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Docket Item No.: II-D-100

ATCHISON CASTING

June 23, 2000

Mr. Jim Maysilles, U.S. EPA
Emissions Standards Division (MD-13)
U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park, NC 27711

Subject: LaGrange Foundry Stack Test – 9/14/93 through 9/17/1993

Dear. Mr. Maysilles:

Per your request Atchison Casting has enclosed the cupola stack test report for the air emission testing conducted at the LaGrange Foundry in September of 1993. The testing focused on the following air pollutants: particulates (including metals), nitrous oxides, carbon monoxide, sulfur dioxide and organic compounds. In reviewing the report, there are a number of comments and limitations were brought to my attention, which affects the conclusions that can be drawn from the report. The comments and limitations include:

1) Stack testing was performed on two cupolas, which are designated North and South. During the test only one cupola was operating at a time. The North cupola was used for testing of air emissions from gray iron melting while the South cupola was used for testing of air emissions from nodular (ductile) melting. A single wet scrubber controlled emissions from both cupolas.

2) As discussed in the report, the wet scrubber spray nozzles were obstructed during portions of the stack test, resulting in an average particulate control efficiency of 91.5% during the 6 tests (see page 5 of the report). This is much lower control efficiency than would be expected from a wet scrubber during normal operations. The lower control efficiency resulted in a higher rate of particulate and metal HAP emissions than would be expected from a typical operating wet scrubber.

3) Metal HAP and organic sampling was only conducted at the scrubber outlet.

4) The removal efficiency of SO2 was above 99% and 98% for gray and nodular iron, respectively (see page 12 of the report).

5) The following errors were found on page 14 of the stack test.
   - in paragraph 1, the concentrations were actually below .024 lb/hr for 9 (not 10) compounds;
   - in paragraph 2, the last sentence, the benzene concentration on Run 3 was actually "less than" .008 lb/hr;
   - in paragraph 3, toluene was mis-identified as tetrachloroethene
   - in paragraph 4, the concentrations of methylene chloride were transposed between Run 2 and Run 3. Also concentrations of acetone and chloroform above the detectable limit were not identified in the paragraph.

ATCHISON/ST. JOE DIVISION
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6) Accurate production information during each stack test run is not known. Hourly averages can be obtained from the daily foundry cupola usage sheets.

7) The Run 1, Nodular Iron, VOST sample was broken in transit to the lab. Analytical results are included for Run 2 and Run 3.

8) Stack testing for PM and PM10 was conducted on two different days (see page 23 of the report).

9) The test period for Nodular Iron, Run 3 was only of a 30-minutes compared to the other runs which were an hour or more in duration.

10) It appears that some of the average emission rates included in summary tables (see pages B4 through B11) are incorrect. For example, see methylene chloride on page B5.

11) The inlet stack test location for the CO measurements is not clearly identified.

12) The reported acetone emissions are most likely a laboratory artifact, as acetone is not typically found in cupola exhaust.

13) In the tables included on page 16, the detection limits for the SVOCs were assumed to be the emission rate.

14) On page 18, the lb/hr emission rate of manganese is in conflict with the rates given on pages B10 and B11 and later on pages B27 and B48. The emission rates on page 18, should be 8.58 lb/hr and 4.93 lb/hr for gray and ductile iron, respectively, in lieu of the values reported.

Please contact me at (913) 367-2121 ext. 211 if I can be of further assistance.

Sincerely,

Jeffrey J. Weatherly, CHMM
Environmental Engineer

Enclosure: Emissions Test Report (1993)

FOUNDRY CUPOLA GAS SCRUBBING SYSTEM EMISSIONS TEST REPORT

FOR

Gardner Denver Machinery, Inc.

AT

LAGRANGE FOUNDRY
LAGRANGE, MISSOURI

MECO PROJECT NO. 244-078
SEPTEMBER, 1993

Gardner
Denver

MECO ENGINEERING COMPANY INC.

TSA

TOTAL SOURCE ANALYSIS, INC.
ENVIRONMENTAL TESTING CONSULTANTS

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CONCLUSIONS

Particulate Emissions

1. The scrubber demonstrates good collection efficiency of particulate collection with Nodular Iron production.

2. With Grey Iron production, scrubber efficiency ~~may be~~ is adequate, but it is much harder for the scrubber to safely achieve 85+% collection efficiency on Grey Iron. Out of 3 test runs, one result was marginally in compliance, one was marginally below compliance, and one result was excellent.

   When Grey Iron is produced, the Foundry will have to watch ~~the~~ two operating ~~trouble spots much more~~ closely to be sure that the scrubber efficiency is adequate. The ~~trouble spots~~ are recycle water flow to the sprays ~~of less than~~ 295 GPM and spray nozzles cannot plugged with solids.

3. Comparison of scrubber particulate emission to the atmosphere with PM_{10} sampling and EPA Method V (TSP) sampling, showed lower emission values with PM_{10} sampling as expected. The value of atmospheric particulate emissions with PM_{10} sampling on Grey Iron was about 83% of the EPA Method V values. On Nodular Iron, the PM_{10} emissions were around 40% of the EPA Method V values.

   We can probably expect new Particulate emission regulations using PM_{10} sampling rather than the EPA Method V some time in the future.

4. The scrubber operation on particulate collection is ~~only~~ good enough to comply with Missouri Air Pollution Regulation 10 CSR 10-3.050, para. (5)(A), which is an exemption for existing grey iron jobbing cupolas which has gas treatment systems having a particulate removal efficiency of at least 85%. ~~Compliance with sub-paragraph 2 may require further study.~~

Gaseous Emissions

1. The emissions of NOx to the atmosphere from the cupolas is in the range of 8 to 20 ppmv. This is about as good an emission level as can be expected from a high temperature combustion operation. It should be expected to be satisfactory, if and when, any NOx emission regulations are adopted.

2. If the Foundry should decide to go to high temperature direct-flame incineration (as opposed to catalytic oxidation) in the future, the concentration of NOx emissions can be expected to increase considerably from the current level.

3. The SO_2 removal efficiency of the scrubber was excellent when the pH of the scrubbing water is in the range of 9.2 to 9.5 The SO_2 emission concentration to the atmosphere was in the range of 1 to 2 ppmv.

4. The outlet CO discharge concentration to the atmosphere was generally in the range of 400 to 600 ppmv. This is an appreciable reduction from the CO level directly above the charging car openings in the brick-lined duct.

   If there is a need to reduce the outlet CO concentration further, additional CO reduction could be achieved ahead of the scrubber inlet by increased gas turbulence and improved gas mixing in the brick-lined ductwork, by increased residence time at high temperature, and by direct-flame incineration or catalytic oxidation.

   The techniques listed above are considered to be in the increasing order of both capital cost and effectiveness.

5. The HCl emissions were generally less than 0.01 to 0.02 lbs/hr. The scrubber should do a good job of control of HCl emissions when the scrubber recycle water pH is maintained in the pH range of 9.2 to 9.5 and spray nozzles are not plugged.

<u>VOC Emissions</u>

1. A great variety of volatile organic compounds, present in trace amounts, was found in the scrubbed effluent released to the atmosphere. Some 36 compounds were identified with samples collected in the Vost train. An additional 64 compounds were identified with the samples collected in the Semi-Vost train.

   In the Vost train samples, only two compounds were present in appreciable amounts: Methylene chloride (9.6 and 3.1 lbs/hr on occasion) and benzene (0.37 lbs/hr on occasion). Both of these compounds are on the Congress designated list of 189 hazardous chemicals in the 1990 Clean Air Reauthorization Act.

   In the Semi-Vost train samples, some 10 or 11 compounds were considerably higher in concentration in comparison to the 53 to 54 other compounds identified in trace quantities.

   We suspect that all of the VOC compounds found in the effluent to the atmosphere originate by volatilization from the coke charged.

Heavy Metal Emissions

1. Manganese is the only heavy metal being emitted at a moderately high rate. ~~Unfortunately, only~~ two samples were obtained with satisfactory results, one on Grey Iron production, run No. 3 with a scrubber outlet emission of 8.58 lbs/hr. The other sample on Nodular Iron production, run No. 3 again, gave an emission of 4.93 lbs/hr. ~~If these emission values seem troublesome, additional sampling for Manganese should be considered, to increase the quantity of data available.~~

2. All other heavy metals analyzed for were quite low except for lead (occasionally 0.15 to 0.13 lbs/hr) and nickel (occasionally 0.33 to 0.26 lbs/hr).

TABLE "1"

SUMMARY OF CUPOLA SCRUBBER TEST RESULTS

LOCATION PRODUCTION	STACK GRAY (LB/HR)	STACK NODULAR (LB/HR)	AVERAGE STACK (LB/HR)	# MAXIMUM (TON/YR)
VOLATILE ORGANIC COMPOUNDS				
Acetone	0.01920	0.05280	0.03600	0.04320
* Benzene	0.14280	0.24540	0.19410	0.23292
Bromodichloromethane	< 0.00800	< 0.00800	< 0.00800	0.00000
* Bromoform	< 0.00800	< 0.00800	< 0.00800	0.00000
Bromomethane	< 0.01590	< 0.01600	< 0.01595	0.00000
* 1,3-Butadiene	< 0.01590	< 0.01600	< 0.01595	0.00000
* 2-Butanone	< 0.01590	0.03420	0.01710	0.02052
* Carbon Disulfide	< 0.00800	< 0.00800	< 0.00800	0.00000
Carbon Tetrachloride	< 0.00800	< 0.00800	< 0.00800	0.00000
* Chlorobenzene	< 0.00800	< 0.00800	< 0.00800	0.00000
Chloroethane	< 0.01590	< 0.01600	< 0.01595	0.00000
* Chloroform	< 0.00800	0.02400	0.01200	0.01440
* Chloromethane	< 0.01590	< 0.01600	< 0.01595	0.00000
* Dibromochloromethane	< 0.00800	< 0.00800	< 0.00800	0.00000
* 1,1-Dichloroethane	< 0.00800	< 0.00800	< 0.00800	0.00000
1,2-Dichloroethane	< 0.00800	< 0.00800	< 0.00800	0.00000
* 1,1-Dichloroethene	< 0.00800	< 0.00800	< 0.00800	0.00000
1,2-Dichloroethene (total)	< 0.00800	< 0.00800	< 0.00800	0.00000
1,2-Dichloropropane	< 0.00800	< 0.00800	< 0.00800	0.00000
Cis-1,3-Dichloropropene	< 0.00800	< 0.00800	< 0.00800	0.00000
Trans-1,3-Dichloropropen	< 0.00800	< 0.00800	< 0.00800	0.00000
* Ethyl Benzene	< 0.00800	< 0.00800	< 0.00800	0.00000
2-Hexanone	< 0.01590	< 0.01600	< 0.01595	0.00000
* Methylene Chloride	1.06040	6.39590	3.72815	4.47378
* 4-Methyl-2-Pentanone	< 0.01590	< 0.01600	< 0.01595	0.00000
* Styrene	< 0.00800	< 0.00800	< 0.00800	0.00000
* Tetrachloroethene	< 0.00800	< 0.00800	< 0.00800	0.00000
1,1,2,2-Tetrachloroethan	< 0.00800	< 0.00800	< 0.00800	0.00000
* Toluene	< 0.00800	0.05170	0.02585	0.03102
* 1,1,1-Trichloroethane	< 0.00800	0.03330	0.01665	0.01998
1,1,2-Trichloroethane	< 0.00800	< 0.00800	< 0.00800	0.00000
* Trichloroethene	< 0.00800	< 0.00800	< 0.00800	0.00000
* Vinyl Acetate	< 0.01590	< 0.01600	< 0.01595	0.00000
Vinyl Chloride	< 0.01590	< 0.01600	< 0.01595	0.00000
* Xylenes	< 0.00800	< 0.00800	< 0.00800	0.00000
TOTAL VOLATILES	1.22240	6.83730	4.02985	4.83582
TOTAL CAA VOLATILES HAP'S	1.20320	6.78450	3.99385	4.79262
TOTAL SULFUR OXIDES (as SO2) (1)	0.35000	0.29000	0.32000	0.38400
OXIDES OF NITROGEN (NOx)	2.04000	2.33000	2.18500	2.62200
CARBON MONOXIDE (CO)	78.04000	46.89000	62.46500	74.95800
CARBON DIOXIDE (CO2)	4.20000	4.74000	4.47000	5.36400
OXYGEN (O2)	16.57000	16.33000	16.45000	19.74000

< LESS THAN VALUES NOT INCLUDED IN TOTALS

* DENOTES CAAA HAP

NOTE: LBS/HR X 2400 HOURS MAX / 2000 = MAX TON/YR

SUMMARY OF CUPOLA SCRUBBER TEST RESULTS

LOCATION PRODUCTION	STACK GRAY (LB/HR)	STACK NODULAR (LB/HR)	AVERAGE STACK (LB/HR)	# MAXIMUM (TON/YR)
SEMI-VOLATILE ORGANIC COMPOUNDS				
Acenaphthene	< 0.00820	< 0.01480	< 0.01150	0.00000
Acenaphthylene	< 0.00820	< 0.01480	< 0.01150	0.00000
Anthracene	< 0.00820	< 0.01480	< 0.01150	0.00000
Benzoic Acid	< 0.04090	< 0.07420	< 0.05755	0.00000
Benzo(a)anthracene	< 0.00820	< 0.01480	< 0.01150	0.00000
Benzo(a)pyrene	< 0.00820	< 0.01480	< 0.01150	0.00000
Benzo(b)fluoranthene	< 0.00820	< 0.01480	< 0.01150	0.00000
Benzo(g,h,i)perylene	< 0.00780	< 0.01480	< 0.01130	0.00000
Benzo(k)fluoranthene	< 0.00820	< 0.01480	< 0.01150	0.00000
Benzyl Alcohol	< 0.01640	< 0.02970	< 0.02305	0.00000
Bis(2-Chloroethoxy) Met	< 0.00820	< 0.01480	< 0.01150	0.00000
Bis(2-Chloroethyl) Ether	< 0.00820	< 0.01480	< 0.01150	0.00000
Bis(2-Chloroisopropyl) E	< 0.00820	< 0.01480	< 0.01150	0.00000
* Bis(2-Ethylhexyl)phthala	0.04410	0.03190	0.03800	0.04560
4-Bromophenyl Phenyl E	< 0.00820	< 0.01480	< 0.01150	0.00000
Butyl Benzyl Phthalate	< 0.00820	< 0.01480	< 0.01150	0.00000
4-Chloroaniline	< 0.01640	< 0.02970	< 0.02305	0.00000
2-Chloronaphthalene	< 0.00820	< 0.01480	< 0.01150	0.00000
2-Chlorophenol	< 0.00820	< 0.01480	< 0.01150	0.00000
4-Chlorophenyl Phenyl E	< 0.00820	< 0.01480	< 0.01150	0.00000
4-Chloro-3-Methylphenol	< 0.01640	< 0.02970	< 0.02305	0.00000
Chrysene	< 0.00820	< 0.01480	< 0.01150	0.00000
Dibenzofuran	< 0.00820	< 0.01480	< 0.01150	0.00000
Dibenz(a,h)anthracene	< 0.00820	< 0.01480	< 0.01150	0.00000
1,2-Dichlorobenzene	< 0.00820	< 0.01480	< 0.01150	0.00000
1,3-Dichlorobenzene	< 0.00820	< 0.01480	< 0.01150	0.00000
1,4-Dichlorobenzene	< 0.00820	< 0.01480	< 0.01150	0.00000
3,3'-Dichlorobenzidine	< 0.01640	< 0.02970	< 0.02305	0.00000
2,4-Dichlorophenol	< 0.00820	< 0.01480	< 0.01150	0.00000
Diethylphthalate	< 0.00820	< 0.01480	< 0.01150	0.00000
Dimethyl Phthalate	< 0.00820	< 0.01480	< 0.01150	0.00000
2,4-Dimethylphenol	< 0.00820	< 0.01480	< 0.01150	0.00000
2,4-Dinitrophenol	< 0.04090	< 0.07420	< 0.05755	0.00000
2,4-Dinitrotoluene	< 0.00820	< 0.01480	< 0.01150	0.00000
2,6-Dinitrotoluene	< 0.00820	< 0.01480	< 0.01150	0.00000
4,6-Dinitro-2-Methylphen	< 0.04090	< 0.07420	< 0.05755	0.00000
* Di-N-Butylphthalate	< 0.00820	< 0.01480	< 0.01150	0.00000
Di-N-Octyl Phthalate	< 0.00820	< 0.01480	< 0.01150	0.00000
Fluoranthene	< 0.00820	< 0.01480	< 0.01150	0.00000
Fluorene	< 0.00820	< 0.01480	< 0.01150	0.00000
Hexachlorobenzene	< 0.00820	< 0.01480	< 0.01150	0.00000
Hexachlorobutadiene	< 0.00820	< 0.01480	< 0.01150	0.00000
Hexachlorocyclopentadi	< 0.00820	< 0.01480	< 0.01150	0.00000
Hexachloroethane	< 0.00820	< 0.01480	< 0.01150	0.00000
Indeno(1,2,3-cd)pyrene	< 0.00820	< 0.01480	< 0.01150	0.00000
Isophorone	< 0.00820	< 0.01480	< 0.01150	0.00000
2-Methylnaphthalene	< 0.00820	< 0.01480	< 0.01150	0.00000
* 2-Methylphenol	< 0.00820	< 0.01480	< 0.01150	0.00000
* 4-Methylphenol	< 0.00820	< 0.01480	< 0.01150	0.00000
* Naphthalene	< 0.00820	< 0.01480	< 0.01150	0.00000
2-Nitroaniline	< 0.04090	< 0.07420	< 0.05755	0.00000
3-Nitroaniline	< 0.04090	< 0.07420	< 0.05755	0.00000
4-Nitroaniline	< 0.00820	< 0.01480	< 0.01150	0.00000
Nitrobenzene	< 0.00820	< 0.01480	< 0.01150	0.00000
2-Nitrophenol	< 0.00820	< 0.01480	< 0.01150	0.00000
4-Nitrophenol	< 0.04090	< 0.07420	< 0.05755	0.00000
N-Nitrosodiphenylamine	< 0.00820	< 0.01480	< 0.01150	0.00000
N-Nitroso-Di-N-Propylam	< 0.00820	< 0.01480	< 0.01150	0.00000
Pentachlorophenol	< 0.04090	< 0.07420	< 0.05755	0.00000
Phenanthrene	< 0.00820	< 0.01480	< 0.01150	0.00000
* Phenol	< 0.00820	< 0.01480	< 0.01150	0.00000
Pyrene	< 0.00820	< 0.01480	< 0.01150	0.00000
2,4,5-Trichlorophenol	< 0.00820	< 0.01480	< 0.01150	0.00000
2,4,6-Trichlorophenol	< 0.00820	< 0.01480	< 0.01150	0.00000
TOTAL SEMI-VOLATILES	0.04410	0.03190	0.03800	0.04560
TOTAL CAA SEMI-VOL. HAP'S	0.04410	0.03190	0.03800	0.04560

< LESS THAN VALUES NOT INCLUDED IN TOTALS

* DENOTES CAAA HAP

NOTE: LBS/HR X 2400 HOURS MAX / 2000 = MAX TON/YR

TABLE "3"

SUMMARY OF CUPOLA SCRUBBER TEST RESULTS

LOCATION PRODUCTION	STACK GRAY (LB/HR)	STACK NODULAR (LB/HR)	AVERAGE STACK (LB/HR)	# MAXIMUM (TON/YR)
METALS				
Aluminum	0.13300	0.18700	0.16000	0.19200
* Antimony	0.00000	0.00000	0.00000	0.00000
* Arsenic	0.00600	0.00300	0.00450	0.00540
Barium	0.00600	0.00400	0.00500	0.00600
* Beryllium	0.00100	0.00000	0.00050	0.00060
* Cadmium	0.00500	0.00500	0.00500	0.00600
* Chromium	0.04400	0.05000	0.04700	0.05640
* Cobalt	0.00700	0.00800	0.00750	0.00900
Copper	0.15000	0.08000	0.11500	0.13800
Iron	7.16000	7.66000	7.41000	8.89200
* Lead	0.12000	0.09000	0.10500	0.12600
Magnesium	0.44000	0.44000	0.44000	0.52800
* Manganese	8.58000	4.93000	6.75500	8.10600
* Mercury	0.00130	0.00010	0.00070	0.00084
Molybdenum	0.00100	0.00000	0.00050	0.00060
* Nickel	0.17000	0.12000	0.14500	0.17400
* Selenium	0.05000	0.04400	0.04700	0.05640
Silver	0.00070	0.00000	0.00035	0.00042
Tin	0.05000	0.08300	0.06650	0.07980
Titanium	0.00700	0.00700	0.00700	0.00840
Zinc	0.72000	0.56000	0.64000	0.76800
TOTAL METALS	17.65200	14.27110	15.96155	19.15386
TOTAL CAA METAL HAP'S	8.98430	5.25010	7.11720	8.54064
PARTICULATE	33.36	47.04	40.20	48.24
PM10	27.58	18.86	23.22	27.86
* HYDROGEN CHLORIDE	0.033	0.043	0.038	0.046

* DENOTES CAAA HAP

\# NOTE: LBS/HR X 2400 HOURS MAX / 2000 = MAX TON/YR

RECOMMENDATIONS

We have two specific recommendations, as follows:

1. Study possible means to reduce VOC and CO emissions to the atmosphere by direct-flame incineration and catalytic oxidation within the space of the brick-lined ducts from above the charging car openings to the gas inlet to the scrubber. Determine probable costs and Gardner Denver's position on such process modifications.

2. Devise a means to remove floating charred wood particles (and other floaters, if any) from the recirculating scrubber water being pumped back to the scrubber, to prevent spray nozzle pluggage.

CUPOLA PARTICULATE EMISSION RESULTS

(Total Source Analysis Report, page B-1)

The results of the particulate sampling runs made on the cupola scrubber inlet and outlet, and calculated scrubber collection efficiency was:

Grey Iron

	Run 1 9/15/93	Run 2 9/15/93	Run 3 9/17/93	Averages	
Scrubber Inlet	227.64	455.03	243.60	308.76	lbs/hr
Scrubber Outlet	38.08	28.76	33.25	33.36	lbs/hr
Efficiency	83.27%	93.37%	86.35%	89.20%	

On the 9/15/93 runs, the scrubber pH was 9.0 to 9.2; flow was 270 GPM. Some spray nozzles were found plugged with wood charcoal particles after the run.

