# *APPENDIX A*

# *RESULTS AND CALCULATIONS*

# *Appendix A.1*

# *Emissions Summary*

SUMMARY OF MERCURY EMISSIONS AND REMOVAL EFFICIENCIES[1]
LOGAN GENERATING STATION

| Method/Component | Units | SDA Inlet | | | | Outlet Stack | | | | I/O Removal Efficiency | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | avg | 1 | 2 | 3 | avg | 1 | 2 | 3 | avg |
| *Ontario Hydro/ Hg* | | | | | | | | | | | | | |
| *Particle bound* | *ug/dscm* | 12.30 | 12.39 | 11.90 | 12.20 | 0.0178 | 0.0162 | 0.0131 | 0.0157 | | | | |
| | *mg/hr* | 9467 | 9373 | 9090 | 9310 | 14.70 | 13.50 | 10.66 | 12.95 | 99.84% | 99.86% | 99.88% | 99.86% |
| *Oxidized, $Hg^{2+}$* | *ug/dscm* | *3.13* | *1.87* | 1.92 | 2.30 | 0.0319 | 0.0523 | 0.0156 | 0.0333 | | | | |
| | *mg/hr* | *2483* | *1382* | 1469 | 1778 | 26.35 | 43.81 | 12.69 | 27.62 | 98.94% | 96.83% | 99.14% | 98.30% |
| *Elemental, $Hg^0$* | *ug/dscm* | *0.26* | 0.40 | *0.29* | 0.31 | 0.1801 | 0.2022 | *0.2022* | 0.1948 | | | | |
| | *mg/hr* | *203* | 301 | *222* | 242 | 148.58 | 168.71 | *167.20* | 161.50 | 26.86% | 43.99% | 24.52% | 31.79% |
| *Total, Hg* | *ug/dscm* | 15.69 | 14.65 | 14.11 | 14.81 | 0.2298 | 0.2707 | 0.2309 | 0.2438 | | | | |
| | *mg/hr* | 12154 | 11056 | 10780 | 11330 | 189.64 | 226.02 | 190.55 | 202.07 | 98.44% | 97.96% | 98.23% | 98.21% |

| Method/Component | Units | Process Samples | | | | Overall Process RE | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | avg | 1 | 2 | 3 | avg |
| *Coal Samples* | | | | | | | | | |
| *Hg* | *ug/g* | 1.90E-01 | 1.80E-01 | 1.70E-01 | 1.80E-01 | ***98.69%*** | ***98.36%*** | ***98.53%*** | ***98.53%*** |
| *Hg rate* | *mg/hr* | 14482 | 13735 | 12955 | 13724 | | | | |
| *Sulfur* | *Wt%* | 1.12 | 1.07 | 1.07 | 1.09 | | | | |
| *Chlorine* | *%* | 0.15 | 0.15 | 0.15 | 0.15 | | | | |
| *HHV* | *Btu/lb* | 13758 | 13767 | 13757 | 13761 | | | | |
| *Lime Slurry* | | | | | | | | | |
| *Hg* | *mg/L* | 0.0002 | 0.0002 | 0.0002 | 0.0002 | | | | |
| *Hg rate* | *mg/hr* | 6 | 7 | 7 | 7 | | | | |
| *Ammonia* | | | | | | | | | |
| *Hg* | *mg/L* | 0.002 | 0.002 | 0.002 | 0.002 | | | | |
| *Hg rate* | *mg/hr* | 1 | 1 | 1 | 1 | | | | |
| *Total Hg Feed Rate* | *mg/hr* | **14489** | **13742** | **12962** | **13731** | | | | |

1- Exclusive of analytical data points determined to be outlying values.

SUMMARY OF MERCURY EMISSION RATES[1]
LOGAN GENERATING STATION

| Method/Component | Units | SDA Inlet | | | | | Outlet Stack | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | avg | | 1 | 2 | 3 | avg |
| *Ontario Hydro/ Hg* | | | | | | | | | | |
| *Particle bound* | *lb/hr* | 2.06E-02 | 2.04E-02 | 1.98E-02 | 2.03E-02 | | 2.89E-05 | 2.78E-05 | 2.49E-05 | 2.72E-05 |
| | *lb/MMBtu* | 9.13E-06 | 9.08E-06 | 8.88E-06 | 9.03E-06 | | 1.46E-08 | 1.31E-08 | 1.05E-08 | 1.27E-08 |
| *Oxidized, $Hg^{2+}$* | *lb/hr* | 5.40E-03 | 3.01E-03 | 3.20E-03 | 3.87E-03 | | 5.73E-05 | 9.53E-05 | 2.76E-05 | 6.01E-05 |
| | *lb/MMBtu* | 2.33E-06 | 1.37E-06 | 1.43E-06 | 1.71E-06 | | 2.61E-08 | 4.25E-08 | 1.25E-08 | 2.71E-08 |
| *Elemental, $Hg^{0}$* | *lb/hr* | 4.42E-04 | 6.55E-04 | 4.82E-04 | 5.26E-04 | | 3.23E-04 | 3.67E-04 | 3.64E-04 | 3.51E-04 |
| | *lb/MMBtu* | 1.91E-07 | 2.90E-07 | 2.13E-07 | 2.32E-07 | | 1.47E-07 | 1.64E-07 | 1.63E-07 | 1.58E-07 |
| *Total, Hg* | *lb/hr* | 2.64E-02 | 2.41E-02 | 2.35E-02 | 2.47E-02 | | 4.10E-04 | 4.90E-04 | 4.16E-04 | 4.39E-04 |
| | *lb/MMBtu* | 1.17E-05 | 1.07E-05 | 1.05E-05 | 1.10E-05 | | 1.88E-07 | 2.19E-07 | 1.86E-07 | 1.98E-07 |

1- Exclusive of analytical data points determined to be outlying values.

DISTRIBUTION OF SPECIATED MERCURY EMISSIONS AND REMOVAL EFFICIENCIES[1]
LOGAN GENERATING STATION

| Method/Component | Units | SDA Inlet | | | | Outlet Stack | | | | I/O Removal Efficiency | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2 | 3 | 4 | avg | 2 | 3 | 4 | avg | 2 | 3 | 4 | avg |
| *Ontario Hydro/ Hg* | | | | | | | | | | | | | |
| *Particle bound* | *mg/hr* | 9467 | 9373 | 9090 | 9310 | 15 | 14 | 11 | 13 | 99.84% | 99.86% | 99.88% | 99.86% |
| | | 78% | 85% | 84% | 82% | 8% | 6% | 6% | 6% | | | | |
| *Oxidized, $Hg^{2+}$* | *mg/hr* | *2483* | *1382* | 1469 | 1778 | 26 | 44 | 13 | 28 | 98.94% | 96.83% | 99.14% | 98.30% |
| | | *20%* | *12%* | 14% | 16% | 14% | 19% | 7% | 13% | | | | |
| *Elemental, $Hg^{0}$* | *mg/hr* | *203* | 301 | *222* | 242 | 149 | 169 | *167* | 161 | 26.86% | 43.99% | 24.52% | 31.79% |
| | | *2%* | 3% | *2%* | 2% | 78% | 75% | *88%* | 80% | | | | |
| *Total, Hg* | *mg/hr* | *12154* | *11056* | *10780* | 11330 | 190 | 226 | 191 | 202 | 98.44% | 97.96% | 98.23% | 98.21% |

1- Exclusive of analytical data points determined to be outlying values.

SUMMARY OF MERCURY EMISSIONS AND REMOVAL EFFICIENCIES[1]
LOGAN GENERATING STATION

| Method/Component | Units | SDA Inlet | | | | Outlet Stack | | | | I/O Removal Efficiency | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | avg | 1 | 2 | 3 | avg | 1 | 2 | 3 | avg |
| *Ontario Hydro/ Hg* | | | | | | | | | | | | | |
| *Particle bound* | *ug/dscm* | 12.30 | 12.39 | 11.90 | 12.20 | 0.0178 | 0.0162 | 0.0131 | 0.0157 | | | | |
| | *mg/hr* | 9467 | 9373 | 9090 | 9310 | 14.70 | 13.50 | 10.66 | 12.95 | 99.84% | 99.86% | 99.88% | 99.86% |
| *Oxidized, $Hg^{2+}$* | *ug/dscm* | 4.84 | 3.58 | 1.92 | 3.45 | 0.0319 | 0.0523 | 0.0156 | 0.0333 | | | | |
| | *mg/hr* | 3684 | 2750 | 1469 | 2634 | 26.35 | 43.81 | 12.69 | 27.62 | 99.28% | 98.41% | 99.14% | 98.94% |
| *Elemental, $Hg^{0}$* | *ug/dscm* | 0.96 | 0.40 | 0.67 | 0.67 | 0.1801 | 0.2022 | 0.8015 | 0.3946 | | | | |
| | *mg/hr* | 718 | 301 | 505 | 508 | 148.58 | 168.71 | 646.27 | 321.19 | 79.32% | 43.99% | -28.05% | 31.75% |
| *Total, Hg* | *ug/dscm* | 18.10 | 16.36 | 14.49 | 16.32 | 0.2298 | 0.2707 | 0.8301 | 0.4435 | | | | |
| | *mg/hr* | 13870 | 12424 | 11064 | 12453 | 189.64 | 226.02 | 669.62 | 361.76 | 98.63% | 98.18% | 93.95% | 96.92% |

| Method/Component | Units | Process Samples | | | | Overall Process RE | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | avg | 1 | 2 | 3 | avg |
| *Coal Samples* | | | | | | | | | |
| *Hg* | *ug/g* | 1.90E-01 | 1.80E-01 | 1.70E-01 | 1.80E-01 | ***98.69%*** | ***98.36%*** | ***94.83%*** | ***97.29%*** |
| *Hg rate* | *mg/hr* | 14482 | 13735 | 12955 | 13724 | | | | |
| *Sulfur* | *Wt%* | 1.12 | 1.07 | 1.07 | 1.09 | | | | |
| *Chlorine* | *%* | 0.15 | 0.15 | 0.15 | 0.15 | | | | |
| *HHV* | *Btu/lb* | 13758 | 13767 | 13757 | 13761 | | | | |
| *Lime Slurry* | | | | | | | | | |
| *Hg* | *mg/L* | 0.0002 | 0.0002 | 0.0002 | 0.0002 | | | | |
| *Hg rate* | *mg/hr* | 6 | 7 | 7 | 7 | | | | |
| *Ammonia* | | | | | | | | | |
| *Hg* | *mg/L* | 0.002 | 0.002 | 0.002 | 0.002 | | | | |
| *Hg rate* | *mg/hr* | 1 | 1 | 1 | 1 | | | | |
| *Total Hg Feed Rate* | *mg/hr* | **14489** | **13742** | **12962** | **13731** | | | | |

1-INCLUSIVE OF ALL DATA POINTS

SUMMARY OF MERCURY EMISSION RATES[1]
LOGAN GENERATING STATION

| Method/Component | Units | SDA Inlet | | | | | Outlet Stack | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | avg | | 1 | 2 | 3 | avg |
| *Ontario Hydro/ Hg* | | | | | | | | | | |
| *Particle bound* | *lb/hr* | 2.06E-02 | 2.04E-02 | 1.98E-02 | 2.03E-02 | | 2.89E-05 | 2.78E-05 | 2.49E-05 | 2.72E-05 |
| | *lb/MMBtu* | 9.13E-06 | 9.08E-06 | 8.88E-06 | 9.03E-06 | | 1.46E-08 | 1.31E-08 | 1.05E-08 | 1.27E-08 |
| *Oxidized, $Hg^{2+}$* | *lb/hr* | 8.02E-03 | 5.98E-03 | 3.20E-03 | 5.73E-03 | | 5.73E-05 | 9.53E-05 | 2.76E-05 | 6.01E-05 |
| | *lb/MMBtu* | 3.59E-06 | 2.62E-06 | 1.43E-06 | 2.55E-06 | | 2.61E-08 | 4.25E-08 | 1.25E-08 | 2.71E-08 |
| *Elemental, $Hg^{0}$* | *lb/hr* | 1.56E-03 | 6.55E-04 | 1.10E-03 | 1.11E-03 | | 3.23E-04 | 3.67E-04 | 1.41E-03 | 6.99E-04 |
| | *lb/MMBtu* | 7.07E-07 | 2.90E-07 | 4.98E-07 | 4.98E-07 | | 1.47E-07 | 1.64E-07 | 6.44E-07 | 3.18E-07 |
| *Total, Hg* | *lb/hr* | 3.02E-02 | 2.70E-02 | 2.41E-02 | 2.71E-02 | | 3.80E-04 | 5.09E-04 | 2.50E-03 | 1.13E-03 |
| | *lb/MMBtu* | 1.34E-05 | 1.20E-05 | 1.08E-05 | 1.21E-05 | | 1.88E-07 | 2.19E-07 | 6.67E-07 | 3.58E-07 |

1-INCLUSIVE OF ALL DATA POINTS

DISTRIBUTION OF SPECIATED MERCURY EMISSIONS AND REMOVAL EFFICIENCIES[1]
LOGAN GENERATING STATION

| Method/Component | Units | SDA Inlet | | | | Outlet Stack | | | | I/O Removal Efficiency | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2 | 3 | 4 | avg | 2 | 3 | 4 | avg | 2 | 3 | 4 | avg |
| *Ontario Hydro/ Hg* | | | | | | | | | | | | | |
| *Particle bound* | *mg/hr* | 9467 | 9373 | 9090 | 9310 | 15 | 14 | 11 | 13 | 99.84% | 99.86% | 99.88% | 99.86% |
| | | 68% | 75% | 82% | 75% | 8% | 6% | 2% | 5% | | | | |
| *Oxidized, $Hg^{2+}$* | *mg/hr* | 3684 | 2750 | 1469 | 2634 | 26 | 44 | 13 | 28 | 99.28% | 98.41% | 99.14% | 98.94% |
| | | 27% | 22% | 13% | 21% | 14% | 19% | 2% | 12% | | | | |
| *Elemental, $Hg^{0}$* | *mg/hr* | 718 | 301 | 505 | 508 | 149 | 169 | 646 | 321 | 79.32% | 43.99% | -28.05% | 31.75% |
| | | 5% | 2% | 5% | 4% | 78% | 75% | 97% | 83% | | | | |
| *Total, Hg* | *mg/hr* | 13870 | 12424 | 11064 | 12453 | 190 | 226 | 670 | 362 | 98.63% | 98.18% | 93.95% | 96.92% |

1-INCLUSIVE OF ALL DATA POINTS

## PC BOILER
## A Trains-STACK EXHAUST OHM - Runs 1, 2 AND 3

| Run No. | 1 | 2 | 3 | |
|---|---|---|---|---|
| Date: | 11-Aug-99 | 11-Aug-99 | 12-Aug-99 | |
| Start Time | 09:45 | 16:15 | 08:35 | |
| Stop Time | 14:27 | 19:36 | 13:02 | AVERAGES |
| Net Sampling Time, (minutes) | 144.0 | 144.0 | 144.0 | 144.0 |
| Volume of Gas Collected, (dscf) | 89.154 | 86.074 | 84.450 | 86.559 |
| Dry Mole Fraction | 0.8731 | 0.8726 | 0.8659 | 0.8705 |
| $CO_2$ Concentration, (percent dry) | 14.00 | 14.00 | 14.00 | 14.00 |
| $O_2$ Concentration, (percent dry) | 5.30 | 5.00 | 5.00 | 5.10 |
| CO and $N_2$, (percent dry) | 80.70 | 81.00 | 81.00 | 80.90 |
| Stack Pressure, (inches of mercury) | 29.69 | 29.69 | 29.85 | 29.74 |
| Average Stack Temperature, (°F) | 188 | 189 | 189 | 189 |
| Stack Gas Velocity, (actual feet per minute - afpm) | 4,439 | 4,505 | 4,371 | 4438 |
| Stack Flowrate, (actual cubic feet per minute - acfm) | 683,375 | 693,454 | 672,802 | 683211 |
| Stack Flowrate, (standard cubic feet per minute - scfm) | 552,484 | 559,768 | 546,038 | 552,763 |
| Stack Flowrate, (dry standard cubic feet per minute - dscfm) | 482,357 | 488,437 | 472,811 | 481202 |
| F-Factor | 9,780 | | | |
| **EMISSIONS** | | | | |
| **$Hg^{tp}$** | | | | |
| total, ug | 0.047 | 0.046 | 0.034 | |
| Concentration, ug/dscf | 0.0005 | 0.0005 | 0.0004 | |
| Concentration, ug/dscm | 0.0186 | 0.0189 | 0.0142 | |
| Emission Rate, mg/hr | 15.26 | 15.66 | 11.42 | |
| Emission Rate, lb/hr | 3.32E-05 | 3.41E-05 | 2.49E-05 | |
| Emission Rate, lb/MMBtu | 1.52E-08 | 1.51E-08 | 1.14E-08 | |
| **$Hg^{2+}$ - (KCL)** | | | | |
| total, ug | 0.061 | 0.081 | 0.039 | |
| Concentration, ug/dscf | 0.0007 | 0.0009 | 0.0005 | |
| Concentration, ug/dscm | 0.0242 | 0.0332 | 0.0163 | |
| Emission Rate, mg/hr | 19.80 | 27.58 | 13.10 | |
| Emission Rate, lb/hr | 4.31E-05 | 6.00E-05 | 2.85E-05 | |
| Emission Rate, lb/MMBtu | 1.98E-08 | 2.67E-08 | 1.31E-08 | |
| **$Hg^{0}$** | | | | |
| total, ug ($HNO_3$-$H_2O_2$) | 0.25 | 0.25 | 0.25 | |
| total, ug (KMnO4-H2SO4) | 0.18 | 0.31 | 3.10 | |
| total, ug | 0.43 | 0.56 | 3.35 | |
| Concentration, ug/dscf | 0.0048 | 0.0065 | 0.0397 | |
| Concentration, ug/dscm | 0.1703 | 0.2297 | 1.4007 | |
| Emission Rate, mg/hr | 139.59 | 190.67 | 1125.34 | |
| Emission Rate, lb/hr | 3.04E-04 | 4.15E-04 | 2.45E-03 | |
| Emission Rate, lb/MMBtu | 1.39E-07 | 1.84E-07 | 1.12E-06 | |
| **$Hg^{total}$** | | | | |
| total, ug | 0.538 | 0.687 | 3.423 | |
| Concentration, ug/dscf | 0.0060 | 0.0080 | 0.0405 | |
| Concentration, ug/dscm | 0.2131 | 0.2818 | 1.4312 | |
| Emission Rate, mg/hr | 174.65 | 233.91 | 1149.86 | |
| Emission Rate, lb/hr | 3.80E-04 | 5.09E-04 | 2.50E-03 | |
| Emission Rate, lb/MMBtu | 1.74E-07 | 2.26E-07 | 1.15E-06 | |

## PC BOILER
## B Trains-STACK EXHAUST OHM - Runs 1, 2 AND 3

| Run No. | 1 | 2 | 3 | |
|---|---|---|---|---|
| Date: | 11-Aug-99 | 11-Aug-99 | 12-Aug-99 | |
| Start Time | 09:45 | 16:15 | 08:35 | |
| Stop Time | 14:27 | 19:36 | 13:02 | AVERAGES |
| Net Sampling Time, (minutes) | 144.0 | 144.0 | 144.0 | 144.0 |
| Volume of Gas Collected, (dscf) | 89.097 | 88.992 | 85.562 | 87.883 |
| Dry Mole Fraction | 0.8694 | 0.8748 | 0.8673 | 0.8705 |
| $CO_2$ Concentration, (percent dry) | 13.90 | 13.80 | 14.00 | 13.90 |
| $O_2$ Concentration, (percent dry) | 5.30 | 5.30 | 5.10 | 5.23 |
| CO and $N_2$, (percent dry) | 80.80 | 80.90 | 80.90 | 80.87 |
| Stack Pressure, (inches of mercury) | 29.69 | 29.89 | 29.84 | 29.81 |
| Average Stack Temperature, (°F) | 188 | 188 | 189 | 188 |
| Stack Gas Velocity, (actual feet per minute - afpm) | 4,515 | 4,513 | 4,492 | 4507 |
| Stack Flowrate, (actual cubic feet per minute - acfm) | 694,975 | 694,769 | 691,476 | 693740 |
| Stack Flowrate, (standard cubic feet per minute - scfm) | 561,903 | 565,479 | 561,047 | 562,810 |
| Stack Flowrate, (dry standard cubic feet per minute - dscfm) | 488,510 | 494,687 | 486,585 | 489927 |
| F-Factor | 9,780 | | | |
| EMISSIONS | | | | |
| $Hg^{tp}$ | | | | |
| total, ug | 0.043 | 0.034 | 0.029 | |
| Concentration, ug/dscf | 0.0005 | 0.0004 | 0.0003 | |
| Concentration, ug/dscm | 0.0170 | 0.0135 | 0.0120 | |
| Emission Rate, mg/hr | 14.15 | 11.34 | 9.90 | |
| Emission Rate, lb/hr | 3.08E-05 | 2.47E-05 | 2.15E-05 | |
| Emission Rate, lb/MMBtu | 1.39E-08 | 1.10E-08 | 9.67E-09 | |
| $Hg^{2+}$ - (KCL) | | | | |
| total, ug | 0.100 | 0.180 | 0.036 | |
| Concentration, ug/dscf | 0.0011 | 0.0020 | 0.0004 | |
| Concentration, ug/dscm | 0.0396 | 0.0714 | 0.0149 | |
| Emission Rate, mg/hr | 32.90 | 60.03 | 12.28 | |
| Emission Rate, lb/hr | 7.16E-05 | 1.31E-04 | 2.67E-05 | |
| Emission Rate, lb/MMBtu | 3.24E-08 | 5.84E-08 | 1.20E-08 | |
| $Hg^0$ | | | | |
| total, ug ($HNO_3$-$H_2O_2$) | 0.25 | 0.25 | 0.25 | |
| total, ug (KMnO4-H2SO4) | 0.23 | 0.19 | 0.24 | |
| total, ug | 0.48 | 0.44 | 0.49 | |
| Concentration, ug/dscf | 0.0054 | 0.0049 | 0.0057 | |
| Concentration, ug/dscm | 0.1898 | 0.1746 | 0.2022 | |
| Emission Rate, mg/hr | 157.58 | 146.75 | 167.20 | |
| Emission Rate, lb/hr | 3.43E-04 | 3.19E-04 | 3.64E-04 | |
| Emission Rate, lb/MMBtu | 1.55E-07 | 1.43E-07 | 1.63E-07 | |
| $Hg^{total}$ | | | | |
| total, ug | 0.62 | 0.65 | 0.56 | |
| Concentration, ug/dscf | 0.0070 | 0.0073 | 0.0065 | |
| Concentration, ug/dscm | 0.2465 | 0.2595 | 0.2290 | |
| Emission Rate, mg/hr | 204.62 | 218.13 | 189.38 | |
| Emission Rate, lb/hr | 4.45E-04 | 4.75E-04 | 4.12E-04 | |
| Emission Rate, lb/MMBtu | 2.02E-07 | 2.12E-07 | 1.85E-07 | |

## PC BOILER
## A TRAINS - SDA INLET OHM - Runs 1, 2 AND 3

| Run No. | 1 | 2 | 3 | |
|---|---|---|---|---|
| Date: | 11-Aug-99 | 11-Aug-99 | 12-Aug-99 | |
| Start Time | 09:45 | 16:15 | 08:35 | |
| Stop Time | 14:26 | 19:36 | 13:02 | AVERAGES |
| Net Sampling Time, (minutes) | 144.0 | 144.0 | 144.0 | 144.0 |
| Volume of Gas Collected, (dscf) | 86.103 | 77.479 | 82.587 | 82.056 |
| Dry Mole Fraction | 0.9045 | 0.9064 | 0.8975 | 0.9028 |
| $CO_2$ Concentration, (percent dry) | 15.00 | 15.40 | 15.10 | 15.17 |
| $O_2$ Concentration, (percent dry) | 3.60 | 3.50 | 3.80 | 3.63 |
| CO and $N_2$, (percent dry) | 81.40 | 81.10 | 81.10 | 81.20 |
| Stack Pressure, (inches of mercury) | 28.38 | 28.66 | 28.58 | 28.54 |
| Average Stack Temperature, (°F) | 293 | 299 | 299 | 297 |
| Stack Gas Velocity, (actual feet per minute - afpm) | 3,597 | 3,558 | 3,665 | 3607 |
| Stack Flowrate, (actual cubic feet per minute - acfm) | 728,297 | 720,504 | 742,178 | 730326 |
| Stack Flowrate, (standard cubic feet per minute - scfm) | 484,439 | 480,137 | 493,210 | 485,929 |
| Stack Flowrate, (dry standard cubic feet per minute - dscfm) | 438,199 | 435,217 | 442,665 | 438694 |
| F-Factor | 9,780 | | | |
| **EMISSIONS** | | | | |
| **$Hg^{tp}$** | | | | |
| total, ug | 29.773 | 31.152 | 26.555 | |
| Concentration, ug/dscf | 0.3458 | 0.4021 | 0.3215 | |
| Concentration, ug/dscm | 12.2097 | 14.1972 | 11.3536 | |
| Emission Rate, mg/hr | 9091.35 | 10499.32 | 8540.06 | |
| Emission Rate, lb/hr | 1.98E-02 | 2.28E-02 | 1.86E-02 | |
| Emission Rate, lb/MMBtu | 9.01E-06 | 1.04E-05 | 8.47E-06 | |
| **$Hg^{2+}$ - (KCL)** | | | | |
| total, ug | 16.00 | 4.10 | 3.70 | |
| Concentration, ug/dscf | 0.1858 | 0.0529 | 0.0448 | |
| Concentration, ug/dscm | 6.5615 | 1.8685 | 1.5819 | |
| Emission Rate, mg/hr | 4885.69 | 1381.84 | 1189.92 | |
| Emission Rate, lb/hr | 1.06E-02 | 3.01E-03 | 2.59E-03 | |
| Emission Rate, lb/MMBtu | 4.84E-06 | 1.37E-06 | 1.18E-06 | |
| **$Hg^{0}$** | | | | |
| total, ug ($HNO_3$-$H_2O_2$) | 0.34 | 0.25 | 0.25 | |
| total, ug (KMnO4-H2SO4) | 3.70 | 0.57 | 2.20 | |
| total, ug | 4.04 | 0.82 | 2.45 | |
| Concentration, ug/dscf | 0.0469 | 0.0106 | 0.0297 | |
| Concentration, ug/dscm | 1.6568 | 0.3737 | 1.0475 | |
| Emission Rate, mg/hr | 1233.64 | 276.37 | 787.92 | |
| Emission Rate, lb/hr | 2.68E-03 | 6.01E-04 | 1.71E-03 | |
| Emission Rate, lb/MMBtu | 1.22E-06 | 2.74E-07 | 7.82E-07 | |
| **$Hg^{total}$** | | | | |
| total, ug | 49.813 | 36.072 | 32.705 | |
| Concentration, ug/dscf | 0.5785 | 0.4656 | 0.3960 | |
| Concentration, ug/dscm | 20.4279 | 16.4394 | 13.9830 | |
| Emission Rate, mg/hr | 15210.68 | 12157.54 | 10517.90 | |
| Emission Rate, lb/hr | 3.31E-02 | 2.65E-02 | 2.29E-02 | |
| Emission Rate, lb/MMBtu | 1.51E-05 | 1.21E-05 | 1.04E-05 | |

## PC BOILER
## B TRAINS- SDA INLET OHM - Runs 1, 2 AND 3

| Run No. | 1 | 2 | 3 | |
|---|---|---|---|---|
| Date: | 11-Aug-99 | 11-Aug-99 | 12-Aug-99 | |
| Start Time | 09:53 | 16:19 | 08:40 | |
| Stop Time | 14:34 | 19:40 | 13:05 | AVERAGES |
| Net Sampling Time, (minutes) | 144.0 | 144.0 | 144.0 | 144.0 |
| Volume of Gas Collected, (dscf) | 86.955 | 80.221 | 87.650 | 84.942 |
| Dry Mole Fraction | 0.9043 | 0.9066 | 0.9035 | 0.9048 |
| $CO_2$ Concentration, (percent dry) | 15.00 | 15.50 | 14.90 | 15.13 |
| $O_2$ Concentration, (percent dry) | 3.80 | 3.50 | 3.80 | 3.70 |
| CO and $N_2$, (percent dry) | 81.20 | 81.00 | 81.30 | 81.17 |
| Stack Pressure, (inches of mercury) | 28.38 | 28.66 | 28.58 | 28.54 |
| Average Stack Temperature, (°F) | 294 | 300 | 296 | 297 |
| Stack Gas Velocity, (actual feet per minute - afpm) | 3,842 | 3,756 | 3,734 | 3777 |
| Stack Flowrate, (actual cubic feet per minute - acfm) | 777,955 | 760,596 | 756,103 | 764884 |
| Stack Flowrate, (standard cubic feet per minute - scfm) | 516,778 | 506,192 | 504,458 | 509,143 |
| Stack Flowrate, (dry standard cubic feet per minute - dscfm) | 467,338 | 458,909 | 455,767 | 460671 |
| F-Factor | 9,780 | | | |
| **EMISSIONS** | | | | |
| **$Hg^{tp}$** | | | | |
| total, ug | 30.525 | 24.026 | 30.900 | |
| Concentration, ug/dscf | 0.3510 | 0.2995 | 0.3525 | |
| Concentration, ug/dscm | 12.3954 | 10.5753 | 12.4481 | |
| Emission Rate, mg/hr | 9843.41 | 8246.56 | 9640.53 | |
| Emission Rate, lb/hr | 2.14E-02 | 1.79E-02 | 2.10E-02 | |
| Emission Rate, lb/MMBtu | 9.25E-06 | 7.76E-06 | 9.29E-06 | |
| **$Hg^{2+}$ - (KCL)** | | | | |
| total, ug | 7.70 | 12.00 | 5.60 | |
| Concentration, ug/dscf | 0.0886 | 0.1496 | 0.0639 | |
| Concentration, ug/dscm | 3.1268 | 5.2819 | 2.2560 | |
| Emission Rate, mg/hr | 2483.02 | 4118.82 | 1747.15 | |
| Emission Rate, lb/hr | 5.40E-03 | 8.96E-03 | 3.80E-03 | |
| Emission Rate, lb/MMBtu | 2.33E-06 | 3.87E-06 | 1.68E-06 | |
| **$Hg^{0}$** | | | | |
| total, ug ($HNO_3$-$H_2O_2$) | 0.25 | 0.31 | 0.25 | |
| total, ug (KMnO4-H2SO4) | 0.38 | 0.64 | 0.46 | |
| total, ug | 0.63 | 0.95 | 0.71 | |
| Concentration, ug/dscf | 0.0072 | 0.0118 | 0.0081 | |
| Concentration, ug/dscm | 0.2558 | 0.4182 | 0.2860 | |
| Emission Rate, mg/hr | 203.16 | 326.07 | 221.51 | |
| Emission Rate, lb/hr | 4.42E-04 | 7.09E-04 | 4.82E-04 | |
| Emission Rate, lb/MMBtu | 1.91E-07 | 3.07E-07 | 2.13E-07 | |
| **$Hg^{total}$** | | | | |
| total, ug | 38.855 | 36.976 | 37.210 | |
| Concentration, ug/dscf | 0.4468 | 0.4609 | 0.4245 | |
| Concentration, ug/dscm | 15.7780 | 16.2754 | 14.9901 | |
| Emission Rate, mg/hr | 12529.59 | 12691.45 | 11609.19 | |
| Emission Rate, lb/hr | 2.73E-02 | 2.76E-02 | 2.53E-02 | |
| Emission Rate, lb/MMBtu | 1.18E-05 | 1.19E-05 | 1.12E-05 | |

# *Appendix A.2*

# *Isokinetic Summary*

# PC BOILER
## A Trains-STACK EXHAUST OHM - Runs 1, 2 AND 3

| Run No. | | Cal. Check | 1A | 2A | 3A | |
|---|---|---|---|---|---|---|
| Date: | | | 11-Aug-99 | 11-Aug-99 | 12-Aug-99 | |
| Start Time | | | 9:45 | 16:15 | 8:35 | |
| Stop Time | | | 14:27 | 19:36 | 13:02 | AVERAGES |
| Nozzle Diameter, (inches) | | | 0.192 | 0.192 | 0.192 | 0.192 |
| Barometric Pressure, (inches of mercury) | | | 29.70 | 29.70 | 29.86 | 29.75 |
| Net Sampling Time, (minutes) | | | 144.0 | 144.0 | 144.0 | 144.0 |
| Volume Metered, (cubic feet) | | | 72.840 | 95.731 | 91.475 | 86.682 |
| Average Dry Gas Meter Temperature, (°F) | | #DIV/0! | 99 | 110 | 98 | 102 |
| Average ΔH, (inches of water) | | | 1.63 | 1.59 | 1.51 | 1.58 |
| Average ΔH, (inches of mercury) | | | 0.1199 | 0.1169 | 0.1110 | 0.1159 |
| Dry Gas Meter Calibration Factor (Y) | Meterbox # 90338 | 0.974 | 0.974 | 0.974 | 0.974 | 0.974 |
| Dry Gas Meter ΔH @ | | 1.939 | 1.939 | 1.939 | 1.939 | 1.939 |
| Volume of Gas Collected, (dscf) | | | 89.154 | 86.074 | 84.450 | 86.559 |
| Total Water Collected, (mL) | | | 274.9 | 266.6 | 277.4 | 273.0 |
| Volume of Water Vapor, (scf) | | | 12.962 | 12.570 | 13.079 | 12.870 |
| Moisture, (percent) | | | 12.7 | 12.7 | 13.4 | 12.9 |
| Dry Mole Fraction | | | 0.8731 | 0.8726 | 0.8659 | 0.8705 |
| $CO_2$ Concentration, (percent dry) | | | 14.00 | 14.00 | 14.00 | 14.00 |
| $O_2$ Concentration, (percent dry) | | | 5.30 | 5.00 | 5.00 | 5.10 |
| CO and $N_2$, (percent dry) | | | 80.70 | 81.00 | 81.00 | 80.90 |
| Dry Molecular Weight, (lb/lb mole) | | | 30.45 | 30.44 | 30.44 | 30.44 |
| Wet Molecular Weight, (lb/lb mole) | | | 28.87 | 28.85 | 28.77 | 28.83 |
| Excess Air at Stack, (percent) | | | 33.1 | 30.5 | 30.5 | 31.4 |
| Stack Area, (square inches) | ID(inches) = 168 | | 22167.1 | 22167.1 | 22167.1 | 22167.1 |
| Static Pressure, (inches of water) | | | -0.18 | -0.18 | -0.17 | -0.18 |
| Stack Pressure, (inches of mercury) | | | 29.69 | 29.69 | 29.85 | 29.74 |
| Average Stack Temperature, (°F) | | | 188 | 189 | 189 | 189 |
| Average Sqroot of ΔP | | | 1.1848 | 1.2010 | 1.1667 | 1.1842 |
| SDE Average | | | 30.160 | 30.596 | 29.722 | 30.159 |
| Pitot Coefficient | | | 0.84 | 0.84 | 0.84 | 0.84 |
| Stack Gas Velocity, (actual feet per minute - afpm) | | | 4,439 | 4,505 | 4,371 | 4438 |
| Stack Flowrate, (actual cubic feet per minute - acfm) | | | 683,375 | 693,454 | 672,802 | 683211 |
| Stack Flowrate, (standard cubic feet per minute - scfm) | | | 552,484 | 559,768 | 546,038 | 552,763 |
| Stack Flowrate, (dry standard cubic feet per minute - dscfm) | | | 482,357 | 488,437 | 472,811 | 481202 |
| **Isokinetics, Percent** | | | **98.3** | **93.7** | **95.0** | **96** |

| Calibration Check | | |
|---|---|---|
| Time (min.) | DGM IN | DGM OUT |
| 0 | | |
| 2 | | |
| 4 | | |
| 6 | | |
| 8 | | |
| 10 | | |
| | #DIV/0! | |

| | RUN1 | | | | | | | RUN2 | | | | | | | RUN3 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traverse Point | Delta P | Sqrt Delta P | DGM IN | DGM OUT | Delta H | Sqrt Delta H | Stack Temp °F | Delta P | Sqrt Delta P | DGM IN | DGM OUT | Delta H | Sqrt Delta H | Stack Temp °F | Delta P | Sqrt Delta P | DGM IN | DGM OUT | Delta H | Sqrt Delta H | Stack Temp °F |
| A1 | 1.25 | 1.1180 | 86 | 85 | 1.45 | 1.20 | 188 | 1.65 | 1.2845 | 105 | 105 | 1.82 | 1.35 | 189 | 1.25 | 1.1180 | 88 | 87 | 1.40 | 1.18 | 188 |
| A1 | 1.25 | 1.1180 | 86 | 85 | 1.45 | 1.20 | 188 | 1.6 | 1.2649 | 109 | 107 | 1.75 | 1.32 | 188 | 1.25 | 1.1180 | 89 | 87 | 1.40 | 1.18 | 190 |
| A2 | 1.2 | 1.0954 | 89 | 87 | 1.38 | 1.17 | 188 | 1.6 | 1.2649 | 111 | 108 | 1.75 | 1.32 | 188 | 1.3 | 1.1402 | 91 | 88 | 1.43 | 1.20 | 190 |
| A2 | 1.2 | 1.0954 | 91 | 87 | 1.38 | 1.17 | 188 | 1.6 | 1.2649 | 113 | 109 | 1.75 | 1.32 | 189 | 1.3 | 1.1402 | 93 | 89 | 1.43 | 1.20 | 190 |
| A3 | 1.2 | 1.0954 | 95 | 90 | 1.38 | 1.17 | 188 | 1.6 | 1.2649 | 114 | 110 | 1.75 | 1.32 | 189 | 1.1 | 1.0488 | 96 | 90 | 1.20 | 1.10 | 190 |
| A3 | 1.2 | 1.0954 | 98 | 92 | 1.38 | 1.17 | 188 | 1.6 | 1.2649 | 115 | 111 | 1.75 | 1.32 | 189 | 1.15 | 1.0724 | 98 | 92 | 1.30 | 1.14 | 189 |
| B1 | 1.25 | 1.1180 | 79 | 79 | 1.38 | 1.17 | 187 | 1.65 | 1.2845 | 114 | 112 | 1.80 | 1.34 | 189 | 1.25 | 1.1180 | 95 | 95 | 1.40 | 1.18 | 188 |
| B1 | 1.25 | 1.1180 | 84 | 80 | 1.38 | 1.17 | 188 | 1.6 | 1.2649 | 114 | 113 | 1.75 | 1.32 | 188 | 1.25 | 1.1180 | 99 | 96 | 1.40 | 1.18 | 191 |
| B2 | 1.25 | 1.1180 | 90 | 83 | 1.38 | 1.17 | 188 | 1.65 | 1.2845 | 116 | 113 | 1.80 | 1.34 | 187 | 1.25 | 1.1180 | 102 | 97 | 1.40 | 1.18 | 189 |
| B2 | 1.25 | 1.1180 | 95 | 86 | 1.38 | 1.17 | 188 | 1.65 | 1.2845 | 115 | 114 | 1.80 | 1.34 | 188 | 1.2 | 1.0954 | 104 | 98 | 1.30 | 1.14 | 188 |
| B3 | 1.15 | 1.0724 | 99 | 90 | 1.27 | 1.13 | 188 | 1.55 | 1.2450 | 115 | 114 | 1.70 | 1.30 | 188 | 1.2 | 1.0954 | 105 | 99 | 1.30 | 1.14 | 190 |
| B3 | 1.2 | 1.0954 | 102 | 95 | 1.33 | 1.15 | 188 | 1.55 | 1.2450 | 115 | 111 | 1.70 | 1.30 | 189 | 1.2 | 1.0954 | 105 | 100 | 1.30 | 1.14 | 190 |
| C1 | 1.65 | 1.2845 | 99 | 99 | 1.82 | 1.35 | 189 | 1.4 | 1.1832 | 115 | 111 | 1.55 | 1.24 | 188 | 1.25 | 1.1180 | 100 | 99 | 1.40 | 1.18 | 187 |
| C1 | 1.65 | 1.2845 | 99 | 99 | 1.82 | 1.35 | 188 | 1.4 | 1.1832 | 108 | 107 | 1.55 | 1.24 | 189 | 1.25 | 1.1180 | 101 | 105 | 1.40 | 1.18 | 188 |
| C2 | 1.6 | 1.2649 | 101 | 99 | 1.76 | 1.33 | 187 | 1.4 | 1.1832 | 108 | 106 | 1.55 | 1.24 | 190 | 1.4 | 1.1832 | 102 | 100 | 1.55 | 1.24 | 188 |
| C2 | 1.6 | 1.2649 | 104 | 99 | 1.76 | 1.33 | 188 | 1.4 | 1.1832 | 109 | 105 | 1.55 | 1.24 | 190 | 1.6 | 1.2649 | 104 | 101 | 1.75 | 1.32 | 189 |
| C3 | 1.65 | 1.2845 | 106 | 101 | 1.82 | 1.35 | 188 | 1.15 | 1.0724 | 110 | 107 | 1.25 | 1.12 | 189 | 1.5 | 1.2247 | 106 | 101 | 1.65 | 1.28 | 188 |
| C3 | 1.6 | 1.2649 | 108 | 102 | 1.76 | 1.33 | 189 | 1.15 | 1.0724 | 111 | 108 | 1.25 | 1.12 | 189 | 1.5 | 1.2247 | 107 | 102 | 1.65 | 1.28 | 190 |
| D1 | 1.6 | 1.2649 | 107 | 105 | 1.76 | 1.33 | 187 | 1.3 | 1.1402 | 112 | 109 | 1.45 | 1.20 | 189 | 1.5 | 1.2247 | 96 | 95 | 1.65 | 1.28 | 190 |
| D1 | 1.6 | 1.2649 | 106 | 108 | 1.76 | 1.33 | 189 | 1.3 | 1.1402 | 108 | 107 | 1.45 | 1.20 | 190 | 1.55 | 1.2450 | 100 | 98 | 1.70 | 1.30 | 190 |
| D2 | 1.6 | 1.2649 | 106 | 104 | 1.76 | 1.33 | 191 | 1.25 | 1.1180 | 110 | 107 | 1.40 | 1.18 | 189 | 1.6 | 1.2649 | 108 | 99 | 1.75 | 1.32 | 190 |
| D2 | 1.6 | 1.2649 | 108 | 106 | 1.76 | 1.33 | 190 | 1.25 | 1.1180 | 111 | 108 | 1.40 | 1.18 | 189 | 1.65 | 1.2845 | 105 | 100 | 1.80 | 1.34 | 190 |
| D3 | 1.5 | 1.2247 | 110 | 107 | 1.65 | 1.28 | 190 | 1.2 | 1.0954 | 112 | 108 | 1.30 | 1.14 | 190 | 1.65 | 1.2845 | 108 | 101 | 1.80 | 1.34 | 190 |
| D3 | 1.55 | 1.2450 | 108 | 108 | 1.70 | 1.30 | 189 | 1.25 | 1.1180 | 112 | 108 | 1.40 | 1.18 | 190 | 1.65 | 1.2845 | 109 | 102 | 1.80 | 1.34 | 191 |
| A1 | | | | | | | | | | | | | | | | | | | | | |
| A2 | | | | | | | | | | | | | | | | | | | | | |
| A3 | | | | | | | | | | | | | | | | | | | | | |
| A4 | | | | | | | | | | | | | | | | | | | | | |
| A5 | | | | | | | | | | | | | | | | | | | | | |
| A6 | | | | | | | | | | | | | | | | | | | | | |
| A7 | | | | | | | | | | | | | | | | | | | | | |
| A8 | | | | | | | | | | | | | | | | | | | | | |
| A9 | | | | | | | | | | | | | | | | | | | | | |
| A10 | | | | | | | | | | | | | | | | | | | | | |
| A11 | | | | | | | | | | | | | | | | | | | | | |
| A12 | | | | | | | | | | | | | | | | | | | | | |
| B1 | | | | | | | | | | | | | | | | | | | | | |
| B2 | | | | | | | | | | | | | | | | | | | | | |
| B3 | | | | | | | | | | | | | | | | | | | | | |
| B4 | | | | | | | | | | | | | | | | | | | | | |
| B5 | | | | | | | | | | | | | | | | | | | | | |
| B6 | | | | | | | | | | | | | | | | | | | | | |
| B7 | | | | | | | | | | | | | | | | | | | | | |
| B8 | | | | | | | | | | | | | | | | | | | | | |
| B9 | | | | | | | | | | | | | | | | | | | | | |
| B10 | | | | | | | | | | | | | | | | | | | | | |
| B11 | | | | | | | | | | | | | | | | | | | | | |
| B12 | | | | | | | | | | | | | | | | | | | | | |
| Average | 1.41 | 1.1848 | 99 | | 1.63 | 1.27 | 188 | 1.45 | 1.2010 | 110 | | 1.59 | 1.26 | 189 | 1.37 | 1.1667 | 98 | | 1.51 | 1.23 | 189 |

| Pb | Time | Delta H@ | $T_{avg}$ | Delta H | Pm |
|---|---|---|---|---|---|
| 29.70 | 36 | 1.9640 | 88 | 1.40 | 0.10 |

VMSTD for 90339
22.36572
22.366

# PC BOILER
## B Trains-STACK EXHAUST OHM - Runs 1, 2 AND 3

| Run No. | Cal. Check | 1B | 2B | 3B | |
|---|---|---|---|---|---|
| Date: | | 11-Aug-99 | 11-Aug-99 | 12-Aug-99 | |
| Start Time | | 9:45 | 16:15 | 8:35 | |
| Stop Time | | 14:27 | 19:36 | 13:02 | AVERAGES |
| Nozzle Diameter, (inches) | | 0.192 | 0.192 | 0.192 | 0.192 |
| Barometric Pressure, (inches of mercury) | | 29.70 | 29.90 | 29.85 | 29.82 |
| Net Sampling Time, (minutes) | | 144.0 | 144.0 | 144.0 | 144.0 |
| Volume Metered, (cubic feet) | | 96.133 | 96.745 | 91.536 | 94.805 |
| Average Dry Gas Meter Temperature, (°F) | #DIV/0! | 98 | 106 | 96 | 100 |
| Average ΔH, (inches of water) | | 1.53 | 1.54 | 1.49 | 1.52 |
| Average ΔH, (inches of mercury) | | 0.1125 | 0.1132 | 0.1096 | 0.1118 |
| Dry Gas Meter Calibration Factor (Y) Meterbox # 90342 | 0.983 | 0.983 | 0.983 | 0.983 | 0.983 |
| Dry Gas Meter ΔH @ | 1.973 | 1.973 | 1.973 | 1.973 | 1.973 |
| Volume of Gas Collected, (dscf) | | 89.097 | 88.992 | 85.562 | 87.883 |
| Total Water Collected, (mL) | | 283.9 | 270.1 | 277.7 | 277.2 |
| Volume of Water Vapor, (scf) | | 13.386 | 12.735 | 13.094 | 13.072 |
| Moisture, (percent) | | 13.1 | 12.5 | 13.3 | 13.0 |
| Dry Mole Fraction | | 0.8694 | 0.8748 | 0.8673 | 0.8705 |
| $CO_2$ Concentration, (percent dry) | | 13.90 | 13.80 | 14.00 | 13.90 |
| $O_2$ Concentration, (percent dry) | | 5.30 | 5.30 | 5.10 | 5.23 |
| CO and $N_2$, (percent dry) | | 80.80 | 80.90 | 80.90 | 80.87 |
| Dry Molecular Weight, (lb/lb mole) | | 30.44 | 30.42 | 30.44 | 30.43 |
| Wet Molecular Weight, (lb/lb mole) | | 28.81 | 28.87 | 28.79 | 28.82 |
| Excess Air at Stack, (percent) | | 33.1 | 33.0 | 31.4 | 32.5 |
| Stack Area, (square inches) ID(inches) = 168 | | 22167.1 | 22167.1 | 22167.1 | 22167.1 |
| Static Pressure, (inches of water) | | -0.15 | -0.18 | -0.14 | -0.16 |
| Stack Pressure, (inches of mercury) | | 29.69 | 29.89 | 29.84 | 29.81 |
| Average Stack Temperature, (°F) | | 188 | 188 | 189 | 188 |
| Average Sqroot of ΔP | | 1.1622 | 1.1668 | 1.1580 | 1.1623 |
| SDE Average | | 29.585 | 29.702 | 29.501 | 29.596 |
| Pitot Coefficient | | 0.87 | 0.87 | 0.87 | 0.87 |
| Stack Gas Velocity, (actual feet per minute - afpm) | | 4,515 | 4,513 | 4,492 | 4507 |
| Stack Flowrate, (actual cubic feet per minute - acfm) | | 694,975 | 694,769 | 691,476 | 693740 |
| Stack Flowrate, (standard cubic feet per minute - scfm) | | 561,903 | 565,479 | 561,047 | 562,810 |
| Stack Flowrate, (dry standard cubic feet per minute - dscfm) | | 488,510 | 494,687 | 486,585 | 489927 |
| **Isokinetics, Percent** | | **97.0** | **95.7** | **93.5** | **95** |
| **Meterbox Calibration Verifications** | | | | | |
| Initial Field: $Y_c$ (Must be $0.97Y < Y_c < 1.03Y$) | #DIV/0! | | | | |
| Post Test: $Y_{qa}$ | | 0.99 | 1.00 | 1.03 | 1.00 |
| % Difference (Alternative Meth. 5 post- cal. Must = +/- 5%) | | 1% | 1% | 4% | 2% |

| Calibration Check | | |
|---|---|---|
| Time (min.) | DGM IN | DGM OUT |
| 0 | | |
| 2 | | |
| 4 | | |
| 6 | | |
| 8 | | |
| 10 | | |
| | #DIV/0! | |

| | RUN1 | | | | | | | RUN2 | | | | | | | RUN3 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traverse Point | Delta P | Sqrt Delta P | DGM IN | DGM OUT | Delta H | Sqrt Delta H | Stack Temp °F | Delta P | Sqrt Delta P | DGM IN | DGM OUT | Delta H | Sqrt Delta H | Stack Temp °F | Delta P | Sqrt Delta P | DGM IN | DGM OUT | Delta H | Sqrt Delta H | Stack Temp °F |
| A1 | 1.2 | 1.0954 | 82 | 84 | 1.35 | 1.16 | 187 | 1.2 | 1.0954 | 99 | 98 | 1.35 | 1.16 | 189 | 1.2 | 1.0954 | 87 | 87 | 1.35 | 1.16 | 190 |
| A2 | 1.2 | 1.0954 | 81 | 84 | 1.35 | 1.16 | 187 | 1.2 | 1.0954 | 97 | 98 | 1.35 | 1.16 | 189 | 1.2 | 1.0954 | 88 | 87 | 1.35 | 1.16 | 190 |
| A3 | 1.2 | 1.0954 | 84 | 84 | 1.35 | 1.16 | 187 | 1.2 | 1.0954 | 98 | 98 | 1.35 | 1.16 | 188 | 1.2 | 1.0954 | 89 | 87 | 1.35 | 1.16 | 190 |
| A4 | 1.2 | 1.0954 | 87 | 86 | 1.35 | 1.16 | 188 | 1.2 | 1.0954 | 100 | 98 | 1.35 | 1.16 | 189 | 1.2 | 1.0954 | 91 | 89 | 1.35 | 1.16 | 189 |
| A5 | 1.2 | 1.0954 | 90 | 86 | 1.35 | 1.16 | 188 | 1.2 | 1.0954 | 101 | 99 | 1.35 | 1.16 | 189 | 1.2 | 1.0954 | 93 | 90 | 1.35 | 1.16 | 189 |
| A6 | 1.2 | 1.0954 | 92 | 89 | 1.35 | 1.16 | 188 | 1.2 | 1.0954 | 103 | 100 | 1.35 | 1.16 | 189 | 1.2 | 1.0954 | 94 | 91 | 1.35 | 1.16 | 190 |
| A7 | 1.5 | 1.2247 | 94 | 93 | 1.70 | 1.30 | 188 | 1.6 | 1.2649 | 105 | 101 | 1.80 | 1.34 | 188 | 1.4 | 1.1832 | 96 | 93 | 1.50 | 1.22 | 190 |
| A8 | 1.5 | 1.2247 | 96 | 94 | 1.70 | 1.30 | 188 | 1.5 | 1.2247 | 107 | 105 | 1.70 | 1.30 | 188 | 1.5 | 1.2247 | 96 | 95 | 1.70 | 1.30 | 191 |
| A9 | 1.5 | 1.2247 | 100 | 95 | 1.70 | 1.30 | 187 | 1.6 | 1.2649 | 108 | 106 | 1.80 | 1.34 | 187 | 1.6 | 1.2649 | 98 | 96 | 1.80 | 1.34 | 187 |
| A10 | 1.6 | 1.2649 | 102 | 95 | 1.80 | 1.34 | 188 | 1.6 | 1.2649 | 109 | 106 | 1.80 | 1.34 | 187 | 1.6 | 1.2649 | 101 | 97 | 1.80 | 1.34 | 187 |
| A11 | 1.6 | 1.2649 | 103 | 96 | 1.80 | 1.34 | 188 | 1.5 | 1.2247 | 110 | 107 | 1.70 | 1.30 | 188 | 1.6 | 1.2649 | 102 | 98 | 1.80 | 1.34 | 188 |
| A12 | 1.6 | 1.2649 | 105 | 97 | 1.80 | 1.34 | 187 | 1.5 | 1.2247 | 111 | 108 | 1.70 | 1.30 | 187 | 1.6 | 1.2649 | 105 | 99 | 1.45 | 1.20 | 188 |
| B1 | 1.5 | 1.2247 | 104 | 98 | 1.69 | 1.30 | 187 | 1.5 | 1.2247 | 112 | 109 | 1.70 | 1.30 | 187 | 1.3 | 1.1402 | 99 | 98 | 1.45 | 1.20 | 188 |
| B2 | 1.5 | 1.2247 | 102 | 101 | 1.70 | 1.30 | 188 | 1.5 | 1.2247 | 108 | 109 | 1.70 | 1.30 | 188 | 1.3 | 1.1402 | 98 | 99 | 1.70 | 1.30 | 188 |
| B3 | 1.5 | 1.2247 | 104 | 101 | 1.70 | 1.30 | 188 | 1.5 | 1.2247 | 109 | 108 | 1.70 | 1.30 | 188 | 1.5 | 1.2247 | 100 | 99 | 1.70 | 1.30 | 188 |
| B4 | 1.6 | 1.2649 | 105 | 102 | 1.80 | 1.34 | 187 | 1.5 | 1.2247 | 110 | 108 | 1.70 | 1.30 | 188 | 1.5 | 1.2247 | 101 | 99 | 1.70 | 1.30 | 188 |
| B5 | 1.6 | 1.2649 | 105 | 102 | 1.80 | 1.34 | 188 | 1.6 | 1.2649 | 111 | 108 | 1.80 | 1.34 | 188 | 1.5 | 1.2247 | 102 | 99 | 1.70 | 1.30 | 188 |
| B6 | 1.6 | 1.2649 | 107 | 105 | 1.80 | 1.34 | 188 | 1.5 | 1.2247 | 112 | 110 | 1.70 | 1.30 | 188 | 1.5 | 1.2247 | 105 | 101 | 1.35 | 1.16 | 188 |
| B7 | 1.2 | 1.0954 | 105 | 104 | 1.35 | 1.16 | 188 | 1.2 | 1.0954 | 114 | 111 | 1.35 | 1.16 | 188 | 1.2 | 1.0954 | 95 | 95 | 1.35 | 1.16 | 190 |
| B8 | 1.2 | 1.0954 | 105 | 105 | 1.35 | 1.16 | 188 | 1.2 | 1.0954 | 107 | 108 | 1.35 | 1.16 | 188 | 1.2 | 1.0954 | 96 | 96 | 1.35 | 1.16 | 189 |
| B9 | 1.2 | 1.0954 | 107 | 105 | 1.35 | 1.16 | 190 | 1.2 | 1.0954 | 107 | 107 | 1.35 | 1.16 | 189 | 1.2 | 1.0954 | 99 | 97 | 1.35 | 1.16 | 189 |
| B10 | 1.2 | 1.0954 | 108 | 106 | 1.35 | 1.16 | 190 | 1.2 | 1.0954 | 109 | 107 | 1.35 | 1.16 | 190 | 1.2 | 1.0954 | 101 | 98 | 1.35 | 1.16 | 189 |
| B11 | 1 | 1.0000 | 110 | 107 | 1.12 | 1.06 | 190 | 1.2 | 1.0954 | 110 | 108 | 1.35 | 1.16 | 189 | 1.2 | 1.0954 | 102 | 100 | 1.35 | 1.16 | 190 |
| B12 | 1 | 1.0000 | 106 | 107 | 1.12 | 1.06 | 189 | 1.2 | 1.0954 | 110 | 108 | 1.35 | 1.16 | 189 | 1.2 | 1.0954 | 104 | 101 | 1.35 | 1.16 | 190 |
| A1 | | | | | | | | | | | | | | | | | | | | | |
| A2 | | | | | | | | | | | | | | | | | | | | | |
| A3 | | | | | | | | | | | | | | | | | | | | | |
| A4 | | | | | | | | | | | | | | | | | | | | | |
| A5 | | | | | | | | | | | | | | | | | | | | | |
| A6 | | | | | | | | | | | | | | | | | | | | | |
| A7 | | | | | | | | | | | | | | | | | | | | | |
| A8 | | | | | | | | | | | | | | | | | | | | | |
| A9 | | | | | | | | | | | | | | | | | | | | | |
| A10 | | | | | | | | | | | | | | | | | | | | | |
| A11 | | | | | | | | | | | | | | | | | | | | | |
| A12 | | | | | | | | | | | | | | | | | | | | | |
| B1 | | | | | | | | | | | | | | | | | | | | | |
| B2 | | | | | | | | | | | | | | | | | | | | | |
| B3 | | | | | | | | | | | | | | | | | | | | | |
| B4 | | | | | | | | | | | | | | | | | | | | | |
| B5 | | | | | | | | | | | | | | | | | | | | | |
| B6 | | | | | | | | | | | | | | | | | | | | | |
| B7 | | | | | | | | | | | | | | | | | | | | | |
| B8 | | | | | | | | | | | | | | | | | | | | | |
| B9 | | | | | | | | | | | | | | | | | | | | | |
| B10 | | | | | | | | | | | | | | | | | | | | | |
| B11 | | | | | | | | | | | | | | | | | | | | | |
| B12 | | | | | | | | | | | | | | | | | | | | | |
| Average | 1.36 | 1.1622 | 98 | | 1.53 | 1.23 | 188 | 1.37 | 1.1668 | 106 | | 1.54 | 1.24 | 188 | 1.35 | 1.1580 | 96 | | 1.49 | 1.22 | 189 |

# PC BOILER
## A TRAINS - SDA INLET OHM - Runs 1, 2 AND 3

| Run No. | Cal. Check | 1 | 2 | 3 | |
|---|---|---|---|---|---|
| Date: | | 11-Aug-99 | 11-Aug-99 | 12-Aug-99 | |
| Start Time | | 9:45 | 16:15 | 8:35 | |
| Stop Time | | 14:26 | 19:36 | 13:02 | AVERAGES |
| Nozzle Diameter, (inches) | | 0.232 | 0.219 | 0.219 | 0.223 |
| Barometric Pressure, (inches of mercury) | | 29.80 | 30.00 | 29.96 | 29.92 |
| Net Sampling Time, (minutes) | | 144.0 | 144.0 | 144.0 | 144.0 |
| Volume Metered, (cubic feet) | | 91.723 | 82.943 | 86.913 | 87.193 |
| Average Dry Gas Meter Temperature, (°F) | #DIV/0! | 95 | 101 | 91 | 96 |
| Average ΔH, (inches of water) | | 1.52 | 1.18 | 1.36 | 1.35 |
| Average ΔH, (inches of mercury) | | 0.1118 | 0.0868 | 0.1000 | 0.0995 |
| Dry Gas Meter Calibration Factor (Y) Meterbox # 90336 | 0.987 | 0.987 | 0.987 | 0.987 | 0.987 |
| Dry Gas Meter ΔH @ | 1.981 | 1.981 | 1.981 | 1.981 | 1.981 |
| Volume of Gas Collected, (dscf) | | 86.103 | 77.479 | 82.587 | 82.056 |
| Total Water Collected, (mL) | | 192.7 | 169.6 | 200.0 | 187.4 |
| Volume of Water Vapor, (scf) | | 9.086 | 7.997 | 9.430 | 8.837 |
| Moisture, (percent) | | 9.5 | 9.4 | 10.2 | 9.7 |
| Dry Mole Fraction | | 0.9045 | 0.9064 | 0.8975 | 0.9028 |
| $CO_2$ Concentration, (percent dry) | | 15.00 | 15.40 | 15.10 | 15.17 |
| $O_2$ Concentration, (percent dry) | | 3.60 | 3.50 | 3.80 | 3.63 |
| CO and $N_2$, (percent dry) | | 81.40 | 81.10 | 81.10 | 81.20 |
| Dry Molecular Weight, (lb/lb mole) | | 30.54 | 30.60 | 30.57 | 30.57 |
| Wet Molecular Weight, (lb/lb mole) | | 29.35 | 29.42 | 29.28 | 29.35 |
| Excess Air at Stack, (percent) | | 20.1 | 19.5 | 21.6 | 20.4 |
| Stack Area, (square inches) ID(inches) = 360 X 8 | | 29160.0 | 29160.0 | 29160.0 | 29160.0 |
| Static Pressure, (inches of water) | | -19.28 | -18.20 | -18.74 | -18.74 |
| Stack Pressure, (inches of mercury) | | 28.38 | 28.66 | 28.58 | 28.54 |
| Average Stack Temperature, (°F) | | 293 | 299 | 299 | 297 |
| Average Sqroot of ΔP | | 0.8379 | 0.8308 | 0.8525 | 0.8404 |
| SDE Average | | 22.993 | 22.889 | 23.486 | 23.123 |
| Pitot Coefficient | | 0.88 | 0.88 | 0.88 | 0.88 |
| Stack Gas Velocity, (actual feet per minute - afpm) | | 3,597 | 3,558 | 3,665 | 3607 |
| Stack Flowrate, (actual cubic feet per minute - acfm) | | 728,297 | 720,504 | 742,178 | 730326 |
| Stack Flowrate, (standard cubic feet per minute - scfm) | | 484,439 | 480,137 | 493,210 | 485,929 |
| Stack Flowrate, (dry standard cubic feet per minute - dscfm) | | 438,199 | 435,217 | 442,665 | 438694 |
| **Isokinetics, Percent** | | **94.5** | **95.7** | **100.3** | **97** |
| **Meterbox Calibration Verifications** | | | | | |
| Initial Field: $Y_c$ (Must be $0.97Y < Y_c < 1.03Y$) | #DIV/0! | | | | |
| Post Test: $Y_{qa}$ | | 1.02 | 1.00 | 1.01 | 1.01 |
| % Difference (Alternative Meth. 5 post- cal. Must = +/- 5%) | | 3% | 1% | 2% | 2% |

| Calibration Check | | |
|---|---|---|
| Time (min.) | DGM IN | DGM OUT |
| 0 | | |
| 2 | | |
| 4 | | |
| 6 | | |
| 8 | | |
| 10 | | |
| | #DIV/0! | |

| | RUN1 | | | | | | | RUN2 | | | | | | | RUN3 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traverse Point | Delta P | Sqrt Delta P | DGM IN | DGM OUT | Delta H | Sqrt Delta H | Stack Temp °F | Delta P | Sqrt Delta P | DGM IN | DGM OUT | Delta H | Sqrt Delta H | Stack Temp °F | Delta P | Sqrt Delta P | DGM IN | DGM OUT | Delta H | Sqrt Delta H | Stack Temp °F |
| A1 | 0.67 | 0.8185 | 84 | 83 | 1.30 | 1.14 | 310 | 0.79 | 0.8888 | 98 | 96 | 1.40 | 1.18 | 272 | 0.71 | 0.8426 | 78 | 76 | 1.30 | 1.14 | 317 |
| A2 | 0.75 | 0.8660 | 87 | 83 | 1.50 | 1.22 | 316 | 0.76 | 0.8718 | 98 | 96 | 1.55 | 1.16 | 277 | 0.75 | 0.8660 | 79 | 76 | 1.55 | 1.16 | 319 |
| A3 | 0.78 | 0.8832 | 90 | 84 | 1.50 | 1.22 | 318 | 0.77 | 0.8775 | 98 | 96 | 1.50 | 1.14 | 279 | 0.86 | 0.9274 | 80 | 77 | 1.50 | 1.22 | 325 |
| A4 | 0.87 | 0.9327 | 92 | 84 | 1.70 | 1.30 | 324 | 0.76 | 0.8718 | 99 | 97 | 1.50 | 1.14 | 280 | 0.88 | 0.9381 | 82 | 77 | 1.55 | 1.24 | 328 |
| A5 | 0.86 | 0.9274 | 95 | 86 | 1.70 | 1.30 | 326 | 0.81 | 0.9000 | 101 | 98 | 1.40 | 1.18 | 280 | 0.9 | 0.9487 | 84 | 79 | 1.60 | 1.26 | 333 |
| A6 | 0.89 | 0.9434 | 94 | 87 | 1.70 | 1.30 | 322 | 0.8 | 0.8944 | 102 | 98 | 1.40 | 1.18 | 279 | 0.9 | 0.9487 | 87 | 81 | 1.60 | 1.26 | 333 |
| 1.00 | 0.41 | 0.6405 | 90 | 89 | 0.82 | 0.91 | 288 | 0.41 | 0.6405 | 104 | 101 | 0.71 | 0.84 | 270 | 0.46 | 0.6782 | 88 | 86 | 0.84 | 0.92 | 301 |
| 2.00 | 0.38 | 0.6164 | 92 | 89 | 0.76 | 0.87 | 301 | 0.43 | 0.6557 | 102 | 101 | 0.74 | 0.86 | 277 | 0.46 | 0.6782 | 89 | 86 | 0.84 | 0.92 | 303 |
| 3.00 | 0.63 | 0.7937 | 93 | 90 | 1.25 | 1.12 | 302 | 0.51 | 0.7141 | 102 | 101 | 0.87 | 0.93 | 283 | 0.62 | 0.7874 | 90 | 86 | 1.10 | 1.05 | 305 |
| 4.00 | 1 | 1.0000 | 96 | 91 | 2.00 | 1.41 | 310 | 0.62 | 0.7874 | 102 | 101 | 1.05 | 1.02 | 288 | 0.81 | 0.9000 | 92 | 86 | 1.45 | 1.20 | 311 |
| 5.00 | 0.87 | 0.9327 | 99 | 93 | 1.70 | 1.30 | 313 | 0.64 | 0.8000 | 103 | 101 | 1.10 | 1.05 | 290 | 1.05 | 1.0247 | 93 | 87 | 1.90 | 1.38 | 316 |
| 6.00 | 0.72 | 0.8485 | 102 | 95 | 1.30 | 1.14 | 305 | 0.74 | 0.8602 | 105 | 102 | 1.25 | 1.12 | 294 | 1.05 | 1.0247 | 93 | 88 | 1.90 | 1.38 | 316 |
| 1.00 | 0.36 | 0.6000 | 96 | 95 | 0.85 | 0.92 | 266 | 0.37 | 0.6083 | 101 | 101 | 0.62 | 0.79 | 302 | 0.38 | 0.6164 | 93 | 90 | 0.72 | 0.85 | 273 |
| 2.00 | 0.37 | 0.6083 | 98 | 94 | 0.85 | 0.92 | 269 | 0.42 | 0.6481 | 101 | 101 | 0.69 | 0.83 | 308 | 0.4 | 0.6325 | 95 | 92 | 0.73 | 0.85 | 275 |
| 3.00 | 0.53 | 0.7280 | 100 | 95 | 1.20 | 1.10 | 278 | 0.59 | 0.7681 | 102 | 101 | 0.97 | 0.98 | 308 | 0.49 | 0.7000 | 96 | 92 | 0.92 | 0.96 | 279 |
| 4.00 | 0.65 | 0.8062 | 101 | 96 | 1.50 | 1.22 | 286 | 0.84 | 0.9165 | 102 | 101 | 1.40 | 1.18 | 311 | 0.59 | 0.7681 | 98 | 93 | 1.10 | 1.05 | 284 |
| 5.00 | 0.8 | 0.8944 | 103 | 98 | 1.80 | 1.34 | 293 | 0.89 | 0.9434 | 103 | 101 | 1.45 | 1.20 | 314 | 0.7 | 0.8367 | 101 | 95 | 1.30 | 1.14 | 288 |
| 6.00 | 0.78 | 0.8832 | 105 | 99 | 1.75 | 1.32 | 294 | 0.93 | 0.9644 | 104 | 101 | 1.55 | 1.24 | 316 | 0.74 | 0.8602 | 105 | 98 | 1.40 | 1.18 | 290 |
| 1.00 | 0.75 | 0.8660 | 101 | 101 | 1.75 | 1.32 | 269 | 0.66 | 0.8124 | 101 | 101 | 1.10 | 1.05 | 316 | 0.81 | 0.9000 | 102 | 95 | 1.55 | 1.24 | 273 |
| 2.00 | 0.79 | 0.8888 | 102 | 100 | 1.85 | 1.36 | 273 | 0.74 | 0.8602 | 102 | 101 | 1.20 | 1.10 | 321 | 0.81 | 0.9000 | 101 | 95 | 1.55 | 1.24 | 276 |
| 3.00 | 0.76 | 0.8718 | 102 | 100 | 1.80 | 1.34 | 275 | 0.8 | 0.8944 | 103 | 101 | 1.30 | 1.14 | 324 | 0.83 | 0.9110 | 102 | 96 | 1.55 | 1.24 | 282 |
| 4.00 | 0.74 | 0.8602 | 102 | 99 | 1.80 | 1.34 | 278 | 0.84 | 0.9165 | 104 | 101 | 1.35 | 1.16 | 330 | 0.81 | 0.9000 | 99 | 95 | 1.55 | 1.24 | 283 |
| 5.00 | 0.83 | 0.9110 | 102 | 100 | 1.70 | 1.30 | 275 | 0.84 | 0.9165 | 105 | 101 | 1.35 | 1.16 | 333 | 0.86 | 0.9274 | 101 | 96 | 1.60 | 1.26 | 279 |
| 6.00 | 0.78 | 0.8832 | 99 | 99 | 1.80 | 1.34 | 260 | 0.86 | 0.9274 | 107 | 101 | 1.35 | 1.16 | 332 | 0.89 | 0.9434 | 104 | 98 | 1.65 | 1.28 | 278 |
| A1 | 0.89 | 0.9434 | 100 | 99 | 2.10 | 1.45 | 266 | | | | | | | | | | | | | | |
| A2 | | | | | | | | | | | | | | | | | | | | | |
| A3 | | | | | | | | | | | | | | | | | | | | | |
| A4 | | | | | | | | | | | | | | | | | | | | | |
| A5 | | | | | | | | | | | | | | | | | | | | | |
| A6 | | | | | | | | | | | | | | | | | | | | | |
| A7 | | | | | | | | | | | | | | | | | | | | | |
| A8 | | | | | | | | | | | | | | | | | | | | | |
| A9 | | | | | | | | | | | | | | | | | | | | | |
| A10 | | | | | | | | | | | | | | | | | | | | | |
| A11 | | | | | | | | | | | | | | | | | | | | | |
| A12 | | | | | | | | | | | | | | | | | | | | | |
| B1 | | | | | | | | | | | | | | | | | | | | | |
| B2 | | | | | | | | | | | | | | | | | | | | | |
| B3 | | | | | | | | | | | | | | | | | | | | | |
| B4 | | | | | | | | | | | | | | | | | | | | | |
| B5 | | | | | | | | | | | | | | | | | | | | | |
| B6 | | | | | | | | | | | | | | | | | | | | | |
| B7 | | | | | | | | | | | | | | | | | | | | | |
| B8 | | | | | | | | | | | | | | | | | | | | | |
| B9 | | | | | | | | | | | | | | | | | | | | | |
| B10 | | | | | | | | | | | | | | | | | | | | | |
| B11 | | | | | | | | | | | | | | | | | | | | | |
| B12 | | | | | | | | | | | | | | | | | | | | | |
| Average | 0.71 | 0.8379 | 95 | | 1.52 | 1.22 | 293 | 0.70 | 0.8308 | 101 | | 1.18 | 1.08 | 299 | 0.74 | 0.8525 | 91 | | 1.36 | 1.15 | 299 |

# PC BOILER
## B TRAINS- SDA INLET OHM - Runs 1, 2 AND 3

| Run No. | Cal. Check | 1B | 2B | 3B | |
|---|---|---|---|---|---|
| Date: | | 11-Aug-99 | 11-Aug-99 | 12-Aug-99 | |
| Start Time | | 9:53 | 16:19 | 8:40 | |
| Stop Time | | 14:34 | 19:40 | 13:05 | AVERAGES |
| Nozzle Diameter, (inches) | | 0.227 | 0.222 | 0.222 | 0.224 |
| Barometric Pressure, (inches of mercury) | | 29.80 | 30.00 | 29.96 | 29.92 |
| Net Sampling Time, (minutes) | | 144.0 | 144.0 | 144.0 | 144.0 |
| Volume Metered, (cubic feet) | | 93.381 | 89.460 | 93.297 | 92.046 |
| Average Dry Gas Meter Temperature, (°F) | #DIV/0! | 96 | 121 | 94 | 104 |
| Average ΔH, (inches of water) | | 1.45 | 1.29 | 1.42 | 1.39 |
| Average ΔH, (inches of mercury) | | 0.1066 | 0.0949 | 0.1044 | 0.1020 |
| Dry Gas Meter Calibration Factor (Y) Meterbox # 90343 | 0.981 | 0.981 | 0.981 | 0.981 | 0.981 |
| Dry Gas Meter ΔH @ | 1.885 | 1.885 | 1.885 | 1.885 | 1.885 |
| Volume of Gas Collected, (dscf) | | 86.955 | 80.221 | 87.650 | 84.942 |
| Total Water Collected, (mL) | | 195.1 | 175.3 | 198.6 | 189.7 |
| Volume of Water Vapor, (scf) | | 9.199 | 8.265 | 9.364 | 8.943 |
| Moisture, (percent) | | 9.6 | 9.3 | 9.7 | 9.5 |
| Dry Mole Fraction | | 0.9043 | 0.9066 | 0.9035 | 0.9048 |
| $CO_2$ Concentration, (percent dry) | | 15.00 | 15.50 | 14.90 | 15.13 |
| $O_2$ Concentration, (percent dry) | | 3.80 | 3.50 | 3.80 | 3.70 |
| CO and $N_2$, (percent dry) | | 81.20 | 81.00 | 81.30 | 81.17 |
| Dry Molecular Weight, (lb/lb mole) | | 30.55 | 30.62 | 30.54 | 30.57 |
| Wet Molecular Weight, (lb/lb mole) | | 29.35 | 29.44 | 29.33 | 29.37 |
| Excess Air at Stack, (percent) | | 21.5 | 19.6 | 21.5 | 20.9 |
| Stack Area, (square inches) ID(inches) = 360 X 81 | | 29160.0 | 29160.0 | 29160.0 | 29160.0 |
| Static Pressure, (inches of water) | | -19.28 | -18.20 | -18.74 | -18.74 |
| Stack Pressure, (inches of mercury) | | 28.38 | 28.66 | 28.58 | 28.54 |
| Average Stack Temperature, (°F) | | 294 | 300 | 296 | 297 |
| Average Sqroot of ΔP | | 0.8945 | 0.8767 | 0.8709 | 0.8807 |
| SDE Average | | 24.562 | 24.169 | 23.946 | 24.226 |
| Pitot Coefficient | | 0.88 | 0.88 | 0.88 | 0.88 |
| Stack Gas Velocity, (actual feet per minute - afpm) | | 3,842 | 3,756 | 3,734 | 3777 |
| Stack Flowrate, (actual cubic feet per minute - acfm) | | 777,955 | 760,596 | 756,103 | 764884 |
| Stack Flowrate, (standard cubic feet per minute - scfm) | | 516,778 | 506,192 | 504,458 | 509,143 |
| Stack Flowrate, (dry standard cubic feet per minute - dscfm) | | 467,338 | 458,909 | 455,767 | 460671 |
| **Isokinetics, Percent** | | **93.5** | **91.5** | **100.6** | **95** |
| **Meterbox Calibration Verifications** | | | | | |
| Initial Field: $Y_c$ (Must be $0.97Y < Y_c < 1.03Y$) | #DIV/0! | | | | |
| Post Test: $Y_{qa}$ | | 1.01 | 1.01 | 0.99 | 1.00 |
| % Difference (Alternative Meth. 5 post- cal. Must = +/- 5%) | | 3% | 3% | 1% | 2% |

| Calibration Check | | |
|---|---|---|
| Time (min.) | DGM IN | DGM OUT |
| 0 | | |
| 2 | | |
| 4 | | |
| 6 | | |
| 8 | | |
| 10 | | |
| | #DIV/0! | |

| | RUN1 | | | | | | | RUN2 | | | | | | | RUN3 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traverse Point | Delta P | Sqrt Delta P | DGM IN | DGM OUT | Delta H | Sqrt Delta H | Stack Temp °F | Delta P | Sqrt Delta P | DGM IN | DGM OUT | Delta H | Sqrt Delta H | Stack Temp °F | Delta P | Sqrt Delta P | DGM IN | DGM OUT | Delta H | Sqrt Delta H | Stack Temp °F |
| A1 | 0.92 | 0.9592 | 83 | 85 | 1.70 | 1.30 | 264 | 0.8 | 0.8944 | 96 | 96 | 1.50 | 1.14 | 319 | 0.82 | 0.9055 | 80 | 78 | 1.56 | 1.25 | 270 |
| A2 | 0.92 | 0.9592 | 84 | 83 | 1.70 | 1.30 | 264 | 0.81 | 0.9000 | 97 | 96 | 1.30 | 1.14 | 322 | 0.84 | 0.9165 | 82 | 78 | 1.60 | 1.26 | 269 |
| A3 | 0.85 | 0.9220 | 87 | 84 | 1.60 | 1.26 | 264 | 0.93 | 0.9644 | 99 | 96 | 1.50 | 1.22 | 328 | 0.84 | 0.9165 | 85 | 79 | 1.60 | 1.26 | 272 |
| A4 | 0.8 | 0.8944 | 90 | 85 | 1.50 | 1.22 | 272 | 0.94 | 0.9695 | 100 | 97 | 1.50 | 1.22 | 333 | 0.87 | 0.9327 | 87 | 81 | 1.65 | 1.28 | 277 |
| A5 | 0.87 | 0.9327 | 91 | 86 | 1.65 | 1.28 | 269 | 0.93 | 0.9644 | 1020 | 98 | 1.50 | 1.22 | 335 | 0.87 | 0.9327 | 90 | 83 | 1.65 | 1.28 | 275 |
| A6 | 0.86 | 0.9274 | 93 | 87 | 1.60 | 1.26 | 267 | 0.97 | 0.9849 | 104 | 99 | 1.55 | 1.24 | 335 | 0.9 | 0.9487 | 92 | 84 | 1.71 | 1.31 | 276 |
| A7 | 0.46 | 0.6782 | 89 | 89 | 0.88 | 0.94 | 265 | 0.49 | 0.7000 | 100 | 100 | 0.80 | 0.89 | 305 | 0.47 | 0.6856 | 91 | 88 | 0.89 | 0.94 | 275 |
| A8 | 0.61 | 0.7810 | 91 | 89 | 1.20 | 1.10 | 271 | 0.5 | 0.7071 | 100 | 100 | 0.81 | 0.90 | 306 | 0.47 | 0.6856 | 92 | 89 | 0.89 | 0.94 | 271 |
| A9 | 0.7 | 0.8367 | 95 | 90 | 1.30 | 1.14 | 275 | 0.67 | 0.8185 | 101 | 100 | 1.10 | 1.05 | 306 | 0.59 | 0.7681 | 92 | 89 | 1.10 | 1.05 | 277 |
| A10 | 0.75 | 0.8544 | 99 | 92 | 1.35 | 1.16 | 282 | 0.87 | 0.9327 | 102 | 100 | 1.45 | 1.20 | 309 | 0.7 | 0.8367 | 94 | 90 | 1.30 | 1.14 | 282 |
| A11 | 0.86 | 0.9274 | 102 | 95 | 1.60 | 1.26 | 290 | 0.91 | 0.9539 | 104 | 101 | 1.45 | 1.20 | 310 | 0.7 | 0.8367 | 96 | 91 | 1.30 | 1.14 | 287 |
| A12 | 0.86 | 0.9274 | 104 | 94 | 1.60 | 1.26 | 292 | 1 | 1.0000 | 105 | 101 | 1.65 | 1.28 | 316 | 0.82 | 0.9055 | 97 | 92 | 1.55 | 1.24 | 291 |
| B1 | 0.52 | 0.7211 | 101 | 96 | 0.96 | 0.98 | 294 | 0.5 | 0.7071 | 102 | 101 | 0.86 | 0.93 | 275 | 0.46 | 0.6782 | 98 | 95 | 0.85 | 0.92 | 297 |
| B2 | 0.52 | 0.7211 | 102 | 96 | 0.96 | 0.98 | 305 | 0.53 | 0.7280 | 103 | 102 | 0.92 | 0.96 | 276 | 0.46 | 0.6782 | 100 | 95 | 0.85 | 0.92 | 301 |
| B3 | 0.66 | 0.8124 | 104 | 98 | 1.20 | 1.10 | 305 | 0.6 | 0.7746 | 104 | 102 | 1.05 | 1.02 | 282 | 0.58 | 0.7616 | 104 | 96 | 1.10 | 1.05 | 302 |
| B4 | 0.97 | 0.9849 | 105 | 99 | 1.75 | 1.32 | 307 | 0.65 | 0.8062 | 104 | 102 | 1.10 | 1.05 | 286 | 0.8 | 0.8944 | 106 | 98 | 1.45 | 1.20 | 304 |
| B5 | 0.96 | 0.9798 | 109 | 101 | 1.70 | 1.30 | 311 | 0.76 | 0.8718 | 105 | 102 | 1.30 | 1.14 | 291 | 0.82 | 0.9055 | 108 | 100 | 1.50 | 1.22 | 305 |
| B6 | 1.2 | 1.0954 | 111 | 102 | 2.10 | 1.45 | 316 | 0.8 | 0.8944 | 107 | 103 | 1.35 | 1.16 | 294 | 0.95 | 0.9747 | 109 | 102 | 1.75 | 1.32 | 305 |
| B7 | 0.78 | 0.8832 | 103 | 103 | 1.30 | 1.14 | 308 | 0.8 | 0.8944 | 102 | 102 | 1.35 | 1.16 | 278 | 0.75 | 0.8660 | 99 | 99 | 1.40 | 1.18 | 318 |
| B8 | 0.81 | 0.9000 | 105 | 103 | 1.30 | 1.14 | 318 | 0.9 | 0.9487 | 105 | 103 | 1.55 | 1.24 | 275 | 0.85 | 0.9220 | 103 | 98 | 1.50 | 1.22 | 323 |
| B9 | 0.93 | 0.9644 | 106 | 102 | 1.50 | 1.22 | 324 | 0.84 | 0.9165 | 106 | 102 | 1.45 | 1.20 | 278 | 0.94 | 0.9695 | 102 | 99 | 1.65 | 1.28 | 328 |
| B10 | 1 | 1.0000 | 107 | 102 | 1.60 | 1.26 | 328 | 0.76 | 0.8718 | 107 | 102 | 1.30 | 1.14 | 279 | 0.96 | 0.9798 | 102 | 99 | 1.70 | 1.30 | 333 |
| B11 | 0.85 | 0.9220 | 101 | 101 | 1.35 | 1.16 | 329 | 0.84 | 0.9165 | 108 | 102 | 1.45 | 1.20 | 278 | 1 | 1.0000 | 104 | 99 | 1.75 | 1.32 | 335 |
| B12 | 0.78 | 0.8832 | 101 | 101 | 1.30 | 1.14 | 330 | 0.85 | 0.9220 | 108 | 103 | 1.45 | 1.20 | 276 | 1 | 1.0000 | 105 | 101 | 1.75 | 1.32 | 336 |
| A1 | | | | | | | | | | | | | | | | | | | | | |
| A2 | | | | | | | | | | | | | | | | | | | | | |
| A3 | | | | | | | | | | | | | | | | | | | | | |
| A4 | | | | | | | | | | | | | | | | | | | | | |
| A5 | | | | | | | | | | | | | | | | | | | | | |
| A6 | | | | | | | | | | | | | | | | | | | | | |
| A7 | | | | | | | | | | | | | | | | | | | | | |
| A8 | | | | | | | | | | | | | | | | | | | | | |
| A9 | | | | | | | | | | | | | | | | | | | | | |
| A10 | | | | | | | | | | | | | | | | | | | | | |
| A11 | | | | | | | | | | | | | | | | | | | | | |
| A12 | | | | | | | | | | | | | | | | | | | | | |
| B1 | | | | | | | | | | | | | | | | | | | | | |
| B2 | | | | | | | | | | | | | | | | | | | | | |
| B3 | | | | | | | | | | | | | | | | | | | | | |
| B4 | | | | | | | | | | | | | | | | | | | | | |
| B5 | | | | | | | | | | | | | | | | | | | | | |
| B6 | | | | | | | | | | | | | | | | | | | | | |
| B7 | | | | | | | | | | | | | | | | | | | | | |
| B8 | | | | | | | | | | | | | | | | | | | | | |
| B9 | | | | | | | | | | | | | | | | | | | | | |
| B10 | | | | | | | | | | | | | | | | | | | | | |
| B11 | | | | | | | | | | | | | | | | | | | | | |
| B12 | | | | | | | | | | | | | | | | | | | | | |
| Average | 0.81 | 0.8945 | 96 | | 1.45 | 1.20 | 294 | 0.78 | 0.8767 | 121 | | 1.29 | 1.13 | 300 | 0.77 | 0.8709 | 94 | | 1.42 | 1.18 | 296 |

# *Appendix A.3*

# *Process Mercury Inflow Calculations*

| Process Stream | Run No. | TPH | g/hr | hg ug/g | ug/hr | mg/hr |
|---|---|---|---|---|---|---|
| Coal | 1 | 84.02 | 7.6222E+07 | 1.90E-01 | 1.4482E+07 | 14482 |
| | 2 | 84.11 | 7.6303E+07 | 1.80E-01 | 1.3735E+07 | 13735 |
| | 3 | 84 | 7.6204E+07 | 1.70E-01 | 1.2955E+07 | 12955 |
| | | GPM | L/hr | mg/L | | mg/hr |
| Slurry | 1 | 142.61 | 32390.26 | 0.0002 | | 6 |
| | 2 | 148.55 | 33739.38 | 0.0002 | | 7 |
| | 3 | 148.81 | 33798.43 | 0.0002 | | 7 |
| | | GPH | L/hr | mg/L | | mg/hr |
| Ammonia | 1 | 76.59 | 289.92 | 0.002 | | 1 |
| | 2 | 80.26 | 303.82 | 0.002 | | 1 |
| | 3 | 76.42 | 289.28 | 0.002 | | 1 |

| Run # | Fuel Flow TPH | Heat Value Btu/lb | Heat Input Btu/Hr | F-Factor | O2 % | flow dscfm |
|---|---|---|---|---|---|---|
| 1 | 84.02 | 13758 | 2.3119E+09 | 9780 | 3.7 | 457903 |
| 2 | 84.11 | 13767 | 2.3159E+09 | 9780 | 3.5 | 453421 |
| 3 | 84 | 13757 | 2.3112E+09 | 9780 | 3.8 | 460438 |

# *Appendix A.4*

# *Statistical Discrimination of Outliers*

**Statistical Discrimination of Outliers**

*Stack Location, Elemental Mercury Data Set.*

The value for elemental mercury for the third test run of sample train A was well above the values for the other five trains. A Dixon test for determining whether this value was consistent with the remaining data was performed. The Dixon test is used when one value in a data set is suspect. The Dixon test consists of ranking the data from the lowest to highest value and calculating the following ratio:

$$r_{ij} = r_{10} = (X_n - X_{n-1}) / (X_n - X_1).$$

If $r_{10} > r_{1-a}$ at the 5% significance level for 6 six data points (which is = 0.560), then the suspected data point should be rejected. The value of $r_{10}$ for this data set was 0.953, therefore this data point should be rejected.

*Inlet Location , Reduced Mercury and Inlet Elemental Mercury Data Sets*

In this case each data set contained two suspected data points. The use of the Dixon test is not appropriate for the evaluation of multiple data points, therefore the procedure described in Grubbs, F.E. and Beck ,G. , " Extension of Sample sizes and Percentage Points for Significance Tests of Outlying Observations", Technometrics, Vol.14, No.4, November 1972, pages 847- 853 was utilized.

The test procedure consists of ranking the data from the lowest to highest value and calculating the following :

$$S^2_o = \text{Sum, from } i = 1 \text{ to } n, (x_i - \bar{x})^2$$

$$S^2_{n-1,n} = \text{Sum, from } i = 1 \text{ to } n-2, (x_i - \bar{x}_{n-1,n})^2$$

$$\bar{X}_{n-1,n} = \text{Sum}, i=1 \text{ to } n-2, x_i /(n-2)$$

$$R = S^2_{n-1,n} / S^2_o$$

If the ratio R is < 0.0564 at the lower 5% level or 0.0920 at the lower 10% level, then the suspected data points should be rejected. The suspected data points for the inlet elemental mercury data set have an R value < than 0.0564 and therefore should be rejected. The suspected data points for the inlet reduced mercury data set have an R value equal to 0.0564 at the 5% level and significantly < 0.0920 at the 10% level and therefore should be rejected.

US GENERATING MERCURY TEST PROGRAM
LOGAN STATION
DIXON OUTLIER TEST

STACK ELMENTAL MERCURY (KMNO4) DATA

| Run no. | ug/dscm | arranged from low to high | | |
|---|---|---|---|---|
| 1a | 0.1703 | 0.1703 X1 | | |
| 2a | 0.2297 | 0.2297 | | r10 at 5% level = 0.560 |
| 3a | 1.4007 | 0.2558 | | r10 = (Xn -Xn-1)/(Xn -X1) |
| 1b | 0.2558 | 0.286 | | |
| 2b | 0.4182 | 0.4182 Xn-1 | $R_{1-a}$= | 0.799 |
| 3b | 0.286 | 1.4007 Xn | | |

Inlet Reduced Mercury Data ( KCl results)

| Observations in ascending order | $(x_i-\bar{x})^2$ | $(x_i-\bar{x}_{n-1,n})^2$ | |
|---|---|---|---|
| 1.5819 | 3.47524164 | 0.392377 | |
| 1.8685 | 2.48882176 | 0.115464 | |
| 2.256 | 1.41633801 | 0.002275 | $\bar{x}$ = 3.4461 |
| 3.1268 | 0.10195249 | 0.843642 | $\bar{x}_{n-1,n}$ = 2.2083 |
| 5.2819 | 3.37016164 | | |
| 6.5615 | 9.70571716 | | |
| $S^2_0=\text{sum}(x_i-\bar{x})^2$ (for i=1 to n) | 20.5582327 | | |
| $S^2_{n-1,n}=\text{sum}(x_i-\bar{x}_{n-1,n})^2$ (for i=1 to n-2) | | 1.353759 | |

$S^2_{n-1,n}/S^2_0$ = 0.0658

Critical Value of $S^2_{n-1,n}/S^2_0$ at 5% significance level= 0.0564

$S^2_{n-1,n}/S^2_0$ at 10% significance level= 0.092

$S^2_{n-1,n}/S^2_0 \leq$ Critical Value of $S^2_{n-1,n}/S^2_0$ at 10% significance, therefore 5.2819 and 6.5615 are considered outliers

Inlet elelmental Mercury Data Set

| Observations in ascending order | $(x_i-\bar{x})^2$ | $(x_i-\bar{x}_{n-1,n})^2$ | |
|---|---|---|---|
| 0.2558 | 0.17405584 | 0.0060256 | |
| 0.286 | 0.149769 | 0.0022491 | |
| 0.3737 | 0.08958049 | 0.0016221 | $\bar{x}$ = 0.673 |
| 0.4182 | 0.06492304 | 0.0071868 | $\bar{x}_{n-1,n}$ = 0.333425 |
| 1.0475 | 0.14025025 | | |
| 1.6568 | 0.96786244 | | |
| $S^2_0=\text{sum}(x_i-\bar{x})^2$ (for i=1 to n) | 1.58644106 | | |
| $S^2_{n-1,n}=\text{sum}(x_i-\bar{x}_{n-1,n})^2$ (for i=1 to n-2) | | 0.0170836 | |

$S^2_{n-1,n}/S^2_0$ = 0.0108

Critical Value of $S^2_{n-1,n}/S^2_0$ at 5% significance level= 0.0564

$S^2_{n-1,n}/S^2_0$ < Critical Value of $S^2_{n-1,n}/S^2_0$ at 5% significance, therefore 1.0475 and 1.6568 are considered ou

Statistics

TECHNOMETRICS VOL. 14, NO. 4 NOVEMBER, 1972

# Extension of Sample Sizes and Percentage Points for Significance Tests of Outlying Observations

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Tables of percentage points for significance tests concerning the highest or the lowest observation in normal samples, or the two highest or the two lowest observations in normal samples, were recently extended to larger sample sizes than heretofore published and to probability levels of .005 and .001. These tables are being published to satisfy a long existing demand for such extensions.

KEY WORDS

Outlying Observations
Significance Tests for Outliers
Tables for Testing Highest or Lowest Outliers

## 1. INTRODUCTION AND SUMMARY

Since the publication of Reference [1] in 1950, there have been many requests for extending the published tables for tests of outlying observations to sample sizes greater than 25 and also to include significance levels beyond the .01 level.

Upon the appearance of Reference [2] in 1969, the demand for such extensions arose again and many specific requests have been made. Therefore, as a result of the possible need for more extensive applications, the attached tables have been computed, the work being programmed for computation and carried out by Mr. Glenn Beck of the US Army Aberdeen Research and Development Center. (The computer program is available to interested readers.) Table I gives significance levels for testing the highest or the lowest observation for $n = 3(1)\ 147$, and Table II gives significance levels for testing the two highest or the two lowest observations for $n = 4(1)\ 149$. There are slight differences in the tabled values previously published in reference [1] and [2] and the present tables, which are believed to be correct to within a unit of the last decimal place.

It is hoped that the attached tables will now satisfy previous requests and practically all requirements in the various applied fields of interest.

## 2. FORMULAS

The observations are arranged in ascending order: $x_1 \leq x_2 \leq \cdots \leq x_n$. Thus, to test whether the largest observation, $x_n$, in normal samples is too large, we compute

$$T_n = (x_n - \bar{x})/S$$

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TABLE I

*Table of Critical Values for T (One-Sided Test of $T_1$ or $T_n$) when the Standard Deviation is Calculated from the Same Sample*

| Number of Observations n | Upper .1% Significance Level | Upper .5% Significance Level | Upper 1% Significance Level | Upper 2.5% Significance Level | Upper 5% Significance Level | Upper 10% Significance Level |
|---|---|---|---|---|---|---|
| 3 | 1.155 | 1.155 | 1.155 | 1.155 | 1.153 | 1.148 |
| 4 | 1.499 | 1.496 | 1.492 | 1.481 | 1.463 | 1.425 |
| 5 | 1.780 | 1.764 | 1.749 | 1.715 | 1.672 | 1.602 |
| 6 | 2.011 | 1.973 | 1.944 | 1.887 | 1.822 | 1.729 |
| 7 | 2.201 | 2.139 | 2.097 | 2.020 | 1.938 | 1.828 |
| 8 | 2.358 | 2.274 | 2.221 | 2.126 | 2.032 | 1.909 |
| 9 | 2.492 | 2.387 | 2.323 | 2.215 | 2.110 | 1.977 |
| 10 | 2.606 | 2.482 | 2.410 | 2.290 | 2.176 | 2.036 |
| 11 | 2.705 | 2.564 | 2.485 | 2.355 | 2.234 | 2.088 |
| 12 | 2.791 | 2.636 | 2.550 | 2.412 | 2.285 | 2.134 |
| 13 | 2.867 | 2.699 | 2.607 | 2.462 | 2.331 | 2.175 |
| 14 | 2.935 | 2.755 | 2.659 | 2.507 | 2.371 | 2.213 |
| 15 | 2.997 | 2.806 | 2.705 | 2.549 | 2.409 | 2.247 |
| 16 | 3.052 | 2.852 | 2.747 | 2.585 | 2.443 | 2.279 |
| 17 | 3.103 | 2.894 | 2.785 | 2.620 | 2.475 | 2.309 |
| 18 | 3.149 | 2.932 | 2.821 | 2.651 | 2.504 | 2.335 |
| 19 | 3.191 | 2.968 | 2.854 | 2.681 | 2.532 | 2.361 |
| 20 | 3.230 | 3.001 | 2.884 | 2.709 | 2.557 | 2.385 |
| 21 | 3.266 | 3.031 | 2.912 | 2.733 | 2.580 | 2.408 |
| 22 | 3.300 | 3.060 | 2.939 | 2.758 | 2.603 | 2.429 |
| 23 | 3.332 | 3.087 | 2.963 | 2.781 | 2.624 | 2.448 |
| 24 | 3.362 | 3.112 | 2.987 | 2.802 | 2.644 | 2.467 |
| 25 | 3.389 | 3.135 | 3.009 | 2.822 | 2.663 | 2.486 |
| 26 | 3.415 | 3.157 | 3.029 | 2.841 | 2.681 | 2.502 |
| 27 | 3.440 | 3.178 | 3.049 | 2.859 | 2.698 | 2.519 |
| 28 | 3.464 | 3.199 | 3.068 | 2.876 | 2.714 | 2.534 |
| 29 | 3.486 | 3.218 | 3.085 | 2.893 | 2.730 | 2.549 |
| 30 | 3.507 | 3.236 | 3.103 | 2.908 | 2.745 | 2.563 |
| 31 | 3.528 | 3.253 | 3.119 | 2.924 | 2.759 | 2.577 |
| 32 | 3.546 | 3.270 | 3.135 | 2.938 | 2.773 | 2.591 |
| 33 | 3.565 | 3.286 | 3.150 | 2.952 | 2.786 | 2.604 |
| 34 | 3.582 | 3.301 | 3.164 | 2.965 | 2.799 | 2.616 |
| 35 | 3.599 | 3.316 | 3.178 | 2.979 | 2.811 | 2.628 |
| 36 | 3.616 | 3.330 | 3.191 | 2.991 | 2.823 | 2.639 |
| 37 | 3.631 | 3.343 | 3.204 | 3.003 | 2.835 | 2.650 |
| 38 | 3.646 | 3.356 | 3.216 | 3.014 | 2.846 | 2.661 |
| 39 | 3.660 | 3.369 | 3.228 | 3.025 | 2.857 | 2.671 |
| 40 | 3.673 | 3.381 | 3.240 | 3.036 | 2.866 | 2.682 |
| 41 | 3.687 | 3.393 | 3.251 | 3.046 | 2.877 | 2.692 |
| 42 | 3.700 | 3.404 | 3.261 | 3.057 | 2.887 | 2.700 |
| 43 | 3.712 | 3.415 | 3.271 | 3.067 | 2.896 | 2.710 |
| 44 | 3.724 | 3.425 | 3.282 | 3.075 | 2.905 | 2.719 |
| 45 | 3.736 | 3.435 | 3.292 | 3.085 | 2.914 | 2.727 |
| 46 | 3.747 | 3.445 | 3.302 | 3.094 | 2.923 | 2.736 |
| 47 | 3.757 | 3.455 | 3.310 | 3.103 | 2.931 | 2.744 |
| 48 | 3.768 | 3.464 | 3.319 | 3.111 | 2.940 | 2.753 |
| 49 | 3.779 | 3.474 | 3.329 | 3.120 | 2.948 | 2.760 |
| 50 | 3.789 | 3.483 | 3.336 | 3.128 | 2.956 | 2.768 |

and

$$S = [\sum (x_i - \bar{x})^2/(n-1)]^{\frac{1}{2}} = [\{n \sum x_i^2 - (\sum x_i)^2\}/n(n-1)]^{\frac{1}{2}}$$

and refer the result to Table I, which gives various upper probability levels for $T_n$. A significance test of the smallest observation for normal samples is obtained by computing

$$T_1 = (\bar{x} - x_1)/S$$

To test the significance of the two largest observations, $x_{n-1}$ and $x_n$, we compute

$$S_{n-1,n}^2/S_0^2$$

where

$$S_0^2 = \sum_{i=1}^{n} (x_i - \bar{x})^2$$

and

$$S_{n-1,n}^2 = \sum_{i=1}^{n-2} (x_i - \bar{x}_{n-1,n})^2,$$

and

$$\bar{x}_{n-1,n} = \sum_{i=1}^{n-2} x_i/(n-2)$$

TABLE I (*Continued*)

*Table of Critical Values for T (One-Sided Test of $T_1$ or $T_n$) when the Standard Deviation is Calculated from the Same Sample*

| Number of Observations n | Upper .1% Significance Level | Upper .5% Significance Level | Upper 1% Significance Level | Upper 2.5% Significance Level | Upper 5% Significance Level | Upper 10% Significance Level |
|---|---|---|---|---|---|---|
| 51 | 3.798 | 3.491 | 3.345 | 3.136 | 2.964 | 2.775 |
| 52 | 3.808 | 3.500 | 3.353 | 3.143 | 2.971 | 2.783 |
| 53 | 3.816 | 3.507 | 3.361 | 3.151 | 2.978 | 2.790 |
| 54 | 3.825 | 3.516 | 3.368 | 3.158 | 2.986 | 2.798 |
| 55 | 3.834 | 3.524 | 3.376 | 3.166 | 2.992 | 2.804 |
| 56 | 3.842 | 3.531 | 3.383 | 3.172 | 3.000 | 2.811 |
| 57 | 3.851 | 3.539 | 3.391 | 3.180 | 3.006 | 2.818 |
| 58 | 3.858 | 3.546 | 3.397 | 3.186 | 3.013 | 2.824 |
| 59 | 3.867 | 3.553 | 3.405 | 3.193 | 3.019 | 2.831 |
| 60 | 3.874 | 3.560 | 3.411 | 3.199 | 3.025 | 2.837 |
| 61 | 3.882 | 3.566 | 3.418 | 3.205 | 3.032 | 2.842 |
| 62 | 3.889 | 3.573 | 3.424 | 3.212 | 3.037 | 2.849 |
| 63 | 3.896 | 3.579 | 3.430 | 3.218 | 3.044 | 2.854 |
| 64 | 3.903 | 3.586 | 3.437 | 3.224 | 3.049 | 2.860 |
| 65 | 3.910 | 3.592 | 3.442 | 3.230 | 3.055 | 2.866 |
| 66 | 3.917 | 3.598 | 3.449 | 3.235 | 3.061 | 2.871 |
| 67 | 3.923 | 3.605 | 3.454 | 3.241 | 3.066 | 2.877 |
| 68 | 3.930 | 3.610 | 3.460 | 3.246 | 3.071 | 2.883 |
| 69 | 3.936 | 3.617 | 3.466 | 3.252 | 3.076 | 2.888 |
| 70 | 3.942 | 3.622 | 3.471 | 3.257 | 3.082 | 2.893 |
| 71 | 3.948 | 3.627 | 3.476 | 3.262 | 3.087 | 2.897 |
| 72 | 3.954 | 3.633 | 3.482 | 3.267 | 3.092 | 2.903 |
| 73 | 3.960 | 3.638 | 3.487 | 3.272 | 3.098 | 2.908 |
| 74 | 3.965 | 3.643 | 3.492 | 3.278 | 3.102 | 2.912 |
| 75 | 3.971 | 3.648 | 3.496 | 3.282 | 3.107 | 2.917 |
| 76 | 3.977 | 3.654 | 3.502 | 3.287 | 3.111 | 2.922 |
| 77 | 3.982 | 3.658 | 3.507 | 3.291 | 3.117 | 2.927 |
| 78 | 3.987 | 3.663 | 3.511 | 3.297 | 3.121 | 2.931 |
| 79 | 3.992 | 3.669 | 3.516 | 3.301 | 3.125 | 2.935 |
| 80 | 3.998 | 3.673 | 3.521 | 3.305 | 3.130 | 2.940 |
| 81 | 4.002 | 3.677 | 3.525 | 3.309 | 3.134 | 2.945 |
| 82 | 4.007 | 3.682 | 3.529 | 3.315 | 3.139 | 2.949 |
| 83 | 4.012 | 3.687 | 3.534 | 3.319 | 3.143 | 2.953 |
| 84 | 4.017 | 3.691 | 3.539 | 3.323 | 3.147 | 2.957 |
| 85 | 4.021 | 3.695 | 3.543 | 3.327 | 3.151 | 2.961 |
| 86 | 4.026 | 3.699 | 3.547 | 3.331 | 3.155 | 2.966 |
| 87 | 4.031 | 3.704 | 3.551 | 3.335 | 3.160 | 2.970 |
| 88 | 4.035 | 3.708 | 3.555 | 3.339 | 3.163 | 2.973 |
| 89 | 4.039 | 3.712 | 3.559 | 3.343 | 3.167 | 2.977 |
| 90 | 4.044 | 3.716 | 3.563 | 3.347 | 3.171 | 2.981 |
| 91 | 4.049 | 3.720 | 3.567 | 3.350 | 3.174 | 2.984 |
| 92 | 4.053 | 3.725 | 3.570 | 3.355 | 3.179 | 2.989 |
| 93 | 4.057 | 3.728 | 3.575 | 3.358 | 3.182 | 2.993 |
| 94 | 4.060 | 3.732 | 3.579 | 3.362 | 3.186 | 2.996 |
| 95 | 4.064 | 3.736 | 3.582 | 3.365 | 3.189 | 3.000 |
| 96 | 4.069 | 3.739 | 3.586 | 3.369 | 3.193 | 3.003 |
| 97 | 4.073 | 3.744 | 3.589 | 3.372 | 3.196 | 3.006 |
| 98 | 4.076 | 3.747 | 3.593 | 3.377 | 3.201 | 3.011 |
| 99 | 4.080 | 3.750 | 3.597 | 3.380 | 3.204 | 3.014 |
| 100 | 4.084 | 3.754 | 3.600 | 3.383 | 3.207 | 3.017 |

TABLE II

*Table of Critical Values for $S^2_{n-1,n}/S^2_0$ or $S^2_{1,2}/S^2_0$ for Simultaneously Testing the Two Largest or Two Smallest Observations*

| Number of Observations n | Lower .1% Significance Level | Lower .5% Significance Level | Lower 1% Significance Level | Lower 2.5% Significance Level | Lower 5% Significance Level | Lower 10% Significance Level |
|---|---|---|---|---|---|---|
| 4 | .0000 | .0000 | .0000 | .0002 | .0008 | .0031 |
| 5 | .0003 | .0018 | .0035 | .0090 | .0183 | .0376 |
| 6 | .0039 | .0116 | .0186 | .0349 | .0564 | .0920 |
| 7 | .0135 | .0308 | .0440 | .0708 | .1020 | .1479 |
| 8 | .0290 | .0563 | .0750 | .1101 | .1478 | .1994 |
| 9 | .0489 | .0851 | .1082 | .1492 | .1909 | .2454 |
| 10 | .0714 | .1150 | .1414 | .1864 | .2305 | .2863 |
| 11 | .0953 | .1448 | .1736 | .2213 | .2667 | .3227 |
| 12 | .1198 | .1738 | .2043 | .2537 | .2996 | .3552 |
| 13 | .1441 | .2016 | .2333 | .2836 | .3295 | .3843 |
| 14 | .1680 | .2280 | .2605 | .3112 | .3568 | .4106 |
| 15 | .1912 | .2530 | .2859 | .3367 | .3818 | .4345 |
| 16 | .2136 | .2767 | .3098 | .3603 | .4048 | .4562 |
| 17 | .2350 | .2990 | .3321 | .3822 | .4259 | .4761 |
| 18 | .2556 | .3200 | .3530 | .4025 | .4455 | .4944 |
| 19 | .2752 | .3398 | .3725 | .4214 | .4636 | .5113 |
| 20 | .2939 | .3585 | .3909 | .4391 | .4804 | .5270 |
| 21 | .3118 | .3761 | .4082 | .4556 | .4961 | .5415 |
| 22 | .3288 | .3927 | .4245 | .4711 | .5107 | .5550 |
| 23 | .3450 | .4085 | .4398 | .4857 | .5244 | .5677 |
| 24 | .3605 | .4234 | .4543 | .4994 | .5373 | .5795 |
| 25 | .3752 | .4376 | .4680 | .5123 | .5495 | .5906 |
| 26 | .3893 | .4510 | .4810 | .5245 | .5609 | .6011 |
| 27 | .4027 | .4638 | .4933 | .5360 | .5717 | .6110 |
| 28 | .4156 | .4759 | .5050 | .5470 | .5819 | .6203 |
| 29 | .4279 | .4875 | .5162 | .5574 | .5916 | .6292 |
| 30 | .4397 | .4985 | .5268 | .5672 | .6008 | .6375 |
| 31 | .4510 | .5091 | .5369 | .5766 | .6095 | .6455 |
| 32 | .4618 | .5192 | .5465 | .5856 | .6178 | .6530 |
| 33 | .4722 | .5288 | .5557 | .5941 | .6257 | .6602 |
| 34 | .4821 | .5381 | .5646 | .6023 | .6333 | .6671 |
| 35 | .4917 | .5469 | .5730 | .6101 | .6405 | .6737 |
| 36 | .5009 | .5554 | .5811 | .6175 | .6474 | .6800 |
| 37 | .5098 | .5636 | .5889 | .6247 | .6541 | .6860 |
| 38 | .5184 | .5714 | .5963 | .6316 | .6604 | .6917 |
| 39 | .5266 | .5789 | .6035 | .6382 | .6665 | .6972 |
| 40 | .5345 | .5862 | .6104 | .6445 | .6724 | .7025 |
| 41 | .5422 | .5932 | .6170 | .6506 | .6780 | .7076 |
| 42 | .5496 | .5999 | .6234 | .6565 | .6834 | .7125 |
| 43 | .5568 | .6064 | .6296 | .6621 | .6886 | .7172 |
| 44 | .5637 | .6127 | .6355 | .6676 | .6936 | .7218 |
| 45 | .5704 | .6188 | .6412 | .6728 | .6985 | .7261 |
| 46 | .5768 | .6246 | .6468 | .6779 | .7032 | .7304 |
| 47 | .5831 | .6303 | .6521 | .6828 | .7077 | .7345 |
| 48 | .5892 | .6358 | .6573 | .6876 | .7120 | .7384 |
| 49 | .5951 | .6411 | .6623 | .6921 | .7163 | .7422 |
| 50 | .6008 | .6462 | .6672 | .6966 | .7203 | .7459 |

## 3. EXAMPLES

1. Two standard chronographs, the ECI Counter and the Oehler Counter, were used simultaneously to measure velocities on each of 49 rounds of 7.62 mm NATO match ammunition. The differences in feet per second of the measured velocities of the ECI and the Oehler chronographs were recorded as follows:
.00, 1.38, 1.09, 1.27, 1.27, .78, .92, 1.44, 1.10, .95, .47, .77, .62, .47, .78, −.32, −.64, .00, .95, .96, −.48, −.32, −1.00, −.31, −.64, −.31, −.17, .00, −.16, −.48, −.31, −.16, −.15, .00, .67, −.63, −.63, −.78, .15, .47, −.47, −.16, .63, .15, −.48, .00, −.49, −.16, .46.
To test whether the difference of −1.00 f/s is too low, we compute

$$(\bar{x} - x_1)/S = (.173 + 1.00)/(.6564) = -1.787$$

and from Table I for $n = 49$ we find that the value −1.00 is not significant at the 10% level (+2.760) even for $n = 49$ rounds.

