Air Resources Board

CDAWG 2014 Workshop

Portland CEMENT MACT Implementation & Updates

CEMs

US EPA Regulations

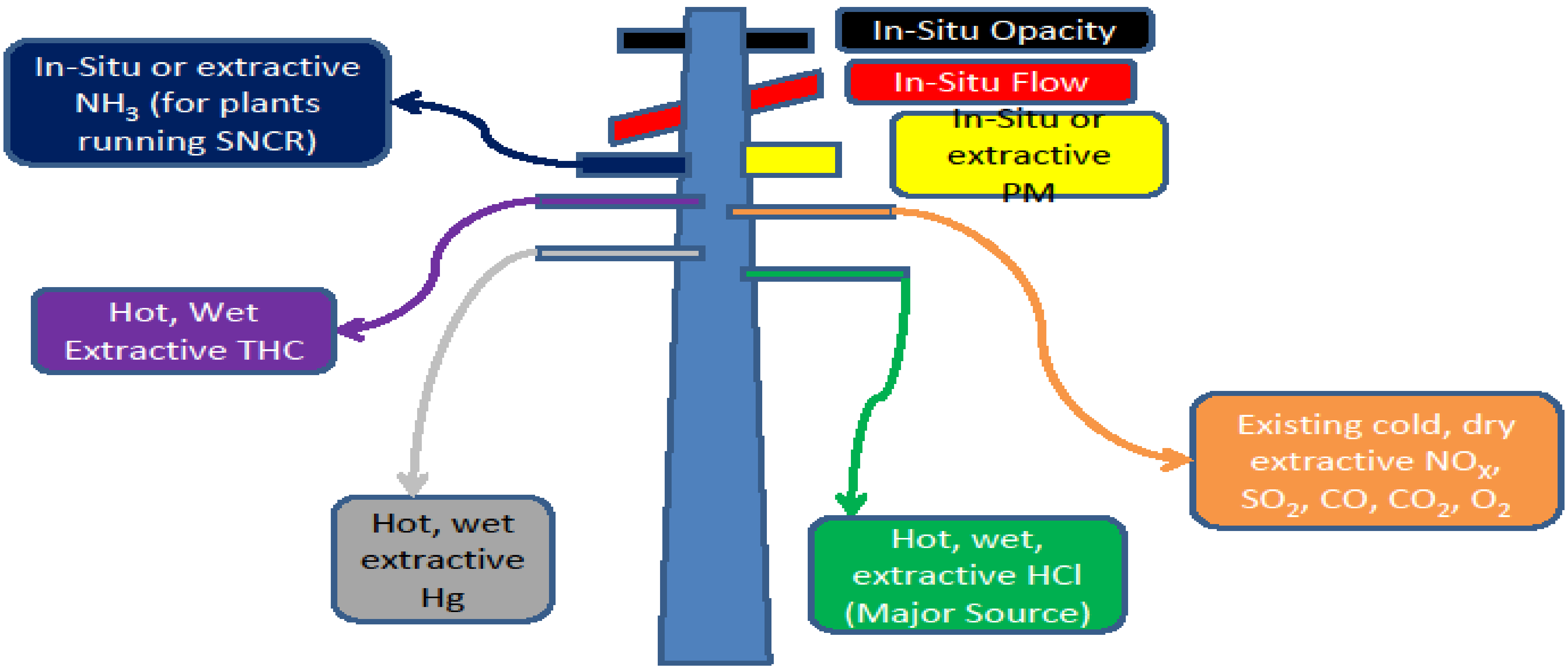
- Portland Cement (PC) NESHAP
  - 40 CFR 63, subpart LLL
- Solid Waste "Incinerators" CISWI (Commercial & Industrial Solid Waste Incineration) rule
- Greenhouse Gas Reporting Program (Part 98) (CO_2 + Flow CEMs requirement)

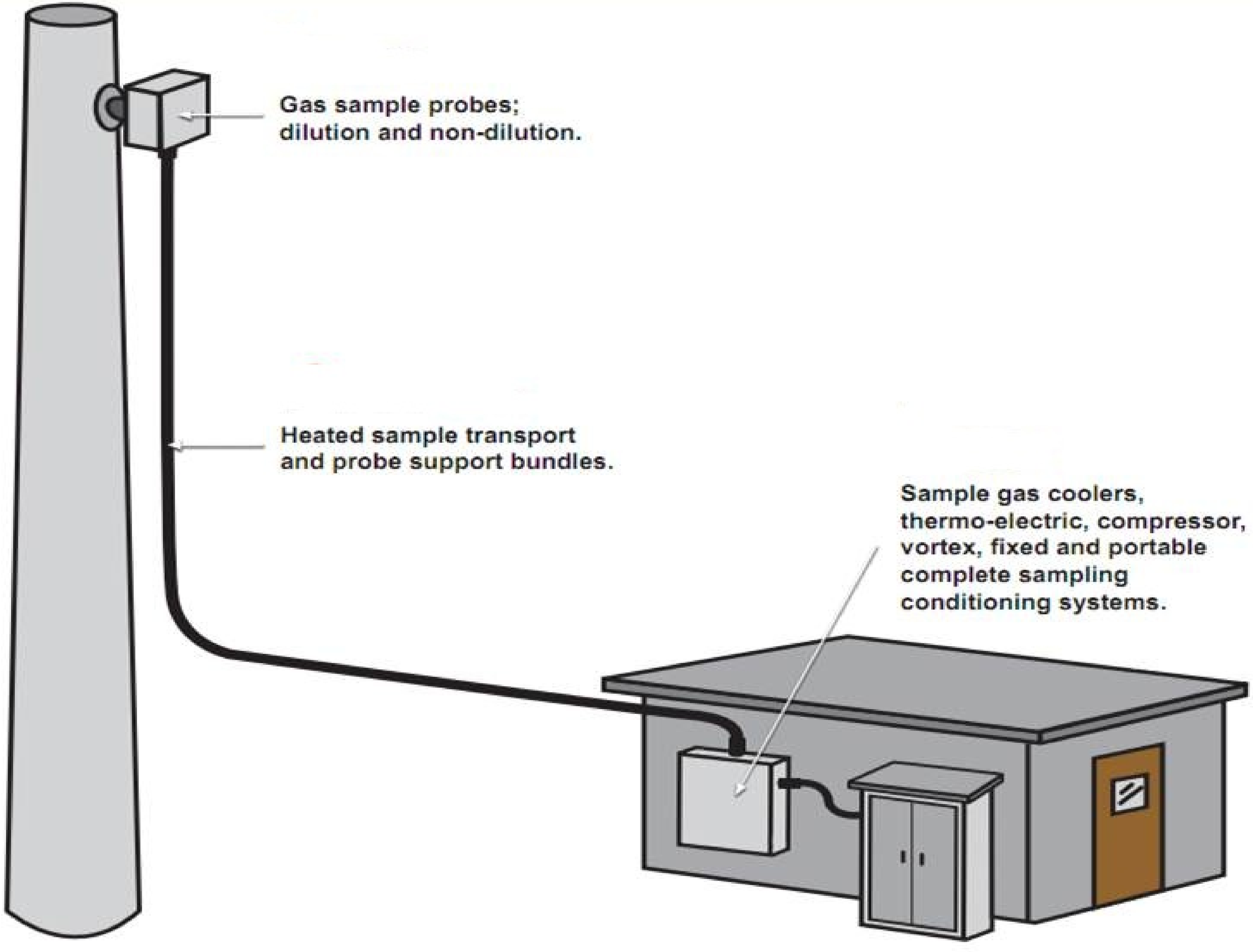
California Regulations

CEMs

- AB2588
- Title V, New Source Review,
- HRA (Health Risk Analysis & new OEHHA risk assessment guidelines)
- AB32 Greenhouse Gas
  - Cap & Trade, Reporting & Verification (scrutinized heavily & market incentive program)
- AB32 Energy Efficiency Assessment
- Solid Waste Facility (Cal Recycle AB1126) (conflicts with CISWI

