

FINAL AUDIT REPORT OF
COMPLIANCE TESTING
AT CF&I STEEL'S
COKE PLANT PUSHING OPERATIONS
IN PUEBLO, COLORADO

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.

AP-42 Section 12-2
Reference _____
Report Sect. 4
Reference 131



Prepared For:

U.S. ENVIRONMENTAL PROTECTION AGENCY
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Under

EPA Contract 68-01-4145
Task 76

TRC Project No. 1274-E28

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FINAL AUDIT AND REVIEW REPORT
OF PARTICULATE COMPLIANCE TESTING
CONDUCTED AT CF&I STEEL CORPORATION'S
COKE PLANT IN PUEBLO, COLORADO

INTRODUCTION

On March 4 through March 20, 1980, emission tests were conducted by the Almega Corporation of Chicago, Illinois at CF&I Steel Corporation's Coke Plant in Pueblo, Colorado to determine particulate emission levels for the mobile gas cleaning system. A total of eight tests was performed - five on the north gas cleaning car and three on the south. Particulates, flue gas velocities, temperatures, moisture, oxygen, and carbon dioxide were measured during each test, with the audited results presented in this report.

Table I summarizes the emission results of this audit using raw data reported by Almega Corporation in their report dated April 21, 1980 and calculated using an EPA computer program. As initially reported in TRC's final Observation Report issued July 16, 1980, all of the tests except NSC-1 (3/04/80) are within the imposed limits of isokinetics and, in general, all of the concentration values reported by Almega Corporation are in close agreement (<0.003 lb/ton difference) with the audited results. There are, however, large differences with those values initially reported in the Observation Report.

NORTH GAS CLEANING CAR (#2)

The average particulate emission rate for the north gas cleaning car was 0.032 lb/ton of coke based on those tests which are acceptable from a testing standpoint. Although the results from the tests completed March 11 through March 14, 1980 have been reviewed, the average emission values are determined from those tests completed March 12 through March 14, 1980. These test results are marginal with respect to the allowable concentration of 0.03 lb/ton of coke.

As was more fully reported in TRC's Final Summary Report of Visible Emission Observations at CF&I Steel's Coke Plant Pushing Operations and Observation Report of Compliance Testing ... various testing and process related problems occurred during the testing program that precluded the use of some data in determining compliance status for the north gas cleaning car. In essence, those comments listed in the report submitted by the testing contractor are accurate. The following highlights the north car testing problems.

Test NSC-1 3/4/80 - Test invalidated by Mr. Humphries because of low sample volume: 22.7 dscf instead of the required 30 dscf; and because of high isokinetics - 113% instead of the required 100[±] 10% due to improper nozzle selection.

Test NSC-2 3/6/80 - Testing cancelled after six pushes because of damaged sampling equipment.

Test NSC-1 3/11/80- Test considered nonrepresentative due to improper coking operation. Pushing schedule followed no 'normal operation' resulting in numerous bad pushes. Also, corrected volume of 28.7 below requirements. Highest grain loading of any test to date.

Test NSC-2 3/12/80- Complete tests with minimal amount of operational
NSC-4 3/14/80 problems, large amounts of moisture and particulate captured in cyclone drop-out bottle of sample train.

As noted on the audit calculation forms, the moisture levels for NSC-3 and NSC-4 were above the saturation level of the flue gas for the measured temperature. As required by USEPA Reference Method 4, the lower psychometric values were used in this audit report for isokinetic determination and to determine the flue gas volume and emission levels. This more accurately reflects true emission conditions, since the volume of water droplets (supersaturated conditions) can be assumed to be negligible. The testing contractor used the actual determined moisture values for these two tests, resulting in lower emission levels.

SOUTH GAS CLEANING CAR (#1)

The average particulate emission rate for the south gas cleaning car was 0.029 lb/ton of coke based on the average of two tests - SSC-2 and SSC-3 (March 19-20, 1980). These results are marginal with respect to the allowable concentration of 0.03 lb/ton of coke. The test run performed on March 18, 1980, although technically representative of actual stack emissions, apparent control system upsets occurred in the first two pushes at the beginning of this test run (See Summary Report of Visible Emission Observations and Observation Report of Compliance Testing for details). Briefly, the scrubber system momentarily shut down upon the initiation of these pushes resulting in high opacity levels and immediate deposition of visible particulate materials on the filter. As a result, the grain loading for the test was 55% higher than series average. Also, numerous delays and diesel problems were encountered during the testing.

