Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

# Background Report Reference

**AP-42 Section Number:** 11.6

**Background Chapter:** 4

**Reference Number:** 41

**Title:** Lehigh Portland Cement Company
White Kiln Coke Conversion
Emission Compliance Report

Tenerex Corp

Tenerex Corp

December 1985

AP-42 Section 11.6
Reference not used
Report Sect. 4
Reference 41

TENERX CORP.

P.O. BOX 1444 • FRIENDSWOOD, TEXAS 77546 • (713) 482-5801

Do not use white cement kiln uses Gas + pet coke

# LEHIGH PORTLAND CEMENT CO.
# WHITE KILN COKE CONVERSION
# (TACB PERMIT NO. C-9399)
# EMISSION COMPLIANCE REPORT
# (SO2, NOX, & PARTICULATES)

(TENERX REPORT NO. TR85-12-26)

PREPARED BY

TENERX CORPORATION

PREPARED FOR

LEHIGH PORTLAND CEMENT CO.
HWY 84-W
WACO, TEXAS 76714-8176

wet process

SAMPLING SITE (WHITE KILN) - LOCATION
WOODWAY, McLENNAN COUNTY, TEXAS
LAT. 31 -38'-55" LONG. 97 -14'-30"

Ref 14

Wet Process Kiln

TACB Methods used

Process data insufficient to designate process type or clinker rate.

Note useable

## SECTION 2.0 - PROCEDURES

The equipment, procedures and analysis methods were those described in the TACB sampling procedures manual, the TACB laboratory manual (1983), and the EPA Federal Register. Tenerx performed the particulates based on Chapter 5 of the TACB Sampling Manual (Stack sampling for particulates). The sulfur dioxide sampling was based on Chapter 6 of the TACB Sampling Procedures Manual and the laboratory analysis was based on Chapter 24 of the TACB Laboratory Methods for Determination of Air Pollutants Manual. The NOx sampling and laboratory analysis was based on the EPA Federal Register, Title 40 (Protection of the Environment), Part 60, Appendix A, Method 7.

The main kiln stack was tested for SO2/Particulates using the combined sampling method and NOx was tested using EPA Method 7. The Clinker Cooler stack was tested for particulates using the TACB sampling procedure. Both stacks were analyzed for condensible particulates.

Pollutant Sampled: $SO_2$ & $SO_3$ Kiln Stack

| | Run No. 1 | Run No. 2 | Run No. 3 | Run No. 4 | Results |
|---|---|---|---|---|---|
| Date Sampled | 12-5-85 | 12-5-85 | 12-5-85 | | |
| Time | 9:45 am / 12:30 pm | 14:30 / 17:19 | 19:30 / 22:19 | | |
| No. of Points Sampled | 12 | 12 | 12 | | |
| Operating/Feed Rate G min | 66.6 | 66.96 | 66.5 | Gal/min | |
| % Operating Rate (Maximum) | 100 | 100 | 100 | | |
| Stack Temperature | 253.3 | 259.16 | 252 | | |
| Stack Flow Rate (DSCFM) | 32996.01 | 34943.79 | 37769.38 | | |
| Percent Moisture | 21.92 | 23.29 | 15.78 | | |
| Percent Oxygen | 12.0 | 12.0 | 10.9 | | |
| Percent Carbon Dioxide | 11.5 | 13.3 | 14.2 | | |
| Percent Isokinetic | 100.16 | 96.64 | 91.77 | | |
| Excess ~~Air~~ ($O_2$ AT STACK) - % | 12.0 | 12.0 | 10.9 | | |
| Pollutant Concentration LB/DSCF | 60.41 | 27.39 | 71.40 | | |
| Mass Emission Rate LB/Hr | 119.59 | 57.42 | 161.78 | | |
| Emissions (NSPS Units) | | | | | |
| TACB Permit Allowable Rate LB/Hr | 645 | 645 | 645 | | |
| NSPS Allowable Emissions LB/Hr | ~~645.0~~ | ~~645.0~~ | ~~645.0~~ | | |
| Regulation Allowable Rate | | | | | |
| TACB Regulation No. | | | | | |

| | Date |
|---|---|
| Dry Gas Meter Calibrated | 11-12-85 |
| Pitot Tube Calibrated | 11-26-85 |
| Nozzle Calibrated | 11-26-85 |