On the 9/17/93 run, the scrubber pH was 8.7 to 8.9; flow was 295 GPM.

Nodular Iron

	Run 1 9/16/93	Run 2 9/16/93	Run 3 9/16/93	Averages	
Scrubber Inlet	1778.91	785.10	606.50	1056.83	lbs/hr
Scrubber Outlet	82.27	16.46	42.39	47.04	lbs/hr
Efficiency	95.38%	97.96%	93.01%	95.55%	

Overall Efficiency 4096.78 lbs(inlet)/241.21 lbs(outlet) = 94.11%

On the 9/16/93 runs, the scrubber PH was 9.2 to 9.4; flow was 295 GPM. 5 to 6 spray nozzles that were found plugged with charred wood particles after shutdown on 9/15/93, were cleaned prior to startup on 9/16/93.

Discussion

The scrubber efficiency is reasonably high on the Nodular Iron tests, and quite capable of meeting the state minimum requirement of 85% efficiency. The test data show that the cupola when

operated on Nodular Iron often tends to blow high quantities of coarse particles out of the cupola.

These particles are easy to catch in the scrubber and tend to give the scrubber a rather high efficiency when making nodular iron. When nodular is made, there tends to be an appreciable quantity of ultra-fine particles produced (smaller than 0.30 um) for which the scrubber would have no collection capability. Since the particles are so small, they have little mass and thus do not reduce the scrubber collection efficiency on a mass-basis by a significant extent. However, a small mass of such particles produce a large number of such particles in the staff effluent, with very high light-scattering capability, giving a much poorer appearance to the plume from the stack in comparison to Grey Iron.

In actuality, the Grey Iron cupola effluent presents a much tougher scrubbing job to the scrubber. There is much less really coarse material blown out to the scrubber, making the scrubber have to capture a large fraction of the material coming to the scrubber which is close to its cut-size capability. In addition, it seems to have an appreciable amount of material in the 2.4 to 0.65 um size range (which the scrubber has poor ability to capture). However, these particles have more mass and less light-scattering ability than the ultra-fines. Thus, the scrubber has a harder time coming out with a high efficiency, and yet gives a plume with a better looking appearance.

The three tests on Grey Iron show ~~only~~ one run with a ~~good~~ high collection efficiency (No. 2). The last run is ~~only marginally~~ in compliance, and the first run was marginally out of compliance. (One should not be too concerned about a single run, since the accuracy of a single measurement alone is probably no better than +/- 30%). However, this test data does indicate that the Foundry is going to have to exercise extreme care when making grey iron, to average collection efficiency exceeding 85%. For grey iron operation, spray nozzles will need to be clean (not plugged), and the flow of scrubbing water maintained close to the maximum achievable. It would be very desirable to provide a device to remove floating particles from the recycle water to prevent spray nozzle plugging for grey iron improved efficiency.

Operating Schedule for Air-Pollution Testing

The EPA Method V particulate testing, and the inlet particle size distribution to the scrubber was performed on Sept. 15-17, 1993, as follows:

Wed., 9/15/93

Grey Iron was being made on the North Cupola.

EPA Method V, Run 1, was conducted from approximately 8:35 to 10:15 AM.

EPA Method V, Run 2, was conducted from approximately 11:50 AM to 1:15 PM.

Sampling for HCl and Heavy Metals was run simultaneously with the EPA Method V sampling on Sept. 15 through 17.

Thurs., 9/16/93

Nodular Iron was made on the South Cupola.

EPA Method V, Run 1, was conducted from approximately 7:35 to 8:50 AM.

EPA Method V, Run 2, was conducted from about 10:35-10:45 AM to 12:20 PM.

EPA Method V, Run 3, was conducted from about 1:30 to 2:00 PM.

Fri., 9/17/93

Grey Iron was made on the North Cupola.

EPA Method V, Run 3, was conducted from about 8:20 to 10:00 AM.

Particle size measurements of particulate entering the scrubber were made, Sept. 15-17, 1993, at about the time of the beginning EPA Method V sampling on some runs on each day.

On Monday, 9/20/93, Nodular Iron was made on the South Cupola. On Tuesday, 9/21/93, Grey Iron was made on the North Cupola.

On each day, the PM particulate sampling was performed, as well as the Vost and Semi-Vost sampling for VOC's. These samples were taken on the scrubber outlet only.

CRITIQUE AND DISCUSSION OF TOTAL SOURCE ANALYSIS REPORT RESULTS

Gaseous Emissions and Analysis (Report page B-3)

Nitrogen Oxides

The NOx analyses marked "inlet" are analysis of the cupola gas for the scrubber inlet. In actuality, the gas samples are taken in the vertical brick-lined exhaust ducts above the openings for the charging car. The samples were taken toward the back of the ducts opposite (but above) the openings for the charging car. This area was more or less equivalent to the location of the hottest gas at this level, since some atmospheric air is pulled into the duct from the charging car opening, at the front side of the duct. Thus, roughly diametrically away, the remainder of the gas was cooled and diluted by admixture with cold atmospheric air. The hotter the gas, the more NOx one would expect to be present from thermal nitrogen-fixation from the atmosphere. Hence, these "inlet" analyses represent the maximum NOx present at this level and not the average NOx concentration.

On Report page B-12, the gas temperatures at the scrubber inlet duct for the Grey Iron runs were 554 and 889 F respectively for runs 1 and 2 on 9/15/93; and 710 F for run No. 3 on 9/17/93. These temperatures are not taken at the same point as the gas analysis samples, but were taken nearby. As temperatures increase, one would normally expect the NOx concentration to increase somewhat.

On Report page B-13, the gas temperatures at the scrubber inlet duct for the Nodular Iron runs 1,2, and 3 were 557, 1076 and 1111 F respectively on 9/16/93. The gas temperature for the gas measurements made on 9/14/93 was not measured. All other comments in the preceding paragraph apply to the Nodular Iron gas analyses as well. The locations of the gas "inlet" samples from the North Cupola (Grey Iron) and the South Cupola (Nodular Iron) were similar but not precisely identical.

The location of the gas sample taken for the gas analysis on the scrubber outlet was in the gas outlet stack adjacent to the East-West traverse ports for the particulate sampling. The gas analysis sample, both "inlet" and "outlet" samples, were always single point location samples, not traversing samples, as was used for particulate sampling. However, at the "outlet" location, the gas was well-mixed (as opposed to particulates which were not well-mixed).

It will be noted on page B-3 of the Report, that in every case, the "outlet" NOx concentration dropped in value when compared to the "inlet" value. This is not because the scrubber would remove any NOx, but is true for 3 other reasons:

(1) The gases between the "inlet" location (just above the charging opening) and the actual gas inlet to the scrubber, are dropping in temperature due to heat losses from the ductwork, and also from mixing with the cold air pulled in at the front of the charging car opening. As the gas temperature drops slowly, NOx will dissociate to

some extent, back into O_2 and N_2.

(2) The gases in this ductwork mentioned above contain appreciable combustibles [CO as shown by analysis, and also organic combustibles (VOC's)]. This gives some time for reduction reactions to occur, reducing some of the NOx back to N_2 and providing reactive oxygen for oxidation of some of the combustibles.

(3) Even more, as mixing proceeds, the dilution effect of the cupola gas with atmospheric air (both from the charging car opening and air inleakage in the ductwork) will reduce the measured NOx concentration at the scrubber outlet sample point.

The important figures for NOx atmospheric emissions are the "outlet" numbers. These are all in the range of 8 to 20 ppmv which are quite low and should be acceptable as effluent levels for high temperature combustion operations.

Sulfur Dioxide

It will be noted that the SO_2 inlet concentrations to the scrubber are in the range of 20 to 60 ppmv, with a single value as high as 170 and one as low as 12 ppmv. These values appear to be highly variable, and probably vary based on cupola firing conditions and sulfur content of the coke being used. (Sulfur in the coke is probably volatilized and oxidized from the coke much faster than the rate at which carbon is consumed; so sulfur release probably increases soon after fresh coke is charged.)

The scrubber, which is being operated at an alkaline pH, has the capability of absorbing SO_2 efficiently, especially when the pH is controlled at 9.2 to 9.5. It will be noted that scrubber outlet

concentration was generally in the range of 1 to 2 ppmv which should be quite acceptable operation. This was a removal efficiency of 99.8% on Grey Iron and 98.1% on Nodular Iron.

Oxygen

The oxygen content of the gases generally increased about 2 percentage points between the (scrubber) inlet samples and the scrubber outlet samples. This was the result of mixing of the gas from the sample inlet point with the atmospheric air pulled in at the charging car opening, and other air inleakage into the system from all cracks ahead of the exhaust fan.

Carbon Dioxide

The CO_2 concentration dropped between the (scrubber) inlet samples and the scrubber outlet samples. This is the reverse of the O_2 increase shown above, and is primarily the effect of dilution from mixing and air inleakage. There is a change that there is a slight absorption of CO_2 in the scrubber, but this should not be appreciable below a scrubber pH of 10. (Operating the scrubber at too high a pH can result in appreciable absorption of CO_2, resulting in excessive caustic consumption, and increasing the waste settled solids removed from the scrubber system due to precipitation of sodium (or calcium) carbonate.

Carbon Monoxide

Combustion of the gases is not complete at the (scrubber) inlet sampling point and this is why appreciable CO combustible content shows up in the "inlet" analysis. Since there is by far more than enough O_2 content to oxidize all the CO, and the gas is hot, some oxidation of CO to CO_2 will proceed in the hot ductwork up to the scrubber inlet, causing the CO content to drop by the scrubber "outlet". More complete mixing aids in both oxidation, and a concentration reduction due to dilution. Both of these effects explain the CO concentration drop down to 400 to 600 ppmv by the scrubber outlet sample. The scrubber itself has no capability to remove CO. If it were necessary to reduce the CO concentration further, one might affect a further reduction in the hot gas stream, ahead of the scrubber, by providing some increased turbulence and mixing, by providing increased residence time at high temperature, and by contact with an oxidation catalyst. The latter would be the most effective, but also the most expensive, and perhaps be subject to poisoning by impurities.

Volatile Organic Compound Emissions, (VOC's)

VOC's -- Vost Method (report pages B-4 and B-5)

Grey Iron Runs:

The highest emissions were generally on run No. 1. Even so, levels below 0.012 lbs/hr occurred for 24 compounds, and were below 0.024 lbs/hr for another 10 compounds.

The only ~~really~~ relatively high emission was for methylene chloride at 3.18 lbs/hr on run No. 3, but below 0.12 lbs/hr on both runs No. 1 and 2. Somewhat high was benzene at 0.295 lbs/hr on run No. 1, and at 0.278 lbs/hr on run No. 2; but only 0.008 lbs/hr on run No. 3.

Nodular Iron Runs:

Almost all of the nodular iron VOC emissions were below 0.02 lbs/hr on run No. 3, except for tetrachloroethene which was 0.086 lbs/hr. On run No. 2, most of the emissions were below 0.05 lbs/hr except for acetone (0.076 lbs/hr), 2-butanone (0.053 lbs/hr), and 1,1,1-trichloroethane (0.059 lbs/hr).

Again, methylene chloride (9.67 lbs/hr on run No. 3) and 3.13 lbs/hr on run No. 2, was the really high compound. Benzene was somewhat elevated, being 0.37 lbs/hr on run No. 2, and 0.12 lbs/hr on Run No. 3.

Unfortunately, the sample collected on Nodular run No. 1 was broken in transit and no data is available.

VOC's -- Semi-Vost Method (Report pages B-6 through B-9)

Grey Iron Runs:

Again, VOC emissions were generally below 0.030 lbs/hr on run No. 1 and No. 2; and below 0.010 lbs/hr on run No. 3.

Eleven compounds were appreciably higher than the above levels. They are shown by compound and run number at the top of the next page.

VOC's -- Semi-Vost Method (continued)

Higher Occurring Semi-Vost VOC's -- Grey Iron Runs

Compound Name	Run No. 1	Run No. 2	Run No. 3
benzyl alcohol	0.058	0.056	0.016
benzoic acid	0.145	0.140	0.041
4-chloroaniline	0.058	0.056	0.016
4-chloro,3-methylphenol	0.058	0.056	0.016
2-nitroaniline	0.145	0.140	0.041
3-nitroaniline	0.145	0.140	0.041
2,4-dinitrophenol	0.145	0.140	0.041
4-nitrophenol	0.145	0.140	0.041
4,6-dinitro,2-methylphenol	0.145	0.140	0.041
pentachlorophenol	0.145	0.140	0.041
3,3'-dichlorobenzidine	0.058	0.056	0.016

Units are lbs/hr

Nodular Iron Runs:

The VOC emissions were generally below 0.04 lbs/hr on Run No. 1 and below 0.02 lbs/hr on Runs No. 2 and 3.

Ten compounds had higher emission levels than these on all runs and are tabulated below.

Higher Occurring Semi-Vost VOC's -- Nodular Iron Runs

Compound Name	Run No. 1	Run No. 2	Run No. 3
benzyl alcohol	0.071	0.027	0.030
benzoic acid	0.176	0.067	0.074
4-chloroaniline	0.071	0.027	0.030
4-chloro,3-methylphenol	0.071	0.027	0.030
2-nitroaniline	0.176	0.067	0.074
2,4-dinitrophenol	0.176	0.067	0.074
4-nitrophenol	0.176	0.067	0.074
4,6-dinitro,2-methylphenol	0.176	0.067	0.074
pentachlorophenol	0.176	0.067	0.074
3,3'-dichlorobenzidine	0.071	0.027	0.030

Units are lbs/hr

VOC's -- Semi-Vost Method (continued)

If it were necessary to reduce any of these VOC emissions, the only practical ways this might be accomplished would be by incineration or by catalytic oxidation. The time and place to accomplish this is while the cupola gases are still hot (before they have been water scrubbed). There is probably enough temperature to provide ignition of these combustibles in the brick-lined duct between the cupolas and the scrubber with a catalytic afterburner. There is also a considerable variety of oxidation catalysts from which to choose. Since there are likely to be some catalyst poisons among the substances evolved from the cupola, the major problem would be in selecting a catalyst which would have long life in this service. Most likely, pilot testing of different catalysts on a gas slip-stream would be required.

An easier alternative would be to design and install a refractory direct-flame afterburner in the gas ductwork to the scrubber. The major disadvantage with a direct-flame afterburner would be the additional energy required to heat the off-gases on up to a temperature in the range of 1300-1500 F, hopefully. (Some compounds may require a temperature as high as 1800 F.) Providing adequate residence time at temperature may result in a space problem. A gas residence time of at least one second would probably be required. The higher gas temperature entering the scrubber would result in more steam being evaporated in the scrubber, and a larger volume off-gas flow. Probably a larger

exhaust fan would be required. In addition, the larger steam plume would travel further down-wind before being dispersed or re-evaporated.

A number of the VOC compounds are chlorinated. Their combustion will liberate HCl in the gas stream. This would be scrubbed out by the alkaline scrubbing liquid and not require an additional scrubber as would be the case with incineration following the present scrubbing system.

Heavy Metal Emissions (Report page B-10)

~~Only~~ Two acceptable samples for Manganese were obtained, one for Grey Iron, and the other for Nodular Iron. Both were obtained on Runs 3.

The emission rates in lbs/hr were:

Grey Iron	Nodular Iron
Run 3	Run 3
8.35	4.26

These values are only moderately high. The manganese, at the sampling temperatures would be in particulate form and would have to constitute a portion of the total particulate catch during EPA Method V sampling for particulates. If these values appear to cause environmental problems, additional manganese sampling would be in order to provide a large quantity of emission data.

Other Metal Emissions

Grey Iron:

Emission of a number of metals was quite low.

Antimony was absent, and mercury was 0.0003 lbs/hr or less.

Barium was 0.0030 lbs/hr or less.

Arsenic was 0.0098 lbs/hr on run 1, 0.0067 on run 2, and 0.0038 lbs/hr on run 3.

Aluminum was 0.133 lbs/hr or less; copper was 0.222 lbs/hr or less.

Nodular Iron:

Again, antimony was absent, and mercury was 0.0003 lbs/hr or less.

Arsenic was absent on run 2, 0.0022 on run 1, and 0.0076 lbs/hr on run 3.

Aluminum was 0.142 lbs/hr or less.

Barium was 0.0076 lbs/hr or less, and copper was 0.108 lbs/hr or less.

On both Grey Iron and Nodular Iron runs, the quantity of chromium, lead and nickel varied considerably from run to run as shown below:

Component	Grey Iron			Nodular Iron		
	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3
Chromium	0.039	0.065	0.029	0.064	0.036	0.049
Lead	0.153	0.155	0.055	0.133	0.049	0.102
Nickel	0.010	0.013	0.334	0.022	0.089	0.263

Units are lbs/hr

HCl Emissions (Report page B-2)

The HCl emissions were quite low and well controlled as one would expect from alkaline scrubbing water. On the Grey Iron tests, only one sample out of 3 was above "less than 0.01 lb/hr emission". The one higher value on run 3 was 0.10 lb/hr.

On Nodular Iron, the HCl emissions tended slightly higher. The one high value (on run 2) was 0.13 lb/hr. One the other two runs, the value was "less than 0.01 lb/hr" and "less than 0.02 lb/hr".

As long as the scrubbing water pH is maintained in the 9.2 to 9.5 range, and the spray nozzles are kept in a clean (unplugged) condition, efficient removal of HCl should be achieved. The scrubbing gas temperature generally runs hotter when making Nodular Iron. This higher temperature raises the vapor pressure of HCl above its water solution somewhat, and tends to make scrubbing efficiency on HCl slightly lower when making nodular iron. This can be compensated for by doing a good job of control of pH and scrubber spray water condition (and scrubber flow rate) when making nodular iron.

Comparison of TSP (Total Suspended Particulate Emissions) and PM Emissions at the Scrubber Outlet

Back in 1987, the US EPA began a change in the method of measurement of particulates in the atmosphere from TSP to PM_{10} measurement. TSP (total suspended particulates) is a gravimetric measurement of all the particulate in the atmospheric air. It consists of taking a sample of the air in the atmosphere (usually 10 meters above the earth's surface) and removing the particulate on a pre-weighed filter media. Since only smaller particles in the atmosphere (those smaller than 10 µm) cause most of the health problems in the human lung, the EPA decided to change the particulate ambient air standard to one based on only those particles in the atmosphere acting like particles which are smaller than an aerodynamic spherical particle of 10 µm. An aerodynamic particle is an airborne particle equivalent to a spherical particle with a density of unity (1.00 gms/cc actual density). Particles of greater density will act like an aerodynamic particle of larger diameter (or greater mass) because of their greater settling rate.

The EPA indicated that the states were to begin using the new PM_{10} standard as soon as they could reasonable change over to new equipment. For ambient air, the change involves adding an air sample classifying head for the Hi-vol sampler which was conventionally used for measuring daily values of TSP concentration in the ambient air. The new head subjects the gas sample to sudden changes in direction, which allows it to separate particles by

aerodynamic size. All particles of 10 µm and smaller aerodynamic size continue to flow on to the filter for capture. The larger particles are removed from the air sample and are rejected (not included) for the gravimetric PM_{10} analysis. The latest copy of the Missouri Air Pollution Control Regulations, which we have, replaces the former TSP ambient air standard with the newer PM_{10} standard. However, most particulate emission regulations, including Missouri's, have still been based on use of the US EPA Method V sampler, which catches all particles being emitted to the atmosphere regardless of particle size. It is only logical that in time, the EPA and the states will revise their particle emission standards to a method which catches only particles of aerodynamic size 10 µm and smaller. The EPA has developed an in-stack sampler which does this, which is currently known as EPA sampling methods 201 and 201A. Total Source Analysis used method 201A for their work.

While Missouri does not yet have regulations controlling PM_{10} emissions, it is probable that they are currently requesting data on PM_{10} emissions from existing operations, from which they can begin to formulate new PM_{10} emissions regulations for various industrial operations. Presumably, it is for this reason that Gardner-Denver (Cooper Industries) has requested such analyses. Since a part of the coarser particulate catch is being discarded, PM_{10} samples always give a lower concentration of particulate than does TSP sampling.

Grey Iron:

A comparison of the EPA Method 5 (TSP) sampling and PM_{10} sampling is shown below. It is to be kept in mind that these samples from different operating days are not precisely comparable in that the cupola might not have been operating in exactly the same way. For precise comparison, the two sampling methods would have to be performed simultaneously over the same identical time periods.

Comparison of TSP and PM_{10} Emission Sampling -- Grey Iron

EPA Method V (TSP)				EPA Method 201A (PM_{10})			
Run 1 9/15/93	Run 2 9/15/93	Run 3 9/17/93	Avg.	Run 1 9/21/93	Run 2 9/21/93	Run 3 9/21/93	Avg.
38.08	28.76	33.23	33.36	22.99	39.62	20.14	27.58

Units are in lbs/hr

Based on the average of 3 samples, PM_{10} results are 83% of the TSP value. The PM_{10} sample for run 2 looks like at extremely high value compared to the other two tests.

Nodular Iron:

Comparison of TSP and PM_{10} Emission Sampling -- Nodular Iron.

EPA Method V (TSP)				EPA Method 201A (PM_{10})			
Run 1 9/16/93	Run 2 9/16/93	Run 3 9/16/93	Avg.	Run 1 9/20/93	Run 2 9/20/93	Run 3 9/20/93	Avg.
82.27	16.46	42.39	47.04	13.39	18.81	24.39	18.86

Units are in lbs/hr

Based on the average of 3 samples, the PM_{10} value is only 40% of the TSP value on nodular iron. This figure is in accord with inferences which can be drawn from the nodular TSP sampling which tends to indicate that uncontrolled emissions from the cupola are much greater when making nodular iron (compared to grey iron), and also much coarser. The latter is apparent from the higher scrubber collection efficiency on the nodular iron gases. With the coarser emission, it stands to reason that the uncollected emission from the scrubber will also be coarser, and that the PM_{10} fraction will be a smaller portion of the TSP emission.

