

**Final Test Report  
for**

**US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report**

**Based on information and belief formed after reasonable inquiry, I certify that the statements and information in this test report are true, accurate, and complete.**

\_\_\_\_\_  
**Permitted Facility Representative / Date**

**Name:  
Title:  
Company:  
Sign Date:**

**I have reviewed all testing details and results in this test report and hereby certify that the test report is authentic and accurate.**

\_\_\_\_\_  
**Testing Company Representative / Date**

**Name:  
Title:  
Company:  
Sign Date:**

## US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

### Facility Information:

|   |    |        |
|---|----|--------|
| U. S. Steel - Minnesota Ore Operations - Ke |    |        |
| 1 Mine Road                                 |    |        |
|   |    |        |
| Keewatin                                    | MN | 55753- |

**Contact:** Stephani Campbell  
**Phone:** (218) 778-8684  
**Fax:**  
**Email:** scampbell@uss.com

### Testing Company:

|                       |    |        |
|-----------------------|----|--------|
| Barr Engineering Co.  |    |        |
| 4300 MarketPointe Dr. |    |        |
| Suite 200             |    |        |
| Minneapolis           | MN | 55435- |

**Contact:** Tom Kuchinski  
**Phone:** (952) 832-2787  
**Fax:**  
**Email:** tkuchinski@barr.com

**Industry/SCC/NAIS:** 212210 **AFS #:** 2713700063 **FRS #:** 110008797864

### Air Permit Number:

13700063

### Permitted Source ID/Name:

EU030 Grate Kiln Indurator Waste Gas Phase II

**Permitted Maximum Process Rate:** **Max. Normal Operation Process Rate:** **Target Process Test Rate**

NA 650 LTPH 580-650 LTPH

**SCC / Description:** 30302351 Industrial Processes - Primary Metal Production - Taconite Iron Ore Processing - Induration: Grate/Kiln, Gas-fired, Acid Pellets

The following state and federal regulations that apply to the proposed testing:

### Description of the source (including control equipment). Please see the attachments for source or process flow diagram:

The Keetac Phase II indurating furnace (EU030) is an Allis Chalmers model 48-30-3 Grate Kiln Pelletizing system. The green ball feed is dried and preheated on a traveling grate by down draft drying to develop mechanical strength prior to entering a rotary kiln for high temperature induration. The kiln product drops into an annular cooler for cooling and heat recovery by ambient air driven by two stages of cooling fans. Hot gases from the first stage of cooling pass through the kiln as secondary air to the preheat section of the grate. A heat recoup system draws air from the cooler for second down draft drying section.

Two wet scrubbers (CE110 and CE111) provide emission control. The scrubbers are venturi type designed by STS. The exhausts of the two scrubbers are vented to the atmosphere through a common waste gas stack (SV051).

### Sampling Location Information:

| Location | Round Duct Diam. | Rect. Duct Length /Width | Equiv. Diam | DownStream Distance from Disturbance (Distance B): | UpStream Distance from Disturbance: | Number of Traverse Ports | Min.Travers Points |
|----------|------------------|--------------------------|-------------|--|-------------------------------------|--------------------------|--------------------|
| SV051    | 227.5            |                          |             | 816  | 504                                 | 4                        | 24                 |
|          |                  |                          |             |  |                                     |                          |                    |

### Test Parameter Information:

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| Location | Target Parameter                        | Test Method   | Number of Test Runs | Test Run Duration | Comments                              |
|----------|---|---------------|---------------------|-------------------|---------------------------------------|
| SV051    | % Moisture                              | Method 1 - 4  | 1                   | 156               |                                       |
| SV051    | Flowrate                                | Method 1 - 4  | 1                   | 156               |                                       |
| SV051    | Carbon Monoxide                         | Method 10     | 4                   | 156               | Concurrent with each M26A and M29 run |
| SV051    | Hydrogen Fluoride                       | Method 26A    | 3                   | 120               | Duration dependent on 2 dcm/run       |
| SV051    | Hydrogen Chloride                       | Method 26A    | 3                   | 120               | Duration dependent on 2 dcm/run       |
| SV051    | Filterable Particulate                  | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Antimony                                | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Antimony Back Half                      | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Antimony Front Half                     | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Arsenic                                 | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Arsenic Back Half                       | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Arsenic Front Half                      | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Beryllium                               | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Beryllium Back Half                     | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Beryllium Front Half                    | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Cadmium                                 | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Cadmium Back Half                       | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Cadmium Front Half                      | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Chromium                                | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Chromium Back Half                      | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Chromium Front Half                     | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Cobalt                                  | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Cobalt Back Half                        | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Cobalt Front Half                       | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Lead                                    | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Lead Back Half                          | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Lead Front Half                         | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Manganese                               | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Manganese Back Half                     | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Manganese Front Half                    | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Mercury                                 | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Mercury Back Half                       | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Mercury Front Half                      | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Nickel                                  | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Nickel Back Half                        | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Nickel Front Half                       | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Phosphorus (yellow or white)            | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Phosphorus (yellow or white) Back Half  | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Phosphorus (yellow or white) Front Half | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Selenium                                | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Selenium Back Half                      | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Selenium Front Half                     | Method 29     | 3                   | 156               | Duration dependent on 3 dcm/run       |
| SV051    | Oxygen                                  | Method 3A O2  | 4                   | 156               | Concurrent with each M26A and M29 run |
| SV051    | Carbon Dioxide                          | Method 3A CO2 | 4                   | 156               | Concurrent with each M26A and M29 run |

The following describes any modifications and/or deviations to the applicable test

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**methods. If alternative methods were requested, see the attachments for documentation of request AND approval, including dates.**

Method 3A and 10 will be modified to have bias calibrations performed before and after each M29/26A test run. > 60 minutes.

Method 26A will include the addition of a fourth impinger loaded with 0.1N sulfuric acid. This impinger will be collected and analyzed separately to monitor HF breakthrough.

Due to the difficulty in obtaining phosphorous free reagents, the back half phosphorus results are blank corrected using the entire amounts found in the back half reagent blank which deviates from Method 29 blank correction procedures.

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## Sampling / Stack Data Results Summary

**Location** SV051 - Method 1 - 4

|   |             | <u>Average</u> |
|---|-------------|----------------|
| Run Number                                      | 3           |                |
| Test Date                                       | 5/4/2022    |                |
| Run Start Time                                  | 9:00:00 AM  |                |
| Run Finish Time                                 | 11:45:00 AM |                |
| Net Run Time, minutes                           | 156         |                |
| Dry Gas Meter Volume Sampled, dscf              | 112.434     | 112.434        |
| Moisture Content of Stack Gas, %                | 15.6775     | 15.678         |
| Moisture Saturation at Stack Gas Temperature, % | 14.77       | 14.770         |
| Carbon Dioxide, %                               | 1.4335      | 1.434          |
| Oxygen, %                                       | 17.7886     | 17.789         |
| Average Stack Gas Temperature, °F               | 127.63      | 127.630        |
| Square Root of Average Velocity, inches of H2O  | 0.7612      | 0.761          |
| Dry Volumetric Flow Rate, dry scfm              | 588,548.9   | 588,548.900    |
| Actual Wet Volumetric Flue Gas Flow Rate, acfm  | 800,969.6   | 800,969.600    |
| Percent Isokinetic of Sampling Rate, %          | 99.8        | 99.800         |
| F-Factor, dscfm/MMBtu @ %O2                     | 0           | 0.000          |
| Fw  | 0           | 0.000          |
| Fc  | 0           | 0.000          |

**Location** SV051 - Method 10

|                                    |             |             |             | <u>Average</u> |
|------------------------------------|-------------|-------------|-------------|----------------|
| Run Number                         | 1           | 2           | 3           |                |
| Test Date                          | 5/3/2022    | 5/3/2022    | 5/4/2022    |                |
| Run Start Time                     | 9:22:00 AM  | 12:55:00 PM | 9:00:00 AM  |                |
| Run Finish Time                    | 12:13:00 PM | 3:41:00 PM  | 11:45:00 AM |                |
| Carbon Dioxide, %                  | 1.4872      | 1.5066      | 1.4335      | 1.476          |
| Oxygen, %                          | 17.8493     | 17.7895     | 17.7886     | 17.809         |
| Dry Volumetric Flow Rate, dry scfm | 608977.2    | 600825.1    | 588548.9    | 599,450.400    |
| F-Factor, dscfm/MMBtu @ %O2        | 0           | 0           | 0           | 0.000          |
| Moisture, %                        | 14.5535     | 15.2748     | 15.6775     | 15.169         |
| Fuel Type                          |             |             |             |                |
| Fw                                 | 0           | 0           | 0           | 0.000          |
| Fc                                 | 0           | 0           | 0           | 0.000          |

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## Location SV051 - Method 10 3

|                                    |            | <u>Average</u> |
|------------------------------------|------------|----------------|
| Run Number                         | 4          |                |
| Test Date                          | 5/4/2022   |                |
| Run Start Time                     | 2:10:00 PM |                |
| Run Finish Time                    | 5:00:00 PM |                |
| Carbon Dioxide, %                  | 1.4969     | 1.497          |
| Oxygen, %                          | 17.6685    | 17.669         |
| Dry Volumetric Flow Rate, dry scfm | 594524.4   | 594,524.400    |
| F-Factor, dscfm/MMBtu @ %O2        | 0          | 0.000          |
| Moisture, %                        | 14.7813    | 14.781         |
| Fuel Type                          |            |                |
| Fw                                 | 0          | 0.000          |
| Fc                                 | 0          | 0.000          |

## Location SV051 - Method 26A

|   |             |             |             | <u>Average</u> |
|---|-------------|-------------|-------------|----------------|
| Run Number                                      | 1           | 2           | 3           |                |
| Test Date                                       | 5/3/2022    | 5/3/2022    | 5/4/2022    |                |
| Run Start Time                                  | 9:22:00 AM  | 12:55:00 PM | 9:00:00 AM  |                |
| Run Finish Time                                 | 11:34:00 AM | 3:04:00 PM  | 11:10:00 AM |                |
| Net Run Time, minutes                           | 120         | 120         | 120         |                |
| Dry Gas Meter Volume Sampled, dscf              | 84.100      | 82.849      | 82.115      | 83.021         |
| Moisture Content of Stack Gas, %                | 15.3140     | 15.5455     | 15.4291     | 15.430         |
| Moisture Saturation at Stack Gas Temperature, % | 15.73       | 16.05       | 15.65       | 15.810         |
| Carbon Dioxide, %                               | 1.4872      | 1.5066      | 1.4335      | 1.476          |
| Oxygen, %                                       | 17.8493     | 17.7895     | 17.7886     | 17.809         |
| Average Stack Gas Temperature, °F               | 129.79      | 130.54      | 129.79      | 130.040        |
| Square Root of Average Velocity, inches of H2O  | 0.7796      | 0.7770      | 0.7675      | 0.775          |
| Dry Volumetric Flow Rate, dry scfm              | 596,915.0   | 593,124.3   | 588,618.5   | 592,885.933    |
| Actual Wet Volumetric Flue Gas Flow Rate, acfm  | 824,851.4   | 822,988.3   | 810,285.2   | 819,374.967    |
| Percent Isokinetic of Sampling Rate, %          | 101.2       | 100.4       | 100.2       | 100.600        |
| F-Factor, dscfm/MMBtu @ %O2                     | 0           | 0           | 0           | 0.000          |
| Fw  | 0           | 0           | 0           | 0.000          |
| Fc  | 0           | 0           | 0           | 0.000          |