PROBLEMS

In reviewing the report submitted by the Almega Corporation, several errors were found. These errors essentially account for the differences in the preliminary results as presented by this office and the final results in this Audit Report.

Those errors found that directly contribute to differences for both gas cleaning cars were the nonuse of calibration values ('Y' and 'Cp') reported by the testing contractor and the use of outdated equations (Pre 1976 Federal Register) in performing calculations. Although the Almega Corporation reported the pre-and post-test calibration factors as requested, standard values were used in the calculations. This omission, plus the use of outdated equations, resulted in a 3% change in results.

More importantly however, was the change, generally an increasing one, in the grain loadings reported in the contractor's report to those reported in TRC's Final Observation Report. With the exception of Test NSC-2

(a computation error by Mr. Humphries), each test run's net weight (reported as grams) increased approximately 6% from previously reported values. There is no readily apparent reason why the sample weight increased from the initial weighings, but the final weights reported by Almega were used in this Audit Report.

Finally, as stated in the Observation Report, the preliminary mass emission rates were based on previously determined process values. The process data submitted in the contractor's report for the month of February (one month prior to testing) shows an increase in the production rate of 0.06 ton of coke per oven (from 12.42 to 12.48 ton of coke pushed per oven) and this production value was used in determining mass emission rates.

SUMMATION

To summarize, the audited results indicate that the mass emission rates for both the north and the south gas cleaning cars are marginal with respect to the applicable particulate emission standard. Several factors may influence the compliance determination, such as the representativeness of the process and control equipment operating conditions as well as the possible testing biases discussed below. As a result, this report does not attempt to make a complete compliance determination.

For the north gas cleaning car the biases (both high and low) introduced by leaving the sampling probe within the stack between pushes and the failure of the glass-lined sampling probe to maintain a consistent temperature have an unknown effect on the representativeness of the samples. One effect is the deposition of saturated moisture and material in the cyclone drop-out bottle.

The most significant departure from previous test procedures, which may have resulted in a more representative sample being taken from the south gas cleaning car was the enlargement of ports to facilitate complete sample train removal from the stack between pushes (points). The additional usage of a stainless steel probe in place of a glass probe as was used on the north

gas cleaning car resulted in accurately maintained temperatures and elimination of moisture condensing in the cyclone part of the sample train. These changes alleviated the possible contamination of the sample and appear to represent a better sampling technique.

For this audit report, all corrected computational values were used, and shows a close relationship, in general, to those submitted by the testing contractor. The changes, as previously noted, result in an overall increase of 5% from preliminary values reported in TRC's Observation Report.

SUMMARY OF AUDITED RESULTS
 CF&I STEEL CORPORATION - COKE PLANT
 NORTH & SOUTH GAS CLEANING CARS

TABLE IA - NORTH CAR

TEST #	DATE	TIME	% MOISTURE	VELOCITY (fps)	FLOWRATE (dscfm)	EMISSION RATE (gr/dscf)/(lb/Ton)	% ISOKINETIC
1	3/11/80 ^b	0849-1628	29.64	95.92	24,711	0.0486	91.0
2	3/12/80	0928-1627	22.38	96.73	28,163	0.0337	99.0
3	3/13/80	0829-1434	26.33 ^A	99.57	27,862	0.0330	101.7
4	3/14/80	0816-1408	26.32 ^A	98.75	27,641	0.0405	93.3
AVERAGE							
	(3/11-3/14)		26.17	97.62	27,094	0.0390	96.3
	(3/12-3/14)		25.01	98.35	27,889	0.0357	98.0