Particle Size Analysis of Particulate Entering the Scrubber

Grey Iron:

The particle size analysis of particulate leaving the cupola was measured in the brick-line duct above the top of the opening for the charging car. Sampling was done with an Anderson Sampler for catching particles by size. The analysis for two samples when

making grey iron was:

Particle Size Range	Run 1 9/15/93 11:30 AM	Run 2 9/17/93 8:35 AM
+28 µm	56.95 %	95.25 %
-28 to +14 µm	1.11	0.86
-14 to +4.9 µm	0.83	0.86
-4.9 to +2.4 µm	4.98	0.04
-2.4 to +1.3 µm	5.42	0.19
-1.3 to +0.65 µm	18.25	0.67
-0.65 to +0.31 µm	6.55	1.24
- 0.31 µm	5.92	0.90
	100.01	100.01

Particle Size Analysis for Nodular Iron Entering the Scrubber

Particle Size Range	Run 1 9/16/93 10:25 AM	Run 2 9/16/93 (time not recorded)
+ 28 µm	91.27	96.91
-28 to + 14 µm	1.47	0.31
-14 to +4.9 µm	0.88	0.31
-4.9 to +2.4 µm	0.55	0.03
-2.4 to +1.3 µm	0.67	0.39
-1.3 to +0.65 µm	1.51	0.18
-0.65 to +0.31 µm	1.31	0.31
-0.31 µm	2.52	1.56
	100.00	100.00

The particle size analysis on Grey Iron, Run 1, 9/15/93, at 11:30 to 11:35 AM, just preceded TSP particulate sampling for run 2 on the scrubber inlet which started at 11:50 AM. On this TSP analysis, the particle loading at the inlet to the scrubber was found to be 455.03 lbs/hr. The scrubber should have been able to collect all the +4.9 µm size particles essentially 100%. The +4.9 µm size particles represented 58.89% of the inlet particle sizes.

So, the +4.9 µm particles collected = (0.5889)(455) = 267.95 lbs/hr.

The scrubber would not be expected to catch any of the particles smaller than 2.4 µm. These total 36.14% or (0.3614)(455)= 164.44 lbs/hr.

Of the particles between 4.9 µm and 2.4 µm, there were 4.98% of the particles in the scrubber inlet in this range. The scrubber might catch 40-50% of these particles or (0.0498)(455) = 22.66 lbs/hr. At 50% catch, this would be 11.33 lbs/hr.

Therefore, the expected atmospheric emission might be 164.44 + 11.33 = 175.77 lbs/hr. The measured emission on the scrubber for Run 2 was 28.76 lbs/hr; so the scrubber was either more efficient in collecting particle sizes, or the particle size caught on Grey Iron particle size analysis, run 1, is not representative of all the solid sizes entering the scrubber.

Likewise, a similar calculation can be made for Grey Iron particle size analysis, Run 2, on 9/17/93 at 8:35-8:40 AM. The results of this calculation, made in the same manner, predict an atmospheric emission of 7.33 lb/hr based on particle size analysis. The actual measured loss from Run 3, 9/17/93, was 33.25 lbs/hr. So in this case, the scrubber would be either less efficient than predicted, or again the particle size analysis is not completely representative of all the size solids going to the scrubber. The latter is to be expected, since the solids for particle size analysis were sampled for 5 minutes each time, while the effluent

loss from the stack was taken over a period of time exceeding one hour.

Nodular Iron Calculations

Similar calculations can be made for the Nodular Iron runs. Such calculations predict a scrubber efficiency of 93.90% for the particle size run no. 1 on 9/16/93 at 10:25 AM. The TSP scrubber inlet quantity measured during run no. 2 on 9/16/93 (which was begun at 10:35 AM), was 785.10 lbs/hr. This predicts an atmospheric emission of 47.89 lbs/hr. This compares with a total outlet measured emission of 16.46 lbs/hr on gas outlet run No. 2. However, it compares favorably with the gas outlet measurement for run No. 3 of 42.39 lbs/hr. However, the run 3 measurement was made considerably later in the day.

For the nodular iron particle size measurement, run No. 2 on 9/16/93, time not recorded (but probably just before the start of TSP sampling from the scrubber inlet, run 3, on 9/16/93) predicted overall scrubber efficiency would be 97.55%. Using the measured scrubber inlet quantity on run 3, 9/16/93, of 606.50 lbs/hr, gives an anticipated atmospheric effluent of 14.86 lbs/hr. This compares with a much higher effluent measurement of 42.39 lbs/hr on TSP outlet sampling of run 3, on 9/16/93.

It appears that one can consider the scrubber inlet particle size measurements as just quick momentary measurements of particle size

distribution, which they are, and not as reliable measurements of the average particle size of the solids entering the scrubber over a period of an hour or longer.

DO NOT INCLUDE PGS 29-46 IN THE REPORT

Summary of Missouri Department of Natural Resources Regulations
Applying to Cooper Industries LaGrange Foundry

According to the latest copy of Air Pollution Control Regulations for the State of Missouri, Air Conservation Commission, which we have, the following pertinent sections could be applicable to emissions from the LaGrange Foundry of Cooper Industries. The following are brief summaries which we have extracted from the regulations. The reader is referred to the detailed regulations for their entirety.

10 CSR 10-3.050 Restriction of Emission of Particulate Matter from Industrial Processes

Par. (3), General Provisions, discusses how the regulations are applied to continuous processes, and cyclical or batch processes. The first control technique applied is the conventional Process Weight Table concept.

Par. (4) covers the emission limits permitted. Par. (4)(A) sets forth the permitted process weight table as Table I (on page A-86). Par. (4)(B) sets forth Table II (page A-87) which is a table of emission source volume vs pollution concentration. Table II applies only to those situations in which the requirement of Table I is more restrictive than would be the requirement of Table II. In this case, Table II supersedes Table I. Par. (4)(C) at the option of the applicant, permits substituting the volume of the gas passing through and leaving the air pollution abatement operation for the source gas volume in Table II, under certain circumstances, when desired. The conditions of the substitution are (1) control device must emit no more than 40% of the particulate matter entering the device (60% overall collection efficiency minimum), and the gas volume which is substituted, must be converted to

standard conditions (70 F and 14.7 lbs/sq in absolute pressure) and moisture content no greater than that of the gas stream entering the collection device. The burden of proving the accuracy of the calculations made to justify the substitution rests with the applicant. Par. (4)(D) further provides that regardless of the emissions permitted by par. (4) (A, B, and C) that no emission of particulate matter from any source may exceed a concentration of 0.30 grain per standard cubic foot of exhaust gas.

Par. (5) covers exceptions to the foregoing requirements. Par. (5)(A) provides an exception for existing grey iron jobbing cupolas. A jobbing cupola is defined as a cupola which has a single melting cycle operated no more than 10 hours in any consecutive 24 hours, and no more than 50 hours in any consecutive 7 days. Par. (5)(A) 1 provides that a jobbing cupola must be equipped with a gas cleaning device so operated to remove at least 85% by weight of all the discharge particulate matter, or release not more than 0.4 grain per standard cubic foot concentration of particulate matter, whichever is the more stringent. Par. (5)(A)2 specifies that all gases, vapors, and entrained effluents from the cupola must be incinerated at a temperature of at least 1200 F for a period of at least 0.3 seconds.

Par. (6) specifies a time schedule for compliance. Under par. (6)(B) all existing installations not in compliance on the effective date of the regulation, must be in compliance within 6

months of the effective date unless the applicant shall have submitted a program and schedule for achieving such compliance. The effective date for this Section (as written -- per our copy) is March 12, 1984.

10 CSR 10-3.080 Restriction of Emission of Visible Air Contaminants

This section prohibits visible emissions of a shade darker than No. 2 on the Ringelmann Chart of equivalent density, for existing installations (No. 1 Ringelmann for new installations). Par. (5) provides an exception for 6 minutes out of any 60 minute period when the opacity may be darker as long as it is not as dark as No. 3 Ringelmann or equivalent density. Par. (5)(C) provides an exception from the regulation when the presence of uncombined water vapor is the only reason for the failure of the emission to meet the regulation. Par. (5)(D) provides exceptions from the regulation for the transfer of molten metals, emissions from transfer ladles, and existing grey iron cupola furnaces.

10 CSR 10.3.100 Restriction of Emission of Sulfur Compounds

This section limits emission of SO_2 from existing sources to outlet concentrations no higher than 2000 ppmv SO_2 (500 ppmv for new sources). Existing sources are limited to emissions of H_2SO_4 or SO_3 to concentrations no higher than 70 mg/m of H_2SO_4 or SO_3. (35 mg/m for new sources). It also limits any emission of SO_2 whatever, which, when add-to background levels will produce SO_2 ambient air

concentrations in any public area exceeding the following concentration-time levels for SO_2:

0.03 ppmv average over a period of one year
0.14 ppmv average over a period of 24 hours
0.50 ppmv average over a period of 3 hours

<u>10 CSR 10-6.080</u> <u>Emission Standards for Hazardous Air Pollutants</u>

As written, this is an old regulation, and applies only to the following hazardous air pollutants: Asbestos, benzene, beryllium, coke oven emissions, inorganic arsenic, mercury, and vinyl chloride. Of these, the only ones that might be of concern to Gardner Denver would be benzene, beryllium, and inorganic arsenic. Arsenic was found in the heavy metal analyses, and is presumably in metallic (or inorganic) form. However, the low emission levels recorded (in hundredth's of a pound per hour) would probably not be of concern. Beryllium was found to be absent in nodular and present in low trace amounts of 0.001 lb/hr in grey iron stack emission. Benzene in somewhat appreciable amounts was found to be present in the VOC sampling with the VOST train. It was highest during nodular iron operation, but not appreciably less with grey iron production. All the levels were below 0.40 lbs/hr emission rate and would probably not be objectionable under the older regulations.

The Missouri regulations in this section have not yet been revised to include Hazardous and Toxic Emission Regulations enacted in Title 3 of the US Clean Air Reauthorization Act of 1990, which includes a list of 189 hazardous chemicals. Many of the VOC's

found in trace amounts during the VOST and Modified-VOST trains sampling are undoubtedly on this list of 189 hazardous chemicals. The initial implications of these regulations will be to require 90% reduction from past emission levels by 1998. The EPA is presently developing detailed requirements in this area. The Act defines a "major source" of hazardous pollutants as one with a potential to emit 10 tons/yr of single pollutant, or 25 tons/yr of a combination of hazardous pollutants. It may be, that because of the low level of VOC's emitted by the cupolas that the LaGrange Foundry will escape designation as a "major source". It is currently unclear how sources which are not "major" will be affected by regulations.

10 CSR 10-6.100 Alternate Emission Limits

These regulations apply only to areas of Missouri which are non-attainment areas in meeting the National Ambient Air Quality Standard (NAAQS) for ozone. We do not have information on the LaGrange area, but believe it is probably in compliance with the NAAQS standards for ozone. If this is true, this section of regulations does not apply to the LaGrange area.

10 CSR 10-6.170 Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin

This regulation was adopted to limit travel of fugitive emissions from operations involving handling, transportation, or storing of material, which travels beyond the premises on which the activity

is conducted. While its intent was not primarily to control emissions from stacks, the wording is such that one can not be sure it might not be applied to stacks or any other operation at the foundry which is emitting dust or particles to the atmosphere. It prohibits the emission of particulate matter into the air in such quantity that it is visible in the ambient air beyond the property line. Also prohibited is emission of particulates in such quantity that they can be found and detected, settled on surfaces in the area beyond the property line of origin.

Ability of Cupola Scrubber to Comply with Various Sections of the Missouri Air Pollution Regulations

Particulate Emissions, Section 10 CSR 10-3.050

These are four options for compliance on particulate emissions. The easiest is the exemption of existing grey iron jobbing cupolas. But let us first see how we stand under the more difficult options. The option intended for most operations in the state is the Process Weight Table.

Process Weight

One must first calculate the process weight. As typical data, consider the Grey Iron charge sheet for 9/15/93. The cupola started producing iron at 8:30 AM and was shut down at 2:00 PM. The elapsed time was 5 hrs, 30 min.

Look at the material charged:

Grey Iron pigged	4,000 lbs	Foundry coke	20,350 lbs
" " returns	51,300 lbs		
" " pig	11,400 lbs		
Rail scrap	51,300 lbs		
	118,000 lbs		
		Total Charge = 140,166 lbs.	
Silicon	570 lbs		
Manganese	456 lbs	Process weight =	
Superseed 75	400 lbs		
Graphidox	10 lbs	(140,166/(5.5 hr) =	
Copper	230 lbs		
Ferrochrome	50 lbs	25,485 lbs/hr	
Carbon riser	100 lbs		
		Process wt in TPHH = 25,485/2000	
	1,816 lbs	= 12.7425 TPH	

To calculate emission rate, the equation is $E = 4.10\ P^{0.67}$
where E = emission rate allowed in lbs/hr
P = process weight in Tons/hr

The above equation applies when P is less than 60,000 lbs or 30 TPH.

$$E = (4.10)(12.7425)^{0.67} = 22.56 \text{ lbs/hr}$$

The emissions on 9/15/93 were:

Run 1	38.08 lbs/hr	Average = 33.42 lbs/hr
Run 2	28.76 lbs/hr	

The actual emissions do not meet the process weight requirement.

Considering par. (4)(B)

We may be able to use the effluent grain loading in Table II to set aside the Process Weight Table requirements. First, under Par. (4)(B) we need to calculate the Source Gas Volume in Std cu ft/min. By regulatory definition, the standard gas conditions are 70 F and 14.7 lbs/sq in absolute. From Total Source Analysis Report page B-12, the scrubber inlet flow in ACFM = 48,558 CFM. The gas temperature = 554 F. The absolute pressure in the ductwork was 29.87 inches of mercury. The standard absolute pressure (14.7 lb/sq in abs) is 29.92 in. Hg. abs. Calculating the standard source gas volume, using the Perfect Gas Laws:

$$(48{,}558)\ \frac{460+70}{460+554}\ \frac{29.87}{29.92} = 25{,}338 \text{ std CFM}$$

The atmospheric emission for Run 1, grey iron = 38.08 lbs/hr. Converting to grains/min, we get:

(38.08)(1 hr/60 min)(7000 gr/1 lb) = 4442.67 gr/min.

Outlet emission in gr/std source gas CFM is:

(442.67 gr/min)/(25,338 std CFM) = 0.1753 gr/source gas std CF.

Interpolating in Table II, of Par. (4)(B), for 25,338 source std CFM gives:

0.0662 gr/std CF

We cannot meet this loading.

?

John G - is this a problem of any kind?

The loading allowed under the Process Weight Table would be

(22.56 lbs/hr)(1/60)(7000/1)/(25,338 std CFM) = 0.1039 gr/std CF.

Therefore the process weight table is even more liberal in this case.

The calculation can be repeated for run 2 on 9/15/93. The actual source gas CFM = 60,811; the gas temp = 889 F; the gas abs pressure = 29.87 in. Hg. The source gas std CFM = 23,852 CFM. The atmos. emission is 28.76 lbs/hr = 3353 gr/min, and a loading of 0.1406 gr/std source gas CF.

Table II, par. (4)(B) allows 0.0675 gr/std CFM. Thus, on run 2, with a lower emission and hotter cupola gas, we can not meet this requirement.

Considering par. (4)(C)

Theoretically, we could use par. (4)(C) to substitute the inlet gas volume to the scrubber in Table II, instead of the Source gas volume. Unfortunately, in this situation, it is the same volume, and we get the same result as we get above for par. (4)(B).

Par. (4)(D)

This paragraph limits concentration of emissions to no more than 0.4 gr/std cu ft of particulate matter. Returning to the calculations for par. (4)(B), about mid-page, the particulate concentration in the outlet gas was calculated, for Grey Iron Particulate Run 1 (9/15/93) as 0.1753 gr/source gas std CF. For Run 2 (bottom of same page above), the outlet gas particulate concentration was calculated as 0.1406 gr/source gas std CF. Therefore, meeting the requirements of par. (4)(D) is not problem. However, this is only a top limit specification in the regulation. Meeting this requirement does not put the operation in compliance.

Sec. (5)(A)

This is the section of the regulation under which the cupolas have been operating in the past. It exempts existing Grey Iron Jobbing cupolas from regulation by Par. (4) as long as the control device removes 85% or more of the particulate, and the concentration of the particulate in the effluent does not exceed 0.4 gr/std cu ft of discharge gas. There are operating time limits of 10 hr/day out of a consecutive 24 hours, and 50 hours in any consecutive 7 days, which Gardner Denver apparently desires to meet. There is apparently a new requirement that has been added, par. (5)(A)2, requiring that the cupola off-gas be incinerated at 1200 F for a period of at least 0.30 sec.

The Gardner Denver LaGrange Foundry should be able to comply with the collection efficiency part of this requirement. On the Grey Iron test runs, the scrubber collections efficiencies were:

Run 1	9/15/93	83.27%
Run 2	9/15/93	93.37%
Run 3	9/17/93	86.35%
Average of all 3 runs		89.20%
Average of 2 runs on 9/15/93		90.21%

The Run 1 sample is below the requirement of 85%, but no one would base compliance or non-compliance on only one sample. The average of all 3 samples indicates good compliance, even though the Run 3 sample does not indicate a large margin of safety. The average of all samples taken on 9/15/93 (2 samples) indicates operation well in compliance.

On the Nodular Iron runs, the results indicate much more satisfaction in the ability to be in regulatory compliance. The results of all 3 tests are individually in compliance, as well as the average. The results are:

Run 1	9/16/93	95.38%
Run 2	9/16/93	97.90%
Run 3	9/16/93	93.01%
Average of all runs		95.55%

These results for Nodular Iron may look surprising, because the appearance of the effluent on Nodular runs does not look as good as does the effluent plume on the Grey Iron runs. The reason for this is two-fold. The emissions from the cupola on the Nodular runs ARE much higher than the cupola emissions on Grey Iron. But a large potion of the Nodular emissions are coarse material which is easily caught in the scrubber compared to the Grey Iron cupola emissions which tend to be finer. This addition of coarser material with the Nodular operation, raises the scrubber overall efficiency, making the scrubber recovery efficiency come out generally higher. Taking an average of the two particle size analyses on each product, the +4.9 µm fraction for Grey Iron is 77.93% vs 95.57% for Nodular Iron. (Admittedly, we do not have enough particle size analysis data, or in enough locations, for each run, to be able to state this opinion with certainty.) However, the efficiency results on the scrubber with 3 longer-term sampling results on each product, tend to bear this out.

The other factor is that the quantity of ultra fine material

evolved from the cupola seems to be somewhat greater with Grey Iron manufacture. This is material which is much harder for the scrubber to catch. The material which the scrubber can hardly catch at all is the particulate which is smaller than around 2.5 to 3 µm in size. The particle size analysis varies extensively for particles smaller than 2.4 µm. On Grey Iron, the Run 1 particle size analysis shows 36.14% of the particles to be finer than 2.4 µm. This was taken shortly after the TSP particulate samples for Grey Iron Run 1, 9/15/93, when only 83.27% scrubber efficiency was obtained. Somewhat at variance with this is the Grey Iron Run 2 particle size analysis taken on 9/17/93 when the minus 2.4 µm particles were only 3.00% of the sample.

For Nodular Iron, both particle size runs were made on 9/16/93. The sample for Run 1 showed minus 2.4 µm particles to be 5.83%, and for Run 2, the minus 2.4 µm particles totalled 2.44%.

Closer study of the size distribution of the minus 2.4 µm fraction shows some difference between the Grey Iron particle size analyses and those for Nodular Iron. The majority of the particles smaller than 2.4 µm on the Grey Iron runs tend to be larger than 0.31 µm, and at least in the case of Run 1, to be gathered about the 1.3 to 0.65 µm fraction. The particles minus 2.4 µm on the Nodular Iron runs, tend to be concentrated in the ultra-fine minus 0.31 µm fraction. These ultra-fine particles, will have a very large surface area, and a very large number of particles for a given unit

weight of such particles. Therefore, their light scattering and visibility obscuring power will be very high, for a rather small amount of mass. Therefore, they will tend to make the effluent plume appear more visible and more opaque, as we observe on Nodular Iron production. Nevertheless, because of their small mass, and the fact that the scrubber efficiency calculations are on a mass basis (and not particle number), the small mass of these ultra-fine losses with Nodular Iron production does not lower the scrubber efficiency by any appreciable amount. The scrubber efficiency comes out less on Grey Iron, because the bulk of the particles not collected tend to be somewhat coarser and have more mass, coupled with the fact that the cupola emits less really coarse particles when making Grey Iron, and therefore reduces the quantity of really "easy to catch" particles. Therefore, when Grey Iron is made, the scrubber really has to work harder to achieve an 85+% efficiency, compared with what it has to do to achieve a 92+% efficiency with Nodular Iron.

Par. (5)(A) -- Other concerns

To comply with the par. (5)(A) exemption, there are several other items that must be considered. The first is the operating time limit. The maximum limit of 10 hours per day appears to be of no concern. None of the heats even exceed 8 hours in a 24 hour day. The only possible concern might be extended operations which could exceed the 50 hours per week. This does not appear to be a problem for even 6 day operation, but does preclude operating 7 days in any

one stretch. Just to be sure, a simple analysis of the Test Period Operating Data was considered.

Length of Operating Periods

Grey Iron

9/15/93 operation --
Started: 8:30 AM
Stopped: 2:00 PM
5.5 hrs

9/17/93 operation --
Started: 8:30 AM
Stopped 2:05 PM
Approx. 5.5 hrs

Average Grey Iron Operating Time -- typically 5.5 to 6 hrs.

Nodular Iron

9/14/93 operation --
Started: 7:35 AM
Stopped: 3:15 PM
7.75 hrs

9/16/93 operation --
Started: 7:30 AM
Stopped: 2:00 PM
6.6 hrs

Average Nodular Iron Operating Time -- typically 7 to 7.5 hrs. With changing product daily, in a 6 day week, the Foundry would have 3 days of Grey Iron runs, and 3 days of Nodular Iron runs. Maximum Operating Time = (3)(6 hr) + (3)(7.5 hr) = 40.5 hrs per week. Thus 6 day per week operation in the present manner would be in compliance with the definition of "jobbing cupola".