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**Location** SV051 - Method 29

|   |             |             |            | <u>Average</u> |
|---|-------------|-------------|------------|----------------|
| Run Number                                      | 1           | 2           | 4          |                |
| Test Date                                       | 5/3/2022    | 5/3/2022    | 5/4/2022   |                |
| Run Start Time                                  | 9:22:00 AM  | 12:55:00 PM | 2:10:00 PM |                |
| Run Finish Time                                 | 12:13:00 PM | 3:41:00 PM  | 5:00:00 PM |                |
| Net Run Time, minutes                           | 156         | 156         | 156        |                |
| Dry Gas Meter Volume Sampled, dscf              | 115.950     | 114.590     | 113.830    | 114.790        |
| Moisture Content of Stack Gas, %                | 14.5535     | 15.2748     | 15.4265    | 15.085         |
| Moisture Saturation at Stack Gas Temperature, % | 14.65       | 14.83       | 15.08      | 14.853         |
| Carbon Dioxide, %                               | 1.4872      | 1.5066      | 1.4969     | 1.497          |
| Oxygen, %                                       | 17.8493     | 17.7895     | 17.6685    | 17.769         |
| Average Stack Gas Temperature, °F               | 127.13      | 127.58      | 128.42     | 127.710        |
| Square Root of Average Velocity, inches of H2O  | 0.7877      | 0.7796      | 0.7696     | 0.779          |
| Dry Volumetric Flow Rate, dry scfm              | 608,977.2   | 600,825.1   | 592,803.0  | 600,868.433    |
| Actual Wet Volumetric Flue Gas Flow Rate, acfm  | 830,271.3   | 822,480.1   | 810,793.3  | 821,181.567    |
| Percent Isokinetic of Sampling Rate, %          | 99.5        | 99.6        | 100.3      | 99.800         |
| F-Factor, dscfm/MMBtu @ %O2                     | 0           | 0           | 0          | 0.000          |
| Fw  | 0           | 0           | 0          | 0.000          |
| Fc  | 0           | 0           | 0          | 0.000          |

**Location** SV051 - Method 3A CO2

|                                    |             |             |             | <u>Average</u> |
|------------------------------------|-------------|-------------|-------------|----------------|
| Run Number                         | 1           | 2           | 3           |                |
| Test Date                          | 5/3/2022    | 5/3/2022    | 5/4/2022    |                |
| Run Start Time                     | 9:22:00 AM  | 12:55:00 PM | 9:00:00 AM  |                |
| Run Finish Time                    | 12:13:00 PM | 3:41:00 PM  | 11:45:00 AM |                |
| Carbon Dioxide, %                  | 1.4842      | 1.5066      | 1.4335      | 1.475          |
| Oxygen, %                          | 17.8493     | 17.7895     | 17.7886     | 17.809         |
| Dry Volumetric Flow Rate, dry scfm | 608977.2    | 593124.3    | 588495.5    | 596,865.667    |
| F-Factor, dscfm/MMBtu @ %O2        | 0           | 0           | 0           | 0.000          |
| Moisture, %                        | 14.5535     | 15.5455     | 15.4291     | 15.176         |
| Fuel Type                          |             |             |             |                |
| Fw                                 | 0           | 0           | 0           | 0.000          |
| Fc                                 | 0           | 0           | 0           | 0.000          |

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## Location SV051 - Method 3A CO2 3

|                                    |            | <u>Average</u> |
|------------------------------------|------------|----------------|
| Run Number                         | 4          |                |
| Test Date                          | 5/4/2022   |                |
| Run Start Time                     | 2:10:00 PM |                |
| Run Finish Time                    | 5:00:00 PM |                |
| Carbon Dioxide, %                  | 1.4969     | 1.497          |
| Oxygen, %                          | 17.6685    | 17.669         |
| Dry Volumetric Flow Rate, dry scfm | 594524.4   | 594,524.400    |
| F-Factor, dscfm/MMBtu @ %O2        | 0          | 0.000          |
| Moisture, %                        | 14.7813    | 14.781         |
| Fuel Type                          |            |                |
| Fw                                 | 0          | 0.000          |
| Fc                                 | 0          | 0.000          |

## Location SV051 - Method 3A O2

|                                    |             |             |             | <u>Average</u> |
|------------------------------------|-------------|-------------|-------------|----------------|
| Run Number                         | 1           | 2           | 3           |                |
| Test Date                          | 5/3/2022    | 5/3/2022    | 5/4/2022    |                |
| Run Start Time                     | 9:22:00 AM  | 12:55:00 PM | 9:00:00 AM  |                |
| Run Finish Time                    | 12:13:00 PM | 3:41:00 PM  | 11:45:00 AM |                |
| Carbon Dioxide, %                  | 0           | 0           | 0           | 0.000          |
| Oxygen, %                          | 17.8493     | 17.7996     | 17.7886     | 17.813         |
| Dry Volumetric Flow Rate, dry scfm | 0           | 0           | 0           | 0.000          |
| F-Factor, dscfm/MMBtu @ %O2        | 0           | 0           | 0           | 0.000          |
| Moisture, %                        | 0           | 0           | 0           | 0.000          |
| Fuel Type                          |             |             |             |                |
| Fw                                 | 0           | 0           | 0           | 0.000          |
| Fc                                 | 0           | 0           | 0           | 0.000          |



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**Location** SV051 - Method 3A O2 3

|                                    |            | <u>Average</u> |
|------------------------------------|------------|----------------|
| Run Number                         | 4          |                |
| Test Date                          | 5/4/2022   |                |
| Run Start Time                     | 2:10:00 PM |                |
| Run Finish Time                    | 5:00:00 PM |                |
| Carbon Dioxide, %                  | 0          | 0.000          |
| Oxygen, %                          | 17.6685    | 17.669         |
| Dry Volumetric Flow Rate, dry scfm | 0          | 0.000          |
| F-Factor, dscfm/MMBtu @ %O2        | 0          | 0.000          |
| Moisture, %                        | 0          | 0.000          |
| Fuel Type                          |            |                |
| Fw                                 | 0          | 0.000          |
| Fc                                 | 0          | 0.000          |

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## Emissions Summary

|                                      |          |          |                |                  |
|--------------------------------------|----------|----------|----------------|------------------|
| <b>Location: SV051 - Method 10</b>   |          |          |                |                  |
| <b>Compound: Carbon Monoxide</b>     |          |          |                |                  |
|                                      |          |          | <b>Average</b> | <b>Reg Limit</b> |
| Run                                  | 1        | 2        | 3              |                  |
| lb/hr                                | 1.51E+01 | 1.48E+01 | 1.49E+01       | 1.49E+01         |
| ppm                                  | 5.67E+00 | 5.64E+00 | 5.81E+00       | 5.71E+00         |
| <b>Location: SV051 - Method 10 3</b> |          |          |                |                  |
| <b>Compound: Carbon Monoxide</b>     |          |          |                |                  |
|                                      |          |          | <b>Average</b> | <b>Reg Limit</b> |
| Run                                  | 4        |          |                |                  |
| lb/hr                                | 1.61E+01 |          |                | 1.61E+01         |
| ppm                                  | 6.22E+00 |          |                | 6.22E+00         |
| <b>Location: SV051 - Method 26A</b>  |          |          |                |                  |
| <b>Compound: Hydrogen Chloride</b>   |          |          |                |                  |
|                                      |          |          | <b>Average</b> | <b>Reg Limit</b> |
| RunNumber                            | 1        | 2        | 3              |                  |
| Mass_mg                              | 0.0884   | 0.0695   | 0.0824         | 8.01E-02         |
| lb / Long Tons of Pellets Processed  | 1.33E-04 | 1.05E-04 | 1.26E-04       | 1.21E-04         |
| lb/hr                                | 8.30E-02 | 6.58E-02 | 7.81E-02       | 7.56E-02         |
| mg/dscm                              | 3.71E-02 | 2.96E-02 | 3.54E-02       | 3.40E-02         |
| <b>Compound: Hydrogen Fluoride</b>   |          |          |                |                  |
|                                      |          |          | <b>Average</b> | <b>Reg Limit</b> |
| RunNumber                            | 1        | 2        | 3              |                  |
| Mass_mg                              | 0.0326   | 0.0355   | 0.0334         | 3.38E-02         |
| lb / Long Tons of Pellets Processed  | 4.90E-05 | 5.36E-05 | 5.10E-05       | 5.12E-05         |
| lb/hr                                | 3.06E-02 | 3.36E-02 | 3.17E-02       | 3.20E-02         |
| mg/dscm                              | 1.37E-02 | 1.51E-02 | 1.44E-02       | 1.44E-02         |
| <b>Location: SV051 - Method 29</b>   |          |          |                |                  |
| <b>Compound: Antimony</b>            |          |          |                |                  |
|                                      |          |          | <b>Average</b> | <b>Reg Limit</b> |
| RunNumber                            | 1        | 2        | 4              |                  |
| Mass_mg                              | 0.000244 | 0.000104 | 0.000056       | 1.35E-04         |
| lb / Long Tons of Pellets Processed  | 2.72E-07 | 1.15E-07 | 6.08E-08       | 1.49E-07         |
| lb/hr                                | 1.70E-04 | 7.21E-05 | 3.86E-05       | 9.36E-05         |
| mg/dscm                              | 7.43E-05 | 3.21E-05 | 1.74E-05       | 4.13E-05         |
| <b>Compound: Antimony Back Half</b>  |          |          |                |                  |
|                                      |          |          | <b>Average</b> | <b>Reg Limit</b> |
| RunNumber                            | 1        | 2        | 4              |                  |
| Mass_mg                              | 0.000192 | 0.000052 | 0.000004       | 8.27E-05         |
| lb / Long Tons of Pellets Processed  | 2.13E-07 | 5.77E-08 | 4.35E-09       | 9.17E-08         |
| lb/hr                                | 1.33E-04 | 3.61E-05 | 2.76E-06       | 5.73E-05         |
| mg/dscm                              | 5.85E-05 | 1.60E-05 | 1.24E-06       | 2.52E-05         |

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## Compound: Antimony Front Half

|                                     |          |          |          | Average  | Reg Limit |
|-------------------------------------|----------|----------|----------|----------|-----------|
| RunNumber                           | 1        | 2        | 4        |          |           |
| Mass_mg                             | 0.000052 | 0.000052 | 0.000052 | 5.20E-05 |           |
| lb / Long Tons of Pellets Processed | 5.79E-08 | 5.77E-08 | 5.64E-08 | 5.73E-08 |           |
| lb/hr                               | 3.61E-05 | 3.61E-05 | 3.58E-05 | 3.60E-05 |           |
| mg/dscm                             | 1.58E-05 | 1.60E-05 | 1.61E-05 | 1.60E-05 |           |

## Compound: Arsenic

|                                     |          |          |          | Average  | Reg Limit |
|-------------------------------------|----------|----------|----------|----------|-----------|
| RunNumber                           | 1        | 2        | 4        |          |           |
| Mass_mg                             | 0.120721 | 0.12659  | 0.126589 | 1.25E-01 |           |
| lb / Long Tons of Pellets Processed | 1.34E-04 | 1.40E-04 | 1.37E-04 | 1.37E-04 |           |
| lb/hr                               | 8.39E-02 | 8.78E-02 | 8.72E-02 | 8.63E-02 |           |
| mg/dscm                             | 3.68E-02 | 3.90E-02 | 3.93E-02 | 3.84E-02 |           |

## Compound: Arsenic Back Half

|                                     |          |          |          | Average  | Reg Limit |
|-------------------------------------|----------|----------|----------|----------|-----------|
| RunNumber                           | 1        | 2        | 4        |          |           |
| Mass_mg                             | 0.000765 | 0.000634 | 0.000633 | 6.77E-04 |           |
| lb / Long Tons of Pellets Processed | 8.51E-07 | 7.03E-07 | 6.87E-07 | 7.47E-07 |           |
| lb/hr                               | 5.31E-04 | 4.40E-04 | 4.36E-04 | 4.69E-04 |           |
| mg/dscm                             | 2.33E-04 | 1.95E-04 | 1.96E-04 | 2.08E-04 |           |

## Compound: Arsenic Front Half

|                                     |          |          |          | Average  | Reg Limit |
|-------------------------------------|----------|----------|----------|----------|-----------|
| RunNumber                           | 1        | 2        | 4        |          |           |
| Mass_mg                             | 0.12     | 0.126    | 0.126    | 1.24E-01 |           |
| lb / Long Tons of Pellets Processed | 1.34E-04 | 1.40E-04 | 1.37E-04 | 1.37E-04 |           |
| lb/hr                               | 8.34E-02 | 8.74E-02 | 8.68E-02 | 8.59E-02 |           |
| mg/dscm                             | 3.66E-02 | 3.88E-02 | 3.91E-02 | 3.82E-02 |           |