TABLE IB - SOUTH CAR

TEST #	DATE	TIME	% MOISTURE	VELOCITY (fps)	FLOWRATE (dscfm)	EMISSION RATE (gr/dscf)/(lb/Ton)	% ISOKINETIC
1	3/18/80 ^b	0849-1635	21.74	94.47	28,707	0.0446	96.0
2	3/19/80	1022-1620	24.38	102.70	29,749	0.0273	94.3
3	3/20/80	0916-1535	22.60	97.77	29,417	0.0296	95.2
AVERAGE							
	(3/18-3/20)		22.91	98.31	29,291	0.0345	95.2
	(3/19-3/20)		23.49	100.24	29,583	0.0295	94.8

^A DETERMINED SATURATED MOISTURE LEVEL; MEASURED MOISTURE CONTENT WAS 32.6% AND 28.7%, RESPECTIVELY.

^b Test usefulness is questionable, see text

SOURCES: CFEI STEEL CORPORATION - COKE PLANT - PUEBLO, COLORADO
 LOCATION: NORTH GAS CLEANING CAR - SCRUBBER OUTLET
 DATE RECEIVED: 28 APRIL 80
 TESTED BY: THE AIMEGA CORPORATION CHICAGO ILLINOIS
 OBSERVED BY: SE HUMPHRIES TRC-DENVER
 AUDIT DATE: 28 APRIL 80
 AUDITED BY: SE HUMPHRIES TRC-DENVER

RUN NO. NSC-1 DATE 11 MARCH 80 TIME 0849-1625

INPUT DATA

% CO	<u>0.00</u>
% CO ₂	<u>5.03</u>
% O ₂	<u>15.70</u>
ΔH_{avg} ("H ₂ O)	<u>0.317</u>
P _b ("H _g)	<u>25.06</u>
V _m (ft. ³)	<u>35.059</u>
T _m (°F)	<u>82.8</u>
Y	<u>1.0053</u>
V _w (ml) (If unknown, enter zero)	<u>257</u>
B _{ws} (decimal) from tables	<u>—</u>
*R/S	
P _{st} ("H ₂ O)	<u>+ 0.963</u>
ΔP_i	
GTO 216	
T _s (°F)	<u>160.7</u>
C _p	<u>0.8426</u>
d _s (ft) (EQUIVALENT)	<u>3.29932341</u>
*R/S	
T _t (MIN)	<u>99.08</u>
d _n (IN)	<u>0.150</u>
M _n (mg)	<u>90.6</u>
C _a (mg/g)	<u>—</u>
V _{aw} (ml)	<u>—</u>
ρ (g/ml)	<u>—</u>
'F' Factor	<u>—</u>

(POST-TEST)

OUTPUT DATA

% EA	292
V _m (dscf)	28.742
B _{ws} (Decimal)	0.296
M _s (Wet)	24.859
ΔP AVG.	1.781
(√ΔP) AVG.	1.335
V _s (fps)	98.82
Q _{sd} (dscfm)	24711.0
% Isokinetic	91.0
M _n (mg corrected for blank)	90.6
mg/dscf	3.1522
gn/dscf	0.0486
lb./dscf	6.9-E06
lb./hr	10.3
lb./10 ⁶ BTU (Boilers)	
Inv. list memories CMS, RST, CLR	0.0383

16/Ton

Nsc-1

13.7000
291.68890
25.06000
28.74177
257.00000
0.29635
24.85935
1.7808
1.7808
1.3345
95.8158
2.4711 04
9.0967 01 XISD
9.0600 01
3.1522 00
4.8646-02
6.9494-06
1.0303 01
1.5297 01 16
3.8305-02 16/Ton

SOURCES: CF&I STEEL CORPORATION - COKE PLANT - PUEBLO, COLORADO
 LOCATION: NORTH GAS CLEANING CAR - SCRUBBER OUTLET
 DATE RECEIVED: 28 APRIL 80
 TESTED BY: THE ALUMEGA CORPORATION CHICAGO, ILLINOIS
 OBSERVED BY: SE HUMPHRIES TRC-DENVER
 AUDIT DATE: 28 APRIL 80
 AUDITED BY: SE HUMPHRIES TRC-DENVER