Emission Opacity, Section 10 CSR 10-3.080

This regulation which limits the opacity of the effluent from existing operations to Ringelmann No. 2 or 40% opacity, does not apply to the cupola operations. Par. (5)(D) provides exceptions for transfer of metals, and emissions from transfer ladles and existing grey iron cupola furnaces. The present plume from the stack is somewhat opaque at the point of discharge to the atmosphere, because of the water droplets in the emission, thus the

Foundry probably needs this exemption. Par. (5)(C) provides an exception for the situation in which uncombined water vapor is the only reason for the emission to fail to comply. This exception also partially applies to the cupola operation because of saturating the effluent with water vapor due to the wet scrubber. It is difficult to judge what the opacity would be if there were no condensing water vapor. It certainly would not be zero. We feel that the Foundry is on much safer ground having an exception for the cupola, than they would be if they were attempting to secure an exemption for the water vapor emission alone.

Sulfur Compound Emission Restriction, Section 10 CSR 10-3.100

This regulation limits emissions of sulfur dioxide to the atmosphere to 2000 ppmv from existing operations. Meeting this should be no problem as long as the Foundry continues to scrub the off-gas with alkaline water of pH in the range of 9.2 to 9.5. With this pH, the SO_2 emissions should generally be in the range of 1 to 2 ppmv. In fact, it appears that uncontrolled emissions would easily be below the 2000 ppmv concentration, but this is quite an old standard. It is my opinion that in the long run, the Foundry will be much better off keeping the SO emissions quite low.

There is also an emission limit for H_2SO_4 and SO_3 mist. However, the Foundry is not expected to emit these materials, except perhaps in extremely low trace amounts. Finally, there is a prohibition against producing ground level SO_2 concentrations which would

violate the National Ambient Air Quality Standards of concentration-exposure time duration.

In bad weather, there may be instances in which the plume may hit the ground close to the paved street in front of the plant, or the public access road going up the hill to the west of the plant. With the present scrubbing, there should be little danger of violating this provision even if public areas are completely enveloped by the plume for extended time periods.

Alternate Emission Limits, Section 10 CSR 10-6.100

The regulations of this section only apply in those regions of out-state Missouri which are non-attainment areas in meeting the National Ambient Air Standards for ozone. While we do not have specific ozone data on the LaGrange region, it is our opinion that it is probably an attainment area and that these regulations do not apply to the Foundry.

Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin, Section 10 CSR 10-6.170

This regulation is intended to apply to fugitive emissions from operations involving material handling, its transportation, or storage. It applies to bulk unloading, handling, stock-piling, etc. It also applies to its hauling over unpaved roads, etc. However, there is no wording specifically to prevent its application to emissions from stacks. In principle, it prohibits the emission to the atmosphere of particulate dusts in such quantity that their presence in the air is visible beyond the bounds of the originating property. It also covers emission in such quantity that it settles out on surfaces beyond the property line of origin.

In poor weather, the cupola plume travels downwind sufficiently far that it may be visibly detected beyond the Foundry property line. In addition, in some weather, settled dust which appears to come from the plume, can be observed on parked cars on the hillside parking lot opposite the Foundry office entrance. While this is Foundry property, it is across a public street from the Foundry itself, and it is difficult to determine how settling of particulate in this area would be interpreted.

While the particulate mentioned above is suspected to come from the cupola plume, it could come from the cupola charging system involving the cranes, material handling, and stockpile operations

which would be clearly within the meaning of this regulation. I suspect that it might be difficult to tell from a collected sample of the dust whether it had been emitted as fugitive dust emissions from cupola raw material handling, or from the cupola scrubbing system itself.

It may be unlikely that the Foundry would be cited for any violation of emission regulations under this section, unless frequent complaints are received from neighbors in the area. However, we point out the possible applicability of this section for completeness of our study.

EMISSIONS TEST REPORT FOR MECO ENGINEERING COOPER INDUSTRIES

September 15/21, 1993

93-354-IN

TOTAL SOURCE ANALYSIS, INC.

TOTAL SOURCE ANALYSIS, INC.
ENVIRONMENTAL TESTING CONSULTANTS

November 12, 1993

I, Terry Shackelford, hereby certify that the emissions tests conducted for Meco Engineering, Cooper Industries, are in accordance with procedures established by the USEPA. This report accurately and faithfully presents the data obtained from the tests and the results determined from analysis of this data.

Terry Shackelford
Crew Chief

I, Carl Vineyard, P.E., hereby attest that all work on this project was completed under my supervision and this report accurately presents the emissions from the unit.

Carl Vineyard, P.E.
Chief Test Engineer

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INTRODUCTION

INTRODUCTION

This report presents the results of the emissions tests performed for MECO Engineering, Cooper Industries.

The purpose of the tests was to determine the emissions of the cupola. The results of the tests can be found in Section II of this report.

The emissions testing was performed by total Source Analysis, Inc., whose main office is located at 510 Dickson Street, Wellington, Ohio 44090.

The tests were performed on September 15/21, 1993. The testing was performed in accordance with EPA reference methods as published in the July 1, 1992 Federal Register, - "Standards of Performance for New Stationary Sources" and subsequent revisions.

The testing equipment and sampling procedures are described in Section III of this report. The raw field data, equations, and laboratory reports used in determining final results are presented in the Appendix.

SUMMARY OF TEST RESULTS

SUMMARY OF TEST RESULTS

The following tables present the final results of the emissions tests performed at Cooper Industries for Meco Engineering.

PARTICULATE

RUN NO.	DATE	LOCATION	LB/HR	LB/DSCF
1	9-15-93	Grey Iron Inlet	227.64	1.53E-04
2	9-15-93	Grey Iron Inlet	455.03	3.27E-04
3	9-17-93	Grey Iron Inlet	243.60	1.56E-04
AVG.			308.76	2.12E-04
1	9-16-93	Nodular Inlet	1778.91	1.01E-03
2	9-16-93	Nodular Inlet	785.10	5.25E-04
3	9-16-93	Nodular Inlet	606.50	4.07E-04
AVG.			1056.83	6.48E-04
1	9-16-93	Nodular Outlet	82.27	6.06E-05
2	9-16-93	Nodular Outlet	16.46	8.72E-06
3	9-16-93	Nodular Outlet	42.39	3.41E-05
AVG.			47.04	3.45E-05
1	9-15-93	Grey Iron Outlet	38.08	1.76E-05
2	9-15-93	Grey Iron Outlet	28.76	2.06E-05
3	9-17-93	Grey Iron Outlet	33.25	1.54E-05
AVG.			33.36	1.79E-05

PM 10

RUN NO.	DATE	LOCATION	LBS/HR	LB/DSCF
1	9-20-93	Nodular Outlet	13.39	1.31E-05
2	9-20-93	Nodular Outlet	18.81	1.99E-05
3	9-20-93	Nodular Outlet	24.39	2.39E-05
AVG.			18.86	1.90E-05
1	9-21-93	Grey Iron Outlet	22.99	2.22E-05
2	9-21-93	Grey Iron Outlet	39.62	3.95E-05
3	9-21-93	Grey Iron Outlet	20.14	1.98E-05
AVG.			27.58	2.72E-05

HCL

RUN NO.	DATE	LOCATION	LBS/HR	LB/DSCF
1	9-16-93	Nodular Outlet	<.01	<8.17E-09
2	9-16-93	Nodular Outlet	.13	7.25E-08
3	9-16-93	Nodular Outlet	<.02	<1.57E-08
1	9-15-93	Grey Iron Outlet	<.01	<5.71E-09
2	9-15-93	Grey Iron Outlet	<.01	<9.55E-09
3	9-17-93	Grey Iron Outlet	.10	4.46E-08

The complete results can be found on the computer printouts following.

CLIENT: MECO ENGINEERING
SITE: LAGRANGE, MISSOURI
LOCATION: COUPOLA INLET AND OUTLET
DATE: 9-14-93 through 9-17-93

Process 1 - Nodular Iron
Inlet

Date	Run #	NOx	SO2	O2	CO2	CO
9-14-93	1	5.09	13.79	13.85	6.13	108.36
9-16-93	1	2.52	6.35	13.43	5.90	115.54
9-16-93	2	3.32	3.26	15.28	6.80	62.17
Avg.		3.64	7.80	14.19	6.28	95.36

Outlet

57.83

Date	Run #	NOx	SO2	O2	CO2	CO
9-14-93	1	3.91	0.00	15.87	4.70	44.69
9-16-93	1	1.61	0.61	16.38	4.48	52.80
9-16-93	2	1.46	0.27	16.75	5.03	43.19
Avg.		2.33	.29	16.33	4.74	46.89

Process 2 - Grey Iron
Inlet

Date	Run #	NOx	SO2	O2	CO2	CO
9-15-93	1	2.49	41.62	12.92	6.04	159.01
9-17-93	1	1.72	13.57	15.58	5.70	124.85
9-17-93	2	3.29	10.86	15.30	6.00	123.41
Avg.		2.50	22.02	14.60	5.91	135.76

Outlet

42.52

Date	Run #	NOx	SO2	O2	CO2	CO
9-15-93	1	1.36	0.39	15.46	4.01	82.37
9-17-93	1	1.90	0.48	17.20	4.03	87.99
9-17-93	2	2.85	0.18	17.05	4.55	63.75
Avg.		2.04	0.35	16.57	4.20	78.04

All readings are in LB/HR

MEGO COOPER INDUSTRIES
NODULAR IRON SCRUBBER OUTLET
VOST METHOD 0030

CAS No.	Compound	RUN # 1 VOL SAMPLED DSCF	RUN # 1 WEIGHT COL. MG	RUN # 1 EMISSIONS LB/HR	RUN #2 VOL SAMPLED DSCF	RUN #2 WEIGHT COL. MG	RUN #2 EMISSIONS LB/HR	RUN #3 VOL SAMPLED DSCF	RUN #3 WEIGHT COL. MG	RUN #3 EMISSIONS LB/HR	AVERAGE EMISSIONS * LB/HR
74-87-3	Chloromethane				6.42	< 0.05	< 0.0345	14.96	< 0.05	< 0.0160	
74-83-9	Bromomethane				6.42	< 0.05	< 0.0345	14.96	< 0.05	< 0.0160	
75-01-4	Vinyl Chloride				6.42	< 0.05	< 0.0345	14.96	< 0.05	< 0.0160	
75-00-3	Chloroethane				6.42	< 0.05	< 0.0345	14.96	< 0.05	< 0.0160	
75-09-2	Methylene Chloride				6.42	< 0.05	< 0.0345	14.96	< 0.05	< 0.0160	
67-64-1	Acetone				6.42	14	0.6038	14.96	9.8	3.1280	6.3959
75-15-0	Carbon Disulfide				6.42	0.11	0.0759	14.96	0.093	0.0297	0.0528
75-35-4	1,1-Dichloroethene				6.42	< 0.025	< 0.0173	14.96	< 0.025	< 0.0080	
75-35-3	1,1-Dichloroethane				6.42	< 0.025	< 0.0173	14.96	< 0.025	< 0.0080	
156-60-5	1,2-Dichloroethene (total)				6.42	< 0.025	< 0.0173	14.96	< 0.025	< 0.0080	
67-66-3	Chloroform				6.42	< 0.025	< 0.0173	14.96	< 0.025	< 0.0080	
107-06-02	1,2-Dichloroethane				6.42	0.058	0.0400	14.96	< 0.025	< 0.0080	0.0240
78-93-3	2-Butanone				6.42	< 0.025	< 0.0173	14.96	< 0.025	< 0.0080	
71-55-6	1,1,1-Trichloroethane				6.42	0.076	0.0525	14.96	< 0.05	< 0.0160	0.0342
56-23-5	Carbon Tetrachloride				6.42	0.085	0.0587	14.96	< 0.025	< 0.0080	0.0333
108-05-4	Vinyl Acetate				6.42	< 0.025	< 0.0173	14.96	< 0.025	< 0.0080	
75-27-4	Bromodichloromethane				6.42	< 0.05	< 0.0345	14.96	< 0.05	< 0.0160	
79-34-5	1,1,2,2-Tetrachloroethane				6.42	< 0.025	< 0.0173	14.96	< 0.025	< 0.0080	
106-99-0	1,3-Butadiene				6.42	< 0.025	< 0.0173	14.96	< 0.025	< 0.0080	
78-87-5	1,2-Dichloropropane				6.42	< 0.05	< 0.0345	14.96	< 0.05	< 0.0160	
10061-02-6	Trans-1,3-Dichloropropene				6.42	< 0.025	< 0.0173	14.96	< 0.025	< 0.0080	
79-01-6	Trichloroethene				6.42	< 0.025	< 0.0173	14.96	< 0.025	< 0.0080	
124-48-1	Dibromochloromethane				6.42	< 0.025	< 0.0173	14.96	< 0.025	< 0.0080	
79-00-5	1,1,2-Trichloroethane				6.42	< 0.025	< 0.0173	14.96	< 0.025	< 0.0080	
71-43-2	Benzene				6.42	< 0.025	< 0.0173	14.96	< 0.025	< 0.0080	
10061-01-5	Cis-1,3-Dichloropropene				6.42	0.54	0.3727	14.96	0.37	0.1181	0.2454
75-25-2	Bromoform				6.42	< 0.025	< 0.0173	14.96	< 0.025	< 0.0080	
591-78-6	2-Hexanone				6.42	< 0.025	< 0.0173	14.96	< 0.025	< 0.0080	
108-10-1	4-Methyl-2-Pentanone				6.42	< 0.05	< 0.0345	14.96	< 0.05	< 0.0160	
127-18-4	Tetrachloroethene				6.42	< 0.05	< 0.0345	14.96	< 0.05	< 0.0160	
108-88-3	Toluene				6.42	< 0.025	< 0.0173	14.96	< 0.025	< 0.0080	
108-90-7	Chlorobenzene				6.42	< 0.025	< 0.0173	14.96	0.27	0.0862	0.0517
100-41-4	Ethyl Benzene				6.42	< 0.025	< 0.0173	14.96	< 0.025	< 0.0080	
100-42-5	Styrene				6.42	< 0.025	< 0.0173	14.96	< 0.025	< 0.0080	
	Xylenes				6.42	< 0.025	< 0.0173	14.96	< 0.025	< 0.0080	

Sample number 01 was broken in transit, so there are no analytical results for that sample.
* Results are not shown for readings that were not detectable.

MECO COOPER INDUSTRIES
GREY IRON SCRUBBER OUTLET
VOST METHOD 0030

CAS No.	Compound	RUN # 1 VOL SAMPLED DSCF		RUN # 1 WEIGHT COL. MG		RUN # 1 EMISSIONS LB/HR	RUN #2 VOL SAMPLED DSCF		RUN #2 WEIGHT COL. MG		RUN #2 EMISSIONS LB/HR	RUN #3 VOL SAMPLED DSCF		RUN #3 WEIGHT COL. MG		RUN #3 EMISSIONS LB/HR	AVERAGE EMISSIONS LB/HR
74-87-3	Chloromethane	10.96	<	0.05	<	0.0230	11.32	<	0.05	<	0.0217	15.58	<	0.05	<	0.0159	
74-83-9	Bromomethane	10.96	<	0.05	<	0.0230	11.32	<	0.05	<	0.0217	15.58	<	0.05	<	0.0159	
75-01-4	Vinyl Chloride	10.96	<	0.05	<	0.0230	11.32	<	0.05	<	0.0217	15.58	<	0.05	<	0.0159	
75-00-3	Chloroethane	10.96	<	0.05	<	0.0230	11.32	<	0.05	<	0.0217	15.58	<	0.05	<	0.0159	
75-09-2	Methylene Chloride	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58		10		3.1812	1.5960
67-64-1	Acetone	10.96		0.051		0.0235	11.32		0.051		0.0221	15.58		0.051		0.0162	0.0192
75-15-0	Carbon Disulfide	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
75-35-4	1,1-Dichloroethene	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
75-35-3	1,1-Dichloroethane	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
156-60-5	1,2-Dichloroethene (total)	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
67-66-3	Chloroform	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
107-06-02	1,2-Dichloroethane	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
78-93-3	2-Butanone	10.96	<	0.05	<	0.0230	11.32	<	0.05	<	0.0217	15.58	<	0.05	<	0.0159	
71-55-6	1,1,1-Trichloroethane	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
56-23-5	Carbon Tetrachloride	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
108-05-4	Vinyl Acetate	10.96	<	0.05	<	0.0230	11.32	<	0.05	<	0.0217	15.58	<	0.05	<	0.0159	
75-27-4	Bromodichloromethane	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
79-34-5	1,1,2,2-Tetrachloroethan	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
106-99-0	1,3-Butadiene	10.96	<	0.05	<	0.0230	11.32	<	0.05	<	0.0217	15.58	<	0.05	<	0.0159	
78-87-5	1,2-Dichloropropane	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
10061-02-6	Trans-1,3-Dichloropropen	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
79-01-6	Trichloroethene	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
124-48-1	Dibromochloromethane	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
79-00-5	1,1,2-Trichloroethane	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
71-43-2	Benzene	10.96		0.64		0.2950	11.32		0.64		0.2777	15.58	<	0.025	<	0.0080	0.1428
10061-01-5	Cis-1,3-Dichloropropene	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
75-25-2	Bromoform	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
591-78-6	2-Hexanone	10.96	<	0.05	<	0.0230	11.32	<	0.05	<	0.0217	15.58	<	0.05	<	0.0159	
108-10-1	4-Methyl-2-Pentanone	10.96	<	0.05	<	0.0230	11.32	<	0.05	<	0.0217	15.58	<	0.05	<	0.0159	
127-18-4	Tetrachloroethene	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
108-88-3	Toluene	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
108-90-7	Chlorobenzene	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
100-41-4	Ethyl Benzene	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
100-42-5	Styrene	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	
	Xylenes	10.96	<	0.025	<	0.0115	11.32	<	0.025	<	0.0108	15.58	<	0.025	<	0.0080	

* Results are not shown for readings that were not detectable.

MECO COOPER INDUSTRIES
NODULAR IRON SCRUBBER OUTLET
SEMI-VOST METHOD 0010

CAS No.	Compound	RUN # 1 VOL SAMPLED DSCF		RUN # 1 WEIGHT COL. MG		RUN # 1 EMISSIONS LB/HR	RUN #2 VOL SAMPLED DSCF		RUN #2 WEIGHT COL. MG		RUN #2 EMISSIONS LB/HR	RUN #3 VOL SAMPLED DSCF		RUN #3 WEIGHT COL. MG		RUN #3 EMISSIONS LB/HR	AVERAGE EMISSIONS * LB/HR
108-95-2	Phenol	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
111-44-4	Bis(-Chloroethyl) Ether	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
95-57-8	2-Chlorophenol	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
541-73-1	1,3-Dichlorobenzene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
106-46-7	1-4-Dichlorobenzene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
100-51-6	Benzyl Alcohol	1.4	<	0.02	<	0.0705	3.37	<	0.02	<	0.0269	3.20	<	0.02	<	0.0297	
95-50-1	1,2-Dichlorobenzene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
95-48-7	2-Methylphenol	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
39638-32-9	Bis(2-Chloroisopropyl) E	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
106-44-5	4-Methylphenol	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
621-64-7	N-Nitroso-Di-N-Propylam	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
67-72-1	Hexachloroethane	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
98-95-3	Nitrobenzene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
78-59-1	Isophorone	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
88-75-5	2-Nitrophenol	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
105-67-9	2,4-Dimethylphenol	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
65-85-0	Benzoic Acid	1.4	<	0.05	<	0.1762	3.37	<	0.05	<	0.0673	3.20	<	0.05	<	0.0742	
111-91-1	Bis(2-Chloroethoxy) Met	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
120-83-2	2,4-Dichlorophenol	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
91-20-3	Naphthalene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
106-47-8	4-Chloroaniline	1.4	<	0.02	<	0.0705	3.37	<	0.02	<	0.0269	3.20	<	0.02	<	0.0297	
87-68-3	Hexachlorobutadiene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
59-50-7	4-Chloro-3-Methylphenol	1.4	<	0.02	<	0.0705	3.37	<	0.02	<	0.0269	3.20	<	0.02	<	0.0297	
91-57-6	2-Methylnaphthalene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
77-47-4	Hexachlorocyclopentadi	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
88-06-2	2,4,6-Trichlorophenol	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
95-95-4	2,4,5-Trichlorophenol	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	
91-58-7	2-Chloronaphthalene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.20	<	0.01	<	0.0148	

* Results are not shown for readings that were not detectable.