TABLE II (*Continued*)

*Table of Critical Values for $S^2_{n-1,n}/S^2_0$ or $S^2_{1,2}/S^2_0$ for Simultaneously Testing the Two Largest or Two Smallest Observations*

| Number of Observations n | Lower .1% Significance Level | Lower .5% Significance Level | Lower 1% Significance Level | Lower 2.5% Significance Level | Lower 5% Significance Level | Lower 10% Significance Level |
|---|---|---|---|---|---|---|
| 51 | .6063 | .6512 | .6719 | .7009 | .7243 | .7495 |
| 52 | .6117 | .6560 | .6765 | .7051 | .7281 | .7529 |
| 53 | .6169 | .6607 | .6809 | .7091 | .7319 | .7563 |
| 54 | .6220 | .6653 | .6852 | .7130 | .7355 | .7595 |
| 55 | .6269 | .6697 | .6894 | .7168 | .7390 | .7627 |
| 56 | .6317 | .6740 | .6934 | .7205 | .7424 | .7658 |
| 57 | .6364 | .6782 | .6974 | .7241 | .7456 | .7687 |
| 58 | .6410 | .6823 | .7012 | .7276 | .7489 | .7716 |
| 59 | .6454 | .6862 | .7049 | .7310 | .7520 | .7744 |
| 60 | .6497 | .6901 | .7086 | .7343 | .7550 | .7772 |
| 61 | .6539 | .6938 | .7121 | .7375 | .7580 | .7798 |
| 62 | .6580 | .6975 | .7155 | .7406 | .7608 | .7824 |
| 63 | .6620 | .7010 | .7189 | .7437 | .7636 | .7850 |
| 64 | .6658 | .7045 | .7221 | .7467 | .7664 | .7874 |
| 65 | .6696 | .7079 | .7253 | .7496 | .7690 | .7898 |
| 66 | .6733 | .7112 | .7284 | .7524 | .7716 | .7921 |
| 67 | .6770 | .7144 | .7314 | .7551 | .7741 | .7944 |
| 68 | .6805 | .7175 | .7344 | .7578 | .7766 | .7966 |
| 69 | .6839 | .7206 | .7373 | .7604 | .7790 | .7988 |
| 70 | .6873 | .7236 | .7401 | .7630 | .7813 | .8009 |
| 71 | .6906 | .7265 | .7429 | .7655 | .7836 | .8030 |
| 72 | .6938 | .7294 | .7455 | .7679 | .7859 | .8050 |
| 73 | .6970 | .7322 | .7482 | .7703 | .7881 | .8070 |
| 74 | .7000 | .7349 | .7507 | .7727 | .7902 | .8089 |
| 75 | .7031 | .7376 | .7532 | .7749 | .7923 | .8108 |
| 76 | .7060 | .7402 | .7557 | .7772 | .7944 | .8127 |
| 77 | .7089 | .7427 | .7581 | .7794 | .7964 | .8145 |
| 78 | .7117 | .7453 | .7605 | .7815 | .7983 | .8162 |
| 79 | .7145 | .7477 | .7628 | .7836 | .8002 | .8180 |
| 80 | .7172 | .7501 | .7650 | .7856 | .8021 | .8197 |
| 81 | .7199 | .7525 | .7672 | .7876 | .8040 | .8213 |
| 82 | .7225 | .7548 | .7694 | .7896 | .8058 | .8230 |
| 83 | .7250 | .7570 | .7715 | .7915 | .8075 | .8245 |
| 84 | .7275 | .7592 | .7736 | .7934 | .8093 | .8261 |
| 85 | .7300 | .7614 | .7756 | .7953 | .8109 | .8276 |
| 86 | .7324 | .7635 | .7776 | .7971 | .8126 | .8291 |
| 87 | .7348 | .7656 | .7796 | .7989 | .8142 | .8306 |
| 88 | .7371 | .7677 | .7815 | .8006 | .8158 | .8321 |
| 89 | .7394 | .7697 | .7834 | .8023 | .8174 | .8335 |
| 90 | .7416 | .7717 | .7853 | .8040 | .8190 | .8349 |
| 91 | .7438 | .7736 | .7871 | .8057 | .8205 | .8362 |
| 92 | .7459 | .7755 | .7889 | .8073 | .8220 | .8376 |
| 93 | .7481 | .7774 | .7906 | .8089 | .8234 | .8389 |
| 94 | .7501 | .7792 | .7923 | .8104 | .8248 | .8402 |
| 95 | .7522 | .7810 | .7940 | .8120 | .8263 | .8414 |
| 96 | .7542 | .7828 | .7957 | .8135 | .8276 | .8427 |
| 97 | .7562 | .7845 | .7973 | .8149 | .8290 | .8439 |
| 98 | .7581 | .7862 | .7989 | .8164 | .8303 | .8451 |

2. The following 49 velocities in feet per second were measured by a portable AVTRON chronograph on the same rounds as in Example 1 (where we have subtracted 2700 f/s):

| | | | | | | |
|---|---|---|---|---|---|---|
| 51.00 | 73.90 | 39.70 | 43.50 | 66.30 | 47.30 | 54.80 |
| 28.50 | 58.60 | 47.30 | 66.30 | 81.60 | 70.10 | 24.80 |
| 32.20 | 54.80 | 51.00 | 73.90 | 62.40 | 47.30 | 81.60 |
| 51.00 | 54.80 | 43.50 | 70.10 | 66.30 | 54.80 | 85.50 |
| 58.60 | 24.80 | 54.80 | 54.80 | 58.60 | 47.30 | 77.80 |
| 39.70 | 36.00 | 73.90 | 93.30 | 66.30 | 54.80 | 70.10 |
| 24.80 | 54.80 | 70.10 | 58.60 | 77.80 | 73.90 | 47.30 |

We are interested in whether the two highest velocities, 2785.50 and 2793.30, are

TABLE II (*Continued*)

*Table of Critical Values for $S^2_{n-1,n}/S^2_0$ or $S^2_{1,2}/S^2_0$ for Simultaneously Testing the Two Largest or Two Smallest Observations*

| Number of Observations n | Lower .1% Significance Level | Lower .5% Significance Level | Lower 1% Significance Level | Lower 2.5% Significance Level | Lower 5% Significance Level | Lower 10% Significance Level |
|---|---|---|---|---|---|---|
| 99 | .7600 | .7879 | .8005 | .8178 | .8316 | .8463 |
| 100 | .7619 | .7896 | .8020 | .8192 | .8329 | .8475 |
| 101 | .7637 | .7912 | .8036 | .8206 | .8342 | .8486 |
| 102 | .7655 | .7928 | .8051 | .8220 | .8354 | .8497 |
| 103 | .7673 | .7944 | .8065 | .8233 | .8367 | .8508 |
| 104 | .7691 | .7959 | .8080 | .8246 | .8379 | .8519 |
| 105 | .7708 | .7974 | .8094 | .8259 | .8391 | .8530 |
| 106 | .7725 | .7989 | .8108 | .8272 | .8402 | .8541 |
| 107 | .7742 | .8004 | .8122 | .8284 | .8414 | .8551 |
| 108 | .7758 | .8018 | .8136 | .8297 | .8425 | .8563 |
| 109 | .7774 | .8033 | .8149 | .8309 | .8436 | .8571 |
| 110 | .7790 | .8047 | .8162 | .8321 | .8447 | .8581 |
| 111 | .7806 | .8061 | .8175 | .8333 | .8458 | .8591 |
| 112 | .7821 | .8074 | .8188 | .8344 | .8469 | .8600 |
| 113 | .7837 | .8088 | .8200 | .8356 | .8479 | .8610 |
| 114 | .7852 | .8101 | .8213 | .8367 | .8489 | .8619 |
| 115 | .7866 | .8114 | .8225 | .8378 | .8500 | .8628 |
| 116 | .7881 | .8127 | .8237 | .8389 | .8510 | .8637 |
| 117 | .7895 | .8139 | .8249 | .8400 | .8519 | .8646 |
| 118 | .7909 | .8152 | .8261 | .8410 | .8529 | .8655 |
| 119 | .7923 | .8164 | .8272 | .8421 | .8539 | .8664 |
| 120 | .7937 | .8176 | .8284 | .8431 | .8548 | .8672 |
| 121 | .7951 | .8188 | .8295 | .8441 | .8557 | .8681 |
| 122 | .7964 | .8200 | .8306 | .8451 | .8567 | .8689 |
| 123 | .7977 | .8211 | .8317 | .8461 | .8576 | .8697 |
| 124 | .7990 | .8223 | .8327 | .8471 | .8585 | .8705 |
| 125 | .8003 | .8234 | .8338 | .8480 | .8593 | .8713 |
| 126 | .8016 | .8245 | .8348 | .8490 | .8602 | .8721 |
| 127 | .8028 | .8256 | .8359 | .8499 | .8611 | .8729 |
| 128 | .8041 | .8267 | .8369 | .8508 | .8619 | .8737 |
| 129 | .8053 | .8278 | .8379 | .8517 | .8627 | .8744 |
| 130 | .8065 | .8288 | .8389 | .8526 | .8636 | .8752 |
| 131 | .8077 | .8299 | .8398 | .8535 | .8644 | .8759 |
| 132 | .8088 | .8309 | .8408 | .8544 | .8652 | .8766 |
| 133 | .8100 | .8319 | .8418 | .8553 | .8660 | .8773 |
| 134 | .8111 | .8329 | .8427 | .8561 | .8668 | .8780 |
| 135 | .8122 | .8339 | .8436 | .8570 | .8675 | .8787 |
| 136 | .8134 | .8349 | .8445 | .8578 | .8683 | .8794 |
| 137 | .8145 | .8358 | .8454 | .8586 | .8690 | .8801 |
| 138 | .8155 | .8368 | .8463 | .8594 | .8698 | .8808 |
| 139 | .8166 | .8377 | .8472 | .8602 | .8705 | .8814 |
| 140 | .8176 | .8387 | .8481 | .8610 | .8712 | .8821 |
| 141 | .8187 | .8396 | .8489 | .8618 | .8720 | .8827 |
| 142 | .8197 | .8405 | .8498 | .8625 | .8727 | .8834 |
| 143 | .8207 | .8414 | .8506 | .8633 | .8734 | .8840 |
| 144 | .8218 | .8423 | .8515 | .8641 | .8741 | .8846 |
| 145 | .8227 | .8431 | .8523 | .8648 | .8747 | .8853 |
| 146 | .8237 | .8440 | .8531 | .8655 | .8754 | .8859 |
| 147 | .8247 | .8449 | .8539 | .8663 | .8761 | .8865 |
| 148 | .8256 | .8457 | .8547 | .8670 | .8767 | .8871 |
| 149 | .8266 | .8465 | .8555 | .8677 | .8774 | .8877 |

"too large" for normal samples. We compute the following:

$$S^2_0 = 12977.5 \qquad S^2_{48,49} = 10780.3 \qquad S^2_{48,49}/S^2_0 = .831$$

Referring the value .867 to Table II for $n = 49$, we find that the observed value of $S^2_{48,49}/S^2_0$ is not significant even at the 10% level.

We therefore conclude for both Examples 1 and 2 that we can proceed with any further analyses of the data since the observations apparently come from homogeneous normal populations.

The author is indebted to Colonel E. H. Harrison of the National Rifle Association for the data of these two examples.

# APPENDIX F

# OUTLIERS

## F.1 INTRODUCTION

An unusually large (or small) value or measurement in a set of observations is usually referred to as an outlier. Some of the reasons for an outlier in data are:

Faulty instrument or component part
Inaccurate reading of record, dial, etc.
Error in transcribing data
Calculation errors
Actual value due to unique circumstances under which the observation(s) was obtained--an extreme manifestation of the random variability inherent in the data.

It is desired to have some statistical procedure to test the presence of an outlier in a set of measurements. The purpose of such tests would be to:

1. Screen data for outliers and hence to identify the need for closer control of the data generating process.

2. Eliminate outliers prior to analysis of the data. For example, in developing control charts the presence of outliers would lead to limits which are too wide and would make the use of the control charts of minimal, if any, value. In most statistical analysis of data (e.g., regression analysis and analysis of variance) the presence of outliers violate a basic assumption of the analysis. Incorrect conclusions are likely to result if the outliers are not eliminated prior to analysis. Outliers should be reported, and their omission from analysis should be noted.

3. Identify the real outliers due to unusual conditions of measurement (e.g., a TSP concentration which is abnormally

large due to local environmental conditions during the time of sample collection). Such observations would not be indicative of the usual concentrations of TSP, and may be eliminated depending on the use of the data. Ideally, these unusual conditions should be recorded on the field data report. Failure to report complete information and unusual circumstances surrounding the collection and analysis of the sample often can be detected by outlier tests. Having identified the outliers using one or more tests, it is necessary to determine, if possible, the cause of the outlier and then to correct the data if appropriate.

It will be assumed in this discussion that the measurements are normally distributed and that the sample of n measurements is being studied for the possibility of one or two outliers. If the measurements are lognormally distributed, such as for concentration of TSP, then the logarithm of the data should be taken prior to application of the tests given herein.

## F.2 PROCEDURE(S) FOR IDENTIFYING OUTLIERS

Let the set of n measurements be arranged in ascending order and denoted by

$$X_1, X_2, \ldots, X_n$$

where $X_i$ denotes the ith smallest measurement. Suppose that $X_n$ is suspected of being too large, and that a statistical test is to be applied to the particular measurement to determine whether $X_n$ is consistent with the remaining data in the sense that it is reasonable that it is part of the same population of measurements from which the sample is taken. Consider the following TSP data from a specific monitoring site during August 1978.

Example F.1

| TSP, $\mu g/m^3$ | ln TSP |
|---|---|
| 40 | 3.69 |
| 88 | 4.48 |
| 71 | 4.26 |
| 175 | 5.16 |
| 85 | 4.44 |

One test procedure for questionable data is to use a test by Dixon,[1] see Table F.1,

$$r_{10} = \frac{X_n - X_{n-1}}{X_n - X_1} = \frac{175-88}{175-40} = \frac{87}{135} = 0.655. \qquad (1)$$

Referring to Table F.1 the 5% significance level for $r_{10}$ is 0.642 and we would thus declare that the value 175 appears to be an outlier. The value should be flagged for further investigation. We do not automatically remove data because a statistical test indicates the value(s) to be questionable.

Suppose that we know that the data are lognormally distributed (or at least that the log normal distribution is a very good approximation), then we should examine the Dixon Ratio for this example. Using the logarithm, the Dixon ratio is

$$r_{10} = \frac{5.16 - 4.48}{5.16 - 3.69} = 0.46,$$

and this value is not significant at the 5% level. Hence on this basis the extreme value 175 is not questionable.

We still may wish to investigate the value further (data permitting) and we compare the data with those at a neighboring site. The corresponding data are given below.

| Site 20 TSP, $\mu g/m^3$ | Site 14 TSP, $\mu g/m^3$ |
|---|---|
| 40 | 42 |
| 88 | 53 |
| 71 | 56 |
| 175 | 129 |
| 85 | 64 |

Thus we see that the value 175 does not appear to be questionable in view of the corresponding value for a neighboring site. Both sites have high values on the same day, suggesting a common source of the high values. The only means to investigate these values further is to go to the source of the data collection and review the meteorological factors, comments in the site logbooks relative to local construction activity, daily traffic, and other possible causation factors.

TABLE F.1. DIXON CRITERIA FOR TESTING OF EXTREME OBSERVATION (SINGLE SAMPLE)*

| n | Criterion | Significance level 10% | 5% | 1% |
|---|---|---|---|---|
| 3 | $r_{10} = \frac{x_2 - x_1}{x_n - x_1}$ if* smallest value is suspected; | .886 | .941 | .988 |
| 4 | | .679 | .765 | .889 |
| 5 | | .557 | .642 | .780 |
| 6 | $= \frac{x_n - x_{n-1}}{x_n - x_1}$ if largest value is suspected. | .482 | .560 | .698 |
| 7 | | .434 | .507 | .637 |
| 8 | $r_{11} = \frac{x_2 - x_1}{x_{n-1} - x_1}$ if smallest value is suspected; | .479 | .554 | .683 |
| 9 | | .441 | .512 | .635 |
| 10 | | .409 | .447 | .597 |
| | $= \frac{x_n - x_{n-1}}{x_n - x_2}$ if largest value is suspected. | | | |
| 11 | $r_{31} = \frac{x_3 - x_1}{x_{n-1} - x_1}$ if smallest value is suspected. | .517 | .576 | .679 |
| 12 | | .490 | .546 | .642 |
| 13 | | .467 | .521 | .615 |
| | $= \frac{x_n - x_{n-2}}{x_n - x_2}$ if largest value is suspected. | | | |
| 14 | $r_{22} = \frac{x_3 - x_1}{x_{n-2} - x_1}$ if smallest value is suspected. | .492 | .546 | .641 |
| 15 | | .472 | .525 | .616 |
| 16 | | .454 | .507 | .595 |
| 17 | $= \frac{x_n - x_{n-2}}{x_n - x_3}$ if largest value is suspected; | .438 | .490 | .577 |
| 18 | | .424 | .475 | .561 |
| 19 | | .412 | .462 | .547 |
| 20 | | .401 | .450 | .535 |
| 21 | | .391 | .440 | .524 |
| 22 | | .382 | .430 | .514 |
| 23 | | .374 | .421 | .505 |
| 24 | | .367 | .413 | .497 |
| 25 | | .360 | .406 | .489 |

*Reproduced with permission from W. J. Dixon, "Processing Data for Outliers," Biometrics, March 1953, Vol. 9, No. 1, Appendix, Page 89. (Reference [1])

$x_1 \leq x_2 \leq \cdots \leq x_{n-2} \leq x_{n-1} \leq x_n$

Criterion $r_{10}$ applies for $3 \leq n \leq 7$

Criterion $r_{11}$ applies for $8 \leq n \leq 10$

Criterion $r_{21}$ applies for $11 \leq n \leq 13$

Criterion $r_{22}$ applies for $14 \leq n \leq 25$

This example points out several considerations in validating data and in particular in detecting and flagging outliers.

1. The use of a statistical procedure for detecting an outlier is a first step and the result should not be to throw out the value(s) if the statistic is significant but to treat the value(s) as suspect until further information can be obtained.

2. The statistical procedures depend on specific assumptions, particularly concerning the distribution of the data--normal, lognormal, and Weibull--and the result should be checked using the distribution which best approximates the data.

3. Often there are values at neighboring sites which can be used to compare the values. If the values at the two sites are correlated, as in the Example F.1, this approach can be very helpful.

4. The final resolution of the suspect values can be made by the collection agency, thus the importance of performing the data validation at the local agency.

Another commonly used test procedure,[2] requires additional computation and is given by

$$T_n = (X_n - \bar{X})/s \qquad (2)$$

where: $X_n$ is the largest observed value among n measurements,
$\bar{X}$ is the sample average,
s is the sample standard deviation (i.e., $s = \{\Sigma(X-\bar{X})^2/(n-1)\}^{1/2}$).

For the data set previously given,

$X_n = 175$
$\bar{X} = 91.8$
$s = 50.2$

and hence $T_n = 1.66$, which is not significant at the 0.05 level, that is, it is less than 1.672 which is the tabulated value for this level from Table F.2. This test result is not in agreement with the previous one, however, both test results are borderline

TABLE F.2. TABLE OF CRITICAL VALUES FOR T(ONE-SIDED TEST OF $T_1$ OR $T_n$) WHEN THE STANDARD DEVIATION IS CALCULATED FROM THE SAME SAMPLE

| Number of Observations n | Upper .1% Significance Level | Upper .5% Significance Level | Upper 1% Significance Level | Upper 2.5% Significance Level | Upper 5% Significance Level | Upper 10% Significance Level |
|---|---|---|---|---|---|---|
| 3 | 1.155 | 1.155 | 1.155 | 1.155 | 1.153 | 1.148 |
| 4 | 1.499 | 1.496 | 1.492 | 1.481 | 1.463 | 1.425 |
| 5 | 1.780 | 1.764 | 1.749 | 1.715 | 1.672 | 1.602 |
| 6 | 2.011 | 1.973 | 1.944 | 1.887 | 1.822 | 1.729 |
| 7 | 2.201 | 2.139 | 2.097 | 2.020 | 1.938 | 1.828 |
| 8 | 2.358 | 2.274 | 2.221 | 2.126 | 2.032 | 1.909 |
| 9 | 2.492 | 2.387 | 2.323 | 2.215 | 2.110 | 1.977 |
| 10 | 2.606 | 2.482 | 2.410 | 2.290 | 2.176 | 2.036 |
| 11 | 2.705 | 2.564 | 2.485 | 2.355 | 2.234 | 2.088 |
| 12 | 2.791 | 2.636 | 2.550 | 2.412 | 2.285 | 2.134 |
| 13 | 2.867 | 2.699 | 2.607 | 2.462 | 2.331 | 2.175 |
| 14 | 2.935 | 2.755 | 2.659 | 2.507 | 2.371 | 2.213 |
| 15 | 2.997 | 2.806 | 2.705 | 2.549 | 2.409 | 2.247 |
| 16 | 3.052 | 2.852 | 2.747 | 2.585 | 2.443 | 2.279 |
| 17 | 3.103 | 2.894 | 2.785 | 2.620 | 2.475 | 2.309 |
| 18 | 3.149 | 2.932 | 2.821 | 2.651 | 2.504 | 2.335 |
| 19 | 3.191 | 2.968 | 2.854 | 2.681 | 2.532 | 2.361 |
| 20 | 3.230 | 3.001 | 2.884 | 2.709 | 2.557 | 2.385 |
| 21 | 3.266 | 3.031 | 2.912 | 2.733 | 2.580 | 2.408 |
| 22 | 3.300 | 3.060 | 2.939 | 2.758 | 2.603 | 2.429 |
| 23 | 3.332 | 3.087 | 2.963 | 2.781 | 2.624 | 2.448 |
| 24 | 3.362 | 3.112 | 2.987 | 2.802 | 2.644 | 2.467 |
| 25 | 3.389 | 3.135 | 3.009 | 2.822 | 2.663 | 2.486 |
| 26 | 3.415 | 3.157 | 3.029 | 2.841 | 2.681 | 2.502 |
| 27 | 3.440 | 3.178 | 3.049 | 2.859 | 2.698 | 2.519 |
| 28 | 3.464 | 3.199 | 3.068 | 2.876 | 2.714 | 2.534 |
| 29 | 3.486 | 3.218 | 3.085 | 2.893 | 2.730 | 2.549 |
| 30 | 3.507 | 3.236 | 3.103 | 2.908 | 2.745 | 2.563 |
| 31 | 3.528 | 3.253 | 3.119 | 2.924 | 2.759 | 2.577 |
| 32 | 3.546 | 3.270 | 3.135 | 2.938 | 2.773 | 2.591 |
| 33 | 3.565 | 3.286 | 3.150 | 2.952 | 2.786 | 2.604 |
| 34 | 3.582 | 3.301 | 3.164 | 2.965 | 2.799 | 2.616 |
| 35 | 3.599 | 3.316 | 3.178 | 2.979 | 2.811 | 2.628 |
| 36 | 3.616 | 3.330 | 3.191 | 2.991 | 2.823 | 2.639 |
| 37 | 3.631 | 3.343 | 3.204 | 3.003 | 2.835 | 2.650 |
| 38 | 3.646 | 3.356 | 3.216 | 3.014 | 2.846 | 2.661 |
| 39 | 3.660 | 3.369 | 3.228 | 3.025 | 2.857 | 2.671 |
| 40 | 3.673 | 3.381 | 3.240 | 3.036 | 2.866 | 2.682 |
| 41 | 3.687 | 3.393 | 3.251 | 3.046 | 2.877 | 2.692 |
| 42 | 3.700 | 3.404 | 3.261 | 3.057 | 2.887 | 2.700 |
| 43 | 3.712 | 3.415 | 3.271 | 3.067 | 2.896 | 2.710 |
| 44 | 3.724 | 3.425 | 3.282 | 3.075 | 2.905 | 2.719 |
| 45 | 3.736 | 3.435 | 3.292 | 3.085 | 2.914 | 2.727 |
| 46 | 3.747 | 3.445 | 3.302 | 3.094 | 2.923 | 2.736 |
| 47 | 3.757 | 3.455 | 3.310 | 3.103 | 2.931 | 2.744 |
| 48 | 3.768 | 3.464 | 3.319 | 3.111 | 2.940 | 2.753 |
| 49 | 3.779 | 3.474 | 3.329 | 3.120 | 2.948 | 2.760 |
| 50 | 3.789 | 3.483 | 3.336 | 3.128 | 2.956 | 2.768 |

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Use $T_1 = \frac{\bar{X} - X_1}{s}$ when testing the smallest value, $X_1$.

Use $T_n = \frac{X_n - \bar{X}}{s}$ when testing the largest value, $X_n$ in a sample of n observations. Unless one has prior information about largest values (or smallest values) the risk levels should be multiplied by two for application of the test.

TABLE F.2 (continued)

| Number of Observations n | Upper .1% Significance Level | Upper .5% Significance Level | Upper 1% Significance Level | Upper 2.5% Significance Level | Upper 5% Significance Level | Upper 10% Significance Level |
|---|---|---|---|---|---|---|
| 51 | 3.798 | 3.491 | 3.345 | 3.136 | 2.964 | 2.775 |
| 52 | 3.808 | 3.500 | 3.353 | 3.143 | 2.971 | 2.783 |
| 53 | 3.816 | 3.507 | 3.361 | 3.151 | 2.978 | 2.790 |
| 54 | 3.825 | 3.516 | 3.368 | 3.158 | 2.986 | 2.798 |
| 55 | 3.834 | 3.524 | 3.376 | 3.166 | 2.992 | 2.804 |
| 56 | 3.842 | 3.531 | 3.383 | 3.172 | 3.000 | 2.811 |
| 57 | 3.851 | 3.539 | 3.391 | 3.180 | 3.006 | 2.818 |
| 58 | 3.858 | 3.546 | 3.397 | 3.186 | 3.013 | 2.824 |
| 59 | 3.867 | 3.553 | 3.405 | 3.193 | 3.019 | 2.831 |
| 60 | 3.874 | 3.560 | 3.411 | 3.199 | 3.025 | 2.837 |
| 61 | 3.882 | 3.566 | 3.418 | 3.205 | 3.032 | 2.842 |
| 62 | 3.889 | 3.573 | 3.424 | 3.212 | 3.037 | 2.849 |
| 63 | 3.896 | 3.579 | 3.430 | 3.218 | 3.044 | 2.854 |
| 64 | 3.903 | 3.586 | 3.437 | 3.224 | 3.049 | 2.860 |
| 65 | 3.910 | 3.592 | 3.442 | 3.230 | 3.055 | 2.866 |
| 66 | 3.917 | 3.598 | 3.449 | 3.235 | 3.061 | 2.871 |
| 67 | 3.923 | 3.605 | 3.454 | 3.241 | 3.066 | 2.877 |
| 68 | 3.930 | 3.610 | 3.460 | 3.246 | 3.071 | 2.883 |
| 69 | 3.936 | 3.617 | 3.466 | 3.252 | 3.076 | 2.888 |
| 70 | 3.942 | 3.622 | 3.471 | 3.257 | 3.082 | 2.893 |
| 71 | 3.948 | 3.627 | 3.476 | 3.262 | 3.087 | 2.897 |
| 72 | 3.954 | 3.633 | 3.482 | 3.267 | 3.092 | 2.903 |
| 73 | 3.960 | 3.638 | 3.487 | 3.272 | 3.098 | 2.908 |
| 74 | 3.965 | 3.643 | 3.492 | 3.278 | 3.102 | 2.912 |
| 75 | 3.971 | 3.648 | 3.496 | 3.282 | 3.107 | 2.917 |
| 76 | 3.977 | 3.654 | 3.502 | 3.287 | 3.111 | 2.922 |
| 77 | 3.982 | 3.658 | 3.507 | 3.291 | 3.117 | 2.927 |
| 78 | 3.987 | 3.663 | 3.511 | 3.297 | 3.121 | 2.931 |
| 79 | 3.992 | 3.669 | 3.516 | 3.301 | 3.125 | 2.935 |
| 80 | 3.998 | 3.673 | 3.521 | 3.305 | 3.130 | 2.940 |
| 81 | 4.002 | 3.677 | 3.525 | 3.309 | 3.134 | 2.945 |
| 82 | 4.007 | 3.682 | 3.529 | 3.315 | 3.139 | 2.949 |
| 83 | 4.012 | 3.687 | 3.534 | 3.319 | 3.143 | 2.953 |
| 84 | 4.017 | 3.691 | 3.539 | 3.323 | 3.147 | 2.957 |
| 85 | 4.021 | 3.695 | 3.543 | 3.327 | 3.151 | 2.961 |
| 86 | 4.026 | 3.699 | 3.547 | 3.331 | 3.155 | 2.966 |
| 87 | 4.031 | 3.704 | 3.551 | 3.335 | 3.160 | 2.970 |
| 88 | 4.035 | 3.708 | 3.555 | 3.339 | 3.163 | 2.973 |
| 89 | 4.039 | 3.712 | 3.559 | 3.343 | 3.167 | 2.977 |
| 90 | 4.044 | 3.716 | 3.563 | 3.347 | 3.171 | 2.981 |
| 91 | 4.049 | 3.720 | 3.567 | 3.350 | 3.174 | 2.984 |
| 92 | 4.053 | 3.725 | 3.570 | 3.355 | 3.179 | 2.989 |
| 93 | 4.057 | 3.728 | 3.575 | 3.358 | 3.182 | 2.993 |
| 94 | 4.060 | 3.732 | 3.579 | 3.362 | 3.186 | 2.996 |
| 95 | 4.064 | 3.736 | 3.582 | 3.365 | 3.189 | 3.000 |
| 96 | 4.069 | 3.739 | 3.586 | 3.369 | 3.193 | 3.003 |
| 97 | 4.073 | 3.744 | 3.589 | 3.372 | 3.196 | 3.006 |
| 98 | 4.076 | 3.747 | 3.593 | 3.377 | 3.201 | 3.011 |
| 99 | 4.080 | 3.750 | 3.597 | 3.380 | 3.204 | 3.014 |
| 100 | 4.084 | 3.754 | 3.600 | 3.383 | 3.207 | 3.017 |

Source: Grubbs, F. E., and Beck, G., Extension of Sample Sizes and Percentage Points for Significance Tests of Outlying Observations, Technometrics, Vol. 14, No. 4, Nov. 1972, pp. 847-854.

tuations. If the $T_n$ is applied to the logarithms, the result is $T_n = \frac{5.16-4.41}{0.527} = 1.42$, which is not significant and which agrees with the Dixon ratio test. In many examples it will be obvious that a particular value is an outlier, whereas in Example F.1 this is not the case. A plot of the data is often helpful in examining a set of data.

After rejecting one outlier using either $T_n$ or $T_1$ the analyst may be faced with the problem of considering a second outlier. In this case the mean and standard deviation may be re-estimated and either $T_{n-1}$ or $T_1$ applied to the sample of n-1 measurements. However, the user should be aware that the test $T_n$ or $T_1$ is not theoretically based on repeated use.

Grubbs[2] gives a test procedure (including tables for the critical values) for simultaneously testing the two largest or two smallest values. This procedure is not given here.

The use of the procedures given in Table F.1 requires very little computation and would be preferable on a routine basis. Grubbs[3] gives a tutorial discussion of outliers and is a very good reference to the subject. A recent text on outliers is also recommended to the reader with some statistical background.[4]

One other procedure for data validation which has an advantage relative to the previous two procedures (Dixon and Grubbs) is the use of a statistical control chart.[5,6] The control chart is discussed in Appendix H and the reader is referred to that Appendix for details in application. The TSP data for a specific site for the years 1975 to 1977 for which there are five measurements per month are used as a historical data base for the control chart and the data for 1978 are plotted on the chart to indicate any questionable data. These data are shown in Table F.3 (historical data) and in Table F.4 (1978 data). Figure F.1 (upper part) is the control chart with both 2σ and 3σ limits for the averages.

$$\bar{\bar{X}} \text{ (average of the } \bar{X}\text{'s)} = 56.5\ \mu g/m^3$$

TABLE F.3. TSP DATA FROM SITE 397140014H01 SELECTED AS HISTORICAL DATA BASE FOR SHEWHART CONTROL CHART (1975-1977)

| Month-year | Mean ($\bar{X}$), $\mu g/m^3$ | Range (R), $\mu g/m^3$ | Month-year | Mean ($\bar{X}$), $\mu g/m^3$ | Range (R), $\mu g/m^3$ |
|---|---|---|---|---|---|
| 1-75 | 54.6 | 67 | 10-76 | 34.6 | 50 |
| 5-75 | 63.8 | 39 | 11-76 | 53.4 | 29 |
| 6-75 | 59.0 | 25 | 12-76 | 52.2 | 44 |
| 7-75 | 63.0 | 23 | 3-77 | 40.4 | 28 |
| 8-75 | 68.2 | 54 | 4-77 | 63.6 | 57 |
| 10-75 | 41.8 | 26 | 6-77 | 45.4 | 31 |
| 11-75 | 68.4 | 81 | 7-77 | 53.4 | 19 |
| 12-75 | 57.6 | 39 | 8-77 | 58.6 | 26 |
| 1-76 | 82.4 | 87 | 9-77 | 46.0 | 12 |
| 4-76 | 90.2 | 117 | 10-77 | 45.6 | 33 |
| 5-76 | 43.8 | 48 | 11-77 | 49.8 | 54 |
| 7-76 | 72.6 | 80 | 12-77 | 30.4 | 22 |
| 9-76 | 73.4 | 83 | | | |

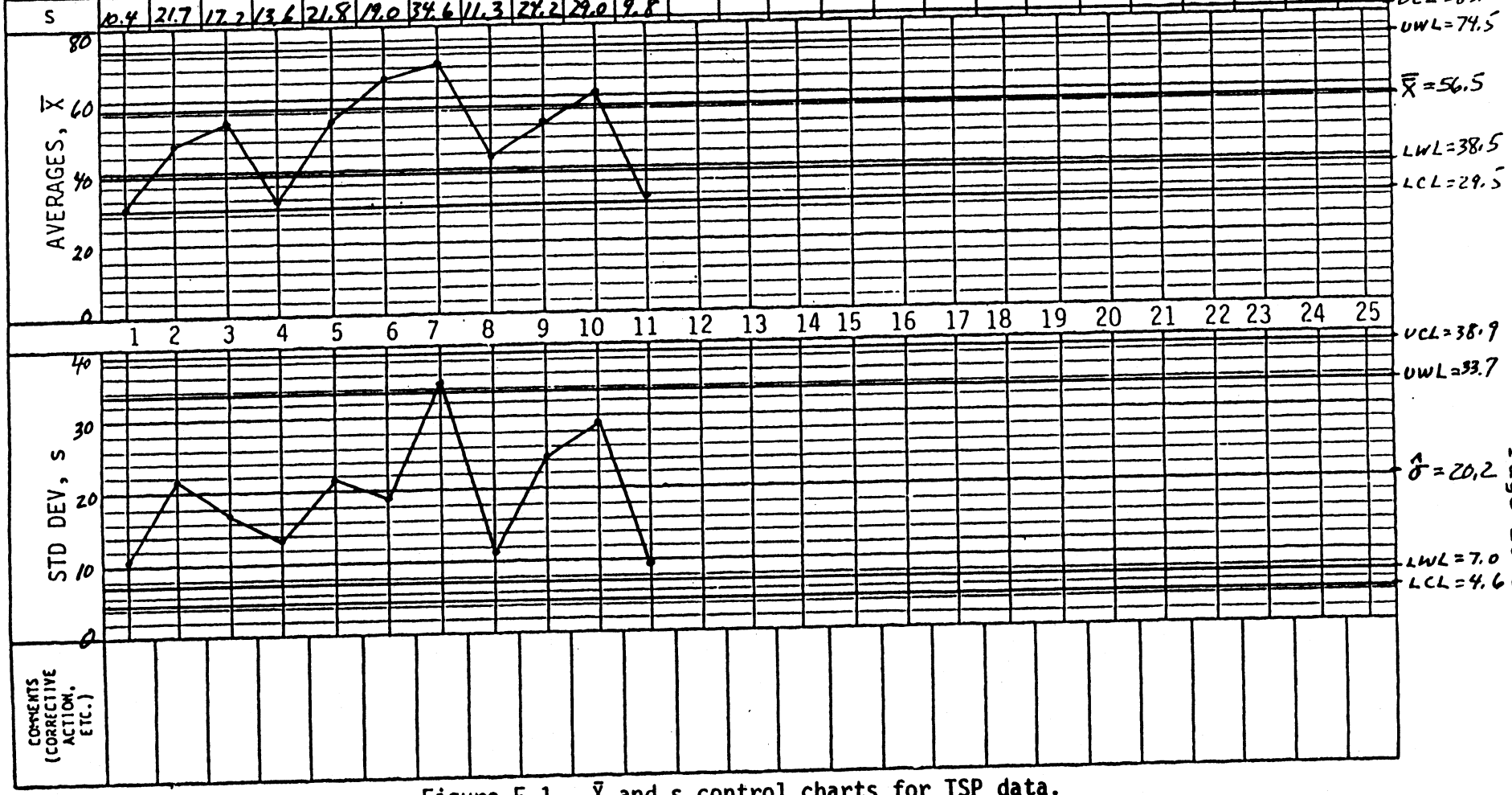
TABLE F.4. TSP DATA FROM SITE 397140014H01 FOR CONTROL CHART (1978)

| Data set | Month | Mean | Range | s |
|---|---|---|---|---|
| 1 | 1 | 30.6 | 27 | 10.4 |
| 2 | 2 | 47.4 | 60 | 21.7 |
| 3 | 3 | 54.4 | 39 | 17.2 |
| 4 | 4 | 31.8 | 29 | 13.6 |
| 5 | 5 | 53.6 | 46 | 21.8 |
| 6 | 6 | 64.8 | 46 | 19.0 |
| 7 | 8 | 68.8 | 87 | 34.6 |
| 8 | 9 | 43.2 | 31 | 11.3 |
| 9 | 10 | 52.4 | 59 | 24.2 |
| 10 | 11 | 60.8 | 71 | 29.0 |
| 11 | 12 | 31.6 | 22 | 9.8 |

$\bar{X}$ AND s CHART

PROJECT *Validation of TSP Data.* MEASUREMENT *Daily TSP at Site 39714001 4H01* UNITS *μg/m³*

| DATE/mo | 1 | 2 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MEASUREMENT CODE 1 | | | | | | | | | | | |
| MEASUREMENT CODE 2 | | | | | | | | | | | |
| MEASUREMENT CODE 3 | | | | | | | | | | | |
| MEASUREMENT RESULT 1 | | | | | | | | | | | |
| MEASUREMENT RESULT 2 | | | | | | | | | | | |
| MEASUREMENT RESULT 3 | | | | | | | | | | | |
| SUM | | | | | | | | | | | |
| $\bar{X}$ | 30.6 | 47.4 | 54.4 | 31.8 | 53.6 | 64.8 | 68.8 | 43.2 | 52.4 | 60.8 | 31.6 |
| s | 10.4 | 21.7 | 17.2 | 13.6 | 21.8 | 19.0 | 34.6 | 11.3 | 24.2 | 29.0 | 9.8 |




COMMENTS (CORRECTIVE ACTION, ETC.)

Figure F.1. $\bar{X}$ and s control charts for TSP data.

$\sigma_{\bar{X}}$ (standard deviation of the mean) = 9.0 $\mu g/m^3$
$UWL_{\bar{X}}$ (upper $2\sigma$ limit) = 74.5 $\mu g/m^3$
$LWL_{\bar{X}}$ (lower $2\sigma$ limit) = 38.5 $\mu g/m^3$
$UCL_{\bar{X}}$ ($3\sigma$) = 83.5 $\mu g/m^3$
$LCL_{\bar{X}}$ ($3\sigma$) = 29.5 $\mu g/m^3$

Figure F.1 shows three averages below the $LWL_{\bar{X}}$ ($2\sigma$ limit) and no values above the $UWL_{\bar{X}}$ ($2\sigma$ limit). No values are below the $3\sigma$ limit $LCL_{\bar{X}}$ ($3\sigma$). Hence we do not suspect any averages to be significantly different from the historical average and which would suggest further investigation.

Figure F.1 (lower part) is the control chart for the standard deviation.

$\bar{R}$ (average range) = 47.0
$\hat{\sigma}$ = 0.43 (47.0) = 20.2
$UWL_s$ (upper $2\sigma$ limit for s) = 33.7
$LWL_s$ (lower $2\sigma$ limit for s) = 7.0
$UCL_s$ (99.5 percentile) = 38.9
$LCL_s$ (0.5 percentile) = 4.6

There is a single outlier on this chart and this sample (one month of data--5 values) should be checked for factors which might explain the high value for the standard deviation. See Example F.1 for further discussion of this example relative to action taken after the flagging or identification of the questionable value. The same data were used in that example.

The advantage of the quality control chart approach is that not only are questionable values within a month detected, but also if all of the values for a month are high relative to values for other months, they will be flagged. The latter can result from personnel changes, instrument problems, calculation errors, and such changes will go undetected when comparing a single possible outlier within a data set. It is recommended that both test procedures (Dixon or Grubbs and the control chart) be used if resources permit, if not use the control chart technique.

## F.3 GUIDANCE ON SIGNIFICANCE LEVELS

The problem of selecting an appropriate level of significance in performing statistical tests for outliers is one of comparing two resulting costs. If the significance level is set too high (e.g., 0.10 or 0.20) there is the cost of investigating the data identified as questionable a relatively large proportion of the time that, in fact, the data are valid.[1] On the other hand, if the significance level is set too low (e.g., 0.005 or 0.001) invalid data may be missed and these data may be subsequently used in making incorrect decisions. This cost can also be large but is difficult to estimate. The person responsible for data validation must therefore seek an appropriate level based on these two costs. If the costs of checking the questionable data are small, it is better to err on the safe side and use $\alpha = 0.05$ or 0.10 say. Otherwise, a value of $\alpha = 0.01$ would probably be satisfactory for most applications. After experience is gained with the validation procedure, the $\alpha$ value should be adjusted as necessary to minimize the total cost (i.e., the cost of investigating outliers plus that of making incorrect decisions).

## F.4 REFERENCES

1. Dixon, W. J., Processing Data for Outliers, Biometrics, Vol. 9, No. 1, March 1953, pp. 74-89.

2. Grubbs, F. E. and Beck, G., Extension of Sample Sizes and Percentage Points for Significance Tests of Outlying Observations, Technometrics, Vol. 14, No. 4, November 1972, pp. 847-854.

3. Grubbs, F. E., Procedures for Detecting Outlying Observations in Samples, Technometrics, Vol. 11, No. 1, February 1969, pp. 1-21.

4. Barnett, V. and T. Lewis, Outliers in Statistical Data, John Wiley and Sons, New York, 1978.

5. US Environmental Protection Agency, Screening Procedures for Ambient Air Quality Data, EPA-450/2-78-037, July 1978.

# *APPENDIX B*

# *RAW FIELD DATA AND CALIBRATION DATA SHEETS*

# *Appendix B.1*

# *Raw Field Data Sheets*

# STACK GEOMETRY AND GAS VELOCITY DATA

| | |
|---|---|
| Date: 8/10/99 | Project No.: 26046-0030-00001 |
| Client: PG&E Generating | Sample Location: SDA INLET |
| Facility: Logan | Load Condition: |
| Run No.: Pre Vim F10 | Operator: S. Tibbetts |
| Barometric Pressure (in. Hg): 29.86 | Meterbox No.: 90343 Y = .974 |
| % Moisture: | Static (in. $H_2O$): (MM Hg) 24.0 |
| Pitot Tube ID: | Pitot Tube Coefficient: 0.84 |
| Post Leak Check: | Stack Diameter (in.): |
| Measurement Device: | Schematic of Stack Cross Section: |
| Micromanometer: | |
| 10" Manometer: X | |
| Magnehelic: | |
| Other: | |
| Explain: | |
| | Stack Diameters Upstream: |
| | Stack Diameters Downstream: |

| Time (24 hr. clock) | Sample Point | Stack Temp °F or °C | Manom. Reading in $H_2O$ | Cyclonic Flow Null Angle |
|---|---|---|---|---|
| ~~1725~~ 40 | 1-1 | 327 | .73 | |
| | 1-2 | 327 | .91 | |
| | 1-3 | 327 | .95 | |
| | 1-4 | 327 | .94 | |
| | 1-5 | 319 | .84 | |
| | 1-6 | 316 | .77 | |
| | 2-1 | 274 | .67 | 3 |
| | 2-2 | 260 | .72 | 5 |
| | 2-3 | 261 | .645 | 6 |
| | 2-4 | 276 | .53 | 2 |
| 25 | 2-5 | 270 | .45 | 1 |
| ~~1740~~ | 2-6 | 293 | ~~.253~~ .32 | 0 |

| Time (24 hr. clock) | Sample Point | Stack Temp °F or °C | Manom. Reading in $H_2O$ | Cyclonic Flow Null Angle |
|---|---|---|---|---|
| 1725 | 3-1 | 242 | .51 | 13.0 |
| | 3-2 | 243 | .55 | 6 |
| | 3-3 | 248 | .57 | 9 |
| | 3-4 | 245 | .47 | 10 |
| | 3-5 | 246 | .42 | 0 |
| | 3-6 | 263 | .31 | 4 |
| | 4-1 | 230 | .66 | +11 |
| | 4-2 | 238 | .67 | +10 |
| | 4-3 | 243 | .66 | +5 |
| | 4-4 | 242 | .68 | 2 |
| | 4-5 | 245 | .68 | 0 |
| 1710 | 4-6 | 251 | .59 | 0 |

ΔH@ 1.972

TRC

Lowell01.xls

# Field Moisture Determination

Client: US GEN
Location: Inlet
Run No.: Run #1

Project No.:
Date: 7/10/99
Operator: R. Rebello

## Data

| Minutes | Clock Time | Gas Meter cf vm | TM In | TM Out | Orifice In. $H_2O$ (+) | Vac. Gage In. Hg (-) |
|---|---|---|---|---|---|---|
| 105 | | 172.18 | 94 | 90 | 1.5 | 14.5 |
| ~~15~~ 120 | | 181.54 | 94 | 81 | 1.5 | 16 |
| ~~10~~ 135 | | 190.95 | 93 | 88 | 1.5 | 18 |
| 144 ~~15~~ ~~150~~ | | 196.535 | 92 | 88 | 1.5 | 19 |
| 20 | OUT OF STACK AT → | 197.425 | | | | |
| 25 | 18:05 | | | | | |
| 30 | | | | | | |
| Total/ Avg | | | | | | |

post Leak Check .000 CF in 60 sec @ 20 in Hg0

## Impingers

| | 1 | 2 | 3 |
|---|---|---|---|
| Final mL | | | |
| Initial mL | | | |
| Net mL | | | |

Total Moisture (Net mL + Net gm) =

## Silica Gel

Container No.
Final gm
Intial gm
Net gm

## Calculations

(1) PB =
(2) VM Net =
(3) TM Avg =

Meterbox No.: 90336
Y = DGM Calibration Factor = .979
TM + 460 =

(4) PM Avg = + Orifice in. $H_2O$ × $\frac{1}{13.6}$ = + orifice in.Hg.
= - Vacuum gage In. Hg (when meter is before pump)

(5) $VMSTD = \frac{528 \times VM \times (PB + PM) \times (Y)}{29.92 \times (TM + 460)}$ =
(6) VW = mL $H_2O$ + gm Silica Gel =
(7) VW Gas = VW × 0.04715 =

(8) $\%M = \frac{100 \times VW\ Gas}{VMSTD + VW\ Gas} = \frac{100 \times (\quad)}{(\quad) + (\quad)} = \frac{(\quad)}{(\quad)} =$

Lowell19.wpd

ΔH@ = 2.031

# Field Moisture Determination

Client: 05-GEN
Location: Inlet
Run No.: Run 1

Project No.:
Date: 8/10/99
Operator: R. Rodarello

## Data

| Minutes | Clock Time | Gas Meter cf vm | TM In | TM Out | Orifice In. $H_2O$ (+) | Vac. Gage In. Hg (-) |
|---|---|---|---|---|---|---|
| 0 | 15:36 | 100.172 | 82 | 82 | 2 | 6 |
| 15 | | 112.29 | 89 | 83 | 2 | 6.5 |
| 30 | | 123.30 | 94 | 84 | 2 | 8 |
| 45 | | 134.34 | 96 | 86 | 2 | 10 |
| 60 | | 144.02 | 97 | 89 | 1.5 | 10 |
| 75 | | 153.54 | 97 | 89 | 1.5 | 11 |
| 90 | | | 96 | 89 | 1.5 | 12 |
| Total/ Avg | | | | | | |

## Impingers

| | 1 | 2 | 3 |
|---|---|---|---|
| Final mL | 766.5 | 673.6 | 803.8 |
| Initial mL | 699.6 | 618.7 | 759.1 |
| Net mL | 66.9 | 54.9 | 44.7 |

Total Moisture (Net mL + Net gm) = 166.5

## Silica Gel

Container No.
Final gm
Intial gm
Net gm

## Calculations

(1) PB = 29.86
(2) VM Net = 96.363
(3) TM Avg = 90

Meterbox No.: 90336
Y = DGM Calibration Factor = .979
TM + 460 =

(4) PM Avg = + 1.6 Orifice in. $H_2O \times \frac{1}{13.6}$ = + orifice in.Hg.
= - Vacuum gage In. Hg (when meter is before pump)

(5) $VMSTD = \frac{528 \times VM \times (PB + PM) \times (Y)}{29.92 \times (TM + 460)}$ = 89.21 (PB + PM = 29.47)
(6) VW = mL $H_2O$ + gm Silica Gel = 166.5
(7) VW Gas = VW × 0.04715 = 7.85

(8) $\%M = \frac{100 \times VW\ Gas}{VMSTD + VW\ Gas} = \frac{100 \times (\quad)}{(\quad) + (\quad)} = \frac{(\quad)}{(\quad)}$ = 8.0%

Lowell19.wpd

# Sample Train Tracking Form

**Sample Train:** OH - Hg **Date:** 8/10/99

**Location:** Inlet **Run:** Field Blank

**Sample ID:** PG&E-OHM-I-FB

| | | | |
|---|---|---|---|
| **Train Set Up By:** | EMacKinnon | **Date:** 8/10/99 | **Time:** 1011 |
| **Transported to Location By:** | [illegible] | **Date:** 8/10/99 | **Time:** ~~1500~~ 1400 |
| **Received at Location By:** | [illegible] | **Date:** 8/10/99 | **Time:** 1410 |
| **Transported to Recovery Area By:** | [illegible] | **Date:** 8/10/99 | **Time:** 1730 |
| **Received at Recovery Area By:** | EMack | **Date:** 8/10/99 | **Time:** 1730 |
| **Train Recovered By:** | EMack | **Date:** 8/10/99 | **Time:** 1750 |

*Comments:*

Hg

# TRC ENVIRONMENTAL CORPORATION - ·KINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 26046-0030-00001
Client: PG&E
Facility: LOGAN STATION
Source: PC Boiler
Sample Location: OUTLET STACK
Stack Diameter: 168"
Date: 8/13/99
Run No.: ~~BLANK~~ PG&E-L-01AM-0-FB
Operator: TL/BRI
Meterbox No.: 90342
Meterbox ΔH @: 1.936
Y Factor: .982

VERY IMPORTANT - FILL IN ALL BLANKS
Read and Record at the Start of Each Test Point
SKETCH

NA

Sheet 1 of

Train Prepared By: E. McKinnon
Pitot Number and Side: P-1
Pitot Tube CP: .84
Filter No.: NA
Ambient Temp., °F: 84°
Bar. Pressure, In. Hg.: 29.86
Assumed Moisture, %: 14%
Heater Box Setting, °F:
Nozzle # / Dia., In.: L-37-G
Probe Length / Material:
Probe Heater Setting:

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. $H_2O$ ΔP | Orifice ΔH Inches $H_2O$ Desired | Orifice ΔH Inches $H_2O$ Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F °C Stack | Filter Box | Imp Temp | XAD Cond | Probe | Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1430 | | | | | | | | | | | | | | | |
| | 1700 | | | | | | | | | | | | | | | |
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Train Leak Check:

Comments:

Before Test: 0.000 CF in 1 min/60 Seconds at 14" In. Hg
After Test: 0.000 CF in 1 min/60 Seconds at 12" In. Hg

| | Initial | Final | | Static Pressure | | | |
|---|---|---|---|---|---|---|---|
| Pitot Tube Leak Check | ○ | ○ | Port | | | | |
| ORSAT Train Leak Check | ○ | ○ | Inches $H_2O$ | | | | |
| | | | Inches Hg | | | | |

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# SAMPLING TRAIN SETUP AND RECOVERY SHEET

| | | | Setup | Recovery |
|---|---|---|---|---|
| Project No.: | 26046 | Date: | 8/10/99 | 8/10/99 |
| Client: | PG&E | Run No.: | I - F13 | |
| Facility: | Logan | Train Type: | OH - Hg | |
| Source: | Inlet | Recovery Person: | [illegible] | |

**FRONT HALF**

| | | | | |
|---|---|---|---|---|
| Filter No.: | | | | Comments: |
| Thimble No.: | | | | |

| | | | | |
|---|---|---|---|---|
| XAD Trap No.: | | | | Comments: |
| XAD Final Wt. (g): | | | | |
| XAD Initial Wt.(g): | | | | |
| Net Collected (g): | | | | |

**IMPINGERS**

| Impinger No.: | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Reagent: 100ml's | KCl | KCl | KCl | $HNO_3/H_2O_2$ |
| Final Volume (ml / g): | 590.1 | 585.6 | 682.1 | 693.1 |
| Initial Volume (ml / g): | 590.1 | 585.6 | 682.1 | 693.1 |
| **Net Collected (ml / g):** | 0 | 0 | 0 | 0 |

| Impinger No.: | 5 | 6 | 7 | |
|---|---|---|---|---|
| Reagent: 100ml's | $KMnO_4$ | → | → | |
| Final Volume (ml / g): | 597.0 | 684.2 | 690.3 | |
| Initial Volume (ml / g): | 597.0 | 684.3 | 690.3 | |
| **Net Collected (ml / g):** | 0 | -0.1 | 0 | |

| Silica Gel Impinger: | 8 | | | |
|---|---|---|---|---|
| Final Volume (ml / g): | 744.6 | | | |
| Initial Volume (ml / g): | 743.9 | | | |
| **Net Collected (ml / g):** | .7 | | | |

**TOTAL MOISTURE (Impingers and Silica Gel) (g) =** 0.6

**TRC**

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# Sample Train Tracking Form

**Sample Train:** OH - Hg **Date:** 8/10/99

**Location:** Outlet **Run:** Field Blank

**Sample ID:** PG&E-OHM-O-FB

| | | | |
|---|---|---|---|
| **Train Set Up By:** | E MacKinnon | **Date:** 8/10/99 | **Time:** 1030 |
| **Transported to Location By:** | [illegible] | **Date:** 8/10/99 | **Time:** 14:00 |
| **Received at Location By:** | [illegible] | **Date:** 8/10/99 | **Time:** 1400 |
| **Transported to Recovery Area By:** | [illegible] | **Date:** 8/10/99 | **Time:** 16:30 |
| **Received at Recovery Area By:** | E MacKinnon | **Date:** 8/10/99 | **Time:** 1630 |
| **Train Recovered By:** | E MacKinnon | **Date:** 8/10/99 | **Time:** 1640 |

*Comments:*

Hg

# TRC ENVIRONMENTAL CORPORATION - KINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 26046-0030-00001
Client: PG&E
Facility: LOGAN GENERATING STATION
Source: PC-Boiler
Sample Location: SDA Inlet
Stack Diameter: 360 X 81
Date: 8/10/99
Run No.: ~~Field Blank~~ PG&E-L-GHM-I-FB
Operator:
Meterbox No.:
Meterbox ΔH @:
Y Factor:

VERY IMPORTANT - FILL IN ALL BLANKS
Read and Record at the Start of Each Test Point
SKETCH

Sheet 1 of
Train Prepared By: K. E. MacKinnon
Pitot Number and Side:
Pitot Tube CP:
Filter No.: NA
Ambient Temp., °F: 85°
Bar. Pressure, In. Hg.: ~~Sum~~ 29.86
Assumed Moisture, %: NA
Heater Box Setting, °F: 250
Nozzle # / Dia., In.: ~~0.218~~ mm 0.217 L-7
Probe Length / Material:
Probe Heater Setting:

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. $H_2O$ ΔP | Orifice ΔH Inches $H_2O$ Desired | Orifice ΔH Inches $H_2O$ Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F °C Stack | Filter Box | Imp Temp | XAD Cond | Probe | Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | |
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Train Leak Check:

Comments:

Before Test: _____ CF in _____ Seconds at _____ In. Hg
After Test: _____ CF in _____ Seconds at _____ In. Hg

| | Initial | Final | | Static Pressure | | | |
|---|---|---|---|---|---|---|---|
| Pitot Tube Leak Check | ○ | ○ | Port | | | | |
| ORSAT Train Leak Check | ○ | ○ | Inches $H_2O$ | | | | |
| | | | Inches Hg | | | | |

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# SAMPLING TRAIN SETUP AND RECOVERY SHEET

| | | | Setup | Recovery |
|---|---|---|---|---|
| Project No.: | 26046 | Date: | 8/10/99 | 8/10/99 |
| Client: | PG&E | Run No.: | O - FB | |
| Facility: | Logan | Train Type: | OH - Hg | |
| Source: | Outlet | Recovery Person: | [illegible] | |

**FRONT HALF**

| | | | | |
|---|---|---|---|---|
| Filter No.: | | | | Comments: |
| Thimble No.: | | | | |

| | | | | |
|---|---|---|---|---|
| XAD Trap No.: | | | | Comments: |
| XAD Final Wt. (g): | | | | |
| XAD Initial Wt.(g): | | | | |
| Net Collected (g): | | | | |

**IMPINGERS**

| Impinger No.: | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Reagent: 100ml/s | KCl | KCl | KCl | $HNO_3/H_2O_2$ |
| Final Volume (ml / g): | 643.3 | 626.7 | 620.9 | 600.0 |
| Initial Volume (ml / g): | 643.3 | 626.8 | 620.8 | 600.0 |
| **Net Collected (ml / g):** | 0.0 | -0.1 | 0.1 | 0.0 |

| Impinger No.: | 5 | 6 | 7 | |
|---|---|---|---|---|
| Reagent: 100ml/s | $KMnO_4$ | → | → | |
| Final Volume (ml / g): | 626.9 | 620.3 | 697.0 | |
| Initial Volume (ml / g): | 627.1 | 620.3 | 697.0 | |
| **Net Collected (ml / g):** | -0.2 | 0.0 | 0.0 | |

| Silica Gel Impinger: | 8 | | | |
|---|---|---|---|---|
| Final Volume (ml / g): | 869.7 | | | |
| Initial Volume (ml / g): | 869.5 | | | |
| **Net Collected (ml / g):** | 0.2 | | | |

**TOTAL MOISTURE (Impingers and Silica Gel) (g) =** 0.0

**TRC**

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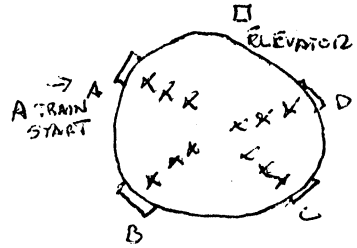
# TRC ENVIRONMENTAL CORPORATION - KINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 26046-0030-00001
Client: PG&E
Facility: LOGAN STATION
Source: AC Boiler
Sample Location: 5x Exhaust STACK
Stack Diameter: 168"
Date: 8/11/99
Run No.: PG-E-OHM-0-a-1
Operator: T. LUNDIN
Meterbox No.: 90339 90339
Meterbox ΔH @: 1.964 1.939
Y Factor: .987 0.974

VERY IMPORTANT - FILL IN ALL BLANKS
Read and Record at the Start of Each Test Point

SKETCH




Sheet 1 of 2
Train Prepared By: Ed Muckinovic
Pitot Number and Side: 200
Pitot Tube CP: .84
Filter No.: NA
Ambient Temp., °F: 86
Bar. Pressure, In. Hg.: 29.70
Assumed Moisture, %: 14%
Heater Box Setting, °F: 248 +/- 25
Nozzle # / Dia., In.: L-3-G .192
Probe Length / Material: 6' GLASS
Probe Heater Setting: 248 +/- 25

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures (°F) Stack | Filter Box | Imp Temp | XAD Cond | Probe | Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1A | 945 | 0 | 645.865 | 1.25 | 1.45 | 1.45 | 86 | 85 | 4 | BLUE | 188 | 243 | 67 | NA | 236 | 145 |
| | | 6 | 649.25 | 1.25 | 1.45 | 1.45 | 86 | 85 | 4 | ✓ | 188 | 242 | 62 | \| | 235 | 224 |
| 2A | | 12 | 652.01 | 1.20 | 1.38 | 1.38 | 89 | 87 | 4 | ✓ | 188 | 244 | 60 | \| | 236 | 218 |
| | | 18 | 655.0 | 1.20 | 1.38 | 1.38 | 91 | 87 | 4 | ✓ | 188 | 236 | 60 | | 236 | 223 |
| 3A | | 24 | 658.01 | 1.20 | 1.38 | 1.38 | 95 | 90 | 4 | ✓ | 188 | 241 | 61 | | 237 | 210 |
| | | 30 | 661.02 | 1.20 | 1.38 | 1.38 | 98 | 92 | 4 | ✓ | 188 | 236 | 62 | | 236 | 214 |
| 1B | | 36 | ~~664.326~~ 226.113 | 1.25 | 1.38 | 1.38 | 79 | 79 | 4 | ✓ | 187 | 241 | 65 | | 237 | 220 |
| | | 42 | 229.71 | 1.25 | 1.38 | 1.38 | 84 | 80 | 4 | ✓ | 188 | 238 | 60 | | 237 | 221 |
| 2B | | 48 | 233.2 | 1.25 | 1.38 | 1.38 | 90 | 83 | 4 | ✓ | 188 | 236 | 57 | | 236 | 220 |
| | | 54 | 236.8 | 1.25 | 1.38 | 1.38 | 95 | 86 | 4 | ✓ | 188 | 238 | 58 | | 237 | 219 |
| 3B | | 60 | 240.5 | 1.15 | 1.27 | 1.27 | 99 | 90 | 4 | ✓ | 188 | 234 | 59 | | 236 | 221 |
| | | 66 | 244.2 | 1.20 | 1.33 | 1.33 | 102 | 93 | 4 | ✓ | 188 | 236 | 60 | | 237 | 218 |
| 1C | | 72 | 247.763 | 1.65 | 1.82 | 1.82 | 99 | 99 | 5 | ✓ | 189 | 236 | 66 | | 234 | 228 |
| | | 78 | 253.5 | 1.65 | 1.82 | 1.82 | 99 | 99 | 5 | ✓ | 188 | 233 | 55 | | 237 | 218 |

Train Leak Check:

Before Test: 0.000 CF in 60 Seconds at 16" In. Hg
After Test: 0.000 CF in 60 Seconds at 12" In. Hg

Static Pressure 0.18

| | Initial | Final | Port | | | | |
|---|---|---|---|---|---|---|---|
| Pitot Tube Leak Check | ✓ | ✓ | Inches H₂O | 4" | | | |
| ORSAT Train Leak Check | ✓ | ✓ | Inches Hg | | | | |

Comments:
* SWITCHED OUT METER BOX AFTER PORT A (STICKY METER)
NEW BEG. VOLUME = 226.113
MB # 90332

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# TRC ENVIRONMENTAL CORPORATION - IS INETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 26046-0030-00001
Client: PG&E
Facility: Logan Station
Source: PC Boiler

Date: 8/4/99
Run No.: PG&E-OHM-O-a-1
Sample Location: Exhaust STACK
Operator: Tillman

Sheet 2 of 2

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F Stack | Temperatures °F Filter Box | Temperatures °F Imp Temp | Temperatures °F XAD Cond | Temperatures °C Probe | Temperatures °C Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2c | | 84 | 256.51 | 1.6 | 1.76 | 1.76 | 101 | 99 | 5 | ✓ | 187 | 241 | 55 | N | 239 | 220 |
| | | 90 | 260.82 | 1.6 | 1.76 | 1.76 | 104 | 99 | 5 | ✓ | 188 | 236 | 56 | | 238 | 219 |
| 3c | | 96 | 264.91 | 1.65 | 1.82 | 1.82 | 106 | 101 | 5 | ✓ | 188 | 239 | 56 | | 234 | 219 |
| | | 102 | 269.24 | 1.6 | 1.76 | 1.76 | 108 | 102 | 5 | ✓ | 189 | 235 | 57 | | 239 | 220 |
| 1D | 1324 | 108 | 273.63 | 1.6 | 1.76 | 1.76 | 107 | 105 | 5 | ✓ | 187 | 236 | 66 | | 237 | 220 |
| | | 114 | 277.82 | 1.6 | 1.76 | 1.76 | 106 | 103 | 5 | ✓ | 189 | 237 | 57 | | 239 | 218 |
| 2D | | 120 | 282.28 | 1.6 | 1.76 | 1.76 | 106 | 104 | 5 | ✓ | 191 | 238 | 52 | | 242 | 220 |
| | | 126 | 286.37 | 1.6 | 1.76 | 1.76 | 108 | 106 | 5 | ✓ | 190 | 241 | 52 | | 239 | 213 |
| 3D | 1334 | 132 | 290.64 | 1.5 | 1.65 | 1.65 | 110 | 107 | 5 | ✓ | 190 | 243 | 52 | | 237 | 212 |
| | 1417 | 138 | 294.81 | 1.55 | 1.70 | 1.70 | 108 | 108 | 5 | | 189 | 242 | 58 | | 234 | 221 |
| | 1427 | 144 | 298.953 | | | | | | | | | | | | | |
| | | | 72.840 | | | | | | | | | | | | | |
| | | + | 18.461 | | | | | | | | | | | | | |
| | | | 91.301 | | | | | | | | | | | | | |

Meter Leak Check During Test:

0. CF in _____ Seconds at _____ In. Hg _____
_____ CF in _____ Seconds at _____ In. Hg _____

Meter Reading: Stop _____ Start _____

Comments: 1334 STOP (INLET STOPPED)
1417 RESTART

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# SAMPLING TRAIN SETUP AND RECOVERY SHEET

| | | | Setup | Recovery |
|---|---|---|---|---|
| Project No.: | 26046 | Date: | 8/10/99 | 8/11/99 |
| Client: | PG&E | Run No.: | Outlet | 1A |
| Facility: | Logan | Train Type: | OH-Hg | |
| Source: | Outlet | Recovery Person: | [illegible] | |

**FRONT HALF**

| | | | | |
|---|---|---|---|---|
| Filter No.: | Q34 | | | Comments: |
| Thimble No.: | | | | |

| | | | | |
|---|---|---|---|---|
| XAD Trap No.: | | | | Comments: |
| XAD Final Wt. (g): | | | | |
| XAD Initial Wt.(g): | | | | |
| Net Collected (g): | | | | |

**IMPINGERS**

| Impinger No.: | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Reagent: 100ml's → | KCl | KCl | KCl | $HNO_3/H_2O_2$ |
| Final Volume (ml / g): | 901.0 | 739.8 | 699.5 | 709.6 |
| Initial Volume (ml / g): | 706.6 | 694.4 | 688.1 | 707.3 |
| **Net Collected (ml / g):** | 194.4 | 45.4 | 11.4 | 2.3 |

| Impinger No.: | 5 | 6 | 7 | |
|---|---|---|---|---|
| Reagent: 100ml's → | $KMnO_4$ | → | → | |
| Final Volume (ml / g): | 712.5 | 715.5 | 695.9 | |
| Initial Volume (ml / g): | 711.4 | 717.0 | 693.8 | |
| **Net Collected (ml / g):** | 1.1 | -2.5 | 2.1 | |

| Silica Gel Impinger: | 8 | | | |
|---|---|---|---|---|
| Final Volume (ml / g): | 777.4 | ~~ab~~ ~50% | spent | |
| Initial Volume (ml / g): | 757.7 | | | |
| **Net Collected (ml / g):** | 19.7 | | | |

**TOTAL MOISTURE (Impingers and Silica Gel) (g) =** 274.9

**TRC**

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# ORSAT ANALYSIS

| | | | |
|---|---|---|---|
| **Project No.** | 26046-0030-00001 | **Date** | 8/11/99 |
| **Client** | PG&E | **Run** | PGE-OHM-O-a-1 |
| **Facility** | Logan Station | **Operator** | Michael Martin |
| **Source** | PC Boiler | **Comments** | |
| **Location** | Stack exhaust | | |

**Orsat Leak Checked** (yes) / no

**Purge System with Sample Gas** (yes) / no

**Ambient Air Check** $CO_2$ _____ $O_2$ _____.

**Audit Gas Check (measured/actual):** $CO_2$ ___/___ $O_2$ ___/___ CO ___/___

**Expiration Date of Reagents** ___/___/___

| Sample Point | Time | $CO_2$ Reading 1 | $O_2$ Reading 2 | | CO Reading 3 | | $F_o$ |
|---|---|---|---|---|---|---|---|
| | | | Actual | Net | Actual | Net | |
| 1 | 1943 | 14.0 | 19.3 | 5.3 | NA | NA | 1.114 |
| 2 | 1951 | 14.0 | 19.3 | 5.3 | NA | NA | 1.114 |
| 3 | 1958 | 14.0 | 19.3 | 5.3 | NA | NA | 1.114 |
| | | | | | | | |
| | | | | | | | |

Net $O_2$ Reading = Reading 2 - Reading 1 (Actual)
Net CO Reading = Reading 3 - Reading 2 (Actual)

**QC Validation**

Calculate $F_o$

$$F_o = \frac{20.9 - \%O_2}{\%CO_2}$$

Fuel _____
Reported $F_o$ _____

**Expected $F_o$ Ranges**

| | |
|---|---|
| Anthracite/Lignite | 1.015 - 1.130 |
| Bituminous | 1.083 - 1.230 |
| Distillate Oil | 1.260 - 1.413 |
| Residual Oil | 1.210 - 1.370 |
| Natural Gas | 1.600 - 1.836 |
| Wood Bark | 1.000 - 1.120 |
| Municipal Garbage | 1.043 - 1.177 |

Other _____

# Sample Train Tracking Form

**Sample Train:** OH - Hg

**Date:** 8/11/99

**Location:** Outlet

**Run:** 1 A

**Sample ID:** PG&E-OHM-Oa-1

| | | | |
|---|---|---|---|
| **Train Set Up By:** | EMacK | **Date:** 8/11/99 | **Time:** 0753 |
| **Transported to Location By:** | R Nixon | **Date:** [illegible] | **Time:** 0700 |
| **Received at Location By:** | [illegible] | **Date:** 8/11/99 | **Time:** 0810 |
| **Transported to Recovery Area By:** | R Nixon | **Date:** 8/11/99 | **Time:** 1505 |
| **Received at Recovery Area By:** | [illegible] | **Date:** 8/11/99 | **Time:** 1506 |
| **Train Recovered By:** | [illegible] | **Date:** 8/11/99 | **Time:** 1530 |

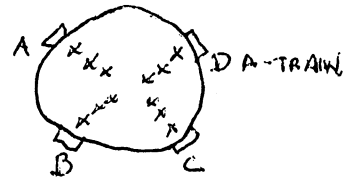
*Comments:*

Hg

# TRC ENVIRONMENTAL CORPORATION - KINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 26046-0030-00001
Client: PG&E
Facility: LOWDEN STATION
Source: PC BOILER
Sample Location: EXHAUST STACK
Stack Diameter: 168"
Date: 8/11/99
Run No.: PG&E-OHM-0-A-2
Operator: T. LUNDINE
Meterbox No.: 90338
Meterbox ΔH @: ~~1.911~~ 1.939
Y Factor: ~~.991~~ 0.974

VERY IMPORTANT - FILL IN ALL BLANKS
Read and Record at the Start of Each Test Point
SKETCH




Sheet 1 of 2
Train Prepared By: ED MUCKINOWN
Pitot Number and Side: 200
Pitot Tube CP: .84
Filter No.: NA
Ambient Temp., °F: 86
Bar. Pressure, In. Hg.: ~~29.70~~ 29.90
Assumed Moisture, %: 14%
Heater Box Setting, °F: 248 +/- 25
Nozzle # / Dia., In.: L-3-G .192
Probe Length / Material: 6' GLASS
Probe Heater Setting: 248 +/- 25

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP (1.65) | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F Stack | Temperatures °F Filter Box | Temperatures °F Imp Temp | Temperatures °F XAD Cond | Temperatures °F Probe | Temperatures °F Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1D | 16:15 | 0 | 305.963 | 1.85 | 1.82 | 1.82 | 105 | 105 | 5.0 | GOOD | 189 | 238 | 66 | NA | 236 | 212 |
| | | 6 | 310.17 | 1.6 | 1.76 | 1.75 | 109 | 107 | 5.0 | | 188 | 242 | 60 | | 236 | 218 |
| 2D | | 12 | 314.44 | 1.6 | 1.76 | 1.75 | 111 | 108 | 5.0 | | 188 | 239 | 57 | | 241 | 219 |
| | | 18 | 318.62 | 1.6 | 1.76 | 1.75 | 113 | 109 | 5.0 | | 189 | 241 | 58 | | 237 | 220 |
| 3D | | 24 | 322.81 | 1.6 | 1.76 | 1.75 | 114 | 110 | 5.0 | | 189 | 244 | 60 | | 237 | 218 |
| | | 30 | 327.00 | 1.6 | 1.76 | 1.75 | 115 | 111 | 5.0 | | 189 | 238 | 63 | | 241 | 219 |
| 1B | 17:13 | 36 | 331.21 | 1.65 | 1.82 | 1.8 | 114 | 112 | 5.0 | | 189 | 239 | 67 | | 240 | 217 |
| | | 42 | 335.52 | 1.6 | 1.76 | 1.75 | 114 | 113 | 5.0 | | 188 | 241 | 58 | | 237 | 212 |
| 2B | | 48 | 339.73 | 1.65 | 1.82 | 1.8 | 116 | 113 | 5.0 | | 187 | 238 | 57 | | 239 | 214 |
| | | 54 | 343.82 | 1.65 | 1.82 | 1.8 | 115 | 114 | 5.0 | | 188 | 239 | 60 | | 241 | 217 |
| 3B | | 60 | 348.10 | 1.55 | 1.71 | 1.7 | 115 | 114 | 5.0 | | 188 | 238 | 60 | | 242 | 218 |
| | | 66 | 352.30 | 1.55 | 1.71 | 1.7 | 115 | 111 | 5.0 | | 189 | 235 | 61 | | 240 | 217 |
| 1A | ~~17:49~~ / 18:01 | 72 | 356.21 / 356.519 | 1.4 | 1.54 | 1.55 | 115 | 111 | 5.0 | | 188 | 239 | 66 | | 243 | 210 |
| | | 78 | 360.73 | 1.4 | 1.54 | 1.55 | 108 | 107 | 5.0 | | 189 | 240 | 62 | | 239 | 211 |

Train Leak Check:
Before Test: ~~.000~~ 0.008 CF in ~~60~~ 60 Seconds at ~~12~~ 15" In. Hg
After Test: 0.004 CF in 60 Seconds at 12" In. Hg

Static Pressure ⊖.18

Comments:

| | Initial | Final | Port | D | C | B | A |
|---|---|---|---|---|---|---|---|
| Pitot Tube Leak Check | ✓ | ✓ | Inches H₂O | .18 | .18 | .17 | .17 |
| ORSAT Train Leak Check | ✓ | ✓ | Inches Hg | | | | |

lowell02.wp

# TRC ENVIRONMENTAL CORPORATION - ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 26046-0030-00001
Client: PG&E
Facility: LOGAN STATION
Source: PC BOILER

Date: 8/1/99
Run No.: PG&E-OHM-A-2
Sample Location: EXHAUST STACK
Operator: T. LUNDIN

Sheet 2 of 2

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F Stack | Temperatures °F Filter Box | Temperatures °F Imp Temp | Temperatures °F XAD Cond | Temperatures °F Probe | Temperatures °F Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2B | | 84 | 364.61 | 1.4 | 1.54 | 1.55 | 108 | 106 | 5.0 | Good | 190 | 238 | 58 | NA | 241 | 210 |
| | | 90 | 368.54 | 1.4 | 1.54 | 1.55 | 109 | 105 | 5.0 | | 190 | 239 | 59 | | 242 | 212 |
| 3B | | 96 | 372.76 | 1.15 | 1.27 | 1.25 | 110 | 107 | 4.0 | | 189 | 242 | 60 | | 240 | 211 |
| | | 102 | 376.10 | 1.15 | 1.27 | 1.25 | 111 | 108 | 4.0 | | 189 | 239 | 62 | | 244 | 210 |
| 1A | ~~1845~~ 1900 | 108 | 379.77 / 380.095 | 1.3 | 1.43 | 1.45 | 112 | 108 | 4.0 | | 189 | 242 | 66 | | 238 | 214 |
| | | 114 | 383.63 | 1.3 | 1.43 | 1.45 | 108 | 107 | 4.5 | | 190 | 240 | 60 | | 239 | 213 |
| 2A | | 120 | 387.32 | 1.25 | 1.38 | 1.4 | 110 | 107 | 4.5 | | 189 | 237 | 61 | | 241 | 215 |
| | | 126 | 391.21 | 1.25 | 1.38 | 1.4 | 111 | 108 | 4.5 | | 189 | 235 | 62 | | 239 | 213 |
| 3A | | 132 | 394.80 | 1.2 | 1.32 | 1.3 | 112 | 108 | 4.0 | | 190 | 238 | 62 | | 240 | 209 |
| | | 138 | 398.53 | 1.25 | 1.32 | 1.4 | 112 | 108 | 4.0 | | 190 | 237 | 64 | | 241 | 210 |
| | 1936 | 144 | 402.328 | | | | | | | | | | | | | |

96.365

Meter Leak Check During Test:

_____ CF in _____ Seconds at _____ In. Hg _____
_____ CF in _____ Seconds at _____ In. Hg _____

Meter Reading: Stop _____ Start _____

Comments:

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# SAMPLING TRAIN SETUP AND RECOVERY SHEET

| | | | Setup | Recovery |
|---|---|---|---|---|
| Project No.: | 26046 | Date: | 8/11/99 | 8/11/99 |
| Client: | PG&E | Run No.: | 2 A | |
| Facility: | Logan | Train Type: | OH-Hg | |
| Source: | Outlet | Recovery Person: | Gm | |

**FRONT HALF**

| | | | | |
|---|---|---|---|---|
| Filter No.: | | | | Comments: |
| Thimble No.: | | | | |

| | | | | |
|---|---|---|---|---|
| XAD Trap No.: | | | | Comments: |
| XAD Final Wt. (g): | | | | |
| XAD Initial Wt.(g): | | | | |
| Net Collected (g): | | | | |

**IMPINGERS**

| Impinger No.: | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Reagent: 100ml/s→ | KCl | KCl | KCl | $HNO_3/H_2O_2$ |
| Final Volume (ml / g): | 851.4 | 653.8 | 626.9 | 597.7 |
| Initial Volume (ml / g): | 642.5 | 626.7 | 622.6 | 598.6 |
| **Net Collected (ml / g):** | 208.9 | 27.1 | 4.3 | -0.9 |

| Impinger No.: | 5 | 6 | 7 | |
|---|---|---|---|---|
| Reagent: 100ml/s→ | $KMnO_4$ | → | → | |
| Final Volume (ml / g): | 629.3 | 624.5 | 704.6 | |
| Initial Volume (ml / g): | 627.7 | 624.7 | 700.5 | |
| **Net Collected (ml / g):** | 1.6 | -0.2 | 4.1 | |

| Silica Gel Impinger: | 8 | | | |
|---|---|---|---|---|
| Final Volume (ml / g): | 891.3 | ~50% Spent | | |
| Initial Volume (ml / g): | 869.6 | | | |
| **Net Collected (ml / g):** | 21.7 | | | |

**TOTAL MOISTURE (Impingers and Silica Gel) (g) =** 266.6

**TRC**

lowell03.wp

# ORSAT ANALYSIS

| | | | |
|---|---|---|---|
| Project No. | 26046-0030-00001 | Date | 8/11/99 |
| Client | PG&E | Run | ~~OHM~~ PGE-OHM-L-O-a-2 |
| Facility | Logan | Operator | Michael Martin |
| Source | PC Boiler | Comments | |
| Location | Exhaust Stack. | | |

Orsat Leak Checked (yes) / no

Purge System with Sample Gas (yes) / no

Ambient Air Check $CO_2$ 0.0 $O_2$ 21.0.

Audit Gas Check (measured/actual): $CO_2$ / $O_2$ / CO /

Expiration Date of Reagents / /

| Sample Point | Time | $CO_2$ Reading 1 | $O_2$ Reading 2 | | CO Reading 3 | | $F_o$ |
|---|---|---|---|---|---|---|---|
| | | | Actual | Net | Actual | Net | |
| 1 | 8/12/99 0715 | 13.9 | 19.0 | 5.1 | | | 1.137 |
| | 0722 | 13.9 | 19.0 | 5.1 | | | |
| | 0728 | 13.8 | 19.0 | 5.2 | | | |
| | | | | | | | |
| | | | | | | | |

Net $O_2$ Reading = Reading 2 - Reading 1 (Actual)
Net CO Reading = Reading 3 - Reading 2 (Actual)

**QC Validation**

Calculate $F_o$

$$F_o = \frac{20.9 - \%\,O_2}{\%\,CO_2}$$

Fuel _____
Reported $F_o$ _____

**Expected $F_o$ Ranges**

| | |
|---|---|
| Anthracite/Lignite | 1.015 - 1.130 |
| Bituminous | 1.083 - 1.230 |
| Distillate Oil | 1.260 - 1.413 |
| Residual Oil | 1.210 - 1.370 |
| Natural Gas | 1.600 - 1.836 |
| Wood Bark | 1.000 - 1.120 |
| Municipal Garbage | 1.043 - 1.177 |

Other _____

# Sample Train Tracking Form

**Sample Train:** OH - Hg **Date:** 8/11/99

**Location:** Outlet **Run:** 2A

**Sample ID:** PG&E-OHM-Oa-2

| | | | |
|---|---|---|---|
| **Train Set Up By:** | EMP | **Date:** 8/11/99 | **Time:** 1010 |
| **Transported to Location By:** | Sam Lundi | **Date:** 8/11/99 | **Time:** 1300 |
| **Received at Location By:** | Sam Lundi | **Date:** 8/11/99 | **Time:** 1305 |
| **Transported to Recovery Area By:** | [illegible] | **Date:** 8/11/99 | **Time:** 2003 |
| **Received at Recovery Area By:** | EMP | **Date:** 8/11/99 | **Time:** 2005 |
| **Train Recovered By:** | EMP | **Date:** 8/11/99 | **Time:** 2010 |

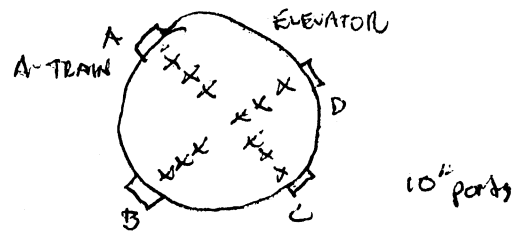
*Comments:*

Hg

# TRC ENVIRONMENTAL CORPORATION - KINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 260046-0030-00001
Client: PG & E
Facility: LOGAN STATION
Source: PC BOILER
Sample Location: OUTLET STACK
Stack Diameter: 168"
Date: 8-12-99
Run No.: 3A
Operator: T. LINGIN
Meterbox No.: 90338
Meterbox ΔH @: ~~1.911~~ 1.939
Y Factor: ~~.991~~ 0.974

VERY IMPORTANT - FILL IN ALL BLANKS
Read and Record at the Start of Each Test Point
SKETCH




Sheet 1 of 2
Train Prepared By: ED MULKINON
Pitot Number and Side: 200
Pitot Tube CP: .84
Filter No.: NA
Ambient Temp., °F: 85
Bar. Pressure, In. Hg.: 29.86
Assumed Moisture, %: 12%
Heater Box Setting, °F: 248 +/-25
Nozzle # / Dia., In.: L-3-G .192
Probe Length / Material: 6' GLASS
Probe Heater Setting: 248 +/-25

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F Stack | Temperatures °F Filter Box | Temperatures °F Imp Temp | Temperatures °F XAD Cond | Temperatures °C Probe | Temperatures °C Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1A | 835 | 0 | 402.616 | 1.25 | 1.38 | 1.4 | 88 | 87 | 4.5 | GOOD | 188 | 235 | 66 | NA | 236 | 140 |
| | | 6 | 406.32 | 1.25 | 1.38 | 1.4 | 89 | 87 | 4.5 | | 190 | 238 | 60 | | 238 | 188 |
| 2A | | 12 | 409.81 | 1.3 | 1.43 | 1.43 | 91 | 88 | 4.5 | | 190 | 240 | 57 | | 238 | 219 |
| | | 18 | 413.22 | 1.3 | 1.43 | 1.43 | 93 | 89 | 4.5 | | 196 | 242 | 59 | | 236 | 220 |
| 3A | | 24 | 417.01 | 1.1 | 1.21 | 1.2 | 96 | 90 | 4.0 | | 190 | 237 | 62 | | 236 | 220 |
| | | 30 | 420.72 | 1.15 | 1.27 | 1.3 | 98 | 92 | 4.0 | | 189 | 241 | 64 | | 238 | 218 |
| 1B | 911/926 | 36 | ~~424.231~~ 424.315 | 1.25 | 1.38 | 1.4 | 95 | 95 | 4.5 | | 188 | 238 | 66 | | 241 | 154 |
| | | 42 | 427.97 | 1.25 | 1.38 | 1.4 | 99 | 96 | 4.5 | | 191 | 237 | 60 | | 239 | 220 |
| 2B | | 48 | 431.68 | 1.25 | 1.38 | 1.4 | 102 | 97 | 4.5 | | 189 | 240 | 57 | | 241 | 221 |
| | | 54 | 435.36 | 1.2 | 1.32 | 1.3 | 104 | 98 | 4.5 | | 188 | 238 | 58 | | 244 | 220 |
| 3B | | 60 | 438.89 | 1.2 | 1.32 | 1.3 | 105 | 99 | 4.5 | | 190 | 241 | 59 | | 240 | 222 |
| | | 66 | 442.45 | 1.2 | 1.32 | 1.3 | 105 | 100 | 4.5 | | 190 | 237 | 63 | | 239 | 220 |
| 1C | 1003/1023 | 72 | ~~446.033~~ 446.130 | 1.25 | 1.38 | 1.4 | 100 | 99 | 4.5 | | 187 | 240 | 65 | | 236 | 150 |
| | | 78 | 449.37 | 1.25 | 1.38 | 1.4 | 101 | 105 | 4.5 | | 188 | 242 | 60 | | 240 | 220 |

Train Leak Check:

Comments:

Before Test: 0.000 CF in 60 Seconds at 16" In. Hg
After Test: 0.0001 CF in 60 Seconds at 13" In. Hg

| | Initial | Final | Port | A | B | C | D |
|---|---|---|---|---|---|---|---|
| Pitot Tube Leak Check | ✓ | ✓ | Inches H₂O | ⊖ .18 | ⊖ .17 | ⊖ .17 | ⊖ .17 |
| ORSAT Train Leak Check | ✓ | ✓ | Inches Hg | | | | |

Static Pressure

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# TRC ENVIRONMENTAL CORPORATION "OKINETIC FLUE GAS SAMPLING DATA SHEET

Project No.. 260446 0030-00001
Client: PG&E
Facility: LOWAN STATION
Source: PC BOILER

Date: 8-12-99
Run No.: 3A
Sample Location: OUTLET (STACK)
Operator: T. LUNDIN

Sheet 2 of 2

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F Stack | Temperatures °F Filter Box | Temperatures °F Imp Temp | Temperatures °F XAD Cond | Temperatures °C Probe | Temperatures °C Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2C | | 84 | 453.31 | 1.4 | 1.54 | 1.55 | 102 | 100 | 4.5 | Good | 188 | 236 | 60 | N/A | 237 | 210 |
| | | 90 | 457.12 | 1.6 | 1.76 | 1.75 | 104 | 101 | ~~4.5~~ 5.0 | | 188 | 241 | 61 | | 239 | 221 |
| 3C | | 96 | 461.31 | 1.5 | 1.65 | 1.65 | 106 | 101 | 4.5 | | 189 | 238 | 62 | | 239 | 222 |
| | | 102 | 465.22 | 1.5 | 1.65 | 1.65 | 107 | 102 | 5.0 | | 188 | 239 | 60 | | 242 | 220 |
| 1D | 1059 / 1226 | 108 | ~~469.230~~ 469.270 | 1.5 | 1.65 | 1.65 | 96 | 95 | 5.0 | | 190 | 240 | 65 | | 241 | 170 |
| | | 114 | 473.32 | 1.55 | 1.71 | 1.70 | 100 | 98 | 5.0 | | 190 | 237 | 60 | | 245 | 213 |
| 2D | | 120 | 477.36 | 1.6 | 1.76 | 1.75 | 103 | 99 | 5.0 | | 190 | 240 | 55 | | 240 | 217 |
| | | 126 | 481.53 | 1.65 | 1.82 | 1.80 | 105 | 100 | 5.0 | | 190 | 239 | 57 | | 238 | 219 |
| 3D | | 132 | 485.84 | 1.65 | 1.82 | 1.80 | 108 | 101 | 5.0 | | 190 | 240 | 61 | | 242 | 220 |
| | | 138 | 490.07 | 1.65 | 1.82 | 1.80 | 109 | 102 | 5.0 | | 191 | 237 | 62 | | 238 | 220 |
| | 1302 | 144 | 494.292 | | | | | | | | | | | | | |
| | | | 91.676 | | | | | | | | | | | | | |

Meter Leak Check During Test:

_____ CF in _____ Seconds at _____

_____ CF in _____ Seconds at _____

Meter Reading

| | Stop | Start |
|---|---|---|
| In. Hg | _____ | _____ |
| In. Hg | _____ | _____ |

Comments:

STOP @ 1059 COAL SHUTE PLUGGED
START @ 1226 port D

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# SAMPLING TRAIN SETUP AND RECOVERY SHEET

| | | | Setup | Recovery |
|---|---|---|---|---|
| Project No.: | 26046 | Date: | 8/11/99 | 8/12/99 |
| Client: | PG&E | Run No.: | Outlet Run 3A | |
| Facility: | Logan | Train Type: | OH-Hg | |
| Source: | Outlet | Recovery Person: | | |

**FRONT HALF**

| | | | | |
|---|---|---|---|---|
| Filter No.: | | | | Comments: |
| Thimble No.: | | | | |

| | | | | |
|---|---|---|---|---|
| XAD Trap No.: | | | | Comments: |
| XAD Final Wt. (g): | | | | |
| XAD Initial Wt.(g): | | | | |
| Net Collected (g): | | | | |

**IMPINGERS**

| Impinger No.: | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Reagent: 100ml(s) → | KCl | KCl | KCl | $HNO_3/H_2O_2$ |
| Final Volume (ml / g): | 901.6 | 749.8 | 703.2 | 711.5 |
| Initial Volume (ml / g): | 711.1 | 698.2 | 694.6 | 708.0 |
| **Net Collected (ml / g):** | 190.5 | 51.6 | 8.6 | 3.5 |

| Impinger No.: | 5 | 6 | 7 | |
|---|---|---|---|---|
| Reagent: 100ml(s) → | $KMnO_4$ | ——— | ——— | |
| Final Volume (ml / g): | 714.6 | 718.4 | 697.3 | |
| Initial Volume (ml / g): | 715.9 | 717.7 | 695.7 | |
| **Net Collected (ml / g):** | -1.3 | 0.7 | 1.6 | |

| Silica Gel Impinger: | 8 | | | |
|---|---|---|---|---|
| Final Volume (ml / g): | 786.6 | ~40% spent | | |
| Initial Volume (ml / g): | 764.4 | | | |
| **Net Collected (ml / g):** | 22.2 | | | |

**TOTAL MOISTURE (Impingers and Silica Gel) (g) =** 277.4

**TRC**

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# ORSAT ANALYSIS

| | | | |
|---|---|---|---|
| Project No. | 26046-0030-00001 | Date | 8/12/94 |
| Client | PG&E | Run | PG&E-L-OHM-Bag-3 |
| Facility | Logan | Operator | Michael Murton |
| Source | PC Boiler | Comments | |
| Location | Exhaust STACK | | |

Orsat Leak Checked (yes) / no

Purge System with Sample Gas (yes) / no

Ambient Air Check $CO_2$ 0.0 $O_2$ 21.0

Audit Gas Check (measured/actual): $CO_2$ / $O_2$ / CO /

Expiration Date of Reagents / /

| Sample Point | Time | $CO_2$ Reading 1 | $O_2$ Reading 2 | | CO Reading 3 | | $F_o$ |
|---|---|---|---|---|---|---|---|
| | | | Actual | Net | Actual | Net | |
| | 2230 | 14.0 | 19.0 | 5.0 | NA | NA | 1.136 |
| | 2234 | 14.0 | 19.0 | 5.0 | ↓ | ↓ | 1.136 |
| | 2238 | 14.0 | 19.0 | 5.0 | ↓ | ↓ | 1.136 |
| | | | | | | | |
| | | | | | | | |

Net $O_2$ Reading = Reading 2 - Reading 1 (Actual)

Net CO Reading = Reading 3 - Reading 2 (Actual)

**QC Validation**

Calculate $F_o$

$$F_o = \frac{20.9 - \%O_2}{\%CO_2}$$

Fuel Bituminous

Reported $F_o$ 1.136

**Expected $F_o$ Ranges**

| | |
|---|---|
| Anthracite/Lignite | 1.015 - 1.130 |
| Bituminous | 1.083 - 1.230 |
| Distillate Oil | 1.260 - 1.413 |
| Residual Oil | 1.210 - 1.370 |
| Natural Gas | 1.600 - 1.836 |
| Wood Bark | 1.000 - 1.120 |
| Municipal Garbage | 1.043 - 1.177 |

Other

# Sample Train Tracking Form

**Sample Train:** OH - Hg **Date:** 8/12/99

**Location:** Outlet **Run:** 3A

**Sample ID:** PG&E-L-OHM-Oa-3

| | | | |
|---|---|---|---|
| **Train Set Up By:** | [signature] | **Date:** 8/12/99 | **Time:** 0720 |
| **Transported to Location By:** | [signature] | **Date:** 8/12/99 | **Time:** 0738 |
| **Received at Location By:** | [signature] | **Date:** 8/12/99 | **Time:** 0738 |
| **Transported to Recovery Area By:** | [signature] | **Date:** 8/12/99 | **Time:** 1340 |
| **Received at Recovery Area By:** | [signature] | **Date:** 8/12/99 | **Time:** 1348 |
| **Train Recovered By:** | [signature] | **Date:** 8/12/99 | **Time:** 1358 |

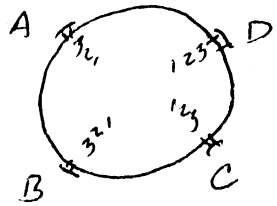
*Comments:*

Hg

# TRC ENVIRONMENTAL CORPORATION - )KINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 26046-0030-00001
Client: PG+E
Facility: Logan Station
Source: PC Boiler
Sample Location: Exhaust Stack
Stack Diameter: 168"
Date: 8/11/99
Run No.: PGE-OHM-O-B-1
Operator: R Nixon
Meterbox No.: 90342
Meterbox ΔH @: ~~1.436~~ 1.973
Y Factor: ~~0.982~~ 0.983

VERY IMPORTANT - FILL IN ALL BLANKS
Read and Record at the Start of Each Test Point
SKETCH




Sheet 1 of 2
Train Prepared By: Ed Mackinnon
Pitot Number and Side: ~~P-1 Left~~ P-4
Pitot Tube CP: ~~.84~~ 0.87
Filter No.: N/A
Ambient Temp., °F: 86
Bar. Pressure, In. Hg.: 29.70
Assumed Moisture, %: 14
Heater Box Setting, °F: 250
Nozzle # / Dia., In.: L146 .192
Probe Length / Material: 5' glass
Probe Heater Setting: 250

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F Stack | Temperatures °F Filter Box | Temperatures °F Imp Temp | Temperatures °F ~~USMT~~ ~~XAD~~ Cond | Temperatures °F Probe | Temperatures °F Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B1 | 0945 | 0 | 642.232 | 1.2 | 1.35 | 1.35 | 82 | 84 | 2.5 | OK | 187 | 249 | 68 | ~~175~~ | 239 | 175 |
| 1a | | 6 | 646.1 | 1.2 | 1.35 | 1.35 | 81 | 84 | 2.5 | OK | 187 | 249 | 55 | — | 236 | 221 |
| 2 | | 12 | 650.0 | 1.2 | 1.35 | 1.35 | 84 | 84 | 2.5 | OK | 187 | 218 | 53 | — | 236 | 221 |
| 2a | | 18 | 654.0 | 1.2 | 1.35 | 1.35 | 87 | 86 | 2.5 | OK | 188 | 217 | 55 | — | 235 | 222 |
| 3 | | 24 | 657.5 | 1.2 | 1.35 | 1.35 | 90 | 86 | 2.5 | OK | 188 | 218 | 56 | — | 233 | 222 |
| 3a | | 30 | 661.2 | 1.2 | 1.35 | 1.35 | 92 | 89 | 2.5 | OK | 188 | 217 | 58 | — | 235 | 220 |
| C1 | 1055 | 36 | 664.874 | 1.5 | 1.69 | 1.70 | 94 | 93 | 3.0 | OK | 188 | 217 | 68 | — | 232 | 170 |
| 1a | | 42 | 669.1 | 1.5 | 1.69 | 1.70 | 96 | 94 | 3.0 | OK | 188 | 219 | 56 | — | 236 | 220 |
| 2 | | 48 | 673.1 | 1.5 | 1.69 | 1.70 | 100 | 95 | 3.0 | OK | 187 | 219 | 54 | — | 237 | 223 |
| 2a | | 54 | 677.5 | 1.6 | 1.80 | 1.80 | 102 | 95 | 3.0 | OK | 188 | 219 | 56 | — | 238 | 221 |
| 3 | | 60 | 682.0 | 1.6 | 1.80 | 1.80 | 103 | 96 | 3.0 | OK | 188 | 219 | 56 | — | 235 | 220 |
| ~~B~~3a | | 66 | 685.8 | 1.6 | 1.80 | 1.80 | 103 | 97 | 3.0 | OK | 187 | 219 | 58 | — | 236 | 218 |
| D1 | 1215 | 72 | 690.323 | 1.5 | 1.69 | 1.69 | 104 | 98 | 3.0 | OK | 187 | 219 | 52 | — | 236 | 219 |
| | 1215 | 78 | 694.6 | 1.5 | 1.69 | 1.70 | 102 | 101 | 3.0 | OK | 188 | 219 | 48 | — | 236 | 219 |

Train Leak Check:

Before Test: 0.000 CF in 60 Seconds at 15 In. Hg
After Test: 0.000 CF in 60 Seconds at 13" In. Hg

Comments:

| | Initial | Final | Static Pressure Port | B | C | D | A |
|---|---|---|---|---|---|---|---|
| Pitot Tube Leak Check | ⊗ | ⊗ | Inches H₂O | -.15 | -.15 | -.15 | |
| ORSAT Train Leak Check | ⊗ | ⊗ | Inches Hg | | | | |

# TRC ENVIRONMENTAL CORPORATION - KINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 2C046-0030-0001
Client: PG+E
Facility: Logan station
Source: PC Boiler

Date: 8/11/99
Run No.: PGE-OHM-05-1
Sample Location: Exhaust Stack
Operator: R Nixon

Sheet 2 of 2

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F (°C) Stack | Filter Box | Imp Temp | XAD Cond | Probe | Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D2 | | 84 | 698.7 | 1.5 | 1.69 | 1.70 | 104 | 101 | 3.0 | OK | 188 | 219 | 47 | — | 234 | 220 |
| 2a | | 90 | 702.8 | 1.6 | 1.80 | 1.80 | 105 | 102 | 3.0 | OK | 187 | 219 | 48 | — | 236 | 220 |
| 3 | | 96 | 707.0 | 1.6 | 1.80 | 1.80 | 105 | 102 | 3.0 | OK | 188 | 220 | 48 | — | 237 | 219 |
| 3a | | 102 | 711.1 | 1.6 | 1.80 | 1.80 | 107 | 103 | 3.0 | OK | 188 | 219 | 49 | — | 240 | 219 |
| A1 | 1324 | 108 | 715.591 | 1.2 | 1.35 | 1.35 | 105 | 104 | 3.0 | OK | 188 | 227 | 68 | — | 233 | 172 |
| 1a | | 114 | 719.5 | 1.2 | 1.35 | 1.35 | 105 | 105 | 3.0 | OK | 188 | 227 | 49 | — | 231 | 220 |
| 2 | | 120 | 723.5 | 1.2 | 1.35 | 1.35 | 107 | 105 | 3.0 | OK | 190 | 208 | 50 | — | 235 | 220 |
| 2a | | 126 | 727.4 | 1.2 | 1.35 | 1.35 | 108 | 106 | 3.0 | OK | 190 | 208 | 53 | — | 239 | 221 |
| 3 | 1417 | 132 | 731.4 | 1.0 | 1.12 | 1.12 | 110 | 107 | 3.0 | OK | 190 | 208 | 54 | — | 236 | 217 |
| 3a | | 138 | 734.8 | 1.0 | 1.12 | 1.12 | 106 | 107 | 3.0 | OK | 189 | 208 | 61 | — | 235 | 206 |
| | 1427 | 144 | 738.365 | | | | | | | | | | | | | |

Meter Leak Check During Test:

0.000 CF in 60 Seconds at _____ Meter Reading Stop In. Hg 13" Start _____

_____ CF in _____ Seconds at _____ In. Hg _____ _____

Comments:

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# SAMPLING TRAIN SETUP AND RECOVERY SHEET

| | | | |
|---|---|---|---|
| Project No.: | 26046 | Date: | Setup 8/10/99 Recovery 8/11/99 |
| Client: | PG&E | Run No.: | Outlet Run 1B |
| Facility: | Logan | Train Type: | OH-Hg |
| Source: | Outlet | Recovery Person: | Chm |

**FRONT HALF**

| | | | | |
|---|---|---|---|---|
| Filter No.: | Q35 | | | Comments: |
| Thimble No.: | | | | |

| | | | | |
|---|---|---|---|---|
| XAD Trap No.: | | | | Comments: |
| XAD Final Wt. (g): | | | | |
| XAD Initial Wt.(g): | | | | |
| Net Collected (g): | | | | |

**IMPINGERS**

| Impinger No.: | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Reagent: 100ml's → | KCl | KCl | KCl | $HNO_3/H_2O_2$ |
| Final Volume (ml / g): | 918.7 | 763.8 | 687.0 | 645.0 |
| Initial Volume (ml / g): | 704.9 | 725.8 | 678.8 | ~~714.1~~ 643.0 ← broken Imp. switched out |
| **Net Collected (ml / g):** | 213.8 | 38.0 | 8.2 | 2.0 |

| Impinger No.: | 5 | 6 | 7 | |
|---|---|---|---|---|
| Reagent: 100ml's → | $KMnO_4$ | → | → | |
| Final Volume (ml / g): | 708.4 | 707.9 | 702.7 | |
| Initial Volume (ml / g): | 705.9 | 708.2 | 701.5 | |
| **Net Collected (ml / g):** | 2.5 | -0.3 | 1.2 | |

| Silica Gel Impinger: | 8 | | | |
|---|---|---|---|---|
| Final Volume (ml / g): | 856.5 | ~40% spent | | |
| Initial Volume (ml / g): | 838.0 | | | |
| **Net Collected (ml / g):** | 18.5 | | | |

**TOTAL MOISTURE (Impingers and Silica Gel) (g) =** 283.9

**TRC**

lowell03.wp

# ORSAT ANALYSIS

| | | | |
|---|---|---|---|
| Project No. | 26046-0030-00001 | Date | 8/11/99 |
| Client | PG+E | Run | PG+E-aum-0-b-1 |
| Facility | Logan Station | Operator | Michael Murtaw |
| Source | PC Boiler | Comments | |
| Location | STACK Exhaust. | | |

Orsat Leak Checked (yes) / no

Purge System with Sample Gas (yes) / no

Ambient Air Check $CO_2$ 0.0 $O_2$ 21.0.

