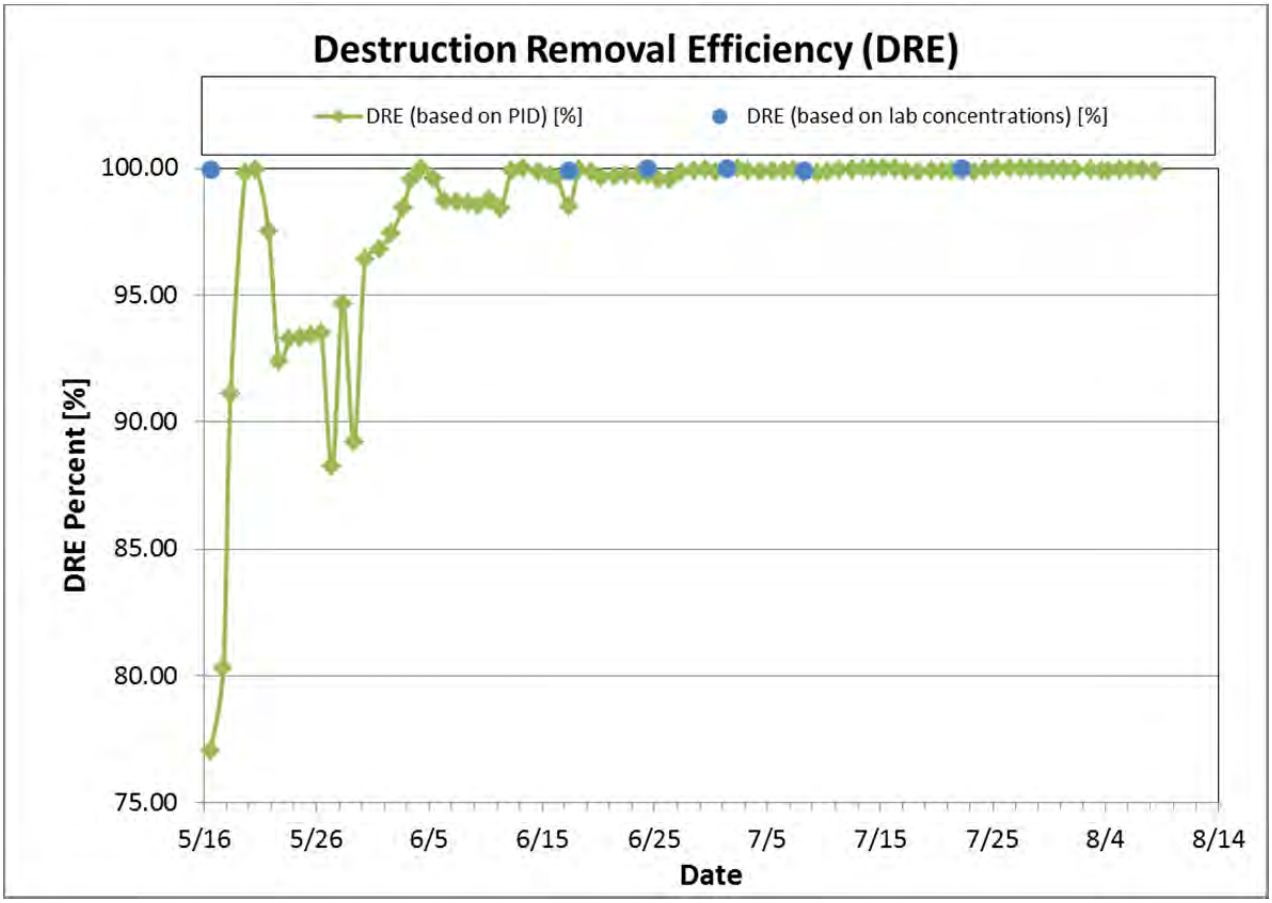


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7.

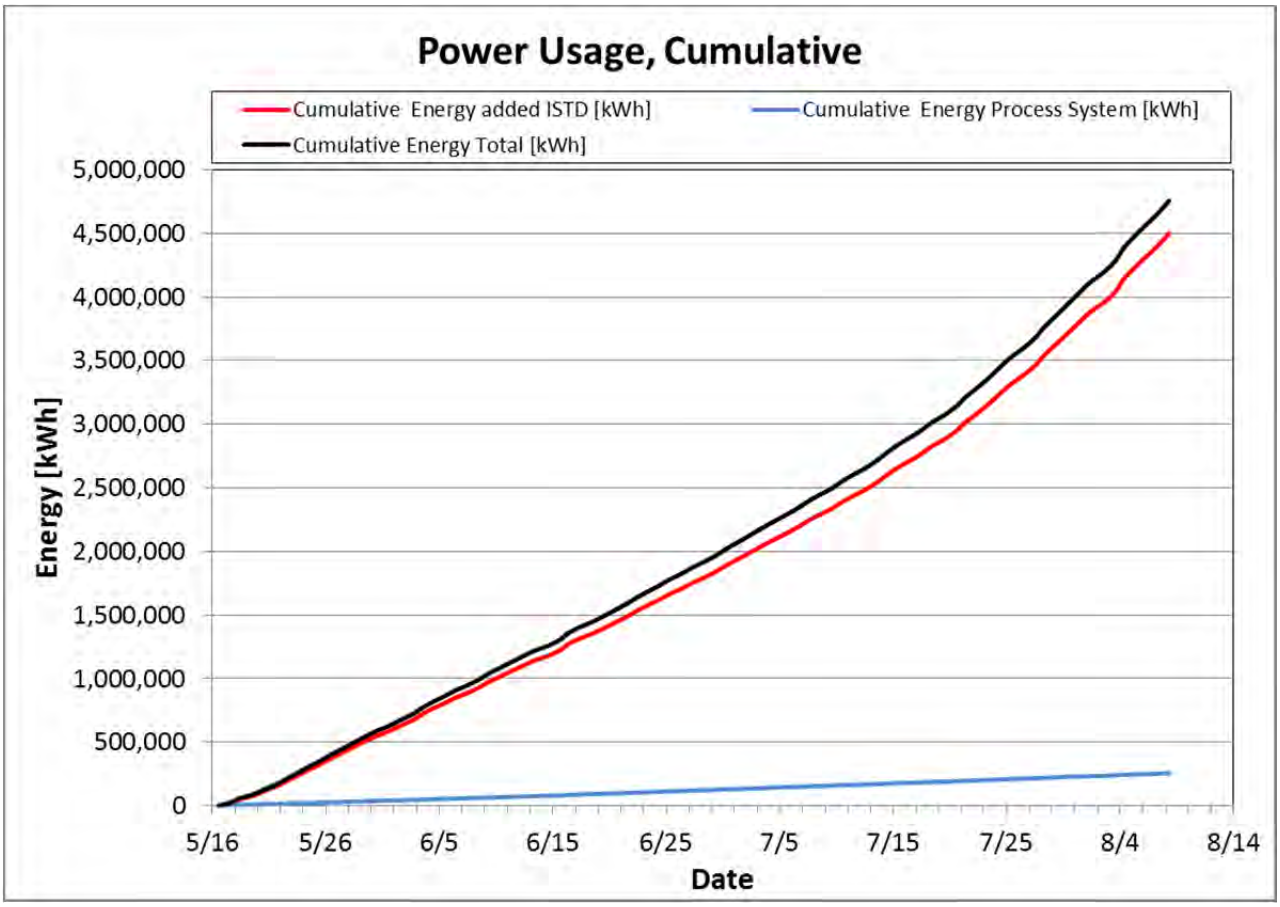


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints.

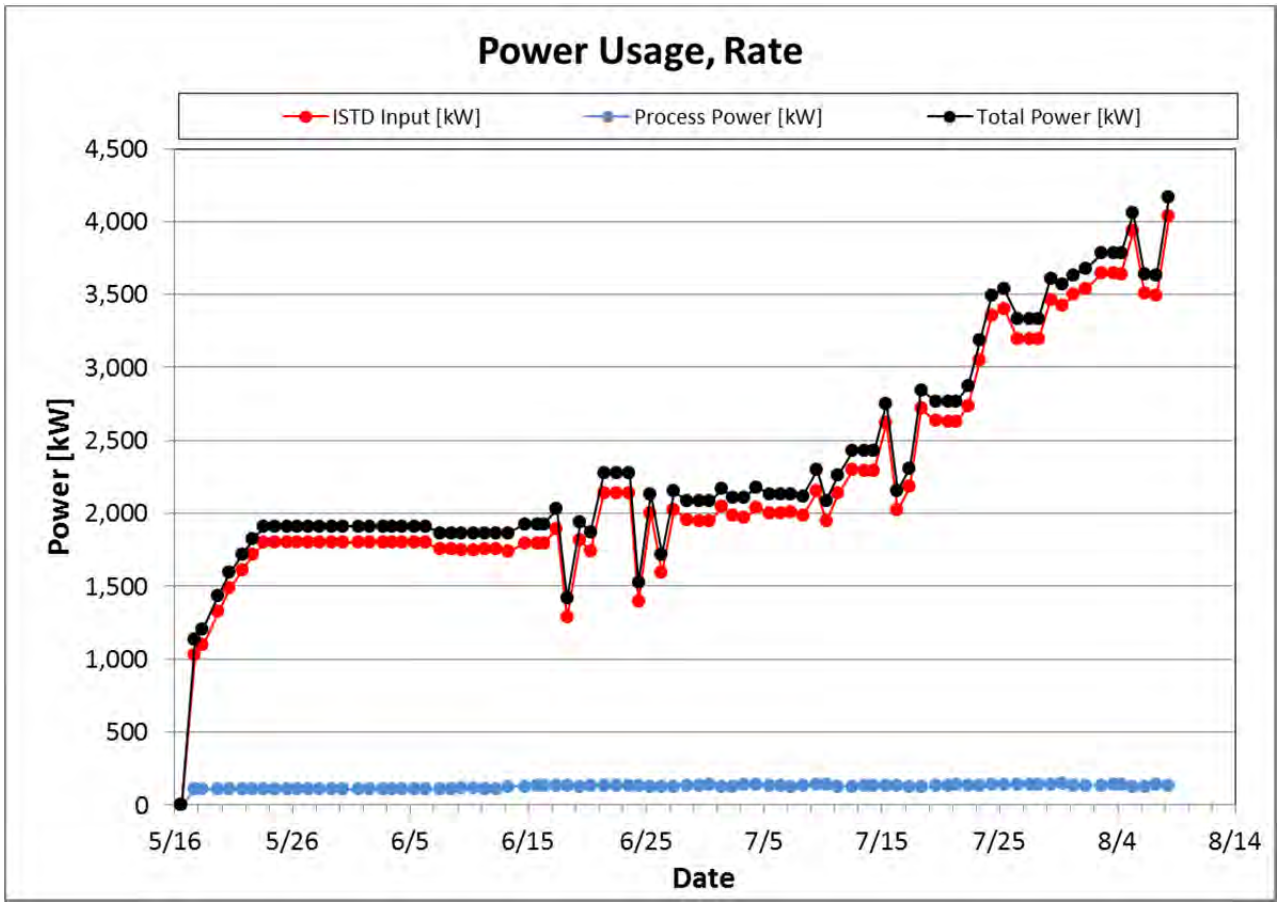


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

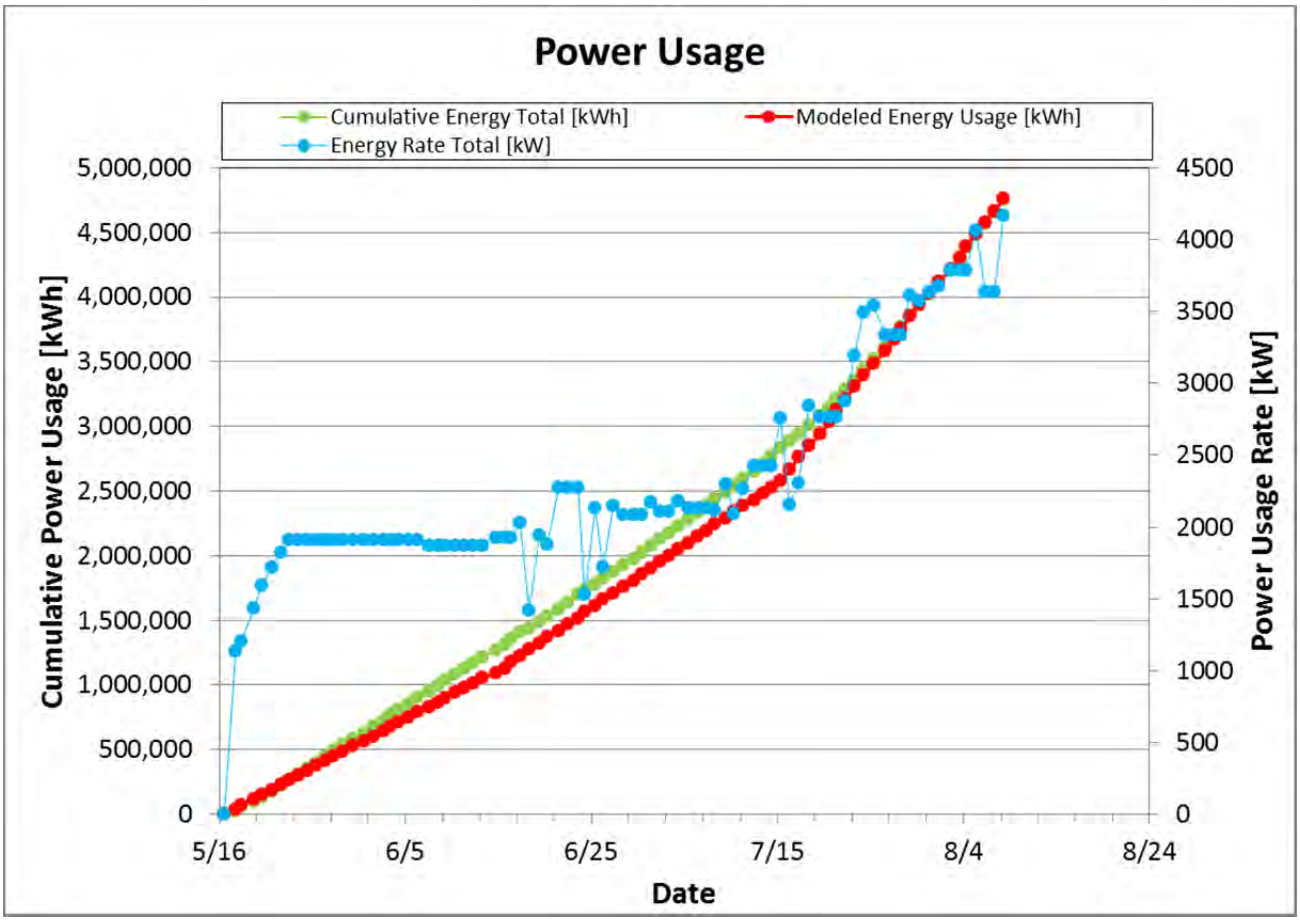


Figure 9. Power Usage

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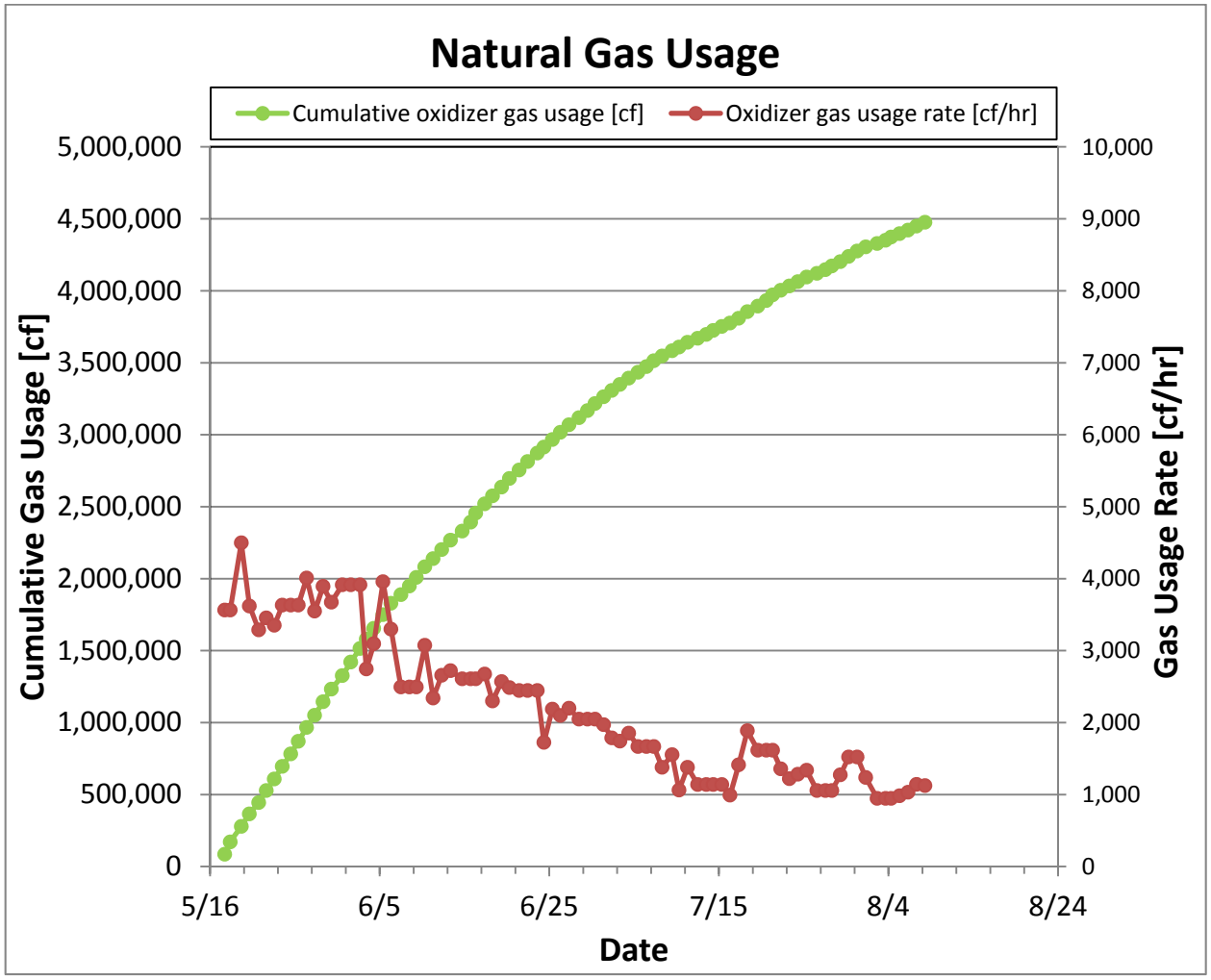


Figure 10. Natural Gas Usage

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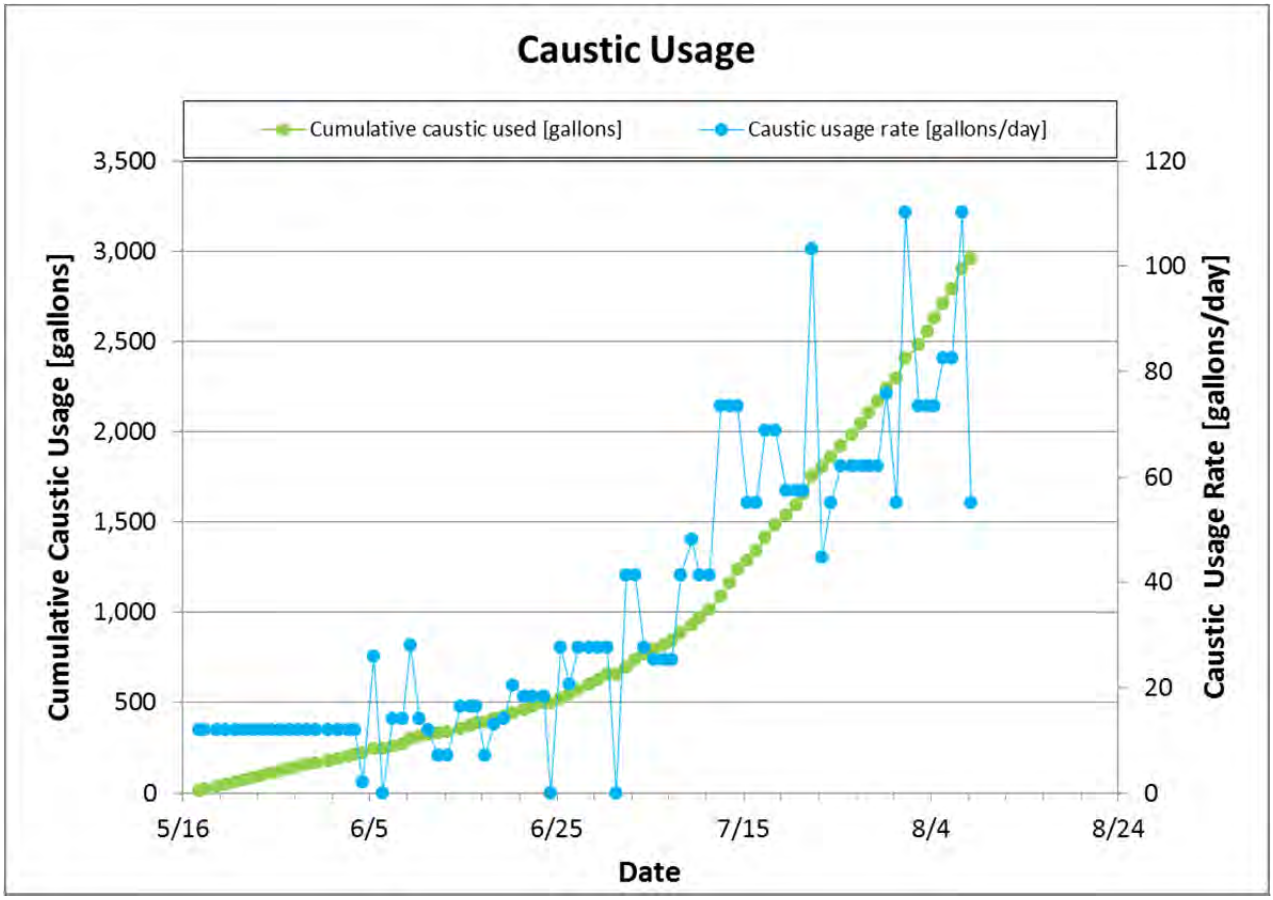


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12a. As of 7/25/14, we have reached the first payment milestone for Phase 1. Phase 2 centroids are shown in Figure 12b. The scatterplots have been updated to show the centroids grouped by depth, with each depth range shown as a different color.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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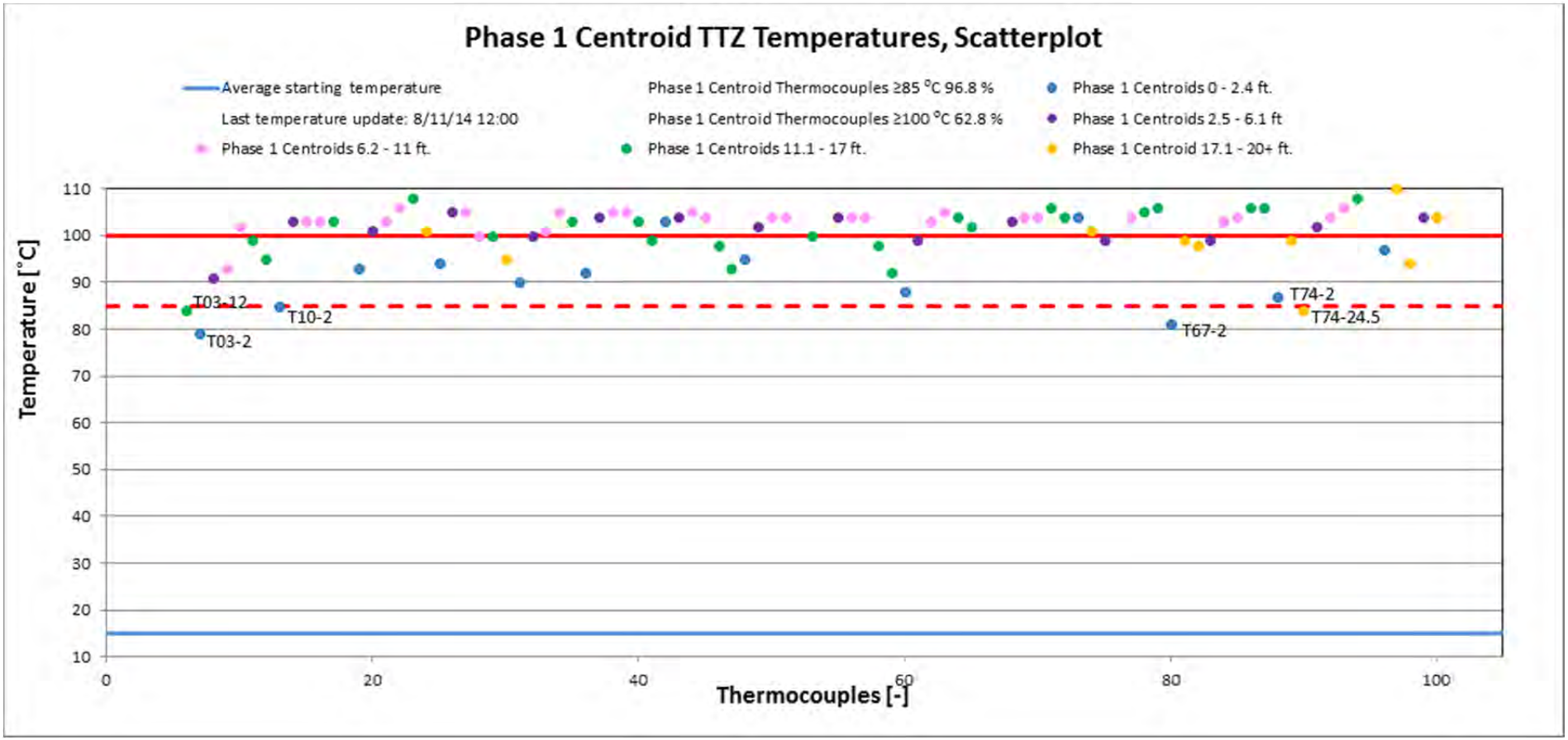


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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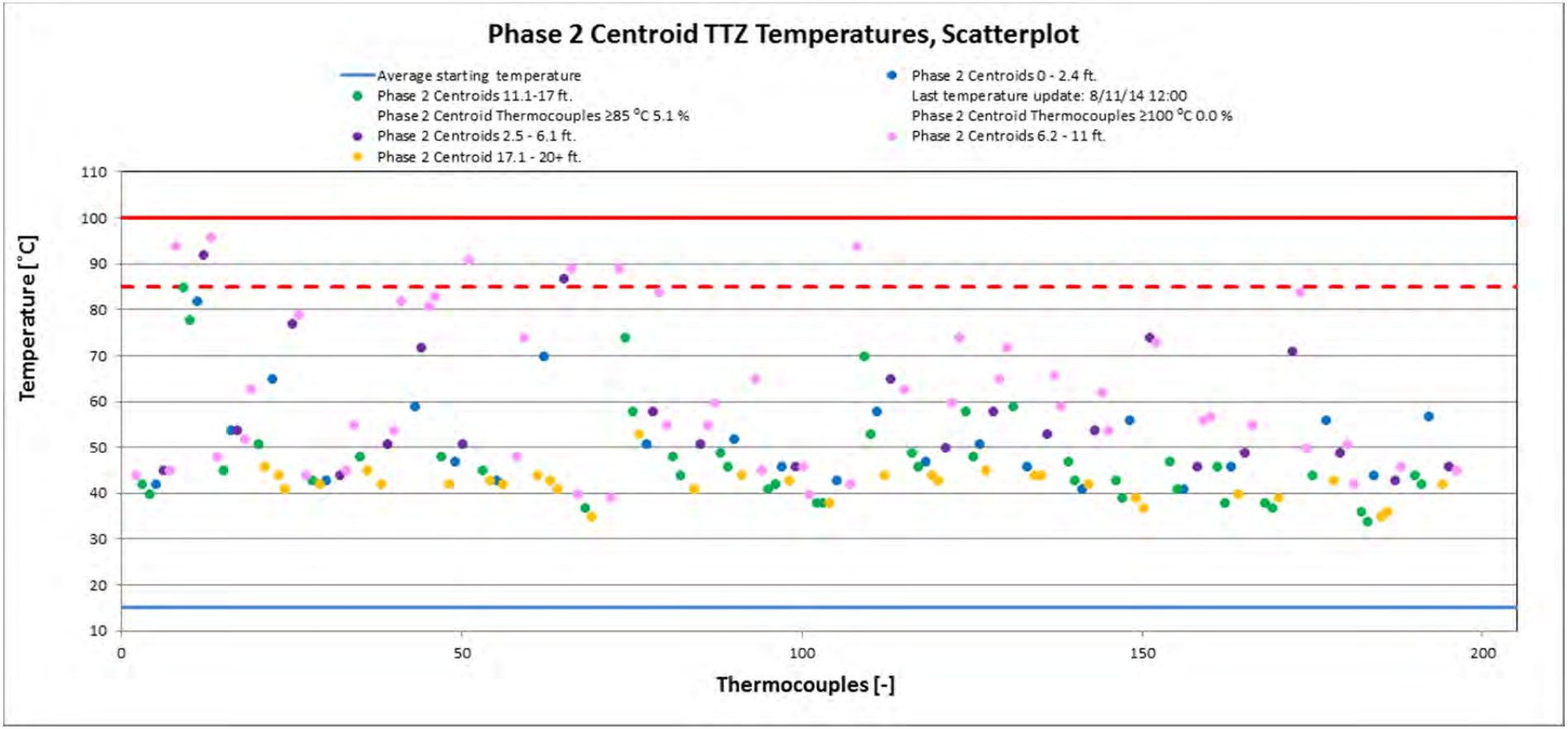


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots		
	Value	**Unit**
Date of Last Update	8/11/14	
Phase 1 Centroid Thermocouples ≥85 °C	96.8	%
Phase 1 Centroid Thermocouples ≥100 °C	62.8	%
Phase 2 Centroid Thermocouples ≥85 °C	5.1	%
Phase 2 Centroid Thermocouples ≥100 °C	0.0	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday August 8, 2014 through Friday August 15, 2014, with temperatures updated through Sunday August 17, 2014.

Table 1 provides a summary of the project operational status as of Friday, August 15, 2014.

Table 1. Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	08/15/14	
Last Temperature Data Update	08/17/14	
Estimated Days of Operation (Total)	195	days
Days of Operation (Total)	92	days
Days of Operation vs. Estimate (Total)	47	%
Estimated Days of Operation Phase 1 (Day 1-134)	135	days
Days of Phase 1 Operation	92	days
Days of Phase 1 Operation vs. Estimate	68	%
Estimated Days of Operation Phase 2 (Day 61-195)	135	days
Days of Phase 2 Operation	30	days
Days of Phase 2 Operation vs. Estimate	22.5	%
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	5,337,800	kWh
Used Electrical Energy vs. Estimate	33.8	%
Total Vapor Mass Removal (based on Oxidizer PID Readings)	21,133	lbs
Total Vapor Mass Removal (Based on Flammability Analyzer)	97,227	lbs
Estimated Mass Removed as LNAPL	3,702	lbs
Average Power Input Last 24 Hours	580	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	856	scfm
Average Condensate Production Rate Last 24 Hours	2.3	gpm

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On 8/13/14, the oxidizer was taken offline and the backup carbon system placed online. After evaluation of the oxidizer and influent/effluent piping, it appears that the daisy wheel was melted during operations, impacting the oxidizer flame. We are working with the oxidizer vendor, Catalytic Combustion Company, to identify the root cause of the failure. In the meantime, the heaters have been lowered to 10% energy input. PID samples are being collected routinely from the wellfield and carbon influent/midfluent/and effluent locations to evaluate discharge emissions, if any.

As of 8/15/14, phase 1 has operated for 92 days and phase 2 for 30 days. The current average wellfield temperature for phase 1 is 99C and 67C for phase 2.

Estimated mass removed to date is reported four different ways. The first, using the combined vapor stream, based on PID, is 21,133 lbs. The second, using the laboratory data, is 18,646 lbs. The third and fourth using the flammability analyzer and a 9,000 BTU/lbs and 13,000 BTU/lbs constant, is 67,300 and 97,300 lbs respectively. There is an additional 3,702 lbs removed as NAPL, assuming the density of toluene. We do not have recent BTU content data on vapor samples, so are assuming values from previous liquid NAPL samples analyzed (13,000 BTU/lbs) combined with an estimate of the BTU value of the vapor fraction of the NAPL mix (9,000 BTU/lbs).

Phase 1/Phase 2 differentiation readings were last collected in the wellfield on 8/07/14 (nothing collected last week due to the oxidizer shutdown). The ratio of mass coming from Phase 1:Phase 2 on that date was 0.74:0.26. These ratios were applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Phase 2 heating began on 7/16/14. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ		
Type	**Value**	**Unit**
Date of Last Update	8/17/14	
Phase 1 Entire TTZ Average Temperature	99	°C
Phase 2 Entire TTZ Average Temperature	67	°C
Phase 1 Centroid Average Temperature	99	°C
Phase 2 Centroid Average Temperature	62	°C

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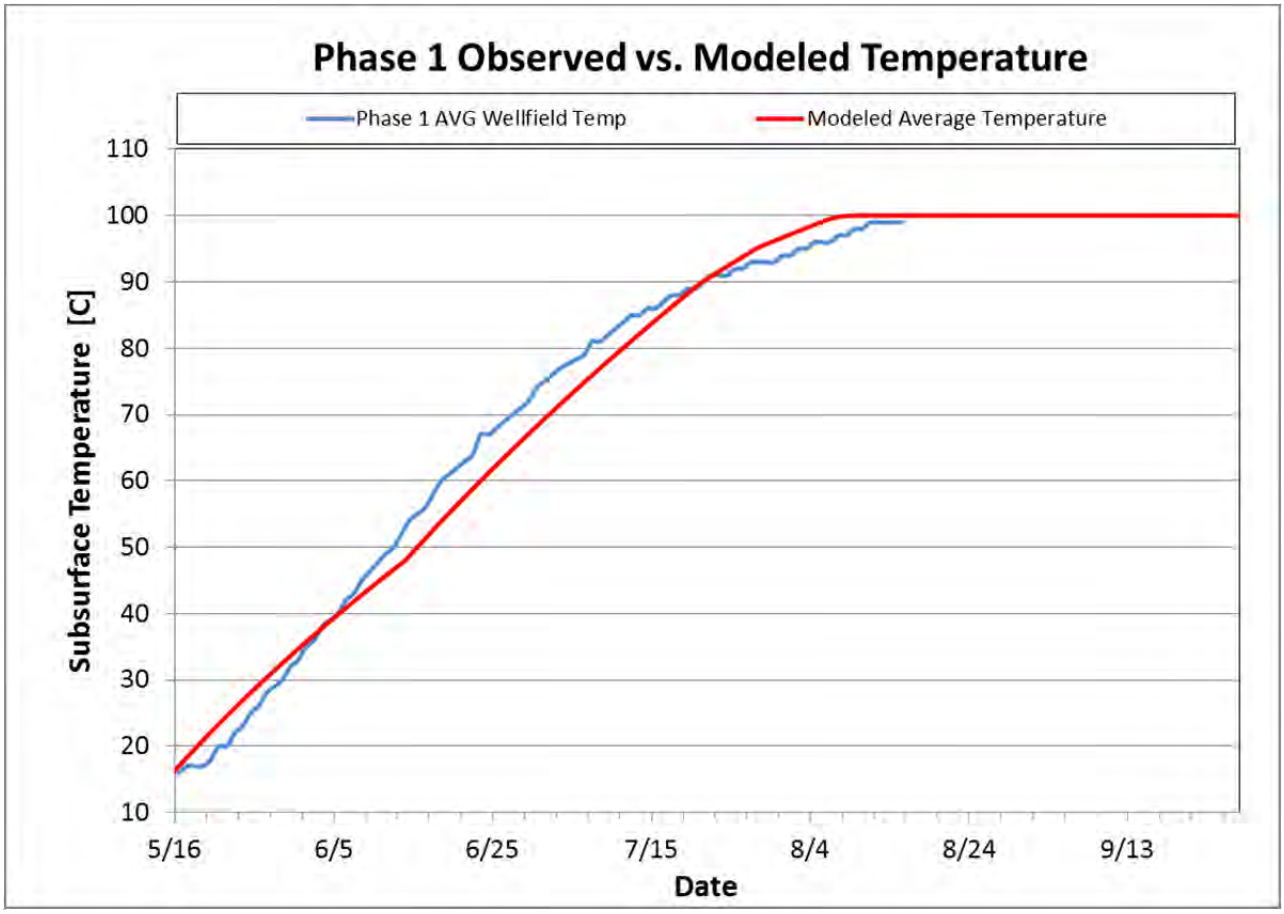


Figure 1a. Phase 1 Observed vs. Modeled Temperatures

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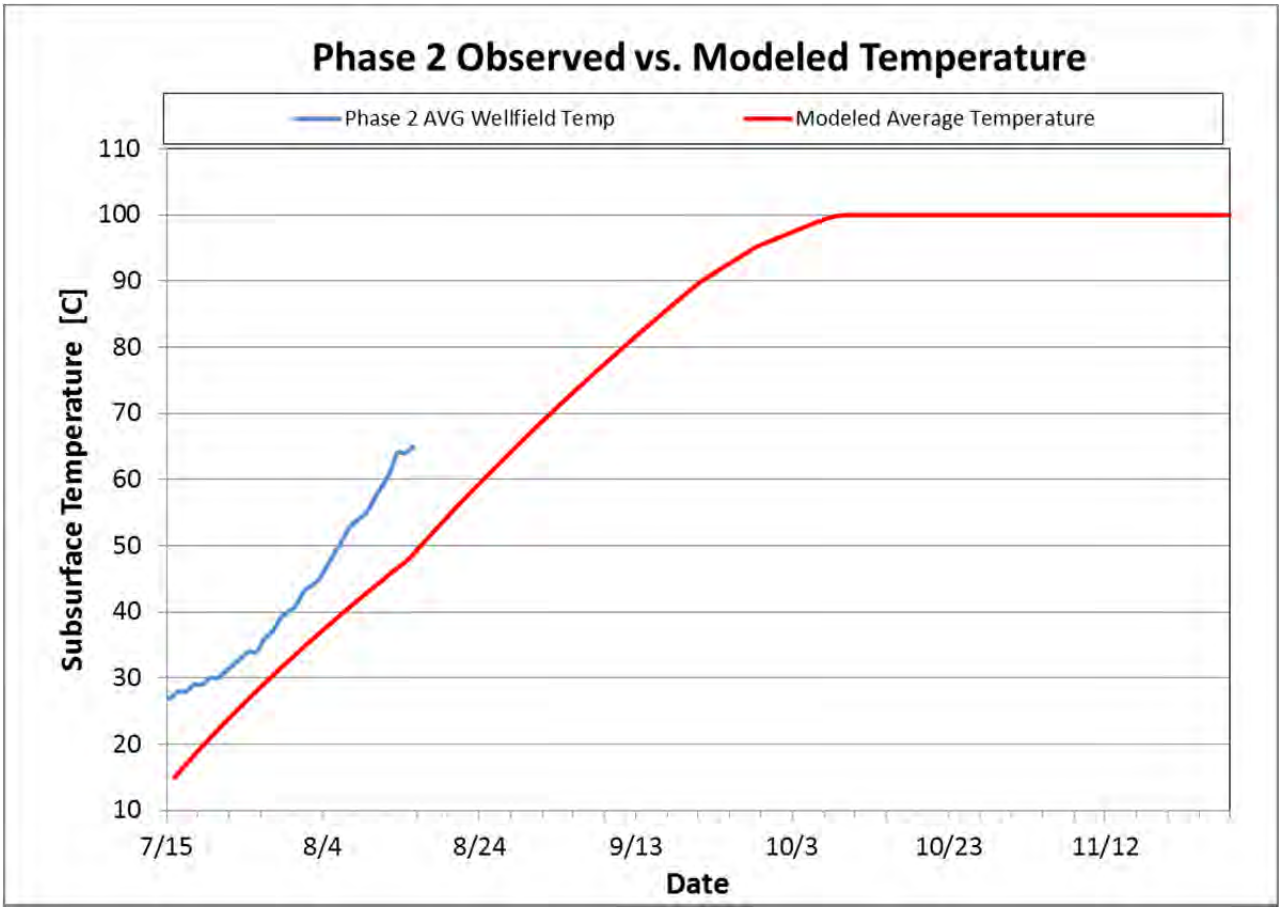


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode.

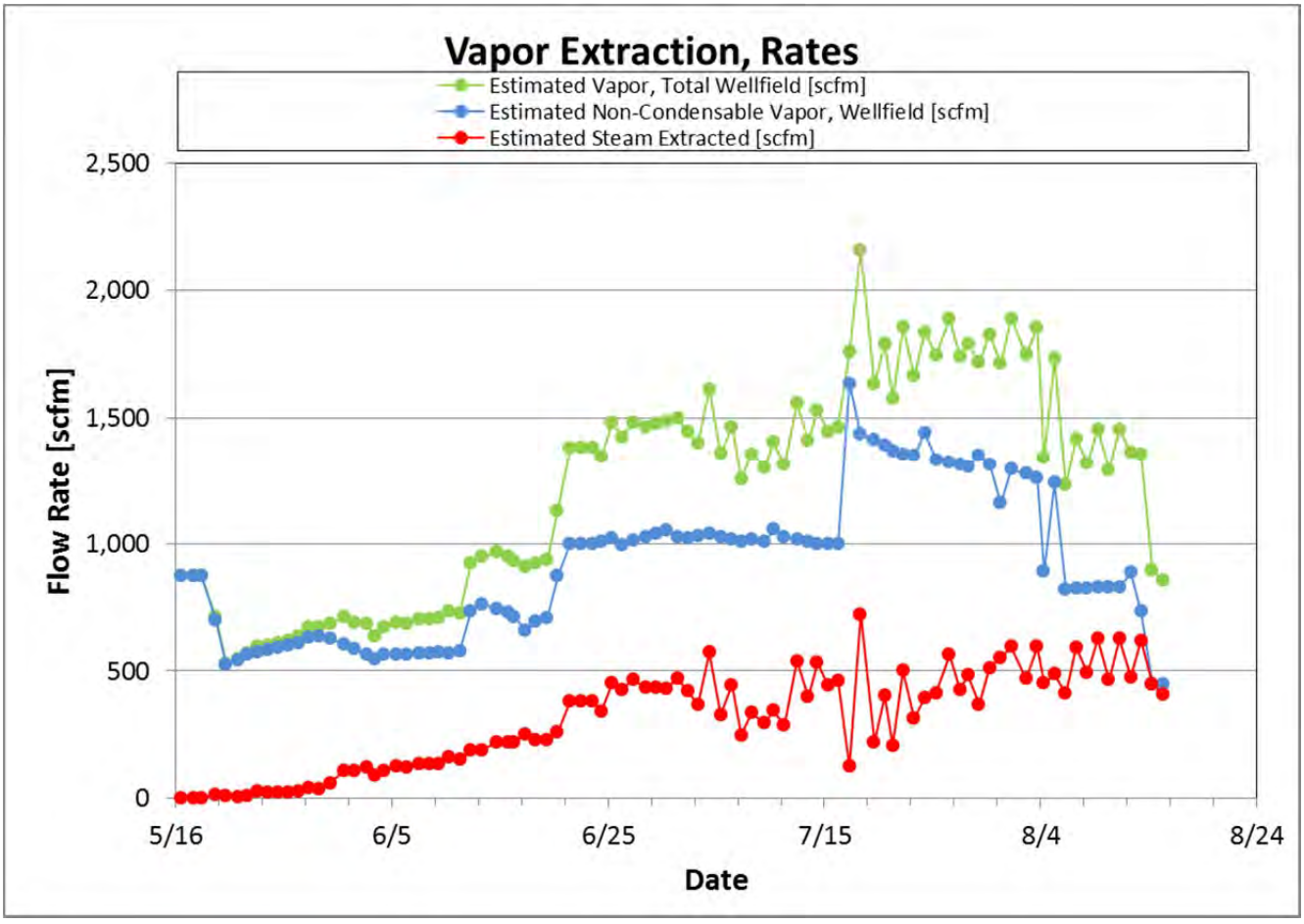


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent one manual daily reading from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf. Currently, the vapors entering the oxidizer are low flammability (<50% LFL) and do not approach the contract limit, although an increase in flammability can be seen after the dilution air valve was closed on June 20, 2014. Dilution air has been reintroduced to the system to assist with current mass being removed (higher removal rate) from the subsurface.

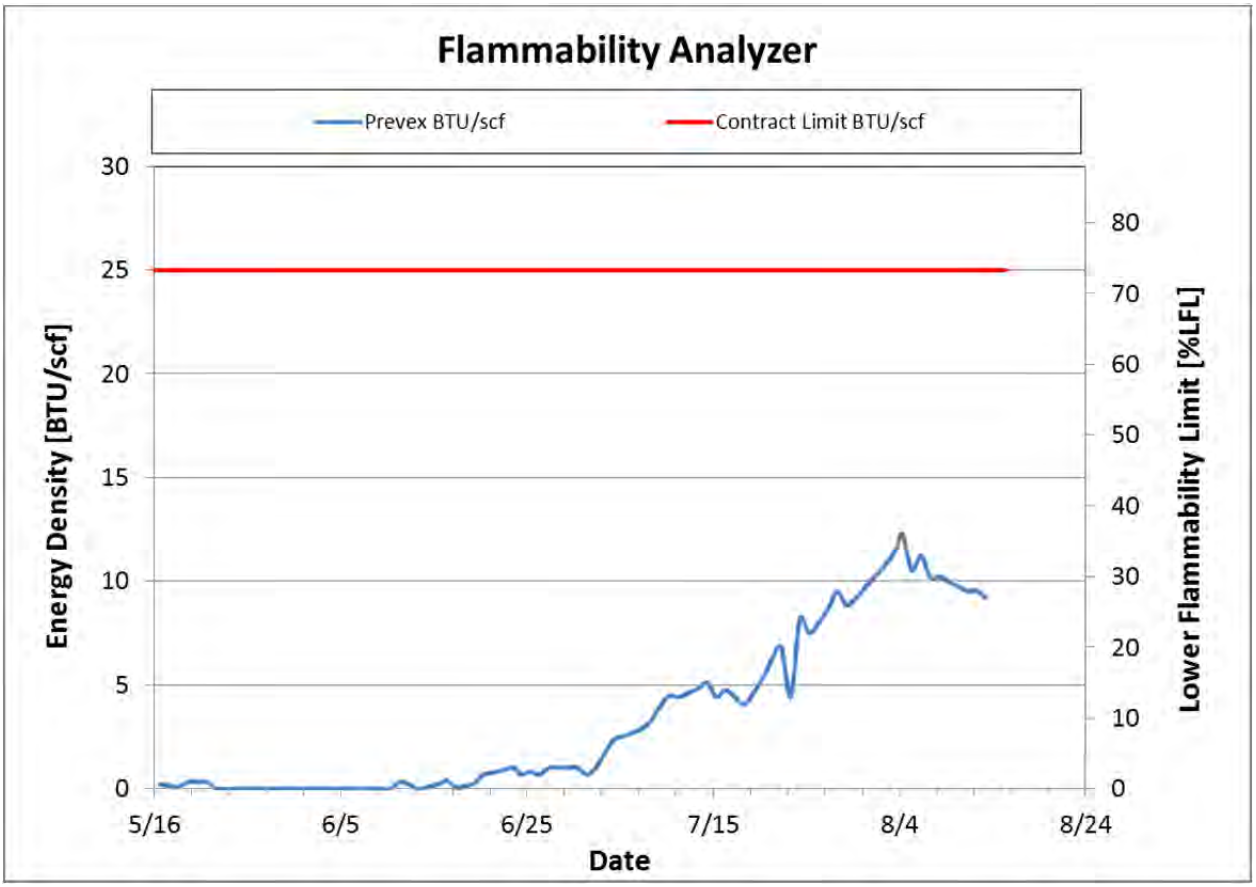


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated total mass removed based on daily photoionization detector (PID) readings and laboratory data (total of Phase 1 and Phase 2), flammability analyzer and LNAPL are shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The decrease in mass removed on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14 and 7/29/14.

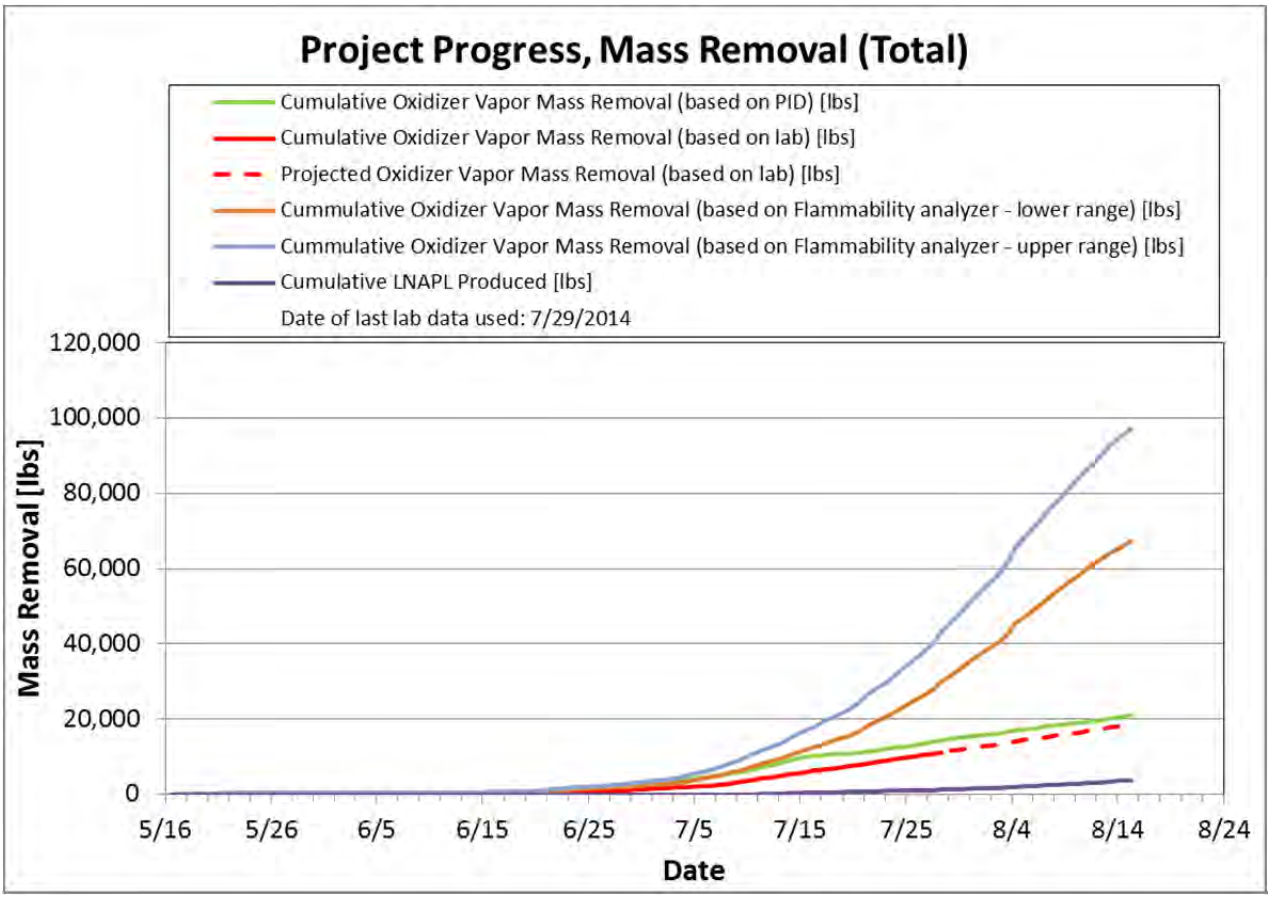


Figure 4a. Project Progress, Mass Removal (Total)

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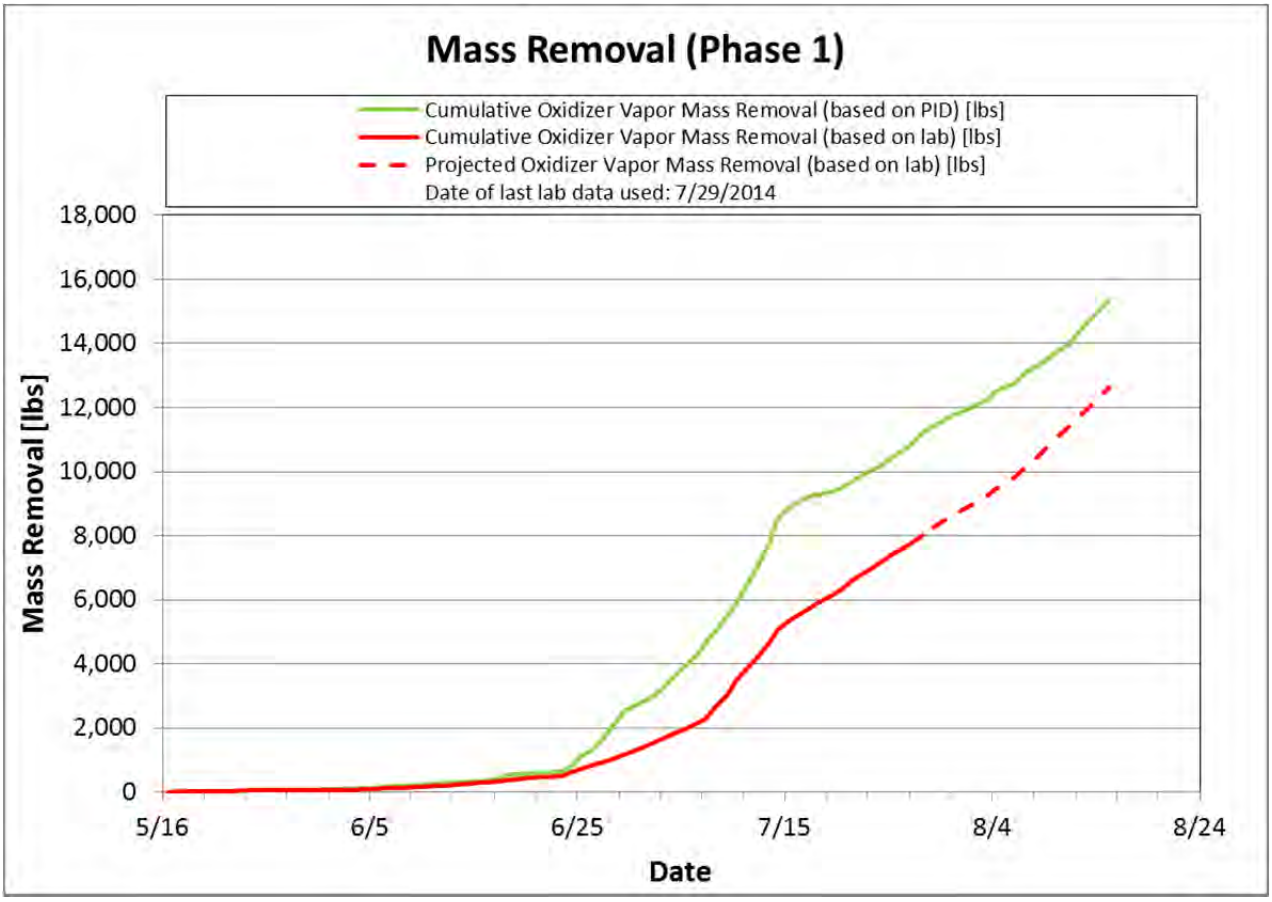


Figure 4b. Project Progress, Mass Removal (Phase 1)

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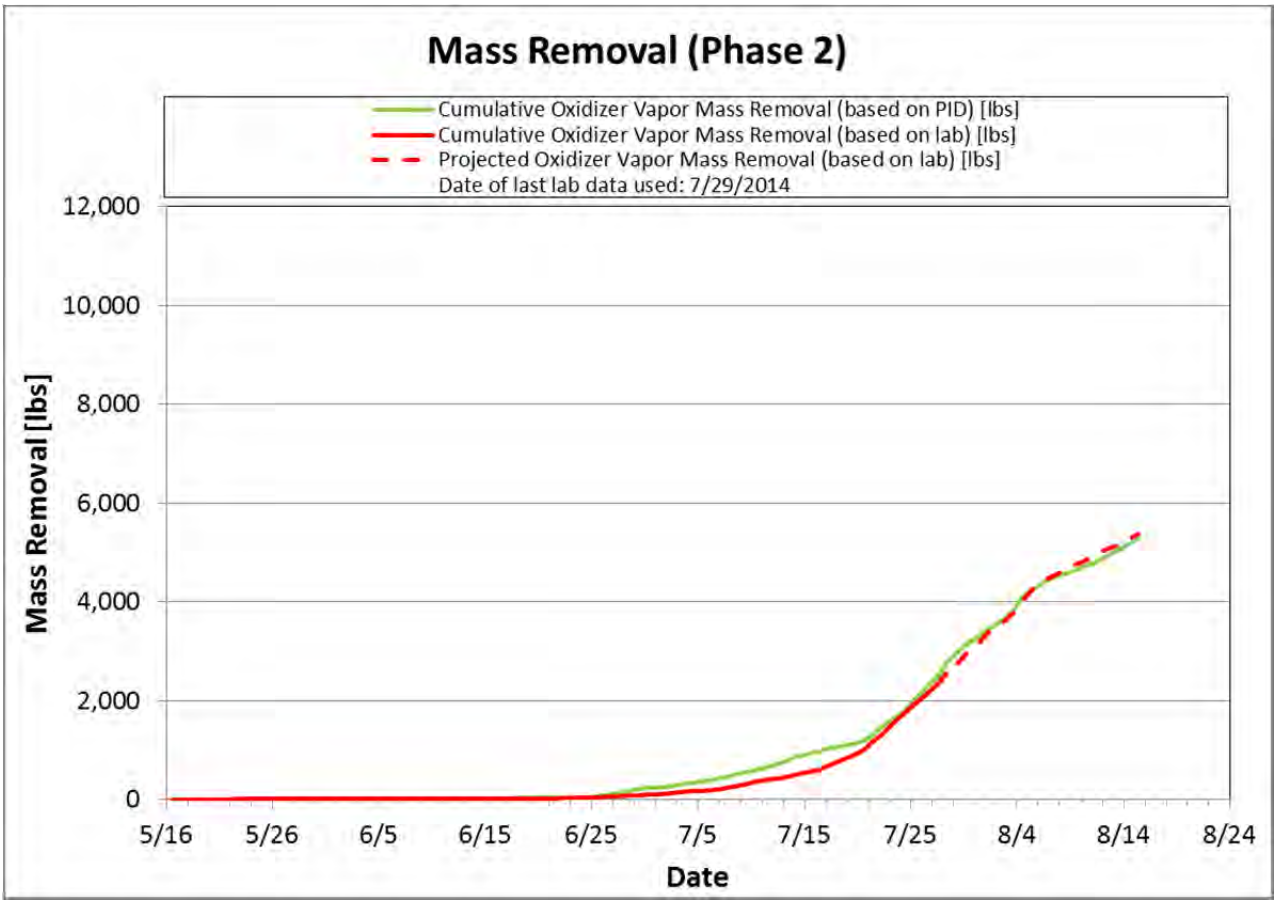


Figure 4c. Project Progress, Mass Removal (Phase 2)

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The flammability analyzer mass removal rate decrease below represents an estimate due to the system shutdown. Currently, treatment of contaminated vapors is through the backup carbon system. The location of the flammability analyzer does not allow data to be recorded when the backup carbon is online. Once the oxidizer is operational, and flammability data available, the mass removal rate will be updated.

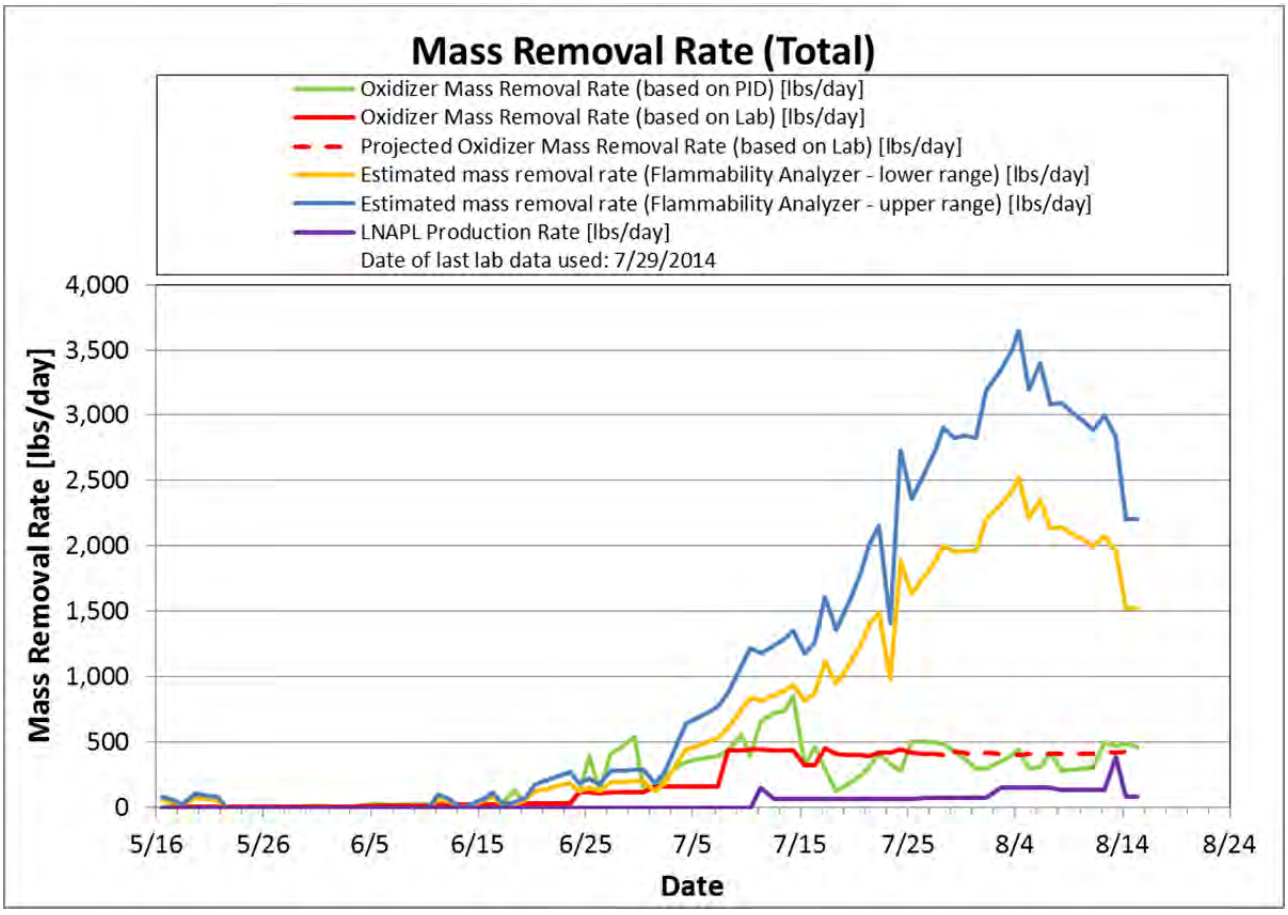


Figure 4d. Mass Removal Rate (Total for Site)

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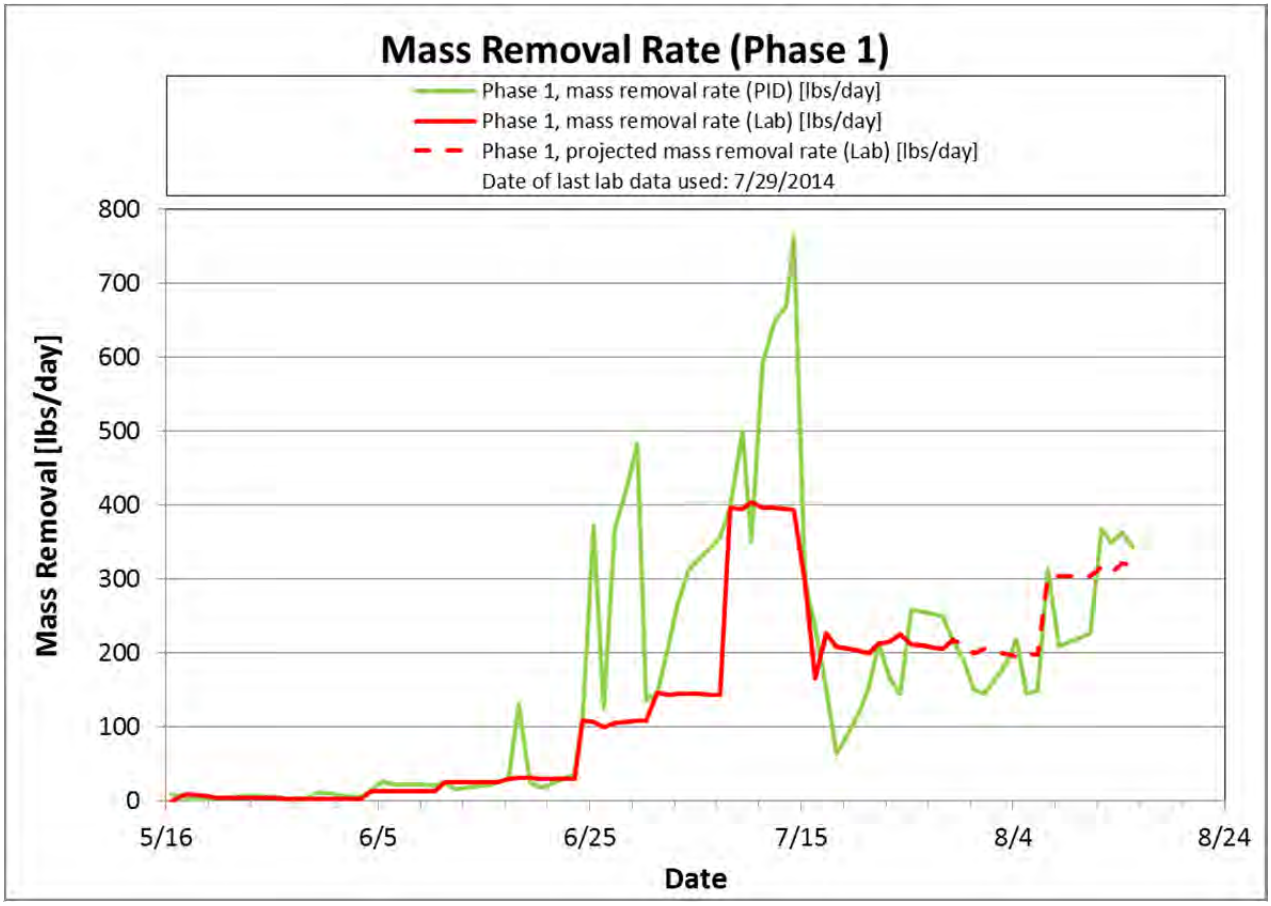


Figure 4e. Mass Removal Rate (Phase 1)

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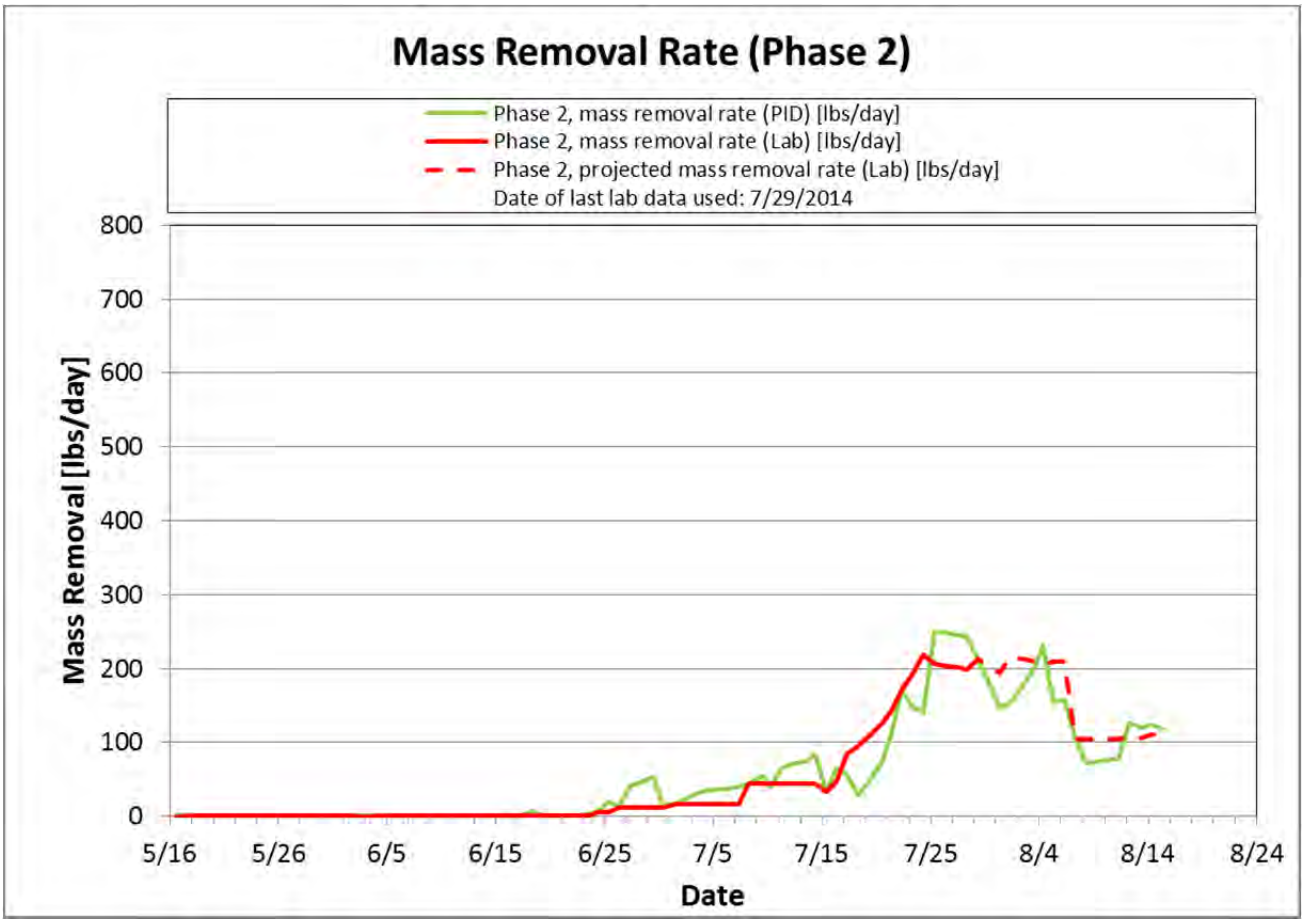


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID readings collected at the oxidizer influent over time. It should be noted that the PID reading from 7/16/14 was obtained with a PID with a 10.6 eV lamp, instead of the 11.7 eV lamp which had reached the upper concentration limit of 2,000 ppmV. Similarly, data collected on 07/25-07/28 were first collected with an 11.7 eV lamp with values exceeding the upper limit. The influent concentrations were then collected with the 10.6 eV lamp with values lower than the 11.7 eV upper limit (2,000 ppm). Therefore, the maximum 11.7 eV lamp is reported.

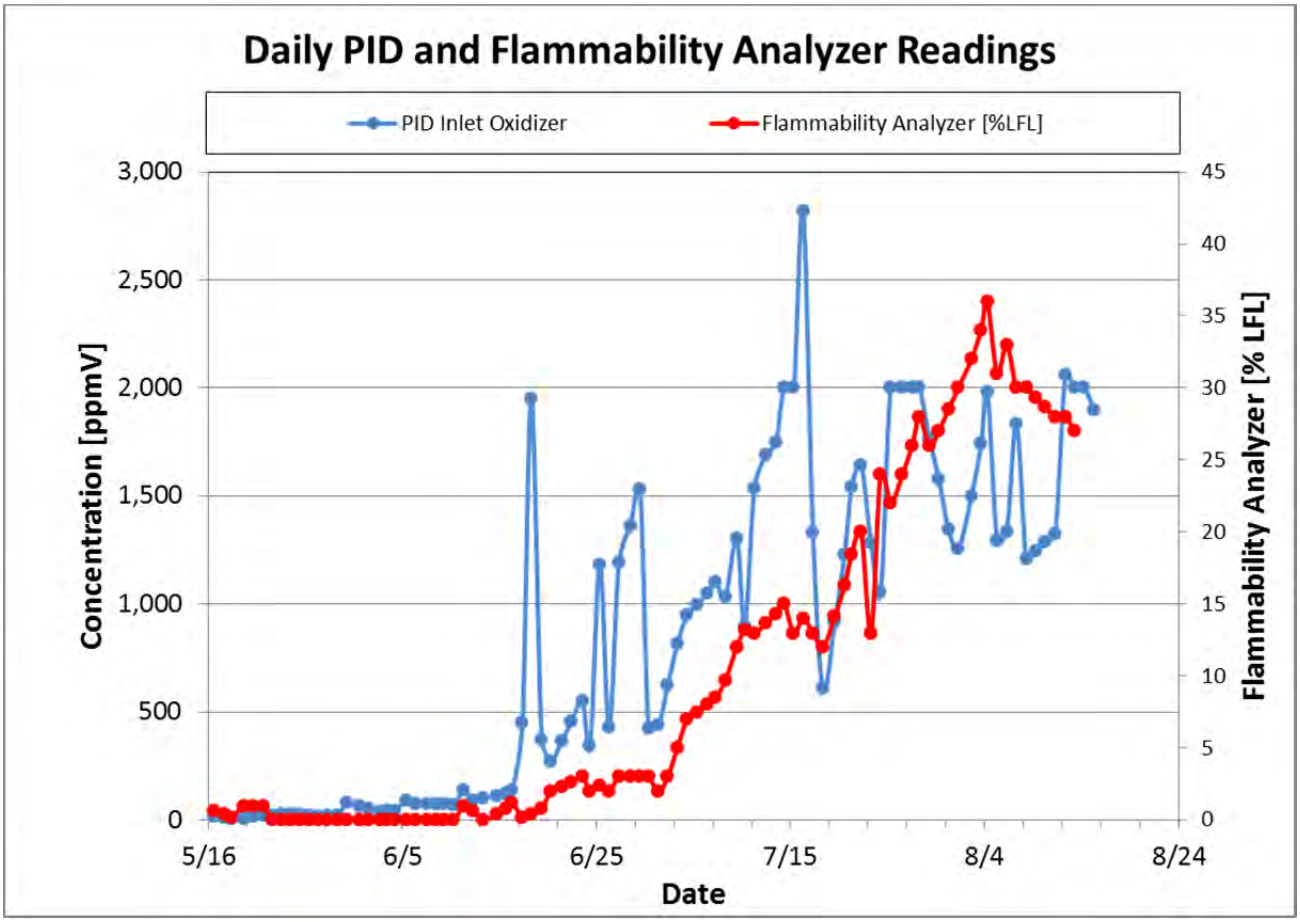


Figure 5. Daily PID Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

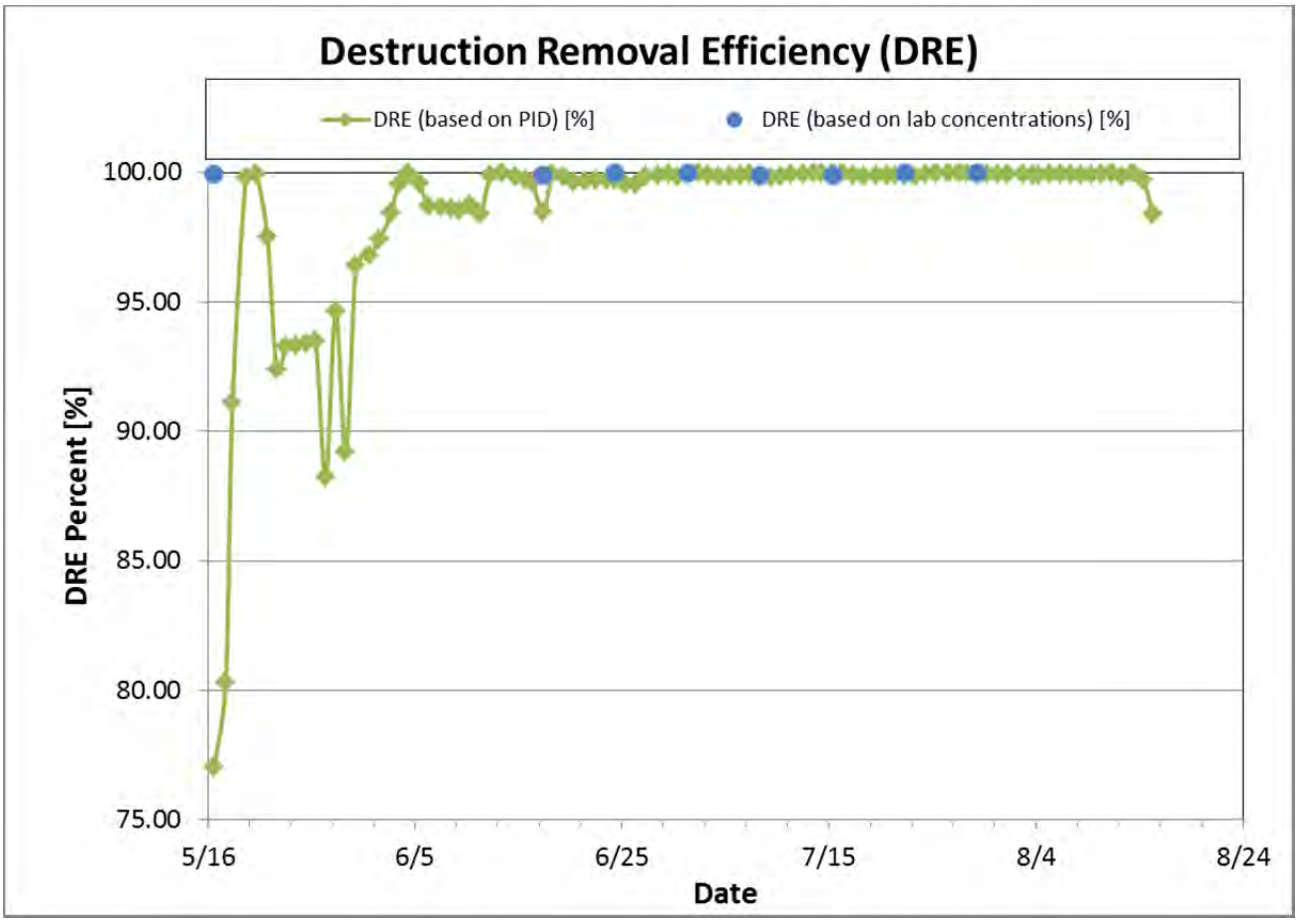


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7.

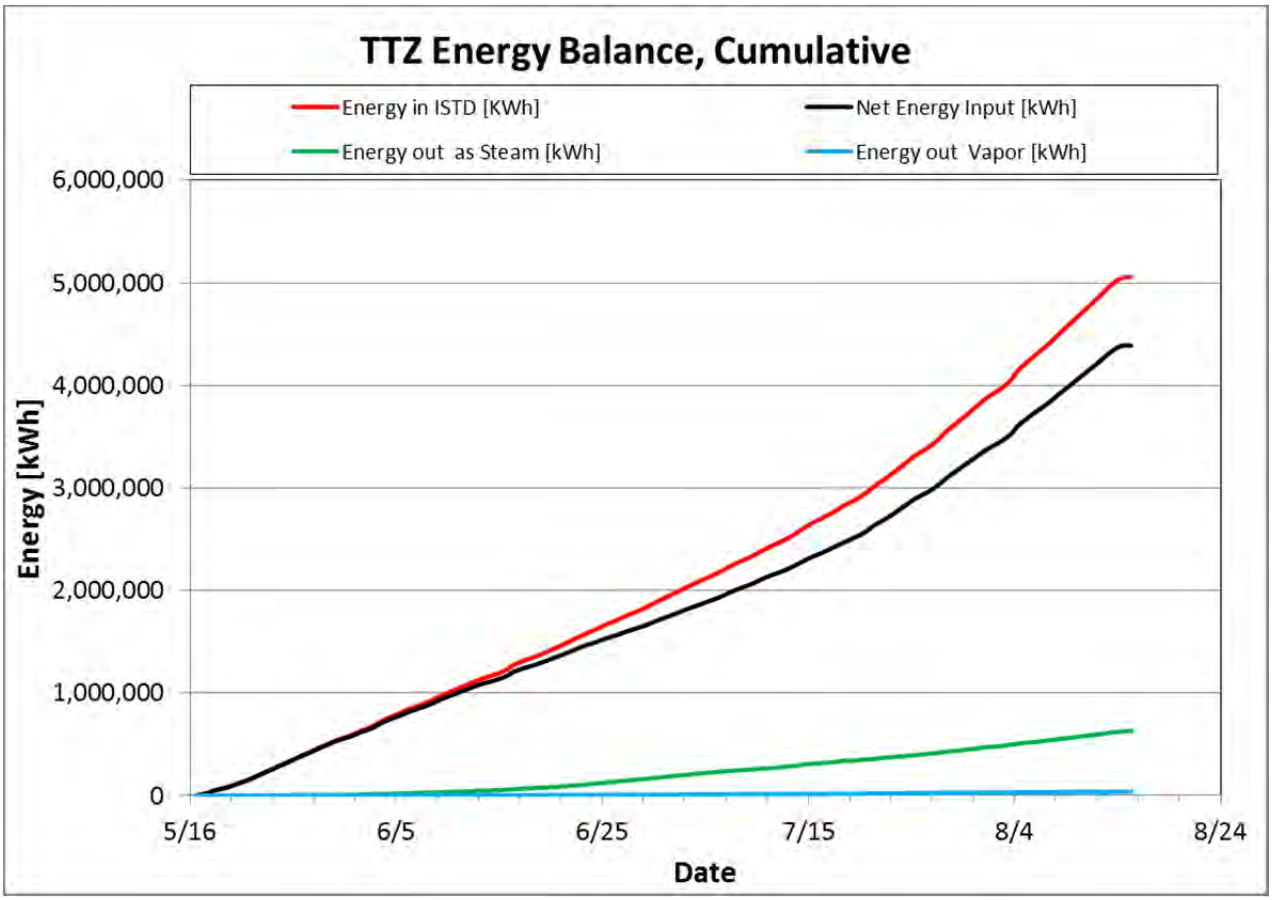


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints.

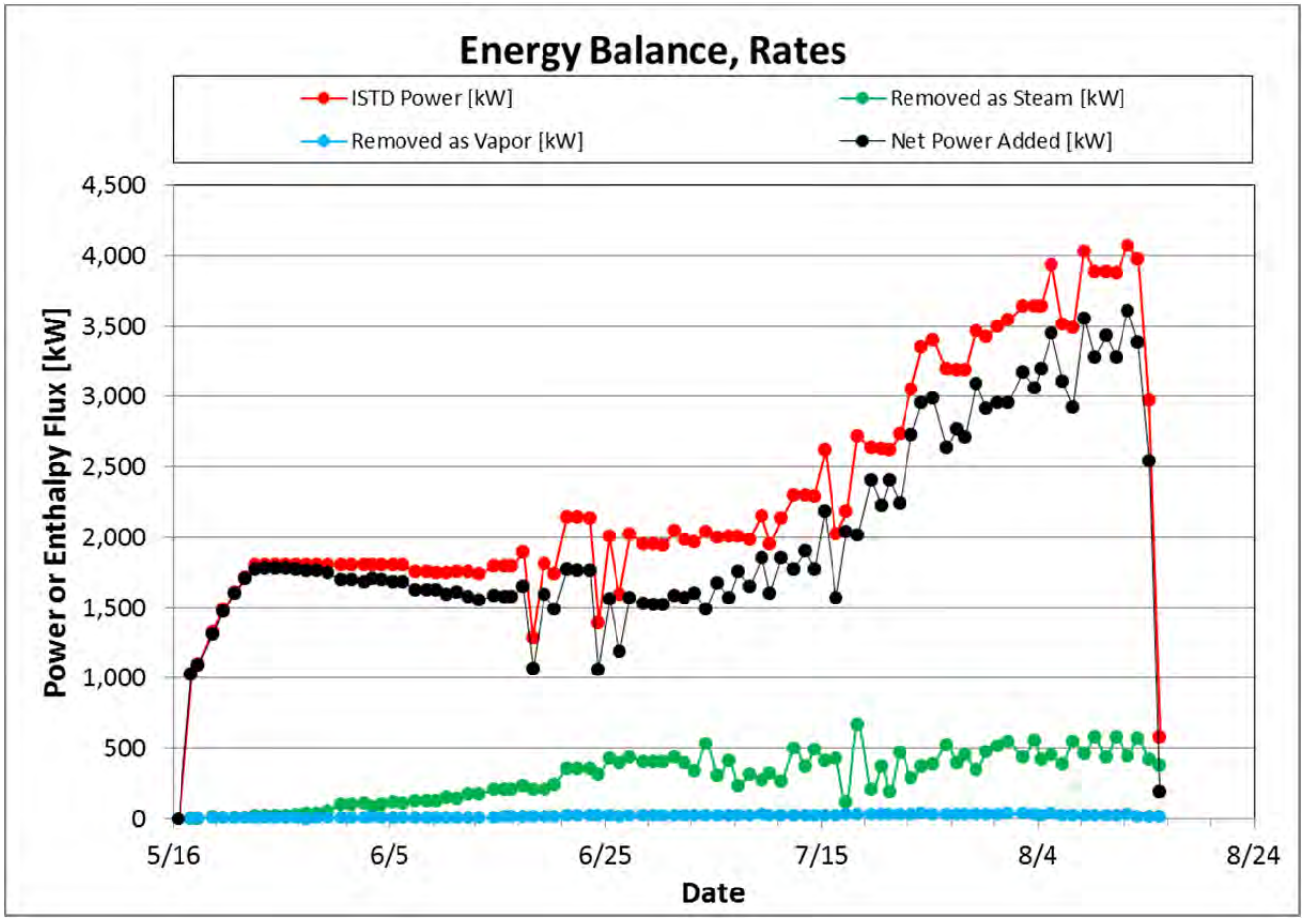


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

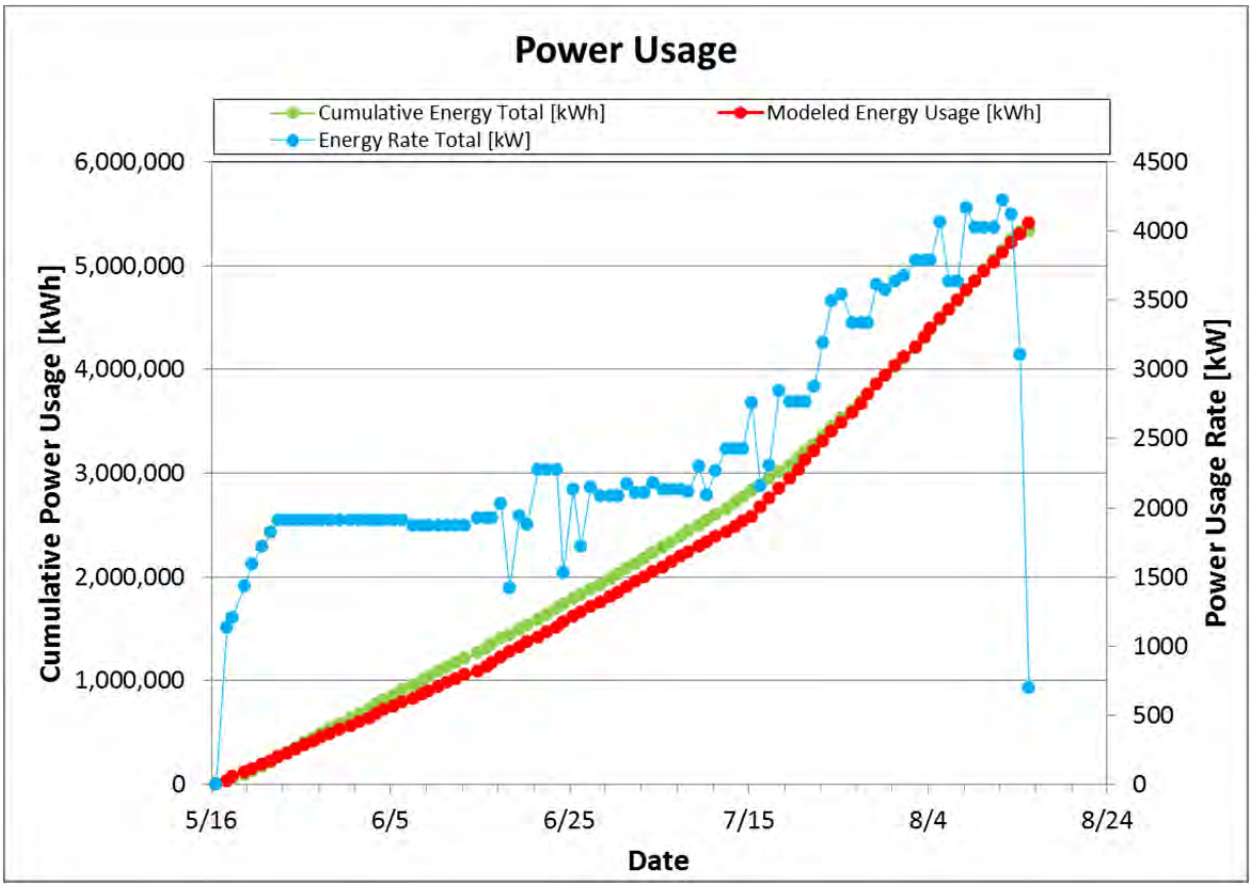


Figure 9. Power Usage

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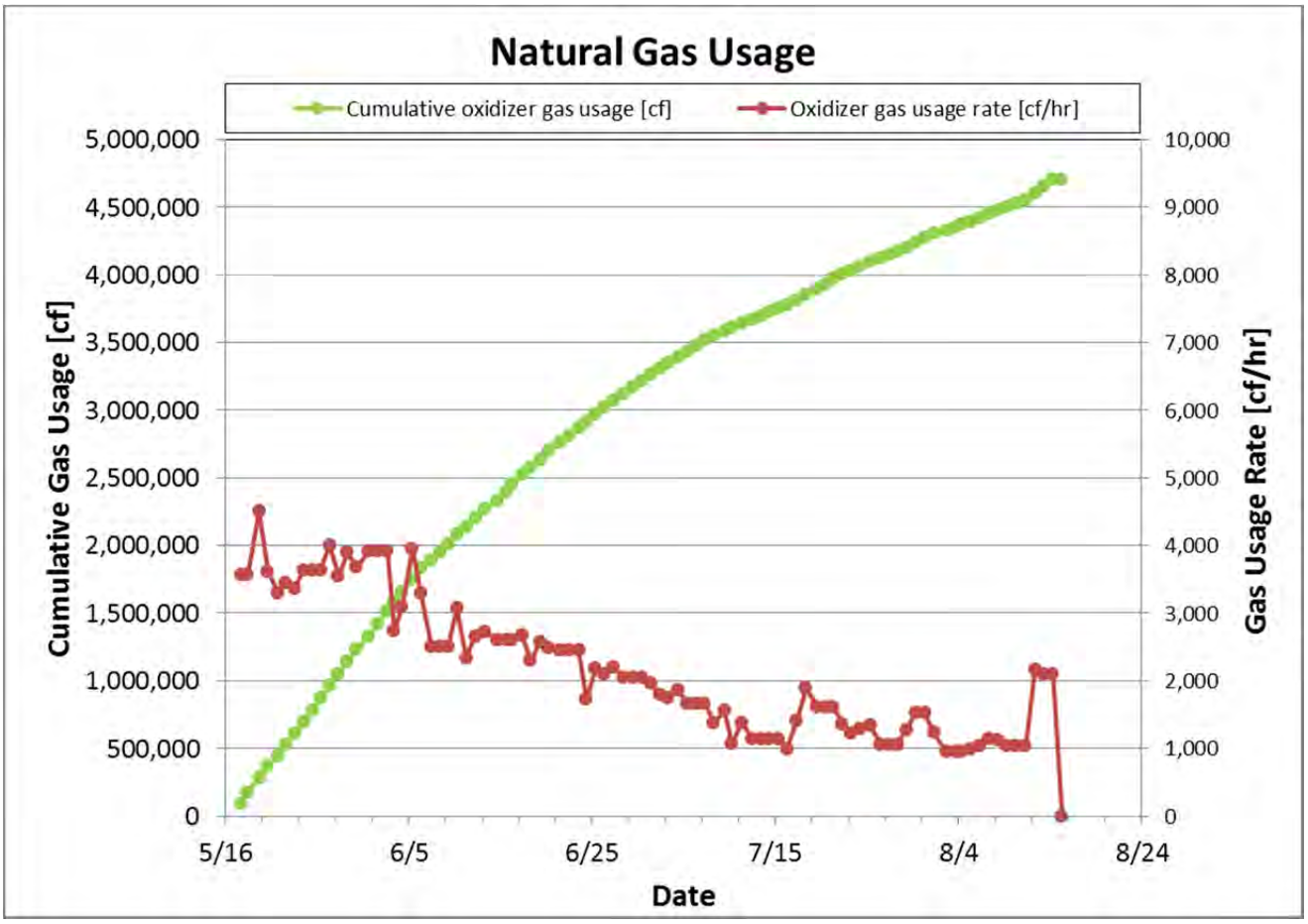


Figure 10. Natural Gas Usage

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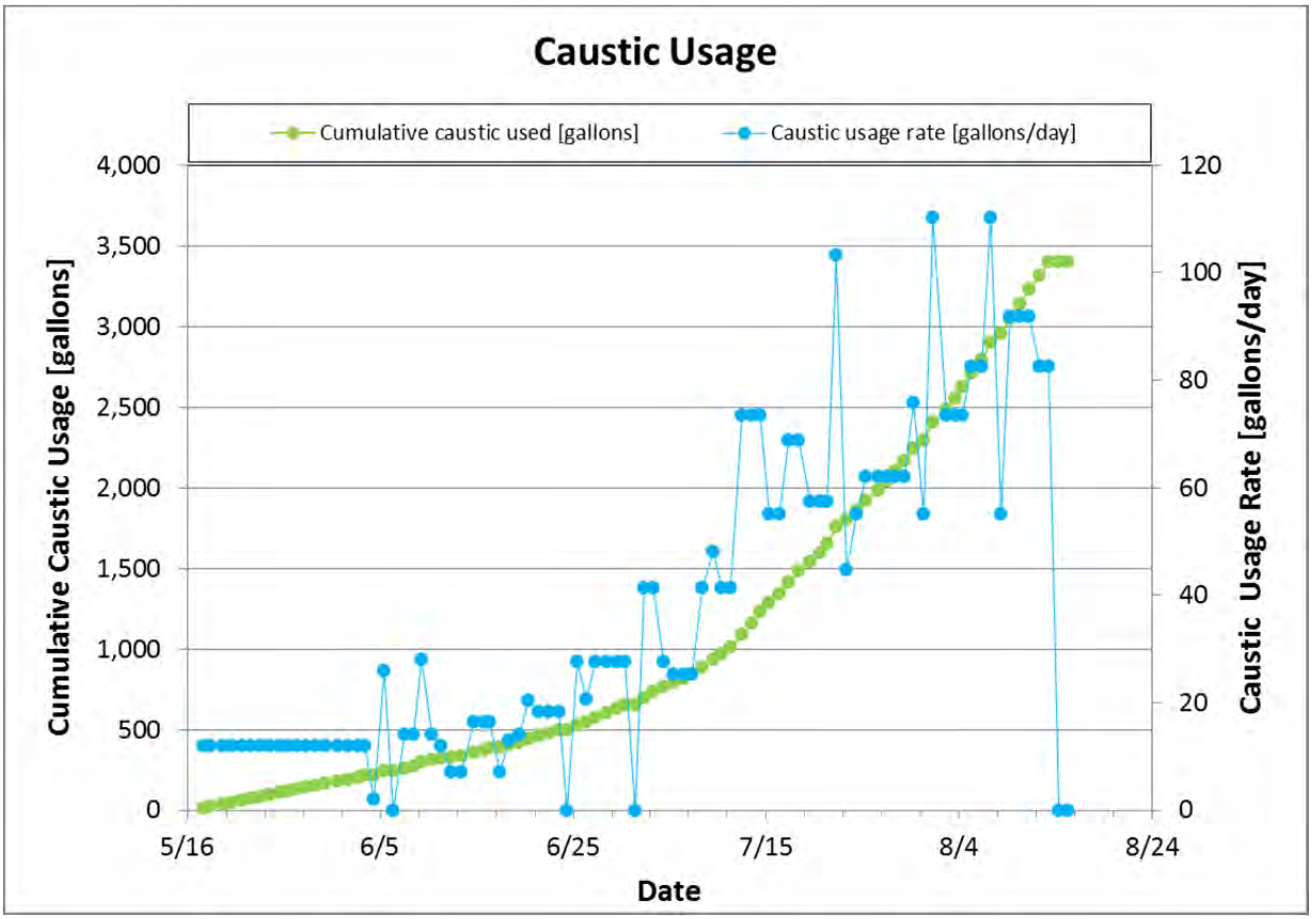


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12a. As of 7/25/14, we have reached the first payment milestone for Phase 1. Phase 2 centroids are shown in Figure 12b. The scatterplots have been updated to show the centroids grouped by depth, with each depth range shown as a different color.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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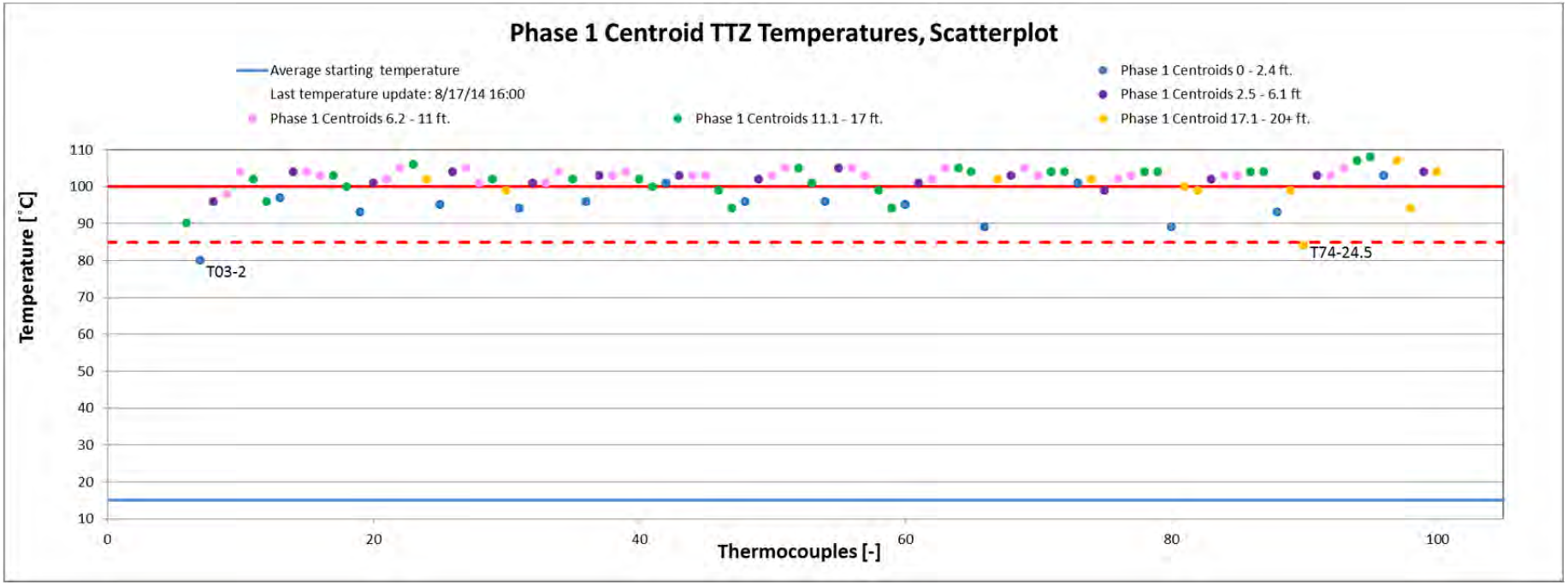


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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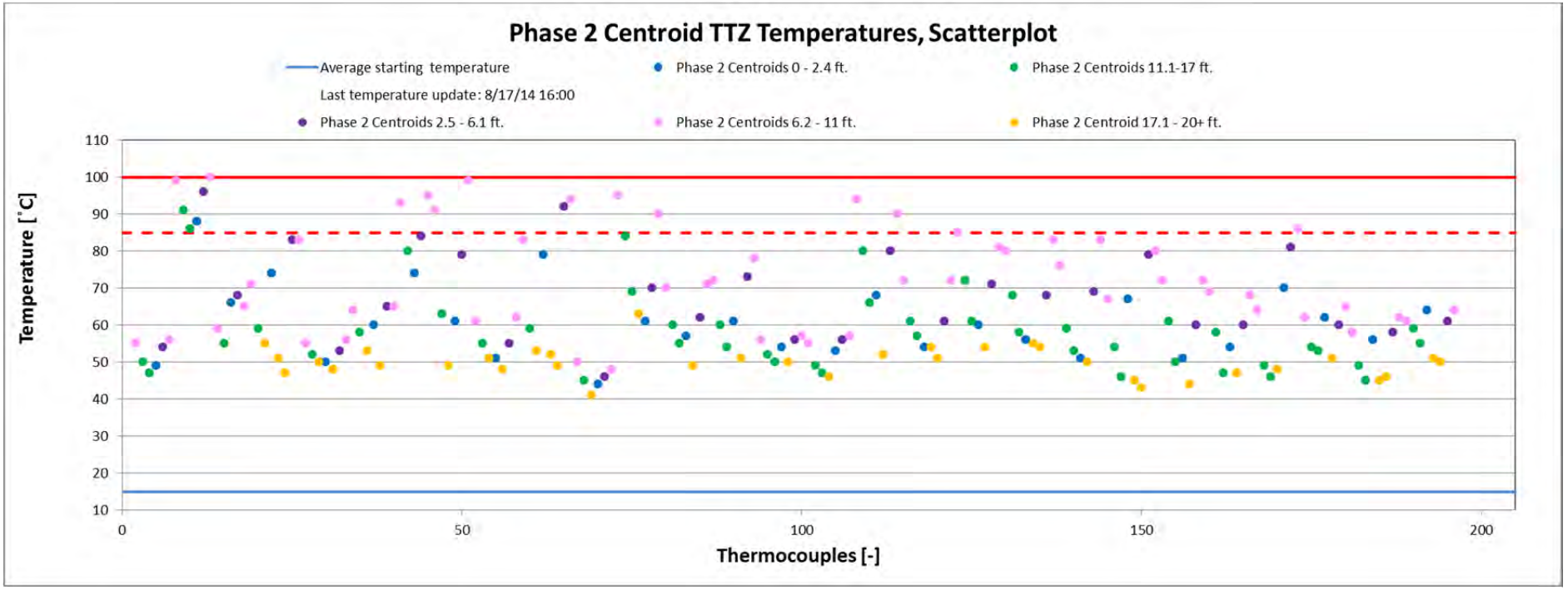


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots	
Date of Last Update	8/17/14
Phase 1 Centroid Thermocouples ≥85 °C	97.9%
Phase 1 Centroid Thermocouples ≥100 °C	75.8%
Phase 2 Centroid Thermocouples ≥85 °C	11.8%
Phase 2 Centroid Thermocouples ≥100 °C	2.1%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









Prepared by:

TERRATHERM

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1 SUMMARY

This report is intended to cover the operational time period of Friday August 15, 2014 through Friday August 22, 2014, with temperatures updated through Sunday August 24, 2014.

Table 1 provides a summary of the project operational status as of Friday, August 22, 2014.

Table 1: Project Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	08/22/14	
Last Temperature Data Update	08/24/14	
Estimated Days of Operation (Total)	195	days
Days of Operation (Total)	100	days
Days of Operation vs. Estimate (Total)	51	%
Estimated Days of Operation Phase 1 (Day 1-134)	135	days
Days of Phase 1 Operation	100	days
Days of Phase 1 Operation vs. Estimate	74	%
Estimated Days of Operation Phase 2 (Day 61-195)	135	days
Days of Phase 2 Operation	38	days
Days of Phase 2 Operation vs. Estimate	27.8	%
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	5,456,500	kWh
Used Electrical Energy vs. Estimate	34.5	%
Total Vapor Mass Removal (based on Oxidizer PID Readings)	21,675	lbs
Total Vapor Mass Removal (Based on Flammability Analyzer)	97,227	lbs
Estimated Mass Removed as LNAPL	6,150	lbs
Average Power Input Last 24 Hours	690	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	627	scfm
Average Condensate Production Rate Last 24 Hours	1.1	gpm

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On 8/13/14, the oxidizer was taken offline and the backup carbon system placed online. Catalytic Combustion Company was onsite last week to disassemble the oxidizer chamber and inspect thoroughly. It appears that some of the refractory was damaged. CCC will be onsite Tuesday, 26 August to repair the oxidizer wheel and refractory. Brideau Sheet Metal and Fabrication installed two ports for thermocouples: one on the inlet piping to the heat exchanger and another on the oxidizer chamber (burner plate). We have shipped an additional flammability analyzer to the site for installation upstream of the heat exchanger (we currently have one inline between the heat exchanger and oxidizer inlet). Heaters continue to operate at 10% energy input. PID samples are being collected routinely from the wellfield and carbon influent/midfluent/and effluent locations to evaluate discharge emissions. Nothing detected to date.

As of 8/22/14, phase 1 has operated for 100 days and phase 2 for 38 days. The current average wellfield temperature for phase 1 is 97C and 69C for phase 2.

Estimated mass removed to date is reported four different ways. The first, using the combined vapor stream, based on PID, is 21,675 lbs. The second, using the laboratory data, is 20,337 lbs. The third and fourth using the flammability analyzer and a 9,000 BTU/lbs and 13,000 BTU/lbs constant, is 67,300 and 97,200 lbs respectively. There is an additional 6,150 lbs removed as NAPL, assuming the density of toluene. We do not have recent BTU content data on vapor samples, so are assuming values from previous liquid NAPL samples analyzed (13,000 BTU/lbs) combined with an estimate of the BTU value of the vapor fraction of the NAPL mix (9,000 BTU/lbs). Please note that the flammability analyzer has not been logging the process stream since the oxidizer was taken offline. Thus mass removal numbers based on flammability does not reflect the mass removed while operating through backup carbon.

Phase 1/Phase 2 differentiation readings were last collected in the wellfield on 8/07/14 (nothing collected last week due to the shutdown of the oxidizer and the modified operation of the wellfield). The ratio of mass coming from Phase 1:Phase 2 on that date was 0.74:0.26. These ratios were applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Phase 2 heating began on 7/16/14. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	8/24/14	
Phase 1 Entire TTZ Average Temperature	97	°C
Phase 2 Entire TTZ Average Temperature	69	°C
Phase 1 Centroid Average Temperature	97	°C
Phase 2 Centroid Average Temperature	66	°C

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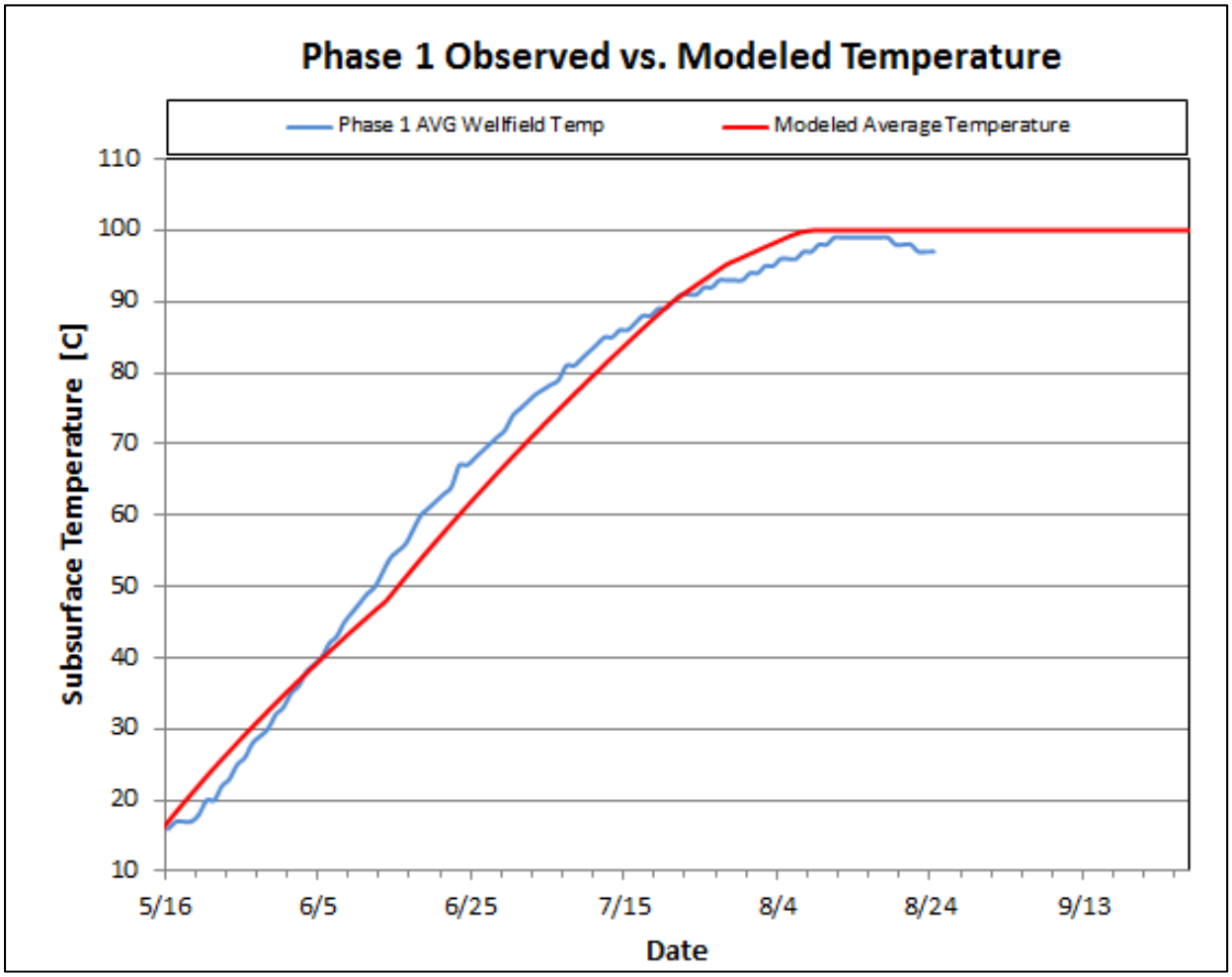


Figure 1a. Phase 1 Observed vs. Modeled Temperatures

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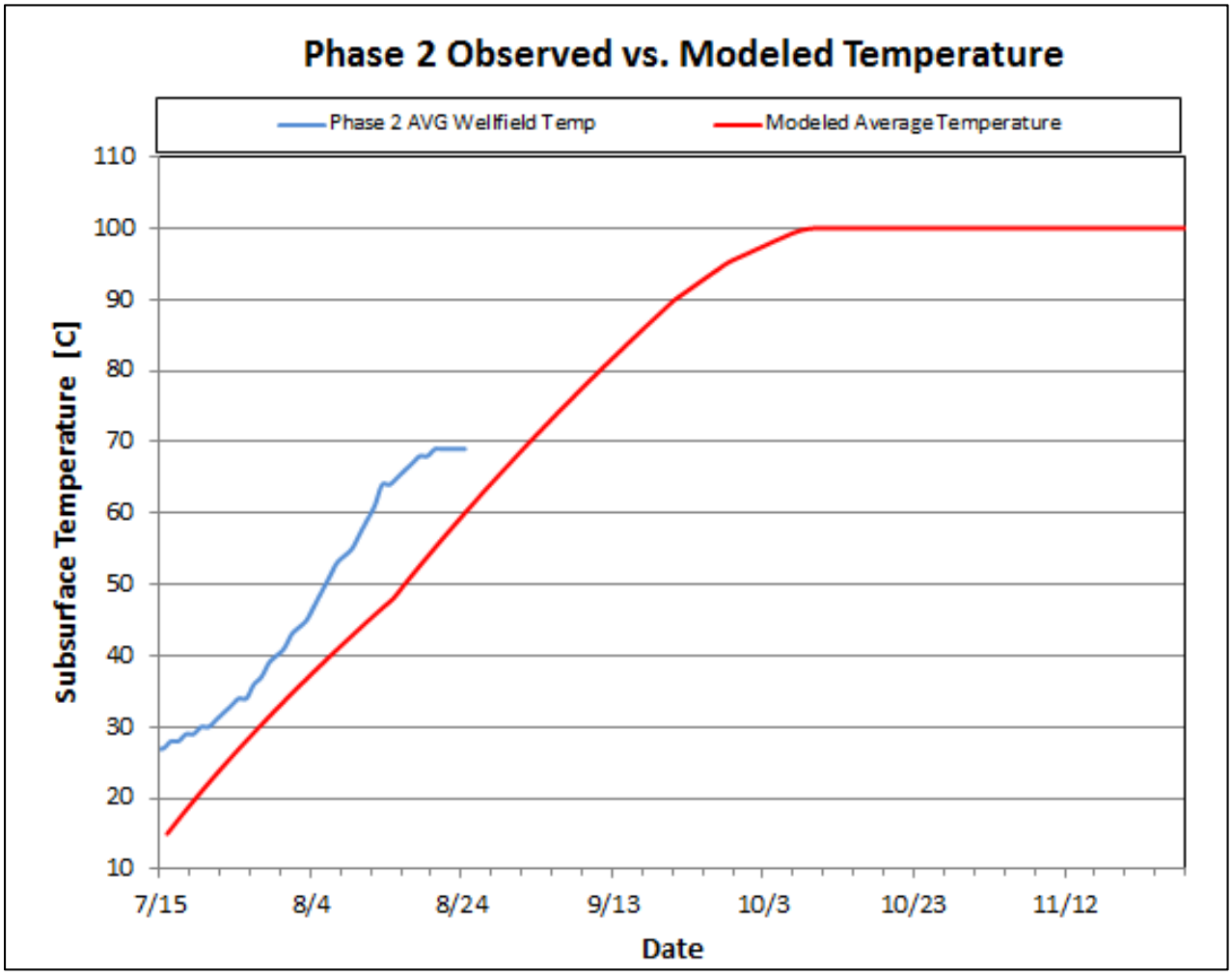


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode.

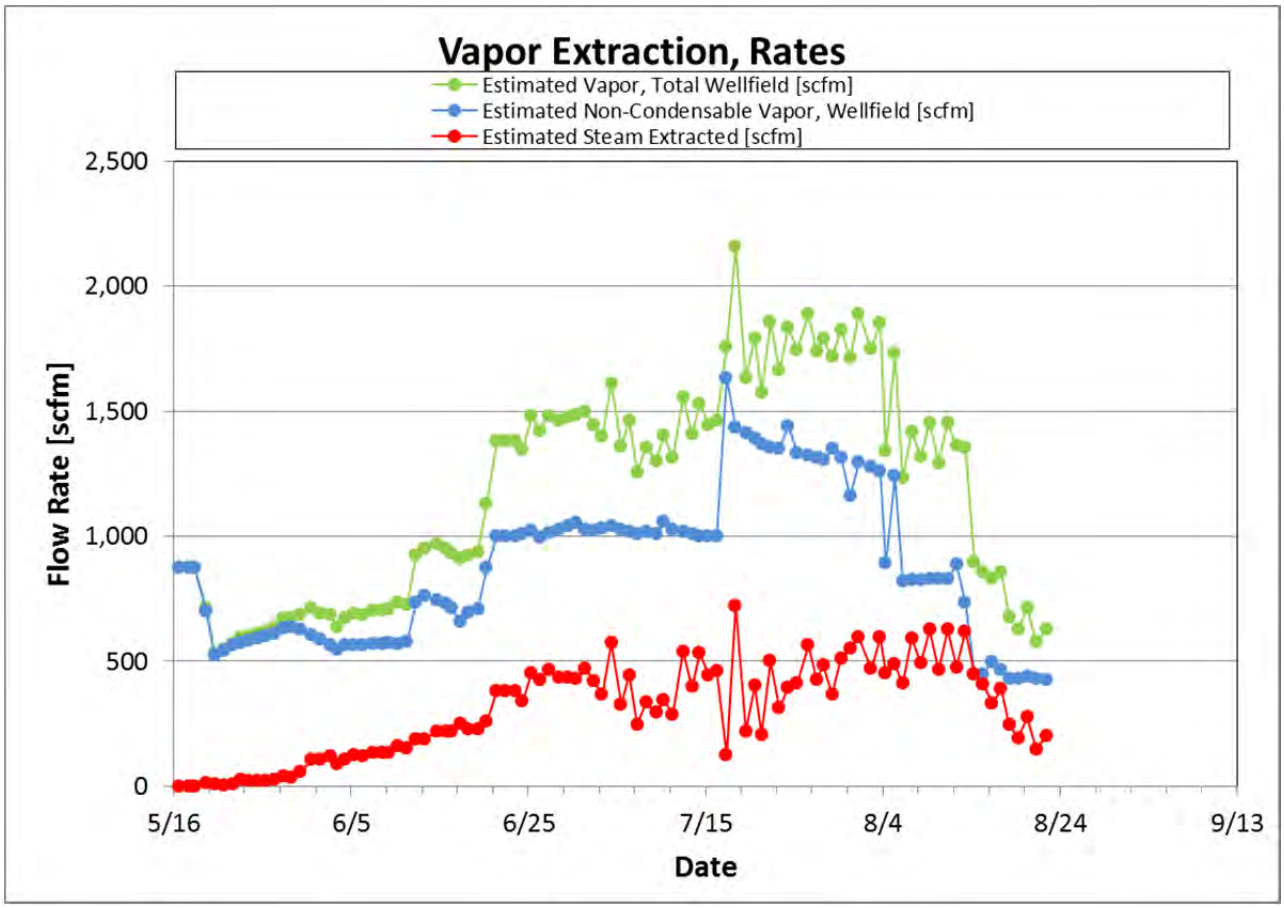


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent one manual daily reading from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf. The flammability analyzer has not been logging the process vapors since the oxidizer was brought offline on August 13, 2014.

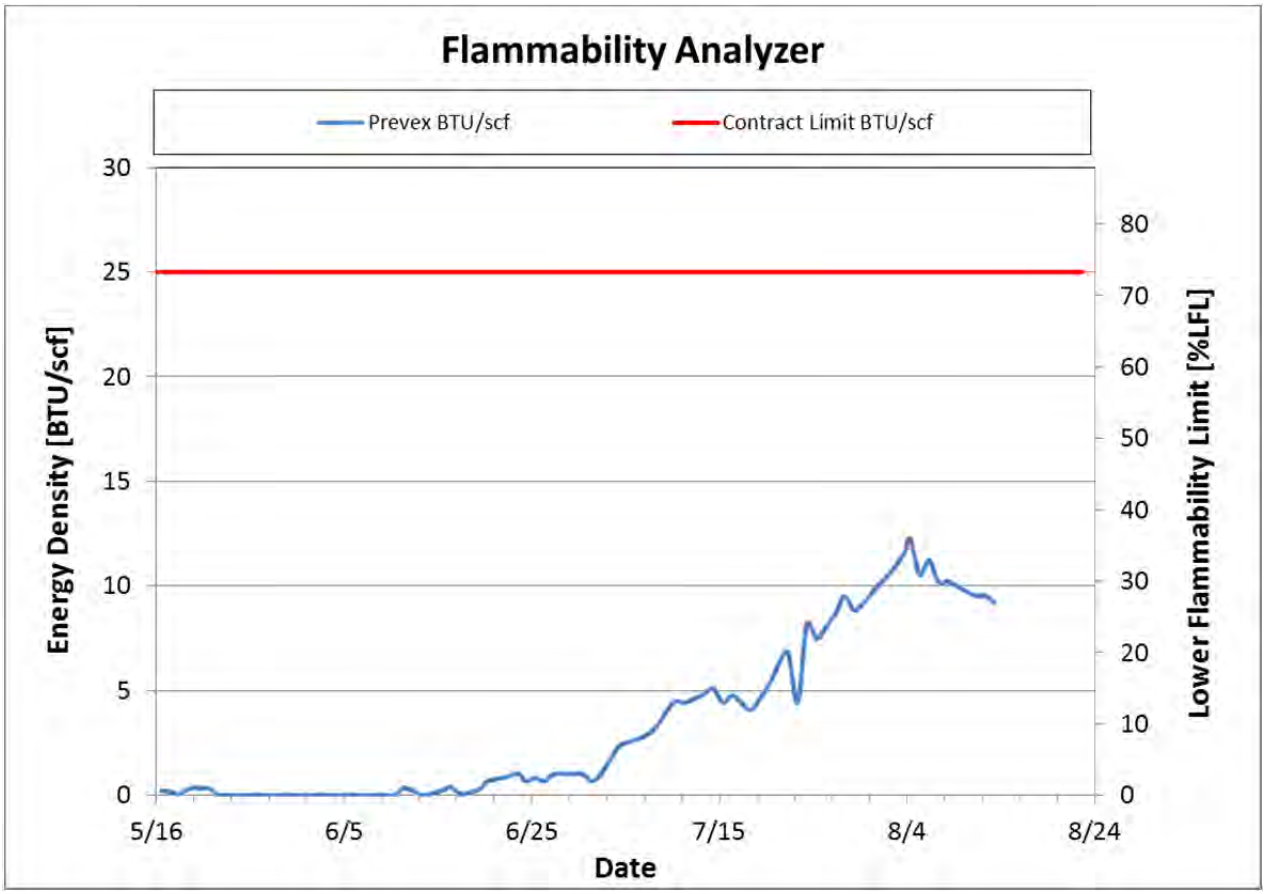


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated total mass removed based on daily photoionization detector (PID) readings and laboratory data (total of Phase 1 and Phase 2), flammability analyzer and LNAPL are shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The decrease in mass removed on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14 and 8/4/14.

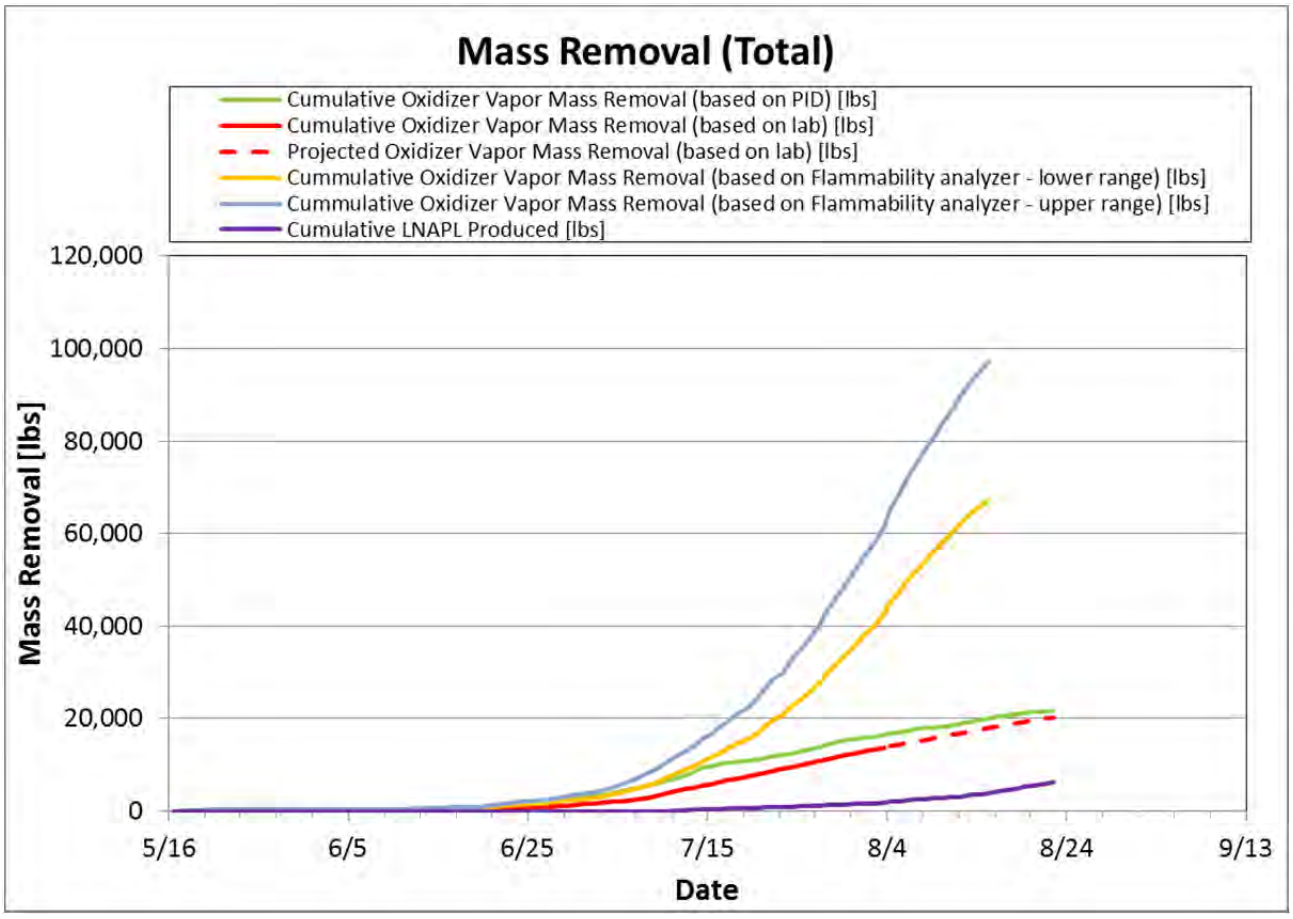


Figure 4a. Project Progress, Mass Removal (Total)

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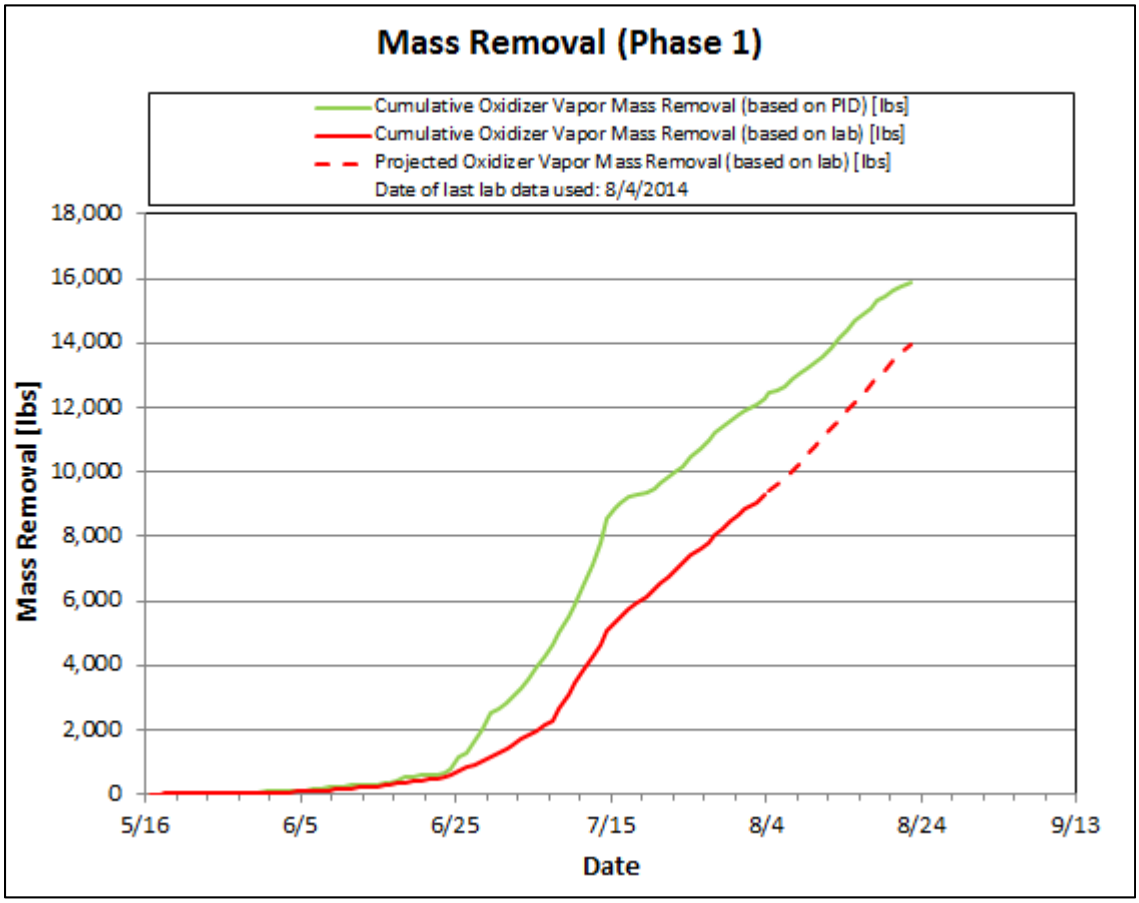


Figure 4b. Project Progress, Mass Removal (Phase 1)

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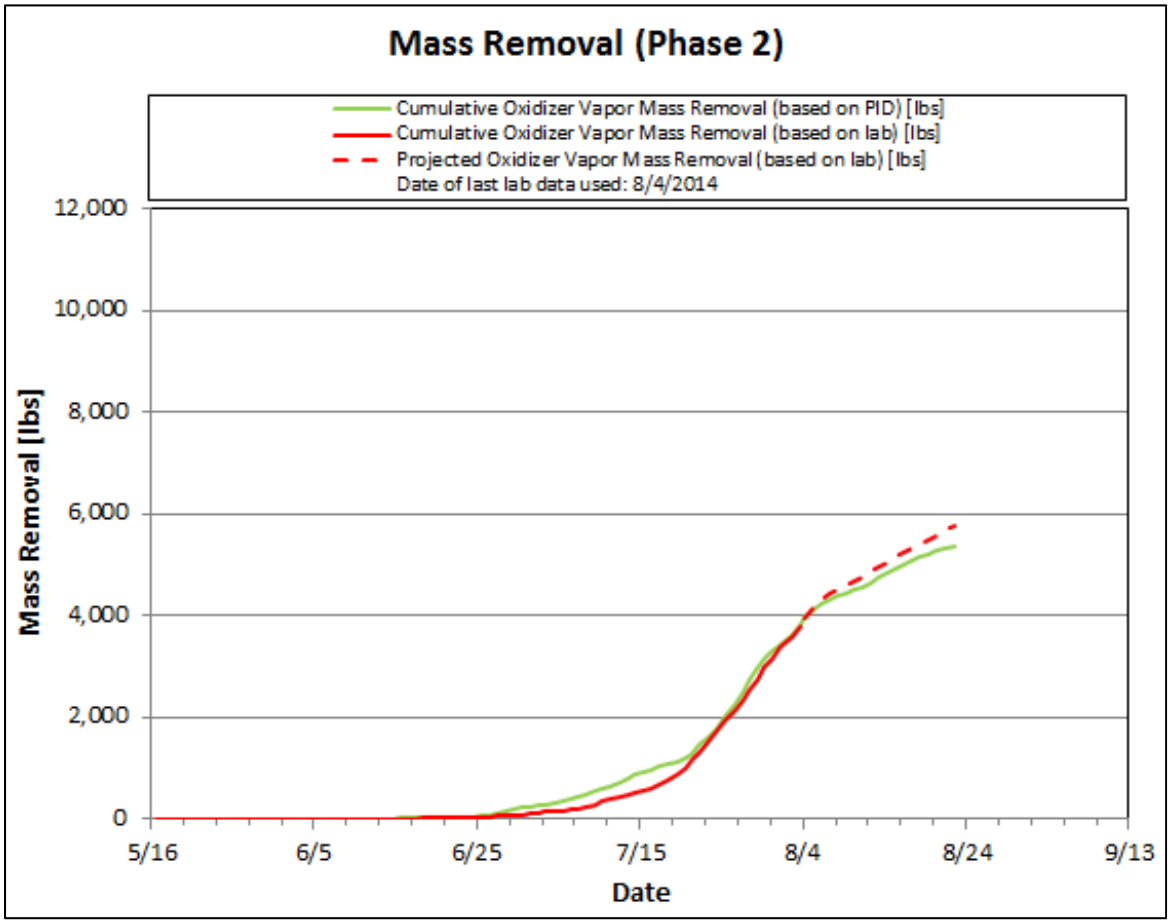


Figure 4c. Project Progress, Mass Removal (Phase 2)

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The flammability analyzer mass removal rate decrease below represents an estimate due to the system shutdown. Currently, treatment of contaminated vapors is through the backup carbon system. The location of the flammability analyzer does not allow data to be recorded when the backup carbon is online. Once the oxidizer is operational, and flammability data available, the mass removal rate will be updated.

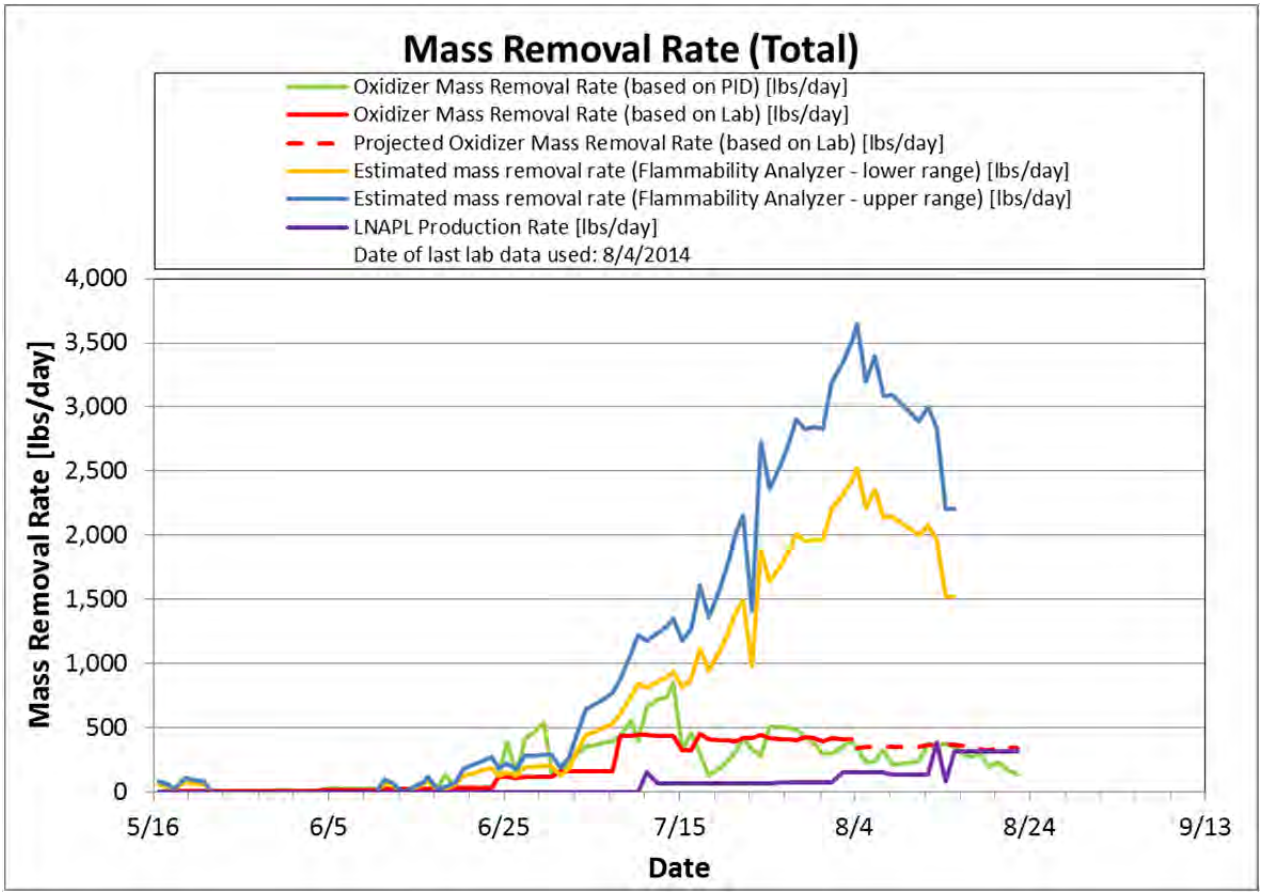


Figure 4d. Mass Removal Rate (Total for Site)

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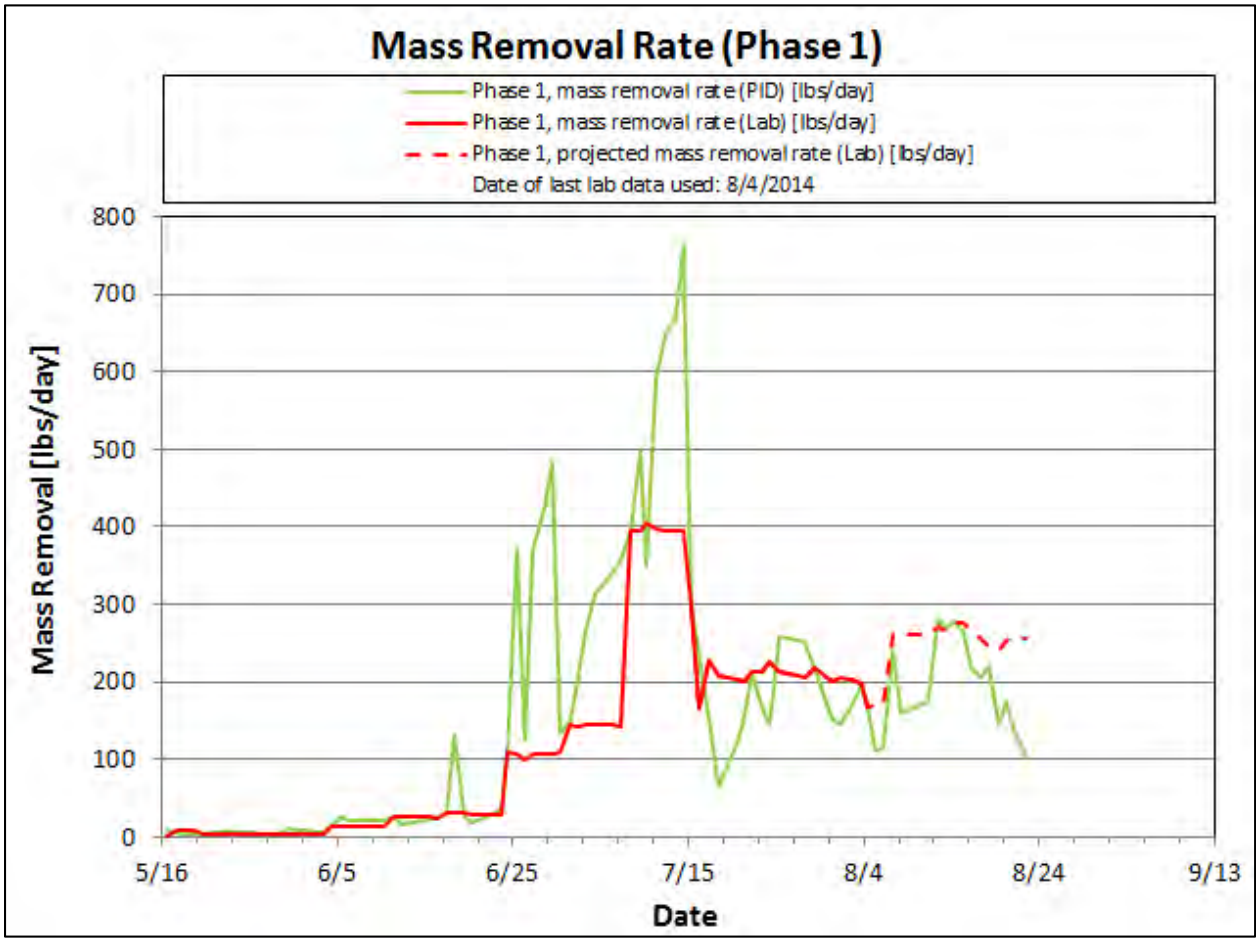


Figure 4e. Mass Removal Rate (Phase 1)

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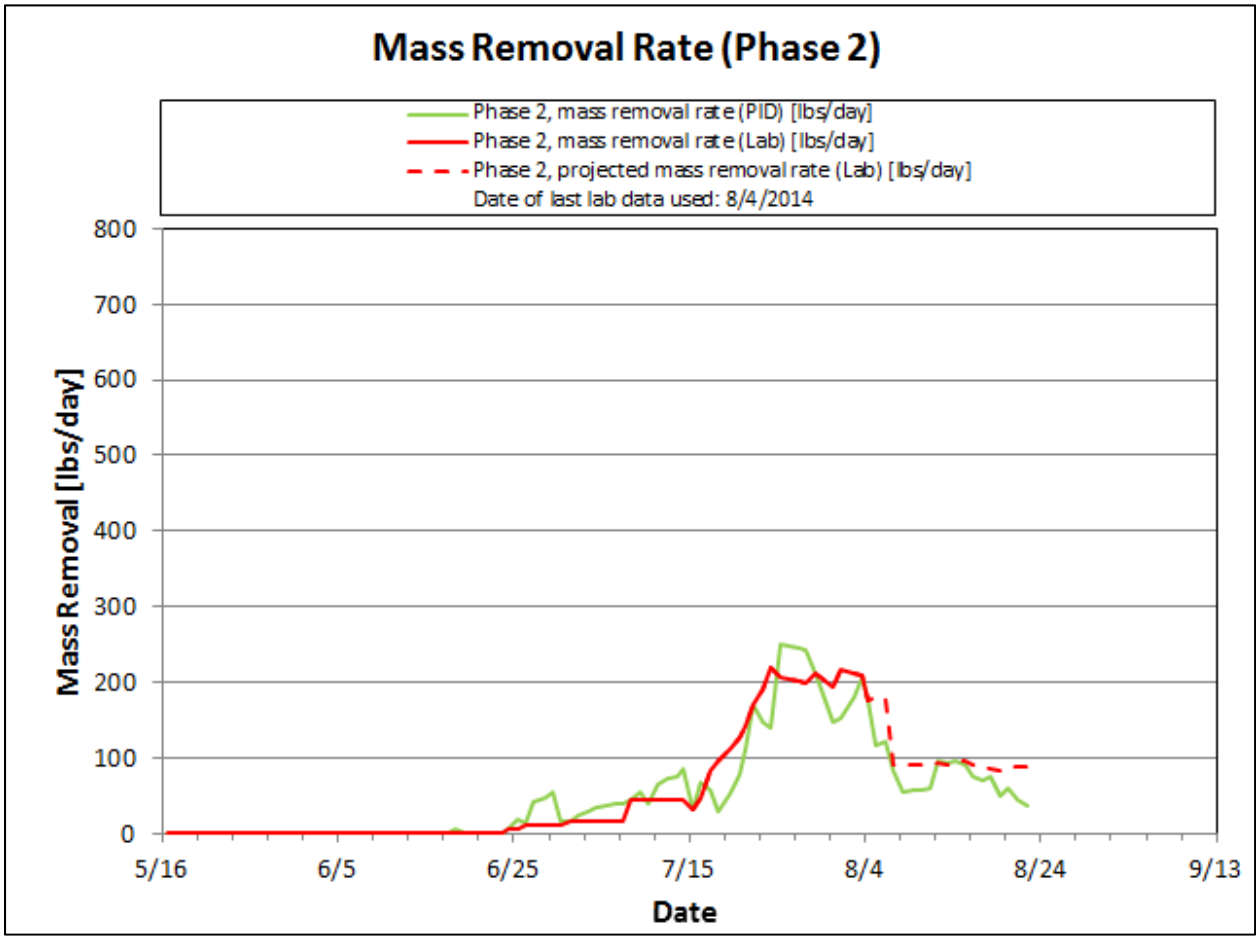


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID readings collected at the oxidizer influent over time. It should be noted that the PID reading from 7/16/14 was obtained with a PID with a 10.6 eV lamp, instead of the 11.7 eV lamp which had reached the upper concentration limit of 2,000 ppmV. Similarly, data collected on 07/25-07/28 were first collected with an 11.7 eV lamp with values exceeding the upper limit. The influent concentrations were then collected with the 10.6 eV lamp with values lower than the 11.7 eV upper limit (2,000 ppm). Therefore, the maximum 11.7 eV lamp is reported.

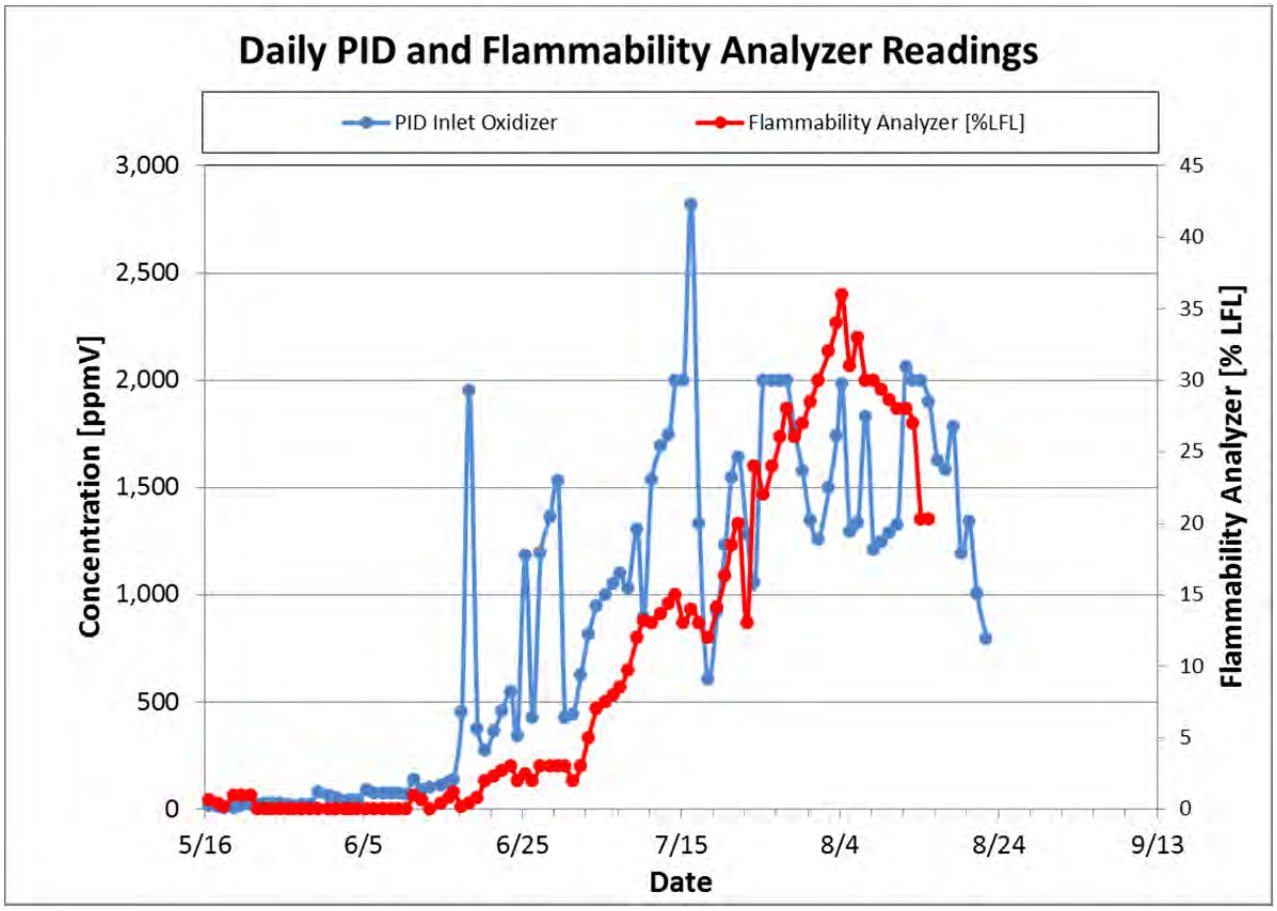


Figure 5. Daily PID and Flammability Analyzer Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13. Spent carbon removed and replaced with fresh carbon Monday, Wednesday and Friday (18, 20 and 22 August) after PID readings were collected.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

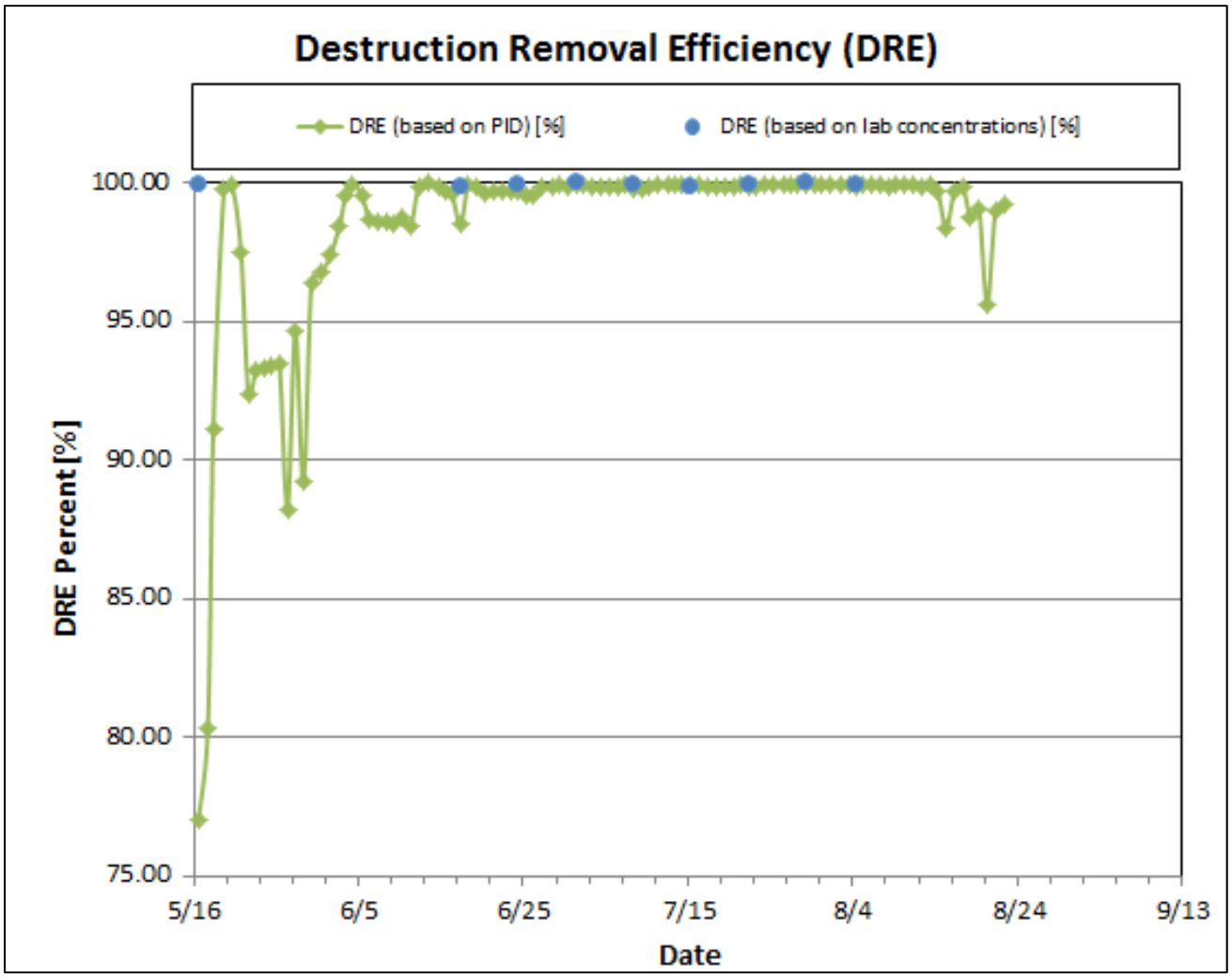


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage for both ISTD heaters and process treatment equipment is shown below in Figure 7.

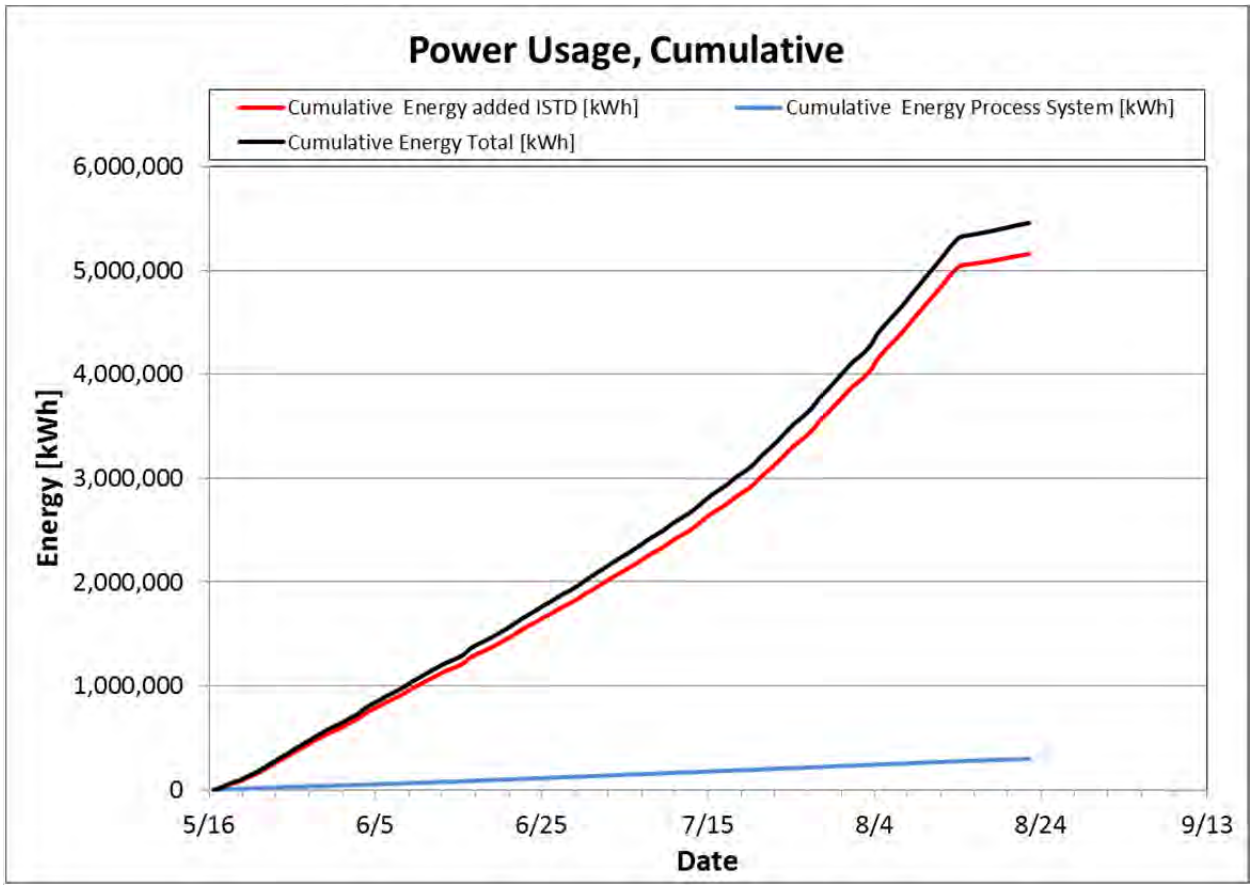


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease observed on 8/14/14 corresponds to the oxidizer being offline and the heaters reduced to 10%.

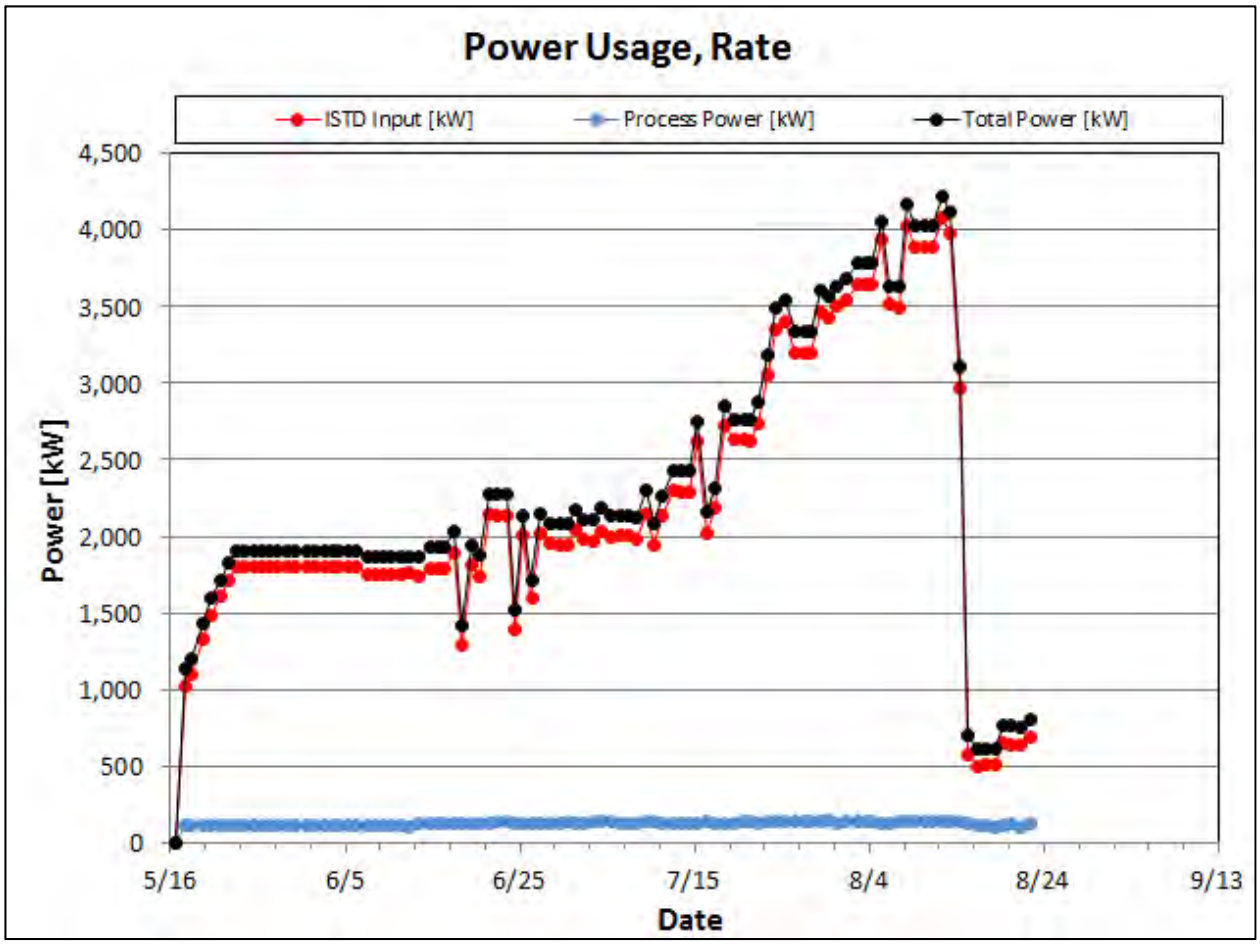


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11. The decrease observed on 8/14/14 corresponds to the oxidizer being offline and the heaters reduced to 10%.

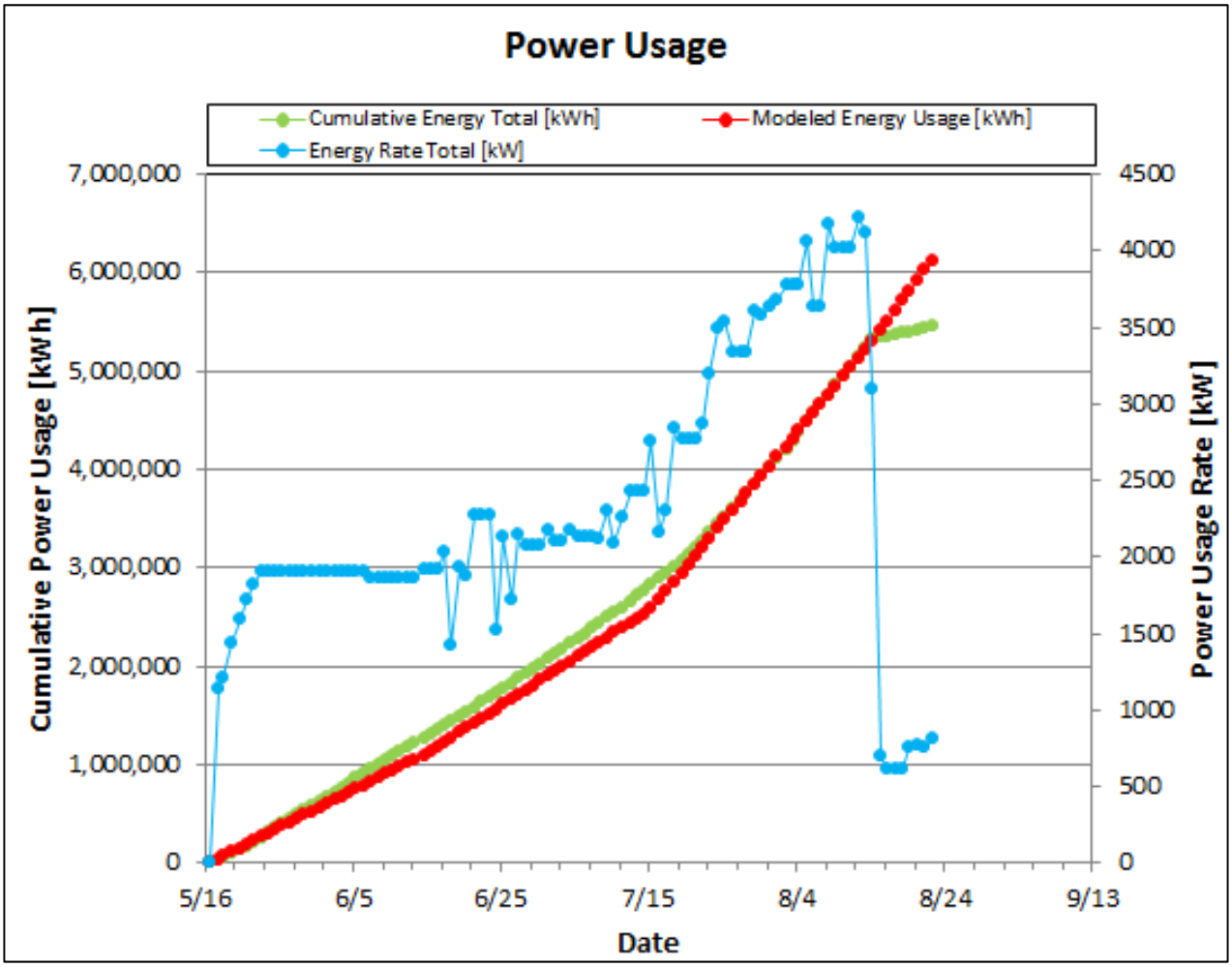


Figure 9. Power Usage

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The decrease observed on 8/14/14 corresponds to the oxidizer being offline.

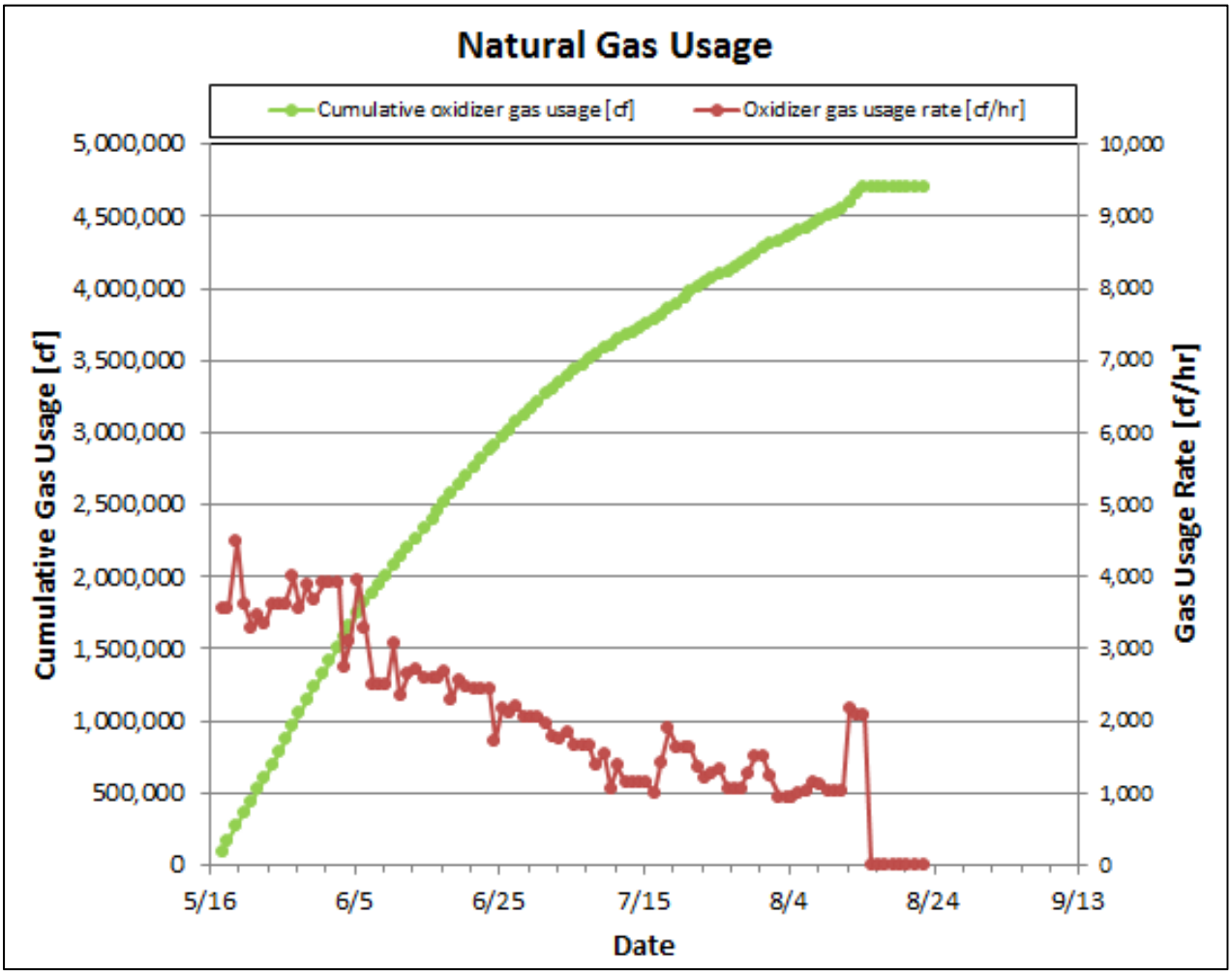


Figure 10. Natural Gas Usage

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The decrease observed on 8/14/14 corresponds to the oxidizer being offline.

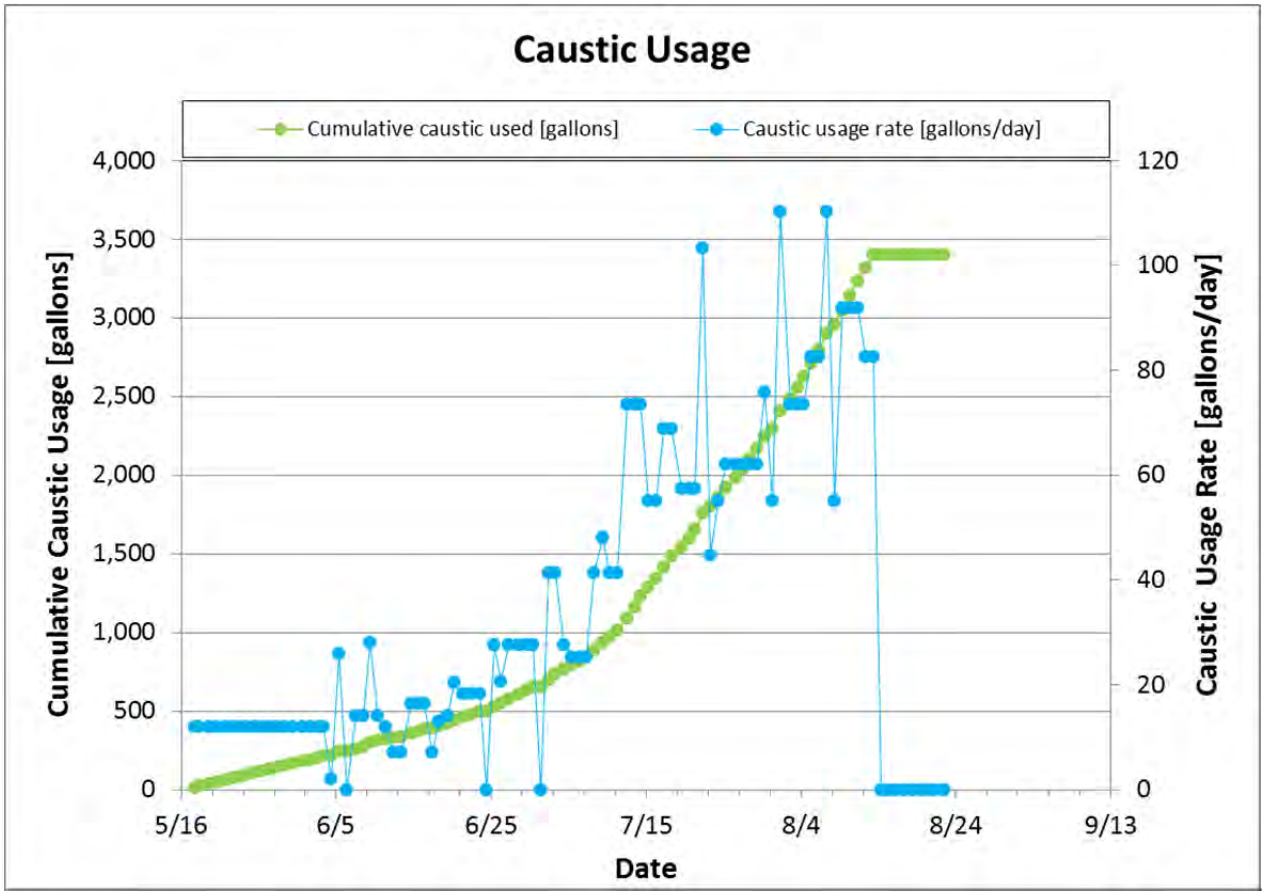


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined

as: Phase 1 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12a. As of 7/25/14, we have reached the first payment milestone for Phase 1. Phase 2 centroids are shown in Figure 12b. The scatterplots have been updated to show the centroids grouped by depth, with each depth range shown as a different color.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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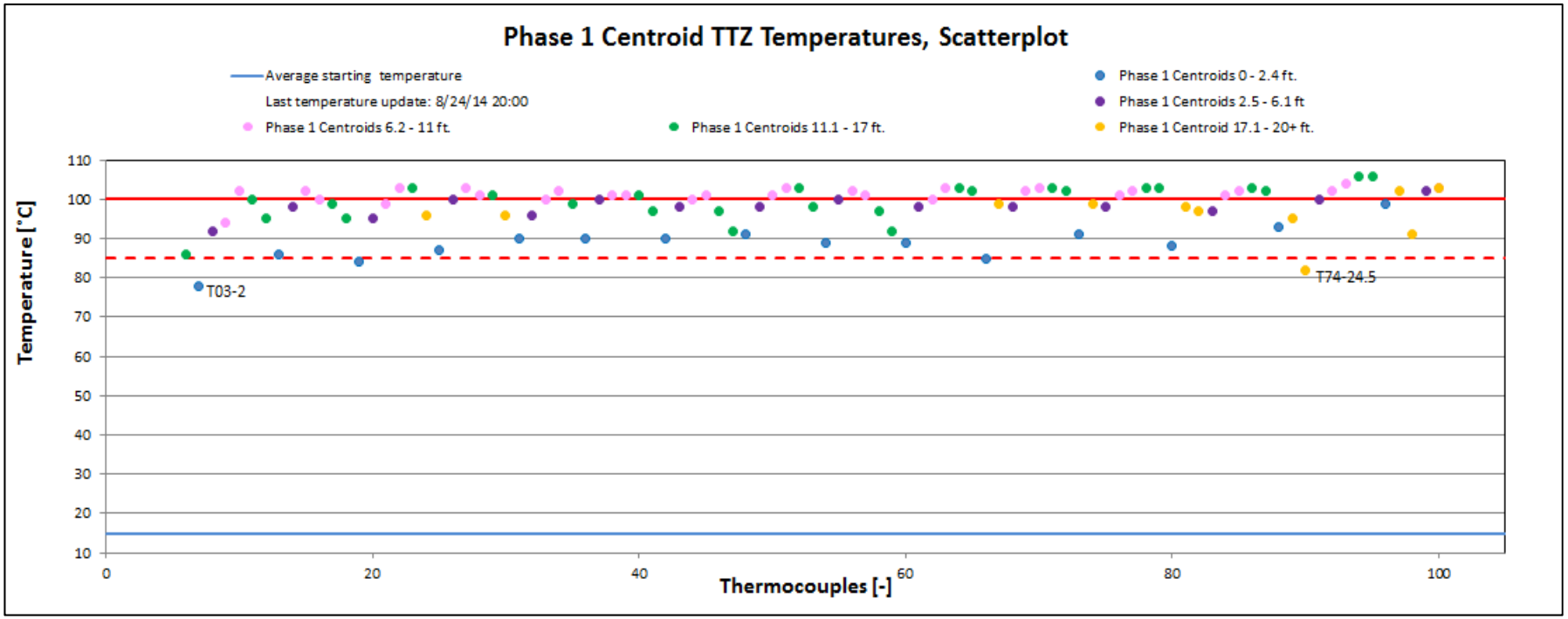


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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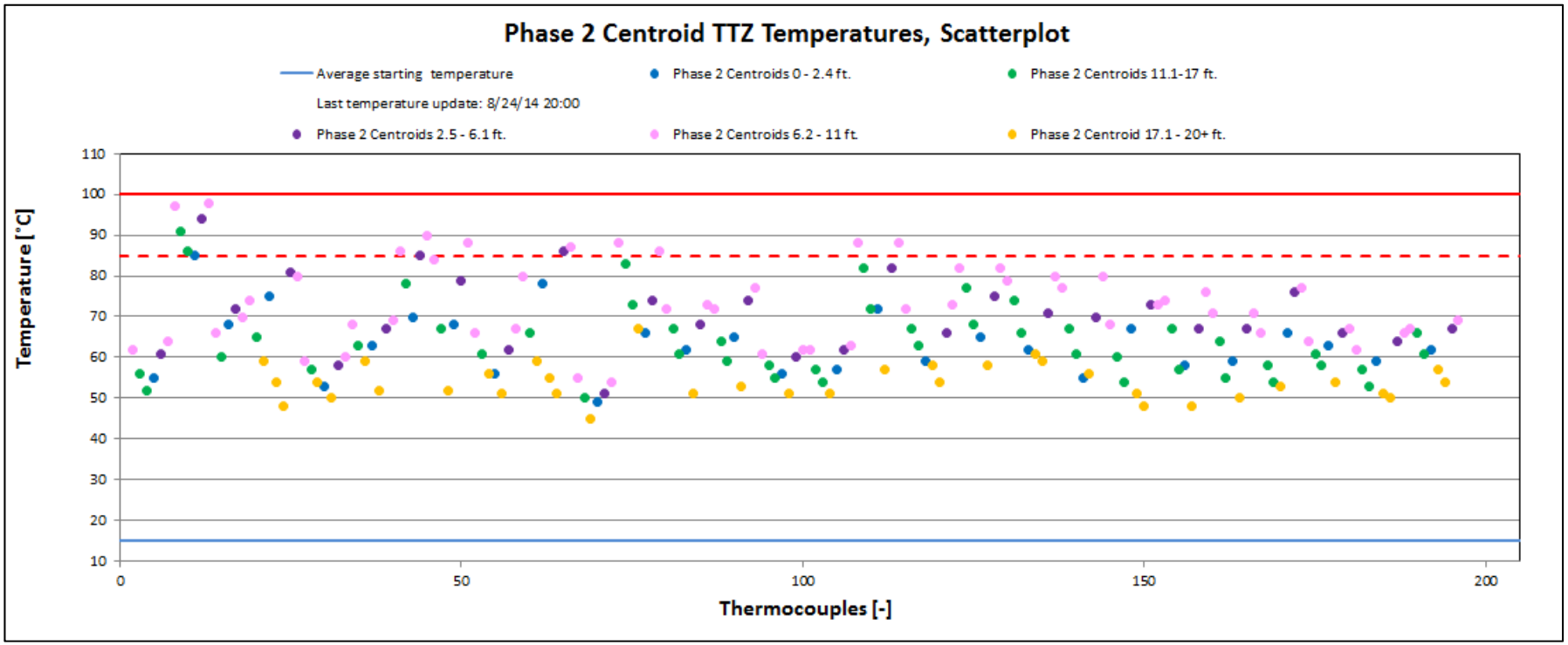


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots		
	Value	**Unit**
Date of Last Update	8/24/14	
Phase 1 Centroid Thermocouples ≥85 °C	98.9	%
Phase 1 Centroid Thermocouples ≥100 °C	77.9	%
Phase 2 Centroid Thermocouples ≥85 °C	10.3	%
Phase 2 Centroid Thermocouples ≥100 °C	2.1	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









Prepared by:

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1 SUMMARY

This report is intended to cover the operational time period of Friday August 22, 2014 through Friday August 29, 2014, with temperatures updated through Sunday August 31, 2014.

Table 1 provides a summary of the project operational status as of Friday, August 29, 2014.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	08/29/14	
Last Temperature Data Update	08/30/14	
Estimated Days of Operation (Total)	195	days
Days of Operation (Total)	106	days
Days of Operation vs. Estimate (Total)	55	%
Estimated Days of Operation Phase 1 (Day 1-134)	135	days
Days of Phase 1 Operation	106	days
Days of Phase 1 Operation vs. Estimate	79	%
Estimated Days of Operation Phase 2 (Day 61-195)	135	days
Days of Phase 2 Operation	44	days
Days of Phase 2 Operation vs. Estimate	32.8	%
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	5,558,400	kWh
Used Electrical Energy vs. Estimate	35.2	%
Total Vapor Mass Removal	114,744	lbs
Average Power Input Last 24 Hours	650	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	531	scfm
Average Condensate Production Rate Last 24 Hours	0.6	gpm

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The oxidizer was repaired, brought back online, and the block valve reopened on Friday, 29 August. The heaters in Phase 1 were increased to 20% on Monday, 1 September.

As of 8/29/14, Phase 1 has operated for 106 days and phase 2 for 44 days. The current average wellfield temperature for phase 1 is 95 °C and 70 °C for phase 2.

As of 8/29/14, mass removed is estimated at 114,744 lbs. This estimate uses the combination of the flammability analyzer data (97,227 lbs), laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer (11,840 lbs), and accumulated LNAPL volume (5,677 lbs).

Phase 1/Phase 2 differentiation readings were last collected in the wellfield on 8/07/14 (nothing collected over the past couple weeks due to the oxidizer shutdown). The ratio of mass coming from Phase 1:Phase 2 on that date was 0.74:0.26. These ratios were applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase. A complete round of wellfield data will be collected this week.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Phase 2 heating began on 7/16/14. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	8/31/14	
Phase 1 Entire TTZ Average Temperature	95	°C
Phase 2 Entire TTZ Average Temperature	70	°C
Phase 1 Centroid Average Temperature	95	°C
Phase 2 Centroid Average Temperature	67	°C

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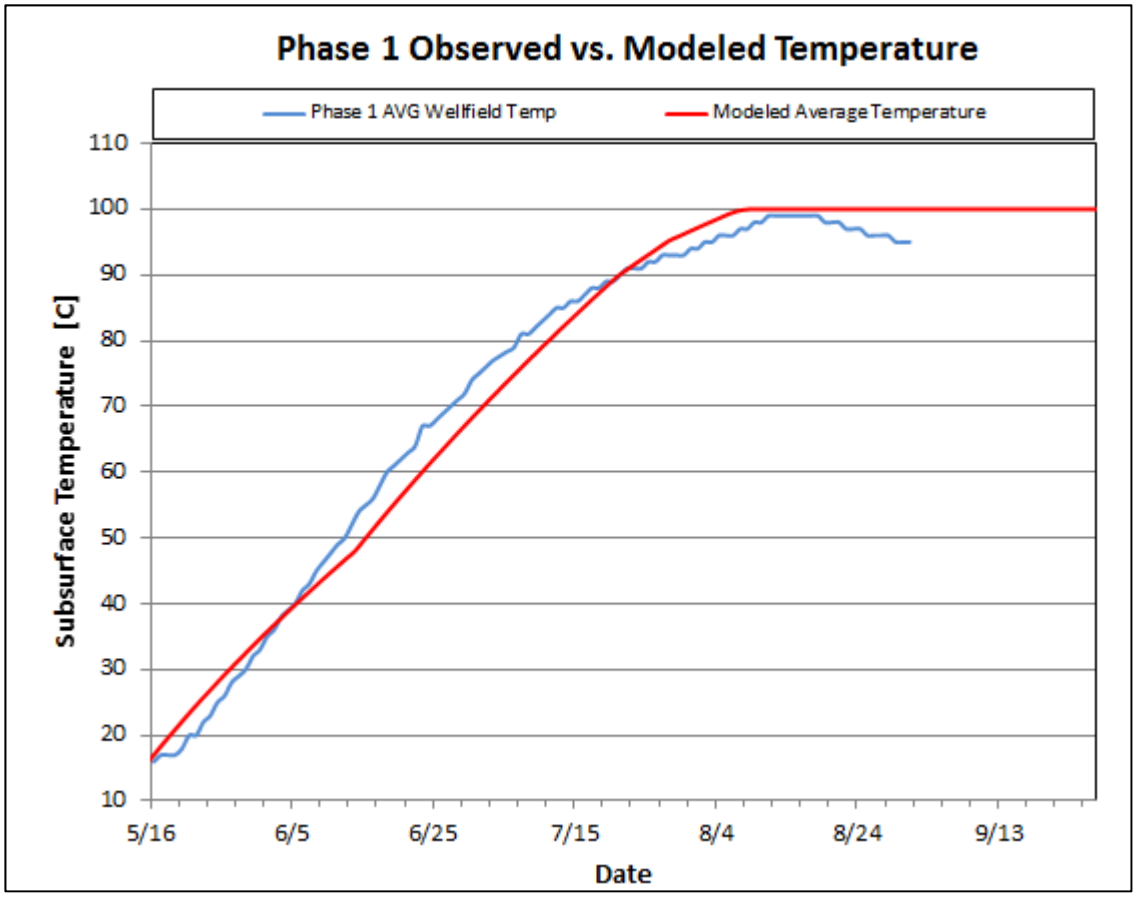


Figure 1a. Phase 1 Observed vs. Modeled Temperatures

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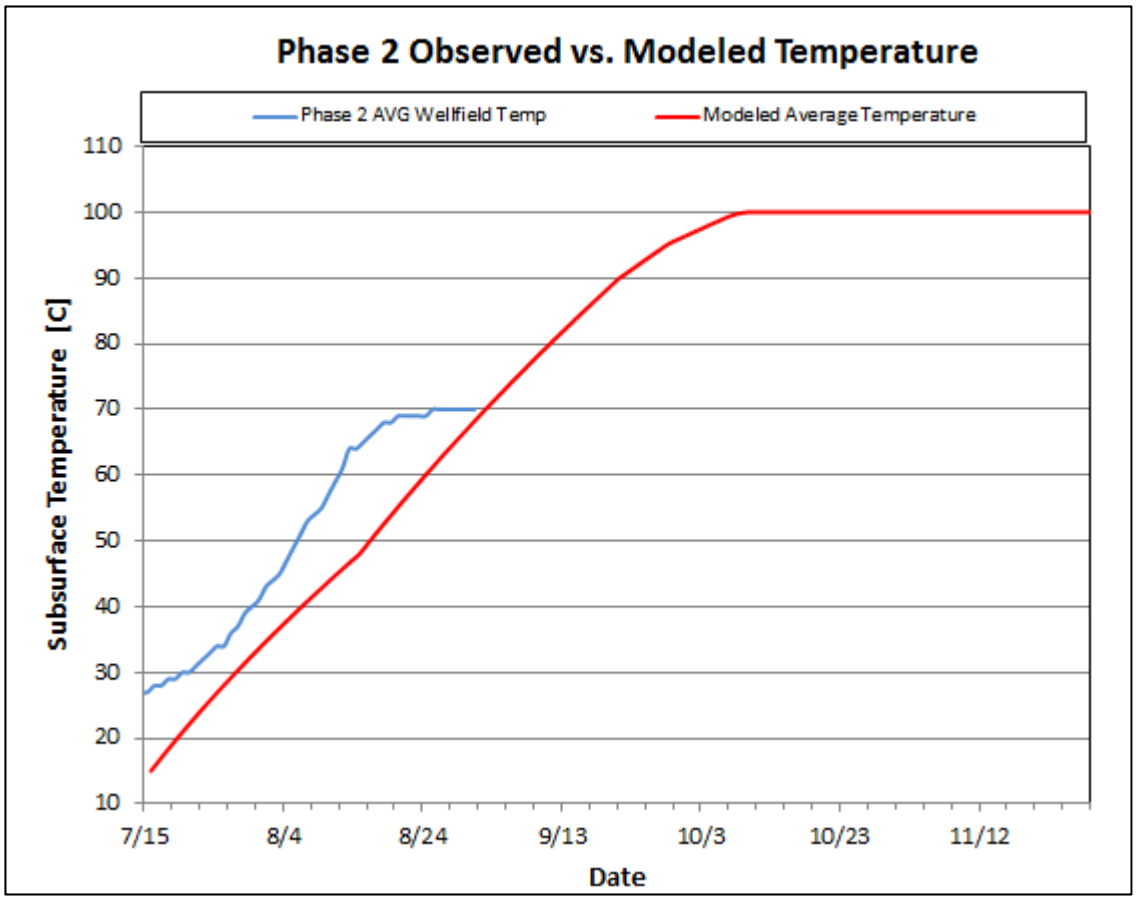


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode.

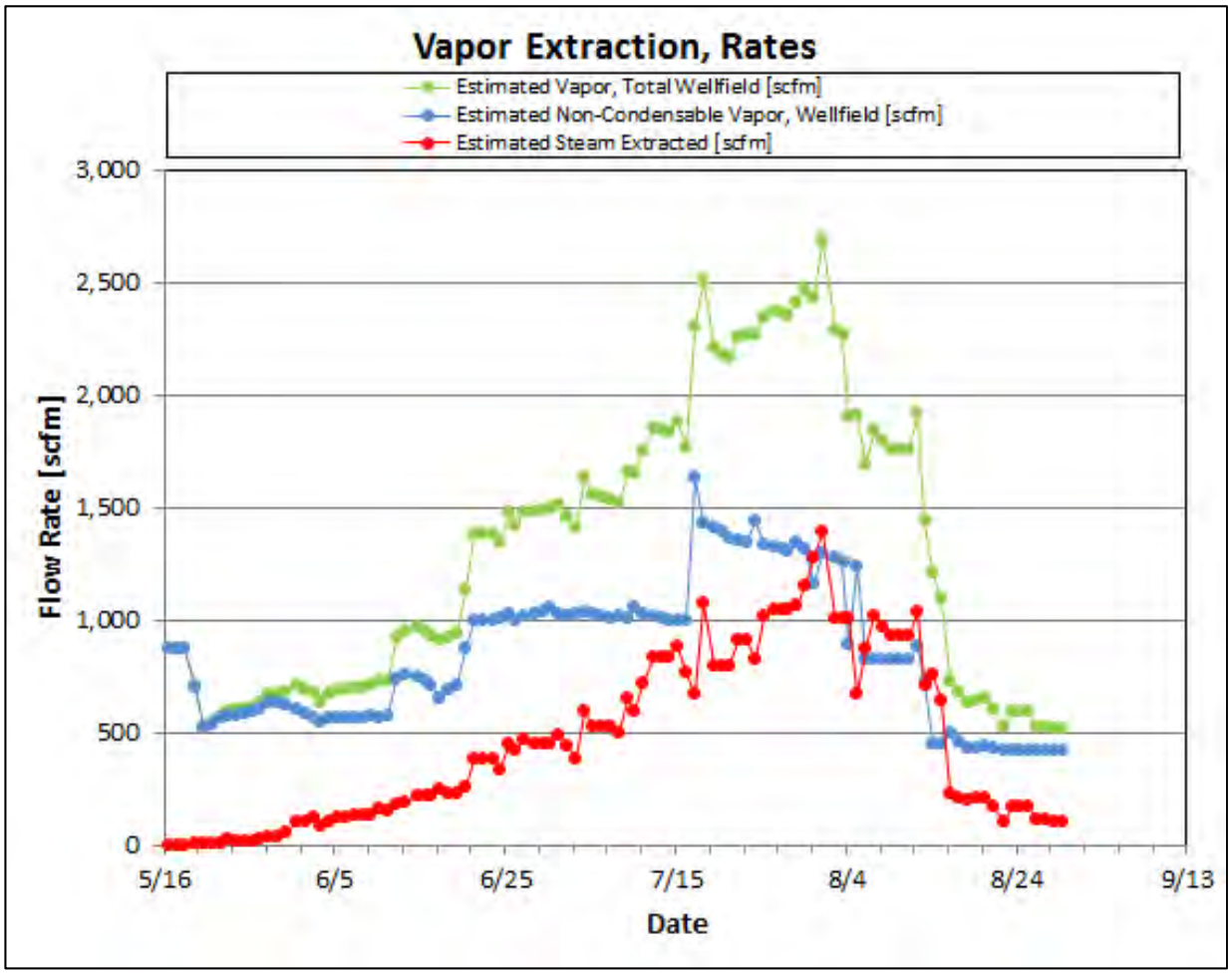


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent one manual daily reading from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf. Currently, the vapors entering the oxidizer are low flammability (<50% LFL) and do not approach the contract limit, although an increase in flammability can be seen after the dilution air valve was closed on June 20, 2014. Dilution air has been reintroduced to the system to assist with current mass being removed (higher removal rate) from the subsurface.

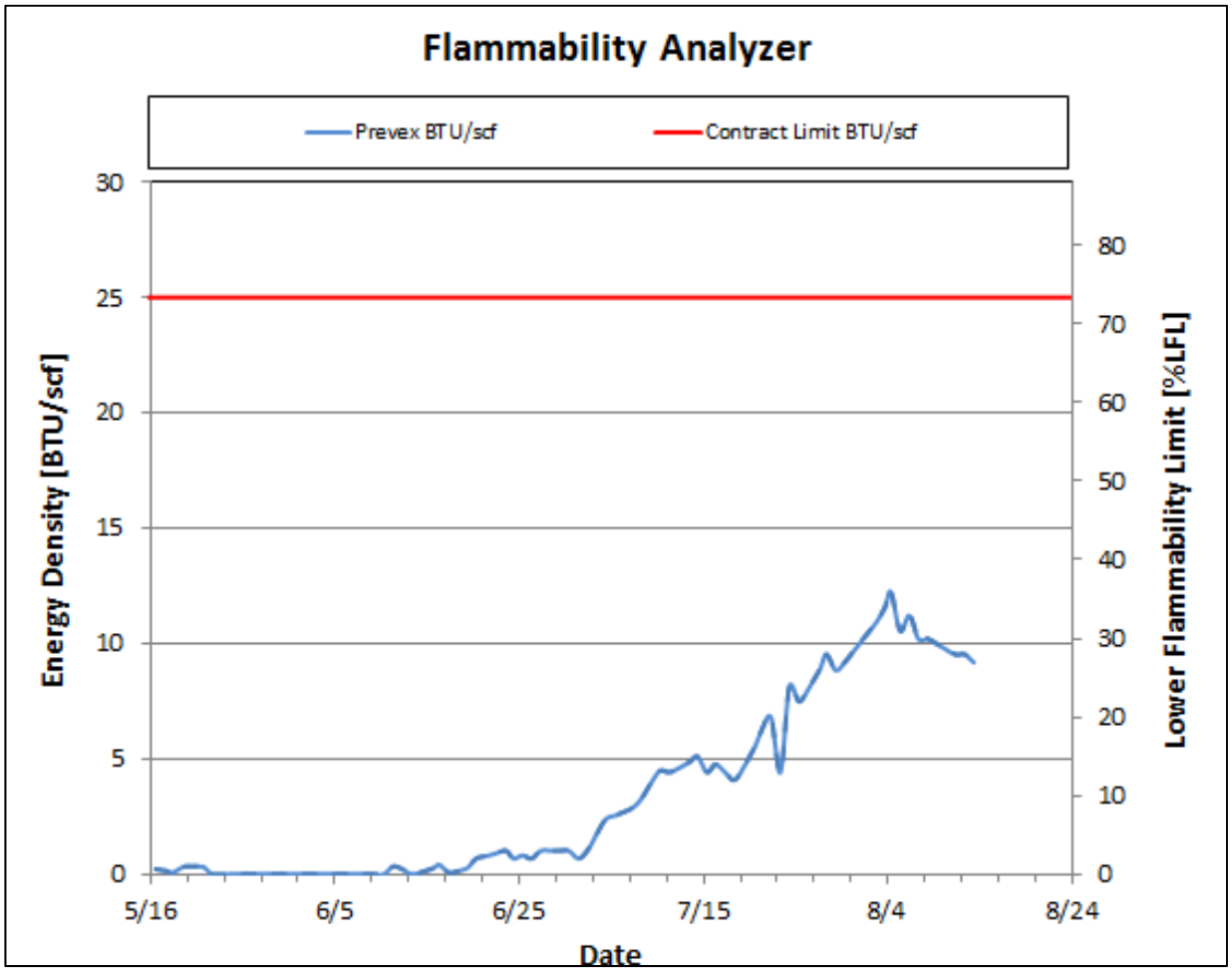


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed to date is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14 and 8/16/14.

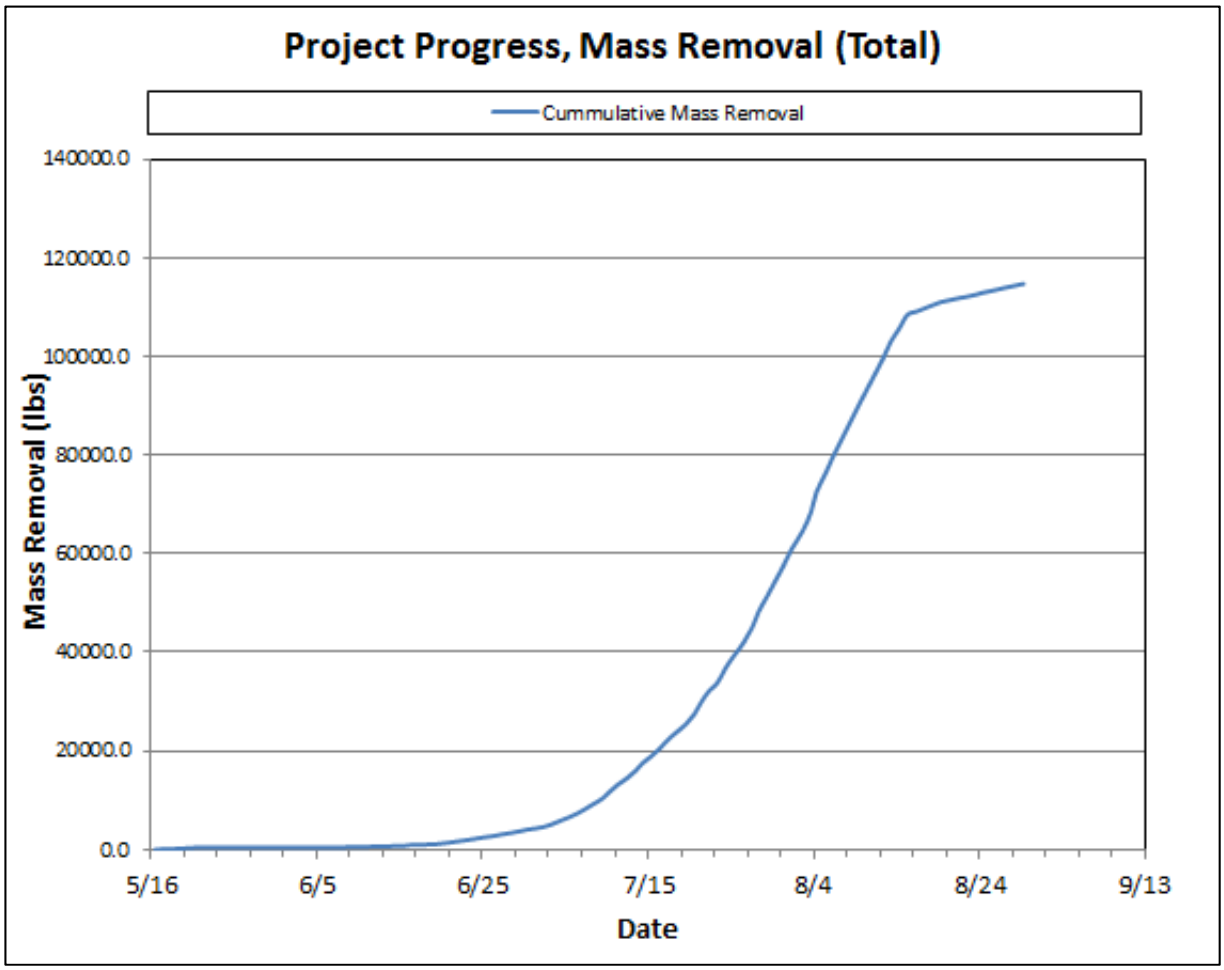


Figure 4a. Project Progress, Mass Removal (Total)

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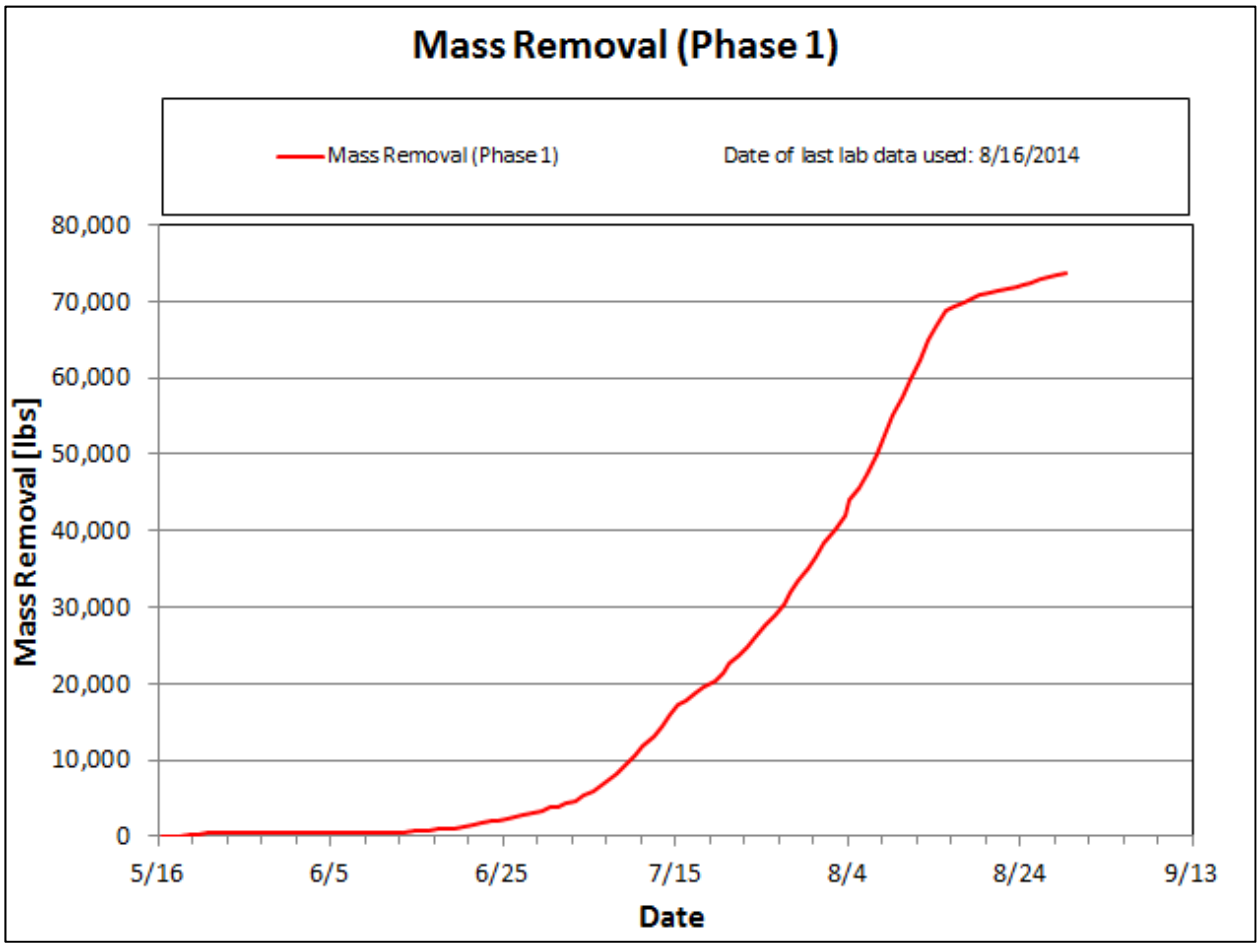


Figure 4b. Project Progress, Mass Removal (Phase 1)

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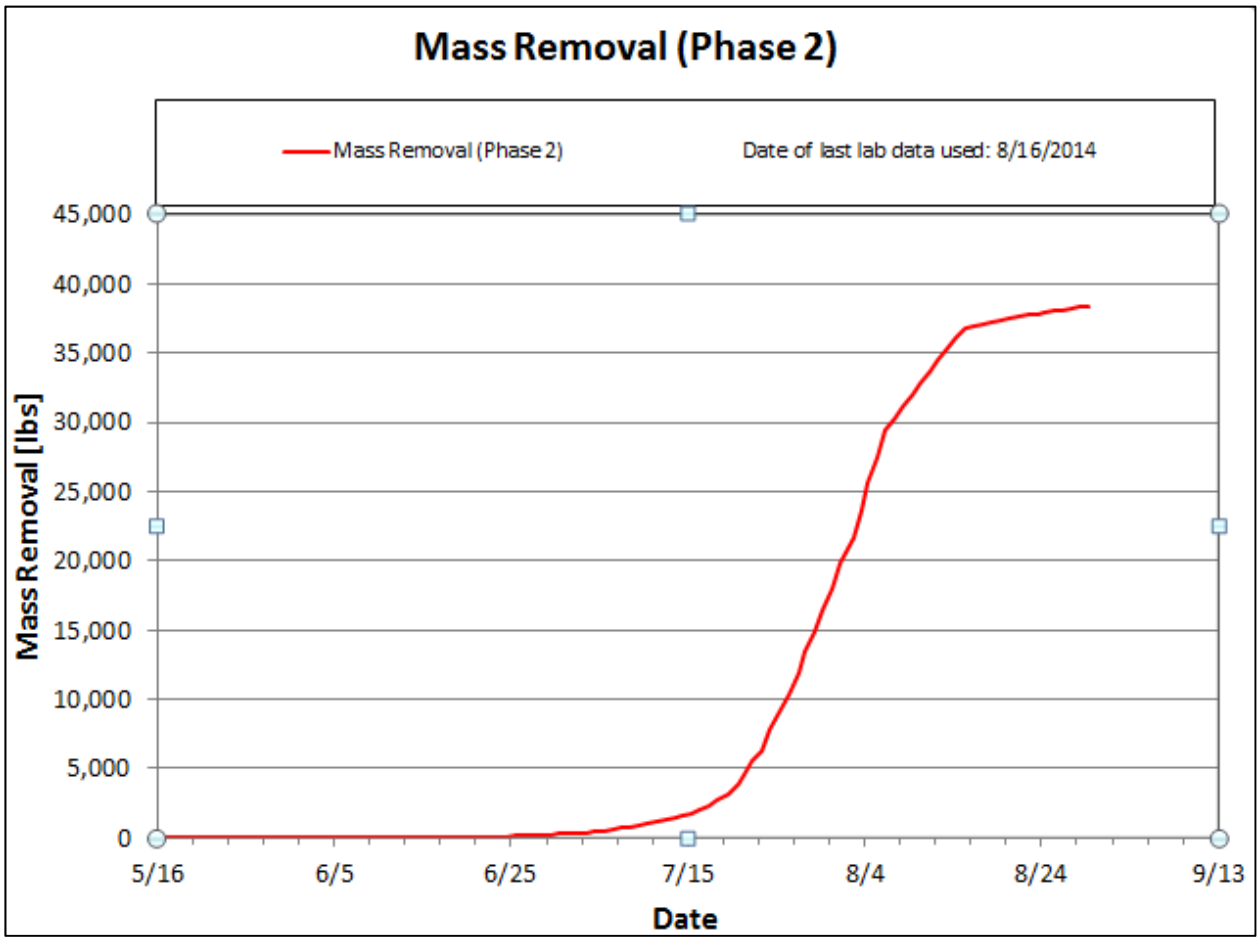


Figure 4c. Project Progress, Mass Removal (Phase 2)

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The mass removal rate decrease below represents an estimate due to the system shutdown. Currently, treatment of contaminated vapors is through the backup carbon system.

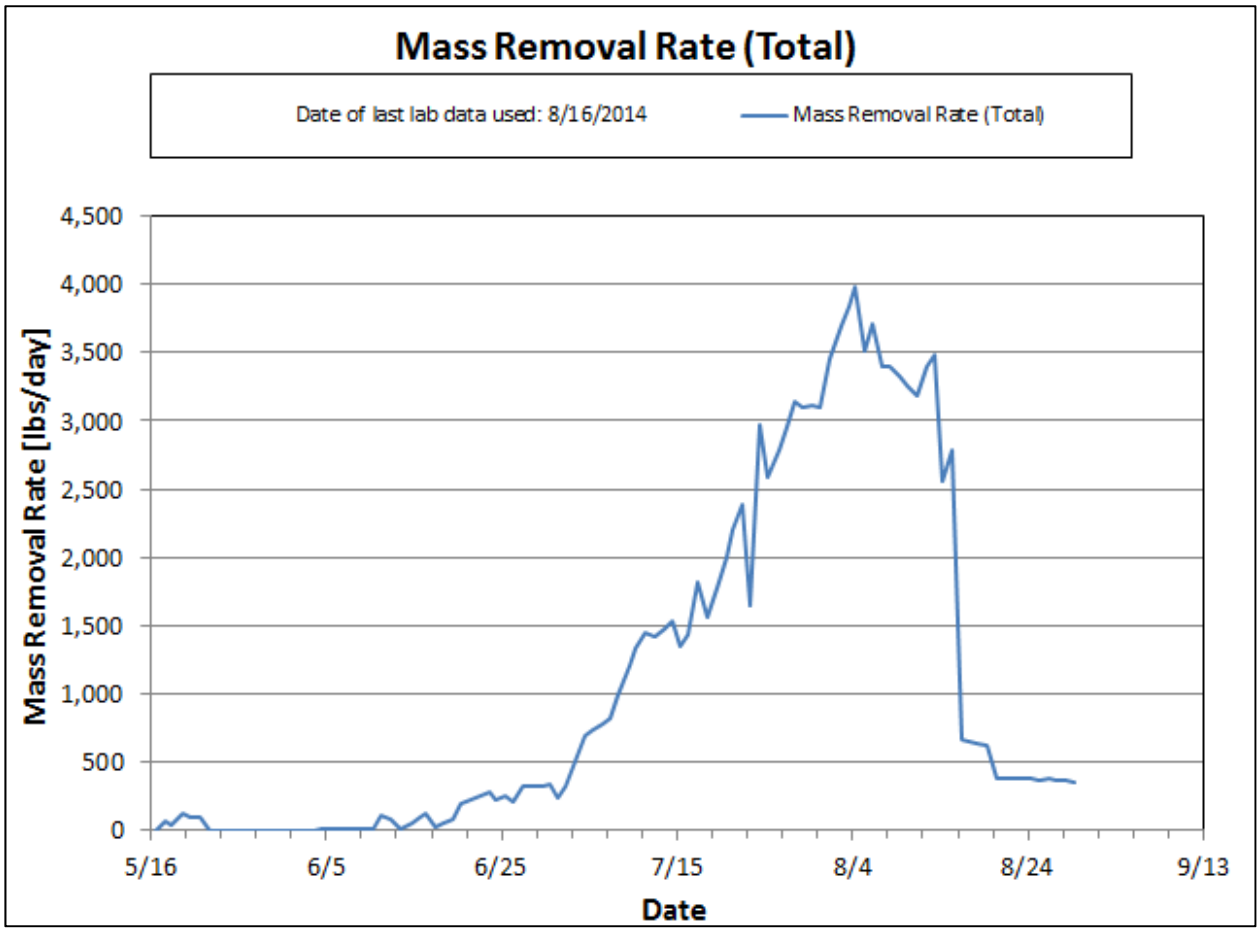


Figure 4d. Mass Removal Rate (Total for Site)

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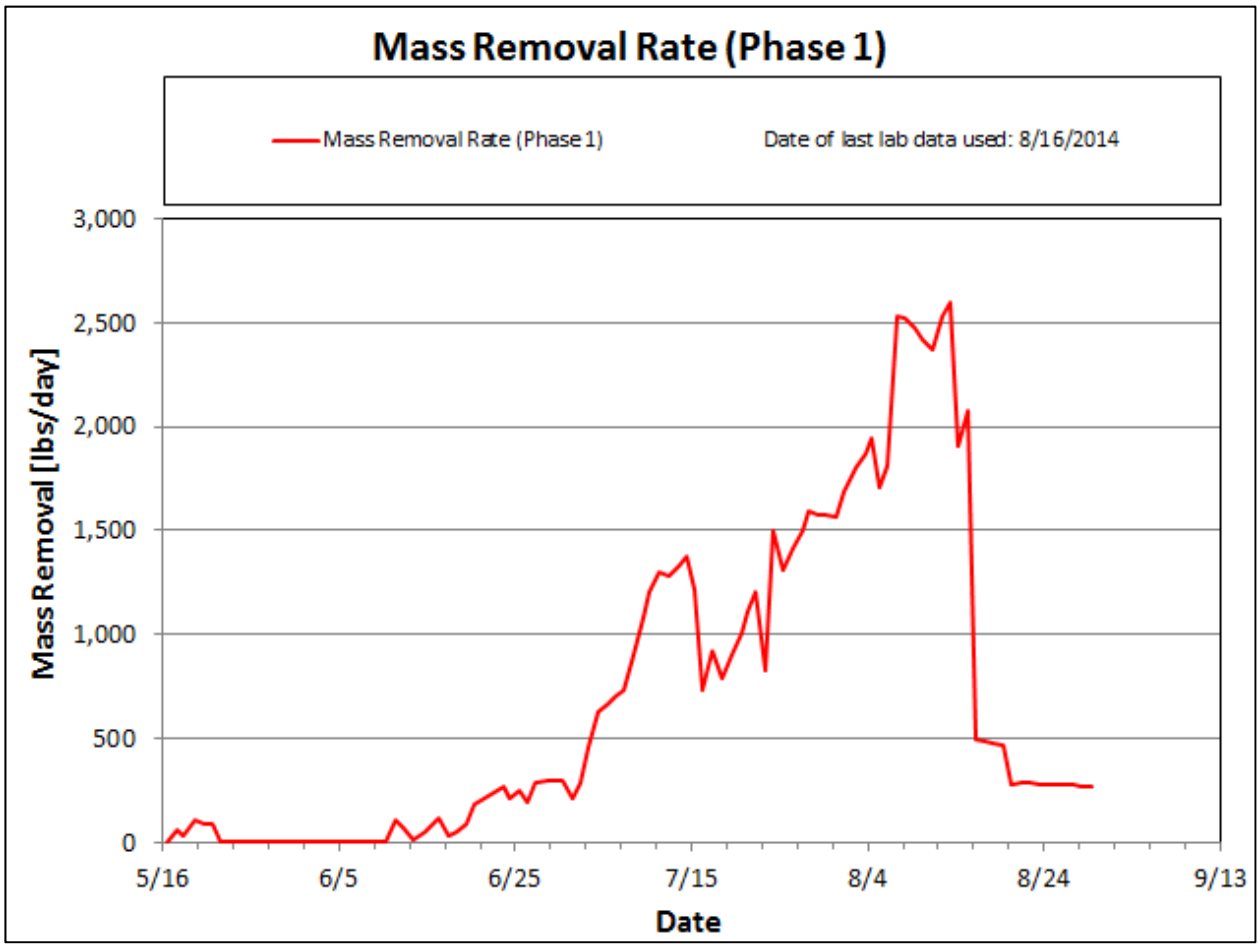


Figure 4e. Mass Removal Rate (Phase 1)

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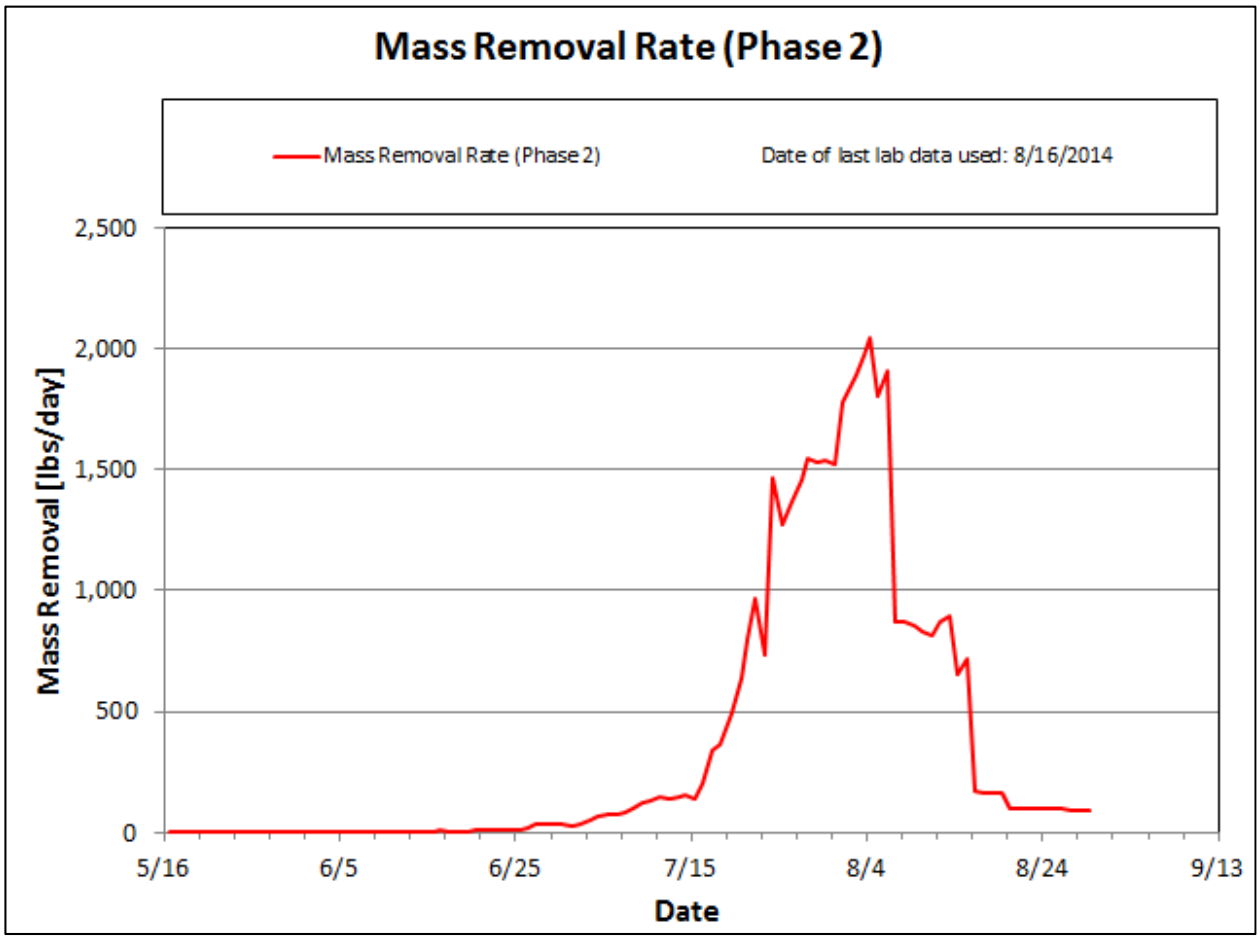


Figure 4f. Mass Removal Rate (Phase 2)

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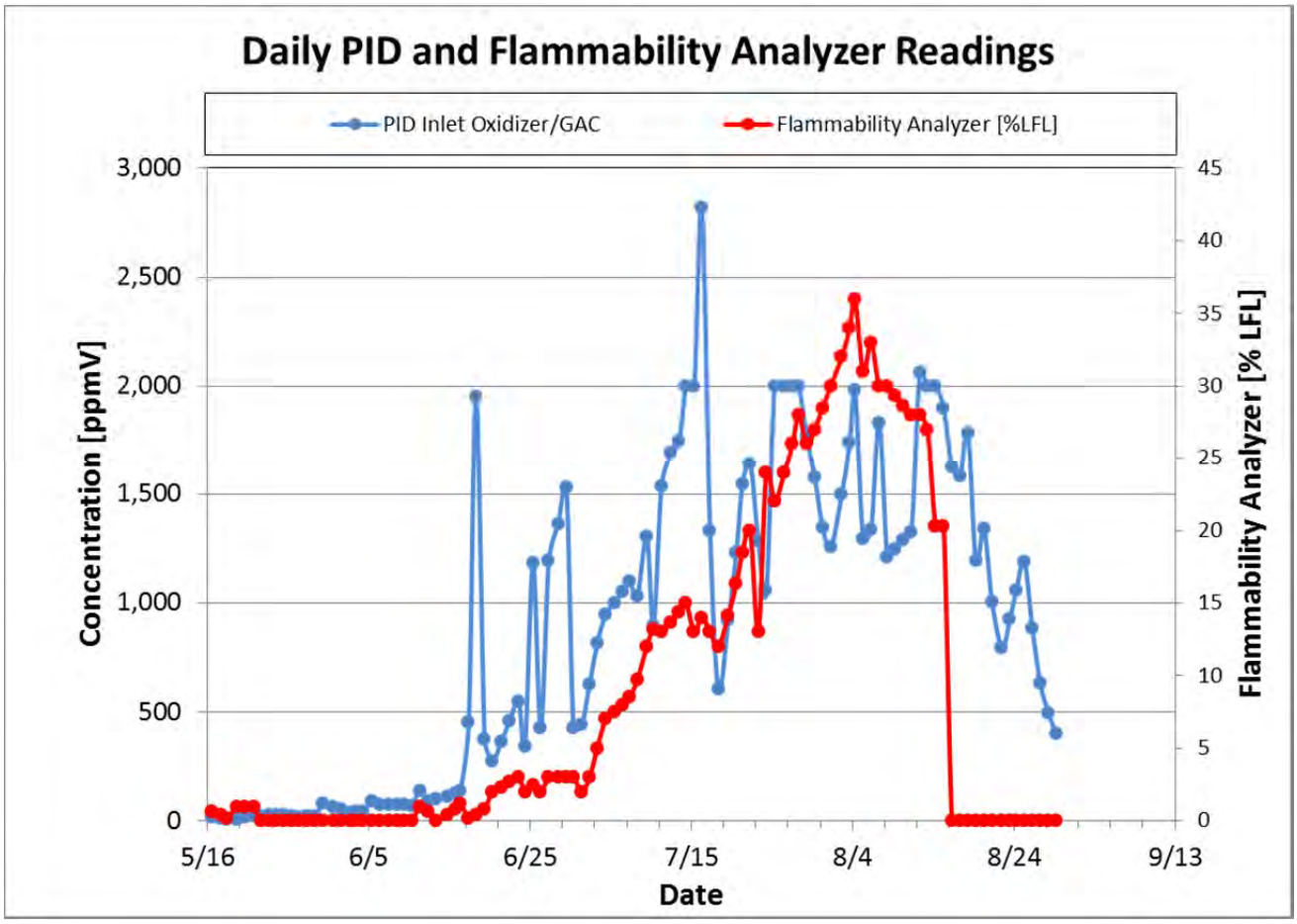


Figure 5. Daily PID Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13. Decreases in the DRE following switchover to the backup carbon system correlate with carbon change-out periods.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

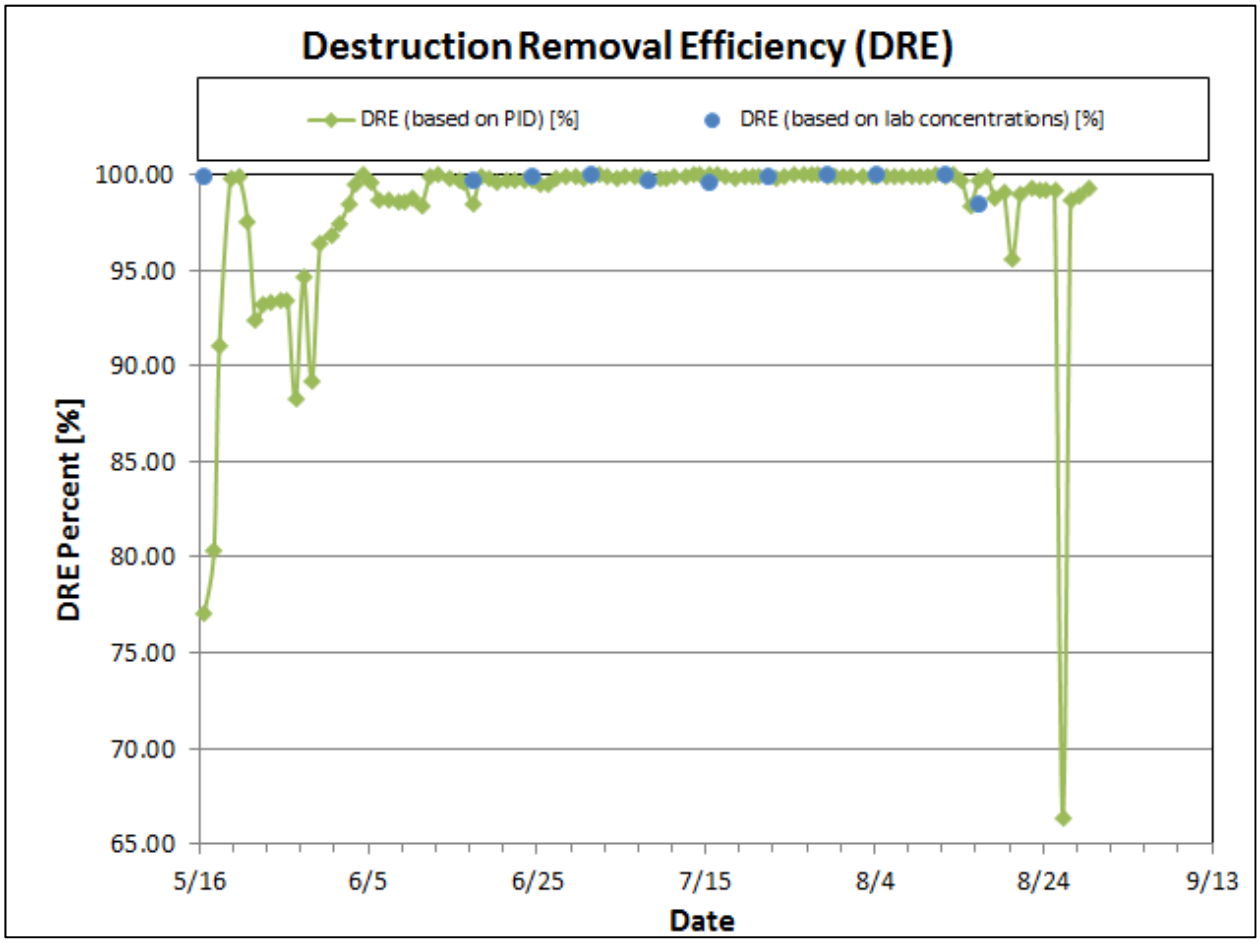


Figure 6. Destruction Removal Efficiency

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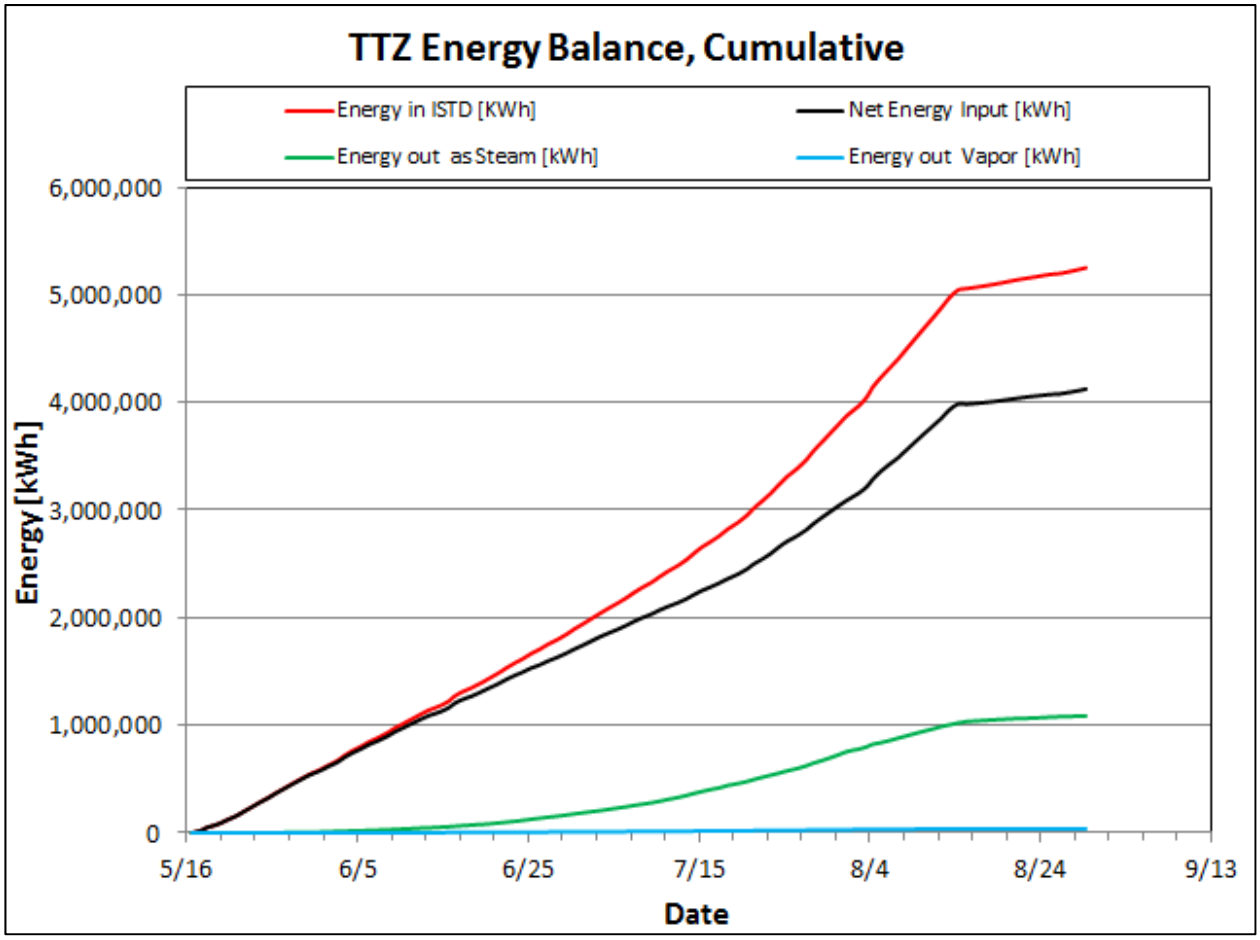


Figure 7. Power Usage, Cumulative

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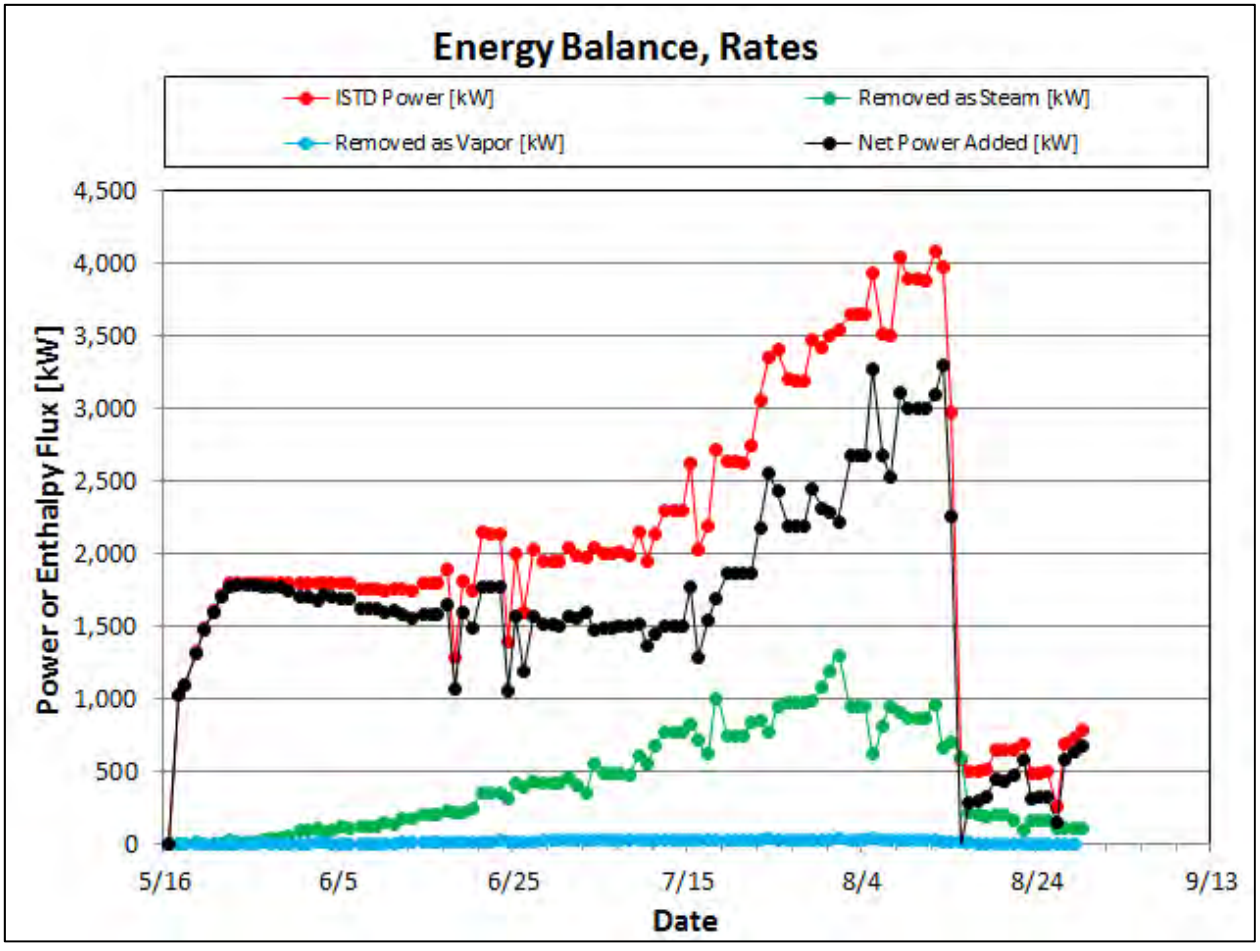


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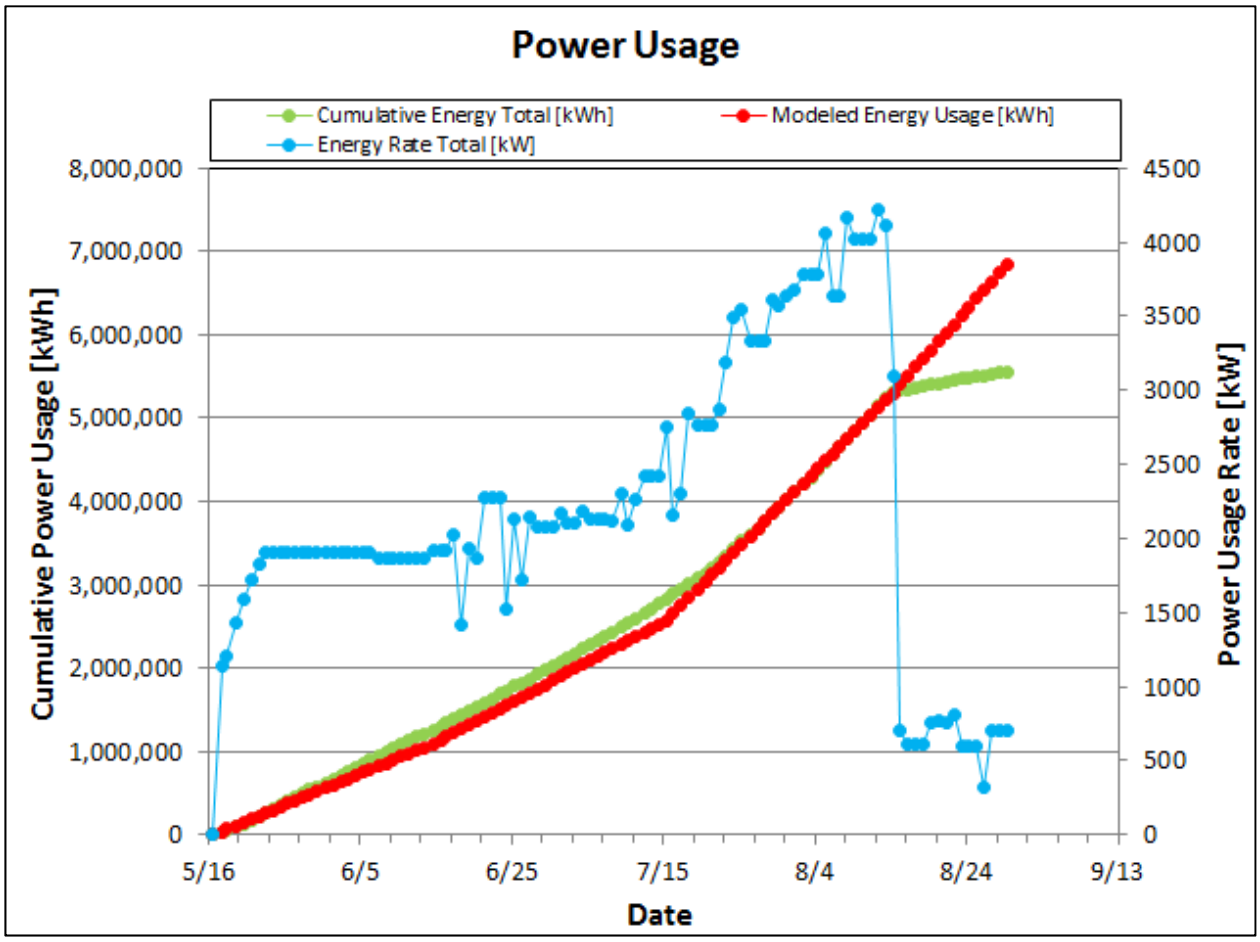


Figure 9. Power Usage

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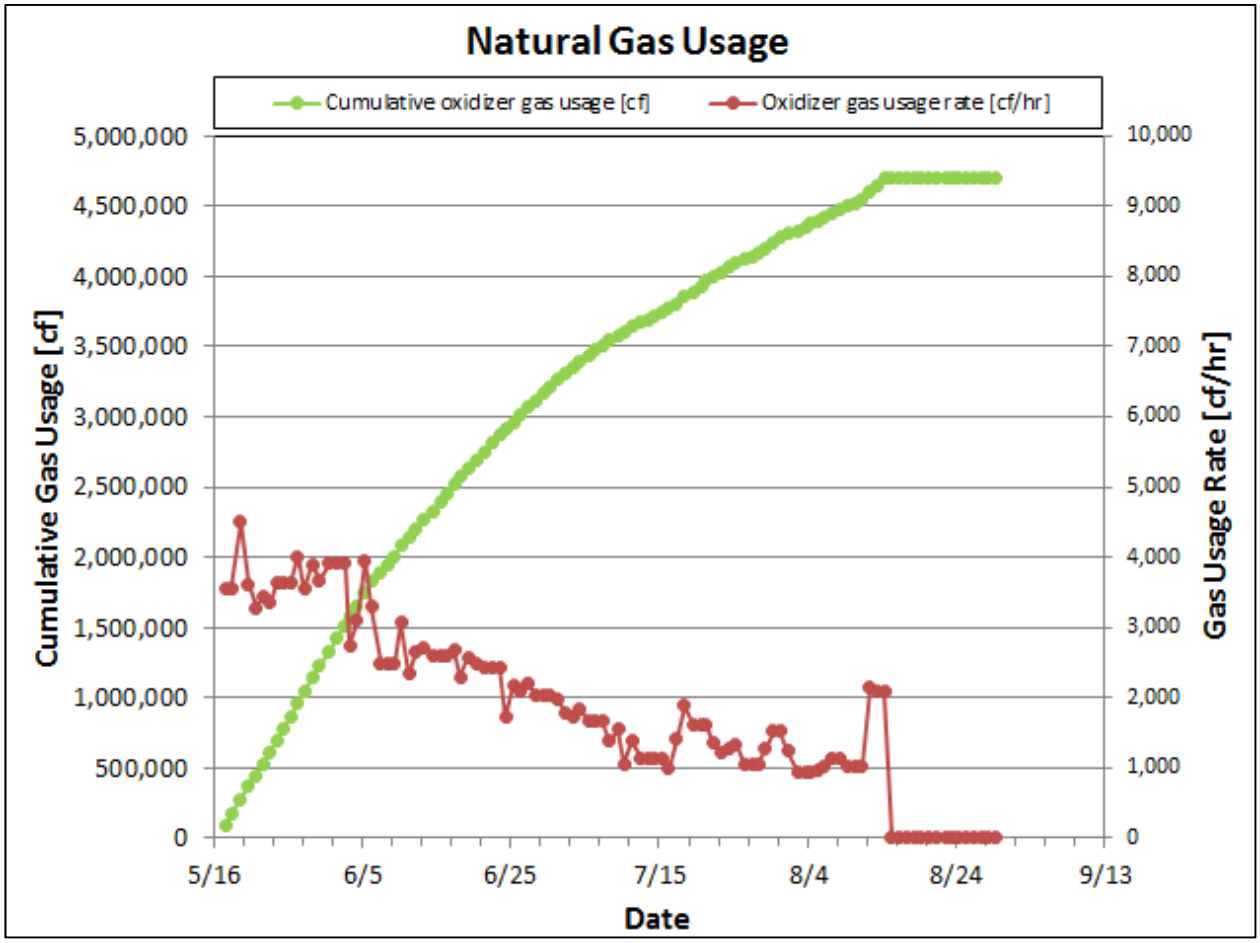


Figure 10. Natural Gas Usage

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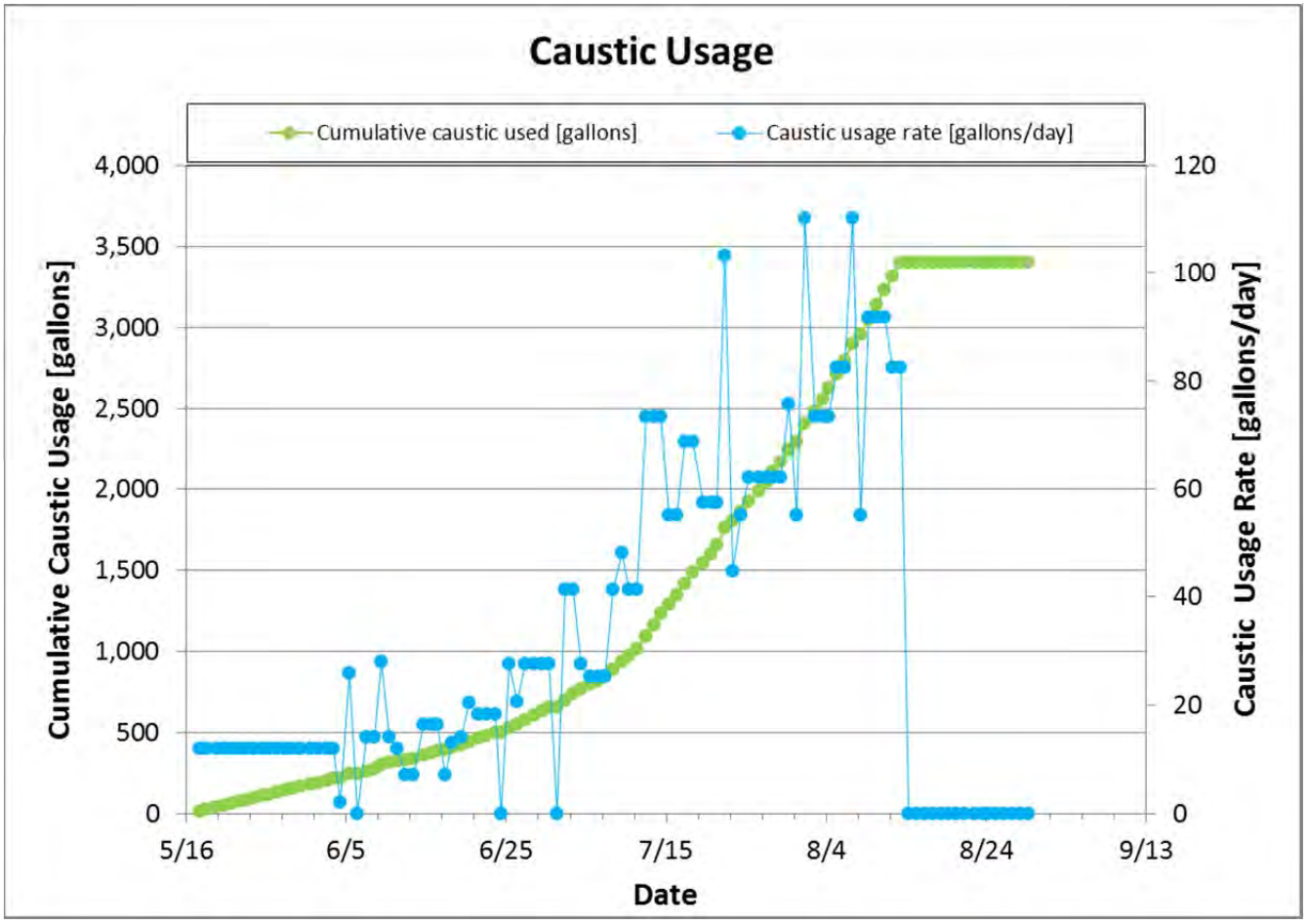


Figure 11. Caustic Usage

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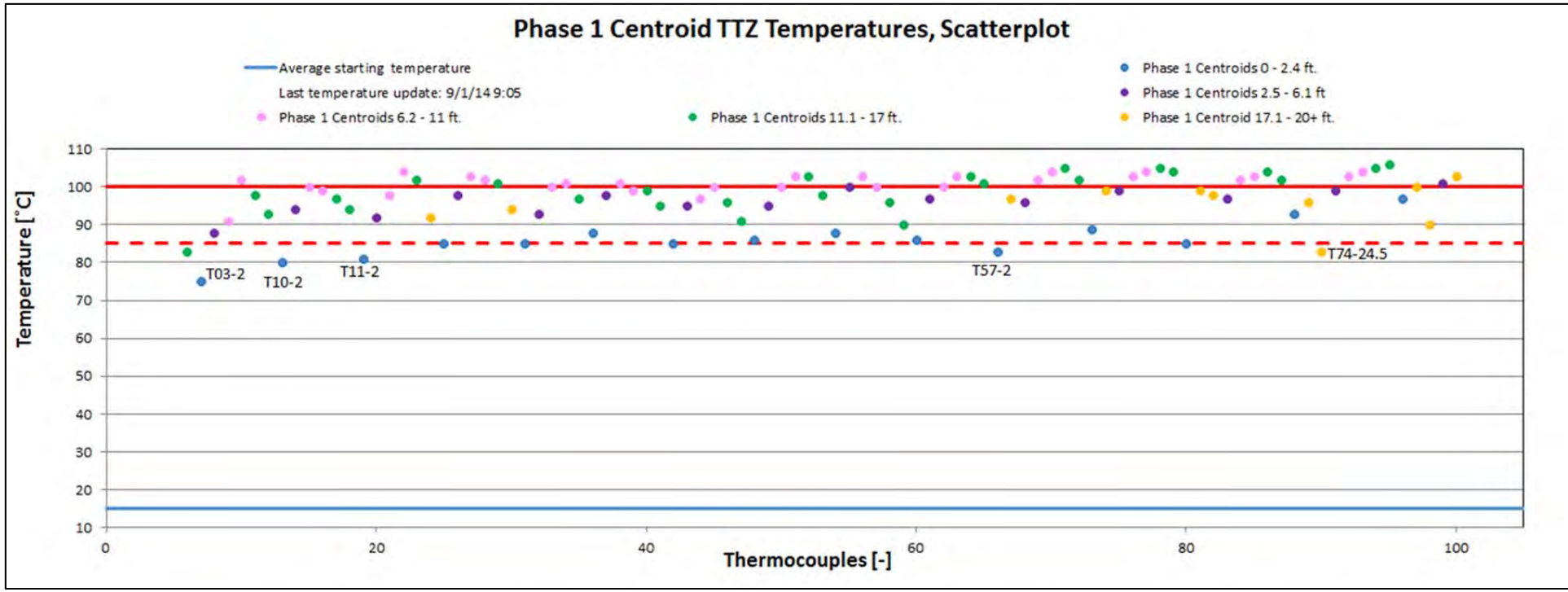


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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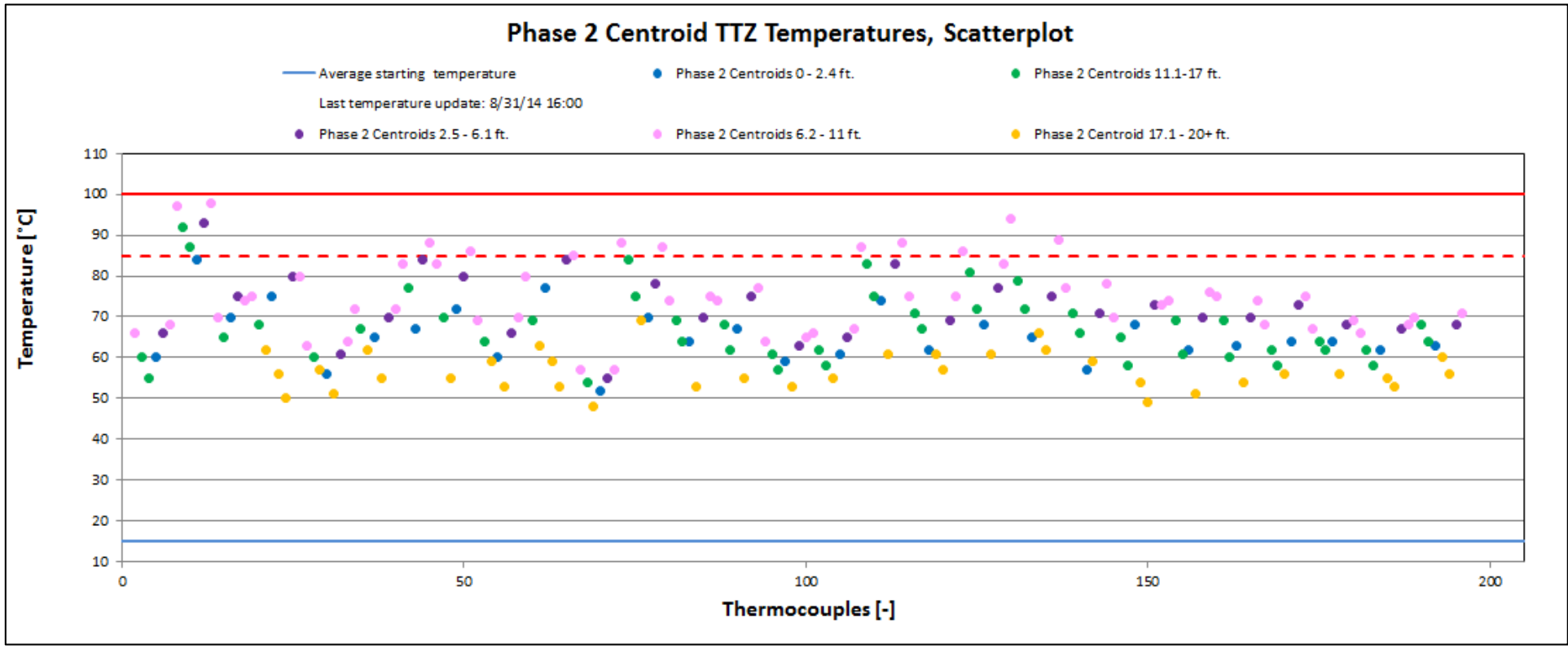


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots		
	Value	**Unit**
Date of Last Update	8/31/14	
Phase 1 Centroid Thermocouples ≥85 °C	99	%
Phase 1 Centroid Thermocouples ≥100 °C	78	%
Phase 2 Centroid Thermocouples ≥85 °C	12	%
Phase 2 Centroid Thermocouples ≥100 °C	2	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday August 29, 2014 through Friday September 5, 2014, with temperatures updated through Sunday September 7, 2014.

Table 1 provides a summary of the project operational status as of Friday, September 5, 2014.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	09/05/14	
Last Temperature Data Update	09/07/14	
Estimated Days of Operation (Total)	195	days
Days of Operation (Total)	113	days
Days of Operation vs. Estimate (Total)	58	%
Estimated Days of Operation Phase 1 (Day 1-134)	135	days
Days of Phase 1 Operation	113	days
Days of Phase 1 Operation vs. Estimate	84	%
Estimated Days of Operation Phase 2 (Day 61-195)	135	days
Days of Phase 2 Operation	51	days
Days of Phase 2 Operation vs. Estimate	38.0	%
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	5,759,400	kWh
Used Electrical Energy vs. Estimate	36.5	%
Total Vapor Mass Removal	149,311	lbs
Average Power Input Last 24 Hours	1,460	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	971	scfm
Average Condensate Production Rate Last 24 Hours	1.8	gpm

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The oxidizer was brought back online on 8/29/14 with the heaters remaining at 10% energy input. Heaters in Phase 1 were increased approximately 10% daily, starting Monday, 1 September. Heaters are currently at approximately 50% energy input. Heaters in Phase 1 will be increased this week until they reach approximately 70%. Influent concentrations have returned to levels prior to the oxidizer shutdown, approximately 2,000 ppm. The flammability analyzer levels have dropped to approximately 10%. Heaters in Phase 2 will remain at 10% while data evaluation continues.

As of 9/5/14, phase 1 has operated for 113 days and phase 2 for 51 days. Please note that this represents calendar days of operation, assuming the heaters are energized (not idling). The current average wellfield temperature for phase 1 is 95°C and 70°C for phase 2.

Estimated mass removed to date is reported using the combination of flammability analyzer data, lab data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. These results yield a total mass removal of 149,311 lbs as of 9/5/14.

Phase 1/Phase 2 differentiation readings were last collected in the wellfield on 9/4/14. The ratio of mass coming from Phase 1:Phase 2 on that date was 0.59:0.41. These ratios were applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Phase 2 heating began on 7/16/14. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	9/7/14	
Phase 1 Entire TTZ Average Temperature	95	°C
Phase 2 Entire TTZ Average Temperature	70	°C
Phase 1 Centroid Average Temperature	95	°C
Phase 2 Centroid Average Temperature	67	°C

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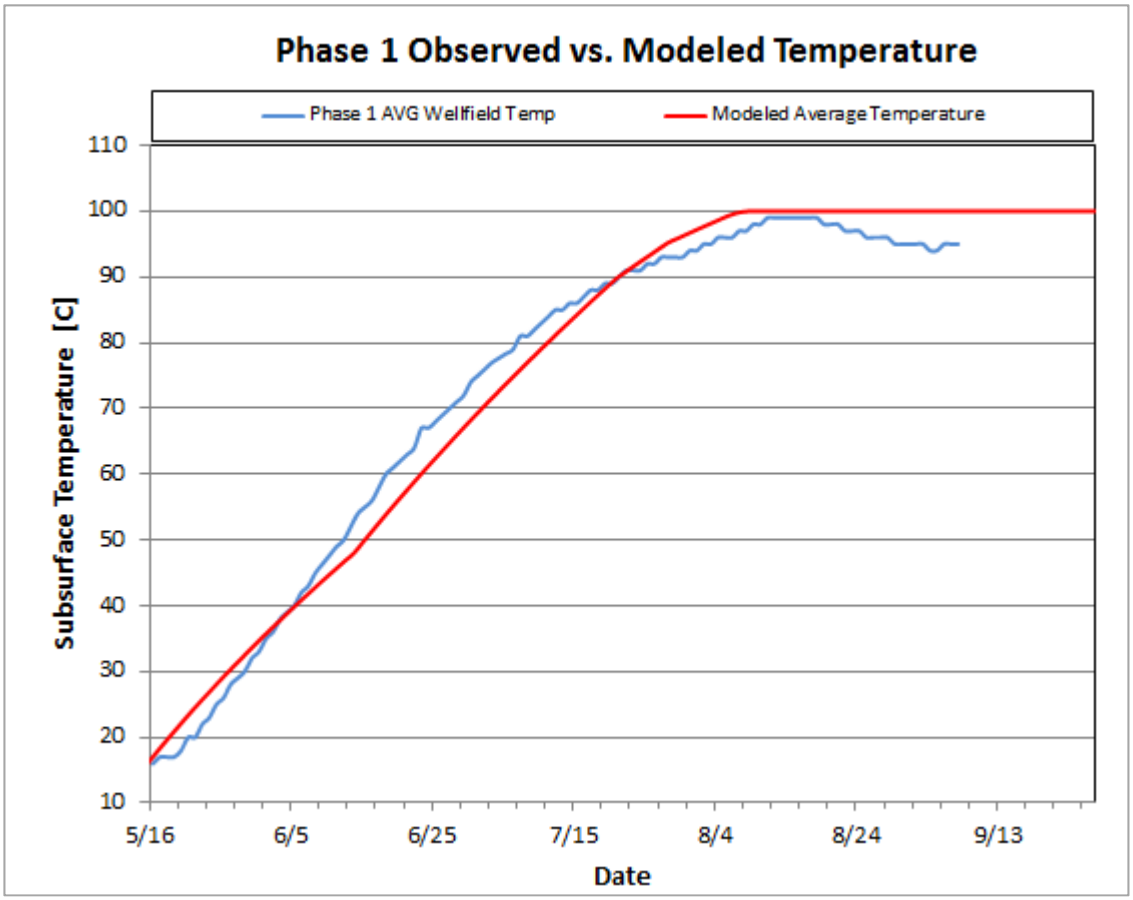


Figure 1a. Phase 1 Observed vs. Modeled Temperatures

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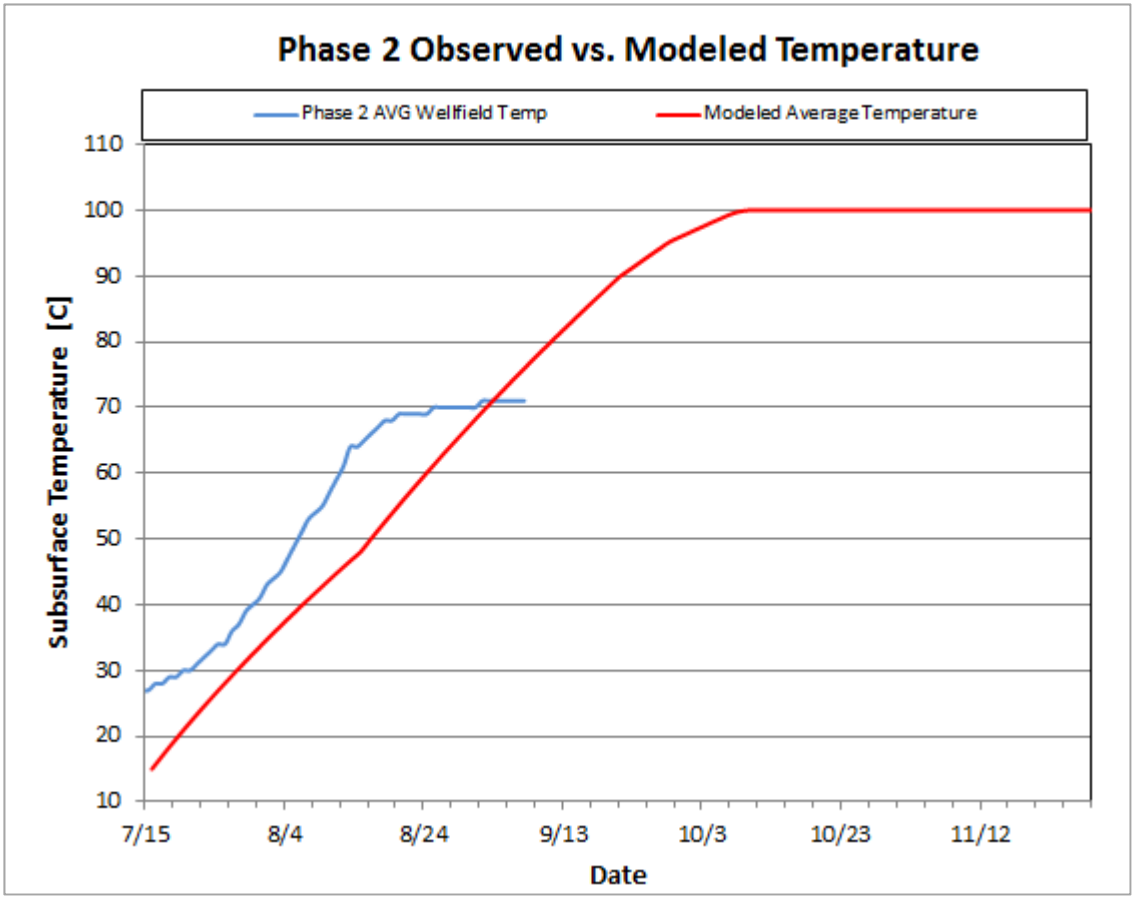


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was restarted on 8/30/14.

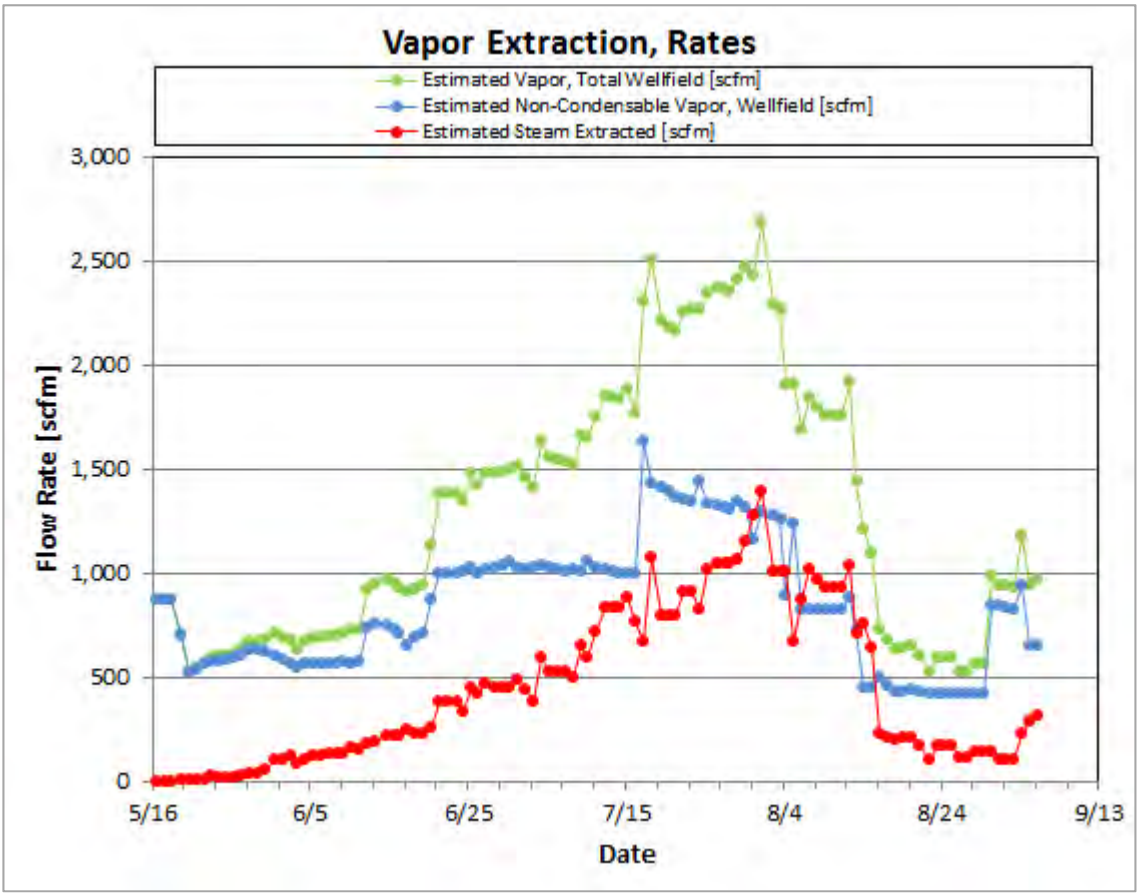


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent one manual daily reading from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. The data displayed starting 8/30/14 is the higher of the two readings from both flammability analyzers (currently approximately 1% difference).

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

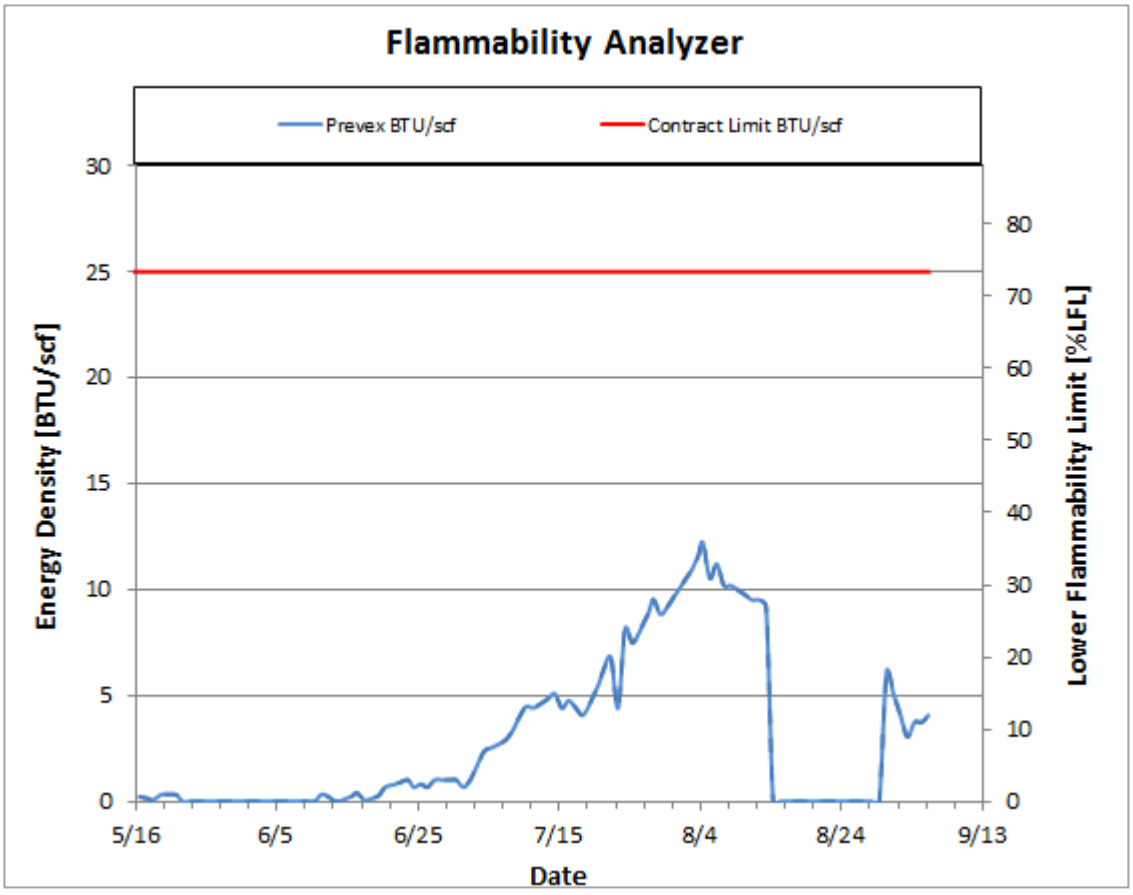


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed to date is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The decrease in mass removed on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14 and 8/19/14.

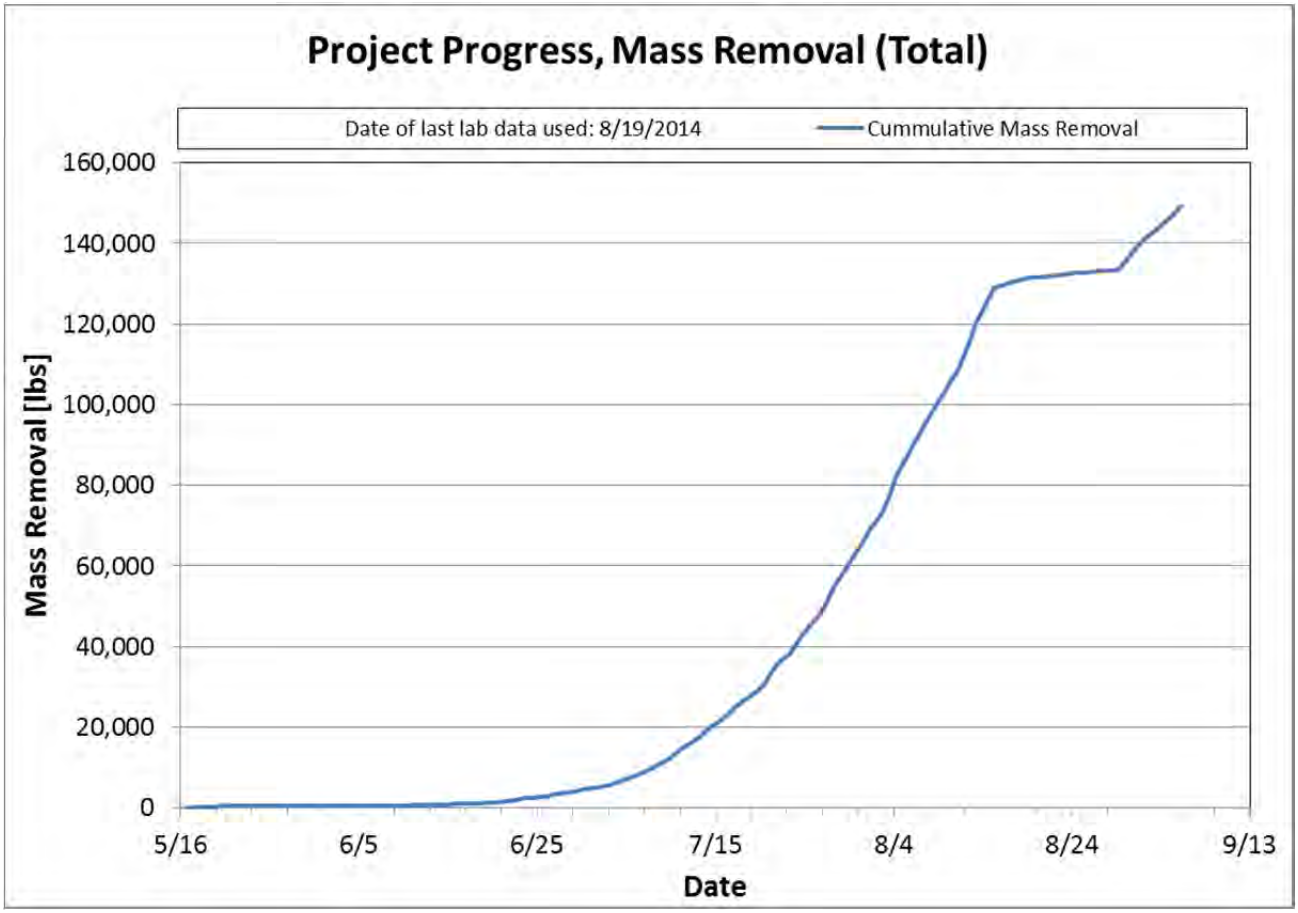


Figure 4a. Project Progress, Mass Removal (Total)

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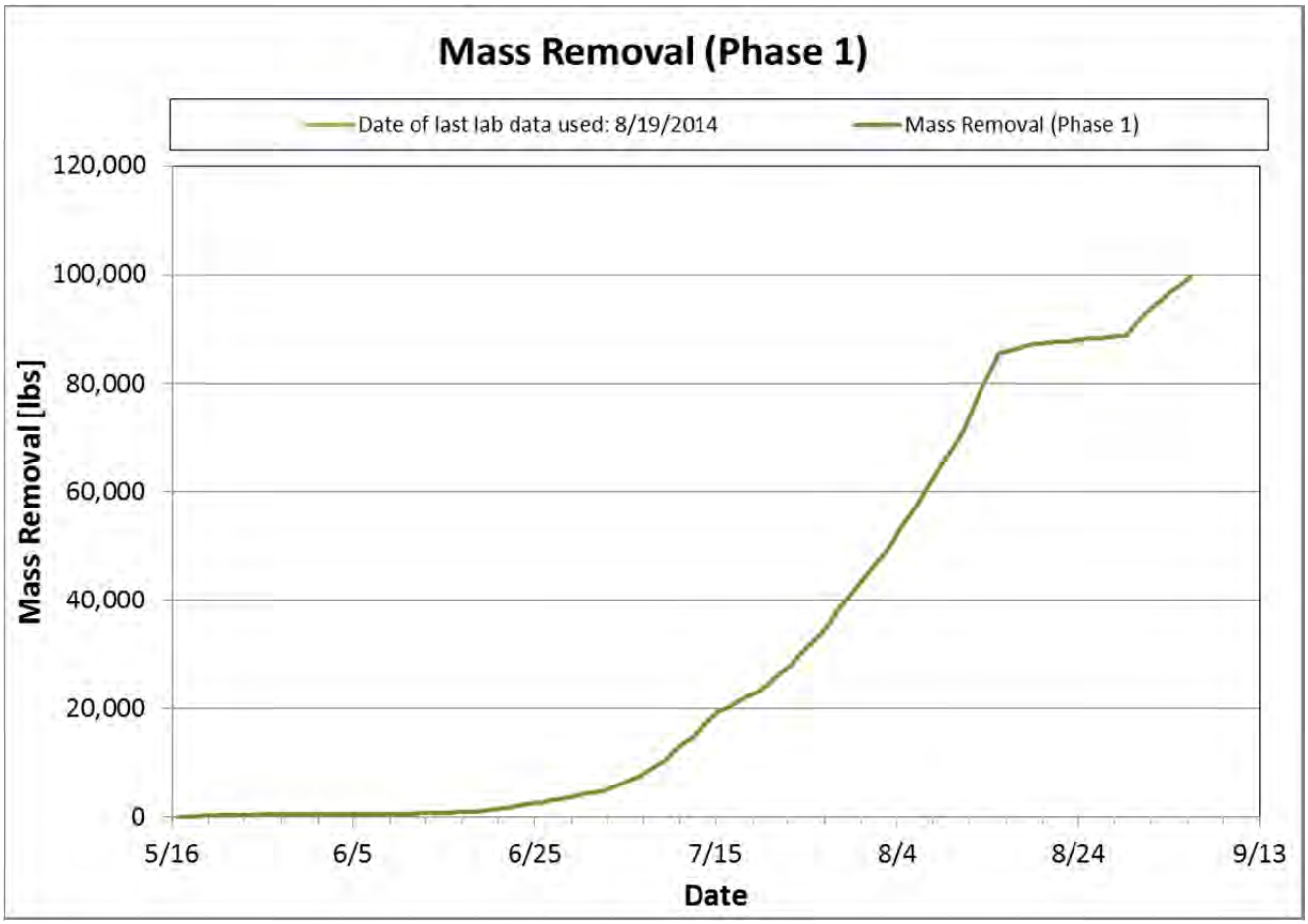


Figure 4b. Project Progress, Mass Removal (Phase 1)

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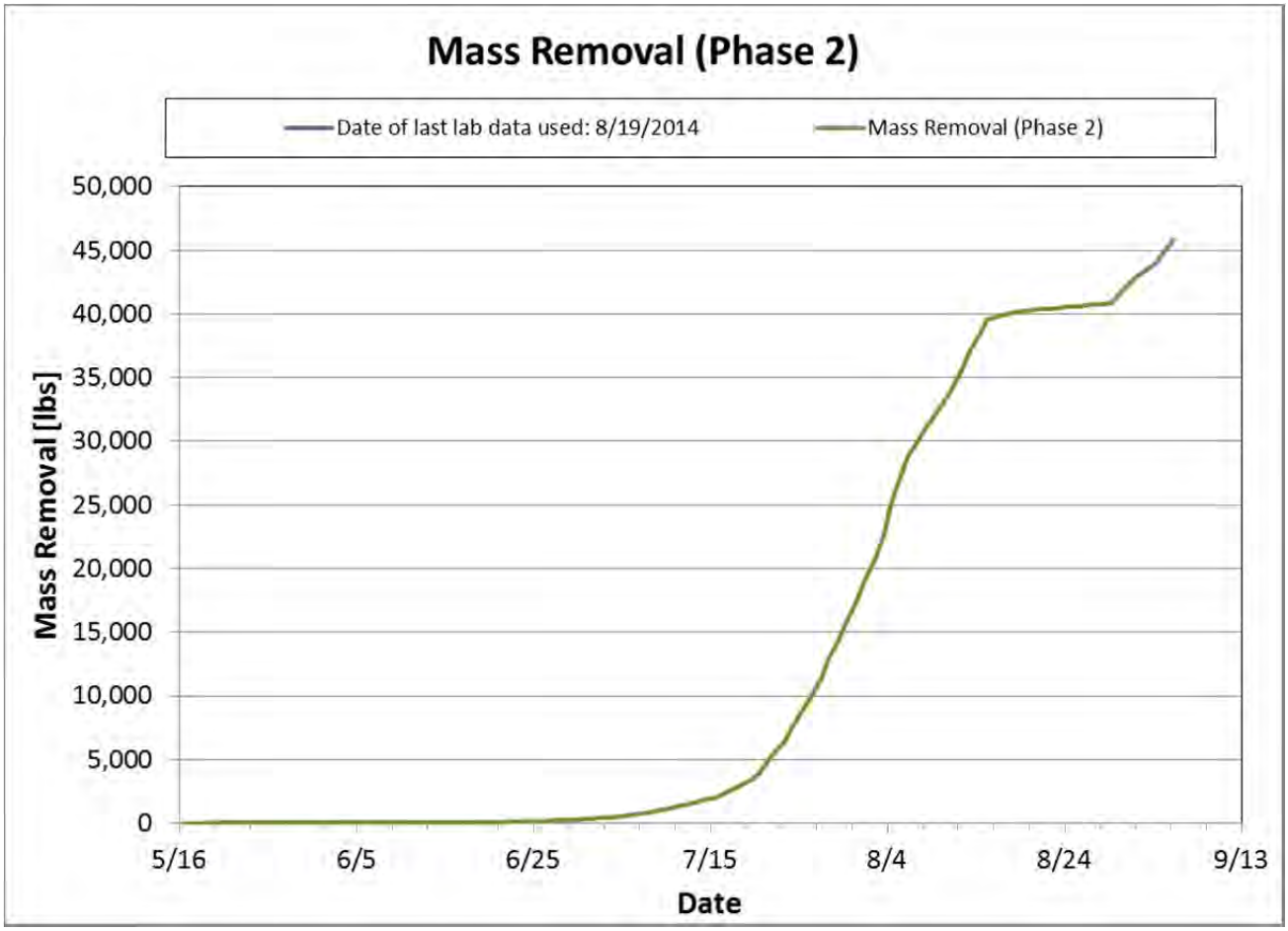


Figure 4c. Project Progress, Mass Removal (Phase 2)

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The mass removal rate decrease below represents an estimate due to the system shutdown. Currently, treatment of contaminated vapors is through the backup carbon system.

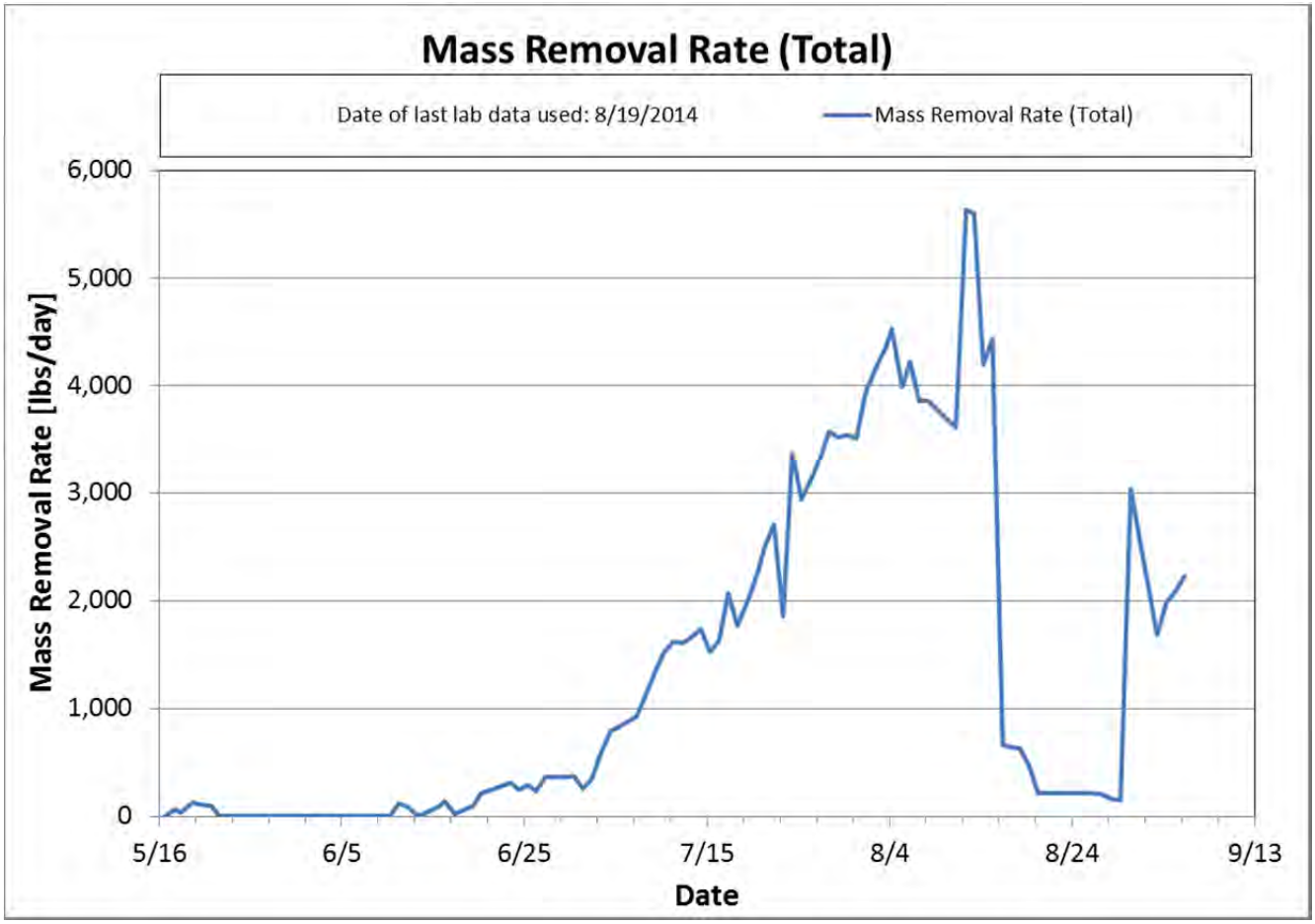


Figure 4d. Mass Removal Rate (Total for Site)

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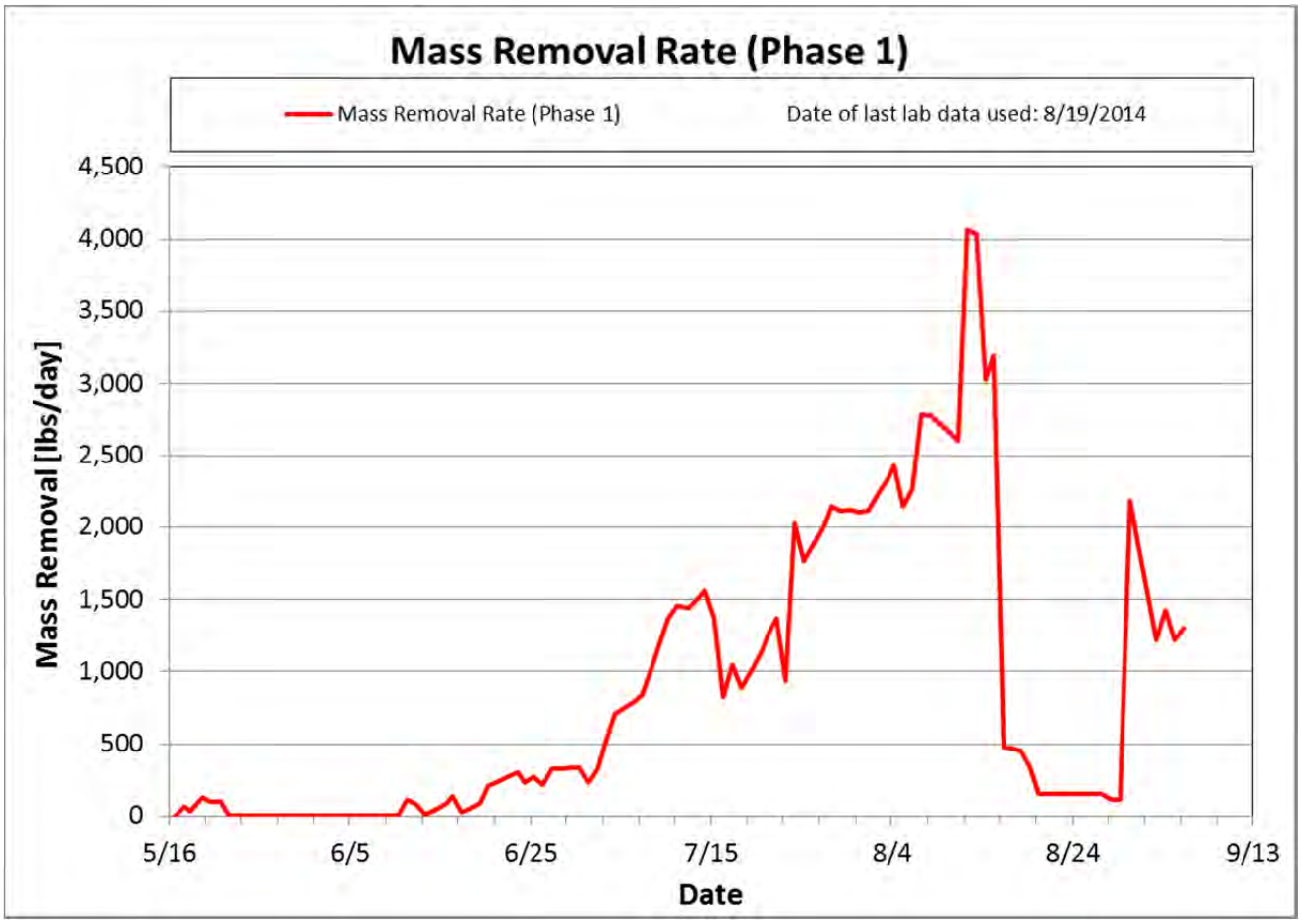


Figure 4e. Mass Removal Rate (Phase 1)

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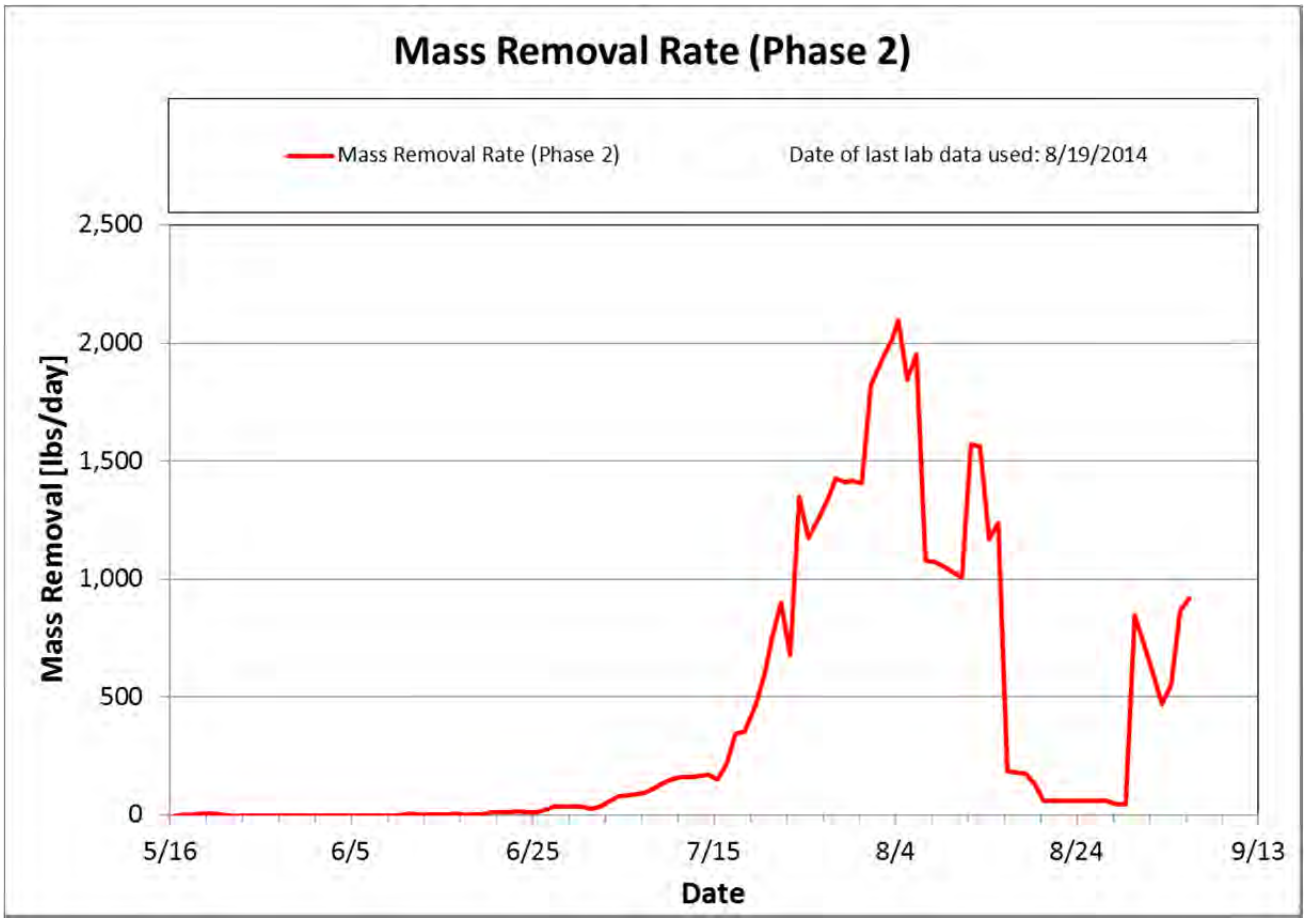


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID readings collected at the oxidizer influent over time. It should be noted that the PID reading from 7/16/14 was obtained with a PID with a 10.6 eV lamp, instead of the 11.7 eV lamp which had reached the upper concentration limit of 2,000 ppmV. Similarly, data collected on 07/25-28 were first collected with an 11.7 eV lamp with values exceeding the upper limit. The influent concentrations were then collected with the 10.6 eV lamp with values lower than the 11.7 eV upper limit (2,000 ppm). Therefore, the maximum 11.7 eV lamp is reported.