MECO COOPER INDUSTRIES
NODULAR IRON SCRUBBER OUTLET
SEMI-VOST METHOD 0010

CAS No.	Compound	RUN # 1 VOL SAMPLED DSCF		RUN # 1 WEIGHT COL. MG		RUN # 1 EMISSIONS LB/HR	RUN #2 VOL SAMPLED DSCF		RUN #2 WEIGHT COL. MG		RUN #2 EMISSIONS LB/HR	RUN #3 VOL SAMPLED DSCF		RUN #3 WEIGHT COL. MG		RUN #3 EMISSIONS LB/HR	AVERAGE EMISSIONS LB/HR
88-74-4	2-Nitroaniline	1.4	<	0.05	<	0.1762	3.37	<	0.05	<	0.0673	3.29	<	0.05	<	0.0742	
131-11-3	Dimethyl Phthalate	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
208-96-8	Acenaphthylene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
99-09-2	3-Nitroaniline	1.4	<	0.05	<	0.0000	3.37	<	0.05	<	0.0673	3.29	<	0.05	<	0.0742	
83-32-9	Acenaphthene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
51-28-5	2,4-Dinitrophenol	1.4	<	0.05	<	0.1762	3.37	<	0.05	<	0.0673	3.29	<	0.05	<	0.0742	
100-02-7	4-Nitrophenol	1.4	<	0.05	<	0.1762	3.37	<	0.05	<	0.0673	3.29	<	0.05	<	0.0742	
132-64-9	Dibenzofuran	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
121-14-2	2,4-Dinitrotoluene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
606-20-2	2,6-Dinitrotoluene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
84-66-2	Diethylphthalate	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
7005-72-3	4-Chlorophenyl Phenyl E	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
86-73-7	Fluorene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
100-01-06	4-Nitroaniline	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
534-52-1	4,6-Dinitro-2-Methylphen	1.4	<	0.05	<	0.1762	3.37	<	0.05	<	0.0673	3.29	<	0.05	<	0.0742	
86-30-6	N-Nitrosodiphenylamine	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
101-55-3	4-Bromophenyl Phenyl E	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
118-74-1	Hexachlorobenzene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
87-86-5	Pentachlorophenol	1.4	<	0.05	<	0.1762	3.37	<	0.05	<	0.0673	3.29	<	0.05	<	0.0742	
85-01-8	Phenanthrene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
120-12-7	Anthracene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
84-74-2	Di-N-Butylphthalate	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
206-44-0	Fluoranthene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
129-00-0	Pyrene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
85-68-7	Butyl Benzyl Phthalate	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
91-94-1	3,3'-Dichlorobenzidine	1.4	<	0.02	<	0.0705	3.37	<	0.02	<	0.0269	3.29	<	0.02	<	0.0297	
56-55-3	Benzo(a)anthracene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
117-81-7	Bis(2-Ethylhexyl)phthala	1.4	<	0.01	<	0.0352	3.37		0.034		0.0458	3.29	<	0.01	<	0.0148	0.0310
218-01-9	Chrysene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
117-84-0	Di-N-Octyl Phthalate	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
205-99-2	Benzo(b)fluoranthene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
207-08-9	Benzo(k)fluoranthene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
50-32-8	Benzo(a)pyrene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
193-39-5	Indeno(1,2,3-cd)pyrene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
53-70-3	Dibenz(a,h)anthracene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	
191-24-2	Benzo(g,h,i)perylene	1.4	<	0.01	<	0.0352	3.37	<	0.01	<	0.0135	3.29	<	0.01	<	0.0148	

* Results are not shown for readings that were not detectable.

MECO COOPER INDUSTRIES
GREY IRON SCRUBBER OUTLET
SEMI-VOST METHOD 0010

CAS No.	Compound	RUN # 1 VOL SAMPLED DSCF		RUN # 1 WEIGHT COL. MG		RUN # 1 EMISSIONS LB/HR	RUN #2 VOL SAMPLED DSCF		RUN #2 WEIGHT COL. MG		RUN #2 EMISSIONS LB/HR	RUN #3 VOL SAMPLED DSCF		RUN #3 WEIGHT COL. MG		RUN #3 EMISSIONS LB/HR	AVERAGE EMISSIONS LB/HR
108-95-2	Phenol	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
111-44-4	Bis(2-Chloroethyl) Ether	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
95-57-8	2-Chlorophenol	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
541-73-1	1,3-Dichlorobenzene	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
106-46-7	1-4-Dichlorobenzene	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
100-51-6	Benzyl Alcohol	1.82	<	0.02	<	0.0576	1.82	<	0.02	<	0.0560	6.28	<	0.02	<	0.0164	
95-50-1	1,2-Dichlorobenzene	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
95-48-7	2-Methylphenol	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
39638-32-9	Bis(2-Chloroisopropyl) Ether	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
106-44-5	4-Methylphenol	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
621-64-7	N-Nitroso-Di-N-Propylamine	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
67-72-1	Hexachloroethane	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
98-95-3	Nitrobenzene	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
78-59-1	Isophorone	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
88-75-5	2-Nitrophenol	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
105-67-9	2,4-Dimethylphenol	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
65-85-0	Benzoic Acid	1.82	<	0.05	<	0.1445	1.82	<	0.05	<	0.1399	6.28	<	0.05	<	0.0409	
111-91-1	Bis(2-Chloroethoxy) Methane	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
120-83-2	2,4-Dichlorophenol	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
91-20-3	Naphthalene	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
106-47-8	4-Chloroaniline	1.82	<	0.02	<	0.0576	1.82	<	0.02	<	0.0560	6.28	<	0.02	<	0.0164	
87-68-3	Hexachlorobutadiene	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
59-50-7	4-Chloro-3-Methylphenol	1.82	<	0.02	<	0.0576	1.82	<	0.02	<	0.0560	6.28	<	0.02	<	0.0164	
91-57-6	2-Methylnaphthalene	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
77-47-4	Hexachlorocyclopentadiene	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
88-06-2	2,4,6-Trichlorophenol	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
95-95-4	2,4,5-Trichlorophenol	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	
91-58-7	2-Chloronaphthalene	1.82	<	0.01	<	0.0280	1.82	<	0.01	<	0.0280	6.28	<	0.01	<	0.0082	

* Results are not shown for readings that were not detectable.

MECO COOPER INDUSTRIES
GREY IRON SCRUBBER OUTLET
SEMI-VOST METHOD 0010

CAS No.	Compound	RUN # 1 VOL SAMPLED DSCF		RUN # 1 WEIGHT COL. MG		RUN # 1 EMISSIONS LB/HR	RUN #2 VOL SAMPLED DSCF		RUN #2 WEIGHT COL. MG		RUN #2 EMISSIONS LB/HR	RUN #3 VOL SAMPLED DSCF		RUN #3 WEIGHT COL. MG		RUN #3 EMISSIONS LB/HR	AVERAGE EMISSION LB/HR
88-74-4	2-Nitroaniline	1.82	<	0.05	<	0.1445	1.82	<	0.05	<	0.1309	6.28	<	0.05	<	0.0409	
131-11-3	Dimethyl Phthalate	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
208-96-8	Acenaphthylene	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
99-09-2	3-Nitroaniline	1.82	<	0.05	<	0.1445	1.82	<	0.05	<	0.1309	6.28	<	0.05	<	0.0409	
83-32-9	Acenaphthene	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
51-28-5	2,4-Dinitrophenol	1.82	<	0.05	<	0.1445	1.82	<	0.05	<	0.1309	6.28	<	0.05	<	0.0409	
100-02-7	4-Nitrophenol	1.82	<	0.05	<	0.1445	1.82	<	0.05	<	0.1309	6.28	<	0.05	<	0.0409	
132-64-9	Dibenzofuran	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
121-14-2	2,4-Dinitrotoluene	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
606-20-2	2,6-Dinitrotoluene	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
84-66-2	Diethylphthalate	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
7005-72-3	4-Chlorophenyl Phenyl Ether	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
86-73-7	Fluorene	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
100-01-06	4-Nitroaniline	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
534-52-1	4,6-Dinitro-2-Methylphenol	1.82	<	0.05	<	0.1445	1.82	<	0.05	<	0.1309	6.28	<	0.05	<	0.0409	
86-30-6	N-Nitrosodiphenylamine	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
101-55-3	4-Bromophenyl Phenyl Ether	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
118-74-1	Hexachlorobenzene	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
87-86-5	Pentachlorophenol	1.82	<	0.05	<	0.1445	1.82	<	0.05	<	0.1309	6.28	<	0.05	<	0.0409	
85-01-8	Phenanthrene	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
120-12-7	Anthracene	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
84-74-2	Di-N-Butylphthalate	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
206-44-0	Fluoranthene	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
129-00-0	Pyrene	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
85-68-7	Butyl Benzyl Phthalate	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
91-94-1	3,3'-Dichlorobenzidine	1.82	<	0.02	<	0.0578	1.82	<	0.02	<	0.0560	6.28	<	0.02	<	0.0164	
56-55-3	Benzo(a)anthracene	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
117-81-7	Bis(2-Ethylhexyl)phthalate	1.82	<	0.01	<	0.0289	1.82		0.034		0.0052	6.28	<	0.01	<	0.0082	0.0441
218-01-9	Chrysene	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
117-84-0	Di-N-Octyl Phthalate	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
205-99-2	Benzo(b)fluoranthene	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
207-08-9	Benzo(k)fluoranthene	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
50-32-8	Benzo(a)pyrene	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
193-39-5	Indeno(1,2,3-cd)pyrene	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
53-70-3	Dibenz(a,h)anthracene	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0082	
191-24-2	Benzo(g,h,i)perylene	1.82	<	0.01	<	0.0289	1.82	<	0.01	<	0.0260	6.28	<	0.01	<	0.0078	

* Results are not shown for readings that were not detectable.

MECO COOPER INDUSTRIES
GREY IRON SCRUBBER OUTLET
MULTIPLE METALS

METAL	RUN # 1 VOL SAMPLED DSCF	RUN # 1 WEIGHT COL. MG	RUN # 1 EMISSIONS LB/HR	RUN #2 VOL SAMPLED DSCF	RUN #2 WEIGHT COL. MG	RUN #2 EMISSIONS LB/HR	RUN #3 VOL SAMPLED DSCF	RUN #3 WEIGHT COL. MG	RUN #3 EMISSIONS LB/HR	AVERAGE EMISSIONS LB/HR
Aluminum	70.75000	1.17300	0.10000	63.49000	1.44400	0.12000	44.61000	2.36500	0.18000	0.13300
Antimony	70.75000	0.00000	0.00000	63.49000	0.00000	0.00000	44.61000	0.00000	0.00000	0.00000
Arsenic	70.75000	0.07590	0.00700	63.49000	0.07600	0.00700	44.61000	0.04950	0.00400	0.00600
Barium	70.75000	0.02760	0.00200	63.49000	0.04560	0.00400	44.61000	0.00550	0.00040	0.00600
Chromium	70.75000	0.43470	0.03865	63.49000	0.73720	0.06531	44.61000	0.37950	0.02910	0.04400
Copper	70.75000	1.72500	0.15000	63.49000	2.50800	0.22000	44.61000	0.88000	0.07000	0.15000
Lead	70.75000	1.72500	0.15000	63.49000	1.74800	0.15000	44.61000	0.71500	0.05000	0.12000
Manganese	70.75000	***	***	63.49000	***	***	44.61000	111.76000	8.58000	8.58000
Mercury	70.75000	0.00180	0.00016	63.49000	0.00060	0.00006	44.61000	0.00150	0.00012	0.00130
Nickel	70.75000	0.11730	0.01000	63.49000	0.14440	0.01000	44.61000	4.34500	0.33000	0.17000
Beryllium	70.75000	0	0.00000	63.49000	0	0.00000	44.61000	0.00550	0.00042	0.00100
Cadmium	70.75000	0.09660	0.00900	63.49000	0.03800	0.00300	44.61000	0.03850	0.00296	0.00500
Cobalt	70.75000	0.08280	0.00700	63.49000	0.12160	0.01000	44.61000	0.04950	0.00400	0.00700
Iron	70.75000	95.84100	8.52100	63.49000	105.56400	9.35000	44.61000	47.24500	3.62000	7.16000
Magnesium	70.75000	4.63200	0.41000	63.49000	8.36000	0.74000	44.61000	2.09000	0.16000	0.44000
Molybdenum	70.75000	0.00000	0.00000	63.49000	0.00000	0.00000	44.61000	0.03850	0.00300	0.00100
Selenium	70.75000	0.62100	0.06000	63.49000	1.06400	0.09000	44.61000	0.16500	0.01000	0.05000
Silver	70.75000	0.00000	0.00000	63.49000	0.00000	0.00000	44.61000	0.02200	0.00200	0.00070
Tin	70.75000	0.93150	0.08000	63.49000	0.49400	0.04000	44.61000	0.35750	0.03000	0.05000
Titanium	70.75000	0.06210	0.00600	63.49000	0.07600	0.00700	44.61000	0.09350	0.00700	0.00700
Zinc	70.75000	13.04100	1.15000	63.49000	9.12000	0.80000	44.61000	2.64000	0.20000	0.72000

*** = SAMPLE ERROR

MEGO COOPER INDUSTRIES
NODULAR IRON SCRUBBER OUTLET
MULTIPLE METALS

	RUN # 1			RUN #2			RUN #3			AVERAGE
METAL	VOL SAMPLED DSCF	WEIGHT COL. MG	EMISSIONS LB/HR	VOL SAMPLED DSCF	WEIGHT COL. MG	EMISSIONS LB/HR	VOL SAMPLED DSCF	WEIGHT COL. MG	EMISSIONS LB/HR	EMISSIONS LB/HR
Aluminum	57.12000	1.98800	0.17000	46.56000	2.04600	0.16000	17.13000	1.37200	0.23000	0.18700
Antimony	57.12000	0.00000	0.00000	46.56000	0.00000	0.00000	17.13000	0.00000	0.00000	0.00000
Arsenic	57.12000	0.02130	0.00200	46.56000	0.00000	0.00000	17.13000	0.04410	0.00800	0.00300
Barium	57.12000	0.04260	0.00400	46.56000	0.06820	0.00500	17.13000	0.01960	0.00300	0.00400
Chromium	57.12000	0.71000	0.06000	46.56000	0.45260	0.04000	17.13000	0.28420	0.05000	0.05000
Copper	57.12000	1.20700	0.10000	46.56000	0.62000	0.05000	17.13000	0.58800	0.10000	0.08000
Lead	57.12000	1.49100	0.13000	46.56000	0.62000	0.05000	17.13000	0.58800	0.10000	0.09000
Manganese	57.12000	***	***	46.56000	***	***	17.13000	28.56700	4.93000	4.93000
Mercury	57.12000	0.00110	0.00010	46.56000	0.00050	0.00004	17.13000	0.00200	0.00030	0.00010
Nickel	57.12000	0.24140	0.02000	46.56000	1.11600	0.09000	17.13000	1.51900	0.26000	0.12000
Beryllium	70.75000	0	0.00000	63.49000	0.	0.00000	44.61000	0.00000	0.00000	0.00000
Cadmium	70.75000	0.04260	0.00400	63.49000	0.02480	0.00200	44.61000	0.05390	0.00900	0.00500
Cobalt	70.75000	0.11360	0.01000	63.49000	0.08060	0.00600	44.61000	0.03920	0.00700	0.00800
Iron	70.75000	98.75390	8.83000	63.49000	80.03580	6.36000	44.61000	45.12410	7.80000	7.66000
Magnesium	70.75000	6.74500	0.60000	63.49000	5.89000	0.46000	44.61000	1.56800	0.27000	0.44000
Molybdenum	70.75000	0.00000	0.00000	63.49000	0.00000	0.00000	44.61000	0.00000	0.00000	0.00000
Selenium	70.75000	0.92300	0.08000	63.49000	0.62000	0.05000	44.61000	0.01960	0.00300	0.04400
Silver	70.75000	0.00000	0.00000	63.49000	0.00000	0.00000	44.61000	0.00000	0.00000	0.00000
Tin	70.75000	1.10050	0.10000	63.49000	0.52700	0.04000	44.61000	0.28420	0.11000	0.08300
Titanium	70.75000	0.07810	0.00700	63.49000	0.05580	0.00400	44.61000	0.05390	0.00900	0.00700
Zinc	70.75000	7.74610	0.69000	63.49000	3.78820	0.30000	44.61000	3.97390	0.68000	0.56000

*** = SAMPLE ERROR

Total Source Analysis, Inc.
Particulate Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-354

Run Number		1	2	3
Data set		(01)	(02)	(03)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON INLET	GREY IRON INLET	GREY IRON INLET
Start time		09:05	11:50	08:42
End time		09:50	13:05	09:47
Barometric Pressure	In. Hg	29.86	29.86	29.85
Static Pressure	In. H2O	0.15	0.15	0.15
Volume of Condensate	Mls	14	13	14
Volume Sampled	DCF	27.858	23.505	24.018
Meter Correction Factor		1.00	1.00	1.00
Square Root of Delta P		0.463	0.502	0.525
Orifice Pressure	In. H2O	2.21	0.37	0.47
Meter Temperature	Deg. F	56	65	68
Flue Temperature	Deg. F	554	889	710
Percent CO2	%	6.10	5.90	6.80
Percent O2	%	13.90	13.40	15.30
Diameter of Nozzle	In	0.376	0.249	0.242
Area of Flue	Sq Ft	22.60	22.60	22.60
Sample Time	Min	38	60	60
Weight Gain	Grams	1.9947	3.5065	1.7069
Absolute Flue Pressure	In. Hg	29.87	29.87	29.86
Corrected Sample Volume	DSCF	28.59	23.60	23.98
Moisture in Flue Gas	%	2.3	2.5	2.7
Molecular Weight	Lb/LbMole	29.27	29.19	29.39
Velocity of Flue Gas	FpS	35.80	44.84	43.53
Volume of Flue Gas	ACFM	48,558	60,811	59,039
Volume of Flue Gas	DSCFM	24,664	23,152	25,868
Dust Concentration	Lb/DSCF	1.53E-04	3.27E-04	1.56E-04
Dust Concentration	Lbs/Hour	227.64	455.03	243.60
Dust Concentration	Grs/ACF	.55	.88	.48
Dust Concentration	Grs/DSCF	1.07	2.29	1.09
Isokinetic Rate	%	90.5	113.4	109.2

Averages:

Stack Temperature	:	717.7	Percent O2 :		14.2
Vol Flue Gas	ACFM :	56,136	DSCFM :		24,561
Part Emis	Lb/DSCF :	2.12E-04	Lb/Hour :		308.76
	Grs/ACF :	.64	Grs/DSCF :		1.48
	Lbs/MBtu :	0			

Total Source Analysis, Inc.
Particulate Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-354

Run Number		1	2	3
Data set		(04)	(05)	(06)
Date		9-16-93	9-16-93	9-16-93
Location		NOD. IRON INLET	NOD. IRON INLET	NOD. IRON INLET
Start time		07:30	10:35	00:0-
End time		08:45	11:40	00:0-
Barometric Pressure	In. Hg	29.85	29.85	29.85
Static Pressure	In. H2O	0.18	0.18	0.18
Volume of Condensate	Mls	11	13	12
Volume Sampled	DCF	25.784	23.518	15.541
Meter Correction Factor		1.00	1.00	1.00
Square Root of Delta P		0.548	0.576	0.586
Orifice Pressure	In. H2O	0.54	0.38	0.43
Meter Temperature	Deg. F	60	82	72
Flue Temperature	Deg. F	557	1076	1111
Percent CO2	%	6.00	6.00	6.00
Percent O2	%	12.90	12.90	12.90
Diameter of Nozzle	In	0.242	0.242	0.242
Area of Flue	Sq Ft	22.60	22.60	22.60
Sample Time	Min	60	60	44
Weight Gain	Grams	12.0191	5.4552	2.8427
Absolute Flue Pressure	In. Hg	29.86	29.86	29.86
Corrected Sample Volume	DSCF	26.14	22.87	15.40
Moisture in Flue Gas	%	1.9	2.6	3.5
Molecular Weight	Lb/LbMole	29.25	29.18	29.07
Velocity of Flue Gas	FpS	42.46	54.92	56.61
Volume of Flue Gas	ACFM	57,584	74,481	76,773
Volume of Flue Gas	DSCFM	29,248	24,878	24,832
Dust Concentration	Lb/DSCF	1.01E-03	5.25E-04	4.07E-04
Dust Concentration	Lbs/Hour	1778.91	785.10	606.50
Dust Concentration	Grs/ACF	3.64	1.24	.93
Dust Concentration	Grs/DSCF	7.09	3.68	2.84
Isokinetic Rate	%	105.3	108.3	99.6

Averages:

Stack Temperature		914.7	Percent O2	:	12.9
Vol Flue Gas	ACFM :	69,613	DSCFM	:	26,319
Part Emis	Lb/DSCF :	6.48E-04	Lb/Hour	:	1056.83
	Grs/ACF :	1.94	Grs/DSCF	:	4.54
	Lbs/MBtu :	0			

Total Source Analysis, Inc.
Particulate Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-354

Run Number		1	2	3
Data set		(16)	(17)	(18)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:35	10:32	13:25
End time		08:57	12:40	13:55
Barometric Pressure	In. Hg	29.85	29.85	29.85
Static Pressure	In. H2O	-0.65	-0.65	-0.65
Volume of Condensate	Mls	152	218	110
Volume Sampled	DCF	37.786	57.489	19.830
Meter Correction Factor		0.98	0.98	0.98
Square Root of Delta P		0.670	0.983	0.679
Orifice Pressure	In. H2O	1.92	4.57	2.00
Meter Temperature	Deg. F	59	65	65
Flue Temperature	Deg. F	105	131	120
Percent CO2	%	4.20	4.20	4.20
Percent O2	%	16.00	16.00	16.00
Diameter of Nozzle	In	0.250	0.260	0.260
Area of Flue	Sq Ft	12.83	12.83	12.83
Sample Time	Min	60	60	30
Weight Gain	Grams	1.0381	0.2262	0.3034
Absolute Flue Pressure	In. Hg	29.80	29.80	29.80
Corrected Sample Volume	DSCF	37.75	57.14	19.59
Moisture in Flue Gas	%	16.0	15.2	20.9
Molecular Weight	Lb/LbMole	27.51	27.59	26.95
Velocity of Flue Gas	FpS	37.57	54.15	37.49
Volume of Flue Gas	ACFM	28,918	41,683	28,861
Volume of Flue Gas	DSCFM	22,614	31,432	20,689
Dust Concentration	Lb/DSCF	6.06E-05	8.72E-06	3.41E-05
Dust Concentration	Lbs/Hour	82.27	16.46	42.39
Dust Concentration	Grs/ACF	.39	4.73E-02	.17
Dust Concentration	Grs/DSCF	.42	6.11E-02	.23
Isokinetic Rate	%	104.5	105.3	109.7

Averages:

Stack Temperature	:	118.7	Percent O2	:	16.0
Vol Flue Gas	ACFM :	33,154	DSCFM	:	24,912
Part Emis	Lb/DSCF :	3.45E-05	Lb/Hour	:	47.04
	Grs/ACF :	.20	Grs/DSCF	:	.24
	Lbs/MBtu :	0			

Total Source Analysis, Inc.
Particulate Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-354