Cement Kiln stack of the future



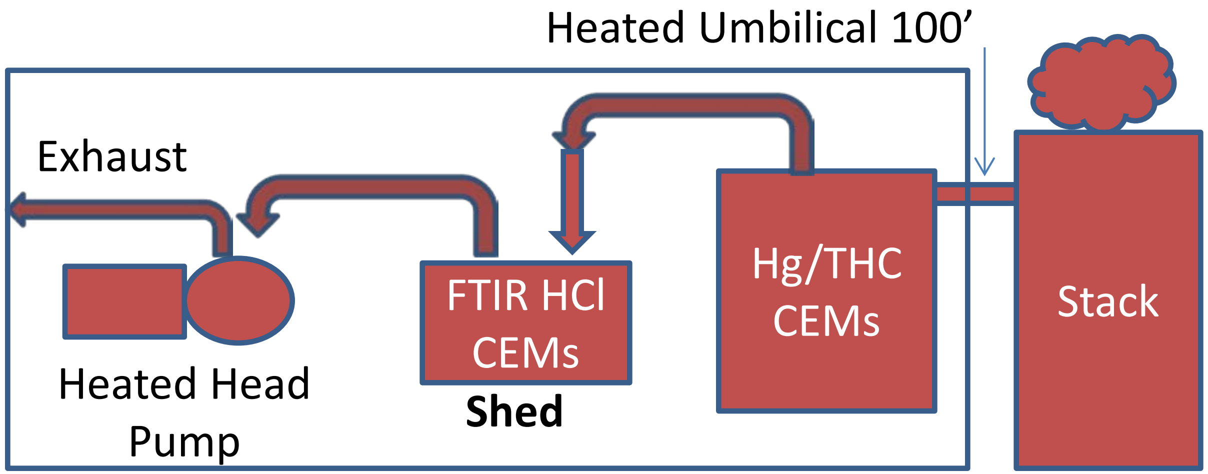

Gas sample probes;
dilution and non-dilution.
Heated sample transport
and probe support bundles.
Sample gas coolers,
thermo-electric, compressor,
vortex, fixed and portable
complete sampling
conditioning systems.

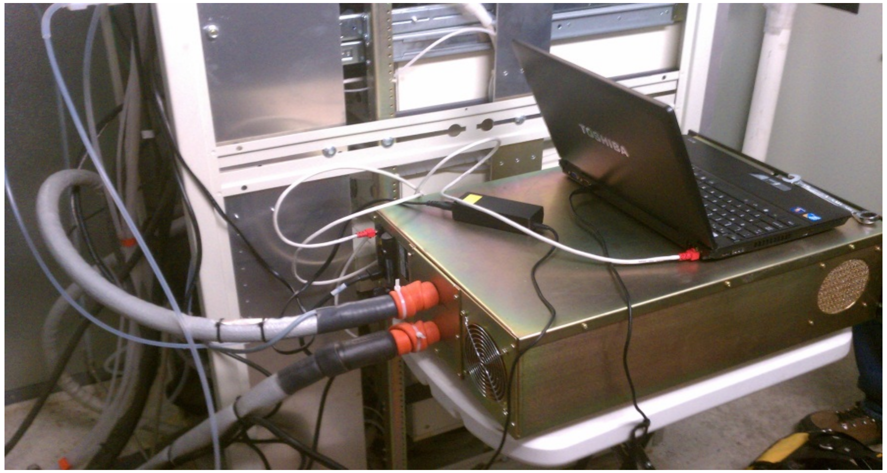
Portland Cement (PC) NESHAP

CEMs

- The final amendments regulate emissions of the following HAPs:
  - Mercury (addition of mercury CEMS on all existing and new kilns + carbon/lime injection)
  - Total Hydrocarbons (THC), a surrogate for non dioxin/furan organic HAP (addition of THC CEMS on all existing and new kilns)
  - HCl (addition of HCl CEMS on all existing and new kilns)
  - PM, a surrogate for non-volatile metal HAP (addition of PM CEMS on all existing and new kilns)

PC MACT: Hg, THC & HCl CEMs Example





PC MACT & Criteria Pollutants Limits

Pollutant	New Source Standards (MM = million)	Existing Source Standards
HCl	3 ppmvd	3 ppmvd
Hg	21 lbs/MM tons clinker	55 lbs/MM tons clinker
Total HC	24 ppmvd	24 ppmvd
PM	0.02 lbs/ton clinker	0.07 lbs/ton clinker
Organic HAP (Alternative to Total HC)	12 ppmvd	12 ppmvd

Portland Cement (PC) NESHAP

- Challenges
  - Alternative Fuels (more on slide #11 & 12)
  - New Abatement & Control Methods
  - HCl, CO, CO_2, NO, NO_2, N_2O, NH_3, SO_2, O_2, H_2O, CH_4, Opacity & Flow measurement
  - New Emissions Monitoring CEMs Technology
    - HCl Fourier Transfer Infared (FTIR) being tested
    - Hg CEMS vs. Hg Sorbent Trap
    - CEMs required for PM & THC monitoring being tested
    - May need overhaul of hardware, software & data acquisition

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 60 and 63

[EPA–HQ–OAR–2011–0817; FRL–9758–6]

RIN 2060–AQ93

National Emission Standards for Hazardous Air Pollutants for the Portland Cement Manufacturing Industry and Standards of Performance for Portland Cement Plants

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

Portland Cement (PC) NESHAP

CEMs

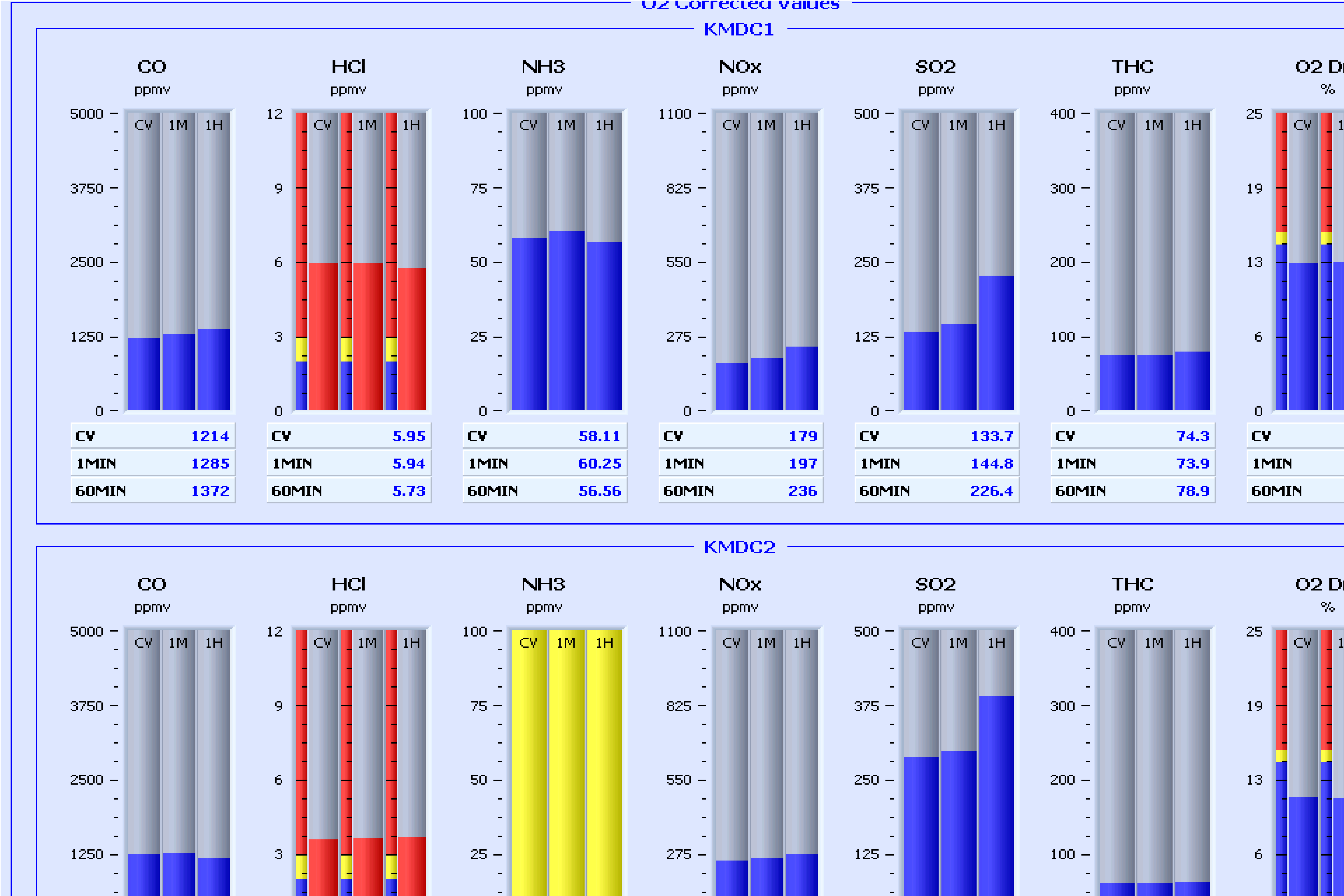
- Challenges
  - Compliance date of Sept 2015 & Title V Renewals
  - Relative Accuracy Test Audit (RATA) may be challenging for some pollutants
  - NIST calibration gases not up to speed & EPA Performance Specifications (PS 18) for HCl is being developed
  - Robust record keeping, QA/QC's, DAS & SOP's
  - Steep learning curve; Dust shuttling
  - Low-level measurement accuracy is critical
  - Economic burden & competitiveness