Pollutant Sampled: $NO_x$ - Kiln Stack

| | Run No. 1 | Run No. 2 | Run No. 3 | Run No. 4 | Results |
|---|---|---|---|---|---|
| Date Sampled | 12-5-85 | 12-5-85 | 12-5-85 | | |
| Time | 9:45 AM / 12:20 AM | 14:30 / 17:19 | 19:30 / 22:19 | | |
| No. of Points Sampled | 4 | 4 | 4 | | |
| Operating/Feed Rate GPM | 66.6 | 66.96 | 66.5 | | |
| % Operating Rate (Maximum) | 100 | 100 | 100 | | |
| Stack Temperature | 253.3 | 259.16 | 252 | | |
| Stack Flow Rate (DSCFM) | 32996.01 | 34943.71 | 37767.38 | | |
| Percent Moisture | 21.92 | 23.29 | 15.78 | | |
| Percent Oxygen | 12.0 | 12.0 | 10.9 | | |
| Percent Carbon Dioxide | 11.5 | 13.3 | 14.2 | | |
| Percent Isokinetic | 100.16 | 96.64 | 91.77 | | |
| Excess ~~Air~~ ($O_2$ At Stack) - % | 12.0 | 12.0 | 10.9 | | |
| Pollutant Concentration LB/DSCF | $1.262 \times 10^{-4}$ | $8.912 \times 10^{-5}$ | $3.405 \times 10^{-5}$ | | |
| Mass Emission Rate LBS/Hr. | 250.0 | 186.7 | 77.2 | | |
| Emissions (NSPS Units) | | | | | |
| TACB Permit Allowable Rate LB/HR | 325.0 | 325.0 | 325.0 | | |
| NSPS Allowable Emissions | | | | | |
| Regulation Allowable Rate | | | | | |
| TACB Regulation No. | | | | | |

| | Date |
|---|---|
| Dry Gas Meter Calibrated | N/A |
| Pitot Tube Calibrated | 11-26-85 |
| Nozzle Calibrated | 11-26-85 |

| ME | TEL COKE | KILN GAS | PRETTR GAS | QD GAS | ~~REDUCT OIL~~ | KILN SPEED | KILN FEED GPM | KILN FEED TPH | KILN FEED %H2O | ~~NOX KILN~~ | BH TEMP | CZ TEMP | % O2 | ID FAN % OPEN | FREE LIME | CLK COLOR | #1 CACC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 AM 0940 | 6377.7 | 198 | 1124 | 157 | 103 | 43 | CP 67.3 | 17.7 | 36.8 | 2869 | 450 | 1560 | 2.2 | 37% | | | |
| 1020 | 6380.0 | 205 | 1204 | 167 | 100 | 43 | 67.3 | 17.7 | 36.8 | 2304 | 450 | 1550 | 2.2 | 37% | | TEST 10 | |
| 1040 | 6380.8 | 210 | 1251 | 172 | 100 | 43 | CP 68.1 | 17.7 | 36.8 | 2238 | 450 | 1520 | 2.4 | 36% | | KILN | |
| 1110 | 6381.8 | 216 | 1312 | 180 | 98 | 43 | CP 65.7 | 17.3 | 36.8 | 210 | 430 | 1450 | 2.0 | 37% | | STACK | |
| 1140 | 6382.9 | 222 | 1384 | 189 | 96 | 43 | 65.7 | 17.3 | 36.8 | 196 | 430 | 1440 | 2.0 | 40% | | | |
| 1210 | 6383.9 | 228 | 1443 | 197 | 96 | 43 | 66.5 | 17.3 | 36.8 | 202 | 430 | 1450 | 2.0 | 40% | | | |
| 12 PM | | | | Test II | | | 66.6 avg | | | | | | | | | | |
| 1425 | 6388.7 | 256 | 1680 | 232 | 95 | 43 | 66.5 | 17.4 | 36.7 | 3140 | 450 | 1480 | 1.5 | 41% | | | |
| 1455 | 6389.6 | 261 | 1724 | 239 | 92 | 43 | 66.5 | 17.3 | 36.8 | 174 | 450 | 1460 | 1.7 | 42% | | | |
| 1525 | 6390.7 | 268 | 1774 | 248 | 92 | 43 | 66.5 | 17.2 | 63.3 | 26 | 440 | 1440 | 1.8 | 42% | | TEST 2 | |
| 1555 | 6391.8 | 274 | 1824 | 258 | 95 | 43 | 67.3 | 17.3 | 36.7 | 0 | 440 | 1440 | 2.4 | 42% | | KILN | |
| 1625 | 6392.8 | 280 | 1872 | 264 | 95 | 43 | 67.3 | 17.4 | 36.7 | 350 | 440 | 1450 | 2.2 | 42% | | STACK | |
| 1655 | 6394.0 | 287 | 1933 | 272 | 95 | 43 | 67.3 | 17.3 | 36.8 | 315 | 440 | 1450 | 2.0 | 42% | | | |
| 1715 | 6394.6 | GAS 290 | METERS 1965 | COUNTERS 277 | 95 | 43 | 67.3 | 17.3 | 36.8 | 239 | 440 | DO NOT 1450 | WRITE 2.2 | IN THIS 42% | SECTION | | |