Run Number		1	2	3
Data set		(13)	(14)	(15)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:51	11:41	08:35
End time		10:15	13:00	09:45
Barometric Pressure	In. Hg	29.86	29.86	29.82
Static Pressure	In. H2O	-0.65	-0.65	-0.65
Volume of Condensate	Mls	84	74	90
Volume Sampled	DCF	54.789	37.794	59.433
Meter Correction Factor		0.98	0.98	0.98
Square Root of Delta P		0.970	0.640	1.020
Orifice Pressure	In. H2O	4.33	1.91	4.57
Meter Temperature	Deg. F	69	71	63
Flue Temperature	Deg. F	95	103	110
Percent CO2	%	4.20	4.20	4.20
Percent O2	%	16.00	16.00	16.00
Diameter of Nozzle	In	0.250	0.250	0.260
Area of Flue	Sq Ft	12.83	12.83	12.83
Sample Time	Min	60	60	60
Weight Gain	Grams	0.4325	0.3462	0.4146
Absolute Flue Pressure	In. Hg	29.81	29.81	29.77
Corrected Sample Volume	DSCF	54.03	36.91	59.24
Moisture in Flue Gas	%	6.8	8.6	6.7
Molecular Weight	Lb/LbMole	28.54	28.34	28.56
Velocity of Flue Gas	FpS	52.91	35.29	54.26
Volume of Flue Gas	ACFM	40,730	27,164	41,772
Volume of Flue Gas	DSCFM	35,961	23,184	35,918
Dust Concentration	Lb/DSCF	1.76E-05	2.06E-05	1.54E-05
Dust Concentration	Lbs/Hour	38.08	28.76	33.25
Dust Concentration	Grs/ACF	.11	.12	9.42E-02
Dust Concentration	Grs/DSCF	.12	.14	.10
Isokinetic Rate	%	94.1	99.7	95.5

Averages:

Stack Temperature	:	102.7	Percent O2 :	16.0
Vol Flue Gas	ACFM :	36,555	DSCFM :	31,688
Part Emis	Lb/DSCF :	1.79E-05	Lb/Hour :	33.36
	Grs/ACF :	.11	Grs/DSCF :	.12
	Lbs/MBtu :	0		

Total Source Analysis, Inc.
Particulate Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-354

Run Number		1	2	3
Data set		(07)	(08)	(09)
Date		9-20-93	9-20-93	9-20-93
Location		N IRON OUT	N IRON OUT	N IRON OUT
		PM 10	PM 10	PM 10
Start time		08:20	10:30	12:37
End time		10:19	12:28	14:35
Barometric Pressure	In. Hg	29.51	29.51	29.51
Static Pressure	In. H2O	-0.65	-0.65	-0.65
Volume of Condensate	Mls	57	112	60
Volume Sampled	DCF	25.951	25.726	26.710
Meter Correction Factor		0.98	0.98	0.98
Square Root of Delta P		0.478	0.478	0.478
Orifice Pressure	In. H2O	0.23	0.23	0.23
Meter Temperature	Deg. F	67	78	78
Flue Temperature	Deg. F	106	107	104
Percent CO2	%	5.00	5.00	5.00
Percent O2	%	16.40	16.40	16.40
Diameter of Nozzle	In	0.164	0.164	0.164
Area of Flue	Sq Ft	12.83	12.83	12.83
Sample Time	Min	120	120	120
Weight Gain	Grams	0.1499	0.2212	0.2758
Absolute Flue Pressure	In. Hg	29.46	29.46	29.46
Corrected Sample Volume	DSCF	25.14	24.41	25.34
Moisture in Flue Gas	%	9.6	17.8	10.0
Molecular Weight	Lb/LbMole	28.35	27.42	28.31
Velocity of Flue Gas	FpS	26.57	27.05	26.55
Volume of Flue Gas	ACFM	20,457	20,819	20,437
Volume of Flue Gas	DSCFM	16,972	15,693	16,943
Dust Concentration	Lb/DSCF	1.31E-05	1.99E-05	2.39E-05
Dust Concentration	Lbs/Hour	13.39	18.81	24.39
Dust Concentration	Grs/ACF	7.79E-02	.10	.14
Dust Concentration	Grs/DSCF	9.20E-02	.13	.16
Isokinetic Rate	%	107.8	113.2	108.8

Averages:

Stack Temperature	:	105.7	Percent O2 :	16.4
Vol Flue Gas	ACFM :	20,571	DSCFM :	16,536
Part Emis	Lb/DSCF :	1.90E-05	Lb/Hour :	18.86
	Grs/ACF :	.10	Grs/DSCF :	.13
	Lbs/MBtu :	0		

Total Source Analysis, Inc.
Particulate Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-354

Run Number		1	2	3
Data set		(00)	(11)	(12)
Date		9-21-93	9-21-93	9-21-93
Location		G IRON OUT PM 10	G IRON OUT PM 10	G IRON OUT PM 10
Start time		08:00	08:00	10:11
End time		09:59	10:00	12:47
Barometric Pressure	In. Hg	29.70	29.70	29.70
Static Pressure	In. H2O	-0.65	-0.65	-0.65
Volume of Condensate	Mls	48	43	62
Volume Sampled	DCF	25.945	16.400	26.033
Meter Correction Factor		0.98	0.98	0.98
Square Root of Delta P		0.478	0.478	0.478
Orifice Pressure	In. H2O	0.23	0.23	0.23
Meter Temperature	Deg. F	75	77	73
Flue Temperature	Deg. F	108	108	102
Percent CO2	%	4.00	4.00	4.00
Percent O2	%	21.60	21.60	21.60
Diameter of Nozzle	In	0.164	0.164	0.164
Area of Flue	Sq Ft	12.83	12.83	12.83
Sample Time	Min	120	90	120
Weight Gain	Grams	0.2519	0.2812	0.2254
Absolute Flue Pressure	In. Hg	29.65	29.65	29.65
Corrected Sample Volume	DSCF	24.91	15.69	25.09
Moisture in Flue Gas	%	8.3	11.4	10.4
Molecular Weight	Lb/LbMole	28.55	28.19	28.31
Velocity of Flue Gas	FpS	26.44	26.61	26.42
Volume of Flue Gas	ACFM	20,357	20,486	20,336
Volume of Flue Gas	DSCFM	17,187	16,709	16,954
Dust Concentration	Lb/DSCF	2.22E-05	3.95E-05	1.98E-05
Dust Concentration	Lbs/Hour	22.99	39.62	20.14
Dust Concentration	Grs/ACF	.13	.23	.11
Dust Concentration	Grs/DSCF	.15	.27	.13
Isokinetic Rate	%	105.5	91.1	107.7

Averages:

Stack Temperature	:	106.0	Percent O2 :	21.6
Vol Flue Gas	ACFM :	20,393	DSCFM :	16,950
Part Emis	Lb/DSCF :	2.72E-05	Lb/Hour :	27.58
	Grs/ACF :	.16	Grs/DSCF :	.19
	Lbs/MBtu :	0		

Total Source Analysis, Inc.
HcL Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-354

Run Number		1	2	3
Data set		(04)	(05)	(06)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:35	10:32	13:25
End time		08:57	12:40	13:55
Barometric Pressure	In. Hg	29.85	29.85	29.85
Volume Sampled	DCF	37.786	57.489	19.830
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	1.92	4.57	2.00
Meter Temperature	Deg. F	59	65	64
Percent O2	%	16.00	16.00	16.00
HcL Collected	mgs	<0.1400	1.8800	<0.1400
Corrected Sample Volume	DSCF	<37.75	57.14	<19.62
Volume of Flue Gas	DSCFM	<22,614	31,432	<20,689
HcL Conc	Lbs/DSCF	<8.17E-09	7.25E-08	<1.57E-08
HcL Emis	Lbs/Hour	<1.10E-02	.13	<1.95E-02
HcL Conc	PPM	<8.62E-02	.76	<.16
HcL Conc	Grs/DSCF	<5.72E-05	5.07E-04	<1.10E-04

Total Source Analysis, Inc.
HcL Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-354

Run Number		1	2	3
Data set		(01)	(02)	(03)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:51	11:41	08:35
End time		10:15	13:00	09:45
Barometric Pressure	In. Hg	29.86	29.86	29.82
Volume Sampled	DCF	54.789	37.794	59.433
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	4.33	1.91	4.57
Meter Temperature	Deg. F	69	71	63
Percent O2	%	16.00	16.00	16.00
HcL Collected	mgs	0.1400	0.1600	1.2000
Corrected Sample Volume	DSCF	54.03	36.91	59.24
Volume of Flue Gas	DSCFM	35,961	23,184	35,918
HcL Conc	Lbs/DSCF	5.71E-09	9.55E-09	4.46E-08
HcL Emis	Lbs/Hour	1.23E-02	1.32E-02	9.62E-02
HcL Conc	PPM	6.02E-02	.10	.47
HcL Conc	Grs/DSCF	3.99E-05	6.69E-05	3.12E-04

Total Source Analysis, Inc.
Aluminum Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-888

Run Number		1	2	3
Data set		(01)	(02)	(03)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	13:00	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Percent O2	%	21.60	21.60	21.60
Aluminum Collected	mgs	1.1730	1.4440	2.3650
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Volume of Flue Gas	DSCFM	47,545	42,514	25,901
Aluminum Conc	Lbs/DSCF	3.65E-08	5.01E-08	1.16E-07
Aluminum Emis	Lbs/Hour	.10	.12	.18
Aluminum Conc	PPM	.52	.71	1.66
Aluminum Conc	Grs/DSCF	2.55E-04	3.51E-04	8.18E-04

Total Source Analysis, Inc.
Antimony Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-888

		1	2	3
Run Number				
Data set		(04)	(05)	(06)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	13:00	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Crifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Percent O2	%	21.60	21.60	21.60
Antimony Collected	mgs	0.0000	0.0000	0.0000
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Volume of Flue Gas	DSCFM	47,545	42,514	25,901
Antimony Conc	Lbs/DSCF	0	0	0
Antimony Emis	Lbs/Hour	0	0	0
Antimony Conc	PPM	0	0	0
Antimony Conc	Grs/DSCF	0	0	0

Total Source Analysis, Inc.
Arsenic Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-888

Run Number		1	2	3
Data set		(07)	(08)	(09)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	13:00	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Percent O2	%	21.60	21.60	21.60
Arsenic Collected	mgs	0.0759	0.0760	0.0495
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Volume of Flue Gas	DSCFM	47,545	42,514	25,901
Arsenic Conc	Lbs/DSCF	2.36E-09	2.63E-09	2.44E-09
Arsenic Emis	Lbs/Hour	6.74E-03	6.73E-03	3.80E-03
Arsenic Conc	PPM	1.21E-02	1.35E-02	1.25E-02
Arsenic Conc	Grs/DSCF	1.65E-05	1.84E-05	1.71E-05

Total Source Analysis, Inc.
Barium Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-888

Run Number		1	2	3
Data set		(10)	(11)	(12)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	13:00	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Percent O2	%	21.60	21.60	21.60
Barium Collected	mgs	0.0276	0.0456	0.0055
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Volume of Flue Gas	DSCFM	47,545	42,514	25,901
Barium Conc	Lbs/DSCF	8.60E-10	1.58E-09	2.71E-10
Barium Emis	Lbs/Hour	2.45E-03	4.03E-03	4.22E-04
Barium Conc	PPM	2.40E-03	4.43E-03	7.61E-04
Barium Conc	Grs/DSCF	6.02E-06	1.10E-05	1.90E-06

Total Source Analysis, Inc.
Chromium Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-888

Run Number		1	2	3
Data set		(13)	(14)	(15)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	13:00	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Percent O2	%	21.60	21.60	21.60
Chromium Collected	mgs	0.4347	0.7372	0.3795
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Volume of Flue Gas	DSCFM	47,545	42,514	25,901
Chromium Conc	Lbs/DSCF	1.35E-08	2.56E-08	1.87E-08
Chromium Emis	Lbs/Hour	3.86E-02	6.53E-02	2.91E-02
Chromium Conc	PPM	.10	.18	.13
Chromium Conc	Grs/DSCF	9.48E-05	1.79E-04	1.31E-04

Total Source Analysis, Inc.
Copper Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-888

Run Number		1	2	3
Data set		(16)	(17)	(18)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	13:00	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Percent O2	%	21.60	21.60	21.60
Copper Collected	mgs	1.7250	2.5080	0.8800
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Volume of Flue Gas	DSCFM	47,545	42,514	25,901
Copper Conc	Lbs/DSCF	5.37E-08	8.71E-08	4.34E-08
Copper Emis	Lbs/Hour	.15	.22	6.75E-02
Copper Conc	PPM	.32	.52	.26
Copper Conc	Grs/DSCF	3.76E-04	6.09E-04	3.04E-04

Total Source Analysis, Inc.
Lead Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-888

Run Number		1	2	3
Data set		(19)	(20)	(21)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	13:00	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Percent O2	%	21.60	21.60	21.60
Lead Collected	mgs	1.7250	1.7480	0.7150
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Volume of Flue Gas	DSCFM	47,545	42,514	25,901
Lead Conc	Lbs/DSCF	5.37E-08	6.07E-08	3.53E-08
Lead Emis	Lbs/Hour	.15	.15	5.49E-02
Lead Conc	PPM	9.97E-02	.11	6.55E-02
Lead Conc	Grs/DSCF	3.76E-04	4.24E-04	2.47E-04

Total Source Analysis, Inc.
Manganese Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-888

Run Number		1	2	3
Data set		(22)	(23)	(24)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	13:00	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Percent O2	%	21.60	21.60	21.60
Manganese Collected	mgs	*0.0000	*0.0000	111.7600
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Volume of Flue Gas	DSCFM	47,545	42,514	25,901
Manganese Conc	Lbs/DSCF	0	0	5.52E-06
Manganese Emis	Lbs/Hour	0	0	8.58
Manganese Conc	PPM	0	0	38.67
Manganese Conc	Grs/DSCF	0	0	3.86E-02

* Sample Error

Total Source Analysis, Inc.
Mercury Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-888

Run Number		1	2	3
Data set		(25)	(26)	(27)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	13:00	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Percent O2	%	21.60	21.60	21.60
Mercury Collected	mgs	0.0018	0.0006	0.0015
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Volume of Flue Gas	DSCFM	47,545	42,514	25,901
Mercury Conc	Lbs/DSCF	5.61E-11	2.22E-11	7.61E-11
Mercury Emis	Lbs/Hour	1.60E-04	5.66E-05	1.18E-04
Mercury Conc	PPM	1.07E-04	4.26E-05	1.45E-04
Mercury Conc	Grs/DSCF	3.92E-07	1.55E-07	5.32E-07

Total Source Analysis, Inc.
Nickel Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-888

Run Number		1	2	3
Data set		(28)	(29)	(30)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	13:00	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Percent O2	%	21.60	21.60	21.60
Nickel Collected	mgs	0.1173	0.1444	4.3450
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Volume of Flue Gas	DSCFM	47,545	42,514	25,901
Nickel Conc	Lbs/DSCF	3.65E-09	5.01E-09	2.14E-07
Nickel Emis	Lbs/Hour	1.04E-02	1.27E-02	[illegible].33
Nickel Conc	PPM	2.39E-02	3.28E-02	1.40
Nickel Conc	Grs/DSCF	2.55E-05	3.51E-05	1.50E-03

Total Source Analysis, Inc.
Beryllium Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(01)	(02)	(03)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	13:00	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Percent O2	%	21.60	21.60	21.60
Beryllium Collected	mgs	0.0000	0.0000	0.0055
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Volume of Flue Gas	DSCFM	47,545	42,514	25,901
Beryllium Conc	Lbs/DSCF	0	0	2.71E-10
Beryllium Emis	Lbs/Hour	0	0	4.22E-04
Beryllium Conc	PPM	0	0	1.16E-02
Beryllium Conc	Grs/DSCF	0	0	1.90E-06

Total Source Analysis, Inc.
Cadmium Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(04)	(05)	(06)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	13:00	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Percent O2	%	21.60	21.60	21.60
Cadmium Collected	mgs	0.0966	0.0380	0.0385
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Volume of Flue Gas	DSCFM	47,545	42,514	25,901
Cadmium Conc	Lbs/DSCF	3.01E-09	1.31E-09	1.90E-09
Cadmium Emis	Lbs/Hour	8.58E-03	3.36E-03	2.95E-03
Cadmium Conc	PPM	1.03E-02	4.51E-03	6.51E-03
Cadmium Conc	Grs/DSCF	2.10E-05	9.23E-06	1.33E-05

Total Source Analysis, Inc.
Cobalt Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(07)	(08)	(09)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	13:00	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Percent O2	%	21.60	21.60	21.60
Cobalt Collected	mgs	0.0828	0.1216	0.0495
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Volume of Flue Gas	DSCFM	47,545	42,514	25,901
Cobalt Conc	Lbs/DSCF	2.58E-09	4.22E-09	2.44E-09
Cobalt Emis	Lbs/Hour	7.36E-03	1.07E-02	3.80E-03
Cobalt Conc	PPM	1.68E-02	2.75E-02	1.59E-02
Cobalt Conc	Grs/DSCF	1.80E-05	2.95E-05	1.71E-05

Total Source Analysis, Inc.
Iron Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(10)	(11)	(12)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	13:00	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Percent O2	%	21.60	21.60	21.60
Iron Collected	mgs	95.8410	105.5640	47.2450
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Volume of Flue Gas	DSCFM	47,545	42,514	25,901
Iron Conc	Lbs/DSCF	2.98E-06	3.66E-06	2.33E-06
Iron Emis	Lbs/Hour	8.52	9.35	3.62
Iron Conc	PPM	20.57	25.24	16.08
Iron Conc	Grs/DSCF	2.09E-02	2.56E-02	1.63E-02

Total Source Analysis, Inc.
Magnesium Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(13)	(14)	(15)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	13:00	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Percent O2	%	21.60	21.60	21.60
Magnesium Collected	mgs	4.6320	8.3600	2.0900
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Volume of Flue Gas	DSCFM	47,545	42,514	25,901
Magnesium Conc	Lbs/DSCF	1.44E-07	2.90E-07	1.03E-07
Magnesium Emis	Lbs/Hour	.41	.74	.16
Magnesium Conc	PPM	2.28	4.59	1.63
Magnesium Conc	Grs/DSCF	1.01E-03	2.03E-03	7.23E-04

Total Source Analysis, Inc.
Molybdenum Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(16)	(17)	(18)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	13:00	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Percent O2	%	21.60	21.60	21.60
Molybdenum Collected	mgs	0.0000	0.0000	0.0385
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Volume of Flue Gas	DSCFM	47,545	42,514	25,901
Molybdenum Conc	Lbs/DSCF	0	0	1.90E-09
Molybdenum Emis	Lbs/Hour	0	0	2.95E-03
Molybdenum Conc	PPM	0	0	7.62E-03
Molybdenum Conc	Grs/DSCF	0	0	1.33E-05

Total Source Analysis, Inc.
Selenium - Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(19)	(20)	(21)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	13:00	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Percent O2	%	21.60	21.60	21.60
Selenium Collected	mgs	0.6210	1.0640	0.1650
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Volume of Flue Gas	DSCFM	47,545	42,514	25,901
Selenium Conc	Lbs/DSCF	1.93E-08	3.69E-08	8.15E-09
Selenium Emis	Lbs/Hour	5.52E-02	9.42E-02	1.26E-02
Selenium Conc	PPM	9.42E-02	.17	3.97E-02
Selenium Conc	Grs/DSCF	1.35E-04	2.58E-04	5.70E-05

Total Source Analysis, Inc.
Silver Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(22)	(23)	(24)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	13:00	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Percent O2	%	21.60	21.60	21.60
Silver Collected	mgs	0.0000	0.0000	0.0220
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Volume of Flue Gas	DSCFM	47,545	42,514	25,901
Silver Conc	Lbs/DSCF	0	0	1.08E-09
Silver Emis	Lbs/Hour	0	0	1.68E-03
Silver Conc	PPM	0	0	3.87E-03
Silver Conc	Grs/DSCF	0	0	7.61E-06

Total Source Analysis, Inc.
Tin Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(25)	(26)	(27)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	13:00	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Percent O2	%	21.60	21.60	21.60
Tin Collected	mgs	0.9315	0.4940	0.3575
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Volume of Flue Gas	DSCFM	47,545	42,514	25,901
Tin Conc	Lbs/DSCF	2.90E-08	1.71E-08	1.76E-08
Tin Emis	Lbs/Hour	8.28E-02	4.37E-02	2.74E-02
Tin Conc	PPM	9.40E-02	5.55E-02	5.72E-02
Tin Conc	Grs/DSCF	2.03E-04	1.20E-04	1.23E-04

Total Source Analysis, Inc.
Titanium Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(28)	(29)	(30)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	13:00	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Percent O2	%	21.60	21.60	21.60
Titanium Collected	mgs	0.0621	0.0760	0.0935
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Volume of Flue Gas	DSCFM	47,545	42,514	25,901
Titanium Conc	Lbs/DSCF	1.93E-09	2.63E-09	4.62E-09
Titanium Emis	Lbs/Hour	5.52E-03	6.73E-03	7.18E-03
Titanium Conc	PPM	1.55E-02	2.11E-02	3.71E-02
Titanium Conc	Grs/DSCF	1.35E-05	1.84E-05	3.23E-05

Total Source Analysis, Inc.
Zinc Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(31)	(32)	(33)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	13:00	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Percent O2	%	21.60	21.60	21.60
Zinc Collected	mgs	13.0410	9.1200	2.6400
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Volume of Flue Gas	DSCFM	47,545	42,514	25,901
Zinc Conc	Lbs/DSCF	4.06E-07	3.16E-07	1.30E-07
Zinc Emis	Lbs/Hour	1.15	.80	.20
Zinc Conc	PPM	2.39	1.86	.76
Zinc Conc	Grs/DSCF	2.84E-03	2.21E-03	9.13E-04

Total Source Analysis, Inc.
Aluminum Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-888

Run Number		1	2	3
Data set		(31)	(32)	(33)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure	In. Hg	29.85	29.85	29.85
Volume Sampled	DCF	57.024	47.228	17.484
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	3.05	2.00	1.06
Meter Temperature	Deg. F	59	66	68
Percent O2	%	16.40	16.40	16.40
Aluminum Collected	mgs	1.9880	2.0460	1.3720
Corrected Sample Volume	DSCF	57.12	46.56	17.13
Volume of Flue Gas	DSCFM	38,640	28,006	22,385
Aluminum Conc	Lbs/DSCF	7.67E-08	9.68E-08	1.76E-07
Aluminum Emis	Lbs/Hour	.17	.16	.23
Aluminum Conc	PPM	1.09	1.38	2.51
Aluminum Conc	Grs/DSCF	5.37E-04	6.78E-04	1.23E-03