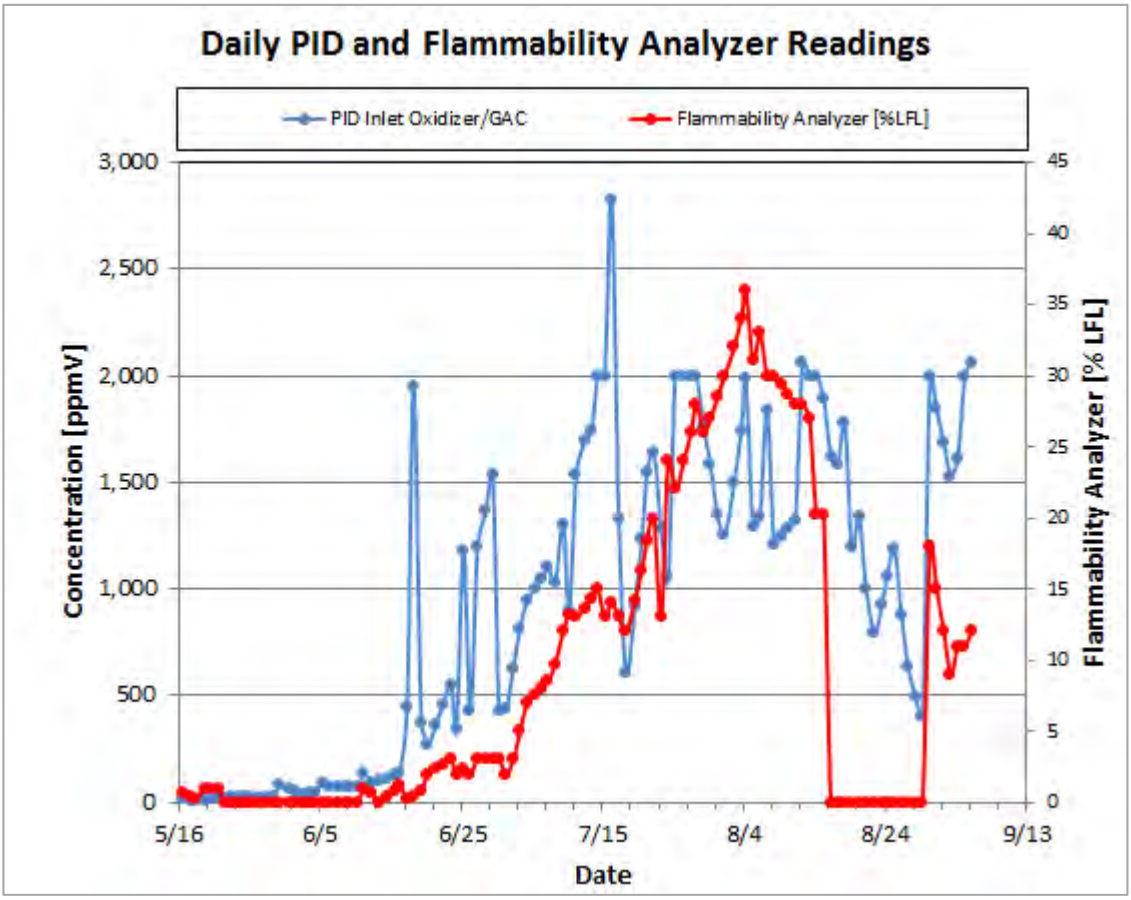


Figure 5. Daily PID Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13. Dips in the DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-out periods.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

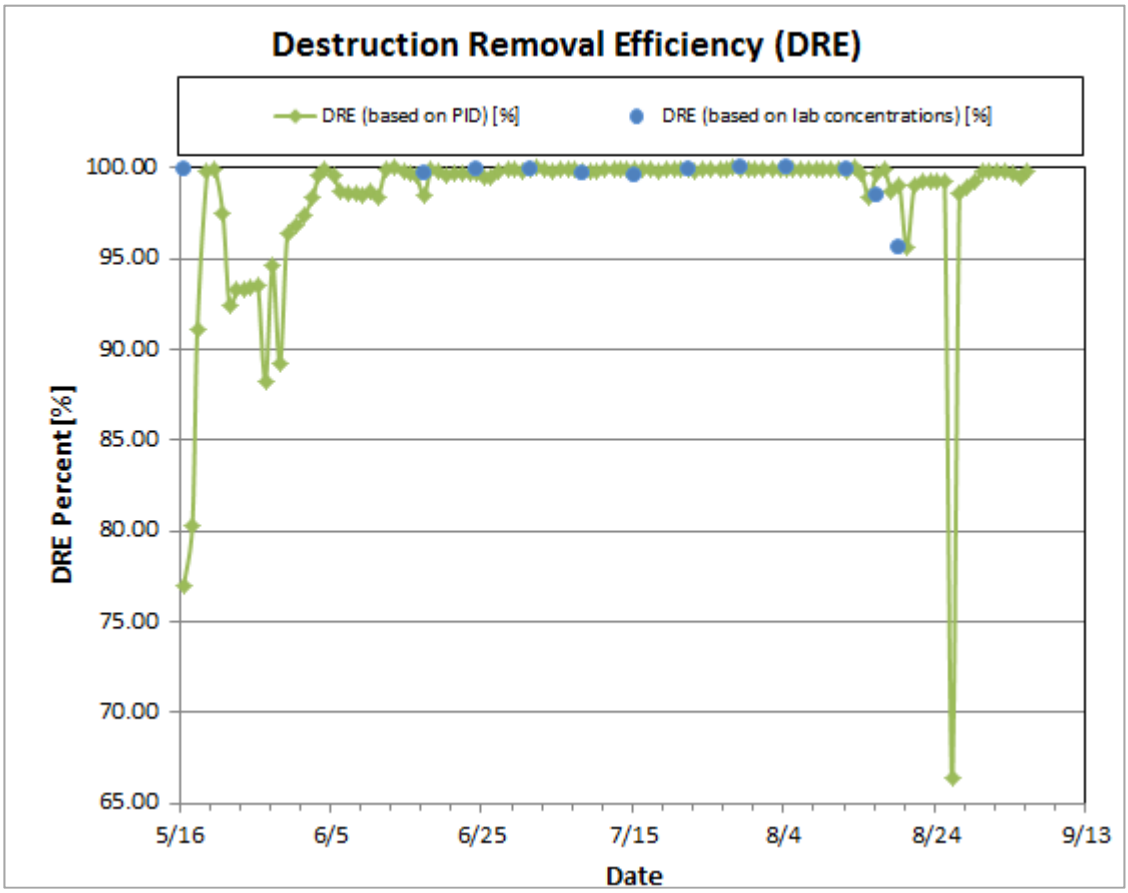


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7.

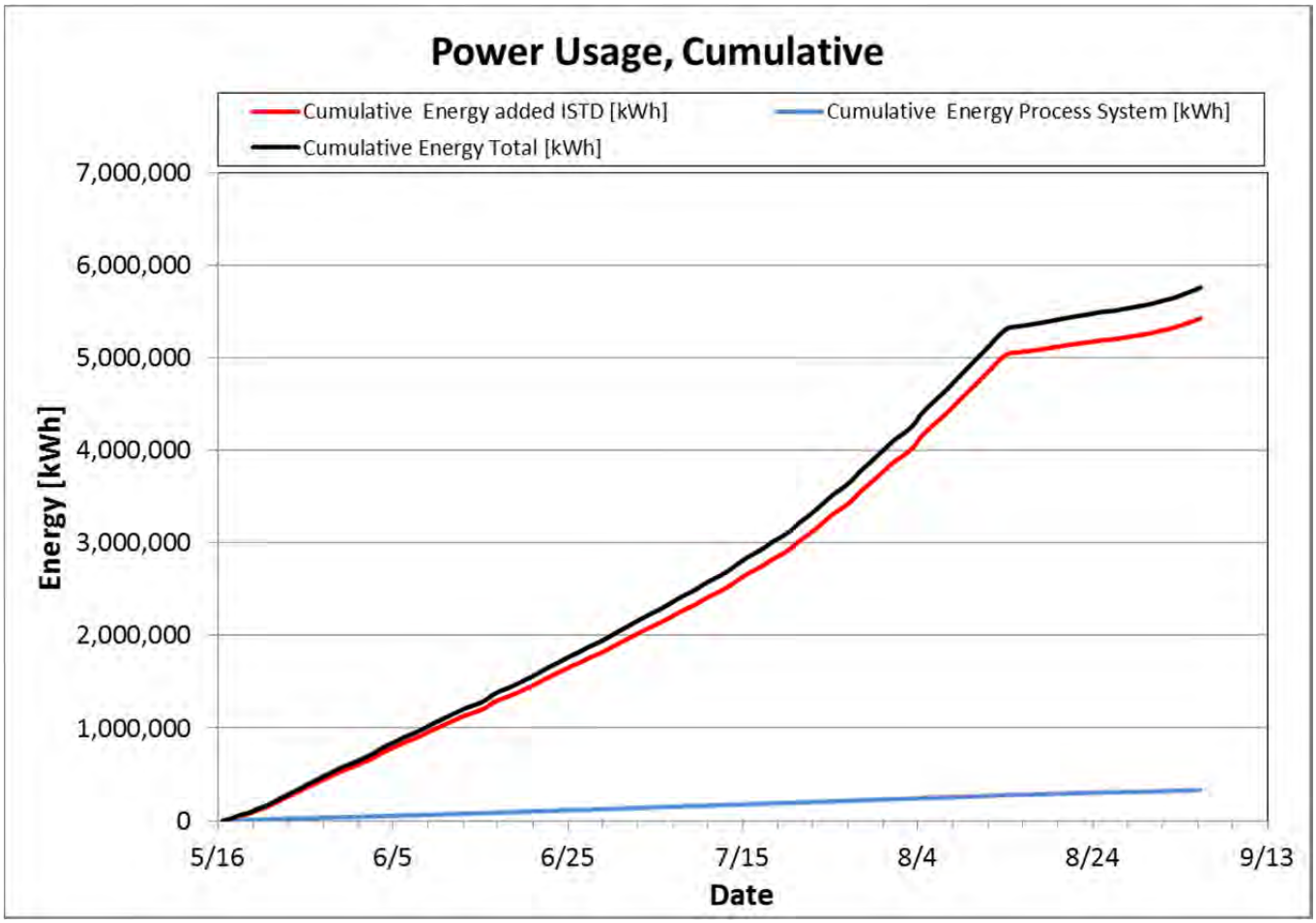


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30 and the following days corresponds with ramping of the heaters after placing the oxidizer back online.

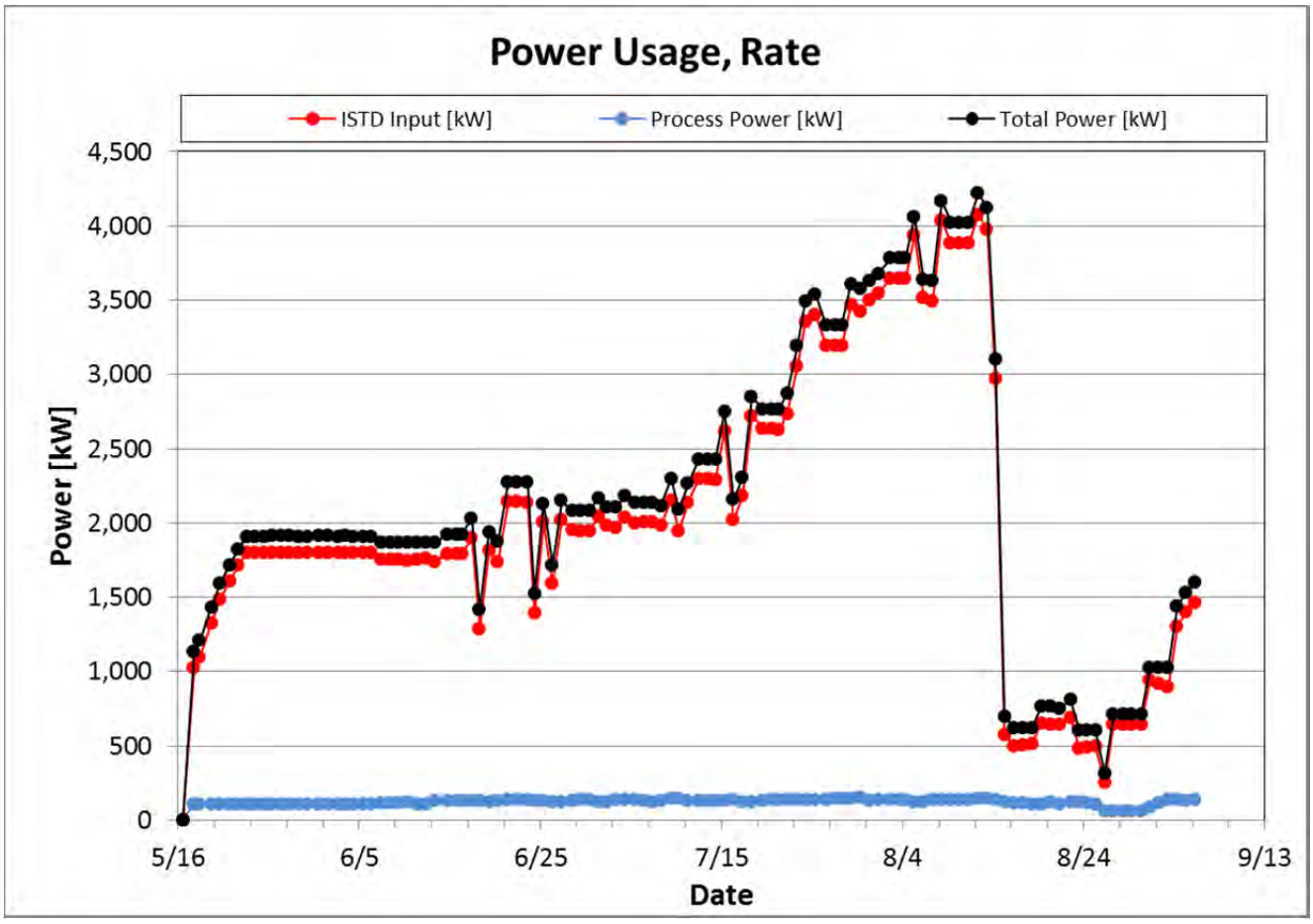


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

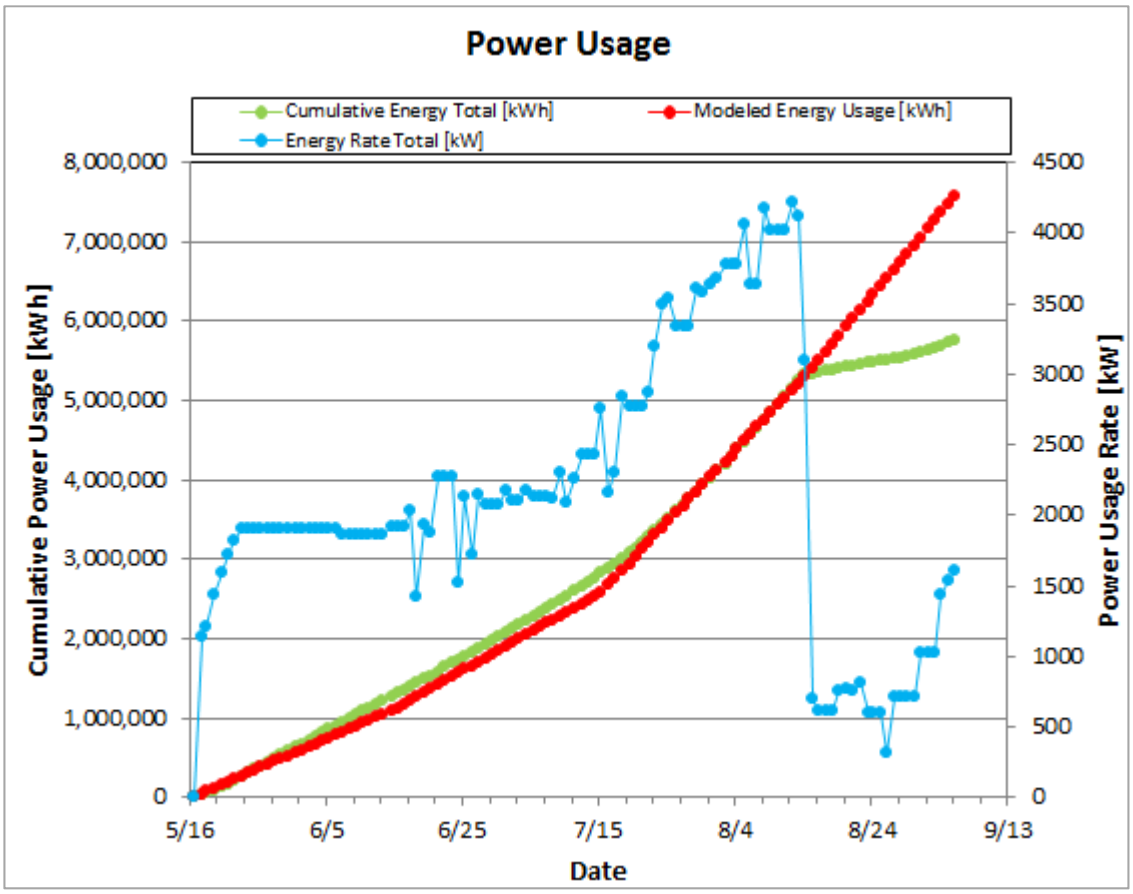


Figure 9. Power Usage

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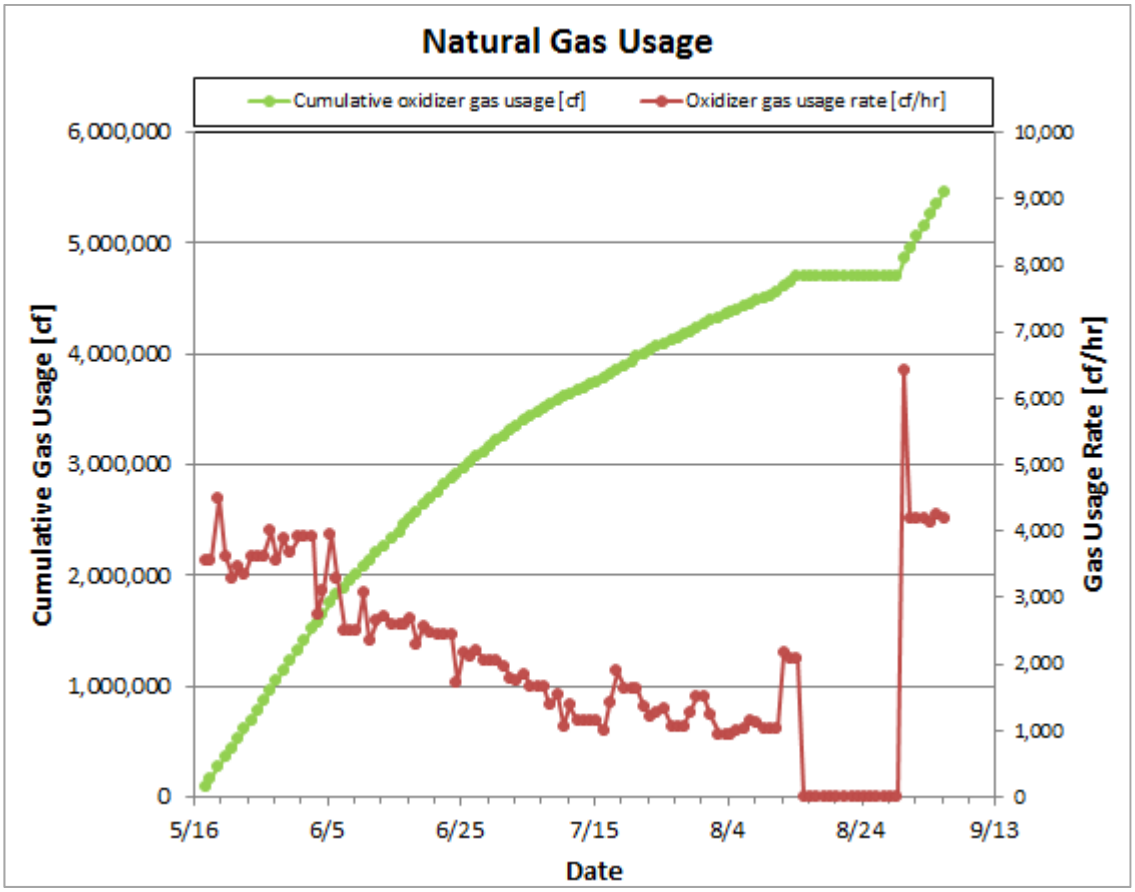


Figure 10. Natural Gas Usage

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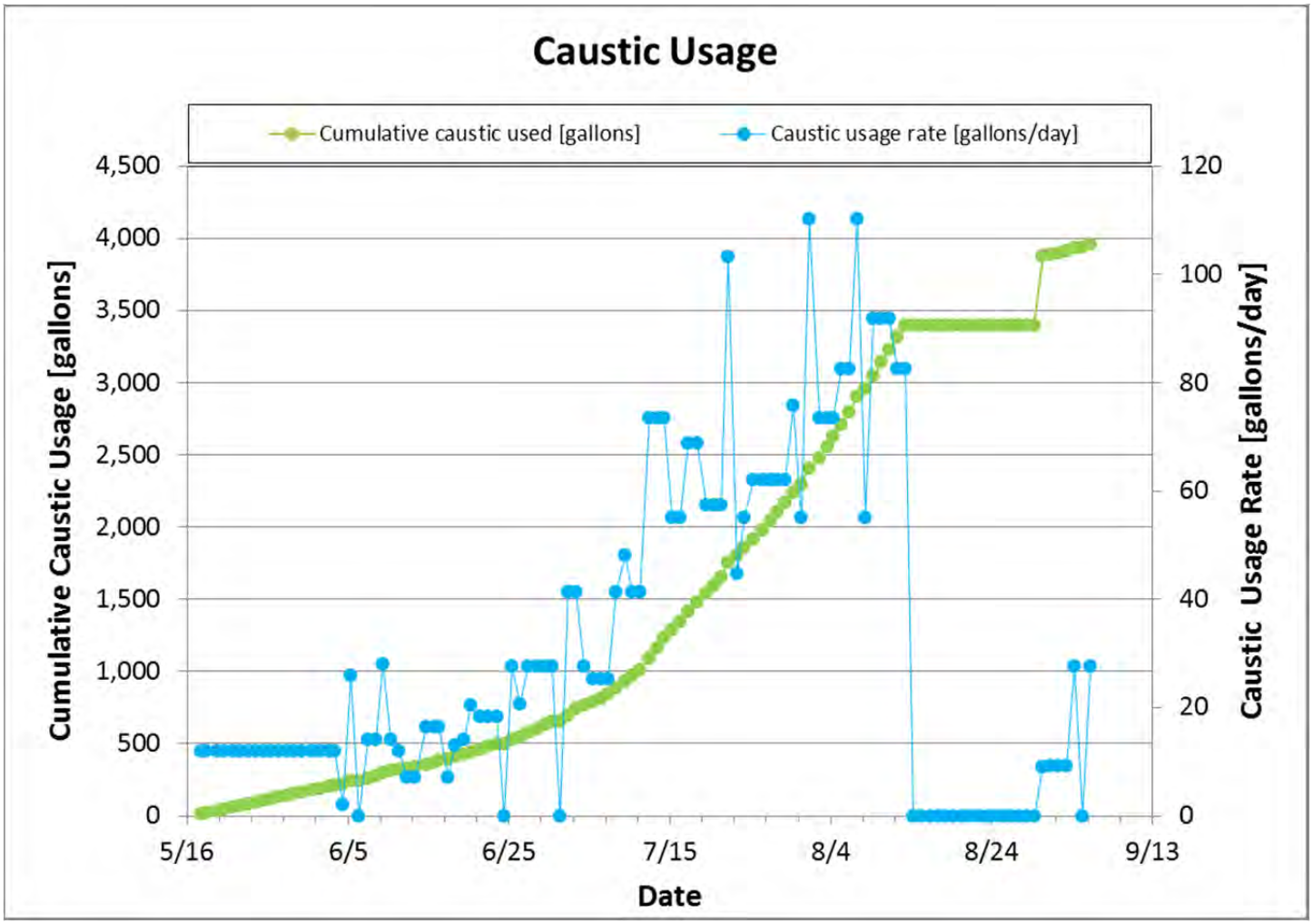


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12a. As of 7/25/14, we have reached the first payment milestone for Phase 1. Phase 2 centroids are shown in Figure 12b. The scatterplots have been updated to show the centroids grouped by depth, with each depth range shown as a different color.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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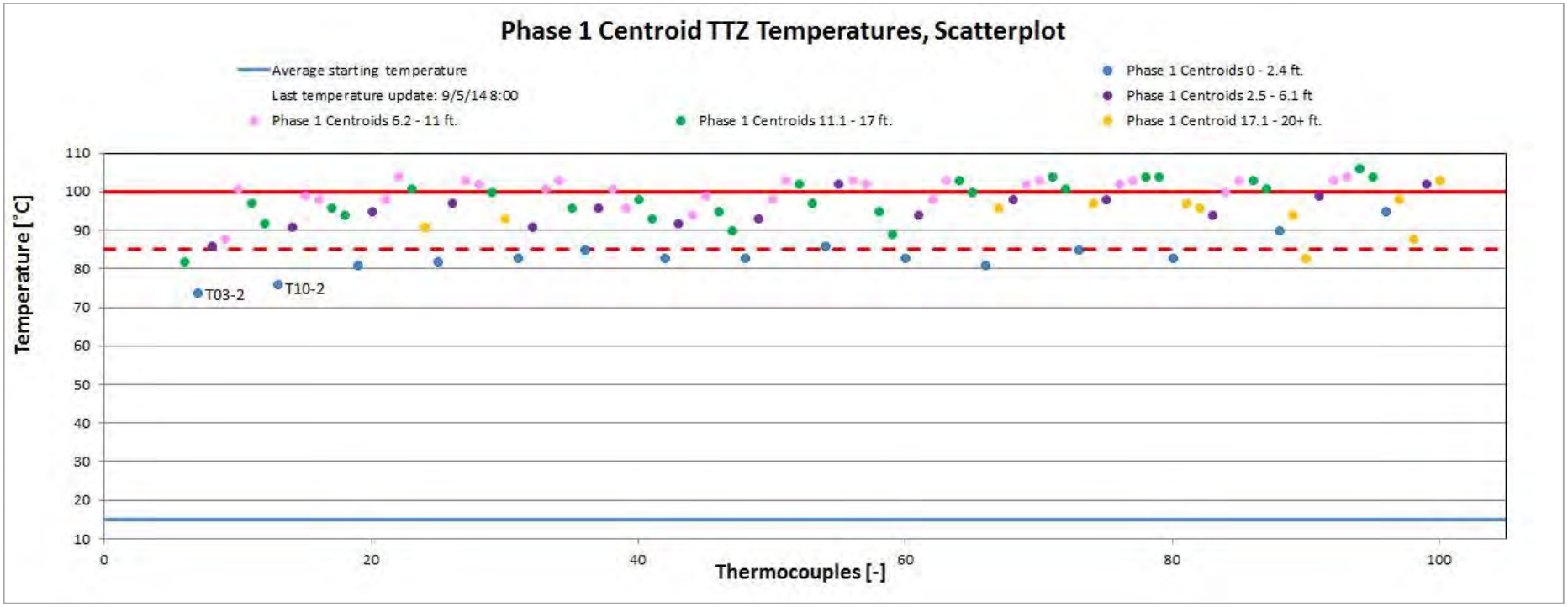


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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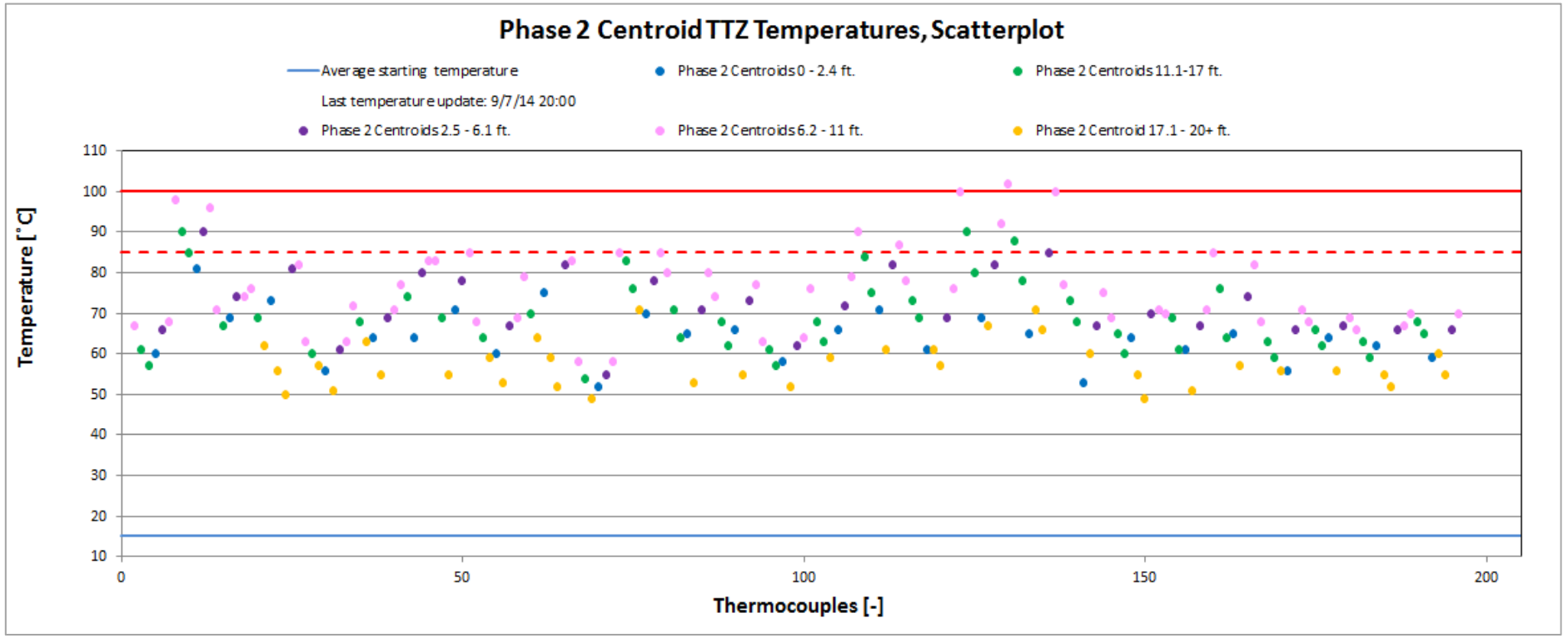


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots		
	Value	**Unit**
Date of Last Update	9/7/14	
Phase 1 Centroid Thermocouples ≥85 °C	99	%
Phase 1 Centroid Thermocouples ≥100 °C	78	%
Phase 2 Centroid Thermocouples ≥85 °C	15	%
Phase 2 Centroid Thermocouples ≥100 °C	4	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday September 5, 2014 through Friday September 12, 2014, with temperatures updated through Sunday September 14, 2014.

Table 1 provides a summary of the project operational status as of Friday, September 12, 2014.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	09/12/14	
Last Temperature Data Update	09/14/14	
Days of Operation (Total)	96	days
Days of Phase 1 Operation	96	days
Days of Phase 2 Operation	19	days
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	6,105,300	kWh
Used Electrical Energy vs. Estimate	38.7	%
Total Vapor Mass Removal	162,262	lbs
Average Power Input Last 24 Hours	2,040	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,095	scfm
Average Condensate Production Rate Last 24 Hours	2.2	gpm

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Heaters in Phase 1 are currently at approximately 70% energy input. Influent concentrations recorded with the PID remain at approximately 1,000 ppm. Flammability analyzer readings remain at approximately 10%. Heaters in Phase 2 will remain at 10% while data evaluation of Phase 1 continues.

As of 9/12/14, Phase 1 has operated for 96 days and Phase 2 for 19 days. Please note that this represents days where heaters operated at or above 70% (per contract definition). The current average wellfield temperature for Phase 1 is 99°C and 73°C for Phase 2.

Estimated mass removed to date is reported using the flammability analyzer data, lab data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. These results yield a total mass removal of 162,262 lbs as of 9/12/14. Individual fractions are shown in 4a.

Phase 1/Phase 2 differentiation readings were last collected in the wellfield on 9/11/14. The ratio of mass coming from Phase 1:Phase 2 on that date was 0.55:0.45. These ratios were applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling. Temperatures are returning to that prior to system shutdown.

Phase 2 heating began on 7/16/14. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling. Please note that heaters in Phase 2 remain at 10%.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	9/14/14	
Phase 1 Entire TTZ Average Temperature	99	°C
Phase 2 Entire TTZ Average Temperature	73	°C
Phase 1 Centroid Average Temperature	98	°C
Phase 2 Centroid Average Temperature	70	°C

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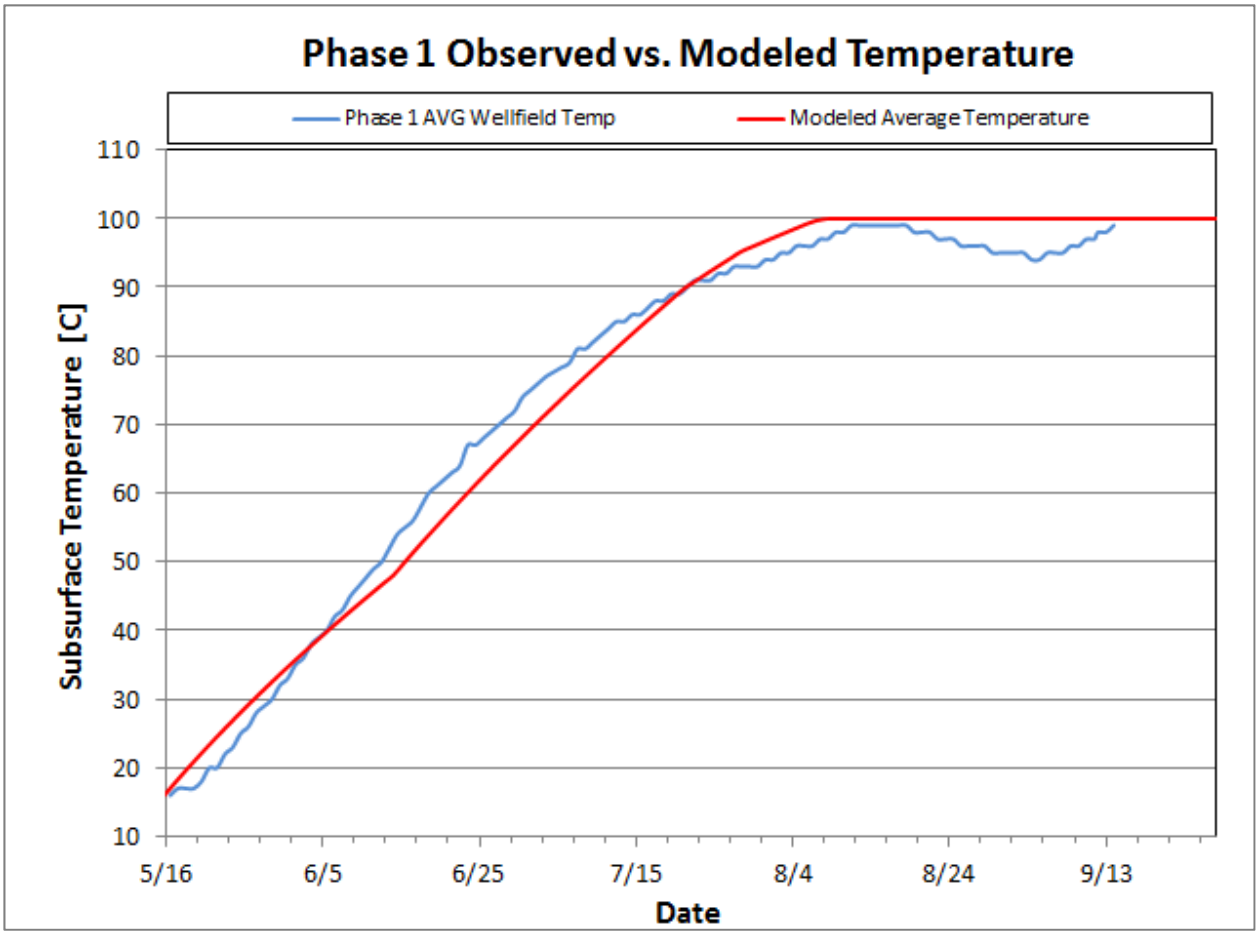


Figure 1a. Phase 1 Observed vs. Modeled Temperatures

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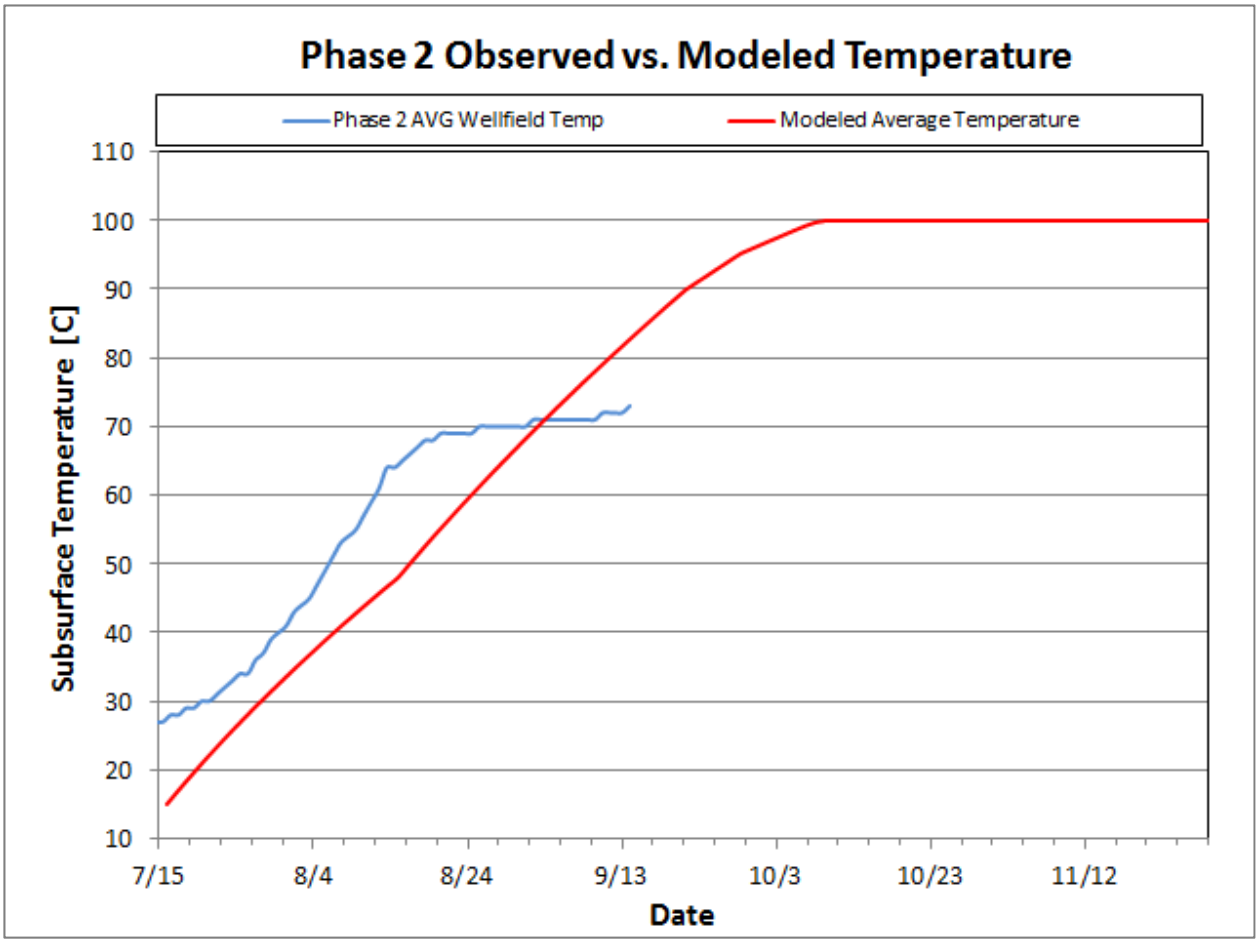


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was restarted on 8/30/14.

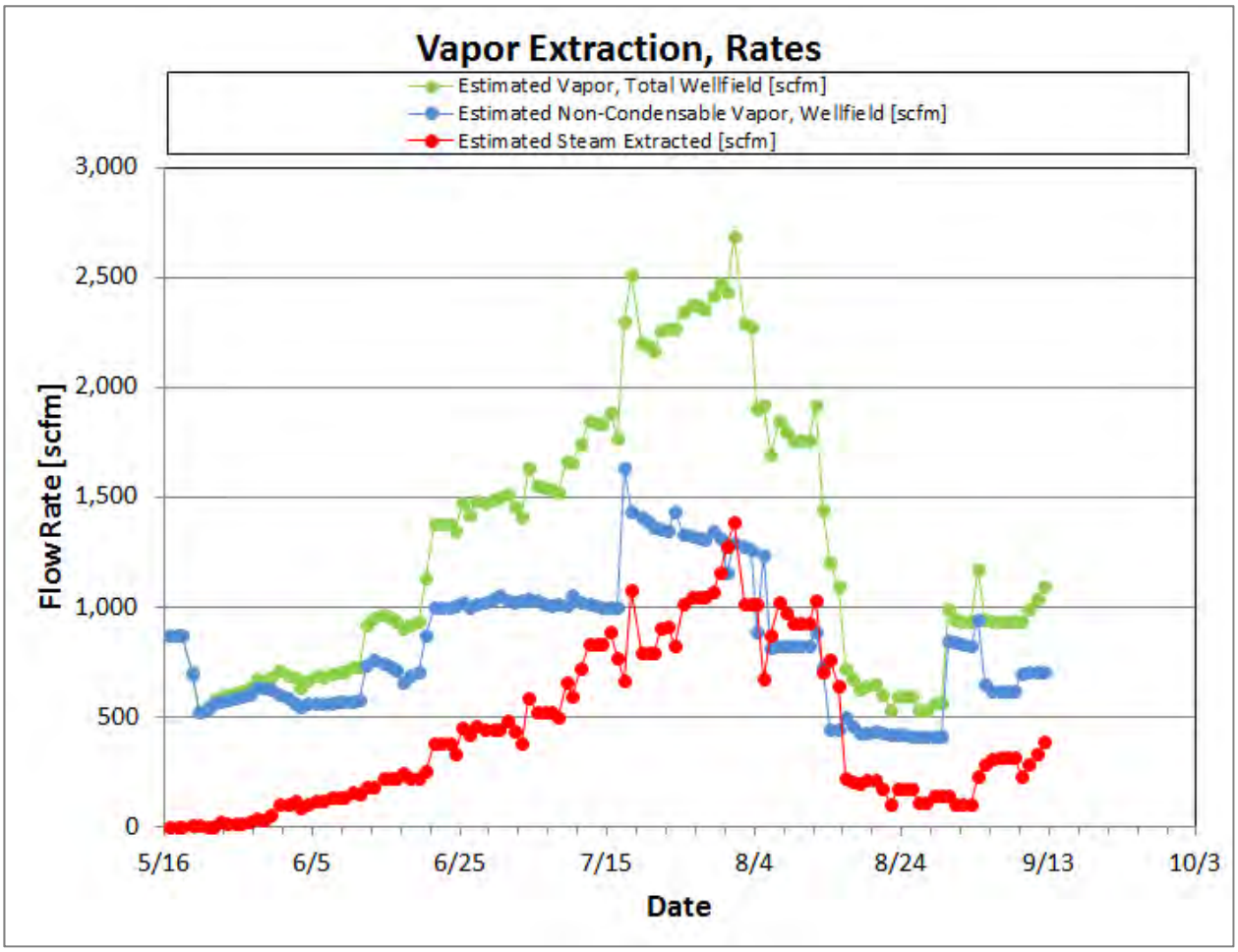


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent one manual daily reading from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

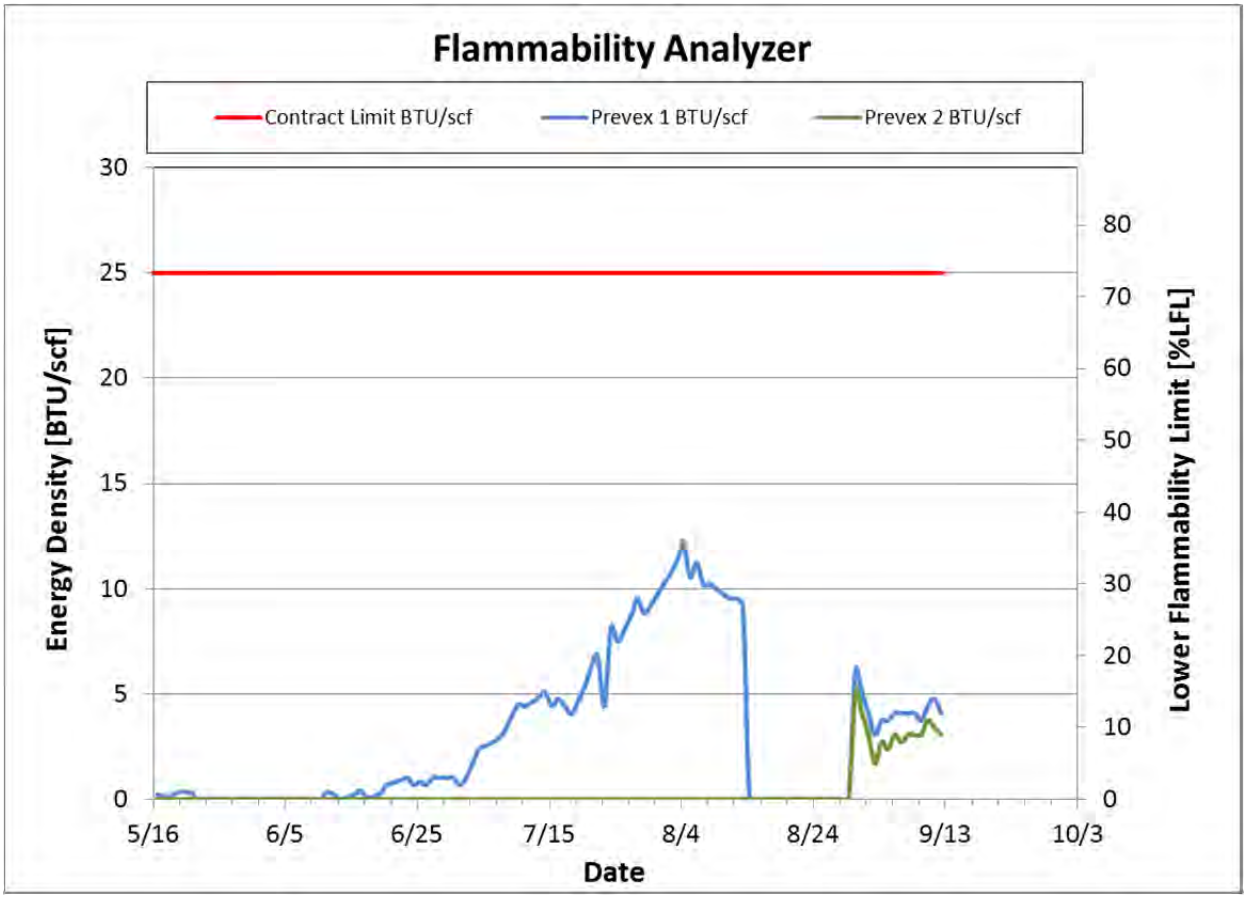


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed to date is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The decrease in mass removed on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14 and 8/26/14.

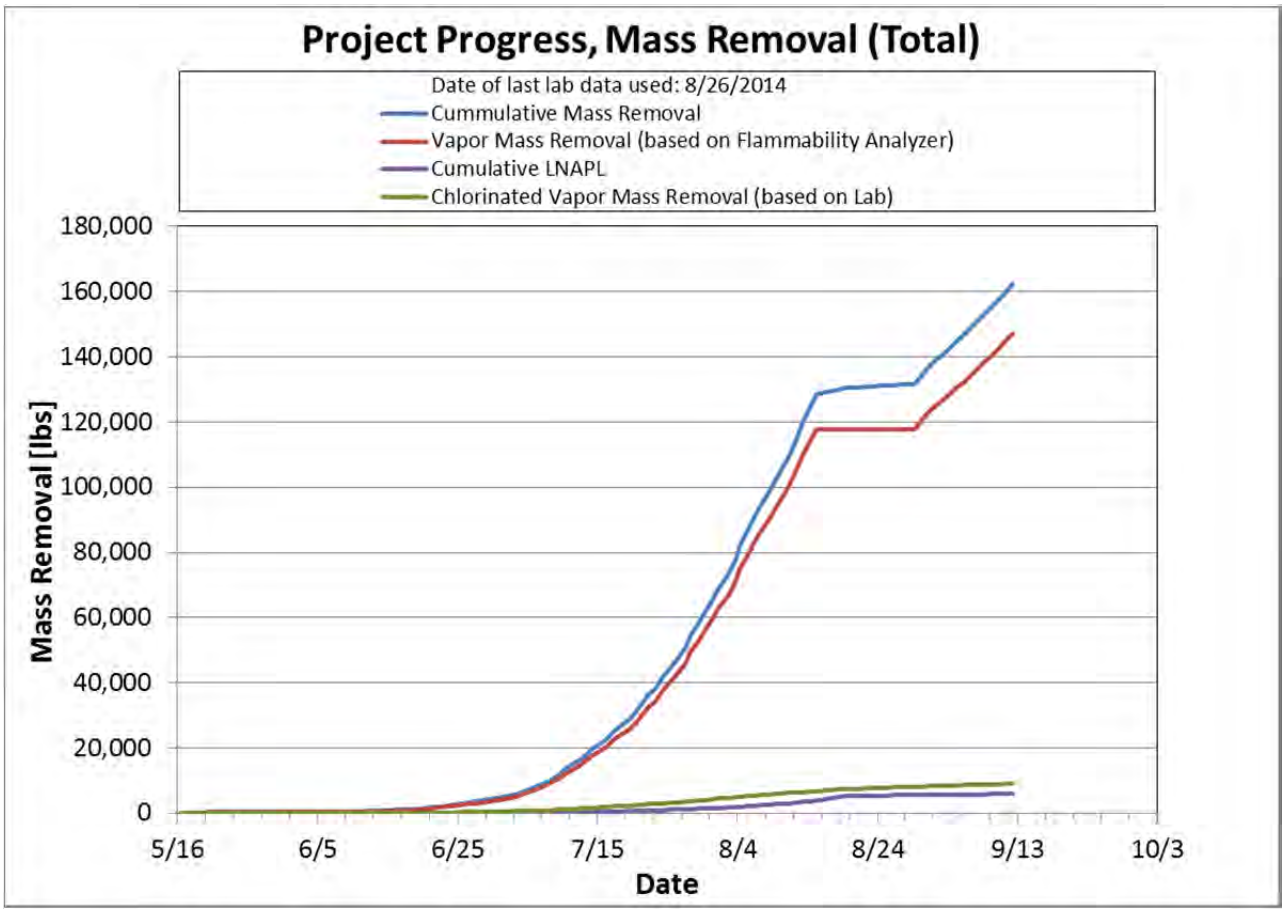


Figure 4a. Project Progress, Mass Removal (Total)

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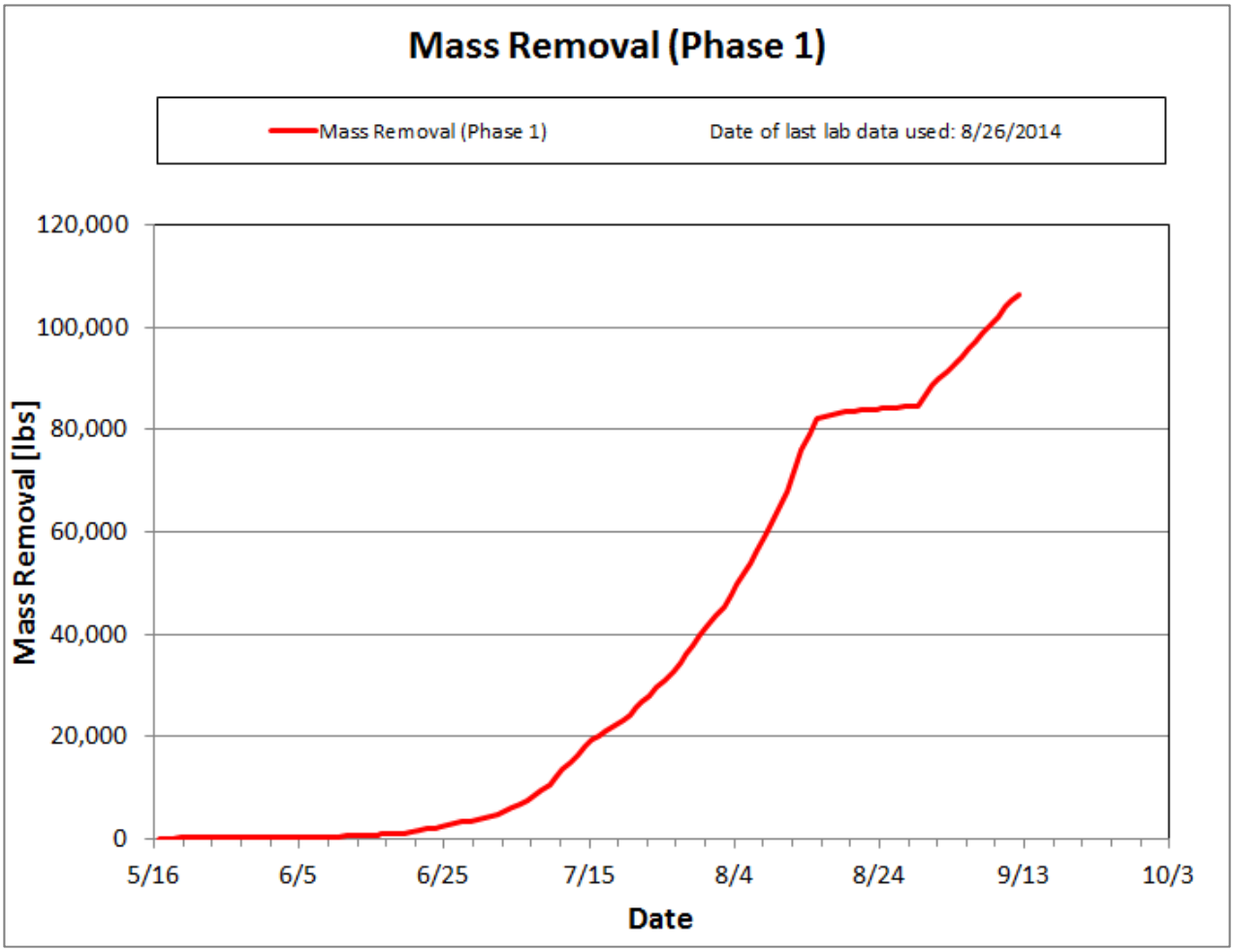


Figure 4b. Project Progress, Mass Removal (Phase 1)

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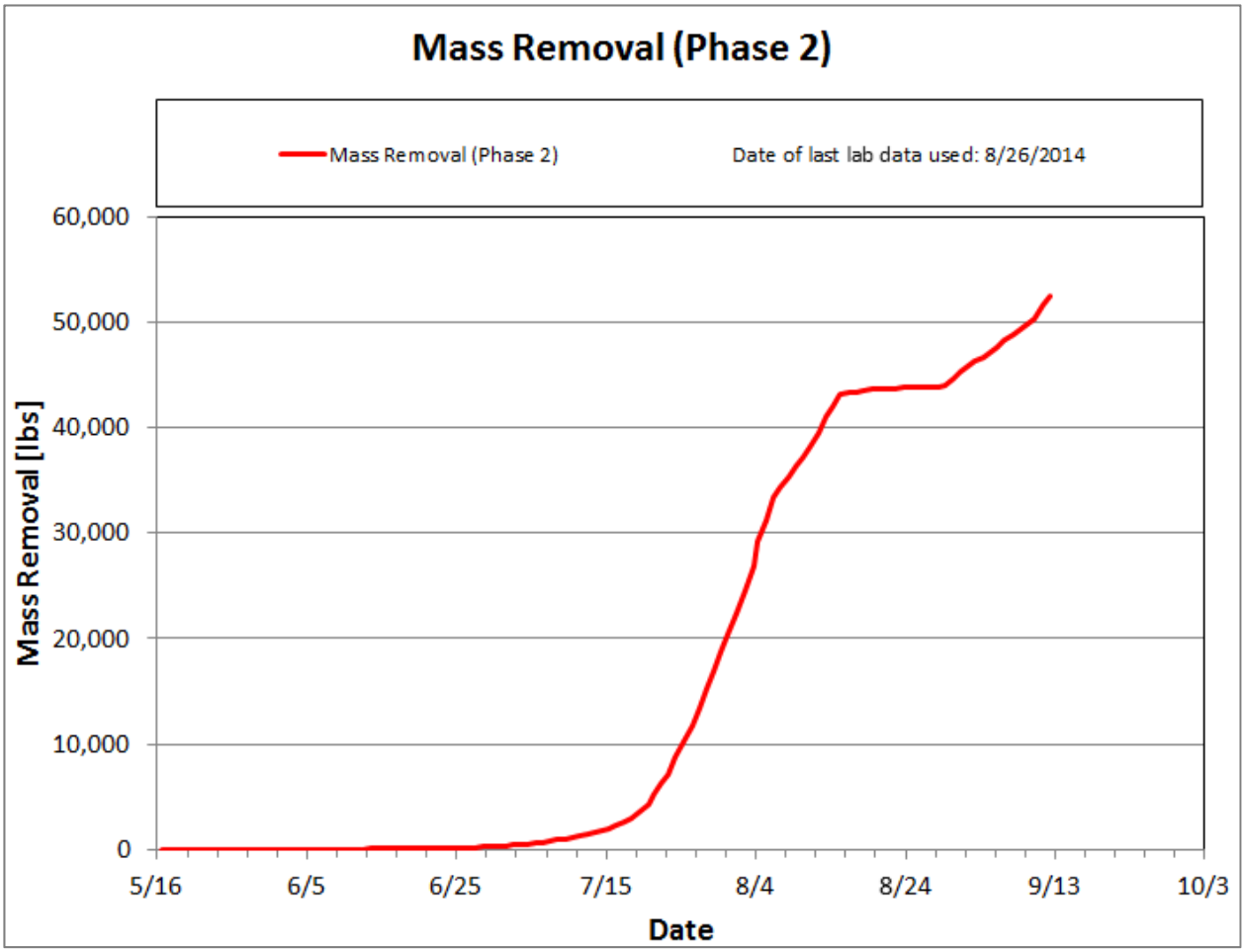


Figure 4c. Project Progress, Mass Removal (Phase 2)

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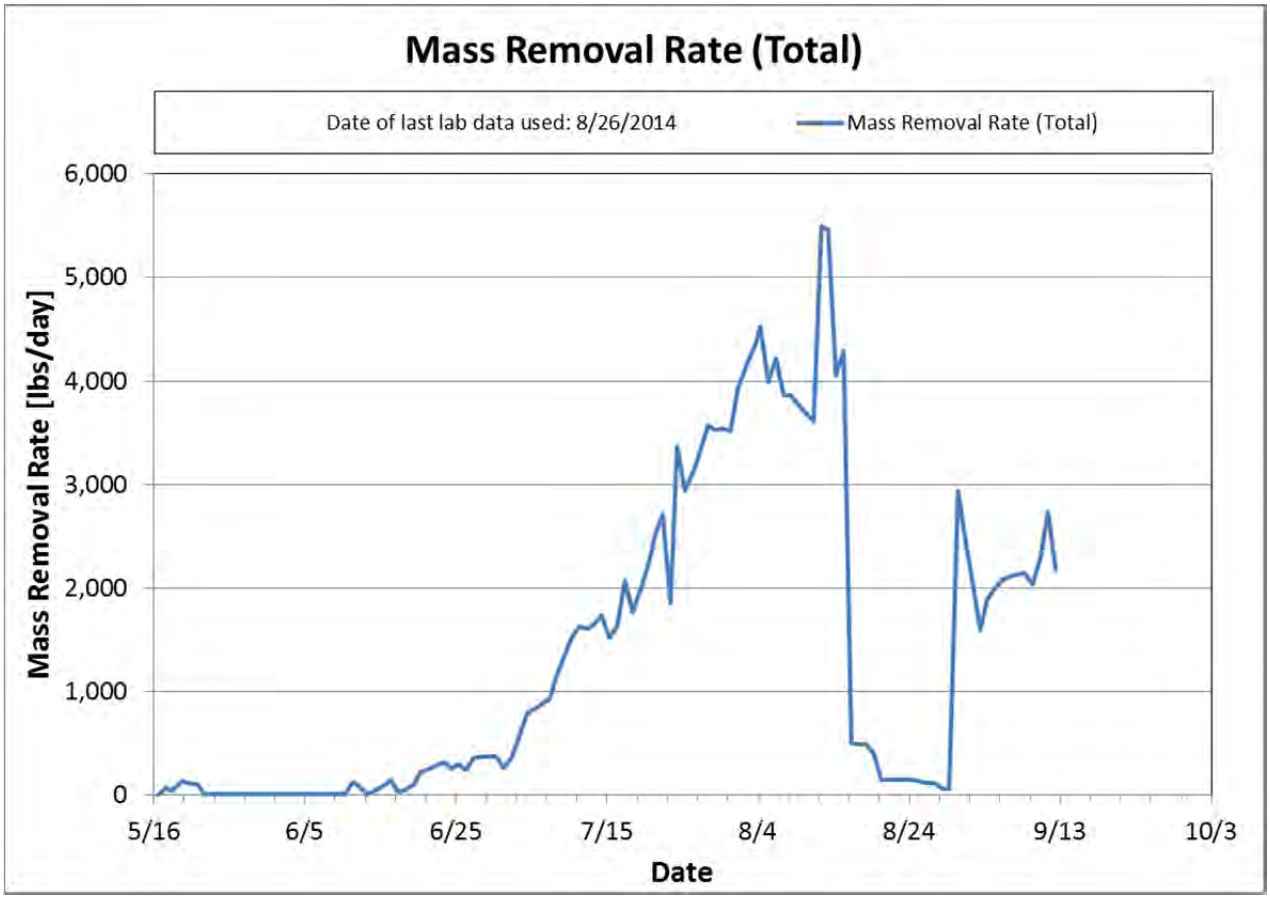


Figure 4d. Mass Removal Rate (Total for Site)

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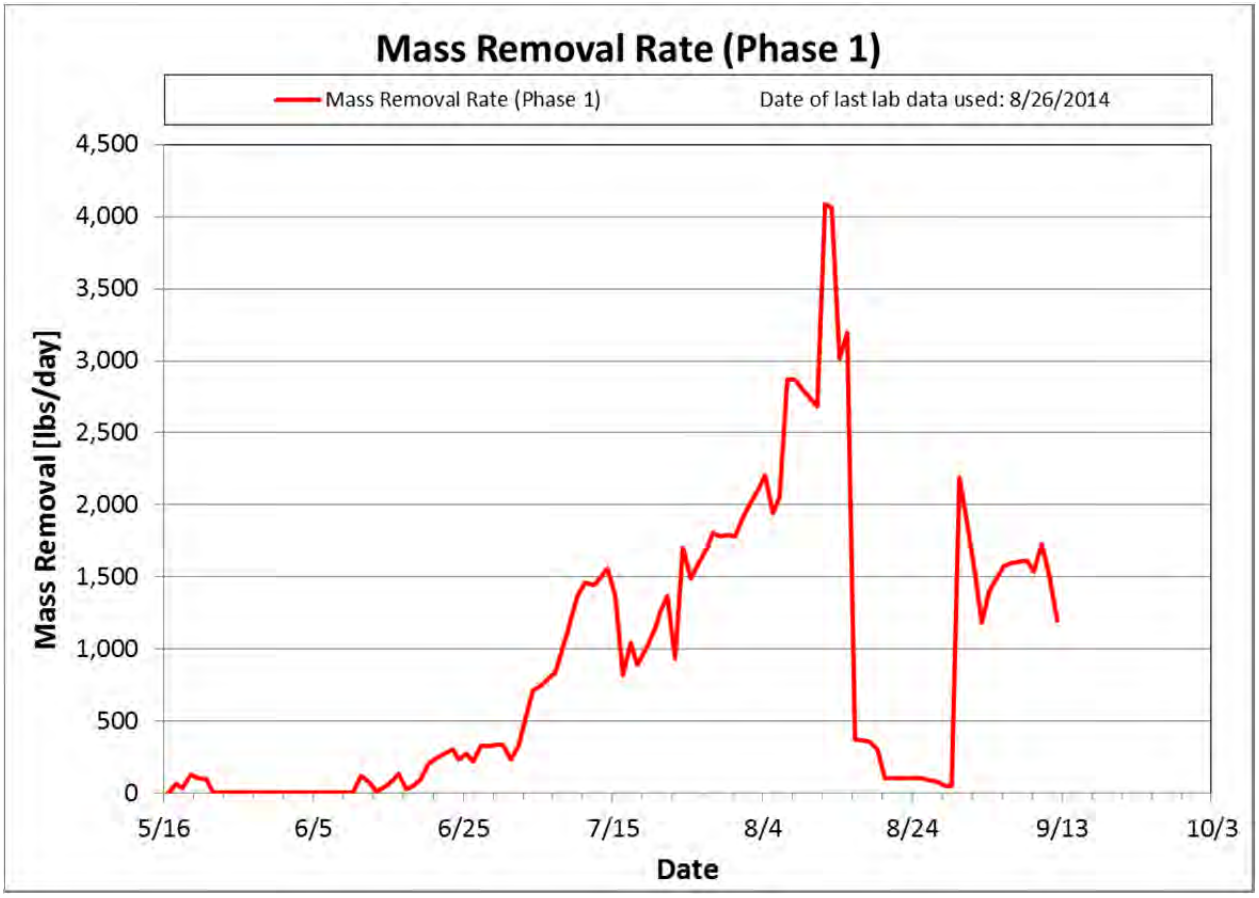


Figure 4e. Mass Removal Rate (Phase 1)

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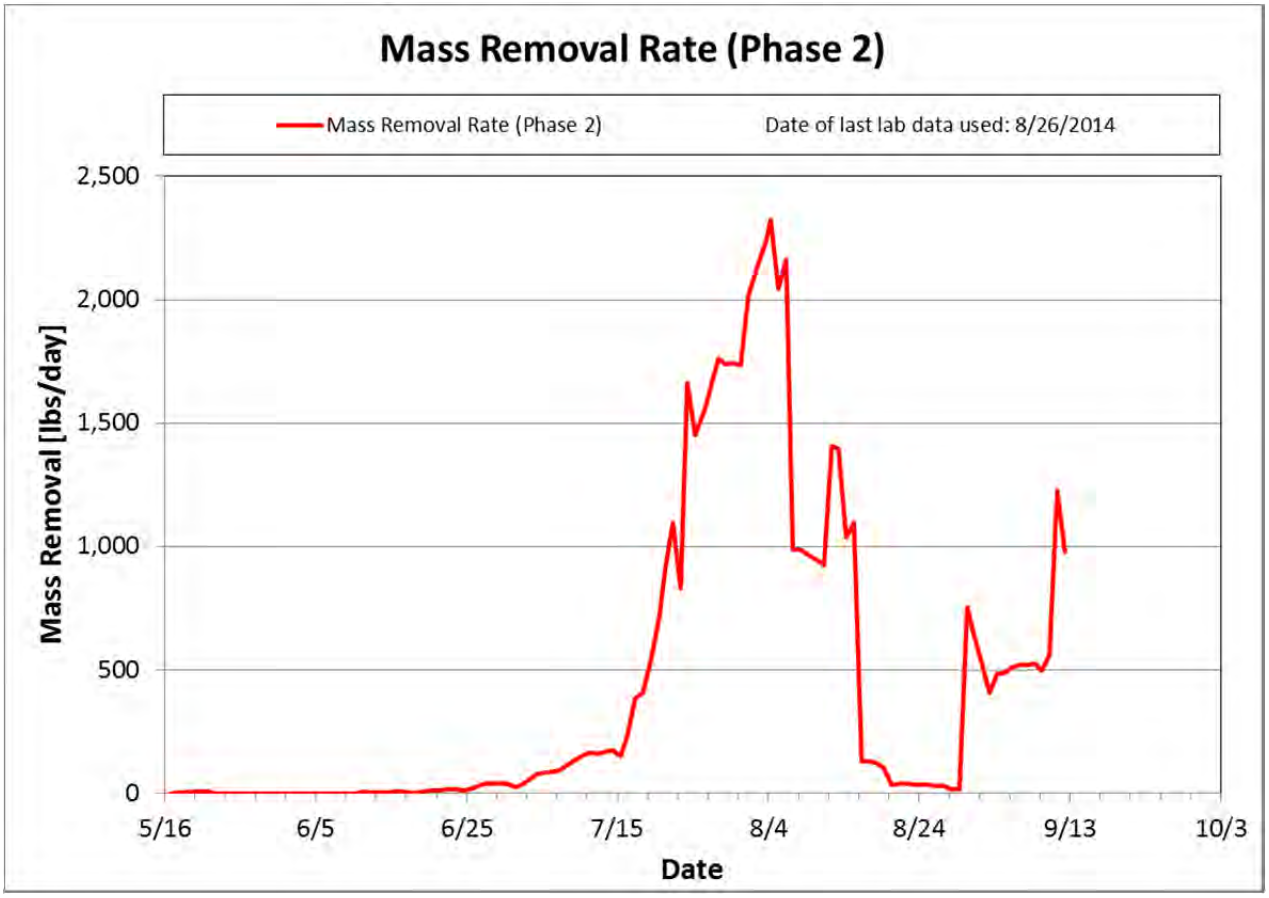


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID readings collected at the oxidizer influent over time. It should be noted that the PID reading from 7/16/14 was obtained with a PID with a 10.6 eV lamp, instead of the 11.7 eV lamp which had reached the upper concentration limit of 2,000 ppmV. Similarly, data collected on 07/25-28 were first collected with an 11.7 eV lamp with values exceeding the upper limit. The influent concentrations were then collected with the 10.6 eV lamp with values lower than the 11.7 eV upper limit (2,000 ppm). Therefore, the maximum 11.7 eV lamp is reported.

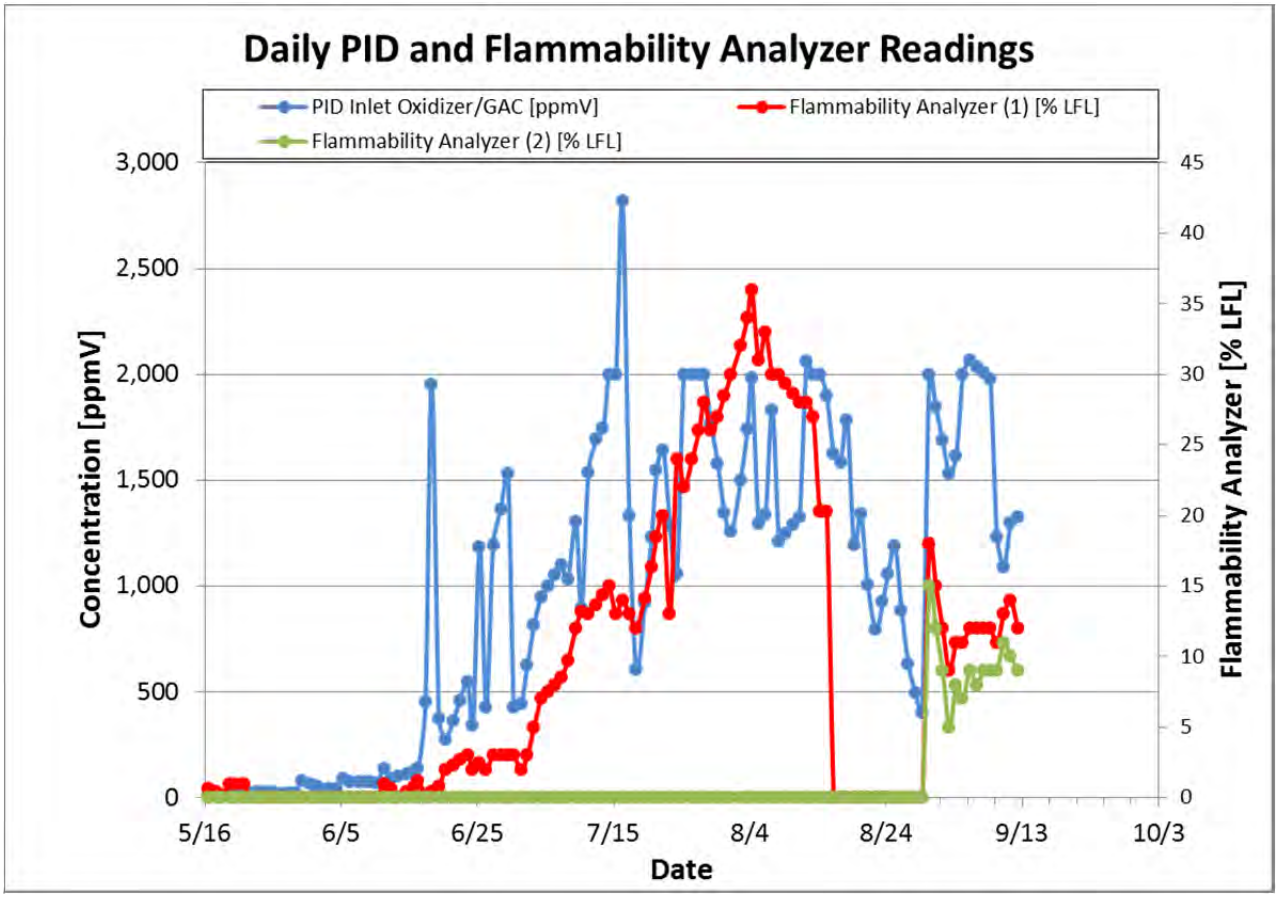


Figure 5. Daily PID Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13. Dips in the DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-out periods.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

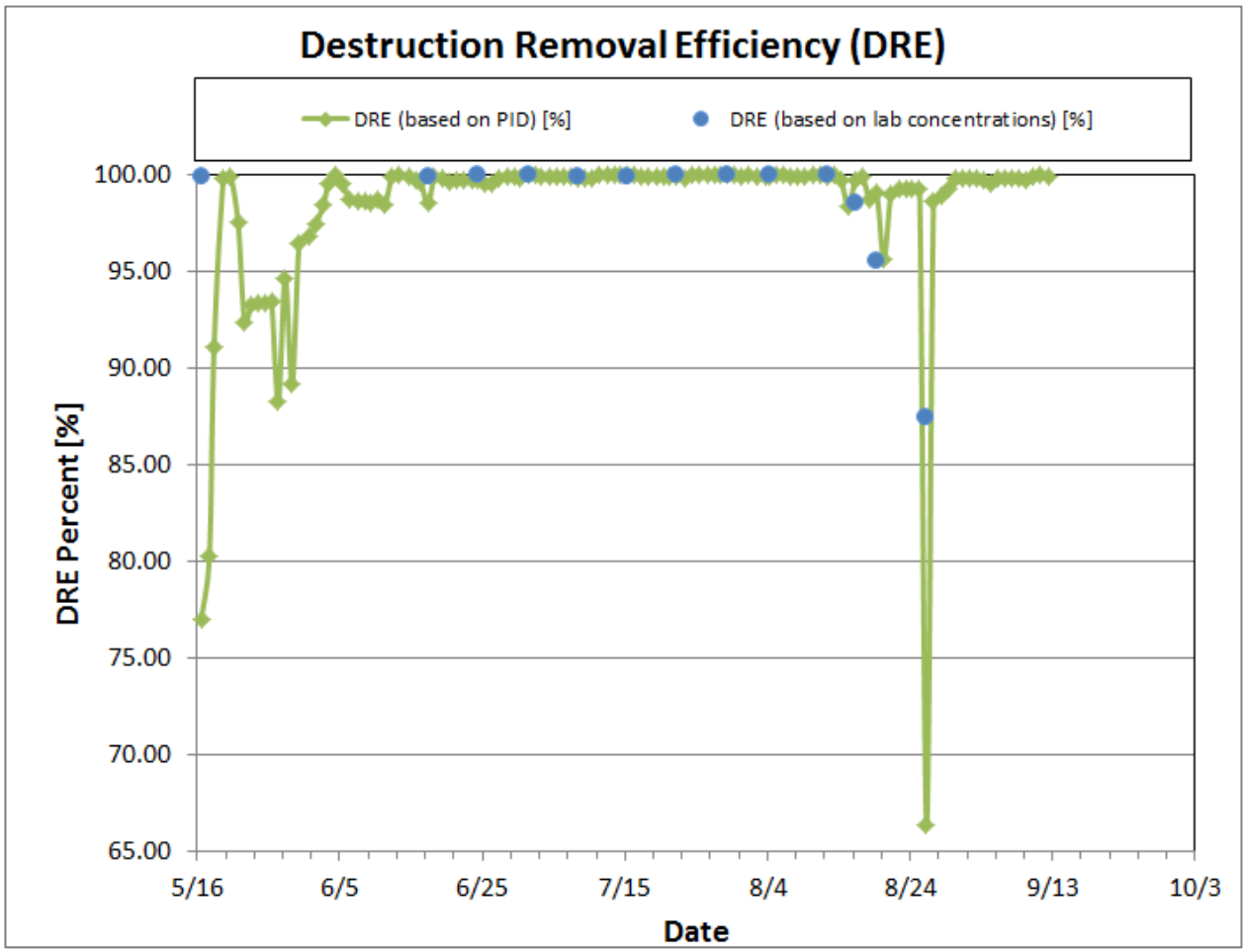


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7.

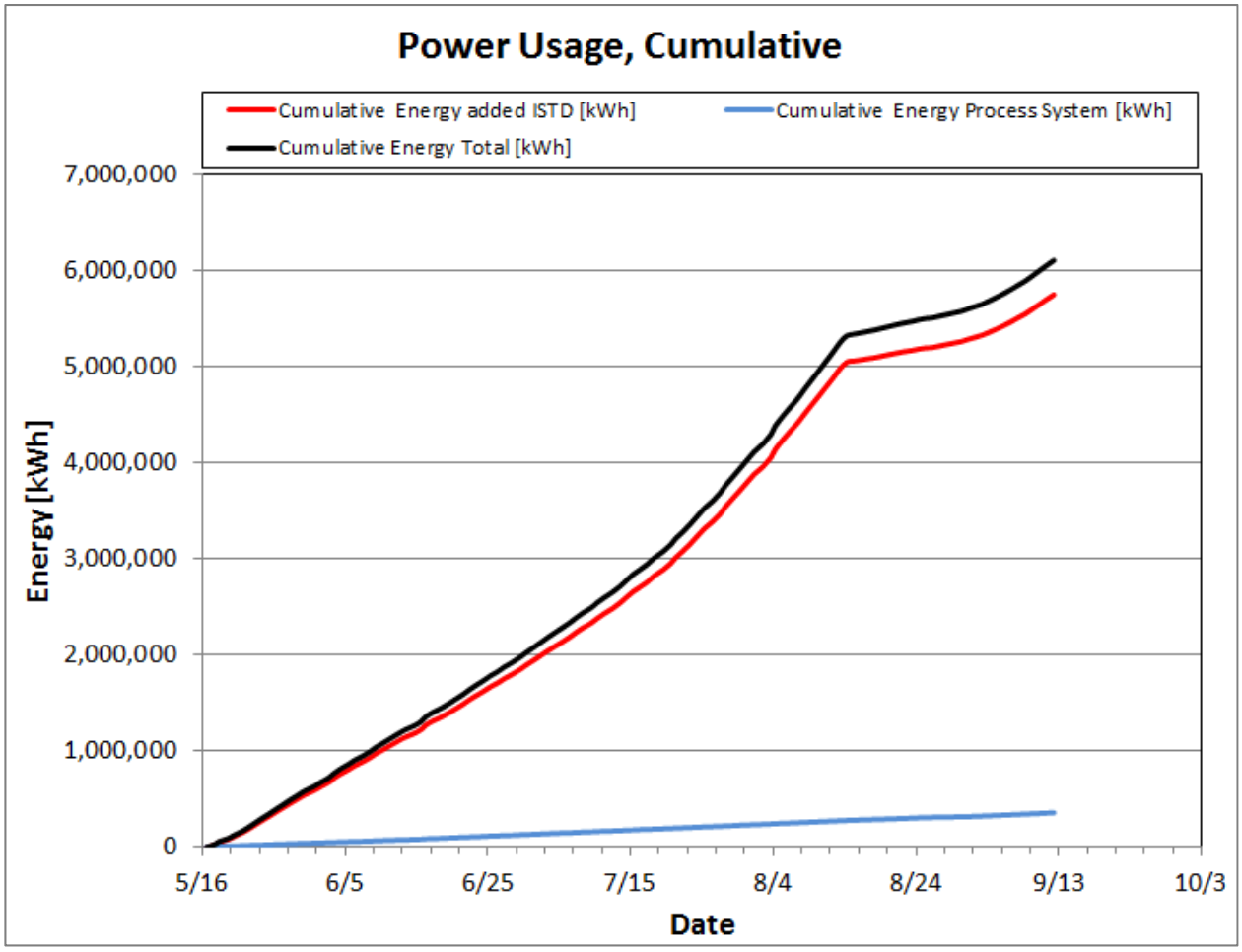


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30 and the following days corresponds with ramping of the heaters after placing the oxidizer back online.

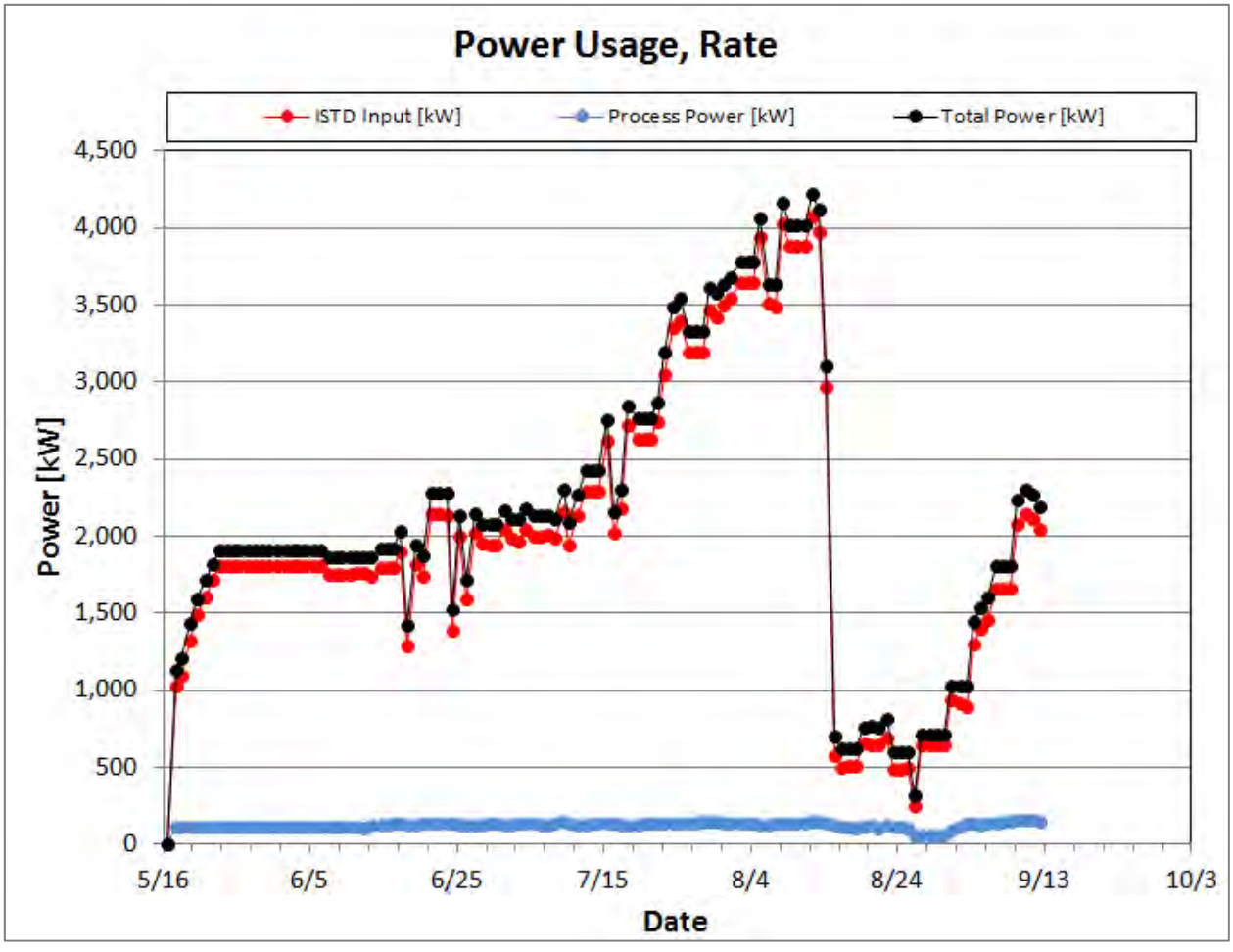


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

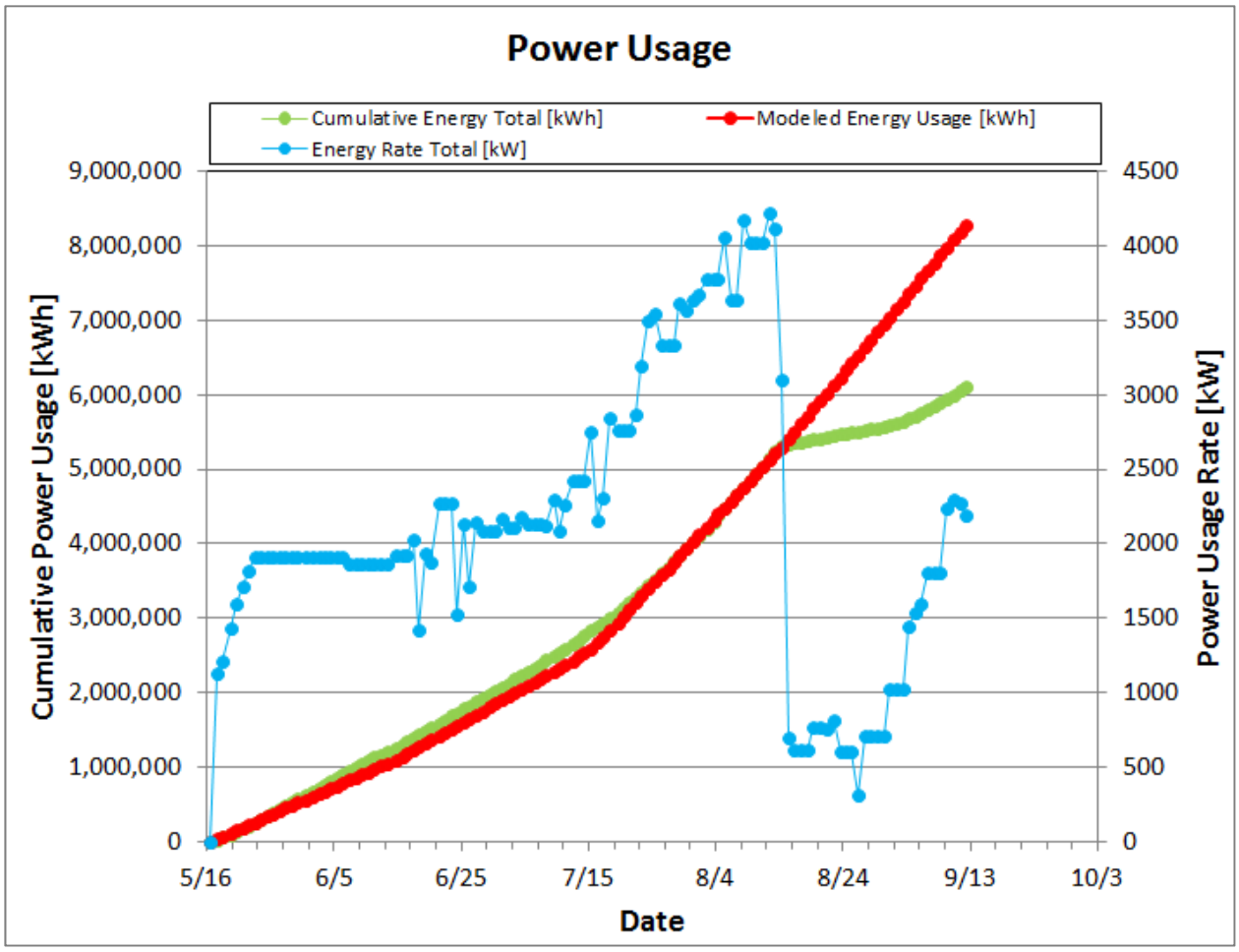


Figure 9. Power Usage

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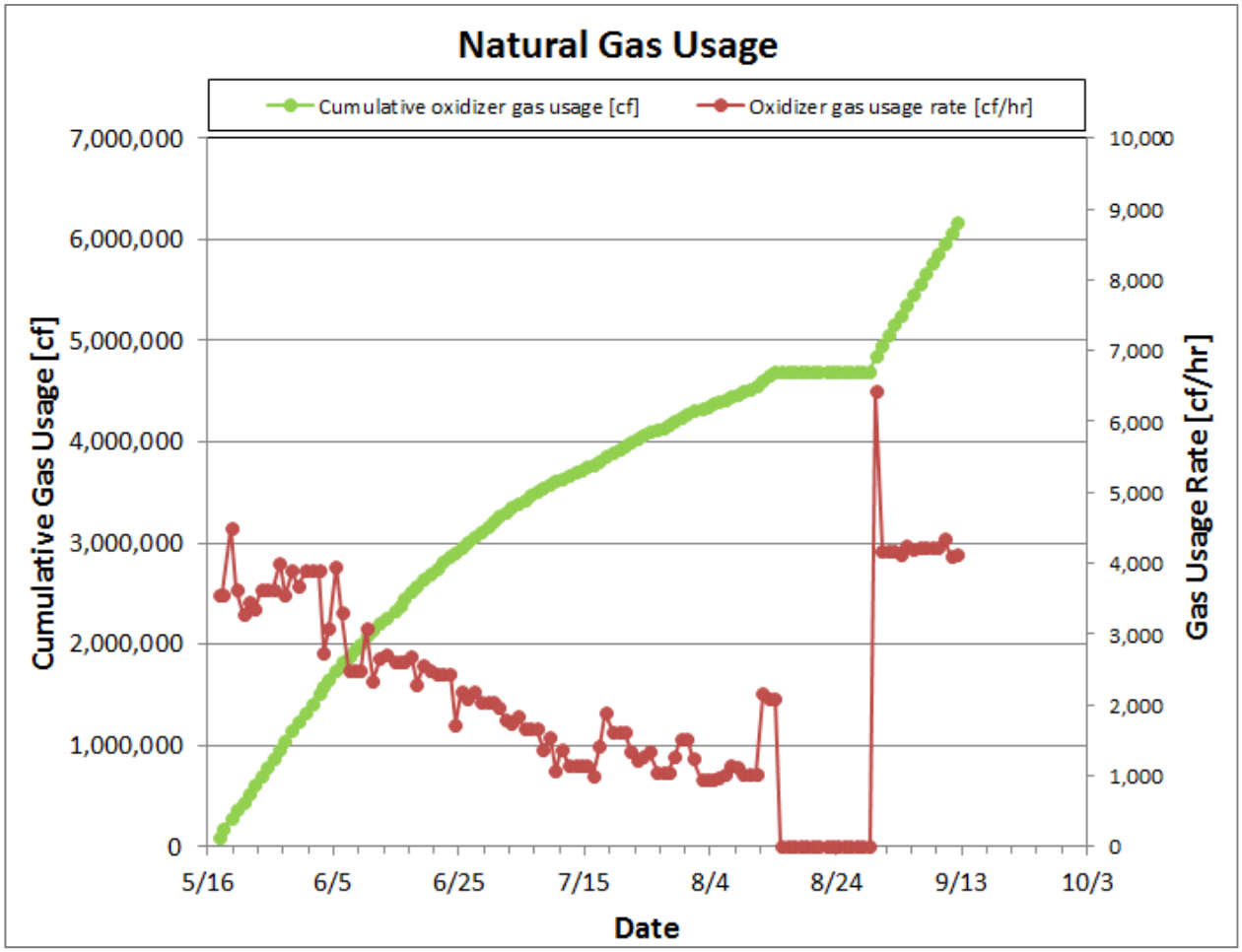


Figure 10. Natural Gas Usage

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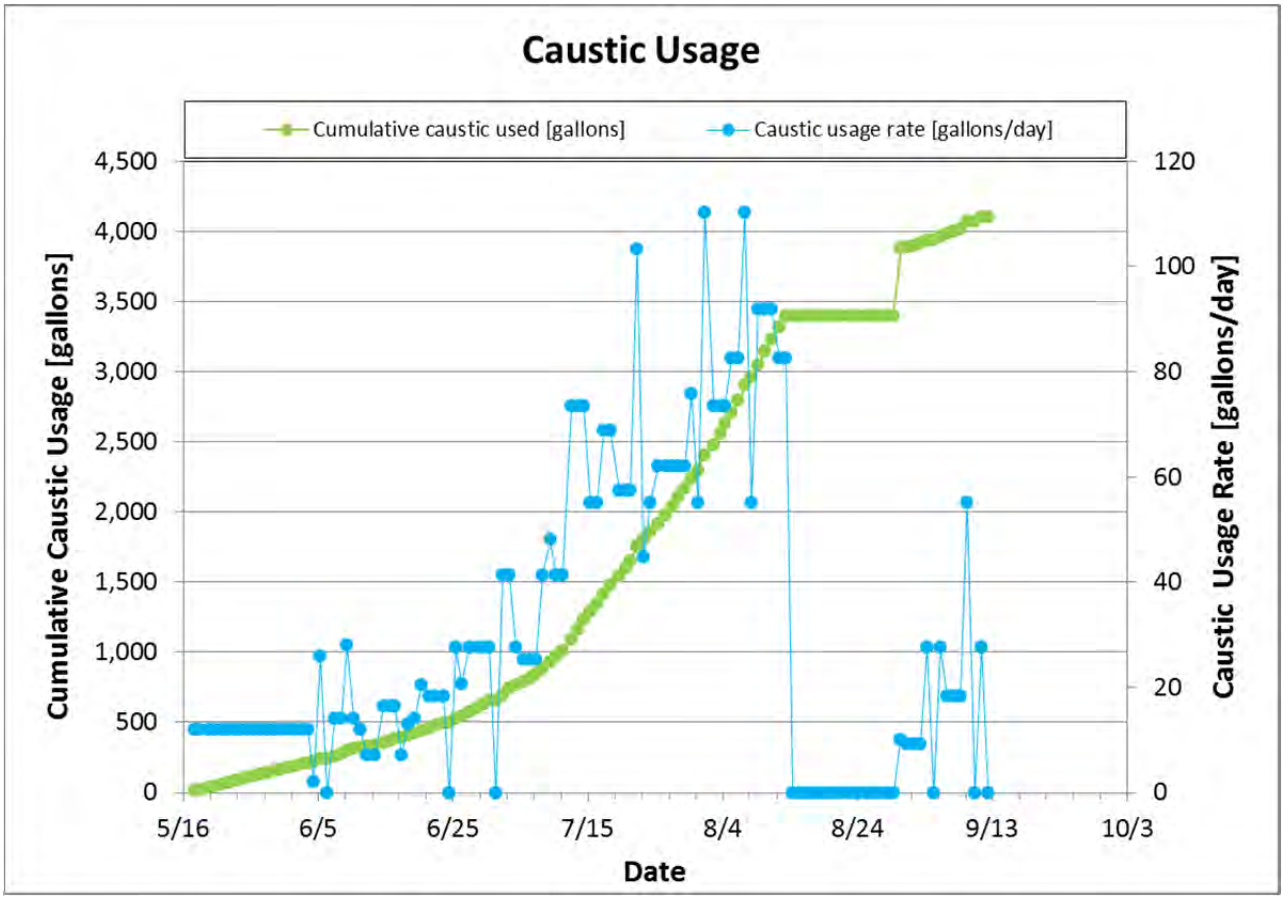


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12a. As of 7/25/14, we have reached the first payment milestone for Phase 1. Phase 2 centroids are shown in Figure 12b. The scatterplots have been updated to show the centroids grouped by depth, with each depth range shown as a different color.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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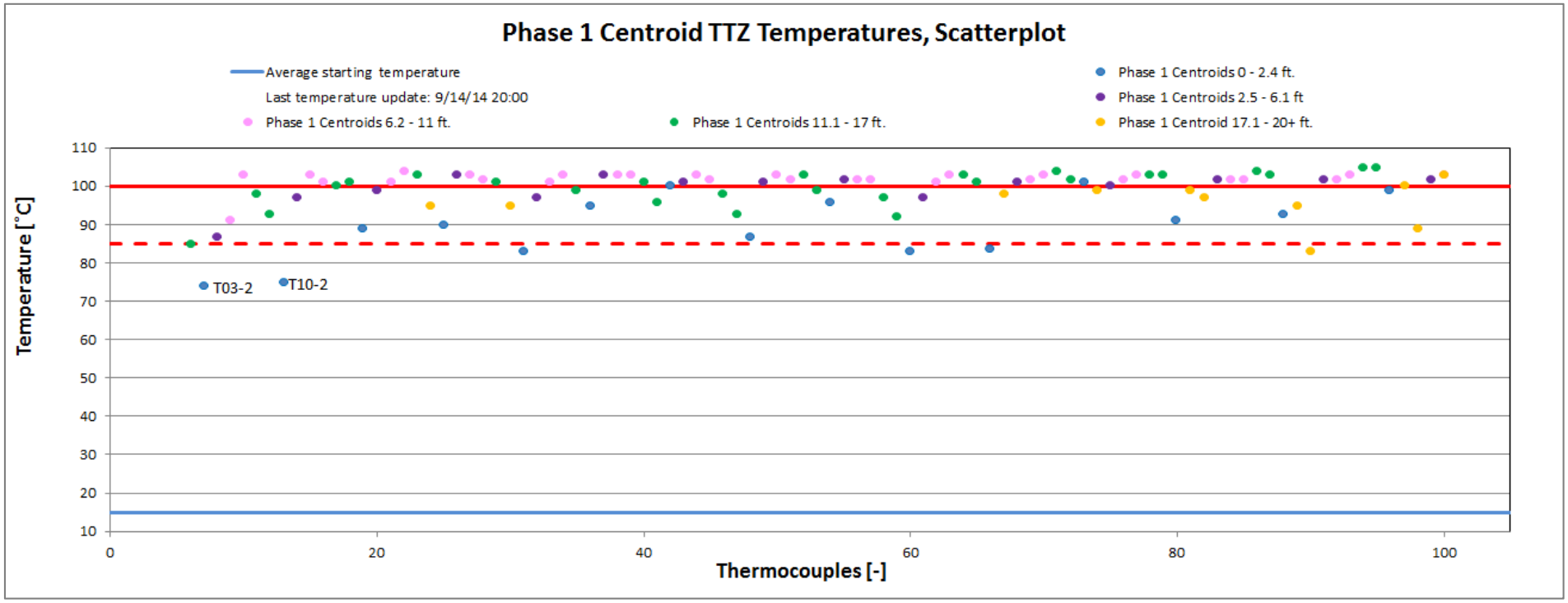


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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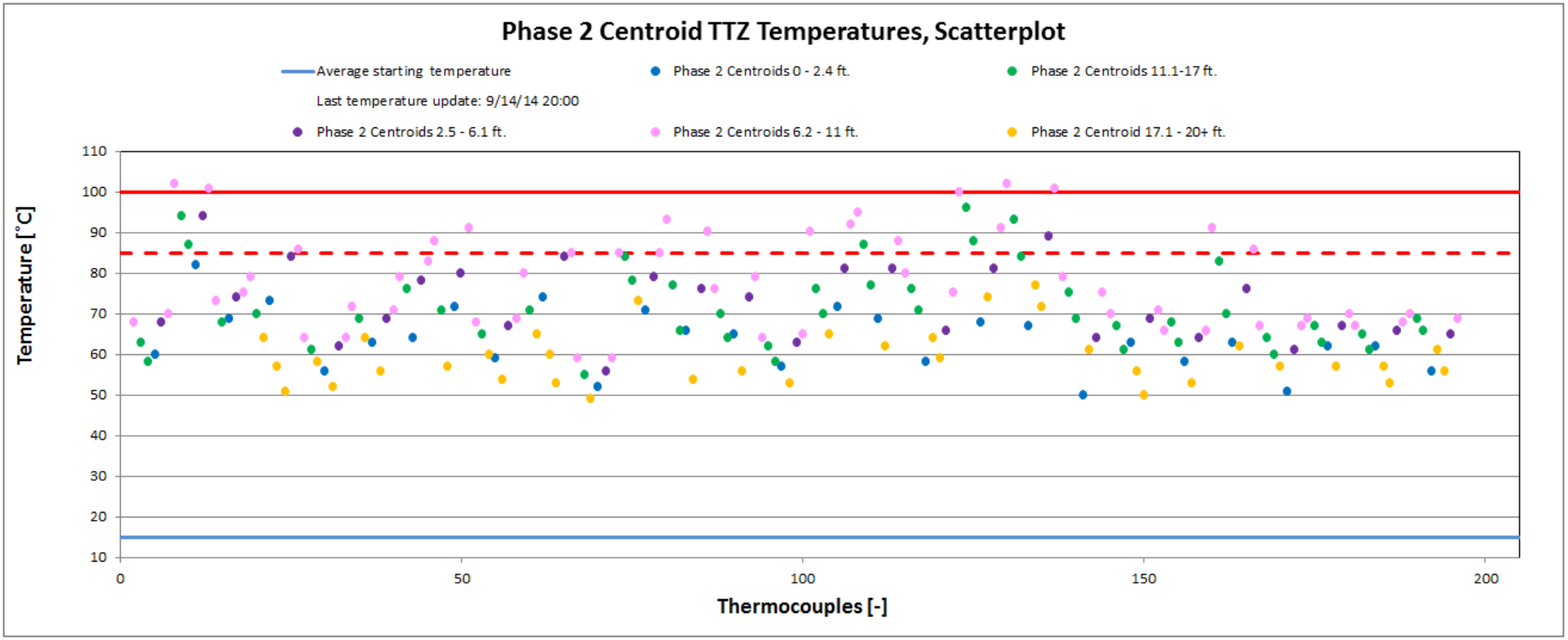


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots		
	Value	**Unit**
Date of Last Update	9/14/14	
Phase 1 Centroid Thermocouples ≥85 °C	99	%
Phase 1 Centroid Thermocouples ≥100 °C	78	%
Phase 2 Centroid Thermocouples ≥85 °C	19	%
Phase 2 Centroid Thermocouples ≥100 °C	4	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









Prepared by:

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1 SUMMARY

This report is intended to cover the operational time period of Friday September 12, 2014 through Friday September 19, 2014, with temperatures updated through Sunday September 21, 2014.

Table 1 provides a summary of the project operational status as of Friday, September 19, 2014.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	09/19/14	
Last Temperature Data Update	09/21/14	
Days of Operation (Total)	103	days
Days of Phase 1 Operation	103	days
Days of Phase 2 Operation	19	days
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	6,485,400	kWh
Used Electrical Energy vs. Estimate	41.1	%
Total Vapor Mass Removal	178,642	lbs
Average Power Input Last 24 Hours	2,190	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,135	scfm
Average Condensate Production Rate Last 24 Hours	3.0	gpm

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Heaters in Phase 1 have returned to energy inputs prior to the shutdown. Heaters in Phase 2 remain at 10%.

As of 9/19/14, Phase 1 has operated for 103 days and Phase 2 for 19 days. Please note that this represents days where energy input to heaters was at or above 70% (per contract definition). The current average wellfield temperature for Phase 1 is 101°C and 75°C for Phase 2.

Estimated mass removed to date is reported using the flammability analyzer data, lab data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. These results yield a total mass removal of 178,642 lbs as of 9/19/14. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were last collected in the wellfield on 9/18/14. The ratio of mass coming from Phase 1:Phase 2 on that date was 0.70:0.30. These ratios were applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling. Temperatures have returned, and are now exceeding those prior to shutdown at all treatment depths.

Phase 2 heating began on 7/16/14 but was stopped on August 14, 2014, as a result of the oxidizer shutdown. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling. Please note that heaters in Phase 2 remain at 10%.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	9/21/14	
Phase 1 Entire TTZ Average Temperature	101	°C
Phase 2 Entire TTZ Average Temperature	75	°C
Phase 1 Centroid Average Temperature	100	°C
Phase 2 Centroid Average Temperature	73	°C

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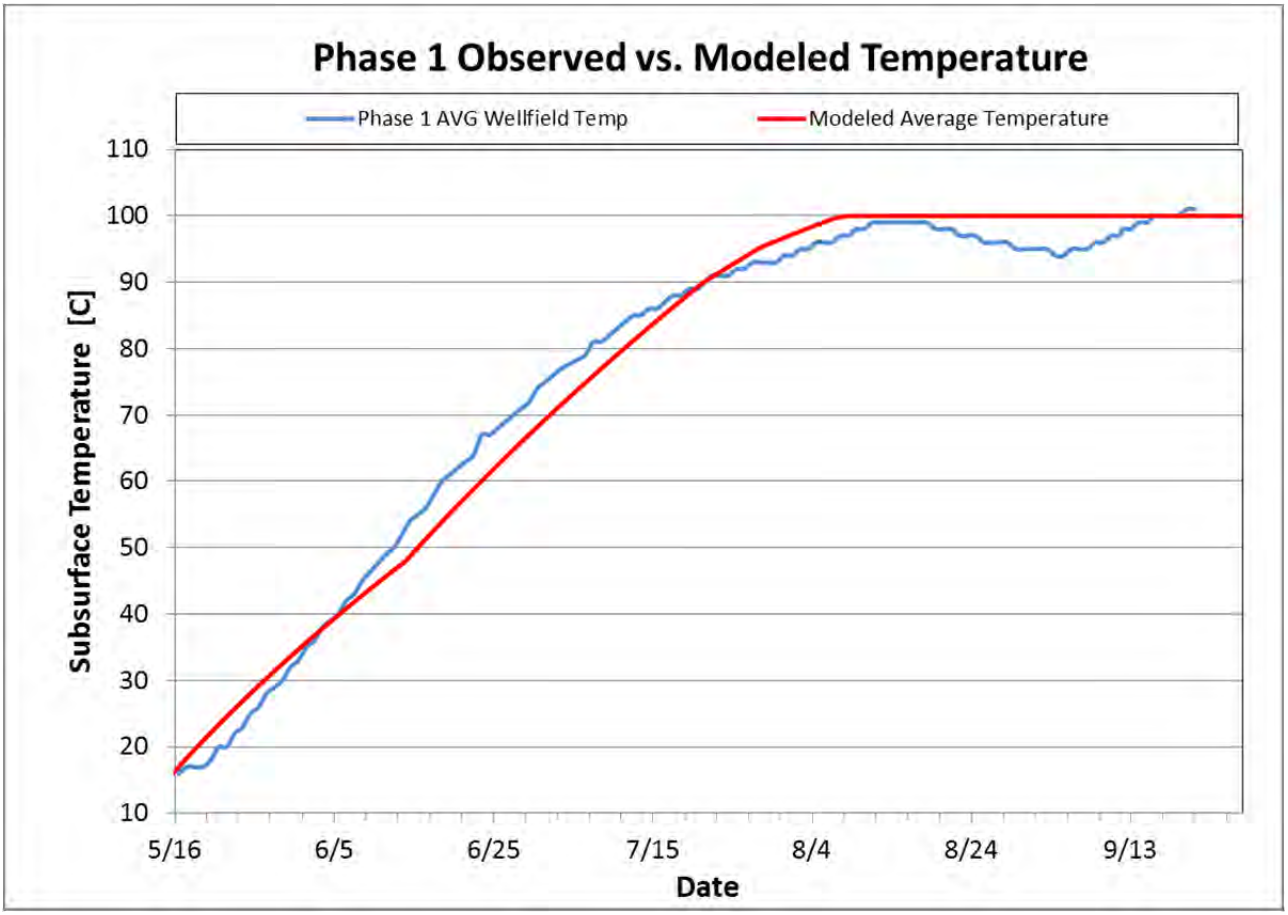


Figure 1a. Phase 1 Observed vs. Modeled Temperature

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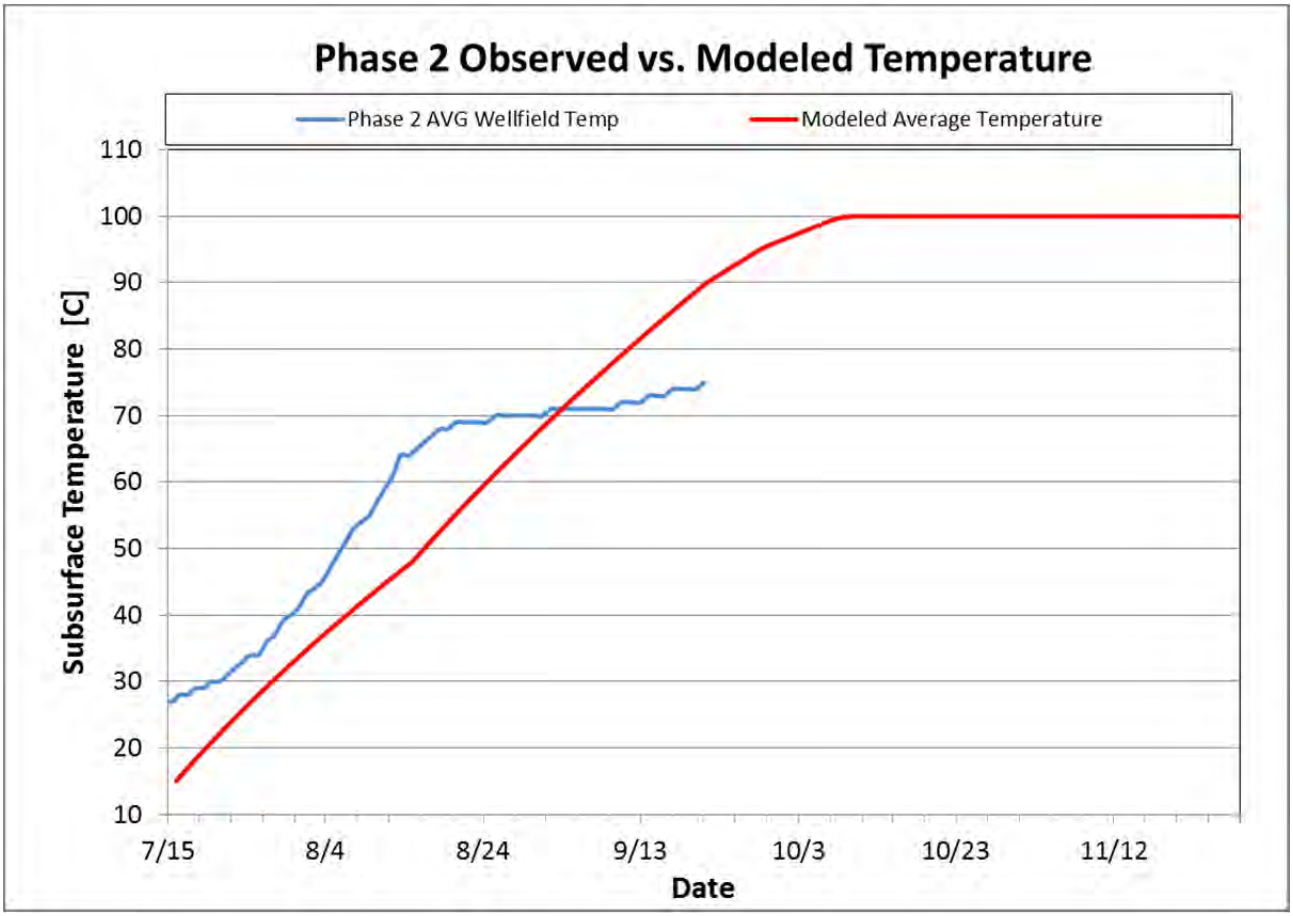


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was restarted on 8/30/14.

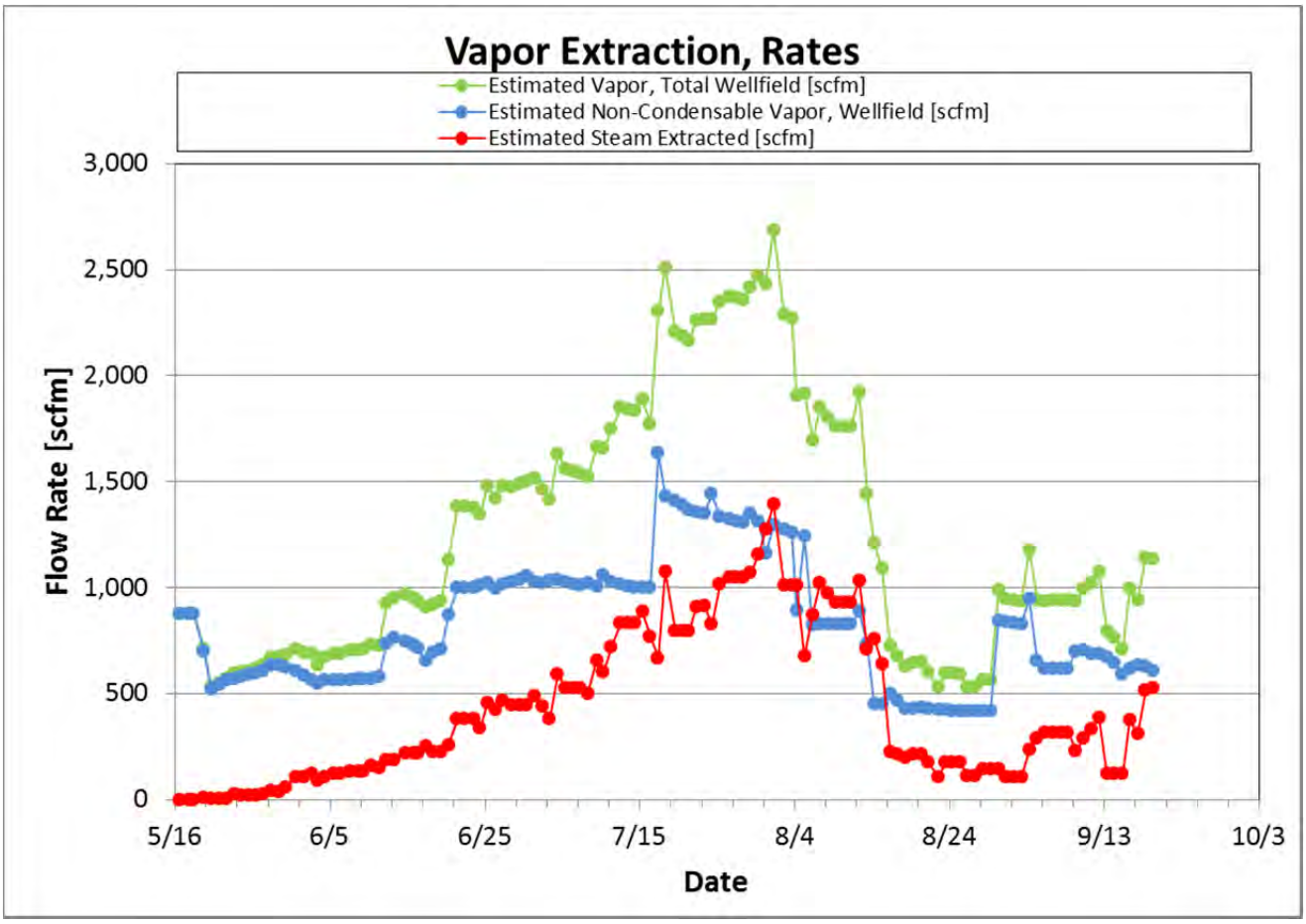


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

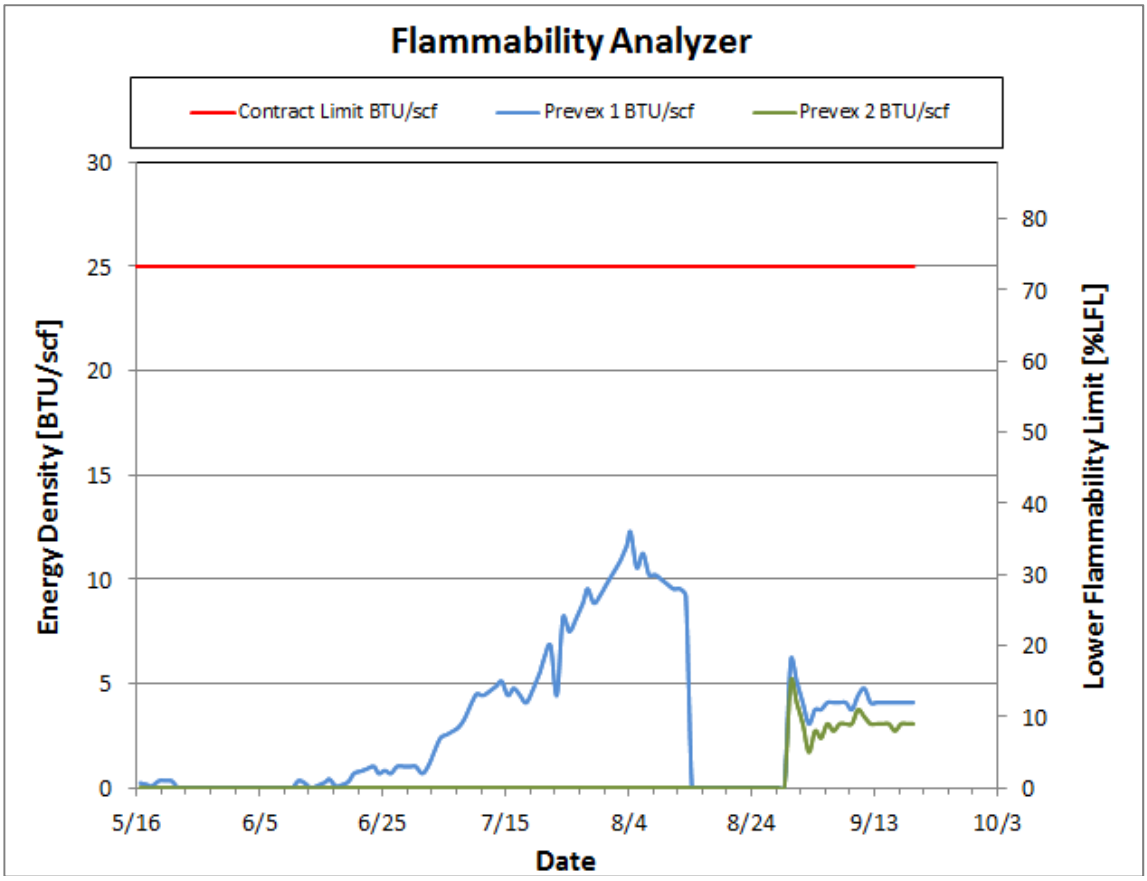


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed to date is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The decrease in mass removed starting on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14 and 9/4/14.

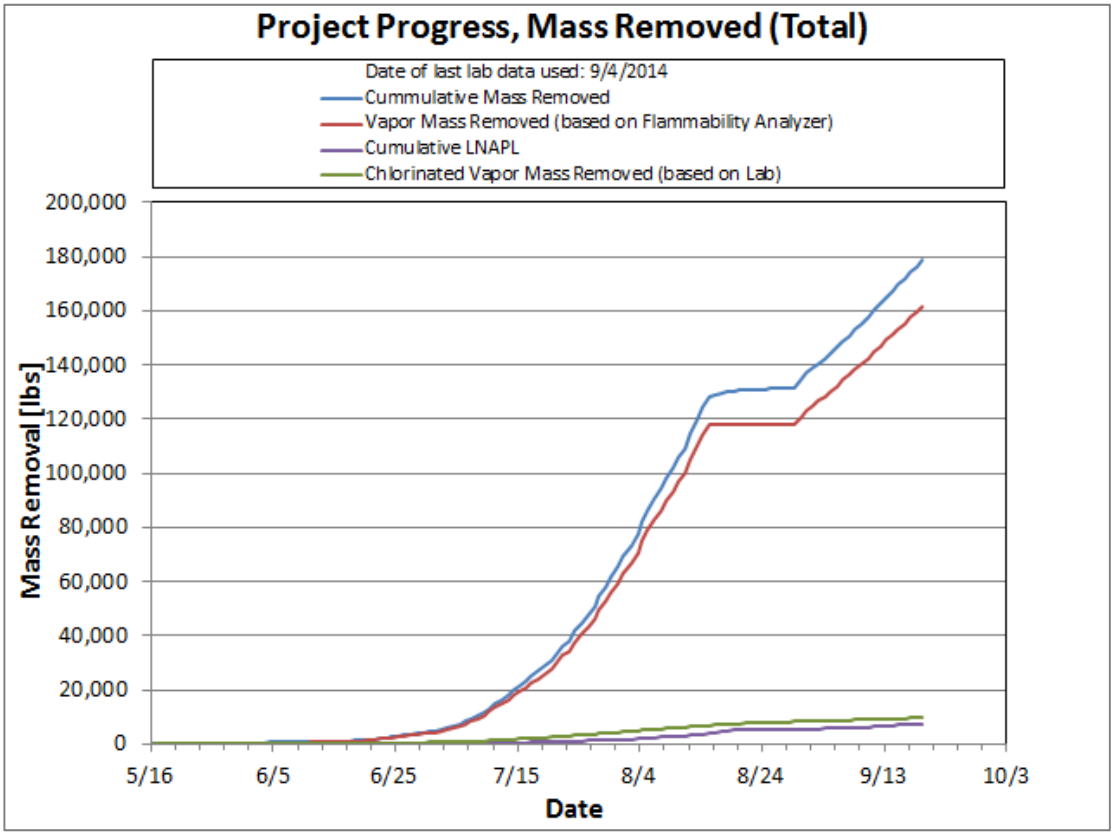


Figure 4a. Project Progress, Mass Removal (Total)

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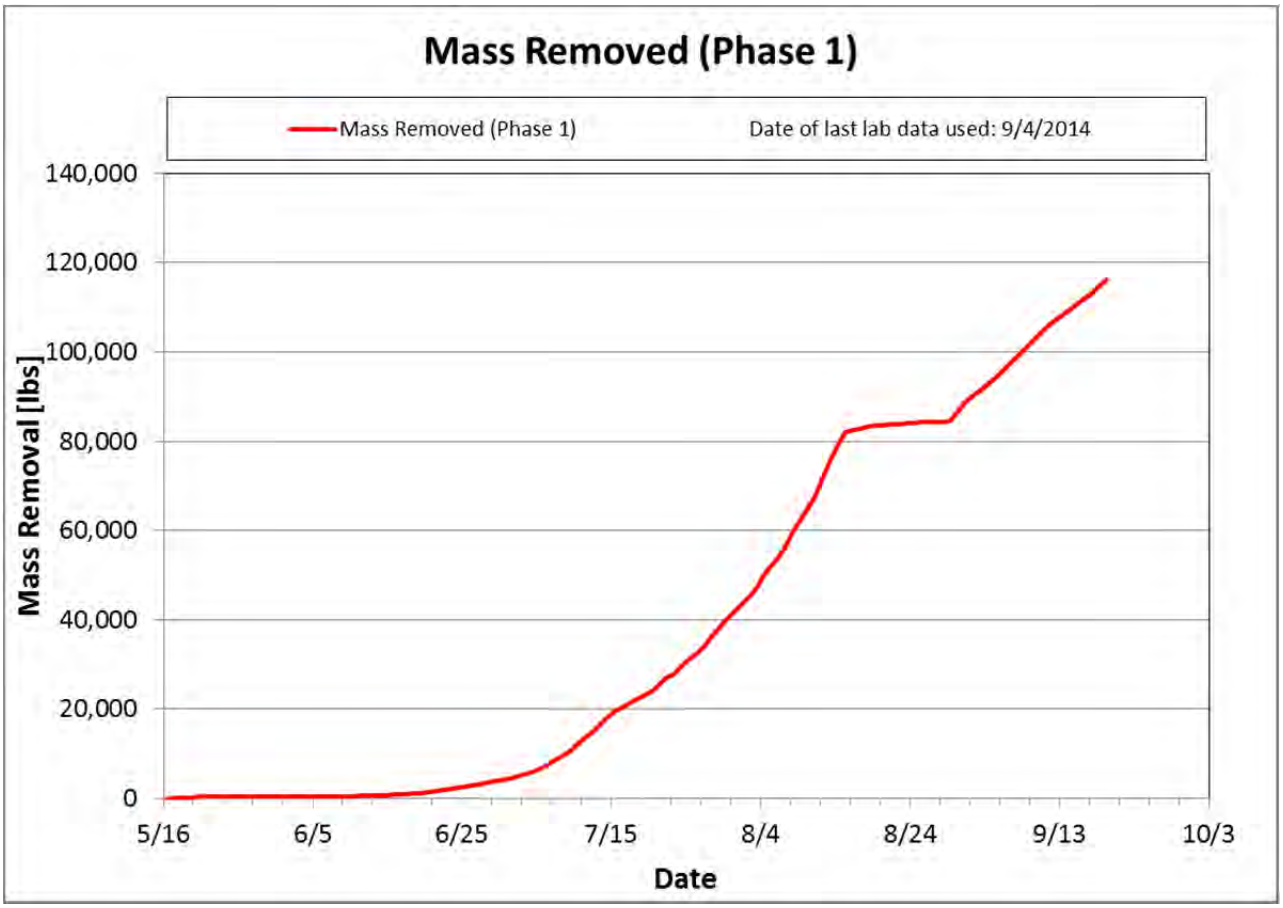


Figure 4b. Project Progress, Mass Removal (Phase 1)

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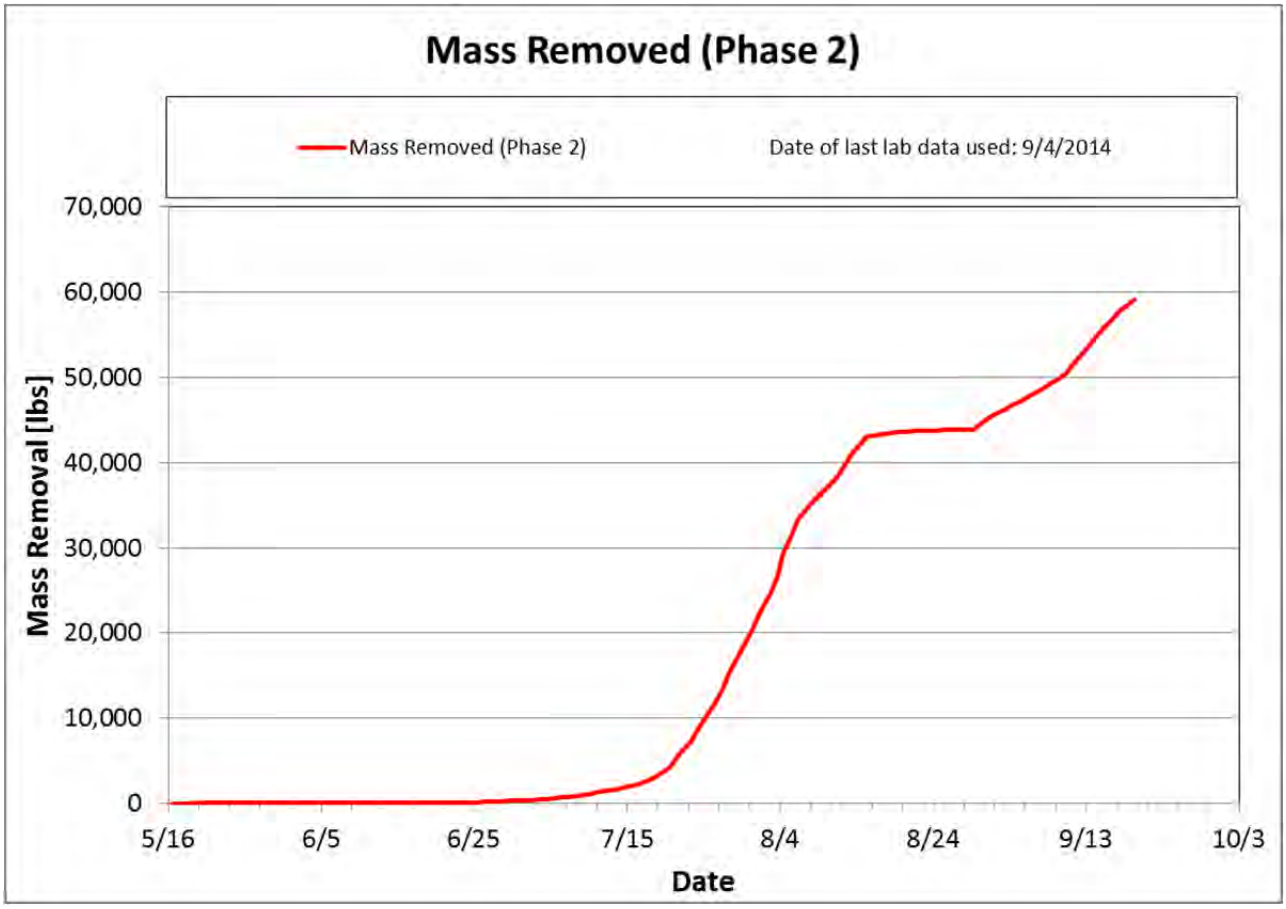


Figure 4c. Project Progress, Mass Removal (Phase 2)

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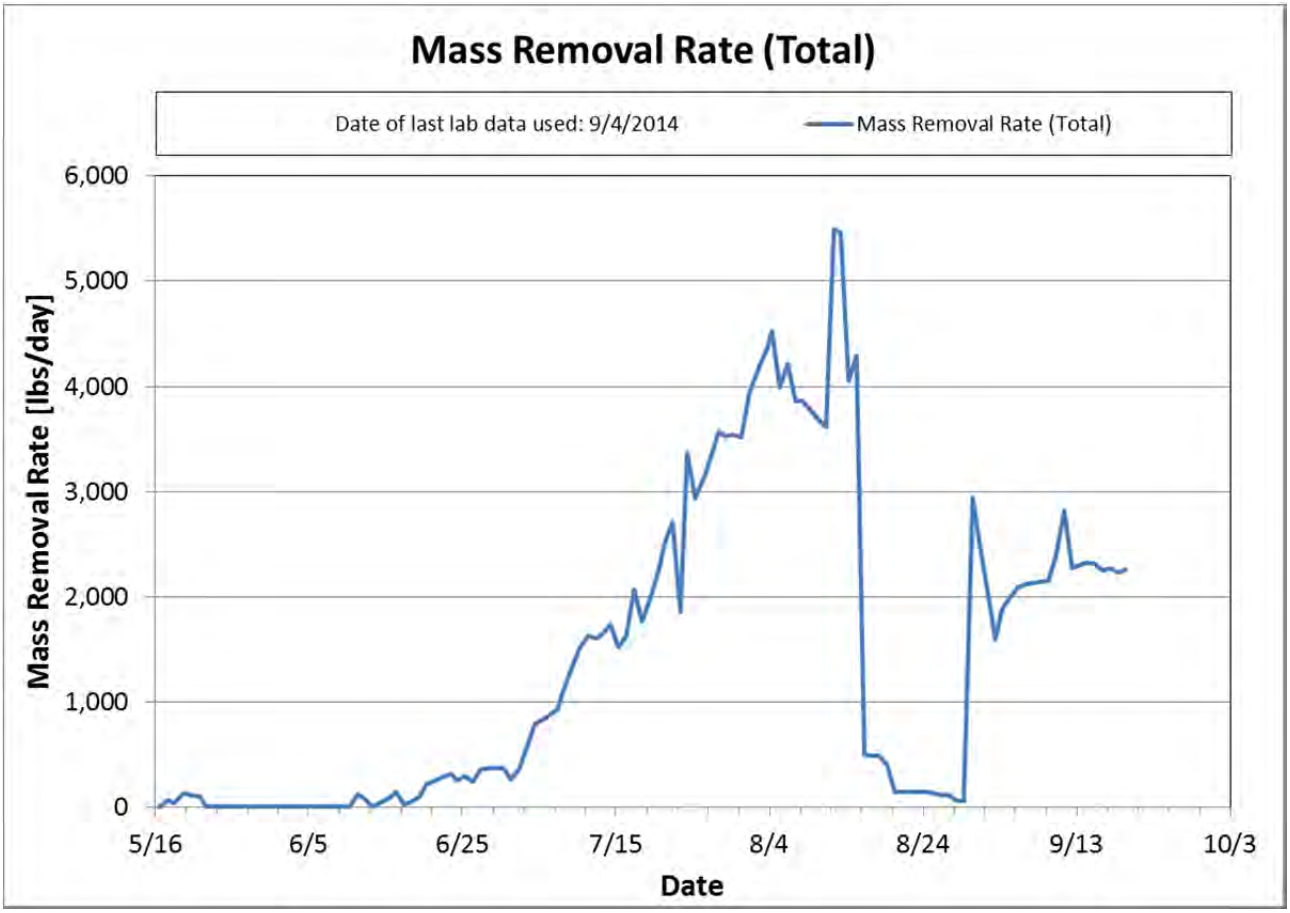


Figure 4d. Mass Removal Rate (Total for Site)

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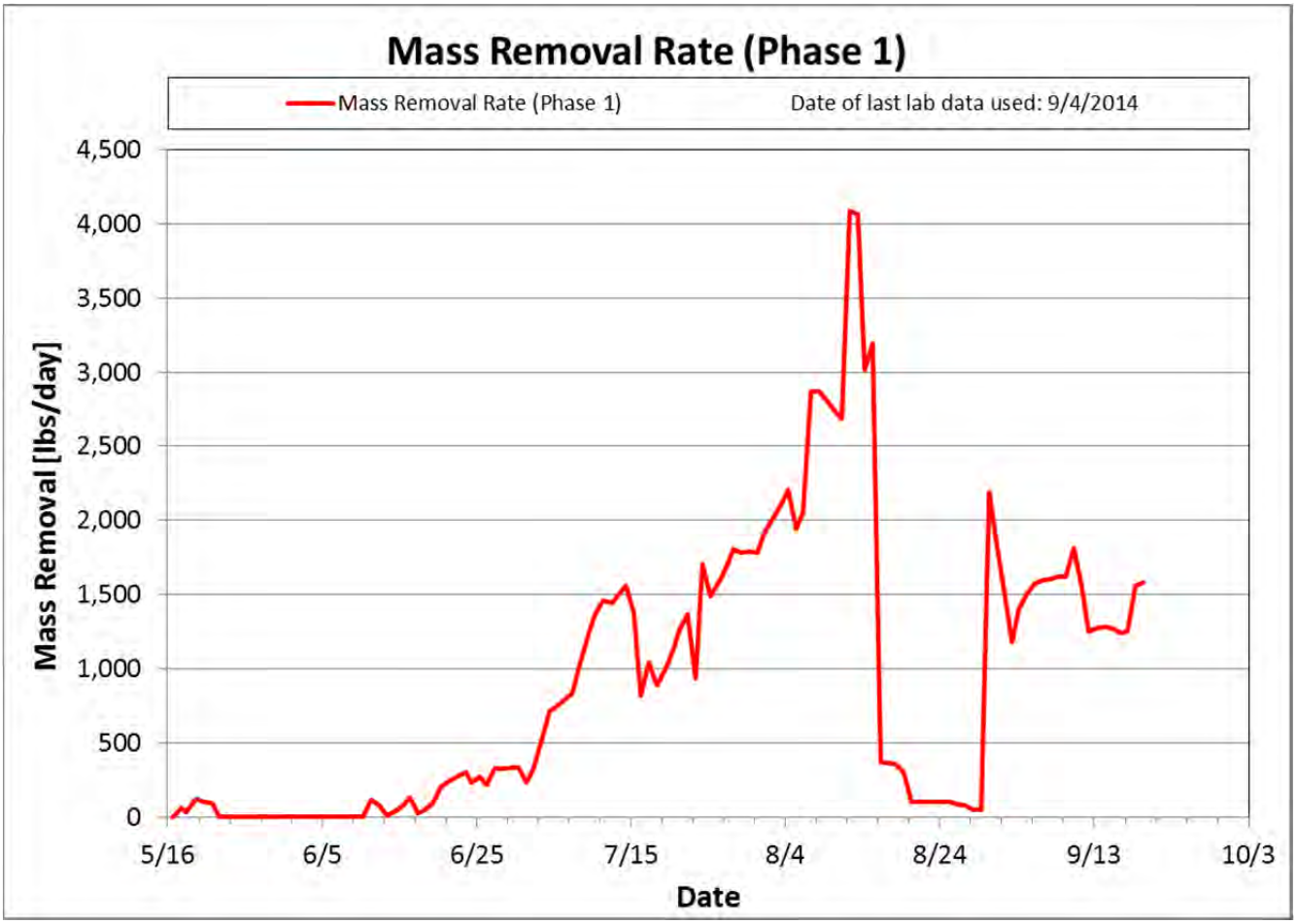


Figure 4e. Mass Removal Rate (Phase 1)

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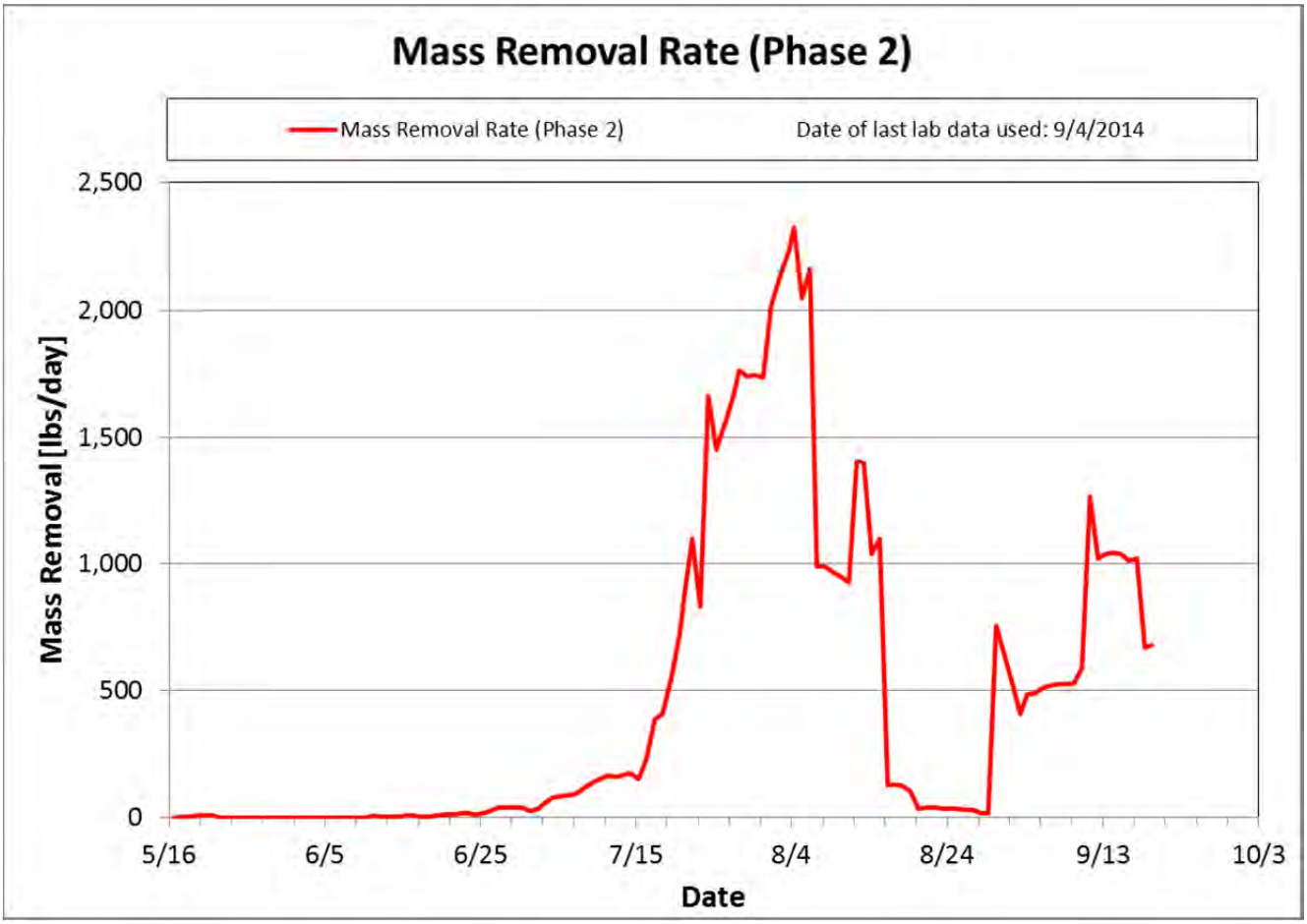


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID readings collected at the oxidizer influent over time. It should be noted that the PID reading from 7/16/14 was obtained with a PID with a 10.6 eV lamp, instead of the 11.7 eV lamp which had reached the upper concentration limit of 2,000 ppmV. Similarly, data collected on 07/25-28 were first collected with an 11.7 eV lamp with values exceeding the upper limit. The influent concentrations were then collected with the 10.6 eV lamp with values lower than the 11.7 eV upper limit (2,000 ppm). Therefore, the maximum 11.7 eV lamp is reported.

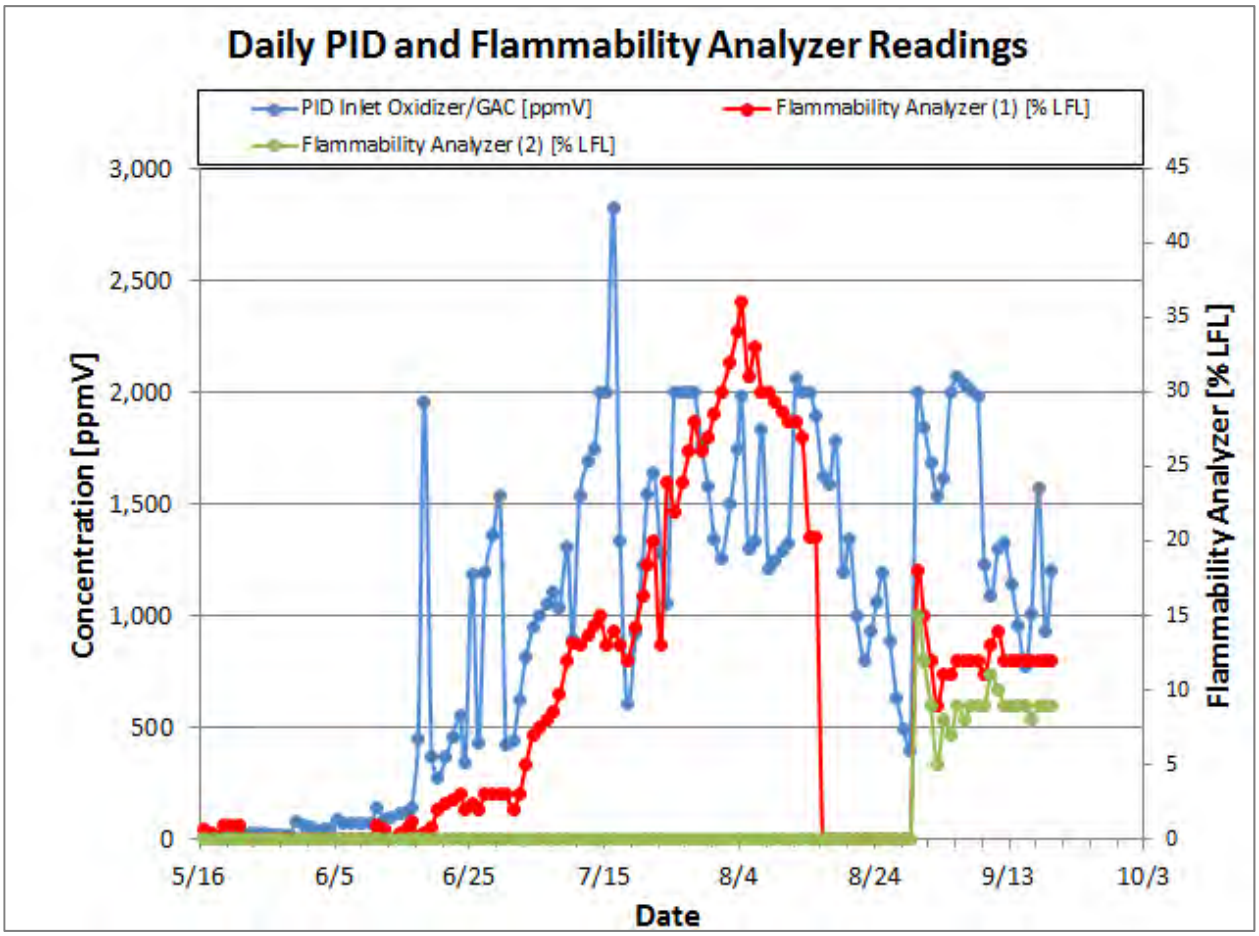


Figure 5. Daily PID Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13. Dips in the DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-out periods.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

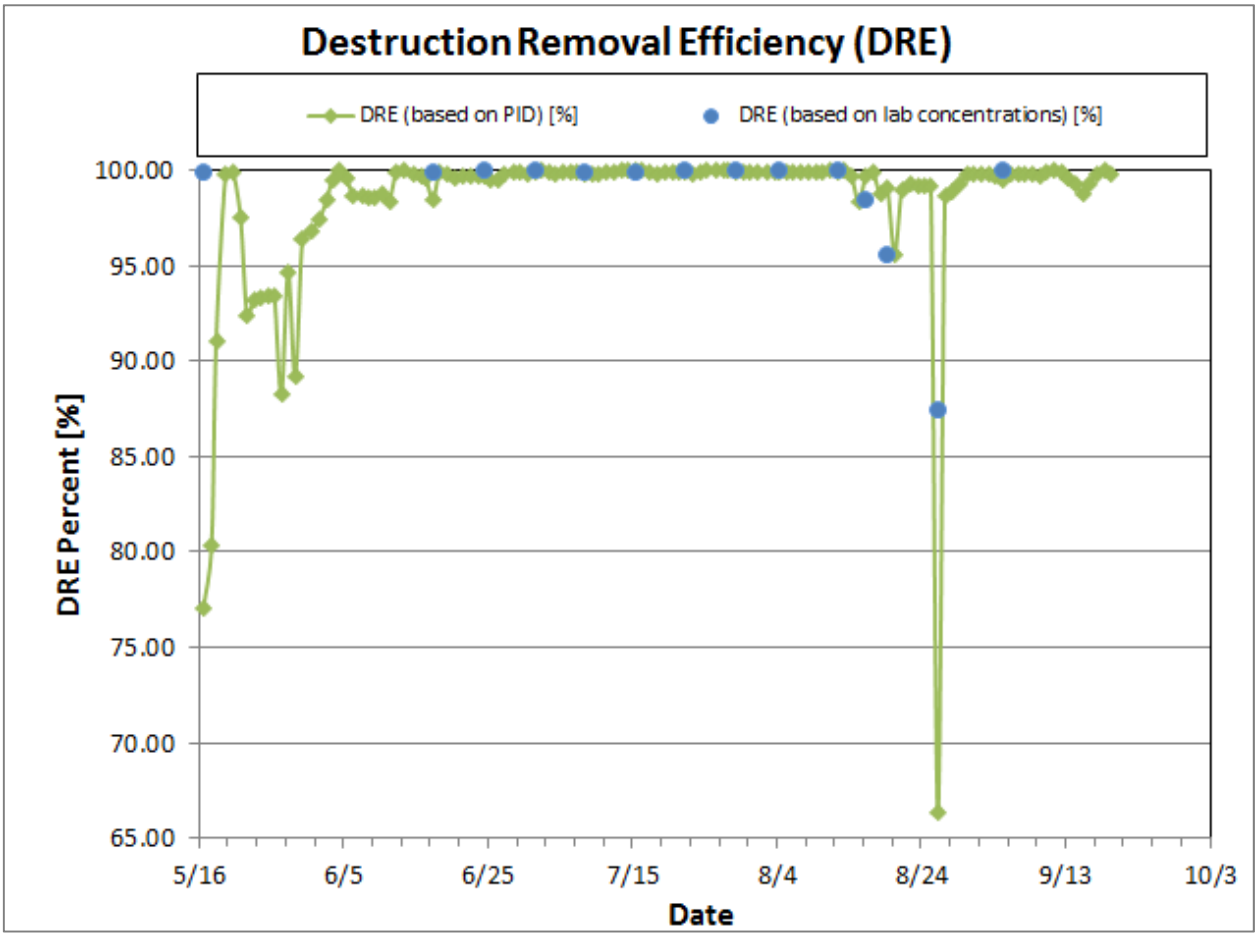


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7.

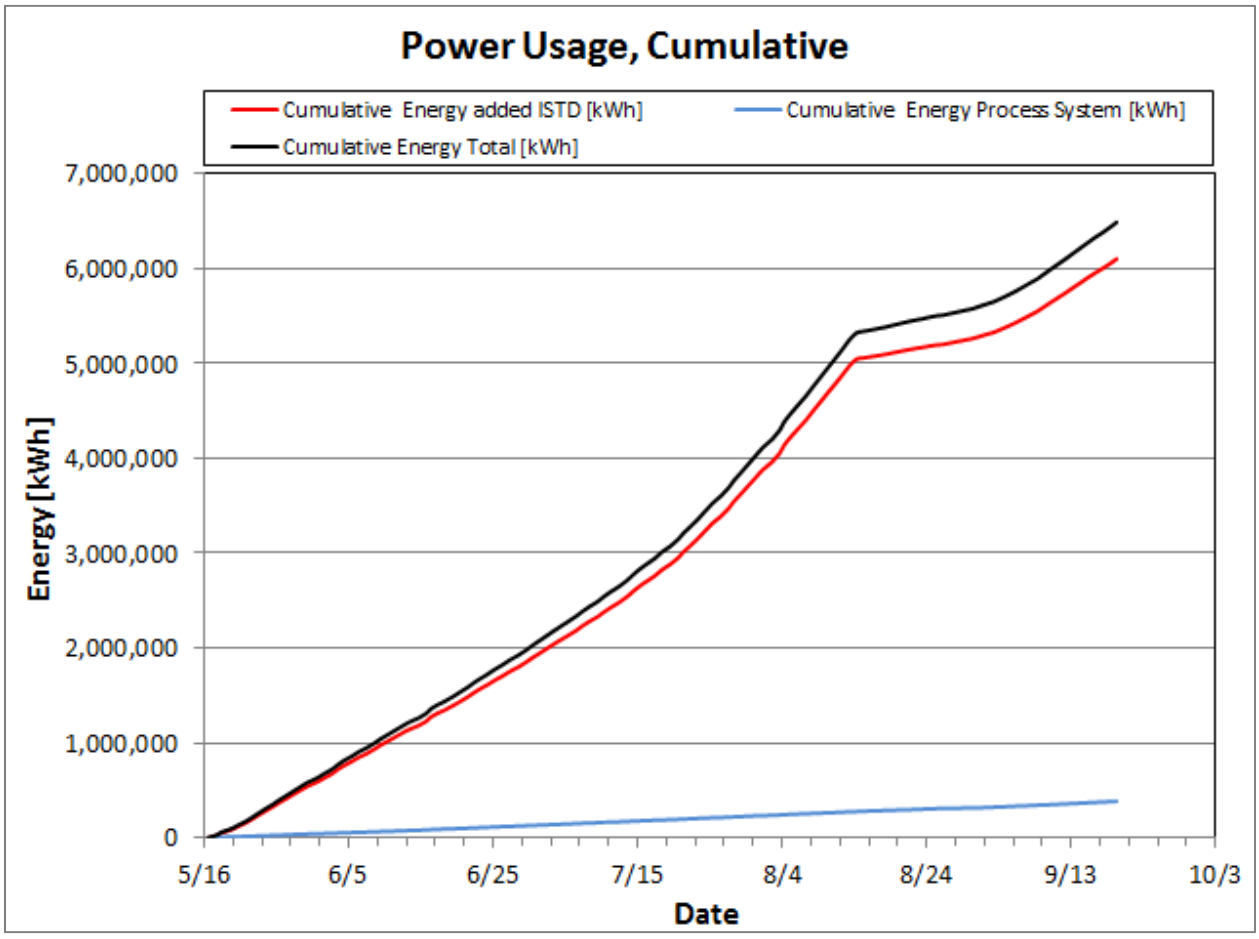


Figure 7. Power Usage, Cumulative

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The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

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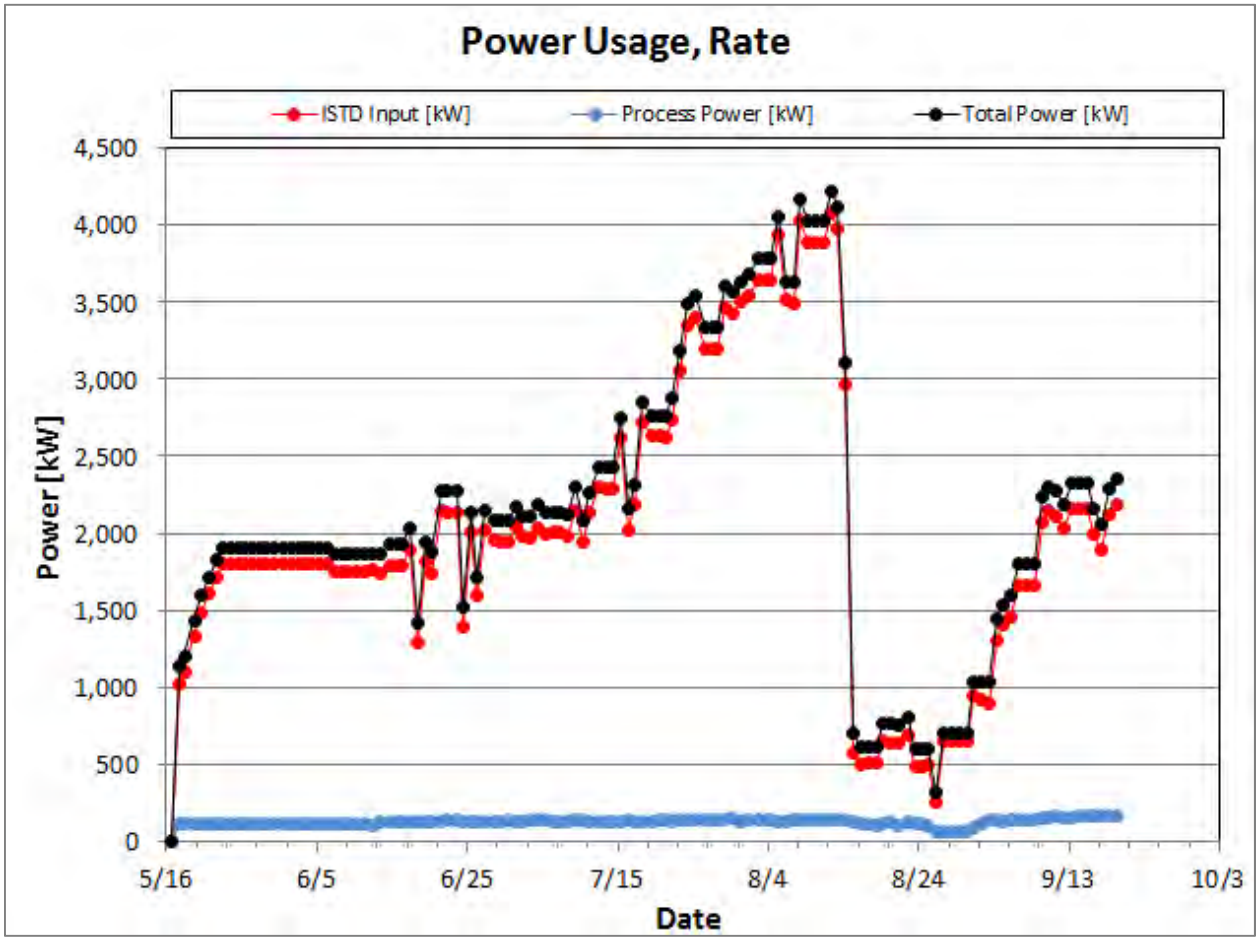


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

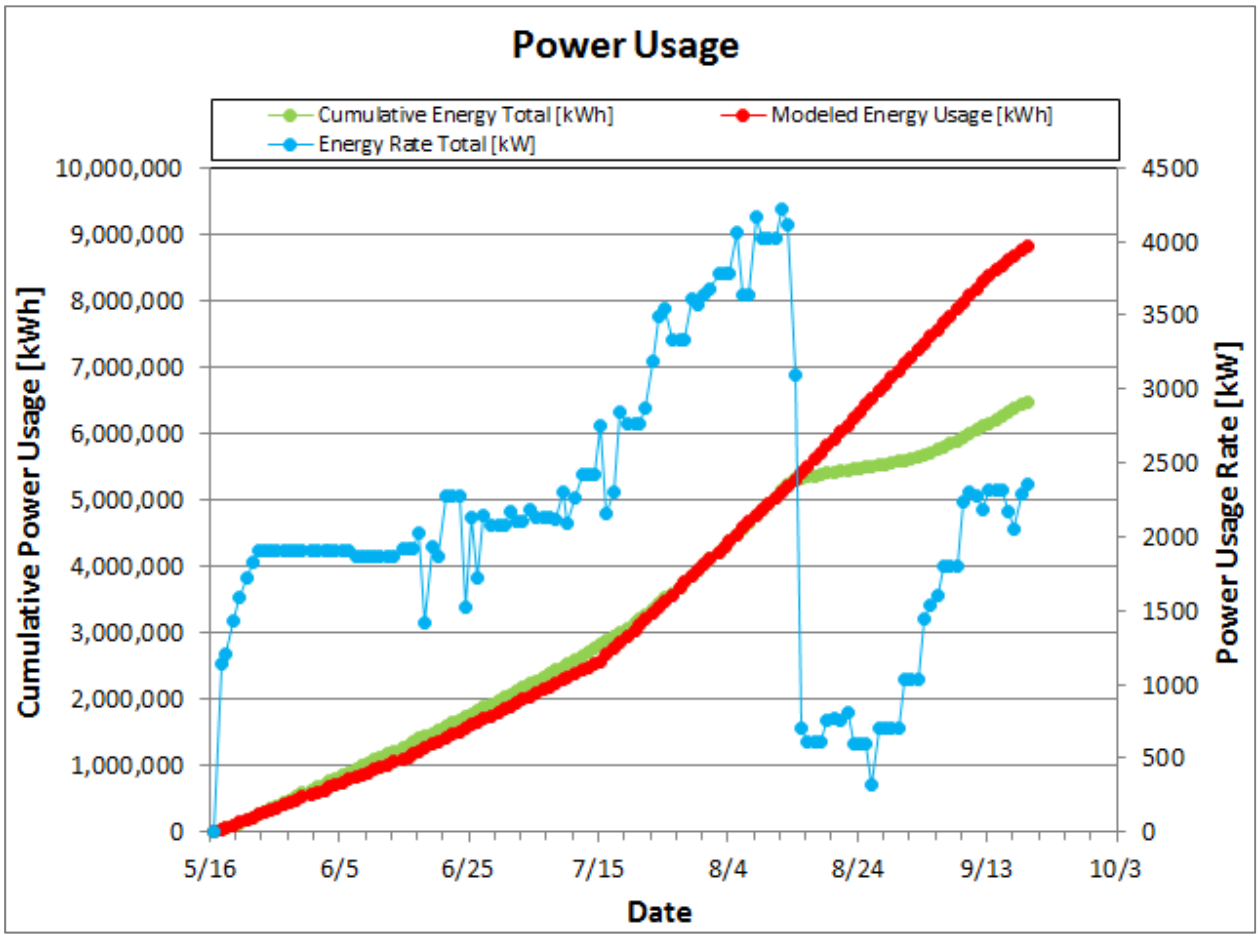


Figure 9. Power Usage

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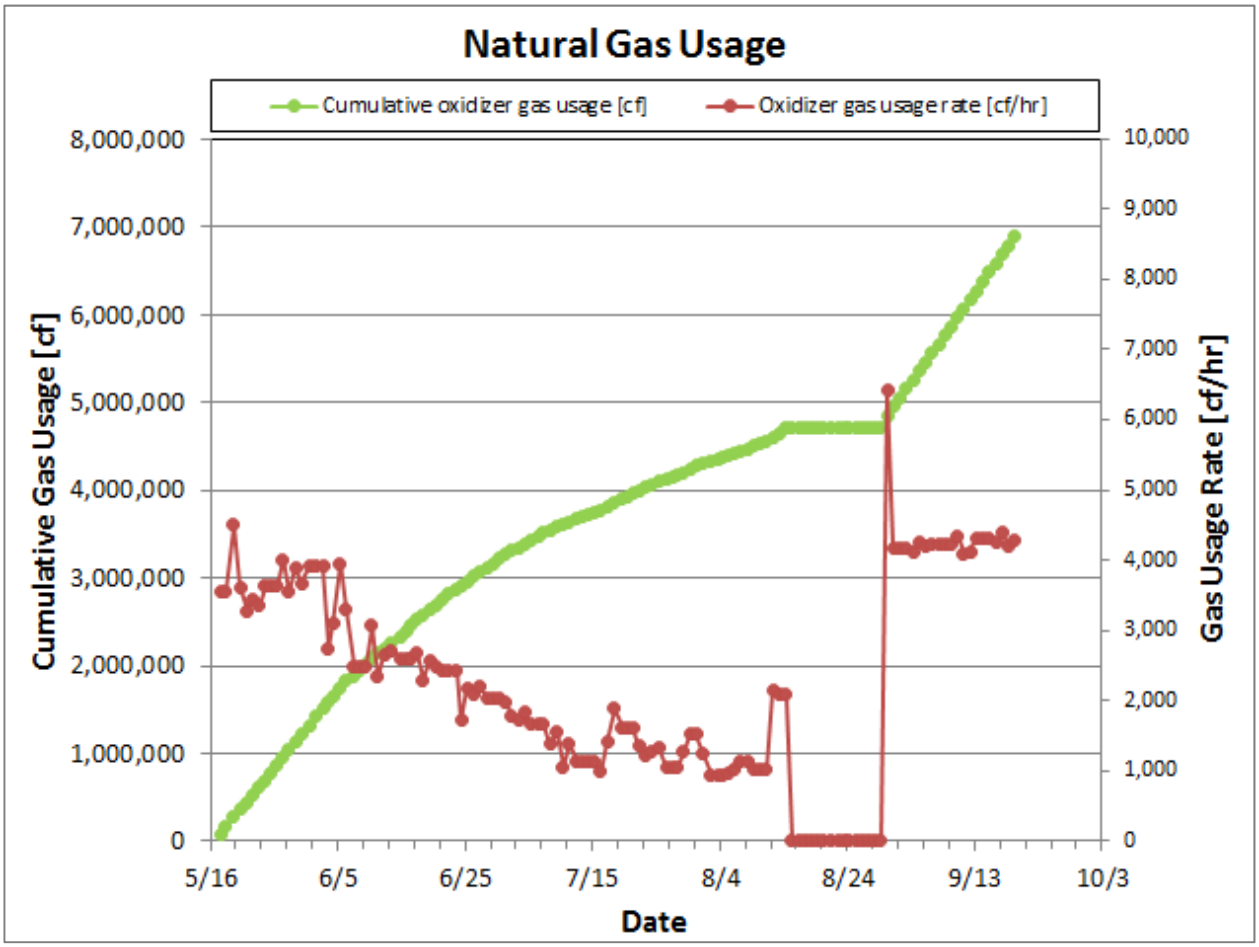


Figure 10. Natural Gas Usage

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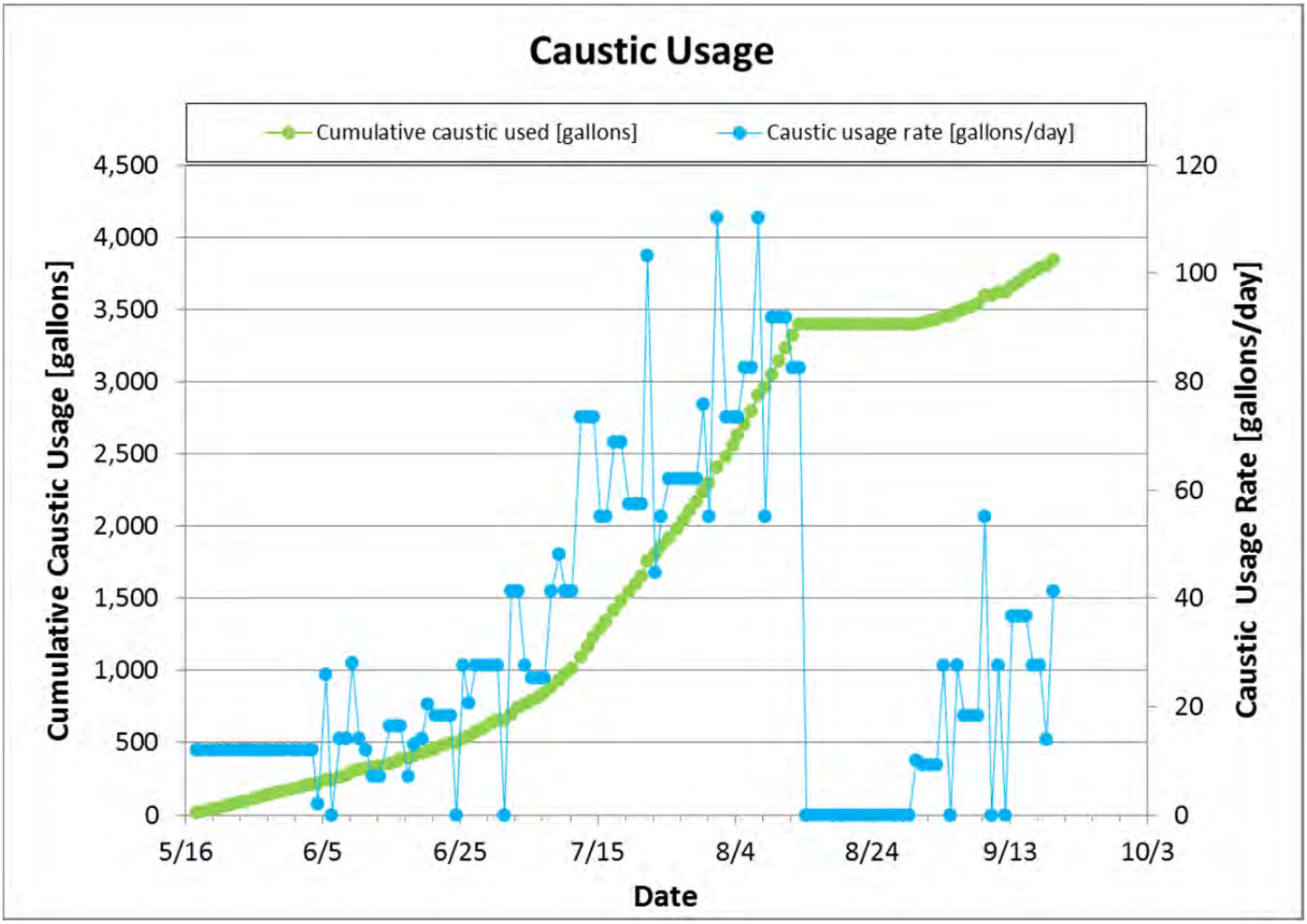


Figure 11. Caustic Usage

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Phase 1 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12a. As of 7/25/14, we have reached the first payment milestone for Phase 1. We have also reached the second payment milestone for Phase 1 as of 9/21/14. Phase 2 centroids are shown in Figure 12b. The scatterplots have been updated to show the centroids grouped by depth, with each depth range shown as a different color.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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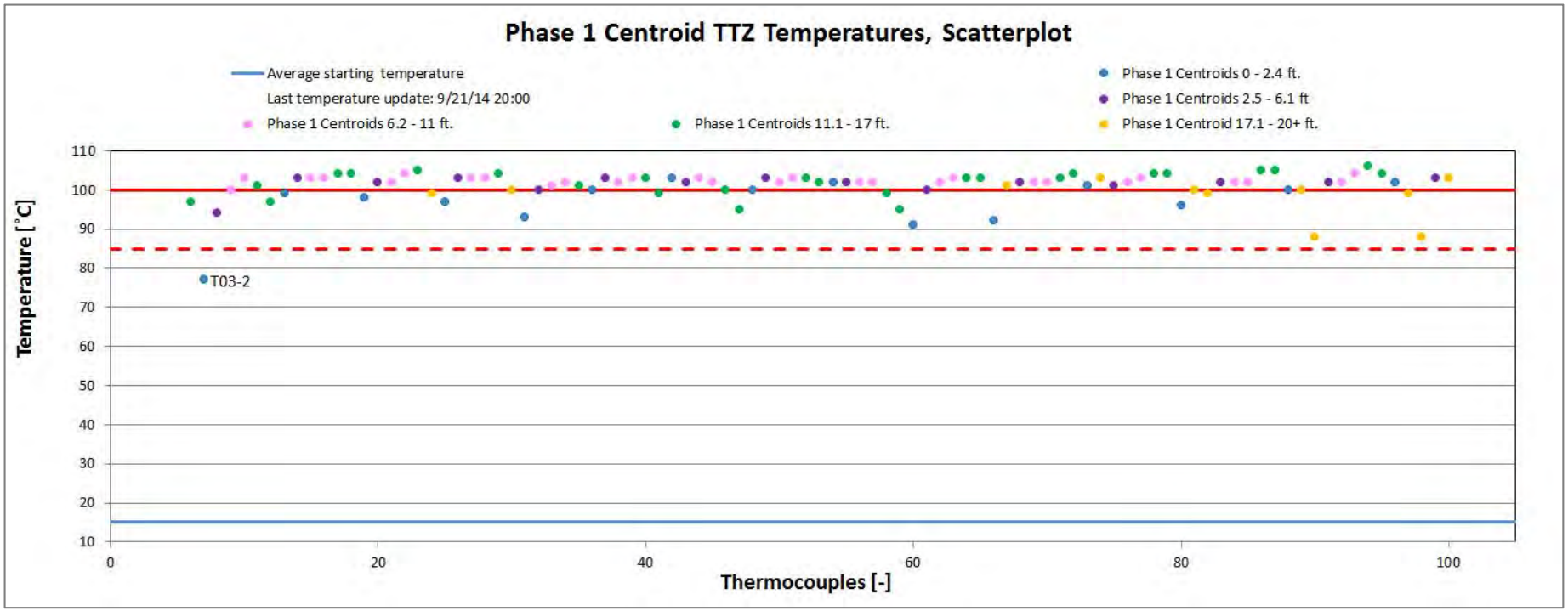


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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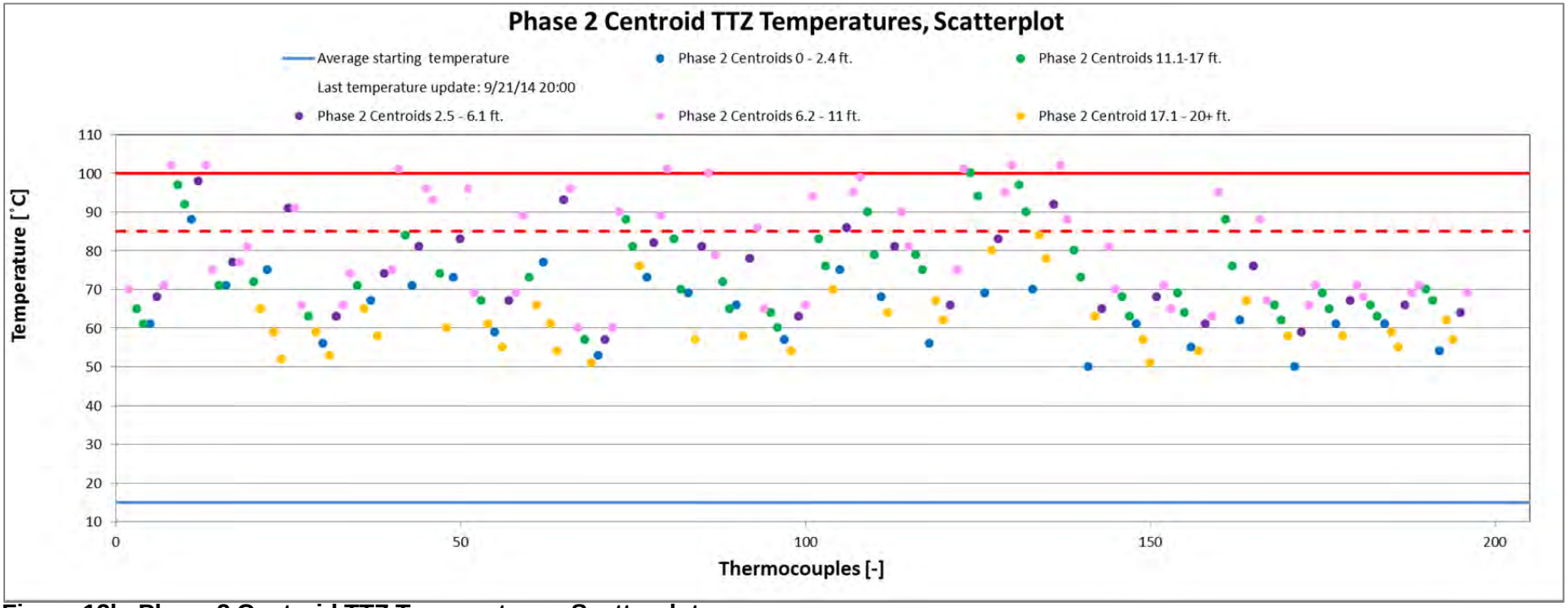


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots		
	Value	**Unit**
Date of Last Update	9/21/14	
Phase 1 Centroid Thermocouples ≥85 °C	99	%
Phase 1 Centroid Thermocouples ≥100 °C	86	%
Phase 2 Centroid Thermocouples ≥85 °C	23	%
Phase 2 Centroid Thermocouples ≥100 °C	6	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









Prepared by:

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1 SUMMARY

This report is intended to cover the operational time period of Friday September 19, 2014 through Friday September 26, 2014, with temperatures updated through Sunday September 28, 2014.

Table 1 provides a summary of the project operational status as of Friday, September 26, 2014.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	09/26/14	
Last Temperature Data Update	09/28/14	
Days of Operation (Total)	110	days
Days of Phase 1 Operation	110	days
Days of Phase 2 Operation	19	days
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	6,871,500	kWh
Used Electrical Energy vs. Estimate	43.5	%
Total Vapor Mass Removal	193,358	lbs
Average Power Input Last 24 Hours	2,560	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	981	scfm
Average Condensate Production Rate Last 24 Hours	2.9	gpm

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Heaters in Phase 1 remain online and at full power; while heaters in Phase 2 remain at 10%. We are expecting to increase energy to heaters in Phase 2 starting this week. Rampup of heaters will be over a couple weeks.

As of 9/26/14, Phase 1 has operated for 110 days and Phase 2 for 19 days. Please note that this represents days where heaters operated at or above 70% (per contract definition). The current average wellfield temperature for Phase 1 is 102°C and 77°C for Phase 2. All three temperature milestone have been achieved for Phase 1.

Estimated mass removed to date is reported using the flammability analyzer data, lab data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. These results yield a total mass removal of 193,358 lbs as of 9/26/14. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 9/24/14. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.54:0.46. These ratios were applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling. Temperatures have returned, and are now exceeding those prior to shutdown at all treatment depths.

Phase 2 heating began on 7/16/14 but was stopped on August 14, 2014, as a result of the oxidizer shutdown. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling. Please note that heaters in Phase 2 remain at 10%.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	9/28/14	
Phase 1 Entire TTZ Average Temperature	102	°C
Phase 2 Entire TTZ Average Temperature	77	°C
Phase 1 Centroid Average Temperature	102	°C
Phase 2 Centroid Average Temperature	75	°C

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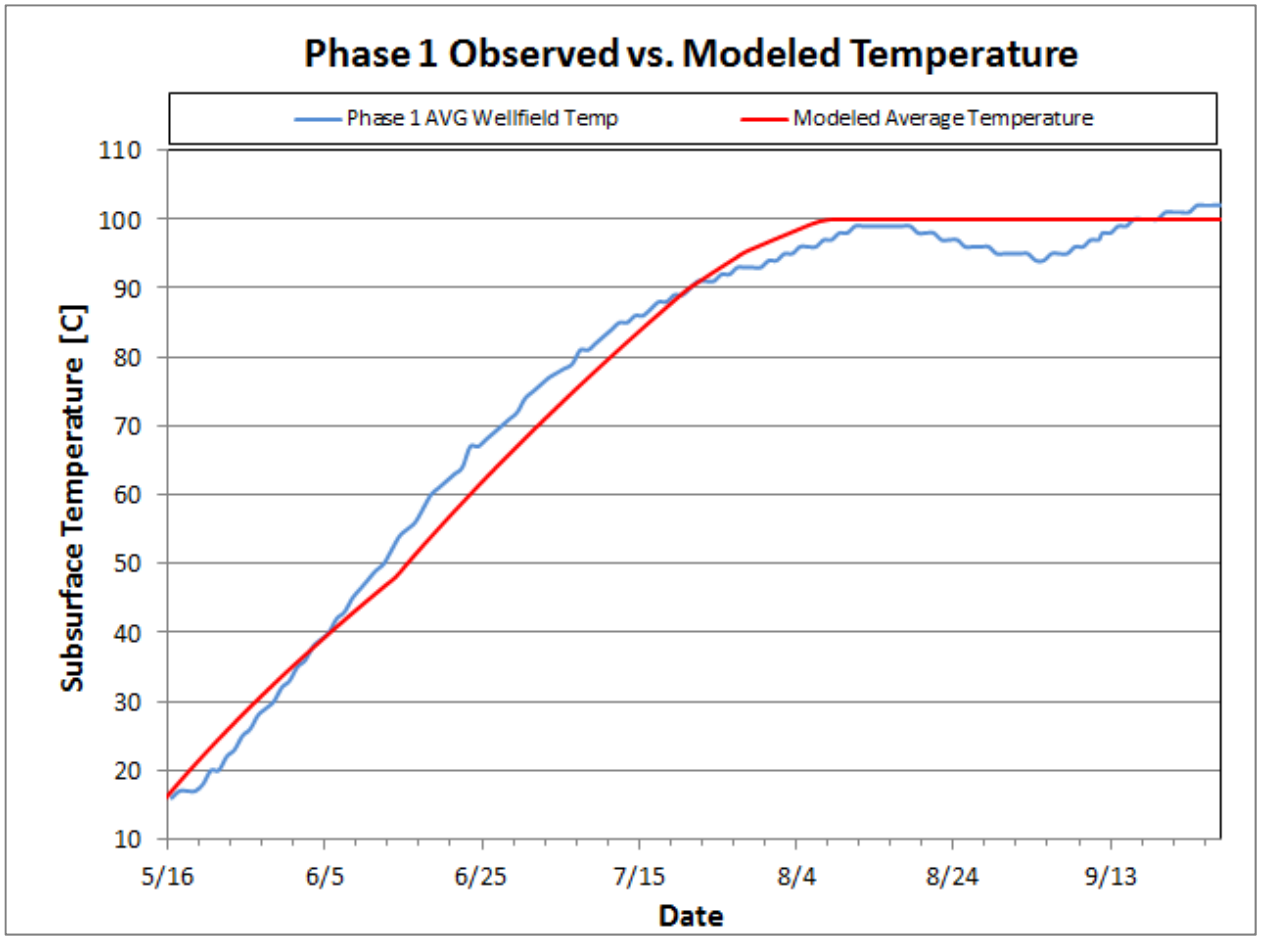


Figure 1a. Phase 1 Observed vs. Modeled Temperature

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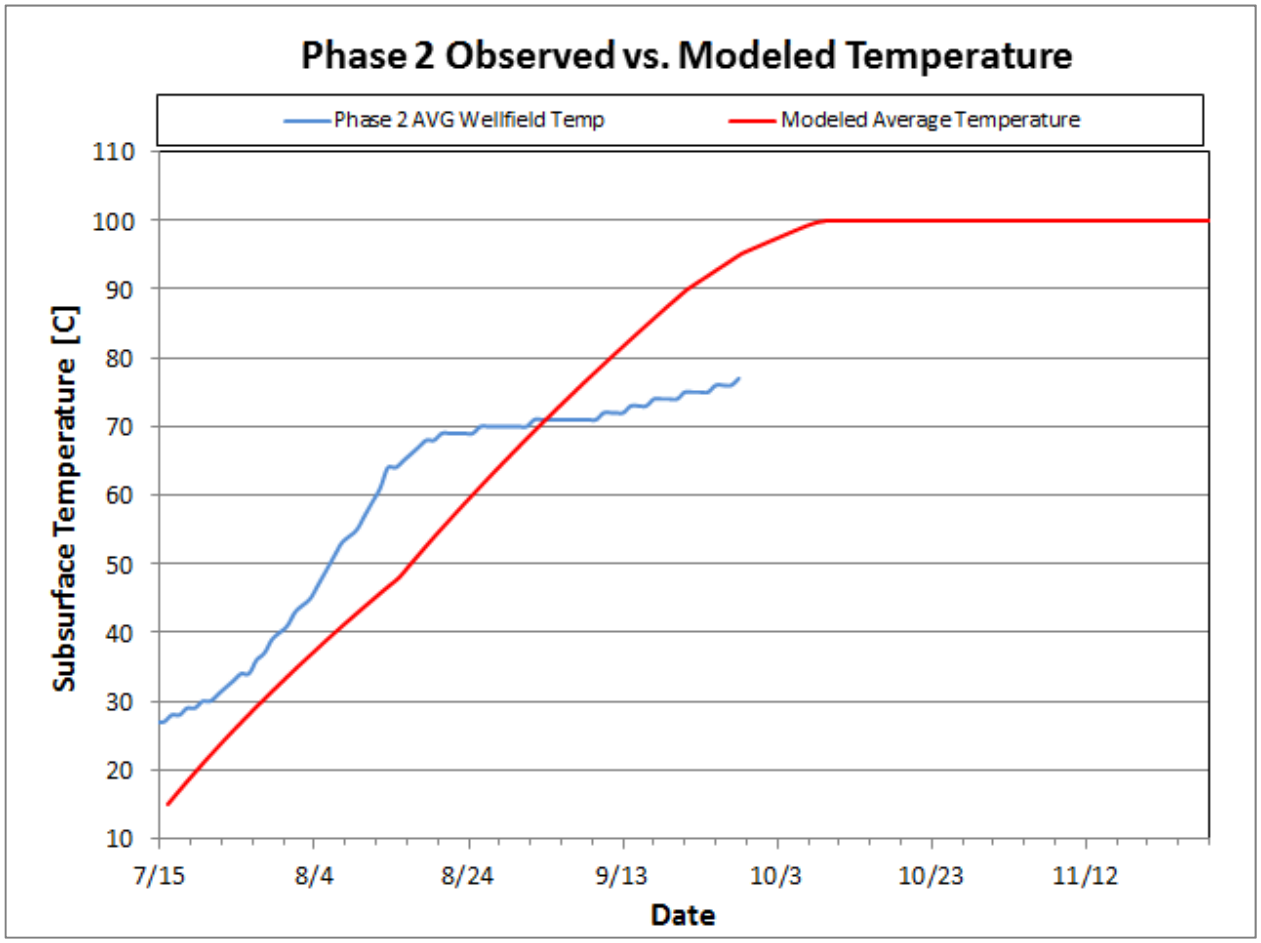


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was restarted on 8/30/14.

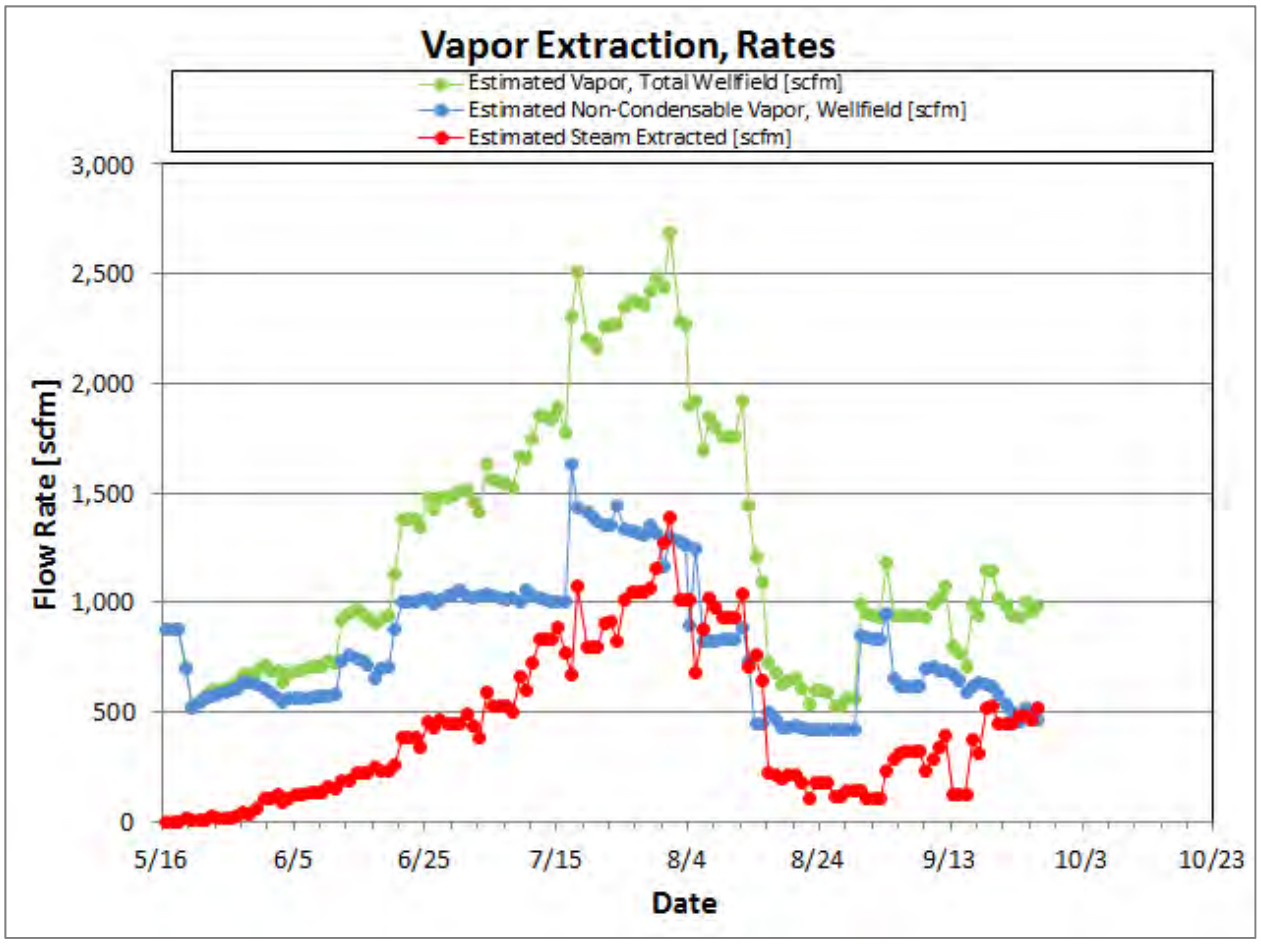


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

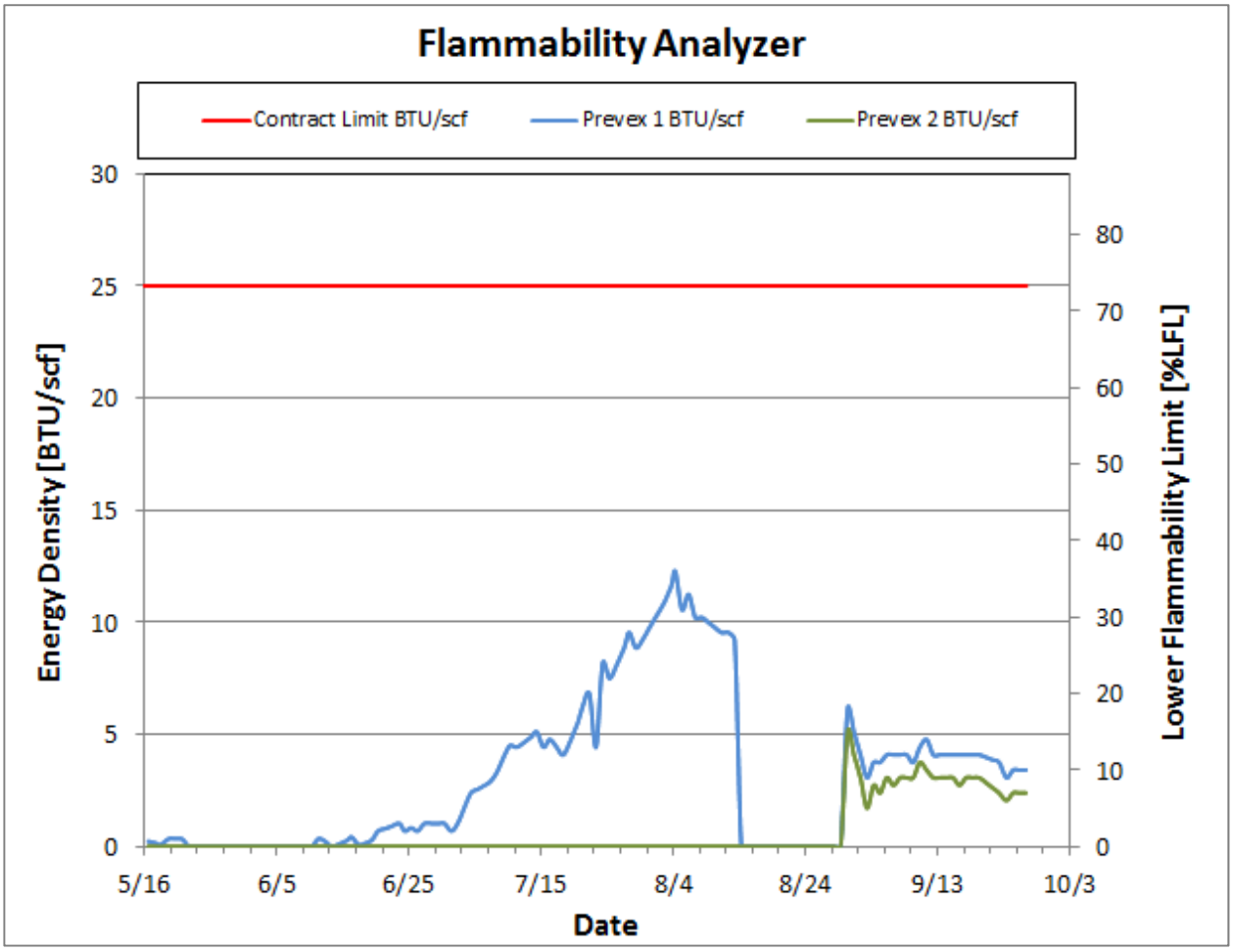


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed to date is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The decrease in mass removed starting on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14 and 9/9/14.

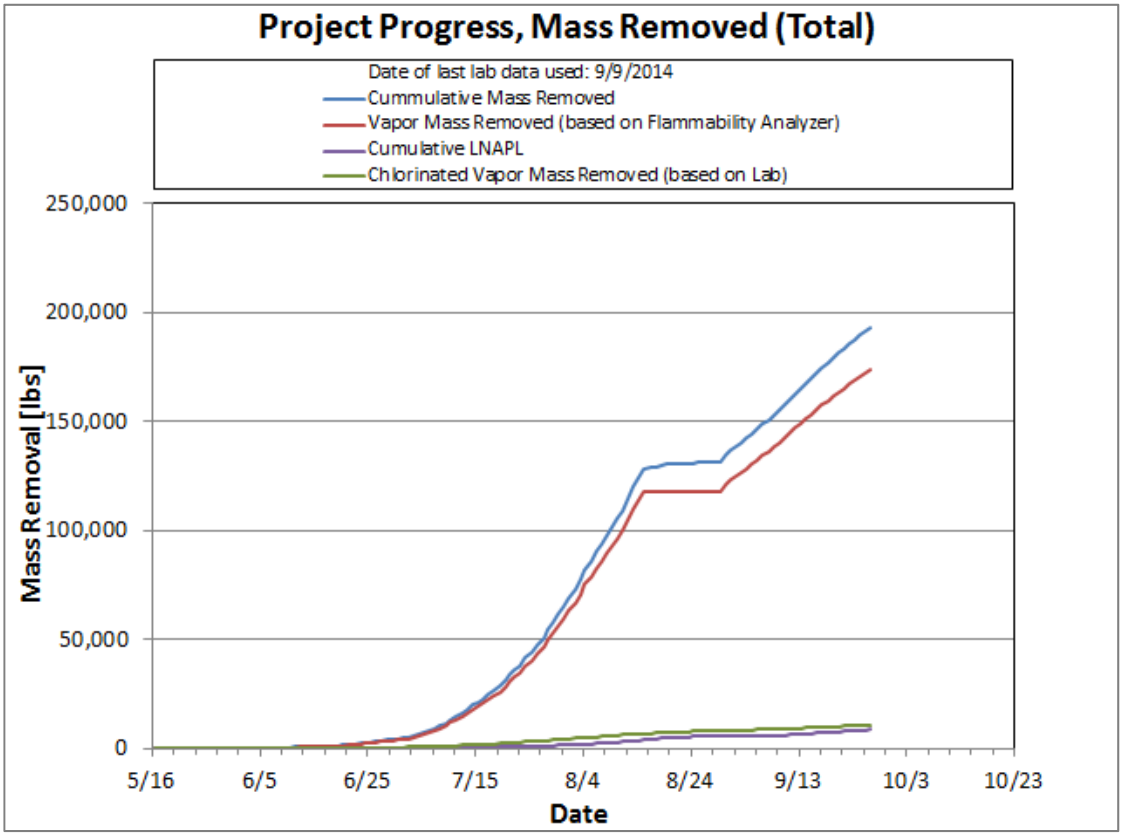


Figure 4a. Project Progress, Mass Removal (Total)

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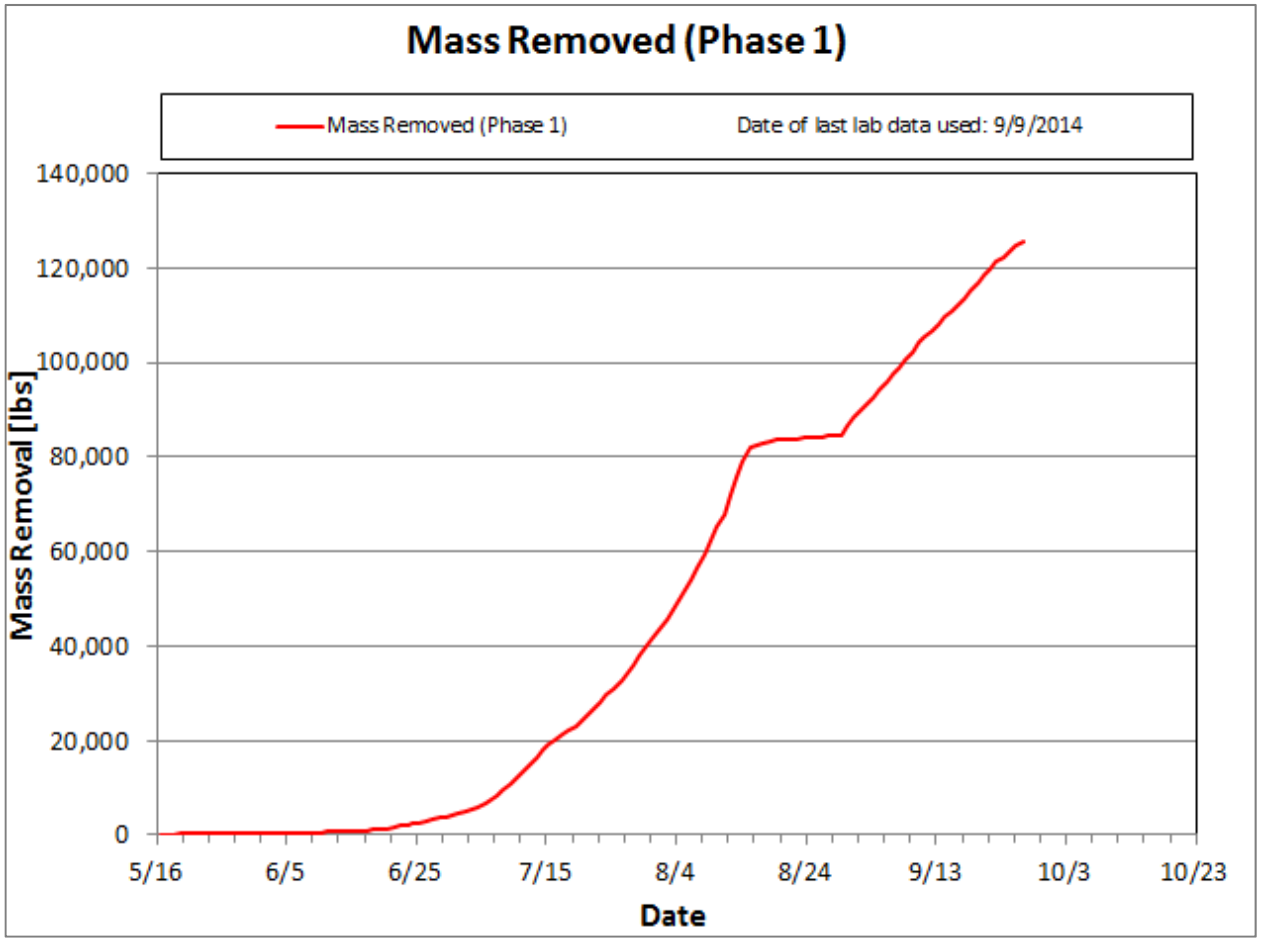


Figure 4b. Project Progress, Mass Removal (Phase 1)

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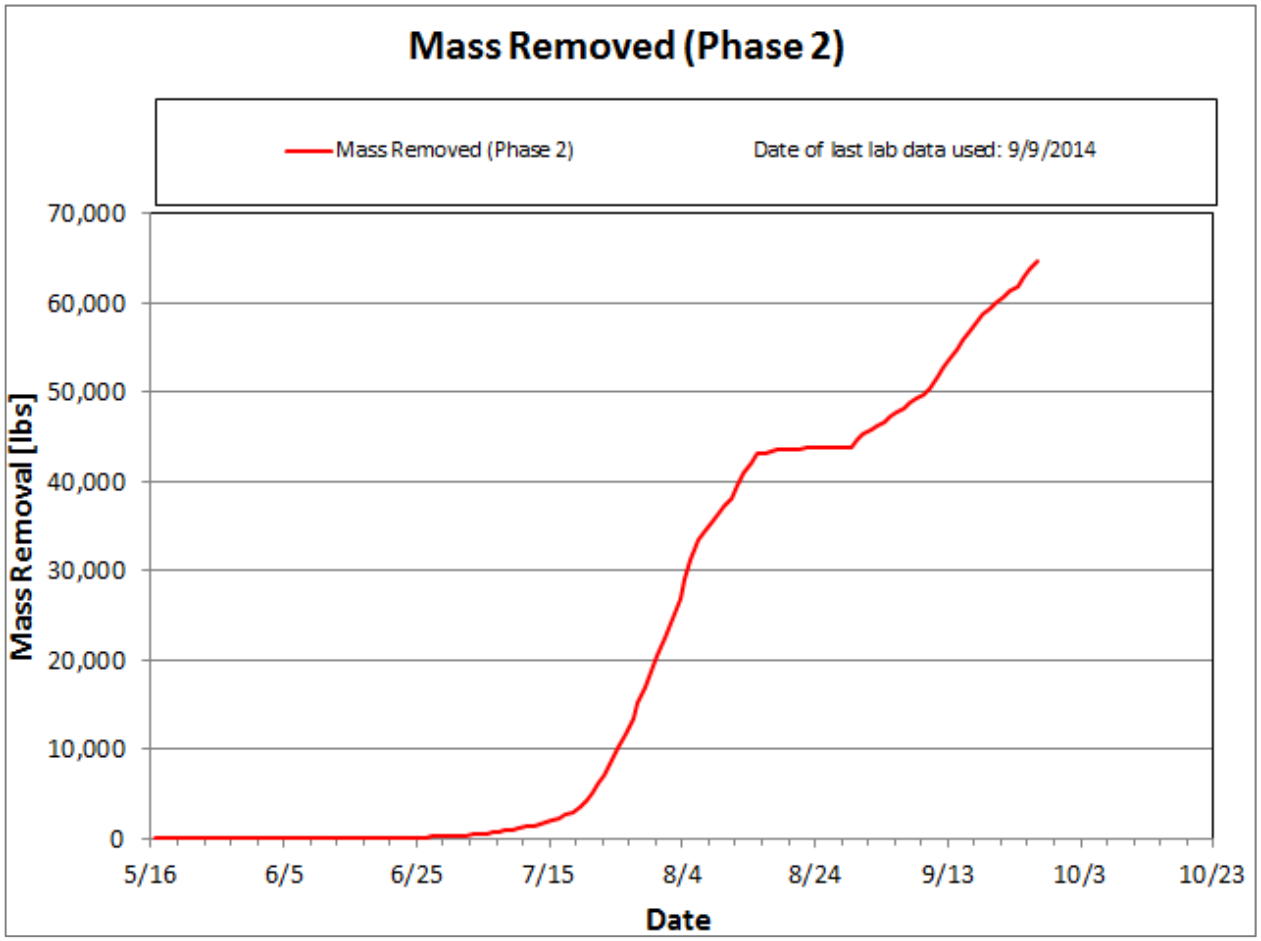


Figure 4c. Project Progress, Mass Removal (Phase 2)

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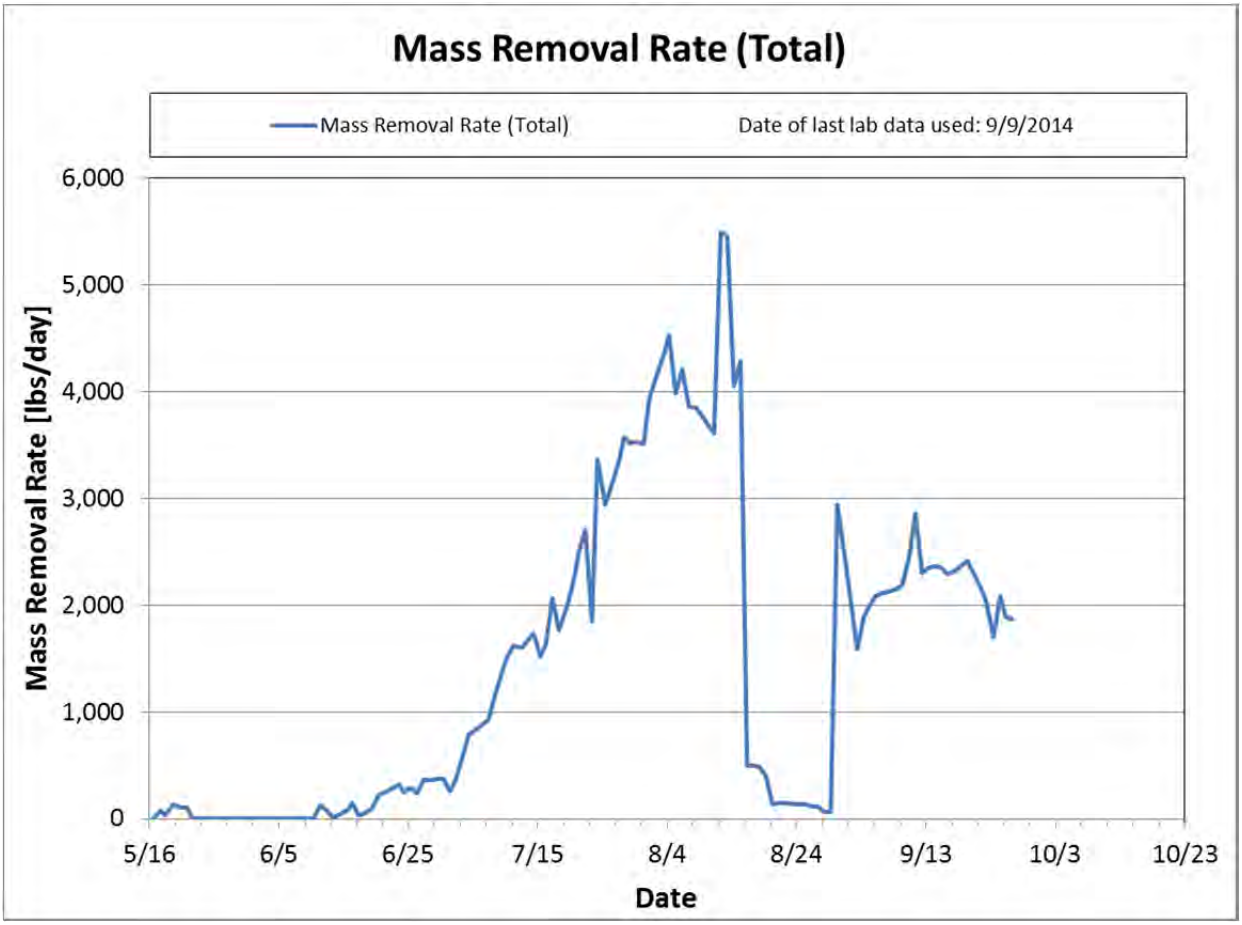


Figure 4d. Mass Removal Rate (Total for Site)

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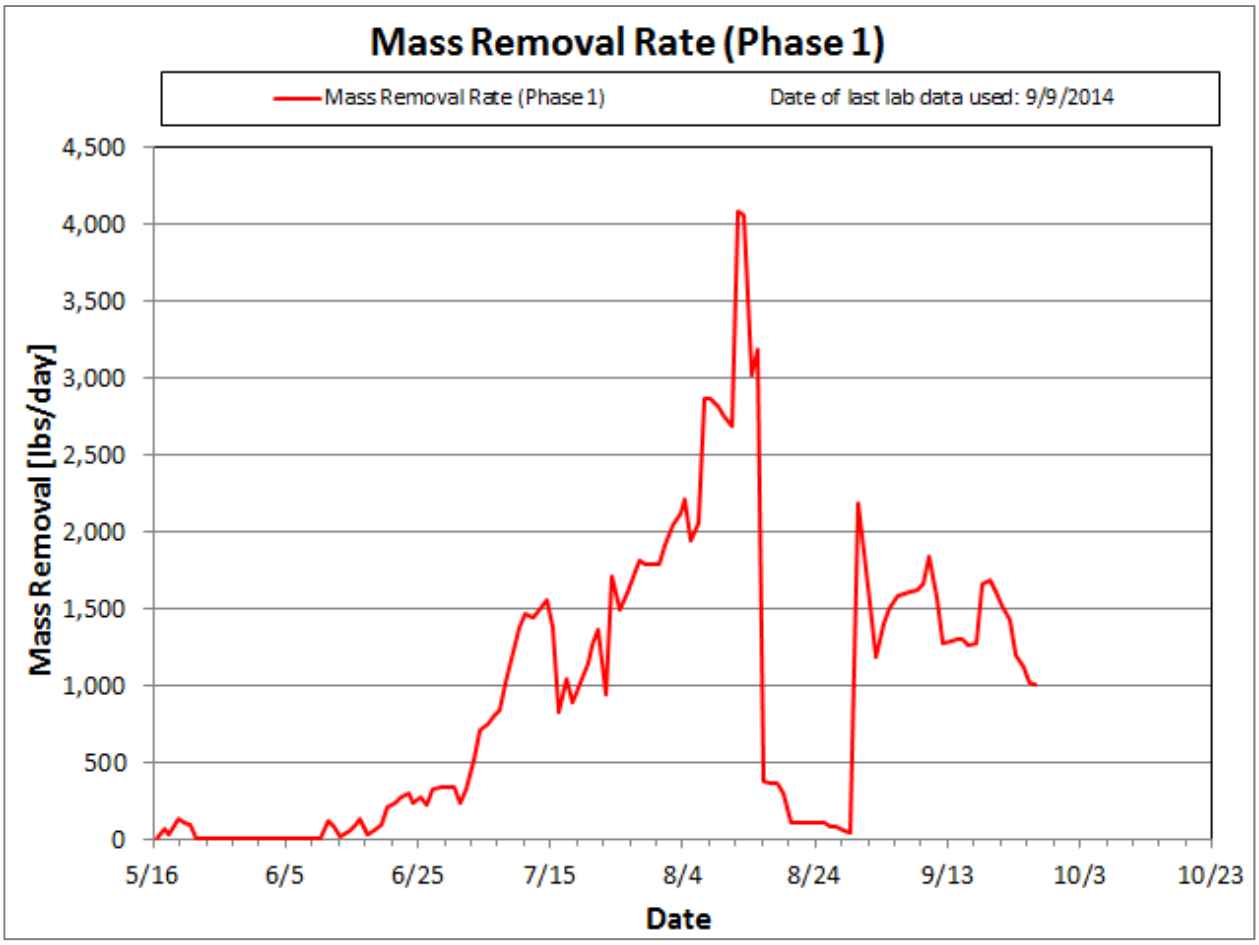


Figure 4e. Mass Removal Rate (Phase 1)

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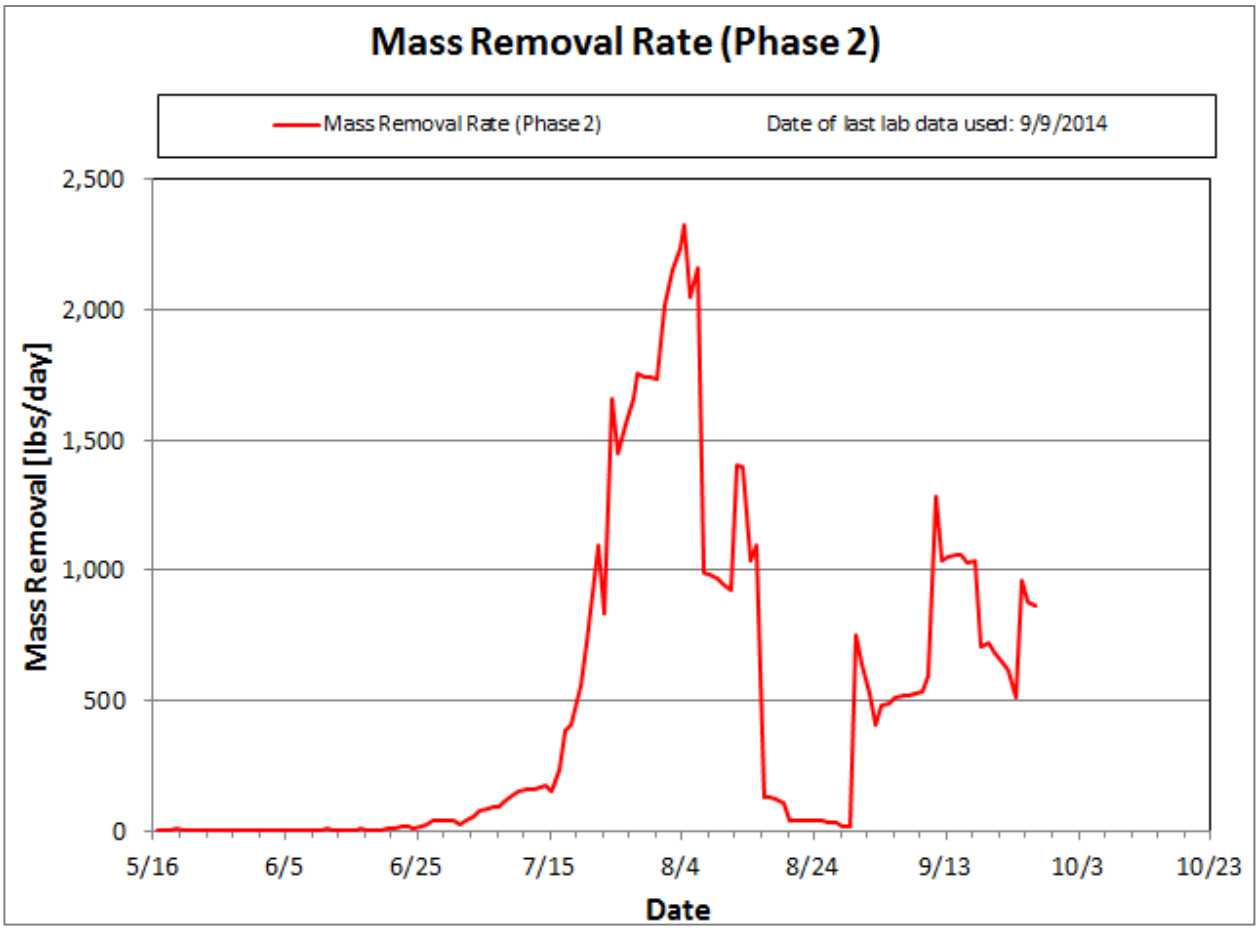


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID readings collected at the oxidizer influent over time. It should be noted that the PID reading from 7/16/14 was obtained with a PID with a 10.6 eV lamp, instead of the 11.7 eV lamp which had reached the upper concentration limit of 2,000 ppmV. Similarly, data collected on 07/25-28 were first collected with an 11.7 eV lamp with values exceeding the upper limit. The influent concentrations were then collected with the 10.6 eV lamp with values lower than the 11.7 eV upper limit (2,000 ppm). Therefore, the maximum 11.7 eV lamp is reported.

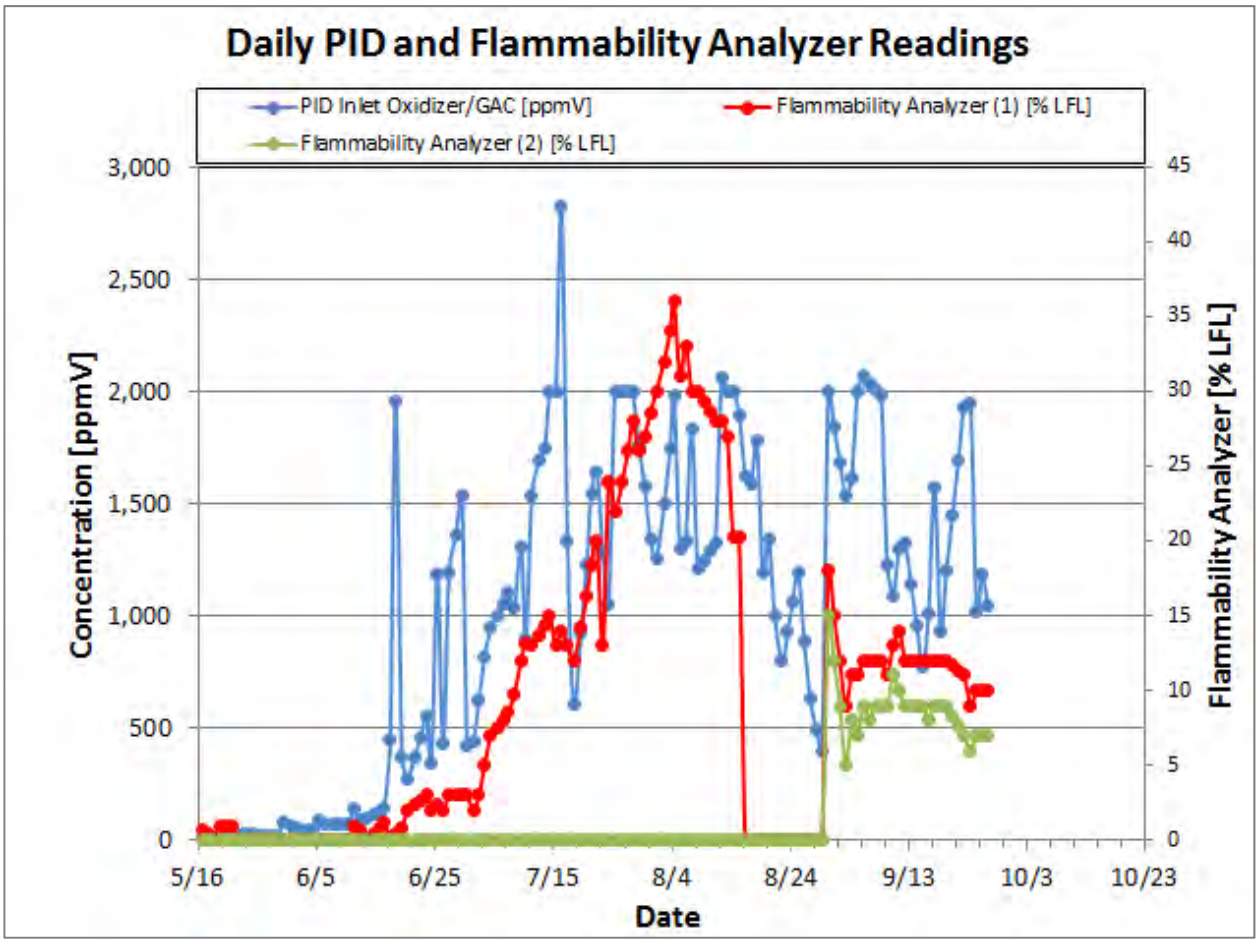


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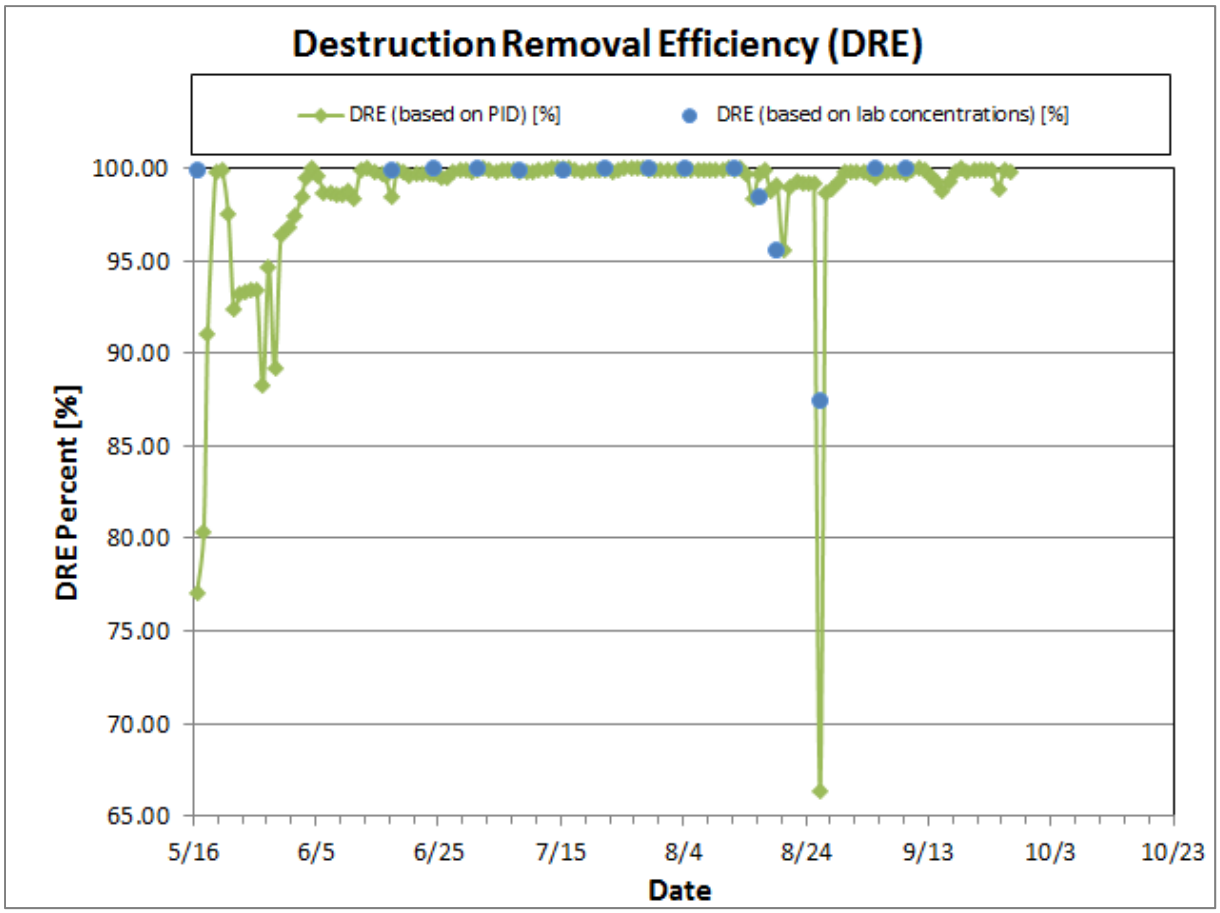


Figure 6. Destruction Removal Efficiency

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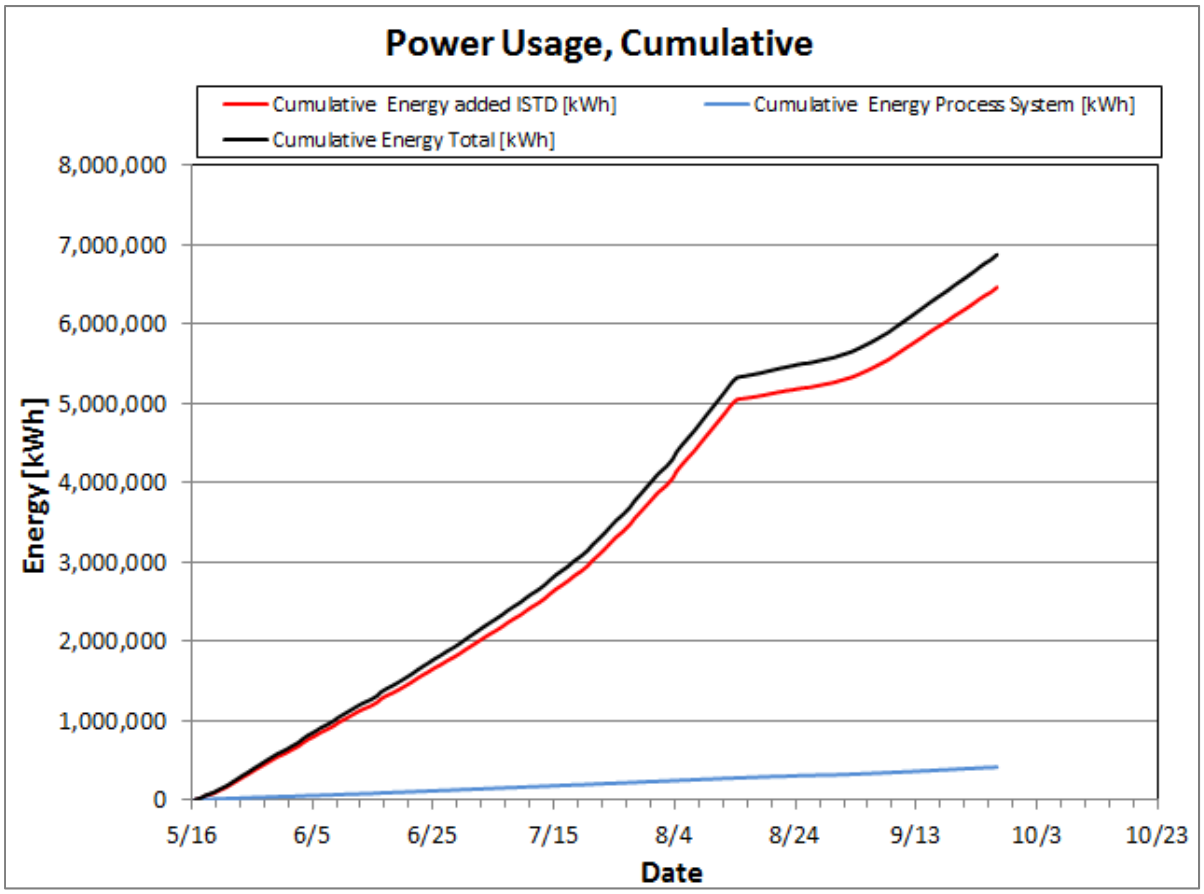


Figure 7. Power Usage, Cumulative

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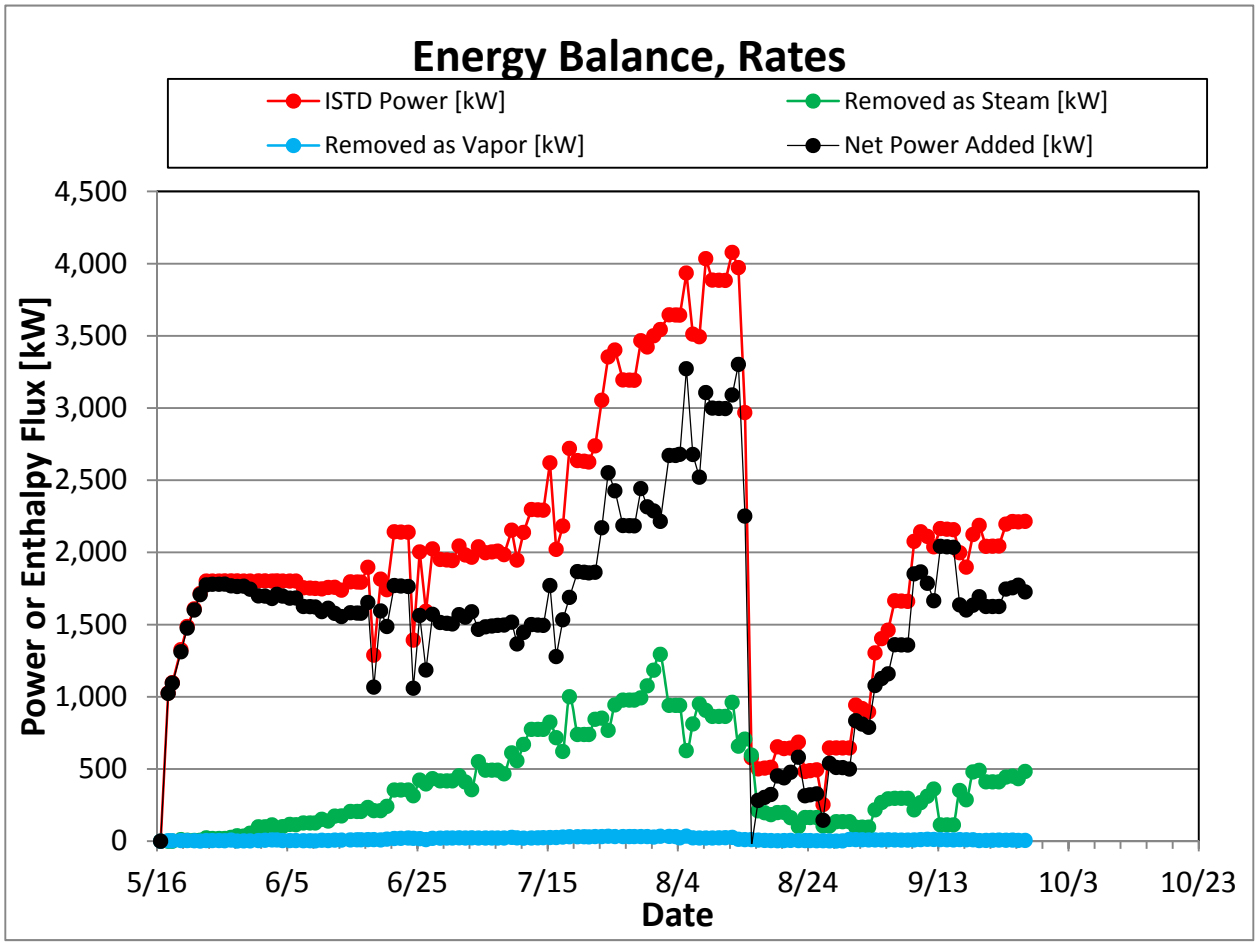


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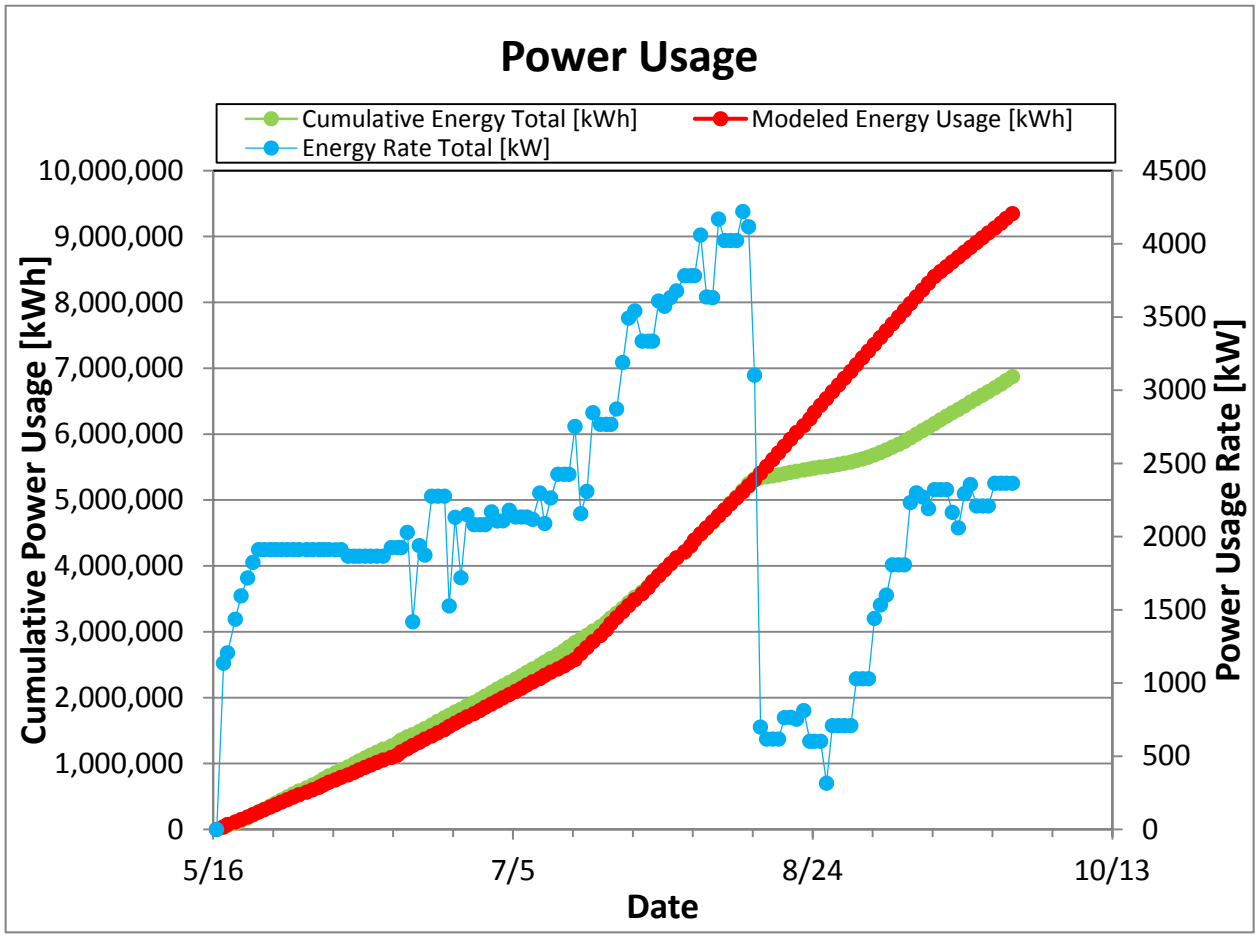


Figure 9. Power Usage

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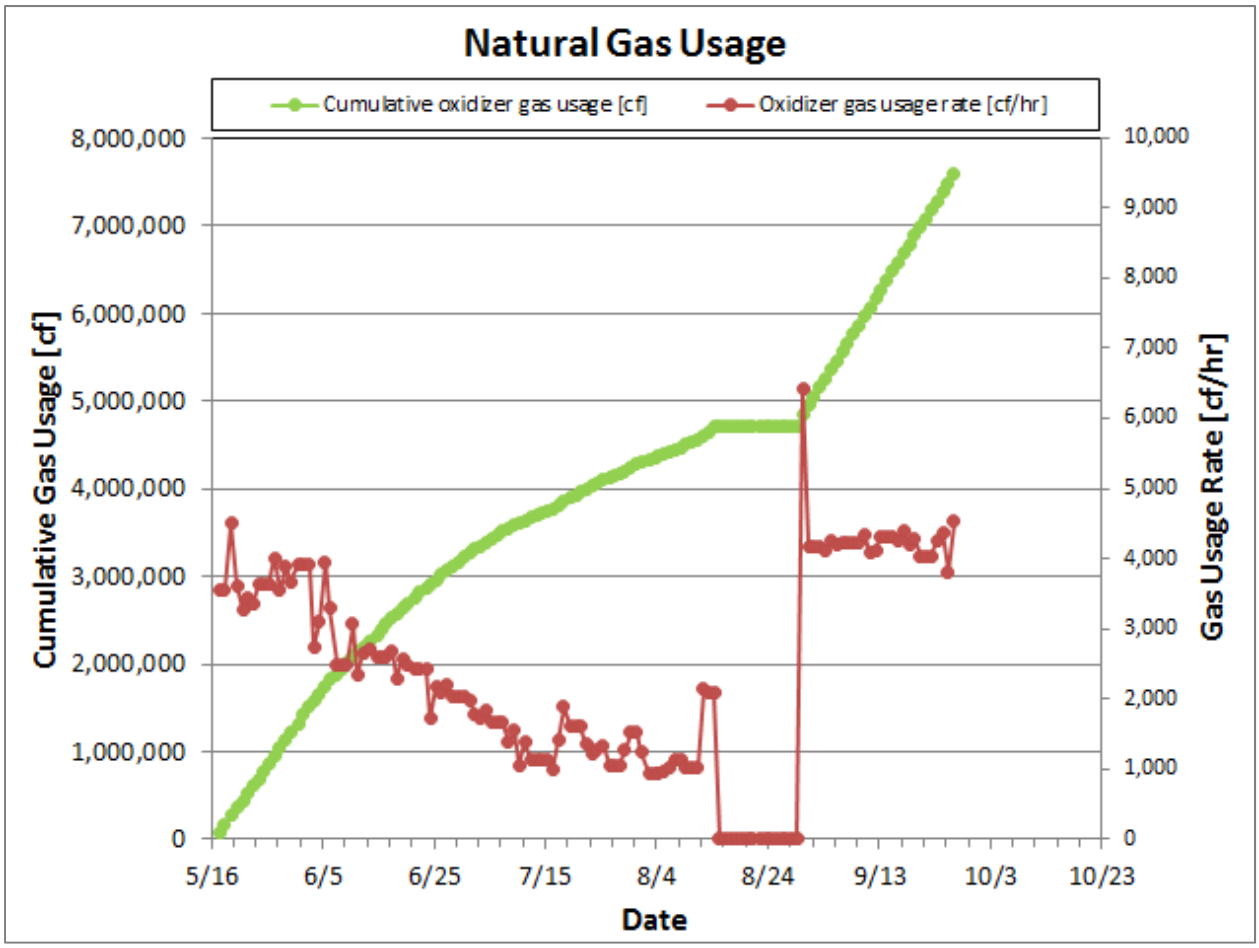


Figure 10. Natural Gas Usage

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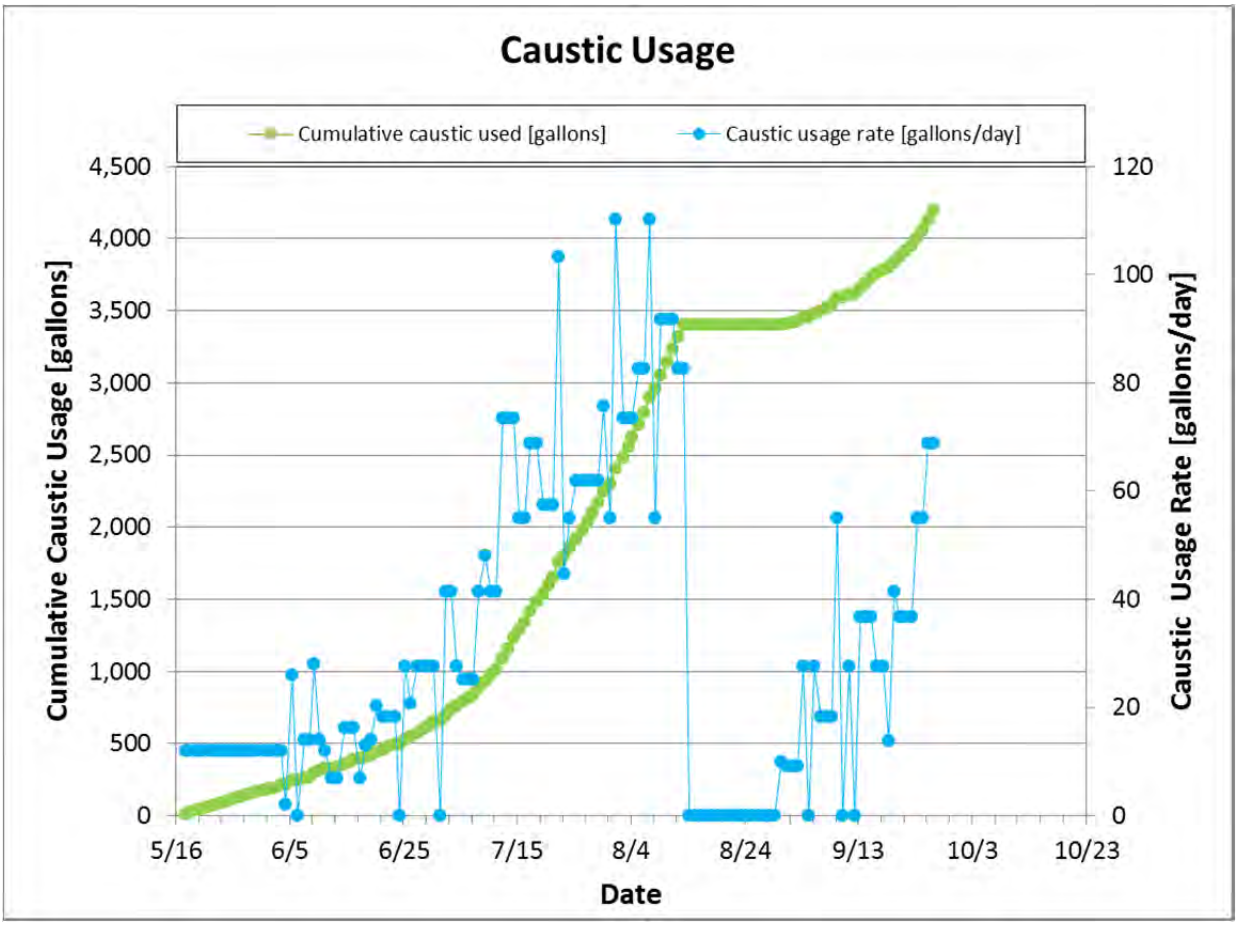


Figure 11. Caustic Usage

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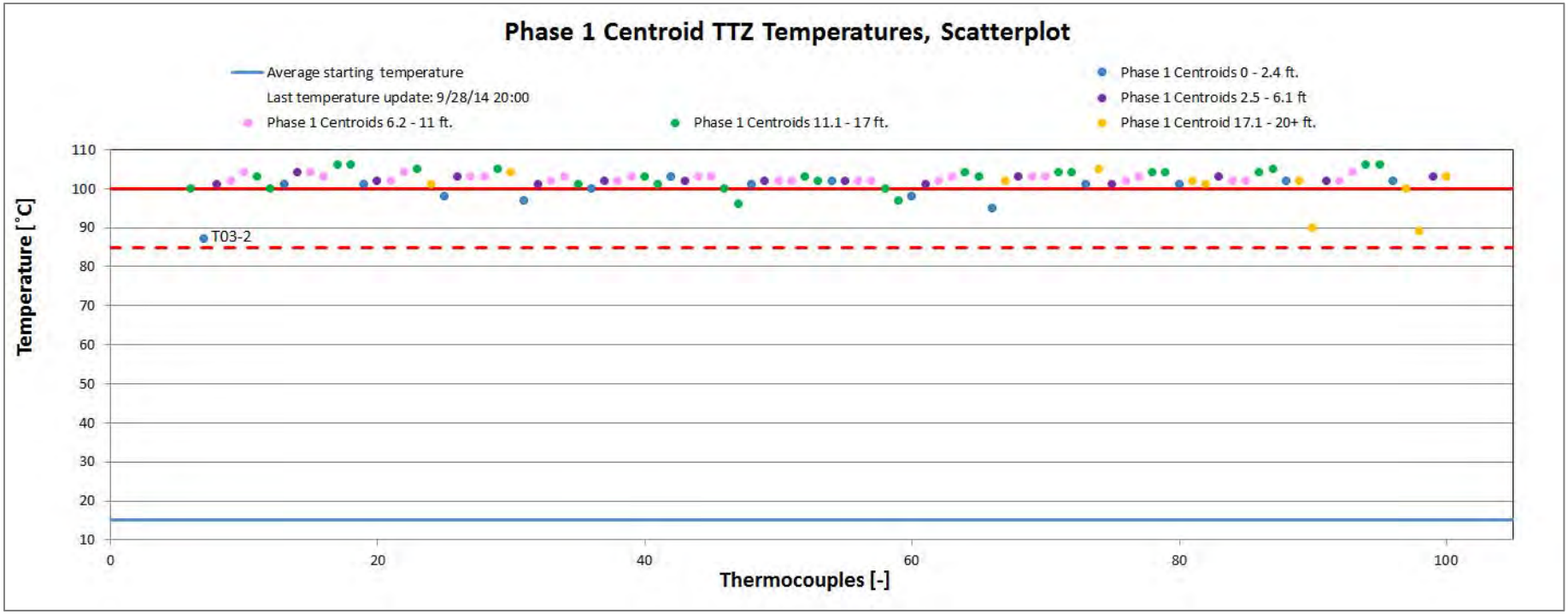


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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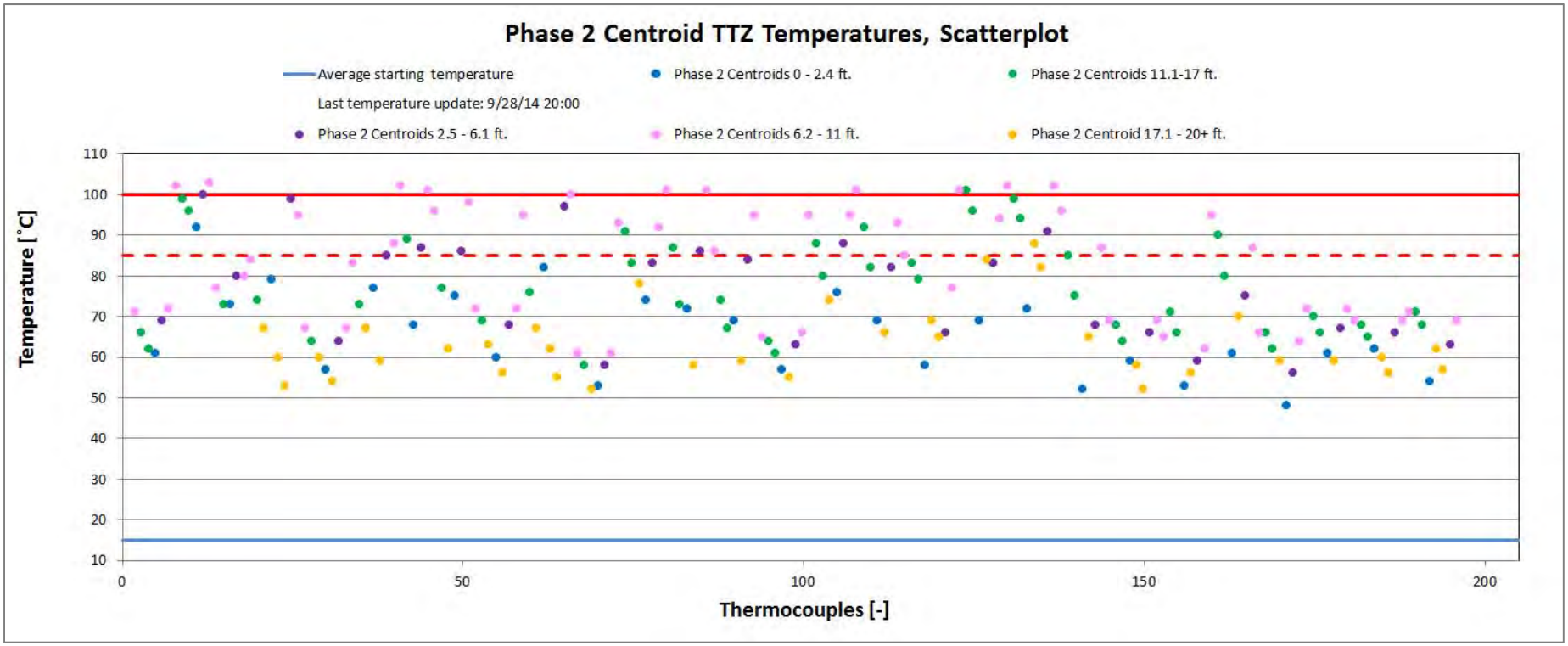


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots		
	Value	**Unit**
Date of Last Update	9/28/14	
Phase 1 Centroid Thermocouples ≥85 °C	100	%
Phase 1 Centroid Thermocouples ≥100 °C	93	%
Phase 2 Centroid Thermocouples ≥85 °C	31	%
Phase 2 Centroid Thermocouples ≥100 °C	9	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday September 26, 2014 through Friday October 3, 2014, with temperatures updated through Sunday October 5, 2014.

Table 1 provides a summary of the project operational status as of Friday, October 3, 2014.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	10/03/14	
Last Temperature Data Update	10/05/14	
Days of Operation (Total)	117	days
Days of Phase 1 Operation	117	days
Days of Phase 2 Operation	19	days
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	7,267,900	kWh
Used Electrical Energy vs. Estimate	46.0	%
Total Vapor Mass Removal	213,164	lbs
Average Power Input Last 24 Hours	2,640	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,458	scfm
Average Condensate Production Rate Last 24 Hours	3.6	gpm

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Heaters in Phase 1 remain online and at full power; while heaters in Phase 2 are at approximately 30%. Heaters are expected to be at full power by the end of the week.

As of 10/3/14, Phase 1 has operated for 117 days and Phase 2 for 19 days. Please note that this represents days where heaters operated at or above 70% (per contract definition). The current average wellfield temperature for Phase 1 is 102°C and 78°C for Phase 2. All three temperature milestone have been achieved for Phase 1.

The second progress soil sampling event is scheduled for next week, 13 October.

Estimated mass removed to date is reported using the flammability analyzer data, lab data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. These results yield a total mass removal of 213,164 lbs as of 10/3/14. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 10/2/14. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.44:0.56. These ratios were applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase. For the first time since startup, the fraction of the total mass coming from the Phase 2 area is greater than the fraction coming from the Phase 1 area.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling. Temperatures have returned, and are now exceeding those prior to shutdown at all treatment depths.

Phase 2 heating began on 7/16/14 but was stopped on August 14, 2014, as a result of the oxidizer shutdown. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling. Heaters in Phase 2 are expected to be at full power by the end of the week.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	10/5/14	
Phase 1 Entire TTZ Average Temperature	102	°C
Phase 2 Entire TTZ Average Temperature	78	°C
Phase 1 Centroid Average Temperature	102	°C
Phase 2 Centroid Average Temperature	76	°C

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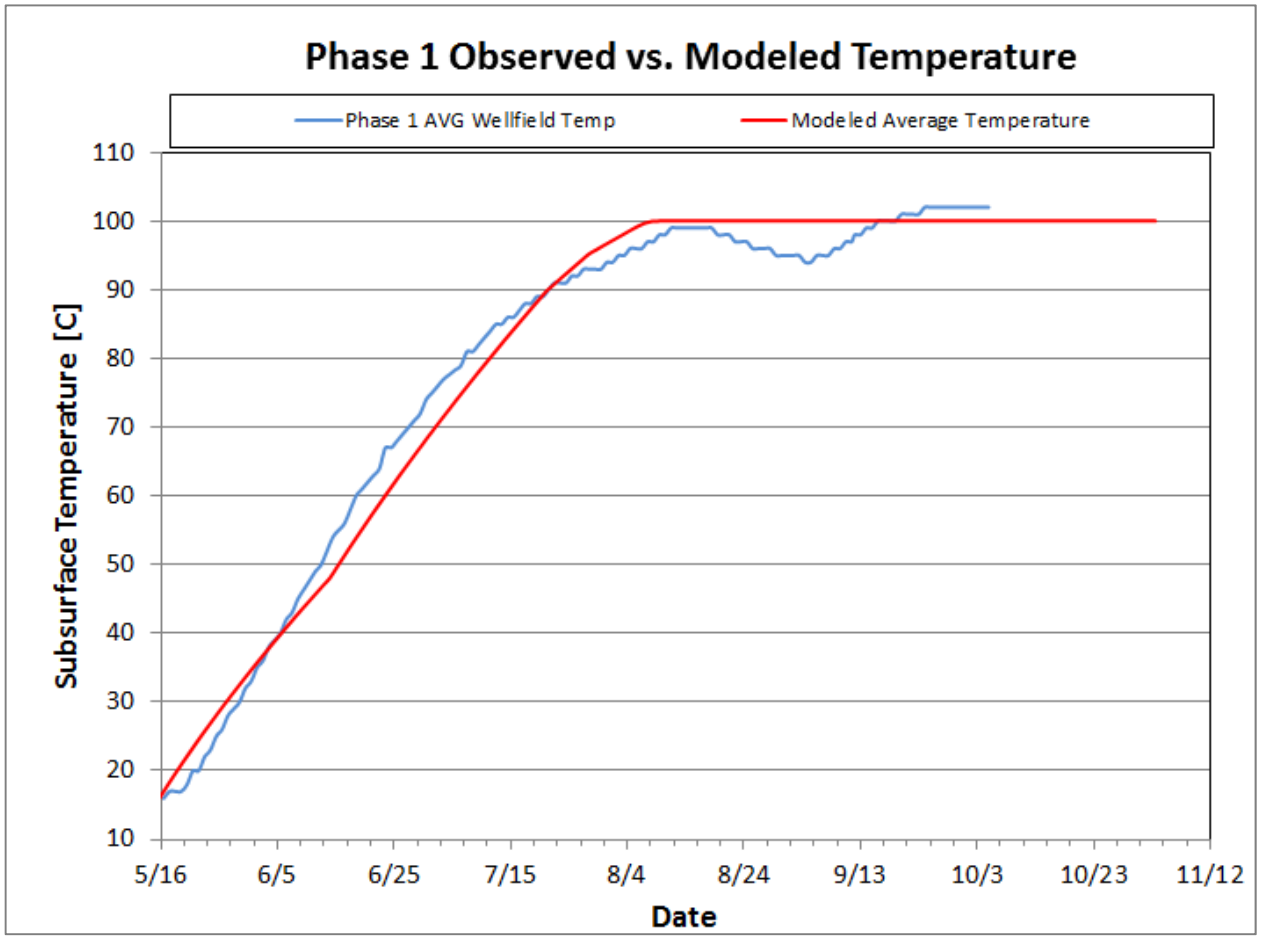


Figure 1a. Phase 1 Observed vs. Modeled Temperature

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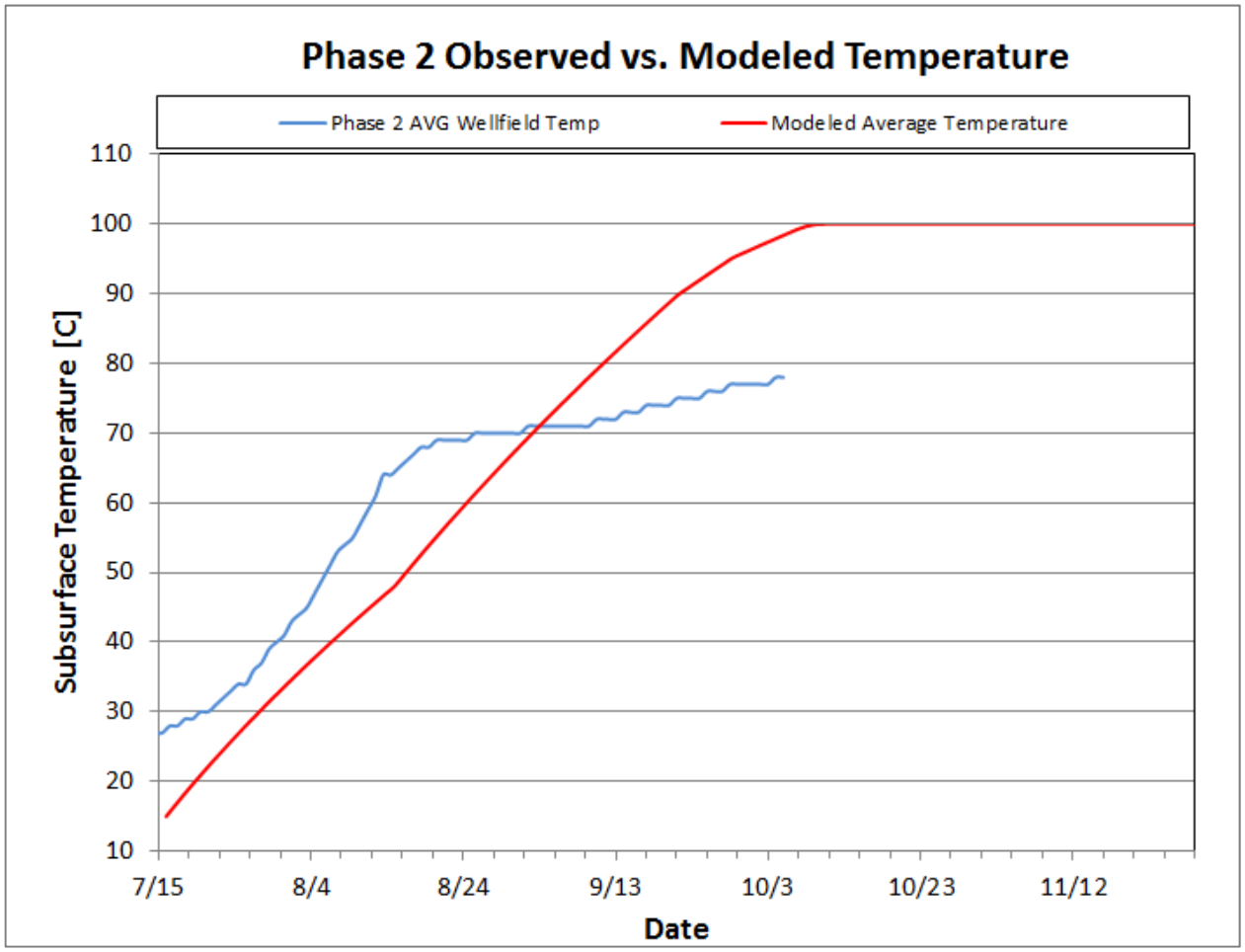


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was restarted on 8/30/14.

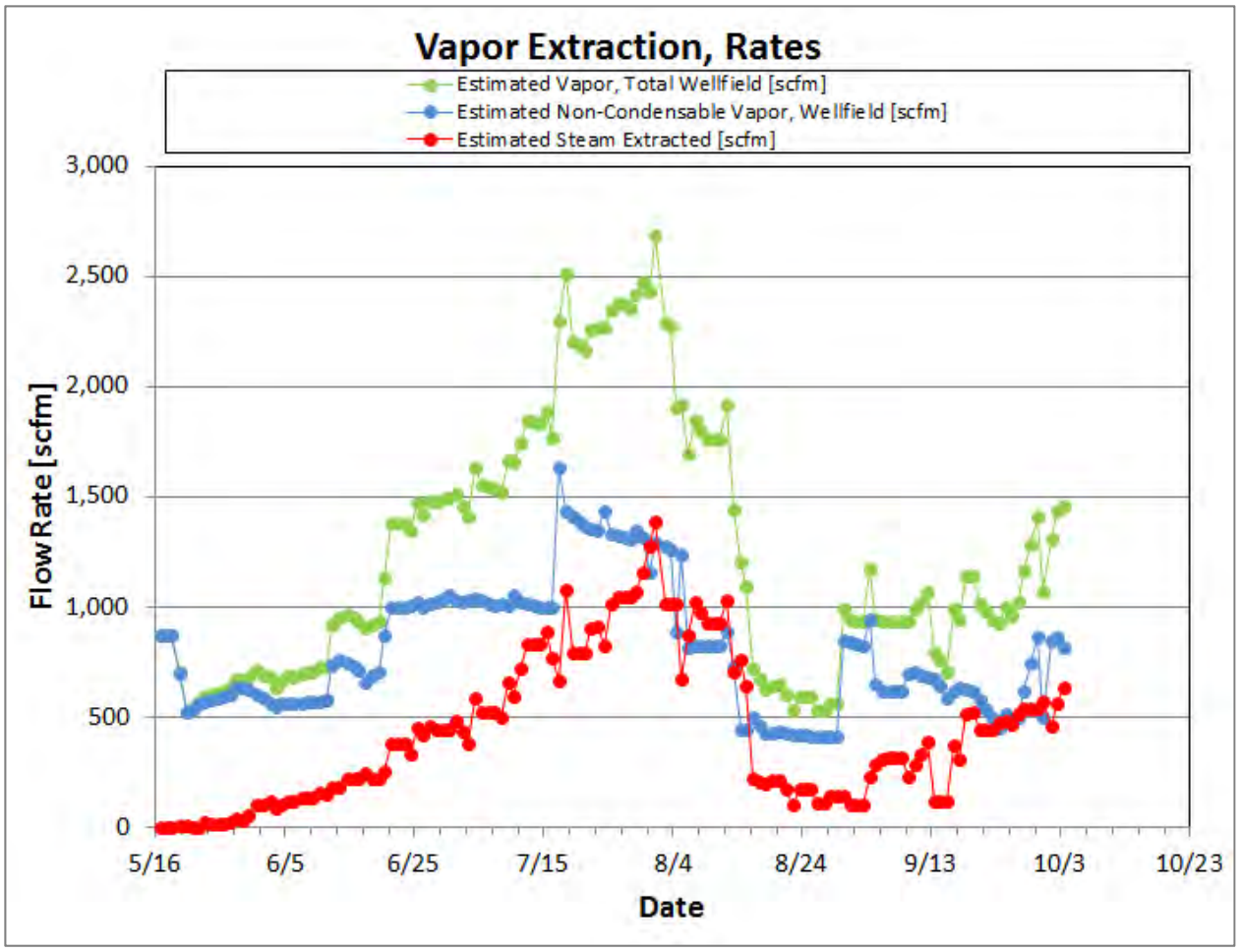


Figure 2. Vapor Extraction Rates

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4 LFLMONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

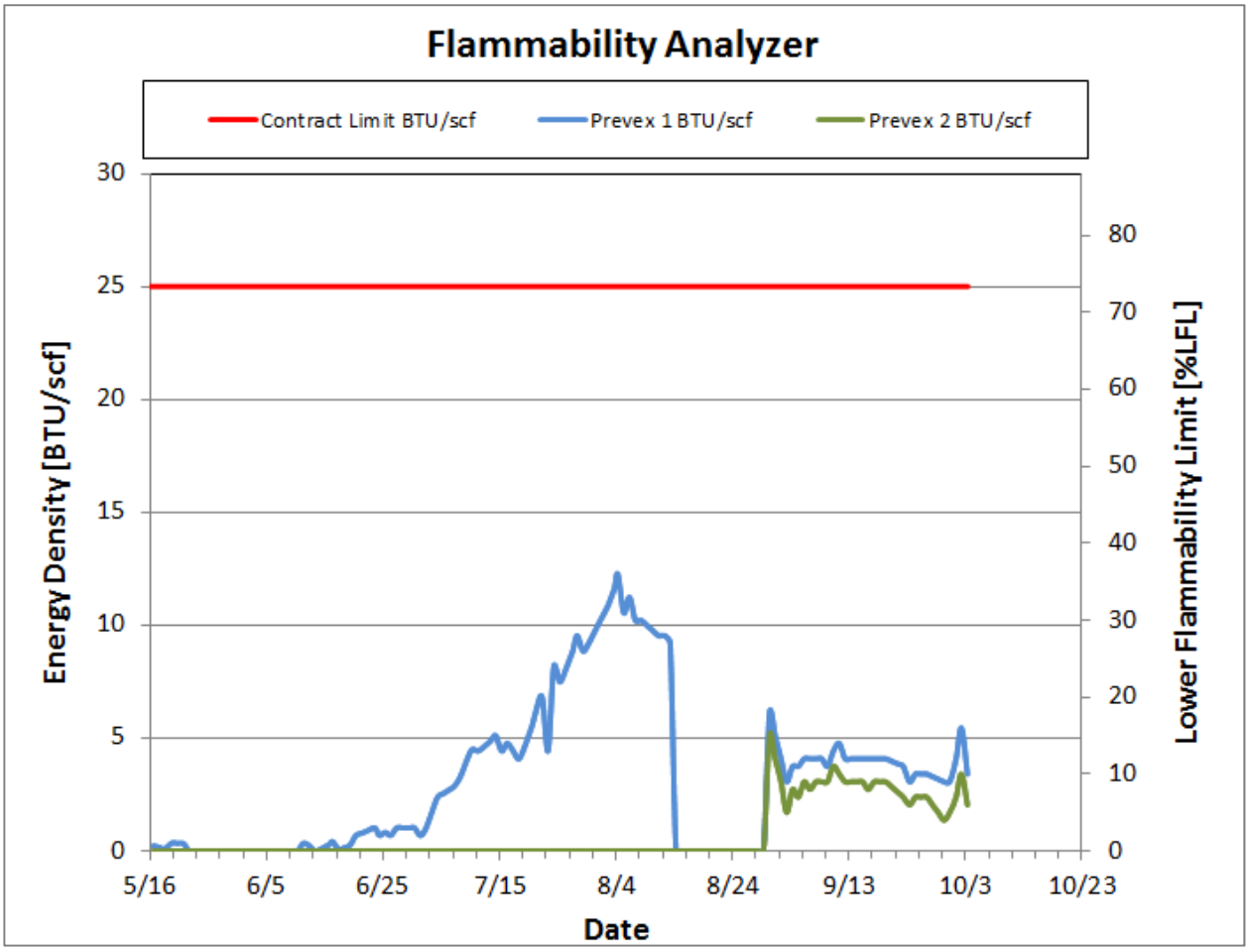


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed to date is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The decrease in mass removed starting on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/14 and 9/16/14.

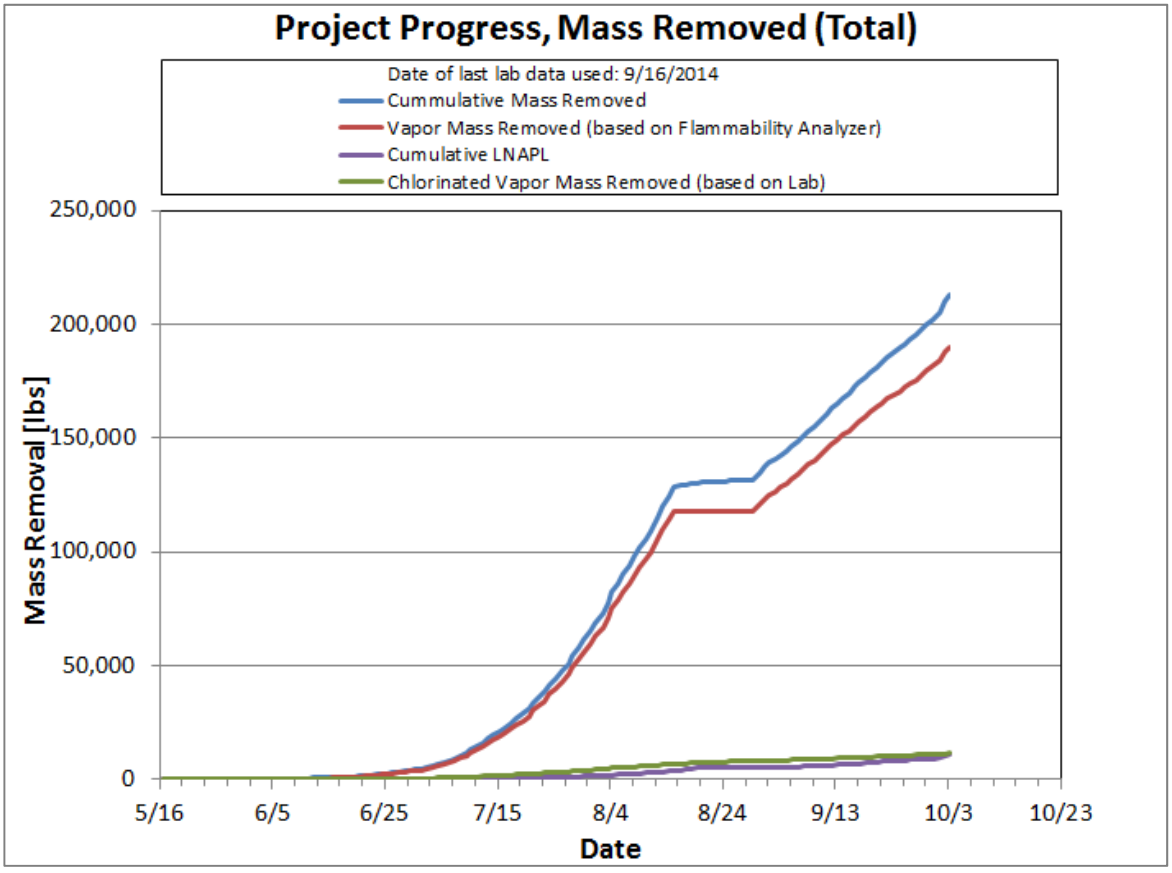


Figure 4a. Project Progress, Mass Removal (Total)

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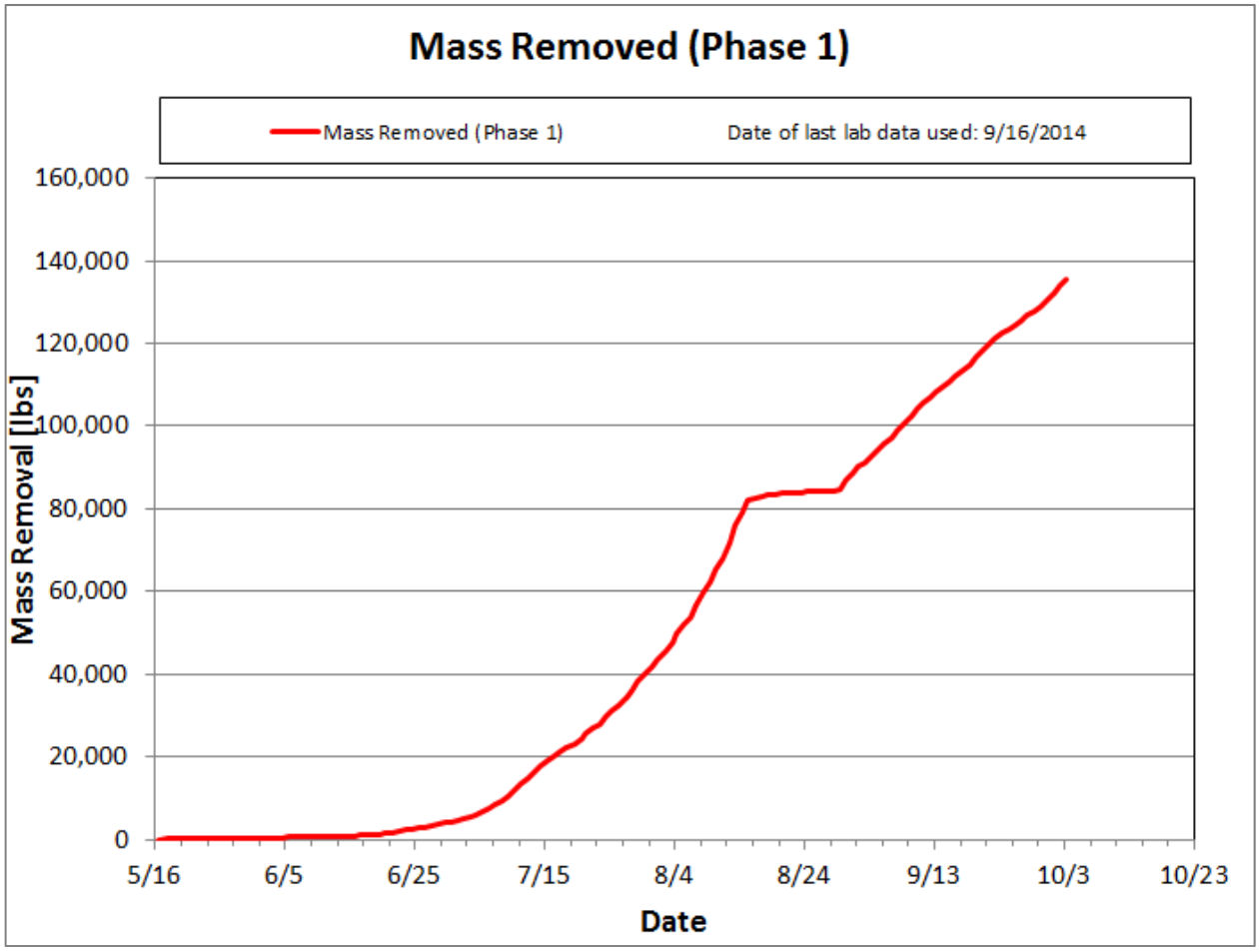


Figure 4b. Project Progress, Mass Removal (Phase 1)

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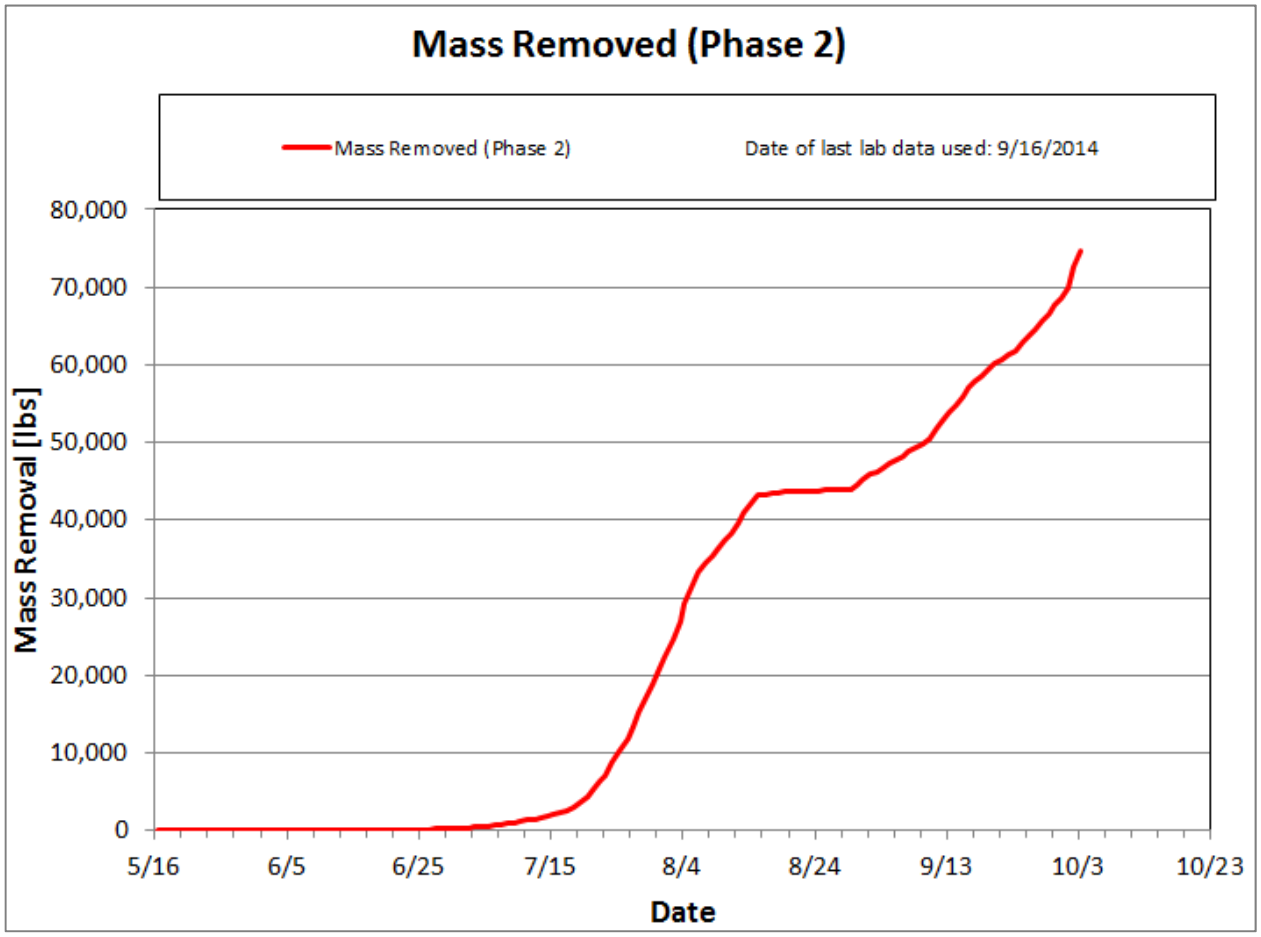


Figure 4c. Project Progress, Mass Removal (Phase 2)

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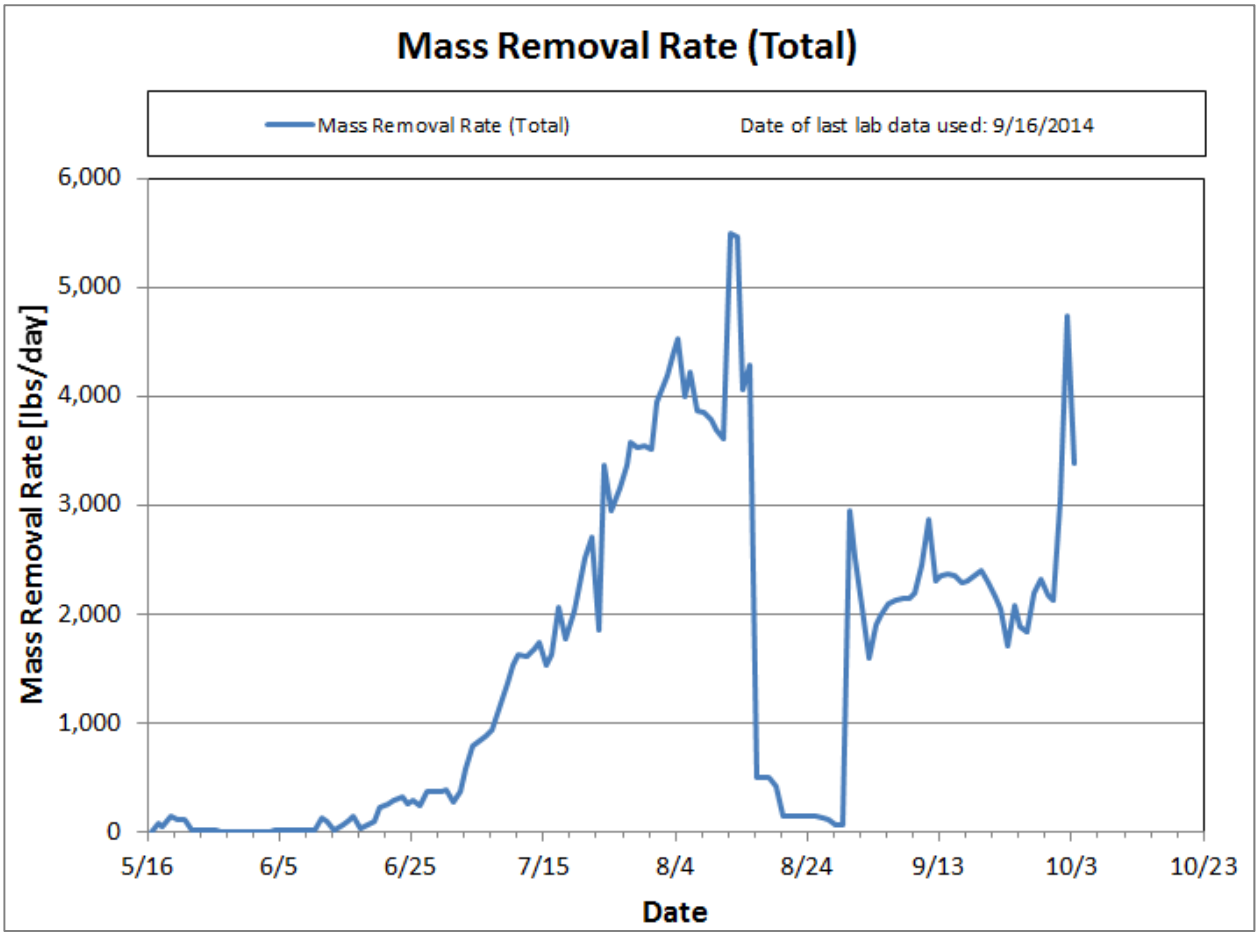


Figure 4d. Mass Removal Rate (Total for Site)

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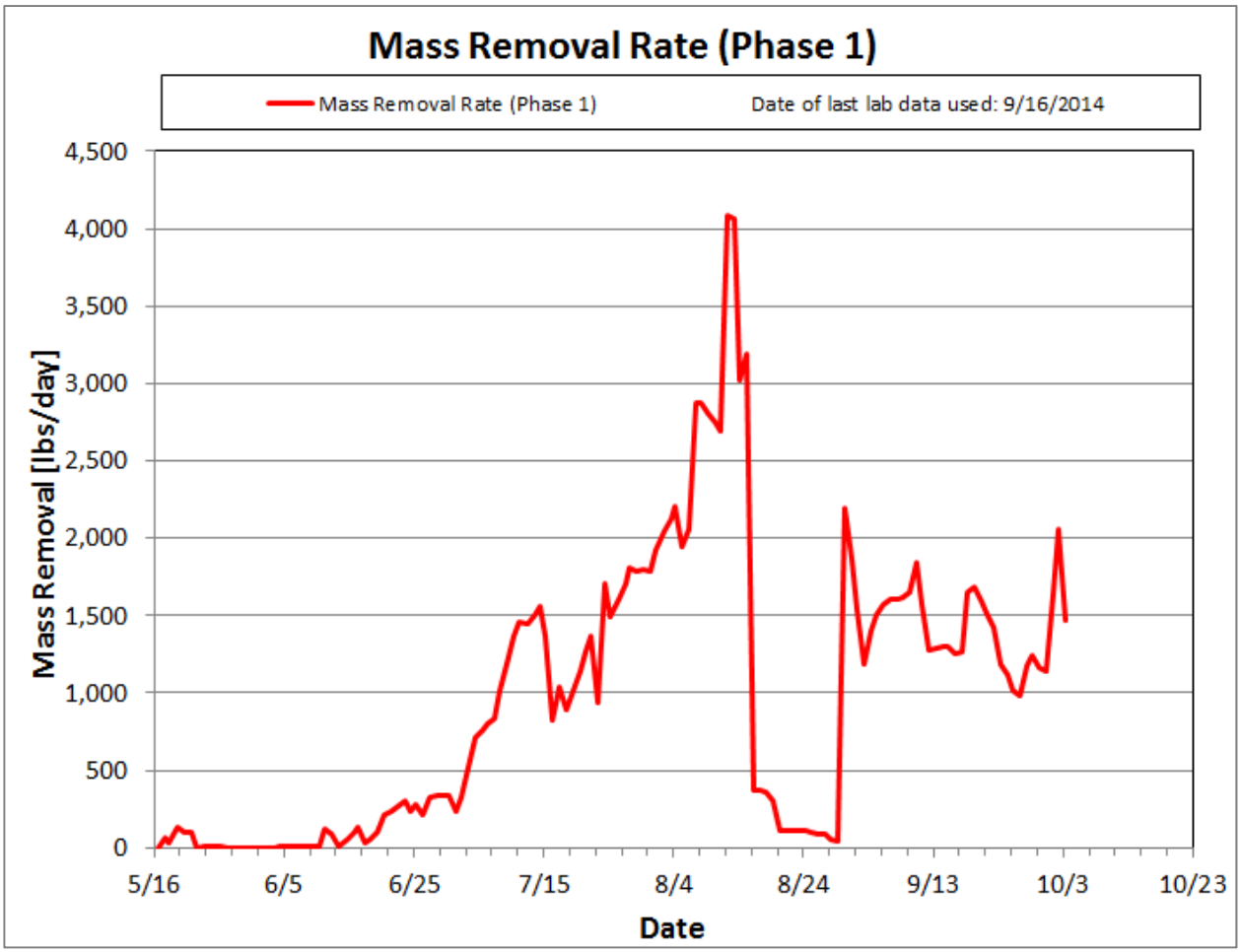


Figure 4e. Mass Removal Rate (Phase 1)

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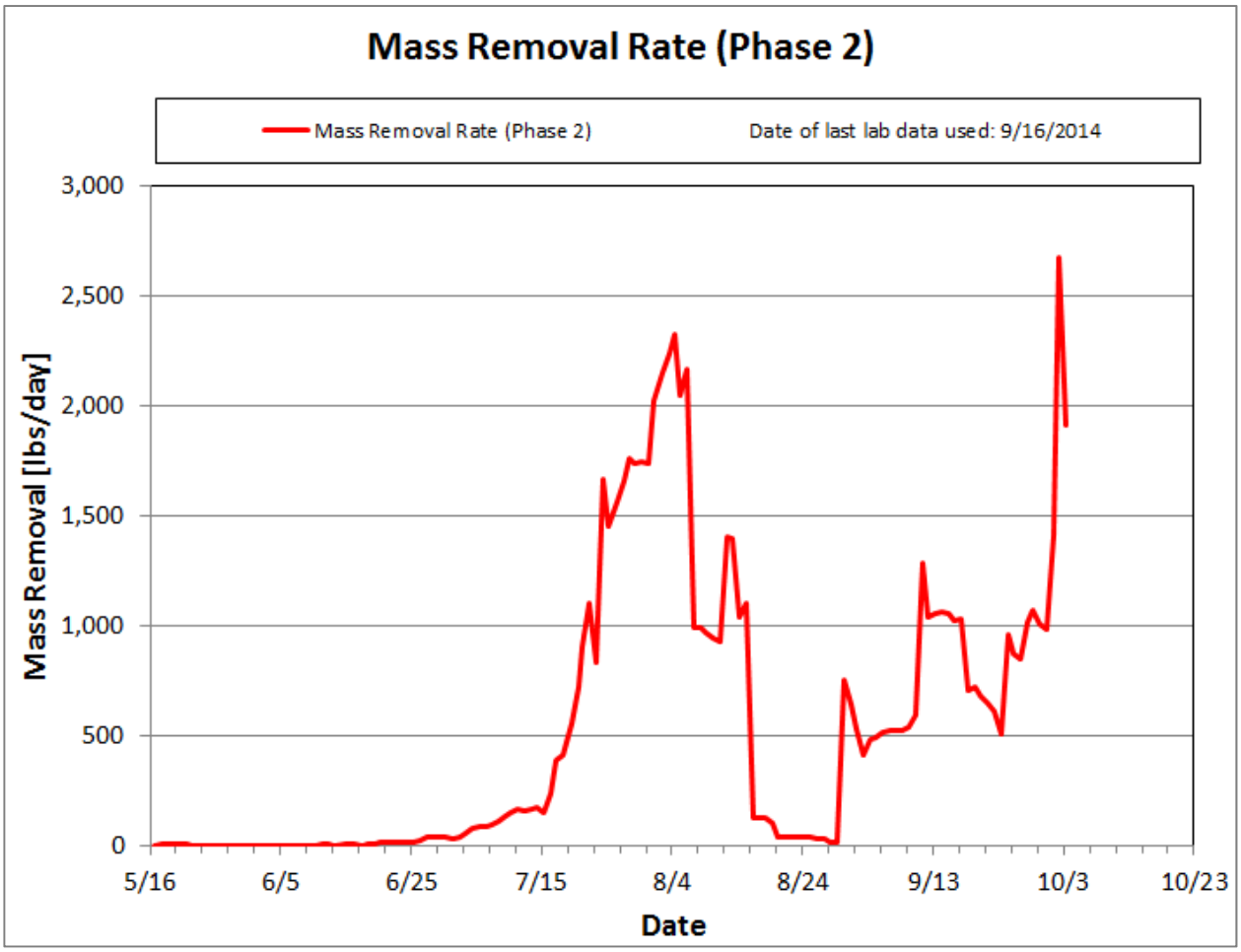


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID readings collected at the oxidizer influent over time. It should be noted that the PID reading from 7/16/14 was obtained with a PID with a 10.6 eV lamp, instead of the 11.7 eV lamp which had reached the upper concentration limit of 2,000 ppmV. Similarly, data collected on 07/25-28 were first collected with an 11.7 eV lamp with values exceeding the upper limit. The influent concentrations were then collected with the 10.6 eV lamp with values lower than the 11.7 eV upper limit (2,000 ppm). Therefore, the maximum 11.7 eV lamp is reported.