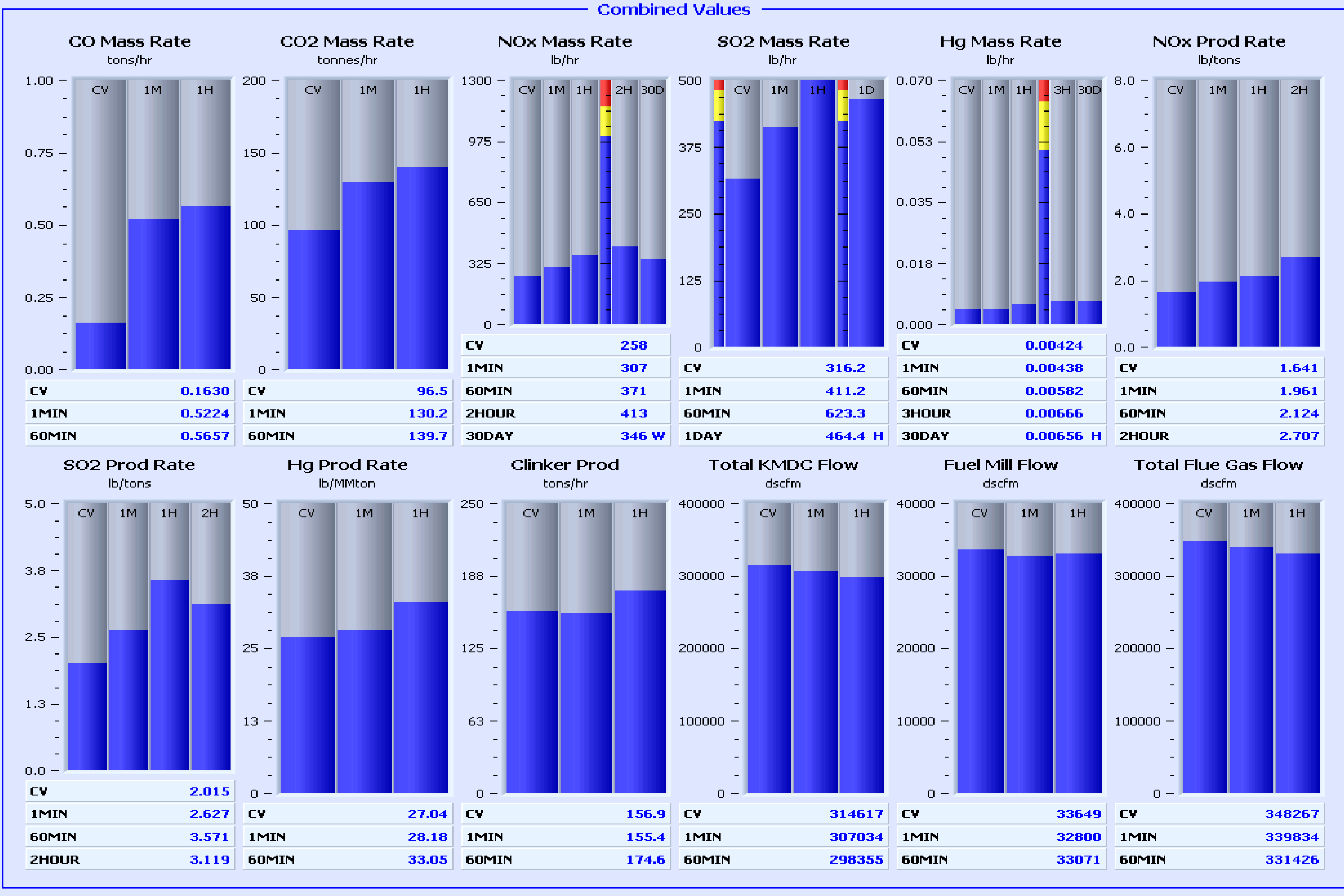
What is an Environmentally Friendly or "Alternative Fuel" & Benefits

- Decrease Coal usage
- Overall emissions reductions
- Potential GHG credit
- Examples
  - Rubber tires
  - "Clean" construction waste
  - Forest debris
  - Engineered fuel (pelletized plastics, Ag + Municipal Solid Waste or MSW)
  - Other biomass (not designated as "solid waste")

Alternative Fuels

- **Challenges**
  - **Cross over to “CISWI” regulation**
  - **Designation of beneficial solid waste by AB1126 may designate a facility into CISWI (new set of standards – cement kiln is not an incinerator)**
  - **EPA Dioxin, Furans (other AB2588 HAPs) testing every 30 months or if fuel is changed**
  - **AB32 (tons of GHG/ton of clinker) vs AB32 Energy Efficiency Assessment (MM Btu fuel /ton of clinker) (maybe be counter productive)**


O2 Corrected Values
KMDC1
CO ppmv
HCl ppmv
NH3 ppmv
NOx ppmv
SO2 ppmv
THC ppmv
O2 D
%
CV 1M 1H
CV 1214
1MIN 1285
60MIN 1372
CV 5.95
1MIN 5.94
60MIN 5.73
CV 58.11
1MIN 60.25
60MIN 56.56
CV 179
1MIN 197
60MIN 236
CV 133.7
1MIN 144.8
60MIN 226.4
CV 74.3
1MIN 73.9
60MIN 78.9
CV
1MIN
60MIN
KMDC2
CO ppmv
HCl ppmv
NH3 ppmv
NOx ppmv
SO2 ppmv
THC ppmv
O2 D
%
CV 1M 1H

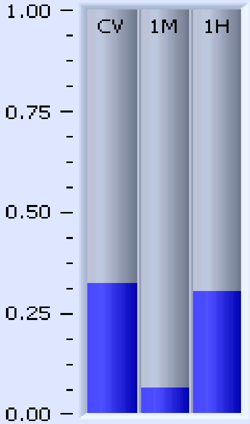

Combined Values
CO Mass Rate
tons/hr
1.00 0.75 0.50 0.25 0.00
CV 1M 1H
CV 0.1630
1MIN 0.5224
60MIN 0.5657
CO2 Mass Rate
tonnes/hr
200 150 100 50 0
CV 1M 1H
CV 96.5
1MIN 130.2
60MIN 139.7
NOx Mass Rate
lb/hr
1300 975 650 325 0
CV 1M 1H 2H 30D
CV 258
1MIN 307
60MIN 371
2HOUR 413
30DAY 346 W
SO2 Mass Rate
lb/hr
500 375 250 125 0
CV 1M 1H 1D
CV 316.2
1MIN 411.2
60MIN 623.3
1DAY 464.4 H
Hg Mass Rate
lb/hr
0.070 0.053 0.035 0.018 0.000
CV 1M 1H 3H 30D
CV 0.00424
1MIN 0.00438
60MIN 0.00582
3HOUR 0.00666
30DAY 0.00656 H
NOx Prod Rate
lb/tons
8.0 6.0 4.0 2.0 0.0
CV 1M 1H 2H
CV 1.641
1MIN 1.961
60MIN 2.124
2HOUR 2.707
SO2 Prod Rate
lb/tons
5.0 3.8 2.5 1.3 0.0
CV 1M 1H 2H
CV 2.015
1MIN 2.627
60MIN 3.571
2HOUR 3.119
Hg Prod Rate
lb/MMton
50 38 25 13 0
CV 1M 1H
CV 27.04
1MIN 28.18
60MIN 33.05
Clinker Prod
tons/hr
250 188 125 63 0
CV 1M 1H
CV 156.9
1MIN 155.4
60MIN 174.6
Total KMDC Flow
dscfm
400000 300000 200000 100000 0
CV 1M 1H
CV 314617
1MIN 307034
60MIN 298355
Fuel Mill Flow
dscfm
40000 30000 20000 10000 0
CV 1M 1H
CV 33649
1MIN 32800
60MIN 33071
Total Flue Gas Flow
dscfm
400000 300000 200000 100000 0
CV 1M 1H
CV 348267
1MIN 339834
60MIN 331426