Audit Gas Check (measured/actual): $CO_2$ / $O_2$ / CO /

Expiration Date of Reagents / /

| Sample Point | Time | $CO_2$ Reading 1 | $O_2$ Reading 2 | | CO Reading 3 | | $F_o$ |
|---|---|---|---|---|---|---|---|
| | | | Actual | Net | Actual | Net | |
| 1 | 1839 | 13.9 | 19.2 | 5.3 | NA | NA | 1.122 |
| 2 | 1931 | 13.8 | 19.1 | 5.3 | NA | NA | 1.130 |
| 3 | 1940 | 13.9 | 19.2 | 5.3 | | | |
| | | | | | | | |
| | | | | | | | |

Net $O_2$ Reading = Reading 2 - Reading 1 (Actual)
Net CO Reading = Reading 3 - Reading 2 (Actual)

**QC Validation**

Calculate $F_o$

$$F_o = \frac{20.9 - \% O_2}{\% CO_2}$$

Fuel _____
Reported $F_o$ _____

**Expected $F_o$ Ranges**

| | |
|---|---|
| Anthracite/Lignite | 1.015 - 1.130 |
| Bituminous | 1.083 - 1.230 |
| Distillate Oil | 1.260 - 1.413 |
| Residual Oil | 1.210 - 1.370 |
| Natural Gas | 1.600 - 1.836 |
| Wood Bark | 1.000 - 1.120 |
| Municipal Garbage | 1.043 - 1.177 |

Other _____

# Sample Train Tracking Form

**Sample Train:** OH - Hg **Date:** 8/11/99

**Location:** Outlet **Run:** 1B

**Sample ID:** PG&E-OHM-Ob-1

| | | | |
|---|---|---|---|
| **Train Set Up By:** | [signature] | **Date:** 8/11/99 | **Time:** 0753 |
| **Transported to Location By:** | [signature] | **Date:** 8/11/99 | **Time:** 08:10 |
| **Received at Location By:** | [signature] | **Date:** 8/11/99 | **Time:** 08:10 |
| **Transported to Recovery Area By:** | [signature] | **Date:** 8/11/99 | **Time:** 1305 |
| **Received at Recovery Area By:** | [signature] | **Date:** 8/11/99 | **Time:** 1506 |
| **Train Recovered By:** | [signature] | **Date:** 8/11/99 | **Time:** 1518 |

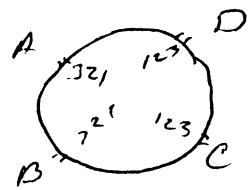
*Comments:*

Hg

# TRC ENVIRONMENTAL CORPORATION — ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 26046-0030-0001
Client: PG&E
Facility: Logan Station
Source: PC Boiler
Sample Location: Exhaust Stack
Stack Diameter: 16'
Date: 8/11/95
Run No.: PGE-OHM-O-B-2
Operator: R. Nixon
Meterbox No.: 90342
Meterbox ΔH @: ~~1.436~~ mpn 1.973
Y Factor: ~~0.982~~ mpn 0.983

VERY IMPORTANT - FILL IN ALL BLANKS
Read and Record at the Start of Each Test Point
SKETCH




Sheet 1 of 2
Train Prepared By: Ed Muckinson
Pitot Number and Side: ~~[illegible]~~ P-9
Pitot Tube CP: ~~[illegible]~~ 0.87
Filter No.: N/A
Ambient Temp., °F: 86
Bar. Pressure, In. Hg.: ~~29.70~~ 29.90
Assumed Moisture, %: 14
Heater Box Setting, °F: 250
Nozzle # / Dia., In.: L1/G .192
Probe Length / Material: 5' glass
Probe Heater Setting: 250

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F Stack | Temperatures °F Filter Box | Temperatures °F Imp Temp | Temperatures °F XAD Cond | Temperatures °F Probe | Temperatures °C Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | 1615 | 0 | 738.790 | 1.2 | 1.35 | 1.35 | 99 | 98 | 3.0 | OK | 189 | 220 | 68 | — | 233 | 135 |
| 1a | | 6 | 742.6 | ~~1.5~~ 1.2 | ~~1.69~~ 1.35 avg | 1.35 avg | 97 | 98 | 3.0 | | 189 | 221 | 60 | — | 233 | 219 |
| 2 | | 12 | 746.3 | 1.2 | 1.35 | 1.35 | 98 | 98 | 3.0 | | 188 | 220 | 58 | — | 232 | 221 |
| 2a | | 18 | 750.5 | 1.2 | 1.35 | 1.35 | 100 | 98 | 3.0 | | 189 | 221 | 59 | — | 236 | 220 |
| 3 | | 24 | 754.3 | 1.2 | 1.35 | 1.35 | 101 | 99 | 3.0 | | 189 | 222 | 61 | — | 232 | 219 |
| 3a | | 30 | 758.1 | 1.2 | 1.35 | 1.35 | 103 | 100 | 3.0 | | 189 | 221 | 61 | — | 235 | 216 |
| B1 | 1713 | 36 | 761.879 | 1.6 | 1.80 | 1.80 | 105 | 101 | 3.0 | | 188 | 221 | 61 | — | 237 | 214 |
| 1a | | 42 | 766.3 | 1.5 | 1.70 | 1.70 | 107 | 105 | 3.0 | | 188 | 221 | 55 | — | 233 | 212 |
| 2 | | 48 | 770.4 | 1.6 | 1.80 | 1.80 | 108 | 106 | 3.0 | | 187 | 221 | 55 | — | 236 | 214 |
| 2a | | 54 | 774.9 | 1.6 | 1.80 | 1.80 | 109 | 106 | 3.0 | | 187 | 221 | 58 | — | 235 | 214 |
| 3 | | 60 | 779.4 | 1.5 | 1.70 | 1.70 | 110 | 107 | 3.0 | | 188 | 221 | 61 | — | 236 | 214 |
| 3a | 1849 | 66 | 783.4 | 1.5 | 1.70 | 1.70 | 111 | 108 | 3.0 | | 187 | 221 | 62 | — | 235 | 213 |
| C1 | 1807 | 72 | 787.764 | 787.862/1.5 | 1.70 | 1.70 | 112 | 109 | 3.0 | | 187 | 224 | 64 | — | 234 | 213 |
| a | | 78 | 792.0 | 1.5 | 1.70 | 1.70 | 106 | 109 | 3.0 | | 188 | 223 | 57 | — | 233 | 195 |

Train Leak Check:

Before Test: .000 CF in 60 Seconds at 12.5 In. Hg
After Test: 0.002 CF in 60 Seconds at 5 In. Hg

Comments:

| | Initial | Final | Static Pressure | | | | |
|---|---|---|---|---|---|---|---|
| | | | Port | -.18 | -.18 | -.18 | -.18 |
| Pitot Tube Leak Check | ⊗ | ⊗ | Inches H₂O | | | | |
| ORSAT Train Leak Check | ⊗ | ⊗ | Inches Hg | | | | |

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# TRC ENVIRONMENTAL CORPORATION ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 26046-0030-00001
Client: PG+E
Facility: Logan station
Source: PC Boiler

Date: 8/..../99
Run No.: PGE-OHM-0-B2
Sample Location: Exhaust stack
Operator: R Nixon

Sheet 2 of 2

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F Stack | Temperatures °F Filter Box | Temperatures °F Imp Temp | Temperatures °F XAD Cond | Temperatures °F Probe | Temperatures °C Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C2 | | 84 | 796.1 | 1.5 | 1.70 | 1.70 | 109 | 108 | 3.0 | OK | 188 | 221 | 58 | — | 230 | 20[illegible] |
| 2a | | 90 | 800.1 | 1.5 | 1.70 | 1.70 | 110 | 108 | 3.0 | OK | 188 | 219 | 60 | — | 233 | 20[illegible] |
| 3 | | 96 | 804.3 | 1.6 | 1.80 | 1.80 | 111 | 108 | 3.0 | OK | 188 | 220 | 60 | — | 236 | 20[illegible] |
| 3a | 1845 | 102 | 808.7 | 1.5 | 1.70 | 1.70 | 112 | 110 | 3.0 | OK | 188 | 220 | 61 | — | 234 | 20[illegible] |
| B1 | 1900 | 108 | 813.194/813.44 | 1.2 | 1.35 | 1.35 | 114 | 111 | 3.0 | OK | 188 | 220 | 63 | — | 235 | 20[illegible] |
| 1a | | 114 | 817.3 | 1.2 | 1.35 | 1.35 | 107 | 108 | 3.0 | OK | 188 | 227 | 60 | — | 235 | 219 |
| 2 | | 120 | 820.7 | 1.2 | 1.35 | 1.35 | 107 | 107 | 3.0 | OK | 189 | 223 | 59 | — | 235 | 219 |
| 2a | | 126 | 824.4 | 1.2 | 1.35 | 1.35 | 109 | 107 | 3.0 | OK | 190 | 223 | 63 | — | 238 | 22[illegible] |
| 3 | | 132 | 828.2 | 1.2 | 1.35 | 1.35 | 110 | 108 | 3.0 | OK | 189 | 221 | 60 | — | 238 | 21[illegible] |
| 3a | | 138 | 832.0 | 1.2 | 1.35 | 1.35 | 110 | 108 | 3.0 | OK | 189 | 221 | 61 | — | 235 | 219 |
| | 1936 | 144 | 835.699 | | | | | | | OK | | | | — | | |
| | | | | | | | | | | | | | | — | | |

Meter Leak Check During Test:

_____ CF in _____ Seconds at _____ In. Hg _____
_____ CF in _____ Seconds at _____ In. Hg _____

Meter Reading: Stop _____ Start _____

Comments:

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# SAMPLING TRAIN SETUP AND RECOVERY SHEET

| | | | Setup | Recovery |
|---|---|---|---|---|
| Project No.: | 26046 | Date: | 8/11/99 | 8/11/99 |
| Client: | PG&E | Run No.: | 2B | |
| Facility: | Logan | Train Type: | OH-Hg | |
| Source: | Outlet | Recovery Person: | GM | |

**FRONT HALF**

| | | | | |
|---|---|---|---|---|
| Filter No.: | | | | Comments: |
| Thimble No.: | | | | |

| | | | | |
|---|---|---|---|---|
| XAD Trap No.: | | | | Comments: |
| XAD Final Wt. (g): | | | | |
| XAD Initial Wt.(g): | | | | |
| Net Collected (g): | | | | |

**IMPINGERS**

| Impinger No.: | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Reagent: 100mls → | KCl | KCl | KCl | $HNO_3/H_2O_2$ |
| Final Volume (ml / g): | 805.2 | 616.6 | 690.3 | 695.5 |
| Initial Volume (ml / g): | 594.1 | 586.8 | 686.2 | 694.8 |
| **Net Collected (ml / g):** | 211.1 | 29.8 | 4.1 | 0.7 |

| Impinger No.: | 5 | 6 | 7 | |
|---|---|---|---|---|
| Reagent: 100mls → | $KMnO_4$ | → | | |
| Final Volume (ml / g): | 601.6 | 687.6 | 703.1 | |
| Initial Volume (ml / g): | 600.4 | 687.3 | 699.8 | |
| **Net Collected (ml / g):** | 1.2 | 0.3 | 3.3 | |

| Silica Gel Impinger: | 8 | | | |
|---|---|---|---|---|
| Final Volume (ml / g): | 764.2 | ~30% spent | | |
| Initial Volume (ml / g): | 744.6 | | | |
| **Net Collected (ml / g):** | 19.6 | | | |

**TOTAL MOISTURE (Impingers and Silica Gel) (g) =** 270.1

**TRC**

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# ORSAT ANALYSIS

| | | | |
|---|---|---|---|
| **Project No.** | 26046-0030-00001 | **Date** | 8/11/99 |
| **Client** | PG&E | **Run** | PG&E-OHM-O-B-2 |
| **Facility** | Logan Station | **Operator** | Michael Martin |
| **Source** | PC Boiler | **Comments** | |
| **Location** | Stack Exhaust. | | |

**Orsat Leak Checked** (yes) / no

**Purge System with Sample Gas** (yes) / no

**Ambient Air Check** $CO_2$ 0.0 $O_2$ 21.0.

**Audit Gas Check (measured/actual):** $CO_2$ / $O_2$ / CO /

**Expiration Date of Reagents** / /

| Sample Point | Time | $CO_2$ Reading 1 | $O_2$ Reading 2 | | CO Reading 3 | | $F_o$ |
|---|---|---|---|---|---|---|---|
| | | | Actual | Net | Actual | Net | |
| 1 | 8/12/99 0810 | 13.8 | 19.2 | 5.4 | | | 1.723 |
| | 0915 | 13.9 | 19.1 | 5.2 | | | |
| | 0924 | 13.8 | 19.1 | 5.3 | | | |
| | | | | | | | |
| | | | | | | | |

Net $O_2$ Reading = Reading 2 - Reading 1 (Actual)
Net CO Reading = Reading 3 - Reading 2 (Actual)

**QC Validation**

Calculate $F_o$

$$F_o = \frac{20.9 - \%\,O_2}{\%\,CO_2}$$

Fuel _____
Reported $F_o$ _____

**Expected $F_o$ Ranges**

| | |
|---|---|
| Anthracite/Lignite | 1.015 - 1.130 |
| Bituminous | 1.083 - 1.230 |
| Distillate Oil | 1.260 - 1.413 |
| Residual Oil | 1.210 - 1.370 |
| Natural Gas | 1.600 - 1.836 |
| Wood Bark | 1.000 - 1.120 |
| Municipal Garbage | 1.043 - 1.177 |

Other _____

# Sample Train Tracking Form

Sample Train: OH - Hg

Date: 8/11/99

Location: Outlet

Run: 2B

Sample ID: PG&E-OHM-Ob-2

Train Set Up By: [illegible] Date: 8/11/99 Time: 1010

Transported to Location By: R Nixon Date: 8/11/99 Time: 1300

Received at Location By: [illegible] Date: 8/11/99 Time: 1305

Transported to Recovery Area By: R Nixon Date: 8/11/99 Time: 2003

Received at Recovery Area By: [illegible] Date: 8/11/99 Time: 2005

Train Recovered By: [illegible] Date: 8/11/99 Time: 203

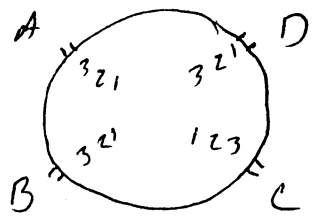
*Comments:*

Hg

# TRC ENVIRONMENTAL CORPORATION - KINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 26046-0030-00001
Client: PG+E
Facility: Logan Station
Source: PC Boiler
Sample Location: Exhaust stack
Stack Diameter: 168"
Date: 8/12/99
Run No.: PGE-OHM-0-b-3
Operator: R Nixon
Meterbox No.: 90342
Meterbox ΔH @: ~~1.936~~ mm 1.973
Y Factor: ~~0.982~~ mm 0.983

VERY IMPORTANT - FILL IN ALL BLANKS
Read and Record at the Start of Each Test Point
SKETCH




Sheet 1 of 2

Train Prepared By: Ed Mackinnon
Pitot Number and Side: P-9
Pitot Tube CP: ~~.84~~ 0.87 MM
Filter No.: N/A
Ambient Temp., °F: 86
Bar. Pressure, In. Hg.: 29.85
Assumed Moisture, %: 12
Heater Box Setting, °F: 250
Nozzle # / Dia., In.: L146 .192
Probe Length / Material: 5' glass
Probe Heater Setting: 250

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F °C Stack | Filter Box | Imp Temp | XAD Cond | Probe | Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B1 | 0835 | 0 | 836.018 | .1.2 | 1.35 | 1.35 | 87 | 87 | 3.0 | OK | 190 | 221 | 68 | — | 235 | 150 |
| 1a | | 6 | 839.7 | .1.2 | 1.35 | 1.35 | 88 | 87 | 3.0 | OK | 190 | 220 | 63 | — | 237 | 191 |
| 2 | | 12 | 843.4 | .1.2 | 1.35 | 1.35 | 89 | 87 | 3.0 | OK | 190 | 220 | 61 | — | 237 | 198 |
| 2a | | 18 | 847.1 | .1.2 | 1.35 | 1.35 | 91 | 89 | 3.0 | OK | 189 | 220 | 65 | — | 236 | 207 |
| 3 | | 24 | 850.8 | .1.2 | 1.35 | 1.35 | 93 | 90 | 3.0 | OK | 189 | 219 | 61 | — | 237 | 200 |
| 3a | 0911 | 30 | 854.3 | .1.2 | 1.35 | 1.35 | 94 | 91 | 3.0 | OK | 190 | 218 | 61 | — | 233 | 201 |
| C1 | 0926 | 36 | ~~857.962~~ 858.046 | 1.4 | 1.57 | 1.5 | 96 | 93 | 3.5 | OK | 190 | 219 | 68 | — | 233 | 180 |
| 1a | | 42 | 861.47 | 1.5 | 1.68 | 1.7 | 96 | 95 | 4 | OK | 191 | 220 | 60 | — | 232 | 214 |
| 2 | | 48 | 865.6 | 1.6 | 1.80 | 1.80 | 98 | 96 | 4 | OK | 187 | 221 | 55 | — | 235 | 223 |
| 2a | | 54 | 869.8 | 1.6 | 1.80 | 1.80 | 101 | 97 | 4 | OK | 187 | 220 | 58 | — | 237 | 221 |
| 3 | | 60 | 874.1 | 1.6 | 1.80 | 1.80 | 102 | 98 | 4 | OK | 188 | 221 | 60 | — | 234 | 219 |
| 3a | 1002 | 66 | 878.4 | 1.6 | 1.80 | 1.80 | 103 | 99 | 4 | OK | 188 | 221 | 65 | — | 233 | 218 |
| D1 | 1023 | 72 | ~~882.794~~ 882.900 | 1.3 | 1.45 | 1.45 | 99 | 98 | 4 | OK | 188 | 222 | 68 | — | 234 | 150 |
| 1a | | 78 | 886.9 | 1.3 | 1.45 | 1.45 | 98 | 99 | 4 | OK | 188 | 220 | 54 | — | 233 | 204 |

Train Leak Check: Comments:

Before Test: 0.001 CF in 60 Seconds at 15 In. Hg
After Test: 0.000 CF in 60 Seconds at 5 In. Hg

| | Initial | Final | Port | Static Pressure A | B | C | D |
|---|---|---|---|---|---|---|---|
| Pitot Tube Leak Check | ⊗ | ⊗ | Inches H₂O | -.14 | -.14 | -.14 | -.14 |
| ORSAT Train Leak Check | ⊗ | ⊗ | Inches Hg | | | | |

lowell02.wj

# TRC ENVIRONMENTAL CORPORATION ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 26046-0030-000001
Client: PG+E
Facility: Logan station
Source: PC Boiler

Date: 8/12/99
Run No.: PGE-10HM-O-b-3
Sample Location: Exhaust stack
Operator: R Nixon

Sheet 2 of 2

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F Stack | Temperatures °F Filter Box | Temperatures °F Imp Temp | Temperatures °F XAD Cond | Temperatures °F Probe | Temperatures °C Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D2 | | 84 | 890.4 | 1.5 | 1.70 | 1.70 | 100 | 99 | 4 | OK | 188 | 221 | 54 | — | 239 | 206 |
| 2a | | 90 | 894.4 | 1.5 | 1.70 | 1.70 | 101 | 99 | 4 | OK | 188 | 220 | 55 | — | 234 | 206 |
| 3 | | 96 | 898.3 | 1.5 | 1.70 | 1.70 | 102 | 99 | 4 | OK | 188 | 219 | 56 | — | 234 | 206 |
| 3a | 1059 | 102 | 902.4 | 1.5 | 1.70 | 1.70 | 103 | 101 | 4 | OK | 188 | 220 | 58 | — | 237 | 206 |
| A1 | 1226 | 108 | 906.702 / 906.790 | 1.2 | 1.35 | 1.35 | 95 | 95 | 2.5 | OK | 190 | 219 | 68 | — | 233 | 201 |
| 1a | | 114 | 910.3 | 1.2 | 1.35 | 1.35 | 96 | 96 | 2.5 | OK | 189 | 220 | 55 | — | 231 | 201 |
| 2 | | 120 | 913.8 | 1.2 | 1.35 | 1.35 | 99 | 97 | 2.5 | OK | 189 | 220 | 54 | — | 232 | 206 |
| 2a | | 126 | 917.3 | 1.2 | 1.35 | 1.35 | 101 | 98 | 2.5 | OK | 189 | 223 | 55 | — | 237 | 203 |
| 3 | | 132 | 921.0 | 1.2 | 1.35 | 1.35 | 102 | 100 | 2.5 | OK | 190 | 235 | 56 | — | 235 | 206 |
| 3a | | 138 | 924.3 | 1.2 | 1.35 | 1.35 | 104 | 101 | 2.5 | OK | 190 | 221 | 60 | — | 235 | 20[illegible] |
| | 1302 | 144 | 927.832 | | | | | | | | | | | | | |

Meter Leak Check During Test:

_____ CF in _____ Seconds at _____ In. Hg _____
_____ CF in _____ Seconds at _____ In. Hg _____

Meter Reading: Stop _____ Start _____

Comments:

lowell02.w

# SAMPLING TRAIN SETUP AND RECOVERY SHEET

| | | | Setup | Recovery |
|---|---|---|---|---|
| Project No.: | 26046 | Date: | 8/11/99 | 8/12/99 |
| Client: | PG&E | Run No.: | Outlet | Run 3B |
| Facility: | Logan | Train Type: | Olt - Hg | |
| Source: | Outlet | Recovery Person: | | |

**FRONT HALF**

| | | | | Comments: |
|---|---|---|---|---|
| Filter No.: | | | | |
| Thimble No.: | | | | |

| | | | | Comments: |
|---|---|---|---|---|
| XAD Trap No.: | | | | |
| XAD Final Wt. (g): | | | | |
| XAD Initial Wt.(g): | | | | |
| Net Collected (g): | | | | |

**IMPINGERS**

| Impinger No.: | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Reagent: 10% (S→) | KCl | KCl | KCl | $HNO_3$ / $H_2O_2$ |
| Final Volume (ml / g): | 913.3 | 770.2 | 691.5 | 649.2 |
| Initial Volume (ml / g): | 710.4 | 728.8 | 683.7 | 646.0 |
| **Net Collected (ml / g):** | 202.9 | 41.4 | 7.8 | 3.2 |

| Impinger No.: | 5 | 6 | 7 | |
|---|---|---|---|---|
| Reagent: 10% (S→) | $KMnO_4$ | → | → | |
| Final Volume (ml / g): | 709.8 | 713.2 | 707.6 | |
| Initial Volume (ml / g): | 708.8 | 712.5 | 706.4 | |
| **Net Collected (ml / g):** | 1.0 | 0.7 | 1.2 | |

| Silica Gel Impinger: | 8 | | | |
|---|---|---|---|---|
| Final Volume (ml / g): | 838.8 | | | |
| Initial Volume (ml / g): | 819.3 | | | |
| **Net Collected (ml / g):** | 19.5 | | | |

**TOTAL MOISTURE (Impingers and Silica Gel) (g) =** 277.7

**TRC**

lowell03.wp

# ORSAT ANALYSIS

| | | | |
|---|---|---|---|
| Project No. | 26046-0030-00001 | Date | 8/12/99 |
| Client | PG&E | Run | PG&E-L-OHM-O-b-3 |
| Facility | Logan | Operator | Michael Martin |
| Source | Pd Boiler | Comments | |
| Location | Exhaust Stack | | |

Orsat Leak Checked (yes) / no

Purge System with Sample Gas (yes) / no

Ambient Air Check $CO_2$ 0.0 $O_2$ 21.0

Audit Gas Check (measured/actual): $CO_2$ / $O_2$ / CO /

Expiration Date of Reagents / /

| Sample Point | Time | $CO_2$ Reading 1 | $O_2$ Reading 2 | | CO Reading 3 | | $F_o$ |
|---|---|---|---|---|---|---|---|
| | | | Actual | Net | Actual | Net | |
| | | 14.0 | 19.2 | 5.2 | NA | NA | 1.1~~18~~ 21 mpm |
| | | 14.0 | 19.1 | 5.~~8~~1 mpm | ↓ | ↓ | 1.129 |
| | | 14.0 | 19.1 | 5.~~8~~1 mpm | | | 1.129 |
| | | | | | | | |
| | | | | | | | |

Net $O_2$ Reading = Reading 2 - Reading 1 (Actual)

Net CO Reading = Reading 3 - Reading 2 (Actual)

**QC Validation**

Calculate $F_o$

$$F_o = \frac{20.9 - \%\,O_2}{\%\,CO_2}$$

Fuel ~~Ax~~ Bituminous

Reported $F_o$ 1.126

**Expected $F_o$ Ranges**

| | |
|---|---|
| Anthracite/Lignite | 1.015 - 1.130 |
| Bituminous | 1.083 - 1.230 |
| Distillate Oil | 1.260 - 1.413 |
| Residual Oil | 1.210 - 1.370 |
| Natural Gas | 1.600 - 1.836 |
| Wood Bark | 1.000 - 1.120 |
| Municipal Garbage | 1.043 - 1.177 |

Other

# Sample Train Tracking Form

Sample Train: OH - Hg

Date: 8/12/99

Location: Outlet

Run: 3B

Sample ID: PG&E-L-OHM-Ob-3

| | | | |
|---|---|---|---|
| Train Set Up By: | [signature] | Date: 8/12/99 | Time: 0720 |
| Transported to Location By: | [signature] | Date: 8/12/99 | Time: 07:38 |
| Received at Location By: | [signature] | Date: 8/12/99 | Time: 07:38 |
| Transported to Recovery Area By: | [signature] | Date: 8/12/99 | Time: 1350 |
| Received at Recovery Area By: | [signature] | Date: 8/12/99 | Time: 1359 |
| Train Recovered By: | [signature] | Date: 8/12/99 | Time: 1359 |

*Comments:*

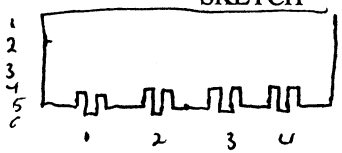
Hg

# TRC ENVIRONMENTAL CORPORATION - ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 260416-0030-00001
Client: PG&E
Facility: Logan Station
Source: PC Boiler
Sample Location: SDA - Inlet.
Stack Diameter: 360 x 81
Date: 8/11/99
Run No.: PG&E-OHM-I-a-1
Operator: Scott Tibbetts
Meterbox No.: 90336
Meterbox ΔH @: 1.981
Y Factor: 0.987

VERY IMPORTANT - FILL IN ALL BLANKS
Read and Record at the Start of Each Test Point

SKETCH




Sheet 1 of 2

Train Prepared By: Ed Mocksinow
Pitot Number and Side: ~~P-1 ST~~ P-1
Pitot Tube CP: 0.88
Filter No.: NA
Ambient Temp., °F: 83
Bar. Pressure, In. Hg.: 29.8
Assumed Moisture, %: 8%
Heater Box Setting, °F: 300
Nozzle # / Dia., In.: L-14-Q 0.228
Probe Length / Material: 6' ext Glass
Probe Heater Setting: 300

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F Stack | Temperatures °F Filter Box | Temperatures °F Imp Temp | Temperatures °F XAD Cond | Temperatures °F Probe | Temperatures °F Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A-1 | 0945 | 0 | 198.430 | .67 | ~~1.31~~ | ~~1.3~~ | 84 | 83 | 5 | ✓ | 310 | 265 | 65 | NA | 250 | 297 |
| A-2 | | 6 | 201.42 | .75 | 1.46 | 1.5 | 87 | 83 | 6.5 | ✓ | 316 | 278 | 63 | NA | 260 | 306 |
| 1-3 | | 12 | 205.24 | .78 | 1.51 | 1.5 | 90 | 84 | 7.0 | ✓ | 318 | 281 | 63 | ↓ | 262 | 304 |
| 1-4 | | 18 | 209.11 | .87 | 1.68 | 1.7 | 92 | 84 | 7.5 | ✓ | 324 | 283 | 60 | ↓ | 270 | 308 |
| 1-5 | | 24 | 213.20 | .86 | 1.7 | 1.7 | 93 | 86 | 8.0 | ✓ | 326 | 285 | 59 | ↓ | 275 | 310 |
| 1-6 | | 30 | 217.32 | .89 | 1.72 | 1.7 | 94 | 87 | 8.0 | ✓ | 322 | 284 | 60 | ↓ | 277 | 311 |
| | 1021 | 36 | 221.423 | | | | | | | | | | | | | |
| 2-1 | 1055 | 36 | 226.3 | .41 | .82 | .82 | 90 | 89 | 7.2 | ✓ | 288 | 290 | 65 | NA | 275 | 290 |
| 2-2 | | 42 | 229.2 | .38 | .756 | .76 | 92 | 89 | 7.2 | ✓ | 301 | 294 | 66 | NA | 270 | 290 |
| 2-3 | | 48 | 232.12 | .63 | 1.25 | 1.25 | 93 | 90 | 8.5 | ✓ | 302 | 290 | 68 | NA | 270 | 292 |
| 2-4 | | 54 | 235.3 | 1.0 | 1.96 | 2.0 | 96 | 91 | 11.0 | ✓ | 310 | 299 | 68 | NA | 272 | 295 |
| 2-5 | | 60 | 239.92 | .87 | 1.7 | 1.7 | 99 | 93 | 11.2 | ✓ | 313 | 296 | 67 | NA | 272 | 294 |
| 2-6 | | 66 | 244.10 | .72 | 1.3 | 1.3 | 102 | 95 | 10.5 | ✓ | 305 | 295 | 68 | NA | 273 | 296 |
| | 1131 | 72.08 | 248.0 | | | | | | | | | | | | | |

Train Leak Check:

Before Test: .005 CF in 60 Seconds at 20 In. Hg
After Test: .002 CF in 60 Seconds at 18.5 In. Hg

| | Initial | Final | Static Pressure | | | |
|---|---|---|---|---|---|---|
| Pitot Tube Leak Check | ✓ | ✓ | Port 4 | | | |
| ORSAT Train Leak Check | ✓ | ✓ | Inches H₂O | | | |
| | | | ~~Inches~~ Hg mm 36 | | | |

Comments:

First port 1 Leak check .002 cf 60 sec 12.5 in Hg
pre port 2 Leak Check .002 60 14.5
post port 2 Leak Check .003 60 15.5

Nozzle lost at port 2 port change
Replaced with L-15-Q 0.235

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# TRC ENVIRONMENTAL CORPORATION "OKINETIC FLUE GAS SAMPLING DATA SHEET

Project No: 26046-0030-00001
Client: PG+E
Facility: Lagun Station
Source: PC Boiler

Date: 81.19
Run No.: PG+E-OHM-I-A-1
Sample Location: SDA Inlet
Operator: S. Tibbetts

Sheet 2 of 2

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F Stack | Temperatures °F Filter Box | Temperatures °F Imp Temp | Temperatures °F XAD Cond | Temperatures °F Probe | Temperatures °F Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3-1 | 1215 | 72 | 248.63 | .36 | .846 | .85 | 96 | 95 | 9.0 | ✓ | 266 | 305 | 66 | NA | 273 | 285 |
| 3-2 | | 78 | 251.31 | .37 | .85 | .85 | 98 | 94 | 10.0 | ✓ | 269 | 303 | 64 | NA | 225 | 262 |
| 3-3 | | 84 | 254.4 | .53 | 1.22 | 1.2 | 100 | 95 | 10.5 | ✓ | 278 | 280 | 61 | NA | 227 | 266 |
| 3-4 | | 90 | 257.7 | .65 | 1.46 | 1.5 | 101 | 96 | 12.2 | ✓ | 286 | 273 | 60 | NA | 224 | 268 |
| 3-5 | | 96 | 261.38 | .80 | 1.8 | 1.8 | 103 | 98 | 14.5 | ✓ | 293 | 283 | 61 | NA | 240 | 281 |
| 3-6 | | 102 | 265.8 | .78 | 1.76 | 1.75 | 105 | 99 | 15.5 | ✓ | 294 | 287 | 63 | NA | 240 | 283 |
| | | 106.6 | 269.94 | | | | | | | | | | | | | |
| 4-1 | 1324 | 106.6 | 270.61 | .75 | 1.75 | 1.75 | 101 | 101 | 16.5 | ✓ | 269 | 287 | 67 | NA | 241 | 278 |
| 4-2 | | 114 | 274.2 | .79 | 1.83 | 1.85 | 102 | 100 | 17.5 | ✓ | 273 | 289 | 60 | NA | 230 | 269 |
| 4-3 | | 120 | 278.35 | .76 | 1.8 | 1.8 | 102 | 100 | 18.5 | ✓ | 275 | 282 | 65 | NA | 232 | 271 |
| 4-4 | | 126 | 282.7 | .74 | 1.8 | 1.8 | 102 | 99 | 19.0 | ✓ | 278 | 283 | 66 | NA | 230 | 272 |
| 4-5 | | 132 | 286.8 | .83 | 1.925 | 1.9 | 102 | 100 | 20.0 | ✓ | 275 | 281 | 61 | NA | 232 | 273 |
| 4-6 | 1417 | 138 | 289.625 | .78 | 1.8 | 1.8 | 99 | 99 | 7.0 | ✓ | 260 | 268 | 65 | NA | 230 | 270 |
| End 4-6 | | 144 | 291.9 | .89 | 2.09 | 2.1 | 105 | 99 | 7.5 | ✓ | 266 | 265 | 60 | NA | 233 | 265 |
| | 1426 | 144 | 296.33 | | | | | | | | | | | | | |

Meter Leak Check During Test:

.003 CF in 60 Seconds at 15 In. Hg
.005 CF in 60 Seconds at 18 In. Hg
.004 60 17

Meter Reading: Stop / Start

pre port 3
post port 3
pre port 4

Comments:

289.212 - VOLUME
LEAK RATE OF 0.003 CF IN 60 SEC @ 22.0 In Hg
STOPPED @ 1351
NEW FILTER LEAK RATE OF 0.003 CF IN 60 SEC @ 17.0 In Hg

lowell02.w

# SAMPLING TRAIN SETUP AND RECOVERY SHEET

| | | | Setup | Recovery |
|---|---|---|---|---|
| Project No.: | 26046 | Date: | 8/10/99 | 8/11/99 |
| Client: | PG&E | Run No.: | Inlet 1 A | |
| Facility: | Logan | Train Type: | ~~CM~~ OH - Hg | |
| Source: | Inlet | Recovery Person: | CM | |

**FRONT HALF**

| | | | | |
|---|---|---|---|---|
| Filter No.: | | | | Comments: |
| Thimble No.: | | | | |

| | | | | |
|---|---|---|---|---|
| XAD Trap No.: | | | | Comments: |
| XAD Final Wt. (g): | | | | |
| XAD Initial Wt.(g): | | | | |
| Net Collected (g): | | | | |

**IMPINGERS**

| Impinger No.: | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Reagent: | 100mls KCl | 100mls KCl | 100mls KCl | 100mls $HNO_3/H_2O_2$ |
| Final Volume (ml / g): | 806.7 | 755.6 | 619.3 | 484.3 |
| Initial Volume (ml / g): | 701.7 | 711.9 | 610.8 | 678.4 |
| **Net Collected (ml / g):** | 105.0 | 43.7 | 8.5 | 5.9 |

| Impinger No.: | ~~5~~ 7 | ~~6~~ 6 | ~~7~~ 5 | |
|---|---|---|---|---|
| Reagent: | 100mL $KMnO_4$ | 100mls $KMnO_4$ | 100mls $KMnO_4$ | |
| Final Volume (ml / g): | 695.1 | 646.7 | 709.4 | |
| Initial Volume (ml / g): | 694.5 | 645.3 | 712.0 | |
| **Net Collected (ml / g):** | 0.6 | 1.4 | - ~~2.~~ 2.6 | |

| Silica Gel Impinger: | 8 | | | |
|---|---|---|---|---|
| Final Volume (ml / g): | 838.2 | ~50% spent | | |
| Initial Volume (ml / g): | 808.0 | | | |
| **Net Collected (ml / g):** | 30.2 | | | |

**TOTAL MOISTURE (Impingers and Silica Gel) (g) =** 192.7

**TRC**

lowell03.wp

# ORSAT ANALYSIS

| | | | |
|---|---|---|---|
| Project No. | 26096-0030-00001 | Date | 8/11/99 |
| Client | PG&E | Run | PGE-OAM-I-a-1 |
| Facility | Logan | Operator | Michael Martin |
| Source | ~~SDA~~ PC Boiler | Comments | |
| Location | SDA inlet | | |

Orsat Leak Checked (yes) / no

Purge System with Sample Gas (yes) / no

Ambient Air Check $CO_2$ 0.0 $O_2$ 21.0

Audit Gas Check (measured/actual): $CO_2$ 10.0/10.0 $O_2$ 10.1/10.1 CO NA/NA

Expiration Date of Reagents / / (cyl # SG9134-128 BAL)

| Sample Point | Time | $CO_2$ Reading 1 | $O_2$ Reading 2 | | CO Reading 3 | | $F_o$ |
|---|---|---|---|---|---|---|---|
| | | | Actual | Net | Actual | Net | |
| 1 | 14:43 | 15.0 | 18.6 | 3.6 | NA | NA | 1.153 |
| 2 | 14:52 | 15.0 | 18.6 | 3.6 | NA | NA | 1.153 |
| 3 | 15:06 | 15.0 | 18.6 | 3.6 | NA | NA | 1.153 |
| | | | | | | | |
| | | | | | | | |

Net $O_2$ Reading = Reading 2 - Reading 1 (Actual)

Net CO Reading = Reading 3 - Reading 2 (Actual)

**QC Validation**

Calculate $F_o$

$$F_o = \frac{20.9 - \%O_2}{\%CO_2}$$

Fuel Bituminous Coal

Reported $F_o$ 1.153 ✓

**Expected $F_o$ Ranges**

| | |
|---|---|
| Anthracite/Lignite | 1.015 - 1.130 |
| Bituminous | 1.083 - 1.230 |
| Distillate Oil | 1.260 - 1.413 |
| Residual Oil | 1.210 - 1.370 |
| Natural Gas | 1.600 - 1.836 |
| Wood Bark | 1.000 - 1.120 |
| Municipal Garbage | 1.043 - 1.177 |

Other

# Sample Train Tracking Form

**Sample Train:** OH - Hg **Date:** 8/11/99

**Location:** Inlet **Run:** 1A

**Sample ID:** PG&E-OHM-Ia-1

| | | | |
|---|---|---|---|
| **Train Set Up By:** | [illegible] | **Date:** 08/11/99 | **Time:** 0755 |
| **Transported to Location By:** | [illegible] | **Date:** 8/11 | **Time:** [illegible] |
| **Received at Location By:** | [illegible] | **Date:** 8/11/99 | **Time:** 0810 |
| **Transported to Recovery Area By:** | [illegible] | **Date:** 8/11/99 | **Time:** 1500 |
| **Received at Recovery Area By:** | [illegible] | **Date:** 8/11/99 | **Time:** 1504 |
| **Train Recovered By:** | [illegible] | **Date:** 8/11/99 | **Time:** 1630 |

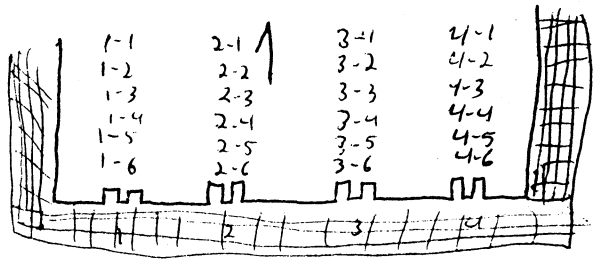
*Comments:*

Hg

# TRC ENVIRONMENTAL CORPORATION — ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 26046-0030-00001
Client: PG&E
Facility: Logan Station
Source: PC Boiler
Sample Location: SDA - Inlet
Stack Diameter: 360 x 81
Date: 8/11/99
Run No.: PG&E-OHM-I-a-2
Operator: S. Tibbetts
Meterbox No.: 90336
Meterbox ΔH @: 1.981
Y Factor: 0.987

VERY IMPORTANT - FILL IN ALL BLANKS
Read and Record at the Start of Each Test Point
SKETCH




Sheet 1 of 2
Train Prepared By: Ed Mackinnon
Pitot Number and Side: P-1
Pitot Tube CP: 0.88
Filter No.: NA
Ambient Temp., °F: 96
Bar. Pressure, In. Hg.: 30.00
Assumed Moisture, %: 8.0
Heater Box Setting, °F: 300
Nozzle # / Dia., In.: ~~1-6 / 0.222~~ 1-5 / .219
Probe Length / Material: 10' off Glass
Probe Heater Setting: 300

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F Stack | Filter Box | Imp Temp | XAD Cond | Probe | Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4-1 | 1615 | 0 | 297.380 | .79 | 1.37 | 1.4 | 98 | 96 | 6.5 | ✓ | 272 | 260 | 66 | NA | 237 | 263 |
| 4-2 | | 6 | 301.06 | .76 | 1.35 | 1.35 | 98 | 96 | 7.0 | ✓ | 277 | 263 | 64 | NA | 236 | 264 |
| 4-3 | | 12 | 304.78 | .77 | 1.32 | 1.3 | 98 | 96 | 7.0 | ✓ | 279 | 264 | 60 | NA | 235 | 265 |
| 4-4 | | 18 | 308.31 | .76 | 1.3 | 1.3 | 99 | 97 | 7.5 | ✓ | 280 | 264 | 61 | NA | 237 | 267 |
| 4-5 | | 24 | 312.0 | .81 | 1.385 | 1.4 | 101 | 98 | 8.5 | ✓ | 280 | 275 | 59 | NA | 240 | 273 |
| 4-6 | | 30 | 315.78 | .80 | 1.38 | 1.4 | 102 | 98 | 8.8 | ✓ | 279 | 275 | 60 | NA | 238 | 274 |
| | 1651 | 36 | 319.50 | | | | | | | | | | | | | |
| | | | Port 4 Post | Leak check | .000 | CF | in 60 sec | @ 16.0 | in Hg | Port 3 | INITIAL LEAK RATE | | OF 0.004 | CF IN 60 SEC @ | | 20.0 IN |
| 3-1 | 1713 | 36 | ~~319.05~~ 320.05 | .41 | .71 | .71 | 104 | 101 | 6.0 | ✓ | 270 | 274 | 65 | NA | 240 | 273 |
| 3-2 | | 42 | 322.92 | .43 | .74 | .74 | 102 | 101 | 6.5 | ✓ | 271 | 270 | 61 | NA | 240 | 274 |
| 3-3 | | 48 | 325.724 | .51 | .867 | .87 | 102 | 101 | 7.0 | ✓ | 283 | 276 | 62 | NA | 242 | 275 |
| 3-4 | | 54 | 327.69 | .62 | 1.05 | 1.05 | 102 | 101 | 8.5 | ✓ | 288 | 274 | 62 | NA | 245 | 277 |
| 3-5 | | 60 | ~~327.0~~ 332.0 | .64 | 1.1 | 1.1 | 103 | 101 | 9.0 | ✓ | 290 | 279 | 61 | NA | 247 | 278 |
| 3-6 | | 66 | ~~335.42~~ | .74 | 1.24 | 1.25 | 104 | 102 | 10.0 | ✓ | 294 | 281 | 62 | NA | 250 | 281 |

Train Leak Check:

Before Test: .001 CF in 60 Seconds at ~~20~~ 22.0 In. Hg
After Test: 0.003 CF in 60 Seconds at 15.0 In. Hg

Comments:

| | Initial | Final | | Static Pressure | | | |
|---|---|---|---|---|---|---|---|
| | | | Port | 4 | | | |
| Pitot Tube Leak Check | ✓ | ✓ | Inches H₂O | | | | |
| ORSAT Train Leak Check | ✓ | ✓ | mm ~~Inches~~ Hg | 34 | | | |

# TRC ENVIRONMENTAL CORPORATION - ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 26046-0030-00001
Client: PG+E
Facility: Logan Station
Source: PC Boiler

Date: 81..19
Run No.: PG+E-OHM-I-A-2
Sample Location: SPA-Inlet
Operator: S. Tibbetts

Sheet 2 of 2

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F Stack | Temperatures °F Filter Box | Temperatures °F Imp Temp | Temperatures °F XAD Cond | Temperatures °F Probe | Temperatures °C Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ~~Port 3 Final Leak check CF in 60 Sec. @ in Hg / Port 2 Initial Leak check CF in 60 Sec @ in Hg~~ | | | | | | | | | | | | | | | |
| | 1149 | 72 | 339.01 | | | | | | | | | | | | | |
| | Port 3 Final Leak check .001 CF in 60 Sec @ 12 in Hg / Port 2 Initial Leak check .001 CF in 60 Sec @ 12.5 in Hg | | | | | | | | | | | | | | | |
| 2-1 | 1807 | 72 | 339.685 | .37 | .617 | .62 | 101 | 101 | 6.5 | ✓ | 302 | 280 | 66 | NA | 255 | 285 |
| 2-2 | | 78 | 342.34 | .42 | .693 | .69 | 101 | 101 | 7.5 | ✓ | 308 | 272 | 60 | NA | 264 | 292 |
| 2-3 | | 84 | 345.06 | .59 | .97 | .97 | 102 | 101 | 8.5 | ✓ | 308 | 270 | 61 | NA | 266 | 293 |
| 2-4 | | 90 | 348.3 | .84 | 1.386 | 1.4 | 102 | 101 | 10.5 | ✓ | 311 | 266 | 60 | NA | 270 | 295 |
| 2-5 | | 96 | 351.98 | .89 | 1.459 | 1.45 | 103 | 101 | 12.0 | ✓ | 314 | 271 | 61 | NA | 275 | 299 |
| 2-6 | | 102 | 355.87 | .93 | 1.534 | 1.55 | 104 | 101 | 12.5 | ✓ | 316 | 268 | 62 | NA | 280 | 305 |
| | | 108 | 359.823 | | | | | | | | | | | | | |
| | Port 2 Final Leak Check .001 CF in 60 Sec @ 16.0 in Hg / Port 1 Initial Leak check .001 CF in 60 Sec @ 21 in Hg | | | | | | | | | | | | | | | |
| ~~1900~~ 1-1 | 1900 | ~~1400~~ 108 | 360.665 | 0.66 | 1.08 | 1.1 | 101 | 101 | 6.5 | ✓ | 316 | 260 | 66 | NA | 285 | 309 |
| 1-2 | | 114 | 364.1 | 0.74 | 1.19 | 1.2 | 102 | 101 | 7.0 | ✓ | 321 | 261 | 64 | NA | 290 | 316 |
| 1-3 | | 120 | 367.668 | 0.80 | 1.28 | 1.3 | 103 | 101 | 7.5 | ✓ | 324 | 259 | 60 | NA | 292 | 317 |
| 1-4 | | 126 | 371.29 | 0.84 | 1.34 | 1.35 | 104 | 101 | 8.5 | ✓ | 330 | 263 | 61 | NA | 295 | 321 |
| 1-5 | | 132 | 375.0 | 0.84 | 1.35 | 1.35 | 105 | 101 | 8.8 | ✓ | 333 | 266 | 60 | NA | 300 | 323 |
| 1-6 | | 138 | ~~377.46~~ 378.69 | 0.86 | 1.35 | 1.35 | 107 | 101 | 9.0 | ✓ | 332 | 272 | 59 | NA | 301 | 325 |
| | 1936 | 144 | 382.39 | | | | | | | | | | | | | |

Meter Leak Check During Test:

_____ CF in _____ Seconds at _____ In. Hg _____
_____ CF in _____ Seconds at _____ In. Hg _____

Meter Reading: Stop _____ Start _____

Comments:

lowell02.w

# SAMPLING TRAIN SETUP AND RECOVERY SHEET

| | | | Setup | Recovery |
|---|---|---|---|---|
| Project No.: | 26046 | Date: | 8/10/99 | 8/11/99 |
| Client: | PG&E | Run No.: | Inlet 2A | |
| Facility: | Logan | Train Type: | OH-Hg | |
| Source: | Inlet | Recovery Person: | Em | |

**FRONT HALF**

| | | | | |
|---|---|---|---|---|
| Filter No.: | | | | Comments: |
| Thimble No.: | | | | |

| | | | | |
|---|---|---|---|---|
| XAD Trap No.: | | | | Comments: |
| XAD Final Wt. (g): | | | | |
| XAD Initial Wt.(g): | | | | |
| Net Collected (g): | | | | |

**IMPINGERS**

| Impinger No.: | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Reagent: 100ml/s → | KCl | KCl | KCl | $HNO_3/H_2O_2$ |
| Final Volume (ml / g): | ~~851.4~~ 786.4 Em | ~~653.8~~ 742.8 Em | ~~626.9~~ 699.0 Em | 661.5 |
| Initial Volume (ml / g): | 692.6 | 707.3 | 692.9 | ~~784.5~~ 654.9 Em |
| **Net Collected (ml / g):** | ~~158.8~~ 93.8 Em | 35.5 | 6.1 | 6.6 |

Note: Cross out Outlet 2A

| Impinger No.: | 5 | 6 | 7 | |
|---|---|---|---|---|
| Reagent: 100ml/s → | $KMnO_4$ | → | | |
| Final Volume (ml / g): | 705.0 | 712.9 | 684.9 | |
| Initial Volume (ml / g): | 706.0 | 710.4 | 681.9 | |
| **Net Collected (ml / g):** | -1.0 | 2.5 | 3.0 | |

| Silica Gel Impinger: | 8 | | | |
|---|---|---|---|---|
| Final Volume (ml / g): | 807.6 | ~50% spent | | |
| Initial Volume (ml / g): | 784.5 | | | |
| **Net Collected (ml / g):** | 23.1 | | | |

**TOTAL MOISTURE (Impingers and Silica Gel) (g) =** 169.6

**TRC**

lowell03.wp

# ORSAT ANALYSIS

| | | | |
|---|---|---|---|
| Project No. | 26046-0030-00001 | Date | 8/11/99 |
| Client | PG&E | Run | PG&E-L-OHM-I-a-2 |
| Facility | Logan Station | Operator | Michael Martin |
| Source | PC Boiler | Comments | |
| Location | SDA Inlet | | |

Orsat Leak Checked (yes) / no

Purge System with Sample Gas (yes) / no

Ambient Air Check $CO_2$ 0.0 $O_2$ 21.0

Audit Gas Check (measured/actual): $CO_2$ / $O_2$ / CO /

Expiration Date of Reagents / /

| Sample Point | Time | $CO_2$ Reading 1 | $O_2$ Reading 2 | | CO Reading 3 | | $F_o$ |
|---|---|---|---|---|---|---|---|
| | | | Actual | Net | Actual | Net | |
| | 2130 | 15.4 | 18.9 | 3.5 | | | |
| | 2136 | 15.4 | 18.9 | 3.5 | | | |
| | 2144 | 15.4 | 18.9 | 3.5 | | | |
| | | | | | | | |
| | | | | | | | |

Net $O_2$ Reading = Reading 2 - Reading 1 (Actual)

Net CO Reading = Reading 3 - Reading 2 (Actual)

**QC Validation**

Calculate $F_o$

$$F_o = \frac{20.9 - \%O_2}{\%CO_2}$$

Fuel _____

Reported $F_o$ _____

**Expected $F_o$ Ranges**

| | |
|---|---|
| Anthracite/Lignite | 1.015 - 1.130 |
| Bituminous | 1.083 - 1.230 |
| Distillate Oil | 1.260 - 1.413 |
| Residual Oil | 1.210 - 1.370 |
| Natural Gas | 1.600 - 1.836 |
| Wood Bark | 1.000 - 1.120 |
| Municipal Garbage | 1.043 - 1.177 |

Other _____

# SAMPLING TRAIN SETUP AND RECOVERY SHEET

| | | | Setup | Recovery |
|---|---|---|---|---|
| Project No.: | 26046 | Date: | 8/11/99 | 8/12/99 |
| Client: | PG&E | Run No.: | Inlet 3A | |
| Facility: | Logan | Train Type: | OH - Hg | |
| Source: | Inlet | Recovery Person: | GM | |

**FRONT HALF**

| | | | | |
|---|---|---|---|---|
| Filter No.: | | | | Comments: |
| Thimble No.: | | | | |

| | | | | |
|---|---|---|---|---|
| XAD Trap No.: | | | | Comments: |
| XAD Final Wt. (g): | | | | |
| XAD Initial Wt.(g): | | | | |
| Net Collected (g): | | | | |

**IMPINGERS**

| Impinger No.: | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Reagent: 100mls → | KCl | KCl | KCl | $HNO_3/H_2O_2$ |
| Final Volume (ml / g): | 810.3 | 764.7 | 623.8 | 693.1 |
| Initial Volume (ml / g): | 707.4 | 716.1 | 612.2 | 685.7 |
| **Net Collected (ml / g):** | 102.9 | 48.6 | 11.6 | 7.4 |

| Impinger No.: | 5 | 6 | 7 | |
|---|---|---|---|---|
| Reagent: 100mls → | $KMnO_4$ | ↓ | → | |
| Final Volume (ml / g): | 719.0 | 652.7 | 700.5 | |
| Initial Volume (ml / g): | 718.6 | 650.9 | 701.1 | |
| **Net Collected (ml / g):** | 0.4 | 1.8 | -0.6 | |

| Silica Gel Impinger: | 8 | | | |
|---|---|---|---|---|
| Final Volume (ml / g): | 787.0 | ~30% | spent | |
| Initial Volume (ml / g): | 763.8 | | | |
| **Net Collected (ml / g):** | 23.2 | | | |

**TOTAL MOISTURE (Impingers and Silica Gel) (g) =** 195.3

**TRC**

lowell03.wp

# Sample Train Tracking Form

**Sample Train:** OH - Hg **Date:** 8/11/99

**Location:** Inlet **Run:** 2A

**Sample ID:** PG&E-OHM-Ia-2

| | | | |
|---|---|---|---|
| **Train Set Up By:** | EMcK | **Date:** 8/11/99 | **Time:** 08:18 |
| **Transported to Location By:** | SJ | **Date:** ~~18~~ 8/11/99 | **Time:** 15:30 |
| **Received at Location By:** | SJ | **Date:** 8/11/99 | **Time:** 1535 |
| **Transported to Recovery Area By:** | SJ | **Date:** 8/11/99 | **Time:** 2000 |
| **Received at Recovery Area By:** | EMK | **Date:** 8/11/99 | **Time:** 2008 |
| **Train Recovered By:** | EMK | **Date:** 8/11/99 | **Time:** 2130 |

*Comments:*

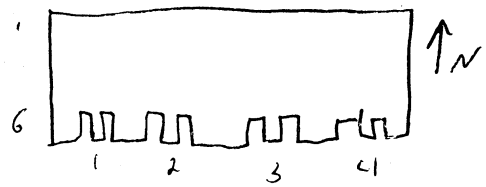
Hg

# TRC ENVIRONMENTAL CORPORATION — ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 26046-0030-00001
Client: PGE
Facility: LOGAN STATION
Source: PC Boiler
Sample Location: SCR Inlet
Stack Diameter: 360 x 81
Date: 8/12/99
Run No.: PGE-OHM-I-a-3
Operator: Scott Tibbetts
Meterbox No.: 90336
Meterbox ΔH @: 1.981
Y Factor: 0.987

VERY IMPORTANT - FILL IN ALL BLANKS
Read and Record at the Start of Each Test Point

SKETCH




Sheet 1 of 2

Train Prepared By: Ed MacKinnon
Pitot Number and Side: P-1
Pitot Tube CP: 0.84
Filter No.: NA
Ambient Temp., °F: 75
Bar. Pressure, In. Hg.: 29.96
Assumed Moisture, %: 8.0
Heater Box Setting, °F: 300
Nozzle # / Dia., In.: L-5 / .219
Probe Length / Material: 10' EFF. Glass
Probe Heater Setting: 300

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F Stack | Temperatures °F Filter Box | Temperatures °F Imp Temp | Temperatures °F XAD Cond | Temperatures °F Probe | Temperatures °F Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-1 | 0835 | 0 | 393.172 | 0.71 | 1.27 | 1.3 | 78 | 76 | 6.0 | Good | 317 | 260 | 67 | NA | 240 | 298 |
| 1-2 | | 6 | 396.85 | 0.75 | 1.335 | 1.35 | 79 | 76 | 7.5 | Good | 319 | 260 | 63 | NA | 255 | 307 |
| 1-3 | | 12 | 400.43 | 0.86 | 1.52 | 1.5 | 80 | 77 | 7.5 | Good | 325 | 265 | 63 | NA | 263 | 313 |
| 1-4 | | 18 | 404.20 | 0.88 | 1.54 | 1.55 | 82 | 77 | 8.0 | Good | 328 | 268 | 63 | NA | 268 | 315 |
| 1-5 | | 24 | 407.98 | 0.90 | 1.575 | 1.6 | 84 | 79 | 9.0 | Good | 333 | 270 | 62 | NA | 270 | 318 |
| 1-6 | 0911 | 30 | 411.89 | 0.90 | 1.575 | 1.6 | 87 | 81 | 9.0 | Good | 333 | 272 | 63 | NA | 275 | 320 |
| | | 36 | 415.635 | | | | | | | | | | | | | |
| | Port 1 | Post Leak check .001 CF in 60 Sec. @ 15 in. Hg / Port 2 Pre Leak check .004 CF in 60 Sec. @ 21 in Hg | | | | | | | | | | | | | | |
| 2-1 | 0926 | 36 | 416.39 | 0.46 | 0.84 | .84 | 86 | 86 | 9.0 | Good | 301 | 271 | 67 | NA | 274 | 310 |
| 2-2 | | 42 | 419.3 | 0.46 | 0.837 | 0.837 | 89 | 86 | 9.5 | Good | 303 | 270 | 65 | NA | 265 | 301 |
| 2-3 | | 48 | 422.295 | 0.62 | 1.128 | 1.1 | 90 | 86 | 10.5 | Good | 305 | 273 | 63 | NA | 266 | 300 |
| 2-4 | | 54 | 425.62 | 0.81 | 1.466 | 1.45 | 92 | 86 | 12.5 | Good | 311 | 272 | 63 | NA | 264 | 301 |
| 2-5 | | 60 | 429.41 | 1.05 | 1.879 | 1.9 | 93 | 87 | 15.0 | Good | 316 | 281 | 63 | NA | 267 | 308 |
| 2-6 | | 66 | 433.87 | 1.05 | 1.88 | 1.9 | 93 | 88 | 18.2 | Good | 316 | 293 | 65 | NA | 268 | 311 |

Train Leak Check:

Before Test: .003 CF in 60 Seconds at 21 In. Hg
After Test: .004 CF in 60 Seconds at 27.5 In. Hg

Comments:

| | Initial | Final | | Static Pressure | | | |
|---|---|---|---|---|---|---|---|
| Pitot Tube Leak Check | ✓ | ✓ | Port | 4 | | | |
| | | | Inches H₂O | | | | |
| ORSAT Train Leak Check | ✓ | ✓ | ~~Inches~~ mm Hg | 35 | | | |

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# TRC ENVIRONMENTAL CORPORATION OKINETIC FLUE GAS SAMPLING DATA SHEET

Project No.. 26046-0030-00001
Client: PGE
Facility: Logan station
Source: PC Boiler

Date: 8/12/99
Run No.: PGE-011M-I-A-3
Sample Location: SDA Inlet
Operator: S. Tibbetts

Sheet 2 of 2

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F Stack | Temperatures °F Filter Box | Temperatures °F Imp Temp | Temperatures °F XAD Cond | Temperatures °F Probe | Temperatures °C Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1002 | 72 | 438.265 | | | | | | | | | | | | | |
| | Port 2 | Post Leak check .001 CF in 60 sec @ 21 in Hg / Port 3 Init. Leak check CF in 60 sec @ in Hg | | | | | | | | | | | | | | |
| 3-1 | 1023 | 72 | 439.25 | 0.38 | 0.116 | 0.72 | 93 | 90 | [illegible] | Good | 273 | 287 | 67 | NA | 250 | 285 |
| 3-2 | | 78 | 442.0 | 0.40 | 0.72 | 0.73 | 95 | 92 | 6.5 | Good | 275 | 291 | 65 | NA | 240 | 272 |
| 3-3 | | 84 | 444.80 | 0.49 | 0.9212 | 0.92 | 96 | 92 | 7.0 | Good | 279 | 291 | 65 | NA | 245 | 273 |
| 3-4 | | 90 | 447.80 | 0.59 | 1.103 | 1.1 | 98 | 93 | 8.5 | Good | 284 | 290 | 65 | NA | 255 | 280 |
| 3-5 | | 96 | 451.087 | 0.70 | 1.295 | 1.3 | 101 | 95 | 9.5 | Good | 288 | 293 | 64 | NA | 257 | 281 |
| 3-6 | | 102 | 454.695 | 0.74 | 1.369 | 1.4 | 105 | 98 | 10.5 | Good | 290 | 293 | 66 | NA | 260 | 282 |
| | 1059 | 108 | 456.441 | | | | | | | | | | | | | |
| | Port 3 Final Leak check .001 CF in 60 sec @ 16.5 in Hg / Port 4 Init. Leak Check 0.002 CF in 60 sec @ 21 in Hg | | | | | | | | | | | | | | | |
| 4-1 | 1226 | 108 | 459.10 | ~~0.78~~ 0.81 | 1.547 | 1.55 | 102 | 95 | 13.0 | Good | 273 | 288 | 66 | NA | 260 | 281 |
| 4-2 | | 114 | 462.78 | 0.81 | 1.547 | 1.55 | 101 | 95 | 13.5 | Good | 276 | 287 | 66 | NA | 260 | 281 |
| 4-3 | | 120 | 466.65 | 0.83 | 1.56 | 1.55 | 102 | 96 | 14.0 | Good | 282 | 290 | 63 | NA | 259 | 280 |
| 4-4 | | 126 | 470.55 | 0.81 | 1.55 | 1.55 | 99 | 95 | 16.0 | Good | 283 | 289 | 60 | NA | 261 | 282 |
| 4-5 | | 132 | 474.4 | 0.86 | 1.61 | 1.6 | 101 | 96 | 18.0 | Good | 279 | 290 | 58 | NA | 260 | 281 |
| 4-6 | 1256 | 138 | 478.445 | 0.89 | 1.67 | 1.65 | 104 | 98 | 20.0 | Good | 278 | 288 | 61 | NA | 262 | 280 |
| End | 1302 | 144 | 482.445 | | | | | | | | | | | | | |

Meter Leak Check During Test:

_____ CF in _____ Seconds at _____ In. Hg _____

_____ CF in _____ Seconds at _____ In. Hg _____

Meter Reading: Stop _____ Start _____

Comments:

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# Sample Train Tracking Form

ample Train: OH - Hg

Date: 8/12/99

Location: Logan Inlet

Run: 3A

Sample ID: PG&E-L-OHM-Ia-3

Train Set Up By: [signature] Date: 8/12/99 Time: 0724

Transported to Location By: [signature] Date: 8-12-99 Time: 0740

Received at Location By: [signature] Date: 8-12-99 Time: 0745

Transported to Recovery Area By: [signature] Date: 8-12-99 Time: 1325

Received at Recovery Area By: [signature] Date: 8/12/99 Time: 1330

Train Recovered By: [signature] Date: 8/12/99 Time: 1330

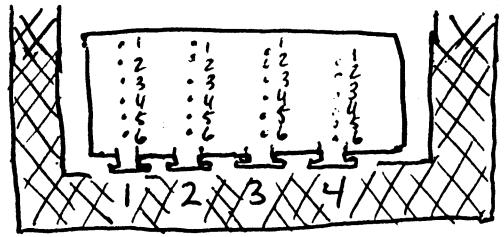
*Comments:*

Hg

# TRC ENVIRONMENTAL CORPORATION · ]KINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 70046-0030-00001
Client: PG & E
Facility: Logan Station
Source: PC Boiler
Sample Location: SDA Inlet
Stack Diameter: 360 x 81
Date: 8/4/99
Run No.: PG+E-OHm-I-b-1
Operator: KLAAKSO
Meterbox No.: 90343
Meterbox ΔH @: ~~1.992~~ 0.981
Y Factor: ~~0.974~~ 1.885

VERY IMPORTANT - FILL IN ALL BLANKS
Read and Record at the Start of Each Test Point
SKETCH




Sheet 1 of 2

Train Prepared By: Ed MacKinnon
Pitot Number and Side: P-3
Pitot Tube CP: ~~0.84~~ 0.88 mm
Filter No.: NA
Ambient Temp., °F: 80°F
Bar. Pressure, In. Hg.: 29.8
Assumed Moisture, %: 8%
Heater Box Setting, °F: 250-300
Nozzle # / Dia., In.: L-2-Q / SWITCHED TO L-6 TO START PORT 1
Probe Length / Material: 10'-GLASS #106
Probe Heater Setting: 250-300

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. $H_2O$ ΔP | Orifice ΔH Inches $H_2O$ Desired | Orifice ΔH Inches $H_2O$ Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F Stack | Filter Box | Imp Temp | XAD Cond | Probe | Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4-1 | 0953 | 0 | 388.092 | 0.92 | 1.~~8~~2 | 1.~~8~~0 | 83 | 83 | 7.5 | GOOD | 264 | 250 | 65 | NA | 250 | 245 |
| 2 | | 6 | 392.650 | 0.92 | 1.~~8~~2 | 1.~~8~~0 | 84 | 83 | 7.5 | GOOD | 264 | 265 | 67 | NA | 243 | 243 |
| 3 | | 12 | 396.600 | 0.85 | 1.59 | 1.60 | 87 | 84 | 8.0 | GOOD | 264 | 284 | 65 | NA | 273 | 250 |
| 4 | | 18 | 400.630 | 0.80 | 1.50 | 1.50 | 90 | 85 | 8.0 | GOOD | 272 | 297 | 65 | NA | 291 | 267 |
| 5 | | 24 | 404.570 | 0.87 | 1.63 | 1.65 | 91 | 86 | 8.5 | GOOD | 269 | 301 | 64 | NA | 300 | 275 |
| 6 | | 30 | 408.680 | 0.86 | 1.61 | 1.60 | 93 | 87 | 10.0 | GOOD | 267 | 302 | 62 | NA | 302 | 280 |
| STOP | 1028 | 36 | 412.771 | | | | | | | | | | | | | |
| | PORT 4 - FINAL LEAK RATE OF 0.004 CF IN 60 SEC @ 11.0 InHg / PORT 3 INITIAL LEAK RATE OF 0.003 CF IN 60 SEC @ 15.0 InHg | | | | | | | | | | | | | | | |
| 3-1 | 1100 | ~~30~~36 | 413.281 | 0.46 | 0.88 | 0.88 | 89 | 89 | 9.0 | GOOD | 265 | 302 | 66 | NA | 302 | 250 |
| 2 | | ~~36~~42 | 416.400 | 0.61 | 1.22 | 1.20 | 91 | 89 | 9.0 | GOOD | 271 | 301 | 66 | NA | 301 | 261 |
| 3 | | ~~42~~48 | 419.900 | 0.70 | 1.32 | 1.30 | 95 | 90 | 11.0 | GOOD | 275 | 301 | 63 | NA | 301 | 275 |
| 4 | | ~~48~~54 | 423.570 | 0.73 | 1.37 | 1.35 | 99 | 92 | 12.0 | GOOD | 282 | 300 | 64 | NA | 302 | 274 |
| 5 | | ~~54~~60 | 427.250 | 0.86 | 1.61 | 1.60 | 102 | 93 | 14.0 | GOOD | 290 | 306 | 65 | NA | 300 | 285 |
| 6 | | 66 | 431.340 | 0.86 | 1.61 | 1.60 | 104 | 94 | 14.5 | GOOD | 292 | 305 | 65 | NA | 300 | 283 |

Train Leak Check:

Before Test: 0.005 CF in 60 Seconds at 18.0 In. Hg
After Test: 0.006 CF in 60 Seconds at 18.0 In. Hg

| | Initial | Final | | Static Pressure | | | |
|---|---|---|---|---|---|---|---|
| | | | Port | 4-5 | | | |
| Pitot Tube Leak Check | ✓ | ✓ | Inches $H_2O$ | | | | |
| ORSAT Train Leak Check | ✓ | ✓ | ~~Inches~~ Hg MM Hg | 36.0 | | | |

Comments:
L-2-Q 0.228
L-6 0.222

L-2-Q Broken during Port change @ 108 minutes. L-6 used to finish test.

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# TRC ENVIRONMENTAL CORPORATION ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 26046-0030-00001
Client: PG&E
Facility: LOGAN
Source: PC BOILER

Date: 8/..99
Run No.: PG&E-OHM-I-b-1
Sample Location: SDA INLET
Operator: KLAAKSO

Sheet 2 of 2

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F Stack | Temperatures °F Filter Box | Temperatures °F Imp Temp | Temperatures °F XAD Cond | Temperatures °F Probe | Temperatures °C Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STOP | 1136 | 72 | 435.442 | | | | | | | | | | | | | |
| | | | PORT 3 FINAL LEAK RATE OF 0.002 CF IN 60 SEC @ 16.0 In Hg / PORT 2 INITIAL LEAK RATE OF 0.007 CF IN 60 SEC @ 20.0 In Hg | | | | | | | | | | | | | |
| 2-1 | 1220 | 72 | 436.294 | 0.52 | 0.96 | 0.96 | 101 | 96 | 8.0 | GOOD | 294 | 303 | 67 | NA | 300 | 287 |
| 2 | | 78 | 439.710 | 0.52 | 0.96 | 0.96 | 102 | 96 | 8.0 | GOOD | 303 | 305 | 62 | NA | 302 | 288 |
| 3 | | 84 | 442.980 | 0.66 | 1.21 | 1.20 | 104 | 98 | 8.0 | GOOD | 303 | 306 | 63 | NA | 300 | 285 |
| 4 | | 90 | 446.450 | 0.97 | 1.76 | 1.75 | 105 | 99 | 10.0 | GOOD | 307 | 305 | 64 | NA | 303 | 290 |
| 5 | | 96 | 450.780 | 0.96 | 1.72 | 1.70 | 109 | 101 | 11.0 | GOOD | 311 | 304 | 64 | NA | 305 | 293 |
| 6 | | 102 | 454.900 | 1.20 | 2.11 | 2.10 | 111 | 102 | 12.5 | GOOD | 316 | 301 | 66 | NA | 308 | 306 |
| STOP | 1256 | 108 | 459.640 | | | | | | | | | | | | | |
| | | | PORT 2 FINAL LEAK RATE OF .004 CF IN 60 SEC @ 22 In Hg / PORT 1 INITIAL LEAK RATE OF 0.002 CF IN 60 SEC @ 17.5 In Hg | | | | | | | | | | | | | |
| 1-1 | 1328 | 108 | 460.550 | 0.78 | 1.31 | 1.30 | 103 | 103 | 12.0 | GOOD | 308 | 307 | 65 | NA | 305 | 284 |
| 2 | | 114 | 464.170 | 0.81 | 1.32 | 1.30 | 105 | 103 | 13.5 | GOOD | 318 | 304 | 64 | NA | 303 | 310 |
| 3 | | 120 | 467.910 | 0.93 | 1.51 | 1.50 | 106 | 102 | 14.5 | GOOD | 324 | 304 | 64 | NA | 304 | 318 |
| 4 | | 126 | 471.950 | 1.00 | 1.61 | 1.60 | 107 | 102 | 15.5 | GOOD | 328 | 304 | 65 | NA | 304 | 319 |
| 5 | 1352 | 132 | 476.085 | 0.85 | 1.37 | 1.35 | 101 | 101 | 15.5 | GOOD | 329 | 307 | 66 | NA | 305 | 321 |
| 6 | | 138 | 480.100 | 0.78 | 1.31 | 1.30 | 101 | 101 | 15.5 | GOOD | 330 | 308 | 65 | NA | 309 | 320 |
| STOP | 1404 | 144 | 483.895 | | | | | | | | | | | | | |
| | 3 hrs | | | | | | | | | | | | | | | |

Meter Leak Check During Test:

_____ CF in _____ Seconds at _____ In. Hg _____
_____ CF in _____ Seconds at _____ In. Hg _____

Meter Reading: Stop _____ Start _____

Comments:
* STOPPED @ 132.0 MIN. BECAUSE TRAIN A HAD A PLUGGED FILTER — 1352
RESTART @ 1422 VOLUME OF 476.195

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# SAMPLING TRAIN SETUP AND RECOVERY SHEET

| | | | Setup | Recovery |
|---|---|---|---|---|
| Project No.: | 26046 | Date: | 8/10/99 | 8/11/99 |
| Client: | PG&E | Run No.: | Inlet 1B | |
| Facility: | Logan | Train Type: | OH - Hg | |
| Source: | Inlet | Recovery Person: | EM | |

**FRONT HALF**

| | | | | |
|---|---|---|---|---|
| Filter No.: | | | | Comments: |
| Thimble No.: | | | | |

| | | | | |
|---|---|---|---|---|
| XAD Trap No.: | | | | Comments: |
| XAD Final Wt. (g): | | | | |
| XAD Initial Wt.(g): | | | | |
| Net Collected (g): | | | | |

**IMPINGERS**

| Impinger No.: | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Reagent: 100ml/s → | KCl | KCl | KCl | $HNO_3/H_2O_2$ |
| Final Volume (ml / g): | 751.9 | 671.7 | 693.2 | 653.4 |
| Initial Volume (ml / g): | 642.8 | 629.4 | 684.8 | 646.8 |
| **Net Collected (ml / g):** | 109.1 | 42.3 | 8.4 | 6.6 |

| Impinger No.: | 5 | 6 | 7 | |
|---|---|---|---|---|
| Reagent: 100ml/s → | $KMnO_4$ | ~~6~~ | → | |
| Final Volume (ml / g): | 718.6 | 628.6 | 694.0 | |
| Initial Volume (ml / g): | 720.6 | 628.2 | 694.3 | |
| **Net Collected (ml / g):** | -2.0 | 0.6 | -0.3 | |

| Silica Gel Impinger: | 8 | | | |
|---|---|---|---|---|
| Final Volume (ml / g): | 870.2 | ~60% spent | | |
| Initial Volume (ml / g): | 839.8 | | | |
| **Net Collected (ml / g):** | 30.4 | | | |

**TOTAL MOISTURE (Impingers and Silica Gel) (g) =** 195.1

**TRC**

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# ORSAT ANALYSIS

| | | | |
|---|---|---|---|
| Project No. | 26046-0030-00001 | Date | 8/11/99 |
| Client | PG&E | Run | PG&E-OHM-I-b-1 |
| Facility | Logan STATION | Operator | Michael Martin |
| Source | PC Boiler | Comments | |
| Location | SDA Inlet | | |

Orsat Leak Checked (yes) / no

Purge System with Sample Gas (yes) / no

Ambient Air Check $CO_2$ 0.0 $O_2$ 21.0

Audit Gas Check (measured/actual): $CO_2$ / $O_2$ / CO /

Expiration Date of Reagents / /

| Sample Point | Time | $CO_2$ Reading 1 | $O_2$ Reading 2 | | CO Reading 3 | | $F_o$ |
|---|---|---|---|---|---|---|---|
| | | | Actual | Net | Actual | Net | |
| 1 | 1817 | 15.0 | 18.8 | 3.8 | NA | NA | 1.140 |
| 2 | 1825 | 15.0 | 18.8 | 3.8 | NA | NA | 1.140 |
| 3 | 1833 | 15.0 | 18.8 | 3.8 | NA | NA | 1.140 |
| | | | | | | | |
| | | | | | | | |

Net $O_2$ Reading = Reading 2 - Reading 1 (Actual)

Net CO Reading = Reading 3 - Reading 2 (Actual)

**QC Validation**

Calculate $F_o$

$$F_o = \frac{20.9 - \%O_2}{\%CO_2}$$

Fuel _____

Reported $F_o$ _____

**Expected $F_o$ Ranges**

| | |
|---|---|
| Anthracite/Lignite | 1.015 - 1.130 |
| Bituminous | 1.083 - 1.230 |
| Distillate Oil | 1.260 - 1.413 |
| Residual Oil | 1.210 - 1.370 |
| Natural Gas | 1.600 - 1.836 |
| Wood Bark | 1.000 - 1.120 |
| Municipal Garbage | 1.043 - 1.177 |

Other _____

# Sample Train Tracking Form

**Sample Train:** OH - Hg **Date:** 8/4/99

**Location:** Inlet **Run:** 1B

**Sample ID:** PG&E-OHM-Ib-1

| | | | |
|---|---|---|---|
| **Train Set Up By:** | [illegible] | **Date:** 8/11/99 | **Time:** 0755 |
| **Transported to Location By:** | [illegible] | **Date:** 8/11/99 | **Time:** 0757 |
| **Received at Location By:** | [illegible] | **Date:** 8/11/99 | **Time:** 0810 |
| **Transported to Recovery Area By:** | [illegible] | **Date:** 8/11/99 | **Time:** 1500 |
| **Received at Recovery Area By:** | [illegible] | **Date:** 8/11/99 | **Time:** 1504 |
| **Train Recovered By:** | [illegible] | **Date:** 8/11/99 | **Time:** 1600 |

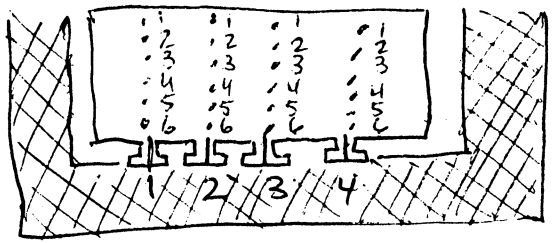
*Comments:*

Hg

# TRC ENVIRONMENTAL CORPORATION · )KINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 26046-0030-00001
Client: PG&E
Facility: LOGAN STATION
Source: PC BOILER
Sample Location: SDA INLET
Stack Diameter: 360 X 81
Date: 8-11-99
Run No.: PG&E-OHM-I-b-2
Operator: R LAAKSO
Meterbox No.: 90343
Meterbox ΔH @: 0.981
Y Factor: 1.885

VERY IMPORTANT - FILL IN ALL BLANKS
Read and Record at the Start of Each Test Point
SKETCH




Sheet 1 of 2
Train Prepared By: ED MACKINNON
Pitot Number and Side: P-3
Pitot Tube CP: ~~0.84~~ 0.88 IMP
Filter No.: —
Ambient Temp., °F: 85
Bar. Pressure, In. Hg.: 30.00
Assumed Moisture, %: 8%
Heater Box Setting, °F: 250-300°F
Nozzle # / Dia., In.: ~~L-2-Q~~ L-6 0.222
Probe Length / Material: 10' - GLASS
Probe Heater Setting: 250-300°F

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F Stack | Filter Box | Imp Temp | XAD Cond | Probe | Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-1 | 1619 | 0 | 484.808 | 0.80 | 1.30 | 1.30 | 96 | 96 | 7.0 | GOOD | 319 | 289 | 67 | NA | 303 | 299 |
| 2 | | 6 | 488.690 | 0.81 | 1.31 | 1.30 | 97 | 96 | 7.0 | GOOD | 322 | 304 | 64 | NA | 305 | 309 |
| 3 | | 12 | 492.380 | 0.93 | 1.51 | 1.50 | 99 | 96 | 8.5 | GOOD | 328 | 307 | 63 | NA | 309 | 311 |
| 4 | | 18 | 496.270 | 0.94 | 1.51 | 1.50 | 100 | 97 | 8.5 | GOOD | 333 | 308 | 62 | NA | 307 | 320 |
| 5 | | 24 | 500.290 | 0.93 | 1.51 | 1.50 | 102 | 98 | 9.0 | GOOD | 335 | 309 | 62 | NA | 312 | 322 |
| 6 | | 30 | 504.230 | 0.97 | 1.55 | 1.55 | 104 | 99 | 10.0 | GOOD | 335 | 318 | 63 | NA | 316 | 320 |
| STOP | 1655 | 36 | 508.395 | | | | | | | | | | | | | |
| | | PORT 1 FINAL LEAK RATE OF 0.001 CF IN 60 SEC @ 11.0 In Hg / PORT 2 INITIAL LEAK RATE OF 0.002 CF IN 60 SEC @ 15.0 In Hg | | | | | | | | | | | | | | |
| 2-1 | 1716 | 36 | 509.065 | 0.49 | 0.80 | 0.80 | 100 | 100 | 6.0 | GOOD | 305 | 298 | 66 | NA | 295 | 299 |
| 2 | | 42 | 512.360 | 0.50 | 0.81 | 0.81 | 100 | 100 | 6.0 | GOOD | 306 | 298 | 65 | NA | 307 | 293 |
| 3 | | 48 | 515.300 | 0.67 | 1.11 | 1.10 | 101 | 100 | 7.5 | GOOD | 306 | 296 | 61 | NA | 311 | 296 |
| 4 | | 54 | 518.74 | 0.87 | 1.43 | 1.45 | 102 | 100 | 8.5 | GOOD | 309 | 296 | 60 | NA | 319 | 305 |
| 5 | | 60 | 522.610 | 0.91 | 1.46 | 1.45 | 104 | 101 | 9.0 | GOOD | 310 | 298 | 60 | NA | 318 | 304 |
| 6 | | 66 | 526.520 | 1.00 | 1.64 | 1.65 | 105 | 101 | 10.5 | GOOD | 316 | 297 | 60 | NA | 316 | 307 |

Train Leak Check:

Before Test: 0.002 CF in 60 Seconds at 23.0 In. Hg
After Test: 0.001 CF in 60 Seconds at 15.0 In. Hg

Comments:

| | Initial | Final | | Static Pressure | | | |
|---|---|---|---|---|---|---|---|
| Pitot Tube Leak Check | ✓ | ✓ | Port | 4-5 | | | |
| ORSAT Train Leak Check | ✓ | ✓ | Inches H₂O | | | | |
| | | | ~~Inches Hg~~ MM Hg | 34 | | | |

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# TRC ENVIRONMENTAL CORPORATION ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 26046-0030-00001
Client: PG&E
Facility: LOGAN
Source: PC BOILER

Date: 6..99
Run No.: PG&E-OHM-I-b-2
Sample Location: SDA INLET
Operator: K. LAAKSO

Sheet 2 of 2

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F Stack | Filter Box | Imp Temp | XAD Cond | Probe | Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STOP | 1752 | 72 | 530.715 | | | | | | | GOOD | | | | NA | | |
| | | | PORT 2 FINAL LEAK RATE OF 0.001 CF IN 60 SEC @ 12 InHg / PORT 3 INITIAL LEAK RATE OF 0.002 CF IN 60 SEC @ 15 InHg | | | | | | | | | | | | | |
| 3-1 | 1809 | 72 | 531.192 | 0.50 | 0.86 | 0.86 | 102 | 101 | 7.0 | GOOD | 275 | 297 | 64 | NA | 301 | 271 |
| 2 | | 78 | 534.600 | 0.53 | 0.92 | 0.92 | 103 | 102 | 7.0 | GOOD | 276 | 291 | 64 | NA | 300 | 282 |
| 3 | | 84 | 537.780 | 0.60 | 1.03 | 1.05 | 104 | 102 | 8.0 | GOOD | 282 | 285 | 55 | NA | 300 | 291 |
| 4 | | 90 | 541.290 | 0.65 | 1.11 | 1.10 | 104 | 102 | 8.0 | GOOD | 286 | 279 | 54 | NA | 301 | 279 |
| 5 | | 96 | 544.630 | 0.76 | 1.29 | 1.30 | 105 | 102 | 9.5 | GOOD | 291 | 290 | 54 | NA | 300 | 292 |
| 6 | | 102 | 548.400 | 0.80 | 1.35 | 1.35 | 107 | 103 | 10.5 | GOOD | 294 | 295 | 56 | NA | 301 | 295 |
| STOP | 1845 | 108 | 552.158 | | | | | | | | | | | | | |
| | | | PORT 3 FINAL LEAK RATE OF 0.001 CF IN 60 SEC @ 12 InHg / PORT 4 INITIAL LEAK RATE OF 0.005 CF IN 60 SEC @ 20 InHg | | | | | | | | | | | | | |
| 4-1 | 1904 | 108 | 553.005 | 0.80 | 1.35 | 1.35 | 102 | 102 | 7.5 | GOOD | 278 | 290 | 66 | NA | 287 | 270 |
| 2 | | 114 | 556.370 | 0.90 | 1.56 | 1.55 | 105 | 103 | 8.5 | GOOD | 275 | 291 | 55 | NA | 301 | 285 |
| 3 | | 120 | 560.530 | 0.84 | 1.44 | 1.45 | 106 | 102 | 9.0 | GOOD | 278 | 300 | 57 | NA | 305 | 285 |
| 4 | | 126 | 564.440 | 0.76 | 1.30 | 1.30 | 107 | 102 | 9.0 | GOOD | 279 | 300 | 54 | NA | 303 | 282 |
| 5 | | 132 | 568.230 | 0.84 | 1.44 | 1.45 | 108 | 102 | 10.0 | GOOD | 278 | 301 | 56 | NA | 290 | 284 |
| 6 | | 138 | 572.410 | 0.85 | 1.45 | 1.45 | 108 | 103 | 10.5 | GOOD | 276 | 290 | 55 | NA | 300 | 283 |
| STOP | 1940 | 144 | 576.292 | | | | | | | | | | | | | |

Meter Leak Check During Test:

_____ CF in _____ Seconds at _____ In. Hg _____
_____ CF in _____ Seconds at _____ In. Hg _____

Meter Reading: Stop _____ Start _____

Comments:

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# SAMPLING TRAIN SETUP AND RECOVERY SHEET

| | | | Setup | Recovery |
|---|---|---|---|---|
| Project No.: | 26046 | Date: | 8/10/99 | 8/11/99 |
| Client: | PG&E | Run No.: | Inlet | 2B |
| Facility: | Logan | Train Type: | OH - Hg | |
| Source: | Inlet | Recovery Person: | CM | |

**FRONT HALF**

| | | | | |
|---|---|---|---|---|
| Filter No.: | | | | Comments: |
| Thimble No.: | | | | |

| | | | | |
|---|---|---|---|---|
| XAD Trap No.: | | | | Comments: |
| XAD Final Wt. (g): | | | | |
| XAD Initial Wt.(g): | | | | |
| Net Collected (g): | | | | |

**IMPINGERS**

| Impinger No.: | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Reagent: 100mls | KCl | KCl | KCl | $HNO_3/H_2O_2$ |
| Final Volume (ml / g): | 817.1 | 731.6 | 700.1 | 656.5 |
| Initial Volume (ml / g): | 712.3 | 699.1 | 694.5 | 651.2 |
| **Net Collected (ml / g):** | 104.8 | 32.5 | 5.6 | 5.3 |

| Impinger No.: | 5 | 6 | 7 | |
|---|---|---|---|---|
| Reagent: 100mls → | $KMnO_4$ | → | | |
| Final Volume (ml / g): | 711.0 | 708.2 | 698.2 | |
| Initial Volume (ml / g): | 708.4 | 706.8 | 695.4 | |
| **Net Collected (ml / g):** | 2.6 | 1.4 | 2.8 | |

| Silica Gel Impinger: | 8 | | | |
|---|---|---|---|---|
| Final Volume (ml / g): | 809.1 | ~35% Spent | | |
| Initial Volume (ml / g): | 788.8 | | | |
| **Net Collected (ml / g):** | 20.3 | | | |

**TOTAL MOISTURE (Impingers and Silica Gel) (g) =** 175.3

**TRC**

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# ORSAT ANALYSIS

Project No. 26046-0030-00001
Client PG&E
Facility Logan Station
Source PC Boiler
Location SDA Inlet

Date 9/11/99
Run PG&E-OHM-I-b-2
Operator Michael Martin
Comments

Orsat Leak Checked (yes) / no
Purge System with Sample Gas (yes) / no
Ambient Air Check $CO_2$ 0.0 $O_2$ 21.0
Audit Gas Check (measured/actual): $CO_2$ / $O_2$ / CO /
Expiration Date of Reagents / /

| Sample Point | Time | $CO_2$ Reading 1 | $O_2$ Reading 2 | | CO Reading 3 | | $F_o$ |
|---|---|---|---|---|---|---|---|
| | | | Actual | Net | Actual | Net | |
| 1 | 2203 | 15.6 | 19.0 | 3.4 | NA | NA | 1.122 |
| | 2211 | 15.5 | 19.0 | 3.5 | NA | NA | |
| | 2219 | 15.5 | 19.0 | 3.5 | NA | NA | |
| | | | | | | | |
| | | | | | | | |

Net $O_2$ Reading = Reading 2 - Reading 1 (Actual)
Net CO Reading = Reading 3 - Reading 2 (Actual)

**QC Validation**

Calculate $F_o$

$$F_o = \frac{20.9 - \%O_2}{\%CO_2}$$

Fuel
Reported $F_o$

**Expected $F_o$ Ranges**

| | |
|---|---|
| Anthracite/Lignite | 1.015 - 1.130 |
| Bituminous | 1.083 - 1.230 |
| Distillate Oil | 1.260 - 1.413 |
| Residual Oil | 1.210 - 1.370 |
| Natural Gas | 1.600 - 1.836 |
| Wood Bark | 1.000 - 1.120 |
| Municipal Garbage | 1.043 - 1.177 |

Other

# Sample Train Tracking Form

**Sample Train:** OH - Hg **Date:** 8/11/99

**Location:** Inlet **Run:** 2B

**Sample ID:** PG&E-OHM-Ib-2

| | | | |
|---|---|---|---|
| **Train Set Up By:** | EMPY | **Date:** 8/11/99 | **Time:** 0830 |
| **Transported to Location By:** | [illegible] | **Date:** 8/11/99 | **Time:** ~~1450~~ 1530 |
| **Received at Location By:** | [illegible] | **Date:** 8/11/99 | **Time:** ~~1540~~ 1530 |
| **Transported to Recovery Area By:** | [illegible] | **Date:** 8/11/99 | **Time:** 2000 |
| **Received at Recovery Area By:** | EMPY | **Date:** 8/11/99 | **Time:** 2008 |
| **Train Recovered By:** | EMPY | **Date:** 8/11/99 | **Time:** 2100 |

*Comments:*

Hg

# TRC ENVIRONMENTAL CORPORATION )KINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 26046-0030-00001
Client: PG+E
Facility: Logan Station
Source: PC Boiler
Sample Location: SDA Inlet
Stack Diameter: 360 X 81
Date: 8/12/99
Run No.: PG+E-OHM-I-b-3
Operator: KLAAKSO
Meterbox No.: 90343
Meterbox ΔH @: 1.445
Y Factor: 0.981

VERY IMPORTANT - FILL IN ALL BLANKS
Read and Record at the Start of Each Test Point
SKETCH

Sheet 1 of 2
Train Prepared By: ED MACKINNON
Pitot Number and Side: P-3
Pitot Tube CP: ~~0.84~~ 0.88 mpm
Filter No.: —
Ambient Temp., °F: 75
Bar. Pressure, In. Hg.: 29.96
Assumed Moisture, %: 8%
Heater Box Setting, °F: 300
Nozzle # / Dia., In.: 2-6 / 0.222
Probe Length / Material: 10'-GLASS
Probe Heater Setting: 300

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. $H_2O$ ΔP | Orifice ΔH Inches $H_2O$ Desired | Orifice ΔH Inches $H_2O$ Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures (°F) Stack | Filter Box | Imp Temp | XAD Cond | Probe | Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4-1 | 0840 | 0 | 578.395 | 0.82 | 1.56 | 1.55 | 80 | 78 | 7.5 | G | 270 | 290 | 64 | NA | 296 | 258 |
| 2 | | 6 | 582.440 | 0.84 | 1.60 | 1.60 | 82 | 78 | 8.0 | G | 269 | 290 | 63 | NA | 295 | 274 |
| 3 | | 12 | 586.450 | 0.8[illegible] | 1.60 | 1.60 | 85 | 79 | 9.0 | G | 272 | 291 | 65 | NA | 297 | 284 |
| 4 | | 18 | 590.530 | 0.87 | 1.65 | 1.65 | 87 | 81 | 10.0 | G | 277 | 291 | 65 | NA | 297 | 284 |
| 5 | | 24 | 594.700 | 0.87 | 1.65 | 1.65 | 90 | 83 | 11.0 | G | 275 | 292 | 63 | NA | 295 | 284 |
| 6 | | 30 | 598.830 | 0.90 | 1.71 | 1.70 | 92 | 84 | 12.5 | G | 276 | 291 | 64 | NA | 295 | 279 |
| STOP | 0916 | 36 | 603.045 | | | | | | | | | | | | | |
| | | | PORT 4 FINAL LEAK RATE OF 0.001 CF IN 60 SEC @ 14 In Hg / PORT 3 INITIAL LEAK RATE OF 0.004 CF IN 60 SEC @ 21 In Hg | | | | | | | | | | | | | |
| 3-1 | 0930 | 36 | 603.805 | 0.47 | 0.89 | 0.89 | 91 | 88 | 11.0 | G | 275 | 292 | 63 | NA | 296 | 265 |
| 2 | | 42 | 606.940 | 0.47 | 0.89 | 0.89 | 92 | 89 | 11.0 | G | 271 | 293 | 60 | NA | 298 | 273 |
| 3 | | 48 | 610.100 | 0.59 | 1.12 | 1.10 | 92 | 89 | 13.0 | G | 277 | 292 | 62 | NA | 300 | 279 |
| 4 | | 54 | 613.480 | 0.70 | 1.32 | 1.30 | 94 | 90 | 15.0 | G | 282 | 294 | 62 | NA | 301 | 282 |
| 5 | | 60 | 617.300 | 0.70 | 1.32 | 1.30 | 96 | 91 | 17.5 | G | 287 | 293 | 63 | NA | 297 | 282 |
| 6 | | 66 | 621.000 | 0.82 | 1.53 | 1.55 | 97 | 92 | 19.0 | G | 291 | 294 | 63 | NA | 299 | 283 |

Train Leak Check:

Before Test: 0.002 CF in 60 Seconds at 23.0 In. Hg
After Test: 0.001 CF in 60 Seconds at 21.5 In. Hg

Comments:

| | Initial | Final | | Static Pressure | | | |
|---|---|---|---|---|---|---|---|
| Pitot Tube Leak Check | ✓ | ✓ | Port | 4-3 | | | |
| ORSAT Train Leak Check | ✓ | ✓ | Inches $H_2O$ | | | | |
| | | | ~~Inches Hg~~ mm Hg | 35 | | | |

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# TRC ENVIRONMENTAL CORPORATION 'OKINETIC FLUE GAS SAMPLING DATA SHEET

Project No. 26046-0030-00001
Client: PG&E
Facility: LOGAN STATION
Source: PC BOILER

Date: 8 -99
Run No.: PG&E-OHM-I-b-3
Sample Location: SDA INLET
Operator: K LAAKSO

Sheet 2 of 2

| Point | Clock Time 24-hr | Clock Time min | Dry Gas Meter, (ft³) | Pitot In. H₂O ΔP | Orifice ΔH Inches H₂O Desired | Orifice ΔH Inches H₂O Actual | Dry Gas Temperature, °F Inlet | Dry Gas Temperature, °F Outlet | Pump Vacuum In. Hg Gauge | Silica Gel Cond. | Temperatures °F Stack | Temperatures °F Filter Box | Temperatures °F Imp Temp | Temperatures °F XAD Cond | Temperatures °F Probe | Temperatures °C Filter Outlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STOP | 1006 | 72 | 625.015 | | | | | | | G | | | | NA | | |
| | | | PORT 3 FINAL LEAK RATE OF 0.003 CF IN 60 SEC @ 20 In Hg / PORT 2 INITIAL LEAK RATE OF 0.002 CF IN 60 SEC @ 21.0 In Hg | | | | | | | | | | | | | |
| 2-1 | 1028 | 72 | 625.958 | 0.46 | 0.85 | 0.85 | 98 | 95 | 7.0 | G | 297 | 293 | 66 | NA | 297 | 289 |
| 2 | | 78 | 629.160 | 0.46 | 0.85 | 0.85 | 100 | 95 | 7.5 | G | 301 | 293 | 64 | NA | 294 | 296 |
| 3 | | 84 | 632.17 | 0.58 | 1.067 | 1.1 | 104 | 96 | 8.0 | G | 302 | 294 | 60 | NA | 299 | 295 |
| 4 | | 90 | 635.610 | 0.80 | 1.46 | 1.45 | 106 | 98 | 10.0 | G | 304 | 294 | 60 | NA | 299 | 296 |
| 5 | | 96 | 639.900 | 0.82 | 1.50 | 1.50 | 108 | 100 | 10.5 | G | 305 | 293 | 60 | NA | 299 | 297 |
| 6 | | 102 | 643.680 | 0.95 | 1.76 | 1.75 | 109 | 102 | 12.0 | G | 305 | 294 | 61 | NA | 301 | 298 |
| STOP | 1104 | 108 | 647.865 | | | | | | | | | | | | | |
| | | | PORT 2 FINAL LEAK RATE OF 0.003 CF IN 60 SEC @ 13 In Hg / PORT 1 INITIAL LEAK RATE OF 0.001 CF IN 60 SEC @ 21 In Hg | | | | | | | | | | | | | |
| 1-1 | 1229 | 108 | 648.575 | 0.75 | 1.38 | 1.40 | 99 | 99 | 12.5 | G | 318 | 298 | 64 | NA | 308 | 299 |
| 2 | | 114 | 652.360 | 0.85 | 1.51 | 1.50 | 103 | 98 | 13.0 | G | 323 | 296 | 61 | NA | 301 | 309 |
| 3 | | 120 | 656.310 | 0.94 | 1.66 | 1.65 | 102 | 99 | 15.0 | G | 328 | 295 | 60 | NA | 299 | 318 |
| 4 | | 126 | 660.480 | 0.96 | 1.69 | 1.70 | 102 | 99 | 16.5 | G | 333 | 294 | 63 | NA | 297 | 320 |
| 5 | | 132 | 664.820 | 1.00 | 1.76 | 1.75 | 104 | 99 | 18.0 | G | 335 | 295 | 63 | NA | 301 | 330 |
| 6 | | 138 | 669.150 | 1.00 | 1.76 | 1.75 | 105 | 101 | 20.0 | G | 336 | 296 | 64 | NA | 303 | 331 |
| STOP | 1305 | 144 | 673.385 | | | | | | | | | | | | | |

Meter Leak Check During Test:

_____ CF in _____ Seconds at _____ In. Hg _____
_____ CF in _____ Seconds at _____ In. Hg _____

Meter Reading: Stop _____ Start _____

Comments:

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# SAMPLING TRAIN SETUP AND RECOVERY SHEET

| | | | Setup | Recovery |
|---|---|---|---|---|
| Project No.: | 26046 | Date: | 8/11/99 | 8/12/99 |
| Client: | PG&E | Run No.: | Inlet Run 3 B | |
| Facility: | Logan | Train Type: | OH - Hg | |
| Source: | Inlet | Recovery Person: | [illegible] | |

**FRONT HALF**

| | | | | |
|---|---|---|---|---|
| Filter No.: | | | | Comments: |
| Thimble No.: | | | | |

| | | | | |
|---|---|---|---|---|
| XAD Trap No.: | | | | Comments: |
| XAD Final Wt. (g): | | | | |
| XAD Initial Wt.(g): | | | | |
| Net Collected (g): | | | | |

**IMPINGERS**

| Impinger No.: | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Reagent: 100mls | KCl | KCl | KCl | $HNO_3/H_2O_2$ |
| Final Volume (ml / g): | 741.3 | 681.6 | 700.0 | 662.8 |
| Initial Volume (ml / g): | 643.4 | 630.7 | 687.7 | 654.7 |
| **Net Collected (ml / g):** | 97.9 | 50.9 | 12.3 | 8.1 |

| Impinger No.: | 5 | 6 | 7 | |
|---|---|---|---|---|
| Reagent: 100mls | $KMnO_4$ | → | → | |
| Final Volume (ml / g): | 724.5 | 635.0 | 698.4 | |
| Initial Volume (ml / g): | 725.4 | 633.8 | 700.0 | |
| **Net Collected (ml / g):** | -0.9 | 1.2 | -1.6 | |

| Silica Gel Impinger: | 8 | | | |
|---|---|---|---|---|
| Final Volume (ml / g): | 862.3 | | | |
| Initial Volume (ml / g): | 531.6 | | | |
| **Net Collected (ml / g):** | 30.7 | | | |

**TOTAL MOISTURE (Impingers and Silica Gel) (g) =** 198.6

**TRC**

lowell03.wp

# ORSAT ANALYSIS

| | | | |
|---|---|---|---|
| Project No. | 26046-0030-00001 | Date | 8/12/99 |
| Client | PG&E | Run | PG&E-L-OHM-I-b-3 |
| Facility | Logan | Operator | Michael Martin |
| Source | DC Boiler | Comments | |
| Location | SDA Inlet | | |

Orsat Leak Checked (yes) / no

Purge System with Sample Gas (yes) / no

Ambient Air Check $CO_2$ 0.0 $O_2$ 21.0

Audit Gas Check (measured/actual): $CO_2$ / $O_2$ / CO /

Expiration Date of Reagents / /

| Sample Point | Time | $CO_2$ Reading 1 | $O_2$ Reading 2 | | CO Reading 3 | | $F_o$ |
|---|---|---|---|---|---|---|---|
| | | | Actual | Net | Actual | Net | |
| | | 14.9 | 18.7 | 3.8 | NA | NA | 1.132 |
| | | 14.9 | 18.7 | 3.8 | ↓ | ↓ | 1.132 |
| | | 14.9 | 18.7 | 3.8 | ↓ | ↓ | 1.132 |
| | | | | | | | |
| | | | | | | | |

Net $O_2$ Reading = Reading 2 - Reading 1 (Actual)

Net CO Reading = Reading 3 - Reading 2 (Actual)

**QC Validation**

Calculate $F_o$

$$F_o = \frac{20.9 - \%\,O_2}{\%\,CO_2}$$

Fuel _____

Reported $F_o$ _____

**Expected $F_o$ Ranges**

| | |
|---|---|
| Anthracite/Lignite | 1.015 - 1.130 |
| Bituminous | 1.083 - 1.230 |
| Distillate Oil | 1.260 - 1.413 |
| Residual Oil | 1.210 - 1.370 |
| Natural Gas | 1.600 - 1.836 |
| Wood Bark | 1.000 - 1.120 |
| Municipal Garbage | 1.043 - 1.177 |

Other _____

# Sample Train Tracking Form

**Sample Train:** OH - Hg **Date:** 8/12/99

**Location:** Inlet **Run:** 3B

**Sample ID:** PG&E-L-OHM-Ib-3

| | | | |
|---|---|---|---|
| **Train Set Up By:** | [illegible] | **Date:** 8/12/99 | **Time:** 0727 |
| **Transported to Location By:** | [illegible] | **Date:** 8/12/99 | **Time:** 0740 |
| **Received at Location By:** | [illegible] | **Date:** 8/12/99 | **Time:** 0745 |
| **Transported to Recovery Area By:** | [illegible] | **Date:** 8/12/99 | **Time:** 1325 |
| **Received at Recovery Area By:** | [illegible] | **Date:** 8/12/99 | **Time:** 1330 |
| **Train Recovered By:** | [illegible] | **Date:** 8/12/99 | **Time:** 1330 |

*Comments:*

Hg

# *Appendix B.2*

# *Calibration Data Sheets*

# QUARTZ NOZZLE CALIBRATIONS

| Nozzle ID No. | Diameter (in.) a | b | c | Average | Nozzle Set No. | Calibration Date |
|---|---|---|---|---|---|---|
| L-1-Q | 0.297 | 0.297 | 0.298 | 0.297 | 1 | 4/21/98 |
| L-2-Q | 0.227 | 0.228 | 0.228 | 0.228 | 1 | 4/21/98 |
| L-3-Q | 0.259 | 0.259 | 0.259 | 0.259 | 1 | 4/21/98 |
| L-4-Q | 0.272 | 0.271 | 0.272 | 0.272 | 1 | 4/21/98 |
| L-5-Q | 0.309 | 0.310 | 0.310 | 0.310 | 1 | 4/21/98 |
| L-6-Q | 0.354 | 0.356 | 0.356 | 0.355 | 1 | 4/21/98 |
| L-7-Q | 0.381 | 0.382 | 0.382 | 0.382 | 1 | 4/21/98 |
| L-8-Q | 0.399 | 0.400 | 0.400 | 0.400 | 1 | 4/21/98 |
| L-9-Q | 0.436 | 0.435 | 0.437 | 0.436 | 1 | 4/21/98 |
| L-10-Q | 0.464 | 0.459 | 0.461 | 0.461 | 1 | 4/21/98 |
| L-11-Q | 0.400 | 0.400 | 0.400 | 0.400 | 1 | 4/21/98 |
| L-12-Q | 0.270 | 0.270 | 0.270 | 0.270 | 1 | 4/21/98 |
| L-13-Q | 0.195 | 0.195 | 0.194 | 0.195 | 2 | 4/21/98 |
| L-14-Q | 0.227 | 0.228 | 0.228 | 0.228 | 2 | 4/21/98 |
| L-15-Q | 0.235 | 0.236 | 0.235 | 0.235 | 2 | 4/21/98 |
| L-16-Q | 0.243 | 0.243 | 0.244 | 0.243 | 2 | 4/21/98 |
| L-17-Q | 0.261 | 0.261 | 0.260 | 0.261 | 2 | 4/21/98 |
| L-18-Q | 0.272 | 0.274 | 0.274 | 0.273 | 2 | 4/21/98 |
| L-19-Q | 0.310 | 0.310 | 0.311 | 0.310 | 2 | 4/21/98 |
| L-20-Q | 0.385 | 0.386 | 0.385 | 0.385 | 2 | 4/21/98 |
| L-21-Q | 0.400 | 0.400 | 0.400 | 0.400 | 2 | 4/21/98 |
| L-22-Q | 0.400 | 0.400 | 0.401 | 0.400 | 2 | 4/21/98 |
| L-23-Q | 0.432 | 0.433 | 0.433 | 0.433 | 2 | 4/21/98 |
| L-24-Q | 0.466 | 0.466 | 0.467 | 0.466 | 2 | 4/21/98 |
| L-25-Q | 0.270 | 0.271 | 0.270 | 0.270 | 3 | 4/21/98 |
| L-26-Q | 0.453 | 0.451 | 0.453 | 0.452 | 3 | 4/21/98 |
| L-27-Q | 0.400 | 0.400 | 0.400 | 0.400 | 3 | 4/21/98 |

# GLASS NOZZLE CALIBRATIONS

| Nozzle ID No. | Diameter (in.) | | | Average | Nozzle Set No. | Calibration Date |
|---|---|---|---|---|---|---|
| | a | b | c | | | |
| L-1-G | 0.158 | 0.158 | 0.158 | 0.158 | 1 | 4/21/98 |
| L-2-G | 0.191 | 0.191 | 0.191 | 0.191 | 1 | 4/21/98 |
| L-3-G | 0.192 | 0.193 | 0.192 | 0.192 | 1 | 4/21/98 |
| L-4-G | 0.213 | 0.213 | 0.212 | 0.213 | 1 | 4/21/98 |
| L-5-G | 0.268 | 0.268 | 0.268 | 0.268 | 1 | 4/21/98 |
| L-6-G | 0.313 | 0.311 | 0.310 | 0.311 | 1 | 4/21/98 |
| L-7-G | 0.354 | 0.356 | 0.356 | 0.355 | 1 | 4/21/98 |
| L-8-G | 0.371 | 0.370 | 0.370 | 0.370 | 1 | 4/21/98 |
| L-9-G | 0.437 | 0.436 | 0.436 | 0.436 | 1 | 4/21/98 |
| L-10-G | 0.453 | 0.454 | 0.454 | 0.454 | 1 | 4/21/98 |
| L-11-G | 0.494 | 0.496 | 0.496 | 0.495 | 1 | 4/21/98 |
| L-12-G | 0.625 | 0.625 | 0.625 | 0.625 | 1 | 4/21/98 |
| L-13-G | 0.153 | 0.152 | 0.153 | 0.153 | 2 | 4/21/98 |
| L-14-G | 0.192 | 0.192 | 0.192 | 0.192 | 2 | 4/21/98 |
| L-15-G | 0.238 | 0.239 | 0.239 | 0.239 | 2 | 4/21/98 |
| L-16-G | 0.240 | 0.241 | 0.240 | 0.240 | 2 | 4/21/98 |
| L-17-G | 0.288 | 0.289 | 0.290 | 0.289 | 2 | 4/21/98 |
| L-18-G | 0.310 | 0.310 | 0.311 | 0.310 | 2 | 4/21/98 |
| L-19-G | 0.345 | 0.346 | 0.346 | 0.346 | 2 | 4/21/98 |
| L-20-G | 0.316 | 0.315 | 0.315 | 0.315 | 2 | 4/21/98 |
| L-21-G | 0.267 | 0.268 | 0.268 | 0.268 | 2 | 4/21/98 |
| L-22-G | 0.456 | 0.457 | 0.457 | 0.457 | 2 | 4/21/98 |
| L-23-G | 0.314 | 0.314 | 0.314 | 0.314 | 2 | 4/21/98 |
| L-24-G | 0.504 | 0.504 | 0.504 | 0.504 | 2 | 4/21/98 |
| L-25-G | 0.159 | 0.158 | 0.159 | 0.159 | 3 | 5/1/98 |
| L-26-G | 0.280 | 0.280 | 0.280 | 0.280 | 3 | 5/1/98 |
| L-27-G | 0.235 | 0.235 | 0.234 | 0.235 | 3 | 5/1/98 |
| L-28-G | 0.504 | 0.504 | 0.504 | 0.504 | 3 | 5/1/98 |
| L-29-G | 0.310 | 0.310 | 0.311 | 0.310 | 3 | 5/1/98 |
| L-30-G | 0.390 | 0.390 | 0.390 | 0.390 | 3 | 5/1/98 |
| L-31-G | 0.455 | 0.455 | 0.455 | 0.455 | 3 | 5/1/98 |
| L-32-G | 0.233 | 0.236 | 0.234 | 0.234 | 3 | 5/1/98 |
| L-33-G | 0.465 | 0.464 | 0.464 | 0.464 | 3 | 5/1/98 |
| L-34-G | 0.518 | 0.512 | 0.515 | 0.515 | 3 | 5/1/98 |
| L-35-G | 0.655 | 0.657 | 0.655 | 0.656 | 3 | 5/1/98 |
| L-36-G | 0.154 | 0.154 | 0.153 | 0.154 | 4 | 5/1/98 |
| L-37-G | 0.192 | 0.194 | 0.194 | 0.193 | 4 | 5/1/98 |
| L-38-G | 0.318 | 0.318 | 0.318 | 0.318 | 4 | 5/1/98 |
| L-39-G | 0.263 | 0.262 | 0.263 | 0.263 | 4 | 5/1/98 |

# NOZZLE CALIBRATION

| Nozzle No. | Diameter (in.) | | | | Nozzle Set No. |
|---|---|---|---|---|---|
| | a | b | c | Average | |
| L-1 | .220 | .219 | .220 | .220 | |
| L-2 | .215 | .216 | .215 | .215 | |
| L-3 | .216 | .215 | .217 | .216 | |
| L-4 | .218 | .218 | .219 | .218 | |
| L-5 | .219 | .219 | .219 | .219 | |
| L-6 | .222 | .221 | .223 | .222 | |
| L-7 | .217 | .217 | .216 | .217 | |
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TRC Environmental
Pitot Calibration Data
Order Number 0005266
4-Aug-99

ambient density = 0.0718 #/cu. Ft
Reference Probe WT-1
Reference Cp = 0.99

| probe P-1 trial | reference | velocity | probe side A | probe Cp | reference | velocity | probe side B | probe Cp |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.10 | 1281 | 0.12 | 0.90 | 0.08 | 1146 | 0.10 | 0.89 |
| 2 | 0.40 | 2562 | 0.52 | 0.87 | 0.39 | 2530 | 0.48 | 0.89 |
| 3 | 0.68 | 3341 | 0.88 | 0.87 | 0.61 | 3164 | 0.76 | 0.89 |
| 4 | 0.85 | 3735 | 1.10 | 0.87 | 0.87 | 3779 | 1.09 | 0.88 |
| 5 | 1.29 | 4601 | 1.68 | 0.87 | 1.29 | 4601 | 1.64 | 0.88 |
| max | 2.07 | 5829 | 2.66 | 0.87 | 1.94 | 5643 | 2.45 | 0.88 |
| | | | Avg Cp | 0.88 | | | Avg Cp | 0.88 |

| probe P-3 trial | reference | velocity | probe side A | probe Cp | reference | velocity | probe side B | probe Cp |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.10 | 1281 | 0.13 | 0.87 | 0.10 | 1281 | 0.12 | 0.90 |
| 2 | 0.43 | 2657 | 0.53 | 0.89 | 0.38 | 2497 | 0.45 | 0.91 |
| 3 | 0.67 | 3316 | 0.84 | 0.88 | 0.62 | 3190 | 0.78 | 0.88 |
| 4 | 0.88 | 3800 | 1.10 | 0.89 | 0.86 | 3757 | 1.06 | 0.89 |
| 5 | 1.29 | 4601 | 1.62 | 0.88 | 1.27 | 4565 | 1.55 | 0.90 |
| max | 2.12 | 5899 | 2.68 | 0.88 | 1.95 | 5657 | 2.38 | 0.90 |
| | | | Avg Cp | 0.88 | | | Avg Cp | 0.90 |

| probe P-9 trial | reference | velocity | probe side A | probe Cp | reference | velocity | probe side B | probe Cp |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.08 | 1146 | 0.12 | 0.81 | 0.12 | 1403 | 0.14 | 0.92 |
| 2 | 0.40 | 2562 | 0.50 | 0.89 | 0.41 | 2594 | 0.51 | 0.89 |
| 3 | 0.66 | 3291 | 0.84 | 0.88 | 0.68 | 3341 | 0.83 | 0.90 |
| 4 | 0.90 | 3843 | 1.14 | 0.88 | 0.99 | 4031 | 1.11 | 0.93 |
| 5 | 1.30 | 4619 | 1.63 | 0.88 | 1.26 | 4547 | 1.55 | 0.89 |
| max | 2.02 | 5758 | 2.51 | 0.89 | 2.03 | 5772 | 2.50 | 0.89 |
| | | | Avg Cp | 0.87 | | | Avg Cp | 0.90 |

| probe 200 trial | reference | velocity | probe side A | probe Cp | reference | velocity | probe side B | probe Cp |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.10 | 1281 | 0.14 | 0.84 | 0.10 | 1281 | 0.14 | 0.84 |
| 2 | 0.39 | 2530 | 0.55 | 0.83 | 0.39 | 2530 | 0.54 | 0.84 |
| 3 | 0.60 | 3138 | 0.83 | 0.84 | 0.64 | 3241 | 0.89 | 0.84 |
| 4 | 0.82 | 3669 | 1.12 | 0.85 | 0.87 | 3779 | 1.19 | 0.85 |
| 5 | 1.20 | 4438 | 1.64 | 0.85 | 1.26 | 4547 | 1.74 | 0.84 |
| max | 2.10 | 5871 | 2.84 | 0.85 | 2.10 | 5871 | 2.88 | 0.85 |
| | | | Avg Cp | 0.84 | | | Avg Cp | 0.84 |

Ambient Conditions DB = 73F WB = 64F Baro =29.34 in Hg

# METHOD 5 DRY GAS METER CALIBRATION

Calibrated: Scott Tibbetts

Barometric Pressure, 29.91 in. Hg

Date: 08/02/99

Meter Box No.: 90336

| Orifice Manometer Setting delta H in. $H_2O$ | Gas Volume Wet Test Meter Vw $ft^3$ | Gas Volume Dry Test Meter Vd $ft^3$ | Temperature: Wet Test Meter tw °F | Temperature: Dry gas meter: Inlet $td_i$ °F | Temperature: Dry gas meter: Outlet $td_o$ °F | Temperature: Dry gas meter: Average $td_a$ °F | Time T min. | Y | delta H @ | Deviation: Y | Deviation: delta H @ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.5 | 5.716 | 5.825 | 75.0 | 82 | 78 | 80 | 15.0 | 0.989 | 1.956 | 0.001 | 0.025 |
| 1.0 | 8.018 | 8.190 | 75.0 | 85 | 79 | 82 | 15.0 | 0.989 | 1.981 | 0.002 | 0.000 |
| 1.5 | 9.801 | 10.064 | 75.0 | 89 | 81 | 85 | 15.0 | 0.988 | 1.983 | 0.001 | 0.002 |
| 2.0 | 11.260 | 11.595 | 75.0 | 89 | 83 | 86 | 15.0 | 0.986 | 1.995 | 0.001 | 0.015 |
| 3.0 | 13.799 | 14.267 | 75.0 | 93 | 84 | 89 | 15.0 | 0.984 | 1.989 | 0.003 | 0.008 |
| | | | | | | | AVERAGE | 0.987 | 1.981 | | |