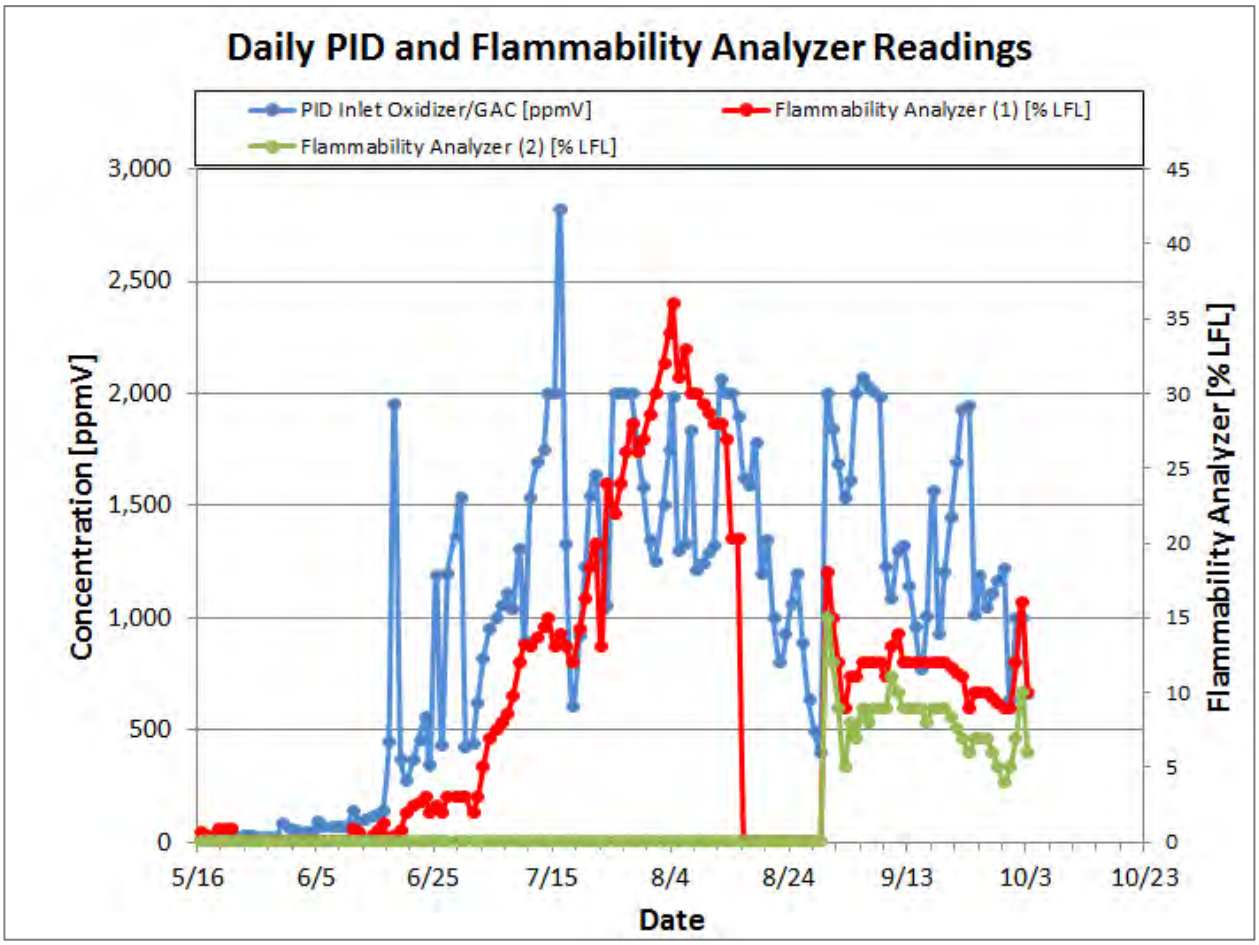


Figure 5. Daily PID Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13. Dips in the DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-out periods.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

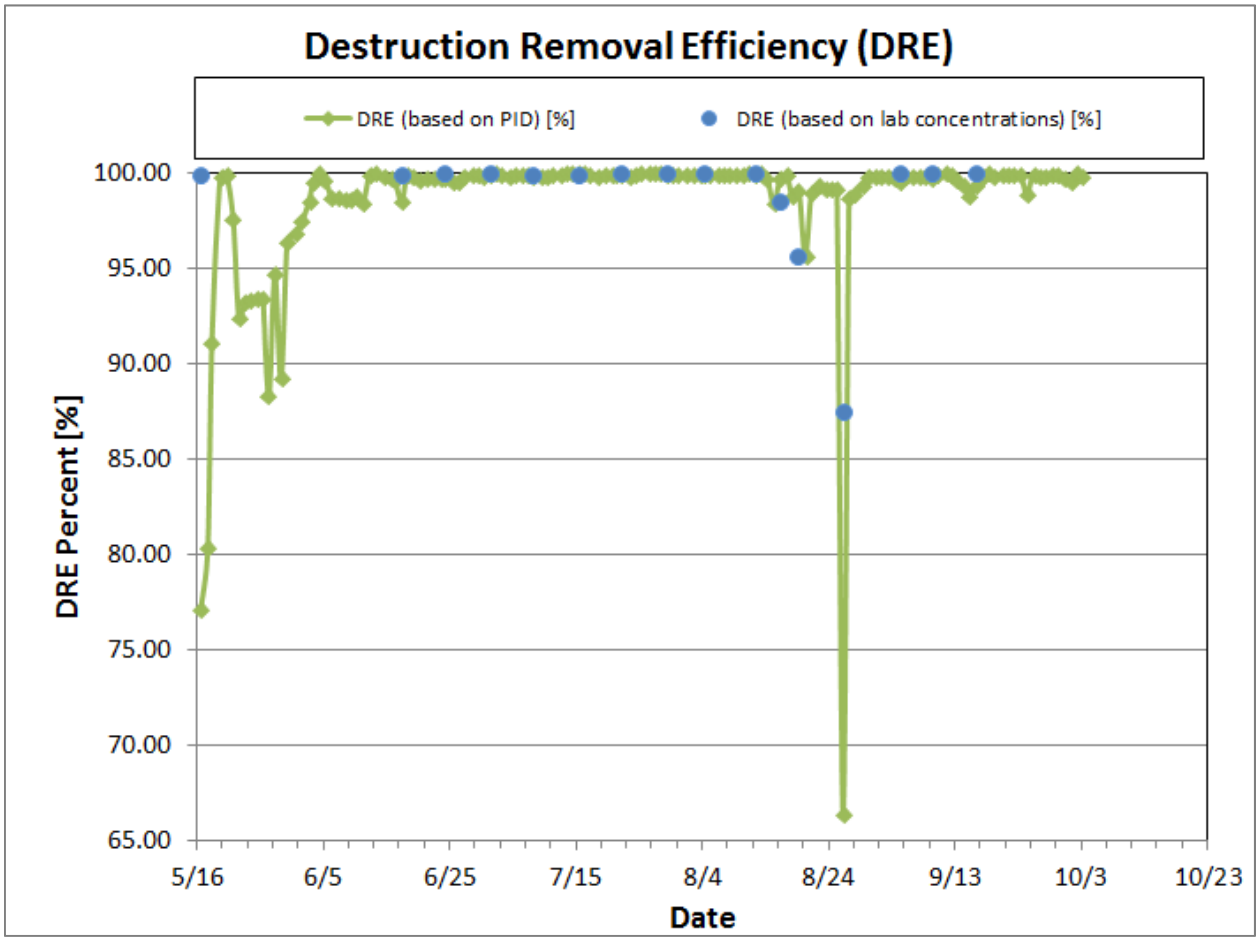


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7.

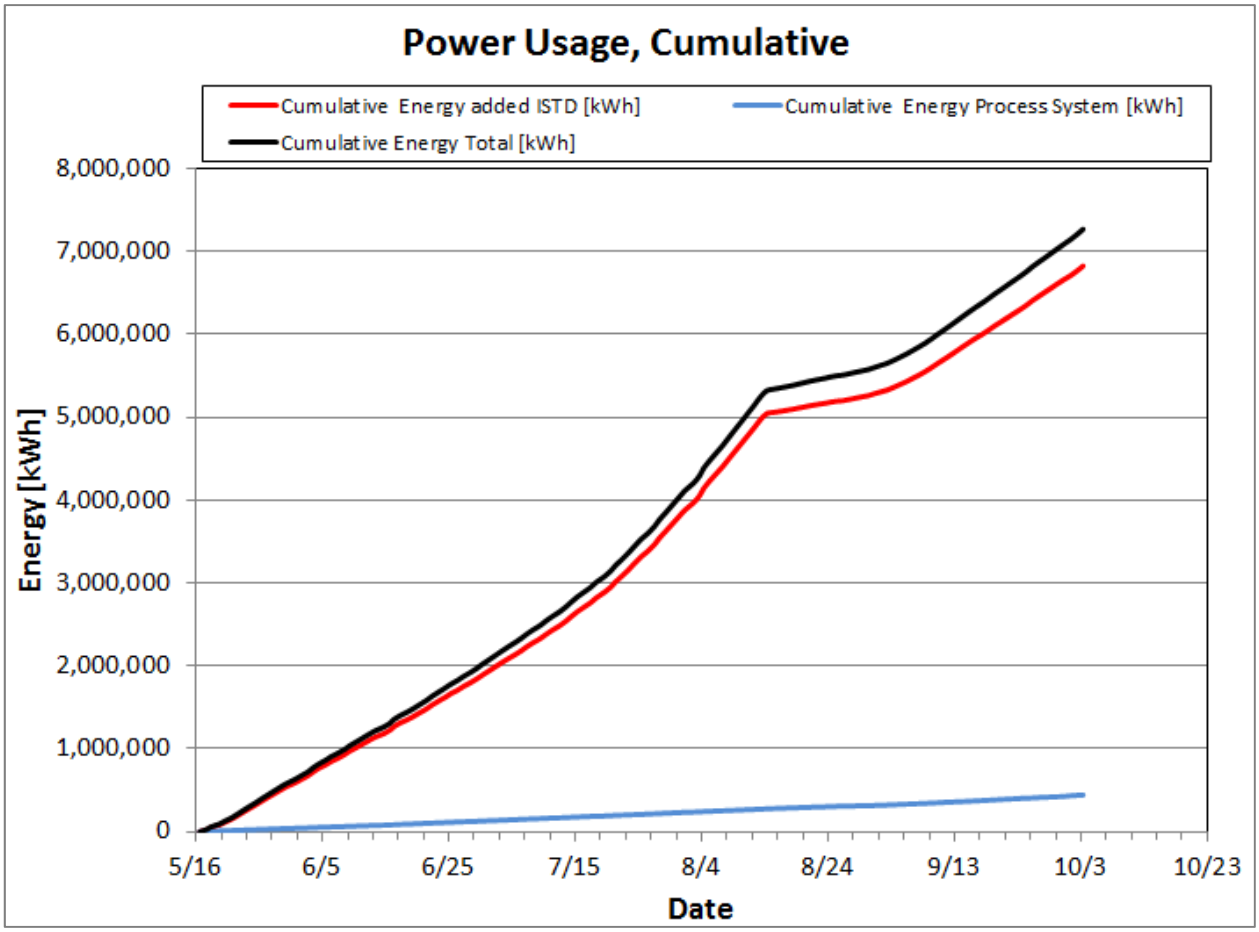


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30 and the following days corresponds with ramping of the heaters after placing the oxidizer back online. The increase in power usage on 10/3 corresponds with increasing the heaters in Phase 2.

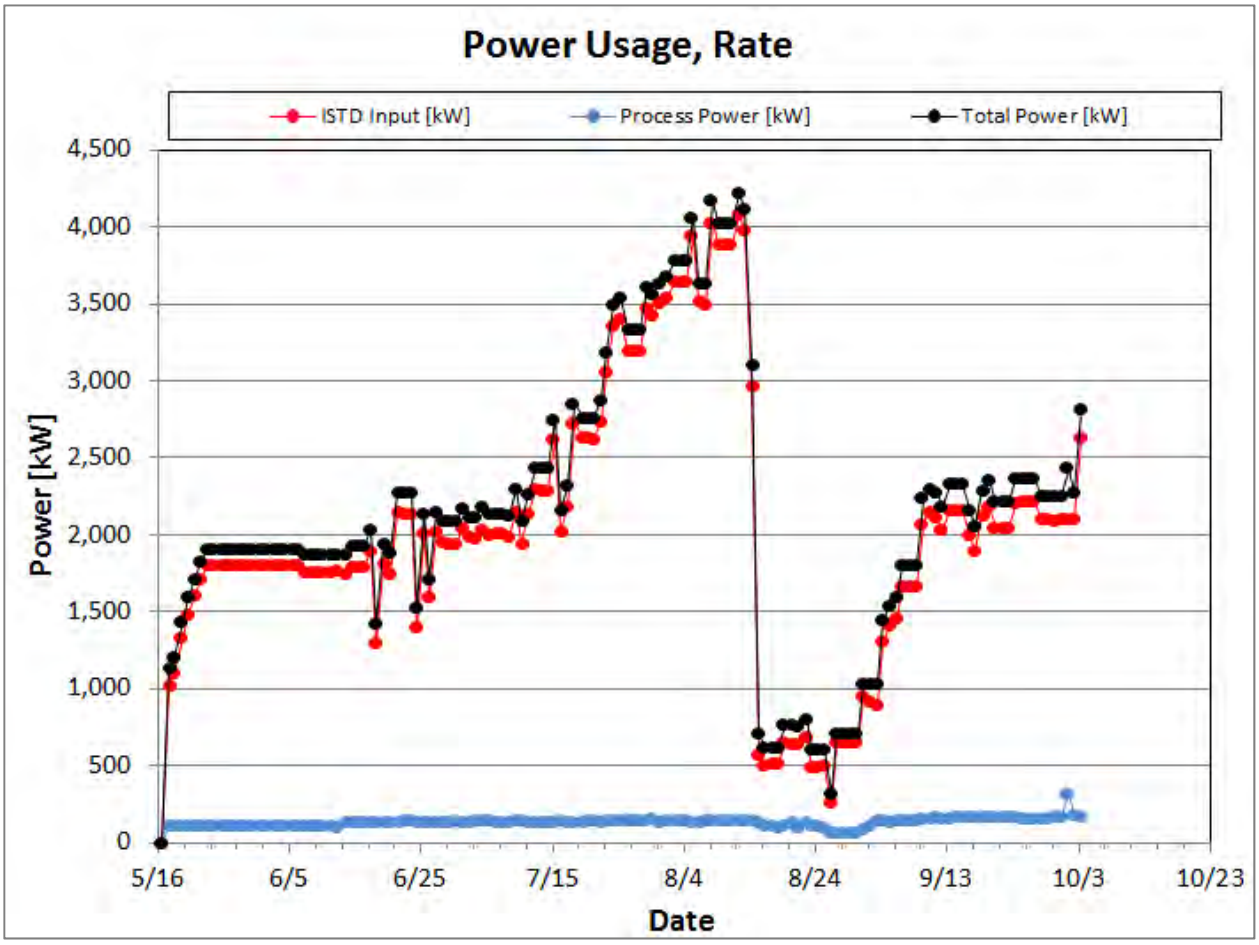


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

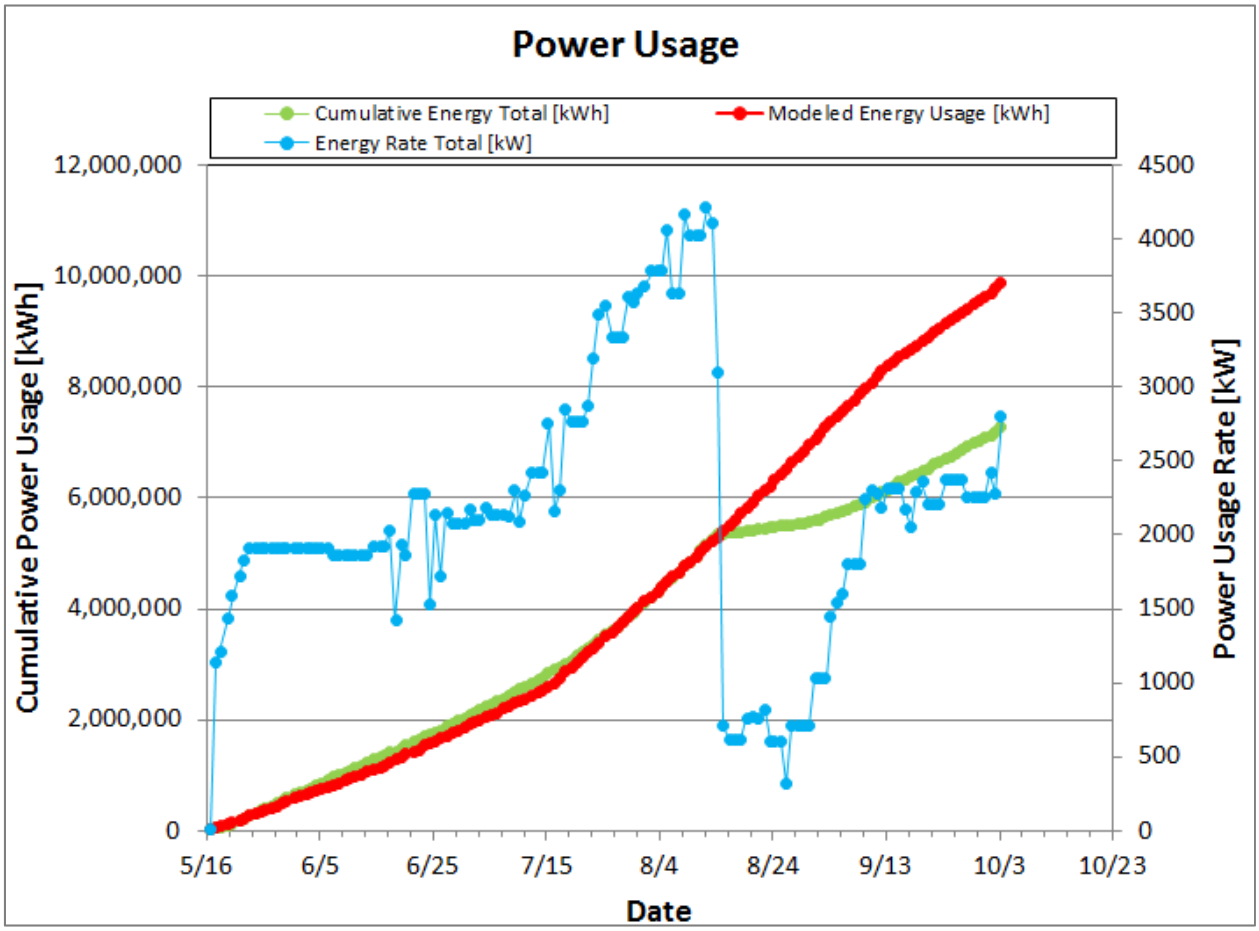


Figure 9. Power Usage

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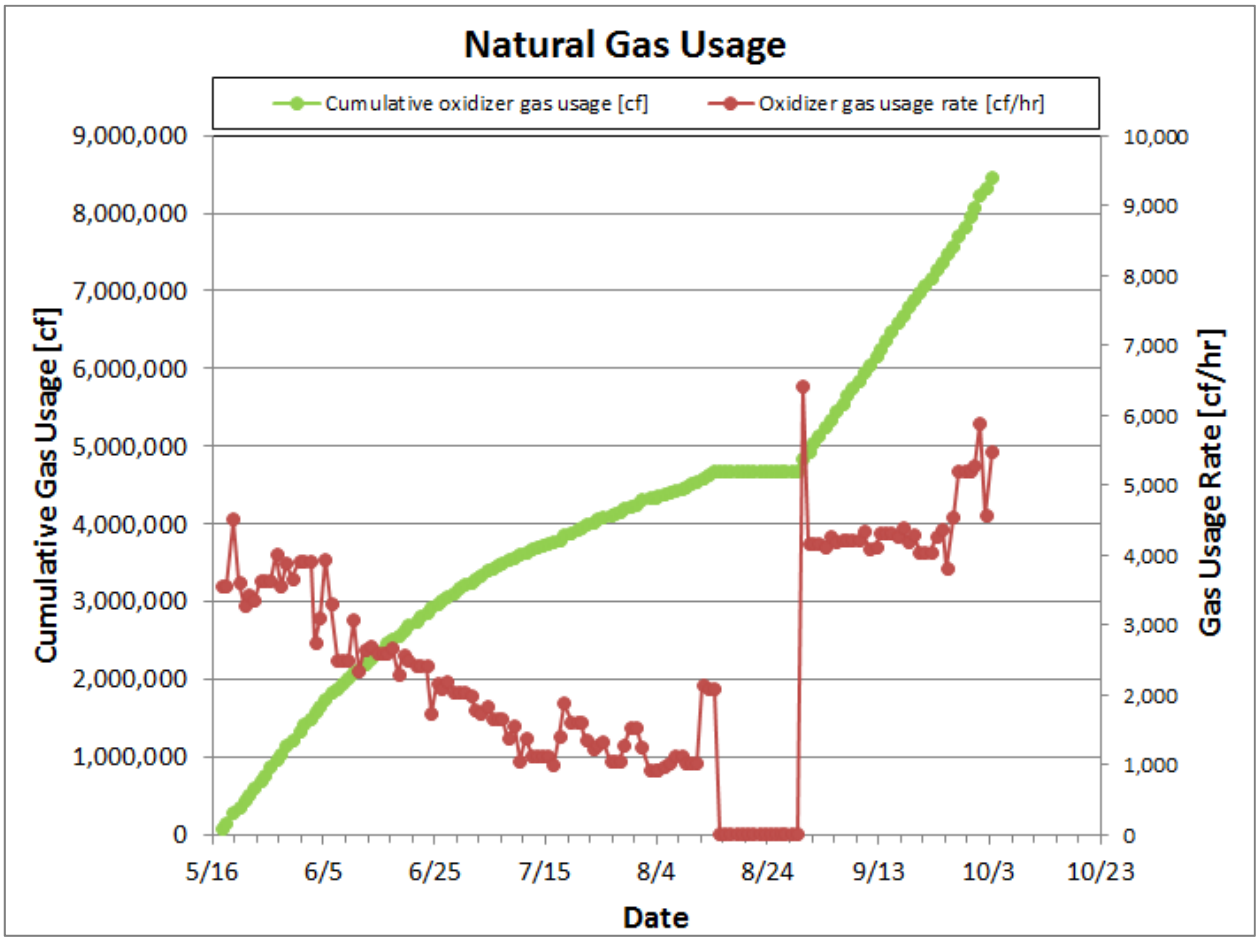


Figure 10. Natural Gas Usage

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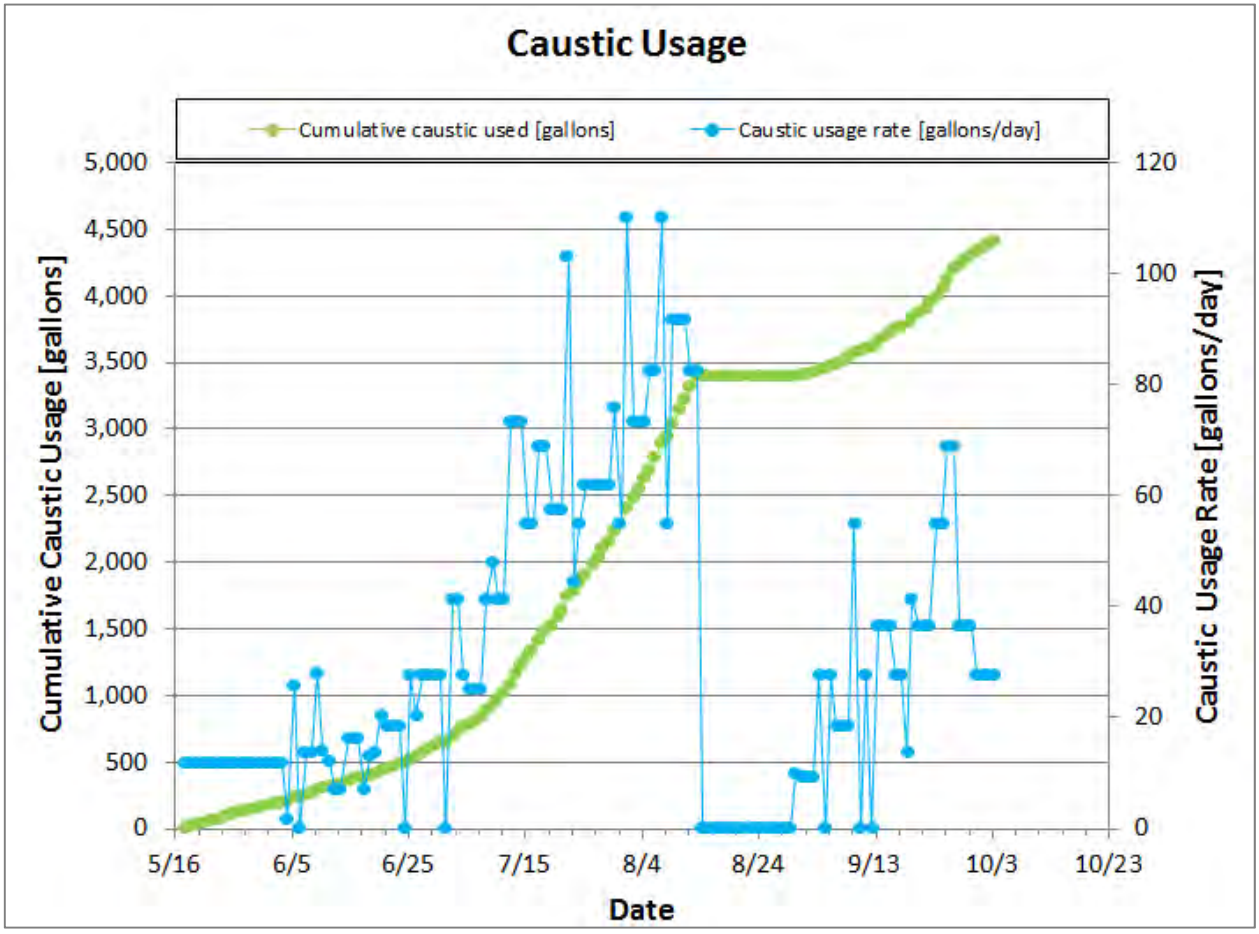


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12a. As of 9/26/14, we have reached all three payment milestone for phase 1. Phase 2 centroids are shown in Figure 12b. The scatterplots have been updated to show the centroids grouped by depth, with each depth range shown as a different color.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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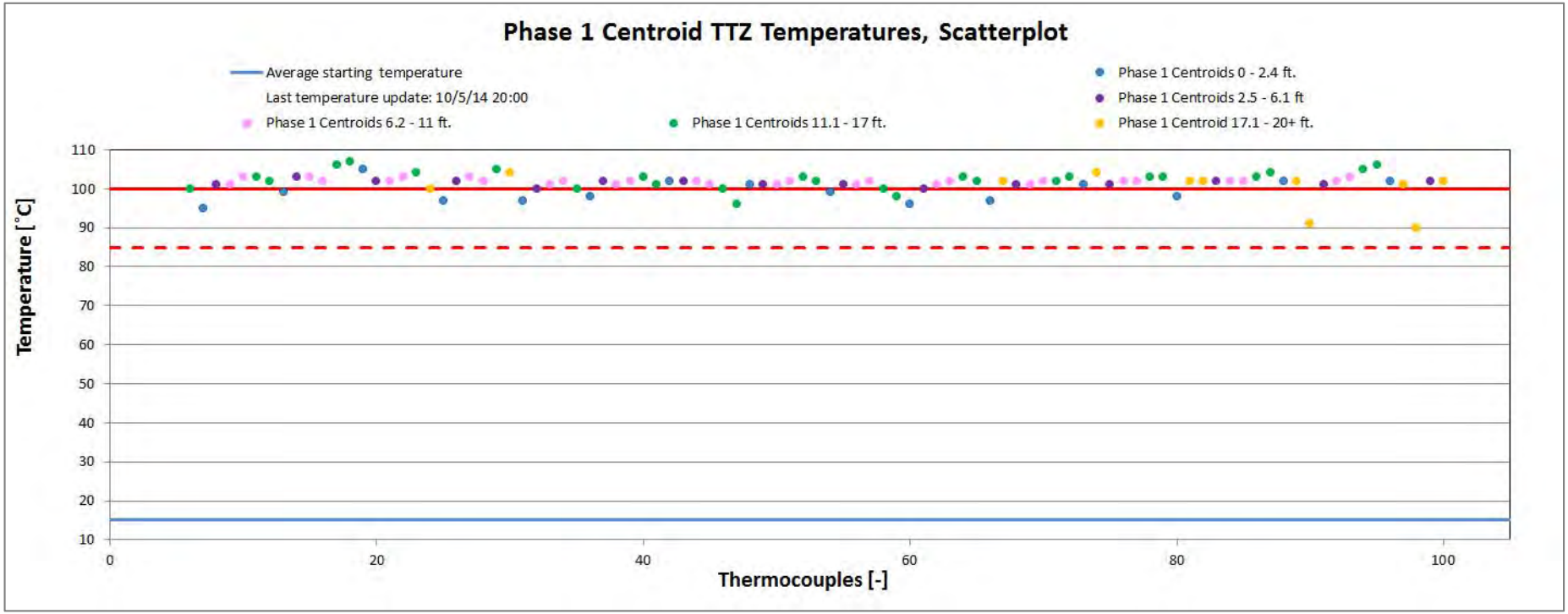


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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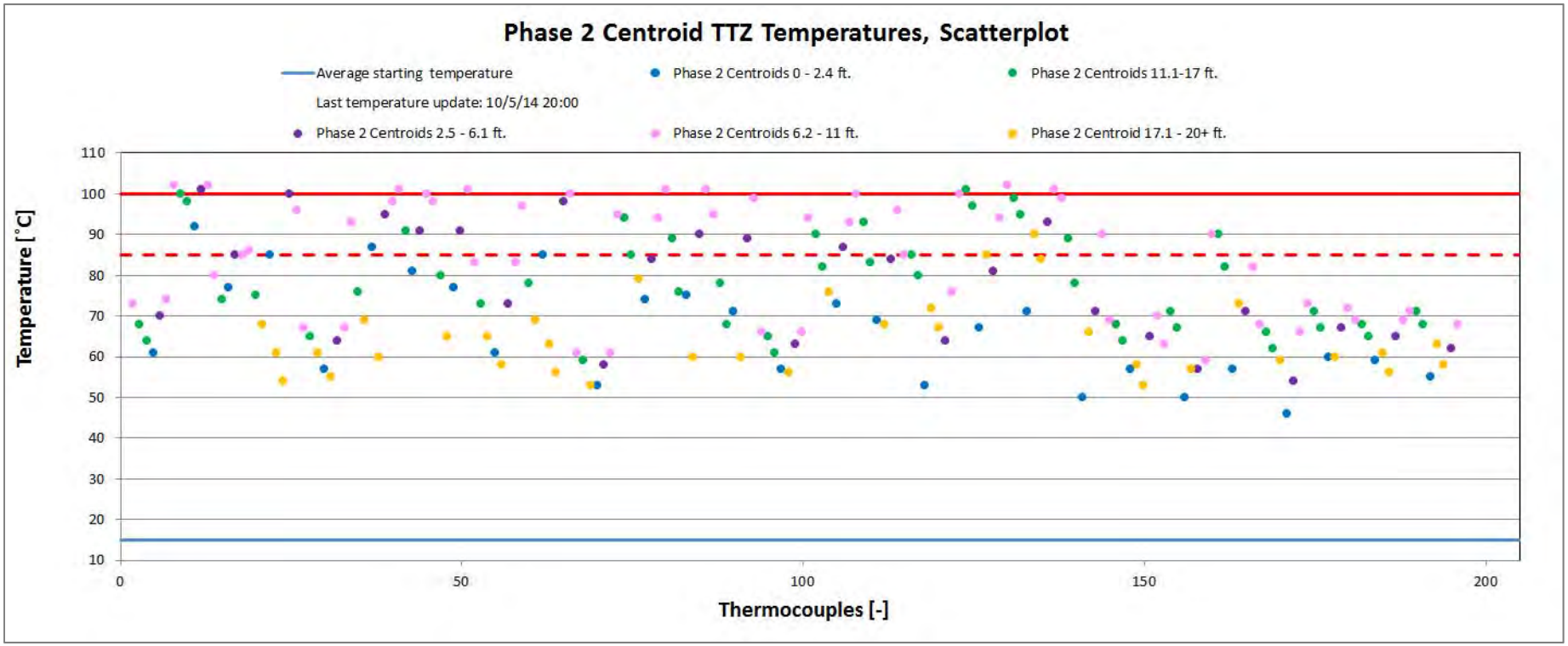


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots		
	Value	**Unit**
Date of Last Update	10/5/14	
Phase 1 Centroid Thermocouples ≥85 °C	100	%
Phase 1 Centroid Thermocouples ≥100 °C	93	%
Phase 2 Centroid Thermocouples ≥85 °C	36	%
Phase 2 Centroid Thermocouples ≥100 °C	11	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday October 3, 2014 through Friday October 10, 2014, with temperatures updated through Sunday October 12, 2014.

Table 1 provides a summary of the project operational status as of Friday, October 10, 2014.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	10/10/14	
Last Temperature Data Update	10/12/14	
Days of Operation (Total)	124	days
Days of Phase 1 Operation	124	days
Days of Phase 2 Operation	19	days
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	7,721,900	kWh
Used Electrical Energy vs. Estimate	48.9	%
Total Mass Removed	383,699	lbs
Average Power Input Last 24 Hours	2,970	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,126	scfm
Average Condensate Production Rate Last 24 Hours	3.7	gpm

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Heaters in Phase 1 remain online at inputs to maintain steam temperatures; while heaters in Phase 2 are at approximately 65%.

As of 10/3/14, Phase 1 has operated for 124 days and Phase 2 for 19 days. Please note that this represents days where heaters operated at or above 70% (per contract definition). The current average wellfield temperature for Phase 1 is 102°C and 81°C for Phase 2. All three temperature milestone have been achieved for Phase 1.

The second progress soil sampling event is currently in progress.

Estimated mass removed to date is reported using the flammability analyzer data, lab data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. These results yield a total mass removal of 383,595 lbs as of 10/10/14. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 10/9/14. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.59:0.41. These ratios were applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling. Temperatures have returned, and are now exceeding those prior to shutdown at all treatment depths.

Phase 2 heating began on 7/16/14 but was stopped on August 14, 2014, as a result of the oxidizer shutdown. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling. Heaters in Phase 2 are near full power.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	10/12/14	
Phase 1 Entire TTZ Average Temperature	102	°C
Phase 2 Entire TTZ Average Temperature	81	°C
Phase 1 Centroid Average Temperature	101	°C
Phase 2 Centroid Average Temperature	78	°C

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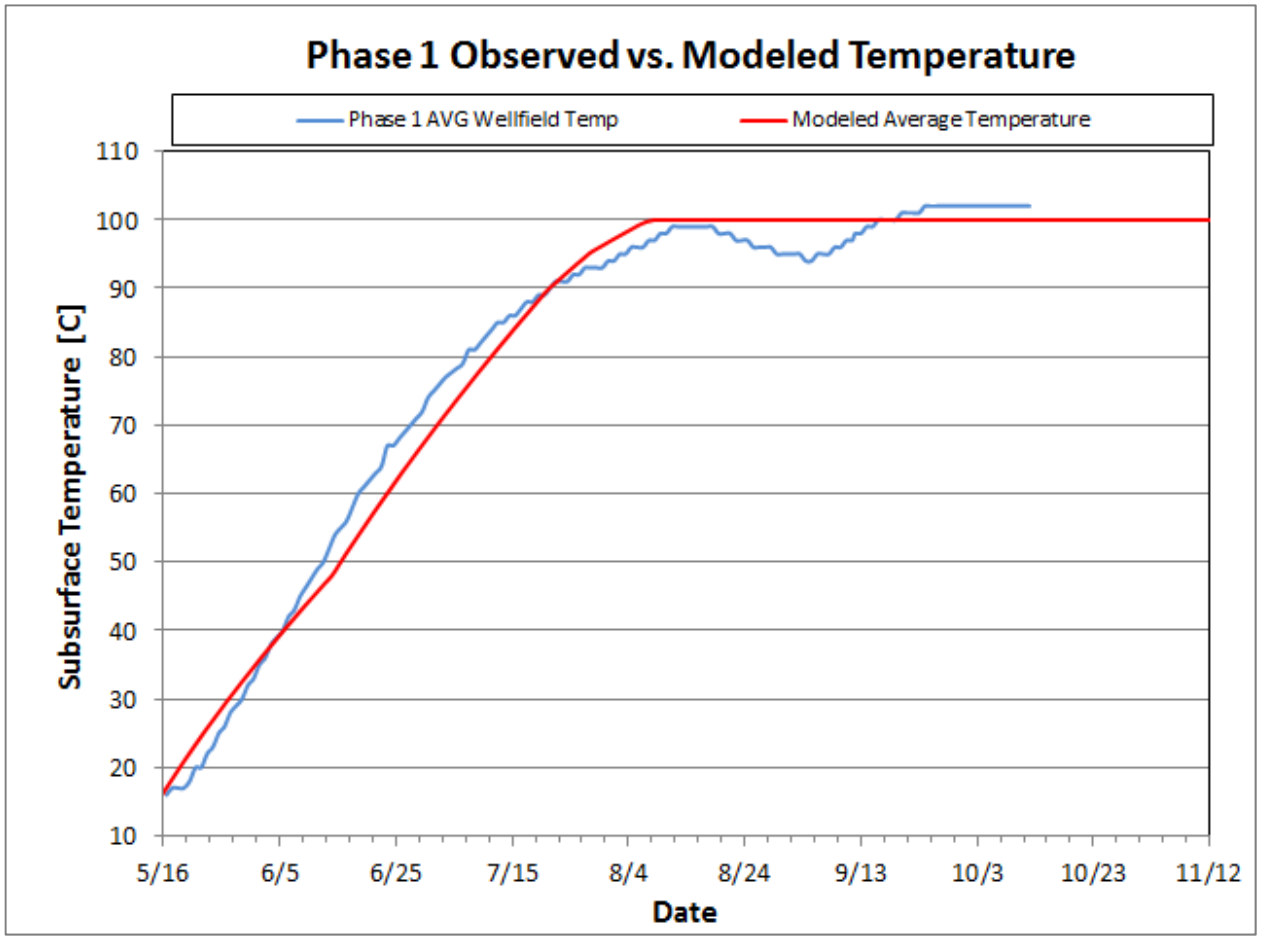


Figure 1a. Phase 1 Observed vs. Modeled Temperature

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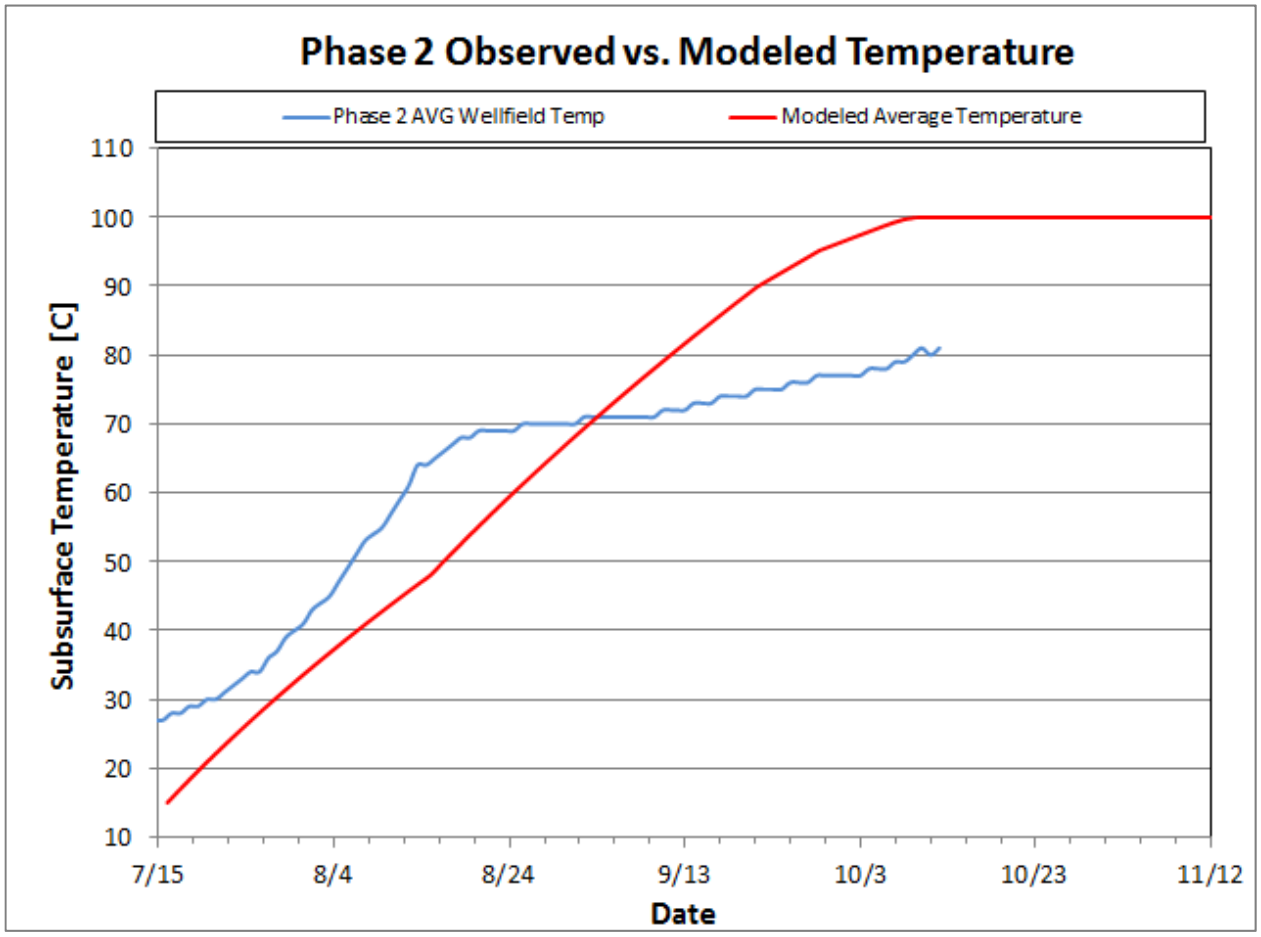


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was restarted on 8/30/14.

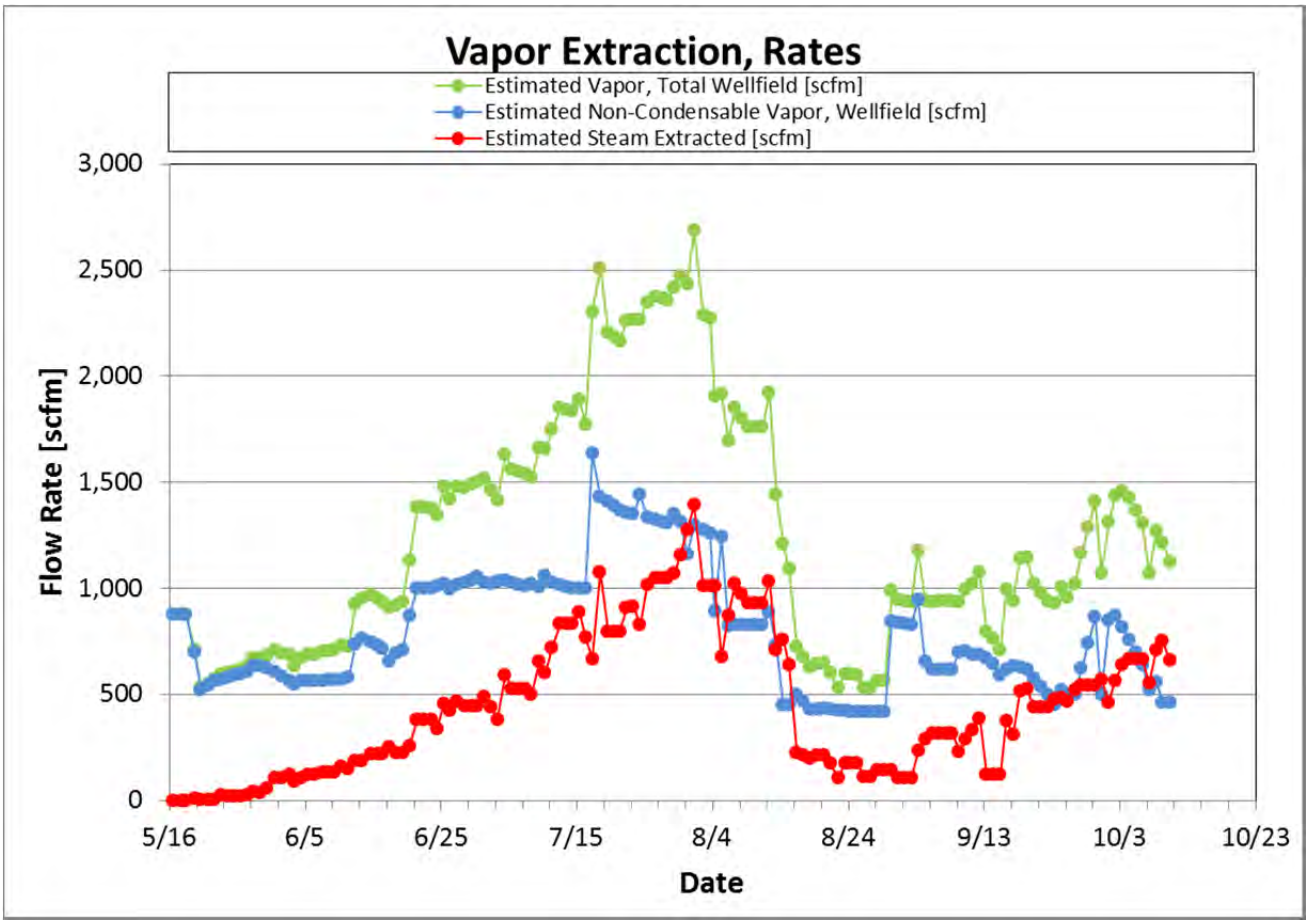


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf. Please note that after review and comment by Focus Environmental, scales have been adjusted to reflect the contract language and data plotted prior to the oxidizer shutdown reflect a temperature correction.

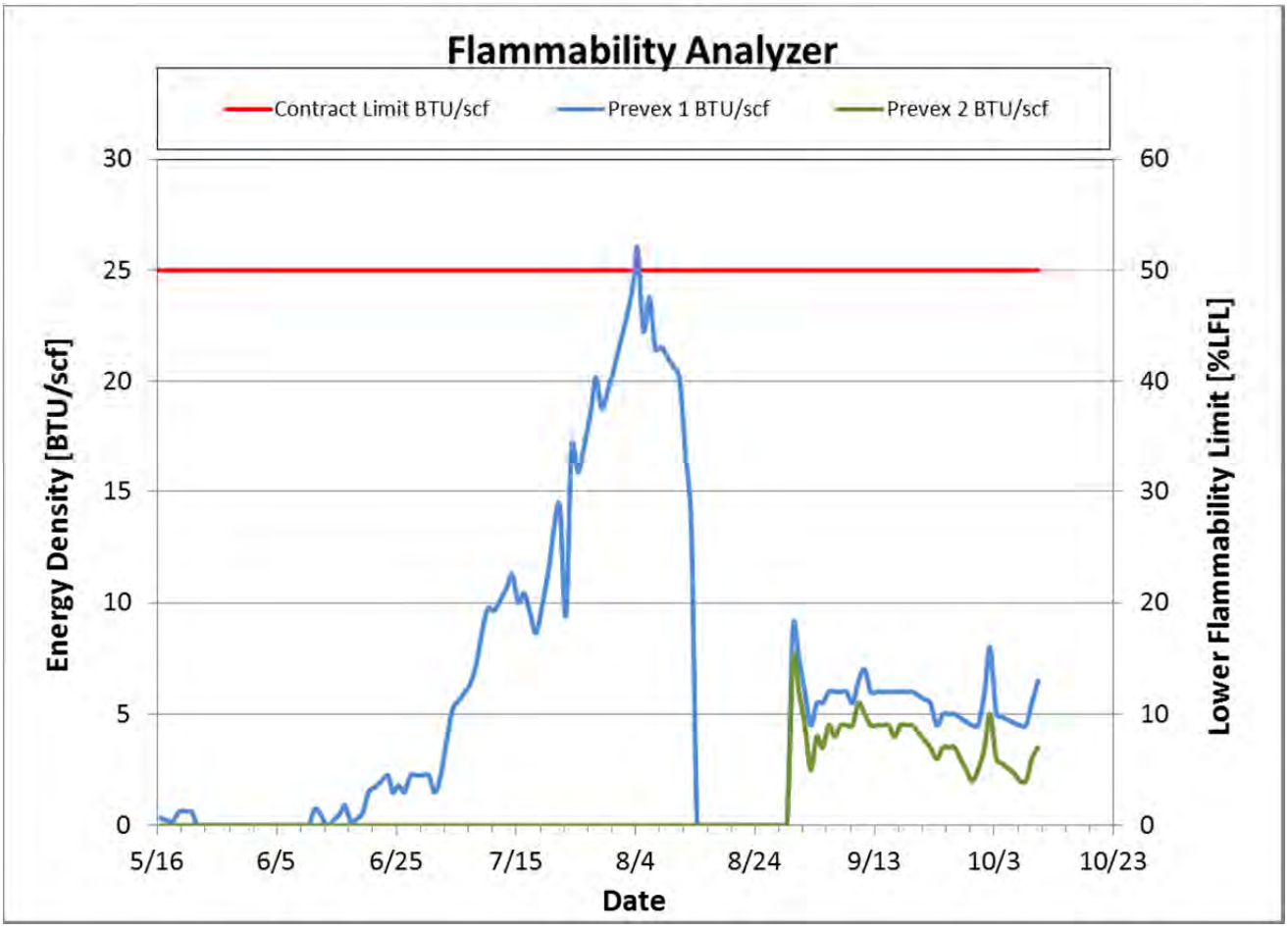


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed to date is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The decrease in mass removed starting on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14 and 9/23/14.

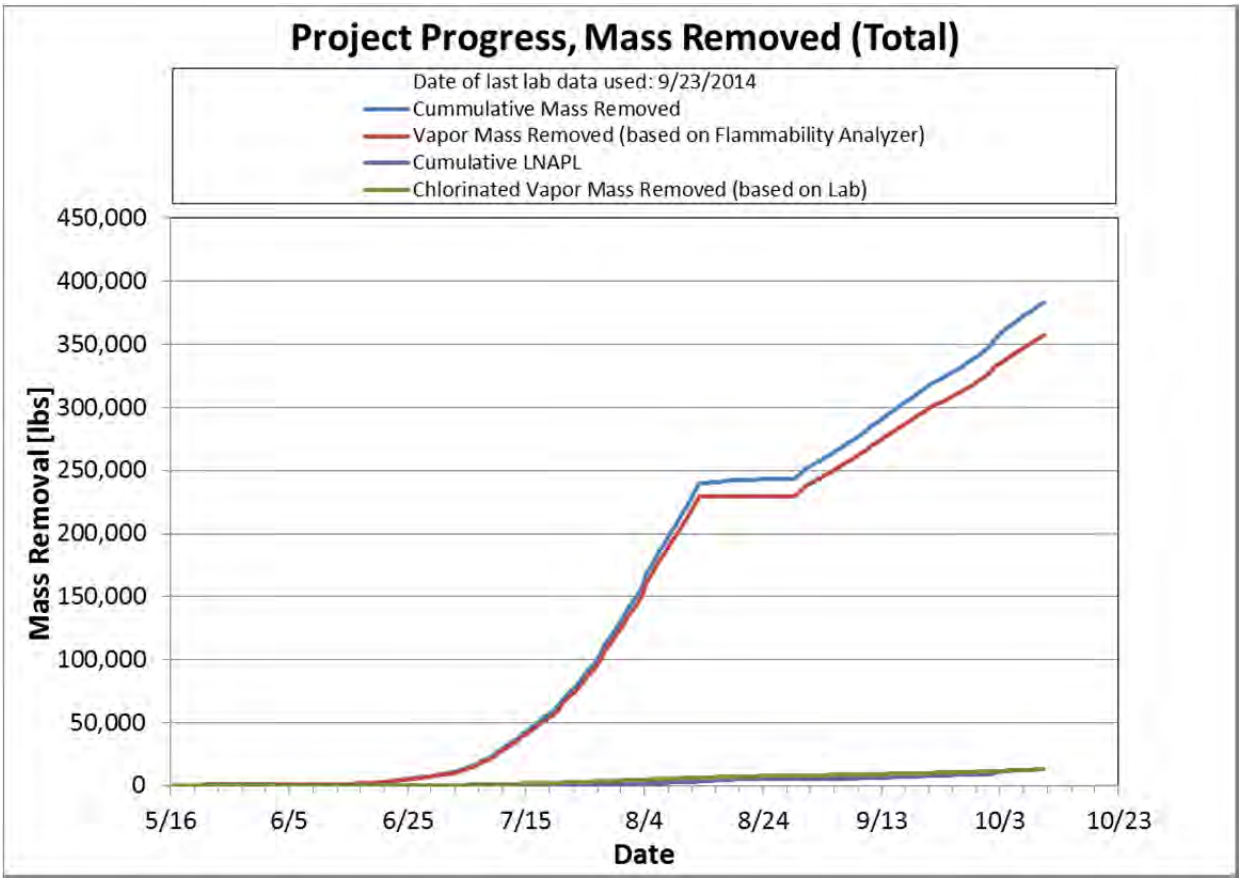


Figure 4a. Project Progress, Mass Removal (Total)

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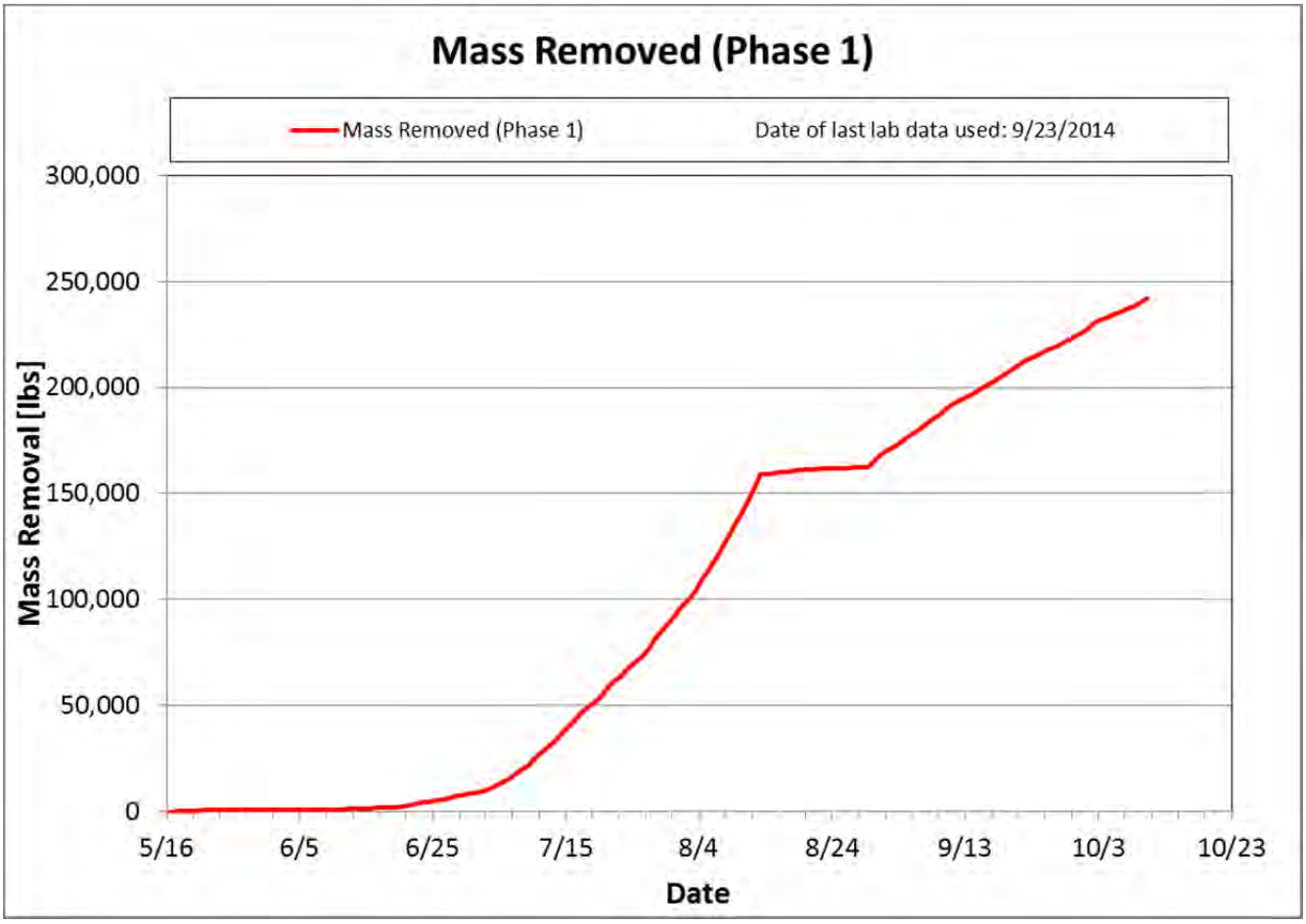


Figure 4b. Project Progress, Mass Removal (Phase 1)

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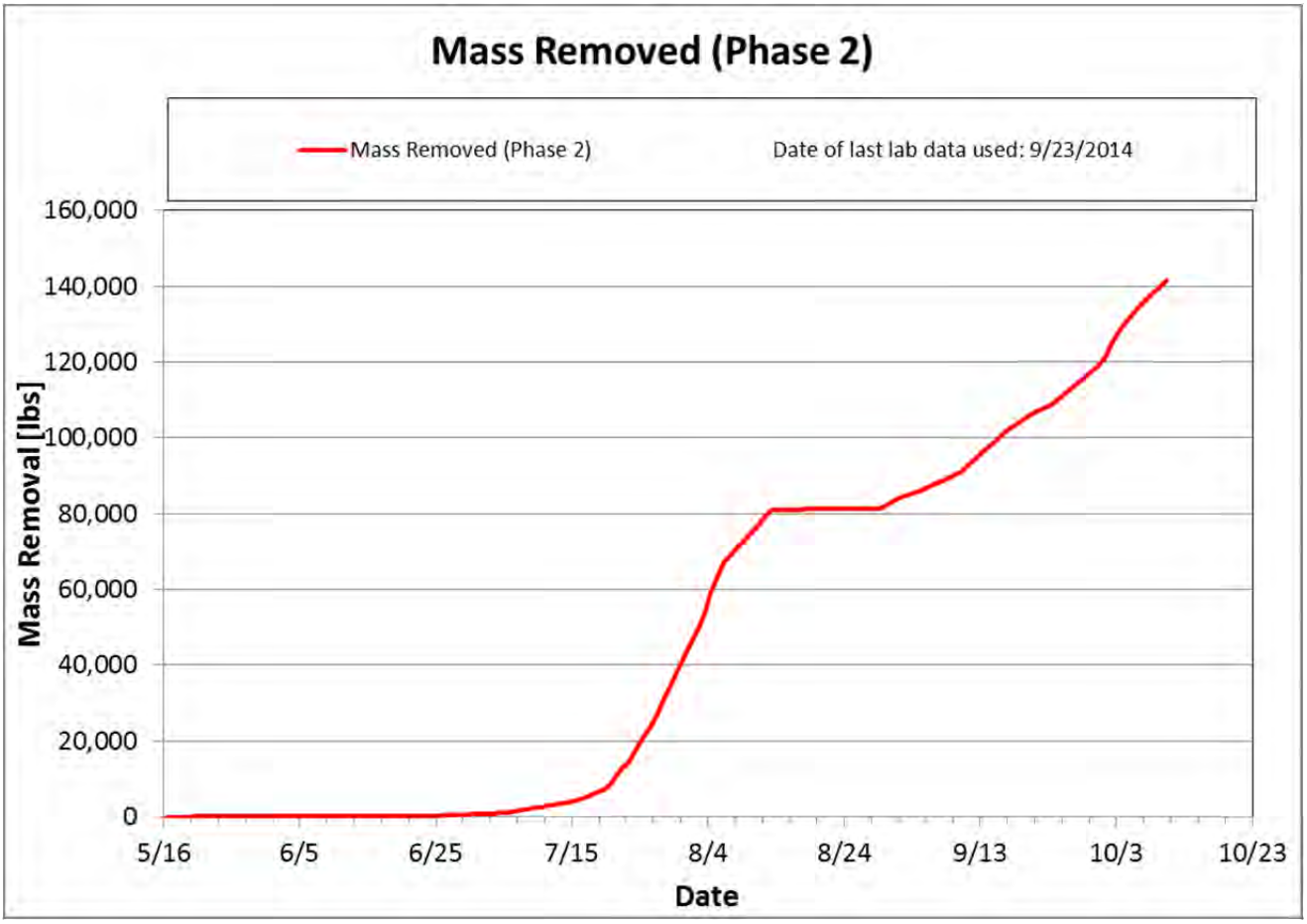


Figure 4c. Project Progress, Mass Removal (Phase 2)

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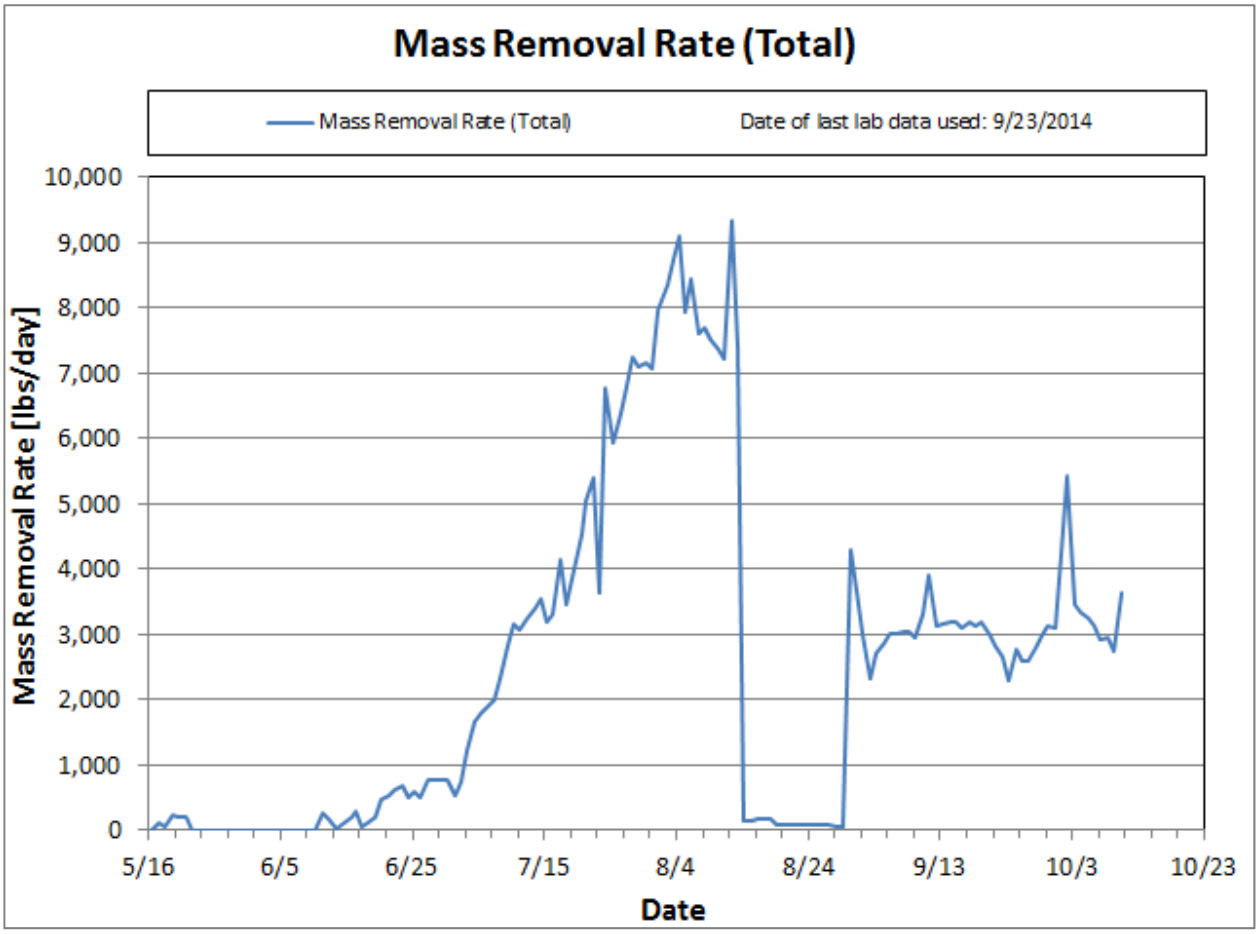


Figure 4d. Mass Removal Rate (Total for Site)

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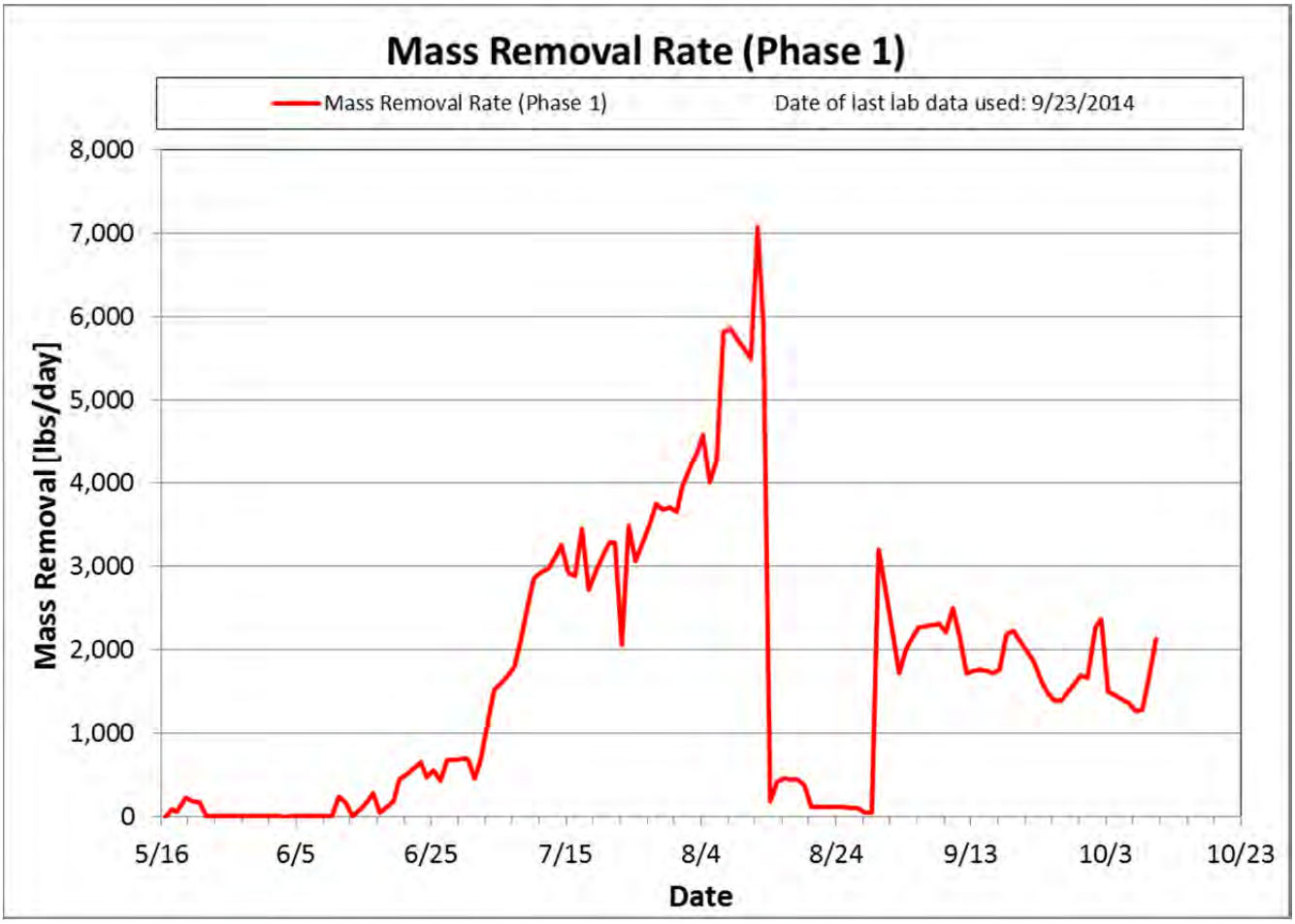


Figure 4e. Mass Removal Rate (Phase 1)

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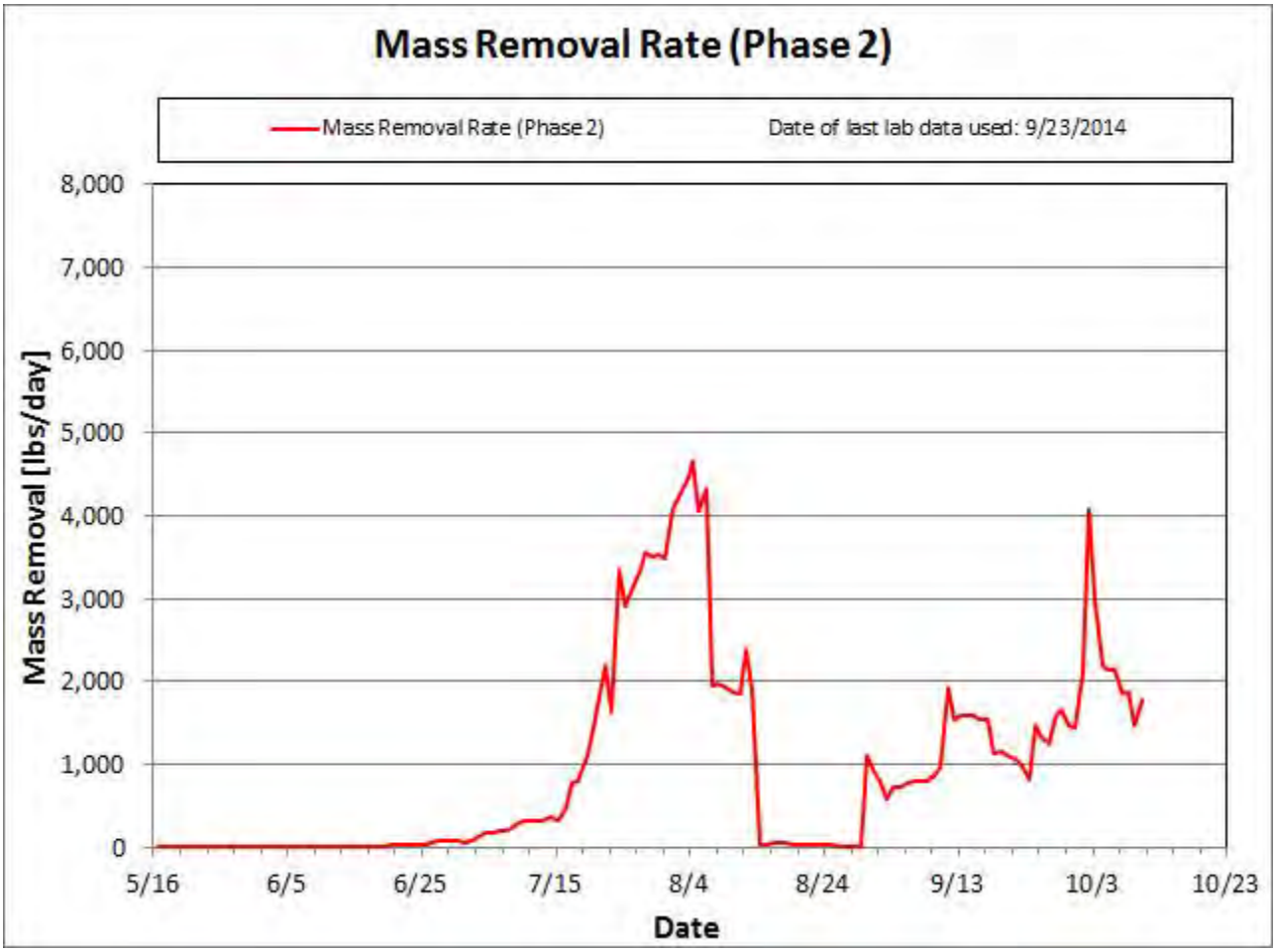


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID readings collected at the oxidizer influent over time. It should be noted that the PID reading from 7/16/14 was obtained with a PID with a 10.6 eV lamp, instead of the 11.7 eV lamp which had reached the upper concentration limit of 2,000 ppmV. Similarly, data collected on 07/25-28 were first collected with an 11.7 eV lamp with values exceeding the upper limit. The influent concentrations were then collected with the 10.6 eV lamp with values lower than the 11.7 eV upper limit (2,000 ppm). Therefore, the maximum 11.7 eV lamp is reported.

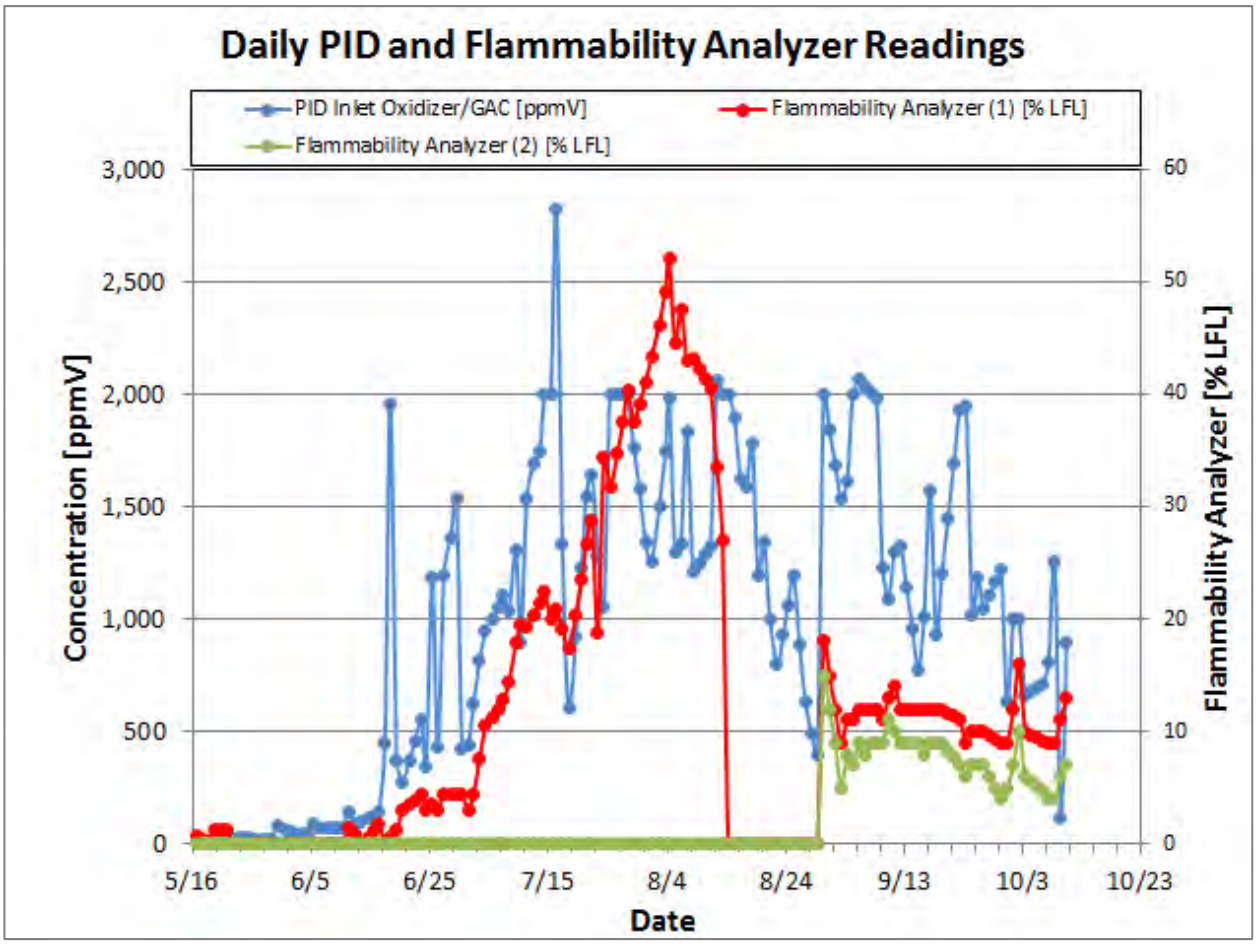


Figure 5. Daily PID Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13. Dips in the DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-out periods.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

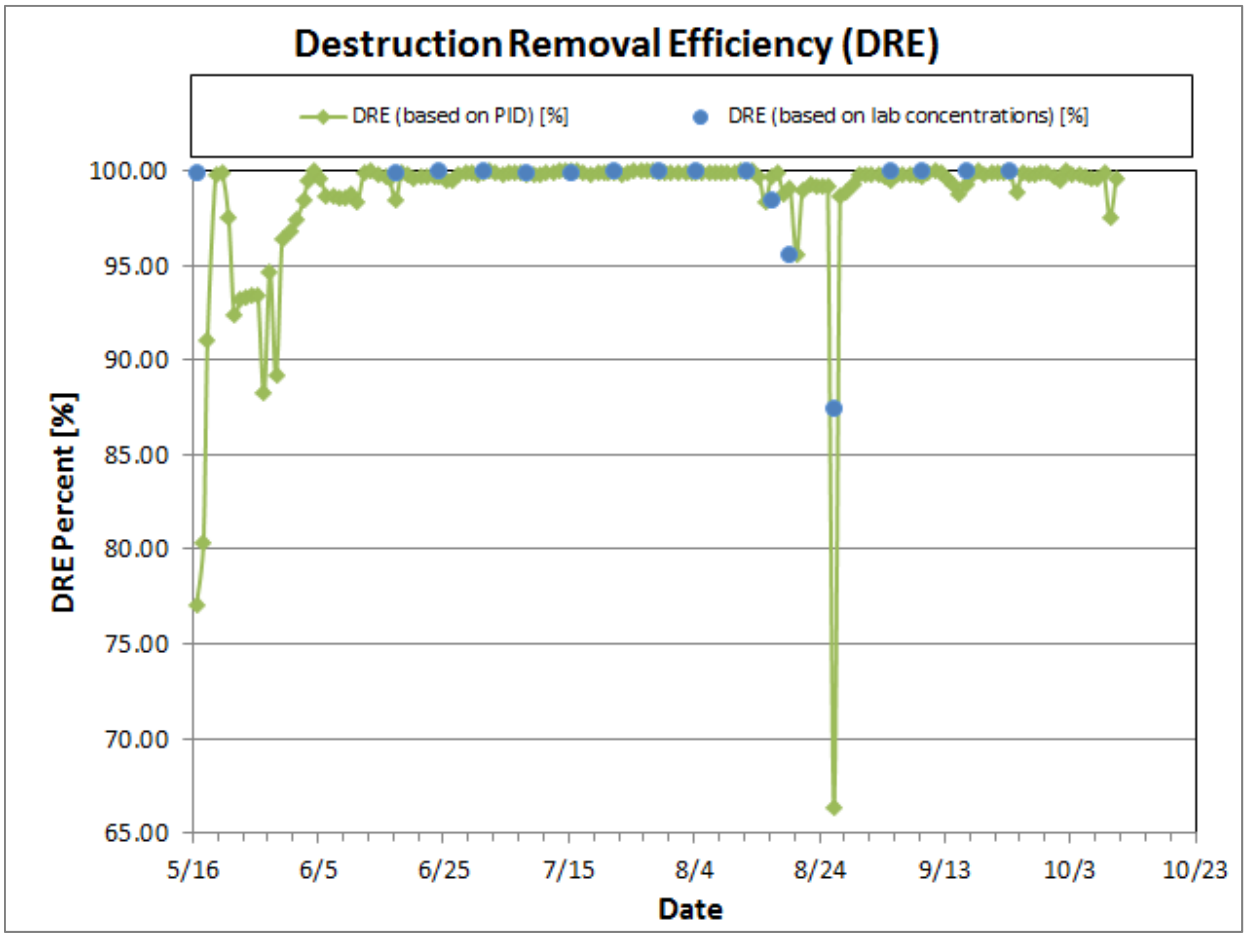


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7.

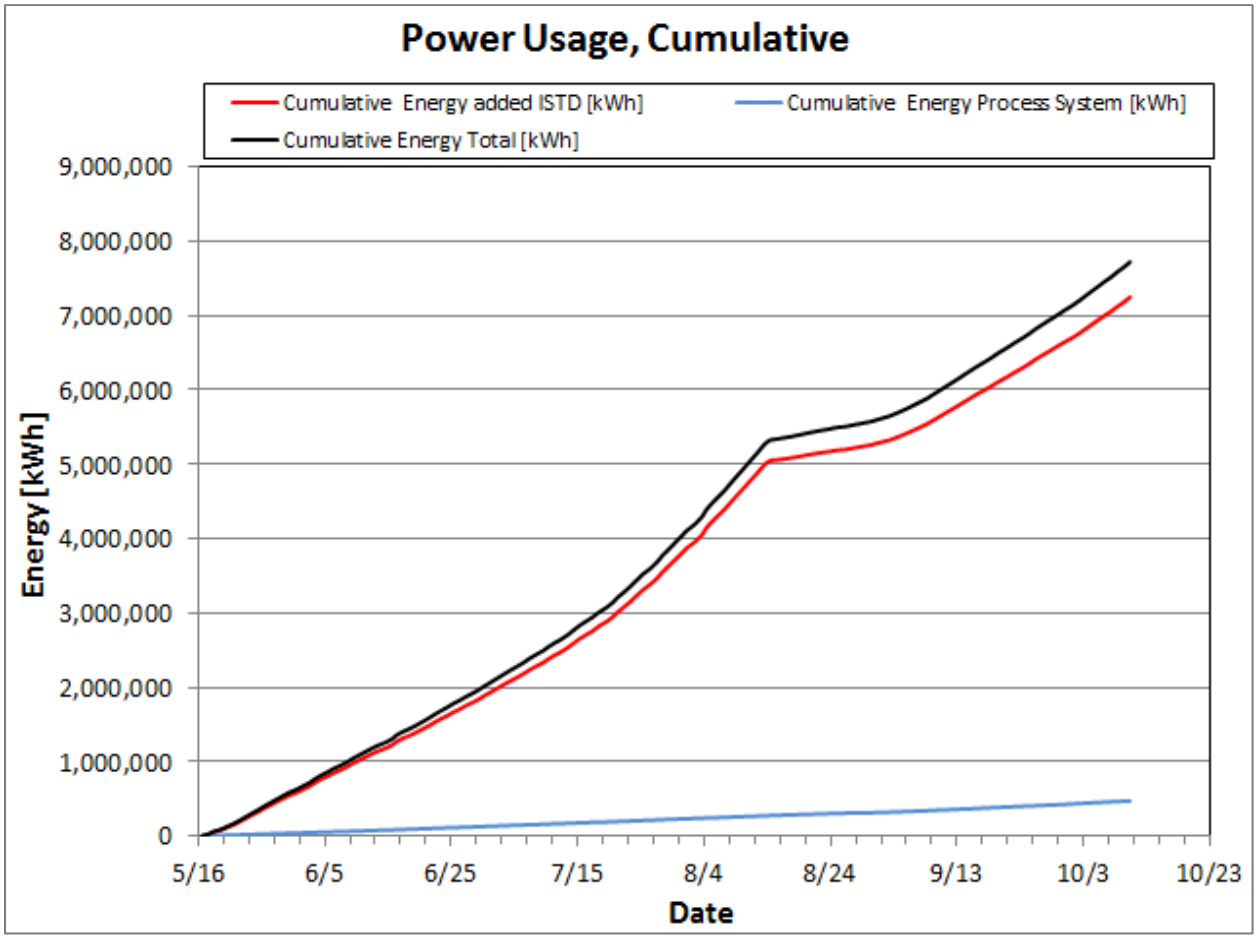


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30 and the following days corresponds with ramping of the heaters after placing the oxidizer back online. The increase in power usage on 10/3 corresponds with increasing the heaters in Phase 2.

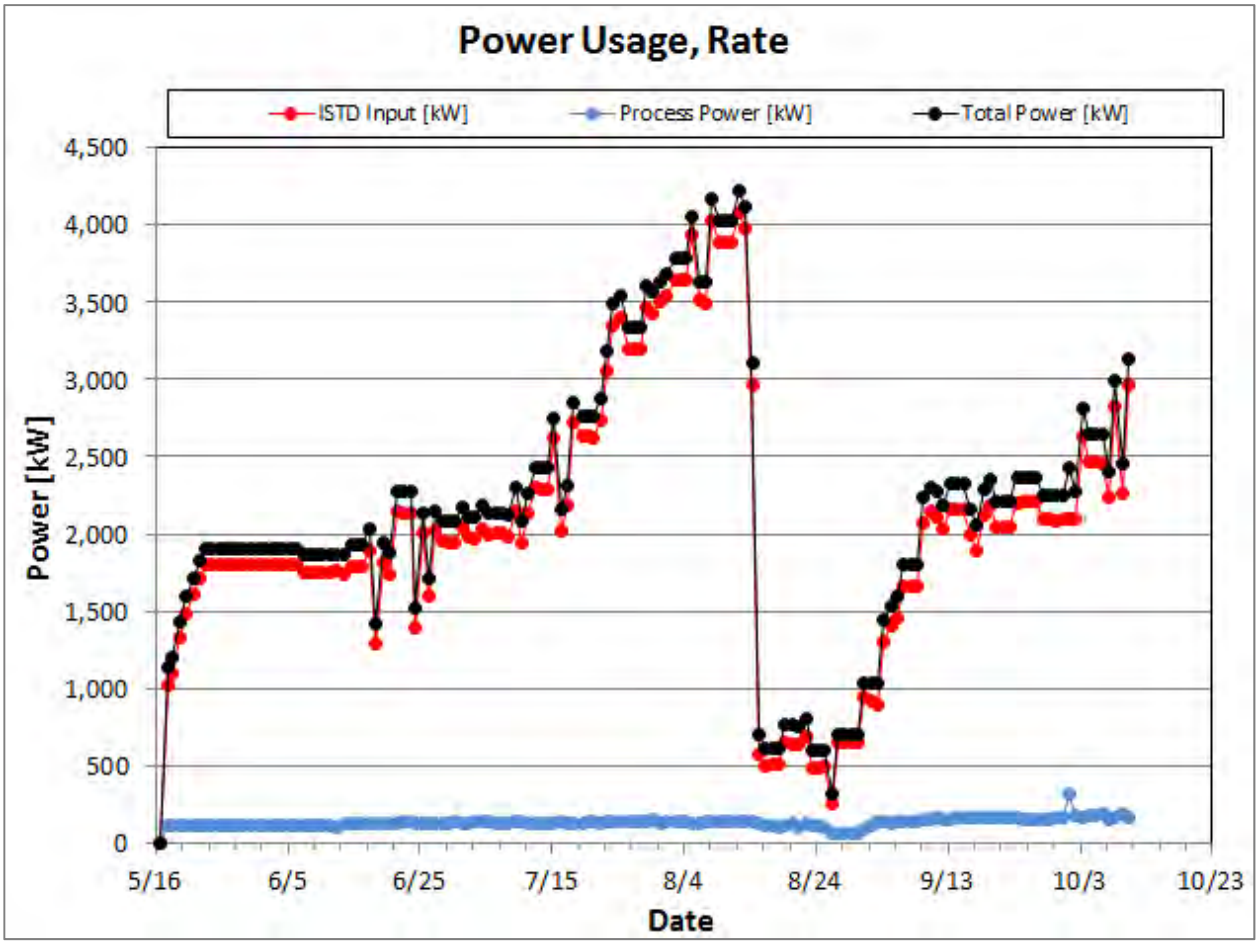


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

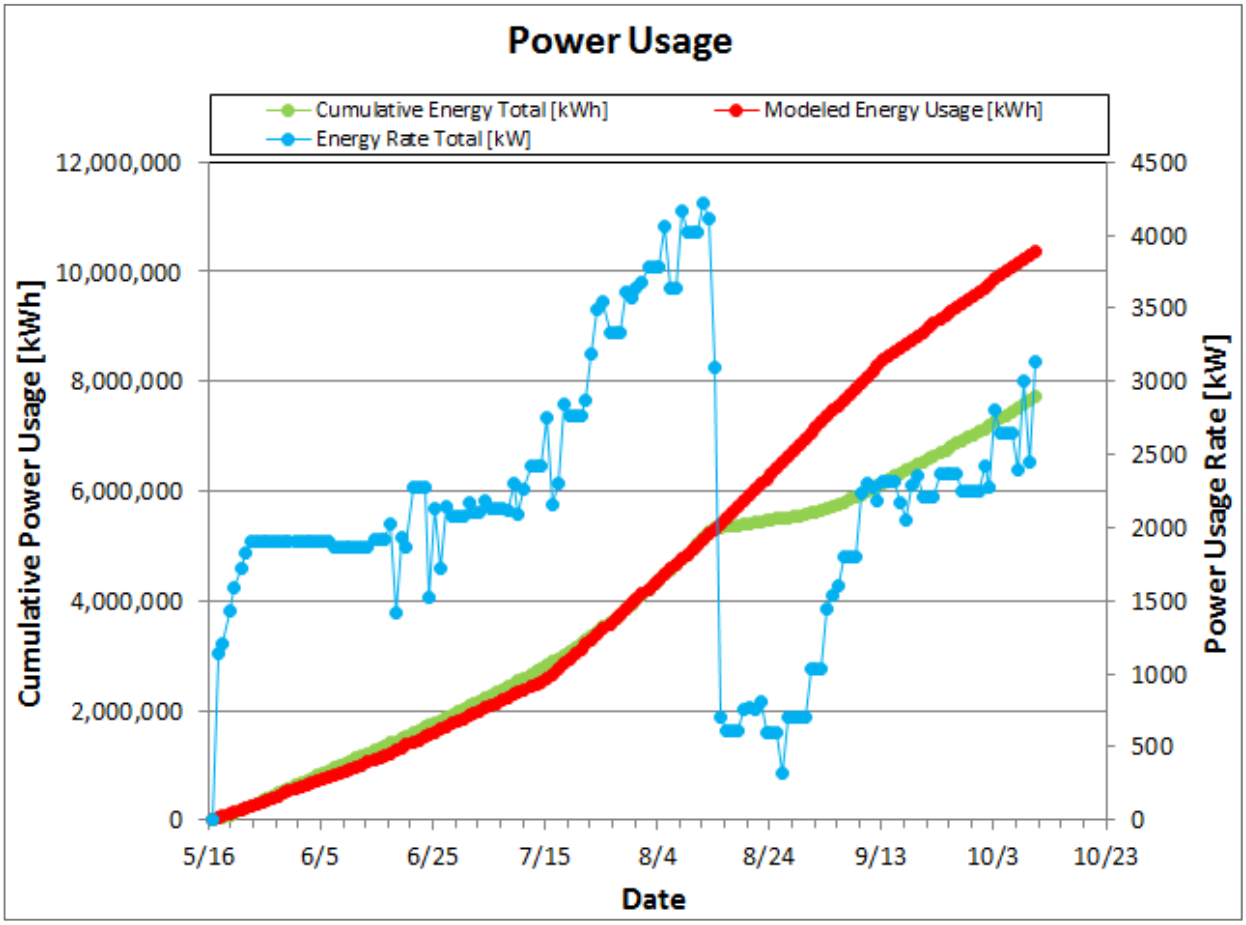


Figure 9. Power Usage

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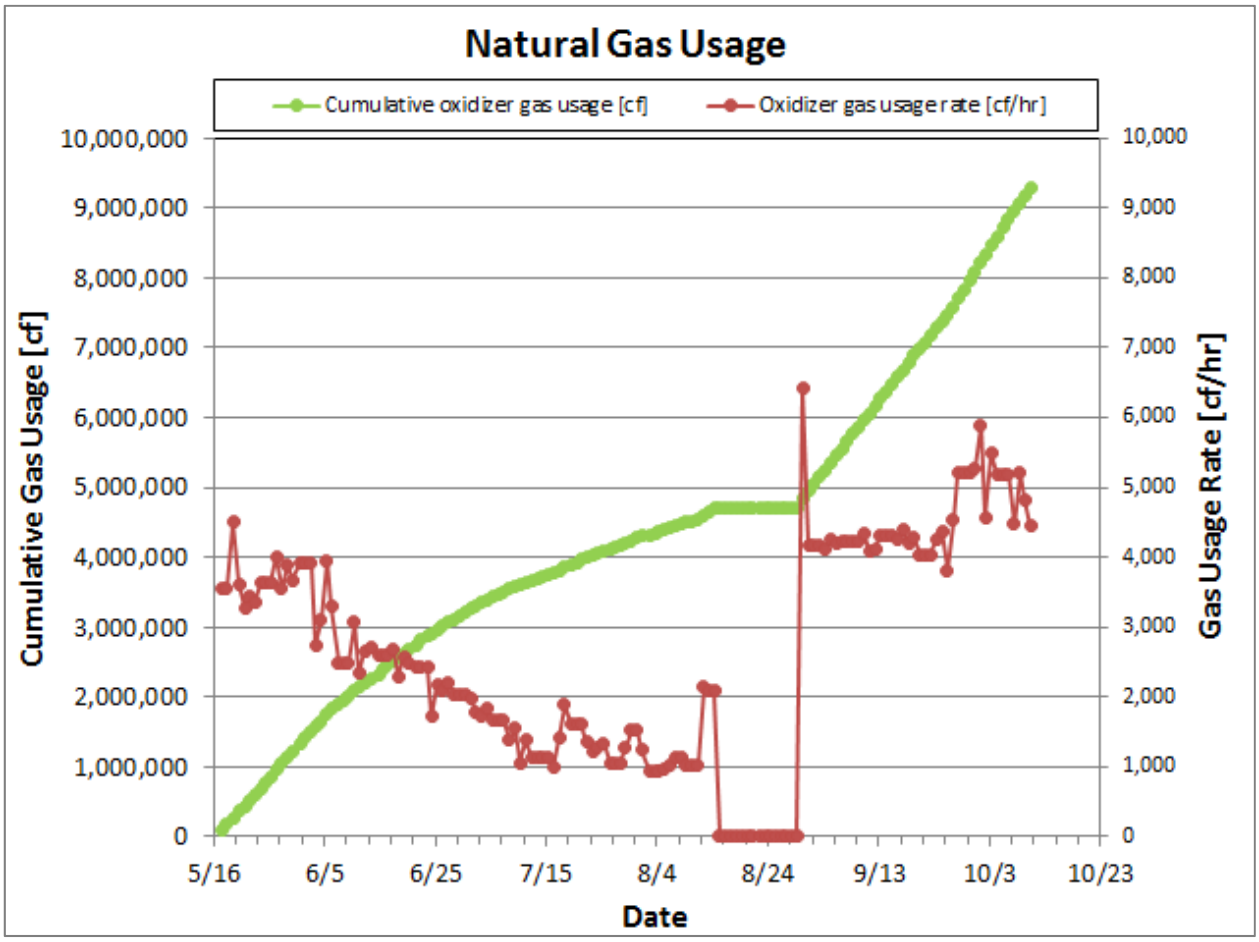


Figure 10. Natural Gas Usage

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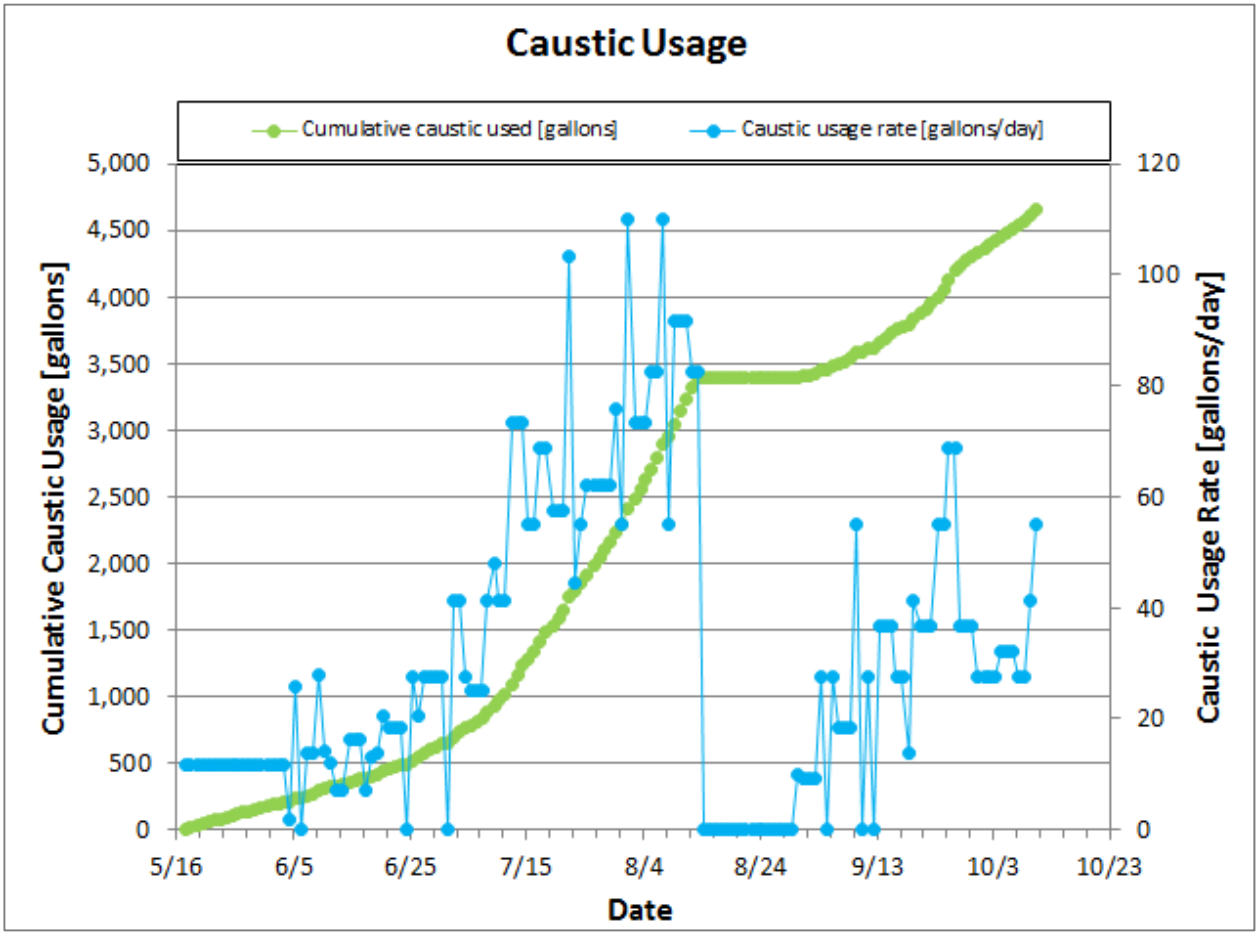


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12a. As of 9/26/14, we have reached all three payment milestone for phase 1. Phase 2 centroids are shown in Figure 12b. The scatterplots have been updated to show the centroids grouped by depth, with each depth range shown as a different color.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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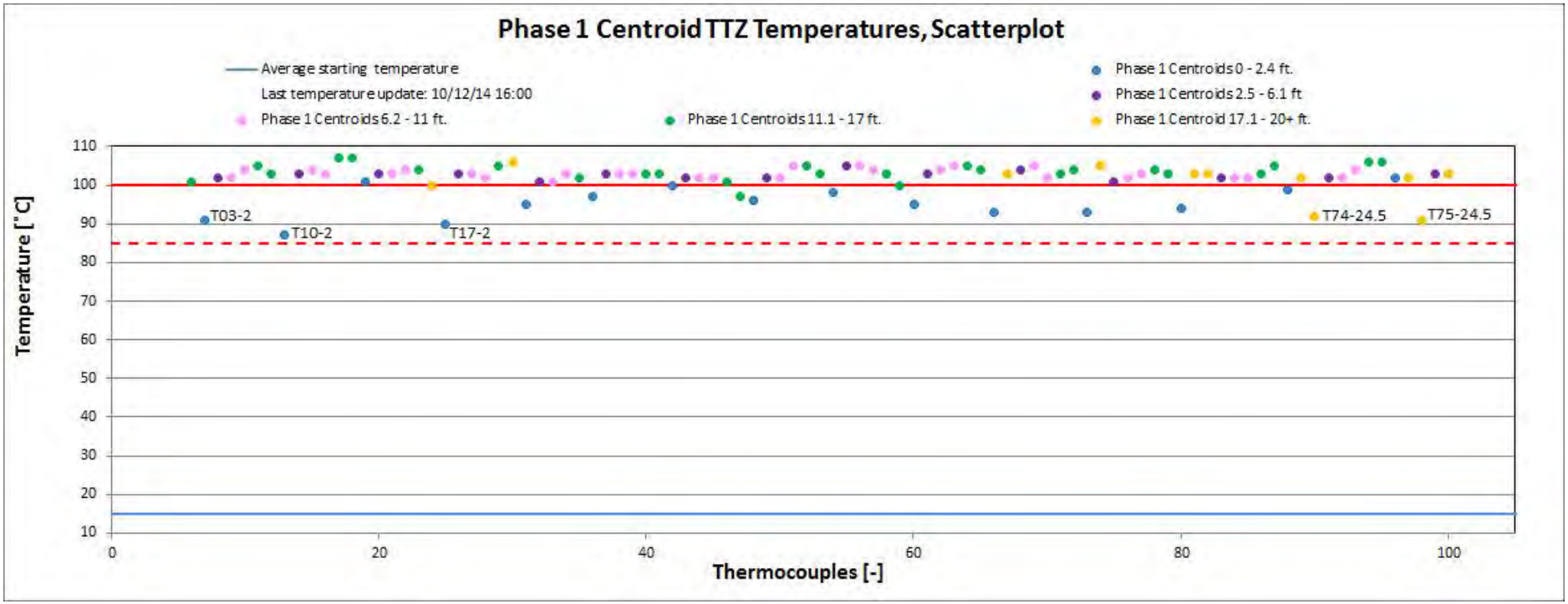


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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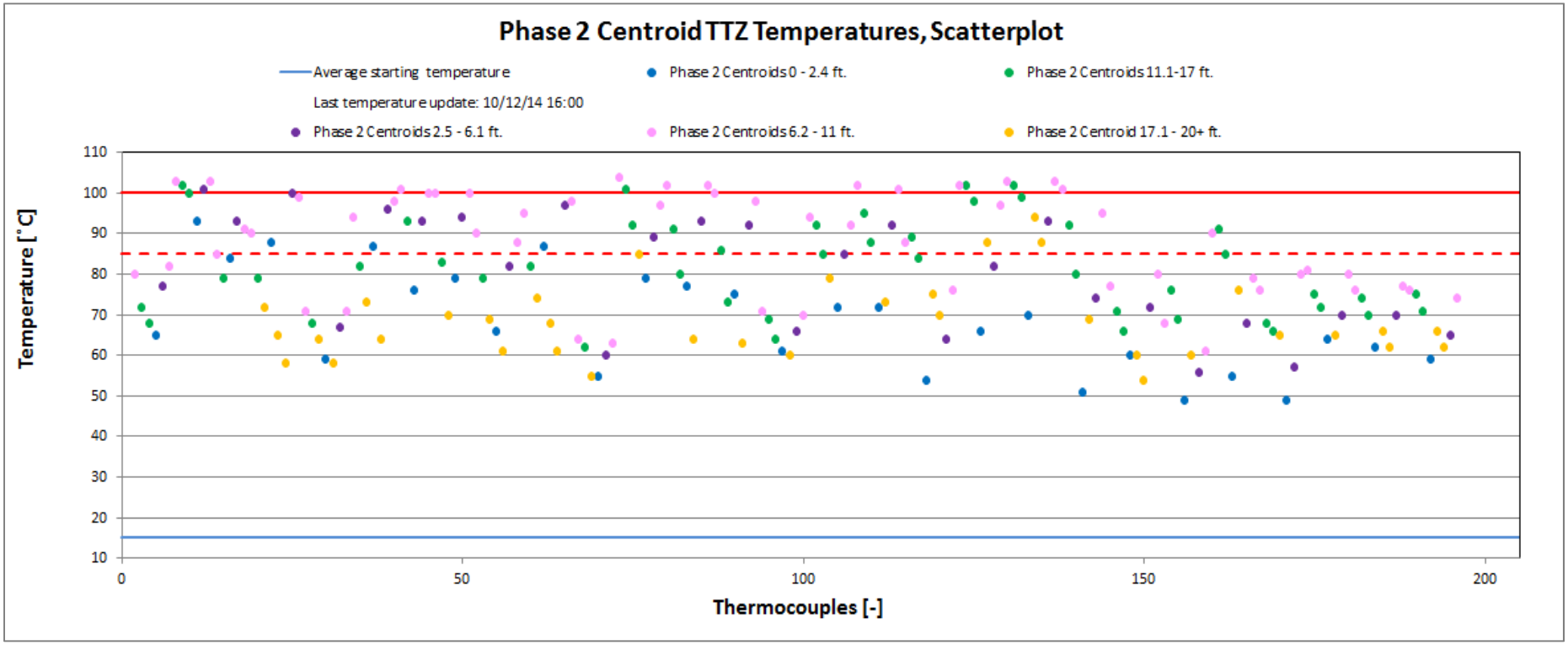


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots		
	Value	**Unit**
Date of Last Update	10/12/14	
Phase 1 Centroid Thermocouples ≥85 °C	100	%
Phase 1 Centroid Thermocouples ≥100 °C	94	%
Phase 2 Centroid Thermocouples ≥85 °C	41	%
Phase 2 Centroid Thermocouples ≥100 °C	15	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









Prepared by:

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1 SUMMARY

This report is intended to cover the operational time period of Friday October 10, 2014 through Friday October 17, 2014, with temperatures updated through Sunday October 19, 2014.

Table 1 provides a summary of the project operational status as of Friday, October 17, 2014.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	10/17/14	
Last Temperature Data Update	10/19/14	
Days of Operation (Total)	131	days
Days of Phase 1 Operation	131	days
Days of Phase 2 Operation	22	days
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	8,267,800	kWh
Used Electrical Energy vs. Estimate	52.3	%
Total Mass Removal	315,719	lbs
Average Power Input Last 24 Hours	3,040	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,422	scfm
Average Condensate Production Rate Last 24 Hours	6.1	gpm

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Heaters in Phase 1 and Phase 2 are at full power. As of 10/17/14, Phase 1 has operated for 131 days and Phase 2 for 22 days. Please note that this represents days where heaters operated at or above 70% (per contract definition). The current average wellfield temperature for Phase 1 is 101°C and 87°C for Phase 2. All three temperature milestone have been achieved for Phase 1.

The scatterplots shown in section 9 of this progress report identify several shallow thermocouples that are below "trend" temperatures in both Phase 1 and Phase 2. Phase 1 temperature lags are believed to be due to the recent soil and groundwater sampling efforts where circuits are being turned off for worker safety. Phase 2 temperature lags are consistent with expected heatup trends – shallow and deep are the last to reach target temperatures.

The second progress soil sampling event is in progress and expected to finish mid-week. Data results are expected by the end of the week.

Estimated mass removed to date is reported using the flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. These results yield a total mass removal of 315,719 lbs as of 10/17/14. Individual fractions are shown in Figure 4a. *Please note this differs by approximately 100,000 lbs from the previous progress report. A temperature correction factor resulting from Focus Environmental's independent review of the oxidizer shutdown was appropriately applied to the influent vapor stream; however, the previous correction factor was also applied; therefore double counting a fraction of the mass removed estimate. Also since last week, additional laboratory vapor BTU results have been used to calibrate the mass removal calculation.*

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 10/17/14. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.49:0.51. These ratios were applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling. Phase 2 heating began on 7/16/14 but was stopped on August 14, 2014, as a result of the oxidizer shutdown. Heaters in Phase 2 are at full power and increasing approximately 5C per day.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	10/19/14	
Phase 1 Entire TTZ Average Temperature	101	°C
Phase 2 Entire TTZ Average Temperature	87	°C
Phase 1 Centroid Average Temperature	100	°C
Phase 2 Centroid Average Temperature	85	°C

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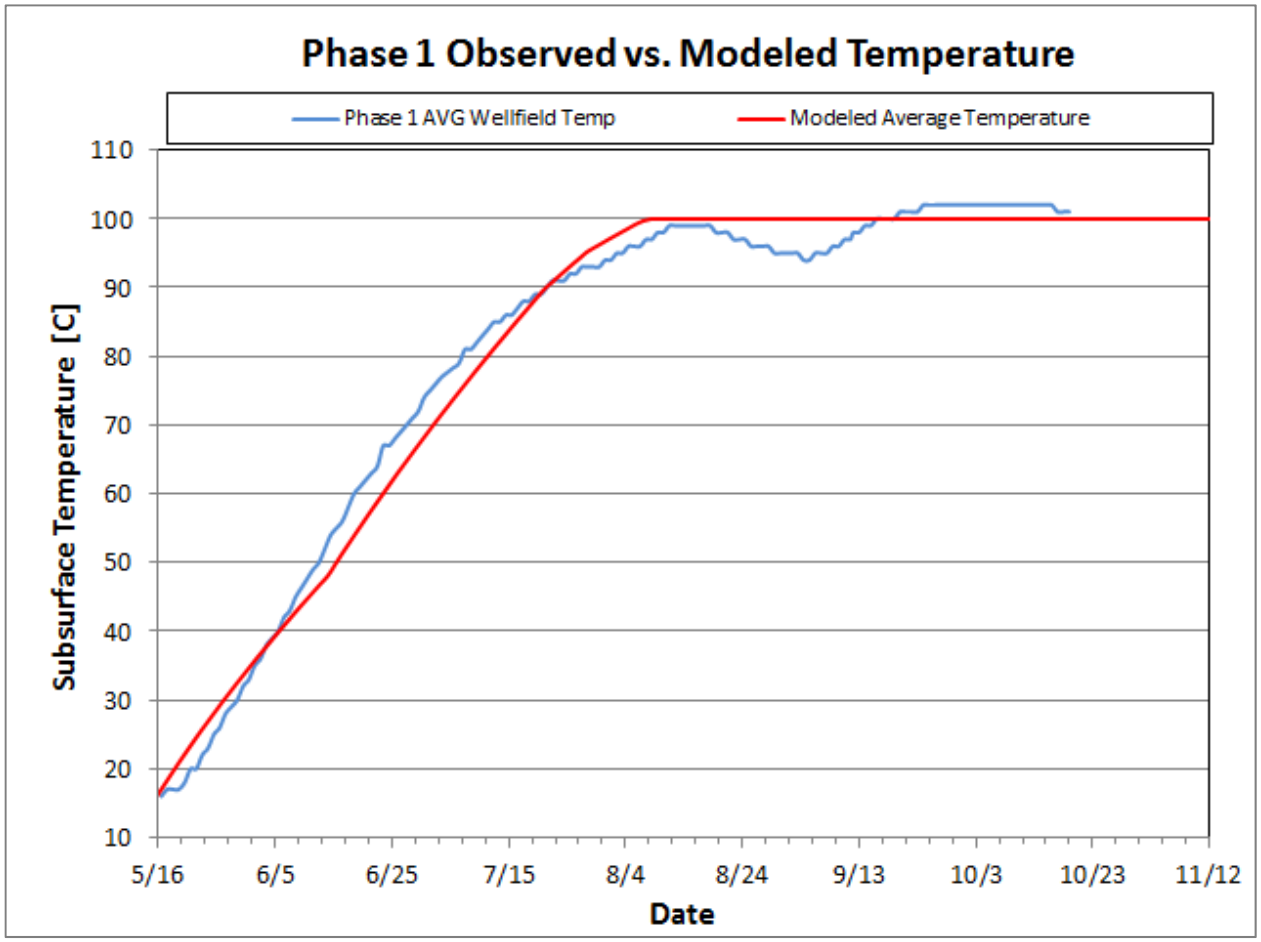


Figure 1a. Phase 1 Observed vs. Modeled Temperature

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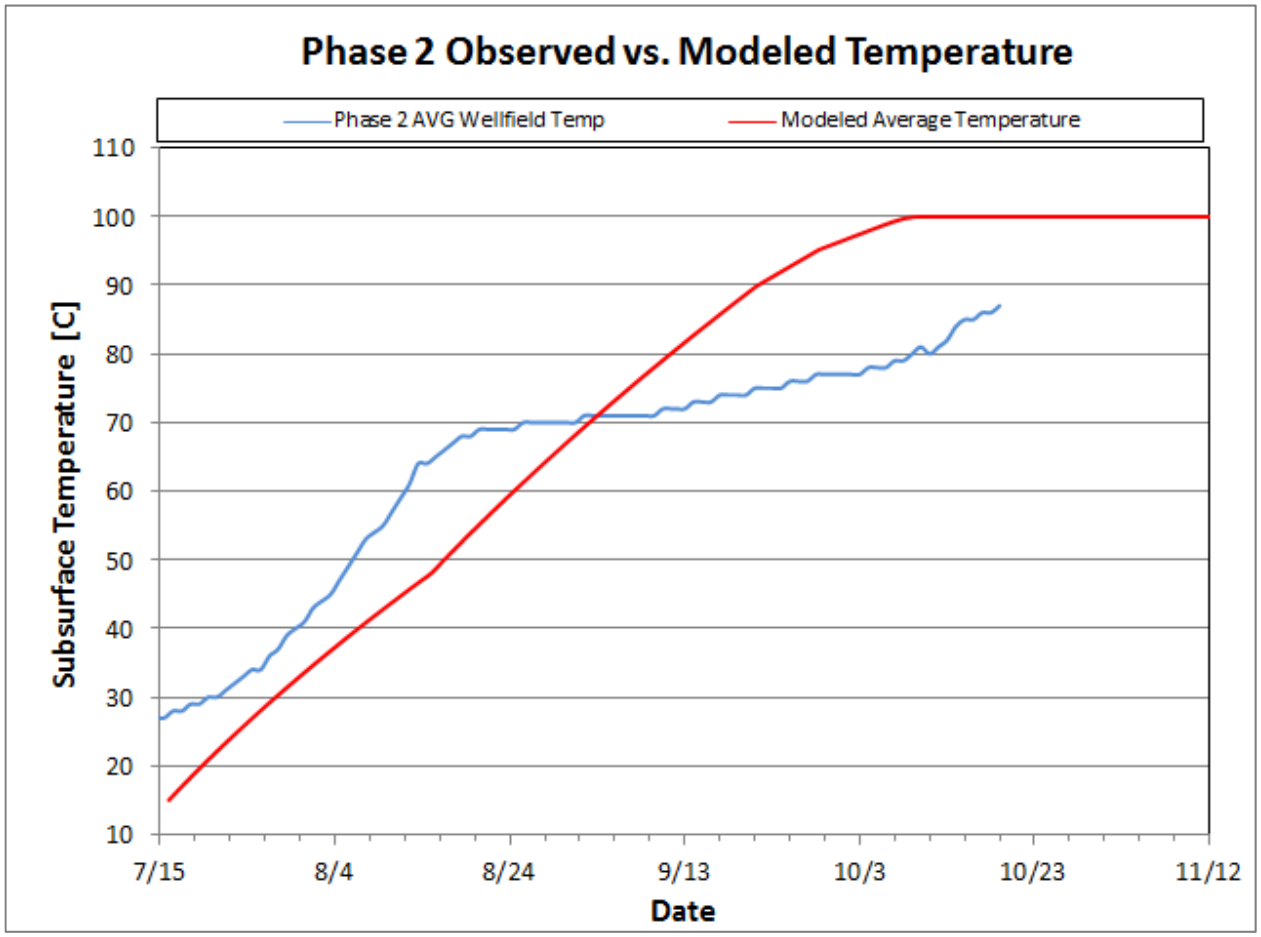


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was restarted on 8/30/14.

As the flow of steam from the wellfield increases, the flow of non-condensables adjusts to yield a relatively constant total flow from the wellfield.

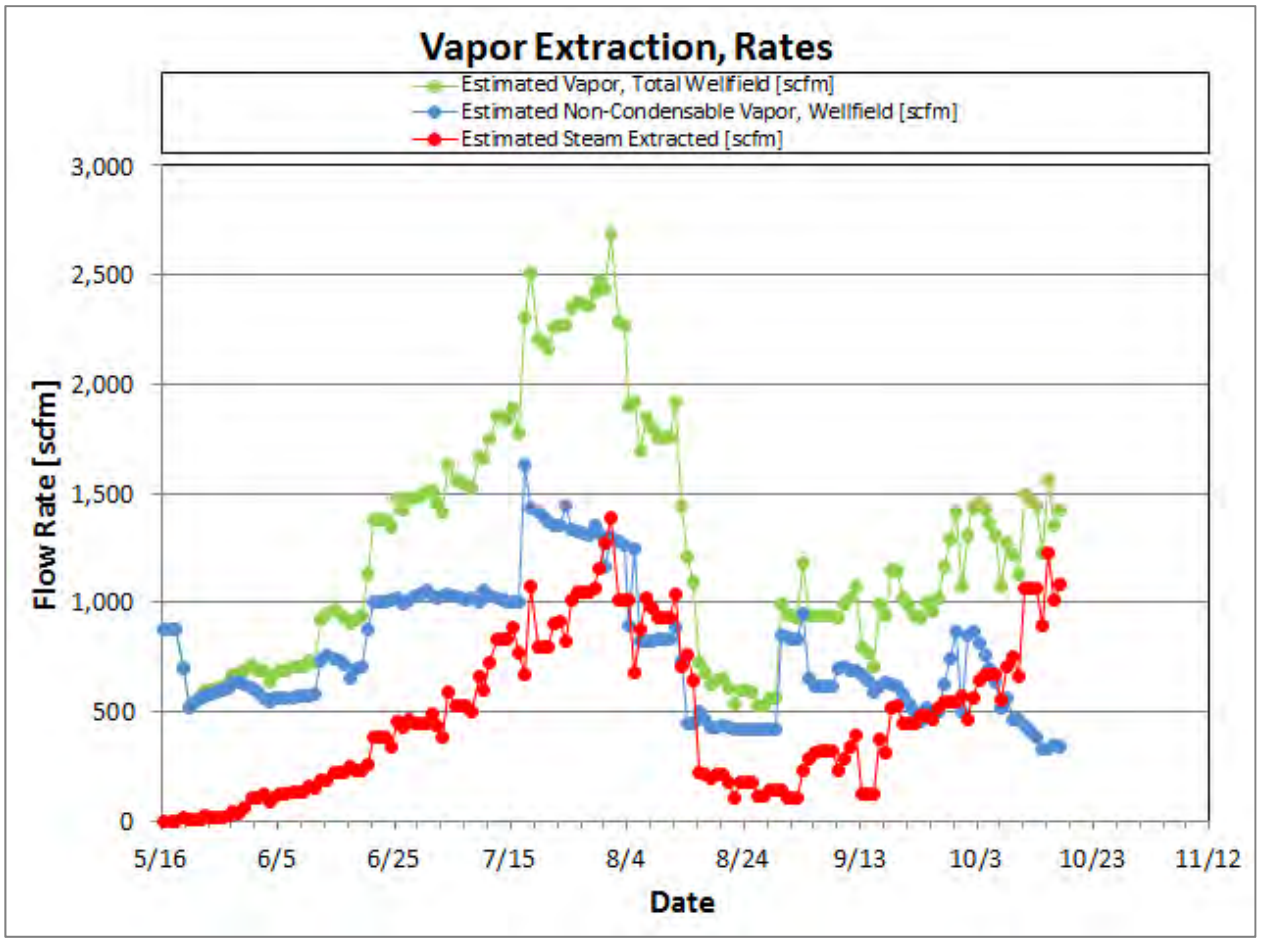


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf), assuming that 100% LFL conditions equals an energy density of 50 BTU/scf. The calculated number is then compared with the contract limit of 25 BTU/scf.

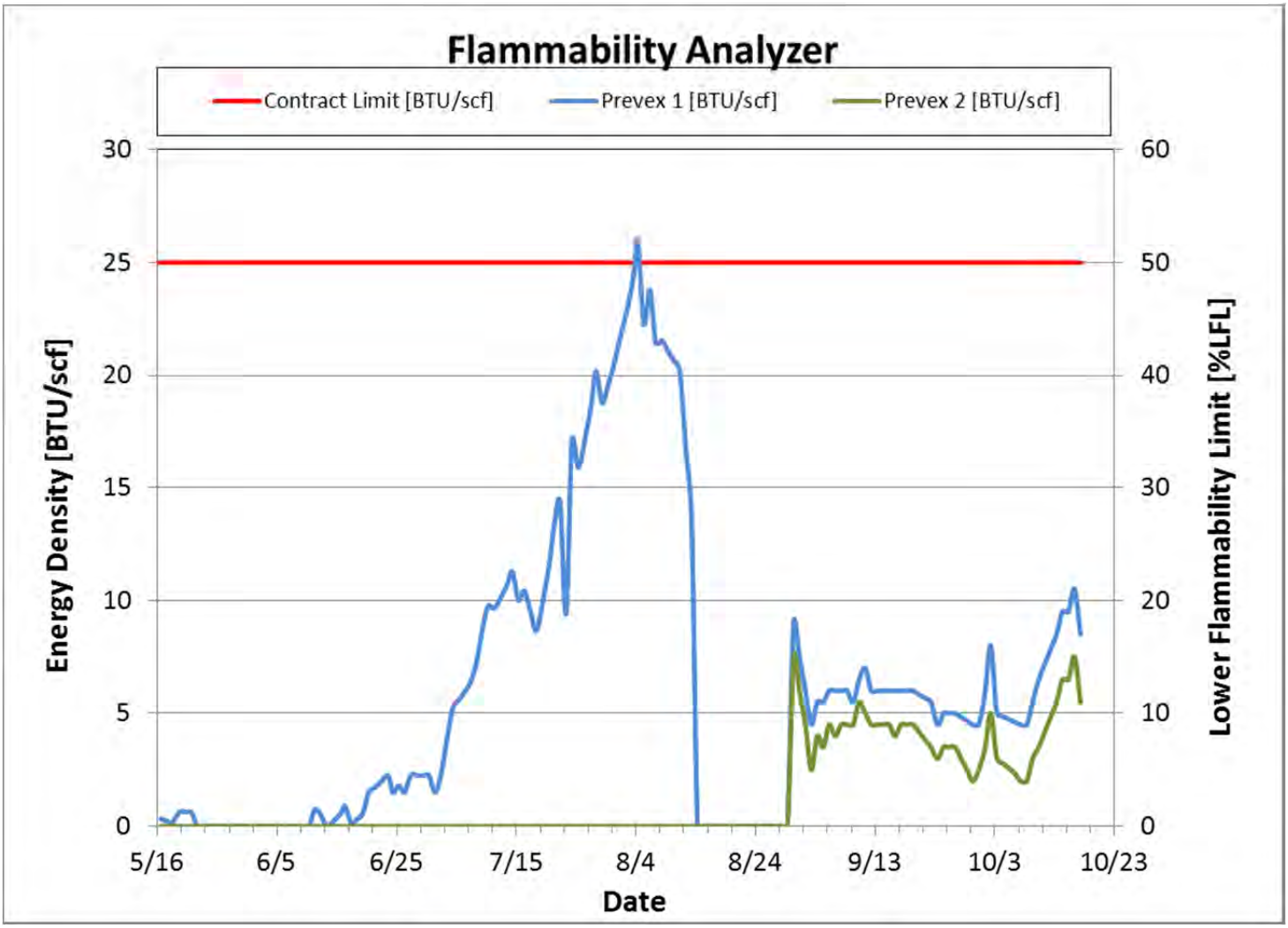


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed to date is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The decrease in mass removed starting on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14, 9/23/14 and 9/30/14.

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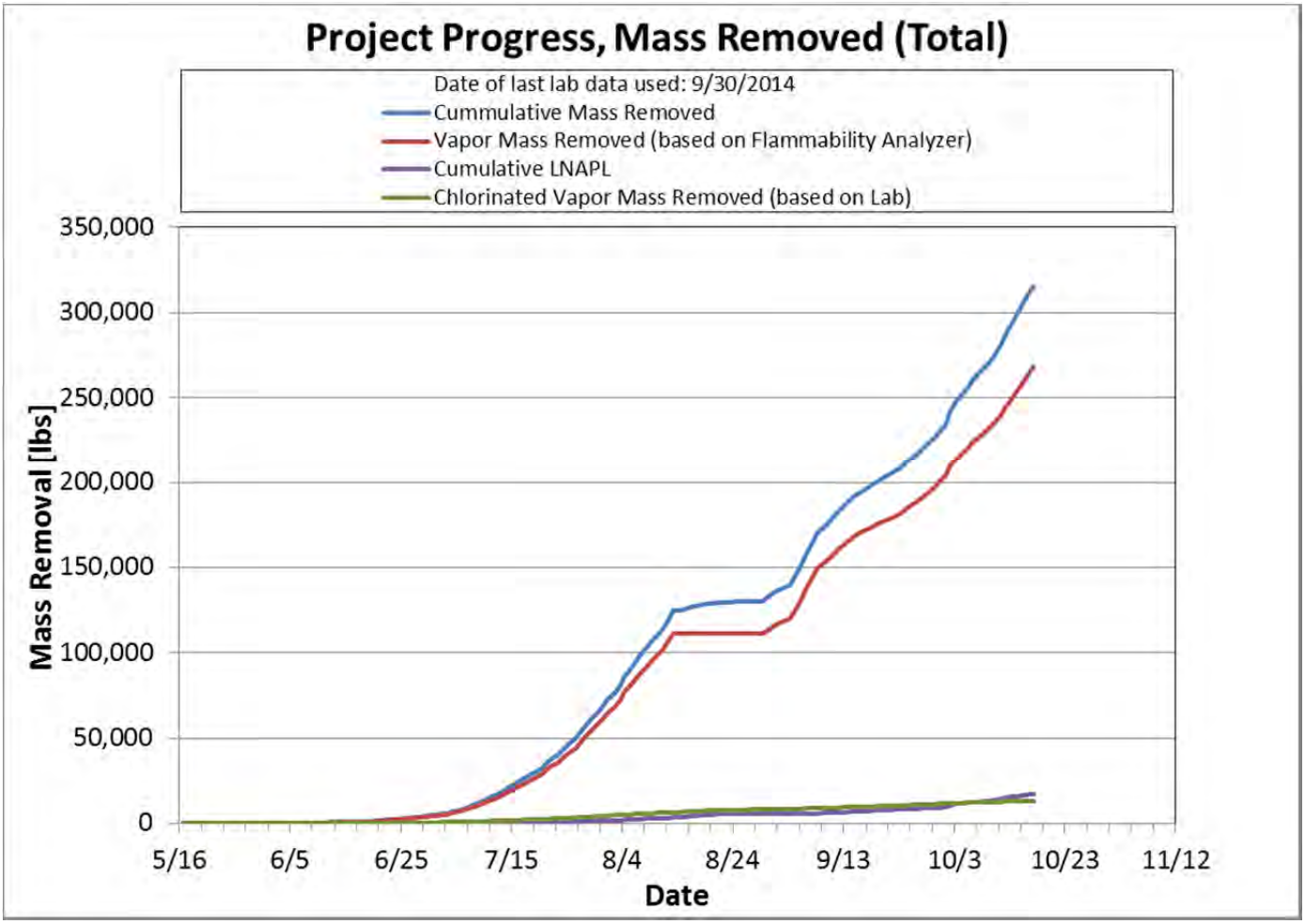


Figure 4a. Project Progress, Mass Removal (Total)

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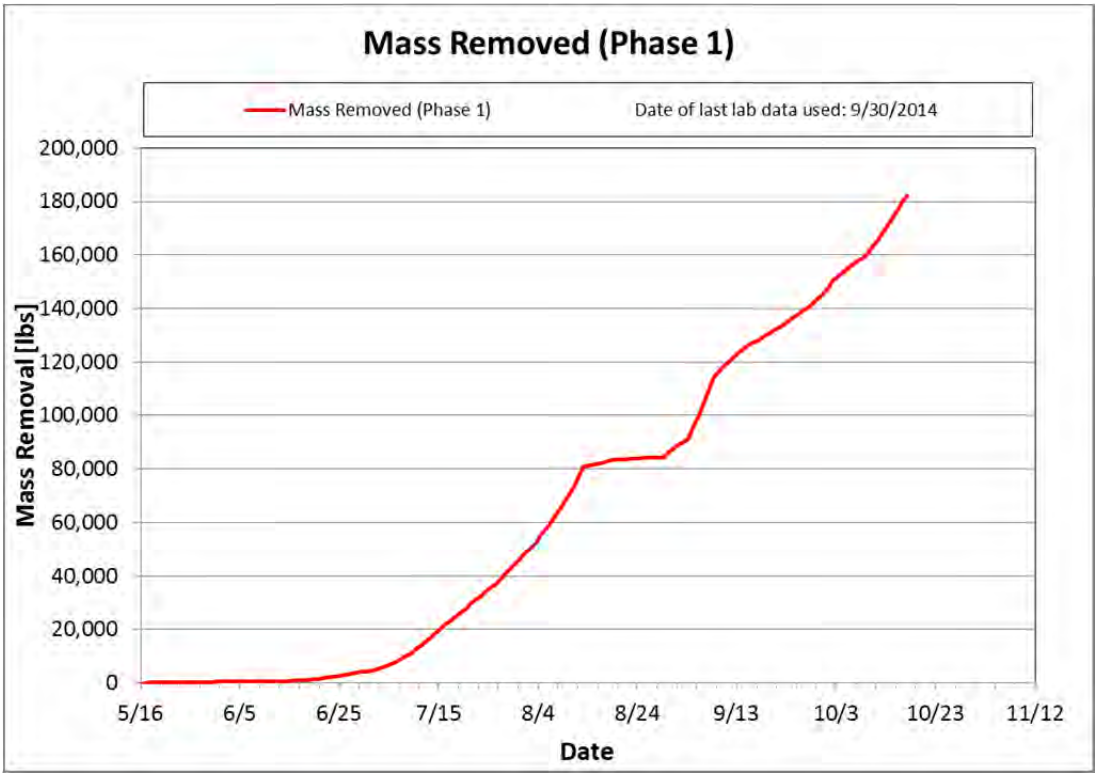


Figure 4b. Project Progress, Mass Removal (Phase 1)

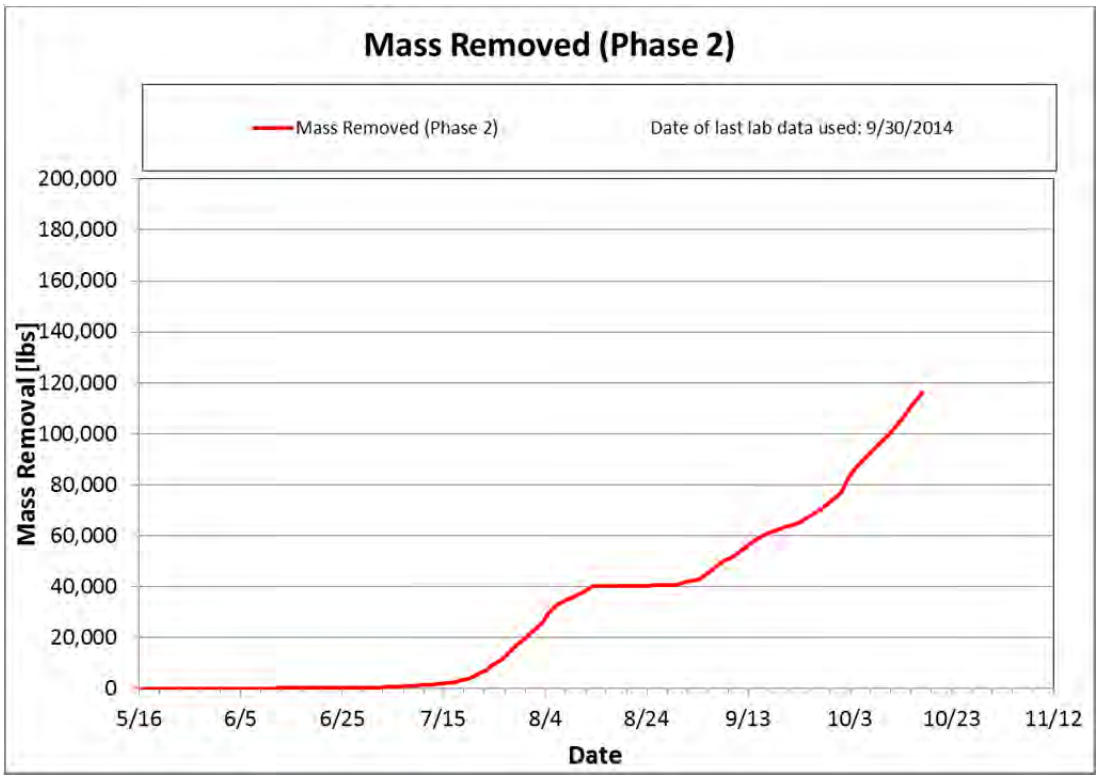


Figure 4c. Project Progress, Mass Removal (Phase 2)

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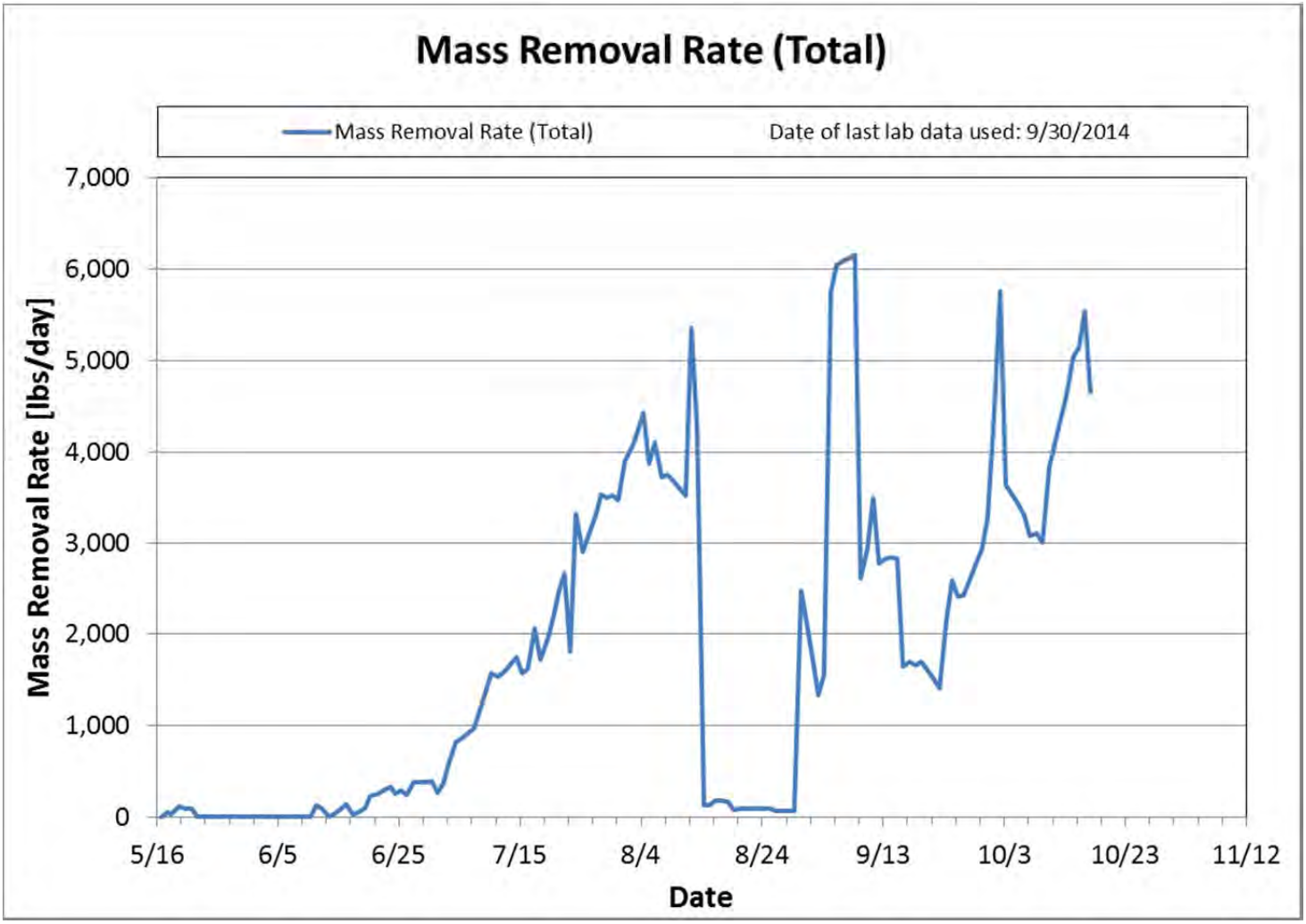


Figure 4d. Mass Removal Rate (Total for Site)

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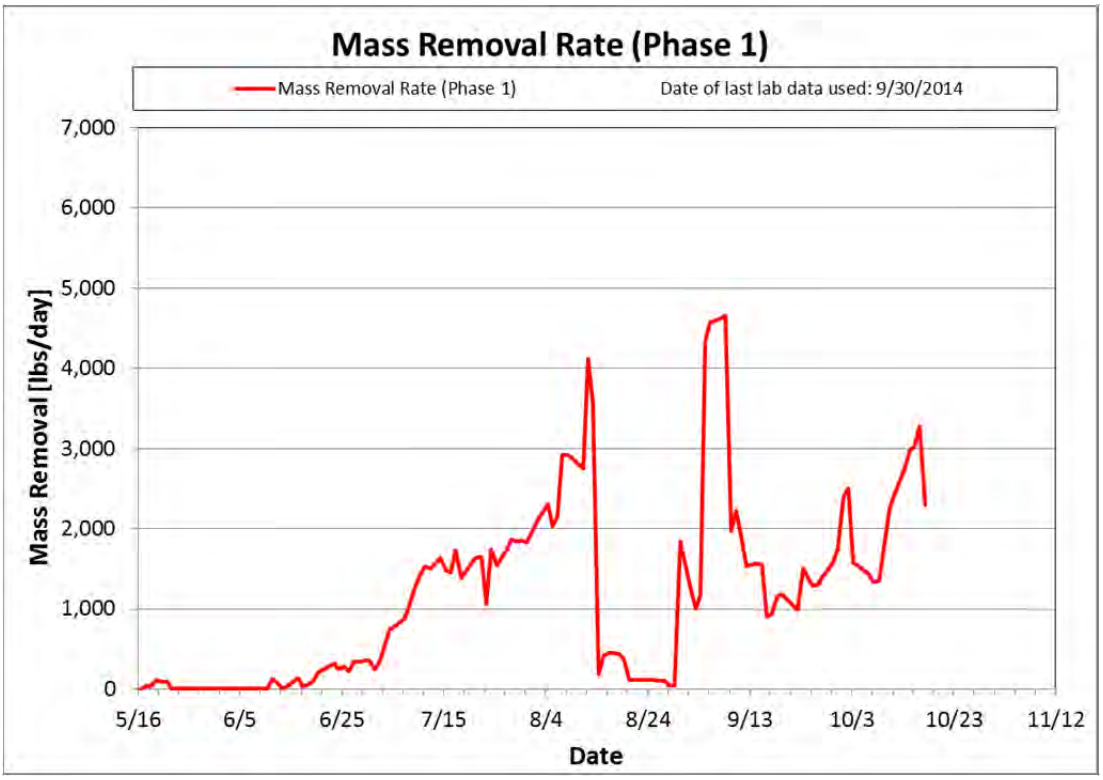


Figure 4e. Mass Removal Rate (Phase 1)

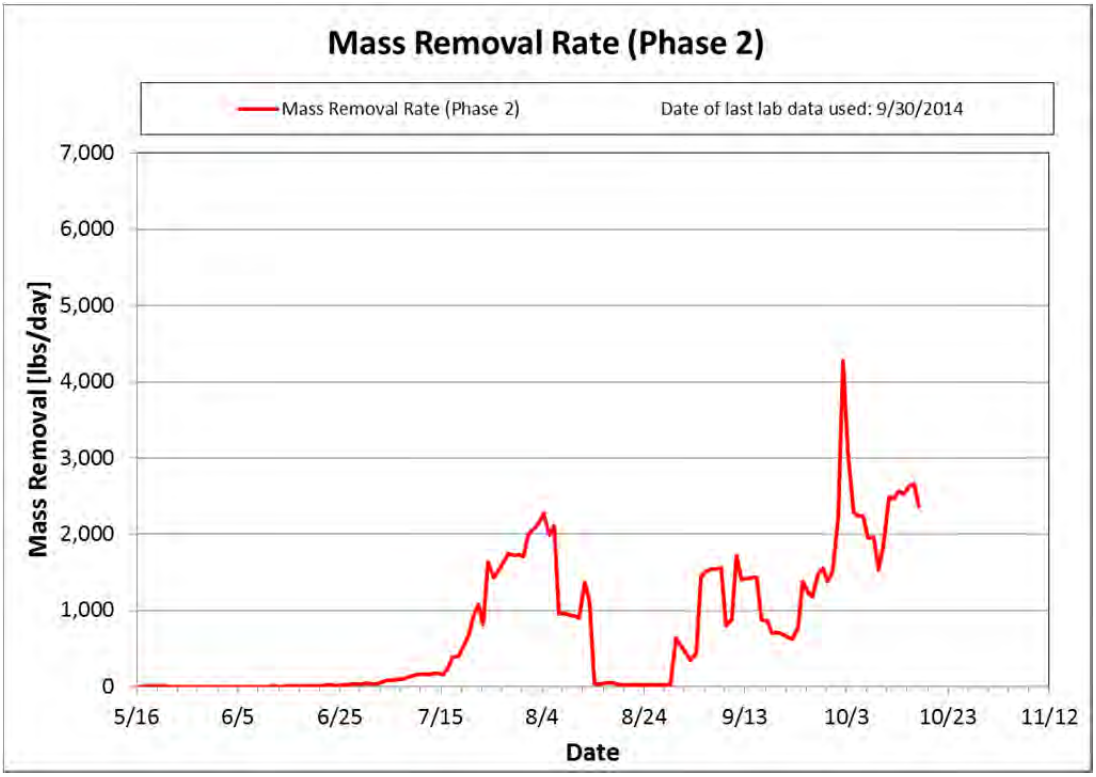


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID readings collected at the oxidizer influent over time. It should be noted that the PID reading from 7/16/14 was obtained with a PID with a 10.6 eV lamp, instead of the 11.7 eV lamp which had reached the upper concentration limit of 2,000 ppmV. Similarly, data collected on 07/25-28 were first collected with an 11.7 eV lamp with values exceeding the upper limit. The influent concentrations were then collected with the 10.6 eV lamp with values lower than the 11.7 eV upper limit (2,000 ppm). Therefore, the maximum 11.7 eV lamp is reported.

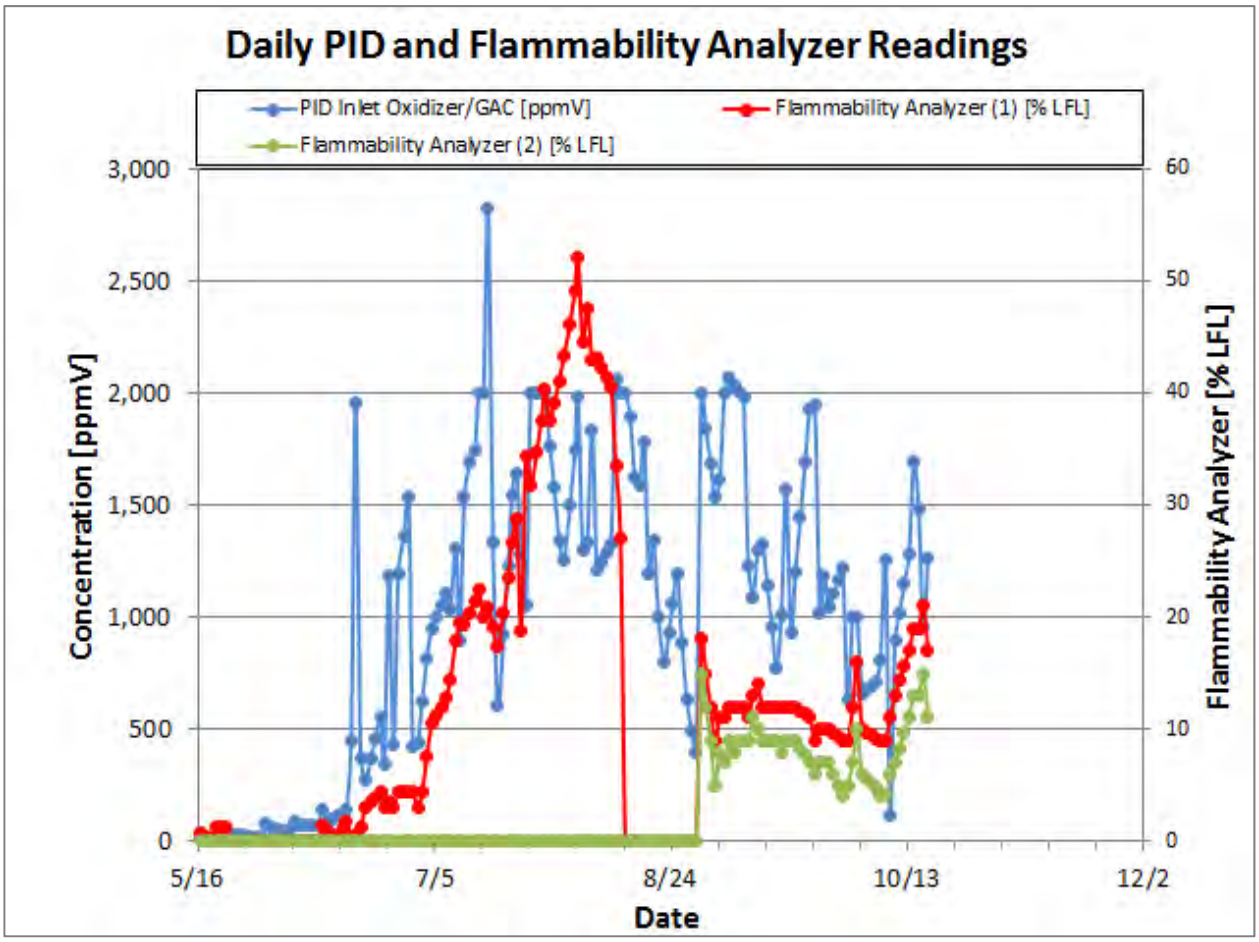


Figure 5. Daily PID Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13. Dips in the DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-out periods.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

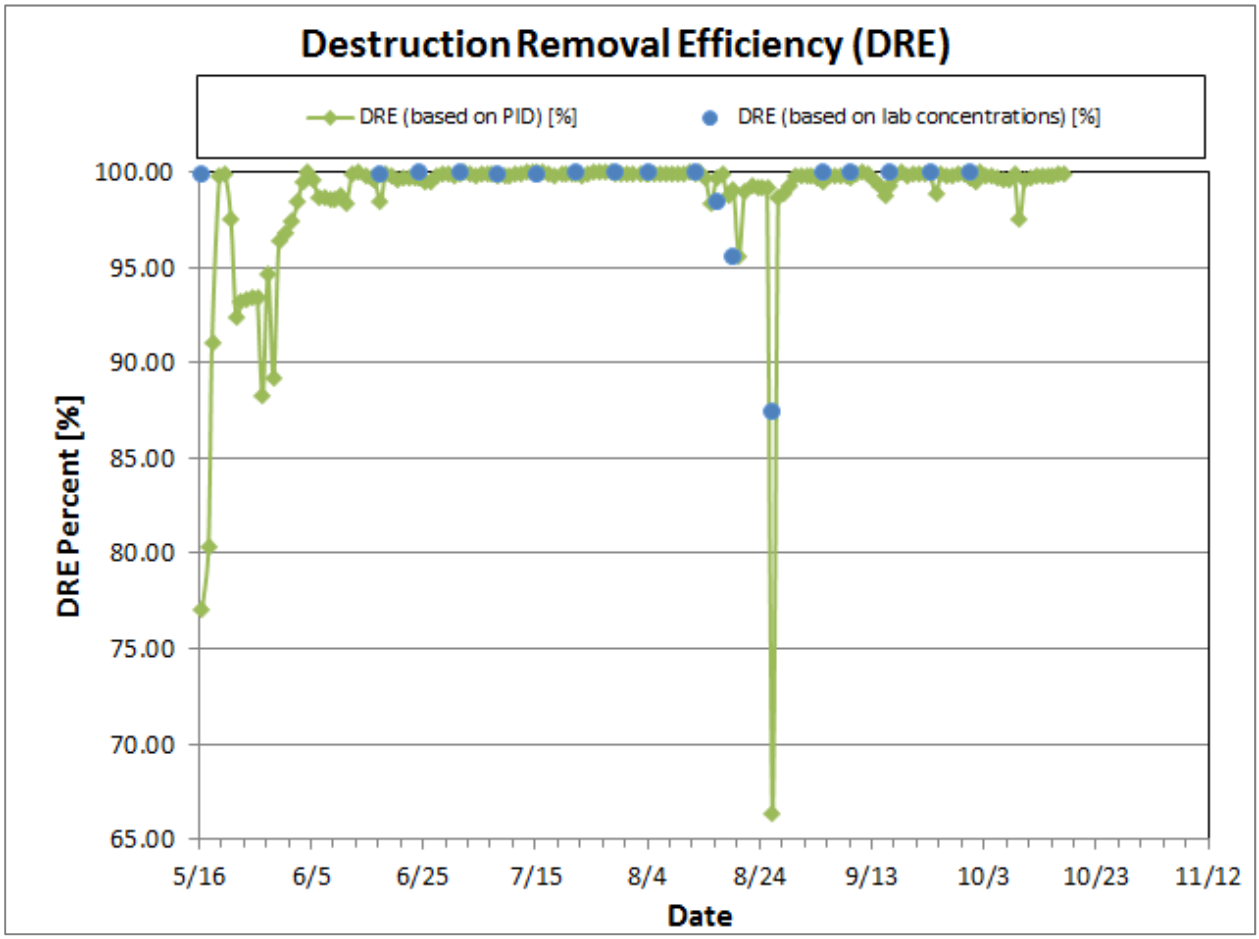


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7. Note that the modeled energy rate has been added to this graph.

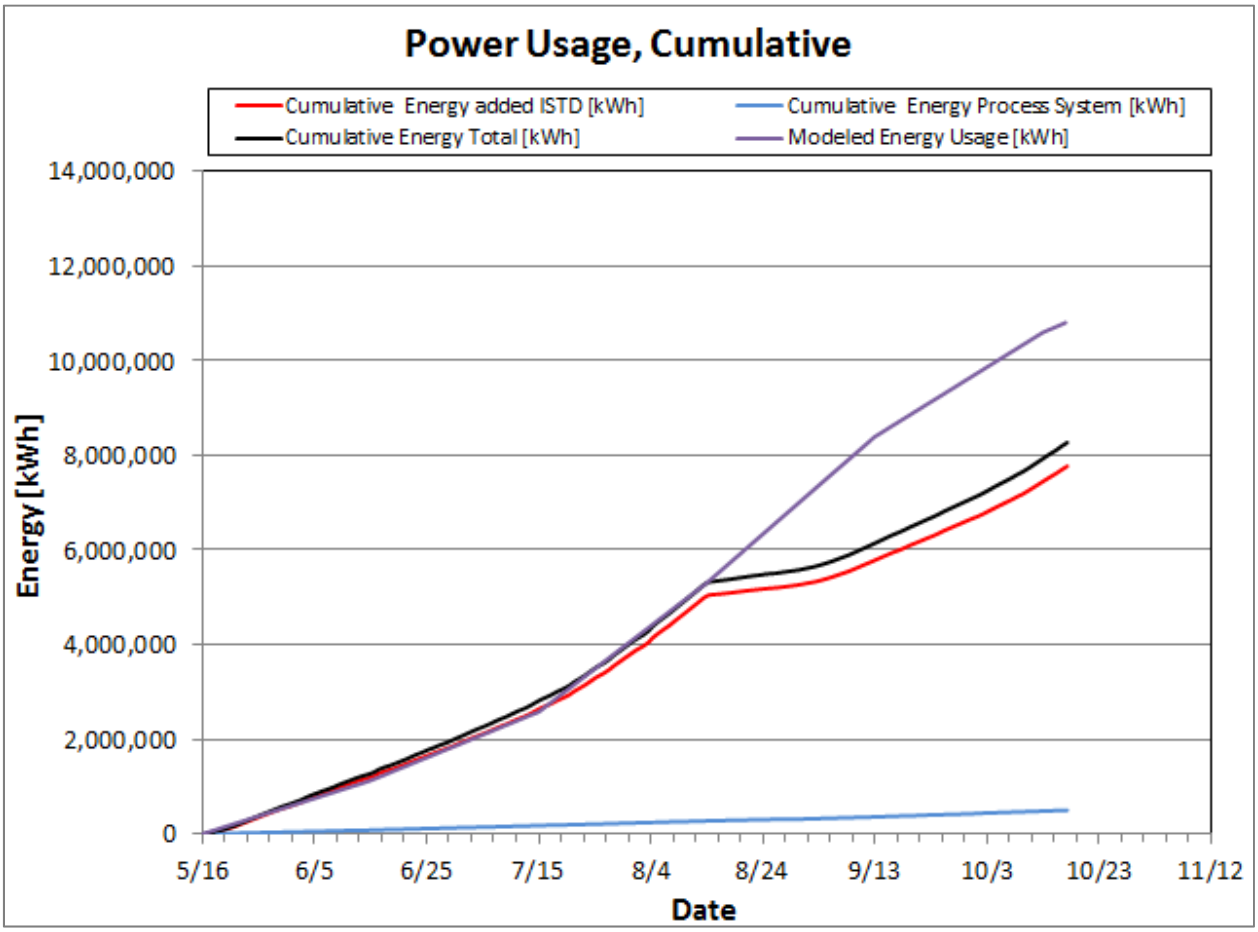


Figure 7. Power Usage, Cumulative

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The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30 and the following days corresponds with ramping of the heaters after placing the oxidizer back online. The increase in power usage on 10/3 corresponds with increasing the heaters in Phase 2.

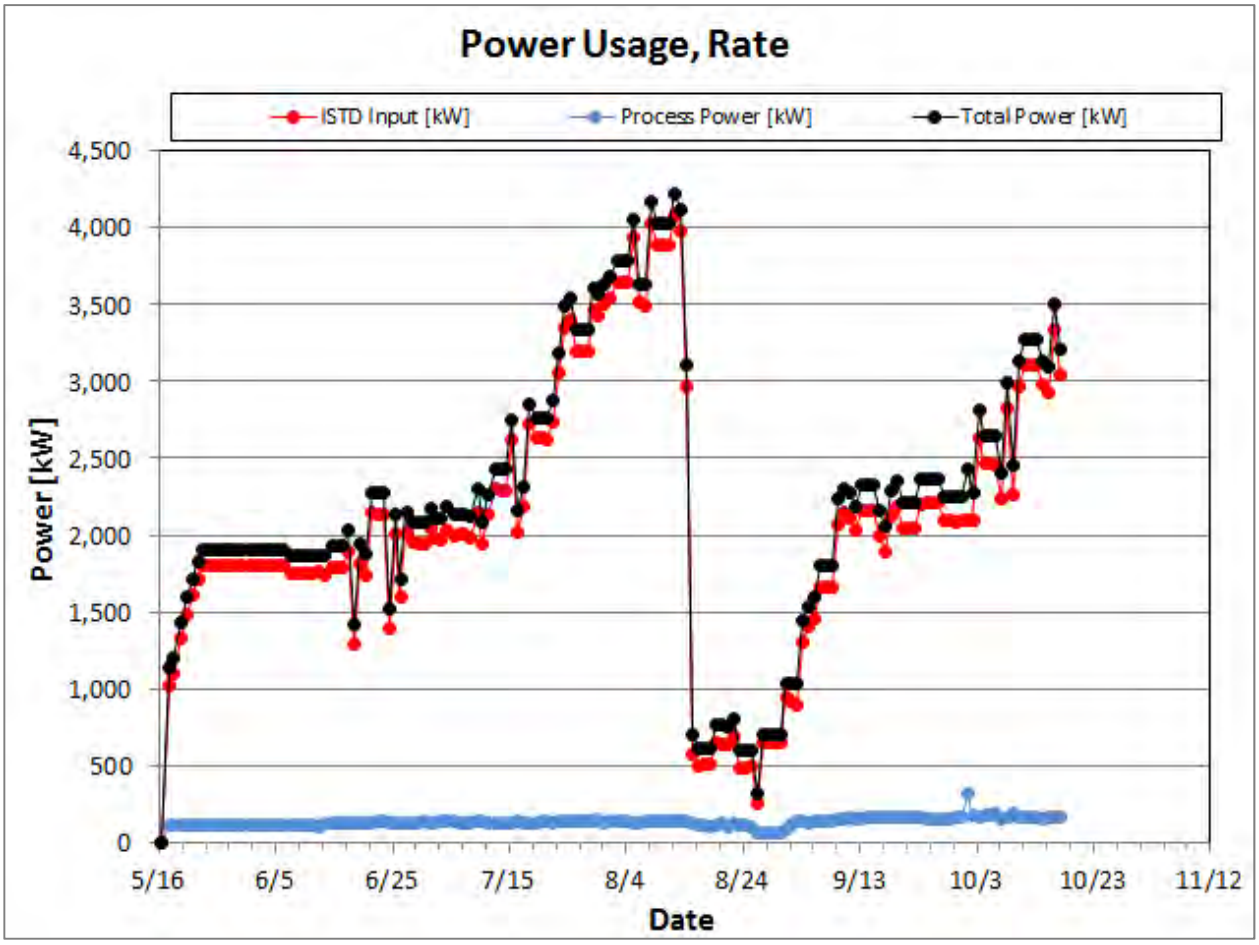


Figure 8. Power Usage, Rate

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The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

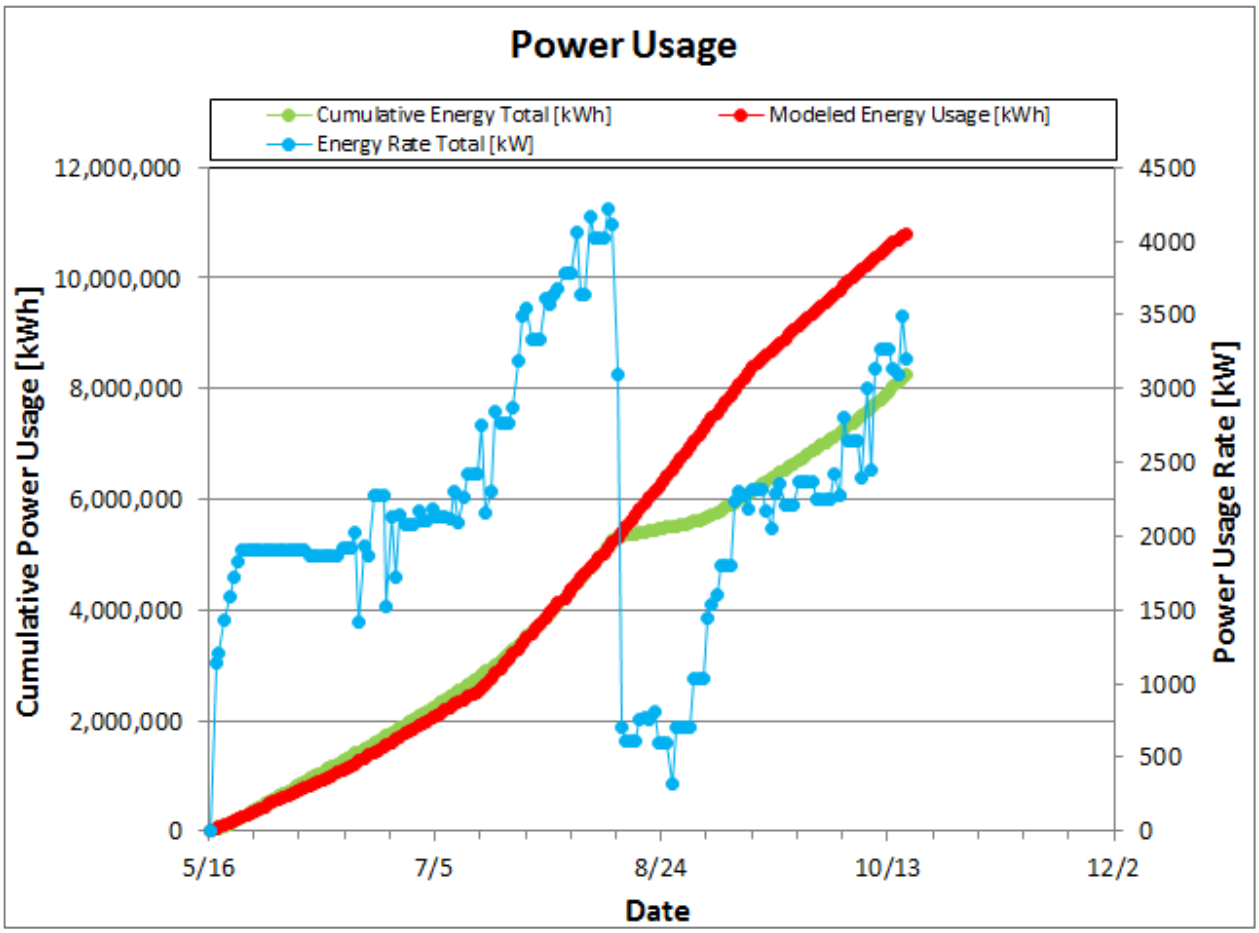


Figure 9. Power Usage

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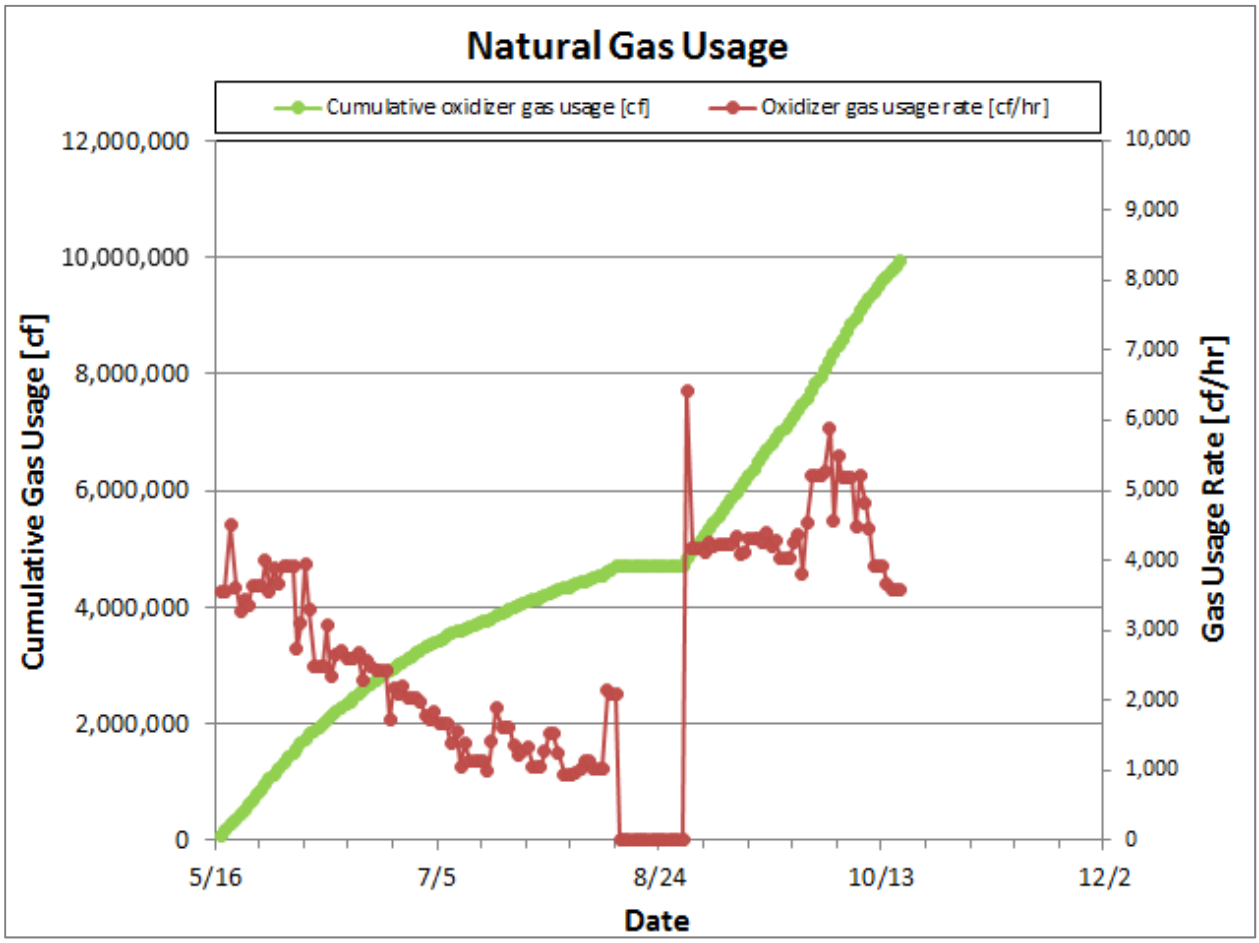


Figure 10. Natural Gas Usage

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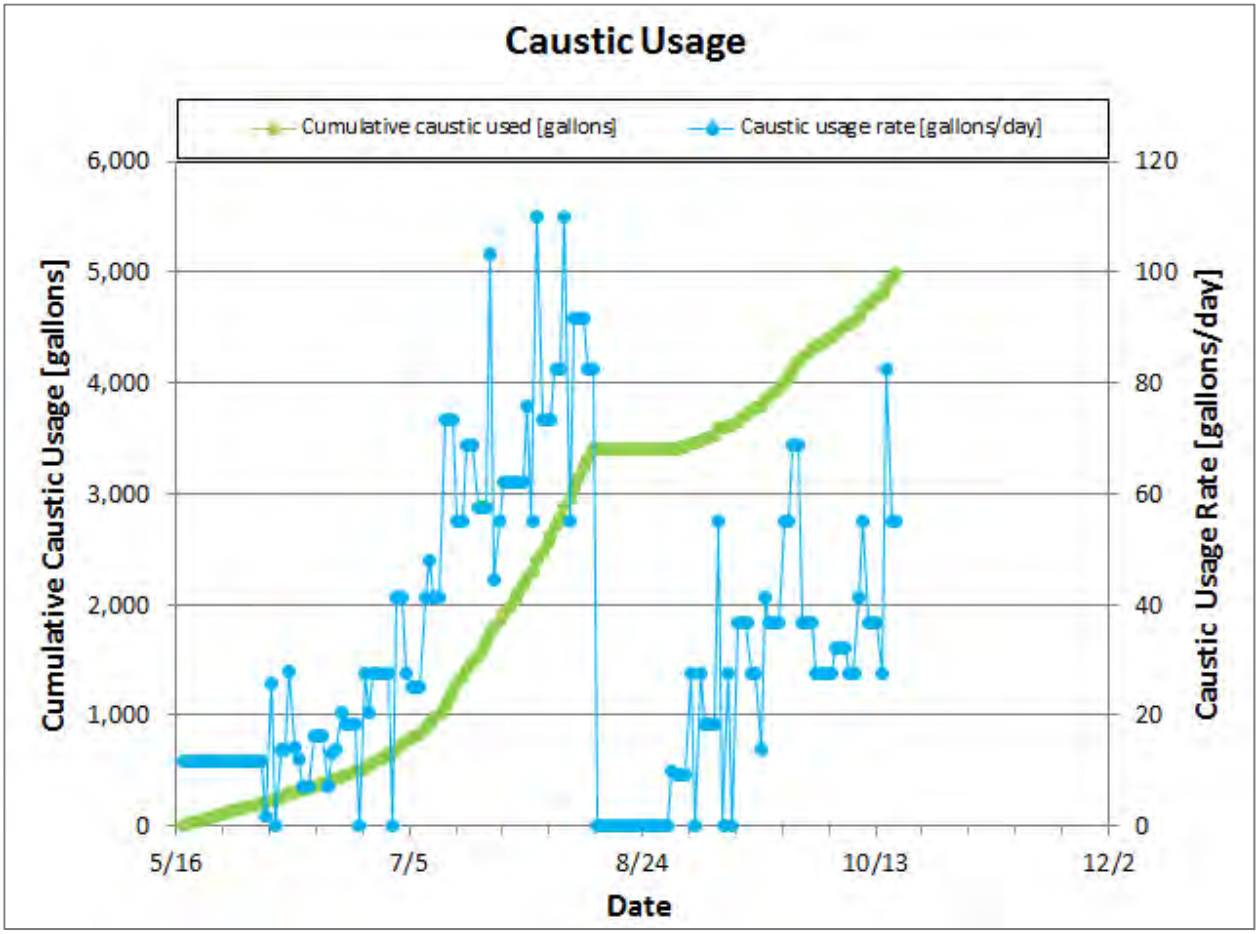


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12a. As of 9/26/14, we have reached all three payment milestone for phase 1. Phase 2 centroids are shown in Figure 12b. The scatterplots have been updated to show the centroids grouped by depth, with each depth range shown as a different color.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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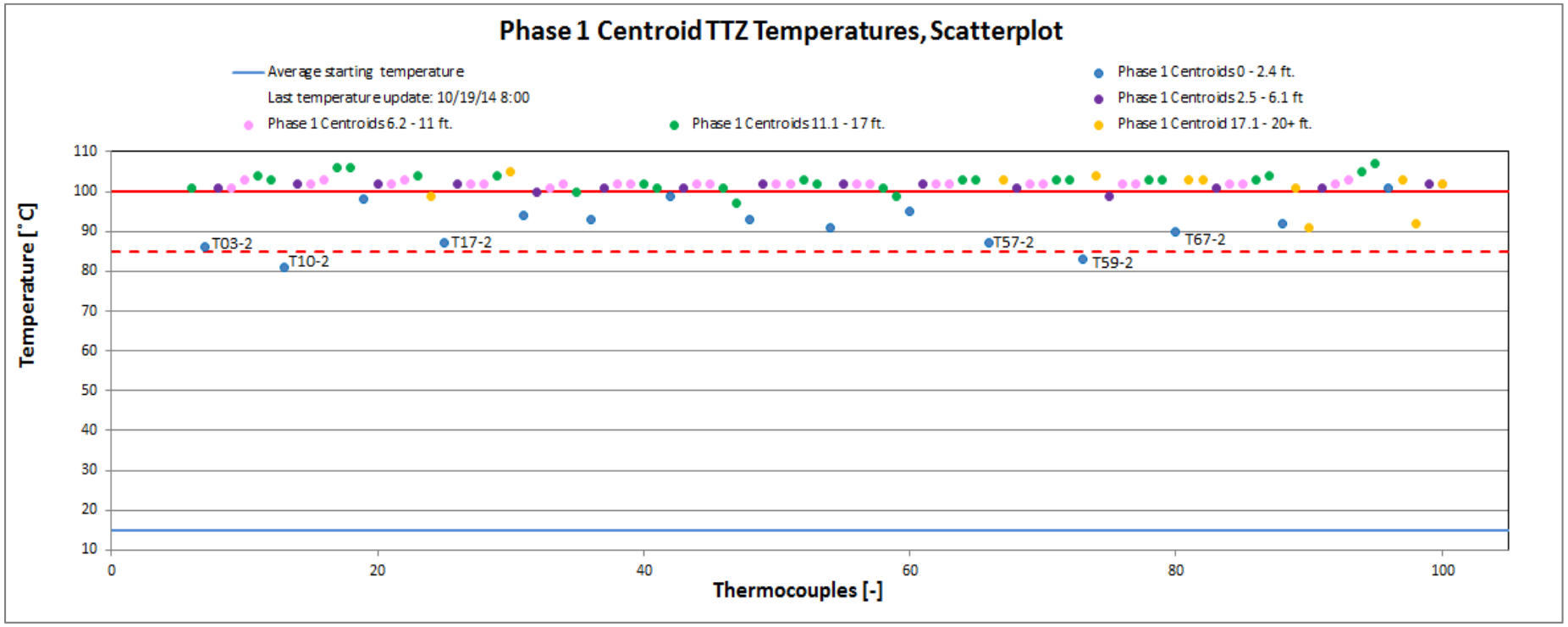


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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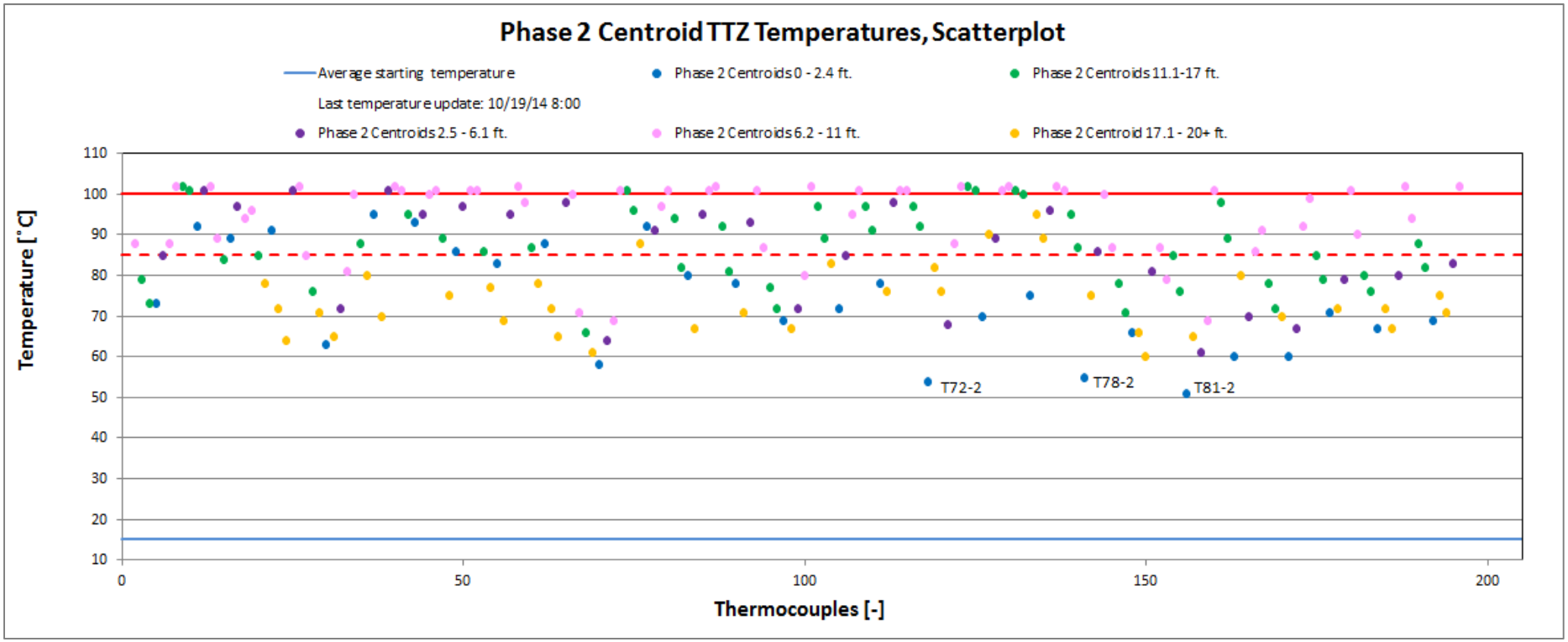


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots		
	Value	**Unit**
Date of Last Update	10/19/14	
Phase 1 Centroid Thermocouples ≥85 °C	100	%
Phase 1 Centroid Thermocouples ≥100 °C	94	%
Phase 2 Centroid Thermocouples ≥85 °C	55	%
Phase 2 Centroid Thermocouples ≥100 °C	23	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









Prepared by:

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1 SUMMARY

This report is intended to cover the operational time period of Friday October 17, 2014 through Friday October 24, 2014, with temperatures updated through Sunday October 26, 2014.

Table 1 provides a summary of the project operational status as of Friday, October 24, 2014.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	10/24/14	
Last Temperature Data Update	10/22/14	
Days of Operation (Total)	138	days
Days of Phase 1 Operation	138	days
Days of Phase 2 Operation	29	days
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	8,866,500	kWh
Used Electrical Energy vs. Estimate	56.1	%
Total Mass Removal	325,163	lbs
Average Power Input Last 24 Hours	3,630	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,188	scfm
Average Condensate Production Rate Last 24 Hours	4.5	gpm

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Heaters in both Phase 1 and Phase 2 remain online and at full power. As of 10/24/14, Phase 1 has operated for 138 days and Phase 2 for 29 days. Please note that this represents days where heaters operated at or above 70% (per contract definition). The current average wellfield temperature for Phase 1 is 101°C and 93°C for Phase 2. All three temperature milestone have been achieved for Phase 1.

The second progress soil sampling event is complete and data results have been received. Soil samples were collected from biased locations (lagging temperatures, former lagoons and drum storage areas) throughout Phase 1. All soil sample results are below project cleanup goals with the exception of TMP-70 at 9 ft which has concentrations of m,p-xylene and o-xylene detected just over the project cleanup goal at78.7 and 45.2 ppm, respectively (project goal 70 and 45, respectively).

Estimated mass removed to date is reported using the flammability analyzer data, lab data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. These results yield a total mass removal of 325,163 lbs as of 10/24/14. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 10/24/14. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.59:0.41. These ratios were applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Phase 2 heating began on 7/16/14 but was stopped on August 14, 2014, as a result of the oxidizer shutdown. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ		
Type	**Value**	**Unit**
Date of Last Update	10/26/14	
Phase 1 Entire TTZ Average Temperature	101	°C
Phase 2 Entire TTZ Average Temperature	93	°C
Phase 1 Centroid Average Temperature	100	°C
Phase 2 Centroid Average Temperature	89	°C

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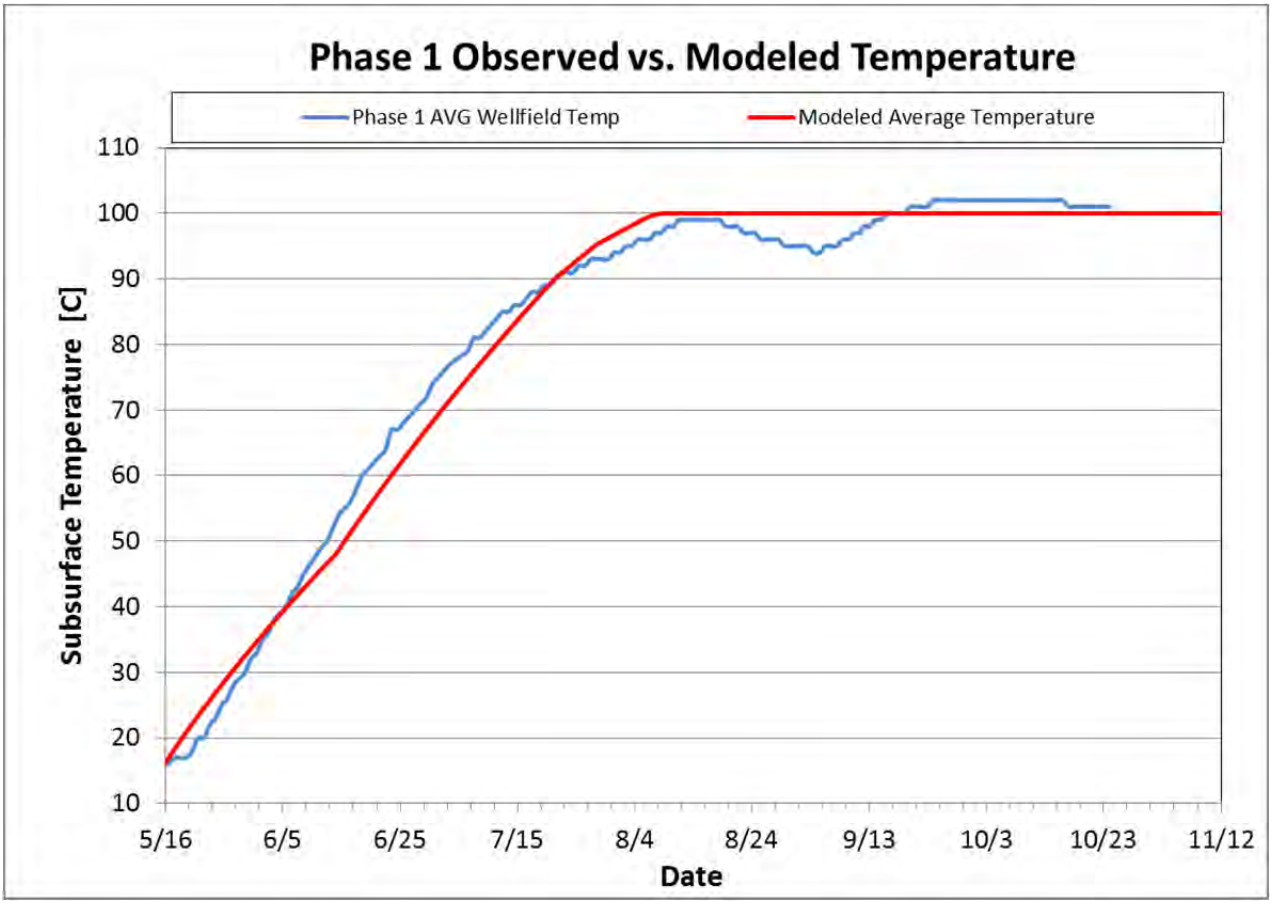


Figure 1a. Phase 1 Observed vs. Modeled Temperature

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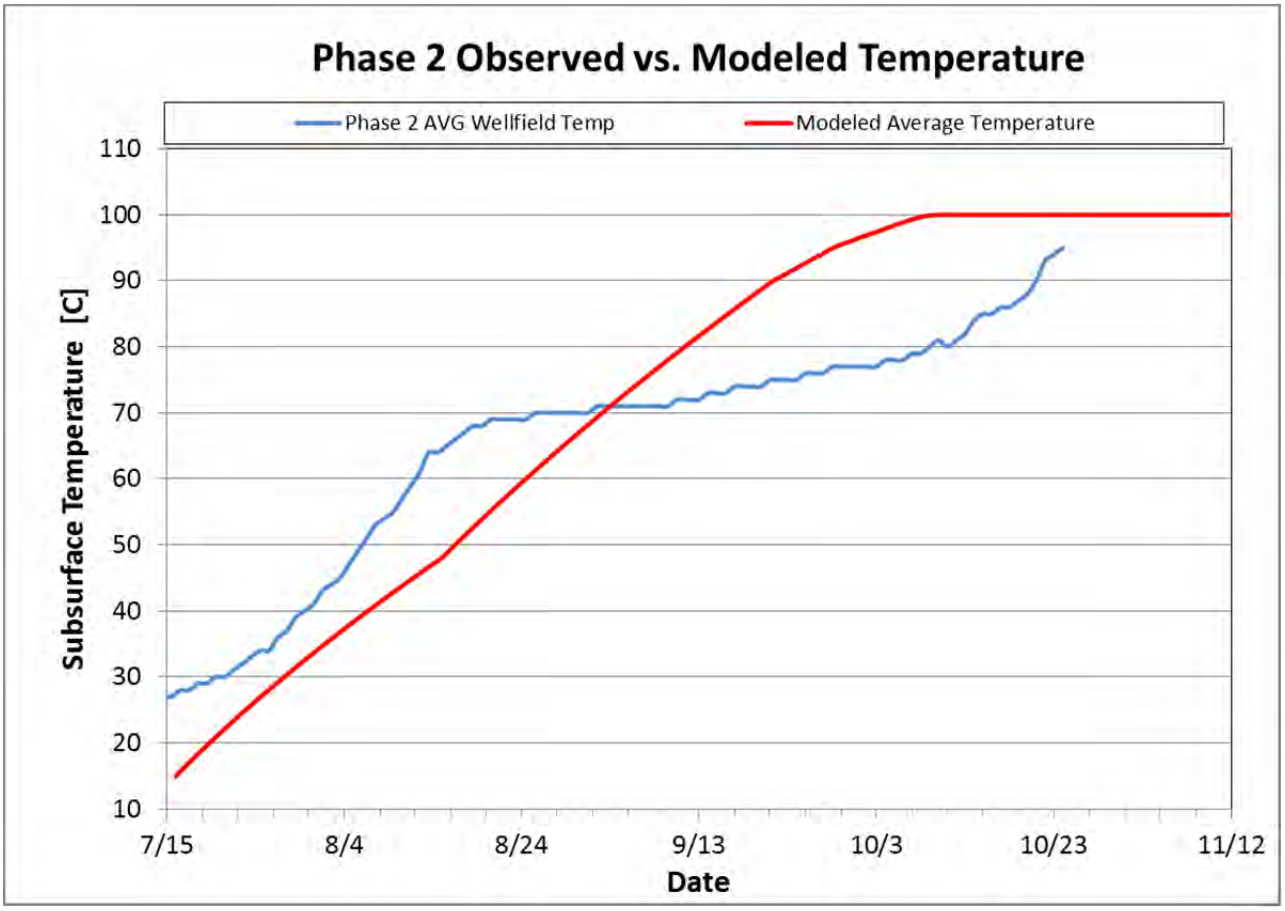


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was restarted on 8/30/14.

The decrease in steam extracted seems suspect and we are reviewing data collected over the past week.

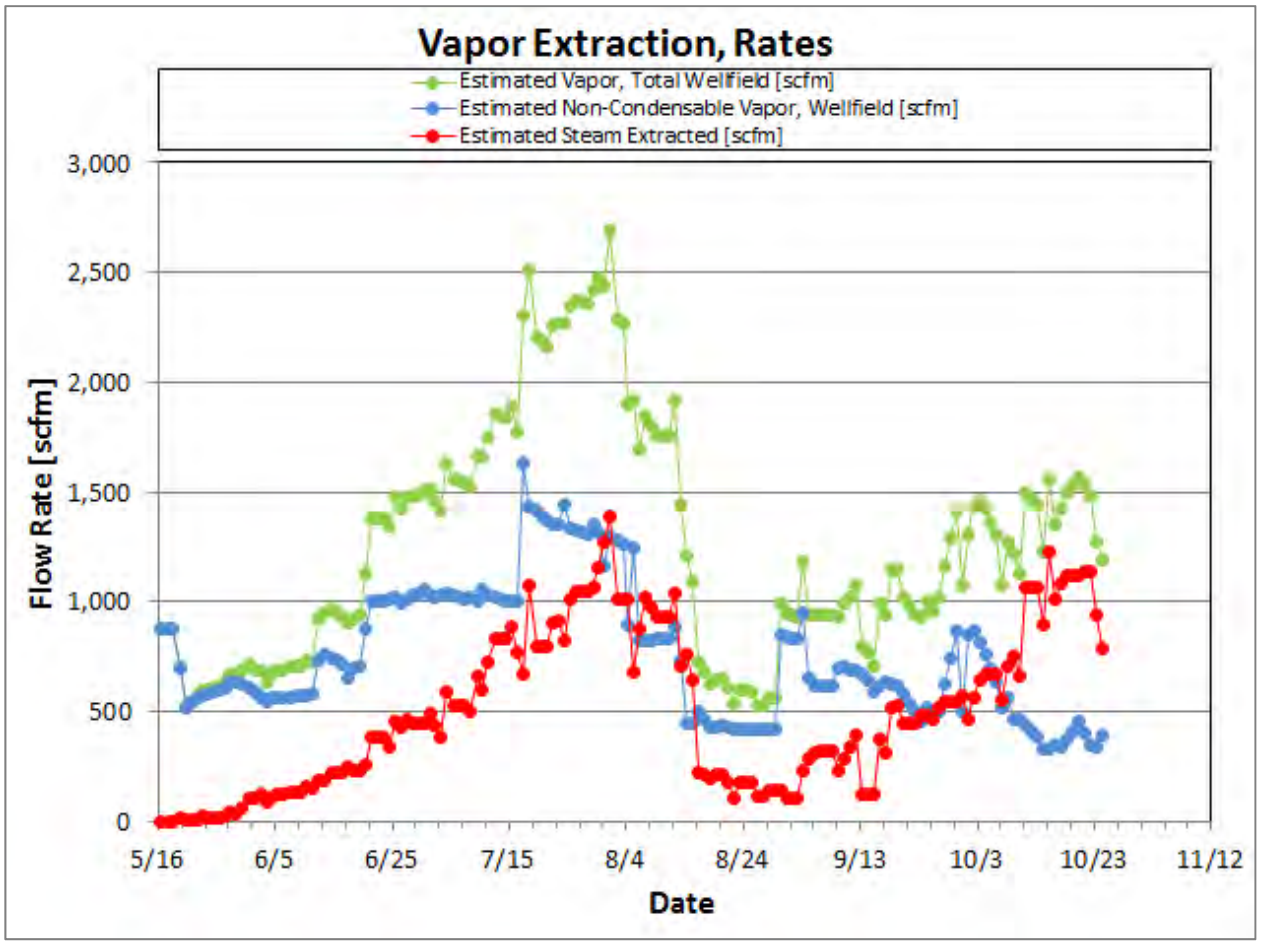


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

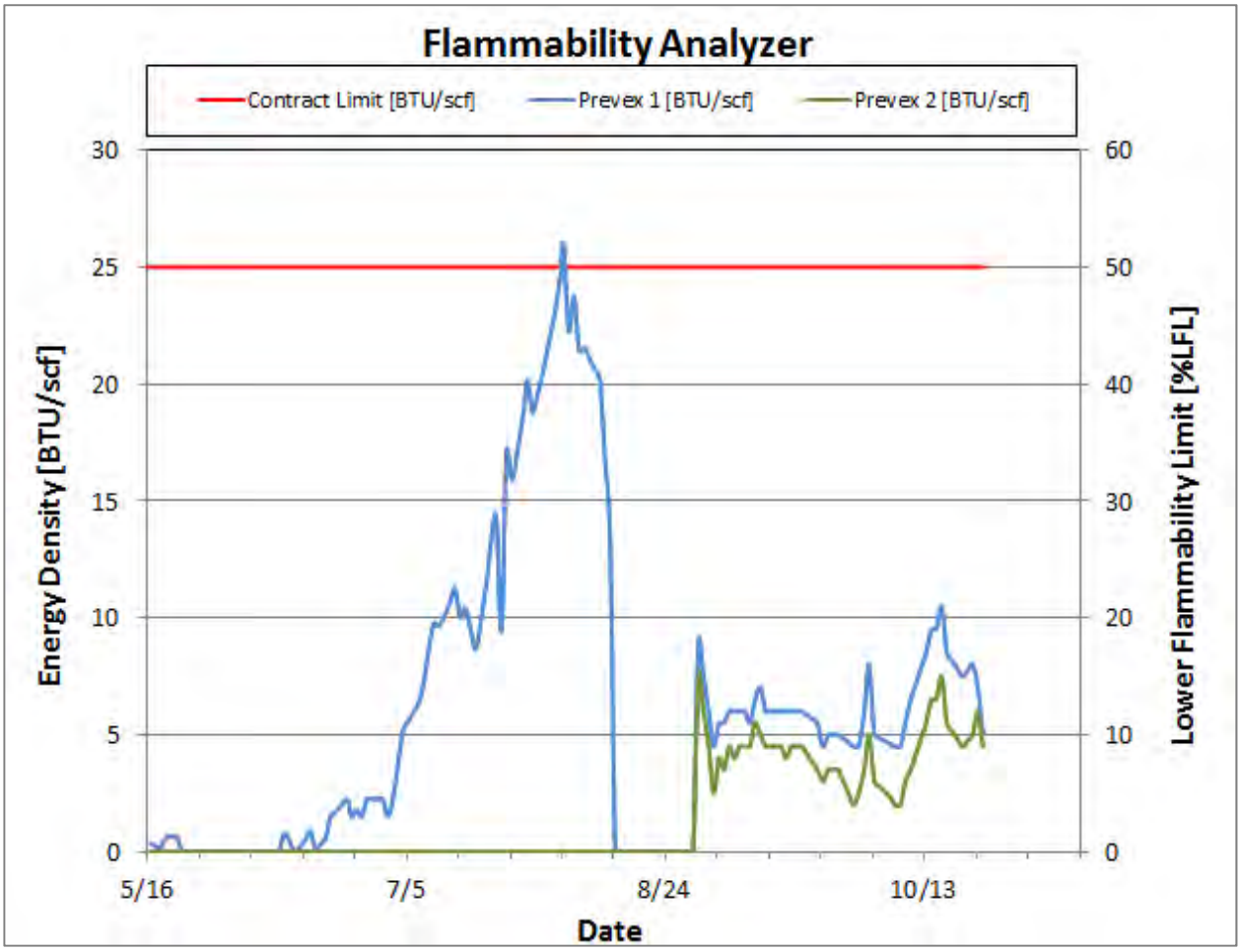


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed to date is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The decrease in mass removed starting on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14, 9/23/14, 9/30/14 and 10/7/14.

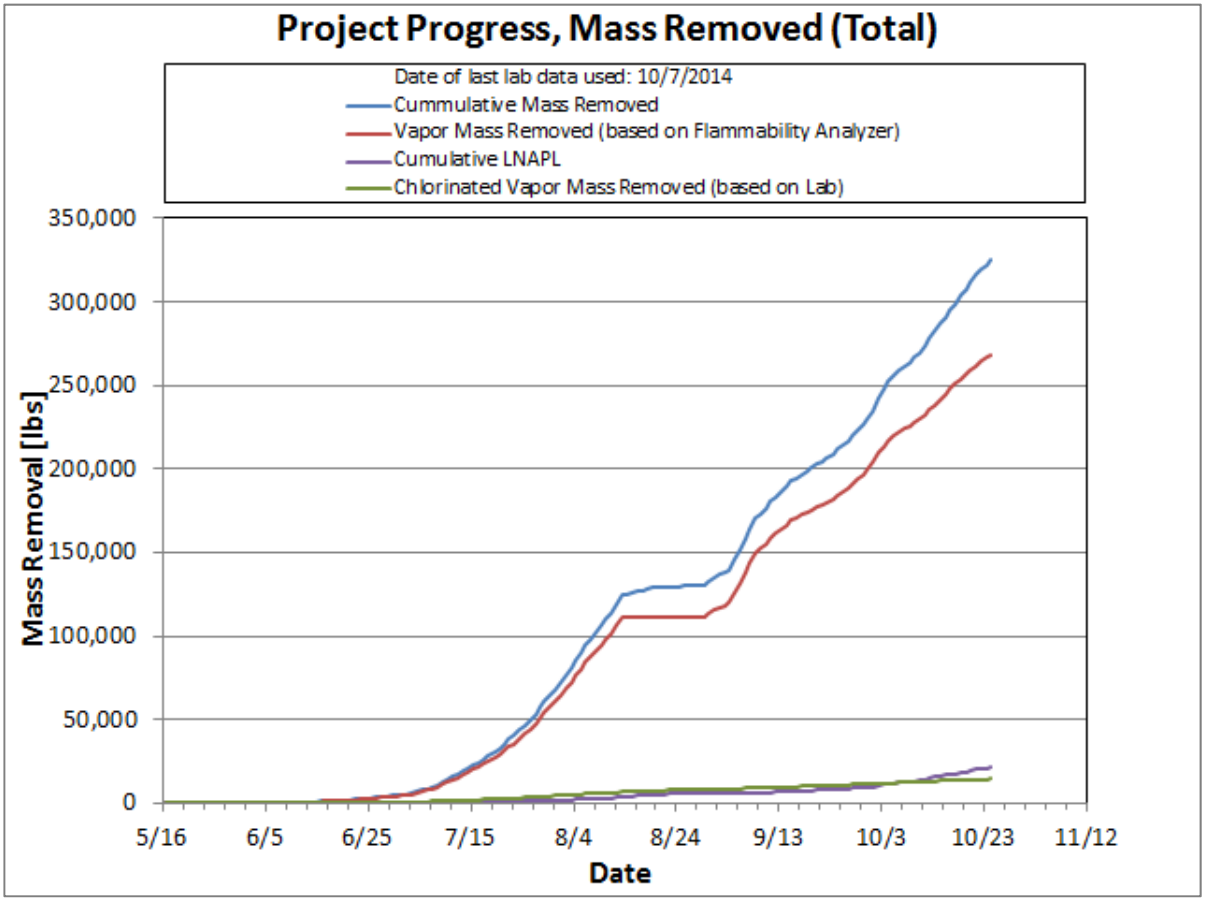


Figure 4a. Project Progress, Mass Removal (Total)

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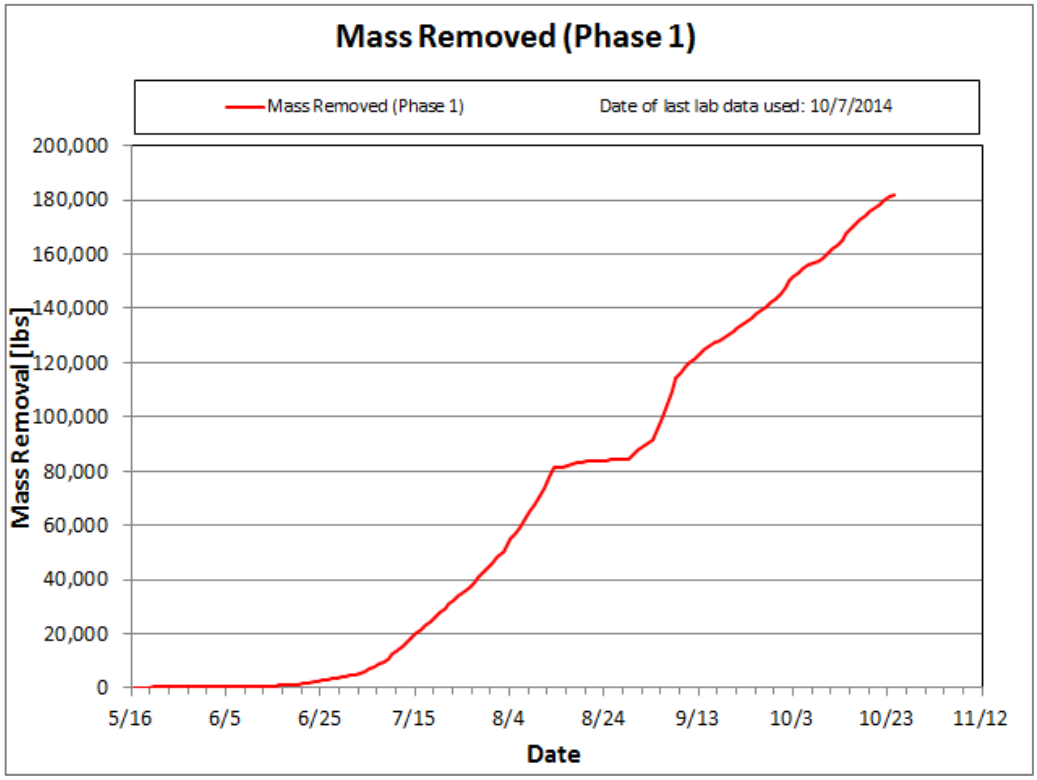


Figure 4b. Project Progress, Mass Removal (Phase 1)

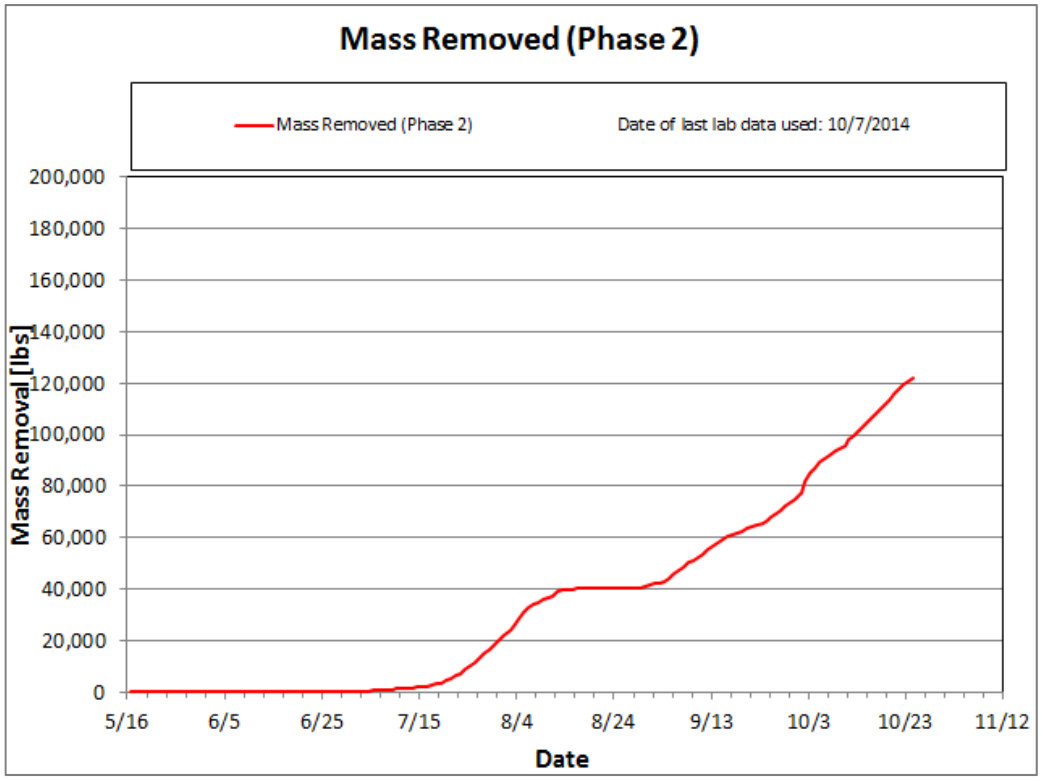


Figure 4c. Project Progress, Mass Removal (Phase 2)

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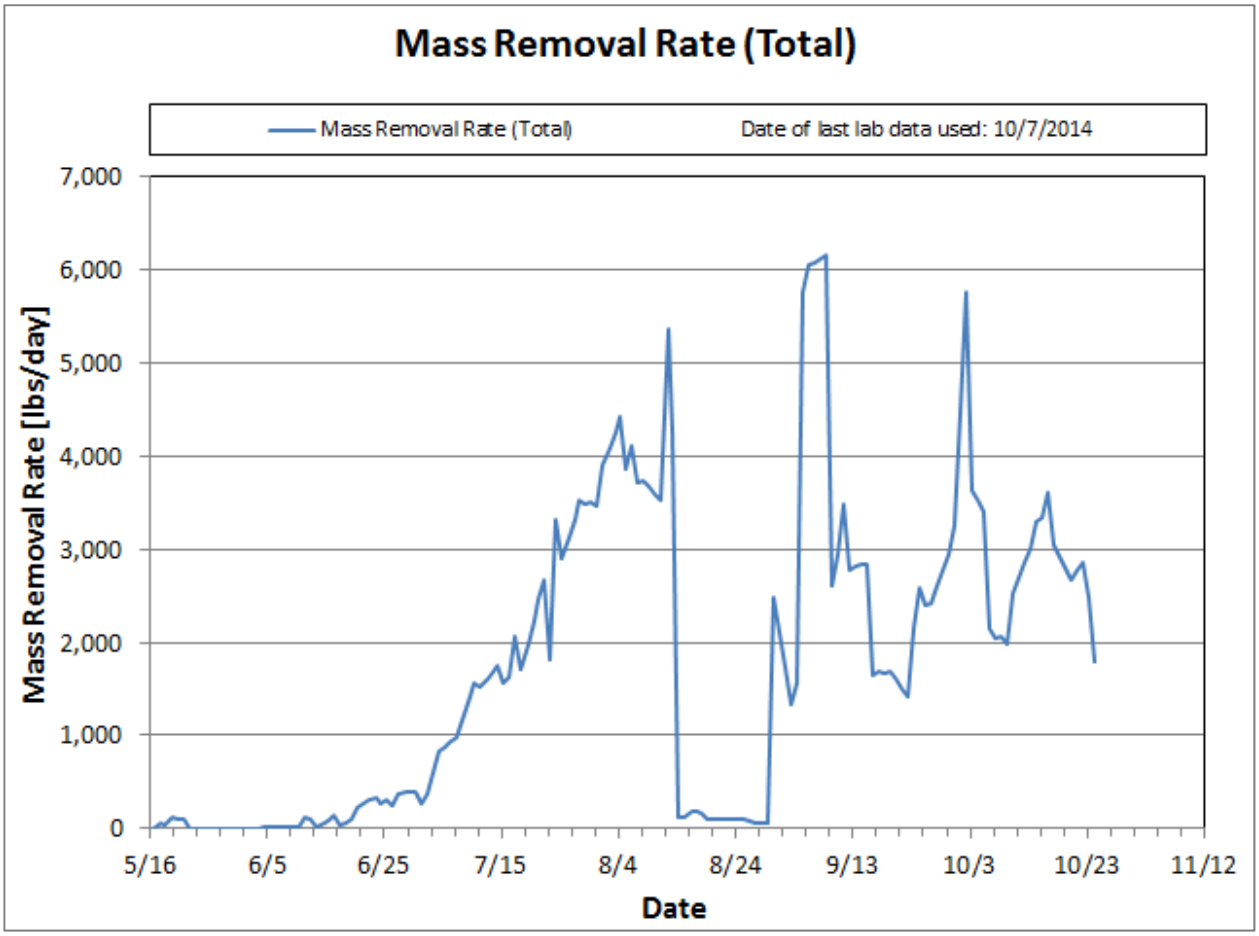


Figure 4d. Mass Removal Rate (Total for Site)

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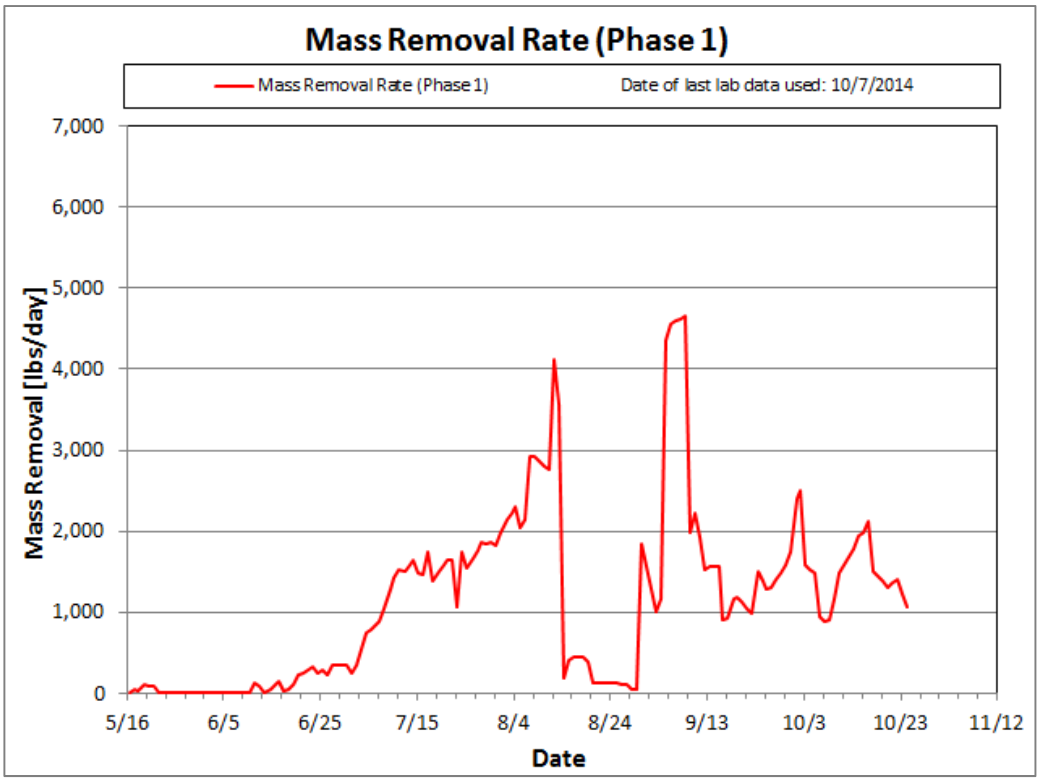


Figure 4e. Mass Removal Rate (Phase 1)

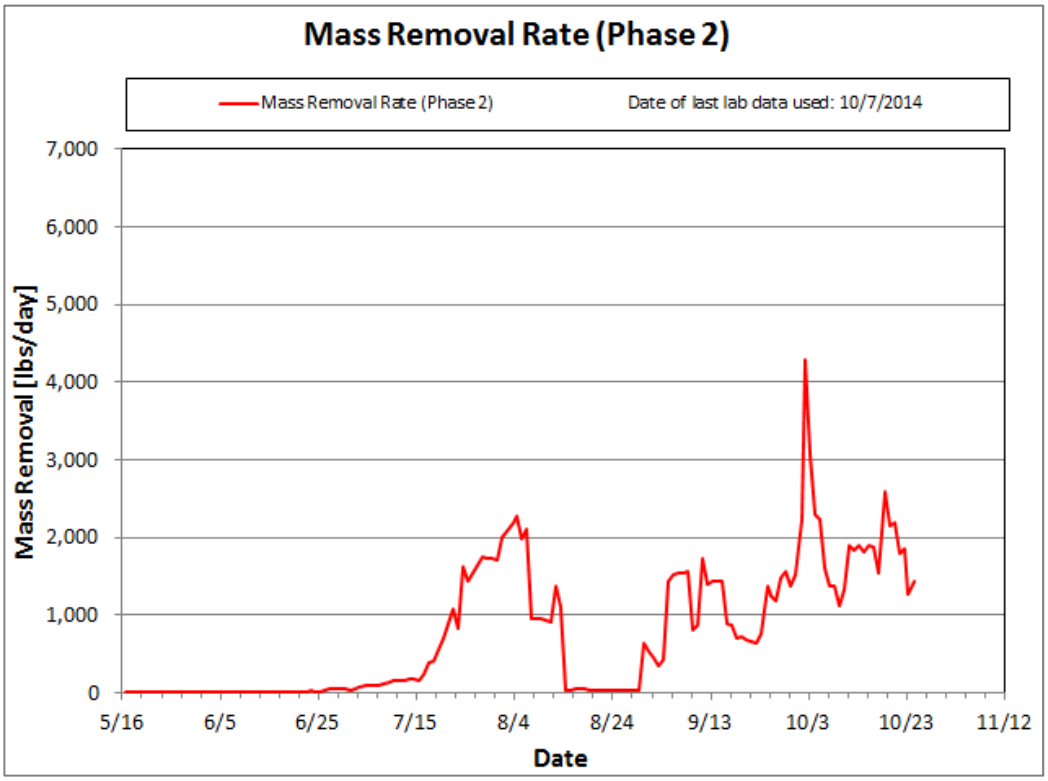


Figure 4f. Mass Removal Rate (Phase 2)

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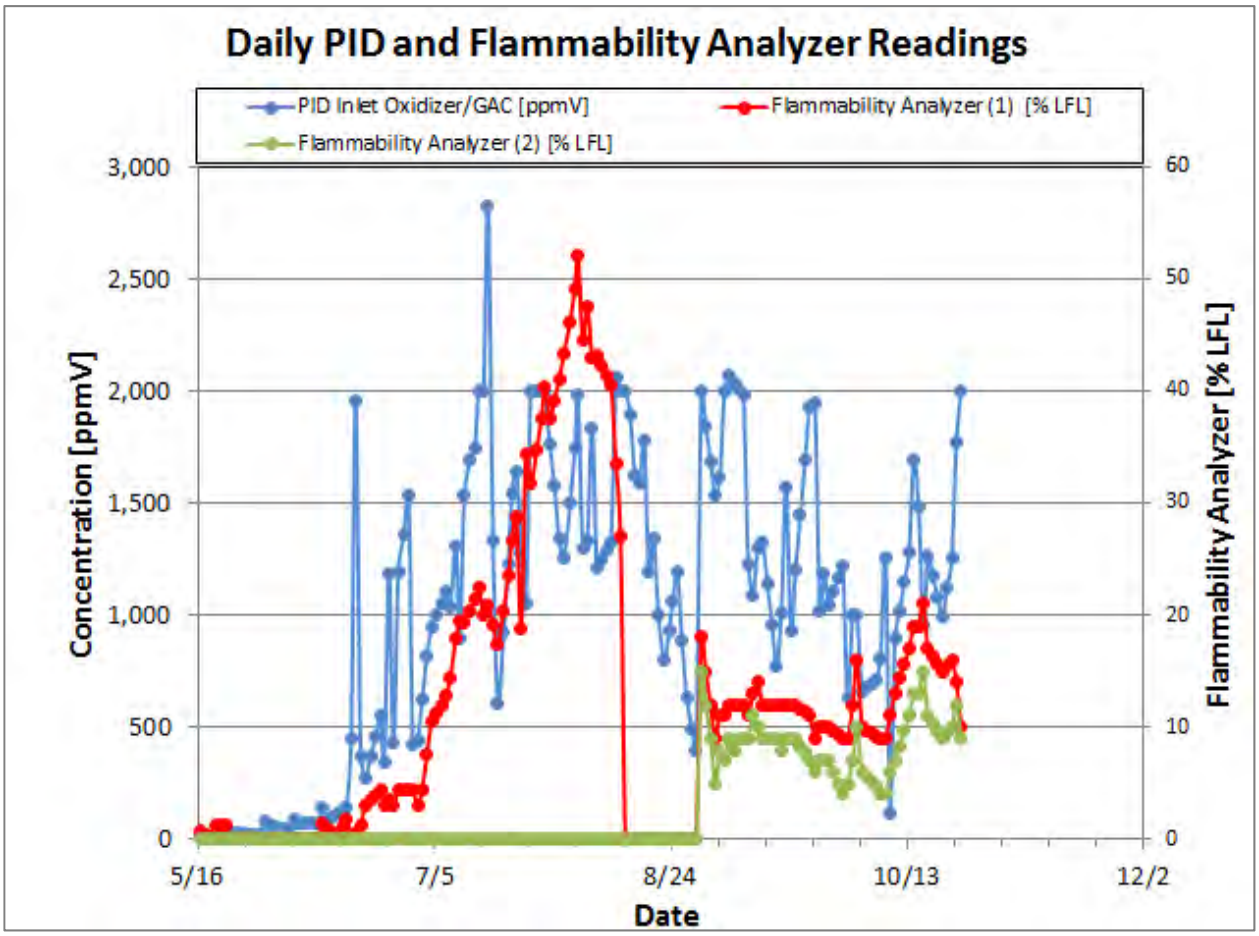


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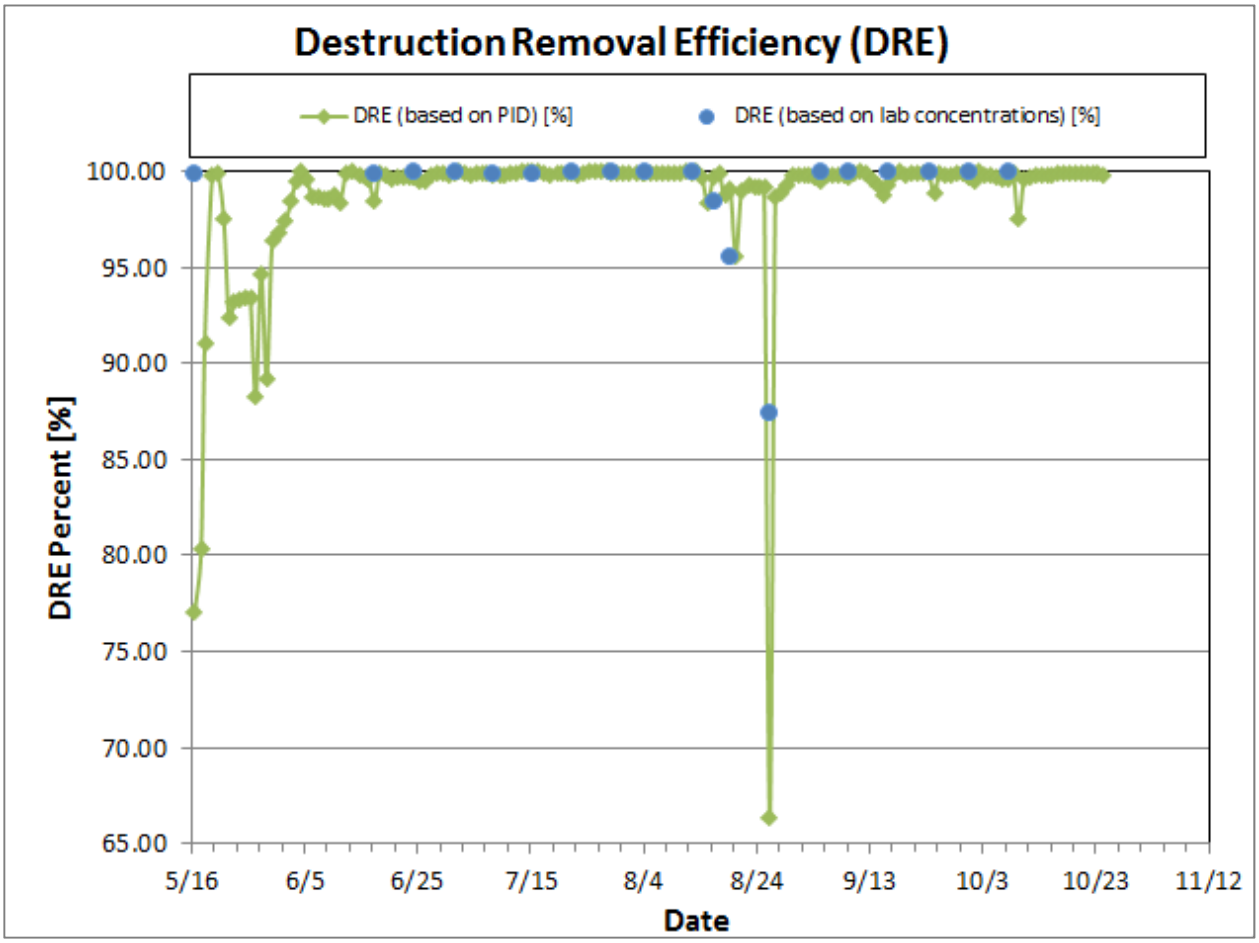


Figure 6. Destruction Removal Efficiency

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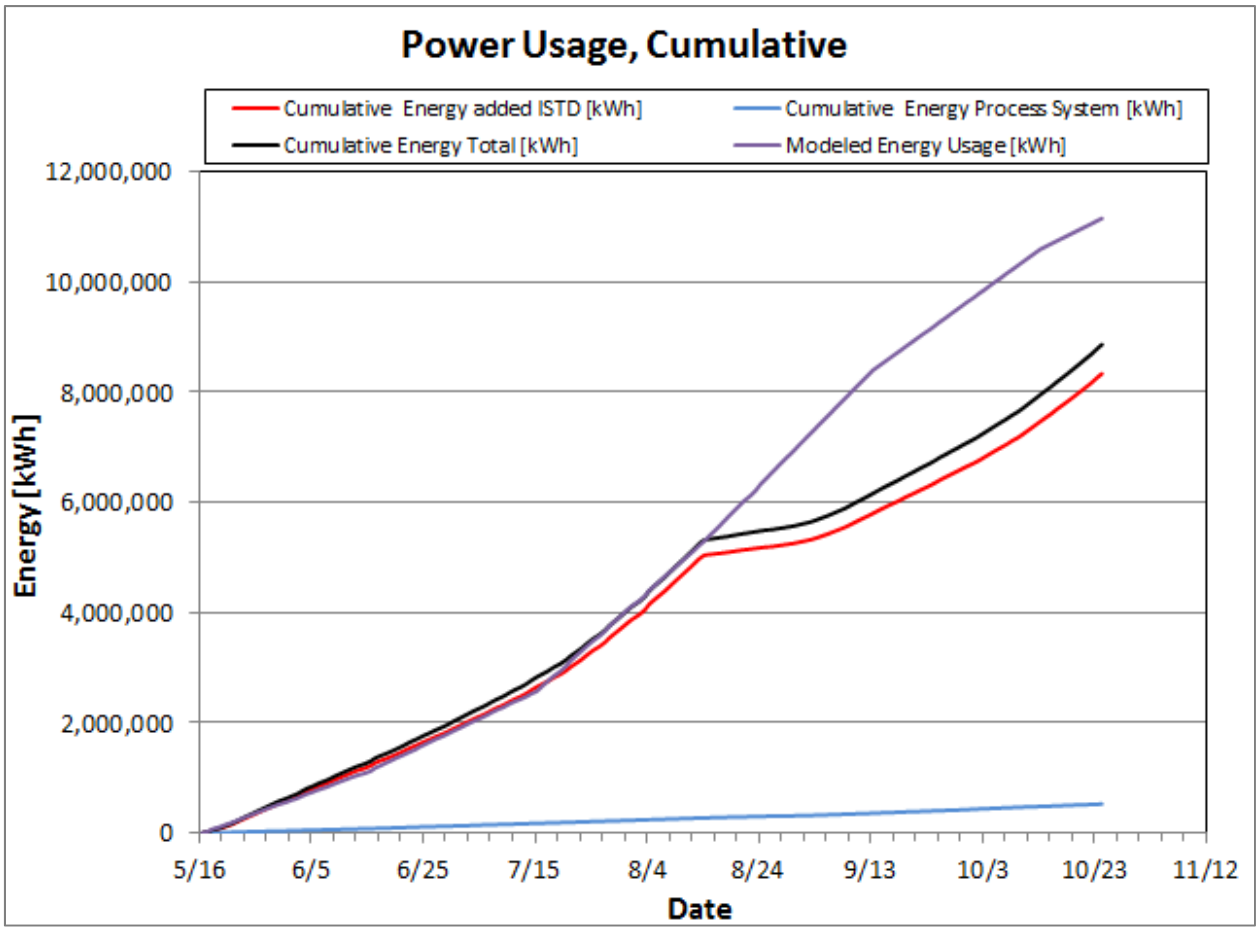


Figure 7. Power Usage, Cumulative

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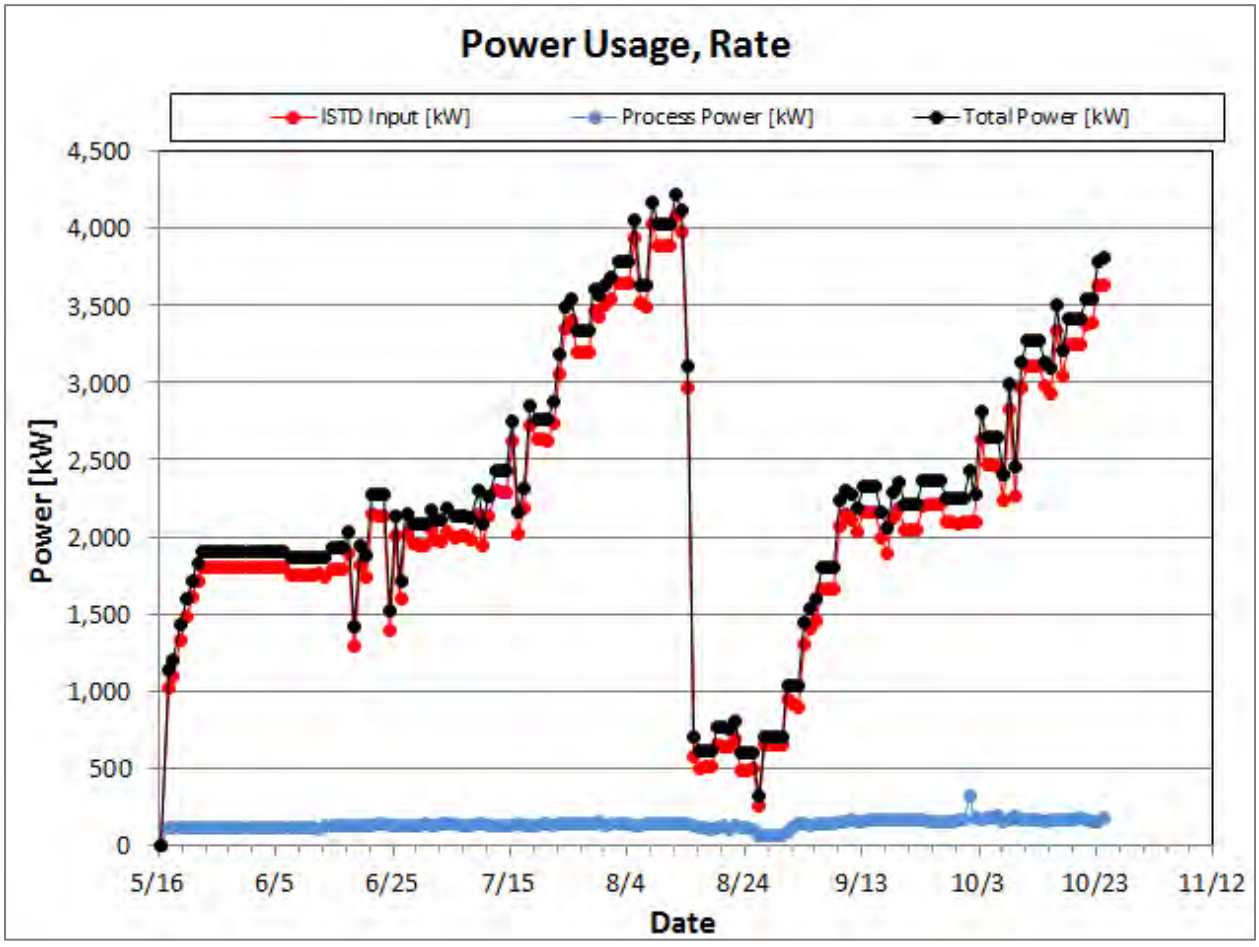


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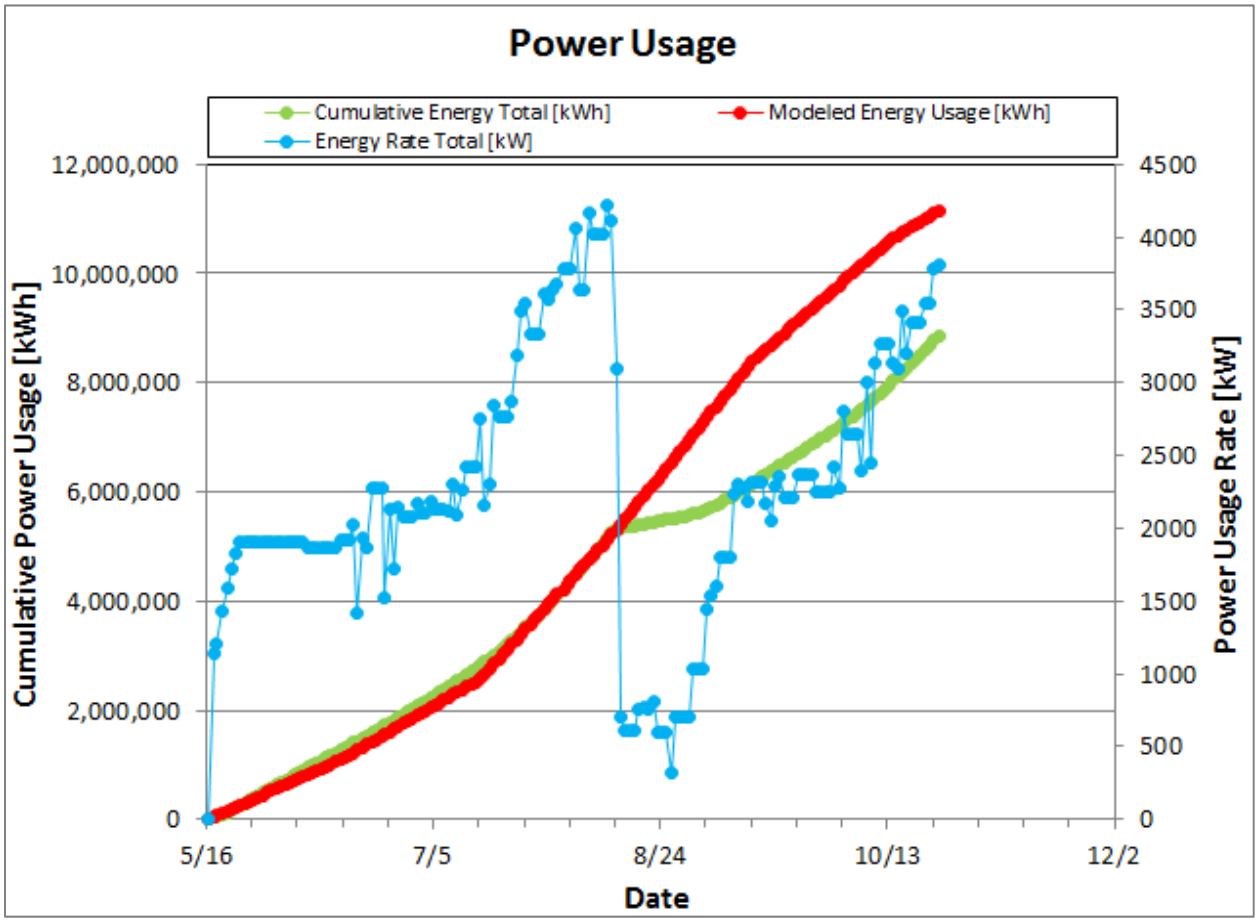


Figure 9. Power Usage

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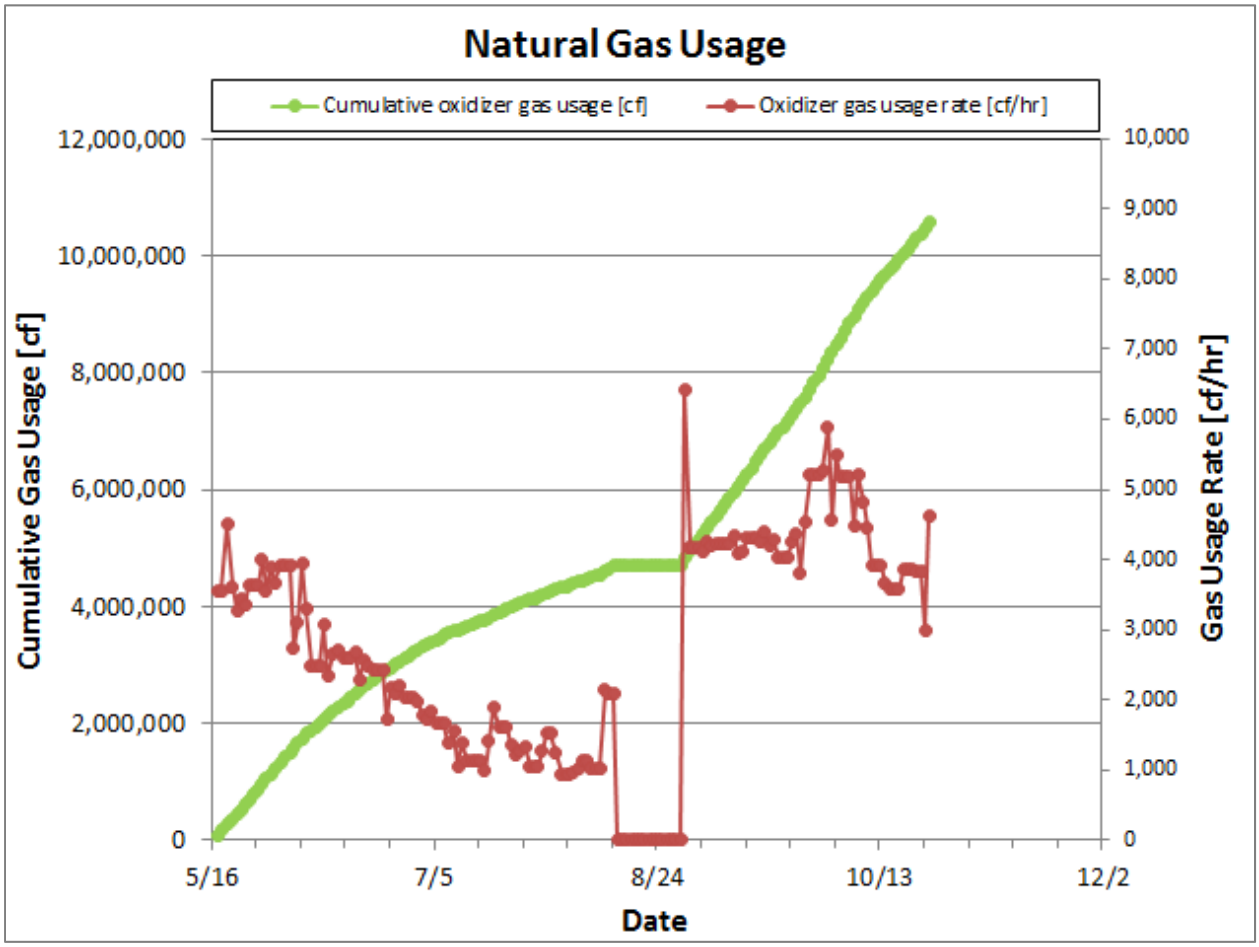


Figure 10. Natural Gas Usage

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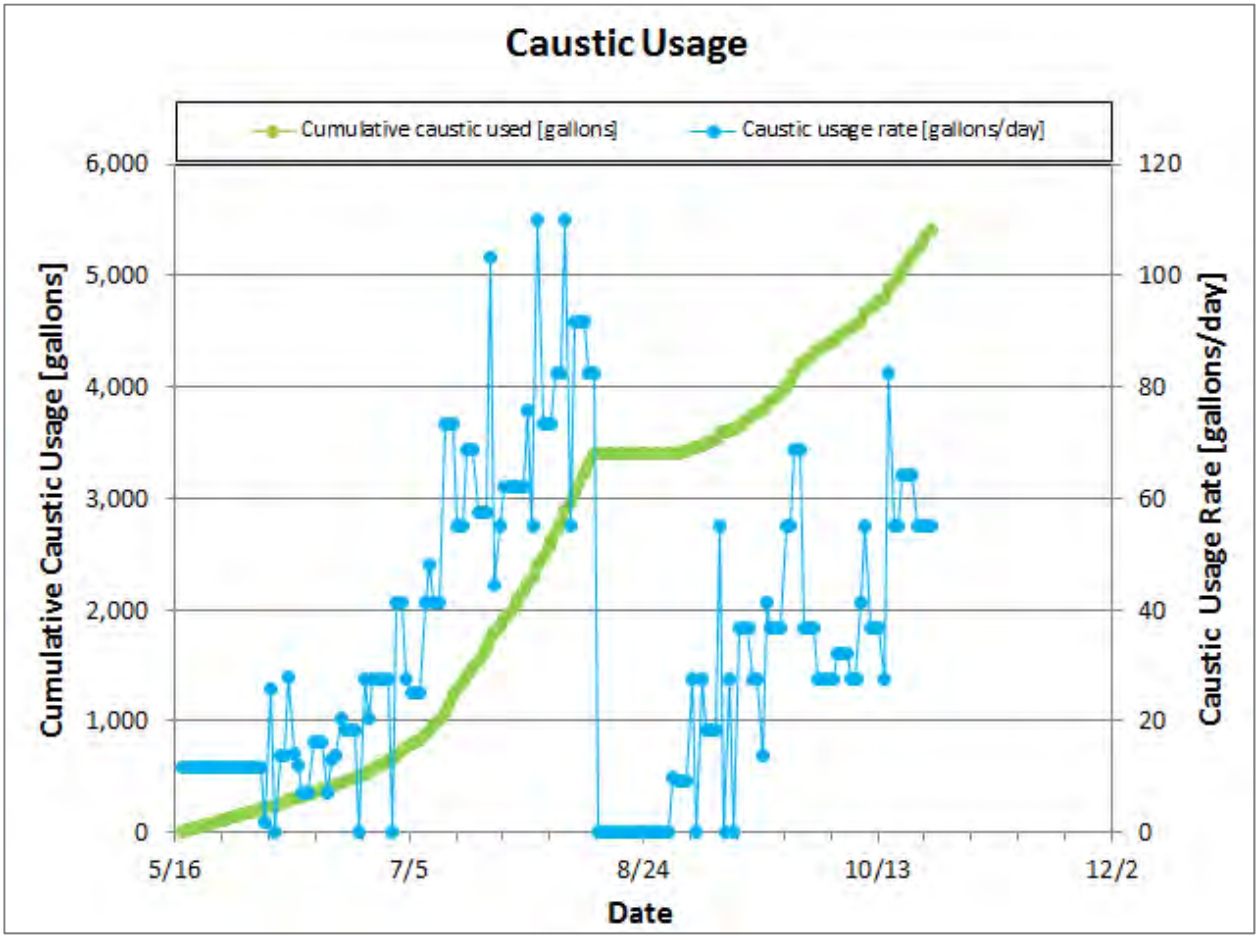


Figure 11. Caustic Usage

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Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12a. As of 9/26/14, we have reached all three payment milestone for phase 1. Phase 2 centroids are shown in Figure 12b. We have reached temperature milestone 1 in Phase 2. The scatterplots have been updated to show the centroids grouped by depth, with each depth range shown as a different color.

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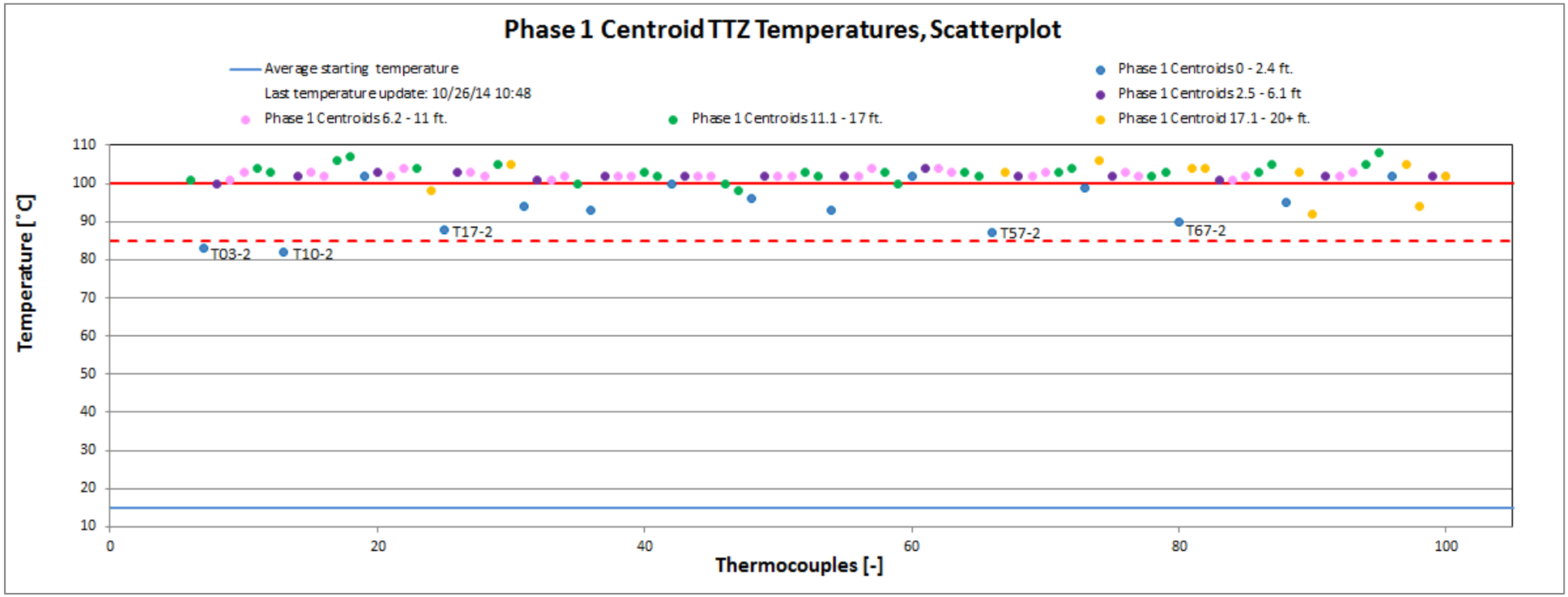


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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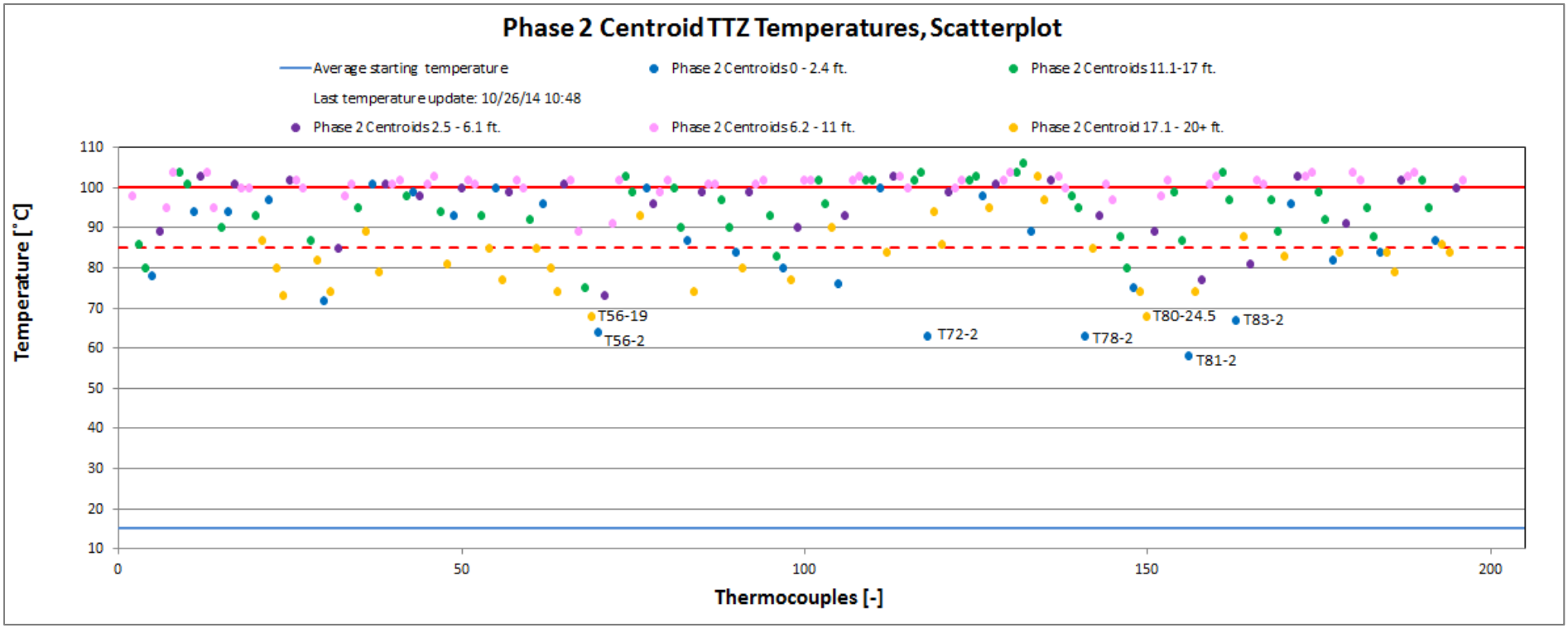


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots		
	Value	**Unit**
Date of Last Update	10/26/14	
Phase 1 Centroid Thermocouples ≥85 °C	100	%
Phase 1 Centroid Thermocouples ≥100 °C	94	%
Phase 2 Centroid Thermocouples ≥85 °C	78	%
Phase 2 Centroid Thermocouples ≥100 °C	41	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday October 24, 2014 through Friday October 31, 2014, with temperatures updated through Sunday November 2, 2014.

Table 1 provides a summary of the project operational status as of Friday, October 31, 2014.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	10/31/14	
Last Temperature Data Update	10/31/14	
Days of Operation (Total)	145	days
Days of Phase 1 Operation	145	days
Days of Phase 2 Operation	36	days
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	9,492,400	kWh
Used Electrical Energy vs. Estimate	60.1	%
Total Mass Removal	336,245	lbs
Average Power Input Last 24 Hours	3,660	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,483	scfm
Average Condensate Production Rate Last 24 Hours	6.1	gpm

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Heaters in both Phase 1 and Phase 2 remain online and at full power. As of 10/24/14, Phase 1 has operated for 145 days and Phase 2 for 36 days. Please note that this represents days where heaters operated at or above 70% (per contract definition). The current average wellfield temperature for Phase 1 is 102°C and 98°C for Phase 2. All three temperature milestone have been achieved for Phase 1 and temperature milestone 1 has been achieved for Phase 2.

Shutdown of Phase 1 is pending confirmation soil sample results. Samples are to be collected by others mid-November.

Estimated mass removed to date is reported using the flammability analyzer data, lab data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. These results yield a total mass removal of 336,245 lbs as of 10/31/14. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 10/31/14. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.56:0.44. These ratios were applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 1, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling. Temperatures have returned, and are now exceeding those prior to shutdown at all treatment depths.

Phase 2 heating began on 7/16/14 but was stopped on August 14, 2014, as a result of the oxidizer shutdown. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	11/2/14	
Phase 1 Entire TTZ Average Temperature	102	°C
Phase 2 Entire TTZ Average Temperature	98	°C
Phase 1 Centroid Average Temperature	101	°C
Phase 2 Centroid Average Temperature	97	°C

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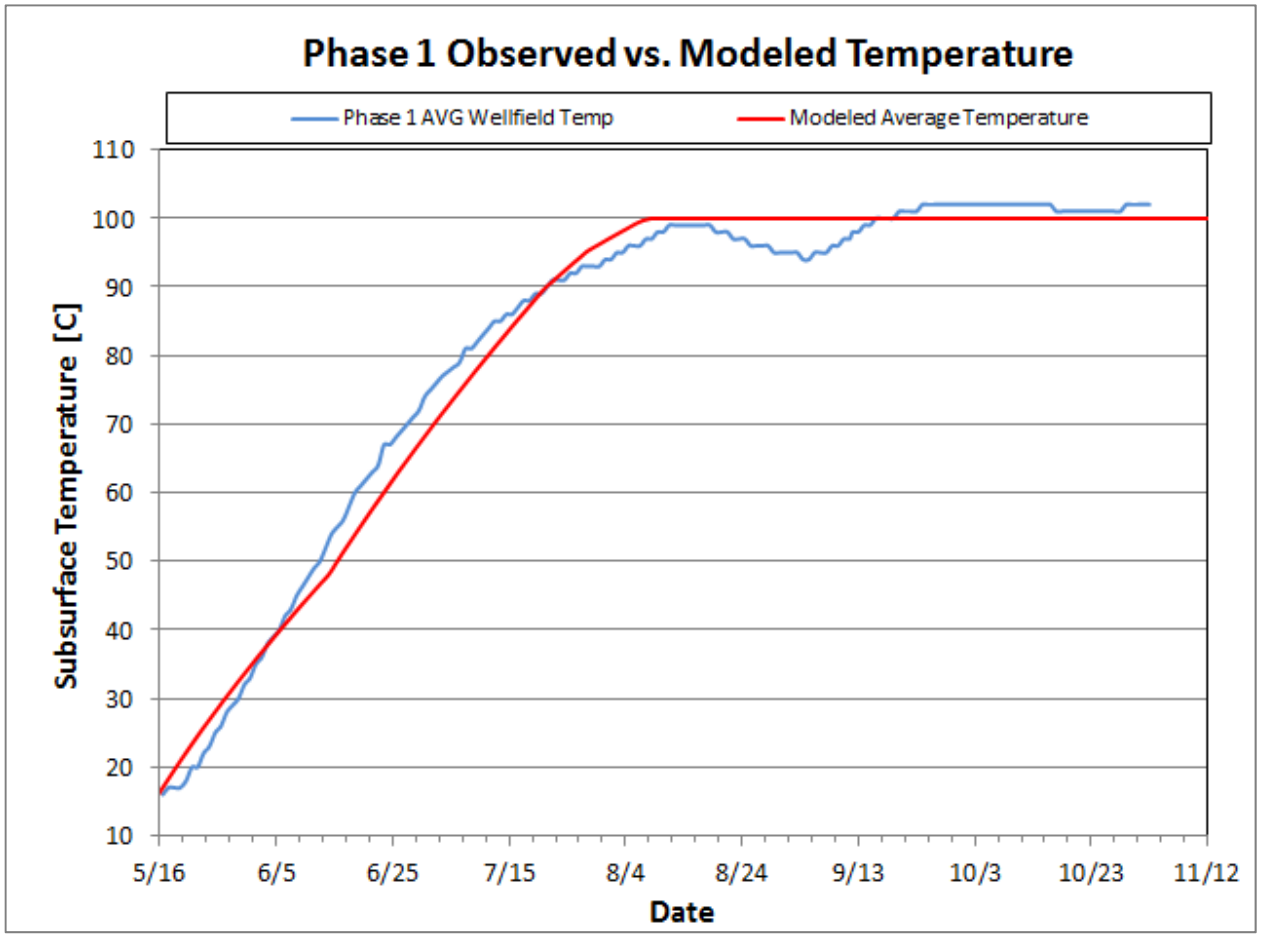


Figure 1a. Phase 1 Observed vs. Modeled Temperature

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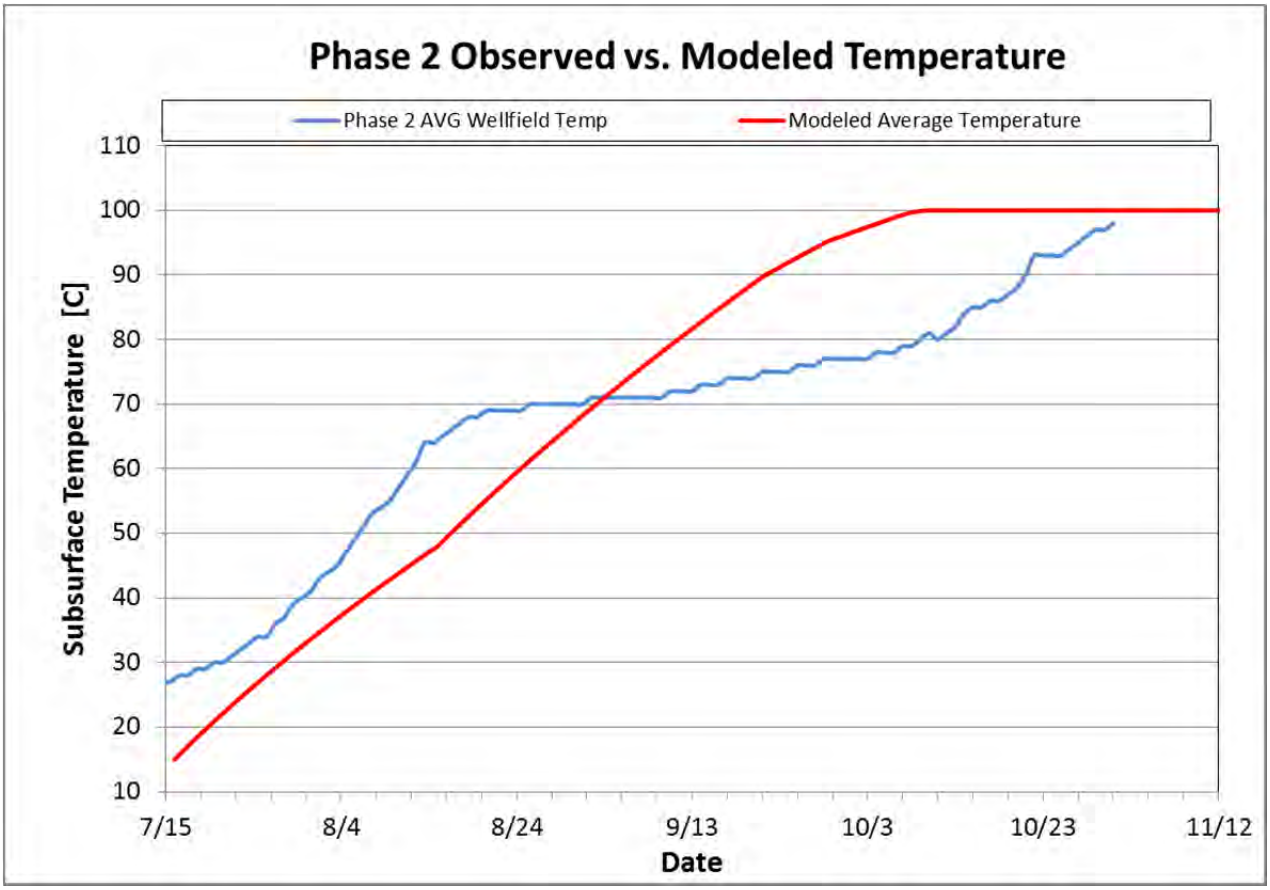


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was restarted on 8/30/14.

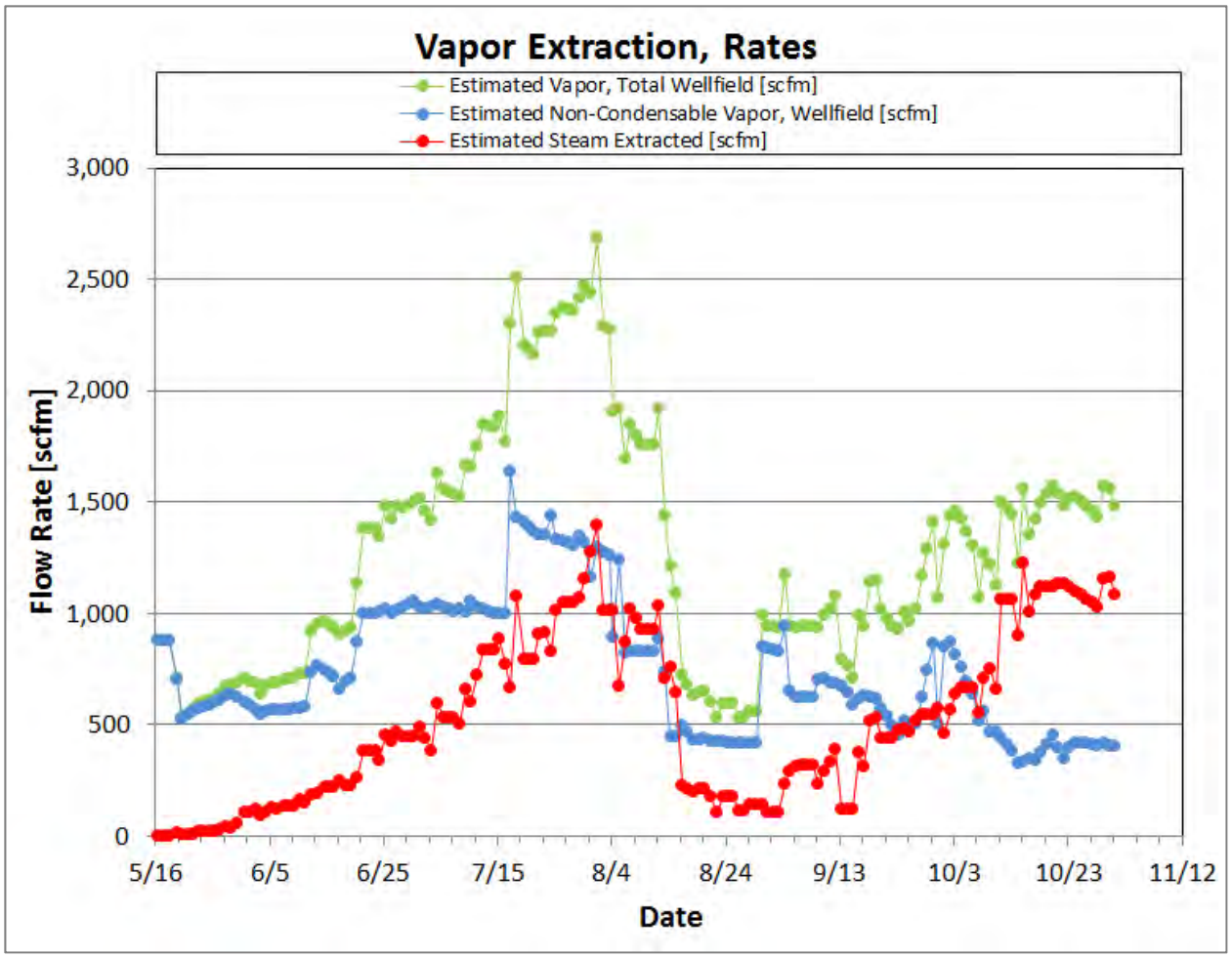


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

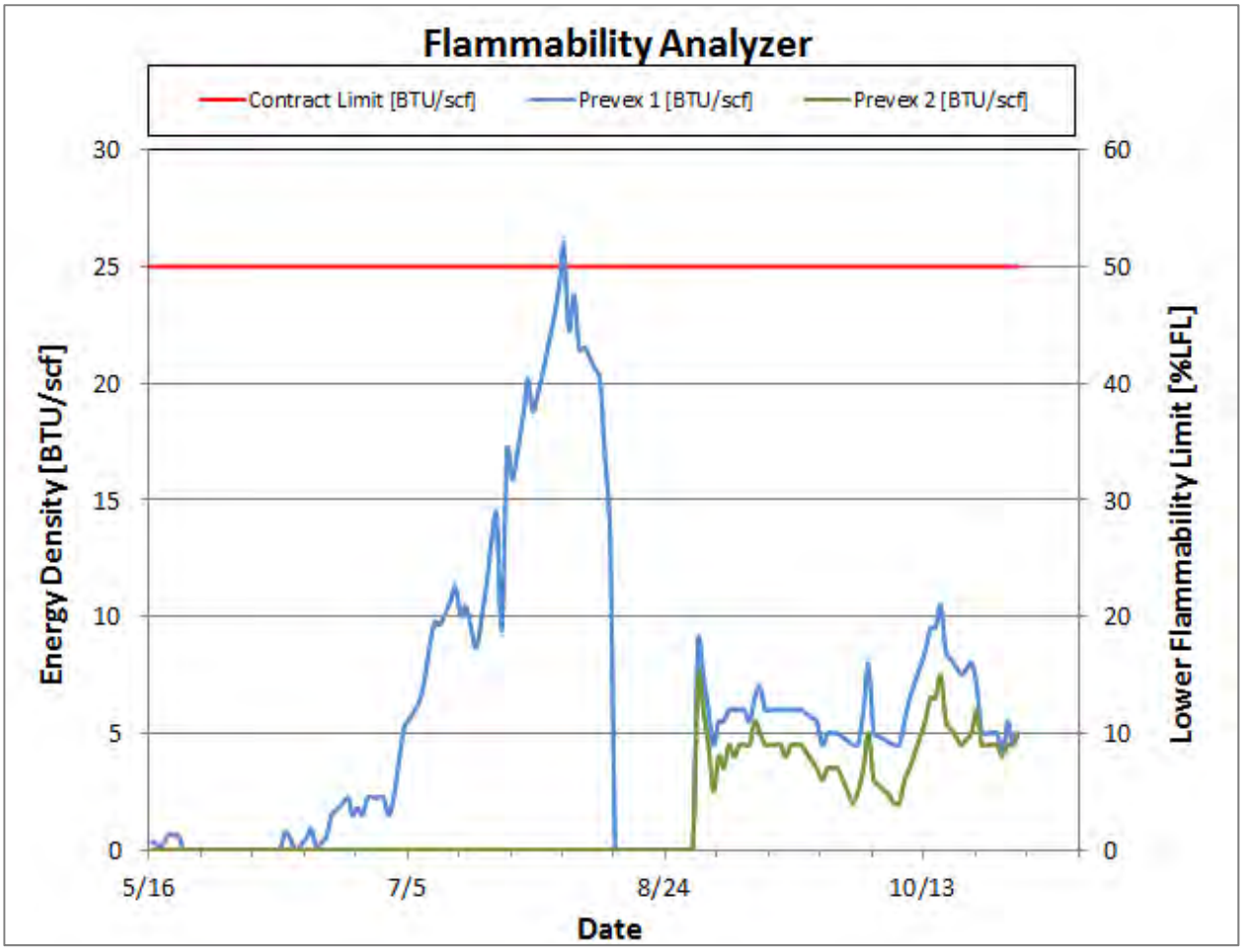


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed to date is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The decrease in mass removed starting on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14, 9/23/14, 9/30/14 , 10/7/14 and 10/14/14.

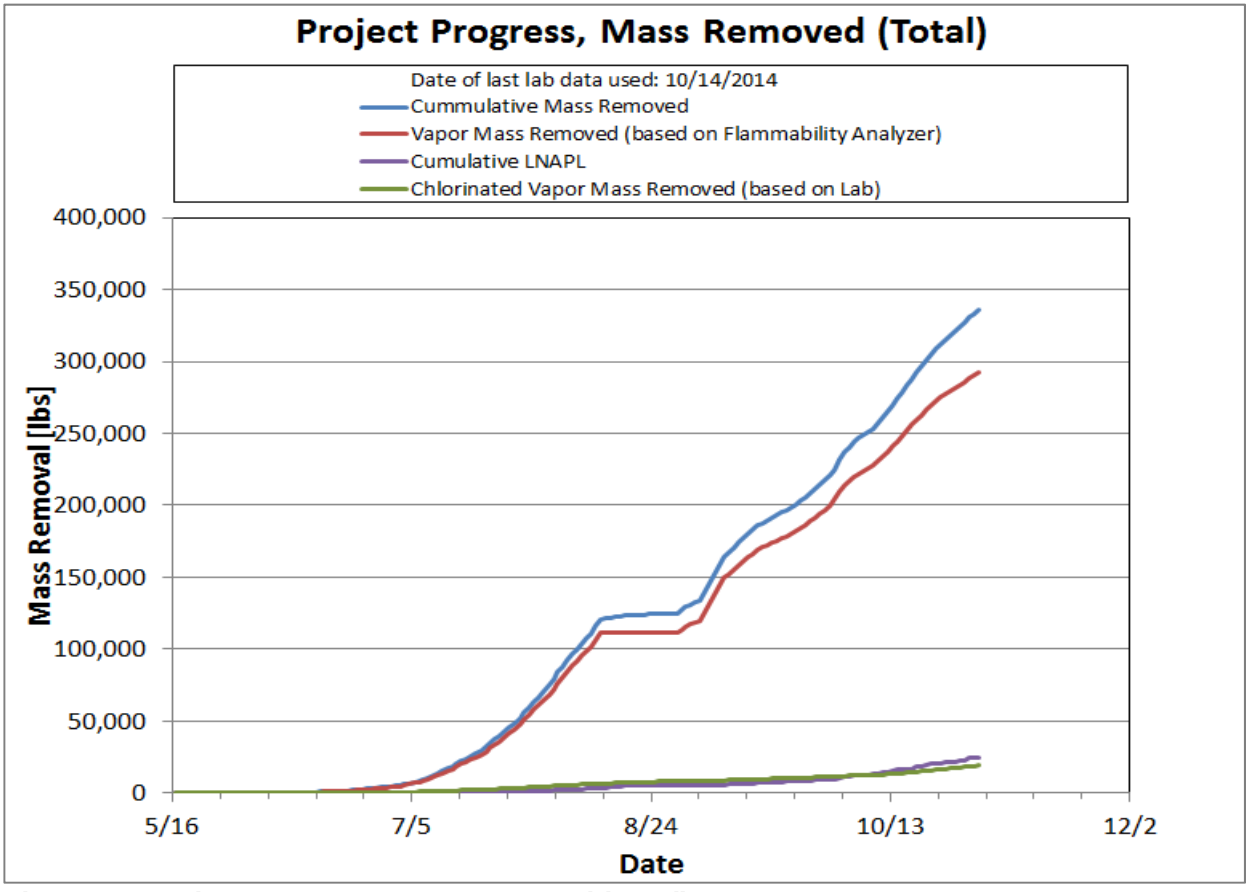


Figure 4a. Project Progress, Mass Removal (Total)

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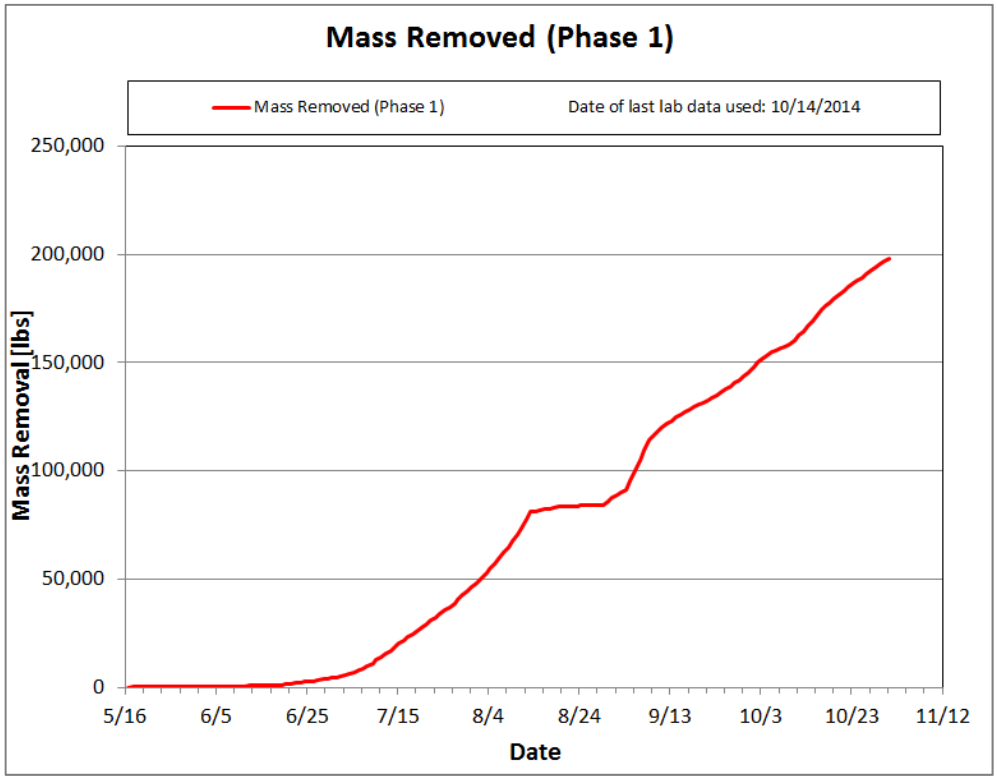


Figure 4b. Project Progress, Mass Removal (Phase 1)

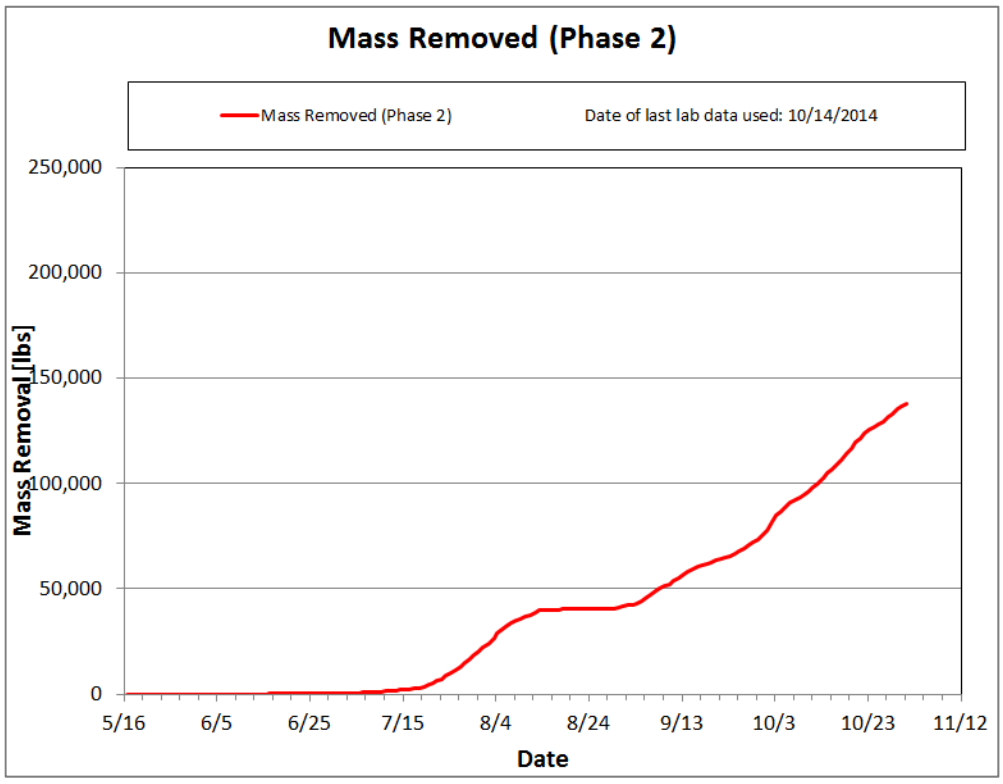


Figure 4c. Project Progress, Mass Removal (Phase 2)

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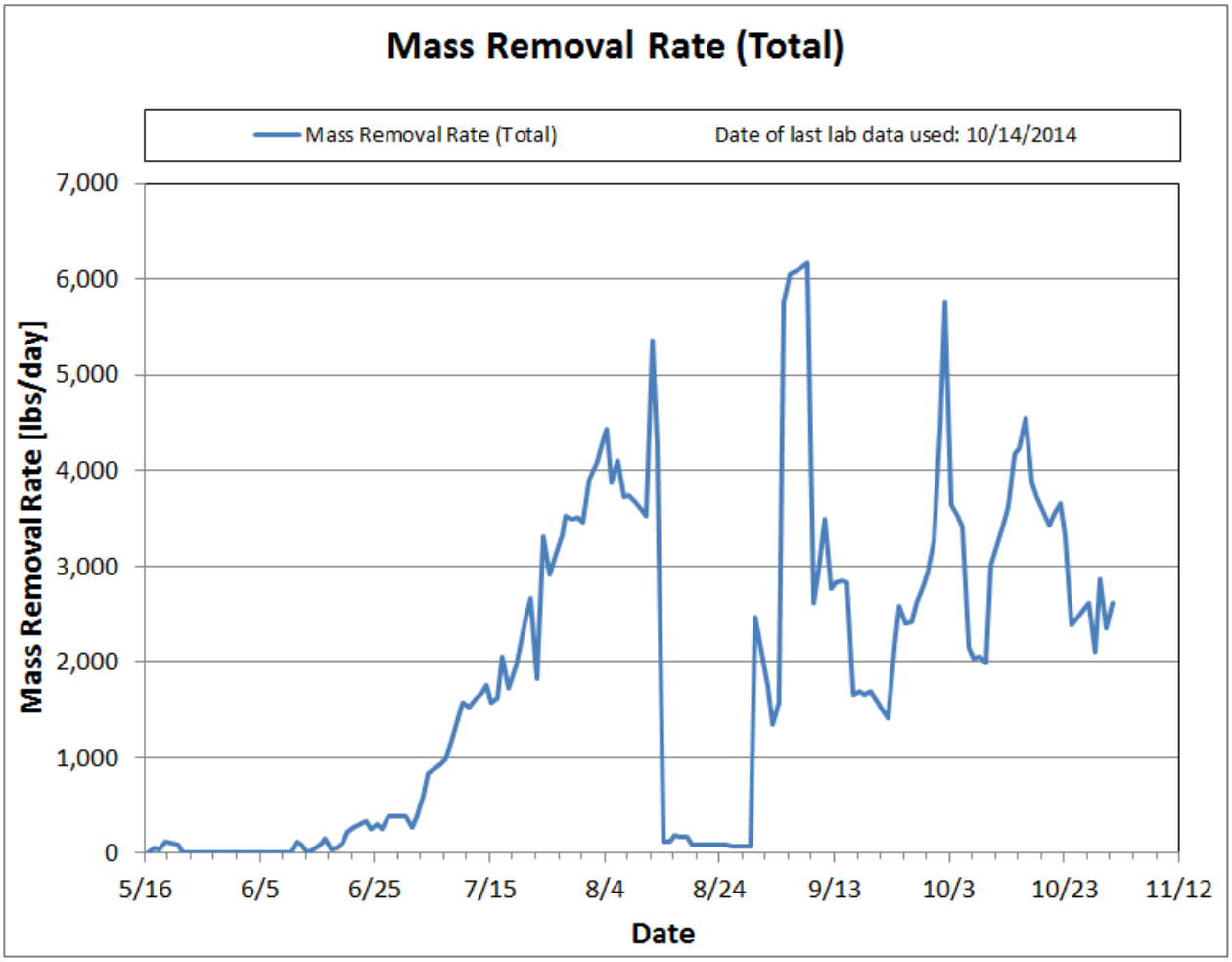


Figure 4d. Mass Removal Rate (Total for Site)

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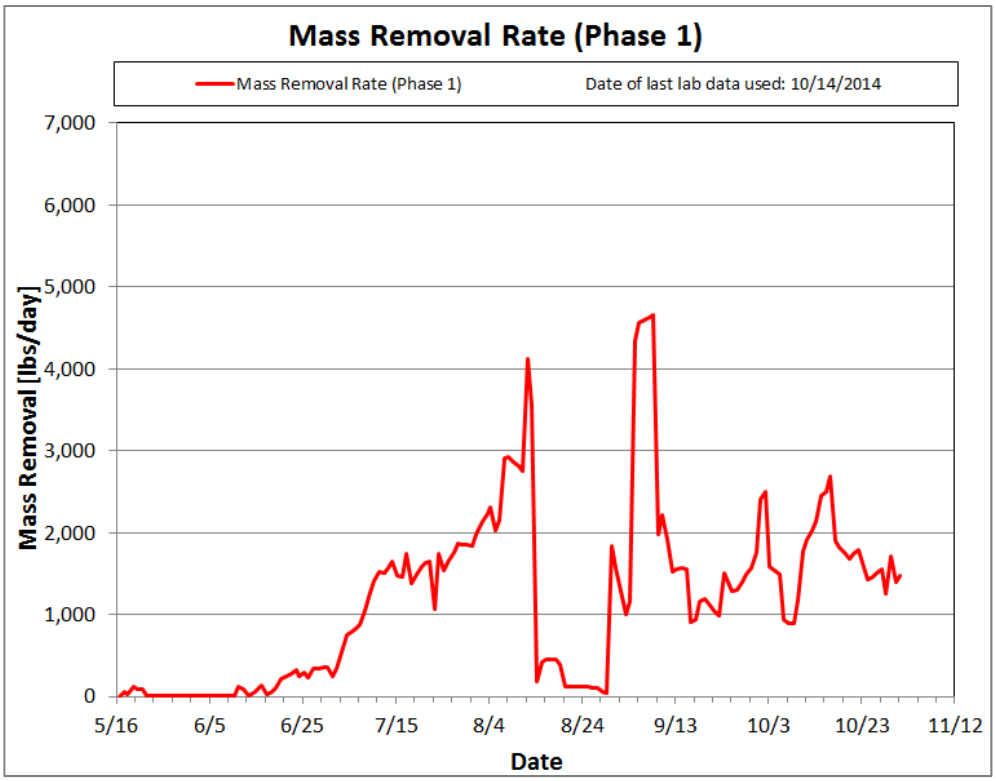


Figure 4e. Mass Removal Rate (Phase 1)

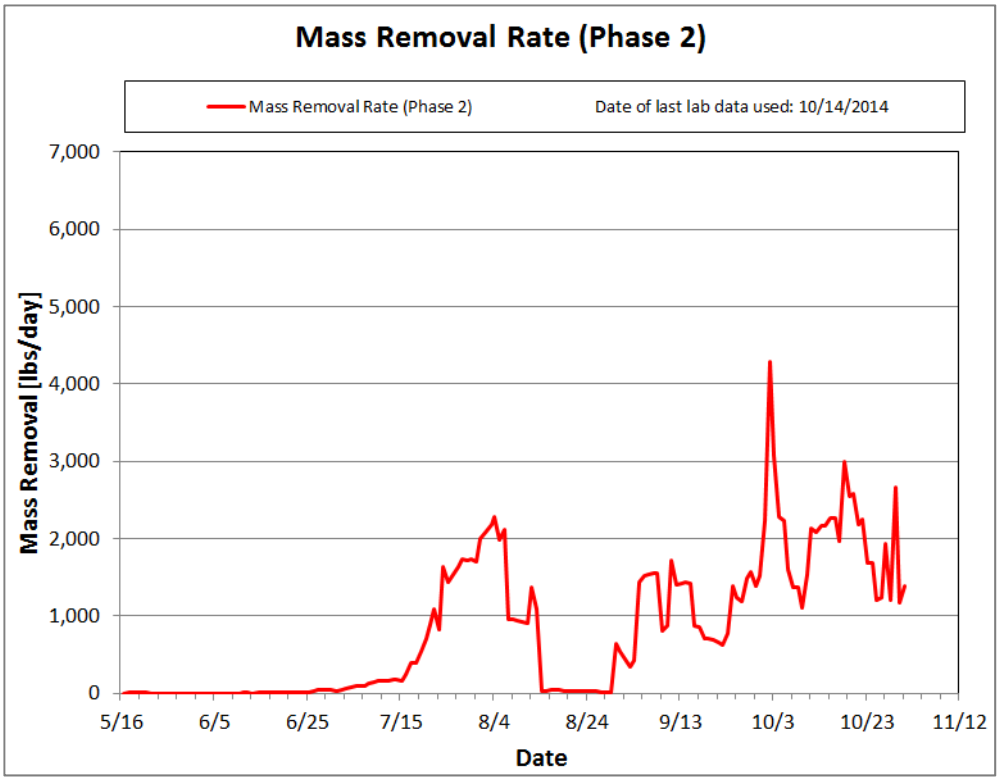


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID readings collected at the oxidizer influent over time. It should be noted that the PID reading from 7/16/14 was obtained with a PID with a 10.6 eV lamp, instead of the 11.7 eV lamp which had reached the upper concentration limit of 2,000 ppmV. Similarly, data collected on 07/25-28 were first collected with an 11.7 eV lamp with values exceeding the upper limit. The influent concentrations were then collected with the 10.6 eV lamp with values lower than the 11.7 eV upper limit (2,000 ppm). Therefore, the maximum 11.7 eV lamp is reported.