Emission Rates

KMDC1

CO Mass Rate

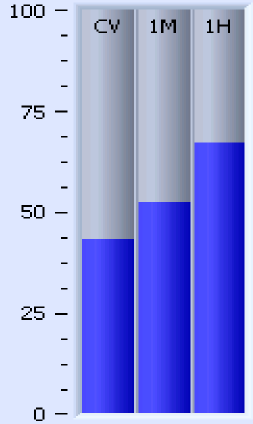
tons/hr



CV	0.3224
1MIN	0.0661
60MIN	0.3039

CO2 Mass Rate

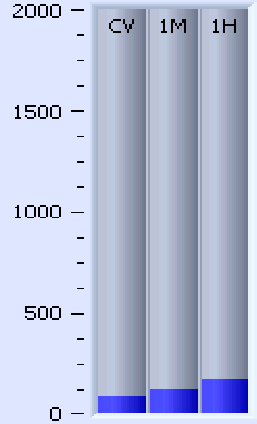
tonnes/hr



CV	43.38
1MIN	52.51
60MIN	67.14

NOx Mass Rate

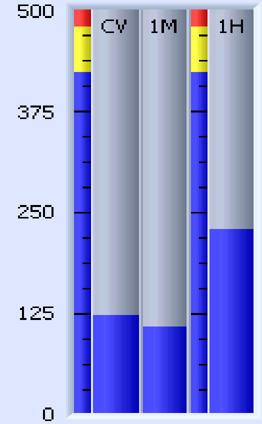
lb/hr



CV	85
1MIN	119
60MIN	172

SO2 Mass Rate

lb/hr

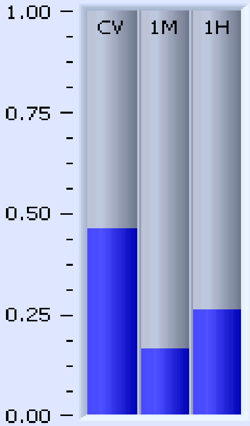


CV	122.3
1MIN	108.4
60MIN	228.6

KMDC2

CO Mass Rate

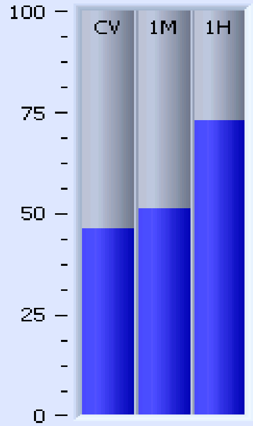
tons/hr



CV	0.4610
1MIN	0.1654
60MIN	0.2618

CO2 Mass Rate

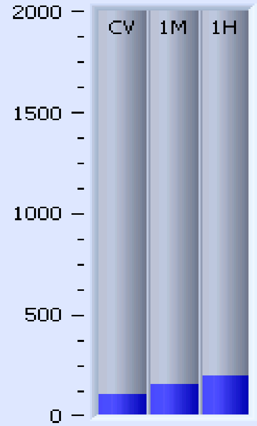
tonnes/hr



CV	46.24
1MIN	51.45
60MIN	72.99

NOx Mass Rate

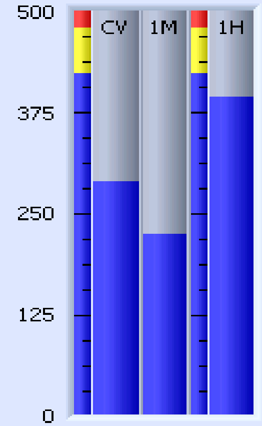
lb/hr



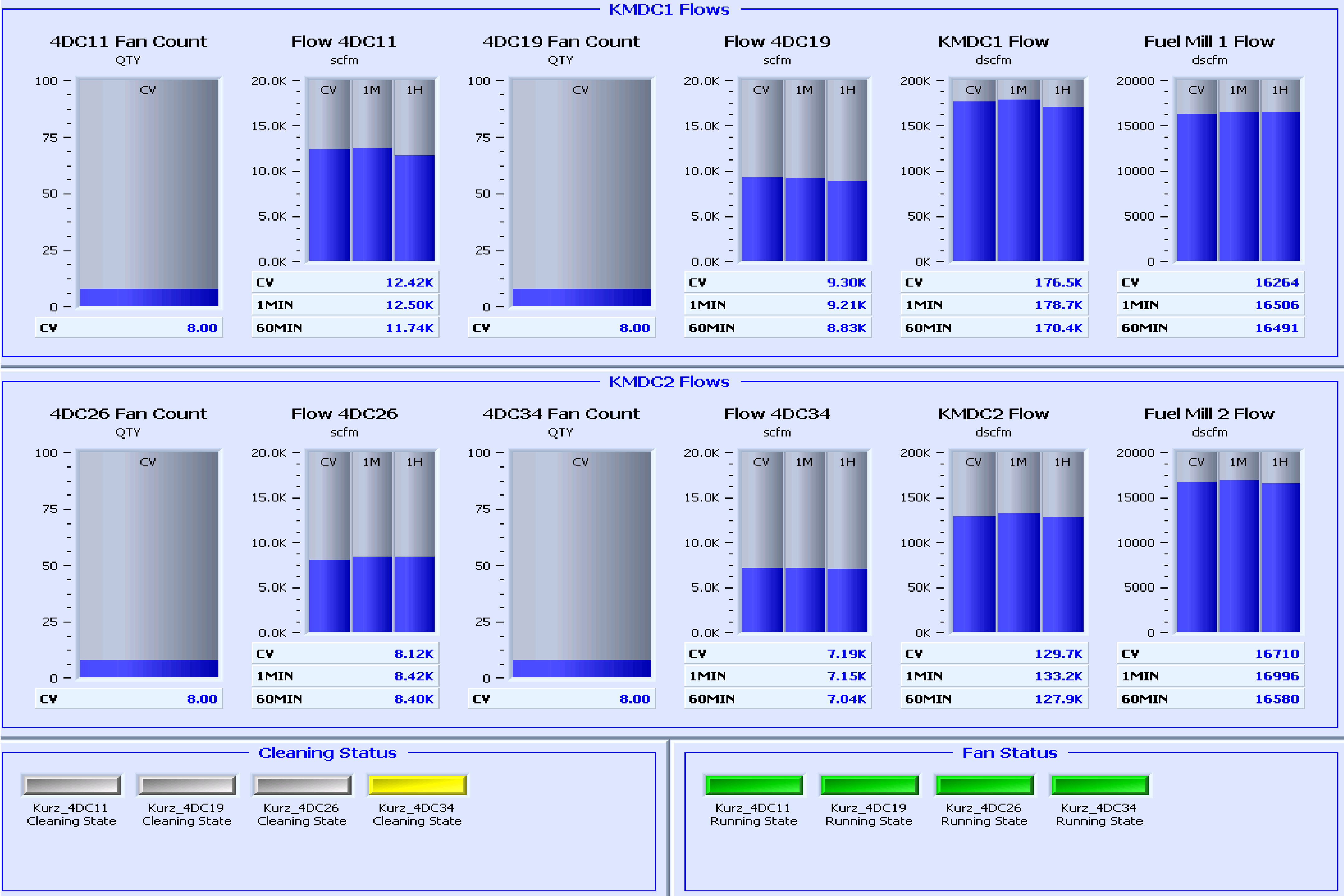
CV	107
1MIN	152
60MIN	199

SO2 Mass Rate

lb/hr

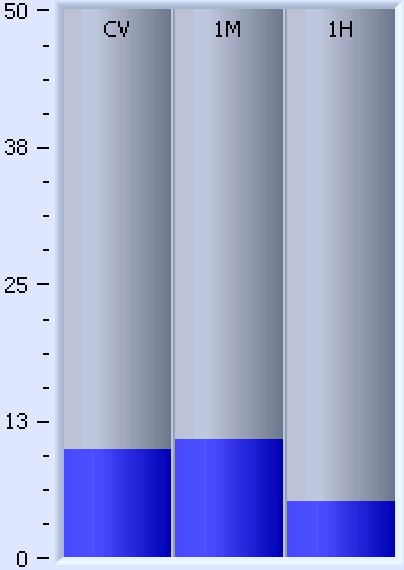


CV	290.7
1MIN	224.0
60MIN	394.7


KMDC1 Flows
4DC11 Fan Count
QTY
CV 8.00
Flow 4DC11
scfm
CV 12.42K
1MIN 12.50K
60MIN 11.74K
4DC19 Fan Count
QTY
CV 8.00
Flow 4DC19
scfm
CV 9.30K
1MIN 9.21K
60MIN 8.83K
KMDC1 Flow
dscfm
CV 176.5K
1MIN 178.7K
60MIN 170.4K
Fuel Mill 1 Flow
dscfm
CV 16264
1MIN 16506
60MIN 16491
KMDC2 Flows
4DC26 Fan Count
QTY
CV 8.00
Flow 4DC26
scfm
CV 8.12K
1MIN 8.42K
60MIN 8.40K
4DC34 Fan Count
QTY
CV 8.00
Flow 4DC34
scfm
CV 7.19K
1MIN 7.15K
60MIN 7.04K
KMDC2 Flow
dscfm
CV 129.7K
1MIN 133.2K
60MIN 127.9K
Fuel Mill 2 Flow
dscfm
CV 16710
1MIN 16996
60MIN 16580
Cleaning Status
Kurz_4DC11 Cleaning State
Kurz_4DC19 Cleaning State
Kurz_4DC26 Cleaning State
Kurz_4DC34 Cleaning State
Fan Status
Kurz_4DC11 Running State
Kurz_4DC19 Running State
Kurz_4DC26 Running State
Kurz_4DC34 Running State