Total Source Analysis, Inc.
Antimony Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-888

Run Number		1	2	3
Data set		(34)	(35)	(36)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure	In. Hg	29.85	29.85	29.85
Volume Sampled	DCF	57.024	47.228	17.484
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	3.05	2.00	1.06
Meter Temperature	Deg. F	59	66	68
Percent O2	%	16.40	16.40	16.40
Antimony Collected	mgs	0.0000	0.0000	0.0000
Corrected Sample Volume	DSCF	57.12	46.56	17.13
Volume of Flue Gas	DSCFM	38,640	28,006	22,385
Antimony Conc	Lbs/DSCF	0	0	0
Antimony Emis	Lbs/Hour	0	0	0
Antimony Conc	PPM	0	0	0
Antimony Conc	Grs/DSCF	0	0	0

Total Source Analysis, Inc.
Arsenic Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-888

Run Number		1	2	3
Data set		(37)	(38)	(39)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure		In. Hg	29.85	29.85	29.85
Volume Sampled		DCF	57.024	47.228	17.484
Meter Correction Factor			0.98	0.98	0.98
Orifice Pressure		In. H2O	3.05	2.00	1.06
Meter Temperature		Deg. F	59	66	68
Percent O2		%	16.40	16.40	16.40
Arsenic	Collected	mgs	0.0213	0.0000	0.0441
Corrected Sample Volume		DSCF	57.12	46.56	17.13
Volume of Flue Gas		DSCFM	38,640	28,006	22,385
Arsenic	Conc	Lbs/DSCF	8.22E-10	0	5.67E-09
Arsenic	Emis	Lbs/Hour	1.90E-03	0	7.62E-03
Arsenic	Conc	PPM	4.22E-03	0	2.91E-02
Arsenic	Conc	Grs/DSCF	5.75E-06	0	3.97E-05

Total Source Analysis, Inc.
Barium Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-888

Run Number		1	2	3
Data set		(40)	(41)	(42)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure	In. Hg	29.85	29.85	29.85
Volume Sampled	DCF	57.024	47.228	17.484
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	3.05	2.00	1.06
Meter Temperature	Deg. F	59	66	68
Percent O2	%	16.40	16.40	16.40
Barium Collected	mgs	0.0426	0.0682	0.0196
Corrected Sample Volume	DSCF	57.12	46.56	17.13
Volume of Flue Gas	DSCFM	38,640	28,006	22,385
Barium Conc	Lbs/DSCF	1.64E-09	3.22E-09	2.52E-09
Barium Emis	Lbs/Hour	3.81E-03	5.42E-03	3.38E-03
Barium Conc	PPM	4.60E-03	9.04E-03	7.06E-03
Barium Conc	Grs/DSCF	1.15E-05	2.26E-05	1.76E-05

Total Source Analysis, Inc.
Chromium Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-888

Run Number		1	2	3
Data set		(43)	(44)	(45)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure	In. Hg	29.85	29.85	29.85
Volume Sampled	DCF	57.024	47.228	17.484
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	3.05	2.00	1.06
Meter Temperature	Deg. F	59	66	68
Percent O2	%	16.40	16.40	16.40
Chromium Collected	mgs	0.7100	0.4526	0.2842
Corrected Sample Volume	DSCF	57.12	46.56	17.13
Volume of Flue Gas	DSCFM	38,640	28,006	22,385
Chromium Conc	Lbs/DSCF	2.74E-08	2.14E-08	3.65E-08
Chromium Emis	Lbs/Hour	6.35E-02	3.60E-02	4.91E-02
Chromium Conc	PPM	.20	.15	.27
Chromium Conc	Grs/DSCF	1.91E-04	1.50E-04	2.56E-04

Total Source Analysis, Inc.
Copper Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-888

Run Number		1	2	3
Data set		(46)	(47)	(48)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure	In. Hg	29.85	29.85	29.85
Volume Sampled	DCF	57.024	47.228	17.484
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	3.05	2.00	1.06
Meter Temperature	Deg. F	59	66	68
Percent O2	%	16.40	16.40	16.40
Copper Collected	mgs	1.2070	0.6200	0.5880
Corrected Sample Volume	DSCF	57.12	46.56	17.13
Volume of Flue Gas	DSCFM	38,640	28,006	22,385
Copper Conc	Lbs/DSCF	4.65E-08	2.93E-08	7.56E-08
Copper Emis	Lbs/Hour	.10	4.93E-02	.10
Copper Conc	PPM	.28	.17	.45
Copper Conc	Grs/DSCF	3.26E-04	2.05E-04	5.29E-04

Total Source Analysis, Inc.
Lead Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-888

Run Number		1	2	3
Data set		(49)	(50)	(51)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure	In. Hg	29.85	29.85	29.85
Volume Sampled	DCF	57.024	47.228	17.484
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	3.05	2.00	1.06
Meter Temperature	Deg. F	59	66	68
Percent O2	%	16.40	16.40	16.40
Lead Collected	mgs	1.4910	0.6200	0.5880
Corrected Sample Volume	DSCF	57.12	46.56	17.13
Volume of Flue Gas	DSCFM	38,640	28,006	22,385
Lead Conc	Lbs/DSCF	5.75E-08	2.93E-08	7.56E-08
Lead Emis	Lbs/Hour	.13	4.93E-02	.10
Lead Conc	PPM	.10	5.45E-02	.14
Lead Conc	Grs/DSCF	4.02E-04	2.05E-04	5.29E-04

Total Source Analysis, Inc.
Manganese Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-888

Run Number		1	2	3
Data set		(52)	(53)	(54)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure	In. Hg	29.85	29.85	29.85
Volume Sampled	DCF	57.024	47.228	17.484
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	3.05	2.00	1.06
Meter Temperature	Deg. F	59	66	68
Percent O2	%	16.40	16.40	16.40
Manganese Collected	mgs	*0.0000	*0.0000	28.5670
Corrected Sample Volume	DSCF	57.12	46.56	17.13
Volume of Flue Gas	DSCFM	38,640	28,006	22,385
Manganese Conc	Lbs/DSCF	0	0	3.67E-06
Manganese Emis	Lbs/Hour	0	0	4.93
Manganese Conc	PPM	0	0	25.74
Manganese Conc	Grs/DSCF	0	0	2.57E-02

* Sample Error

Total Source Analysis, Inc.
Mercury Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-888

Run Number		1	2	3
Data set		(55)	(56)	(57)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure	In. Hg	29.85	29.85	29.85
Volume Sampled	DCF	57.024	47.228	17.484
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	3.05	2.00	1.06
Meter Temperature	Deg. F	59	66	68
Percent O2	%	16.40	16.40	16.40
Mercury Collected	mgs	0.0011	0.0005	0.0020
Corrected Sample Volume	DSCF	57.12	46.56	17.13
Volume of Flue Gas	DSCFM	38,640	28,006	22,385
Mercury Conc	Lbs/DSCF	4.13E-11	2.55E-11	2.52E-10
Mercury Emis	Lbs/Hour	9.57E-05	4.29E-05	3.38E-04
Mercury Conc	PPM	7.91E-05	4.90E-05	4.83E-04
Mercury Conc	Grs/DSCF	2.89E-07	1.79E-07	1.76E-06

Total Source Analysis, Inc.
Nickel Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-888

Run Number		1	2	3
Data set		(58)	(59)	(60)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure	In. Hg	29.85	29.85	29.85
Volume Sampled	DCF	57.024	47.228	17.484
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	3.05	2.00	1.06
Meter Temperature	Deg. F	59	66	68
Percent O2	%	16.40	16.40	16.40
Nickel Collected	mgs	0.2414	1.1160	1.5190
Corrected Sample Volume	DSCF	57.12	46.56	17.13
Volume of Flue Gas	DSCFM	38,640	28,006	22,385
Nickel Conc	Lbs/DSCF	9.31E-09	5.28E-08	1.95E-07
Nickel Emis	Lbs/Hour	2.16E-02	8.88E-02	.26
Nickel Conc	PPM	6.10E-02	.34	1.28
Nickel Conc	Grs/DSCF	6.52E-05	3.69E-04	1.36E-03

Total Source Analysis, Inc.
Beryllium Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(34)	(35)	(36)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure	In. Hg	29.85	29.85	29.85
Volume Sampled	DCF	57.024	47.228	17.484
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	3.05	2.00	1.06
Meter Temperature	Deg. F	59	66	68
Percent O2	%	16.40	16.40	16.40
Beryllium Collected	mgs	0.0000	0.0000	0.0000
Corrected Sample Volume	DSCF	57.12	46.56	17.13
Volume of Flue Gas	DSCFM	38,640	28,006	22,385
Beryllium Conc	Lbs/DSCF	0	0	0
Beryllium Emis	Lbs/Hour	0	0	0
Beryllium Conc	PPM	0	0	0
Beryllium Conc	Grs/DSCF	0	0	0

Total Source Analysis, Inc.
Cadmium Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(37)	(38)	(39)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure	In. Hg	29.85	29.85	29.85
Volume Sampled	DCF	57.024	47.228	17.484
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	3.05	2.00	1.06
Meter Temperature	Deg. F	59	66	68
Percent O2	%	16.40	16.40	16.40
Cadmium Collected	mgs	0.0426	0.0248	0.0539
Corrected Sample Volume	DSCF	57.12	46.56	17.13
Volume of Flue Gas	DSCFM	38,640	28,006	22,385
Cadmium Conc	Lbs/DSCF	1.64E-09	1.17E-09	6.93E-09
Cadmium Emis	Lbs/Hour	3.81E-03	1.97E-03	9.31E-03
Cadmium Conc	PPM	5.62E-03	4.01E-03	2.37E-02
Cadmium Conc	Grs/DSCF	1.15E-05	8.22E-06	4.85E-05

Total Source Analysis, Inc.
Cobalt Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(40)	(41)	(42)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure	In. Hg	29.85	29.85	29.85
Volume Sampled	DCF	57.024	47.228	17.484
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	3.05	2.00	1.06
Meter Temperature	Deg. F	59	66	68
Percent O2	%	16.40	16.40	16.40
Cobalt Collected	mgs	0.1136	0.0806	0.0392
Corrected Sample Volume	DSCF	57.12	46.56	17.13
Volume of Flue Gas	DSCFM	38,640	28,006	22,385
Cobalt Conc	Lbs/DSCF	4.38E-09	3.81E-09	5.04E-09
Cobalt Emis	Lbs/Hour	1.01E-02	6.41E-03	6.77E-03
Cobalt Conc	PPM	2.86E-02	2.49E-02	3.29E-02
Cobalt Conc	Grs/DSCF	3.06E-05	2.67E-05	3.53E-05

Total Source Analysis, Inc.
Iron Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(43)	(44)	(45)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure	In. Hg	29.85	29.85	29.85
Volume Sampled	DCF	57.024	47.228	17.484
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	3.05	2.00	1.06
Meter Temperature	Deg. F	59	66	68
Percent O2	%	16.40	16.40	16.40
Iron Collected	mgs	98.7539	80.0358	45.1241
Corrected Sample Volume	DSCF	57.12	46.56	17.13
Volume of Flue Gas	DSCFM	38,640	28,006	22,385
Iron Conc	Lbs/DSCF	3.81E-06	3.79E-06	5.80E-06
Iron Emis	Lbs/Hour	8.83	6.36	7.80
Iron Conc	PPM	26.25	26.10	39.99
Iron Conc	Grs/DSCF	2.66E-02	2.65E-02	4.06E-02

Total Source Analysis, Inc.
Magnesium Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(46)	(47)	(48)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure	In. Hg	29.85	29.85	29.85
Volume Sampled	DCF	57.024	47.228	17.484
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	3.05	2.00	1.06
Meter Temperature	Deg. F	59	66	68
Percent O2	%	16.40	16.40	16.40
Magnesium Collected	mgs	6.7450	5.8900	1.5680
Corrected Sample Volume	DSCF	57.12	46.56	17.13
Volume of Flue Gas	DSCFM	38,640	28,006	22,385
Magnesium Conc	Lbs/DSCF	2.60E-07	2.78E-07	2.01E-07
Magnesium Emis	Lbs/Hour	.60	.46	.27
Magnesium Conc	PPM	4.12	4.41	3.19
Magnesium Conc	Grs/DSCF	1.82E-03	1.95E-03	1.41E-03

Total Source Analysis, Inc.
Molybdenum Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(49)	(50)	(51)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR	NODULAR	NODULAR
		OUTLET	OUTLET	OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure	In. Hg	29.85	29.85	29.85
Volume Sampled	DCF	57.024	47.228	17.484
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	3.05	2.00	1.06
Meter Temperature	Deg. F	59	66	68
Percent O2	%	16.40	16.40	16.40
Molybdenum Collected	mgs	0.0000	0.0000	0.0000
Corrected Sample Volume	DSCF	57.12	46.56	17.13
Volume of Flue Gas	DSCFM	38,640	28,006	22,385
Molybdenum Conc	Lbs/DSCF	0	0	0
Molybdenum Emis	Lbs/Hour	0	0	0
Molybdenum Conc	PPM	0	0	0
Molybdenum Conc	Grs/DSCF	0	0	0

Total Source Analysis, Inc.
Selenium Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(52)	(53)	(54)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure	In. Hg	29.85	29.85	29.85
Volume Sampled	DCF	57.024	47.228	17.484
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	3.05	2.00	1.06
Meter Temperature	Deg. F	59	66	68
Percent O2	%	16.40	16.40	16.40
Selenium Collected	mgs	0.9230	0.6200	0.0196
Corrected Sample Volume	DSCF	57.12	46.56	17.13
Volume of Flue Gas	DSCFM	38,640	28,006	22,385
Selenium Conc	Lbs/DSCF	3.56E-08	2.93E-08	2.52E-09
Selenium Emis	Lbs/Hour	8.26E-02	4.93E-02	3.38E-03
Selenium Conc	PPM	.17	.14	1.22E-02
Selenium Conc	Grs/DSCF	2.49E-04	2.05E-04	1.76E-05

Total Source Analysis, Inc.
Silver Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(55)	(56)	(57)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure	In. Hg	29.85	29.85	29.85
Volume Sampled	DCF	57.024	47.228	17.484
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	3.05	2.00	1.06
Meter Temperature	Deg. F	59	66	68
Percent O2	%	16.40	16.40	16.40
Silver Collected	mgs	0.0000	0.0000	0.0000
Corrected Sample Volume	DSCF	57.12	46.56	17.13
Volume of Flue Gas	DSCFM	38,640	28,006	22,385
Silver Conc	Lbs/DSCF	0	0	0
Silver Emis	Lbs/Hour	0	0	0
Silver Conc	PPM	0	0	0
Silver Conc	Grs/DSCF	0	0	0

Total Source Analysis, Inc.
Tin Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(58)	(59)	(60)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure	In. Hg	29.85	29.85	29.85
Volume Sampled	DCF	57.024	47.228	17.484
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	3.05	2.00	1.06
Meter Temperature	Deg. F	59	66	68
Percent O2	%	16.40	16.40	16.40
Tin Collected	mgs	1.1005	0.5270	0.2842
Corrected Sample Volume	DSCF	57.12	46.56	17.13
Volume of Flue Gas	DSCFM	38,640	28,006	22,385
Tin Conc	Lbs/DSCF	4.24E-08	2.49E-08	3.65E-08
Tin Emis	Lbs/Hour	9.84E-02	4.19E-02	4.91E-02
Tin Conc	PPM	.13	8.08E-02	.11
Tin Conc	Grs/DSCF	2.97E-04	1.74E-04	2.56E-04

Total Source Analysis, Inc.
Titanium Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(61)	(62)	(63)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure	In. Hg	29.85	29.85	29.85
Volume Sampled	DCF	57.024	47.228	17.484
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	3.05	2.00	1.06
Meter Temperature	Deg. F	59	66	68
Percent O2	%	16.40	16.40	16.40
Titanium Collected	mgs	0.0781	0.0558	0.0539
Corrected Sample Volume	DSCF	57.12	46.56	17.13
Volum. of Flue Gas	DSCFM	38,640	28,006	22,385
Titanium Co..	Lbs/DSCF	3.01E-09	2.64E-09	6.93E-09
Titanium Emis	Lbs/Hour	6.98E-03	4.44E-03	9.31E-03
Titanium Conc	PPM	2.42E-02	2.12E-02	5.57E-02
Titanium Conc	Grs/DSCF	2.11E-05	1.84E-05	4.85E-05

Total Source Analysis, Inc.
Zinc Test Analysis

MECO ENGINEERING
COOPER INDUSTRIES

93-003

Run Number		1	2	3
Data set		(64)	(65)	(66)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure	In. Hg	29.85	29.85	29.85
Volume Sampled	DCF	57.024	47.228	17.484
Meter Correction Factor		0.98	0.98	0.98
Orifice Pressure	In. H2O	3.05	2.00	1.06
Meter Temperature	Deg. F	59	66	68
Percent O2	%	16.40	16.40	16.40
Zinc Collected	mgs	7.7461	3.7882	3.9739
Corrected Sample Volume	DSCF	57.12	46.56	17.13
Volume of Flue Gas	DSCFM	38,640	28,006	22,385
Zinc Conc	Lbs/DSCF	2.99E-07	1.79E-07	5.11E-07
Zinc Emis	Lbs/Hour	.69	.30	.68
Zinc Conc	PPM	1.75	1.05	3.00
Zinc Conc	Grs/DSCF	2.09E-03	1.25E-03	3.58E-03

Total Source Analysis, Inc.
Velocity Traverse Results

MECO ENGINEERING
COOPER INDUSTRIES

93-654

Run Number		1	2	3
Data set		(07)	(08)	(09)
Date		9-20-93	9-20-93	9-20-93
Location		NOD. IRON OUTLET	NOD. IRON OUTLET	NOD. IRON OUTLET
Start time		11:05	13:00	14:30
End time		11:15	31:5]	14:40
Barometric Pressure	In. Hg	29.51	29.51	29.51
Static Pressure	In. H2O	-0.65	-0.65	-0.65
Square Root of Delta P		1.060	1.060	1.060
Flue Temperature	Deg. F	74	80	82
Percent CO2	%	5.0	5.0	5.0
Percent O2	%	16.4	16.4	16.4
Percent Of Moisture		9.6	17.8	10.0
Area of Flue	Sq Ft	12.83	12.83	12.83
Absolute Flue Pressure	In. Hg	29.46	29.46	29.46
Molecular Weight	Lb/LbMole	28.36	27.42	28.31
Velocity of Flue Gas	FpS	55.06	56.31	55.52
Volume of Flue Gas	ACFM	42,386	43,348	42,737
Volume of Flue Gas	DSCFM	37,292	34,293	36,882
Volume of Flue Gas	KSCFM	41.25	41.72	40.98
Volume of Flue Gas	KSCFH	2,475	2,503	2,459

Total Source Analysis, Inc.
Velocity Traverse Results

MECO ENGINEERING
COOPER INDUSTRIES

93-654

Run Number		1	2	3
Data set		(10)	(11)	(12)
Date		9-21-93	9-21-93	9-21-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		08:53	11:15	12:45
End time		09:03	11:30	13:05
Barometric Pressure	In. Hg	29.74	29.74	29.74
Static Pressure	In. H2O	-0.65	-0.65	-0.65
Square Root of Delta P		1.100	1.100	1.100
Flue Temperature	Deg. F	64	68	69
Percent CO2	%	4.0	4.0	4.0
Percent O2	%	17.6	17.6	17.6
Percent Of Moisture		8.3	11.4	10.4
Area of Flue	Sq Ft	12.83	12.83	12.83
Absolute Flue Pressure	In. Hg	29.69	29.69	29.69
Molecular Weight	Lb/LbMole	28.40	28.05	28.16
Velocity of Flue Gas	FpS	56.34	56.90	56.84
Volume of Flue Gas	ACFM	43,368	43,805	43,758
Volume of Flue Gas	DSCFM	39,751	38,500	38,820
Volume of Flue Gas	KSCFM	43.35	43.45	43.33
Volume of Flue Gas	KSCFH	2,601	2,607	2,600

Total Source Analysis, Inc.