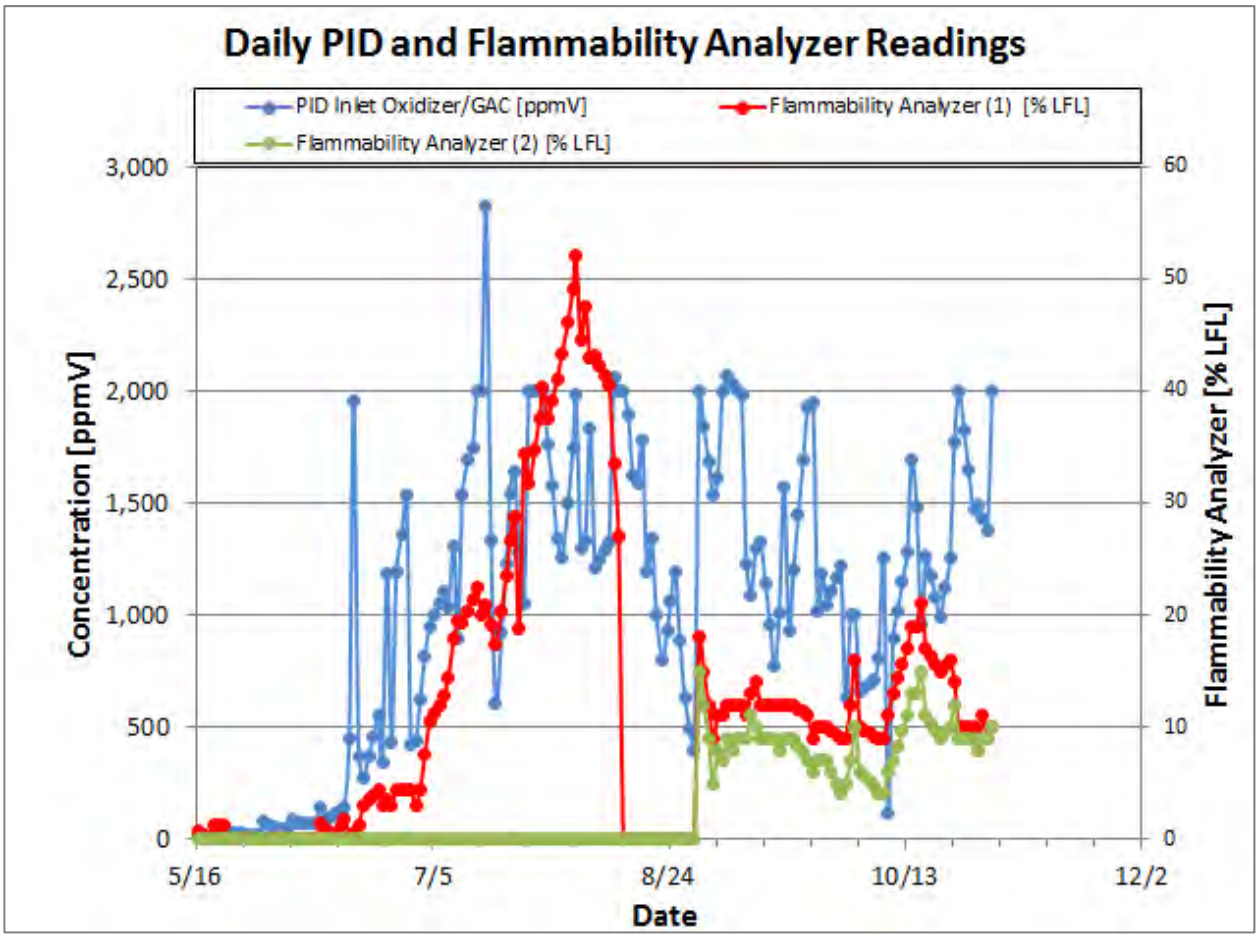


Figure 5. Daily PID Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13. Dips in the DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-out periods.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

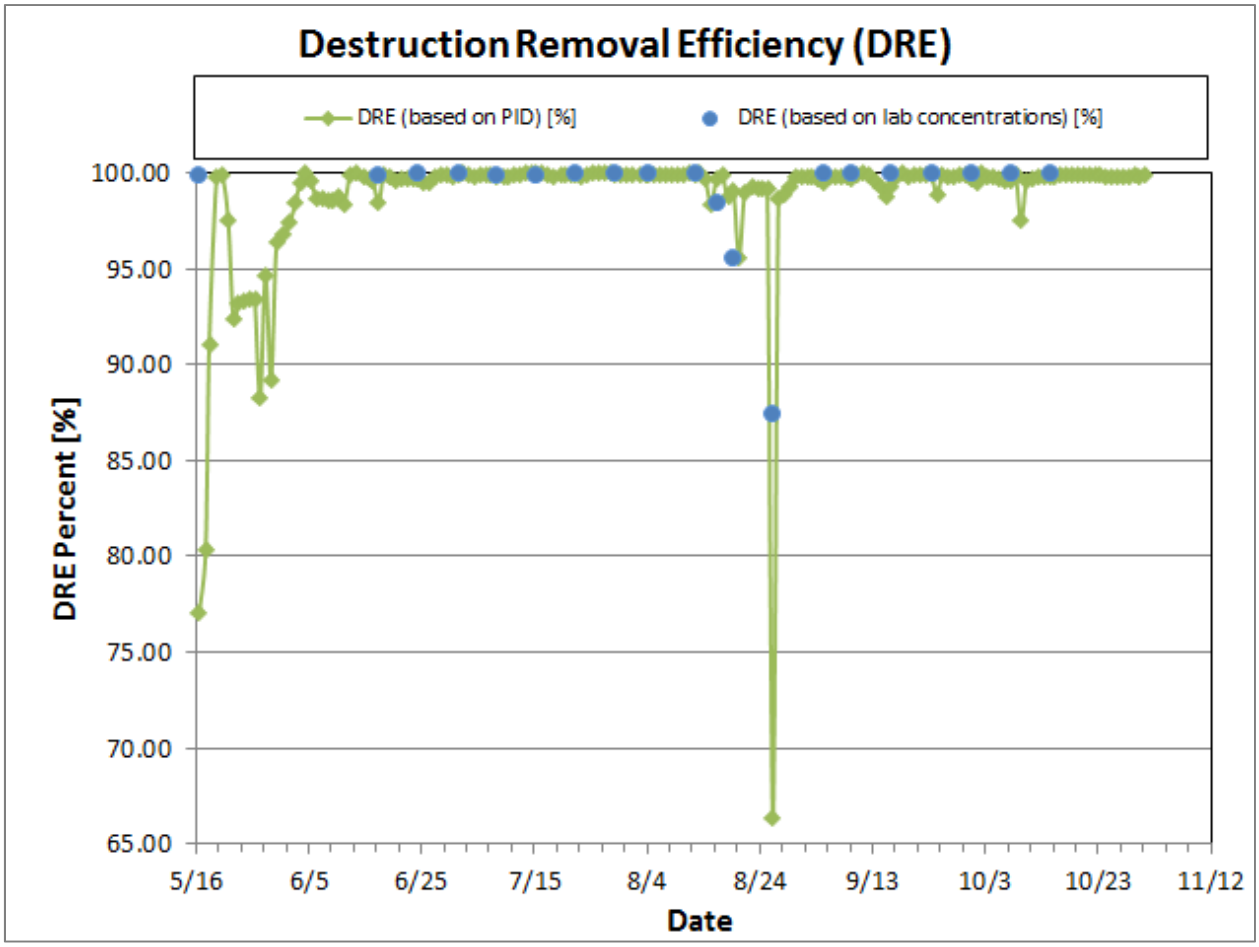


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7.

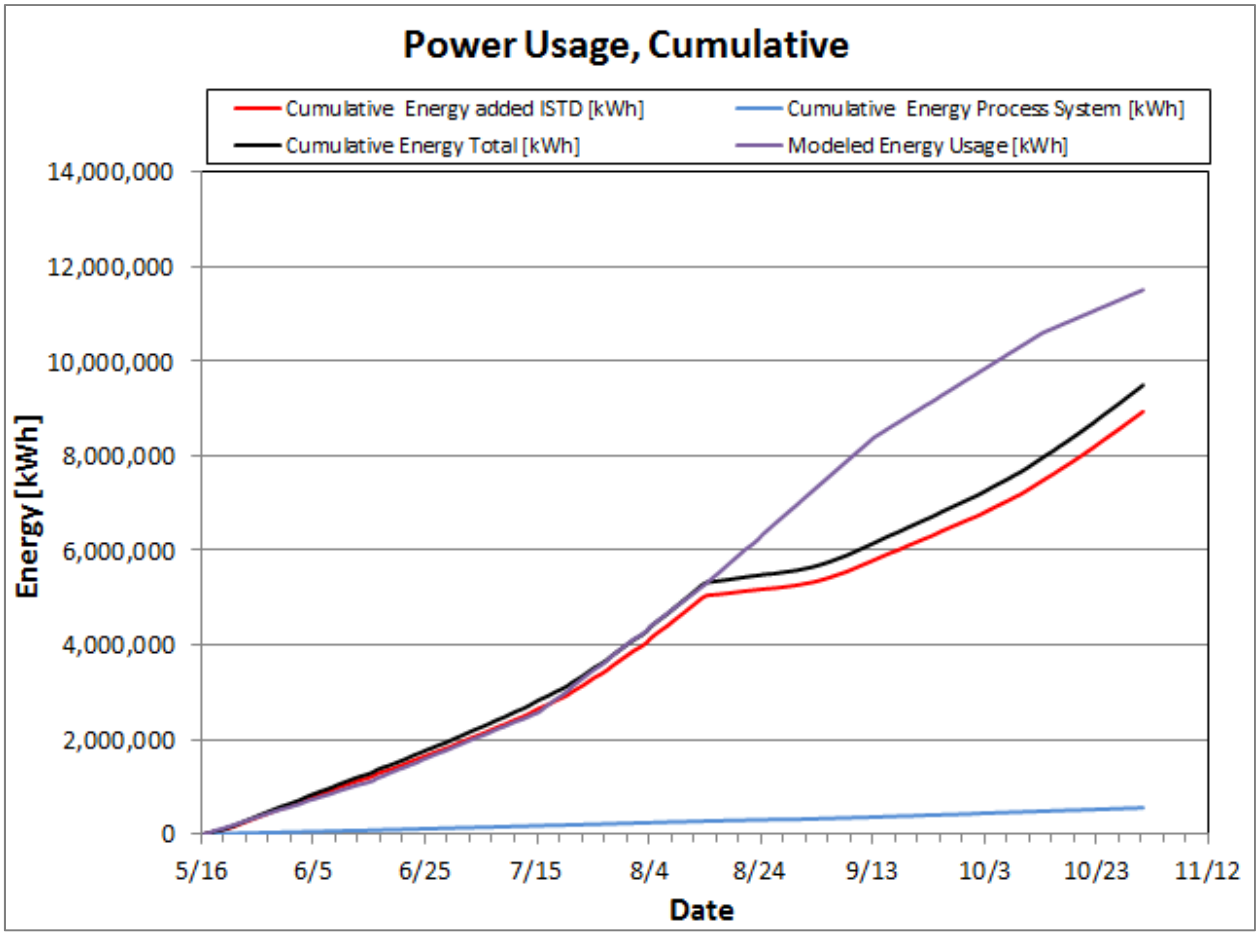


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30 and the following days corresponds with ramping of the heaters after placing the oxidizer back online. The increase in power usage on 10/3 corresponds with increasing the heaters in Phase 2.

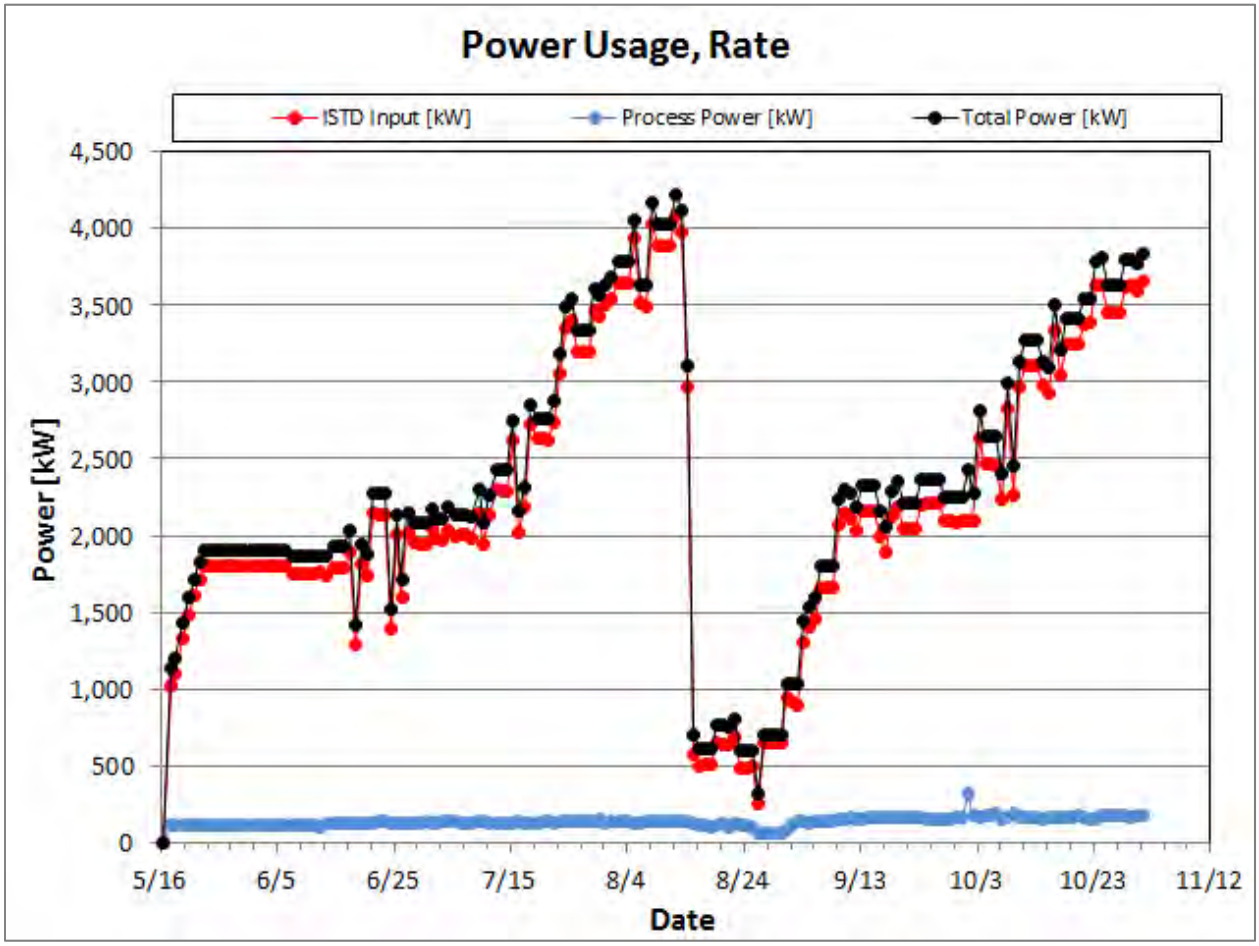


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

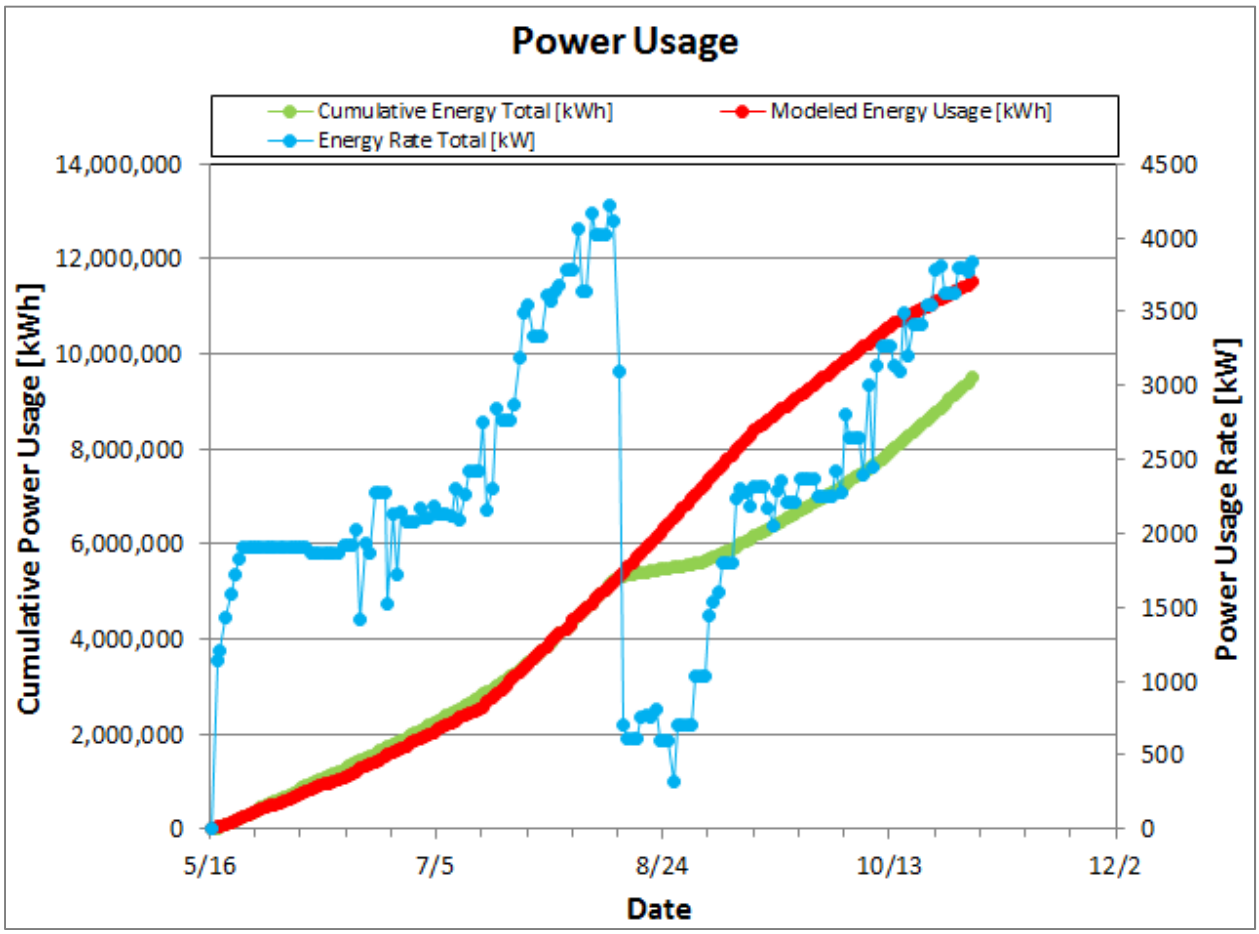


Figure 9. Power Usage

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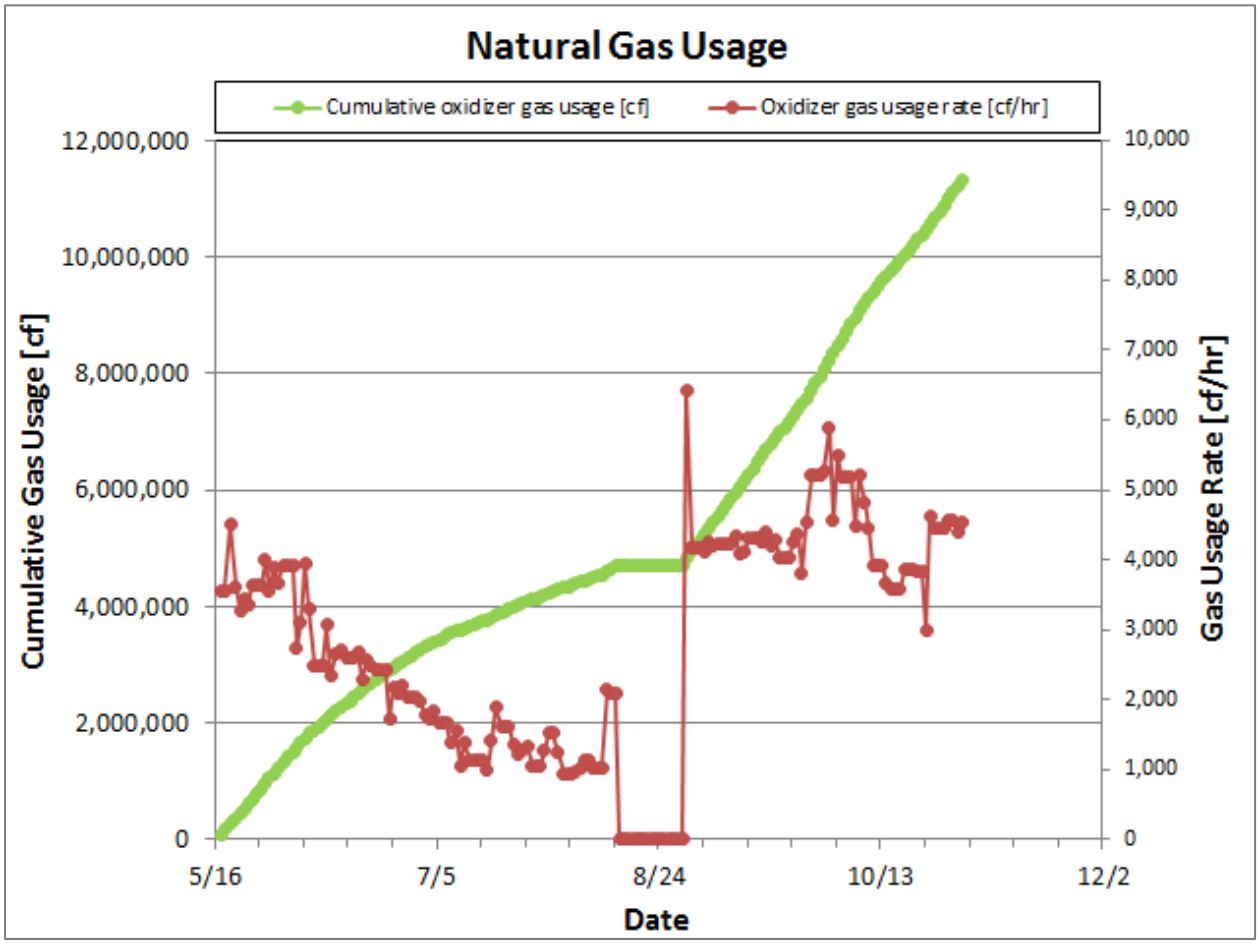


Figure 10. Natural Gas Usage

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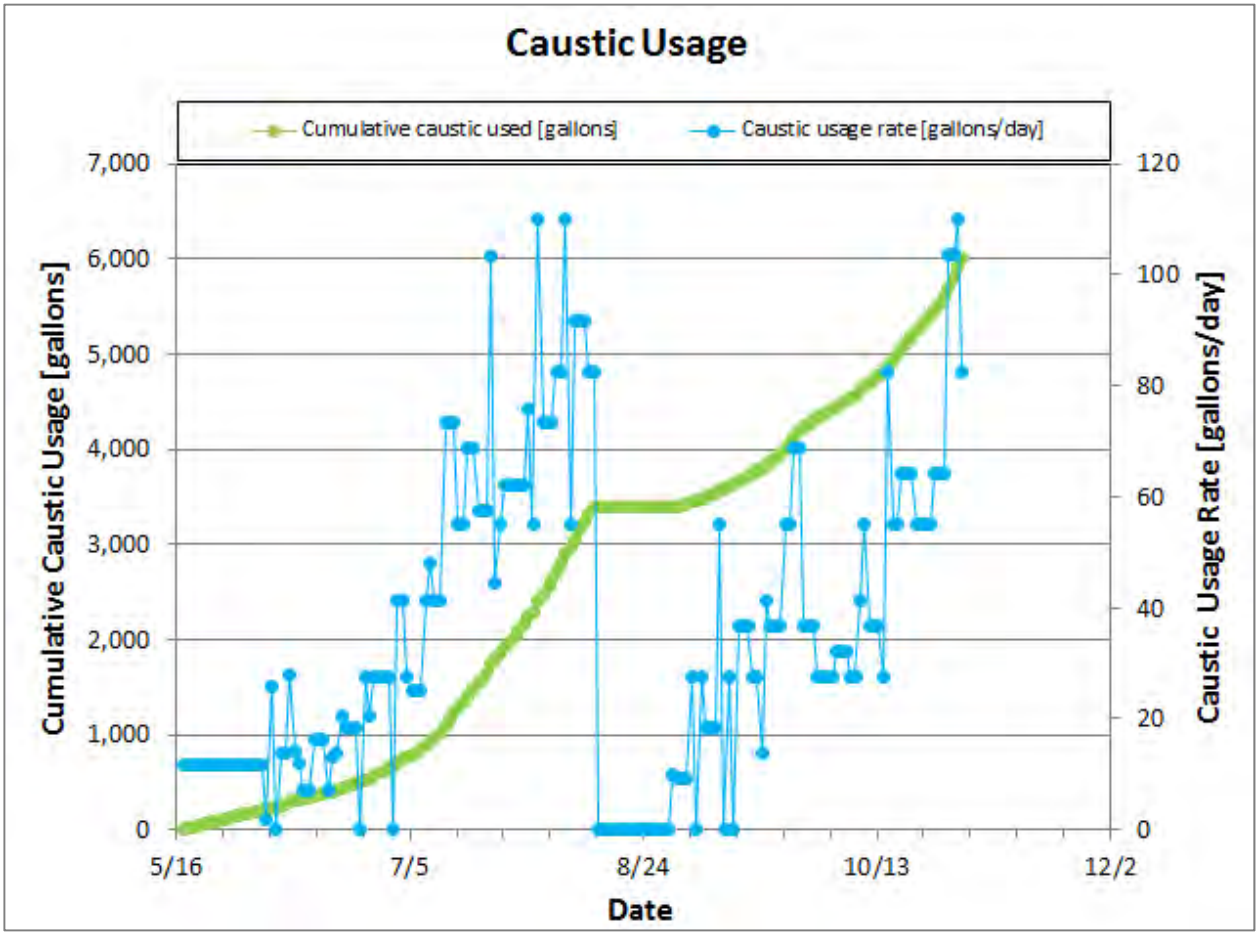


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12a. As of 9/26/14, we have reached all three payment milestone for phase 1. Phase 2 centroids are shown in Figure 12b. We have reached temperature milestone 1 in Phase 2. The scatterplots have been updated to show the centroids grouped by depth, with each depth range shown as a different color.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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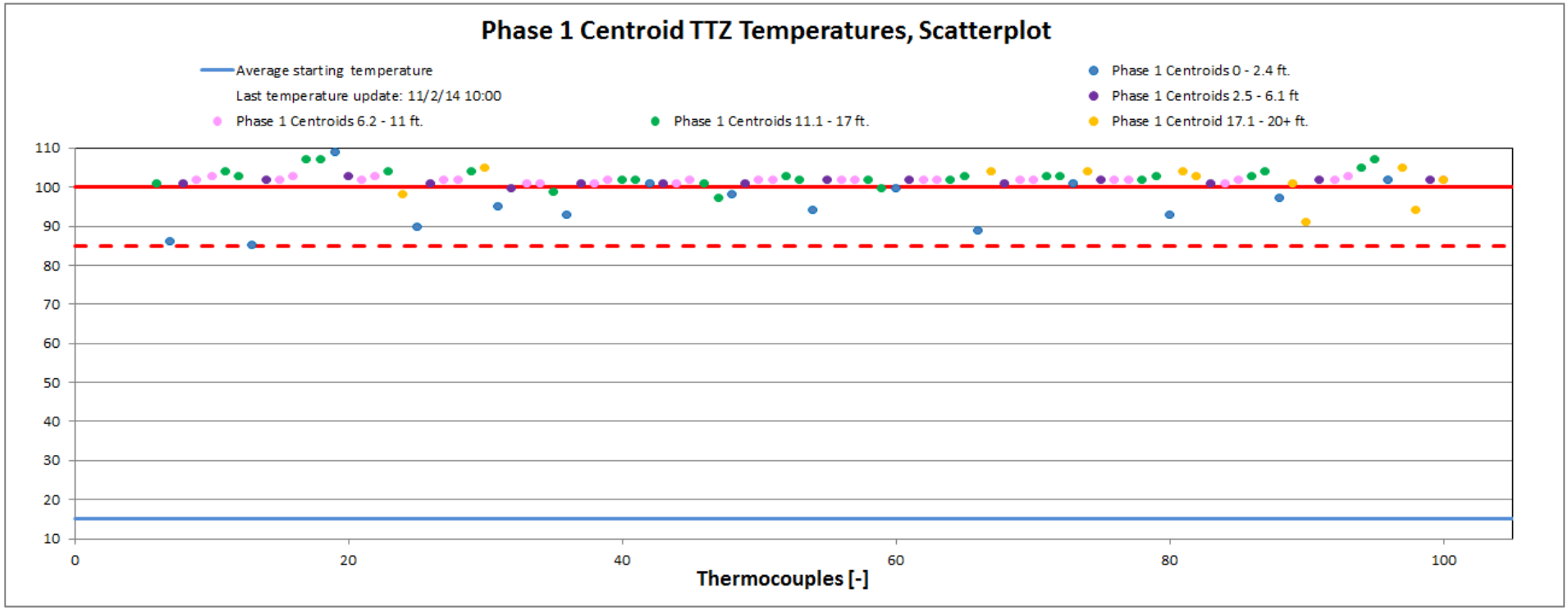


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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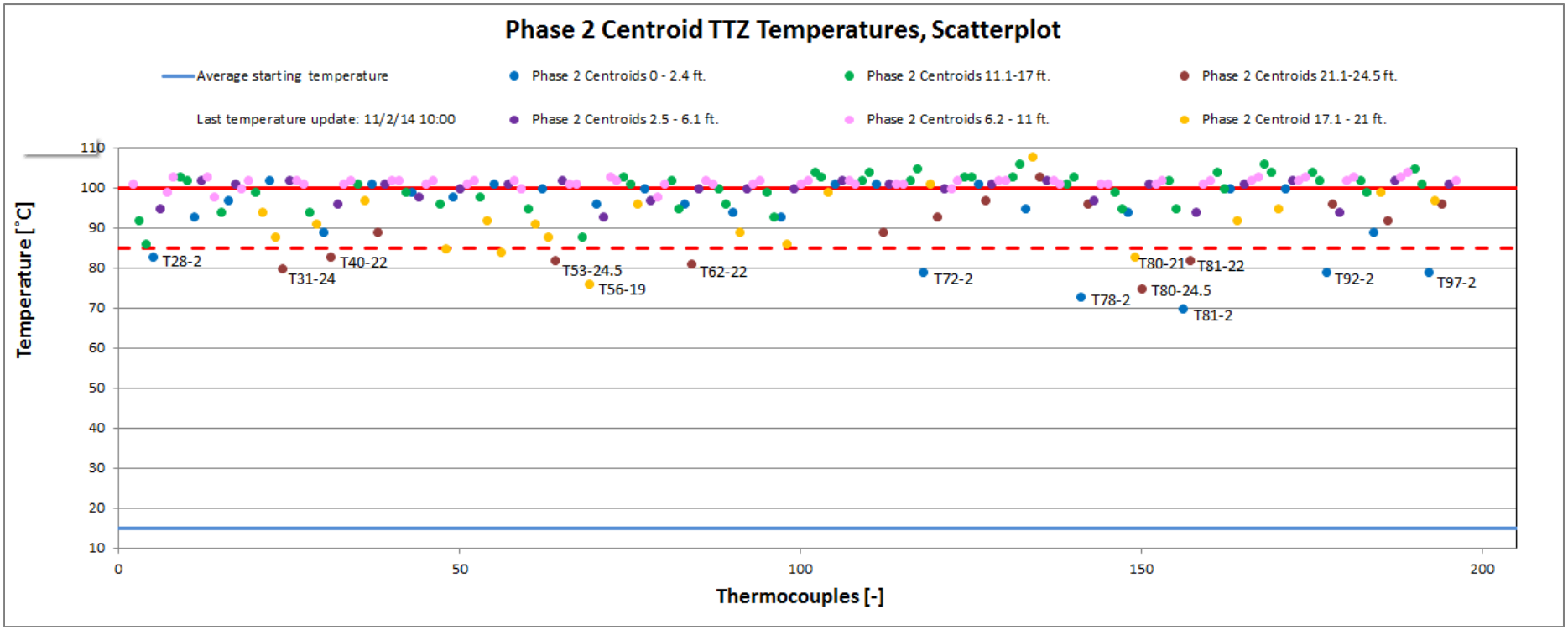


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots		
	Value	**Unit**
Date of Last Update	11/2/14	
Phase 1 Centroid Thermocouples ≥85 °C	100	%
Phase 1 Centroid Thermocouples ≥100 °C	94	%
Phase 2 Centroid Thermocouples ≥85 °C	94	%
Phase 2 Centroid Thermocouples ≥100 °C	61	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday October 31, 2014 through Friday November 7, 2014, with temperatures updated through Sunday November 9, 2014.

Table 1 provides a summary of the project operational status as of Friday, November 7, 2014.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	11/07/14	
Last Temperature Data Update	11/09/14	
Days of Operation (Total)	152	days
Days of Phase 1 Operation	152	days
Days of Phase 2 Operation	43	days
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	10,123,600	kWh
Used Electrical Energy vs. Estimate	64.1	%
Total Mass Removal	356,870	lbs
Average Power Input Last 24 Hours	3,470	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,861	scfm
Average Condensate Production Rate Last 24 Hours	8.4	gpm

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Heaters in both Phase 1 and Phase 2 remain online and at full power. As of 11/7/14, Phase 1 has operated for 152 days and Phase 2 for 43 days. Please note that this represents days where heaters operated at or above 70% (per contract definition). The current average wellfield temperature for Phase 1 is 102°C and 100°C for Phase 2. All three temperature milestone have been achieved for Phase 1 and temperature milestone 1 has been achieved for Phase 2.

Shutdown of Phase 1 is pending confirmation soil sample results. Samples are scheduled to be collected this week.

Estimated mass removed to date is reported using the flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. These results yield a total mass removal of 356,870 lbs as of 11/7/14. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 11/7/14. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.54:0.46. These ratios were applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperatures for both Phase 1 and Phase 2, as well as the average centroid temperatures. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Phase 2 heating began on 7/16/14 but was stopped on August 14, 2014, as a result of the oxidizer shutdown. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	11/9/14	
Phase 1 Entire TTZ Average Temperature	102	°C
Phase 2 Entire TTZ Average Temperature	100	°C
Phase 1 Centroid Average Temperature	101	°C
Phase 2 Centroid Average Temperature	100	°C

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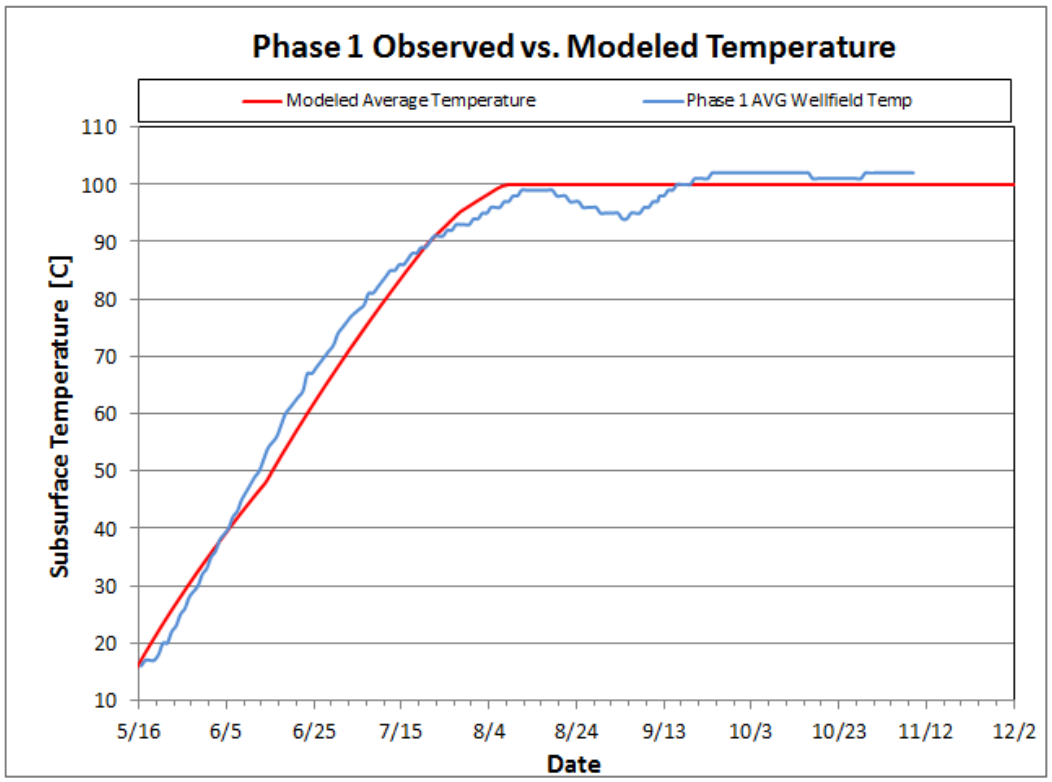


Figure 1a. Phase 1 Observed vs. Modeled Temperature

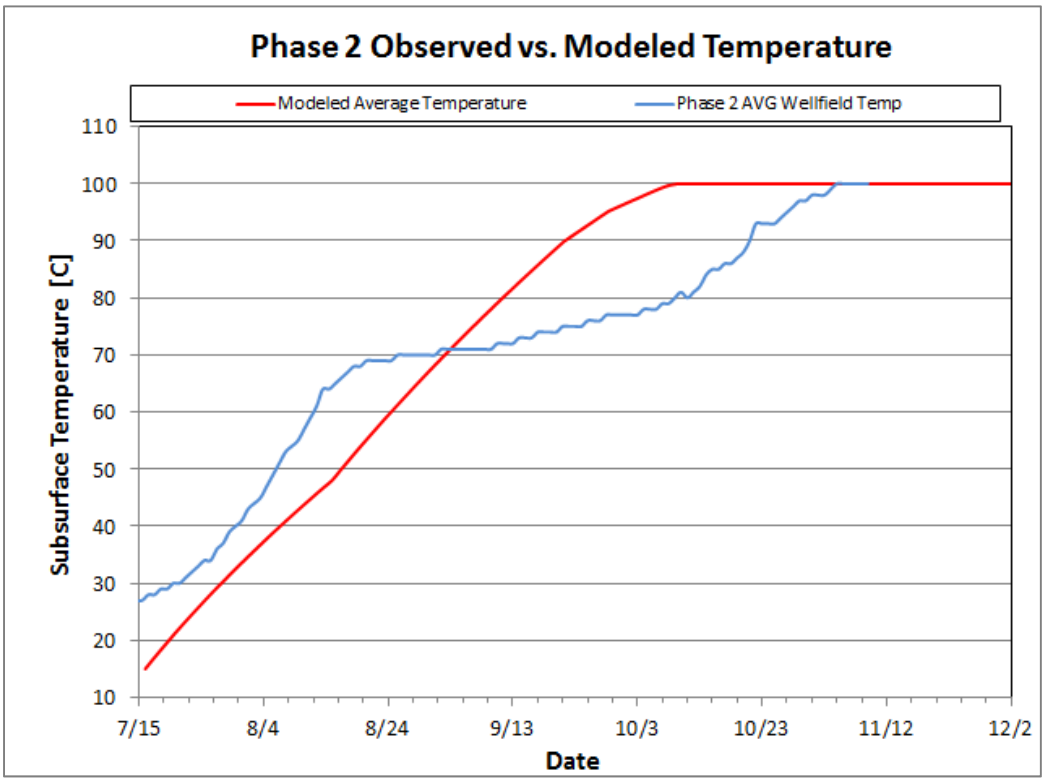


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was restarted on 8/30/14.

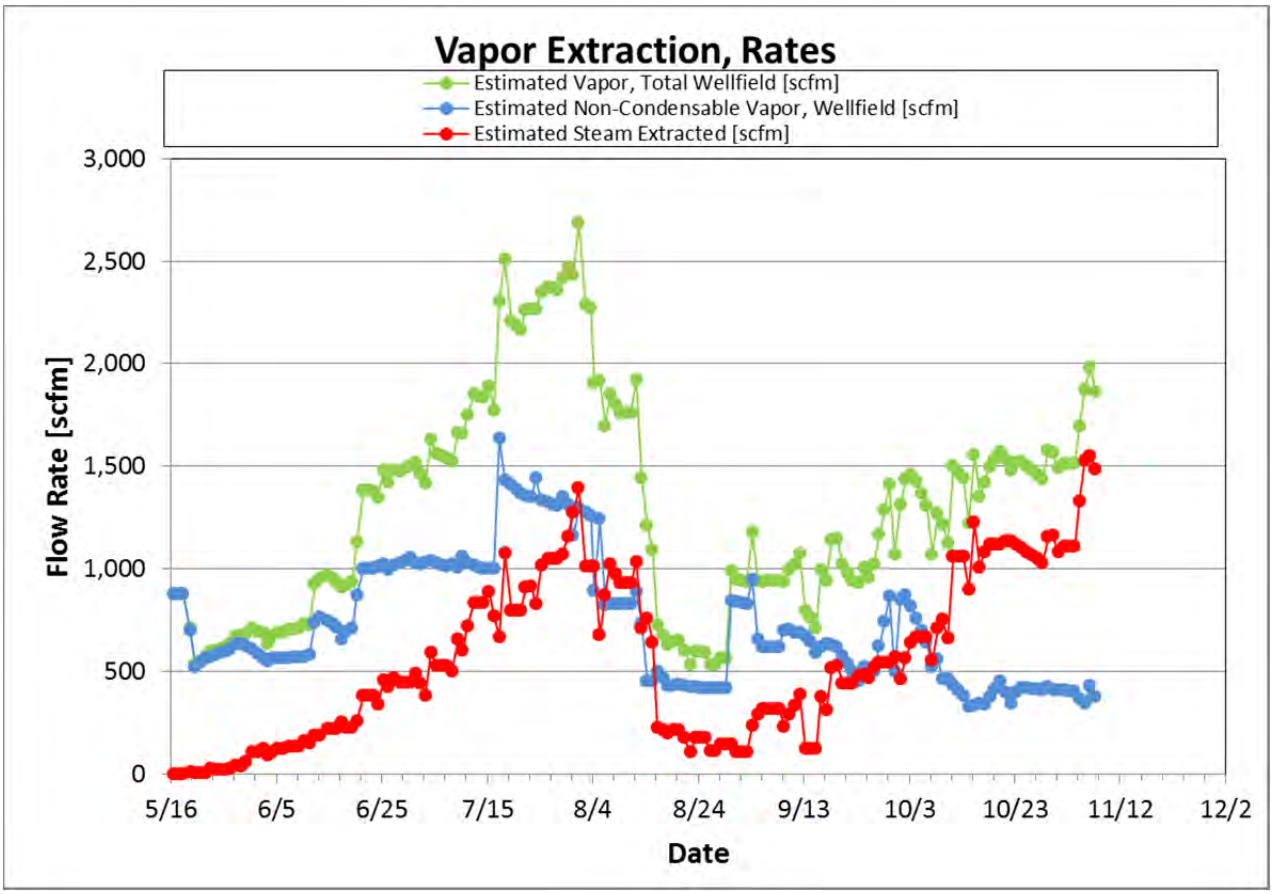


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

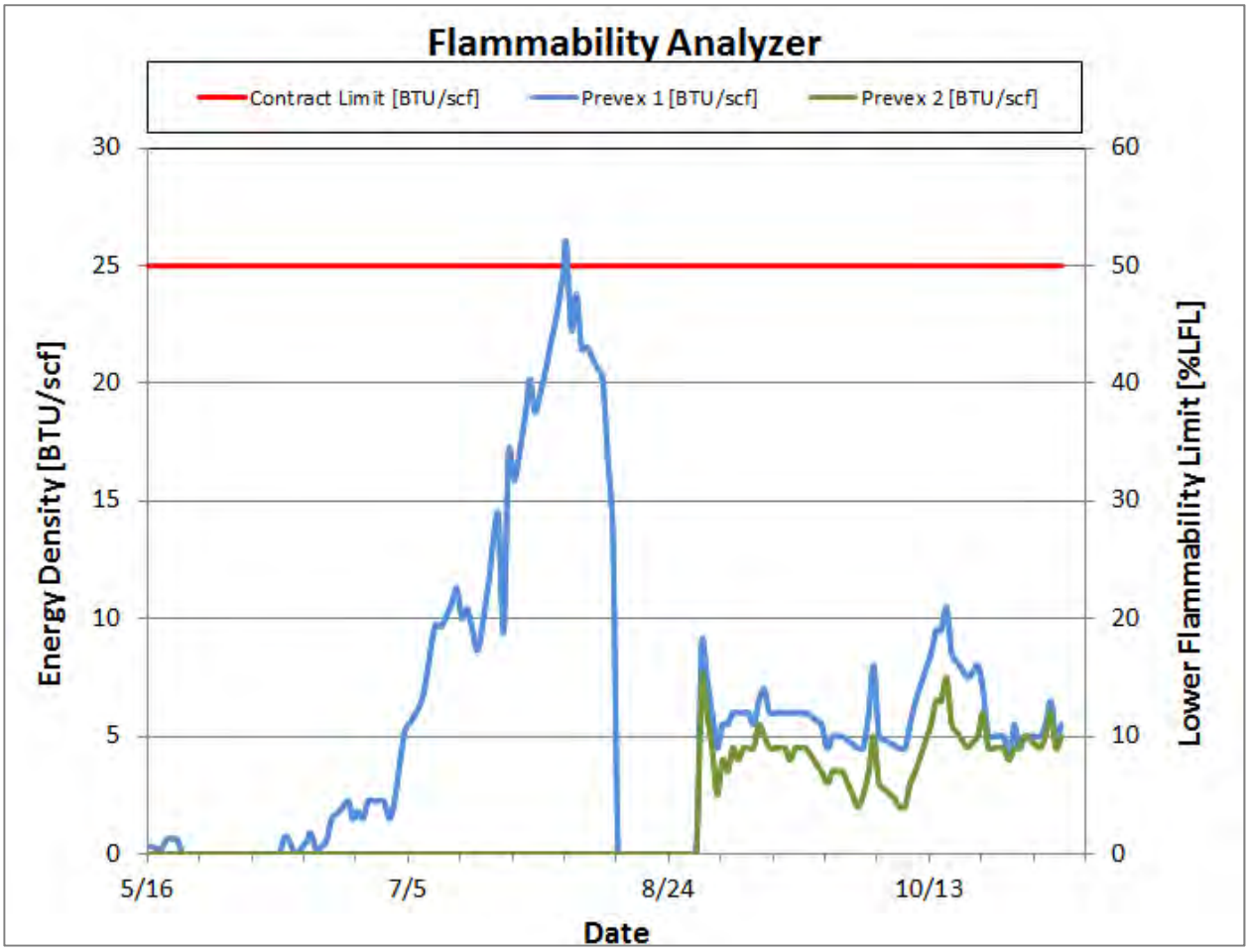


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed to date is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The decrease in mass removed starting on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14, 9/23/14, 9/30/14 , 10/7/14 and 10/14/14.

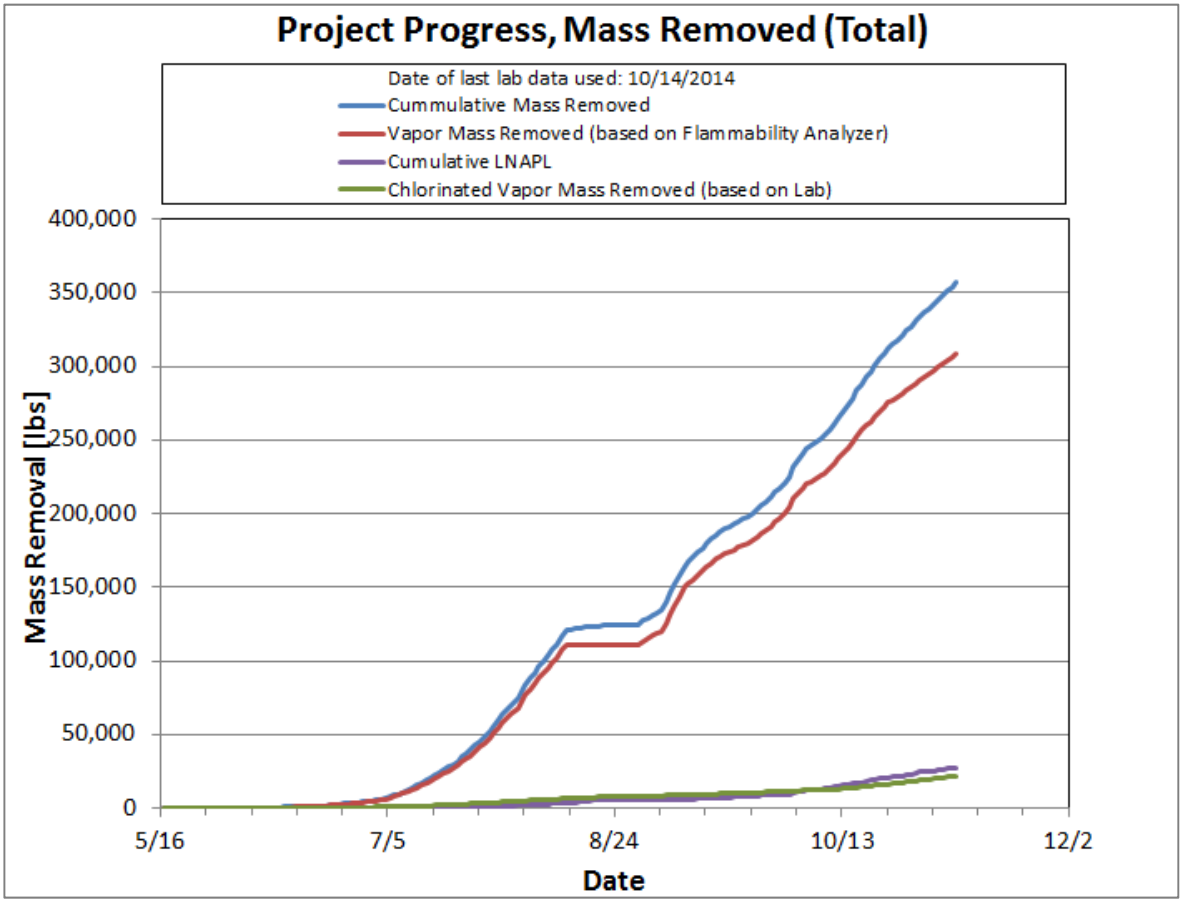


Figure 4a. Project Progress, Mass Removal (Total)

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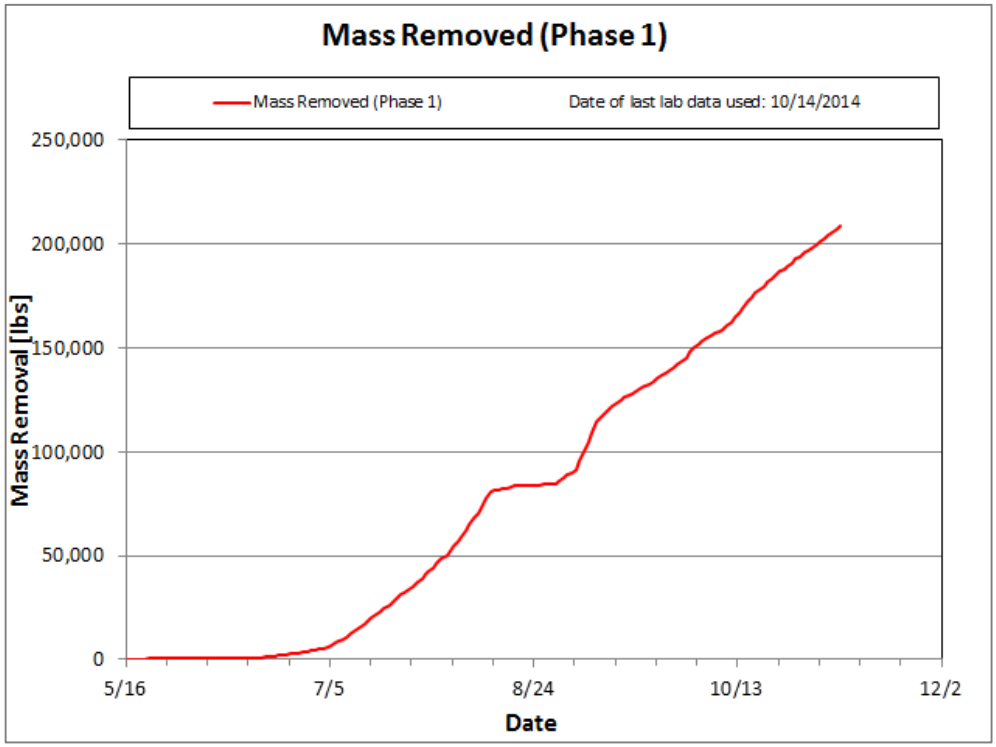


Figure 4b. Project Progress, Mass Removal (Phase 1)

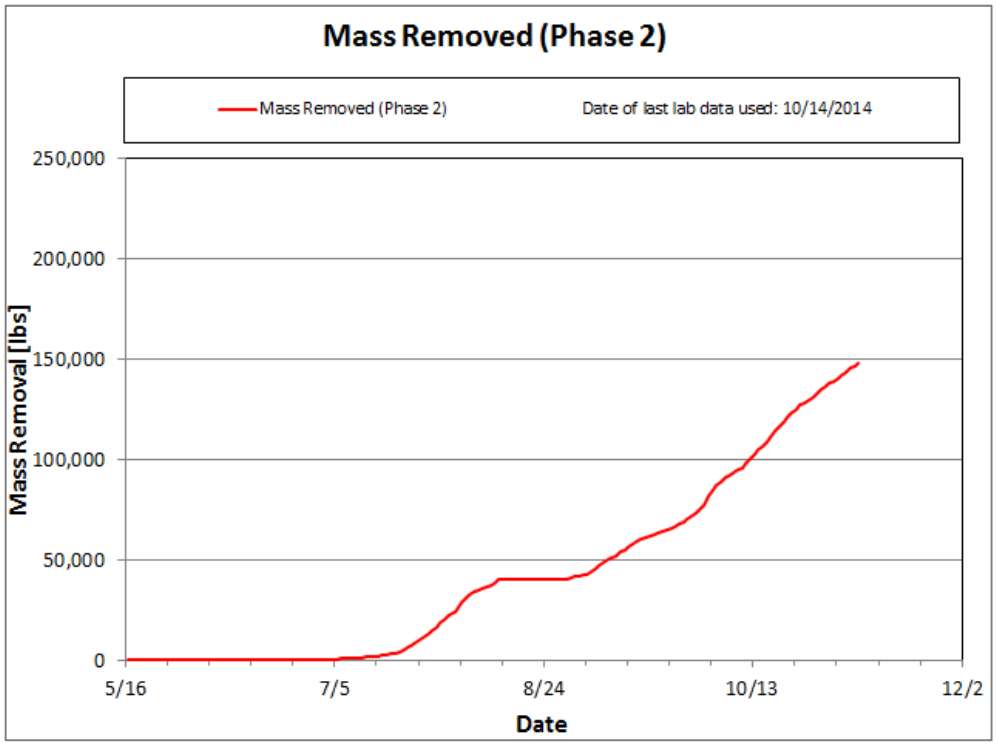


Figure 4c. Project Progress, Mass Removal (Phase 2)

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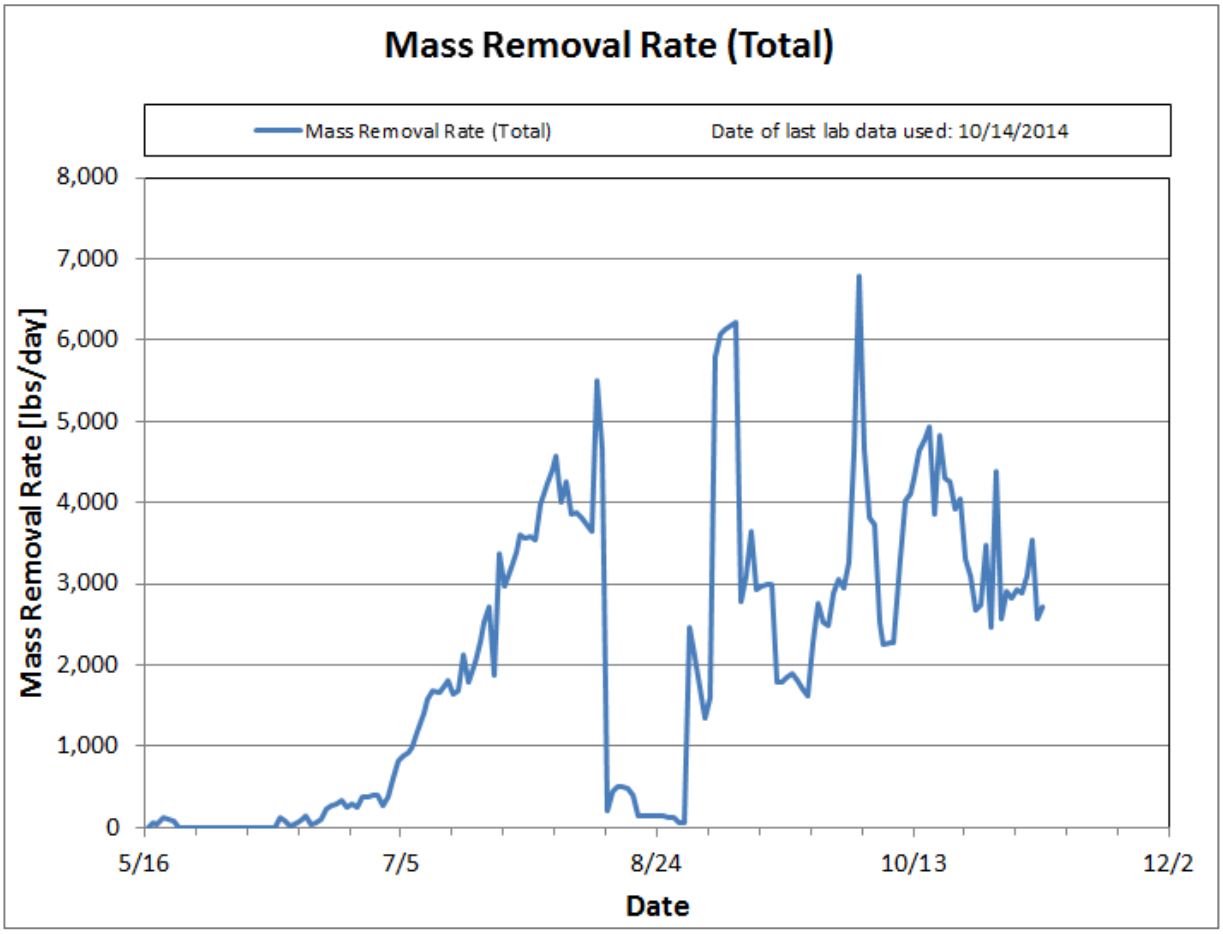


Figure 4d. Mass Removal Rate (Total for Site)

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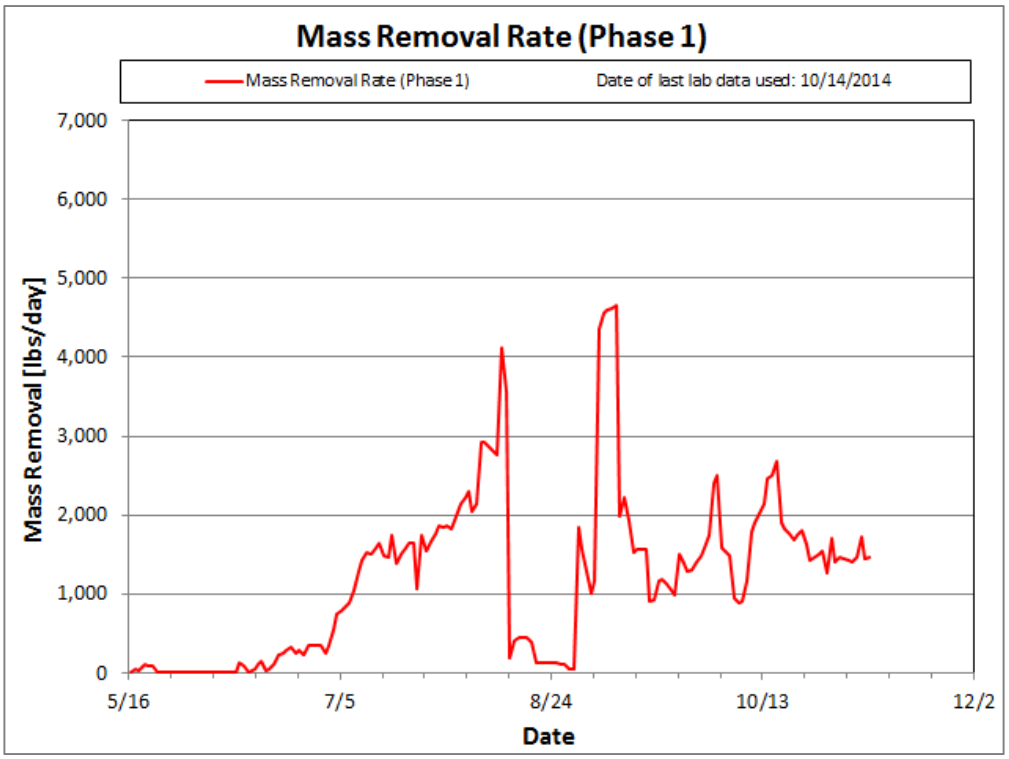


Figure 4e. Mass Removal Rate (Phase 1)

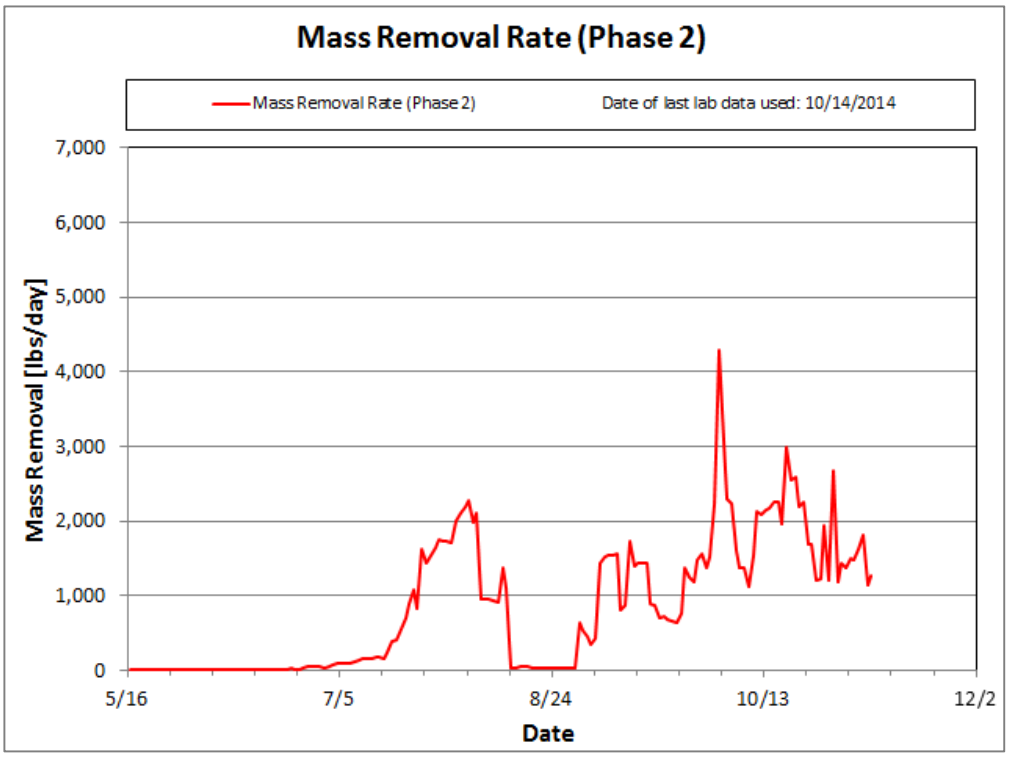


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID readings collected at the oxidizer influent over time. It should be noted that PID readings on a few occasions were obtained with a PID with a 10.6 eV lamp, instead of the 11.7 eV lamp which had reached the upper concentration limit of 2,000 ppmV. Similarly, data collected on 07/25-28 were first collected with an 11.7 eV lamp with values exceeding the upper limit. The influent concentrations were then collected with the 10.6 eV lamp with values lower than the 11.7 eV upper limit (2,000 ppm). Therefore, the maximum 11.7 eV lamp is reported.

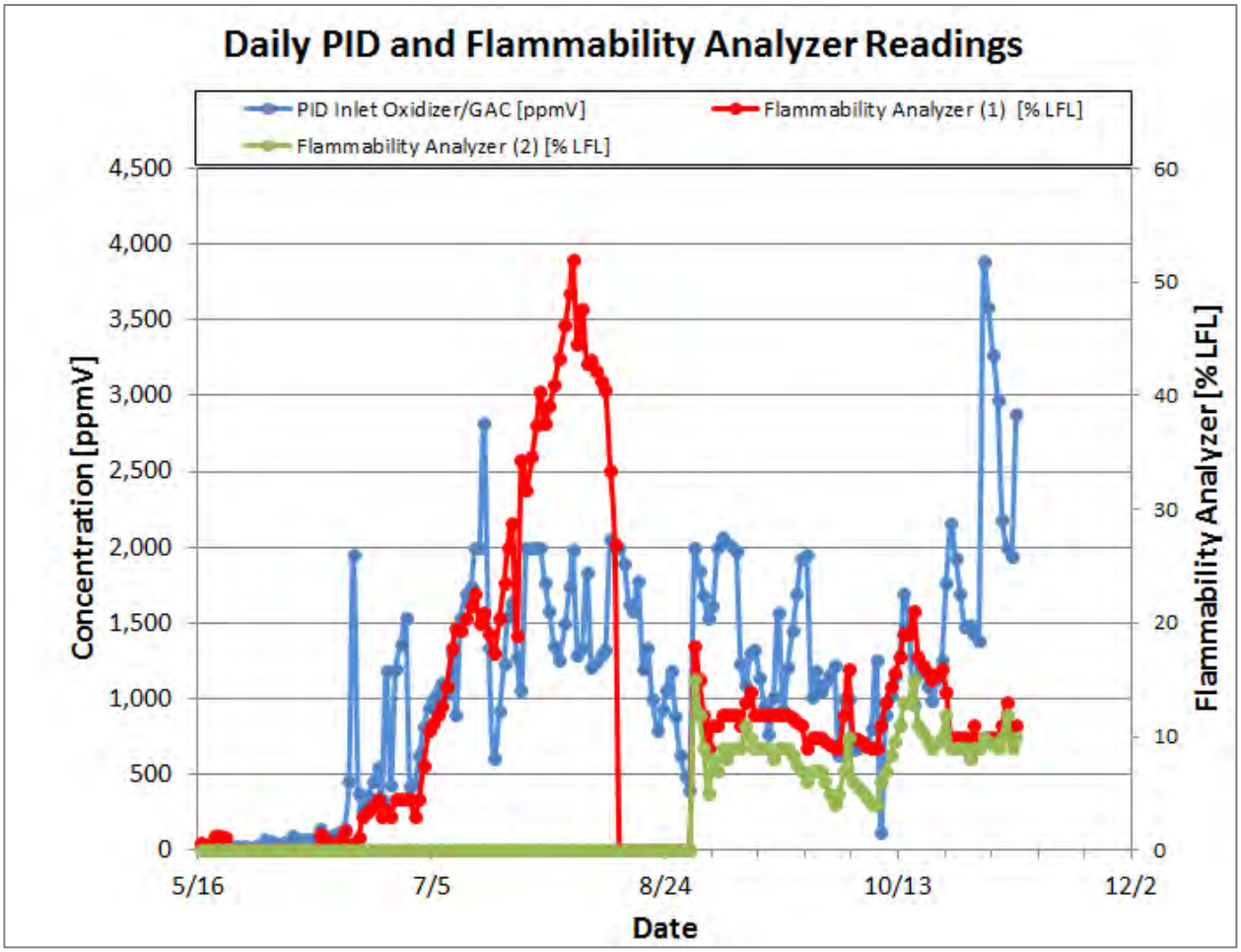


Figure 5. Daily PID Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13. Decreases in DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-outs.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

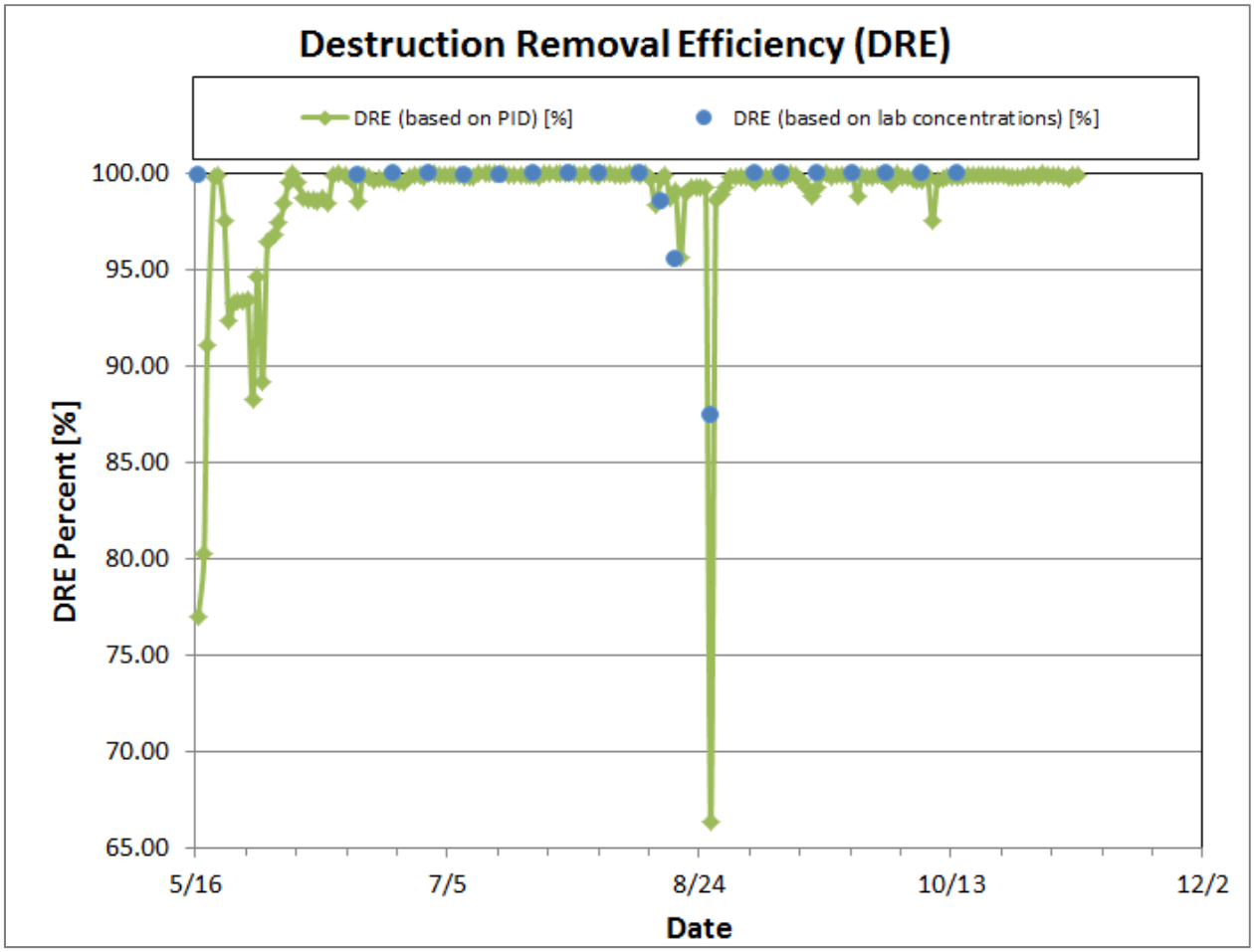


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7.

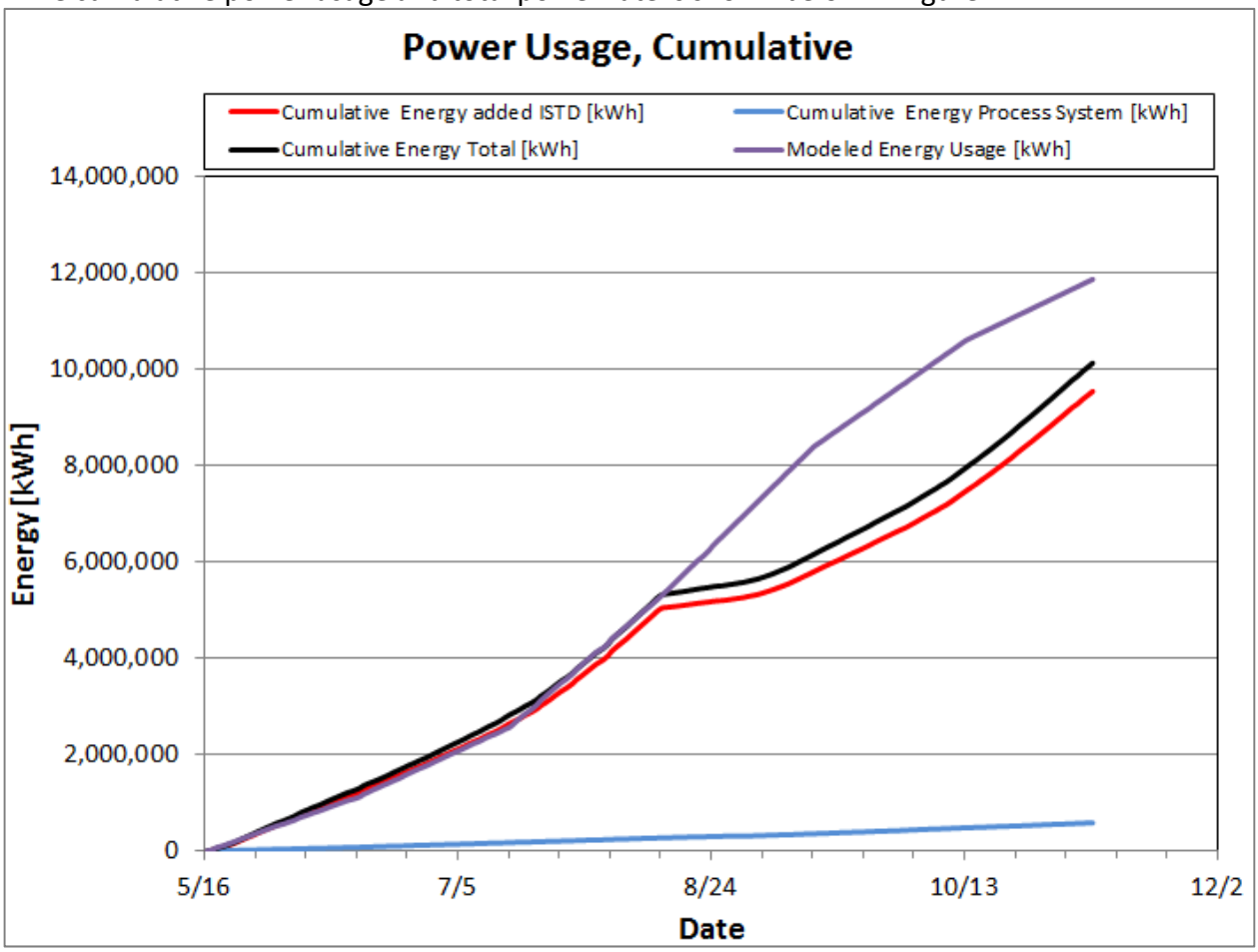


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30 and the following days corresponds with ramping of the heaters after placing the oxidizer back online.

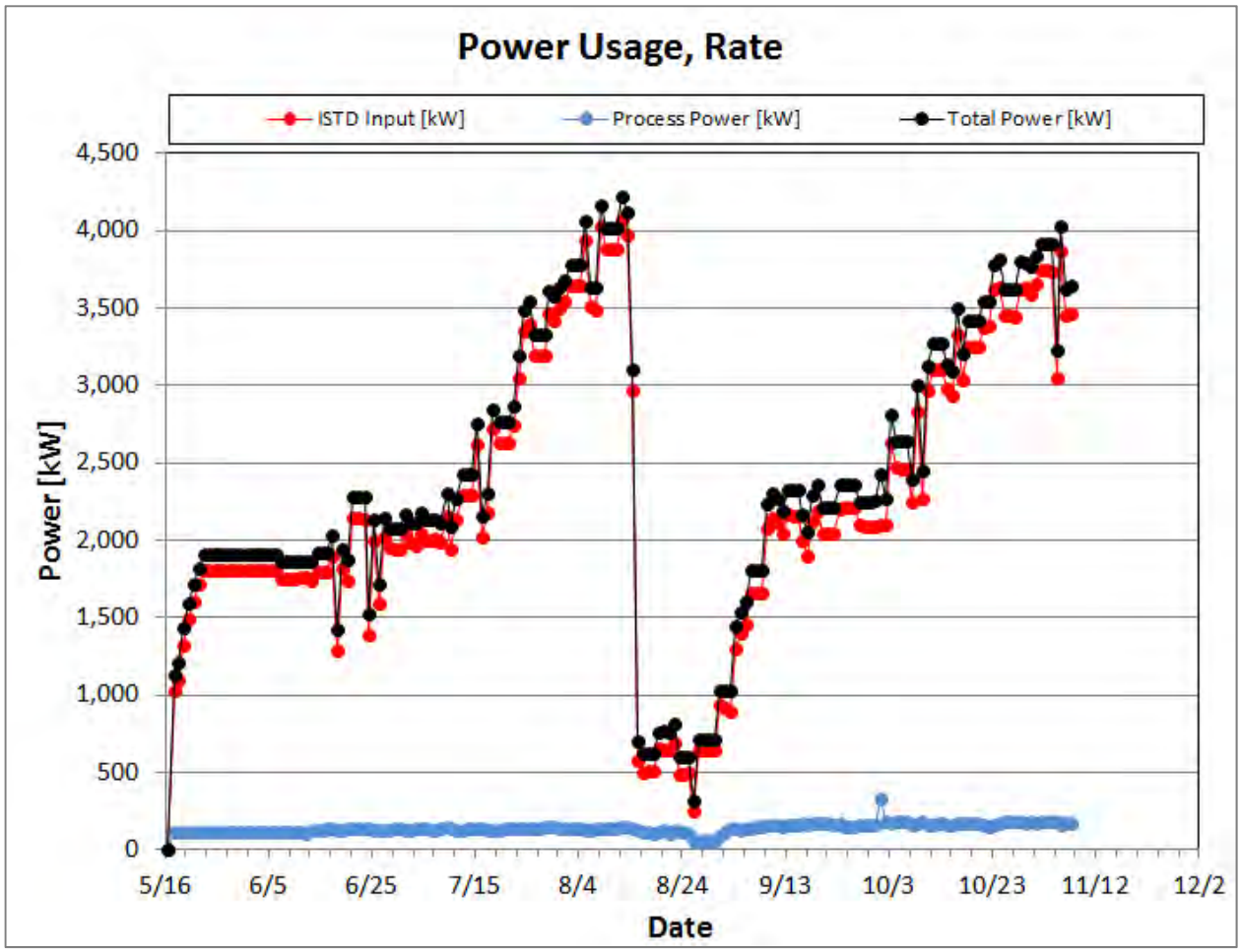


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

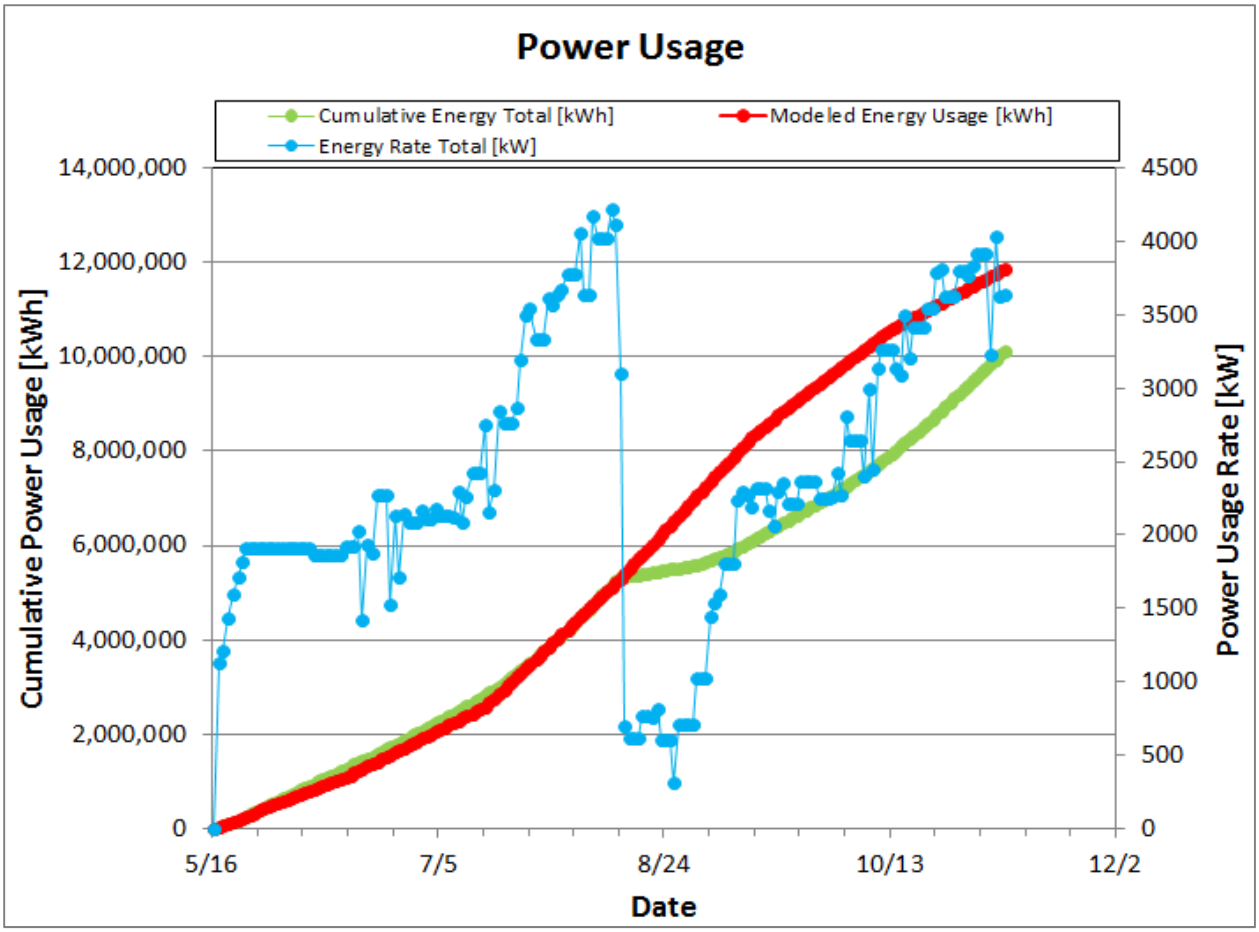


Figure 9. Power Usage

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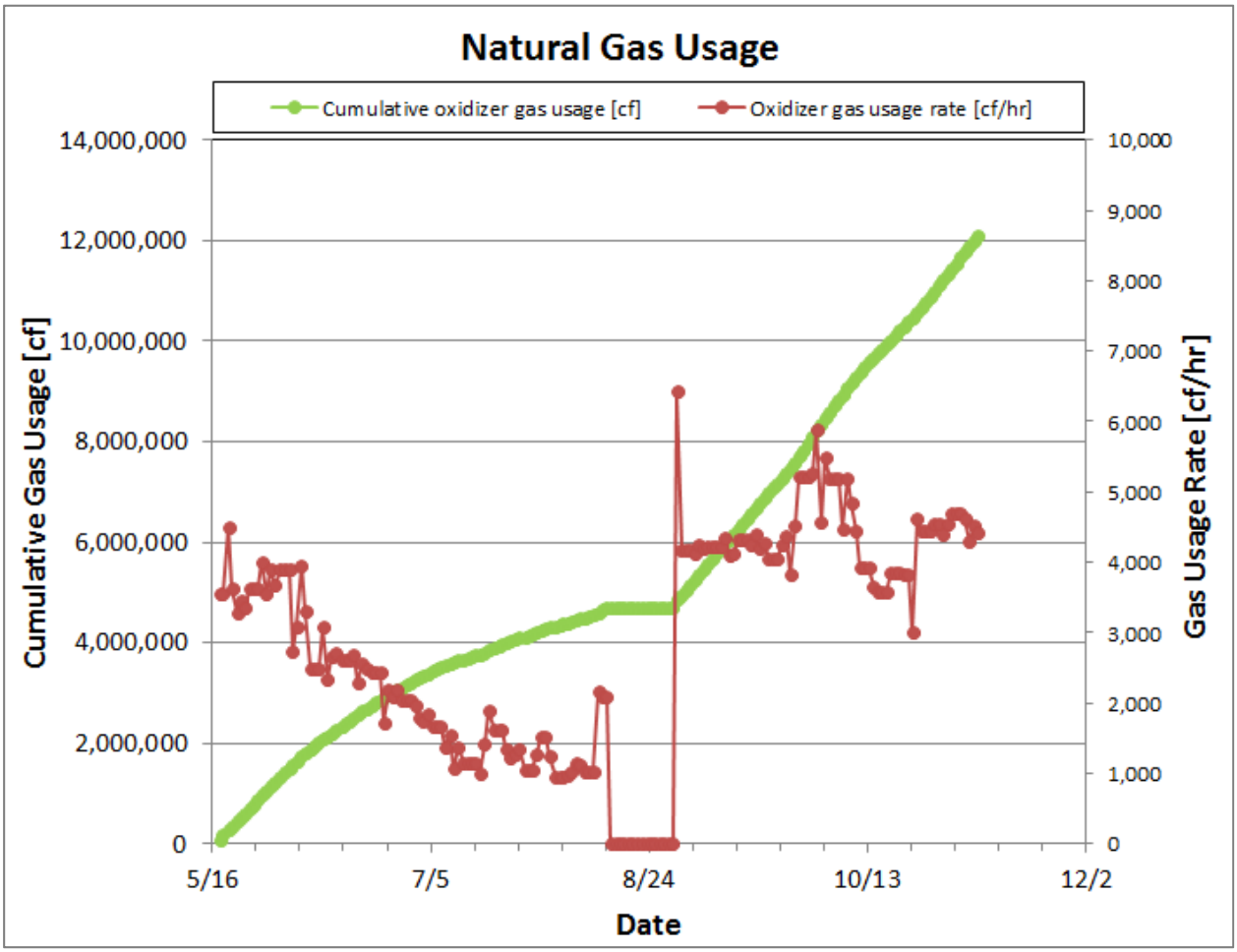


Figure 10. Natural Gas Usage

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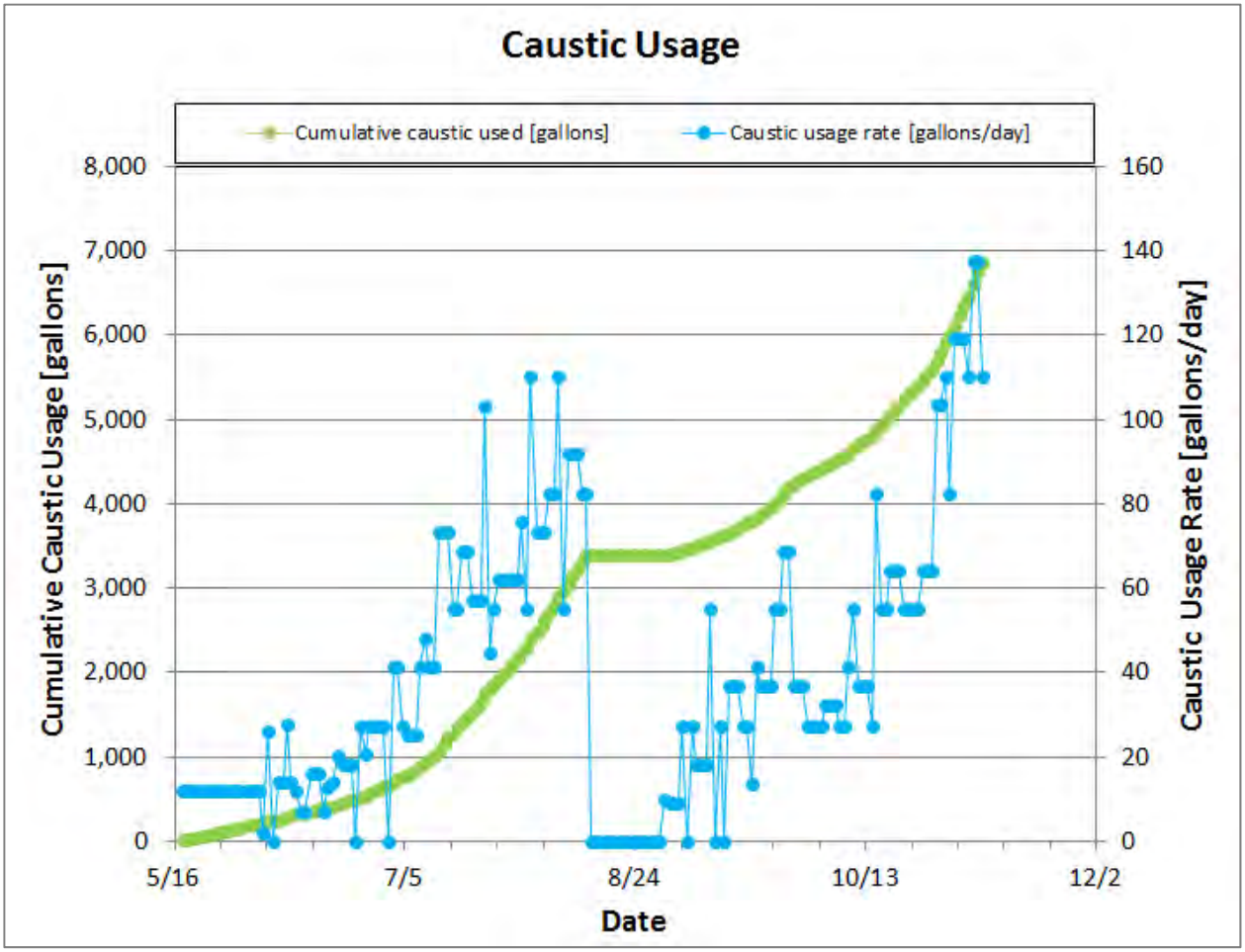


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12a. As of 9/26/14, we have reached all three temperature milestones for phase 1. Phase 2 centroids are shown in Figure 12b. We have reached temperature milestone 1 in Phase 2.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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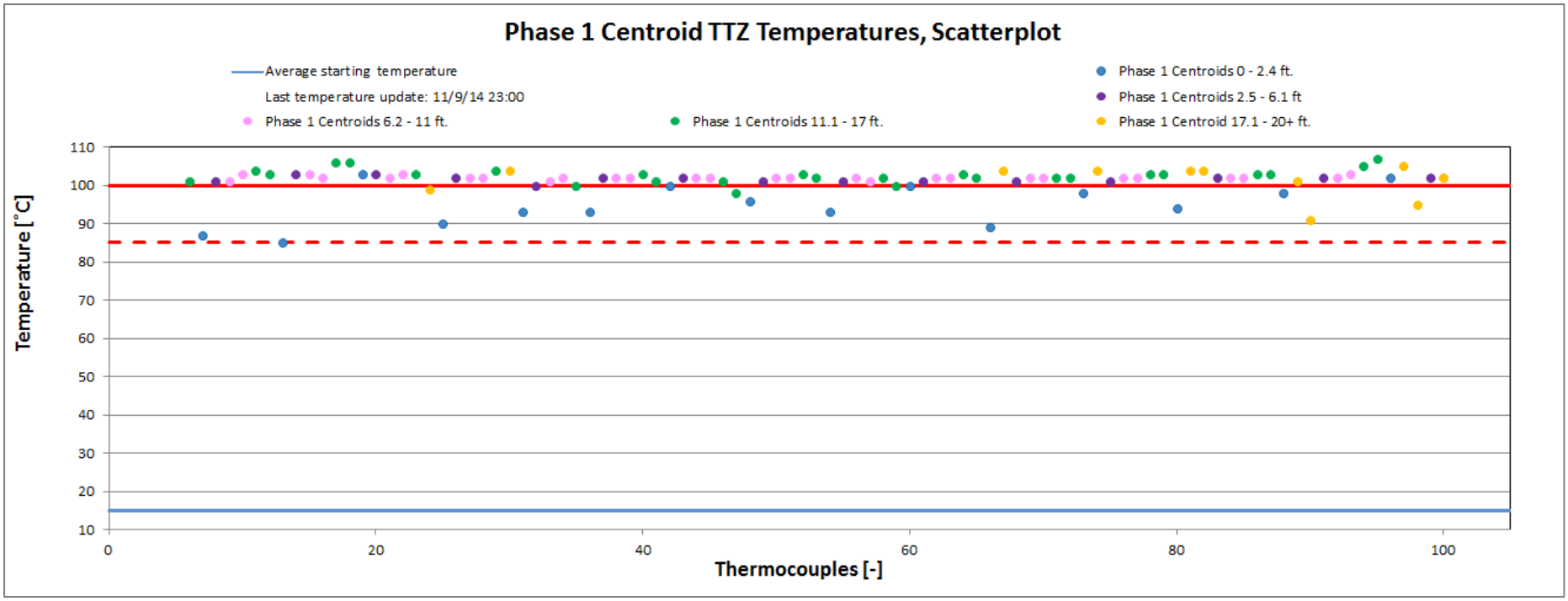


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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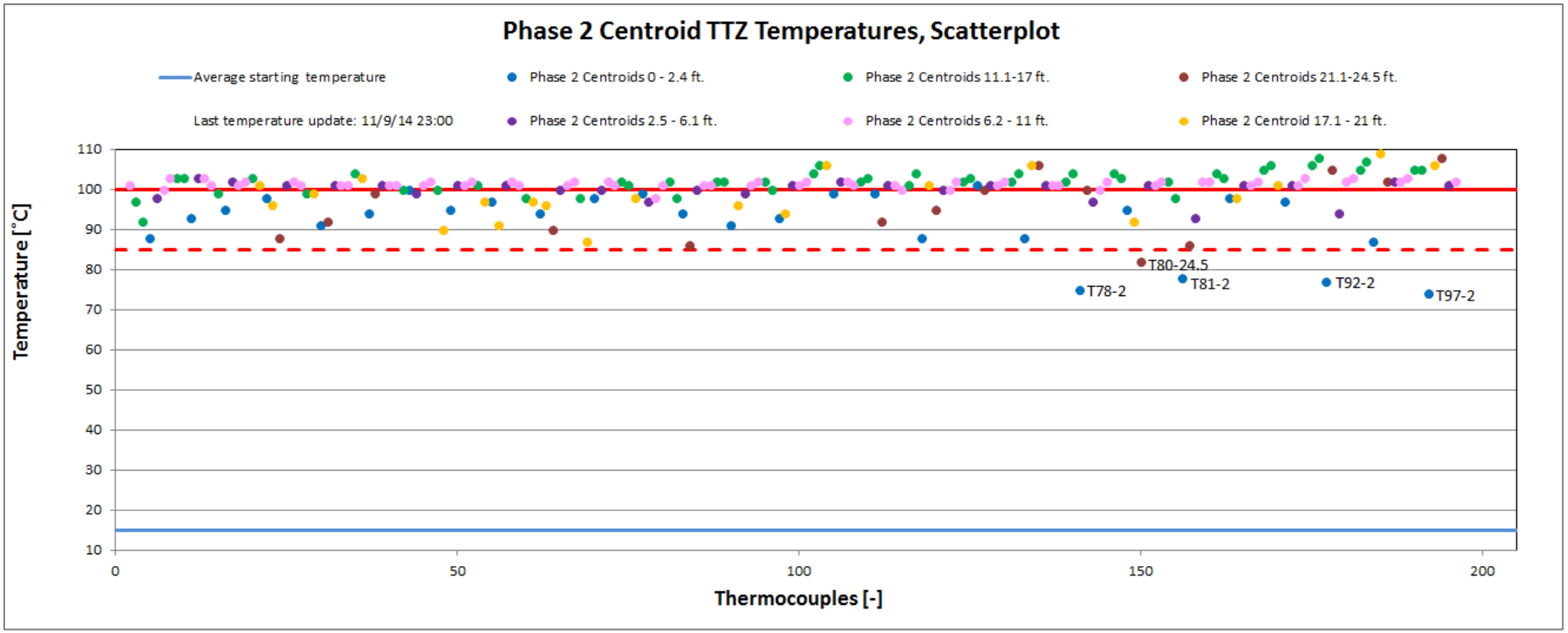


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots		
	Value	**Unit**
Date of Last Update	11/9/14	
Phase 1 Centroid Thermocouples ≥85 °C	100	%
Phase 1 Centroid Thermocouples ≥100 °C	94	%
Phase 2 Centroid Thermocouples ≥85 °C	98	%
Phase 2 Centroid Thermocouples ≥100 °C	77	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









Prepared by:

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1 SUMMARY

This report is intended to cover the operational time period of Friday November 7, 2014 through Friday November 14, 2014, with temperatures updated through Sunday November 16, 2014.

Table 1 provides a summary of the project operational status as of Friday, November 14, 2014.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	11/14/14	
Last Temperature Data Update	11/16/14	
Days of Operation (Total)	159	days
Days of Phase 1 Operation	159	days
Days of Phase 2 Operation	50	days
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	10,585,800	kWh
Used Electrical Energy vs. Estimate	67.0	%
Total Mass Removal	378,944	lbs
Average Power Input Last 24 Hours	2,100	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,976	scfm
Average Condensate Production Rate Last 24 Hours	7.7	gpm

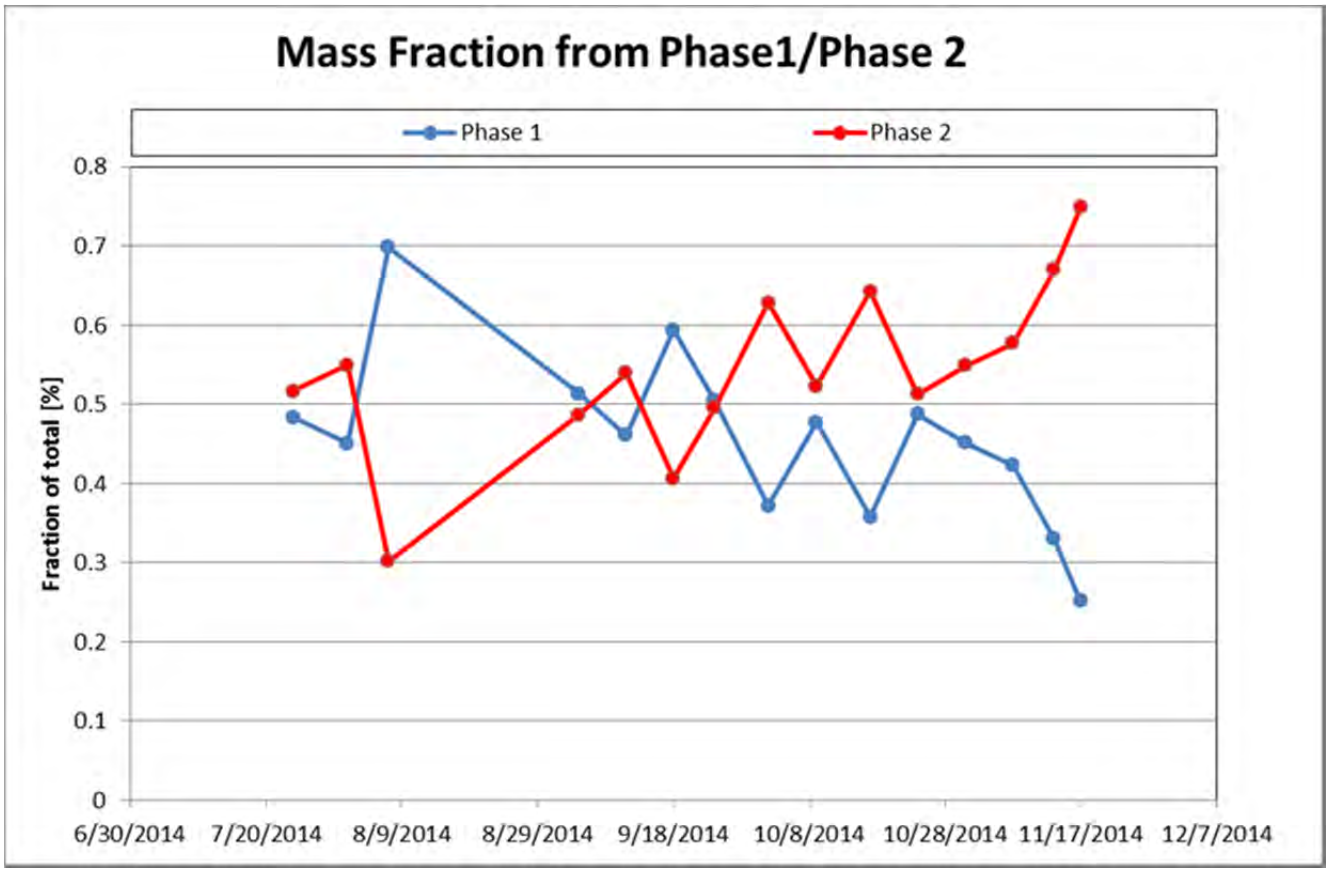
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Heaters in both Phase 1 and Phase 2 remain online and at full power. As of 11/14/14, Phase 1 has operated for 159 days and Phase 2 for 50 days. Please note that this represents days where heaters operated at or above 70% (per contract definition). The current average wellfield temperature for Phase 1 is 101°C and 99°C for Phase 2. All three temperature milestones have been achieved for Phase 1 and temperature milestones 1 and 2 have been achieved for Phase 2.

Shutdown of Phase 1 is pending confirmation soil sample results. Samples are scheduled to be collected this week.

Estimated mass removed to date is reported using the flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. These results yield a total mass removal of 378,944 lbs as of 11/14/14. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 11/13/14. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.33:0.67. To confirm these readings, another complete data set was collected on 11/17/14, which yielded a similar ratio (0.25:0.75). Since individual manifold flow data was not collected on 11/17/14, these data should be considered an estimate until additional data are collected later this week. These ratios were then applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase. Mass faction data over time is presented below.



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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperatures for both Phase 1 and Phase 2, as well as the average centroid temperatures. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Phase 2 heating began on 7/16/14 but was stopped on 8/14/14, as a result of the oxidizer shutdown, and reenergized on 09/3014. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	11/16/14	
Phase 1 Entire TTZ Average Temperature	101	°C
Phase 2 Entire TTZ Average Temperature	99	°C
Phase 1 Centroid Average Temperature	99	°C
Phase 2 Centroid Average Temperature	99	°C

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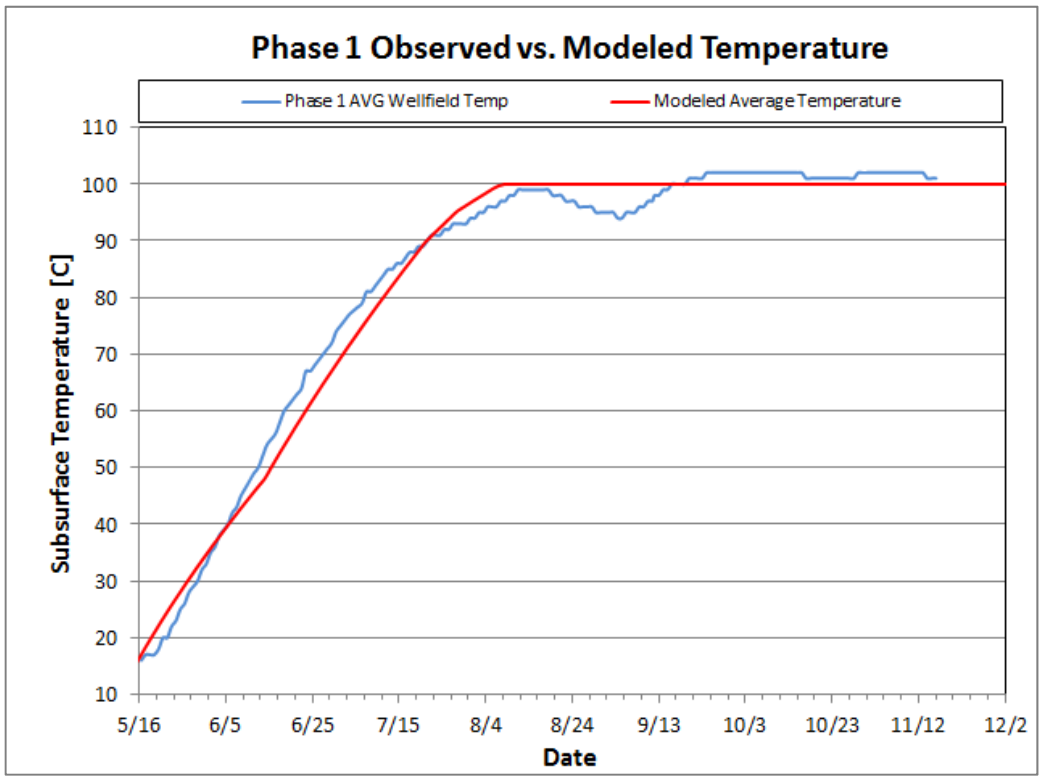


Figure 1a. Phase 1 Observed vs. Modeled Temperature

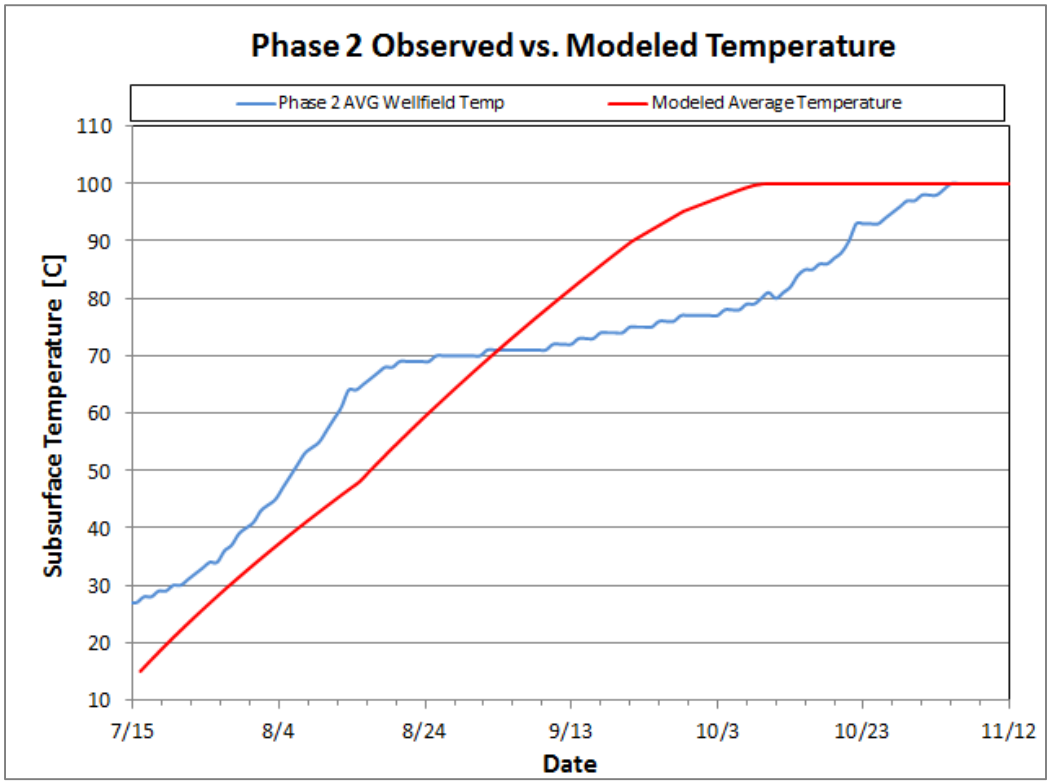


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was restarted on 8/30/14.

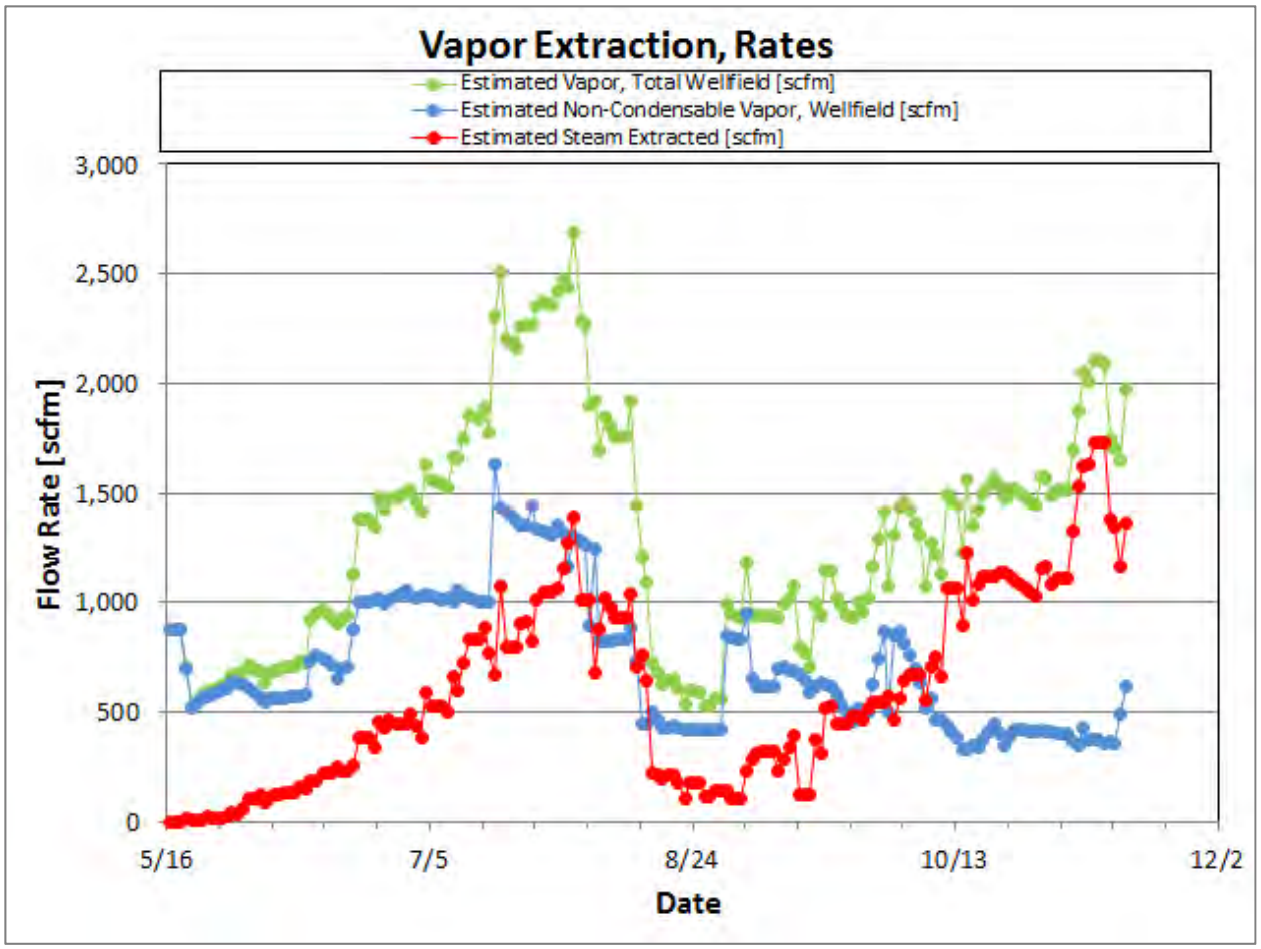


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

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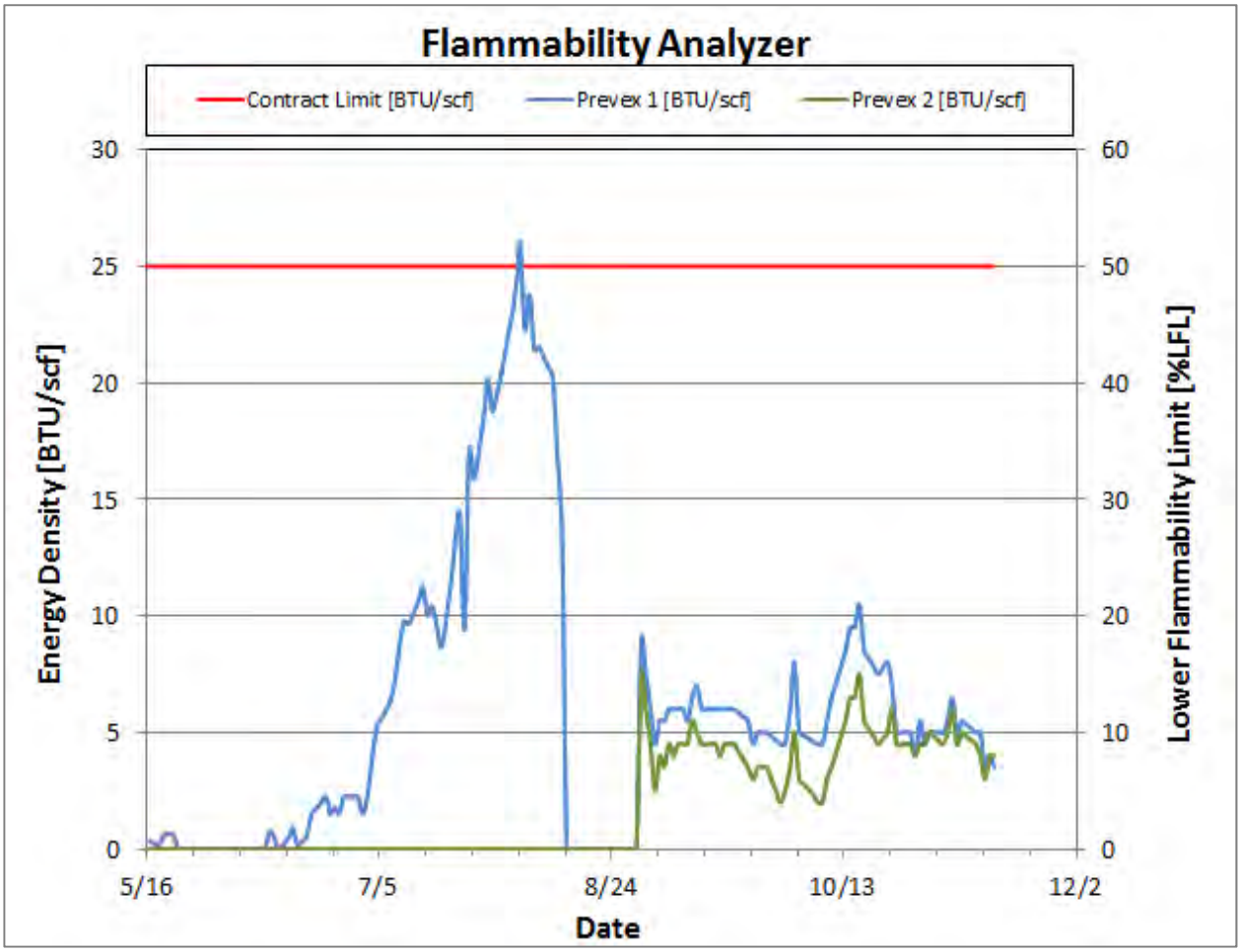


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

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The decrease in mass removed starting on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14, 9/23/14, 9/30/14 , 10/7/14, 10/14/14, 10/21/14 and 10/30/14.

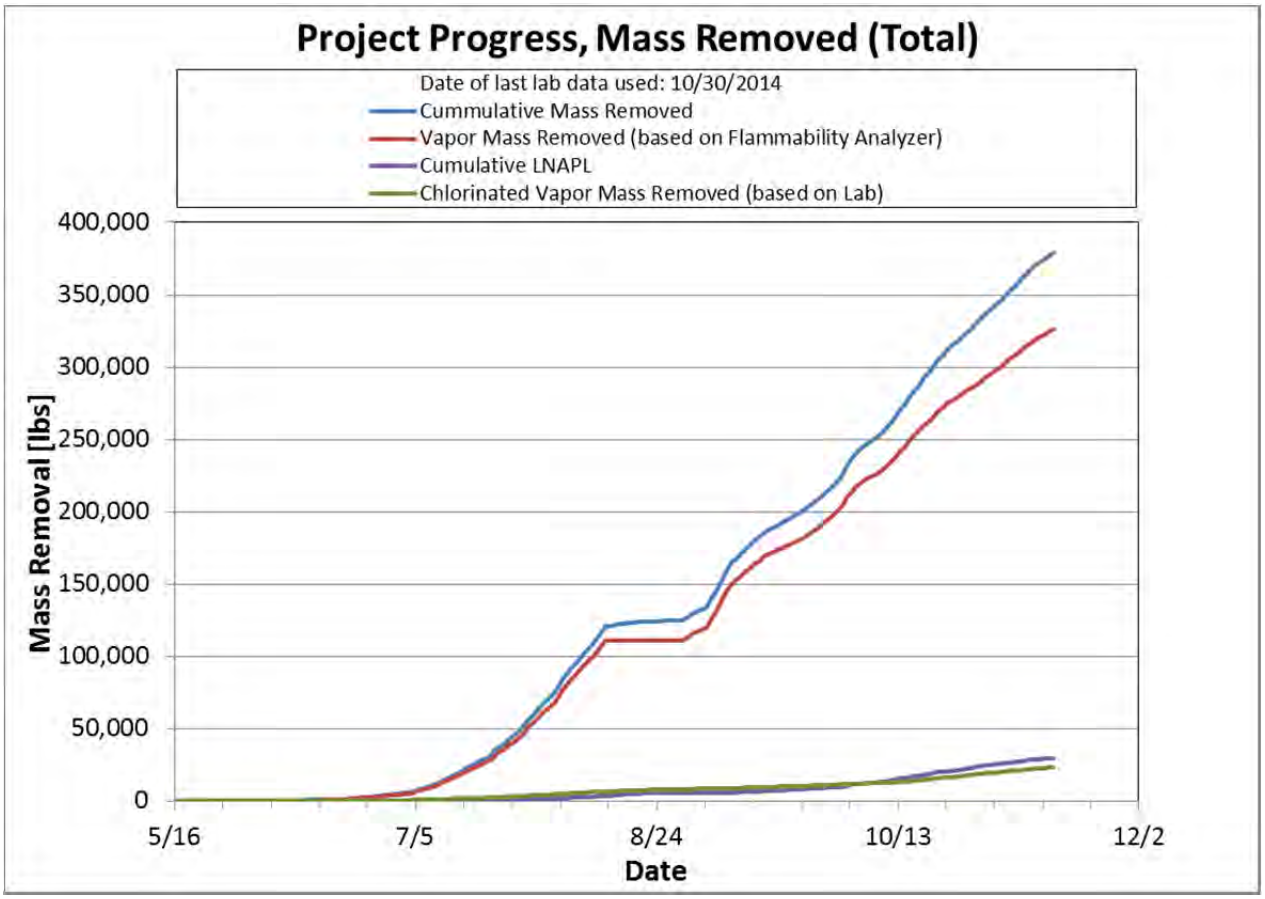


Figure 4a. Project Progress, Mass Removal (Total)

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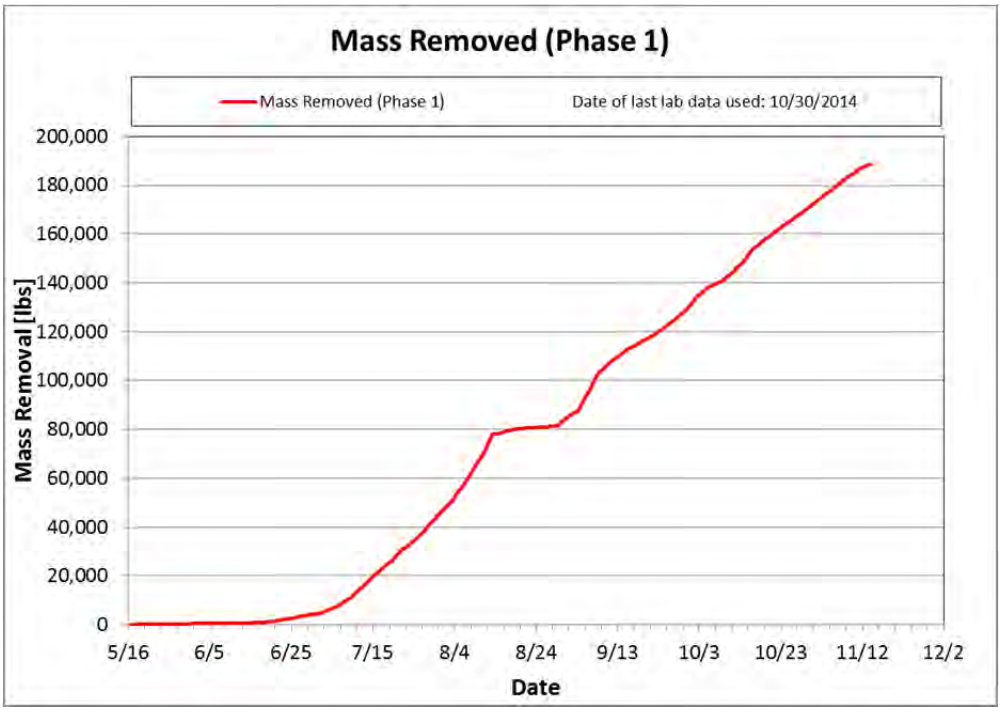


Figure 4b. Project Progress, Mass Removal (Phase 1)

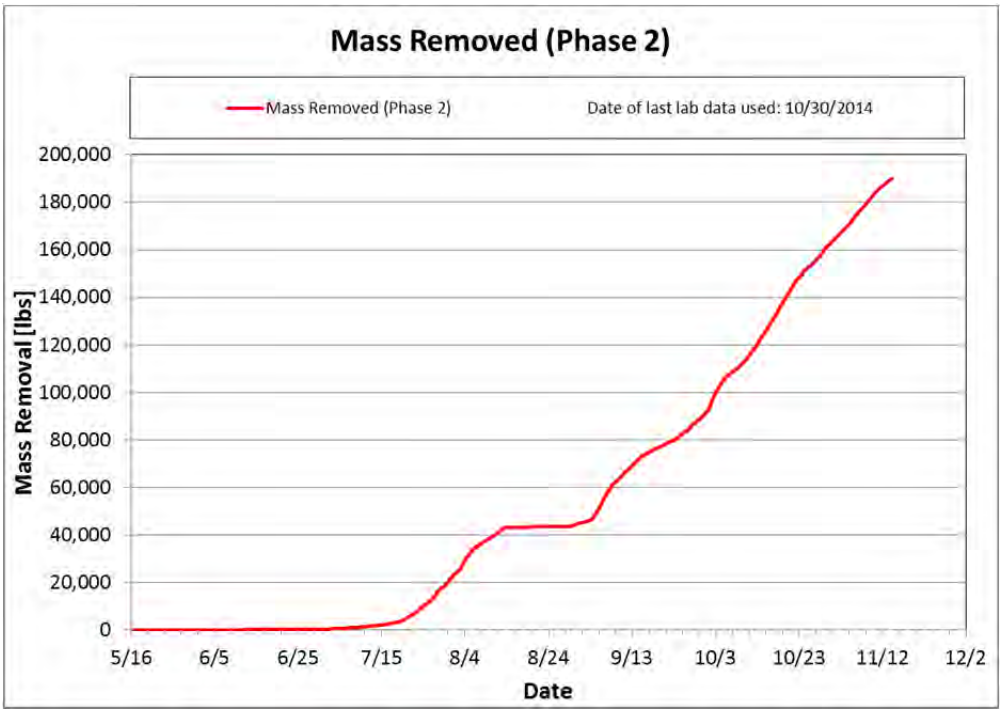


Figure 4c. Project Progress, Mass Removal (Phase 2)

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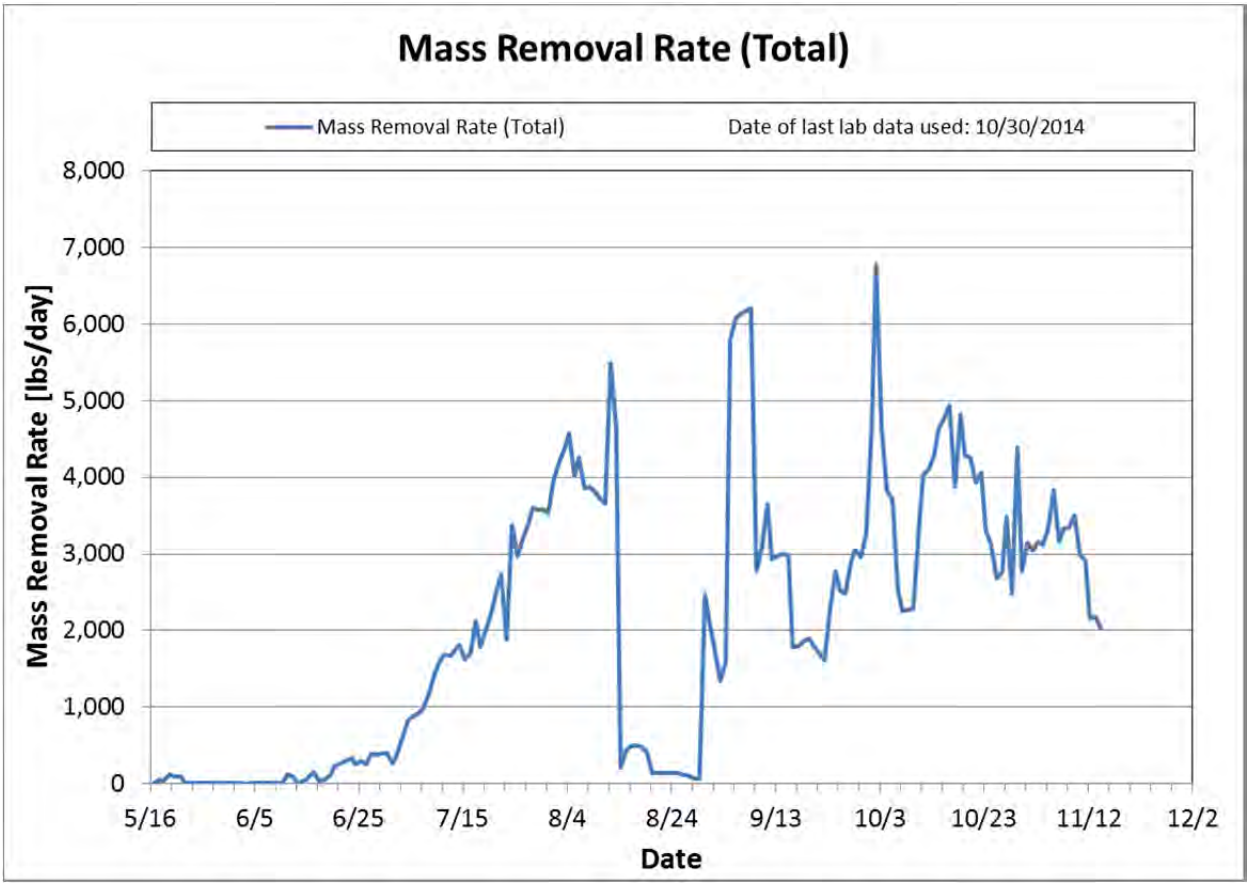


Figure 4d. Mass Removal Rate (Total for Site)

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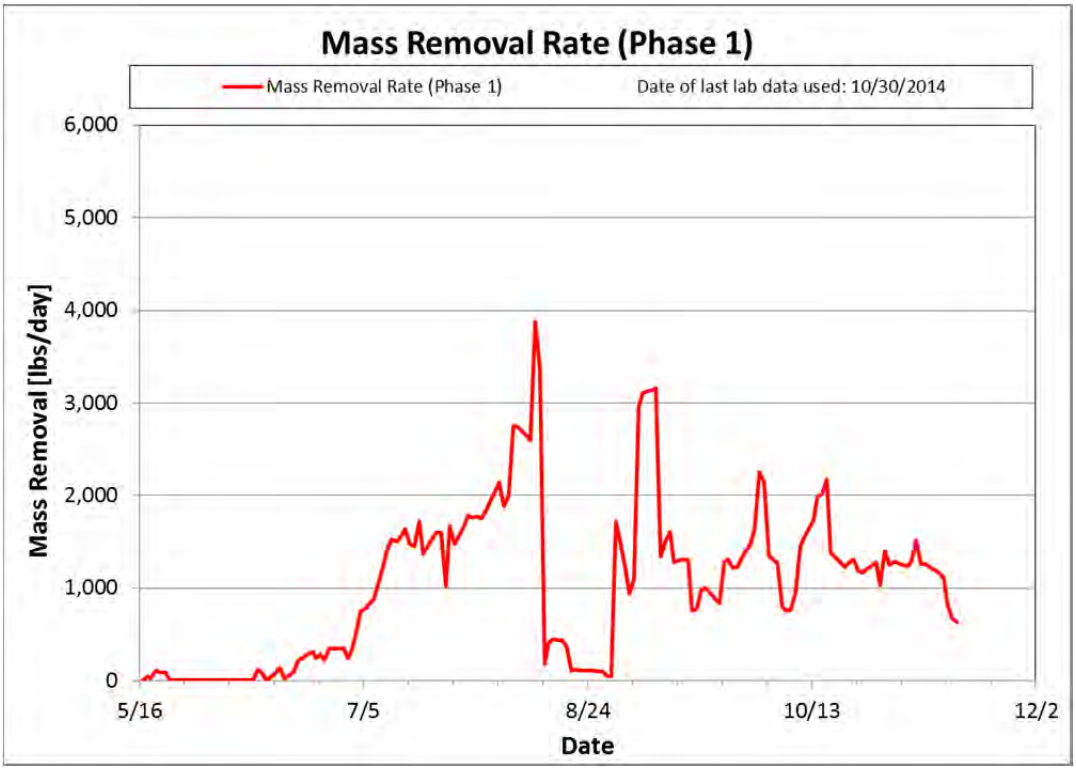


Figure 4e. Mass Removal Rate (Phase 1)

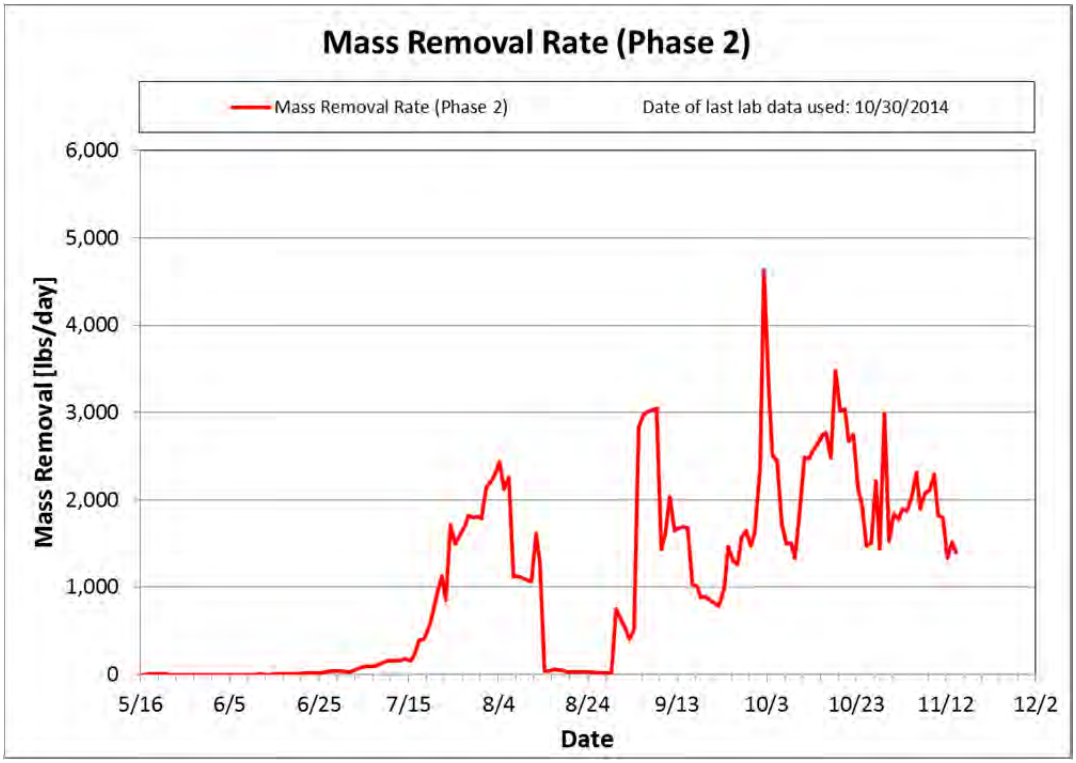


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID and flammability analyzer readings collected at the oxidizer influent over time. It should be noted that PID readings are first collected using an 11.7 eV lamp (determined by site contaminants). If the reading exceeds the limit of the meter (>2000 ppm), the readings are collected using a 10.6 eV lamp. When both meters are used, the maximum value is recorded.

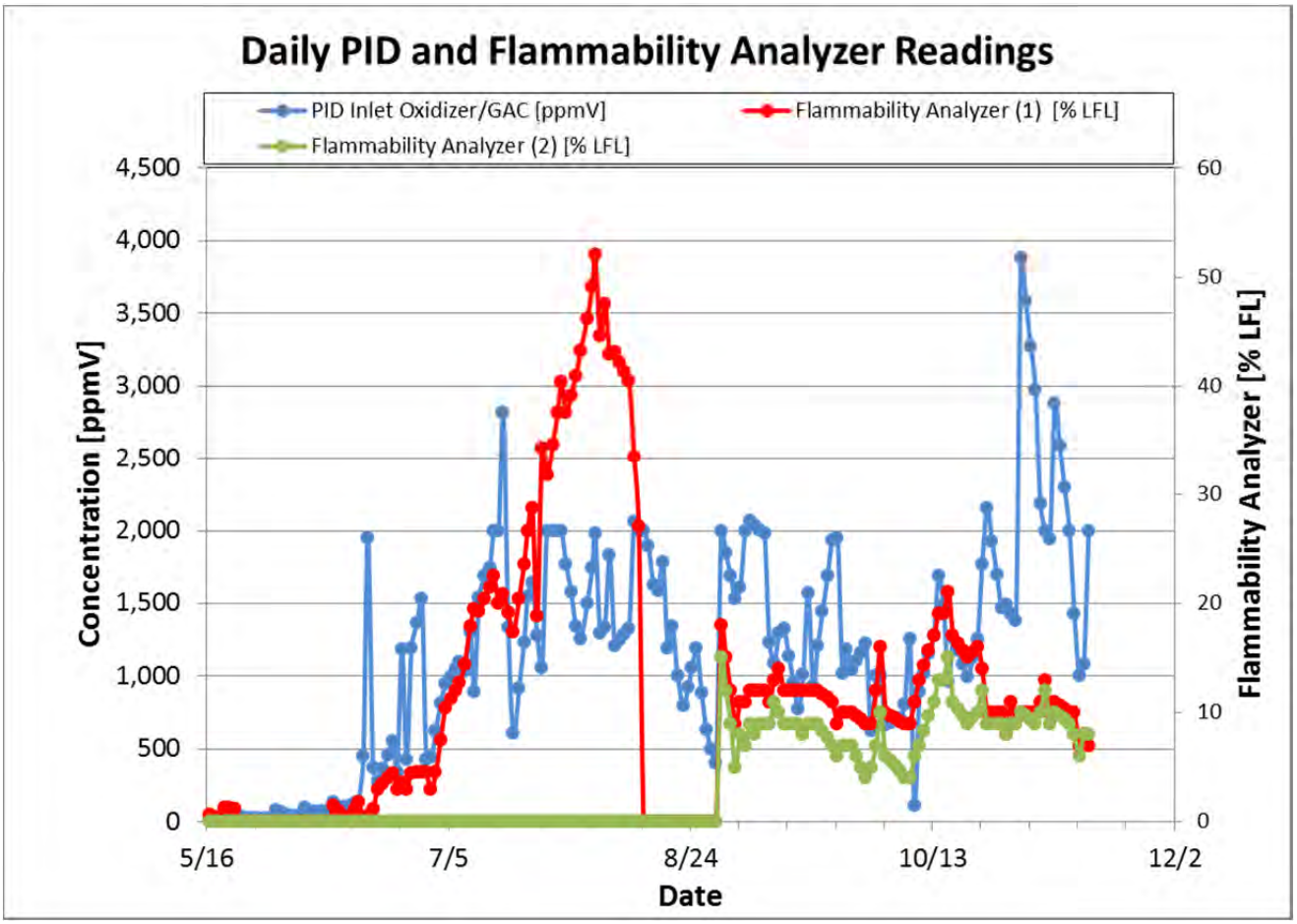


Figure 5. Daily PID and Flammability Analyzer Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13. Decreases in DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-outs.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

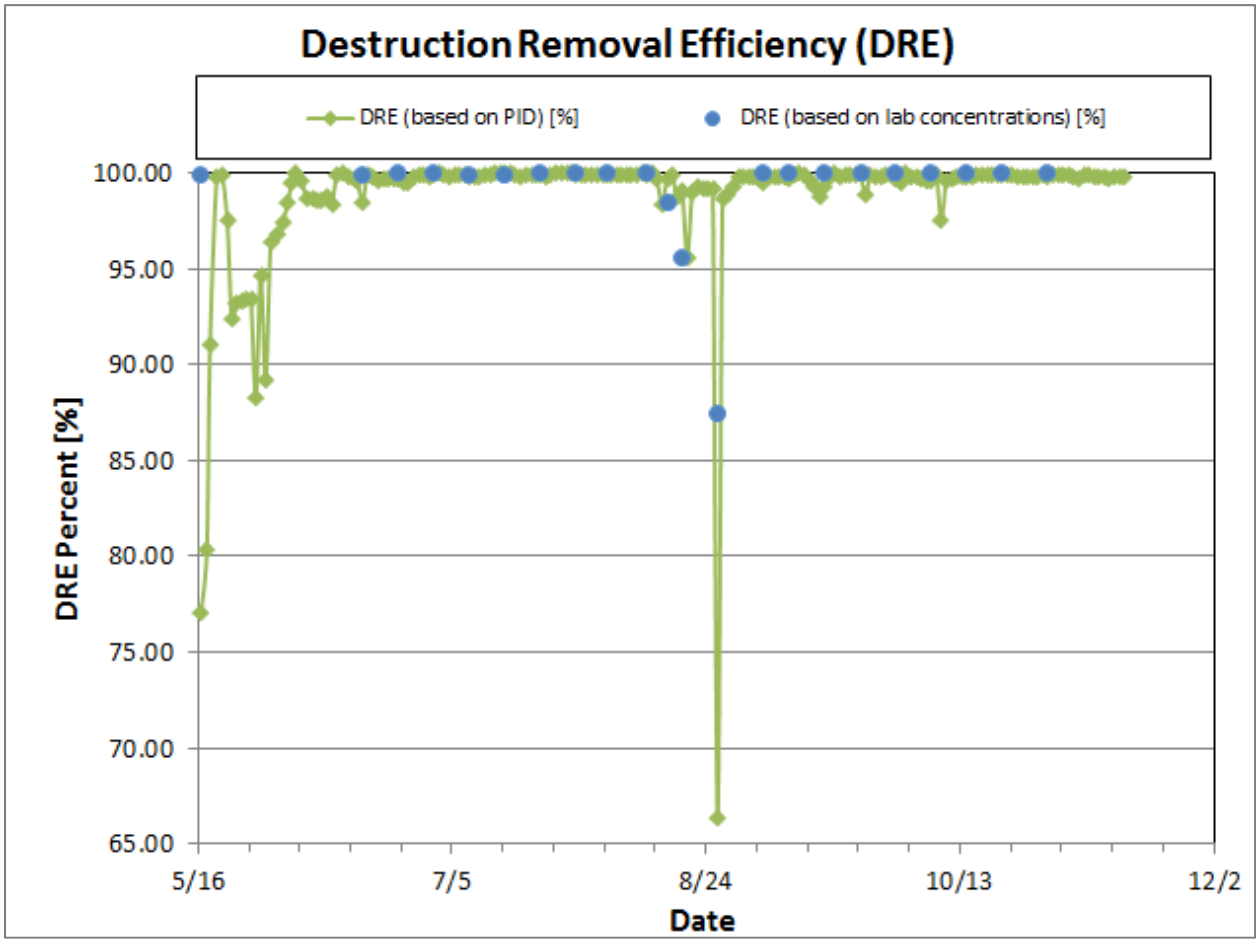


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7.

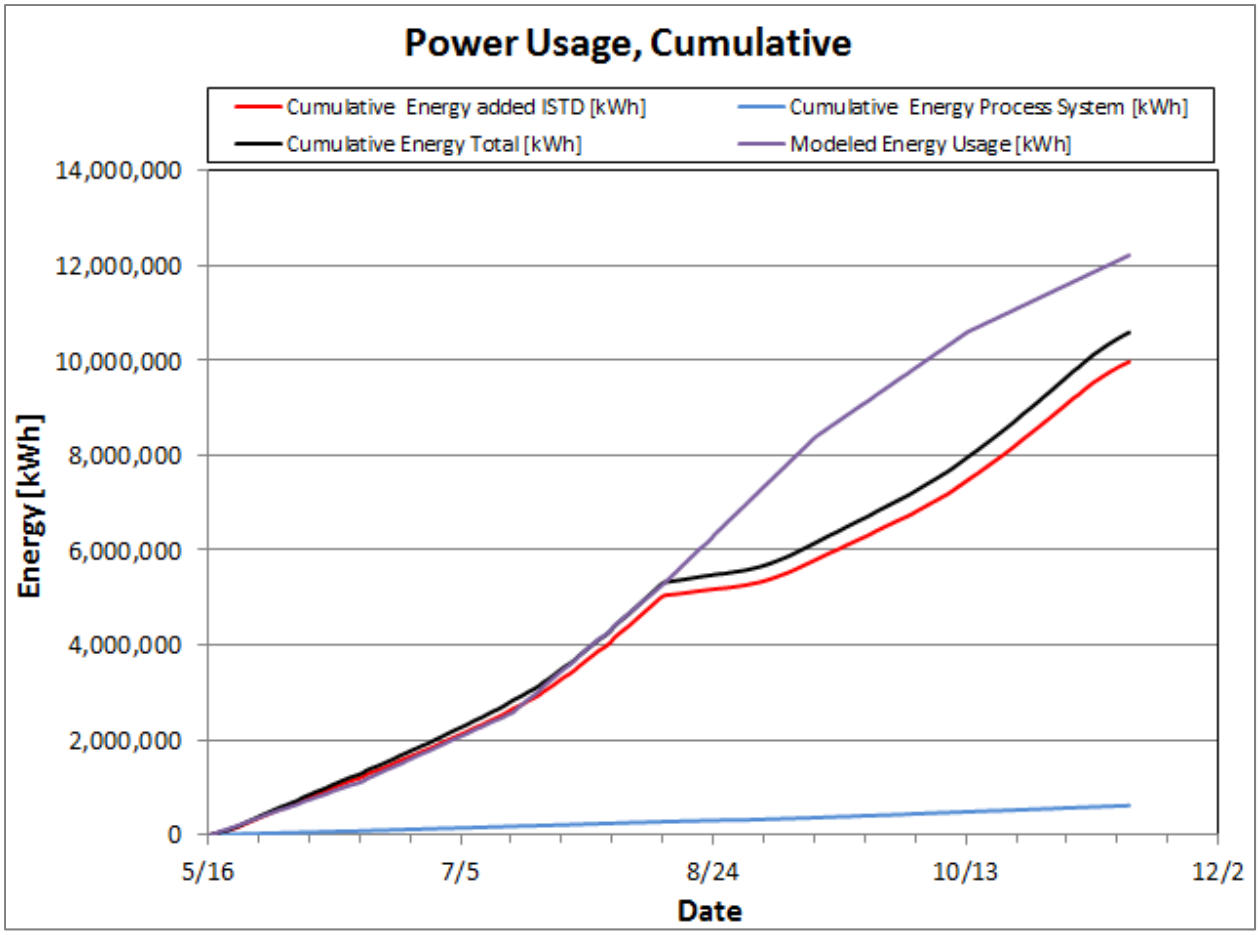


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30/14 and the following days corresponds with ramping of the heaters after placing the oxidizer back online.

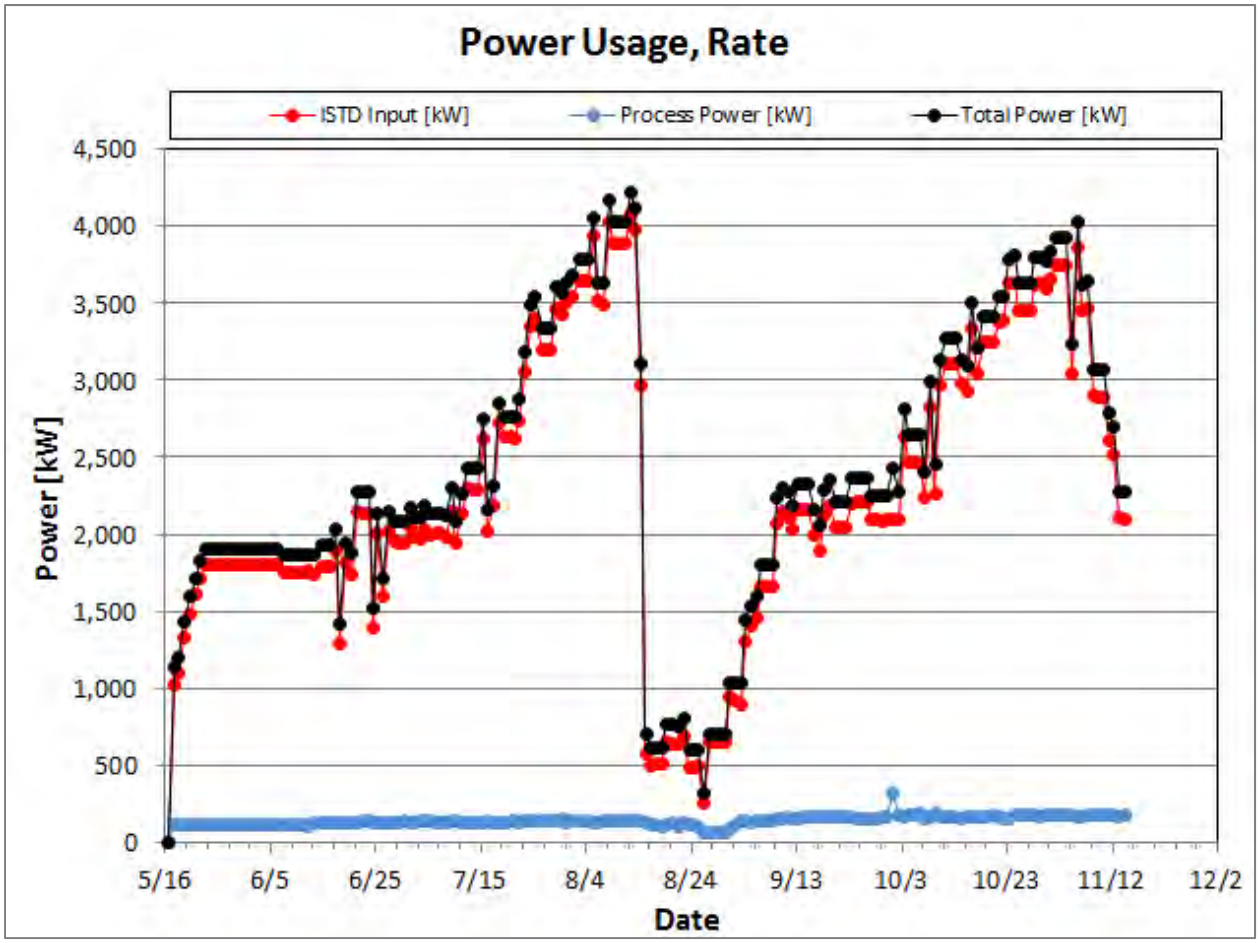


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

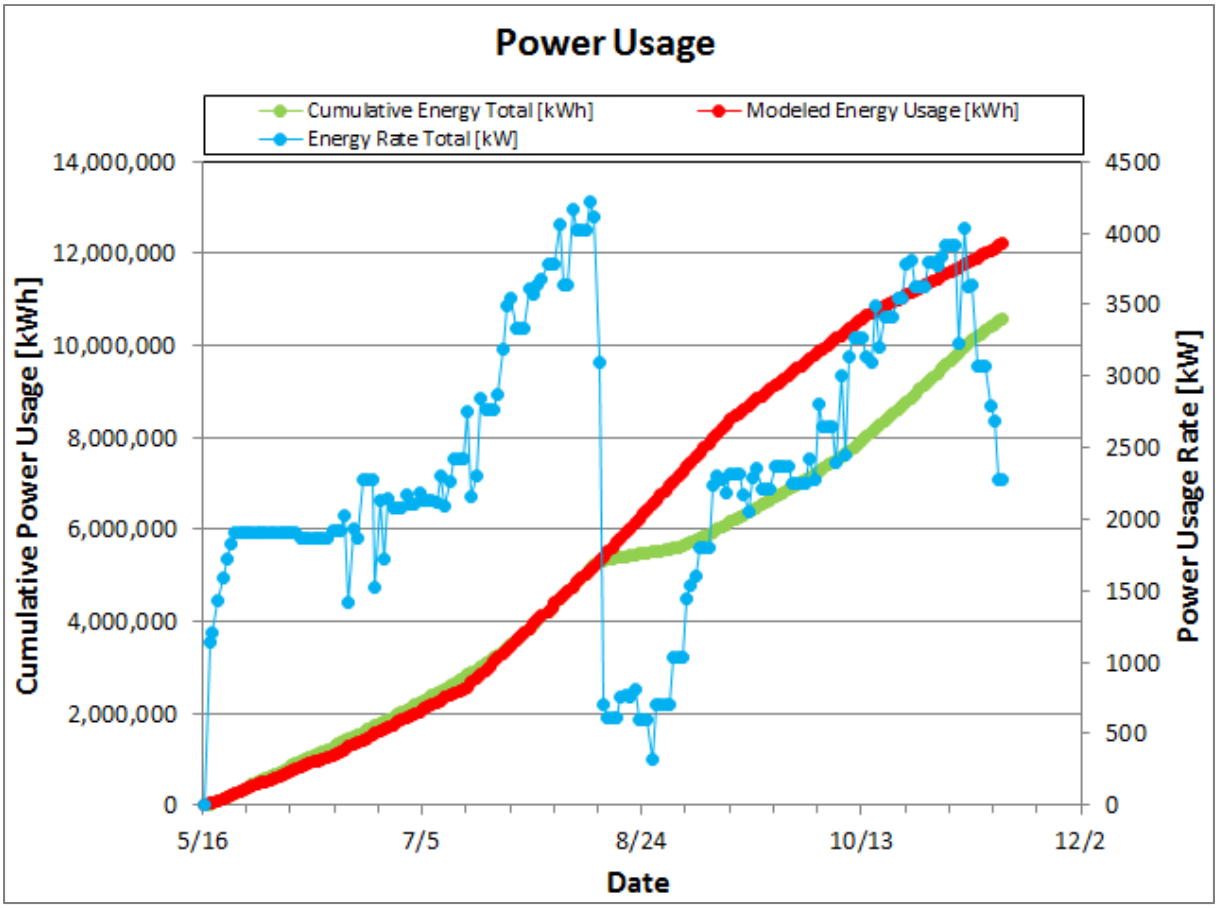


Figure 9. Power Usage

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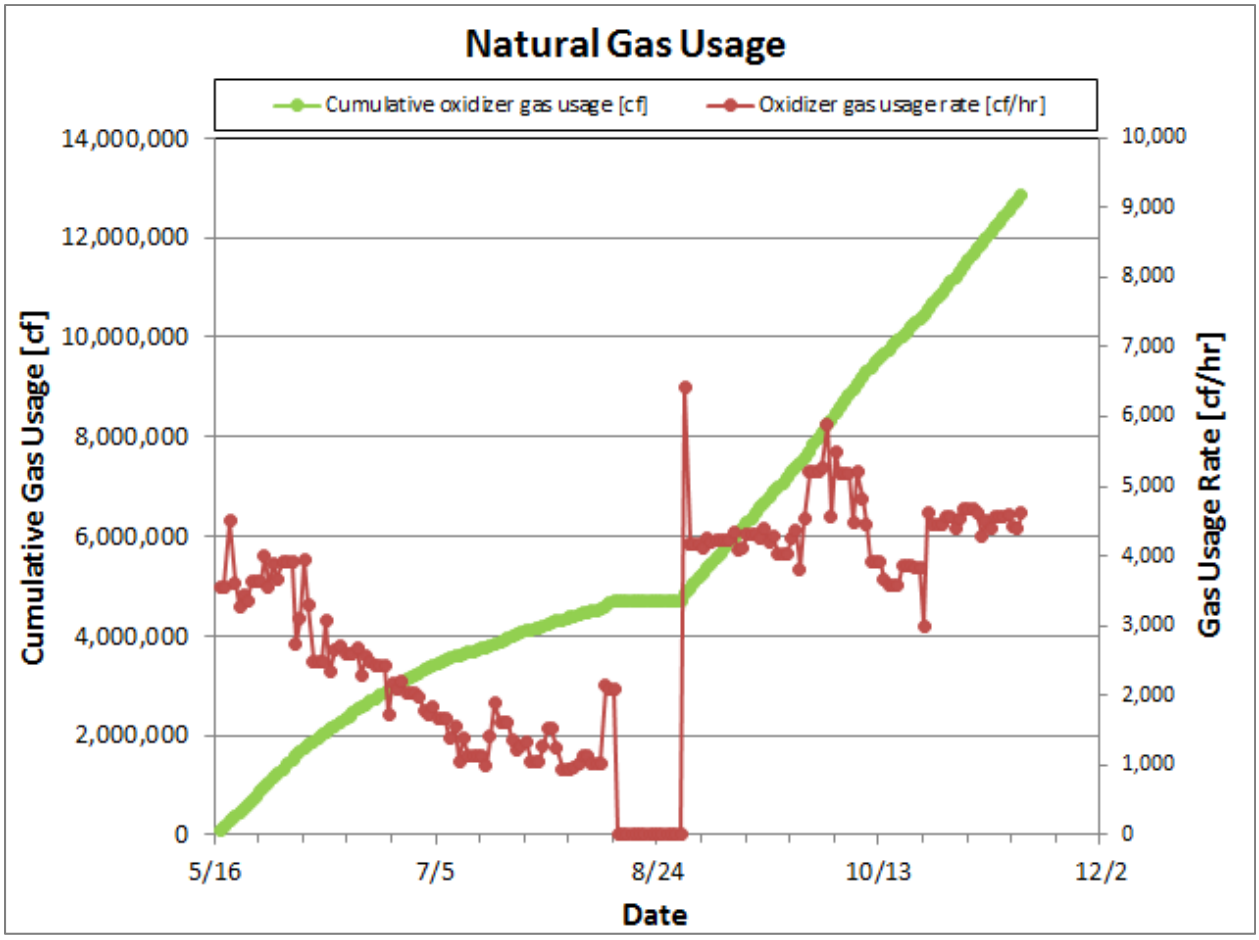


Figure 10. Natural Gas Usage

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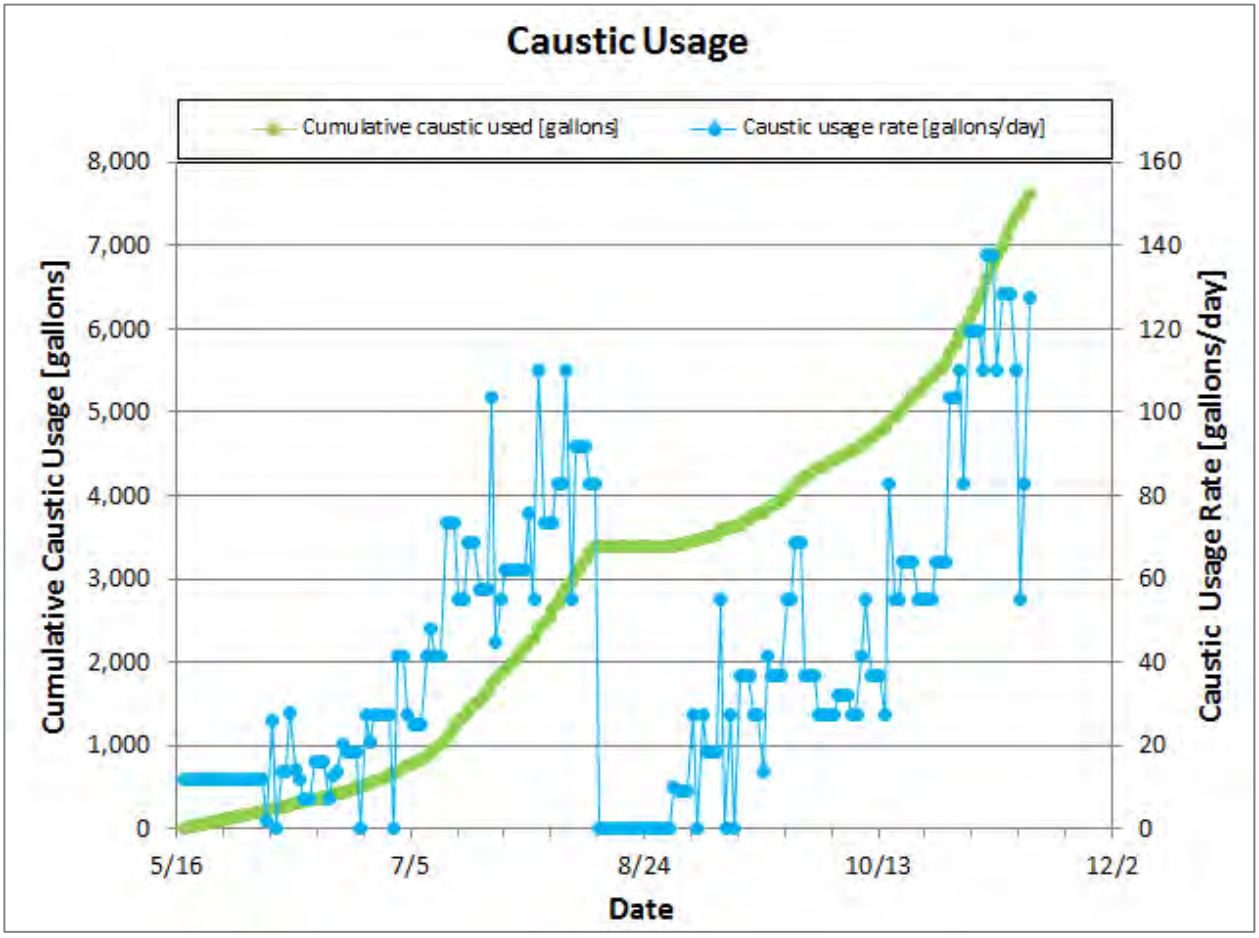


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Same milestones apply to Phase 2.

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12a. As of 9/26/14, we have reached all three temperature milestones for phase 1. Phase 2 centroids are shown in Figure 12b. As of 11/18/14, we have achieved two temperature milestones for Phase 2.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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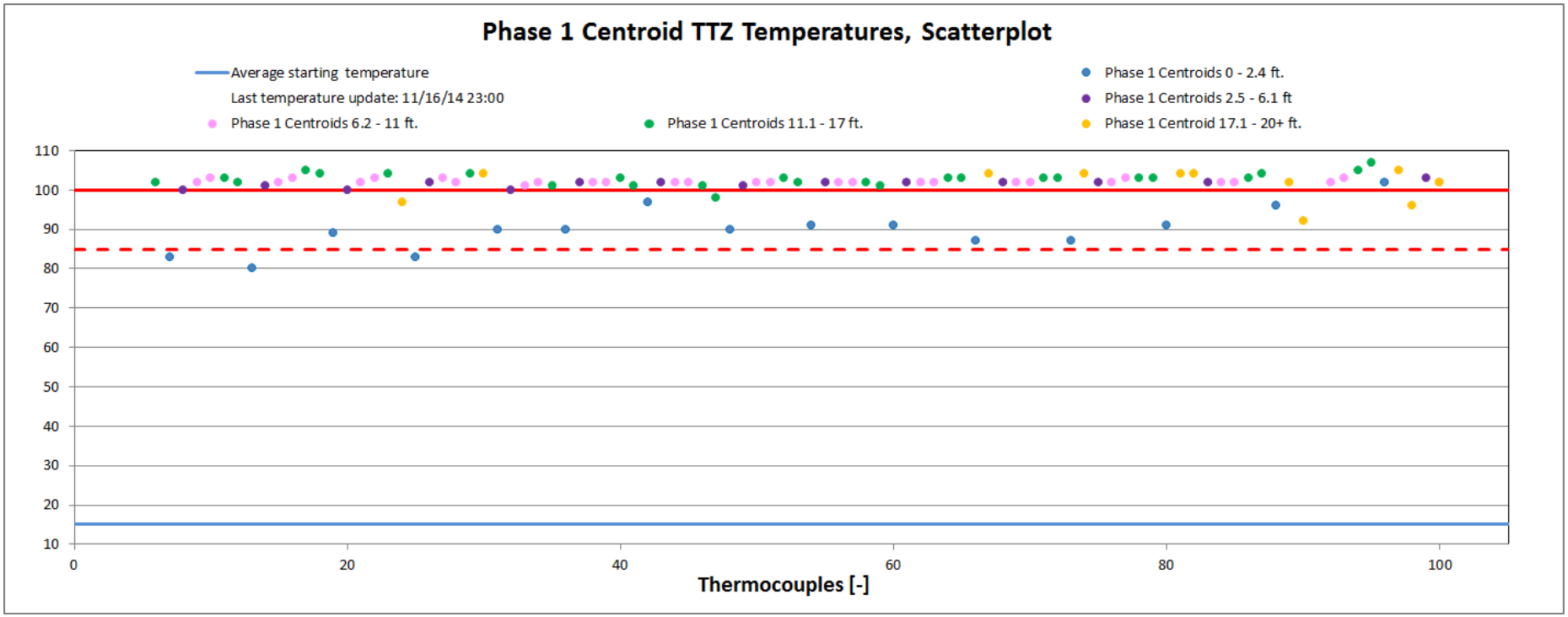


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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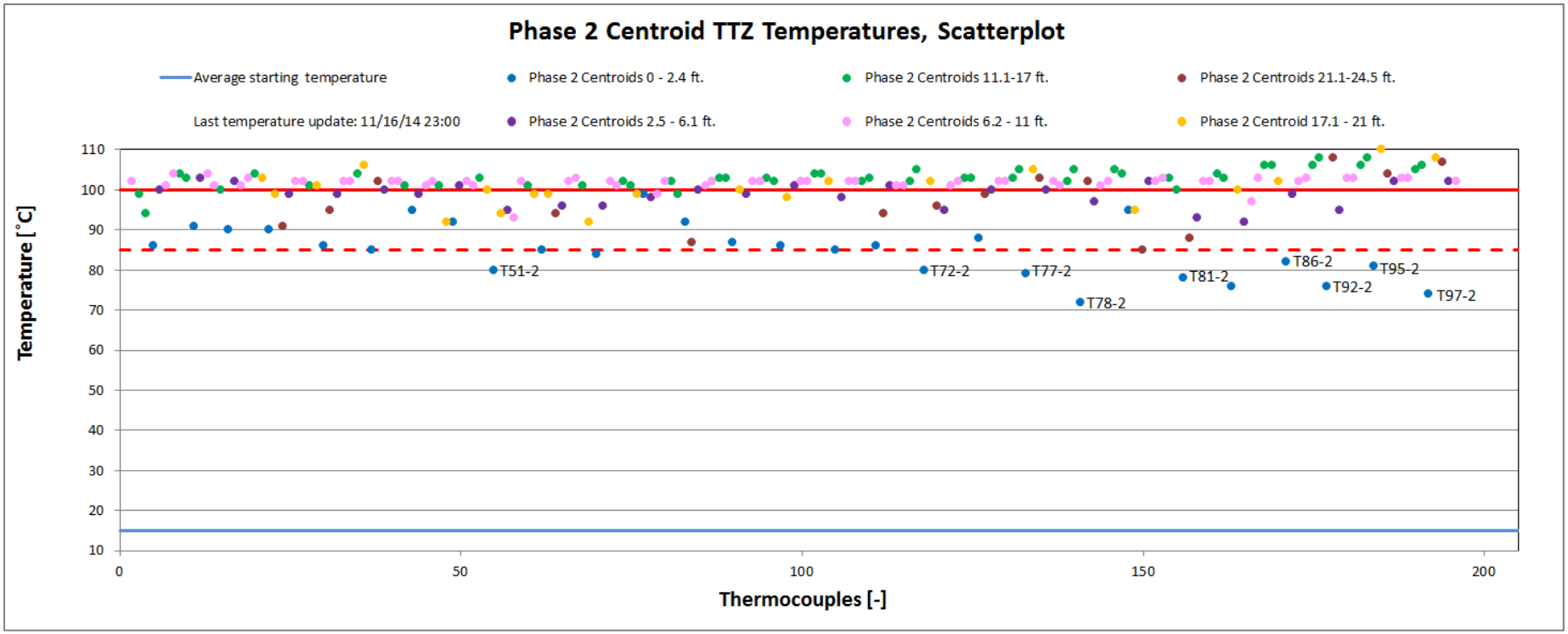


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots		
	Value	**Unit**
Date of Last Update	11/16/14	
Phase 1 Centroid Thermocouples ≥85 ^{o}C	100	%
Phase 1 Centroid Thermocouples ≥100 ^{o}C	94	%
Phase 2 Centroid Thermocouples ≥85 ^{o}C	99	%
Phase 2 Centroid Thermocouples ≥100 ^{o}C	84	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









Prepared by:

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1 SUMMARY

This report is intended to cover the operational time period of Friday November 14, 2014 through Friday November 21, 2014, with temperatures updated through Sunday November 23, 2014.

Table 1 provides a summary of the project operational status as of Friday, November 21, 2014.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	11/21/14	
Last Temperature Data Update	11/23/14	
Days of Operation (Total)	166	days
Days of Phase 1 Operation	166	days
Days of Phase 2 Operation	57	days
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	11,017,800	kWh
Used Electrical Energy vs. Estimate	69.8	%
Total Mass Removal	399,058	lbs
Average Power Input Last 24 Hours	2,510	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,713	scfm
Average Condensate Production Rate Last 24 Hours	5.7	gpm

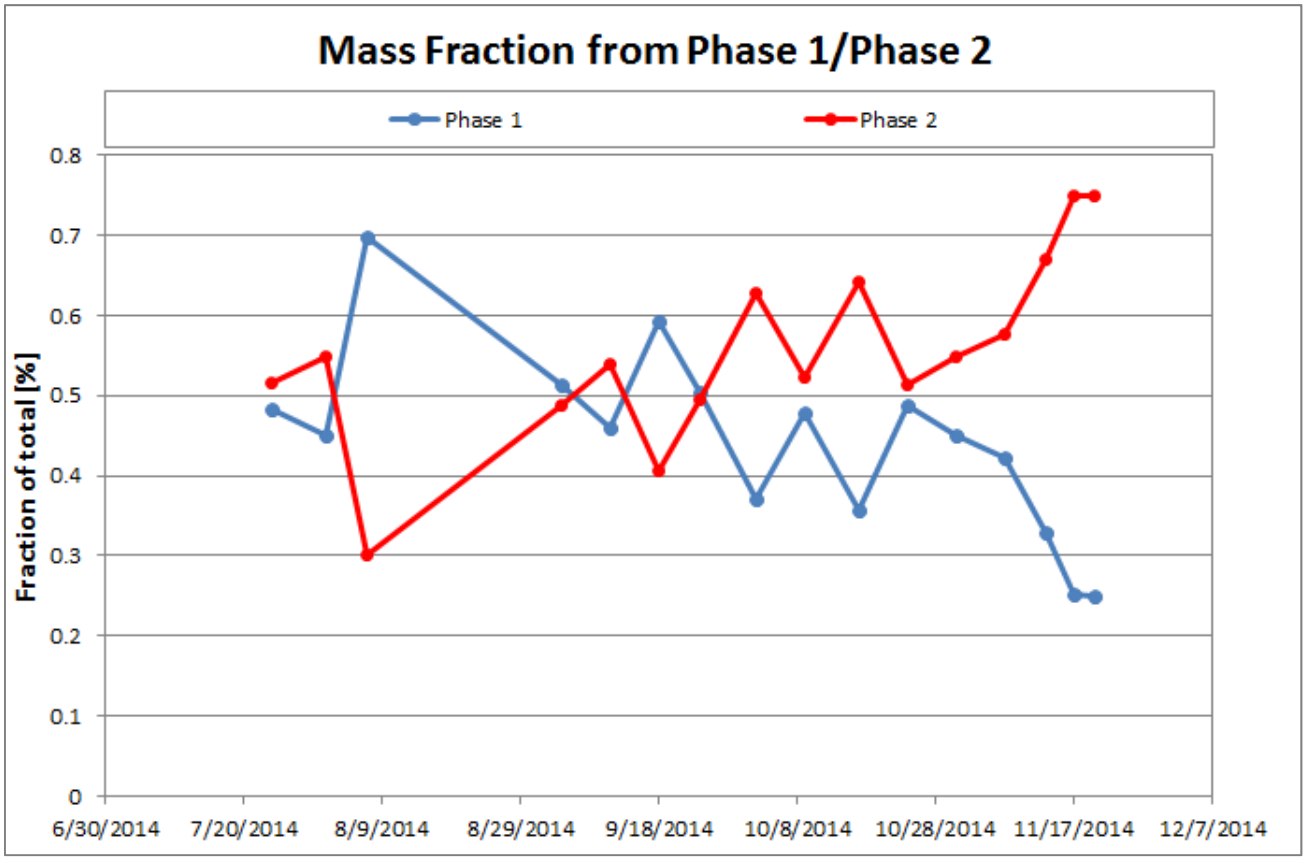
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Heaters in both Phase 1 and Phase 2 remain online and at full power. As of 11/21/14, Phase 1 has operated for 166 days and Phase 2 for 57 days. Please note that this represents days where heaters operated at or above 70% (per contract definition). The current average wellfield temperature for Phase 1 is 100°C and 99°C for Phase 2. All three temperature milestones have been achieved for Phase 1 and temperature milestones 1 and 2 have been achieved for Phase 2.

Confirmation soil sample results have been received. All sample locations were below project cleanup goals. Shutdown of Phase 1 is pending authorization of EPA. Progress soil samples in Phase 2 are scheduled to begin Monday, 1 December 2014.

Estimated mass removed to date is reported using the flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. These results yield a total mass removal of 399,058 lbs as of 11/21/14. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 11/20/14. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.25:0.75. These ratios were then applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase. Mass faction data over time is presented below.



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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperatures for both Phase 1 and Phase 2, as well as the average centroid temperatures. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Phase 2 heating began on 7/16/14 but was stopped on 8/14/14, as a result of the oxidizer shutdown, and reenergized on 09/30/14. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	11/23/14	
Phase 1 Entire TTZ Average Temperature	100	°C
Phase 2 Entire TTZ Average Temperature	99	°C
Phase 1 Centroid Average Temperature	100	°C
Phase 2 Centroid Average Temperature	99	°C

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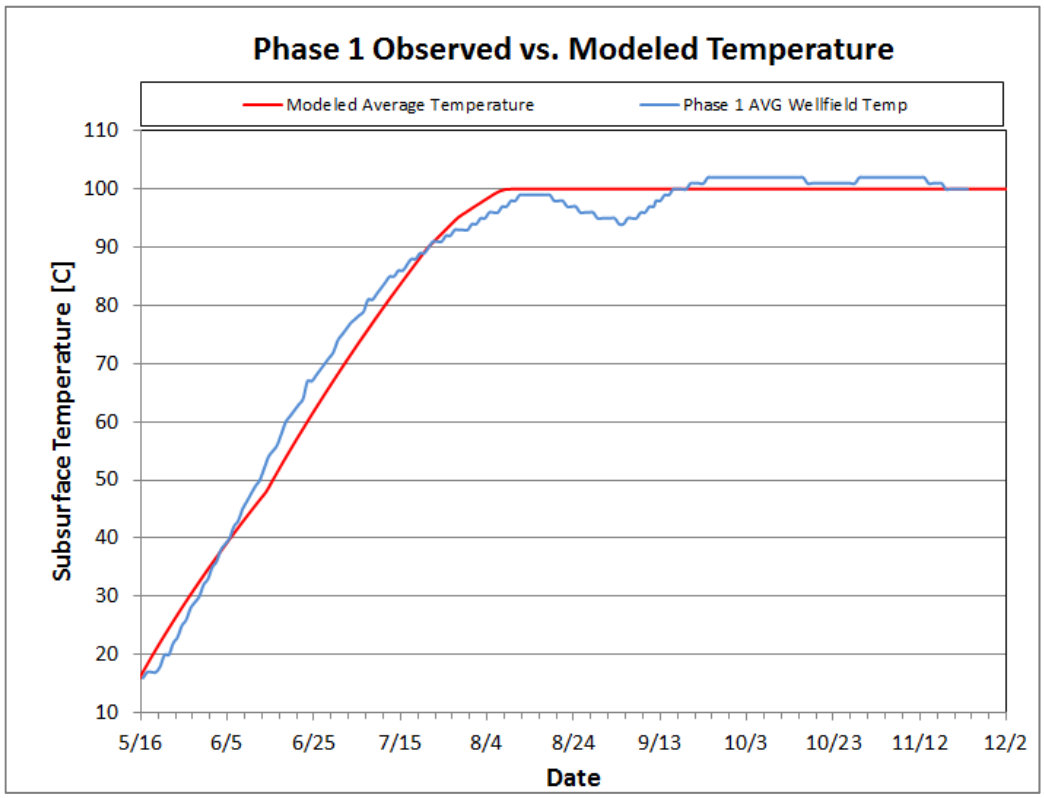


Figure 1a. Phase 1 Observed vs. Modeled Temperature

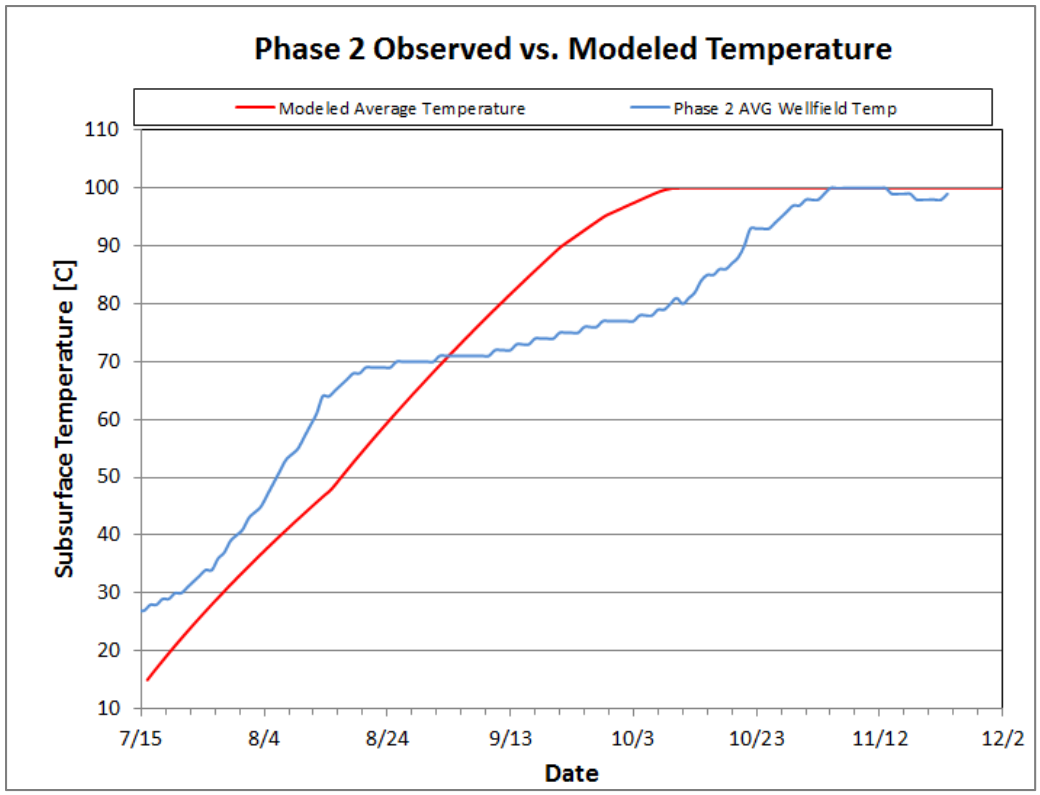


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was restarted on 8/30/14.

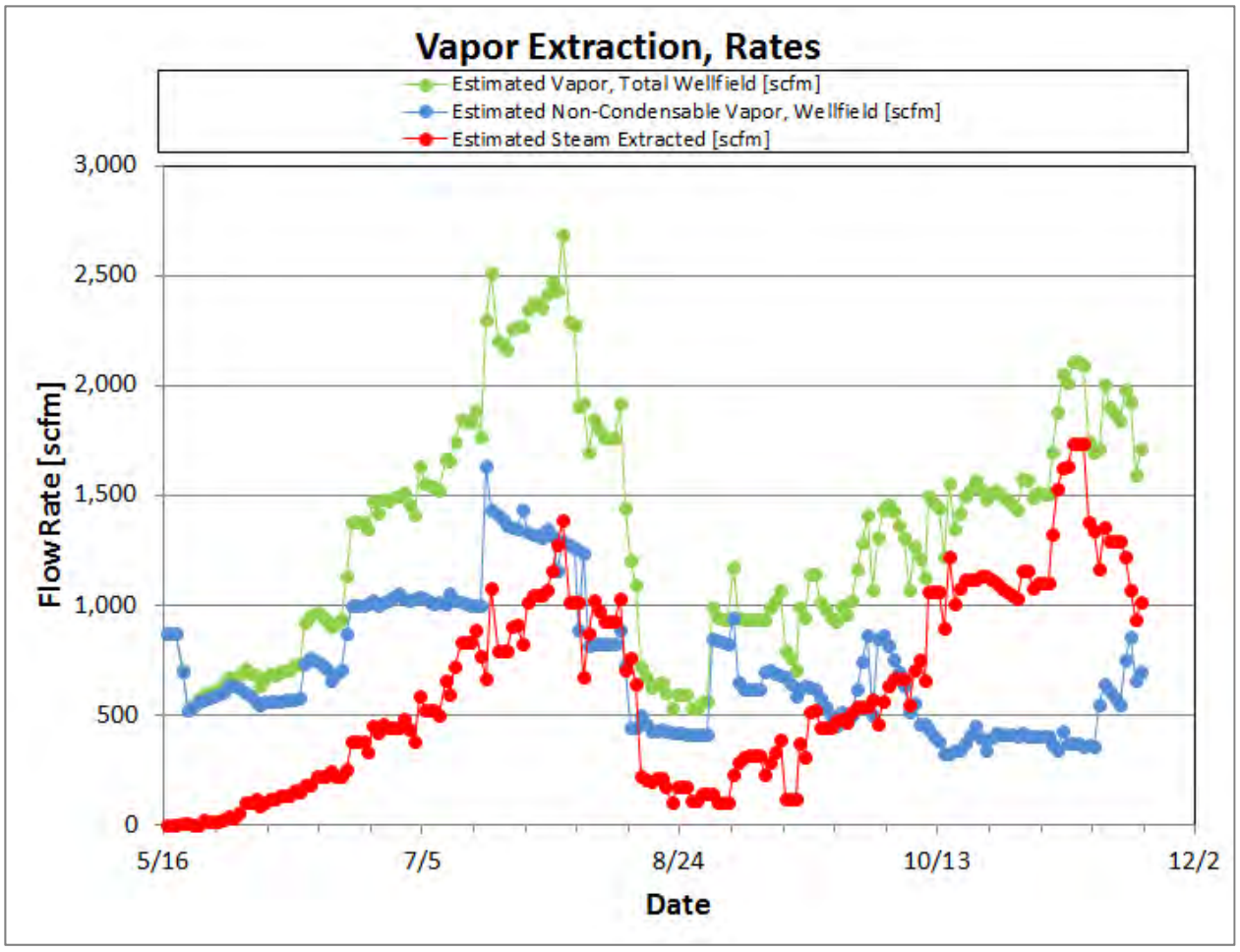


Figure 2. Vapor Extraction Rates

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4 LFLMONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

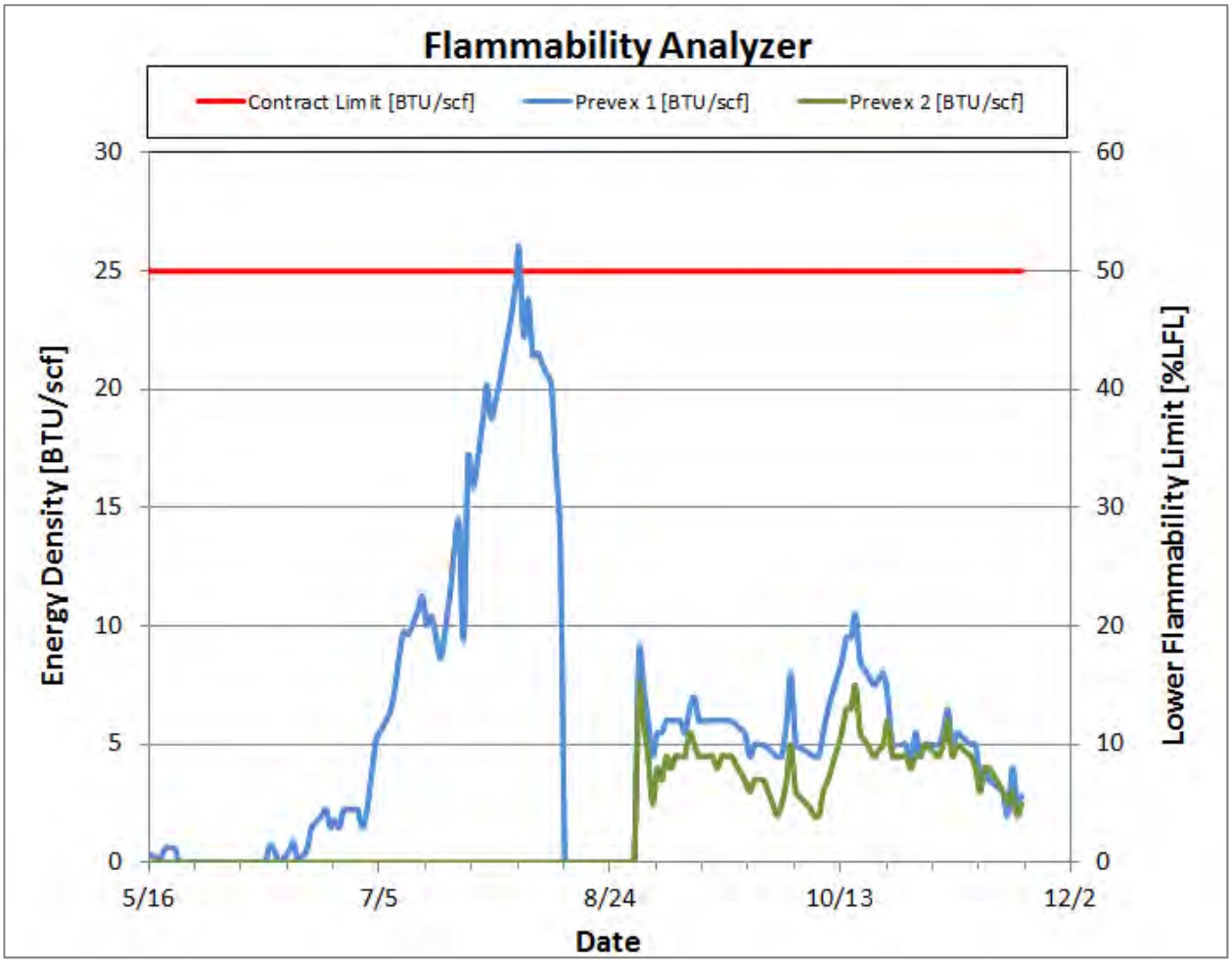


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed to date is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The decrease in mass removed starting on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14, 9/23/14, 9/30/14 , 10/7/14, 10/14/14, 10/21/14, 10/30/14 and 11/4/14.

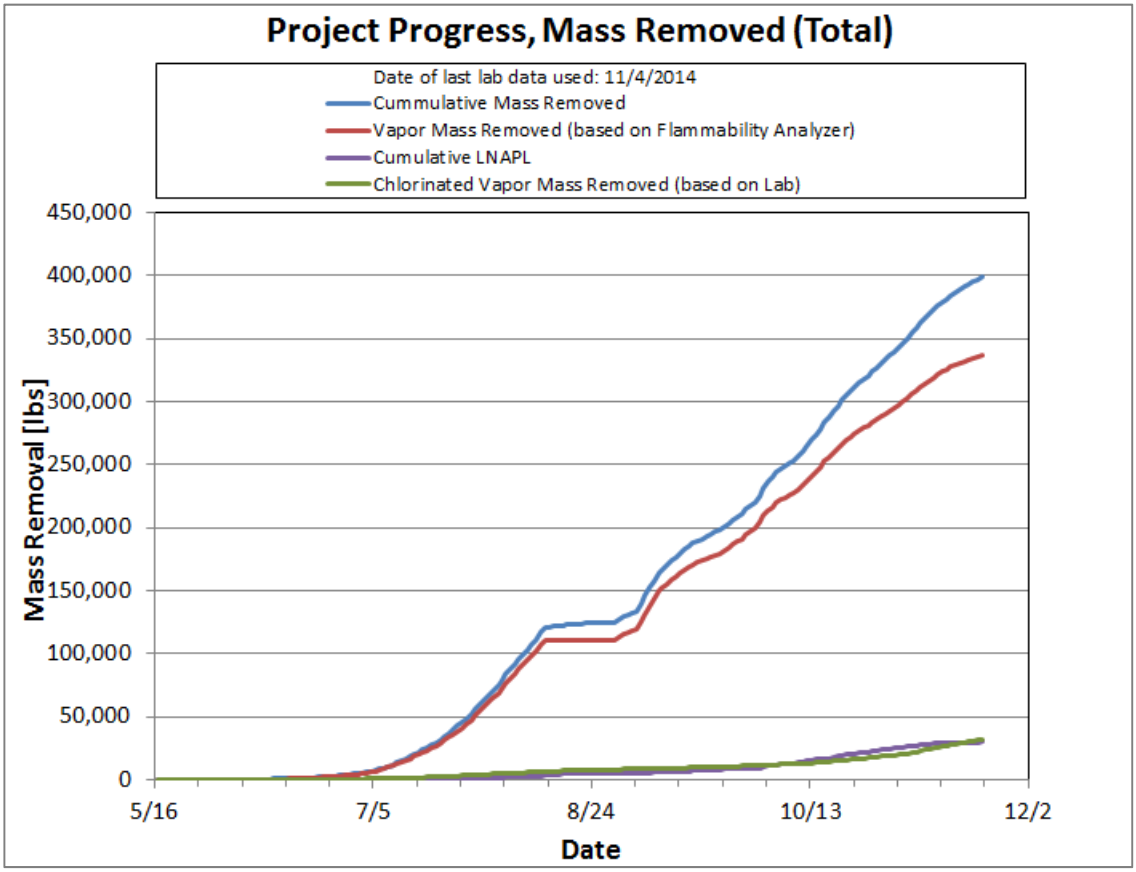


Figure 4a. Project Progress, Mass Removal (Total)

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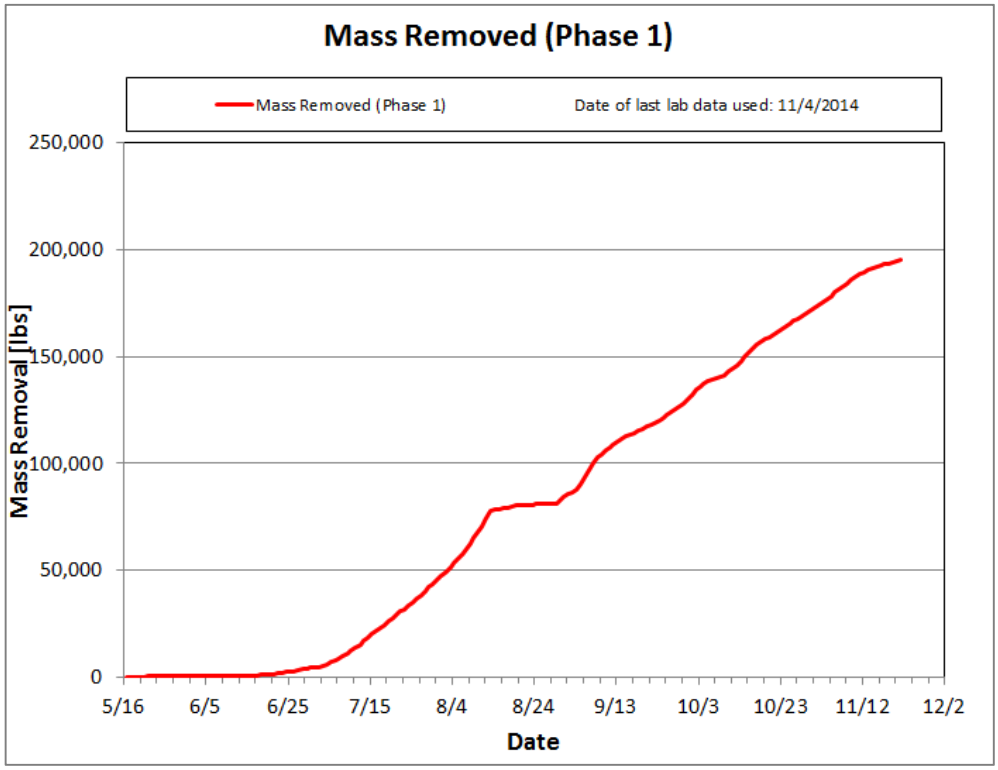


Figure 4b. Project Progress, Mass Removal (Phase 1)

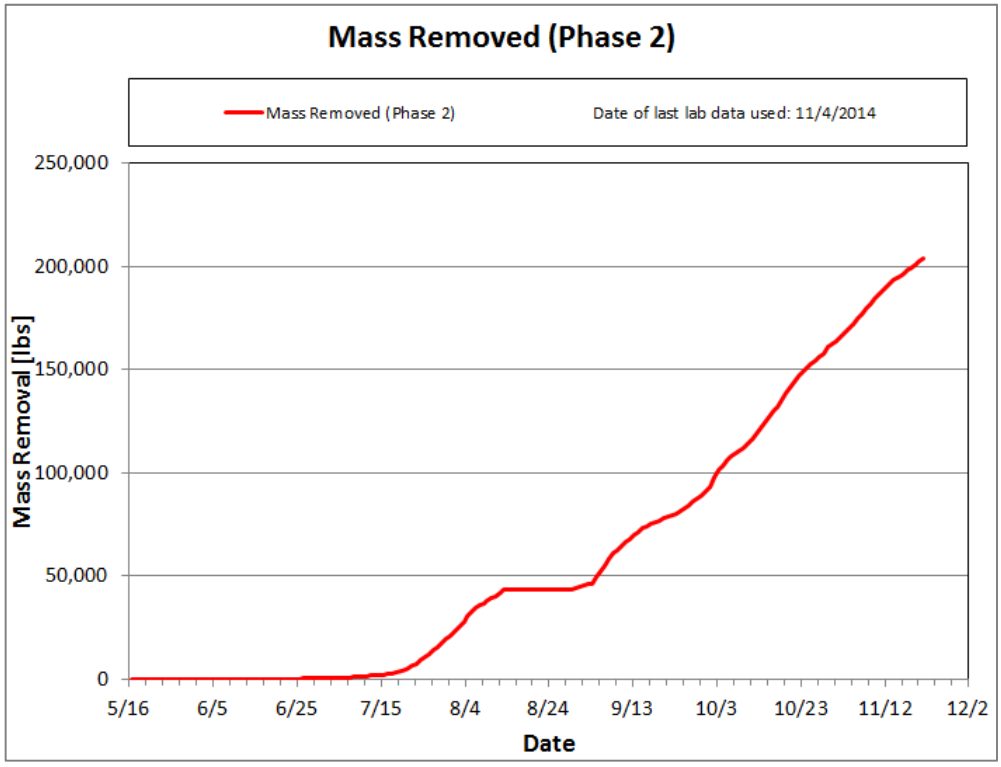


Figure 4c. Project Progress, Mass Removal (Phase 2)

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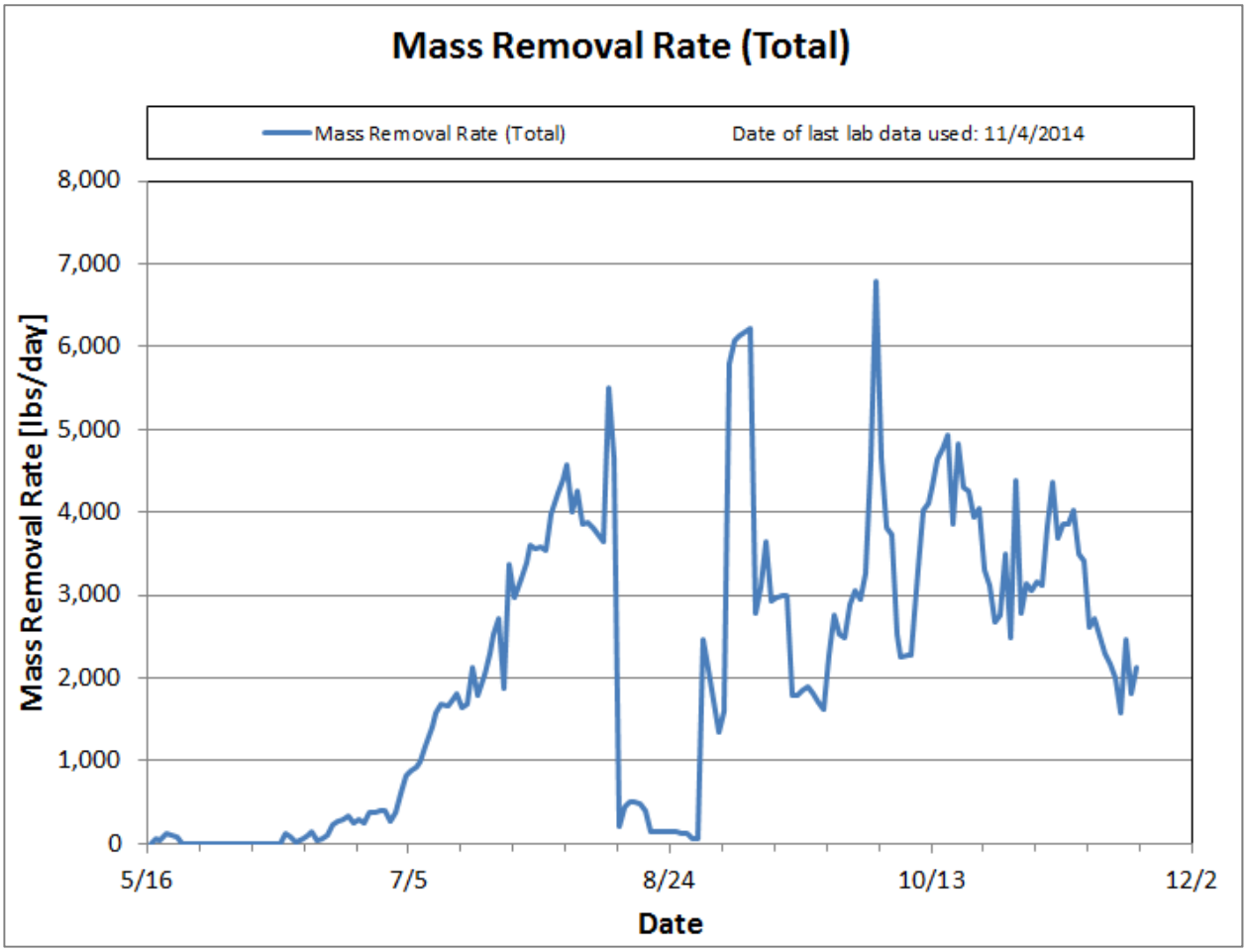


Figure 4d. Mass Removal Rate (Total for Site)

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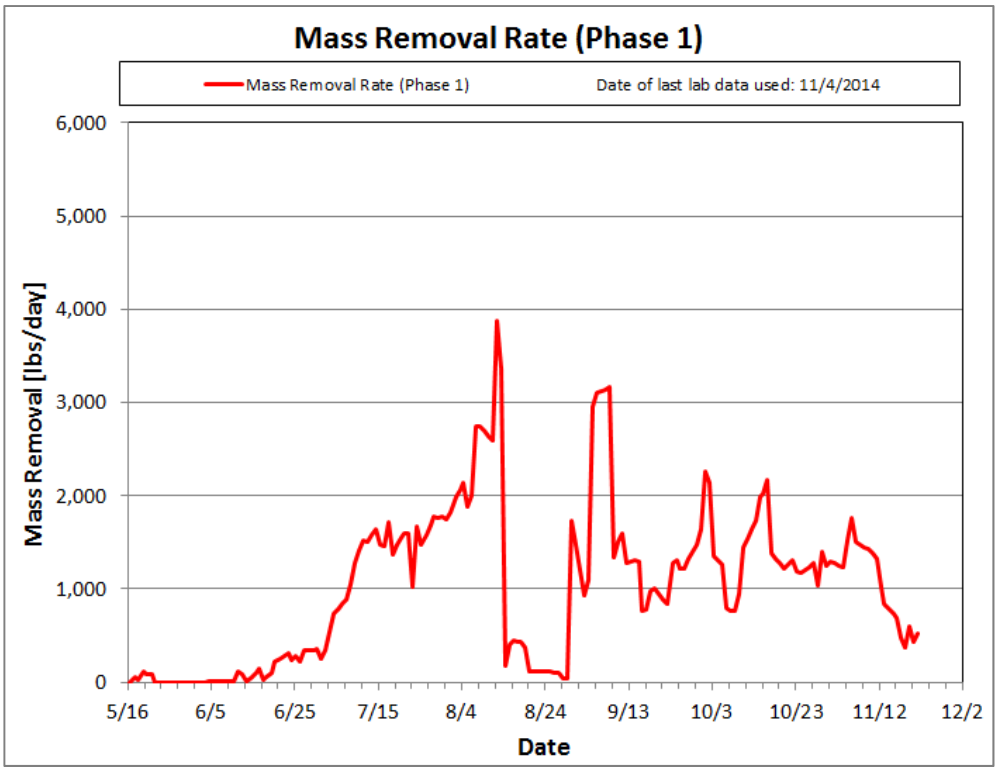


Figure 4e. Mass Removal Rate (Phase 1)

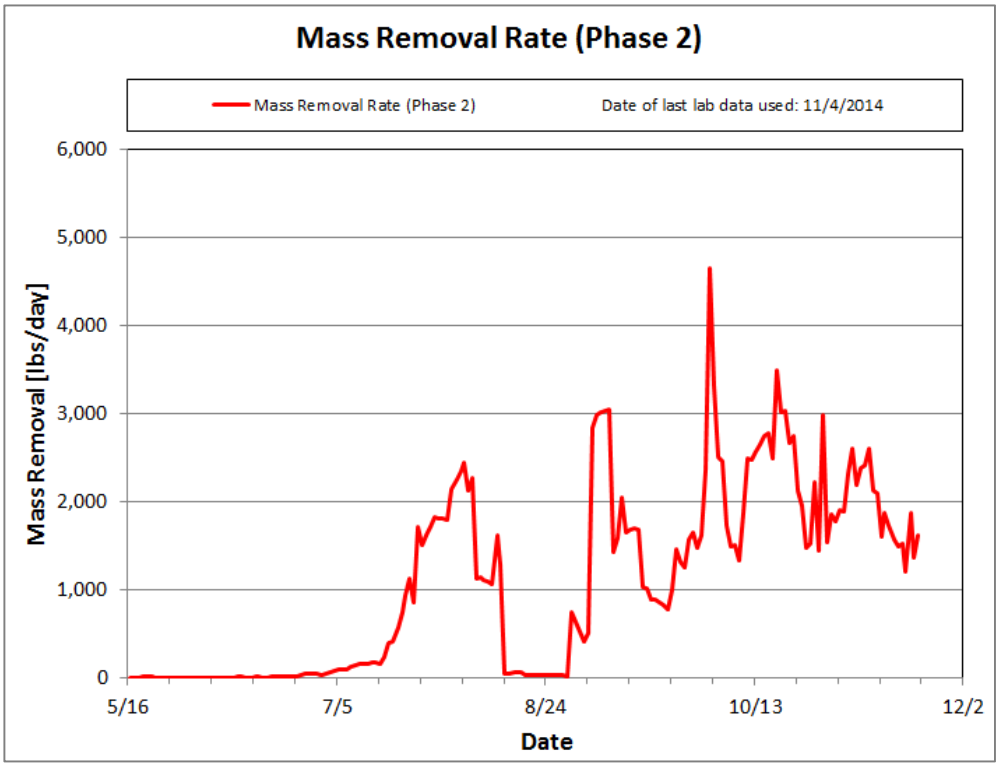


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID and flammability analyzer readings collected at the oxidizer influent over time. It should be noted that PID readings are first collected using an 11.7 eV lamp (determined by site contaminants). If the reading exceeds the limit of the meter (>2000 ppm), the readings are collected using a 10.6 eV lamp. When both meters are used, the maximum value is recorded.

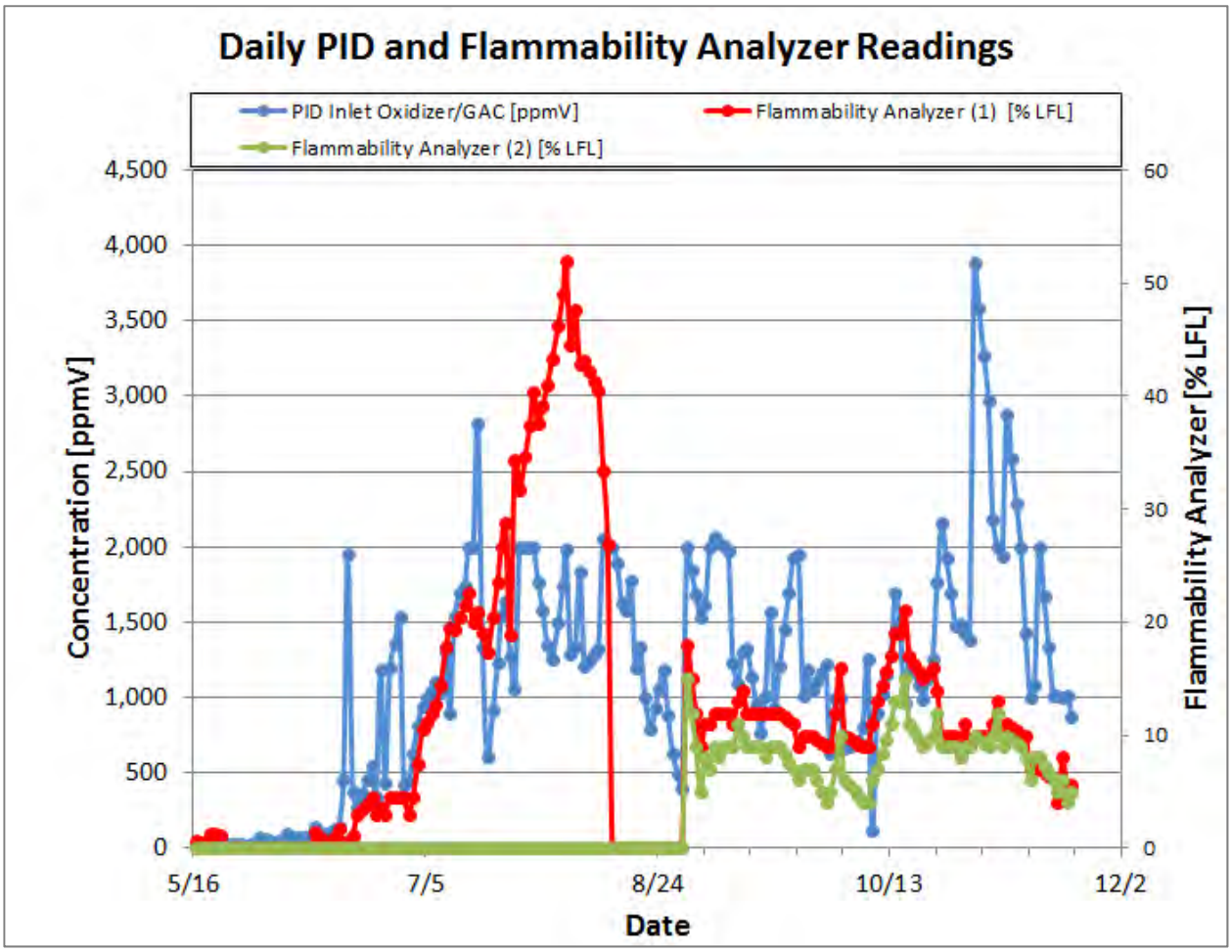


Figure 5. Daily PID and Flammability Analyzer Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13. Decreases in DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-outs.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

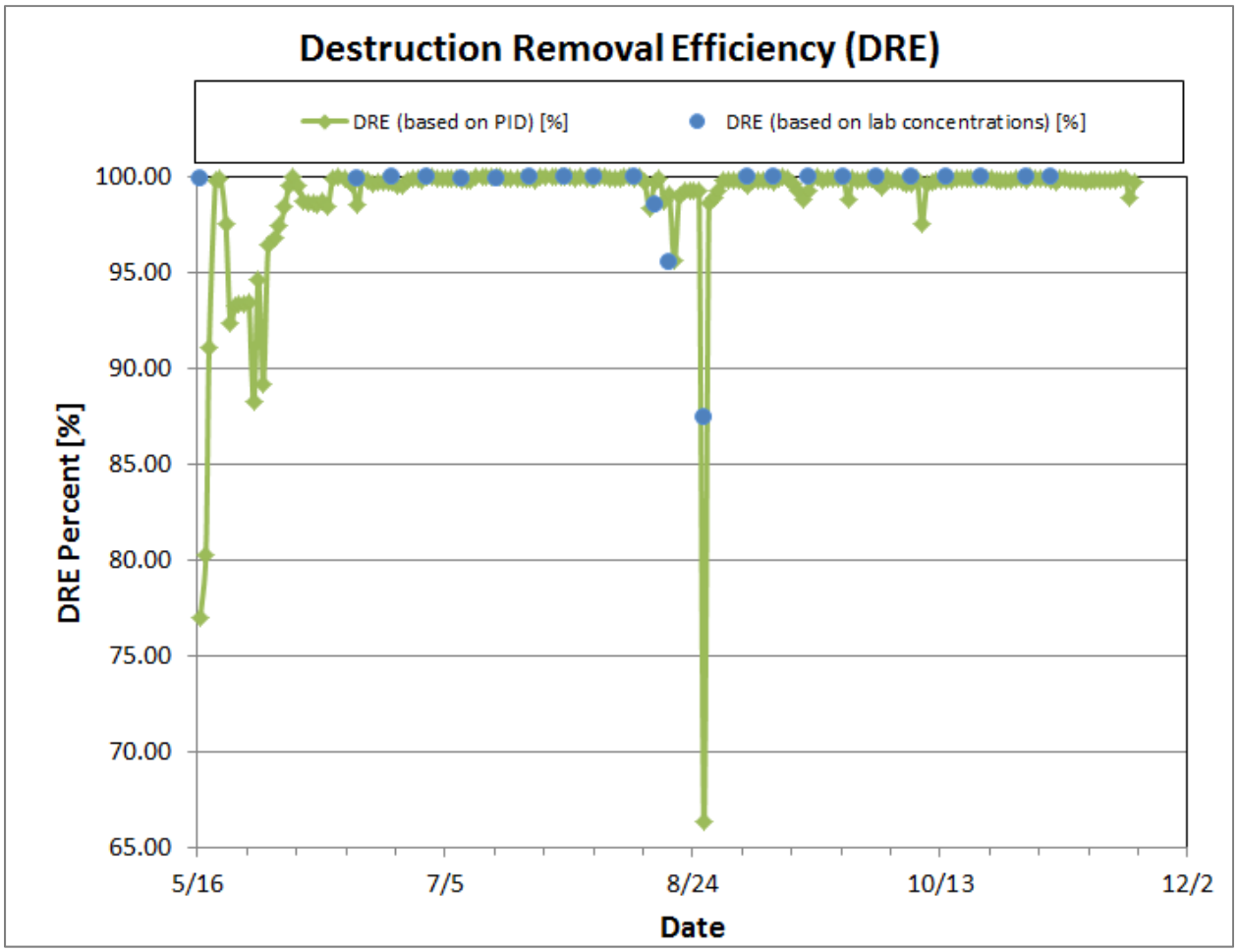


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7.

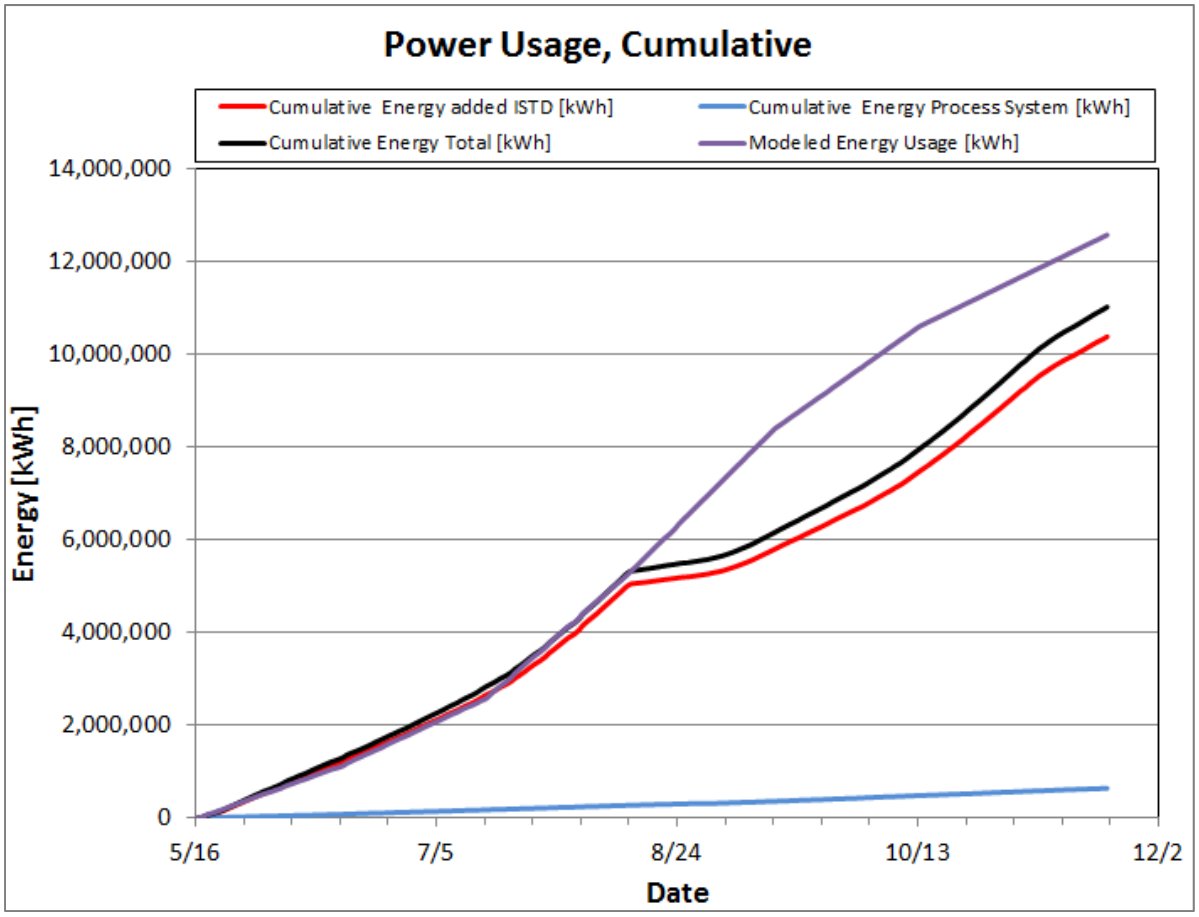


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30/14 and the following days corresponds with ramping of the heaters after placing the oxidizer back online. The decrease observed mid-November is associated with profiling of the heaters in Phase 2 and subsequent adjustments.

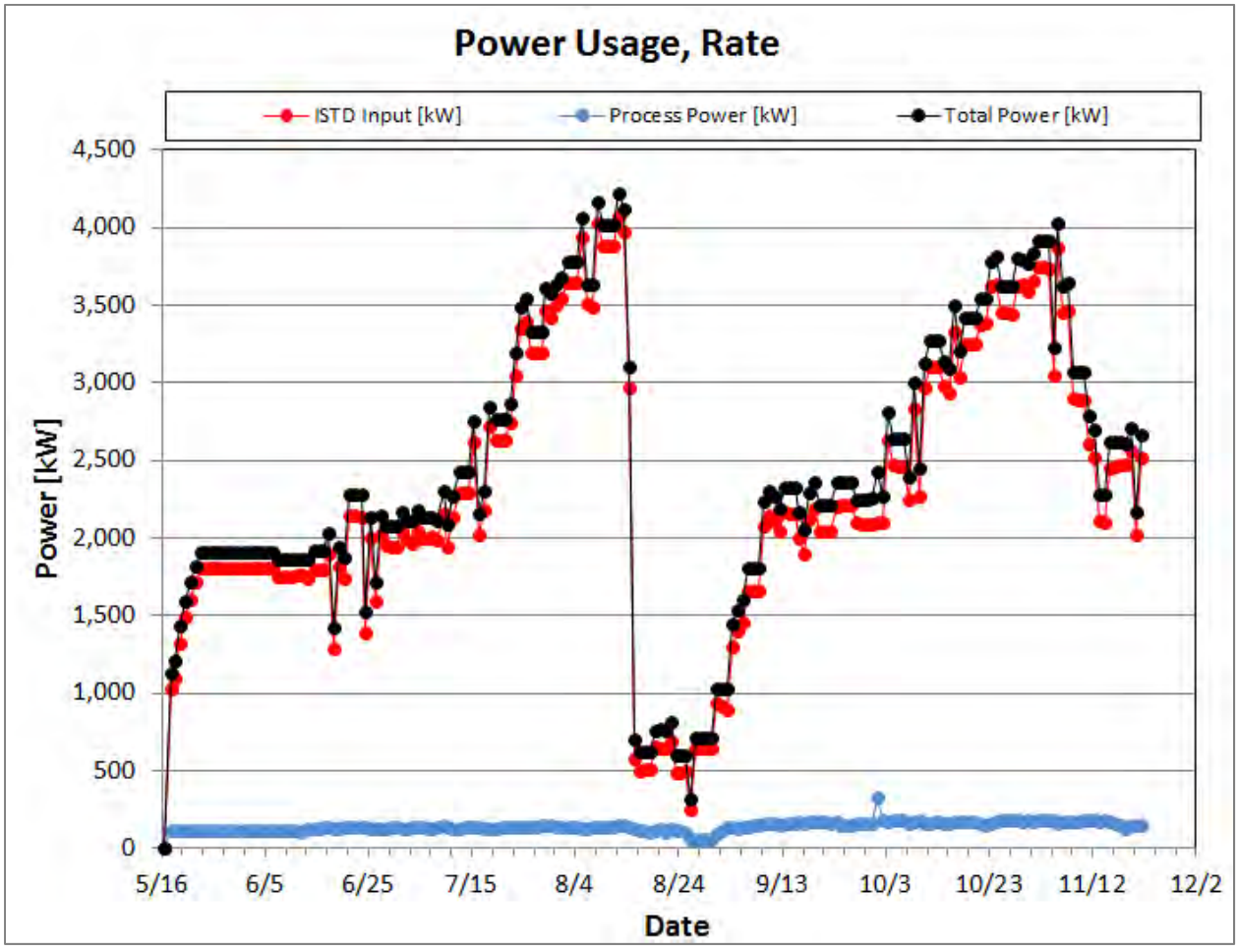


Figure 8. Power Usage, Rate

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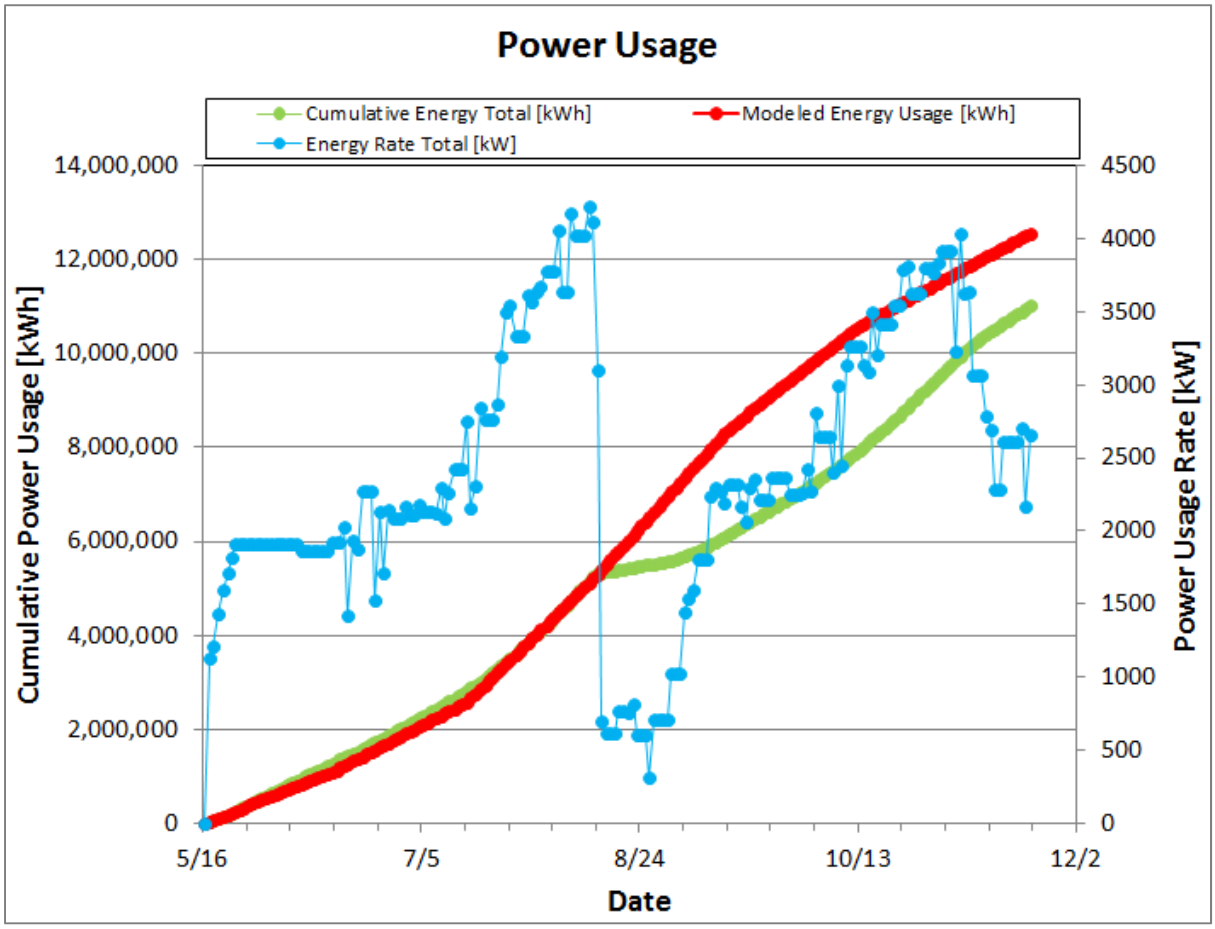


Figure 9. Power Usage

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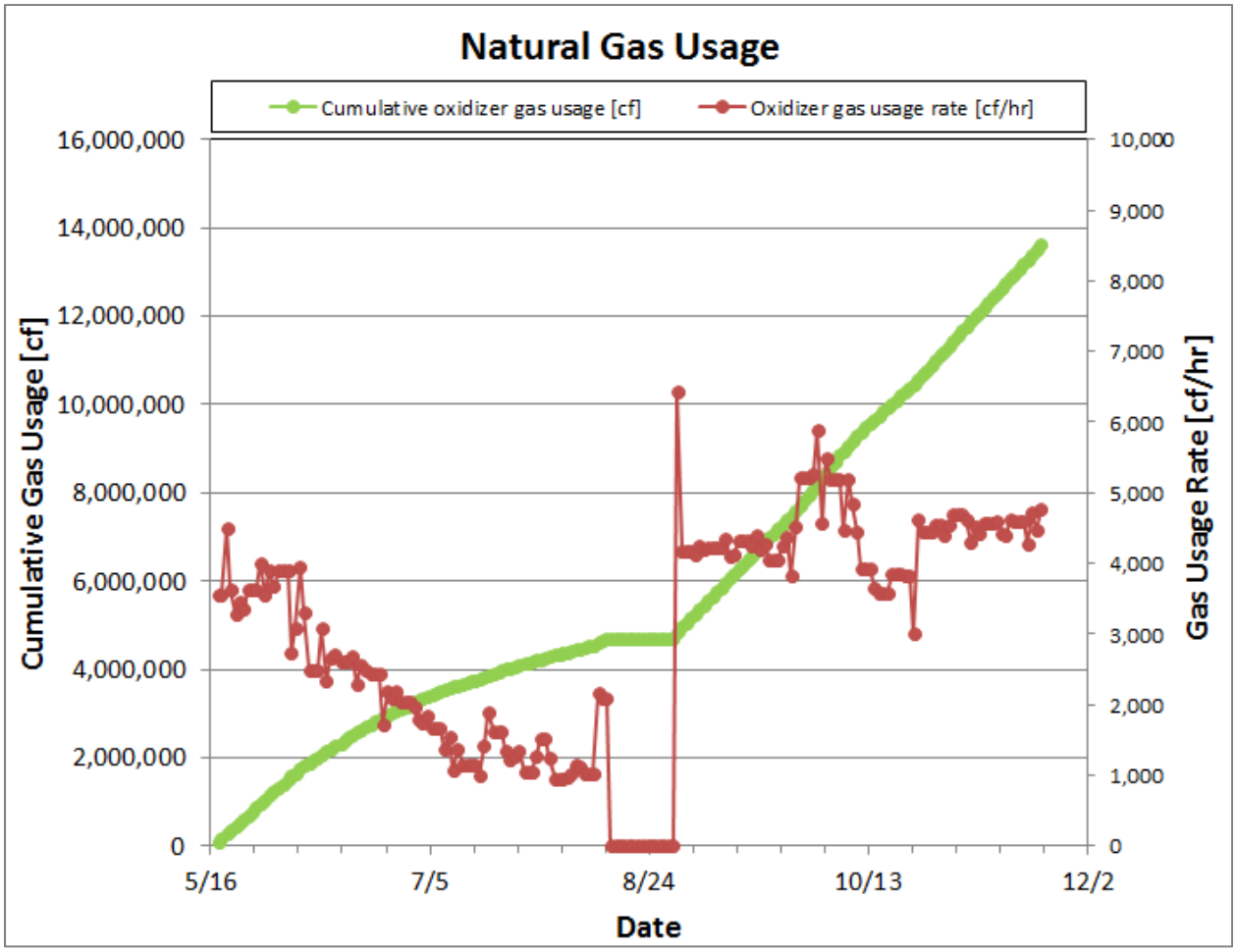


Figure 10. Natural Gas Usage

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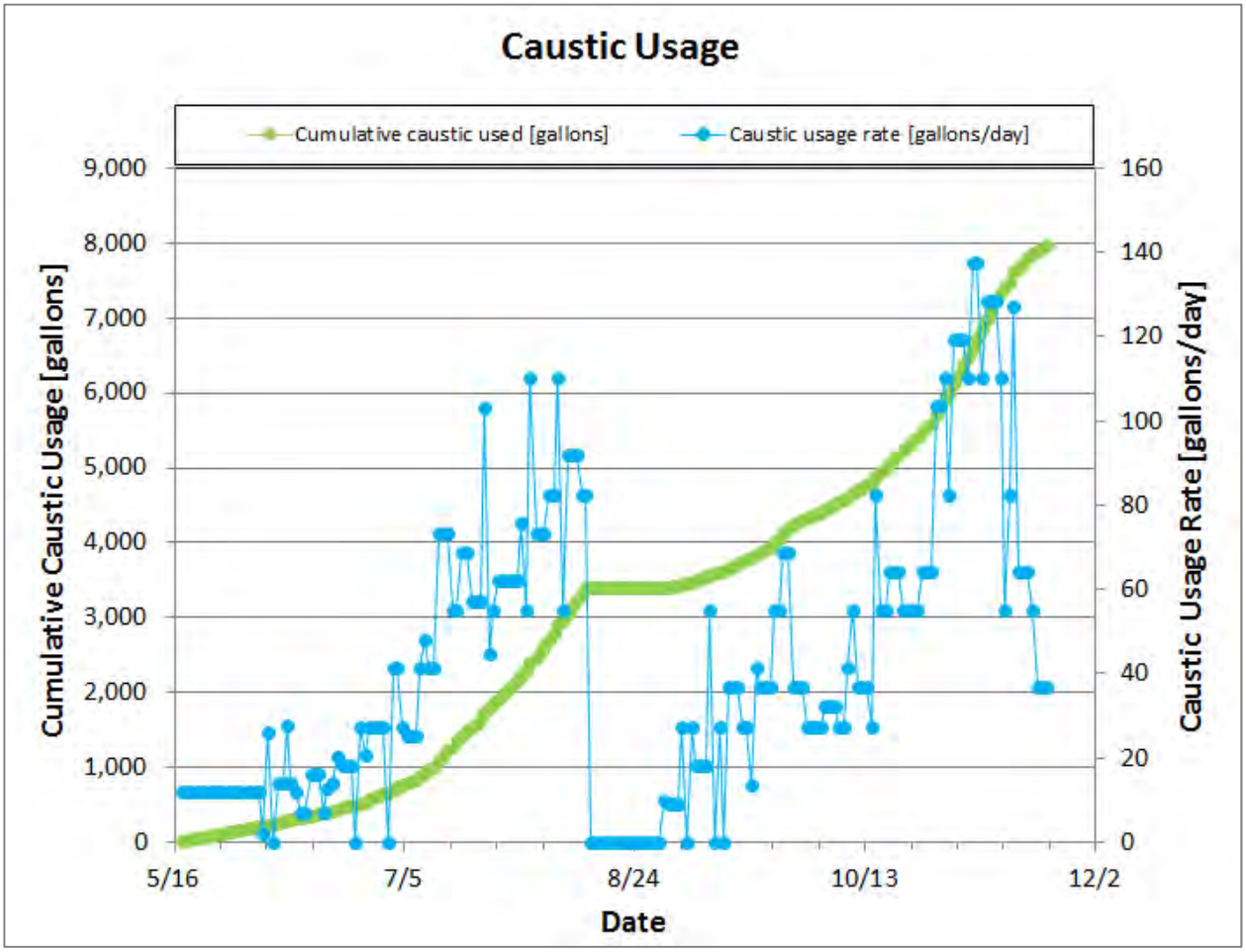


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

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Phase 1 and Phase 2 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12a. As of 9/26/14, we have reached all three temperature milestones for phase 1. Phase 2 centroids are shown in Figure 12b. As of 11/18/14, we have achieved two temperature milestones for Phase 2.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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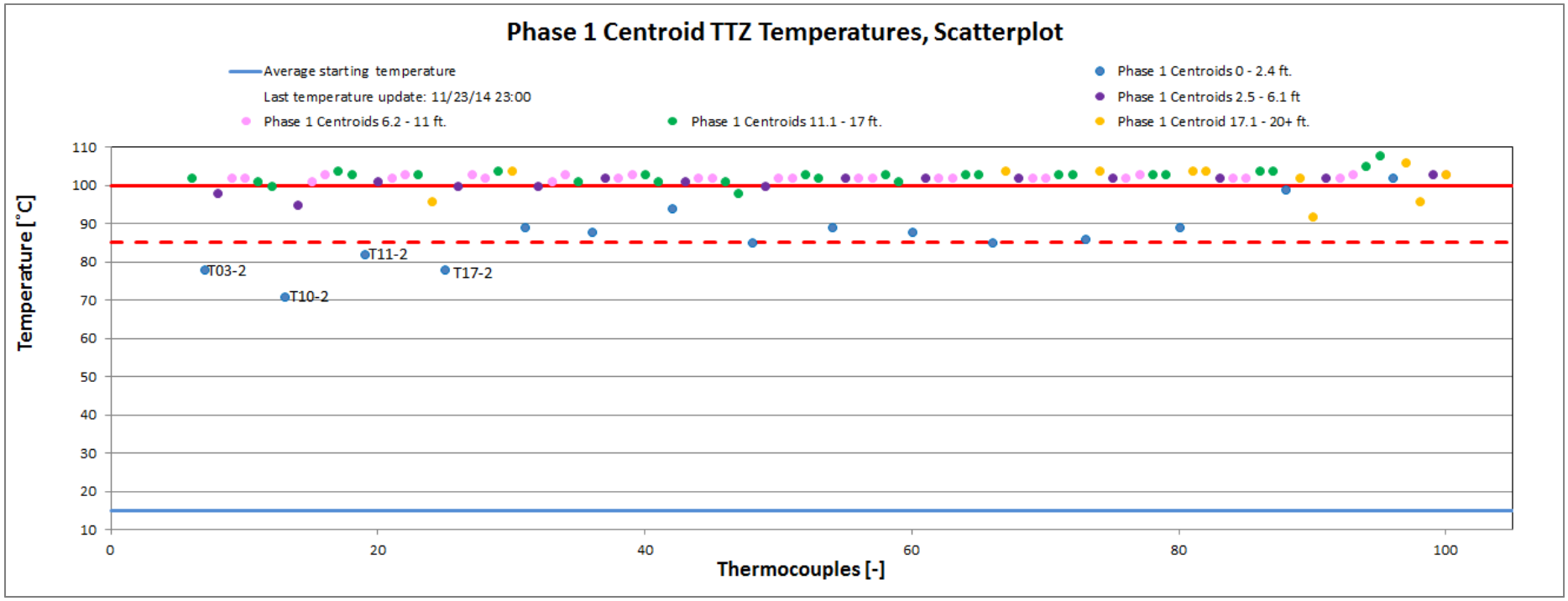


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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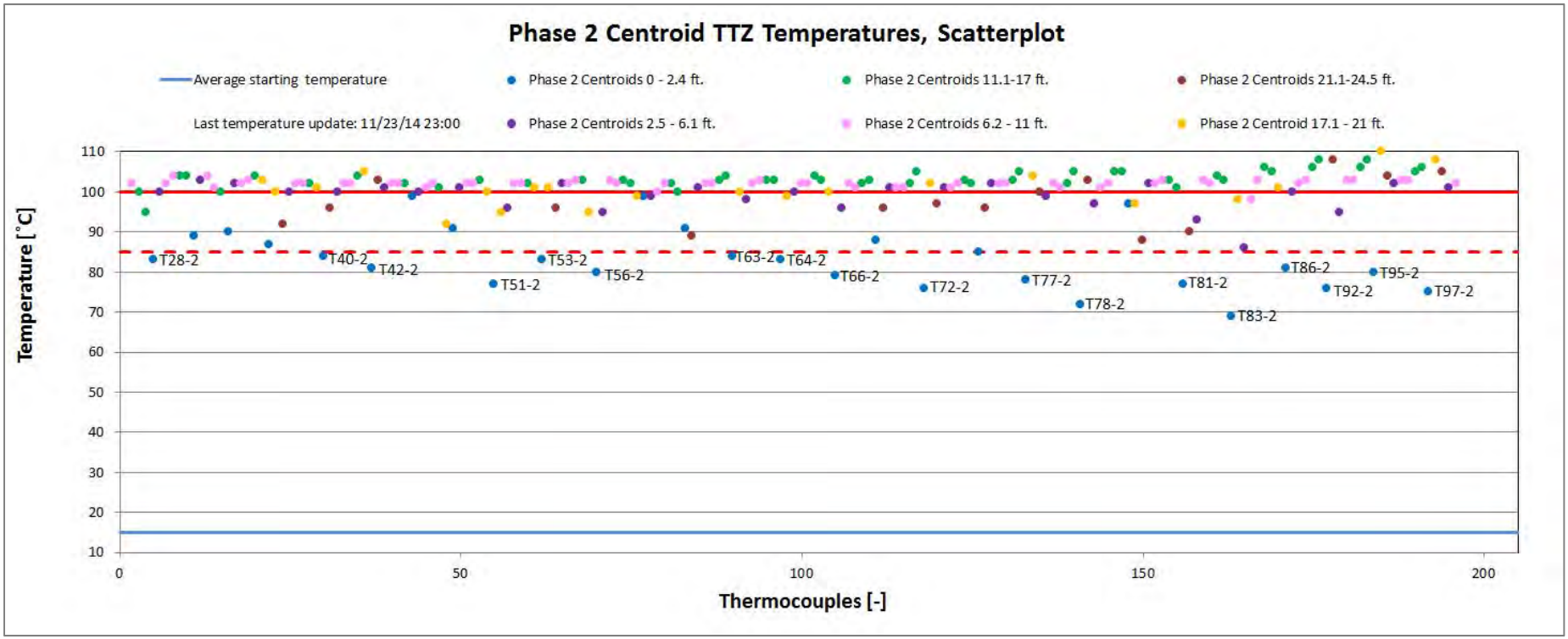


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots		
	Value	**Unit**
Date of Last Update	11/23/14	
Phase 1 Centroid Thermocouples ≥85 °C	100	%
Phase 1 Centroid Thermocouples ≥100 °C	94	%
Phase 2 Centroid Thermocouples ≥85 °C	99	%
Phase 2 Centroid Thermocouples ≥100 °C	85	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday, 21 November 2014 through Friday, 28 November 2014, with temperatures updated through Sunday, 30 November 2014.

Table 1 provides a summary of the project operational status as of Friday, 28 November 2014.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	11/28/14	
Last Temperature Data Update	11/30/14	
Days of Operation (Total)	173	days
Days of Phase 1 Operation	173	days
Days of Phase 2 Operation	64	days
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	11,419,300	kWh
Used Electrical Energy vs. Estimate	72.3	%
Total Mass Removal	408,197	lbs
Average Power Input Last 24 Hours	1,970	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,627	scfm
Average Condensate Production Rate Last 24 Hours	5.8	gpm

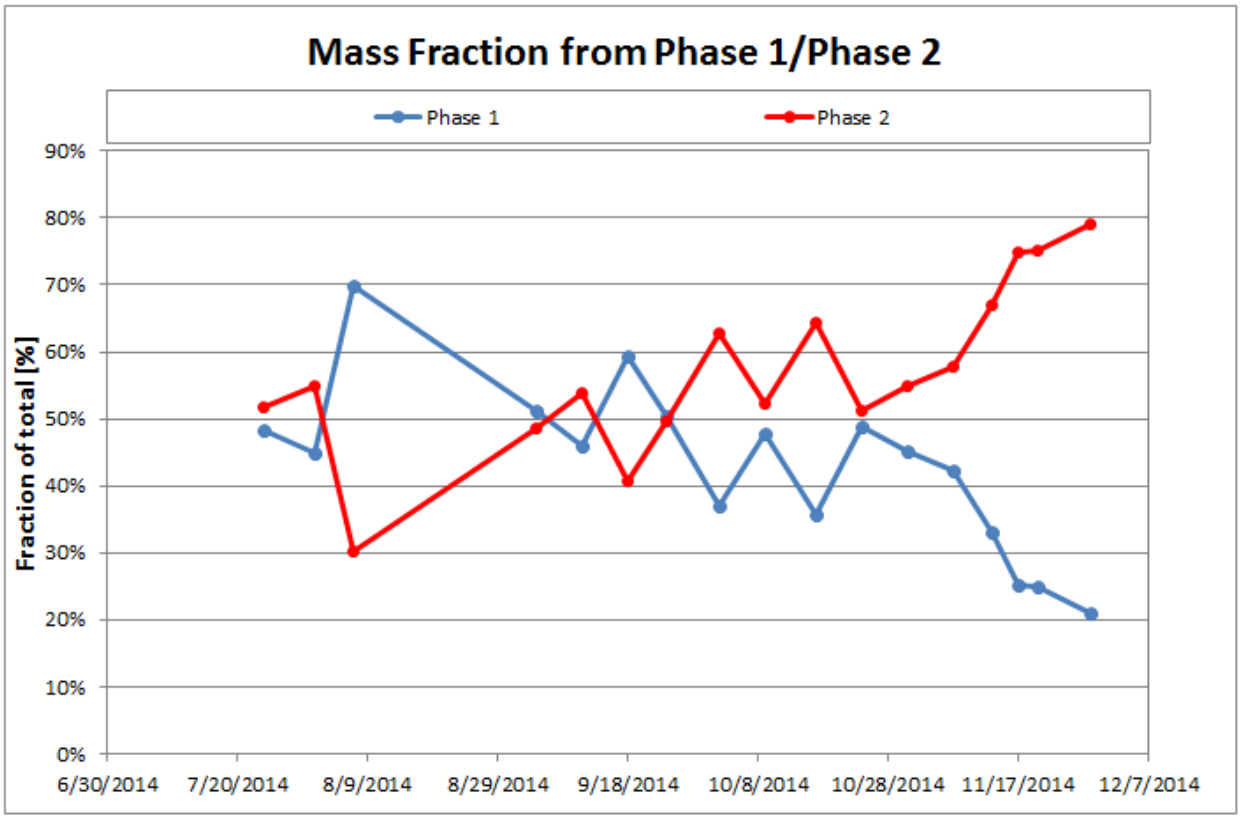
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Heaters in both Phase 1 and Phase 2 remain online and at full power. As of 11/28/14, Phase 1 has operated for 173 days and Phase 2 for 64 days. Please note that this represents days where heaters operated at or above 70% (per contract definition). The current average wellfield temperature for Phase 1 is 100°C and 99°C for Phase 2. All three temperature milestones have been achieved for Phase 1 and temperature milestones 1 and 2 have been achieved for Phase 2.

Shutdown of Phase 1 is pending authorization of EPA. Progress soil sampling in Phase 2 started Monday, 1 December 2014.

Estimated mass removed to date is reported using the flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. These results yield a total mass removal of 408,197 lbs as of 11/28/14. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 11/28/14. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.21:0.79. These ratios were then applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase. Mass fraction data over time is presented below.



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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperatures for both Phase 1 and Phase 2, as well as the average centroid temperatures. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Phase 2 heating began on 7/16/14 but was stopped on 8/14/14, as a result of the oxidizer shutdown, and reenergized on 09/30/14. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	11/30/14	
Phase 1 Entire TTZ Average Temperature	100	°C
Phase 2 Entire TTZ Average Temperature	99	°C
Phase 1 Centroid Average Temperature	99	°C
Phase 2 Centroid Average Temperature	99	°C

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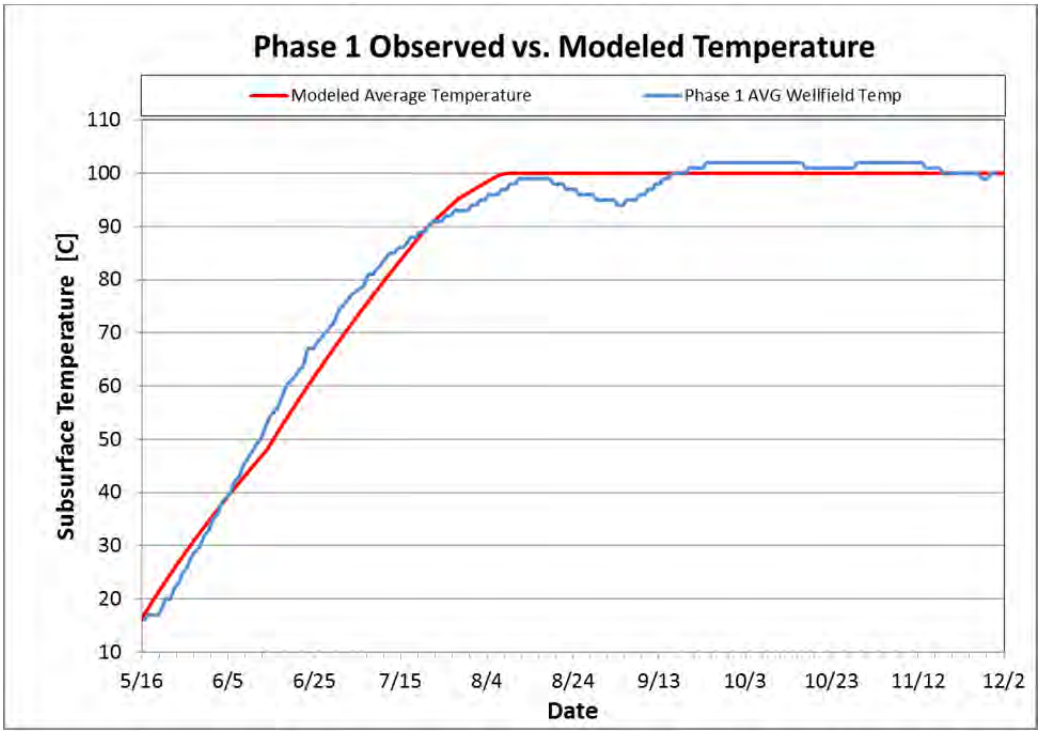


Figure 1a. Phase 1 Observed vs. Modeled Temperature

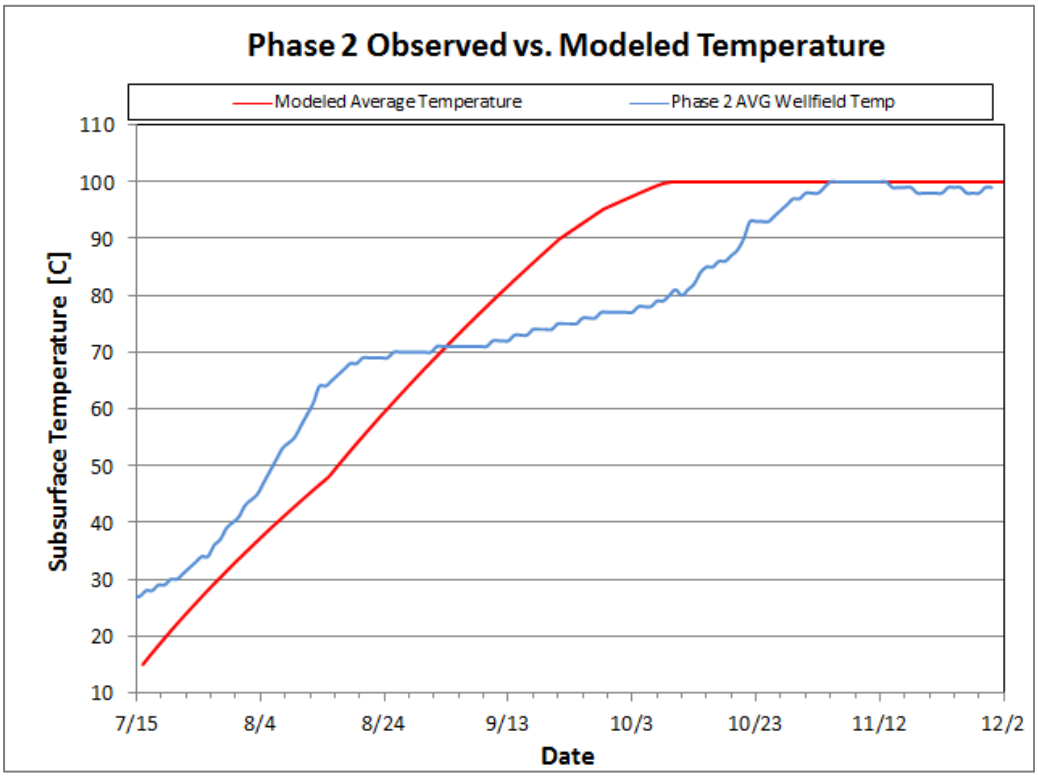


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was increased on 8/30/14.

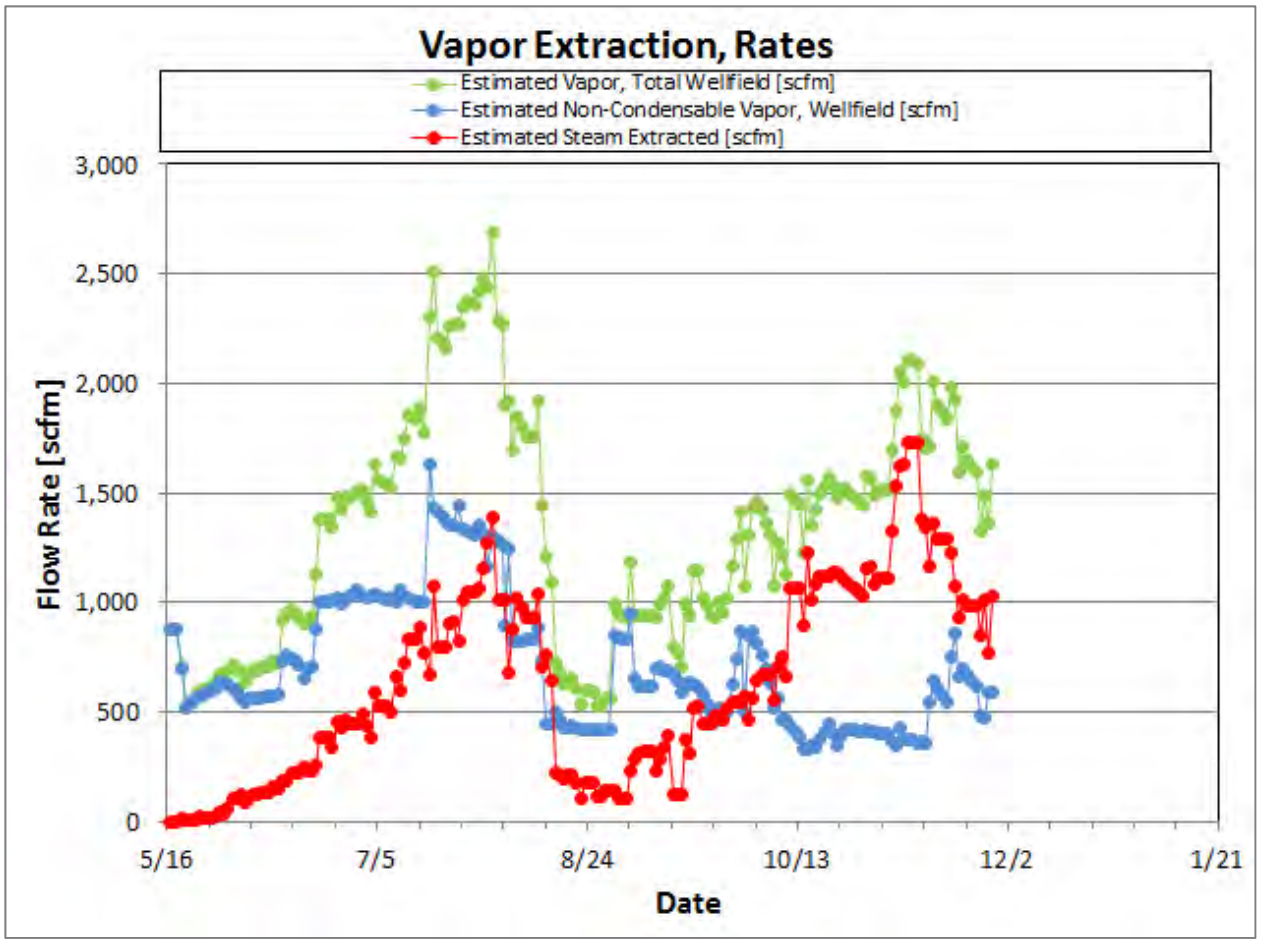


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

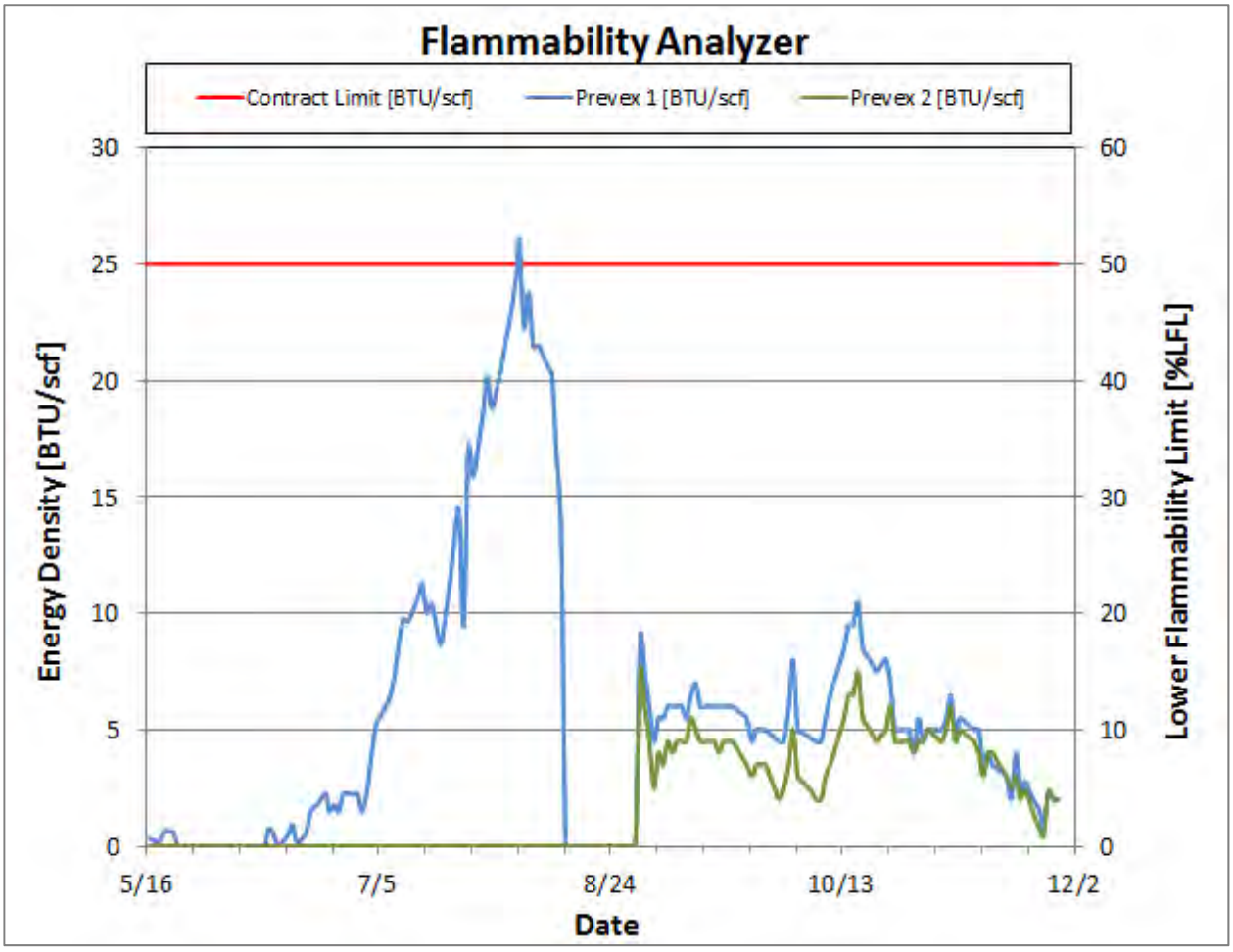


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed to date is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The decrease in mass removed starting on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14, 9/23/14, 9/30/14 , 10/7/14, 10/14/14, 10/21/14, 10/30/14 and 11/4/14.

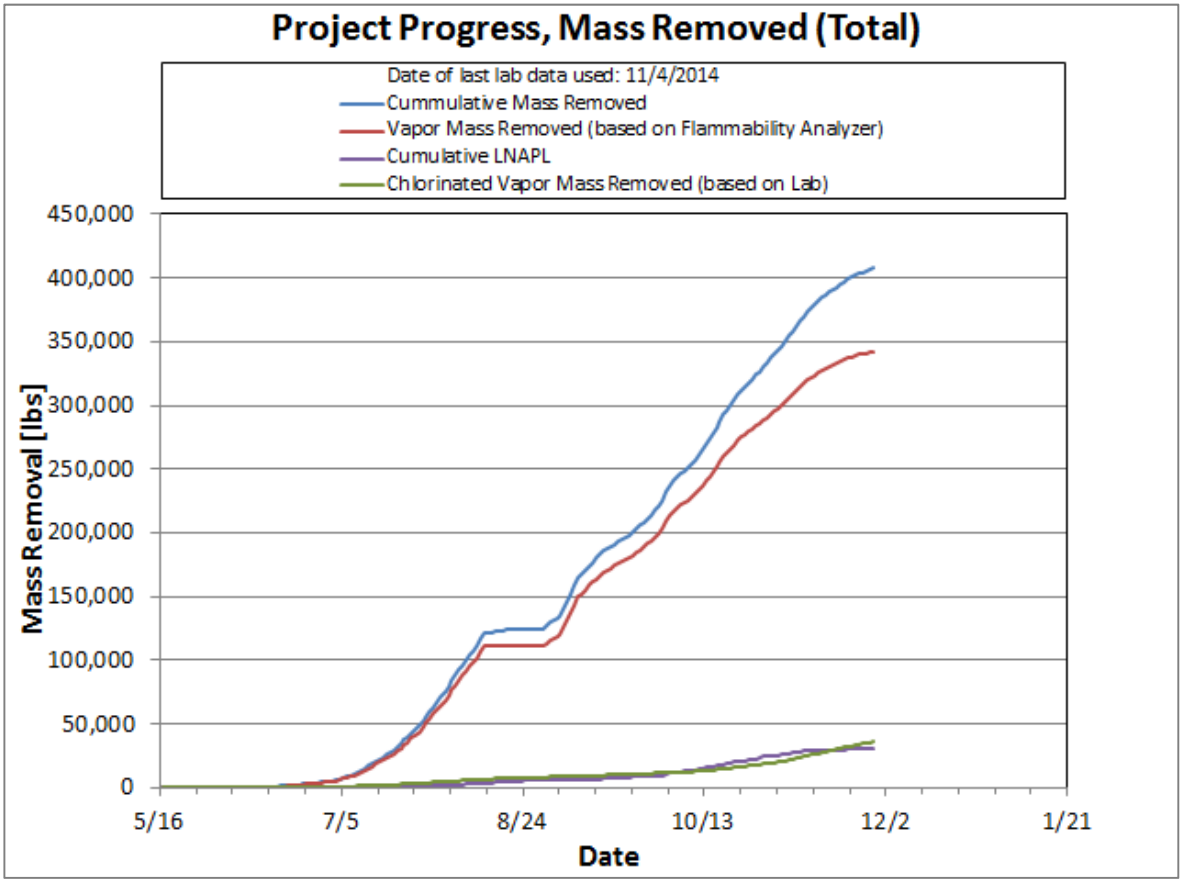


Figure 4a. Project Progress, Mass Removal (Total)

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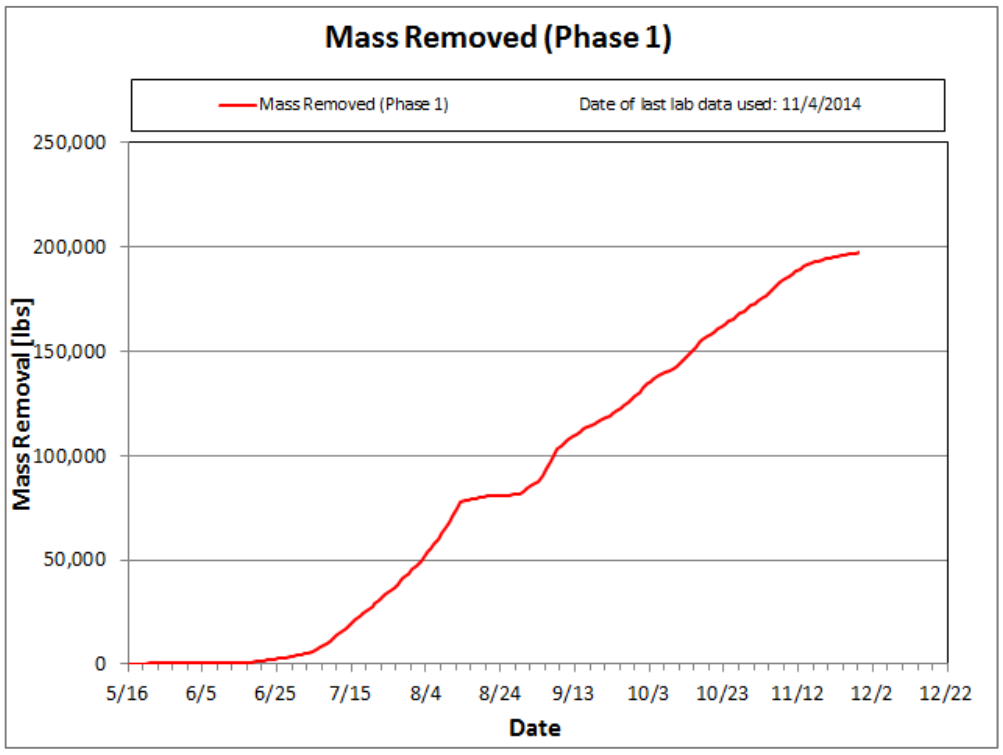


Figure 4b. Project Progress, Mass Removal (Phase 1)

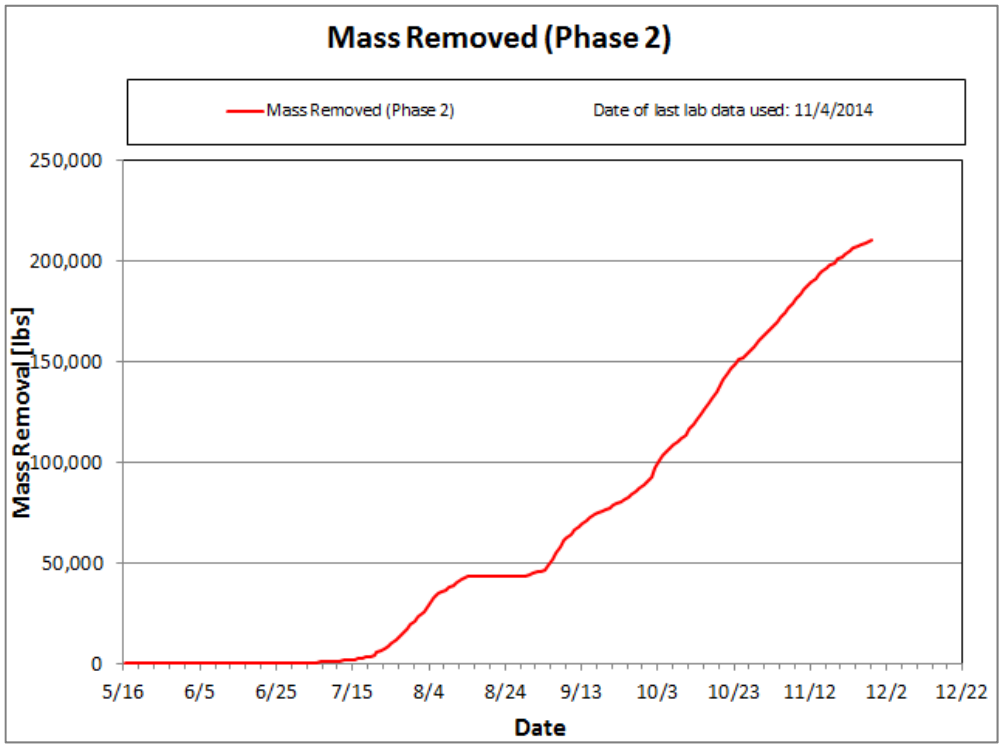


Figure 4c. Project Progress, Mass Removal (Phase 2)

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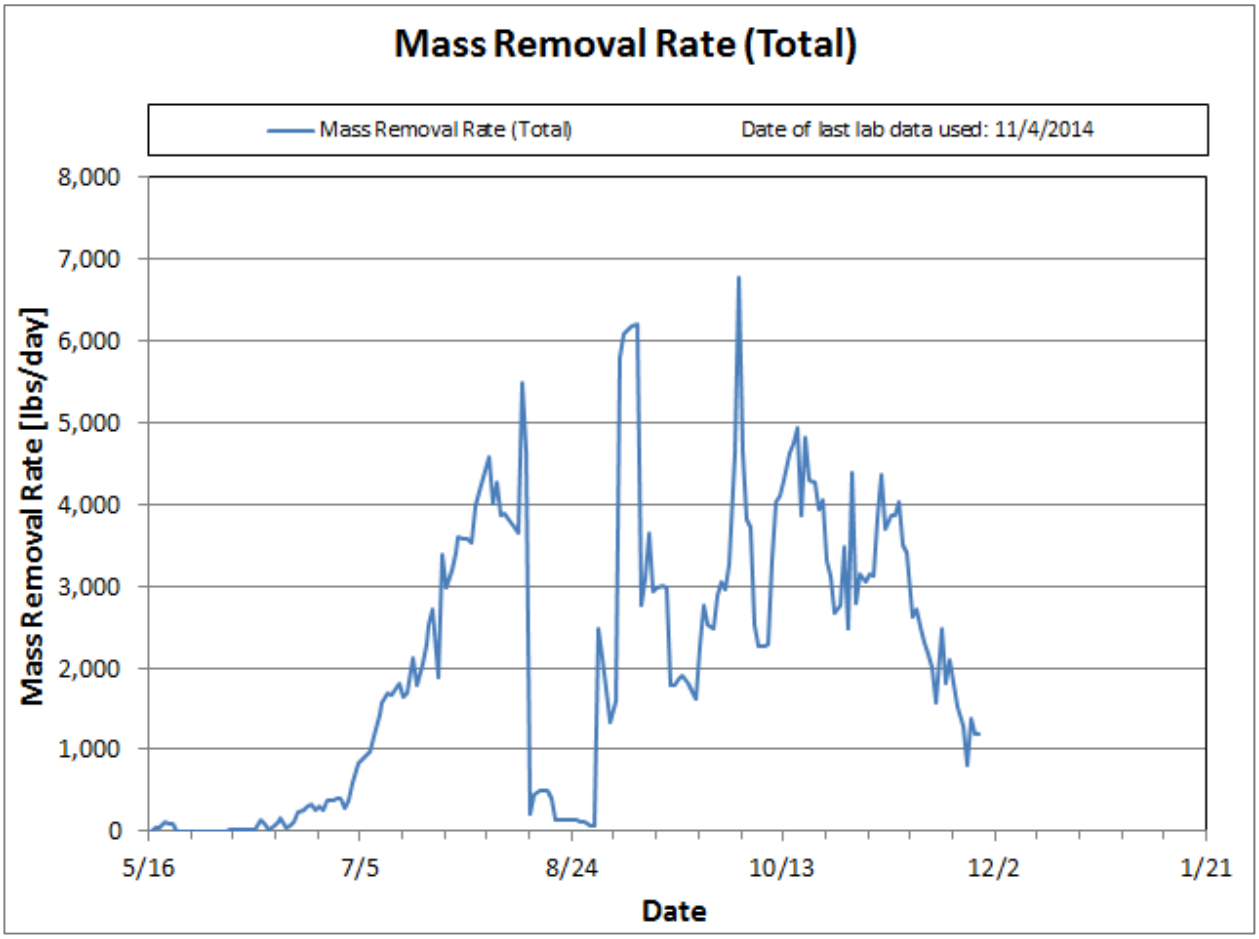


Figure 4d. Mass Removal Rate (Total for Site)

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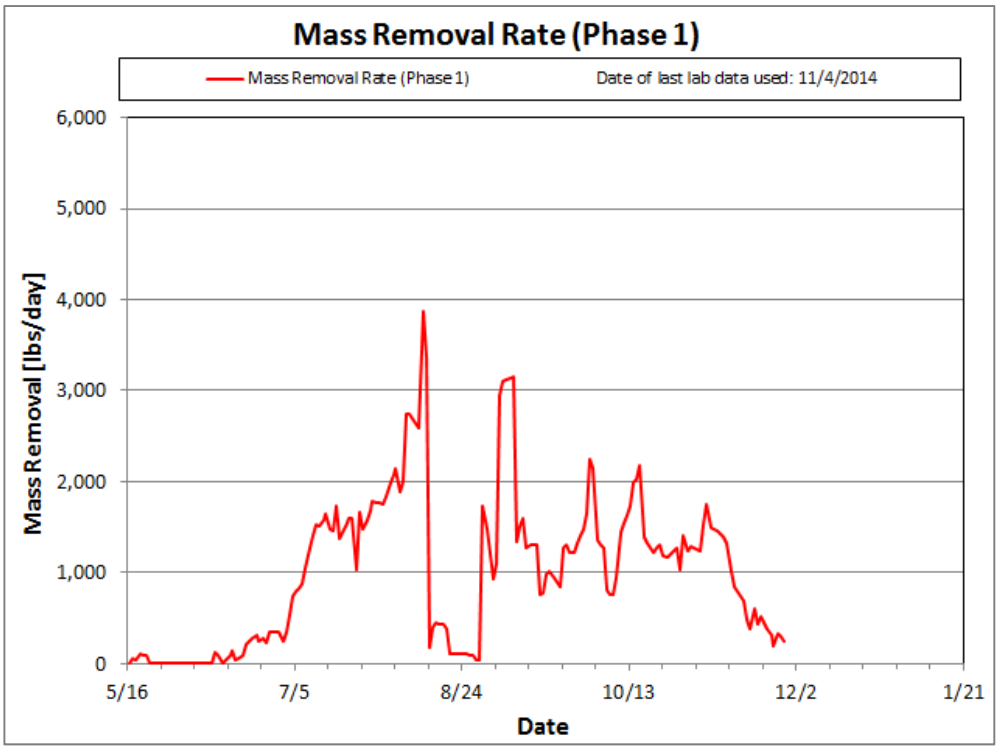


Figure 4e. Mass Removal Rate (Phase 1)

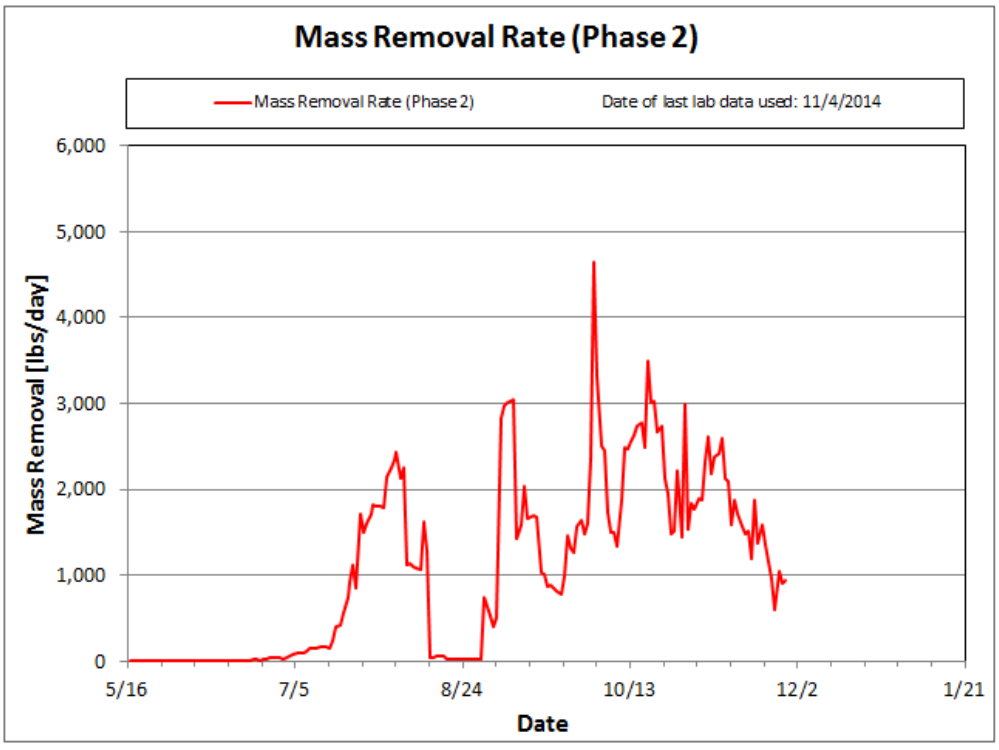


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID and flammability analyzer readings collected at the oxidizer influent over time. It should be noted that PID readings are first collected using an 11.7 eV lamp (determined by site contaminants). If the reading exceeds the limit of the meter (>2000 ppm), the readings are collected using a 10.6 eV lamp. When both meters are used, the maximum value is recorded.

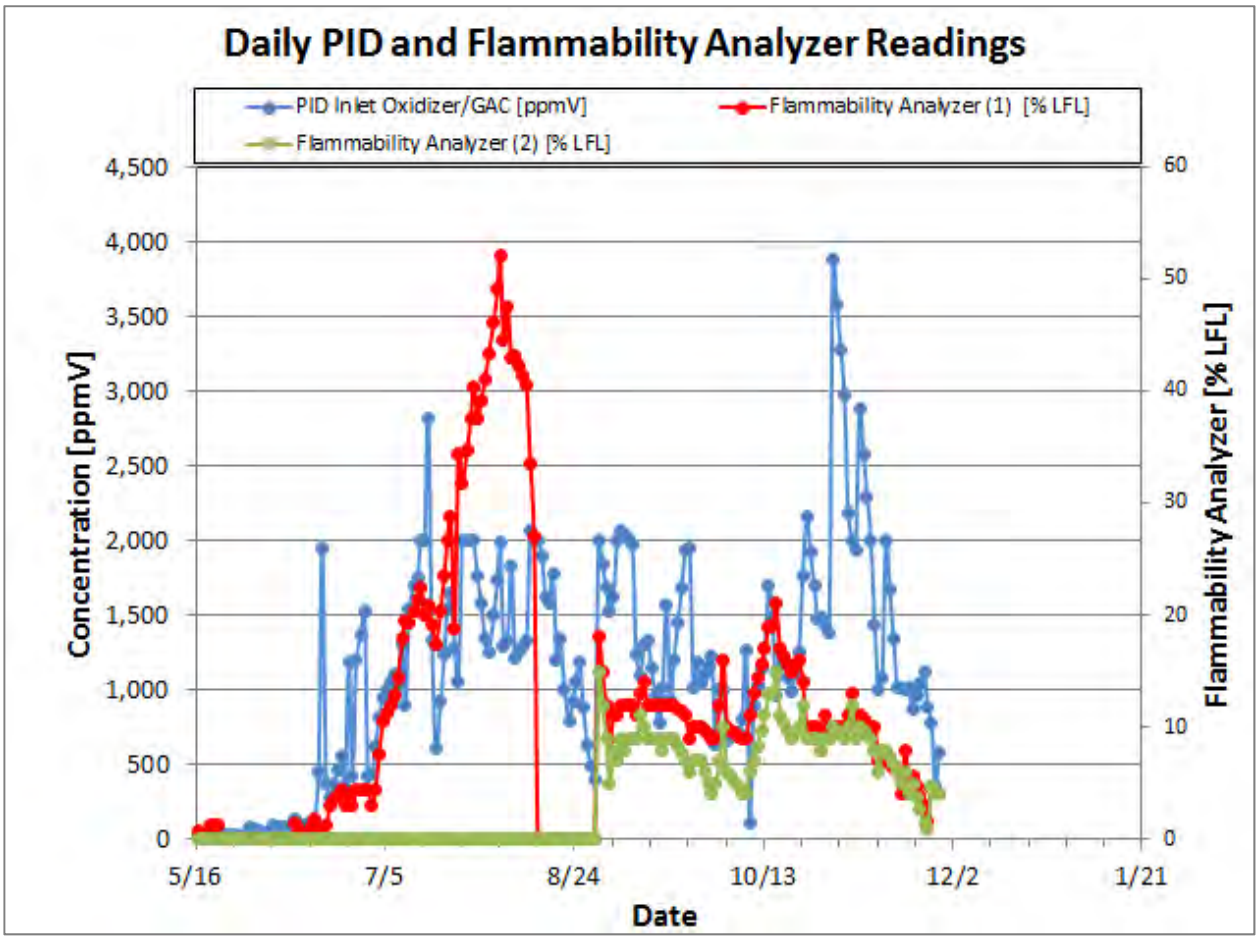


Figure 5. Daily PID and Flammability Analyzer Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13. Decreases in DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-outs.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

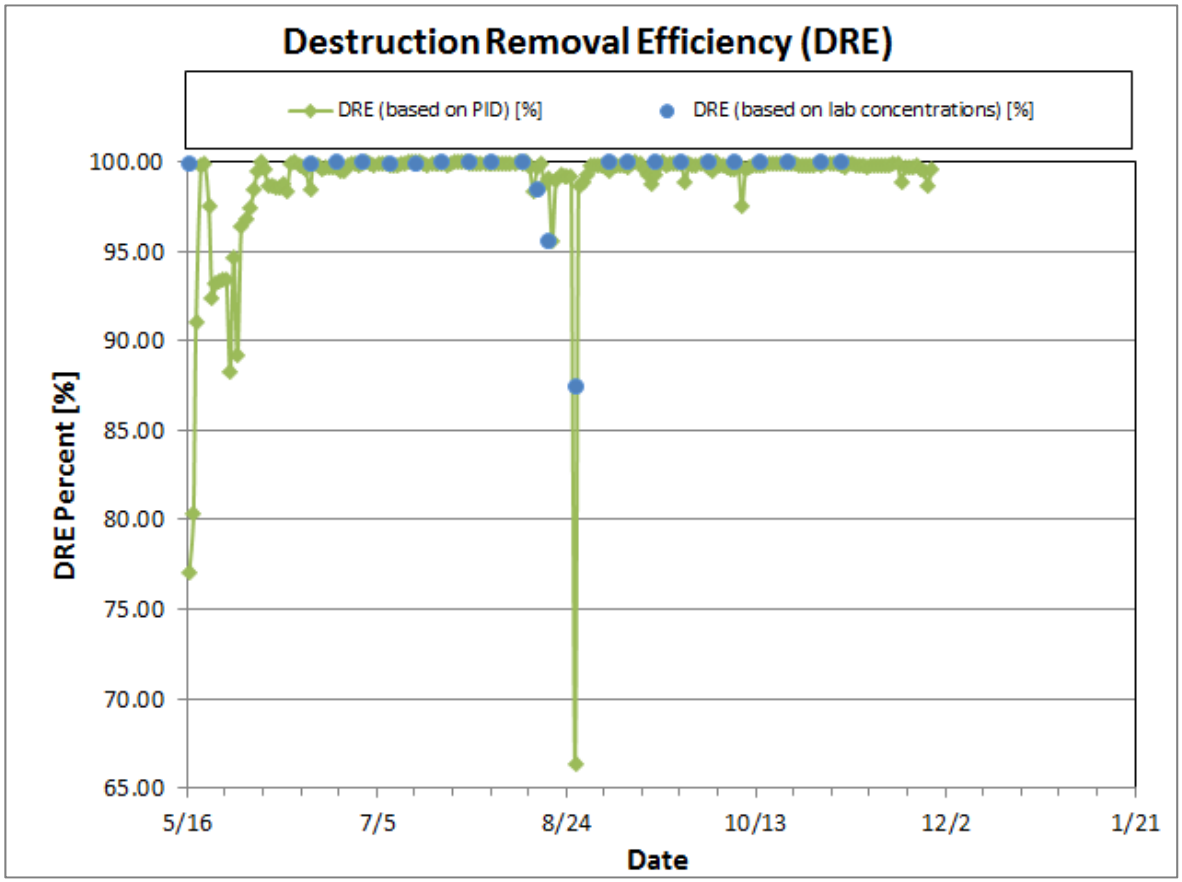


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7.

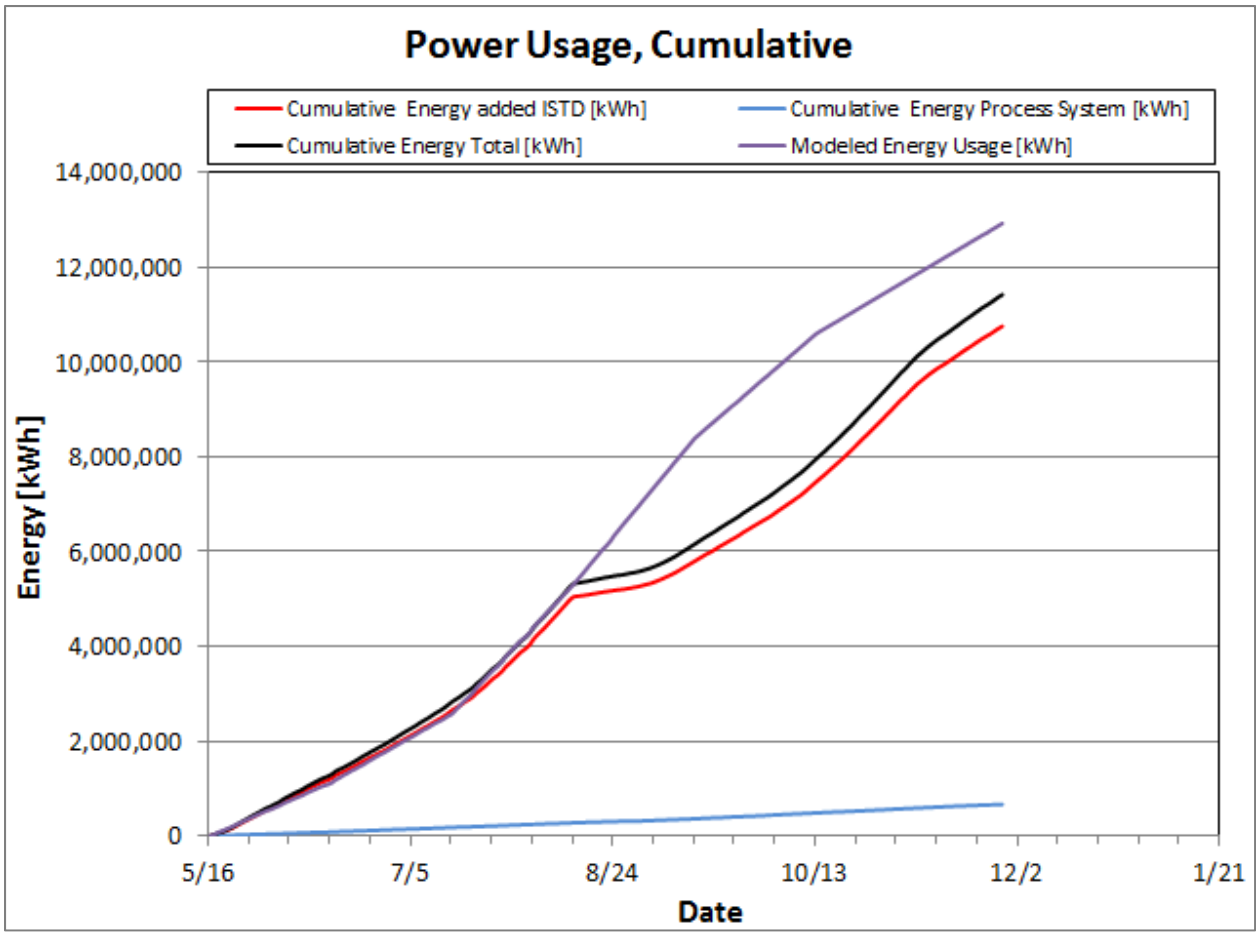


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30/14 and the following days corresponds with ramping of the heaters after placing the oxidizer back online. The decrease observed mid-November is associated with profiling of the heaters in Phase 2 and subsequent adjustments.