66.96 avg

KILN GAS

PH GAS

COKE AIR HTR GAS

QD GAS

C.P. WATER

QD WATER

FUEL

| | | |
|---|---|---|
| KILN | CFH | |
| PH | CFH | CFH |
| AH-1 | CFH | |
| COKE | TPH | |
| OIL | GPM | |
| QD | CFH | |

TOTAL GAS TO KILN

TONS MBTU/NT

[redacted] HIT PLA[redacted] RE[redacted]RT [redacted] DA[redacted]

| TIME | PET. COKE 2.14 | KILN GAS | PREHTR GAS | QD GAS | REDUCT ~~AIR~~ | KILN SPEED | KILN FEED GPM | KILN FEED TPH | KILN FEED %H2O | H2O TO KILN | BH TEMP | C2 TEMP | % O2 | ID FAN % OPEN | FREE LIME | CLK COLOR | # 1 K CAGE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1930 ~~12 AM~~ | 6399.4 | 329 | 2201 | 313 | 95 | 43 | 66.5 | 17.4 | 36.4 | 194 | 490 | 1500 | 2.1 | 45 | | | |
| 0000 2 | 6400.4 | 337 | 2253 | 320 | 90 | 43 | 66.5 | 17.2 | 36.5 | 160 | 520 | 1520 | 2.0 | 45 | | | |
| 0330 | 6401.7 | 344 | 2316 | 330 | 95 | 43 | 66.5 | 17.5 | 36.5 | 136 | 510 | 1520 | 1.5 | 45 | | TEST 3 | |
| 6 0600 | 6402.5 | 356 | 2360 | 336 | 95 | 43 | C-D 66.5 | 17.3 | 36.5 | 138 | 470 | 1480 | 1.5 | 45 | | K-40 | |
| 8 0930 | 6403.4 | 366 | 2413 | 344 | 90 | 43 | 66.5 | 17.3 | 36.6 | 154 | 440 | 1400 | 2.5 | 45 | | SPACE | |
| 10 1200 | 6404.6 | 375 | 2481 | 352 | 95 | 43 | 66.5 | 17.2 | 36.5 | 164 | 450 | 1420 | 2.0 | 44 | | | |
| 12 PM 1230 | 6405.6 | 384 | 2533 | 359 | 90 | 43 | 66.0 | 17.2 | 36.5 | 178 | 470 | 1490 | 2.5 | 44 | | | |
| 2 | | | | | | | 66.5 avg | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | |

| | GAS METERS | COUNTERS |
|---|---|---|
| KILN GAS | | |
| PH GAS | | |
| COKE PREHTR GAS | | |
| QD GAS | | |
| [illegible] OIL | | |

C.P. WATER _____

QD WATER _____

DO NOT WRITE IN THIS SECTION

| Fuel | | |
|---|---|---|
| KILN | | CFH |
| PH | | CFH |
| AH-1 | | CFH |
| COKE | | TPH |
| OIL | | GPM |
| QD | | CFH |