## Compound: Beryllium

|                                     |          |          |          | Average  | Reg Limit |
|-------------------------------------|----------|----------|----------|----------|-----------|
| RunNumber                           | 1        | 2        | 4        |          |           |
| Mass_mg                             | 0.000217 | 0.000231 | 0.000243 | 2.30E-04 |           |
| lb / Long Tons of Pellets Processed | 2.42E-07 | 2.56E-07 | 2.63E-07 | 2.54E-07 |           |
| lb/hr                               | 1.51E-04 | 1.60E-04 | 1.67E-04 | 1.59E-04 |           |
| mg/dscm                             | 6.61E-05 | 7.12E-05 | 7.54E-05 | 7.09E-05 |           |

## Compound: Beryllium Back Half

|                                     |          |          |          | Average  | Reg Limit |
|-------------------------------------|----------|----------|----------|----------|-----------|
| RunNumber                           | 1        | 2        | 4        |          |           |
| Mass_mg                             | 0.000002 | 0.000002 | 0.000002 | 2.00E-06 |           |
| lb / Long Tons of Pellets Processed | 2.23E-09 | 2.22E-09 | 2.17E-09 | 2.21E-09 |           |
| lb/hr                               | 1.39E-06 | 1.39E-06 | 1.38E-06 | 1.39E-06 |           |
| mg/dscm                             | 6.09E-07 | 6.16E-07 | 6.21E-07 | 6.15E-07 |           |

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## Compound: Beryllium Front Half

|                                     |          |          |          | Average  | Reg Limit |
|-------------------------------------|----------|----------|----------|----------|-----------|
| RunNumber                           | 1        | 2        | 4        |          |           |
| Mass_mg                             | 0.000215 | 0.000229 | 0.000241 | 2.28E-04 |           |
| lb / Long Tons of Pellets Processed | 2.39E-07 | 2.54E-07 | 2.61E-07 | 2.51E-07 |           |
| lb/hr                               | 1.49E-04 | 1.59E-04 | 1.66E-04 | 1.58E-04 |           |
| mg/dscm                             | 6.55E-05 | 7.06E-05 | 7.48E-05 | 7.03E-05 |           |

## Compound: Cadmium

|                                     |          |          |          | Average  | Reg Limit |
|-------------------------------------|----------|----------|----------|----------|-----------|
| RunNumber                           | 1        | 2        | 4        |          |           |
| Mass_mg                             | 0.000571 | 0.000396 | 0.000431 | 4.66E-04 |           |
| lb / Long Tons of Pellets Processed | 6.36E-07 | 4.39E-07 | 4.68E-07 | 5.14E-07 |           |
| lb/hr                               | 3.97E-04 | 2.75E-04 | 2.97E-04 | 3.23E-04 |           |
| mg/dscm                             | 1.74E-04 | 1.22E-04 | 1.34E-04 | 1.43E-04 |           |

## Compound: Cadmium Back Half

|                                     |          |          |          | Average  | Reg Limit |
|-------------------------------------|----------|----------|----------|----------|-----------|
| RunNumber                           | 1        | 2        | 4        |          |           |
| Mass_mg                             | 0.000275 | 0.000105 | 0.000093 | 1.58E-04 |           |
| lb / Long Tons of Pellets Processed | 3.06E-07 | 1.16E-07 | 1.01E-07 | 1.74E-07 |           |
| lb/hr                               | 1.91E-04 | 7.28E-05 | 6.41E-05 | 1.09E-04 |           |
| mg/dscm                             | 8.38E-05 | 3.24E-05 | 2.89E-05 | 4.84E-05 |           |

## Compound: Cadmium Front Half

|                                     |          |          |          | Average  | Reg Limit |
|-------------------------------------|----------|----------|----------|----------|-----------|
| RunNumber                           | 1        | 2        | 4        |          |           |
| Mass_mg                             | 0.000296 | 0.000291 | 0.000338 | 3.08E-04 |           |
| lb / Long Tons of Pellets Processed | 3.30E-07 | 3.23E-07 | 3.67E-07 | 3.40E-07 |           |
| lb/hr                               | 2.06E-04 | 2.02E-04 | 2.33E-04 | 2.14E-04 |           |
| mg/dscm                             | 9.02E-05 | 8.97E-05 | 1.05E-04 | 9.50E-05 |           |

## Compound: Chromium

|                                     |          |          |          | Average  | Reg Limit |
|-------------------------------------|----------|----------|----------|----------|-----------|
| RunNumber                           | 1        | 2        | 4        |          |           |
| Mass_mg                             | 0.010997 | 0.013651 | 0.013208 | 1.26E-02 |           |
| lb / Long Tons of Pellets Processed | 1.22E-05 | 1.51E-05 | 1.43E-05 | 1.39E-05 |           |
| lb/hr                               | 7.64E-03 | 9.47E-03 | 9.10E-03 | 8.74E-03 |           |
| mg/dscm                             | 3.35E-03 | 4.21E-03 | 4.10E-03 | 3.89E-03 |           |

## Compound: Chromium Back Half

|                                     |          |          |          | Average  | Reg Limit |
|-------------------------------------|----------|----------|----------|----------|-----------|
| RunNumber                           | 1        | 2        | 4        |          |           |
| Mass_mg                             | 0.00027  | 0.000274 | 0.000681 | 4.08E-04 |           |
| lb / Long Tons of Pellets Processed | 3.01E-07 | 3.04E-07 | 7.39E-07 | 4.48E-07 |           |
| lb/hr                               | 1.88E-04 | 1.90E-04 | 4.69E-04 | 2.82E-04 |           |
| mg/dscm                             | 8.22E-05 | 8.45E-05 | 2.11E-04 | 1.26E-04 |           |

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**Compound:** Chromium Front Half

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.0107   | 0.0134   | 0.0125   | 1.22E-02       |                  |
| lb / Long Tons of Pellets Processed | 1.19E-05 | 1.48E-05 | 1.36E-05 | 1.34E-05       |                  |
| lb/hr                               | 7.43E-03 | 9.29E-03 | 8.61E-03 | 8.44E-03       |                  |
| mg/dscm                             | 3.26E-03 | 4.13E-03 | 3.88E-03 | 3.76E-03       |                  |

**Compound:** Cobalt

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.000811 | 0.000544 | 0.000476 | 6.10E-04       |                  |
| lb / Long Tons of Pellets Processed | 9.02E-07 | 6.02E-07 | 5.17E-07 | 6.74E-07       |                  |
| lb/hr                               | 5.63E-04 | 3.77E-04 | 3.28E-04 | 4.23E-04       |                  |
| mg/dscm                             | 2.47E-04 | 1.68E-04 | 1.48E-04 | 1.88E-04       |                  |

**Compound:** Cobalt Back Half

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.000291 | 0.000069 | 0.000135 | 1.65E-04       |                  |
| lb / Long Tons of Pellets Processed | 3.24E-07 | 7.65E-08 | 1.46E-07 | 1.82E-07       |                  |
| lb/hr                               | 2.02E-04 | 4.79E-05 | 9.30E-05 | 1.14E-04       |                  |
| mg/dscm                             | 8.86E-05 | 2.13E-05 | 4.19E-05 | 5.06E-05       |                  |

**Compound:** Cobalt Front Half

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.00052  | 0.000475 | 0.000341 | 4.45E-04       |                  |
| lb / Long Tons of Pellets Processed | 5.79E-07 | 5.26E-07 | 3.70E-07 | 4.92E-07       |                  |
| lb/hr                               | 3.61E-04 | 3.29E-04 | 2.35E-04 | 3.08E-04       |                  |
| mg/dscm                             | 1.58E-04 | 1.46E-04 | 1.06E-04 | 1.37E-04       |                  |

**Compound:** Filterable Particulate

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 38.97    | 39.25    | 36.32    | 3.82E+01       |                  |
| lb / Long Tons of Pellets Processed | 4.34E-02 | 4.35E-02 | 3.94E-02 | 4.21E-02       |                  |
| lb/hr                               | 2.71E+01 | 2.72E+01 | 2.50E+01 | 2.64E+01       |                  |
| mg/dscm                             | 1.19E+01 | 1.21E+01 | 1.13E+01 | 1.18E+01       |                  |

**Compound:** Lead

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.051533 | 0.048723 | 0.059293 | 5.32E-02       |                  |
| lb / Long Tons of Pellets Processed | 5.74E-05 | 5.40E-05 | 6.43E-05 | 5.86E-05       |                  |
| lb/hr                               | 3.58E-02 | 3.38E-02 | 4.08E-02 | 3.68E-02       |                  |
| mg/dscm                             | 1.57E-02 | 1.50E-02 | 1.84E-02 | 1.64E-02       |                  |

**US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report**

**Compound:** Lead Back Half

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.00742  | 0.00396  | 0.00588  | 5.75E-03       |                  |
| lb / Long Tons of Pellets Processed | 8.25E-06 | 4.39E-06 | 6.38E-06 | 6.34E-06       |                  |
| lb/hr                               | 5.15E-03 | 2.75E-03 | 4.05E-03 | 3.98E-03       |                  |
| mg/dscm                             | 2.26E-03 | 1.22E-03 | 1.82E-03 | 1.77E-03       |                  |

**Compound:** Lead Front Half

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.0441   | 0.0448   | 0.0534   | 4.74E-02       |                  |
| lb / Long Tons of Pellets Processed | 4.90E-05 | 4.97E-05 | 5.80E-05 | 5.22E-05       |                  |
| lb/hr                               | 3.06E-02 | 3.11E-02 | 3.68E-02 | 3.28E-02       |                  |
| mg/dscm                             | 1.34E-02 | 1.38E-02 | 1.66E-02 | 1.46E-02       |                  |

**Compound:** Manganese

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.054486 | 0.057354 | 0.057376 | 5.64E-02       |                  |
| lb / Long Tons of Pellets Processed | 6.07E-05 | 6.36E-05 | 6.22E-05 | 6.22E-05       |                  |
| lb/hr                               | 3.79E-02 | 3.98E-02 | 3.95E-02 | 3.91E-02       |                  |
| mg/dscm                             | 1.66E-02 | 1.77E-02 | 1.78E-02 | 1.74E-02       |                  |

**Compound:** Manganese Back Half

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.00207  | 0.00084  | 0.00526  | 2.72E-03       |                  |
| lb / Long Tons of Pellets Processed | 2.31E-06 | 9.31E-07 | 5.70E-06 | 2.98E-06       |                  |
| lb/hr                               | 1.44E-03 | 5.83E-04 | 3.62E-03 | 1.88E-03       |                  |
| mg/dscm                             | 6.31E-04 | 2.59E-04 | 1.63E-03 | 8.40E-04       |                  |

**Compound:** Manganese Front Half

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.0524   | 0.0565   | 0.0521   | 5.37E-02       |                  |
| lb / Long Tons of Pellets Processed | 5.83E-05 | 6.26E-05 | 5.65E-05 | 5.91E-05       |                  |
| lb/hr                               | 3.64E-02 | 3.92E-02 | 3.59E-02 | 3.72E-02       |                  |
| mg/dscm                             | 1.60E-02 | 1.74E-02 | 1.62E-02 | 1.65E-02       |                  |

**Compound:** Mercury

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.021564 | 0.022902 | 0.023328 | 2.26E-02       |                  |
| lb / Long Tons of Pellets Processed | 2.40E-05 | 2.54E-05 | 2.54E-05 | 2.49E-05       |                  |
| lb/hr                               | 1.50E-02 | 1.59E-02 | 1.61E-02 | 1.57E-02       |                  |
| mg/dscm                             | 6.57E-03 | 7.06E-03 | 7.24E-03 | 6.96E-03       |                  |

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**Compound:** Mercury Back Half

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.02153  | 0.02286  | 0.0232   | 2.25E-02       |                  |
| lb / Long Tons of Pellets Processed | 2.40E-05 | 2.54E-05 | 2.52E-05 | 2.49E-05       |                  |
| lb/hr                               | 1.50E-02 | 1.59E-02 | 1.60E-02 | 1.56E-02       |                  |
| mg/dscm                             | 6.56E-03 | 7.05E-03 | 7.20E-03 | 6.94E-03       |                  |