## CALCULATIONS

| Y | delta H @ |
|---|---|
| $\frac{Vw \times Pb \times (td_a + 460)}{Vd \times (Pb + dH/13.6) \times (tw + 460)}$ | $\frac{0.0319 \times dH}{Pb \times (td_o + 460)} \times \left[\frac{(tw + 460) \times T}{Vw}\right]^2$ |

Y = Ratio of reading of wet test meter to dry gas meter;
Tolerance for individual value ± 0.02 from average

delta H @ = Orifice pressure differential that equates to 0.75 cfm of air at 68°F and 29.92 inches of mercury, in. H2O;
Tolerance for individual values ± 0.20 from average

# METHOD 5 DRY GAS METER CALIBRATION

Calibrated: Scott Tibbetts

Barometric Pressure, 29.98 in. Hg

Date: 08/04/99

Meter Box No.: 90338

| Orifice Manometer Setting delta H in. $H_2O$ | Gas Volume Wet Test Meter Vw $ft^3$ | Gas Volume Dry Test Meter Vd $ft^3$ | Temperature: Wet Test Meter tw °F | Temperature: Dry gas meter: Inlet $td_i$ °F | Temperature: Dry gas meter: Outlet $td_o$ °F | Temperature: Dry gas meter: Average $td_a$ °F | Time T min. | Y | delta H @ | Deviation: Y | Deviation: delta H @ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.5 | 5.845 | 6.037 | 76.0 | 83 | 80 | 82 | 15.0 | 0.977 | 1.864 | 0.003 | 0.074 |
| 1.0 | 8.173 | 8.486 | 76.0 | 85 | 80 | 83 | 15.0 | 0.972 | 1.907 | 0.001 | 0.032 |
| 1.5 | 9.801 | 10.186 | 76.0 | 87 | 81 | 84 | 15.0 | 0.973 | 1.984 | 0.000 | 0.045 |
| 2.0 | 11.290 | 11.764 | 76.0 | 89 | 83 | 86 | 15.0 | 0.973 | 1.988 | 0.001 | 0.049 |
| 3.0 | 13.946 | 14.541 | 76.0 | 91 | 84 | 88 | 15.0 | 0.973 | 1.950 | 0.001 | 0.012 |
| | | | | | | | AVERAGE | 0.974 | 1.939 | | |

## CALCULATIONS

| Y | delta H @ |
|---|---|
| $\frac{Vw \times Pb \times (td_a + 460)}{Vd \times (Pb + dH/13.6) \times (tw + 460)}$ | $\frac{0.0319 \times dH}{Pb \times (td_o + 460)} \times \left[\frac{(tw + 460) \times T}{Vw}\right]^2$ |

Y = Ratio of reading of wet test meter to dry gas meter;
Tolerance for individual value ± 0.02 from average

delta H @ = Orifice pressure differential that equates to 0.75 cfm of air at 68°F and 29.92 inches of mercury, in. H2O;
Tolerance for individual values ± 0.20 from average

# METHOD 5 DRY GAS METER CALIBRATION

Calibrated: Scott Tibbetts

Barometric Pressure, 30.08 in. Hg

Date: 08/03/99

Meter Box No.: 90339

| Orifice Manometer Setting delta H in. $H_2O$ | Gas Volume Wet Test Meter Vw $ft^3$ | Gas Volume Dry Test Meter Vd $ft^3$ | Temperature: Wet Test Meter tw °F | Temperature: Dry gas meter: Inlet $td_i$ °F | Temperature: Dry gas meter: Outlet $td_o$ °F | Temperature: Dry gas meter: Average $td_a$ °F | Time T min. | Y | delta H @ | Deviation: Y | Deviation: delta H @ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.5 | 5.690 | 5.850 | 76.0 | 84 | 80 | 82 | 15.0 | 0.982 | 1.961 | 0.006 | 0.072 |
| 1.0 | 7.925 | 8.205 | 76.0 | 87 | 81 | 84 | 15.0 | 0.978 | 2.018 | 0.002 | 0.015 |
| 1.5 | 9.557 | 9.956 | 76.0 | 90 | 83 | 87 | 15.0 | 0.975 | 2.073 | 0.001 | 0.041 |
| 2.0 | 11.101 | 11.597 | 76.0 | 91 | 84 | 88 | 15.0 | 0.973 | 2.045 | 0.003 | 0.013 |
| 3.0 | 13.509 | 14.160 | 76.0 | 93 | 86 | 89 | 15.0 | 0.971 | 2.065 | 0.005 | 0.033 |
| | | | | | | | AVERAGE | 0.976 | 2.032 | | |

## CALCULATIONS

| Y | delta H @ |
|---|---|
| $\frac{Vw \times Pb \times (td_a + 460)}{Vd \times (Pb + dH/13.6) \times (tw + 460)}$ | $\frac{0.0319 \times dH}{Pb \times (td_o + 460)} \times \left[\frac{(tw + 460) \times T}{Vw}\right]^2$ |

Y = Ratio of reading of wet test meter to dry gas meter;
Tolerance for individual value ± 0.02 from average

delta H @ = Orifice pressure differential that equates to 0.75 cfm of air at 68°F and 29.92 inches of mercury, in. H2O;
Tolerance for individual values ± 0.20 from average

# METHOD 5 DRY GAS METER CALIBRATION

Calibrated: Scott Tibbetts

Barometric Pressure, 29.98 in. Hg

Date: 08/04/99

Meter Box No.: 90342

| Orifice Manometer Setting delta H in. $H_2O$ | Gas Volume Wet Test Meter Vw $ft^3$ | Gas Volume Dry Test Meter Vd $ft^3$ | Temperature: Wet Test Meter tw °F | Temperature: Dry gas meter: Inlet $td_i$ °F | Temperature: Dry gas meter: Outlet $td_o$ °F | Temperature: Dry gas meter: Average $td_a$ °F | Time T min. | Y | delta H @ | Deviation: Y | Deviation: delta H @ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.5 | 5.770 | 5.901 | 76.0 | 84 | 80 | 82 | 15.0 | 0.987 | 1.913 | 0.004 | 0.060 |
| 1.0 | 8.132 | 8.296 | 76.0 | 82 | 78 | 80 | 15.0 | 0.985 | 1.933 | 0.002 | 0.040 |
| 1.5 | 9.801 | 10.040 | 76.0 | 84 | 79 | 82 | 15.0 | 0.983 | 1.993 | 0.000 | 0.020 |
| 2.0 | 11.232 | 11.539 | 76.0 | 86 | 81 | 84 | 15.0 | 0.982 | 2.016 | 0.001 | 0.042 |
| 3.0 | 13.771 | 14.178 | 76.0 | 87 | 81 | 84 | 15.0 | 0.979 | 2.011 | 0.004 | 0.038 |
| | | | | | | | AVERAGE | 0.983 | 1.973 | | |

## CALCULATIONS

| Y | delta H @ |
|---|---|
| $\frac{Vw \times Pb \times (td_a + 460)}{Vd \times (Pb + dH/13.6) \times (tw + 460)}$ | $\frac{0.0319 \times dH}{Pb \times (td_o + 460)} \times \left[\frac{(tw + 460) \times T}{Vw}\right]^2$ |

Y = Ratio of reading of wet test meter to dry gas meter;
Tolerance for individual value ± 0.02 from average

delta H @ = Orifice pressure differential that equates to 0.75 cfm of air at 68°F and 29.92 inches of mercury, in. H2O;
Tolerance for individual values ± 0.20 from average

# METHOD 5 DRY GAS METER CALIBRATION

Calibrated: Scott Tibbetts

Barometric Pressure, 29.8 in. Hg

Date: 07/29/99

Meter Box No.: 90343

| Orifice Manometer Setting delta H in. $H_2O$ | Gas Volume Wet Test Meter Vw $ft^3$ | Gas Volume Dry Test Meter Vd $ft^3$ | Temperature: Wet Test Meter tw °F | Temperature: Dry gas meter: Inlet $td_i$ °F | Temperature: Dry gas meter: Outlet $td_o$ °F | Temperature: Dry gas meter: Average $td_a$ °F | Time T min. | Y | delta H @ | Deviation: Y | Deviation: delta H @ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.5 | 5.989 | 6.134 | 76.0 | 83 | 79 | 81 | 15.0 | 0.984 | 1.790 | 0.003 | 0.095 |
| 1.0 | 8.311 | 8.554 | 76.0 | 87 | 81 | 84 | 15.0 | 0.983 | 1.852 | 0.002 | 0.034 |
| 1.5 | 9.936 | 10.268 | 76.0 | 89 | 83 | 86 | 15.0 | 0.982 | 1.937 | 0.001 | 0.052 |
| 2.0 | 11.477 | 11.886 | 76.0 | 92 | 84 | 88 | 15.0 | 0.982 | 1.931 | 0.001 | 0.046 |
| 3.0 | 14.086 | 14.632 | 76.0 | 94 | 86 | 87 | 15.0 | 0.974 | 1.916 | 0.007 | 0.031 |
| | | | | | | | AVERAGE | 0.981 | 1.885 | | |

## CALCULATIONS

| Y | delta H @ |
|---|---|
| $\frac{Vw \times Pb \times (td_a + 460)}{Vd \times (Pb + dH/13.6) \times (tw + 460)}$ | $\frac{0.0319 \times dH}{Pb \times (td_a + 460)} \times \left[\frac{(tw + 460) \times T}{Vw}\right]^2$ |

Y = Ratio of reading of wet test meter to dry gas meter;
Tolerance for individual value ± 0.02 from average

delta H @ = Orifice pressure differential that equates to 0.75 cfm of air at 68°F and 29.92 inches of mercury, in. H2O;
Tolerance for individual values ± 0.20 from average

# METHOD 5 DRY GAS METER CALIBRATION

Calibrated: Scott James

Barometric Pressure, 30.20 in. Hg

Date: 11/24/99

Meter Box No.: 90338

| Orifice Manometer Setting delta H in. $H_2O$ | Gas Volume Wet Test Meter Vw $ft^3$ | Gas Volume Dry Test Meter Vd $ft^3$ | Temperature: Wet Test Meter tw °F | Temperature: Dry gas meter: Inlet $td_i$ °F | Temperature: Dry gas meter: Outlet $td_o$ °F | Temperature: Dry gas meter: Average $td_a$ °F | Time T min. | Y | delta H @ | Deviation: Y | Deviation: delta H @ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.6 | 10.050 | 10.455 | 72.0 | 84 | 78 | 81 | 15.0 | 0.974 | 1.981 | 0.000 | 0.005 |
| 1.6 | 10.070 | 10.471 | 72.0 | 83 | 78 | 81 | 15.0 | 0.974 | 1.973 | 0.000 | 0.003 |
| 1.6 | 10.070 | 10.457 | 72.0 | 82 | 78 | 80 | 15.0 | 0.974 | 1.973 | 0.000 | 0.003 |
| | | | | | | | AVERAGE | 0.974 | 1.975 | | |

## CALCULATIONS

| Y | delta H @ |
|---|---|
| $\frac{Vw \times Pb \times (td_a + 460)}{Vd \times (Pb + dH/13.6) \times (tw + 460)}$ | $\frac{0.0319 \times dH}{Pb \times (td_o + 460)} \times \left[\frac{(tw + 460) \times T}{Vw}\right]^2$ |

Y = Ratio of reading of wet test meter to dry gas meter;
Tolerance for individual value ± 0.02 from average

delta H @ = Orifice pressure differential that equates to 0.75 cfm of air at 68°F and 29.92 inches of mercury, in. H2O;
Tolerance for individual values ± 0.20 from average

# METERBOX THERMOCOUPLE CALIBRATION FORM

METERBOX NUMBER: 90336

| Thermocouple Number | Reference Temp.1 °F | Temp. Reading 1 °F | Criteria | Reference Temp.2 °F | Temp. Reading 2 °F | Criteria |
|---|---|---|---|---|---|---|
| #1 | 32.0 | 31 | | 250.0 | 249 | |
| #2 | | 31 | | | 249 | |
| #3 | | 32 | | | 249 | |
| #4 | | 31 | | | 249 | |
| #5 | | 31 | | | 249 | |

| Thermocouple Number | Reference Temp.3 °F | Temp. Reading 3 °F | Criteria | Reference Temp.4 °F | Temp. Reading 4 °F | Criteria |
|---|---|---|---|---|---|---|
| #1 | 500.0 | 500 | | 1800.0 | 1800 | |
| #2 | | 500 | | | 1800 | |
| #3 | | 500 | | | 1800 | |
| #4 | | 500 | | | 1800 | |
| #5 | | 500 | | | 1800 | |

Name: Scott Tibbetts

Date: 8/5/99

Criteria: Percent difference between the Reference Temperature and the Average Temperature Reading can be only +/- 1.5% °R

Equation:

$$\frac{((\text{Ref. Temp.} + 460) - (\text{Temp. Reading} + 460))}{(\text{Ref. Temp.} + 460)} \times 100$$

TRC

Lowell14.xls

# METERBOX THERMOCOUPLE CALIBRATION FORM

METERBOX NUMBER: 90338

| Thermocouple Number | Reference Temp.1 °F | Temp. Reading 1 °F | Criteria | Reference Temp.2 °F | Temp. Reading 2 °F | Criteria |
|---|---|---|---|---|---|---|
| #1 | 32.0 | 32 | | 250.0 | 250 | |
| #2 | | 32 | | | 250 | |
| #3 | | 32 | | | 250 | |
| #4 | | 32 | | | 250 | |
| #5 | | 32 | | | 250 | |

| Thermocouple Number | Reference Temp.3 °F | Temp. Reading 3 °F | Criteria | Reference Temp.4 °F | Temp. Reading 4 °F | Criteria |
|---|---|---|---|---|---|---|
| #1 | 500.0 | 500 | | 1800.0 | 1801 | |
| #2 | | 500 | | | 1802 | |
| #3 | | 500 | | | 1802 | |
| #4 | | 500 | | | 1802 | |
| #5 | | 500 | | | 1801 | |

Name: Scott Tibbetts

Date: 8/4/99

Criteria: Percent difference between the Reference Temperature and the Average Temperature Reading can be only +/- 1.5% °R

Equation:

$$\frac{((\text{Ref. Temp.} + 460) - (\text{Temp. Reading} + 460))}{(\text{Ref. Temp.} + 460)} \times 100$$

TRC

Lowell14.xls

# METERBOX THERMOCOUPLE CALIBRATION FORM

METERBOX NUMBER: 90339

| Thermocouple Number | Reference Temp.1 °F | Temp. Reading 1 °F | Criteria | Reference Temp.2 °F | Temp. Reading 2 °F | Criteria |
|---|---|---|---|---|---|---|
| #1 | 32.0 | 32 | | 250.0 | 250 | |
| #2 | | 32 | | | 250 | |
| #3 | | 32 | | | 251 | |
| #4 | | 33 | | | 251 | |
| #5 | | 32 | | | 250 | |

| Thermocouple Number | Reference Temp.3 °F | Temp. Reading 3 °F | Criteria | Reference Temp.4 °F | Temp. Reading 4 °F | Criteria |
|---|---|---|---|---|---|---|
| #1 | 500.0 | 500 | | 1500.0 | 1501 | |
| #2 | | 500 | | | 1501 | |
| #3 | | 501 | | | 1501 | |
| #4 | | 501 | | | 1501 | |
| #5 | | 500 | | | 1501 | |

Name: Scott Willett

Date: 8/3/99

Criteria: Percent difference between the Reference Temperature and the Average Temperature Reading can be only +/- 1.5% °R

Equation:

$$\frac{((\text{Ref. Temp.} + 460) - (\text{Temp. Reading} + 460))}{(\text{Ref. Temp.} + 460)} \times 100$$

TRC

Lowell14.xls

# METERBOX THERMOCOUPLE CALIBRATION FORM

METERBOX NUMBER: 90342

| Thermocouple Number | Reference Temp.1 °F | Temp. Reading 1 °F | Criteria | Reference Temp.2 °F | Temp. Reading 2 °F | Criteria |
|---|---|---|---|---|---|---|
| #1 | 32.0 | 32 | | 250.0 | 250 | |
| #2 | | 32 | | | 250 | |
| #3 | | 32 | | | 250 | |
| #4 | | 32 | | | 250 | |
| #5 | | 32 | | | 250 | |

| Thermocouple Number | Reference Temp.3 °F | Temp. Reading 3 °F | Criteria | Reference Temp.4 °F | Temp. Reading 4 °F | Criteria |
|---|---|---|---|---|---|---|
| #1 | 500.0 | 500 | | 1800.0 | 1800 | |
| #2 | | 500 | | | 1800 | |
| #3 | | 500 | | | 1800 | |
| #4 | | 500 | | | 1800 | |
| #5 | | 500 | | | 1800 | |

Name: Scott Tibbetts

Date: 8/4/99

Criteria: Percent difference between the Reference Temperature and the Average Temperature Reading can be only +/- 1.5% °R

Equation:

$$\frac{((\text{Ref. Temp.} + 460) - (\text{Temp. Reading} + 460))}{(\text{Ref. Temp.} + 460)} \times 100$$

TRC

Lowell14.xls

# METERBOX THERMOCOUPLE CALIBRATION FORM

METERBOX NUMBER: 90343

| Thermocouple Number | Reference Temp.1 °F | Temp. Reading 1 °F | Criteria | Reference Temp.2 °F | Temp. Reading 2 °F | Criteria |
|---|---|---|---|---|---|---|
| #1 | 32.0 | 31 | | 250.0 | 249 | |
| #2 | | 31 | | | 249 | |
| #3 | | 31 | | | 249 | |
| #4 | | 31 | | | 249 | |
| #5 | | 31 | | | 249 | |

| Thermocouple Number | Reference Temp.3 °F | Temp. Reading 3 °F | Criteria | Reference Temp.4 °F | Temp. Reading 4 °F | Criteria |
|---|---|---|---|---|---|---|
| #1 | 500.0 | 500 | | 1800.0 | 1800 | |
| #2 | | 500 | | | 1800 | |
| #3 | | 500 | | | 1800 | |
| #4 | | 500 | | | 1800 | |
| #5 | | 500 | | | 1800 | |

Name: Scott Tibbetts

Date: 8/5/99

Criteria: Percent difference between the Reference Temperature and the Average Temperature Reading can be only +/- 1.5% °R

Equation:

$$\frac{((\text{Ref. Temp.} + 460) - (\text{Temp. Reading} + 460))}{(\text{Ref. Temp.} + 460)} \times 100$$

TRC

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# Appendix C

# *APPENDIX C*

# *SAMPLING LOG AND CHAIN-OF-CUSTODY RECORDS*

# *Appendix C.1*

# *Exhaust Gas Streams*

NOTICE OF SAMPLE RECEIPT-PHILIP ANALYTICAL SERVICES

Attention: Michael P. Martin
Client: TRC Environmental Corporation
Re Client Project: 26046
FAX #: 978-453-1995
Phone #: 978-970-5600

Samples for: Dtt Mercury (Trans)
were received in good condition unless
indicated below.

SAMPLE LISTING

| Philip ID # | Sample ID | Date Sampled | Date Received |
|---|---|---|---|
| 044796 | OHM-RB | 99/08/11 | 99/08/17 |
| 044797 | OHM-I-FB | 99/08/10 | 99/08/17 |
| 044798 | OHM-Ia-R1 | 99/08/11 | 99/08/17 |
| 044799 | OHM-Ib-R1 | 99/08/11 | 99/08/17 |
| 044800 | OHM-Ia-R2 | 99/08/11 | 99/08/17 |
| 044801 | OHM-Ib-R2 | 99/08/11 | 99/08/17 |
| 044802 | OHM-Ia-R3 | 99/08/12 | 99/08/17 |
| 044803 | OHM-Ib-R3 | 99/08/12 | 99/08/17 |
| 044804 | OHM-Oa-R1 | 99/08/11 | 99/08/17 |
| 044805 | OHM-Ob-R1 | 99/08/11 | 99/08/17 |
| 044806 | OHM-Oa-R2 | 99/08/11 | 99/08/17 |
| 044807 | OHM-Ob-R2 | 99/08/11 | 99/08/17 |
| 044808 | OHM-Oa-R3 | 99/08/12 | 99/08/17 |
| 044809 | OHM-Ob-R3 | 99/08/12 | 99/08/17 |
| 044888 | OHM-O-FB | 99/08/10 | 99/08/17 |

Comments: _____

Date 99/08/18

NOTICE OF SAMPLE RECEIPT-PHILIP ANALYTICAL SERVICES

Attention: Michael P. Martin
Client: TRC Environmental Corporation
Re Client Project: 26046
FAX #: 978-453-1995
Phone #: 978-970-5600

Samples for: Hg via 7471A -
were received in good condition unless
indicated below.

SAMPLE LISTING

| Philip ID # | Sample ID | Date Sampled | Date Received |
|---|---|---|---|
| 044813 | OHM-Ia-R1 Flyash | 99/08/11 | 99/08/17 |
| 044814 | OHM-Ib-R1 Flyash | 99/08/11 | 99/08/17 |
| 044815 | OHM-Ia-R2 Flyash | 99/08/11 | 99/08/17 |
| 044816 | OHM-Ib-R2 Flyash | 99/08/11 | 99/08/17 |
| 044817 | OHM-Ia-R3 Flyash | 99/08/12 | 99/08/17 |
| 044818 | OHM-Ib-R3 Flyash | 99/08/12 | 99/08/17 |
| 044891 | NIST 1633b Reference | 99/08/18 | 99/08/18 |

Comments: _____

Date 99/08/18

NOTICE OF SAMPLE RECEIPT-PHILIP ANALYTICAL SERVICES

Attention: Michael P. Martin
Client: TRC Environmental Corporation
Re Client Project: 26046
FAX #: 978-453-1995
Phone #: 978-970-5600

Samples for: Hold
were received in good condition unless indicated below.

SAMPLE LISTING

| Philip ID # | Sample ID | Date Sampled | Date Received |
|---|---|---|---|
| 044810 | OHM-RB-10% HNO3 | 99/08/12 | 99/08/17 |
| 044811 | OHM-RB-5% KMNO4 | 99/08/12 | 99/08/17 |

Comments:

Date 99/08/18

# CHAIN OF CUSTODY RECORD

Project Name: PG&E Logan
Project No.: 26046
Sampling Date(s): 8/11/99, 8/12/99
Laboratory: Philip
Laboratory P.O. #:
Shipping Airbill No.:
Shipping Date(s):
Shipper's Name:

| Sample Code | Sampled Date | Container Size | Container G/P | MATRIX: Aqueous | Organic Solvent | Ash/Soil/Sediment | Acidic | Basic | Other | Source Description | ANALYSIS: Trace Metals* | Mercury | Hexavalent Chromium | HCl | Cl2 | Particulate Matter | PCDD/PCDF | Semi-Volatile Organics | Volatile Organics | Physical Parameters* | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PG&E-L-OHM-Ob-2-PF-Hg | 8/11/99 | Petri | | | | | | | ✓ | Outlet Run 2B | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ob-2-PR-HNO3-Hg | ↓ | 250 | G | | | | ✓ | | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ob-2-KCl-Hg | ↓ | 1L | ↓ | | | | ✓ | | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ob-2-HNO3/H2O2-Hg | ↓ | 250 | ↓ | | | | ✓ | | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ob-2-KMnO4-Hg | ↓ | 1L | ↓ | | | | ✓ | | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Oa-3-PF-Hg | 8/12/99 | Petri | | | | | | | ✓ | Outlet Run 3A | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Oa-3-PR-Hg | ↓ | 250 | G | | | | ✓ | | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Oa-3-KCl-Hg | ↓ | 1L | ↓ | | | | ✓ | | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Oa-3-KMnO4-Hg | ↓ | 1L | ↓ | | | | ✓ | | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Oa-3-HNO3/H2O2-Hg | ↓ | 250 | ↓ | | | | ✓ | | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ob-3-PF-Hg | 8/12/99 | Petri | | | | | | | ✓ | Outlet Run 3B | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ob-3-PR-Hg | ↓ | 250 | G | | | | ✓ | | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ob-3-KCl-Hg | ↓ | 1L | ↓ | | | | ✓ | | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ob-3-HNO3/H2O2-Hg | ↓ | 250 | ↓ | | | | ✓ | | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ob-3-KMnO4-Hg | ↓ | 1L | ↓ | | | | ✓ | | | ↓ | ✓ | | | | | | | | | | |

| | | | |
|---|---|---|---|
| Relinquished by: [signature] | Date/Time: 8/16/99 1400 | Relinquished by: | Date/Time: |
| Received by: | Date/Time: | Received by: | Date/Time: |

REMARKS (*): Measure & Record all volumes prior to analysis

№ 02403

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TRC Environmental Corporation

# CHAIN OF CUSTODY RECORD

Project Name: PG&E Logan
Project No.: 26041C
Sampling Date(s): 8/10/99
Laboratory: Philip
Laboratory P.O. #:
Shipping Airbill No.:
Shipping Date(s):
Shipper's Name:

| Sample Code | Sampled Date | Container Size | Container G/P | MATRIX: Aqueous | Organic Solvent | Ash/Soil/Sediment | Acidic | Basic | Other | Source Description | ANALYSIS: Trace Metals* | Mercury | Hexavalent Chromium | HCl | Cl2 | Particulate Matter | PCDD/PCDF | Semi-Volatile Organics | Volatile Organics | Physical Parameters* | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PG&E-L-OHM-O-FB-PR-$HNO_3$-Hg | 8/10/99 | 125ml | G | | | | ✓ | | | Outlet Field BLK | ✓ | | | | | | | | | | |
| PG&E-L-OHM-O-FB-PF-Hg | ↓ | 125ml | ↓ | | | | | ✓ | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-O-FB-KCl-Hg | | 500ml | | | | | ✓ | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-O-FB-$KMnO_4$-Hg | | 500ml | | | | | ✓ | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-O-FB-$HNO_3$/$H_2O_2$-Hg | | 125ml | | | | | ✓ | | | | ✓ | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| PG&E-L-OHM-I-FB-PR-$HNO_3$-Hg | 8/10/99 | 125ml | G | | | | ✓ | | | Inlet Field BLK | ✓ | | | | | | | | | | |
| PG&E-L-OHM-I-FB-PF-Hg | ↓ | 125ml | ↓ | | | | | ✓ | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-I-FB-KCl-Hg | | 500ml | | | | | ✓ | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-I-FB-$KMnO_4$-Hg | | 500ml | | | | | ✓ | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-I-FB-$HNO_3$/$H_2O_2$-Hg | | 125ml | | | | | ✓ | | | | ✓ | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| PG&E-L-OHM-RB-PF-Hg | 8/11/99 | Petri | | | | | | ✓ | | Reagent BLK | ✓ | | | | | | | | | | Filter |
| PG&E-L-OHM-RB-$KMnO_4$-Hg | 8/11/99 | 125ml | G | | | | ✓ | | | | ✓ | | | | | | | | | | 4% $KMnO_4$/10% $H_2SO_4$ |
| PG&E-L-OHM-RB-KCl-Hg | ↓ | 125ml | ↓ | | | | ✓ | | | ↓ | ✓ | | | | | | | | | | KCl Solution |
| PG&E-L-OHM-RB-$HNO_3$-Hg | | | | | | | ✓ | | | | ✓ | | | | | | | | | | 0.1 N $HNO_3$ |
| PG&E-L-OHM-RB-$HNO_3$/$H_2O_2$-Hg | | | | | | | ✓ | | | | ✓ | | | | | | | | | | 5% $HNO_3$/10% $H_2O_2$ |
| PG&E-L-OHM-RB-$H_2SO_4$-Hg | | | | | | | ✓ | | | | ✓ | | | | | | | | | | 10% Hydroxylamine Sulfate |

| | | | |
|---|---|---|---|
| Relinquished by: | Date/Time: 8/16/99 1403 | Relinquished by: | Date/Time: |
| Received by: | Date/Time: | Received by: | Date/Time: |

REMARKS (*): Measure and Record all volumes prior to analysis

№ 02401

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TRC Environmental Corporation

# CHAIN OF CUSTODY RECORD

Project Name: PG&E Logan
Project No.: 26046
Sampling Date(s): 8/11/99
Laboratory:
Laboratory P.O. #:
Shipping Airbill No.:
Shipping Date(s):
Shipper's Name:

| Sample Code | Sampled Date | Container Size | Container G/P | Aqueous | Organic Solvent | Ash/Soil/Sediment | Acidic | Basic | Other | Source Description | Trace Metals* | Mercury | Hexavalent Chromium | HCl | Cl2 | Particulate Matter | PCDD/PCDF | Semi-Volatile Organics | Volatile Organics | Physical Parameters* | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PG&E-L-OHM-Oa-1-PF-Hg | 8/11/99 | Petri | | | | | | | ✓ | Outlet Run 1A | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Oa-1-PR-HNO3-Hg | ↓ | 250 | G | | | ✓ | | | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Oa-1-KCl-Hg | ↓ | 1L | ↓ | | | ✓ | | | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Oa-1-HNO3/H2O2-Hg | ↓ | 250 | ↓ | | | ✓ | | | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Oa-1-KMnO4-Hg | ↓ | 1L | ↓ | | | ✓ | | | | ↓ | ✓ | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| PG&E-L-OHM-Ob-1-PF-Hg | 8/11/99 | Petri | | | | | | | ✓ | Outlet Run 1B | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ob-1-PR-HNO3-Hg | ↓ | 250 | G | | | ✓ | | | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ob-1-KCl-Hg | ↓ | 1L | ↓ | | | ✓ | | | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ob-1-HNO3/H2O2-Hg | ↓ | 250 | ↓ | | | ✓ | | | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ob-1-KMnO4-Hg | ↓ | 1L | ↓ | | | ✓ | | | | ↓ | ✓ | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| PG&E-L-OHM-Oa-2-PF-Hg | 8/11/99 | Petri | | | | | | | ✓ | Outlet Run 2A | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Oa-2-PR-HNO3-Hg | ↓ | 250 | G | | | ✓ | | | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Oa-2-KCl-Hg | ↓ | 1L | ↓ | | | ✓ | | | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Oa-2-HNO3/H2O2-Hg | ↓ | 250 | ↓ | | | ✓ | | | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Oa-2-KMnO4-Hg | ↓ | 1L | ↓ | | | ✓ | | | | ↓ | ✓ | | | | | | | | | | |

| | | | |
|---|---|---|---|
| Relinquished by: [signature] | Date/Time: 8/16/99 1329 | Relinquished by: | Date/Time: |
| Received by: | Date/Time: | Received by: | Date/Time: |

REMARKS (*): Measure and record volumes prior to analysis

№ 02402

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TRC Environmental Corporation

# CHAIN OF CUSTODY RECORD

Project Name: PG&E Logan
Project No.: 26046
Sampling Date(s): 8/11/99
Laboratory: Philip
Laboratory P.O. #:
Shipping Airbill No.:
Shipping Date(s):
Shipper's Name:

| Sample Code | Sampled Date | Container Size | Container G/P | MATRIX: Aqueous | Organic Solvent | Ash/Soil/Sediment | Acidic | Basic | Other | Source Description | ANALYSIS: Trace Metals* | Mercury | Hexavalent Chromium | HCl | Cl2 | Particulate Matter | PCDD/PCDF | Semi-Volatile Organics | Volatile Organics | Physical Parameters* | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PG&E-L-OHM-Ia-1-A-Hg | 8/11/99 | 125 | G | | | | | | | Inlet Run 1A | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ia-1-PF-Hg | | Petri | | | | | | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ia-1-PR-HNO3-Hg | | 250 | G | | | | | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ia-1-KCl-Hg | | 1L | | | | | | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ia-1-HNO3/H2O2-Hg | | 250 | | | | | | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ia-1-KMnO4-Hg | | 1L | | | | | | | | | ✓ | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| PG&E-L-OHM-Ib-1-A-Hg | 8/11/99 | 125 | G | | | | | | | Inlet Run 1B | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ib-1-PF-Hg | | Petri | | | | | | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ib-1-PR-HNO3-Hg | | 250ml | G | | | | | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ib-1-KCl-Hg | | 1L | | | | | | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ib-1-HNO3/H2O2-Hg | | 250ml | | | | | | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ib-1-KMnO4-Hg | | 1L | | | | | | | | | ✓ | | | | | | | | | | |

| | | | |
|---|---|---|---|
| Relinquished by: S. J | Date/Time: 8/16/99 1328 | Relinquished by: | Date/Time: |
| Received by: | Date/Time: | Received by: | Date/Time: |

REMARKS (*): Measure and record all volumes prior to analysis

No. 02400

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TRC Environmental Corporation

# CHAIN OF CUSTODY RECORD

Project Name: PG&E Logan
Project No.: 26046
Sampling Date(s): 8/11/99
Laboratory: Philip
Laboratory P.O. #:
Shipping Airbill No.:
Shipping Date(s):
Shipper's Name:

| Sample Code | Sampled Date | Container Size (ml) | Container G/P | MATRIX: Aqueous | Organic Solvent | Ash/Soil/Sediment | Acidic | Basic | Other | Source Description | ANALYSIS: Trace Metals* | Mercury | Hexavalent Chromium | HCl | Cl2 | Particulate Matter | PCDD/PCDF | Semi-Volatile Organics | Volatile Organics | Physical Parameters* | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PG&E-L-OHM-Ia-2-A-Hg | 8/11/99 | 125 | G | | | ✓ | | | | Inlet Run 2 A | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ia-2-PF-Hg | | Petri | | | | | | ✓ | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ia-2-PR-HNO3-Hg | | 500ml | | | | | ✓ | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ia-2-KCl-Hg | | 1L | | | | | ✓ | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ia-2-H2O2/KOH-Hg | | 250ml | | | | | ✓ | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ia-2-KMnO4-Hg | | 1L | | | | | ✓ | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ib-2-A-Hg | 8/11/99 | 125 | G | | | ✓ | | | | Inlet Run 2 B | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ib-2-PF-Hg | | Petri | | | | | | ✓ | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ib-2-PR-HNO3-Hg | | 500 | G | | | | ✓ | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ib-2-KCl-Hg | | 1L | | | | | ✓ | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ib-2-H2O2/KOH-Hg | | 250 | | | | | ✓ | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ib-2-KMnO4-Hg | | 1L | | | | | ✓ | | | | ✓ | | | | | | | | | | |

| | | | |
|---|---|---|---|
| Relinquished by: S. J | Date/Time: 8/16/99 1326 | Relinquished by: | Date/Time: |
| Received by: | Date/Time: | Received by: | Date/Time: |

REMARKS (*): Measure & Record all volumes prior to analysis

№ 02404

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TRC
TRC Environmental Corporation

# CHAIN OF CUSTODY RECORD

Project Name: PG&E Logan
Project No.: 26046
Sampling Date(s): 8/12/99
Laboratory: Philip
Laboratory P.O. #:
Shipping Airbill No.:
Shipping Date(s):
Shipper's Name:

| Sample Code | Sampled Date | Container Size | Container G/P | MATRIX: Aqueous | Organic Solvent | Ash/Soil/Sediment | Acidic | Basic | Other | Source Description | ANALYSIS: Trace Metals* | Mercury | Hexavalent Chromium | HCl | Cl2 | Particulate Matter | PCDD/PCDF | Semi-Volatile Organics | Volatile Organics | Physical Parameters* | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PG&E-L-OHM-Ia-3-PF-Hg | 7/12/99 | Petri | | | | | | | ✓ | Inlet Run 3A | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ia-3-A-Hg | ↓ | 125 | G | | | ✓ | | | | ↓ | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ia-3-PR-$HNO_3$-Hg | | 500 | ↓ | | | | ✓ | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ia-3-KCl-Hg | | 1L | | | | | ✓ | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ia-3-$HNO_3$/$H_2O_2$-Hg | | 250 | | | | | ✓ | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ia-3-$KMnO_4$-Hg | ↓ | 1L | ↓ | | | | ✓ | | | ↓ | ✓ | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| PG&E-L-OHM-Ib-3-PF-Hg | 8/12/99 | Petri | | | | | | | ✓ | Inlet Run 3B | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ib-3-A-Hg | ↓ | 125 | G | | | ✓ | | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ib-3-PR-$HNO_3$-Hg | | 500 | ↓ | | | | ✓ | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ib-3-KCl-Hg | | 1L | | | | | ✓ | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ib-3-$HNO_3$/$H_2O_2$-Hg | | 250 | | | | | ✓ | | | | ✓ | | | | | | | | | | |
| PG&E-L-OHM-Ib-3-$KMnO_4$-Hg | ↓ | 1L | ↓ | | | | ✓ | | | | ✓ | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| PG&E-L-OHM-RB-10%$HNO_3$-Hg | 8/12/99 | 125 | G | | | | ✓ | | | Reagent BIK | ✓ | | | | | | | | | | Archive |
| PG&E-L-OHM-RB-5%$KMnO_4$-Hg | ↓ | ↓ | ↓ | | | | ✓ | | | Reagent BIK | ✓ | | | | | | | | | | Archive |

| | | | |
|---|---|---|---|
| Relinquished by: S. J | Date/Time: 8/16/99 1325 | Relinquished by: | Date/Time: |
| Received by: | Date/Time: | Received by: | Date/Time: |

REMARKS (*): Measure & Record all volumes prior to Analysis.

No 02405

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# *Appendix C.2*

# *Process Streams*

PG & E GENERATING
LOGAN STATION
26046-0030-00001

TOTAL SLURRY

RUN No. 3

| Sub Sample no. | DATE | Time | Sampler | Approx. Volume | Comment |
|---|---|---|---|---|---|
| 1 | 8-12-99 | 0835 | LT | 500 Ml | |
| 2 | 8-12-99 | 0850 | LT | 500 Ml | |
| 3 | 8-12-99 | 0905 | LT | 500 Ml | |
| 4 | 8-12-99 | 0920 | LT | 500 Ml | |
| 5 | 8-12-99 | 0935 | LT | 500 Ml | |
| 6 | 8-12-99 | 0950 | RM | 500 Ml | |
| 7 | 8-12-99 | 1005 | RM | 500 Ml | |
| 8 | 8-12-99 | 1020 | RM | 500 Ml | |
| 9 | 8-12-99 | 1035 | RM | 500 Ml | |
| 10 | 8-12-99 | 1050 | RM | 500 Ml | |
| 11 | 8-12-99 | 1226 | RM | 500 Ml | |
| 12 | 8-12-99 | 1241 | RM | 500 Ml | |
| 13 | 8-12-99 | 1256 | RM | 500 ML | |
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# CHAIN OF STODY RECORD

Project Name: PG&E LOGAN STATION Hg sampling
Project No.: 26046-0030
Sampling Date(s): 8/11-12/99
Laboratory: [redacted]
Laboratory P.O. #:
Shipping Airbill No.:
Shipping Date(s):
Shipper's Name: TRC

| Sample Code | Sampled Date | Container Size | Container G/P | MATRIX: Aqueous (Slurry - Lime) | Organic Solvent | Ash/Soil/Sediment | Acidic | Basic | Other (Aqueous Ammonia Slurry lime & fly ash) | Source Description | ANALYSIS: Trace Metals* | Mercury | Hexavalent Chromium | HCl | Particulate Matter | PCDD/PCDF | Semi-Volatile Organics | Volatile Organics | Physical Parameters* | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PG&E-L-OHM-1-L | 8/11/99 | 1L | G | ✓ | | | | | | Lime slurry Run 1 | ✓ | | | | | | | | | |
| PG&E-L-OHM-1-L DUP | 8/11/99 | 1L | G | ✓ | | | | | | Lime slurry Run 1 DUP | ✓ | | | | | | | | | |
| PG&E-L-OHM-2-L | 8/11/99 | 1L | G | ✓ | | | | | | Lime Slurry Run 2 | ✓ | | | | | | | | | |
| PG&E-L-OHM-3-L | 8/12/99 | 1L | G | ✓ | | | | | | Lime slurry Run 3 | ✓ | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| PG&E-L-OHM-1R | 8/11/99 | 1L | G | | | | | | ✓ | Reactor slurry Run 1 | ✓ | | | | | | | | | |
| PG&E-L-OHM-1R dup | 8/11/99 | 1L | G | | | | | | ✓ | Reactor slurry Run 1 D | ✓ | | | | | | | | | |
| PG&E-L-OHM-2-R | 8/11/99 | 1L | G | | | | | | ✓ | Reactor Slurry Run 2 | ✓ | | | | | | | | | |
| PG&E-L-OHM-3-R | 8/12/99 | 1L | G | | | | | | ✓ | Reactor slurry Run 3 | ✓ | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| PG&E-L-OHM-1,2,3-A | 8/12/99 | 1L | G | | | | | | ✓ | 27.5% Ammonia soln Runs 1,2&3 | ✓ | | | | | | | | | |

| | | | |
|---|---|---|---|
| Relinquished by: [signature] | Date/Time: 8/26/99 1300 | Relinquished by: [signature] | Date/Time: 9-1-99 1500 |
| Received by: [signature] | Date/Time: 9-1-99 1100 | Received by: | Date/Time: |

REMARKS (*):
Lime slurry - lime/River water  Reactor slurry - lime/River water/fly ash  A 27.5% Ammonia solution

№ 02406

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TRC
TRC Environmental Corporation

# CHAIN OF CUSTODY RECORD

Project Name: PG&E LOGAN STATION Hg SAMPLING
Project No.: 26046-0030 00001
Sampling Date(s): 8/11-12/99
Laboratory: CTL
Laboratory P.O. #:
Shipping Airbill No.:
Shipping Date(s):
Shipper's Name:

| Sample Code | Sampled Date | Container Size | Container G/P | MATRIX: Aqueous | Organic Solvent | Ash/Soil/Sediment | Acidic | Basic | Other | Source Description | ANALYSIS: Trace Metals* | Mercury | Hexavalent Chromium | HCl | Cl2 | Particulate Matter | PCDD/PCDF | Semi-Volatile Organics | Volatile Organics | Physical Parameters* | ~~Proximate~~ | ~~Ultimate~~ | ~~GHV~~ * | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PG&E-L-OHM-1-C-A | 8/11/99 | 5 gal | P | | | | | | ✓ | COAL composite Run 1A | ✓ | | | X | | | | | | ✓ | | | | COMBINE Before ANALYSIS |
| PG&E-L-OHM-1-C-B | 8/11/99 | 5 gal | P | | | | | | ✓ | COAL composite Run 1B | ✓ | | | X | | | | | | ✓ | | | | |
| PG&E-L-OHM-2-C-A | 8/11/99 | 5 gal | P | | | | | | ✓ | COAL composite Run 2A | ✓ | | | X | | | | | | ✓ | | | | ~~COMBINE Before~~ ANALYSIS |
| PG&E-L-OHM-2-C-B | 8/11/99 | 5 gal | P | | | | | | ✓ | COAL composite Run 2B | ✓ | | | X | | | | | | ✓ | | | | |
| PG&E-L-OHM-3-C-A | 8/12/99 | 5 gal | P | | | | | | ✓ | COAL composite Run 3A | ✓ | | | X | | | | | | ✓ | | | | COMBINE Before ANALYSIS |
| PG&E-L-OHM-3-C-B | 8/12/99 | 5 gal | P | | | | | | ✓ | COAL composite Run 3B | ✓ | | | X | | | | | | ✓ | | | | |

| Relinquished by: | Date/Time: 8/26/99 1700 | Relinquished by: | Date/Time: |
|---|---|---|---|
| Received by: | Date/Time: | Received by: | Date/Time: |

REMARKS (*): PROXIMATE (MOISTURE, ASH, SULFUR, VOLATILE, BTU/lb)
there are two containers for each Run. - make 1 Analytical sample from both containers. (combine equal lbs A & B)

No 407

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TRC Environmental Corporation

UPS

Worldwide Olympic Partner

36 USC 380

RECEIVED FROM ( PLEASE PRINT)

NAME: DAVID GILL /TRC

DATE: 8/27/99

STREET: foot of John

CITY: Lowell

STATE: MA

ZIP CODE: 01852

TELEPHONE (H): ( )

TELEPHONE (W): (978) 970-5600

# CUSTOMER COUNTER SHIPPING RECORD

Questions?
www.ups.com
or
1-800-PICK-UPS

SHIPPER COMPLETE ALL INFORMATION SHOWN BELOW / A DUPLICATE ADDRESS LABEL SHOULD BE ENCLOSED IN F...

| PACKAGE | SEND TO ADDRESS / LIST EACH PACKAGE SEPARATELY | C.O.D. AMOUNT | DECLARED VALUE | TYPE CHARGE |
|---|---|---|---|---|
| 1 | NAME: Commerical testing & Engineering<br>STREET: RT 2 Box 162A 1.5 miles Not ofted<br>CITY: Middlesboro STATE: KY ZIP: 40965<br>PACKAGE CONTENTS: Samples | $ | | C.O.D.<br>EXCESS VALUATION<br>PACKAGE |
| 2 | NAME<br>STREET: SAME<br>CITY STATE ZIP<br>PACKAGE CONTENTS: | $ | | C.O.D.<br>EXCESS VALUATION<br>PACKAGE |
| 3 | NAME<br>STREET: SAME<br>CITY STATE<br>PACKAGE CONTENTS: | $ | | C.O.D.<br>EXCESS VALUATION<br>PACKAGE |
| 4 | NAME<br>STREET<br>CITY STATE ZIP<br>PACKAGE CONTENTS: | $ | $ | C.O.D.<br>EXCESS VALUATION<br>PACKAGE |

Ground Tracking Number 1Z 010 X87 03 1198 095 9

Ground Tracking Number 1Z 010 X87 03 1198 094 0

Ground Tracking Number 1Z 010 X87 03 1198 093 1

## FOR UPS USE ONLY

SHIPPER NO. - PACKAGE ID # - CHARGES

| | | |
|---|---|---|
| P#453 Z5 | 20.02 LB | 9.15 |
| P#454 Z5 | 27.78 LB | 11.40 |
| P#455 Z5 | 29.24 LB | 12.10 |
| * SUBTOTAL | | 32.65 |
| ** TOTAL ** CR | | 141.80 |
| 010X87 08/27/99 TRANS #0898 REG #1 | | |

* Unless a greater value is declared in writing on this receipt, the shipper hereby declares and agrees that the released value of each package covered by this receipt is $100, which is a reasonable value under the circumstances surrounding the transportation, *even in the event that the carrier repackages or assists the shipper in packaging a shipment.* In addition, the maximum value or declared value per package is $50,000 and the maximum liability per package is $50,000. Claims not made to the carrier within 9 months of the scheduled delivery date are waived. The carrier shall not be liable for any special, incidental, or consequential damages.

The entry of a C.O.D. amount is not a declaration of value. All checks tendered in payment of C.O.D.'s will be accepted by UPS at shipper's risk.

**All shipments are subject to the terms and conditions contained in the UPS tariff which is maintained at local UPS offices or at www.ups.com.**

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36 USC 380

# CUSTOMER COUNTER SHIPPING RECORD

Questions?
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or
1-800-PICK-UPS

RECEIVED FROM ( PLEASE PRINT)

NAME: DAVID GILL /TRC
DATE: 8/27/99
STREET: FOOT of JOHN ST
CITY: LOWELL
STATE: MA
ZIP CODE: 01852
TELEPHONE (H): ( )
TELEPHONE (W): (978) 970-5600

SHIPPER COMPLETE ALL INFORMATION SHOWN BELOW / A DUPLICATE ADDRESS LABEL SHOULD BE ENCLOSED IN EACH PACKAGE

| PACKAGE | SEND TO ADDRESS / LIST EACH PACKAGE SEPARATELY | C.O.D. AMOUNT | DECLARED VALUE* | UPS ZONE | TYPE |
|---|---|---|---|---|---|
| 1 | NAME: COMMERCIAL TESTING & ENG<br>STREET: RT 2 BOX 162A 1.5 Miles N of Mdl<br>CITY: Middles Boro STATE: KY ZIP: 40965<br>PACKAGE CONTENTS: SAMPLES | Ground Tracking Number 1Z 010 X87 03 1198 099 5 | $ | | EXCESS VALUATION / PACKAGE |
| 2 | NAME:<br>STREET: SAME<br>CITY: STATE: ZIP:<br>PACKAGE CONTENTS: | $ Ground Tracking Number 1Z 010 X87 03 1198 098 6 | | | EXCESS VALUATION / PACKAGE |
| 3 | NAME:<br>STREET: SAME<br>CITY: STATE: ZIP:<br>PACKAGE CONTENTS: | Ground Tracking Number 1Z 010 X87 03 1198 097 7 | $ | | C.O.D. / EXCESS VALUATION / PACKAGE |
| 4 | NAME:<br>STREET: SAME<br>CITY: STATE:<br>PACKAGE CONTENTS: | $ Ground Tracking Number 1Z 010 X87 03 1198 096 8 | | | C.O.D. / EXCESS VALUATION / PACKAGE |

FOR UPS USE ONLY

SHIPPER NO. - PACKAGE ID # - CHARGES

| | | |
|---|---|---|
| P#449 Z5 | 57.10 LB | 20.75 |
| P#450 Z5 | 23.62 LB | 10.15 |
| P#451 Z5 | 32.20 LB | 13.10 |
| P#452 Z5 | 31.88 LB | 12.75 |
| * SUBTOTAL | | 56.75 |
| 010X87 08/27/99 TRANS #0898 REG #1 | | |

* Unless a greater value is declared in writing on this receipt, the shipper hereby declares and agrees that the released value of each package covered by this receipt is $100, which is a reasonable value under the circumstances surrounding the transportation, *even in the event that the carrier repackages or assists the shipper in packaging a shipment.* In addition, the maximum value or declared value per package is $50,000 and the maximum liability per package is $50,000. Claims not made to the carrier within 9 months of the scheduled delivery date are waived. The carrier shall not be liable for any special, incidental, or consequential damages.

The entry of a C.O.D. amount is not a declaration of value. All checks tendered in payment of C.O.D.'s will be accepted by UPS at shipper's risk.

**All shipments are subject to the terms and conditions contained in the UPS tariff which is maintained at local UPS offices or at www.ups.com.**

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**CUSTOMER COUNTER SHIPPING RECORD**

Questions?
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or
1-800-PICK-UPS

RECEIVED FROM ( PLEASE PRINT)

NAME David Gill / TRC — DATE 8/27/99

STREET Foot of John St

CITY Lowell — STATE MA — ZIP CODE 01852

TELEPHONE (H) ( ) — TELEPHONE (W) (978) 970-5600

SHIPPER COMPLETE ALL INFORMATION SHOWN BELOW / A DUPLICATE ADDRESS LABEL SHOULD BE ENCLOSED

FOR UPS USE ONLY

| PACKAGE | SEND TO ADDRESS / LIST EACH PACKAGE SEPARATELY | Ground Tracking Number | ZONE | TYPE CHARGE | SHIPPER NO. - PACKAGE ID # - CHARGES |
|---|---|---|---|---|---|
| 1 | NAME Commercial Testing + Engineering<br>STREET RT 2 Box 162A 1.5mi NOF Middlesboro<br>CITY Middlesboro STATE KY ZIP 40965<br>PACKAGE CONTENTS: Samples | 1Z 010 X87 03 1198 103 8 | | C.O.D. $<br>EXCESS VALUATION $<br>PACKAGE | |
| 2 | NAME SAME<br>STREET<br>CITY STATE ZIP<br>PACKAGE CONTENTS: | 1Z 010 X87 03 1198 102 9 | | EXCESS VALUATION $<br>PACKAGE | P#445 Z5 32.14 LB 13.10<br>P#446 Z5 31.06 LB 12.75 |
| 3 | NAME SAME<br>STREET<br>CITY STATE ZIP<br>PACKAGE CONTENTS: | 1Z 010 X87 03 1198 101 0 | | EXCESS VALUATION $<br>PACKAGE | P#447 Z5 34.86 LB 13.80 |
| 4 | NAME SAME<br>STREET<br>CITY STATE ZIP<br>PACKAGE CONTENTS: | 1Z 010 X87 03 1198 100 1 | | C.O.D.<br>EXCESS VALUATION $<br>PACKAGE | P#448 Z5 31.90 LB 12.75<br>* SUBTOTAL 52.40<br>010X87 08/27/99 TRANS #0898 REG #1 |

* Unless a greater value is declared in writing on this receipt, the shipper hereby declares and agrees that the released value of each package covered by this receipt is $100, which is a reasonable value under the circumstances surrounding the transportation, *even in the event that the carrier repackages or assists the shipper in packaging a shipment.* In addition, the maximum value or declared value per package is $50,000 and the maximum liability per package is $50,000. Claims not made to the carrier within 9 months of the scheduled delivery date are waived. The carrier shall not be liable for any special, incidental, or consequential damages.

The entry of a C.O.D. amount is not a declaration of value. All checks tendered in payment of C.O.D.'s will be accepted by UPS at shipper's risk.

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1.82

PG & E GENERATING
SCRUBGRASS STATION
26046-0030-00004

LIME TOTALIZER DATA LOG

RUN No. 1

| | DATE | TIME | LIME TOTALIZER (TONS) 1 B | LIME TOTALIZER (TONS) 2 E |
|---|---|---|---|---|
| 1A | 9/16/99 | 1100 | 42077280 | 300 |
| 2A | 9/16/99 | 1100 | 76451794 | |
| 1B | 9/16/99 | 1105 | 98915453 | |
| 2B | 9/16/99 | 1105 | 29739175 | |
| 1A | 9/16/99 | 1130 | 42080116 | |
| 1B | 9/16/99 | 1130 | 76454242 | |
| 2A | 9/16/99 | 1135 | 98918377 | |
| 2B | 9/16/99 | 1135 | 29742207 | |
| 1A | 9/16/99 | 1200 | 42083732 | |
| 2A | 9/16/99 | 1200 | 76459467 | |
| 1B | 9/16/99 | 1200 | 98922036 | |
| 2B | 9/16/99 | 1200 | 29747567 | |
| 1A | 9/16/99 | 1230 | 42087505 | |
| 2A | 9/16/99 | 1230 | 76465254 | |
| 1B | 9/16/99 | 1230 | 98925761 | |
| 2B | 9/16/99 | 1230 | 29753328 | |
| 1A | 9/16/99 | 1300 | 42090921 | |
| 2A | 9/16/99 | 1300 | 76469911 | |
| 1B | 9/16/99 | 1300 | 98929546 | |
| 2B | 9/16/99 | 1300 | 29757685 | |
| 1A | | | | |
| 2A | | | | |
| 1B | | | | |
| 2B | | | | |

B 1054 - 253.8 = 800.6
A 1488.6 - 268.4 = 1220.2

41
17
0
60
240

PG & E GENERATING
LOGAN STATION
26046-0030-00001

PULVERIZED COAL SAMPLE LOG

Logbook Sheet

RUN No. 1

| | Sub Sample no. | DATE | Time | Sampler | Approx. Volume | Comment | B |
|---|---|---|---|---|---|---|---|
| P1 | 1 | 8/11/99 | 0945-51 | DAN/Doug | A-1220/B800 | wtg 1054.4-253.8=800.6/1488.6-268.4= | 1220.2 |
| | 2 | 8/11/99 | 1000-06 | DAN/Doug | | | |
| | 3 | 8/11/99 | 1015-22 | DAN Doug | | | |
| | 4 | 8/11/99 | 1055-1101 | DAN Doug | | | |
| P2 | 5 | 8/11/99 | 1110-1116 | DAN Doug | | | |
| | 6 | 8/11/99 | 1125-31 | DAN Doug | | | |
| | 7 | 8/11/99 | 1140-46 | DAN/Doug | | | |
| | 8 | 8/11/99 | 1215-21 | DAN/Doug | | | |
| P3 | 9 | 8/11/99 | 1230-36 | DAN/Doug | | B #1 changed filters | |
| | 10 | 8/11/99 | 1245-52 | DAN/Doug | | | |
| | 11 | 8/11/99 | 1324-1330 | DAN Doug | | | |
| P4 | 12 | 8/11/99 | 1339-45 | DAN/Doug | | 1351 - hold for Dual Filter change | |
| | 13 | 8/11/99 | 1354-1400 | DAN Doug | | 1417-23 resume | |
| | 14 | 8/11/99 | | | | | |
| | 15 | | | | | | |
| | 16 | | | | | | |
| | 17 | | | | | | |
| | 18 | | | | | | |
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| | 22 | | | | | | |
| | 23 | | | | | | |

Run start 0945 end ~~1404~~ 1427
sample taken from both pulverizers simultaneously every 15 TM 1197 A pulverizer - sample obtained over minutes
+ 10sec/point - 12 points x 2 taps per coal pipe ≈ 4 minutes per sample

PG&E DAN Hewitt A mill A-4 pipe
Doug Gleason B mill B-6 pipe
Justin DeAngelis lead engineer

12 A mill - moisture content in coal pipe

sampling discontinued when changing ports on the inlet
— was on BACK —

PG & E GENERATING
LOGAN STATION
26046-0030-00001

LIME SLURRY

RUN No. #1

| Sub Sample no. | DATE | Time | Sampler | Approx. Volume | Comment |
|---|---|---|---|---|---|
| 1 | 8-11-99 | 09:45 | LT. | 500 ml | |
| 2 | 8-11-99 | 1000 | L.T. | 500 ml | |
| 3 | 8-11-99 | 1015 | L.T. | 500 ml | |
| 4 | 8-11-99 | 1030 | LT | 500 ml | |
| 5 | 8-11-99 | 1055 | L.T. | 500 ml | |
| 6 | 8-11-99 | 1110 | L.T | 500 ml | |
| 7 | 8-11-99 | 1125 | L.T | 500 ml | |
| 8 | 8-11-99 | 1140 | LT | 500 ml | |
| 9 | 8-11-99 | 1215 | LT | 500 ml | |
| 10 | 8-11-99 | 1230 | LT | 500 ml | |
| 11 | 8-11-99 | 1245 | LT | 500 ml | |
| 12 | 8-11-99 | 1300 | LT | 500 ml | |
| 13 | 8-11-99 | 1324 | LT | 500 ml | |
| 14 | 8-11-99 | 1339 | LT | 500 ml | |
| 15 | 8-11-99 | 1354 | LT | 500 ml | Stop taken Sample |
| 16 | 8-11-99 | 1420 | LT | 500 ml | |
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LOGAN STATION
26046-0030-00001

TOTAL SLURRY

RUN No. #1

| Sub Sample no. | DATE | Time | Sampler | Approx. Volume | Comment |
|---|---|---|---|---|---|
| 1 | 8/11/99 | 0945 | L.T. | 500 ml | |
| 2 | 8-11-99 | 1000 | L.T. | 500 ml | |
| 3 | 8-11-99 | 1015 | L.T | 500 ml | |
| 4 | 8-11-99 | 1030 | L.T | 500 ml | |
| 5 | 8-11-99 | 1045 | L.T. | 500 ml | |
| 6 | 8-11-99 | 1110 | LT | 500 ml | |
| 7 | 8-11-99 | 1125 | L.T. | 500 ml | |
| 8 | 8-11-99 | 1140 | LT | 500 ml | |
| 9 | 8-11-99 | 1215 | LT | 500 ml | |
| 10 | 8-11-99 | 1230 | LT | 500 ml | |
| 11 | 8-11-99 | 1300 | LT | 500 ml | |
| 12 | 8-11-99 | 1324 | LT | 500 ml | |
| 13 | 8-11-99 | 1339 | LT | 500 ml | |
| 14 | 8-11-99 | 1354 | LT | 500 ml | |
| 15 | 8-11-99 | 1420 | LT | 500 ml | |
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PG & E GENERATING
LOGAN STATION
26046-0030-00001

PULVERIZED COAL SAMPLE LOG

RUN No. 2

weights / subsample other side

log kept by [illegible]

| Sub Sample no. | DATE | Time | Sampler | Approx. ~~Volume~~ g | Comment |
|---|---|---|---|---|---|
| 1 | 8/11/99 | 1615-22 | DAN/Doug | 1000g | |
| 2 | 8/11/99 | 1630-37 | DAN/Doug | 1000 | |
| 3 | 8/11/99 | 1645-1652 | DAN/Doug | 1000 | end port 1A/6R/Blue 1655 |
| 4 | 8/11/99 | 1713-1720 | DAN/Lew | 1000 | restart PR |
| 5 | 8/11/99 | 1728-1735 | DAN/Lew | 1000 | |
| 6 | 8/11/99 | 1743-1750 | DAN/Lew | 1000 | end - 1752 |
| 7 | 8/11/99 | 1807-14 | DAN/Lew | 1000 | start 1807 |
| 8 | 8/11/99 | 1822-29 | DAN/Lew | 1000 | |
| 9 | 8/11/99 | 1837-44 | DAN/Lew | 1000 | end 1845 |
| 10 | 8/11/99 | 1900-~~07~~ | ~~1907~~ DAN/Lew | 1000 | start 1904 |
| 11 | 8/11/99 | 1915-22 | DAN/Lew | 1000 | |
| 12 | 8/11/99 | 1930-37 | | 1000 | end 1940 |
| 13 | | | | | |
| 14 | | | | | |
| 15 | | | | | |
| 16 | | | | | |

Run start - 1615
samplers Dan Hewitt - A mill A4 PIR
Doug Gleason B mill B6 pipe
PG&E
1713- Lew Perry - replaced Doug Gleason

10 sec/pt - 12 pt x 2 TAPS
Per coal pipe - 4 hours/5

~~Run end~~ Run END - 19

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26046-0030-00001

LIME SLURRY

RUN No. #2

| Sub Sample no. | DATE | Time | Sampler | Approx. Volume | Comment |
|---|---|---|---|---|---|
| 1 | 8-11-99 | 1615 | LT | 500 ml | |
| 2 | 8-11-99 | 1630 | LT | 500ml | |
| 3 | 8-11-99 | 1645 | LT | 500ml | |
| 4 | 8-11-99 | 1713 | LT | 500ml | |
| 5 | 8-11-99 | 1727 | LT | 500ml | |
| 6 | 8-11-99 | 1742 | LT | 500 ml | |
| 7 | 8-11-99 | | LT | 500 ml | |
| 8 | 8-11-99 | 1810 | RJ-H | 500 ml | |
| 9 | 8-11-99 | 1826 | R.J. H. | 500 ml. | |
| 10 | 8-11-99 | 1842 | R&H | 500 ml. | |
| 11 | 8-11-99 | 1904 | R&H | 500ml. | |
| 12 | 8-11-99 | 1917 | R&H. | 500ml | |
| 13 | 8-11-99 | 1935 | R&H | 500ml | |
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PG & E GENERATING
LOGAN STATION
26046-0030-00001

TOTAL SLURRY

RUN No. #2

| Sub Sample no. | DATE | Time | Sampler | Approx. Volume | Comment |
|---|---|---|---|---|---|
| 1 | 8-11-99 | 1615 | LT | 500 Ml | |
| 2 | 8-11-99 | 1630 | LT | 500 Ml | |
| 3 | 8-11-99 | 1645 | LT | 500 Ml | |
| 4 | 8-11-99 | 1713 | LT | 500 Ml | |
| 5 | 8-11-99 | 1727 | LT | 500 Ml | |
| 6 | 8-11-99 | 1742 | LT | 500 Ml | |
| 7 | 8-11-99 | 1814 | R&H | 500 Ml | |
| 8 | " " | 1827 | R&H. | 500 ML | @ 1-20 DENSITY |
| 9 | 8-11-99 | 1842 | R&H | 500 ML | @ 1-20 |
| 10 | 8-11-99 | 1902 | R&H | 500 ML | @ 1.19 |
| 11 | 8-11-99 | 1919 | R&H | 500 ML | @ 1-19 |
| 12 | 8-11-99 | 1937 | R&H | 500 ML | @ 1-20 |
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Belt Feeder Reading at 1000 6030 55 185

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PULVERIZED COAL SAMPLE LOG

Log [illegible]

RUN No. 3

| Sub Sample no. | DATE | Time | Sampler | Approx. ~~Volume~~ g | Comment |
|---|---|---|---|---|---|
| 1 | 8/12/99 | 0835-42 | DAN/Doug | 1000 | |
| 2 | 8/12/99 | 0850-57 | DAN/Doug | 1000 | |
| 3 | 8/12/99 | 0905-12 | DAN/Doug | 1000 | |
| 4 | 8/12/99 | 0920-26 | DAN/Doug | 1000 | |
| 5 | 8/12/99 | 0935-41 | DAN/Doug | 1000 | |
| 6 | 8/12/99 | 0950-56 | DAN/Doug | 1000 | |
| 7 | 8/12/99 | NO SAMPLE | | | 0959- Feeder 2A tripped |
| 8 | 8/12/99 | 1020-28 | DAN Doug | 1000 | |
| | | | | | |
| 9 | 8/12/99 | 1226-32 | DAN/Doug | 1000 | Restarted Run at 1226 - |
| 10 | 8/12/99 | 1241-47 | DAN/Doug | 1000 | |
| 11 | 8/12/99 | 1256-1305 | DAN Doug | 1000 | |

(1) Run start 0835 10 sec coal/point - 12 points/traverse
Samplers PG&E DAN Hewitt A mill A-4 pipe 2 traverses per pipe
Doug Gleason B mill B-6 pipe

(2) 0959 - SRNV. Feeder A2 tripped - plugged silo core into down chute to feeder
DAN & Doug went to help unplugg feeder

(3) NO Samples after 1026 - sampler eductor air being used for pressure air
lancing of silo. cannot ~~operate~~ operate samplers after 1036

(4) 1245 - silo now feeding to Belt feeder

Subsample 7mg

| | A ~~Side~~ Pull | | | B Pull | | |
|---|---|---|---|---|---|---|
| # | Gross | Tare | Net | Gross | Tare | Net |
| 1 | 1314.9 | 267.9 | 1047.0 | 1486.7 | 253.7 | 1233.0 |
| 2 | 1355.1 | 267.9 | 1087.2 | 1531.1 | 254.1 | 1277.0 |
| 3 | 1113.9 | 267.8 | 846.1 | 1493.4 | 253.9 | 1239.5 |
| 4 | 1057.6 | 267.8 | 790.0 | 1033.0 | 254.1 | 778.9 |
| 5 | 1138.3 | 268.0 | 870.3 | 966.2 | 253.9 | 712.4 |
| 6 | 1026.4 | 267.8 | 758.6 | 1066.9 | 254.0 | 812.4 |
| 7 | — | — | — NS | — | — | — |
| 8 | 1076.0 | 268.3 | 808.7 | 1041.9 | 253.9 | 787.9 |
| 9 | — | | | NS | | |
| 10 | — | | | | | |
| 11 | — | | | | | |
| 12 | — | | | | | |
| 13 | 1228.3 | 268.1 | 960.2 | 1543.9 | 254.2 | 1288.8 |
| 14 | 1228.2 | 268.0 | 960.2 | 1375.2 | 254.4 | 1120.8 |
| 15 | 1271.3 | 267.8 | | 1418.7 | 254.5 | |
| 16 | 267.8 | | | | | |
| | 1003.5 | | | | | |

After B Sampling suspended due problem with cone feeder.

1418.7
201.5
1642

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26046-0030-00001

AMMONIA SOLUTION

RUN No.

| Sub Sample no. | DATE | Time | Sampler | Approx. Volume | Comment |
|---|---|---|---|---|---|
| 1 | 8-12-99 | 1415 | DH | 1000 ml | Pre-filtered |
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This sample is for all 3 Runs
Received ~~by~~ 1420 8/12/99
[illegible]

PG & E GENERATING
LOGAN STATION
26046-0030-00001

LIME SLURRY

RUN No. 3

| Sub Sample no. | DATE | Time | Sampler | Approx. Volume | Comment |
|---|---|---|---|---|---|
| 1 | 8-12-99 | 0835 | LT | 500 Ml | |
| 2 | 8-12-99 | 0850 | LT | 500 Ml | |
| 3 | 8-12-99 | 0905 | LT | 500 Ml | |
| 4 | 8-12-99 | 0920 | LT | 500 Ml | |
| 5 | 8-12-99 | 0935 | RM | 500 Ml | |
| 6 | 8-12-99 | 0950 | RM | 500 Ml | |
| 7 | 8-12-99 | 1005 | RM | 500 Ml | |
| 8 | 8-12-99 | 1020 | RM | 500 Ml | |
| 9 | 8-12-99 | 1035 | RM | 500 Ml | |
| 10 | 8-12-99 | 1050 | RM | 500 ML | |
| 11 | 8-12-99 | 1226 | RM | 500 ML | |
| 12 | 8-12-99 | 1241 | RM | 500 ML | |
| 13 | 8-12-99 | 1256 | RM | 500 ML | |
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Appendix D

# *APPENDIX D*

# *ANALYTICAL DATA SHEETS*

# *Appendix D.1*

# *Exhaust Gas Streams*

PHILIP SERVICES

# INORGANIC DATA PACKAGE
# FOR
# TRC ENVIRONMENTAL CORPORATION

***Project # 26046***

**Philip Analytical Services Corporation**
**5555 North Service Road**
**Burlington, ON L7L 5H7**

***Submission #: 9H0535***

Prepared by : Janice Joseph - CSR Initial : _____

Approved by : Dr. Ron McLeod - Principal Scientist Initial : _____

# 1. CASE NARRATIVE

**PROJECT NARRATIVE**

**PHILIP Analytical Services (Burlington ON)**
**Philip Project: AN990787**
**Philip Submission #:9H0535**

**Client: TRC Environmental Corporation**
**Client Project: 26046**

## I. SAMPLE RECEIPT/ANALYSIS

a) Sample Listing

| Philip ID | Client Sample ID | Date Sampled | Date Received | Date Prepped | Run Date |
|---|---|---|---|---|---|
| ***Mercury via SW846 Method 7471A*** | | | | | |
| 044812 99 | Method Blank | 99/08/11 | 99/08/17 | 99/08/23 | 99/08/24 |
| 044813 99 | OHM-Ia-R1 Flyash | 99/08/11 | 99/08/17 | 99/08/23 | 99/08/24 |
| 044814 99 | OHM-Ib-R1 Flyash | 99/08/11 | 99/08/17 | 99/08/23 | 99/08/24 |
| 044815 99 | OHM-Ia-R2 Flyash | 99/08/11 | 99/08/17 | 99/08/23 | 99/08/24 |
| 044816 99 | OHM-Ib-R2 Flyash | 99/08/11 | 99/08/17 | 99/08/23 | 99/08/24 |
| 044817 99 | OHM-Ia-R3 Flyash | 99/08/12 | 99/08/17 | 99/08/23 | 99/08/24 |
| 044818 99 | OHM-Ib-R3 Flyash | 99/08/12 | 99/08/17 | 99/08/23 | 99/08/24 |
| 044891 99 | NIST 1633b Reference | 99/08/18 | 99/08/18 | 99/08/30 | 99/08/30 |
| ***Draft ASTM Mercury Speciation Method (September1, 1999 Revision)- Front Half*** | | | | | |
| 044795 99 | Method Blank | 99/08/11 | 99/08/17 | 99/10/08 | 99/10/08 |
| 044796 99 | OHM-RB | 99/08/11 | 99/08/17 | 99/10/08 | 99/10/08 |
| 044797 99 | OHM-I-FB | 99/08/10 | 99/08/17 | 99/10/08 | 99/10/08 |
| 044804 99 | OHM-Oa-R1 | 99/08/11 | 99/08/17 | 99/10/08 | 99/10/08 |
| 044805 99 | OHM-Ob-R1 | 99/08/11 | 99/08/17 | 99/10/08 | 99/10/08 |
| 044806 99 | OHM-Oa-R2 | 99/08/11 | 99/08/17 | 99/10/08 | 99/10/08 |
| 044807 99 | OHM-Ob-R2 | 99/08/11 | 99/08/17 | 99/10/08 | 99/10/08 |
| 044808 99 | OHM-Oa-R3 | 99/08/12 | 99/08/17 | 99/10/08 | 99/10/08 |
| 044809 99 | OHM-Ob-R3 | 99/08/12 | 99/08/17 | 99/10/08 | 99/10/08 |
| 044888 99 | OHM-O-FB | 99/08/10 | 99/08/17 | 99/10/08 | 99/10/08 |
| 044795 99 | Method Blank | 99/08/11 | 99/08/17 | 99/10/10 | 99/10/10 |
| 044798 99 | OHM-Ia-R1 | 99/08/11 | 99/08/17 | 99/10/10 | 99/10/10 |
| 044799 99 | OHM-Ib-R1 | 99/08/11 | 99/08/17 | 99/10/10 | 99/10/10 |
| 044800 99 | OHM-Ia-R2 | 99/08/11 | 99/08/17 | 99/10/10 | 99/10/10 |
| 044801 99 | OHM-Ib-R2 | 99/08/11 | 99/08/17 | 99/10/10 | 99/10/10 |
| 044802 99 | OHM-Ia-R3 | 99/08/12 | 99/08/17 | 99/10/10 | 99/10/10 |
| 044803 99 | OHM-Ib-R3 | 99/08/12 | 99/08/17 | 99/10/10 | 99/10/10 |
| ***Draft ASTM Mercury Speciation Method (September1, 1999 Revision)- Hydroxylamine*** | | | | | |
| 044795 99 | Method Blank | 99/08/11 | 99/08/17 | 99/10/01 | 99/10/01 |

| | | | | | |
|---|---|---|---|---|---|
| 044796 99 | OHM-RB | 99/08/11 | 99/08/17 | 99/10/01 | 99/10/01 |

***Draft ASTM Mercury Speciation Method (September1, 1999 Revision)- KCl Impingers/Rinses***

| | | | | | |
|---|---|---|---|---|---|
| 044795 99 | Method Blank | 99/08/11 | 99/08/17 | 99/09/16 | 99/09/16 |
| 044796 99 | OHM-RB | 99/08/11 | 99/08/17 | 99/09/16 | 99/09/16 |
| 044797 99 | OHM-I-FB | 99/08/10 | 99/08/17 | 99/09/16 | 99/09/16 |
| 044798 99 | OHM-Ia-R1 | 99/08/11 | 99/08/17 | 99/09/16 | 99/09/16 |
| 044799 99 | OHM-Ib-R1 | 99/08/11 | 99/08/17 | 99/09/16 | 99/09/16 |
| 044800 99 | OHM-Ia-R2 | 99/08/11 | 99/08/17 | 99/09/16 | 99/09/16 |
| 044801 99 | OHM-Ib-R2 | 99/08/11 | 99/08/17 | 99/09/16 | 99/09/16 |
| 044802 99 | OHM-Ia-R3 | 99/08/12 | 99/08/17 | 99/09/16 | 99/09/16 |
| 044803 99 | OHM-Ib-R3 | 99/08/12 | 99/08/17 | 99/09/16 | 99/09/16 |
| 044804 99 | OHM-Oa-R1 | 99/08/11 | 99/08/17 | 99/09/16 | 99/09/16 |
| 044805 99 | OHM-Ob-R1 | 99/08/11 | 99/08/17 | 99/09/16 | 99/09/16 |
| 044806 99 | OHM-Oa-R2 | 99/08/11 | 99/08/17 | 99/09/16 | 99/09/16 |
| 044807 99 | OHM-Ob-R2 | 99/08/11 | 99/08/17 | 99/09/16 | 99/09/16 |
| 044808 99 | OHM-Oa-R3 | 99/08/12 | 99/08/17 | 99/09/16 | 99/09/16 |
| 044809 99 | OHM-Ob-R3 | 99/08/12 | 99/08/17 | 99/09/16 | 99/09/16 |
| 044888 99 | OHM-O-FB | 99/08/10 | 99/08/17 | 99/09/20 | 99/09/20 |

***Draft ASTM Mercury Speciation Method (September1, 1999 Revision)- KMNO4 Impingers/Rinses***

| | | | | | |
|---|---|---|---|---|---|
| 044795 99 | Method Blank | 99/08/11 | 99/08/17 | 99/09/20 | 99/09/20 |
| 044796 99 | OHM-RB | 99/08/11 | 99/08/17 | 99/09/20 | 99/09/20 |
| 044797 99 | OHM-I-FB | 99/08/10 | 99/08/17 | 99/09/20 | 99/09/20 |
| 044798 99 | OHM-Ia-R1 | 99/08/11 | 99/08/17 | 99/09/20 | 99/09/20 |
| 044799 99 | OHM-Ib-R1 | 99/08/11 | 99/08/17 | 99/09/20 | 99/09/20 |
| 044800 99 | OHM-Ia-R2 | 99/08/11 | 99/08/17 | 99/09/20 | 99/09/20 |
| 044801 99 | OHM-Ib-R2 | 99/08/11 | 99/08/17 | 99/09/20 | 99/09/20 |
| 044802 99 | OHM-Ia-R3 | 99/08/12 | 99/08/17 | 99/09/20 | 99/09/20 |
| 044803 99 | OHM-Ib-R3 | 99/08/12 | 99/08/17 | 99/09/20 | 99/09/20 |
| 044804 99 | OHM-Oa-R1 | 99/08/11 | 99/08/17 | 99/09/20 | 99/09/20 |
| 044805 99 | OHM-Ob-R1 | 99/08/11 | 99/08/17 | 99/09/20 | 99/09/20 |
| 044806 99 | OHM-Oa-R2 | 99/08/11 | 99/08/17 | 99/09/20 | 99/09/20 |
| 044807 99 | OHM-Ob-R2 | 99/08/11 | 99/08/17 | 99/09/20 | 99/09/20 |
| 044808 99 | OHM-Oa-R3 | 99/08/12 | 99/08/17 | 99/09/20 | 99/09/20 |
| 044809 99 | OHM-Ob-R3 | 99/08/12 | 99/08/17 | 99/09/20 | 99/09/20 |
| 044888 99 | OHM-O-FB | 99/08/10 | 99/08/17 | 99/09/20 | 99/09/20 |

***Draft ASTM Mercury Speciation Method (September1, 1999 Revision)- HNO3/H202 Impingers/Rinses***

| | | | | | |
|---|---|---|---|---|---|
| 044795 99 | Method Blank | 99/08/11 | 99/08/17 | 99/09/07 | 99/09/08 |
| 044796 99 | OHM-RB | 99/08/11 | 99/08/17 | 99/09/07 | 99/09/08 |
| 044797 99 | OHM-I-FB | 99/08/10 | 99/08/17 | 99/09/07 | 99/09/08 |
| 044798 99 | OHM-Ia-R1 | 99/08/11 | 99/08/17 | 99/09/07 | 99/09/08 |
| 044799 99 | OHM-Ib-R1 | 99/08/11 | 99/08/17 | 99/09/07 | 99/09/08 |
| 044800 99 | OHM-Ia-R2 | 99/08/11 | 99/08/17 | 99/09/07 | 99/09/08 |
| 044801 99 | OHM-Ib-R2 | 99/08/11 | 99/08/17 | 99/09/07 | 99/09/08 |
| 044802 99 | OHM-Ia-R3 | 99/08/12 | 99/08/17 | 99/09/07 | 99/09/08 |
| 044803 99 | OHM-Ib-R3 | 99/08/12 | 99/08/17 | 99/09/07 | 99/09/08 |
| 044804 99 | OHM-Oa-R1 | 99/08/11 | 99/08/17 | 99/09/07 | 99/09/08 |

| | | | | | |
|---|---|---|---|---|---|
| 044805 99 | OHM-Ob-R1 | 99/08/11 | 99/08/17 | 99/09/07 | 99/09/08 |
| 044806 99 | OHM-Oa-R2 | 99/08/11 | 99/08/17 | 99/09/07 | 99/09/08 |
| 044807 99 | OHM-Ob-R2 | 99/08/11 | 99/08/17 | 99/09/07 | 99/09/08 |
| 044808 99 | OHM-Oa-R3 | 99/08/12 | 99/08/17 | 99/09/07 | 99/09/08 |
| 044809 99 | OHM-Ob-R3 | 99/08/12 | 99/08/17 | 99/09/07 | 99/09/08 |
| 044888 99 | OHM-O-FB | 99/08/10 | 99/08/17 | 99/09/07 | 99/09/08 |

Run Date is defined as the date of injection of the last calibration standard (12 hour or less) prior to the samples analyzed within that run sequence. Therefore the time of calibration injection that defines the run date is always within 12 hours of the time of sample injection.

b) Shipping Problems: none encountered

c) Documentation Problems: none encountered

**II. SAMPLE PREP:**

Significant unexpected preparatory problems were encountered with the submission of the first few batches of 'Ontario Hydro' Method trains sampled in accordance to this draft ASTM method. This caused significant delays in processing until we were comfortable with the correct analytical processes. Following the Case Narrative are enclosed copies of comments that have been submitted to the method authors which provide details of the difficulties and suggested method changes.

**III. SAMPLE ANALYSIS:**

See also comments within the appropriate Certificate of Analysis.

a) Hold Times:
All impingers portions were analyzed within this recommended hold time of 45 days. The filter and rinses were analyzed approximately 60 days following sampling while the ash portions were analyzed within the recommended hold times. Since the front half portions of the sample are within the 'heated zone' of the sampling train and since volatile mercury would have been stripped from this section, there should be no compromise to data quality for this exceedance.

b) Instrument Calibration: all within control limits

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above.
In addition, I certify, that to the best of my knowledge and belief, the data as reported are true and accurate.
Release of the data contained in this data package has been authorized by the cognizant laboratory official or his/her designee, as verified by this signature.

Ronald A. McLeod, Principal Sci., Ph.D.,C.Chem.

99/10/25
Date

**ASTM Draft Method for Mecury Speciation (Ontario Hydro Method): - Suggested Changes**

I feel compelled to provide comments and suggestions relating to the Draft ASTM method (Ontario Hydro Method) for mercury speciation. Although significant and valiant effort has been made to develop and define this method, I suggest a few improvements and changes as follows.

I do not suggest that the data obtained from the method as written is compromised. I do not have data to suggest this. I do have enough experience to suggest that recovery protocols could be improved which should ease the analytical processes.

Before I continue, I would point out that Keith Curtis - who developed that use of the KCl impinger for effective capture of HgCl2 - recovers and processes his Hg speciation trains in the field significantly differently than the approach presented in the existing draft method. I am aware that are good reasons for the changes relative to Keith's approach, but those changes have a significant impact on the ultimate handling of the samples. We have had the luxury of having received samples into our laboratory that were treated in the manner that Keith's team handles them in the field. Indeed, we have seen the difference.

In part these comments are derived from discussions with Keith in regards to the intention of the recovery processes that he designed for his field staff. According to Keith, the recovered impinger solutions are supposed to be homogeneous. The KCl and permanganate impinger samples coming in from field derived from the draft ASTM method are in general the farthest possible from this description.

**Re KCl Recoveries:**

1) Firstly, I would suggest to use some other oxidant than KMnO4 to treat/preserve the KCl impingers after sampling. Perhaps use dichromate instead. Once the permanganate is used, then the impingers are rinsed with hydroxylamine to remove the inevitable brown staining. It seems to be this combination of permanganate and hyrdoxylamine that causes problems creating large amounts of MnO2 on standing. Please eliminate the KMnO4 and hydroxylamine rinses.

We commonly receive these KCl impingers and rinses in the lab with large amounts of MnO2 precipitates. This appears to be because of the presence of significant permanganate and hydroxylamine rinses. [The resulting copious amounts of MnO2 precipitates can be resolublized in the lab, but this is time consuming and unnecessary. Furthermore, we cannot easily stabilize these solutions. If we do not analyze them immediately then the MnO2 precipitates again.]

It is worth noting that samples treated via Keith Curtis's approach have been easy to process. These had been treated with permanganate and dichromate and remain homogeneous.

It is our experience that all solutions so treated have remained homogeneous. The dichromate is an additional preservative process that Keith Cutis's field staff include for KCl impingers.

**Re KMnO4 Recoveries:**

2) Here I suggest one of two approaches... either use Keith Curtis's field approach entirely or adopt the method 29 approach with HCl rinses.

The Curtis approach is to reduce the permanganate solutions all the way to colorless in the field with cautious addition of hydroxylamine, then preservation with dichromate. This provides a stable and homogenous solution. [re this approach: I understand there is some concern from the ASTM method writers with the severity of this reaction being done by non-chemists in the field. I share some of these concerns.]

The method 29 approach is to recover the brown stains with 8 N HCl and place these in a separate bottle. We are all familiar with the disadvantages of handling the strong hydrochloric acid. However, it is a devil that is known to all field staff. It is also a recovery process well accepted and I presume well validated.

The problem with the draft ASTM method as currently written is that the addition of hydroxylamine in the field (not enough to reduce all the way to a colorless solution) appears to provide an unstable mixture which creates large amounts of MnO2 precipitate upon standing. If the solution was taken all the way to colorless in the field then copious amounts of precipitate would not likely occur and certainly not occur after treatment with hydroxylamine .

[We occasionally observe high amounts of MnO2 precipitation in method 29 permanganate submissions. I suspect that this occurs for sources with high organic emissions that have been oxidized by the permanganate. Usually for method 29 samples, the precipitation of MnO2 is minor in amount - unlike almost all of the permanganates coming from the ASTM mercury speciation trains. I conclude that the 'small' amounts of hydroxylamine added in the field is causing the problems (i.e. the reason for copious amounts of precipitate).]

Summary of how we (PASC) are handling submissions from the field:

**KCl Impinger Contents and Rinses:**

Initially we were trying to reduce the permanganate and MnO2 with hydroxylamine to just colorless and the re-add a one or so drops of permanganate to just pink color. In general, we found this impractical. It was very difficult to obtain a persistent pink color.

We had consulted Keith Curtis on this and he was concerned about losses of elemental Hg after addition of excess hydroxyamine. I think that this comment slowed us from reaching our final approach. I believe that Keilth's concern was unfounded since hydroxylamine is not a strong enough reducing agent to take Hg all the way to zero oxidation state.

Now we are not taking such care to avoid excesses of hydroxylamine. This speeds the reduction to colorless. Once reduced to colorless and on the same day, we take a subsample for final Hg processing and analysis. The remaining unused sample is retreated with permanganate (to purple) for long term sample archiving.

**KMnO4 Iminger Contents and Rinses:**

Similar changes in processing have occurred here too. Initially we were trying to cautiously titrate to just colorless. Now we are no longer so concerned about the addition of excess hydroxylamine and we analyze the reduced solutions on the same day as the reduction step. For long term storage of samples, the archived samples are preserved with permanganate.

I feel compelled to provide comments and suggestions relating to the Draft ASTM method (Ontario Hydro Method) for mercury speciation. Although significant and valiant effort has been made to develop and define this method, I suggest a few improvements and changes as follows.

I do not suggest that the data obtained from the method as written is compromised. I do not have data to suggest this. I do have enough experience to suggest that recovery protocols could be improved which should ease the analytical processes.

Before I continue, I would point out that Keith Curtis - who developed that use of the KCl impinger for effective capture of HgCl2 - recovers and processes his Hg speciation trains in the field significantly differently than the approach presented in the existing draft method. I am aware that are good reasons for the changes relative to Keith's approach, but those changes have a significant impact on the ultimate handling of the samples. We have had the luxury of having received samples into our laboratory that were treated in the manner that Keith's team handles them in the field. Indeed, we have seen the difference.

In part these comments are derived from discussions with Keith in regards to the intention of the recovery processes that he designed for his field staff. According to Keith, the recovered impinger solutions are supposed to be homogeneous. The KCl and permanganate impinger samples coming in from field derived from the draft ASTM method are in general the farthest possible from this description.

**Re KCl Recoveries:**

1) Firstly, I would suggest to use some other rinse solution than KMnO4 to rinse out the KCl impingers after transferring the KCl solution to the recovery bottle. Instead, use more KCl solution, or water or 0.1N HNO3 but **NOT** KMnO4. Once the permanganate is used, then the impingers are rinsed with hydroxylamine to remove the inevitable brown staining. It is this combination of rinses that causes

problems analytically. Please eliminate the KMnO4 and hydroxylamine rinses. Replace these rinses with one of the others suggested above.

We commonly receive these KCl impingers and rinses in the lab with large amounts of MnO2 precipitates. This is because of the presence of significant permanganate and hydroxylamine rinses. [The resulting copious amounts of MnO2 precipitates can be resolublized in the lab, but this is time consuming and unnecessary. Furthermore, we cannot easily stabilize these solutions. If we do not analyze them immediately then the MnO2 precipitates again.]

If no KMnO4 is used in the impinger rinsing and no hydroylamine has subsequently been used, I believe that the field staff will find it easier, in general, to obtain a 'just pink' solution using only a very few drops of permangate . [This premise has been confirmed by discussions with a field sampling team]

2) Secondly once the impinger solutions have been treated to just pink with permanganate, then add dichromate as preservative.

Ii is our experience that all solutions so treated have remained homogeneous. The dichromate is an additional preservative process that Keith Cutis's field staff include for KCl impingers.

**Re KMnO4 Recoveries:**

3) Here I suggest one of two approaches... either use Keith Curtis's field approach entirely or adopt the method 29 approach with HCl rinses.

The Curtis approach is to reduce the permanganate solutions all the way to colorless in the field with cautious addition of hydroxylamine, then preservation with dichromate. This provides a stable and homogenous solution. [re this approach: I understand there is some concern from the ASTM method writers with the severity of this reaction being done by non-chemists in the field. I share some of these concerns.]

The method 29 approach is to recover the brown stains with 8 N HCl and place these in a separate bottle. We are all familiar with the disadvantages of handling the strong hydrochloric acid. However, it is a devil that is known to all field staff. It is also a recovery process well accepted and I presume well validated.

The problem with the draft ASTM method as currently written is that the addition of hydroxylamine in the field (not enough to reduce all the way to a colorless solution) provides an unstable mixture which creates large amounts of MnO2 precipitate upon standing. If the solution was taken all the way to colorless in the field then copious amounts of precipitate would not likely occur and certainly not occur after treatment with hydroxylamine .

[We occasionally observe high amounts of MnO2 precipitation in method 29 permanganate submissions. I suspect that this occurs for sources with high organic emissions that have been oxidized by the permanganate. Usually for method 29 samples, the precipitation of MnO2 is minor in amount - unlike almost all of the permanganates coming from the ASTM mercury speciation trains. I conclude that the 'small' amounts of hydroxylamine added in the field is causing the problems (i.e. the reason for copious amounts of precipitate).]

# 2. ANALYTICAL DATA REPORT

PHILIP SERVICES

# *Certificate of Analysis*

| CLIENT INFORMATION | | LABORATORY INFORMATION | |
|---|---|---|---|
| **Attention:** | Michael P. Martin | **Contact:** | Ron McLeod |
| **Client Name:** | TRC Environmental Corporation | **Project:** | AN990787 |
| **Project:** | 26046 | **Date Received:** | 99/08/17 |
| **Project Desc:** | PG&E | **Date Reported:** | 99/10/12 |
| **Address:** | Boott Mills South, Foot of John Street<br>Lowell, MA<br>MA 01852 | **Submission No.:** | 9H0535 |
| | | **Sample No.:** | 044795-044809 |
| **Fax Number:** | 978-453-1995 | | |
| **Phone Number:** | 978-970-5600 | | |

**NOTES:** ***"-" = not analysed '<' = less than Method Detection Limit (MDL) 'NA' = no data available***
***LOQ can by determined for all analytes by multiplying the appropriate MDL X 3.33***
***Solids data is based on dry weight except for biota analyses.***
***Organic analyses are not corrected for extraction recovery standards except for isotope dilution methods, (i.e. CARB 429 PAH, all PCDD/F and DBD/DBF analyses)***

Methods used by PASC are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', Nineteenth Edition. Other methods are based on the principles of MISA or EPA methodologies. New York State: ELAP Identification Number 10756.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Any and all use of these test results shall be limited to the actual cost of the pertinent analysis done. There is no other warranty expressed or implied. Your samples will be retained at PASC for a period of three weeks from receipt of data or as per contract.

COMMENTS: **Revision 99/12/06:**

***Certified by:*** _____



PHILIP ANALYTICAL SERVICES CORPORATION
5555 North Service Road, Burlington, Ontario, Canada L7L 5H7 Tel: (905) 332-8788 Fax: (905) 332-9169

# PASC - Certificate of Analysis



| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ***Client ID:*** | | Method Blank | Blank Spike#1 | Blank Spike#1 | Blank Spike#2 | Blank Spike#2 | OHM-RB | OHM-I-FB | OHM Ia-R1 | OHM Ia-R1 |
| | ***Lab No.:*** | | 044795 99 | 044795 99 | 044795 99 | 044795 99 | 044795 99 | 044796 99 | 044797 99 | 044798 99 | 044798 99 |
| | ***Date Sampled:*** | | - | - | - | - | - | 99/08/11 | 99/08/10 | 99/08/11 | 99/08/11 |
| **Component** | **MDL** | **Units** | | | % Recoveries | | % Recoveries | | | | Duplicate |
| Mercury - FH (Outlet) | 0.010 | ug | < | 0.10 | 100 | 0.10 | 100 | < | < | - | - |
| Mercury -FH (Inlet) | 0.010 | " | < | 0.10 | 100 | 0.099 | 99 | - | - | 9.5 | 9.4 |
| Mercury - hydroxalamine | 0.010 | " | < | 0.10 | 100 | 0.10 | 100 | < | - | - | - |
| Mercury - KCl | 0.030 | " | < | 0.45 | 102 | 0.47 | 103 | < | 0.083 | 16 | 16 |
| Mercury - KMnO4 | 0.030 | " | < | 0.22 | 97 | 0.22 | 98 | 0.04 | 1.8 | 3.7 | 3.7 |
| Mercury - H202 | 0.010 | " | < | 0.10 | 100 | 0.10 | 100 | <0.25 | <0.25 | 0.34 | 0.30 |

# PASC - Certificate of Analysis



| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ***Client ID:*** | | OHM Ia-R1 | OHM Ia-R1 | OHM Ia-R1 | OHM Ia-R1 | OHM Ib-R1 | OHM Ia-R2 | OHM Ib-R2 | OHM Ia-R3 | OHM Ib-R3 |
| | ***Lab No.:*** | | 044798 99 | 044798 99 | 044798 99 | 044798 99 | 044799 99 | 044800 99 | 044801 99 | 044802 99 | 044803 99 |
| | ***Date Sampled:*** | | 99/08/11 | 99/08/11 | 99/08/11 | 99/08/11 | 99/08/11 | 99/08/11 | 99/08/11 | 99/08/12 | 99/08/12 |
| **Component** | **MDL** | **Units** | M. Spike | MS % Rec. | MS Dup | MSD % Rec. | | | | | |
| Mercury - FH (Outlet) | 0.010 | ug | - | - | - | - | - | - | - | - | - |
| Mercury -FH (Inlet) | 0.010 | " | 19 | 98 | 19 | 98 | 12 | 11 | 5.6 | 10 | 7.8 |
| Mercury - hydroxalamine | 0.010 | " | - | - | - | - | - | - | - | - | - |
| Mercury - KCl | 0.030 | " | 33 | 97 | 33 | 97 | 7.7 | 4.1 | 12 | 3.7 | 5.6 |
| Mercury - KMnO4 | 0.030 | " | 7.0 | 96 | 7.1 | 97 | 0.38 | 0.57 | 0.64 | 2.2 | 0.46 |
| Mercury - H202 | 0.010 | " | 2.9 | 100 | 2.9 | 100 | <0.25 | <0.25 | 0.31 | <0.25 | <0.25 |

# PASC - Certificate of Analysis



| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ***Client ID:*** | | OHM Oa-R1 | OHM Oa-R1 | OHM Oa-R1 | OHM Oa-R1 | OHM Oa-R1 | OHM Oa-R1 | OHM Ob-R1 | OHM Oa-R2 | OHM Oa-R2 |
| | ***Lab No.:*** | | 044804 99 | 044804 99 | 044804 99 | 044804 99 | 044804 99 | 044804 99 | 044805 99 | 044806 99 | 044806 99 |
| | ***Date Sampled:*** | | 99/08/11 | 99/08/11 | 99/08/11 | 99/08/11 | 99/08/11 | 99/08/11 | 99/08/11 | 99/08/11 | 99/08/11 |
| **Component** | **MDL** | **Units** | | Duplicate | M. Spike | MS % Rec. | MS Dup | MSD % Rec. | | | Duplicate |
| Mercury - FH (Outlet) | 0.010 | ug | 0.047 | 0.047 | 0.15 | 100 | 0.15 | 100 | 0.043 | 0.046 | - |
| Mercury -FH (Inlet) | 0.010 | " | - | - | - | - | - | - | - | - | - |
| Mercury - hydroxalamine | 0.010 | " | - | - | - | - | - | - | - | - | - |
| Mercury - KCl | 0.030 | " | 0.061 | - | - | - | - | - | 0.10 | 0.081 | 0.081 |
| Mercury - KMnO4 | 0.030 | " | 0.18 | - | - | - | - | - | 0.29 | 0.31 | 0.31 |
| Mercury - H202 | 0.010 | " | <0.25 | - | - | - | - | - | <0.25 | <0.25 | <0.25 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | ***Client ID:*** | | OHM Oa-R2 | OHM Oa-R2 | OHM Oa-R2 | OHM Oa-R2 | OHM Ob-R2 | OHM Oa-R3 | OHM Ob-R3 | OHM-O-FB |
| | ***Lab No.:*** | | 044806 99 | 044806 99 | 044806 99 | 044806 99 | 044807 99 | 044808 99 | 044809 99 | 044888 99 |
| | ***Date Sampled:*** | | 99/08/11 | 99/08/11 | 99/08/11 | 99/08/11 | 99/08/11 | 99/08/12 | 99/08/12 | 99/08/10 |
| **Component** | **MDL** | **Units** | M. Spike | MS % Rec. | MS Dup | MSD % Rec. | | | | |
| Mercury - FH (Outlet) | 0.010 | ug | - | - | - | - | 0.034 | 0.034 | 0.029 | < |
| Mercury -FH (Inlet) | 0.010 | " | - | - | - | - | - | - | - | - |
| Mercury - hydroxalamine | 0.010 | " | - | - | - | - | - | - | - | - |
| Mercury - KCl | 0.030 | " | 0.56 | 104 | 0.55 | 103 | 0.18 | 0.039 | 0.036 | 0.21 |
| Mercury - KMnO4 | 0.030 | " | 0.68 | 95 | 0.68 | 95 | 0.19 | 3.1 | 0.24 | 2.0 |
| Mercury - H202 | 0.010 | " | 2.6 | 100 | 2.7 | 100 | <0.25 | <0.25 | <0.25 | <0.25 |

# *PASC - Cer..,.cate of Analysis*



| | | | | | | |
|---|---|---|---|---|---|---|
| | ***Client ID:*** | | NIST 1633b Reference | NIST 1633b Reference | NIST 1633b Reference | NIST 1633b Reference |
| | ***Lab No.:*** | | 044891 99 | 044891 99 | 044891 99 | 044891 99 |
| | ***Date Sampled:*** | | 99/08/18 | 99/08/18 | 99/08/18 | 99/08/18 |
| **Component** | **MDL** | **Units** | | Duplicate | M. Spike | MS % Rec. |
| Mercury | 0.04 | mg/kg | 0.15 | 0.14 | 1.2 | 100 |

# *PASC - Summary of Analysis Pre. Dates*



| | | | |
|---|---|---|---|
| **Batch Code:** | **0830IIC1** | | |
| Mercury | 044891 99 | | |
| Run Date: | 99/08/30 | | |
| Date of Sample Prep: | 99/08/30 | | |
| **Batch Code:** | **10082GFL** | **1008IGFL** | |
| Mercury - FH (Outlet) | 044795 99 | 044796 99 | |
| | 044797 99 | | |
| | 044804 99 | | |
| | 044805 99 | | |
| | 044806 99 | | |
| | 044807 99 | | |
| | 044808 99 | | |
| | 044809 99 | | |
| | 044888 99 | | |
| Run Date: | 99/10/08 | 99/10/08 | |
| Date of Sample Prep: | 99/10/08 | 99/10/08 | |
| **Batch Code:** | **10101GFT** | | |
| Mercury -FH (Inlet) | 044795 99 | | |
| | 044798 99 | | |
| | 044799 99 | | |
| | 044800 99 | | |
| | 044801 99 | | |
| | 044802 99 | | |
| | 044803 99 | | |
| Run Date: | 99/10/10 | | |
| Date of Sample Prep: | 99/10/10 | | |
| **Batch Code:** | **1001MGHY** | | |
| Mercury - hydroxalamine | 044795 99 | | |
| | 044796 99 | | |
| Run Date: | 99/10/01 | | |
| Date of Sample Prep: | 99/10/01 | | |
| **Batch Code:** | **09161GKC** | **09162GKC** | **09202GKC** |
| Mercury - KCl | 044795 99 | 044806 99 | 044888 99 |
| | 044796 99 | 044807 99 | |
| | 044797 99 | 044808 99 | |
| | 044798 99 | 044809 99 | |
| | 044799 99 | | |
| | 044800 99 | | |
| | 044801 99 | | |
| | 044802 99 | | |
| | 044803 99 | | |
| | 044804 99 | | |
| | 044805 99 | | |
| Run Date: | 99/09/16 | 99/09/16 | 99/09/20 |
| Date of Sample Prep: | 99/09/16 | 99/09/16 | 99/09/20 |

# *PASC - Summary of Analysis Pre. Dates*



| **Batch Code:** | **09201GM4** | **09202GMN** | **09202GM4** |
|---|---|---|---|
| Mercury - KMnO4 | 044795 99 | 044797 99 | 044806 99 |
| | 044796 99 | 044888 99 | 044807 99 |
| | 044798 99 | | 044808 99 |
| | 044799 99 | | 044809 99 |
| | 044800 99 | | |
| | 044801 99 | | |
| | 044802 99 | | |
| | 044803 99 | | |
| | 044804 99 | | |
| | 044805 99 | | |
| Run Date: | 99/09/20 | 99/09/20 | 99/09/20 |
| Date of Sample Prep: | 99/09/20 | 99/09/20 | 99/09/20 |

| **Batch Code:** | **0907NRA1** | **0907NRA2** |
|---|---|---|
| Mercury - H202 | 044795 99 | 044806 99 |
| | 044796 99 | 044807 99 |
| | 044797 99 | 044808 99 |
| | 044798 99 | 044809 99 |
| | 044799 99 | 044888 99 |
| | 044800 99 | |
| | 044801 99 | |
| | 044802 99 | |
| | 044803 99 | |
| | 044804 99 | |
| | 044805 99 | |
| Run Date: | 99/09/08 | 99/09/08 |
| Date of Sample Prep: | 99/09/07 | 99/09/07 |

PHILIP SERVICES

# *Certificate of Analysis*

| CLIENT INFORMATION | | LABORATORY INFORMATION | |
|---|---|---|---|
| **Attention:** | Michael P. Martin | **Contact:** | Ron McLeod |
| **Client Name:** | TRC Environmental Corporation | **Project:** | AN990787 |
| **Project:** | 26046 | **Date Received:** | 99/08/17 |
| **Project Desc:** | PG&E | **Date Reported:** | 99/10/08 |
| **Address:** | Boott Mills South, Foot of John Street<br>Lowell, MA<br>MA 01852 | **Submission No.:** | 9H0535 |
| | | **Sample No.:** | 044812-044818 |
| **Fax Number:** | 978-453-1995 | | |
| **Phone Number:** | 978-970-5600 | | |

**NOTES:** ***'-' = not analysed '<' = less than Method Detection Limit (MDL) 'NA' = no data available***
***LOQ can by determined for all analytes by multiplying the appropriate MDL X 3.33***
***Solids data is based on dry weight except for biota analyses.***
***Organic analyses are not corrected for extraction recovery standards except for isotope dilution methods, (i.e. CARB 429 PAH, all PCDD/F and DBD/DBF analyses)***

Methods used by PASC are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', Nineteenth Edition. Other methods are based on the principles of MISA or EPA methodologies. New York State: ELAP Identification Number 10756.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Any and all use of these test results shall be limited to the actual cost of the pertinent analysis done. There is no other warranty expressed or implied. Your samples will be retained at PASC for a period of three weeks from receipt of data or as per contract.

COMMENTS:

***Certified by:*** _____



PHILIP ANALYTICAL SERVICES CORPORATION
5555 North Service Road Burlington Ontario Canada L7L 5H7 Tel (905) 332-8788 Fax (905) 332-9169

# PASC - Certificate of Analysis



| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ***Client ID:*** | | Method Blank | Blank Spike | Blank Spike | OHM-Ia-R1 Flyash | OHM-Ia-R1 Flyash | OHM-Ia-R1 Flyash | OHM-Ia-R1 Flyash | OHM-Ib-R1 Flyash | OHM-Ia-R2 Flyash | OHM-Ib-R2 Flyash |
| | ***Lab No.:*** | | 044812 99 | 044812 99 | 044812 99 | 044813 99 | 044813 99 | 044813 99 | 044813 99 | 044814 99 | 044815 99 | 044816 99 |
| | ***Date Sampled:*** | | - | - | - | 99/08/11 | 99/08/11 | 99/08/11 | 99/08/11 | 99/08/11 | 99/08/11 | 99/08/11 |
| **Component** | **MDL** | **Units** | | | % Recoveries | | Duplicate | M. Spike | MS % Rec. | | | |
| Weight of sample | 0.0001 | g | - | - | - | 20.9 | - | - | - | 19.5 | 22.9 | 22.2 |
| Mercury | 0.04 | mg/kg | < | 1.0 | 100 | 0.97 | 0.98 | 1.9 | 96 | 0.95 | 0.88 | 0.83 |



00018

# *PASC - Certificate of Analysis*



| | | | | |
|---|---|---|---|---|
| | ***Client ID:*** | | OHM-Ia-R3 Flyash | OHM-Ib-R3 Flyash |
| | ***Lab No.:*** | | 044817 99 | 044818 99 |
| | ***Date Sampled:*** | | 99/08/12 | 99/08/12 |
| **Component** | **MDL** | **Units** | | |
| Weight of sample | 0.0001 | g | 21.5 | 30.0 |
| Mercury | 0.04 | mg/kg | 0.77 | 0.77 |

# *PASC - Summary of Analysis Pre. Dates*



| | |
|---|---|
| **Batch Code:** | **1007LTA1** |
| Weight of sample | 044813 99 |
| | 044814 99 |
| | 044815 99 |
| | 044816 99 |
| | 044817 99 |
| | 044818 99 |
| Run Date: | 99/10/07 |
| Date of Sample Prep: | 99/10/07 |

| | |
|---|---|
| **Batch Code:** | **0823IIA4** |
| Mercury | 044812 99 |
| | 044813 99 |
| | 044814 99 |
| | 044815 99 |
| | 044816 99 |
| | 044817 99 |
| | 044818 99 |
| Run Date: | 99/08/24 |
| Date of Sample Prep: | 99/08/23 |

PHILIP SERVICES

# *Certificate of Analysis*

| CLIENT INFORMATION | | LABORATORY INFORMATION | |
|---|---|---|---|
| **Attention:** | Michael P. Martin | **Contact:** | Ron McLeod |
| **Client Name:** | TRC Environmental Corporation | **Project:** | AN990787 |
| **Project:** | 26046 | **Date Received:** | 99/08/18 |
| **Project Desc:** | PG&E | **Date Reported:** | 99/10/08 |
| **Address:** | Boott Mills South, Foot of John Street<br>Lowell, MA<br>MA 01852 | **Submission No.:** | 9H0535 |
| | | **Sample No.:** | 044891 |
| **Fax Number:** | 978-453-1995 | | |
| **Phone Number:** | 978-970-5600 | | |

**NOTES:** ***"-" = not analysed '<' = less than Method Detection Limit (MDL) 'NA' = no data available***
***LOQ can by determined for all analytes by multiplying the appropriate MDL X 3.33***
***Solids data is based on dry weight except for biota analyses.***
***Organic analyses are not corrected for extraction recovery standards except for isotope dilution methods, (i.e. CARB 429 PAH, all PCDD/F and DBD/DBF analyses)***

Methods used by PASC are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', Nineteenth Edition. Other methods are based on the principles of MISA or EPA methodologies. New York State: ELAP Identification Number 10756.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Any and all use of these test results shall be limited to the actual cost of the pertinent analysis done. There is no other warranty expressed or implied. Your samples will be retained at PASC for a period of three weeks from receipt of data or as per contract.