TOTAL GAS TO KILN _____ CFH

TONS MBTU/HT

| ME | PET. COKE | KILN GAS | PREHTR GAS | QD GAS | Reduct OIL | KILN SPEED | KILN FEED GPM | KILN FEED TPH | KILN FEED %H2O | NOx KILN | BH TEMP | CZ TEMP | % O2 | ID FAN % OPEN | FREE LIME | CLK COLOR | #1 CRC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0940 | 6378.7 | 198 | 1124 | 157 | 103 | 43 | 67.3 | 17.7 | 36.8 | 2869 | 450 | 1560 | 2.2 | 37% | | | |
| 1020 | 6320.0 | 205 | 1204 | 167 | 100 | 43 | 67.3 | 17.7 | 36.8 | 2504 | 450 | 1550 | 2.2 | 37% | | | |
| 1040 | 6386.8 | 210 | 1251 | 172 | 100 | 43 | 68.1 | 17.7 | 36.8 | 2238 | 450 | 1520 | 2.4 | 36% | | | |
| 1110 | 6381.8 | 216 | 1312 | 180 | 98 | 43 | 65.7 | 17.3 | 36.5 | 210 | 430 | 1450 | 2.0 | 37% | | | |
| 1140 | 6389.9 | 222 | 1384 | 189 | 96 | 43 | 65.7 | 17.3 | 36.5 | 196 | 430 | 1440 | 2.0 | 40% | | | |
| 1210 | 6393.9 | 228 | 1443 | 197 | 96 | 43 | 66.5 | 17.3 | 36.8 | 202 | 420 | 1430 | 2.0 | 40% | | | |
| PM | | | | Test | | II | | | | | | | | | | | |
| 1425 | 6388.7 | 256 | 1680 | 232 | 95 | 43 | 66.5 | 17.4 | 36.7 | 2140 | 450 | 1480 | 1.5 | 41% | | | |
| 1455 | 6389.6 | 261 | 1720 | 239 | 92 | 43 | 66.5 | 17.3 | 36.8 | 1740 | 450 | 1460 | 1.7 | 42% | | | |
| 1529 | 6394.7 | 268 | 1774 | 248 | 92 | 43 | 66.5 | 17.2 | 36.8 | 26 | 440 | 1440 | 1.8 | 42% | | | |
| 1555 | 6391.8 | 274 | 1824 | 258 | 95 | 43 | 67.3 | 17.3 | 36.7 | 0 | 440 | 1440 | 2.4 | 42% | | | |
| 1625 | 6392.8 | 280 | 1872 | 264 | 95 | 43 | 67.3 | 17.4 | 36.7 | 350 | 440 | 1450 | 2.2 | 42% | | | |
| 1655 | 6394.0 | 287 | 1933 | 272 | 95 | 43 | 67.3 | 17.3 | 36.8 | 315 | 440 | 1450 | 2.0 | 42% | | | |
| 1745 | 6394.6 | | | | | 43 | 67.3 | 17.3 | 36.8 | 239 | 440 | 1450 | 2.2 | 42% | | | |

| | GAS | METERS | COUNTERS | |
|---|---|---|---|---|
| | 290 | 1965 | 277 | 95 |
| KILN GAS | | | | |
| PH GAS | | | | |
| COKE AIR HTR. GAS | | | | |
| QD GAS | | | | |