RUN NO. NSC-2 DATE 12 MARCH 80 TIME 0928-1627

INPUT DATA

% CO	<u>0.00</u>
% CO ₂	<u>4.60</u>
% O ₂	<u>15.125</u>
ΔH_{avg} ("H ₂ O)	<u>0.470</u>
P _b ("Hg)	<u>24.99</u>
V _m (ft. ³)	<u>46.66</u>
T _m (°F)	<u>84.2</u>
Y	<u>1.0053</u>
V _w (ml) (If unknown, enter zero)	<u>233</u>
B _{ws} (decimal) from tables	<u>—</u>
*R/S	
P _{st} ("H ₂ O)	<u>+1.05</u>
ΔP_i	
GTO 216	
T _s (°F)	<u>145</u>
C _p	<u>0.8426</u>
d _s (ft)	<u>3.29932341</u>
*R/S	
T _t (MIN)	<u>95.1</u>
d _n (IN)	<u>0.150</u>
M _n (mg)	<u>83.1</u>
C _a (mg/g)	<u>—</u>
V _{aw} (ml)	<u>—</u>
ρ (g/ml)	<u>—</u>
'F' Factor	<u>—</u>

NSC-2

OUTPUT, DATA

% EA	243
V _m (dscf)	38.065
B _{ws} (Decimal)	0.224
M _s (Wet)	25.908
ΔP AVG.	1.936
(√ΔP) AVG.	1.391
V _s (fps)	96.74
Q _{sd} (dscfm)	28163.0
% Isokinetic	99.0
M _n (mg corrected for blank)	83.1
mg/dscf	2.1831
gn/dscf	0.0337
lb./dscf	4.8 - E06
lb./hr	8.1
lb./10 ⁶ BTU (Boilers)	
Inv. list memories CMS, RST, CLR	0.0323

16/TON

15.1250
242.98227
24.99000
38.06463
233.00000
0.22379
25.90788
2.6
2.6
2.1
2.5
2.8
2.9
2.9
2.5
1.0
1.7
1.8
1.7
1.7
1.2
1.4
1.4
1.5
1.5
1.0
1.0
1.0
1.0
1.0
1.0
1.0
1.0
1.0
1.0
1.0
1.9359
1.3914
96.7352
2.8163 04
9.9014 01 2180
8.3100 01
2.1831 00
3.3691-02
4.8129-06
8.1329 00
1.2890 01 15
3.2278-02 16/TON

SOURCES: CF&I STEEL CORPORATION - CORE PLANT - PUEBLO, COLORADO
 LOCATION: NORTH GAS CLEANING CAR - SCRUBBER OUTLET
 DATE RECEIVED: 28 April 80
 TESTED BY: THE ALMEGA CORPORATION CHICAGO ILLINOIS
 OBSERVED BY: SE HUMPHRIES TRC-DENVER
 AUDIT DATE: 28 April 80
 AUDITED BY: SE HUMPHRIES TRC-DENVER

RUN NO. NSC-3 DATE 13 March 80 TIME 0729-1434

INPUT DATA

% CO	<u>0.00</u>
% CO ₂	<u>4.70</u>
% O ₂	<u>15.025</u>
Δ H _{avg} ("H ₂ O)	<u>0.462</u>
P _b ("Hg)	<u>25.31</u>
V _m (ft. ³)	<u>42.810</u>
T _m (°F)	<u>74.5</u>
Y	<u>1.0053</u>
V _w (ml) (If unknown, enter zero)	<u> </u>
B _{ws} (decimal) from tables	<u>0.26327 (SATURATED)</u>
*R/S	
P _{st} ("H ₂ O)	<u>+1.000</u>
ΔP _i	
GTO 216	
T _s (°F)	<u>145</u>
C _p	<u>0.9426</u>
d _s (ft)	<u>3.29932341</u>
*R/S	
T _t (MIN)	<u>88.57</u>
d _n (IN)	<u>0.150</u>
M _n (mg)	<u>76.9</u>
C _a (mg/g)	<u> </u>
V _{aw} (ml)	<u> </u>
ρ (g/ml)	<u> </u>
'F' Factor	<u> </u>