COMMENTS:

***Certified by:*** _____



PHILIP ANALYTICAL SERVICES CORPORATION
5555 North Service Road, Burlington, Ontario, Canada L7L 5H7 Tel: (905) 332-8788 Fax: (905) 332-9169

# *PASC - Certificate of Analysis*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | ***Client ID:*** | | NIST 1633b Reference | NIST 1633b Reference | NIST 1633b Reference | NIST 1633b Reference | NIST 1633b Reference |
| | ***Lab No.:*** | | 044891 99 | 044891 99 | 044891 99 | 044891 99 | 044891 100 |
| | ***Date Sampled:*** | | 99/08/18 | 99/08/18 | 99/08/18 | 99/08/18 | 99/08/19 |
| **Component** | **MDL** | **Units** | | Duplicate | M. Spike | MS % Rec. | Theoretical |
| Mercury | 0.04 | mg/kg | 0.15 | 0.14 | 1.2 | 100 | 0.141 |

# *PASC - Summary of Analysis Pre. Dates*



| | |
|---|---|
| **Batch Code:** | **0830IIC1** |
| Mercury | 044891 99 |
| Run Date: | 99/08/30 |
| Date of Sample Prep: | 99/08/30 |

# 3. RAW DATA

| enon umber | Client | Client ID | Parameter | TS | Result | Dup. | Spike | % Rec. | Dup. Spk | % Rec. | Batch Date | Batch Code | Run Date | Run Code | Day Old | Day In | Analyst's Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44795 | TRC-LO | MB R456 | Mercury - | PV | -0.015 | -99999.0 | 0.147 | 97. | 0.147 | 98. | 99/09/20 | 1GM4 | 99/09/20 | MG01 | 40. | 34. | |
| 44796 | TRC-LO | OHM-RB | Mercury - | PV | 0.040 | | | | | | 99/09/20 | 1GM4 | 99/09/20 | MG01 | 40. | 34. | |
| 44798 | TRC-LO | OHM-Ia-R1 | Mercury - | PV | 3.658 | 3.653 | 7.048 | 96. | 7.077 | 97. | 99/09/20 | 1GM4 | 99/09/20 | MG01 | 40. | 34. | *PDS* |
| 44799 | TRC-LO | OHM-Ib-R1 | Mercury - | PV | 0.383 | | | | | | 99/09/20 | 1GM4 | 99/09/20 | MG01 | 40. | 34. | |
| 44800 | TRC-LO | OHM-Ia-R2 | Mercury - | PV | 0.569 | | | | | | 99/09/20 | 1GM4 | 99/09/20 | MG01 | 40. | 34. | |
| 44801 | TRC-LO | OHM-Ib-R2 | Mercury - | PV | 0.637 | | | | | | 99/09/20 | 1GM4 | 99/09/20 | MG01 | 40. | 34. | |
| 44802 | TRC-LO | OHM-Ia-R3 | Mercury - | PV | 2.210 | | | | | | 99/09/20 | 1GM4 | 99/09/20 | MG01 | 39. | 34. | |
| 44803 | TRC-LO | OHM-Ib-R3 | Mercury - | PV | 0.465 | | | | | | 99/09/20 | 1GM4 | 99/09/20 | MG01 | 39. | 34. | |
| 44804 | TRC-LO | OHM-Oa-R1 | Mercury - | PV | 0.183 | | | | | | 99/09/20 | 1GM4 | 99/09/20 | MG01 | 40. | 34. | |
| 44805 | TRC-LO | OHM-Ob-R1 | Mercury - | PV | 0.292 | | | | | | 99/09/20 | 1GM4 | 99/09/20 | MG01 | 40. | 34. | |
| L0920 | INTERNAL | | Mercury - | PV | 6.000 | -99999.0 | 0.147 | 97. | 0.147 | 98. | 99/09/20 | 1GM4 | 99/09/20 | MG01 | $$$ | $$$ | *PDS* |
| 44806 | TRC-LO | OHM-Oa-R2 | Mercury - | PV | 0.313 | 0.311 | 0.680 | 9. | 0.682 | 95. | 99/09/20 | 2GM4 | 99/09/20 | MG01 | 40. | 34. | *PDS* |
| 44807 | TRC-LO | OHM-Ob-R2 | Mercury - | PV | 0.191 | | | | | | 99/09/20 | 2GM4 | 99/09/20 | MG01 | 40. | 34. | |
| 44808 | TRC-LO | OHM-Oa-R3 | Mercury - | PV | 0.764 | | | | | | 99/09/20 | 2GM4 | 99/09/20 | MG01 | 39. | 34. | |
| 44809 | TRC-LO | OHM-Ob-R3 | Mercury - | PV | 0.245 | | | | | | 99/09/20 | 2GM4 | 99/09/20 | MG01 | 39. | 34. | |
| L0920 | INTERNAL | | Mercury - | PV | -0.015 | -99999.0 | 0.149 | 99. | 0.148 | 99. | 99/09/20 | 2GM4 | 99/09/20 | MG01 | $$$ | $$$ | *PDS* |

16 Tests for OHMN4 with an MDL of 0.030 ug Validated By CMA Control Chart Updated N/A IO Requirements met N/A

00 624

| Zenon Number | Client | Client ID | Parameter | TS | Result | Dup. | Spike | % Rec. | Dup. Spk | % Rec. | Batch Date | Batch Code | Run Date | Run Code | Day Old | Day In | Analyst's Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 044888 | TRC-LO | OHM-O-FB | Mercury - | PV | 0.462 | | | | | | 99/09/20 | 2GKC | 99/09/20 | MG01 | 41. | 34. | |

1 Tests for OHKCL with an MDL of 0.015 ug Validated By CMB Control Chart Updated N/A IO Requirements met N/A

# LDC AUTOSAMPLER RUN LOG (MERCURY)

Date: 99.09.20(W) Run Code: MG01 Matrix: IMP.

alyst: MG Units: µg (see comments) MDL: _____

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 1 | | | Primer (ICV) | | | |
| 2 | | | Dummy (Blk) | | | |
| 3 | | | Std 1 (S1) | 0.0 | | |
| 4 | | | Std 2 (S2) | 0.5 | | |
| 5 | | | Std 3 (S3) | 1.0 | | |
| 6 | | | Std 4 (S4) | 1.5 | | |
| 7 | | | Std 5 (S5) | 2.0 | | |
| 8 | | | Std 6 (S6) | 2.5 | | |
| 9 | | | ICV | | | |
| 10 | | | B (Std 1) | | | |
| 11 | | | D4 (Std 4) | | | |
| 12 | | | BL0920 | 1GM4 | | |
| 13 | | | " | | | |
| 14 | | | BL0920 S | | | |
| 15 | | | " | | | |
| 16 | | | BL0920 DS | | | |
| 17 | | | " | | | |
| 18 | 1.5 | 1/10 | 44798 | | | |
| 19 | | | " | | | |
| 20 | | | 44798 D | | | |
| 21 | | | " | | | |
| 22 | | | 44798 S | | | |
| 23 | | | " | | | |
| 24 | | | 44798 DS | | | |
| 25 | | | " | | | |
| 26 | | 1/100 | 44798 DS | | | |
| 27 | | ↓ | " | | | |
| 28 | | | 44796 | | | |
| 29 | | | " | | | |
| 30 | | 1/2 | 44796 | | | |
| 31 | | ↓ | " | | | |
| 32 | | | 44797 | | | |
| 33 | | | " | | | |
| 34 | | | CCV | | | |
| 35 | | | B | | | |
| 36 | | | D4 | | | |
| 37 | 1.5 | | 44799 | | | |
| 38 | | | " | | | |
| 39 | | | 44801 | | | |
| 40 | | | " | | | |
| 41 | 1.5 | 1/4 | 44802 | | | |
| 42 | | ↓ | " | | | |
| 43 | | | 44803 | | | |
| 44 | | | " | | | |
| 45 | | | 44804 | | | |
| 46 | | | " | | | |
| 47 | | | 44805 | | | |
| 48 | | | " | | | |
| 49 | | | BL0920 | 2GM4 | | |
| 50 | | | " | | | |
| 51 | | | BL0920 S | | | |
| 52 | | | " | | | |
| 53 | | | BL0920 DS | | | |
| 54 | | | " | | | |
| 55 | | | CCV | | | |
| 56 | | | B | | | |
| 57 | | | D4 | | | |
| 58 | 1.5 | | 44806 | | | |
| 59 | | | " | | | |
| 60 | | | 44806 D | | | |
| 61 | | | " | | | |
| 62 | | | 44806 S | | | |
| 63 | | | " | | | |
| 64 | | | 44806 DS | | | |
| 65 | | | " | | | |
| 66 | | | 44807 | | | |
| 67 | | | " | | | |
| 68 | | 1/4 | 44808 | | | |
| 69 | | ↓ | " | | | |
| 70 | | | 44809 | | | |
| 71 | | | " | | | |
| 72 | | | 44888 | KMNO4 | | |
| 73 | | | " | | | |
| 74 | | | 44888 | KCL | | |
| 75 | | | " | | | |
| 76 | | 1/4 | 42122 | | | |
| 77 | | ↓ | " | | | |
| 78 | | 1/20 | 44797 | | | |
| 79 | | ↓ | " | | | |
| 80 | | | CCV | | | |

Comments: *** "HG-347" and "MISA12" units are expressed in mg/L not ug/L

ICV = 1.5 ug/L, CCV = 1.0 ug/L, Blank Spike = 1.0 ug/L for liquid samples.

ICV = 1.5 mg/kg, CCV = 1.0 mg/kg, Blank Spike = 1.0 mg/kg for solid samples.

# LDC AUTOSAMPLER RUN LOG (MERCURY)

Date: 99.09.20(W) Run Code: MG01 Matrix: IMP. /WATER

alyst: MG Units: ~~ug~~/mg/L (see comments) MDL: _____

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 1 | | | Primer (ICV) | | | |
| 2 | | | Dummy (Blk) | | | |
| 3 | | | Std 1 (S1) | 0.0 | | |
| 4 | | | Std 2 (S2) | 0.5 | | |
| 5 | | | Std 3 (S3) | 1.0 | | |
| 6 | | | Std 4 (S4) | 1.5 | | |
| 7 | | | Std 5 (S5) | 2.0 | | |
| 8 | | | Std 6 (S6) | 2.5 | | |
| 9 | | | ICV | | | |
| 10 | | | B (Std 1) | | | |
| 11 | | | D4 (Std 4) | | | |
| 12 | | | | | | |
| 13 | | | | | | |
| 14 | | | | | | |
| 15 | | | | | | |
| 16 | | | | | | |
| 17 | | | | | | |
| 18 | | | | | | |
| 19 | | | | | | |
| 20 | | | | | | |
| 21 | | | B | | | |
| 22 | | | D4 | | | |
| 23 | | | BL0920 | ABA1 | | |
| 24 | | | BL0920 S | | | |
| 25 | | | 51350 | | | |
| 26 | | | 350 D | | | |
| 27 | | | 350 S | | | |
| 28 | | | 348 | | | |
| 29 | | | 348 S | | | |
| 30 | | | 52103 | | | |
| 31 | | | 05 | | | |
| 32 | | | 07 | | | |
| 33 | | | 51093 | | | |
| 34 | | | 51371 | | | |
| 35 | | | 373 | | | |
| 36 | | | 50792 | | | |
| 37 | | | 51615 | | | |
| 38 | | | CCV | | | |
| 39 | | | B | | | |
| 40 | | | D4 | | | |

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 41 | | | BL0920 | ABA2 | | |
| 42 | | | BL0920 | | | |
| 43 | | | 51667 | | | |
| 44 | | | 667 D | | | |
| 45 | | | 667 S | | | |
| 46 | | | 51511 | | | |
| 47 | | | 51487 | | | |
| 48 | | | 488 | | | |
| 49 | | | 489 | | | |
| 50 | 1.5 | 1/20 | 44888 | KMNO4 | | |
| 51 | ↓ | ↓ | " | | | |
| 52 | | | WS 378 | | | |
| 53 | | | ORG. REF. | | | |
| 54 | | | CCV | | | |
| 55 | | | B | | | |
| 56 | | | D4 | | | |
| 57 | | | | | | |
| 58 | | | | | | |
| 59 | | | | | | |
| 60 | | | | | | |
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| 75 | | | | | | |
| 76 | | | | | | |
| 77 | | | | | | |
| 78 | | | | | | |
| 79 | | | | | | |
| 80 | | | | | | |

Comments: *** "HG-347" and "MISA12" units are expressed in mg/L not ug/L

ICV = 1.5 ug/L, CCV = 1.0 ug/L, Blank Spike = 1.0 ug/L for liquid samples.

ICV = 1.5 mg/kg, CCV = 1.0 mg/kg, Blank Spike = 1.0 mg/kg for solid samples.

UNDIGESTED

# EPA 7470 WATER PREPARATION LOG - MERCURY

DG7470HG
DGHGLEACH, DG29HG***

Calibration Solutions:

| # | I.D. | *Conc. | Spike | **Conc. Entered |
|---|---|---|---|---|
| 1 | Blank/Dummy | 0 ppb | None | 0.0 |
| 2 | Standard 1 | 0 ppb | None | 0.0 |
| 3 | Standard 2 | 0.33 | 200 ul of 0.05 ppm IV working standard | 0.5 |
| 4 | Standard 3 | 0.67 | 400 ul of 0.05 ppm IV working standard | 1.0 |
| 5 | Standard 4 | 1.0 | 600 ul of 0.05 ppm IV working standard | 1.5 |
| 6 | Standard 4 | 1.0 | 600 ul of 0.05 ppm IV working standard | 1.5 |
| 7 | Standard 5 | 1.33 | 800 ul of 0.05 ppm IV working standard | 2.0 |
| 7 | Standard 6 | 1.67 | 1000 ul of 0.05 ppm IV working standard | 2.5 |

Check List
- ✓ Digest Code/labels
- Samples poured out
- Acids added
- Reagents added
- Samples spiked
- Bath at 95 degrees C
- Samples digested
- Hydroxylamine HCl added
- Samples bulked and mixed
- ✓ Rack order checked

| | # | Sample I.D. | B.Code | Init.Vol. | F. Vol. | Dil | Comment |
|---|---|---|---|---|---|---|---|
| | 9 | ICV (Init. Calib. Verif.) | 1GM#1 | 20 ml | 30 ml | 1 X | 1.5 ppb = 600 ul. of 0.05 ppm HP MESS-ZENO 30/QCA Std. |
| | 10 | BL 0920 | " | " | " | " | (Processed Blank) |
| | 11 | BL 0920 S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 12 | 44798 | " | " | " | " | VOLUME = 530 ml |
| 1 | 13 | D | " | " | " | " | (Duplicate sample) |
| 1 | 14 | S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 15 | DS | " | " | " | " | (Duplicate Spiked sample) |
| 2 | 16 | 796 | " | " | " | " | 112 ml |
| 3 | 17 | 797 | " | " | " | " | 420 ml |
| 4 | 18 | 99 | " | " | " | " | 470 ml |
| 5 | 19 | 44800 | " | " | " | " | 570 ✓ |
| 6 | 20 | 01 | " | " | " | " | 560 ✓ |
| 7 | 21 | 02 | " | " | " | " | 565 ✓ |
| 8 | 22 | 03 | " | " | " | " | 580 ✓ |
| 9 | 23 | 04 | " | " | " | " | 510 |
| 10 | 24 | 05 | " | " | " | " | 550 |
| | 25 | CCV (Cont. Calib. Verif.) | 2GM#1 | 20 ml | 30 ml | 1 X | 1.0 ppb = 400 ul. of 0.05 ppm HP MESS-ZENO 30/QCA Std. |
| | 26 | BL 0920 | " | " | " | " | (Processed Blank) |
| | 27 | BL 0920 S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 28 | 44806 | " | " | " | " | 580 ml |
| 1 | 29 | D | " | " | " | " | (Duplicate sample) |
| 1 | 30 | S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 31 | DS | " | " | " | " | (Duplicate Spiked sample) |
| 2 | 32 | 807 | " | " | " | " | 445 ml |
| 3 | 33 | 808 | " | " | " | " | 600 ml |
| 4 | 34 | 809 | " | " | " | " | 610 ml |
| 5 | 35 | 44888 - KC | 2GKC | " | " | " | 415 ml. |
| 6 | 36 | | " | " | " | " | |
| 7 | 37 | | " | " | " | " | |
| 8 | 38 | | " | " | " | " | |
| 9 | 39 | | " | " | " | " | |
| 10 | 40 | | " | " | " | " | |

Notes: Other Applicable Test Codes: DG29HG-1B, DG29HG-2B, DG29HG-3A, DG29HG-3B, DG29HG-3C
DG29HGI, DG29HGF, DG101AA1, DG101AA2

Include External Reference Material (EPA WS 378 or SPEX CertiPrep TM - WS) per run — Prepare 0.05 ppm standards daily

HNO3 Lot. No. | H2SO4 Lot. No. | Bath Temps. / / °C

Prepared By: cmbm Date: 99/09/20 Checked by: cmbm

JN DATE: 09-19-1999 CHART DATE: 09-20-1999
CHART SPEED: 30
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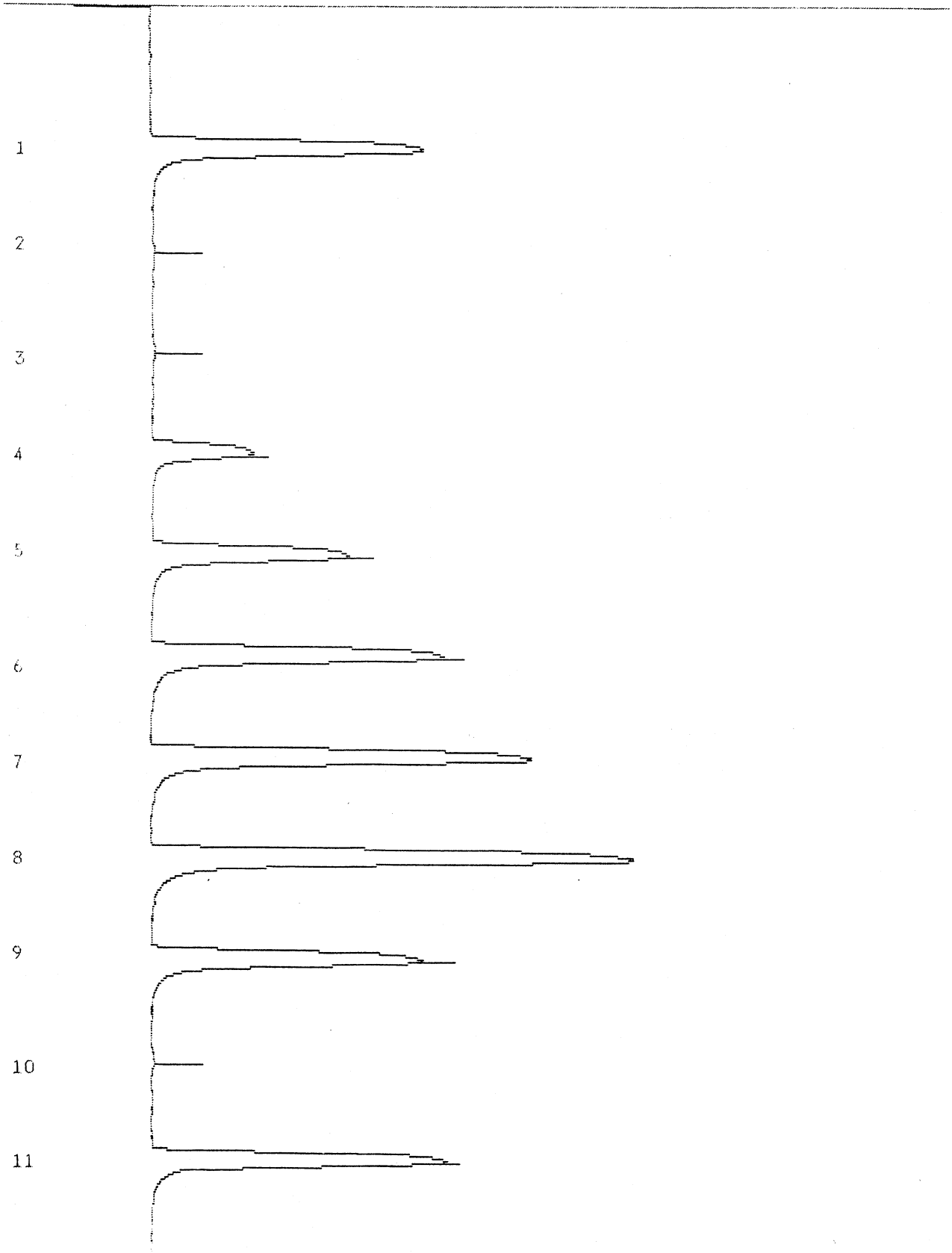

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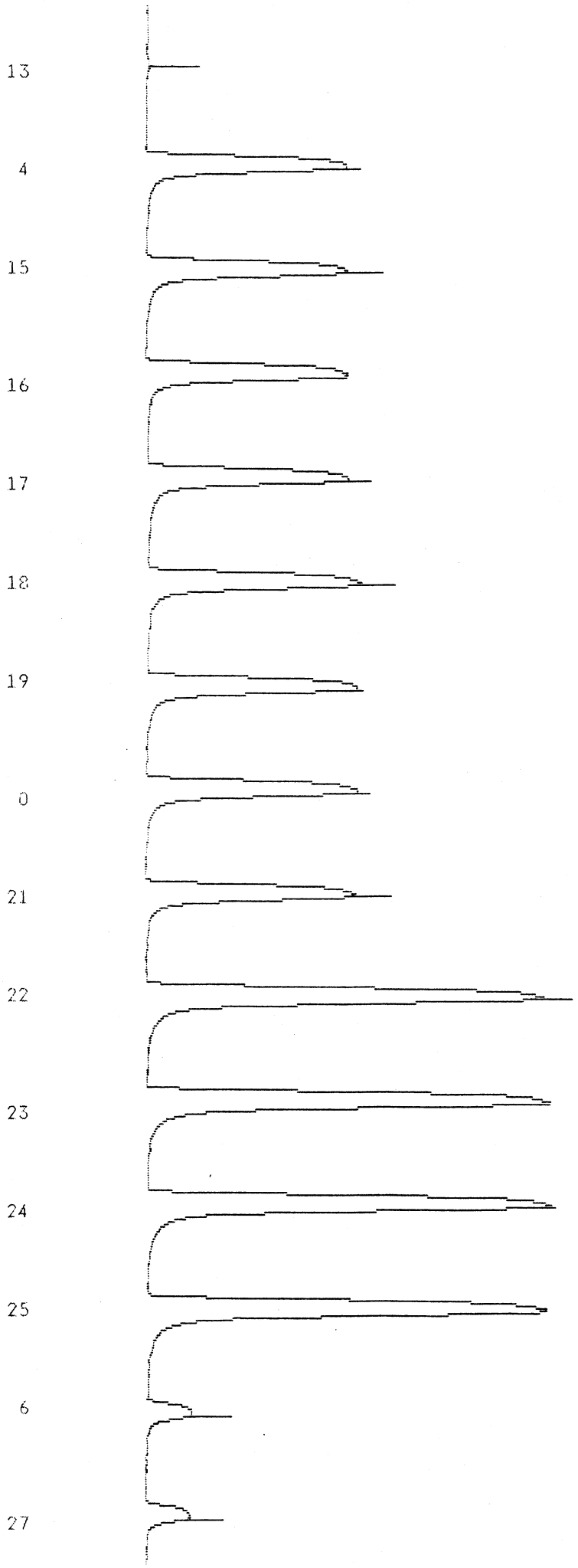

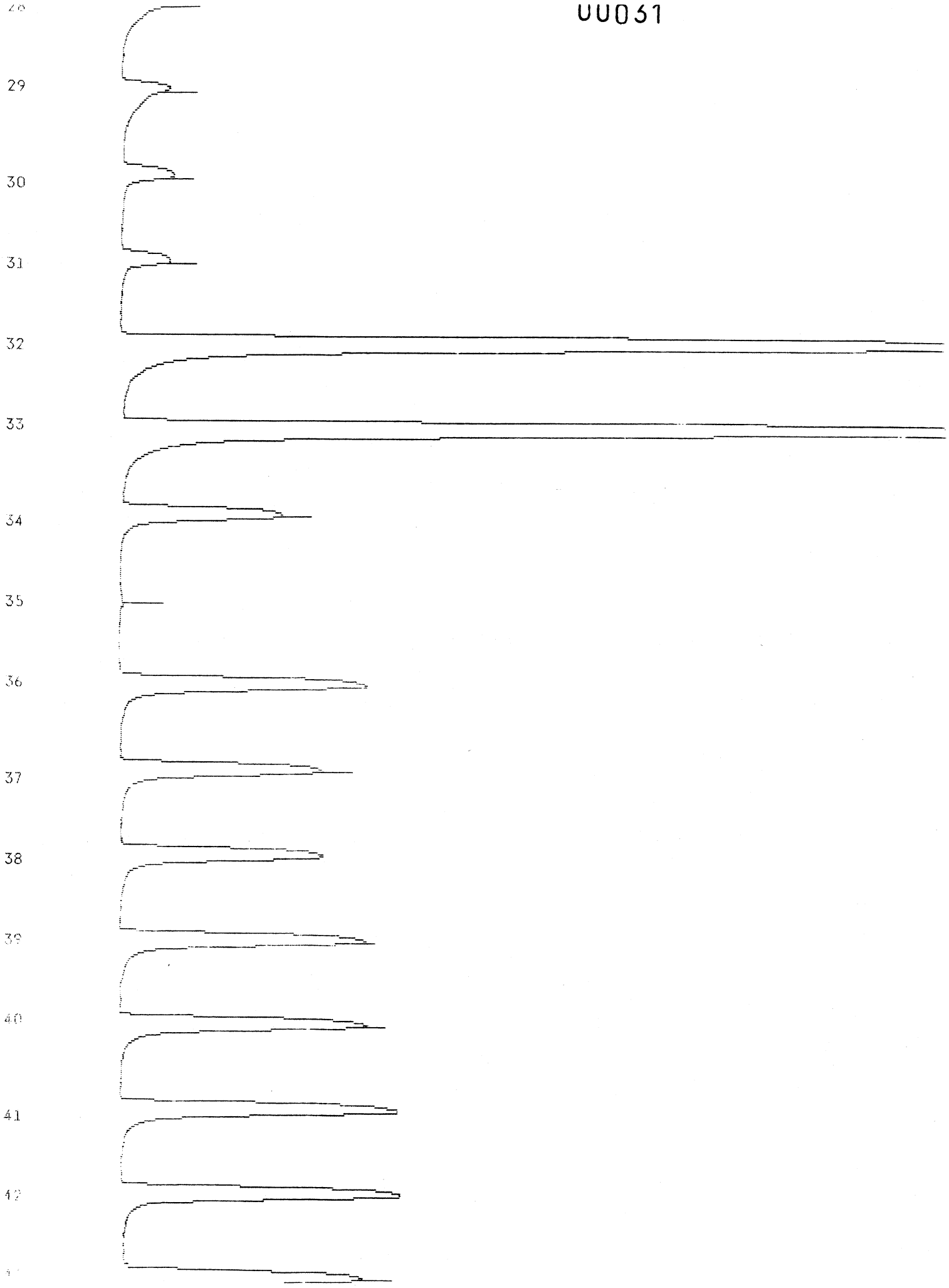
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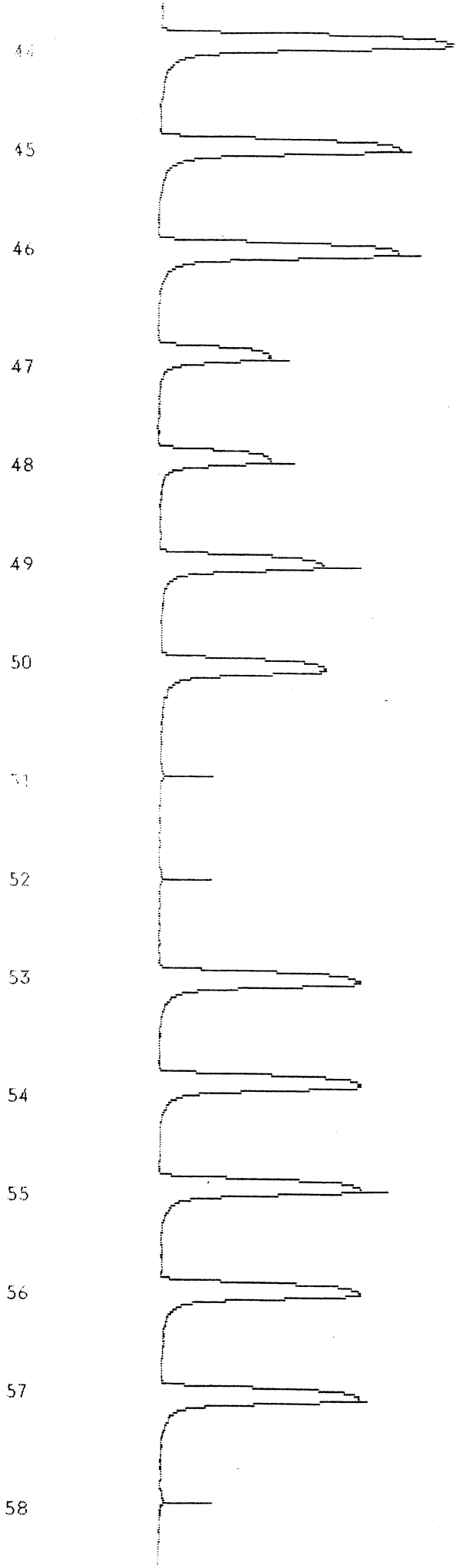
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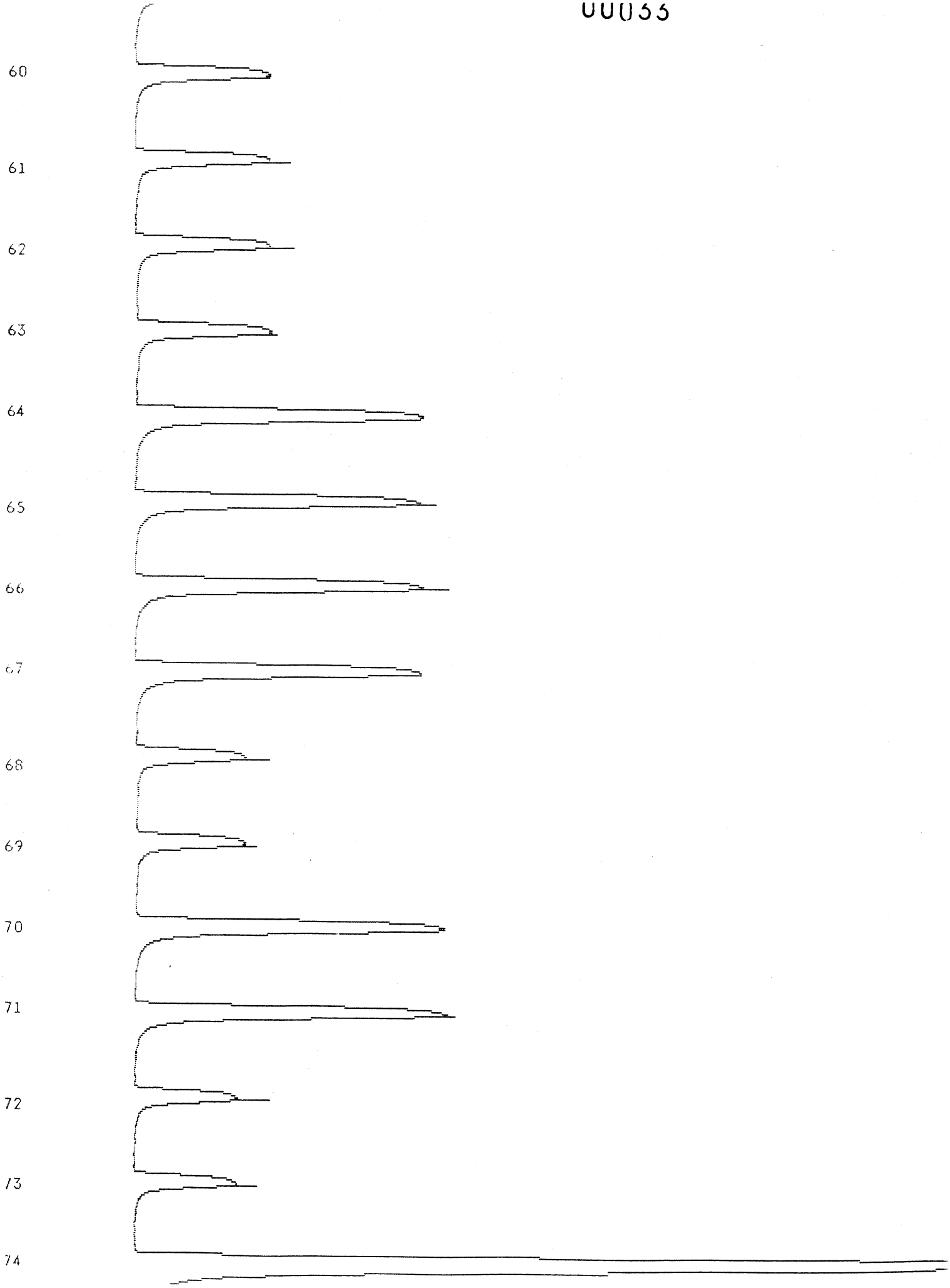
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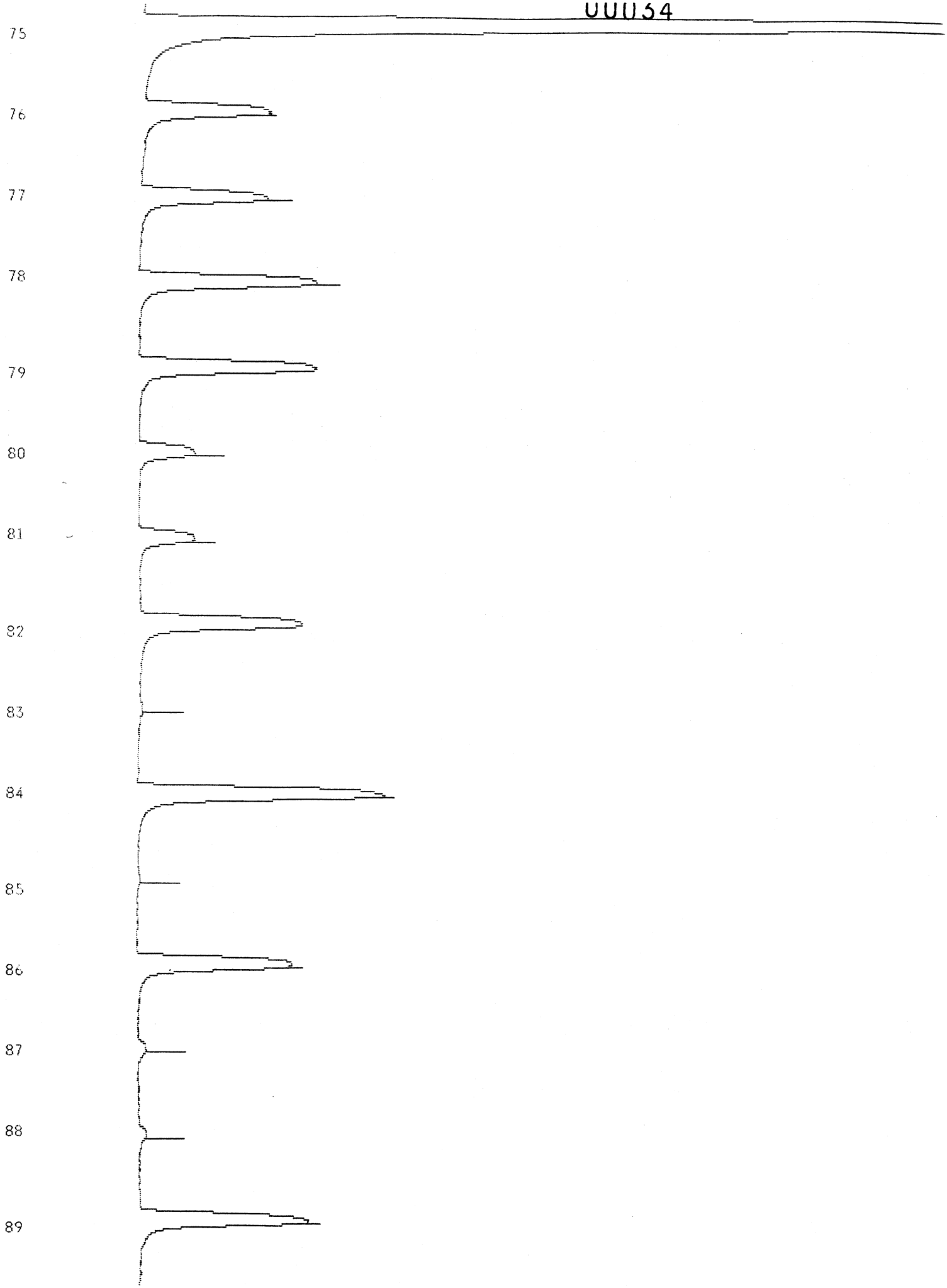
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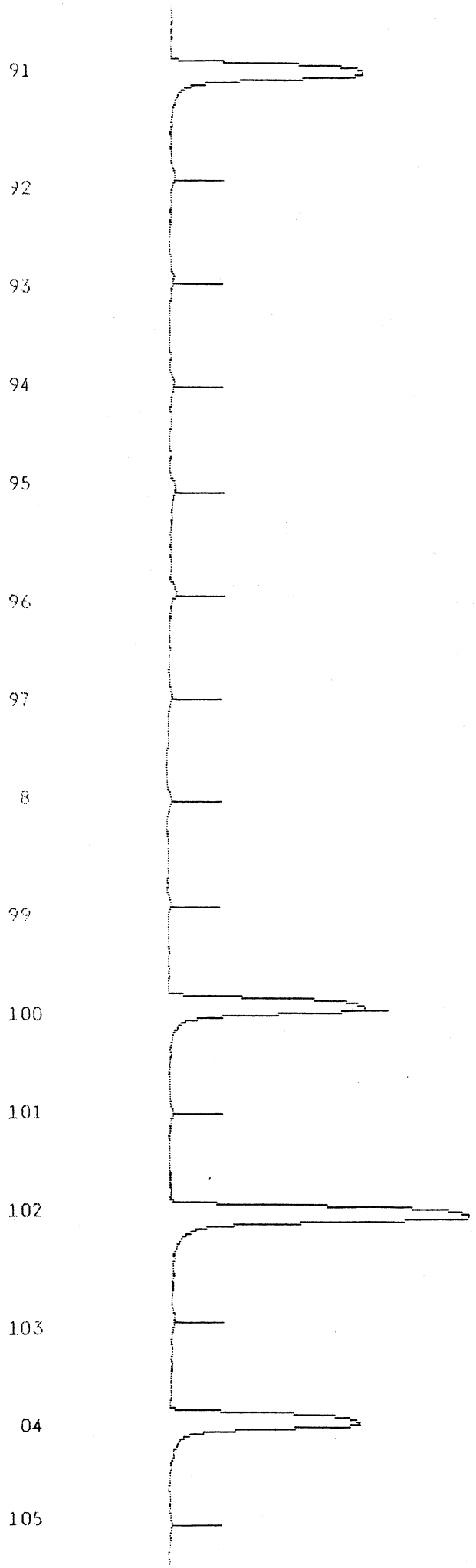
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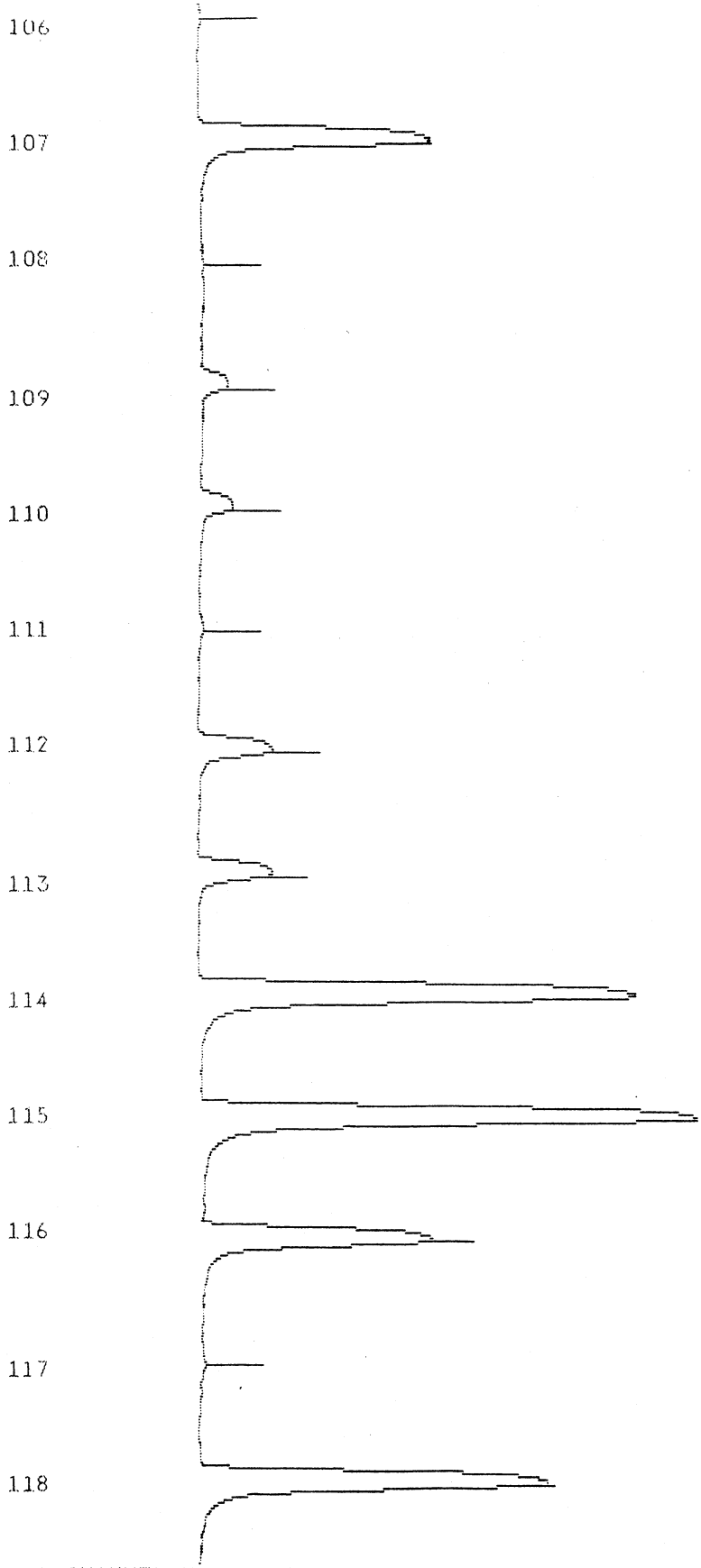


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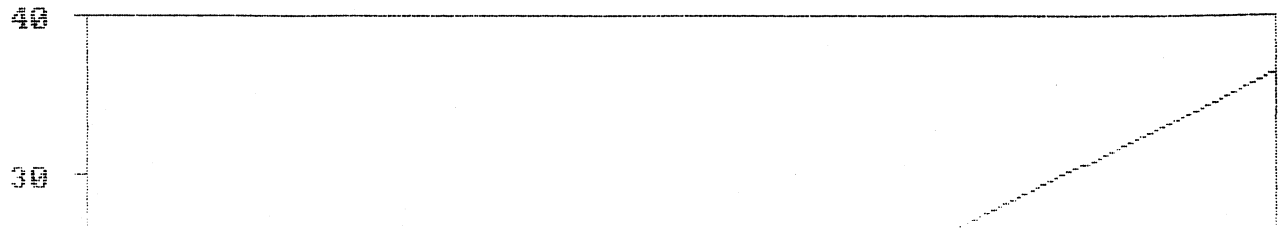
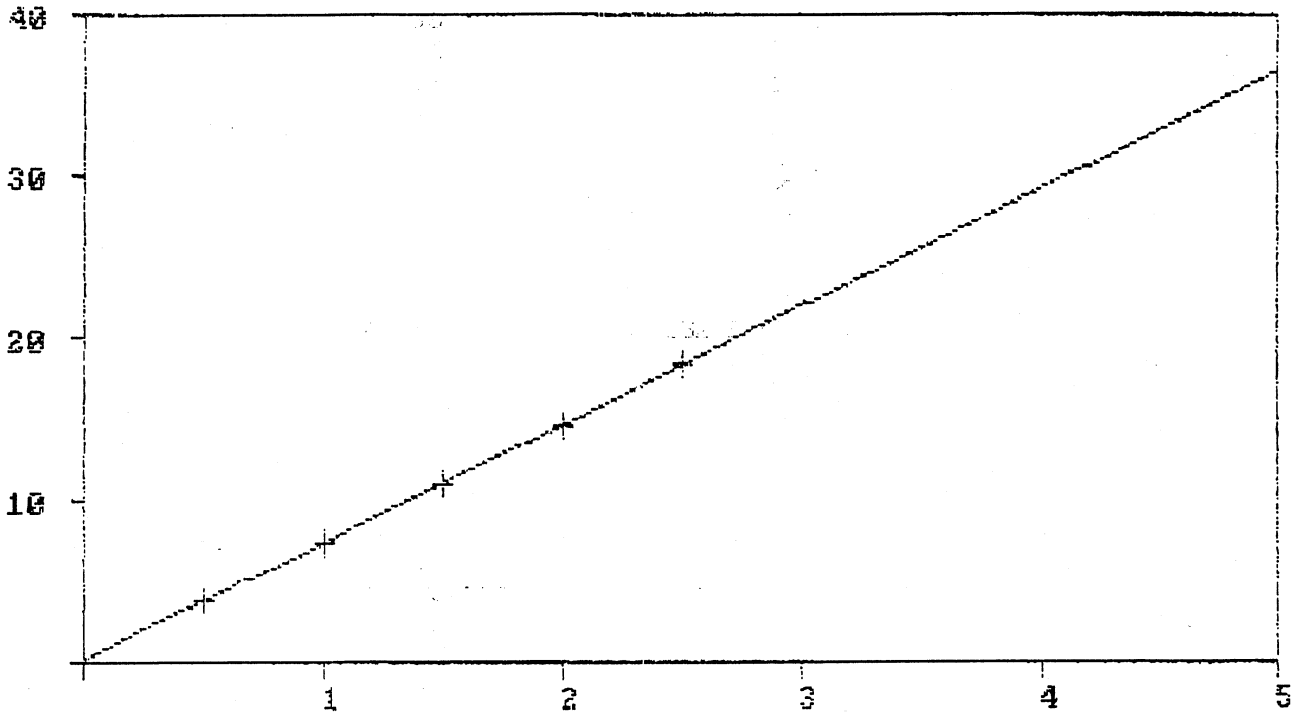
RUN NAME: 990920W



CHANNEL NAME: LDC
RUN NAME: 990920W




DATA TYPE: FIA
INTERCEPT = 0.11

CALIBRATION ORDER: 1
SLOPE = 7.267399

CORRELATION: .9999353

CHANNEL NAME: LDC
RUN DATE: 09-19-1999
SAMPLE TABLE NAME: 990920W
METHOD NAME: HGWATER

| CUP# | SAMPLE ID | DIL | WGT | HEIGHT/AREA | Total µg | CONCENTRATION (ppb) | EF |
|---|---|---|---|---|---|---|---|
| 1 | PRIMER | 1 | 1 | 10.4 | | 1.417 | s |
| 2 | DUMMY | 1 | 1 | 0.0 | | -0.008 | I |
| 3 | S1: 0 | 1 | 1 | 0.1 | | -0.004 | I |
| 4 | S2: .5 | 1 | 1 | 3.7 | | 0.500 | |
| 5 | S3: 1 | 1 | 1 | 7.4 | | 1.007 | |
| 6 | S4: 1.5 | 1 | 1 | 11.1 | | 1.511 | |
| 7 | S5: 2 | 1 | 1 | 14.5 | | 1.981 | |
| 8 | S6: 2.5 | 1 | 1 | 18.3 | | 2.506 | |
| 9 | ICV | 1 | 1 | 10.2 | | 1.390 93% | |
| 10 | B | 1 | 1 | 0.0 | | -0.015 | b |
| 11 | D4 | 1 | 1 | 11.1 | | 1.511 | d |
| 12 | BL0920-1GM4 44795 | 1 | 1 | 0.0 | <0.03 | -0.015 | I |
| 13 | BL0920-1GM4 | 1 | 1 | 0.0 | | -0.015 | I |
| | BL0920S | 1 | 1 | 7.2 | 0.147 | 0.980 97% | |
| 15 | BL0920S | 1 | 1 | 7.2 | | 0.977 | |
| 16 | BL0920DS | 1 | 1 | 7.2 | 0.147 | 0.980 98% | |
| 17 | BL0920DS | 1 | 1 | 7.2 | | 0.980 | |
| 18 | 44798 | 6.666 | 1 | 7.7 | 3.658 | 6.936 | |
| 19 | 44798 | 6.666 | 1 | 7.6 | | 6.869 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 23 | 44798S | 6.666 | 1 | 14.7 | | 13.365 | 101. OOO | |
| 24 | 44798DS | 6.666 | 1 | 14.7 | 7.077 | 13.342 | 97% | |
| 25 | 44798DS | 6.666 | 1 | 14.7 | | 13.365 | | |
| 26 | 44798DS | 66.66 | 1 | 1.4 | | 12.245 | 9% RPD | |
| 27 | 44798DS | 66.66 | 1 | 1.4 | | 12.245 | | |
| 28 | 44796 | .6666 | 1 | 1.9 | | ~~0.163~~ | VOID MB | |
| | 44796 | .6666 | 1 | 1.9 | | ~~0.165~~ | | |
| | 44796 | 1.333 | 1 | 2.1 | 0.040 | 0.366 | | |
| 31 | 44796 | 1.333 | 1 | 2.0 | | 0.343 | s | |
| 32 | 44797 | 1.333 | 1 | 41.7 | | ~~7.627~~ | R | VOID MB |
| 33 | 44797 | 1.333 | 1 | 42.1 | | ~~7.694~~ | R | |
| 34 | CCV | 1 | 1 | 7.0 | | 0.953 | 95% | |
| 35 | B | 1 | 1 | 0.0 | | -0.015 | b | |
| 36 | D4 | 1 | 1 | 11.1 | | 1.511 | d | |
| 37 | 44799 | .6666 | 1 | 9.0 | 0.383 | 0.815 | | |
| 38 | 44799 | .6666 | 1 | 9.0 | | 0.815 | | |
| 39 | 44800 | .6666 | 1 | 11.0 | 0.569 | 0.998 | | |
| 40 | 44800 | .6666 | 1 | 11.0 | | 1.000 | | |
| 41 | 44801 | .6666 | 1 | 12.5 | 0.637 | 1.139 | | |
| 42 | 44801 | .6666 | 1 | 12.5 | | 1.137 | | |
| 43 | 44802 | 2.666 | 1 | 10.8 | 2.210 | 3.921 | | |
| 44 | 44802 | 2.666 | 1 | 10.7 | | 3.903 | | |
| 45 | 44803 | .6666 | 1 | 8.9 | 0.465 | 0.806 | | |
| 46 | 44803 | .6666 | 1 | 8.8 | | 0.797 | s | |
| 47 | 44804 | .6666 | 1 | 4.0 | 0.183 | 0.358 | | |
| 48 | 44804 | .6666 | 1 | 4.0 | | 0.358 | | |
| 49 | 44805 | .6666 | 1 | 5.9 | 0.292 | 0.528 | | |
| 50 | 44805 | .6666 | 1 | 5.9 | | 0.535 | | |
| 51 | BL0920-2GM4 | 1 | 1 | 0.0 | <0.015 | -0.015 | I | |
| 52 | BL0920-2GM4 | 1 | 1 | 0.0 | | -0.015 | I | |
| 53 | BL0920S | 1 | 1 | 7.3 | 0.149 | 0.990 | 99% | |
| | BL0920S | 1 | 1 | 7.3 | | 0.994 | | |
| | BL0920DS | 1 | 1 | 7.4 | 0.148 | 0.997 | 99% | |
| 56 | BL0920DS | 1 | 1 | 7.2 | | 0.973 | | |
| 57 | CCV | 1 | 1 | 7.3 | | 0.987 | 99% | |
| 58 | B | 1 | 1 | 0.0 | | -0.015 | b | |
| 59 | D4 | 1 | 1 | 11.1 | | 1.511 | d | |
| 60 | 44806 | .6666 | 1 | 6.0 | | 0.544 | | |
| 61 | 44806 | .6666 | 1 | 5.9 | 0.313 | 0.535 | s | |
| 62 | 44806D | .6666 | 1 | 5.9 | 0.311 | 0.532 | | |
| 63 | 44806D | .6666 | 1 | 6.0 | | 0.539 | | |
| 64 | 44806S | .6666 | 1 | 12.9 | 0.680 | 1.175 | 95% | |
| 65 | 44806S | .6666 | 1 | 12.9 | | 1.171 | | |
| 66 | 44806DS | .6666 | 1 | 12.9 | 0.682 | 1.175 | 95% | |
| 67 | 44806DS | .6666 | 1 | 12.9 | | 1.175 | | |
| 68 | 44807 | .6666 | 1 | 4.8 | 0.191 | 0.432 | | |
| 69 | 44807 | .6666 | 1 | 4.8 | | 0.427 | | |
| 70 | 44808 | .6666 | 1 | 13.9 | 0.764 | 1.269 | | |
| 71 | 44808 | .6666 | 1 | 14.0 | | 1.276 | | |
| 72 | 44809 | .6666 | 1 | 4.5 | 0.245 | 0.402 | | |
| 73 | 44809 | .6666 | 1 | 4.5 | | 0.400 | | |
| 74 | 44888-KMNO4 | .6666 | 1 | 42.6 | | ~~3.897~~ | R | |
| 75 | 44888-KMNO4 VOID | .6666 | 1 | 42.8 | | ~~3.919~~ | R | |
| 76 | 44888-KCL | .6666 | 1 | 5.5 | 0.206 | 0.497 | s | |
| 77 | 44888-KCL | .6666 | 1 | 5.5 | | 0.494 | | |
| 78 | 42122 | 2.666 | 1 | 7.9 | | 2.873 | | |
| | 42122 | 2.666 | 1 | 8.0 | | 2.882 | | |
| | 44797 | 13.33 | 1 | 2.4 | 1.724 | 4.151 | | |
| 81 | 44797 | 13.33 | 1 | 2.3 | | 4.061 | | |
| 82 | CCV | 1 | 1 | 7.2 | | 0.973 | | |
| 83 | B | 1 | 1 | 0.0 | | -0.015 | b | |
| 84 | D4 | 1 | 1 | 11.1 | | 1.511 | d | |
| 85 | BL0920-ABAJ | 1 | 1 | 0.0 | | -0.015 | I | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 89 | 51350S | 1 | 1 | 7.5 | 1.017 | |
| 90 | 51348 | 1 | 1 | 0.0 | -0.015 | I |
| 91 | 51348S | 1 | 1 | 7.0 | 0.950 | s |
| 92 | 52103 | 1 | 1 | 0.0 | -0.015 | I |
| 93 | 52105 | 1 | 1 | 0.0 | -0.015 | I |
| 94 | 52107 | 1 | 1 | 0.0 | -0.015 | I |
| [illegible] | 51093 | 1 | 1 | 0.0 | -0.008 | I |
| 96 | 51371 | 1 | 1 | 0.1 | -0.001 | I |
| 97 | 51373 | 1 | 1 | 0.0 | -0.015 | I |
| 98 | 50792 | 1 | 1 | 0.0 | -0.015 | I |
| 99 | 51615 | 1 | 1 | 0.0 | -0.015 | I |
| 100 | CCV | 1 | 1 | 7.2 | 0.980 | |
| 101 | B | 1 | 1 | 0.0 | -0.015 | b |
| 102 | D4 | 1 | 1 | 11.1 | 1.511 | d |
| 103 | BL0920-ABA2 | 1 | 1 | 0.0 | -0.011 | I |
| 104 | BL0920S | 1 | 1 | 6.9 | 0.940 | |
| 105 | 51667 | 1 | 1 | 0.0 | -0.015 | I |
| 106 | 51667D | 1 | 1 | 0.0 | -0.015 | s |
| 107 | 51667S | 1 | 1 | 7.3 | 0.983 | |
| 108 | 51511 | 1 | 1 | 0.0 | -0.015 | I |
| 109 | 51487 | 1 | 1 | 0.7 | 0.080 | |
| 110 | 51488 | 1 | 1 | 0.8 | 0.093 | |
| 111 | 51489 | 1 | 1 | 0.0 | -0.011 | I |
| 112 | 44888-KMNO4 | 30 | 1 | 2.2 | 8.535 | |
| 113 | 44888-KMNO4 | 30 | 1 | 2.2 | 8.636 | |
| 114 | WS 378 | 1 | 1 | 13.7 | 1.864 | |
| 115 | ORG REF | 1 | 1 | 15.4 | 2.106 | |
| 116 | CCV | 1 | 1 | 7.1 | 0.987 | |
| 117 | B | 1 | 1 | 0.0 | -0.015 | b |
| 118 | D4 | 1 | 1 | 11.1 | 1.511 | d |

ERCEPT: 0.11 LINEAR COEF: 7.267399

RELATION COEF: .9999353

| Zenon Number | Client | Client ID | Parameter | TS | Result | Dup. | Spike | % Rec. | Dup. Spk | % Rec. | Batch Date | Batch Code | Run Date | Run Code | Day Old | Day In | Analyst's Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 044795 | TRC-LO | MB R456 | Mercury - | PV | -0.0100 | -99999.0 | 0.1010 | 101. | 0.1000 | 100. | 99/09/07 | NRA1 | 99/09/08 | MG01 | 27. | 21. | *BLKIMP* |
| 044796 | TRC-LO | OHM-RB | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA1 | 99/09/08 | MG01 | 27. | 21. | *DDL* |
| 044797 | TRC-LO | OHM-I-FB | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA1 | 99/09/08 | MG01 | 28. | 21. | *DDL* |
| 044798 | TRC-LO | OHM-Ia-R1 | Mercury - | PV | 0.3350 | 0.3010 | 2.9160 | 103. | 2.9160 | 103. | 99/09/07 | NRA1 | 99/09/08 | MG01 | 27. | 21. | |
| 044799 | TRC-LO | OHM-Ib-R1 | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA1 | 99/09/08 | MG01 | 27. | 21. | *DDL* |
| 044800 | TRC-LO | OHM-Ia-R2 | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA1 | 99/09/08 | MG01 | 27. | 21. | *DDL* |
| 044801 | TRC-LO | OHM-Ib-R2 | Mercury - | PV | 0.3070 | | | | | | 99/09/07 | NRA1 | 99/09/08 | MG01 | 27. | 21. | |
| 044802 | TRC-LO | OHM-Ia-R3 | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA1 | 99/09/08 | MG01 | 26. | 21. | *DDL* |
| 044803 | TRC-LO | OHM-Ib-R3 | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA1 | 99/09/08 | MG01 | 26. | 21. | *DDL* |
| 044804 | TRC-LO | OHM-Oa-R1 | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA1 | 99/09/08 | MG01 | 27. | 21. | *DDL* |
| 044805 | TRC-LO | OHM-Ob-R1 | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA1 | 99/09/08 | MG01 | 27. | 21. | *DDL* |
| BL0907 | INTERNAL | | Mercury - | PV | -0.0100 | -99999.0 | 0.1010 | 101. | 0.1000 | 100. | 99/09/07 | NRA1 | 99/09/08 | MG01 | $$$ | $$$ | *BLKIMP* |
| 044806 | TRC-LO | OHM-Oa-R2 | Mercury - | PV | -0.2500 | -0.2500 | 2.6340 | 101. | 2.6790 | 103. | 99/09/07 | NRA2 | 99/09/08 | MG01 | 27. | 21. | *DDL* |
| 044807 | TRC-LO | OHM-Ob-R2 | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA2 | 99/09/08 | MG01 | 27. | 21. | *DDL* |
| 044808 | TRC-LO | OHM-Oa-R3 | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA2 | 99/09/08 | MG01 | 26. | 21. | *DDL* |
| 044809 | TRC-LO | OHM-Ob-R3 | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA2 | 99/09/08 | MG01 | 26. | 21. | *DDL* |
| 044888 | TRC-LO | OHM-O-FB | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA2 | 99/09/08 | MG01 | 28. | 21. | *DDL* |
| 047488 | TRC-LO | MB R456 | Mercury - | PV | -0.2500 | -99999.0 | 0.1020 | 102. | 0.0970 | 97. | 99/09/07 | NRA2 | 99/09/08 | MG01 | 14. | 11. | *BLKIMP* |
| 047489 | TRC-LO | [redacted] | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA2 | 99/09/08 | MG01 | 14. | 11. | *DDL* |
| 047490 | TRC-LO | [redacted] | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA2 | 99/09/08 | MG01 | 15. | 11. | *DDL* |
| 047491 | TRC-LO | [redacted] | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA2 | 99/09/08 | MG01 | 14. | 11. | *DDL* |
| 047492 | TRC-LO | [redacted] | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA2 | 99/09/08 | MG01 | 16. | 11. | *DDL* |
| BL0907 | INTERNAL | | Mercury - | PV | -0.0100 | -99999.0 | 0.1020 | 102. | 0.0970 | 97. | 99/09/07 | NRA2 | 99/09/08 | MG01 | $$$ | $$$ | *BLKIMP* |
| 047493 | TRC-LO | [redacted] | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA3 | 99/09/08 | MG01 | 14. | 11. | *DDL* |
| 047494 | TRC-LO | [redacted] | Mercury - | PV | -0.2500 | -0.2500 | 2.7640 | 107. | 2.7130 | 105. | 99/09/07 | NRA3 | 99/09/08 | MG01 | 14. | 11. | *DDL* |
| 047495 | TRC-LO | [redacted] | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA3 | 99/09/08 | MG01 | 13. | 11. | *DDL* |
| 047496 | TRC-LO | [redacted] | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA3 | 99/09/08 | MG01 | 13. | 11. | *DDL* |
| 047497 | TRC-LO | [redacted] | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA3 | 99/09/08 | MG01 | 13. | 11. | *DDL* |
| 047498 | TRC-LO | [redacted] | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA3 | 99/09/08 | MG01 | 13. | 11. | *DDL* |
| 047499 | TRC-LO | [redacted] | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA3 | 99/09/08 | MG01 | 15. | 11. | *DDL* |
| 047500 | TRC-LO | [redacted] | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA3 | 99/09/08 | MG01 | 14. | 11. | *DDL* |
| 047501 | TRC-LO | [redacted] | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA3 | 99/09/08 | MG01 | 14. | 11. | *DDL* |
| 047502 | TRC-LO | [redacted] | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA3 | 99/09/08 | MG01 | 13. | 11. | *DDL* |
| 047503 | TRC-LO | [redacted] | Mercury - | PV | -0.2500 | | | | | | 99/09/07 | NRA3 | 99/09/08 | MG01 | 13. | 11. | *DDL* |
| BL0907 | INTERNAL | | Mercury - | PV | -0.0100 | -99999.0 | 0.1050 | 105. | 0.1040 | 104. | 99/09/07 | NRA3 | 99/09/08 | MG01 | $$$ | $$$ | *BLKIMP* |

35 Tests for OHPOX with an MDL of 0.010 ug Validated By cmt Control Chart Updated N/A IO Requirements met N/A

00040

# LDC AUTOSAMPLER RUN LOG (MERCURY)

Date: 99-09-08 Run Code: MG01 Matrix: IMP

Analyst: MG Units: µg (see comments) MDL: 0.01

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 1 | | | Primer (ICV) | | | |
| 2 | | | Dummy (Blk) | | | |
| 3 | | | Std 1 (S1) | 0.0 | | |
| 4 | | | Std 2 (S2) | 0.5 | | |
| 5 | | | Std 3 (S3) | 1.0 | | |
| 6 | | | Std 4 (S4) | 1.5 | | |
| 7 | | | Std 5 (S5) | 2.0 | | |
| 8 | | | Std 6 (S6) | 2.5 | | |
| 9 | | | ICV | | | |
| 10 | | | B (Std 1) | | | |
| 11 | | | D4 (Std 4) | | | |
| 12 | | | WS 378 | | | |
| 13 | | | ORG. REF. | | | |
| 14 | | | BL0907 | NRA1. | | |
| 15 | | | " | | | |
| 16 | | | BL0907 S | | | |
| 17 | | | " | | | |
| 18 | | | BL0907 DS | | | |
| 19 | | | " | | | |
| 20 | 10 | | 44798 | | | |
| 21 | | | " | | | |
| 22 | | | 44798 D | | | |
| 23 | | | " | | | |
| 24 | | | 44798 S | | | |
| 25 | | | " | | | |
| 26 | | | 44798 DS | | | |
| 27 | | | " | | | |
| 28 | | | 44796 | | | |
| 29 | | | " | | | |
| 30 | | | 44797 | | | |
| 31 | | | " | | | |
| 32 | | | 44799 | | | |
| 33 | | | " | | | |
| 34 | | | CCV | | | |
| 35 | | | B | | | |
| 36 | | | D4 | | | |
| 37 | 10 | | 44800 | | | |
| 38 | | | " | | | |
| 39 | | | 44801 | | | |
| 40 | | | " | | | |

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 41 | 10 | | 44802 | | | |
| 42 | | | " | | | |
| 43 | | | 44803 | | | |
| 44 | | | " | | | |
| 45 | | | 44804 | | | |
| 46 | | | " | | | |
| 47 | | | 44805 | | | |
| 48 | | | " | | | |
| 49 | | | BL0907 | NRA2 | | |
| 50 | | | " | | | |
| 51 | | | BL0907 S | | | |
| 52 | | | " | | | |
| 53 | | | BL0907 DS | | | |
| 54 | | | " | | | |
| 55 | 10 | | 44806 | | | |
| 56 | | | " | | | |
| 57 | | | CCV | | | |
| 58 | | | B | | | |
| 59 | | | D4 | | | |
| 60 | 10 | | 44806 D | | | |
| 61 | | | " | | | |
| 62 | | | 44806 S | | | |
| 63 | | | " | | | |
| 64 | | | 44806 DS | | | |
| 65 | | | " | | | |
| 66 | | | 44807 | | | |
| 67 | | | " | | | |
| 68 | | | 44808 | | | |
| 69 | | | " | | | |
| 70 | | | 44809 | | | |
| 71 | | | " | | | |
| 72 | | | 44888 | | | |
| 73 | | | " | | | |
| 74 | | | 44889 | | | |
| 75 | | | 47489 | | | |
| 76 | | | 47490 | | | |
| 77 | | | " | | | |
| 78 | | | 47491 | | | |
| 79 | | | " | | | |
| 80 | | | CCV | | | |

Comments: *** "HG-347" and "MISA12" units are expressed in mg/L not ug/L

ICV = 1.5 ug/L, CCV = 1.0 ug/L, Blank Spike = 1.0 ug/L for liquid samples.

ICV = 1.5 mg/kg, CCV = 1.0 mg/kg, Blank Spike = 1.0 mg/kg for solid samples.

00042

2 of 2

# LDC AUTOSAMPLER RUN LOG (MERCURY)

Date: 99.09.08 Run Code: MG01 Matrix: INP

Analyst: MG Units: µg (see comments) MDL: 0.01

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 1 | | | Primer (ICV) | | | |
| 2 | | | Dummy (Blk) | | | |
| 3 | | | Std 1 (S1) | 0.0 | | |
| 4 | | | Std 2 (S2) | 0.5 | | |
| 5 | | | Std 3 (S3) | 1.0 | | |
| 6 | | | Std 4 (S4) | 1.5 | | |
| 7 | | | Std 5 (S5) | 2.0 | | |
| 8 | | | Std 6 (S6) | 2.5 | | |
| 9 | | | ICV | | | |
| 10 | | | B (Std 1) | | | |
| 11 | | | D4 (Std 4) | | | |
| 12 | | | | | | |
| 13 | | | | | | |
| 14 | | | | | | |
| 15 | | | | | | |
| 16 | | | | | | |
| 17 | | | | | | |
| 18 | | | | | | |
| 19 | | | | | | |
| 20 | | | | | | |
| 21 | | | B | | | |
| 22 | | | D4 | | | |
| 23 | 10 | | 47492 | | | |
| 24 | | | " | | | |
| 25 | | | 47493 | | | |
| 26 | | | " | | | |
| 27 | | | BL0907 | NRA3 | | |
| 28 | | | " | | | |
| 29 | | | BL0907 S | | | |
| 30 | | | " | | | |
| 31 | | | BL0907 DS | | | |
| 32 | | | " | | | |
| 33 | 10 | | 47494 | | | |
| 34 | | | " | | | |
| 35 | | | 47494 D | | | |
| 36 | | | " | | | |
| 37 | | | 47494 S | | | |
| 38 | | | " | | | |
| 39 | | | 47494 DS | | | |
| 40 | | | " | | | |
| 41 | 10 | | 47495 | | | |
| 42 | | | " | | | |
| 43 | | | CCV | | | |
| 44 | | | B | | | |
| 45 | | | D4 | | | |
| 46 | 10 | | 47496 | | | |
| 47 | | | " | | | |
| 48 | | | 47497 | | | |
| 49 | | | " | | | |
| 50 | | | 47498 | | | |
| 51 | | | " | | | |
| 52 | | | 47499 | | | |
| 53 | | | " | | | |
| 54 | | | 47500 | | | |
| 55 | | | " | | | |
| 56 | | | 47501 | | | |
| 57 | | | " | | | |
| 58 | | | 47502 | | | |
| 59 | | | " | | | |
| 60 | | | 47503 | | | |
| 61 | | | " | | | |
| 62 | | | CCV | | | |
| 63 | | | B | | | |
| 64 | | | D4 | | | |
| 65 | | | BL0908 | ABB3 | | |
| 66 | | | BL0908 S | | | |
| 67 | | | 49178 | | | |
| 68 | | | 178 D | | | |
| 69 | | | 178 S | | | |
| 70 | | | 176 | | | |
| 71 | | | 176 S | | | |
| 72 | | | 48702 | | | |
| 73 | | | 49158 | | | |
| 74 | | | 160 | | | |
| 75 | 10 | 1/10 | 48582 | ABA1/0907 (RERUN) | | |
| 76 | | | WS378 | | | |
| 77 | | | ORG. REF | | | |
| 78 | | | CCV | | | |
| 79 | | | B | | | |
| 80 | | | D4 | | | |

Comments: *** "HG-347" and "MISA12" units are expressed in mg/L not ug/L

ICV = 1.5 ug/L, CCV = 1.0 ug/L, Blank Spike = 1.0 ug/L for liquid samples.

ICV = 1.5 mg/kg, CCV = 1.0 mg/kg, Blank Spike = 1.0 mg/kg for solid samples.

00043 DG0HPOX

# EPA 7470 WATER PREPARATION LOG - MERCURY

DG7470HG
DGHGLEACH, DG29HG***

Calibration Solutions:

| # | I.D. | *Conc. | Spike | **Conc. Entered |
|---|---|---|---|---|
| 1 | Blank/Dummy | 0 ppb | None | 0.0 |
| 2 | Standard 1 | 0 ppb | None | 0.0 |
| 3 | Standard 2 | 0.33 | 200 ul of 0.05 ppm IV working standard | 0.5 |
| 4 | Standard 3 | 0.67 | 400 ul of 0.05 ppm IV working standard | 1.0 |
| 5 | Standard 4 | 1.0 | 600 ul of 0.05 ppm IV working standard | 1.5 |
| 6 | Standard 4 | 1.0 | 600 ul of 0.05 ppm IV working standard | 1.5 |
| 7 | Standard 5 | 1.33 | 800 ul of 0.05 ppm IV working standard | 2.0 |
| 7 | Standard 6 | 1.67 | 1000 ul of 0.05 ppm IV working standard | 2.5 |

Check List
- ✓ Digest Code/labels
- ✓ Samples poured out
- ✓ Acids added
- ✓ Reagents added
- ✓ Samples spiked
- ✓ Bath at 95 degrees C
- ✓ Samples digested
- ✓ Hydroxylamine HCl added
- ✓ Samples bulked and mixed
- ✓ Rack order checked

| | # | Sample I.D. | B.Code | Init.Vol. | F. Vol. | Dil | Comment |
|---|---|---|---|---|---|---|---|
| | 9 | ICV (Init. Calib. Verif.) | NRA1 | 20 ml | 30 ml | 1 X | 1.5 ppb = 600 ul. of 0.05 ppm HP MESS-ZENO 30/QCA Std. |
| | 10 | BL0907 | " | " | " | " | (Processed Blank) |
| | 11 | BL0907 S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 12 | 044798 | " | 1 | 15 | 10x | 250 ml |
| 1 | 13 | D | " | ↓ | ↓ | ↓ | (Duplicate sample) |
| 1 | 14 | S | " | ↓ | ↓ | ↓ | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 15 | DS | " | ↓ | ↓ | ↓ | (Duplicate Spiked sample) |
| 2 | 16 | 796 | " | ↓ | ↓ | ↓ | |
| 3 | 17 | 797 | " | ↓ | ↓ | ↓ | |
| 4 | 18 | 799 | " | ↓ | ↓ | ↓ | |
| 5 | 19 | 800 | " | ↓ | ↓ | ↓ | |
| 6 | 20 | 801 | " | ↓ | ↓ | ↓ | |
| 7 | 21 | 802 | " | ↓ | ↓ | ↓ | |
| 8 | 22 | 803 | " | ↓ | ↓ | ↓ | |
| 9 | 23 | 804 | " | ↓ | ↓ | ↓ | |
| 10 | 24 | 805 | " | ↓ | ↓ | ↓ | |
| | 25 | CCV (Cont. Calib. Verif.) | NRA2 | 20 ml | 30 ml | 1 X | 1.0 ppb = 400 ul. of 0.05 ppm HP MESS-ZENO 30/QCA Std. |
| | 26 | BL0907 | " | " | " | " | (Processed Blank) |
| | 27 | BL0907 S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 28 | 44806 | " | 1 | 15 | 10x | 250 ml |
| 1 | 29 | D | " | ↓ | ↓ | ↓ | (Duplicate sample) |
| 1 | 30 | S | " | ↓ | ↓ | ↓ | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 31 | DS | " | ↓ | ↓ | ↓ | (Duplicate Spiked sample) |
| 2 | 32 | 807 | " | ↓ | ↓ | ↓ | |
| 3 | 33 | 808 | " | ↓ | ↓ | ↓ | |
| 4 | 34 | 809 | " | ↓ | ↓ | ↓ | |
| 5 | 35 | 44888 | " | ↓ | ↓ | ↓ | |
| 6 | 36 | 47489 | " | ↓ | ↓ | ↓ | |
| 7 | 37 | 490 | " | ↓ | ↓ | ↓ | |
| 8 | 38 | 491 | " | ↓ | ↓ | ↓ | |
| 9 | 39 | 492 | " | ↓ | ↓ | ↓ | |
| 10 | 40 | 493 | " | ↓ | ↓ | ↓ | |

Notes: Other Applicable Test Codes: DG29HG-1B, DG29HG-2B, DG29HG-3A, DG29HG-3B, DG29HG-3C
DG29HGI, DG29HGF, DG101AA1, DG101AA2

Include External Reference Material (EPA WS 378 or SPEX CertiPrep TM - WS) per run — Prepare 0.05 ppm standards daily

| | | |
|---|---|---|
| HNO3 Lot. No. 119940 | H2SO4 Lot. No. 318060 | Bath Temps. 195 °C |

Prepared By: NR Date: 99/09/07 Checked by: MN

| | # | Sample I.D. | B.Code | Init.Vol. | F. Vol. | Dil | Comment |
|---|---|---|---|---|---|---|---|
| | 41 | CCV (Cont. Calib. Verif.) | NCA3 | 20 ml | 30 ml | 1 X | 1.0 ppb = 400 ul. of 0.05 ppm HP MESS-ZENO 30/QCA Std. |
| | 42 | BL 0907 | " | " | " | " | (Processed Blank) |
| | 43 | BL 0907 S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 44 | 047494 | " | 1 | 15 | 10x | 250 ml |
| 1 | 45 | D | " | " | " | " | (Duplicate sample) |
| 1 | 46 | S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 47 | DS | " | " | " | " | (Duplicate Spiked sample) |
| 2 | 48 | 495 | " | " | " | " | |
| 3 | 49 | 496 | " | " | " | " | |
| 4 | 50 | 497 | " | " | " | " | |
| 5 | 51 | 498 | " | " | " | " | |
| 6 | 52 | 499 | " | " | " | " | |
| 7 | 53 | 500 | " | " | " | " | |
| 8 | 54 | 501 | " | " | " | " | |
| 9 | 55 | 502 | " | " | " | " | |
| 10 | 56 | 047503 | " | " | " | " | |

**Comments**

* concentration based on 30 ml final volume, ** concentration based on 20 ml final volume

*** group of several Method 29 testcodes

Dilution factor of 1.5 is corrected by entering the calibration concentrations listed above

## Procedure/Methodology:

1. Prepare 25 ppm Intermediate stock (if required) by pipetting 625 ul., of 1000 ppm Stock to 25 ml final volume of 2% HNO3
2. Prepare 0.05 ppm Working stock daily by pipetting 200 ul., of 25 ppm Stock to 100 ml final volume of 2% HNO3
3. Using the LIMS Screen "SCNDIG" enter the required samples into LIMS
4. Using the labeling program, "DIGLBL", retreive the "SCNDIG" list and create labels for the required samples.
5. Label the falcon tubes appropriately
6. Transfer a 20 ml. aliquot of well mixed sample into the designated falcon tube
7. Spike the tubes as indicated in the comment sector of the digestion sheet
8. Add 0.5 ml. of conc. Nitric Acid (HNO3), and 1 ml. of conc. Sulphuric acid, (H2SO4), to each tube
9. Add 3 ml. Potassium Permanganate (KMnO4), colour should remain for at least 15 minutes
10. Add 1.5 ml. of Potassium persulphate, (K2S2O8), to each tube
11. Mix samples, cap loosely and place in a water bath @ 95 degrees C for 2 hours
12. Remove tubes and allow to cool to room temperature
13. Add 1.0 ml. 20% Hydroxylamine Hydrochloride to each tube
14. Recap tubes and shake until the Potassium Permanganate (KMnO4) is destroyed and sample becomes colourless
15. Dilute the sample to a final volume of 30 ml., cap and mix well

**REFERENCE STANDARDS/SPIKING SOLUTIONS:**

Source: Inorganic Ventures Standard, see standard tracking binder for current lot and expiry date information

**ICV/CCV STANDARDS:**

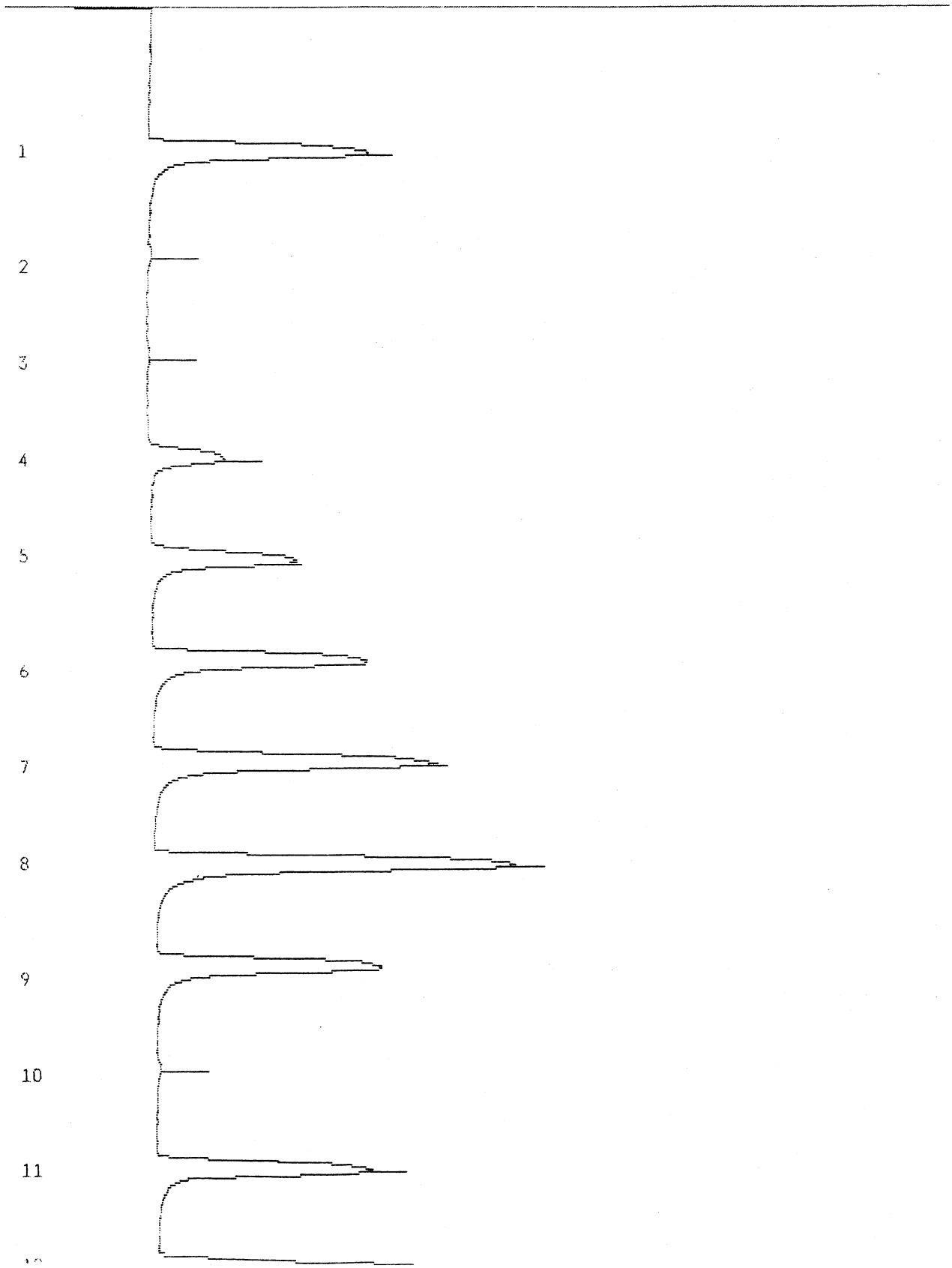
Source: High Purity MESS-ZENO 30/QCA Standard, see standard tracking binder for current lot

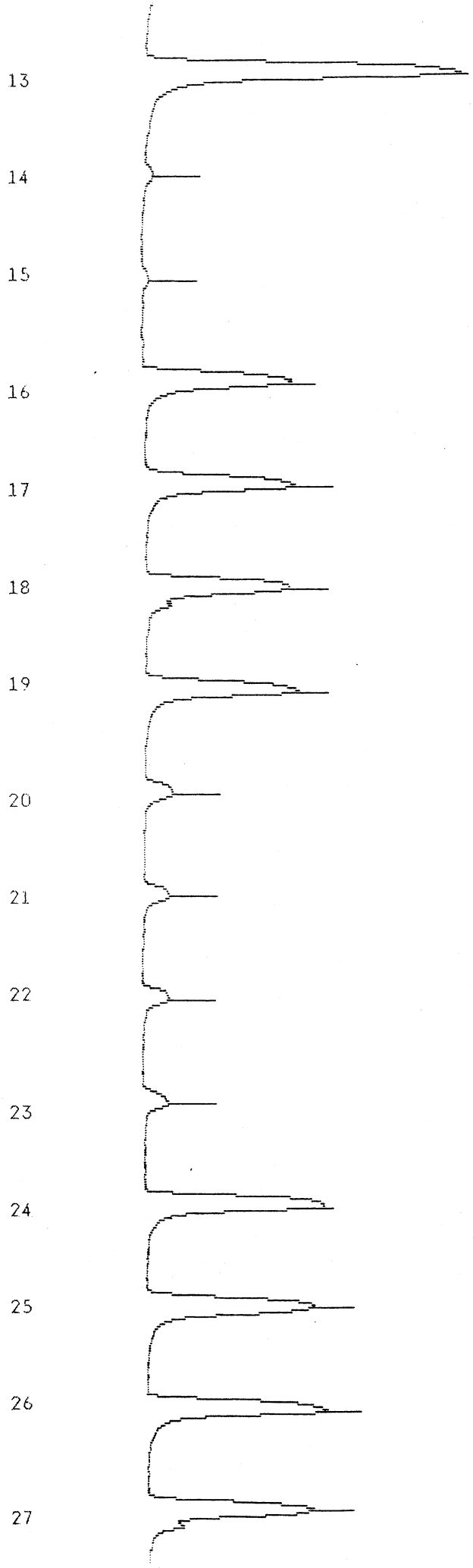
**INTERNAL REFERENCE STANDARD: (2 ppb in 10% HNO3)**

Source: EPA WS 378 or SPEX CertiPrep Trace Metal - Water Supply, see standard tracking binder for current source, lot and expiry date information.

All reagents used are of a grade suitable for mercury analyses

RUN DATE: 09-07-1999 CHART DATE: 09-08-1999
CHART SPEED: 30
DATA FILE NAME: C:\DP4\DATA\990908W.DAT

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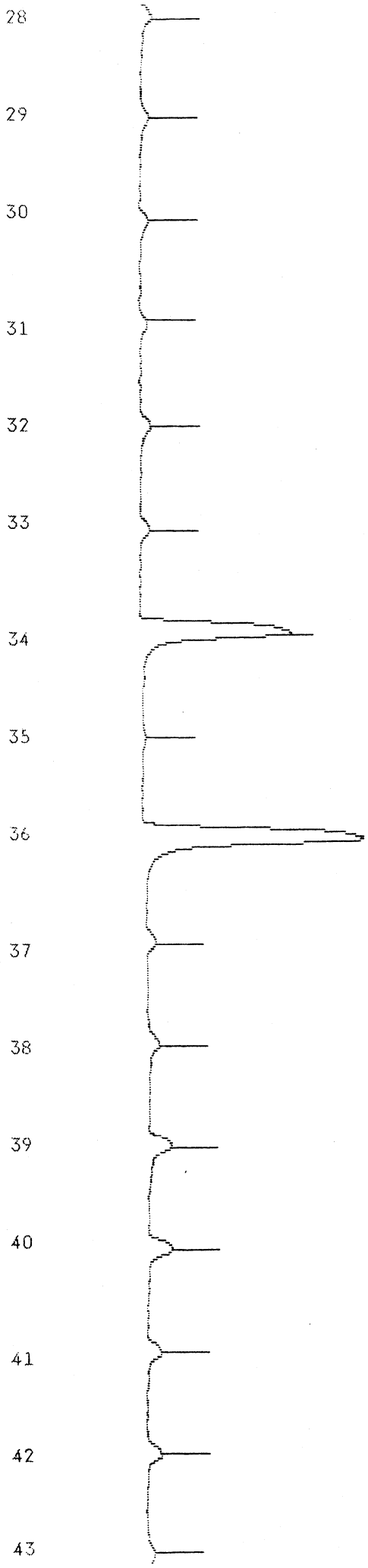
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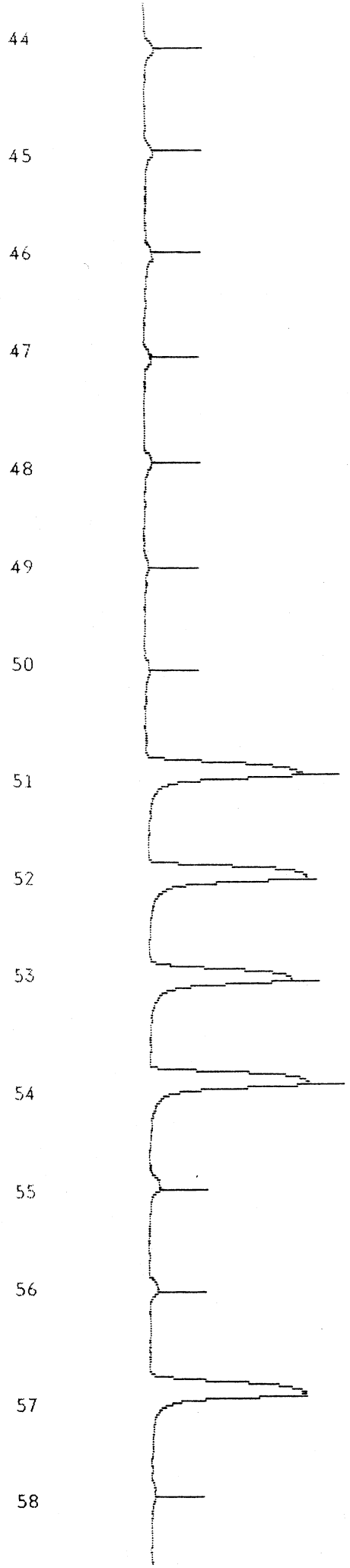
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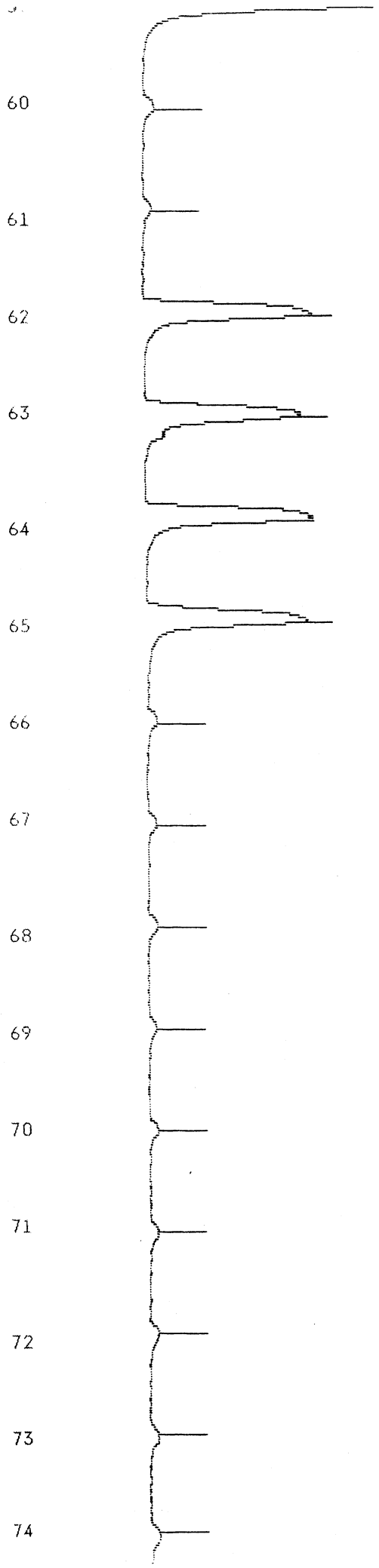
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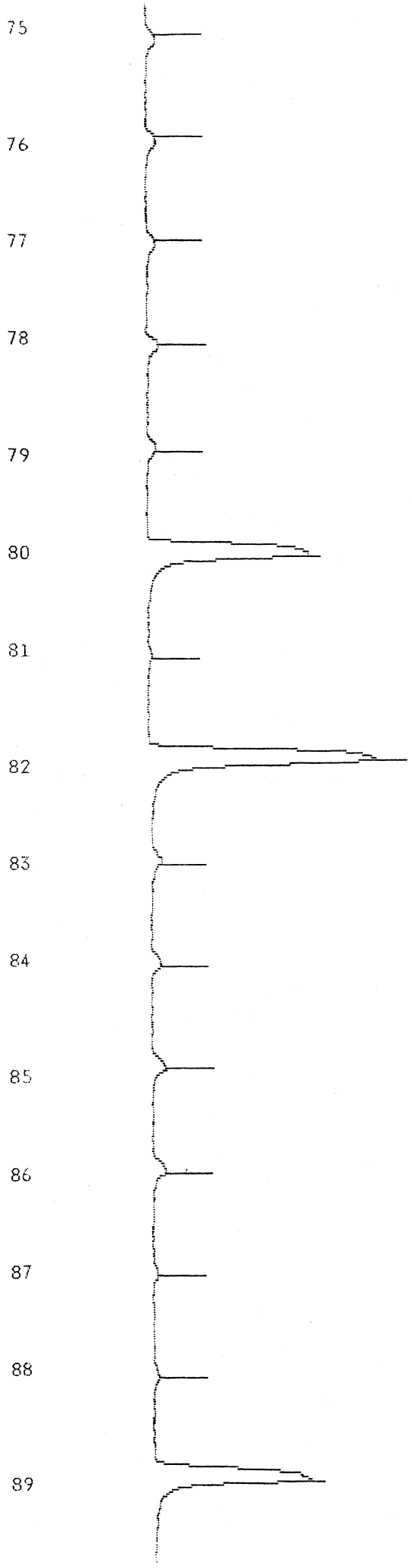

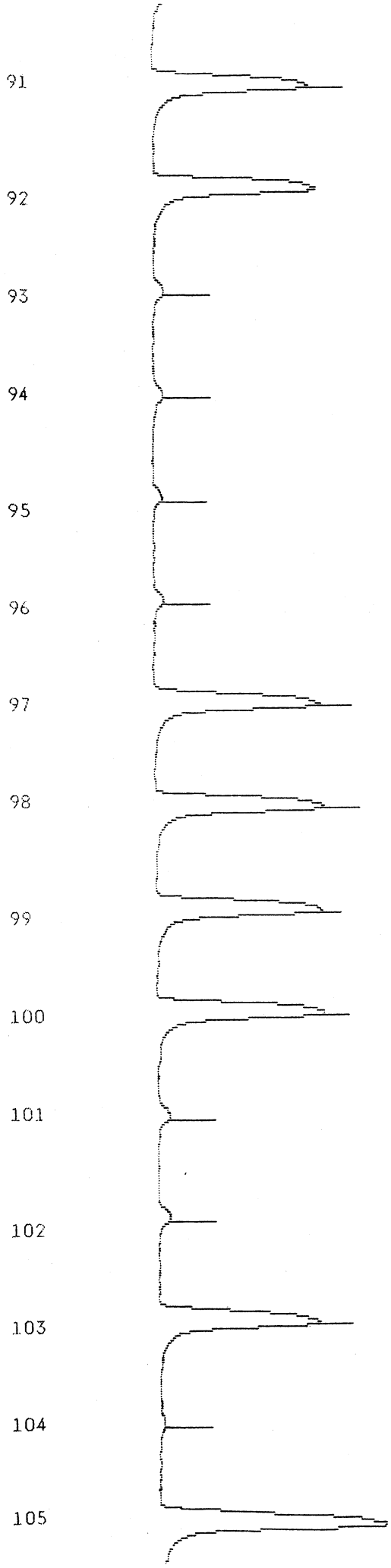
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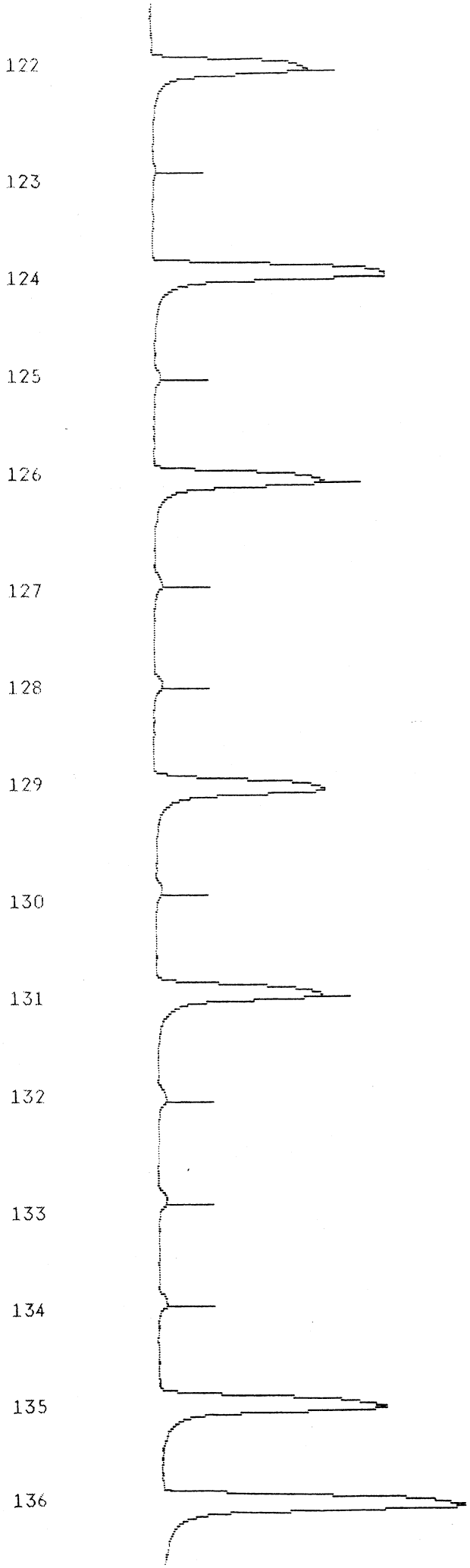
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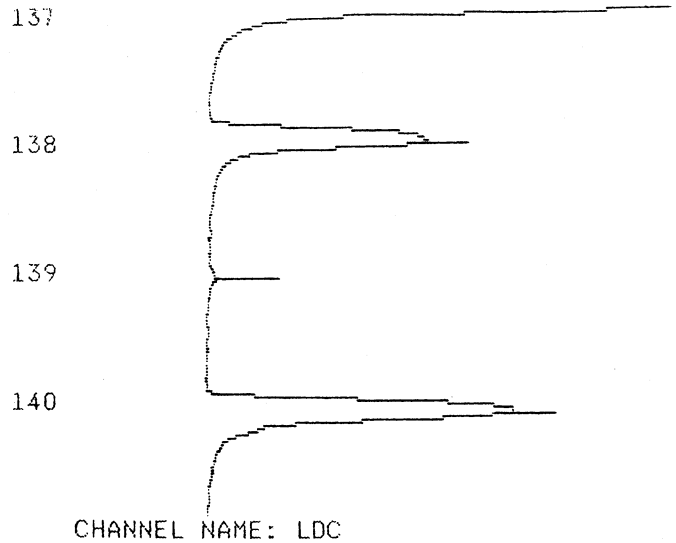
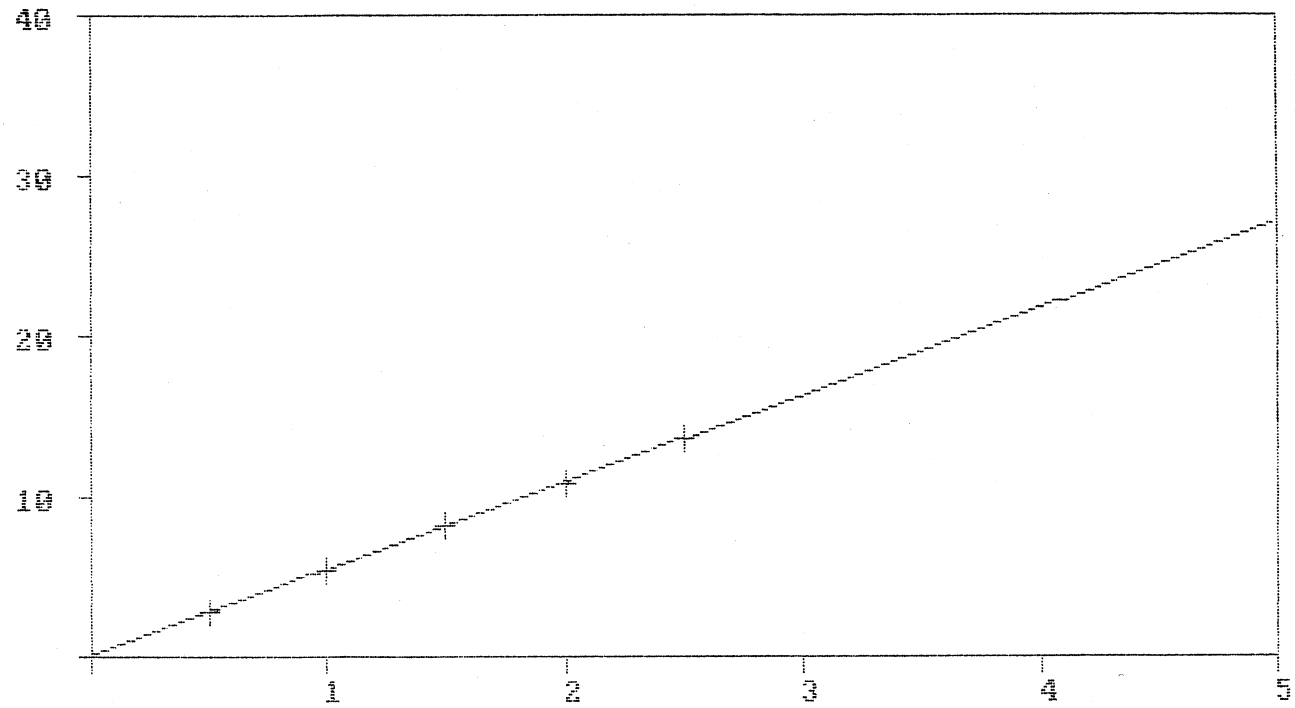



CHANNEL NAME: LDC
RUN NAME: 990908W




DATA TYPE: FIA  CALIBRATION ORDER: 1
INTERCEPT = -4.54  SLOPE = 5.4045

CORRELATION: .9999488

CHANNEL NAME: LDC
RUN DATE: 09-07-1999
SAMPLE TABLE NAME: 990908W
METHOD NAME: HGWATER

| CUP# | SAMPLE ID | DIL | WGT | HEIGHT/AREA | CONCENTRATION (ppb) | EF |
|---|---|---|---|---|---|---|
| 1 | PRIMER | 1 | 1 | 8.4 | 1.537 | s |
| 2 | DUMMY | 1 | 1 | 0.0 | -0.004 | I |
| 3 | S1: 0 | 1 | 1 | 0.0 | 0.001 | I |
| 4 | S2: .5 | 1 | 1 | 2.8 | 0.502 | |
| 5 | S3: 1 | 1 | 1 | 5.4 | 0.995 | |
| 6 | S4: 1.5 | 1 | 1 | 8.2 | 1.510 | |
| 7 | S5: 2 | 1 | 1 | 10.8 | 1.984 | |
| 8 | S6: 2.5 | 1 | 1 | 13.6 | 2.508 | |
| 9 | ICV | 1 | 1 | 8.6 | 1.582 | 105% |

| Zenon Number | Client | Client ID | Parameter | TS | Result | Dup. | Spike | % Rec. | Dup. Spk | % Rec. | Batch Date | Batch Code | Run Date | Run Code | Day Old | Day In | Analyst's Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 044795 | TRC-LO | MB R456 | Mercury - | PV | -0.045 | -99999.0 | 0.453 | 102. | 0.467 | 103. | 99/09/16 | 1GKC | 99/09/16 | MG02 | 36. | 30. | |
| 044796 | TRC-LO | OHM-RB | Mercury - | PV | -0.045 | | | | | | 99/09/16 | 1GKC | 99/09/16 | MG02 | 36. | 30. | |
| 044797 | TRC-LO | OHM-I-FB | Mercury - | PV | 0.186 | | | | | | 99/09/16 | 1GKC | 99/09/16 | MG02 | 37. | 30. | |
| 044798 | TRC-LO | OHM-Ia-R1 | Mercury - | PV | 36.792 | 36.930 | 73.328 | 97. | 73.604 | 97. | 99/09/16 | 1GKC | 99/09/16 | MG02 | 36. | 30. | *PDS* |
| 044799 | TRC-LO | OHM-Ib-R1 | Mercury - | PV | 17.330 | | | | | | 99/09/16 | 1GKC | 99/09/16 | MG02 | 36. | 30. | |
| 044800 | TRC-LO | OHM-Ia-R2 | Mercury - | PV | 9.287 | | | | | | 99/09/16 | 1GKC | 99/09/16 | MG02 | 36. | 30. | |
| 044801 | TRC-LO | OHM-Ib-R2 | Mercury - | PV | 27.717 | | | | | | 99/09/16 | 1GKC | 99/09/16 | MG02 | 36. | 30. | |
| 044802 | TRC-LO | OHM-Ia-R3 | Mercury - | PV | 8.268 | | | | | | 99/09/16 | 1GKC | 99/09/16 | MG02 | 35. | 30. | |
| 044803 | TRC-LO | OHM-Ib-R3 | Mercury - | PV | 12.671 | | | | | | 99/09/16 | 1GKC | 99/09/16 | MG02 | 35. | 30. | |
| 044804 | TRC-LO | OHM-Oa-R1 | Mercury - | PV | 0.138 | | | | | | 99/09/16 | 1GKC | 99/09/16 | MG02 | 36. | 30. | |
| 044805 | TRC-LO | OHM-Ob-R1 | Mercury - | PV | 0.228 | | | | | | 99/09/16 | 1GKC | 99/09/16 | MG02 | 36. | 30. | |
| BL0916 | INTERNAL | | Mercury - | PV | -0.030 | -99999.0 | 0.302 | 102. | 0.311 | 103. | 99/09/16 | 1GKC | 99/09/16 | MG02 | $$$ | $$$ | |
| 044806 | TRC-LO | OHM-Oa-R2 | Mercury - | PV | 0.182 | 0.183 | 1.253 | 104. | 1.248 | 103. | 99/09/16 | 2GKC | 99/09/16 | MG02 | 36. | 30. | *PDS* |
| 044807 | TRC-LO | OHM-Ob-R2 | Mercury - | PV | 0.398 | | | | | | 99/09/16 | 2GKC | 99/09/16 | MG02 | 36. | 30. | |
| 044808 | TRC-LO | OHM-Oa-R3 | Mercury - | PV | 0.088 | | | | | | 99/09/16 | 2GKC | 99/09/16 | MG02 | 35. | 30. | |
| 044809 | TRC-LO | OHM-Ob-R3 | Mercury - | PV | 0.080 | | | | | | 99/09/16 | 2GKC | 99/09/16 | MG02 | 35. | 30. | |
| BL0916 | INTERNAL | | Mercury - | PV | -0.030 | -99999.0 | 0.302 | 102. | 0.311 | 103. | 99/09/16 | 2GKC | 99/09/16 | MG02 | $$$ | $$$ | |

17 Tests for OHKCL with an MDL of 0.030 ug Validated By amb Control Chart Updated N/A IO Requirements met N/A

00058

# LDC AUTOSAMPLER RUN LOG (MERCURY)

Date: 99.09.16 Run Code: MG02 Matrix: IMP

Analyst: MG Units: µg (see comments) MDL: 0.03

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 1 | | | Primer (ICV) | | | |
| 2 | | | Dummy (Blk) | | | |
| 3 | | | Std 1 (S1) | 0.0 | | |
| 4 | | | Std 2 (S2) | 0.5 | | |
| 5 | | | Std 3 (S3) | 1.0 | | |
| 6 | | | Std 4 (S4) | 1.5 | | |
| 7 | | | Std 5 (S5) | 2.0 | | |
| 8 | | | Std 6 (S6) | 2.5 | | |
| 9 | | | ICV | | | |
| 10 | | | B (Std 1) | | | |
| 11 | | | D4 (Std 4) | | | |
| 12 | | | | | | |
| 13 | | | | | | |
| 14 | | | | | | |
| 15 | | | | | | |
| 16 | | | | | | |
| 17 | | | | | | |
| 18 | | | | | | |
| 19 | | | | | | |
| 20 | | | | | | |
| 21 | | | B | | | |
| 22 | | | D4 | | | |
| 23 | 1.5 | 1/40 | 44798 | | | |
| 24 | | | " | | | |
| 25 | | | 44798 D | | | |
| 26 | | | " | | | |
| 27 | | | 44798 S | | | |
| 28 | | | " | | | |
| 29 | | | 44798 DS | | | |
| 30 | | | " | | | |
| 31 | | 1/200 | 44798 DS | | | |
| 32 | | | " | | | |
| 33 | | | 44796 | | | |
| 34 | | | " | | | |
| 35 | | | 44797 | | | |
| 36 | | | " | | | |
| 37 | | 1/10 | 44799 | | | |
| 38 | | | " | | | |
| 39 | | 1/4 | 44800 | | | |
| 40 | | | | | | |
| 41 | 1.5 | 1/20 | 44801 | | | |
| 42 | | | " | | | |
| 43 | | | CCV | | | |
| 44 | | | B | | | |
| 45 | | | D4 | | | |
| 46 | 1.5 | 1/4 | 44802 | | | |
| 47 | | | " | | | |
| 48 | | 1/8 | 44803 | | | |
| 49 | | | " | | | |
| 50 | | | 44804 | | | |
| 51 | | | " | | | |
| 52 | | | 44805 | | | |
| 53 | | | " | | | |
| 54 | | | BL0916 | 2GKC | | |
| 55 | | | " | | | |
| 56 | | | BL0916 S | | | |
| 57 | | | " | | | |
| 58 | | | BL0916 DS | | | |
| 59 | | | " | | | |
| 60 | 1.5 | | 44806 | | | |
| 61 | | | " | | | |
| 62 | | | 44806 D | | | |
| 63 | | | " | | | |
| 64 | | | 44806 S | | | |
| 65 | | | " | | | |
| 66 | | | CCV | | | |
| 67 | | | B | | | |
| 68 | | | D4 | | | |
| 69 | 1.5 | | 44806 DS | | | |
| 70 | | | " | | | |
| 71 | | | 44807 | | | |
| 72 | | | " | | | |
| 73 | | | 44808 | | | |
| 74 | | | " | | | |
| 75 | | | 44809 | | | |
| 76 | | | " | | | |
| 77 | | | WS 378 | | | |
| 78 | | | CCV | | | |
| 79 | | | B | | | |
| 80 | | | D4 | | | |

Comments: *** "HG-347" and "MISA12" units are expressed in mg/L not ug/L

ICV = 1.5 ug/L, CCV = 1.0 ug/L, Blank Spike = 1.0 ug/L for liquid samples.

ICV = 1.5 mg/kg, CCV = 1.0 mg/kg, Blank Spike = 1.0 mg/kg for solid samples.

# LDC AUTOSAMPLER RUN LOG (MERCURY)

Date: 99.09.16 Run Code: MG02 Matrix: IMP

Analyst: MG Units: µg (see comments) MDL: 0.05/0.03

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 1 | | | Primer (ICV) | | | |
| 2 | | | Dummy (Blk) | | | |
| 3 | | | Std 1 (S1) | 0.0 | | |
| 4 | | | Std 2 (S2) | 0.5 | | |
| 5 | | | Std 3 (S3) | 1.0 | | |
| 6 | | | Std 4 (S4) | 1.5 | | |
| 7 | | | Std 5 (S5) | 2.0 | | |
| 8 | | | Std 6 (S6) | 2.5 | | |
| 9 | | | ICV | | | |
| 10 | | | B (Std 1) | | | |
| 11 | | | D4 (Std 4) | | | |
| 12 | | | WS 378 | | | |
| 13 | | | S2 | 0.5 | | |
| 14 | | | BL0916 | 16KC | | |
| 15 | | | " | | | |
| 16 | | | BL0916 S | | | |
| 17 | | | " | | | |
| 18 | | | BL0916 DS | | | |
| 19 | | | " | | | |
| 20 | | 1/10 | 40618 | | | |
| 21 | | | " | | | |
| 22 | | | 18 D | | | |
| 23 | | | " | | | |
| 24 | | | 18 S | | | |
| 25 | | | " | | | |
| 26 | | | 18 DS | | | |
| 27 | | | ~~18~~ | | | |
| 28 | | 1/10 | 18 DS | | | |
| 29 | | | " | | | |
| 30 | | | 40617 | | | |
| 31 | | | " | | | |
| 32 | | 1/2 | 19 | | | |
| 33 | | | " | | | |
| 34 | | | CCV | | | |
| 35 | | | B | | | |
| 36 | | | D4 | | | |
| 37 | | | 40620 | | | |
| 38 | | | " | | | |
| 39 | | | 42066 | | | |
| 40 | | | " | | | |
| 41 | | | 42066 D | | | |
| 42 | | | " | | | |
| 43 | | | 66 S | | | |
| 44 | | | " | | | |
| 45 | | | 66 DS | | | |
| 46 | | | " | | | |
| 47 | | | 67 | | | |
| 48 | | | " | | | |
| 49 | | | 68 | | | |
| 50 | | | " | | | |
| 51 | | | 42104 | | | |
| 52 | | | " | | | |
| 53 | | | 105 | | | |
| 54 | | | " | | | |
| 55 | | | 106 | | | |
| 56 | | | " | | | |
| 57 | | | CCV | | | |
| 58 | | | B | | | |
| 59 | | | D4 | | | |
| 60 | | | BL0916 | | | |
| 61 | | | " | | | |
| 62 | | | BL0916S | | | |
| 63 | | | " | | | |
| 64 | | | BL0916 DS | | | |
| 65 | | | " | | | |
| 66 | | | 50091 | | | |
| 67 | | | " | | | |
| 68 | | | 50091 D | | | |
| 69 | | | " | | | |
| 70 | | | 50091 S | | | |
| 71 | | | " | | | |
| 72 | | | 50091 DS | | | |
| 73 | | | " | | | |
| 74 | | | BL0916 | 16KC | | |
| 75 | | | " | | | |
| 76 | | | BL0916 S | PDS | | |
| 77 | | | " | | | |
| 78 | | | BL0916 DS | PDS | | |
| 79 | | | " | | | |
| 80 | | | CCV | | | |

Comments: *** "HG-347" and "MISA12" units are expressed in mg/L not ug/L

ICV = 1.5 ug/L, CCV = 1.0 ug/L, Blank Spike = 1.0 ug/L for liquid samples.

ICV = 1.5 mg/kg, CCV = 1.0 mg/kg, Blank Spike = 1.0 mg/kg for solid samples.

*SAMPLES ARE NOT DIGESTED.