C.P. WATER _____

QD WATER _____

DO NOT WRITE IN THIS SECTION

Fuel

| | | |
|---|---|---|
| KILN | | CFH |
| PH | | CFH |
| AH-1 | | CFH |
| COKE | | TPH |
| OIL | | GPM |
| QD | | CFH |

TOTAL GAS TO KILN _____ CFH

TONS _____

MBTU/NT _____

| ME | PET. COKE | KILN GAS | PREHTR GAS | QD GAS | REDUCT ~~OIL~~ | KILN SPEED | KILN FEED GPM | KILN FEED TPH | KILN FEED %H2O | H2O TO KILN | BH TEMP | CZ TEMP | % O2 | ID FAN % OPEN | FREE LIME | CLK COLOR | ±1 CRC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1930 12-AM | 2.14 6399.4 | 329 | 2204 | 313 | 95 | 43 | 66.5 | 17.4 | 36.4 | 194 | 490 | 1500 | 2.1 | 45 | | | |
| 2000 2 | 6400.4 | 337 | 2253 | 320 | 90 | 43 | 66.3 | 17.2 | 36.5 | 160 | 520 | 1520 | 2.0 | 45 | | | |
| 2030 | 6401.7 | 344 | 2316 | 330 | 95 | 43 | 66.5 | 17.5 | 36.5 | 136 | 510 | 1520 | 1.5 | 45 | | | |
| 6 2100 | 6402.5 | 356 | 2360 | 336 | 95 | 43 | C-P 66.5 | 17.3 | 36.5 | 138 | 470 | 1480 | 1.5 | 45 | | | |
| 8 2130 | 6403.4 | 366 | 2413 | 344 | 90 | 43 | 66.5 | 17.3 | 36.6 | 154 | 440 | 1400 | 2.5 | 45 | | | |
| 10 2200 | 6404.6 | 375 | 2481 | 352 | 95 | 43 | 66.5 | 17.2 | 36.5 | 164 | 450 | 1420 | 2.0 | 44 | | | |
| 12 PM 2230 | 6405.6 | 384 | 2533 | 359 | 90 | 43 | 66.0 | 17.2 | 36.5 | 178 | 470 | 1490 | 2.5 | 44 | | | |
| 2 | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | |

| | GAS METERS | COUNTERS |
|---|---|---|
| KILN GAS | | |
| BH GAS | | |
| COKE AIR HTR GAS | | |
| QD GAS | | |
| [illegible] OIL | | |

C.P. WATER _____

QD WATER _____

DO NOT WRITE IN THIS SECTION

FUEL

| | | |
|---|---|---|
| KILN | | CFH |
| PH | | CFH |
| AH-1 | | CFH |
| COKE | | TPH |
| OIL | | GPM |
| QD | | CFH |

TOTAL GAS TO KILN _____ CFH

TONS _____

MBTU/NT _____

[redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted]

# WHITE PLANT KILN REPORT

DATE 12-6-85

| TIME | PET COKE (X 1000) | KILN GAS (X 100) | PREHTR GAS (X 100) | QD GAS (X 100) | REJECT FAN ~~OIL~~ | KILN SPEED | KILN FEED GPM | KILN FEED TPH | KILN FEED %$H_2O$ | $H_2O$ TO KILN | BH TEMP | CZ TEMP | % $O_2$ | ID FAN % OPEN | FREE LIME | CLK COLOR | # CLK CREO |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ~~12 AM~~ 30 PM | 6433.4 | 664 | 4521 | 518 | 109 | 42 | 68.5 | 17.3 | 36.7 | — | 450 | 1490 | 1.8 | 43 | | | |
| 2:30 PM | 6435.5 | 674 | 4641 | 534 | 102 | 42 | 68.9 | 17.2 | 36.8 | — | 460 | 1500 | 2.0 | 43 | | | |
| TOP 4 | 6438.6 | 694 | 4801 | 559 | 102 | 42 | 67.1 | 17.2 | 36.9 | — | 460 | 1480 | 2.0 | 43 | | | |
| PART 5 | 6440.9 | 706 | 4923 | 577 | 102 | 42 | 67.3 | 17.2 | 36.7 | — | 460 | 1480 | 2.0 | 43% | | | |
| 6:00 PM | 6442.8 | 716 | 5045 | 591 | 102 | 42 | 67.2 | 17.4 | 36.6 | | 460 | 1500 | 2.0 | 43.5% | | | |
| 7:00 | 6445.0 | 725 | 5178 | 606 | 102 | 42 | 66.5 | 17.2 | 36.7 | | 460 | 1500 | 2.0 | 43% | | | |
| 8:00 | 6447.2 | 735 | 5315 | 623 | 102 | 42 | 66.5 | 17.2 | 36.7 | | 450 | 1500 | 2.3 | 43.% | | | |
| 10 | | | | | | | | | | | | | | | | | |
| 12 PM | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | |

| | GAS METERS | COUNTERS |
|---|---|---|
| KILN GAS | | |
| PH GAS | | |
| COKE AIR HTR GAS | | |
| QD GAS | | |

C.P. WATER _____

QD WATER _____

DO NOT WRITE IN THIS SECTION

| Fuel | | |
|---|---|---|
| KILN | | CFH |
| PH | | CFH |
| AH-1 | | CFH |
| COKE | | TPH |
| OIL | | GPM |
| QD | | CFH |

TOTAL GAS TO KILN _____ CFH

TONS MBTU/NT