**Compound:** Mercury Front Half

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.000031 | 0.000039 | 0.000081 | 5.03E-05       |                  |
| lb / Long Tons of Pellets Processed | 3.45E-08 | 4.31E-08 | 8.79E-08 | 5.52E-08       |                  |
| lb/hr                               | 2.15E-05 | 2.70E-05 | 5.58E-05 | 3.48E-05       |                  |
| mg/dscm                             | 9.44E-06 | 1.20E-05 | 2.51E-05 | 1.55E-05       |                  |

**Compound:** Nickel

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.003216 | 0.003333 | 0.003729 | 3.43E-03       |                  |
| lb / Long Tons of Pellets Processed | 3.57E-06 | 3.69E-06 | 4.05E-06 | 3.77E-06       |                  |
| lb/hr                               | 2.23E-03 | 2.31E-03 | 2.57E-03 | 2.37E-03       |                  |
| mg/dscm                             | 9.80E-04 | 1.03E-03 | 1.16E-03 | 1.06E-03       |                  |

**Compound:** Nickel Back Half

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.000603 | 0.000585 | 0.00104  | 7.43E-04       |                  |
| lb / Long Tons of Pellets Processed | 6.71E-07 | 6.49E-07 | 1.13E-06 | 8.17E-07       |                  |
| lb/hr                               | 4.19E-04 | 4.06E-04 | 7.16E-04 | 5.14E-04       |                  |
| mg/dscm                             | 1.84E-04 | 1.80E-04 | 3.23E-04 | 2.29E-04       |                  |

**Compound:** Nickel Front Half

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.00261  | 0.00275  | 0.00269  | 2.68E-03       |                  |
| lb / Long Tons of Pellets Processed | 2.90E-06 | 3.05E-06 | 2.91E-06 | 2.95E-06       |                  |
| lb/hr                               | 1.81E-03 | 1.91E-03 | 1.85E-03 | 1.86E-03       |                  |
| mg/dscm                             | 7.95E-04 | 8.48E-04 | 8.35E-04 | 8.26E-04       |                  |

**Compound:** Phosphorus (yellow or white)

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.02238  | 0.02588  | 0.022154 | 2.35E-02       |                  |
| lb / Long Tons of Pellets Processed | 2.48E-05 | 2.86E-05 | 2.41E-05 | 2.58E-05       |                  |
| lb/hr                               | 1.55E-02 | 1.79E-02 | 1.53E-02 | 1.62E-02       |                  |
| mg/dscm                             | 6.82E-03 | 7.98E-03 | 6.87E-03 | 7.22E-03       |                  |

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**Compound:** Phosphorus (yellow or white) Back

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.0031   | 0.00535  | 0.000274 | 2.91E-03       |                  |
| lb / Long Tons of Pellets Processed | 3.45E-06 | 5.93E-06 | 2.98E-07 | 3.23E-06       |                  |
| lb/hr                               | 2.15E-03 | 3.71E-03 | 1.89E-04 | 2.02E-03       |                  |
| mg/dscm                             | 9.44E-04 | 1.65E-03 | 8.50E-05 | 8.93E-04       |                  |

**Compound:** Phosphorus (yellow or white) Front

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.0193   | 0.0205   | 0.0219   | 2.06E-02       |                  |
| lb / Long Tons of Pellets Processed | 2.15E-05 | 2.27E-05 | 2.38E-05 | 2.27E-05       |                  |
| lb/hr                               | 1.34E-02 | 1.42E-02 | 1.51E-02 | 1.42E-02       |                  |
| mg/dscm                             | 5.88E-03 | 6.32E-03 | 6.80E-03 | 6.33E-03       |                  |

**Compound:** Selenium

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.01944  | 0.02246  | 0.01968  | 2.05E-02       |                  |
| lb / Long Tons of Pellets Processed | 2.16E-05 | 2.49E-05 | 2.14E-05 | 2.26E-05       |                  |
| lb/hr                               | 1.35E-02 | 1.56E-02 | 1.36E-02 | 1.42E-02       |                  |
| mg/dscm                             | 5.92E-03 | 6.92E-03 | 6.11E-03 | 6.32E-03       |                  |

**Compound:** Selenium Back Half

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.00614  | 0.00631  | 0.00528  | 5.91E-03       |                  |
| lb / Long Tons of Pellets Processed | 6.84E-06 | 7.00E-06 | 5.73E-06 | 6.52E-06       |                  |
| lb/hr                               | 4.27E-03 | 4.38E-03 | 3.64E-03 | 4.10E-03       |                  |
| mg/dscm                             | 1.87E-03 | 1.94E-03 | 1.64E-03 | 1.82E-03       |                  |

**Compound:** Selenium Front Half

|                                     |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|-------------------------------------|----------|----------|----------|----------------|------------------|
| RunNumber                           | 1        | 2        | 4        |                |                  |
| Mass_mg                             | 0.0133   | 0.0162   | 0.0144   | 1.46E-02       |                  |
| lb / Long Tons of Pellets Processed | 1.48E-05 | 1.79E-05 | 1.56E-05 | 1.61E-05       |                  |
| lb/hr                               | 9.24E-03 | 1.12E-02 | 9.92E-03 | 1.01E-02       |                  |
| mg/dscm                             | 4.05E-03 | 4.99E-03 | 4.47E-03 | 4.50E-03       |                  |

**Location:** SV051 - Method 3A CO2

**Compound:** Carbon Dioxide

|            |          |          |          | <b>Average</b> | <b>Reg Limit</b> |
|------------|----------|----------|----------|----------------|------------------|
| Run        | 1        | 2        | 3        |                |                  |
| Percent(%) | 1.48E+00 | 1.51E+00 | 1.43E+00 | 1.47E+00       |                  |

**Location:** SV051 - Method 3A CO2 3

**Compound:** Carbon Dioxide

|  |  |  |  | <b>Average</b> | <b>Reg Limit</b> |
|--|--|--|--|----------------|------------------|
|--|--|--|--|----------------|------------------|



# US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

|   |          |          |          |                          |
|---|----------|----------|----------|--------------------------|
| Run                                     | 4        |          |          |                          |
| Percent(%)                              | 1.50E+00 |          |          | 1.50E+00                 |
| <b>Location: SV051 - Method 3A O2</b>   |          |          |          |                          |
| <b>Compound: Oxygen</b>                 |          |          |          |                          |
|   |          |          |          | <b>Average Reg Limit</b> |
| Run                                     | 1        | 2        | 3        |                          |
| Percent(%)                              | 1.78E+01 | 1.78E+01 | 1.78E+01 | 1.78E+01                 |
| <b>Location: SV051 - Method 3A O2 3</b> |          |          |          |                          |
| <b>Compound: Oxygen</b>                 |          |          |          |                          |
|   |          |          |          | <b>Average Reg Limit</b> |
| Run                                     | 4        |          |          |                          |
| Percent(%)                              | 1.77E+01 |          |          | 1.77E+01                 |

## US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

### Process Run Data

| Process: | Pellets Processed   |                 |            |             | SCC:    | 30302351 |
|----------|---|-----------------|------------|-------------|---------|----------|
| Comment: |   |                 |            |             |         |          |
| Run      | Value   | Unit of Measure | Target Low | Target High | Comment |          |
| 1        | 624   | Long Tons/hr    | 580        | 650         | M26A    |          |
| 2        | 627   | Long Tons/hr    | 580        | 650         | M26A    |          |
| 3        | 621   | Long Tons/hr    | 580        | 650         | M26A    |          |
| 4        | 624   | Long Tons/hr    | 580        | 650         | M29     |          |
| 5        | 626   | Long Tons/hr    | 580        | 650         | M29     |          |
| 6        | 635   | Long Tons/hr    | 580        | 650         | M29     |          |
| Process: | Natural Gas Burned  |                 |            |             | SCC:    |          |
| Comment: | Values will be provided in the report.  |                 |            |             |         |          |
| Run      | Value   | Unit of Measure | Target Low | Target High | Comment |          |
| 1        | 284   | Million Btus/hr | 0          | 0           | M26A    |          |
| 2        | 284   | Million Btus/hr | 0          | 0           | M26A    |          |
| 3        | 266   | Million Btus/hr | 0          | 0           | M26A    |          |
| 4        | 284   | Million Btus/hr | 0          | 0           | M29     |          |
| 5        | 283   | Million Btus/hr | 0          | 0           | M29     |          |
| 6        | 270   | Million Btus/hr | 0          | 0           | M29     |          |
| Process: | Flux Added  |                 |            |             | SCC:    |          |
| Comment: | Pounds of flux (limestone) per long ton pellets. Values will be provided in the report.   |                 |            |             |         |          |
| Run      | Value   | Unit of Measure | Target Low | Target High | Comment |          |
| 1        | 32  | Pounds/hr       | 0          | 0           | M26A    |          |
| 2        | 34  | Pounds/hr       | 0          | 0           | M26A    |          |
| 3        | 34  | Pounds/hr       | 0          | 0           | M26A    |          |
| 4        | 32  | Pounds/hr       | 0          | 0           | M29     |          |
| 5        | 34  | Pounds/hr       | 0          | 0           | M29     |          |
| 6        | 30  | Pounds/hr       | 0          | 0           | M29     |          |
| Process: | Binder Added  |                 |            |             | SCC:    |          |
| Comment: | Pounds of binder (bentonite) per long ton pellets. Values will be provided in the report. |                 |            |             |         |          |
| Run      | Value   | Unit of Measure | Target Low | Target High | Comment |          |
| 1        | 18.9  | Pounds/hr       | 0          | 0           | M26A    |          |
| 2        | 19.1  | Pounds/hr       | 0          | 0           | M26A    |          |
| 3        | 18.4  | Pounds/hr       | 0          | 0           | M26A    |          |
| 4        | 18.9  | Pounds/hr       | 0          | 0           | M29     |          |
| 5        | 19.1  | Pounds/hr       | 0          | 0           | M29     |          |
| 6        | 18.1  | Pounds/hr       | 0          | 0           | M29     |          |

### APCD Run Data

| APCD:    | SCRUBBER      |                 |              |                    |
|----------|---------------|-----------------|--------------|--------------------|
| Comment: | Hydrated Lime |                 |              |                    |
| Run      | Value         | Unit of Measure | Target Value | Comment            |
| 1        | 1.72          | gpm             | 0            | M26A HYDRATED LIME |
| 1        | 2171          | gpm             | 2099         | M26A CE111         |

## US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

|   |      |        |      |                    |
|---|------|--------|------|--------------------|
| 1 | 2143 | gpm    | 2097 | M26A CE110         |
| 1 | 12.4 | in H2O | 8.82 | M26A CE111 UPPER   |
| 1 | 13   | in H2O | 8.82 | M26A CE110 UPPER   |
| 1 | 12.2 | in H2O | 9.7  | M26A CE110 LOWER   |
| 1 | 12.2 | in H2O | 9.7  | M26A CE111 LOWER   |
| 2 | 2171 | gpm    | 2099 | M26A CE111         |
| 2 | 12.1 | in H2O | 9.7  | M26A CE110 LOWER   |
| 2 | 1.65 | gpm    | 0    | M26A HYDRATED LIME |
| 2 | 2143 | gpm    | 2097 | M26A CE110         |
| 2 | 12.8 | in H2O | 8.82 | M26A CE110 UPPER   |
| 2 | 12   | in H2O | 9.7  | M26A CE111 LOWER   |
| 2 | 12.2 | in H2O | 8.82 | M26A CE111 UPPER   |
| 3 | 2200 | gpm    | 2099 | M26A CE111         |
| 3 | 2171 | gpm    | 2097 | M26A CE110         |
| 3 | 12.2 | in H2O | 8.82 | M26A CE111 UPPER   |
| 3 | 12.8 | in H2O | 8.82 | M26A CE110 UPPER   |
| 3 | 11.9 | in H2O | 9.7  | M26A CE111 LOWER   |
| 3 | 12   | in H2O | 9.7  | M26A CE110 LOWER   |
| 3 | 0.95 | gpm    | 0    | M26A HYDRATED LIME |
| 4 | 1.72 | gpm    | 0    | M29 HYDRATED LIME  |
| 4 | 12.2 | in H2O | 9.7  | M29 CE111 LOWER    |
| 4 | 2142 | gpm    | 2097 | M29 CE110          |
| 4 | 13   | in H2O | 8.82 | M29 CE110 UPPER    |
| 4 | 12.2 | in H2O | 9.7  | M29 CE110 LOWER    |
| 4 | 2167 | gpm    | 2099 | M29 CE111          |
| 4 | 12.4 | in H2O | 8.82 | M29 CE111 UPPER    |
| 5 | 2168 | gpm    | 2099 | M29 CE111          |
| 5 | 12.1 | in H2O | 9.7  | M29 CE110 LOWER    |
| 5 | 2162 | gpm    | 2097 | M29 CE110          |
| 5 | 1.66 | gpm    | 0    | M29 HYDRATED LIME  |
| 5 | 12   | in H2O | 9.7  | M29 CE111 LOWER    |
| 5 | 12.8 | in H2O | 8.82 | M29 CE110 UPPER    |
| 5 | 12.2 | in H2O | 8.82 | M29 CE111 UPPER    |
| 6 | 12.1 | in H2O | 9.7  | M29 CE110 LOWER    |
| 6 | 12.1 | in H2O | 9.7  | M29 CE111 LOWER    |
| 6 | 2200 | gpm    | 2099 | M29 CE111          |
| 6 | 2172 | gpm    | 2097 | M29 CE110          |
| 6 | 1.15 | gpm    | 0    | M29 HYDRATED LIME  |
| 6 | 12.8 | in H2O | 8.82 | M29 CE110 UPPER    |
| 6 | 12.3 | in H2O | 8.82 | M29 CE111 UPPER    |