00061

# EPA 7470 WATER PREPARATION LOG - MERCURY

DG7470HG
DGHGLEACH, DG29HG***

Calibration Solutions:

| # | I.D. | *Conc. | Spike | **Conc. Entered |
|---|---|---|---|---|
| 1 | Blank/Dummy | 0 ppb | None | 0.0 |
| 2 | Standard 1 | 0 ppb | None | 0.0 |
| 3 | Standard 2 | 0.33 | 200 ul of 0.05 ppm IV working standard | 0.5 |
| 4 | Standard 3 | 0.67 | 400 ul of 0.05 ppm IV working standard | 1.0 |
| 5 | Standard 4 | 1.0 | 600 ul of 0.05 ppm IV working standard | 1.5 |
| 6 | Standard 4 | 1.0 | 600 ul of 0.05 ppm IV working standard | 1.5 |
| 7 | Standard 5 | 1.33 | 800 ul of 0.05 ppm IV working standard | 2.0 |
| 7 | Standard 6 | 1.67 | 1000 ul of 0.05 ppm IV working standard | 2.5 |

Check List
- Digest Code/labels
- Samples poured out
- Acids added
- Reagents added
- Samples spiked
- Bath at 95 degrees C
- Samples digested
- Hydroxylamine HCl added
- Samples bulked and mixed
- Rack order checked

| | # | Sample I.D. | B.Code | Init.Vol. | F. Vol. | Dil | Comment |
|---|---|---|---|---|---|---|---|
| | 9 | ICV (Init. Calib. Verif.) | 1GKC | 20 ml | 30 ml | 1 X | 1.5 ppb = 600 ul. of 0.05 ppm HP MESS-ZENO 30/QCA Std. |
| | 10 | BL 0916 | " | " | " | " | (Processed Blank) |
| | 11 | BL 0916 S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 12 | 44798 | " | " | " | " | Final vol. 630 ml |
| 1 | 13 | D | " | " | " | " | (Duplicate sample) |
| 1 | 14 | PDS | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 15 | PDDS | " | " | " | " | (Duplicate Spiked sample) |
| 2 | 16 | 44796 | " | " | " | " | F. Vol. 100 ml |
| 3 | 17 | 97 | " | " | " | " | 380 ml |
| 4 | 18 | 99 | " | " | " | " | 590 |
| 5 | 19 | 44800 | " | " | " | " | 630 |
| 6 | 20 | 01 | " | " | " | " | 575 |
| 7 | 21 | 02 | " | " | " | " | 650 |
| 8 | 22 | 03 | " | " | " | " | 630 |
| 9 | 23 | 04 | " | " | " | " | 735 |
| 10 | 24 | 05 | " | " | " | " | 720 |
| | 25 | CCV (Cont. Calib. Verif.) | 2GKC | 20 ml | 30 ml | 1 X | 1.0 ppb = 400 ul. of 0.05 ppm HP MESS-ZENO 30/QCA Std. |
| | 26 | BL 0916 | " | " | " | " | (Processed Blank) |
| | 27 | BL 0916 S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 28 | 44806 | " | " | " | " | 685 ml |
| 1 | 29 | D | " | " | " | " | (Duplicate sample) |
| 1 | 30 | PDS | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 31 | PDDS | " | " | " | " | (Duplicate Spiked sample) |
| 2 | 32 | 807 | " | " | " | " | 670 |
| 3 | 33 | 808 | " | " | " | " | 740 |
| 4 | 34 | 809 | " | " | " | " | 710 |
| 5 | 35 | | " | " | " | " | |
| 6 | 36 | | " | " | " | " | |
| 7 | 37 | | " | " | " | " | |
| 8 | 38 | | " | " | " | " | |
| 9 | 39 | | " | " | " | " | |
| 10 | 40 | | " | " | " | " | |

Notes: Other Applicable Test Codes: DG29HG-1B, DG29HG-2B, DG29HG-3A, DG29HG-3B, DG29HG-3C
DG29HGI, DG29HGF, DG101AA1, DG101AA2

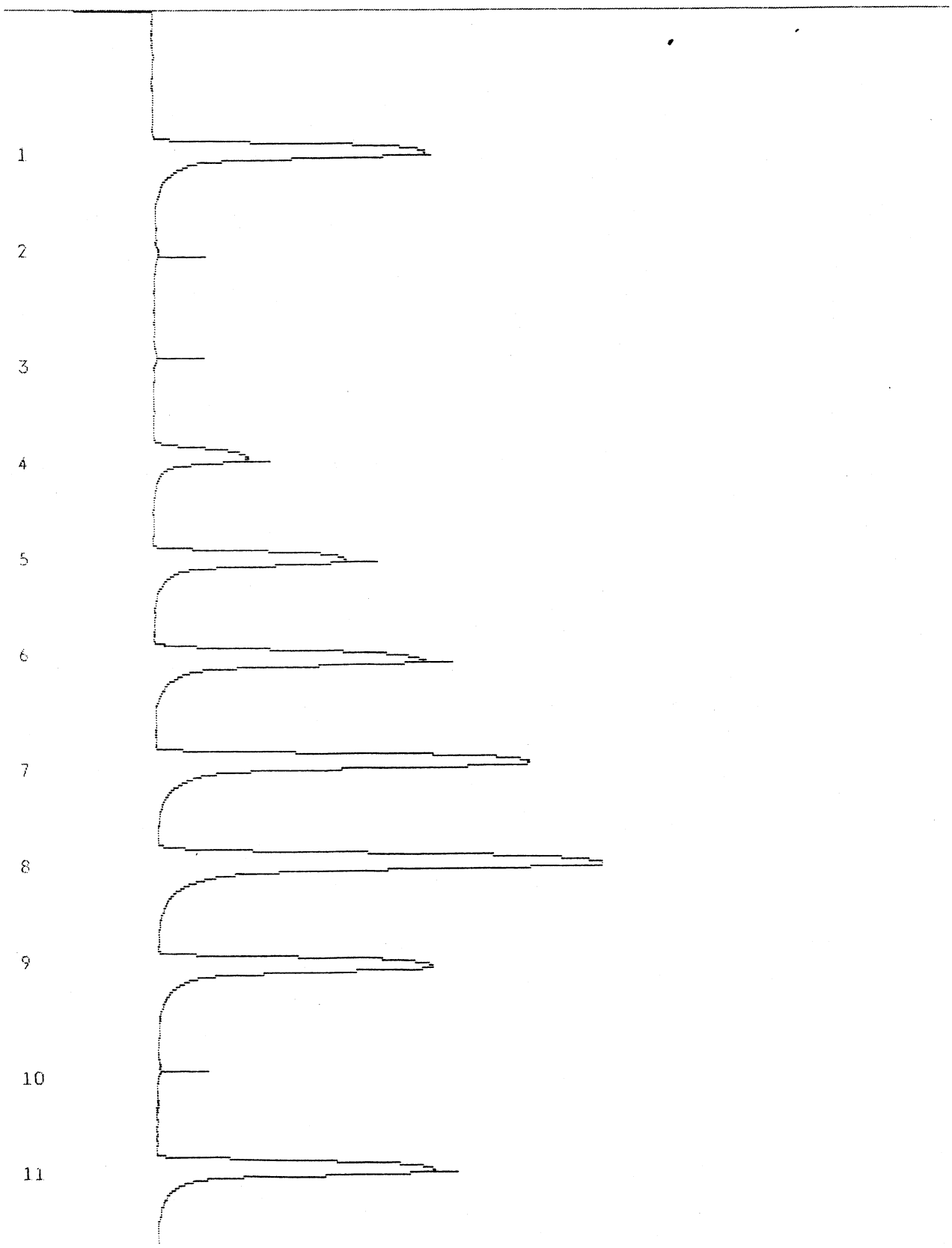
Include External Reference Material (EPA WS 378 or SPEX CertiPrep TM - WS) per run

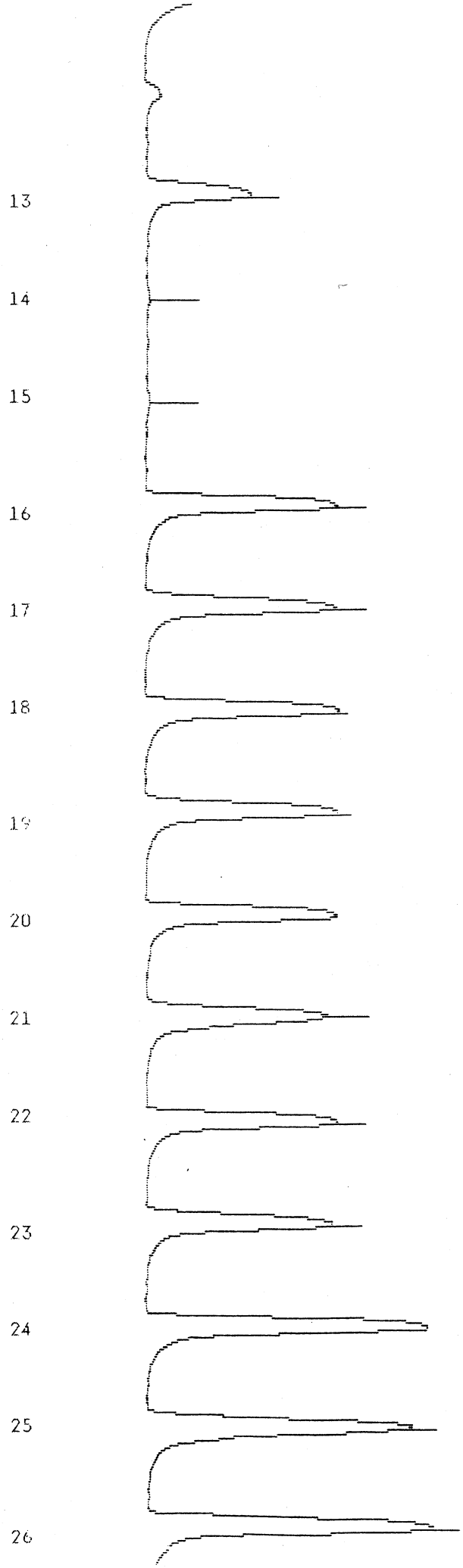
Prepare 0.05 ppm standards daily

| HNO3 Lot. No. 119960 | H2SO4 Lot. No. 318069 | Bath Temps. / / °C |
|---|---|---|

Prepared By: CMBM Date: 99/09/16 Checked by: CMBM

RUN DATE: 09-17-1999 CHART DATE: 09-17-1999
CHART SPEED: 30
DATA FILE NAME: C:\DP4\DATA\990916W.DAT

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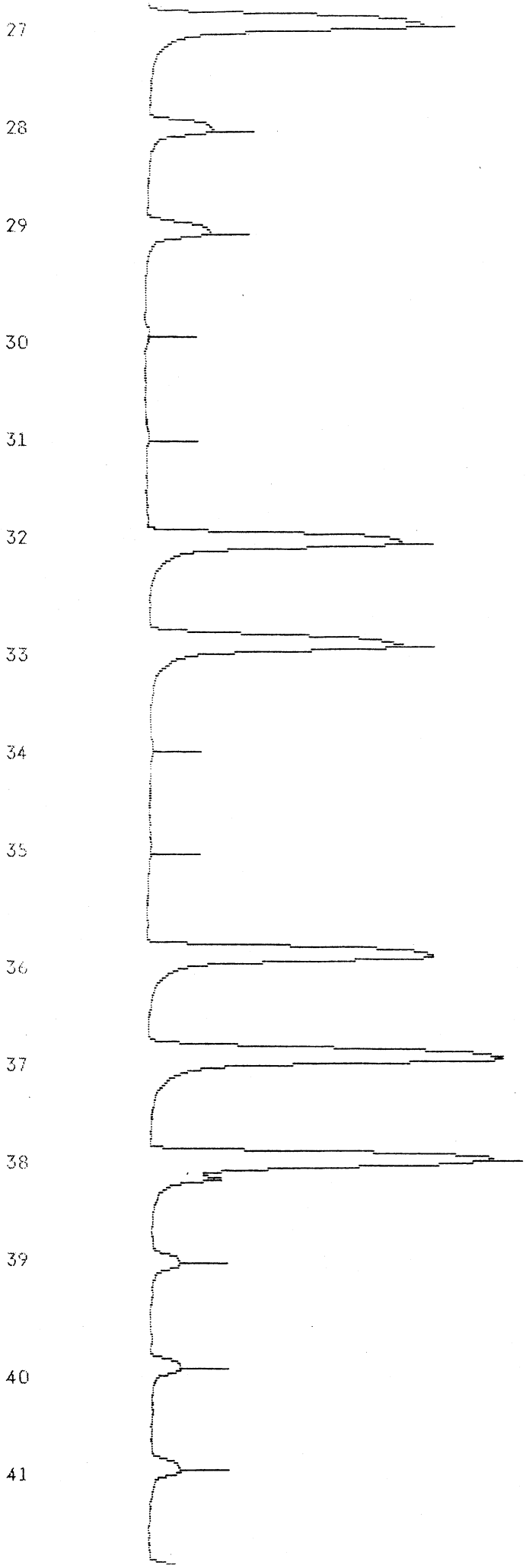
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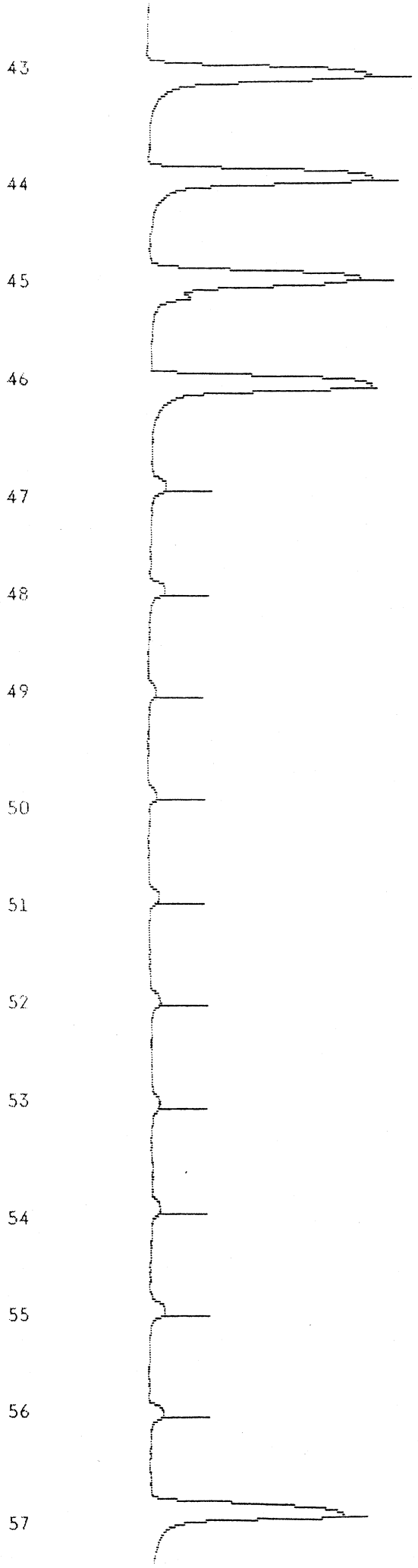
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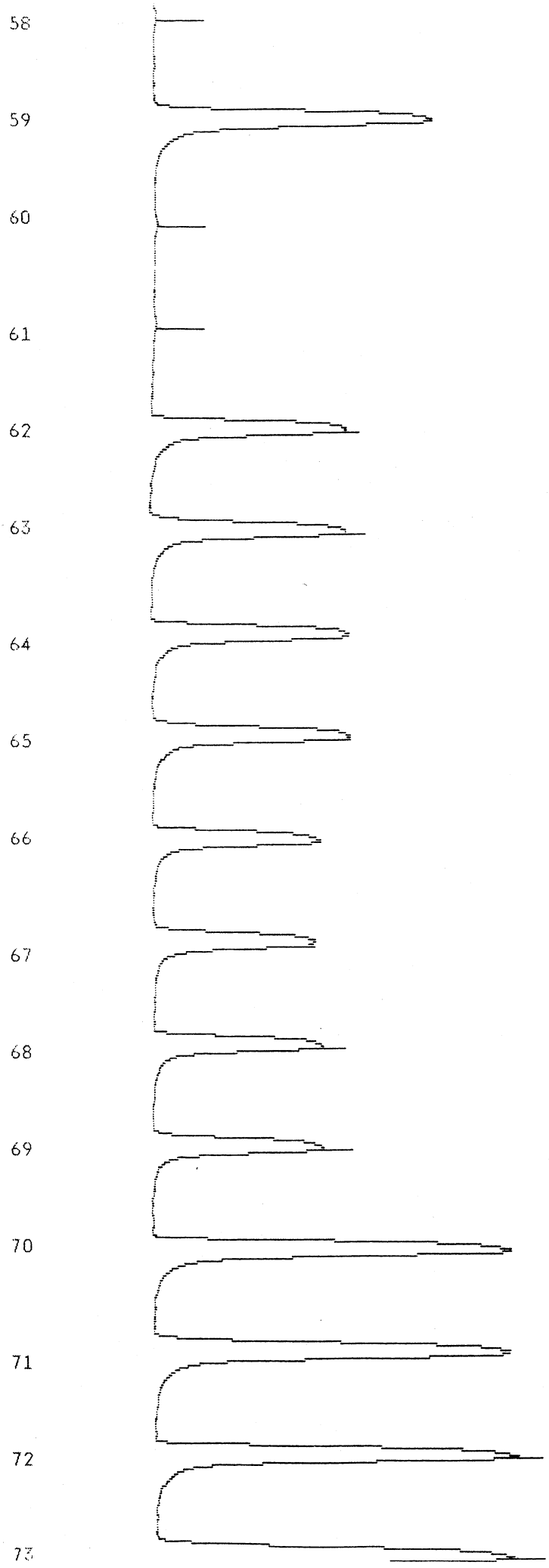
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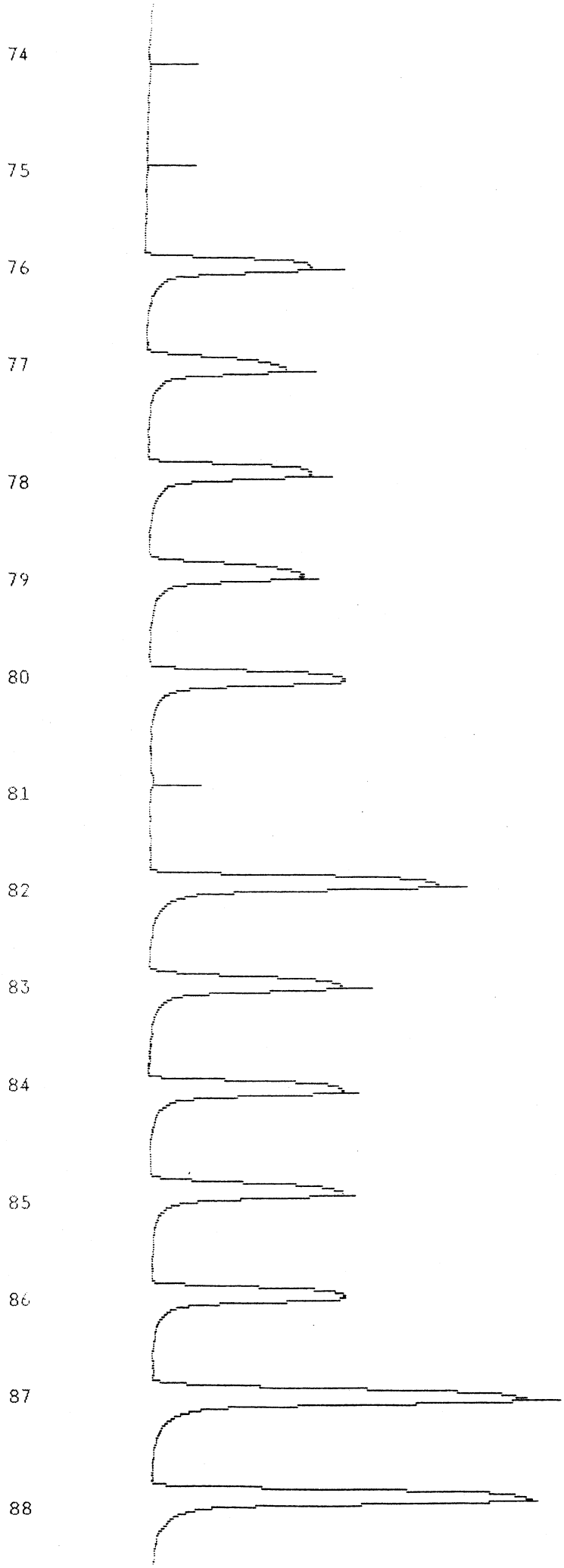
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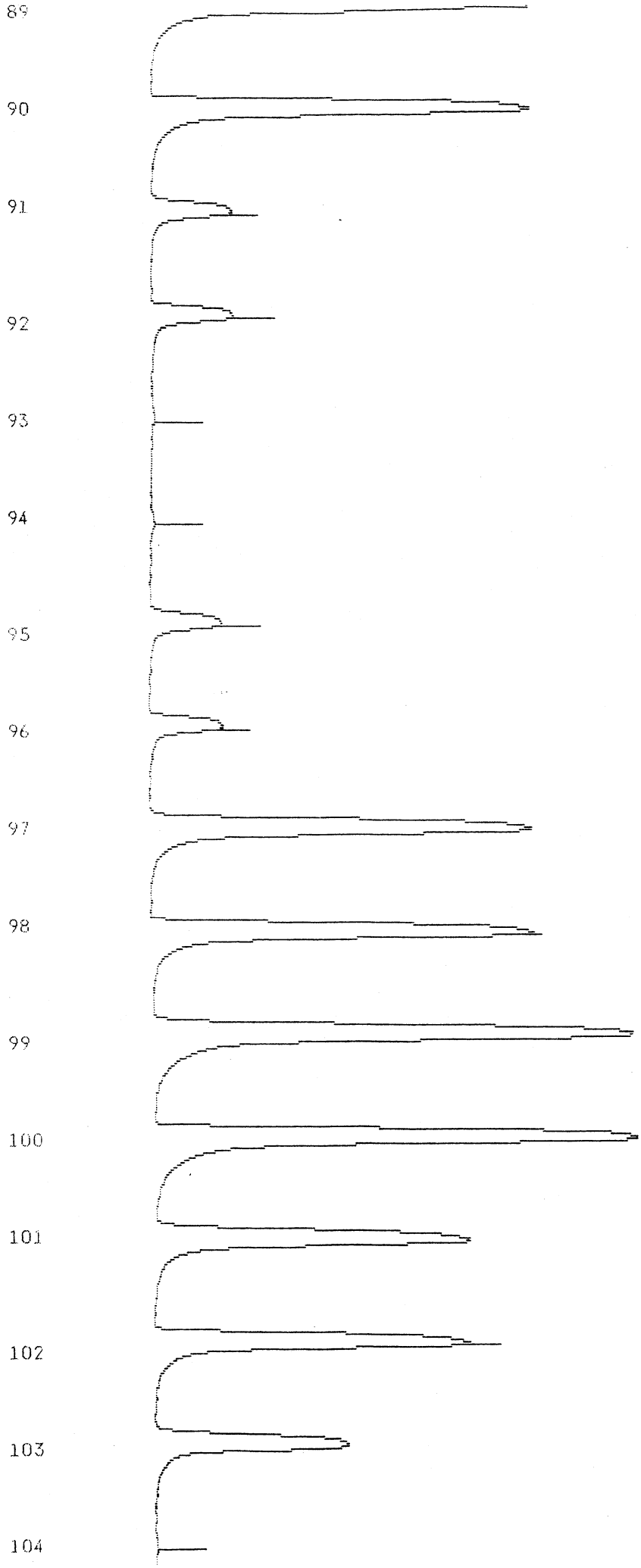
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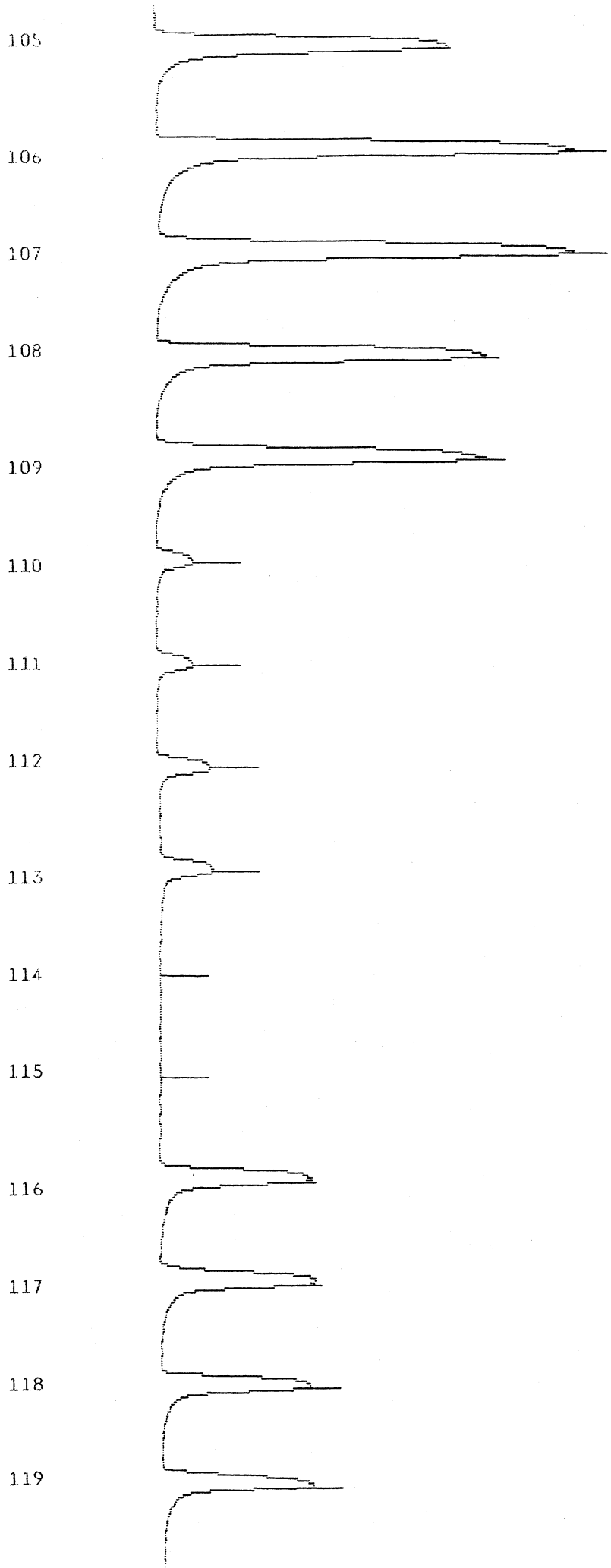
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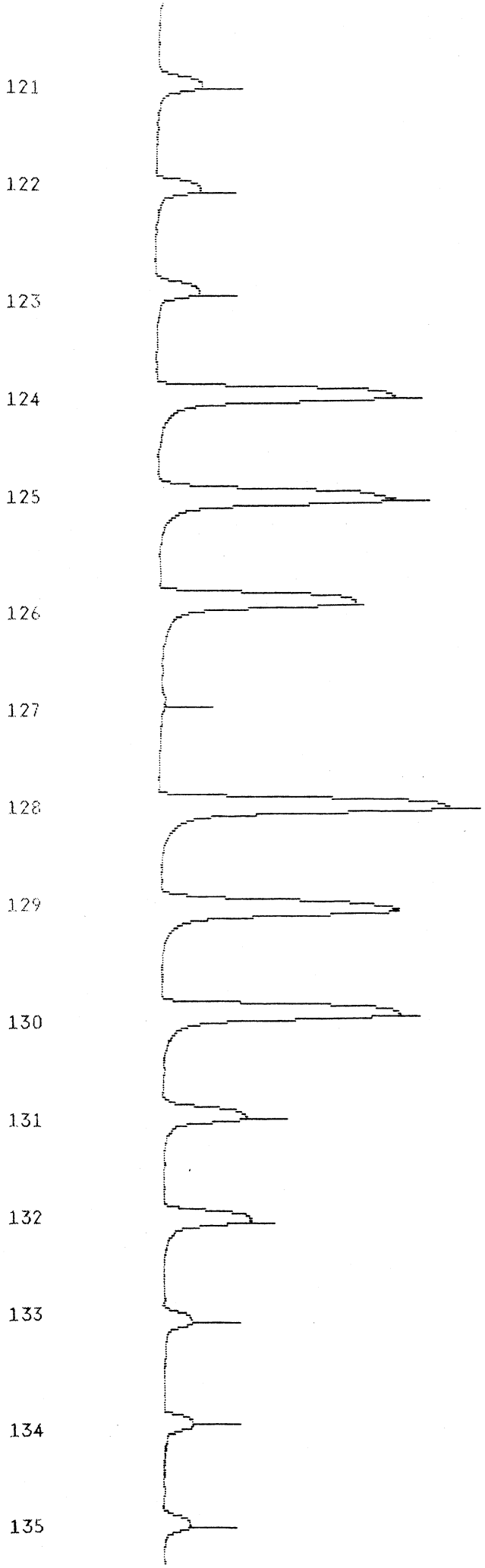
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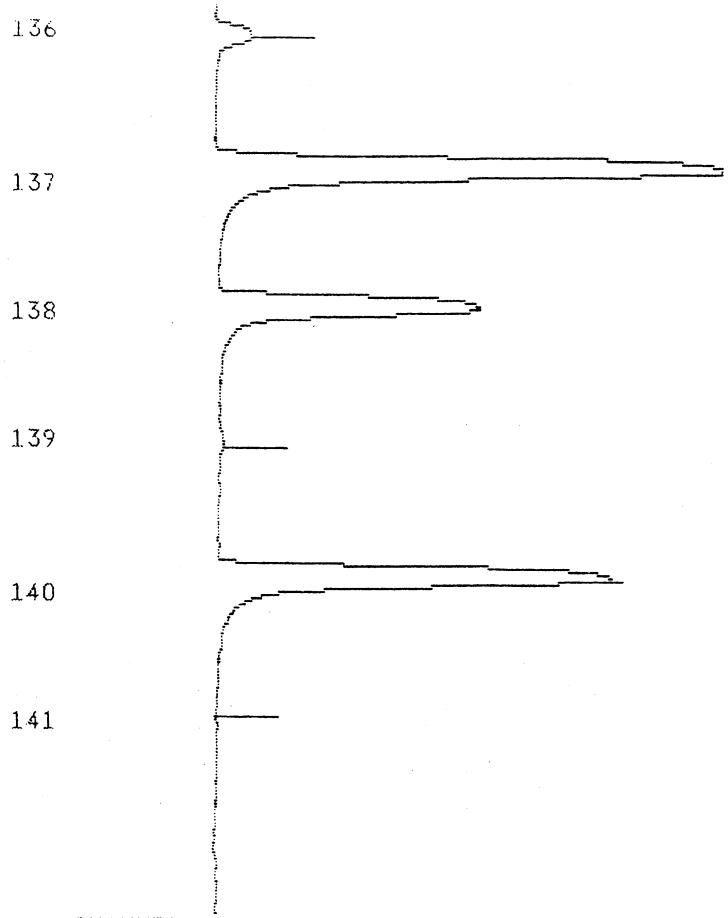
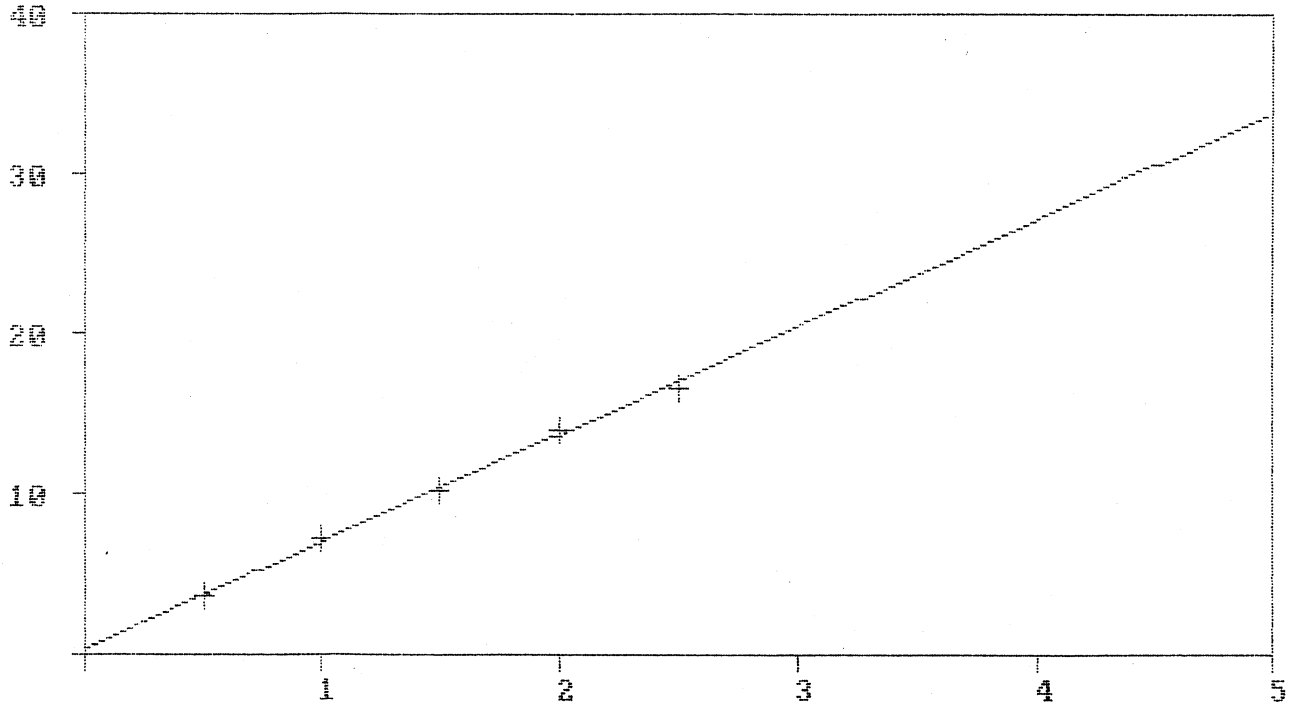



CHANNEL NAME: LDC
RUN NAME: 990916W

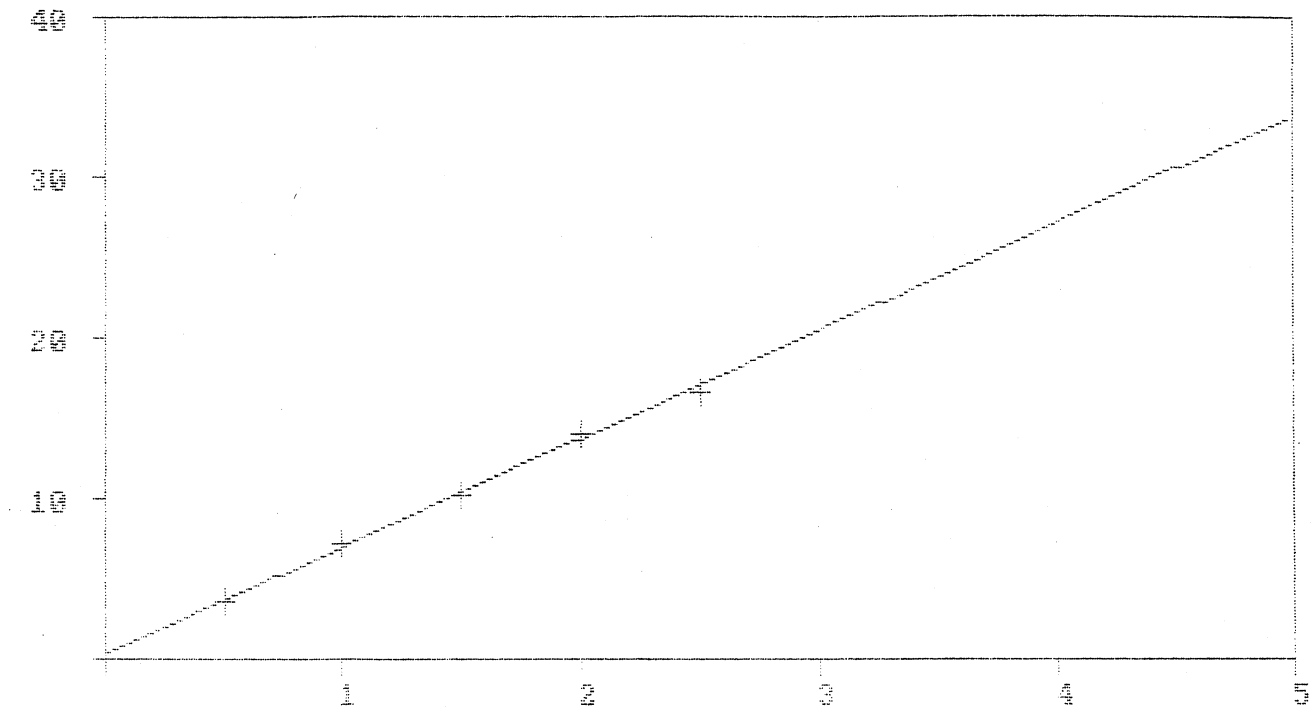



DATA TYPE: FIA
CALIBRATION ORDER: 1
INTERCEPT = 0.25
SLOPE = 6.707831

CORRELATION: .9991137

CHANNEL NAME: LDC
RUN DATE: 09-17-1999
SAMPLE TABLE NAME: 990916W

CHANNEL NAME: LDC
RUN NAME: 990916W




DATA TYPE: FIA CALIBRATION ORDER: 1
INTERCEPT = 0.25 SLOPE = 6.707331

CORRELATION: .9991137

CHANNEL NAME: LDC
RUN DATE: 09-17-1999
SAMPLE TABLE NAME: 990916W
METHOD NAME: HGWATER

| CUP# | SAMPLE ID | DIL | WGT | HEIGHT/AREA | | CONCENTRATION (ppb) | EF |
|---|---|---|---|---|---|---|---|
| 1 | PRIMER | 1 | 1 | 10.3 | | 1.492 | s |
| 2 | DUMMY | 1 | 1 | 0.0 | | -0.030 | I |
| 3 | S1: 0 | 1 | 1 | 0.0 | | -0.033 | I |
| 4 | STD2 | 1 | 1 | 3.5 | | 0.487 | |
| 5 | S3: 1 | 1 | 1 | 7.2 | | 1.033 | |
| 6 | S4: 1.5 | 1 | 1 | 10.2 | | 1.488 | |
| 7 | S5: 2 | 1 | 1 | 14.0 | | 2.053 | |
| 8 | S6: 2.5 | 1 | 1 | 16.7 | | 2.450 | |
| 9 | ICV | 1 | 1 | 10.2 | | 1.478 | 99% |
| 10 | B | 1 | 1 | 0.0 | | -0.037 | b |
| 11 | D4 | 1 | 1 | 10.2 | | 1.488 | d |
| 12 | WS 378 | 1 | 1 | 13.2 | TUG | 1.933 | 97% |
| 13 | S2: .5 | 1 | 1 | 3.7 | | 0.509 | |
| 14 | BL0916-1GKC | 1 | 1 | 0.0 | <0.03 | -0.037 | I |
| 15 | BL0916-1GKC | 1 | 1 | 0.0 | | -0.037 | s |
| 16 | BL0916S | 1 | 1 | 6.9 | 0.397 | 0.990 | 99% |
| 17 | BL0916S | 1 | 1 | 6.9 | | 0.990 | |
| 18 | BL0916DS | 1 | 1 | 7.0 | 0.301 | 1.004 | 100% |
| 19 | BL0916DS | 1 | 1 | 7.0 | | 1.004 | |
| 20 | 40618 | 2 | 1 | 6.9 | | 1.987 | |
| 21 | 40618 | 2 | 1 | 6.5 | | 1.877 | |
| 22 | 40618D | 2 | 1 | 6.9 | | 1.972 | |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 24 | 40613 | 2 | 1 | 10.2 | | 2.998 | | |
| 25 | 40618S | 2 | 1 | 9.6 | | 2.788 | | |
| 26 | 40618DS | 2 | 1 | 10.3 | | 2.999 | | |
| 27 | 40618DS | 2 | 1 | 10.0 | | 2.904 | | |
| 28 | 40618DS | 10 | 1 | 2.3 | | 3.016 | | |
| 29 | 40618DS | 10 | 1 | 2.1 | | 2.834 | | |
| 30 | 40617 | 1 | 1 | 0.0 | | -0.030 | s | |
| 31 | 40617 | 1 | 1 | 0.0 | | -0.030 | I | |
| 32 | 40619 | 2 | 1 | 9.1 | | 2.649 | | |
| 33 | 40619 | 2 | 1 | 9.1 | | 2.642 | | |
| 34 | CUP MISSED | 1 | 1 | 0.0 | | -0.030 | I | |
| 35 | B | 1 | 1 | 0.0 | | -0.037 | b | |
| 36 | D4 | 1 | 1 | 10.2 | | 1.488 | d | |
| 37 | 40620 | 1 | 1 | 12.8 | | 1.874 | | |
| 38 | 40620 | 1 | 1 | 12.4 | | 1.809 | M | |
| 39 | 42066 | 1 | 1 | 0.9 | | 0.101 | | |
| 40 | 42066 | 1 | 1 | 1.0 | | 0.109 | | |
| 41 | 42066D | 1 | 1 | 1.0 | | 0.105 | | |
| 42 | 42066D | 1 | 1 | 0.9 | | 0.098 | | |
| 43 | 42066S | 1 | 1 | 8.1 | | 1.168 | | |
| 44 | 42066S | 1 | 1 | 8.1 | | 1.175 | | |
| 45 | 42066DS | 1 | 1 | 7.7 | | 1.106 | s | |
| 46 | 42066DS | 1 | 1 | 8.1 | | 1.164 | | |
| 47 | 42067 | 1 | 1 | 0.4 | | 0.025 | I | |
| 48 | 42067 | 1 | 1 | 0.4 | | 0.029 | I | |
| 49 | 42068 | 1 | 1 | 0.2 | | -0.008 | I | |
| 50 | 42068 | 1 | 1 | 0.2 | | -0.011 | I | |
| 51 | 42104 | 1 | 1 | 0.3 | | 0.003 | I | |
| 52 | 42104 | 1 | 1 | 0.3 | | 0.003 | I | |
| 53 | 42105 | 1 | 1 | 0.2 | | -0.008 | I | |
| 54 | 42105 | 1 | 1 | 0.2 | | -0.011 | I | |
| 55 | 42106 | 1 | 1 | 0.4 | | 0.025 | I | |
| 56 | 42106 | 1 | 1 | 0.4 | | 0.018 | I | |
| 57 | CCV | 1 | 1 | 7.0 | | 1.008 | 101% | |
| 58 | B | 1 | 1 | 0.0 | | -0.037 | b | |
| 59 | D4 | 1 | 1 | 10.2 | | 1.488 | d | |
| 60 | BL0916-1N3C 50089, | 1 | 1 | 0.0 | | -0.037 | s | |
| 61 | BL0916-1N3C 44795 M.B. | 1 | 1 | 0.0 | <0.03 | -0.037 | I | |
| 62 | BL0916S | 1 | 1 | 7.1 | 0.302 | 1.022 | 102% | |
| 63 | BL0916S | 1 | 1 | 7.1 | | 1.019 | | |
| 64 | BL0916DS | 1 | 1 | 7.2 | 0.311 | 1.037 | 103% | |
| 65 | BL0916DS | 1 | 1 | 7.2 | | 1.033 | | |
| 66 | 50091 | 1 | 1 | 6.0 | 0.419 | 0.859 | | |
| 67 | 50091 | 1 | 1 | 5.7 | | 0.815 | | |
| 68 | 50091D | 1 | 1 | 6.1 | 0.436 | 0.873 | | |
| 69 | 50091D | 1 | 1 | 6.1 | | 0.870 | | |
| 70 | 50091S | 1 | 1 | 13.0 | 0.948 | 1.907 | 104% | |
| 71 | 50091S | 1 | 1 | 12.9 | | 1.885 | | |
| 72 | 50091DS | 1 | 1 | 13.1 | 0.952 | 1.922 | 105% | |
| 73 | 50091DS | 1 | 1 | 12.9 | | 1.885 | | |
| 74 | BL0916-1GKC | 1 | 1 | 0.0 | <0.03 | -0.037 | I | |
| 75 | BL0916-1GKC | 1 | 1 | 0.0 | | -0.037 | s | |
| 76 | BL0916S | 1 | 1 | 5.9 | | ~~0.840~~ | VOID SPIKING ERROR MB | |
| 77 | BL0916S | 1 | 1 | 4.9 | | ~~0.691~~ | | |
| 78 | BL0916DS | 1 | 1 | 5.7 | | ~~0.811~~ | | |
| 79 | BL0916DS | 1 | 1 | 5.4 | | ~~0.771~~ | | |
| 80 | CCV | 1 | 1 | 6.9 | | 0.997 | 100% | |
| 81 | B | 1 | 1 | 0.0 | | -0.037 | b | |
| 82 | D4 | 1 | 1 | 10.2 | | 1.488 | d | |
| 83 | 44798 | 60 | 1 | 6.8 | 36.792 | 58.290 | | |
| 84 | 44798 | 60 | 1 | 6.8 | | 58.508 | | |
| 85 | 44798D | 60 | 1 | 6.8 | 36.930 | 58.508 | | |
| 86 | 44798D | 60 | 1 | 6.8 | | 58.727 | | |
| 87 | 44798S | 60 | 1 | 13.2 | 73.328 | 115.737 | 97% | |
| 88 | 44798S | 60 | 1 | 13.3 | | 117.048 | | |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 90 | 44798DS | 60 | 1 | 13.3 | | 117.048 | s | " |
| 91 | 44798DS | 300 | 1 | 2.7 | | 109.060 | | |
| 92 | 44798DS Dil. check | 300 | 1 | 2.8 | | 113.428 | | 5% RPD |
| 93 | 44796 | 1.5 | 1 | 0.0 | <0.045 | -0.055 | I | |
| 94 | 44796 | 1.5 | 1 | 0.0 | | -0.050 | I | |
| 95 | 44797 | 1.5 | 1 | 2.5 | 0.186 | 0.496 | | |
| 96 | 44797 | 1.5 | 1 | 2.5 | | 0.502 | | |
| 97 | 44799 | 15 | 1 | 13.4 | 17.330 | 29.317 | | |
| 98 | 44799 | 15 | 1 | 13.4 | | 29.426 | | |
| 99 | 44800 | 6 | 1 | 16.7 | 9.287 | 14.697 | | |
| 100 | 44800 | 6 | 1 | 16.8 | | 14.785 | | |
| 101 | 44801 | 30 | 1 | 11.0 | 27.717 | 48.258 | | |
| 102 | 44801 | 30 | 1 | 11.0 | | 48.149 | | |
| 103 | CCV | 1 | 1 | 6.7 | | 0.968 | | 97% |
| 104 | B | 1 | 1 | 0.0 | | -0.037 | b | |
| 105 | D4 | 1 | 1 | 10.2 | | 1.488 | s | |
| 106 | 44802 | 6 | 1 | 14.5 | 8.268 | 12.731 | | |
| 107 | 44802 | 6 | 1 | 14.5 | | 12.710 | | |
| 108 | 44803 | 12 | 1 | 11.5 | 12.671 | 20.089 | | |
| 109 | 44803 | 12 | 1 | 11.5 | | 20.133 | | |
| 110 | 44804 | 1.5 | 1 | 1.1 | 0.138 | 0.201 | | |
| 111 | 44804 | 1.5 | 1 | 1.2 | | 0.207 | | |
| 112 | 44805 | 1.5 | 1 | 1.7 | 0.228 | 0.321 | | |
| 113 | 44805 | 1.5 | 1 | 1.8 | | 0.338 | | |
| 114 | BL0916-2GKC | 1 | 1 | 0.0 | <0.03 | -0.037 | I | |
| 115 | BL0916-2GKC | 1 | 1 | 0.0 | | -0.037 | I | |
| 116 | BL0916S | 1 | 1 | 5.2 | | ~~0.739~~ | | VOID: SPIKING ERROR MD |
| 117 | BL0916S | 1 | 1 | 5.3 | | ~~0.760~~ | | |
| 118 | BL09160S | 1 | 1 | 5.1 | | ~~0.728~~ | | |
| 119 | BL0916DS | 1 | 1 | 5.3 | | ~~0.746~~ | | |
| 120 | 44806 | 1.5 | 1 | 1.5 | 0.182 | 0.272 | s | |
| 121 | 44806 | 1.5 | 1 | 1.4 | | 0.256 | | |
| 122 | 44806D | 1.5 | 1 | 1.4 | 0.183 | 0.267 | | |
| 123 | 44806D | 1.5 | 1 | 1.4 | | 0.267 | | |
| 124 | 44806S | 1.5 | 1 | 8.4 | 1.253 | 1.818 | | 104% |
| 125 | 44806S | 1.5 | 1 | 8.5 | | 1.840 | | |
| 126 | CCV | 1 | 1 | 6.9 | | 0.990 | | 99% |
| 127 | B | 1 | 1 | 0.0 | | -0.037 | b | |
| 128 | D4 | 1 | 1 | 10.2 | | 1.488 | d | |
| 129 | 44806DS | 1.5 | 1 | 8.4 | 1.248 | 1.823 | | 103% |
| 130 | 44806DS | 1.5 | 1 | 8.4 | | 1.823 | | |
| 131 | 44807 | 1.5 | 1 | 2.9 | 0.398 | 0.589 | | |
| 132 | 44807 | 1.5 | 1 | 2.9 | | 0.600 | | |
| 133 | 44808 | 1.5 | 1 | 0.8 | 0.088 | 0.130 | | |
| 134 | 44808 | 1.5 | 1 | 0.9 | | 0.147 | | |
| 135 | 44809 | 1.5 | 1 | 0.8 | 0.080 | 0.125 | s | |
| 136 | 44809 | 1.5 | 1 | 0.8 | | 0.114 | | |
| 137 | WS 378 | 1 | 1 | 13.1 | | 1.922 | | 96% |
| 138 | CCV | 1 | 1 | 6.7 | | 0.968 | | 97% |
| 139 | B | 1 | 1 | 0.0 | | -0.037 | b | |
| 140 | D4 | 1 | 1 | 10.2 | | 1.488 | d | |

INTERCEPT: 0.25 LINEAR COEF: 6.707831

CORRELATION COEF: .9991137

| Zenon Number | Client | Client ID | Parameter | TS | Result | Dup. | Spike | % Rec. | Dup. Spk | % Rec. | Batch Date | Batch Code | Run Date | Run Code | Day Old | Day In | Analyst's Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 044796 | TRC-LO | OHM-RB | Mercury - | PV | 0.006 | | | | | | 99/10/08 | 1GFL | 99/10/08 | MG01 | 58. | 52. | |
| BL1008 | INTERNAL | | Mercury - | PV | -0.005 | -99999.0 | 0.102 | 102. | 0.102 | 102. | 99/10/08 | 1GFL | 99/10/08 | MG01 | $$$ | $$$ | |
| 044795 | TRC-LO | MB R456 | Mercury - | PV | -0.005 | -99999.0 | 0.103 | 103. | 0.103 | 103. | 99/10/08 | 2GFL | 99/10/08 | MG01 | 58. | 52. | |
| 044797 | TRC-LO | OHM-I-FB | Mercury - | PV | -0.005 | | | | | | 99/10/08 | 2GFL | 99/10/08 | MG01 | 59. | 52. | |
| 044804 | TRC-LO | OHM-Oa-R1 | Mercury - | PV | 0.047 | 0.047 | 0.149 | 101. | 0.148 | 101. | 99/10/08 | 2GFL | 99/10/08 | MG01 | 58. | 52. | *PDS* |
| 044805 | TRC-LO | OHM-Ob-R1 | Mercury - | PV | 0.043 | | | | | | 99/10/08 | 2GFL | 99/10/08 | MG01 | 58. | 52. | |
| 044806 | TRC-LO | OHM-Oa-R2 | Mercury - | PV | 0.046 | | | | | | 99/10/08 | 2GFL | 99/10/08 | MG01 | 58. | 52. | |
| 044807 | TRC-LO | OHM-Ob-R2 | Mercury - | PV | 0.034 | | | | | | 99/10/08 | 2GFL | 99/10/08 | MG01 | 58. | 52. | |
| 044808 | TRC-LO | OHM-Oa-R3 | Mercury - | PV | 0.034 | | | | | | 99/10/08 | 2GFL | 99/10/08 | MG01 | 57. | 52. | |
| 044809 | TRC-LO | OHM-Ob-R3 | Mercury - | PV | 0.029 | | | | | | 99/10/08 | 2GFL | 99/10/08 | MG01 | 57. | 52. | |
| 044888 | TRC-LO | OHM-O-FB | Mercury - | PV | 0.005 | | | | | | 99/10/08 | 2GFL | 99/10/08 | MG01 | 59. | 52. | |
| 047488 | TRC-LO | [redacted] | Mercury - | PV | -0.005 | -99999.0 | 0.103 | 103. | 0.103 | 103. | 99/10/08 | 2GFL | 99/10/08 | MG01 | 45. | 42. | |
| 047490 | TRC-LO | [redacted] | Mercury - | PV | 0.006 | | | | | | 99/10/08 | 2GFL | 99/10/08 | MG01 | 46. | 42. | |
| BL1008 | INTERNAL | | Mercury - | PV | -0.005 | -99999.0 | 0.103 | 103. | 0.103 | 103. | 99/10/08 | 2GFL | 99/10/08 | MG01 | $$$ | $$$ | |
| 047499 | TRC-LO | [redacted] | Mercury - | PV | -0.005 | -0.005 | 0.103 | 101. | 0.105 | 102. | 99/10/08 | 3GFL | 99/10/08 | MG01 | 46. | 42. | *PDS* |
| 047500 | TRC-LO | [redacted] | Mercury - | PV | 0.105 | | | | | | 99/10/08 | 3GFL | 99/10/08 | MG01 | 45. | 42. | |
| 047501 | TRC-LO | [redacted] | Mercury - | PV | 0.136 | | | | | | 99/10/08 | 3GFL | 99/10/08 | MG01 | 45. | 42. | |
| 047502 | TRC-LO | [redacted] | Mercury - | PV | 0.169 | | | | | | 99/10/08 | 3GFL | 99/10/08 | MG01 | 44. | 42. | |
| BL1008 | INTERNAL | | Mercury - | PV | -0.005 | -99999.0 | 0.101 | 101. | 0.100 | 100. | 99/10/08 | 3GFL | 99/10/08 | MG01 | $$$ | $$$ | |

19 Tests for OHFLT with an MDL of 0.010 ug Validated By CMK Control Chart Updated N/A IO Requirements met N/A

00075

# LDC AUTOSAMPLER RUN LOG (MERCURY)

Date: 99.10.08 Run Code: MG01 Matrix: IMP. (OHFLT)

Analyst: MG Units: µg (see comments) MDL: 0.01

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 1 | | | Primer (ICV) | | | |
| 2 | | | Dummy (Blk) | | | |
| 3 | | | Std 1 (S1) | 0.0 | | |
| 4 | | | Std 2 (S2) | 0.5 | | |
| 5 | | | Std 3 (S3) | 1.0 | | |
| 6 | | | Std 4 (S4) | 1.5 | | |
| 7 | | | Std 5 (S5) | 2.0 | | |
| 8 | | | Std 6 (S6) | 2.5 | | |
| 9 | | | ICV | | | |
| 10 | | | B (Std 1) | | | |
| 11 | | | D4 (Std 4) | | | |
| 12 | | | | | | |
| 13 | | | | | | |
| 14 | | | | | | |
| 15 | | | | | | |
| 16 | | | | | | |
| 17 | | | | | | |
| 18 | | | | | | |
| 19 | | | | | | |
| 20 | | | | | | |
| 21 | | | B | | | |
| 22 | | | D4 | | | |
| 23 | | | 44805 | | | |
| 24 | | | " | | | |
| 25 | | | 44806 | | | |
| 26 | | | " | | | |
| 27 | | | 44807 | | | |
| 28 | | | " | | | |
| 29 | | | 44808 | | | |
| 30 | | | " | | | |
| 31 | | | 44809 | | | |
| 32 | | | " | | | |
| 33 | | | 44888 | | | |
| 34 | | | 44888 | | | |
| 35 | | | 47490 | | | |
| 36 | | | " | | | |
| 37 | | | 47489 a | | | |
| 38 | | | " | | | |
| 39 | | | 47489 b | | | |
| 40 | | | " | | | |

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 41 | | | 47489 c | | | |
| 42 | | | " | | | |
| 43 | | | CCV | | | |
| 44 | | | B | | | |
| 45 | | | D4 | | | |
| 46 | | | BL1008 | 36 fl | | |
| 47 | | | " | | | |
| 48 | | | BL1008 S | | | |
| 49 | | | " | | | |
| 50 | | | BL1008 DS | | | |
| 51 | | | " | | | |
| 52 | | | 47499 | | | |
| 53 | | | " | | | |
| 54 | | | 47499 D | | | |
| 55 | | | " | | | |
| 56 | | | 47499 S | | | |
| 57 | | | " | | | |
| 58 | | | 47499 DS | | | |
| 59 | | | " | | | |
| 60 | | | 47500 | | | |
| 61 | | | " | | | |
| 62 | | | 47501 | | | |
| 63 | | | " | | | |
| 64 | | | 47502 | | | |
| 65 | | | " | | | |
| 66 | | | CCV | | | |
| 67 | | | B | | | |
| 68 | | | D4 | | | |
| 69 | | | 47503 | REPEATED | | |
| 70 | | | " | | | |
| 71 | | | 51449 a | | | |
| 72 | | | " | | | |
| 73 | | | 51449 b | | | |
| 74 | | | " | | | |
| 75 | | | 51449 c | | | |
| 76 | | | " | | | |
| 77 | | | 51450 | | | |
| 78 | | | " | | | |
| 79 | | | 51459 | | | |
| 80 | | | " | | | |

Comments: *** "HG-347" and "MISA12" units are expressed in mg/L not ug/L

ICV = 1.5 ug/L, CCV = 1.0 ug/L, Blank Spike = 1.0 ug/L for liquid samples.

ICV = 1.5 mg/kg, CCV = 1.0 mg/kg, Blank Spike = 1.0 mg/kg for solid samples.

# LDC AUTOSAMPLER RUN LOG (MERCURY)

Date: 99.10.08 Run Code: MG01 Matrix: IMP (OHFLT)

alyst: MG Units: µg (see comments) MDL: 0.01

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 1 | | | Primer (ICV) | | | |
| 2 | | | Dummy (Blk) | | | |
| 3 | | | Std 1 (S1) | 0.0 | | |
| 4 | | | Std 2 (S2) | 0.5 | | |
| 5 | | | Std 3 (S3) | 1.0 | | |
| 6 | | | Std 4 (S4) | 1.5 | | |
| 7 | | | Std 5 (S5) | 2.0 | | |
| 8 | | | Std 6 (S6) | 2.5 | | |
| 9 | | | ICV | | | |
| 10 | | | B (Std 1) | | | |
| 11 | | | D4 (Std 4) | | | |
| 12 | | | WS 378 | | | |
| 13 | | | ORG. REF | | | |
| 14 | | | BL1008 | 1GFL | | |
| 15 | | | " | | | |
| 16 | | | BL1008 S | | | |
| 17 | | | " | | | |
| 18 | | | BL1008 DS | | | |
| 19 | | | " | | | |
| 20 | | | 54470 | | | |
| 21 | | | " | | | |
| 22 | | | 54470 D | | | |
| 23 | | | " | | | |
| 24 | | | 54470 S | | | |
| 25 | | | " | | | |
| 26 | | | 54470 DS | | | |
| 27 | | | " | | | |
| 28 | | | 42478 | | | |
| 29 | | | " | | | |
| 30 | | | 42478 D | | | |
| 31 | | | " | | | |
| 32 | | | 42478 S | | | |
| 33 | | | " | | | |
| 34 | | | CCV | | | |
| 35 | | | B | | | |
| 36 | | | D4 | | | |
| 37 | | | 42478 DS | | | |
| 38 | | | " | | | |
| 39 | | | 42477 a | | | |
| 40 | | | " | | | |
| 41 | | | 42477 b | | | |
| 42 | | | " | | | |
| 43 | | | 42477 c | | | |
| 44 | | | " | | | |
| 45 | | | 42479 | | | |
| 46 | | | " | | | |
| 47 | | | 42480 | | | |
| 48 | | | " | | | |
| 49 | | | 42481 | | | |
| 50 | | | " | | | |
| 51 | | | 42515 | | | |
| 52 | | | " | | | |
| 53 | | | 42516 | | | |
| 54 | | | " | | | |
| 55 | | | 42517 | | | |
| 56 | | | " | | | |
| 57 | | | CCV | | | |
| 58 | | | B | | | |
| 59 | | | D4 | | | |
| 60 | | | 42518 | | | |
| 61 | | | " | | | |
| 62 | | | 44796 | | | |
| 63 | | | " | | | |
| 64 | | | BL1008 | 2GFL | | |
| 65 | | | " | | | |
| 66 | | | BL1008 S | | | |
| 67 | | | " | | | |
| 68 | | | BL1008 DS | | | |
| 69 | | | " | | | |
| 70 | | | 44804 | | | |
| 71 | | | " | | | |
| 72 | | | 44804 D | | | |
| 73 | | | " | | | |
| 74 | | | 44804 S | | | |
| 75 | | | " | | | |
| 76 | | | 44804 DS | | | |
| 77 | | | " | | | |
| 78 | | | 44797 | | | |
| 79 | | | " | | | |
| 80 | | | CCV | | | |

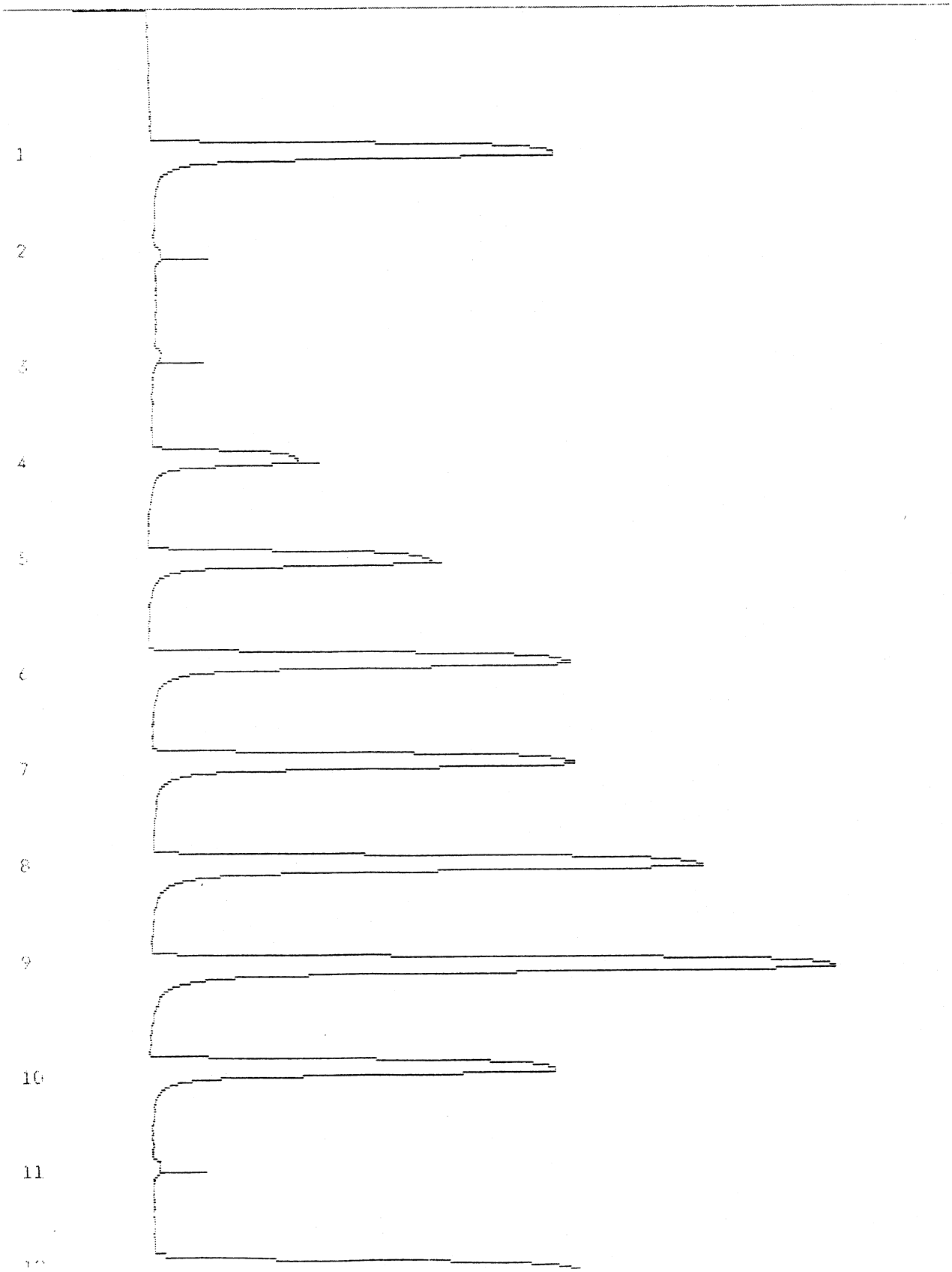
Comments: *** "HG-347" and "MISA12" units are expressed in mg/L not ug/L

ICV = 1.5 ug/L, CCV = 1.0 ug/L, Blank Spike = 1.0 ug/L for liquid samples.

ICV = 1.5 mg/kg, CCV = 1.0 mg/kg, Blank Spike = 1.0 mg/kg for solid samples.

000 1/A

JN DATE: 10-08-1999 CHART DATE: 10-09-1999
CHART SPEED: 30
DATA FILE NAME: C:\DP4\DATA\991008W.DAT



# LDC AUTOSAMPLER RUN LOG (MERCURY)

Date: 99.10.08 Run Code: MG01 Matrix: IMP. (OHFLT)

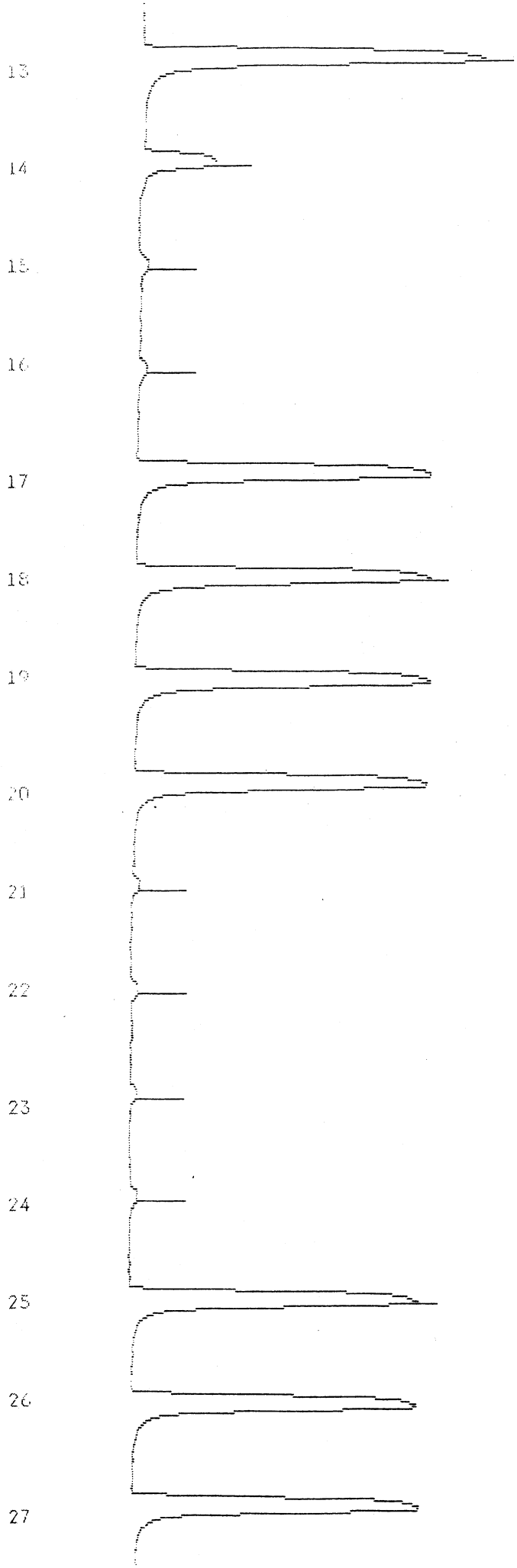
alyst: MG Units: µg (see comments) MDL: 0.01

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 1 | | | Primer (ICV) | | | |
| 2 | | | Dummy (Blk) | | | |
| 3 | | | Std 1 (S1) | 0.0 | | |
| 4 | | | Std 2 (S2) | 0.5 | | |
| 5 | | | Std 3 (S3) | 1.0 | | |
| 6 | | | Std 4 (S4) | 1.5 | | |
| 7 | | | Std 5 (S5) | 2.0 | | |
| 8 | | | Std 6 (S6) | 2.5 | | |
| 9 | | | ICV | | | |
| 10 | | | B (Std 1) | | | |
| 11 | | | D4 (Std 4) | | | |
| 12 | | | | | | |
| 13 | | | | | | |
| 14 | | | | | | |
| 15 | | | | | | |
| 16 | | | | | | |
| 17 | | | | | | |
| 18 | | | | | | |
| 19 | | | | | | |
| 20 | | | | | | |
| 21 | | 1/10 | 51460 | | | |
| 22 | | | " | | | |
| 23 | | | 51461 | | | |
| 24 | | | " | | | |
| 25 | | | BL1008 | 4GFL | | |
| 26 | | | " | | | |
| 27 | | | BL1008 S | | | |
| 28 | | | " | | | |
| 29 | | | CCV | | | |
| 30 | | | B | | | |
| 31 | | | D4 | | | |
| 32 | | | BL1008 DS | | | |
| 33 | | | " | | | |
| 34 | | | 51664 | | | |
| 35 | | | " | | | |
| 36 | | | 51664 D | | | |
| 37 | | | " | | | |
| 38 | | | 51664 S | | | |
| 39 | | | " | | | |
| 40 | | | 51664 DS | | | |
| 41 | | | 51664 DS | | | |
| 42 | | 1/10 | 51462 | | | |
| 43 | | | " | | | |
| 44 | | | 51463 | | | |
| 45 | | | " | | | |
| 46 | | | 53129 a | | | |
| 47 | | | " | | | |
| 48 | | | 53129 b | | | |
| 49 | | | " | | | |
| 50 | | | 53129 c | | | |
| 51 | | | " | | | |
| 52 | | | CCV | | | |
| 53 | | | B | | | |
| 54 | | | D4 | | | |
| 55 | | | 53130 | | | |
| 56 | | | " | | | |
| 57 | | | 53138 | | | |
| 58 | | | " | | | |
| 59 | | | 53139 | | | |
| 60 | | | " | | | |
| 61 | | | 53140 | | | |
| 62 | | | " | | | |
| 63 | | | 53141 | | | |
| 64 | | | " | | | |
| 65 | | | 53142 | | | |
| 66 | | | " | | | |
| 67 | | | BL1008 | 5GFL | | |
| 68 | | | " | | | |
| 69 | | | BL1008 S | | | |
| 70 | | | " | | | |
| 71 | | | BL1008 DS | | | |
| 72 | | | " | | | |
| 73 | | | 53144 | | | |
| 74 | | | " | | | |
| 75 | | | CCV | | | |
| 76 | | | B | | | |
| 77 | | | D4 | | | |
| 78 | | | 53144 D | | | |
| 79 | | | " | | | |
| 80 | | | 53144 S | | | |

Comments: *** "HG-347" and "MISA12" units are expressed in mg/L not ug/L

ICV = 1.5 ug/L, CCV = 1.0 ug/L, Blank Spike = 1.0 ug/L for liquid samples.

ICV = 1.5 mg/kg, CCV = 1.0 mg/kg, Blank Spike = 1.0 mg/kg for solid samples.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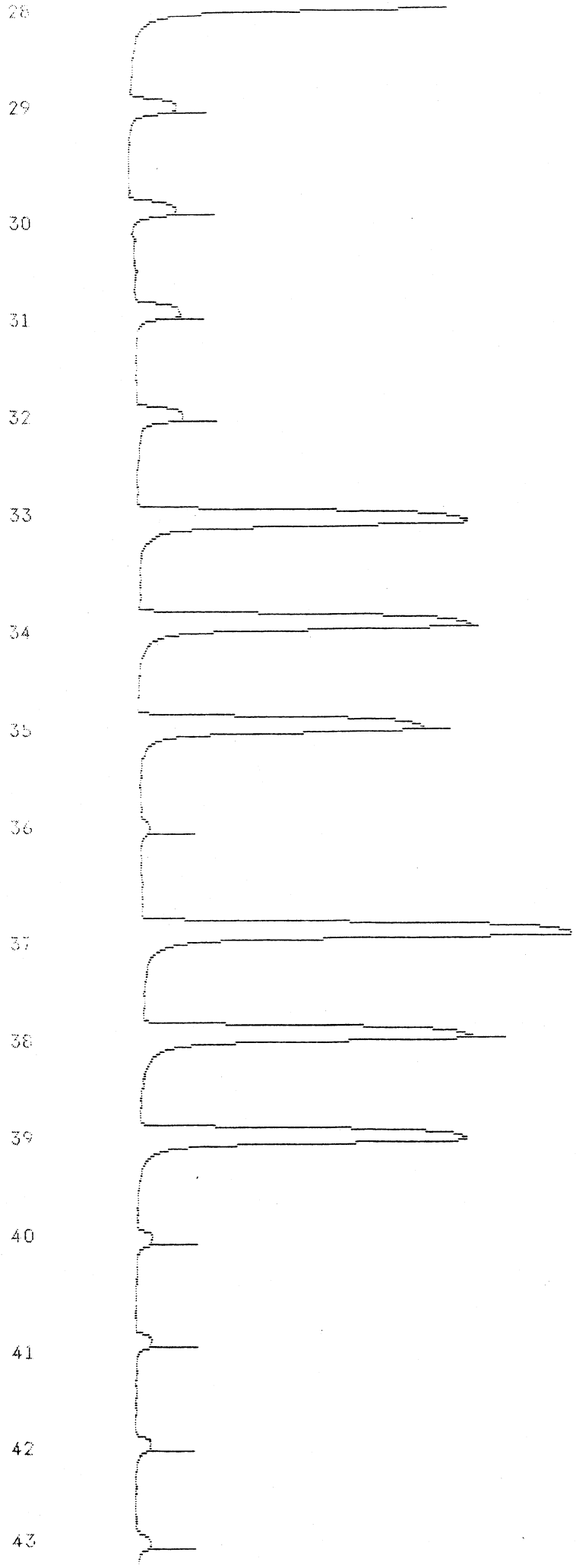

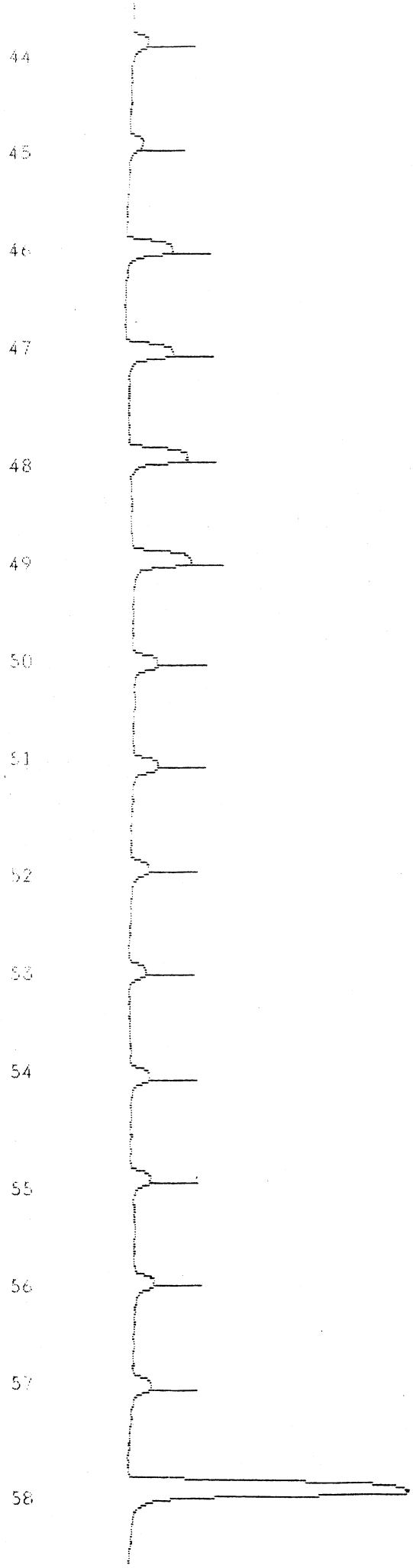
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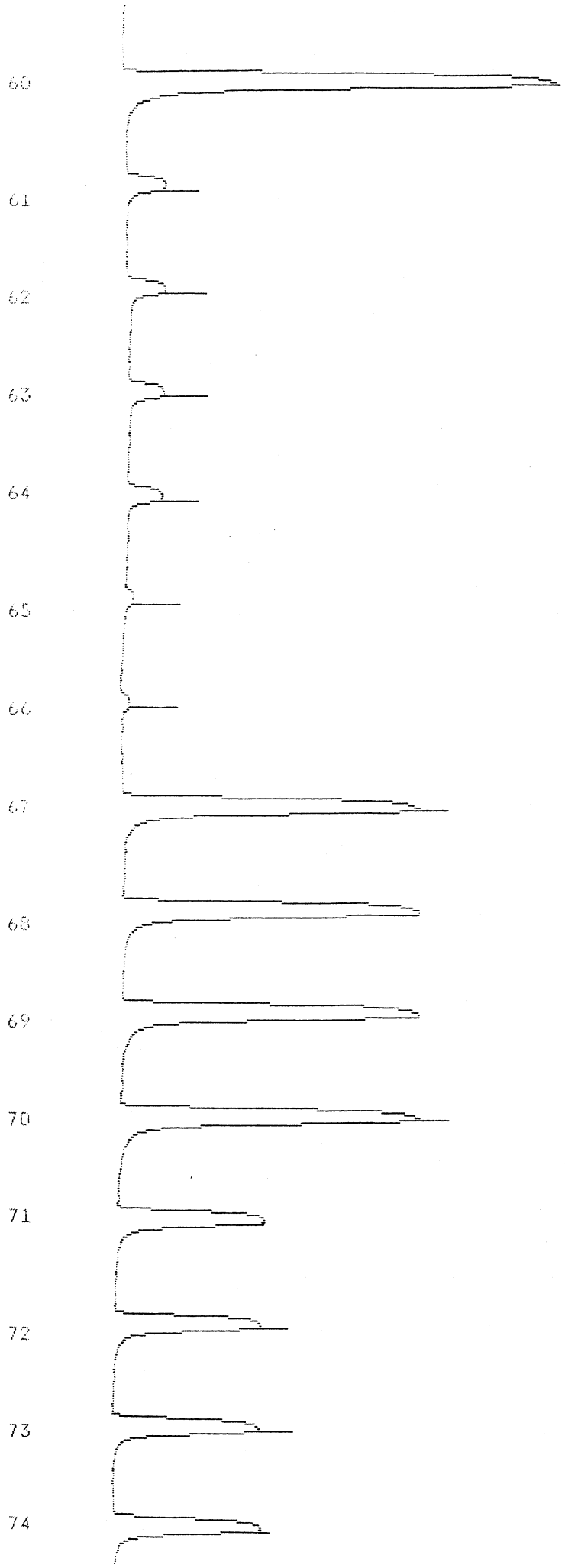
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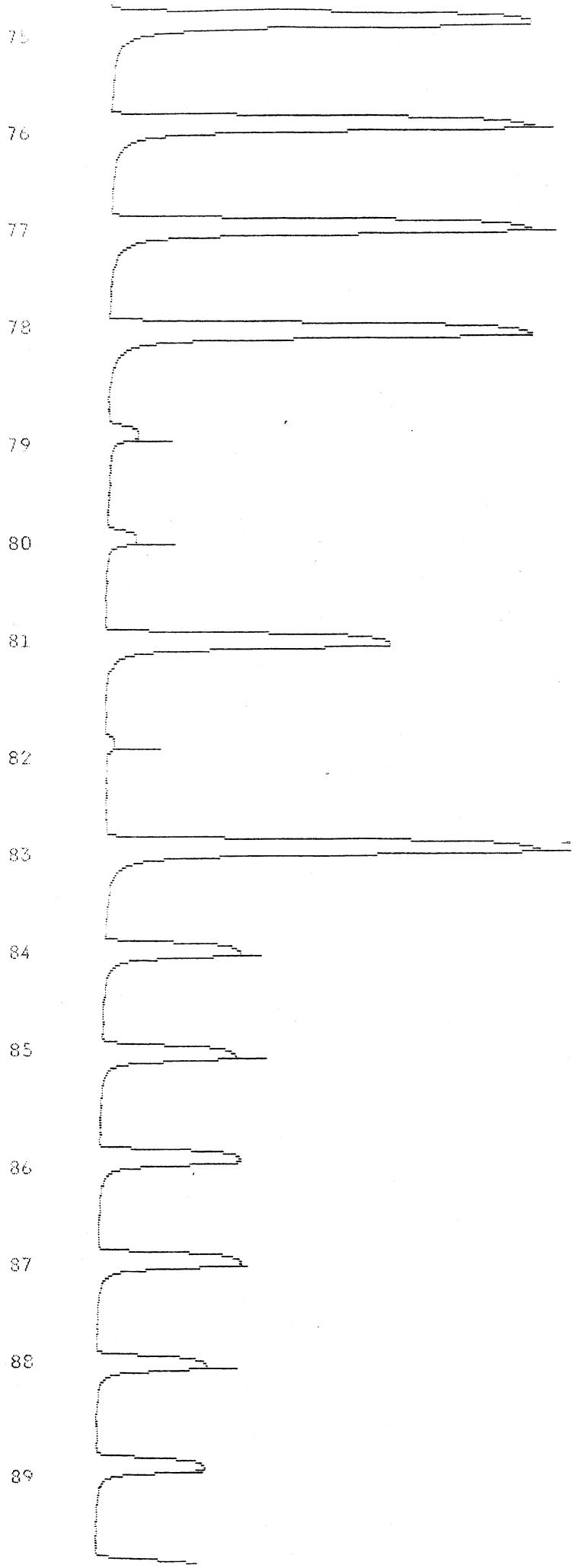
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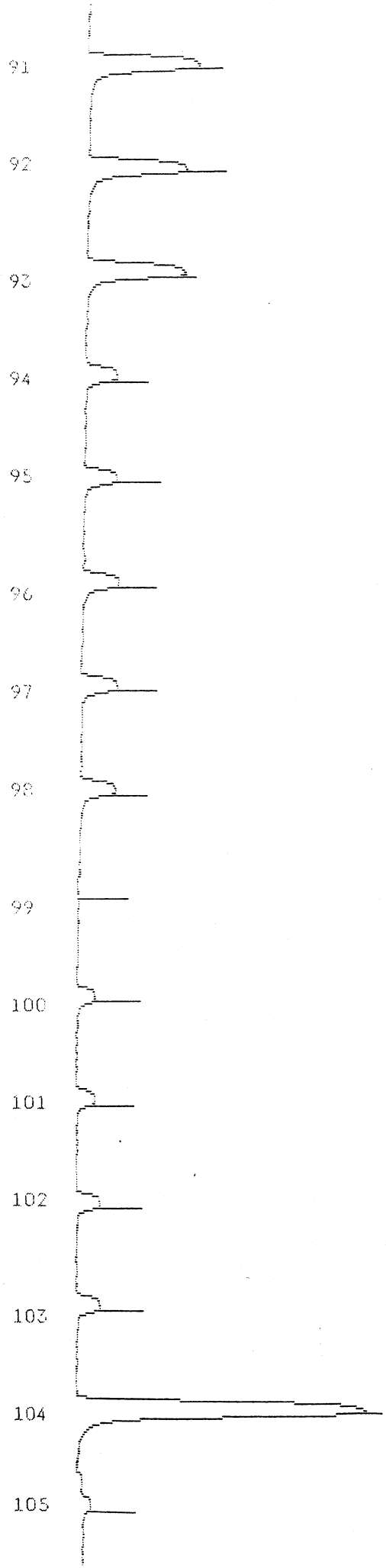
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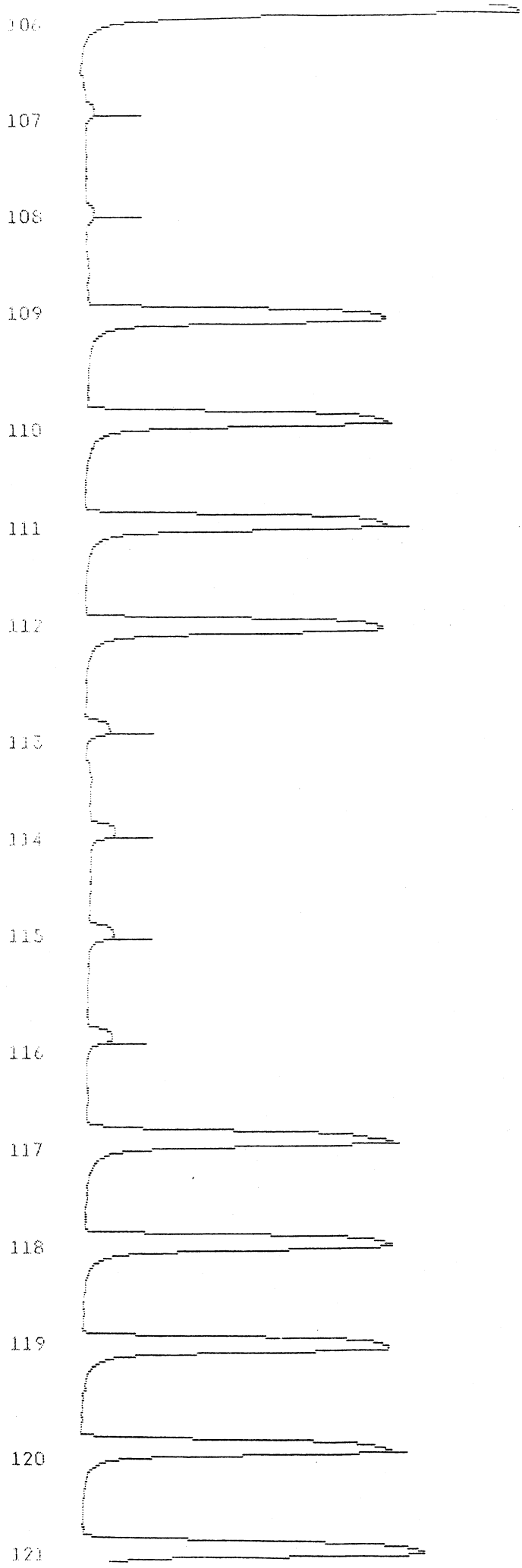
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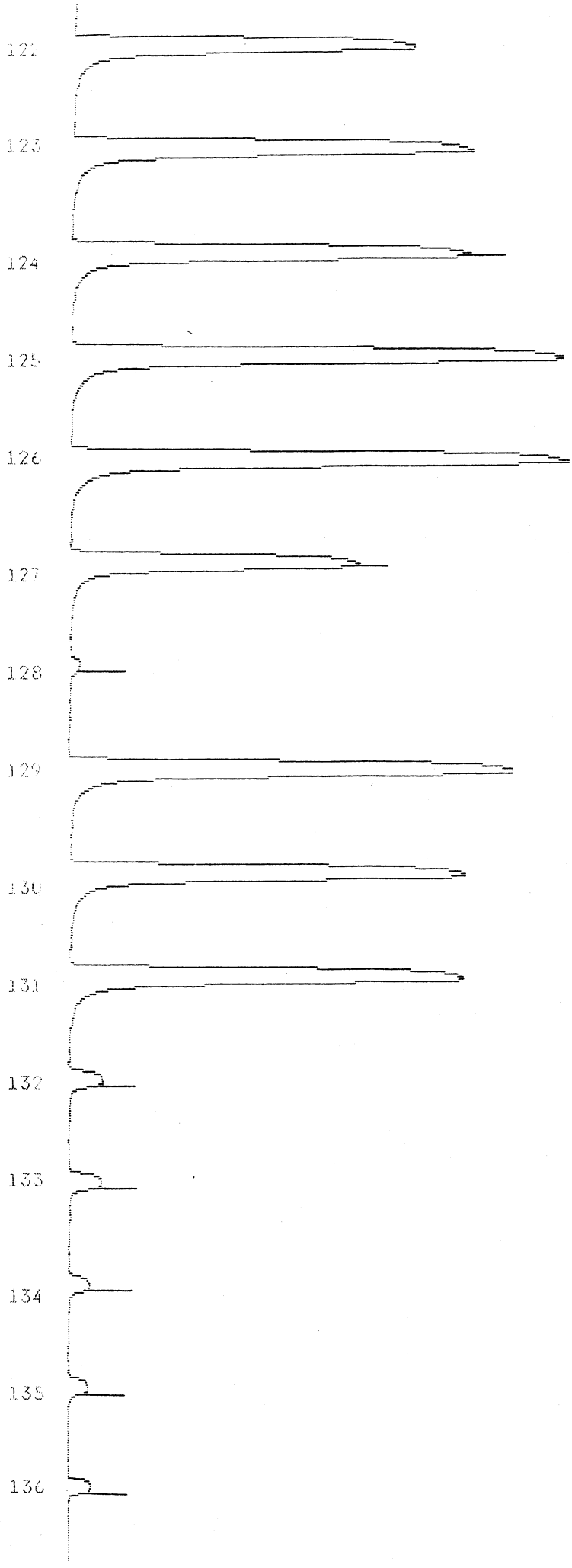
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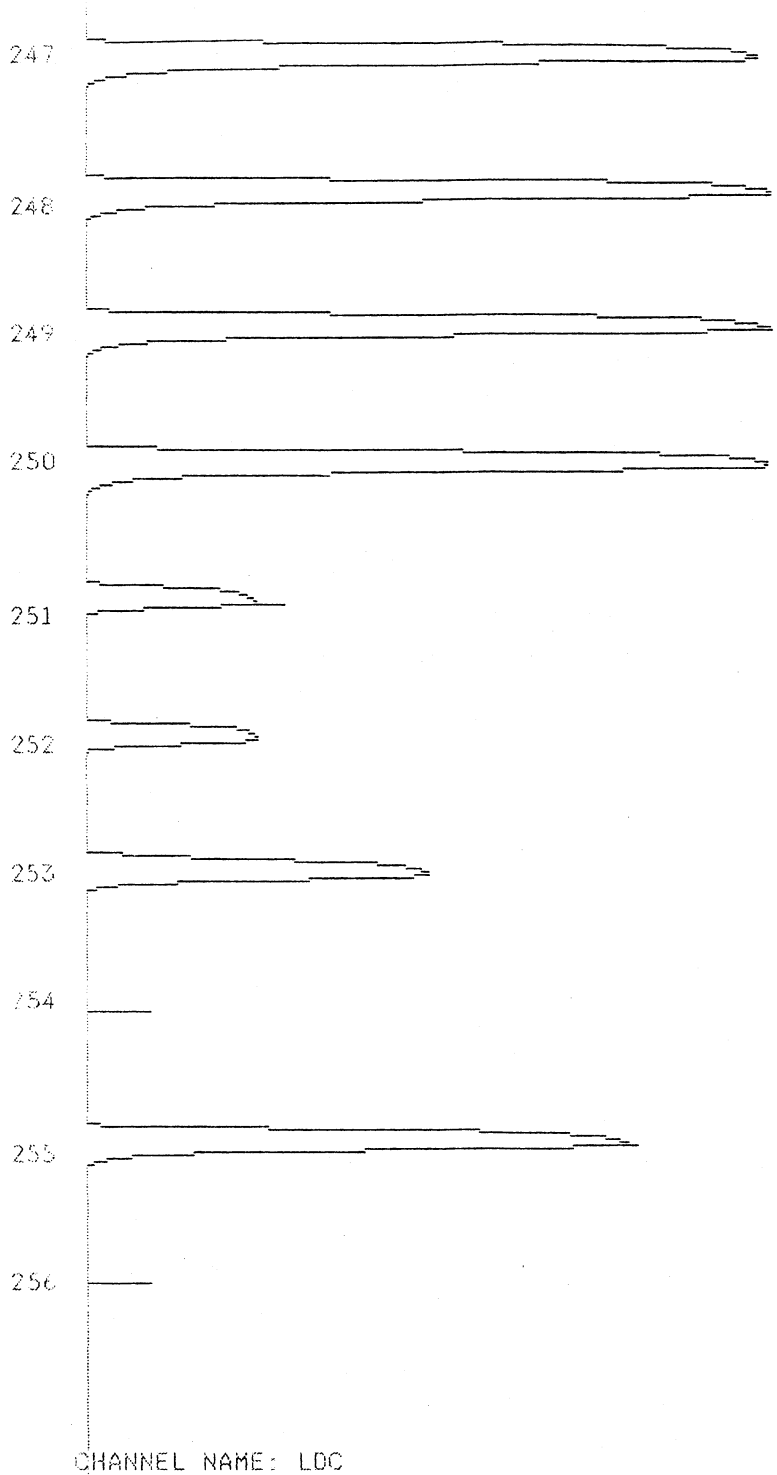
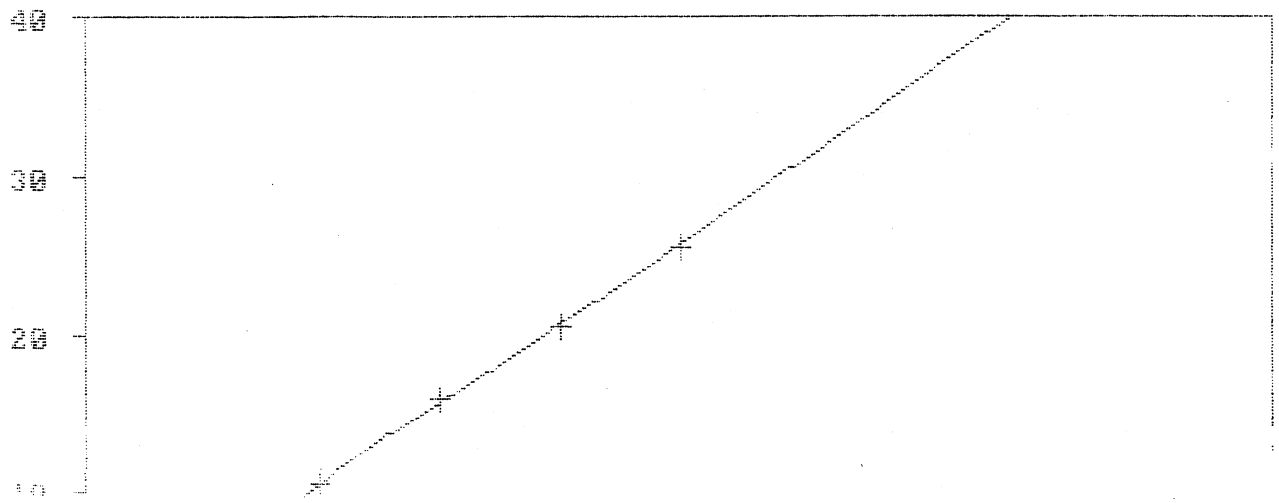



CHANNEL NAME: LDC
RUN NAME: 991008W



DATA TYPE: [illegible]
INTERCEPT [illegible]

CHANNEL [illegible]
RUN [illegible]
SAMPLE [illegible]
METHOD [illegible]

ppb

| CURV | SAMPLE ID | [illegible] | WGT | WEIGHT/AREA | CONCENTRATION | EF |
|---|---|---|---|---|---|---|
| | [illegible] | 1 | 1 | 15.3 | 1.474 | s |
| [illegible] | [illegible] | 1 | 1 | 0.1 | -0.019 | I |
| | [illegible] | 1 | 1 | 0.1 | -0.019 | I |
| | [illegible] | 1 | 1 | 5.4 | 0.503 | |
| [illegible] | [illegible] | 1 | 1 | 10.7 | 1.016 | |
| [illegible] | [illegible] | 1 | 1 | 15.8 | 1.521 | |
| [illegible] | STD4 | 1 | 1 | 15.9 | 1.526 | |
| [illegible] | S5: 2 | 1 | 1 | 20.6 | 1.989 | |
| 9 | S6: 2.5 | 1 | 1 | 25.7 | 2.489 | |
| 10 | ICV | 1 | 1 | 15.2 | 1.462 | 98% |
| 11 | B | 1 | 1 | 0.0 | -0.031 | b |
| 12 | D4 | 1 | 1 | 15.8 | 1.521 | d |
| 13 | WC 378 | 1 | 1 | 12.6 | ~~1.203~~ | VOID MB |
| 14 | ORG REF | 1 | 1 | 2.4 | ~~0.202~~ | VOID MB |
| 15 | BL1008-1GFL 42476 | 1 | 1 | 0.0 | <0.005 -0.026 | I |
| 16 | BL1008-1GFL | 1 | 1 | 0.0 | -0.031 | s |
| 17 | BL1008S | 1 | 1 | 10.8 | 0.102 1.026 | 102% |
| 18 | BL1008S | 1 | 1 | 10.7 | 1.021 | |
| 19 | BL1008DS | 1 | 1 | 10.7 | 0.102 1.023 | 102% |
| 20 | BL1008DS | 1 | 1 | 10.7 | 1.016 | |
| 21 | 54470 | 1 | 1 | 0.0 | <0.01 -0.031 | I |
| 22 | 54470 | 1 | 1 | 0.0 | -0.031 | I |
| 23 | 54470D | 1 | 1 | 0.0 | <0.01 -0.031 | I |
| 24 | 54470D | 1 | 1 | 0.0 | -0.028 | I |
| 25 | 54470S | 1 | 1 | 10.5 | 0.099 0.995 | 99% |
| 26 | 54470S | 1 | 1 | 10.4 | 0.992 | |
| 27 | 54470DS | 1 | 1 | 10.5 | 0.100 0.997 | 100% |
| 28 | 54470DS | 1 | 1 | 10.5 | 0.997 | |
| 29 | 42478 | 1 | 1 | 1.4 | 0.011 0.106 | |
| 30 | 42478 | 1 | 1 | 1.4 | 0.106 | |
| 31 | 42478D | 1 | 1 | 1.4 | 0.011 0.108 | s |
| 32 | 42478D | 1 | 1 | 1.4 | 0.108 | |
| 33 | 42478S | 1 | 1 | 12.1 | 0.116 1.160 | 105% |
| 34 | 42478S | 1 | 1 | 12.1 | 1.157 | |
| 35 | CCV | 1 | 1 | 10.4 | 0.992 | 99% |
| 36 | B | 1 | 1 | 0.0 | -0.031 | b |
| 37 | D4 | 1 | 1 | 15.8 | 1.521 | d |
| 38 | 42478DS | 1 | 1 | 12.1 | 0.115 1.157 | 104% |
| 39 | 42478DS | 1 | 1 | 12.0 | 1.148 | |
| 40 | 42477 A | 1 | 1 | 0.3 | <0.005 -0.002 | I |
| 41 | 42477 A | 1 | 1 | 0.3 | -0.004 | I |
| 42 | 42477 B | 1 | 1 | 0.3 | <0.005 -0.004 | I |
| 43 | 42477 B | 1 | 1 | 0.2 | -0.009 | I |
| 44 | 42477 C | 1 | 1 | 0.2 | <0.005 -0.007 | I |
| 45 | 42477 C | 1 | 1 | 0.2 | -0.014 | I |

TUG

00088

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 47 | 42477 | 1 | 1 | 1.0 | | 0.141 | | |
| 48 | 42480 | 1 | 1 | 1.8 | 0.015 | 0.149 | | |
| 49 | 42480 | 1 | 1 | 1.9 | | 0.151 | | |
| 50 | 42481 | 1 | 1 | 0.5 | <0.005 | 0.022 | | |
| 51 | 42481 | 1 | 1 | 0.6 | | 0.024 | | |
| 52 | 42515 | 1 | 1 | 0.2 | <0.005 | -0.007 | I | |
| 53 | 42515 | 1 | 1 | 0.2 | | -0.014 | I | |
| 54 | 42516 | 1 | 1 | 0.2 | <0.005 | -0.007 | R | |
| 55 | 42516 | 1 | 1 | 0.2 | | -0.007 | R | |
| 56 | 42517 | 1 | 1 | 0.3 | <0.005 | -0.002 | I | |
| 57 | 42517 | 1 | 1 | 0.2 | | -0.012 | R | |
| 58 | CCV | 1 | 1 | 10.3 | | 0.983 | 98% | |
| 59 | B | 1 | 1 | 0.0 | | -0.031 | b | |
| 60 | D4 | 1 | 1 | 15.8 | | 1.521 | d | |
| 61 | 42518 | 1 | 1 | 1.0 | 0.007 | 0.070 | s | |
| 62 | 42518 | 1 | 1 | 1.0 | | 0.068 | | |
| 63 | 44796 | 1 | 1 | 0.9 | 0.006 | 0.056 | | |
| 64 | 44796 | 1 | 1 | 0.9 | | 0.053 | | |
| 65 | BL1008-2GFL 44795,47488 | 1 | 1 | 0.0 | <0.005 | -0.031 | I | |
| 66 | BL1008-2GFL | 1 | 1 | 0.0 | | -0.031 | I | |
| 67 | BL1008S | 1 | 1 | 10.8 | 0.103 | 1.030 | 103% | |
| 68 | BL1008S | 1 | 1 | 10.9 | | 1.035 | | |
| 69 | BL1008DS | 1 | 1 | 10.8 | 0.103 | 1.028 | 103% | |
| 70 | BL1008DS | 1 | 1 | 10.9 | | 1.035 | | |
| 71 | 44804 | 1 | 1 | 5.1 | 0.047 | 0.472 | | |
| 72 | 44804 | 1 | 1 | 5.1 | | 0.468 | | |
| 73 | 44804D | 1 | 1 | 5.1 | 0.047 | 0.465 | | |
| 74 | 44804D | 1 | 1 | 5.2 | | 0.477 | | |
| 75 | 44804S | 1 | 1 | 15.4 | 0.149 | 1.481 | 101% | |
| 76 | 44804S | 1 | 1 | 15.5 | | 1.493 | s | |
| 77 | 44804DS | 1 | 1 | 15.4 | 0.148 | 1.478 | 101% | |
| 78 | 44804DS | 1 | 1 | 15.5 | | 1.488 | | |
| 79 | 44797 | 1 | 1 | 0.7 | <0.005 | 0.041 | | |
| 80 | 44797 | 1 | 1 | 0.8 | | 0.046 | | |
| 81 | CCV | 1 | 1 | 10.5 | | 1.002 | 100% | |
| 82 | B | 1 | 1 | 0.0 | | -0.031 | b | |
| 83 | D4 | 1 | 1 | 15.8 | | 1.521 | d | |
| 84 | 44805 | 1 | 1 | 4.7 | 0.043 | 0.432 | | |
| 85 | 44805 | 1 | 1 | 4.7 | | 0.429 | | |
| 86 | 44806 | 1 | 1 | 4.9 | 0.046 | 0.453 | | |
| 87 | 44806 | 1 | 1 | 5.0 | | 0.456 | | |
| 88 | 44807 | 1 | 1 | 3.8 | 0.034 | 0.338 | | |
| 89 | 44807 | 1 | 1 | 3.7 | | 0.333 | | |
| 90 | 44808 | 1 | 1 | 3.8 | 0.034 | 0.338 | | |
| 91 | 44808 | 1 | 1 | 3.7 | | 0.333 | s | |
| 92 | 44809 | 1 | 1 | 3.3 | 0.029 | 0.290 | | |
| 93 | 44809 | 1 | 1 | 3.3 | | 0.290 | | |
| 94 | 44888 | 1 | 1 | 0.8 | 0.005 | 0.051 | | |
| 95 | 44888 | 1 | 1 | 0.8 | | 0.051 | | |
| 96 | MA 47490 | 1 | 1 | 0.9 | 0.006 | 0.060 | | |
| 97 | 47490 | 1 | 1 | 1.0 | | 0.065 | | |
| 98 | 47489 A | 1 | 1 | 0.9 | | 0.058 | RERUN ON 09/10/99 | |
| 99 | 47489 A | 1 | 1 | 0.0 | <0.005 | -0.031 | I | |
| 100 | 47489 B | 1 | 1 | 0.3 | | -0.004 | I | |
| 101 | 47489 B | 1 | 1 | 0.3 | <0.005 | -0.002 | I | |
| 102 | 47489 C | 1 | 1 | 0.4 | | 0.012 | | |
| 103 | 47489 C | 1 | 1 | 0.4 | | 0.012 | | |
| 104 | CCV | 1 | 1 | 10.1 | | 0.961 | 96% | |
| 105 | B | 1 | 1 | 0.0 | | -0.031 | b | |
| 106 | D4 | 1 | 1 | 15.8 | | 1.521 | s | |
| 107 | BL1008-3GFL | 1 | 1 | 0.0 | <0.005 | -0.028 | I | |
| 108 | BL1008-3GFL | 1 | 1 | 0.0 | | -0.031 | I | |
| 109 | BL1008S | 1 | 1 | 10.5 | 0.101 | 0.999 | 101 | |
| 110 | BL1008S | 1 | 1 | 10.6 | | 1.011 | | |
| 111 | BL1008DS | 1 | 1 | 10.6 | 0.100 | 1.009 | 100% | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 113 | 47499 | 1 | 1 | 0.5 | <0.00089 | 0.022 | | |
| 114 | 47499 | 1 | 1 | 0.6 | | 0.024 | | |
| 115 | 47499D | 1 | 1 | 0.5 | <0.005 | 0.022 | | |
| 116 | 47499D | 1 | 1 | 0.6 | | 0.024 | | |
| 117 | 47499S | 1 | 1 | 10.8 | 0.103 | 1.028 | 101% | |
| 118 | 47499S | 1 | 1 | 10.8 | | 1.033 | | |
| 119 | 47499DS | 1 | 1 | 10.9 | | 1.042 | | |
| 120 | 47499DS | 1 | 1 | 11.0 | 0.105 | 1.047 | 102 | |
| 121 | 47500 | 1 | 1 | 12.1 | | 1.157 | s | |
| 122 | 47500 | 1 | 1 | 12.1 | 0.116 | 1.155 | | |
| 123 | 47501 | 1 | 1 | 14.2 | | 1.361 | | |
| 124 | 47501 | 1 | 1 | 14.2 | 0.136 | 1.363 | | |
| 125 | 47502 | 1 | 1 | 17.4 | | 1.680 | | |
| 126 | 47502 | 1 | 1 | 17.7 | 0.169 | 1.706 | | |
| 127 | CCV | 1 | 1 | 10.1 | | 0.961 | 96% | |
| 128 | B | 1 | 1 | 0.0 | | -0.031 | b | |
| 129 | D4 | 1 | 1 | 15.8 | | 1.521 | d | RERUN DUE TO BASELINE DROP. |
| 130 | 47503 | 1 | 1 | 14.0 | | 1.344 | | |
| 131 | 47503 | 1 | 1 | 14.1 | | 1.349 | | |
| 132 | 51449 A | 1 | 1 | 0.9 | | 0.060 | | |
| 133 | 51449 A | 1 | 1 | 0.9 | | 0.056 | | |
| 134 | 51449 B | 1 | 1 | 0.5 | | 0.015 | I | |
| 135 | 51449 B | 1 | 1 | 0.4 | | 0.010 | I | |
| 136 | 51449 C | 1 | 1 | 0.5 | | 0.017 | s | |
| 137 | 51449 C | 1 | 1 | 0.5 | | 0.020 | | |
| 138 | 51450 | 1 | 1 | 0.6 | | 0.029 | | |
| 139 | 51450 | 1 | 1 | 0.5 | | 0.022 | | |
| 140 | 51459 | 1 | 1 | 0.3 | | 0.000 | | |
| 141 | 51459 | 1 | 1 | 0.3 | | 0.000 | | |
| 142 | 51460 | 10 | 1 | 0.1 | | -0.163 | I | |
| 143 | 51460 | 10 | 1 | 0.1 | | -0.187 | I | |
| 144 | 51461 | 10 | 1 | 14.3 | | 13.754 | | |
| 145 | 51461 | 10 | 1 | 14.7 | | 14.065 | | |
| 146 | BL1008-4GFL | 1 | 1 | 0.0 | | -0.031 | I | |
| 147 | BL1008-4GFL | 1 | 1 | 0.0 | | -0.031 | I | |
| 148 | BL1008S | 1 | 1 | 10.3 | | 0.983 | | |
| 149 | BL1008S | 1 | 1 | 10.3 | | 0.983 | | |
| 150 | CCV | 1 | 1 | 9.9 | | 0.939 | | |
| 151 | B | 1 | 1 | 0.0 | | -0.031 | b | |
| 152 | D4 | 1 | 1 | 15.8 | | 1.521 | d | |
| 153 | BL1008DS | 1 | 1 | 10.8 | | 1.026 | | |
| 154 | BL1008DS | 1 | 1 | 10.6 | | 1.014 | | |
| 155 | 51664 | 1 | 1 | 0.3 | | 0.000 | I | |
| 156 | 51664 | 1 | 1 | 0.3 | | -0.004 | I | |
| 157 | 51664D | 1 | 1 | 0.2 | | -0.014 | I | |
| 158 | 51664D | 1 | 1 | 0.1 | | -0.019 | I | |
| 159 | 51664S | 1 | 1 | 10.5 | | 1.002 | | |
| 160 | 51664S | 1 | 1 | 10.5 | | 0.997 | | |
| 161 | 51664DS | 1 | 1 | 10.5 | | 0.997 | | |
| 162 | 51664DS | 1 | 1 | 10.5 | | 0.997 | | |
| 163 | 51462 | 10 | 1 | 16.1 | | 15.454 | | |
| 164 | 51462 | 10 | 1 | 16.0 | | 15.382 | | |
| 165 | 51463 | 10 | 1 | 16.4 | | 15.742 | | |
| 166 | 51463 | 10 | 1 | 16.2 | | 15.550 | s | |
| 167 | 53129 A | 1 | 1 | 0.5 | | 0.015 | I | |
| 168 | 53129 A | 1 | 1 | 0.4 | | 0.008 | I | |
| 169 | 53129 B | 1 | 1 | 0.0 | | -0.031 | I | |
| 170 | 53129 B | 1 | 1 | 0.0 | | -0.031 | I | |
| 171 | 53129 C | 1 | 1 | 0.0 | | -0.031 | I | |
| 172 | 53129 C | 1 | 1 | 0.0 | | -0.031 | I | |
| 173 | CCV | 1 | 1 | 10.1 | | 0.959 | | |
| 174 | B | 1 | 1 | 0.0 | | -0.031 | b | |
| 175 | D4 | 1 | 1 | 15.8 | | 1.521 | d | |
| 176 | 53130 | 1 | 1 | 0.2 | | -0.007 | I | |
| 177 | 53130 | 1 | 1 | 0.2 | | -0.012 | I | |

| enon umber | Client | Client ID | Parameter | TS | Result | Dup. | Spike | % Rec. | Dup. Spk | % Rec. | Batch Date | Batch Code | Run Date | Run Code | Day Old | Day In | Analyst's Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44795 | TRC-LO | MB R456 | Mercury - | PV | -0.010 | -99999.0 | 0.100 | 100. | 0.099 | 99. | 99/10/10 | 1GFT | 99/10/10 | MG02 | 60. | 54. | |
| 44798 | TRC-LO | OHM-Ia-R1 | Mercury - | PV | 9.466 | 9.418 | 19.264 | 98. | 19.240 | 98. | 99/10/10 | 1GFT | 99/10/10 | MG02 | 60. | 54. | *PDS* |
| 44799 | TRC-LO | OHM-Ib-R1 | Mercury - | PV | 11.603 | | | | | | 99/10/10 | 1GFT | 99/10/10 | MG02 | 60. | 54. | |
| 44800 | TRC-LO | OHM-Ia-R2 | Mercury - | PV | 11.231 | | | | | | 99/10/10 | 1GFT | 99/10/10 | MG02 | 60. | 54. | |
| 44801 | TRC-LO | OHM-Ib-R2 | Mercury - | PV | 5.583 | | | | | | 99/10/10 | 1GFT | 99/10/10 | MG02 | 60. | 54. | |
| 44802 | TRC-LO | OHM-Ia-R3 | Mercury - | PV | 10.138 | | | | | | 99/10/10 | 1GFT | 99/10/10 | MG02 | 59. | 54. | |
| 44803 | TRC-LO | OHM-Ib-R3 | Mercury - | PV | 7.845 | | | | | | 99/10/10 | 1GFT | 99/10/10 | MG02 | 59. | 54. | |
| 47488 | TRC-LO | MB R456 | Mercury - | PV | -0.010 | -99999.0 | 0.100 | 100. | 0.099 | 99. | 99/10/10 | 1GFT | 99/10/10 | MG02 | 47. | 44. | |
| 47491 | TRC-LO | PG&E-S-OHM-Ia-1 | Mercury - | PV | 3.231 | | | | | | 99/10/10 | 1GFT | 99/10/10 | MG02 | 47. | 44. | |
| L1010 | INTERNAL | | Mercury - | PV | -0.010 | -99999.0 | 0.100 | 100. | 0.100 | 100. | 99/10/10 | 1GFT | 99/10/10 | MG02 | $$$ | $$$ | |
| 47492 | TRC-LO | [redacted] | Mercury - | PV | 2.793 | 2.802 | 6.818 | 101. | 6.793 | 100. | 99/10/10 | 2GFT | 99/10/10 | MG02 | 49. | 44. | *PDS* |
| 47493 | TRC-LO | [redacted] | Mercury - | PV | 2.830 | | | | | | 99/10/10 | 2GFT | 99/10/10 | MG02 | 47. | 44. | |
| 47494 | TRC-LO | [redacted] | Mercury - | PV | 3.671 | | | | | | 99/10/10 | 2GFT | 99/10/10 | MG02 | 47. | 44. | |
| 47495 | TRC-LO | [redacted] | Mercury - | PV | 1.894 | | | | | | 99/10/10 | 2GFT | 99/10/10 | MG02 | 46. | 44. | |
| 47496 | TRC-LO | [redacted] | Mercury - | PV | 3.512 | | | | | | 99/10/10 | 2GFT | 99/10/10 | MG02 | 46. | 44. | |
| 47497 | TRC-LO | [redacted] | Mercury - | PV | 2.266 | | | | | | 99/10/10 | 2GFT | 99/10/10 | MG02 | 46. | 44. | |
| 47498 | TRC-LO | [redacted] | Mercury - | PV | 3.291 | | | | | | 99/10/10 | 2GFT | 99/10/10 | MG02 | 46. | 44. | |
| 51451 | TRC-LO | [redacted] | Mercury - | PV | 2.239 | | | | | | 99/10/10 | 2GFT | 99/10/10 | MG02 | 40. | 26. | |
| 51452 | TRC-LO | [redacted] | Mercury - | PV | 1.205 | | | | | | 99/10/10 | 2GFT | 99/10/10 | MG02 | 40. | 26. | |
| 51453 | TRC-LO | [redacted] | Mercury - | PV | 1.151 | | | | | | 99/10/10 | 2GFT | 99/10/10 | MG02 | 39. | 26. | |
| L1010 | INTERNAL | | Mercury - | PV | -0.010 | -99999.0 | 0.100 | 100. | 0.099 | 99. | 99/10/10 | 2GFT | 99/10/10 | MG02 | $$$ | $$$ | |
| 51454 | TRC-LO | [redacted] | Mercury - | PV | 1.237 | 1.236 | 2.208 | 97. | 2.209 | 97. | 99/10/10 | 3GFT | 99/10/10 | MG02 | 39. | 26. | *PDS* |
| 51455 | TRC-LO | [redacted] | Mercury - | PV | 1.059 | | | | | | 99/10/10 | 3GFT | 99/10/10 | MG02 | 39. | 26. | |
| 51456 | TRC-LO | [redacted] | Mercury - | PV | 1.450 | | | | | | 99/10/10 | 3GFT | 99/10/10 | MG02 | 39. | 26. | |
| 51457 | TRC-LO | [redacted] | Mercury - | PV | 0.665 | | | | | | 99/10/10 | 3GFT | 99/10/10 | MG02 | 38. | 26. | |
| 51458 | TRC-LO | [redacted] | Mercury - | PV | -0.100 | | | | | | 99/10/10 | 3GFT | 99/10/10 | MG02 | 38. | 26. | |
| 53131 | TRC-LO | [redacted] | Mercury - | PV | 11.262 | | | | | | 99/10/10 | 3GFT | 99/10/10 | MG02 | 24. | 22. | |
| 53132 | TRC-LO | [redacted] | Mercury - | PV | 2.799 | | | | | | 99/10/10 | 3GFT | 99/10/10 | MG02 | 23. | 22. | |
| 53133 | TRC-LO | [redacted] | Mercury - | PV | 6.385 | | | | | | 99/10/10 | 3GFT | 99/10/10 | MG02 | 23. | 22. | |
| 53134 | TRC-LO | [redacted] | Mercury - | PV | 9.406 | | | | | | 99/10/10 | 3GFT | 99/10/10 | MG02 | 24. | 22. | |
| 53135 | TRC-LO | [redacted] | Mercury - | PV | 7.927 | | | | | | 99/10/10 | 3GFT | 99/10/10 | MG02 | 23. | 22. | |
| L1010 | INTERNAL | | Mercury - | PV | -0.010 | -99999.0 | 0.098 | 98. | 0.098 | 98. | 99/10/10 | 3GFT | 99/10/10 | MG02 | $$$ | $$$ | |
| 53145 | TRC-LO | [redacted] | Mercury - | PV | 2.758 | | | | | | 99/10/10 | 4GFT | 99/10/10 | MG02 | 31. | 22. | |
| 53148 | TRC-LO | [redacted] | Mercury - | PV | 1.535 | | | | | | 99/10/10 | 4GFT | 99/10/10 | MG02 | 31. | 22. | |
| L1010 | INTERNAL | | Mercury - | PV | -0.010 | -99999.0 | 0.098 | 98. | 0.099 | 99. | 99/10/10 | 4GFT | 99/10/10 | MG02 | $$$ | $$$ | |

35 Tests for OHFLTB with an MDL of 0.010 ug Validated By CMY Control Chart Updated N/A IO Requirements met N/A

00190

| Zenon Number | Client | Client ID | Parameter | TS | Result | Dup. | Spike | % Rec. | Dup. Spk | % Rec. | Batch Date | Batch Code | Run Date | Run Code | Day Old | Day In | Analyst's Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 042477 | FOSSIL | Reagent Blank F.H. | Mercury - | PV | -0.010 | | | | | | 99/10/10 | 1GFT | 99/10/10 | MG02 | 73. | 68. | |
| 042534 | FOSSIL | NU2 Inlet-R3 F.H. | Mercury - | PV | -0.200 | | | | | | 99/10/10 | 1GFT | 99/10/10 | MG02 | 69. | 68. | |
| BL1010 | INTERNAL | | Mercury - | PV | -0.010 | -99999.0 | 0.100 | 100. | 0.100 | 100. | 99/10/10 | 1GFT | 99/10/10 | MG02 | $$$ | $$$ | |

3 Tests for OHFLTB with an MDL of 0.010 ug Validated By CMB Control Chart Updated N/A IO Requirements met N/A

00091

# LDC AUTOSAMPLER RUN LOG (MERCURY)

Date: 99.10.10(WA) Run Code: MG02 Matrix: IMP.

alyst: MG Units: µg (see comments) MDL: 0.01

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 1 | | | Primer (ICV) | | | |
| 2 | | | Dummy (Blk) | | | |
| 3 | | | Std 1 (S1) | 0.0 | | |
| 4 | | | Std 2 (S2) | 0.5 | | |
| 5 | | | Std 3 (S3) | 1.0 | | |
| 6 | | | Std 4 (S4) | 1.5 | | |
| 7 | | | Std 5 (S5) | 2.0 | | |
| 8 | | | Std 6 (S6) | 2.5 | | |
| 9 | | | ICV | | | |
| 10 | | | B (Std 1) | | | |
| 11 | | | D4 (Std 4) | | | |
| 12 | | | BL1010 | 1GFB | | |
| 13 | | | " | | | |
| 14 | | | BL1010 S | | | |
| 15 | | | " | | | |
| 16 | | | BL1010 DS | | | |
| 17 | | | " | | | |
| 18 | | 1/10 | 44798 | | | |
| 19 | | | " | | | |
| 20 | | | 44798 D | | | |
| 21 | | | " | | | |
| 22 | | | 44798 S | | | |
| 23 | | | " | | | |
| 24 | | | 44798 DS | | | |
| 25 | | | " | | | |
| 26 | | | 42477 a | | | |
| 27 | | | " | | | |
| 28 | | | 42477 b | | | |
| 29 | | | " | | | |
| 30 | | | 42477 c | | | |
| 31 | | | " | | | |
| 32 | | | CCV | | | |
| 33 | | | B | | | |
| 34 | | | D4 | | | |
| 35 | | | 42534 | | | |
| 36 | | | " | | | |
| 37 | | | 42264 | | | |
| 38 | | | " | | | |
| 39 | | 1/10 | 44799 | | | |
| 40 | | | | | | |

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 41 | | 1/10 | 44800 | | | |
| 42 | | | " | | | |
| 43 | | 1/4 | 44801 | | | |
| 44 | | | " | | | |
| 45 | | 1/8 | 44802 | | | |
| 46 | | | " | | | |
| 47 | | 1/4 | 44803 | | | |
| 48 | | | " | | | |
| 49 | | 1/2 | 47491 | | | |
| 50 | | | " | | | |
| 51 | | | BL1010 | 2GFB | | |
| 52 | | | " | | | |
| 53 | | | BL1010 S | | | |
| 54 | | | " | | | |
| 55 | | | CCV | | | |
| 56 | | | B | | | |
| 57 | | | D4 | | | |
| 58 | | | BL1010 DS | | | |
| 59 | | | " | | | |
| 60 | | 1/4 | 47492 | | | |
| 61 | | | " | | | |
| 62 | | | 47492 D | | | |
| 63 | | | " | | | |
| 64 | | | 47492 S | | | |
| 65 | | | " | | | |
| 66 | | | 47492 DS | | | |
| 67 | | | " | | | |
| 68 | | 1/2 | 47493 | | | |
| 69 | | | " | | | |
| 70 | | | 47494 | | | |
| 71 | | | " | | | |
| 72 | | | 47495 | | | |
| 73 | | | " | | | |
| 74 | | | 47496 | | | |
| 75 | | | " | | | |
| 76 | | | 47497 | | | |
| 77 | | | " | | | |
| 78 | | | CCV | | | |
| 79 | | | B | | | |
| 80 | | | D4 | | | |

Comments: *** "HG-347" and "MISA12" units are expressed in mg/L not ug/L

ICV = 1.5 ug/L, CCV = 1.0 ug/L, Blank Spike = 1.0 ug/L for liquid samples.