Hg Totalized

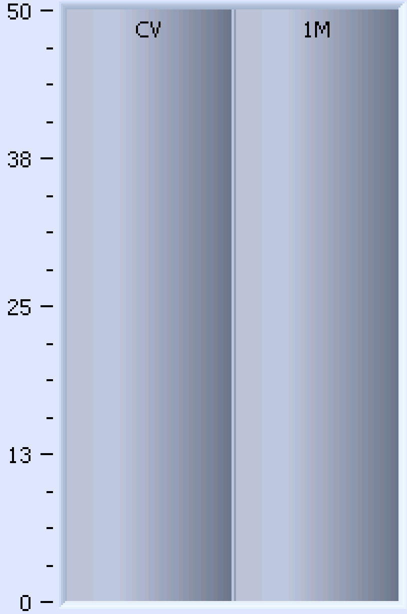
ug/sm³



CV	9.88
1MIN	10.81
60MIN	5.17

Hg Oxidized

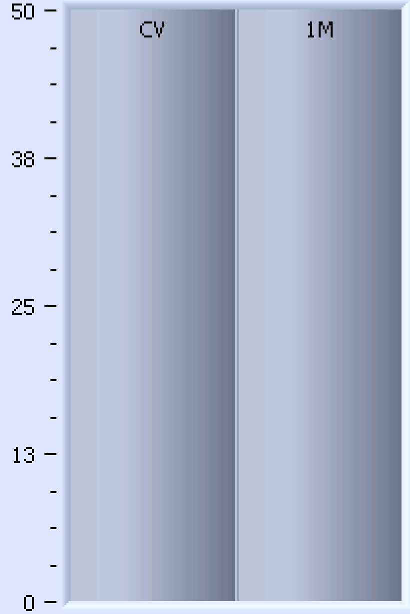
ug/sm³



CV	0.00
1MIN	0.00

Hg Elemental

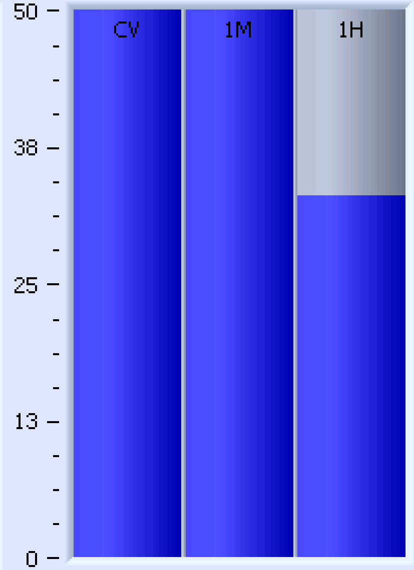
ug/sm³



CV	0.00
1MIN	0.00

Hg Prod Rate

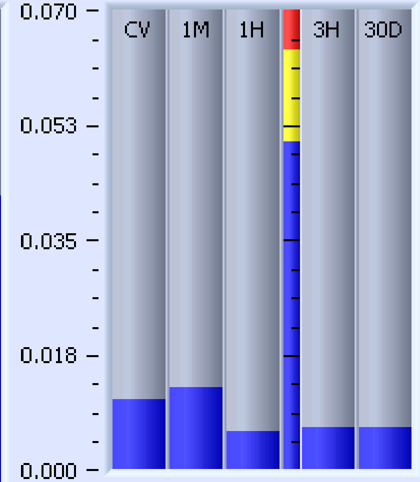
lb/MMton



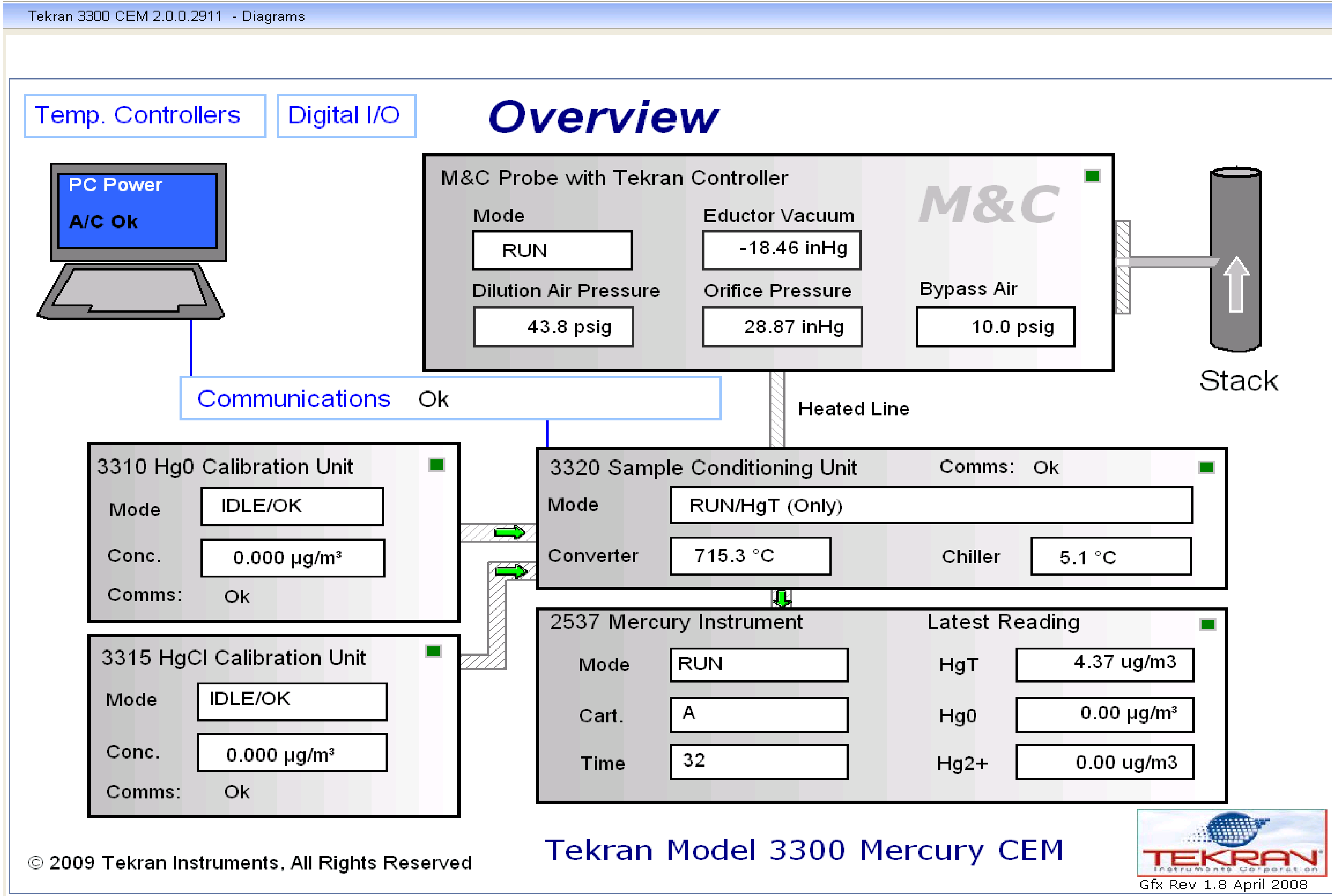
CV	68.83
1MIN	80.94
60MIN	33.05

Hg Mass Rate

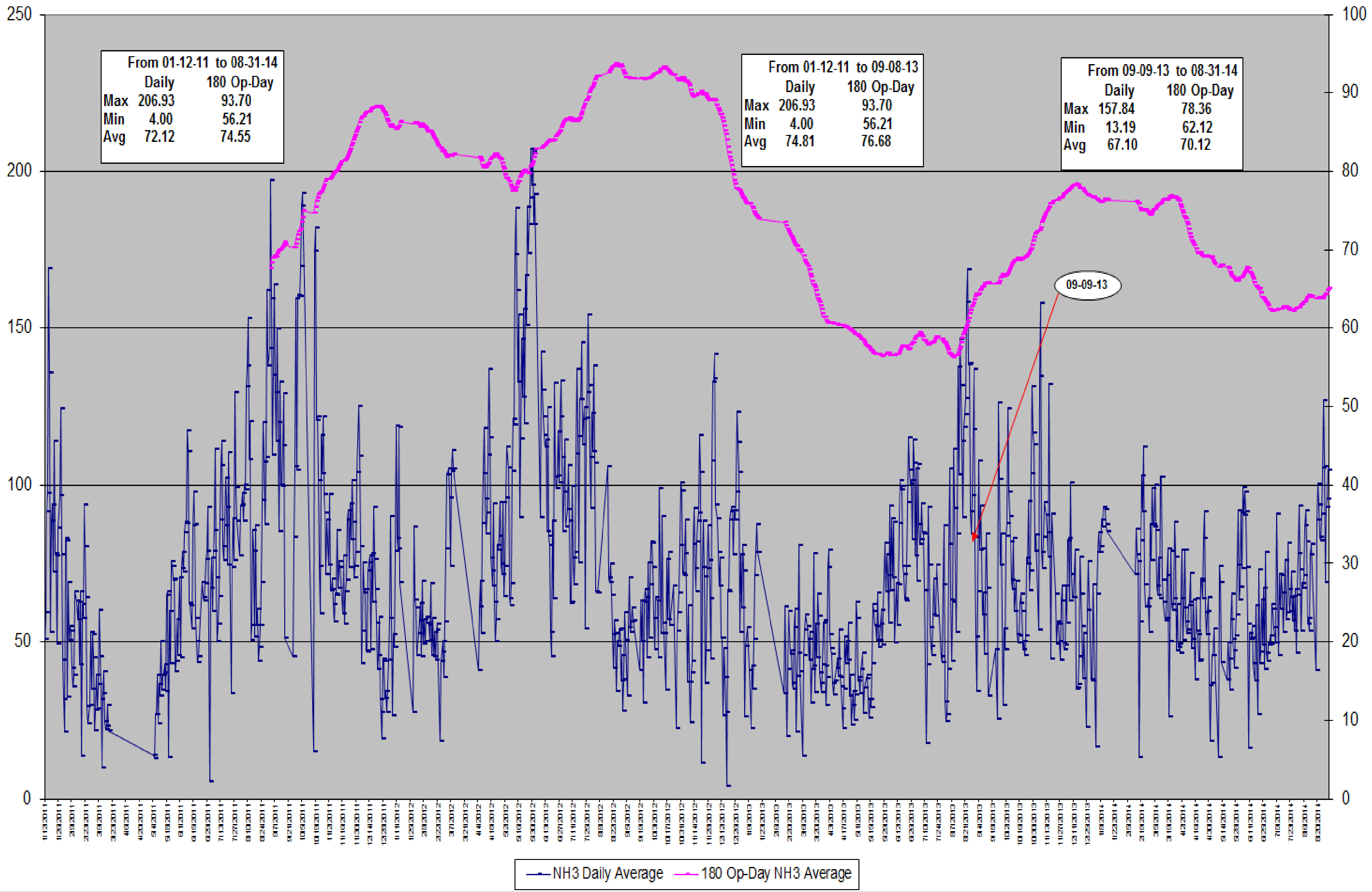
lb/hr



CV	0.01078
1MIN	0.01272
60MIN	0.00582
3HOUR	0.00666
30DAY	0.00656 H


Tekran 3300 CEM 2.0.0.2911 - Diagrams
Temp. Controllers
Digital I/O
Overview
PC Power
A/C Ok
M&C Probe with Tekran Controller
M&C
Mode
RUN
Eductor Vacuum
-18.46 inHg
Dilution Air Pressure
43.8 psig
Orifice Pressure
28.87 inHg
Bypass Air
10.0 psig
Stack
Communications Ok
Heated Line
3310 Hg0 Calibration Unit
Mode
IDLE/OK
Conc.
0.000 µg/m³
Comms: Ok
3315 HgCl Calibration Unit
Mode
IDLE/OK
Conc.
0.000 µg/m³
Comms: Ok
3320 Sample Conditioning Unit
Comms: Ok
Mode
RUN/HgT (Only)
Converter
715.3 °C
Chiller
5.1 °C
2537 Mercury Instrument
Latest Reading
Mode
RUN
Cart.
A
Time
32
HgT
4.37 ug/m3
Hg0
0.00 µg/m³
Hg2+
0.00 ug/m3
© 2009 Tekran Instruments, All Rights Reserved
Tekran Model 3300 Mercury CEM
TEKRAN
Gfx Rev 1.8 April 2008