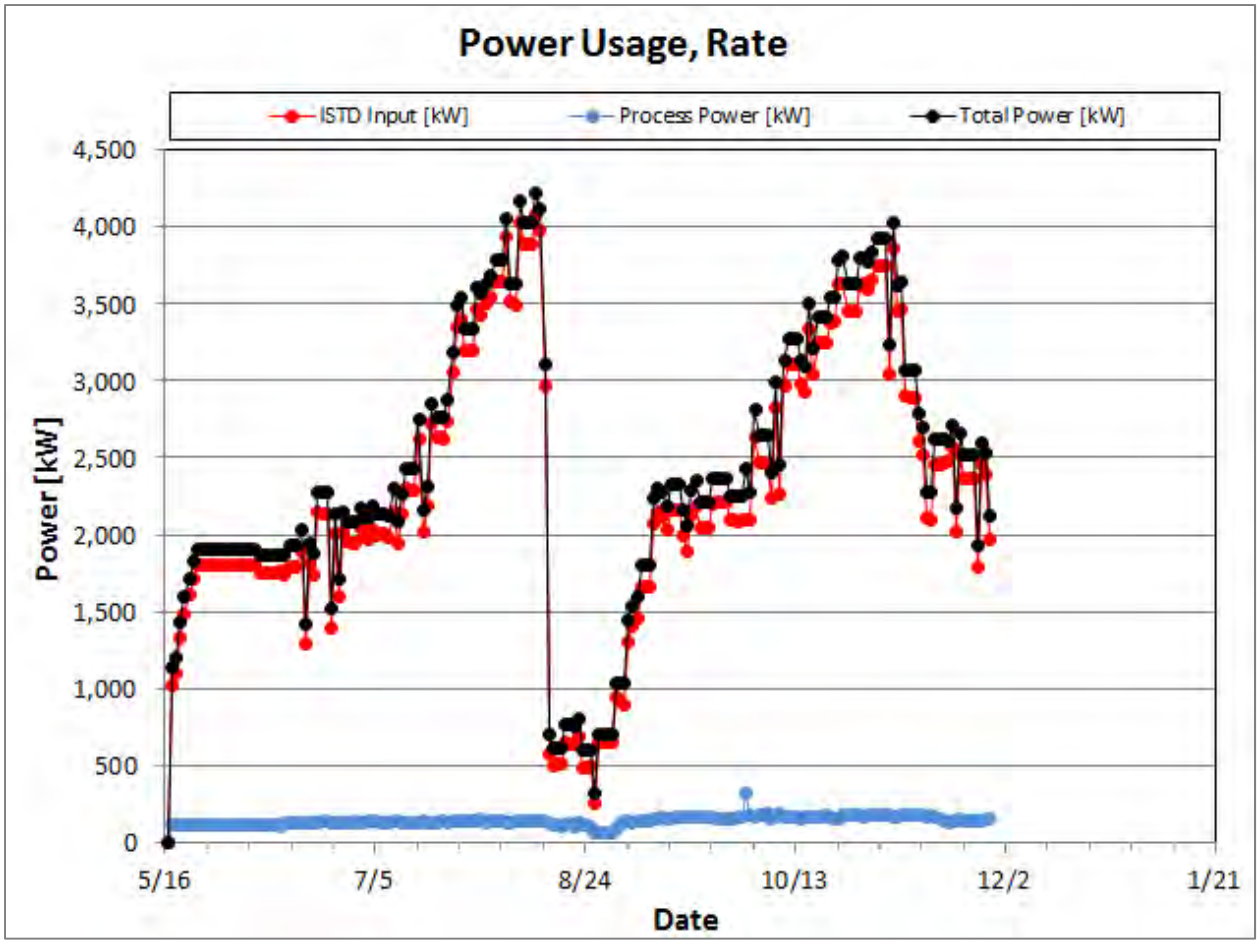


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

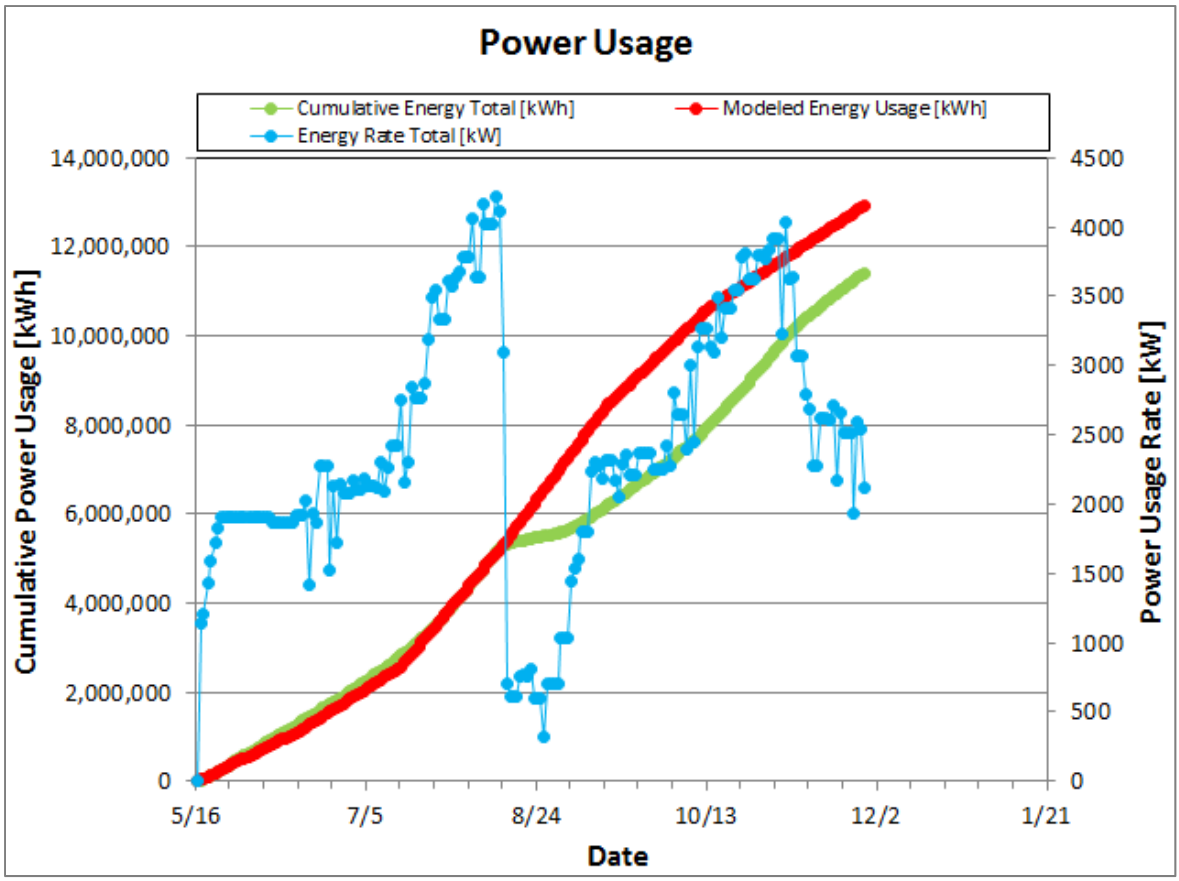


Figure 9. Power Usage

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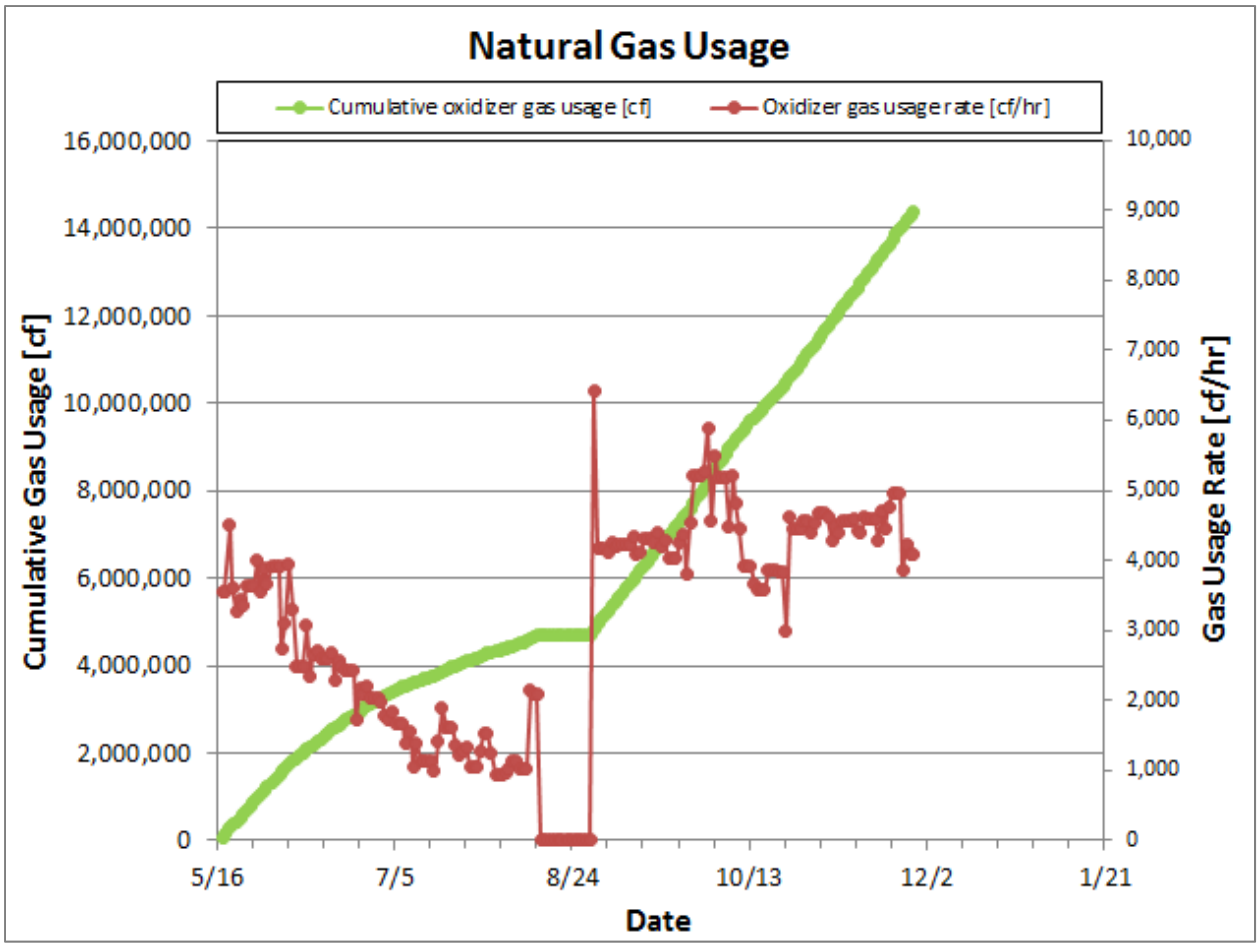


Figure 10. Natural Gas Usage

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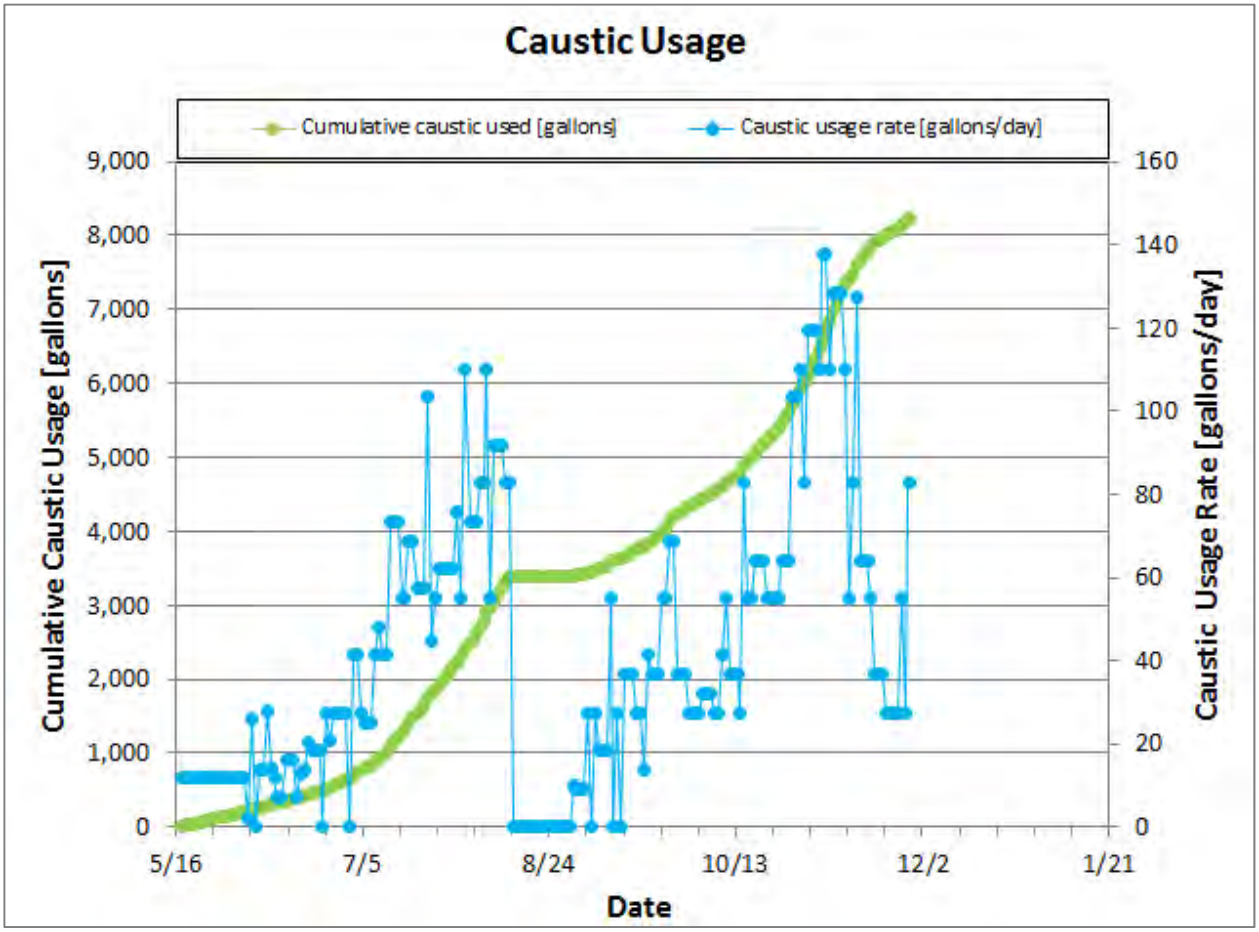


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 and Phase 2 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12a. As of 9/26/14, we have reached all three temperature milestones for phase 1. Phase 2 centroids are shown in Figure 12b. As of 11/18/14, we have achieved two of the three temperature milestones for Phase 2.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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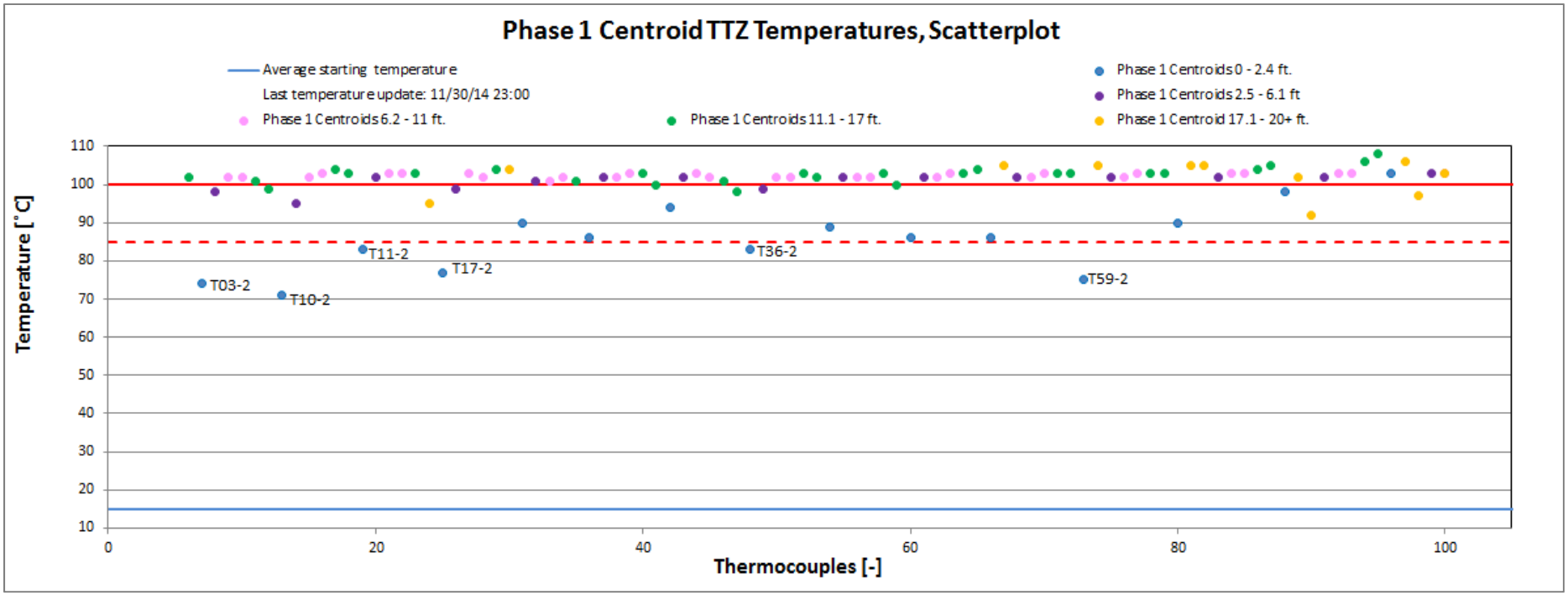


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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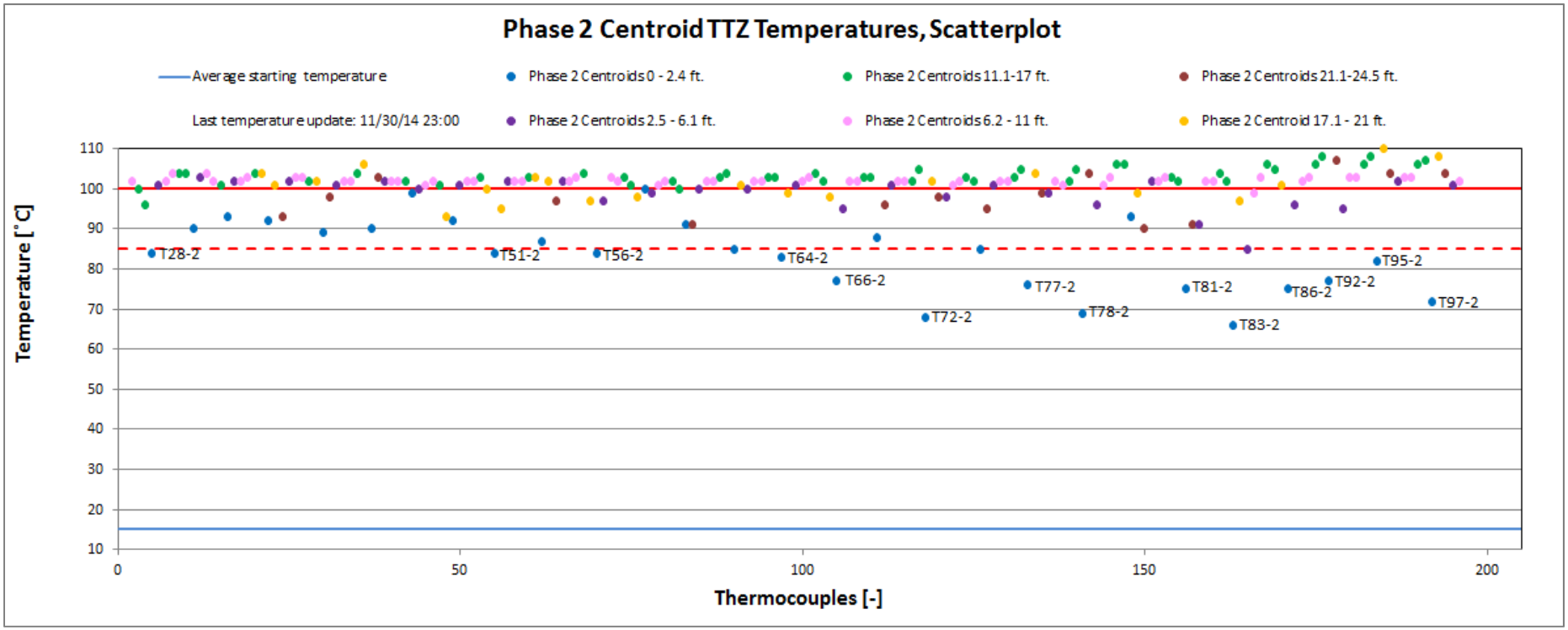


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots		
	Value	**Unit**
Date of Last Update	11/30/14	
Phase 1 Centroid Thermocouples ≥85 °C	100	%
Phase 1 Centroid Thermocouples ≥100 °C	94	%
Phase 2 Centroid Thermocouples ≥85 °C	99	%
Phase 2 Centroid Thermocouples ≥100 °C	85	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



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1 SUMMARY

This report is intended to cover the operational time period of Friday, 28 November 2014 through Friday, 5 December 2014, with temperatures updated through Sunday, 7 December 2014.

Table 1 provides a summary of the project operational status as of Friday, 5 Decembr 2014.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	12/05/14	
Last Temperature Data Update	12/07/14	
Days of Operation (Total)	180	days
Days of Phase 1 Operation	158	days
Days of Phase 2 Operation	71	days
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	11,810,100	kWh
Used Electrical Energy vs. Estimate	74.8	%
Total Mass Removal	415,371	lbs
Average Power Input Last 24 Hours	1,680	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,777	scfm
Average Condensate Production Rate Last 24 Hours	5.0	gpm

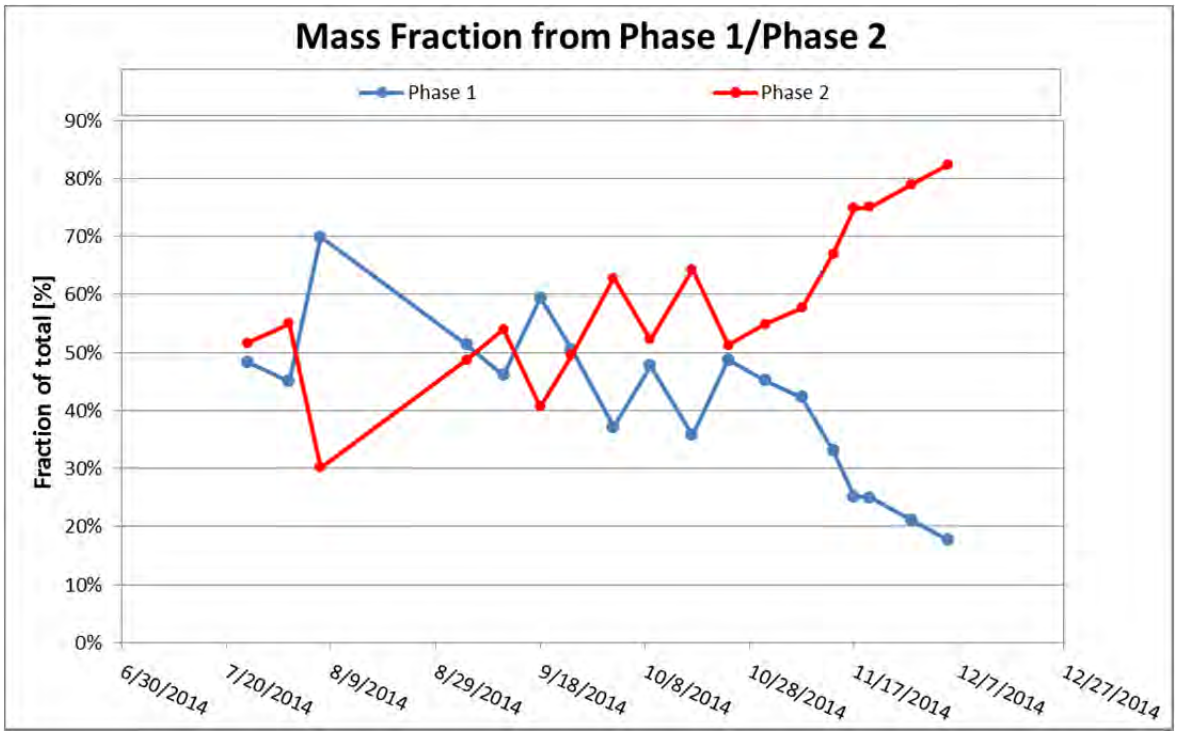
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Energy to select circuits in Phase 1 has been decreased and will continue to be decreased over a period of days. Ultimate shutdown of agreed upon circuits in Phase 1 is Monday, 8 December. Phase 2 remains online and at full power. Phase 1 operated for a total of 158 days, which represents days where heaters operated at or above 70% and to the collection date of the last confirmation soil sample (per contract definition). Phase 2 has operated for 71 days. The current average wellfield temperature for Phase 1 is 99°C and 98°C for Phase 2. All three temperature milestones have been achieved for Phase 1 and temperature milestones 1 and 2 have been achieved for Phase 2.

Progress soil sampling in Phase 2 started Monday, 1 December 2014 and is expected to be completed the week of 8 December.

Estimated mass removed to date is reported using the flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. These results yield a total mass removal of 415,371 lbs as of 12/05/14. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 12/5/14. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.18:0.82. These ratios were then applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase and leg. These data are included in Tables 2 and 3. Mass fraction data over time is presented below.



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Table 2. PID Readings Collected from Manifold Legs

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14
1	SV-1	215	100	745	602	720	604	590	1181	550	516	5	770	712	851	845	790	450	360
	SV-2	742	173	1271	887	872	1129	1318	2987	780	770	1610	1004	931	1179	600	934	660	677
	SV-3	2588	872	3609	2854	1198	3395	1414	5512	2643	1120	3971	1430	627	99	101	3138	1717	1782
	SV-4	1971	307	2543	1921	1514	2652	1153	4790	1927	3820	3275	2204	2650	3297	1375	2903	1510	2341
	SV-5	1817	279	1642	740	444	1407	1197	4790	759	1411	950	1153	802	326	302	490	402	135
	SV-6	4480	332	1926	956	765	4283	2347	11564	3525	9177	5750	4780	4919	5854	1083	2100	601	435
	SV-8	3222	385	1330	2375	1479	3267	1816	4744	179	172	3815	1881	1850	88	1475	940	401	450
	SV-9	3245	142	324	1993	1565	2995	1777	11950	2762	4967	3801	2121	2863	3227	1265	801	1209	1040
	SV-10	1896	131	2148	1096	1111	2459	1517	4382	1933	1745	3384	2841	1318	4121	1494	1982	1302	1221
	SV-11	1016	666	1712	1979	2145	1988	930	2534	1393	2687	1950	1469	1380	596	596	1360	750	641
	SV-12	80	53	158	139	104	815	1427	3234	682	1102	1090	2100	512	563	206	413	440	426
	SV-13	417	211	736	145	170	1452	1476	4291	1109	375	370	985	380	295	315	1210	210	131
	SV-14	632	452	1526	2636	1450	777	1610	3411	1917	4668	4274	4150	5565	8416	1107	1053	630	500
	SV-15	3440	1072	1153	2000	915	2150	2054	608	3265	4890	4801	5780	5000	618	654	1623	730	660
2 (and between divider line)	SV-7	3843	366	1751	1210	1482	4307	1835	3337	3672	9379	7350	5812	7910	553	3115	6391	2860	2977
	SV-16	3113	885	233	1911	1703	2823	2216	6230	3165	6888	4994	3841	6029	11	2340	6276	3118	3307
	SV-17	3715	429	306	2928	1824	2801	1837	8933	1927	2713	2954	3313	5408	389	1670	10903	1983	1335
	SV-18	1760	862	1203	2034	1634	2388	2446	15000	3554	5030	2815	2465	5632	13871	3377	4768	3650	5071
	SV-19	2258	350	2067	1971	2005	1818	2038	10522	2191	6417	4561	4398	3067	2693	1075	875	925	530
	SV-20	1990	796	1545	2344	1610	2268	2158	15000	2853	2305	2059	343	4053	8642	3534	5500	2725	12650
	SV-21	1964	487	2295	2077	1855	3458	1755	8561	2756	8053	4661	2119	4298	2631	2264	6000	4186	4440
	SV-22	2670	980	1606	2222	1892	2466	2448	14750	3344	5023	3578	2236	3582	55	3460	4765	3450	11187
	SV-23	2515	671	3248	3158	2165	3233	1532	8102	2973	7684	4880	3933	2707	4560	4005	5367	2993	2598
	SV-24	1412	638	1504	2406	1567	1669	1949	11882	1999	6130	4554	5005	6223	8864	2843	4555	2946	4280
	SV-25	688	220	1261	1035	1059	1350	2418	5725	1542	2247	1873	1743	1925	991	570	1301	740	773
	SV-26	90	185	350	580	573	638	1133	1119	790	3559	4305	4752	4633	1933	865	2742	710	520
	SV-27	192	151	718	944	789	1117	1518	3922	1256	1485	1650	947	840	1040	313	769	745	620
	SV-28	15	87	77	151	178	310	211	730	335	1250	3624	5592	5447	4380	1438	6351	1440	1100
	SV-29	8	66	55	20	52	130	1	15	35	21	352	255	83	41	1375	43	80	41
Breakdown of Wellfield VOC Flux by Phase																			
Phase 1:		48%	45%	70%	51%	46%	59%	51%	37%	48%	36%	49%	45%	42%	33%	25%	25%	21%	18%
Phase 2:		52%	55%	30%	49%	54%	41%	50%	63%	52%	64%	51%	55%	58%	67%	75%	75%	79%	82%

Table 3. Estimated Mass Loading by Manifold Leg/Phase

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14
1	SV-1	0.5%	0.7%	3.5%	1.5%	3.0%	1.6%	1.7%	1.0%	1.1%	0.7%	0.0%	1.3%	0.8%	1.2%	2.2%	1.2%	1.0%	0.6%
	SV-2	2.0%	1.3%	4.3%	2.6%	3.6%	3.0%	4.7%	2.5%	1.9%	0.8%	2.4%	1.8%	1.2%	1.7%	1.6%	1.3%	1.4%	1.3%
	SV-3	3.5%	7.5%	16.2%	7.4%	5.0%	8.9%	5.0%	4.5%	7.1%	1.3%	5.7%	2.6%	0.7%	0.2%	0.3%	5.1%	4.2%	3.3%
	SV-4	3.3%	2.5%	8.5%	5.7%	5.5%	5.9%	3.3%	3.5%	4.8%	3.9%	4.5%	3.2%	3.1%	3.8%	3.0%	4.4%	3.5%	4.5%
	SV-5	2.5%	2.9%	9.6%	2.5%	1.6%	3.1%	3.2%	3.2%	2.1%	1.9%	1.4%	1.5%	1.0%	0.5%	0.9%	0.7%	1.0%	0.3%
	SV-6	2.5%	1.4%	3.8%	1.6%	1.2%	4.1%	3.0%	3.4%	3.7%	4.5%	3.5%	3.0%	2.4%	3.1%	1.1%	1.6%	0.6%	0.3%
	SV-8	8.7%	2.9%	4.4%	7.1%	6.3%	8.7%	6.8%	3.1%	0.4%	0.1%	5.9%	3.5%	4.4%	0.1%	4.2%	1.6%	1.0%	0.8%
	SV-9	9.0%	0.9%	1.3%	6.0%	5.8%	8.4%	6.4%	7.3%	6.9%	6.6%	6.2%	3.9%	6.8%	4.8%	3.6%	1.0%	2.5%	2.0%
	SV-10	2.4%	0.5%	3.0%	1.3%	1.7%	2.1%	1.8%	1.5%	2.2%	0.9%	2.0%	2.1%	0.7%	2.3%	1.6%	1.4%	1.1%	1.0%
	SV-11	1.3%	2.3%	3.4%	2.2%	3.4%	1.9%	1.0%	0.9%	1.5%	1.4%	1.2%	1.0%	0.6%	0.3%	0.5%	1.2%	0.7%	0.5%
	SV-12	0.3%	0.5%	0.6%	0.4%	0.5%	2.3%	4.8%	2.4%	1.6%	1.4%	1.8%	2.7%	1.2%	1.0%	0.7%	0.7%	1.0%	0.8%
	SV-13	0.6%	0.9%	1.6%	0.2%	0.3%	1.4%	2.0%	1.3%	1.2%	0.2%	0.2%	0.7%	0.2%	0.2%	0.4%	0.8%	0.2%	0.1%
	SV-14	2.3%	6.1%	5.8%	7.5%	5.5%	2.2%	1.1%	2.0%	4.5%	6.3%	6.9%	7.4%	12.7%	13.1%	3.3%	1.8%	1.5%	0.9%
	SV-15	9.5%	14.7%	3.9%	5.3%	2.8%	5.6%	5.7%	0.5%	8.8%	5.8%	6.9%	10.4%	6.4%	0.9%	1.8%	2.3%	1.5%	1.3%
2 (and between divider line)	SV-7	2.2%	1.5%	1.9%	1.5%	2.9%	4.2%	2.3%	1.1%	3.9%	4.8%	3.8%	4.0%	3.2%	0.3%	3.1%	5.3%	2.5%	2.1%
	SV-16	9.5%	7.1%	1.1%	5.7%	6.2%	6.6%	6.9%	5.2%	8.0%	8.7%	6.9%	6.9%	8.0%	0.0%	6.8%	10.3%	10.5%	6.6%
	SV-17	2.9%	0.1%	-3.3%	2.1%	1.6%	-1.5%	-0.6%	-0.5%	-1.6%	-3.1%	-2.0%	-1.3%	0.0%	-2.8%	0.7%	6.0%	1.3%	0.7%
	SV-18	5.5%	11.4%	4.9%	6.8%	5.6%	6.7%	7.8%	13.0%	9.5%	6.6%	3.6%	4.3%	7.1%	22.8%	10.5%	8.2%	14.5%	9.1%
	SV-19	3.6%	0.3%	-2.0%	5.5%	6.3%	0.6%	2.8%	3.0%	3.2%	6.5%	6.4%	4.3%	3.0%	3.4%	2.0%	0.7%	1.2%	0.7%
	SV-20	7.2%	12.0%	7.2%	6.2%	6.3%	5.7%	5.5%	11.9%	6.1%	2.8%	2.9%	0.6%	5.0%	14.1%	11.0%	8.9%	8.7%	23.9%
	SV-21	2.6%	2.0%	3.8%	0.9%	2.4%	3.2%	2.9%	3.6%	2.5%	5.3%	1.6%	-0.4%	2.2%	0.2%	3.5%	6.3%	5.8%	4.3%
	SV-22	8.5%	9.3%	8.3%	5.9%	7.6%	6.7%	7.0%	12.2%	8.5%	6.7%	4.8%	3.9%	4.4%	0.1%	9.9%	5.4%	11.5%	19.8%
	SV-23	5.2%	-2.9%	-2.4%	1.9%	4.4%	-0.3%	0.5%	0.3%	1.0%	8.8%	1.3%	4.6%	2.9%	6.2%	10.3%	3.2%	3.4%	2.6%
	SV-24	4.0%	8.5%	9.4%	7.2%	6.2%	4.4%	5.6%	10.3%	4.7%	8.0%	6.8%	7.4%	7.4%	13.6%	8.3%	6.5%	11.3%	8.5%
	SV-25	-0.1%	1.1%	0.0%	0.7%	0.8%	0.1%	1.5%	0.1%	1.4%	2.1%	0.2%	1.3%	1.2%	-0.2%	0.0%	0.5%	0.3%	0.4%
	SV-26	0.3%	2.2%	1.9%	1.9%	2.4%	1.6%	3.4%	1.0%	1.6%	4.3%	6.8%	8.1%	5.9%	3.2%	2.7%	3.9%	2.8%	1.1%
	SV-27	0.1%	0.7%	-0.5%	1.7%	0.4%	1.4%	3.2%	1.2%	2.4%	1.1%	2.0%	0.4%	0.2%	0.0%	-1.5%	0.1%	0.7%	0.5%
	SV-28	0.0%	1.0%	0.5%	0.6%	0.7%	0.8%	0.6%	0.5%	0.9%	1.7%	5.5%	10.1%	6.9%	6.1%	3.8%	9.5%	4.2%	2.0%
	SV-29	0.0%	0.6%	0.4%	0.1%	0.2%	0.4%	0.0%	0.0%	0.1%	0.0%	0.6%	0.5%	0.2%	0.1%	3.7%	0.1%	0.3%	0.1%
	Total:	100%	100%	101%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note: Six out of the 23 wellfield branch lines service both Phase 1 and Phase 2; therfore, a correction has been made to subtract the shared mass sometimes resulting in a negative value. This value indicates that the mass contribution from the Phase 2 area was limited in that particular sample round. This is a result of the accuracy of the flow and PID data measurements collected.

2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperatures for both Phase 1 and Phase 2, as well as the average centroid temperatures. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Phase 2 heating began on 7/16/14 but was stopped on 8/14/14, as a result of the oxidizer shutdown, and reenergized on 09/30/14. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	12/7/14	
Phase 1 Entire TTZ Average Temperature	99	°C
Phase 2 Entire TTZ Average Temperature	98	°C
Phase 1 Centroid Average Temperature	98	°C
Phase 2 Centroid Average Temperature	98	°C

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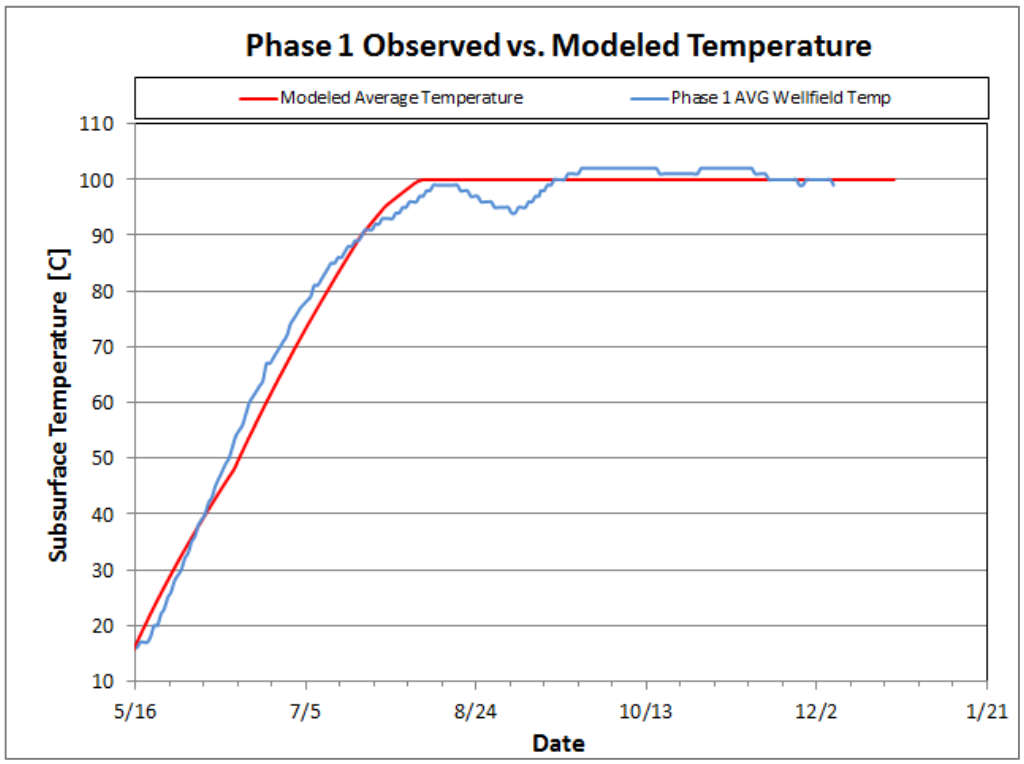


Figure 1a. Phase 1 Observed vs. Modeled Temperature

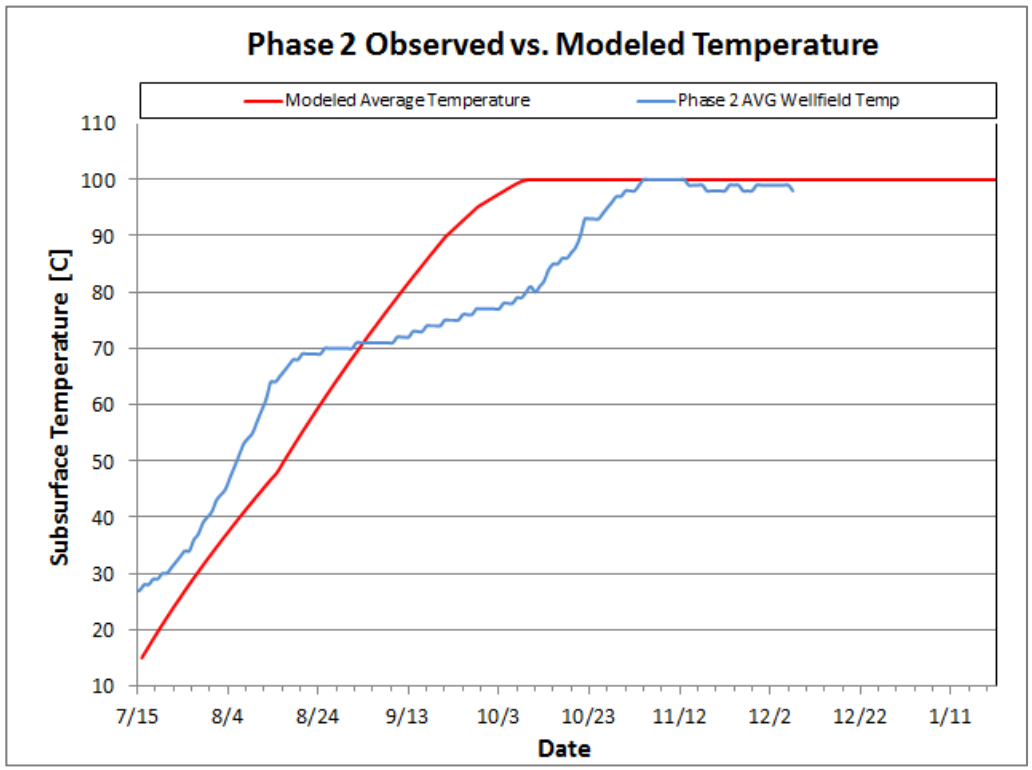


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was increased on 8/30/14.

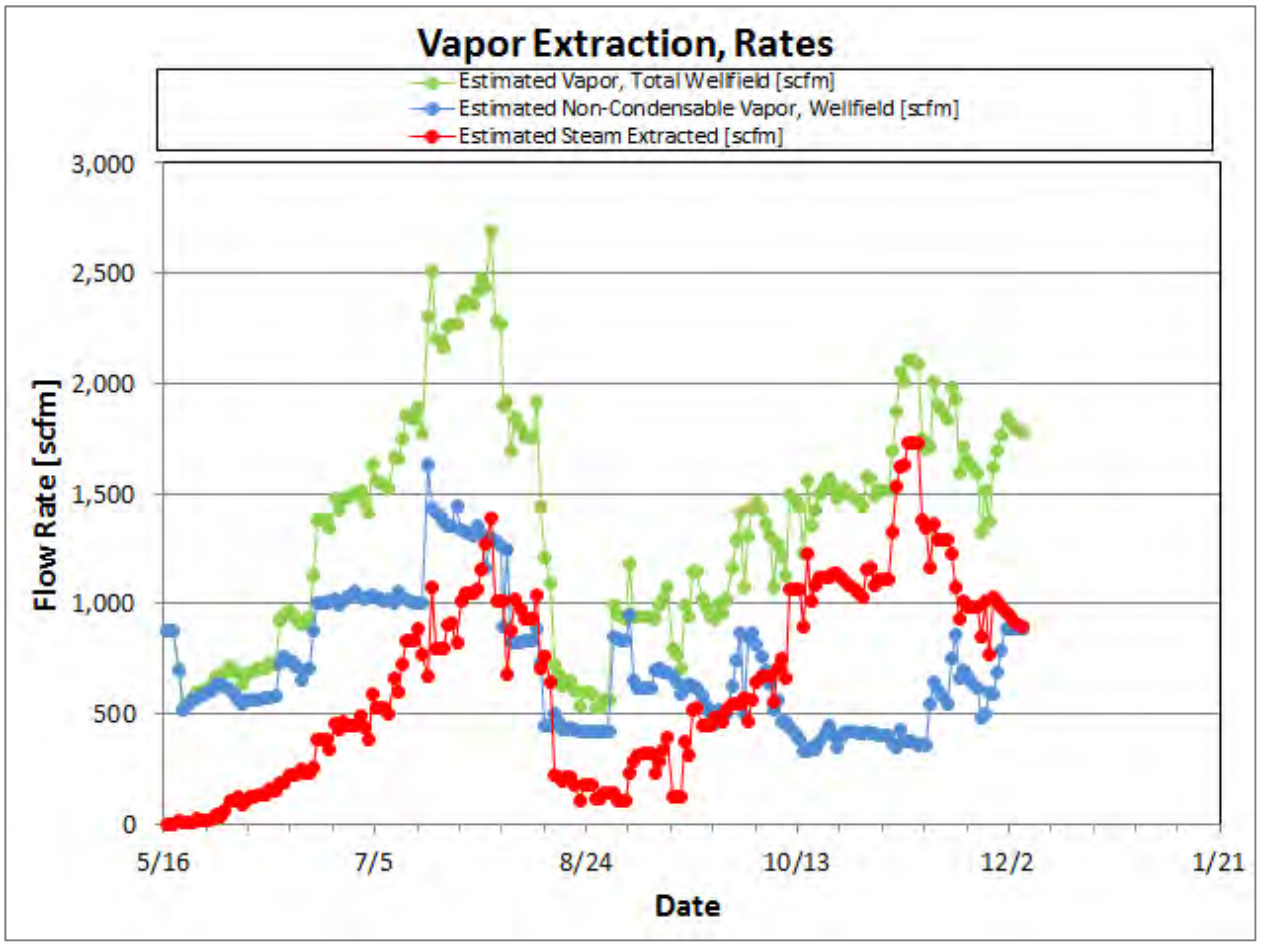


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

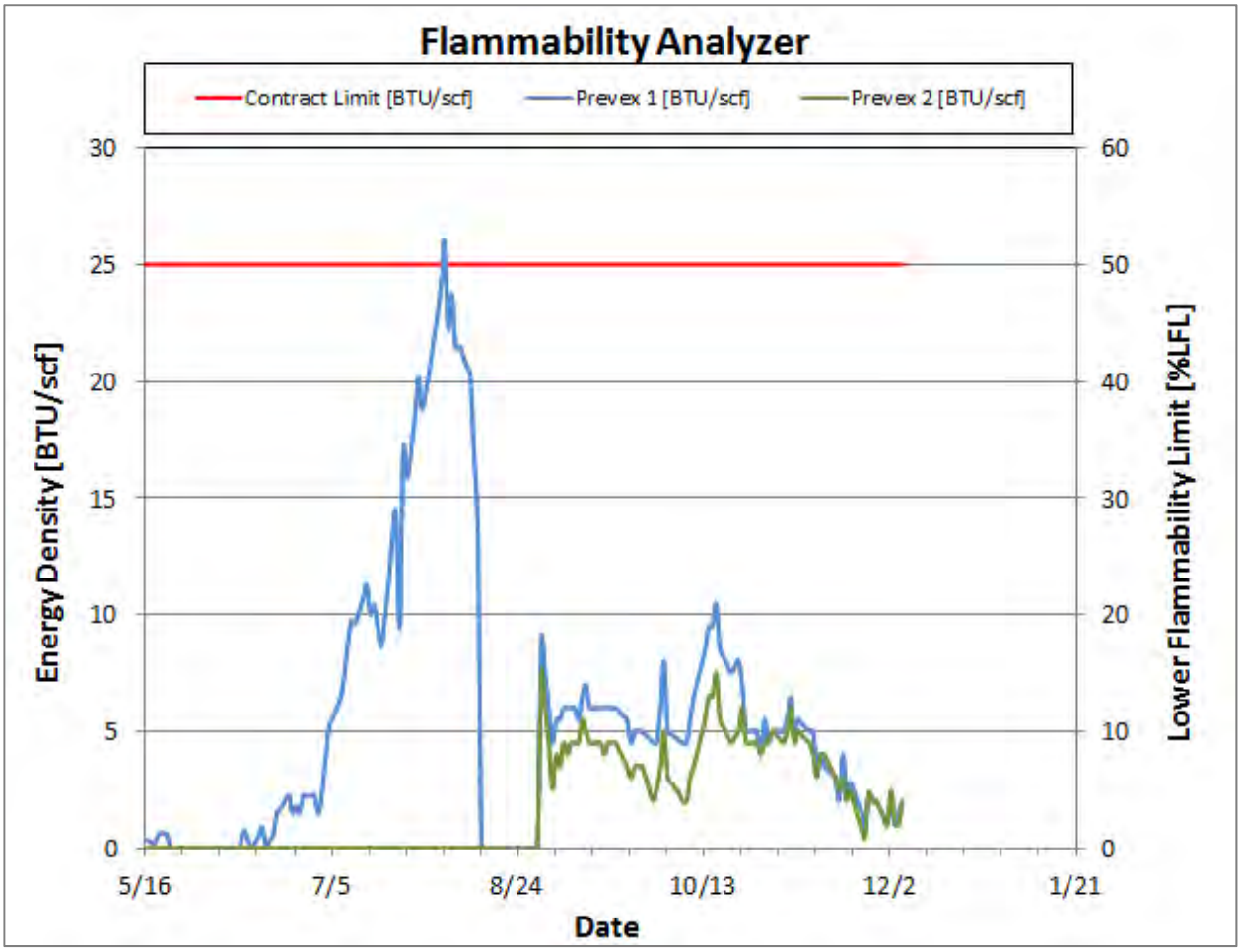


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed to date is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The decrease in mass removed starting on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14, 9/23/14, 9/30/14 , 10/7/14, 10/14/14, 10/21/14, 10/30/14 and 11/4/14. Sample results were received from the 11/13/14 sampling effort; however the results appear suspect and are not included in this report. Results will be reevaluated after receiving the next Summa sampling data used if appropriate.

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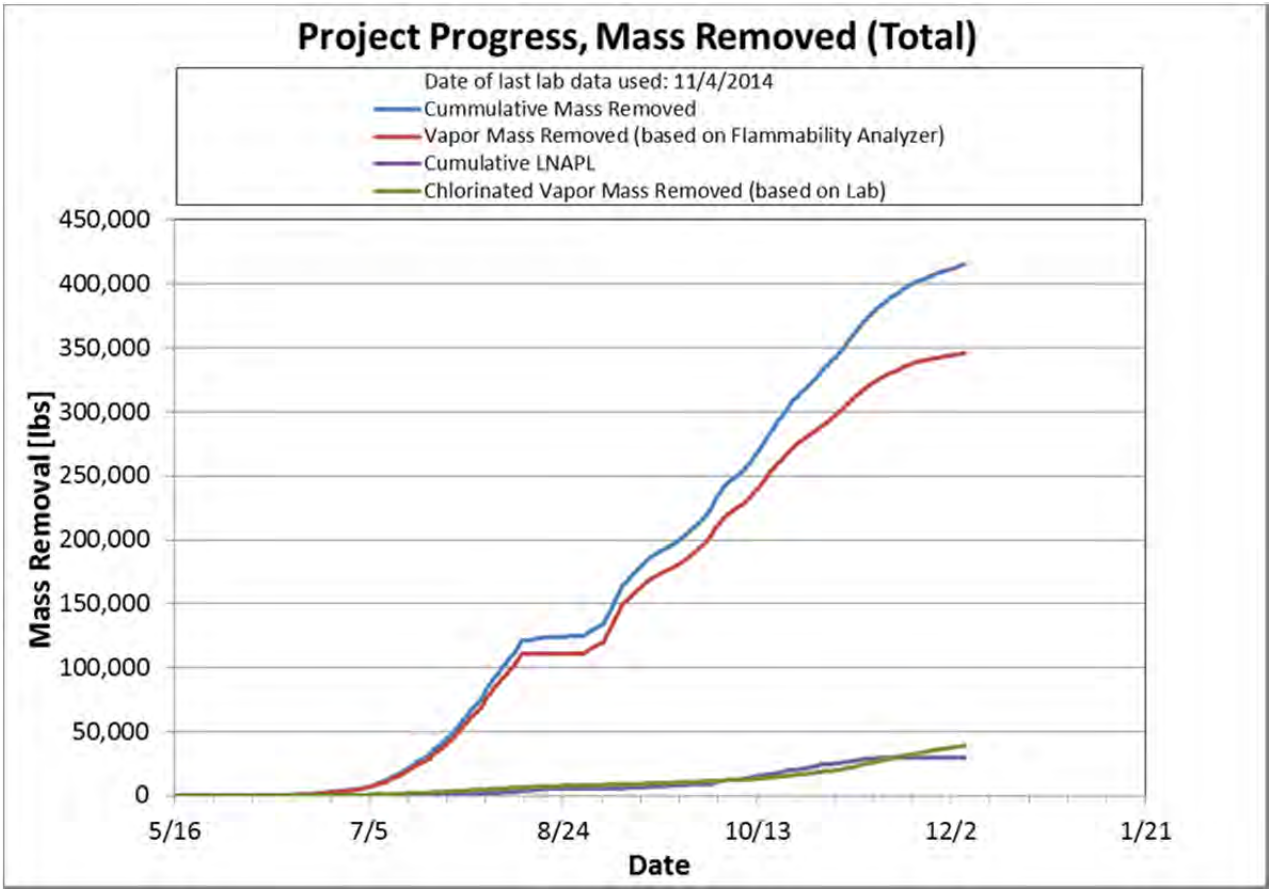


Figure 4a. Project Progress, Mass Removal (Total)

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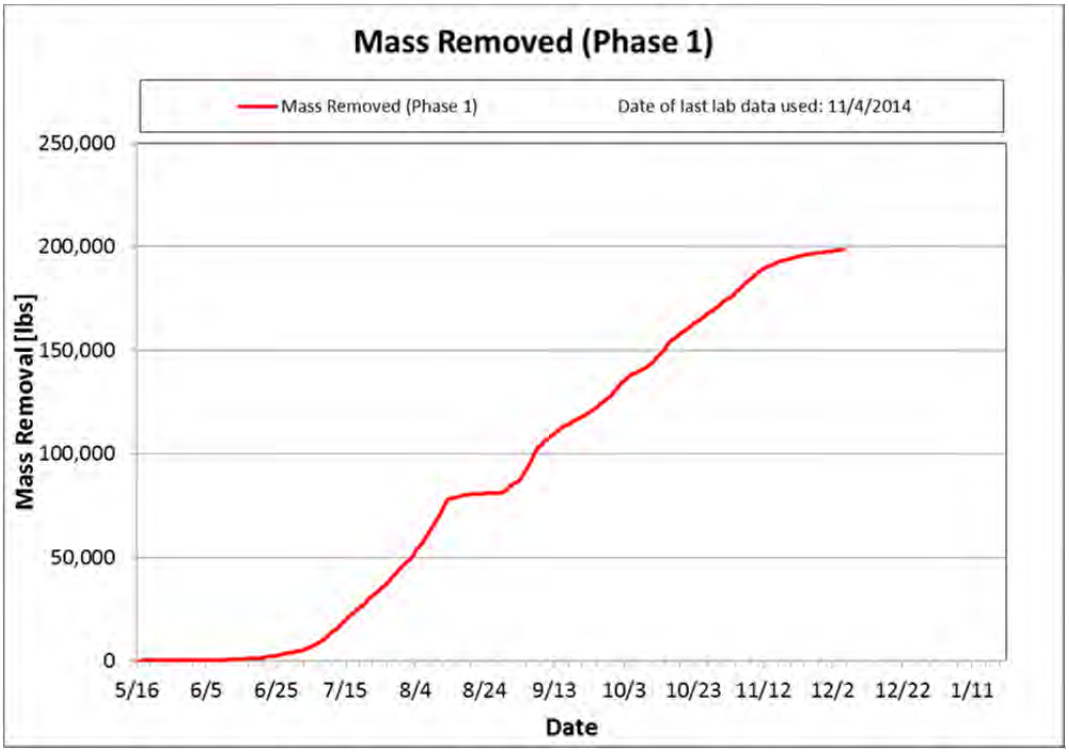


Figure 4b. Project Progress, Mass Removal (Phase 1)

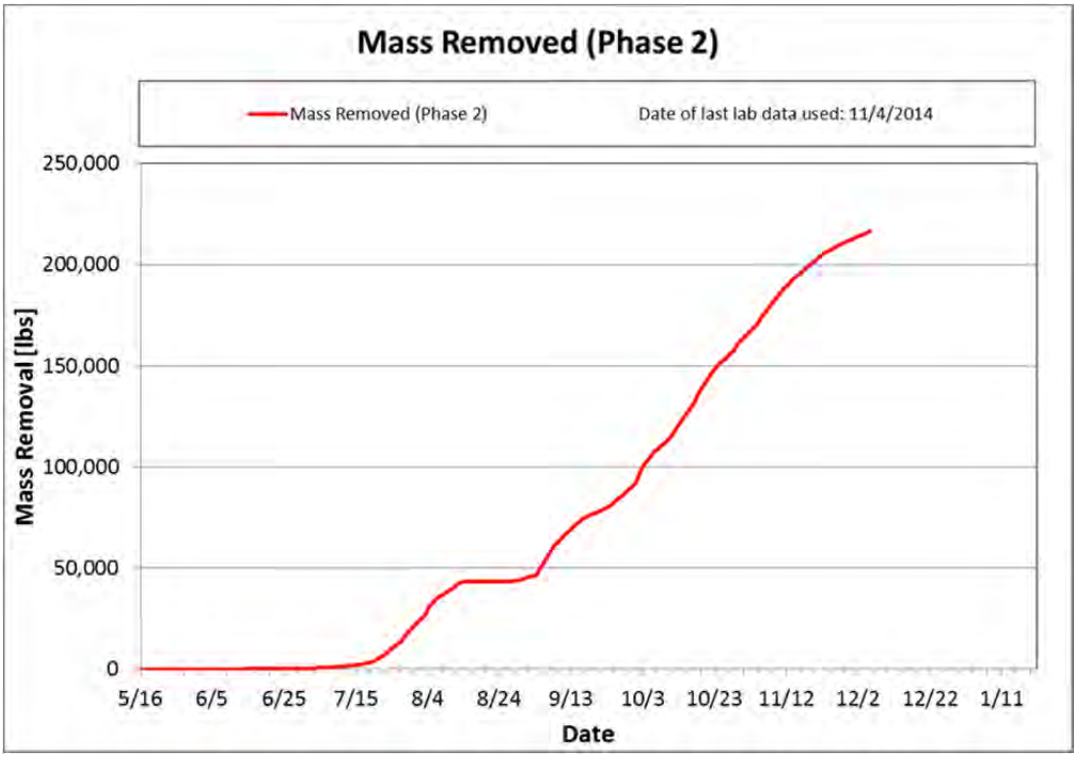


Figure 4c. Project Progress, Mass Removal (Phase 2)

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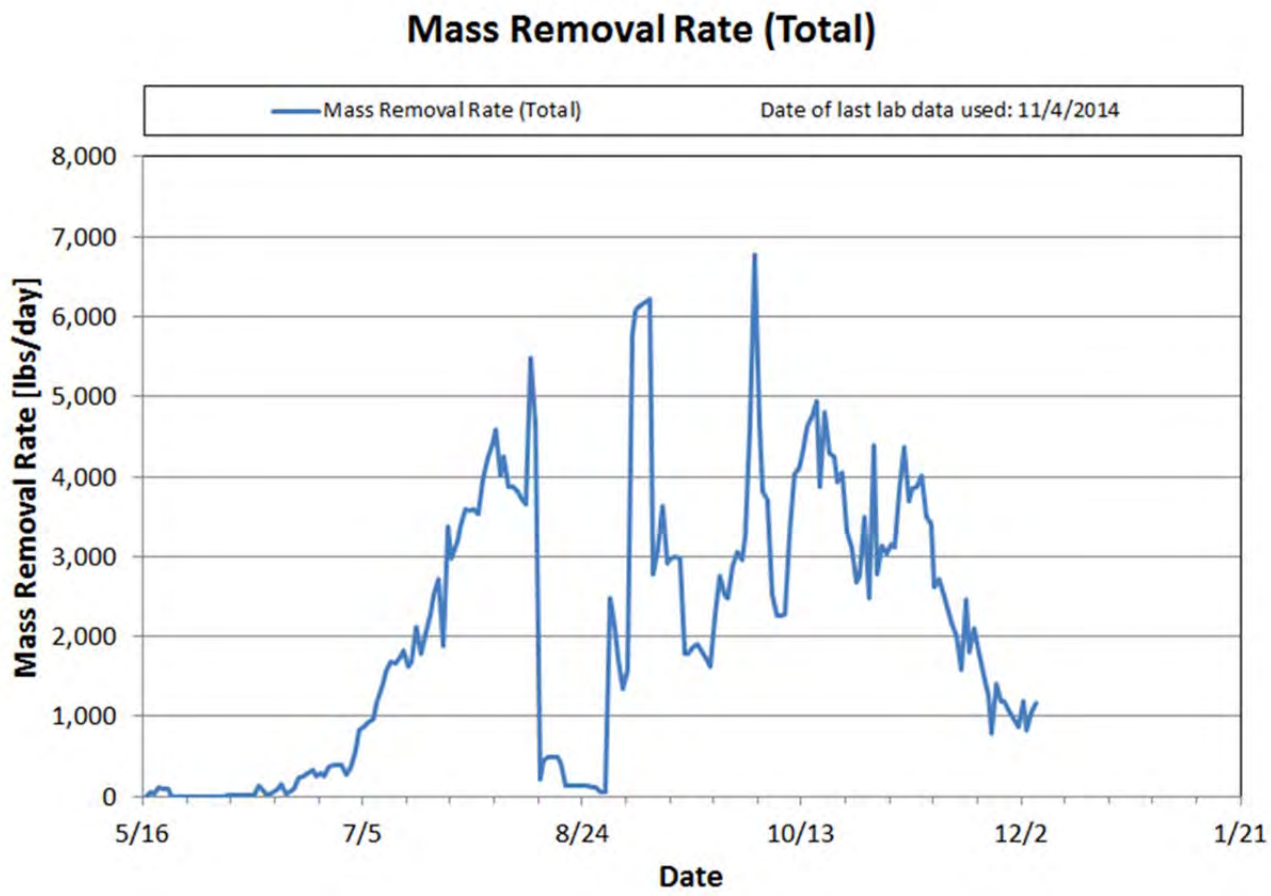


Figure 4d. Mass Removal Rate (Total for Site)

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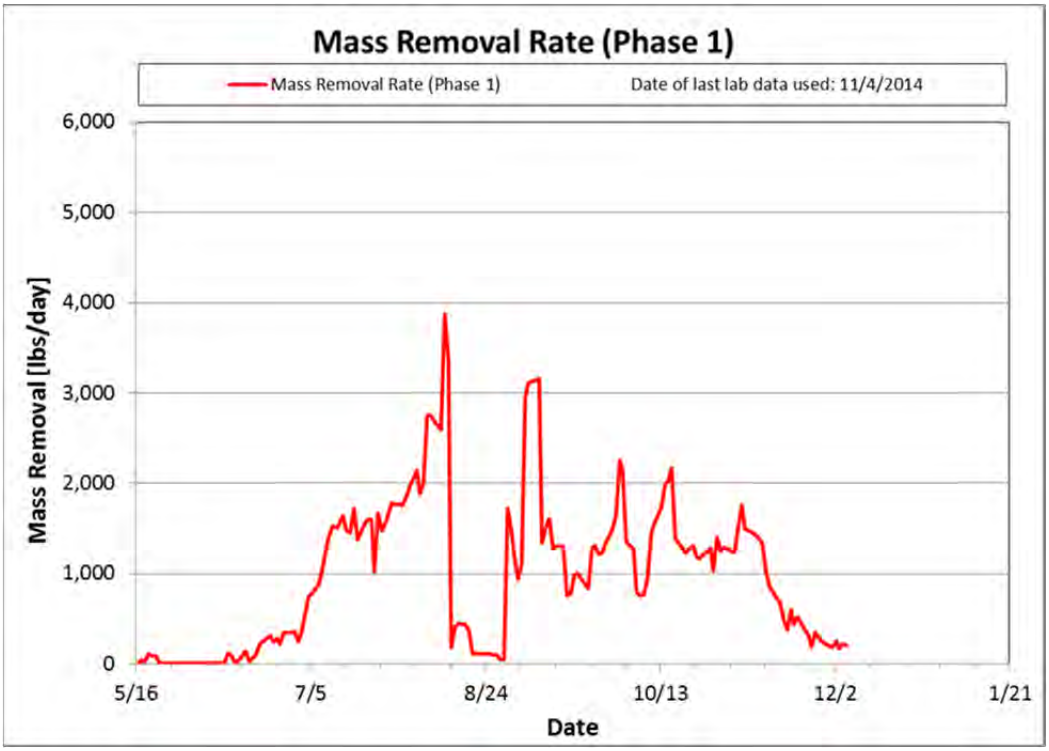


Figure 4e. Mass Removal Rate (Phase 1)

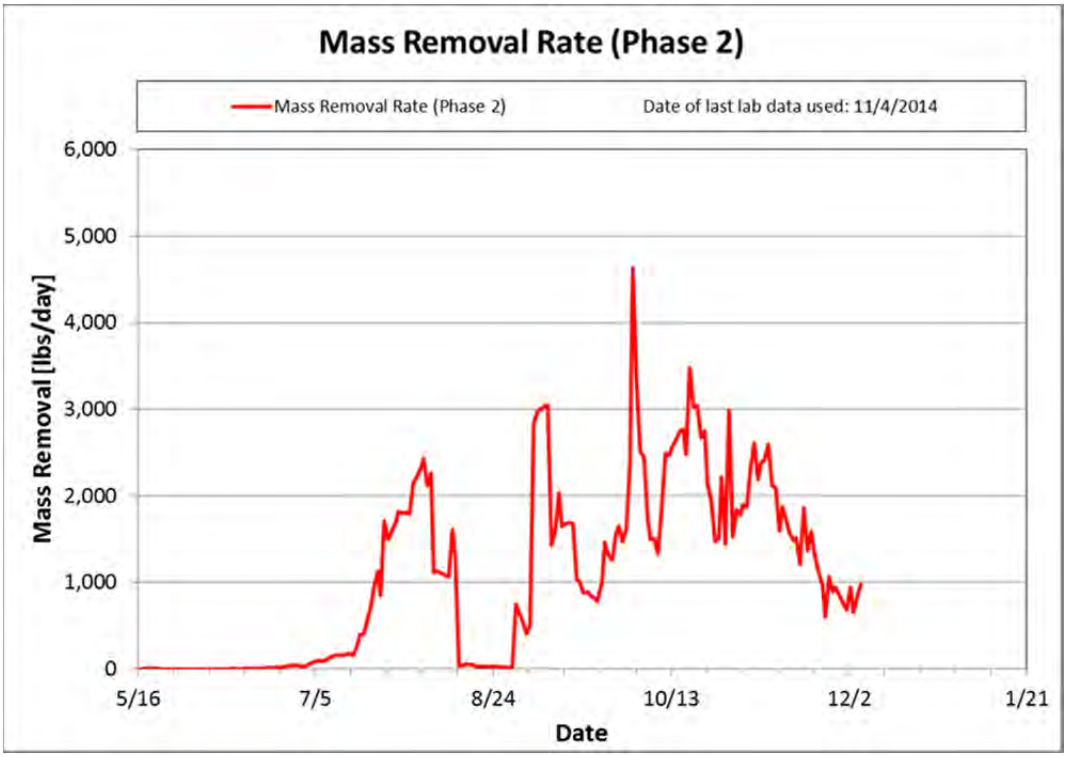


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID and flammability analyzer readings collected at the oxidizer influent over time. It should be noted that PID readings are first collected using an 11.7 eV lamp (determined by site contaminants). If the reading exceeds the limit of the meter (>2000 ppm), the readings are collected using a 10.6 eV lamp. When both meters are used, the maximum value is recorded.

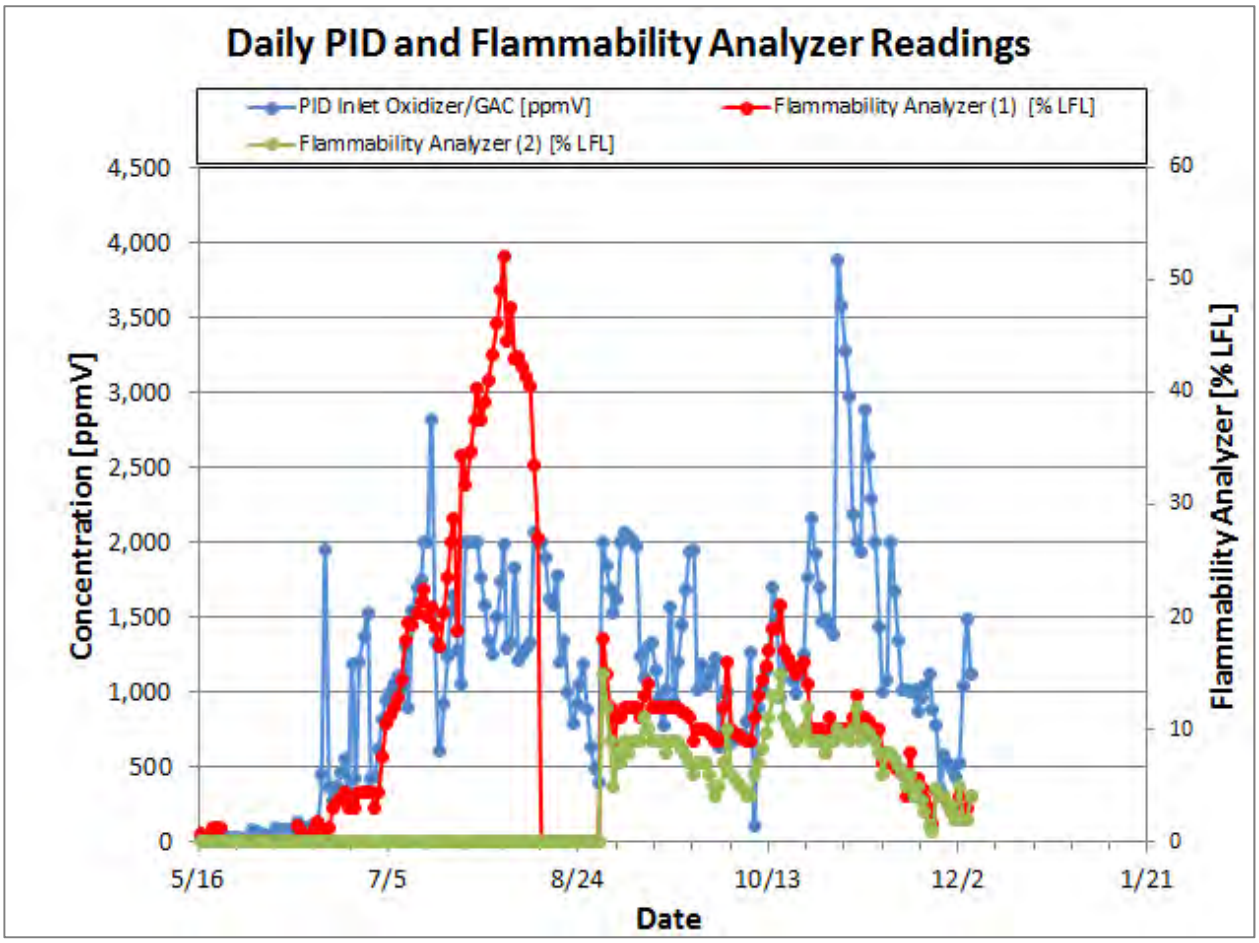


Figure 5. Daily PID and Flammability Analyzer Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13. Decreases in DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-outs.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

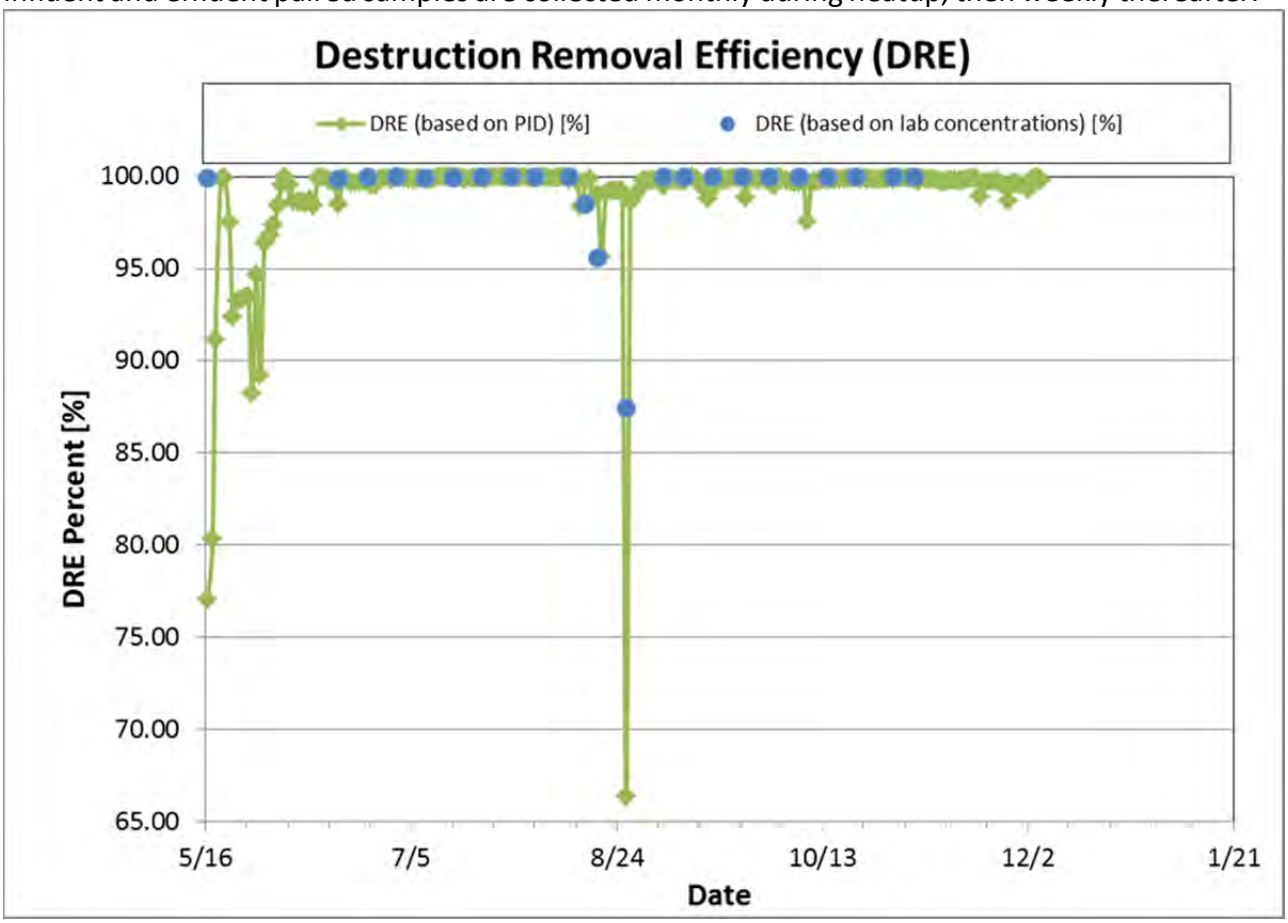


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7.

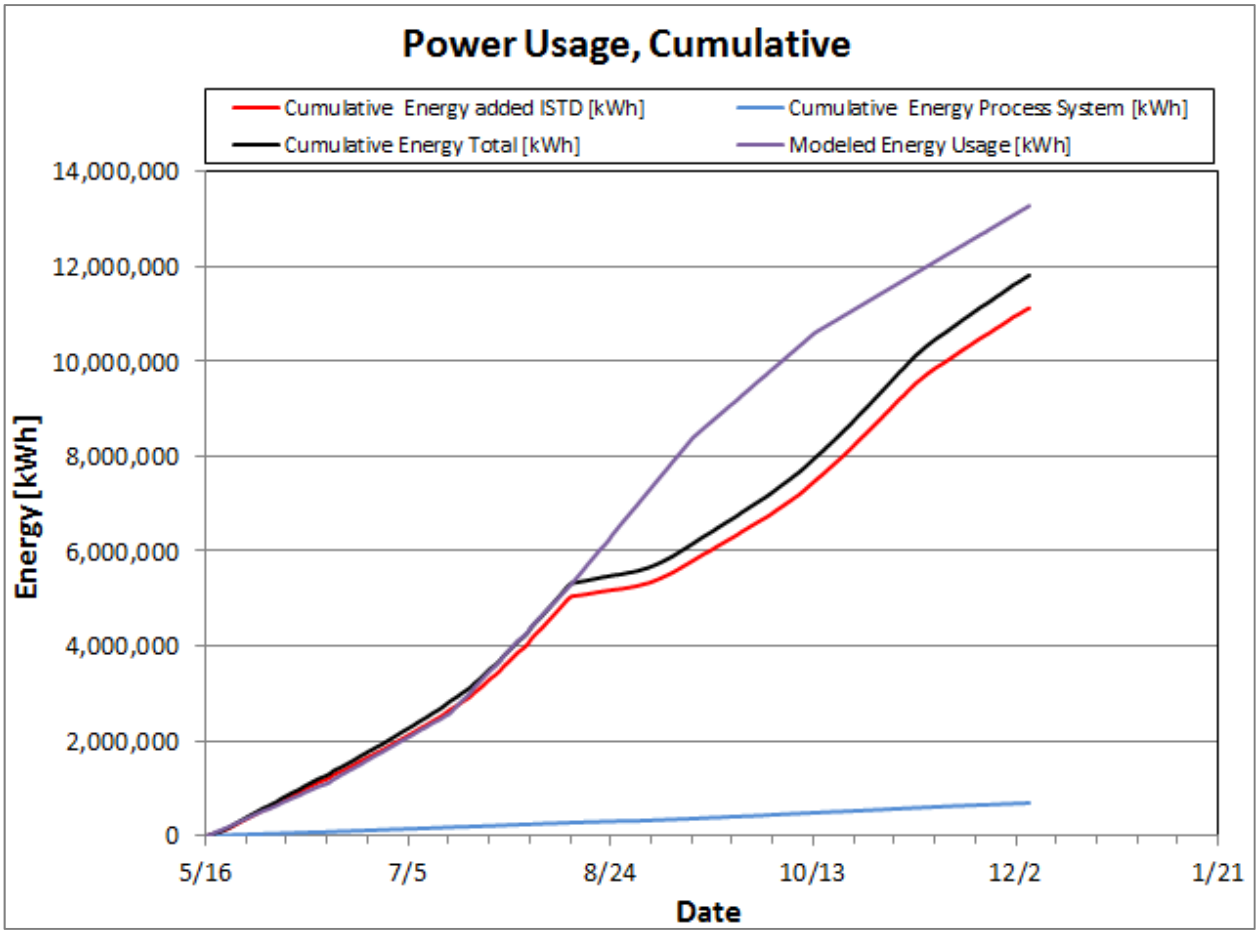


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30/14 and the following days corresponds with ramping of the heaters after placing the oxidizer back online. The decrease observed mid-November is associated with profiling of the heaters in Phase 2 and subsequent adjustments.

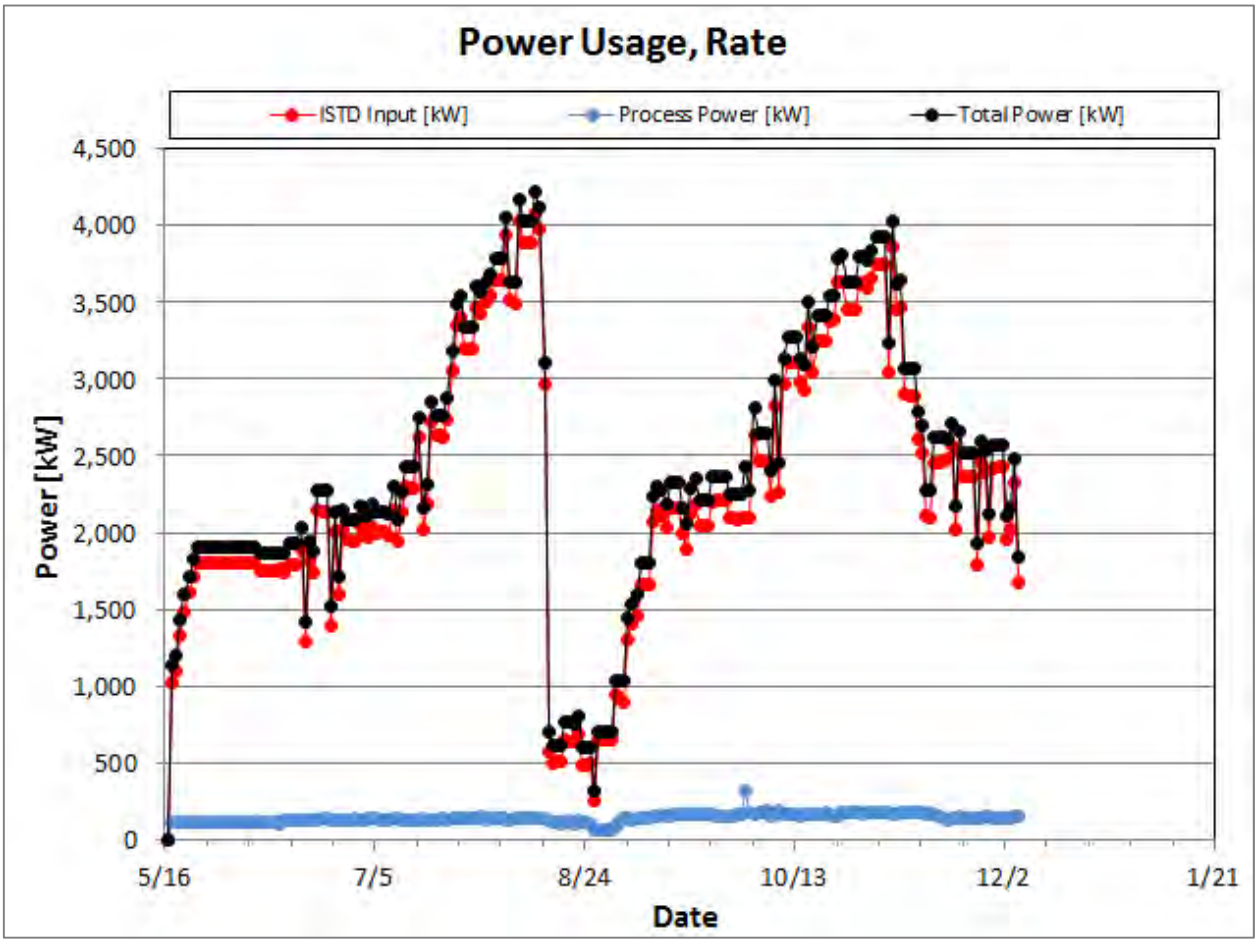


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

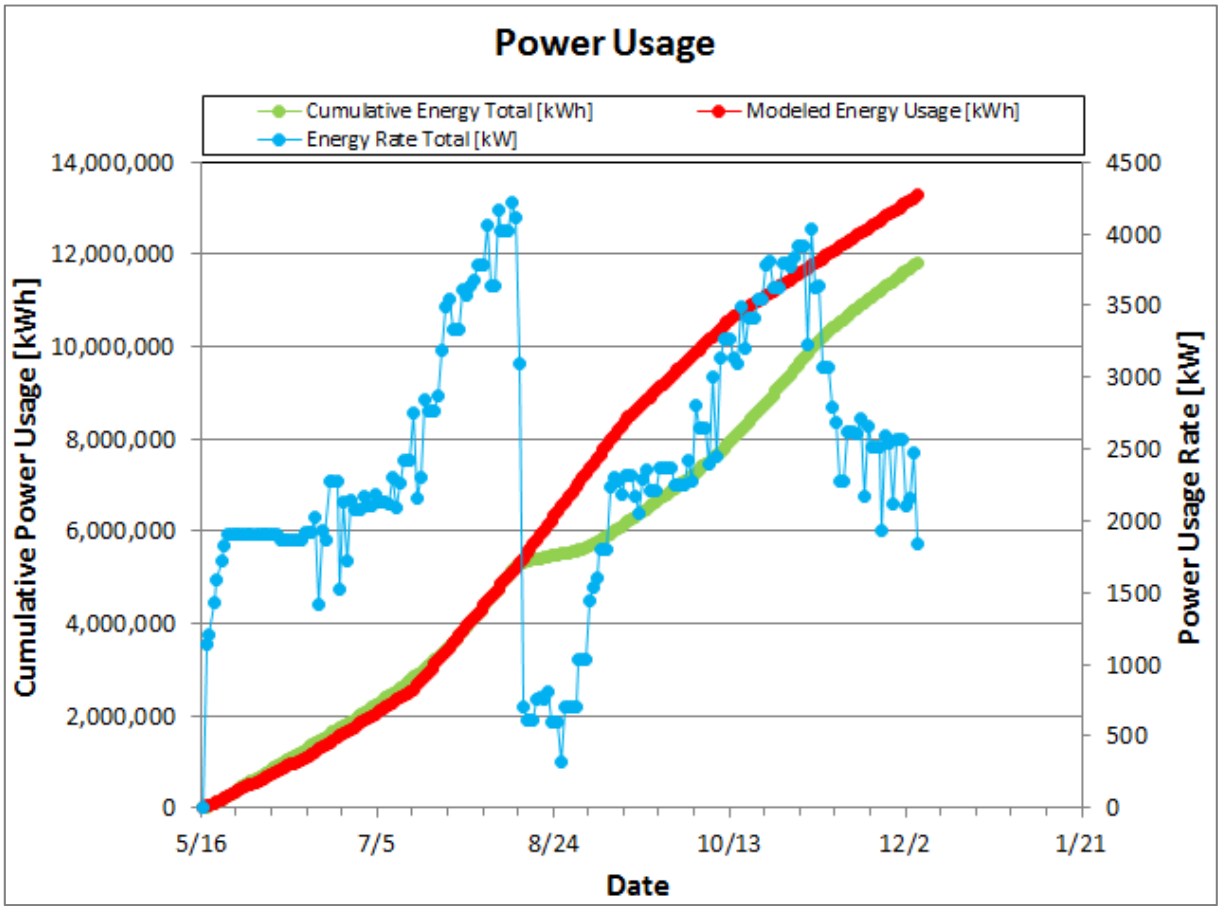


Figure 9. Power Usage

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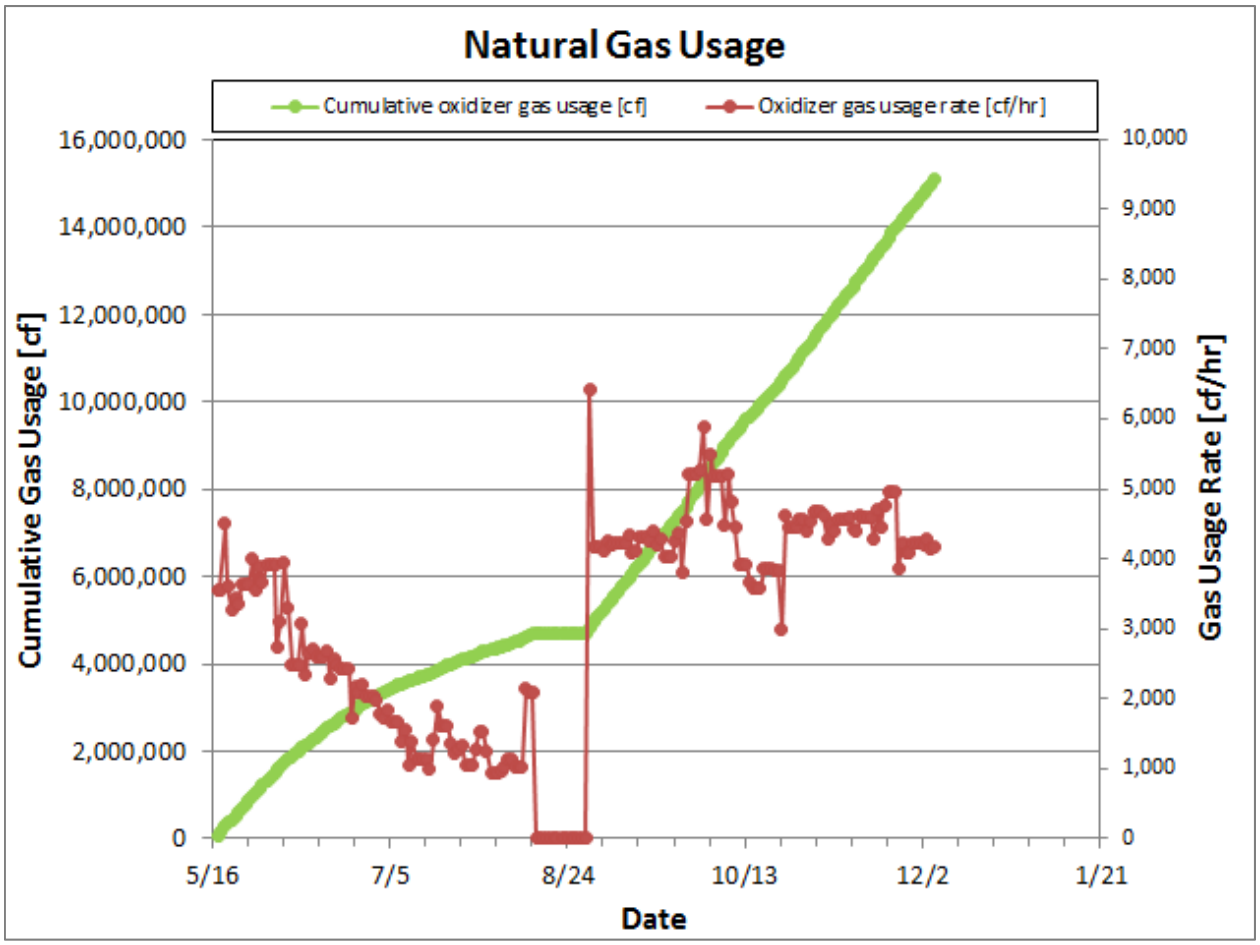


Figure 10. Natural Gas Usage

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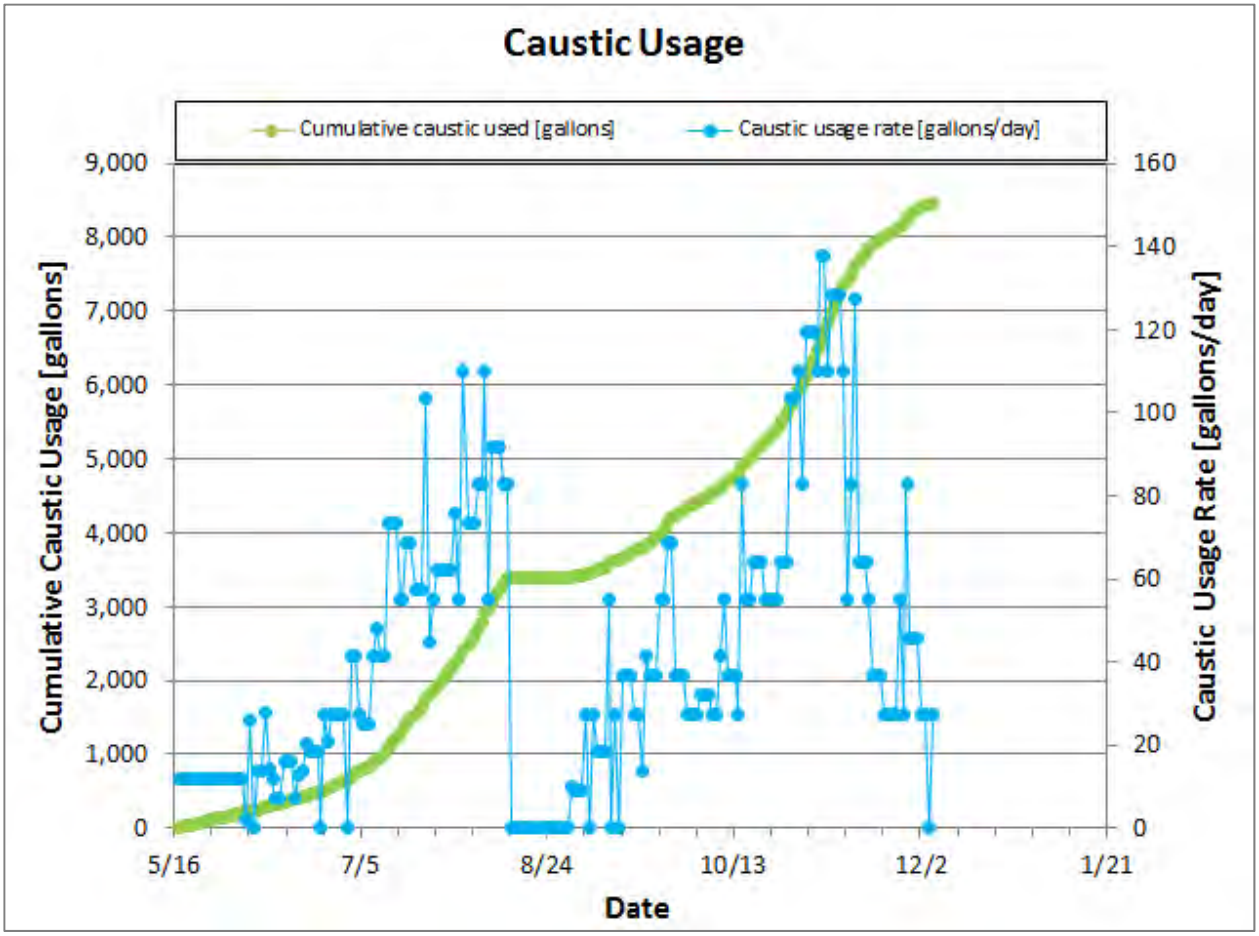


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 and Phase 2 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12a. As of 9/26/14, we have reached all three temperature milestones for phase 1. Phase 2 centroids are shown in Figure 12b. As of 11/18/14, we have achieved two of the three temperature milestones for Phase 2.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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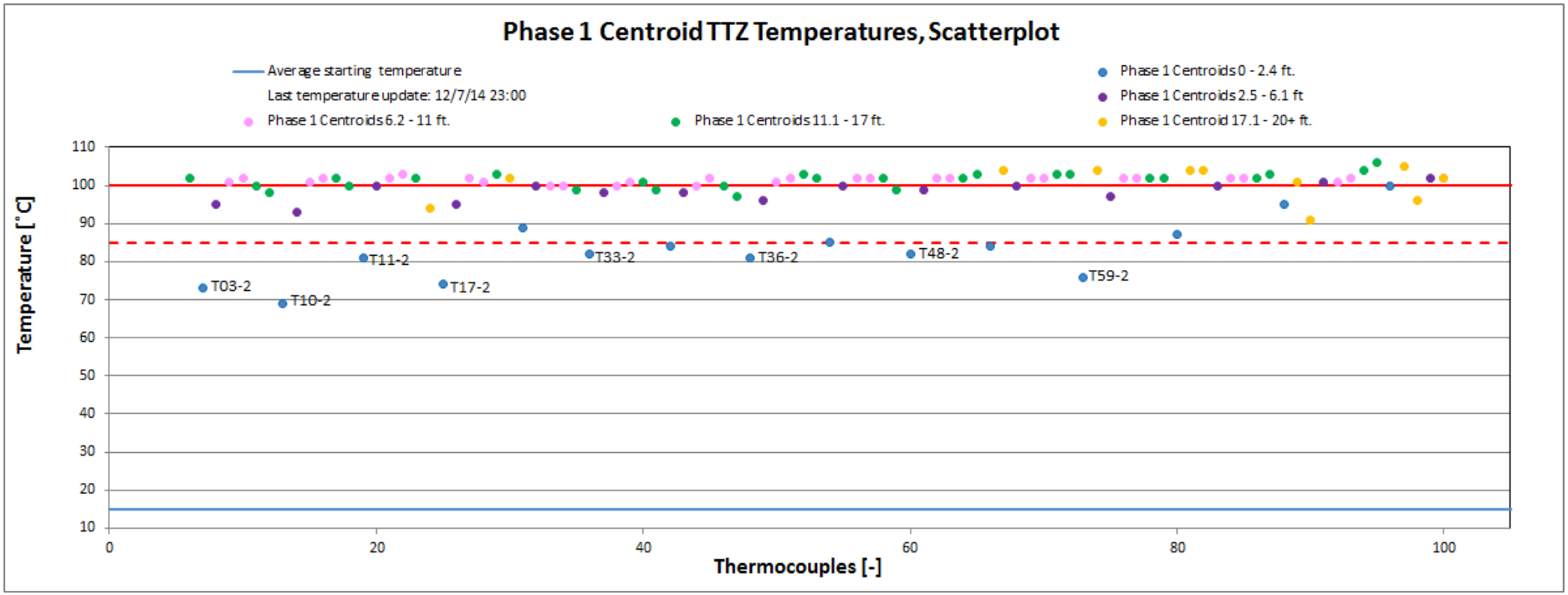


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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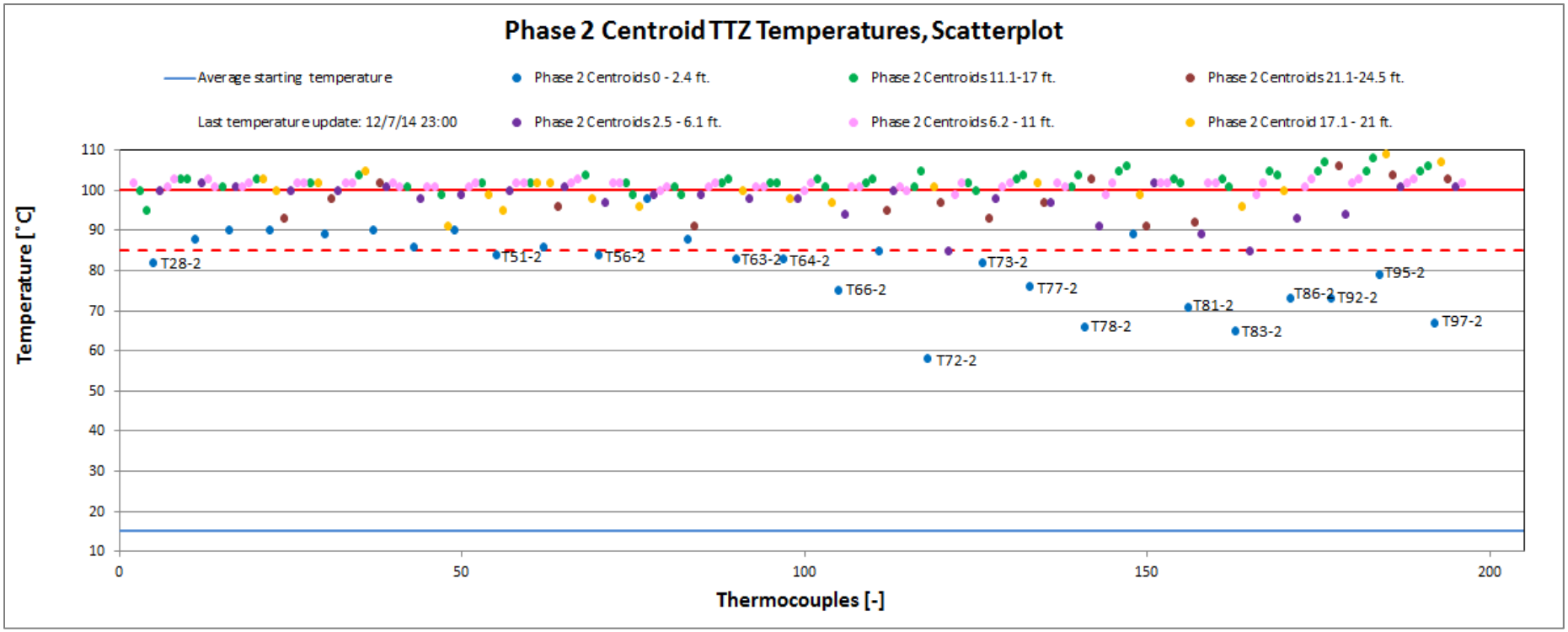


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots		
	Value	**Unit**
Date of Last Update	12/7/14	
Phase 1 Centroid Thermocouples ≥85 °C	100	%
Phase 1 Centroid Thermocouples ≥100 °C	94	%
Phase 2 Centroid Thermocouples ≥85 °C	99	%
Phase 2 Centroid Thermocouples ≥100 °C	85	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday, 5 December 2014 through Friday, 12 December 2014, with temperatures updated through Sunday, 14 December 2014.

Table 1 provides a summary of the project operational status as of Friday, 12 December 2014.

Table 1: Project Summary

Summary

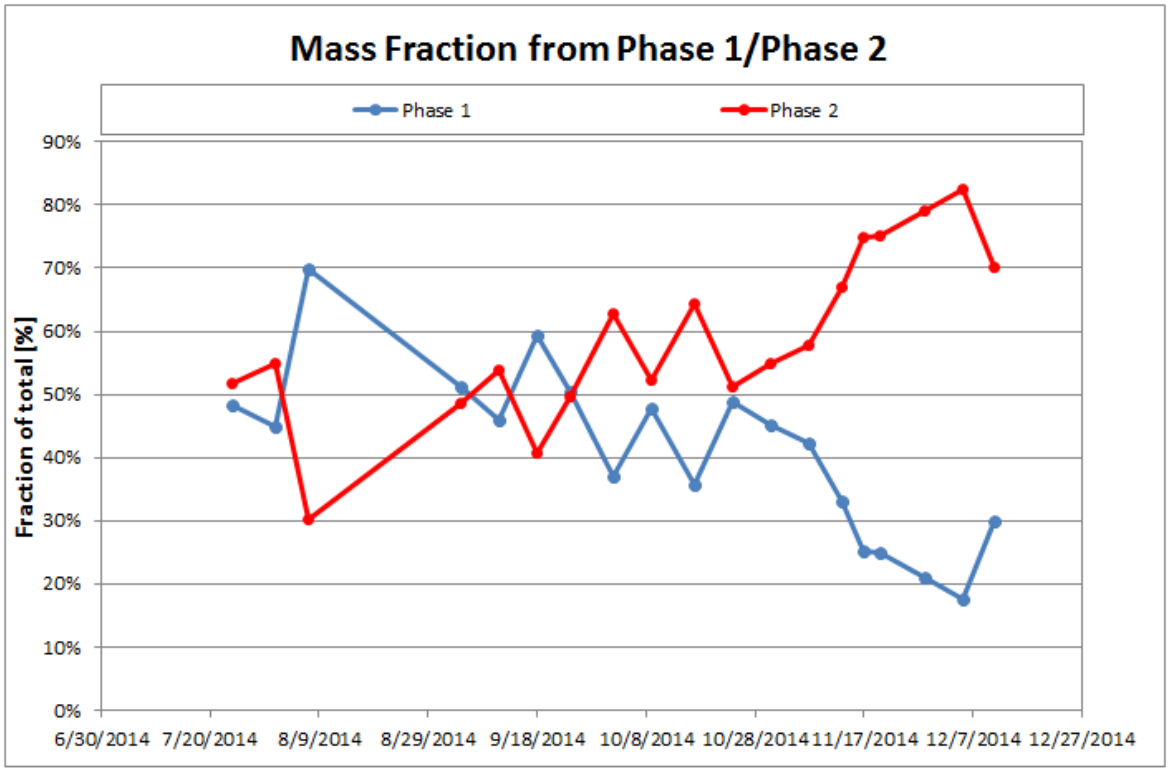
	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	12/12/14	
Last Temperature Data Update	12/14/14	
Days of Operation (Total)	187	days
Days of Phase 1 Operation	158	days
Days of Phase 2 Operation	78	days
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	12,084,900	kWh
Used Electrical Energy vs. Estimate	76.5	%
Total Mass Removal	418,145	lbs
Average Power Input Last 24 Hours	1,530	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,594	scfm
Average Condensate Production Rate Last 24 Hours	4.0	gpm

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Phase 2 remains online and at full power. Phase 2 has operated for 78 days. The current average wellfield temperature for Phase 1 is 99°C. Phase 1 operated for a total of 158 days, which represents days where heaters operated at or above 70% and to the collection date of the last confirmation soil sample (per contract definition). All three temperature milestones have been achieved for Phase 1 and temperature milestones 1 and 2 have been achieved for Phase 2.

Estimated mass removed to date is reported using the flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. These results yield a total mass removal of 418,145 lbs as of 12/12/14. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 12/11/14. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.30:0.70. These ratios were then applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase and leg. These data are included in Tables 2 and 3. Mass fraction data over time is presented below.



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Table 2. PID Readings Collected from Manifold Legs

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14
1	SV-1	215	100	745	602	720	604	590	1181	550	516	5	770	712	851	845	790	450	360	236
	SV-2	742	173	1271	887	872	1129	1318	2987	780	770	1610	1004	931	1179	600	934	660	677	482
	SV-3	2588	872	3609	2854	1198	3395	1414	5512	2643	1120	3971	1430	627	99	101	3138	1717	1782	1218
	SV-4	1971	307	2543	1921	1514	2652	1153	4790	1927	3820	3275	2204	2650	3297	1375	2903	1510	2341	1278
	SV-5	1817	279	1642	740	444	1407	1197	4790	759	1411	950	1153	802	326	302	490	402	135	243
	SV-6	4480	332	1926	956	765	4283	2347	11564	3525	9177	5750	4780	4919	5854	1083	2100	601	435	1271
	SV-8	3222	385	1330	2375	1479	3267	1816	4744	179	172	3815	1881	1850	88	1475	940	401	450	890
	SV-9	3245	142	324	1993	1565	2995	1777	11950	2762	4967	3801	2121	2863	3227	1265	801	1209	1040	1480
	SV-10	1896	131	2148	1096	1111	2459	1517	4382	1933	1745	3384	2841	1318	4121	1494	1982	1302	1221	3215
	SV-11	1016	666	1712	1979	2145	1988	930	2534	1393	2687	1950	1469	1380	596	596	1360	750	641	270
	SV-12	80	53	158	139	104	815	1427	3234	682	1102	1090	2100	512	563	206	413	440	426	1413
	SV-13	417	211	736	145	170	1452	1476	4291	1109	375	370	985	380	295	315	1210	210	131	432
	SV-14	632	452	1526	2636	1450	777	1610	3411	1917	4668	4274	4150	5565	8416	1107	1053	630	500	1288
	SV-15	3440	1072	1153	2000	915	2150	2054	608	3265	4890	4801	5780	5000	618	654	1623	730	660	1007
2 (and between divider line)	SV-7	3843	366	1751	1210	1482	4307	1835	3337	3672	9379	7350	5812	7910	553	3115	6391	2860	2977	2810
	SV-16	3113	885	233	1911	1703	2823	2216	6230	3165	6888	4994	3841	6029	11	2340	6276	3118	3307	7931
	SV-17	3715	429	306	2928	1824	2801	1837	8933	1927	2713	2954	3313	5408	389	1670	10903	1983	1335	409
	SV-18	1760	862	1203	2034	1634	2388	2446	15000	3554	5030	2815	2465	5632	13871	3377	4768	3650	5071	3361
	SV-19	2258	350	2067	1971	2005	1818	2038	10522	2191	6417	4561	4398	3067	2693	1075	875	925	530	528
	SV-20	1990	796	1545	2344	1610	2268	2158	15000	2853	2305	2059	343	4053	8642	3534	5500	2725	12650	6352
	SV-21	1964	487	2295	2077	1855	3458	1755	8561	2756	8053	4661	2119	4298	2631	2264	6000	4186	4440	2002
	SV-22	2670	980	1606	2222	1892	2466	2448	14750	3344	5023	3578	2236	3582	55	3460	4765	3450	11187	4509
	SV-23	2515	671	3248	3158	2165	3233	1532	8102	2973	7684	4880	3933	2707	4560	4005	5367	2993	2598	1326
	SV-24	1412	638	1504	2406	1567	1669	1949	11882	1999	6130	4554	5005	6223	8864	2843	4555	2946	4280	3267
	SV-25	688	220	1261	1035	1059	1350	2418	5725	1542	2247	1873	1743	1925	991	570	1301	740	773	500
	SV-26	90	185	350	580	573	638	1133	1119	790	3559	4305	4752	4633	1933	865	2742	710	520	642
	SV-27	192	151	718	944	789	1117	1518	3922	1256	1485	1650	947	840	1040	313	769	745	620	318
	SV-28	15	87	77	151	178	310	211	730	335	1250	3624	5592	5447	4380	1438	6351	1440	1100	1588
	SV-29	8	66	55	20	52	130	1	15	35	21	352	255	83	41	1375	43	80	41	52
Breakdown of Wellfield VOC Flux by Phase																				
Phase 1:		48%	45%	70%	51%	46%	59%	51%	37%	48%	36%	49%	45%	42%	33%	25%	25%	21%	18%	30%
Phase 2:		52%	55%	30%	49%	54%	41%	50%	63%	52%	64%	51%	55%	58%	67%	75%	75%	79%	82%	70%

Table 3. Estimated Mass Loading by Manifold Leg/Phase

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14
1	SV-1	0.5%	0.7%	3.5%	1.5%	3.0%	1.6%	1.7%	1.0%	1.1%	0.7%	0.0%	1.3%	0.8%	1.2%	2.2%	1.2%	1.0%	0.6%	0.6%
	SV-2	2.0%	1.3%	4.3%	2.6%	3.6%	3.0%	4.7%	2.5%	1.9%	0.8%	2.4%	1.8%	1.2%	1.7%	1.6%	1.3%	1.4%	1.3%	1.3%
	SV-3	3.5%	7.5%	16.2%	7.4%	5.0%	8.9%	5.0%	4.5%	7.1%	1.3%	5.7%	2.6%	0.7%	0.2%	0.3%	5.1%	4.2%	3.3%	3.2%
	SV-4	3.3%	2.5%	8.5%	5.7%	5.5%	5.9%	3.3%	3.5%	4.8%	3.9%	4.5%	3.2%	3.1%	3.8%	3.0%	4.4%	3.5%	4.5%	3.0%
	SV-5	2.5%	2.9%	9.6%	2.5%	1.6%	3.1%	3.2%	3.2%	2.1%	1.9%	1.4%	1.5%	1.0%	0.5%	0.9%	0.7%	1.0%	0.3%	0.6%
	SV-6	2.5%	1.4%	3.8%	1.6%	1.2%	4.1%	3.0%	3.4%	3.7%	4.5%	3.5%	3.0%	2.4%	3.1%	1.1%	1.6%	0.6%	0.3%	1.4%
	SV-8	8.7%	2.9%	4.4%	7.1%	6.3%	8.7%	6.8%	3.1%	0.4%	0.1%	5.9%	3.5%	4.4%	0.1%	4.2%	1.6%	1.0%	0.8%	2.6%
	SV-9	9.0%	0.9%	1.3%	6.0%	5.8%	8.4%	6.4%	7.3%	6.9%	6.6%	6.2%	3.9%	6.8%	4.8%	3.6%	1.0%	2.5%	2.0%	3.7%
	SV-10	2.4%	0.5%	3.0%	1.3%	1.7%	2.1%	1.8%	1.5%	2.2%	0.9%	2.0%	2.1%	0.7%	2.3%	1.6%	1.4%	1.1%	1.0%	3.6%
	SV-11	1.3%	2.3%	3.4%	2.2%	3.4%	1.9%	1.0%	0.9%	1.5%	1.4%	1.2%	1.0%	0.6%	0.3%	0.5%	1.2%	0.7%	0.5%	0.3%
	SV-12	0.3%	0.5%	0.6%	0.4%	0.5%	2.3%	4.8%	2.4%	1.6%	1.4%	1.8%	2.7%	1.2%	1.0%	0.7%	0.7%	1.0%	0.8%	3.7%
	SV-13	0.6%	0.9%	1.6%	0.2%	0.3%	1.4%	2.0%	1.3%	1.2%	0.2%	0.2%	0.7%	0.2%	0.2%	0.4%	0.8%	0.2%	0.1%	0.4%
	SV-14	2.3%	6.1%	5.8%	7.5%	5.5%	2.2%	1.1%	2.0%	4.5%	6.3%	6.9%	7.4%	12.7%	13.1%	3.3%	1.8%	1.5%	0.9%	3.3%
	SV-15	9.5%	14.7%	3.9%	5.3%	2.8%	5.6%	5.7%	0.5%	8.8%	5.8%	6.9%	10.4%	6.4%	0.9%	1.8%	2.3%	1.5%	1.3%	2.3%
2 (and between divider line)	SV-7	2.2%	1.5%	1.9%	1.5%	2.9%	4.2%	2.3%	1.1%	3.9%	4.8%	3.8%	4.0%	3.2%	0.3%	3.1%	5.3%	2.5%	2.1%	3.3%
	SV-16	9.5%	7.1%	1.1%	5.7%	6.2%	6.6%	6.9%	5.2%	8.0%	8.7%	6.9%	6.9%	8.0%	0.0%	6.8%	10.3%	10.5%	6.6%	18.3%
	SV-17	2.9%	0.1%	-3.3%	2.1%	1.6%	-1.5%	-0.6%	-0.5%	-1.6%	-3.1%	-2.0%	-1.3%	0.0%	-2.8%	0.7%	6.0%	1.3%	0.7%	-1.0%
	SV-18	5.5%	11.4%	4.9%	6.8%	5.6%	6.7%	7.8%	13.0%	9.5%	6.6%	3.6%	4.3%	7.1%	22.8%	10.5%	8.2%	14.5%	9.1%	7.9%
	SV-19	3.6%	0.3%	-2.0%	5.5%	6.3%	0.6%	2.8%	3.0%	3.2%	6.5%	6.4%	4.3%	3.0%	3.4%	2.0%	0.7%	1.2%	0.7%	0.9%
	SV-20	7.2%	12.0%	7.2%	6.2%	6.3%	5.7%	5.5%	11.9%	6.1%	2.8%	2.9%	0.6%	5.0%	14.1%	11.0%	8.9%	8.7%	23.9%	14.6%
	SV-21	2.6%	2.0%	3.8%	0.9%	2.4%	3.2%	2.9%	3.6%	2.5%	5.3%	1.6%	-0.4%	2.2%	0.2%	3.5%	6.3%	5.8%	4.3%	1.4%
	SV-22	8.5%	9.3%	8.3%	5.9%	7.6%	6.7%	7.0%	12.2%	8.5%	6.7%	4.8%	3.9%	4.4%	0.1%	9.9%	5.4%	11.5%	19.8%	11.5%
	SV-23	5.2%	-2.9%	-2.4%	1.9%	4.4%	-0.3%	0.5%	0.3%	1.0%	8.8%	1.3%	4.6%	2.9%	6.2%	10.3%	3.2%	3.4%	2.6%	-0.2%
	SV-24	4.0%	8.5%	9.4%	7.2%	6.2%	4.4%	5.6%	10.3%	4.7%	8.0%	6.8%	7.4%	7.4%	13.6%	8.3%	6.5%	11.3%	8.5%	7.7%
	SV-25	-0.1%	1.1%	0.0%	0.7%	0.8%	0.1%	1.5%	0.1%	1.4%	2.1%	0.2%	1.3%	1.2%	-0.2%	0.0%	0.5%	0.3%	0.4%	0.1%
	SV-26	0.3%	2.2%	1.9%	1.9%	2.4%	1.6%	3.4%	1.0%	1.6%	4.3%	6.8%	8.1%	5.9%	3.2%	2.7%	3.9%	2.8%	1.1%	1.7%
	SV-27	0.1%	0.7%	-0.5%	1.7%	0.4%	1.4%	3.2%	1.2%	2.4%	1.1%	2.0%	0.4%	0.2%	0.0%	-1.5%	0.1%	0.7%	0.5%	0.2%
	SV-28	0.0%	1.0%	0.5%	0.6%	0.7%	0.8%	0.6%	0.5%	0.9%	1.7%	5.5%	10.1%	6.9%	6.1%	3.8%	9.5%	4.2%	2.0%	3.4%
	SV-29	0.0%	0.6%	0.4%	0.1%	0.2%	0.4%	0.0%	0.0%	0.1%	0.0%	0.6%	0.5%	0.2%	0.1%	3.7%	0.1%	0.3%	0.1%	0.1%
	Total:	100%	100%	101%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note: Six out of the 23 wellfield branch lines service both Phase 1 and Phase 2; therfore, a correction has been made to subtract the shared mass sometimes resulting in a negative value. This value indicates that the mass contribution from the Phase 2 area was limited in that particular sample round. This is a result of the accuracy of the flow and PID data measurements collected.

2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperatures for both Phase 1 and Phase 2, as well as the average centroid temperatures. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Phase 2 heating began on 7/16/14 but was stopped on 8/14/14, as a result of the oxidizer shutdown, and reenergized on 09/30/14. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	12/14/14	
Phase 1 Entire TTZ Average Temperature	95	°C
Phase 2 Entire TTZ Average Temperature	99	°C
Phase 1 Centroid Average Temperature	96	°C
Phase 2 Centroid Average Temperature	99	°C

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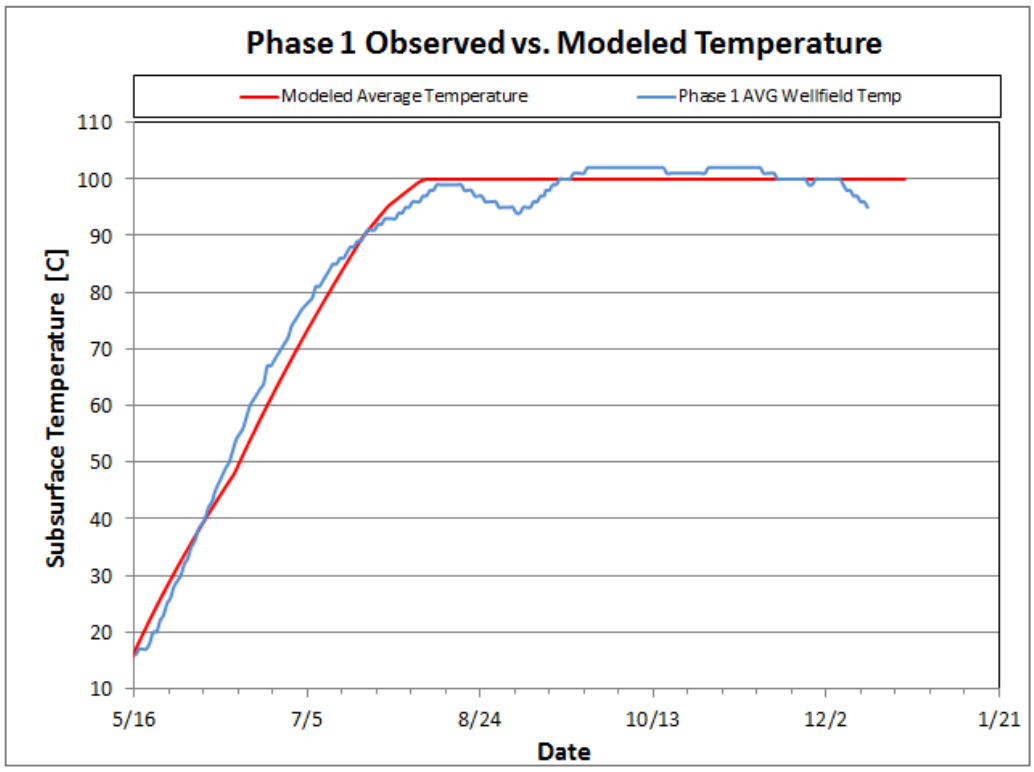


Figure 1a. Phase 1 Observed vs. Modeled Temperature

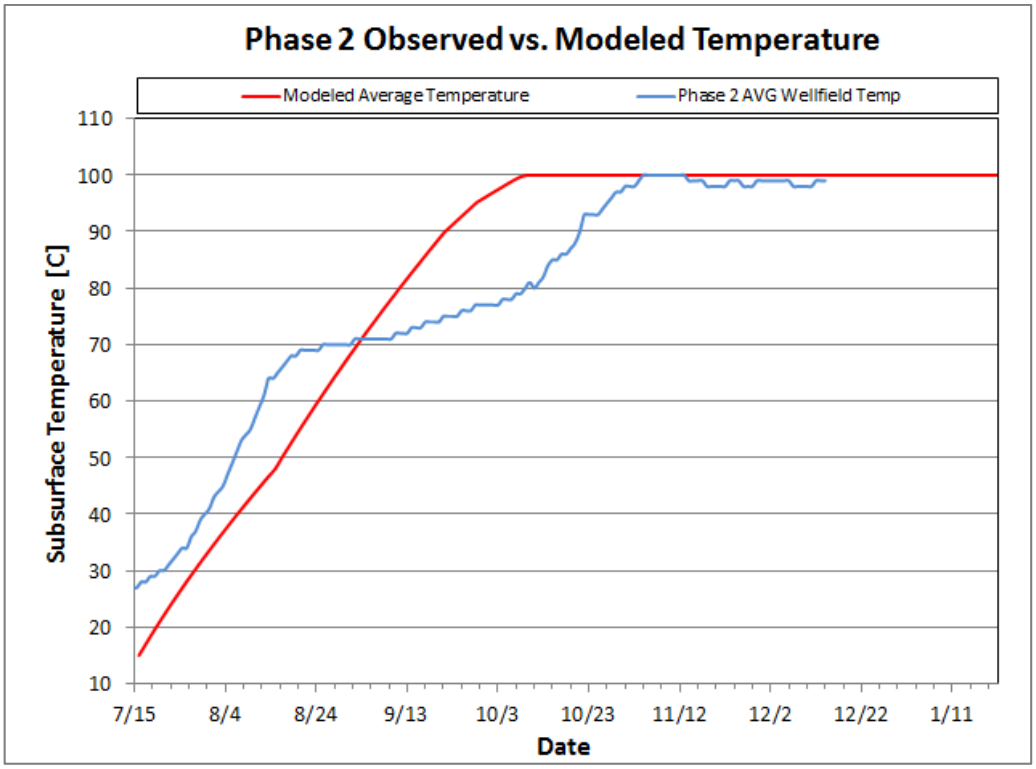


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was increased on 8/30/14.

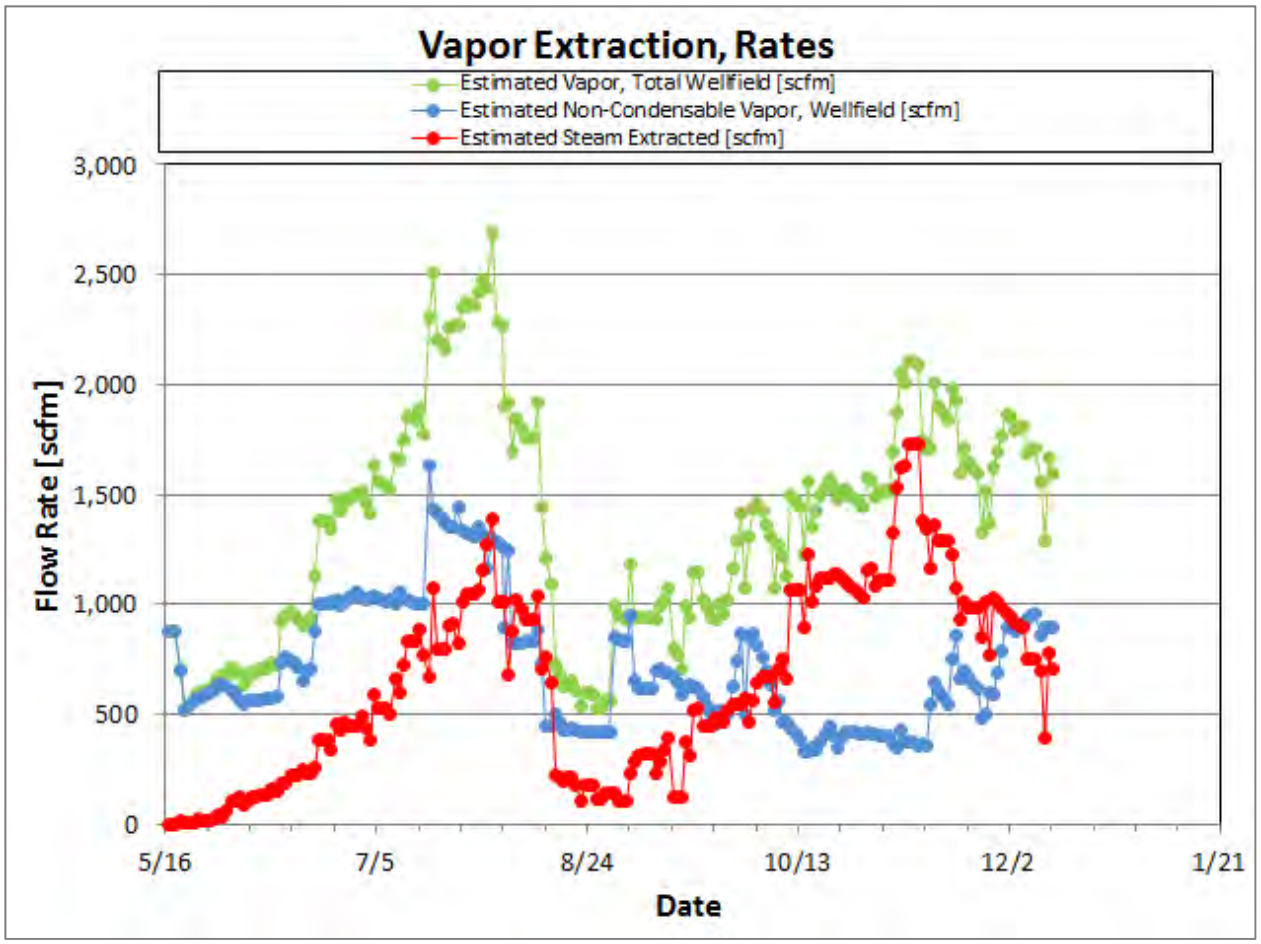


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

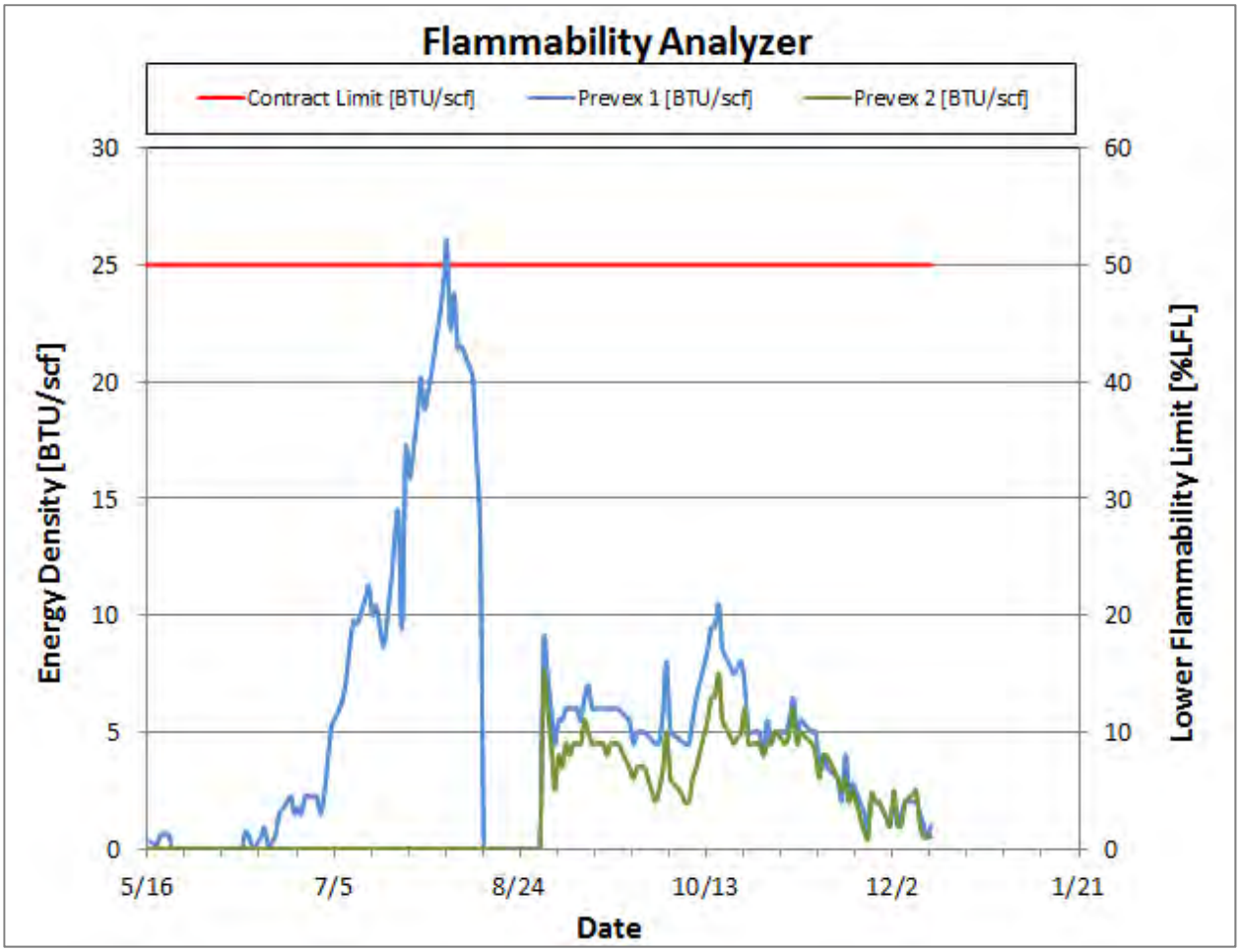


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed to date is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The decrease in mass removed starting on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14, 9/23/14, 9/30/14 , 10/7/14, 10/14/14, 10/21/14, 10/30/14, 11/4/14 and 11/18/14.

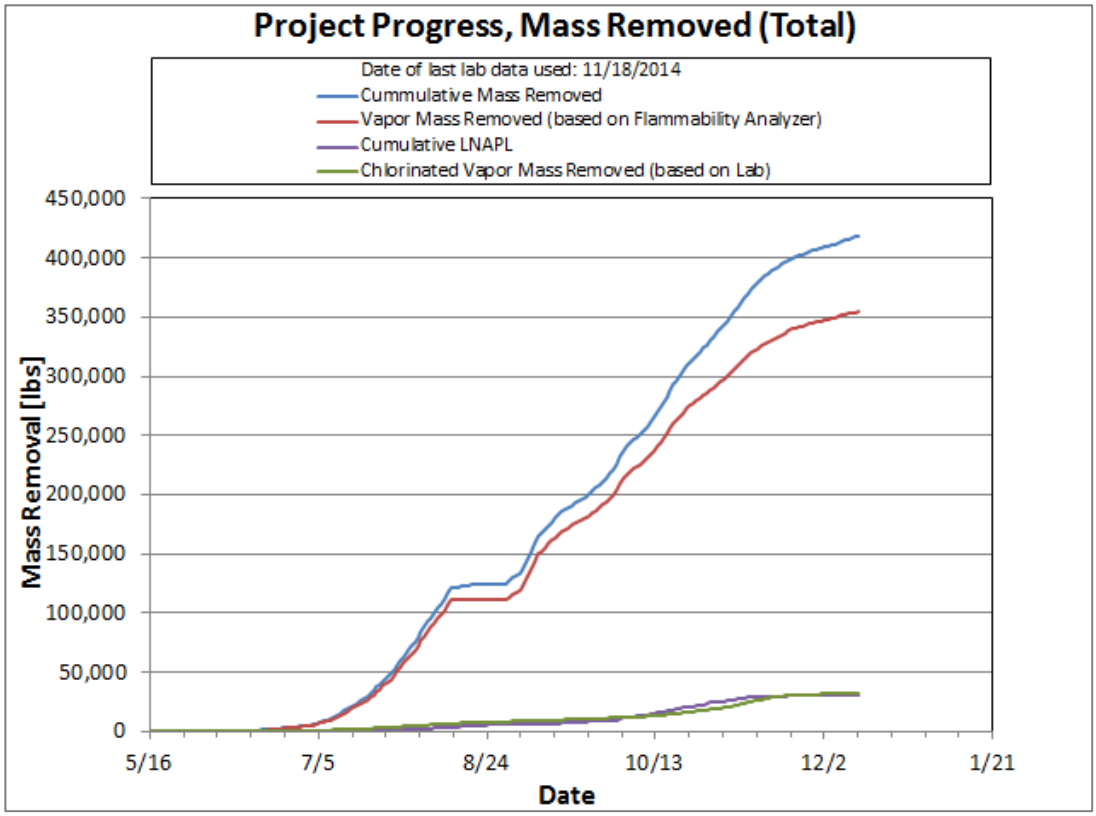


Figure 4a. Project Progress, Mass Removal (Total)

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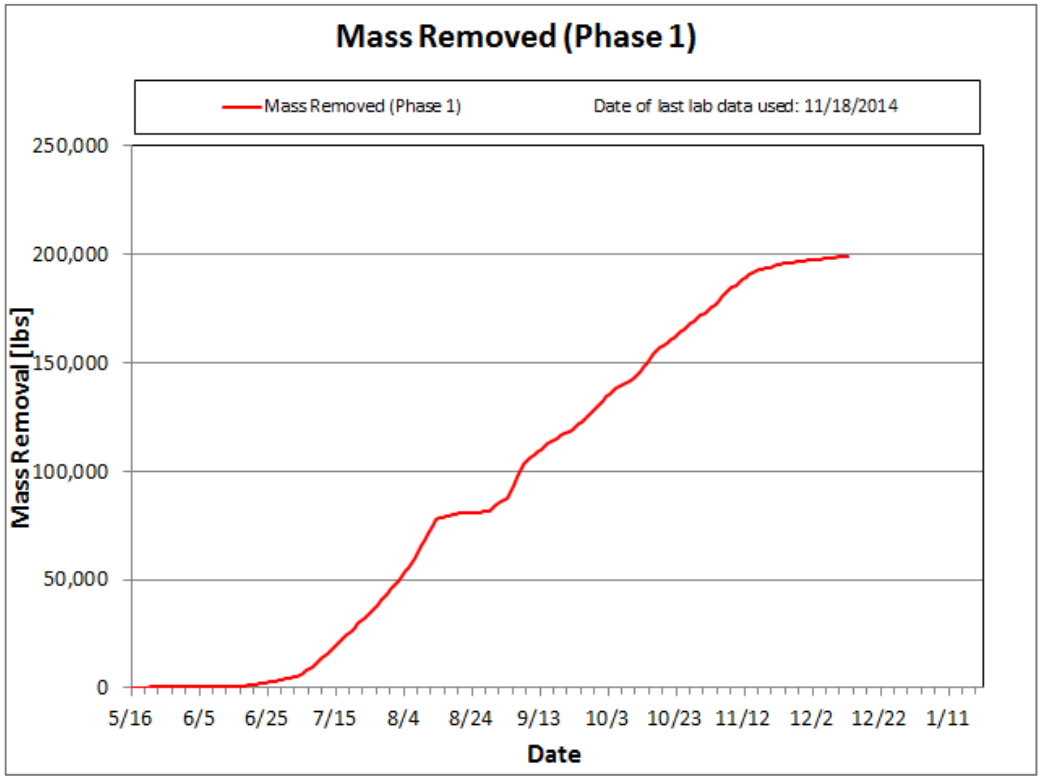


Figure 4b. Project Progress, Mass Removal (Phase 1)

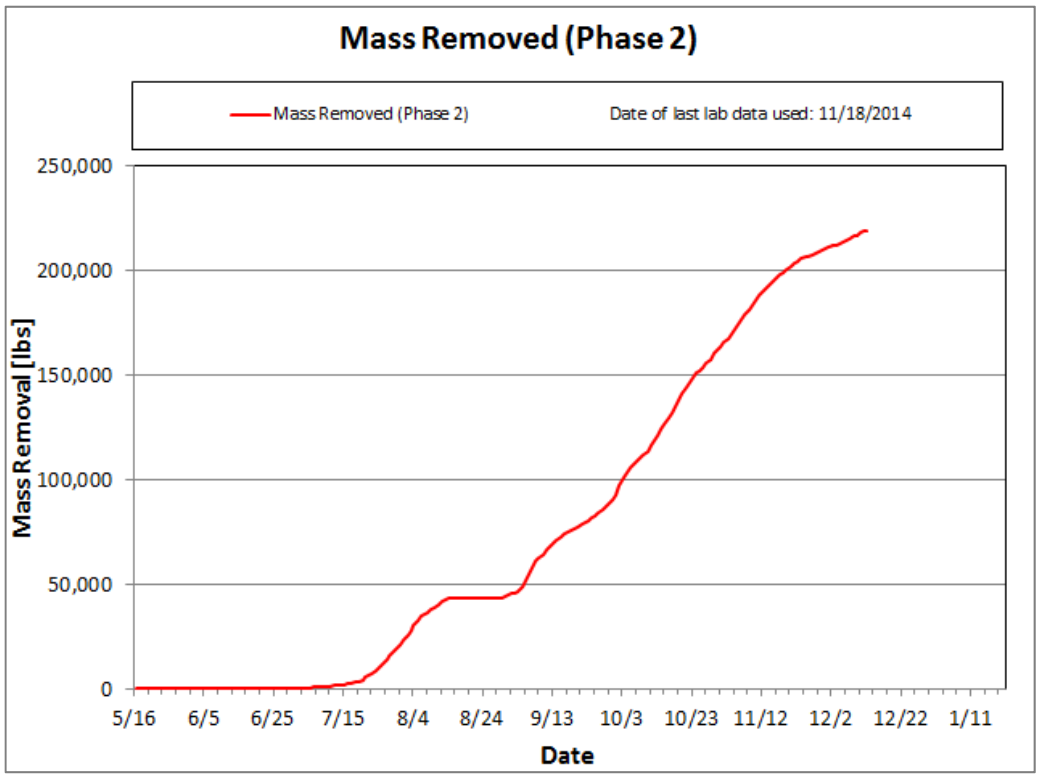


Figure 4c. Project Progress, Mass Removal (Phase 2)

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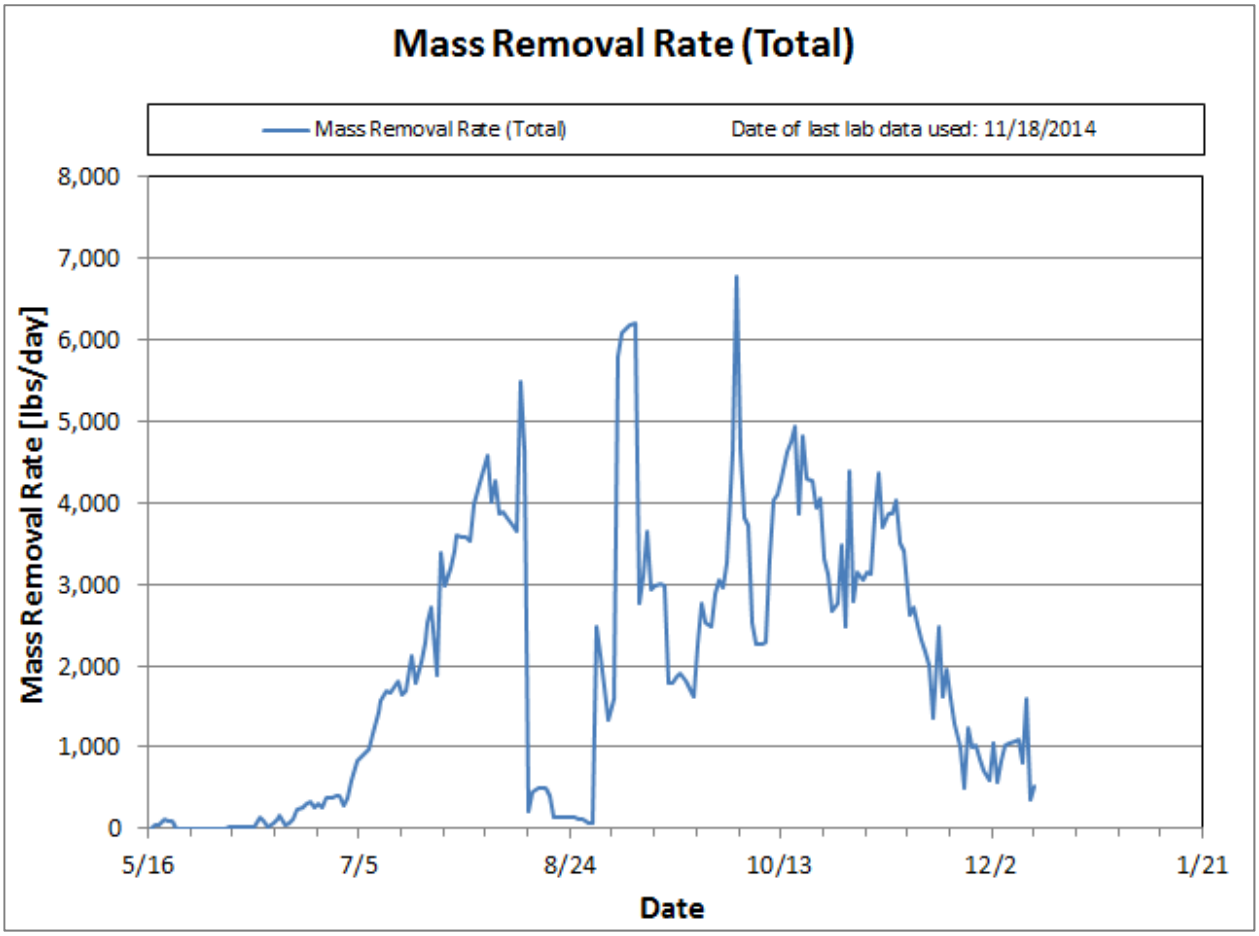


Figure 4d. Mass Removal Rate (Total for Site)

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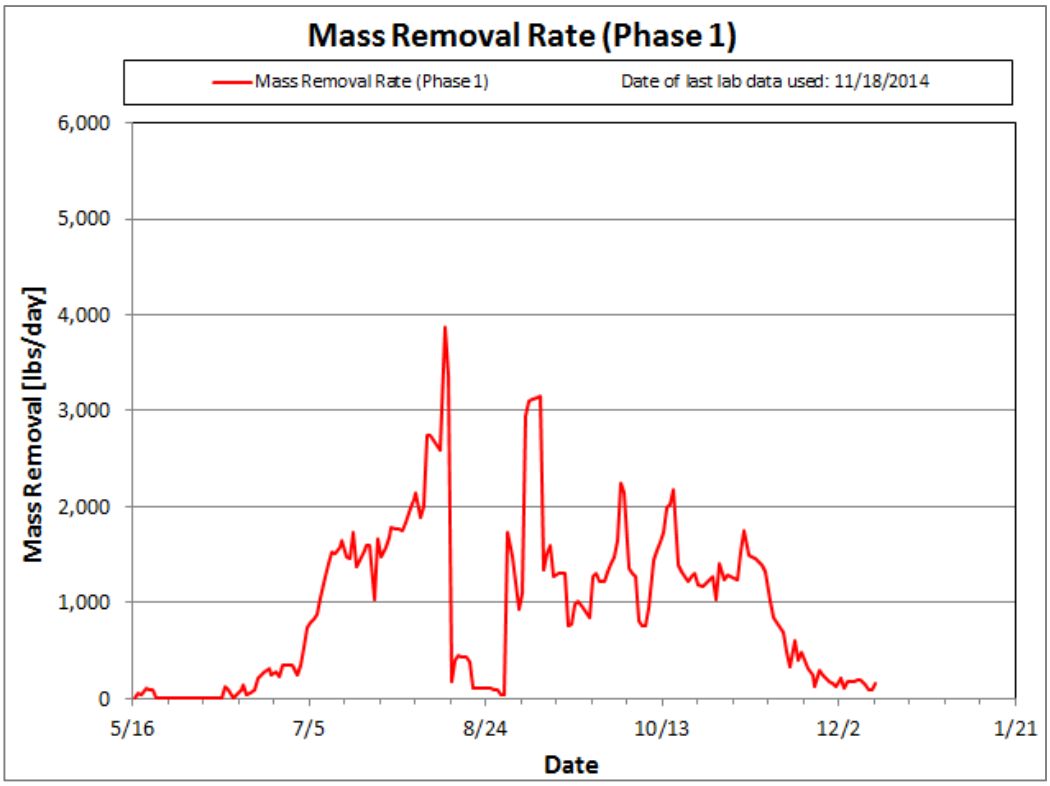


Figure 4e. Mass Removal Rate (Phase 1)

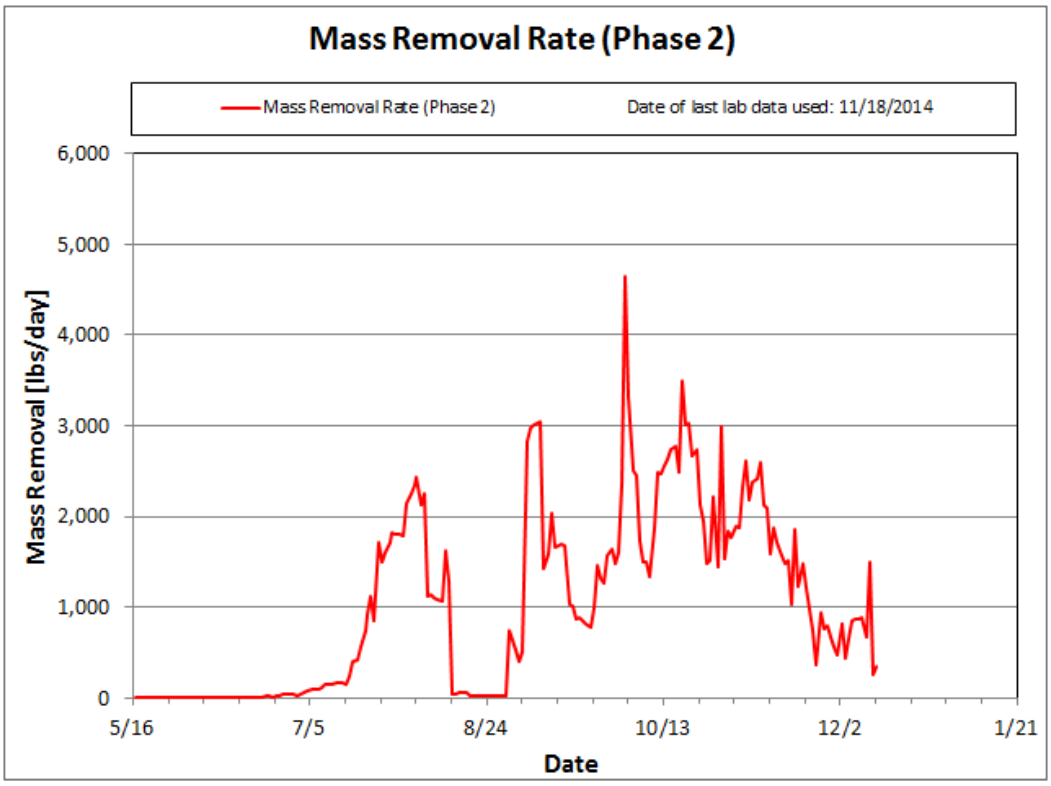


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID and flammability analyzer readings collected at the oxidizer influent over time. It should be noted that PID readings are first collected using an 11.7 eV lamp (determined by site contaminants). If the reading exceeds the limit of the meter (>2000 ppm), the readings are collected using a 10.6 eV lamp. When both meters are used, the maximum value is recorded.

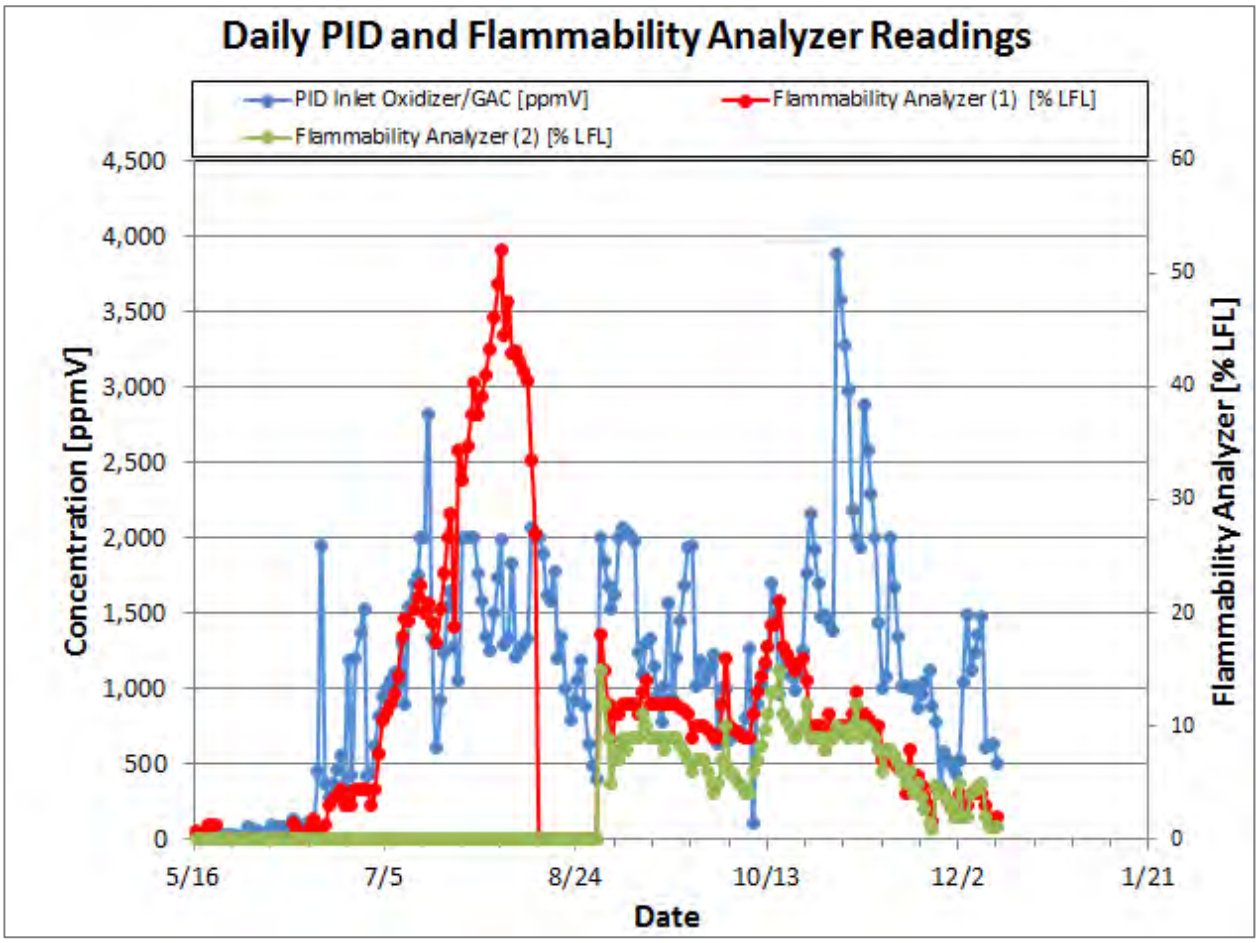


Figure 5. Daily PID and Flammability Analyzer Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13. Decreases in DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-outs.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

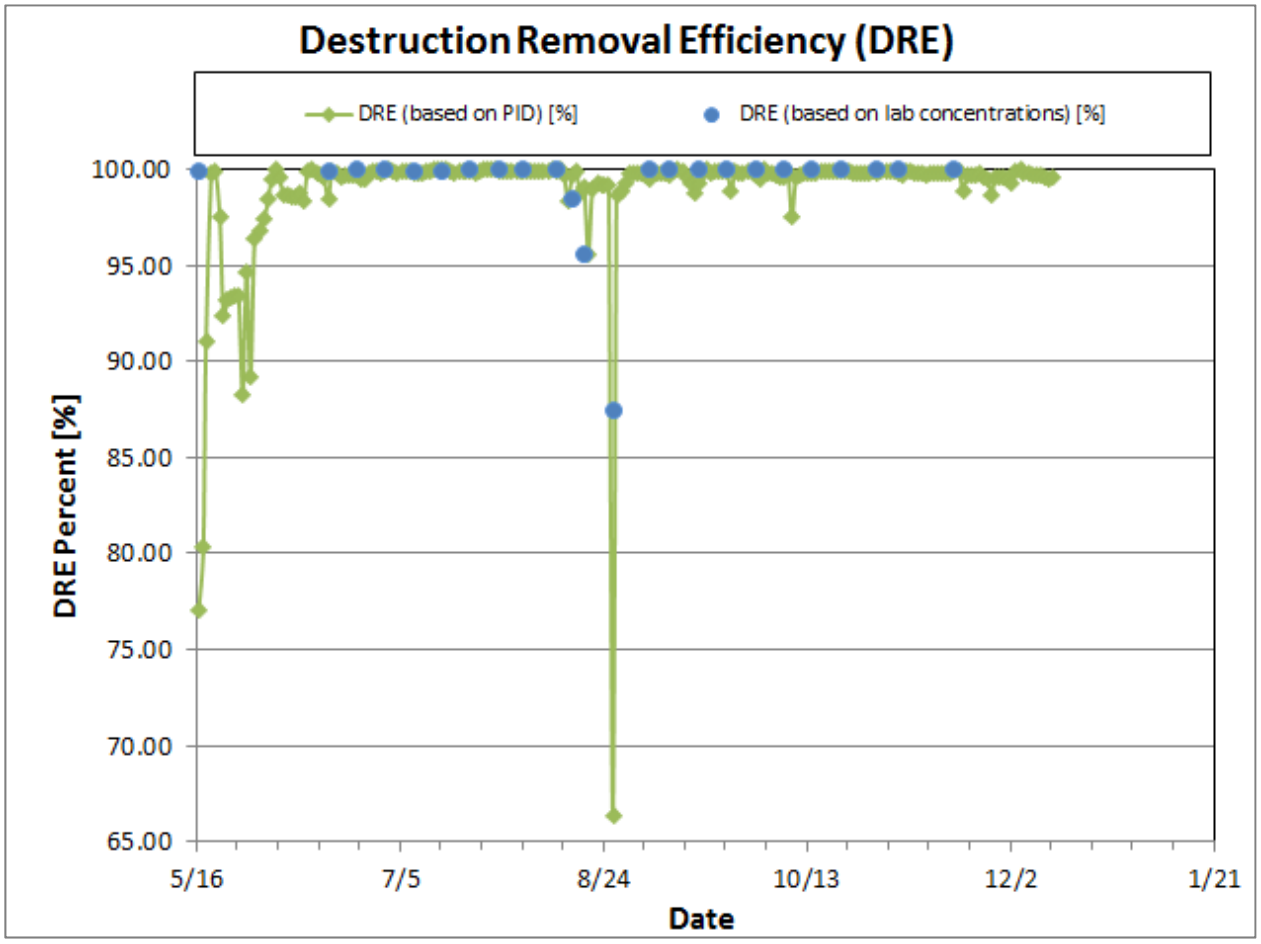


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7. Please note that the graph has been modified to present the estimated modeled energy for the heaters (ISTD) over the original predicted 195 day treatment. This does not take into account contract definitions such as heaters operating at or above 70% energy input. The flatline represents days beyond 195 days.

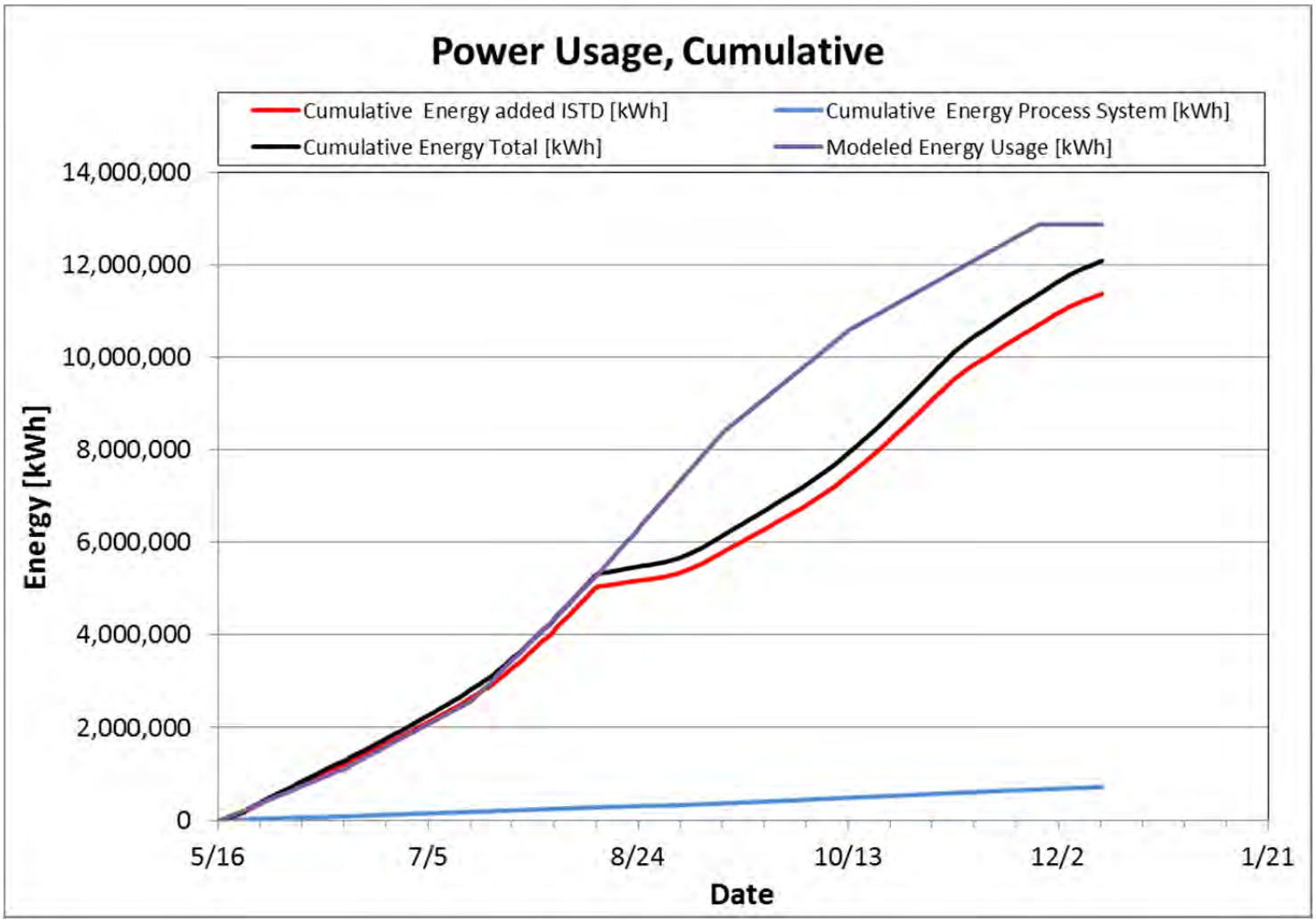


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30/14 and the following days corresponds with ramping of the heaters after placing the oxidizer back online. The decrease observed mid-November is associated with profiling of the heaters in Phase 2 and subsequent adjustments.

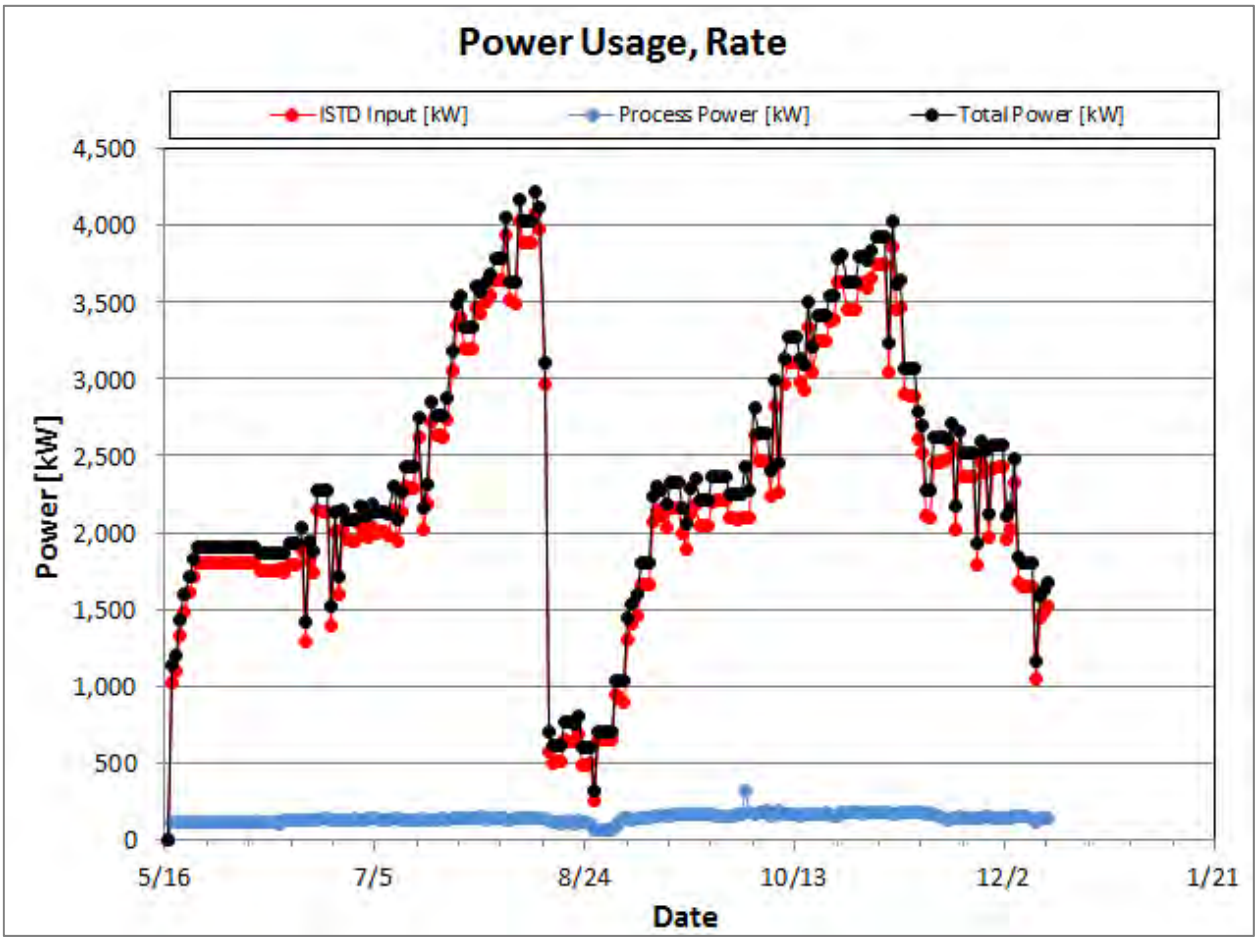


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

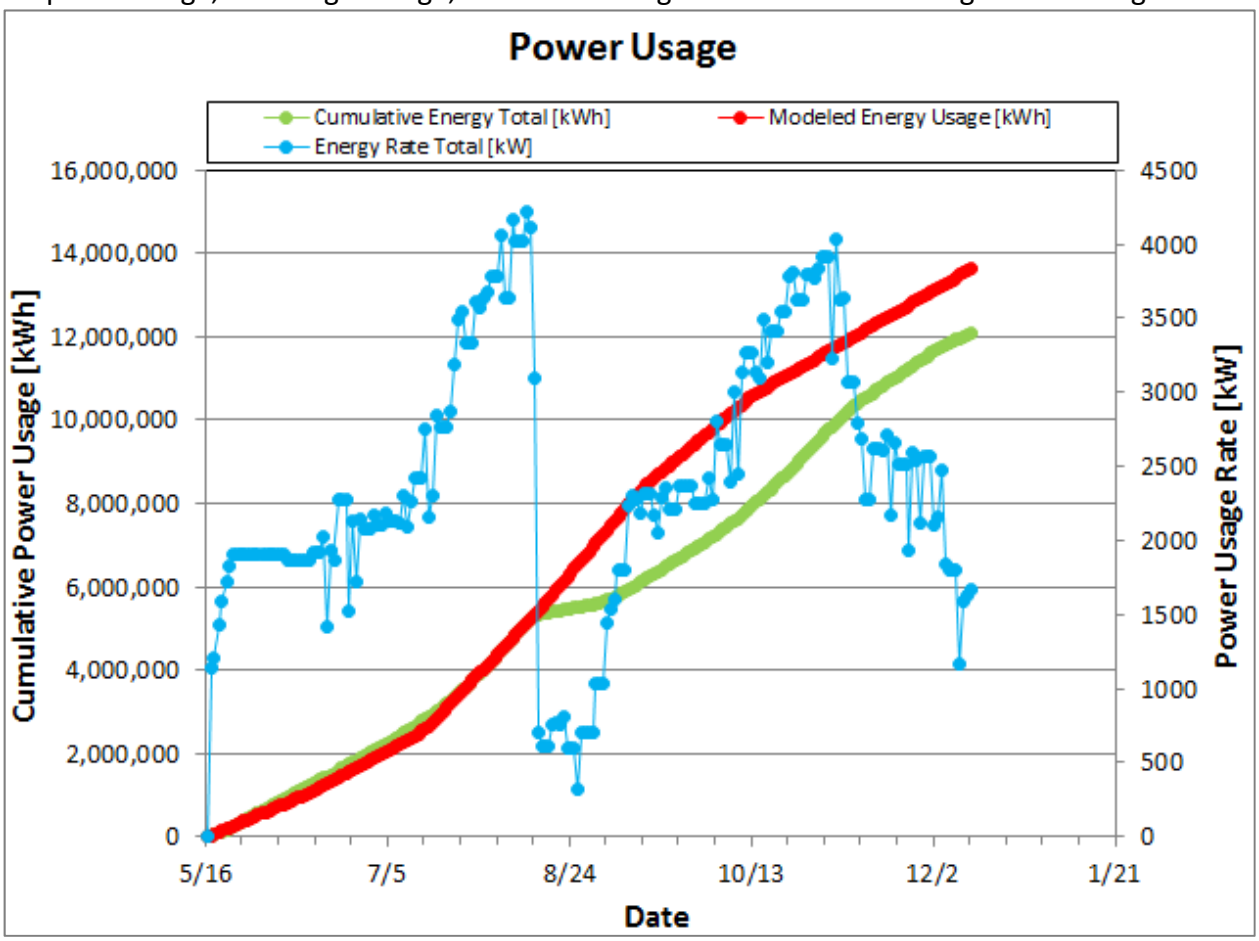


Figure 9. Power Usage

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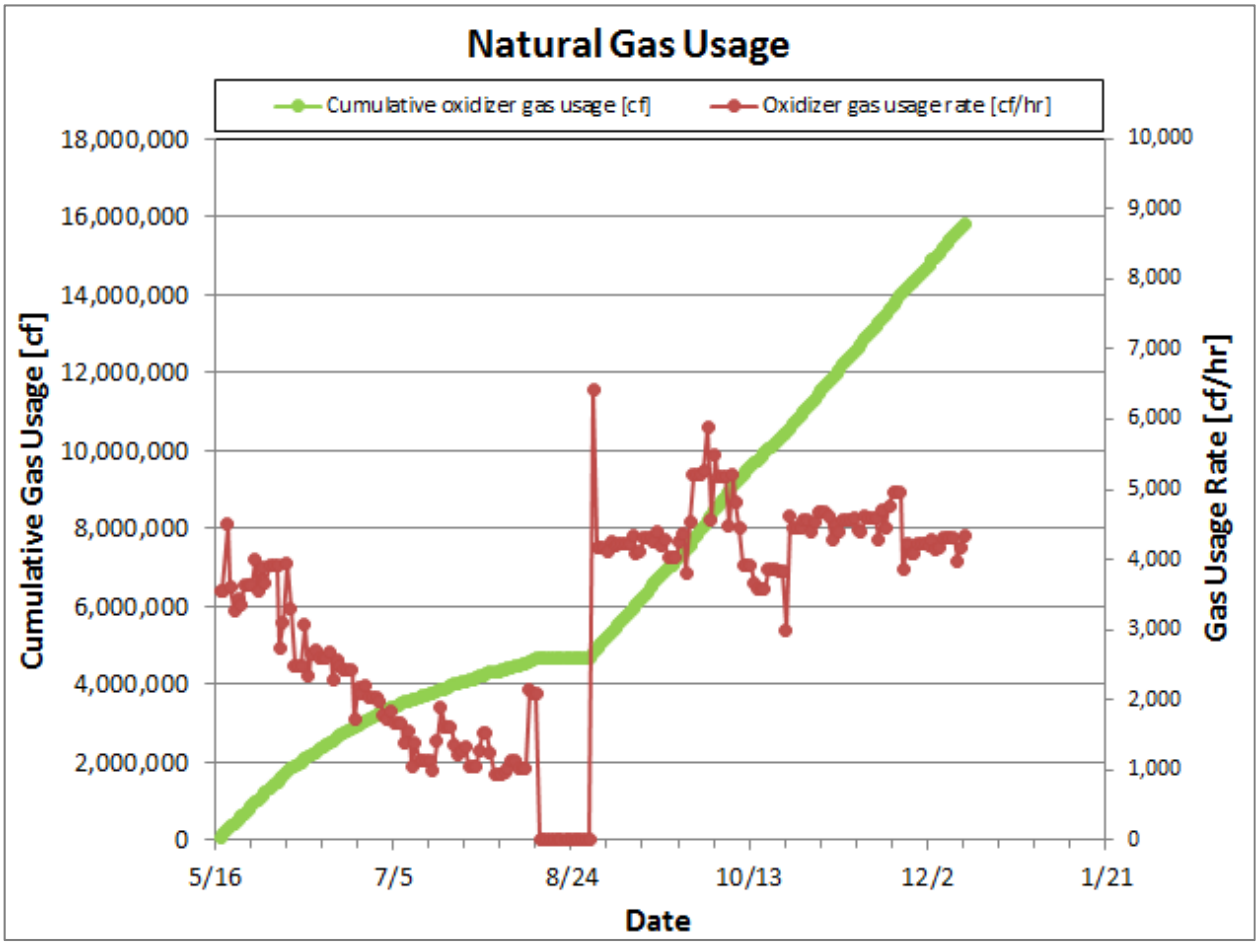


Figure 10. Natural Gas Usage

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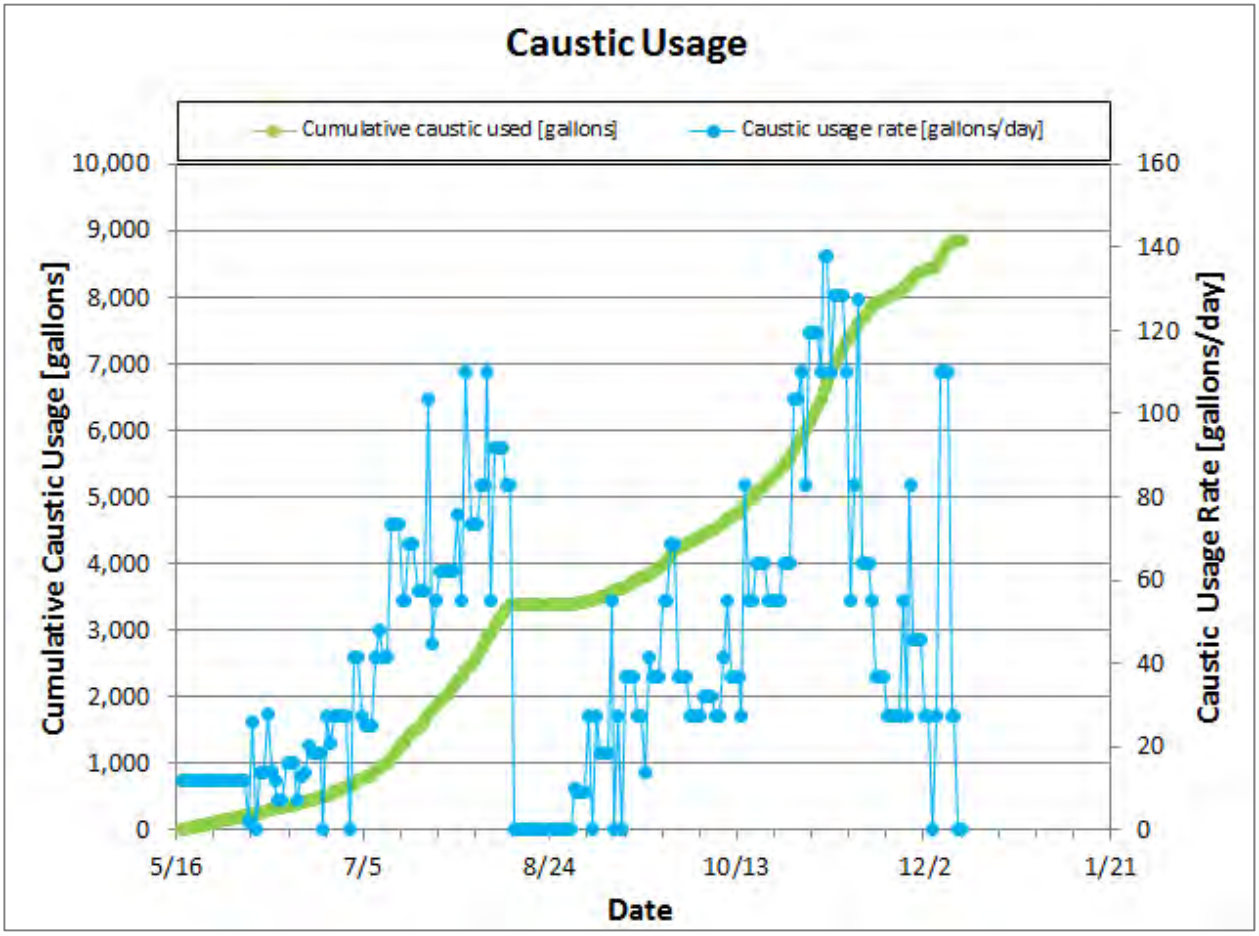


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 and Phase 2 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12a. As of 9/26/14, we have reached all three temperature milestones for phase 1. Phase 2 centroids are shown in Figure 12b. As of 11/18/14, we have achieved two of the three temperature milestones for Phase 2.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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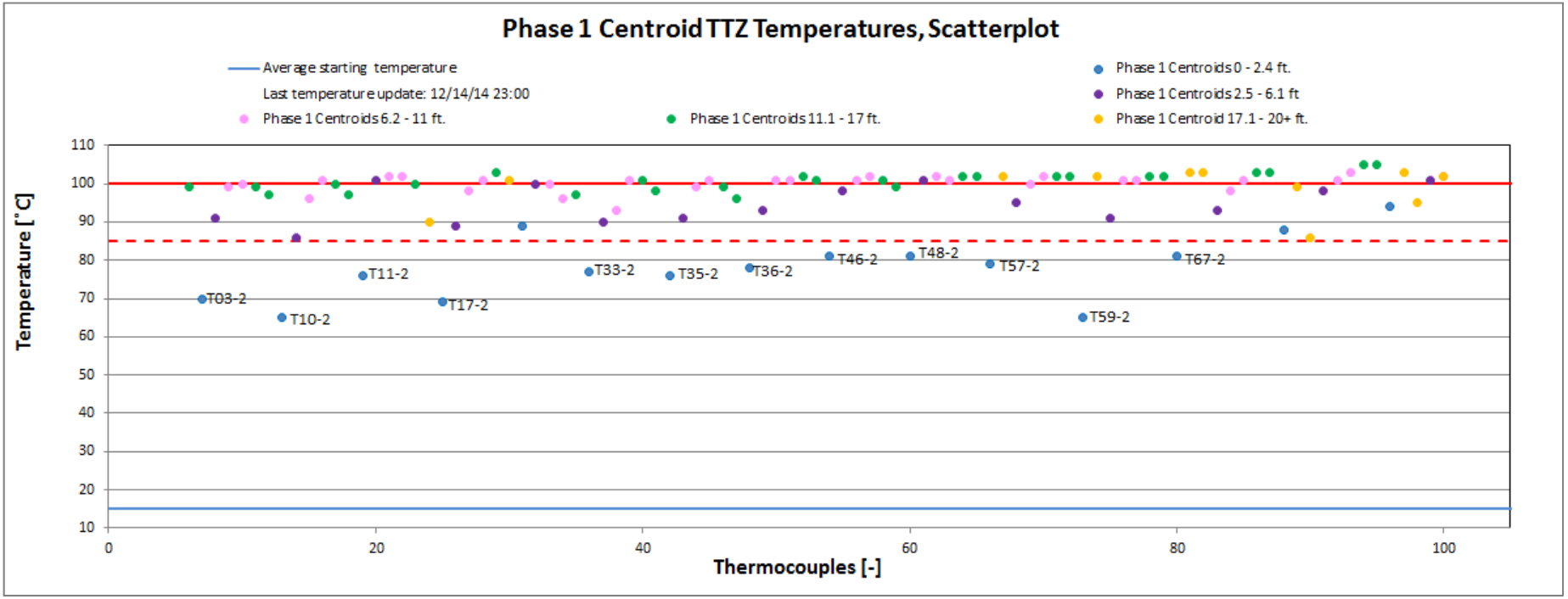


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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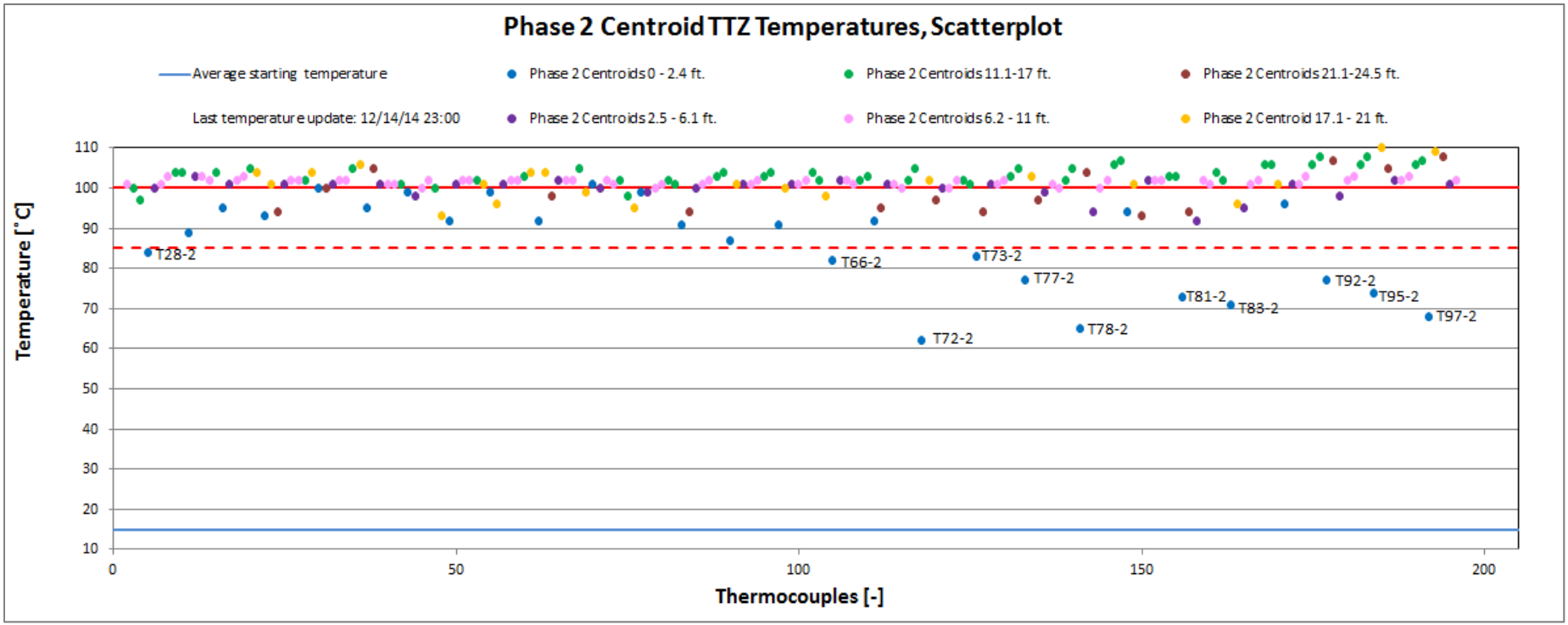


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots		
	Value	**Unit**
Date of Last Update	12/14/14	
Phase 1 Centroid Thermocouples ≥85 ^{0}C	100	%
Phase 1 Centroid Thermocouples ≥100 ^{0}C	94	%
Phase 2 Centroid Thermocouples ≥85 ^{0}C	99	%
Phase 2 Centroid Thermocouples ≥100 ^{0}C	85	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday, 12 December 2014 through Friday, 19 December 2014, with temperatures updated through Sunday, 21 December 2014.

Table 1 provides a summary of the project operational status as of Friday, 19 December 2014.

Table 1: Project Summary

Summary

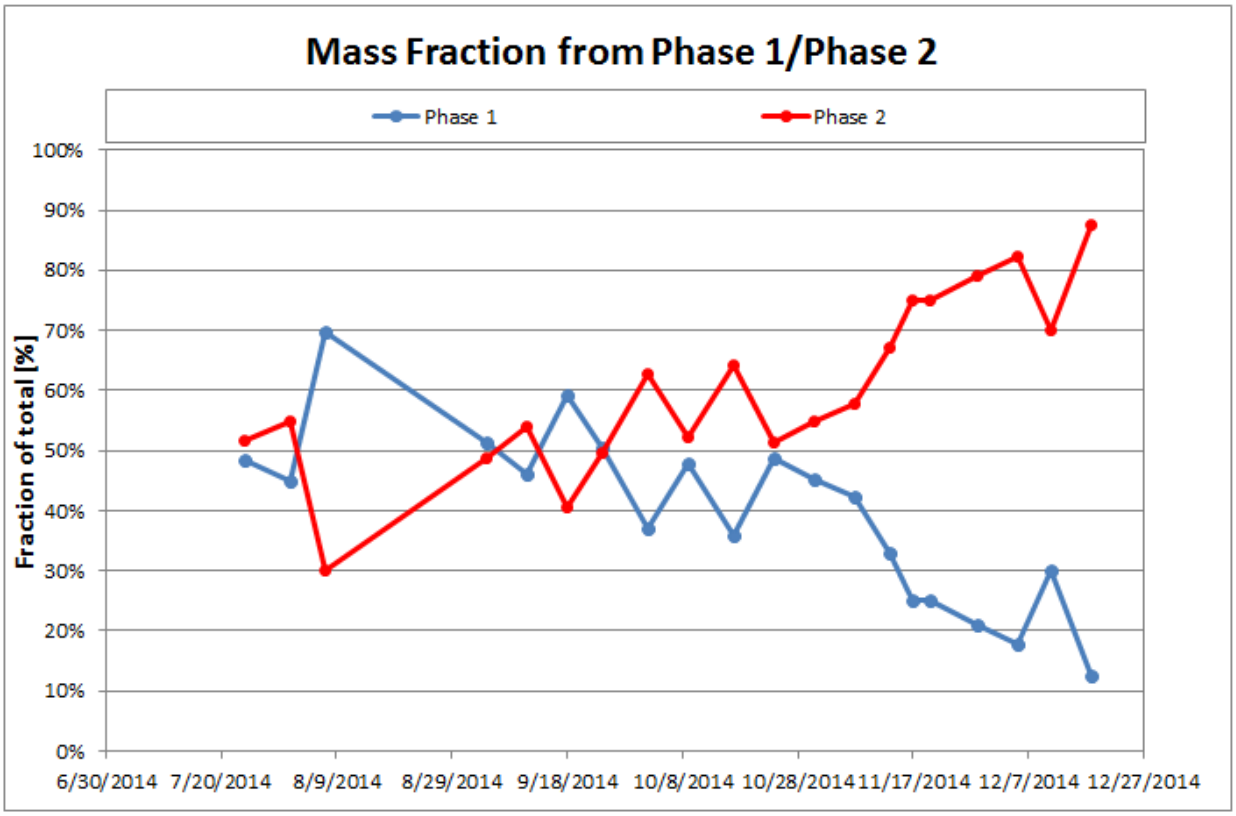
	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	12/19/14	
Last Temperature Data Update	12/21/14	
Days of Operation (Total)	194	days
Days of Phase 1 Operation	158	days
Days of Phase 2 Operation	85	days
Total Design ISTD Energy Input	15,795,000	kWh
Total Energy Added (ISTD)	12,470,500	kWh
Used Electrical Energy vs. Estimate	79.0	%
Total Mass Removal	415,743	lbs
Average Power Input Last 24 Hours	2,180	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,809	scfm
Average Condensate Production Rate Last 24 Hours	5.2	gpm

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Phase 2 remains online and at full power. Phase 2 has operated for 85 days. The current average wellfield temperature for Phase 2 is 102°C. Phase 1 operated for a total of 158 days, which represents days where heaters operated at or above 70% *and* the collection date of the last confirmation soil sample (per contract definition). All three temperature milestones have been achieved for Phase 1 and temperature milestones 1 and 2 have been achieved for Phase 2.

Estimated mass removed to date is reported using the flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. These results yield a total mass removed of 415,743 lbs as of 12/19/14. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 12/18/14. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.12:0.88. These ratios were then applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase and leg. These data are included in Tables 2 and 3. Mass fraction data over time is presented below.



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Table 2. PID Readings Collected from Manifold Legs

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14
1	SV-1	215	100	745	602	720	604	590	1181	550	516	5	770	712	851	845	790	450	360	236	185
	SV-2	742	173	1271	887	872	1129	1318	2987	780	770	1610	1004	931	1179	600	934	660	677	482	377
	SV-3	2588	872	3609	2854	1198	3395	1414	5512	2643	1120	3971	1430	627	99	101	3138	1717	1782	1218	1246
	SV-4	1971	307	2543	1921	1514	2652	1153	4790	1927	3820	3275	2204	2650	3297	1375	2903	1510	2341	1278	979
	SV-5	1817	279	1642	740	444	1407	1197	4790	759	1411	950	1153	802	326	302	490	402	135	243	120
	SV-6	4480	332	1926	956	765	4283	2347	11564	3525	9177	5750	4780	4919	5854	1083	2100	601	435	1271	375
	SV-8	3222	385	1330	2375	1479	3267	1816	4744	179	172	3815	1881	1850	88	1475	940	401	450	890	150
	SV-9	3245	142	324	1993	1565	2995	1777	11950	2762	4967	3801	2121	2863	3227	1265	801	1209	1040	1480	390
	SV-10	1896	131	2148	1096	1111	2459	1517	4382	1933	1745	3384	2841	1318	4121	1494	1982	1302	1221	3215	500
	SV-11	1016	666	1712	1979	2145	1988	930	2534	1393	2687	1950	1469	1380	596	596	1360	750	641	270	399
	SV-12	80	53	158	139	104	815	1427	3234	682	1102	1090	2100	512	563	206	413	440	426	1413	545
	SV-13	417	211	736	145	170	1452	1476	4291	1109	375	370	985	380	295	315	1210	210	131	432	143
	SV-14	632	452	1526	2636	1450	777	1610	3411	1917	4668	4274	4150	5565	8416	1107	1053	630	500	1288	300
	SV-15	3440	1072	1153	2000	915	2150	2054	608	3265	4890	4801	5780	5000	618	654	1623	730	660	1007	115
2 (and between divider line)	SV-7	3843	366	1751	1210	1482	4307	1835	3337	3672	9379	7350	5812	7910	553	3115	6391	2860	2977	2810	1323
	SV-16	3113	885	233	1911	1703	2823	2216	6230	3165	6888	4994	3841	6029	11	2340	6276	3118	3307	7931	1957
	SV-17	3715	429	306	2928	1824	2801	1837	8933	1927	2713	2954	3313	5408	389	1670	10903	1983	1335	409	800
	SV-18	1760	862	1203	2034	1634	2388	2446	15000	3554	5030	2815	2465	5632	13871	3377	4768	3650	5071	3361	5491
	SV-19	2258	350	2067	1971	2005	1818	2038	10522	2191	6417	4561	4398	3067	2693	1075	875	925	530	528	315
	SV-20	1990	796	1545	2344	1610	2268	2158	15000	2853	2305	2059	343	4053	8642	3534	5500	2725	12650	6352	6520
	SV-21	1964	487	2295	2077	1855	3458	1755	8561	2756	8053	4661	2119	4298	2631	2264	6000	4186	4440	2002	2870
	SV-22	2670	980	1606	2222	1892	2466	2448	14750	3344	5023	3578	2236	3582	55	3460	4765	3450	11187	4509	5516
	SV-23	2515	671	3248	3158	2165	3233	1532	8102	2973	7684	4880	3933	2707	4560	4005	5367	2993	2598	1326	1154
	SV-24	1412	638	1504	2406	1567	1669	1949	11882	1999	6130	4554	5005	6223	8864	2843	4555	2946	4280	3267	5764
	SV-25	688	220	1261	1035	1059	1350	2418	5725	1542	2247	1873	1743	1925	991	570	1301	740	773	500	445
	SV-26	90	185	350	580	573	638	1133	1119	790	3559	4305	4752	4633	1933	865	2742	710	520	642	1710
	SV-27	192	151	718	944	789	1117	1518	3922	1256	1485	1650	947	840	1040	313	769	745	620	318	320
	SV-28	15	87	77	151	178	310	211	730	335	1250	3624	5592	5447	4380	1438	6351	1440	1100	1588	4527
	SV-29	8	66	55	20	52	130	1	15	35	21	352	255	83	41	1375	43	80	41	52	117
Breakdown of Wellfield VOC Flux by Phase																					
Phase 1:		48%	45%	70%	51%	46%	59%	51%	37%	48%	36%	49%	45%	42%	33%	25%	25%	21%	18%	30%	12%
Phase 2:		52%	55%	30%	49%	54%	41%	50%	63%	52%	64%	51%	55%	58%	67%	75%	75%	79%	82%	70%	88%

Table 3. Estimated Mass Loading by Manifold Leg/Phase

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/12/14
1	SV-1	0.5%	0.7%	3.5%	1.5%	3.0%	1.6%	1.7%	1.0%	1.1%	0.7%	0.0%	1.3%	0.8%	1.2%	2.2%	1.2%	1.0%	0.6%	0.6%	0.4%
	SV-2	2.0%	1.3%	4.3%	2.6%	3.6%	3.0%	4.7%	2.5%	1.9%	0.8%	2.4%	1.8%	1.2%	1.7%	1.6%	1.3%	1.4%	1.3%	1.3%	1.0%
	SV-3	3.5%	7.5%	16.2%	7.4%	5.0%	8.9%	5.0%	4.5%	7.1%	1.3%	5.7%	2.6%	0.7%	0.2%	0.3%	5.1%	4.2%	3.3%	3.2%	3.5%
	SV-4	3.3%	2.5%	8.5%	5.7%	5.5%	5.9%	3.3%	3.5%	4.8%	3.9%	4.5%	3.2%	3.1%	3.8%	3.0%	4.4%	3.5%	4.5%	3.0%	2.3%
	SV-5	2.5%	2.9%	9.6%	2.5%	1.6%	3.1%	3.2%	3.2%	2.1%	1.9%	1.4%	1.5%	1.0%	0.5%	0.9%	0.7%	1.0%	0.3%	0.6%	0.3%
	SV-6	2.5%	1.4%	3.8%	1.6%	1.2%	4.1%	3.0%	3.4%	3.7%	4.5%	3.5%	3.0%	2.4%	3.1%	1.1%	1.6%	0.6%	0.3%	1.4%	0.3%
	SV-8	8.7%	2.9%	4.4%	7.1%	6.3%	8.7%	6.8%	3.1%	0.4%	0.1%	5.9%	3.5%	4.4%	0.1%	4.2%	1.6%	1.0%	0.8%	2.6%	0.3%
	SV-9	9.0%	0.9%	1.3%	6.0%	5.8%	8.4%	6.4%	7.3%	6.9%	6.6%	6.2%	3.9%	6.8%	4.8%	3.6%	1.0%	2.5%	2.0%	3.7%	1.1%
	SV-10	2.4%	0.5%	3.0%	1.3%	1.7%	2.1%	1.8%	1.5%	2.2%	0.9%	2.0%	2.1%	0.7%	2.3%	1.6%	1.4%	1.1%	1.0%	3.6%	0.4%
	SV-11	1.3%	2.3%	3.4%	2.2%	3.4%	1.9%	1.0%	0.9%	1.5%	1.4%	1.2%	1.0%	0.6%	0.3%	0.5%	1.2%	0.7%	0.5%	0.3%	0.3%
	SV-12	0.3%	0.5%	0.6%	0.4%	0.5%	2.3%	4.8%	2.4%	1.6%	1.4%	1.8%	2.7%	1.2%	1.0%	0.7%	0.7%	1.0%	0.8%	3.7%	1.3%
	SV-13	0.6%	0.9%	1.6%	0.2%	0.3%	1.4%	2.0%	1.3%	1.2%	0.2%	0.2%	0.7%	0.2%	0.2%	0.4%	0.8%	0.2%	0.1%	0.4%	0.1%
	SV-14	2.3%	6.1%	5.8%	7.5%	5.5%	2.2%	1.1%	2.0%	4.5%	6.3%	6.9%	7.4%	12.7%	13.1%	3.3%	1.8%	1.5%	0.9%	3.3%	0.7%
	SV-15	9.5%	14.7%	3.9%	5.3%	2.8%	5.6%	5.7%	0.5%	8.8%	5.8%	6.9%	10.4%	6.4%	0.9%	1.8%	2.3%	1.5%	1.3%	2.3%	0.3%
2 (and between divider line)	SV-7	2.2%	1.5%	1.9%	1.5%	2.9%	4.2%	2.3%	1.1%	3.9%	4.8%	3.8%	4.0%	3.2%	0.3%	3.1%	5.3%	2.5%	2.1%	3.3%	1.3%
	SV-16	9.5%	7.1%	1.1%	5.7%	6.2%	6.6%	6.9%	5.2%	8.0%	8.7%	6.9%	6.9%	8.0%	0.0%	6.8%	10.3%	10.5%	6.6%	18.3%	5.0%
	SV-17	2.9%	0.1%	-3.3%	2.1%	1.6%	-1.5%	-0.6%	-0.5%	-1.6%	-3.1%	-2.0%	-1.3%	0.0%	-2.8%	0.7%	6.0%	1.3%	0.7%	-1.0%	0.5%
	SV-18	5.5%	11.4%	4.9%	6.8%	5.6%	6.7%	7.8%	13.0%	9.5%	6.6%	3.6%	4.3%	7.1%	22.8%	10.5%	8.2%	14.5%	9.1%	7.9%	13.9%
	SV-19	3.6%	0.3%	-2.0%	5.5%	6.3%	0.6%	2.8%	3.0%	3.2%	6.5%	6.4%	4.3%	3.0%	3.4%	2.0%	0.7%	1.2%	0.7%	0.9%	0.6%
	SV-20	7.2%	12.0%	7.2%	6.2%	6.3%	5.7%	5.5%	11.9%	6.1%	2.8%	2.9%	0.6%	5.0%	14.1%	11.0%	8.9%	8.7%	23.9%	14.6%	16.8%
	SV-21	2.6%	2.0%	3.8%	0.9%	2.4%	3.2%	2.9%	3.6%	2.5%	5.3%	1.6%	-0.4%	2.2%	0.2%	3.5%	6.3%	5.8%	4.3%	1.4%	4.8%
	SV-22	8.5%	9.3%	8.3%	5.9%	7.6%	6.7%	7.0%	12.2%	8.5%	6.7%	4.8%	3.9%	4.4%	0.1%	9.9%	5.4%	11.5%	19.8%	11.5%	13.6%
	SV-23	5.2%	-2.9%	-2.4%	1.9%	4.4%	-0.3%	0.5%	0.3%	1.0%	8.8%	1.3%	4.6%	2.9%	6.2%	10.3%	3.2%	3.4%	2.6%	-0.2%	-0.2%
	SV-24	4.0%	8.5%	9.4%	7.2%	6.2%	4.4%	5.6%	10.3%	4.7%	8.0%	6.8%	7.4%	7.4%	13.6%	8.3%	6.5%	11.3%	8.5%	7.7%	14.7%
	SV-25	-0.1%	1.1%	0.0%	0.7%	0.8%	0.1%	1.5%	0.1%	1.4%	2.1%	0.2%	1.3%	1.2%	-0.2%	0.0%	0.5%	0.3%	0.4%	0.1%	0.2%
	SV-26	0.3%	2.2%	1.9%	1.9%	2.4%	1.6%	3.4%	1.0%	1.6%	4.3%	6.8%	8.1%	5.9%	3.2%	2.7%	3.9%	2.8%	1.1%	1.7%	4.0%
	SV-27	0.1%	0.7%	-0.5%	1.7%	0.4%	1.4%	3.2%	1.2%	2.4%	1.1%	2.0%	0.4%	0.2%	0.0%	-1.5%	0.1%	0.7%	0.5%	0.2%	0.5%
	SV-28	0.0%	1.0%	0.5%	0.6%	0.7%	0.8%	0.6%	0.5%	0.9%	1.7%	5.5%	10.1%	6.9%	6.1%	3.8%	9.5%	4.2%	2.0%	3.4%	11.6%
	SV-29	0.0%	0.6%	0.4%	0.1%	0.2%	0.4%	0.0%	0.0%	0.1%	0.0%	0.6%	0.5%	0.2%	0.1%	3.7%	0.1%	0.3%	0.1%	0.1%	0.3%
	Total:	100%	100%	101%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note: Six out of the 23 wellfield branch lines service both Phase 1 and Phase 2; therfore, a correction has been made to subtract the shared mass sometimes resulting in a negative value. This value indicates that the mass contribution from the Phase 2 area was limited in that particular sample round. This is a result of the accuracy of the flow and PID data measurements collected.

2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperatures for both Phase 1 and Phase 2, as well as the average centroid temperatures. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Phase 2 heating began on 7/16/14 but was stopped on 8/14/14, as a result of the oxidizer shutdown, and reenergized on 09/30/14. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	12/21/14	
Phase 1 Entire TTZ Average Temperature	94	°C
Phase 2 Entire TTZ Average Temperature	102	°C
Phase 1 Centroid Average Temperature	95	°C
Phase 2 Centroid Average Temperature	102	°C

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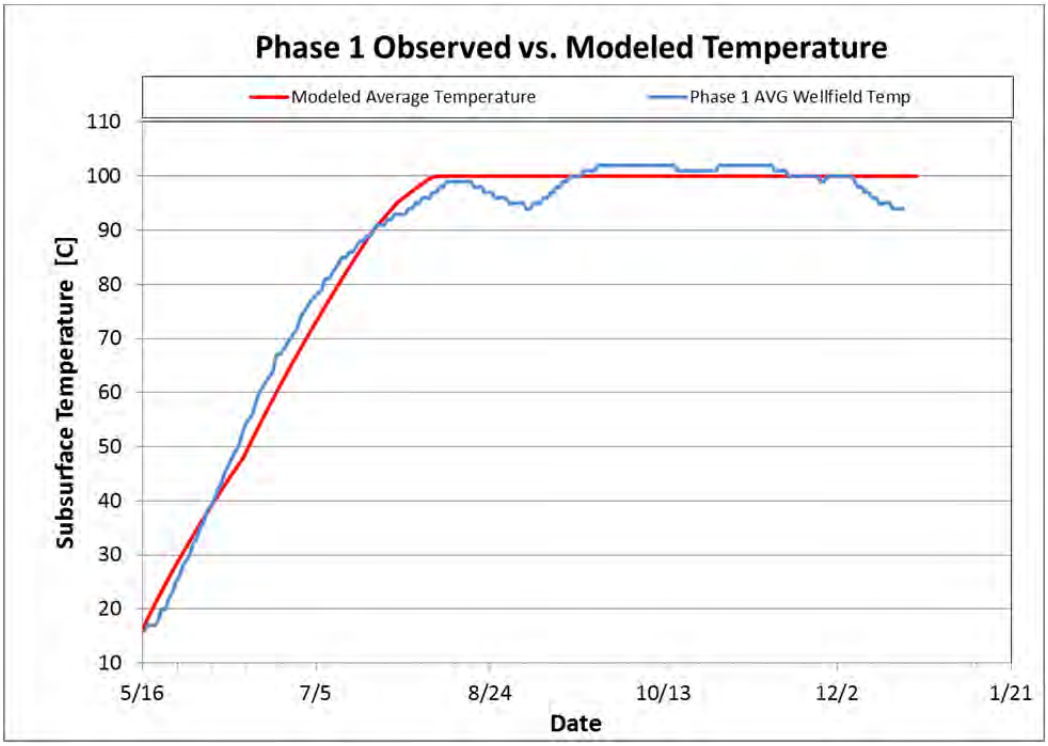


Figure 1a. Phase 1 Observed vs. Modeled Temperatues

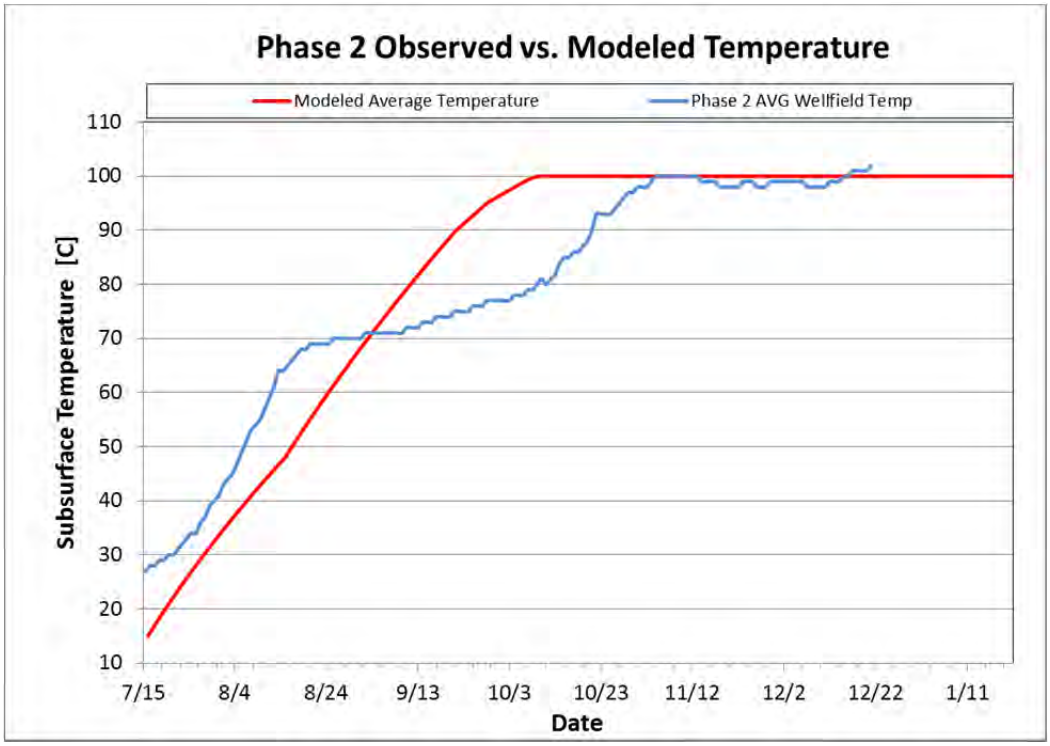


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was increased on 8/30/14.

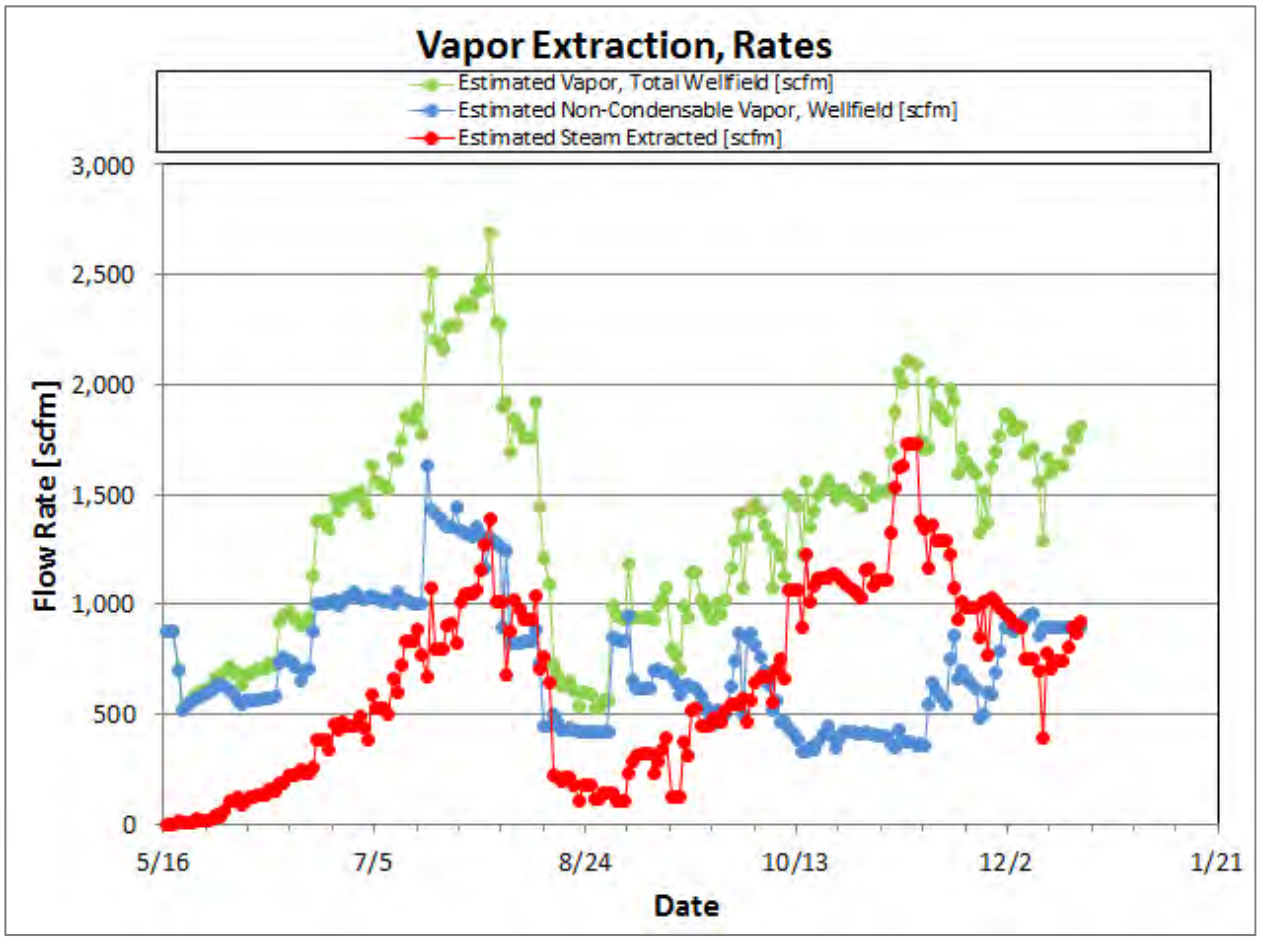


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

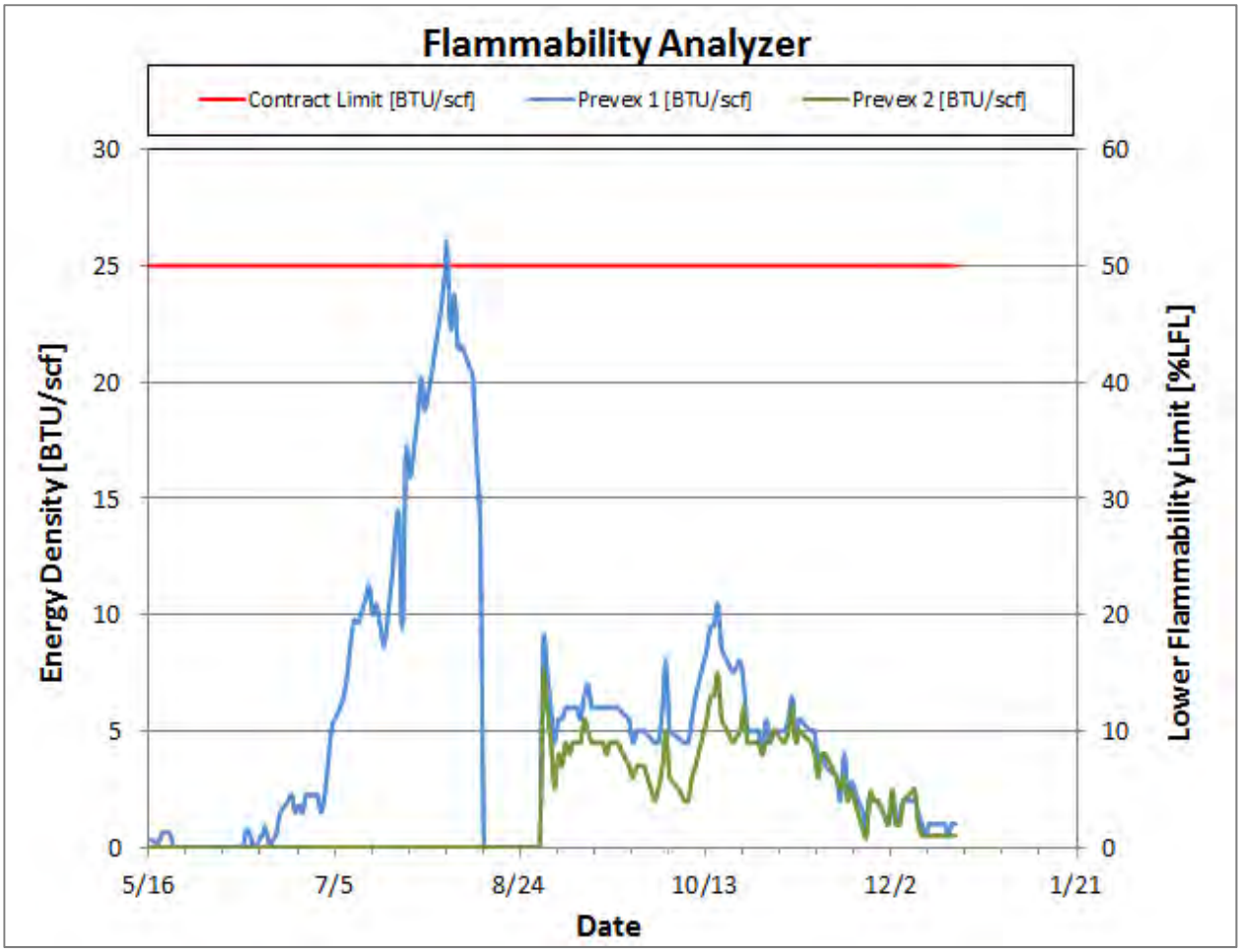


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed to date is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The decrease in mass removed starting on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14, 9/23/14, 9/30/14 , 10/7/14, 10/14/14, 10/21/14, 10/30/14, 11/4/14, 11/18/14, 11/25/2014 and 12/2/2014. Please note that the correction factor calculated from the 12/2/2014 data results decreased the total mass removed compared to the number reported last week (415,743 vs. 418,145 lbs).

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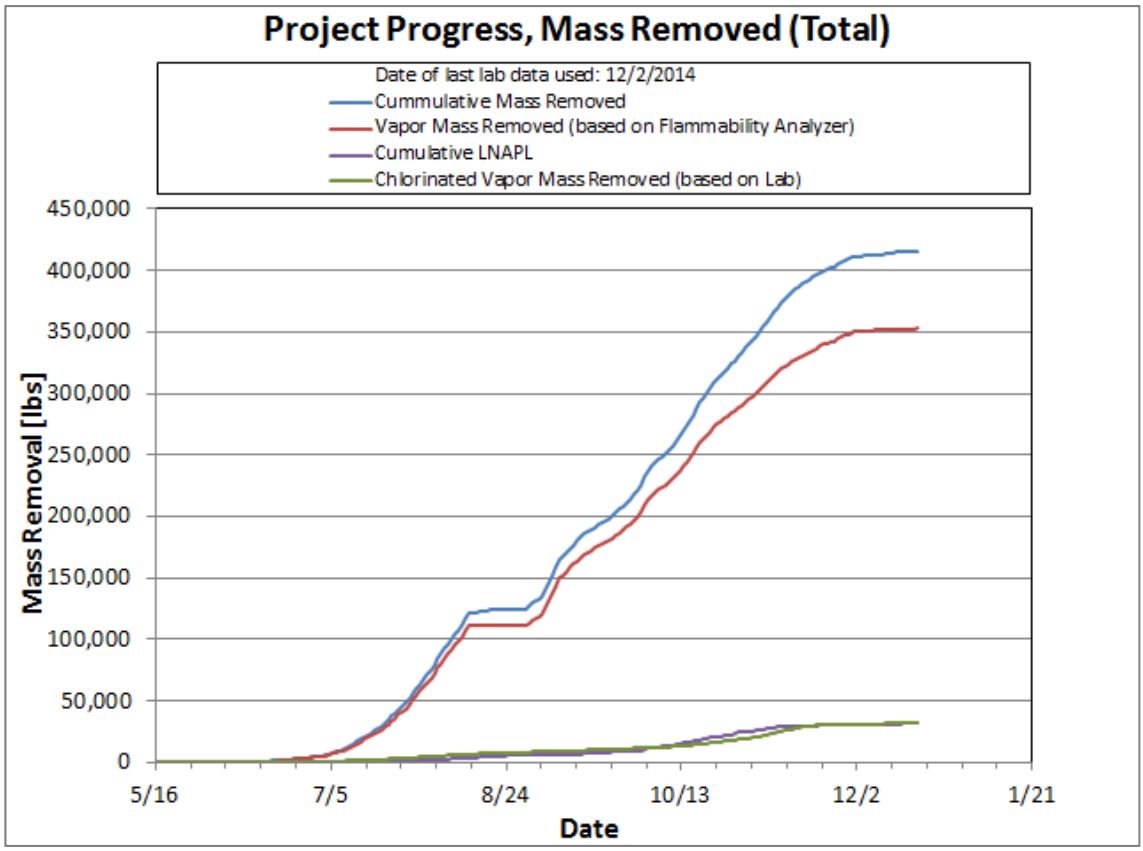


Figure 4a. Project Progress, Mass Removal (Total)

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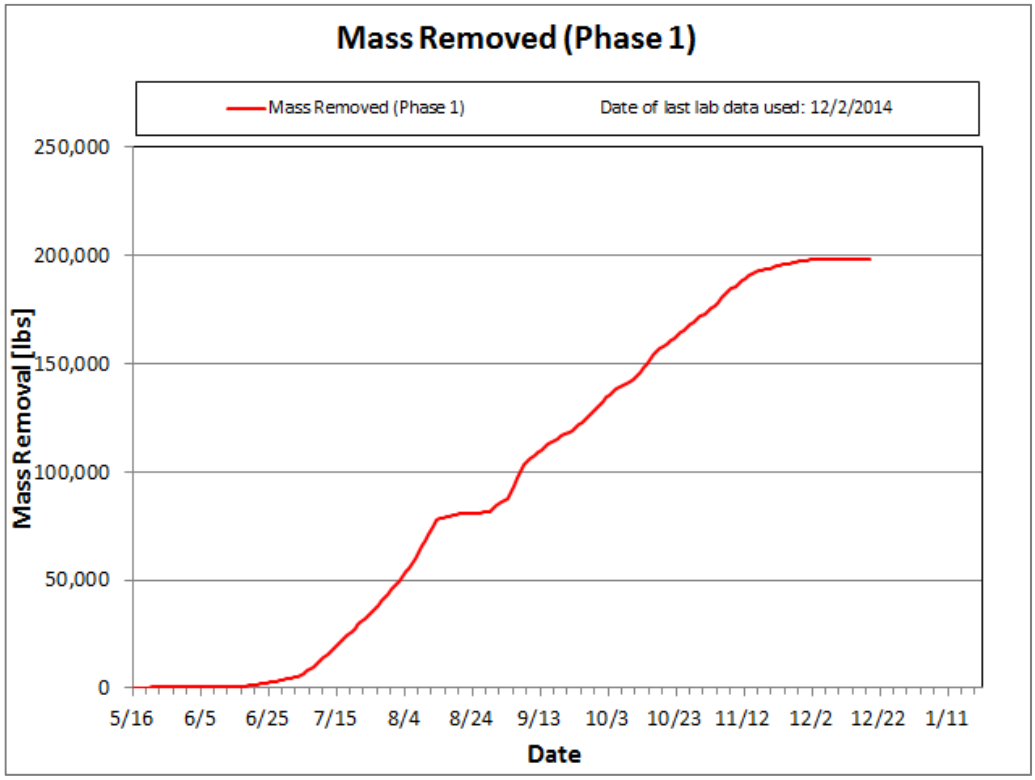


Figure 4b. Project Progress, Mass Removal (Phase 1)

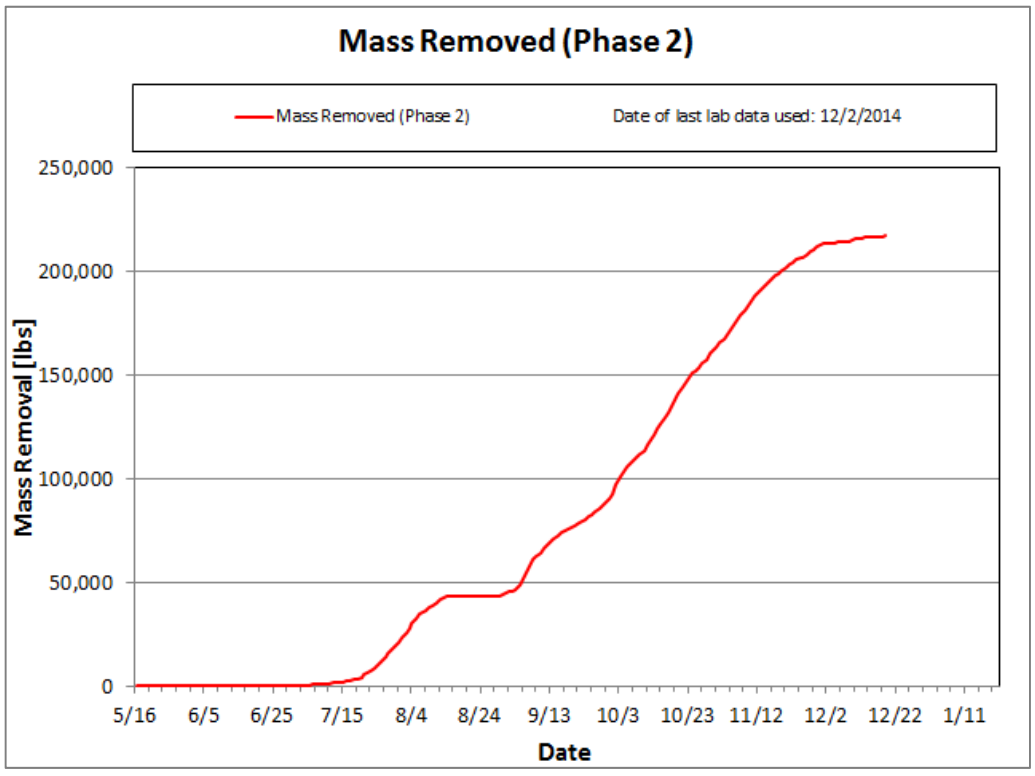


Figure 4c. Project Progress, Mass Removal (Phase 2)

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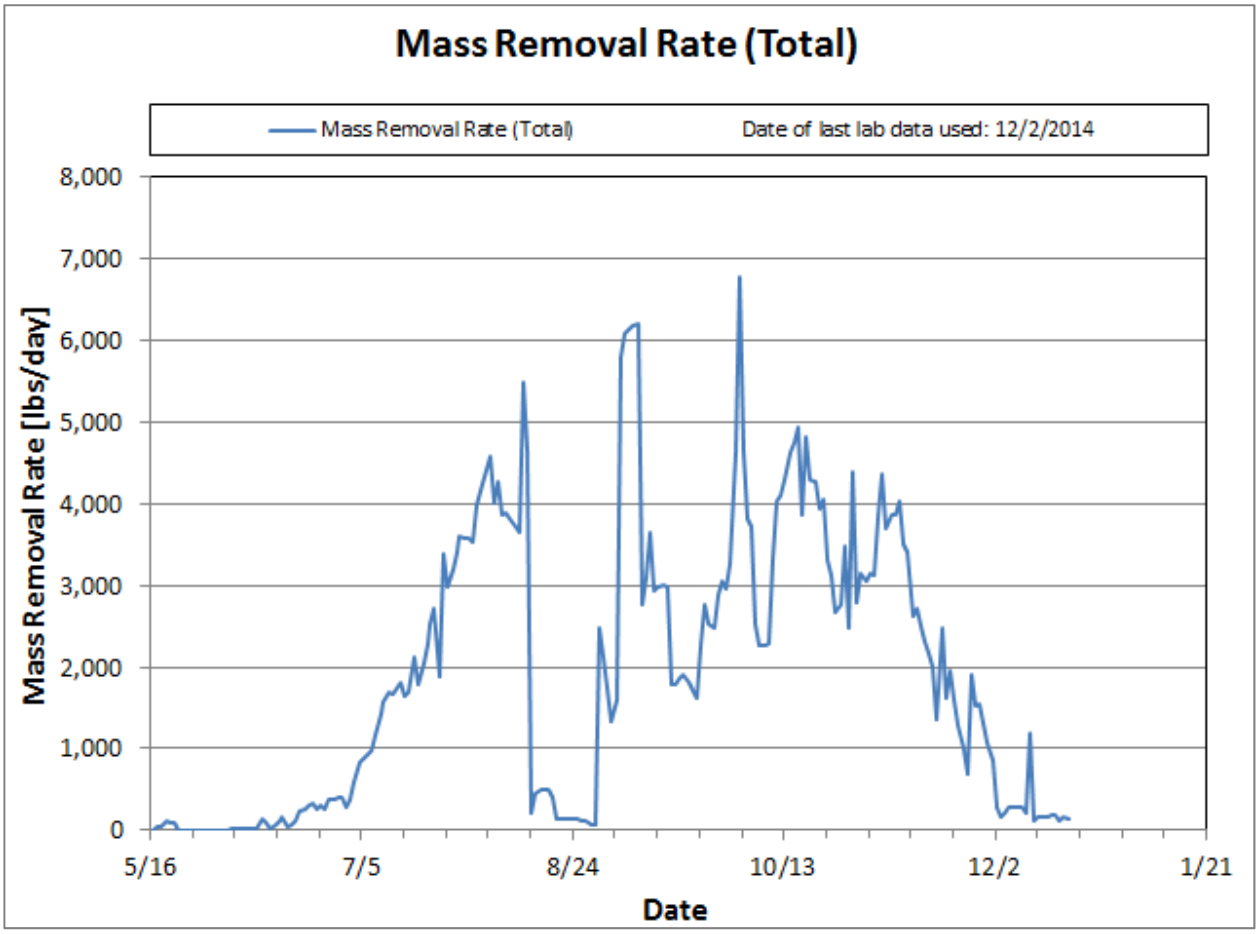


Figure 4d. Mass Removal Rate (Total for Site)

Spike observed on 12/10/14 corresponds to LNAPL drummed during a liquid carbon changeout.

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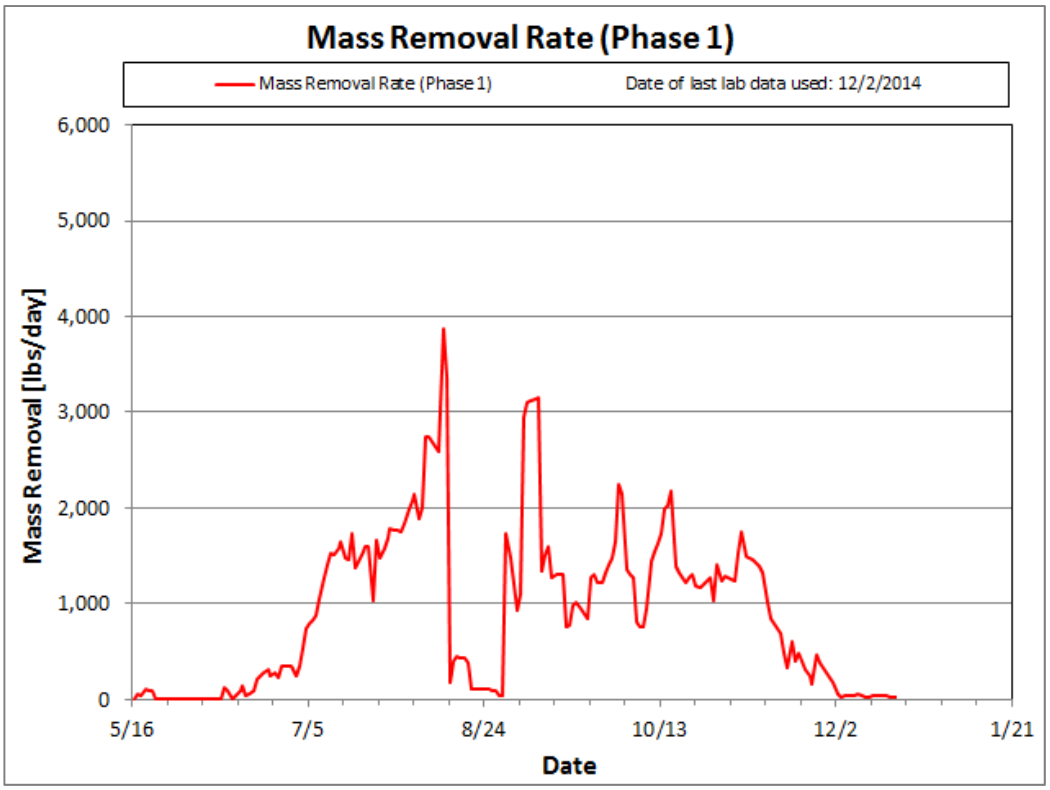


Figure 4e. Mass Removal Rate (Phase 1)

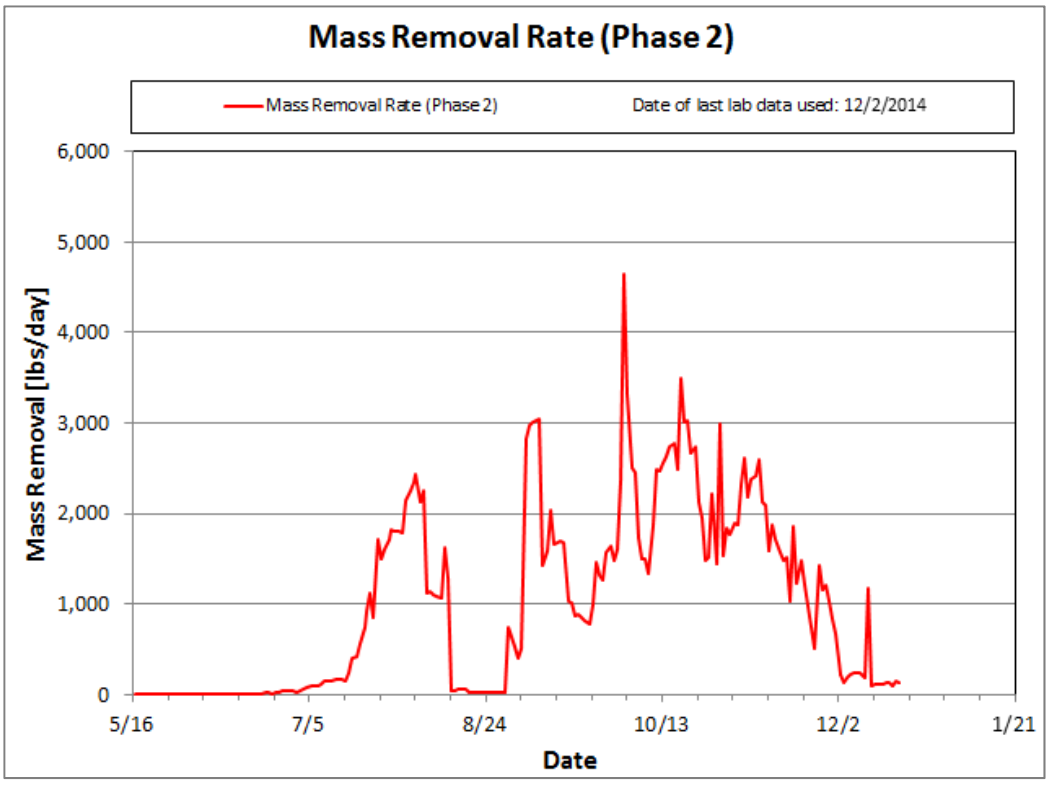


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID and flammability analyzer readings collected at the oxidizer influent over time. It should be noted that PID readings are first collected using an 11.7 eV lamp (determined by site contaminants). If the reading exceeds the limit of the meter (>2000 ppm), the readings are collected using a 10.6 eV lamp. When both meters are used, the maximum value is recorded.

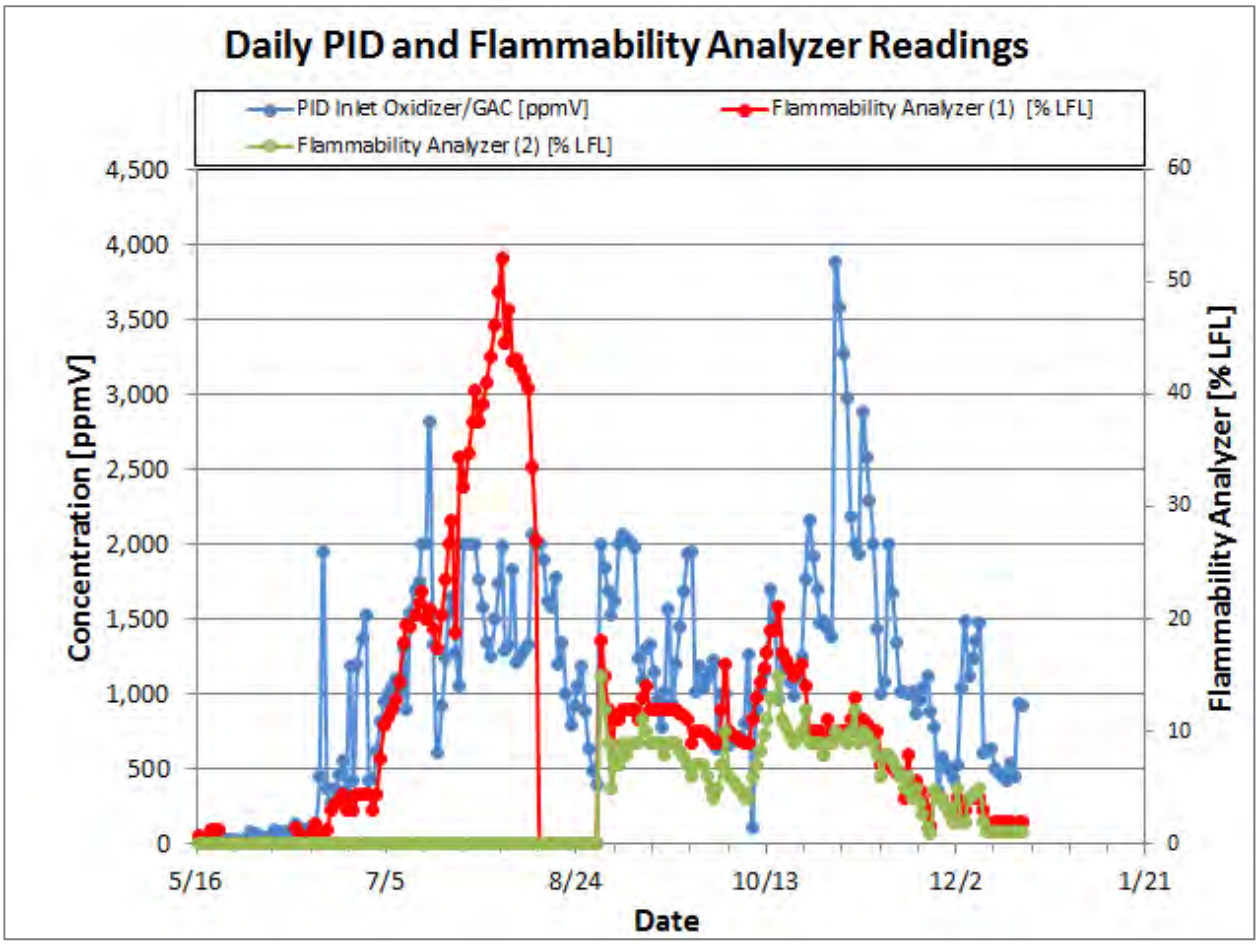


Figure 5. Daily PID and Flammability Analyzer Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13. Decreases in DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-outs.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

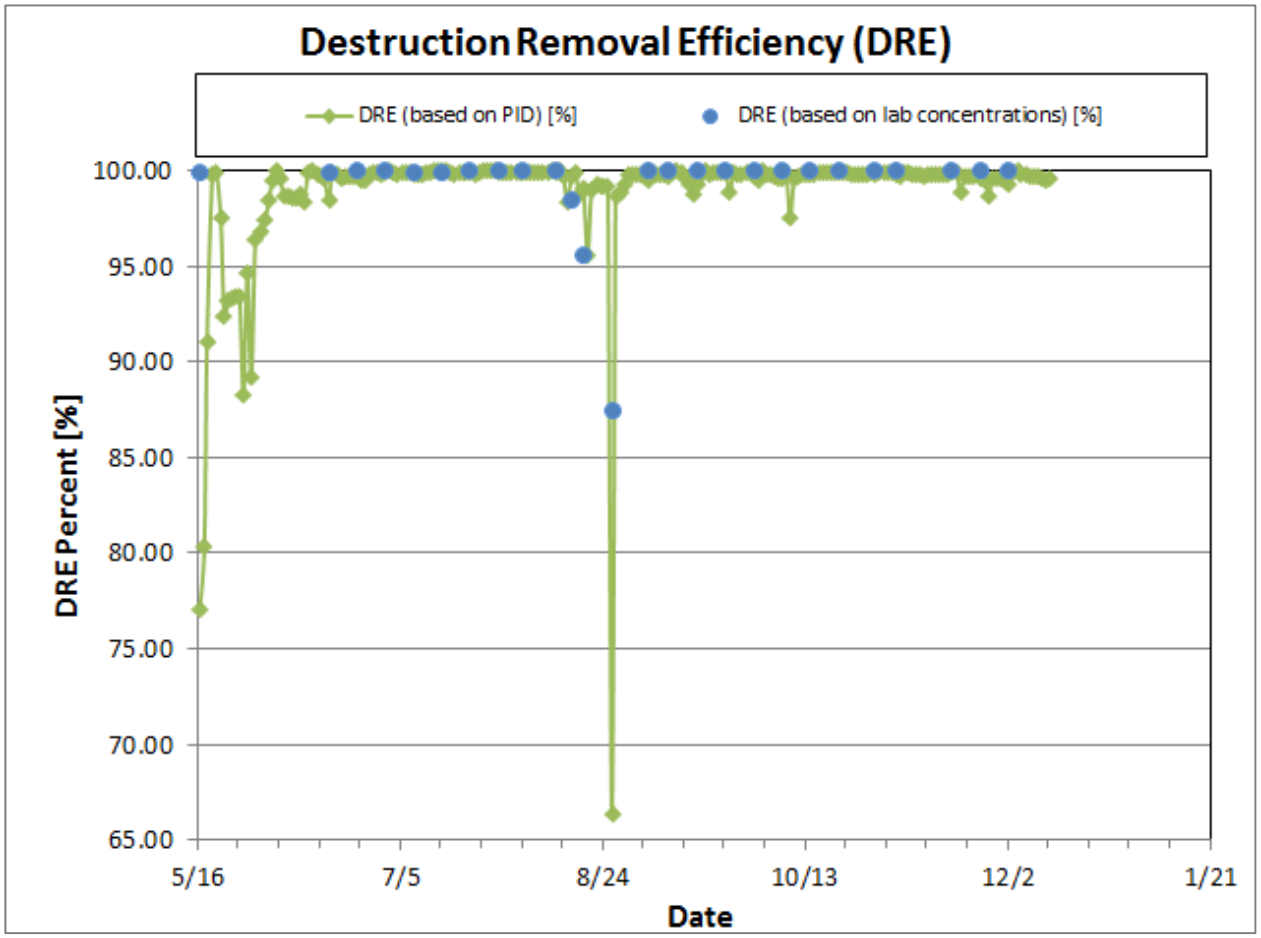


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7. Please note that the graph has been modified to present the estimated modeled energy for the heaters (ISTD) over the original predicted 195 day treatment. This does not take into account contract definitions such as heaters operating at or above 70% energy input. The flatline represents days beyond 195 days.

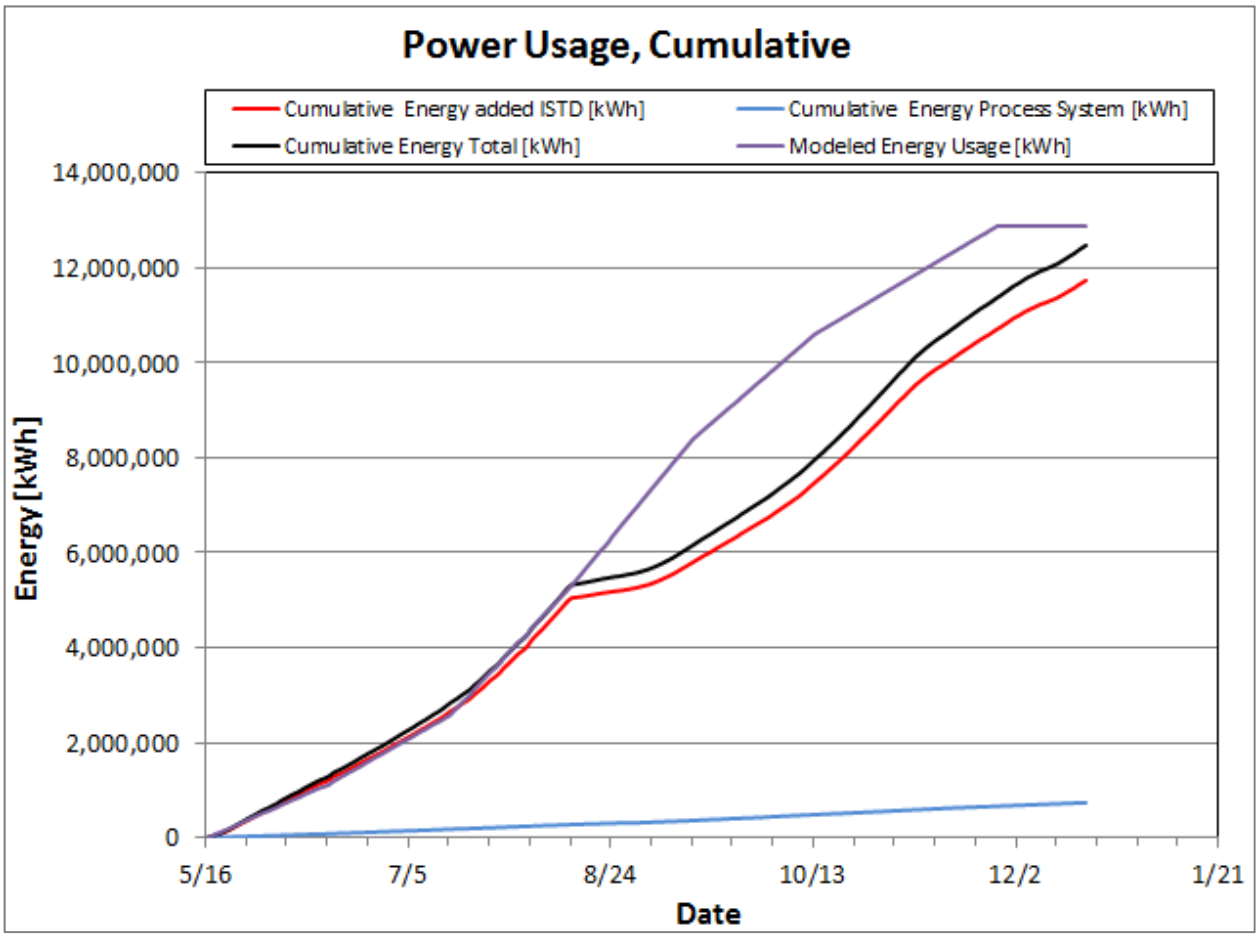


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30/14 and the following days corresponds with ramping of the heaters after placing the oxidizer back online. The decrease observed mid-November is associated with profiling of the heaters in Phase 2 and subsequent adjustments. The increase observed in January corresponds with additional profiling and subsequent adjustments.

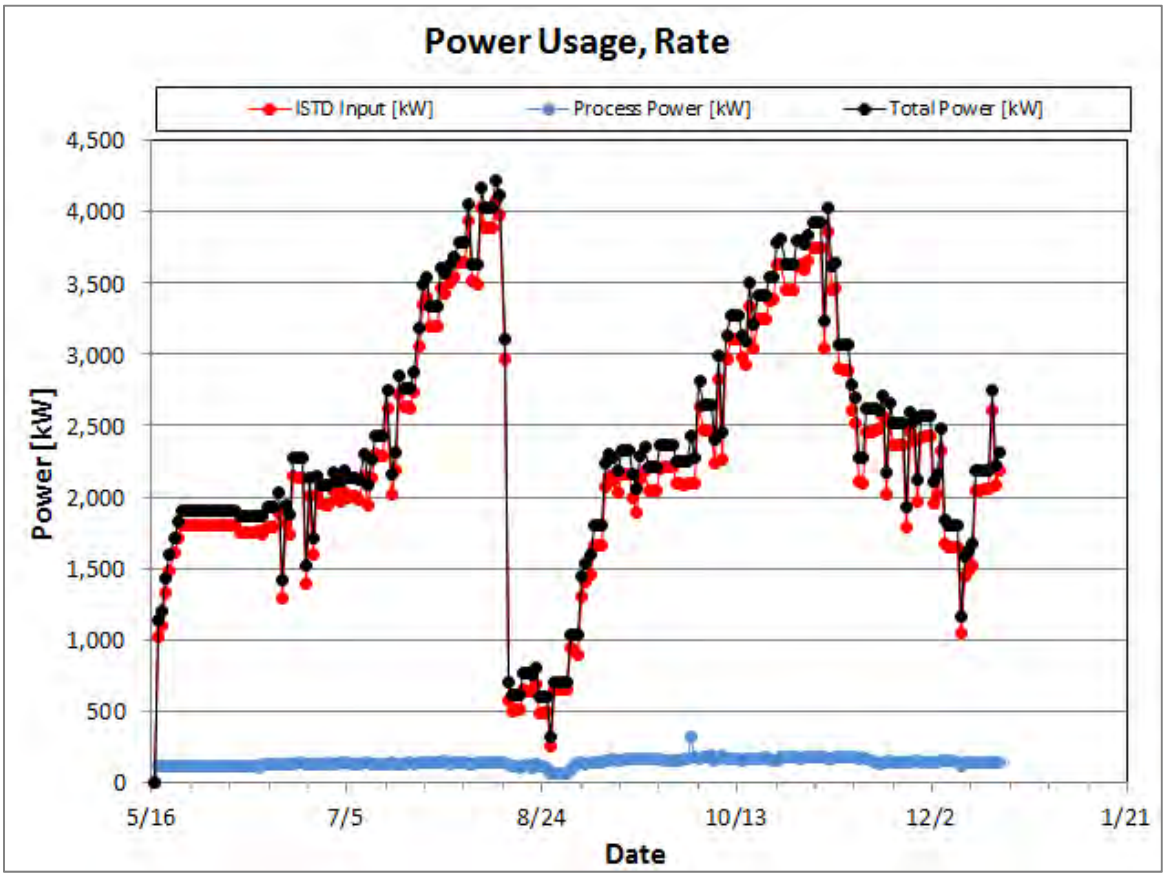


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

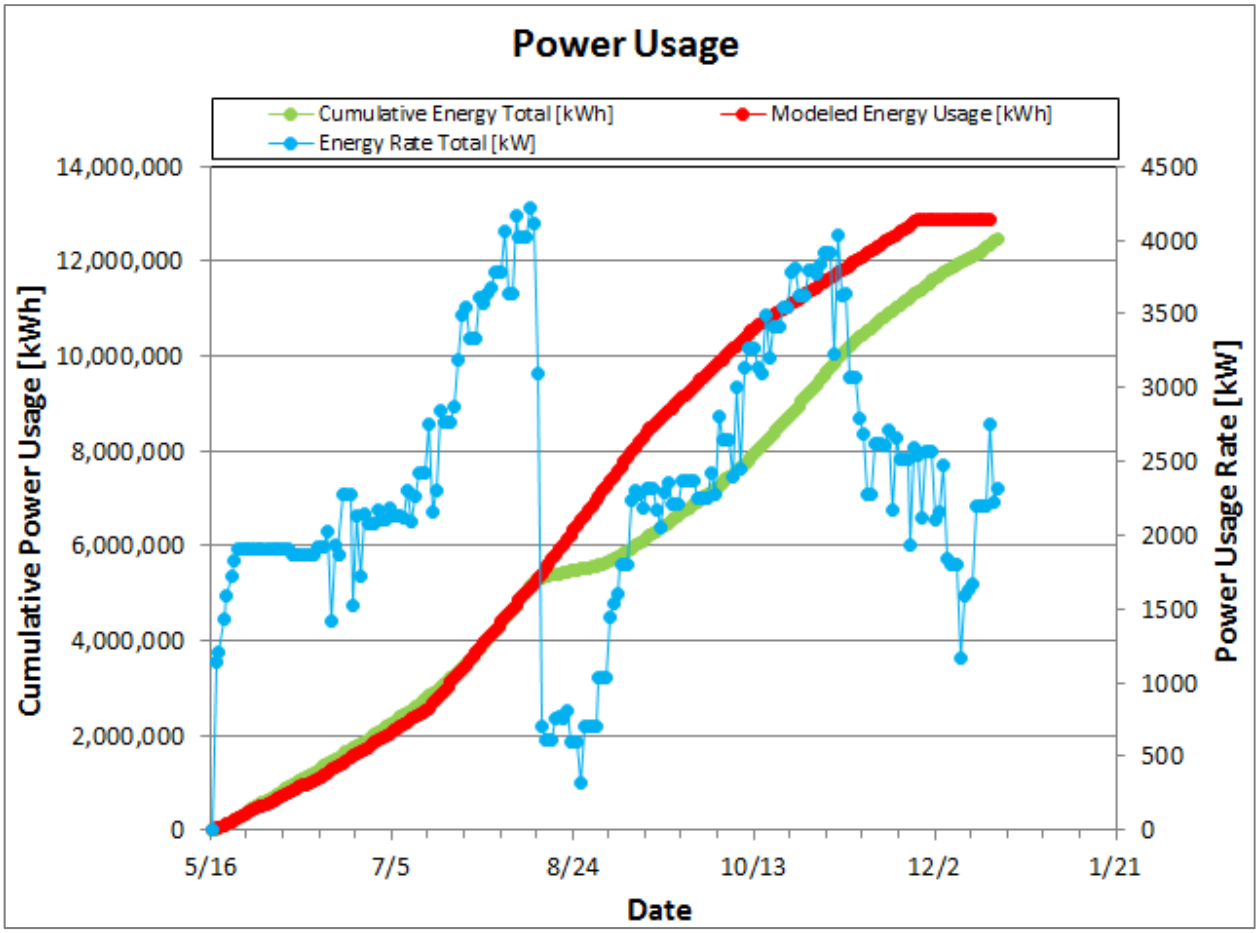


Figure 9. Power Usage

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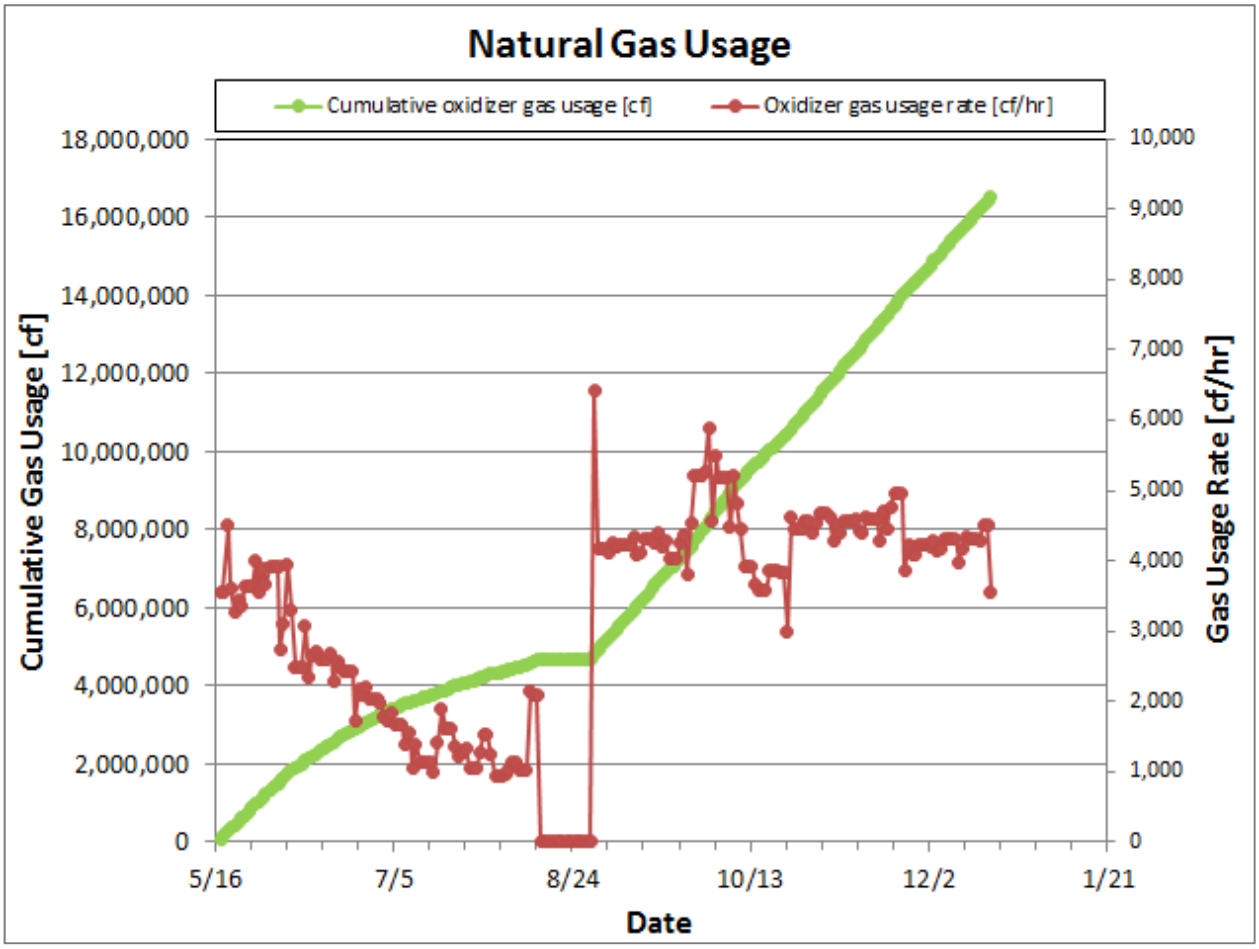


Figure 10. Natural Gas Usage

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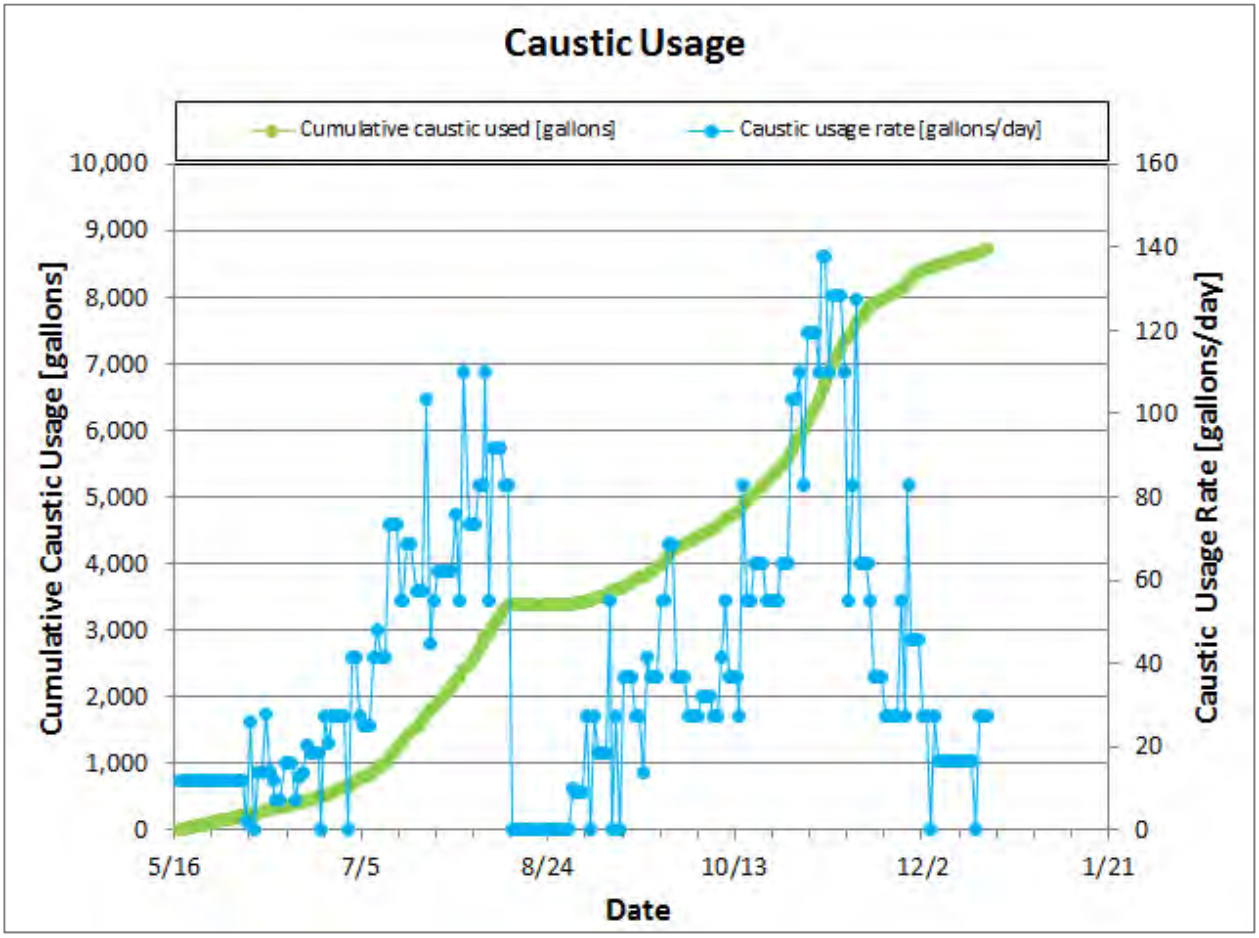


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 and Phase 2 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12a. As of 9/26/14, we have reached all three temperature milestones for phase 1. Phase 2 centroids are shown in Figure 12b. As of 11/18/14, we have achieved two of the three temperature milestones for Phase 2.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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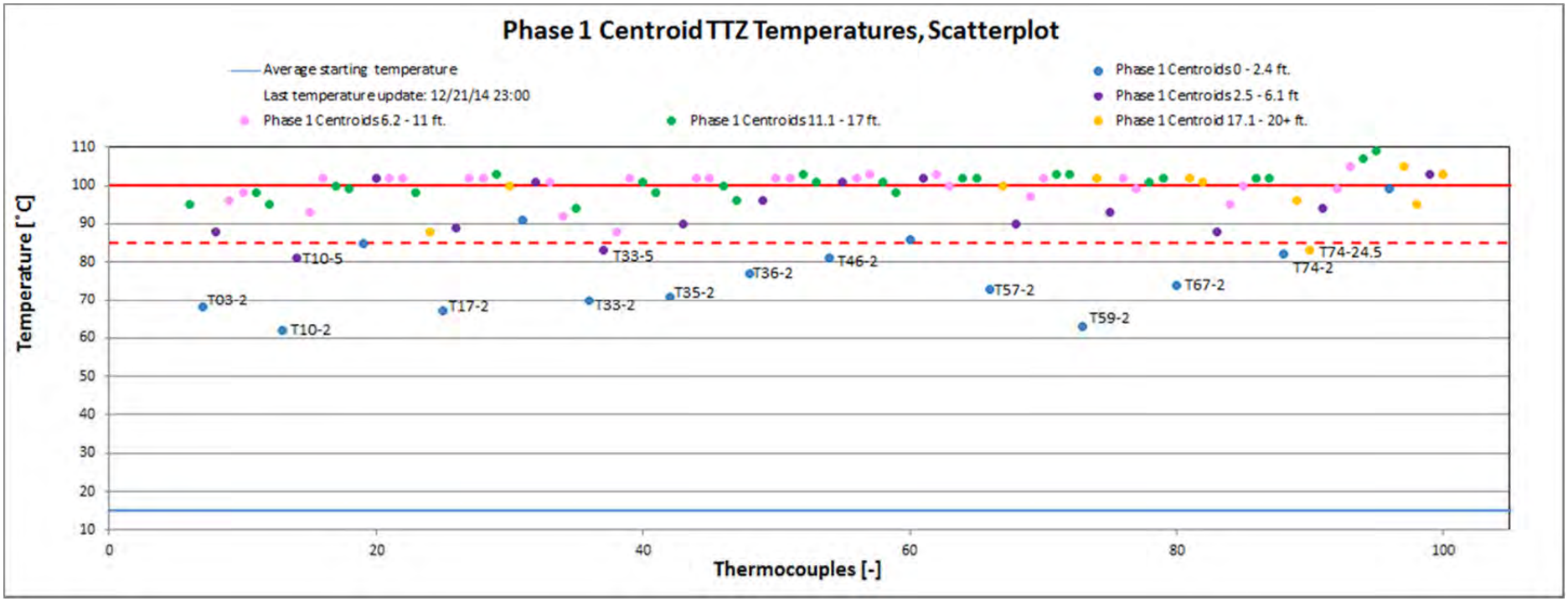


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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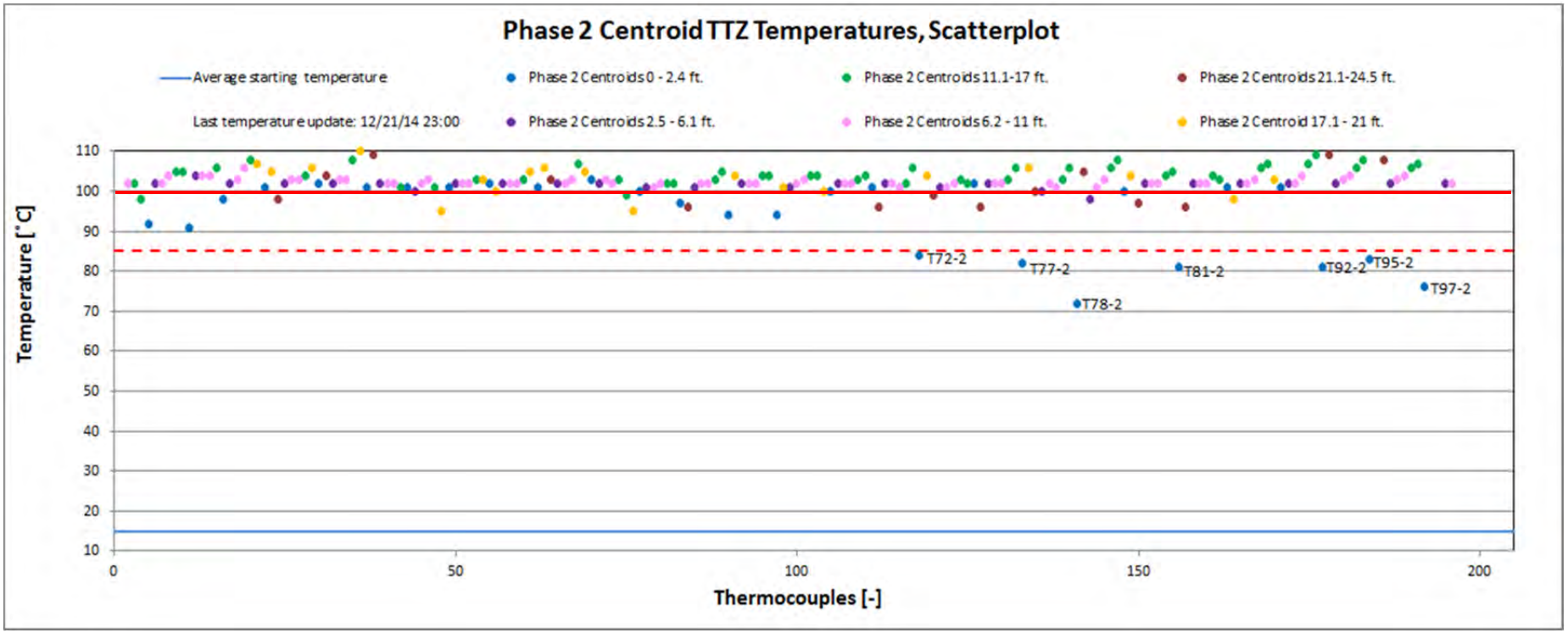


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots		
	Value	Unit
Date of Last Update	12/21/14	
Phase 1 Centroid Thermocouples ≥85 °C	100	%
Phase 1 Centroid Thermocouples ≥100 °C	95	%
Phase 2 Centroid Thermocouples ≥85 °C	99	%
Phase 2 Centroid Thermocouples ≥100 °C	89	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









Prepared by:

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1 SUMMARY

This report is intended to cover the operational time period of Friday, 19 December 2014 through Friday, 26 December 2014, with temperatures updated through Sunday, 28 December 2014.

Table 1 provides a summary of the project operational status as of Friday, 26 December 2014.

Table 1: Project Summary

Summary

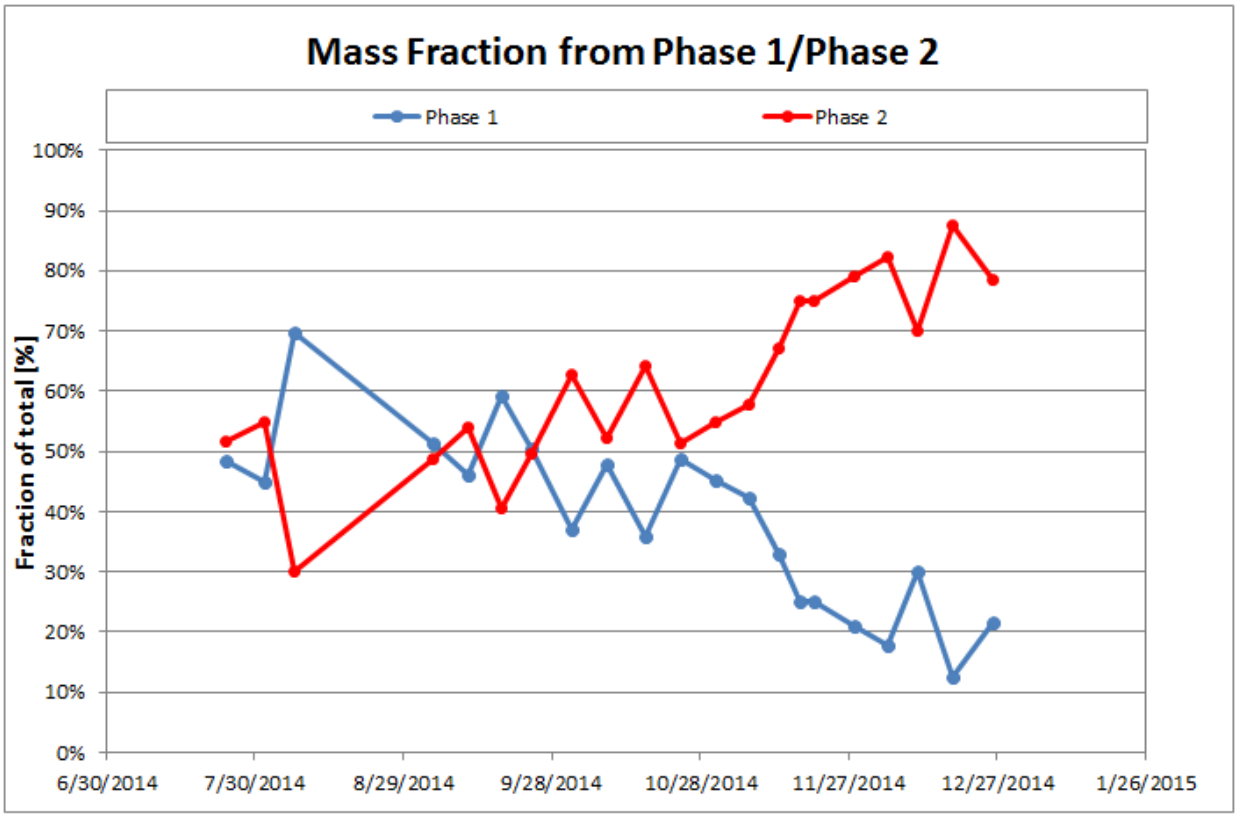
	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	12/26/14	
Last Temperature Data Update	12/28/14	
Days of Operation (Total)	201	days
Days of Phase 1 Operation	158	days
Days of Phase 2 Operation	92	days
Total Design Energy Usage (ISTD and treatment system)	15,795,000	kWh
Total Energy Added (ISTD)	12,938,700	kWh
Used Electrical Energy vs. Estimate	81.9	%
Total Mass Removal	417,831	lbs
Average Power Input Last 24 Hours	2,760	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,997	scfm
Average Condensate Production Rate Last 24 Hours	6.2	gpm

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Phase 2 remains online and at full power. Phase 2 has operated for 92 days. The current average wellfield temperature for Phase 2 is 102°C. Phase 1 operated for a total of 158 days, which represents days where heaters operated at or above 70% *and* the collection date of the last confirmation soil sample (per contract definition). All three temperature milestones have been achieved for both Phase 1 and 2.

Estimated mass removed to date is reported using the flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. These results yield a total mass removed of 417,831 lbs as of 12/26/14. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 12/26/14. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.22:0.78. These ratios were then applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase and leg. These data are included in Tables 2 and 3. Mass fraction data over time is presented below.



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Table 2. PID Readings Collected from Manifold Legs

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14
1	SV-1	215	100	745	602	720	604	590	1181	550	516	5	770	712	851	845	790	450	360	236	185	177
	SV-2	742	173	1271	887	872	1129	1318	2987	780	770	1610	1004	931	1179	600	934	660	677	482	377	397
	SV-3	2588	872	3609	2854	1198	3395	1414	5512	2643	1120	3971	1430	627	99	101	3138	1717	1782	1218	1246	347
	SV-4	1971	307	2543	1921	1514	2652	1153	4790	1927	3820	3275	2204	2650	3297	1375	2903	1510	2341	1278	979	333
	SV-5	1817	279	1642	740	444	1407	1197	4790	759	1411	950	1153	802	326	302	490	402	135	243	120	235
	SV-6	4480	332	1926	956	765	4283	2347	11564	3525	9177	5750	4780	4919	5854	1083	2100	601	435	1271	375	277
	SV-8	3222	385	1330	2375	1479	3267	1816	4744	179	172	3815	1881	1850	88	1475	940	401	450	890	150	178
	SV-9	3245	142	324	1993	1565	2995	1777	11950	2762	4967	3801	2121	2863	3227	1265	801	1209	1040	1480	390	350
	SV-10	1896	131	2148	1096	1111	2459	1517	4382	1933	1745	3384	2841	1318	4121	1494	1982	1302	1221	3215	500	381
	SV-11	1016	666	1712	1979	2145	1988	930	2534	1393	2687	1950	1469	1380	596	596	1360	750	641	270	399	332
	SV-12	80	53	158	139	104	815	1427	3234	682	1102	1090	2100	512	563	206	413	440	426	1413	545	569
	SV-13	417	211	736	145	170	1452	1476	4291	1109	375	370	985	380	295	315	1210	210	131	432	143	473
	SV-14	632	452	1526	2636	1450	777	1610	3411	1917	4668	4274	4150	5565	8416	1107	1053	630	500	1288	300	468
	SV-15	3440	1072	1153	2000	915	2150	2054	608	3265	4890	4801	5780	5000	618	654	1623	730	660	1007	115	490
2 (and between divider line)	SV-7	3843	366	1751	1210	1482	4307	1835	3337	3672	9379	7350	5812	7910	553	3115	6391	2860	2977	2810	1323	554
	SV-16	3113	885	233	1911	1703	2823	2216	6230	3165	6888	4994	3841	6029	11	2340	6276	3118	3307	7931	1957	1502
	SV-17	3715	429	306	2928	1824	2801	1837	8933	1927	2713	2954	3313	5408	389	1670	10903	1983	1335	409	800	1133
	SV-18	1760	862	1203	2034	1634	2388	2446	15000	3554	5030	2815	2465	5632	13871	3377	4768	3650	5071	3361	5491	2057
	SV-19	2258	350	2067	1971	2005	1818	2038	10522	2191	6417	4561	4398	3067	2693	1075	875	925	530	528	315	552
	SV-20	1990	796	1545	2344	1610	2268	2158	15000	2853	2305	2059	343	4053	8642	3534	5500	2725	12650	6352	6520	2084
	SV-21	1964	487	2295	2077	1855	3458	1755	8561	2756	8053	4661	2119	4298	2631	2264	6000	4186	4440	2002	2870	937
	SV-22	2670	980	1606	2222	1892	2466	2448	14750	3344	5023	3578	2236	3582	55	3460	4765	3450	11187	4509	5516	2803
	SV-23	2515	671	3248	3158	2165	3233	1532	8102	2973	7684	4880	3933	2707	4560	4005	5367	2993	2598	1326	1154	805
	SV-24	1412	638	1504	2406	1567	1669	1949	11882	1999	6130	4554	5005	6223	8864	2843	4555	2946	4280	3267	5764	2614
	SV-25	688	220	1261	1035	1059	1350	2418	5725	1542	2247	1873	1743	1925	991	570	1301	740	773	500	445	400
	SV-26	90	185	350	580	573	638	1133	1119	790	3559	4305	4752	4633	1933	865	2742	710	520	642	1710	548
	SV-27	192	151	718	944	789	1117	1518	3922	1256	1485	1650	947	840	1040	313	769	745	620	318	320	277
	SV-28	15	87	77	151	178	310	211	730	335	1250	3624	5592	5447	4380	1438	6351	1440	1100	1588	4527	1575
	SV-29	8	66	55	20	52	130	1	15	35	21	352	255	83	41	1375	43	80	41	52	117	70
Breakdown of Wellfield VOC Flux by Phase																						
Phase 1:		48%	45%	70%	51%	46%	59%	51%	37%	48%	36%	49%	45%	42%	33%	25%	25%	21%	18%	30%	12%	22%
Phase 2:		52%	55%	30%	49%	54%	41%	50%	63%	52%	64%	51%	55%	58%	67%	75%	75%	79%	82%	70%	88%	78%

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Table 3. Estimated Mass Loading by Manifold Leg/Phase

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14
1	SV-1	0.5%	0.7%	3.5%	1.5%	3.0%	1.6%	1.7%	1.0%	1.1%	0.7%	0.0%	1.3%	0.8%	1.2%	2.2%	1.2%	1.0%	0.6%	0.6%	0.4%	0.9%
	SV-2	2.0%	1.3%	4.3%	2.6%	3.6%	3.0%	4.7%	2.5%	1.9%	0.8%	2.4%	1.8%	1.2%	1.7%	1.6%	1.3%	1.4%	1.3%	1.3%	1.0%	1.9%
	SV-3	3.5%	7.5%	16.2%	7.4%	5.0%	8.9%	5.0%	4.5%	7.1%	1.3%	5.7%	2.6%	0.7%	0.2%	0.3%	5.1%	4.2%	3.3%	3.2%	3.5%	1.7%
	SV-4	3.3%	2.5%	8.5%	5.7%	5.5%	5.9%	3.3%	3.5%	4.8%	3.9%	4.5%	3.2%	3.1%	3.8%	3.0%	4.4%	3.5%	4.5%	3.0%	2.3%	1.5%
	SV-5	2.5%	2.9%	9.6%	2.5%	1.6%	3.1%	3.2%	3.2%	2.1%	1.9%	1.4%	1.5%	1.0%	0.5%	0.9%	0.7%	1.0%	0.3%	0.6%	0.3%	1.2%
	SV-6	2.5%	1.4%	3.8%	1.6%	1.2%	4.1%	3.0%	3.4%	3.7%	4.5%	3.5%	3.0%	2.4%	3.1%	1.1%	1.6%	0.6%	0.3%	1.4%	0.3%	0.5%
	SV-8	8.7%	2.9%	4.4%	7.1%	6.3%	8.7%	6.8%	3.1%	0.4%	0.1%	5.9%	3.5%	4.4%	0.1%	4.2%	1.6%	1.0%	0.8%	2.6%	0.3%	0.9%
	SV-9	9.0%	0.9%	1.3%	6.0%	5.8%	8.4%	6.4%	7.3%	6.9%	6.6%	6.2%	3.9%	6.8%	4.8%	3.6%	1.0%	2.5%	2.0%	3.7%	1.1%	1.9%
	SV-10	2.4%	0.5%	3.0%	1.3%	1.7%	2.1%	1.8%	1.5%	2.2%	0.9%	2.0%	2.1%	0.7%	2.3%	1.6%	1.4%	1.1%	1.0%	3.6%	0.4%	0.8%
	SV-11	1.3%	2.3%	3.4%	2.2%	3.4%	1.9%	1.0%	0.9%	1.5%	1.4%	1.2%	1.0%	0.6%	0.3%	0.5%	1.2%	0.7%	0.5%	0.3%	0.3%	0.7%
	SV-12	0.3%	0.5%	0.6%	0.4%	0.5%	2.3%	4.8%	2.4%	1.6%	1.4%	1.8%	2.7%	1.2%	1.0%	0.7%	0.7%	1.0%	0.8%	3.7%	1.3%	3.1%
	SV-13	0.6%	0.9%	1.6%	0.2%	0.3%	1.4%	2.0%	1.3%	1.2%	0.2%	0.2%	0.7%	0.2%	0.2%	0.4%	0.8%	0.2%	0.1%	0.4%	0.1%	1.0%
	SV-14	2.3%	6.1%	5.8%	7.5%	5.5%	2.2%	1.1%	2.0%	4.5%	6.3%	6.9%	7.4%	12.7%	13.1%	3.3%	1.8%	1.5%	0.9%	3.3%	0.7%	2.7%
	SV-15	9.5%	14.7%	3.9%	5.3%	2.8%	5.6%	5.7%	0.5%	8.8%	5.8%	6.9%	10.4%	6.4%	0.9%	1.8%	2.3%	1.5%	1.3%	2.3%	0.3%	2.8%
2 (and between divider line)	SV-7	2.2%	1.5%	1.9%	1.5%	2.9%	4.2%	2.3%	1.1%	3.9%	4.8%	3.8%	4.0%	3.2%	0.3%	3.1%	5.3%	2.5%	2.1%	3.3%	1.3%	1.1%
	SV-16	9.5%	7.1%	1.1%	5.7%	6.2%	6.6%	6.9%	5.2%	8.0%	8.7%	6.9%	6.9%	8.0%	0.0%	6.8%	10.3%	10.5%	6.6%	18.3%	5.0%	8.1%
	SV-17	2.9%	0.1%	-3.3%	2.1%	1.6%	-1.5%	-0.6%	-0.5%	-1.6%	-3.1%	-2.0%	-1.3%	0.0%	-2.8%	0.7%	6.0%	1.3%	0.7%	-1.0%	0.5%	1.6%
	SV-18	5.5%	11.4%	4.9%	6.8%	5.6%	6.7%	7.8%	13.0%	9.5%	6.6%	3.6%	4.3%	7.1%	22.8%	10.5%	8.2%	14.5%	9.1%	7.9%	13.9%	10.4%
	SV-19	3.6%	0.3%	-2.0%	5.5%	6.3%	0.6%	2.8%	3.0%	3.2%	6.5%	6.4%	4.3%	3.0%	3.4%	2.0%	0.7%	1.2%	0.7%	0.9%	0.6%	1.7%
	SV-20	7.2%	12.0%	7.2%	6.2%	6.3%	5.7%	5.5%	11.9%	6.1%	2.8%	2.9%	0.6%	5.0%	14.1%	11.0%	8.9%	8.7%	23.9%	14.6%	16.8%	10.7%
	SV-21	2.6%	2.0%	3.8%	0.9%	2.4%	3.2%	2.9%	3.6%	2.5%	5.3%	1.6%	-0.4%	2.2%	0.2%	3.5%	6.3%	5.8%	4.3%	1.4%	4.8%	3.0%
	SV-22	8.5%	9.3%	8.3%	5.9%	7.6%	6.7%	7.0%	12.2%	8.5%	6.7%	4.8%	3.9%	4.4%	0.1%	9.9%	5.4%	11.5%	19.8%	11.5%	13.6%	14.3%
	SV-23	5.2%	-2.9%	-2.4%	1.9%	4.4%	-0.3%	0.5%	0.3%	1.0%	8.8%	1.3%	4.6%	2.9%	6.2%	10.3%	3.2%	3.4%	2.6%	-0.2%	-0.2%	2.4%
	SV-24	4.0%	8.5%	9.4%	7.2%	6.2%	4.4%	5.6%	10.3%	4.7%	8.0%	6.8%	7.4%	7.4%	13.6%	8.3%	6.5%	11.3%	8.5%	7.7%	14.7%	13.7%
	SV-25	-0.1%	1.1%	0.0%	0.7%	0.8%	0.1%	1.5%	0.1%	1.4%	2.1%	0.2%	1.3%	1.2%	-0.2%	0.0%	0.5%	0.3%	0.4%	0.1%	0.2%	0.0%
	SV-26	0.3%	2.2%	1.9%	1.9%	2.4%	1.6%	3.4%	1.0%	1.6%	4.3%	6.8%	8.1%	5.9%	3.2%	2.7%	3.9%	2.8%	1.1%	1.7%	4.0%	2.6%
	SV-27	0.1%	0.7%	-0.5%	1.7%	0.4%	1.4%	3.2%	1.2%	2.4%	1.1%	2.0%	0.4%	0.2%	0.0%	-1.5%	0.1%	0.7%	0.5%	0.2%	0.5%	0.5%
	SV-28	0.0%	1.0%	0.5%	0.6%	0.7%	0.8%	0.6%	0.5%	0.9%	1.7%	5.5%	10.1%	6.9%	6.1%	3.8%	9.5%	4.2%	2.0%	3.4%	11.6%	7.9%
	SV-29	0.0%	0.6%	0.4%	0.1%	0.2%	0.4%	0.0%	0.0%	0.1%	0.0%	0.6%	0.5%	0.2%	0.1%	3.7%	0.1%	0.3%	0.1%	0.1%	0.3%	0.4%
	Total:	100%	100%	101%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note: Six out of the 23 wellfield branch lines service both Phase 1 and Phase 2; therfore, a correction has been made to subtract the shared mass sometimes resulting in a negative value. This value indicates that the mass contribution from the Phase 2 area was limited in that particular sample round. This is a result of the accuracy of the flow and PID data measurements collected.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperatures for both Phase 1 and Phase 2, as well as the average centroid temperatures. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Phase 2 heating began on 7/16/14 but was stopped on 8/14/14, as a result of the oxidizer shutdown, and reenergized on 09/30/14. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	12/28/14	
Phase 1 Entire TTZ Average Temperature	94	°C
Phase 2 Entire TTZ Average Temperature	102	°C
Phase 1 Centroid Average Temperature	96	°C
Phase 2 Centroid Average Temperature	103	°C

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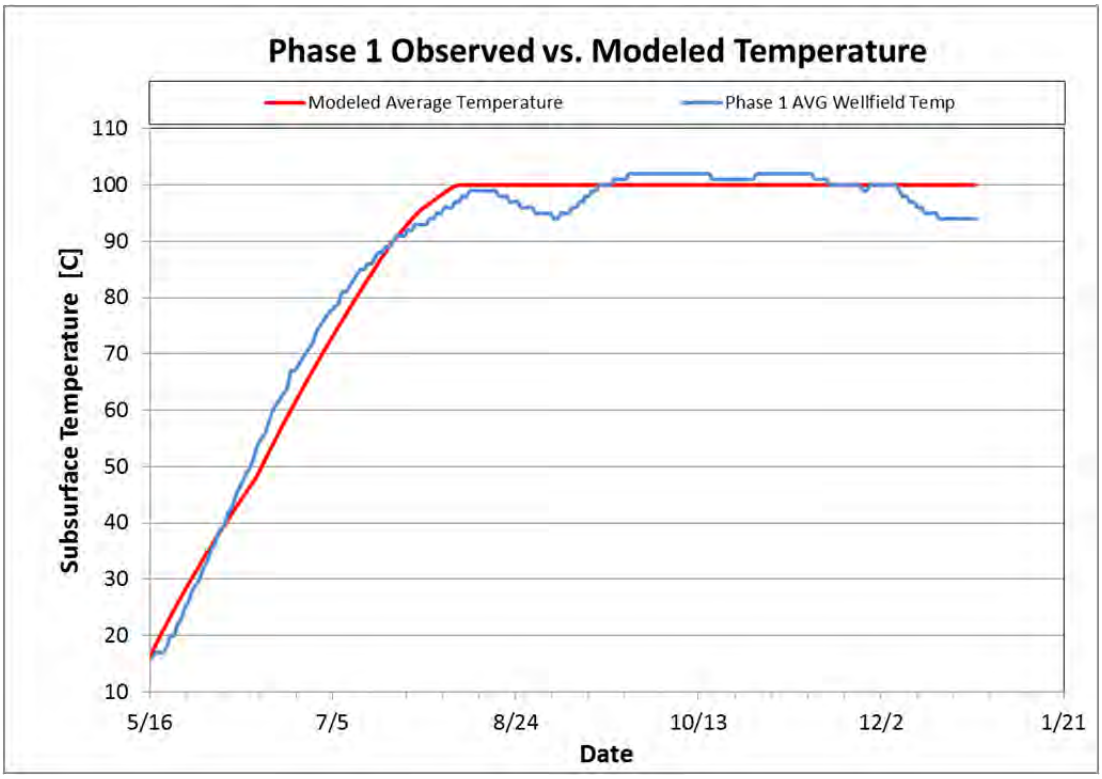


Figure 1a. Phase 1 Observed vs. Modeled Temperatues

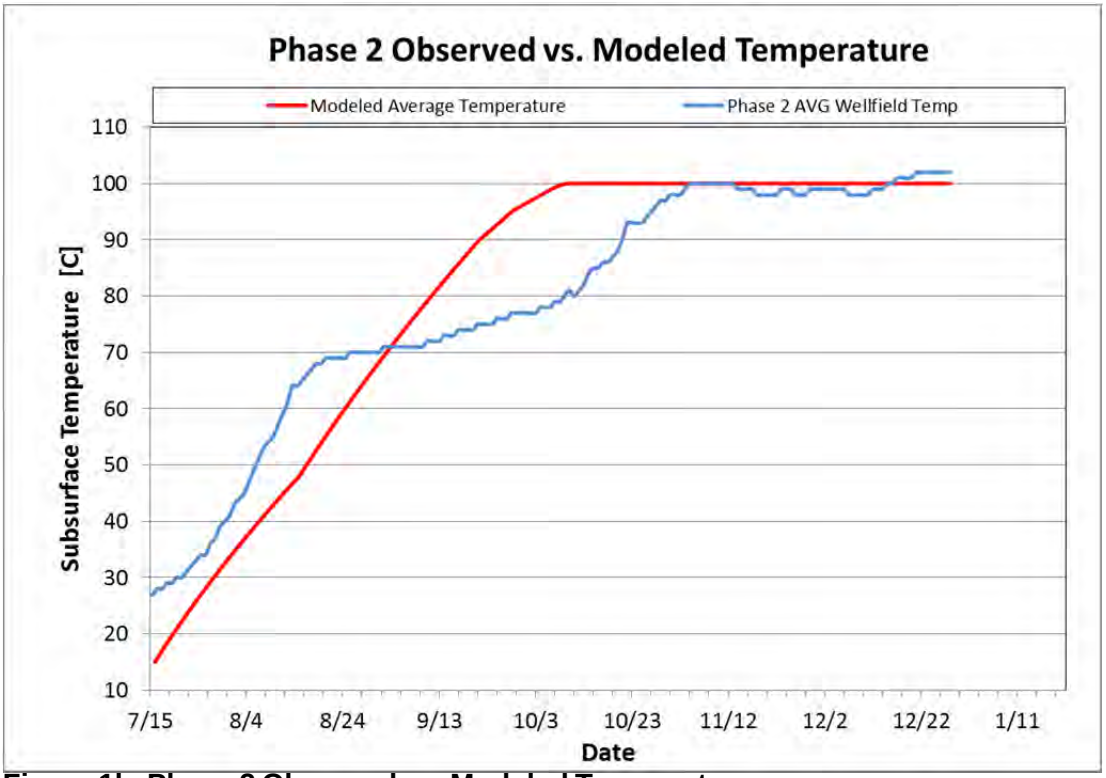


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was increased on 8/30/14.

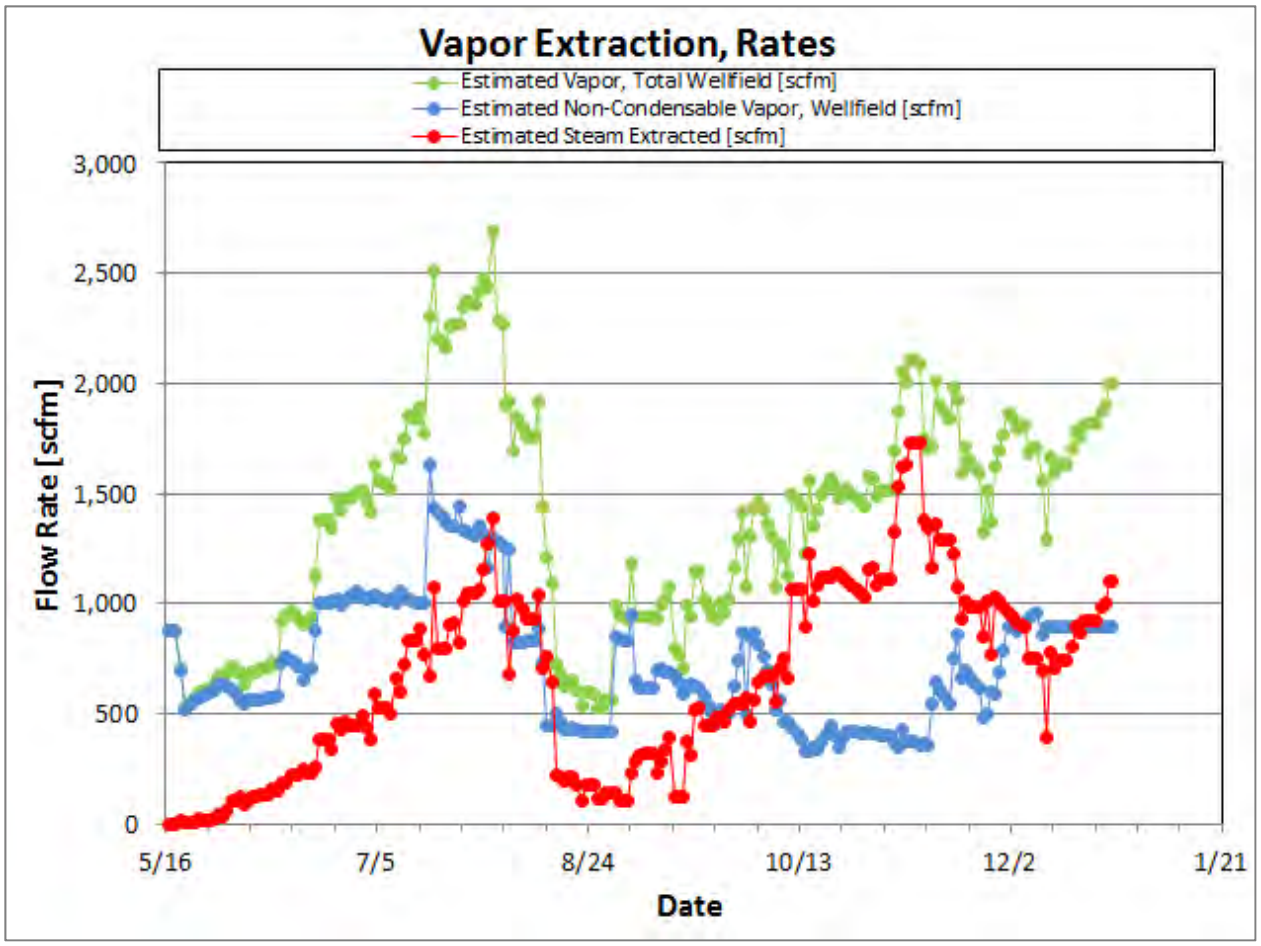


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

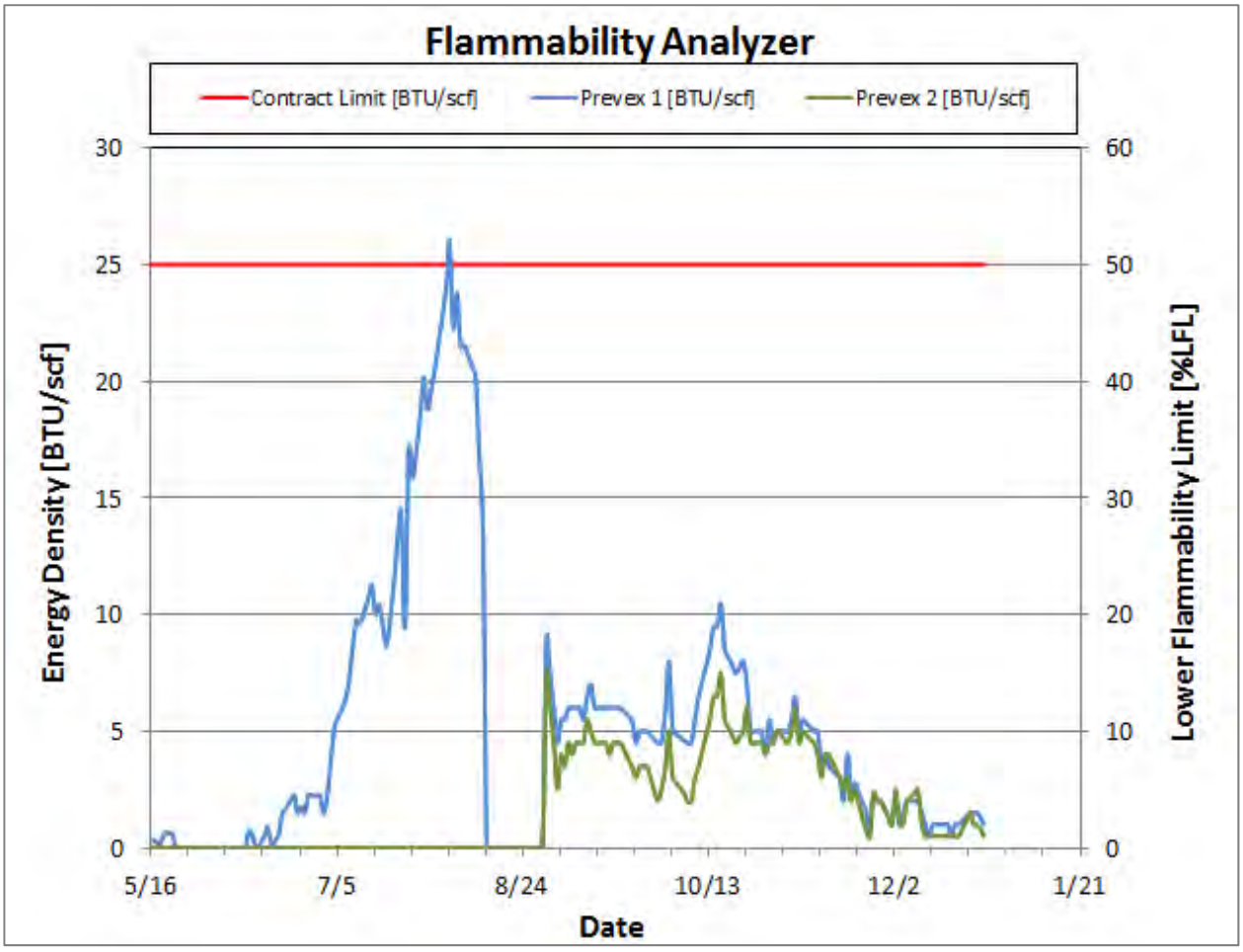


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed to date is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The decrease in mass removed starting on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14, 9/23/14, 9/30/14 , 10/7/14, 10/14/14, 10/21/14, 10/30/14, 11/4/14, 11/18/14, 11/25/2014 and 12/2/2014.