**Process Lab Run Data**

# US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

## Sampling / Stack Data Results Detail

| Location SV051 - Method 1 - 4                   |             | Average     |
|---|-------------|-------------|
| Run Number                                      | 3           |             |
| Test Date                                       | 5/4/2022    |             |
| Run Start Time                                  | 9:00:00 AM  |             |
| Run Finish Time                                 | 11:45:00 AM |             |
| Net Traversing Points                           | 24          |             |
| Net Run Time, minutes                           | 156         |             |
| Nozzle Diameter, inches                         | 0.252       | 0.252       |
| Pitot Tube Coefficient                          | 0.84        | 0.840       |
| Dry Gas Meter Calibration Factor                | 0.981       | 0.981       |
| Barometric Pressure, inches of Mercury          | 28.75       | 28.750      |
| Average Orifice Meter Differential, inches H2O  | 1.87        | 1.870       |
| Dry Gas Meter Volume Sampled, cubic feet        | 117.320     | 117.320     |
| Average Dry Gas Meter Temperature, °F           | 61.83       | 61.830      |
| Dry Gas Meter Volume Sampled, dscf              | 112.434     | 112.434     |
| Total Moisture Liquid collected, g              | 443.3       | 443.300     |
| Volume of Water Vapor, standard cubic feet      | 20.904      | 20.904      |
| Moisture Content of Stack Gas, %                | 15.6775     | 15.678      |
| Moisture Saturation at Stack Gas Temperature, % | 14.77       | 14.770      |
| Dry Mole Fraction                               | 0.8523      | 0.852       |
| Carbon Dioxide, %                               | 1.4335      | 1.434       |
| Oxygen, %                                       | 17.7886     | 17.789      |
| Carbon Monoxide & Nitrogen, %                   | 80.7779     | 80.778      |
| Fuel Factor                                     | 2.17        |             |
| Dry Molecular Weight, lb/lb-Mole                | 28.9409     | 28.941      |
| Wet Molecular weight, lb/lb-Mole                | 27.3271     | 27.327      |
| Flue Gas Static Pressure, inches of H2O         | -0.57       | -0.570      |
| Absolute Flue Gas Pressure, inches of Mercury   | 28.71       | 28.710      |
| Average Stack Gas Temperature, °F               | 127.63      | 127.630     |
| Square Root of Average Velocity, inches of H2O  | 0.7612      | 0.761       |
| Average Stack Gas Velocity, feet/second         | 47.29       | 47.290      |
| Stack Cross-Sectional Area, square feet         | 282.29      | 282.290     |
| Dry Volumetric Flow Rate, dry scfm              | 588,548.9   | 588,548.900 |
| Actual Wet Volumetric Flue Gas Flow Rate, acfm  | 800,969.6   | 800,969.600 |
| Percent Isokinetic of Sampling Rate, %          | 99.8        | 99.800      |
| Percent Excess Air, %                           | 503.0       | 503.000     |
| F-Factor, dscfm/MMBtu @ %O2                     | 0           | 0.000       |
| Round Duct Diameter, inches                     | 227.5       |             |
| Rectangular Duct Width, inches                  |             |             |

## US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

|                                 |   |       |
|---------------------------------|---|-------|
| Rectangular Duct Length, inches |   |       |
| Fw                              | 0 | 0.000 |
| Fc                              | 0 | 0.000 |

# US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

| Location SV051 - Method 10                         |                       |                       |                       |                       |
|--|-----------------------|-----------------------|-----------------------|-----------------------|
|  |                       |                       |                       | Average               |
| Run Number   | 1                     | 2                     | 3                     |                       |
| Test Date  | 5/3/2022              | 5/3/2022              | 5/4/2022              |                       |
| Run Start Time                                     | 9:22:00 AM            | 12:55:00 PM           | 9:00:00 AM            |                       |
| Run Finish Time                                    | 12:13:00 PM           | 3:41:00 PM            | 11:45:00 AM           |                       |
| Carbon Dioxide, %                                  | 1.4872                | 1.5066                | 1.4335                | 1.476                 |
| Oxygen, %  | 17.8493               | 17.7895               | 17.7886               | 17.809                |
| Fuel Factor  | 0                     | 0                     | 0                     |                       |
| Dry Volumetric Flow Rate, dry scfm                 | 608977.2              | 600825.1              | 588548.9              | 599,450.400           |
| F-Factor, dscfm/MMBtu @ %O2                        | 0                     | 0                     | 0                     | 0.000                 |
| Moisture, %  | 14.5535               | 15.2748               | 15.6775               | 15.169                |
| Analyzer Make                                      | Thermo                | Thermo                | Thermo                |                       |
| Analyzer Model                                     | CO-5, 48i             | CO-5, 48i             | CO-5, 48i             |                       |
| Analyzer Serial Number                             | 1151040014            | 1151040014            | 1151040014            | 1,151,040,0<br>14.000 |
| Operating Range                                    | 45.1                  | 45.1                  | 45.1                  | 45.100                |
| Operating Units                                    | ppm                   | ppm                   | ppm                   |                       |
| No. Readings/Avg.                                  | 156                   | 156                   | 156                   | 156.000               |
| Calibration Set                                    | 3                     | 3                     | 3                     | 3.000                 |
| Calibration Pre Zero Cylinder ID                   | EB0098963 -<br>ZERO   | EB0098963 -<br>ZERO   | EB0098963 -<br>ZERO   |                       |
| Calibration Pre Zero Cylinder Instrument Response  | 0                     | 0.1                   | 0                     | 0.033                 |
| Calibration Pre Zero Cylinder Bias                 | 0                     | 0.22                  | 0                     | 0.073                 |
| Calibration Pre Zero Cylinder Drift                | 0                     | 0                     | 0                     | 0.000                 |
| Calibration Pre High Cylinder ID                   | EB0098653 - CO<br>MID | EB0098653 - CO<br>MID | EB0098653 - CO<br>MID |                       |
| Calibration Pre High Cylinder Instrument Response  | 23                    | 23.1                  | 23                    | 23.033                |
| Calibration Pre High Cylinder Bias                 | -0.22                 | 0                     | -0.22                 | -0.147                |
| Calibration Pre High Cylinder Drift                | 0                     | 0                     | 0                     | 0.000                 |
| Calibration Post Zero Cylinder ID                  | EB0098963 -<br>ZERO   | EB0098963 -<br>ZERO   | EB0098963 -<br>ZERO   |                       |
| Calibration Post Zero Cylinder Instrument Response | 0.1                   | 0.1                   | 0.1                   | 0.100                 |
| Calibration Post Zero Cylinder Bias                | 0.22                  | 0.22                  | 0.22                  | 0.220                 |
| Calibration Post Zero Cylinder Drift               | 0.22                  | 0                     | 0.22                  | 0.147                 |
| Calibration Post High Cylinder ID                  | EB0098653 - CO<br>MID | EB0098653 - CO<br>MID | EB0098653 - CO<br>MID |                       |
| Calibration Post High Cylinder Instrument Response | 23.1                  | 23.1                  | 23.1                  | 23.100                |
| Calibration Post High Cylinder Bias                | 0                     | 0                     | 0                     | 0.000                 |
| Calibration Post High Cylinder Drift               | 0.22                  | 0                     | 0.22                  | 0.147                 |
| Cavg   | 5.6                   | 5.62                  | 5.74                  | 5.653                 |
| Cavg Units   | ppmvd                 | ppmvd                 | ppmvd                 |                       |
| Cgas   | 5.6707                | 5.64                  | 5.8137                | 5.708                 |

## US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

| Cgas Units  | ppmvd | ppmvd | ppmvd |       |
|-------------|-------|-------|-------|-------|
| Fuel Type   |       |       |       |       |
| Fw          | 0     | 0     | 0     | 0.000 |
| Fc          | 0     | 0     | 0     | 0.000 |
| Cgasw       | 0     | 0     | 0     | 0.000 |
| Cgasw Units |       |       |       |       |

# US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

| Location SV051 - Method 10 3                       |                       | Average               |
|--|-----------------------|-----------------------|
| Run Number   | 4                     |                       |
| Test Date  | 5/4/2022              |                       |
| Run Start Time                                     | 2:10:00 PM            |                       |
| Run Finish Time                                    | 5:00:00 PM            |                       |
| Carbon Dioxide, %                                  | 1.4969                | 1.497                 |
| Oxygen, %  | 17.6685               | 17.669                |
| Fuel Factor  | 0                     |                       |
| Dry Volumetric Flow Rate, dry scfm                 | 594524.4              | 594,524.400           |
| F-Factor, dscfm/MMBtu @ %O2                        | 0                     | 0.000                 |
| Moisture, %  | 14.7813               | 14.781                |
| Analyzer Make                                      | Thermo                |                       |
| Analyzer Model                                     | CO-5, 48i             |                       |
| Analyzer Serial Number                             | 1151040014            | 1,151,040.0<br>14.000 |
| Operating Range                                    | 45.1                  | 45.100                |
| Operating Units                                    | ppm                   |                       |
| No. Readings/Avg.                                  | 156                   | 156.000               |
| Calibration Set                                    | 3                     | 3.000                 |
| Calibration Pre Zero Cylinder ID                   | EB0098963 -<br>ZERO   |                       |
| Calibration Pre Zero Cylinder Instrument Response  | 0.1                   | 0.100                 |
| Calibration Pre Zero Cylinder Bias                 | 0.22                  | 0.220                 |
| Calibration Pre Zero Cylinder Drift                | 0                     | 0.000                 |
| Calibration Pre High Cylinder ID                   | EB0098653 - CO<br>MID |                       |
| Calibration Pre High Cylinder Instrument Response  | 23.1                  | 23.100                |
| Calibration Pre High Cylinder Bias                 | 0                     | 0.000                 |
| Calibration Pre High Cylinder Drift                | 0                     | 0.000                 |
| Calibration Post Zero Cylinder ID                  | EB0098963 -<br>ZERO   |                       |
| Calibration Post Zero Cylinder Instrument Response | 0.1                   | 0.100                 |
| Calibration Post Zero Cylinder Bias                | 0.22                  | 0.220                 |
| Calibration Post Zero Cylinder Drift               | 0                     | 0.000                 |
| Calibration Post High Cylinder ID                  | EB0098653 - CO<br>MID |                       |
| Calibration Post High Cylinder Instrument Response | 23.1                  | 23.100                |
| Calibration Post High Cylinder Bias                | 0                     | 0.000                 |
| Calibration Post High Cylinder Drift               | 0                     | 0.000                 |
| Cavg   | 6.19                  | 6.190                 |
| Cavg Units   | ppmvd                 |                       |
| Cgas   | 6.2224                | 6.222                 |