	Date	Total Raw Mills Operating Hours, hrs	Kiln Operating Hours	Daily Clinker Produced, stons	SO2	NO2				Hg						Lime	Quarry			Comment
					Daily Average, lbs/hr	Daily Average, lbs/hr	Daily Average, lbs NO2/ ton Clinker	30 Op Day Rolling Average, lbs NO2/ ton Clinker	NH4OH Daily Total (M^3)	Hourly Average, lbs/hr	Target Daily lbs Hg	Daily Total, lbs	Daily Hg per MM t_clk	Carbon Daily Usage, tons	Hours of KMDC Dust Shuttle, hrs	Daily Usage by Kiln Op Hrs, lb/min	Avg. 24 Hrs Flow, gpm	Avg. Run Hrs Flow, gpm	Turbidity, NTU	
	Limits	48	24	------	481	------	2.3	2.3		0.0100			55	------	------	------	1972	------	40	
1	08/25/14	32.54	24.00	4534	438	392	2.07	2.09	21.67	0.0075	0.2494	0.1807	40	2.51	0.00	4.44	0	0	1.0	
2	08/26/14	22.67	24.00	4223	465	365	2.07	2.09	20.49	0.0078	0.2323	0.1873	44	2.68	7.47	4.87	0	0	1.0	
3	08/27/14	27.08	24.00	4232	434	390	2.21	2.11	20.53	0.0068	0.2328	0.1640	39	2.45	10.49	4.86	0	0	1.0	
4	08/28/14	48.00	24.00	4537	367	389	2.06	2.11	18.76	0.0062	0.2496	0.1492	33	1.25	9.05	3.36	0	0	1.0	
5	08/29/14	45.07	24.00	4450	479	385	2.08	2.11	19.69	0.0074	0.2448	0.1767	40	1.99	6.91	3.55	0	0	1.0	
6	08/30/14	41.38	24.00	4408	477	377	2.06	2.12	19.95	0.0075	0.2424	0.1803	41	2.12	11.98	4.27	0	0	1.1	
7	08/31/14	24.00	24.00	4405	464	384	2.09	2.11	19.45	0.0079	0.2422	0.1906	43	3.18	19.96	5.80	0	0	1.0	
8	09/01/14	39.80	24.00	4326	404	362	2.01	2.11	17.57	0.0075	0.2379	0.1804	42	2.12	0.00	4.46	0	0	1.0	
9	09/02/14	24.33	24.00	4278	442	355	1.99	2.11	17.87	0.0078	0.2353	0.1868	44	2.69	10.11	5.41	0	0	1.0	
10	09/03/14	32.74	24.00	4314	342	372	2.07	2.11	20.77	0.0076	0.2373	0.1818	42	2.27	5.86	4.69	0	0	1.0	
11	09/04/14	46.39	24.00	4162	247	345	1.99	2.11	15.49	0.0057	0.2289	0.1365	33	1.64	10.36	3.34	0	0	1.0	
12	09/05/14	29.98	24.00	4382	381	386	2.11	2.11	17.87	0.0075	0.2410	0.1802	41	2.17	5.78	4.20	0	0	1.0	
13	09/06/14	24.53	24.00	4327	340	375	2.08	2.11	21.93	0.0068	0.2380	0.1640	38	2.21	10.46	4.31	0	0	1.0	
14	09/07/14	34.14	24.00	4305	317	374	2.09	2.11	21.63	0.0067	0.2368	0.1603	37	1.93	11.85	4.15	0	0	1.0	
15	09/08/14	38.92	14.96	2511	197	198	1.90	2.10	8.49	0.0039	0.1381	0.0944	38	1.31	14.02	3.39	0	0	1.0	
16	09/11/14	0.00	6.08	547	171	65	2.84	2.11	3.00	0.0007	0.0301	0.0156	29	0.16	10.97	2.96	0	0	0.7	
17	09/12/14	19.75	24.00	4402	391	383	2.09	2.11	21.09	0.0087	0.2421	0.2082	47	3.33	5.99	6.12	0	0	0.0	
18	09/13/14	46.68	22.97	3678	313	325	2.12	2.10	26.15	0.0063	0.2023	0.1510	41	1.13	5.83	3.28	0	0	0.0	127 min of high temp. No exceedance.
19	09/14/14	35.73	23.04	4123	480	374	2.18	2.10	26.96	0.0072	0.2268	0.1729	42	1.70	16.67	5.19	0	0	0.0	152 min of high temp. No exceedance.
20	09/15/14	14.80	23.88	3612	451	311	2.07	2.11	15.67	0.0057	0.1987	0.1361	38	1.74	14.62	5.89	0	0	0.0	
21	09/16/14	29.93	24.00	3973	462	346	2.09	2.11	16.37	0.0059	0.2185	0.1416	36	2.19	11.42	4.67	0	0	0.0	
22	09/17/14	48.00	22.73	3741	358	327	2.10	2.11	21.45	0.0047	0.2058	0.1130	30	1.20	16.02	3.29	0	0	0.0	
23	09/18/14	30.25	24.00	3995	452	358	2.15	2.11	22.07	0.0064	0.2197	0.1547	39	2.48	2.50	6.18	0	0	0.0	
24	09/19/14	4.83	24.00	4054	462	354	2.10	2.10	22.93	0.0079	0.2230	0.1897	47	3.56	7.98	9.54	0	0	0.0	
25	09/20/14	40.74	24.00	4524	381	405	2.15	2.09	23.49	0.0080	0.2488	0.1922	42	2.64	0.00	6.71	0	0	0.0	
26	09/21/14	46.18	24.00	4673	271	416	2.14	2.09	28.63	0.0084	0.2570	0.2009	43	2.48	4.05	3.08	0	0	0.0	
27	09/22/14	35.20	24.00	4084	254	354	2.08	2.09	28.26	0.0069	0.2246	0.1660	41	3.34	5.93	4.11	0	0	0.0	
28	09/23/14	18.08	19.28	3109	319	324	2.50	2.10	20.41	0.0055	0.1710	0.1323	43	2.13	13.18	4.82	0	0	0.0	
29	09/24/14	25.48	24.00	4084	375	495	2.91	2.13	27.70	0.0071	0.2246	0.1705	42	2.67	10.03	5.39	0	0	0.0	
30	09/25/14	27.22	22.83	3899	464	439	2.70	2.15	29.31	0.0070	0.2144	0.1681	43	2.00	16.97	4.83	0	0	0.0	
	30-day	934		119894		10726		2.15	615.69			4.83	40	65.28	Average	4.71				



250
200
150
100
50
0
100
90
80
70
60
50
40
30
20
10
0
From 01-12-11 to 08-31-14
Daily 180 Op-Day
Max 206.93 93.70
Min 4.00 56.21
Avg 72.12 74.55
From 01-12-11 to 09-08-13
Daily 180 Op-Day
Max 206.93 93.70
Min 4.00 56.21
Avg 74.81 76.68
From 09-09-13 to 08-31-14
Daily 180 Op-Day
Max 157.84 78.36
Min 13.19 62.12
Avg 67.10 70.12
09-09-13
NH3 Daily Average
180 Op-Day NH3 Average

Implementation Guide

CEMs

- Process definitions
- Clinker production determination
- Daily calibration policy
- Calculation of hourly, daily and 30-day rolls
- Mercury and HCl “above span” rules
- Mercury CEMS QA discrepancies
- PM CMPS considerations

Process Definition

- Startup – time from when a shutdown kiln starts the ID fan and begins combusting fuel in the main burner. Startup ends when feed is being continuously introduced into the kiln for at least 120 minutes or when the feed rate exceeds 60% of the kiln design limit rate.

- Shutdown – begins when feed to the kiln is halted and ends when the kiln stops rotating

Clinker Production

- Necessary for Mercury and possibly PM limits
- Options are:
  - Measure directly or
  - Measure kiln feed rate and apply a kiln specific feed-to-clinker ratio based on reconciled clinker production (much like a bias factor in Part 75) (may not be the preferred method) (gets tricky) (apply to 30 day average and input into DAS)

Daily Calibration Policy

CEMs

- Generally follow Part 60 Appendix F
  - OOC: 4 * PS immediately or 2 * PS for 5 days
  - Applies to all CEMS
- PM CMPS and stack flow have no defined OOC (Out of Control)
- Therefore it is recommended that we follow the standard Part 60 App F policy for all CEMs and Stack flow monitors.

Hourly Validation / Average Creation

- **Hourly averages:**
  - **Follow 63.8 in general provisions**
  - **Arithmetic average of all valid on-line readings**
  - **Considered SU/SD hour if at least one minute is in SU/SD**
  - **Hourly calculated averages derived from raw hourly averages**
  - **63.1348(b)(1)(ii) changes when monitoring is required (i.e. downtime)**

Hourly Validation / Average Creation

- \- 63.1348(b)(1)(ii) states that CEMs should be in operation at all times except for periods of startup, shutdown and malfunction.
- Contentious!!
- The DAHS must record data during all periods of operation and derive the downtime logs from that. It is clear that all SU/SD data should be excluded from all excess emission logs.