MECO ENGINEERING
COOPER INDUSTRIES

93-888

Run Number		1	2	3
Data set		(04)	(05)	(06)
Date		9-16-93	9-16-93	9-16-93
Location		NODULAR OUTLET	NODULAR OUTLET	NODULAR OUTLET
Start time		07:50	10:32	13:30
End time		09:00	12:45	14:00
Barometric Pressure	In. Hg	29.85	29.85	29.85
Static Pressure	In. H2O	-0.65	-0.65	-0.65
Volume of Condensate	Mls	62	90	40
Volume Sampled	DCF	57.024	47.228	17.484
Meter Correction Factor		0.98	0.98	0.98
Square Root of Delta P		0.960	0.871	0.660
Orifice Pressure	In. H2O	3.05	2.00	1.06
Meter Temperature	Deg. F	59	66	68
Flue Temperature	Deg. F	101	126	118
Percent CO2	%	5.00	5.00	5.00
Percent O2	%	16.40	16.40	16.40
Diameter of Nozzle	In	0.250	0.250	0.250
Area of Flue	Sq Ft	12.83	12.83	12.83
Sample Time	Min	60	60	60
Absolute Flue Pressure	In. Hg	29.80	29.80	29.80
Corrected Sample Volume	DSCF	57.12	46.56	17.13
Moisture in Flue Gas	%	4.9	8.3	9.9
Molecular Weight	Lb/LbMole	28.90	28.50	28.32
Velocity of Flue Gas	FpS	56.30	47.01	35.49
Volume of Flue Gas	ACFM	43,341	36,185	27,317
Volume of Flue Gas	DSCFM	38,640	29,753	22,385

MECO ENGINEERING
COOPER INDUSTRIES

93-888

Run Number		1	2	3
Data set		(01)	(02)	(03)
Date		9-15-93	9-15-93	9-17-93
Location		GREY IRON OUTLET	GREY IRON OUTLET	GREY IRON OUTLET
Start time		09:55	11:45	08:35
End time		10:22	00:0-	09:46
Barometric Pressure	In. Hg	29.86	29.86	29.85
Static Pressure	In. H2O	-0.65	-0.65	-0.65
Volume of Condensate	Mls	84	74	72
Volume Sampled	DCF	71.125	64.815	44.838
Meter Correction Factor		0.98	0.98	0.98
Square Root of Delta P		1.180	1.060	0.710
Orifice Pressure	In. H2O	4.74	3.87	1.86
Meter Temperature	Deg. F	65	72	61
Flue Temperature	Deg. F	95	101	107
Percent CO2	%	4.00	4.00	4.00
Percent O2	%	21.60	21.60	21.60
Diameter of Nozzle	In	0.250	0.250	0.250
Area of Flue	Sq Ft	12.83	12.83	12.83
Sample Time	Min	60	60	60
Absolute Flue Pressure	In. Hg	29.81	29.81	29.80
Corrected Sample Volume	DSCF	70.75	63.49	44.61
Moisture in Flue Gas	%	5.3	5.2	7.1
Molecular Weight	Lb/LbMole	28.89	28.91	28.69
Velocity of Flue Gas	FpS	68.83	62.15	39.05
Volume of Flue Gas	ACFM	52,983	47,842	30,059
Volume of Flue Gas	DSCFM	47,545	42,514	25,901

Total Source Analysis, Inc.
Particulate Size Distribution

MECO ENGINEERING
COOPER INDUSTRIES

93-354

Run Number		1	2
Data set		(01)	(02)
Date		9-15-93	9-17-93
Location		GREY IRON INLET	GREY IRON INLET
Start time		11:30	08:35
End time		11:35	08:40
Barometric Pressure	In. Hg	29.86	29.85
Static Pressure	In. H2O	0.15	0.15
Volume of Condensate	Mls	3	3
Volume Sampled	DCF	2.064	2.099
Meter Correction Factor		1.00	1.00
Square Root of Delta P		0.548	0.548
Orifice Pressure	In. H2O	0.55	0.55
Meter Temperature	Deg. F	60	71
Flue Temperature	Deg. F	600	600
Percent CO2	%	6.10	5.90
Percent O2	%	13.90	13.40
Diameter of Nozzle	In	0.248	0.248
Sample Time	Min	5	5
Weight Gain Plate 0	Grams	0.2060	0.2545
Weight Gain Plate 1	Grams	0.0040	0.0023
Weight Gain Plate 2	Grams	0.0030	0.0023
Weight Gain Plate 3	Grams	0.0180	0.0001
Weight Gain Plate 4	Grams	0.0196	0.0005
Weight Gain Plate 5	Grams	0.0660	0.0018
Weight Gain Plate 6	Grams	0.0237	0.0033
Weight Gain Plate 7	Grams	0.0214	0.0024
Absolute Flue Pressure	In. Hg	29.87	29.86
Corrected Sample Volume	DSCF	2.09	2.08
Moisture in Flue Gas	%	5.3	5.3
Sample Rate Stack Cond.	CFM	0.000	0.000
Dust Conc. Plate 0	Lb/DSCF	2.16E-04	2.69E-04
Dust Conc. Plate 1	Lb/DSCF	4.21E-06	2.43E-06
Dust Conc. Plate 2	Lb/DSCF	3.15E-06	2.43E-06
Dust Conc. Plate 3	Lb/DSCF	1.89E-05	1.05E-07
Dust Conc. Plate 4	Lb/DSCF	2.06E-05	5.28E-07
Dust Conc. Plate 5	Lb/DSCF	6.95E-05	1.90E-06
Dust Conc. Plate 6	Lb/DSCF	2.49E-05	3.49E-06
Dust Conc. Plate 7	Lb/DSCF	2.25E-05	2.53E-06
Isokinetic Rate	%	101.2	100.7

Total Source Analysis, Inc.
Particulate Size Distribution

MECO ENGINEERING
COOPER INDUSTRIES

93-354

Run Number	1	Data set	(01)
Date	9-15-93	Location	GREY IRON
	INLET		
Start time	11:30	End time	11:35

	DP50(Micron)	%In Size Range	% Less Than
Plate 1	28.0	56.95	43.05
Plate 2	14.0	1.11	41.94
Plate 3	4.9	0.83	41.11
Plate 4	2.4	4.98	36.13
Plate 5	1.3	5.42	30.72
Plate 6	.65	18.25	12.47
Plate 7	.31	6.55	5.92
Plate 8	<.31	5.92	0.00

Run Number	2	Data set	(02)
Date	9-17-93	Location	GREY IRON
	INLET		
Start time	08:35	End time	08:40

	DP50(Micron)	%In Size Range	% Less Than
Plate 1	28.0	95.25	4.75
Plate 2	14.0	0.86	3.89
Plate 3	4.9	0.86	3.03
Plate 4	2.4	0.04	2.99
Plate 5	1.3	0.19	2.81
Plate 6	.65	0.67	2.13
Plate 7	.31	1.24	0.90
Plate 8	<.31	0.90	0.00

Total Source Analysis, Inc.
Particulate Size Distribution

MECO ENGINEERING
COOPER INDUSTRIES

93-354

Run Number		1	2
Data set		(03)	(04)
Date		9-16-93	9-16-93
Location		NOD. IRON INLET	NOD. IRON INLET
Start time		10:25	00:0-
End time		10:30	00:0-
Barometric Pressure	In. Hg	29.85	29.85
Static Pressure	In. H2O	0.18	0.15
Volume of Condensate	Mls	3	3
Volume Sampled	DCF	2.124	2.132
Meter Correction Factor		1.00	1.00
Square Root of Delta P		0.548	0.548
Orifice Pressure	In. H2O	0.56	0.56
Meter Temperature	Deg. F	53	65
Flue Temperature	Deg. F	568	568
Percent CO2	%	6.00	6.00
Percent O2	%	12.90	12.90
Diameter of Nozzle	In	0.248	0.248
Sample Time	Min	5	5
Weight Gain Plate 0	Grams	0.2175	0.3735
Weight Gain Plate 1	Grams	0.0035	0.0012
Weight Gain Plate 2	Grams	0.0021	0.0012
Weight Gain Plate 3	Grams	0.0013	0.0001
Weight Gain Plate 4	Grams	0.0016	0.0015
Weight Gain Plate 5	Grams	0.0036	0.0007
Weight Gain Plate 6	Grams	0.0027	0.0012
Weight Gain Plate 7	Grams	0.0060	0.0060
Absolute Flue Pressure	In. Hg	29.86	29.86
Corrected Sample Volume	DSCF	2.18	2.14
Moisture in Flue Gas	%	5.1	5.2
Sample Rate Stack Cond.	CFM	0.000	0.000
Dust Conc. Plate 0	Lb/DSCF	2.19E-04	3.84E-04
Dust Conc. Plate 1	Lb/DSCF	3.53E-06	1.23E-06
Dust Conc. Plate 2	Lb/DSCF	2.12E-06	1.23E-06
Dust Conc. Plate 3	Lb/DSCF	1.31E-06	1.02E-07
Dust Conc. Plate 4	Lb/DSCF	1.61E-06	1.54E-06
Dust Conc. Plate 5	Lb/DSCF	3.63E-06	7.20E-07
Dust Conc. Plate 6	Lb/DSCF	2.72E-06	1.23E-06
Dust Conc. Plate 7	Lb/DSCF	6.06E-06	6.17E-06
Isokinetic Rate	%	103.7	101.8

Total Source Analysis, Inc.
Particulate Size Distribution

MECO ENGINEERING
COOPER INDUSTRIES

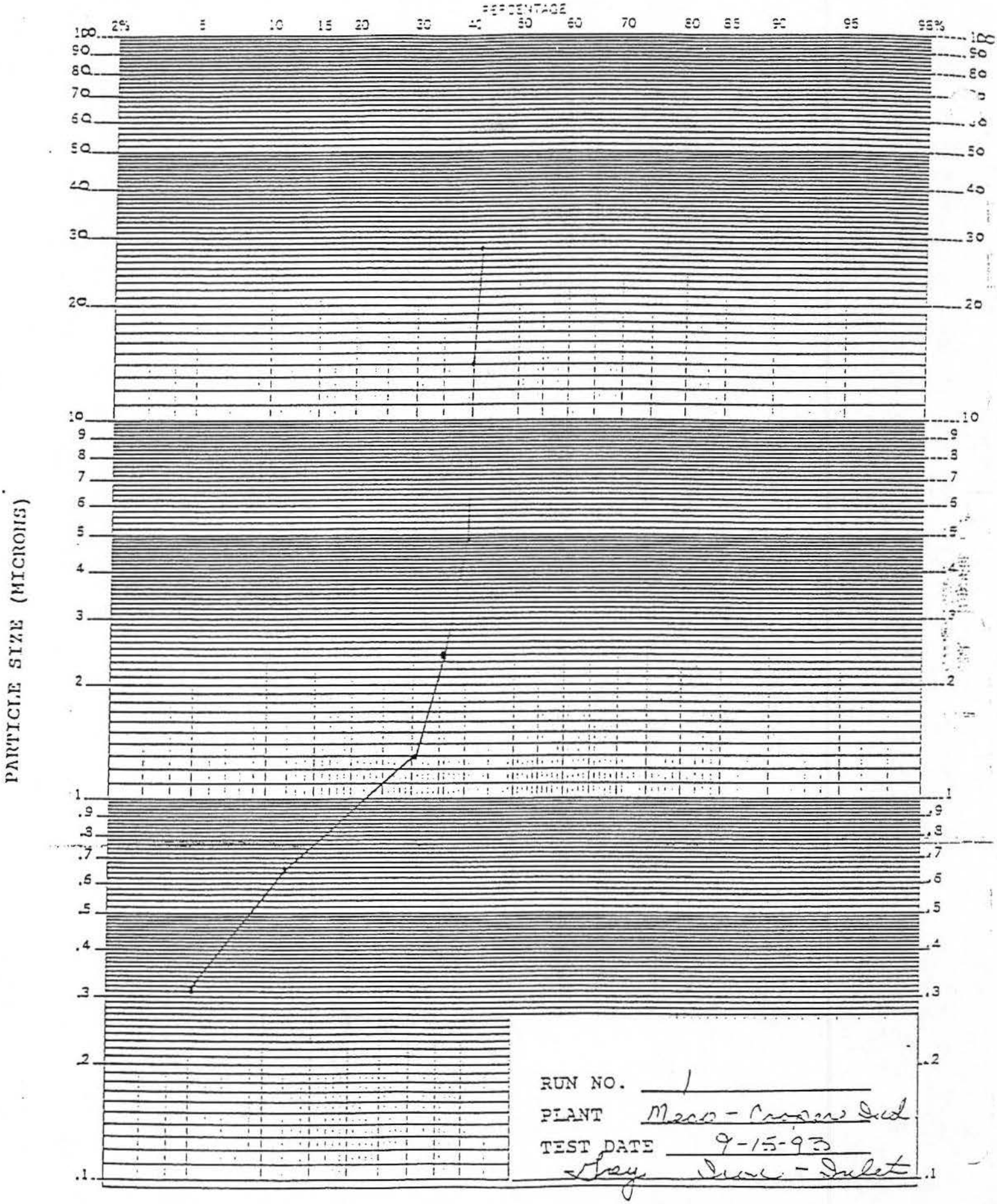
93-354

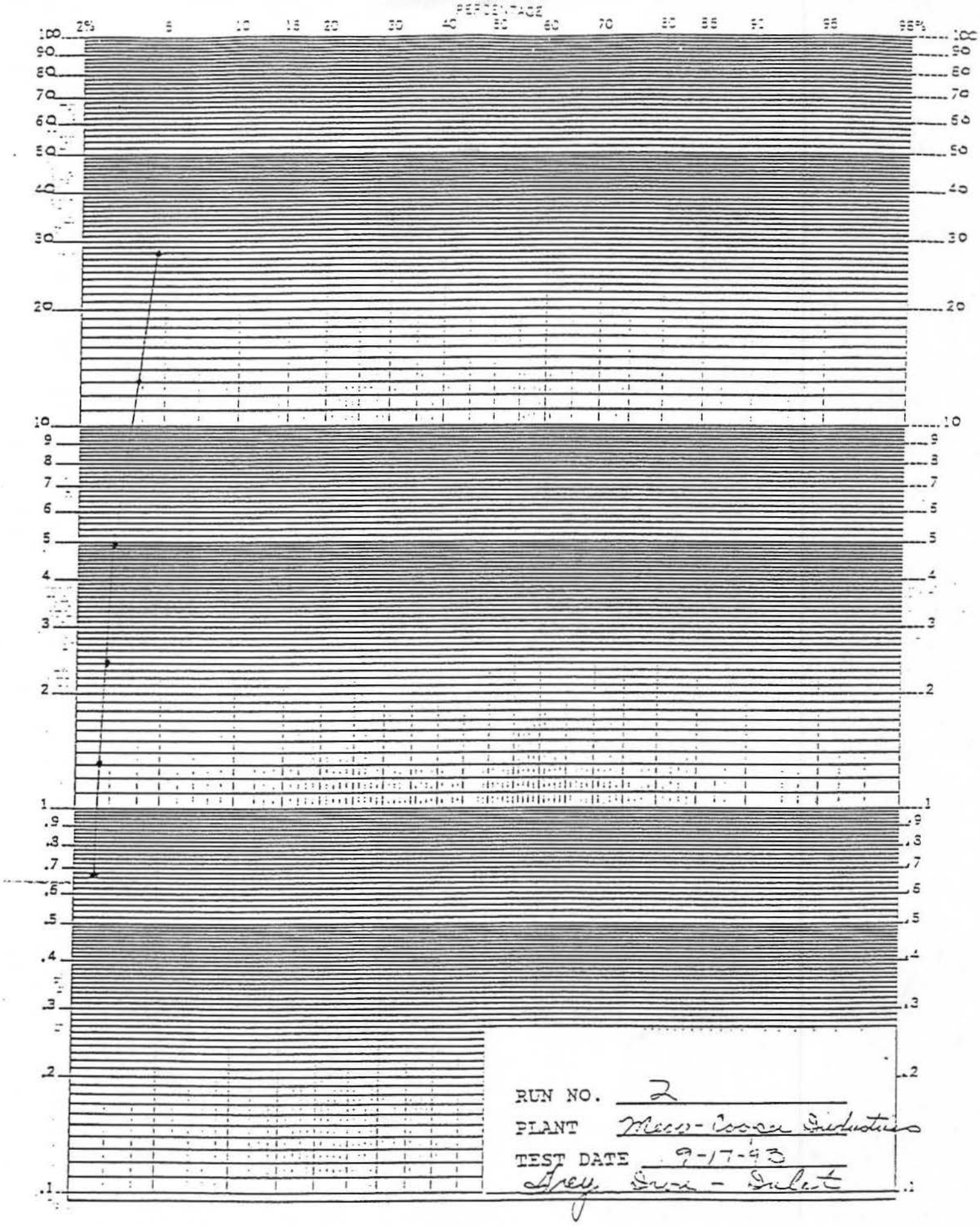
Run Number	1	Data set	(03)
Date	9-16-93	Location	NOD. IRON
	INLET		
Start time	10:25	End time	10:30

	DP50(Micron)	%In Size Range	% Less Than
Plate 1	28.0	91.27	8.73
Plate 2	14.0	1.47	7.26
Plate 3	4.9	0.88	6.38
Plate 4	2.4	0.55	5.83
Plate 5	1.3	0.67	5.16
Plate 6	.65	1.51	3.65
Plate 7	.31	1.13	2.52
Plate 8	<.31	2.52	0.00

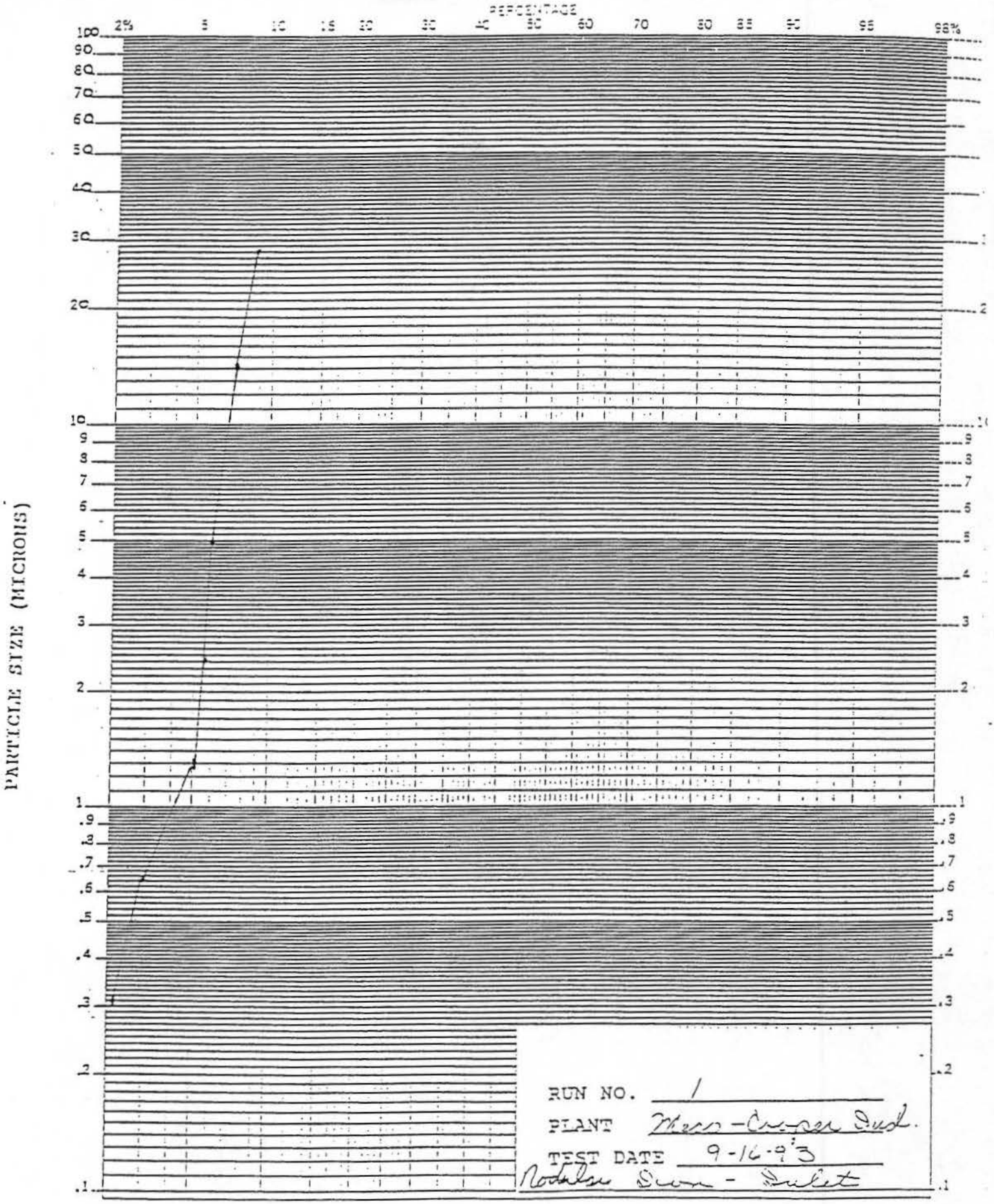
Run Number	2	Data set:	(04)
Date	9-16-93	Location	NOD. IRON
	INLET		
tart time	00:0-	End time	00:0-

	DP50(Micron)	%In Size Range	% Less Than
Plate 1	28.0	96.91	3.09
Plate 2	14.0	0.31	2.78
Plate 3	4.9	0.31	2.46
Plate 4	2.4	0.03	2.44
Plate 5	1.3	0.39	2.05
Plate 6	.65	0.18	1.87
Plate 7	.31	0.31	1.56
Plate 8	<.31	1.56	0.00


PERCENTAGE
2% 5 10 15 20 30 40 50 60 70 80 85 90 95 98%
100 90 80 70 60 50 40 30 20 10 9 8 7 6 5 4 3 2 1 .9 .8 .7 .6 .5 .4 .3 .2 .1
PARTICLE SIZE (MICRONS)
RUN NO. 1
PLANT Mass - Cross Ind
TEST DATE 9-15-93
Gray Iron - Inlet
CUMULATIVE PERCENT LESS THAN



CUMULATIVE PERCENT LESS THAN


PERCENTAGE
2% 5 10 15 20 30 40 50 60 70 80 85 90 95 98%
PARTICLE SIZE (MICRONS)
100 90 80 70 60 50 40 30 20 10 9 8 7 6 5 4 3 2 1 .9 .8 .7 .6 .5 .4 .3 .2 .1
RUN NO. 1
PLANT Mess-Cruser Dust.
TEST DATE 9-16-93
Rotaclone Scrn - Inlet
CUMULATIVE PERCENT LESS THAN

CUPOLA PRODUCTION

Year	Total Melt Hrs	Total Melt Tons	Average Melt Ton/Hr	Tons Catgs Produced	% of Rated Capacity	% Yield	Tons Shpd
1985	1,107.5	13,063.0	11.8	7,047.0	41.5	53.9	6,311.0
1986	797.3	9,002.5	11.3	4,790.0	28.2	53.2	4,541.0
1987	948.3	11,122.5	11.7	6,252.0	36.8	56.2	5,446.0
1988	1,558.3	18,323.5	11.8	10,646.6	62.6	58.1	9,828.0
1989	1,386.5	15,058.5	10.9	8,876.8	52.2	58.9	8,070.0
1990	1,559.5	17,153.0	11.0	10,489.4	61.7	61.2	9,874.0
1991	1,125.8	12,981.0	11.5	7,787.4	45.8	60.0	7,530.0
1992	841.8	10,133.0	12.0	6,007.1	35.3	59.3	5,800.0
1993	1207.5	14938.5	12.4	8777.7	51.6	58.8	7,925.0
1994							
1995							
1996							
2400 Max. Tons Iron		30,000	12.5	17,000	100.0	56.7	