## US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

|             |       |       |
|-------------|-------|-------|
| Cgas Units  | ppmvd |       |
| Fuel Type   |       |       |
| Fw          | 0     | 0.000 |
| Fc          | 0     | 0.000 |
| Cgasw       | 0     | 0.000 |
| Cgasw Units |       |       |

# US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

Location SV051 - Method 26A

|   |             |             |             | Average     |
|---|-------------|-------------|-------------|-------------|
| Run Number                                      | 1           | 2           | 3           |             |
| Test Date                                       | 5/3/2022    | 5/3/2022    | 5/4/2022    |             |
| Run Start Time                                  | 9:22:00 AM  | 12:55:00 PM | 9:00:00 AM  |             |
| Run Finish Time                                 | 11:34:00 AM | 3:04:00 PM  | 11:10:00 AM |             |
| Net Traversing Points                           | 24          | 24          | 24          |             |
| Net Run Time, minutes                           | 120         | 120         | 120         |             |
| Nozzle Diameter, inches                         | 0.245       | 0.245       | 0.245       | 0.245       |
| Pitot Tube Coefficient                          | 0.84        | 0.84        | 0.84        | 0.840       |
| Dry Gas Meter Calibration Factor                | 0.982       | 0.982       | 0.982       | 0.982       |
| Barometric Pressure, inches of Mercury          | 28.6        | 28.6        | 28.75       | 28.650      |
| Average Orifice Meter Differential, inches H2O  | 1.85        | 1.86        | 1.79        | 1.833       |
| Dry Gas Meter Volume Sampled, cubic feet        | 87.220      | 87.630      | 85.200      | 86.683      |
| Average Dry Gas Meter Temperature, °F           | 56.46       | 66.73       | 59.31       | 60.833      |
| Dry Gas Meter Volume Sampled, dscf              | 84.100      | 82.849      | 82.115      | 83.021      |
| Total Moisture Liquid collected, g              | 322.5       | 323.4       | 317.7       | 321.200     |
| Volume of Water Vapor, standard cubic feet      | 15.208      | 15.250      | 14.981      | 15.146      |
| Moisture Content of Stack Gas, %                | 15.3140     | 15.5455     | 15.4291     | 15.430      |
| Moisture Saturation at Stack Gas Temperature, % | 15.73       | 16.05       | 15.65       | 15.810      |
| Dry Mole Fraction                               | 0.8469      | 0.8445      | 0.8457      | 0.846       |
| Carbon Dioxide, %                               | 1.4872      | 1.5066      | 1.4335      | 1.476       |
| Oxygen, %                                       | 17.8493     | 17.7895     | 17.7886     | 17.809      |
| Carbon Monoxide & Nitrogen, %                   | 80.6635     | 80.7039     | 80.7779     | 80.715      |
| Fuel Factor                                     | 2.05        | 2.06        | 2.17        |             |
| Dry Molecular Weight, lb/lb-Mole                | 28.9519     | 28.9526     | 28.9409     | 28.948      |
| Wet Molecular weight, lb/lb-Mole                | 27.2782     | 27.2510     | 27.2549     | 27.261      |
| Flue Gas Static Pressure, inches of H2O         | -0.57       | -0.57       | -0.57       | -0.570      |
| Absolute Flue Gas Pressure, inches of Mercury   | 28.56       | 28.56       | 28.71       | 28.610      |
| Average Stack Gas Temperature, °F               | 129.79      | 130.54      | 129.79      | 130.040     |
| Square Root of Average Velocity, inches of H2O  | 0.7796      | 0.7770      | 0.7675      | 0.775       |
| Average Stack Gas Velocity, feet/second         | 48.70       | 48.59       | 47.84       | 48.377      |
| Stack Cross-Sectional Area, square feet         | 282.29      | 282.29      | 282.29      | 282.290     |
| Dry Volumetric Flow Rate, dry scfm              | 596,915.0   | 593,124.3   | 588,618.5   | 592,885.933 |
| Actual Wet Volumetric Flue Gas Flow Rate, acfm  | 824,851.4   | 822,988.3   | 810,285.2   | 819,374.967 |
| Percent Isokinetic of Sampling Rate, %          | 101.2       | 100.4       | 100.2       | 100.600     |
| Percent Excess Air, %                           | 518.0       | 505.9       | 503.0       | 508.967     |
| F-Factor, dscfm/MMBtu @ %O2                     | 0           | 0           | 0           | 0.000       |
| Round Duct Diameter, inches                     | 227.5       | 227.5       | 227.5       |             |
| Rectangular Duct Width, inches                  |             |             |             |             |
| Rectangular Duct Length, inches                 |             |             |             |             |

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|    |   |   |   |       |
|----|---|---|---|-------|
| Fw | 0 | 0 | 0 | 0.000 |
| Fc | 0 | 0 | 0 | 0.000 |

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# US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

**Location** SV051 - Method 29

|   |             |             |            | Average     |
|---|-------------|-------------|------------|-------------|
| Run Number                                      | 1           | 2           | 4          |             |
| Test Date                                       | 5/3/2022    | 5/3/2022    | 5/4/2022   |             |
| Run Start Time                                  | 9:22:00 AM  | 12:55:00 PM | 2:10:00 PM |             |
| Run Finish Time                                 | 12:13:00 PM | 3:41:00 PM  | 5:00:00 PM |             |
| Net Traversing Points                           | 24          | 24          | 24         |             |
| Net Run Time, minutes                           | 156         | 156         | 156        |             |
| Nozzle Diameter, inches                         | 0.252       | 0.252       | 0.252      | 0.252       |
| Pitot Tube Coefficient                          | 0.84        | 0.84        | 0.84       | 0.840       |
| Dry Gas Meter Calibration Factor                | 0.981       | 0.981       | 0.981      | 0.981       |
| Barometric Pressure, inches of Mercury          | 28.6        | 28.6        | 28.75      | 28.650      |
| Average Orifice Meter Differential, inches H2O  | 1.99        | 1.97        | 1.94       | 1.967       |
| Dry Gas Meter Volume Sampled, cubic feet        | 121.070     | 121.430     | 119.990    | 120.830     |
| Average Dry Gas Meter Temperature, °F           | 59.63       | 67.33       | 67.25      | 64.737      |
| Dry Gas Meter Volume Sampled, dscf              | 115.950     | 114.590     | 113.830    | 114.790     |
| Total Moisture Liquid collected, g              | 418.8       | 438.1       | 440.3      | 432.400     |
| Volume of Water Vapor, standard cubic feet      | 19.749      | 20.659      | 20.763     | 20.390      |
| Moisture Content of Stack Gas, %                | 14.5535     | 15.2748     | 15.4265    | 15.085      |
| Moisture Saturation at Stack Gas Temperature, % | 14.65       | 14.83       | 15.08      | 14.853      |
| Dry Mole Fraction                               | 0.8545      | 0.8517      | 0.8492     | 0.852       |
| Carbon Dioxide, %                               | 1.4872      | 1.5066      | 1.4969     | 1.497       |
| Oxygen, %                                       | 17.8493     | 17.7895     | 17.6685    | 17.769      |
| Carbon Monoxide & Nitrogen, %                   | 80.6635     | 80.7039     | 80.8346    | 80.734      |
| Fuel Factor                                     | 2.05        | 2.06        | 2.16       |             |
| Dry Molecular Weight, lb/lb-Mole                | 28.9519     | 28.9526     | 28.9462    | 28.950      |
| Wet Molecular weight, lb/lb-Mole                | 27.3612     | 27.3306     | 27.2978    | 27.330      |
| Flue Gas Static Pressure, inches of H2O         | -0.57       | -0.57       | -0.57      | -0.570      |
| Absolute Flue Gas Pressure, inches of Mercury   | 28.56       | 28.56       | 28.71      | 28.610      |
| Average Stack Gas Temperature, °F               | 127.13      | 127.58      | 128.42     | 127.710     |
| Square Root of Average Velocity, inches of H2O  | 0.7877      | 0.7796      | 0.7696     | 0.779       |
| Average Stack Gas Velocity, feet/second         | 49.02       | 48.56       | 47.87      | 48.483      |
| Stack Cross-Sectional Area, square feet         | 282.29      | 282.29      | 282.29     | 282.290     |
| Dry Volumetric Flow Rate, dry scfm              | 608,977.2   | 600,825.1   | 592,803.0  | 600,868.433 |
| Actual Wet Volumetric Flue Gas Flow Rate, acfm  | 830,271.3   | 822,480.1   | 810,793.3  | 821,181.567 |
| Percent Isokinetic of Sampling Rate, %          | 99.5        | 99.6        | 100.3      | 99.800      |
| Percent Excess Air, %                           | 518.0       | 505.9       | 481.2      | 501.700     |
| F-Factor, dscfm/MMBtu @ %O2                     | 0           | 0           | 0          | 0.000       |
| Round Duct Diameter, inches                     | 227.5       | 227.5       | 227.5      |             |
| Rectangular Duct Width, inches                  |             |             |            |             |
| Rectangular Duct Length, inches                 |             |             |            |             |

**US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report**

|    |   |   |   |       |
|----|---|---|---|-------|
| Fw | 0 | 0 | 0 | 0.000 |
| Fc | 0 | 0 | 0 | 0.000 |

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# US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

| Location SV051 - Method 3A CO2                     |                     |                     |                     |             |
|--|---------------------|---------------------|---------------------|-------------|
|  |                     |                     |                     | Average     |
| Run Number   | 1                   | 2                   | 3                   |             |
| Test Date  | 5/3/2022            | 5/3/2022            | 5/4/2022            |             |
| Run Start Time                                     | 9:22:00 AM          | 12:55:00 PM         | 9:00:00 AM          |             |
| Run Finish Time                                    | 12:13:00 PM         | 3:41:00 PM          | 11:45:00 AM         |             |
| Carbon Dioxide, %                                  | 1.4842              | 1.5066              | 1.4335              | 1.475       |
| Oxygen, %  | 17.8493             | 17.7895             | 17.7886             | 17.809      |
| Fuel Factor  | 0                   | 0                   | 0                   |             |
| Dry Volumetric Flow Rate, dry scfm                 | 608977.2            | 593124.3            | 588495.5            | 596,865.667 |
| F-Factor, dscfm/MMBtu @ %O2                        | 0                   | 0                   | 0                   | 0.000       |
| Moisture, %  | 14.5535             | 15.5455             | 15.4291             | 15.176      |
| Analyzer Make                                      | Servomex            | Servomex            | Servomex            |             |
| Analyzer Model                                     | 1440                | 1440                | 1440                | 1,440.000   |
| Analyzer Serial Number                             |                     |                     |                     |             |
| Operating Range                                    | 9.5                 | 9.5                 | 9.5                 | 9.500       |
| Operating Units                                    | %                   | %                   | %                   |             |
| No. Readings/Avg.                                  | 156                 | 156                 | 156                 | 156.000     |
| Calibration Set                                    | 2                   | 2                   | 2                   | 2.000       |
| Calibration Pre Zero Cylinder ID                   | EB0098963 - ZERO    | EB0098963 - ZERO    | EB0098963 - ZERO    |             |
| Calibration Pre Zero Cylinder Instrument Response  | 0                   | 0                   | 0                   | 0.000       |
| Calibration Pre Zero Cylinder Bias                 | 0                   | 0                   | 0                   | 0.000       |
| Calibration Pre Zero Cylinder Drift                | 0                   | 0                   | 0                   | 0.000       |
| Calibration Pre High Cylinder ID                   | EB0097783 - CO2 MID | EB0097783 - CO2 MID | EB0097783 - CO2 MID |             |
| Calibration Pre High Cylinder Instrument Response  | 5                   | 5                   | 4.9                 | 4.967       |
| Calibration Pre High Cylinder Bias                 | 0                   | 0                   | -1.05               | -0.350      |
| Calibration Pre High Cylinder Drift                | 0                   | 0                   | 0                   | 0.000       |
| Calibration Post Zero Cylinder ID                  | EB0098963 - ZERO    | EB0098963 - ZERO    | EB0098963 - ZERO    |             |
| Calibration Post Zero Cylinder Instrument Response | 0                   | 0                   | 0                   | 0.000       |
| Calibration Post Zero Cylinder Bias                | 0                   | 0                   | 0                   | 0.000       |
| Calibration Post Zero Cylinder Drift               | 0                   | 0                   | 0                   | 0.000       |
| Calibration Post High Cylinder ID                  | EB0097783 - CO2 MID | EB0097783 - CO2 MID | EB0097783 - CO2 MID |             |
| Calibration Post High Cylinder Instrument Response | 5                   | 5                   | 5                   | 5.000       |
| Calibration Post High Cylinder Bias                | 0                   | 0                   | 0                   | 0.000       |
| Calibration Post High Cylinder Drift               | 0                   | 0                   | 1.05                | 0.350       |
| Cavg   | 1.527               | 1.55                | 1.46                | 1.512       |
| Cavg Units   | %vd                 | %vd                 | %vd                 |             |
| Cgas   | 1.4842              | 1.5066              | 1.4335              | 1.475       |
| Cgas Units   | %vd                 | %vd                 | %vd                 |             |