OUTPUT DATA

% EA	238.
V _m (dscf)	36.012
B _{ws} (Decimal)	0.263
M _s (Wet)	25.311
ΔP AVG.	2.029
(√ΔP) AVG.	1.425
V _s (fps)	99.57
Q _{sd} (dscfm)	27862.0
% Isokinetic	101.7
M _n (mg corrected for blank)	76.9
mg/dscf	2.135
gn/dscf	0.0330
lb./dscf	4.7 - E06
lb./hr	7.9
lb./10 ⁶ BTU (Boilers)	—
Inv. list memories CMS, RST, CLR	0.0291

16/ton

NSC-3

- 15.02300
- 237.55940
- 25.31000
- 36.01150
- 273.22486
- 0.26327
- 25.31097
- 2.0291
- 2.0291
- 1.4245
- 99.5717
- 2.7862 04
- 1.0167 02 %190
- 7.6900 01
- 2.1354 00
- 3.2955-02
- 4.7078-06
- 7.8700 00
- 1.1618 01 16
- 2.9091-02 16/Ton

SOURCES: CF&I STEEL CORPORATION - COKE PLANT - PUEBLO, COLORADO
 LOCATION: North Gas Cleaning Can - Scrubber Outlet
 DATE RECEIVED: 28 April 80
 TESTED BY: The ALMERA CORPORATION CHICAGO, ILLINOIS
 OBSERVED BY: SE HUMPHRIES TRC-DENVER
 AUDIT DATE: 27 April 80
 AUDITED BY: SE HUMPHRIES TRC-DENVER

RUN NO. NSC-4 DATE 14 March 80 TIME 0816-1408

INPUT DATA

% CO	<u>0.00</u>
% CO ₂	<u>4.625</u>
% O ₂	<u>15.00</u>
Δ H _{avg} ("H ₂ O)	<u>0.404</u>
P _b ("Hg)	<u>25.32</u>
V _m (ft. ³)	<u>39.160</u>
T _m (°F)	<u>84.3</u>
Y	<u>1.0053</u>
V _w (ml) (If unknown, enter zero)	<u>—</u>
B _{ws} (decimal) from tables	<u>0.26321 (SATURATED)</u>
*R/S	
P _{st} ("H ₂ O)	<u>+0.95</u>
ΔP _i	
GTO 216	
T _s (°F)	<u>145</u>
C _p	<u>0.8426</u>
d _s (ft)	<u>3.29932341</u>
*R/S	
T _t (MIN)	<u>87.4</u>
d _n (IN)	<u>0.150</u>
M _n (mg)	<u>85.0</u>
C _a (mg/g)	<u>—</u>
V _{aw} (ml)	<u>—</u>
ρ (g/ml)	<u>—</u>
'F' Factor	<u>—</u>

OUTPUT DATA

% EA	<u>235.</u>
V _m (dscf)	<u>32.355</u>
B _{ws} (Decimal)	<u>0.263</u>
M _s (Wet)	<u>25.302</u>
ΔP AVG.	<u>1.996</u>
(√ΔP) AVG.	<u>1.413</u>
V _s (fps)	<u>98.75</u>
Q _{sd} (dscfm)	<u>27641.0</u>
% Isokinetic	<u>93.3</u>
M _n (mg corrected for blank)	<u>85.0</u>
mg/dscf	<u>2.6271</u>
gn/dscf	<u>0.0405</u>
lb./dscf	<u>5.8-E06</u>
lb./hr	<u>9.6</u>
lb./10 ⁶ BTU (Boilers)	<u> </u>
Inv. list memories CMS, RST, CLR	<u>0.0350</u>

16/ton

NSC-4

15.00000
235.24505
25.32000
32.35536
245.40222
0.26321
25.30240
1.9955
1.9955
1.4126
98.7482
2.7641 04
9.3310 01 %ISO
8.5000 01
2.6271 00
4.0542-02
5.7917-06
9.6051 00
1.3992 01 V _o
3.5035-02 V _o /T _o