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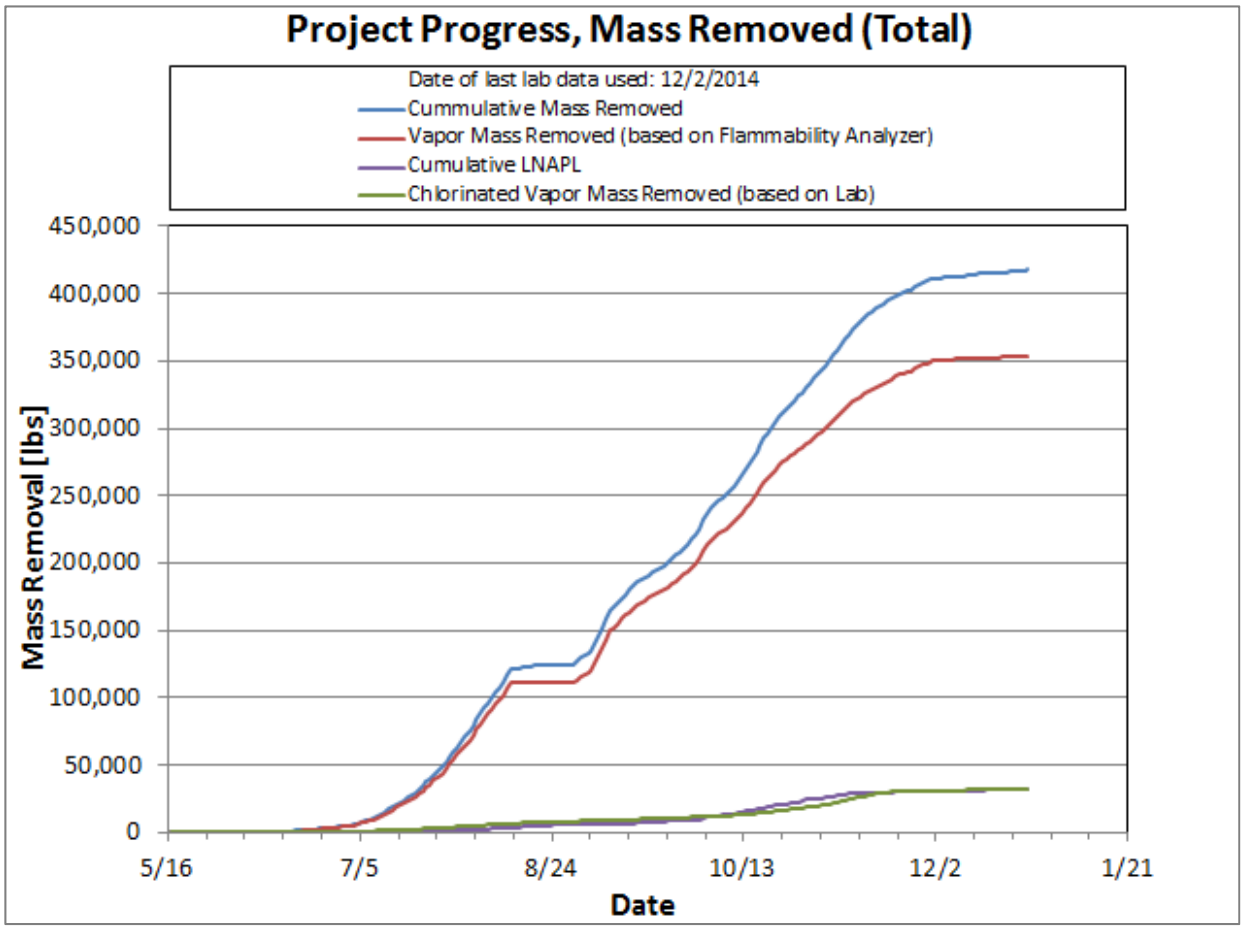


Figure 4a. Project Progress, Mass Removal (Total)

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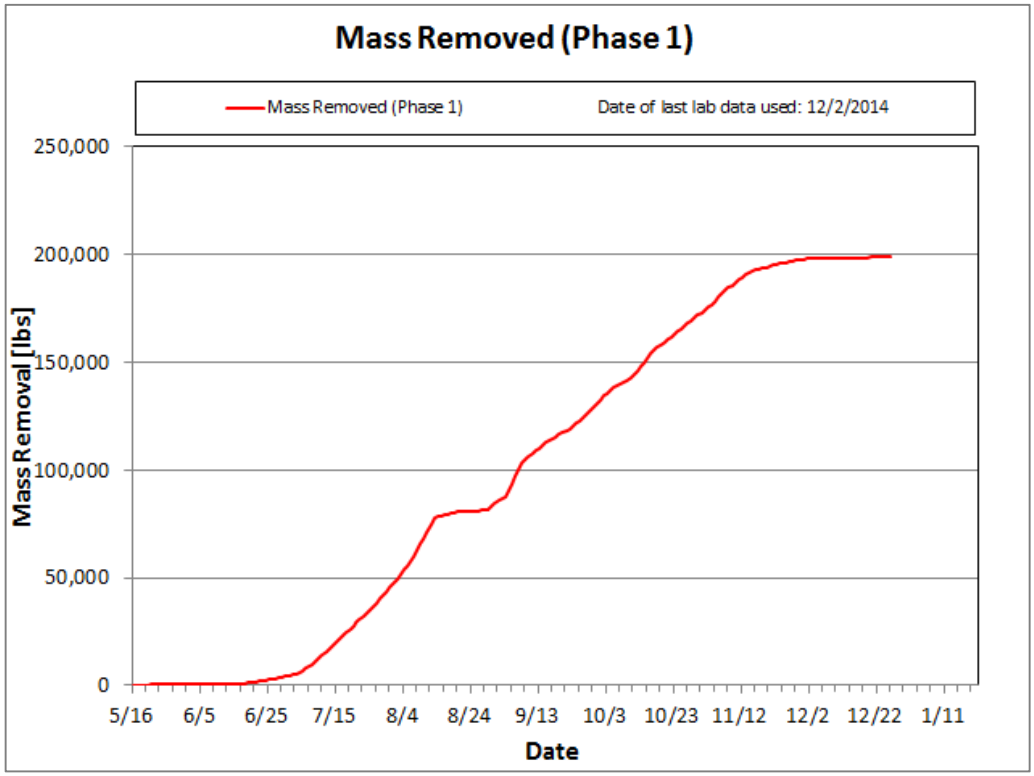


Figure 4b. Project Progress, Mass Removal (Phase 1)

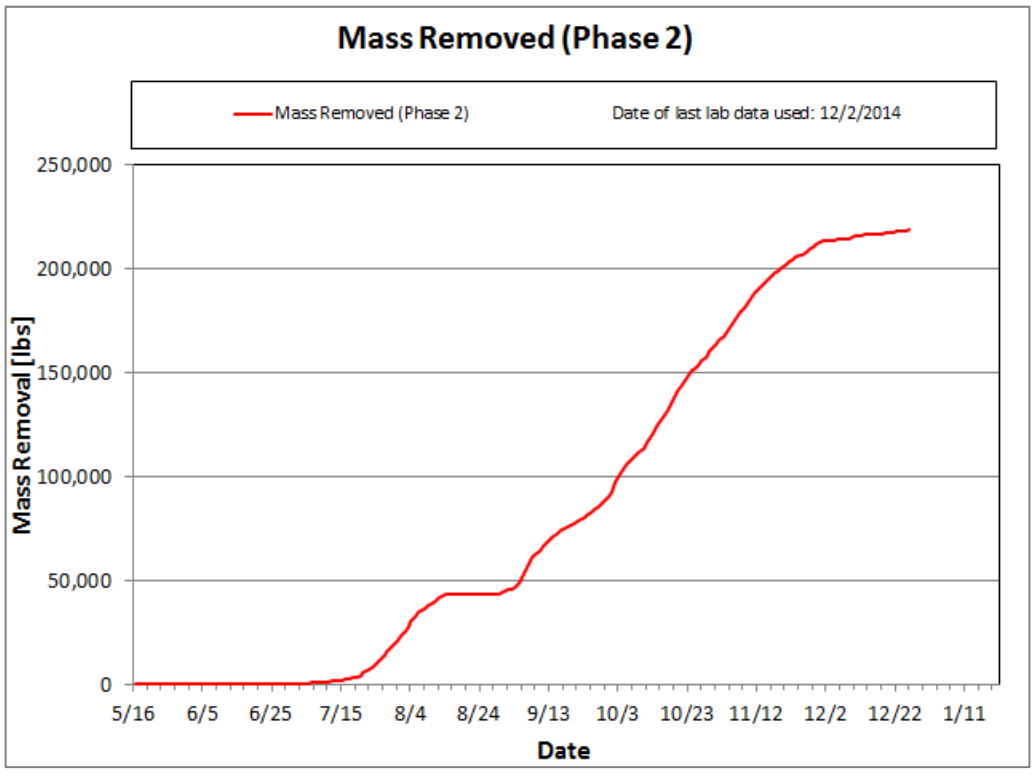


Figure 4c. Project Progress, Mass Removal (Phase 2)

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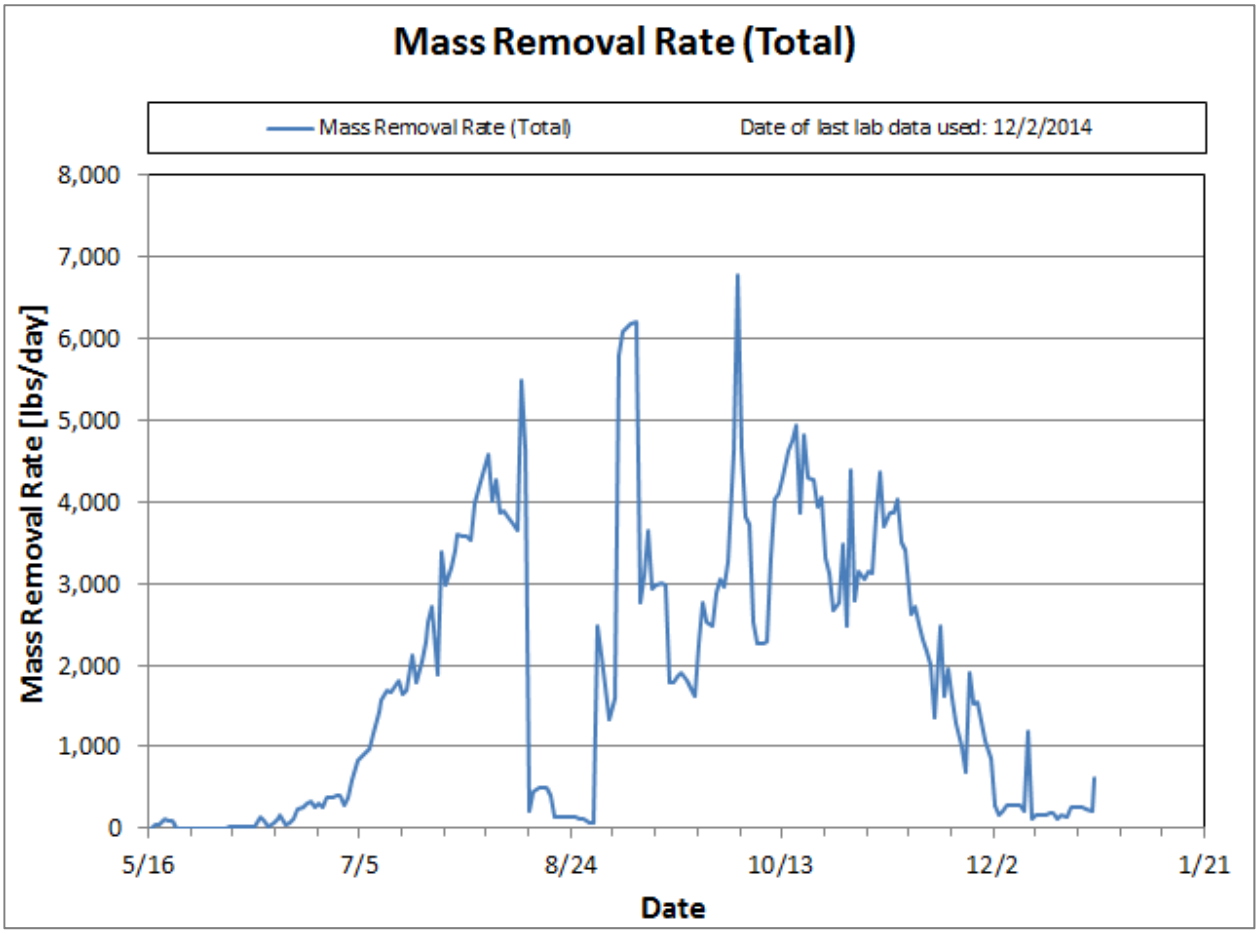


Figure 4d. Mass Removal Rate (Total for Site)

Spike observed on 12/26/14 corresponds to NAPL removed manually from the first condensate skid during a maintenance event.

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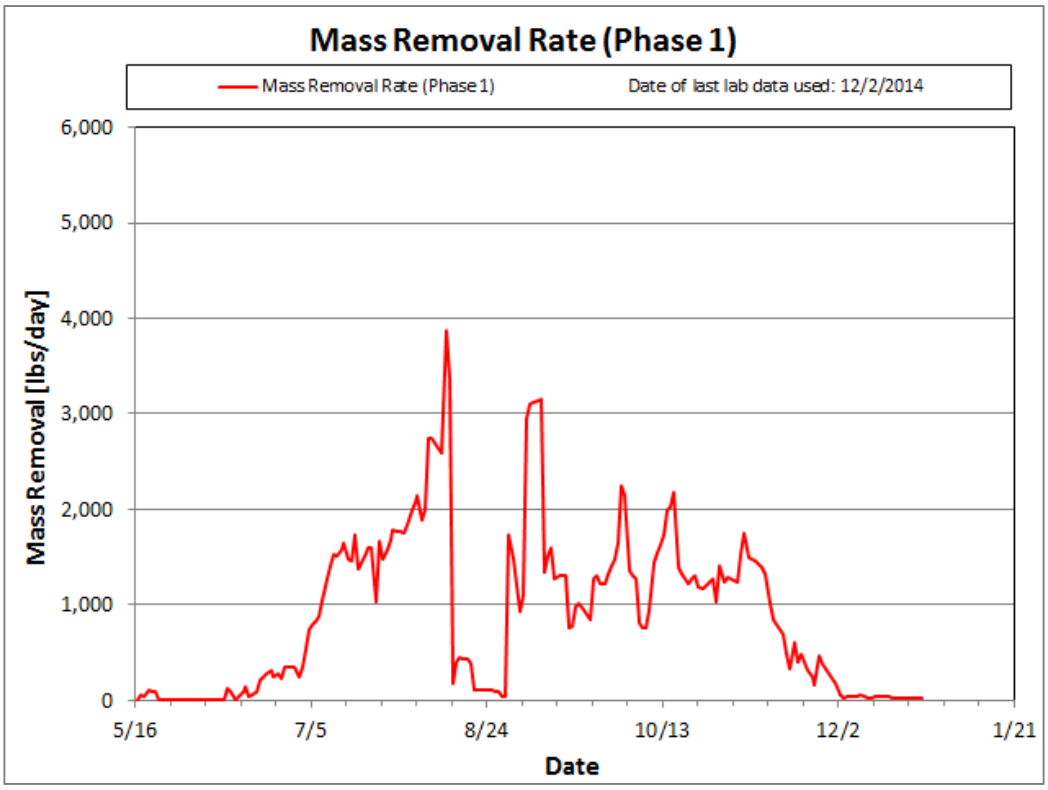


Figure 4e. Mass Removal Rate (Phase 1)

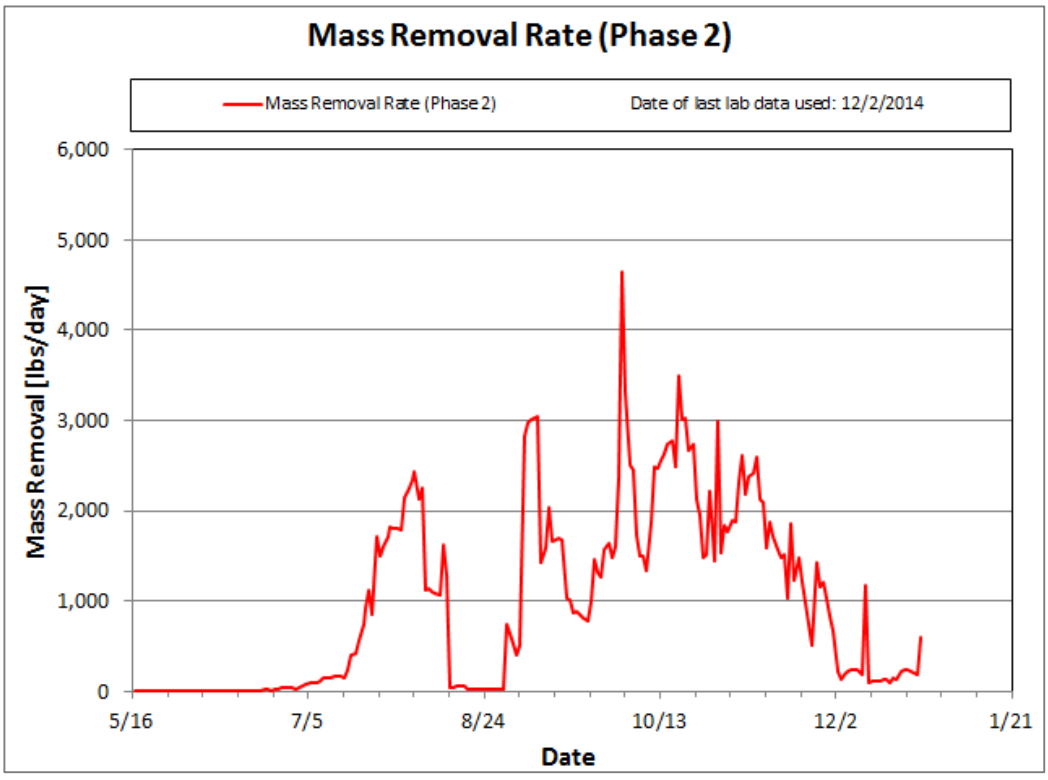


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID and flammability analyzer readings collected at the oxidizer influent over time. It should be noted that PID readings are first collected using an 11.7 eV lamp (determined by site contaminants). If the reading exceeds the limit of the meter (>2000 ppm), the readings are collected using a 10.6 eV lamp. When both meters are used, the maximum value is recorded.

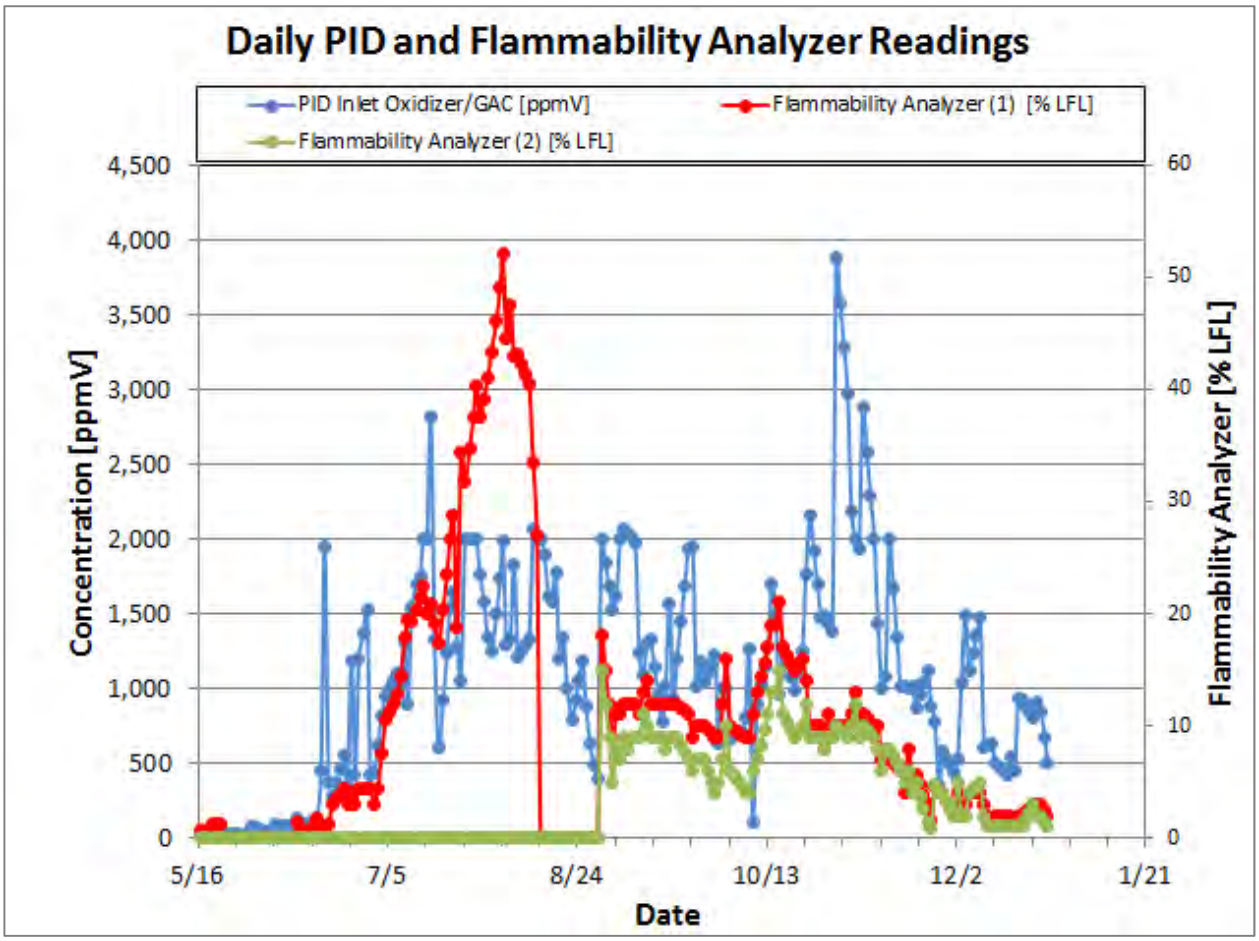


Figure 5. Daily PID and Flammability Analyzer Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13. Decreases in DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-outs.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter.

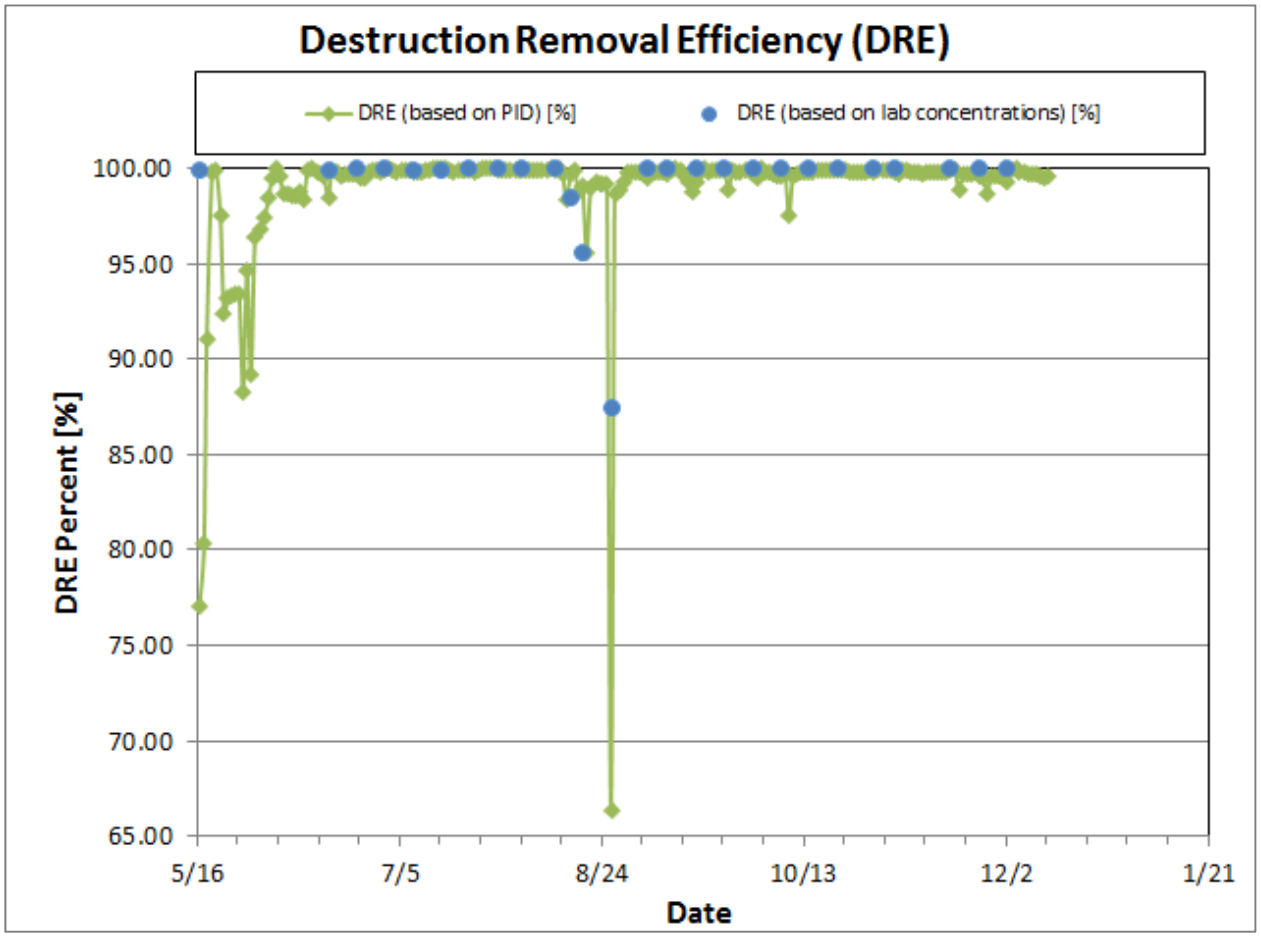


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7. Please note that the graph has been modified to present the estimated modeled energy for the heaters (ISTD) over the original predicted 195 day treatment. This does not take into account contract definitions such as heaters operating at or above 70% energy input. The flatline represents days beyond 195 days.

Please note that the modeled energy usage (12,873,000 kWh) only includes the energy predicted to be added to the subsurface. Therefore, the number should be compared to the cumulative energy added by the ISTD system to the subsurface (red line). The total energy usage (including the treatment system power usage) is predicted to be 15,795,000 kWh as stated in the summary table.

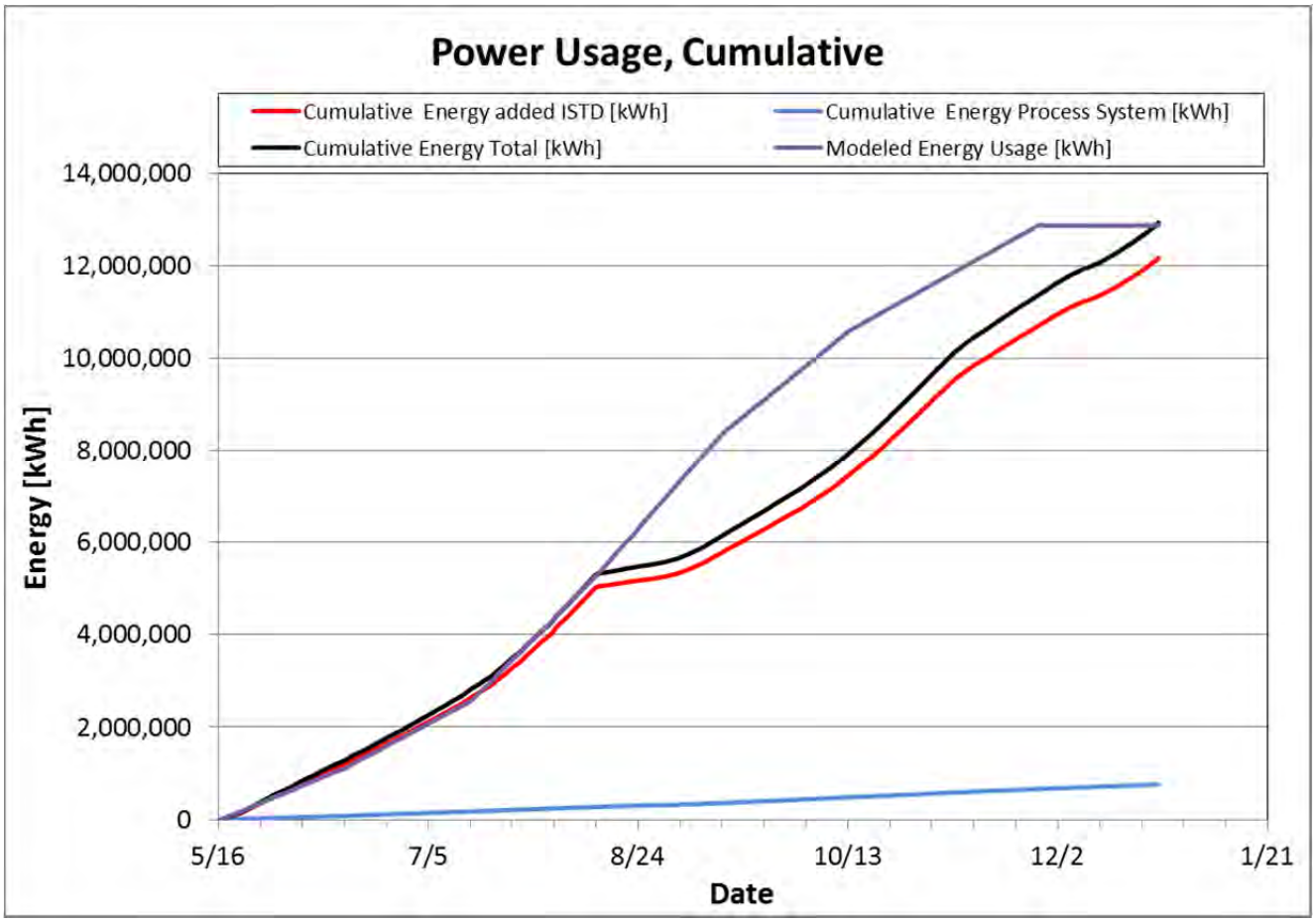


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30/14 and the following days corresponds with ramping of the heaters after placing the oxidizer back online. The decrease observed mid-November is associated with profiling of the heaters in Phase 2 and subsequent adjustments. The increase observed in December corresponds with additional profiling and subsequent adjustments.

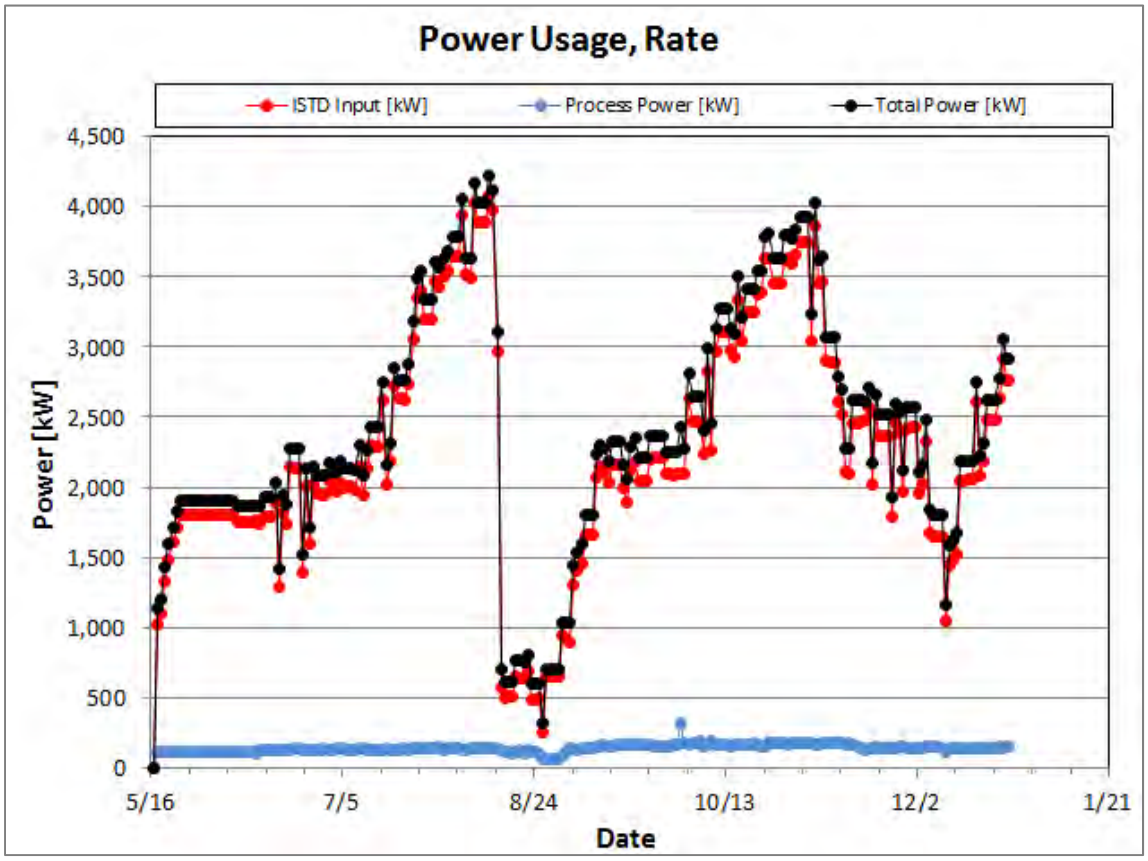


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

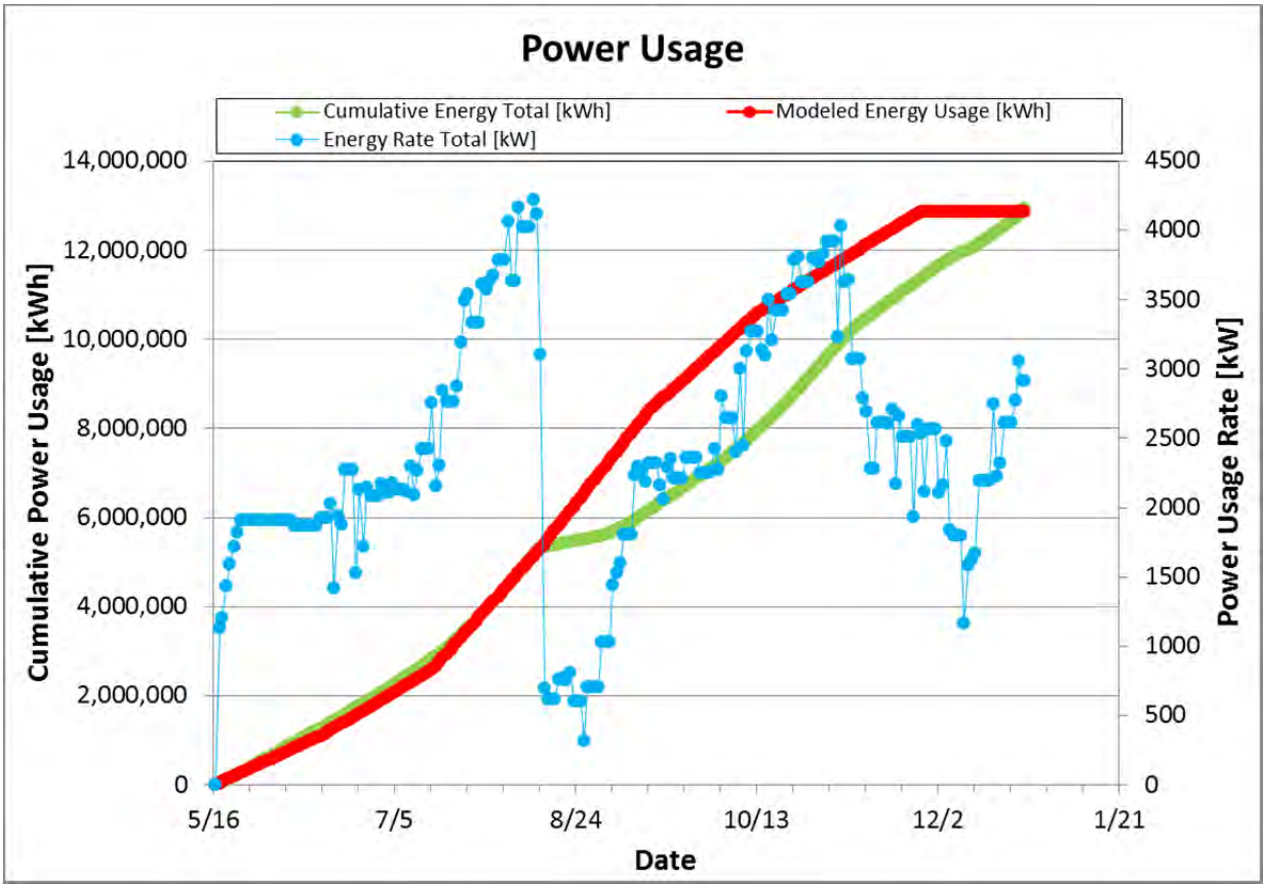


Figure 9. Power Usage

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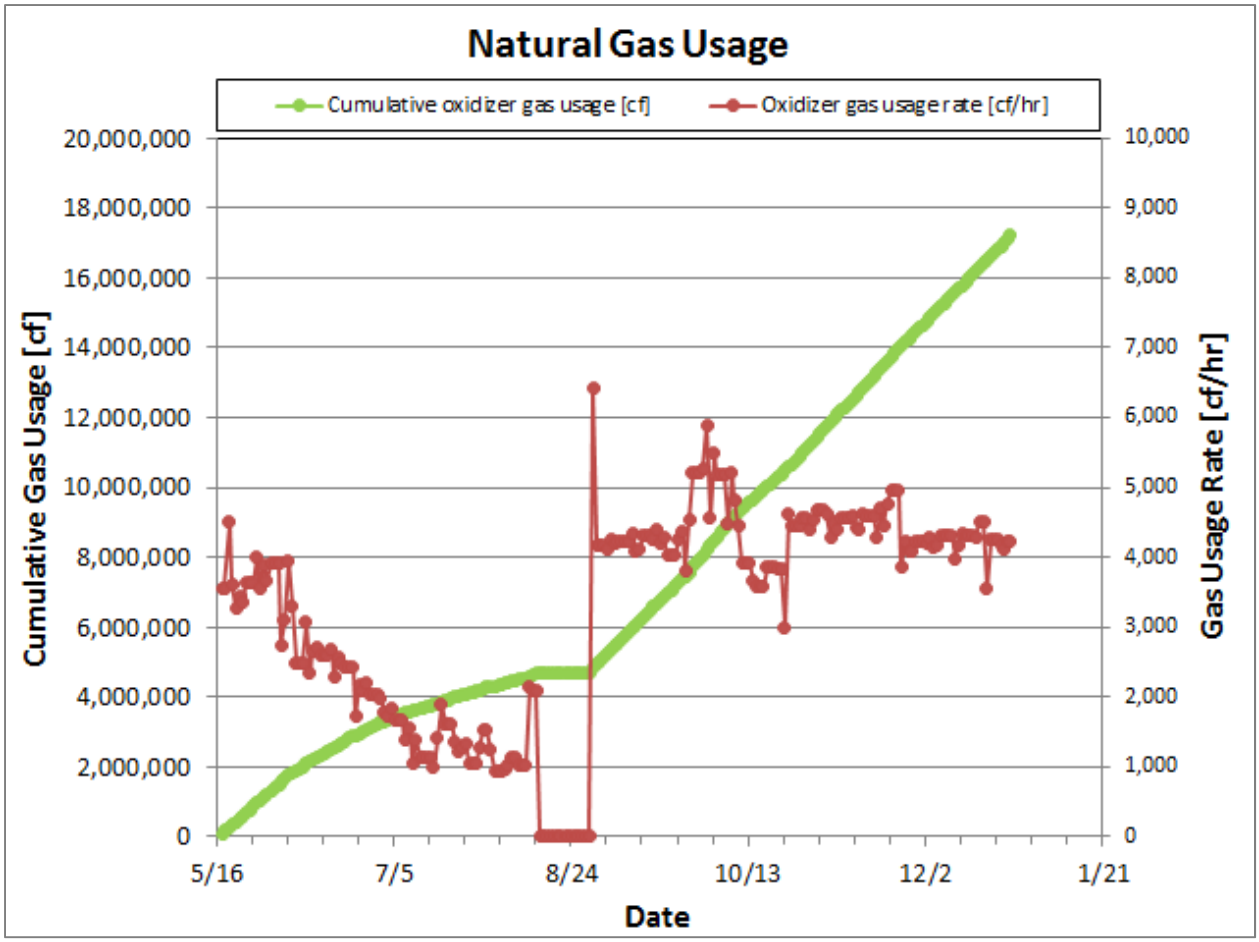


Figure 10. Natural Gas Usage

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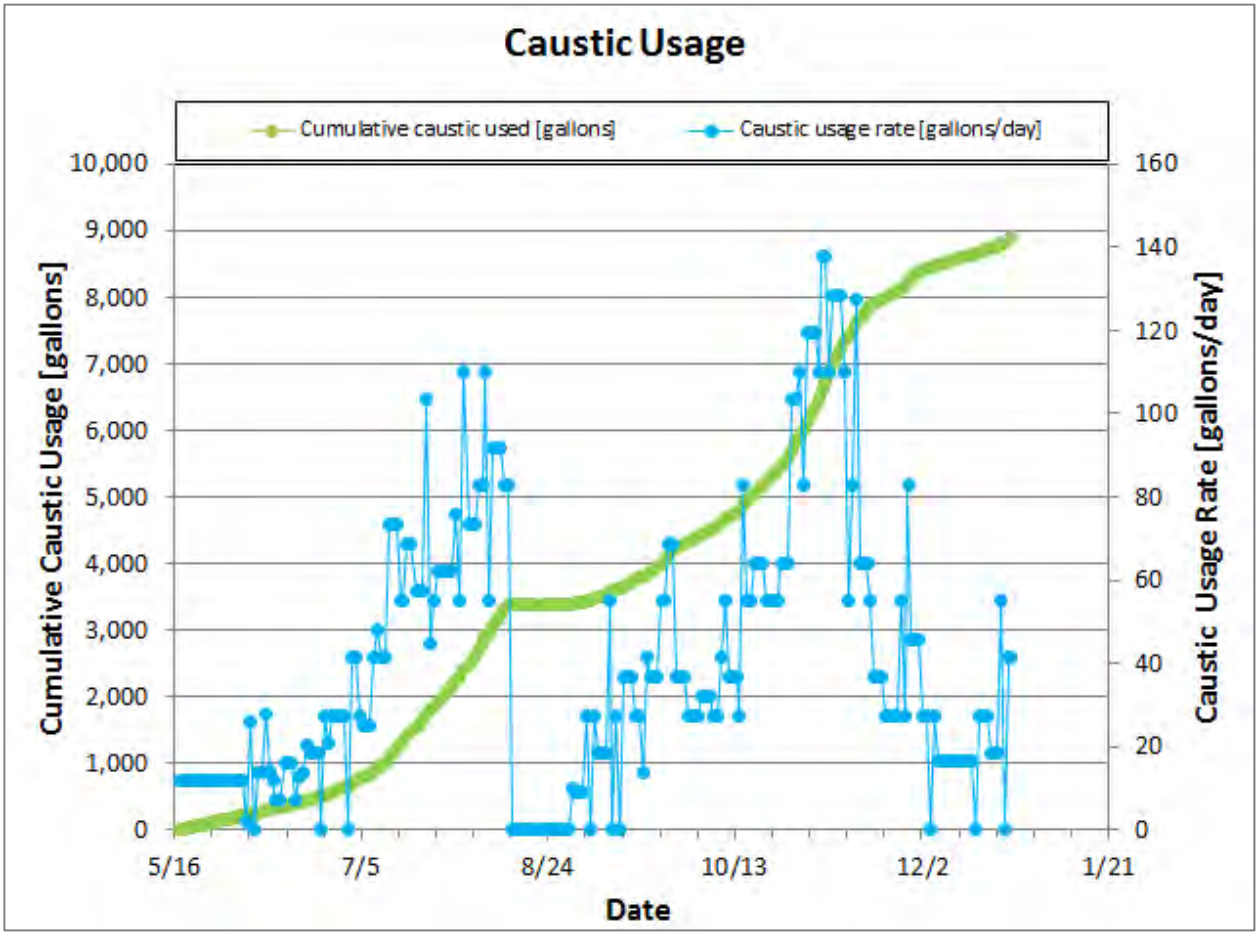


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as:

Phase 1 and Phase 2 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12a. As of 9/26/14, we have reached all three temperature milestones for phase 1. Phase 2 centroids are shown in Figure 12b. As of 12/24/14, we have achieved all three temperature milestones for Phase 2.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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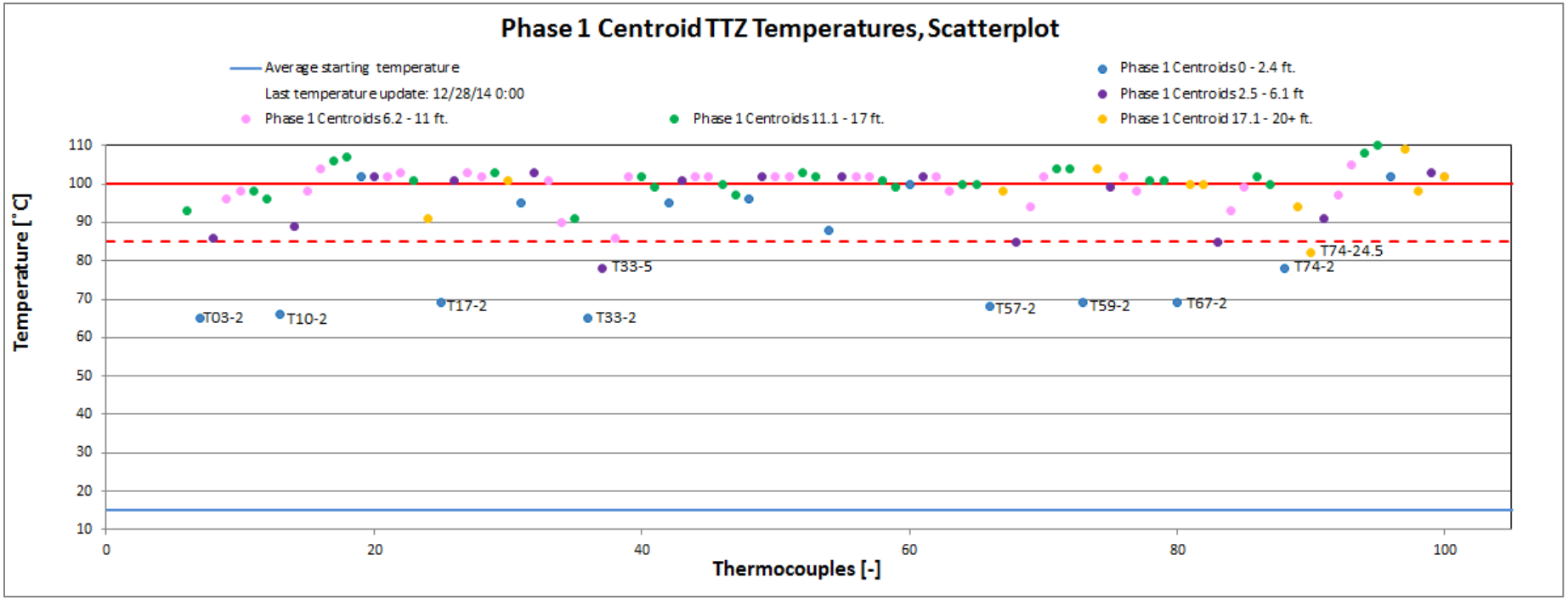


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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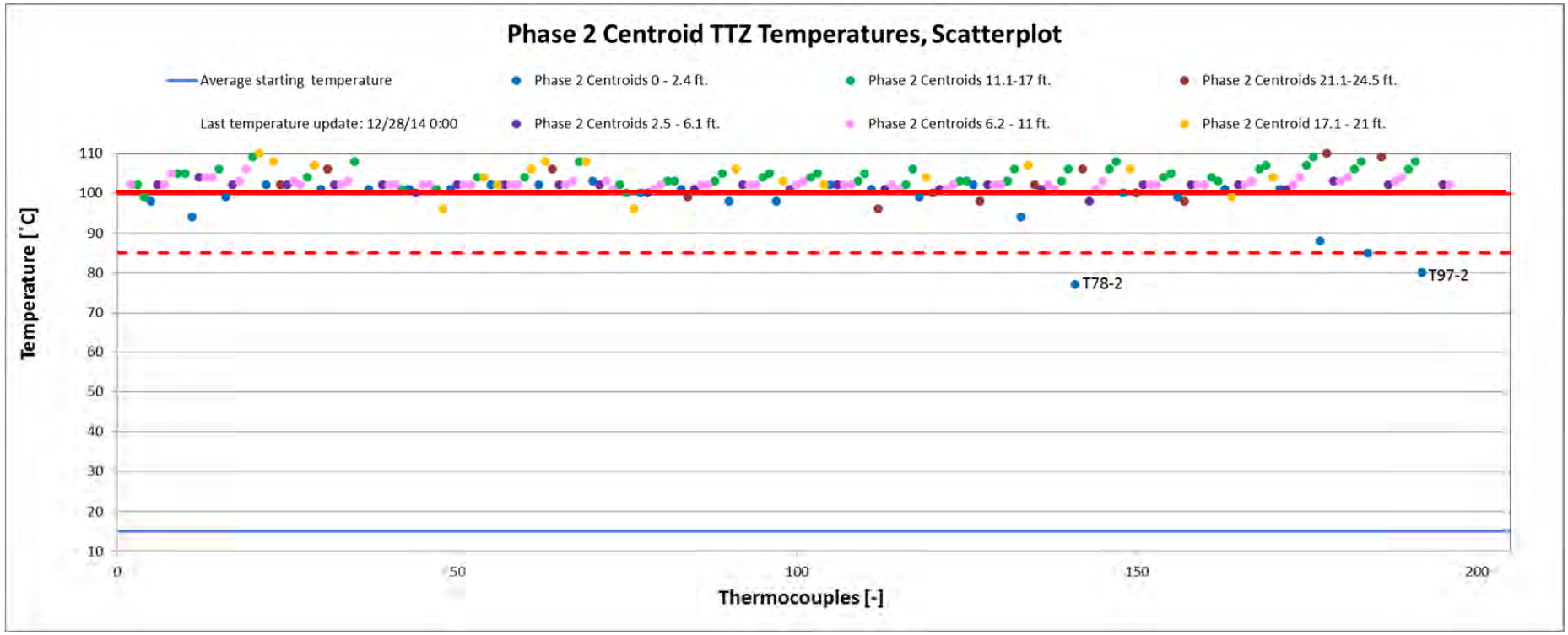


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots		
	Value	**Unit**
Date of Last Update	12/28/14	
Phase 1 Centroid Thermocouples ≥85 °C	100	%
Phase 1 Centroid Thermocouples ≥100 °C	95	%
Phase 2 Centroid Thermocouples ≥85 °C	99	%
Phase 2 Centroid Thermocouples ≥100 °C	93	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday, 26 December 2014 through Friday, 2 January 2015, with temperatures updated through Sunday, 4 January 2015.

Table 1 provides a summary of the project operational status as of Friday, 2 January 2015.

Table 1: Project Summary

Summary

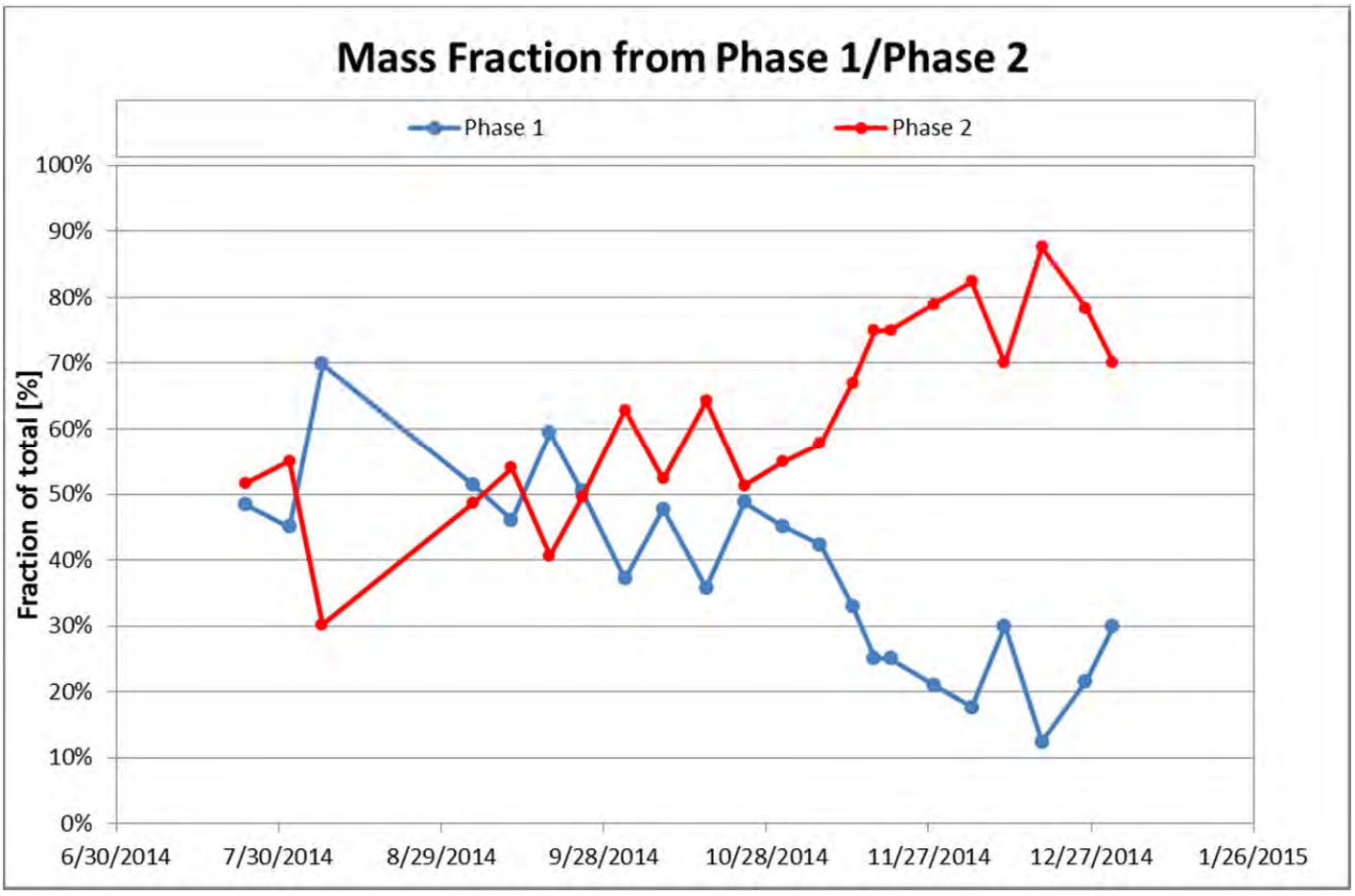
	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	01/02/15	
Last Temperature Data Update	01/04/15	
Days of Operation (Total)	208	days
Days of Phase 1 Operation	158	days
Days of Phase 2 Operation	99	days
Total Design Energy Usage (ISTD and treatment system)	15,795,000	kWh
Total Energy Added (ISTD)	13,437,600	kWh
Used Electrical Energy vs. Estimate	85.1	%
Total Mass Removal	419,483	lbs
Average Power Input Last 24 Hours	2,640	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	2,102	scfm
Average Condensate Production Rate Last 24 Hours	6.9	gpm

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Phase 2 remains online and at full power. Phase 2 has operated for 99 days. The current average wellfield temperature for Phase 2 is 103°C. Phase 1 operated for a total of 158 days, which represents days where heaters operated at or above 70% *and* the collection date of the last confirmation soil sample (per contract definition). All three temperature milestones have been achieved for both Phase 1 and 2.

Estimated mass removed to date is reported using the flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. These results yield a total mass removed of 419,483 lbs as of 01/02/15. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 12/31/14. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.30:0.70. These ratios were then applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase and leg. These data are included in Tables 2 and 3. Mass fraction data over time is presented below.



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Table 2. PID Readings Collected from Manifold Legs

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14	12/31/14
1	SV-1	215	100	745	602	720	604	590	1181	550	516	5	770	712	851	845	790	450	360	236	185	177	170
	SV-2	742	173	1271	887	872	1129	1318	2987	780	770	1610	1004	931	1179	600	934	660	677	482	377	397	436
	SV-3	2588	872	3609	2854	1198	3395	1414	5512	2643	1120	3971	1430	627	99	101	3138	1717	1782	1218	1246	347	1622
	SV-4	1971	307	2543	1921	1514	2652	1153	4790	1927	3820	3275	2204	2650	3297	1375	2903	1510	2341	1278	979	333	611
	SV-5	1817	279	1642	740	444	1407	1197	4790	759	1411	950	1153	802	326	302	490	402	135	243	120	235	29
	SV-6	4480	332	1926	956	765	4283	2347	11564	3525	9177	5750	4780	4919	5854	1083	2100	601	435	1271	375	277	197
	SV-8	3222	385	1330	2375	1479	3267	1816	4744	179	172	3815	1881	1850	88	1475	940	401	450	890	150	178	170
	SV-9	3245	142	324	1993	1565	2995	1777	11950	2762	4967	3801	2121	2863	3227	1265	801	1209	1040	1480	390	350	340
	SV-10	1896	131	2148	1096	1111	2459	1517	4382	1933	1745	3384	2841	1318	4121	1494	1982	1302	1221	3215	500	381	420
	SV-11	1016	666	1712	1979	2145	1988	930	2534	1393	2687	1950	1469	1380	596	596	1360	750	641	270	399	332	354
	SV-12	80	53	158	139	104	815	1427	3234	682	1102	1090	2100	512	563	206	413	440	426	1413	545	569	490
	SV-13	417	211	736	145	170	1452	1476	4291	1109	375	370	985	380	295	315	1210	210	131	432	143	473	445
	SV-14	632	452	1526	2636	1450	777	1610	3411	1917	4668	4274	4150	5565	8416	1107	1053	630	500	1288	300	468	570
	SV-15	3440	1072	1153	2000	915	2150	2054	608	3265	4890	4801	5780	5000	618	654	1623	730	660	1007	115	490	600
2 (and between divider line)	SV-7	3843	366	1751	1210	1482	4307	1835	3337	3672	9379	7350	5812	7910	553	3115	6391	2860	2977	2810	1323	554	531
	SV-16	3113	885	233	1911	1703	2823	2216	6230	3165	6888	4994	3841	6029	11	2340	6276	3118	3307	7931	1957	1502	1908
	SV-17	3715	429	306	2928	1824	2801	1837	8933	1927	2713	2954	3313	5408	389	1670	10903	1983	1335	409	800	1133	730
	SV-18	1760	862	1203	2034	1634	2388	2446	15000	3554	5030	2815	2465	5632	13871	3377	4768	3650	5071	3361	5491	2057	2012
	SV-19	2258	350	2067	1971	2005	1818	2038	10522	2191	6417	4561	4398	3067	2693	1075	875	925	530	528	315	552	130
	SV-20	1990	796	1545	2344	1610	2268	2158	15000	2853	2305	2059	343	4053	8642	3534	5500	2725	12650	6352	6520	2084	2492
	SV-21	1964	487	2295	2077	1855	3458	1755	8561	2756	8053	4661	2119	4298	2631	2264	6000	4186	4440	2002	2870	937	958
	SV-22	2670	980	1606	2222	1892	2466	2448	14750	3344	5023	3578	2236	3582	55	3460	4765	3450	11187	4509	5516	2803	2565
	SV-23	2515	671	3248	3158	2165	3233	1532	8102	2973	7684	4880	3933	2707	4560	4005	5367	2993	2598	1326	1154	805	883
	SV-24	1412	638	1504	2406	1567	1669	1949	11882	1999	6130	4554	5005	6223	8864	2843	4555	2946	4280	3267	5764	2614	2195
	SV-25	688	220	1261	1035	1059	1350	2418	5725	1542	2247	1873	1743	1925	991	570	1301	740	773	500	445	400	547
	SV-26	90	185	350	580	573	638	1133	1119	790	3559	4305	4752	4633	1933	865	2742	710	520	642	1710	548	550
	SV-27	192	151	718	944	789	1117	1518	3922	1256	1485	1650	947	840	1040	313	769	745	620	318	320	277	350
	SV-28	15	87	77	151	178	310	211	730	335	1250	3624	5592	5447	4380	1438	6351	1440	1100	1588	4527	1575	886
	SV-29	8	66	55	20	52	130	1	15	35	21	352	255	83	41	1375	43	80	41	52	117	70	61
Breakdown of Wellfield VOC Flux by Phase																							
Phase 1:		48%	45%	70%	51%	46%	59%	51%	37%	48%	36%	49%	45%	42%	33%	25%	25%	21%	18%	30%	12%	22%	30%
Phase 2:		52%	55%	30%	49%	54%	41%	50%	63%	52%	64%	51%	55%	58%	67%	75%	75%	79%	82%	70%	88%	78%	70%

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Table 3. Estimated Mass Loading by Manifold Leg/Phase

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14	12/31/14
1	SV-1	0.5%	0.7%	3.5%	1.5%	3.0%	1.6%	1.7%	1.0%	1.1%	0.7%	0.0%	1.3%	0.8%	1.2%	2.2%	1.2%	1.0%	0.6%	0.6%	0.4%	0.9%	0.7%
	SV-2	2.0%	1.3%	4.3%	2.6%	3.6%	3.0%	4.7%	2.5%	1.9%	0.8%	2.4%	1.8%	1.2%	1.7%	1.6%	1.3%	1.4%	1.3%	1.3%	1.0%	1.9%	2.2%
	SV-3	3.5%	7.5%	16.2%	7.4%	5.0%	8.9%	5.0%	4.5%	7.1%	1.3%	5.7%	2.6%	0.7%	0.2%	0.3%	5.1%	4.2%	3.3%	3.2%	3.5%	1.7%	9.4%
	SV-4	3.3%	2.5%	8.5%	5.7%	5.5%	5.9%	3.3%	3.5%	4.8%	3.9%	4.5%	3.2%	3.1%	3.8%	3.0%	4.4%	3.5%	4.5%	3.0%	2.3%	1.5%	1.8%
	SV-5	2.5%	2.9%	9.6%	2.5%	1.6%	3.1%	3.2%	3.2%	2.1%	1.9%	1.4%	1.5%	1.0%	0.5%	0.9%	0.7%	1.0%	0.3%	0.6%	0.3%	1.2%	0.2%
	SV-6	2.5%	1.4%	3.8%	1.6%	1.2%	4.1%	3.0%	3.4%	3.7%	4.5%	3.5%	3.0%	2.4%	3.1%	1.1%	1.6%	0.6%	0.3%	1.4%	0.3%	0.5%	0.4%
	SV-8	8.7%	2.9%	4.4%	7.1%	6.3%	8.7%	6.8%	3.1%	0.4%	0.1%	5.9%	3.5%	4.4%	0.1%	4.2%	1.6%	1.0%	0.8%	2.6%	0.3%	0.9%	1.0%
	SV-9	9.0%	0.9%	1.3%	6.0%	5.8%	8.4%	6.4%	7.3%	6.9%	6.6%	6.2%	3.9%	6.8%	4.8%	3.6%	1.0%	2.5%	2.0%	3.7%	1.1%	1.9%	2.0%
	SV-10	2.4%	0.5%	3.0%	1.3%	1.7%	2.1%	1.8%	1.5%	2.2%	0.9%	2.0%	2.1%	0.7%	2.3%	1.6%	1.4%	1.1%	1.0%	3.6%	0.4%	0.8%	0.9%
	SV-11	1.3%	2.3%	3.4%	2.2%	3.4%	1.9%	1.0%	0.9%	1.5%	1.4%	1.2%	1.0%	0.6%	0.3%	0.5%	1.2%	0.7%	0.5%	0.3%	0.3%	0.7%	0.8%
	SV-12	0.3%	0.5%	0.6%	0.4%	0.5%	2.3%	4.8%	2.4%	1.6%	1.4%	1.8%	2.7%	1.2%	1.0%	0.7%	0.7%	1.0%	0.8%	3.7%	1.3%	3.1%	3.0%
	SV-13	0.6%	0.9%	1.6%	0.2%	0.3%	1.4%	2.0%	1.3%	1.2%	0.2%	0.2%	0.7%	0.2%	0.2%	0.4%	0.8%	0.2%	0.1%	0.4%	0.1%	1.0%	0.9%
	SV-14	2.3%	6.1%	5.8%	7.5%	5.5%	2.2%	1.1%	2.0%	4.5%	6.3%	6.9%	7.4%	12.7%	13.1%	3.3%	1.8%	1.5%	0.9%	3.3%	0.7%	2.7%	3.5%
	SV-15	9.5%	14.7%	3.9%	5.3%	2.8%	5.6%	5.7%	0.5%	8.8%	5.8%	6.9%	10.4%	6.4%	0.9%	1.8%	2.3%	1.5%	1.3%	2.3%	0.3%	2.8%	3.1%
2 (and between divider line)	SV-7	2.2%	1.5%	1.9%	1.5%	2.9%	4.2%	2.3%	1.1%	3.9%	4.8%	3.8%	4.0%	3.2%	0.3%	3.1%	5.3%	2.5%	2.1%	3.3%	1.3%	1.1%	0.9%
	SV-16	9.5%	7.1%	1.1%	5.7%	6.2%	6.6%	6.9%	5.2%	8.0%	8.7%	6.9%	6.9%	8.0%	0.0%	6.8%	10.3%	10.5%	6.6%	18.3%	5.0%	8.1%	10.5%
	SV-17	2.9%	0.1%	-3.3%	2.1%	1.6%	-1.5%	-0.6%	-0.5%	-1.6%	-3.1%	-2.0%	-1.3%	0.0%	-2.8%	0.7%	6.0%	1.3%	0.7%	-1.0%	0.5%	1.6%	1.2%
	SV-18	5.5%	11.4%	4.9%	6.8%	5.6%	6.7%	7.8%	13.0%	9.5%	6.6%	3.6%	4.3%	7.1%	22.8%	10.5%	8.2%	14.5%	9.1%	7.9%	13.9%	10.4%	10.8%
	SV-19	3.6%	0.3%	-2.0%	5.5%	6.3%	0.6%	2.8%	3.0%	3.2%	6.5%	6.4%	4.3%	3.0%	3.4%	2.0%	0.7%	1.2%	0.7%	0.9%	0.6%	1.7%	0.6%
	SV-20	7.2%	12.0%	7.2%	6.2%	6.3%	5.7%	5.5%	11.9%	6.1%	2.8%	2.9%	0.6%	5.0%	14.1%	11.0%	8.9%	8.7%	23.9%	14.6%	16.8%	10.7%	13.4%
	SV-21	2.6%	2.0%	3.8%	0.9%	2.4%	3.2%	2.9%	3.6%	2.5%	5.3%	1.6%	-0.4%	2.2%	0.2%	3.5%	6.3%	5.8%	4.3%	1.4%	4.8%	3.0%	3.5%
	SV-22	8.5%	9.3%	8.3%	5.9%	7.6%	6.7%	7.0%	12.2%	8.5%	6.7%	4.8%	3.9%	4.4%	0.1%	9.9%	5.4%	11.5%	19.8%	11.5%	13.6%	14.3%	14.0%
	SV-23	5.2%	-2.9%	-2.4%	1.9%	4.4%	-0.3%	0.5%	0.3%	1.0%	8.8%	1.3%	4.6%	2.9%	6.2%	10.3%	3.2%	3.4%	2.6%	-0.2%	-0.2%	2.4%	-6.0%
	SV-24	4.0%	8.5%	9.4%	7.2%	6.2%	4.4%	5.6%	10.3%	4.7%	8.0%	6.8%	7.4%	7.4%	13.6%	8.3%	6.5%	11.3%	8.5%	7.7%	14.7%	13.7%	11.6%
	SV-25	-0.1%	1.1%	0.0%	0.7%	0.8%	0.1%	1.5%	0.1%	1.4%	2.1%	0.2%	1.3%	1.2%	-0.2%	0.0%	0.5%	0.3%	0.4%	0.1%	0.2%	0.0%	0.4%
	SV-26	0.3%	2.2%	1.9%	1.9%	2.4%	1.6%	3.4%	1.0%	1.6%	4.3%	6.8%	8.1%	5.9%	3.2%	2.7%	3.9%	2.8%	1.1%	1.7%	4.0%	2.6%	3.2%
	SV-27	0.1%	0.7%	-0.5%	1.7%	0.4%	1.4%	3.2%	1.2%	2.4%	1.1%	2.0%	0.4%	0.2%	0.0%	-1.5%	0.1%	0.7%	0.5%	0.2%	0.5%	0.5%	1.0%
	SV-28	0.0%	1.0%	0.5%	0.6%	0.7%	0.8%	0.6%	0.5%	0.9%	1.7%	5.5%	10.1%	6.9%	6.1%	3.8%	9.5%	4.2%	2.0%	3.4%	11.6%	7.9%	4.8%
	SV-29	0.0%	0.6%	0.4%	0.1%	0.2%	0.4%	0.0%	0.0%	0.1%	0.0%	0.6%	0.5%	0.2%	0.1%	3.7%	0.1%	0.3%	0.1%	0.1%	0.3%	0.4%	0.3%
	Total:	100%	100%	101%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note: Six out of the 23 wellfield branch lines service both Phase 1 and Phase 2; therfore, a correction has been made to subtract the shared mass sometimes resulting in a negative value. This value indicates that the mass contribution from the Phase 2 area was limited in that particular sample round. This is a result of the accuracy of the flow and PID data measurements collected.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperatures for both Phase 1 and Phase 2, as well as the average centroid temperatures. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Figure 1a displays the average Phase 1 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Phase 2 heating began on 7/16/14 but was stopped on 8/14/14, as a result of the oxidizer shutdown, and reenergized on 09/30/14. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	1/4/15	
Phase 1 Entire TTZ Average Temperature	95	°C
Phase 2 Entire TTZ Average Temperature	103	°C
Phase 1 Centroid Average Temperature	97	°C
Phase 2 Centroid Average Temperature	103	°C

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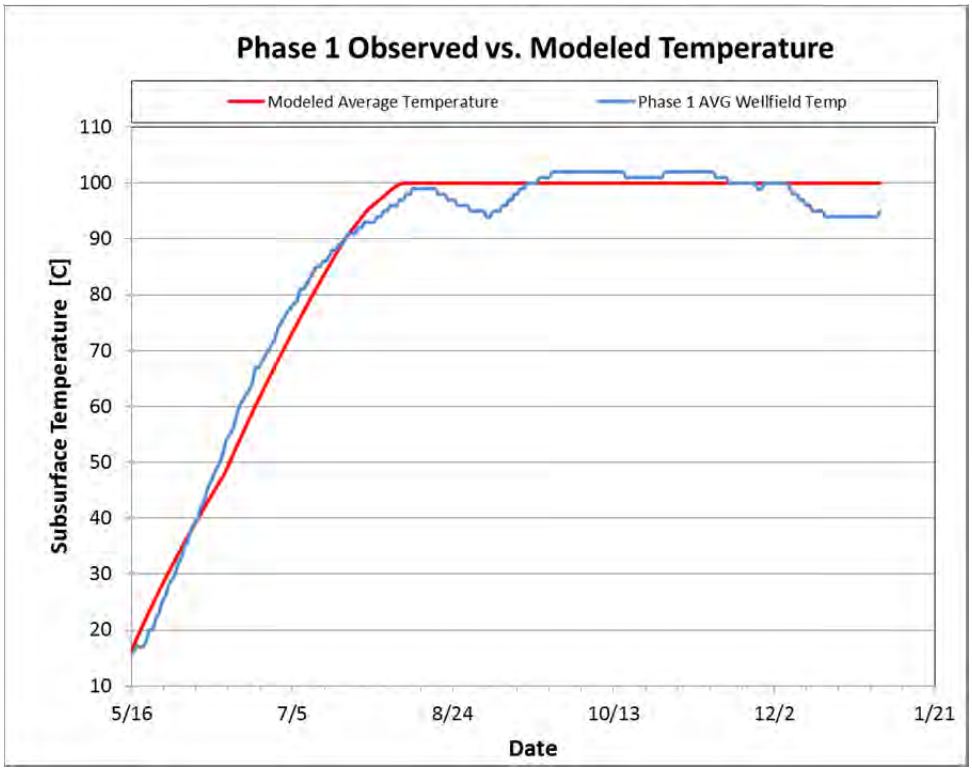


Figure 1a. Phase 1 Observed vs. Modeled Temperatures

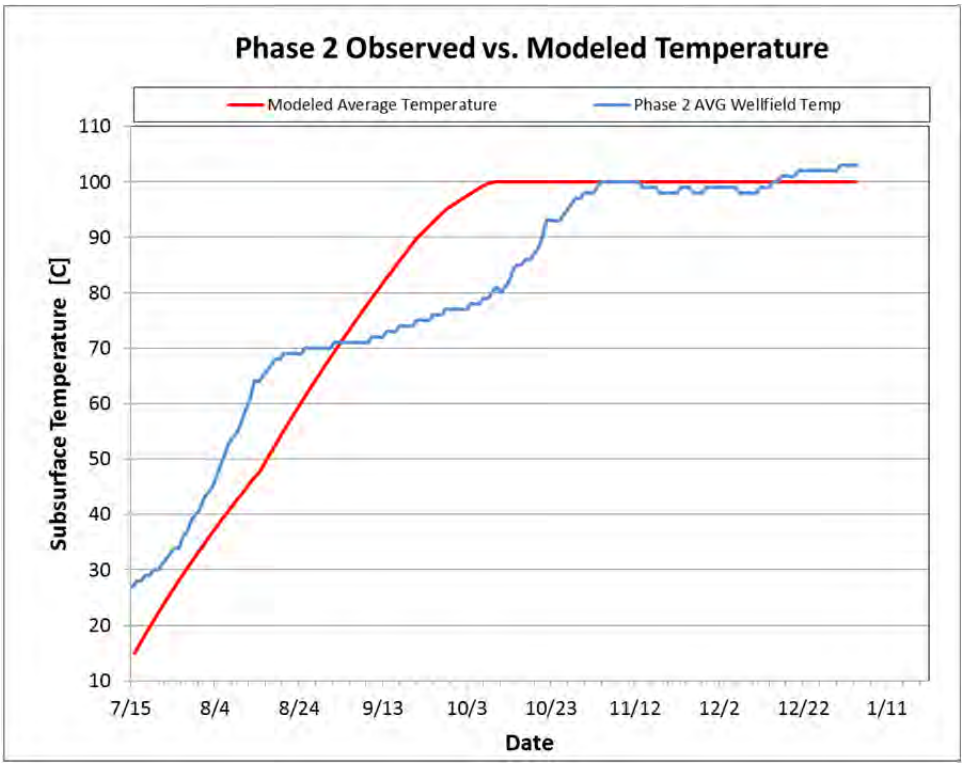


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was increased on 8/30/14.

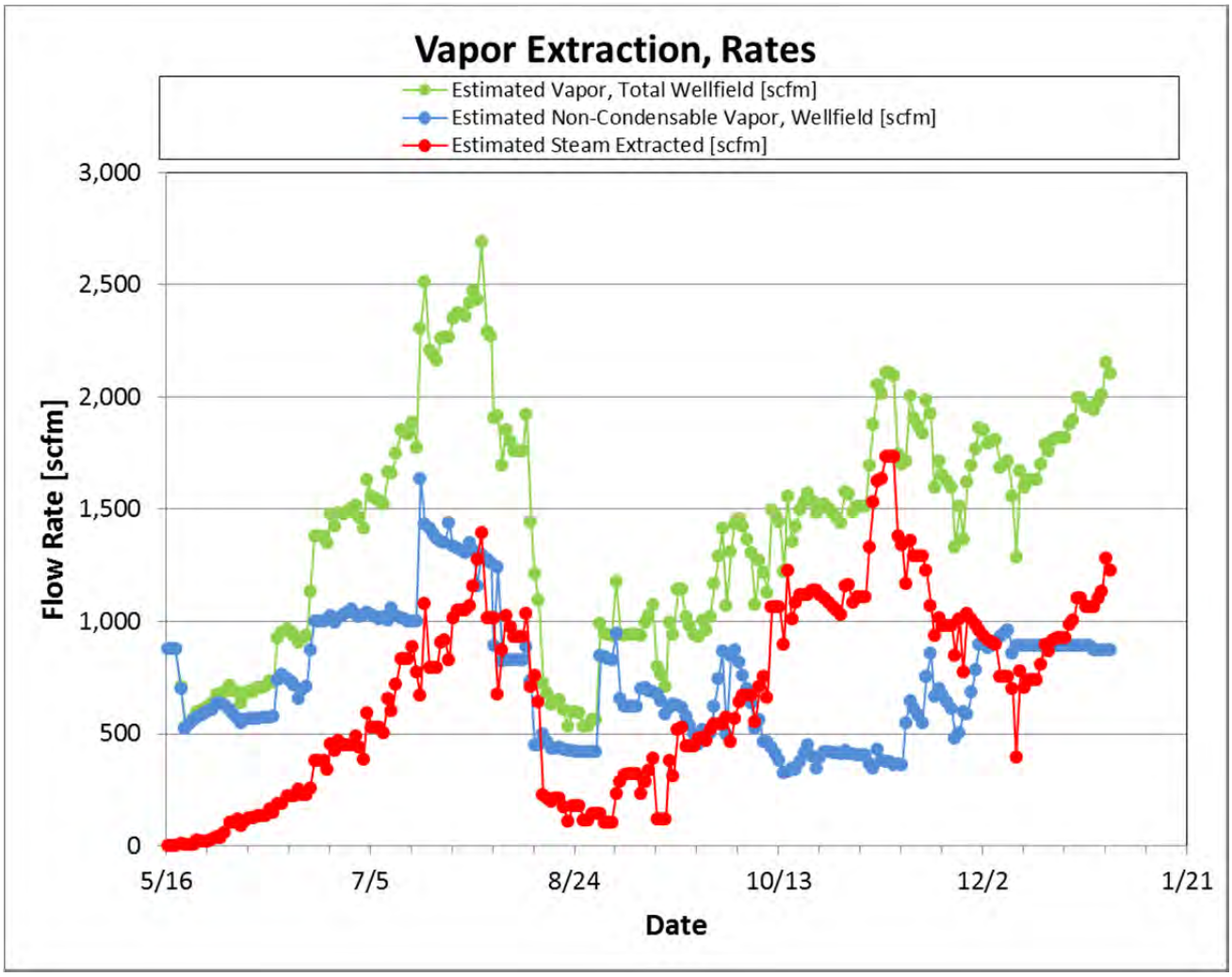


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

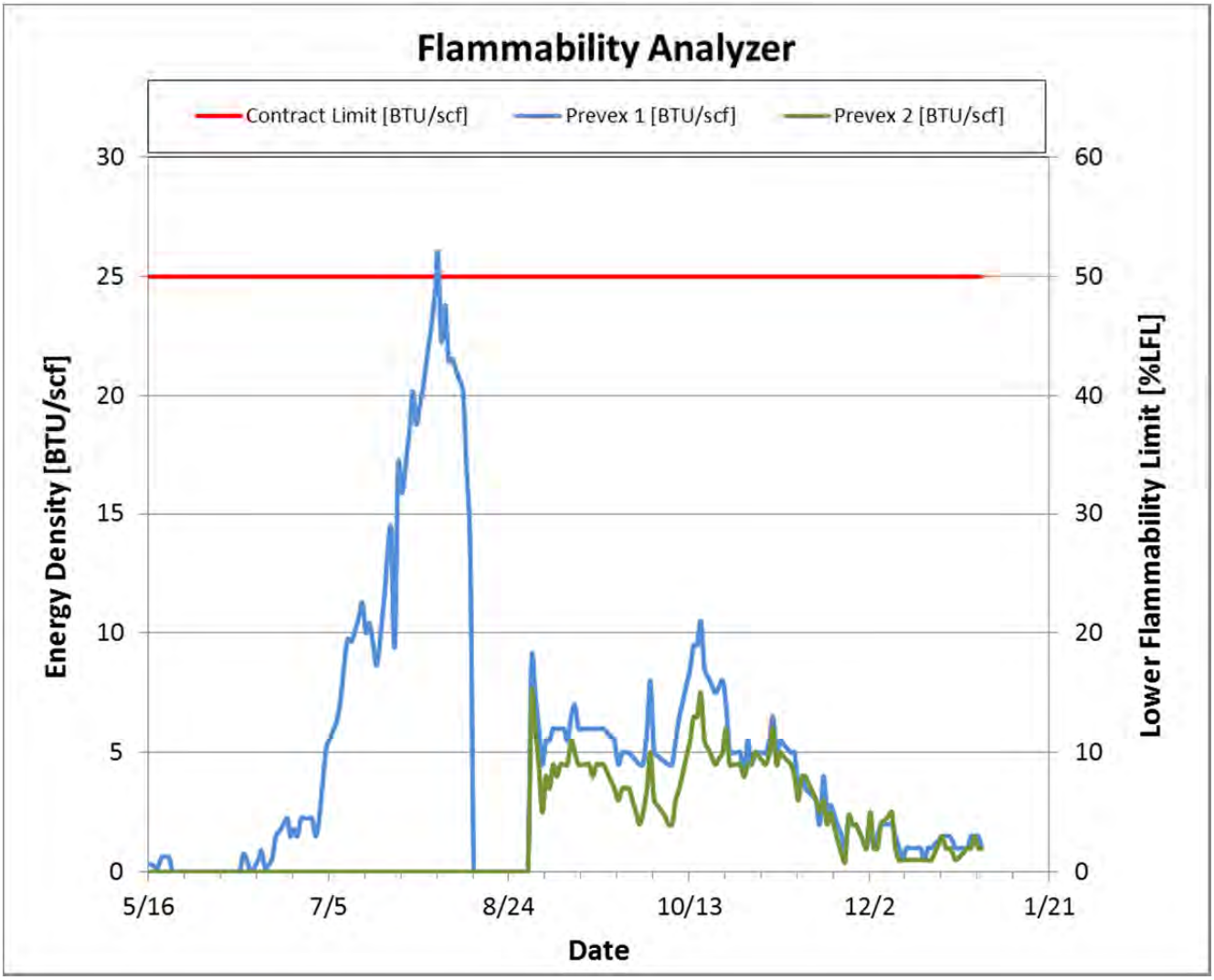


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed to date is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The decrease in mass removed starting on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14, 9/23/14, 9/30/14, 10/7/14, 10/14/14, 10/21/14, 10/30/14, 11/4/14, 11/18/14, 11/25/2014, 12/2/2014 and 12/9/2014.

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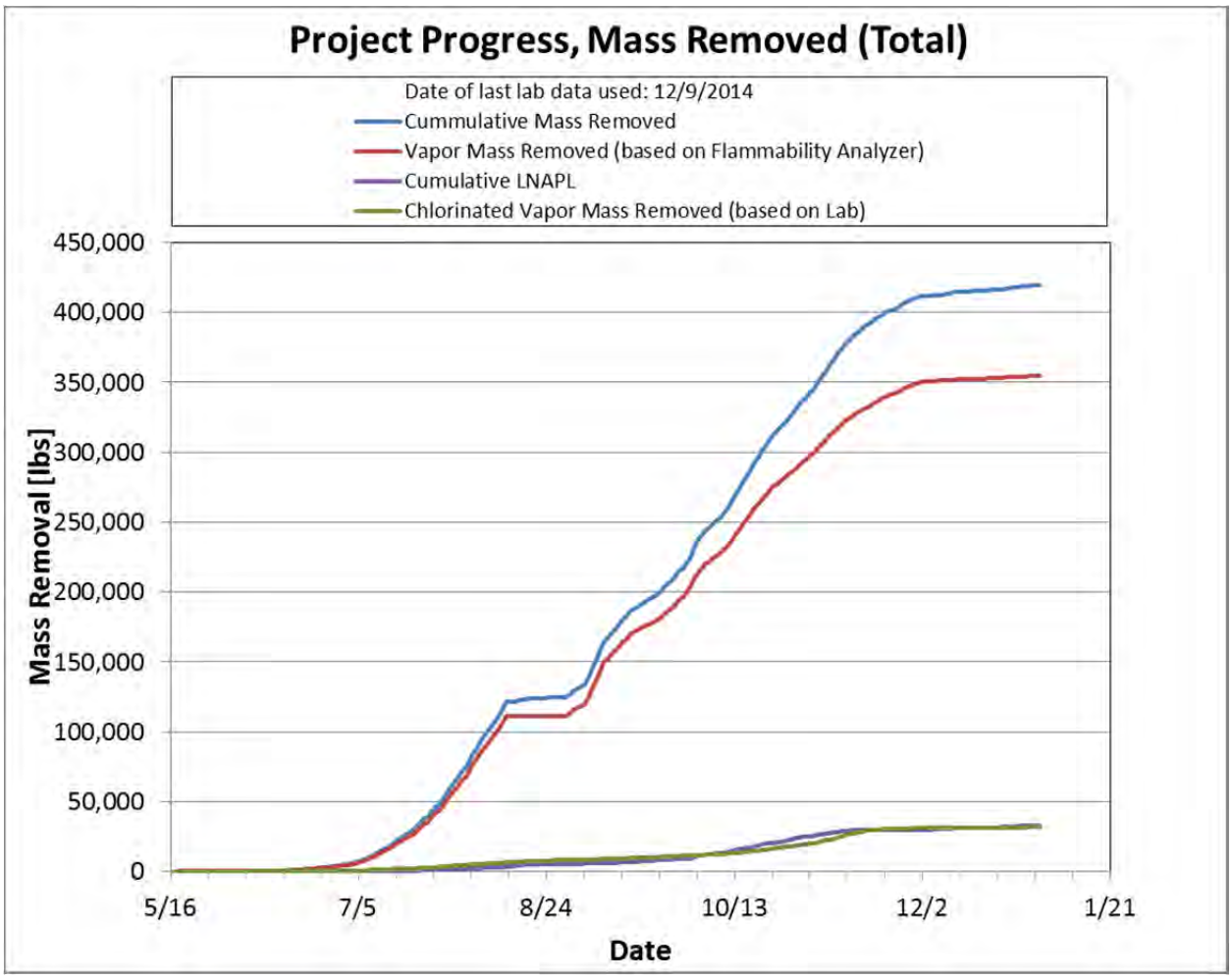


Figure 4a. Project Progress, Mass Removal (Total)

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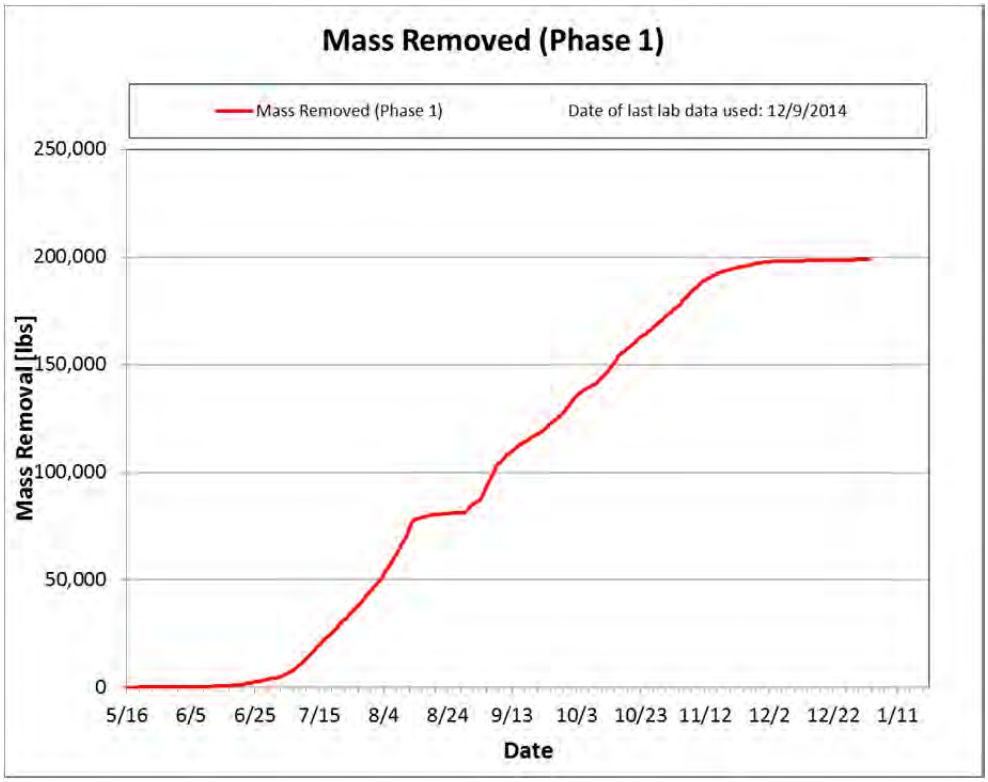


Figure 4b. Project Progress, Mass Removal (Phase 1)

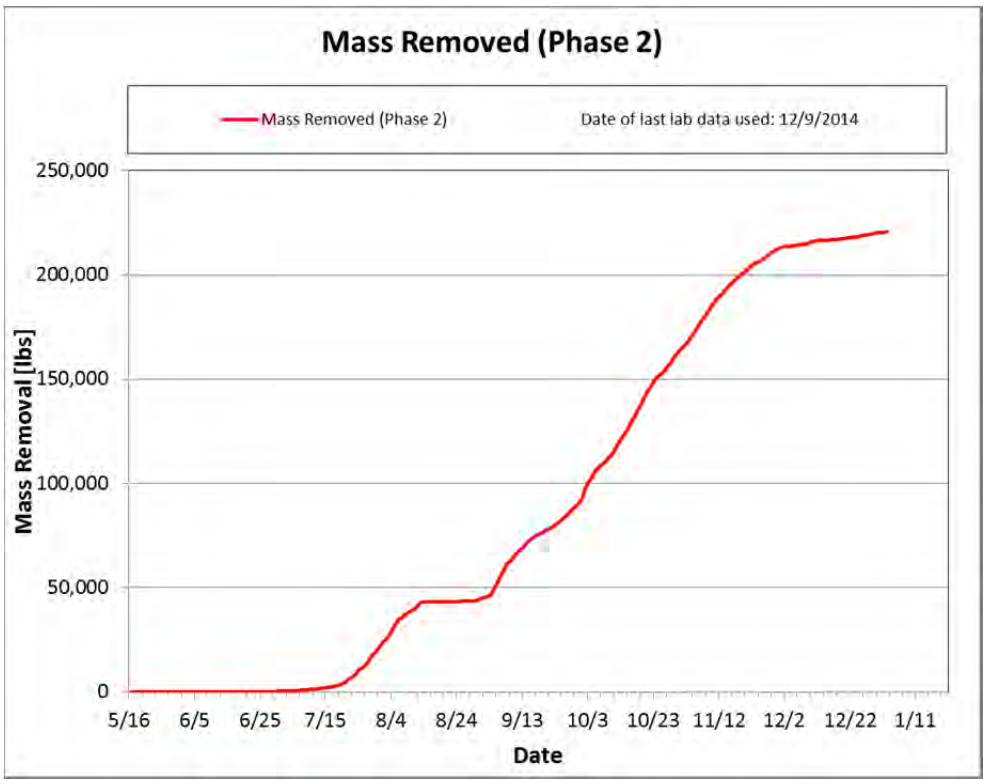


Figure 4c. Project Progress, Mass Removal (Phase 2)

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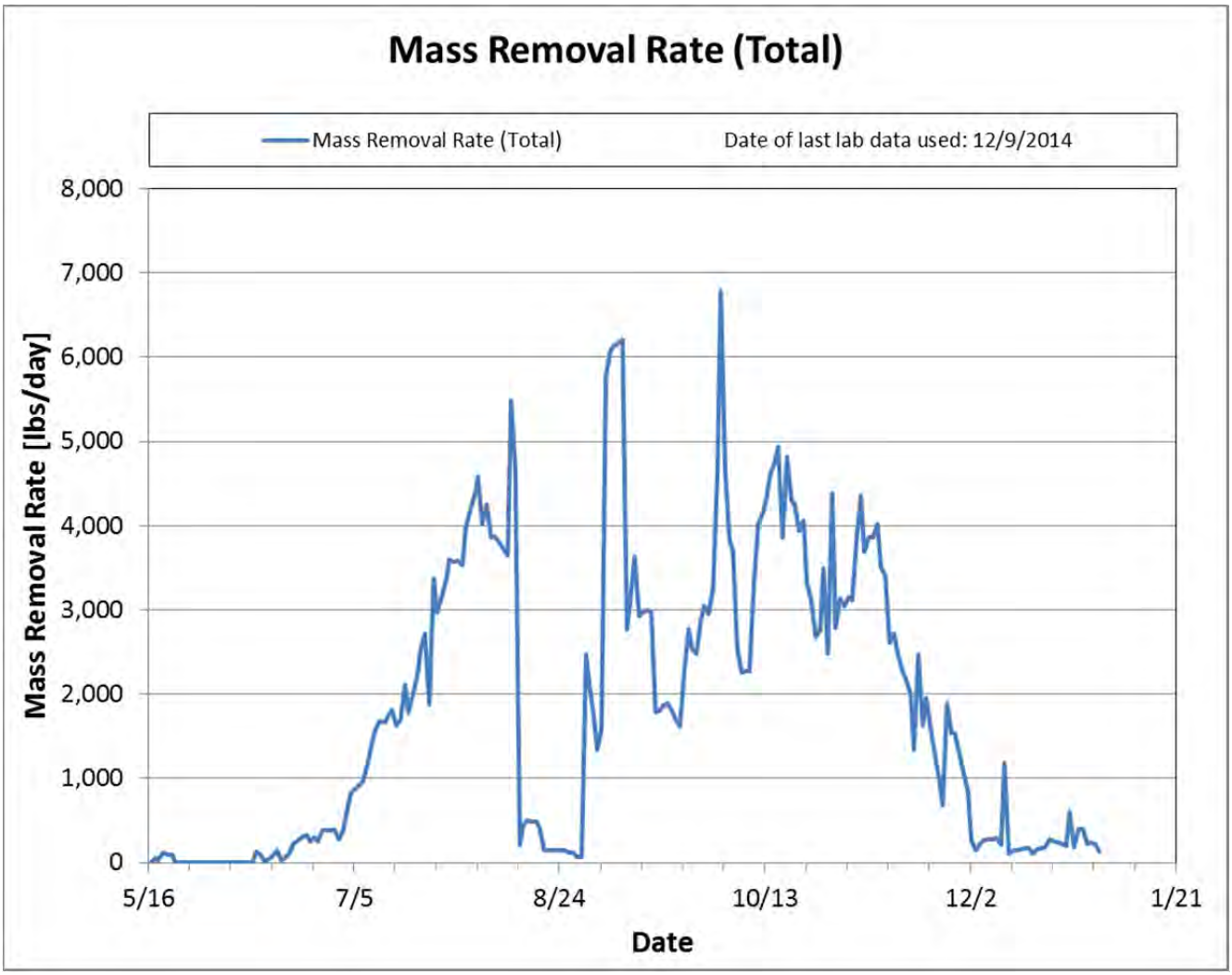


Figure 4d. Mass Removal Rate (Total for Site)

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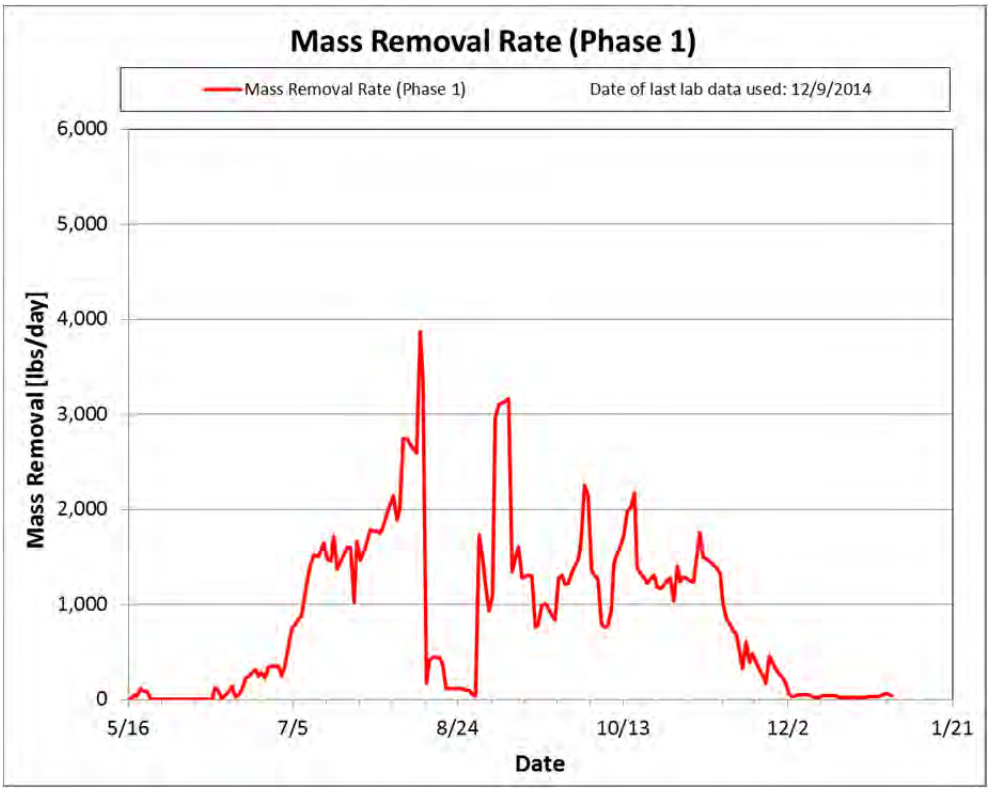


Figure 4e. Mass Removal Rate (Phase 1)

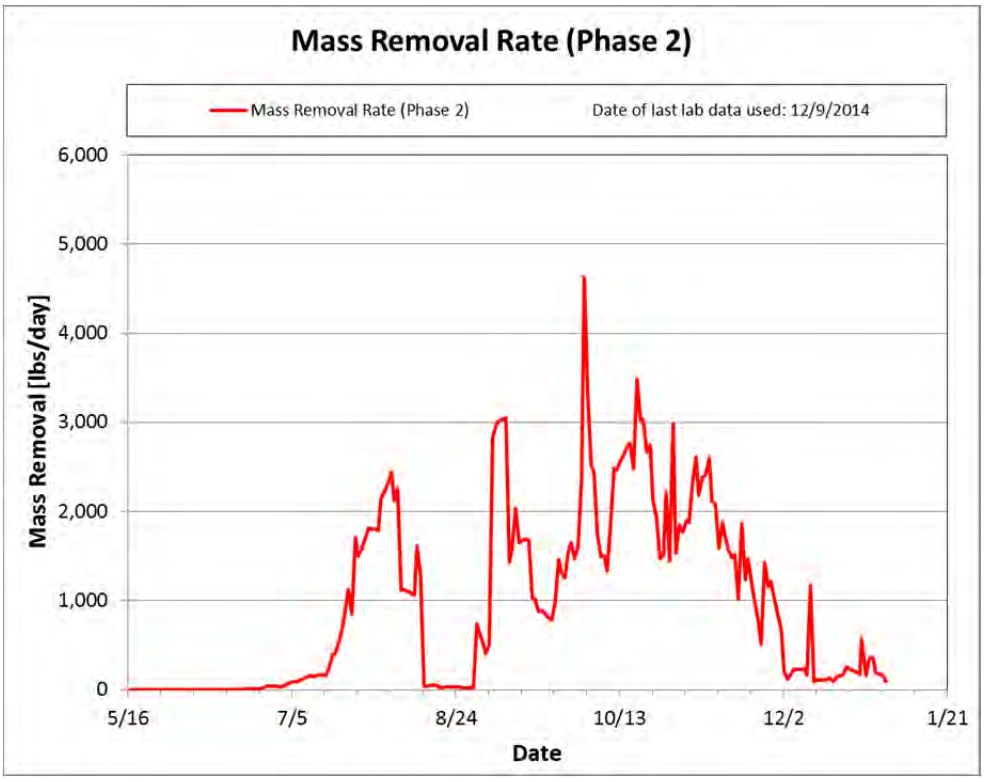


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID and flammability analyzer readings collected at the oxidizer influent over time. It should be noted that PID readings are first collected using an 11.7 eV lamp (determined by site contaminants). If the reading exceeds the limit of the meter (>2000 ppm), the readings are collected using a 10.6 eV lamp. When both meters are used, the maximum value is recorded.

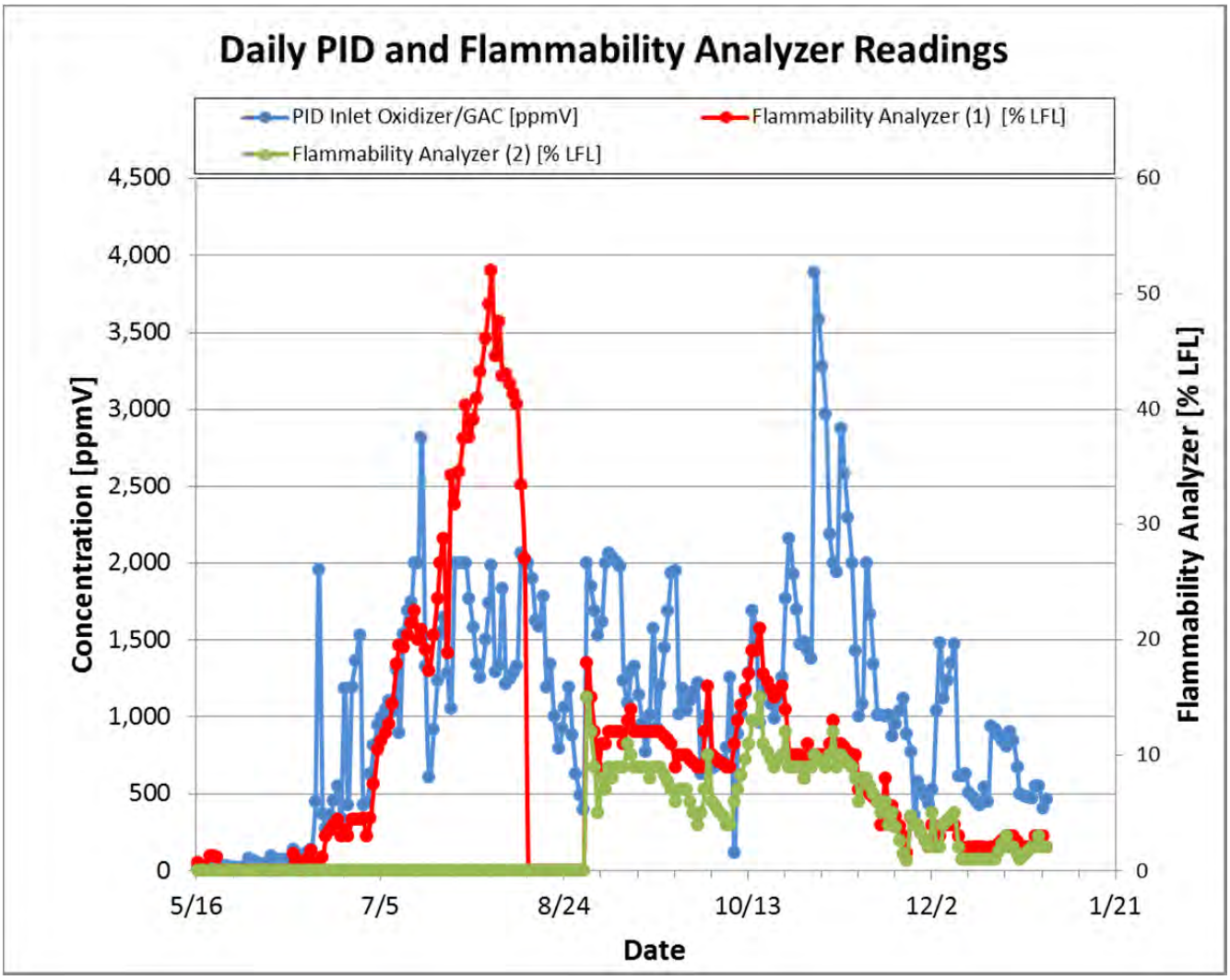


Figure 5. Daily PID and Flammability Analyzer Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13. Decreases in DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-outs.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter until peak concentrations have decreased.

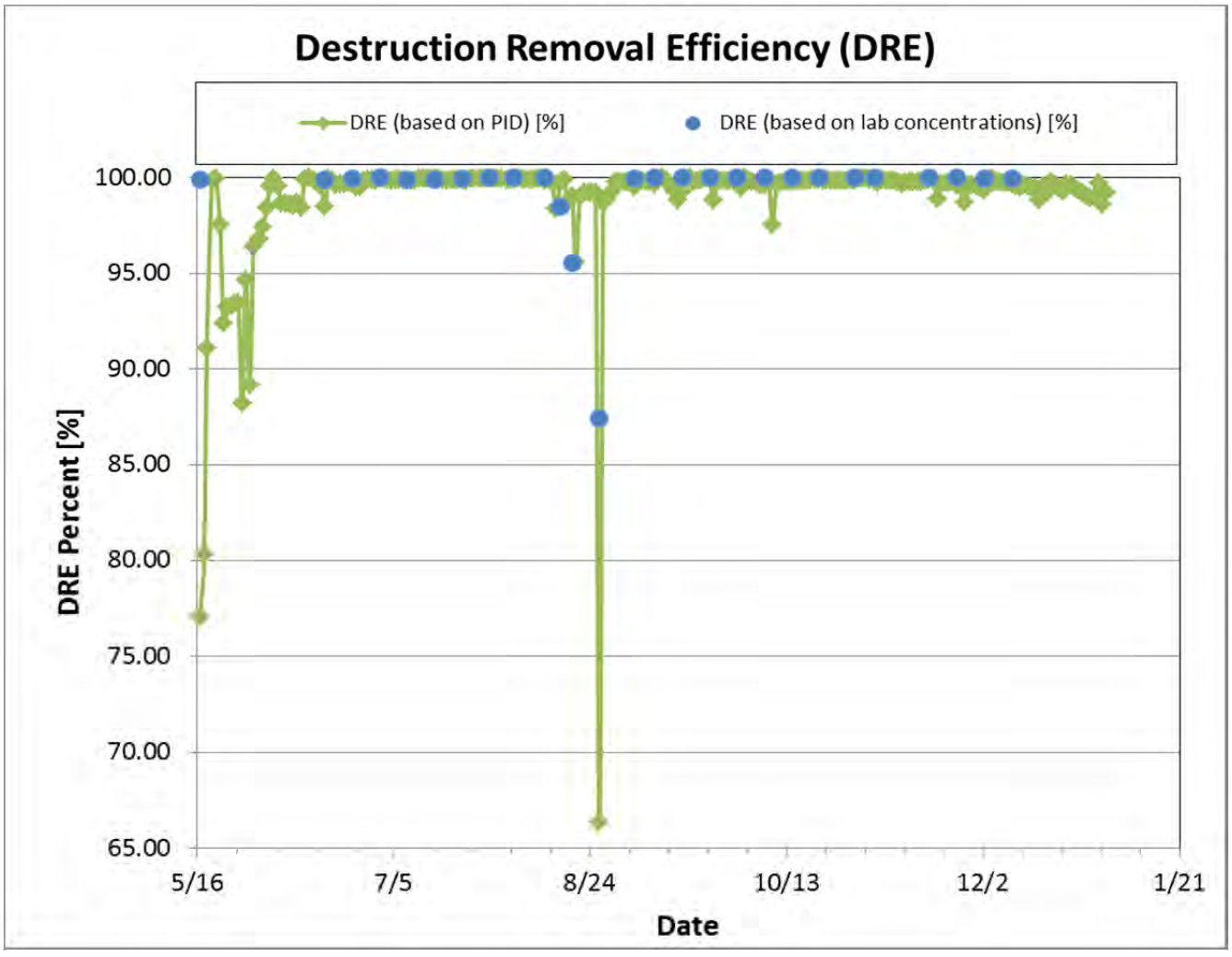


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7. Please note that the graph has been modified to present the estimated modeled energy for the heaters (ISTD) over the original predicted 195 day treatment. This does not take into account contract definitions such as heaters operating at or above 70% energy input. The flatline represents days beyond 195 days.

Please note that the modeled energy usage (12,873,000 kWh) only includes the energy predicted to be added to the subsurface. Therefore, the number should be compared to the cumulative energy added by the ISTD system to the subsurface (red line). The total energy usage (including the treatment system power usage) is predicted to be 15,795,000 kWh as stated in the summary table.

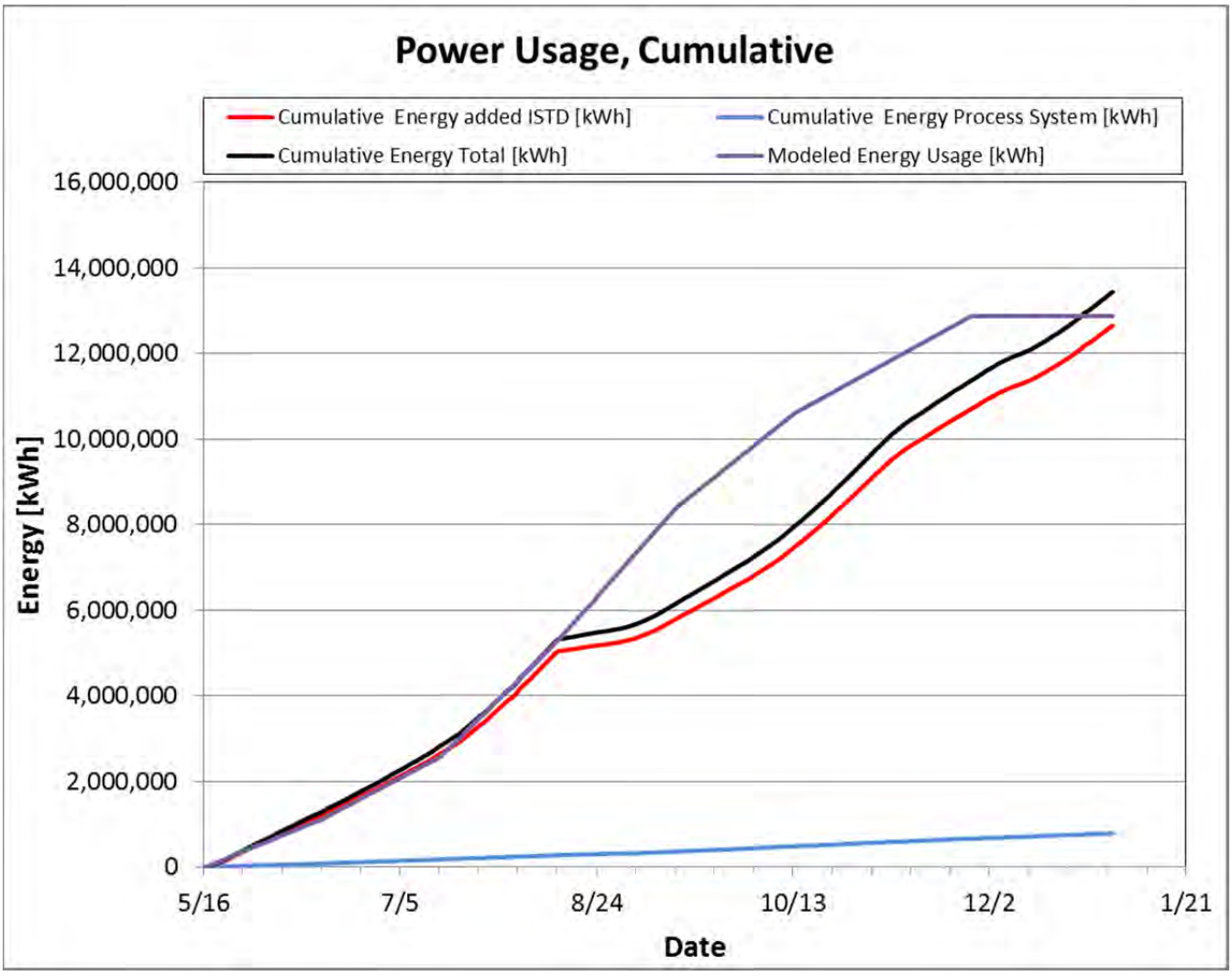


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30/14 and the following days corresponds with ramping of the heaters after placing the oxidizer back online. The decrease observed mid- November is associated with profiling of the heaters in Phase 2 and subsequent adjustments. The increase observed in December corresponds with additional profiling and subsequent adjustments.

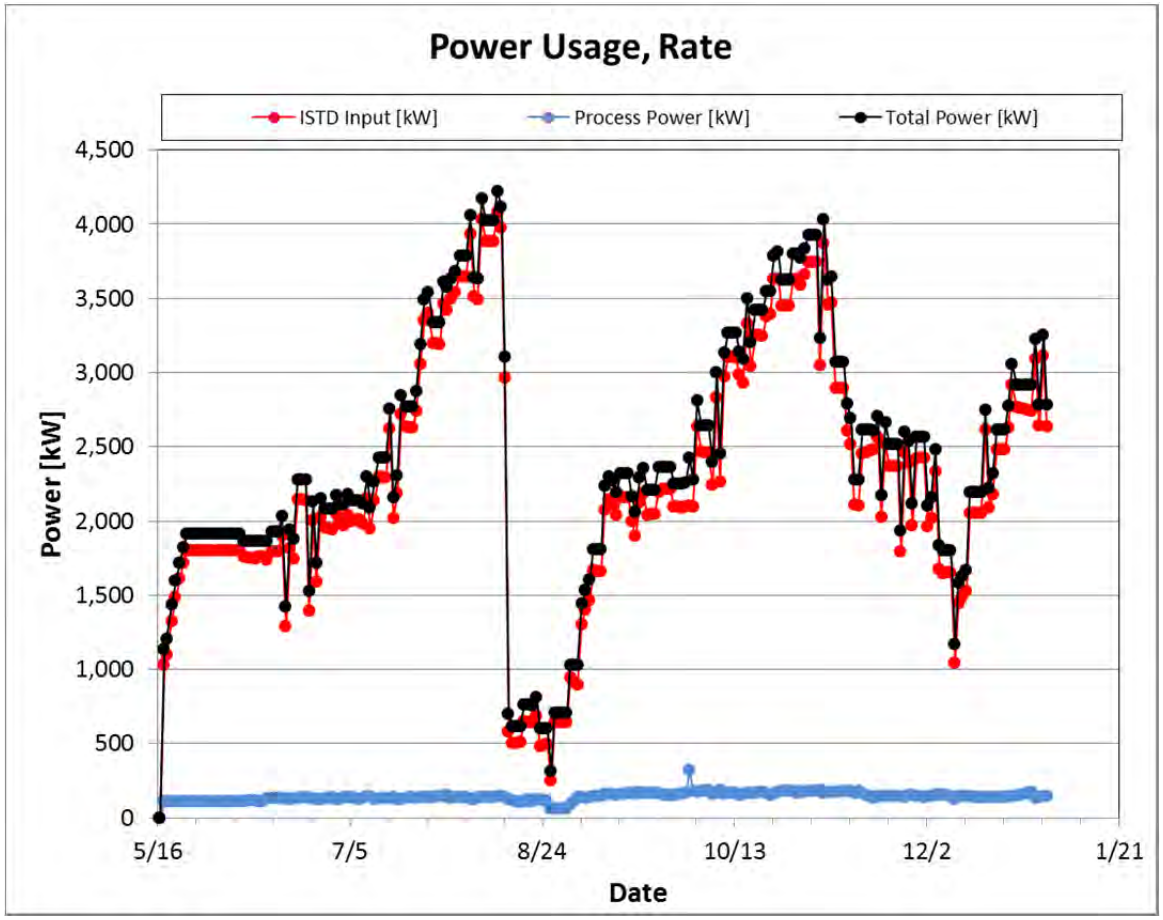


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

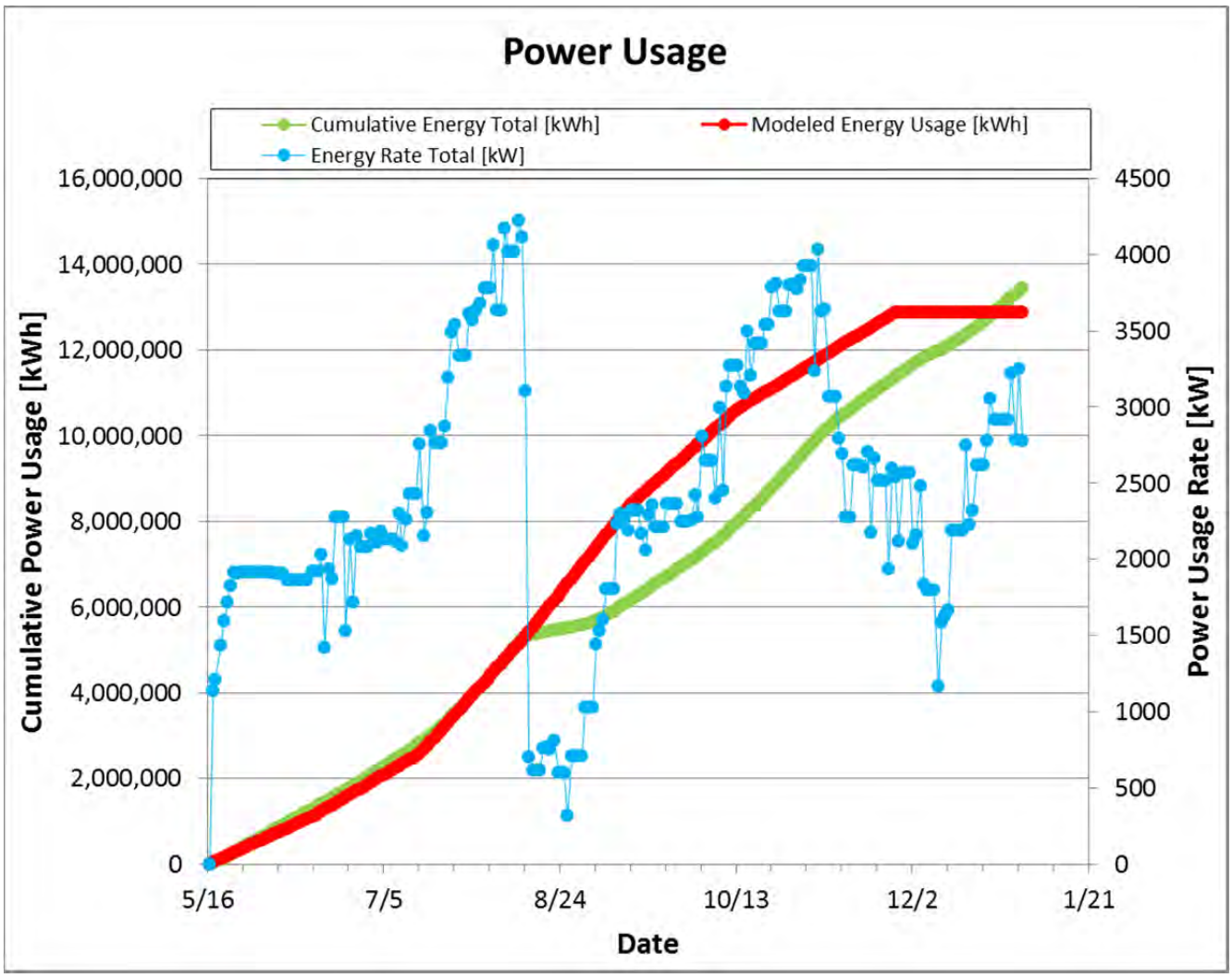


Figure 9. Power Usage

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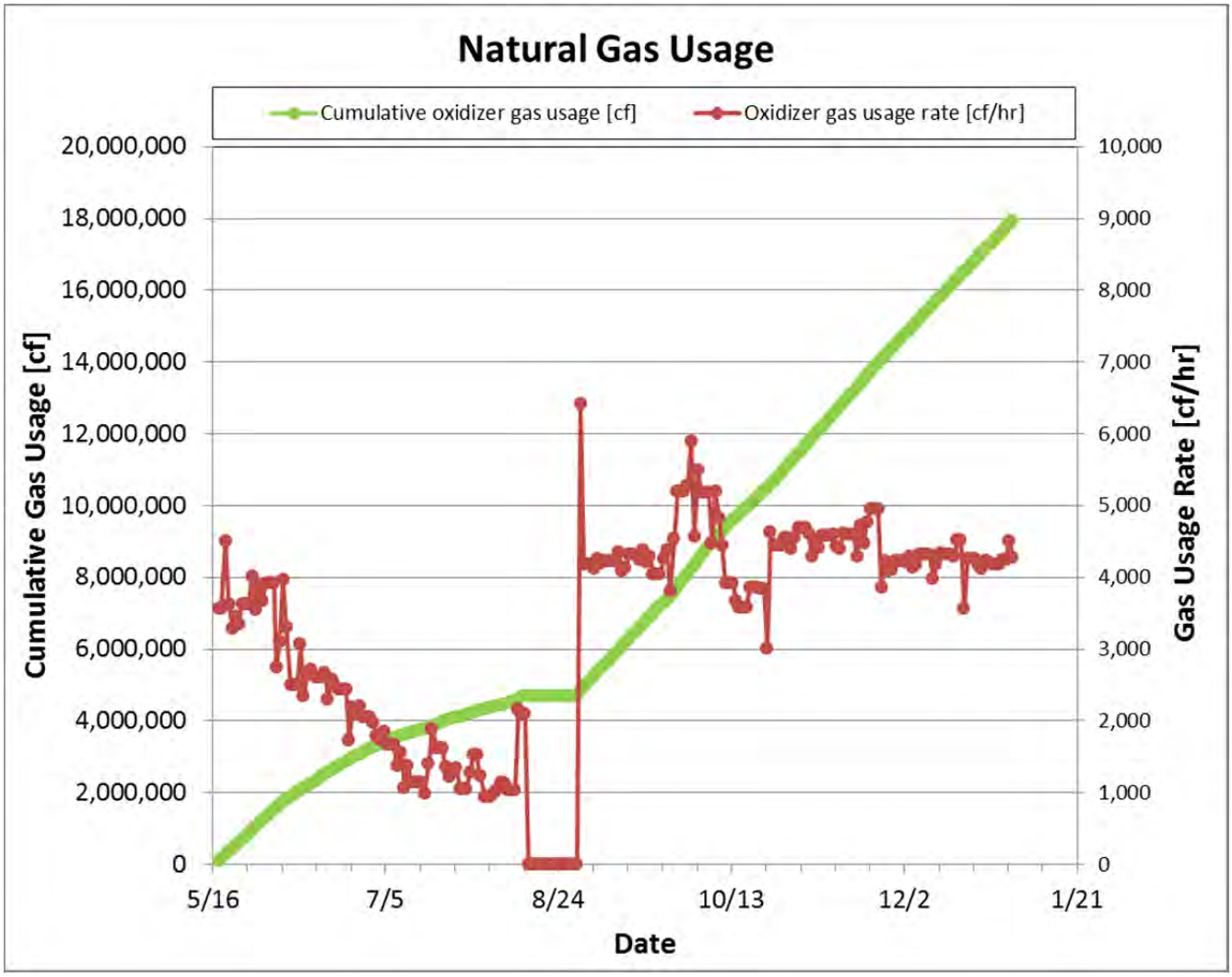


Figure 10. Natural Gas Usage

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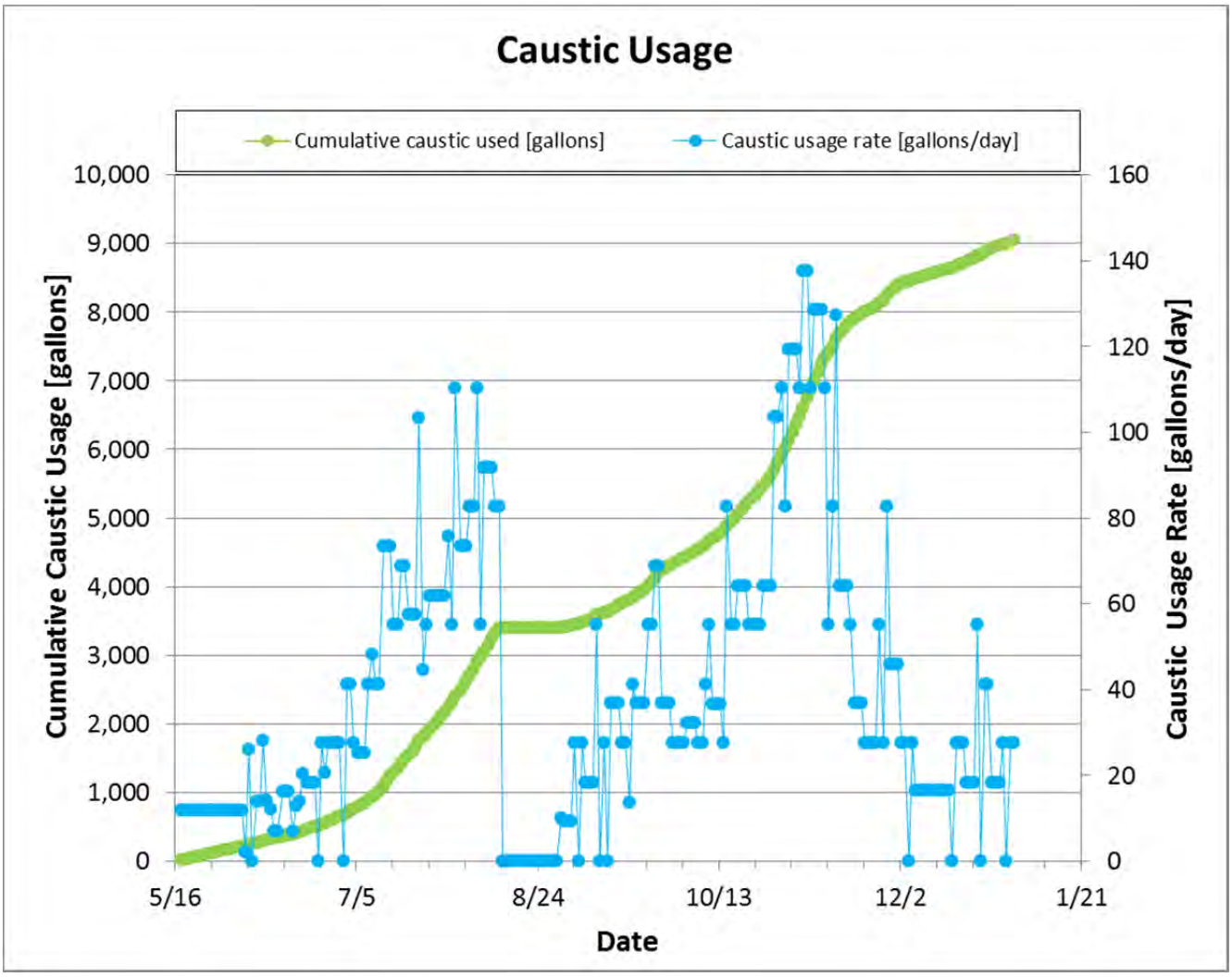


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as: Phase 1 and Phase 2

Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12a. As of 9/26/14, we have reached all three temperature milestones for phase 1. Phase 2 centroids are shown in Figure 12b. As of 12/24/14, we have achieved all three temperature milestones for Phase 2.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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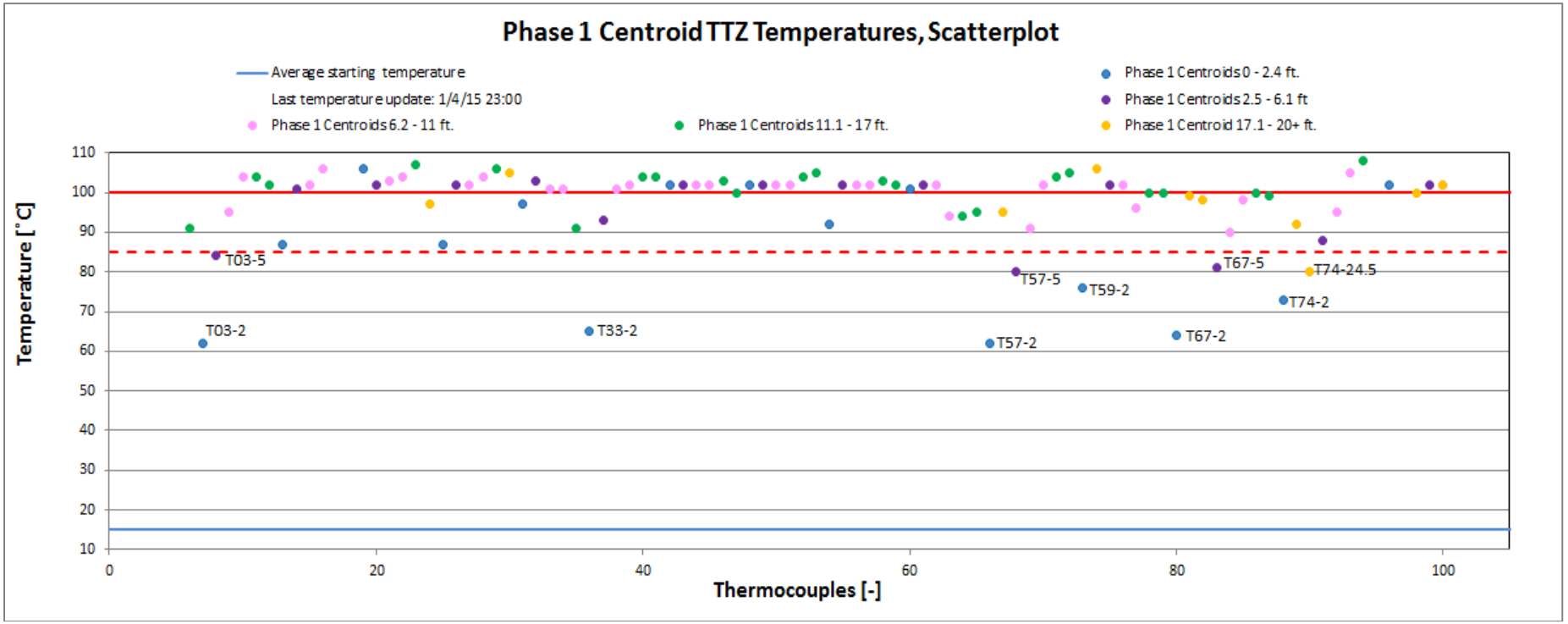


Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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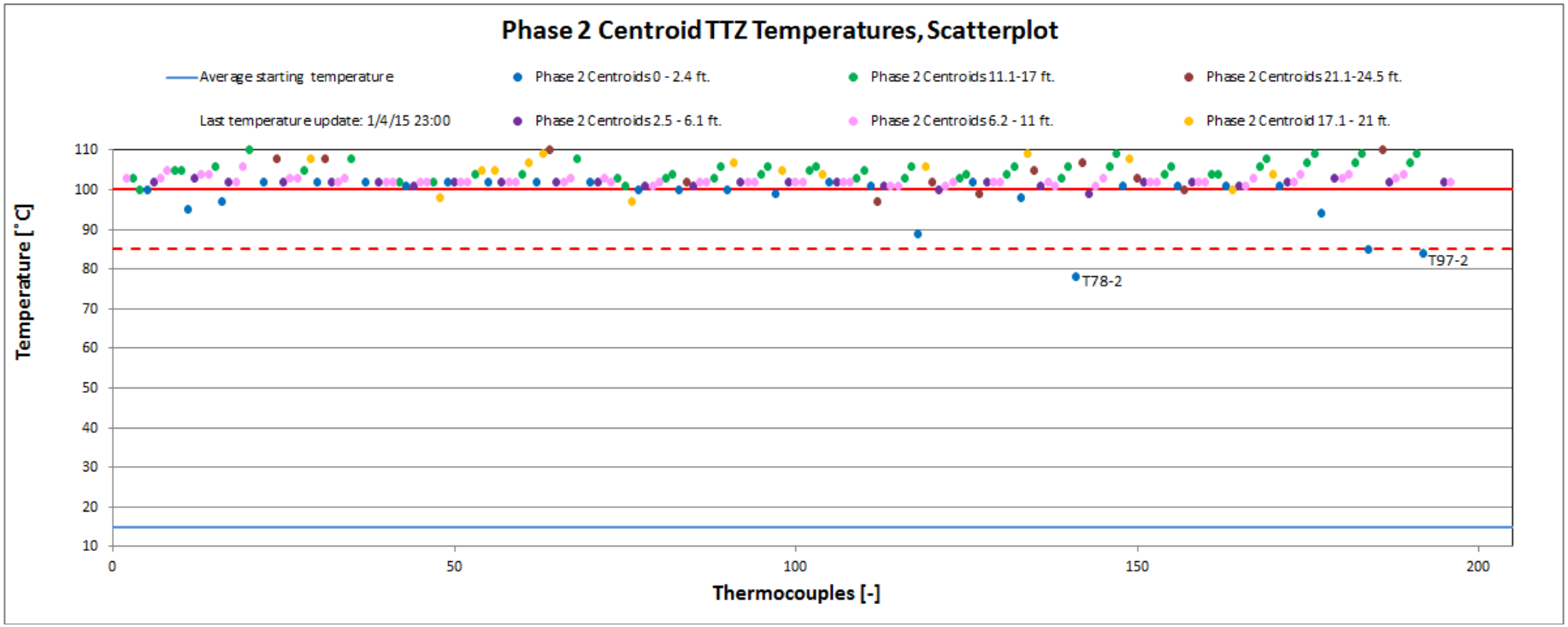


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots

	Value	Unit
Date of Last Update	1/4/15	
Phase 1 Centroid Thermocouples ≥85 ^{0}C	100	%
Phase 1 Centroid Thermocouples ≥100 ^{0}C	97	%
Phase 2 Centroid Thermocouples ≥85 ^{0}C	99	%
Phase 2 Centroid Thermocouples ≥100 ^{0}C	96	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









Prepared by:

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1 SUMMARY

This report is intended to cover the operational time period of Friday, 2 January, 2015 through Friday, 9 January 2015, with temperatures updated through Sunday, 11 January 2015.

Table 1 provides a summary of the project operational status as of Friday, 2 January 2015.

Table 1: Project Summary

Summary

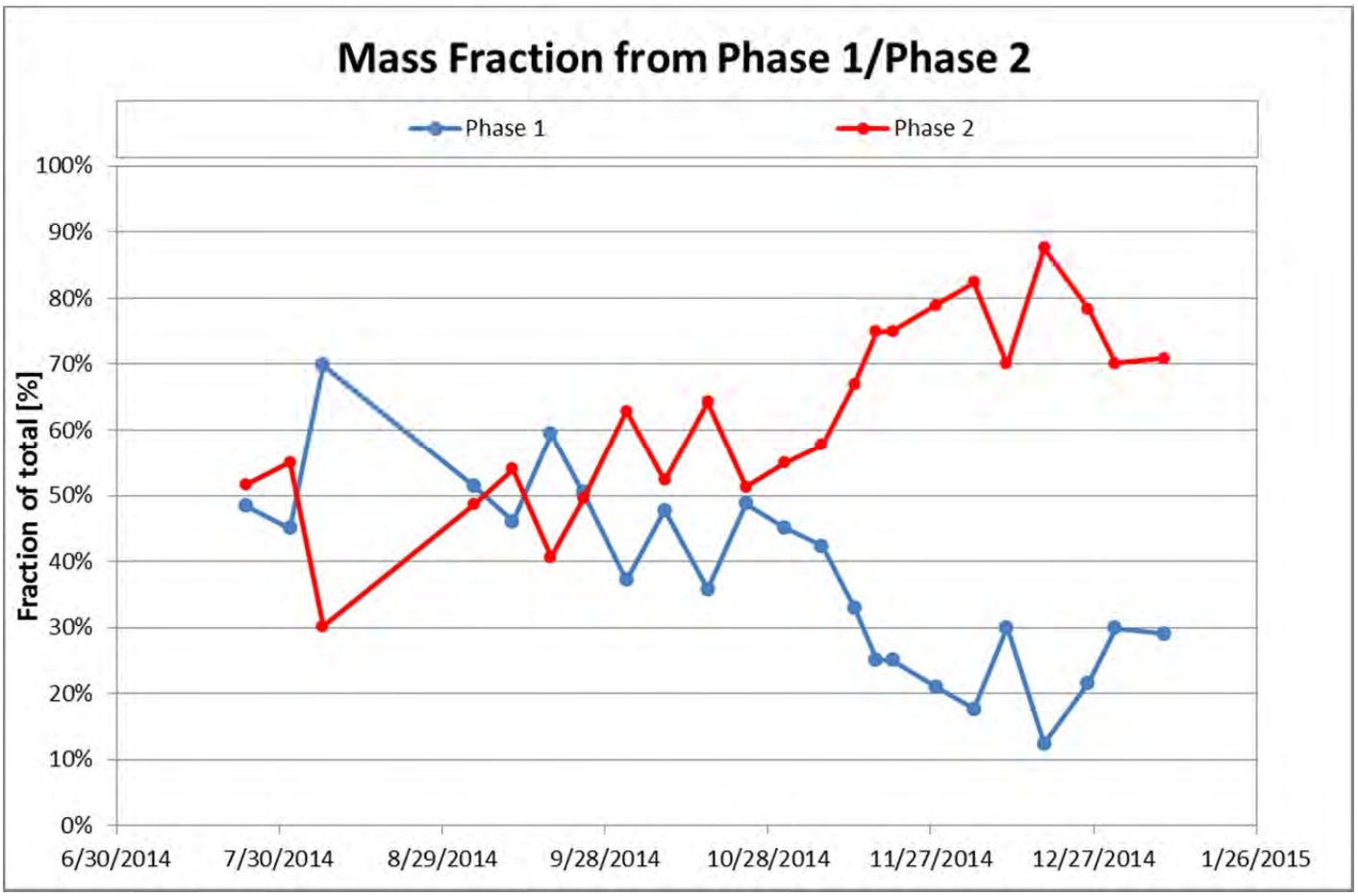
	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	01/09/15	
Last Temperature Data Update	01/11/15	
Days of Operation (Total)	215	days
Days of Phase 1 Operation	158	days
Days of Phase 2 Operation	106	days
Total Design Energy Usage (ISTD and treatment system)	15,795,000	kWh
Total Energy Added (ISTD)	13,904,800	kWh
Used Electrical Energy vs. Estimate	88.0	%
Total Mass Removal	425,375	lbs
Average Power Input Last 24 Hours	3,000	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	2,107	scfm
Average Condensate Production Rate Last 24 Hours	6.9	gpm

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Phase 2 remains online and at full power. Phase 2 has operated for 106 days. The current average wellfield temperature for Phase 2 is 102°C. Phase 1 operated for a total of 158 days, which represents days where heaters operated at or above 70% *and* the collection date of the last confirmation soil sample (per contract definition). All three temperature milestones have been achieved for both Phase 1 and 2. Please note that the majority of the Phase 1 temperature monitoring system was demobilized on January 8, 2015. Therefore Phase 1 temperatures are not reported.

Estimated mass removed to date is reported using the flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. These results yield a total mass removed of 425,375 lbs as of 01/09/15. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 01/09/15. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.29:0.71. These ratios were then applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase and leg. These data are included in Tables 2 and 3. Mass fraction data over time is presented below.



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Table 2. PID Readings Collected from Manifold Legs

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14	12/31/14	1/9/15
1	SV-1	215	100	745	602	720	604	590	1181	550	516	5	770	712	851	845	790	450	360	236	185	177	170	95
	SV-2	742	173	1271	887	872	1129	1318	2987	780	770	1610	1004	931	1179	600	934	660	677	482	377	397	436	300
	SV-3	2588	872	3609	2854	1198	3395	1414	5512	2643	1120	3971	1430	627	99	101	3138	1717	1782	1218	1246	347	1622	725
	SV-4	1971	307	2543	1921	1514	2652	1153	4790	1927	3820	3275	2204	2650	3297	1375	2903	1510	2341	1278	979	333	611	585
	SV-5	1817	279	1642	740	444	1407	1197	4790	759	1411	950	1153	802	326	302	490	402	135	243	120	235	29	202
	SV-6	4480	332	1926	956	765	4283	2347	11564	3525	9177	5750	4780	4919	5854	1083	2100	601	435	1271	375	277	197	678
	SV-8	3222	385	1330	2375	1479	3267	1816	4744	179	172	3815	1881	1850	88	1475	940	401	450	890	150	178	170	110
	SV-9	3245	142	324	1993	1565	2995	1777	11950	2762	4967	3801	2121	2863	3227	1265	801	1209	1040	1480	390	350	340	445
	SV-10	1896	131	2148	1096	1111	2459	1517	4382	1933	1745	3384	2841	1318	4121	1494	1982	1302	1221	3215	500	381	420	400
	SV-11	1016	666	1712	1979	2145	1988	930	2534	1393	2687	1950	1469	1380	596	596	1360	750	641	270	399	332	354	315
	SV-12	80	53	158	139	104	815	1427	3234	682	1102	1090	2100	512	563	206	413	440	426	1413	545	569	490	465
	SV-13	417	211	736	145	170	1452	1476	4291	1109	375	370	985	380	295	315	1210	210	131	432	143	473	445	365
	SV-14	632	452	1526	2636	1450	777	1610	3411	1917	4668	4274	4150	5565	8416	1107	1053	630	500	1288	300	468	570	493
	SV-15	3440	1072	1153	2000	915	2150	2054	608	3265	4890	4801	5780	5000	618	654	1623	730	660	1007	115	490	600	705
2 (and between divider line)	SV-7	3843	366	1751	1210	1482	4307	1835	3337	3672	9379	7350	5812	7910	553	3115	6391	2860	2977	2810	1323	554	531	500
	SV-16	3113	885	233	1911	1703	2823	2216	6230	3165	6888	4994	3841	6029	11	2340	6276	3118	3307	7931	1957	1502	1908	1765
	SV-17	3715	429	306	2928	1824	2801	1837	8933	1927	2713	2954	3313	5408	389	1670	10903	1983	1335	409	800	1133	730	116
	SV-18	1760	862	1203	2034	1634	2388	2446	15000	3554	5030	2815	2465	5632	13871	3377	4768	3650	5071	3361	5491	2057	2012	2423
	SV-19	2258	350	2067	1971	2005	1818	2038	10522	2191	6417	4561	4398	3067	2693	1075	875	925	530	528	315	552	130	515
	SV-20	1990	796	1545	2344	1610	2268	2158	15000	2853	2305	2059	343	4053	8642	3534	5500	2725	12650	6352	6520	2084	2492	2750
	SV-21	1964	487	2295	2077	1855	3458	1755	8561	2756	8053	4661	2119	4298	2631	2264	6000	4186	4440	2002	2870	937	958	808
	SV-22	2670	980	1606	2222	1892	2466	2448	14750	3344	5023	3578	2236	3582	55	3460	4765	3450	11187	4509	5516	2803	2565	2720
	SV-23	2515	671	3248	3158	2165	3233	1532	8102	2973	7684	4880	3933	2707	4560	4005	5367	2993	2598	1326	1154	805	883	517
	SV-24	1412	638	1504	2406	1567	1669	1949	11882	1999	6130	4554	5005	6223	8864	2843	4555	2946	4280	3267	5764	2614	2195	2350
	SV-25	688	220	1261	1035	1059	1350	2418	5725	1542	2247	1873	1743	1925	991	570	1301	740	773	500	445	400	547	410
	SV-26	90	185	350	580	573	638	1133	1119	790	3559	4305	4752	4633	1933	865	2742	710	520	642	1710	548	550	420
	SV-27	192	151	718	944	789	1117	1518	3922	1256	1485	1650	947	840	1040	313	769	745	620	318	320	277	350	210
	SV-28	15	87	77	151	178	310	211	730	335	1250	3624	5592	5447	4380	1438	6351	1440	1100	1588	4527	1575	886	610
	SV-29	8	66	55	20	52	130	1	15	35	21	352	255	83	41	1375	43	80	41	52	117	70	61	20
Breakdown of Wellfield VOC Flux by Phase																								
Phase 1:		48%	45%	70%	51%	46%	59%	51%	37%	48%	36%	49%	45%	42%	33%	25%	25%	21%	18%	30%	12%	22%	30%	29%
Phase 2:		52%	55%	30%	49%	54%	41%	50%	63%	52%	64%	51%	55%	58%	67%	75%	75%	79%	82%	70%	88%	78%	70%	71%

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Table 3. Estimated Mass Loading by Manifold Leg/Phase

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14	12/31/14	1/9/15
1	SV-1	0.5%	0.7%	3.5%	1.5%	3.0%	1.6%	1.7%	1.0%	1.1%	0.7%	0.0%	1.3%	0.8%	1.2%	2.2%	1.2%	1.0%	0.6%	0.6%	0.4%	0.9%	0.7%	0.6%
	SV-2	2.0%	1.3%	4.3%	2.6%	3.6%	3.0%	4.7%	2.5%	1.9%	0.8%	2.4%	1.8%	1.2%	1.7%	1.6%	1.3%	1.4%	1.3%	1.3%	1.0%	1.9%	2.2%	1.7%
	SV-3	3.5%	7.5%	16.2%	7.4%	5.0%	8.9%	5.0%	4.5%	7.1%	1.3%	5.7%	2.6%	0.7%	0.2%	0.3%	5.1%	4.2%	3.3%	3.2%	3.5%	1.7%	9.4%	4.5%
	SV-4	3.3%	2.5%	8.5%	5.7%	5.5%	5.9%	3.3%	3.5%	4.8%	3.9%	4.5%	3.2%	3.1%	3.8%	3.0%	4.4%	3.5%	4.5%	3.0%	2.3%	1.5%	1.8%	3.4%
	SV-5	2.5%	2.9%	9.6%	2.5%	1.6%	3.1%	3.2%	3.2%	2.1%	1.9%	1.4%	1.5%	1.0%	0.5%	0.9%	0.7%	1.0%	0.3%	0.6%	0.3%	1.2%	0.2%	1.2%
	SV-6	2.5%	1.4%	3.8%	1.6%	1.2%	4.1%	3.0%	3.4%	3.7%	4.5%	3.5%	3.0%	2.4%	3.1%	1.1%	1.6%	0.6%	0.3%	1.4%	0.3%	0.5%	0.4%	1.4%
	SV-8	8.7%	2.9%	4.4%	7.1%	6.3%	8.7%	6.8%	3.1%	0.4%	0.1%	5.9%	3.5%	4.4%	0.1%	4.2%	1.6%	1.0%	0.8%	2.6%	0.3%	0.9%	1.0%	0.6%
	SV-9	9.0%	0.9%	1.3%	6.0%	5.8%	8.4%	6.4%	7.3%	6.9%	6.6%	6.2%	3.9%	6.8%	4.8%	3.6%	1.0%	2.5%	2.0%	3.7%	1.1%	1.9%	2.0%	2.7%
	SV-10	2.4%	0.5%	3.0%	1.3%	1.7%	2.1%	1.8%	1.5%	2.2%	0.9%	2.0%	2.1%	0.7%	2.3%	1.6%	1.4%	1.1%	1.0%	3.6%	0.4%	0.8%	0.9%	1.0%
	SV-11	1.3%	2.3%	3.4%	2.2%	3.4%	1.9%	1.0%	0.9%	1.5%	1.4%	1.2%	1.0%	0.6%	0.3%	0.5%	1.2%	0.7%	0.5%	0.3%	0.3%	0.7%	0.8%	0.8%
	SV-12	0.3%	0.5%	0.6%	0.4%	0.5%	2.3%	4.8%	2.4%	1.6%	1.4%	1.8%	2.7%	1.2%	1.0%	0.7%	0.7%	1.0%	0.8%	3.7%	1.3%	3.1%	3.0%	3.1%
	SV-13	0.6%	0.9%	1.6%	0.2%	0.3%	1.4%	2.0%	1.3%	1.2%	0.2%	0.2%	0.7%	0.2%	0.2%	0.4%	0.8%	0.2%	0.1%	0.4%	0.1%	1.0%	0.9%	1.0%
	SV-14	2.3%	6.1%	5.8%	7.5%	5.5%	2.2%	1.1%	2.0%	4.5%	6.3%	6.9%	7.4%	12.7%	13.1%	3.3%	1.8%	1.5%	0.9%	3.3%	0.7%	2.7%	3.5%	3.2%
	SV-15	9.5%	14.7%	3.9%	5.3%	2.8%	5.6%	5.7%	0.5%	8.8%	5.8%	6.9%	10.4%	6.4%	0.9%	1.8%	2.3%	1.5%	1.3%	2.3%	0.3%	2.8%	3.1%	3.9%
2 (and between divider line)	SV-7	2.2%	1.5%	1.9%	1.5%	2.9%	4.2%	2.3%	1.1%	3.9%	4.8%	3.8%	4.0%	3.2%	0.3%	3.1%	5.3%	2.5%	2.1%	3.3%	1.3%	1.1%	0.9%	1.2%
	SV-16	9.5%	7.1%	1.1%	5.7%	6.2%	6.6%	6.9%	5.2%	8.0%	8.7%	6.9%	6.9%	8.0%	0.0%	6.8%	10.3%	10.5%	6.6%	18.3%	5.0%	8.1%	10.5%	11.1%
	SV-17	2.9%	0.1%	-3.3%	2.1%	1.6%	-1.5%	-0.6%	-0.5%	-1.6%	-3.1%	-2.0%	-1.3%	0.0%	-2.8%	0.7%	6.0%	1.3%	0.7%	-1.0%	0.5%	1.6%	1.2%	-1.1%
	SV-18	5.5%	11.4%	4.9%	6.8%	5.6%	6.7%	7.8%	13.0%	9.5%	6.6%	3.6%	4.3%	7.1%	22.8%	10.5%	8.2%	14.5%	9.1%	7.9%	13.9%	10.4%	10.8%	12.9%
	SV-19	3.6%	0.3%	-2.0%	5.5%	6.3%	0.6%	2.8%	3.0%	3.2%	6.5%	6.4%	4.3%	3.0%	3.4%	2.0%	0.7%	1.2%	0.7%	0.9%	0.6%	1.7%	0.6%	0.2%
	SV-20	7.2%	12.0%	7.2%	6.2%	6.3%	5.7%	5.5%	11.9%	6.1%	2.8%	2.9%	0.6%	5.0%	14.1%	11.0%	8.9%	8.7%	23.9%	14.6%	16.8%	10.7%	13.4%	16.3%
	SV-21	2.6%	2.0%	3.8%	0.9%	2.4%	3.2%	2.9%	3.6%	2.5%	5.3%	1.6%	-0.4%	2.2%	0.2%	3.5%	6.3%	5.8%	4.3%	1.4%	4.8%	3.0%	3.5%	1.1%
	SV-22	8.5%	9.3%	8.3%	5.9%	7.6%	6.7%	7.0%	12.2%	8.5%	6.7%	4.8%	3.9%	4.4%	0.1%	9.9%	5.4%	11.5%	19.8%	11.5%	13.6%	14.3%	14.0%	16.1%
	SV-23	5.2%	-2.9%	-2.4%	1.9%	4.4%	-0.3%	0.5%	0.3%	1.0%	8.8%	1.3%	4.6%	2.9%	6.2%	10.3%	3.2%	3.4%	2.6%	-0.2%	-0.2%	2.4%	-6.0%	-2.0%
	SV-24	4.0%	8.5%	9.4%	7.2%	6.2%	4.4%	5.6%	10.3%	4.7%	8.0%	6.8%	7.4%	7.4%	13.6%	8.3%	6.5%	11.3%	8.5%	7.7%	14.7%	13.7%	11.6%	8.4%
	SV-25	-0.1%	1.1%	0.0%	0.7%	0.8%	0.1%	1.5%	0.1%	1.4%	2.1%	0.2%	1.3%	1.2%	-0.2%	0.0%	0.5%	0.3%	0.4%	0.1%	0.2%	0.0%	0.4%	0.8%
	SV-26	0.3%	2.2%	1.9%	1.9%	2.4%	1.6%	3.4%	1.0%	1.6%	4.3%	6.8%	8.1%	5.9%	3.2%	2.7%	3.9%	2.8%	1.1%	1.7%	4.0%	2.6%	3.2%	2.2%
	SV-27	0.1%	0.7%	-0.5%	1.7%	0.4%	1.4%	3.2%	1.2%	2.4%	1.1%	2.0%	0.4%	0.2%	0.0%	-1.5%	0.1%	0.7%	0.5%	0.2%	0.5%	0.5%	1.0%	0.8%
	SV-28	0.0%	1.0%	0.5%	0.6%	0.7%	0.8%	0.6%	0.5%	0.9%	1.7%	5.5%	10.1%	6.9%	6.1%	3.8%	9.5%	4.2%	2.0%	3.4%	11.6%	7.9%	4.8%	2.7%
	SV-29	0.0%	0.6%	0.4%	0.1%	0.2%	0.4%	0.0%	0.0%	0.1%	0.0%	0.6%	0.5%	0.2%	0.1%	3.7%	0.1%	0.3%	0.1%	0.1%	0.3%	0.4%	0.3%	0.1%
	Total:	100%	100%	101%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note: Six out of the 23 wellfield branch lines service both Phase 1 and Phase 2; therfore, a correction has been made to subtract the shared mass sometimes resulting in a negative value. This value indicates that the mass contribution from the Phase 2 area was limited in that particular sample round. This is a result of the accuracy of the flow and PID data measurements collected.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 2 only, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* As of 01/08/15, Phase 1 is only partially operational; therefore, temperature data for Phase 1 is no longer included.

Phase 2 heating began on 7/16/14 but was stopped on 8/14/14, as a result of the oxidizer shutdown, and reenergized on 09/30/14. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	1/11/15	
Phase 1 Entire TTZ Average Temperature	N/A	°C
Phase 2 Entire TTZ Average Temperature	102	°C
Phase 1 Centroid Average Temperature	N/A	°C
Phase 2 Centroid Average Temperature	102	°C

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N/A

Figure 1a. Phase 1 Observed vs. Modeled Temperatures

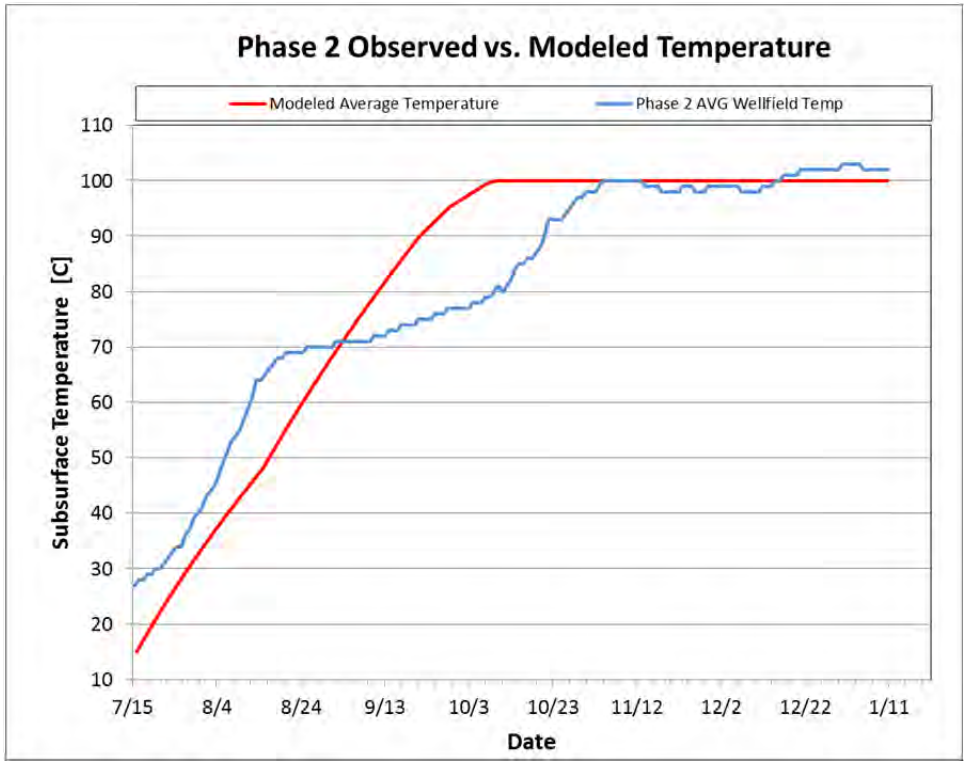


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was increased on 8/30/14.

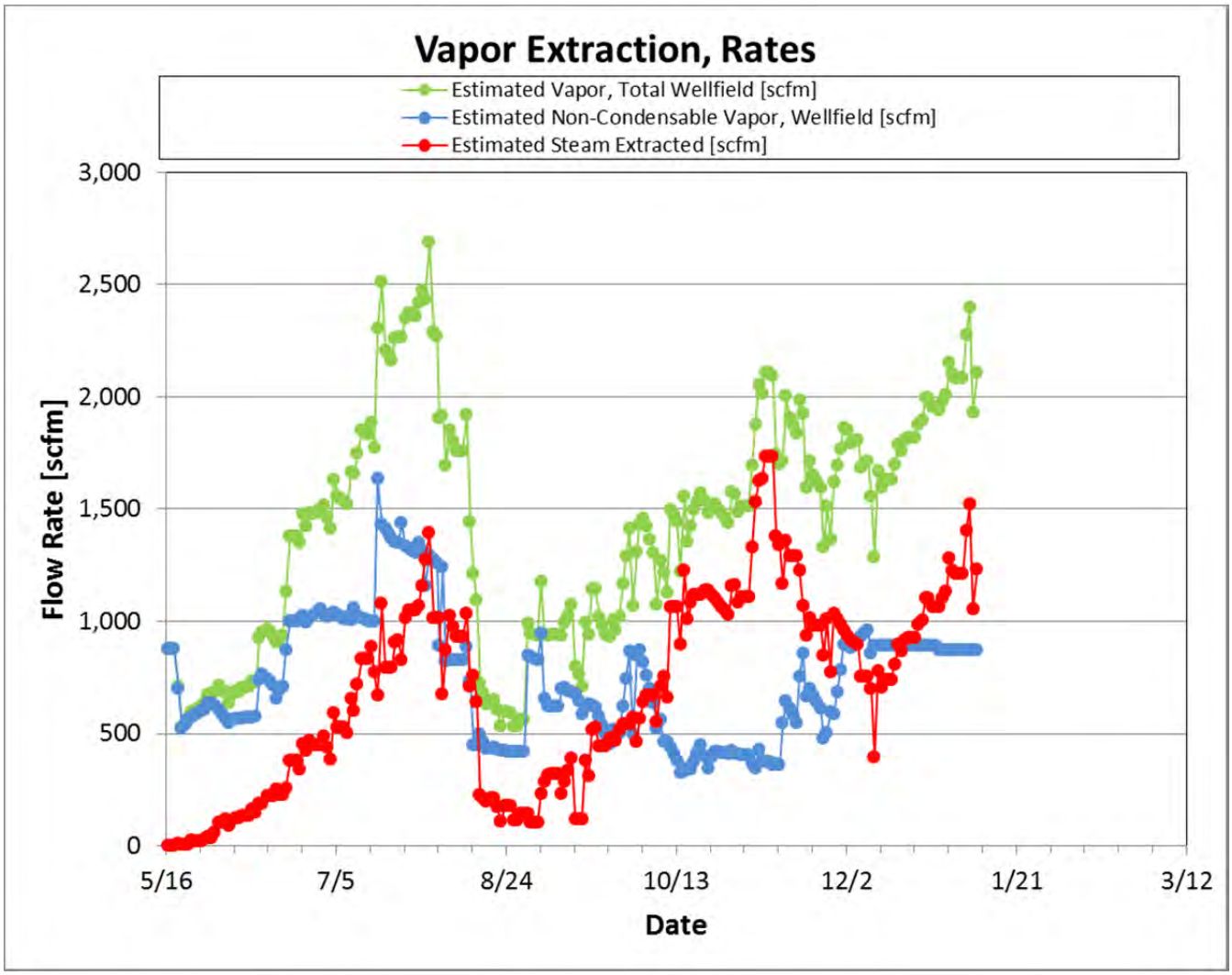


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

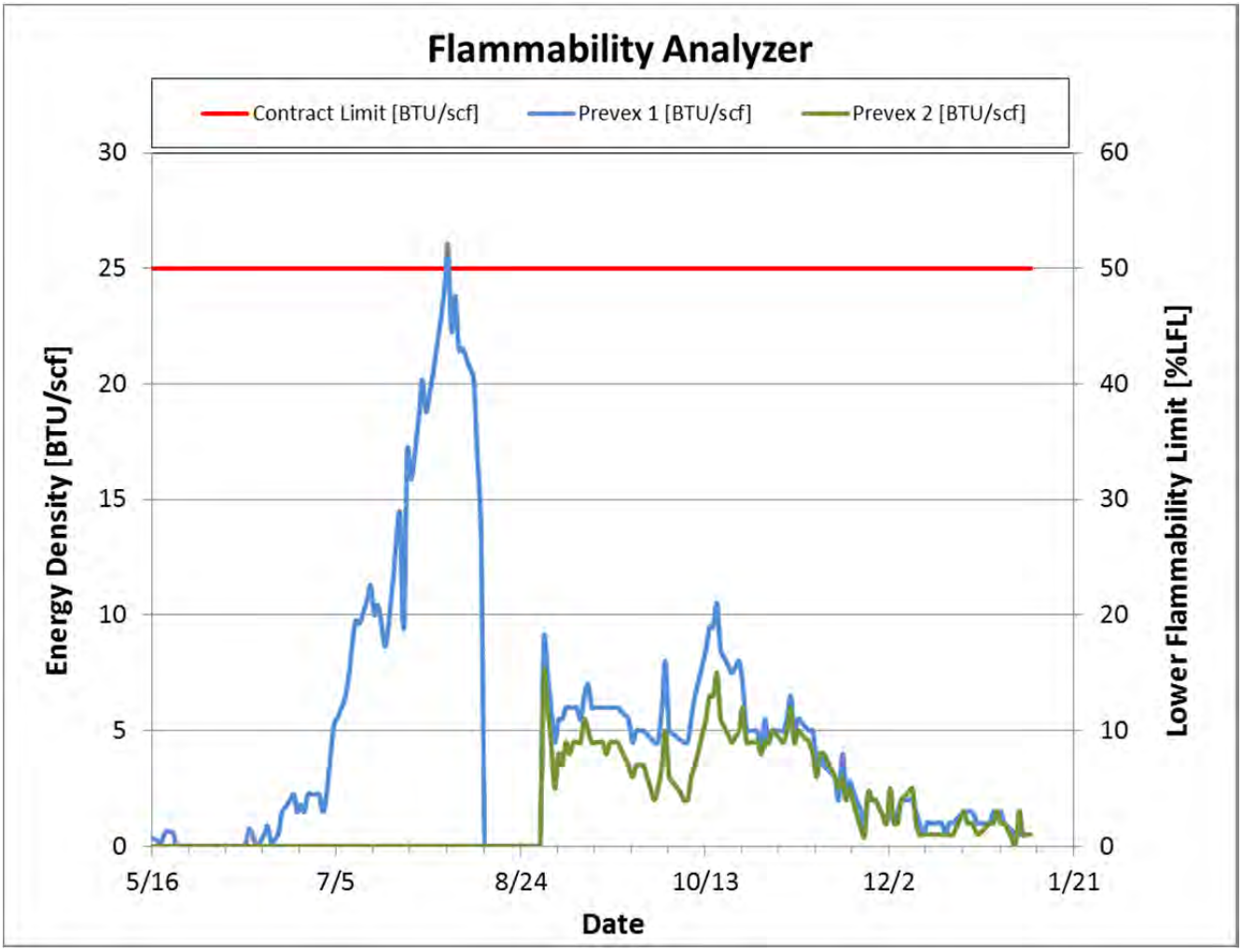


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed to date is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The decrease in mass removed starting on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14, 9/23/14, 9/30/14, 10/7/14, 10/14/14, 10/21/14, 10/30/14, 11/4/14, 11/18/14, 11/25/2014, 12/2/2014, 12/9/2014, 12/16/14 and 12/23/14.

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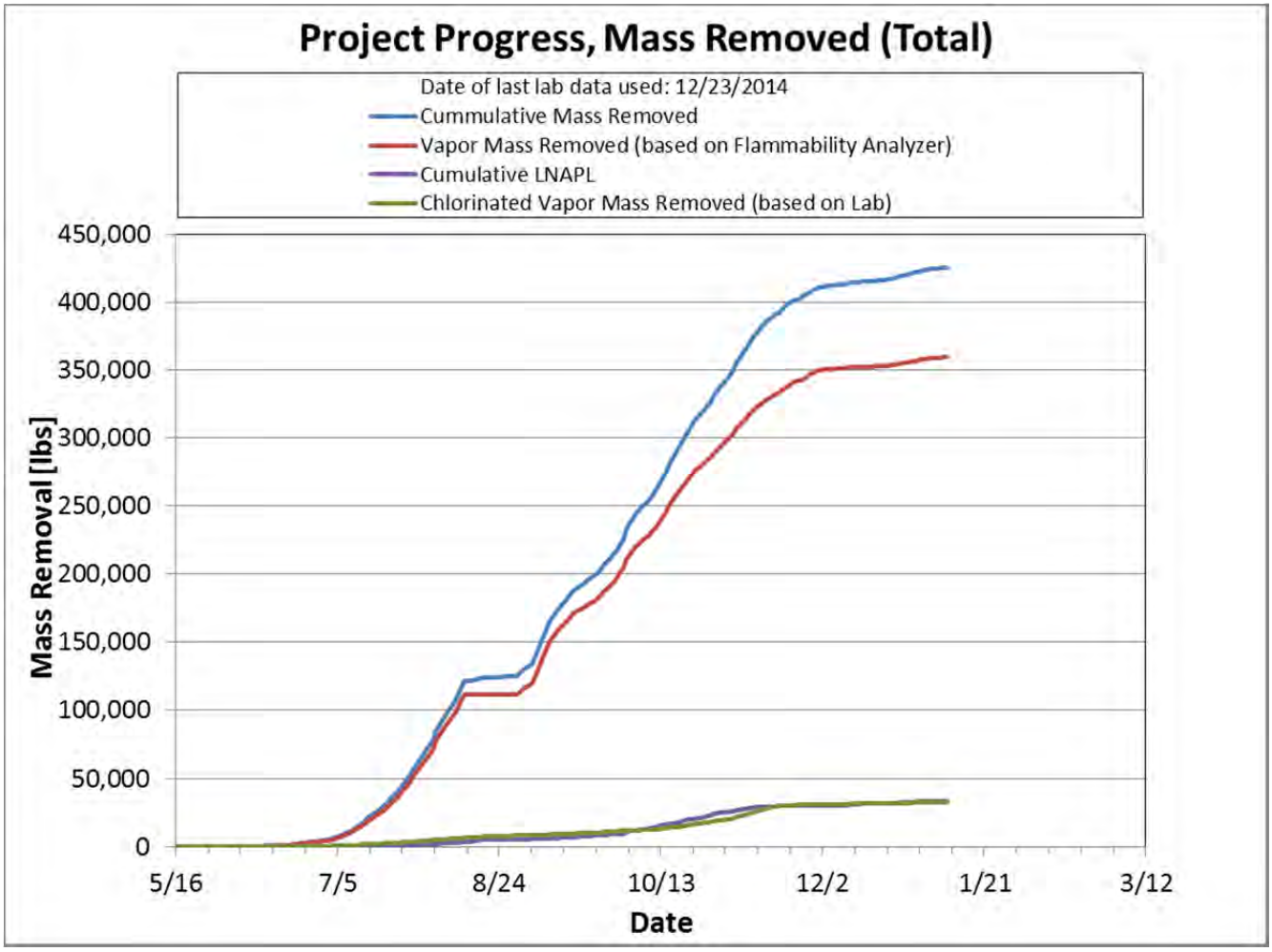


Figure 4a. Project Progress, Mass Removal (Total)

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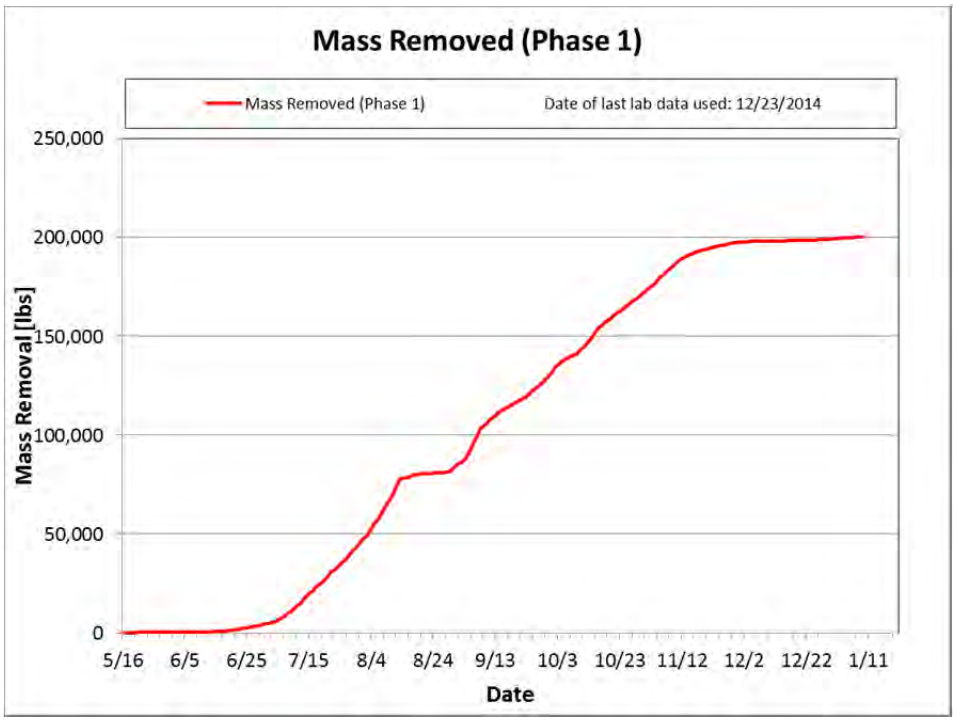


Figure 4b. Project Progress, Mass Removal (Phase 1)

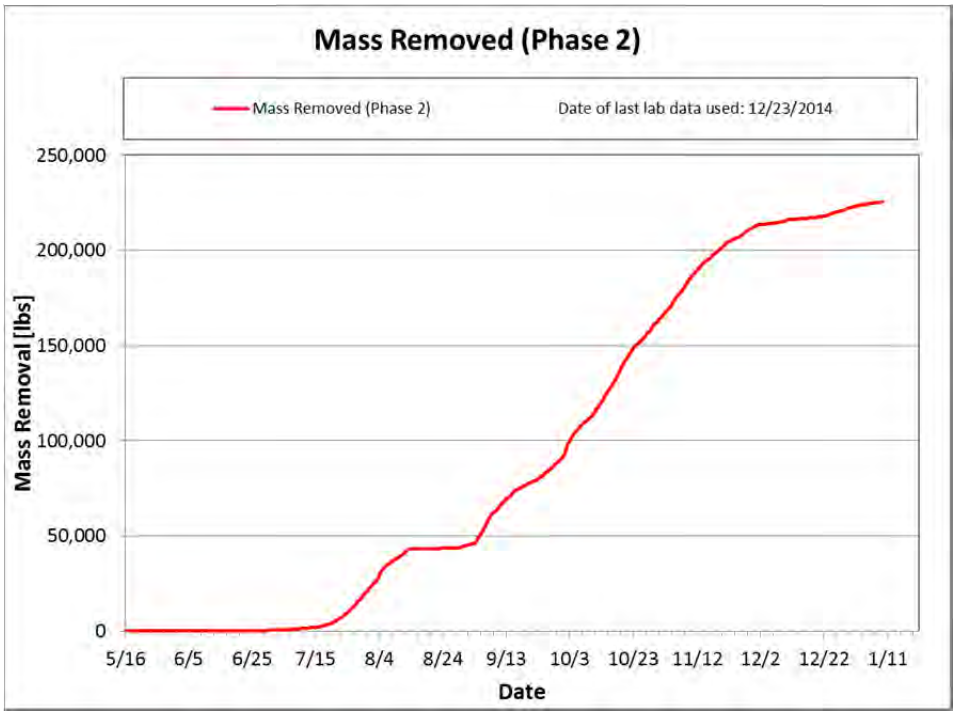


Figure 4c. Project Progress, Mass Removal (Phase 2)

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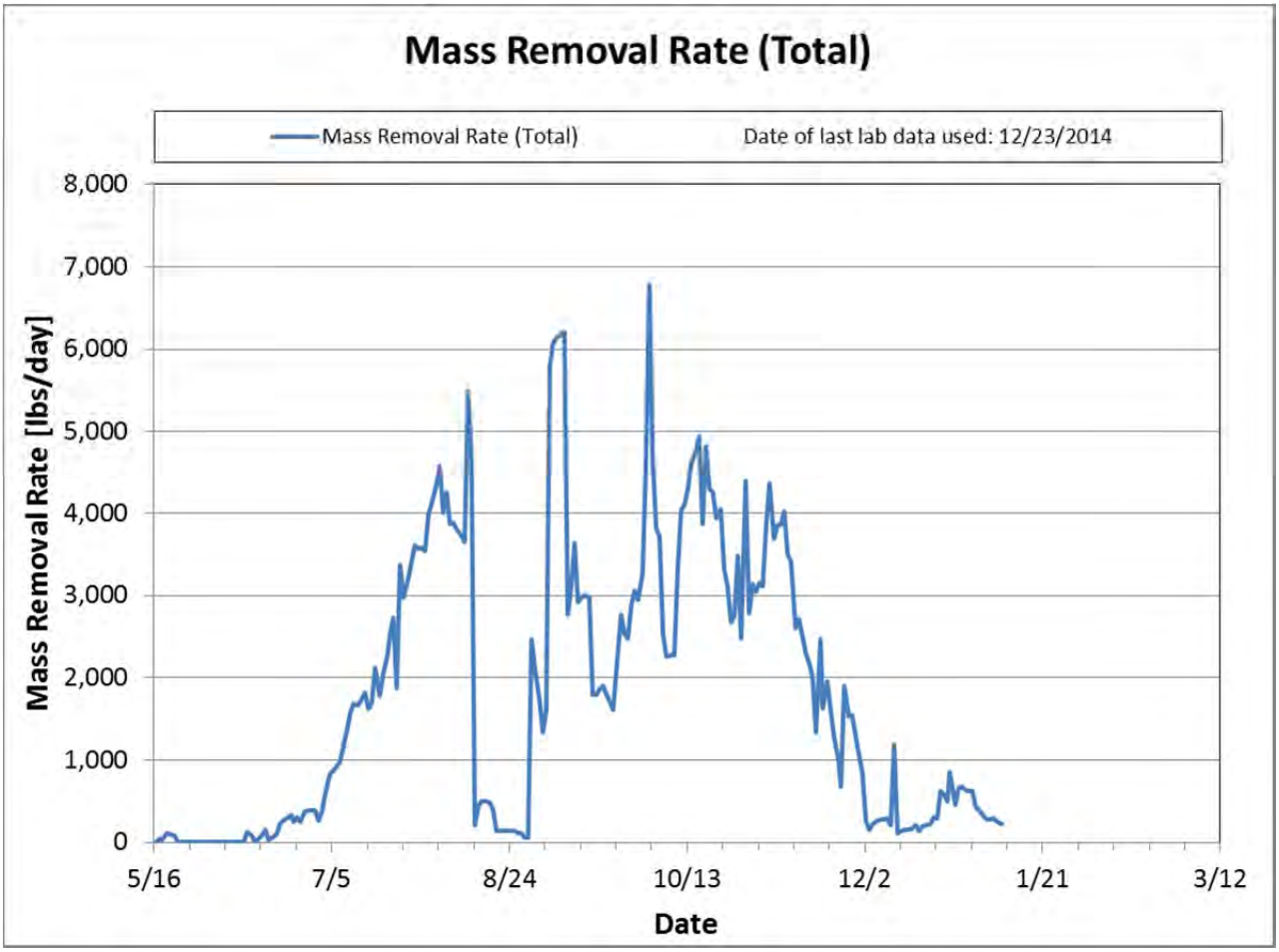


Figure 4d. Mass Removal Rate (Total for Site)

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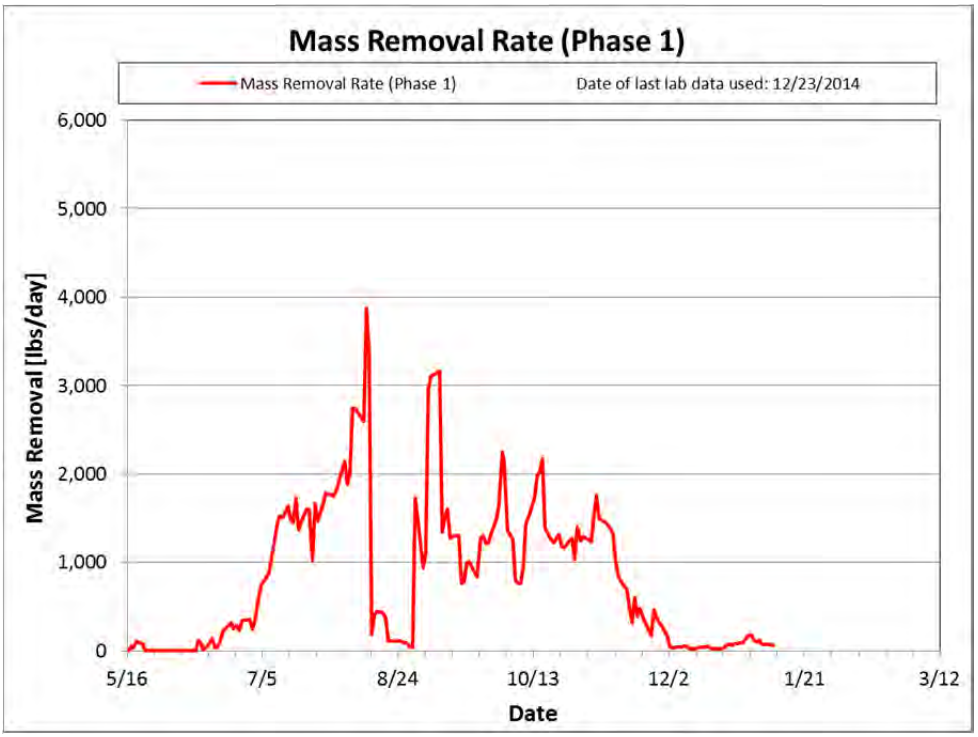


Figure 4e. Mass Removal Rate (Phase 1)

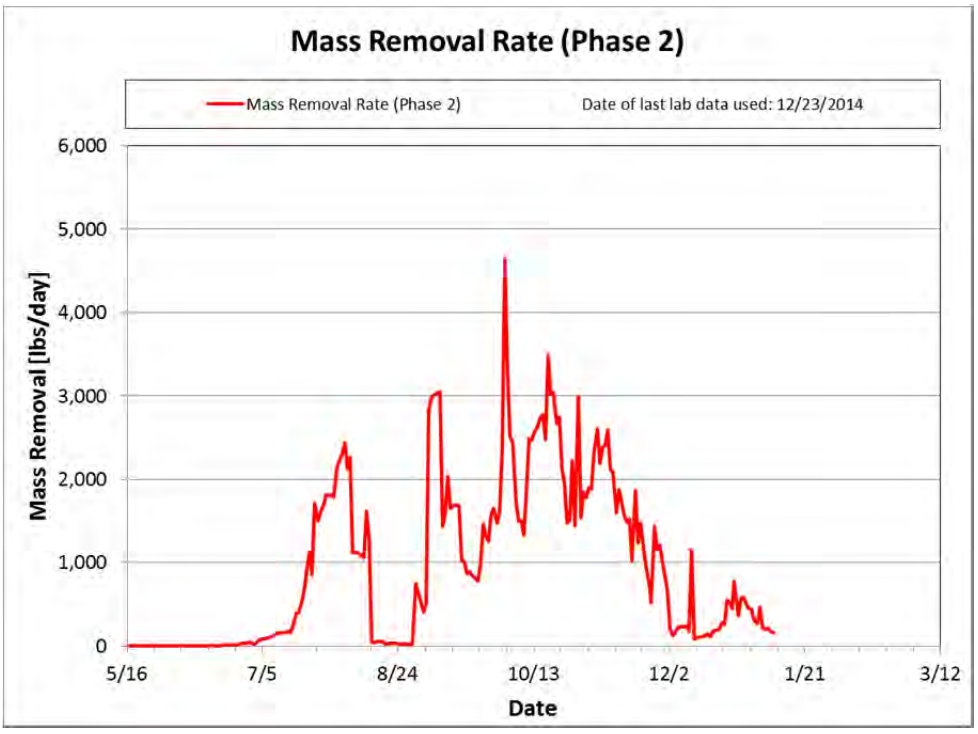


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID and flammability analyzer readings collected at the oxidizer influent over time. It should be noted that PID readings are first collected using an 11.7 eV lamp (determined by site contaminants). If the reading exceeds the limit of the meter (>2000 ppm), the readings are collected using a 10.6 eV lamp. When both meters are used, the maximum value is recorded.

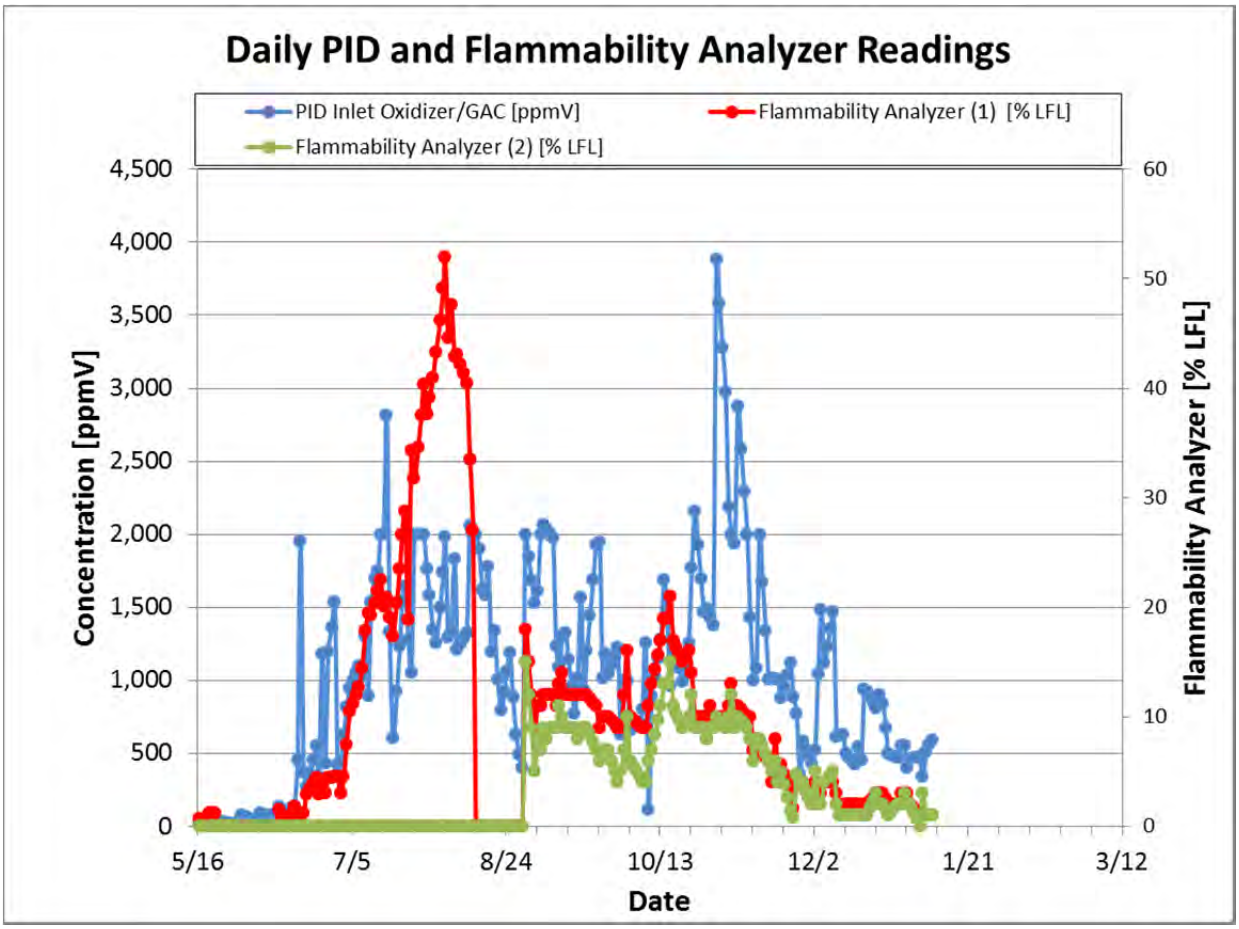


Figure 5. Daily PID and Flammability Analyzer Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13. Decreases in DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-outs.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter until peak concentrations have decreased.

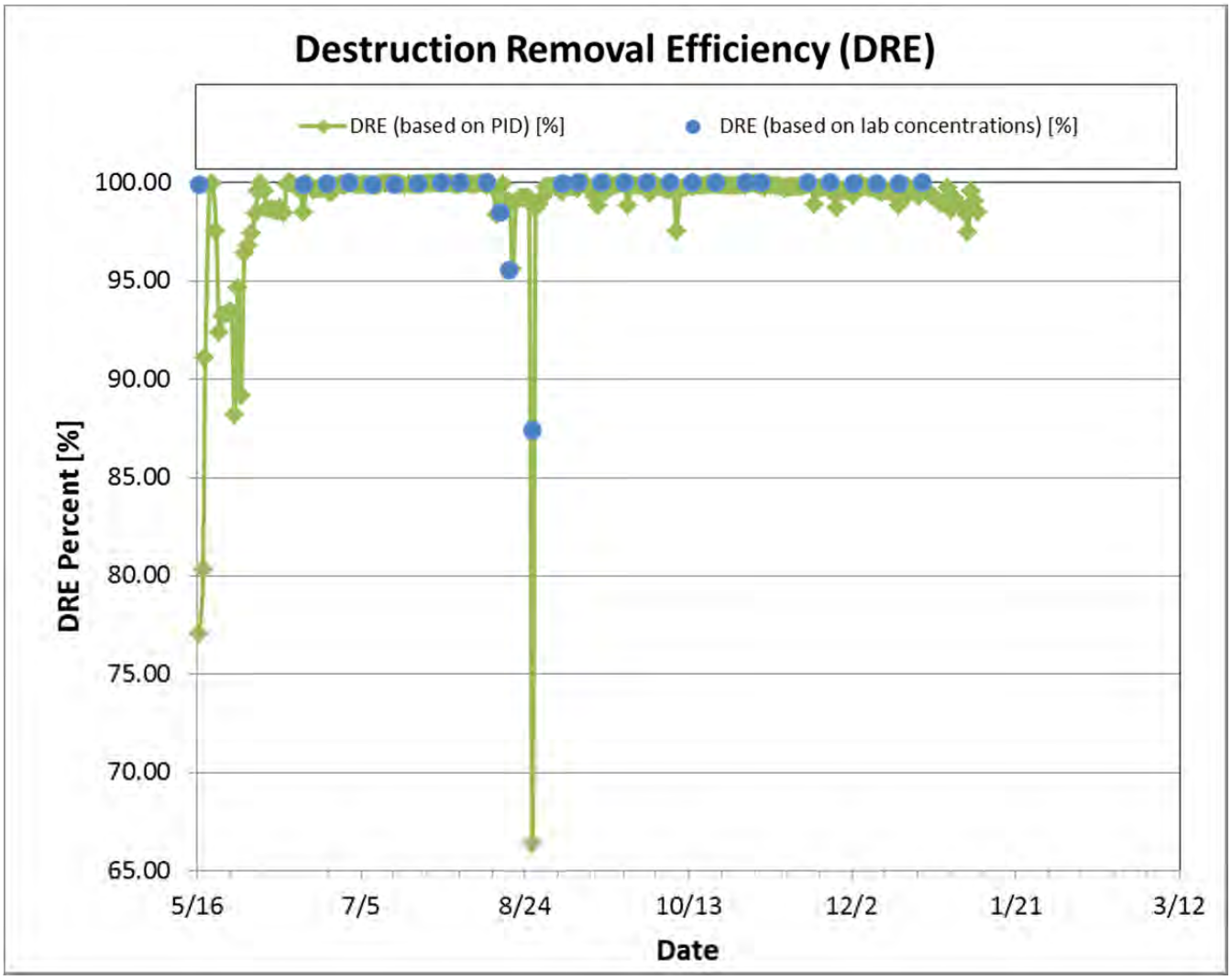


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7. Please note that the graph has been modified to present the estimated modeled energy for the heaters (ISTD) over the original predicted 195 day treatment. This does not take into account contract definitions such as heaters operating at or above 70% energy input. The flatline represents days beyond 195 days.

Please note that the modeled energy usage (12,873,000 kWh) only includes the energy predicted to be added to the subsurface. Therefore, the number should be compared to the cumulative energy added by the ISTD system to the subsurface (red line). The total energy usage (including the treatment system power usage) is predicted to be 15,795,000 kWh as stated in the summary table.

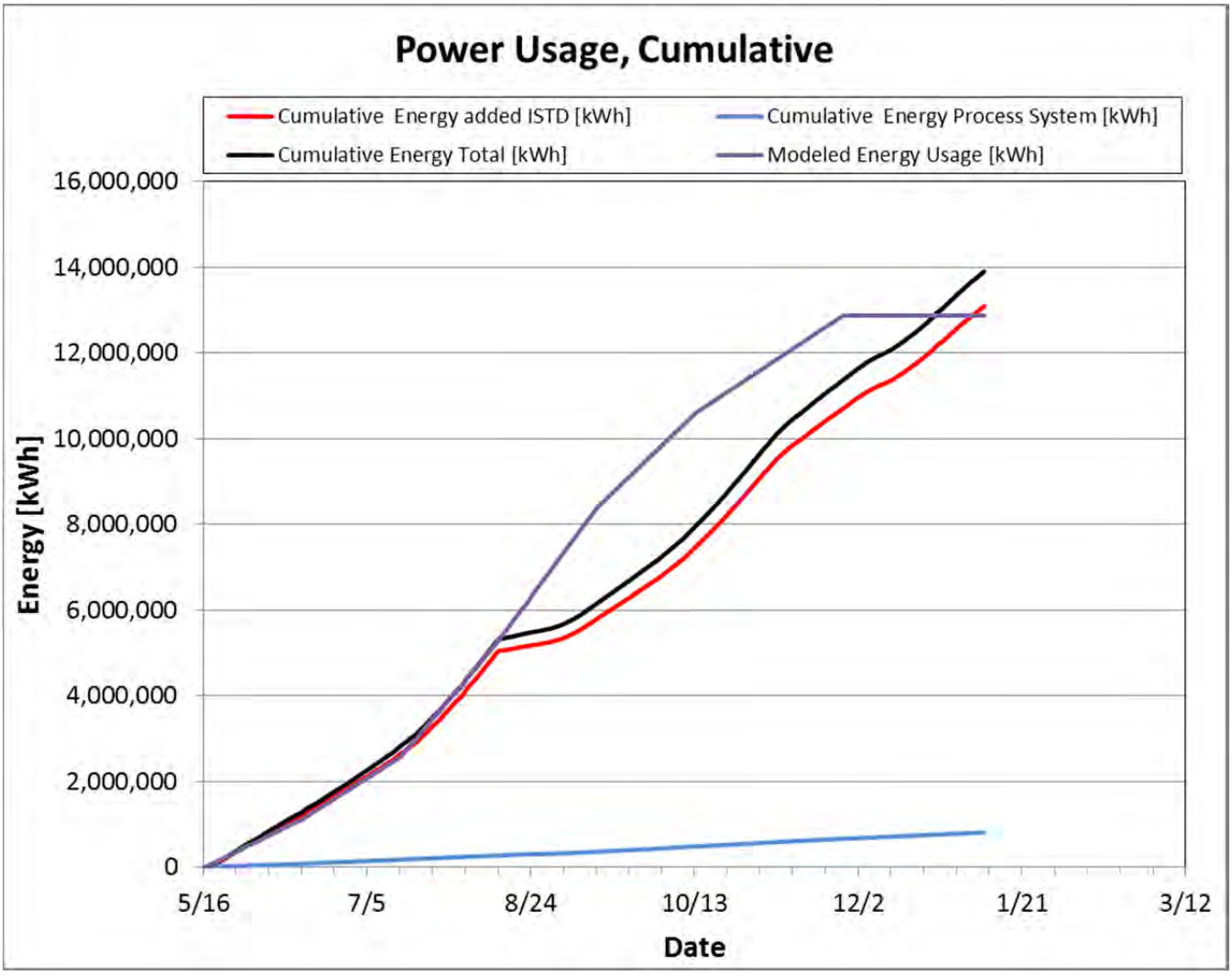


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30/14 and the following days corresponds with ramping of the heaters after placing the oxidizer back online. The decrease observed mid- November is associated with profiling of the heaters in Phase 2 and subsequent adjustments. The increase observed in December corresponds with additional profiling and subsequent adjustments.

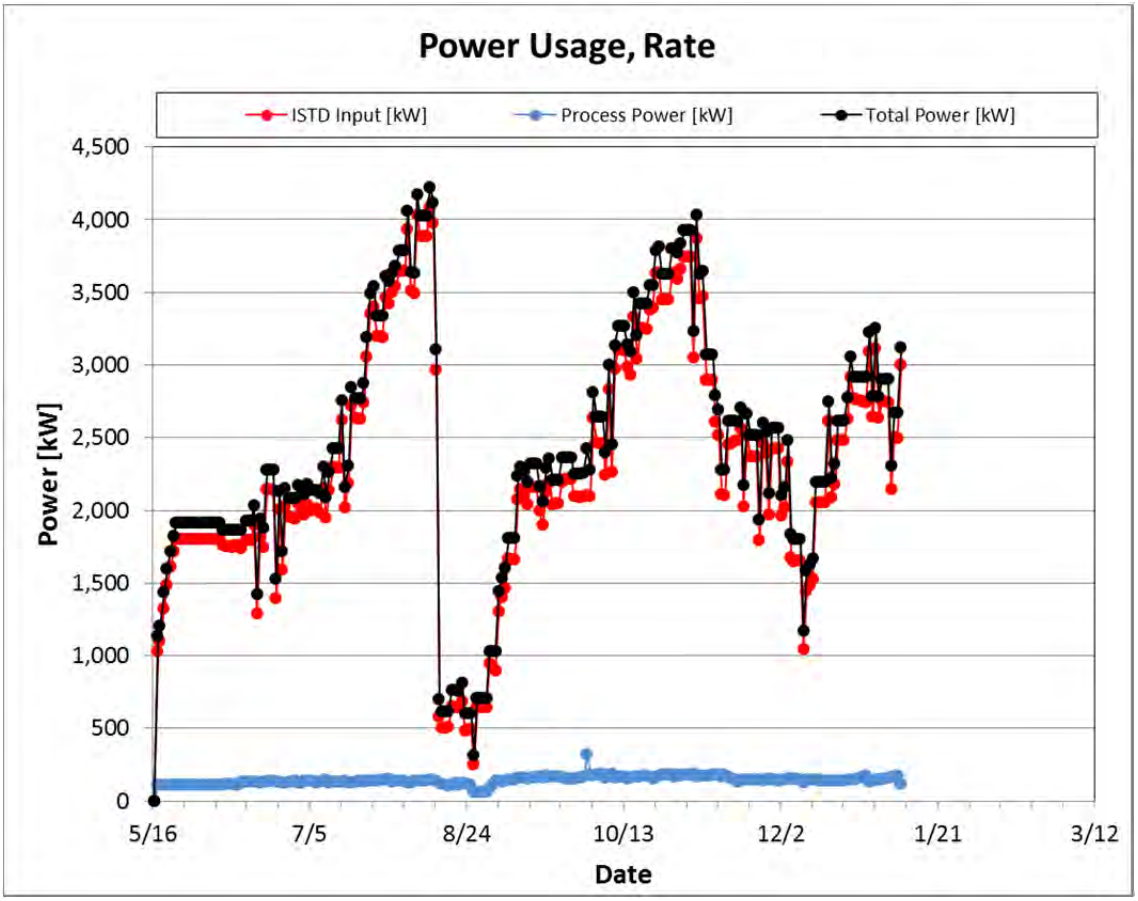


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

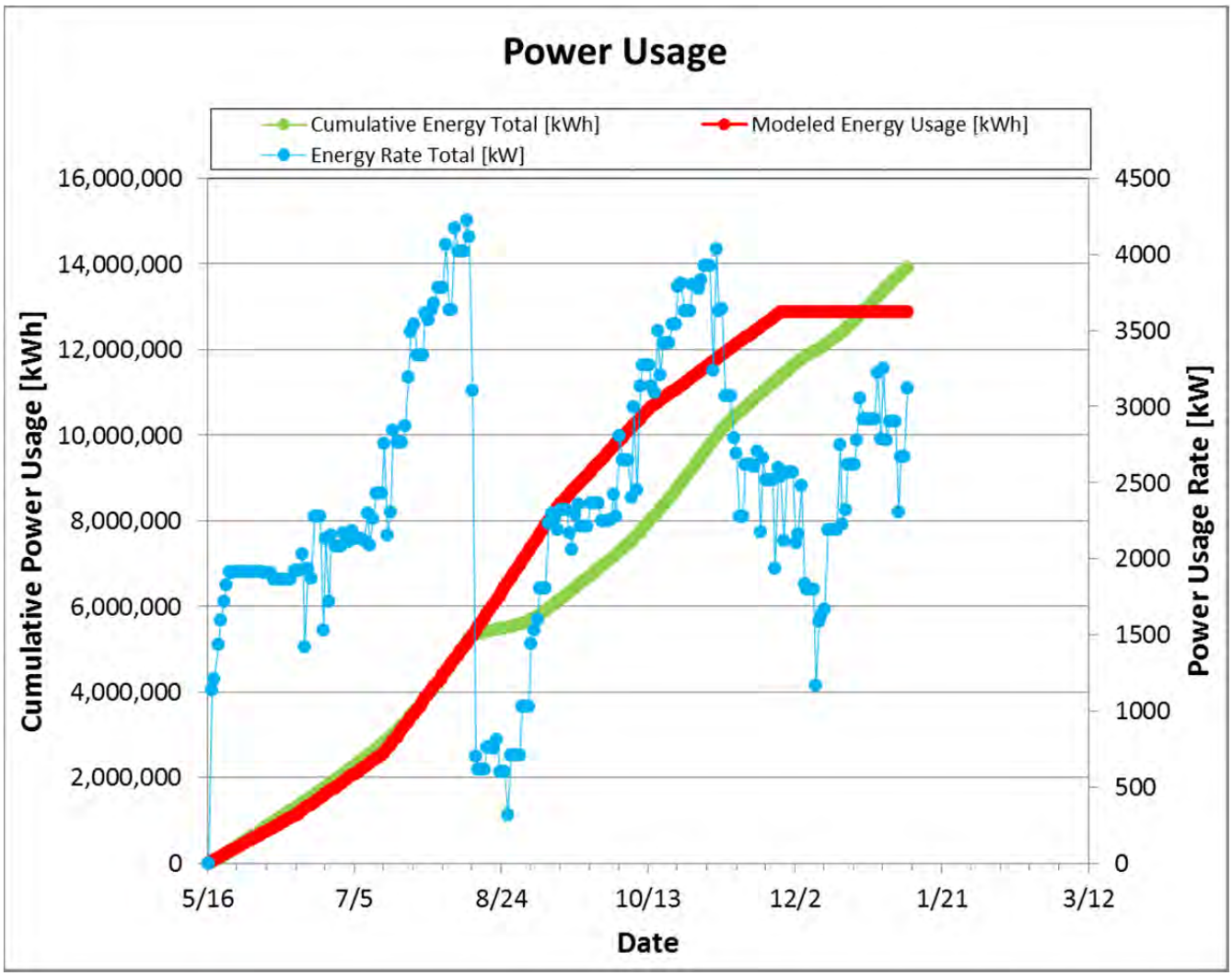


Figure 9. Power Usage

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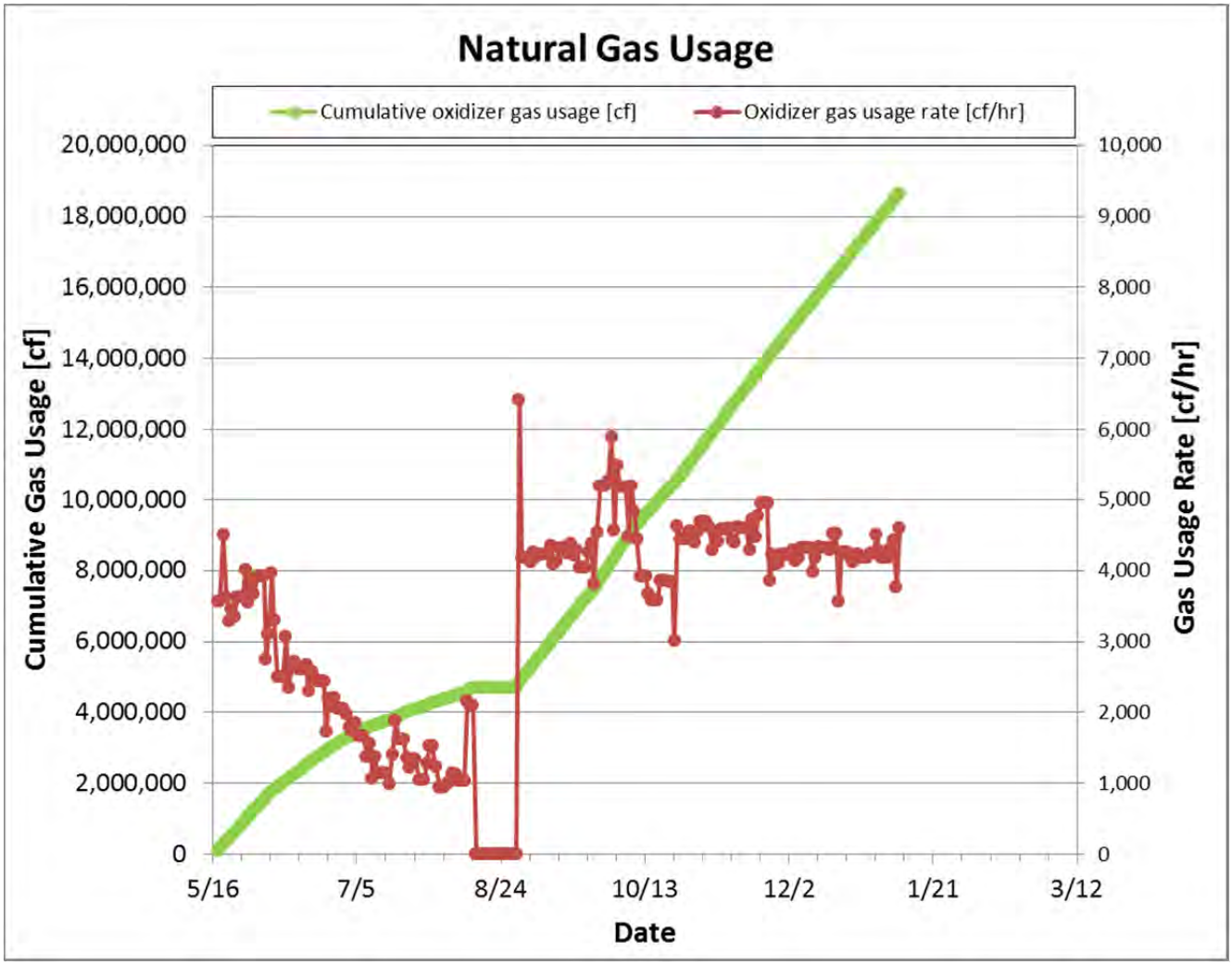


Figure 10. Natural Gas Usage

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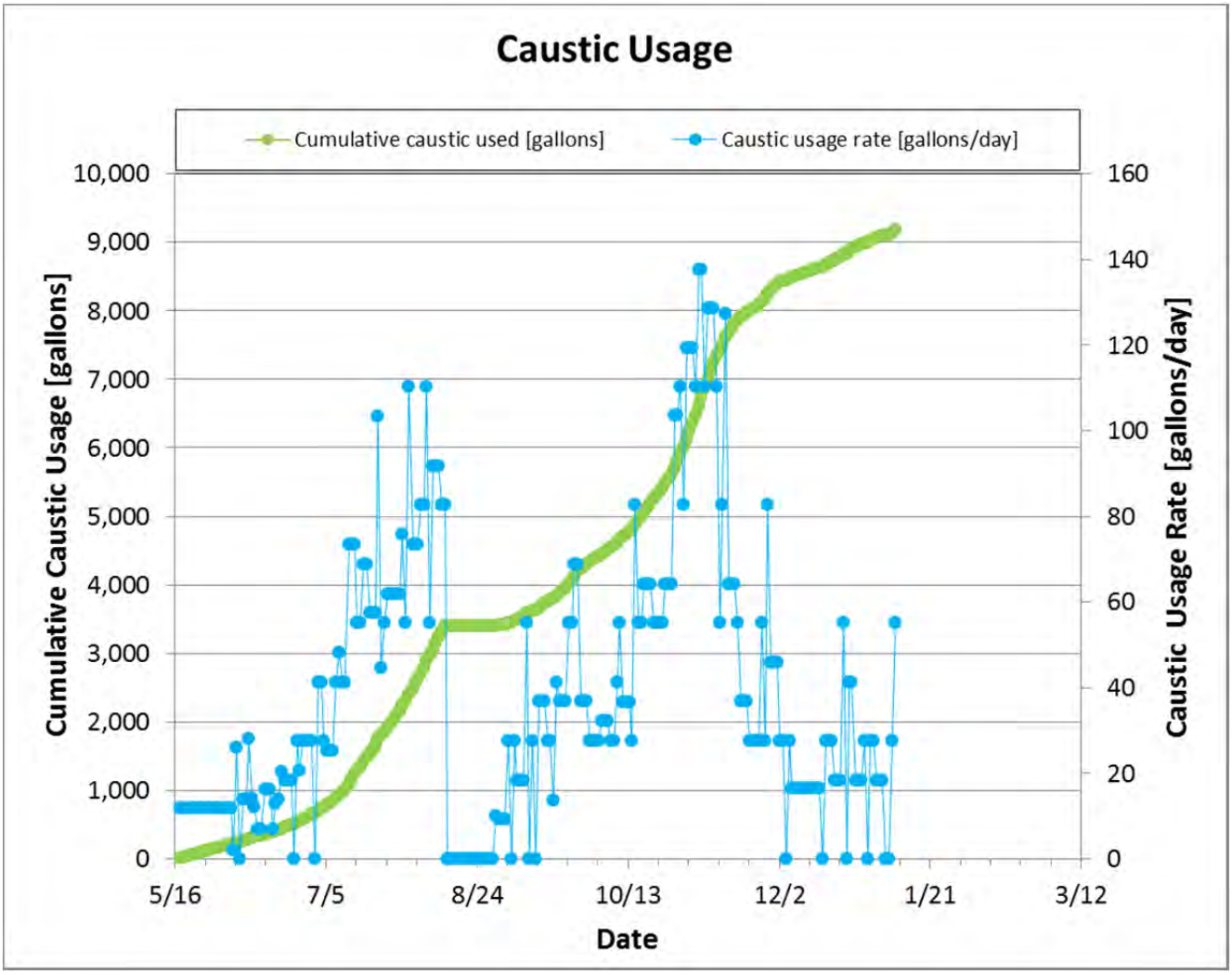


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as: Phase 1 and Phase 2

Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

A scatterplot of Phase 1 centroid temperature monitoring points is shown in Figure 12a. As of 9/26/14, we have reached all three temperature milestones for phase 1. Phase 2 centroids are shown in Figure 12b. As of 12/24/14, we have achieved all three temperature milestones for Phase 2.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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N/A

Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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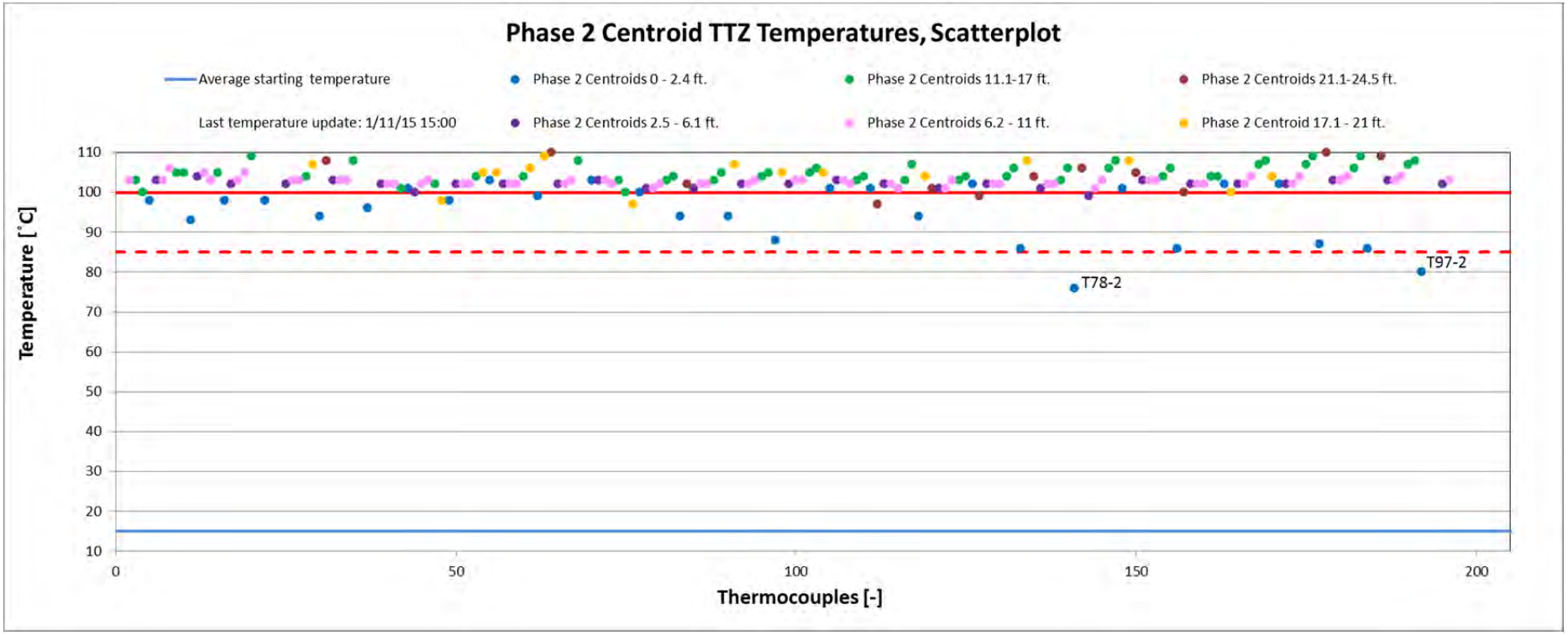


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots

	Value	Unit
Date of Last Update	1/11/15	
*Phase 1 Centroid Thermocouples ≥85 ^{0}C	100	%
*Phase 1 Centroid Thermocouples ≥100 ^{0}C	97	%
Phase 2 Centroid Thermocouples ≥85 ^{0}C	99	%
Phase 2 Centroid Thermocouples ≥100 ^{0}C	96	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday, 9 January, 2015 through Friday, 16 January 2015, with temperatures updated through Sunday, 18 January 2015.

Table 1 provides a summary of the project operational status as of Friday, 16 January 2015.

Table 1: Project Summary

Summary

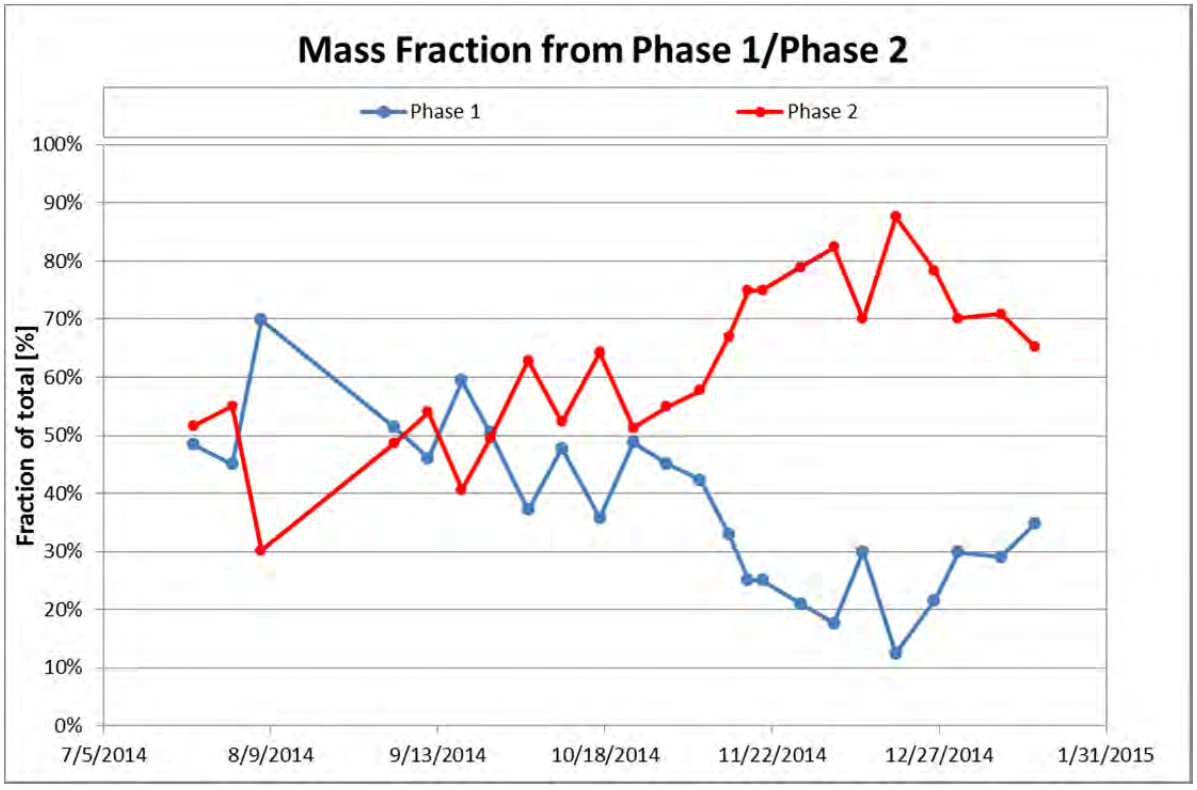
	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	01/16/15	
Last Temperature Data Update	01/18/15	
Days of Operation (Total)	223	days
Days of Phase 1 Operation	158	days
Days of Phase 2 Operation	114	days
Total Design Energy Usage (ISTD and treatment system)	15,795,000	kWh
Total Energy Added (ISTD)	14,389,800	kWh
Used Electrical Energy vs. Estimate	91.1	%
Total Mass Removal	425,565	lbs
Average Power Input Last 24 Hours	3,340	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	2,190	scfm
Average Condensate Production Rate Last 24 Hours	8.9	gpm

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Phase 2 remains online and at full power. Phase 2 has operated for 114 days. The current average wellfield temperature for Phase 2 is 103°C. Phase 1 operated for a total of 158 days, which represents days where heaters operated at or above 70% *and* the collection date of the last confirmation soil sample (per contract definition). All three temperature milestones have been achieved for both Phase 1 and 2. Please note that the majority of the Phase 1 temperature monitoring system was demobilized on January 8, 2015. Therefore Phase 1 temperatures are not reported.

As of 1/10/15, the oxidizer was taken offline. Vapor treatment is through the vapor carbon vessels. Estimated mass removed through 01/09/15 (oxidizer online) was reported using the flammability analyzer data, laboratory data for chlorinated compounds that were assumed not to be detected by the flammability analyzer, and accumulated LNAPL. Following the oxidizer shutdown (01/10/15), estimated mass removed is estimated using the analytical laboratory data results, corrected with daily PID readings, plus the accumulated LNAPL. These results yield a total mass removed of 425,565 lbs as of 01/16/15. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 01/16/15. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.35:0.65. These ratios were then applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase and leg. These data are included in Tables 2 and 3. Mass fraction data over time is presented below.



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Table 2. PID Readings Collected from Manifold Legs

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14	12/31/14	1/9/15	1/16/15
1	SV-1	215	100	745	602	720	604	590	1181	550	516	5	770	712	851	845	790	450	360	236	185	177	170	95	238
	SV-2	742	173	1271	887	872	1129	1318	2987	780	770	1610	1004	931	1179	600	934	660	677	482	377	397	436	300	449
	SV-3	2588	872	3609	2854	1198	3395	1414	5512	2643	1120	3971	1430	627	99	101	3138	1717	1782	1218	1246	347	1622	725	626
	SV-4	1971	307	2543	1921	1514	2652	1153	4790	1927	3820	3275	2204	2650	3297	1375	2903	1510	2341	1278	979	333	611	585	477
	SV-5	1817	279	1642	740	444	1407	1197	4790	759	1411	950	1153	802	326	302	490	402	135	243	120	235	29	202	248
	SV-6	4480	332	1926	956	765	4283	2347	11564	3525	9177	5750	4780	4919	5854	1083	2100	601	435	1271	375	277	197	678	664
	SV-8	3222	385	1330	2375	1479	3267	1816	4744	179	172	3815	1881	1850	88	1475	940	401	450	890	150	178	170	110	244
	SV-9	3245	142	324	1993	1565	2995	1777	11950	2762	4967	3801	2121	2863	3227	1265	801	1209	1040	1480	390	350	340	445	445
	SV-10	1896	131	2148	1096	1111	2459	1517	4382	1933	1745	3384	2841	1318	4121	1494	1982	1302	1221	3215	500	381	420	400	371
	SV-11	1016	666	1712	1979	2145	1988	930	2534	1393	2687	1950	1469	1380	596	596	1360	750	641	270	399	332	354	315	495
	SV-12	80	53	158	139	104	815	1427	3234	682	1102	1090	2100	512	563	206	413	440	426	1413	545	569	490	465	201
	SV-13	417	211	736	145	170	1452	1476	4291	1109	375	370	985	380	295	315	1210	210	131	432	143	473	445	365	315
	SV-14	632	452	1526	2636	1450	777	1610	3411	1917	4668	4274	4150	5565	8416	1107	1053	630	500	1288	300	468	570	493	422
	SV-15	3440	1072	1153	2000	915	2150	2054	608	3265	4890	4801	5780	5000	618	654	1623	730	660	1007	115	490	600	705	872
2 (and between divider line)	SV-7	3843	366	1751	1210	1482	4307	1835	3337	3672	9379	7350	5812	7910	553	3115	6391	2860	2977	2810	1323	554	531	500	514
	SV-16	3113	885	233	1911	1703	2823	2216	6230	3165	6888	4994	3841	6029	11	2340	6276	3118	3307	7931	1957	1502	1908	1765	2144
	SV-17	3715	429	306	2928	1824	2801	1837	8933	1927	2713	2954	3313	5408	389	1670	10903	1983	1335	409	800	1133	730	116	718
	SV-18	1760	862	1203	2034	1634	2388	2446	15000	3554	5030	2815	2465	5632	13871	3377	4768	3650	5071	3361	5491	2057	2012	2423	1553
	SV-19	2258	350	2067	1971	2005	1818	2038	10522	2191	6417	4561	4398	3067	2693	1075	875	925	530	528	315	552	130	515	438
	SV-20	1990	796	1545	2344	1610	2268	2158	15000	2853	2305	2059	343	4053	8642	3534	5500	2725	12650	6352	6520	2084	2492	2750	1673
	SV-21	1964	487	2295	2077	1855	3458	1755	8561	2756	8053	4661	2119	4298	2631	2264	6000	4186	4440	2002	2870	937	958	808	634
	SV-22	2670	980	1606	2222	1892	2466	2448	14750	3344	5023	3578	2236	3582	55	3460	4765	3450	11187	4509	5516	2803	2565	2720	1598
	SV-23	2515	671	3248	3158	2165	3233	1532	8102	2973	7684	4880	3933	2707	4560	4005	5367	2993	2598	1326	1154	805	883	517	948
	SV-24	1412	638	1504	2406	1567	1669	1949	11882	1999	6130	4554	5005	6223	8864	2843	4555	2946	4280	3267	5764	2614	2195	2350	1446
	SV-25	688	220	1261	1035	1059	1350	2418	5725	1542	2247	1873	1743	1925	991	570	1301	740	773	500	445	400	547	410	457
	SV-26	90	185	350	580	573	638	1133	1119	790	3559	4305	4752	4633	1933	865	2742	710	520	642	1710	548	550	420	677
	SV-27	192	151	718	944	789	1117	1518	3922	1256	1485	1650	947	840	1040	313	769	745	620	318	320	277	350	210	289
	SV-28	15	87	77	151	178	310	211	730	335	1250	3624	5592	5447	4380	1438	6351	1440	1100	1588	4527	1575	886	610	759
	SV-29	8	66	55	20	52	130	1	15	35	21	352	255	83	41	1375	43	80	41	52	117	70	61	20	318
Breakdown of Wellfield VOC Flux by Phase																									
Phase 1:		48%	45%	70%	51%	46%	59%	51%	37%	48%	36%	49%	45%	42%	33%	25%	25%	21%	18%	30%	12%	22%	30%	29%	35%
Phase 2:		52%	55%	30%	49%	54%	41%	50%	63%	52%	64%	51%	55%	58%	67%	75%	75%	79%	82%	70%	88%	78%	70%	71%	65%

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Table 3. Estimated Mass Loading by Manifold Leg/Phase

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14	12/31/14	1/9/15	1/16/15
1	SV-1	0.5%	0.7%	3.5%	1.5%	3.0%	1.6%	1.7%	1.0%	1.1%	0.7%	0.0%	1.3%	0.8%	1.2%	2.2%	1.2%	1.0%	0.6%	0.6%	0.4%	0.9%	0.7%	0.6%	1.2%
	SV-2	2.0%	1.3%	4.3%	2.6%	3.6%	3.0%	4.7%	2.5%	1.9%	0.8%	2.4%	1.8%	1.2%	1.7%	1.6%	1.3%	1.4%	1.3%	1.3%	1.0%	1.9%	2.2%	1.7%	2.8%
	SV-3	3.5%	7.5%	16.2%	7.4%	5.0%	8.9%	5.0%	4.5%	7.1%	1.3%	5.7%	2.6%	0.7%	0.2%	0.3%	5.1%	4.2%	3.3%	3.2%	3.5%	1.7%	9.4%	4.5%	5.0%
	SV-4	3.3%	2.5%	8.5%	5.7%	5.5%	5.9%	3.3%	3.5%	4.8%	3.9%	4.5%	3.2%	3.1%	3.8%	3.0%	4.4%	3.5%	4.5%	3.0%	2.3%	1.5%	1.8%	3.4%	3.3%
	SV-5	2.5%	2.9%	9.6%	2.5%	1.6%	3.1%	3.2%	3.2%	2.1%	1.9%	1.4%	1.5%	1.0%	0.5%	0.9%	0.7%	1.0%	0.3%	0.6%	0.3%	1.2%	0.2%	1.2%	1.8%
	SV-6	2.5%	1.4%	3.8%	1.6%	1.2%	4.1%	3.0%	3.4%	3.7%	4.5%	3.5%	3.0%	2.4%	3.1%	1.1%	1.6%	0.6%	0.3%	1.4%	0.3%	0.5%	0.4%	1.4%	1.6%
	SV-8	8.7%	2.9%	4.4%	7.1%	6.3%	8.7%	6.8%	3.1%	0.4%	0.1%	5.9%	3.5%	4.4%	0.1%	4.2%	1.6%	1.0%	0.8%	2.6%	0.3%	0.9%	1.0%	0.6%	1.1%
	SV-9	9.0%	0.9%	1.3%	6.0%	5.8%	8.4%	6.4%	7.3%	6.9%	6.6%	6.2%	3.9%	6.8%	4.8%	3.6%	1.0%	2.5%	2.0%	3.7%	1.1%	1.9%	2.0%	2.7%	3.8%
	SV-10	2.4%	0.5%	3.0%	1.3%	1.7%	2.1%	1.8%	1.5%	2.2%	0.9%	2.0%	2.1%	0.7%	2.3%	1.6%	1.4%	1.1%	1.0%	3.6%	0.4%	0.8%	0.9%	1.0%	0.7%
	SV-11	1.3%	2.3%	3.4%	2.2%	3.4%	1.9%	1.0%	0.9%	1.5%	1.4%	1.2%	1.0%	0.6%	0.3%	0.5%	1.2%	0.7%	0.5%	0.3%	0.3%	0.7%	0.8%	0.8%	0.8%
	SV-12	0.3%	0.5%	0.6%	0.4%	0.5%	2.3%	4.8%	2.4%	1.6%	1.4%	1.8%	2.7%	1.2%	1.0%	0.7%	0.7%	1.0%	0.8%	3.7%	1.3%	3.1%	3.0%	3.1%	1.7%
	SV-13	0.6%	0.9%	1.6%	0.2%	0.3%	1.4%	2.0%	1.3%	1.2%	0.2%	0.2%	0.7%	0.2%	0.2%	0.4%	0.8%	0.2%	0.1%	0.4%	0.1%	1.0%	0.9%	1.0%	0.9%
	SV-14	2.3%	6.1%	5.8%	7.5%	5.5%	2.2%	1.1%	2.0%	4.5%	6.3%	6.9%	7.4%	12.7%	13.1%	3.3%	1.8%	1.5%	0.9%	3.3%	0.7%	2.7%	3.5%	3.2%	3.3%
	SV-15	9.5%	14.7%	3.9%	5.3%	2.8%	5.6%	5.7%	0.5%	8.8%	5.8%	6.9%	10.4%	6.4%	0.9%	1.8%	2.3%	1.5%	1.3%	2.3%	0.3%	2.8%	3.1%	3.9%	6.7%
2 (and between divider line)	SV-7	2.2%	1.5%	1.9%	1.5%	2.9%	4.2%	2.3%	1.1%	3.9%	4.8%	3.8%	4.0%	3.2%	0.3%	3.1%	5.3%	2.5%	2.1%	3.3%	1.3%	1.1%	0.9%	1.2%	1.7%
	SV-16	9.5%	7.1%	1.1%	5.7%	6.2%	6.6%	6.9%	5.2%	8.0%	8.7%	6.9%	6.9%	8.0%	0.0%	6.8%	10.3%	10.5%	6.6%	18.3%	5.0%	8.1%	10.5%	11.1%	14.4%
	SV-17	2.9%	0.1%	-3.3%	2.1%	1.6%	-1.5%	-0.6%	-0.5%	-1.6%	-3.1%	-2.0%	-1.3%	0.0%	-2.8%	0.7%	6.0%	1.3%	0.7%	-1.0%	0.5%	1.6%	1.2%	-1.1%	0.5%
	SV-18	5.5%	11.4%	4.9%	6.8%	5.6%	6.7%	7.8%	13.0%	9.5%	6.6%	3.6%	4.3%	7.1%	22.8%	10.5%	8.2%	14.5%	9.1%	7.9%	13.9%	10.4%	10.8%	12.9%	10.1%
	SV-19	3.6%	0.3%	-2.0%	5.5%	6.3%	0.6%	2.8%	3.0%	3.2%	6.5%	6.4%	4.3%	3.0%	3.4%	2.0%	0.7%	1.2%	0.7%	0.9%	0.6%	1.7%	0.6%	0.2%	0.5%
	SV-20	7.2%	12.0%	7.2%	6.2%	6.3%	5.7%	5.5%	11.9%	6.1%	2.8%	2.9%	0.6%	5.0%	14.1%	11.0%	8.9%	8.7%	23.9%	14.6%	16.8%	10.7%	13.4%	16.3%	9.3%
	SV-21	2.6%	2.0%	3.8%	0.9%	2.4%	3.2%	2.9%	3.6%	2.5%	5.3%	1.6%	-0.4%	2.2%	0.2%	3.5%	6.3%	5.8%	4.3%	1.4%	4.8%	3.0%	3.5%	1.1%	1.6%
	SV-22	8.5%	9.3%	8.3%	5.9%	7.6%	6.7%	7.0%	12.2%	8.5%	6.7%	4.8%	3.9%	4.4%	0.1%	9.9%	5.4%	11.5%	19.8%	11.5%	13.6%	14.3%	14.0%	16.1%	7.8%
	SV-23	5.2%	-2.9%	-2.4%	1.9%	4.4%	-0.3%	0.5%	0.3%	1.0%	8.8%	1.3%	4.6%	2.9%	6.2%	10.3%	3.2%	3.4%	2.6%	-0.2%	-0.2%	2.4%	-6.0%	-2.0%	2.6%
	SV-24	4.0%	8.5%	9.4%	7.2%	6.2%	4.4%	5.6%	10.3%	4.7%	8.0%	6.8%	7.4%	7.4%	13.6%	8.3%	6.5%	11.3%	8.5%	7.7%	14.7%	13.7%	11.6%	8.4%	8.9%
	SV-25	-0.1%	1.1%	0.0%	0.7%	0.8%	0.1%	1.5%	0.1%	1.4%	2.1%	0.2%	1.3%	1.2%	-0.2%	0.0%	0.5%	0.3%	0.4%	0.1%	0.2%	0.0%	0.4%	0.8%	0.2%
	SV-26	0.3%	2.2%	1.9%	1.9%	2.4%	1.6%	3.4%	1.0%	1.6%	4.3%	6.8%	8.1%	5.9%	3.2%	2.7%	3.9%	2.8%	1.1%	1.7%	4.0%	2.6%	3.2%	2.2%	2.8%
	SV-27	0.1%	0.7%	-0.5%	1.7%	0.4%	1.4%	3.2%	1.2%	2.4%	1.1%	2.0%	0.4%	0.2%	0.0%	-1.5%	0.1%	0.7%	0.5%	0.2%	0.5%	0.5%	1.0%	0.8%	0.6%
	SV-28	0.0%	1.0%	0.5%	0.6%	0.7%	0.8%	0.6%	0.5%	0.9%	1.7%	5.5%	10.1%	6.9%	6.1%	3.8%	9.5%	4.2%	2.0%	3.4%	11.6%	7.9%	4.8%	2.7%	3.2%
	SV-29	0.0%	0.6%	0.4%	0.1%	0.2%	0.4%	0.0%	0.0%	0.1%	0.0%	0.6%	0.5%	0.2%	0.1%	3.7%	0.1%	0.3%	0.1%	0.1%	0.3%	0.4%	0.3%	0.1%	1.0%
Total:		100%	100%	101%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note: Six out of the 23 wellfield branch lines service both Phase 1 and Phase 2; therfore, a correction has been made to subtract the shared mass sometimes resulting in a negative value. This value indicates that the mass contribution from the Phase 2 area was limited in that particular sample round. This is a result of the accuracy of the flow and PID data measurements collected.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 2 only, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* As of 01/08/15, Phase 1 is only partially operational; therefore, temperature data for Phase 1 is no longer included.

Phase 2 heating began on 7/16/14 but was stopped on 8/14/14, as a result of the oxidizer shutdown, and reenergized on 09/30/14. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	1/18/15	
Phase 1 Entire TTZ Average Temperature	N/A	°C
Phase 2 Entire TTZ Average Temperature	103	°C
Phase 1 Centroid Average Temperature	N/A	°C
Phase 2 Centroid Average Temperature	103	°C

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N/A

Figure 1a. Phase 1 Observed vs. Modeled Temperatures

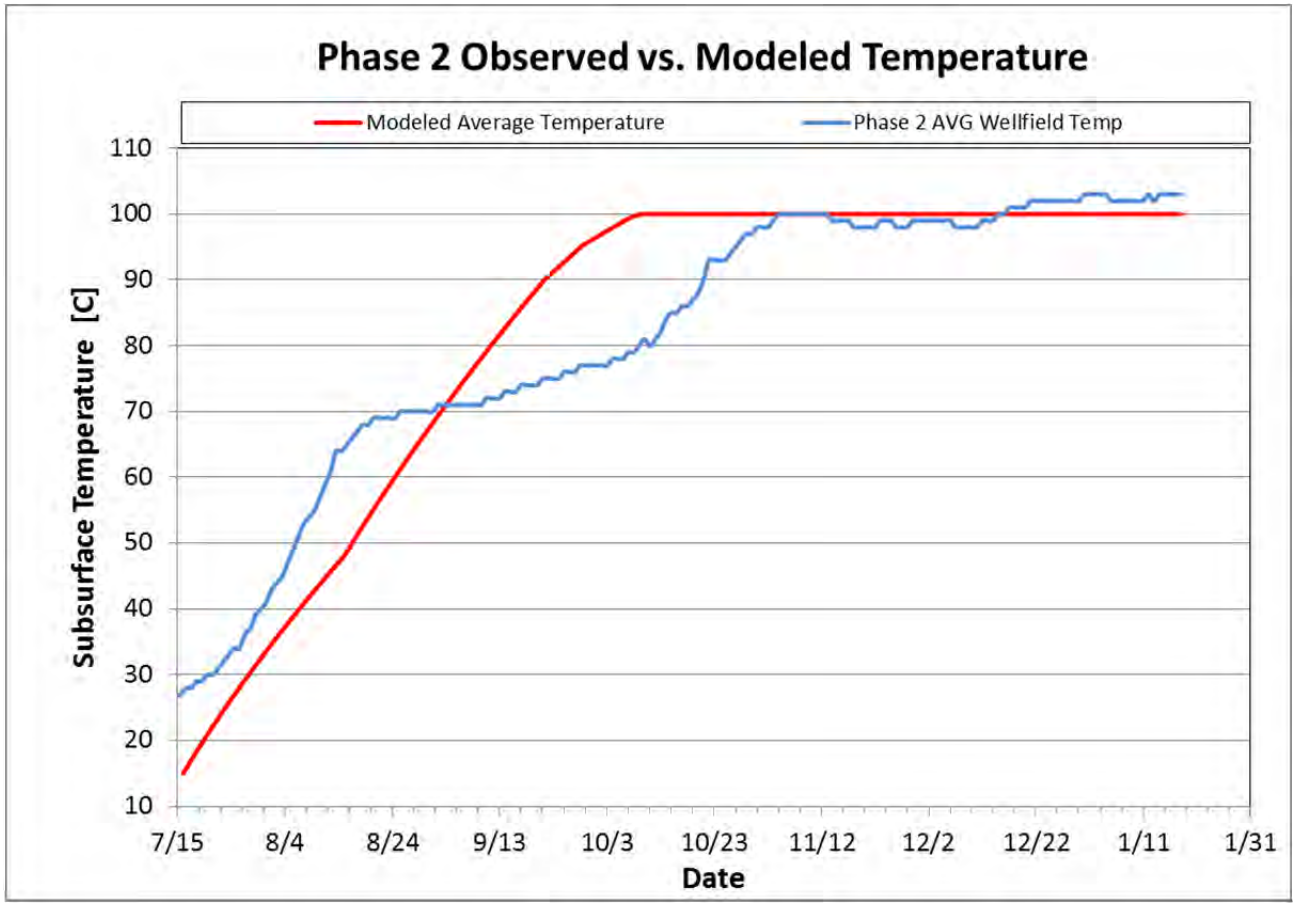


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was increased on 8/30/14.

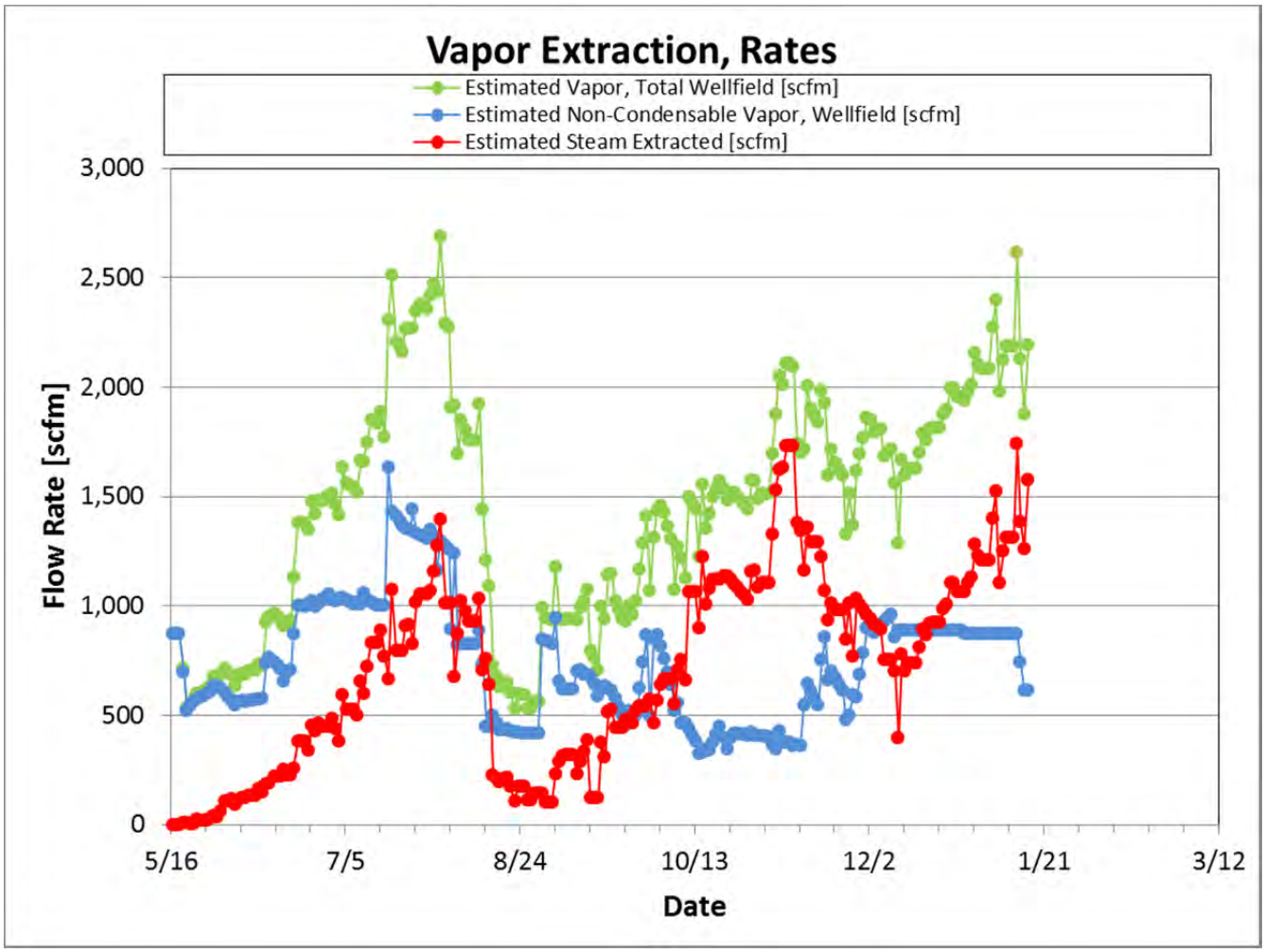


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

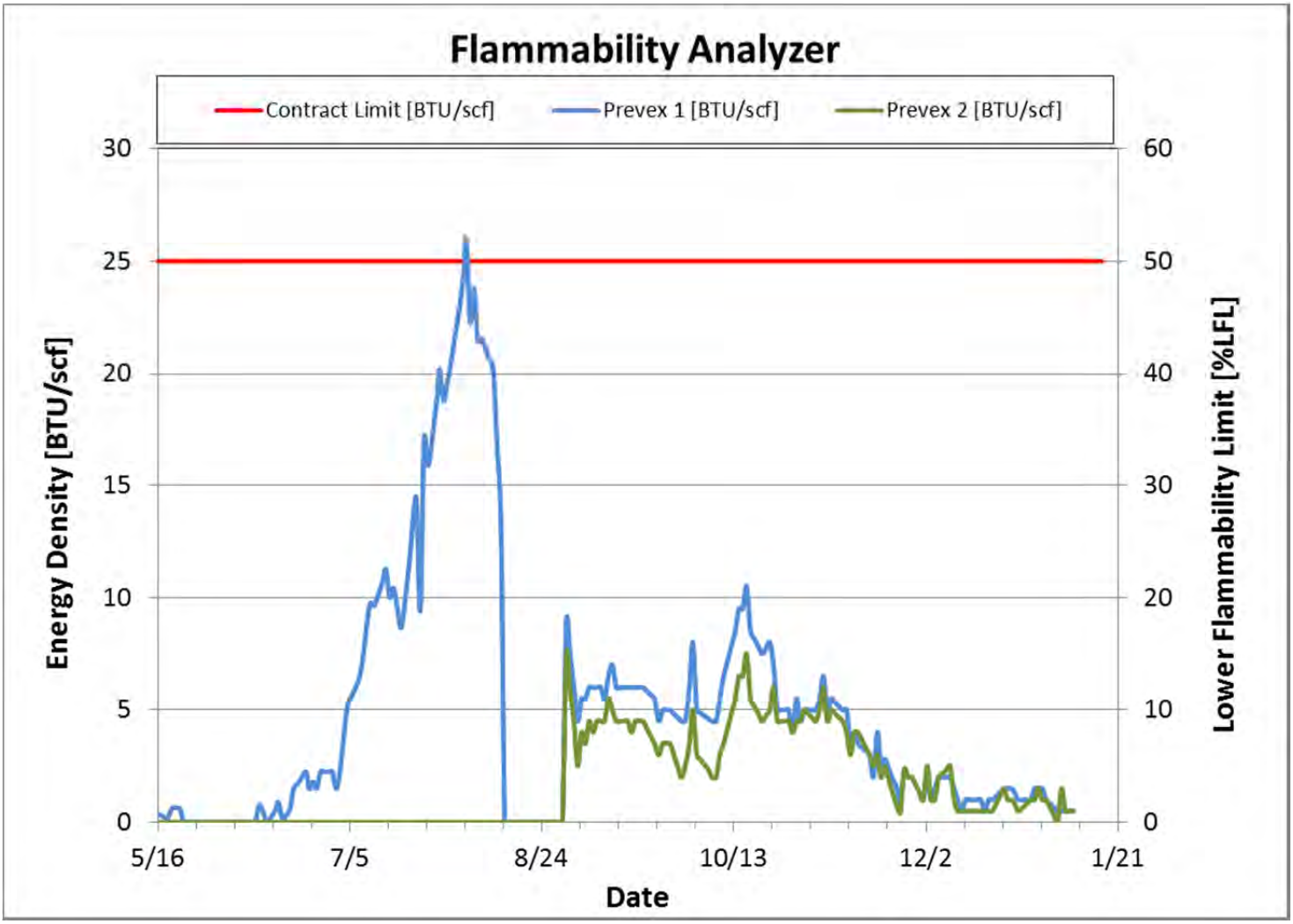


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed through 01/09/15 is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. Mass removal starting 01/10/15 is reported as the total compounds detected in the laboratory data corrected using the PID plus the accumulated LNAPL. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively.

The decrease in mass removed starting on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14, 9/23/14, 9/30/14, 10/7/14, 10/14/14, 10/21/14, 10/30/14, 11/4/14, 11/18/14, 11/25/2014, 12/2/2014, 12/9/2014, 12/16/14, 12/23/14 and 12/30/14.

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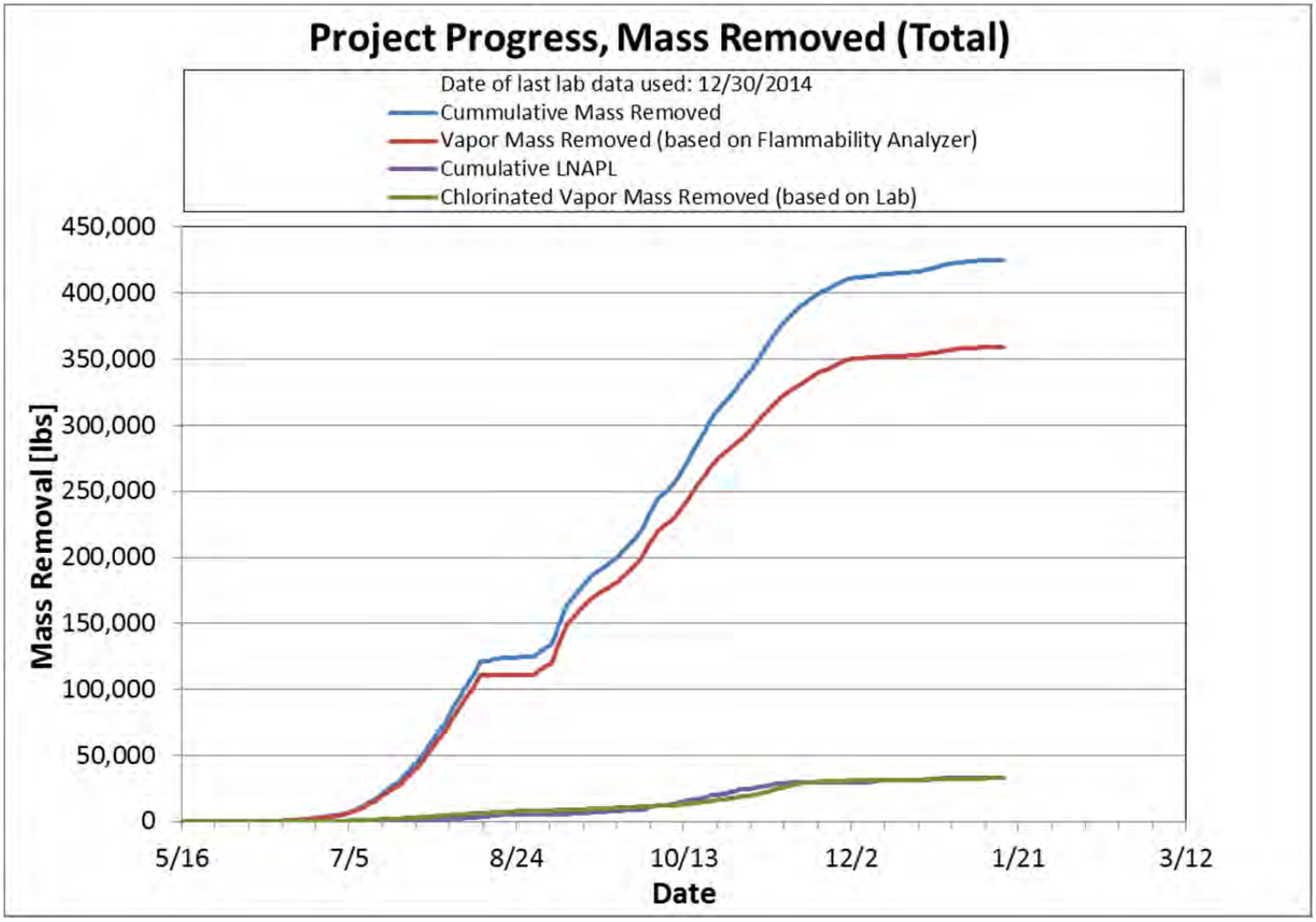


Figure 4a. Project Progress, Mass Removal (Total)

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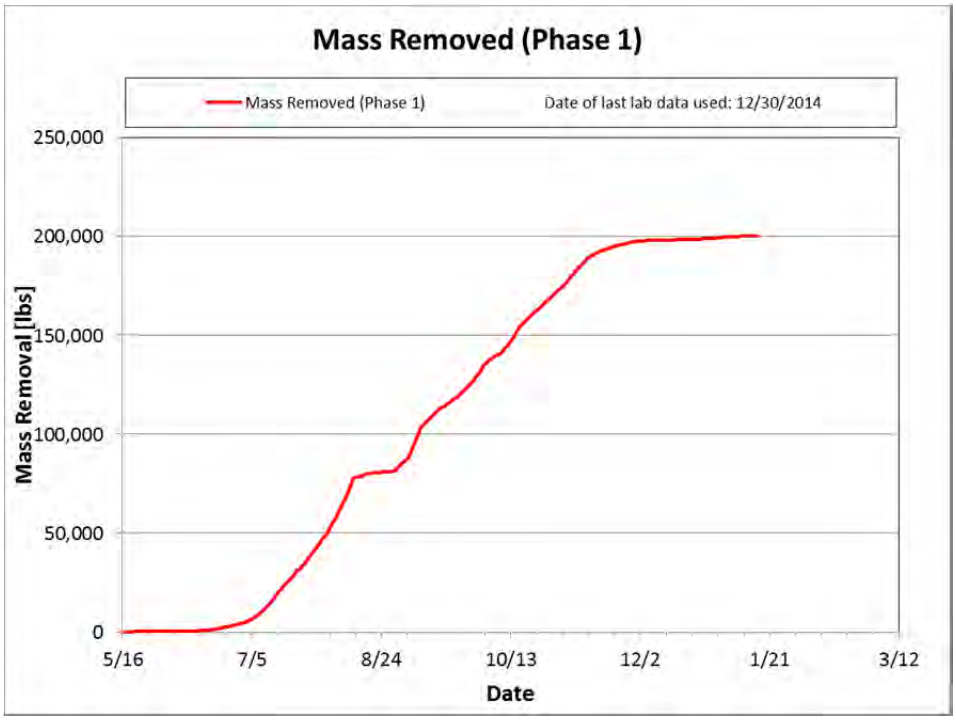


Figure 4b. Project Progress, Mass Removal (Phase 1)

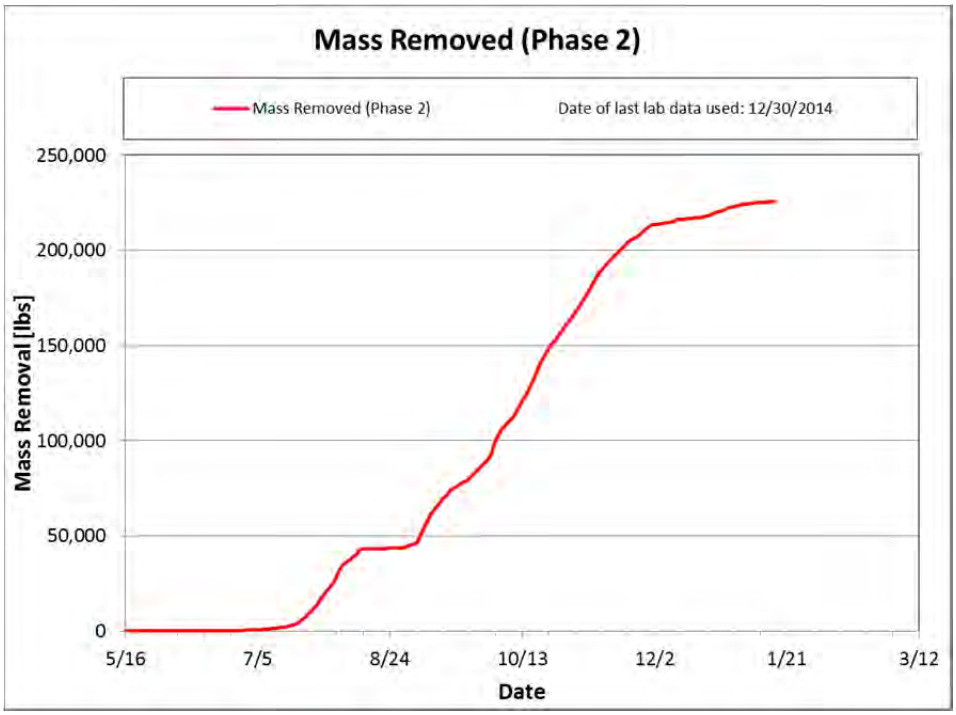


Figure 4c. Project Progress, Mass Removal (Phase 2)

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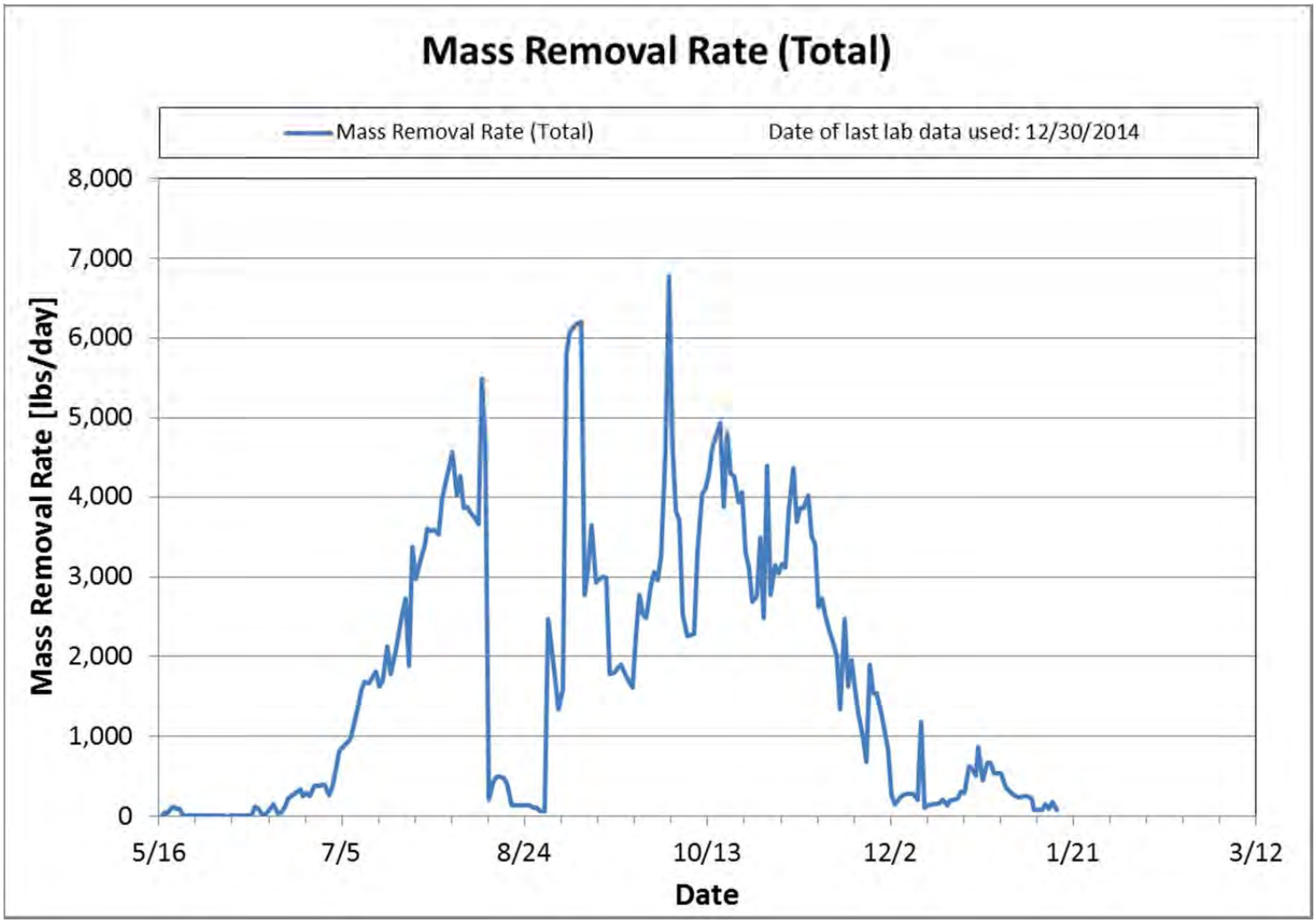


Figure 4d. Mass Removal Rate (Total for Site)

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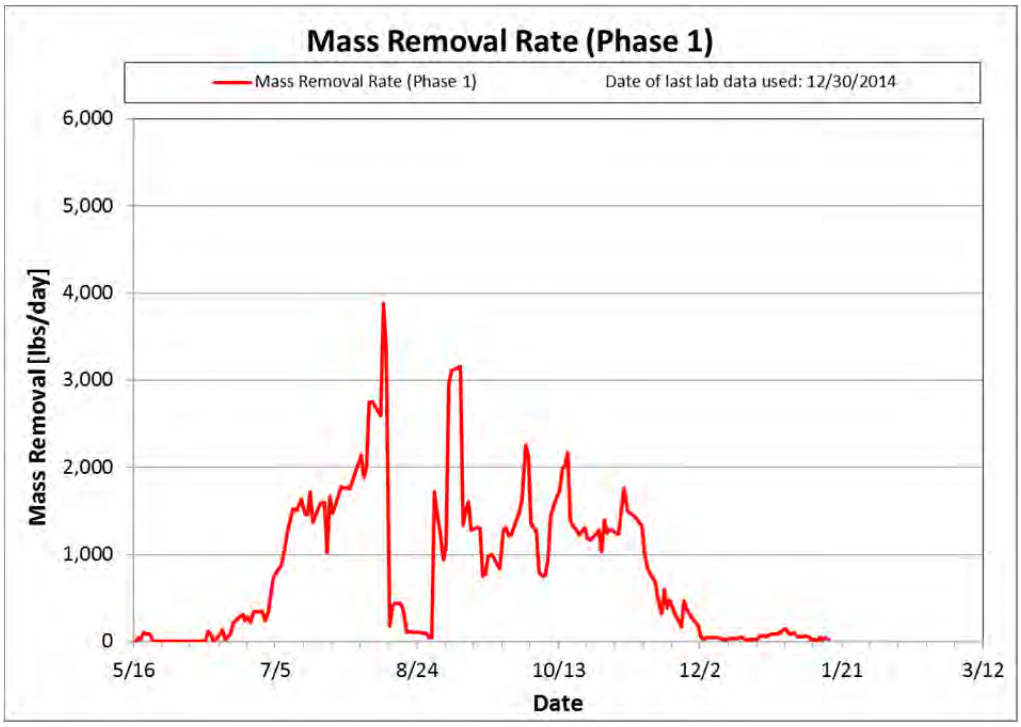


Figure 4e. Mass Removal Rate (Phase 1)

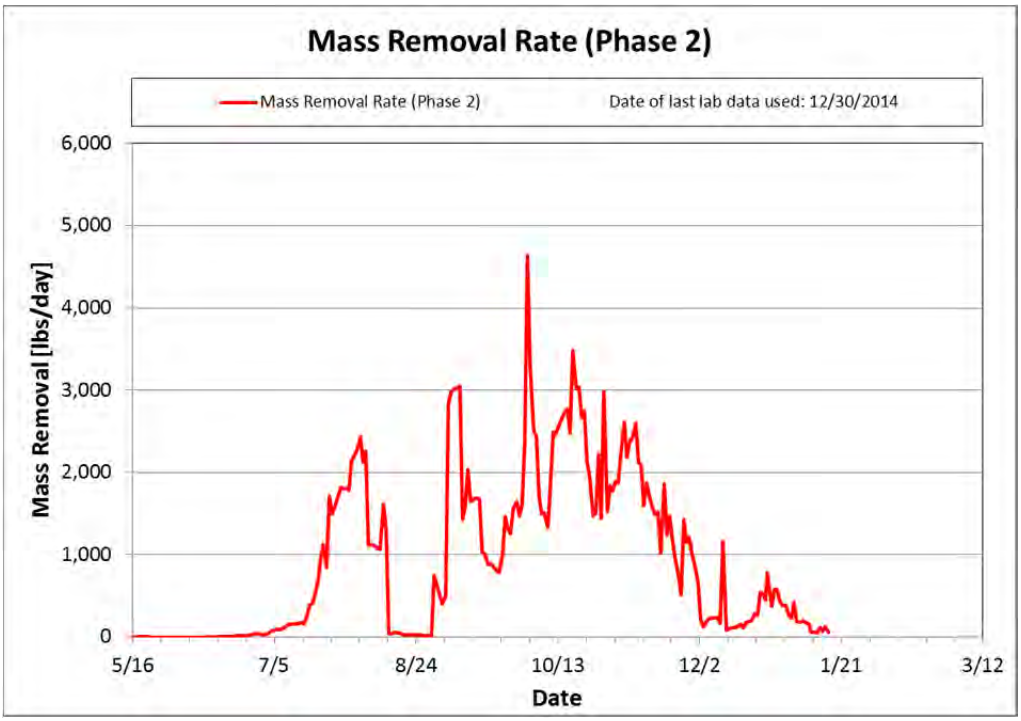


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID and flammability analyzer readings collected at the oxidizer influent over time. It should be noted that PID readings are first collected using an 11.7 eV lamp (determined by site contaminants). If the reading exceeds the limit of the meter (>2000 ppm), the readings are collected using a 10.6 eV lamp. When both meters are used, the maximum value is recorded.

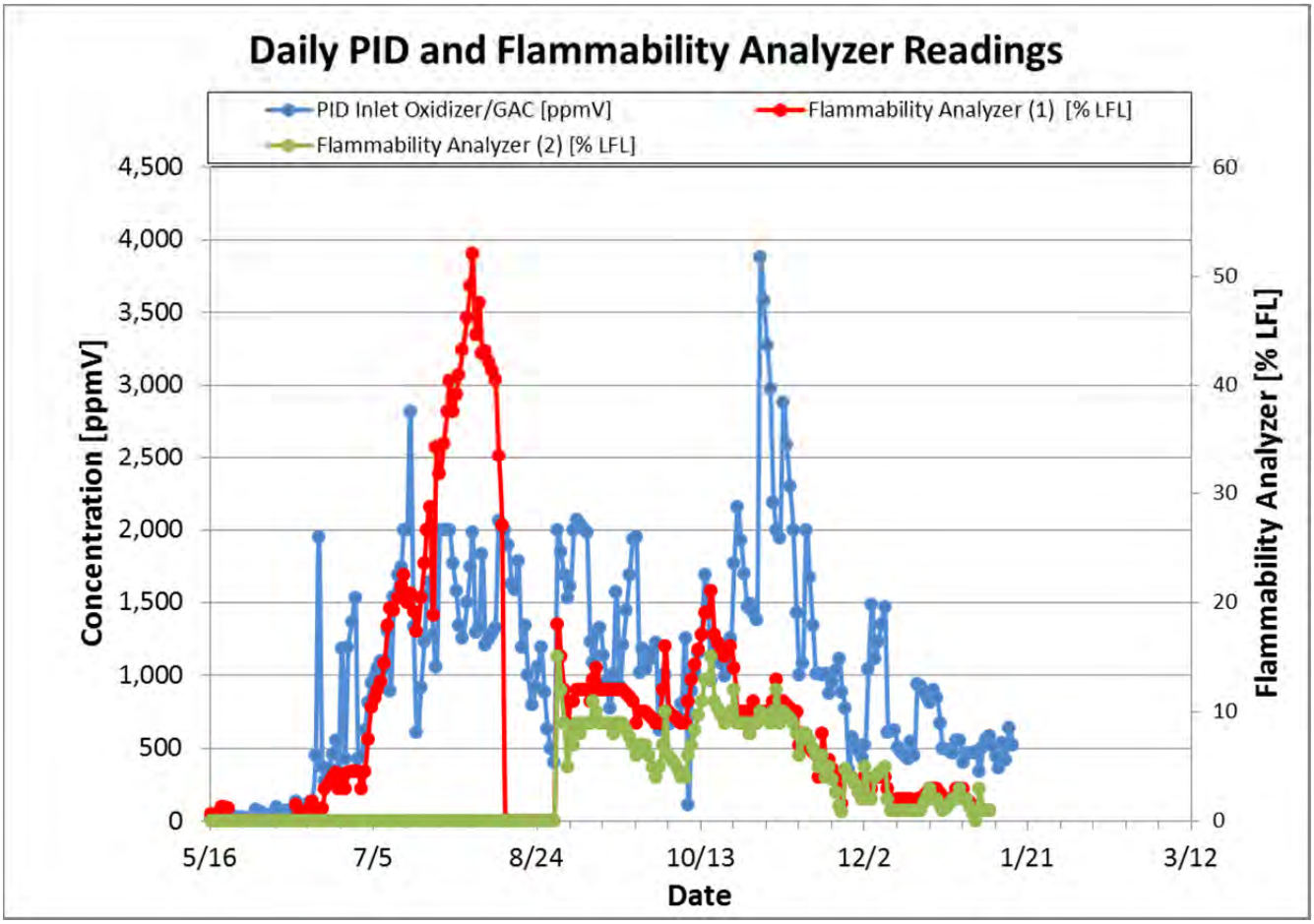


Figure 5. Daily PID and Flammability Analyzer Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13. Decreases in DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-outs.

Influent and effluent paired samples are collected monthly during heatup, then weekly thereafter until peak concentrations have decreased.

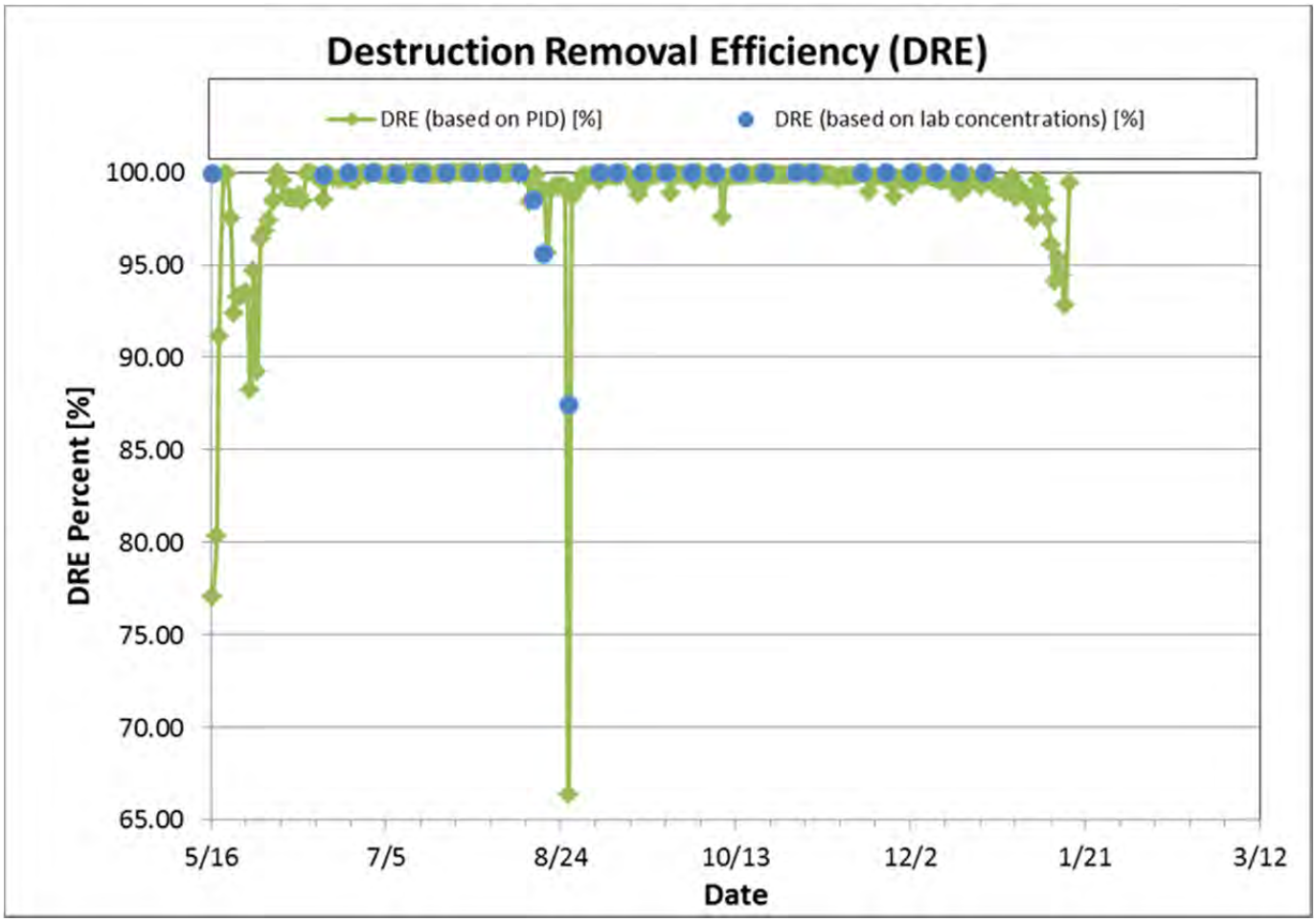


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7. Please note that the graph has been modified to present the estimated modeled energy for the heaters (ISTD) over the original predicted 195 day treatment. This does not take into account contract definitions such as heaters operating at or above 70% energy input. The flatline represents days beyond 195 days.

Please note that the modeled energy usage (12,873,000 kWh) only includes the energy predicted to be added to the subsurface. Therefore, the number should be compared to the cumulative energy added by the ISTD system to the subsurface (red line). The total energy usage (including the treatment system power usage) is predicted to be 15,795,000 kWh as stated in the summary table.

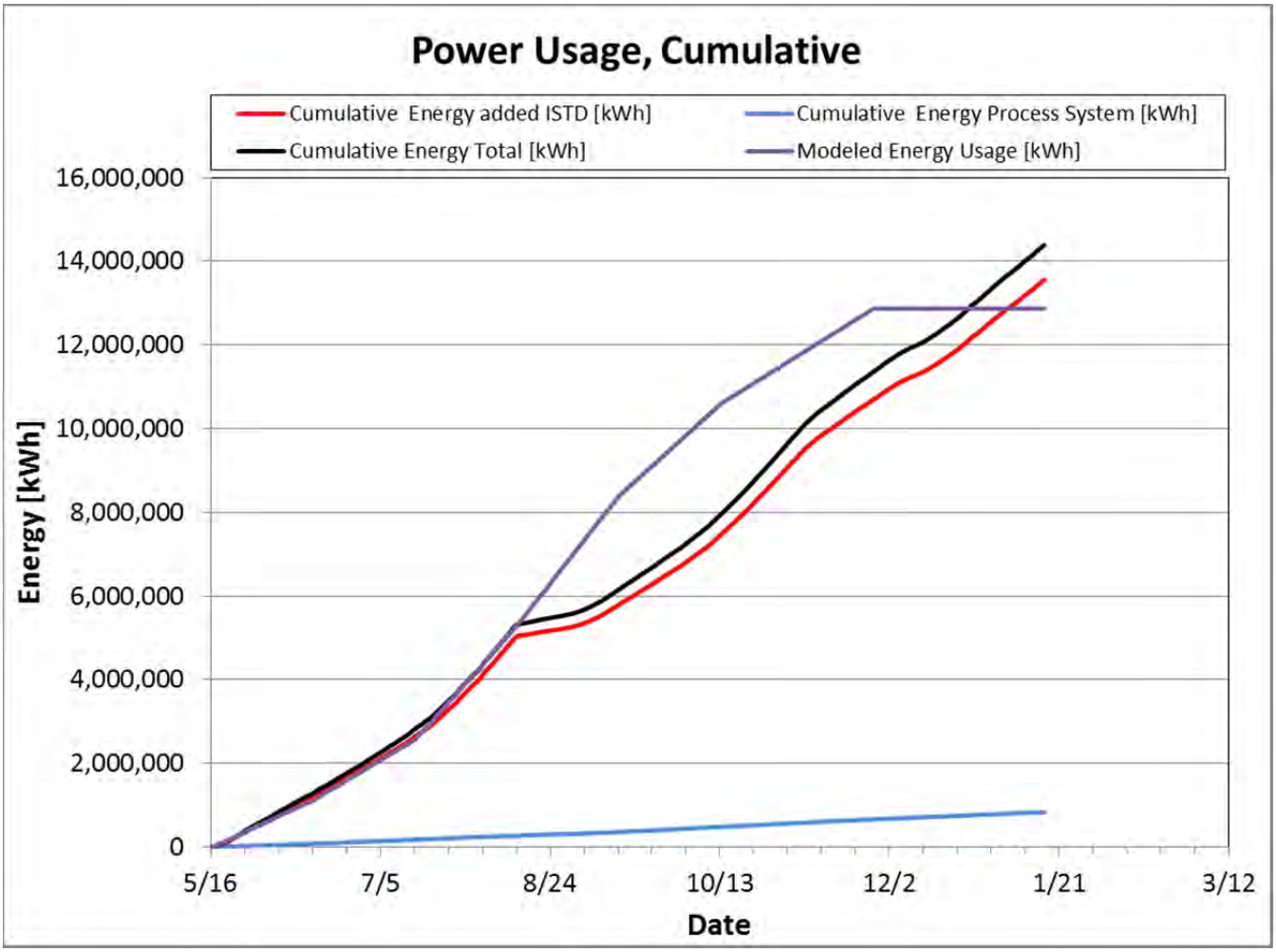


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30/14 and the following days corresponds with ramping of the heaters after placing the oxidizer back online. The decrease observed mid- November is associated with profiling of the heaters in Phase 2 and subsequent adjustments. The increase observed in December corresponds with additional profiling and subsequent adjustments.

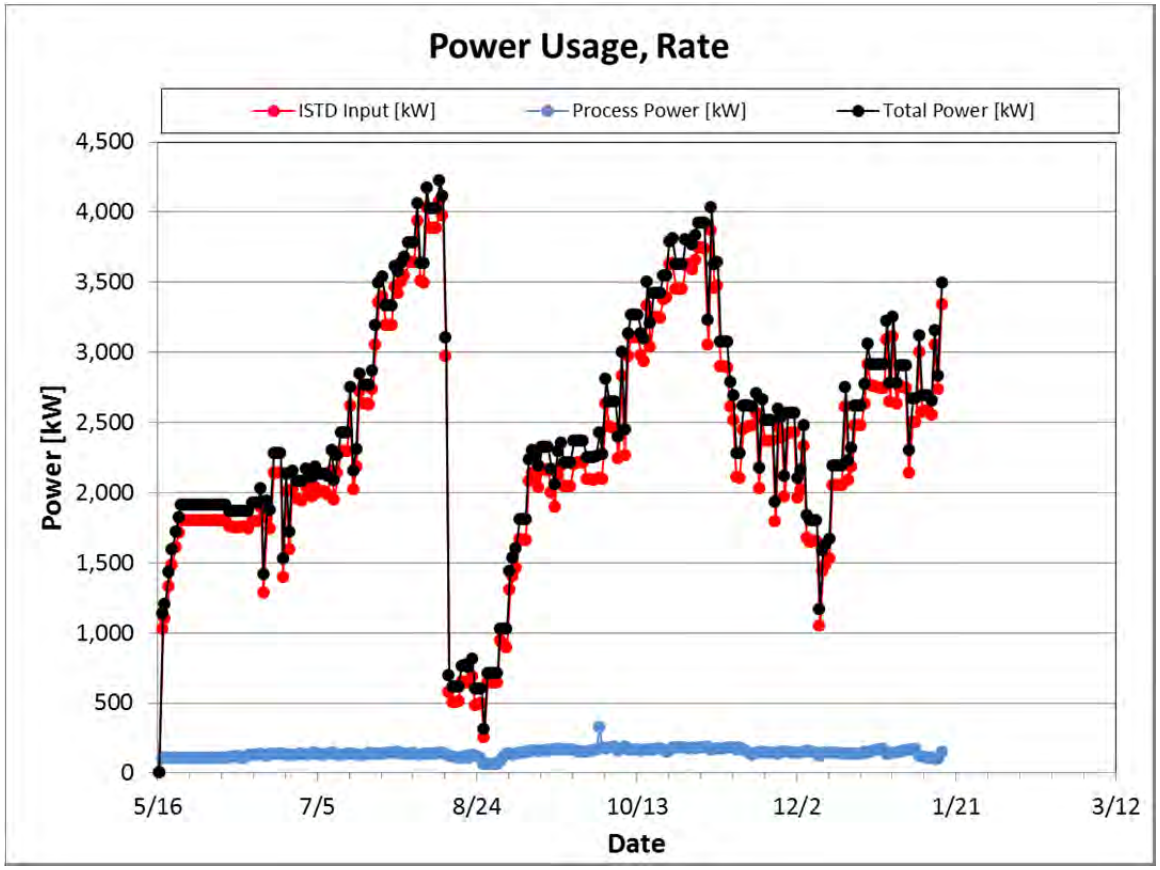


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

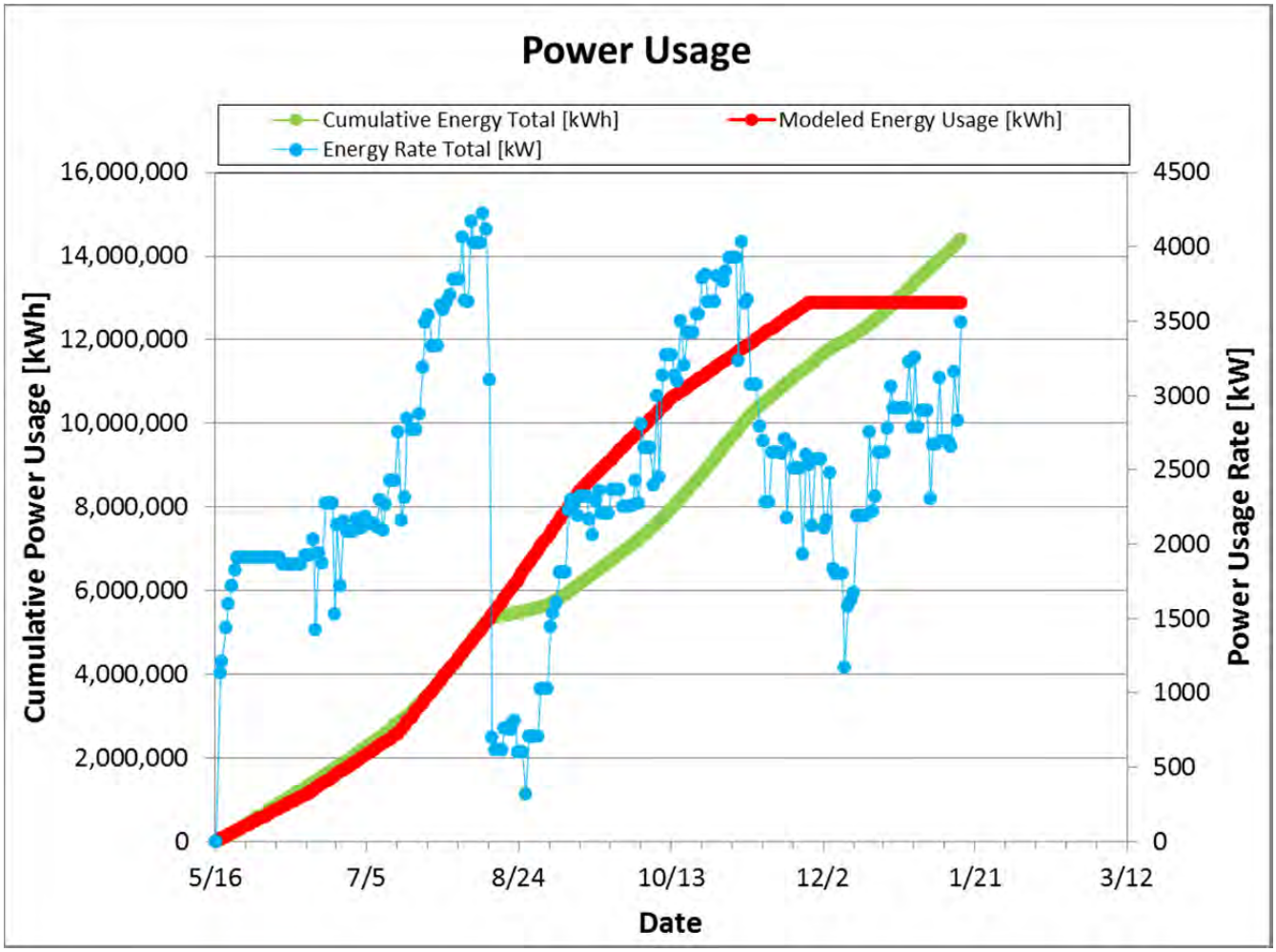


Figure 9. Power Usage

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With the oxidizer offline, natural gas is no longer in demand (as shown below starting on 10 January 2015).

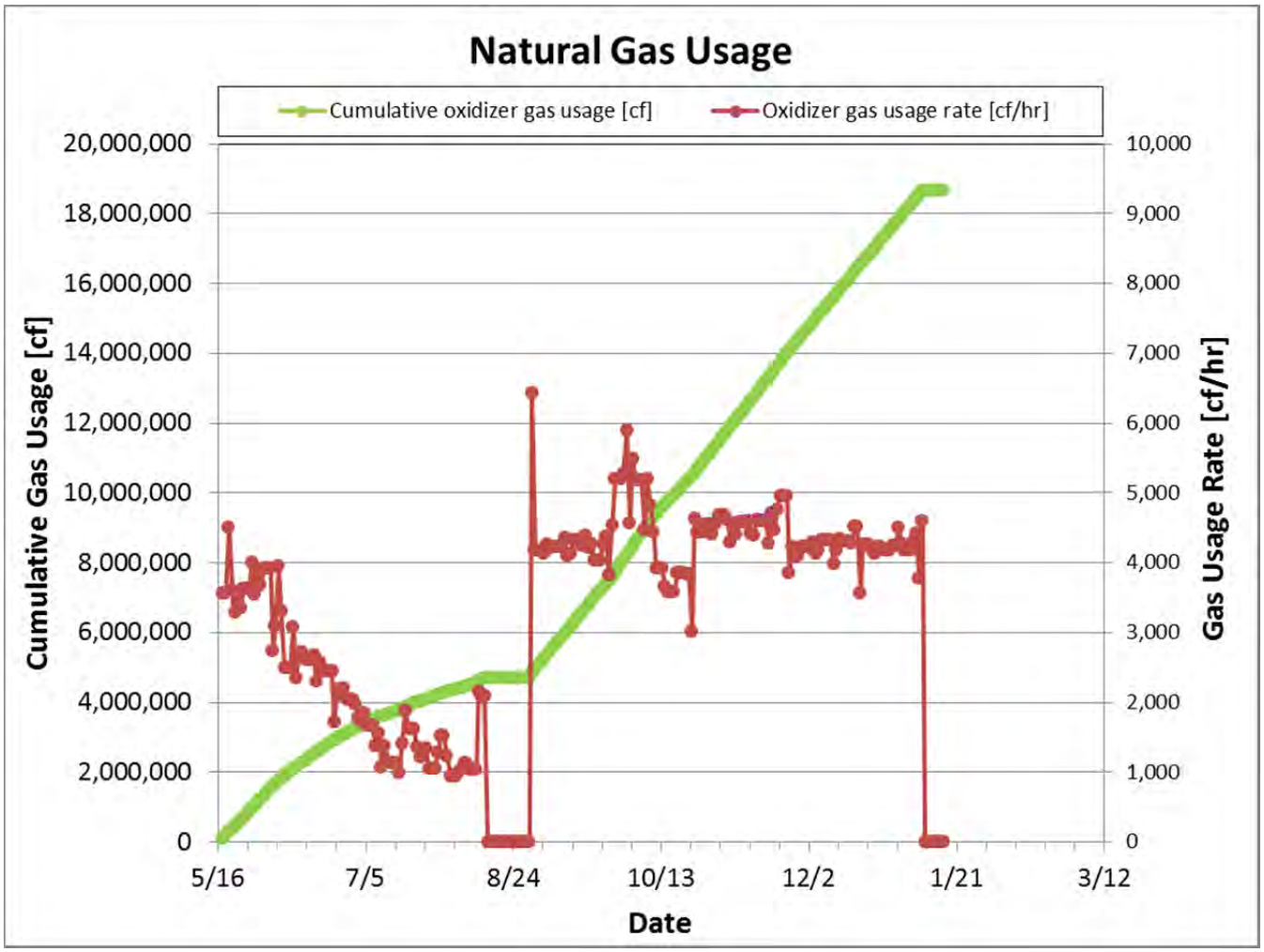


Figure 10. Natural Gas Usage

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With the oxidizer offline, caustic is no longer in demand (as shown below starting on 10 January 2015).