ICV = 1.5 mg/kg, CCV = 1.0 mg/kg, Blank Spike = 1.0 mg/kg for solid samples.

# LDC AUTOSAMPLER RUN LOG (MERCURY)

Date: 99.10.10 Run Code: MG02 Matrix: IMP.

alyst: MG Units: µg (see comments) MDL: 0.01

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 1 | | | Primer (ICV) | | | |
| 2 | | | Dummy (Blk) | | | |
| 3 | | | Std 1 (S1) | 0.0 | | |
| 4 | | | Std 2 (S2) | 0.5 | | |
| 5 | | | Std 3 (S3) | 1.0 | | |
| 6 | | | Std 4 (S4) | 1.5 | | |
| 7 | | | Std 5 (S5) | 2.0 | | |
| 8 | | | Std 6 (S6) | 2.5 | | |
| 9 | | | ICV | | | |
| 10 | | | B (Std 1) | | | |
| 11 | | | D4 (Std 4) | | | |
| 12 | | | | | | |
| 13 | | | | | | |
| 14 | | | | | | |
| 15 | | | | | | |
| 16 | | | | | | |
| 17 | | | | | | |
| 18 | | | | | | |
| 19 | | | | | | |
| 20 | | | | | | |
| 21 | | 1/2 | 47498 | | | |
| 22 | | ↓ | " | | | |
| 23 | | | 51451 | | | |
| 24 | | | " | | | |
| 25 | | | 51452 | | | |
| 26 | | | " | | | |
| 27 | | | 51453 | | | |
| 28 | | | " | | | |
| 29 | | | BL 1010 | 3GFT | | |
| 30 | | | " | | | |
| 31 | | | BL1010 S | | | |
| 32 | | | " | | | |
| 33 | | | BL1010 DS | | | |
| 34 | | | " | | | |
| 35 | | | 51454 | | | |
| 36 | | | " | | | |
| 37 | | | 51454 D | | | |
| 38 | | | " | | | |
| 39 | | | 51454 S | | | |
| 40 | | | " | | | |

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 41 | | | CCV | | | |
| 42 | | | B | | | |
| 43 | | | D4 | | | |
| 44 | | | 51454 DS | | | |
| 45 | | | " | | | |
| 46 | | | 51455 | | | |
| 47 | | | " | | | |
| 48 | | | 51456 | | | |
| 49 | | | " | | | |
| 50 | | | 51457 | | | |
| 51 | | | " | | | |
| 52 | | | 51458 | | | |
| 53 | | | " | | | |
| 54 | | 1/8 | 53131 | | | |
| 55 | | ↓ | " | | | |
| 56 | | 1/2 | 53132 | | | |
| 57 | | ↓ | " | | | |
| 58 | | 1/4 | 53133 | | | |
| 59 | | ↓ | " | | | |
| 60 | | | 53134 | | | |
| 61 | | ↓ | " | | | |
| 62 | | 1/4 | 53135 | | | |
| 63 | | ↓ | " | | | |
| 64 | | | CCV | | | |
| 65 | | | B | | | |
| 66 | | | D4 | | | |
| 67 | | | BL1010 | 4GFT | | |
| 68 | | | " | | | |
| 69 | | | BL1010 S | | | |
| 70 | | | " | | | |
| 71 | | | BL1010 DS | | | |
| 72 | | | " | | | |
| 73 | | 1/10 | 53136 | | | |
| 74 | | ↓ | " | | | |
| 75 | | | 53136 D | | | |
| 76 | | | " | | | |
| 77 | | | 53136 S | | | |
| 78 | | | " | | | |
| 79 | | | 53136 DS | | | |
| 80 | | ↓ | " | | | |

Comments: *** "HG-347" and "MISA12" units are expressed in mg/L not ug/L

ICV = 1.5 ug/L, CCV = 1.0 ug/L, Blank Spike = 1.0 ug/L for liquid samples.

ICV = 1.5 mg/kg, CCV = 1.0 mg/kg, Blank Spike = 1.0 mg/kg for solid samples.

# LDC AUTOSAMPLER RUN LOG (MERCURY)

Date: 99.10.10 Run Code: MG02 Matrix: IMP.

alyst: MG Units: µg (see comments) MDL: 0.01

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 1 | | | Primer (ICV) | | | |
| 2 | | | Dummy (Blk) | | | |
| 3 | | | Std 1 (S1) | 0.0 | | |
| 4 | | | Std 2 (S2) | 0.5 | | |
| 5 | | | Std 3 (S3) | 1.0 | | |
| 6 | | | Std 4 (S4) | 1.5 | | |
| 7 | | | Std 5 (S5) | 2.0 | | |
| 8 | | | Std 6 (S6) | 2.5 | | |
| 9 | | | ICV | | | |
| 10 | | | B (Std 1) | | | |
| 11 | | | D4 (Std 4) | | | |
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| 41 ~~21~~ | | 1/4 | 53137 | | | |
| 22 | | ↓ | " | | | |
| 23 | | 1/2 | 53145 | | | |
| 24 | | ↓ | " | | | |
| 25 | | 1/10 | 53146 | | | |
| 26 | | ↓ | " | | | |
| 27 | | | CCV | | | |
| 28 | | | B | | | |
| 29 | | | D4 | | | |
| 30 | | 1/2 | 53147 | | | |
| 31 | | ↓ | " | | | |
| 32 | | | 53148 | | | |
| 33 | | | " | | | |
| 34 | | | 51664 | OHFLT | | |
| 35 | | | " | | | |
| 36 | | | 51665 | OHFLTB | | |
| 37 | | | " | | | |
| 38 | | | CCV | | | |
| 39 | | | B | | | |
| 40 | | | D4 | | | |

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
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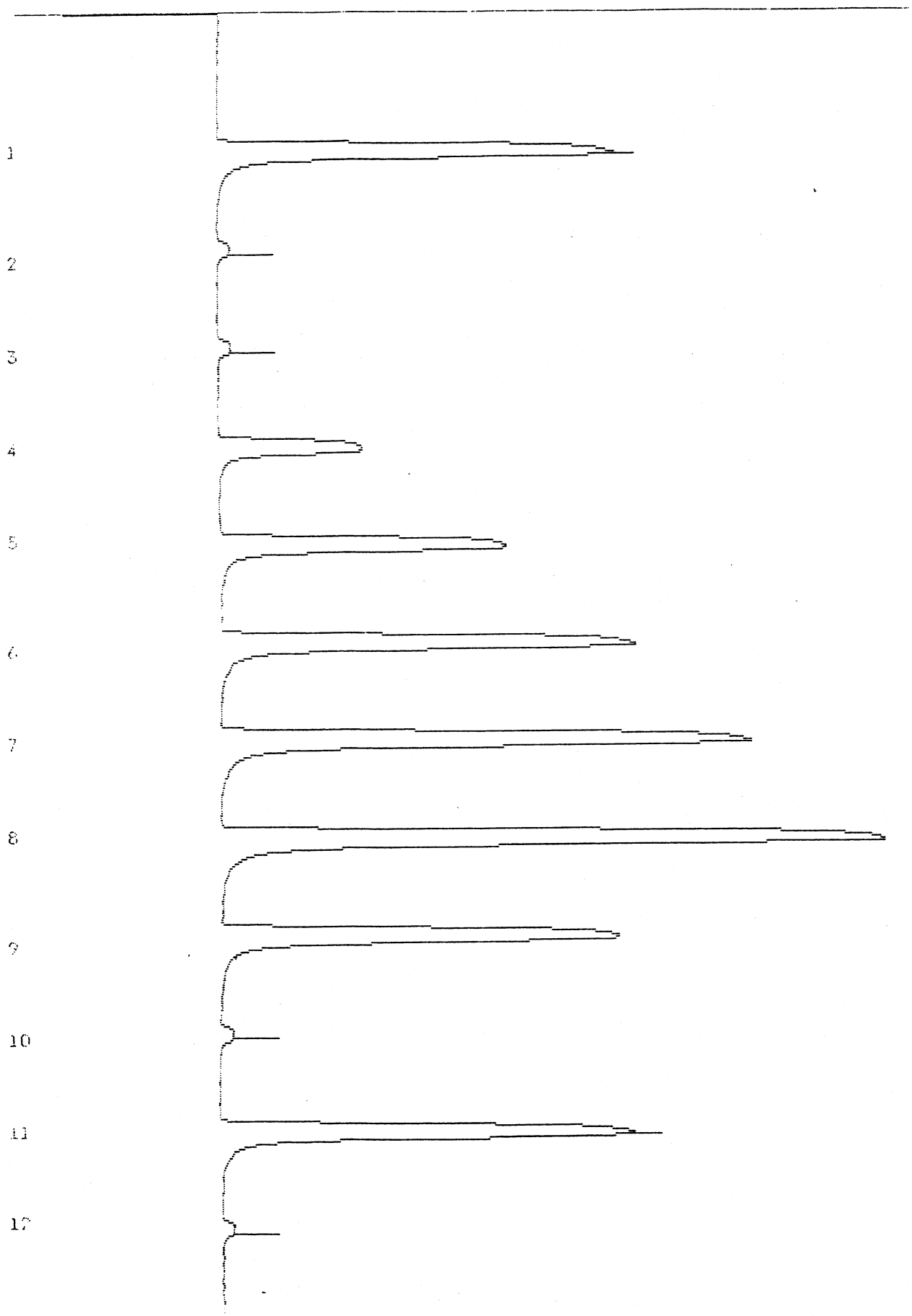
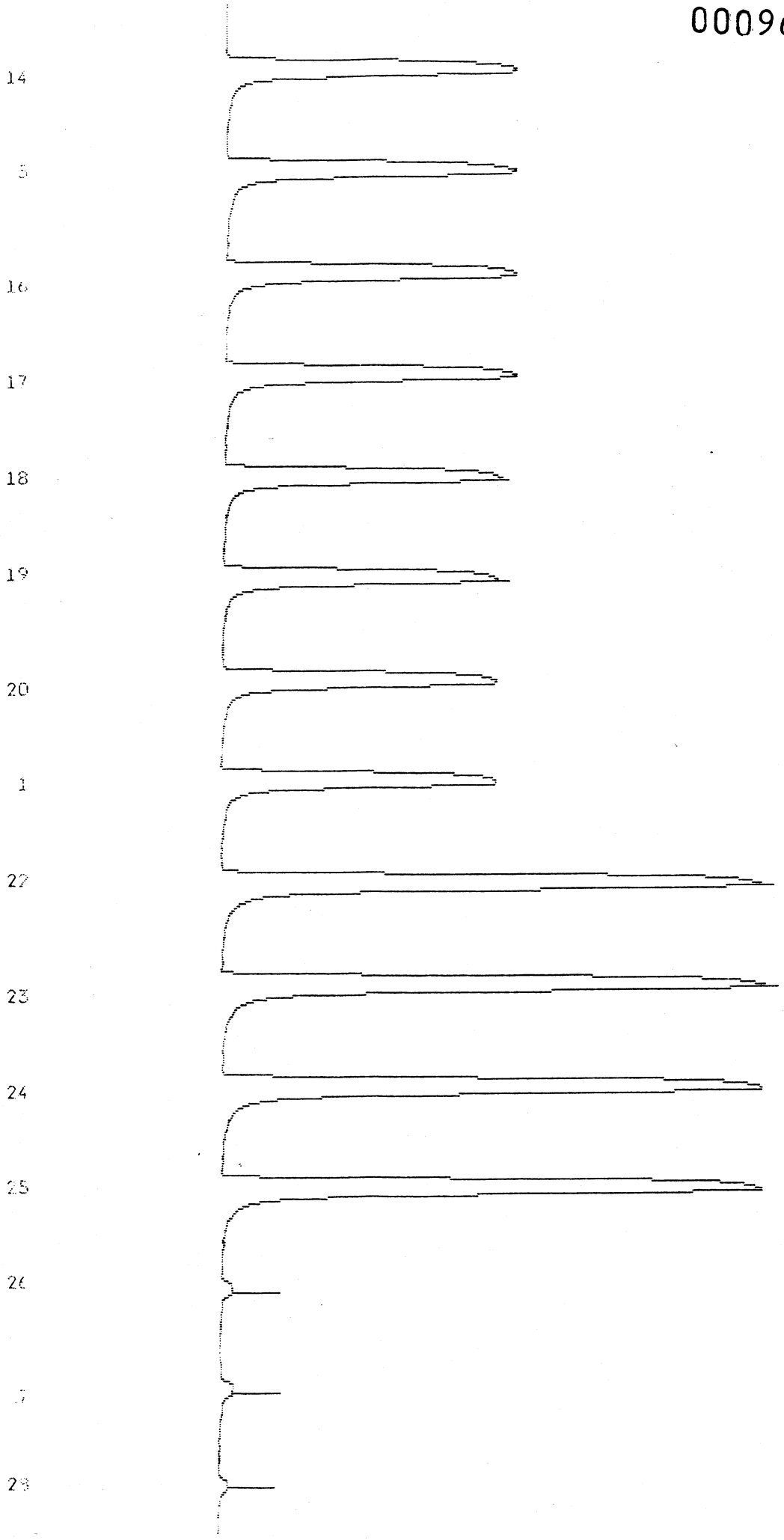
Comments: *** "HG-347" and "MISA12" units are expressed in mg/L not ug/L

ICV = 1.5 ug/L, CCV = 1.0 ug/L, Blank Spike = 1.0 ug/L for liquid samples.

ICV = 1.5 mg/kg, CCV = 1.0 mg/kg, Blank Spike = 1.0 mg/kg for solid samples.

RUN DATE: 10-11-1999 CHART DATE: 10-11-1999
CHART SPEED: 30
DATA FILE NAME: C:\DP4\DATA\991010WA.DAT

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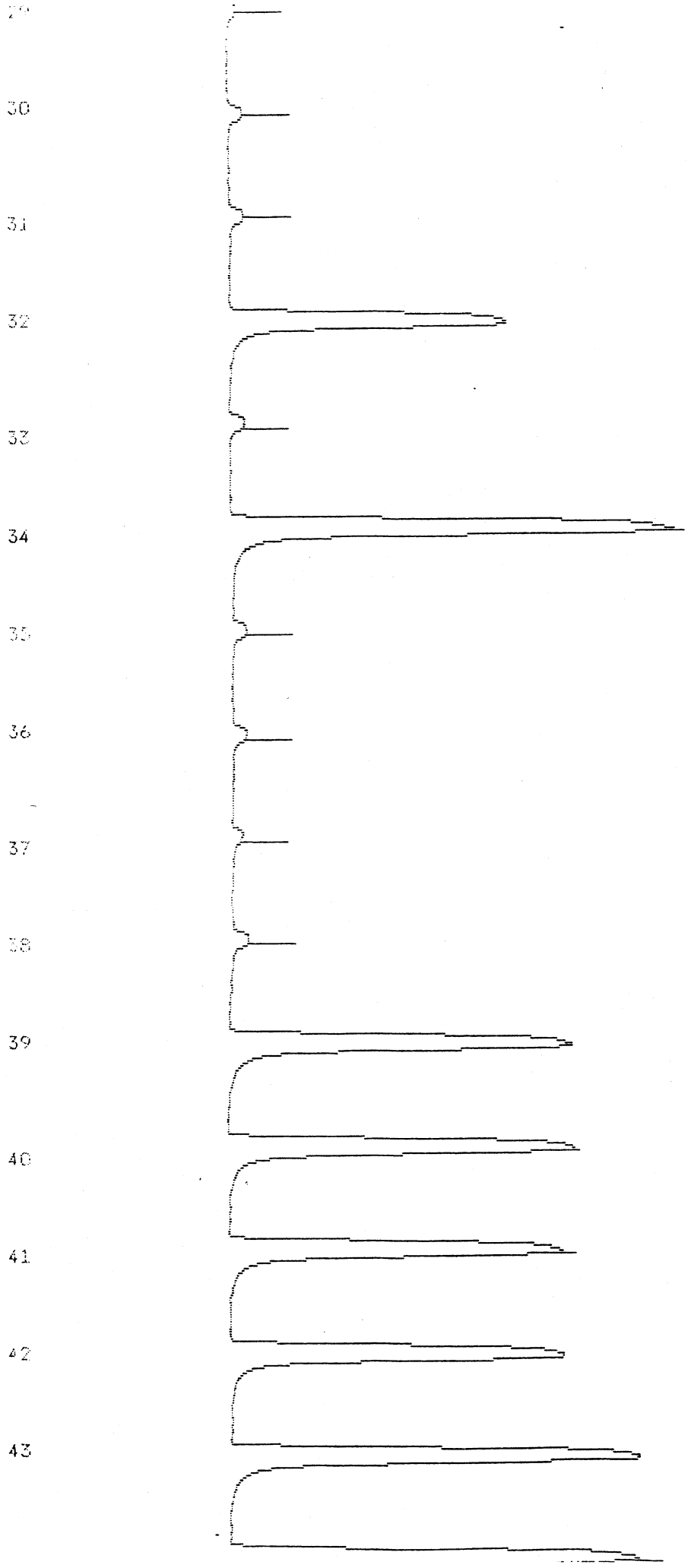
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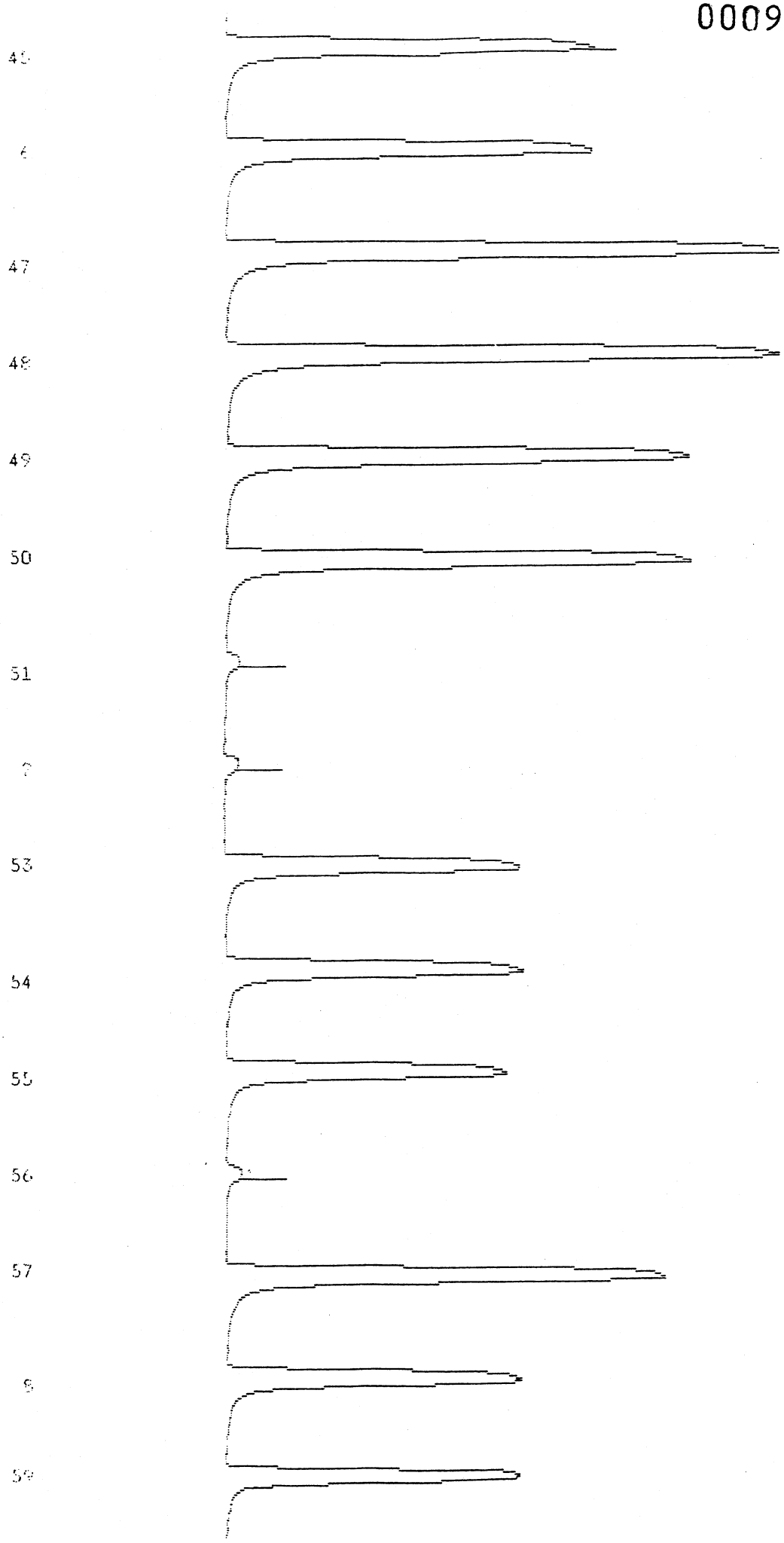
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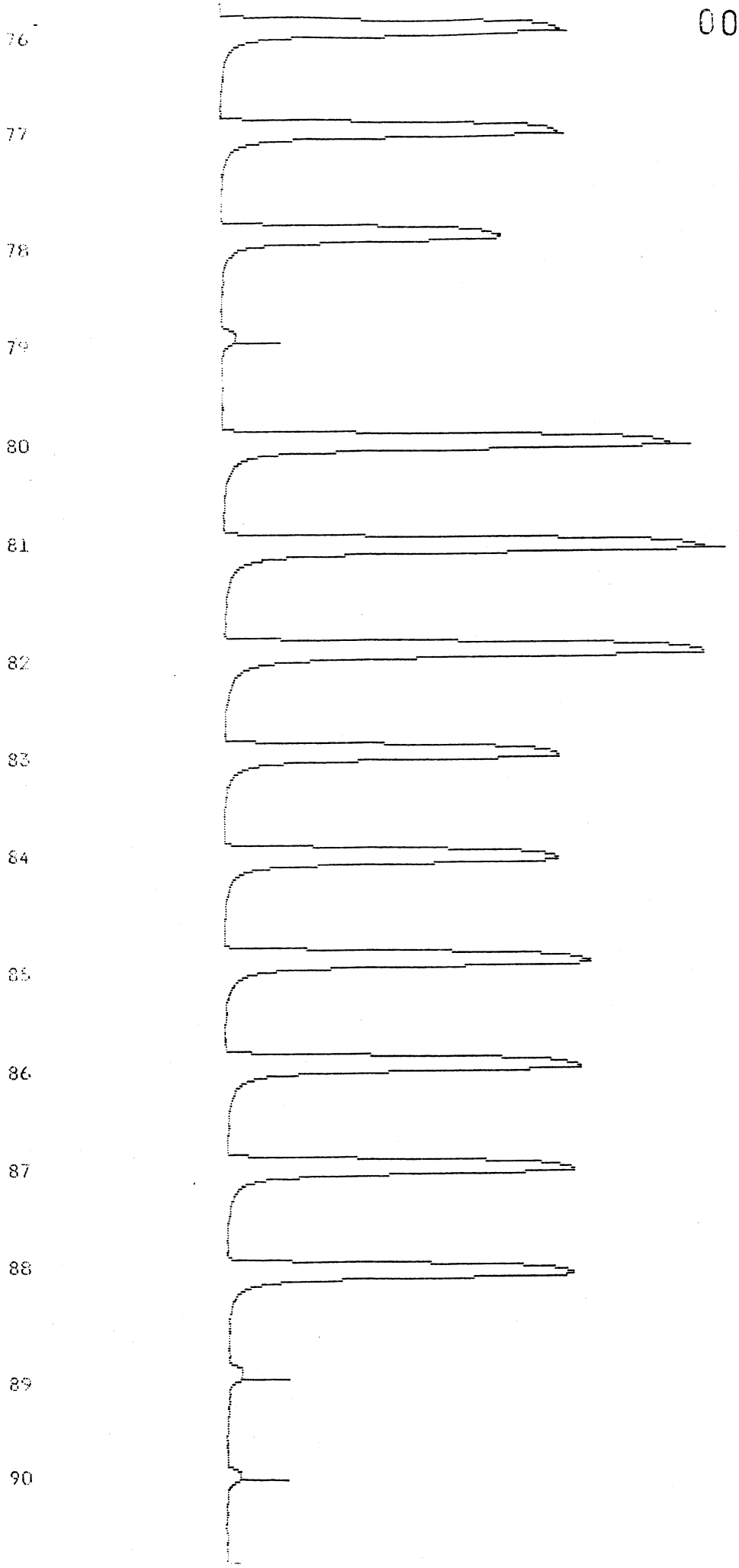

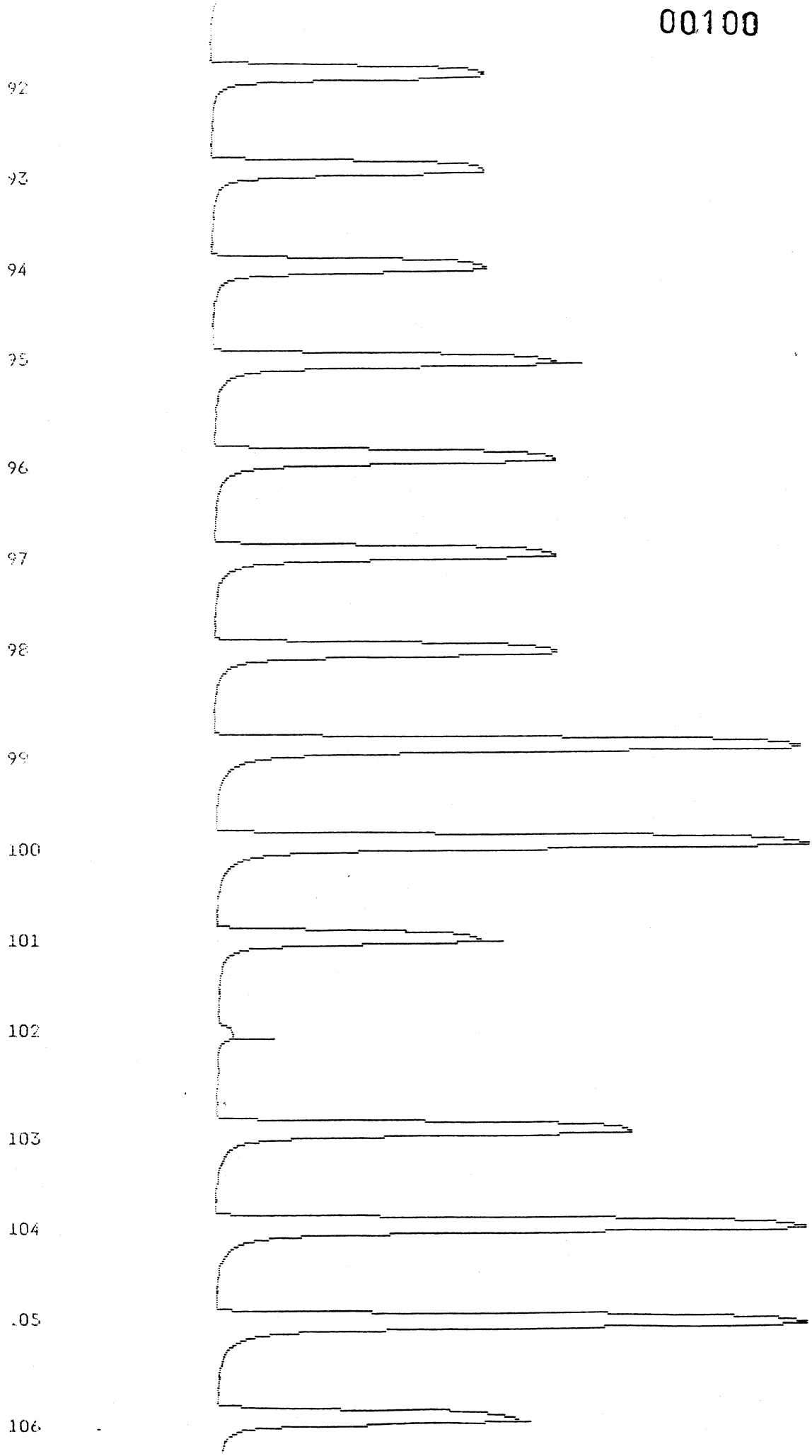
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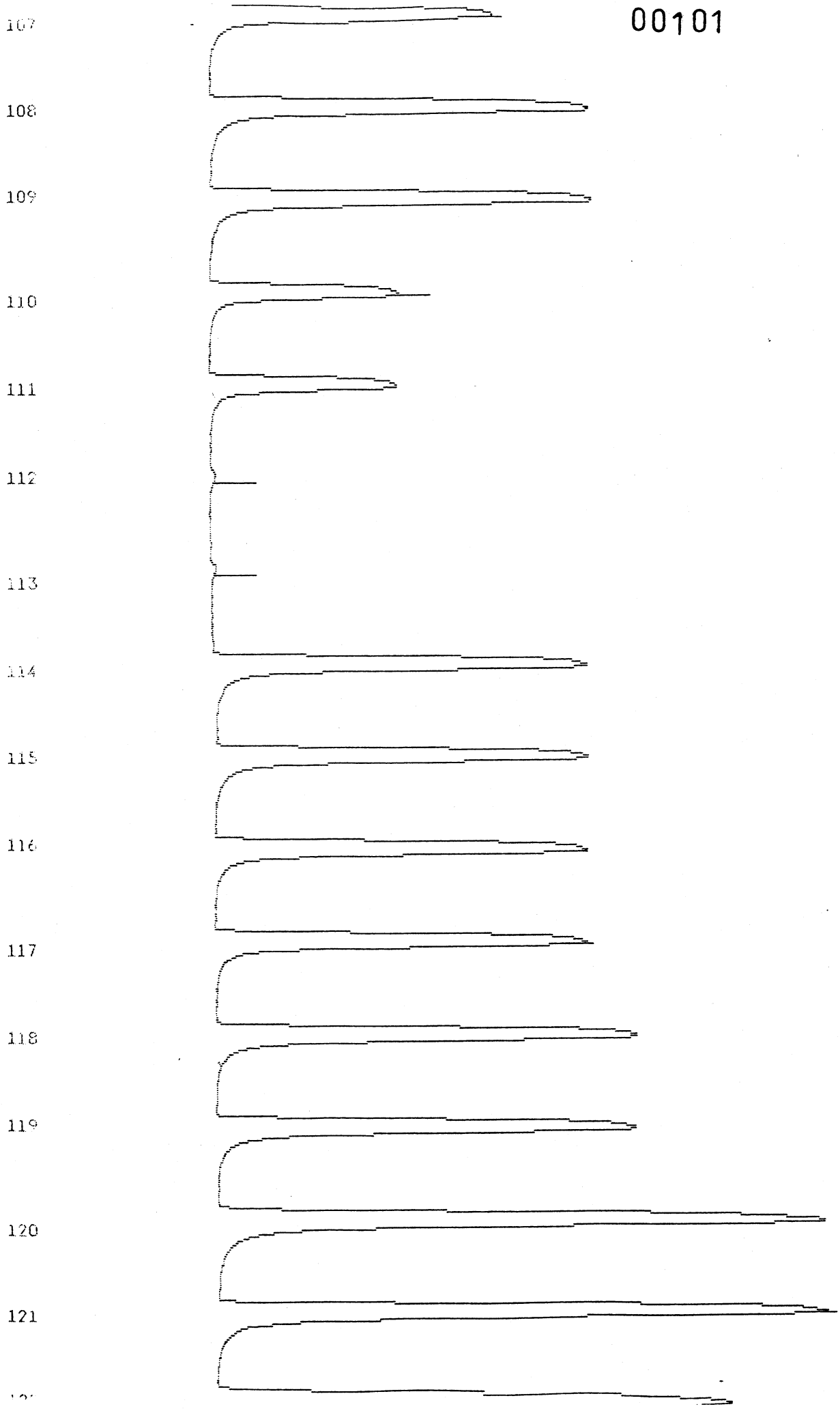
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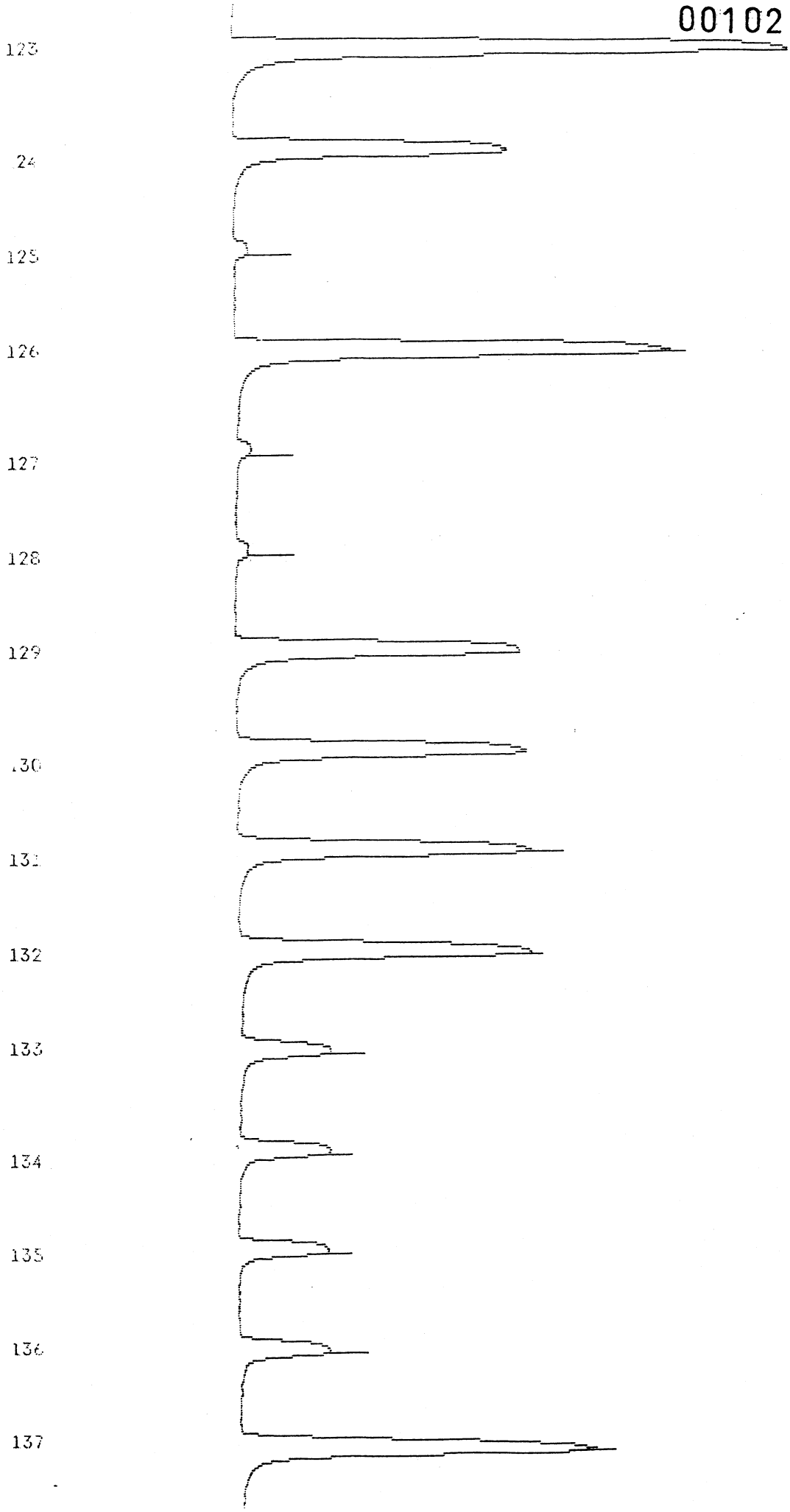
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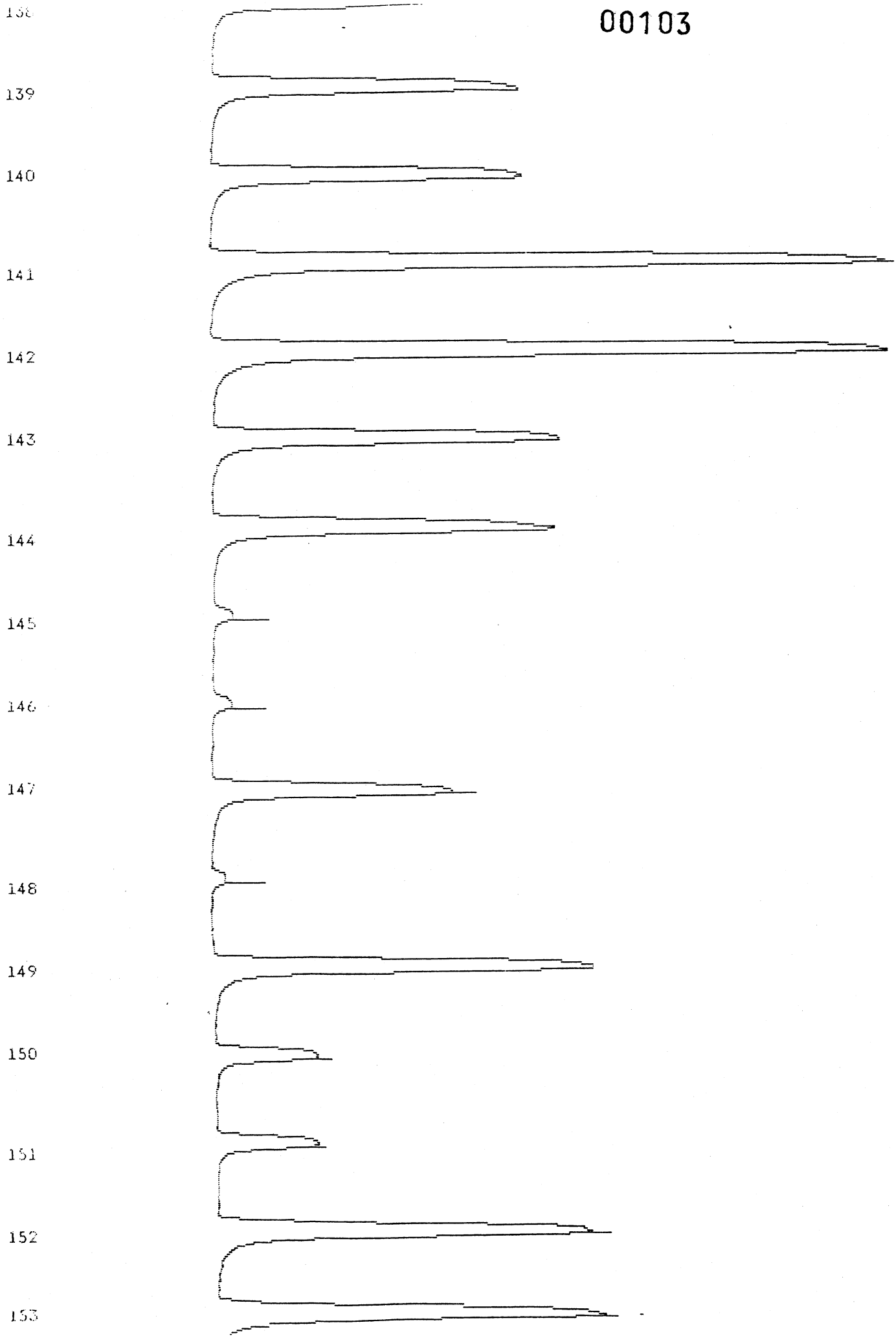
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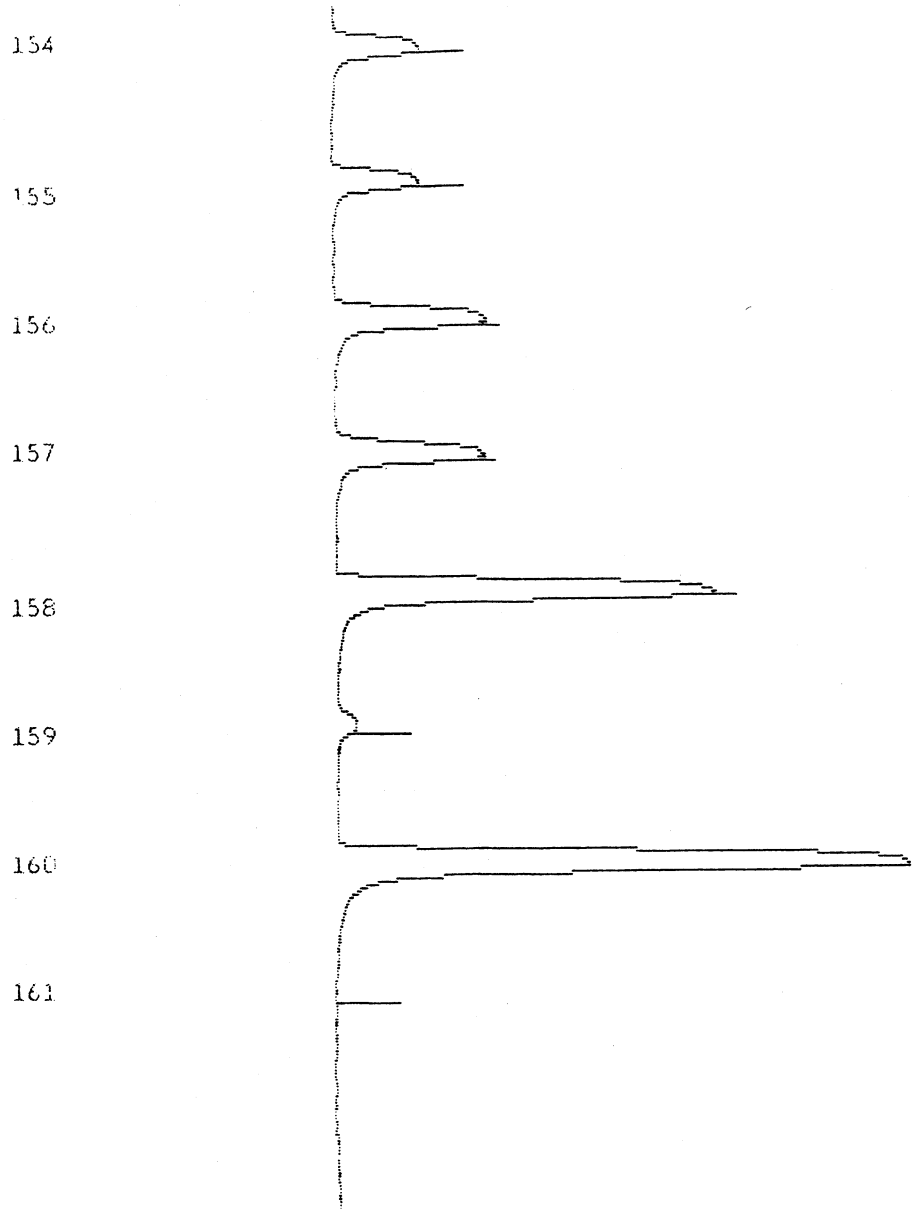
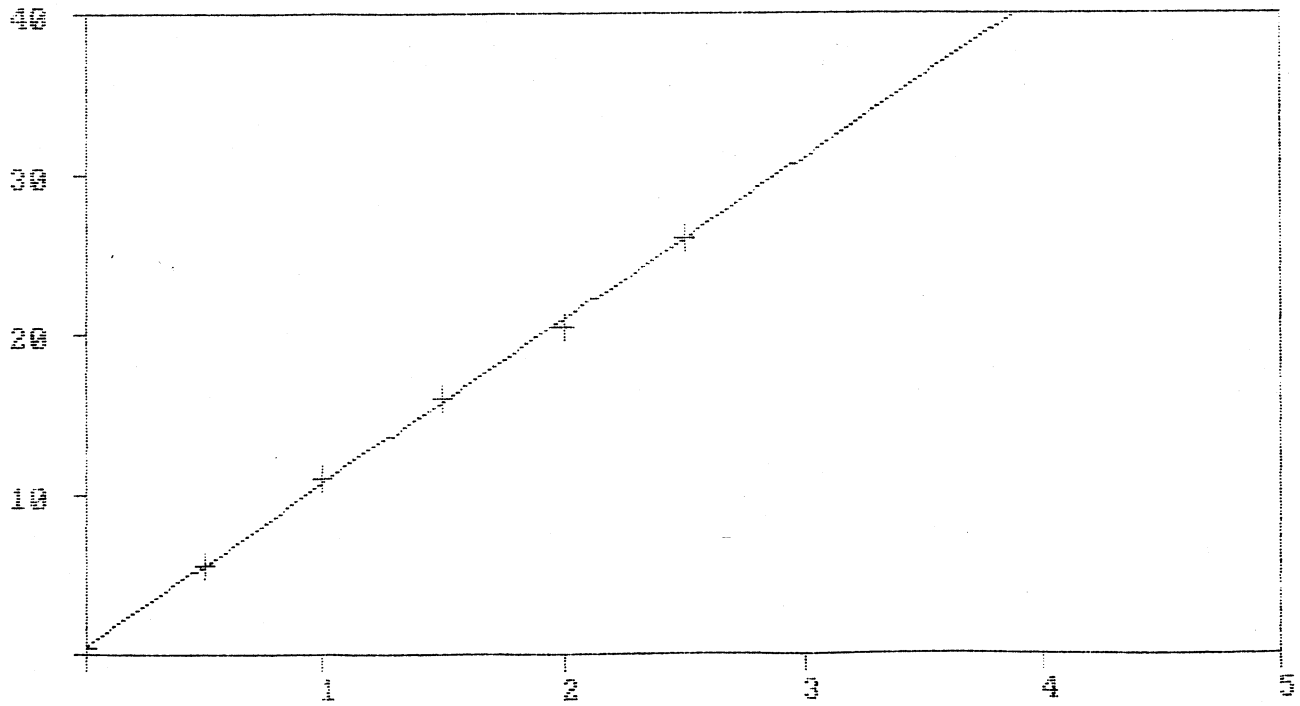



CHANNEL NAME: LDC
RUN NAME: 991010WA



CORRELATION: .9996244

00105

CHANNEL NAME: LDC
RUN DATE: 10-11-1999
SAMPLE TABLE NAME: 991010WA
METHOD NAME: HGWATER

ppb

| CUP# | SAMPLE ID | DIL | WGT | HEIGHT/AREA | | CONCENTRATION | EF |
|---|---|---|---|---|---|---|---|
| 1 | PRIMER | 1 | 1 | 15.6 | | 1.479 | s |
| 2 | DUMMY | 1 | 1 | 0.4 | | -0.015 | I |
| 3 | S1: 0 | 1 | 1 | 0.4 | | -0.015 | I |
| 4 | S2: .5 | 1 | 1 | 5.5 | | 0.492 | |
| 5 | S3: 1 | 1 | 1 | 11.0 | | 1.034 | |
| 6 | S4: 1.5 | 1 | 1 | 16.0 | | 1.522 | |
| 7 | S5: 2 | 1 | 1 | 20.5 | | 1.964 | |
| 8 | S6: 2.5 | 1 | 1 | 26.0 | | 2.504 | |
| 9 | ICV | 1 | 1 | 15.4 | TUG | 1.459 | 97% |
| 10 | B | 1 | 1 | 0.0 | | -0.051 | b |
| 11 | D4 | 1 | 1 | 16.0 | | 1.522 | d |
| 12 | BL1010-1GFT 44795, | 1 | 1 | 0.0 | <0.01 | -0.051 | I |
| 13 | BL1010-1GFT 47488 | 1 | 1 | 0.0 | | -0.046 | I |
| 14 | BL1010S | 1 | 1 | 10.7 | 0.100 | 1.005 | 100% |
| 15 | BL1010S | 1 | 1 | 10.6 | | 0.991 | |
| 16 | BL1010DS | 1 | 1 | 10.6 | 0.100 | 0.996 | 100% |
| 17 | BL1010DS | 1 | 1 | 10.7 | | 1.001 | |
| 18 | 44798 | 10 | 1 | 10.2 | NS 9.466 | 9.526 | |
| 19 | 44798 | 10 | 1 | 10.1 | | 9.406 | |
| 20 | 44798D | 10 | 1 | 10.1 | 9.418 | 9.430 | |
| 21 | 44798D | 10 | 1 | 10.1 | | 9.406 | |
| 22 | 44798S | 10 | 1 | 20.0 | 19.264 | 19.204 | 98% |
| 23 | 44798S | 10 | 1 | 20.2 | | 19.324 | |
| 24 | 44798DS | 10 | 1 | 20.1 | 19.240 | 19.252 | 98% |
| 25 | 44798DS | 10 | 1 | 20.1 | | 19.228 | |
| 26 | 42477 A | 1 | 1 | 0.0 | <0.01 | 0.051 | I |
| 27 | 42477 A | 1 | 1 | 0.0 | | -0.051 | I |
| 28 | 42477 B | 1 | 1 | 0.0 | <0.01 | -0.051 | I |
| 29 | 42477 B | 1 | 1 | 0.0 | | -0.051 | I |
| 30 | 42477 C | 1 | 1 | 0.0 | <0.01 | -0.051 | I |
| 31 | 42477 C | 1 | 1 | 0.0 | | -0.046 | s |
| 32 | CCV | 1 | 1 | 9.9 | | 0.921 | 92% |
| 33 | B | 1 | 1 | 0.0 | | -0.051 | b |
| 34 | D4 | 1 | 1 | 16.0 | | 1.522 | d |
| 35 | 42534 | 1 | 1 | 0.0 | <0.200 | -0.051 | I |
| 36 | 42534 | 1 | 1 | 0.0 | | -0.049 | I |
| 37 | 42264 | 1 | 1 | 0.0 | <0.01 | -0.051 | I |
| 38 | 42264 | 1 | 1 | 0.1 | | -0.044 | I |
| 39 | 44799 | 10 | 1 | 12.2 | 11.603 | 11.519 | |
| 40 | 44799 | 10 | 1 | 12.4 | | 11.687 | |
| 41 | 44800 | 10 | 1 | 12.0 | 11.231 | 11.279 | |
| 42 | 44800 | 10 | 1 | 11.9 | | 11.183 | |
| 43 | 44801 | 4 | 1 | 14.7 | 5.583 | 5.588 | |
| 44 | 44801 | 4 | 1 | 14.7 | | 5.578 | |
| 45 | 44802 | 8 | 1 | 13.4 | 10.138 | 10.157 | |
| 46 | 44802 | 8 | 1 | 13.4 | | 10.118 | |
| 47 | 44803 | 4 | 1 | 20.5 | 7.845 | 7.855 | |
| 48 | 44803 | 4 | 1 | 20.4 | | 7.835 | |
| 49 | 47491 | 2 | 1 | 16.9 | 3.231 | 3.216 | |
| 50 | 47491 | 2 | 1 | 17.0 | | 3.245 | |
| 51 | BL1010-2GFT | 1 | 1 | 0.0 | <0.01 | -0.051 | I |
| 52 | BL1010-2GFT | 1 | 1 | 0.0 | | -0.051 | I |
| 53 | BL1010S | 1 | 1 | 10.7 | 0.100 | 0.998 | 100% |
| | | | | | | [illegible] | |

00106

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 56 | [illegible] | 1 | [illegible] | [illegible] | | [illegible] | b | |
| 57 | D4 | 1 | 1 | 16.0 | | 1.521 | d | |
| 58 | BL1010DS | 1 | 1 | 10.6 | 0.099 | 0.993 | 99% | |
| 59 | BL1010DS | 1 | 1 | 10.6 | | 0.993 | | |
| 60 | 47492 | 4 | 1 | 7.6 | 2.793 | 2.783 | | |
| 61 | 47492 | 4 | 1 | 7.6 | | 2.802 | s | |
| 62 | 47492D | 4 | 1 | 7.6 | 2.802 | 2.792 | | |
| 63 | 47492D | 4 | 1 | 7.7 | | 2.811 | | |
| 64 | 47492S | 4 | 1 | 17.9 | 6.818 | 6.827 | 101% | |
| 65 | 47492S | 4 | 1 | 17.8 | | 6.808 | | |
| 66 | 47492DS | 4 | 1 | 17.9 | 6.793 | 6.817 | 100% | |
| 67 | 47492DS | 4 | 1 | 17.7 | | 6.769 | | |
| 68 | 47493 | 2 | 1 | 14.9 | 2.830 | 2.837 | | |
| 69 | 47493 | 2 | 1 | 14.9 | | 2.823 | | |
| 70 | 47494 | 2 | 1 | 19.1 | 3.671 | 3.663 | | |
| 71 | 47494 | 2 | 1 | 19.2 | | 3.678 | | |
| 72 | 47495 | 2 | 1 | 10.2 | 1.894 | 1.896 | | |
| 73 | 47495 | 2 | 1 | 10.1 | | 1.891 | | |
| 74 | 47496 | 2 | 1 | 18.2 | 3.512 | 3.485 | | |
| 75 | 47496 | 2 | 1 | 18.5 | | 3.538 | | |
| 76 | 47497 | 2 | 1 | 12.1 | 2.266 | 2.275 | s | |
| 77 | 47497 | 2 | 1 | 12.0 | | 2.256 | | |
| 78 | CCV | 1 | 1 | 9.9 | | 0.921 | 92% | |
| 79 | B | 1 | 1 | 0.0 | | -0.051 | b | |
| 80 | D4 | 1 | 1 | 16.0 | | 1.522 | d | |
| 81 | 47498 | 2 | 1 | 17.3 | 3.291 | 3.293 | | |
| 82 | 47498 | 2 | 1 | 17.2 | | 3.289 | | |
| 83 | 51451 | 2 | 1 | 11.9 | 2.239 | 2.241 | | |
| 84 | 51451 | 2 | 1 | 11.9 | | 2.237 | | |
| 85 | 51452 | 1 | 1 | 13.0 | 1.205 | 1.224 | | |
| 86 | 51452 | 1 | 1 | 12.6 | | 1.186 | | |
| 87 | 51453 | 1 | 1 | 12.2 | 1.151 | 1.152 | | |
| 88 | 51453 | 1 | 1 | 12.2 | | 1.150 | | |
| 89 | BL1010-3GFT | 1 | 1 | 0.0 | <0.01 | -0.051 | I | |
| 90 | BL1010-3GFT | 1 | 1 | 0.0 | | -0.051 | I | |
| 91 | BL1010S | 1 | 1 | 10.5 | | 0.984 | s | |
| 92 | BL1010S | 1 | 1 | 10.5 | 0.098 | 0.979 | 98% | |
| 93 | BL1010DS | 1 | 1 | 10.5 | 0.098 | 0.979 | 98% | |
| 94 | BL1010DS | 1 | 1 | 10.5 | | 0.981 | | |
| 95 | 51454 | 1 | 1 | 13.2 | 1.237 | 1.243 | | |
| 96 | 51454 | 1 | 1 | 13.0 | | 1.231 | | |
| 97 | 51454D | 1 | 1 | 13.1 | 1.236 | 1.234 | | |
| 98 | 51454D | 1 | 1 | 13.1 | | 1.238 | | |
| 99 | 51454S | 1 | 1 | 22.9 | 2.208 | 2.197 | 97% | |
| 100 | 51454S | 1 | 1 | 23.1 | | 2.218 | | |
| 101 | CCV | 1 | 1 | 9.9 | | 0.924 | 92% | |
| 102 | B | 1 | 1 | 0.0 | | -0.051 | b | |
| 103 | D4 | 1 | 1 | 16.0 | | 1.522 | d | |
| 104 | 51454DS | 1 | 1 | 23.0 | 2.209 | 2.209 | 97% | |
| 105 | 51454DS | 1 | 1 | 23.0 | | 2.209 | | |
| 106 | 51455 | 1 | 1 | 11.4 | 1.059 | 1.068 | s | |
| 107 | 51455 | 1 | 1 | 11.2 | | 1.049 | | |
| 108 | 51456 | 1 | 1 | 15.1 | 1.450 | 1.438 | | |
| 109 | 51456 | 1 | 1 | 15.4 | | 1.462 | | |
| 110 | 51457 | 1 | 1 | 7.4 | 0.665 | 0.672 | | |
| 111 | 51457 | 1 | 1 | 7.2 | | 0.657 | | |
| 112 | 51458 | 1 | 1 | 0.0 | <0.100 | -0.051 | I | |
| 113 | 51458 | 1 | 1 | 0.0 | | -0.051 | I | |
| 114 | 53131 | 8 | 1 | 14.8 | 11.262 | 11.252 | | |
| 115 | 53131 | 8 | 1 | 14.8 | | 11.271 | | |
| 116 | 53132 | 2 | 1 | 14.7 | 2.799 | 2.794 | | |
| 117 | 53132 | 2 | 1 | 14.8 | | 2.803 | | |
| 118 | 53133 | 4 | 1 | 16.8 | 6.385 | 6.394 | | |
| 119 | 53133 | 4 | 1 | 16.7 | | 6.375 | | |

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|---|---|---|---|---|---|---|---|---|
| 122 | 53135 | 4 | 1 | 20.6 | | [illegible] | | |
| 123 | 53135 | 4 | 1 | 20.7 | 00107 | 0.941 | | |
| 124 | CCV | 1 | 1 | 10.0 | | 0.929 | 93% | |
| 125 | B | 1 | 1 | 0.0 | | -0.051 | b | |
| 126 | D4 | 1 | 1 | 16.0 | | 1.522 | d | |
| 127 | BL1010-4GFT | 1 | 1 | 0.0 | <0.01 | -0.051 | I | |
| 128 | BL1010-4GFT | 1 | 1 | 0.0 | | -0.051 | I | |
| 129 | BL1010S | 1 | 1 | 10.4 | 0.098 | 0.972 | 98% | |
| 130 | BL1010S | 1 | 1 | 10.5 | | [illegible] | | |
| 131 | BL1010DS | 1 | 1 | 10.6 | 0.099 | [illegible] | 99% | |
| 132 | BL1010DS | 1 | 1 | 10.6 | | [illegible] | | |
| 133 | 53136 | 10 | 1 | 2.8 | | [illegible] | | RERUN ON 5x DIL. ON 99/10/11. MB |
| 134 | 53136 | 10 | 1 | [illegible] | | [illegible] | | |
| 135 | 53136D | 10 | 1 | [illegible] | | [illegible] | | |
| 136 | 53136D | 10 | 1 | [illegible] | | [illegible] | | |
| 137 | 53136S | 10 | | [illegible] | | [illegible] | | |
| 138 | 53136S | [illegible] | | | | [illegible] | | |
| 139 | 53136DS | [illegible] | | [illegible] | | [illegible] | | |
| 140 | 53136DS | [illegible] | | [illegible] | | [illegible] | | |
| 141 | [illegible] | 4 | | [illegible] | | [illegible] | R | RERUN ON 10x DIL. 99/10/11 MB |
| 142 | [illegible] | [illegible] | | [illegible] | | 11.246 | R | |
| [illegible] | [illegible] | 7 | | 16.5 | 2.758 | 2.755 | | |
| [illegible] | [illegible] | [illegible] | 1 | 14.6 | | 2.760 | | |
| [illegible] | [illegible] | 10 | 1 | 0.2 | | -0.272 | R | RERUN ON 1x DIL |
| [illegible] | [illegible] | 10 | 1 | 0.2 | | -0.296 | R | |
| [illegible] | [illegible] | 1 | 1 | 10.0 | | 0.933 | 93% | |
| [illegible] | [illegible] | 1 | 1 | 0.0 | | -0.051 | b | |
| 149 | D4 | 1 | 1 | 16.0 | | 1.522 | d | |
| 150 | [illegible] | 2 | 1 | 4.1 | | 0.695 | | RERUN ON 1x DIL. MB |
| 151 | 53148 | 2 | 1 | 4.1 | | 0.695 | s | |
| 152 | 53148 | 1 | 1 | 15.9 | 1.535 | 1.515 | | |
| 153 | 53148 | 1 | 1 | 16.3 | | 1.555 | | |
| 154 | 51664 | 1 | 1 | 1.9 | 0.014 | 0.134 | | |
| 155 | 51664 | 1 | 1 | 2.0 | | 0.141 | | |
| 156 | 51665 | 1 | 1 | 3.8 | 0.325 | 0.326 | | |
| 157 | 51665 | 1 | 1 | 3.8 | | 0.323 | | |
| 158 | CCV | 1 | 1 | 10.2 | | 0.955 | 95% | |
| 159 | B | 1 | 1 | 0.0 | | -0.051 | b | |
| 160 | D4 | 1 | 1 | 16.0 | | 1.522 | d | |

INTERCEPT: 0.52 LINEAR COEF: 10.1685

CORRELATION COEF: .9996244

| :non ımber | Client | Client ID | Parameter | TS | Result | Dup. | Spike | % Rec. | Dup. Spk | % Rec. | Batch Date | Batch Code | Run Date | Run Code | Day Old | Day In | Analyst's Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4795 | TRC-LO | MB R456 | Mercury - | PV | -0.010 | -99999.0 | 0.100 | 100. | 0.101 | 101. | 99/10/01 | MGHY | 99/10/01 | MG02 | 51. | 45. | *BLKIMP* |
| 4796 | TRC-LO | OHM-RB | Mercury - | PV | -0.010 | | | | | | 99/10/01 | MGHY | 99/10/01 | MG02 | 51. | 45. | |
| 7489 | TRC-LO | [redacted] | Mercury - | PV | -0.010 | | | | | | 99/10/01 | MGHY | 99/10/01 | MG02 | 38. | 35. | |
| 3128 | TRC-LO | [redacted] | Mercury - | PV | -0.010 | -99999.0 | 0.100 | 100. | 0.101 | 101. | 99/10/01 | MGHY | 99/10/01 | MG02 | 17. | 13. | *BLKIMP* |
| 3129 | TRC-LO | [redacted] | Mercury - | PV | -0.010 | | | | | | 99/10/01 | MGHY | 99/10/01 | MG02 | 17. | 13. | |
| 3143 | TRC-LO | [redacted] | Mercury - | PV | -0.010 | | | | | | 99/10/01 | MGHY | 99/10/01 | MG02 | 23. | 13. | |
| 1001 | INTERNAL | | Mercury - | PV | -0.010 | -99999.0 | 0.100 | 100. | 0.101 | 101. | 99/10/01 | MGHY | 99/10/01 | MG02 | $$$ | $$$ | *BLKIMP* |

7 Tests for OHHYX with an MDL of 0.010 ug Validated By CMB Control Chart Updated N/A IO Requirements met N/A

00108

# LDC AUTOSAMPLER RUN LOG (MERCURY)

Date: 99.10.01 Run Code: MG02 Matrix: IMP.

Analyst: MG Units: µg (see comments) MDL: 0.005

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 1 | | | Primer (ICV) | | | |
| 2 | | | Dummy (Blk) | | | |
| 3 | | | Std 1 (S1) | 0.0 | | |
| 4 | | | Std 2 (S2) | 0.5 | | |
| 5 | | | Std 3 (S3) | 1.0 | | |
| 6 | | | Std 4 (S4) | 1.5 | | |
| 7 | | | Std 5 (S5) | 2.0 | | |
| 8 | | | Std 6 (S6) | 2.5 | | |
| 9 | | | ICV | | | |
| 10 | | | B (Std 1) | | | |
| 11 | | | D4 (Std 4) | | | |
| 12 | | | WS 378 | | | |
| 13 | | | ORG. REF. | | | |
| 14 | | | BL001 | 1B1B | | |
| 15 | | | ~~xxxxxx~~ NO CUP | | | |
| 16 | | | BL1001 S | | | |
| 17 | | | " | | | |
| 18 | | | BL1001 DS | | | |
| 19 | | | " | | | |
| 20 | 2 | | 50091 | | | |
| 21 | | | " | | | |
| 22 | | | 50091 D | | | |
| 23 | | | " | | | |
| 24 | | | 50091 S | | | |
| 25 | | | " | | | |
| 26 | | | 50091 DS | | | |
| 27 | | | " | | | |
| 28 | | | 50089 | | | |
| 29 | | | " | | | |
| 30 | | | 50090 | | | |
| 31 | | | " | | | |
| 32 | | | 50092 | | | |
| 33 | | | " | | | |
| 34 | | | CCV | | | |
| 35 | | | B | | | |
| 36 | | | D4 | | | |
| 37 | | | 50093 | | | |
| 38 | | | " | | | |
| 39 | | | 50094 | | | |
| 40 | | | " | | | |

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 41 | | | BL001 | 1N2B | | |
| 42 | | | " | | | |
| 43 | | | BL1001 S | | | |
| 44 | | | " | | | |
| 45 | | | BL1001 DS | | | |
| 46 | | | " | | | |
| 47 | 10 | | 42257 | | | |
| 48 | | | " | | | |
| 49 | | | 42257 D | | | |
| 50 | | | " | | | |
| 51 | | | 42257 S | | | |
| 52 | | | " | | | |
| 53 | | | 42257 DS | | | |
| 54 | | | " | | | |
| 55 | | | 42256 | | | |
| 56 | | | " | | | |
| 57 | | | CCV | | | |
| 58 | | | B | | | |
| 59 | | | D4 | | | |
| 60 | 10 | | 42258 | | | |
| 61 | | | " | | | |
| 62 | | | 42259 | | | |
| 63 | | | " | | | |
| 64 | | | 42272 | | | |
| 65 | | | " | | | |
| 66 | | | 42273 | | | |
| 67 | | | " | | | |
| 68 | | | 42274 | | | |
| 69 | | | " | | | |
| 70 | | | 42275 | | | |
| 71 | | | " | | | |
| 72 | | | 42280 | | | |
| 73 | | | " | | | |
| 74 | | | BL001 | 2N2B | | |
| 75 | | | " | | | |
| 76 | | | BL1001 S | | | |
| 77 | | | " | | | |
| 78 | | | BL1001 DS | | | |
| 79 | | | " | | | |
| 80 | | | CCV | | | |

Comments: *** "HG-347" and "MISA12" units are expressed in mg/L not ug/L

ICV = 1.5 ug/L, CCV = 1.0 ug/L, Blank Spike = 1.0 ug/L for liquid samples.

ICV = 1.5 mg/kg, CCV = 1.0 mg/kg, Blank Spike = 1.0 mg/kg for solid samples.

# LDC AUTOSAMPLER RUN LOG (MERCURY)

te: 99.10801 Run Code: MG02 Matrix: IMP

Analyst: MG Units: µg (see comments) MDL: _____

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 1 | | | Primer (ICV) | | | |
| 2 | | | Dummy (Blk) | | | |
| 3 | | | Std 1 (S1) | 0.0 | | |
| 4 | | | Std 2 (S2) | 0.5 | | |
| 5 | | | Std 3 (S3) | 1.0 | | |
| 6 | | | Std 4 (S4) | 1.5 | | |
| 7 | | | Std 5 (S5) | 2.0 | | |
| 8 | | | Std 6 (S6) | 2.5 | | |
| 9 | | | ICV | | | |
| 10 | | | B (Std 1) | | | |
| 11 | | | D4 (Std 4) | | | |
| 12 | | | | | | |
| 13 | | | | | | |
| 14 | | | | | | |
| 15 | | | | | | |
| 16 | | | | | | |
| 17 | | | | | | |
| 18 | | | | | | |
| 19 | | | | | | |
| 20 | | | | | | |
| 41 ~~21~~ | | | BL1001 | 4N2B | | |
| 22 | | | " | | | |
| 23 | | | BL1001S | | | |
| 24 | | | " | | | |
| 25 | | | BL1001 DS | | | |
| 26 | | | " | | | |
| 27 | 10 | | 42745 | | | |
| 28 | ↓ | | " | | | |
| 29 | | | CCV | | | |
| 30 | | | B | | | |
| 31 | | | D4 | | | |
| 32 | 10 | | 42745 D | | | |
| 33 | | | " | | | |
| 34 | | | 42745 S | | | |
| 35 | | | " | | | |
| 36 | | | 42745 DS | | | |
| 37 | | | " | | | |
| 38 | | | 42743 | | | |
| 39 | | | " | | | |
| 40 | ↓ | | 42744 | | | |

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 41 | 10 | | 42744 (Cup Missed) | | | |
| 42 | | | 42746 | | | |
| 43 | | | " | | | |
| 44 | | | 42747 | | | |
| 45 | | | " | | | |
| 46 | | | 42748 | | | |
| 47 | | | " | | | |
| 48 | | | 42749 | | | |
| 49 | | | " | | | |
| 50 | | | 42750 | | | |
| 51 | ↓ | | " | | | |
| 52 | | | CCV | | | |
| 53 | | | B | | | |
| 54 | | | D4 | | | |
| 55 | 10 | | 42751 | | | |
| 56 | ↓ | | " | | | |
| 57 | | | 42282 | HYDR. | | |
| 58 | | | " | HYX | | |
| 59 | | | 42497 | | | |
| 60 | | | " | | | |
| 61 | | | 43224 | | | |
| 62 | | | " | | | |
| 63 | | | 42760 | | | |
| 64 | | | ~~44497~~ " | | | |
| 65 | | | 44796 | | | |
| 66 | | | " | | | |
| 67 | | | 47489 | | | |
| 68 | | | " | | | |
| 69 | | | 53129 | | | |
| 70 | | | " | | | |
| 71 | | | 53143 | | | |
| 72 | | | " | | | |
| 73 | | | 53685 | | | |
| 74 | | | " | | | |
| 75 | | | WS 378 | | | |
| 76 | | | ORG REF | | | |
| 77 | | | CCV | | | |
| 78 | | | B | | | |
| 79 | | | D4 | | | |
| 80 | | | | | | |

Comments: *** "HG-347" and "MISA12" units are expressed in mg/L not ug/L

ICV = 1.5 ug/L, CCV = 1.0 ug/L, Blank Spike = 1.0 ug/L for liquid samples.

ICV = 1.5 mg/kg, CCV = 1.0 mg/kg, Blank Spike = 1.0 mg/kg for solid samples.

00111 NOT DIGESTED

# EPA 7470 WATER PREPARATION LOG - MERCURY

DG7470HG
DGHGLEACH, DG29HG***

Calibration Solutions:

| # | I.D. | *Conc. | Spike | **Conc. Entered |
|---|---|---|---|---|
| 1 | Blank/Dummy | 0 ppb | None | 0.0 |
| 2 | Standard 1 | 0 ppb | None | 0.0 |
| 3 | Standard 2 | 0.33 | 200 ul of 0.05 ppm IV working standard | 0.5 |
| 4 | Standard 3 | 0.67 | 400 ul of 0.05 ppm IV working standard | 1.0 |
| 5 | Standard 4 | 1.0 | 600 ul of 0.05 ppm IV working standard | 1.5 |
| 6 | Standard 4 | 1.0 | 600 ul of 0.05 ppm IV working standard | 1.5 |
| 7 | Standard 5 | 1.33 | 800 ul of 0.05 ppm IV working standard | 2.0 |
| 7 | Standard 6 | 1.67 | 1000 ul of 0.05 ppm IV working standard | 2.5 |

Check List
- Digest Code/labels
- Samples poured out
- Acids added
- Reagents added
- Samples spiked
- Bath at 95 degrees C
- Samples digested
- Hydroxylamine HCl added
- Samples bulked and mixed
- Rack order checked

| | # | Sample I.D. | B.Code | Init.Vol. | F. Vol. | Dil | Comment |
|---|---|---|---|---|---|---|---|
| | 9 | ICV (Init. Calib. Verif.) | MGHY | 20 ml | 30 ml | 1 X | 1.5 ppb = 600 ul. of 0.05 ppm HP MESS-ZENO 30/QCA Std. |
| | 10 | BL 1001 | " | " | " | " | (Processed Blank) |
| | 11 | BL 1001 S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 12 | 42282 | " | " | " | " | 90 ml |
| 1 | 13 | D | " | " | " | " | (Duplicate sample) |
| 1 | 14 | S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 15 | DS | " | " | " | " | (Duplicate Spiked sample) |
| 2 | 16 | 42497 | " | " | " | " | 50 ml |
| 3 | 17 | 43224 | " | " | " | " | 84 ml |
| 4 | 18 | 42760 | " | " | " | " | 90 ml |
| 5 | 19 | ~~42498~~ | " | " | " | " | 50 ml |
| 6 | 20 | 44796 | " | " | " | " | 110 ml |
| 7 | 21 | 47489 | " | " | " | " | 100 ml |
| 8 | 22 | 53129 | " | " | " | " | 48 ml |
| 9 | 23 | 53143 | " | " | " | " | 74 ml |
| 10 | 24 | 53685 | " | " | " | " | 50 ml |
| | 25 | CCV (Cont. Calib. Verif.) | | 20 ml | 30 ml | 1 X | 1.0 ppb = 400 ul. of 0.05 ppm HP MESS-ZENO 30/QCA Std. |
| | 26 | BL | " | " | " | " | (Processed Blank) |
| | 27 | BL S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 28 | | " | " | " | " | |
| 1 | 29 | D | " | " | " | " | (Duplicate sample) |
| 1 | 30 | S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 31 | DS | " | " | " | " | (Duplicate Spiked sample) |
| 2 | 32 | | " | " | " | " | |
| 3 | 33 | | " | " | " | " | |
| 4 | 34 | | " | " | " | " | |
| 5 | 35 | | " | " | " | " | |
| 6 | 36 | | " | " | " | " | |
| 7 | 37 | | " | " | " | " | |
| 8 | 38 | | " | " | " | " | |
| 9 | 39 | | " | " | " | " | |
| 10 | 40 | | " | " | " | " | |

Notes: Other Applicable Test Codes: DG29HG-1B, DG29HG-2B, DG29HG-3A, DG29HG-3B, DG29HG-3C
DG29HGI, DG29HGF, DG101AA1, DG101AA2

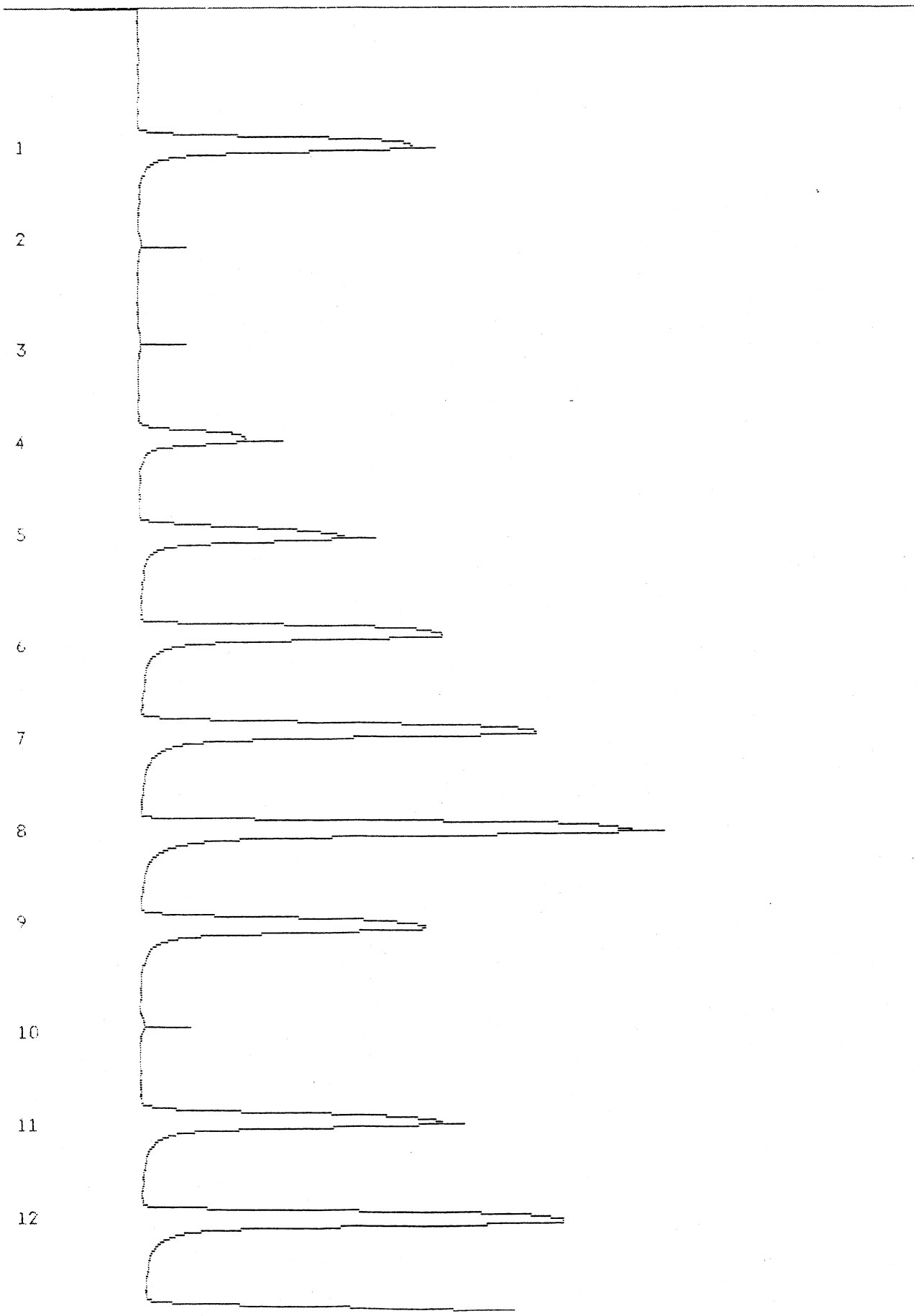
Include External Reference Material (EPA WS 378 or SPEX CertiPrep TM - WS) per run

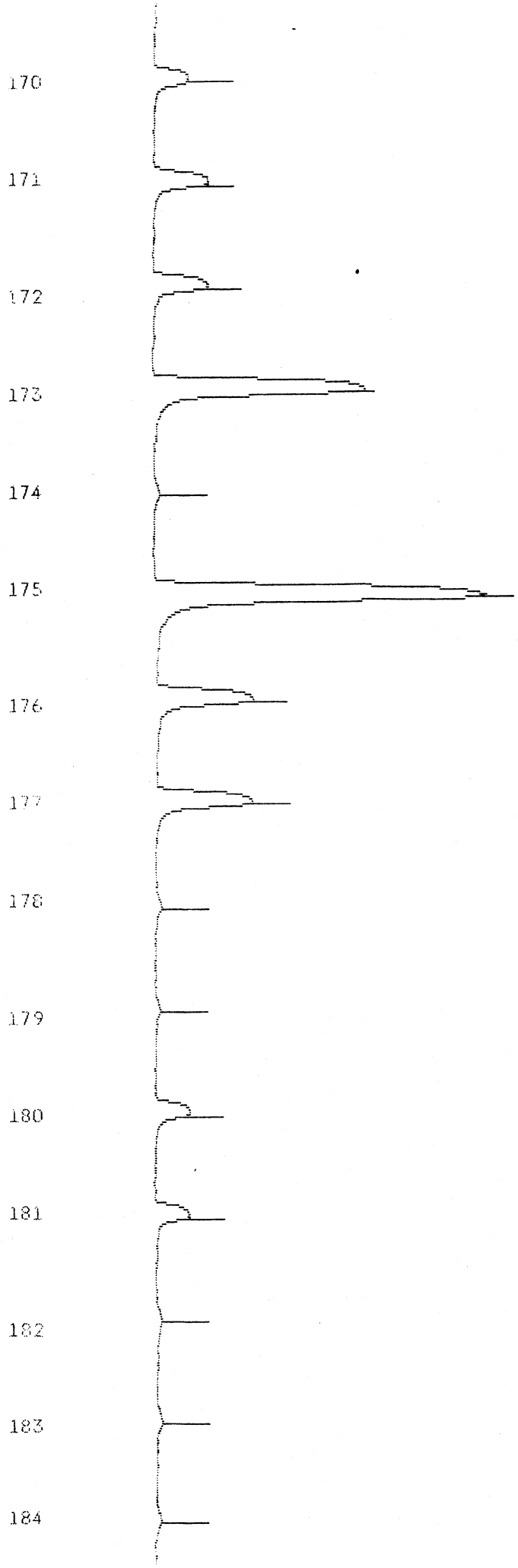
Prepare 0.05 ppm standards daily

| HNO3 Lot. No. | H2SO4 Lot. No. | Bath Temps. / / °C |
|---|---|---|

Prepared By: [illegible] Date: 99/10/01 Checked by: [illegible]

RUN DATE: 10-01-1999 CHART DATE: 10-02-1999
CHART SPEED: 30
DATA FILE NAME: C:\DP4\DATA\991001W.DAT

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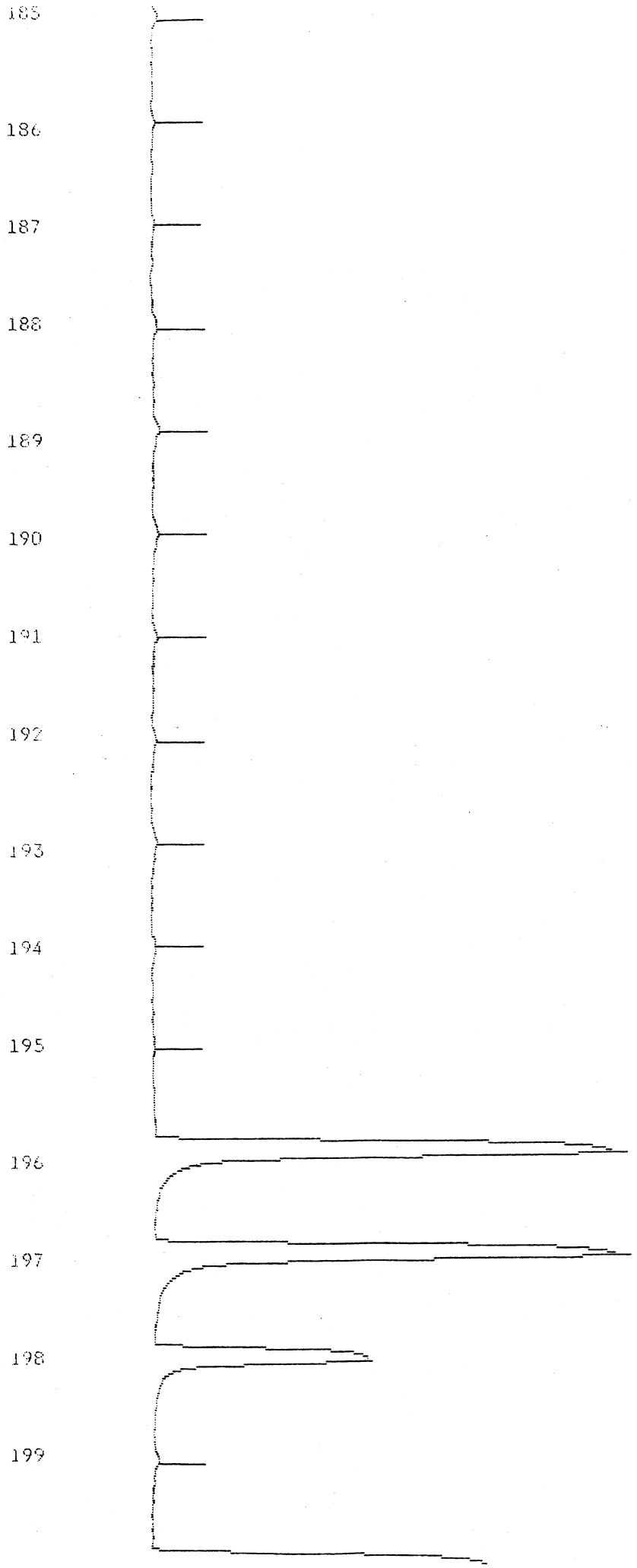
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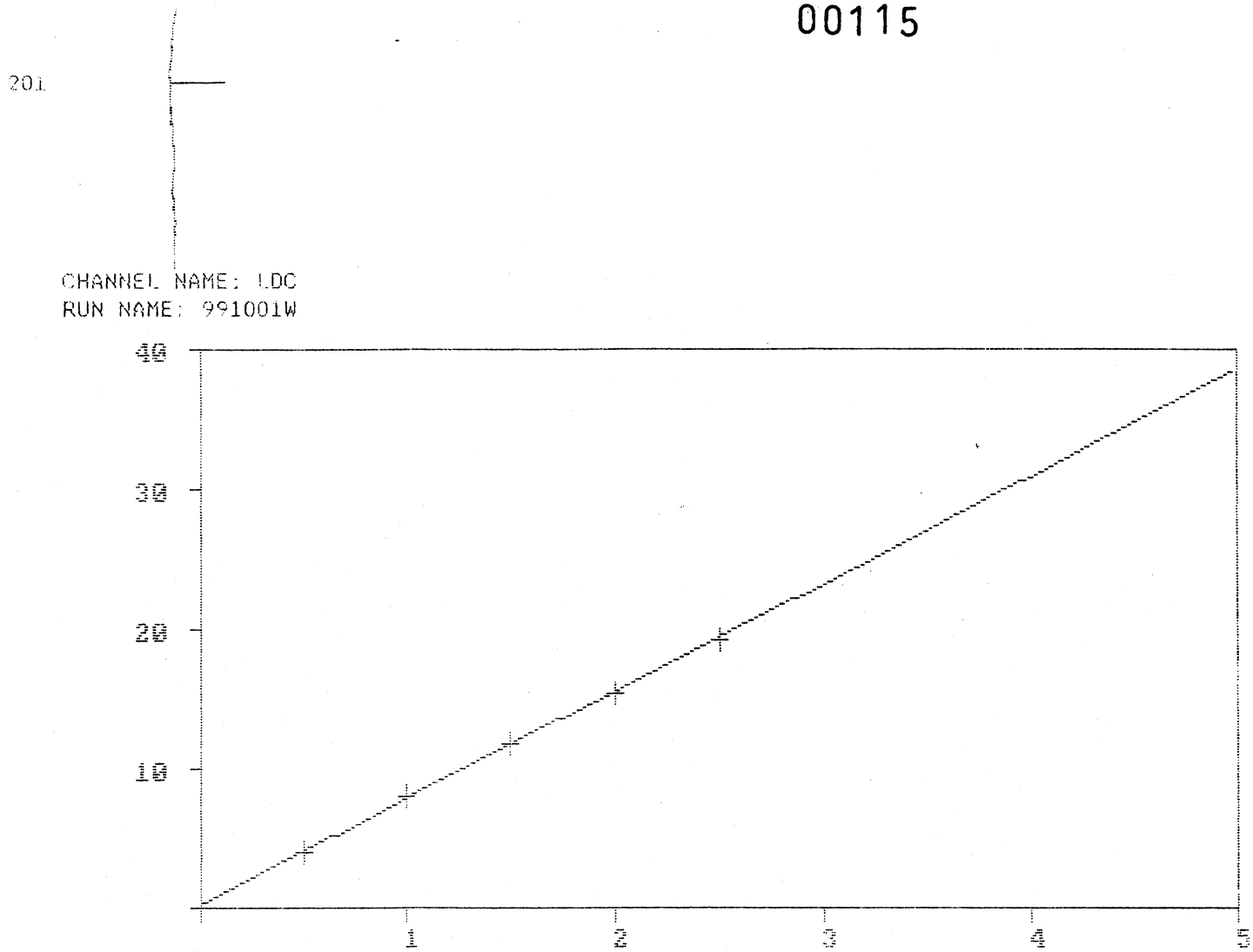


DATA TYPE: FIA CALIBRATION ORDER: 1
INTERCEPT = 0.20 SLOPE = 7.65812

CORRELATION: .9997931

CHANNEL NAME: LDC
RUN DATE: 10-01-1999
SAMPLE TABLE NAME: 991001W
METHOD NAME: HGWATER

| CUP# | SAMPLE ID | DIL | WGT | HEIGHT/AREA | CONCENTRATION (ppb) | EF |
|---|---|---|---|---|---|---|
| 1 | PRIMER | 1 | 1 | 10.8 | 1.383 | s |
| 2 | DUMMY | 1 | 1 | 0.0 | -0.020 | I |
| 3 | S1: 0 | 1 | 1 | 0.0 | -0.023 | I |
| 4 | S2: .5 | 1 | 1 | 4.1 | 0.506 | |
| 5 | S3: 1 | 1 | 1 | 8.0 | 1.019 | |
| 6 | S4: 1.5 | 1 | 1 | 11.9 | 1.523 | |
| 7 | S5: 2 | 1 | 1 | 15.4 | 1.989 | |
| 8 | S6: 2.5 | 1 | 1 | 19.2 | 2.486 | |
| 9 | ICV | 1 | 1 | 11.2 | 1.440 96% | |
| 10 | 8 | 1 | 1 | 0.0 | -0.027 | b |
| 11 | D4 | 1 | 1 | 11.9 | 1.523 | d |
| 12 | WS 378 | 1 | 1 | 16.6 | Tug 2.139 107% | |
| 13 | ORG REF | 1 | 1 | 16.5 | 2.132 107% | |
| 14 | BL1001-1B18 50089 | 1 | 1 | 0.0 | <0.03 -0.027 | I |
| 15 | BL1001-1B18 | 1 | 1 | 0.0 | -0.027 | I |
| 16 | BL10013 | 1 | 1 | 7.8 | m. 201 0.987 | 99% |

00116

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 150 | [illegible] | 1 | 1 | 7.6 | | [illegible] | 46% | |
| 151 | B | 1 | 1 | 0.0 | | -0.027 | b | |
| 152 | D4 | 1 | 1 | 11.9 | | 1.523 | d | |
| 153 | 42745D | 10 | 1 | 0.5 | <0.250 | 0.372 | I | |
| 154 | 42745D | 10 | 1 | 0.5 | | 0.436 | I | |
| 155 | 42545S | 10 | 1 | 8.4 | 2.676 | 10.640 | 101% | |
| 156 | 42545S | 10 | 1 | 8.4 | | 10.767 | | |
| 157 | 42545DS | 10 | 1 | 7.9 | 2.568 | 10.098 | 97% | |
| 158 | 42545DS | 10 | 1 | 8.2 | | 10.449 | | |
| 159 | 42743 | 10 | 1 | 0.5 | <0.250 | 0.404 | I | |
| 160 | 42743 | 10 | 1 | 0.3 | | 0.085 | I | |
| 161 | 42744 | 10 | 1 | 0.2 | <0.250 | -0.043 | I | |
| 162 | 42744 | 10 | 1 | 0.0 | | -0.266 | I | |
| 163 | 42746 | 10 | 1 | 3.5 | 1.090 | 4.294 | | |
| 164 | 42746 | 10 | 1 | 3.6 | | 4.422 | | |
| 165 | 42747 | 10 | 1 | 0.4 | <0.250 | 0.276 | I | |
| 166 | 42747 | 10 | 1 | 0.4 | | 0.276 | s | |
| 167 | 42748 | 10 | 1 | 0.1 | <0.250 | -0.170 | I | |
| 168 | 42748 | 10 | 1 | 0.1 | | -0.138 | I | |
| 169 | 42749 | 10 | 1 | 1.1 | 0.264 | 1.105 | | |
| 170 | 42749 | 10 | 1 | 1.0 | | 1.010 | | |
| 171 | 42750 | 10 | 1 | 1.8 | 0.520 | 2.094 | | |
| 172 | 42750 | 10 | 1 | 1.8 | | 2.062 | | |
| 173 | CCV | 1 | 1 | 7.5 | | 0.956 | 95% | |
| 174 | B | 1 | 1 | 0.0 | | -0.027 | b | |
| 175 | D4 | 1 | 1 | 11.9 | | 1.523 | d | |
| 176 | 42751 | 10 | 1 | 3.3 | 1.018 | 4.071 | | |
| 177 | 42751 | 10 | 1 | 3.3 | | 4.071 | | |
| 178 | 42282-HYX -MGHYX | 1 | 1 | 0.0 | | -0.023 | I | |
| 179 | 42282-HYX | 1 | 1 | 0.0 | | -0.027 | I | |
| 180 | 42497 | 1 | 1 | 1.1 | | 0.111 | | |
| 181 | 42497 | 1 | 1 | 1.1 | | 0.114 | s | |
| 182 | 43224 | 1 | 1 | 0.0 | | -0.027 | I | |
| 183 | 43224 | 1 | 1 | 0.0 | | -0.027 | I | |
| 184 | 42760 | 1 | 1 | 0.0 | | -0.020 | I | |
| 185 | 42760 | 1 | 1 | 0.0 | | -0.020 | I | |
| 186 | 44796 | 1 | 1 | 0.0 | | -0.027 | I | |
| 187 | 44796 | 1 | 1 | 0.0 | | -0.027 | I | |
| 188 | 47489 | 1 | 1 | 0.0 | | -0.027 | I | |
| 189 | 47489 | 1 | 1 | 0.1 | | -0.017 | I | |
| 190 | 53129 | 1 | 1 | 0.1 | | -0.017 | I | |
| 191 | 53129 | 1 | 1 | 0.0 | | -0.027 | I | |
| 192 | 53143 | 1 | 1 | 0.0 | | -0.027 | I | |
| 193 | 53143 | 1 | 1 | 0.0 | | -0.027 | I | |
| 194 | 53685 | 1 | 1 | 0.0 | | -0.027 | I | |
| 195 | 53685 | 1 | 1 | 0.0 | | -0.027 | I | |
| 196 | WS 378 | 1 | 1 | 16.1 | | 2.075 | 103% | |
| 197 | ORG REF | 1 | 1 | 16.2 | | 2.084 | 104% | |
| 198 | CCV | 1 | 1 | 7.5 | | 0.952 | 95% | |
| 199 | B | 1 | 1 | 0.0 | | -0.027 | b | |
| 200 | D4 | 1 | 1 | 11.9 | | 1.523 | d | |

INTERCEPT: 0.20 LINEAR COEF: 7.65812

CORRELATION COEF: .9997931

| Lenon Number | Client | Client ID | Parameter | TS | Result | Dup. | Spike | % Rec. | Dup. Spk | % Rec. | Batch Date | Batch Code | Run Date | Run Code | Day Old | Day In | Analyst's Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| )47488 | TRC-LO | MB R456 | Mercury - | PV | -0.023 | -99999.0 | 0.227 | 101. | 0.228 | 101. | 99/09/20 | 1GMN | 99/09/20 | MG02 | 27. | 24. | *PDS* |
| )47489 | TRC-LO | [redacted] | Mercury - | PV | -0.023 | | | | | | 99/09/20 | 1GMN | 99/09/20 | MG02 | 27. | 24. | |
| )47490 | TRC-LO | [redacted] | Mercury - | PV | 0.314 | | | | | | 99/09/20 | 1GMN | 99/09/20 | MG02 | 28. | 24. | |
| )47491 | TRC-LO | [redacted] | Mercury - | PV | 2.418 | 2.406 | 5.732 | 95. | 5.756 | 96. | 99/09/20 | 1GMN | 99/09/20 | MG02 | 27. | 24. | *PDS* |
| )47492 | TRC-LO | [redacted] | Mercury - | PV | 1.340 | | | | | | 99/09/20 | 1GMN | 99/09/20 | MG02 | 29. | 24. | |
| )47493 | TRC-LO | [redacted] | Mercury - | PV | 3.218 | | | | | | 99/09/20 | 1GMN | 99/09/20 | MG02 | 27. | 24. | |
| )47494 | TRC-LO | [redacted] | Mercury - | PV | 0.444 | | | | | | 99/09/20 | 1GMN | 99/09/20 | MG02 | 27. | 24. | |
| )47495 | TRC-LO | [redacted] | Mercury - | PV | 0.983 | | | | | | 99/09/20 | 1GMN | 99/09/20 | MG02 | 26. | 24. | |
| )47496 | TRC-LO | [redacted] | Mercury - | PV | 0.207 | | | | | | 99/09/20 | 1GMN | 99/09/20 | MG02 | 26. | 24. | |
| )47497 | TRC-LO | [redacted] | Mercury - | PV | 1.055 | | | | | | 99/09/20 | 1GMN | 99/09/20 | MG02 | 26. | 24. | |
| )47498 | TRC-LO | [redacted] | Mercury - | PV | 0.210 | | | | | | 99/09/20 | 1GMN | 99/09/20 | MG02 | 26. | 24. | |
| 3L0920 | INTERNAL | [redacted] | Mercury - | PV | -0.015 | -99999.0 | 0.151 | 101. | 0.152 | 101. | 99/09/20 | 1GMN | 99/09/20 | MG02 | $$$ | $$$ | *PDS* |
| )44797 | TRC-LO | OHM-I-FB | Mercury - | PV | 4.071 | | | | | | 99/09/20 | 2GMN | 99/09/20 | MG02 | 41. | 34. | |
| )44888 | TRC-LO | OHM-O-FB | Mercury - | PV | 4.458 | | | | | | 99/09/20 | 2GMN | 99/09/20 | MG02 | 41. | 34. | |
| )47499 | TRC-LO | [redacted] | Mercury - | PV | 0.338 | | | | | | 99/09/20 | 2GMN | 99/09/20 | MG02 | 28. | 24. | |
| )47500 | TRC-LO | [redacted] | Mercury - | PV | 1.365 | 1.394 | 2.267 | 95. | 2.249 | 93. | 99/09/20 | 2GMN | 99/09/20 | MG02 | 27. | 24. | *PDS* |
| )47501 | TRC-LO | [redacted] | Mercury - | PV | 1.299 | | | | | | 99/09/20 | 2GMN | 99/09/20 | MG02 | 27. | 24. | |
| )47502 | TRC-LO | [redacted] | Mercury - | PV | 0.618 | | | | | | 99/09/20 | 2GMN | 99/09/20 | MG02 | 26. | 24. | |
| )47503 | TRC-LO | [redacted] | Mercury - | PV | 0.519 | | | | | | 99/09/20 | 2GMN | 99/09/20 | MG02 | 26. | 24. | |
| 3L0920 | INTERNAL | [redacted] | Mercury - | PV | -0.015 | -99999.0 | 0.154 | 103. | 0.151 | 101. | 99/09/20 | 2GMN | 99/09/20 | MG02 | $$$ | $$$ | *PDS* |

20 Tests for OHMN4 with an MDL of 0.030 ug Validated By CMB Control Chart Updated N/A IO Requirements met N/A

00117

# LDC AUTOSAMPLER RUN LOG (MERCURY)

Date: 99.09.20(WK) Run Code: MG02 Matrix: IMP.