## US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

|             |   |   |   |       |
|-------------|---|---|---|-------|
| Fuel Type   |   |   |   |       |
| Fw          | 0 | 0 | 0 | 0.000 |
| Fc          | 0 | 0 | 0 | 0.000 |
| Cgasw       | 0 | 0 | 0 | 0.000 |
| Cgasw Units |   |   |   |       |

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# US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

| Location SV051 - Method 3A CO2 3                   |                        | Average     |
|--|------------------------|-------------|
| Run Number   | 4                      |             |
| Test Date  | 5/4/2022               |             |
| Run Start Time                                     | 2:10:00 PM             |             |
| Run Finish Time                                    | 5:00:00 PM             |             |
| Carbon Dioxide, %                                  | 1.4969                 | 1.497       |
| Oxygen, %  | 17.6685                | 17.669      |
| Fuel Factor  | 0                      |             |
| Dry Volumetric Flow Rate, dry scfm                 | 594524.4               | 594,524.400 |
| F-Factor, dscfm/MMBtu @ %O2                        | 0                      | 0.000       |
| Moisture, %  | 14.7813                | 14.781      |
| Analyzer Make                                      | Servomex               |             |
| Analyzer Model                                     | 1440                   | 1,440.000   |
| Analyzer Serial Number                             |                        |             |
| Operating Range                                    | 9.5                    | 9.500       |
| Operating Units                                    | %                      |             |
| No. Readings/Avg.                                  | 156                    | 156.000     |
| Calibration Set                                    | 2                      | 2.000       |
| Calibration Pre Zero Cylinder ID                   | EB0098963 -<br>ZERO    |             |
| Calibration Pre Zero Cylinder Instrument Response  | 0                      | 0.000       |
| Calibration Pre Zero Cylinder Bias                 | 0                      | 0.000       |
| Calibration Pre Zero Cylinder Drift                | 0                      | 0.000       |
| Calibration Pre High Cylinder ID                   | EB0097783 - CO2<br>MID |             |
| Calibration Pre High Cylinder Instrument Response  | 5                      | 5.000       |
| Calibration Pre High Cylinder Bias                 | 0                      | 0.000       |
| Calibration Pre High Cylinder Drift                | 0                      | 0.000       |
| Calibration Post Zero Cylinder ID                  | EB0098963 -<br>ZERO    |             |
| Calibration Post Zero Cylinder Instrument Response | 0                      | 0.000       |
| Calibration Post Zero Cylinder Bias                | 0                      | 0.000       |
| Calibration Post Zero Cylinder Drift               | 0                      | 0.000       |
| Calibration Post High Cylinder ID                  | EB0097783 - CO2<br>MID |             |
| Calibration Post High Cylinder Instrument Response | 5                      | 5.000       |
| Calibration Post High Cylinder Bias                | 0                      | 0.000       |
| Calibration Post High Cylinder Drift               | 0                      | 0.000       |
| Cavg   | 1.54                   | 1.540       |
| Cavg Units   | %vd                    |             |
| Cgas   | 1.4969                 | 1.497       |
| Cgas Units   | %vd                    |             |



## US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

Fuel Type

|    |   |       |
|----|---|-------|
| Fw | 0 | 0.000 |
|----|---|-------|

|    |   |       |
|----|---|-------|
| Fc | 0 | 0.000 |
|----|---|-------|

|       |   |       |
|-------|---|-------|
| Cgasw | 0 | 0.000 |
|-------|---|-------|

Cgasw Units

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# US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

| Location SV051 - Method 3A O2                      |                     |                     |                     |           |
|--|---------------------|---------------------|---------------------|-----------|
|  |                     |                     |                     | Average   |
| Run Number   | 1                   | 2                   | 3                   |           |
| Test Date  | 5/3/2022            | 5/3/2022            | 5/4/2022            |           |
| Run Start Time                                     | 9:22:00 AM          | 12:55:00 PM         | 9:00:00 AM          |           |
| Run Finish Time                                    | 12:13:00 PM         | 3:41:00 PM          | 11:45:00 AM         |           |
| Carbon Dioxide, %                                  | 0                   | 0                   | 0                   | 0.000     |
| Oxygen, %  | 17.8493             | 17.7996             | 17.7886             | 17.813    |
| Fuel Factor  | 0                   | 0                   | 0                   |           |
| Dry Volumetric Flow Rate, dry scfm                 | 0                   | 0                   | 0                   | 0.000     |
| F-Factor, dscfm/MMBtu @ %O2                        | 0                   | 0                   | 0                   | 0.000     |
| Moisture, %  | 0                   | 0                   | 0                   | 0.000     |
| Analyzer Make                                      | Servomex            | Servomex            | Servomex            |           |
| Analyzer Model                                     | 1440                | 1440                | 1440                | 1,440.000 |
| Analyzer Serial Number                             |                     |                     |                     |           |
| Operating Range                                    | 22.5                | 22.5                | 22.5                | 22.500    |
| Operating Units                                    | %                   | %                   | %                   |           |
| No. Readings/Avg.                                  | 156                 | 156                 | 156                 | 156.000   |
| Calibration Set                                    | 1                   | 1                   | 1                   | 1.000     |
| Calibration Pre Zero Cylinder ID                   | EB0098963 - ZERO    | EB0098963 - ZERO    | EB0098963 - ZERO    |           |
| Calibration Pre Zero Cylinder Instrument Response  | 0                   | -0.1                | 0                   | -0.033    |
| Calibration Pre Zero Cylinder Bias                 | 0                   | -0.44               | 0                   | -0.147    |
| Calibration Pre Zero Cylinder Drift                | 0                   | 0                   | 0                   | 0.000     |
| Calibration Pre High Cylinder ID                   | EB0097783 - O2 HIGH | EB0097783 - O2 HIGH | EB0097783 - O2 HIGH |           |
| Calibration Pre High Cylinder Instrument Response  | 22.4                | 22.3                | 22.3                | 22.333    |
| Calibration Pre High Cylinder Bias                 | -0.44               | -0.89               | -0.89               | -0.740    |
| Calibration Pre High Cylinder Drift                | 0                   | 0                   | 0                   | 0.000     |
| Calibration Post Zero Cylinder ID                  | EB0098963 - ZERO    | EB0098963 - ZERO    | EB0098963 - ZERO    |           |
| Calibration Post Zero Cylinder Instrument Response | -0.1                | -0.1                | 0                   | -0.067    |
| Calibration Post Zero Cylinder Bias                | -0.44               | -0.44               | 0                   | -0.293    |
| Calibration Post Zero Cylinder Drift               | 0.44                | 0                   | 0                   | 0.147     |
| Calibration Post High Cylinder ID                  | EB0097783 - O2 HIGH | EB0097783 - O2 HIGH | EB0097783 - O2 HIGH |           |
| Calibration Post High Cylinder Instrument Response | 22.3                | 22.4                | 22.4                | 22.367    |
| Calibration Post High Cylinder Bias                | -0.89               | -0.44               | -0.44               | -0.590    |
| Calibration Post High Cylinder Drift               | 0.45                | 0.45                | 0.45                | 0.450     |
| Cavg   | 17.72               | 17.66               | 17.67               | 17.683    |
| Cavg Units   | %vd                 | %vd                 | %vd                 |           |
| Cgas   | 17.8493             | 17.7996             | 17.7886             | 17.813    |
| Cgas Units   | %vd                 | %vd                 | %vd                 |           |

## US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

|             |   |   |   |       |
|-------------|---|---|---|-------|
| Fuel Type   |   |   |   |       |
| Fw          | 0 | 0 | 0 | 0.000 |
| Fc          | 0 | 0 | 0 | 0.000 |
| Cgasw       | 0 | 0 | 0 | 0.000 |
| Cgasw Units |   |   |   |       |

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# US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

| Location SV051 - Method 3A O2 3                    |                     | Average   |
|--|---------------------|-----------|
| Run Number   | 4                   |           |
| Test Date  | 5/4/2022            |           |
| Run Start Time                                     | 2:10:00 PM          |           |
| Run Finish Time                                    | 5:00:00 PM          |           |
| Carbon Dioxide, %                                  | 0                   | 0.000     |
| Oxygen, %  | 17.6685             | 17.669    |
| Fuel Factor  | 0                   |           |
| Dry Volumetric Flow Rate, dry scfm                 | 0                   | 0.000     |
| F-Factor, dscfm/MMBtu @ %O2                        | 0                   | 0.000     |
| Moisture, %  | 0                   | 0.000     |
| Analyzer Make                                      | Servomex            |           |
| Analyzer Model                                     | 1440                | 1,440.000 |
| Analyzer Serial Number                             |                     |           |
| Operating Range                                    | 22.5                | 22.500    |
| Operating Units                                    | %                   |           |
| No. Readings/Avg.                                  | 156                 | 156.000   |
| Calibration Set                                    | 1                   | 1.000     |
| Calibration Pre Zero Cylinder ID                   | EB0098963 - ZERO    |           |
| Calibration Pre Zero Cylinder Instrument Response  | 0                   | 0.000     |
| Calibration Pre Zero Cylinder Bias                 | 0                   | 0.000     |
| Calibration Pre Zero Cylinder Drift                | 0                   | 0.000     |
| Calibration Pre High Cylinder ID                   | EB0097783 - O2 HIGH |           |
| Calibration Pre High Cylinder Instrument Response  | 22.4                | 22.400    |
| Calibration Pre High Cylinder Bias                 | -0.44               | -0.440    |
| Calibration Pre High Cylinder Drift                | 0                   | 0.000     |
| Calibration Post Zero Cylinder ID                  | EB0098963 - ZERO    |           |
| Calibration Post Zero Cylinder Instrument Response | 0                   | 0.000     |
| Calibration Post Zero Cylinder Bias                | 0                   | 0.000     |
| Calibration Post Zero Cylinder Drift               | 0                   | 0.000     |
| Calibration Post High Cylinder ID                  | EB0097783 - O2 HIGH |           |
| Calibration Post High Cylinder Instrument Response | 22.4                | 22.400    |
| Calibration Post High Cylinder Bias                | -0.44               | -0.440    |
| Calibration Post High Cylinder Drift               | 0                   | 0.000     |
| Cavg   | 17.59               | 17.590    |
| Cavg Units   | %vd                 |           |
| Cgas   | 17.6685             | 17.669    |
| Cgas Units   | %vd                 |           |

**US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report**

|             |   |       |
|-------------|---|-------|
| Fuel Type   |   |       |
| Fw          | 0 | 0.000 |
| Fc          | 0 | 0.000 |
| Cgasw       | 0 | 0.000 |
| Cgasw Units |   |       |