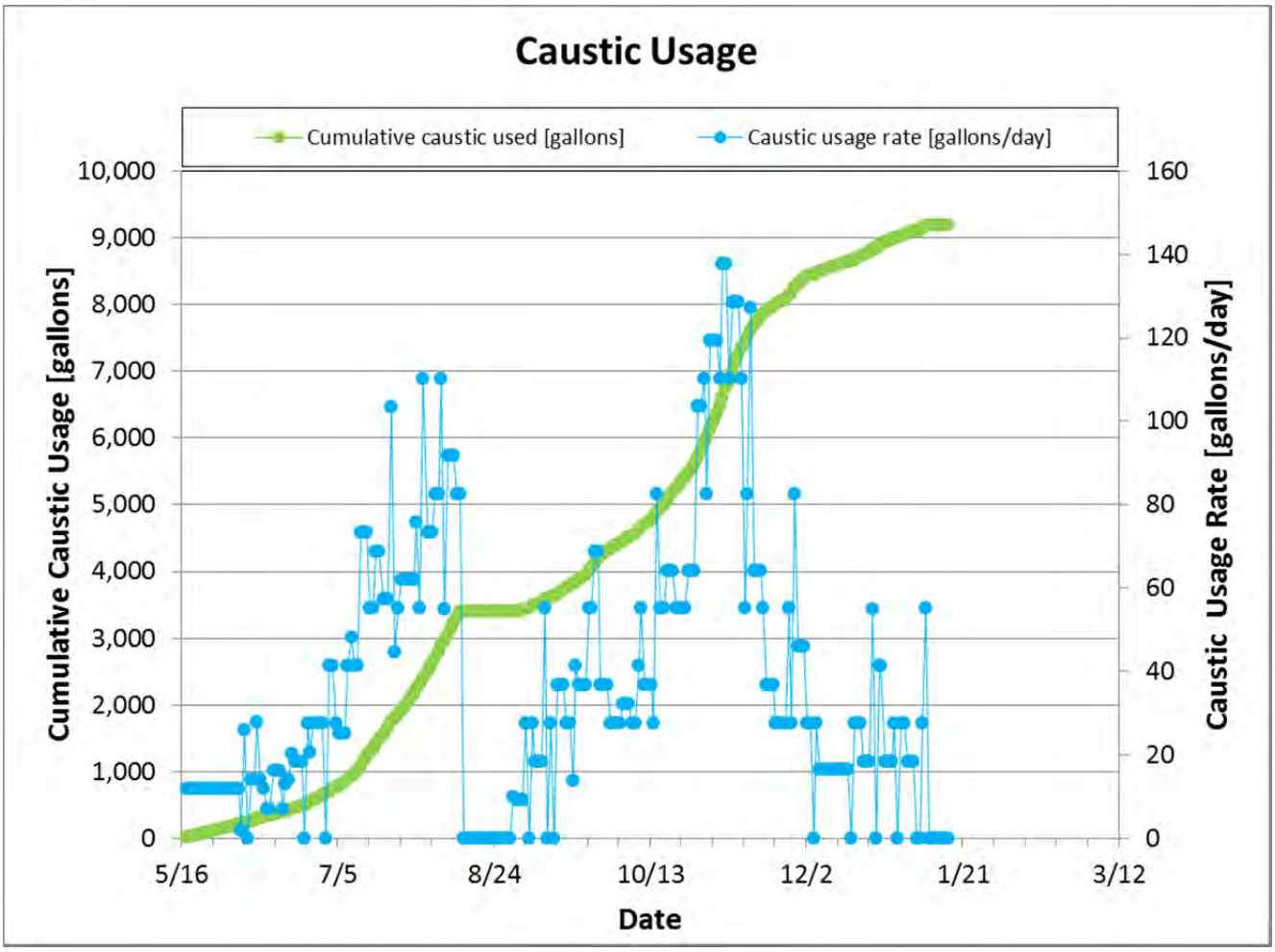


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as: Phase 1 and Phase 2

Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Phase 2 centroids are shown in Figure 12b. As of 12/24/14, we have achieved all three temperature milestones for both Phase 1 and Phase 2.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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N/A

Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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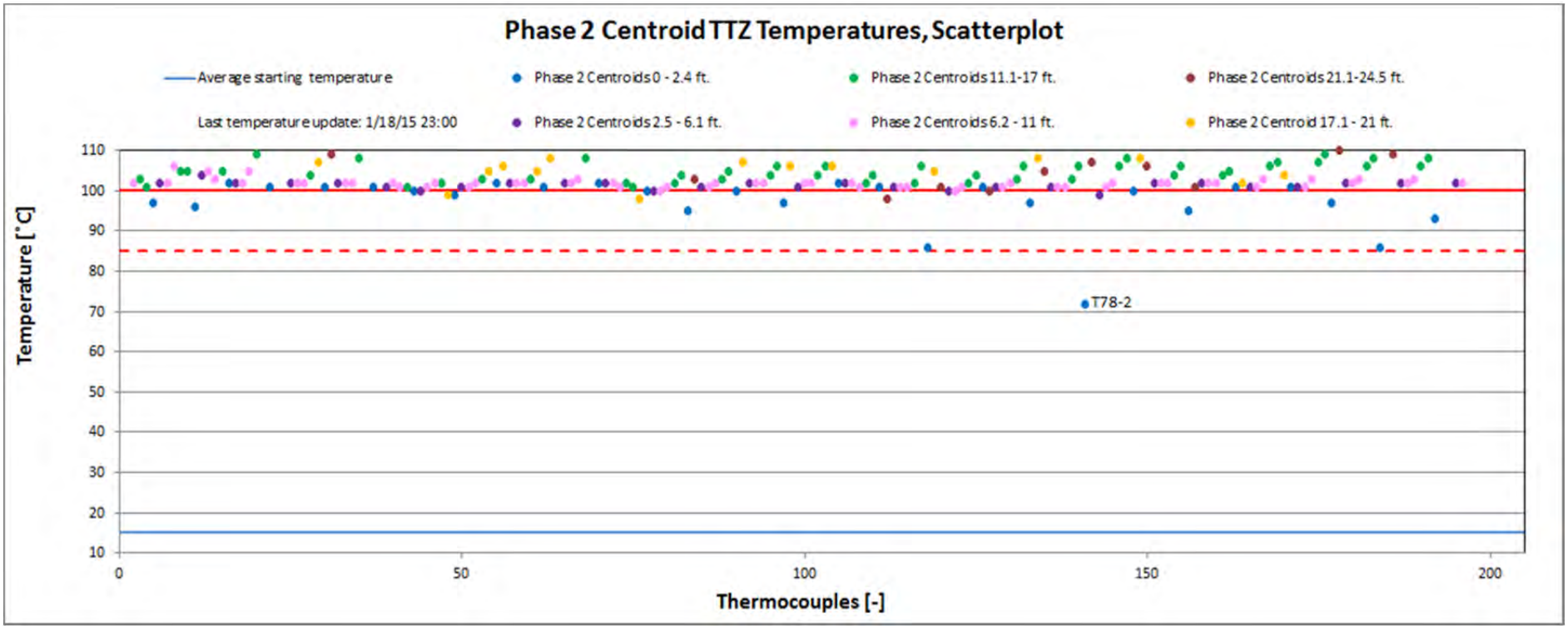


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots		
	Value	**Unit**
Date of Last Update	1/18/15	
*Phase 1 Centroid Thermocouples ≥85 °C	100	%
*Phase 1 Centroid Thermocouples ≥100 °C	97	%
Phase 2 Centroid Thermocouples ≥85 °C	99	%
Phase 2 Centroid Thermocouples ≥100 °C	97	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday, 16 January, 2015 through Friday, 23 January 2015, with temperatures updated through Sunday, 25 January 2015.

Table 1 provides a summary of the project operational status as of Friday, 23 January 2015.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	01/23/15	
Last Temperature Data Update	01/25/15	
Days of Operation (Total)	229	days
Days of Phase 1 Operation	158	days
Days of Phase 2 Operation	120	days
Total Design Energy Usage (ISTD and treatment system)	15,795,000	kWh
Total Energy Added (ISTD)	14,862,100	kWh
Used Electrical Energy vs. Estimate	94.1	%
Total Mass Removal	427,200	lbs
Average Power Input Last 24 Hours	2,670	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,842	scfm
Average Condensate Production Rate Last 24 Hours	6.9	gpm

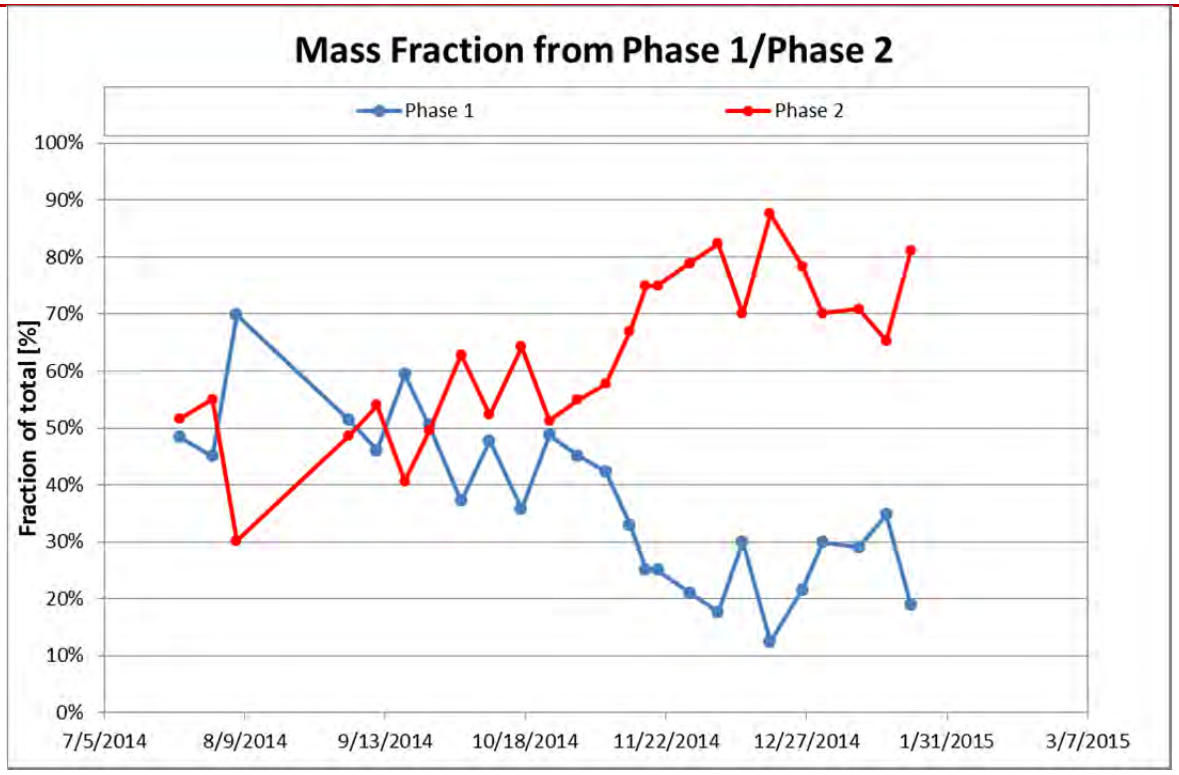
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Phase 2 remains online and at full power. Phase 2 has operated for 120 days. The current average wellfield temperature for Phase 2 is 103°C. Phase 1 operated for a total of 158 days, which represents days where heaters operated at or above 70% *and* the collection date of the last confirmation soil sample (per contract definition). All three temperature milestones have been achieved for both Phase 1 and 2. Please note that the majority of the Phase 1 temperature monitoring system was demobilized on January 8, 2015. Therefore Phase 1 temperatures are not reported.

As of 1/10/15, the oxidizer was taken offline. Vapor treatment is through the vapor carbon vessels. Estimated mass removed through 01/09/15 (oxidizer online) was reported using the flammability analyzer data, laboratory data for chlorinated compounds that were assumed not to be detected by the flammability analyzer, and accumulated LNAPL. Following the oxidizer being offline (01/10/15), estimated mass removed is estimated using the analytical laboratory data results, corrected with daily PID readings, plus the accumulated LNAPL. These results yield a total mass removed of 427,200 lbs as of 01/23/15. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 01/22/15. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.19:0.81. During the 01/22/15 manifold data collection effort, flows were estimated based on the measurement collected at the blower as the wellfield flows were too low to be accurately recorded/measured on the handheld meter. These ratios were then applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase and leg. These data are included in Tables 2 and 3. Mass fraction data over time is presented below.

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Table 2. PID Readings Collected from Manifold Legs

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14	12/31/14	1/9/15	1/16/15	1/22/15
1	SV-1	215	100	745	602	720	604	590	1181	550	516	5	770	712	851	845	790	450	360	236	185	177	170	95	238	128
	SV-2	742	173	1271	887	872	1129	1318	2987	780	770	1610	1004	931	1179	600	934	660	677	482	377	397	436	300	449	810
	SV-3	2588	872	3609	2854	1198	3395	1414	5512	2643	1120	3971	1430	627	99	101	3138	1717	1782	1218	1246	347	1622	725	626	1108
	SV-4	1971	307	2543	1921	1514	2652	1153	4790	1927	3820	3275	2204	2650	3297	1375	2903	1510	2341	1278	979	333	611	585	477	487
	SV-5	1817	279	1642	740	444	1407	1197	4790	759	1411	950	1153	802	326	302	490	402	135	243	120	235	29	202	248	198
	SV-6	4480	332	1926	956	765	4283	2347	11564	3525	9177	5750	4780	4919	5854	1083	2100	601	435	1271	375	277	197	678	664	1141
	SV-8	3222	385	1330	2375	1479	3267	1816	4744	179	172	3815	1881	1850	88	1475	940	401	450	890	150	178	170	110	244	185
	SV-9	3245	142	324	1993	1565	2995	1777	11950	2762	4967	3801	2121	2863	3227	1265	801	1209	1040	1480	390	350	340	445	445	365
	SV-10	1896	131	2148	1096	1111	2459	1517	4382	1933	1745	3384	2841	1318	4121	1494	1982	1302	1221	3215	500	381	420	400	371	269
	SV-11	1016	666	1712	1979	2145	1988	930	2534	1393	2687	1950	1469	1380	596	596	1360	750	641	270	399	332	354	315	495	271
	SV-12	80	53	158	139	104	815	1427	3234	682	1102	1090	2100	512	563	206	413	440	426	1413	545	569	490	465	201	74
	SV-13	417	211	736	145	170	1452	1476	4291	1109	375	370	985	380	295	315	1210	210	131	432	143	473	445	365	315	139
	SV-14	632	452	1526	2636	1450	777	1610	3411	1917	4668	4274	4150	5565	8416	1107	1053	630	500	1288	300	468	570	493	422	352
	SV-15	3440	1072	1153	2000	915	2150	2054	608	3265	4890	4801	5780	5000	618	654	1623	730	660	1007	115	490	600	705	872	627
2 (and between divider line)	SV-7	3843	366	1751	1210	1482	4307	1835	3337	3672	9379	7350	5812	7910	553	3115	6391	2860	2977	2810	1323	554	531	500	514	483
	SV-16	3113	885	233	1911	1703	2823	2216	6230	3165	6888	4994	3841	6029	11	2340	6276	3118	3307	7931	1957	1502	1908	1765	2144	3610
	SV-17	3715	429	306	2928	1824	2801	1837	8933	1927	2713	2954	3313	5408	389	1670	10903	1983	1335	409	800	1133	730	116	718	1223
	SV-18	1760	862	1203	2034	1634	2388	2446	15000	3554	5030	2815	2465	5632	13871	3377	4768	3650	5071	3361	5491	2057	2012	2423	1553	5546
	SV-19	2258	350	2067	1971	2005	1818	2038	10522	2191	6417	4561	4398	3067	2693	1075	875	925	530	528	315	552	130	515	438	504
	SV-20	1990	796	1545	2344	1610	2268	2158	15000	2853	2305	2059	343	4053	8642	3534	5500	2725	12650	6352	6520	2084	2492	2750	1673	3511
	SV-21	1964	487	2295	2077	1855	3458	1755	8561	2756	8053	4661	2119	4298	2631	2264	6000	4186	4440	2002	2870	937	958	808	634	1346
	SV-22	2670	980	1606	2222	1892	2466	2448	14750	3344	5023	3578	2236	3582	55	3460	4765	3450	11187	4509	5516	2803	2565	2720	1598	3970
	SV-23	2515	671	3248	3158	2165	3233	1532	8102	2973	7684	4880	3933	2707	4560	4005	5367	2993	2598	1326	1154	805	883	517	948	3832
	SV-24	1412	638	1504	2406	1567	1669	1949	11882	1999	6130	4554	5005	6223	8864	2843	4555	2946	4280	3267	5764	2614	2195	2350	1446	3030
	SV-25	688	220	1261	1035	1059	1350	2418	5725	1542	2247	1873	1743	1925	991	570	1301	740	773	500	445	400	547	410	457	494
	SV-26	90	185	350	580	573	638	1133	1119	790	3559	4305	4752	4633	1933	865	2742	710	520	642	1710	548	550	420	677	298
	SV-27	192	151	718	944	789	1117	1518	3922	1256	1485	1650	947	840	1040	313	769	745	620	318	320	277	350	210	289	309
	SV-28	15	87	77	151	178	310	211	730	335	1250	3624	5592	5447	4380	1438	6351	1440	1100	1588	4527	1575	886	610	759	181
	SV-29	8	66	55	20	52	130	1	15	35	21	352	255	83	41	1375	43	80	41	52	117	70	61	20	318	62
Breakdown of Wellfield VOC Flux by Phase																										
Phase 1:		48%	45%	70%	51%	46%	59%	51%	37%	48%	36%	49%	45%	42%	33%	25%	25%	21%	18%	30%	12%	22%	30%	29%	35%	19%
Phase 2:		52%	55%	30%	49%	54%	41%	50%	63%	52%	64%	51%	55%	58%	67%	75%	75%	79%	82%	70%	88%	78%	70%	71%	65%	81%

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Table 3. Estimated Mass Loading by Manifold Leg/Phase

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14	12/31/14	1/9/15	1/16/15	1/22/15
1	SV-1	0.5%	0.7%	3.5%	1.5%	3.0%	1.6%	1.7%	1.0%	1.1%	0.7%	0.0%	1.3%	0.8%	1.2%	2.2%	1.2%	1.0%	0.6%	0.6%	0.4%	0.9%	0.7%	0.6%	1.2%	0.3%
	SV-2	2.0%	1.3%	4.3%	2.6%	3.6%	3.0%	4.7%	2.5%	1.9%	0.8%	2.4%	1.8%	1.2%	1.7%	1.6%	1.3%	1.4%	1.3%	1.3%	1.0%	1.9%	2.2%	1.7%	2.8%	2.7%
	SV-3	3.5%	7.5%	16.2%	7.4%	5.0%	8.9%	5.0%	4.5%	7.1%	1.3%	5.7%	2.6%	0.7%	0.2%	0.3%	5.1%	4.2%	3.3%	3.2%	3.5%	1.7%	9.4%	4.5%	5.0%	4.7%
	SV-4	3.3%	2.5%	8.5%	5.7%	5.5%	5.9%	3.3%	3.5%	4.8%	3.9%	4.5%	3.2%	3.1%	3.8%	3.0%	4.4%	3.5%	4.5%	3.0%	2.3%	1.5%	1.8%	3.4%	3.3%	1.8%
	SV-5	2.5%	2.9%	9.6%	2.5%	1.6%	3.1%	3.2%	3.2%	2.1%	1.9%	1.4%	1.5%	1.0%	0.5%	0.9%	0.7%	1.0%	0.3%	0.6%	0.3%	1.2%	0.2%	1.2%	1.8%	0.8%
	SV-6	2.5%	1.4%	3.8%	1.6%	1.2%	4.1%	3.0%	3.4%	3.7%	4.5%	3.5%	3.0%	2.4%	3.1%	1.1%	1.6%	0.6%	0.3%	1.4%	0.3%	0.5%	0.4%	1.4%	1.6%	1.5%
	SV-8	8.7%	2.9%	4.4%	7.1%	6.3%	8.7%	6.8%	3.1%	0.4%	0.1%	5.9%	3.5%	4.4%	0.1%	4.2%	1.6%	1.0%	0.8%	2.6%	0.3%	0.9%	1.0%	0.6%	1.1%	0.4%
	SV-9	9.0%	0.9%	1.3%	6.0%	5.8%	8.4%	6.4%	7.3%	6.9%	6.6%	6.2%	3.9%	6.8%	4.8%	3.6%	1.0%	2.5%	2.0%	3.7%	1.1%	1.9%	2.0%	2.7%	3.8%	1.7%
	SV-10	2.4%	0.5%	3.0%	1.3%	1.7%	2.1%	1.8%	1.5%	2.2%	0.9%	2.0%	2.1%	0.7%	2.3%	1.6%	1.4%	1.1%	1.0%	3.6%	0.4%	0.8%	0.9%	1.0%	0.7%	0.3%
	SV-11	1.3%	2.3%	3.4%	2.2%	3.4%	1.9%	1.0%	0.9%	1.5%	1.4%	1.2%	1.0%	0.6%	0.3%	0.5%	1.2%	0.7%	0.5%	0.3%	0.3%	0.7%	0.8%	0.8%	0.8%	0.2%
	SV-12	0.3%	0.5%	0.6%	0.4%	0.5%	2.3%	4.8%	2.4%	1.6%	1.4%	1.8%	2.7%	1.2%	1.0%	0.7%	0.7%	1.0%	0.8%	3.7%	1.3%	3.1%	3.0%	3.1%	1.7%	0.3%
	SV-13	0.6%	0.9%	1.6%	0.2%	0.3%	1.4%	2.0%	1.3%	1.2%	0.2%	0.2%	0.7%	0.2%	0.2%	0.4%	0.8%	0.2%	0.1%	0.4%	0.1%	1.0%	0.9%	1.0%	0.9%	0.2%
	SV-14	2.3%	6.1%	5.8%	7.5%	5.5%	2.2%	1.1%	2.0%	4.5%	6.3%	6.9%	7.4%	12.7%	13.1%	3.3%	1.8%	1.5%	0.9%	3.3%	0.7%	2.7%	3.5%	3.2%	3.3%	1.5%
	SV-15	9.5%	14.7%	3.9%	5.3%	2.8%	5.6%	5.7%	0.5%	8.8%	5.8%	6.9%	10.4%	6.4%	0.9%	1.8%	2.3%	1.5%	1.3%	2.3%	0.3%	2.8%	3.1%	3.9%	6.7%	2.6%
2 (and between divider line)	SV-7	2.2%	1.5%	1.9%	1.5%	2.9%	4.2%	2.3%	1.1%	3.9%	4.8%	3.8%	4.0%	3.2%	0.3%	3.1%	5.3%	2.5%	2.1%	3.3%	1.3%	1.1%	0.9%	1.2%	1.7%	0.8%
	SV-16	9.5%	7.1%	1.1%	5.7%	6.2%	6.6%	6.9%	5.2%	8.0%	8.7%	6.9%	6.9%	8.0%	0.0%	6.8%	10.3%	10.5%	6.6%	18.3%	5.0%	8.1%	10.5%	11.1%	14.4%	12.9%
	SV-17	2.9%	0.1%	-3.3%	2.1%	1.6%	-1.5%	-0.6%	-0.5%	-1.6%	-3.1%	-2.0%	-1.3%	0.0%	-2.8%	0.7%	6.0%	1.3%	0.7%	-1.0%	0.5%	1.6%	1.2%	-1.1%	0.5%	0.5%
	SV-18	5.5%	11.4%	4.9%	6.8%	5.6%	6.7%	7.8%	13.0%	9.5%	6.6%	3.6%	4.3%	7.1%	22.8%	10.5%	8.2%	14.5%	9.1%	7.9%	13.9%	10.4%	10.8%	12.9%	10.1%	19.2%
	SV-19	3.6%	0.3%	-2.0%	5.5%	6.3%	0.6%	2.8%	3.0%	3.2%	6.5%	6.4%	4.3%	3.0%	3.4%	2.0%	0.7%	1.2%	0.7%	0.9%	0.6%	1.7%	0.6%	0.2%	0.5%	0.7%
	SV-20	7.2%	12.0%	7.2%	6.2%	6.3%	5.7%	5.5%	11.9%	6.1%	2.8%	2.9%	0.6%	5.0%	14.1%	11.0%	8.9%	8.7%	23.9%	14.6%	16.8%	10.7%	13.4%	16.3%	9.3%	10.4%
	SV-21	2.6%	2.0%	3.8%	0.9%	2.4%	3.2%	2.9%	3.6%	2.5%	5.3%	1.6%	-0.4%	2.2%	0.2%	3.5%	6.3%	5.8%	4.3%	1.4%	4.8%	3.0%	3.5%	1.1%	1.6%	3.8%
	SV-22	8.5%	9.3%	8.3%	5.9%	7.6%	6.7%	7.0%	12.2%	8.5%	6.7%	4.8%	3.9%	4.4%	0.1%	9.9%	5.4%	11.5%	19.8%	11.5%	13.6%	14.3%	14.0%	16.1%	7.8%	10.4%
	SV-23	5.2%	-2.9%	-2.4%	1.9%	4.4%	-0.3%	0.5%	0.3%	1.0%	8.8%	1.3%	4.6%	2.9%	6.2%	10.3%	3.2%	3.4%	2.6%	-0.2%	-0.2%	2.4%	-6.0%	-2.0%	2.6%	11.6%
	SV-24	4.0%	8.5%	9.4%	7.2%	6.2%	4.4%	5.6%	10.3%	4.7%	8.0%	6.8%	7.4%	7.4%	13.6%	8.3%	6.5%	11.3%	8.5%	7.7%	14.7%	13.7%	11.6%	8.4%	8.9%	10.0%
	SV-25	-0.1%	1.1%	0.0%	0.7%	0.8%	0.1%	1.5%	0.1%	1.4%	2.1%	0.2%	1.3%	1.2%	-0.2%	0.0%	0.5%	0.3%	0.4%	0.1%	0.2%	0.0%	0.4%	0.8%	0.2%	-1.0%
	SV-26	0.3%	2.2%	1.9%	1.9%	2.4%	1.6%	3.4%	1.0%	1.6%	4.3%	6.8%	8.1%	5.9%	3.2%	2.7%	3.9%	2.8%	1.1%	1.7%	4.0%	2.6%	3.2%	2.2%	2.8%	0.7%
	SV-27	0.1%	0.7%	-0.5%	1.7%	0.4%	1.4%	3.2%	1.2%	2.4%	1.1%	2.0%	0.4%	0.2%	0.0%	-1.5%	0.1%	0.7%	0.5%	0.2%	0.5%	0.5%	1.0%	0.8%	0.6%	0.7%
	SV-28	0.0%	1.0%	0.5%	0.6%	0.7%	0.8%	0.6%	0.5%	0.9%	1.7%	5.5%	10.1%	6.9%	6.1%	3.8%	9.5%	4.2%	2.0%	3.4%	11.6%	7.9%	4.8%	2.7%	3.2%	0.4%
	SV-29	0.0%	0.6%	0.4%	0.1%	0.2%	0.4%	0.0%	0.0%	0.1%	0.0%	0.6%	0.5%	0.2%	0.1%	3.7%	0.1%	0.3%	0.1%	0.1%	0.3%	0.4%	0.3%	0.1%	1.0%	0.1%
Total:		100%	100%	101%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note: Six out of the 23 wellfield branch lines service both Phase 1 and Phase 2; therfore, a correction has been made to subtract the shared mass sometimes resulting in a negative value. This value indicates that the mass contribution from the Phase 2 area was limited in that particular sample round. This is a result of the accuracy of the flow and PID data measurements collected.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 2 only, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* As of 01/08/15, Phase 1 is only partially operational; therefore, temperature data for Phase 1 is no longer included.

Phase 2 heating began on 7/16/14 but was stopped on 8/14/14, as a result of the oxidizer shutdown, and reenergized on 09/30/14. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	1/25/15	
Phase 1 Entire TTZ Average Temperature	N/A	°C
Phase 2 Entire TTZ Average Temperature	103	°C
Phase 1 Centroid Average Temperature	N/A	°C
Phase 2 Centroid Average Temperature	103	°C

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N/A

Figure 1a. Phase 1 Observed vs. Modeled Temperatures

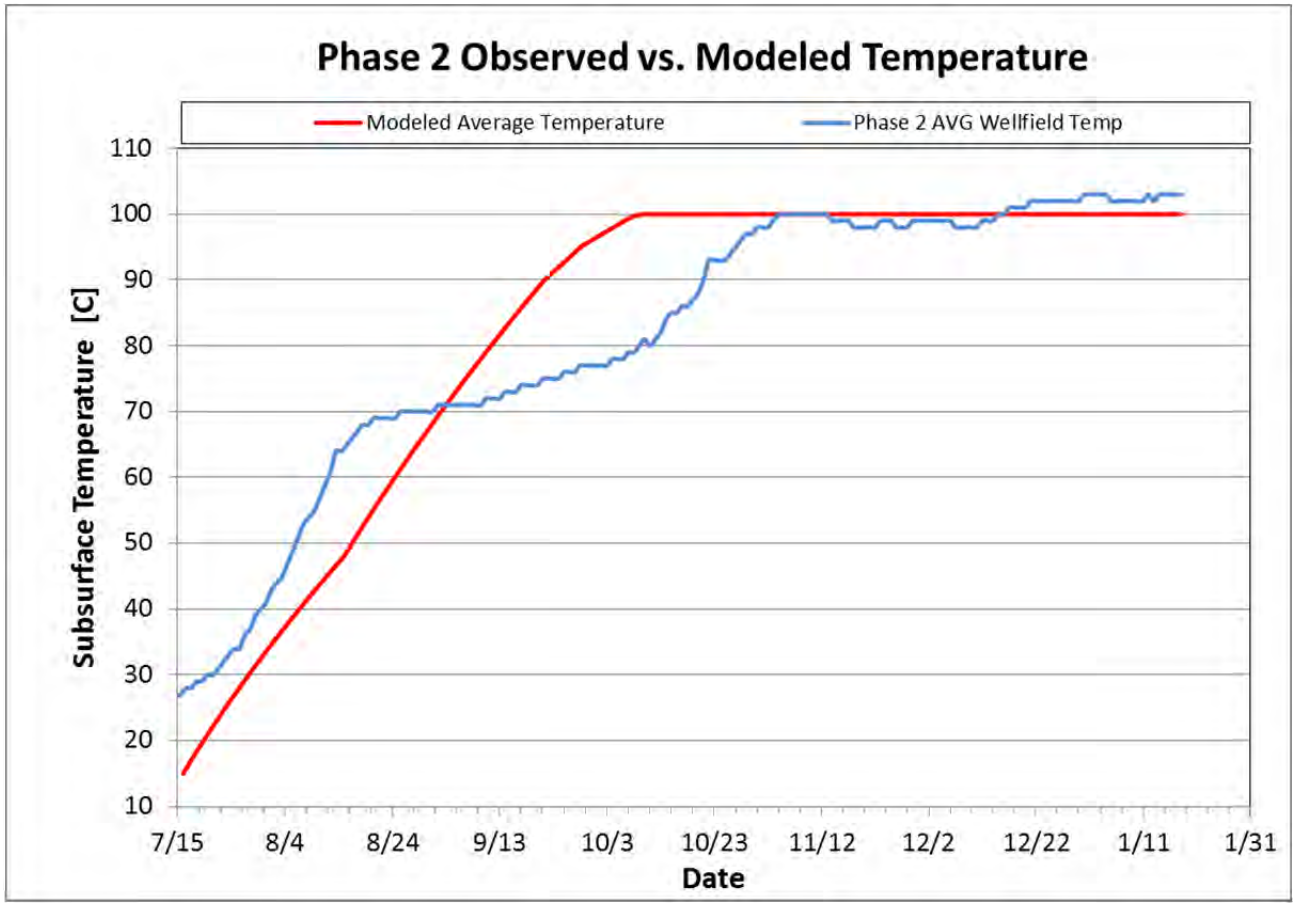


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was increased on 8/30/14. On 1/15/15 the vapor extraction rate was decreased again.

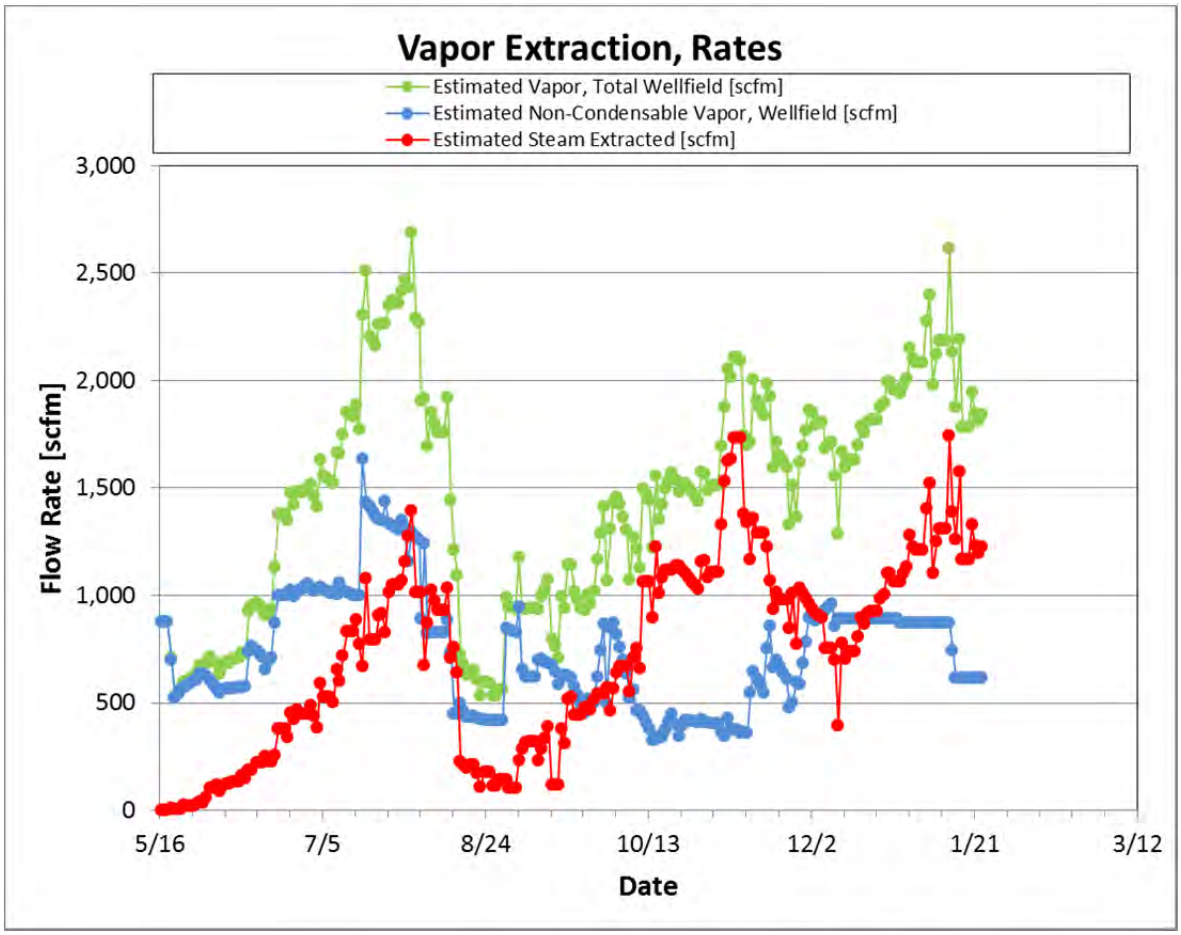


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

Please note that the flammability analyzer is no longer online (corresponds with taking the oxidizer offline).

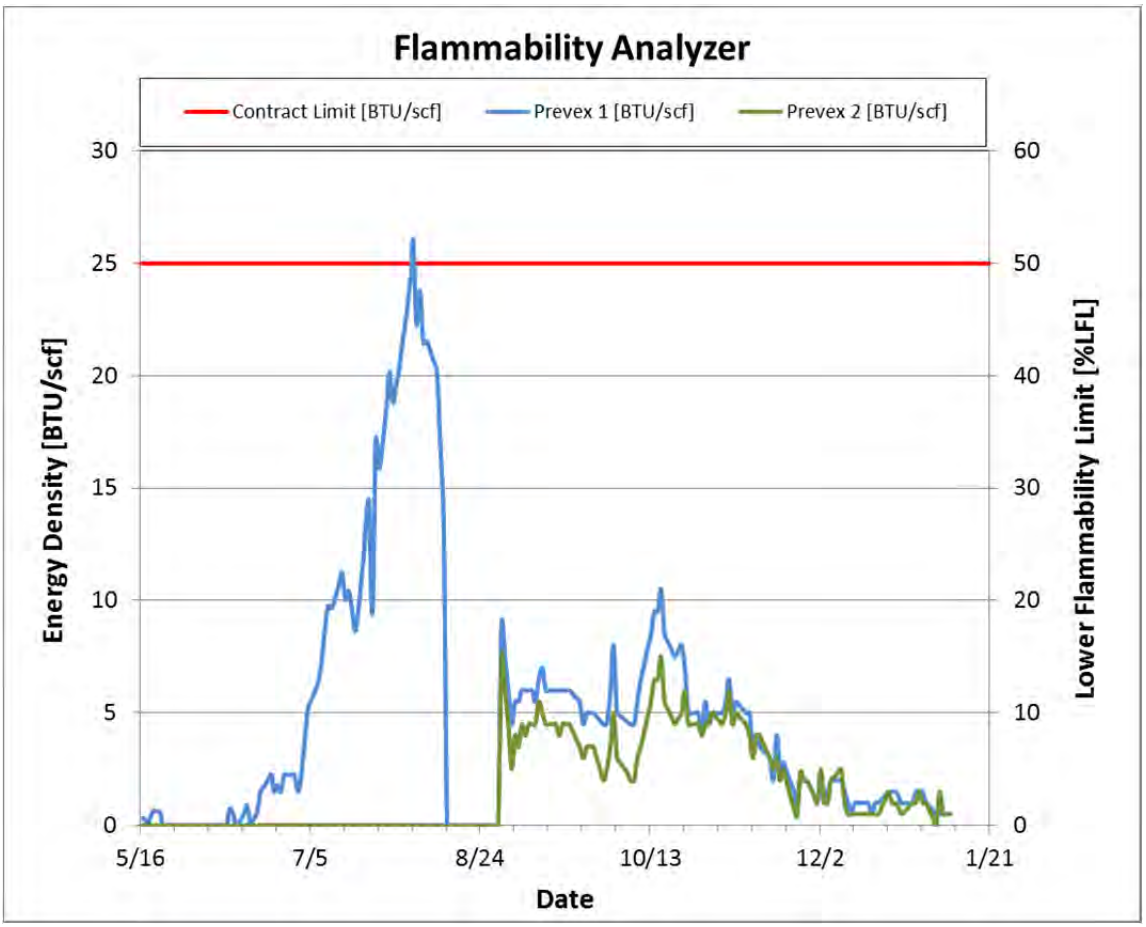


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed through 01/09/15 is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. Mass removal starting 01/10/15 is reported as the total compounds detected in the laboratory data corrected using the PID plus the accumulated LNAPL. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively. Please note that the mass removal rates are shown on a logarithmic scale.

The decrease in mass removed starting on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14, 9/23/14, 9/30/14, 10/7/14, 10/14/14, 10/21/14, 10/30/14, 11/4/14, 11/18/14, 11/25/2014, 12/2/2014, 12/9/2014, 12/16/14, 12/23/14, 12/30/14, 01/06/15 and 01/13/15.

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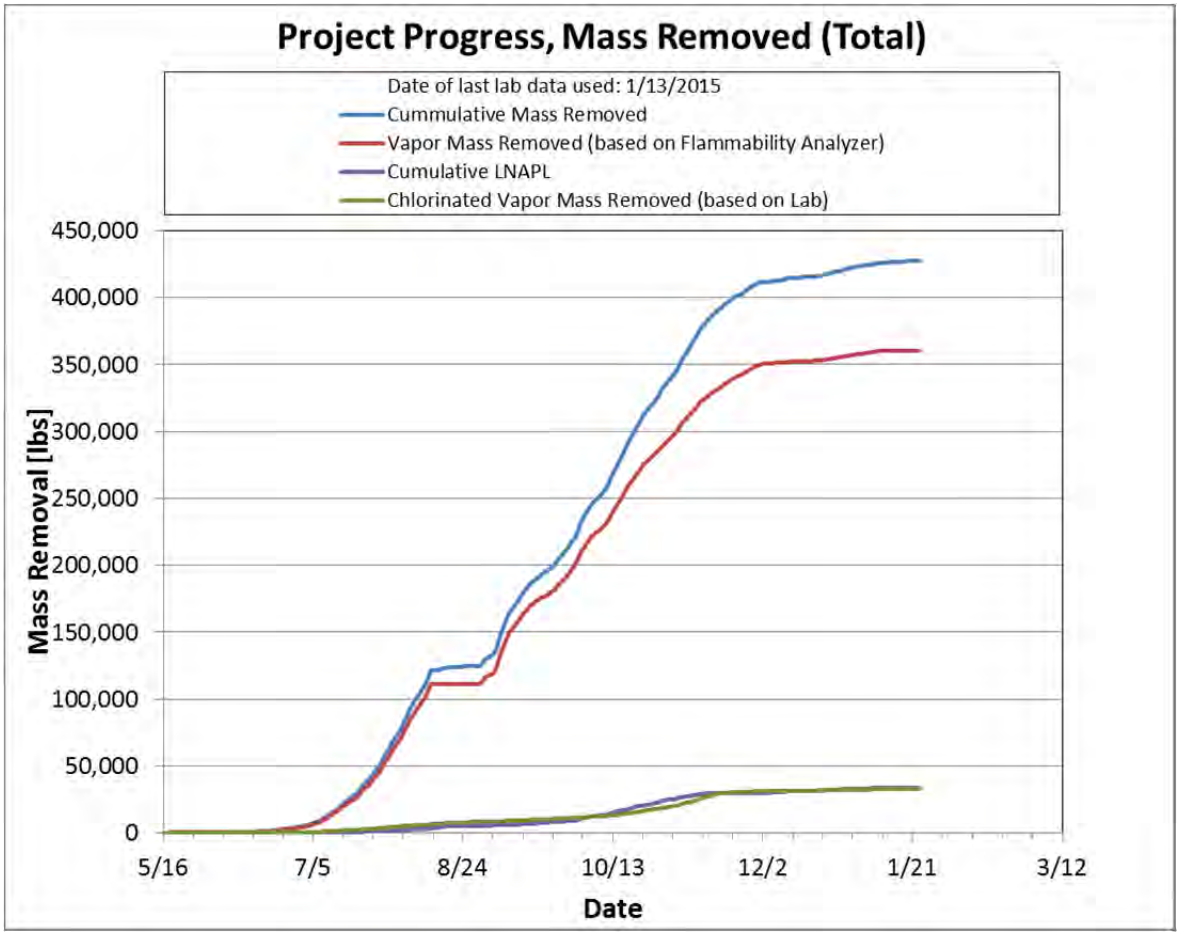


Figure 4a. Project Progress, Mass Removal (Total)

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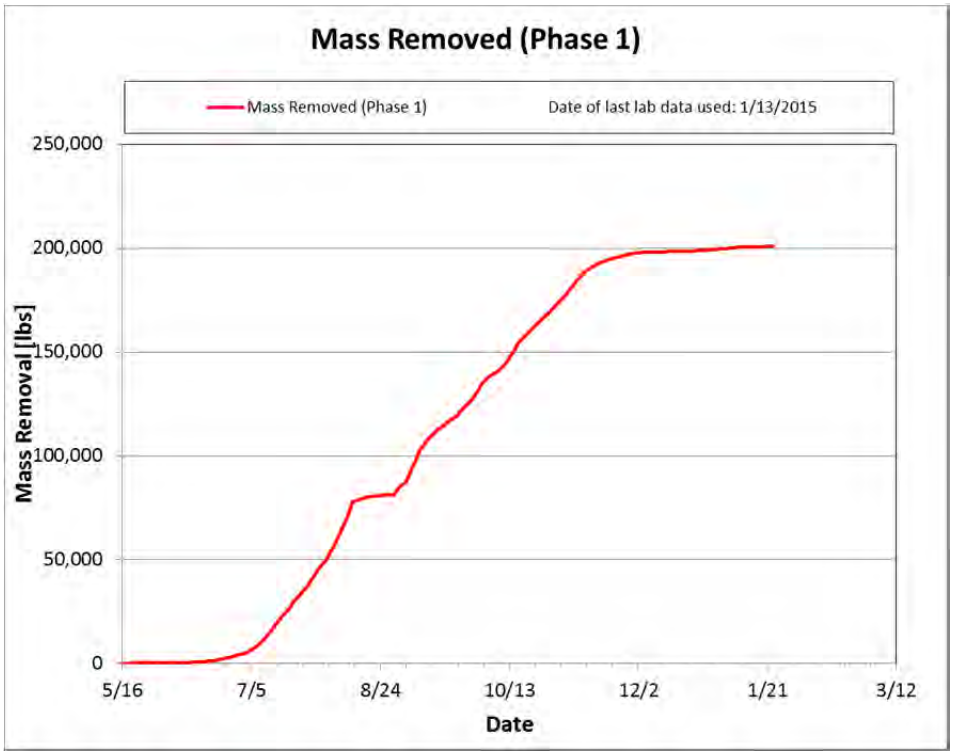


Figure 4b. Project Progress, Mass Removal (Phase 1)

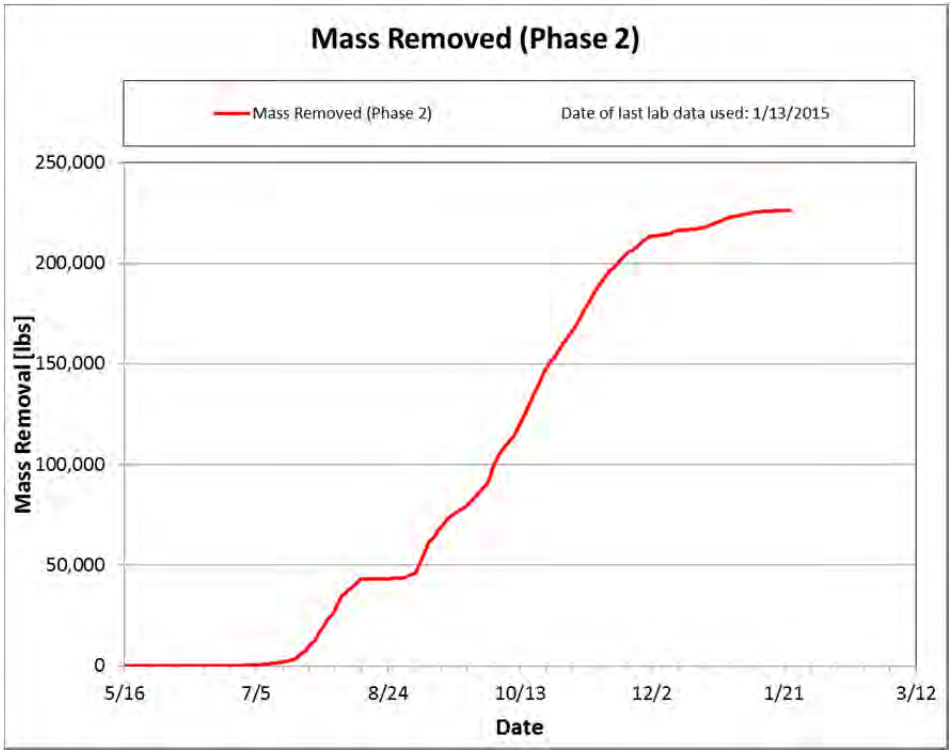


Figure 4c. Project Progress, Mass Removal (Phase 2)

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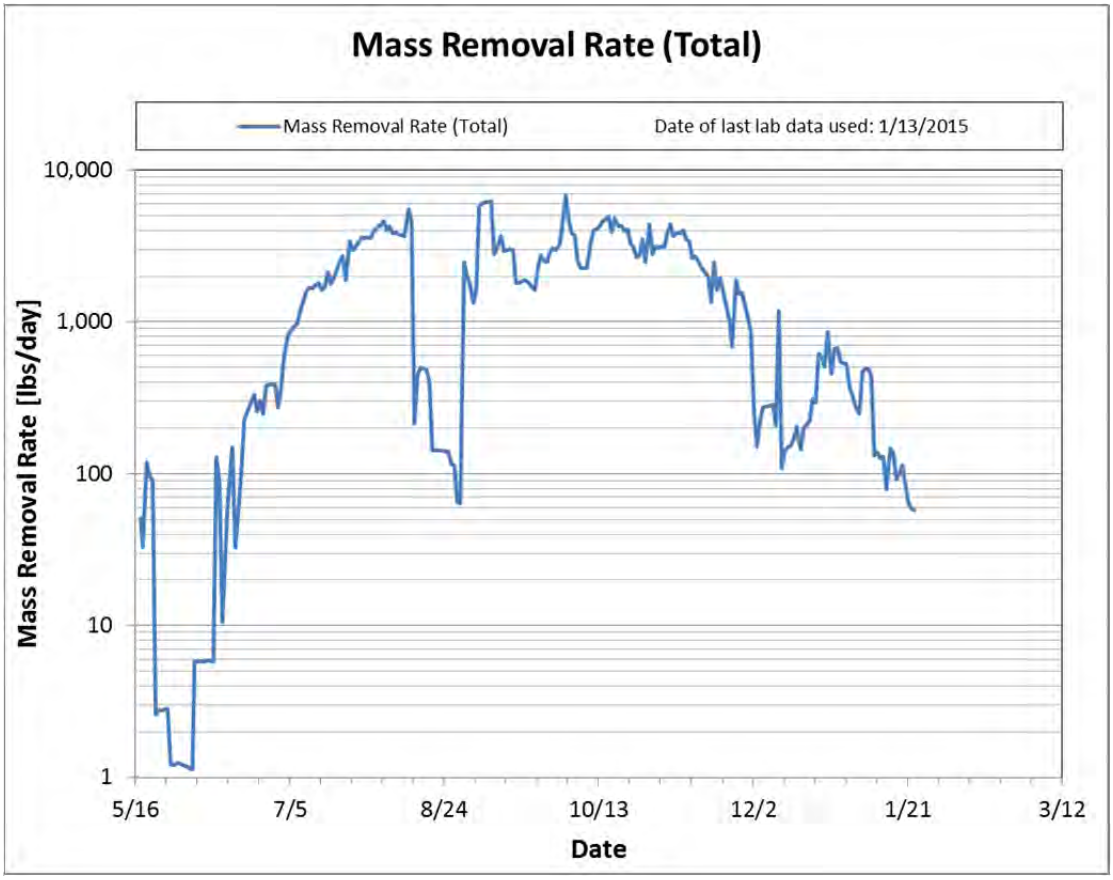


Figure 4d. Mass Removal Rate (Total for Site)

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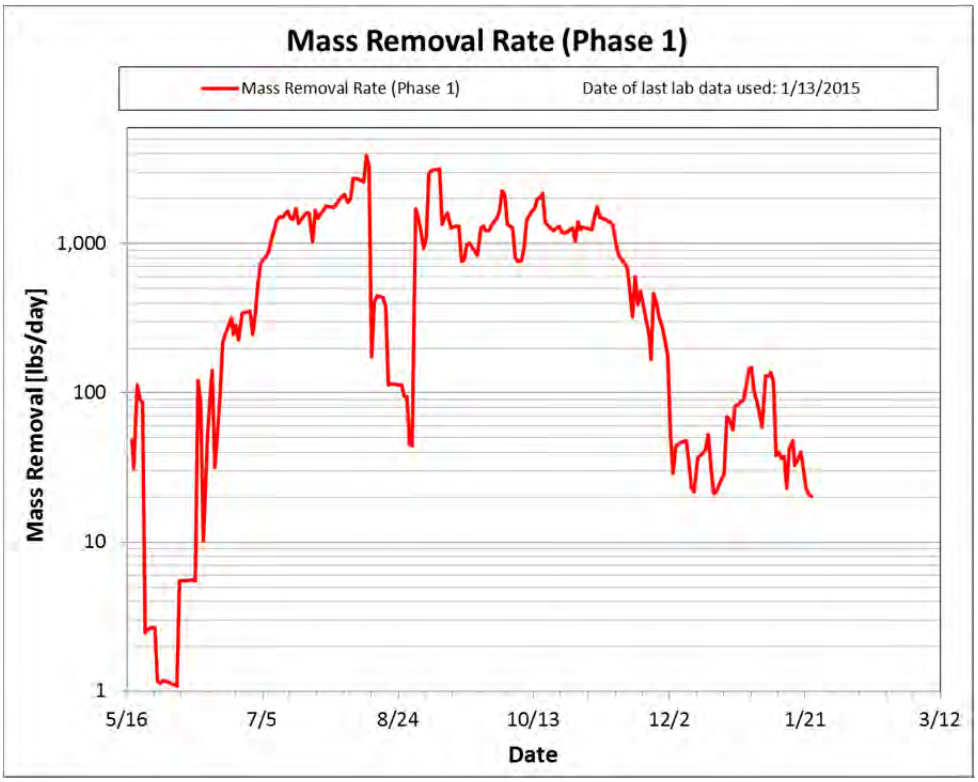


Figure 4e. Mass Removal Rate (Phase 1)

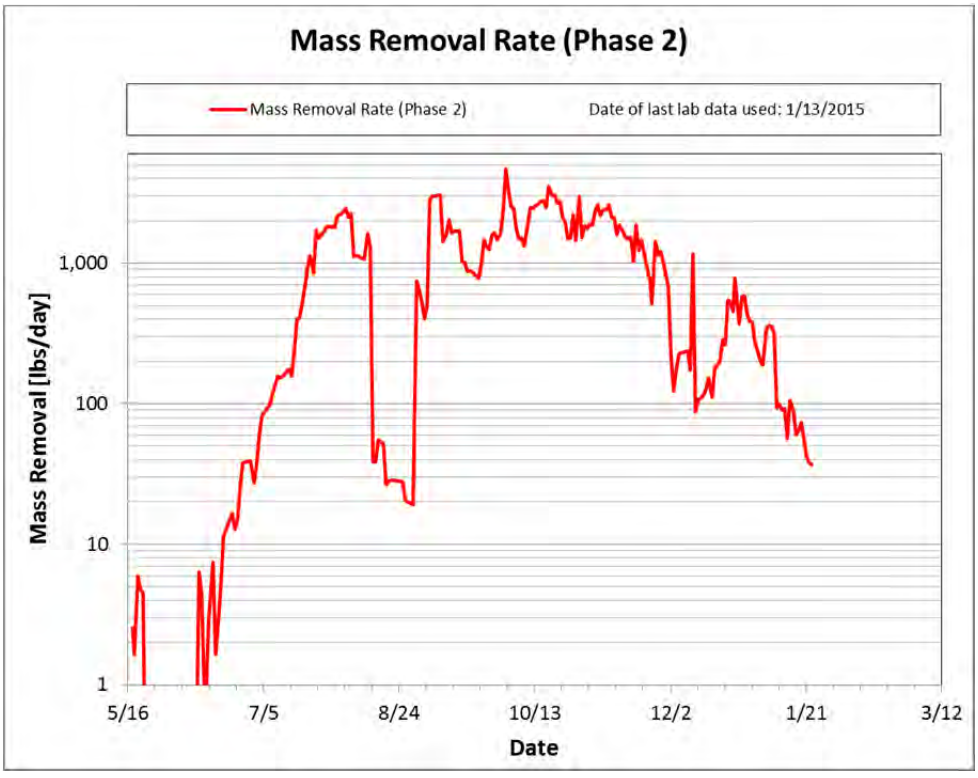


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID and flammability analyzer readings collected at the oxidizer influent over time. It should be noted that PID readings are first collected using an 11.7 eV lamp (determined by site contaminants). If the reading exceeds the limit of the meter (>2000 ppm), the readings are collected using a 10.6 eV lamp. When both meters are used, the maximum value is recorded.

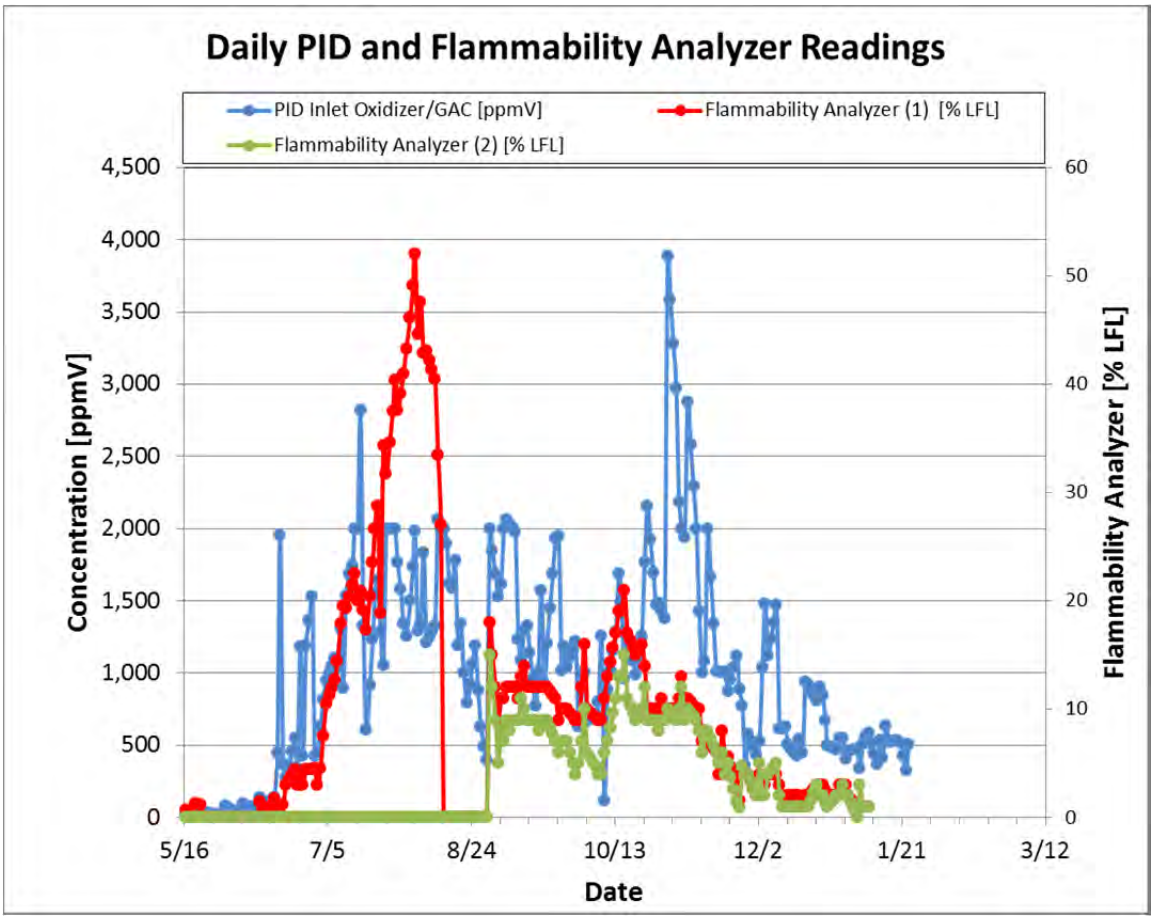


Figure 5. Daily PID and Flammability Analyzer Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13, after the oxidizer shutdown. Decreases in DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-outs.

Influent concentrations collected during the latter half of last week were approximately 300 ppm, with effluent concentrations ranging between 20 to 60 ppm. While the calculated DRE is less than 95%, calculated mass emissions are less than 2 lbs/hr (air permit limit) by approximately 50%.

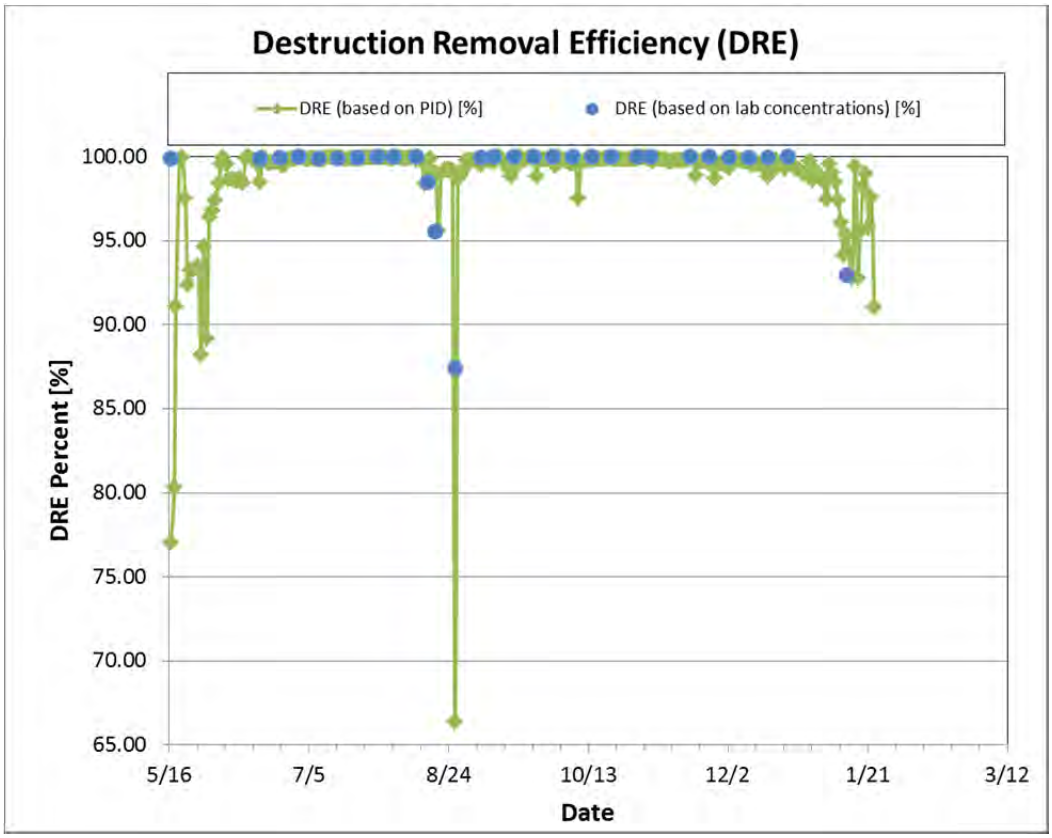


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7. Please note that the graph has been modified to present the estimated modeled energy for the heaters (ISTD) over the original predicted 195 day treatment. This does not take into account contract definitions such as heaters operating at or above 70% energy input. The flatline represents days beyond 195 days.

Please note that the modeled energy usage (12,873,000 kWh) only includes the energy predicted to be added to the subsurface. Therefore, the number should be compared to the cumulative energy added by the ISTD system to the subsurface (red line). The total energy usage (including the treatment system power usage) is predicted to be 15,795,000 kWh as stated in the summary table.

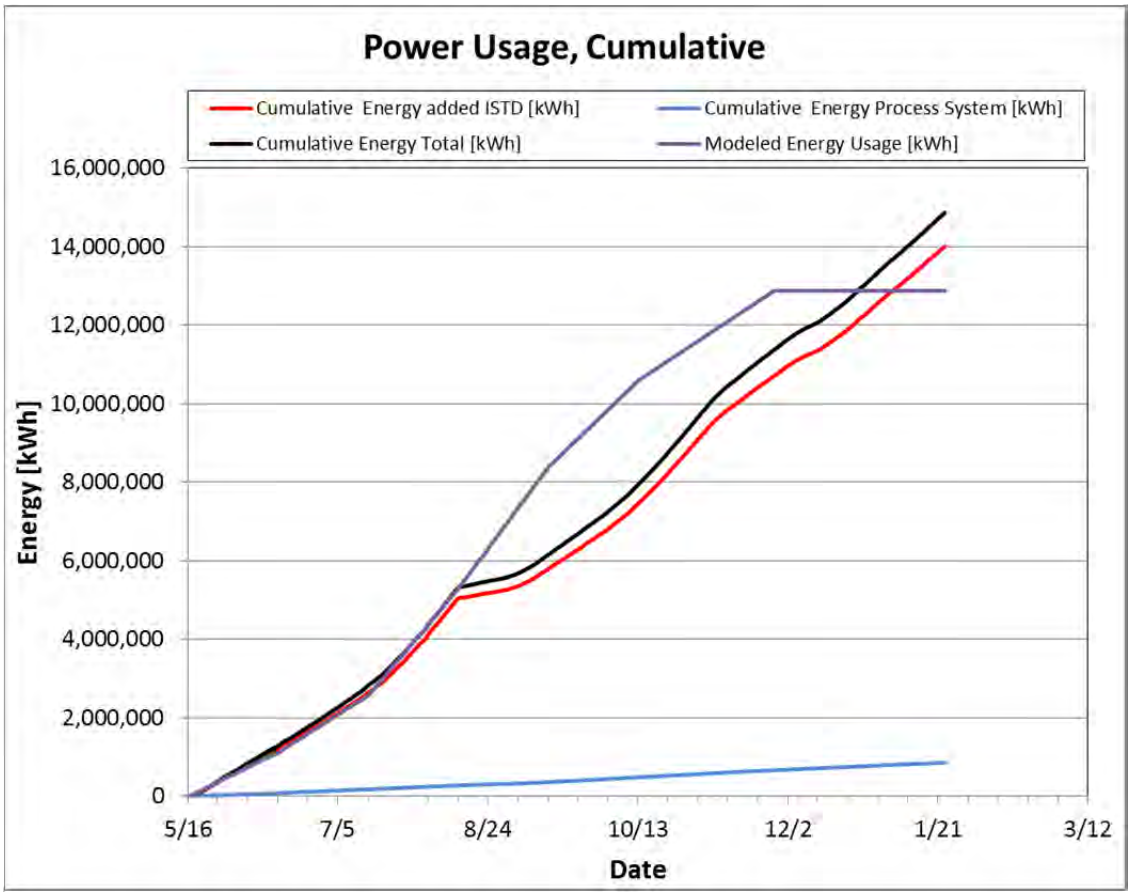


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30/14 and the following days corresponds with ramping of the heaters after placing the oxidizer back online. The decrease observed mid- November is associated with profiling of the heaters in Phase 2 and subsequent adjustments. The increase observed in December corresponds with additional profiling and subsequent adjustments.

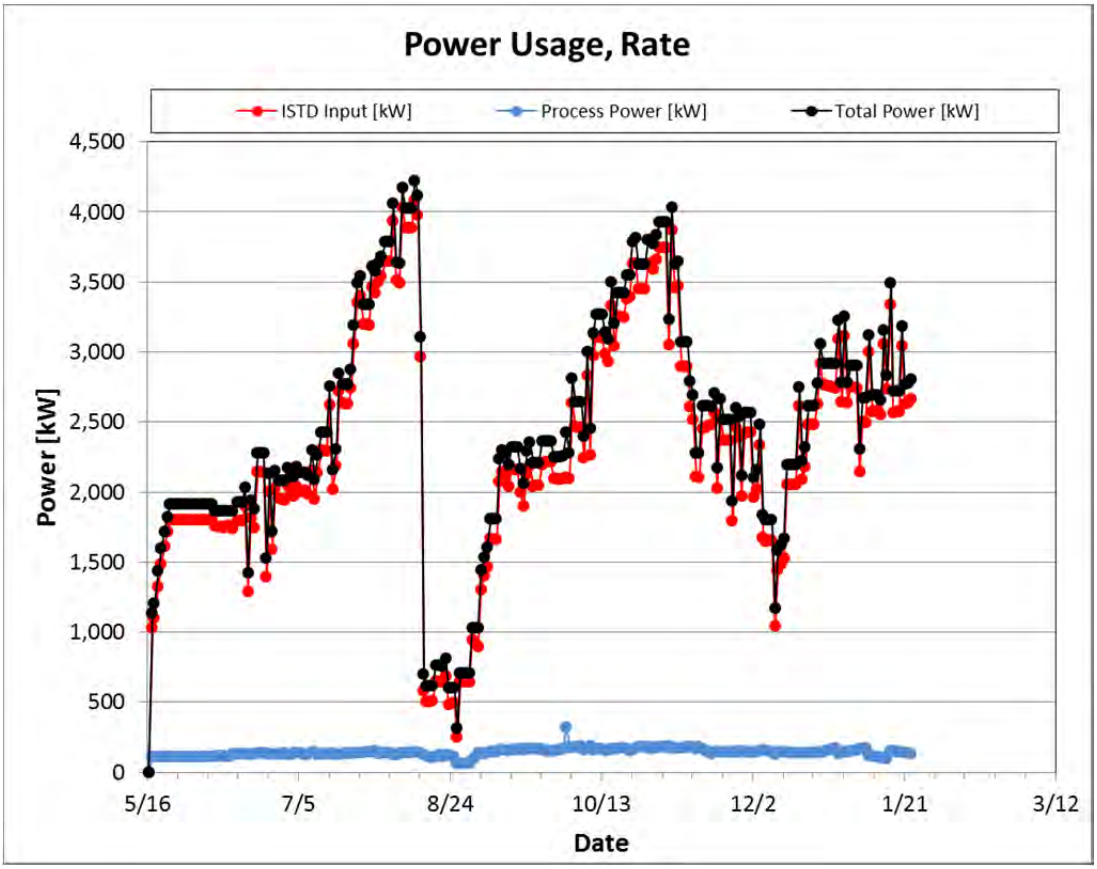


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

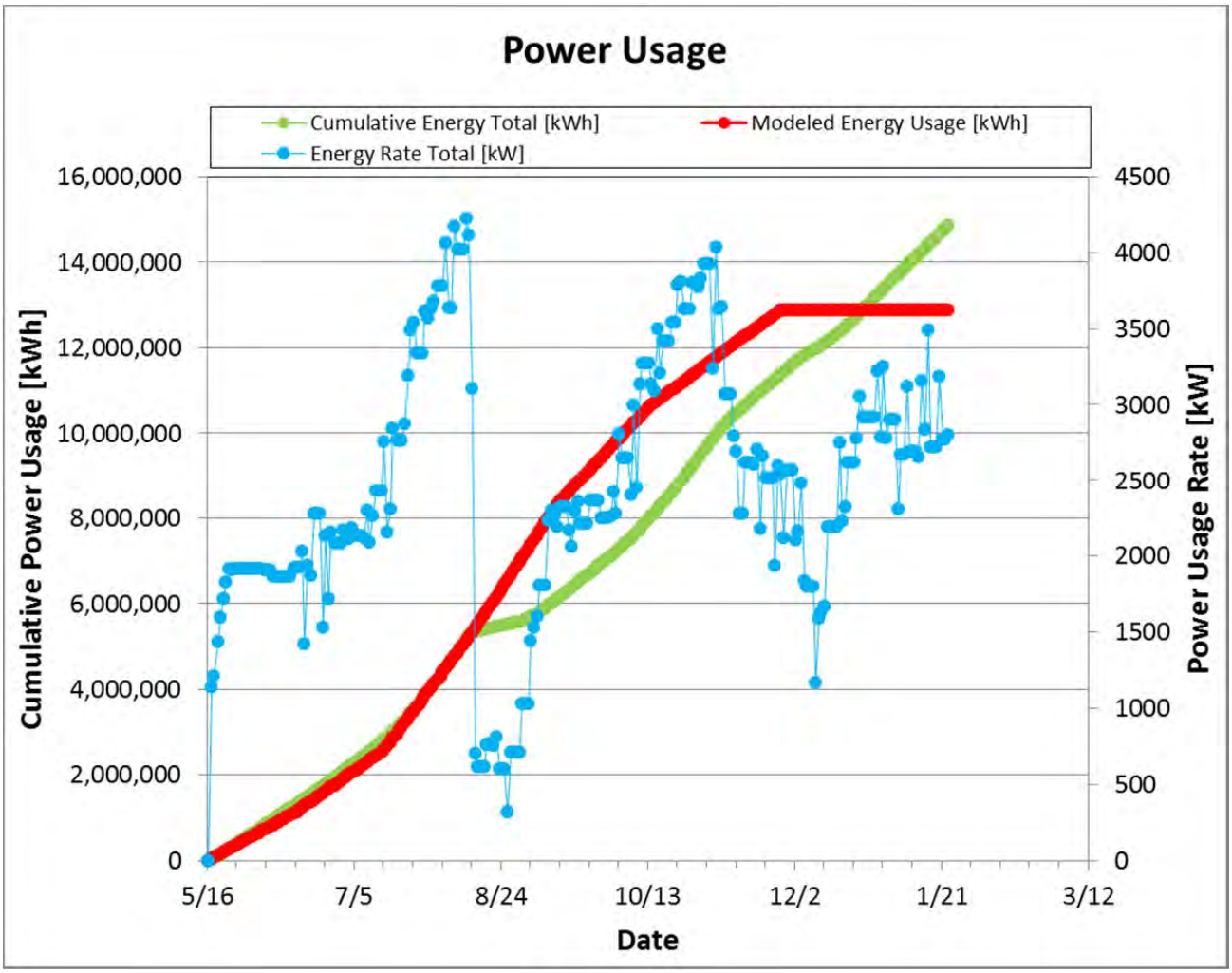


Figure 9. Power Usage

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With the oxidizer offline, natural gas is no longer in demand (as shown below starting on 10 January 2015).

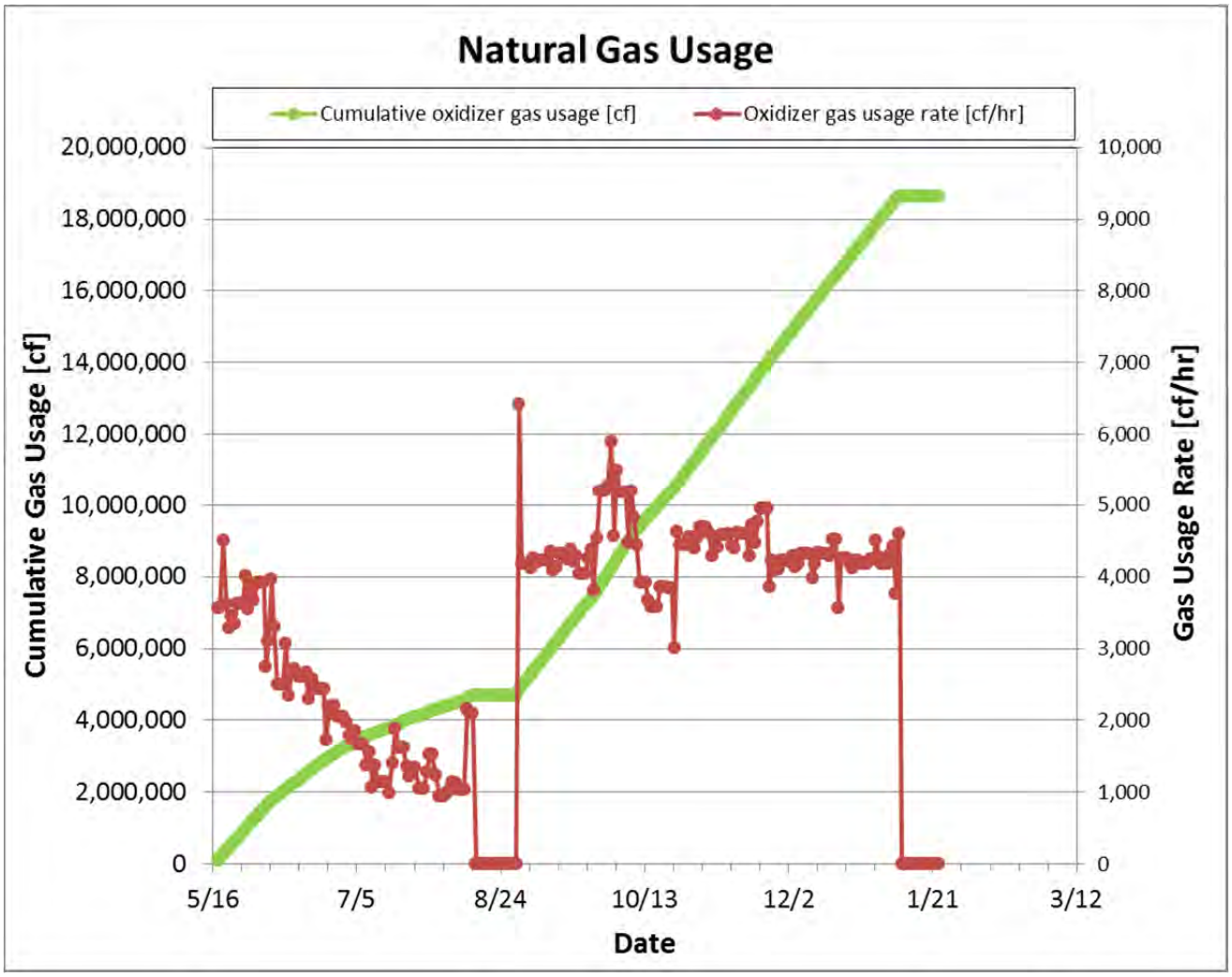


Figure 10. Natural Gas Usage

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With the oxidizer offline, caustic is no longer in demand (as shown below starting on 10 January 2015).

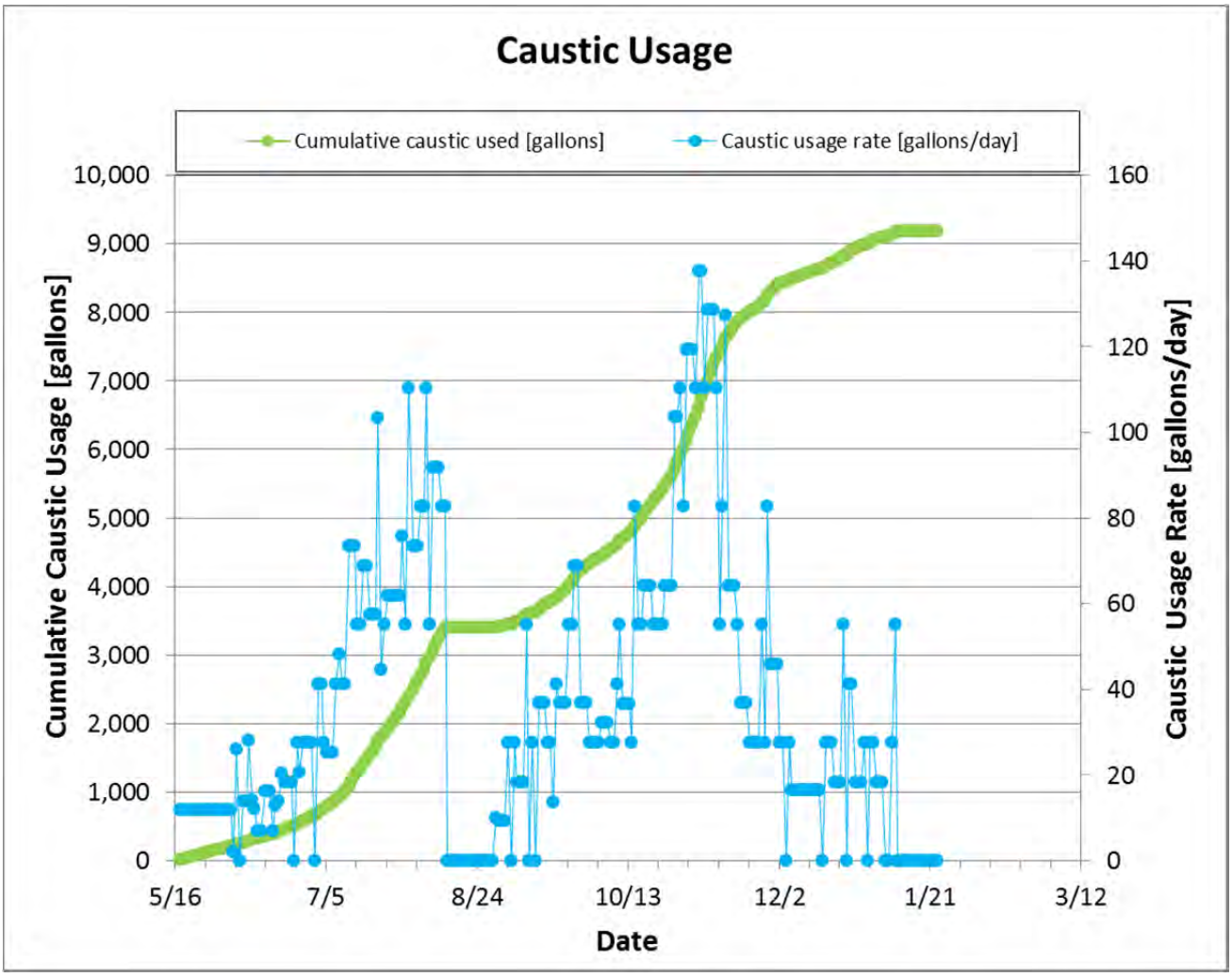


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as: Phase 1 and Phase 2

Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Phase 2 centroids are shown in Figure 12b. As of 12/24/14, we have achieved all three temperature milestones for both Phase 1 and Phase 2.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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N/A

Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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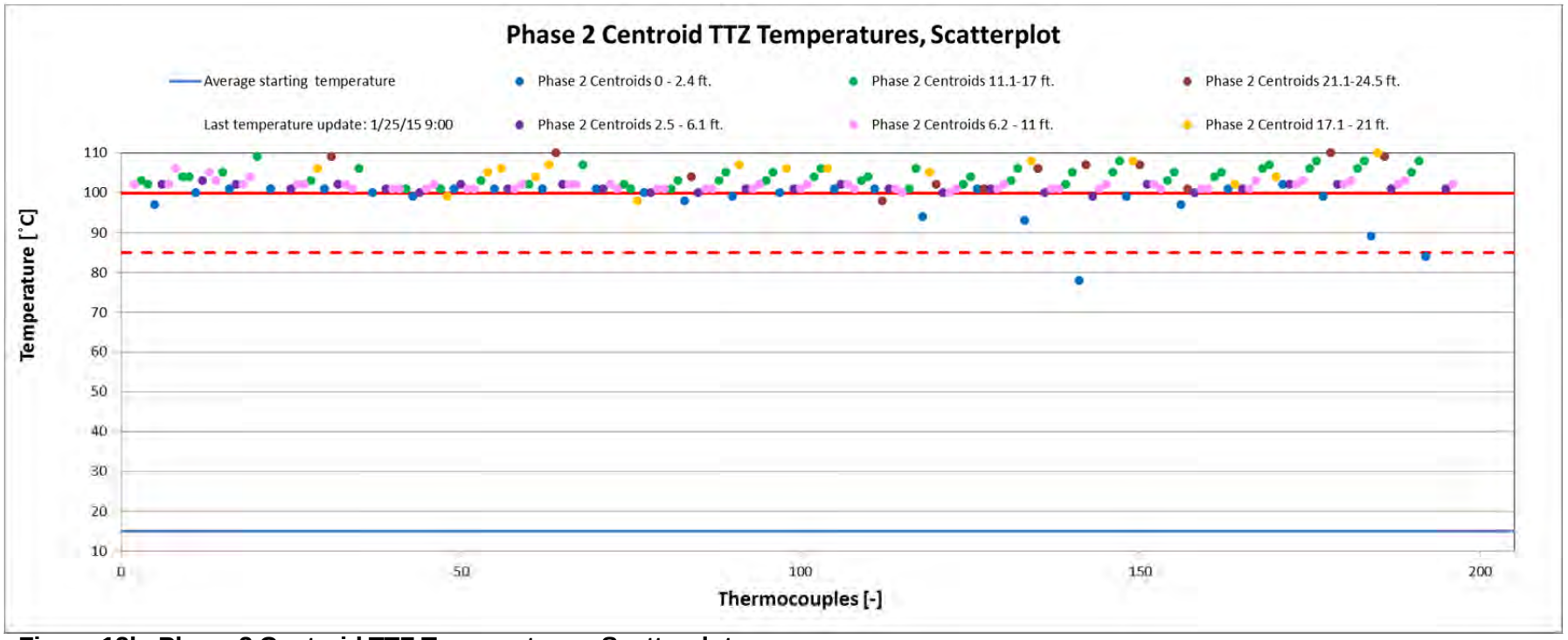


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots

	Value	Unit
Date of Last Update	1/25/15	
*Phase 1 Centroid Thermocouples ≥85 ^{0}C	100	%
*Phase 1 Centroid Thermocouples ≥100 ^{0}C	97	%
Phase 2 Centroid Thermocouples ≥85 ^{0}C	99	%
Phase 2 Centroid Thermocouples ≥100 ^{0}C	97	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday, 23 January, 2015 through Friday, 30 January 2015, with temperatures updated through Sunday, 1 February 2015.

Table 1 provides a summary of the project operational status as of Friday, 30 January 2015.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	01/30/15	
Last Temperature Data Update	02/01/15	
Days of Operation (Total)	236	days
Days of Phase 1 Operation	158	days
Days of Phase 2 Operation	127	days
Total Design Energy Usage (ISTD and treatment system)	15,795,000	kWh
Total Energy Added (ISTD)	15,329,000	kWh
Used Electrical Energy vs. Estimate	97.0	%
Total Mass Removal	427,612	lbs
Average Power Input Last 24 Hours	2,640	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	2,266	scfm
Average Condensate Production Rate Last 24 Hours	8.9	gpm

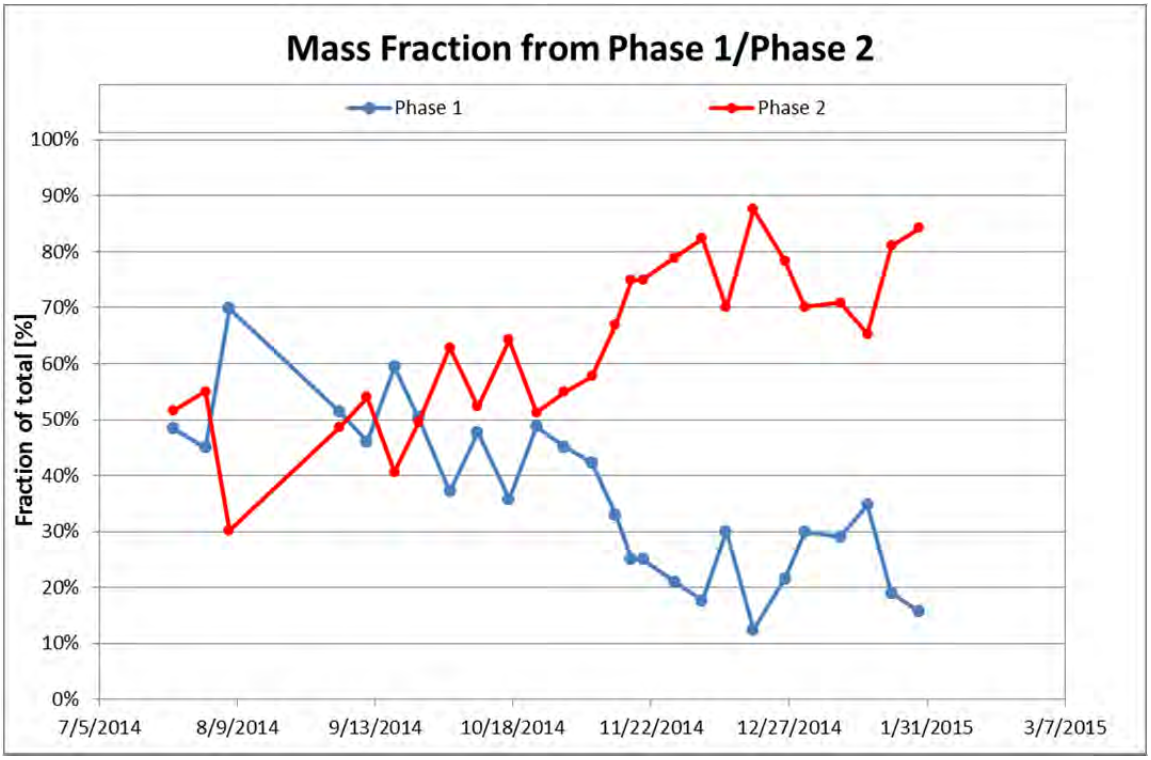
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Phase 2 remains online and at full power. Phase 2 has operated for 127 days. The current average wellfield temperature for Phase 2 is 102°C. Phase 1 operated for a total of 158 days, which represents days where heaters operated at or above 70% *and* the collection date of the last confirmation soil sample (per contract definition). All three temperature milestones have been achieved for both Phase 1 and 2. Please note that the majority of the Phase 1 temperature monitoring system was demobilized on January 8, 2015. Therefore Phase 1 temperatures are not reported.

As of 1/10/15, the oxidizer was taken offline. Vapor treatment is through the vapor carbon vessels. Estimated mass removed through 01/09/15 (oxidizer online) was reported using the flammability analyzer data, laboratory data for chlorinated compounds that were assumed not to be detected by the flammability analyzer, and accumulated LNAPL. Following the oxidizer being offline (01/10/15), estimated mass removed is estimated using the analytical laboratory data results, corrected with daily PID readings, plus the accumulated LNAPL. These results yield a total mass removed of 427,612 lbs as of 01/30/15. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 01/29/15. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.16:0.84. During the 01/22/15 manifold data collection effort, flows were estimated based on the measurement collected at the blower as the wellfield flows were too low to be accurately recorded/measured on the handheld meter. These ratios were then applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase and leg. These data are included in Tables 2 and 3. Mass fraction data over time is presented below.

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Table 2. PID Readings Collected from Manifold Legs

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14	12/31/14	1/9/15	1/16/15	1/22/15	1/29/15
1	SV-1	215	100	745	602	720	604	590	1181	550	516	5	770	712	851	845	790	450	360	236	185	177	170	95	238	128	182
	SV-2	742	173	1271	887	872	1129	1318	2987	780	770	1610	1004	931	1179	600	934	660	677	482	377	397	436	300	449	810	404
	SV-3	2588	872	3609	2854	1198	3395	1414	5512	2643	1120	3971	1430	627	99	101	3138	1717	1782	1218	1246	347	1622	725	626	1108	1241
	SV-4	1971	307	2543	1921	1514	2652	1153	4790	1927	3820	3275	2204	2650	3297	1375	2903	1510	2341	1278	979	333	611	585	477	487	446
	SV-5	1817	279	1642	740	444	1407	1197	4790	759	1411	950	1153	802	326	302	490	402	135	243	120	235	29	202	248	198	180
	SV-6	4480	332	1926	956	765	4283	2347	11564	3525	9177	5750	4780	4919	5854	1083	2100	601	435	1271	375	277	197	678	664	1141	699
	SV-8	3222	385	1330	2375	1479	3267	1816	4744	179	172	3815	1881	1850	88	1475	940	401	450	890	150	178	170	110	244	185	235
	SV-9	3245	142	324	1993	1565	2995	1777	11950	2762	4967	3801	2121	2863	3227	1265	801	1209	1040	1480	390	350	340	445	445	365	622
	SV-10	1896	131	2148	1096	1111	2459	1517	4382	1933	1745	3384	2841	1318	4121	1494	1982	1302	1221	3215	500	381	420	400	371	269	99
	SV-11	1016	666	1712	1979	2145	1988	930	2534	1393	2687	1950	1469	1380	596	596	1360	750	641	270	399	332	354	315	495	271	412
	SV-12	80	53	158	139	104	815	1427	3234	682	1102	1090	2100	512	563	206	413	440	426	1413	545	569	490	465	201	74	637
	SV-13	417	211	736	145	170	1452	1476	4291	1109	375	370	985	380	295	315	1210	210	131	432	143	473	445	365	315	139	550
	SV-14	632	452	1526	2636	1450	777	1610	3411	1917	4668	4274	4150	5565	8416	1107	1053	630	500	1288	300	468	570	493	422	352	366
	SV-15	3440	1072	1153	2000	915	2150	2054	608	3265	4890	4801	5780	5000	618	654	1623	730	660	1007	115	490	600	705	872	627	1247
2 (and between divider line)	SV-7	3843	366	1751	1210	1482	4307	1835	3337	3672	9379	7350	5812	7910	553	3115	6391	2860	2977	2810	1323	554	531	500	514	483	300
	SV-16	3113	885	233	1911	1703	2823	2216	6230	3165	6888	4994	3841	6029	11	2340	6276	3118	3307	7931	1957	1502	1908	1765	2144	3610	3159
	SV-17	3715	429	306	2928	1824	2801	1837	8933	1927	2713	2954	3313	5408	389	1670	10903	1983	1335	409	800	1133	730	116	718	1223	850
	SV-18	1760	862	1203	2034	1634	2388	2446	15000	3554	5030	2815	2465	5632	13871	3377	4768	3650	5071	3361	5491	2057	2012	2423	1553	5546	4535
	SV-19	2258	350	2067	1971	2005	1818	2038	10522	2191	6417	4561	4398	3067	2693	1075	875	925	530	528	315	552	130	515	438	504	401
	SV-20	1990	796	1545	2344	1610	2268	2158	15000	2853	2305	2059	343	4053	8642	3534	5500	2725	12650	6352	6520	2084	2492	2750	1673	3511	13673
	SV-21	1964	487	2295	2077	1855	3458	1755	8561	2756	8053	4661	2119	4298	2631	2264	6000	4186	4440	2002	2870	937	958	808	634	1346	1644
	SV-22	2670	980	1606	2222	1892	2466	2448	14750	3344	5023	3578	2236	3582	55	3460	4765	3450	11187	4509	5516	2803	2565	2720	1598	3970	3235
	SV-23	2515	671	3248	3158	2165	3233	1532	8102	2973	7684	4880	3933	2707	4560	4005	5367	2993	2598	1326	1154	805	883	517	948	3832	3889
	SV-24	1412	638	1504	2406	1567	1669	1949	11882	1999	6130	4554	5005	6223	8864	2843	4555	2946	4280	3267	5764	2614	2195	2350	1446	3030	2866
	SV-25	688	220	1261	1035	1059	1350	2418	5725	1542	2247	1873	1743	1925	991	570	1301	740	773	500	445	400	547	410	457	494	448
	SV-26	90	185	350	580	573	638	1133	1119	790	3559	4305	4752	4633	1933	865	2742	710	520	642	1710	548	550	420	677	298	410
	SV-27	192	151	718	944	789	1117	1518	3922	1256	1485	1650	947	840	1040	313	769	745	620	318	320	277	350	210	289	309	233
	SV-28	15	87	77	151	178	310	211	730	335	1250	3624	5592	5447	4380	1438	6351	1440	1100	1588	4527	1575	886	610	759	181	856
	SV-29	8	66	55	20	52	130	1	15	35	21	352	255	83	41	1375	43	80	41	52	117	70	61	20	318	62	63
Breakdown of Wellfield VOC Flux by Phase																											
Phase 1:		48%	45%	70%	51%	46%	59%	51%	37%	48%	36%	49%	45%	42%	33%	25%	25%	21%	18%	30%	12%	22%	30%	29%	35%	19%	16%
Phase 2:		52%	55%	30%	49%	54%	41%	50%	63%	52%	64%	51%	55%	58%	67%	75%	75%	79%	82%	70%	88%	78%	70%	71%	65%	81%	84%

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Table 3. Estimated Mass Loading by Manifold Leg/Phase

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14	12/31/14	1/9/15	1/16/15	1/22/15	1/29/15
1	SV-1	0.5%	0.7%	3.5%	1.5%	3.0%	1.6%	1.7%	1.0%	1.1%	0.7%	0.0%	1.3%	0.8%	1.2%	2.2%	1.2%	1.0%	0.6%	0.6%	0.4%	0.9%	0.7%	0.6%	1.2%	0.3%	0.4%
	SV-2	2.0%	1.3%	4.3%	2.6%	3.6%	3.0%	4.7%	2.5%	1.9%	0.8%	2.4%	1.8%	1.2%	1.7%	1.6%	1.3%	1.4%	1.3%	1.3%	1.0%	1.9%	2.2%	1.7%	2.8%	2.7%	1.0%
	SV-3	3.5%	7.5%	16.2%	7.4%	5.0%	8.9%	5.0%	4.5%	7.1%	1.3%	5.7%	2.6%	0.7%	0.2%	0.3%	5.1%	4.2%	3.3%	3.2%	3.5%	1.7%	9.4%	4.5%	5.0%	4.7%	3.3%
	SV-4	3.3%	2.5%	8.5%	5.7%	5.5%	5.9%	3.3%	3.5%	4.8%	3.9%	4.5%	3.2%	3.1%	3.8%	3.0%	4.4%	3.5%	4.5%	3.0%	2.3%	1.5%	1.8%	3.4%	3.3%	1.8%	1.0%
	SV-5	2.5%	2.9%	9.6%	2.5%	1.6%	3.1%	3.2%	3.2%	2.1%	1.9%	1.4%	1.5%	1.0%	0.5%	0.9%	0.7%	1.0%	0.3%	0.6%	0.3%	1.2%	0.2%	1.2%	1.8%	0.8%	0.4%
	SV-6	2.5%	1.4%	3.8%	1.6%	1.2%	4.1%	3.0%	3.4%	3.7%	4.5%	3.5%	3.0%	2.4%	3.1%	1.1%	1.6%	0.6%	0.3%	1.4%	0.3%	0.5%	0.4%	1.4%	1.6%	1.5%	0.5%
	SV-8	8.7%	2.9%	4.4%	7.1%	6.3%	8.7%	6.8%	3.1%	0.4%	0.1%	5.9%	3.5%	4.4%	0.1%	4.2%	1.6%	1.0%	0.8%	2.6%	0.3%	0.9%	1.0%	0.6%	1.1%	0.4%	0.6%
	SV-9	9.0%	0.9%	1.3%	6.0%	5.8%	8.4%	6.4%	7.3%	6.9%	6.6%	6.2%	3.9%	6.8%	4.8%	3.6%	1.0%	2.5%	2.0%	3.7%	1.1%	1.9%	2.0%	2.7%	3.8%	1.7%	1.7%
	SV-10	2.4%	0.5%	3.0%	1.3%	1.7%	2.1%	1.8%	1.5%	2.2%	0.9%	2.0%	2.1%	0.7%	2.3%	1.6%	1.4%	1.1%	1.0%	3.6%	0.4%	0.8%	0.9%	1.0%	0.7%	0.3%	0.0%
	SV-11	1.3%	2.3%	3.4%	2.2%	3.4%	1.9%	1.0%	0.9%	1.5%	1.4%	1.2%	1.0%	0.6%	0.3%	0.5%	1.2%	0.7%	0.5%	0.3%	0.3%	0.7%	0.8%	0.8%	0.8%	0.2%	0.5%
	SV-12	0.3%	0.5%	0.6%	0.4%	0.5%	2.3%	4.8%	2.4%	1.6%	1.4%	1.8%	2.7%	1.2%	1.0%	0.7%	0.7%	1.0%	0.8%	3.7%	1.3%	3.1%	3.0%	3.1%	1.7%	0.3%	1.7%
	SV-13	0.6%	0.9%	1.6%	0.2%	0.3%	1.4%	2.0%	1.3%	1.2%	0.2%	0.2%	0.7%	0.2%	0.2%	0.4%	0.8%	0.2%	0.1%	0.4%	0.1%	1.0%	0.9%	1.0%	0.9%	0.2%	0.6%
	SV-14	2.3%	6.1%	5.8%	7.5%	5.5%	2.2%	1.1%	2.0%	4.5%	6.3%	6.9%	7.4%	12.7%	13.1%	3.3%	1.8%	1.5%	0.9%	3.3%	0.7%	2.7%	3.5%	3.2%	3.3%	1.5%	0.8%
	SV-15	9.5%	14.7%	3.9%	5.3%	2.8%	5.6%	5.7%	0.5%	8.8%	5.8%	6.9%	10.4%	6.4%	0.9%	1.8%	2.3%	1.5%	1.3%	2.3%	0.3%	2.8%	3.1%	3.9%	6.7%	2.6%	3.2%
2 (and between divider line)	SV-7	2.2%	1.5%	1.9%	1.5%	2.9%	4.2%	2.3%	1.1%	3.9%	4.8%	3.8%	4.0%	3.2%	0.3%	3.1%	5.3%	2.5%	2.1%	3.3%	1.3%	1.1%	0.9%	1.2%	1.7%	0.8%	0.3%
	SV-16	9.5%	7.1%	1.1%	5.7%	6.2%	6.6%	6.9%	5.2%	8.0%	8.7%	6.9%	6.9%	8.0%	0.0%	6.8%	10.3%	10.5%	6.6%	18.3%	5.0%	8.1%	10.5%	11.1%	14.4%	12.9%	8.6%
	SV-17	2.9%	0.1%	-3.3%	2.1%	1.6%	-1.5%	-0.6%	-0.5%	-1.6%	-3.1%	-2.0%	-1.3%	0.0%	-2.8%	0.7%	6.0%	1.3%	0.7%	-1.0%	0.5%	1.6%	1.2%	-1.1%	0.5%	0.5%	0.3%
	SV-18	5.5%	11.4%	4.9%	6.8%	5.6%	6.7%	7.8%	13.0%	9.5%	6.6%	3.6%	4.3%	7.1%	22.8%	10.5%	8.2%	14.5%	9.1%	7.9%	13.9%	10.4%	10.8%	12.9%	10.1%	19.2%	11.2%
	SV-19	3.6%	0.3%	-2.0%	5.5%	6.3%	0.6%	2.8%	3.0%	3.2%	6.5%	6.4%	4.3%	3.0%	3.4%	2.0%	0.7%	1.2%	0.7%	0.9%	0.6%	1.7%	0.6%	0.2%	0.5%	0.7%	0.6%
	SV-20	7.2%	12.0%	7.2%	6.2%	6.3%	5.7%	5.5%	11.9%	6.1%	2.8%	2.9%	0.6%	5.0%	14.1%	11.0%	8.9%	8.7%	23.9%	14.6%	16.8%	10.7%	13.4%	16.3%	9.3%	10.4%	36.1%
	SV-21	2.6%	2.0%	3.8%	0.9%	2.4%	3.2%	2.9%	3.6%	2.5%	5.3%	1.6%	-0.4%	2.2%	0.2%	3.5%	6.3%	5.8%	4.3%	1.4%	4.8%	3.0%	3.5%	1.1%	1.6%	3.8%	1.9%
	SV-22	8.5%	9.3%	8.3%	5.9%	7.6%	6.7%	7.0%	12.2%	8.5%	6.7%	4.8%	3.9%	4.4%	0.1%	9.9%	5.4%	11.5%	19.8%	11.5%	13.6%	14.3%	14.0%	16.1%	7.8%	10.4%	8.4%
	SV-23	5.2%	-2.9%	-2.4%	1.9%	4.4%	-0.3%	0.5%	0.3%	1.0%	8.8%	1.3%	4.6%	2.9%	6.2%	10.3%	3.2%	3.4%	2.6%	-0.2%	-0.2%	2.4%	-6.0%	-2.0%	2.6%	11.6%	6.4%
	SV-24	4.0%	8.5%	9.4%	7.2%	6.2%	4.4%	5.6%	10.3%	4.7%	8.0%	6.8%	7.4%	7.4%	13.6%	8.3%	6.5%	11.3%	8.5%	7.7%	14.7%	13.7%	11.6%	8.4%	8.9%	10.0%	7.0%
	SV-25	-0.1%	1.1%	0.0%	0.7%	0.8%	0.1%	1.5%	0.1%	1.4%	2.1%	0.2%	1.3%	1.2%	-0.2%	0.0%	0.5%	0.3%	0.4%	0.1%	0.2%	0.0%	0.4%	0.8%	0.2%	-1.0%	0.0%
	SV-26	0.3%	2.2%	1.9%	1.9%	2.4%	1.6%	3.4%	1.0%	1.6%	4.3%	6.8%	8.1%	5.9%	3.2%	2.7%	3.9%	2.8%	1.1%	1.7%	4.0%	2.6%	3.2%	2.2%	2.8%	0.7%	1.1%
	SV-27	0.1%	0.7%	-0.5%	1.7%	0.4%	1.4%	3.2%	1.2%	2.4%	1.1%	2.0%	0.4%	0.2%	0.0%	-1.5%	0.1%	0.7%	0.5%	0.2%	0.5%	0.5%	1.0%	0.8%	0.6%	0.7%	0.2%
	SV-28	0.0%	1.0%	0.5%	0.6%	0.7%	0.8%	0.6%	0.5%	0.9%	1.7%	5.5%	10.1%	6.9%	6.1%	3.8%	9.5%	4.2%	2.0%	3.4%	11.6%	7.9%	4.8%	2.7%	3.2%	0.4%	2.0%
	SV-29	0.0%	0.6%	0.4%	0.1%	0.2%	0.4%	0.0%	0.0%	0.1%	0.0%	0.6%	0.5%	0.2%	0.1%	3.7%	0.1%	0.3%	0.1%	0.1%	0.3%	0.4%	0.3%	0.1%	1.0%	0.1%	0.1%
Total:		100%	100%	101%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note: Six out of the 23 wellfield branch lines service both Phase 1 and Phase 2; therfore, a correction has been made to subtract the shared mass sometimes resulting in a negative value. This value indicates that the mass contribution from the Phase 2 area was limited in that particular sample round. This is a result of the accuracy of the flow and PID data measurements collected.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 2 only, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* As of 01/08/15, Phase 1 is only partially operational; therefore, temperature data for Phase 1 is no longer included.

Phase 2 heating began on 7/16/14 but was stopped on 8/14/14, as a result of the oxidizer shutdown, and reenergized on 09/30/14. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	2/1/15	
Phase 1 Entire TTZ Average Temperature	N/A	°C
Phase 2 Entire TTZ Average Temperature	103	°C
Phase 1 Centroid Average Temperature	N/A	°C
Phase 2 Centroid Average Temperature	102	°C

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N/A

Figure 1a. Phase 1 Observed vs. Modeled Temperatures

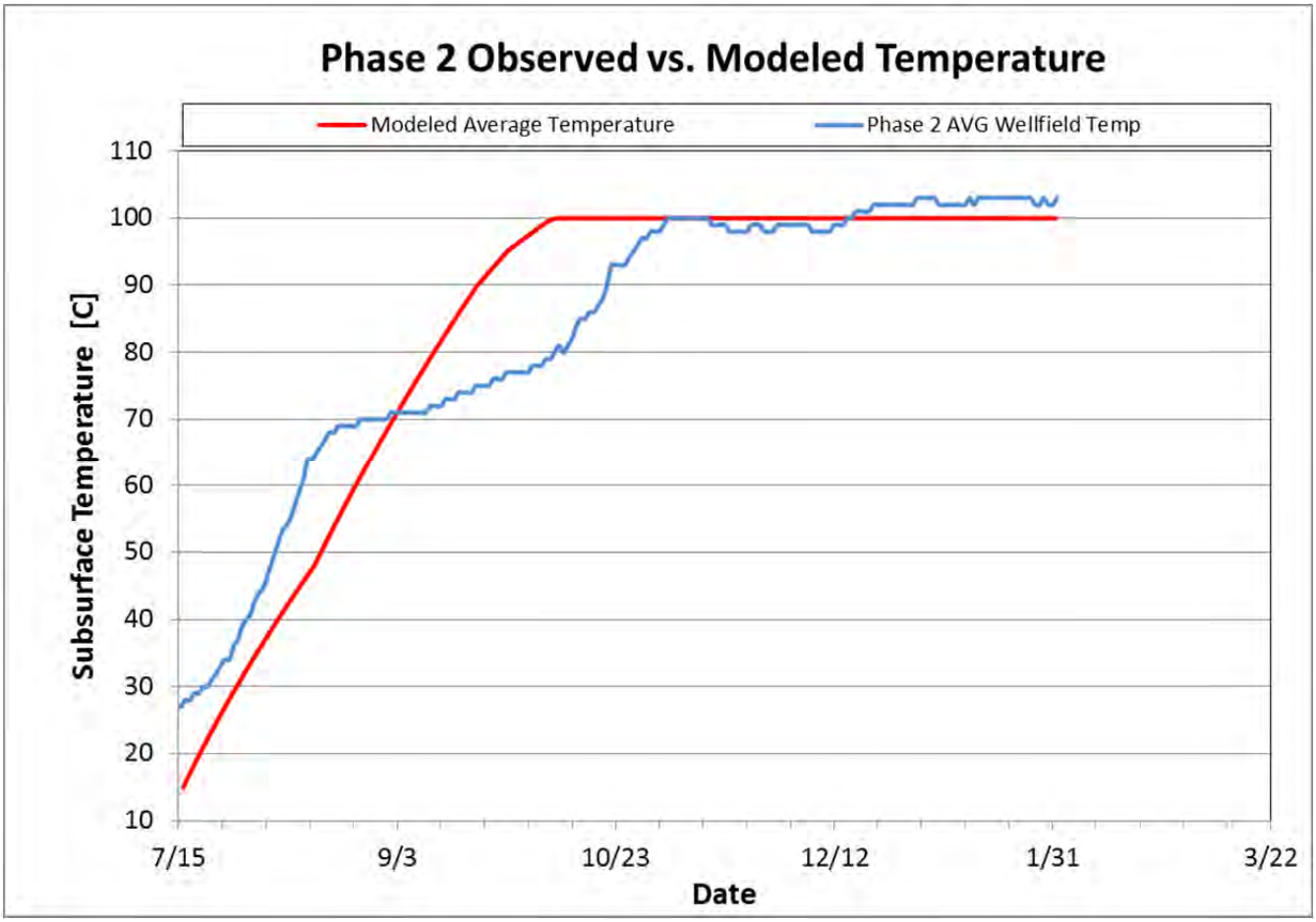


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was increased on 8/30/14. On 1/15/15 the vapor extraction rate was decreased again.

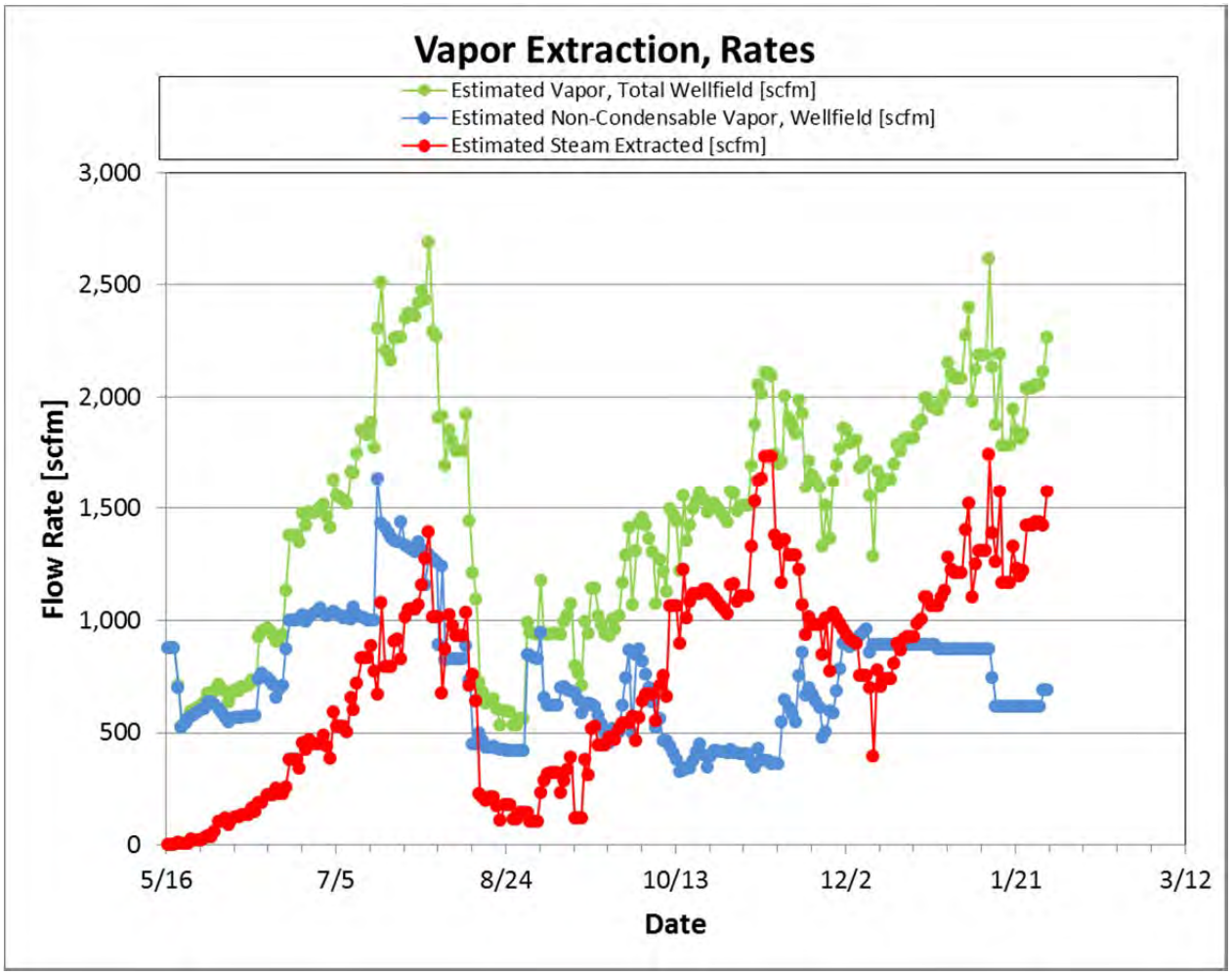


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Please note that the flammability analyzer is no longer online (corresponds with taking the oxidizer offline).

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

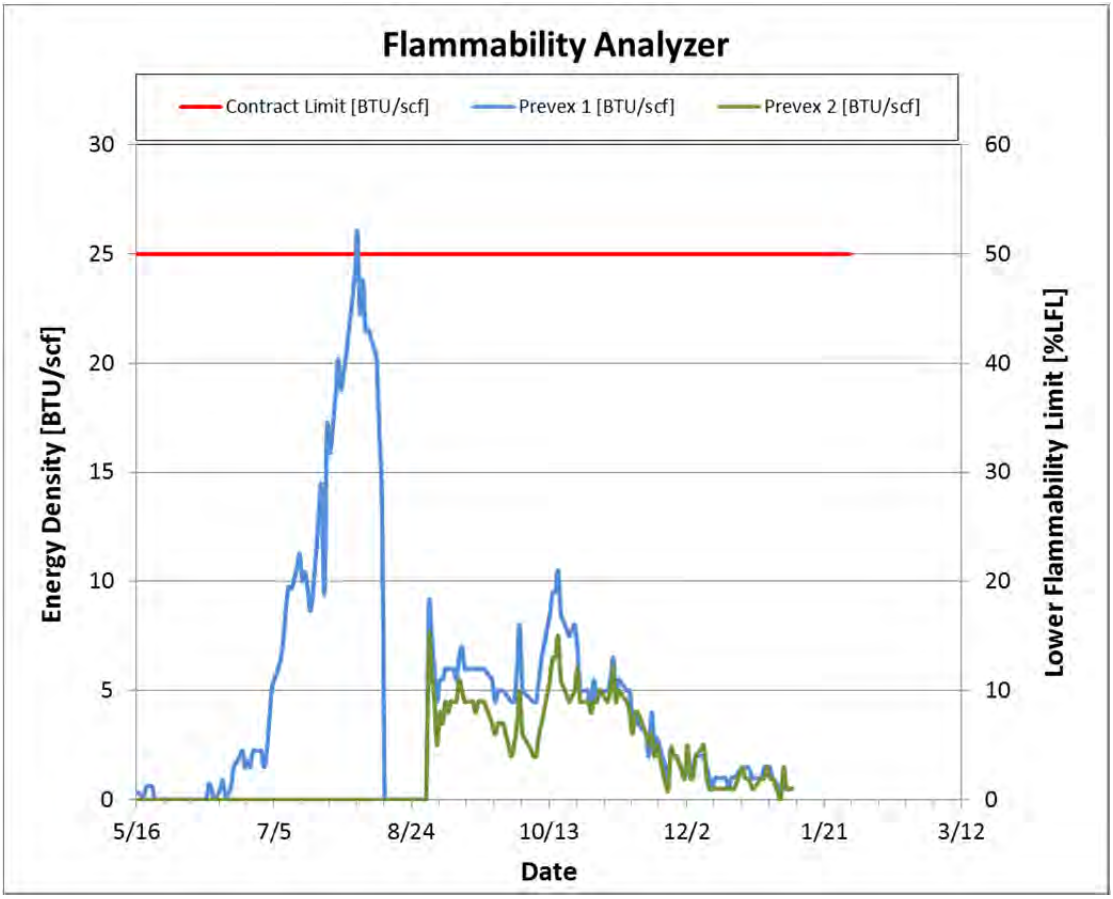


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed through 01/09/15 is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. Mass removal starting 01/10/15 is reported as the total compounds detected in the laboratory data corrected using the PID plus the accumulated LNAPL. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively. Please note that the mass removal rates are shown on a logarithmic scale.

The decrease in mass removed starting on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14, 9/23/14, 9/30/14, 10/7/14, 10/14/14, 10/21/14, 10/30/14, 11/4/14, 11/18/14, 11/25/2014, 12/2/2014, 12/9/2014, 12/16/14, 12/23/14, 12/30/14, 01/06/15, 01/13/15 and 01/20/15.

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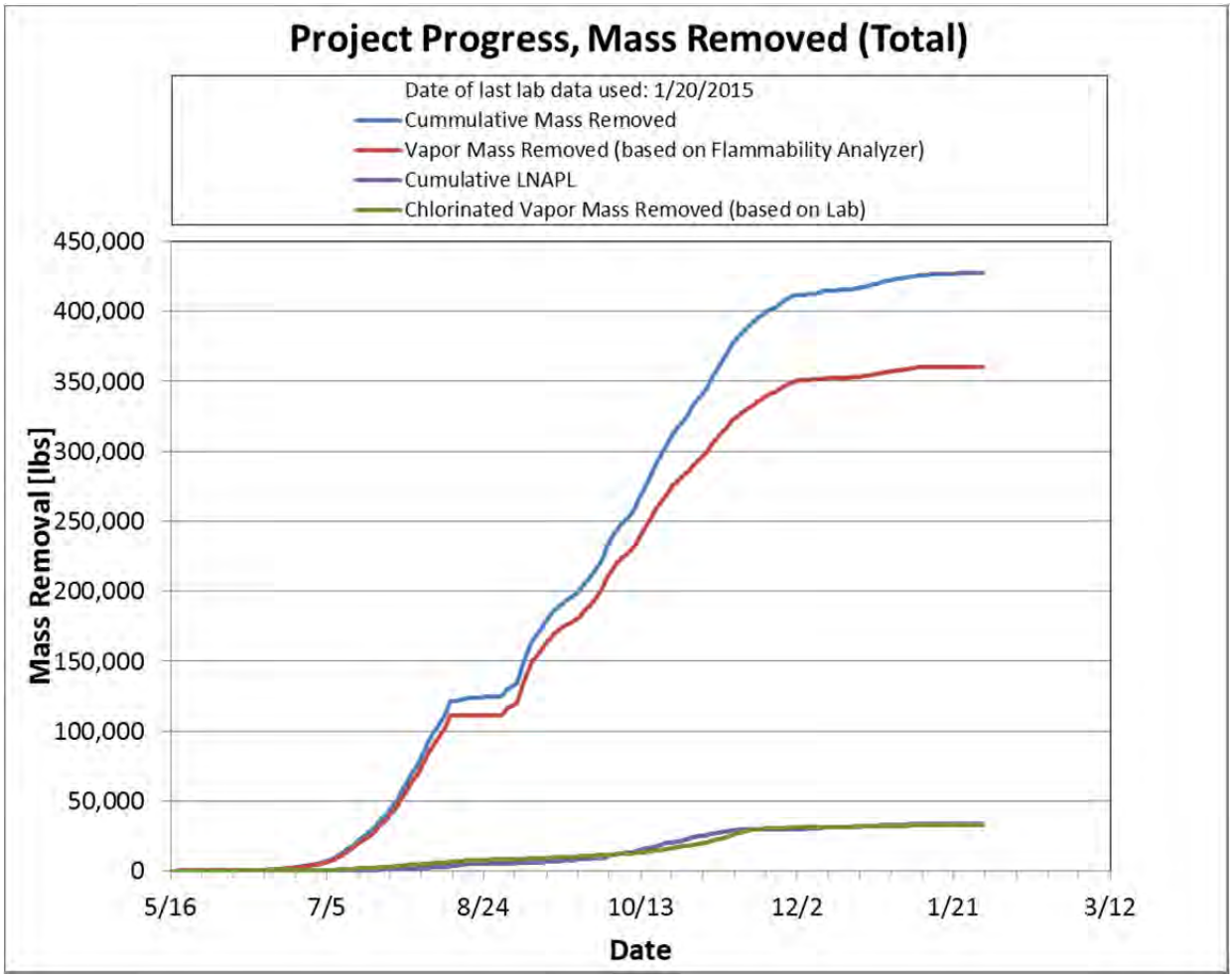


Figure 4a. Project Progress, Mass Removal (Total)

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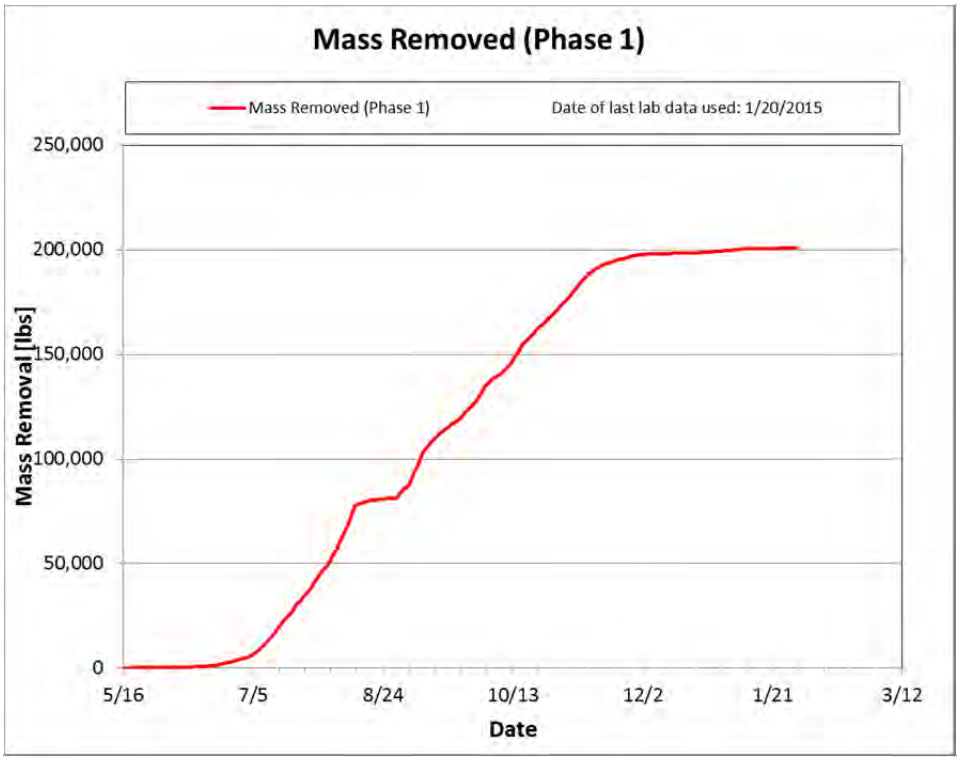


Figure 4b. Project Progress, Mass Removal (Phase 1)

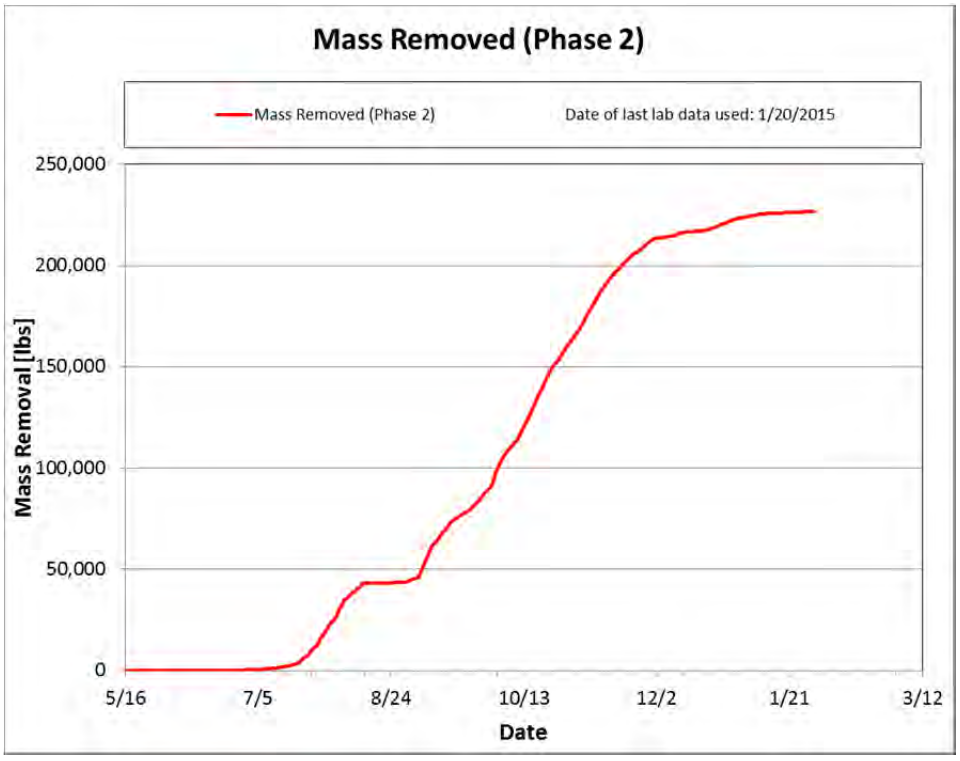


Figure 4c. Project Progress, Mass Removal (Phase 2)

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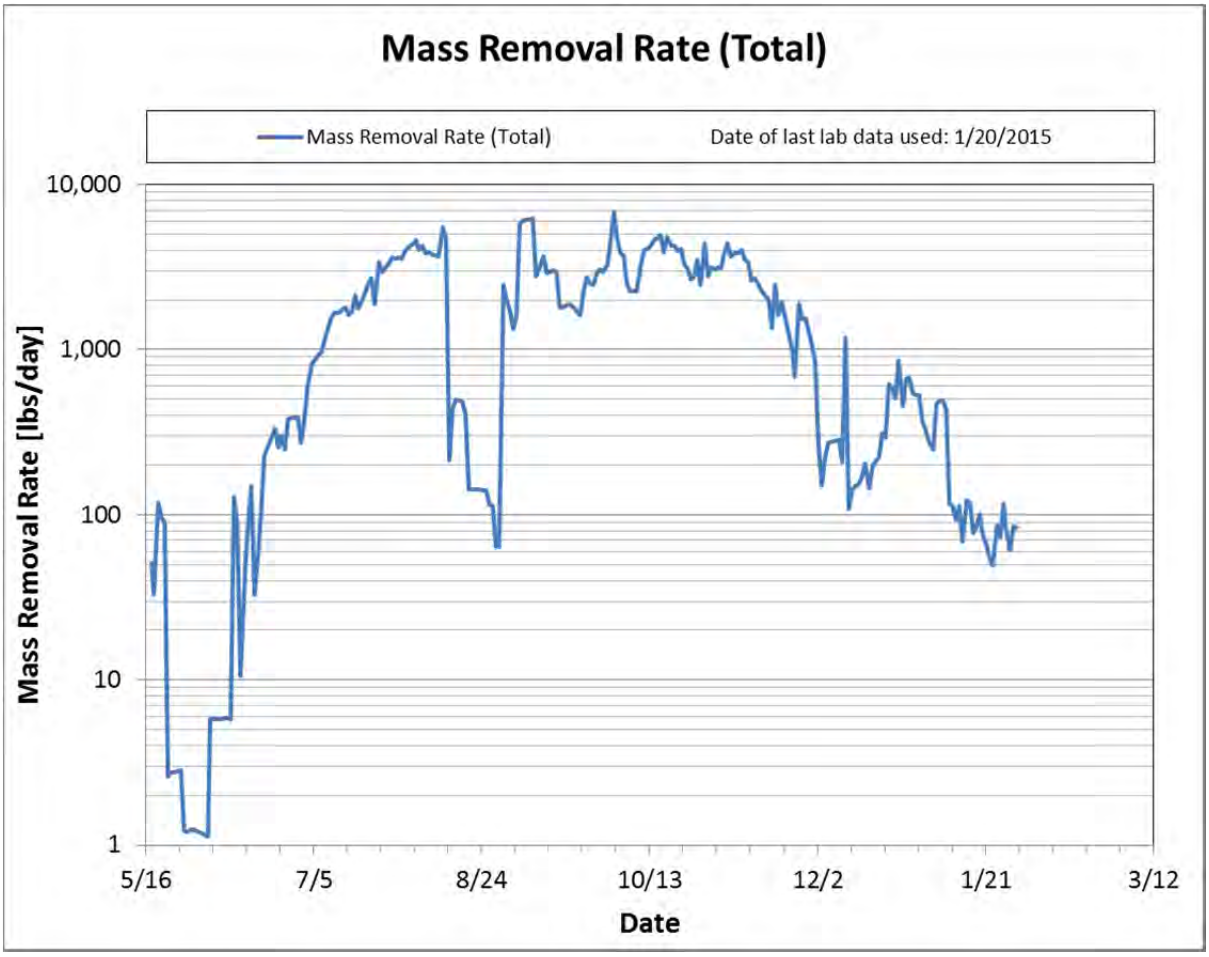


Figure 4d. Mass Removal Rate (Total for Site)

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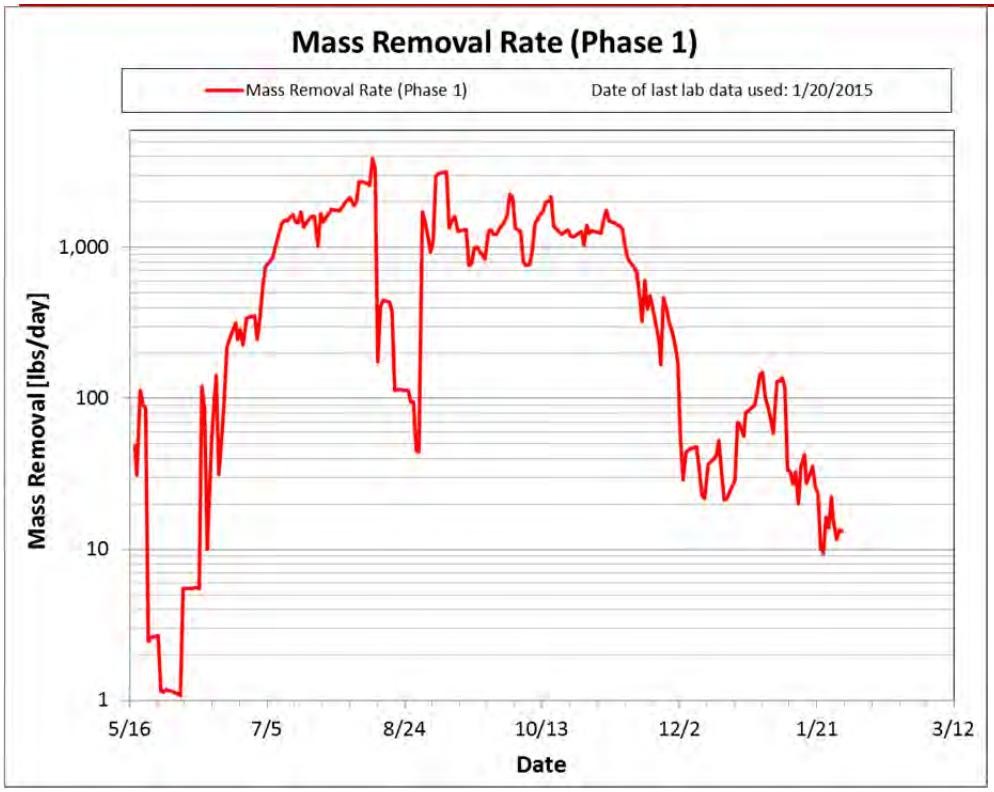


Figure 4e. Mass Removal Rate (Phase 1)

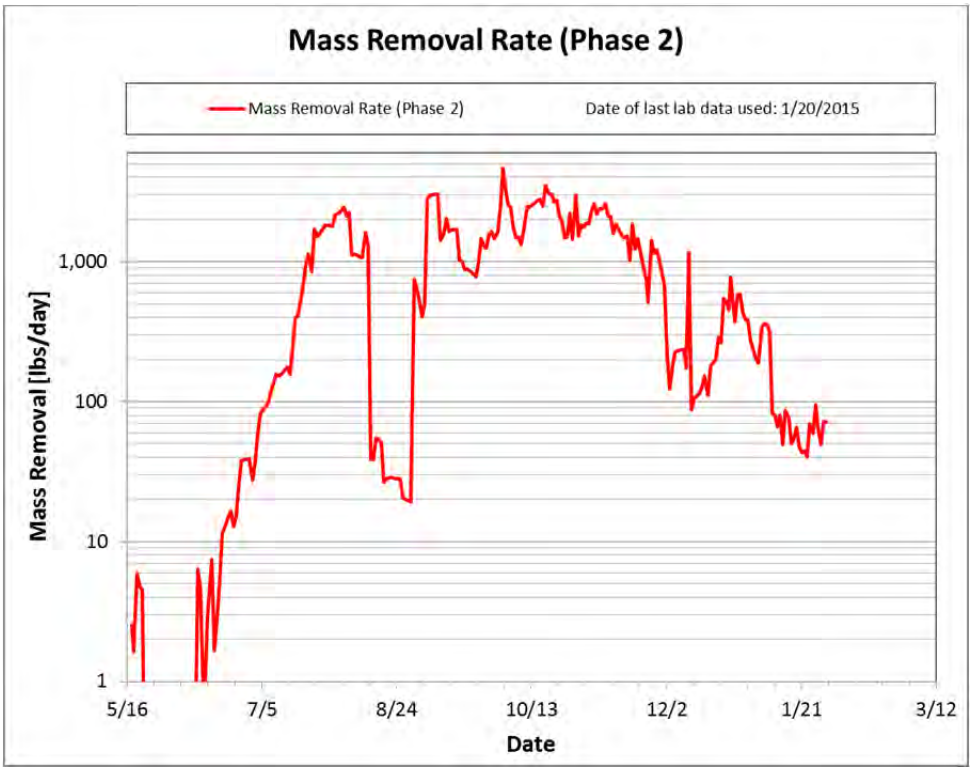


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID and flammability analyzer readings collected at the oxidizer influent over time. It should be noted that PID readings are first collected using an 11.7 eV lamp (determined by site contaminants). If the reading exceeds the limit of the meter (>2000 ppm), the readings are collected using a 10.6 eV lamp. When both meters are used, the maximum value is recorded.

As of 1/9/15, the flammability analyzer is no longer online.

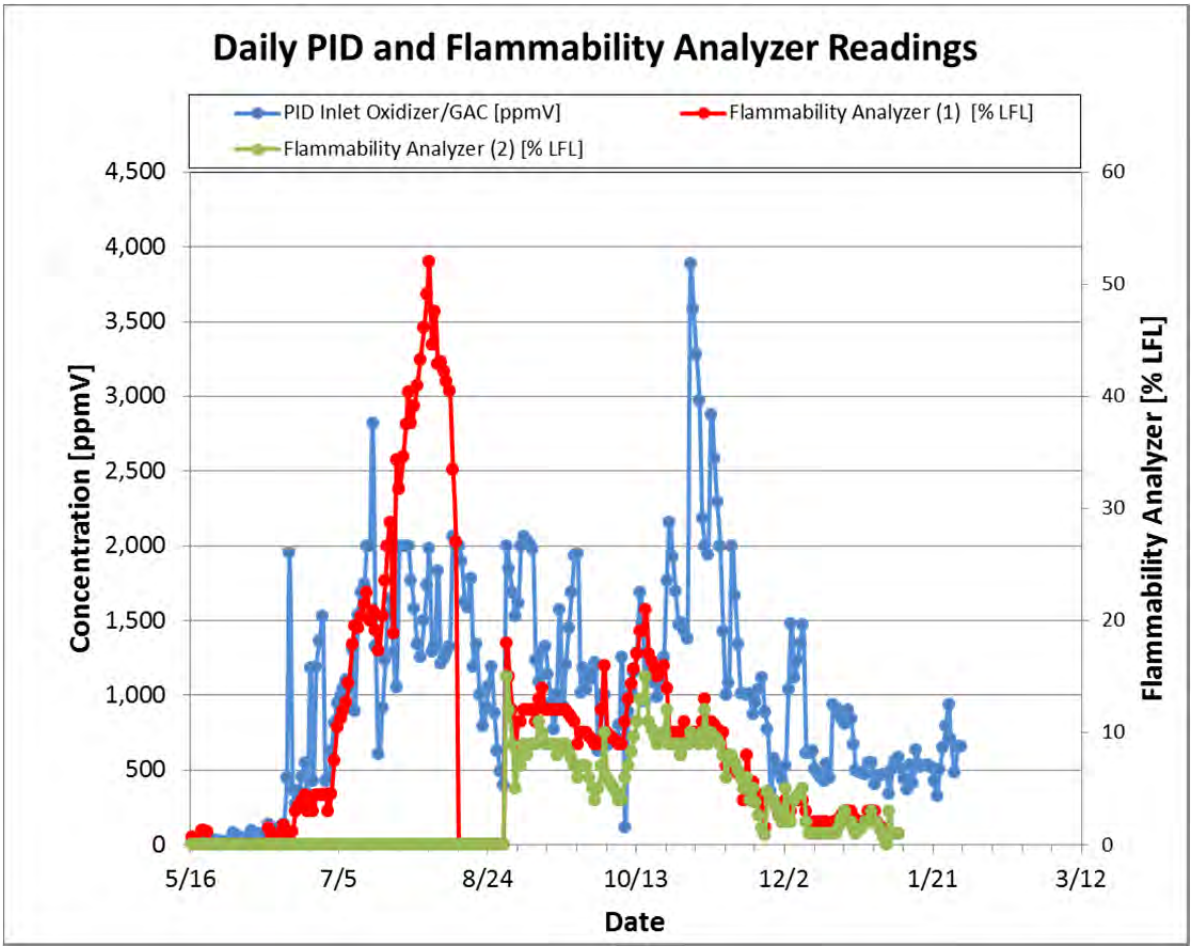


Figure 5. Daily PID and Flammability Analyzer Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13, after the oxidizer shutdown. Decreases in DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-outs.

Influent concentrations collected over the past week were between 400 to 600 ppm, with effluent concentrations ranging between 20 to 60 ppm. While some calculated DRE is less than 95%, calculated mass emissions are less than 2 lbs/hr (air permit limit) by approximately 50%.

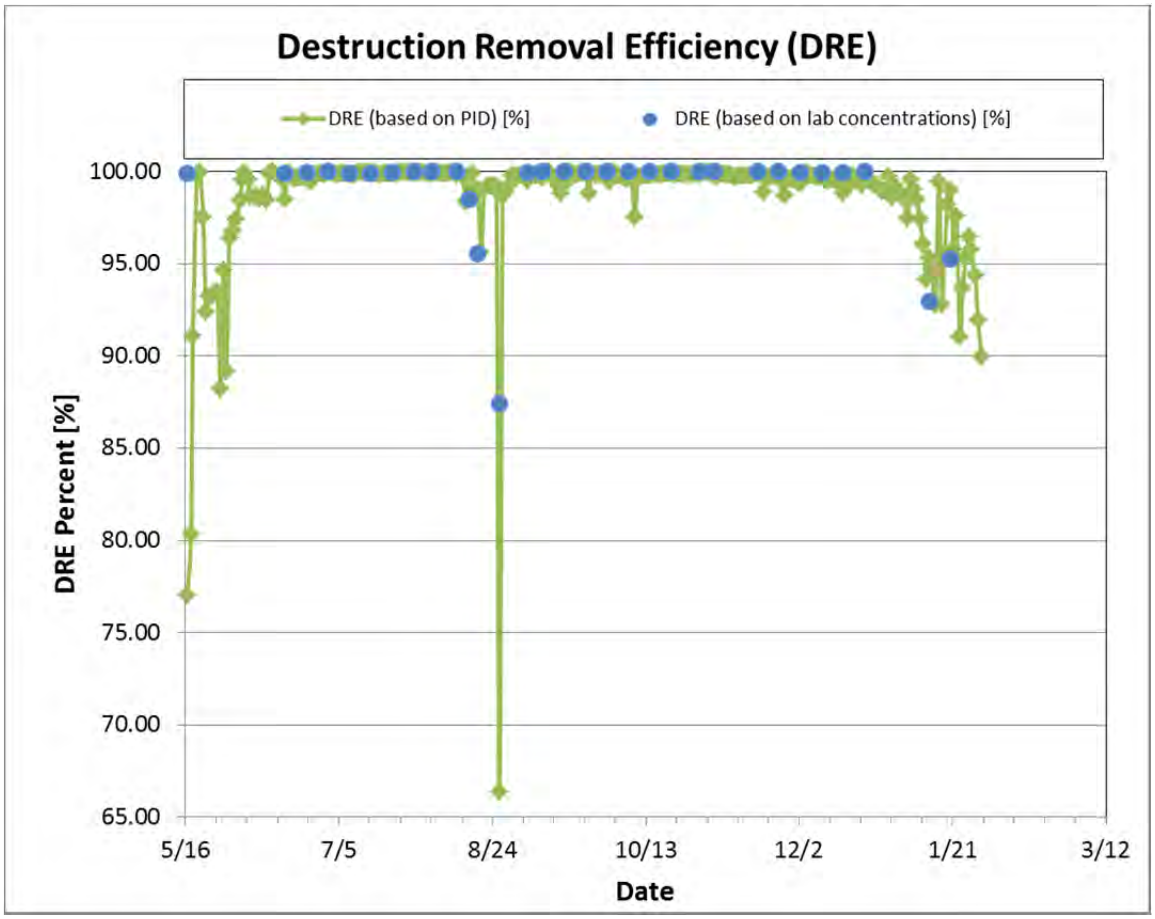


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7. Please note that the graph has been modified to present the estimated modeled energy for the heaters (ISTD) over the original predicted 195 day treatment. This does not take into account contract definitions such as heaters operating at or above 70% energy input. The flatline represents days beyond 195 days.

Please note that the modeled energy usage (12,873,000 kWh) only includes the energy predicted to be added to the subsurface. Therefore, the number should be compared to the cumulative energy added by the ISTD system to the subsurface (red line). The total energy usage (including the treatment system power usage) is predicted to be 15,795,000 kWh as stated in the summary table.

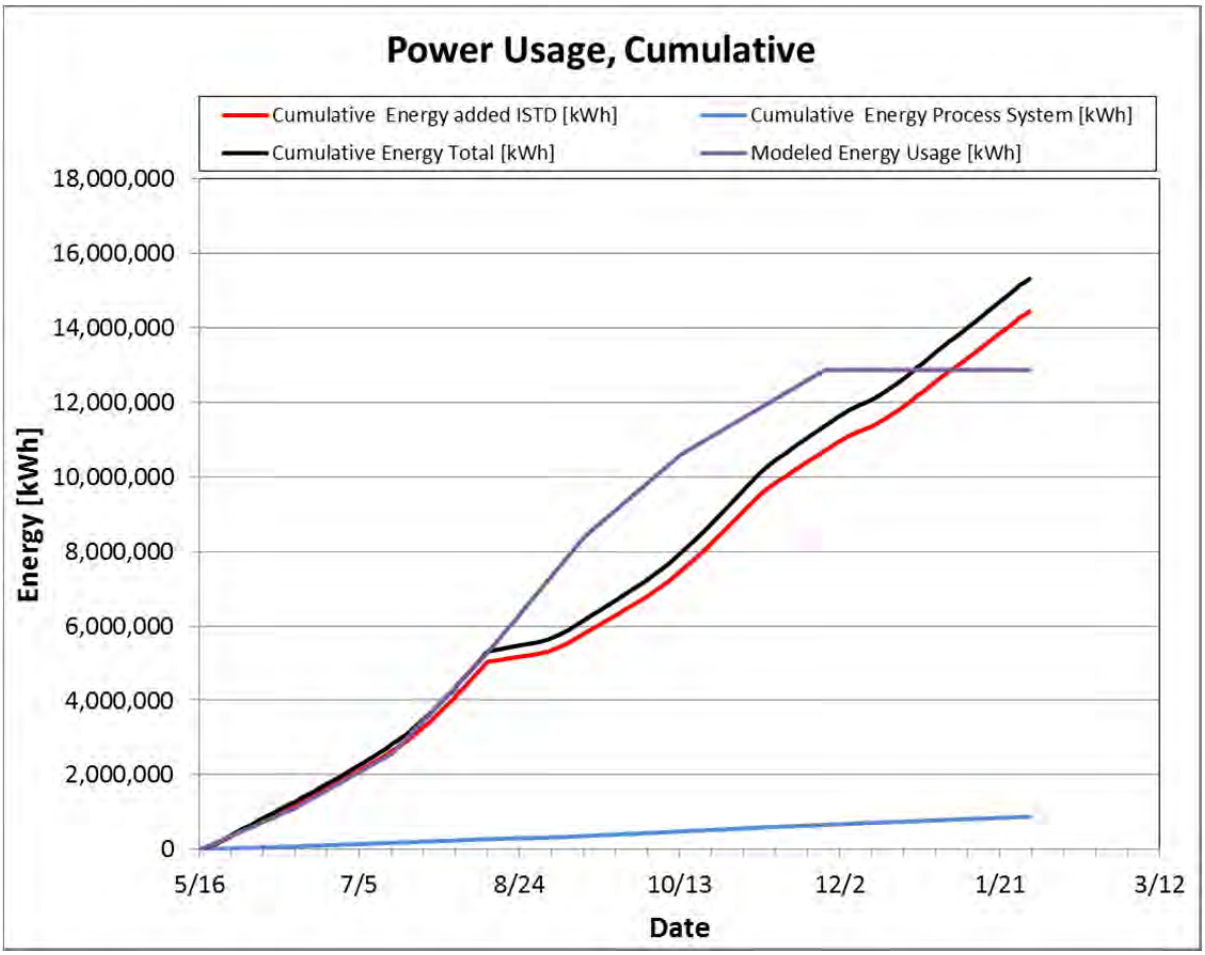


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30/14 and the following days corresponds with ramping of the heaters after placing the oxidizer back online. The decrease observed mid- November is associated with profiling of the heaters in Phase 2 and subsequent adjustments. The increase observed in December corresponds with additional profiling and subsequent adjustments.

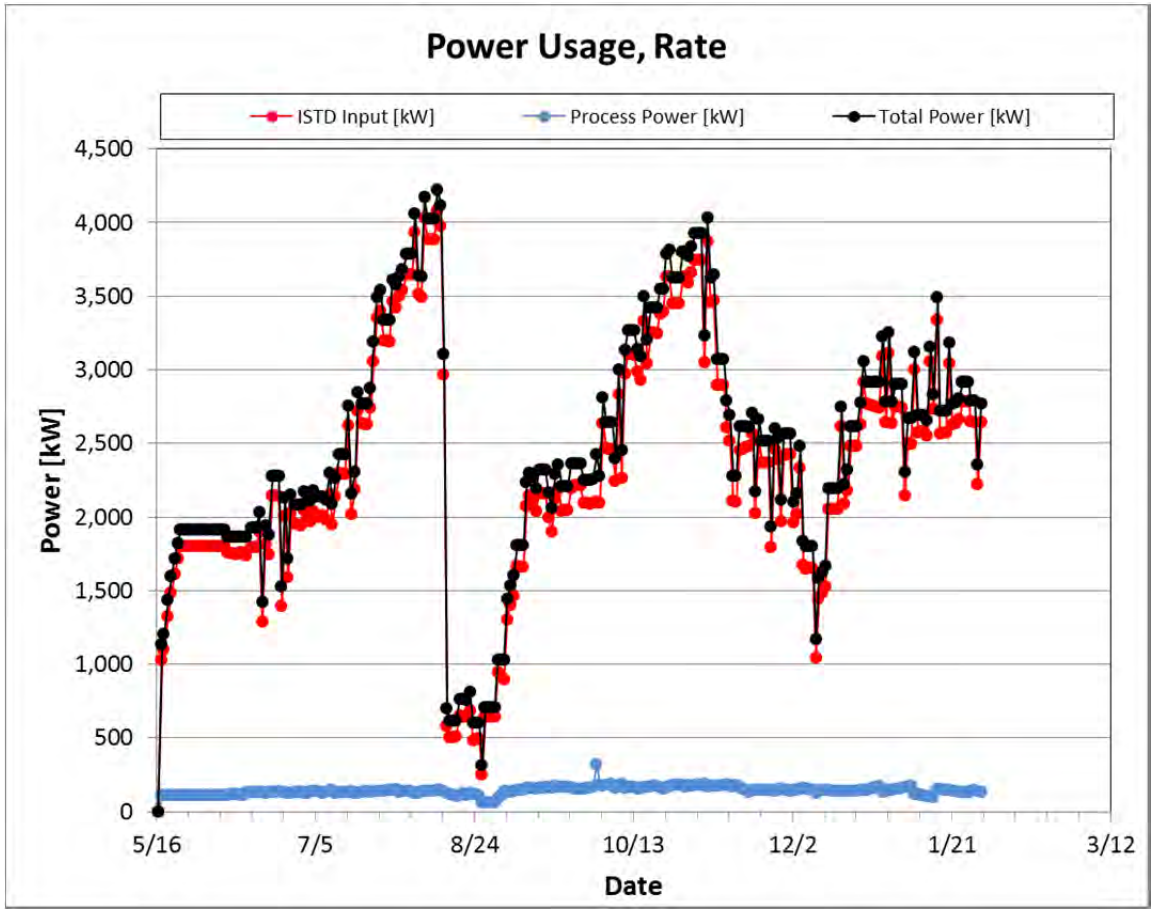


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

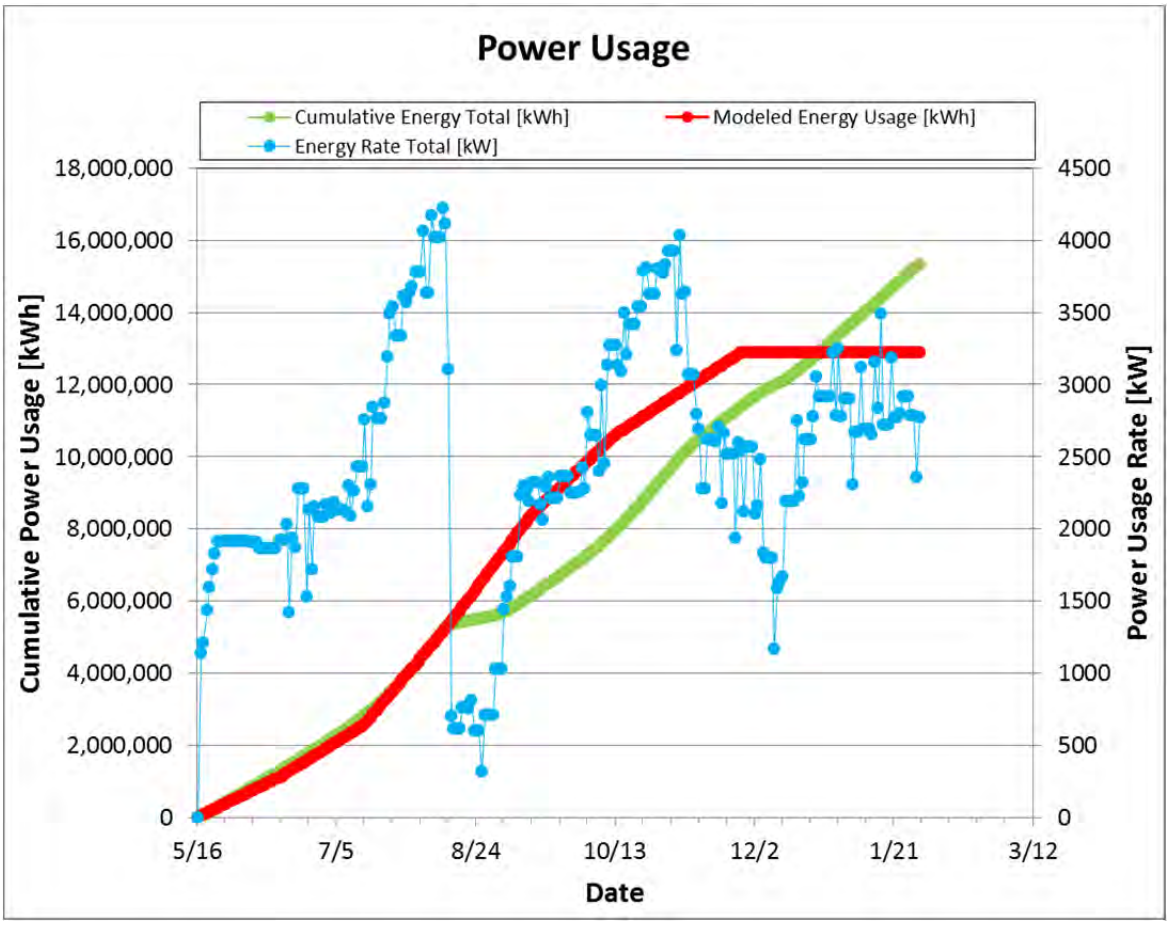


Figure 9. Power Usage

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With the oxidizer offline, natural gas is no longer in demand (as shown below starting on 10 January 2015).

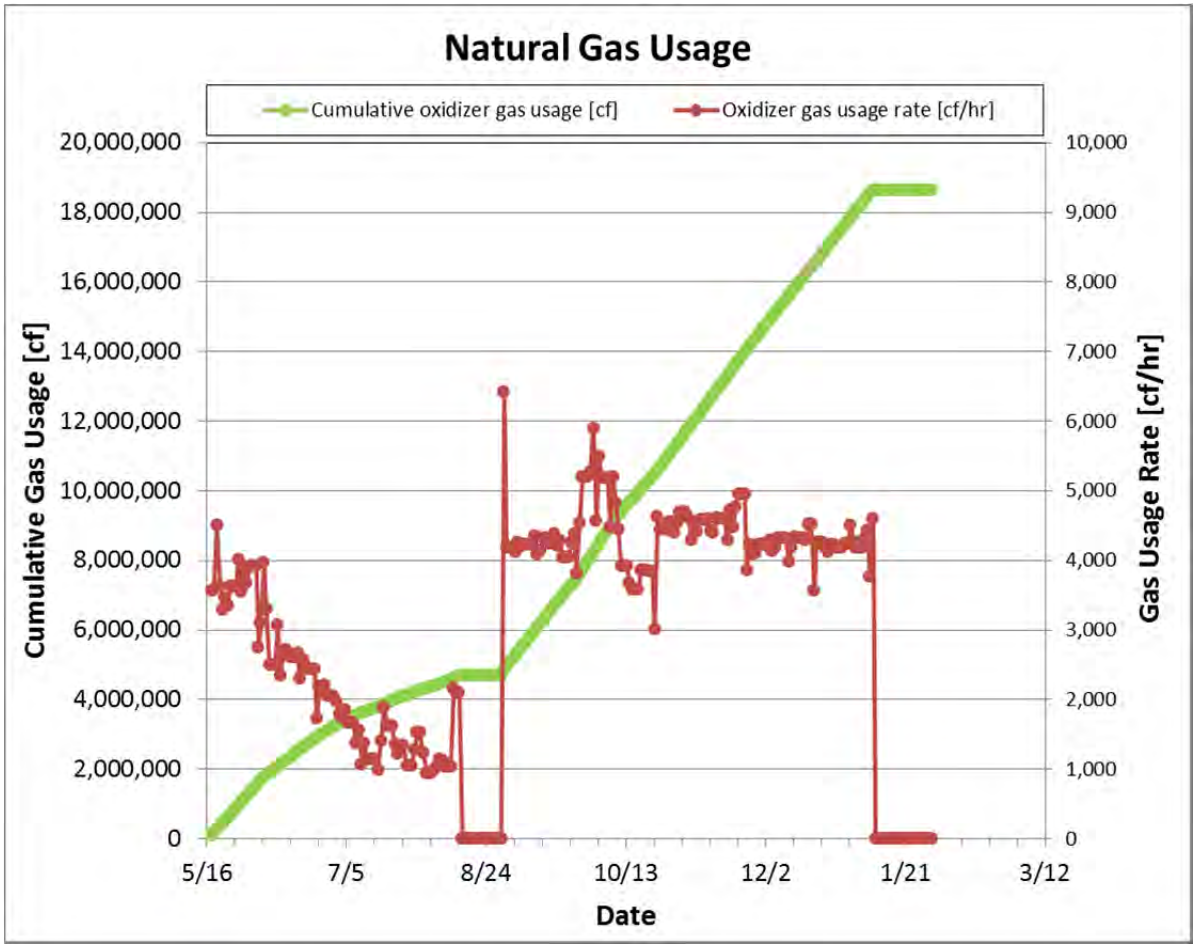


Figure 10. Natural Gas Usage

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With the oxidizer offline, caustic is no longer in demand (as shown below starting on 10 January 2015).

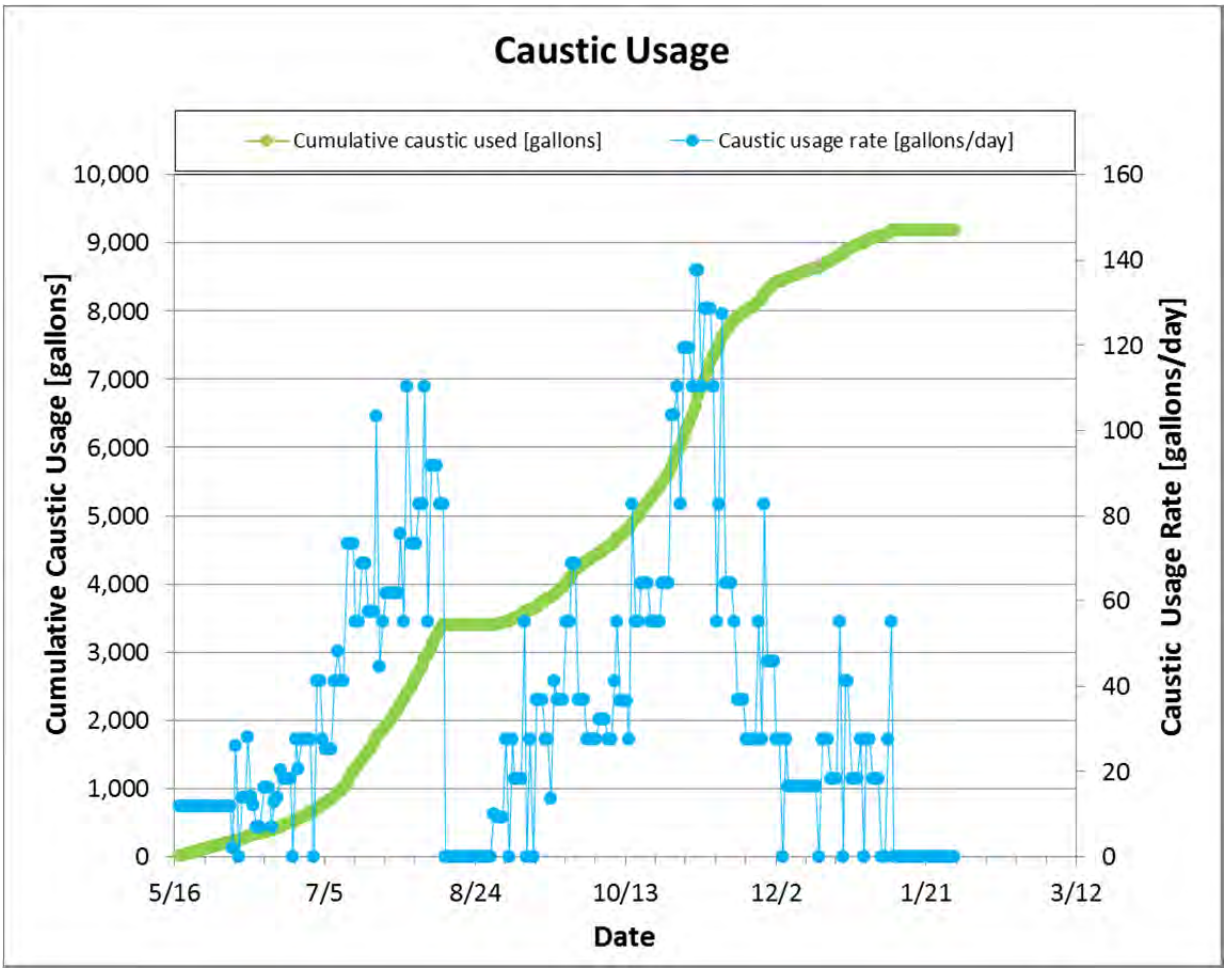


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as Phase 1 and Phase 2 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Phase 2 centroids are shown in Figure 12b. As of 12/24/14, we have achieved all three temperature milestones for both Phase 1 and Phase 2.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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N/A

Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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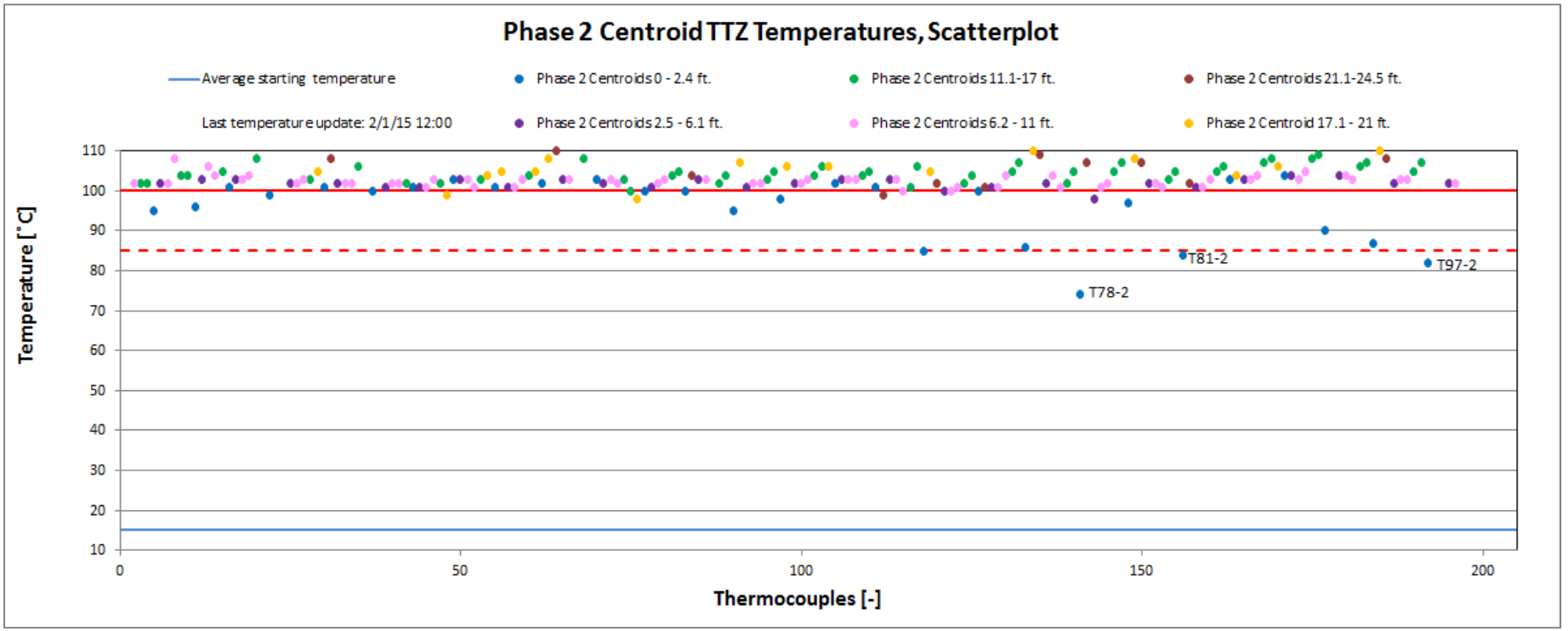


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots

	Value	Unit
Date of Last Update	2/1/15	
Phase 1 Centroid Thermocouples ≥85 ^{0}C	100	%
Phase 1 Centroid Thermocouples ≥100 ^{0}C	97	%
Phase 2 Centroid Thermocouples ≥85 ^{0}C	99	%
Phase 2 Centroid Thermocouples ≥100 ^{0}C	98	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday, 30 January, 2015 through Friday, 6 February 2015, with temperatures updated through Sunday, 8 February 2015.

Table 1 provides a summary of the project operational status as of Friday, 30 January 2015.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	02/06/15	
Last Temperature Data Update	02/08/15	
Days of Operation (Total)	243	days
Days of Phase 1 Operation	158	days
Days of Phase 2 Operation	134	days
Total Design Energy Usage (ISTD and treatment system)	15,795,000	kWh
Total Energy Added (ISTD)	15,596,500	kWh
Used Electrical Energy vs. Estimate	98.7	%
Total Mass Removal	427,872	lbs
Average Power Input Last 24 Hours	620	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,755	scfm
Average Condensate Production Rate Last 24 Hours	6.0	gpm

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Select circuits in Phase 2 remain online and at full power. Phase 2 has operated for 134 days. The current average wellfield temperature for Phase 2 is 100°C. Phase 1 operated for a total of 158 days, which represents days where heaters operated at or above 70% *and* the collection date of the last confirmation soil sample (per contract definition). All three temperature milestones have been achieved for both Phase 1 and 2. Please note that the majority of the Phase 1 temperature monitoring system was demobilized on January 8, 2015. Therefore Phase 1 temperatures are not reported.

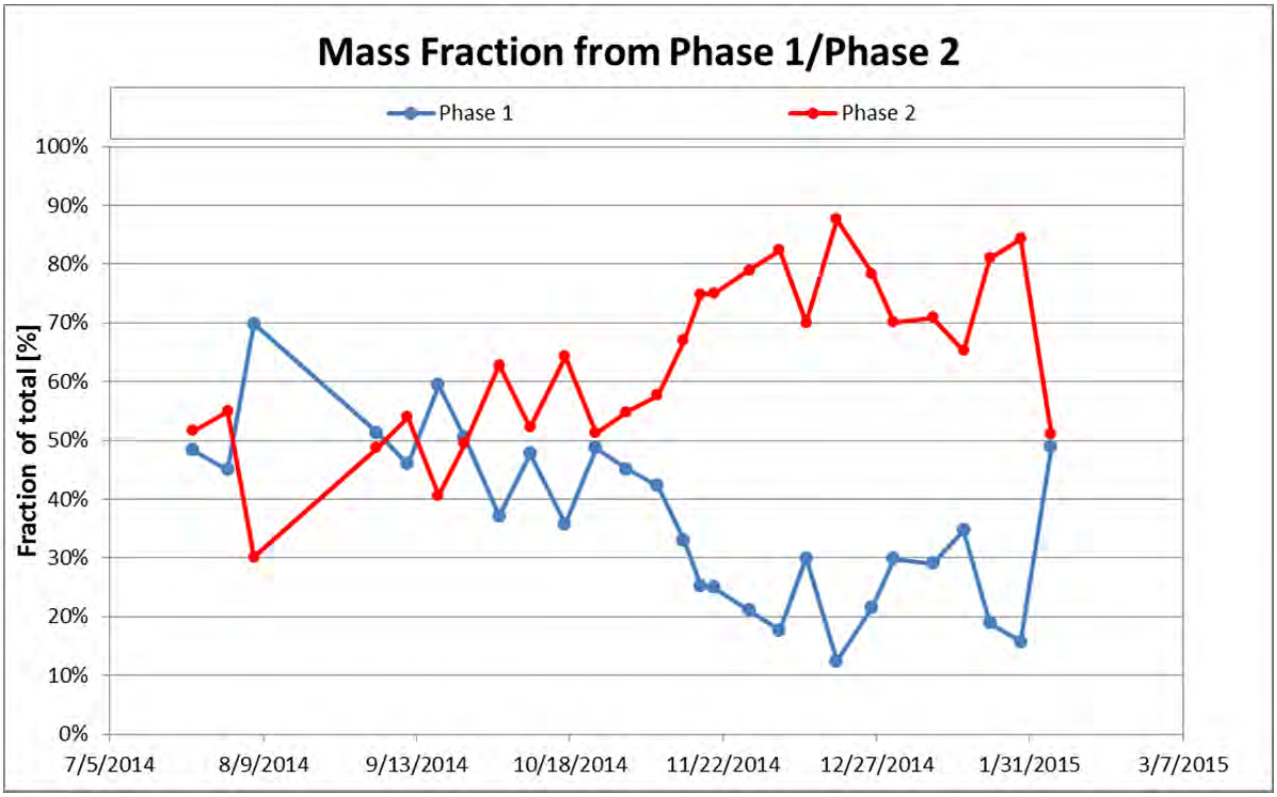
As of 1/10/15, the oxidizer was taken offline. Vapor treatment is now through the vapor carbon vessels. Estimated mass removed through 01/09/15 (oxidizer online) was reported using the flammability analyzer data, laboratory data for chlorinated compounds that were assumed not to be detected by the flammability analyzer, and accumulated LNAPL. Following the oxidizer being offline (01/10/15), estimated mass removed is calculated using the analytical laboratory data results (TO-15), corrected with daily PID readings, plus the accumulated LNAPL. These results yield a total mass removed of 427,872 lbs as of 02/06/15. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 02/05/15. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.49:0.51. These ratios were then applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase and leg. These data are included in Tables 2 and 3. Please note that the drop in Phase 2 fraction (and matching increase in Phase 1 fraction) is related to decreases in the measured Phase 2 concentrations at more or less all of the sample locations.

During the 01/22/15 manifold data collection effort, flows were estimated based on the measurement collected at the blower as the wellfield flows were too low to be accurately recorded/measured on the handheld meter.

Mass fraction data over time is presented below.

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Table 2. PID Readings Collected from Manifold Legs

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14	12/31/14	1/9/15	1/16/15	1/22/15	1/29/15	2/5/15
1	SV-1	215	100	745	602	720	604	590	1181	550	516	5	770	712	851	845	790	450	360	236	185	177	170	95	238	128	182	179
	SV-2	742	173	1271	887	872	1129	1318	2987	780	770	1610	1004	931	1179	600	934	660	677	482	377	397	436	300	449	810	404	283
	SV-3	2588	872	3609	2854	1198	3395	1414	5512	2643	1120	3971	1430	627	99	101	3138	1717	1782	1218	1246	347	1622	725	626	1108	1241	653
	SV-4	1971	307	2543	1921	1514	2652	1153	4790	1927	3820	3275	2204	2650	3297	1375	2903	1510	2341	1278	979	333	611	585	477	487	446	300
	SV-5	1817	279	1642	740	444	1407	1197	4790	759	1411	950	1153	802	326	302	490	402	135	243	120	235	29	202	248	198	180	129
	SV-6	4480	332	1926	956	765	4283	2347	11564	3525	9177	5750	4780	4919	5854	1083	2100	601	435	1271	375	277	197	678	664	1141	699	558
	SV-8	3222	385	1330	2375	1479	3267	1816	4744	179	172	3815	1881	1850	88	1475	940	401	450	890	150	178	170	110	244	185	235	94
	SV-9	3245	142	324	1993	1565	2995	1777	11950	2762	4967	3801	2121	2863	3227	1265	801	1209	1040	1480	390	350	340	445	445	365	622	298
	SV-10	1896	131	2148	1096	1111	2459	1517	4382	1933	1745	3384	2841	1318	4121	1494	1982	1302	1221	3215	500	381	420	400	371	269	99	65
	SV-11	1016	666	1712	1979	2145	1988	930	2534	1393	2687	1950	1469	1380	596	596	1360	750	641	270	399	332	354	315	495	271	412	346
	SV-12	80	53	158	139	104	815	1427	3234	682	1102	1090	2100	512	563	206	413	440	426	1413	545	569	490	465	201	74	637	143
	SV-13	417	211	736	145	170	1452	1476	4291	1109	375	370	985	380	295	315	1210	210	131	432	143	473	445	365	315	139	550	209
	SV-14	632	452	1526	2636	1450	777	1610	3411	1917	4668	4274	4150	5565	8416	1107	1053	630	500	1288	300	468	570	493	422	352	366	129
	SV-15	3440	1072	1153	2000	915	2150	2054	608	3265	4890	4801	5780	5000	618	654	1623	730	660	1007	115	490	600	705	872	627	1247	742
2 (and between divider line)	SV-7	3843	366	1751	1210	1482	4307	1835	3337	3672	9379	7350	5812	7910	553	3115	6391	2860	2977	2810	1323	554	531	500	514	483	300	129
	SV-16	3113	885	233	1911	1703	2823	2216	6230	3165	6888	4994	3841	6029	11	2340	6276	3118	3307	7931	1957	1502	1908	1765	2144	3610	3159	821
	SV-17	3715	429	306	2928	1824	2801	1837	8933	1927	2713	2954	3313	5408	389	1670	10903	1983	1335	409	800	1133	730	116	718	1223	850	712
	SV-18	1760	862	1203	2034	1634	2388	2446	15000	3554	5030	2815	2465	5632	13871	3377	4768	3650	5071	3361	5491	2057	2012	2423	1553	5546	4535	146
	SV-19	2258	350	2067	1971	2005	1818	2038	10522	2191	6417	4561	4398	3067	2693	1075	875	925	530	528	315	552	130	515	438	504	401	263
	SV-20	1990	796	1545	2344	1610	2268	2158	15000	2853	2305	2059	343	4053	8642	3534	5500	2725	12650	6352	6520	2084	2492	2750	1673	3511	13673	951
	SV-21	1964	487	2295	2077	1855	3458	1755	8561	2756	8053	4661	2119	4298	2631	2264	6000	4186	4440	2002	2870	937	958	808	634	1346	1644	158
	SV-22	2670	980	1606	2222	1892	2466	2448	14750	3344	5023	3578	2236	3582	55	3460	4765	3450	11187	4509	5516	2803	2565	2720	1598	3970	3235	584
	SV-23	2515	671	3248	3158	2165	3233	1532	8102	2973	7684	4880	3933	2707	4560	4005	5367	2993	2598	1326	1154	805	883	517	948	3832	3889	163
	SV-24	1412	638	1504	2406	1567	1669	1949	11882	1999	6130	4554	5005	6223	8864	2843	4555	2946	4280	3267	5764	2614	2195	2350	1446	3030	2866	502
	SV-25	688	220	1261	1035	1059	1350	2418	5725	1542	2247	1873	1743	1925	991	570	1301	740	773	500	445	400	547	410	457	494	448	350
	SV-26	90	185	350	580	573	638	1133	1119	790	3559	4305	4752	4633	1933	865	2742	710	520	642	1710	548	550	420	677	298	410	183
	SV-27	192	151	718	944	789	1117	1518	3922	1256	1485	1650	947	840	1040	313	769	745	620	318	320	277	350	210	289	309	233	241
	SV-28	15	87	77	151	178	310	211	730	335	1250	3624	5592	5447	4380	1438	6351	1440	1100	1588	4527	1575	886	610	759	181	856	300
	SV-29	8	66	55	20	52	130	1	15	35	21	352	255	83	41	1375	43	80	41	52	117	70	61	20	318	62	63	53
Breakdown of Wellfield VOC Flux by Phase																												
Phase 1:		48%	45%	70%	51%	46%	59%	51%	37%	48%	36%	49%	45%	42%	33%	25%	25%	21%	18%	30%	12%	22%	30%	29%	35%	19%	16%	49%
Phase 2:		52%	55%	30%	49%	54%	41%	50%	63%	52%	64%	51%	55%	58%	67%	75%	75%	79%	82%	70%	88%	78%	70%	71%	65%	81%	84%	51%

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Table 3. Estimated Mass Loading by Manifold Leg/Phase

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14	12/31/14	1/9/15	1/16/15	1/22/15	1/29/15	2/5/15
1	SV-1	0.5%	0.7%	3.5%	1.5%	3.0%	1.6%	1.7%	1.0%	1.1%	0.7%	0.0%	1.3%	0.8%	1.2%	2.2%	1.2%	1.0%	0.6%	0.6%	0.4%	0.9%	0.7%	0.6%	1.2%	0.3%	0.4%	2.4%
	SV-2	2.0%	1.3%	4.3%	2.6%	3.6%	3.0%	4.7%	2.5%	1.9%	0.8%	2.4%	1.8%	1.2%	1.7%	1.6%	1.3%	1.4%	1.3%	1.3%	1.0%	1.9%	2.2%	1.7%	2.8%	2.7%	1.0%	3.9%
	SV-3	3.5%	7.5%	16.2%	7.4%	5.0%	8.9%	5.0%	4.5%	7.1%	1.3%	5.7%	2.6%	0.7%	0.2%	0.3%	5.1%	4.2%	3.3%	3.2%	3.5%	1.7%	9.4%	4.5%	5.0%	4.7%	3.3%	10.5%
	SV-4	3.3%	2.5%	8.5%	5.7%	5.5%	5.9%	3.3%	3.5%	4.8%	3.9%	4.5%	3.2%	3.1%	3.8%	3.0%	4.4%	3.5%	4.5%	3.0%	2.3%	1.5%	1.8%	3.4%	3.3%	1.8%	1.0%	3.4%
	SV-5	2.5%	2.9%	9.6%	2.5%	1.6%	3.1%	3.2%	3.2%	2.1%	1.9%	1.4%	1.5%	1.0%	0.5%	0.9%	0.7%	1.0%	0.3%	0.6%	0.3%	1.2%	0.2%	1.2%	1.8%	0.8%	0.4%	2.1%
	SV-6	2.5%	1.4%	3.8%	1.6%	1.2%	4.1%	3.0%	3.4%	3.7%	4.5%	3.5%	3.0%	2.4%	3.1%	1.1%	1.6%	0.6%	0.3%	1.4%	0.3%	0.5%	0.4%	1.4%	1.6%	1.5%	0.5%	2.7%
	SV-8	8.7%	2.9%	4.4%	7.1%	6.3%	8.7%	6.8%	3.1%	0.4%	0.1%	5.9%	3.5%	4.4%	0.1%	4.2%	1.6%	1.0%	0.8%	2.6%	0.3%	0.9%	1.0%	0.6%	1.1%	0.4%	0.6%	1.6%
	SV-9	9.0%	0.9%	1.3%	6.0%	5.8%	8.4%	6.4%	7.3%	6.9%	6.6%	6.2%	3.9%	6.8%	4.8%	3.6%	1.0%	2.5%	2.0%	3.7%	1.1%	1.9%	2.0%	2.7%	3.8%	1.7%	1.7%	4.7%
	SV-10	2.4%	0.5%	3.0%	1.3%	1.7%	2.1%	1.8%	1.5%	2.2%	0.9%	2.0%	2.1%	0.7%	2.3%	1.6%	1.4%	1.1%	1.0%	3.6%	0.4%	0.8%	0.9%	1.0%	0.7%	0.3%	0.0%	0.4%
	SV-11	1.3%	2.3%	3.4%	2.2%	3.4%	1.9%	1.0%	0.9%	1.5%	1.4%	1.2%	1.0%	0.6%	0.3%	0.5%	1.2%	0.7%	0.5%	0.3%	0.3%	0.7%	0.8%	0.8%	0.8%	0.2%	0.5%	1.7%
	SV-12	0.3%	0.5%	0.6%	0.4%	0.5%	2.3%	4.8%	2.4%	1.6%	1.4%	1.8%	2.7%	1.2%	1.0%	0.7%	0.7%	1.0%	0.8%	3.7%	1.3%	3.1%	3.0%	3.1%	1.7%	0.3%	1.7%	2.8%
	SV-13	0.6%	0.9%	1.6%	0.2%	0.3%	1.4%	2.0%	1.3%	1.2%	0.2%	0.2%	0.7%	0.2%	0.2%	0.4%	0.8%	0.2%	0.1%	0.4%	0.1%	1.0%	0.9%	1.0%	0.9%	0.2%	0.6%	1.0%
	SV-14	2.3%	6.1%	5.8%	7.5%	5.5%	2.2%	1.1%	2.0%	4.5%	6.3%	6.9%	7.4%	12.7%	13.1%	3.3%	1.8%	1.5%	0.9%	3.3%	0.7%	2.7%	3.5%	3.2%	3.3%	1.5%	0.8%	2.3%
	SV-15	9.5%	14.7%	3.9%	5.3%	2.8%	5.6%	5.7%	0.5%	8.8%	5.8%	6.9%	10.4%	6.4%	0.9%	1.8%	2.3%	1.5%	1.3%	2.3%	0.3%	2.8%	3.1%	3.9%	6.7%	2.6%	3.2%	9.5%
2 (and between divider line)	SV-7	2.2%	1.5%	1.9%	1.5%	2.9%	4.2%	2.3%	1.1%	3.9%	4.8%	3.8%	4.0%	3.2%	0.3%	3.1%	5.3%	2.5%	2.1%	3.3%	1.3%	1.1%	0.9%	1.2%	1.7%	0.8%	0.3%	0.7%
	SV-16	9.5%	7.1%	1.1%	5.7%	6.2%	6.6%	6.9%	5.2%	8.0%	8.7%	6.9%	6.9%	8.0%	0.0%	6.8%	10.3%	10.5%	6.6%	18.3%	5.0%	8.1%	10.5%	11.1%	14.4%	12.9%	8.6%	12.9%
	SV-17	2.9%	0.1%	-3.3%	2.1%	1.6%	-1.5%	-0.6%	-0.5%	-1.6%	-3.1%	-2.0%	-1.3%	0.0%	-2.8%	0.7%	6.0%	1.3%	0.7%	-1.0%	0.5%	1.6%	1.2%	-1.1%	0.5%	0.5%	0.3%	0.6%
	SV-18	5.5%	11.4%	4.9%	6.8%	5.6%	6.7%	7.8%	13.0%	9.5%	6.6%	3.6%	4.3%	7.1%	22.8%	10.5%	8.2%	14.5%	9.1%	7.9%	13.9%	10.4%	10.8%	12.9%	10.1%	19.2%	11.2%	2.2%
	SV-19	3.6%	0.3%	-2.0%	5.5%	6.3%	0.6%	2.8%	3.0%	3.2%	6.5%	6.4%	4.3%	3.0%	3.4%	2.0%	0.7%	1.2%	0.7%	0.9%	0.6%	1.7%	0.6%	0.2%	0.5%	0.7%	0.6%	1.3%
	SV-20	7.2%	12.0%	7.2%	6.2%	6.3%	5.7%	5.5%	11.9%	6.1%	2.8%	2.9%	0.6%	5.0%	14.1%	11.0%	8.9%	8.7%	23.9%	14.6%	16.8%	10.7%	13.4%	16.3%	9.3%	10.4%	36.1%	15.9%
	SV-21	2.6%	2.0%	3.8%	0.9%	2.4%	3.2%	2.9%	3.6%	2.5%	5.3%	1.6%	-0.4%	2.2%	0.2%	3.5%	6.3%	5.8%	4.3%	1.4%	4.8%	3.0%	3.5%	1.1%	1.6%	3.8%	1.9%	-1.2%
	SV-22	8.5%	9.3%	8.3%	5.9%	7.6%	6.7%	7.0%	12.2%	8.5%	6.7%	4.8%	3.9%	4.4%	0.1%	9.9%	5.4%	11.5%	19.8%	11.5%	13.6%	14.3%	14.0%	16.1%	7.8%	10.4%	8.4%	9.2%
	SV-23	5.2%	-2.9%	-2.4%	1.9%	4.4%	-0.3%	0.5%	0.3%	1.0%	8.8%	1.3%	4.6%	2.9%	6.2%	10.3%	3.2%	3.4%	2.6%	-0.2%	-0.2%	2.4%	-6.0%	-2.0%	2.6%	11.6%	6.4%	-7.9%
	SV-24	4.0%	8.5%	9.4%	7.2%	6.2%	4.4%	5.6%	10.3%	4.7%	8.0%	6.8%	7.4%	7.4%	13.6%	8.3%	6.5%	11.3%	8.5%	7.7%	14.7%	13.7%	11.6%	8.4%	8.9%	10.0%	7.0%	6.6%
	SV-25	-0.1%	1.1%	0.0%	0.7%	0.8%	0.1%	1.5%	0.1%	1.4%	2.1%	0.2%	1.3%	1.2%	-0.2%	0.0%	0.5%	0.3%	0.4%	0.1%	0.2%	0.0%	0.4%	0.8%	0.2%	-1.0%	0.0%	1.1%
	SV-26	0.3%	2.2%	1.9%	1.9%	2.4%	1.6%	3.4%	1.0%	1.6%	4.3%	6.8%	8.1%	5.9%	3.2%	2.7%	3.9%	2.8%	1.1%	1.7%	4.0%	2.6%	3.2%	2.2%	2.8%	0.7%	1.1%	3.1%
	SV-27	0.1%	0.7%	-0.5%	1.7%	0.4%	1.4%	3.2%	1.2%	2.4%	1.1%	2.0%	0.4%	0.2%	0.0%	-1.5%	0.1%	0.7%	0.5%	0.2%	0.5%	0.5%	1.0%	0.8%	0.6%	0.7%	0.2%	1.2%
	SV-28	0.0%	1.0%	0.5%	0.6%	0.7%	0.8%	0.6%	0.5%	0.9%	1.7%	5.5%	10.1%	6.9%	6.1%	3.8%	9.5%	4.2%	2.0%	3.4%	11.6%	7.9%	4.8%	2.7%	3.2%	0.4%	2.0%	4.7%
	SV-29	0.0%	0.6%	0.4%	0.1%	0.2%	0.4%	0.0%	0.0%	0.1%	0.0%	0.6%	0.5%	0.2%	0.1%	3.7%	0.1%	0.3%	0.1%	0.1%	0.3%	0.4%	0.3%	0.1%	1.0%	0.1%	0.1%	0.7%
Total:		100%	100%	101%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note: Six out of the 23 wellfield branch lines service both Phase 1 and Phase 2; therfore, a correction has been made to subtract the shared mass sometimes resulting in a negative value. This value indicates that the mass contribution from the Phase 2 area was limited in that particular sample round. This is a result of the accuracy of the flow and PID data measurements collected.

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2 TEMPERATURE PROGRESS

Table 2 summarizes the average target treatment zone temperature for Phase 2 only, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* As of 01/08/15, Phase 1 is only partially operational; therefore, temperature data for Phase 1 is no longer included. As of

Phase 2 heating began on 7/16/14 but was stopped on 8/14/14, as a result of the oxidizer shutdown, and reenergized on 09/30/14. Figure 1b displays the average Phase 2 target treatment zone temperature as compared with the predicted subsurface temperature based on TerraTherm's modeling.

Table 2. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	2/8/15	
Phase 1 Entire TTZ Average Temperature	N/A	°C
Phase 2 Entire TTZ Average Temperature	100	°C
Phase 1 Centroid Average Temperature	N/A	°C
Phase 2 Centroid Average Temperature	99	°C

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N/A

Figure 1a. Phase 1 Observed vs. Modeled Temperatures

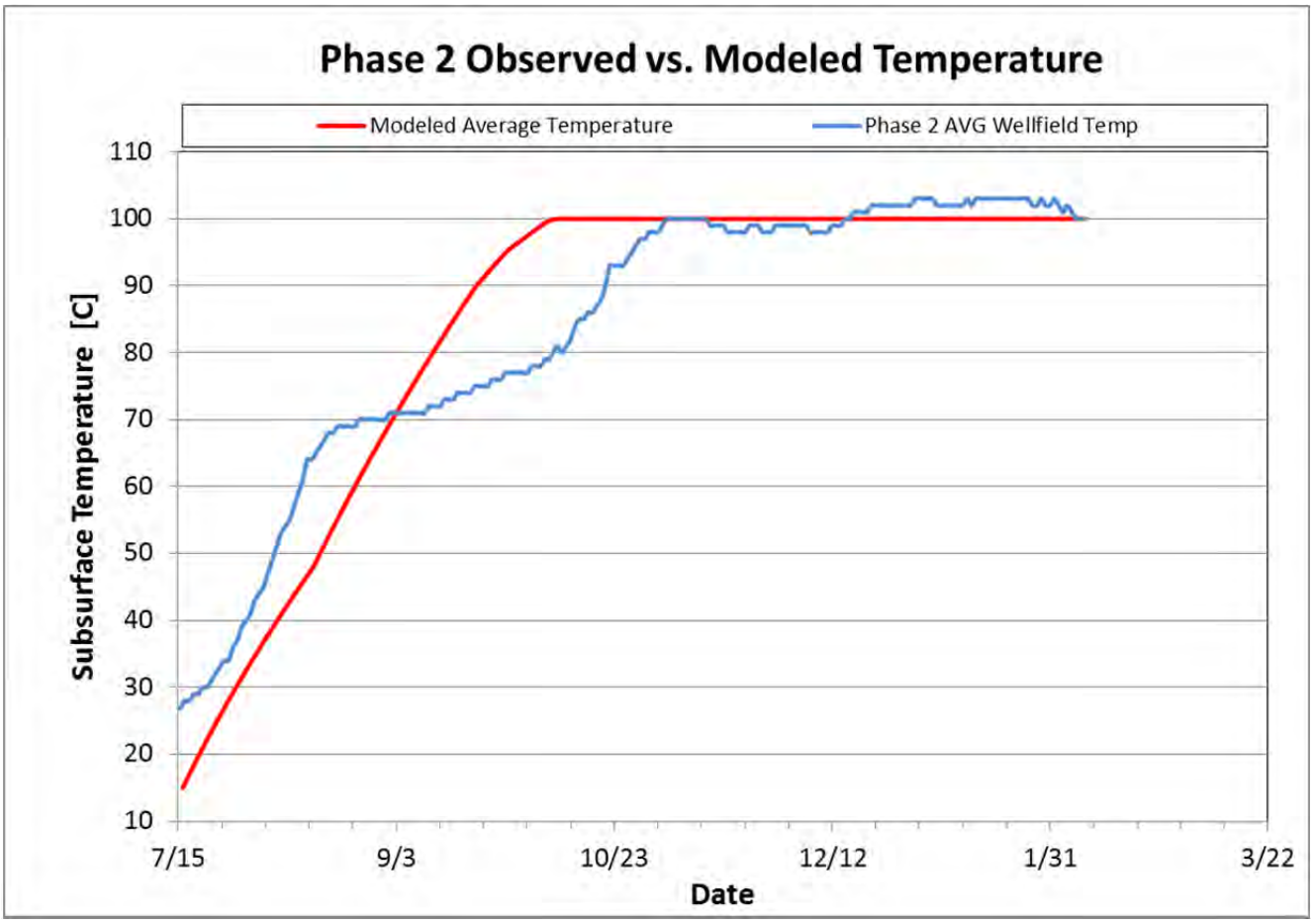


Figure 1b. Phase 2 Observed vs. Modeled Temperatures

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was increased on 8/30/14. On 1/15/15 the vapor extraction rate was decreased again.

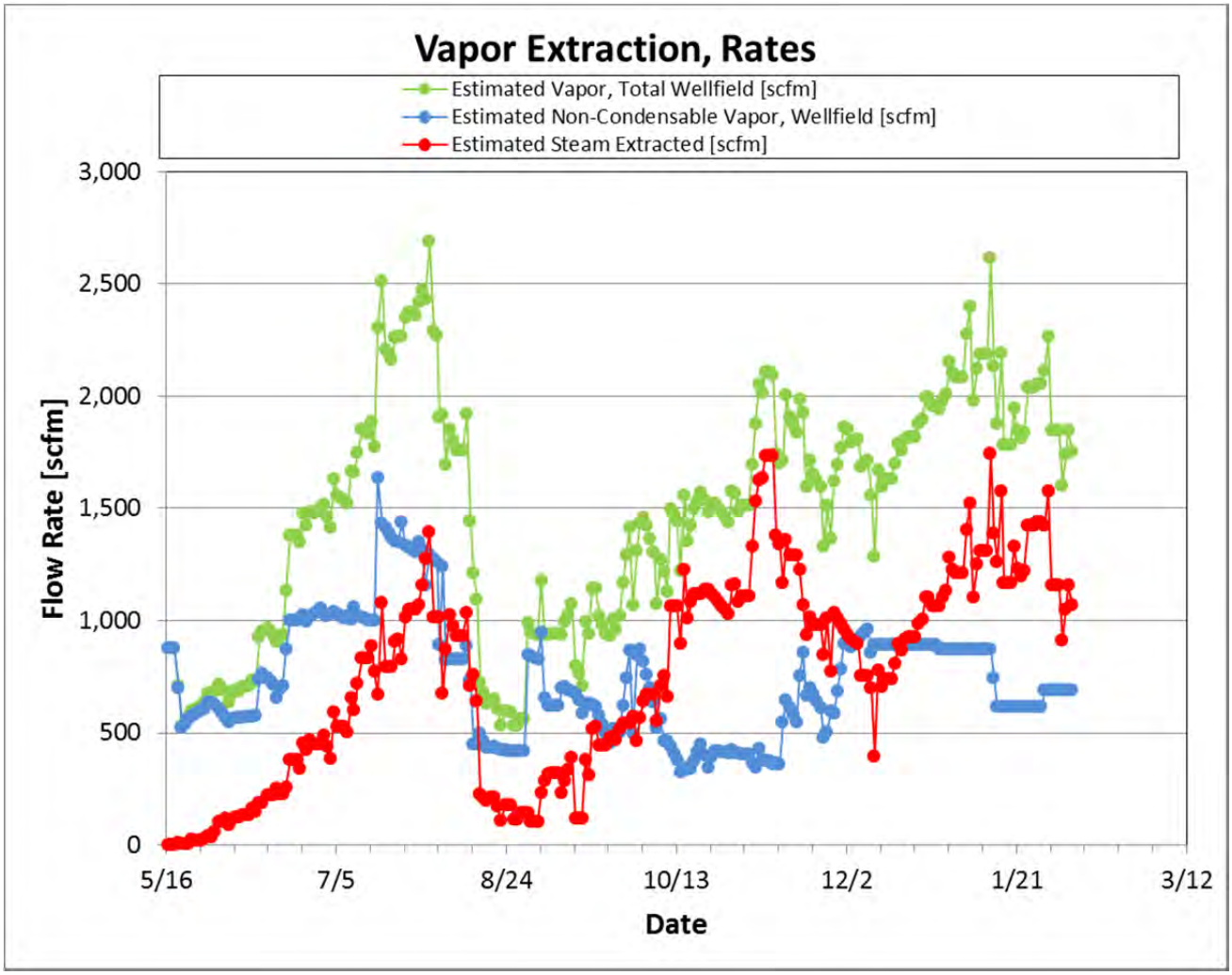


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Please note that the flammability analyzer is no longer online (corresponds with taking the oxidizer offline).

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

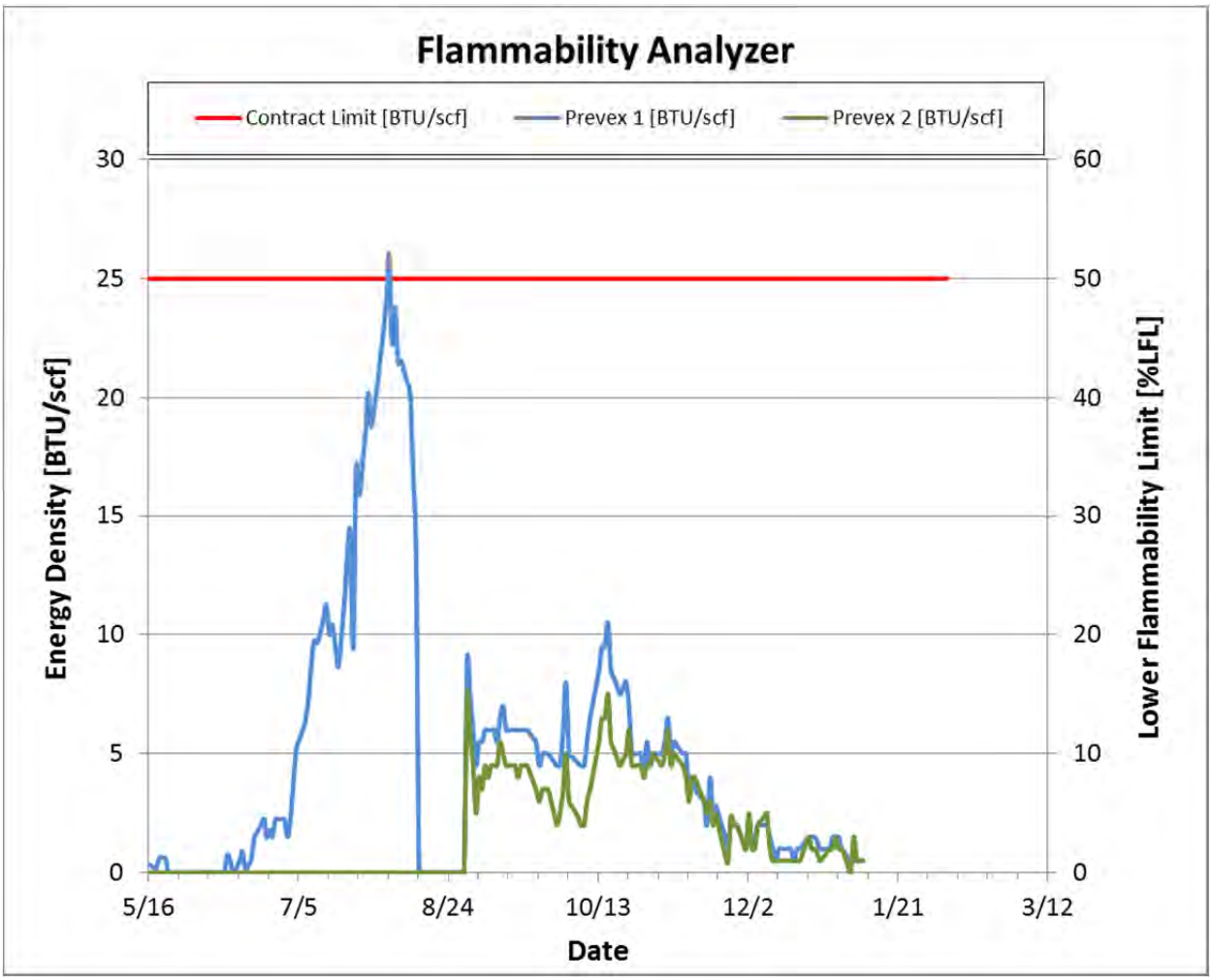


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed through 01/09/15 is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. Mass removal starting 01/10/15 is reported as the total compounds detected in the laboratory data corrected using the PID plus the accumulated LNAPL. The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively. Please note that the mass removal rates are shown on a logarithmic scale.

The decrease in mass removed starting on 8/14/14 corresponds with the oxidizer being offline and the backup carbon online. The heaters were decreased to 10% to extend the life of the carbon.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14, 9/23/14, 9/30/14, 10/7/14, 10/14/14, 10/21/14, 10/30/14, 11/4/14, 11/18/14, 11/25/14, 12/2/14, 12/9/14, 12/16/14, 12/23/14, 12/30/14, 01/06/15, 01/13/15, 01/20/15 and 01/26/15.

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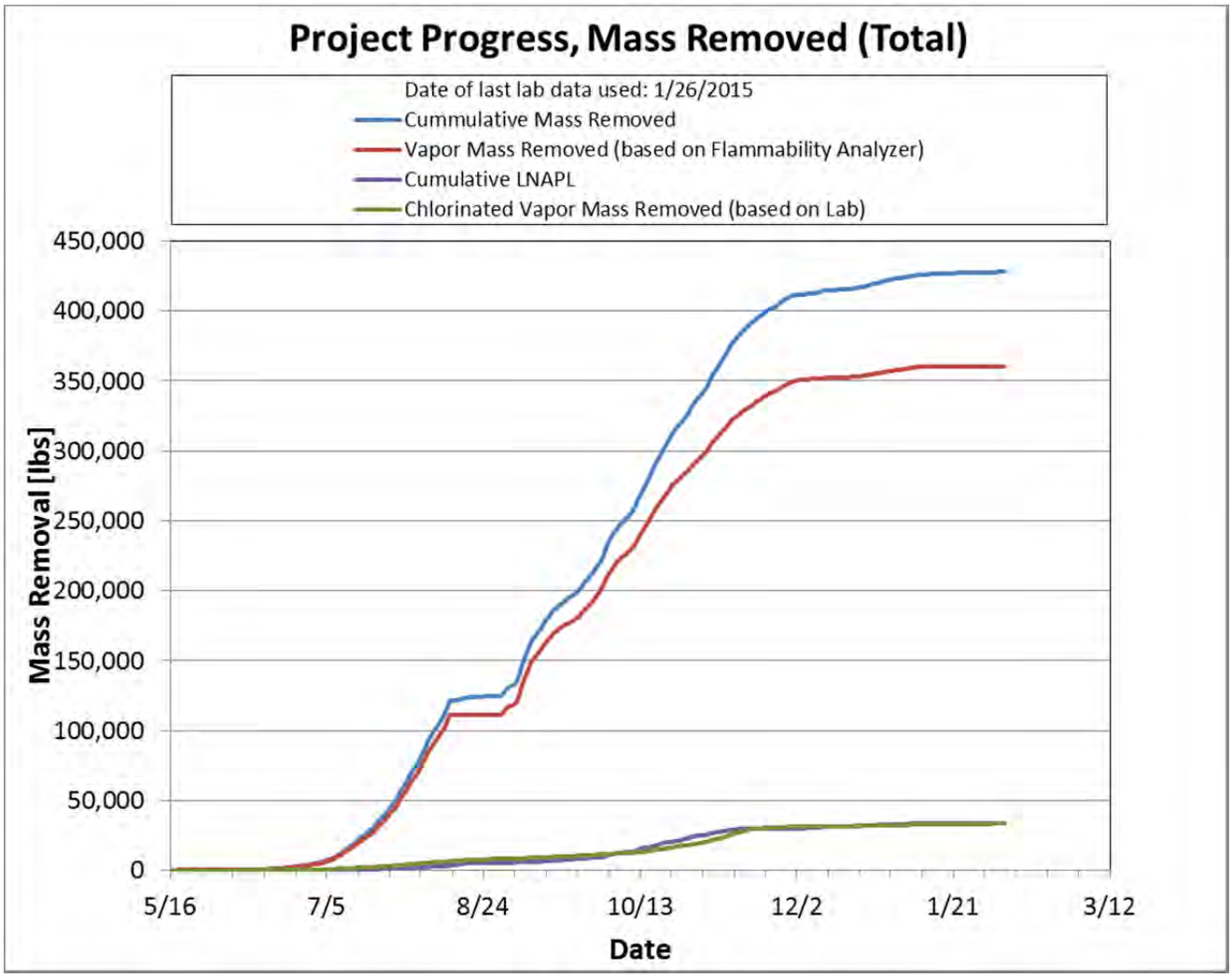


Figure 4a. Project Progress, Mass Removal (Total)

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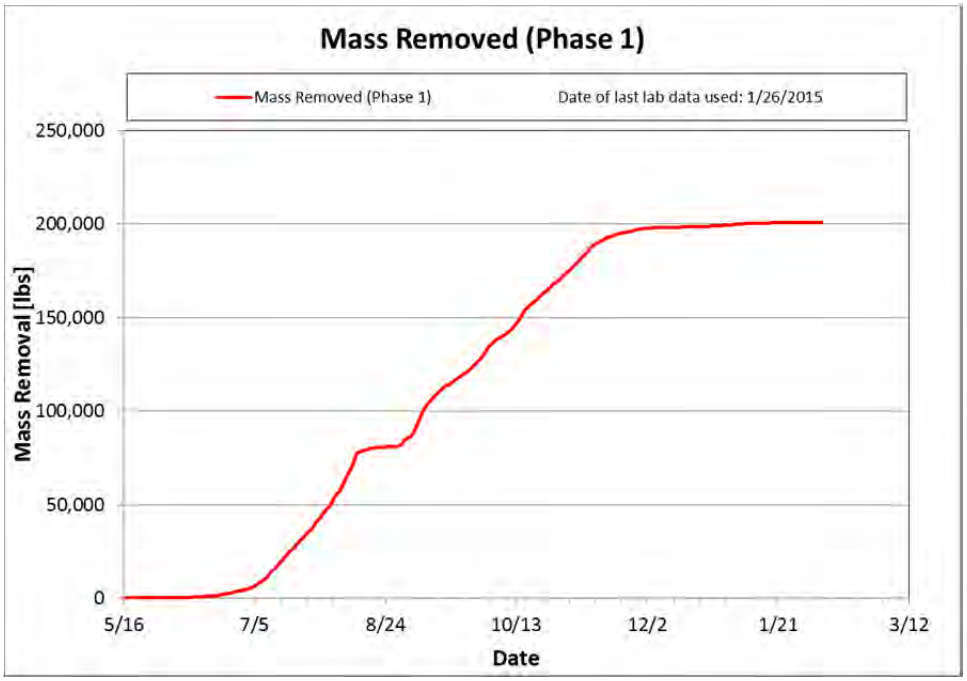


Figure 4b. Project Progress, Mass Removal (Phase 1)

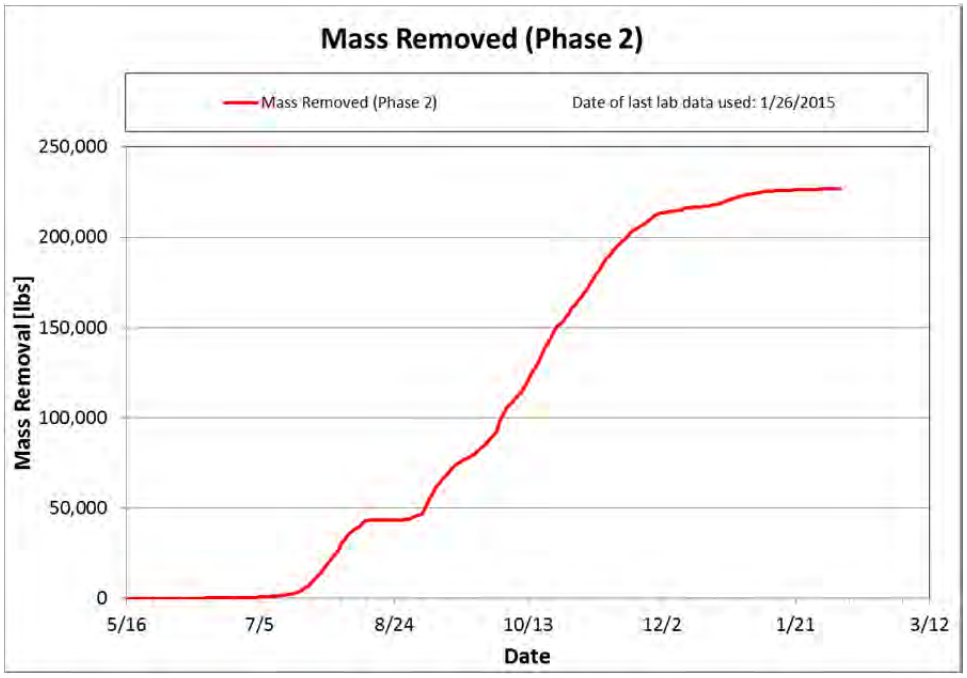


Figure 4c. Project Progress, Mass Removal (Phase 2)

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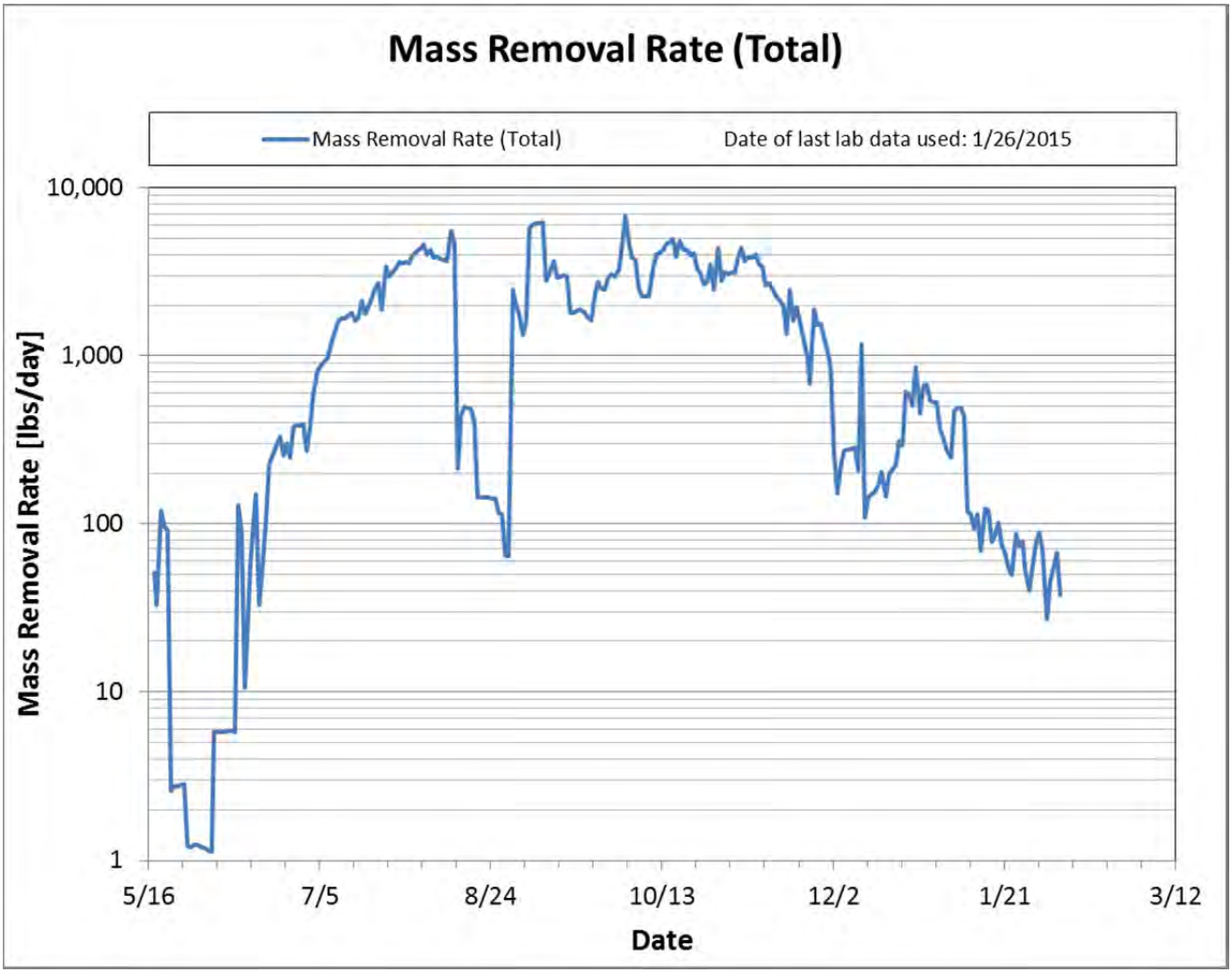


Figure 4d. Mass Removal Rate (Total for Site)

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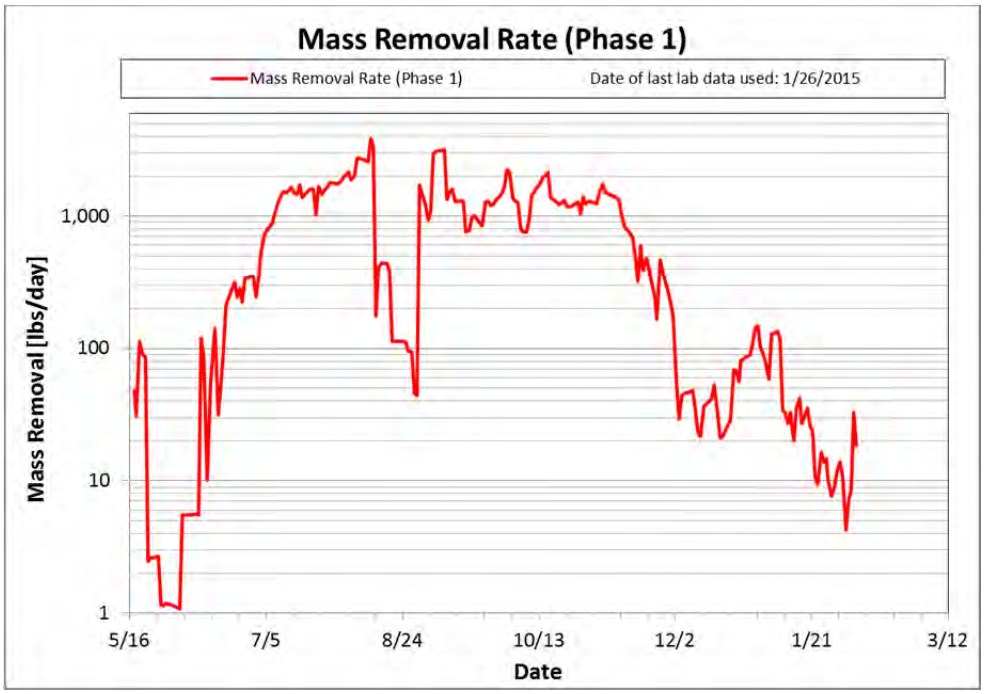


Figure 4e. Mass Removal Rate (Phase 1)

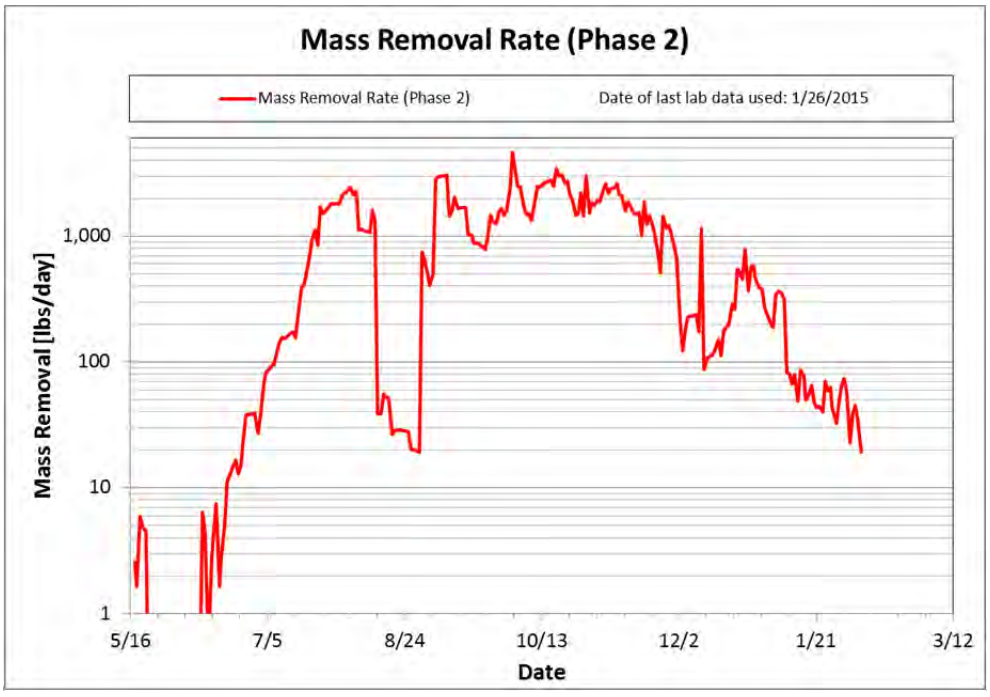


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID and flammability analyzer readings collected at the oxidizer influent over time. It should be noted that PID readings are first collected using an 11.7 eV lamp (determined by site contaminants). If the reading exceeds the limit of the meter (>2000 ppm), the readings are collected using a 10.6 eV lamp. When both meters are used, the maximum value is recorded.

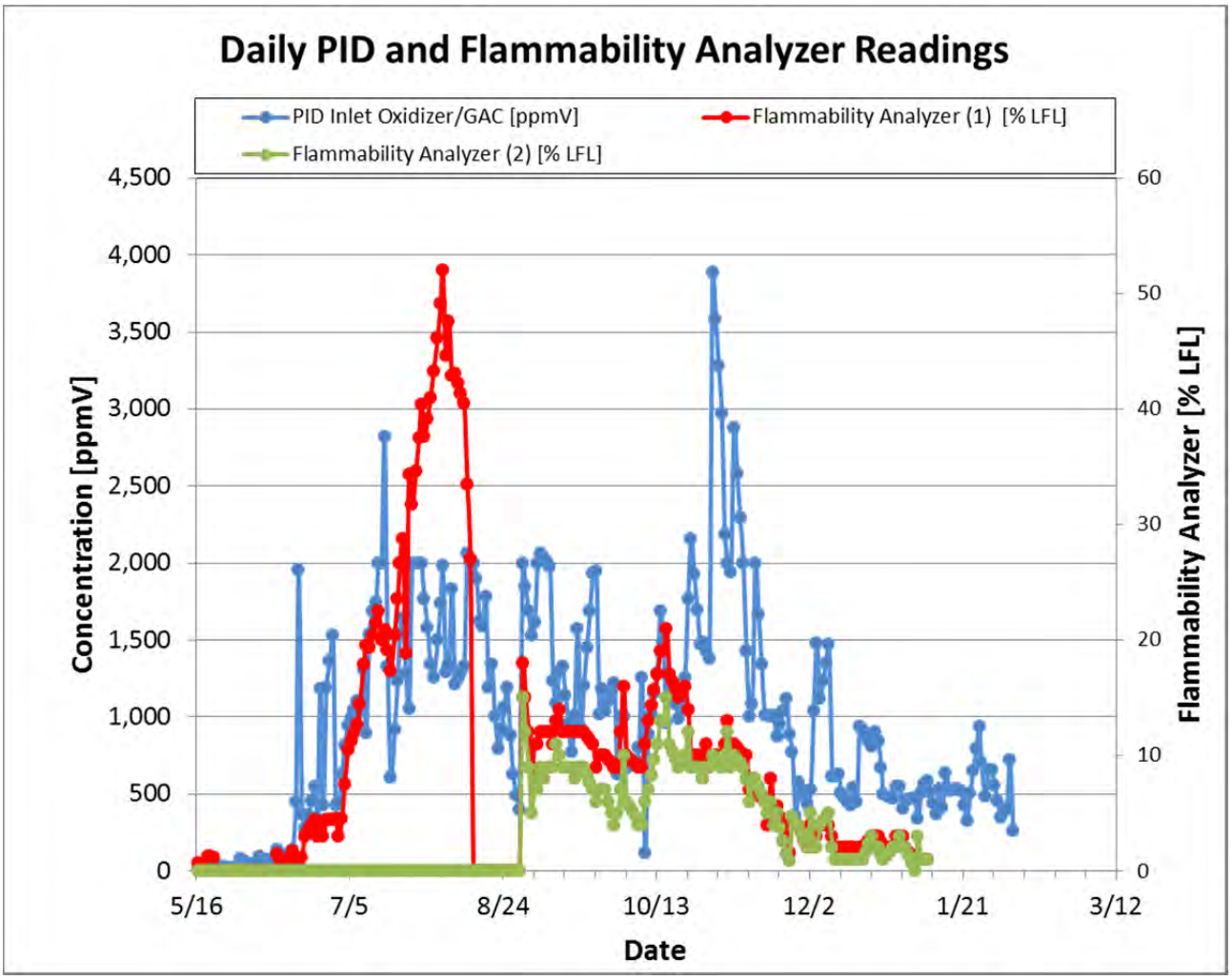


Figure 5. Daily PID and Flammability Analyzer Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13, after the oxidizer shutdown. Decreases in DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-outs.

Influent concentrations collected over the past week were between 260 to 950 ppm, with effluent concentrations ranging between 4 to 66 ppm. While the calculated DRE is less than 95% on some days, calculated mass emissions are less than 2 lbs/hr (air permit limit) by more than 50%.

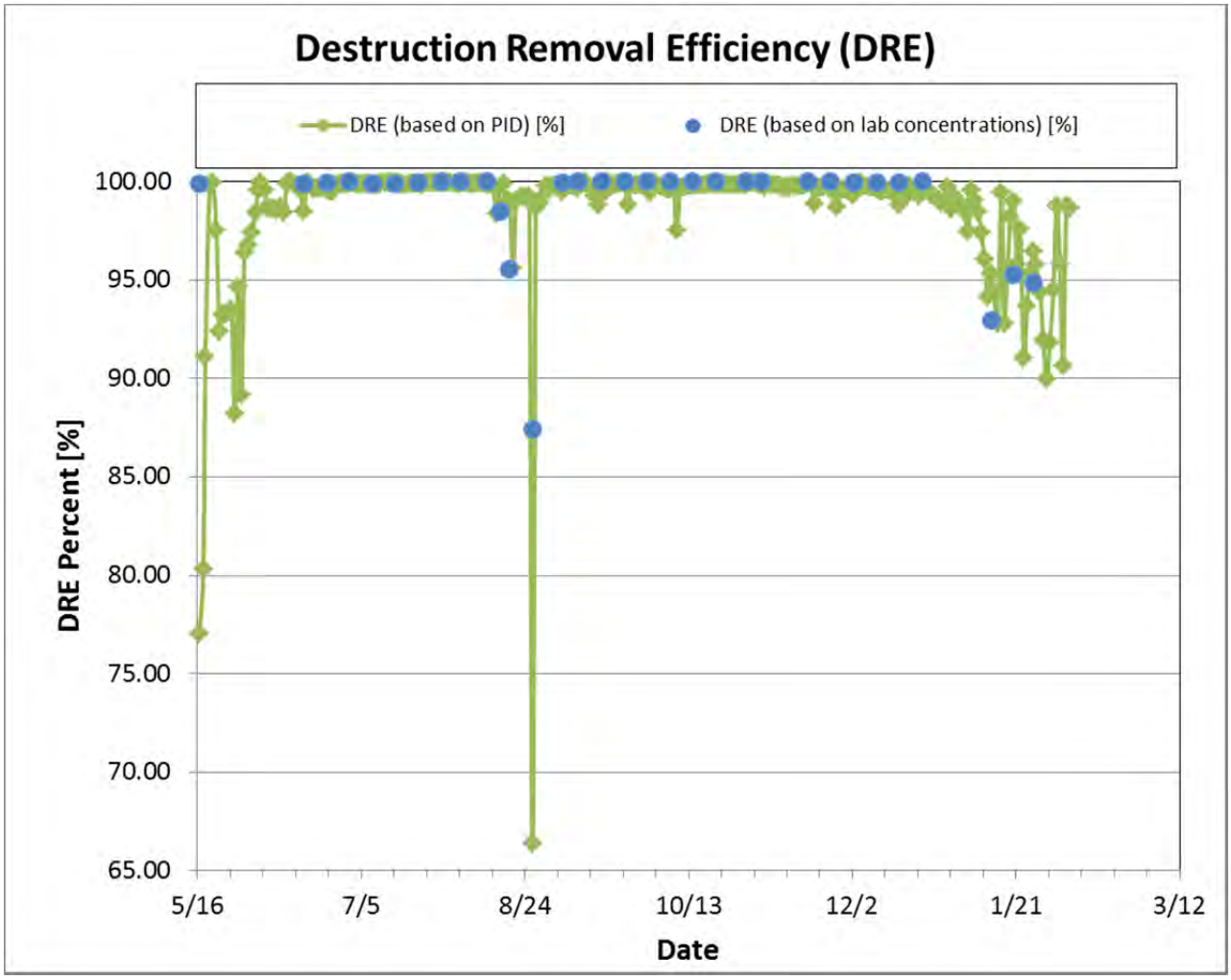


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7. Please note that the graph has been modified to present the estimated modeled energy for the heaters (ISTD) over the original predicted 195 day treatment. This does not take into account contract definitions such as heaters operating at or above 70% energy input. The flatline represents days beyond 195 days.

Please note that the modeled energy usage (12,873,000 kWh) only includes the energy predicted to be added to the subsurface. Therefore, the number should be compared to the cumulative energy added by the ISTD system to the subsurface (red line). The total energy usage (including the treatment system power usage) is predicted to be 15,795,000 kWh as stated in the summary table.

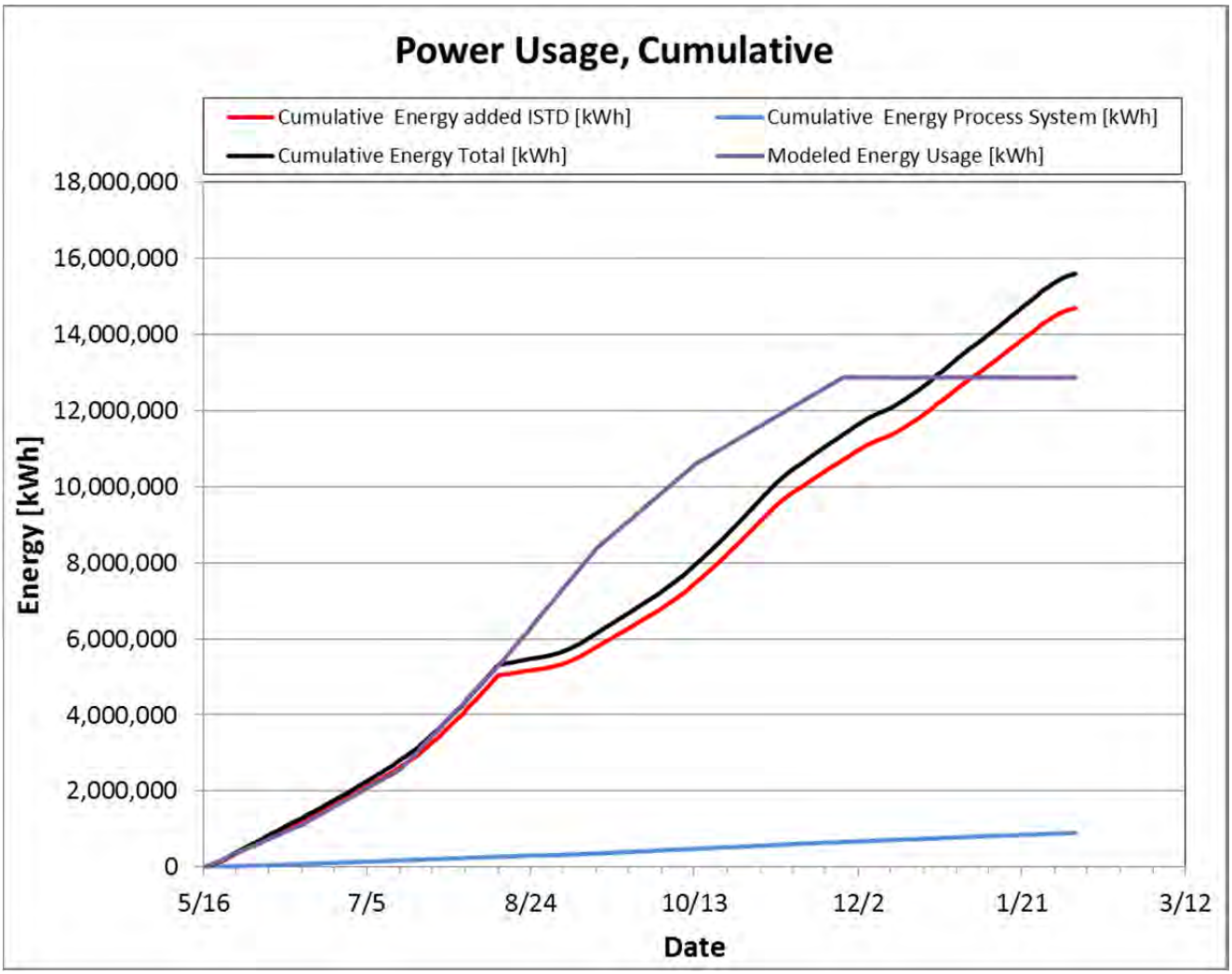


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30/14 and the following days corresponds with ramping of the heaters after placing the oxidizer back online. The decrease observed mid- November is associated with profiling of the heaters in Phase 2 and subsequent adjustments. The increase observed in December corresponds with additional profiling and subsequent adjustments. Approved circuits in Phase 2 were decreased last week with ultimate shutdown of them Monday, 9 February.

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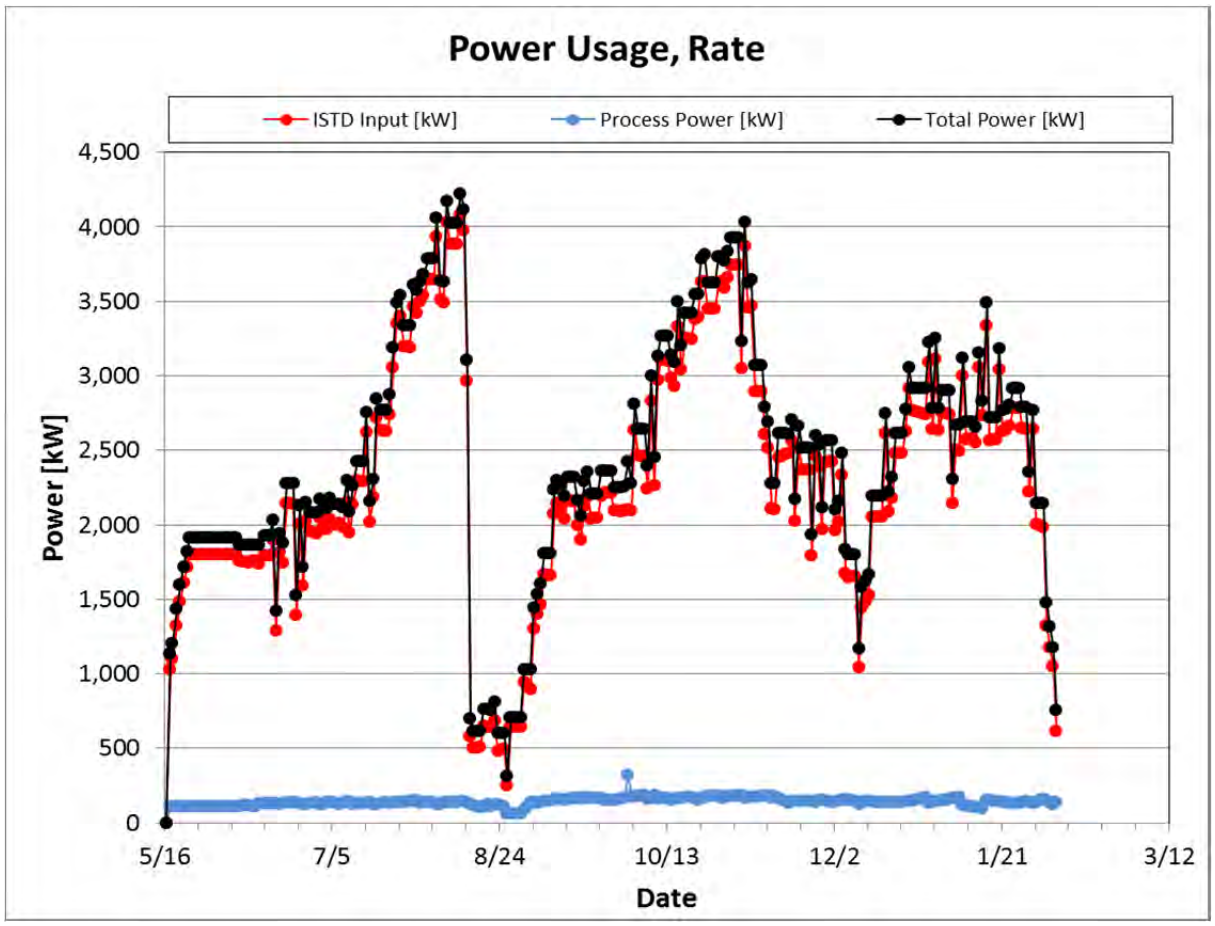


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

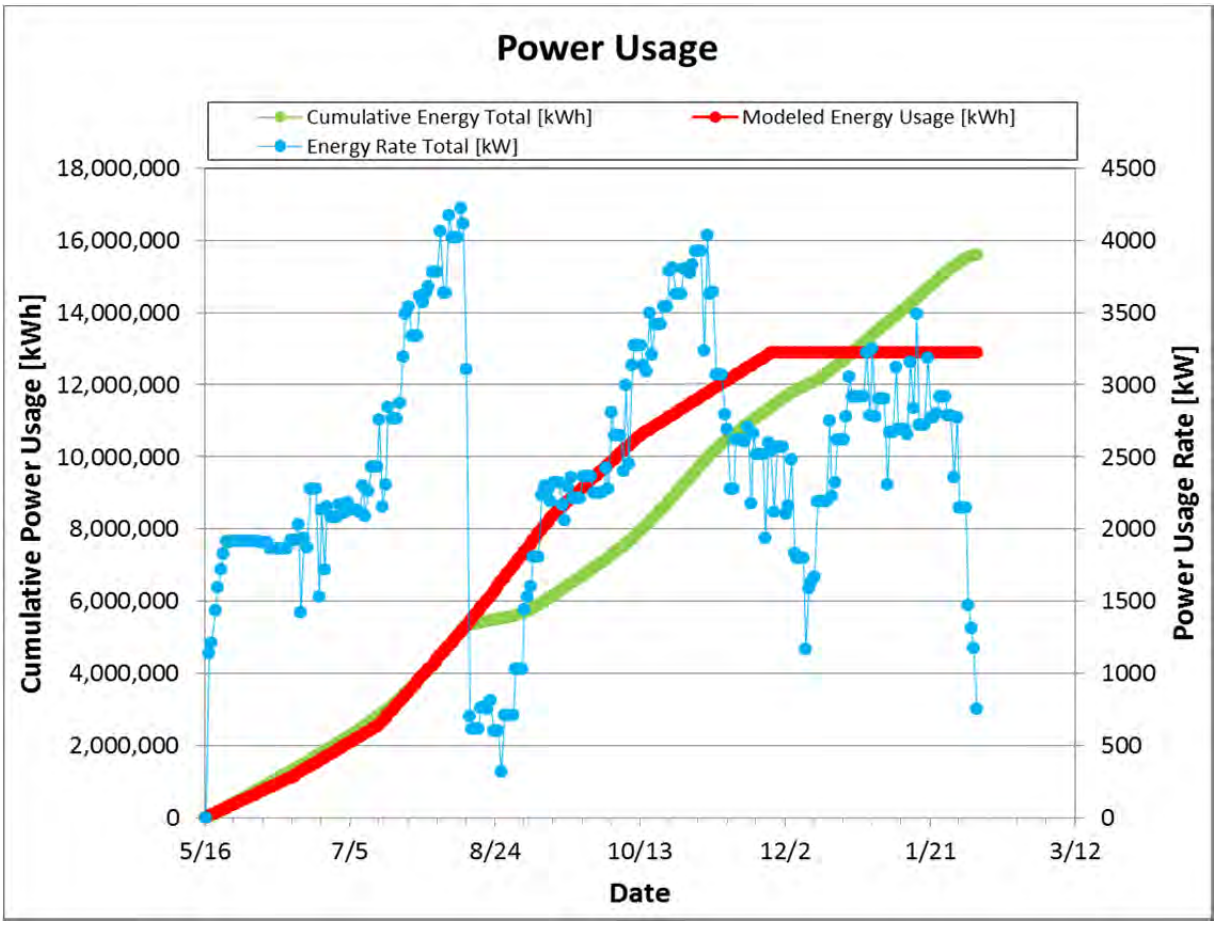


Figure 9. Power Usage

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With the oxidizer offline, natural gas is no longer in demand (as shown below starting on 10 January 2015).

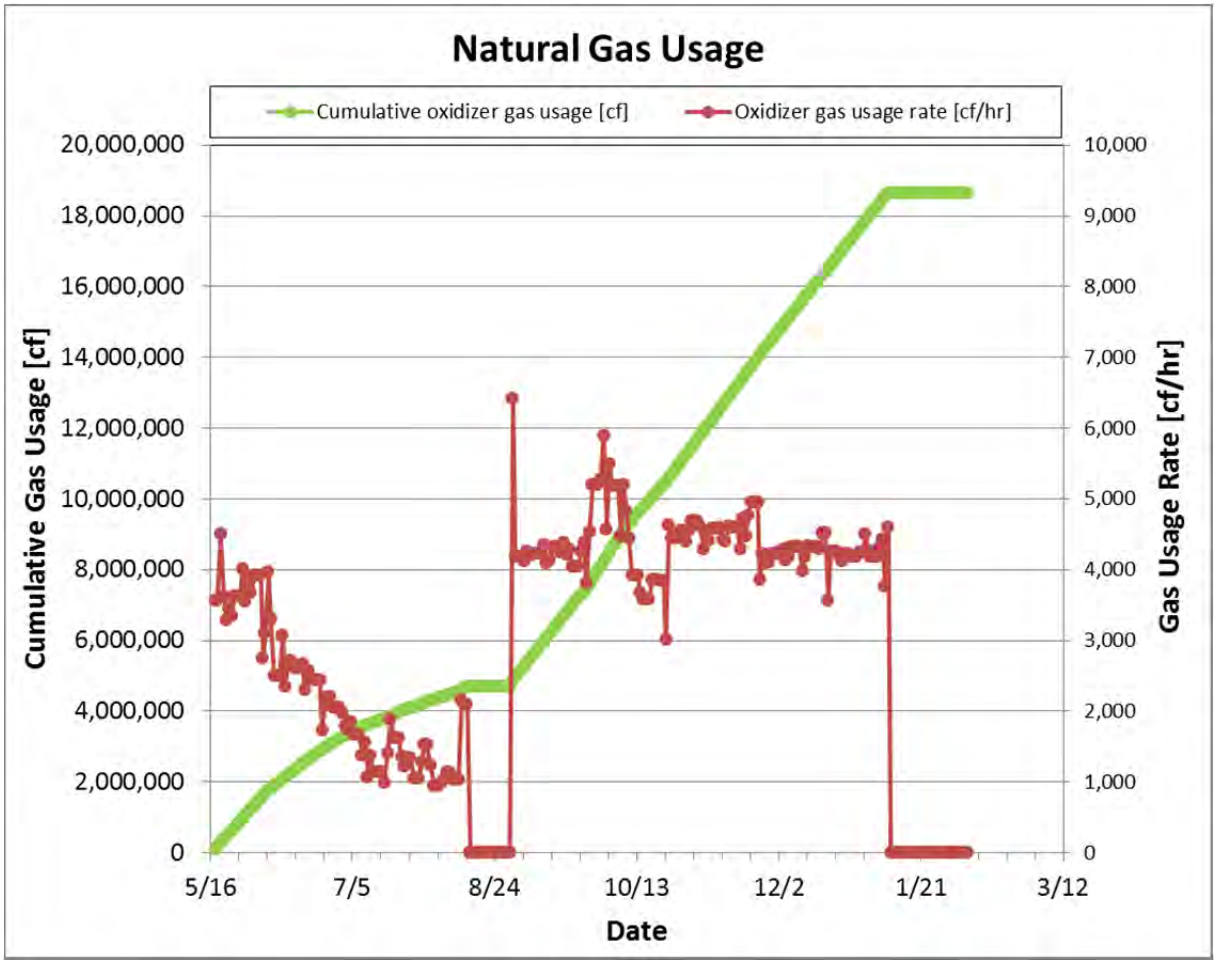


Figure 10. Natural Gas Usage

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With the oxidizer offline, caustic is no longer in demand (as shown below starting on 10 January 2015).

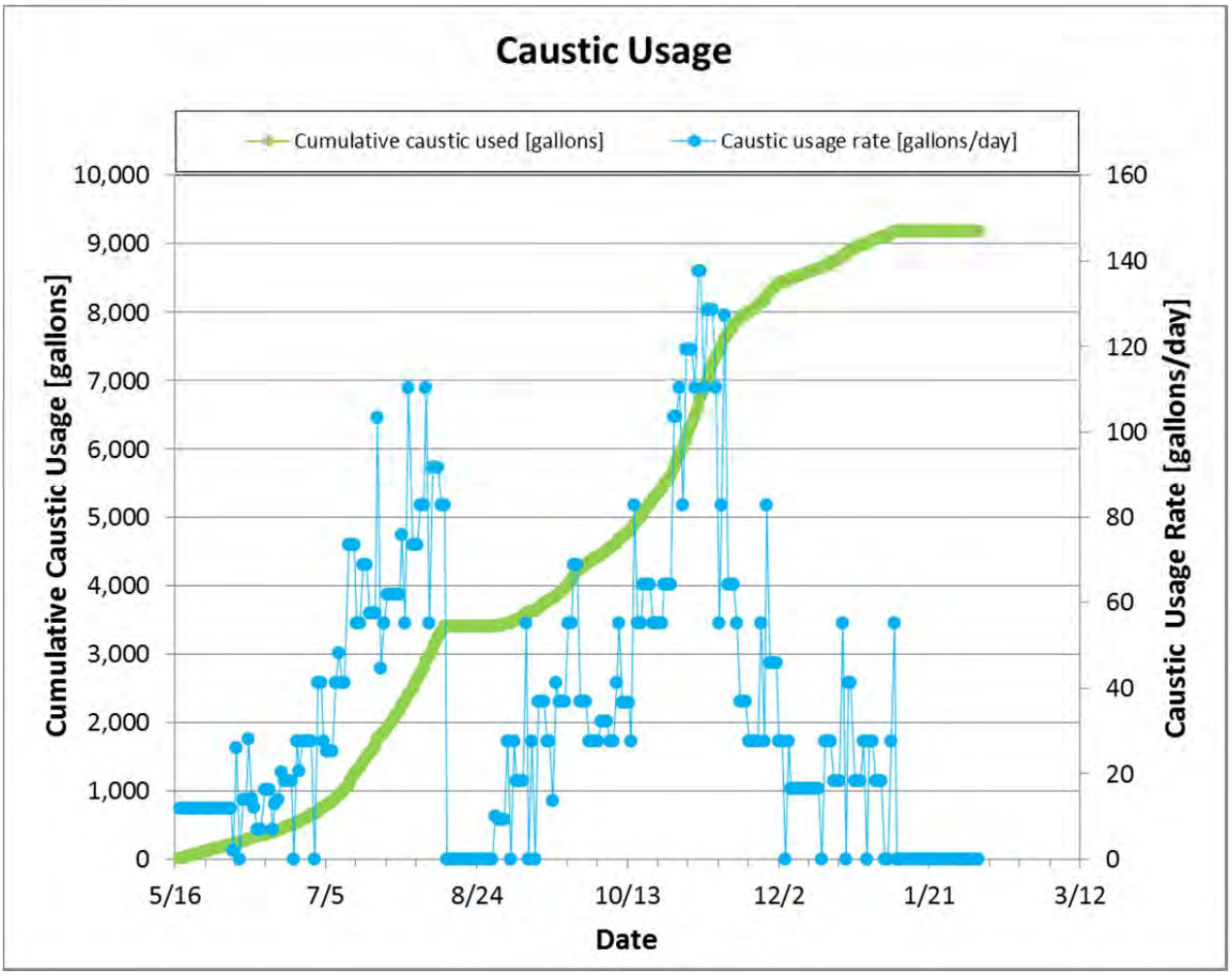


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as: Phase 1 and Phase 2

Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Phase 2 centroids are shown in Figure 12b. As of 12/24/14, we have achieved all three temperature milestones for both Phase 1 and Phase 2.

A table with percentages is also shown (Table 3) reporting those thermocouples which have met target temperatures. As heating continues, it is often necessary to adjust energy to individual circuits which results in either an increase or decrease to an individual thermocouple.

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N/A

Figure 12a. Phase 1 Centroid TTZ Temperatures, Scatterplot

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Please note the decrease in several centroids is due to the reduction in energy to individual circuits in preparation of recircuiting and ultimately taking them offline. The scatterplot in next week's progress report will be more accurate.

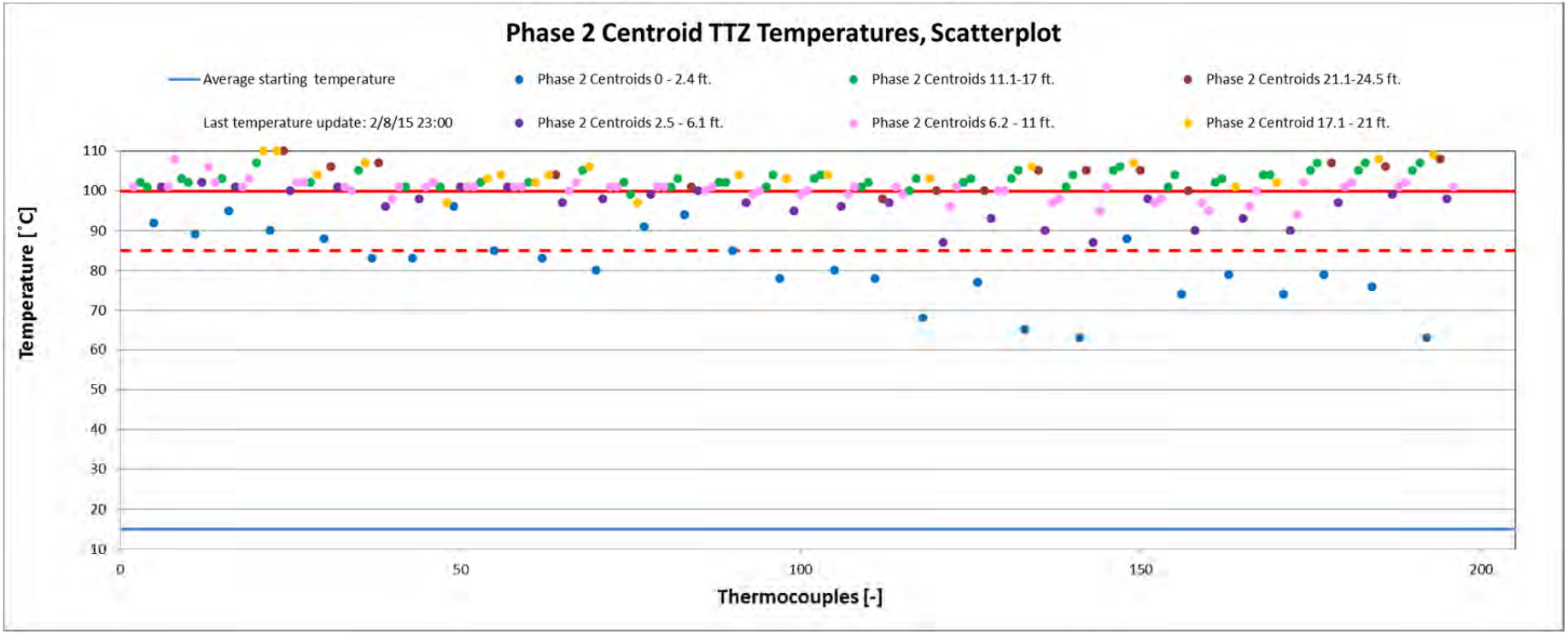


Figure 12b. Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 3. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots

	Value	Unit
Date of Last Update	2/8/15	
Phase 1 Centroid Thermocouples ≥85 ^{0}C	100	%
Phase 1 Centroid Thermocouples ≥100 ^{0}C	97	%
Phase 2 Centroid Thermocouples ≥85 ^{0}C	99	%
Phase 2 Centroid Thermocouples ≥100 ^{0}C	98	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday, 6 February, 2015 through Friday, 13 February 2015, with temperatures updated through Sunday, 15 February 2015.

Table 1 provides a summary of the project operational status as of Friday, 13 February 2015.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	02/13/15	
Last Temperature Data Update	02/15/15	
Days of Operation (Total)	250	days
Days of Phase 1 Operation	158	days
Days of Phase 2 Operation	141	days
Total Design Energy Usage (ISTD and treatment system)	15,795,000	kWh
Total Energy Added (ISTD)	15,763,900	kWh
Used Electrical Energy vs. Estimate	99.8	%
Total Mass Removal	428,032	lbs
Average Power Input Last 24 Hours	1,030	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,380	scfm
Average Condensate Production Rate Last 24 Hours	4.3	gpm

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Temperature figures and calculations within this progress report represent ALL thermocouples that are currently online, whether they are located in Phase 1 or Phase 2, unless otherwise noted.

The current average wellfield temperature (includes thermocouple sensors in both Phase 1 and Phase 2) is 99°C at the centroid locations and 104 °C at non-centroid locations. This information is shown in the "Phase 2" label of Table 4.

Phase 2 has operated for 141 days. Phase 1 operated for a total of 158 days, which represents days where heaters operated at or above 70% *and* the collection date of the last confirmation soil sample (per contract definition). All three temperature milestones have been achieved for both Phase 1 and 2.

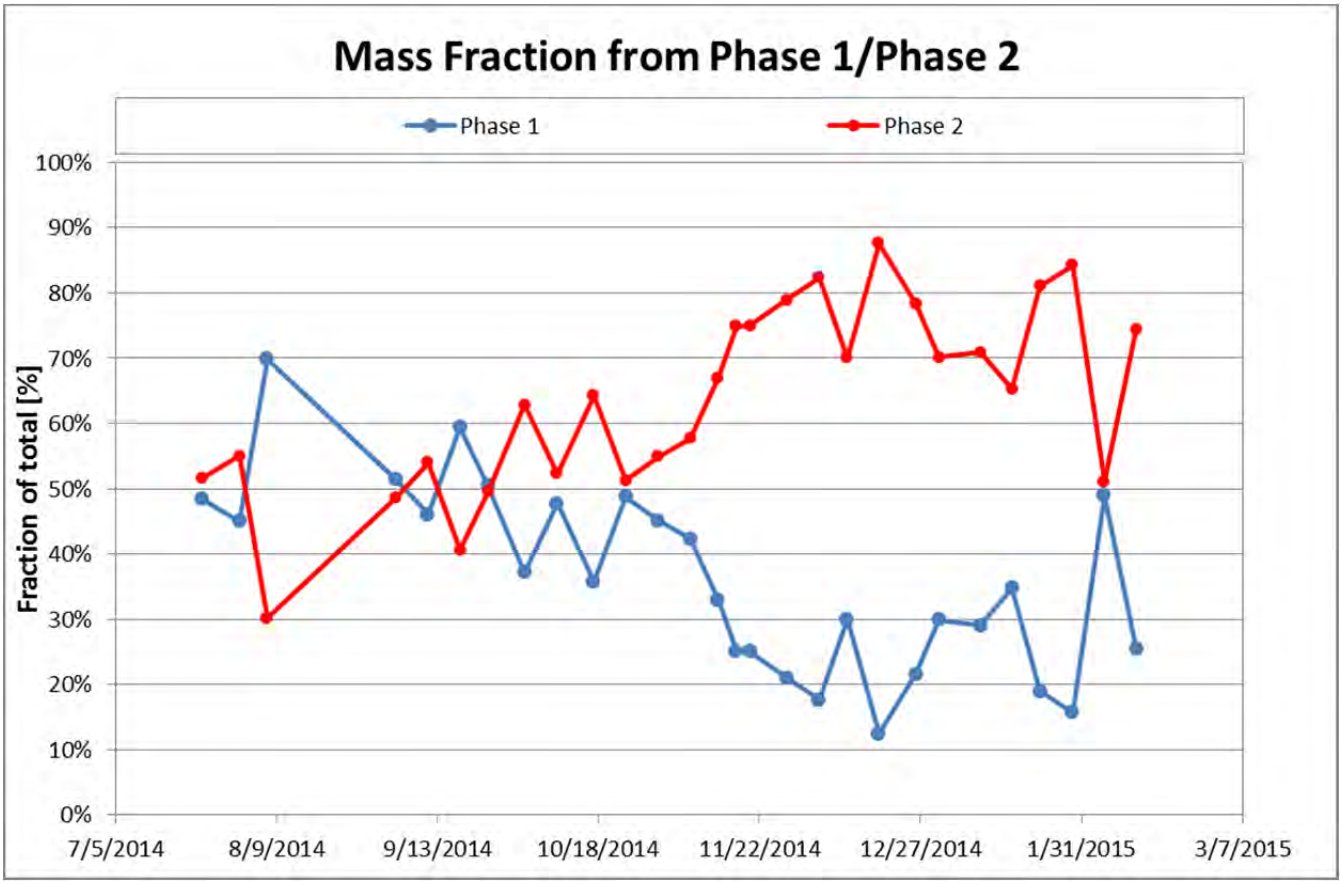
The oxidizer was taken offline on 01/10/15. Vapor treatment is now through the vapor carbon vessels. Estimated mass removed through 01/09/15 (oxidizer online) was reported using the flammability analyzer data, laboratory data for chlorinated compounds that were assumed not to be detected by the flammability analyzer, and accumulated LNAPL. Following the oxidizer being offline (01/10/15), estimated mass removed is calculated using the analytical laboratory data results (TO-15), corrected with daily PID readings, plus the accumulated LNAPL. These results yield a total mass removed of **428,032 lbs** as of 02/13/15. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 02/12/15. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.24:0.76. These ratios were then applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase and leg. These data are included in Tables 2 and 3. Please note that the drop in Phase 2 fraction (and matching increase in Phase 1 fraction) is related to decreases in the measured Phase 2 concentrations at more or less all of the sample locations.

During the 01/22/15 manifold data collection effort, flows were estimated based on the measurement collected at the blower as the wellfield flows were too low to be accurately recorded/measured on the handheld meter.

Mass fraction data over time is presented below.

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Table 2. PID Readings Collected from Manifold Legs

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14	12/31/14	1/9/15	1/16/15	1/22/15	1/29/15	2/5/15	2/12/15
1	SV-1	215	100	745	602	720	604	590	1181	550	516	5	770	712	851	845	790	450	360	236	185	177	170	95	238	128	182	179	201
	SV-2	742	173	1271	887	872	1129	1318	2987	780	770	1610	1004	931	1179	600	934	660	677	482	377	397	436	300	449	810	404	283	91
	SV-3	2588	872	3609	2854	1198	3395	1414	5512	2643	1120	3971	1430	627	99	101	3138	1717	1782	1218	1246	347	1622	725	626	1108	1241	653	86
	SV-4	1971	307	2543	1921	1514	2652	1153	4790	1927	3820	3275	2204	2650	3297	1375	2903	1510	2341	1278	979	333	611	585	477	487	446	300	129
	SV-5	1817	279	1642	740	444	1407	1197	4790	759	1411	950	1153	802	326	302	490	402	135	243	120	235	29	202	248	198	180	129	131
	SV-6	4480	332	1926	956	765	4283	2347	11564	3525	9177	5750	4780	4919	5854	1083	2100	601	435	1271	375	277	197	678	664	1141	699	558	328
	SV-8	3222	385	1330	2375	1479	3267	1816	4744	179	172	3815	1881	1850	88	1475	940	401	450	890	150	178	170	110	244	185	235	94	167
	SV-9	3245	142	324	1993	1565	2995	1777	11950	2762	4967	3801	2121	2863	3227	1265	801	1209	1040	1480	390	350	340	445	445	365	622	298	274
	SV-10	1896	131	2148	1096	1111	2459	1517	4382	1933	1745	3384	2841	1318	4121	1494	1982	1302	1221	3215	500	381	420	400	371	269	99	65	93
	SV-11	1016	666	1712	1979	2145	1988	930	2534	1393	2687	1950	1469	1380	596	596	1360	750	641	270	399	332	354	315	495	271	412	346	333
	SV-12	80	53	158	139	104	815	1427	3234	682	1102	1090	2100	512	563	206	413	440	426	1413	545	569	490	465	201	74	637	143	65
	SV-13	417	211	736	145	170	1452	1476	4291	1109	375	370	985	380	295	315	1210	210	131	432	143	473	445	365	315	139	550	209	187
	SV-14	632	452	1526	2636	1450	777	1610	3411	1917	4668	4274	4150	5565	8416	1107	1053	630	500	1288	300	468	570	493	422	352	366	129	243
	SV-15	3440	1072	1153	2000	915	2150	2054	608	3265	4890	4801	5780	5000	618	654	1623	730	660	1007	115	490	600	705	872	627	1247	742	500
2 (and between divider line)	SV-7	3843	366	1751	1210	1482	4307	1835	3337	3672	9379	7350	5812	7910	553	3115	6391	2860	2977	2810	1323	554	531	500	514	483	300	129	184
	SV-16	3113	885	233	1911	1703	2823	2216	6230	3165	6888	4994	3841	6029	11	2340	6276	3118	3307	7931	1957	1502	1908	1765	2144	3610	3159	821	454
	SV-17	3715	429	306	2928	1824	2801	1837	8933	1927	2713	2954	3313	5408	389	1670	10903	1983	1335	409	800	1133	730	116	718	1223	850	712	501
	SV-18	1760	862	1203	2034	1634	2388	2446	15000	3554	5030	2815	2465	5632	13871	3377	4768	3650	5071	3361	5491	2057	2012	2423	1553	5546	4535	146	1110
	SV-19	2258	350	2067	1971	2005	1818	2038	10522	2191	6417	4561	4398	3067	2693	1075	875	925	530	528	315	552	130	515	438	504	401	263	288
	SV-20	1990	796	1545	2344	1610	2268	2158	15000	2853	2305	2059	343	4053	8642	3534	5500	2725	12650	6352	6520	2084	2492	2750	1673	3511	13673	951	1305
	SV-21	1964	487	2295	2077	1855	3458	1755	8561	2756	8053	4661	2119	4298	2631	2264	6000	4186	4440	2002	2870	937	958	808	634	1346	1644	158	449
	SV-22	2670	980	1606	2222	1892	2466	2448	14750	3344	5023	3578	2236	3582	55	3460	4765	3450	11187	4509	5516	2803	2565	2720	1598	3970	3235	584	792
	SV-23	2515	671	3248	3158	2165	3233	1532	8102	2973	7684	4880	3933	2707	4560	4005	5367	2993	2598	1326	1154	805	883	517	948	3832	3889	163	1017
	SV-24	1412	638	1504	2406	1567	1669	1949	11882	1999	6130	4554	5005	6223	8864	2843	4555	2946	4280	3267	5764	2614	2195	2350	1446	3030	2866	502	957
	SV-25	688	220	1261	1035	1059	1350	2418	5725	1542	2247	1873	1743	1925	991	570	1301	740	773	500	445	400	547	410	457	494	448	350	295
	SV-26	90	185	350	580	573	638	1133	1119	790	3559	4305	4752	4633	1933	865	2742	710	520	642	1710	548	550	420	677	298	410	183	169
	SV-27	192	151	718	944	789	1117	1518	3922	1256	1485	1650	947	840	1040	313	769	745	620	318	320	277	350	210	289	309	233	241	254
	SV-28	15	87	77	151	178	310	211	730	335	1250	3624	5592	5447	4380	1438	6351	1440	1100	1588	4527	1575	886	610	759	181	856	300	175
	SV-29	8	66	55	20	52	130	1	15	35	21	352	255	83	41	1375	43	80	41	52	117	70	61	20	318	62	63	53	34
Breakdown of Wellfield VOC Flux by Phase																													
Phase 1:		48%	45%	70%	51%	46%	59%	51%	37%	48%	36%	49%	45%	42%	33%	25%	25%	21%	18%	30%	12%	22%	30%	29%	35%	19%	16%	49%	26%
Phase 2:		52%	55%	30%	49%	54%	41%	50%	63%	52%	64%	51%	55%	58%	67%	75%	75%	79%	82%	70%	88%	78%	70%	71%	65%	81%	84%	51%	74%

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Table 3. Estimated Mass Loading by Manifold Leg/Phase

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14	12/31/14	1/9/15	1/16/15	1/22/15	1/29/15	2/5/15	2/12/15
1	SV-1	0.5%	0.7%	3.5%	1.5%	3.0%	1.6%	1.7%	1.0%	1.1%	0.7%	0.0%	1.3%	0.8%	1.2%	2.2%	1.2%	1.0%	0.6%	0.6%	0.4%	0.9%	0.7%	0.6%	1.2%	0.3%	0.4%	2.4%	2.1%
	SV-2	2.0%	1.3%	4.3%	2.6%	3.6%	3.0%	4.7%	2.5%	1.9%	0.8%	2.4%	1.8%	1.2%	1.7%	1.6%	1.3%	1.4%	1.3%	1.3%	1.0%	1.9%	2.2%	1.7%	2.8%	2.7%	1.0%	3.9%	1.0%
	SV-3	3.5%	7.5%	16.2%	7.4%	5.0%	8.9%	5.0%	4.5%	7.1%	1.3%	5.7%	2.6%	0.7%	0.2%	0.3%	5.1%	4.2%	3.3%	3.2%	3.5%	1.7%	9.4%	4.5%	5.0%	4.7%	3.3%	10.5%	0.9%
	SV-4	3.3%	2.5%	8.5%	5.7%	5.5%	5.9%	3.3%	3.5%	4.8%	3.9%	4.5%	3.2%	3.1%	3.8%	3.0%	4.4%	3.5%	4.5%	3.0%	2.3%	1.5%	1.8%	3.4%	3.3%	1.8%	1.0%	3.4%	1.2%
	SV-5	2.5%	2.9%	9.6%	2.5%	1.6%	3.1%	3.2%	3.2%	2.1%	1.9%	1.4%	1.5%	1.0%	0.5%	0.9%	0.7%	1.0%	0.3%	0.6%	0.3%	1.2%	0.2%	1.2%	1.8%	0.8%	0.4%	2.1%	1.4%
	SV-6	2.5%	1.4%	3.8%	1.6%	1.2%	4.1%	3.0%	3.4%	3.7%	4.5%	3.5%	3.0%	2.4%	3.1%	1.1%	1.6%	0.6%	0.3%	1.4%	0.3%	0.5%	0.4%	1.4%	1.6%	1.5%	0.5%	2.7%	1.2%
	SV-8	8.7%	2.9%	4.4%	7.1%	6.3%	8.7%	6.8%	3.1%	0.4%	0.1%	5.9%	3.5%	4.4%	0.1%	4.2%	1.6%	1.0%	0.8%	2.6%	0.3%	0.9%	1.0%	0.6%	1.1%	0.4%	0.6%	1.6%	1.9%
	SV-9	9.0%	0.9%	1.3%	6.0%	5.8%	8.4%	6.4%	7.3%	6.9%	6.6%	6.2%	3.9%	6.8%	4.8%	3.6%	1.0%	2.5%	2.0%	3.7%	1.1%	1.9%	2.0%	2.7%	3.8%	1.7%	1.7%	4.7%	3.7%
	SV-10	2.4%	0.5%	3.0%	1.3%	1.7%	2.1%	1.8%	1.5%	2.2%	0.9%	2.0%	2.1%	0.7%	2.3%	1.6%	1.4%	1.1%	1.0%	3.6%	0.4%	0.8%	0.9%	1.0%	0.7%	0.3%	0.0%	0.4%	0.5%
	SV-11	1.3%	2.3%	3.4%	2.2%	3.4%	1.9%	1.0%	0.9%	1.5%	1.4%	1.2%	1.0%	0.6%	0.3%	0.5%	1.2%	0.7%	0.5%	0.3%	0.3%	0.7%	0.8%	0.8%	0.8%	0.2%	0.5%	1.7%	1.4%
	SV-12	0.3%	0.5%	0.6%	0.4%	0.5%	2.3%	4.8%	2.4%	1.6%	1.4%	1.8%	2.7%	1.2%	1.0%	0.7%	0.7%	1.0%	0.8%	3.7%	1.3%	3.1%	3.0%	3.1%	1.7%	0.3%	1.7%	2.8%	0.8%
	SV-13	0.6%	0.9%	1.6%	0.2%	0.3%	1.4%	2.0%	1.3%	1.2%	0.2%	0.2%	0.7%	0.2%	0.2%	0.4%	0.8%	0.2%	0.1%	0.4%	0.1%	1.0%	0.9%	1.0%	0.9%	0.2%	0.6%	1.0%	0.8%
	SV-14	2.3%	6.1%	5.8%	7.5%	5.5%	2.2%	1.1%	2.0%	4.5%	6.3%	6.9%	7.4%	12.7%	13.1%	3.3%	1.8%	1.5%	0.9%	3.3%	0.7%	2.7%	3.5%	3.2%	3.3%	1.5%	0.8%	2.3%	3.1%
	SV-15	9.5%	14.7%	3.9%	5.3%	2.8%	5.6%	5.7%	0.5%	8.8%	5.8%	6.9%	10.4%	6.4%	0.9%	1.8%	2.3%	1.5%	1.3%	2.3%	0.3%	2.8%	3.1%	3.9%	6.7%	2.6%	3.2%	9.5%	5.7%
2 (and between divider line)	SV-7	2.2%	1.5%	1.9%	1.5%	2.9%	4.2%	2.3%	1.1%	3.9%	4.8%	3.8%	4.0%	3.2%	0.3%	3.1%	5.3%	2.5%	2.1%	3.3%	1.3%	1.1%	0.9%	1.2%	1.7%	0.8%	0.3%	0.7%	0.9%
	SV-16	9.5%	7.1%	1.1%	5.7%	6.2%	6.6%	6.9%	5.2%	8.0%	8.7%	6.9%	6.9%	8.0%	0.0%	6.8%	10.3%	10.5%	6.6%	18.3%	5.0%	8.1%	10.5%	11.1%	14.4%	12.9%	8.6%	12.9%	5.4%
	SV-17	2.9%	0.1%	-3.3%	2.1%	1.6%	-1.5%	-0.6%	-0.5%	-1.6%	-3.1%	-2.0%	-1.3%	0.0%	-2.8%	0.7%	6.0%	1.3%	0.7%	-1.0%	0.5%	1.6%	1.2%	-1.1%	0.5%	0.5%	0.3%	0.6%	0.9%
	SV-18	5.5%	11.4%	4.9%	6.8%	5.6%	6.7%	7.8%	13.0%	9.5%	6.6%	3.6%	4.3%	7.1%	22.8%	10.5%	8.2%	14.5%	9.1%	7.9%	13.9%	10.4%	10.8%	12.9%	10.1%	19.2%	11.2%	2.2%	12.4%
	SV-19	3.6%	0.3%	-2.0%	5.5%	6.3%	0.6%	2.8%	3.0%	3.2%	6.5%	6.4%	4.3%	3.0%	3.4%	2.0%	0.7%	1.2%	0.7%	0.9%	0.6%	1.7%	0.6%	0.2%	0.5%	0.7%	0.6%	1.3%	1.6%
	SV-20	7.2%	12.0%	7.2%	6.2%	6.3%	5.7%	5.5%	11.9%	6.1%	2.8%	2.9%	0.6%	5.0%	14.1%	11.0%	8.9%	8.7%	23.9%	14.6%	16.8%	10.7%	13.4%	16.3%	9.3%	10.4%	36.1%	15.9%	15.2%
	SV-21	2.6%	2.0%	3.8%	0.9%	2.4%	3.2%	2.9%	3.6%	2.5%	5.3%	1.6%	-0.4%	2.2%	0.2%	3.5%	6.3%	5.8%	4.3%	1.4%	4.8%	3.0%	3.5%	1.1%	1.6%	3.8%	1.9%	-1.2%	3.7%
	SV-22	8.5%	9.3%	8.3%	5.9%	7.6%	6.7%	7.0%	12.2%	8.5%	6.7%	4.8%	3.9%	4.4%	0.1%	9.9%	5.4%	11.5%	19.8%	11.5%	13.6%	14.3%	14.0%	16.1%	7.8%	10.4%	8.4%	9.2%	7.0%
	SV-23	5.2%	-2.9%	-2.4%	1.9%	4.4%	-0.3%	0.5%	0.3%	1.0%	8.8%	1.3%	4.6%	2.9%	6.2%	10.3%	3.2%	3.4%	2.6%	-0.2%	-0.2%	2.4%	-6.0%	-2.0%	2.6%	11.6%	6.4%	-7.9%	9.6%
	SV-24	4.0%	8.5%	9.4%	7.2%	6.2%	4.4%	5.6%	10.3%	4.7%	8.0%	6.8%	7.4%	7.4%	13.6%	8.3%	6.5%	11.3%	8.5%	7.7%	14.7%	13.7%	11.6%	8.4%	8.9%	10.0%	7.0%	6.6%	10.3%
	SV-25	-0.1%	1.1%	0.0%	0.7%	0.8%	0.1%	1.5%	0.1%	1.4%	2.1%	0.2%	1.3%	1.2%	-0.2%	0.0%	0.5%	0.3%	0.4%	0.1%	0.2%	0.0%	0.4%	0.8%	0.2%	-1.0%	0.0%	1.1%	2.3%
	SV-26	0.3%	2.2%	1.9%	1.9%	2.4%	1.6%	3.4%	1.0%	1.6%	4.3%	6.8%	8.1%	5.9%	3.2%	2.7%	3.9%	2.8%	1.1%	1.7%	4.0%	2.6%	3.2%	2.2%	2.8%	0.7%	1.1%	3.1%	2.0%
	SV-27	0.1%	0.7%	-0.5%	1.7%	0.4%	1.4%	3.2%	1.2%	2.4%	1.1%	2.0%	0.4%	0.2%	0.0%	-1.5%	0.1%	0.7%	0.5%	0.2%	0.5%	0.5%	1.0%	0.8%	0.6%	0.7%	0.2%	1.2%	0.7%
	SV-28	0.0%	1.0%	0.5%	0.6%	0.7%	0.8%	0.6%	0.5%	0.9%	1.7%	5.5%	10.1%	6.9%	6.1%	3.8%	9.5%	4.2%	2.0%	3.4%	11.6%	7.9%	4.8%	2.7%	3.2%	0.4%	2.0%	4.7%	2.1%
	SV-29	0.0%	0.6%	0.4%	0.1%	0.2%	0.4%	0.0%	0.0%	0.1%	0.0%	0.6%	0.5%	0.2%	0.1%	3.7%	0.1%	0.3%	0.1%	0.1%	0.3%	0.4%	0.3%	0.1%	1.0%	0.1%	0.1%	0.7%	0.4%
Total:		100%	100%	101%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note: Six out of the 23 wellfield branch lines service both Phase 1 and Phase 2; therfore, a correction has been made to subtract the shared mass sometimes resulting in a negative value. This value indicates that the mass contribution from the Phase 2 area was limited in that particular sample round. This is a result of the accuracy of the flow and PID data measurements collected.

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2 TEMPERATURE PROGRESS

Table 4 summarizes the average target treatment zone temperature for both Phase 1 and Phase 2 thermocouples that remain online, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Select heaters in Phase 1 were taken offline on 01/08/15; while select heaters in Phase 2 were taken offline on 2/9/15.

Table 4. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	2/15/15	
Phase 1 Entire TTZ Average Temperature	N/A	°C
Phase 2 Online TMPs Average Temperature	104	°C
Phase 1 Centroid Average Temperature	N/A	°C
Phase 2 Online Centroid Average Temperature	99	°C

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was increased on 8/30/14. Recent increases and decreases correlate with wellfield modifications to sweep the subsurface.

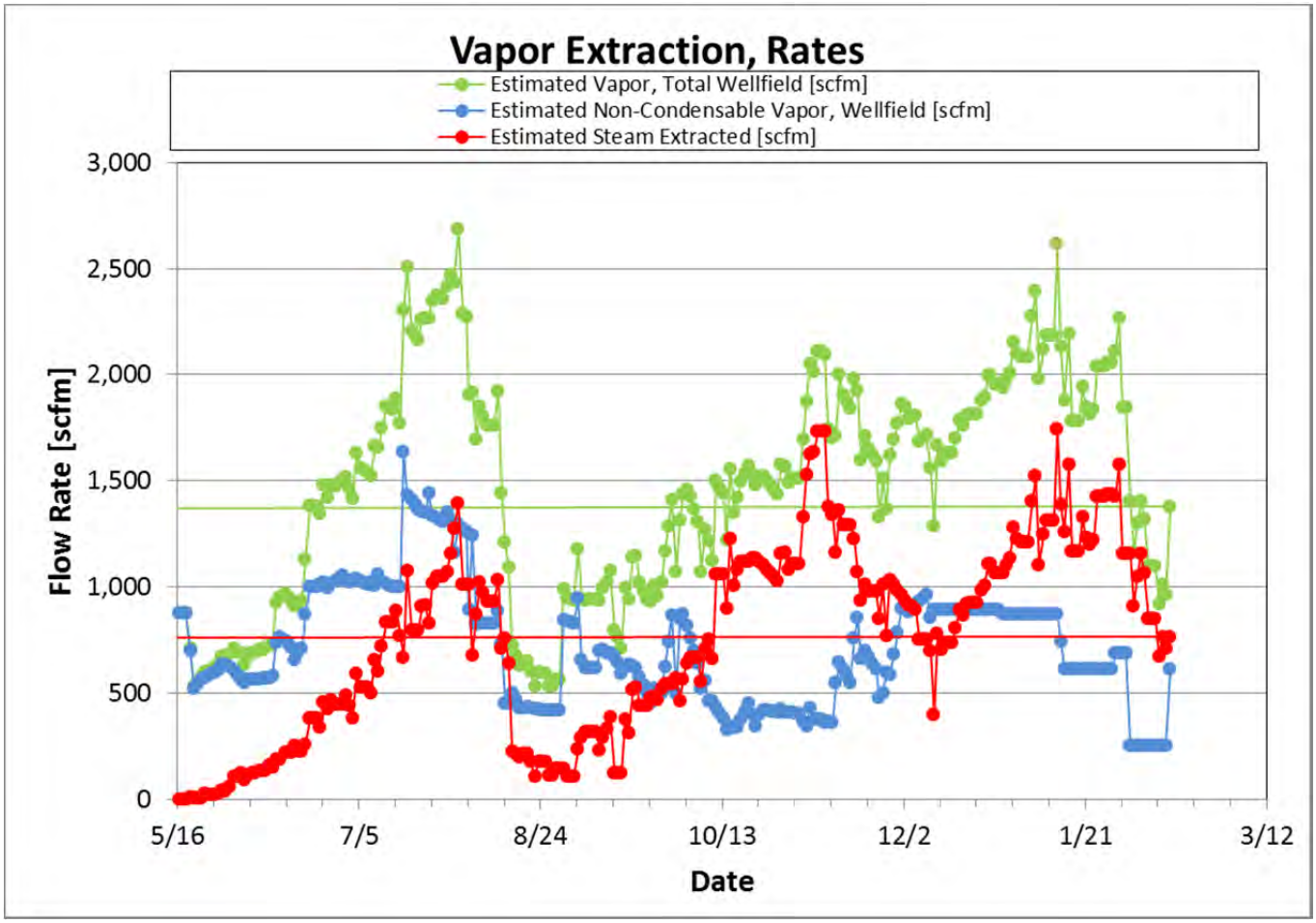


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Please note that the flammability analyzer is *no longer online* (corresponds with taking the oxidizer offline).

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

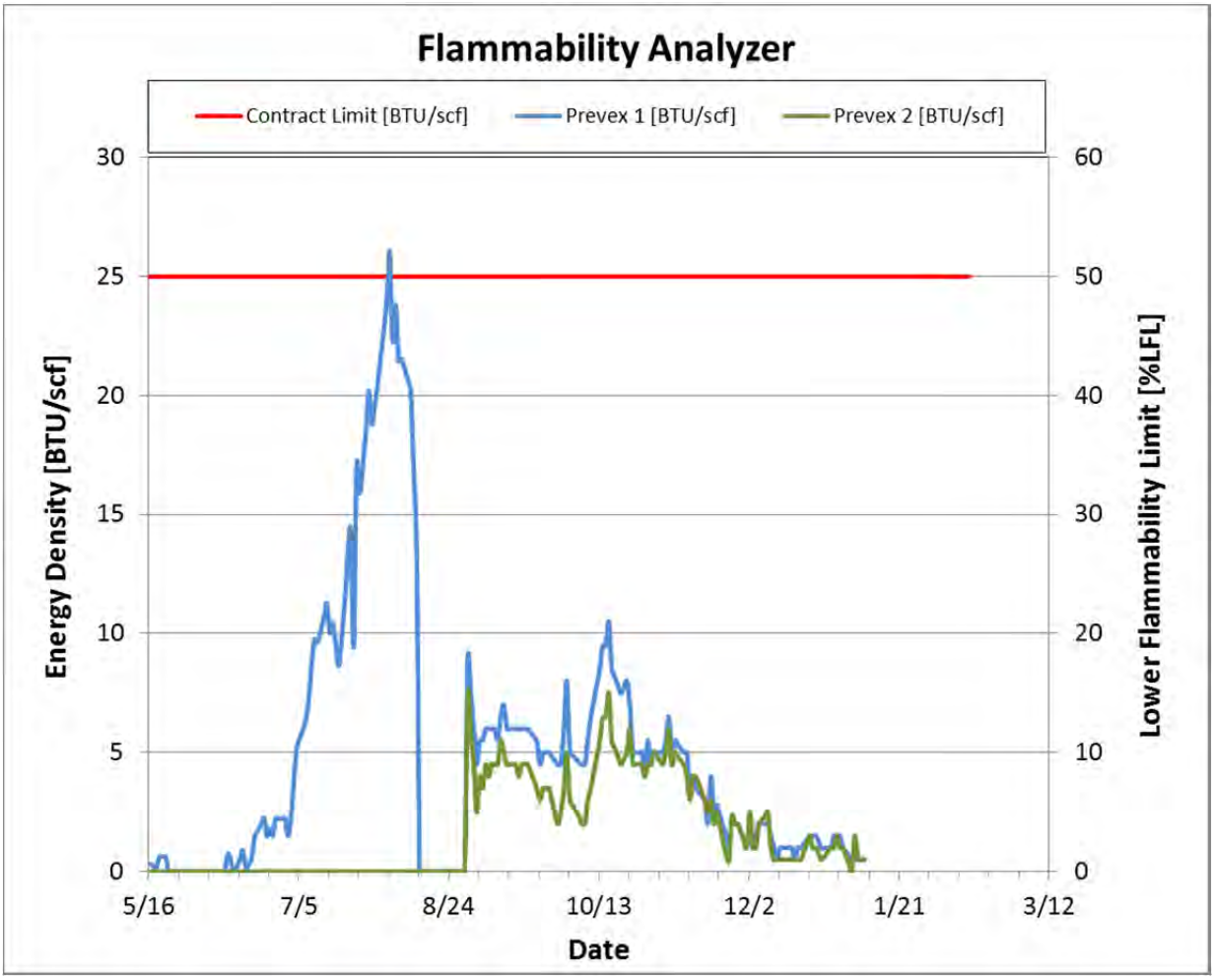


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed through 01/09/15 is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. Mass removal starting 01/10/15 is reported as the total compounds detected in the laboratory data corrected using the PID plus the accumulated LNAPL.

The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively. Please note that the mass removal rates are shown on a logarithmic scale.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14, 9/23/14, 9/30/14, 10/7/14, 10/14/14, 10/21/14, 10/30/14, 11/4/14, 11/18/14, 11/25/14, 12/2/14, 12/9/14, 12/16/14, 12/23/14, 12/30/14, 01/06/15, 01/13/15, 01/20/15 and 01/26/15.