SOURCES: CFEI STEEL CORPORATION - COKE PLANT - PUEBLO, COLORADO
 LOCATION: SOUTH GAS CLEANING CAR - SCRUBBER OUTLET
 DATE RECEIVED: 28 APRIL 80
 TESTED BY: THE ALUMINA CORPORATION CHICAGO ILLINOIS
 OBSERVED BY: SE HUMPHRIES TRC-DENOER
 AUDIT DATE: 29 APRIL 80
 AUDITED BY: SE HUMPHRIES TRC-DENOER

RUN NO. SSC-1 DATE 18 MARCH 80 TIME 0849-1635

INPUT DATA

% CO	<u>0.00</u>
% CO ₂	<u>4.35</u>
% O ₂	<u>15.025</u>
Δ H _{avg} ("H ₂ O)	<u>0.458</u>
P _b ("H _g)	<u>25.35</u>
V _m (ft. ³)	<u>47.944</u>
T _m (°F)	<u>101.0</u>
Y	<u>1.0053</u>
V _w (ml) (If unknown, enter zero)	<u>227.0</u>
B _{ws} (decimal) from tables	<u>—</u>
*R/S	
P _{st} ("H ₂ O)	<u>+1.017</u>
ΔP _i	
GTO 216	
T _s (°F)	<u>145</u>
C _p	<u>0.8423</u>
d _s (ft) (EQUIVALENT)	<u>3.315697324</u>
*R/S	
T _t (MIN)	<u>98.27</u>
d _n (IN)	<u>0.150</u>
M _n (mg)	<u>111.10</u>
C _a (mg/g)	<u>—</u>
V _{aw} (ml)	<u>—</u>
ρ (g/ml)	<u>—</u>
'F' Factor	<u>—</u>

OUTPUT DATA

% EA	234
V _m (dscf)	38.485
B _{ws} (Decimal)	0.217
M _s (Wet)	25.971
ΔP AVG.	1.919
(√ΔP) AVG.	1.385
V _s (fps)	95.47
Q _{sd} (dscfm)	28707.0
% Isokinetic	96.0
M _n (mg corrected for blank)	111.1
mg/dscf	2.8868
gn/dscf	0.0455
lb./dscf	6.4-E06
lb./hr	11.0
lb./10 ⁶ BTU (Boilers)	—
Inv. list memories CMS, RST, CLR	0.0450

15.1 TON

SSC-1
 15.025
 234.11380
 25.35000
 38.48531
 227.00000
 0.21741
 25.97124
 1.9187
 1.9187
 1.3852
 95.4747
 2.8707 04
 9.5989 01 21SD
 1.1110 02
 2.8868 00
 4.4550-02
 6.3643-06
 1.0962 01
 1.7954 01 15
 4.4957-02 15/TON

SOURCES: CF&I STEEL CORPORATION - COKE PLANT - PUEBLO, COLORADO
 LOCATION: SOUTH GAS CLEANING CAR - SCRUBBER OUTLET
 DATE RECEIVED: 28 APRIL 80
 TESTED BY: THE ALUMINA CORPORATION CHICAGO, ILLINOIS
 OBSERVED BY: SE HUMPHRIES TRC-DENVER
 AUDIT DATE: 29 APRIL 80
 AUDITED BY: SE HUMPHRIES TRC-DENVER

RUN NO. SSC-2 DATE 19 MARCH 80 TIME 1022-1620

INPUT DATA

% CO	<u>0.00</u>
% CO ₂	<u>4.375</u>
% O ₂	<u>15.075</u>
ΔH_{avg} ("H ₂ O)	<u>0.511</u>
P _b ("Hg)	<u>25.28</u>
V _m (ft. ³)	<u>47.545</u>
T _m (°F)	<u>104.3</u>
Y	<u>1.0053</u>
V _w (ml) (If unknown, enter zero)	<u>259.0</u>
B _{ws} (decimal) from tables	<u> </u>
*R/S	
P _{st} ("H ₂ O)	<u>+0.93</u>
ΔP_i	
GTO 216	
T _s (°F)	<u>145</u>
C _p	<u>0.8423</u>
d _s (ft)	<u>3.315/697324</u>
*R/S	
T _t (MIN)	<u>94.90</u>
d _n (IN)	<u>0.150</u>
M _n (mg)	<u>67.0</u>
C _a (mg/g)	<u> </u>
V _{aw} (ml)	<u> </u>
ρ (g/ml)	<u> </u>
'F' Factor	<u> </u>