Hourly Validation / Average Creation

CEMs

- 30-day rolling averages are built from hourly data within the last 30 kiln unit operating days (any 24-hour period in which the kiln operates for any time)

- Averages will only include normal operating hours and exclude hours defined as startup and shutdown. However, days that contain any operation (even if it's exclusive to startup or shutdown) will count as a kiln operating day and thus count as a "day" towards the 30-day roll

Hourly Validation / Average Creation

CEMs

- Hg rolls follow §63.1349 Eq-10 rather than average of hours
- It will sum the valid hourly mercury * flow emission rates over the 30-day period and divide it by the total clinker produced over the same 30-day period
- Could count kiln SU/SD operating day and thus count as a “day” towards the 30-day roll

Mercury "Above Span"

CEMs

- To quality assure mercury data above the certified span value, sources have the option to: (1) install and certify a second higher span monitor or (2) conduct and implement "above span" calibration checks and normalize the data.
- Option #1 is unlikely and burdensome

Mercury "Above Span"

- Required when readings are above certified span:
  - 2 <u>consecutive</u> valid hourly averages
  - Inject concentration within 50 – 150% of of the highest hourly average for the above span period.
  - If the above span calibration check is within 20% of the target the test passes with no data adjustment.
  - Normalization is both +/- and applies to hourly data that is > span
  - Normalize data 24 hours before or after above span calibration

Mercury "Above Span"

- If the calibration gas check is > 20% of the target then we will need to normalize only those hourly concentrations that are above the span during the 24-hr period preceding or following the above span calibration

- (Normalized concentration data = (R/A) * measured concentration). (like a Bias Adjustment factor in CFR Part 75 & RECLAIM)

Mercury "Above Span"

- It is acceptable to have normalization that reduces the measured concentration if the actual concentration during the above span calibration is above the target. Again, only above span data acquired during the particular "above span" event are normalized. Normalization of hourly data does not apply to Hg concentrations that are below the span value.

Mercury "Above Span"

CEMs

- A facility may want to accommodate any above span calibration by using 2 or 3 above span targets, referred to as "span 4 and span 5" (with span 1-3 being low-high levels required relative to the span value).
- It is highly preferable to conduct the "above span" calibration checks during the actual event in order to reduce down time
- A scenario may exist that a facility will want to schedule the "above span" calibration to occur daily as part of or after the routine daily calibration drift checks. Option is unlikely and burdensome

Mercury "Above Span"

CEMs

- A facility will have to configure alarms that indicate when an over span condition occurs thus notifying the facility when an above span calibration check needs to be initiated.
- A custom PLC code may need to be developed and associated DAS modifications
- It has not been determined by EPA if startup and shutdown data will be included in this above span logic.

CEMs

Ongoing Mercury QA/QC requirements

- Follow Procedure 5, PS 12A & B, 40 CFR 60, Appendix B
- Daily Calibration Drift is required and clearly defined
- Qtrly QGA (CGA) and RATA are clearly defined
- Weekly system integrity check procedure is missing and unclear (converter efficiency test from Ionic to Elemental)

Weekly system integrity check

- <u>System Integrity (SI) Check</u> means a test procedure assessing transport and measurement of oxidized Hg by a Hg CEMS. In particular, system integrity is expressed as the absolute value of the difference between the CEMS output response and the reference value of either a mid- or high-level mercuric chloride ($HgCl_2$) reference gas, as a percentage of span, when the entire CEMS, including the sampling interface, is challenged.

Weekly system integrity check

CEMs

- Required but no OOC defined
- No clearly defined pass/fail criteria defined in Procedure 5.
- Single run vs. Three run?
- Procedure 5 defined as % of span while everyone else is % of reference
- Absent any other guidance, some plants are using Pass/Fail from P63 Subpart UUUUU (Ulility MACT) which is 10% of reference or 0.8 ug/scm.

Ongoing Mercury QA/QC requirements

- <u>Quarterly Gas Audit (QGA)</u>
  - Required quarterly except when RATA is done
  - Elemental Hg audit followed by oxidized Hg
  - Elemental and oxidized gases must be NIST traceable. If gases used, no dilution allowed.
  - Zero, Low and Mid gases
  - An alternate Relative Accuracy Audit (RAA or a 3 point RATA) can be substituted for QGA

Ongoing Mercury QA/QC requirements

CEMs

- Calculations need to follow PS12A but…
- P/F defined in PS12A is % of span while
- PS12A Elemental limit is ±5.0% and Oxidized limit is ±10.0%

- P/F defined in Procedure 5 is % of reference
- Procedure 5 QGA limit is ±15% of audit value or ±0.5 ug/scm, whichever is greater

Ongoing Mercury QA/QC requirements

- It is recommended that sources petition EPA on an alternative to the QGA.
- This test, if conducted according to the rule, will likely take approximately 24 hours to complete (9 run elemental followed by a 9 run oxidized).
- DAS may need to be re-configured

HCl "Above Span"

- Similar to Mercury except that:
  - Target must be within 50 – 100% of concentration (Hg is 50 – 150%)
  - If the hourly average fails to collect the minimum data collection (two [2] 15-min quadrants) then the hour needs to be substituted with the average of the hour before and the hour after. The data substitution requirement only applies to invalid hours resulting from an above span calibration event… not every hour.

HCl "Above Span"

- Required when 2 hours with 24-hr period (not 2 consecutive as is for Hg)

- HCL only requires above span checks when there are 2 hourly averages greater than the span value with 24-hr period . The rule doesn't specify consecutive like it does for mercury…need EPA clarification

PM CEMs vs CPMS

- **PM CEMS measures particulate directly and is required to meet a battery of certification tests (initially using PS-11 and ongoing using Appendix F Procedure 2). Could become difficult.**

- **PM CMPS is a monitoring system that correlates a known reading (i.e. mA output of a PM CEMS) to a series of PM performance tests in the units of the applicable standard (lb/ton clinker)**

PM CPMS

CEMs

- PM CMPS have no defined ongoing QA … but no free pass
- Each source must derive their Site Specific Operating Limit (SSOL)
- If the results of the performance test are less than 75% of the limit (i.e. 0.75 * 0.07 = 0.0525), then the SSOL is equal to 75% of the limit.
- If the results are greater than 75% of the limit then the SSOL is the average of the 3 test runs.

PM CPMS

CEMs

- Separate SSOLs must be determined for both mill on and mill off conditions and weighted together to a single PM limit similar to what is conducted for THC. Some plants have questioned this?
- Most use a digital scale without a defined “scale” and need to be converted to mA
- EPA has release a guidance document on how this conversion is to be handled.
- Plants can correlate other data (i.e. backscatter) and develop a compliance plan based on this reading.

PM CPMS: Data Collection

- Vast number of interpretations of the rule
- Must be defined by the plants SSOL
- If mA signal, compliance will be demonstrated by a 30-day rolling average of this reading below their SSOL.

- If it's a digital signal then we should log some form of data from the instrument (i.e. backscatter, mg/scm) and compare it's reading against an equivalent SSOL in the units we're recording.

PM CPMS: SSOL for mill on & mill off

- Sources with in-line raw mills will be to calculate an hourly weighted PM SSOL based on the raw mill operating status (similar to what is done for Part 60 Subpart KKKK).

- Compliance will then be demonstrated by taking the 30-day rolling average PM readings and compare it against the 30-day rolling average weighted emission limit.

DAS Options

CEMs

- Is there any way to exclude any monitors from the CEMS DAS? For example, if using lime injection system parameters for HCl compliance, can that data be off-DAS (as well as that keeps the HCl FTIR off-DAS)? Could OEM software packages be used separate from the CEMS DAS for Hg or PM?

- Of course. Plants are making specific DAS

Implementation Challenges

- Mercury RATAs lately have been hit or miss for unknown reasons
- Failure of mercury RATA is unknown
- Mercury RATA involves a Reference Method Sorbent trap vs facility CEMs. Challenging!
- Some plants are injecting activated carbon/bromide to combat mercury
- Mercury CEMs filters tend to fail often. Aggressive maintenance.

Implementation Challenges

- HCl wet lime injection has been problematic
- Plants are leaning towards HCl compliance using a CaO dry injection but using HCl FTIR CEMs as a process monitor
- HCl NIST protocol gases are unavailable. Greater than 2% accuracy for HCl protocol gas for a 3 ppm compliance is challenging
- When measuring HCl, we are at the maximum detection limits. Challenging!

Compliance for PC MACT is a steep learning curve