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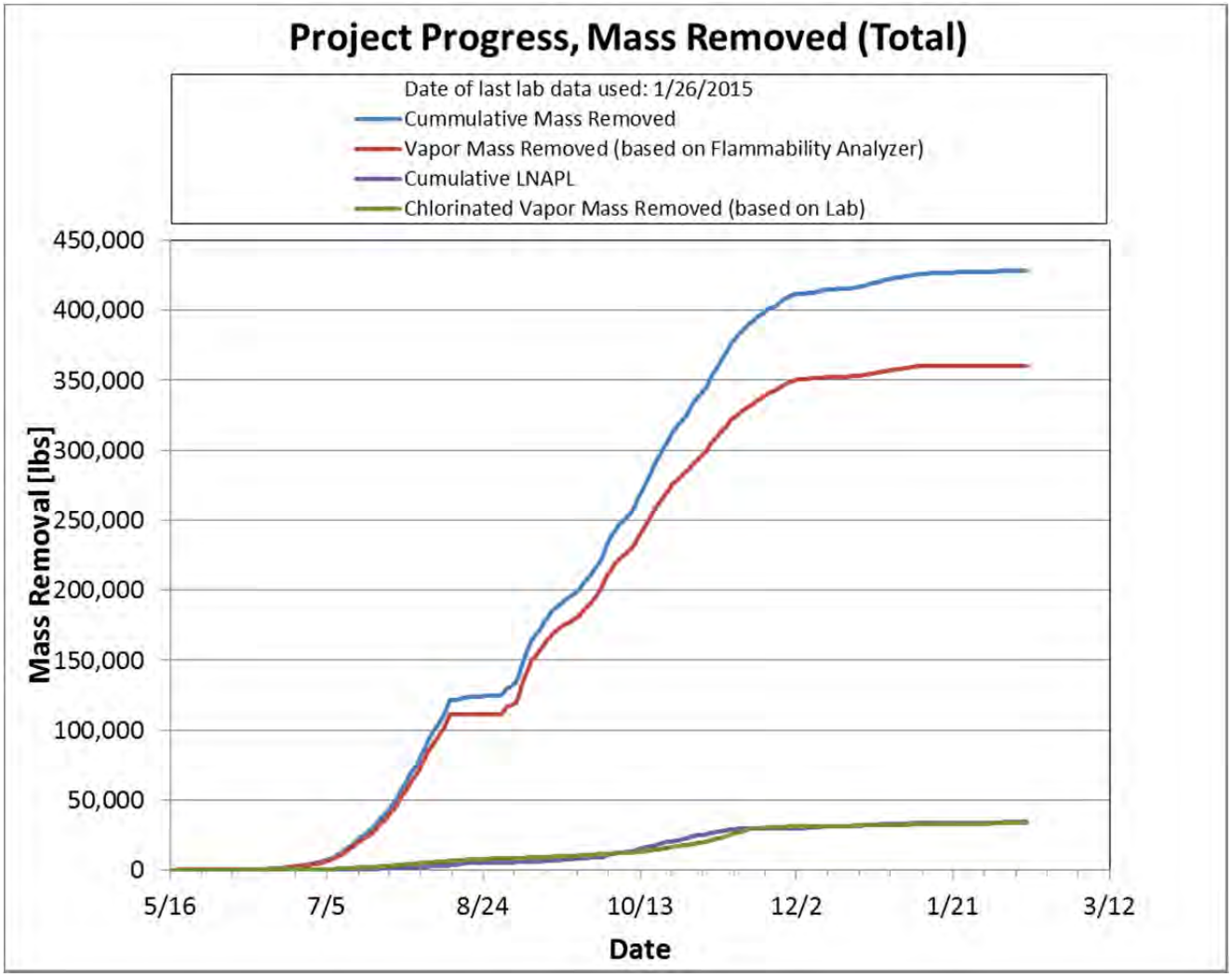


Figure 4a. Project Progress, Mass Removal (Total)

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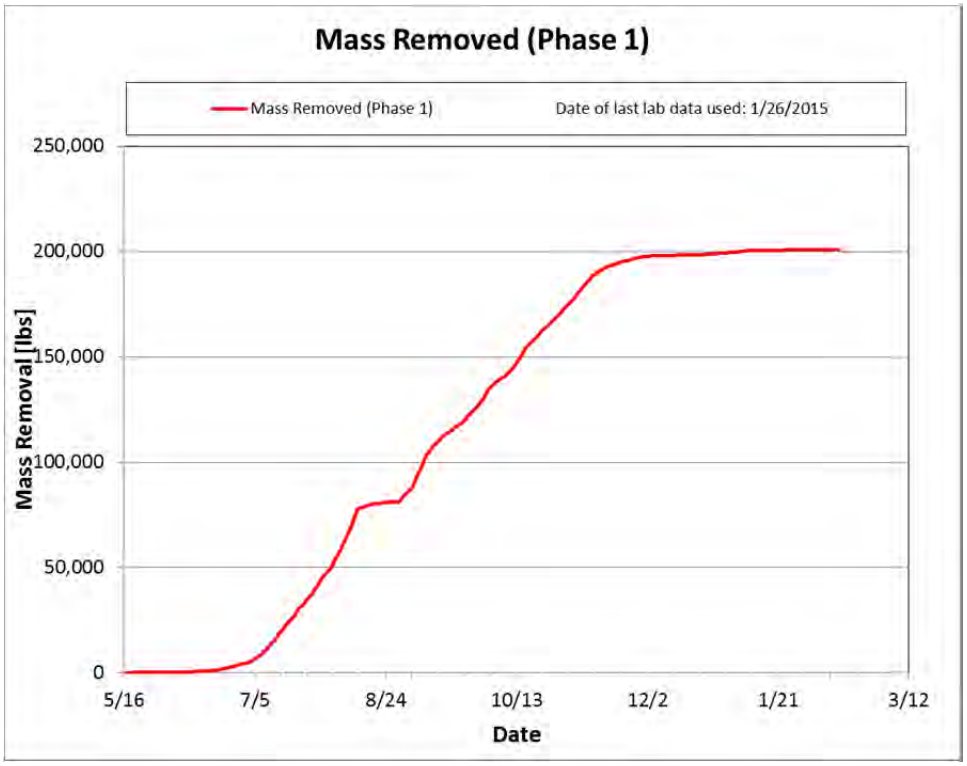


Figure 4b. Project Progress, Mass Removal (Phase 1)

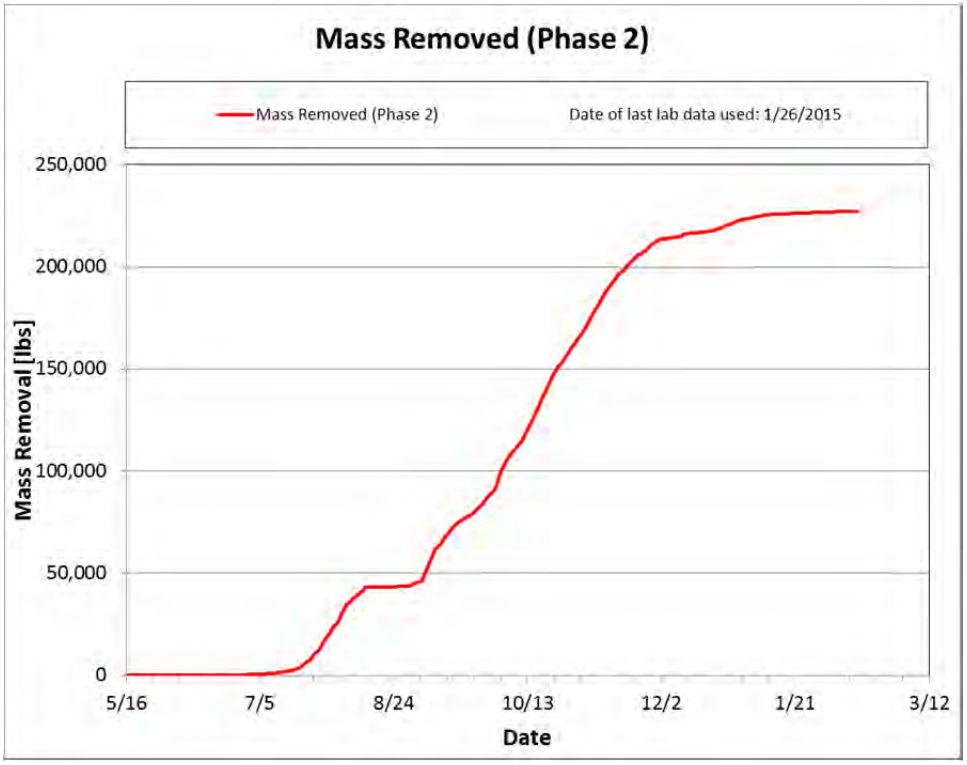


Figure 4c. Project Progress, Mass Removal (Phase 2)

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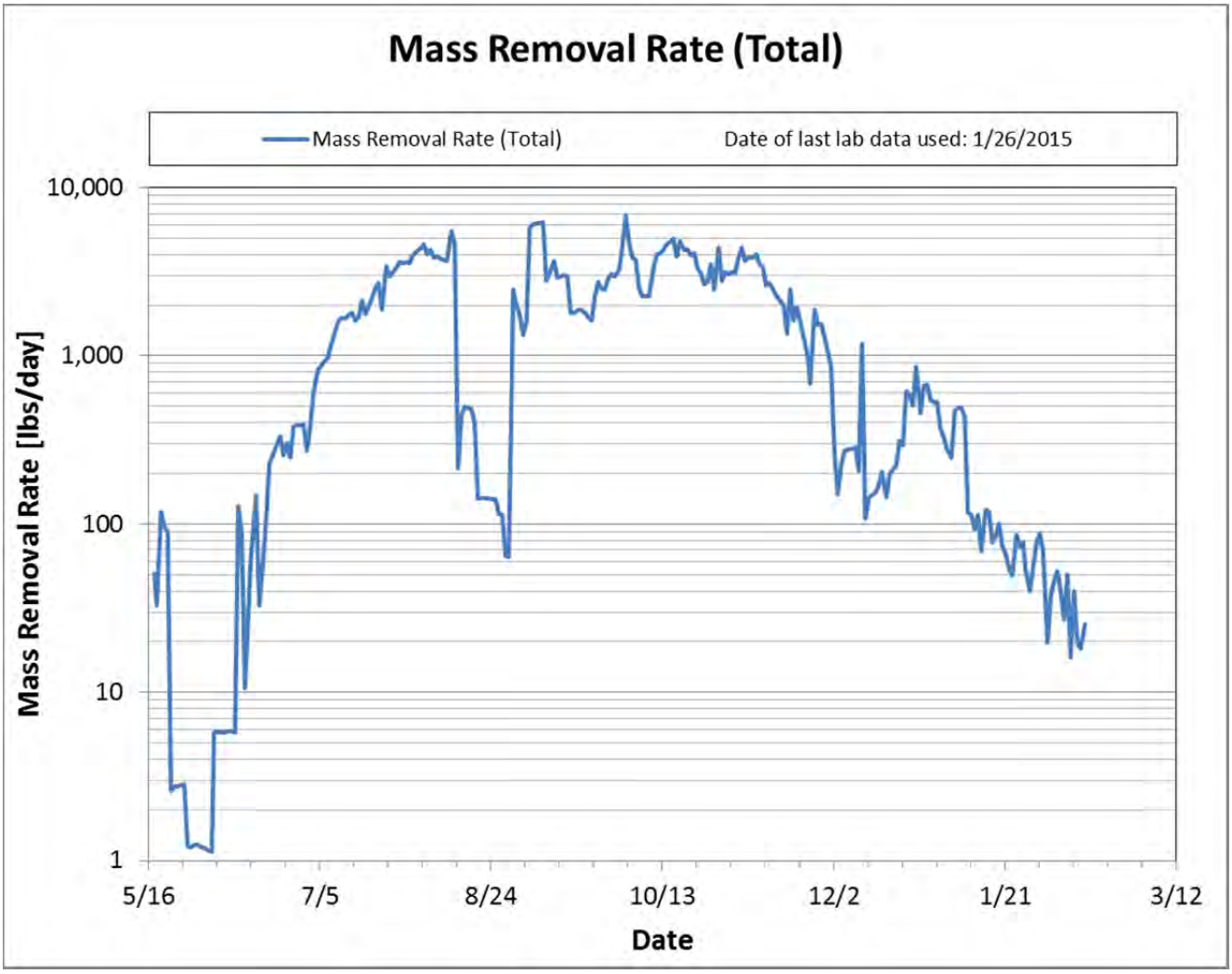


Figure 4d. Mass Removal Rate (Total for Site)

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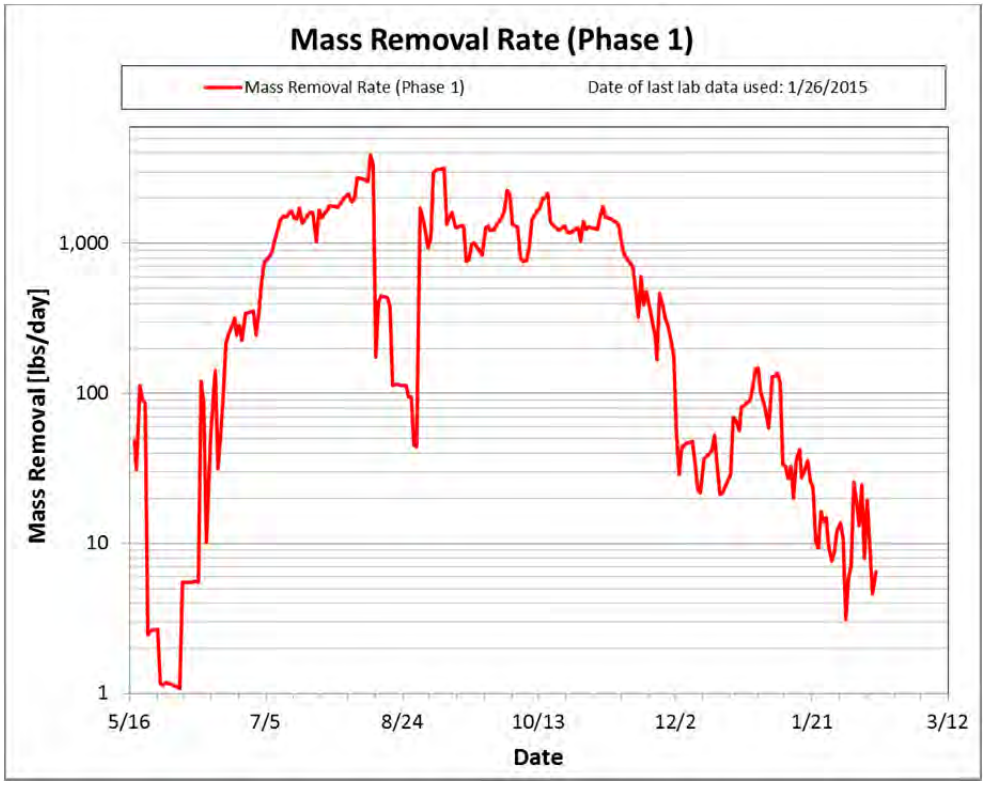


Figure 4e. Mass Removal Rate (Phase 1)

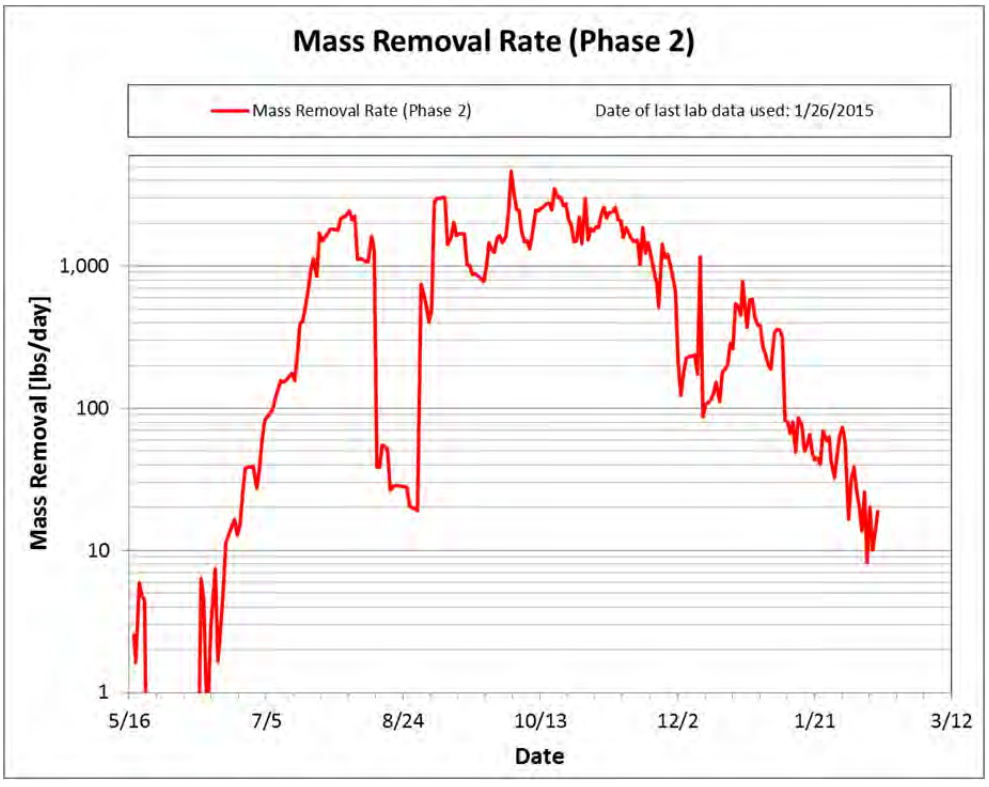


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID and flammability analyzer readings collected at the oxidizer influent over time. It should be noted that PID readings are first collected using an 11.7 eV lamp (determined by site contaminants). If the reading exceeds the limit of the meter (>2000 ppm), the readings are collected using a 10.6 eV lamp. When both meters are used, the maximum value is recorded.

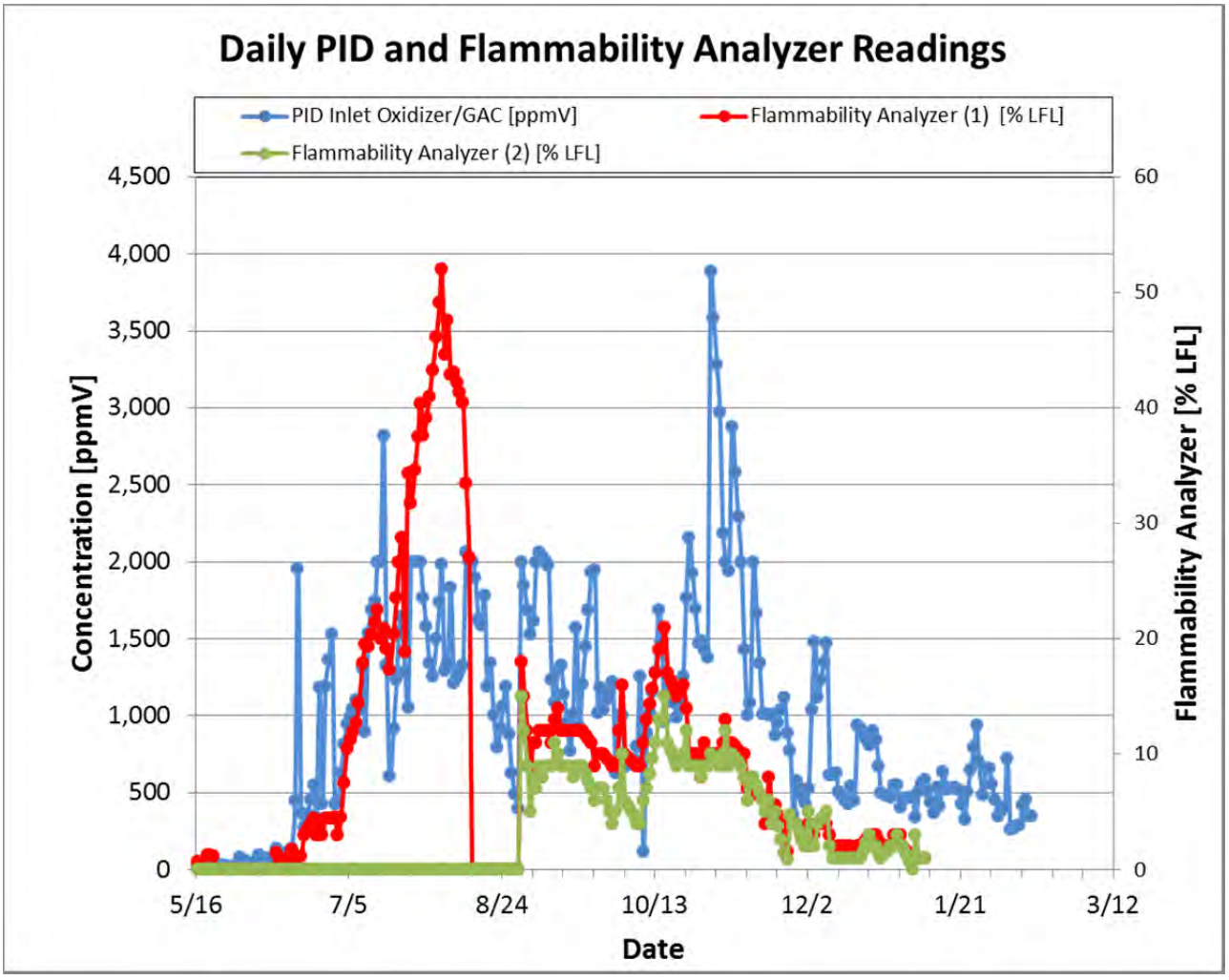


Figure 5. Daily PID and Flammability Analyzer Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13, after the oxidizer shutdown. Decreases in DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-outs.

Influent concentrations collected over the past week were between 270 to 459 ppm, with effluent concentrations ranging between 0.8 to 30 ppm. While the calculated DRE is less than 95% on some days, calculated mass emissions are less than 2 lbs/hr (air permit limit) by more than 50%.

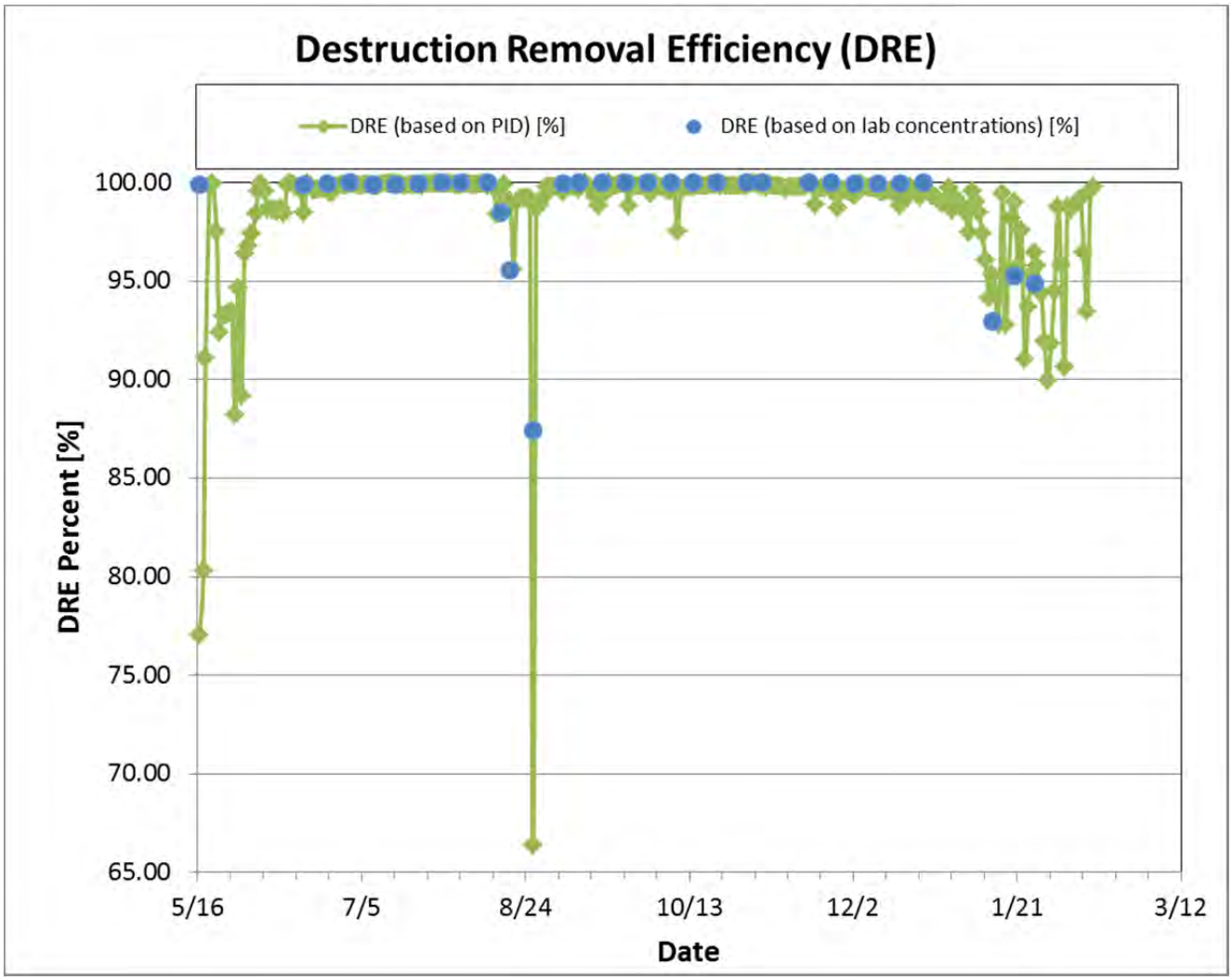


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7. Please note that the graph has been modified to present the estimated modeled energy for the heaters (ISTD) over the original predicted 195 day treatment. This does not take into account contract definitions such as heaters operating at or above 70% energy input. The flatline represents days beyond 195 days.

Please note that the modeled energy usage (12,873,000 kWh) only includes the energy predicted to be added to the subsurface. Therefore, the number should be compared to the cumulative energy added by the ISTD system to the subsurface (red line). The total energy usage (including the treatment system power usage) is predicted to be 15,795,000 kWh as stated in the summary table.

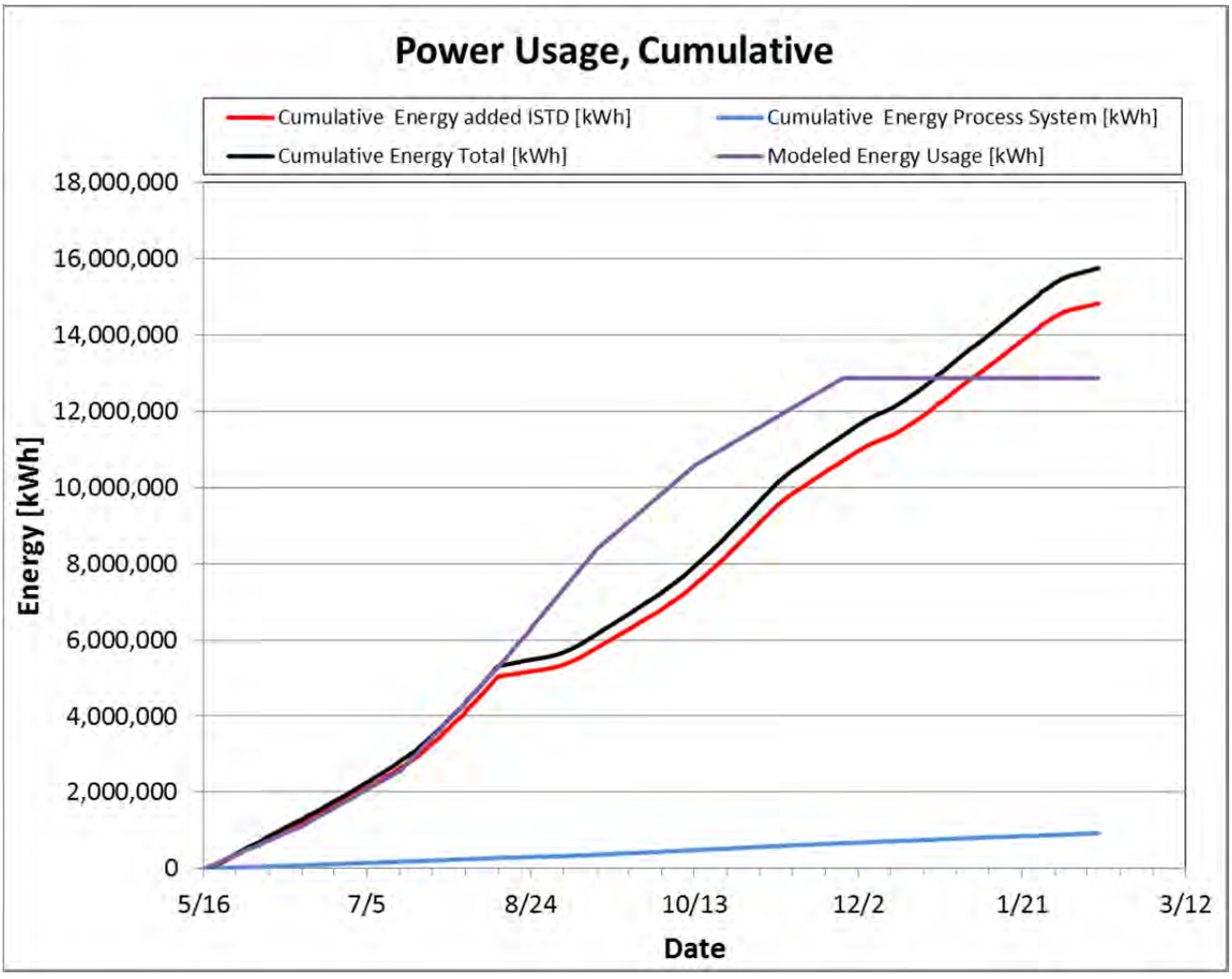


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30/14 and the following days corresponds with ramping of the heaters after placing the oxidizer back online. The decrease observed mid- November is associated with profiling of the heaters in Phase 2 and subsequent adjustments. The increase observed in December corresponds with additional profiling and subsequent adjustments. Approved circuits in Phase 2 were decreased last week with ultimate shutdown of them Monday, 9 February.

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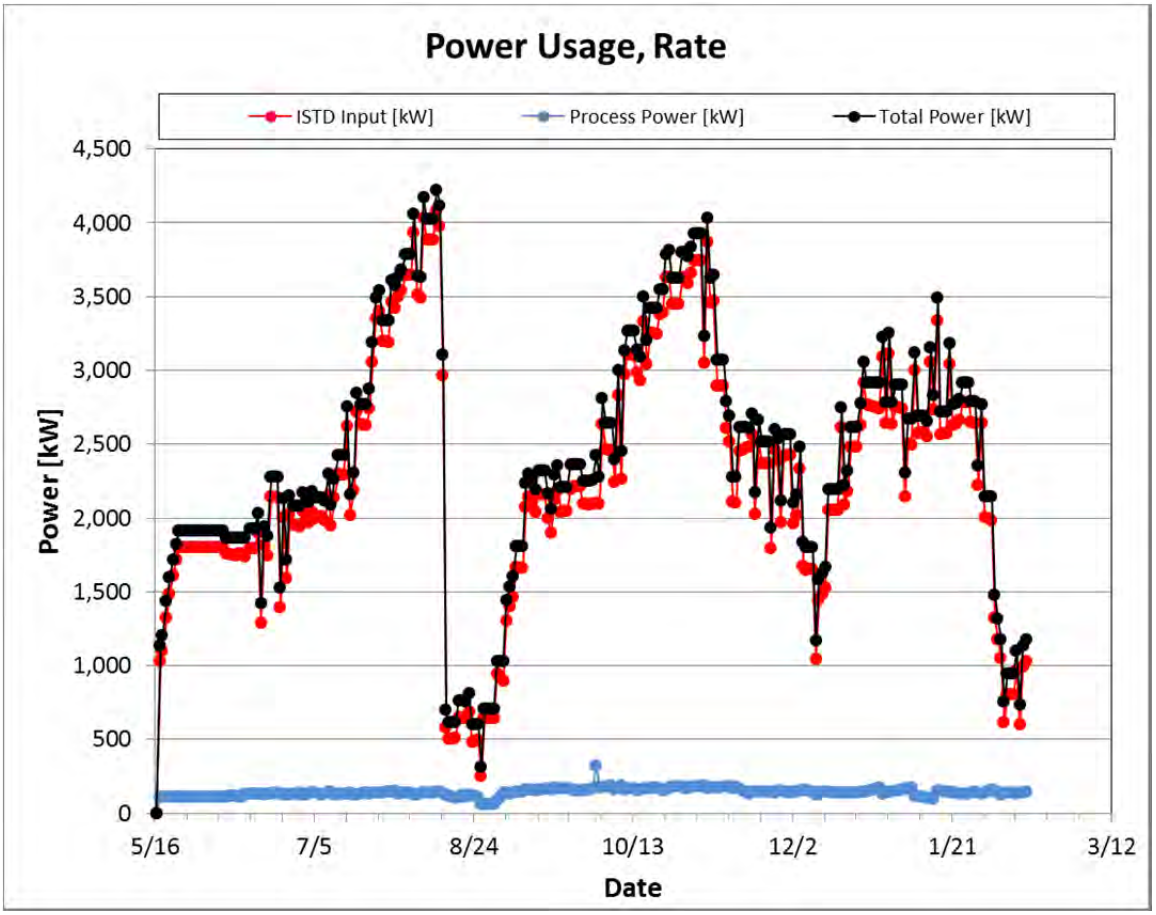


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

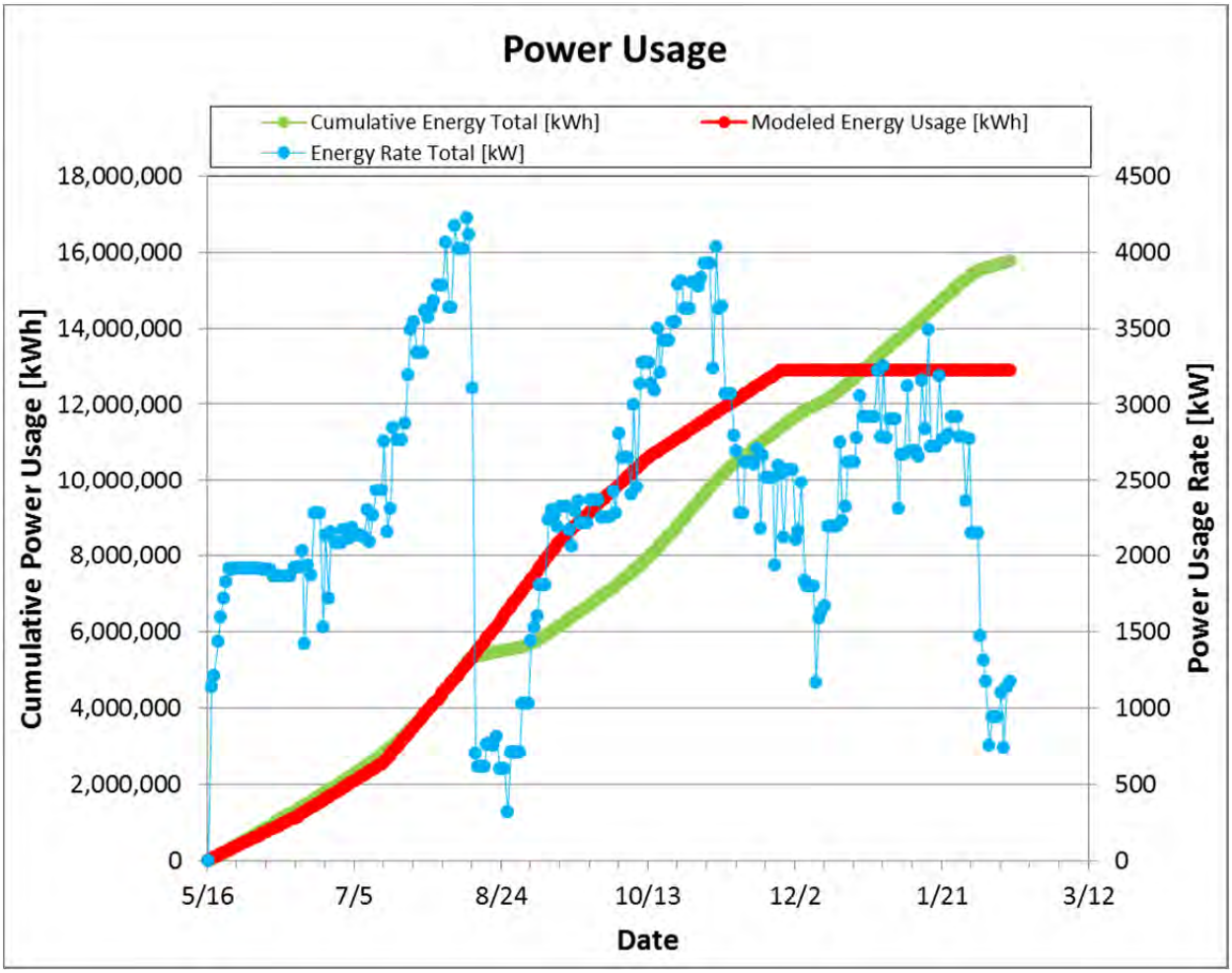


Figure 9. Power Usage

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With the oxidizer offline, natural gas is no longer in demand (as shown below starting on 10 January 2015).

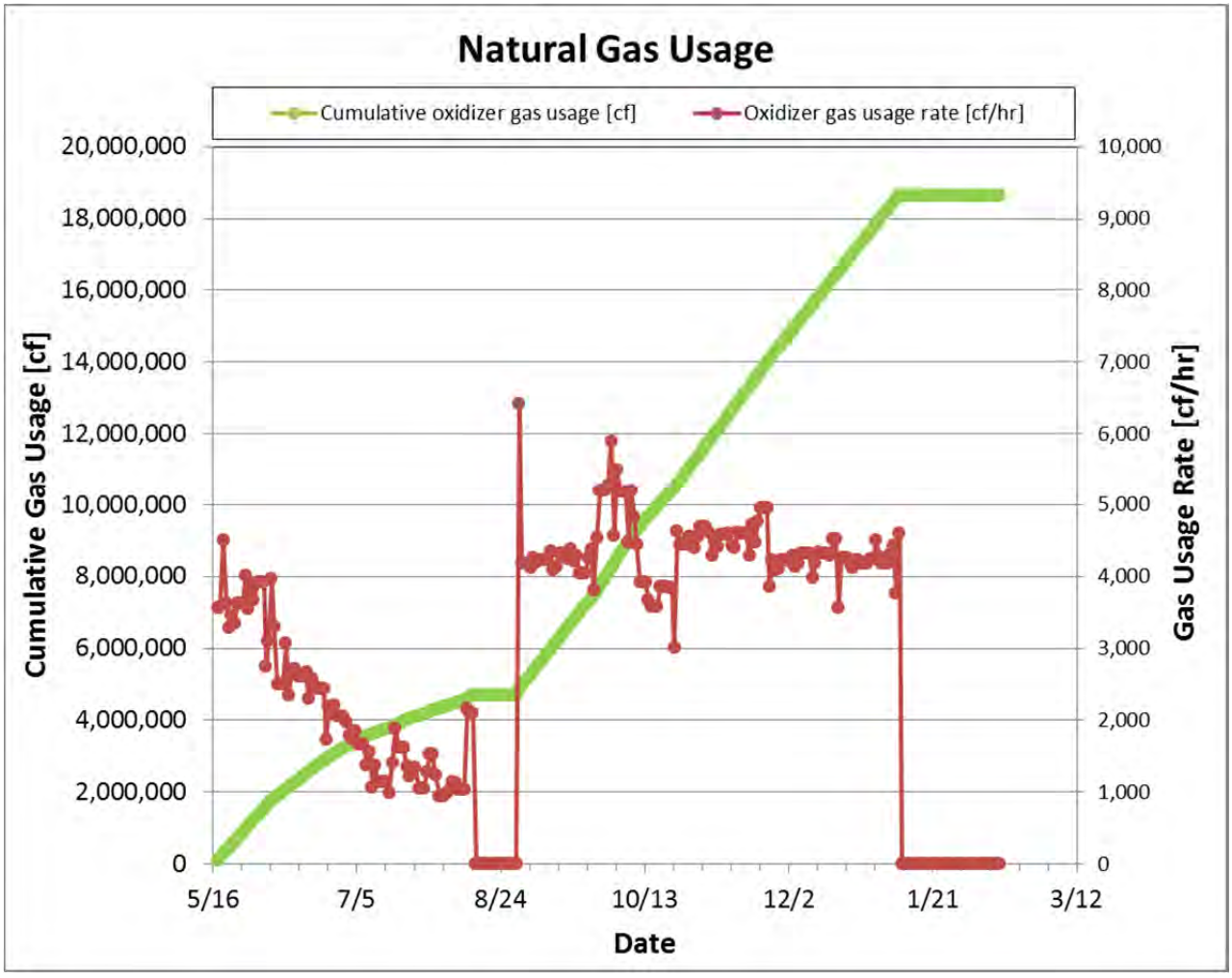


Figure 10. Natural Gas Usage

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With the oxidizer offline, caustic is no longer in demand (as shown below starting on 10 January 2015).

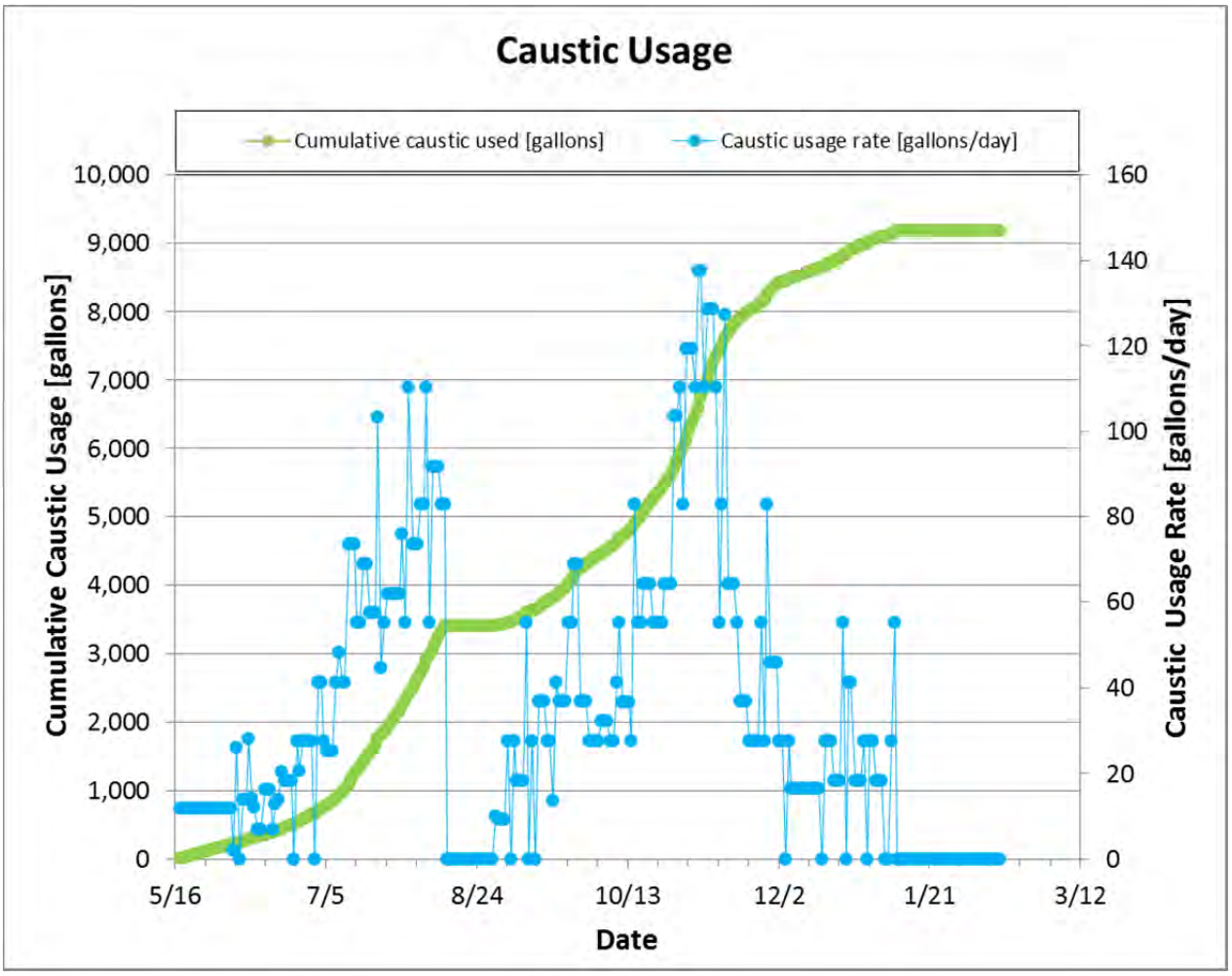


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as Phase 1 and Phase 2 Treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Currently, thermocouples for both Phase 1 and Phase are online (Figure 12c). The below figure represents those data. The following table is accurate to the individual Phase 1 and Phase 2 milestones.

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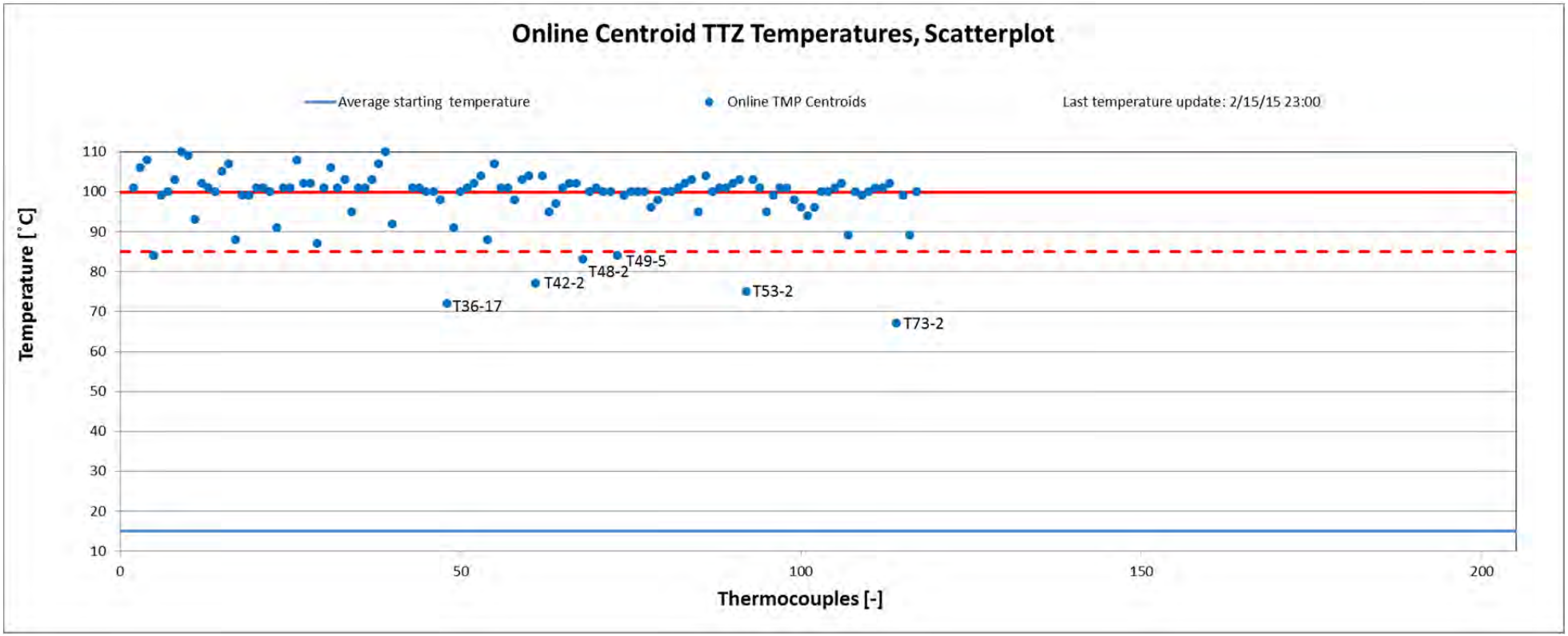


Figure 12c. Phase 1 and Phase 2 Centroid Temperatures, Scatterplot

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Table 5. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots

	Value	Unit
Date of Last Update	2/8/15	
Phase 1 Centroid Thermocouples ≥85 ^{0}C	100	%
Phase 1 Centroid Thermocouples ≥100 ^{0}C	97	%
Phase 2 Centroid Thermocouples ≥85 ^{0}C	99	%
Phase 2 Centroid Thermocouples ≥100 ^{0}C	98	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday, 13 February, 2015 through Friday, 20 February 2015, with temperatures updated through Sunday, 22 February 2015.

Table 1 provides a summary of the project operational status as of Friday, 20 February 2015.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	02/20/15	
Last Temperature Data Update	02/22/15	
Days of Operation (Total)	257	days
Days of Phase 1 Operation	158	days
Days of Phase 2 Operation	148	days
Total Design Energy Usage (ISTD and treatment system)	15,795,000	kWh
Total Energy Added (ISTD)	15,930,100	kWh
Used Electrical Energy vs. Estimate	100.9	%
Total Mass Removal	428,445	lbs
Average Power Input Last 24 Hours	1,040	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,511	scfm
Average Condensate Production Rate Last 24 Hours	3.0	gpm

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Temperature figures and calculations within this progress report represent ALL thermocouples that are currently online, whether they are located in Phase 1 or Phase 2, unless otherwise noted.

The current average wellfield temperature (includes thermocouple sensors in both Phase 1 and Phase 2) is 100°C at the centroid locations and 106°C at non-centroid locations. This information is shown in the "Phase 2" label of Table 4.

Phase 2 has operated for 141 days. Phase 1 operated for a total of 158 days, which represents days where heaters operated at or above 70% and the collection date of the last confirmation soil sample (per contract definition). All three temperature milestones have been achieved for both Phase 1 and 2.

The oxidizer was taken offline 01/10/15. Vapor treatment is now through the vapor carbon vessels. Estimated mass removed through 01/09/15 (oxidizer online) was reported using the flammability analyzer data, laboratory data for chlorinated compounds that were assumed not to be detected by the flammability analyzer, and accumulated LNAPL. Following the oxidizer being offline (01/10/15), estimated mass removed is calculated using the analytical laboratory data results (TO-15), corrected with daily PID readings, plus the accumulated LNAPL. These results yield a total mass removed of **428,445** lbs as of 02/20/15. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 02/19/15. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.28:0.72. These ratios were then applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase and leg. These data are included in Tables 2 and 3. Please note that the drop in Phase 2 fraction (and matching increase in Phase 1 fraction) is related to decreases in the measured Phase 2 concentrations at more or less all of the sample locations.

During the 01/22/15 manifold data collection effort, flows were estimated based on the measurement collected at the blower as the wellfield flows were too low to be accurately recorded/measured on the handheld meter.

Mass fraction data over time is presented below.

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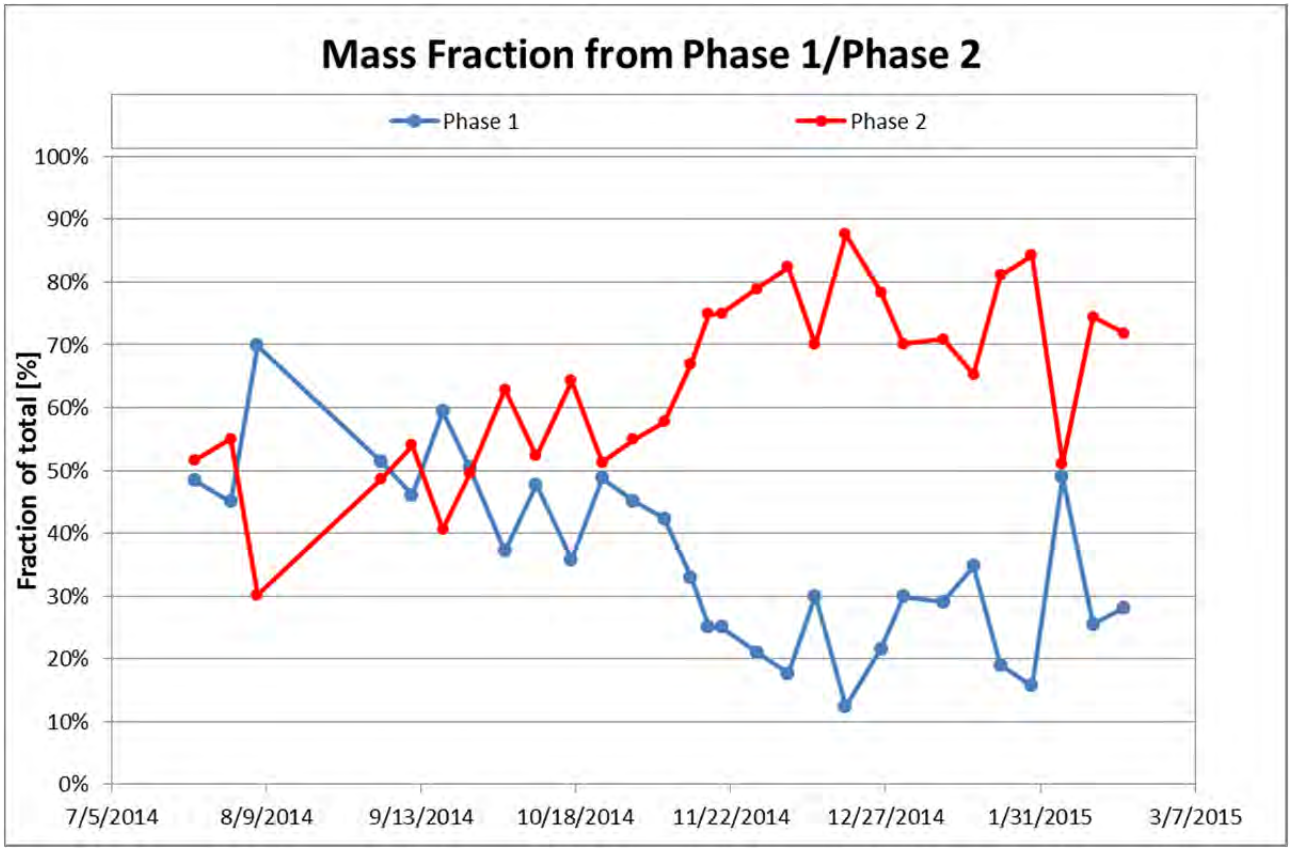


Figure 1. Mass Fraction from Phase 1/Phase 2

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Table 2. PID Readings Collected from Manifold Legs

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14	12/31/14	1/9/15	1/16/15	1/22/15	1/29/15	2/5/15	2/12/15	2/19/15
1	SV-1	215	100	745	602	720	604	590	1181	550	516	5	770	712	851	845	790	450	360	236	185	177	170	95	238	128	182	179	201	199
	SV-2	742	173	1271	887	872	1129	1318	2987	780	770	1610	1004	931	1179	600	934	660	677	482	377	397	436	300	449	810	404	283	91	187
	SV-3	2588	872	3609	2854	1198	3395	1414	5512	2643	1120	3971	1430	627	99	101	3138	1717	1782	1218	1246	347	1622	725	626	1108	1241	653	86	430
	SV-4	1971	307	2543	1921	1514	2652	1153	4790	1927	3820	3275	2204	2650	3297	1375	2903	1510	2341	1278	979	333	611	585	477	487	446	300	129	264
	SV-5	1817	279	1642	740	444	1407	1197	4790	759	1411	950	1153	802	326	302	490	402	135	243	120	235	29	202	248	198	180	129	131	80
	SV-6	4480	332	1926	956	765	4283	2347	11564	3525	9177	5750	4780	4919	5854	1083	2100	601	435	1271	375	277	197	678	664	1141	699	558	328	518
	SV-8	3222	385	1330	2375	1479	3267	1816	4744	179	172	3815	1881	1850	88	1475	940	401	450	890	150	178	170	110	244	185	235	94	167	166
	SV-9	3245	142	324	1993	1565	2995	1777	11950	2762	4967	3801	2121	2863	3227	1265	801	1209	1040	1480	390	350	340	445	445	365	622	298	274	450
	SV-10	1896	131	2148	1096	1111	2459	1517	4382	1933	1745	3384	2841	1318	4121	1494	1982	1302	1221	3215	500	381	420	400	371	269	99	65	93	182
	SV-11	1016	666	1712	1979	2145	1988	930	2534	1393	2687	1950	1469	1380	596	596	1360	750	641	270	399	332	354	315	495	271	412	346	333	389
	SV-12	80	53	158	139	104	815	1427	3234	682	1102	1090	2100	512	563	206	413	440	426	1413	545	569	490	465	201	74	637	143	65	185
	SV-13	417	211	736	145	170	1452	1476	4291	1109	375	370	985	380	295	315	1210	210	131	432	143	473	445	365	315	139	550	209	187	173
	SV-14	632	452	1526	2636	1450	777	1610	3411	1917	4668	4274	4150	5565	8416	1107	1053	630	500	1288	300	468	570	493	422	352	366	129	243	232
	SV-15	3440	1072	1153	2000	915	2150	2054	608	3265	4890	4801	5780	5000	618	654	1623	730	660	1007	115	490	600	705	872	627	1247	742	500	764
2 (and between divider line)	SV-7	3843	366	1751	1210	1482	4307	1835	3337	3672	9379	7350	5812	7910	553	3115	6391	2860	2977	2810	1323	554	531	500	514	483	300	129	184	278
	SV-16	3113	885	233	1911	1703	2823	2216	6230	3165	6888	4994	3841	6029	11	2340	6276	3118	3307	7931	1957	1502	1908	1765	2144	3610	3159	821	454	1332
	SV-17	3715	429	306	2928	1824	2801	1837	8933	1927	2713	2954	3313	5408	389	1670	10903	1983	1335	409	800	1133	730	116	718	1223	850	712	501	492
	SV-18	1760	862	1203	2034	1634	2388	2446	15000	3554	5030	2815	2465	5632	13871	3377	4768	3650	5071	3361	5491	2057	2012	2423	1553	5546	4535	146	1110	2876
	SV-19	2258	350	2067	1971	2005	1818	2038	10522	2191	6417	4561	4398	3067	2693	1075	875	925	530	528	315	552	130	515	438	504	401	263	288	259
	SV-20	1990	796	1545	2344	1610	2268	2158	15000	2853	2305	2059	343	4053	8642	3534	5500	2725	12650	6352	6520	2084	2492	2750	1673	3511	13673	951	1305	2221
	SV-21	1964	487	2295	2077	1855	3458	1755	8561	2756	8053	4661	2119	4298	2631	2264	6000	4186	4440	2002	2870	937	958	808	634	1346	1644	158	449	497
	SV-22	2670	980	1606	2222	1892	2466	2448	14750	3344	5023	3578	2236	3582	55	3460	4765	3450	11187	4509	5516	2803	2565	2720	1598	3970	3235	584	792	995
	SV-23	2515	671	3248	3158	2165	3233	1532	8102	2973	7684	4880	3933	2707	4560	4005	5367	2993	2598	1326	1154	805	883	517	948	3832	3889	163	1017	1048
	SV-24	1412	638	1504	2406	1567	1669	1949	11882	1999	6130	4554	5005	6223	8864	2843	4555	2946	4280	3267	5764	2614	2195	2350	1446	3030	2866	502	957	1553
	SV-25	688	220	1261	1035	1059	1350	2418	5725	1542	2247	1873	1743	1925	991	570	1301	740	773	500	445	400	547	410	457	494	448	350	295	370
	SV-26	90	185	350	580	573	638	1133	1119	790	3559	4305	4752	4633	1933	865	2742	710	520	642	1710	548	550	420	677	298	410	183	169	277
	SV-27	192	151	718	944	789	1117	1518	3922	1256	1485	1650	947	840	1040	313	769	745	620	318	320	277	350	210	289	309	233	241	254	171
	SV-28	15	87	77	151	178	310	211	730	335	1250	3624	5592	5447	4380	1438	6351	1440	1100	1588	4527	1575	886	610	759	181	856	300	175	258
	SV-29	8	66	55	20	52	130	1	15	35	21	352	255	83	41	1375	43	80	41	52	117	70	61	20	318	62	63	53	34	93
Breakdown of Wellfield VOC Flux by Phase																														
Phase 1:		48%	45%	70%	51%	46%	59%	51%	37%	48%	36%	49%	45%	42%	33%	25%	25%	21%	18%	30%	12%	22%	30%	29%	35%	19%	16%	49%	26%	28%
Phase 2:		52%	55%	30%	49%	54%	41%	50%	63%	52%	64%	51%	55%	58%	67%	75%	75%	79%	82%	70%	88%	78%	70%	71%	65%	81%	84%	51%	74%	72%

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Table 3. Estimated Mass Loading by Manifold Leg/Phase

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14	12/31/14	1/9/15	1/16/15	1/22/15	1/29/15	2/5/15	2/12/15	2/19/15
1	SV-1	0.5%	0.7%	3.5%	1.5%	3.0%	1.6%	1.7%	1.0%	1.1%	0.7%	0.0%	1.3%	0.8%	1.2%	2.2%	1.2%	1.0%	0.6%	0.6%	0.4%	0.9%	0.7%	0.6%	1.2%	0.3%	0.4%	2.4%	2.1%	1.3%
	SV-2	2.0%	1.3%	4.3%	2.6%	3.6%	3.0%	4.7%	2.5%	1.9%	0.8%	2.4%	1.8%	1.2%	1.7%	1.6%	1.3%	1.4%	1.3%	1.3%	1.0%	1.9%	2.2%	1.7%	2.8%	2.7%	1.0%	3.9%	1.0%	1.2%
	SV-3	3.5%	7.5%	16.2%	7.4%	5.0%	8.9%	5.0%	4.5%	7.1%	1.3%	5.7%	2.6%	0.7%	0.2%	0.3%	5.1%	4.2%	3.3%	3.2%	3.5%	1.7%	9.4%	4.5%	5.0%	4.7%	3.3%	10.5%	0.9%	3.0%
	SV-4	3.3%	2.5%	8.5%	5.7%	5.5%	5.9%	3.3%	3.5%	4.8%	3.9%	4.5%	3.2%	3.1%	3.8%	3.0%	4.4%	3.5%	4.5%	3.0%	2.3%	1.5%	1.8%	3.4%	3.3%	1.8%	1.0%	3.4%	1.2%	1.8%
	SV-5	2.5%	2.9%	9.6%	2.5%	1.6%	3.1%	3.2%	3.2%	2.1%	1.9%	1.4%	1.5%	1.0%	0.5%	0.9%	0.7%	1.0%	0.3%	0.6%	0.3%	1.2%	0.2%	1.2%	1.8%	0.8%	0.4%	2.1%	1.4%	0.5%
	SV-6	2.5%	1.4%	3.8%	1.6%	1.2%	4.1%	3.0%	3.4%	3.7%	4.5%	3.5%	3.0%	2.4%	3.1%	1.1%	1.6%	0.6%	0.3%	1.4%	0.3%	0.5%	0.4%	1.4%	1.6%	1.5%	0.5%	2.7%	1.2%	3.4%
	SV-8	8.7%	2.9%	4.4%	7.1%	6.3%	8.7%	6.8%	3.1%	0.4%	0.1%	5.9%	3.5%	4.4%	0.1%	4.2%	1.6%	1.0%	0.8%	2.6%	0.3%	0.9%	1.0%	0.6%	1.1%	0.4%	0.6%	1.6%	1.9%	1.1%
	SV-9	9.0%	0.9%	1.3%	6.0%	5.8%	8.4%	6.4%	7.3%	6.9%	6.6%	6.2%	3.9%	6.8%	4.8%	3.6%	1.0%	2.5%	2.0%	3.7%	1.1%	1.9%	2.0%	2.7%	3.8%	1.7%	1.7%	4.7%	3.7%	3.0%
	SV-10	2.4%	0.5%	3.0%	1.3%	1.7%	2.1%	1.8%	1.5%	2.2%	0.9%	2.0%	2.1%	0.7%	2.3%	1.6%	1.4%	1.1%	1.0%	3.6%	0.4%	0.8%	0.9%	1.0%	0.7%	0.3%	0.0%	0.4%	0.5%	1.2%
	SV-11	1.3%	2.3%	3.4%	2.2%	3.4%	1.9%	1.0%	0.9%	1.5%	1.4%	1.2%	1.0%	0.6%	0.3%	0.5%	1.2%	0.7%	0.5%	0.3%	0.3%	0.7%	0.8%	0.8%	0.8%	0.2%	0.5%	1.7%	1.4%	2.5%
	SV-12	0.3%	0.5%	0.6%	0.4%	0.5%	2.3%	4.8%	2.4%	1.6%	1.4%	1.8%	2.7%	1.2%	1.0%	0.7%	0.7%	1.0%	0.8%	3.7%	1.3%	3.1%	3.0%	3.1%	1.7%	0.3%	1.7%	2.8%	0.8%	1.3%
	SV-13	0.6%	0.9%	1.6%	0.2%	0.3%	1.4%	2.0%	1.3%	1.2%	0.2%	0.2%	0.7%	0.2%	0.2%	0.4%	0.8%	0.2%	0.1%	0.4%	0.1%	1.0%	0.9%	1.0%	0.9%	0.2%	0.6%	1.0%	0.8%	1.2%
	SV-14	2.3%	6.1%	5.8%	7.5%	5.5%	2.2%	1.1%	2.0%	4.5%	6.3%	6.9%	7.4%	12.7%	13.1%	3.3%	1.8%	1.5%	0.9%	3.3%	0.7%	2.7%	3.5%	3.2%	3.3%	1.5%	0.8%	2.3%	3.1%	1.6%
	SV-15	9.5%	14.7%	3.9%	5.3%	2.8%	5.6%	5.7%	0.5%	8.8%	5.8%	6.9%	10.4%	6.4%	0.9%	1.8%	2.3%	1.5%	1.3%	2.3%	0.3%	2.8%	3.1%	3.9%	6.7%	2.6%	3.2%	9.5%	5.7%	5.1%
2 (and between divider line)	SV-7	2.2%	1.5%	1.9%	1.5%	2.9%	4.2%	2.3%	1.1%	3.9%	4.8%	3.8%	4.0%	3.2%	0.3%	3.1%	5.3%	2.5%	2.1%	3.3%	1.3%	1.1%	0.9%	1.2%	1.7%	0.8%	0.3%	0.7%	0.9%	1.8%
	SV-16	9.5%	7.1%	1.1%	5.7%	6.2%	6.6%	6.9%	5.2%	8.0%	8.7%	6.9%	6.9%	8.0%	0.0%	6.8%	10.3%	10.5%	6.6%	18.3%	5.0%	8.1%	10.5%	11.1%	14.4%	12.9%	8.6%	12.9%	5.4%	8.7%
	SV-17	2.9%	0.1%	-3.3%	2.1%	1.6%	-1.5%	-0.6%	-0.5%	-1.6%	-3.1%	-2.0%	-1.3%	0.0%	-2.8%	0.7%	6.0%	1.3%	0.7%	-1.0%	0.5%	1.6%	1.2%	-1.1%	0.5%	0.5%	0.3%	0.6%	0.9%	-0.2%
	SV-18	5.5%	11.4%	4.9%	6.8%	5.6%	6.7%	7.8%	13.0%	9.5%	6.6%	3.6%	4.3%	7.1%	22.8%	10.5%	8.2%	14.5%	9.1%	7.9%	13.9%	10.4%	10.8%	12.9%	10.1%	19.2%	11.2%	2.2%	12.4%	19.1%
	SV-19	3.6%	0.3%	-2.0%	5.5%	6.3%	0.6%	2.8%	3.0%	3.2%	6.5%	6.4%	4.3%	3.0%	3.4%	2.0%	0.7%	1.2%	0.7%	0.9%	0.6%	1.7%	0.6%	0.2%	0.5%	0.7%	0.6%	1.3%	1.6%	1.2%
	SV-20	7.2%	12.0%	7.2%	6.2%	6.3%	5.7%	5.5%	11.9%	6.1%	2.8%	2.9%	0.6%	5.0%	14.1%	11.0%	8.9%	8.7%	23.9%	14.6%	16.8%	10.7%	13.4%	16.3%	9.3%	10.4%	36.1%	15.9%	15.2%	14.1%
	SV-21	2.6%	2.0%	3.8%	0.9%	2.4%	3.2%	2.9%	3.6%	2.5%	5.3%	1.6%	-0.4%	2.2%	0.2%	3.5%	6.3%	5.8%	4.3%	1.4%	4.8%	3.0%	3.5%	1.1%	1.6%	3.8%	1.9%	-1.2%	3.7%	1.4%
	SV-22	8.5%	9.3%	8.3%	5.9%	7.6%	6.7%	7.0%	12.2%	8.5%	6.7%	4.8%	3.9%	4.4%	0.1%	9.9%	5.4%	11.5%	19.8%	11.5%	13.6%	14.3%	14.0%	16.1%	7.8%	10.4%	8.4%	9.2%	7.0%	6.8%
	SV-23	5.2%	-2.9%	-2.4%	1.9%	4.4%	-0.3%	0.5%	0.3%	1.0%	8.8%	1.3%	4.6%	2.9%	6.2%	10.3%	3.2%	3.4%	2.6%	-0.2%	-0.2%	2.4%	-6.0%	-2.0%	2.6%	11.6%	6.4%	-7.9%	9.6%	3.9%
	SV-24	4.0%	8.5%	9.4%	7.2%	6.2%	4.4%	5.6%	10.3%	4.7%	8.0%	6.8%	7.4%	7.4%	13.6%	8.3%	6.5%	11.3%	8.5%	7.7%	14.7%	13.7%	11.6%	8.4%	8.9%	10.0%	7.0%	6.6%	10.3%	9.8%
	SV-25	-0.1%	1.1%	0.0%	0.7%	0.8%	0.1%	1.5%	0.1%	1.4%	2.1%	0.2%	1.3%	1.2%	-0.2%	0.0%	0.5%	0.3%	0.4%	0.1%	0.2%	0.0%	0.4%	0.8%	0.2%	-1.0%	0.0%	1.1%	2.3%	1.3%
	SV-26	0.3%	2.2%	1.9%	1.9%	2.4%	1.6%	3.4%	1.0%	1.6%	4.3%	6.8%	8.1%	5.9%	3.2%	2.7%	3.9%	2.8%	1.1%	1.7%	4.0%	2.6%	3.2%	2.2%	2.8%	0.7%	1.1%	3.1%	2.0%	1.8%
	SV-27	0.1%	0.7%	-0.5%	1.7%	0.4%	1.4%	3.2%	1.2%	2.4%	1.1%	2.0%	0.4%	0.2%	0.0%	-1.5%	0.1%	0.7%	0.5%	0.2%	0.5%	0.5%	1.0%	0.8%	0.6%	0.7%	0.2%	1.2%	0.7%	-0.2%
	SV-28	0.0%	1.0%	0.5%	0.6%	0.7%	0.8%	0.0%	0.5%	0.9%	1.7%	5.5%	10.1%	6.9%	6.1%	3.8%	9.5%	4.2%	2.0%	3.4%	11.6%	7.9%	4.8%	2.7%	3.2%	0.4%	2.0%	4.7%	2.1%	1.7%
	SV-29	0.0%	0.6%	0.4%	0.1%	0.2%	0.4%	0.0%	0.0%	0.1%	0.0%	0.6%	0.5%	0.2%	0.1%	3.7%	0.1%	0.3%	0.1%	0.1%	0.3%	0.4%	0.3%	0.1%	1.0%	0.1%	0.1%	0.7%	0.4%	0.6%
Total:		100%	100%	101%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note: Six out of the 23 wellfield branch lines service both Phase 1 and Phase 2; therfore, a correction has been made to subtract the shared mass sometimes resulting in a negative value. This value indicates that the mass contribution from the Phase 2 area was limited in that particular sample round. This is a result of the accuracy of the flow and PID data measurements collected.

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2 TEMPERATURE PROGRESS

Table 4 summarizes the average target treatment zone temperature for both Phase 1 and Phase 2 thermocouples that remain online, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Select heaters in Phase 1 were taken offline on 01/08/15; while select heaters in Phase 2 were taken offline on 2/9/15

Table 4. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	2/22/15	
Phase 1 Entire TTZ Average Temperature	N/A	°C
Phase 2 Online TMPs Average Temperature	106	°C
Phase 1 Centroid Average Temperature	N/A	°C
Phase 2 Online Centroid Average Temperature	100	°C

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was increased on 8/30/14. Recent increases and decreases correlate with wellfield modifications to sweep the subsurface.

<

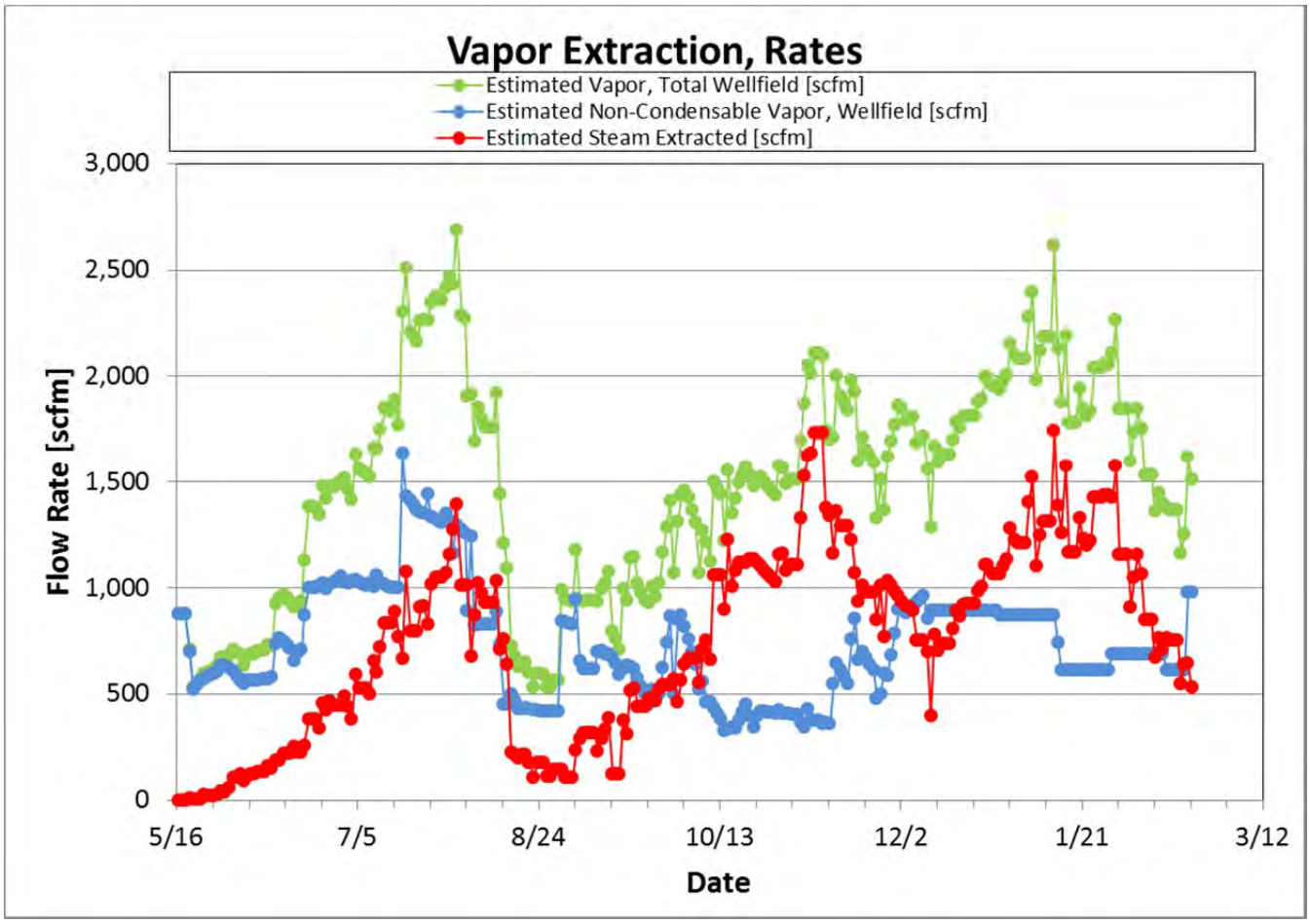


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Please note that the flammability analyzer is no longer online (corresponds with taking the oxidizer offline).

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

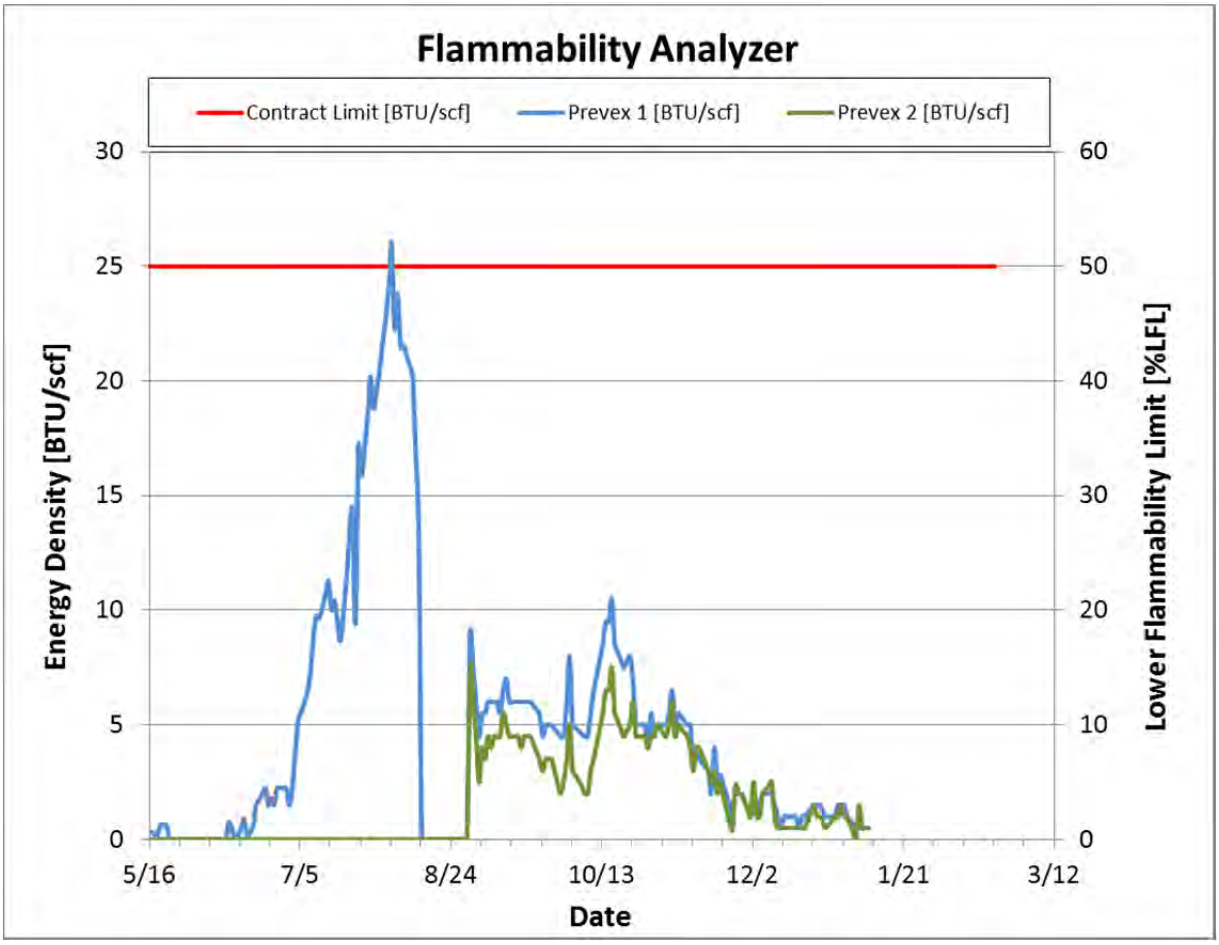


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed through 01/09/15 is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. Mass removal starting 01/10/15 is reported as the total compounds detected in the laboratory data corrected using the PID plus the accumulated LNAPL.

The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively. Please note that the mass removal rates are shown on a logarithmic scale.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14, 9/23/14, 9/30/14, 10/7/14, 10/14/14, 10/21/14, 10/30/14, 11/4/14, 11/18/14, 11/25/14, 12/2/14, 12/9/14, 12/16/14, 12/23/14, 12/30/14, 01/06/15, 01/13/15, 01/20/15, 01/26/15 and 02/10/15.

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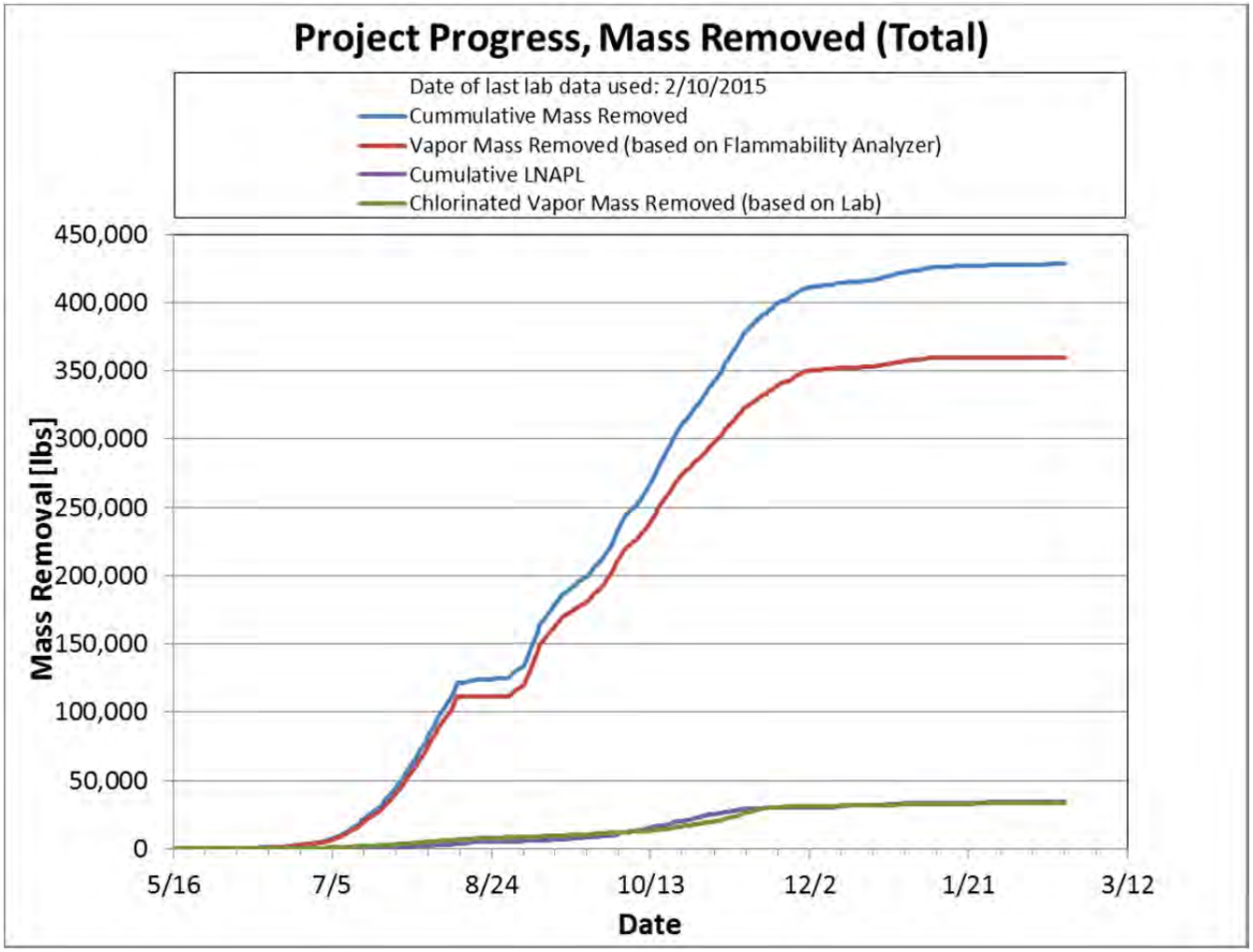


Figure 4a. Project Progress, Mass Removal (Total)

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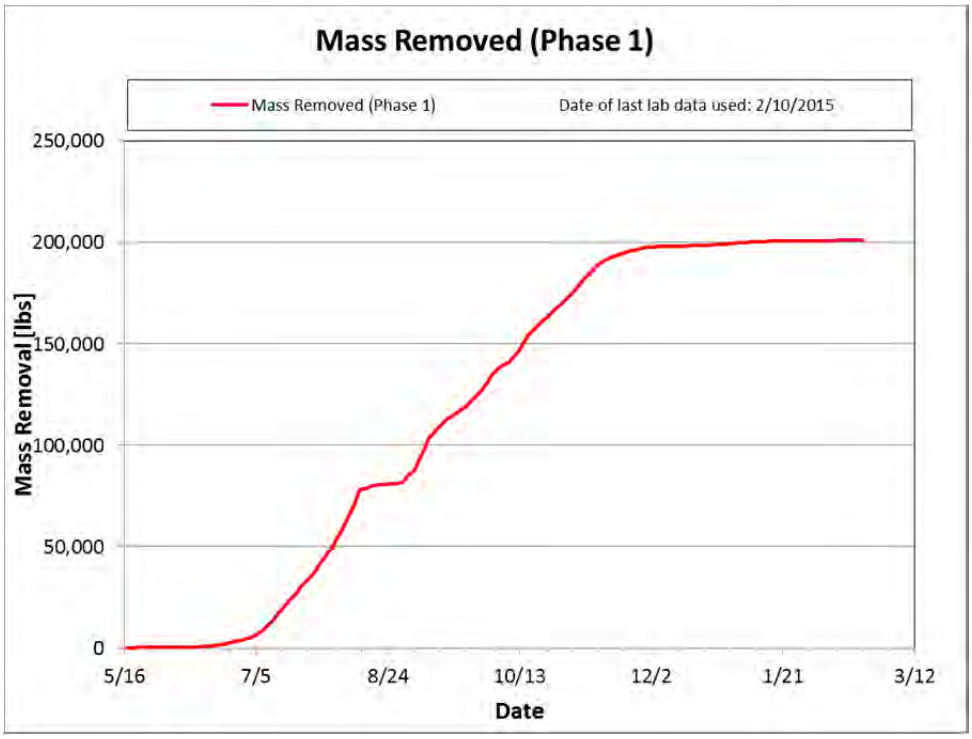


Figure 4b. Project Progress, Mass Removal (Phase 1)

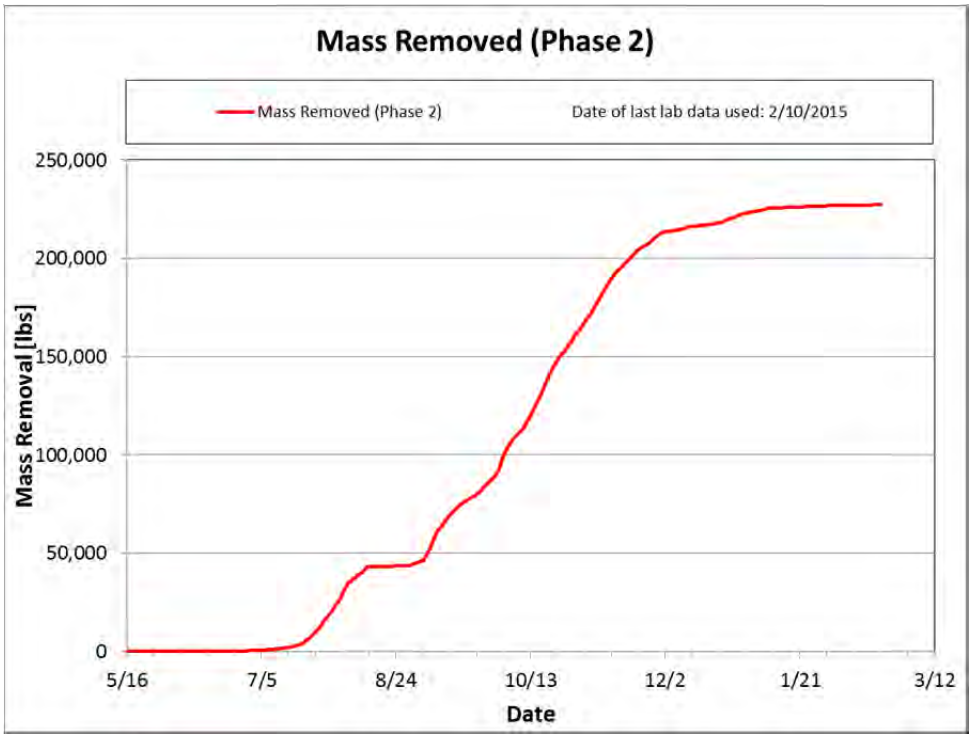


Figure 4c. Project Progress, Mass Removal (Phase 2)

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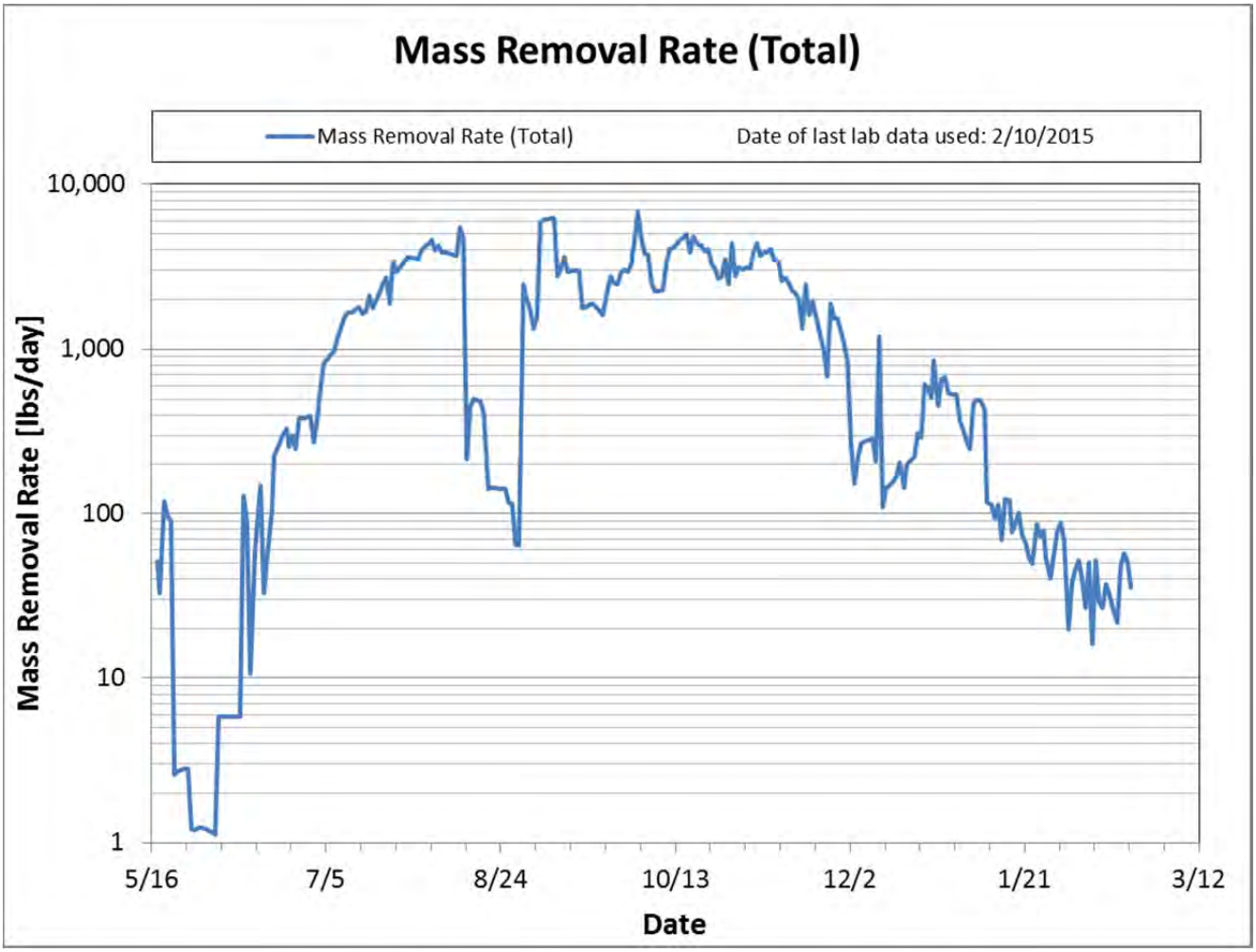


Figure 4d. Mass Removal Rate (Total for Site)

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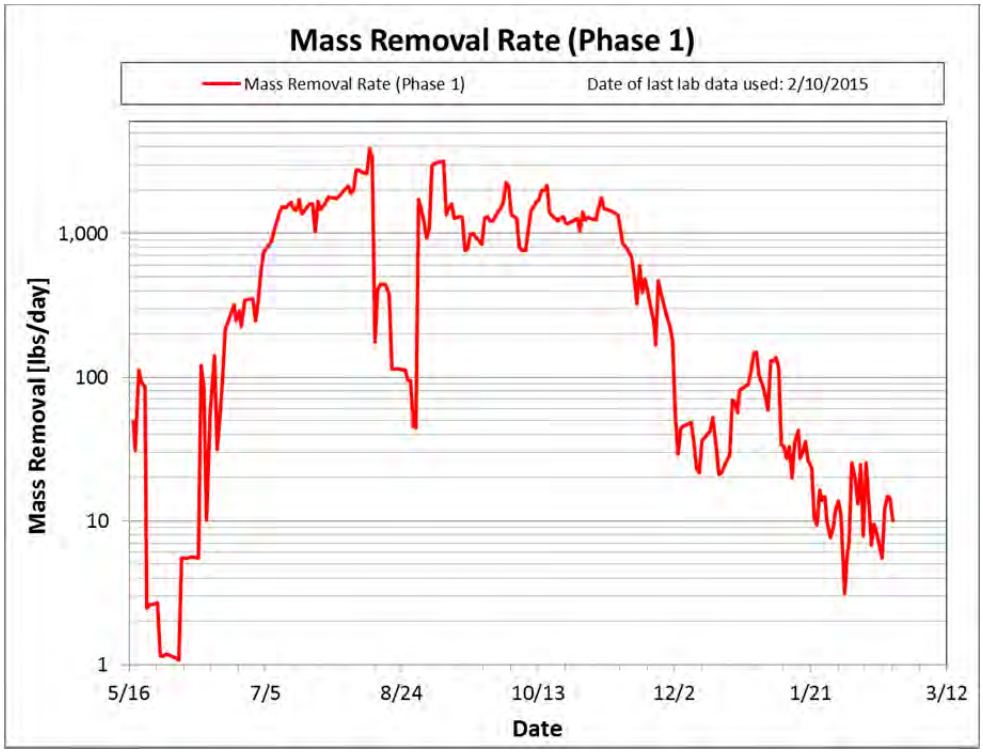


Figure 4e. Mass Removal Rate (Phase 1)

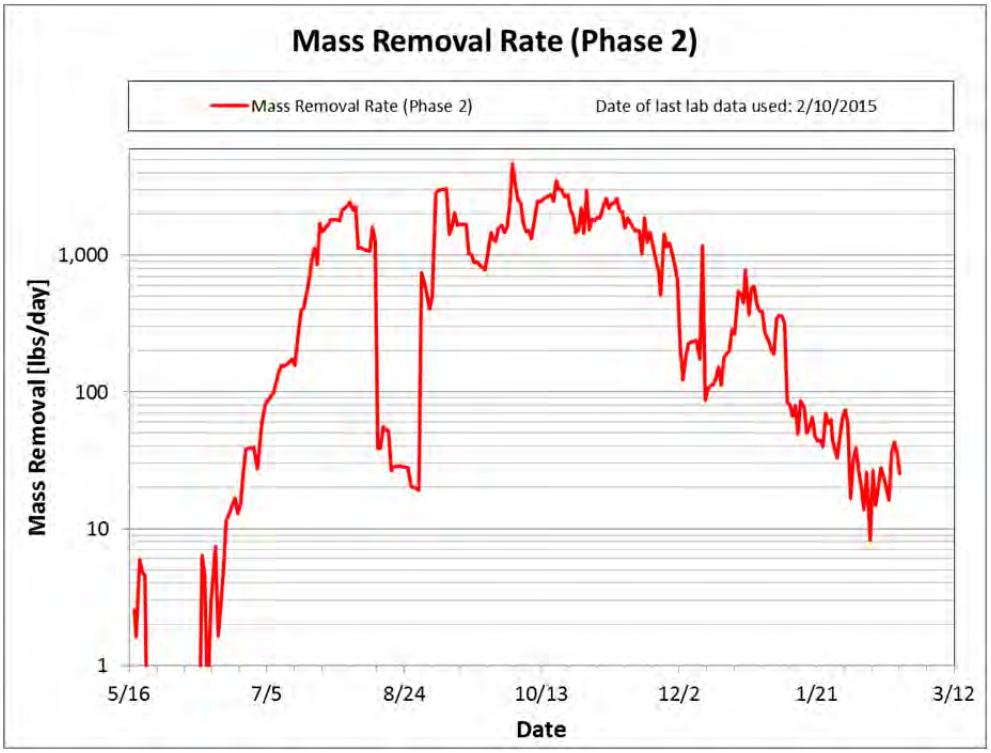


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID and flammability analyzer readings collected at the oxidizer influent over time. It should be noted that PID readings are first collected using an 11.7 eV lamp (determined by site contaminants). If the reading exceeds the limit of the meter (>2000 ppm), the readings are collected using a 10.6 eV lamp. When both meters are used, the maximum value is recorded.

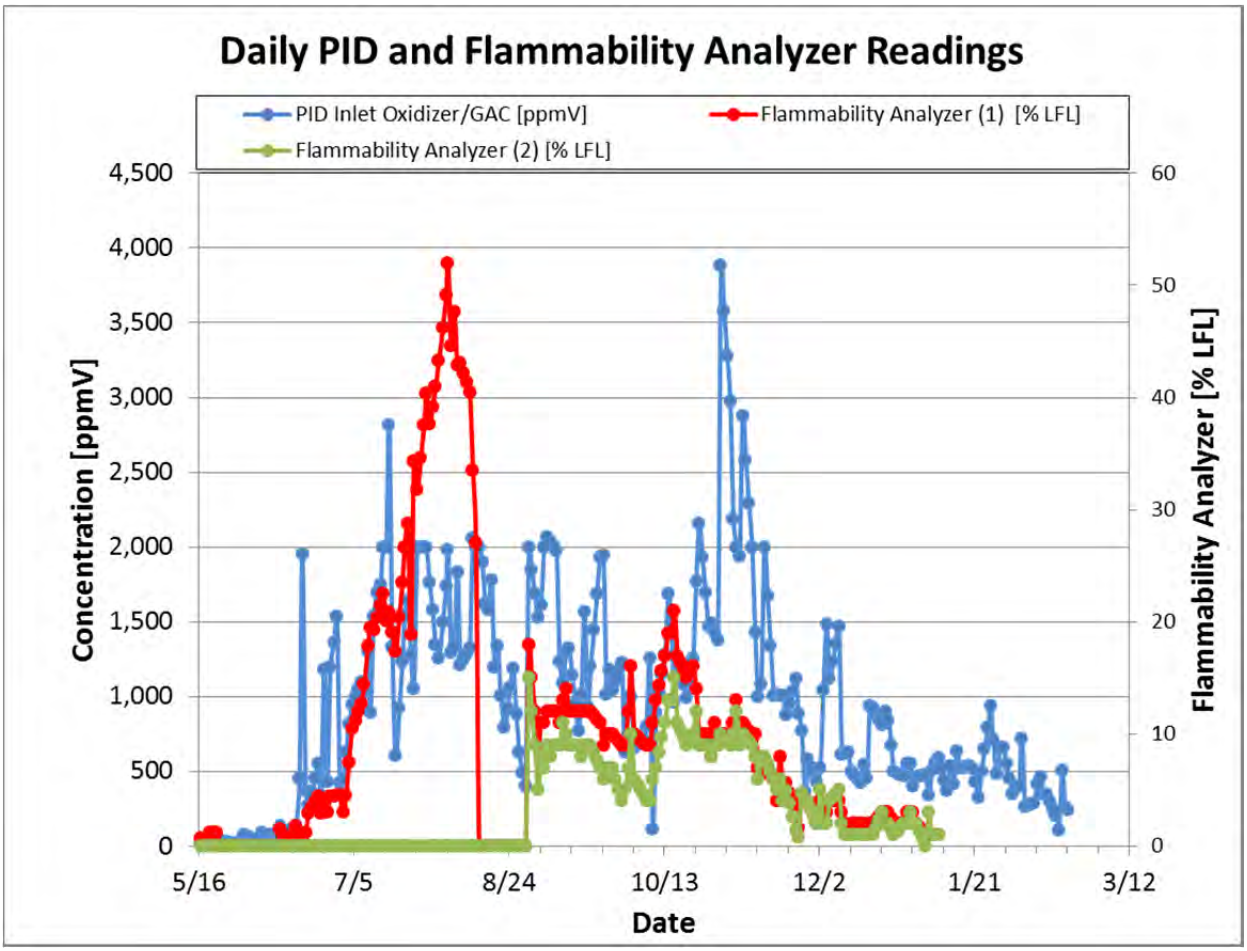


Figure 5. Daily PID and Flammability Analyzer Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13, after the oxidizer shutdown. Decreases in DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-outs.

Influent concentrations collected over the past week were between 108 to 508 ppm, with effluent concentrations ranging between 0.1 to 2.6 ppm. While the calculated DRE is less than 95% on some days, calculated mass emissions are less than 2 lbs/hr (air permit limit) by more than 50%.

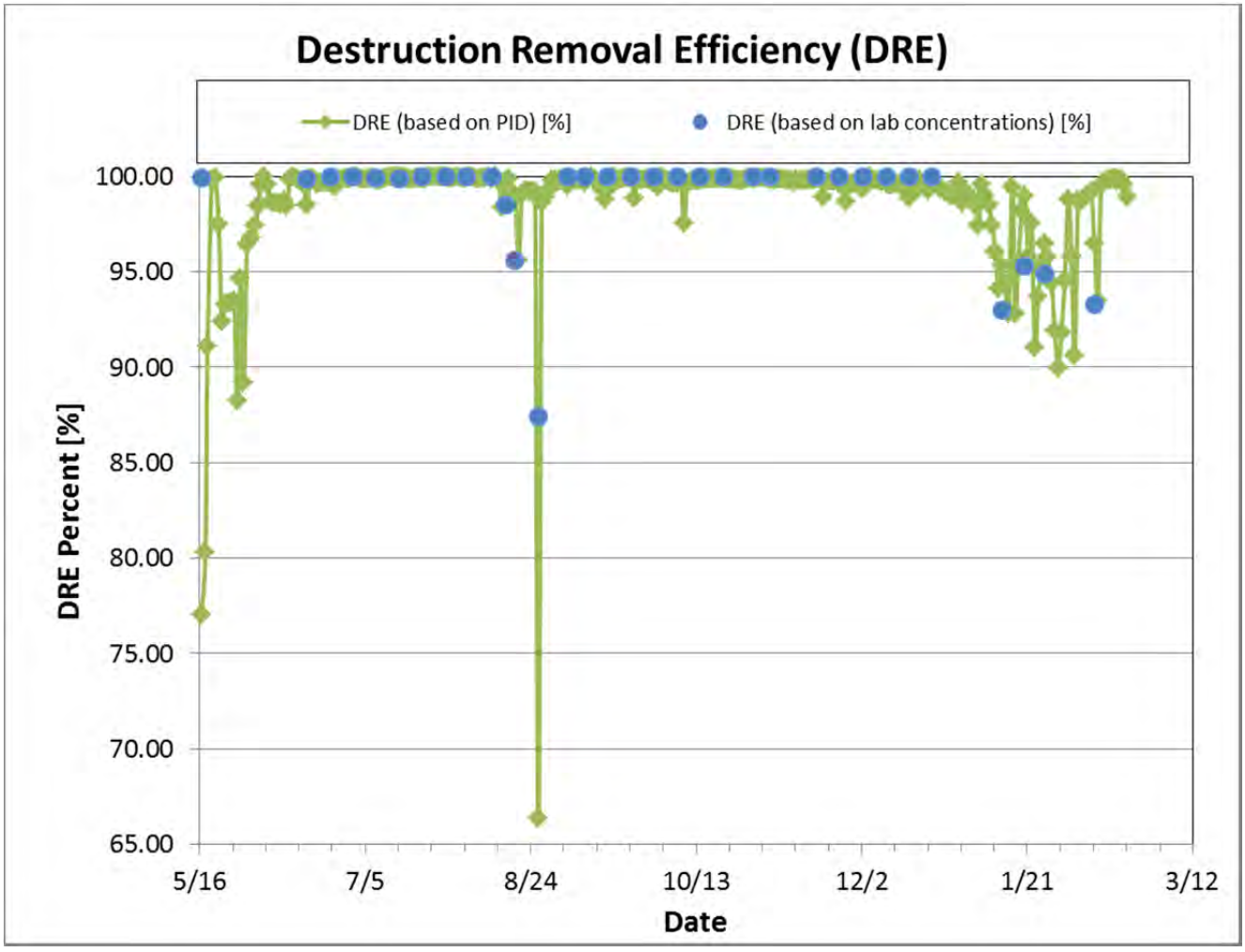


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7. Please note that the graph has been modified to present the estimated modeled energy for the heaters (ISTD) over the original predicted 195 day treatment. This does not take into account contract definitions such as heaters operating at or above 70% energy input. The flatline represents days beyond 195 days.

Please note that the modeled energy usage (12,873,000 kWh) only includes the energy predicted to be added to the subsurface. Therefore, the number should be compared to the cumulative energy added by the ISTD system to the subsurface (red line). The total energy usage (including the treatment system power usage) is predicted to be 15,795,000 kWh as stated in the summary table.

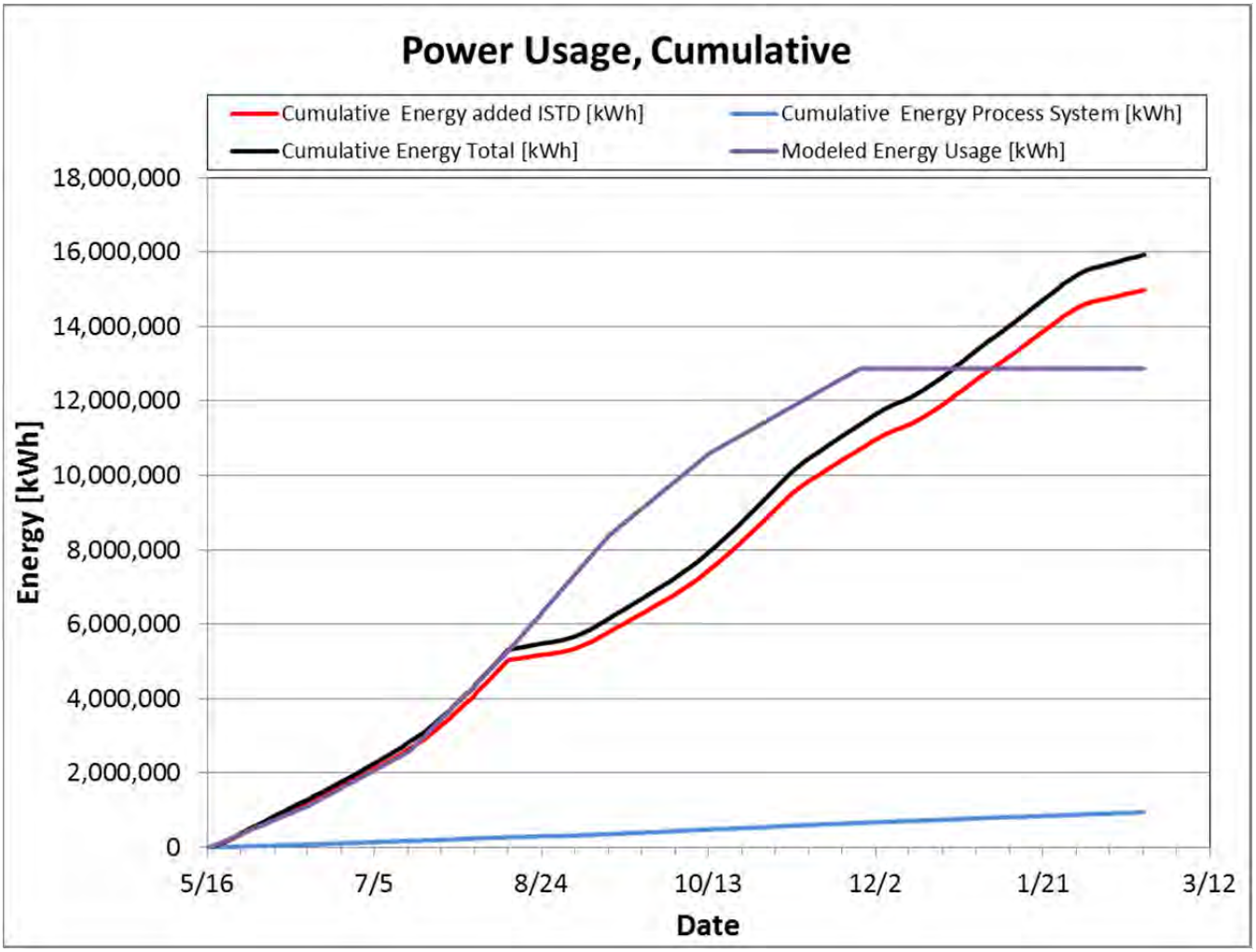


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30/14 and the following days corresponds with ramping of the heaters after placing the oxidizer back online. The decrease observed mid- November is associated with profiling of the heaters in Phase 2 and subsequent adjustments. The increase observed in December corresponds with additional profiling and subsequent adjustments. Approved circuits in Phase 2 were decreased last week with ultimate shutdown of them Monday, 9 February.

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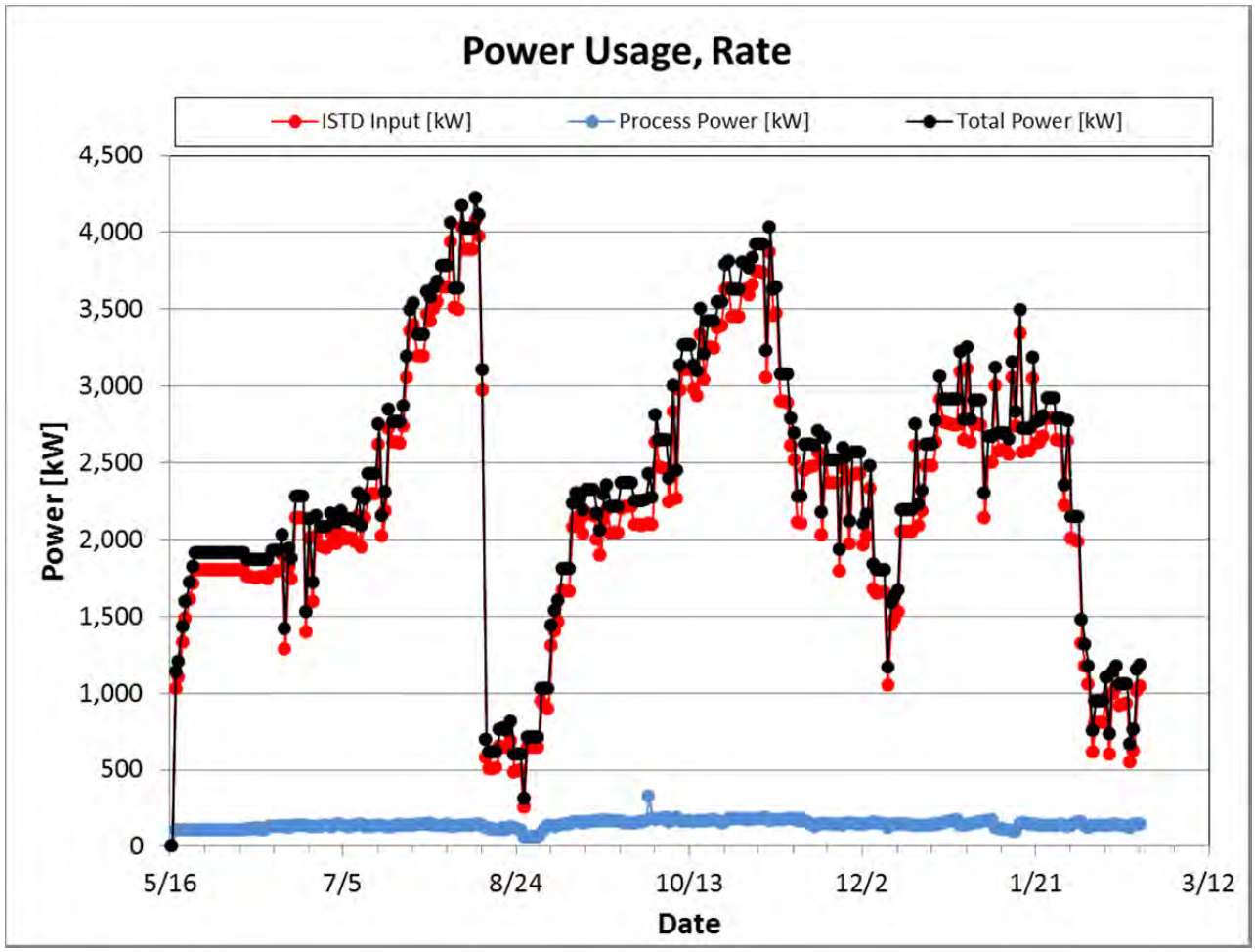


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

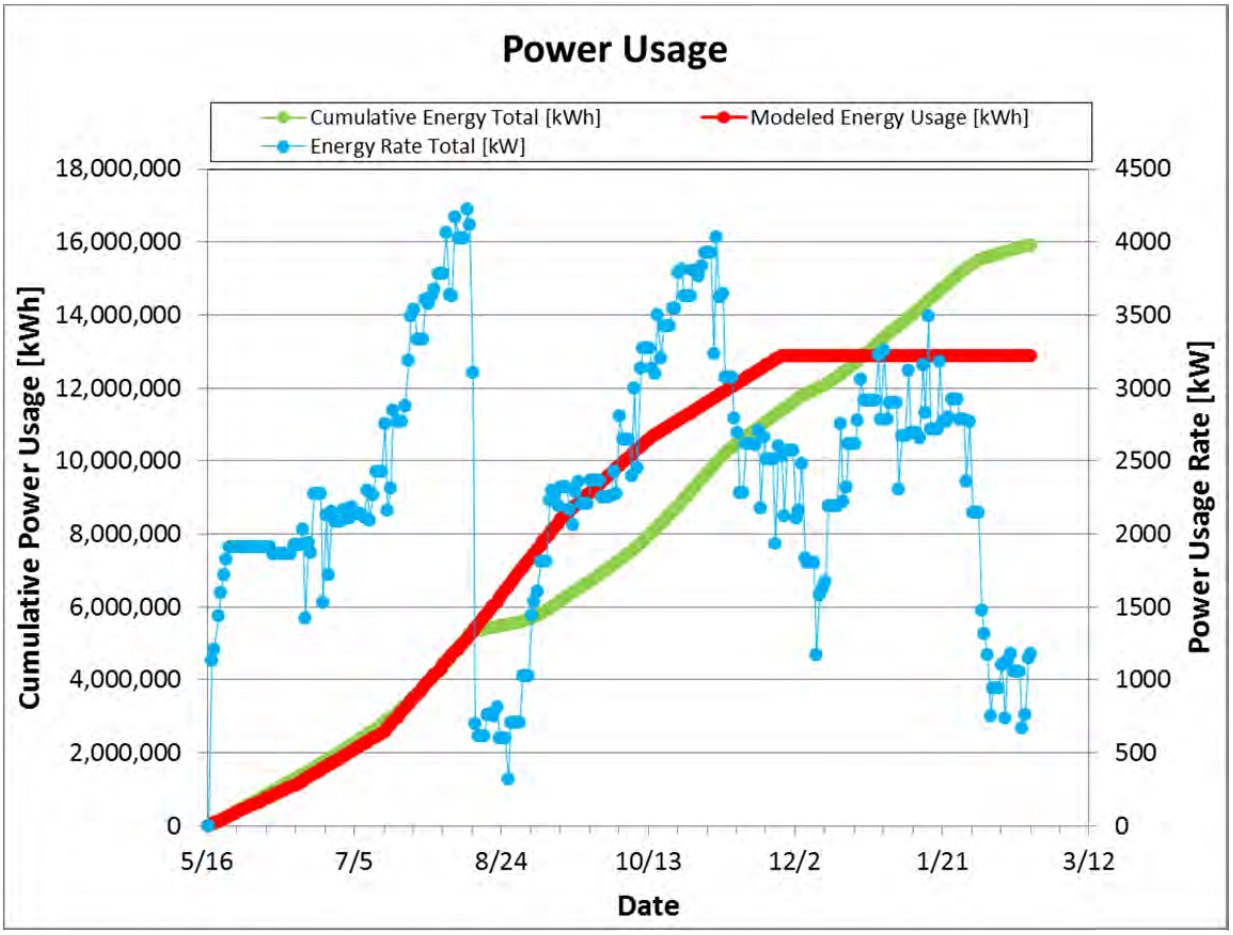


Figure 9. Power Usage

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With the oxidizer offline, natural gas is no longer in demand (as shown below starting on 10 January 2015).

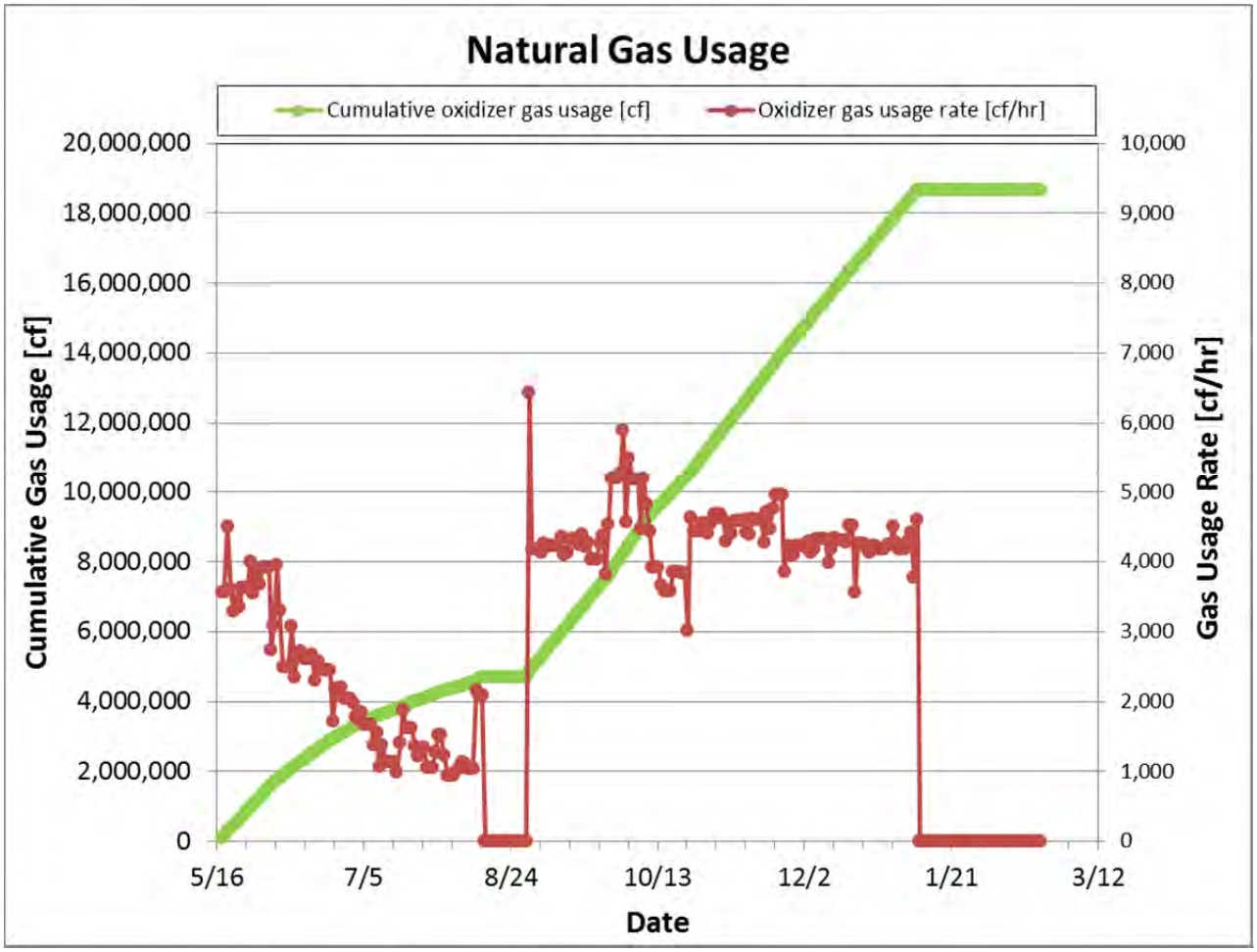


Figure 10. Natural Gas Usage

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With the oxidizer offline, caustic is no longer in demand (as shown below starting on 10 January 2015).

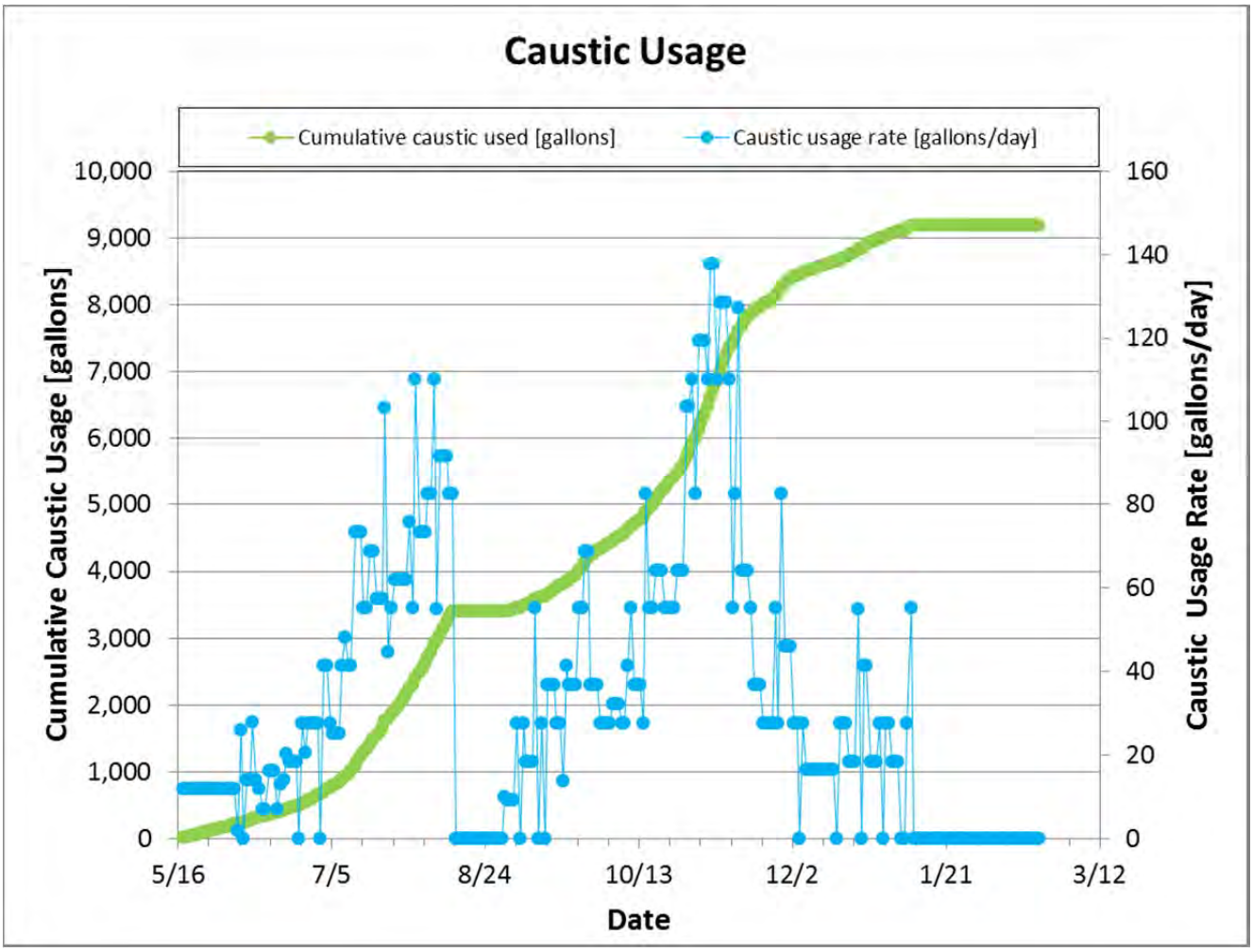


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as: Phase 1 and Phase 2 treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Currently, thermocouples for both Phase 1 and Phase are online (Figure 12c). The below figure represents those data. The following table is accurate to the individual Phase 1 and Phase 2 milestones.

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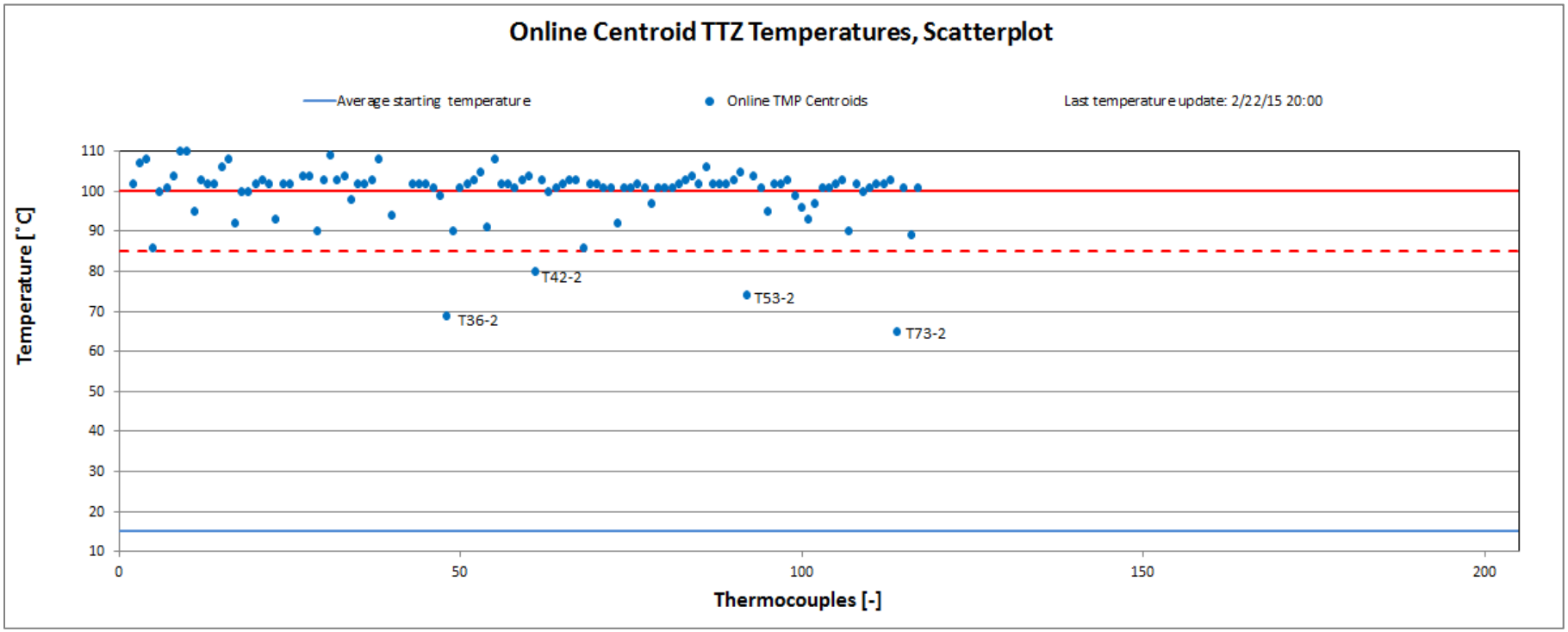


Figure 12c. Phase 1 and Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 5. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots

	Value	Unit
Date of Last Update	2/8/15	
Phase 1 Centroid Thermocouples ≥85 ^{0}C	100	%
Phase 1 Centroid Thermocouples ≥100 ^{0}C	97	%
Phase 2 Centroid Thermocouples ≥85 ^{0}C	99	%
Phase 2 Centroid Thermocouples ≥100 ^{0}C	98	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday, 20 February, 2015 through Friday, 27 February, 2015, with temperatures updated through Sunday, 1 March, 2015.

Table 1 provides a summary of the project operational status as of Friday, 27 February, 2015.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	02/27/15	
Last Temperature Data Update	03/01/15	
Days of Operation (Total)	264	days
Days of Phase 1 Operation	158	days
Days of Phase 2 Operation	155	days
Total Design Energy Usage (ISTD and treatment system)	15,795,000	kWh
Total Energy Added (ISTD)	16,085,900	kWh
Used Electrical Energy vs. Estimate	101.8	%
Total Mass Removal	428,666	lbs
Average Power Input Last 24 Hours	590	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,464	scfm
Average Condensate Production Rate Last 24 Hours	2.7	gpm

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Temperature figures and calculations within this progress report represent ALL thermocouples that are currently online, whether they are located in Phase 1 or Phase 2, unless otherwise noted.

The current average wellfield temperature (includes thermocouple sensors in both Phase 1 and Phase 2 in the area where heaters are still operating) is 101°C at the centroid locations and 106°C at non-centroid locations. This information is shown in the "Phase 2" label of Table 4.

Phase 2 has operated for 155 days. Phase 1 operated for a total of 158 days, which represents days where heaters operated at or above 70% and the collection date of the last confirmation soil sample (per contract definition). All three temperature milestones have been achieved for both Phase 1 and 2.

The oxidizer was taken offline 01/10/15. Vapor treatment is now through the vapor carbon vessels. Estimated mass removed through 01/09/15 (oxidizer online) was reported using the flammability analyzer data, laboratory data for chlorinated compounds that were assumed not to be detected by the flammability analyzer, and accumulated LNAPL. Following the oxidizer being offline (01/10/15), estimated mass removed is calculated using the analytical laboratory data results (TO-15), corrected with daily PID readings, plus the accumulated LNAPL. These results yield a total mass removed of **428,666** lbs as of 02/27/15. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 02/26/15. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.19:0.81. These ratios were then applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase and leg. These data are included in Tables 2 and 3. Please note that the drop in Phase 2 fraction (and matching increase in Phase 1 fraction) is related to decreases in the measured Phase 2 concentrations at more or less all of the sample locations.

During the 01/22/15 manifold data collection effort, flows were estimated based on the measurement collected at the blower as the wellfield flows were too low to be accurately recorded/measured on the handheld meter.

Mass fraction data over time is presented below.

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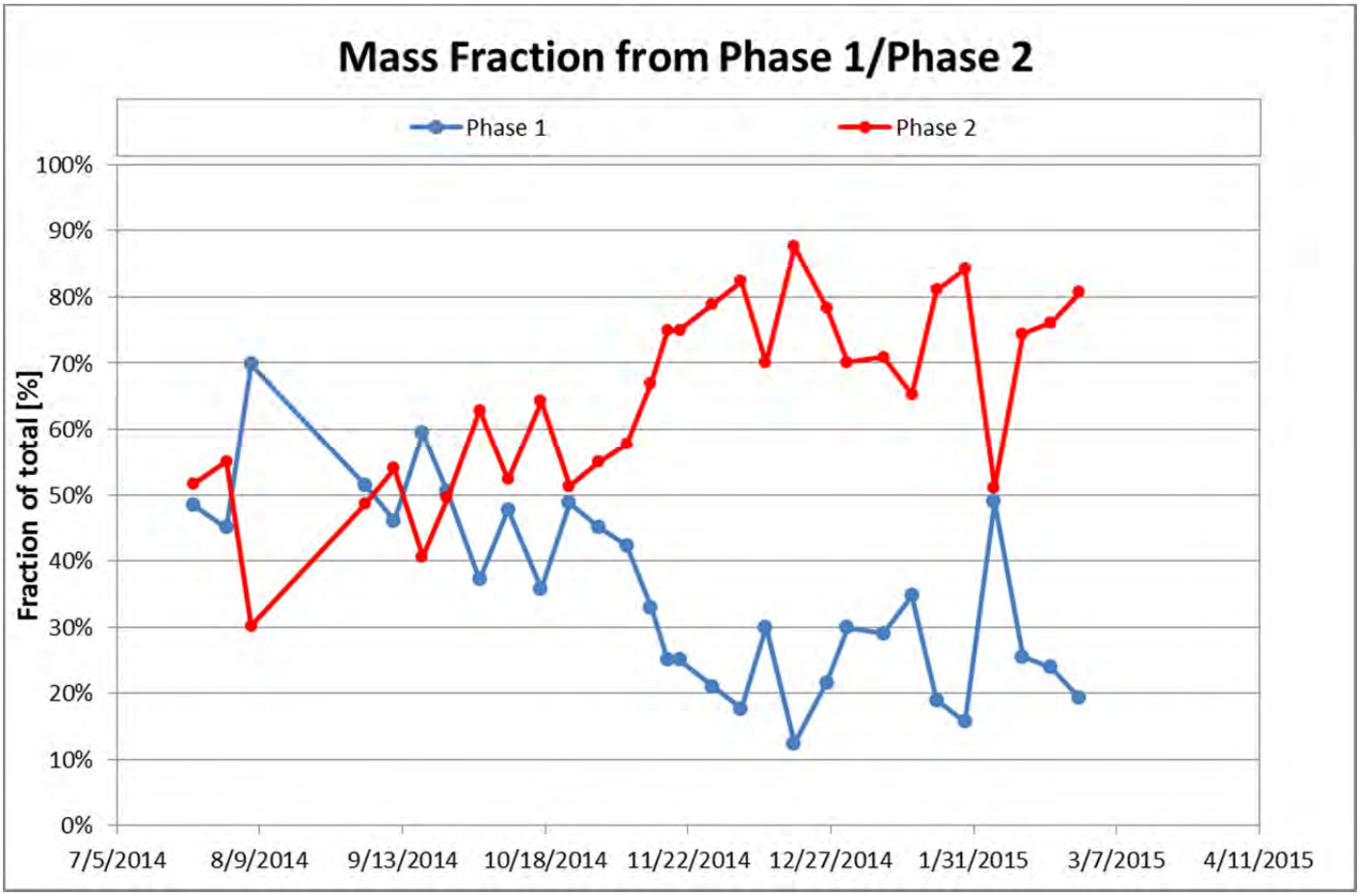


Figure 1. Mass Fraction from Phase 1/Phase 2

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Table 2. PID Readings Collected from Manifold Legs

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14	12/31/14	1/9/15	1/16/15	1/22/15	1/29/15	2/5/15	2/12/15	2/19/15	2/26/15
1	SV-1	215	100	745	602	720	604	590	1181	550	516	5	770	712	851	845	790	450	360	236	185	177	170	95	238	128	182	179	201	199	87
	SV-2	742	173	1271	887	872	1129	1318	2987	780	770	1610	1004	931	1179	600	934	660	677	482	377	397	436	300	449	810	404	283	91	187	126
	SV-3	2588	872	3609	2854	1198	3395	1414	5512	2643	1120	3971	1430	627	99	101	3138	1717	1782	1218	1246	347	1622	725	626	1108	1241	653	86	430	292
	SV-4	1971	307	2543	1921	1514	2652	1153	4790	1927	3820	3275	2204	2650	3297	1375	2903	1510	2341	1278	979	333	611	585	477	487	446	300	129	264	45
	SV-5	1817	279	1642	740	444	1407	1197	4790	759	1411	950	1153	802	326	302	490	402	135	243	120	235	29	202	248	198	180	129	131	80	102
	SV-6	4480	332	1926	956	765	4283	2347	11564	3525	9177	5750	4780	4919	5854	1083	2100	601	435	1271	375	277	197	678	664	1141	699	558	328	518	345
	SV-8	3222	385	1330	2375	1479	3267	1816	4744	179	172	3815	1881	1850	88	1475	940	401	450	890	150	178	170	110	244	185	235	94	167	166	187
	SV-9	3245	142	324	1993	1565	2995	1777	11950	2762	4967	3801	2121	2863	3227	1265	801	1209	1040	1480	390	350	340	445	445	365	622	298	274	450	158
	SV-10	1896	131	2148	1096	1111	2459	1517	4382	1933	1745	3384	2841	1318	4121	1494	1982	1302	1221	3215	500	381	420	400	371	269	99	65	93	182	101
	SV-11	1016	666	1712	1979	2145	1988	930	2534	1393	2687	1950	1469	1380	596	596	1360	750	641	270	399	332	354	315	495	271	412	346	333	389	83
	SV-12	80	53	158	139	104	815	1427	3234	682	1102	1090	2100	512	563	206	413	440	426	1413	545	569	490	465	201	74	637	143	65	185	91
	SV-13	417	211	736	145	170	1452	1476	4291	1109	375	370	985	380	295	315	1210	210	131	432	143	473	445	365	315	139	550	209	187	173	146
	SV-14	632	452	1526	2636	1450	777	1610	3411	1917	4668	4274	4150	5565	8416	1107	1053	630	500	1288	300	468	570	493	422	352	366	129	243	232	154
	SV-15	3440	1072	1153	2000	915	2150	2054	608	3265	4890	4801	5780	5000	618	654	1623	730	660	1007	115	490	600	705	872	627	1247	742	500	764	586
2 (and between divider line)	SV-7	3843	366	1751	1210	1482	4307	1835	3337	3672	9379	7350	5812	7910	553	3115	6391	2860	2977	2810	1323	554	531	500	514	483	300	129	184	278	273
	SV-16	3113	885	233	1911	1703	2823	2216	6230	3165	6888	4994	3841	6029	11	2340	6276	3118	3307	7931	1957	1502	1908	1765	2144	3610	3159	821	454	1332	791
	SV-17	3715	429	306	2928	1824	2801	1837	8933	1927	2713	2954	3313	5408	389	1670	10903	1983	1335	409	800	1133	730	116	718	1223	850	712	501	492	346
	SV-18	1760	862	1203	2034	1634	2388	2446	15000	3554	5030	2815	2465	5632	13871	3377	4768	3650	5071	3361	5491	2057	2012	2423	1553	5546	4535	146	1110	2876	2547
	SV-19	2258	350	2067	1971	2005	1818	2038	10522	2191	6417	4561	4398	3067	2693	1075	875	925	530	528	315	552	130	515	438	504	401	263	288	259	235
	SV-20	1990	796	1545	2344	1610	2268	2158	15000	2853	2305	2059	343	4053	8642	3534	5500	2725	12650	6352	6520	2084	2492	2750	1673	3511	13673	951	1305	2221	1592
	SV-21	1964	487	2295	2077	1855	3458	1755	8561	2756	8053	4661	2119	4298	2631	2264	6000	4186	4440	2002	2870	937	958	808	634	1346	1644	158	449	497	239
	SV-22	2670	980	1606	2222	1892	2466	2448	14750	3344	5023	3578	2236	3582	55	3460	4765	3450	11187	4509	5516	2803	2565	2720	1598	3970	3235	584	792	995	832
	SV-23	2515	671	3248	3158	2165	3233	1532	8102	2973	7684	4880	3933	2707	4560	4005	5367	2993	2598	1326	1154	805	883	517	948	3832	3889	163	1017	1048	1153
	SV-24	1412	638	1504	2406	1567	1669	1949	11882	1999	6130	4554	5005	6223	8864	2843	4555	2946	4280	3267	5764	2614	2195	2350	1446	3030	2866	502	957	1553	1119
	SV-25	688	220	1261	1035	1059	1350	2418	5725	1542	2247	1873	1743	1925	991	570	1301	740	773	500	445	400	547	410	457	494	448	350	295	370	141
	SV-26	90	185	350	580	573	638	1133	1119	790	3559	4305	4752	4633	1933	865	2742	710	520	642	1710	548	550	420	677	298	410	183	169	277	102
	SV-27	192	151	718	944	789	1117	1518	3922	1256	1485	1650	947	840	1040	313	769	745	620	318	320	277	350	210	289	309	233	241	254	171	102
	SV-28	15	87	77	151	178	310	211	730	335	1250	3624	5592	5447	4380	1438	6351	1440	1100	1588	4527	1575	886	610	759	181	856	300	175	258	93
	SV-29	8	66	55	20	52	130	1	15	35	21	352	255	83	41	1375	43	80	41	52	117	70	61	20	318	62	63	53	34	93	26
Breakdown of Wellfield VOC Flux by Phase																															
Phase 1:		48%	45%	70%	51%	46%	59%	51%	37%	48%	36%	49%	45%	42%	33%	25%	25%	21%	18%	30%	12%	22%	30%	29%	35%	19%	16%	49%	26%	24%	19%
Phase 2:		52%	55%	30%	49%	54%	41%	50%	63%	52%	64%	51%	55%	58%	67%	75%	75%	79%	82%	70%	88%	78%	70%	71%	65%	81%	84%	51%	74%	76%	81%

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Table 3. Estimated Mass Loading by Manifold Leg/Phase

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14	12/31/14	1/9/15	1/16/15	1/22/15	1/29/15	2/5/15	2/12/15	2/19/15	2/26/15
1	SV-1	0.5%	0.7%	3.5%	1.5%	3.0%	1.6%	1.7%	1.0%	1.1%	0.7%	0.0%	1.3%	0.8%	1.2%	2.2%	1.2%	1.0%	0.6%	0.6%	0.4%	0.9%	0.7%	0.6%	1.2%	0.3%	0.4%	2.4%	2.1%	1.5%	0.8%
	SV-2	2.0%	1.3%	4.3%	2.6%	3.6%	3.0%	4.7%	2.5%	1.9%	0.8%	2.4%	1.8%	1.2%	1.7%	1.6%	1.3%	1.4%	1.3%	1.3%	1.0%	1.9%	2.2%	1.7%	2.8%	2.7%	1.0%	3.9%	1.0%	1.4%	1.2%
	SV-3	3.5%	7.5%	16.2%	7.4%	5.0%	8.9%	5.0%	4.5%	7.1%	1.3%	5.7%	2.6%	0.7%	0.2%	0.3%	5.1%	4.2%	3.3%	3.2%	3.5%	1.7%	9.4%	4.5%	5.0%	4.7%	3.3%	10.5%	0.9%	3.2%	2.8%
	SV-4	3.3%	2.5%	8.5%	5.7%	5.5%	5.9%	3.3%	3.5%	4.8%	3.9%	4.5%	3.2%	3.1%	3.8%	3.0%	4.4%	3.5%	4.5%	3.0%	2.3%	1.5%	1.8%	3.4%	3.3%	1.8%	1.0%	3.4%	1.2%	1.7%	0.3%
	SV-5	2.5%	2.9%	9.6%	2.5%	1.6%	3.1%	3.2%	3.2%	2.1%	1.9%	1.4%	1.5%	1.0%	0.5%	0.9%	0.7%	1.0%	0.3%	0.6%	0.3%	1.2%	0.2%	1.2%	1.8%	0.8%	0.4%	2.1%	1.4%	0.6%	0.9%
	SV-6	2.5%	1.4%	3.8%	1.6%	1.2%	4.1%	3.0%	3.4%	3.7%	4.5%	3.5%	3.0%	2.4%	3.1%	1.1%	1.6%	0.6%	0.3%	1.4%	0.3%	0.5%	0.4%	1.4%	1.6%	1.5%	0.5%	2.7%	1.2%	1.3%	1.1%
	SV-8	8.7%	2.9%	4.4%	7.1%	6.3%	8.7%	6.8%	3.1%	0.4%	0.1%	5.9%	3.5%	4.4%	0.1%	4.2%	1.6%	1.0%	0.8%	2.6%	0.3%	0.9%	1.0%	0.6%	1.1%	0.4%	0.6%	1.6%	1.9%	1.3%	2.0%
	SV-9	9.0%	0.9%	1.3%	6.0%	5.8%	8.4%	6.4%	7.3%	6.9%	6.6%	6.2%	3.9%	6.8%	4.8%	3.6%	1.0%	2.5%	2.0%	3.7%	1.1%	1.9%	2.0%	2.7%	3.8%	1.7%	1.7%	4.7%	3.7%	3.4%	1.6%
	SV-10	2.4%	0.5%	3.0%	1.3%	1.7%	2.1%	1.8%	1.5%	2.2%	0.9%	2.0%	2.1%	0.7%	2.3%	1.6%	1.4%	1.1%	1.0%	3.6%	0.4%	0.8%	0.9%	1.0%	0.7%	0.3%	0.0%	0.4%	0.5%	0.5%	0.3%
	SV-11	1.3%	2.3%	3.4%	2.2%	3.4%	1.9%	1.0%	0.9%	1.5%	1.4%	1.2%	1.0%	0.6%	0.3%	0.5%	1.2%	0.7%	0.5%	0.3%	0.3%	0.7%	0.8%	0.8%	0.8%	0.2%	0.5%	1.7%	1.4%	0.6%	0.2%
	SV-12	0.3%	0.5%	0.6%	0.4%	0.5%	2.3%	4.8%	2.4%	1.6%	1.4%	1.8%	2.7%	1.2%	1.0%	0.7%	0.7%	1.0%	0.8%	3.7%	1.3%	3.1%	3.0%	3.1%	1.7%	0.3%	1.7%	2.8%	0.8%	0.7%	0.8%
	SV-13	0.6%	0.9%	1.6%	0.2%	0.3%	1.4%	2.0%	1.3%	1.2%	0.2%	0.2%	0.7%	0.2%	0.2%	0.4%	0.8%	0.2%	0.1%	0.4%	0.1%	1.0%	0.9%	1.0%	0.9%	0.2%	0.6%	1.0%	0.8%	0.5%	0.5%
	SV-14	2.3%	6.1%	5.8%	7.5%	5.5%	2.2%	1.1%	2.0%	4.5%	6.3%	6.9%	7.4%	12.7%	13.1%	3.3%	1.8%	1.5%	0.9%	3.3%	0.7%	2.7%	3.5%	3.2%	3.3%	1.5%	0.8%	2.3%	3.1%	1.7%	1.0%
	SV-15	9.5%	14.7%	3.9%	5.3%	2.8%	5.6%	5.7%	0.5%	8.8%	5.8%	6.9%	10.4%	6.4%	0.9%	1.8%	2.3%	1.5%	1.3%	2.3%	0.3%	2.8%	3.1%	3.9%	6.7%	2.6%	3.2%	9.5%	5.7%	5.4%	5.8%
2 (and between divider line)	SV-7	2.2%	1.5%	1.9%	1.5%	2.9%	4.2%	2.3%	1.1%	3.9%	4.8%	3.8%	4.0%	3.2%	0.3%	3.1%	5.3%	2.5%	2.1%	3.3%	1.3%	1.1%	0.9%	1.2%	1.7%	0.8%	0.3%	0.7%	0.9%	1.1%	1.0%
	SV-16	9.5%	7.1%	1.1%	5.7%	6.2%	6.6%	6.9%	5.2%	8.0%	8.7%	6.9%	6.9%	8.0%	0.0%	6.8%	10.3%	10.5%	6.6%	18.3%	5.0%	8.1%	10.5%	11.1%	14.4%	12.9%	8.6%	12.9%	5.4%	9.3%	7.8%
	SV-17	2.9%	0.1%	-3.3%	2.1%	1.6%	-1.5%	-0.6%	-0.5%	-1.6%	-3.1%	-2.0%	-1.3%	0.0%	-2.8%	0.7%	6.0%	1.3%	0.7%	-1.0%	0.5%	1.6%	1.2%	-1.1%	0.5%	0.5%	0.3%	0.6%	0.9%	0.0%	0.1%
	SV-18	5.5%	11.4%	4.9%	6.8%	5.6%	6.7%	7.8%	13.0%	9.5%	6.6%	3.6%	4.3%	7.1%	22.8%	10.5%	8.2%	14.5%	9.1%	7.9%	13.9%	10.4%	10.8%	12.9%	10.1%	19.2%	11.2%	2.2%	12.4%	19.6%	24.2%
	SV-19	3.6%	0.3%	-2.0%	5.5%	6.3%	0.6%	2.8%	3.0%	3.2%	6.5%	6.4%	4.3%	3.0%	3.4%	2.0%	0.7%	1.2%	0.7%	0.9%	0.6%	1.7%	0.6%	0.2%	0.5%	0.7%	0.6%	1.3%	1.6%	1.3%	1.2%
	SV-20	7.2%	12.0%	7.2%	6.2%	6.3%	5.7%	5.5%	11.9%	6.1%	2.8%	2.9%	0.6%	5.0%	14.1%	11.0%	8.9%	8.7%	23.9%	14.6%	16.8%	10.7%	13.4%	16.3%	9.3%	10.4%	36.1%	15.9%	15.2%	14.8%	15.3%
	SV-21	2.6%	2.0%	3.8%	0.9%	2.4%	3.2%	2.9%	3.6%	2.5%	5.3%	1.6%	-0.4%	2.2%	0.2%	3.5%	6.3%	5.8%	4.3%	1.4%	4.8%	3.0%	3.5%	1.1%	1.6%	3.8%	1.9%	-1.2%	3.7%	1.8%	1.8%
	SV-22	8.5%	9.3%	8.3%	5.9%	7.6%	6.7%	7.0%	12.2%	8.5%	6.7%	4.8%	3.9%	4.4%	0.1%	9.9%	5.4%	11.5%	19.8%	11.5%	13.6%	14.3%	14.0%	16.1%	7.8%	10.4%	8.4%	9.2%	7.0%	6.3%	8.1%
	SV-23	5.2%	-2.9%	-2.4%	1.9%	4.4%	-0.3%	0.5%	0.3%	1.0%	8.8%	1.3%	4.6%	2.9%	6.2%	10.3%	3.2%	3.4%	2.6%	-0.2%	-0.2%	2.4%	-6.0%	-2.0%	2.6%	11.6%	6.4%	-7.9%	9.6%	4.7%	7.3%
	SV-24	4.0%	8.5%	9.4%	7.2%	6.2%	4.4%	5.6%	10.3%	4.7%	8.0%	6.8%	7.4%	7.4%	13.6%	8.3%	6.5%	11.3%	8.5%	7.7%	14.7%	13.7%	11.6%	8.4%	8.9%	10.0%	7.0%	6.6%	10.3%	11.3%	11.3%
	SV-25	-0.1%	1.1%	0.0%	0.7%	0.8%	0.1%	1.5%	0.1%	1.4%	2.1%	0.2%	1.3%	1.2%	-0.2%	0.0%	0.5%	0.3%	0.4%	0.1%	0.2%	0.0%	0.4%	0.8%	0.2%	-1.0%	0.0%	1.1%	2.3%	1.3%	0.1%
	SV-26	0.3%	2.2%	1.9%	1.9%	2.4%	1.6%	3.4%	1.0%	1.6%	4.3%	6.8%	8.1%	5.9%	3.2%	2.7%	3.9%	2.8%	1.1%	1.7%	4.0%	2.6%	3.2%	2.2%	2.8%	0.7%	1.1%	3.1%	2.0%	1.9%	1.1%
	SV-27	0.1%	0.7%	-0.5%	1.7%	0.4%	1.4%	3.2%	1.2%	2.4%	1.1%	2.0%	0.4%	0.2%	0.0%	-1.5%	0.1%	0.7%	0.5%	0.2%	0.5%	0.5%	1.0%	0.8%	0.6%	0.7%	0.2%	1.2%	0.7%	-0.2%	0.2%
	SV-28	0.0%	1.0%	0.5%	0.6%	0.7%	0.8%	0.6%	0.5%	0.9%	1.7%	5.5%	10.1%	6.9%	6.1%	3.8%	9.5%	4.2%	2.0%	3.4%	11.6%	7.9%	4.8%	2.7%	3.2%	0.4%	2.0%	4.7%	2.1%	2.0%	0.9%
	SV-29	0.0%	0.6%	0.4%	0.1%	0.2%	0.4%	0.0%	0.0%	0.1%	0.0%	0.6%	0.5%	0.2%	0.1%	3.7%	0.1%	0.3%	0.1%	0.1%	0.3%	0.4%	0.3%	0.1%	1.0%	0.1%	0.1%	0.7%	0.4%	0.9%	0.3%
Total:		100%	100%	101%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note: Six out of the 23 wellfield branch lines service both Phase 1 and Phase 2; therfore, a correction has been made to subtract the shared mass sometimes resulting in a negative value. This value indicates that the mass contribution from the Phase 2 area was limited in that particular sample round. This is a result of the accuracy of the flow and PID data measurements collected.

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2 TEMPERATURE PROGRESS

Table 4 summarizes the average target treatment zone temperature for both Phase 1 and Phase 2 thermocouples that remain online, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Select heaters in Phase 1 were taken offline on 01/08/15; while select heaters in Phase 2 were taken offline on 2/9/15.

Table 4. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	3/1/15	
Phase 1 Entire TTZ Average Temperature	N/A	°C
Phase 2 Online TMPs Average Temperature	106	°C
Phase 1 Centroid Average Temperature	N/A	°C
Phase 2 Online Centroid Average Temperature	101	°C

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was increased on 8/30/14. Recent increases and decreases correlate with wellfield modifications to sweep the subsurface.

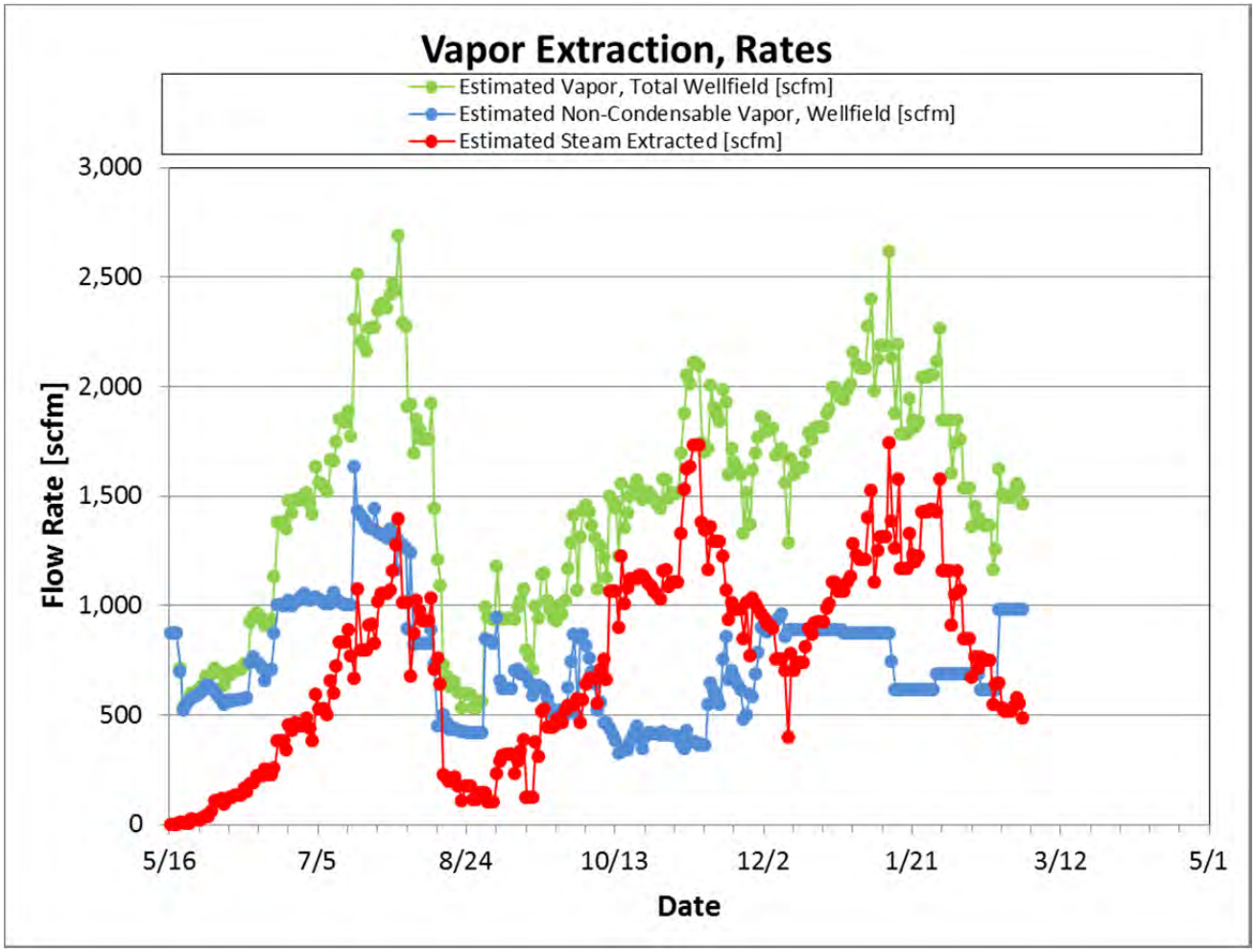


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Please note that the flammability analyzer is no longer online (corresponds with taking the oxidizer offline).

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

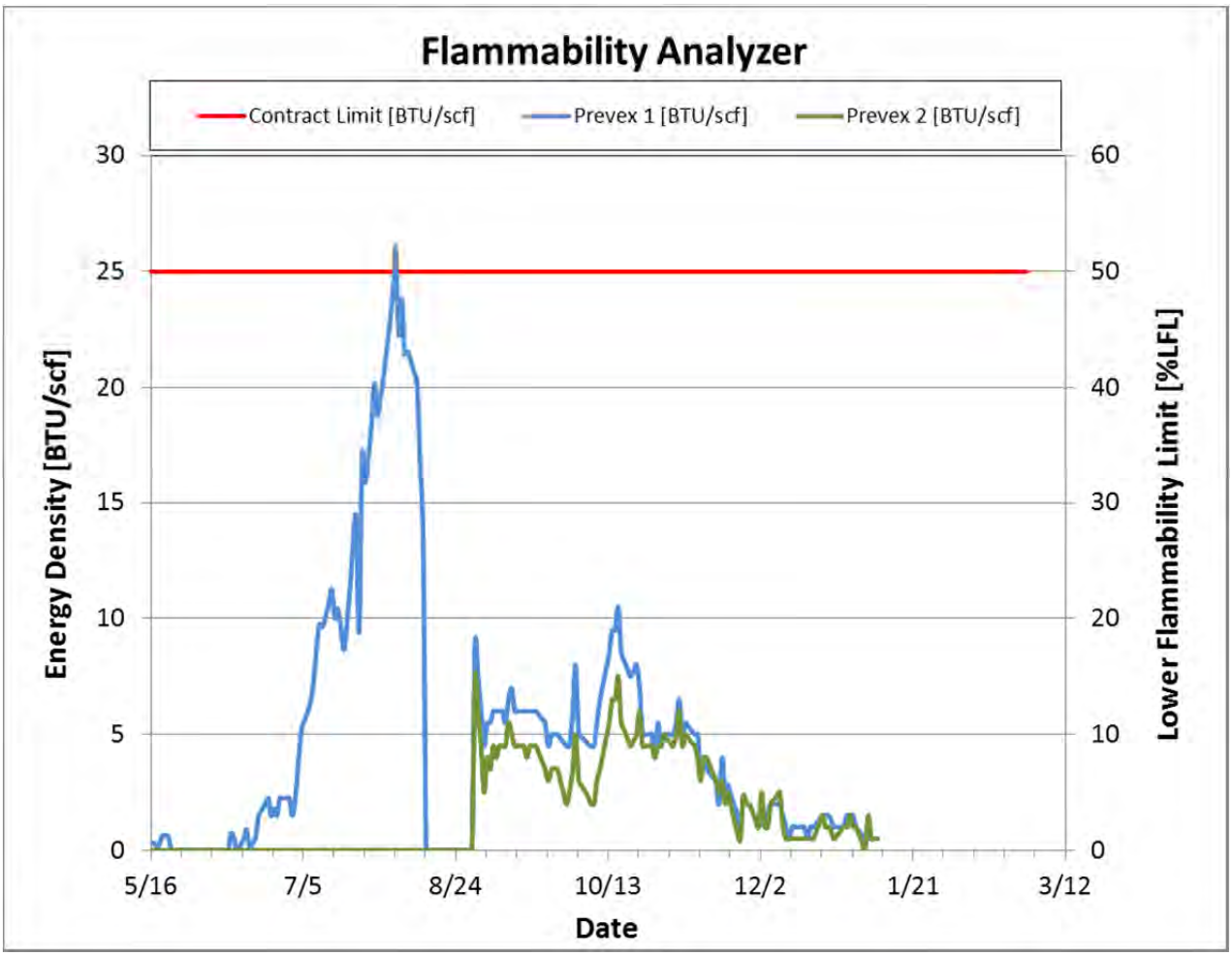


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed through 01/09/15 is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. Mass removal starting 01/10/15 is reported as the total compounds detected in the laboratory data corrected using the PID plus the accumulated LNAPL.

The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively. Please note that the mass removal rates are shown on a logarithmic scale.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14, 9/23/14, 9/30/14, 10/7/14, 10/14/14, 10/21/14, 10/30/14, 11/4/14, 11/18/14, 11/25/14, 12/2/14, 12/9/14, 12/16/14, 12/23/14, 12/30/14, 01/06/15, 01/13/15, 01/20/15, 01/26/15, 02/10/15 and 02/17/15.

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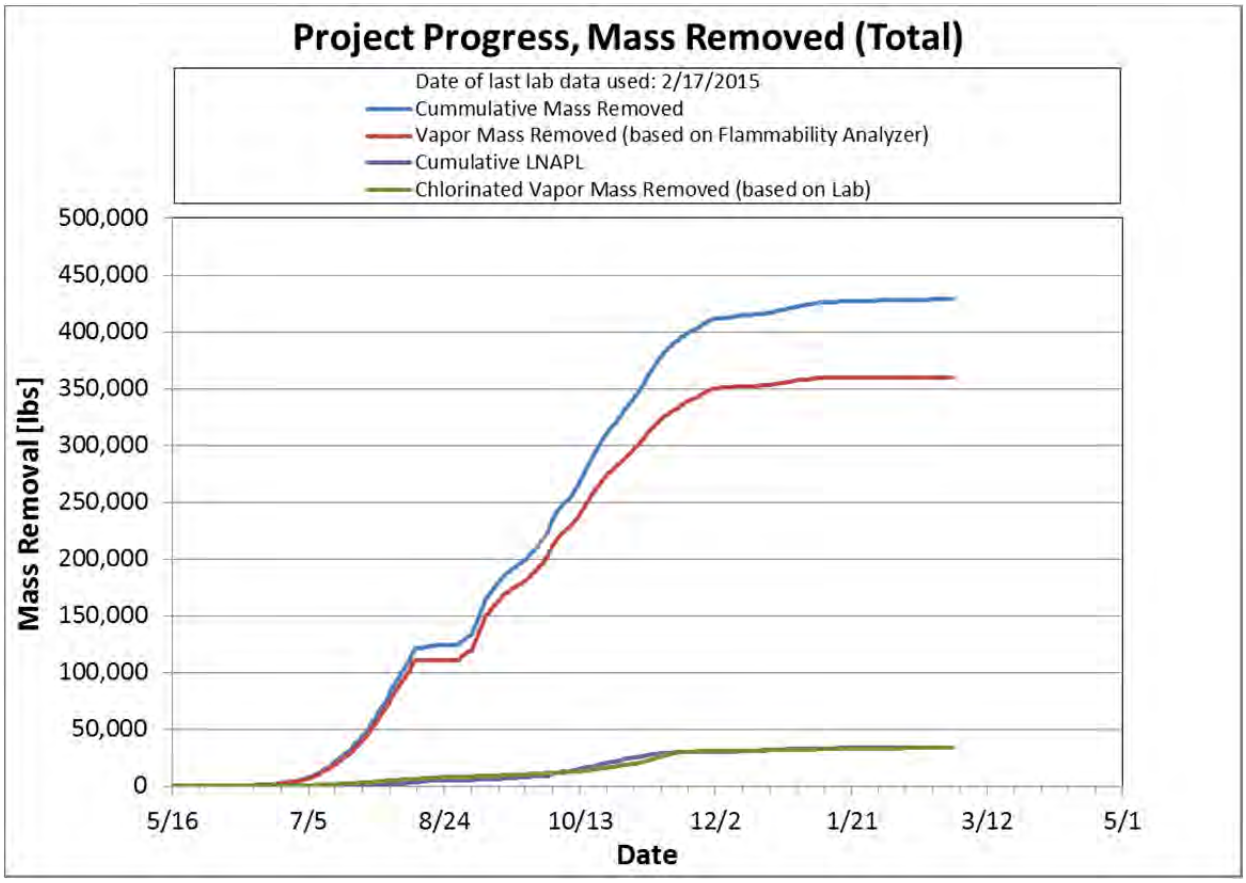


Figure 4a. Project Progress, Mass Removal (Total)

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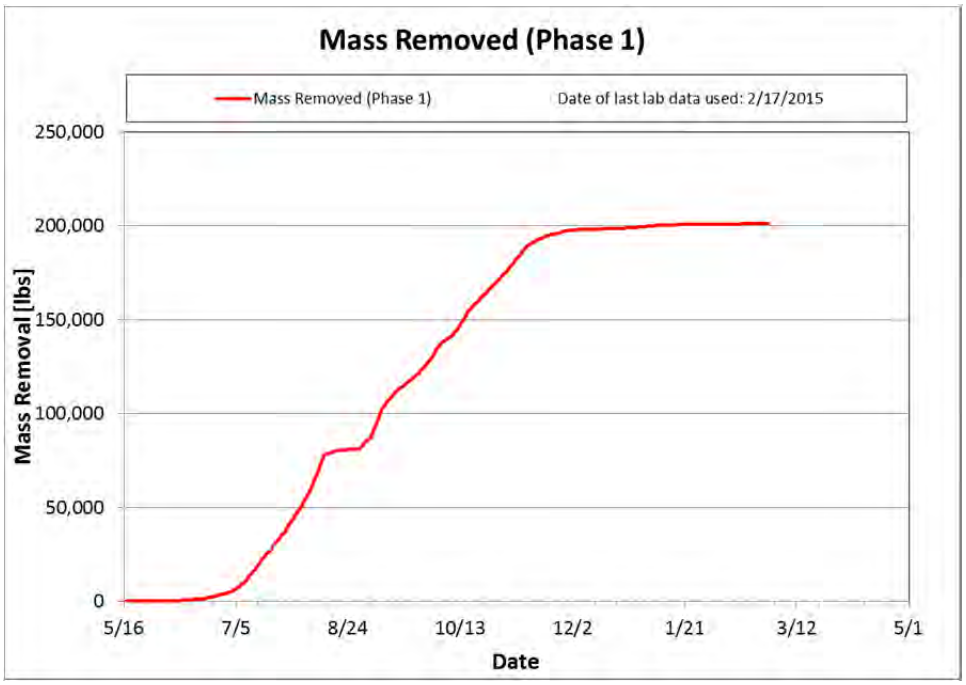


Figure 4b. Project Progress, Mass Removal (Phase 1)

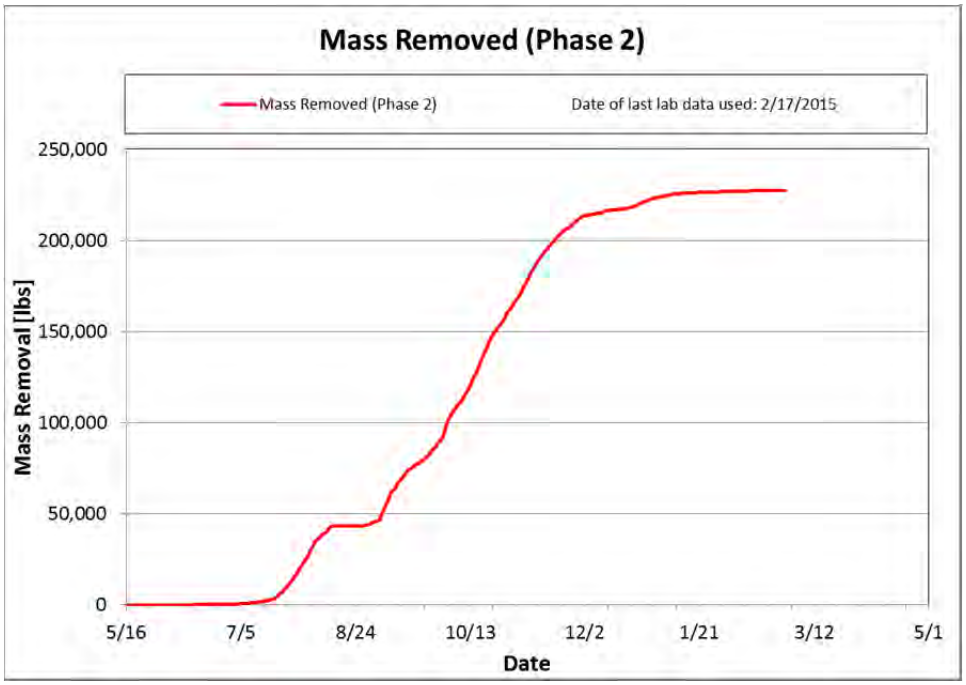


Figure 4c. Project Progress, Mass Removal (Phase 2)

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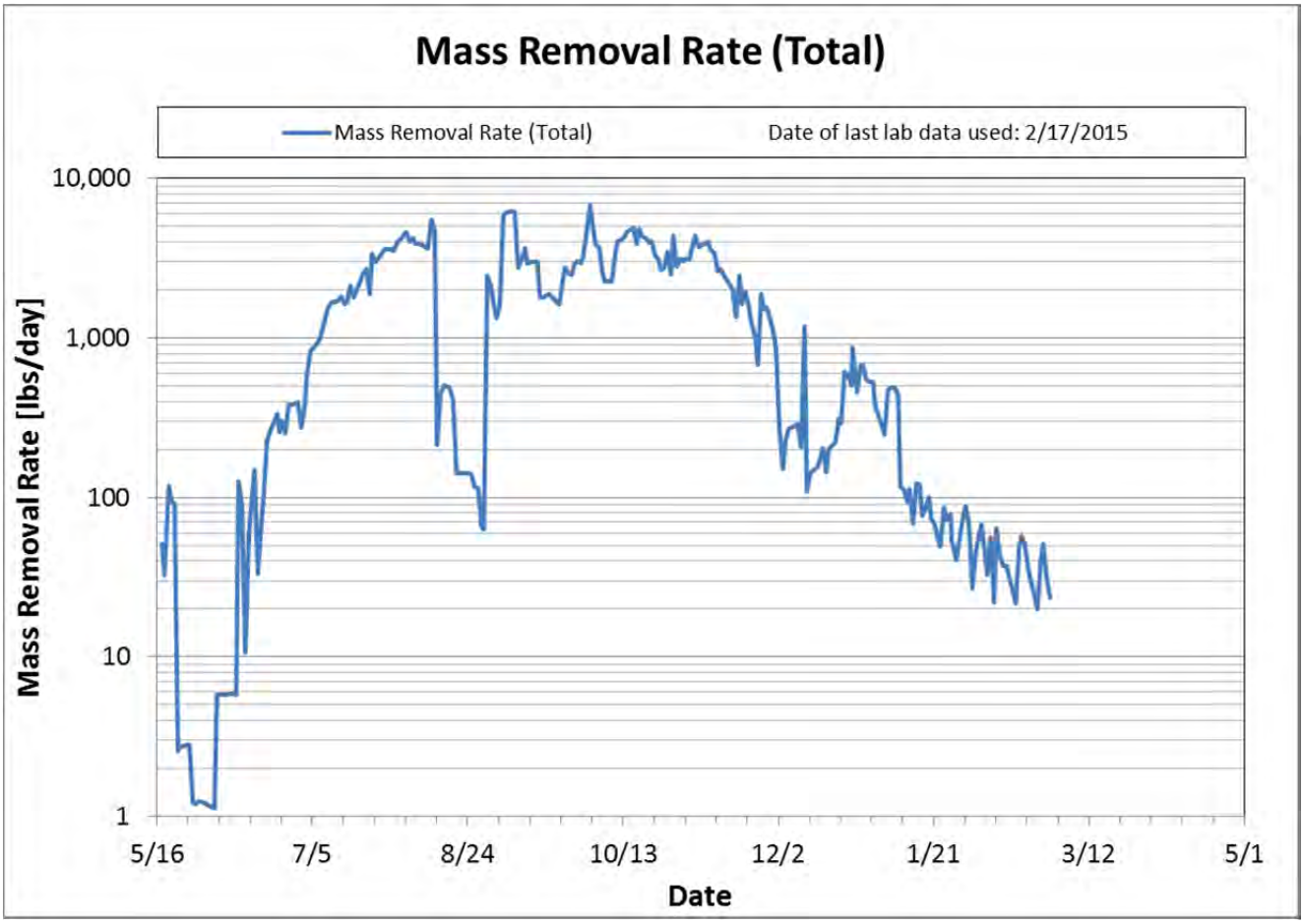


Figure 4d. Mass Removal Rate (Total for Site)

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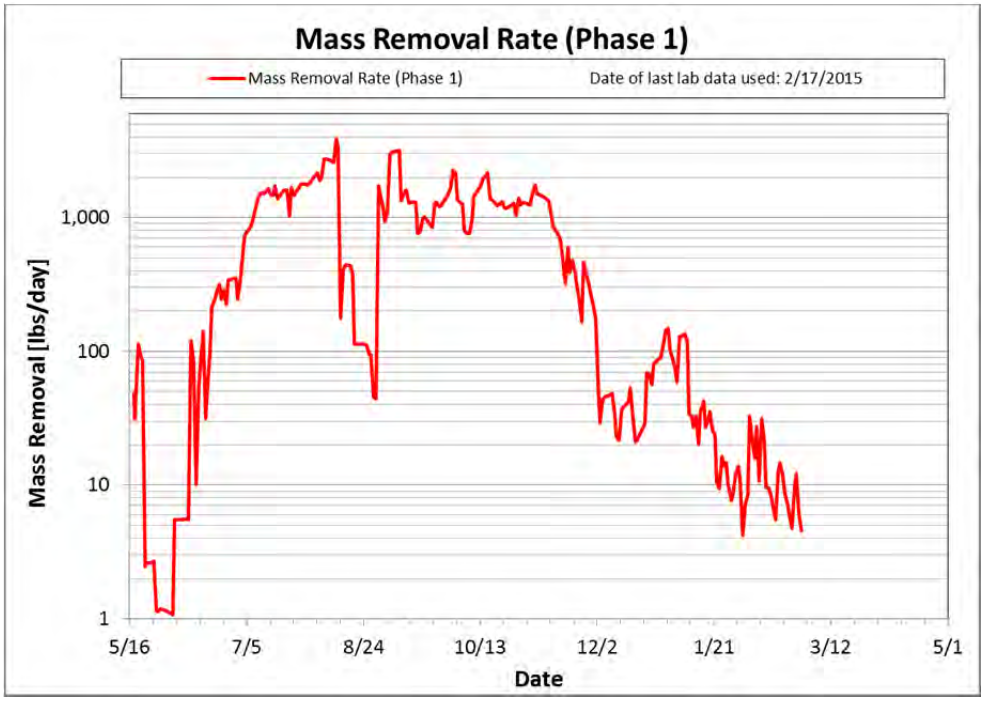


Figure 4e. Mass Removal Rate (Phase 1)

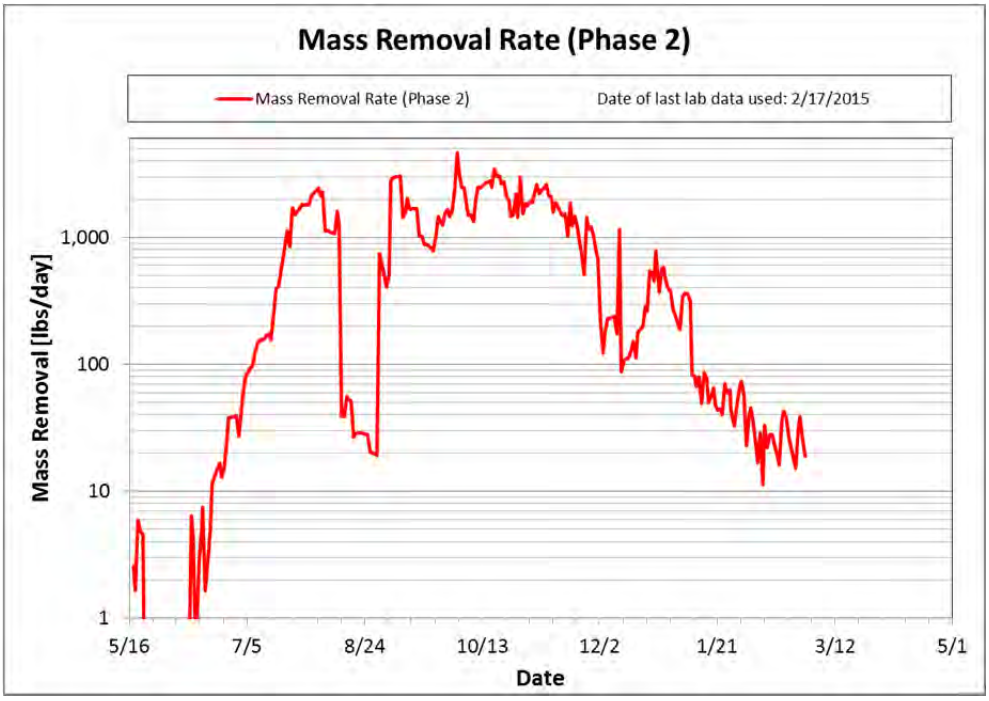


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID and flammability analyzer readings collected at the oxidizer influent over time. It should be noted that PID readings are first collected using an 11.7 eV lamp (determined by site contaminants). If the reading exceeds the limit of the meter (>2000 ppm), the readings are collected using a 10.6 eV lamp. When both meters are used, the maximum value is recorded.

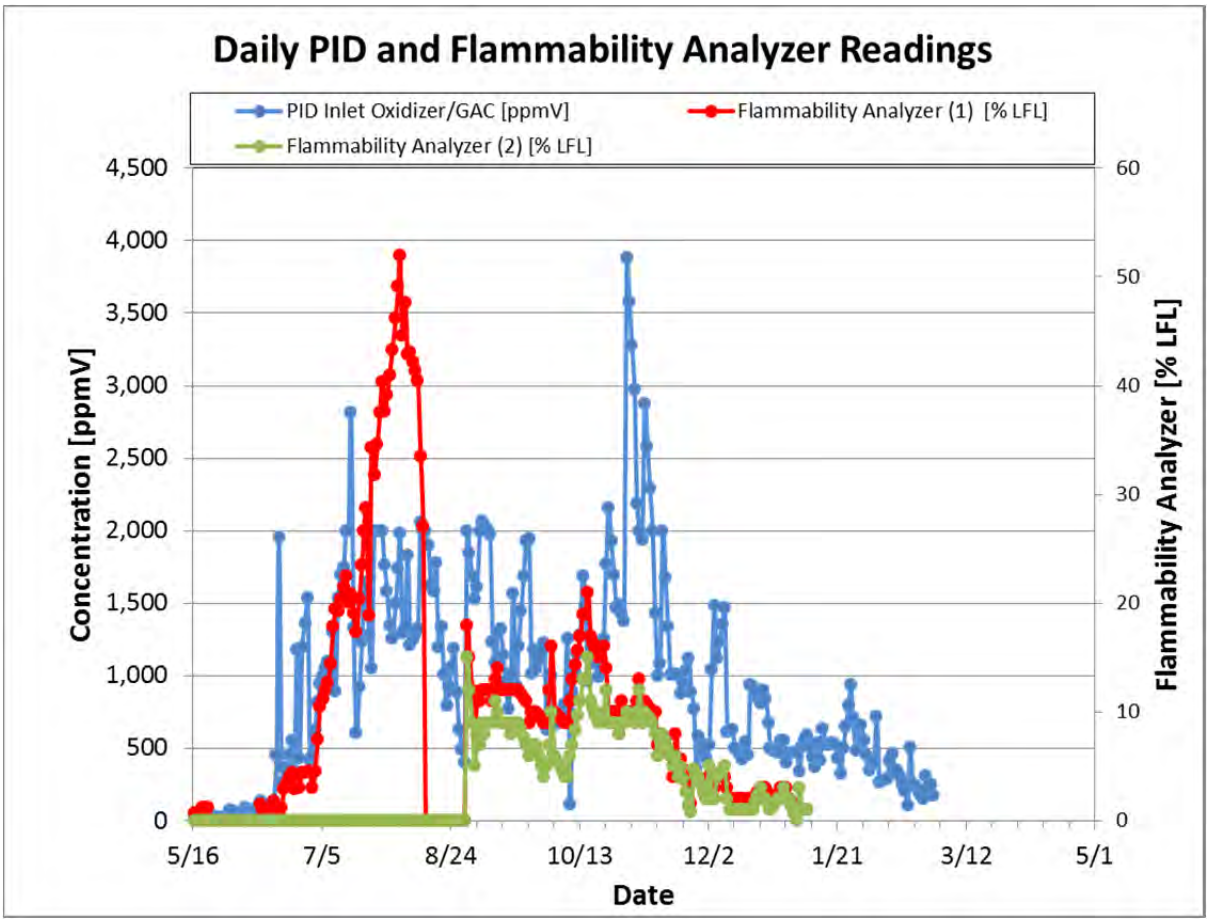


Figure 5. Daily PID and Flammability Analyzer Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13, after the oxidizer shutdown. Decreases in DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-outs.

Influent concentrations collected over the past week were between 108 to 508 ppm, with effluent concentrations ranging between 2.9 to 65 ppm. While the calculated DRE is less than 95% on some days, calculated mass emissions are less than 2 lbs/hr (air permit limit) by more than 50%.

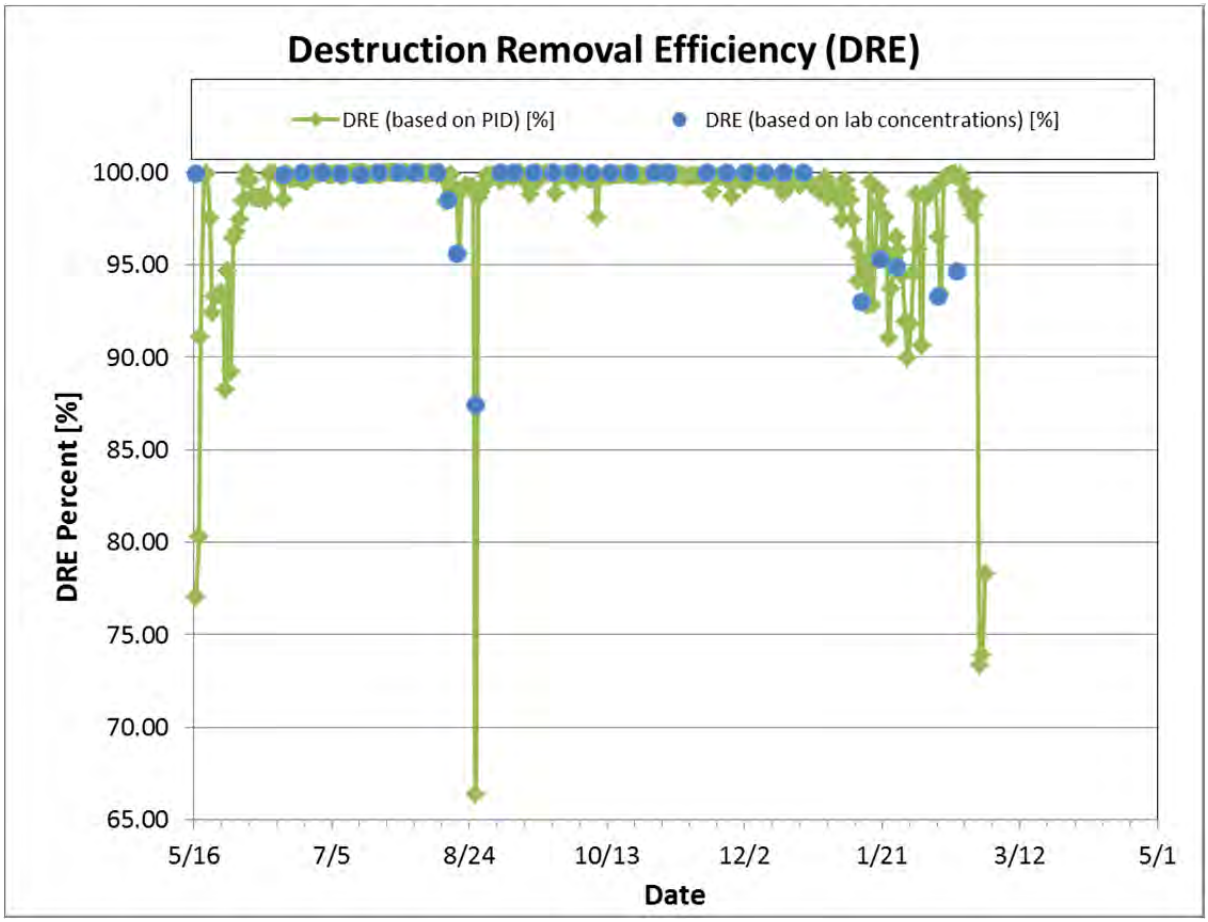


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7. Please note that the graph has been modified to present the estimated modeled energy for the heaters (ISTD) over the original predicted 195 day treatment. This does not take into account contract definitions such as heaters operating at or above 70% energy input. The flatline represents days beyond 195 days.

Please note that the modeled energy usage (12,873,000 kWh) only includes the energy predicted to be added to the subsurface. Therefore, the number should be compared to the cumulative energy added by the ISTD system to the subsurface (red line). The total energy usage (including the treatment system power usage) is predicted to be 15,795,000 kWh as stated in the summary table. To date approximately 16,086,000 kWh have been used.

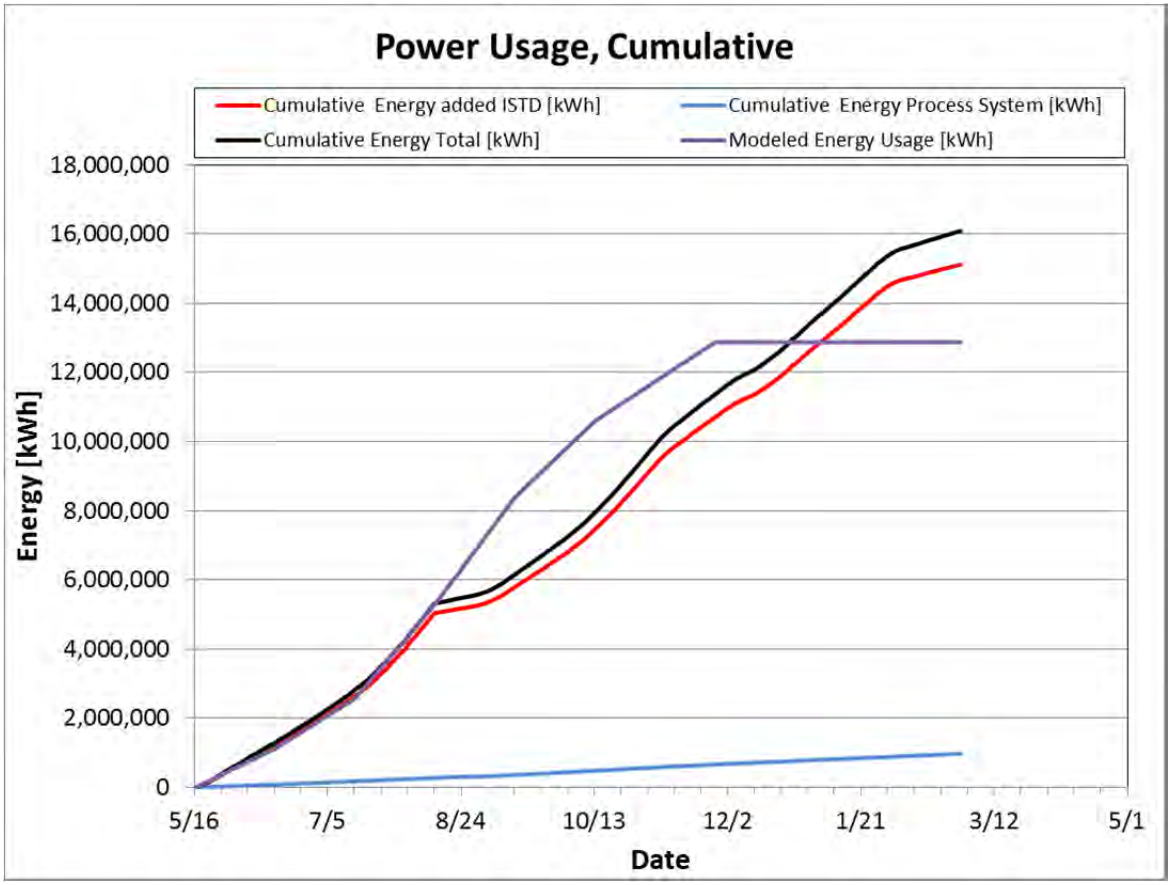


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30/14 and the following days corresponds with ramping of the heaters after placing the oxidizer back online. The decrease observed mid- November is associated with profiling of the heaters in Phase 2 and subsequent adjustments. The increase observed in December corresponds with additional profiling and subsequent adjustments. Approved circuits in Phase 2 were decreased last week with ultimate shutdown of them Monday, 9 February.

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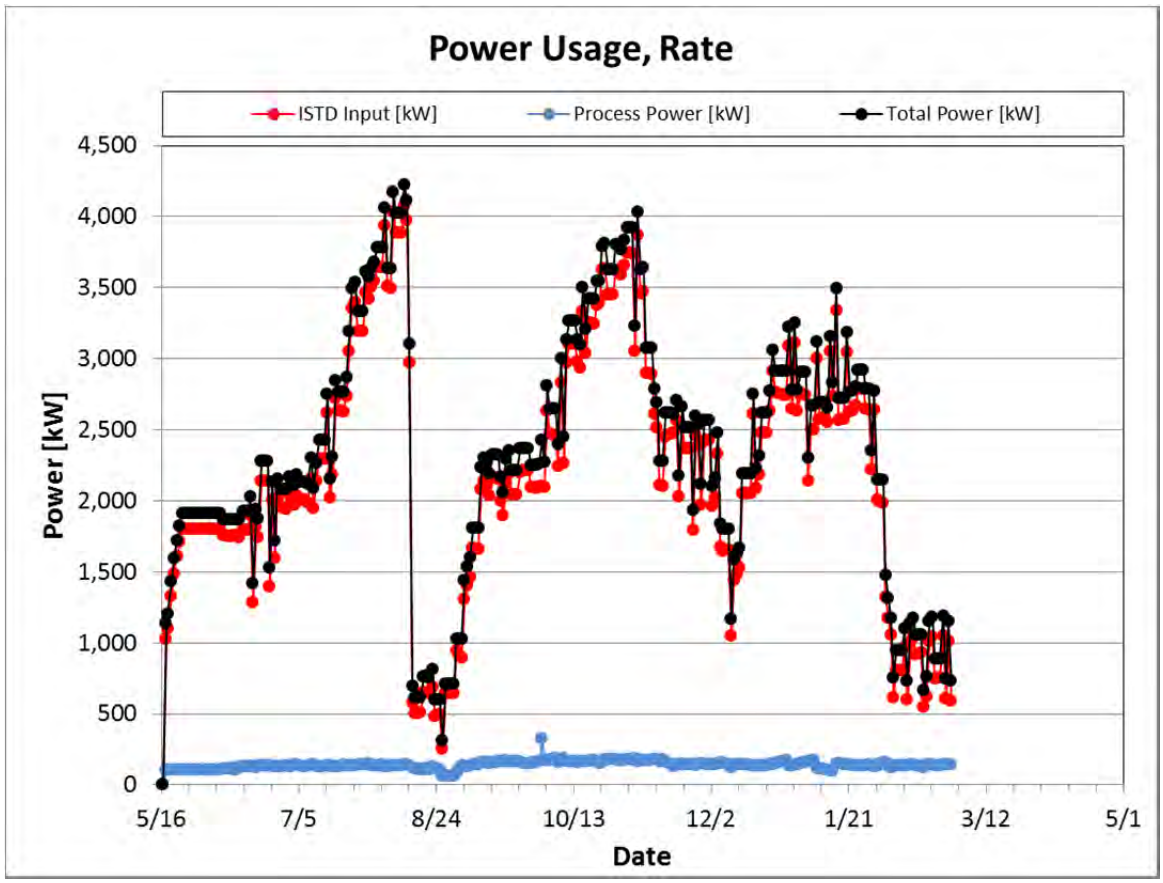


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

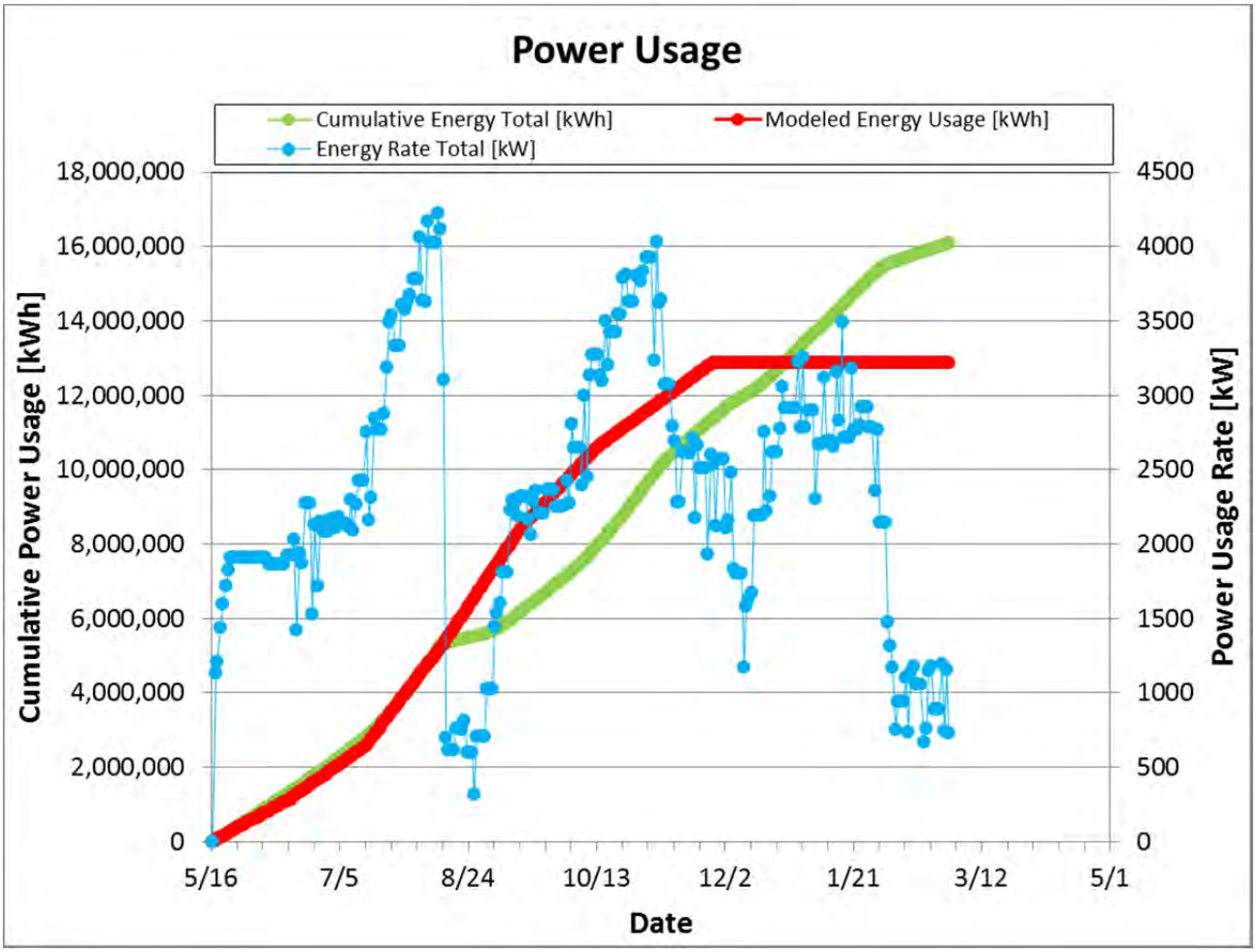


Figure 9. Power Usage

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With the oxidizer offline, natural gas is no longer in demand (as shown below starting on 10 January 2015).

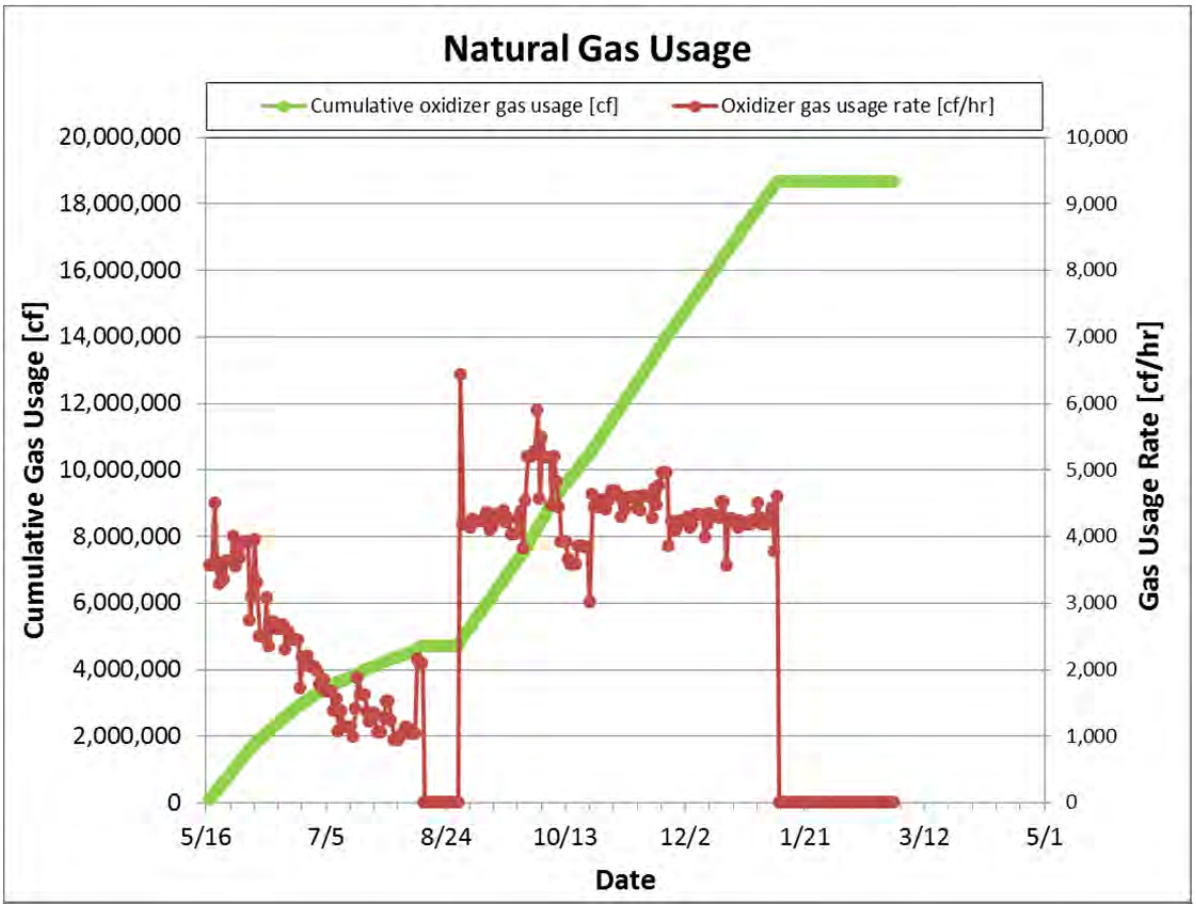


Figure 10. Natural Gas Usage

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With the oxidizer offline, caustic is no longer in demand (as shown below starting on 10 January 2015).

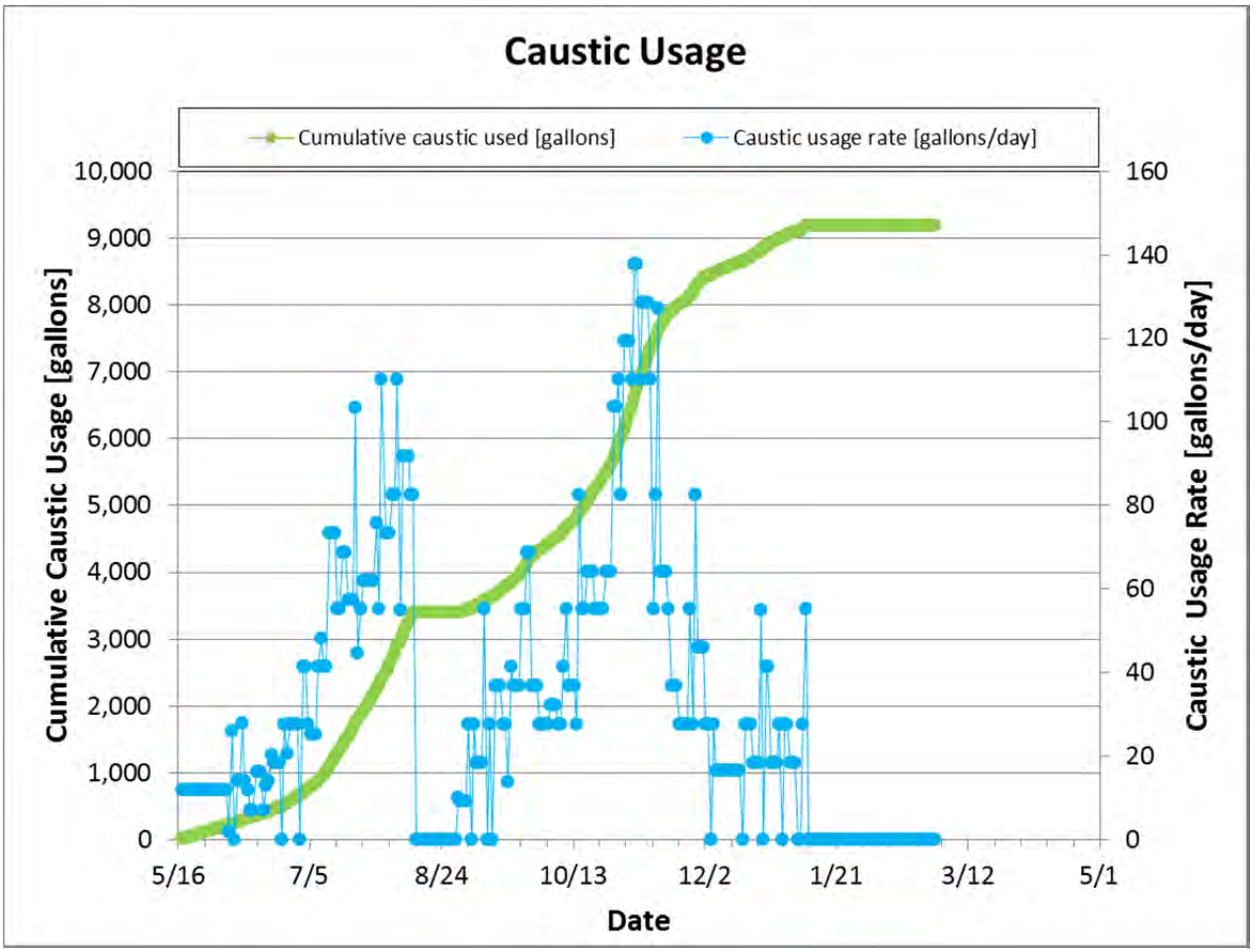


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as: Phase 1 and Phase 2 treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Currently, thermocouples for both Phase 1 and Phase are online (Figure 12c). The below figure represents those data. The following table is accurate to the individual Phase 1 and Phase 2 milestones.

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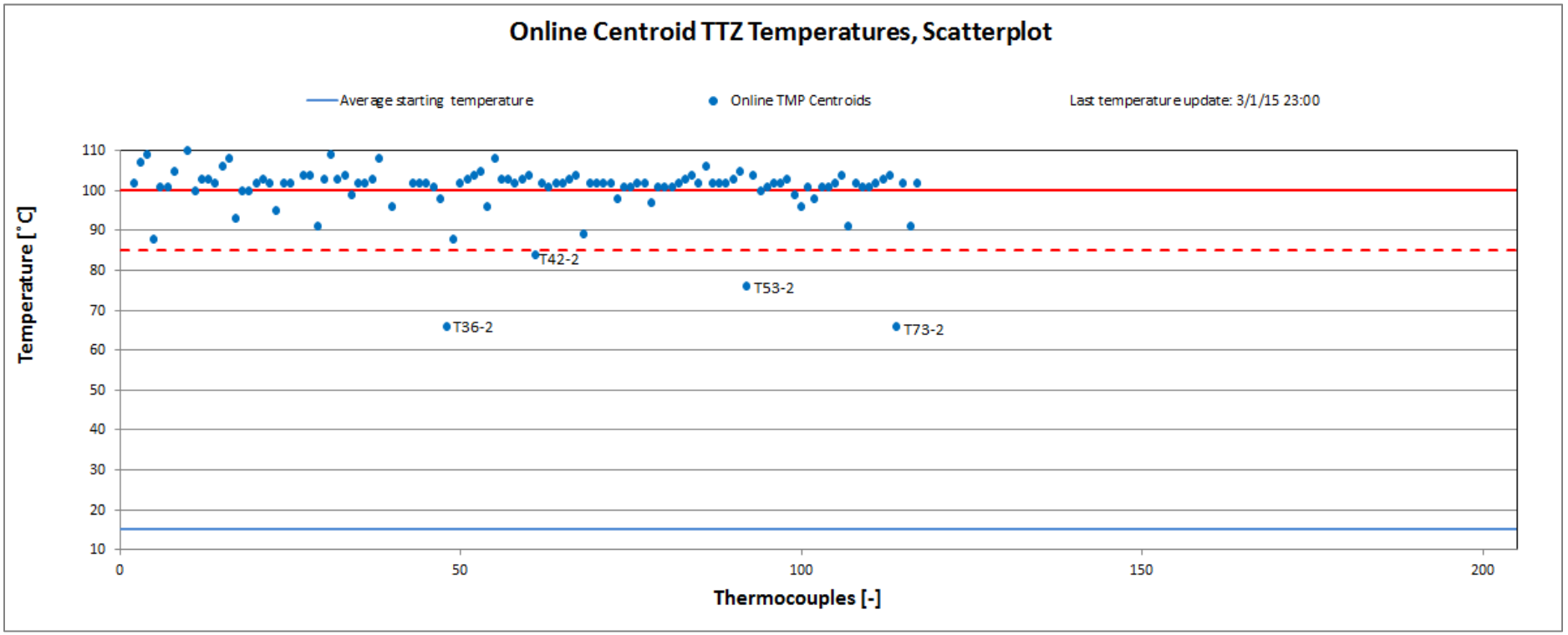


Figure 12c. Phase 1 and Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 5. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots

	Value	Unit
Date of Last Update	2/8/15	
Phase 1 Centroid Thermocouples ≥85 ^{0}C	100	%
Phase 1 Centroid Thermocouples ≥100 ^{0}C	97	%
Phase 2 Centroid Thermocouples ≥85 ^{0}C	99	%
Phase 2 Centroid Thermocouples ≥100 ^{0}C	98	%

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In Situ Thermal Remediation at the Solvents Recovery Service of New England, Inc.

Southington, Connecticut



PROGRESS REPORT









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1 SUMMARY

This report is intended to cover the operational time period of Friday, 27 February, 2015 through Monday, 2 March, 2015, with temperatures updated through Sunday, 8 March, 2015.

Approval to shutdown the remaining heaters was provided by EPA on 2 March 2015. Heater circuits were ramped down over the week with final shutdown on Friday, 6 March.

Table 1 provides a summary of the project operational status as of Monday, 2 March, 2015.

Table 1: Project Summary

Summary

	Value	Unit
TTZ Soil Volume	56,770	cy
Area	74,048	ft2
Upper Depth of Treatment	1	ft bgs
Lower Depth of Treatment	12-27	ft bgs
Groundwater Extraction Started	N/A	
VLT system Started	05/15/14	
Thermal Operations Started	05/15/14	
Last Process Data Update	03/02/15	
Last Temperature Data Update	03/08/15	
Days of Operation (Total)	267	days
Days of Phase 1 Operation	158	days
Days of Phase 2 Operation	158	days
Total Design Energy Usage (ISTD and treatment system)	15,795,000	kWh
Total Energy Added (ISTD)	16,160,700	kWh
Used Electrical Energy vs. Estimate	102.3	%
Total Mass Removal	428,767	lbs
Average Power Input Last 24 Hours	910	kW
Average Wellfield Vapor Extraction Rate Last 24 Hours	1,489	scfm
Average Condensate Production Rate Last 24 Hours	2.9	gpm

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Temperature figures and calculations within this progress report represent ALL thermocouples that are online, whether they are located in Phase 1 or Phase 2, unless otherwise noted.

The average wellfield temperature as of Sunday, 8 March, 2015 (includes thermocouple sensors in both Phase 1 and Phase 2 in the area where heaters were still operating) was 96°C at the centroid locations and 101°C at non-centroid locations. This information is shown in the "Phase 2" label of Table 4.

Phase 1 and Phase 2 each operator for a total of 158 days, which represents days where heaters operated at or above 70% and the collection date of the last confirmation soil sample (per contract definition). All three temperature milestones have been achieved for both Phase 1 and 2.

The oxidizer was taken offline 01/10/15. Vapor treatment is now through the vapor carbon vessels. Estimated mass removed through 01/09/15 (oxidizer online) was reported using the flammability analyzer data, laboratory data for chlorinated compounds that were assumed not to be detected by the flammability analyzer, and accumulated LNAPL. Following the oxidizer being offline (01/10/15), estimated mass removed is calculated using the analytical laboratory data results (TO-15), corrected with daily PID readings, plus the accumulated LNAPL. These results yield a total mass removed of **428,767** lbs as of 03/02/15. Individual fractions are shown in Figure 4a.

Phase 1/Phase 2 differentiation readings were collected in the wellfield on 03/03/15. The ratio of mass coming from Phase 1:Phase 2 on that date was calculated to be 0.31:0.69. These ratios were then applied to the total combined vapor flow/concentration data to estimate the amount of mass removed from each phase and leg. These data are included in Tables 2 and 3. Please note that the drop in Phase 2 fraction (and matching increase in Phase 1 fraction) is related to decreases in the measured Phase 2 concentrations at more or less all of the sample locations.

During the 01/22/15 manifold data collection effort, flows were estimated based on the measurement collected at the blower as the wellfield flows were too low to be accurately recorded/measured on the handheld meter.

Mass fraction data over time is presented below.

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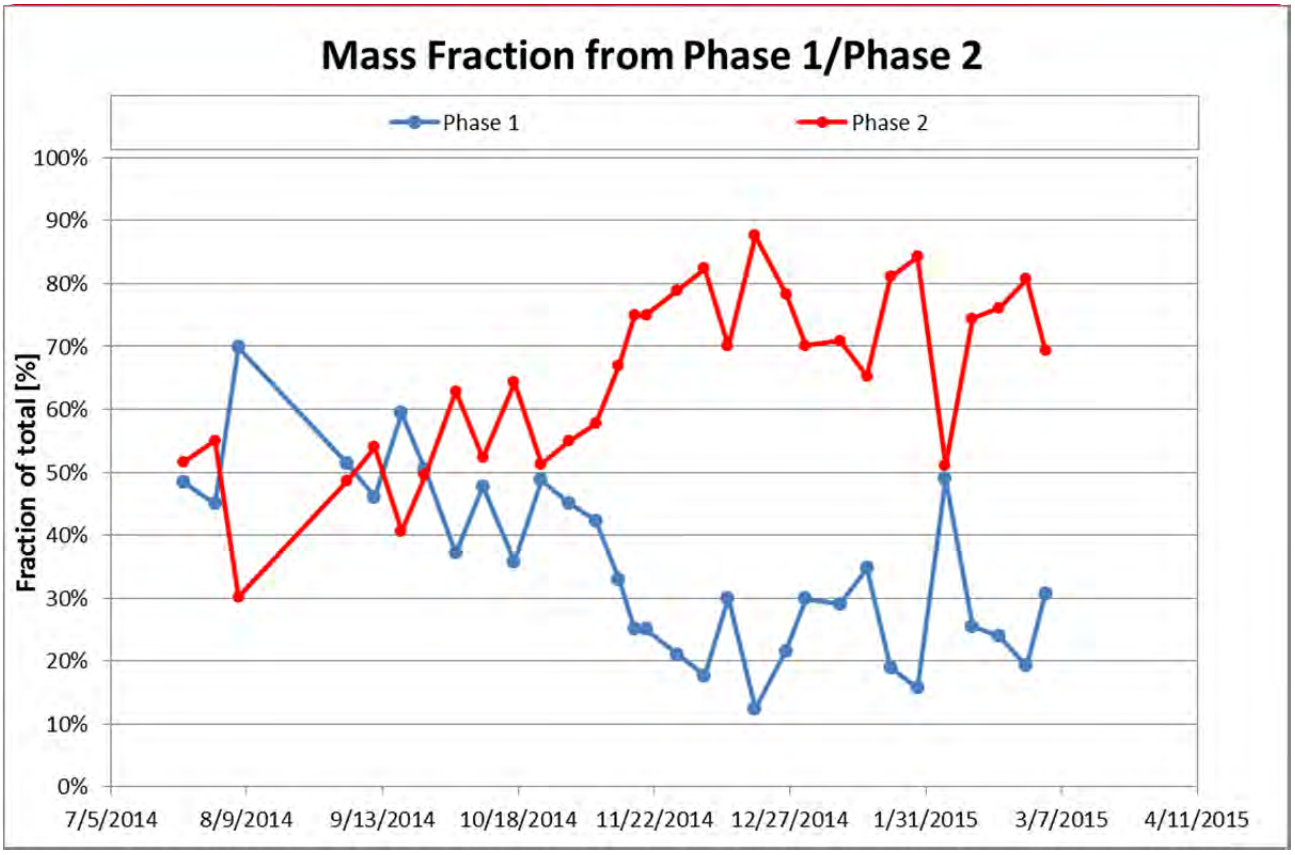


Figure 1. Mass Fraction from Phase 1/Phase 2

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Table 2. PID Readings Collected from Manifold Legs

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14	12/31/14	1/9/15	1/16/15	1/22/15	1/29/15	2/5/15	2/12/15	2/19/15	2/26/15	3/3/15
1	SV-1	215	100	745	602	720	604	590	1181	550	516	5	770	712	851	845	790	450	360	236	185	177	170	95	238	128	182	179	201	199	87	61
	SV-2	742	173	1271	887	872	1129	1318	2987	780	770	1610	1004	931	1179	600	934	660	677	482	377	397	436	300	449	810	404	283	91	187	126	124
	SV-3	2588	872	3609	2854	1198	3395	1414	5512	2643	1120	3971	1430	627	99	101	3138	1717	1782	1218	1246	347	1622	725	626	1108	1241	653	86	430	292	303
	SV-4	1971	307	2543	1921	1514	2652	1153	4790	1927	3820	3275	2204	2650	3297	1375	2903	1510	2341	1278	979	333	611	585	477	487	446	300	129	264	45	209
	SV-5	1817	279	1642	740	444	1407	1197	4790	759	1411	950	1153	802	326	302	490	402	135	243	120	235	29	202	248	198	180	129	131	80	102	106
	SV-6	4480	332	1926	956	765	4283	2347	11564	3525	9177	5750	4780	4919	5854	1083	2100	601	435	1271	375	277	197	678	664	1141	699	558	328	518	345	393
	SV-8	3222	385	1330	2375	1479	3267	1816	4744	179	172	3815	1881	1850	88	1475	940	401	450	890	150	178	170	110	244	185	235	94	167	166	187	165
	SV-9	3245	142	324	1993	1565	2995	1777	11950	2762	4967	3801	2121	2863	3227	1265	801	1209	1040	1480	390	350	340	445	445	365	622	298	274	450	158	329
	SV-10	1896	131	2148	1096	1111	2459	1517	4382	1933	1745	3384	2841	1318	4121	1494	1982	1302	1221	3215	500	381	420	400	371	269	99	65	93	182	101	118
	SV-11	1016	666	1712	1979	2145	1988	930	2534	1393	2687	1950	1469	1380	596	596	1360	750	641	270	399	332	354	315	495	271	412	346	333	389	83	199
	SV-12	80	53	158	139	104	815	1427	3234	682	1102	1090	2100	512	563	206	413	440	426	1413	545	569	490	465	201	74	637	143	65	185	91	120
	SV-13	417	211	736	145	170	1452	1476	4291	1109	375	370	985	380	295	315	1210	210	131	432	143	473	445	365	315	139	550	209	187	173	146	199
	SV-14	632	452	1526	2636	1450	777	1610	3411	1917	4668	4274	4150	5565	8416	1107	1053	630	500	1288	300	468	570	493	422	352	366	129	243	232	154	129
	SV-15	3440	1072	1153	2000	915	2150	2054	608	3265	4890	4801	5780	5000	618	654	1623	730	660	1007	115	490	600	705	872	627	1247	742	500	764	586	467
2 (and between divider line)	SV-7	3843	366	1751	1210	1482	4307	1835	3337	3672	9379	7350	5812	7910	553	3115	6391	2860	2977	2810	1323	554	531	500	514	483	300	129	184	278	273	243
	SV-16	3113	885	233	1911	1703	2823	2216	6230	3165	6888	4994	3841	6029	11	2340	6276	3118	3307	7931	1957	1502	1908	1765	2144	3610	3159	821	454	1332	791	639
	SV-17	3715	429	306	2928	1824	2801	1837	8933	1927	2713	2954	3313	5408	389	1670	10903	1983	1335	409	800	1133	730	116	718	1223	850	712	501	492	346	416
	SV-18	1760	862	1203	2034	1634	2388	2446	15000	3554	5030	2815	2465	5632	13871	3377	4768	3650	5071	3361	5491	2057	2012	2423	1553	5546	4535	146	1110	2876	2547	1546
	SV-19	2258	350	2067	1971	2005	1818	2038	10522	2191	6417	4561	4398	3067	2693	1075	875	925	530	528	315	552	130	515	438	504	401	263	288	259	235	260
	SV-20	1990	796	1545	2344	1610	2268	2158	15000	2853	2305	2059	343	4053	8642	3534	5500	2725	12650	6352	6520	2084	2492	2750	1673	3511	13673	951	1305	2221	1592	1081
	SV-21	1964	487	2295	2077	1855	3458	1755	8561	2756	8053	4661	2119	4298	2631	2264	6000	4186	4440	2002	2870	937	958	808	634	1346	1644	158	449	497	239	236
	SV-22	2670	980	1606	2222	1892	2466	2448	14750	3344	5023	3578	2236	3582	55	3460	4765	3450	11187	4509	5516	2803	2565	2720	1598	3970	3235	584	792	995	832	491
	SV-23	2515	671	3248	3158	2165	3233	1532	8102	2973	7684	4880	3933	2707	4560	4005	5367	2993	2598	1326	1154	805	883	517	948	3832	3889	163	1017	1048	1153	1189
	SV-24	1412	638	1504	2406	1567	1669	1949	11882	1999	6130	4554	5005	6223	8864	2843	4555	2946	4280	3267	5764	2614	2195	2350	1446	3030	2866	502	957	1553	1119	742
	SV-25	688	220	1261	1035	1059	1350	2418	5725	1542	2247	1873	1743	1925	991	570	1301	740	773	500	445	400	547	410	457	494	448	350	295	370	141	133
	SV-26	90	185	350	580	573	638	1133	1119	790	3559	4305	4752	4633	1933	865	2742	710	520	642	1710	548	550	420	677	298	410	183	169	277	102	90
	SV-27	192	151	718	944	789	1117	1518	3922	1256	1485	1650	947	840	1040	313	769	745	620	318	320	277	350	210	289	309	233	241	254	171	102	75
	SV-28	15	87	77	151	178	310	211	730	335	1250	3624	5592	5447	4380	1438	6351	1440	1100	1588	4527	1575	886	610	759	181	856	300	175	258	93	76
	SV-29	8	66	55	20	52	130	1	15	35	21	352	255	83	41	1375	43	80	41	52	117	70	61	20	318	62	63	53	34	93	26	16
Breakdown of Wellfield VOC Flux by Phase																																
Phase 1:		48%	45%	70%	51%	46%	59%	51%	37%	48%	36%	49%	45%	42%	33%	25%	25%	21%	18%	30%	12%	22%	30%	29%	35%	19%	16%	49%	26%	24%	19%	31%
Phase 2:		52%	55%	30%	49%	54%	41%	50%	63%	52%	64%	51%	55%	58%	67%	75%	75%	79%	82%	70%	88%	78%	70%	71%	65%	81%	84%	51%	74%	76%	81%	69%

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Table 3. Estimated Mass Loading by Manifold Leg/Phase

Phase	Sampling Location	7/24/14	8/1/14	8/7/14	9/4/14	9/11/14	9/18/14	9/24/14	10/2/14	10/9/14	10/17/14	10/24/14	10/31/14	11/7/14	11/13/14	11/17/14	11/20/14	11/28/14	12/5/14	12/11/14	12/18/14	12/26/14	12/31/14	1/9/15	1/16/15	1/22/15	1/29/15	2/5/15	2/12/15	2/19/15	2/26/15	3/3/15
1	SV-1	0.5%	0.7%	3.5%	1.5%	3.0%	1.6%	1.7%	1.0%	1.1%	0.7%	0.0%	1.3%	0.8%	1.2%	2.2%	1.2%	1.0%	0.6%	0.6%	0.4%	0.9%	0.7%	0.6%	1.2%	0.3%	0.4%	2.4%	2.1%	1.5%	0.8%	0.7%
	SV-2	2.0%	1.3%	4.3%	2.6%	3.6%	3.0%	4.7%	2.5%	1.9%	0.8%	2.4%	1.8%	1.2%	1.7%	1.6%	1.3%	1.4%	1.3%	1.3%	1.0%	1.9%	2.2%	1.7%	2.8%	2.7%	1.0%	3.9%	1.0%	1.4%	1.2%	1.7%
	SV-3	3.5%	7.5%	16.2%	7.4%	5.0%	8.9%	5.0%	4.5%	7.1%	1.3%	5.7%	2.6%	0.7%	0.2%	0.3%	5.1%	4.2%	3.3%	3.2%	3.5%	1.7%	9.4%	4.5%	5.0%	4.7%	3.3%	10.5%	0.9%	3.2%	2.8%	3.9%
	SV-4	3.3%	2.5%	8.5%	5.7%	5.5%	5.9%	3.3%	3.5%	4.8%	3.9%	4.5%	3.2%	3.1%	3.8%	3.0%	4.4%	3.5%	4.5%	3.0%	2.3%	1.5%	1.8%	3.4%	3.3%	1.8%	1.0%	3.4%	1.2%	1.7%	0.3%	2.3%
	SV-5	2.5%	2.9%	9.6%	2.5%	1.6%	3.1%	3.2%	3.2%	2.1%	1.9%	1.4%	1.5%	1.0%	0.5%	0.9%	0.7%	1.0%	0.3%	0.6%	0.3%	1.2%	0.2%	1.2%	1.8%	0.8%	0.4%	2.1%	1.4%	0.6%	0.9%	1.4%
	SV-6	2.5%	1.4%	3.8%	1.6%	1.2%	4.1%	3.0%	3.4%	3.7%	4.5%	3.5%	3.0%	2.4%	3.1%	1.1%	1.6%	0.6%	0.3%	1.4%	0.3%	0.5%	0.4%	1.4%	1.6%	1.5%	0.5%	2.7%	1.2%	1.3%	1.1%	2.0%
	SV-8	8.7%	2.9%	4.4%	7.1%	6.3%	8.7%	6.8%	3.1%	0.4%	0.1%	5.9%	3.5%	4.4%	0.1%	4.2%	1.6%	1.0%	0.8%	2.6%	0.3%	0.9%	1.0%	0.6%	1.1%	0.4%	0.6%	1.6%	1.9%	1.3%	2.0%	2.2%
	SV-9	9.0%	0.9%	1.3%	6.0%	5.8%	8.4%	6.4%	7.3%	6.9%	6.6%	6.2%	3.9%	6.8%	4.8%	3.6%	1.0%	2.5%	2.0%	3.7%	1.1%	1.9%	2.0%	2.7%	3.8%	1.7%	1.7%	4.7%	3.7%	3.4%	1.6%	4.9%
	SV-10	2.4%	0.5%	3.0%	1.3%	1.7%	2.1%	1.8%	1.5%	2.2%	0.9%	2.0%	2.1%	0.7%	2.3%	1.6%	1.4%	1.1%	1.0%	3.6%	0.4%	0.8%	0.9%	1.0%	0.7%	0.3%	0.0%	0.4%	0.5%	0.5%	0.3%	0.6%
	SV-11	1.3%	2.3%	3.4%	2.2%	3.4%	1.9%	1.0%	0.9%	1.5%	1.4%	1.2%	1.0%	0.6%	0.3%	0.5%	1.2%	0.7%	0.5%	0.3%	0.3%	0.7%	0.8%	0.8%	0.8%	0.2%	0.5%	1.7%	1.4%	0.6%	0.2%	0.9%
	SV-12	0.3%	0.5%	0.6%	0.4%	0.5%	2.3%	4.8%	2.4%	1.6%	1.4%	1.8%	2.7%	1.2%	1.0%	0.7%	0.7%	1.0%	0.8%	3.7%	1.3%	3.1%	3.0%	3.1%	1.7%	0.3%	1.7%	2.8%	0.8%	0.7%	0.8%	1.6%
	SV-13	0.6%	0.9%	1.6%	0.2%	0.3%	1.4%	2.0%	1.3%	1.2%	0.2%	0.2%	0.7%	0.2%	0.2%	0.4%	0.8%	0.2%	0.1%	0.4%	0.1%	1.0%	0.9%	1.0%	0.9%	0.2%	0.6%	1.0%	0.8%	0.5%	0.5%	1.0%
	SV-14	2.3%	6.1%	5.8%	7.5%	5.5%	2.2%	1.1%	2.0%	4.5%	6.3%	6.9%	7.4%	12.7%	13.1%	3.3%	1.8%	1.5%	0.9%	3.3%	0.7%	2.7%	3.5%	3.2%	3.3%	1.5%	0.8%	2.3%	3.1%	1.7%	1.0%	1.8%
	SV-15	9.5%	14.7%	3.9%	5.3%	2.8%	5.6%	5.7%	0.5%	8.8%	5.8%	6.9%	10.4%	6.4%	0.9%	1.8%	2.3%	1.5%	1.3%	2.3%	0.3%	2.8%	3.1%	3.9%	6.7%	2.6%	3.2%	9.5%	5.7%	5.4%	5.8%	6.0%
2 (and between divider line)	SV-7	2.2%	1.5%	1.9%	1.5%	2.9%	4.2%	2.3%	1.1%	3.9%	4.8%	3.8%	4.0%	3.2%	0.3%	3.1%	5.3%	2.5%	2.1%	3.3%	1.3%	1.1%	0.9%	1.2%	1.7%	0.8%	0.3%	0.7%	0.9%	1.1%	1.0%	1.2%
	SV-16	9.5%	7.1%	1.1%	5.7%	6.2%	6.6%	6.9%	5.2%	8.0%	8.7%	6.9%	6.9%	8.0%	0.0%	6.8%	10.3%	10.5%	6.6%	18.3%	5.0%	8.1%	10.5%	11.1%	14.4%	12.9%	8.6%	12.9%	5.4%	9.3%	7.8%	7.6%
	SV-17	2.9%	0.1%	-3.3%	2.1%	1.6%	-1.5%	-0.6%	-0.5%	-1.6%	-3.1%	-2.0%	-1.3%	0.0%	-2.8%	0.7%	6.0%	1.3%	0.7%	-1.0%	0.5%	1.6%	1.2%	-1.1%	0.5%	0.5%	0.3%	0.6%	0.9%	0.0%	0.1%	0.1%
	SV-18	5.5%	11.4%	4.9%	6.8%	5.6%	6.7%	7.8%	13.0%	9.5%	6.6%	3.6%	4.3%	7.1%	22.8%	10.5%	8.2%	14.5%	9.1%	7.9%	13.9%	10.4%	10.8%	12.9%	10.1%	19.2%	11.2%	2.2%	12.4%	19.6%	24.2%	16.9%
	SV-19	3.6%	0.3%	-2.0%	5.5%	6.3%	0.6%	2.8%	3.0%	3.2%	6.5%	6.4%	4.3%	3.0%	3.4%	2.0%	0.7%	1.2%	0.7%	0.9%	0.6%	1.7%	0.6%	0.2%	0.5%	0.7%	0.6%	1.3%	1.6%	1.3%	1.2%	2.1%
	SV-20	7.2%	12.0%	7.2%	6.2%	6.3%	5.7%	5.5%	11.9%	6.1%	2.8%	2.9%	0.6%	5.0%	14.1%	11.0%	8.9%	8.7%	23.9%	14.6%	16.8%	10.7%	13.4%	16.3%	9.3%	10.4%	36.1%	15.9%	15.2%	14.8%	15.3%	12.2%
	SV-21	2.6%	2.0%	3.8%	0.9%	2.4%	3.2%	2.9%	3.6%	2.5%	5.3%	1.6%	-0.4%	2.2%	0.2%	3.5%	6.3%	5.8%	4.3%	1.4%	4.8%	3.0%	3.5%	1.1%	1.6%	3.8%	1.9%	-1.2%	3.7%	1.8%	1.8%	0.8%
	SV-22	8.5%	9.3%	8.3%	5.9%	7.6%	6.7%	7.0%	12.2%	8.5%	6.7%	4.8%	3.9%	4.4%	0.1%	9.9%	5.4%	11.5%	19.8%	11.5%	13.6%	14.3%	14.0%	16.1%	7.8%	10.4%	8.4%	9.2%	7.0%	6.3%	8.1%	5.6%
	SV-23	5.2%	-2.9%	-2.4%	1.9%	4.4%	-0.3%	0.5%	0.3%	1.0%	8.8%	1.3%	4.6%	2.9%	6.2%	10.3%	3.2%	3.4%	2.6%	-0.2%	-0.2%	2.4%	-6.0%	-2.0%	2.6%	11.6%	6.4%	-7.9%	9.6%	4.7%	7.3%	11.3%
	SV-24	4.0%	8.5%	9.4%	7.2%	6.2%	4.4%	5.6%	10.3%	4.7%	8.0%	6.8%	7.4%	7.4%	13.6%	8.3%	6.5%	11.3%	8.5%	7.7%	14.7%	13.7%	11.6%	8.4%	8.9%	10.0%	7.0%	6.6%	10.3%	11.3%	11.3%	9.0%
	SV-25	-0.1%	1.1%	0.0%	0.7%	0.8%	0.1%	1.5%	0.1%	1.4%	2.1%	0.2%	1.3%	1.2%	-0.2%	0.0%	0.5%	0.3%	0.4%	0.1%	0.2%	0.0%	0.4%	0.8%	0.2%	-1.0%	0.0%	1.1%	2.3%	1.3%	0.1%	0.0%
	SV-26	0.3%	2.2%	1.9%	1.9%	2.4%	1.6%	3.4%	1.0%	1.6%	4.3%	6.8%	8.1%	5.9%	3.2%	2.7%	3.9%	2.8%	1.1%	1.7%	4.0%	2.6%	3.2%	2.2%	2.8%	0.7%	1.1%	3.1%	2.0%	1.9%	1.1%	1.1%
	SV-27	0.1%	0.7%	-0.5%	1.7%	0.4%	1.4%	3.2%	1.2%	2.4%	1.1%	2.0%	0.4%	0.2%	0.0%	-1.5%	0.1%	0.7%	0.5%	0.2%	0.5%	0.5%	1.0%	0.8%	0.6%	0.7%	0.2%	1.2%	0.7%	-0.2%	0.2%	0.3%
	SV-28	0.0%	1.0%	0.5%	0.6%	0.7%	0.8%	0.6%	0.5%	0.9%	1.7%	5.5%	10.1%	6.9%	6.1%	3.8%	9.5%	4.2%	2.0%	3.4%	11.6%	7.9%	4.8%	2.7%	3.2%	0.4%	2.0%	4.7%	2.1%	2.0%	0.9%	0.7%
	SV-29	0.0%	0.6%	0.4%	0.1%	0.2%	0.4%	0.0%	0.0%	0.1%	0.0%	0.6%	0.5%	0.2%	0.1%	3.7%	0.1%	0.3%	0.1%	0.1%	0.3%	0.4%	0.3%	0.1%	1.0%	0.1%	0.1%	0.7%	0.4%	0.9%	0.3%	0.2%
Total:		100%	100%	101%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note: Six out of the 23 wellfield branch lines service both Phase 1 and Phase 2; therfore, a correction has been made to subtract the shared mass sometimes resulting in a negative value. This value indicates that the mass contribution from the Phase 2 area was limited in that particular sample round. This is a result of the accuracy of the flow and PID data measurements collected.

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2 TEMPERATURE PROGRESS

Table 4 summarizes the average target treatment zone temperature for both Phase 1 and Phase 2 thermocouples that remain online, as well as the average centroid temperature. *A centroid is defined as the farthest location from the heat sources and therefore the most difficult to heat to target temperatures.* Select heaters in Phase 1 were taken offline on 01/08/15; while select heaters in Phase 2 were taken offline on 2/9/15.

Table 4. Temperature Summary

Temperatures TTZ

Type	Value	Unit
Date of Last Update	3/8/15	
Phase 1 Entire TTZ Average Temperature	N/A	°C
Phase 2 Online TMPs Average Temperature	101	°C
Phase 1 Centroid Average Temperature	N/A	°C
Phase 2 Online Centroid Average Temperature	96	°C

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3 VAPOR EXTRACTION

Figure 2 below shows the vapor extraction rate from the wellfield. Note that the increased wellfield non-condensable vapor flow on 7/17/14 corresponds with the balancing of the flows in the Phase 2 area. The drop on 8/14/14 corresponds with the oxidizer shutdown and operation at a decreased flow in backup mode. Vapor extraction was increased on 8/30/14. Recent increases and decreases correlate with wellfield modifications to sweep the subsurface.

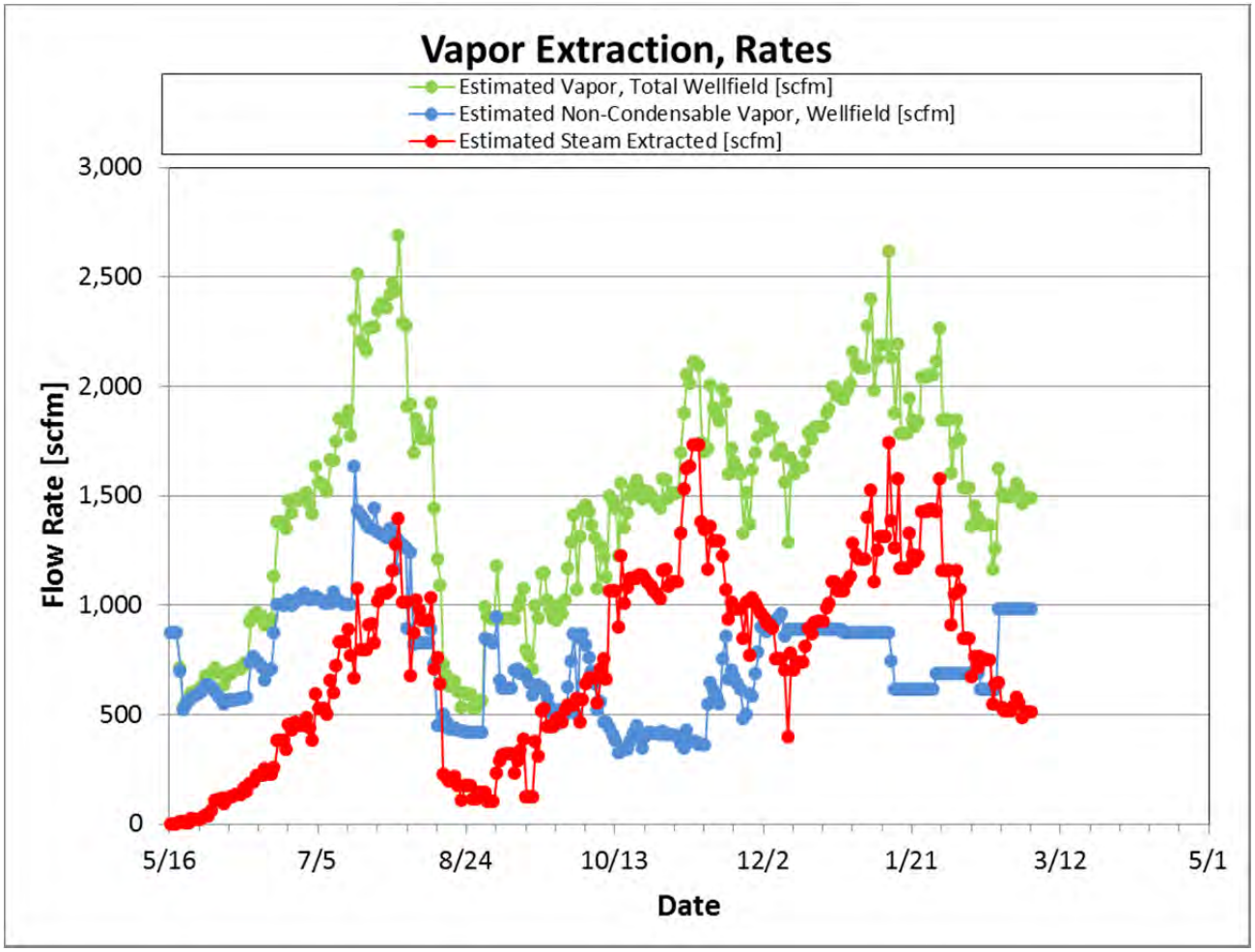


Figure 2. Vapor Extraction Rates

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4 LFL MONITORING

Please note that the flammability analyzer is no longer online (corresponds with taking the oxidizer offline).

Figure 3 below depicts the Lower Flammability Limit (%LFL) readings of the process treatment stream taken at the oxidizer influent. The plotted data represent a daily average reading collected throughout a 24 hour period from the analyzer. This value is collected after dilution air is introduced into the system. Please note that values were not recorded by the flammability analyzer, after shutdown of the oxidizer. The original flammability analyzer was brought back online, as well as a second analyzer on 8/30/14. Both readings are displayed on the chart below.

%LFL is converted to British Thermal Units per standard cubic foot (BTU/scf) and compared with the contract limit of 25 BTU/scf.

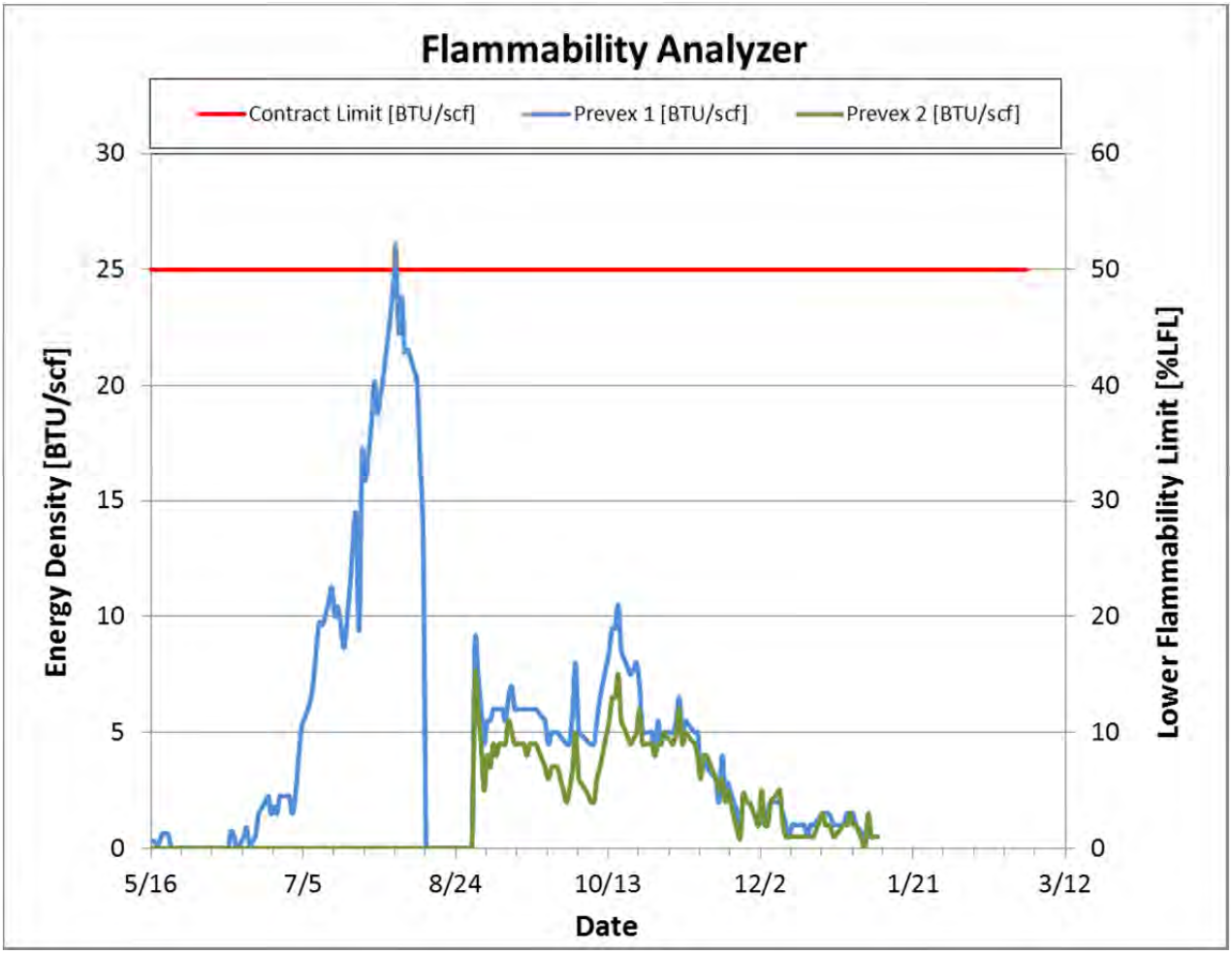


Figure 3. Flammability Analyzer

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5 MASS REMOVAL

Estimated mass removed through 01/09/15 is reported using the combination of flammability analyzer data, laboratory data for chlorinated compounds that are assumed not to be detected by the flammability analyzer, and accumulated LNAPL volume. Mass removal starting 01/10/15 is reported as the total compounds detected in the laboratory data corrected using the PID plus the accumulated LNAPL.

The total estimated mass removed from the site is shown below in Figure 4a. Figure 4b graphs the estimated mass removed from Phase 1, and Figure 4c graphs the estimated mass removed from Phase 2. Figures 4d, 4e and 4f were added to show the mass removal rates per day for the entire site and for Phase 1 and Phase 2, respectively. Please note that the mass removal rates are shown on a logarithmic scale.

The below graphs are prepared using laboratory data results from samples collected at the influent location on 5/16/14, 5/20/14, 5/27/14, 6/4/14, 6/11/14, 6/17/14, 6/24/14, 7/1/14, 7/8/14, 7/15/14, 7/22/14, 7/29/14, 8/5/14, 8/12/14, 8/16/14, 8/19/14, 8/26/14, 9/4/14, 9/9/1, 9/16/14, 9/23/14, 9/30/14, 10/7/14, 10/14/14, 10/21/14, 10/30/14, 11/4/14, 11/18/14, 11/25/14, 12/2/14, 12/9/14, 12/16/14, 12/23/14, 12/30/14, 1/6/15, 1/13/15, 1/20/15, 1/26/15, 2/10/15 and 2/24/15. Samples collected 17 February were not included in the mass estimate/correction as the data results appear suspect.

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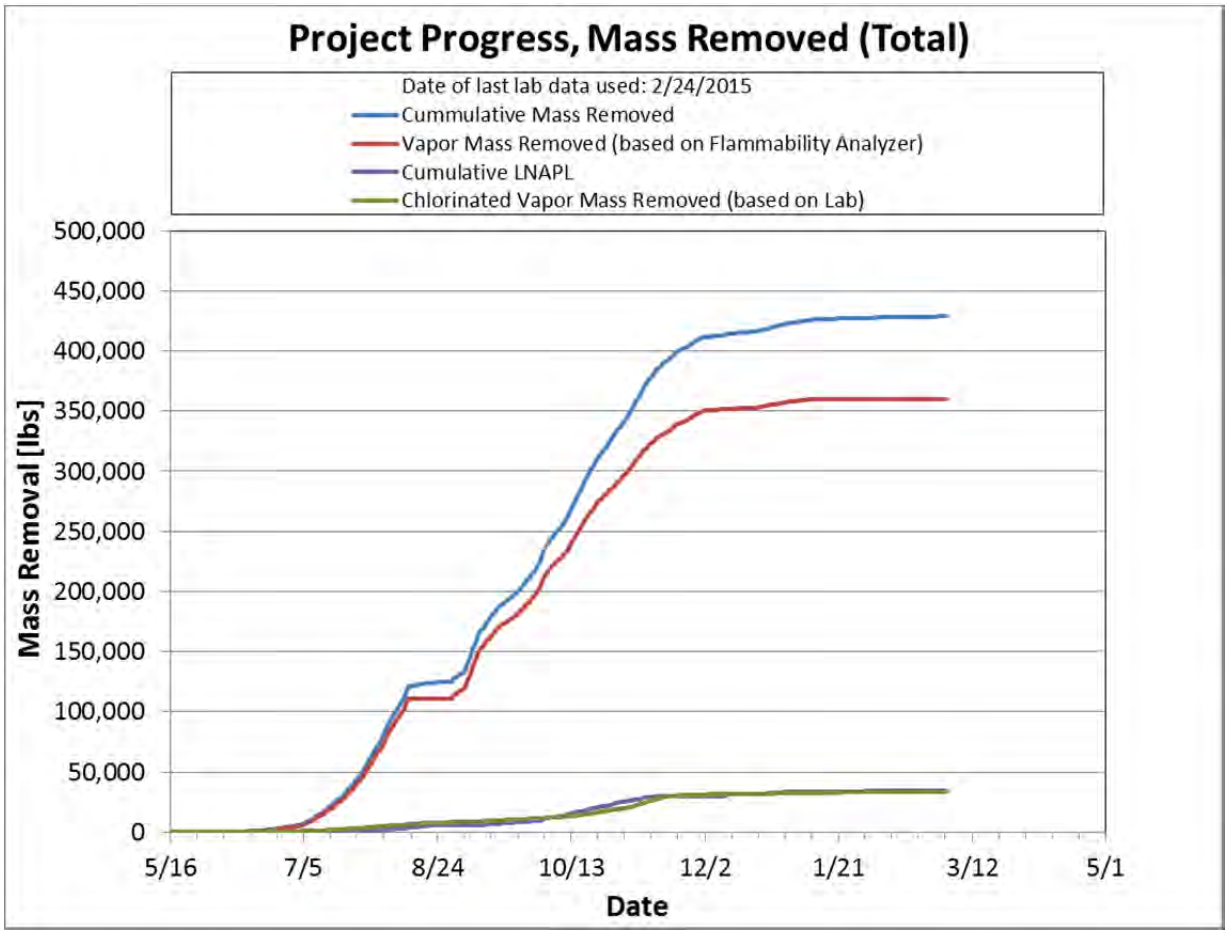


Figure 4a. Project Progress, Mass Removal (Total)

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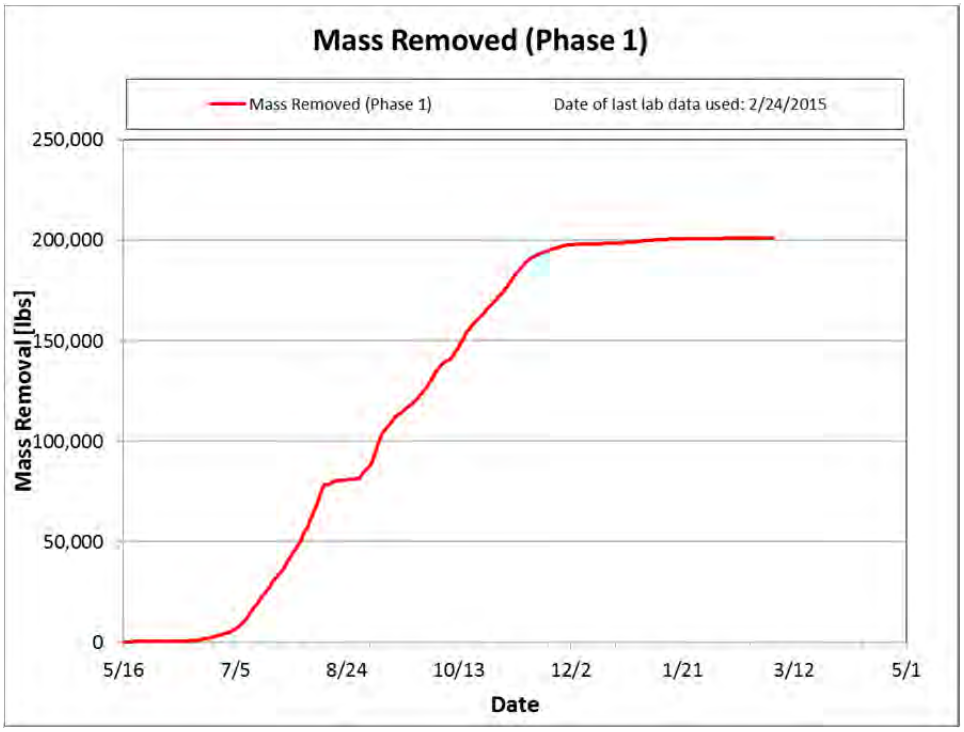


Figure 4b. Project Progress, Mass Removal (Phase 1)

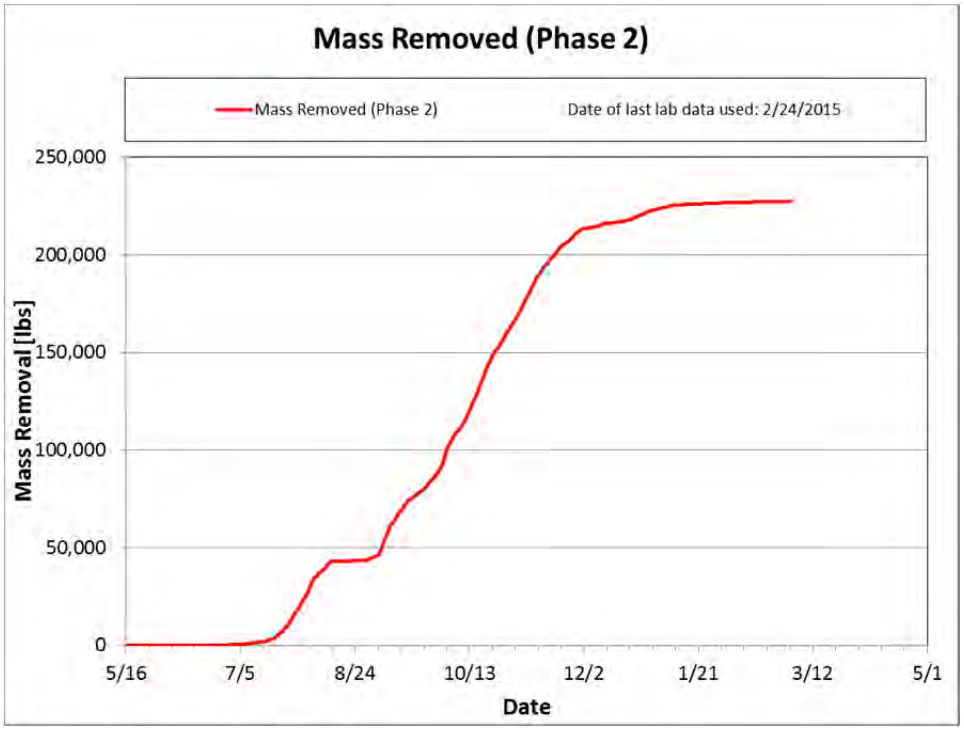


Figure 4c. Project Progress, Mass Removal (Phase 2)

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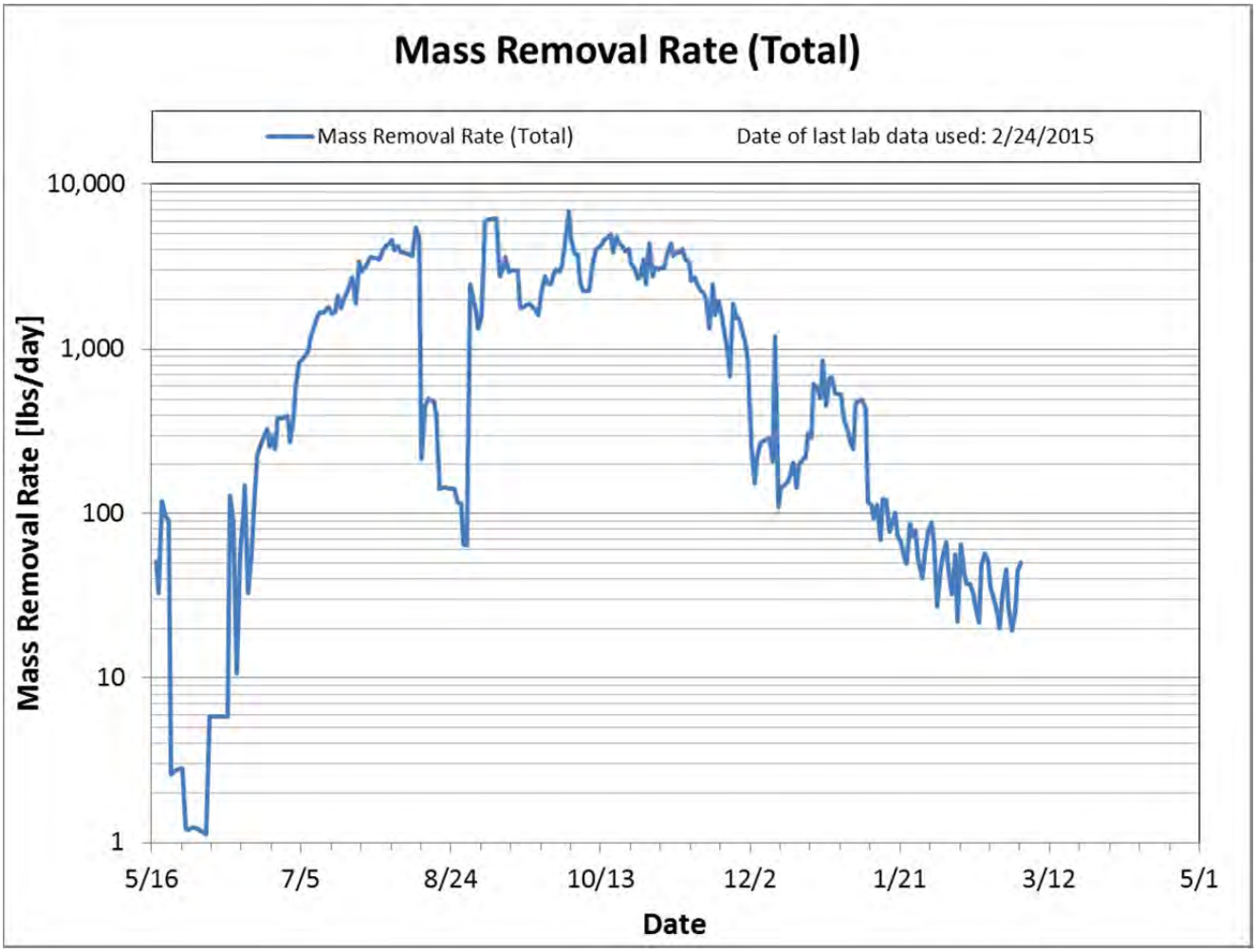


Figure 4d. Mass Removal Rate (Total for Site)

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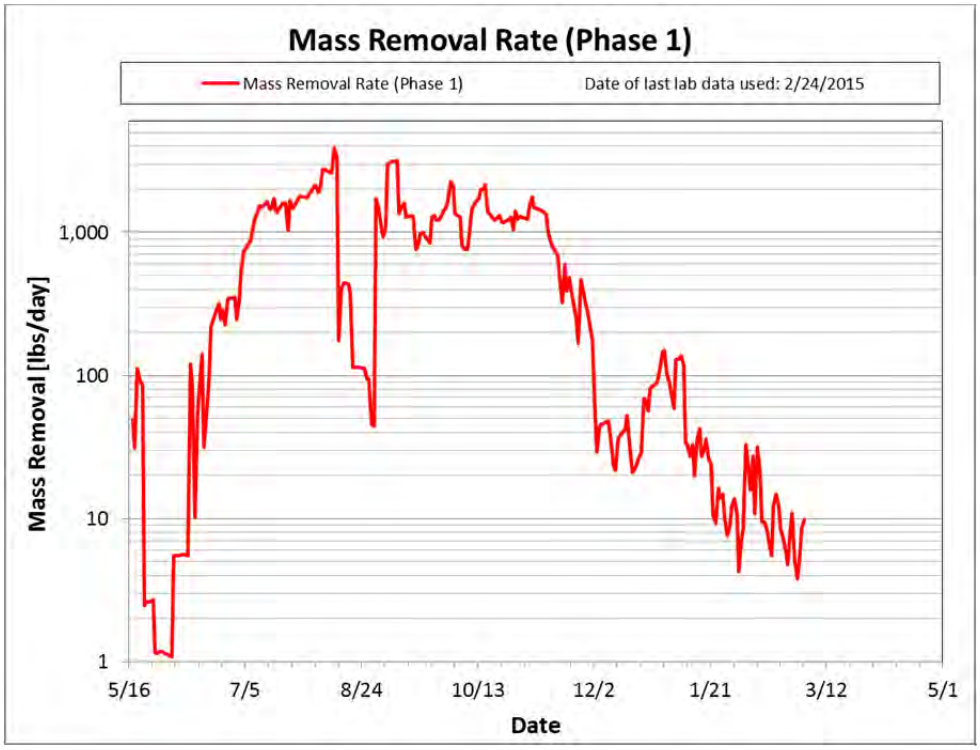


Figure 4e. Mass Removal Rate (Phase 1)

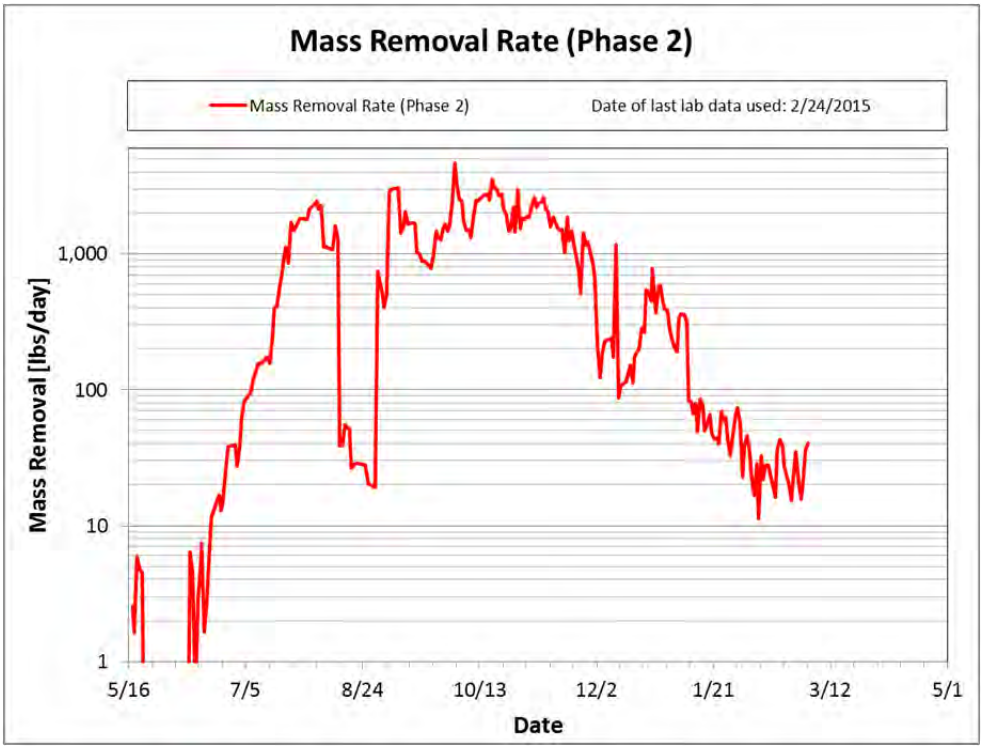


Figure 4f. Mass Removal Rate (Phase 2)

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Figure 5 below displays the daily PID and flammability analyzer readings collected at the oxidizer influent over time. It should be noted that PID readings are first collected using an 11.7 eV lamp (determined by site contaminants). If the reading exceeds the limit of the meter (>2000 ppm), the readings are collected using a 10.6 eV lamp. When both meters are used, the maximum value is recorded.

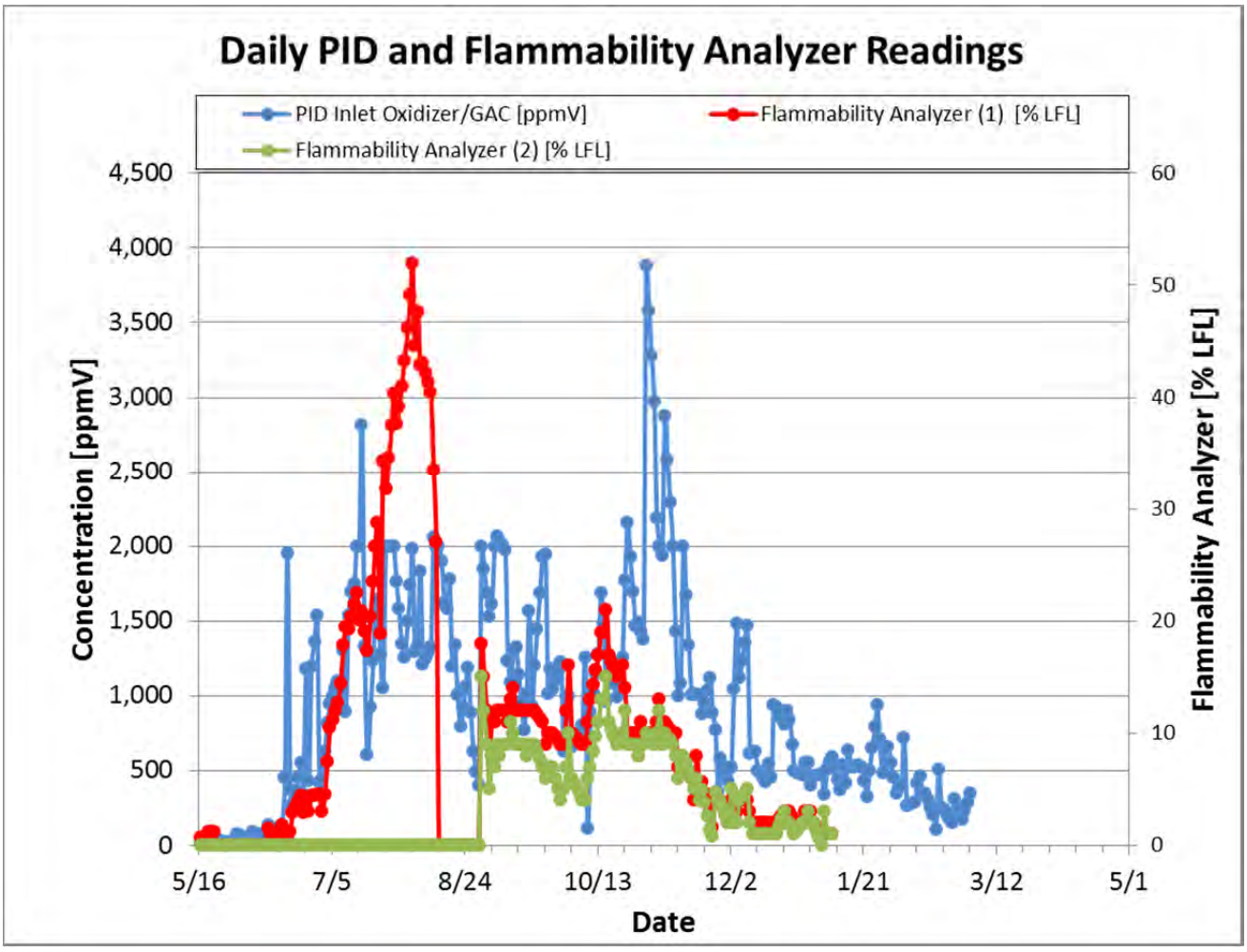


Figure 5. Daily PID and Flammability Analyzer Readings – Total Influent

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The figure below displays the destruction removal efficiency (DRE) using the PID data collected daily from the influent and effluent locations. As expected, when influent concentrations are low, calculated DRE values are low. As the temperatures within the wellfield increase and influent concentrations increase, DRE calculations increase. The backup carbon system was placed online on 8/13, after the oxidizer shutdown. Decreases in DRE, following turnover to the carbon system on 8/14/14, correlate with carbon change-outs.

Influent concentrations collected over the past week were between 175 to 349 ppm, with effluent concentrations ranging between 13.8 to 38 ppm. While the calculated DRE is less than 95% on some days, calculated mass emissions are less than 2 lbs/hr (air permit limit) by more than 50%.

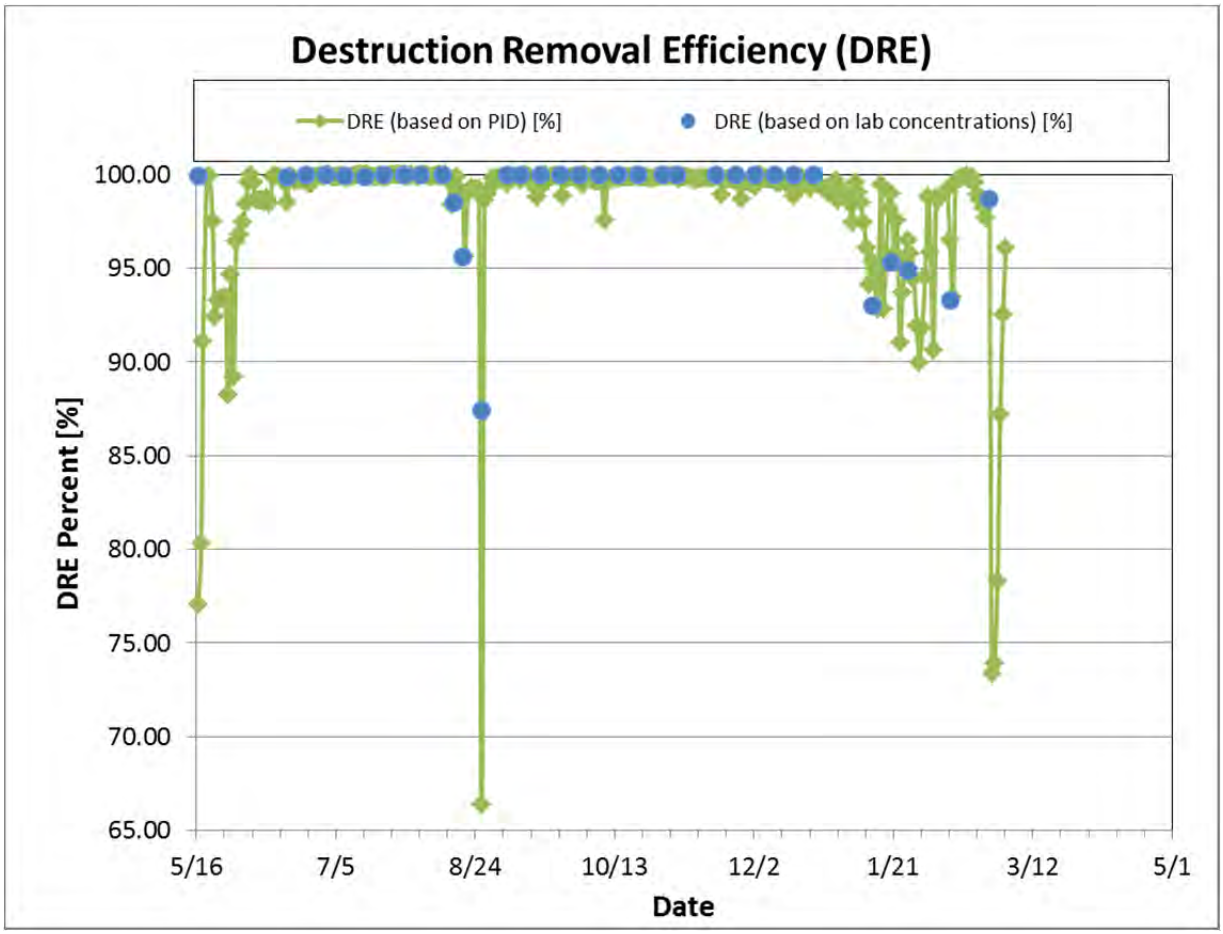


Figure 6. Destruction Removal Efficiency

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6 POWER USAGE

The cumulative power usage and total power rate is shown below in Figure 7. Please note that the graph has been modified to present the estimated modeled energy for the heaters (ISTD) over the original predicted 195 day treatment. This does not take into account contract definitions such as heaters operating at or above 70% energy input. The flatline represents days beyond 195 days.

Please note that the modeled energy usage (12,873,000 kWh) only includes the energy predicted to be added to the subsurface. Therefore, the number should be compared to the cumulative energy added by the ISTD system to the subsurface (red line). The total energy usage (including the treatment system power usage) is predicted to be 15,795,000 kWh as stated in the summary table.

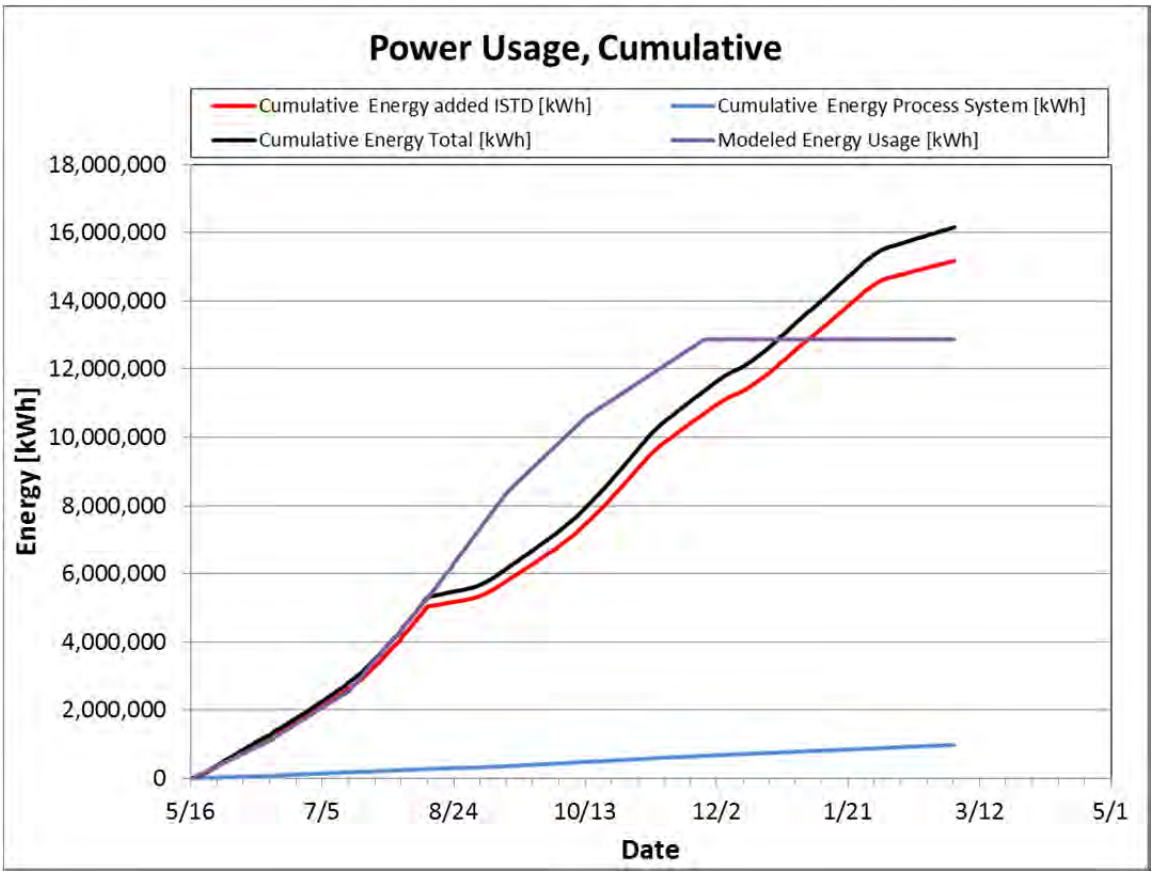


Figure 7. Power Usage, Cumulative

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7 APPLIED POWER RATE

The rate of power applied to the site through both ISTD heaters and process treatment equipment is shown below in Figure 8.

Note that the reduced power input rate on 6/18/14 reflects the site power outage due to a nearby car accident with a utility pole (per CL&P). The reduced power input rate on 6/24/14 is a result of maintenance being done to the vapor treatment system (i.e., a controlled shutdown). Starting 6/25/14, several SCRs were increased by approximately 10% to correspond with the power input model and adjusted over the next couple days. The increase observed on 7/16/14 corresponds to the heaters in phase 2 being energized. Subsequent increases correspond to the increase in setpoints. The decrease in energy input on 8/14/14 corresponds with the oxidizer shutdown. The increase in power usage on 8/30/14 and the following days corresponds with ramping of the heaters after placing the oxidizer back online. The decrease observed mid- November is associated with profiling of the heaters in Phase 2 and subsequent adjustments. The increase observed in December corresponds with additional profiling and subsequent adjustments. Approved circuits in Phase 2 were decreased last week with ultimate shutdown of them Monday, 9 February.

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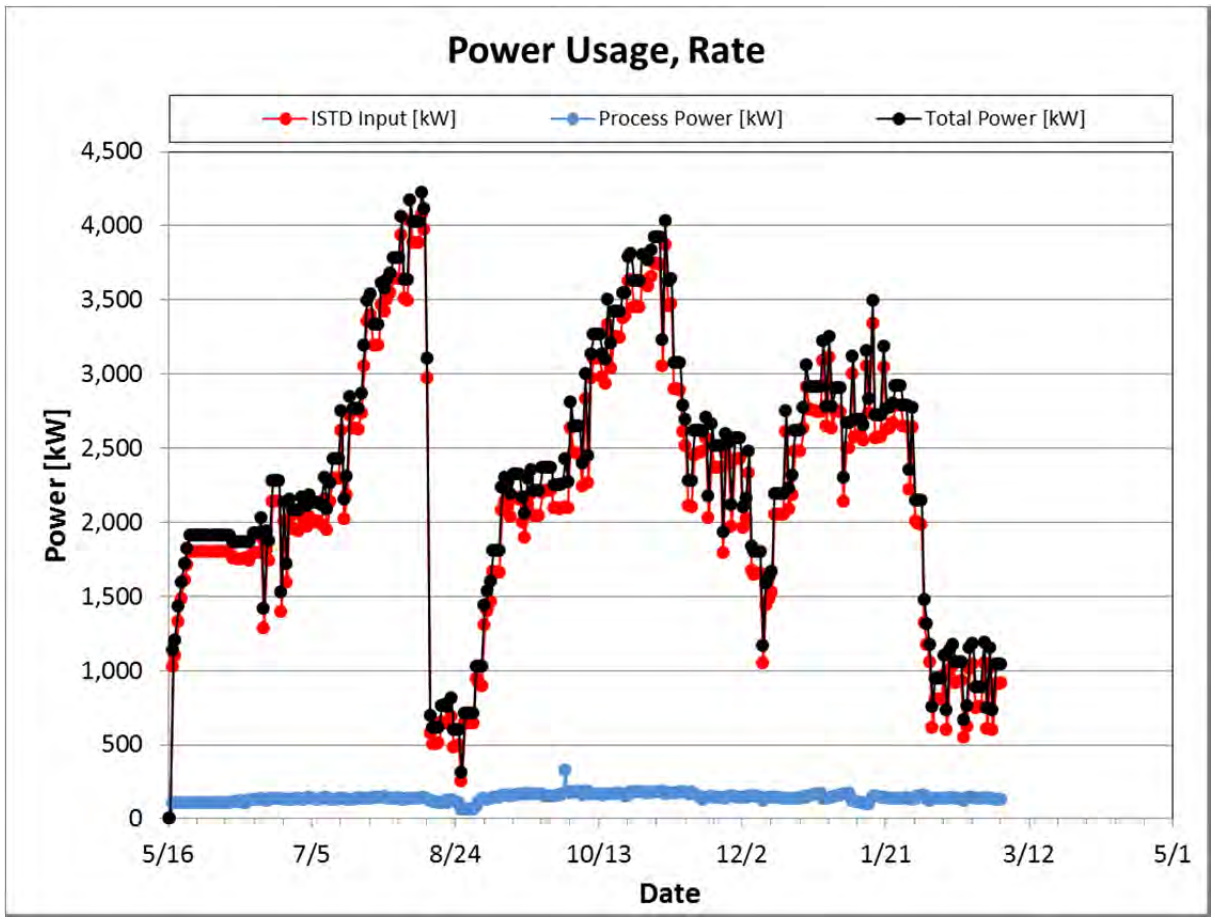


Figure 8. Power Usage, Rate

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8 UTILITY USAGE

The power usage, natural gas usage, and caustic usage are summarized in Figures 9 through 11.

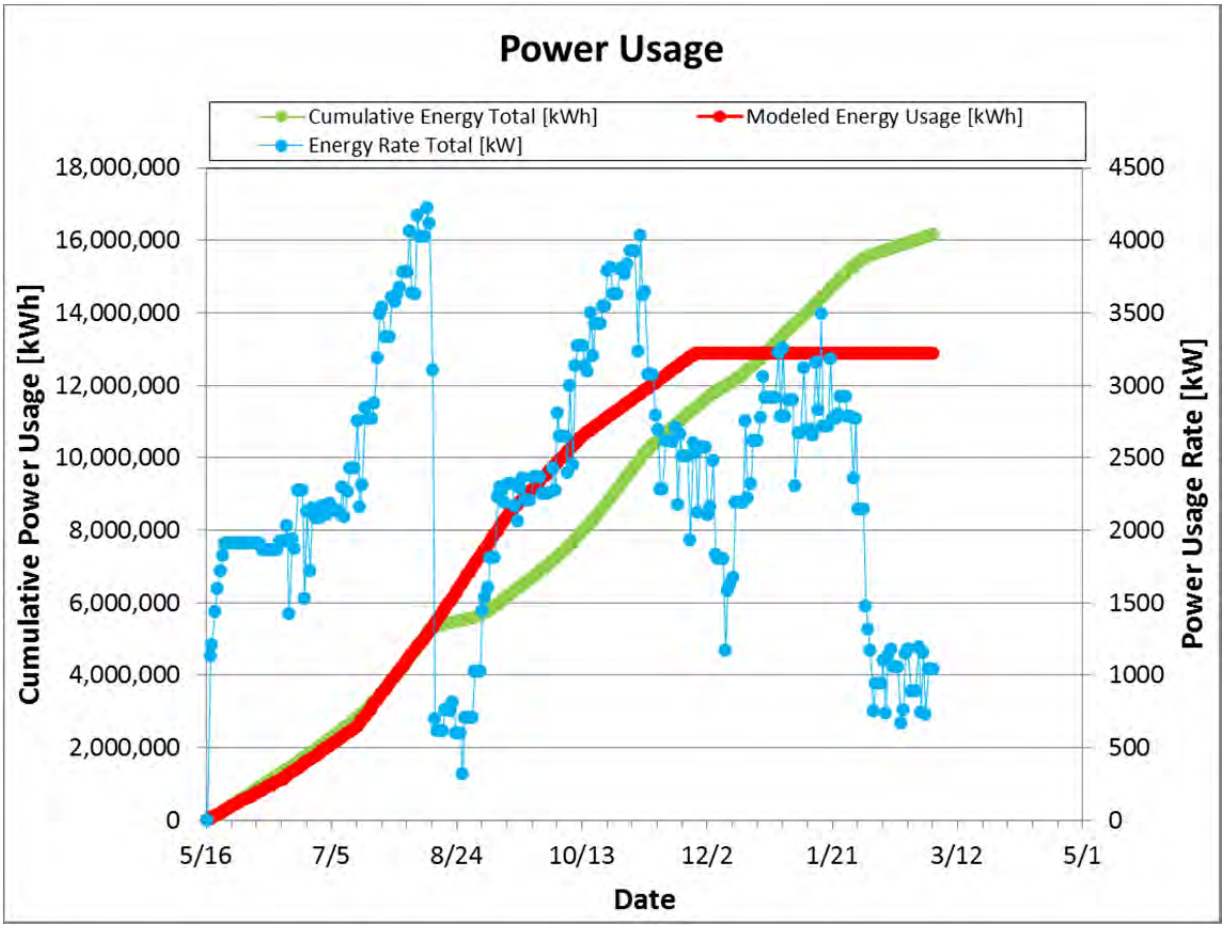


Figure 9. Power Usage

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With the oxidizer offline, natural gas is no longer in demand (as shown below starting on 10 January 2015).

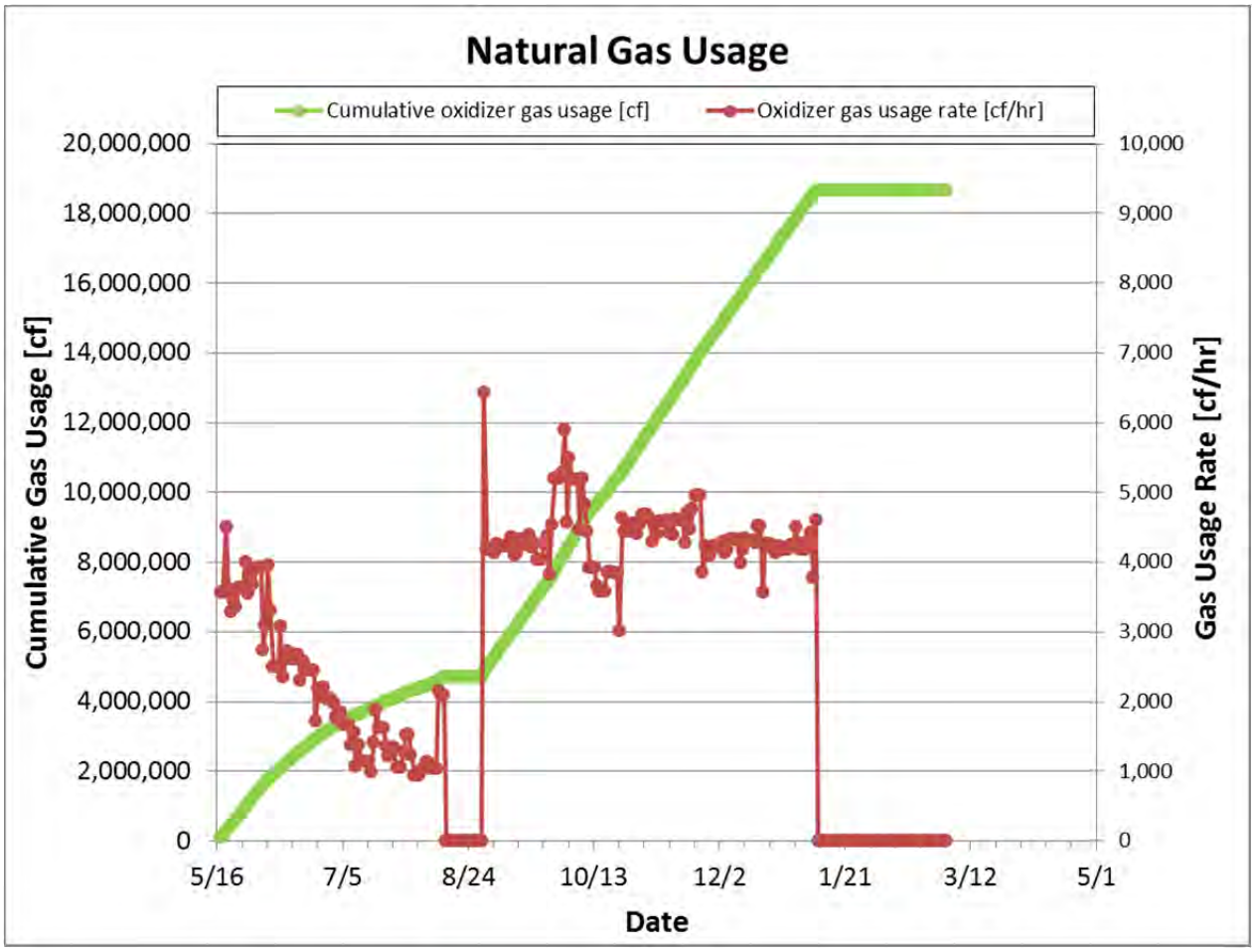


Figure 10. Natural Gas Usage

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With the oxidizer offline, caustic is no longer in demand (as shown below starting on 10 January 2015).

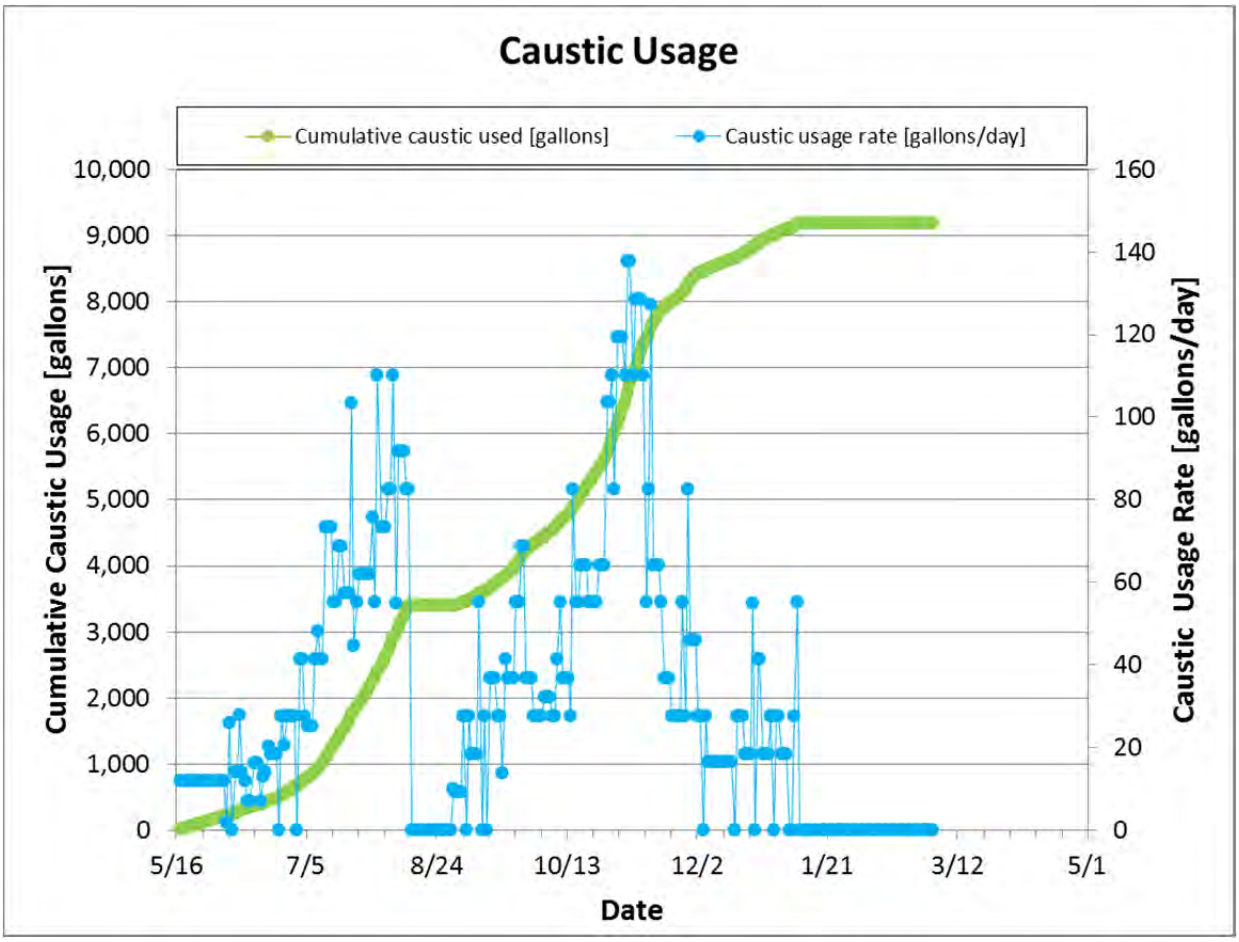


Figure 11. Caustic Usage

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9 PAYMENT MILESTONES

In accordance with our contract, payment milestones are defined as: Phase 1 and Phase 2 treatment:

- 75% of thermocouples located at the centroids achieves 85°C
- 80% of thermocouples located at the centroids achieves 100°C
- 90% of thermocouples located at the centroids achieves 100°C

Figure 12c below represents the temperature data for those thermocouples for both Phase 1 and Phase 2 on Sunday, 8 March, 2015. The following table is accurate to the individual Phase 1 and Phase 2 milestones.

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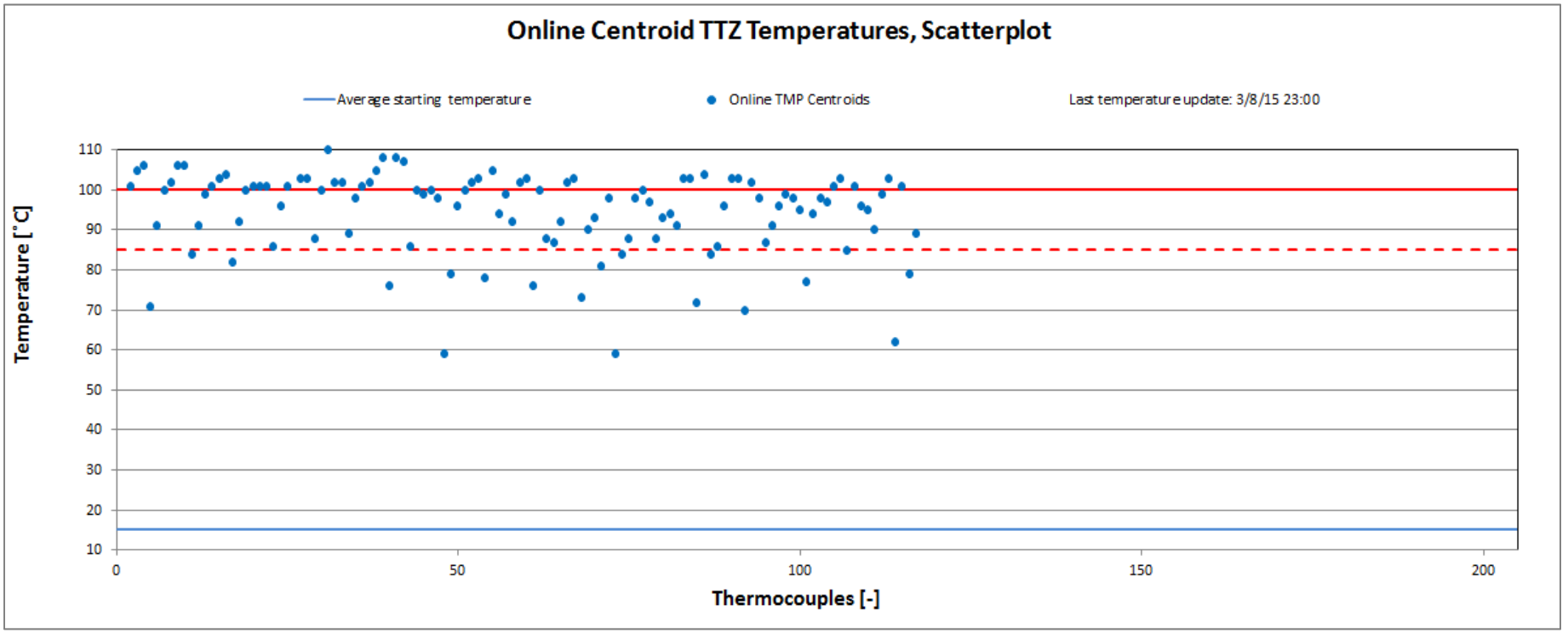


Figure 12c. Phase 1 and Phase 2 Centroid TTZ Temperatures, Scatterplot

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Table 5. Percent of Thermocouples which have met Target Temperatures

Temperature Scatterplots

	Value	Unit
Date of Last Update	2/8/15	
Phase 1 Centroid Thermocouples ≥85 ^{0}C	100	%
Phase 1 Centroid Thermocouples ≥100 ^{0}C	97	%
Phase 2 Centroid Thermocouples ≥85 ^{0}C	99	%
Phase 2 Centroid Thermocouples ≥100 ^{0}C	98	%

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