## US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

### Included Attachments:

| Attachments   |   |
|---|---|
| Source/Process Flow Diagram                                       | Stack Diagram.pdf                       |
| EPA Method 1Location Supporting Documentation (Item 9) (optional) | Stack Diagram.pdf                       |
| EPA Method 1Location Supporting Documentation (Item 9) (optional) | SV051 24 Traverse points .pdf           |
| Cyclonic Flow Absence Supporting Documentation (Item 10)          | Cyclonic Flow.pdf                       |
| Pre-Test Meter Boxes/DGMs Calibrations                            | M26A C-12 4-29-2022.pdf                 |
| Pre-Test Meter Boxes/DGMs Calibrations                            | M29 C-5 4-27-2022.pdf                   |
| Post-Test Meter Boxes/DGMs Calibrations                           | 26A Post Test.pdf                       |
| Post-Test Meter Boxes/DGMs Calibrations                           | 29 Post Test.pdf                        |
| Nozzles Calibrations  | 26A Nozzle-Bal.pdf                      |
| Nozzles Calibrations  | M29 Nozzle-Bal.pdf                      |
| Pitots Calibrations   | M26A 7-4.pdf                            |
| Pitots Calibrations   | M29 7-5.pdf                             |
| Thermocouples Calibrations  | 7-4.pdf                                 |
| Thermocouples Calibrations  | 7-5.pdf                                 |
| Thermocouples Calibrations  | C-5-I.pdf                               |
| Thermocouples Calibrations  | C-5-O.pdf                               |
| Thermocouples Calibrations  | C-12-I.pdf                              |
| Thermocouples Calibrations  | C-12-O.pdf                              |
| Thermocouples Calibrations  | M26A TIO 3680.pdf                       |
| Thermocouples Calibrations  | TIO-3619.pdf                            |
| Sampling Locations Dimensions and Point Locations                 | Stack Diagram.pdf                       |
| Sampling Locations Dimensions and Point Locations                 | SV051 24 Traverse points .pdf           |
| Run Field Data Sheets (raw data sheets for field sampling)        | instrument output.pdf                   |
| Run Field Data Sheets (raw data sheets for field sampling)        | Table 4 - Gaseous Pollutant Results.pdf |
| Run Field Data Sheets (raw data sheets for field sampling)        | M29 EFDS.pdf                            |
| Run Field Data Sheets (raw data sheets for field sampling)        | M26A EFDS.pdf                           |
| Moisture Recovery   | moisture recovery data sheets.pdf       |

## US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

|  |  |
|--|--|
| Lab Data (raw data sheets for field and laboratory analysis)         | 26A lab results.pdf  |
| Lab Data (raw data sheets for field and laboratory analysis)         | Enthalpy signature.pdf   |
| Lab Data (raw data sheets for field and laboratory analysis)         | _email3_38554 Barr Engineering M5-29 Packet Rev. 06.20.22.pdf                |
| Chain-of-Custody   | COC.pdf  |
| Laboratory Accreditation Certification                               | Element One - LA_NELAP_Certificate_Parameter_List_2.pdf                      |
| Laboratory Accreditation Certification                               | Element One - NJ_NELAP_Certificate__u0026_Parameter_30_22__2_.pdf            |
| Laboratory Accreditation Certification                               | Enthalpy - Durham_Louisiana-DEQ-NELA 063022.pdf                              |
| Laboratory Accreditation Certification                               | SOP-104 Method 5 Determination of Pa Matter Emissions from Stationary Source |
| Laboratory Accreditation Certification                               | Enthalpy - Durham_New-Jersey-DEP-NE 063022-1.pdf                             |
| Laboratory Accreditation Certification                               | Element One - SOP-201 Method 29 and 1.9.pdf                                  |
| Laboratory Accreditation Certification                               | Enthalpy - SOP-312_R15 EPA Methods 2   |
| Interference/Response Time/Converter Efficiency/Stratification Tests | Stratification Test.pdf  |
| Process and APCD Monitor Calibrations                                | Process Data.pdf   |
| Calibration Gas Certificates (Item 16)                               | CO2 O2 9.48 9.52 EB0097773 Exp 02-11   |
| Calibration Gas Certificates (Item 16)                               | EB0098653.20190909.PDF   |
| Calibration Gas Certificates (Item 16)                               | Redball EB0098963.pdf  |
| Calibration Gas Certificates (Item 16)                               | CO 45.1 EB0099384 Exp 10-11-2029.pdf   |
| Calibration Gas Certificates (Item 16)                               | CO2 O2 4.86 22.5 EB0097783 Exp 10-03   |
| Stratification Test  | 5-2-22 Strat Check.pdf   |
| Example calculations for reported results                            | 26A Calcs.pdf  |
| Example calculations for reported results                            | Analyzer Calcs.pdf   |
| Example calculations for reported results                            | M2 M4 Calcs.pdf  |
| Example calculations for reported results                            | Metals calcs.pdf   |
| Example calculations for reported results                            | Metals lab summary.pdf   |

## US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

|   |                    |
|---|--------------------|
| Example calculations for reported results | PM Calcs.pdf       |
| Example calculations for reported results | PM lab Summary.pdf |

### Completeness Questions:

| Completeness Quality Assessment Questions  |     |                                    |
|--|-----|------------------------------------|
| As described in ASTM D7036-12 Standard Practice for Competence of Air Emission Testing Bodies, does the testing firm meet the criteria as an AETB or is the person in charge of the field team a QI for the type of testing conducted? A certificate from an independent organization (e.g., Stack Testing Accreditation council (STAC), California Air Resources Board (CARB), National Environmental Laboratory Accreditation Program (NELAP) or self declaration provides documentation of competence as an AETB. | No  | Not required for non-Part 75 testi |
| Is a description and drawing of test location provided?  | Yes |                                    |
| Has a description of deviations from published test methods been provided, or is there a statement that deviations were not required to obtain data representative of typical facility operation?  | Yes |                                    |
| Is a full description of the process and the unit being tested (including installed controls) provided?  | Yes |                                    |
| Has a detailed discussion of source operating conditions, air pollution control device operations and the representativeness of measurements made during the test been provided?   | No  |                                    |
| Were the operating parameters for the tested process unit and associated controls described and reported?  | Yes |                                    |
| Is there an assessment of the validity, representativeness, achievement of DQO's and usability of the data?  | No  |                                    |
| Have field notes addressing issues that may influence data quality been provided?  | No  | No field notes provided            |
| Have the following been included in the report: Dry Gas Meter (DGM) calibrations, pitot tuve and nozzle inspections?   | Yes |                                    |
| Was the Method 1 sample point evaluation included in the report?   | Yes |                                    |
| Were the cyclonic flow checks included in the report?  | Yes |                                    |
| Were the raw sampling data and test sheets included in the report?   | Yes |                                    |
| Did the report include a description and flow diagram of the recovery procedures?  | Yes |                                    |



## US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

|   |     |  |
|---|-----|--|
| Was the laboratory certified/accredited to perform these analyses?                        | Yes |  |
| Did the report include a complete laboratory report and flow diagram of sample analysis?  | Yes |  |
| Were the chain-of-custody forms included in the report?                                   | Yes |  |
| Did the report include a complete description of the instrumental method sampling system? | Yes |  |
| Did the report include calibration gas certifications?                                    | Yes |  |
| Did the report include interference tests?  | No  | Interference tests performed by n              |
| Were the response time tests included in the report?                                      | No  |  |
| Were the calibration error tests included in the report?                                  | Yes |  |
| Did the report include drift tests?   | Yes |  |
| Did the report include system bias tests?   | Yes |  |
| Were the converter efficiency tests included in the report?                               | No  | Converter efficiency tests are not NOx testing |
| Did the report include stratification checks?   | No  |  |
| Did the report include the raw data for the instrumental method?                          | Yes |  |

### Regulatory Review Questions:

| Regulatory Review Quality Assessment Questions   |  |  |
|--|--|--|
| As described in ASTM D7036-12 Standard Practice for Competence of Air Emission Testing Bodies, does the testing firm meet the criteria as an AETB or is the person in charge of the field team a QI for the type of testing conducted? A certificate from an independent organization (e.g., STAC, CARB, NELAP) or self declaration provides documentation of competence as an AETB. |  |  |
| Was a representative of the regulatory agency on site during the test?   |  |  |
| Is a description and drawing of test location provided?  |  |  |
| Is there documentation that the source or the test company sought and obtained approval for deviations from the published test method prior to conducting the test or that the tester's assertion that deviations were not required to obtain data representative of operations that are typical for the facility?   |  |  |
| Were all test method deviations acceptable?  |  |  |
| Is a full description of the process and the unit being tested (including installed controls) provided?  |  |  |
|  |  |  |

## US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

|  |  |  |
|--|--|--|
| Has a detailed discussion of source operating conditions, air pollution control device operations and the representativeness of measurements made during the test been provided?   |  |  |
| Is there documentation that the required process monitors have been calibrated and that the calibration is acceptable?   |  |  |
| Was the process capacity documented?   |  |  |
| Was the process operating within an appropriate range for the test program objective?  |  |  |
| Were process data concurrent with testing?   |  |  |
| Were data included in the report for all parameters for which limits will be set?  |  |  |
| Did the report discuss the representativeness of the facility operations, control device operation, and the measurements of the target pollutants, and were any changes from published test methods or process and control device monitoring protocols identified? |  |  |
| Were all sampling issues handled such that data quality was not adversely affected?  |  |  |
| Was the DGM pre-test calibration within the criteria specified by the test method?   |  |  |
| Was the DGM post-test calibration within the criteria specified by the test method?  |  |  |
| Were thermocouple calibrations within method criteria?   |  |  |
| Was the pitot tube inspection acceptable?  |  |  |
| Were nozzle inspections acceptable?  |  |  |
| Were flow meter calibrations acceptable?   |  |  |
| Were the appropriate number and location of sampling points used?  |  |  |
| Did the cyclonic flow evaluation show the presence of an acceptable average gas flow angle?  |  |  |
| Were all data required by the method recorded?   |  |  |
| Were required leak checks performed and did the checks meet method requirements?   |  |  |
| Was the required minimum sample volume collected?  |  |  |
| Did probe, filter, and impinger exit temperatures meet method criteria (as applicable)?  |  |  |
| Did isokinetic sampling rates meet method criteria?  |  |  |
| Was the sampling time at each point greater than 2 minutes and the same for each point?  |  |  |

## US Steel Keetac Pellet Indurator Waste Gas Phase II 114 Request Test Report

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|--|--|--|
| Was the recovery process consistent with the method?   |  |  |
| Were all required blanks collected in the field?   |  |  |
| Where performed, were blank corrections handled per method requirements?   |  |  |
| Were sample volumes clearly marked on the jar or measured and recorded?  |  |  |
| Was the laboratory certified/accredited to perform these analyses?   |  |  |
| Did the laboratory note the sample volume upon receipt?  |  |  |
| If sample loss occurred, was the compensation method used, documented, and approved for the method?  |  |  |
| Were the physical characteristics of the samples (e.g., color, volume, integrity, pH, temperature) recorded and consistent with the method?        |  |  |
| Were sample hold times within method requirements?   |  |  |
| Does the laboratory report document the analytical procedures and techniques?  |  |  |
| Were all laboratory QA requirements documented?  |  |  |
| Were analytical standards required by the method documented?   |  |  |
| Were required laboratory duplicates within acceptable limits?  |  |  |
| Were required spike recoveries within method requirements?   |  |  |
| Were method-specific analytical blanks analyzed?   |  |  |
| If problems occurred during analysis, is there sufficient documentation to conclude that the problems did not adversely affect the sample results? |  |  |
| Was the analytical detection limit specified in the test report?   |  |  |
| Is the reported detection limit adequate for the purposes of the test program?   |  |  |
| Do the chain-of-custody forms indicate acceptable management of collected samples between collection and analysis?                                 |  |  |
| Was a complete description of the sampling system provided?  |  |  |
| Were calibration standards used prior to the end of the expiration date?   |  |  |
| Did calibration standards meet method criteria?  |  |  |
| Did interference checks meet method requirements?  |  |  |
| Was a response time test performed?  |  |  |
| Did calibration error tests meet method requirements?  |  |  |

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| Were drift tests performed after each run and did they meet method requirements?  |  |  |
| Did system bias checks meet method requirements?  |  |  |
| Was the NOX converter test acceptable?  |  |  |
| Was a stratification assessment performed?  |  |  |
| Was the duration of each sample run within method criteria?   |  |  |
| Was the appropriate traverse performed during sample collection, or was the probe placed at an appropriate center point (if allowed by the method)? |  |  |
| Were sample times at each point uniform and did they meet method requirements?  |  |  |
| Were sample lines heated sufficiently to prevent potential adverse data quality issues?   |  |  |
| Was all data required by the method recorded?   |  |  |

**Tester's DQ Assement:**

| Comment  |
|--|
| See Additional Comments and Method deviations in test plan |