OUTPUT DATA

% EA	<u>237.</u>
V _m (dscf)	<u>37.843</u>
B _{ws} (Decimal)	<u>0.244</u>
M _s (Wet)	<u>25.573</u>
ΔP AVG.	<u>2.179</u>
($\sqrt{\Delta P}$) AVG.	<u>1.476</u>
V _s (fps)	<u>102.70</u>
Q _{sd} (dscfm)	<u>29749.0</u>
% Isokinetic	<u>94.3</u>
M _n (mg corrected for blank)	<u>67.0</u>
mg/dscf	<u>1.7705</u>
gn/dscf	<u>0.0273</u>
lb./dscf	<u>3.9-E06</u>
lb./hr	<u>11.0</u>
lb./10 ⁶ BTU (Boilers)	<u>0.0276</u>
Inv. list memories CMS, RST, CLR	<u>0.0276</u>

1.6/ton

SSC-2

15.0750
237.48115
25.28000
37.84303
259.00000
0.24377
25.57253
2.1793
2.1793
1.4762
102.6967
2.9749 04
9.4317 01 %ISO
6.7000 01
1.7705 00
2.7323-02
3.9032-06
6.9669 00
1.1016 01 16
2.7584-02 16/105

SOURCES: CPI STEEL CORPORATION - COKE PLANT - PUEBLO, COLORADO
 LOCATION: SOUTH GAS CLEANING CAB - SCRUBBER OUTLET
 DATE RECEIVED: 28 APRIL 80
 TESTED BY: THE AMEGA CORPORATION CHICAGO, ILLINOIS
 OBSERVED BY: SE HUMPHRIES TRC-DENVER
 AUDIT DATE: 29 APRIL 80
 AUDITED BY: SE HUMPHRIES TRC-DENVER

RUN NO. SSC-3 DATE 20 MARCH 80 TIME 0916-1535

INPUT DATA

% CO	<u>0.00</u>
% CO ₂	<u>4.70</u>
% O ₂	<u>15.025</u>
Δ H _{avg} ("H ₂ O)	<u>0.461</u>
P _b ("H _g)	<u>25.66</u>
V _m (ft. ³)	<u>46.922</u>
T _m (°F)	<u>94.9</u>
Y	<u>1.0053</u>
V _w (ml) (If unknown, enter zero)	<u>239.0</u>
B _{ws} (decimal) from tables	<u>—</u>
*R/S	
P _{st} ("H ₂ O)	<u>+0.475</u>
ΔP _i	
GTO 216	
T _s (°F)	<u>145</u>
C _p	<u>0.8423</u>
d _s (ft)	<u>3.315697324</u>
*R/S	
T _t (MIN)	<u>96.98</u>
d _n (IN)	<u>0.150</u>
M _n (mg)	<u>73.9</u>
C _a (mg/g)	<u>—</u>
V _{aw} (ml)	<u>—</u>
ρ (g/ml)	<u>—</u>
'F' Factor	<u>—</u>

OUTPUT DATA

% EA	238
V _m (dscf)	38.544
B _{ws} (Decimal)	0.226
M _s (Wet)	25.883
ΔP AVG.	2.029
(√ΔP) AVG.	1.424
V _s (fps)	97.77
Q _{sd} (dscfm)	29417
% Isokinetic	95.2
M _n (mg corrected for blank)	73.9
mg/dscf	1.9173
gn/dscf	0.0296
lb./dscf	4.2 - E06
lb./hr	12.0
lb./10 ⁶ BTU (Boilers)	—
Inv. list memories CMS, RST, CLR	0.0302

(b) Ton

SSC-3

13.0250
237.55940
25.66000
38.54436
239.00000
0.22604
25.88266
2.029
2.0290
1.4244
97.7742
2.9417 04
9.5162 01 X180
7.3900 01
1.9173 00
2.9588-02
4.2268-06
7.4605 00
1.2046 01 (b)
3.0163-02 (b) (100)