Analyst: MG Units: µg (see comments) MDL: 0.015

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 1 | | | Primer (ICV) | | | |
| 2 | | | Dummy (Blk) | | | |
| 3 | | | Std 1 (S1) | 0.0 | | |
| 4 | | | Std 2 (S2) | 0.5 | | |
| 5 | | | Std 3 (S3) | 1.0 | | |
| 6 | | | Std 4 (S4) | 1.5 | | |
| 7 | | | Std 5 (S5) | 2.0 | | |
| 8 | | | Std 6 (S6) | 2.5 | | |
| 9 | | | ICV | | | |
| 10 | | | B (Std 1) | | | |
| 11 | | | D4 (Std 4) | | | |
| 12 | | | WS 378 | | | |
| 13 | | | ORG. REF. | | | |
| 14 | | | BL0920 | 1GMN. | | |
| 15 | | | " | | | |
| 16 | | | BL0920 S | | | |
| 17 | | | " | | | |
| 18 | | | BL0920 DS | | | |
| 19 | | | " | | | |
| 20 | 1.5 | 1/4 | 47491 | | | |
| 21 | | | " | | | |
| 22 | | | 47491 D | | | |
| 23 | | | " | | | |
| 24 | | | 47491 S | | | |
| 25 | | | " | | | |
| 26 | | | 47491 DS | | | |
| 27 | | | " | | | |
| 28 | | 1/20 | 47491 DS | | | |
| 29 | | | " | | | |
| 30 | | | 47489 | | | |
| 31 | | | " | | | |
| 32 | | | 47490 | | | |
| 33 | | | " | | | |
| 34 | | | CCV | | | |
| 35 | | | B | | | |
| 36 | | | D4 | | | |
| 37 | 1.5 | | 47492 | | | |
| 38 | | | " | | | |
| 39 | | 1/2 | 47493 | | | |
| 40 | | | " | | | |
| 41 | 1.5 | | 47494 | | | |
| 42 | | | " | | | |
| 43 | | | 47495 | | | |
| 44 | | | " | | | |
| 45 | | | 47496 | | | |
| 46 | | | " | | | |
| 47 | | | 47497 | | | |
| 48 | | | " | | | |
| 49 | | | 47498 | | | |
| 50 | | | " | | | |
| 51 | | | BL0920 | 2G MN | | |
| 52 | | | " | | | |
| 53 | | | BL0920 S | | | |
| 54 | | | " | | | |
| 55 | | | BL0920 DS | | | |
| 56 | | | " | | | |
| 57 | | | CCV | | | |
| 58 | | | B | | | |
| 59 | | | D4 | | | |
| 60 | 1.5 | | 47500 | | | |
| 61 | | | " | | | |
| 62 | | | 47500 D | | | |
| 63 | | | " | | | |
| 64 | | | 47500 S | | | |
| 65 | | | " | | | |
| 66 | | | 47500 DS | | | |
| 67 | | | " | | | |
| 68 | | | 47499 | | | |
| 69 | | | " | | | |
| 70 | | | 47501 | | | |
| 71 | | | " | | | |
| 72 | | | 47502 | | | |
| 73 | | | " | | | |
| 74 | | | 47503 | | | |
| 75 | | | " | | | |
| 76 | | | BL0920 | 3GKC | | |
| 77 | | | " | | | |
| 78 | | | BL0920 S | | | |
| 79 | | | " | | | |
| 80 | | | CCV | | | |

Comments: *** "HG-347" and "MISA12" units are expressed in mg/L not ug/L

ICV = 1.5 ug/L, CCV = 1.0 ug/L, Blank Spike = 1.0 ug/L for liquid samples.

ICV = 1.5 mg/kg, CCV = 1.0 mg/kg, Blank Spike = 1.0 mg/kg for solid samples.

# LDC AUTOSAMPLER RUN LOG (MERCURY)

Date: 99-09-20 Run Code: MG02 Matrix: IMP

Analyst: MG Units: µg (see comments) MDL: 0.015

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 1 | | | Primer (ICV) | | | |
| 2 | | | Dummy (Blk) | | | |
| 3 | | | Std 1 (S1) | 0.0 | | |
| 4 | | | Std 2 (S2) | 0.5 | | |
| 5 | | | Std 3 (S3) | 1.0 | | |
| 6 | | | Std 4 (S4) | 1.5 | | |
| 7 | | | Std 5 (S5) | 2.0 | | |
| 8 | | | Std 6 (S6) | 2.5 | | |
| 9 | | | ICV | | | |
| 10 | | | B (Std 1) | | | |
| 11 | | | D4 (Std 4) | | | |
| 12 | | | | | | |
| 13 | | | | | | |
| 14 | | | | | | |
| 15 | | | | | | |
| 16 | | | | | | |
| 17 | | | | | | |
| 18 | | | | | | |
| 19 | | | | | | |
| 20 | | | | | | |
| 21 | | | B | | | |
| 22 | | | D4 | | | |
| 23 | | | BL0920 DS | | | |
| 24 | | | " | | | |
| 25 | 1.5 | | 47491 | | | |
| 26 | | | " | | | |
| 27 | | | 47491 D | | | |
| 28 | | | " | | | |
| 29 | | | 47491 S | | | |
| 30 | | | " | | | |
| 31 | | | 47491 DS | | | |
| 32 | | | " | | | |
| 33 | | | 47489 | | | |
| 34 | | | " | | | |
| 35 | | | 47490 | | | |
| 36 | | | " | | | |
| 37 | | | 47492 | | | |
| 38 | | | " | | | |
| 39 | | | 47493 | | | |
| 40 | | | " | | | |
| 41 | 1.5 | | 47494 | | | |
| 42 | | | " | | | |
| 43 | | | CCV | | | |
| 44 | | | B | | | |
| 45 | | | D4 | | | |
| 46 | 1.5 | | 47495 | | | |
| 47 | | | " | | | |
| 48 | | | 47496 | | | |
| 49 | | | " | | | |
| 50 | | | 47497 | | | |
| 51 | | | " | | | |
| 52 | | | 47498 | | | |
| 53 | | | " | | | |
| 54 | | | BL0920 | 4GKC | | |
| 55 | | | " | | | |
| 56 | | | BL0920 S | | | |
| 57 | | | " | | | |
| 58 | | | BL0920 DS | | | |
| 59 | | | " | | | |
| 60 | 1.5 | | 47500 | | | |
| 61 | | | " | | | |
| 62 | | | 47500 D | | | |
| 63 | | | " | | | |
| 64 | | | 47500 S | | | |
| 65 | | | " | | | |
| 66 | | | CCV | | | |
| 67 | | | B | | | |
| 68 | | | D4 | | | |
| 69 | 1.5 | | 47500 DS | | | |
| 70 | | | " | | | |
| 71 | | | 47499 | | | |
| 72 | | | " | | | |
| 73 | | | 47501 | | | |
| 74 | | | " | | | |
| 75 | | | 47502 | | | |
| 76 | | | " | | | |
| 77 | | | 47503 | | | |
| 78 | | | " | | | |
| 79 | | 1/20 | 42065 | | | |
| 80 | | | " | | | |

Comments: *** "HG-347" and "MISA12" units are expressed in mg/L not ug/L

ICV = 1.5 ug/L, CCV = 1.0 ug/L, Blank Spike = 1.0 ug/L for liquid samples.

ICV = 1.5 mg/kg, CCV = 1.0 mg/kg, Blank Spike = 1.0 mg/kg for solid samples.

# LDC AUTOSAMPLER RUN LOG (MERCURY)

'e: 99.09.20 Run Code: MG02 Matrix: IMP.

Analyst: MG Units: µg (see comments) MDL: 0.03

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 1 | | | Primer (ICV) | | | |
| 2 | | | Dummy (Blk) | | | |
| 3 | | | Std 1 (S1) | 0.0 | | |
| 4 | | | Std 2 (S2) | 0.5 | | |
| 5 | | | Std 3 (S3) | 1.0 | | |
| 6 | | | Std 4 (S4) | 1.5 | | |
| 7 | | | Std 5 (S5) | 2.0 | | |
| 8 | | | Std 6 (S6) | 2.5 | | |
| 9 | | | ICV | | | |
| 10 | | | B (Std 1) | | | |
| 11 | | | D4 (Std 4) | | | |
| 12 | | | | | | |
| 13 | | | | | | |
| 14 | | | | | | |
| 15 | | | | | | |
| 16 | | | | | | |
| 17 | | | | | | |
| 18 | | | | | | |
| 19 | | | | | | |
| 20 | | | | | | |
| 41 21 | 1.5 | 1/10 | 44797 | KMNO4 | | |
| 22 | | ↓ | " | ↓ | | |
| 23 | | | 44888 | | | |
| 24 | | | " | | | |
| 25 | | | WS 378 | | | |
| 26 | | | ORG. REF. | | | |
| 27 | | | CCV | | | |
| 28 | | | B | | | |
| 29 | | | D4 | | | |
| 30 | | | | | | |
| 31 | | | | | | |
| 32 | | | | | | |
| 33 | | | | | | |
| 34 | | | | | | |
| 35 | | | | | | |
| 36 | | | | | | |
| 37 | | | | | | |
| 38 | | | | | | |
| 39 | | | | | | |
| 40 | | | | | | |

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 41 | | | | | | |
| 42 | | | | | | |
| 43 | | | | | | |
| 44 | | | | | | |
| 45 | | | | | | |
| 46 | | | | | | |
| 47 | | | | | | |
| 48 | | | | | | |
| 49 | | | | | | |
| 50 | | | | | | |
| 51 | | | | | | |
| 52 | | | | | | |
| 53 | | | | | | |
| 54 | | | | | | |
| 55 | | | | | | |
| 56 | | | | | | |
| 57 | | | | | | |
| 58 | | | | | | |
| 59 | | | | | | |
| 60 | | | | | | |
| 61 | | | | | | |
| 62 | | | | | | |
| 63 | | | | | | |
| 64 | | | | | | |
| 65 | | | | | | |
| 66 | | | | | | |
| 67 | | | | | | |
| 68 | | | | | | |
| 69 | | | | | | |
| 70 | | | | | | |
| 71 | | | | | | |
| 72 | | | | | | |
| 73 | | | | | | |
| 74 | | | | | | |
| 75 | | | | | | |
| 76 | | | | | | |
| 77 | | | | | | |
| 78 | | | | | | |
| 79 | | | | | | |
| 80 | | | | | | |

Comments: *** "HG-347" and "MISA12" units are expressed in mg/L not ug/L

ICV = 1.5 ug/L, CCV = 1.0 ug/L, Blank Spike = 1.0 ug/L for liquid samples.

ICV = 1.5 mg/kg, CCV = 1.0 mg/kg, Blank Spike = 1.0 mg/kg for solid samples.

# EPA 7470 WATER PREPARATION LOG - MERCURY

DG7470HG
DGHGLEACH, DG29HG***

Calibration Solutions:

| # | I.D. | *Conc. | Spike | **Conc. Entered |
|---|---|---|---|---|
| 1 | Blank/Dummy | 0 ppb | None | 0.0 |
| 2 | Standard 1 | 0 ppb | None | 0.0 |
| 3 | Standard 2 | 0.33 | 200 ul of 0.05 ppm IV working standard | 0.5 |
| 4 | Standard 3 | 0.67 | 400 ul of 0.05 ppm IV working standard | 1.0 |
| 5 | Standard 4 | 1.0 | 600 ul of 0.05 ppm IV working standard | 1.5 |
| 6 | Standard 4 | 1.0 | 600 ul of 0.05 ppm IV working standard | 1.5 |
| 7 | Standard 5 | 1.33 | 800 ul of 0.05 ppm IV working standard | 2.0 |
| 7 | Standard 6 | 1.67 | 1000 ul of 0.05 ppm IV working standard | 2.5 |

Check List
- [x] Digest Code/labels
- [x] Samples poured out
- [x] Acids added
- [x] Reagents added
- [x] Samples spiked
- [x] Bath at 95 degrees C
- [x] Samples digested
- [x] Hydroxylamine HCl added
- [x] Samples bulked and mixed
- [x] Rack order checked

| | # | Sample I.D. | B.Code | Init.Vol. | F. Vol. | Dil | Comment |
|---|---|---|---|---|---|---|---|
| | 9 | ICV (Init. Calib. Verif.) | 46KC | 20 ml | 30 ml | 1 X | 1.5 ppb = 600 ul. of 0.05 ppm HP MESS-ZENO 30/QCA Std. |
| | 10 | BL 0920 | " | " | " | " | (Processed Blank) |
| | 11 | BL 0920 S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 12 | ~~485~~ 47500 | " | " | " | " | 680 ml |
| 1 | 13 | D | " | " | " | " | (Duplicate sample) |
| 1 | 14 | S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 15 | DS | " | " | " | " | (Duplicate Spiked sample) |
| 2 | 16 | 47499 | " | " | " | " | 440 |
| 3 | 17 | 47501 | " | " | " | " | 630 |
| 4 | 18 | 502 | " | " | " | " | 680 |
| 5 | 19 | 503 | " | " | " | " | 665 |
| 6 | 20 | 44886 | $KMNO_4$ | " | " | " | 470 |
| 7 | 21 | 44797 | " | " | " | " | 420 |
| 8 | 22 | | " | " | " | " | |
| 9 | 23 | | " | " | " | " | |
| 10 | 24 | | " | " | " | " | |
| | 25 | CCV (Cont. Calib. Verif.) | | 20 ml | 30 ml | 1 X | 1.0 ppb = 400 ul. of 0.05 ppm HP MESS-ZENO 30/QCA Std. |
| | 26 | BL | " | " | " | " | (Processed Blank) |
| | 27 | BL S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 28 | | " | " | " | " | |
| 1 | 29 | D | " | " | " | " | (Duplicate sample) |
| 1 | 30 | S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 31 | DS | " | " | " | " | (Duplicate Spiked sample) |
| 2 | 32 | | " | " | " | " | |
| 3 | 33 | | " | " | " | " | |
| 4 | 34 | | " | " | " | " | |
| 5 | 35 | | " | " | " | " | |
| 6 | 36 | | " | " | " | " | |
| 7 | 37 | | " | " | " | " | |
| 8 | 38 | | " | " | " | " | |
| 9 | 39 | | " | " | " | " | |
| 10 | 40 | | " | " | " | " | |

Notes: Other Applicable Test Codes: DG29HG-1B, DG29HG-2B, DG29HG-3A, DG29HG-3B, DG29HG-3C
DG29HGI, DG29HGF, DG101AA1, DG101AA2

Include External Reference Material (EPA WS 378 or SPEX CertiPrep TM - WS) per run

Prepare 0.05 ppm standards daily

HNO3 Lot. No. | H2SO4 Lot. No. | Bath Temps. / / °C

Prepared By: [illegible] Date: 99/09/20 Checked by: [illegible]

#01122T DIGESTED

# EPA 7470 WATER PREPARATION LOG - MERCURY

DG7470HG
DGHGLEACH, DG29HG***

Calibration Solutions:

| # | I.D. | *Conc. | Spike | **Conc. Entered |
|---|---|---|---|---|
| 1 | Blank/Dummy | 0 ppb | None | 0.0 |
| 2 | Standard 1 | 0 ppb | None | 0.0 |
| 3 | Standard 2 | 0.33 | 200 ul of 0.05 ppm IV working standard | 0.5 |
| 4 | Standard 3 | 0.67 | 400 ul of 0.05 ppm IV working standard | 1.0 |
| 5 | Standard 4 | 1.0 | 600 ul of 0.05 ppm IV working standard | 1.5 |
| 6 | Standard 4 | 1.0 | 600 ul of 0.05 ppm IV working standard | 1.5 |
| 7 | Standard 5 | 1.33 | 800 ul of 0.05 ppm IV working standard | 2.0 |
| 7 | Standard 6 | 1.67 | 1000 ul of 0.05 ppm IV working standard | 2.5 |

Check List
- ✓ Digest Code/labels
- Samples poured out
- Acids added
- Reagents added
- Samples spiked
- Bath at 95 degrees C
- Samples digested
- Hydroxylamine HCl added
- Samples bulked and mixed
- ✓ Rack order checked

| | # | Sample I.D. | B.Code | Init.Vol. | F. Vol. | Dil | Comment |
|---|---|---|---|---|---|---|---|
| | 9 | ICV (Init. Calib. Verif.) | 1GMN | 20 ml | 30 ml | 1 X | 1.5 ppb = 600 ul. of 0.05 ppm HP MESS-ZENO 30/QCA Std. |
| | 10 | BL 0920 | " | " | " | " | (Processed Blank) |
| | 11 | BL 0920 S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 12 | 47491 | " | " | " | " | 580 ml |
| 1 | 13 | D | " | " | " | " | (Duplicate sample) |
| 1 | 14 | S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 15 | DS | " | " | " | " | (Duplicate Spiked sample) |
| 2 | 16 | 489 | " | " | " | " | 90 ml |
| 3 | 17 | 490 | " | " | " | " | 440 ml |
| 4 | 18 | 492 | " | " | " | " | ~~580~~ ml (600 ml) |
| 5 | 19 | 493 | " | " | " | " | ~~ml~~ 580 ml |
| 6 | 20 | 494 | " | " | " | " | 580 |
| 7 | 21 | 495 | " | " | " | " | 620 |
| 8 | 22 | 496 | " | " | " | " | 600 |
| 9 | 23 | 497 | " | " | " | " | 605 |
| 10 | 24 | 498 | " | " | " | " | 585 |
| | 25 | CCV (Cont. Calib. Verif.) | 2GMN | 20 ml | 30 ml | 1 X | 1.0 ppb = 400 ul. of 0.05 ppm HP MESS-ZENO 30/QCA Std. |
| | 26 | BL 0920 | " | " | " | " | (Processed Blank) |
| | 27 | BL 092 S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 28 | 47500 | " | " | " | " | 620 ml |
| 1 | 29 | D | " | " | " | " | (Duplicate sample) |
| 1 | 30 | S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 31 | DS | " | " | " | " | (Duplicate Spiked sample) |
| 2 | 32 | 47499 | " | " | " | " | 445 |
| 3 | 33 | 47501 | " | " | " | " | 570 |
| 4 | 34 | 502 | " | " | " | " | 570 |
| 5 | 35 | 503 | " | " | " | " | 600 |
| 6 | 36 | 44797 KMnO4 | " | " | " | " | 420 ml |
| 7 | 37 | 44888 - KMnO4 | " | " | " | " | 470 |
| 8 | 38 | | " | " | " | " | |
| 9 | 39 | | " | " | " | " | |
| 10 | 40 | | " | " | " | " | |

Notes: Other Applicable Test Codes: DG29HG-1B, DG29HG-2B, DG29HG-3A, DG29HG-3B, DG29HG-3C
DG29HGI, DG29HGF, DG101AA1, DG101AA2

Include External Reference Material (EPA WS 378 or SPEX CertiPrep TM - WS) per run — Prepare 0.05 ppm standards daily

| HNO3 Lot. No. | H2SO4 Lot. No. | Bath Temps. / / °C |
|---|---|---|

Prepared By: [illegible] Date: 99/09/20 Checked by: [illegible]

| | # | Sample I.D. | B.Code | Init.Vol. | F. Vol. | Dil | Comment |
|---|---|---|---|---|---|---|---|
| | 41 | CCV (Cont. Calib. Verif.) | 36L6 | 20 ml | 30 ml | 1 X | 1.0 ppb = 400 ul. of 0.05 ppm HP MESS-ZENO 30/QCA Std. |
| | 42 | BL 0920 | " | " | " | " | (Processed Blank) |
| | 43 | BL 0920 S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 44 | 47491 | " | " | " | " | 715 ml |
| 1 | 45 | D | " | " | " | " | (Duplicate sample) |
| 1 | 46 | S | " | " | " | " | 1 ppb = 400 ul. of 0.05 ppm Inorganic Ventures Std Interm. |
| 1 | 47 | DS | " | " | " | " | (Duplicate Spiked sample) |
| 2 | 48 | 489 | " | " | " | " | 100 |
| 3 | 49 | 490 | " | " | " | " | 485 |
| 4 | 50 | 492 | " | " | " | " | 730 |
| 5 | 51 | 493 | " | " | " | " | 685 |
| 6 | 52 | 494 | " | " | " | " | 610 |
| 7 | 53 | 495 | " | " | " | " | 745 |
| 8 | 54 | 496 | " | " | " | " | 710 |
| 9 | 55 | 497 | " | " | " | " | 665 |
| 10 | 56 | 498 | " | " | " | " | 725 |

**Comments**

* concentration based on 30 ml final volume, ** concentration based on 20 ml final volume

*** group of several Method 29 testcodes

Dilution factor of 1.5 is corrected by entering the calibration concentrations listed above

## Procedure/Methodology:

1 Prepare 25 ppm Intermediate stock (if required) by pipetting 625 ul., of 1000 ppm Stock to 25 ml final volume of 2% HNO3
2 Prepare 0.05 ppm Working stock daily by pipetting 200 ul., of 25 ppm Stock to 100 ml final volume of 2% HNO3
3 Using the LIMS Screen "SCNDIG" enter the required samples into LIMS
4 Using the labeling program, "DIGLBL", retreive the "SCNDIG" list and create labels for the required samples.
5 Label the falcon tubes appropriately
6 Transfer a 20 ml. aliquot of well mixed sample into the designated falcon tube
7 Spike the tubes as indicated in the comment sector of the digestion sheet
8 Add 0.5 ml. of conc. Nitric Acid (HNO3), and 1 ml. of conc. Sulphuric acid, (H2SO4), to each tube
9 Add 3 ml. Potassium Permanganate (KMnO4), colour should remain for at least 15 minutes
10 Add 1.5 ml. of Potassium persulphate, (K2S2O8), to each tube
11 Mix samples, cap loosely and place in a water bath @ 95 degrees C for 2 hours
12 Remove tubes and allow to cool to room temperature
13 Add 1.0 ml. 20% Hydroxylamine Hydrochloride to each tube
14 Recap tubes and shake until the Potassium Permanganate (KMnO4) is destroyed and sample becomes colourless
15 Dilute the sample to a final volume of 30 ml., cap and mix well

**REFERENCE STANDARDS/SPIKING SOLUTIONS:**
Source: Inorganic Ventures Standard, see standard tracking binder for current lot and expiry date information

**ICV/CCV STANDARDS:**
Source: High Purity MESS-ZENO 30/QCA Standard, see standard tracking binder for current lot

**INTERNAL REFERENCE STANDARD: (2 ppb in 10% HNO3)**
Source: EPA WS 378 or SPEX CertiPrep Trace Metal - Water Supply, see standard tracking binder for current source, lot and expiry date information.

All reagents used are of a grade suitable for mercury analyses

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CHART SPEED: 30
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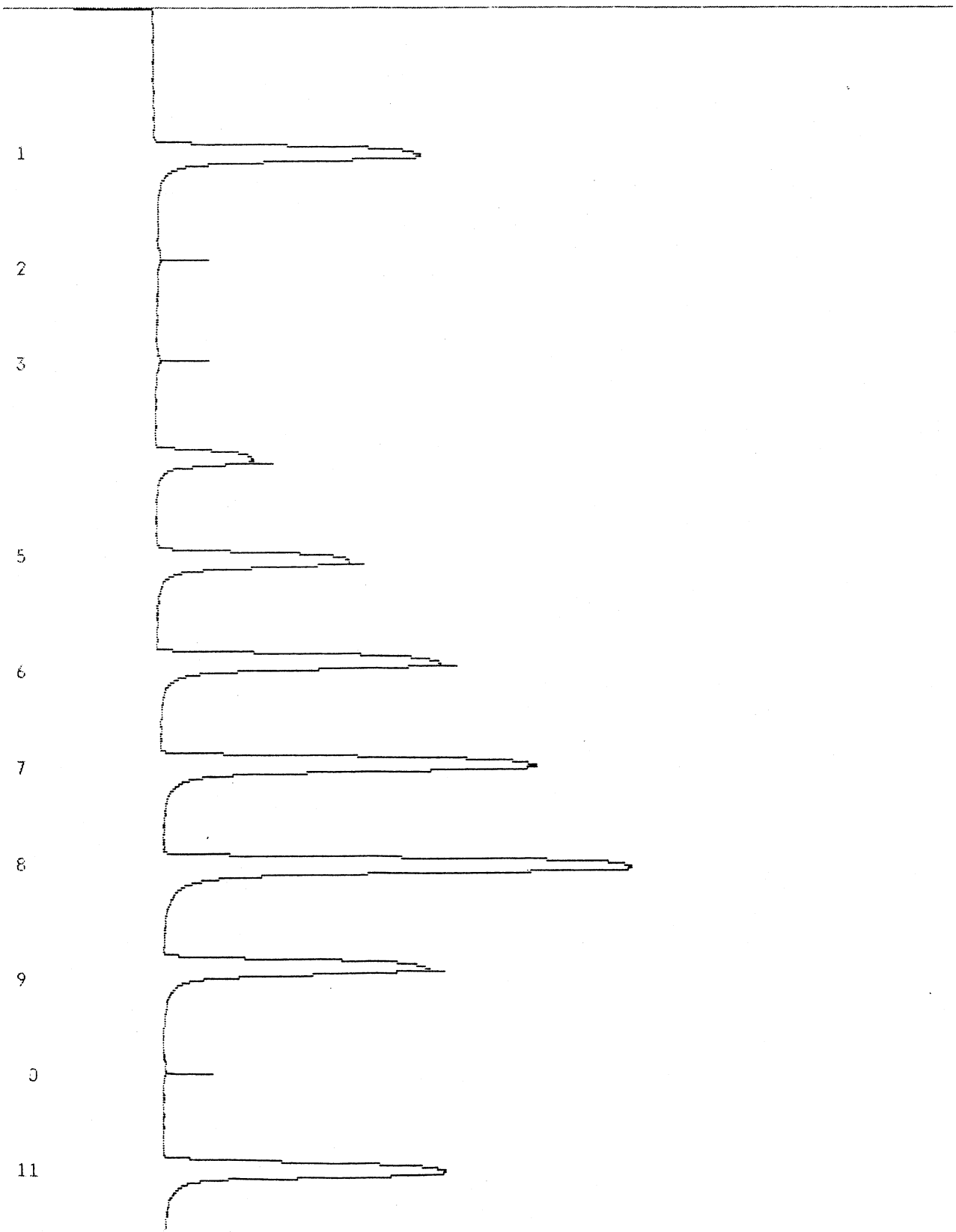

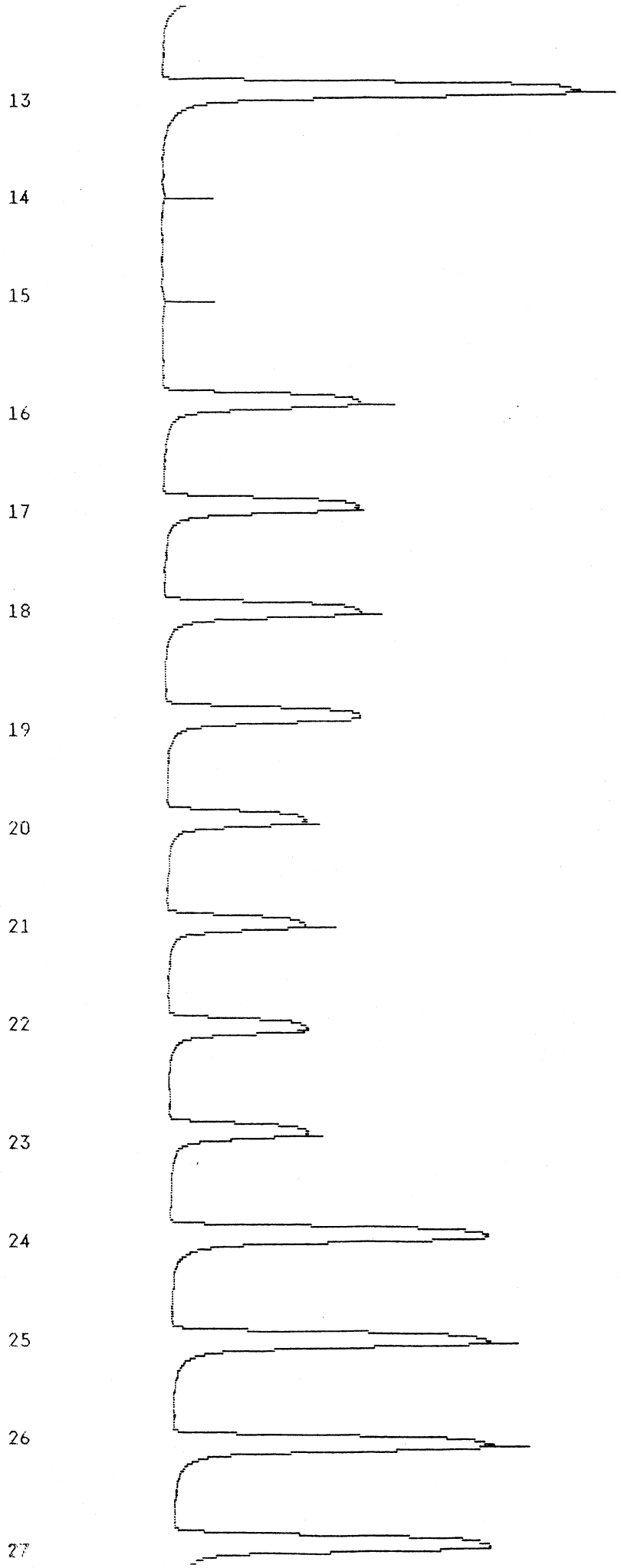
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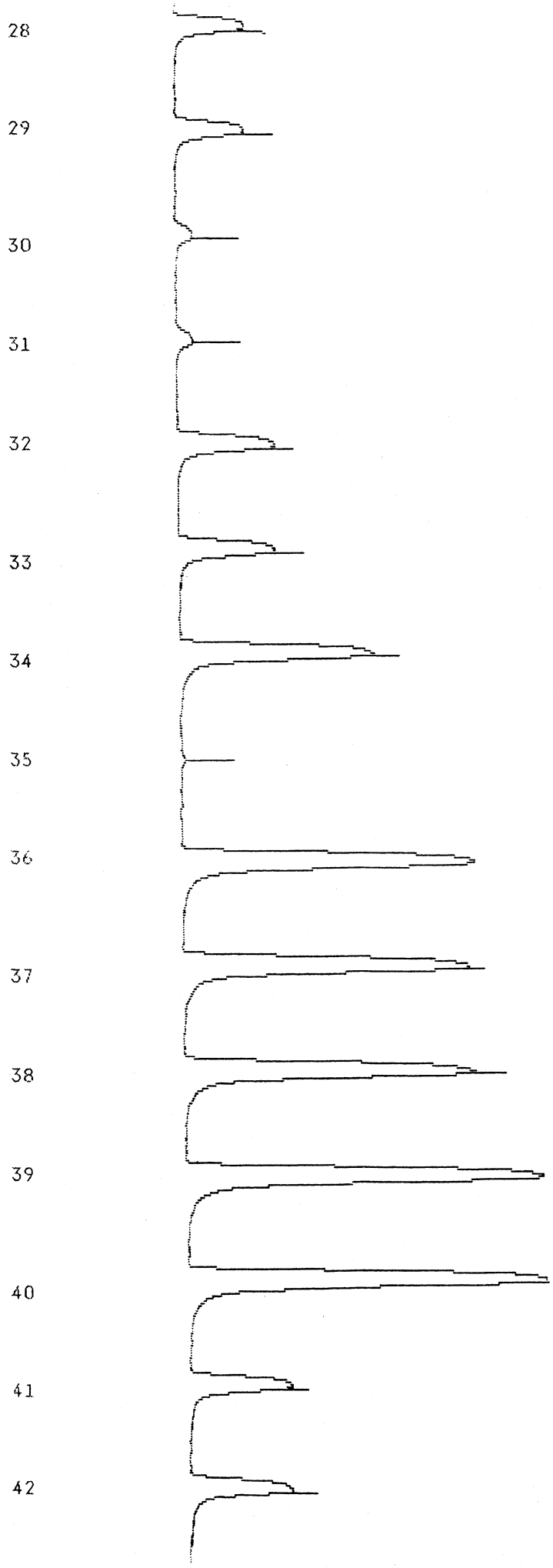
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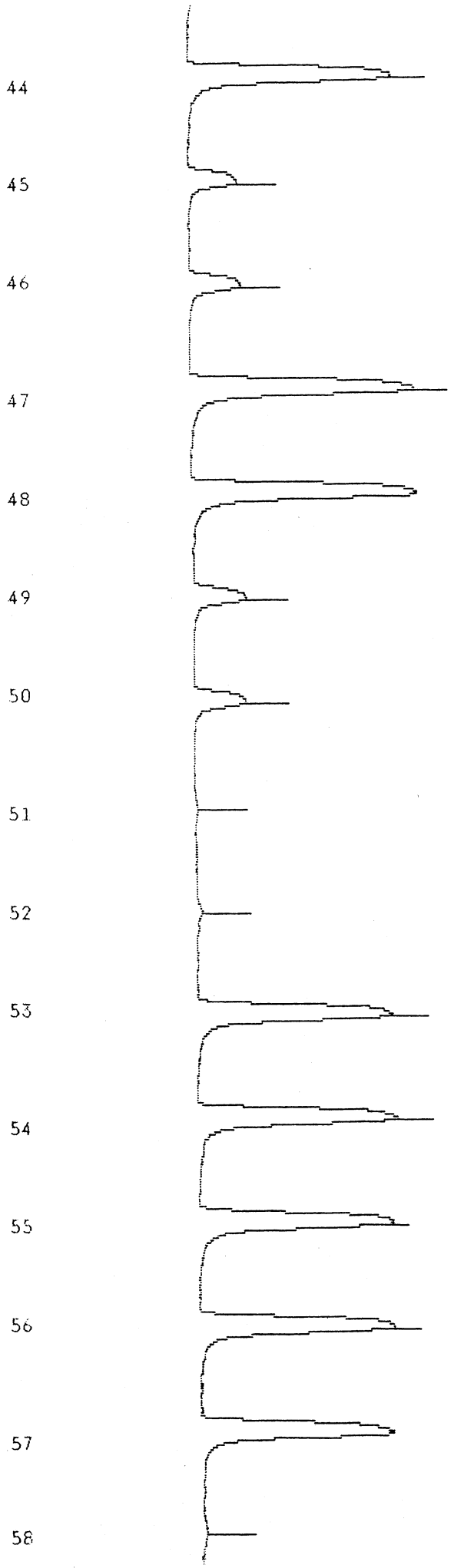
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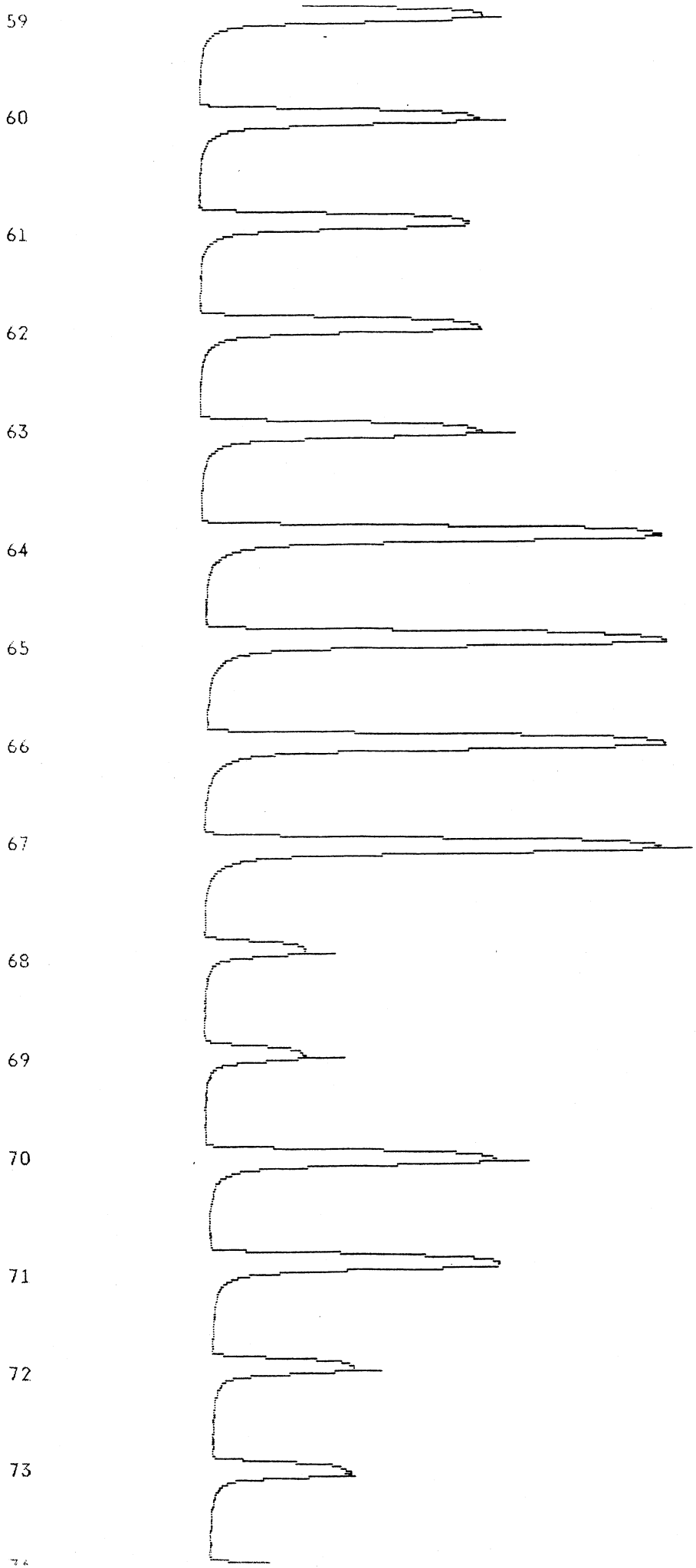
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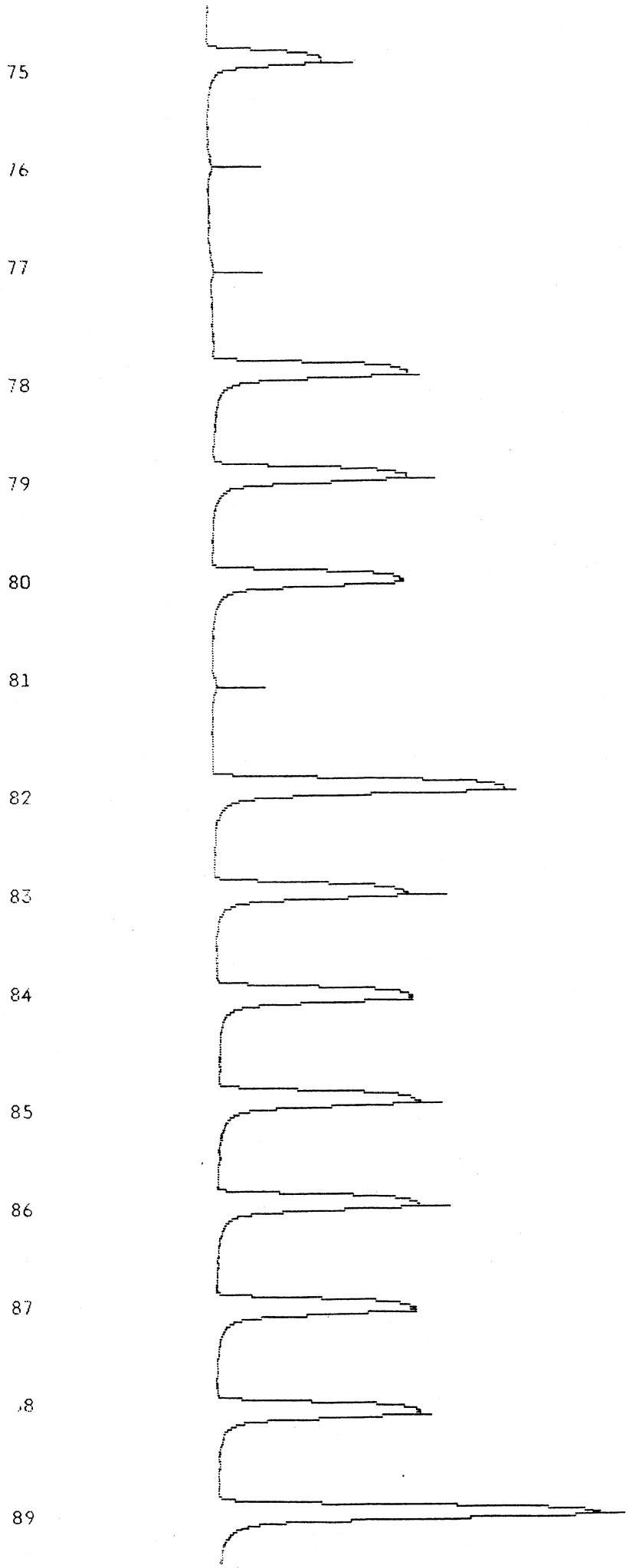
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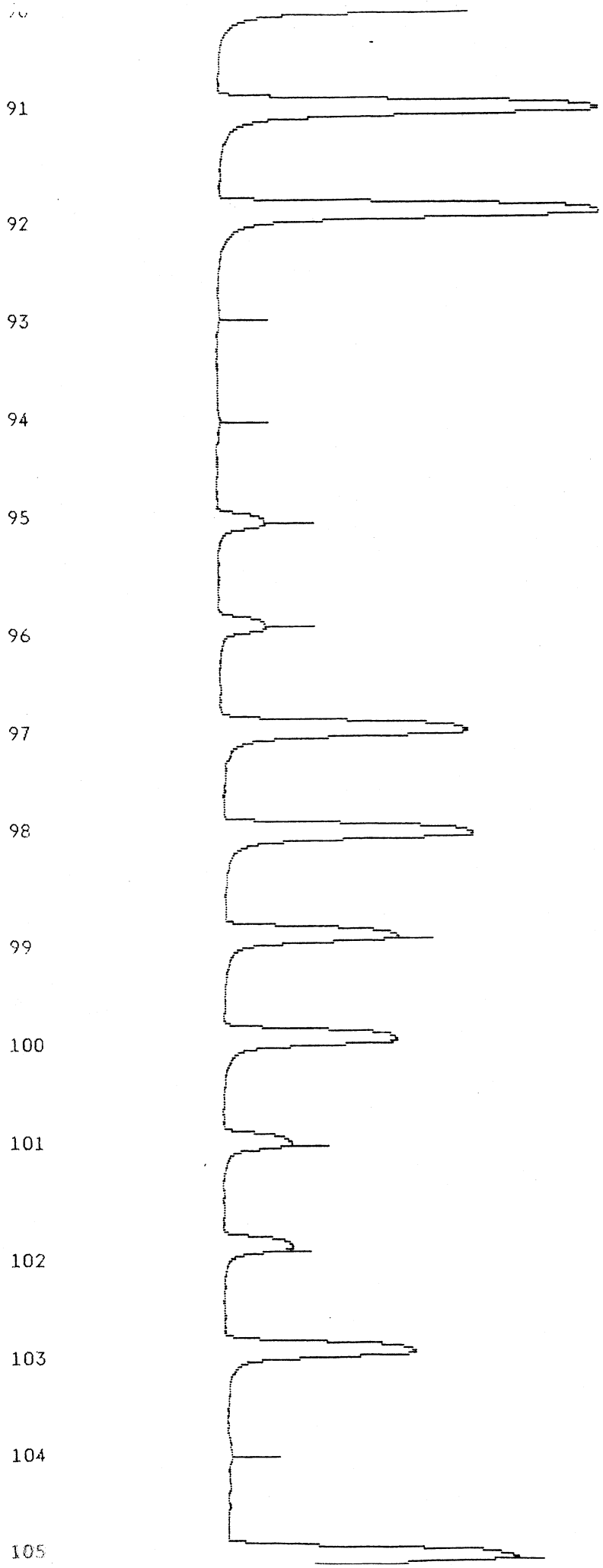
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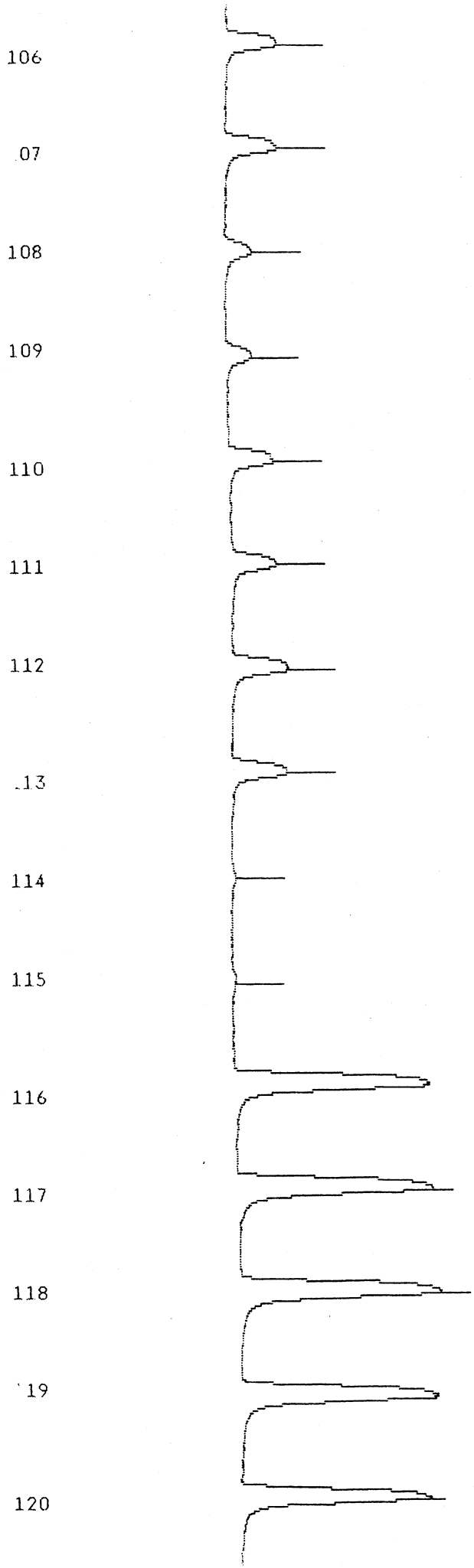
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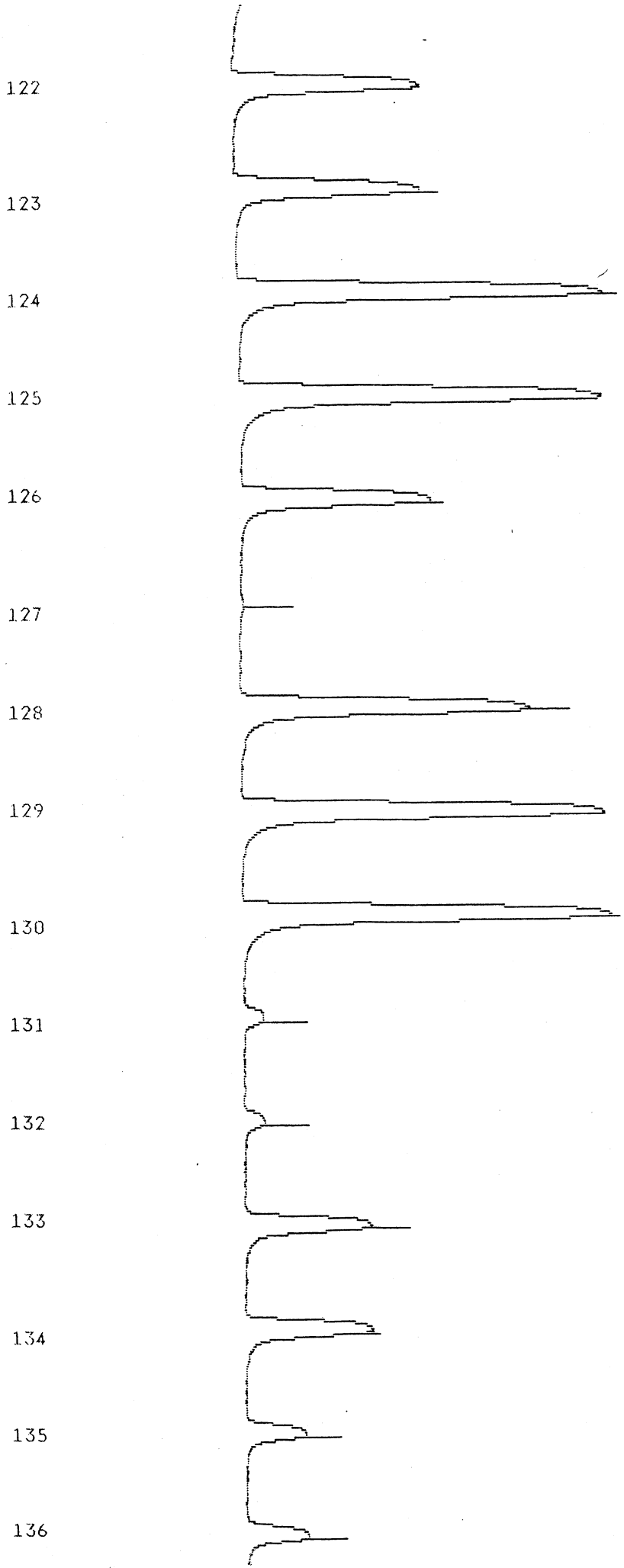
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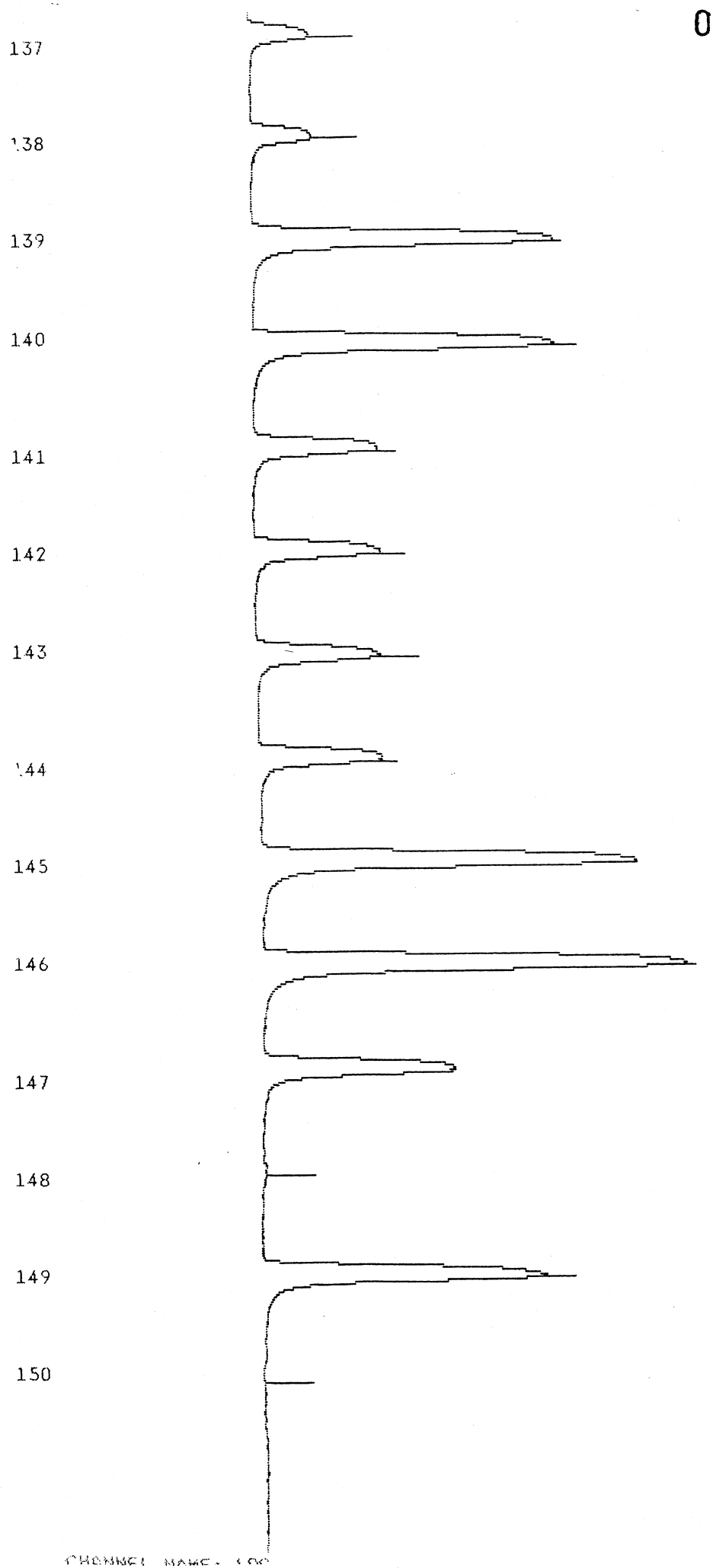
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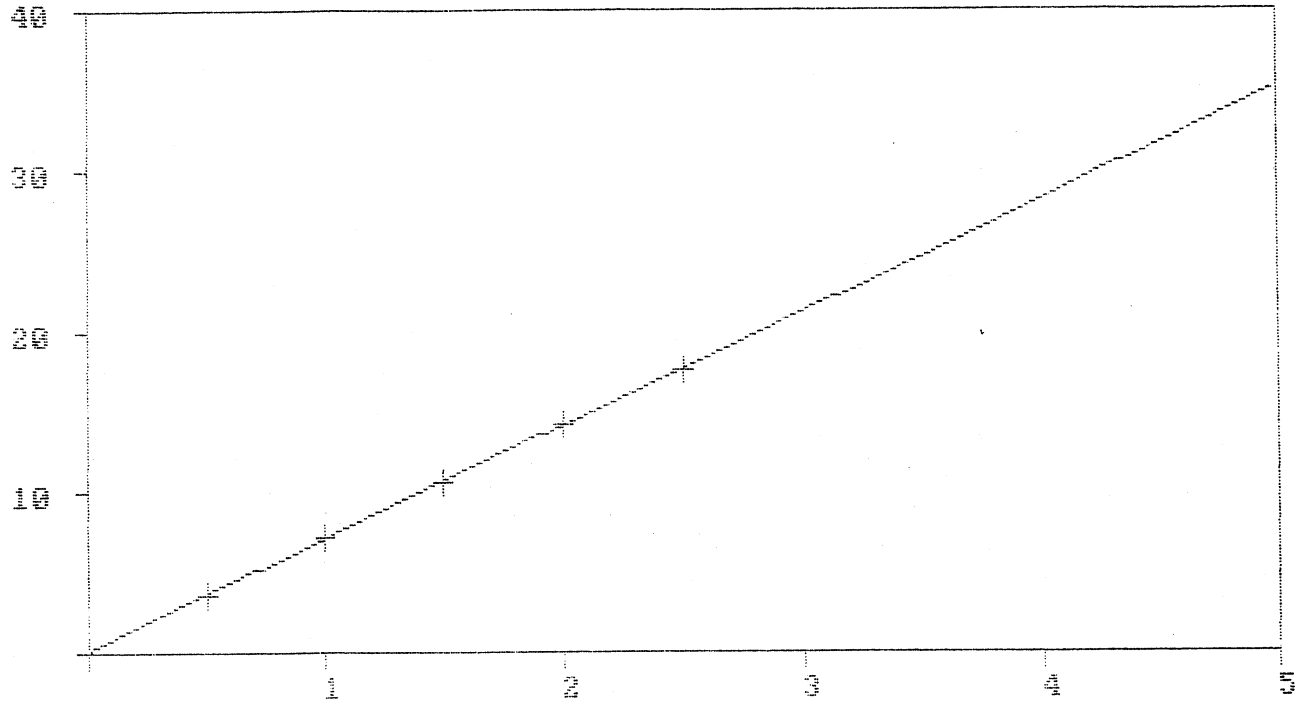
CHANNEL NAME: LDC
RUN NAME: 990920WA




DATA TYPE: FIA
CALIBRATION ORDER: 1
INTERCEPT = 0.14
SLOPE = 7.003663

CORRELATION: .9999714

CHANNEL NAME: LDC
RUN DATE: 09-20-1999
SAMPLE TABLE NAME: 990920WA
METHOD NAME: HGWATER

| CUP# | SAMPLE ID | DIL | WGT | HEIGHT/AREA | | CONCENTRATION (ppb) | EF |
|---|---|---|---|---|---|---|---|
| 1 | PRIMER | 1 | 1 | 10.1 | | 1.420 | s |
| 2 | DUMMY | 1 | 1 | 0.1 | | -0.009 | I |
| 3 | S1: 0 | 1 | 1 | 0.1 | | -0.006 | I |
| 4 | S2: .5 | 1 | 1 | 3.6 | | 0.496 | |
| 5 | S3: 1 | 1 | 1 | 7.2 | | 1.012 | |
| 6 | S4: 1.5 | 1 | 1 | 10.7 | | 1.504 | |
| 7 | S5: 2 | 1 | 1 | 14.1 | | 1.992 | |
| 8 | S6: 2.5 | 1 | 1 | 17.6 | | 2.494 | |
| 9 | ICV | 1 | 1 | 10.0 | | 1.403 | 94% |
| 10 | B | 1 | 1 | 0.0 | | -0.020 | b |
| 11 | D4 | 1 | 1 | 10.7 | | 1.504 | d |
| 12 | WS 378 | 1 | 1 | 13.7 | TUG | 1.936 | 97% |
| 13 | ORG REF | 1 | 1 | 15.6 | | 2.205 | 110% |
| 14 | BL0920-1GMN | 1 | 1 | 0.0 | <0.015 | -0.020 | I |
| 15 | BL0920-1GMN | 1 | 1 | 0.0 | | -0.020 | I |
| 16 | BL0920S | 1 | 1 | 7.2 | 0.151 | 1.012 | 101 |
| 17 | BL0920S | 1 | 1 | 7.2 | | 1.002 | |
| 18 | BL0920DS | 1 | 1 | 7.3 | 0.152 | 1.019 | 101% |
| 19 | BL0920DS | 1 | 1 | 7.2 | | 1.005 | |
| 20 | 47491 | 6 | 1 | 5.0 | 2.418 | 4.170 | |
| 21 | 47491 | 6 | 1 | 5.0 | | 4.170 | |
| 22 | 47491 | 6 | 1 | 5.0 | | 4.142 | |

00135

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 25 | 47491S | 6 | 1 | 11.7 | | 9.902 | |
| 26 | 47491DS | 6 | 1 | 11.8 | 5.756 | 9.965 | 96% |
| 27 | 47491DS | 6 | 1 | 11.7 | | 9.881 | |
| 28 | 47491DS Dil. Check | 30 | 1 | 2.4 | | 9.658 | 2% RPD |
| 29 | 47491DS | 30 | 1 | 2.4 | | 9.763 | |
| 0 | 47489 | 1.5 | 1 | 0.5 | <0.023 | 0.070 | I |
| 31 | 47489 | 1.5 | 1 | 0.4 | | 0.065 | s |
| 32 | 47490 | 1.5 | 1 | 3.5 | 0.314 | 0.713 | |
| 33 | 47490 | 1.5 | 1 | 3.5 | | 0.713 | |
| 34 | CCV | 1 | 1 | 7.1 | | 0.995 | 100% |
| 35 | B | 1 | 1 | 0.0 | | -0.020 | b |
| 36 | D4 | 1 | 1 | 10.7 | | 1.504 | d |
| 37 | 47492 | 1.5 | 1 | 10.5 | 1.340 | 2.209 | |
| 38 | 47492 | 1.5 | 1 | 10.7 | | 2.256 | |
| 39 | 47493 | 3 | 1 | 13.1 | 3.218 | 5.547 | |
| 40 | 47493 | 3 | 1 | 13.1 | | 5.547 | |
| 41 | 47494 | 1.5 | 1 | 3.7 | 0.444 | 0.760 | |
| 42 | 47494 | 1.5 | 1 | 3.7 | | 0.771 | |
| 43 | 47495 | 1.5 | 1 | 7.6 | 0.983 | 1.597 | |
| 44 | 47495 | 1.5 | 1 | 7.5 | | 1.571 | |
| 45 | 47496 | 1.5 | 1 | 1.7 | 0.207 | 0.336 | |
| 46 | 47496 | 1.5 | 1 | 1.8 | | 0.352 | s |
| 47 | 47497 | 1.5 | 1 | 8.2 | 1.055 | 1.728 | |
| 48 | 47497 | 1.5 | 1 | 8.4 | | 1.759 | |
| 49 | 47498 | 1.5 | 1 | 1.8 | 0.210 | 0.363 | |
| 50 | 47498 | 1.5 | 1 | 1.8 | | 0.352 | |
| 51 | BL0920-2GMN | 1 | 1 | 0.0 | <0.015 | -0.020 | I |
| 52 | BL0920-2GMN | 1 | 1 | 0.1 | | -0.009 | I |
| 53 | BL0920S | 1 | 1 | 7.3 | 0.154 | 1.019 | 103% |
| 54 | BL0920S | 1 | 1 | 7.4 | | 1.037 | |
| 55 | BL0920DS | 1 | 1 | 7.1 | 0.151 | 0.995 | 101% |
| 6 | BL0920DS | 1 | 1 | 7.3 | | 1.019 | |
| 57 | CCV | 1 | 1 | 7.2 | | 1.002 | 100% |
| 58 | B | 1 | 1 | 0.0 | | -0.020 | b |
| 59 | D4 | 1 | 1 | 10.7 | | 1.504 | d |
| 60 | 47500 | 1.5 | 1 | 10.6 | 1.365 | 2.235 | |
| 61 | 47500 | 1.5 | 1 | 10.3 | | 2.167 | s |
| 62 | 47500D | 1.5 | 1 | 10.6 | 1.394 | 2.245 | |
| 63 | 47500D | 1.5 | 1 | 10.6 | | 2.251 | |
| 64 | 47500S | 1.5 | 1 | 17.2 | 2.267 | 3.652 | 95% |
| 65 | 47500S | 1.5 | 1 | 17.2 | | 3.658 | |
| 66 | 47500DS | 1.5 | 1 | 17.1 | 2.249 | 3.642 | 93% |
| 67 | 47500DS | 1.5 | 1 | 17.0 | | 3.611 | |
| 68 | 47499 | 1.5 | 1 | 3.7 | 0.338 | 0.755 | |
| 69 | 47499 | 1.5 | 1 | 3.7 | | 0.760 | |
| 70 | 47501 | 1.5 | 1 | 10.8 | 1.299 | 2.277 | |
| 71 | 47501 | 1.5 | 1 | 10.8 | | 2.282 | |
| 72 | 47502 | 1.5 | 1 | 5.3 | 0.618 | 1.095 | |
| 73 | 47502 | 1.5 | 1 | 5.2 | | 1.074 | |
| 74 | 47503 | 1.5 | 1 | 4.3 | 0.519 | 0.891 | |
| 75 | 47503 | 1.5 | 1 | 4.1 | | 0.839 | |
| 76 | BL0920-3GKC | 1 | 1 | 0.0 | <0.015 | -0.013 | s |
| 77 | BL0920-3GKC | 1 | 1 | 0.0 | | -0.020 | I |
| 78 | BL0920S | 1 | 1 | 7.2 | 0.300 | 1.002 | 100 |
| 79 | BL0920S | 1 | 1 | 7.1 | | 0.998 | |
| 80 | CCV | 1 | 1 | 7.0 | | 0.981 | 98% |
| 1 | B | 1 | 1 | 0.0 | | -0.020 | b |
| 82 | D4 | 1 | 1 | 10.7 | | 1.504 | d |
| 83 | BL0920DS | 1 | 1 | 7.1 | 0.297 | 0.991 | 99% |
| 84 | BL0920DS | 1 | 1 | 7.1 | | 0.991 | |
| 85 | 47491 | 1.5 | 1 | 7.4 | MD ~~0.738~~ 1.106 | 1.535 | |
| 86 | 47491 | 1.5 | 1 | 7.3 | | 1.539 | |
| 87 | 47491D | 1.5 | 1 | 7.3 | MD ~~0.734~~ 1.101 | 1.534 | |
| 88 | 47491D | 1.5 | 1 | 7.4 | | 1.545 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 91 | 47491DS | 1.5 | 1 | 15.9 | MD | 2.001 | 2.957 | s |
| 92 | 47491DS | 1.5 | 1 | 14.0 | | 36 | 2.967 | 95% |
| 93 | 47489 | 1.5 | 1 | 0.0 | MD | <0.030 | -0.030 | I |
| 94 | 47489 | 1.5 | 1 | 0.0 | | | -0.030 | I |
| 95 | 47490 | 1.5 | 1 | 1.6 | MD | 0.149 | 0.310 | |
| 96 | 47490 | 1.5 | 1 | 1.6 | | | 0.305 | |
| 97 | 47492 | 1.5 | 1 | 9.1 | | 1.402 | 1.916 | |
| 98 | 47492 | 1.5 | 1 | 9.1 | | | 1.926 | |
| 99 | 47493 | 1.5 | 1 | 6.4 | | 0.918 | 1.335 | |
| 100 | 47493 | 1.5 | 1 | 6.4 | | | 1.346 | |
| 101 | 47494 | 1.5 | 1 | 2.4 | | 0.292 | 0.478 | |
| 102 | 47494 | 1.5 | 1 | 2.4 | | | 0.478 | |
| 103 | CCV | 1 | 1 | 7.0 | | | 0.974 | 97% |
| 104 | B | 1 | 1 | 0.0 | | | -0.020 | b |
| 105 | D4 | 1 | 1 | 10.7 | | | 1.504 | d |
| 106 | 47495 | 1.5 | 1 | 1.8 | | 0.254 | 0.347 | s |
| 107 | 47495 | 1.5 | 1 | 1.7 | | | 0.336 | |
| 108 | 47496 | 1.5 | 1 | 0.9 | | 0.099 | 0.153 | |
| 109 | 47496 | 1.5 | 1 | 0.7 | | | 0.127 | I |
| 110 | 47497 | 1.5 | 1 | 1.4 | | 0.186 | 0.279 | |
| 111 | 47497 | 1.5 | 1 | 1.4 | | | 0.279 | |
| 112 | 47498 | 1.5 | 1 | 1.9 | | 0.103 | 0.384 | |
| 113 | 47498 | 1.5 | 1 | 1.9 | | | 0.368 | |
| 114 | BL0920-4GKC | 1 | 1 | 0.0 | | <0.03 | -0.016 | I |
| 115 | BL0920-4GKC | 1 | 1 | 0.0 | | | -0.016 | I |
| 116 | BL0920S | 1 | 1 | 7.1 | | 0.298 | 0.988 | 99% |
| 117 | BL0920S | 1 | 1 | 7.1 | | | 0.998 | |
| 118 | BL0920DS | 1 | 1 | 7.4 | | 0.304 | 1.030 | 101% |
| 119 | BL0920DS | 1 | 1 | 7.1 | | | 0.995 | |
| 120 | 47500 | 1.5 | 1 | 6.9 | | 0.984 | 1.450 | |
| 121 | 47500 | 1.5 | 1 | 6.9 | | | 1.445 | s |
| 122 | 475000 | 1.5 | 1 | 6.9 | | 0.983 | 1.450 | |
| 123 | 475000 | 1.5 | 1 | 6.9 | | | 1.440 | |
| 124 | 47500S | 1.5 | 1 | 13.4 | | 1.931 | 2.831 | 93% |
| 125 | 47500S | 1.5 | 1 | 13.4 | | | 2.847 | |
| 126 | CCV | 1 | 1 | 7.0 | | | 0.984 | 98% |
| 127 | B | 1 | 1 | 0.0 | | | -0.020 | b |
| 128 | D4 | 1 | 1 | 10.7 | | | 1.504 | d |
| 129 | 47500DS | 1.5 | 1 | 13.4 | | 1.939 | 2.836 | 94% |
| 130 | 475000S | 1.5 | 1 | 13.5 | | | 2.868 | |
| 131 | 47499 | 1.5 | 1 | 0.6 | | 0.042 | 0.091 | I |
| 132 | 47499 | 1.5 | 1 | 0.6 | | | 0.101 | I |
| 133 | 47501 | 1.5 | 1 | 4.6 | | 0.606 | 0.959 | |
| 134 | 47501 | 1.5 | 1 | 4.6 | | | 0.964 | |
| 135 | 47502 | 1.5 | 1 | 2.1 | | 0.281 | 0.415 | |
| 136 | 47502 | 1.5 | 1 | 2.1 | | | 0.410 | s |
| 137 | 47503 | 1.5 | 1 | 2.1 | | 0.283 | 0.420 | |
| 138 | 47503 | 1.5 | 1 | 2.1 | | | 0.431 | |
| 139 | 42065 | 30 | 1 | 11.2 | | | 47.315 | |
| 140 | 42065 | 30 | 1 | 11.2 | | | 47.315 | |
| 141 | 44797-KMNO4 | 15 | 1 | 4.7 | | 4.071 | 9.693 | |
| 142 | 44797-KMNO4 | 15 | 1 | 4.7 | | | 9.693 | |
| 143 | 44888-KMNO4 | 15 | 1 | 4.6 | | 4.458 | 9.484 | |
| 144 | 44888-KMNO4 | 15 | 1 | 4.6 | | | 9.484 | |
| 145 | WS 378 | 1 | 1 | 14.0 | | | 1.978 | |
| 146 | ORG REF | 1 | 1 | 15.8 | | | 2.229 | |
| 147 | CCV | 1 | 1 | 7.1 | | | 0.998 | |
| 148 | B | 1 | 1 | 0.0 | | | -0.020 | b |
| 149 | D4 | 1 | 1 | 10.7 | | | 1.504 | d |

INTERCEPT: 0.14 LINEAR COEF: 7.003663
CORRELATION COEF: .9999714

| Zenon Number | Client | Client ID | Parameter | TS | Result | Dup. | Spike | % Rec. | Dup. Spk | % Rec. | Batch Date | Batch Code | Run Date | Run Code | Day Old | Day In | Analyst's Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 044812 | TRC-LO | MB R456 | Mercury | PV | -0.04 | -99999.0 | 1.01 | 101. | | | 99/08/23 | IIA4 | 99/08/24 | MG02 | 12. | 6. | |
| 044813 | TRC-LO | OHM-Ia-R1 Flyash | Mercury | PV | 0.97 | 0.98 | 1.94 | 96. | | | 99/08/23 | IIA4 | 99/08/24 | MG02 | 12. | 6. | |
| 044814 | TRC-LO | OHM-Ib-R1 Flyash | Mercury | PV | 0.95 | | | | | | 99/08/23 | IIA4 | 99/08/24 | MG02 | 12. | 6. | |
| 044815 | TRC-LO | OHM-Ia-R2 Flyash | Mercury | PV | 0.88 | | | | | | 99/08/23 | IIA4 | 99/08/24 | MG02 | 12. | 6. | |
| 044816 | TRC-LO | OHM-Ib-R2 Flyash | Mercury | PV | 0.83 | | | | | | 99/08/23 | IIA4 | 99/08/24 | MG02 | 12. | 6. | |
| 044817 | TRC-LO | OHM-Ia-R3 Flyash | Mercury | PV | 0.77 | | | | | | 99/08/23 | IIA4 | 99/08/24 | MG02 | 11. | 6. | |
| 044818 | TRC-LO | OHM-Ib-R3 Flyash | Mercury | PV | 0.77 | | | | | | 99/08/23 | IIA4 | 99/08/24 | MG02 | 11. | 6. | |
| BL0823 | INTERNAL | | Mercury | PV | -0.04 | -99999.0 | 1.01 | 101. | | | 99/08/23 | IIA4 | 99/08/24 | MG02 | $$$ | $$$ | |

8 Tests for 7471HG-S with an MDL of 0.04 mg/kg Validated By CMJ Control Chart Updated N/A IO Requirements met N/A

00137

# LDC AUTOSAMPLER RUN LOG (MERCURY)

Date: Aug 24, 99 Run Code: MG02 Matrix: SOIL

Analyst: MG Units: MG/KG (see comments) MDL: 0.04

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 1 | | | Primer (ICV) | | | |
| 2 | | | Dummy (Blk) | | | |
| 3 | | | Std 1 (S1) | 0.0 | | |
| 4 | | | Std 2 (S2) | 0.5 | | |
| 5 | | | Std 3 (S3) | 1.0 | | |
| 6 | | | Std 4 (S4) | 1.5 | | |
| 7 | | | Std 5 (S5) | 2.0 | | |
| 8 | | | Std 6 (S6) | 2.5 | | |
| 9 | | | ICV | | | |
| 10 | | | B (Std 1) | | | |
| 11 | | | D4 (Std 4) | | | |
| 12 | | | BL0823 | IIA1 | | |
| 13 | | | BL0823 S | | | |
| 14 | | 1/3 | 44162 | | | |
| 15 | | | 162 D | | | |
| 16 | | | 162 S | | | |
| 17 | | | 44163 | | | |
| 18 | | 1/50 | 166 | | | |
| 19 | | 1/300 | 167 | | | |
| 20 | | | 169 | | | |
| 21 | | | 170 | | | |
| 22 | | | 171 | | | |
| 23 | | | 172 | | | |
| 24 | | | 173 | | | |
| 25 | | | 174 | | | |
| 26 | | | 175 | | | |
| 27 | | | CCV | | | |
| 28 | | | B | | | |
| 29 | | | D4 | | | |
| 30 | | | BL0823 | IIA2 | | |
| 31 | | | BL0823 S | | | |
| 32 | | | 44176 | | | |
| 33 | | | 176 D | | | |
| 34 | | | 176 S | | | |
| 35 | | | 177 | | | |
| 36 | | | 178 | | | |
| 37 | | | 179 | | | |
| 38 | | | 180 | | | |
| 39 | | | 181 | | | |
| 40 | | | 182 | | | |

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 41 | | | 44185 | | | |
| 42 | | | CCV | | | |
| 43 | | | B | | | |
| 44 | | | D4 | | | |
| 45 | | | BL0823 | IIA3 | | |
| 46 | | | BL0823 S | | | |
| 47 | | | 44482 | | | |
| 48 | | | 482 D | | | |
| 49 | | | 482 S | | | |
| 50 | | | 483 | | | |
| 51 | | | 484 | | | |
| 52 | | | 485 | | | |
| 53 | | | 486 | | | |
| 54 | | | 487 | | | |
| 55 | | | 489 | | | |
| 56 | | | 44490 | | | |
| 57 | | | 491 | | | |
| 58 | | | CCV | | | |
| 59 | | | B | | | |
| 60 | | | D4 | | | |
| 61 | | | BL0823 | IIA4 | | |
| 62 | | | BL0822 S | | | |
| 63 | | | 44813 | | | |
| 64 | | | 813 D | | | |
| 65 | | | 813 S | | | |
| 66 | | | 814 | | | |
| 67 | | | 815 | | | |
| 68 | | | 816 | | | |
| 69 | | | 817 | | | |
| 70 | | | 818 | 44166 (1/80) | | |
| 71 | | | ERA 239 | | | |
| 72 | | | CCV | | | |
| 73 | | | B | | | |
| 74 | | | D4 | | | |
| 75 | | | | | | |
| 76 | | 1/3 | 44176 | | | |
| 77 | | | 176 D | | | |
| 78 | | | 176 S | | | |
| 79 | | | | | | |
| 80 | | | | | | |

Comments: *** "HG-347" and "MISA12" units are expressed in mg/L not ug/L

ICV = 1.5 ug/L, CCV = 1.0 ug/L, Blank Spike = 1.0 ug/L for liquid samples.

ICV = 1.5 mg/kg, CCV = 1.0 mg/kg, Blank Spike = 1.0 mg/kg for solid samples.

# EPA 7471 SOIL PREPARATION LOG - MERCURY

00139

**DG7471HG**

Calibration Solutions:

| # | I.D. | *Conc. | Spike | **Conc. Entered |
|---|---|---|---|---|
| 1 | Blank/Dummy/Std 1 | 0 ppb | None | 0 mg/kg |
| 2 | Standard 2 | 2.5 | 200 ul of 0.5 ppm IV working stock std. | 0.5 |
| 3 | Standard 3 | 5 | 400 ul of 0.5 ppm IV working stock std. | 1.0 |
| 4 | Standard 4 | 7.5 | 600 ul of 0.5 ppm IV working stock std. | 1.5 |
| 5 | Standard 5 | 10 | 800 ul of 0.5 ppm IV working stock std. | 2.0 |
| 6 | Standard 6 | 12.5 | 1000 ul of 0.5 ppm IV working stock std | 2.5 |

Check List

- ✓ Digest Code/labels
- ✓ Samples weighed
- ✓ Acids added
- ✓ Samples spiked
- ✓ Bath at 95 degrees C
- ✓ Samples digested
- ✓ Hydroxyamine HCl added
- ✓ Samples bulked, mixed, and centrifuged
- ✓ Rack order checked

| | # | Sample I.D. | B.Code | Init.Wt. | F. Vol. | Dil | Comment |
|---|---|---|---|---|---|---|---|
| | 7 | ICV (Init. Calib. Verif.) | 11A4 | 0.2gm | 40 ml | 200X | 7.5 ppb or 1.5 mg/kg = 600 ul. of 0.5 ppm HP MESS-ZENO 30/QCA Std. |
| | 8 | BL 0823 | " | " | " | " | (Processed Blank) 044812 |
| | 9 | BL 0823 S | " | " | " | " | 5 ppb or 1 mg/kg = 400 ul. of 0.5 ppm Inorg. Ventures working stock std. |
| 1 | 10 | 044813 | " | 0.201 | " | " | |
| 1 | 11 | D | " | 0.202 | " | " | (Duplicate sample) |
| 1 | 12 | S | " | 0.202 | " | " | 5 ppb or 1 mg/kg = 400 ul. of 0.5 ppm Inorg. Ventures working stock std. |
| 1 | 13 | 044814 DS | " | 0.202 | " | " | 5 ppb or 1 mg/kg = 400 ul. of 0.5 ppm Inorg. Ventures working stock std. |
| 2 | 14 | 044815 | " | 0.201 | " | " | |
| 3 | 15 | 044816 | " | 0.202 | " | " | |
| 4 | 16 | 044817 | " | 0.199 | " | " | 0.200 |
| 5 | 17 | 044818 | " | 0.200 | " | " | |
| 6 | 18 | ? 044891 | " | " | " | " | |
| 7 | 19 | | " | " | " | " | |
| 8 | 20 | | " | " | " | " | |
| 9 | 21 | | " | " | " | " | |
| 10 | 22 | | " | " | " | " | |
| | 23 | CCV (Cont. Calib. Verif.) | | 0.2gm | 40 ml | 200X | 5 ppb or 1 mg/kg = 400 ul. of 0.5 ppm Inorg. Ventures working stock std. |
| | 24 | BL | " | " | " | " | (Processed Blank) |
| | 25 | BL S | " | " | " | " | 5 ppb or 1 mg/kg = 400 ul. of 0.5 ppm Inorg. Ventures working stock std. |
| 1 | 26 | | " | " | " | " | |
| 1 | 27 | D | " | " | " | " | (Duplicate sample) |
| 1 | 28 | S | " | " | " | " | 5 ppb or 1 mg/kg = 400 ul. of 0.5 ppm Inorg. Ventures working stock std. |
| 1 | 29 | DS | " | " | " | " | 5 ppb or 1 mg/kg = 400 ul. of 0.5 ppm Inorg. Ventures working stock std. |
| 2 | 30 | | " | " | " | " | |
| 3 | 31 | | " | " | " | " | |
| 4 | 32 | | " | " | " | " | |
| 5 | 33 | | " | " | " | " | |
| 6 | 34 | | " | " | " | " | |
| 7 | 35 | | " | " | " | " | |
| 8 | 36 | | " | " | " | " | |
| 9 | 37 | | " | " | " | " | |
| 10 | 38 | | " | " | " | " | |

| HCL Lot No. 418090. | HNO3 Lot No. 119020. | Bath Temps. / 195°C |
|---|---|---|

Notes:

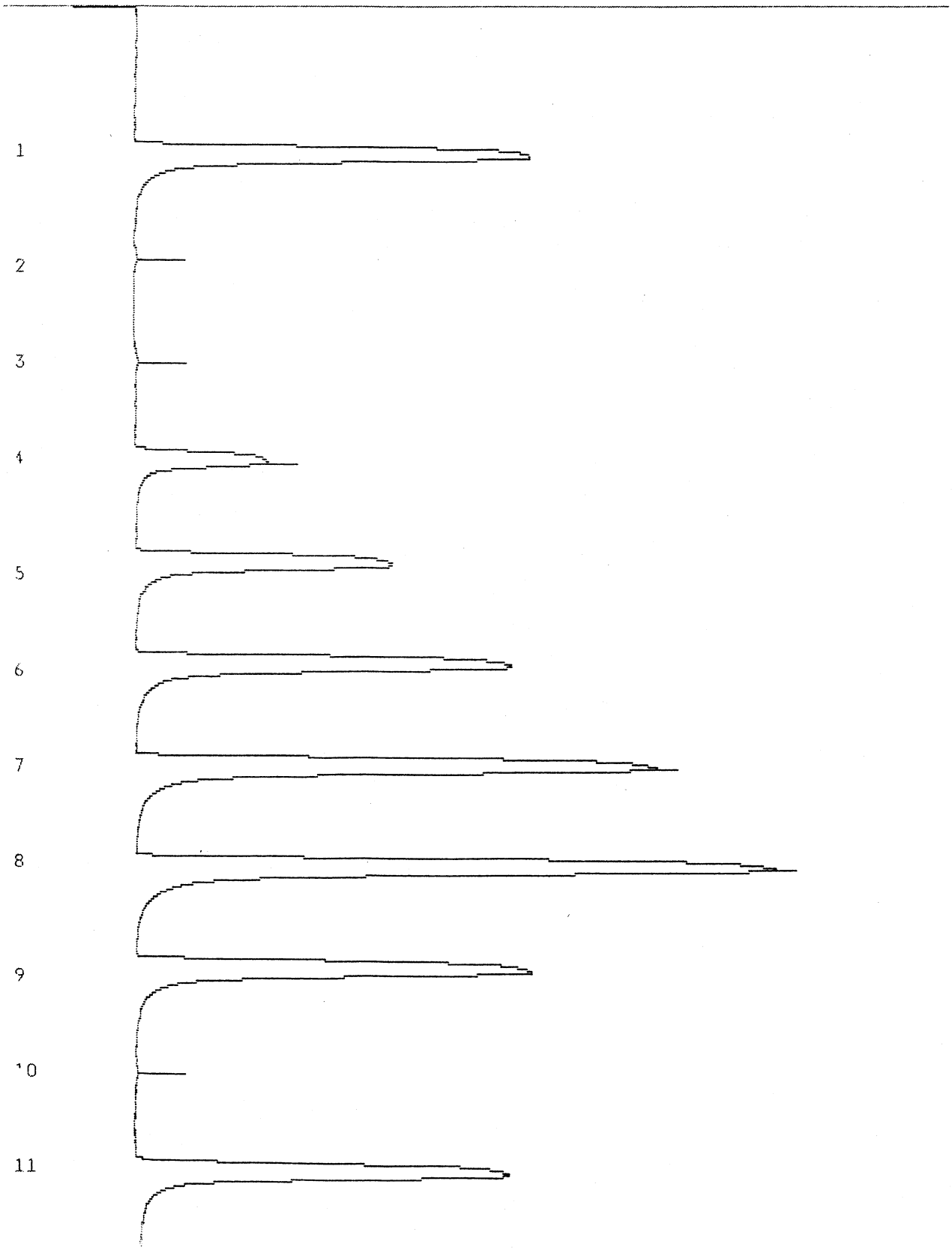
* concentration based on 40 ml final volume, ** concentration based on 1 gram of sample

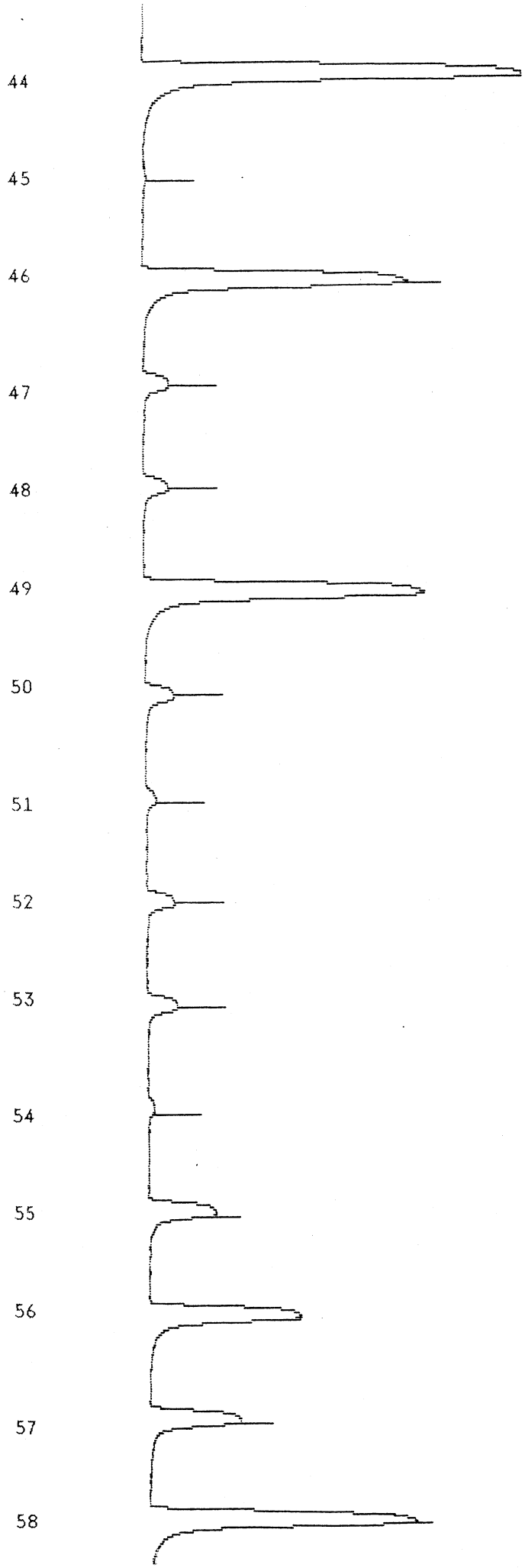
Prepare 0.5 ppm standards daily

Include one External Reference Material (ERA 230 or NRC PACS-1) per run

Prepared By: JJ/ HS. Date: 990823. Checked by: LS.

RUN DATE: 08-25-1999 CHART DATE: 08-25-1999
CHART SPEED: 30
DATA FILE NAME: C:\DP4\DATA\990824S.DAT

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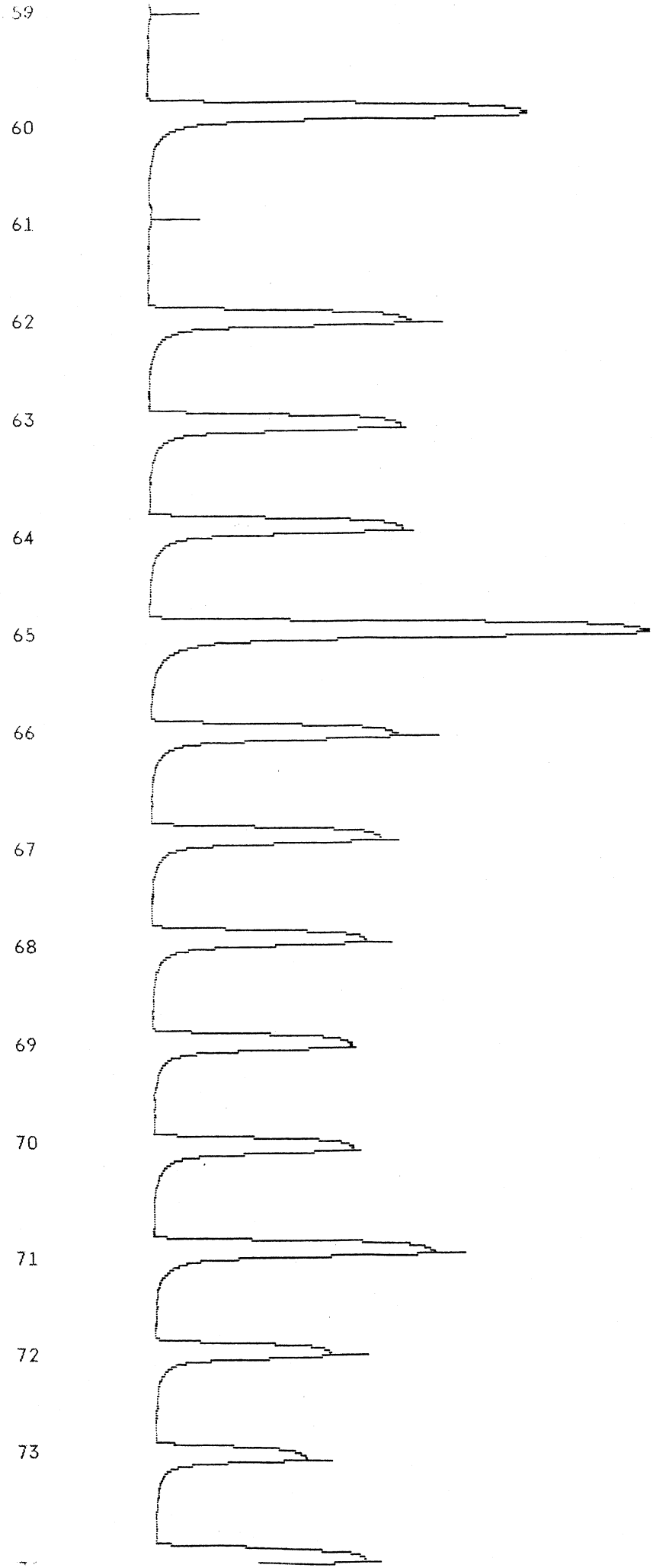
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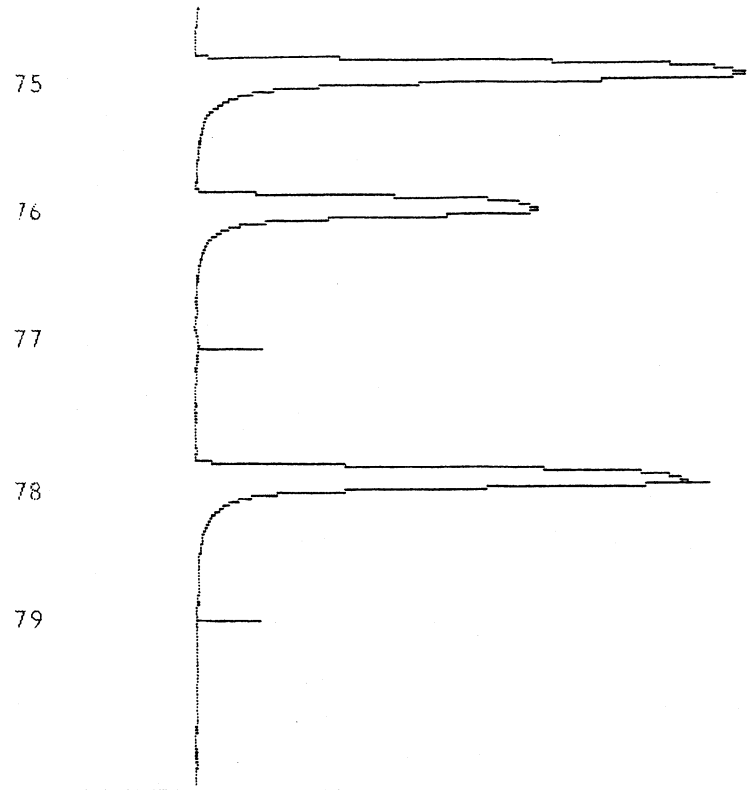
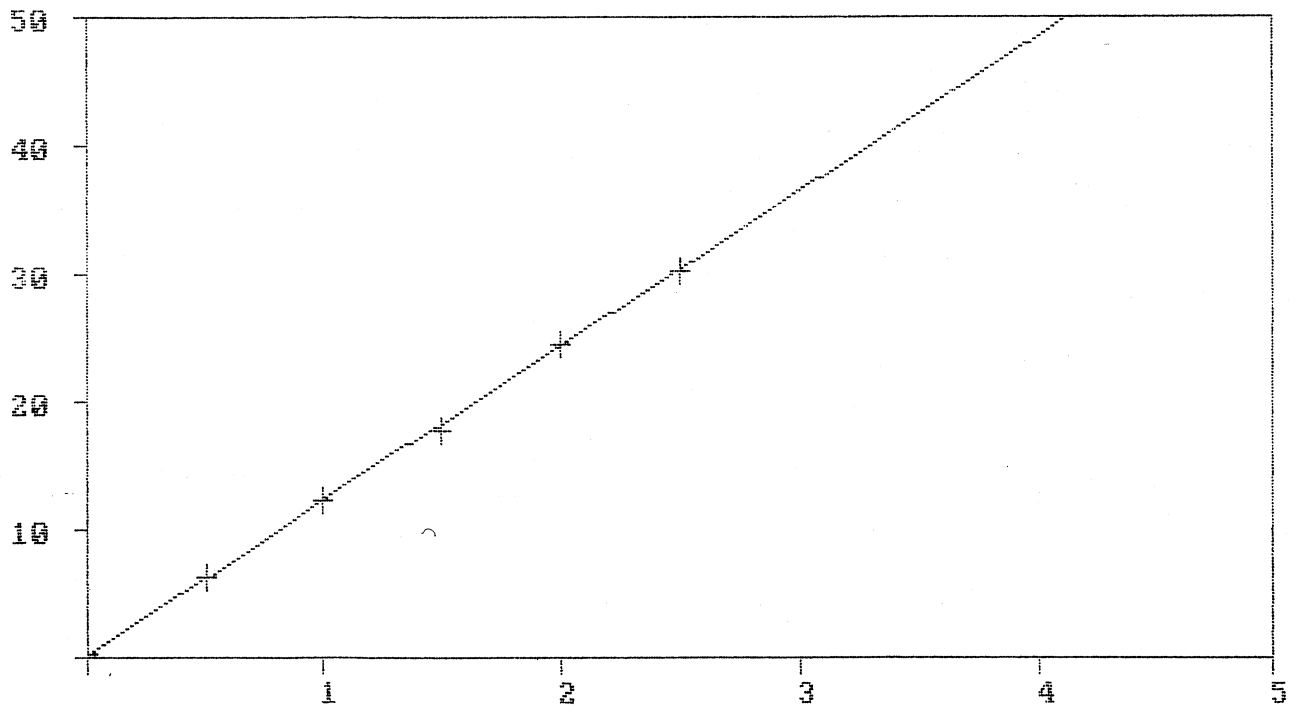



CHANNEL NAME: LDC
RUN NAME: 990824S




DATA TYPE: FIA CALIBRATION ORDER: 1
INTERCEPT = 0.13 SLOPE = 12.09698

CORRELATION: .999812

CHANNEL NAME: LDC
RUN DATE: 08-25-1999
SAMPLE TABLE NAME: 990824S
METHOD NAME: HGSOIL

| CUP# | SAMPLE ID | DIL | WGT | HEIGHT/AREA | CONCENTRATION | EF |
|---|---|---|---|---|---|---|
| 1 | PRIMER | 1 | 1 | 18.8 | 1.546 | S |

00144

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | S1: 0 | 1 | 1 | 0.1 | 0.001 | I |
| 4 | S2: .5 | 1 | 1 | 6.2 | .504 | |
| 5 | S3: 1 | 1 | 1 | 12.3 | 1.007 | |
| 6 | S4: 1.5 | 1 | 1 | 17.9 | 1.467 | |
| 7 | S5: 2 | 1 | 1 | 24.6 | 2.022 | |
| 8 | S6: 2.5 | 1 | 1 | 30.4 | 2.499 | |
| 9 | ICV | 1 | 1 | 18.8 | 1.546 | |
| 10 | B | 1 | 1 | 0.0 | -0.011 | b |
| 11 | D4 | 1 | 1 | 17.9 | 1.467 | d |
| 12 | BL0823-IIA1 44161 | 1 | 1 | 0.0 | -0.011 | I |
| 13 | BL0823S | 1 | 1 | 12.0 | 0.981 | 98% |
| 14 | 44162 | 3 | 1 | 12.0 | 2.954 | |
| 15 | 44162D | 3 | 1 | 12.5 | 3.069 | |
| 16 | 44162S | 3 | 1 | 15.9 | 3.917 | s91% |
| 17 | 44163 | 1 | 1 | 1.3 | 0.094 | |
| 18 | 44166 | 50 | 1 | 38.0 | ~~156.520~~ | R VOID |
| 19 | 44167 | 300 | 1 | 25.6 | 630.869 | |
| 20 | 44169 | 1 | 1 | 16.0 | 1.316 | |
| 21 | 44170 | 1 | 1 | 6.2 | 0.500 | |
| 22 | 44171 | 1 | 1 | 26.6 | 2.188 | |
| 23 | 44172 | 1 | 1 | 7.1 | 0.579 | |
| 24 | 44173 | 1 | 1 | 5.7 | 0.460 | |
| 25 | 44174 | 1 | 1 | 2.9 | 0.230 | |
| 26 | 44175 | 1 | 1 | 15.2 | 1.249 | |
| 27 | CCV | 1 | 1 | 12.4 | 1.017 | 101% |
| 28 | B | 1 | 1 | 0.0 | -0.011 | b |
| 29 | D4 | 1 | 1 | 17.9 | 1.467 | d |
| 30 | BL0823-IIA2 | 1 | 1 | 0.0 | -0.007 | I |
| 31 | BL0823S | 1 | 1 | 12.5 | 1.021 | s102% |
| 32 | 44176 | 1 | 1 | 24.4 | 2.010 | VOID |
| 33 | 44176D | 1 | 1 | 20.9 | 1.715 | |
| 34 | 44176S | 1 | 1 | 29.5 | 2.424 | |
| 35 | 44177 | 1 | 1 | 0.3 | 0.012 | I |
| 36 | 44178 | 1 | 1 | 0.3 | 0.016 | I |
| 37 | 44179 | 1 | 1 | 0.4 | 0.026 | |
| 38 | 44180 | 1 | 1 | 0.3 | 0.018 | I |
| 39 | 44181 | 1 | 1 | 10.8 | 0.886 | |
| 40 | 44182 | 1 | 1 | 1.2 | 0.086 | |
| 41 | 44185 | 1 | 1 | 0.3 | 0.016 | I |
| 42 | CCV | 1 | 1 | 12.6 | 1.029 | 103% |
| 43 | B | 1 | 1 | 0.0 | -0.011 | b |
| 44 | D4 | 1 | 1 | 17.9 | 1.467 | d |
| 45 | BL0823-IIA3 | 1 | 1 | 0.0 | -0.007 | I |
| 46 | BL0823S | 1 | 1 | 12.4 | 1.015 | s101% |
| 47 | 44482 | 1 | 1 | 1.0 | 0.068 | |
| 48 | 44482D | 1 | 1 | 0.9 | 0.066 | |
| 49 | 44482S | 1 | 1 | 13.2 | 1.077 | 101% |
| 50 | 44483 | 1 | 1 | 1.1 | 0.078 | |
| 51 | 44484 | 1 | 1 | 0.3 | 0.018 | I |
| 52 | 44485 | 1 | 1 | 1.1 | 0.080 | |
| 53 | 44486 | 1 | 1 | 1.2 | 0.090 | |
| 54 | 44487 | 1 | 1 | 0.2 | 0.003 | I |
| 55 | 44489 | 1 | 1 | 3.1 | 0.244 | |
| 56 | 44490 | 1 | 1 | 7.0 | 0.567 | |
| 57 | 44491 | 1 | 1 | 4.2 | 0.333 | |
| 58 | CCV | 1 | 1 | 12.5 | 1.025 | 103% |
| 59 | B | 1 | 1 | 0.0 | -0.011 | b |
| 60 | D4 | 1 | 1 | 17.9 | 1.467 | d |
| 61 | BL0823-IIA4 44812 | 1 | 1 | 0.0 | -0.009 | s |
| 62 | BL0823S | 1 | 1 | 12.3 | 1.009 | 101% |
| 63 | 44813 | 1 | 1 | 11.9 | 0.974 | |
| 64 | 44813D | 1 | 1 | 12.0 | 0.983 | |
| 65 | 44813S | 1 | 1 | 23.6 | 1.939 | 96% |
| 66 | 44814 | 1 | 1 | 11.6 | 0.950 | |
| 67 | 44815 | 1 | 1 | 10.8 | 0.884 | |

00145

| | | | | | | |
|---|---|---|---|---|---|---|
| 69 | 44817 | 1 | 1 | 9.5 | 0.773 | |
| 70 | 44818 | 1 | 1 | 9.5 | 0.773 | |
| 71 | 44166 | 80 | 1 | 13.3 | 86.838 | |
| 72 | 44176 | 3 | 1 | 8.3 | 2.027 | 16% RPD |
| 73 | 44176D | 3 | 1 | 7.1 | 1.724 | |
| 74 | 44176S | 3 | 1 | 10.0 | 2.445 | 57% |
| 75 | ERA 239 | 1 | 1 | 20.0 | 1.643 | |
| 76 | CCV | 1 | 1 | 12.5 | 1.019 | s101% |
| 77 | B | 1 | 1 | 0.0 | -0.011 | b |
| 78 | D4 | 1 | 1 | 17.9 | 1.467 | d |

INTERCEPT: 0.13 LINEAR COEF: 12.09698

CORRELATION COEF: .999812

| Zenon Number | Client | Client ID | Parameter | TS | Result | Dup. | Spike | % Rec. | Dup. Spk | % Rec. | Batch Date | Batch Code | Run Date | Run Code | Day Old | Day In | Analyst's Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 044891 | TRC-LO | NIST 1633b Reference | Mercury | PV | 0.15 | 0.14 | 1.17 | 102. | | | 99/08/30 | IIC1 | 99/08/30 | MG01 | 12. | 12. | |
| BL0830 | INTERNAL | | Mercury | PV | -0.04 | -99999.0 | 1.03 | 103. | | | 99/08/30 | IIC1 | 99/08/30 | MG01 | $$$ | $$$ | |

2 Tests for 7471HG-S with an MDL of 0.04 mg/kg Validated By CMD Control Chart Updated N/A IO Requirements met N/A

00146

# LDC AUTOSAMPLER RUN LOG (MERCURY)

Date: Aug 30, 99 Run Code: MG01 Matrix: SOIL

Analyst: MG Units: MG/KG (see comments) MDL: 0.04

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 1 | | | Primer (ICV) | | | |
| 2 | | | Dummy (Blk) | | | |
| 3 | | | Std 1 (S1) | 0.0 | | |
| 4 | | | Std 2 (S2) | 0.5 | | |
| 5 | | | Std 3 (S3) | 1.0 | | |
| 6 | | | Std 4 (S4) | 1.5 | | |
| 7 | | | Std 5 (S5) | 2.0 | | |
| 8 | | | Std 6 (S6) | 2.5 | | |
| 9 | | | ICV | | | |
| 10 | | | B (Std 1) | | | |
| 11 | | | D4 (Std 4) | | | |
| 12 | | | BL0830 | IJ | | |
| 13 | | | BL0830S | | | |
| 14 | | | 44891 | | | |
| 15 | | | 891 D | | | |
| 16 | | | 891 S | | | |
| 17 | | | 46625 | | | |
| 18 | | | ERA 240 | | | |
| 19 | | | CCV | | | |
| 20 | | | B | | | |
| 21 | | | D4 | | | |
| 22 | | | | | | |
| 23 | | | | | | |
| 24 | | | | | | |
| 25 | | | | | | |
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| 37 | | | | | | |
| 38 | | | | | | |
| 39 | | | | | | |
| 40 | | | | | | |

| Cup | Dig. F. | Dil. F. | Zenon ID | Init. Conc. | F. Conc. | % R |
|---|---|---|---|---|---|---|
| 41 | | | | | | |
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| 80 | | | | | | |

Comments: *** "HG-347" and "MISA12" units are expressed in mg/L not ug/L

ICV = 1.5 ug/L, CCV = 1.0 ug/L, Blank Spike = 1.0 ug/L for liquid samples.

ICV = 1.5 mg/kg, CCV = 1.0 mg/kg, Blank Spike = 1.0 mg/kg for solid samples.

00148

# EPA 7471 SOIL PREPARATION LOG - MERCURY

**DG7471HG**

Calibration Solutions:

| # | I.D. | *Conc. | Spike | **Conc. Entered |
|---|---|---|---|---|
| 1 | Blank/Dummy/Std 1 | 0 ppb | None | 0 mg/kg |
| 2 | Standard 2 | 2.5 | 200 ul of 0.5 ppm IV working stock std. | 0.5 |
| 3 | Standard 3 | 5 | 400 ul of 0.5 ppm IV working stock std. | 1.0 |
| 4 | Standard 4 | 7.5 | 600 ul of 0.5 ppm IV working stock std. | 1.5 |
| 5 | Standard 5 | 10 | 800 ul of 0.5 ppm IV working stock std. | 2.0 |
| 6 | Standard 6 | 12.5 | 1000 ul of 0.5 ppm IV working stock std | 2.5 |

Check List

- ✓ Digest Code/labels
- ✓ Samples weighed
- ✓ Acids added
- ✓ Samples spiked
- ✓ Bath at 95 degrees C
- ✓ Samples digested
- ✓ Hydroxyamine HCl added
- ✓ Samples bulked, mixed, and centrifuged
- ✓ Rack order checked

| | # | Sample I.D. | B.Code | Init.Wt. | F. Vol. | Dil | Comment |
|---|---|---|---|---|---|---|---|
| | 7 | ICV (Init. Calib. Verif.) | | 0.2gm | 40 ml | 200X | 7.5 ppb or 1.5 mg/kg = 600 ul. of 0.5 ppm HP MESS-ZENO 30/QCA Std. |
| | 8 | BL | " | " | " | " | (Processed Blank) |
| | 9 | BL S | " | " | " | " | 5 ppb or 1 mg/kg = 400 ul. of 0.5 ppm Inorg. Ventures working stock std. |
| 1 | 10 | ~~045671~~ | " | " | " | " | |
| 1 | 11 | D | " | " | " | " | (Duplicate sample) |
| 1 | 12 | S | " | " | " | " | 5 ppb or 1 mg/kg = 400 ul. of 0.5 ppm Inorg. Ventures working stock std. |
| 1 | 13 | DS | " | " | " | " | 5 ppb or 1 mg/kg = 400 ul. of 0.5 ppm Inorg. Ventures working stock std. |
| 2 | 14 | | " | " | " | " | |
| 3 | 15 | | " | " | " | " | |
| 4 | 16 | | " | " | " | " | |
| 5 | 17 | | " | " | " | " | |
| 6 | 18 | | " | " | " | " | |
| 7 | 19 | | " | " | " | " | |
| 8 | 20 | | " | " | " | " | |
| 9 | 21 | | " | " | " | " | |
| 10 | 22 | | " | " | " | " | |
| | 23 | CCV (Cont. Calib. Verif.) | HCl | 0.2gm | 40 ml | 200X | 5 ppb or 1 mg/kg = 400 ul. of 0.5 ppm Inorg. Ventures working stock std. |
| | 24 | BL | " | " | " | " | (Processed Blank) 045570. |
| | 25 | BL S | " | " | " | " | 5 ppb or 1 mg/kg = 400 ul. of 0.5 ppm Inorg. Ventures working stock std. |
| 1 | 26 | 044891 | " | 0.200 | " | " | |
| 1 | 27 | D | " | 0.198 | " | " | (Duplicate sample) |
| 1 | 28 | S | " | 0.200 | " | " | 5 ppb or 1 mg/kg = 400 ul. of 0.5 ppm Inorg. Ventures working stock std. |
| 1 | 29 | 046625 DS | " | 0.200 | " | " | 5 ppb or 1 mg/kg = 400 ul. of 0.5 ppm Inorg. Ventures working stock std. |
| 2 | 30 | ~~042571~~ | " | " | " | " | |
| 3 | 31 | | " | " | " | " | |
| 4 | 32 | | " | " | " | " | |
| 5 | 33 | | " | " | " | " | |
| 6 | 34 | | " | " | " | " | |
| 7 | 35 | | " | " | " | " | |
| 8 | 36 | | " | " | " | " | |
| 9 | 37 | | " | " | " | " | |
| 10 | 38 | ERA 240 | " | 0.200 | " | " | |

| HCL Lot No. 419030 | HNO3 Lot No. 119040 | Bath Temps. 1 195 °C |
|---|---|---|

Notes:

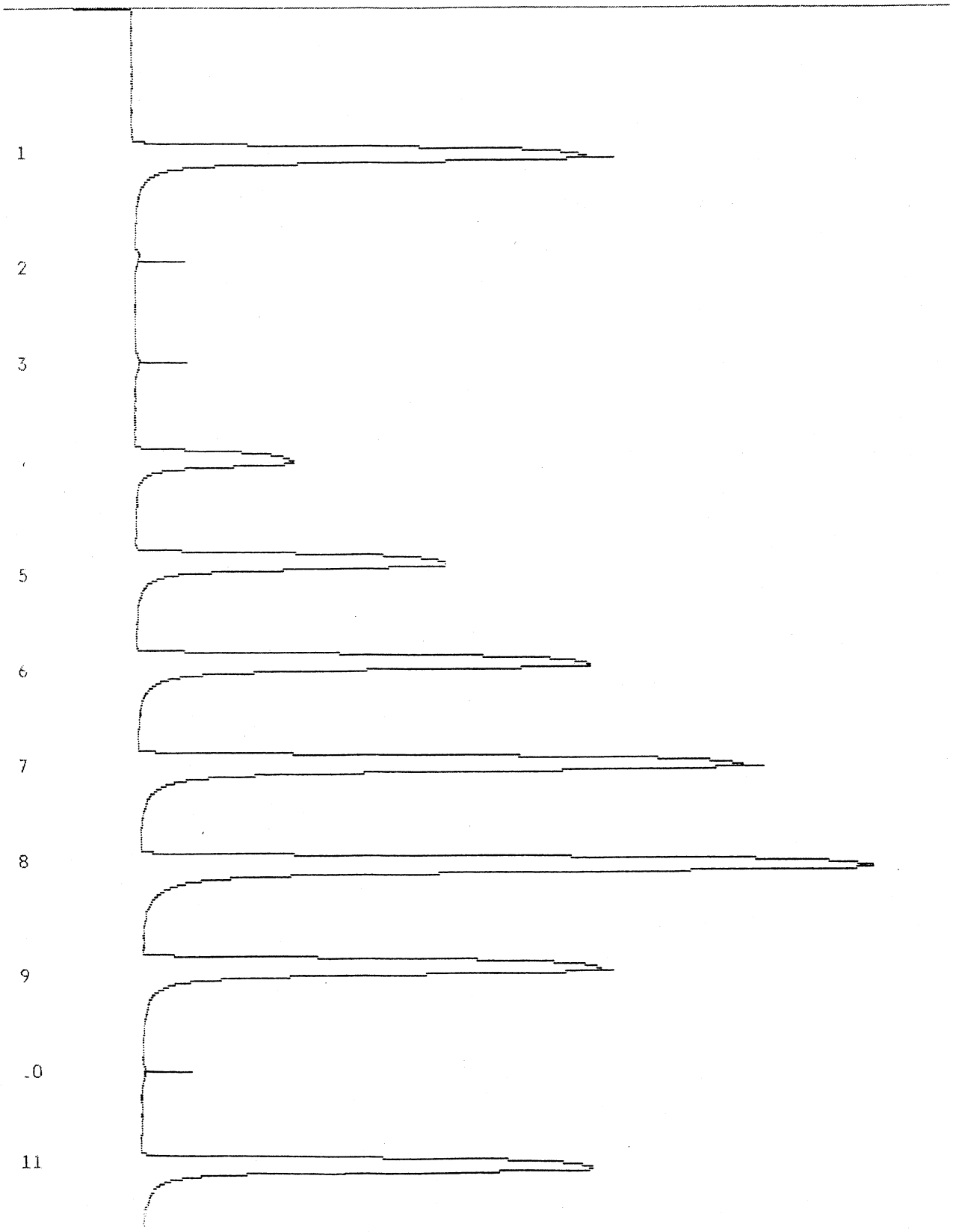
* concentration based on 40 ml final volume, ** concentration based on 1 gram of sample

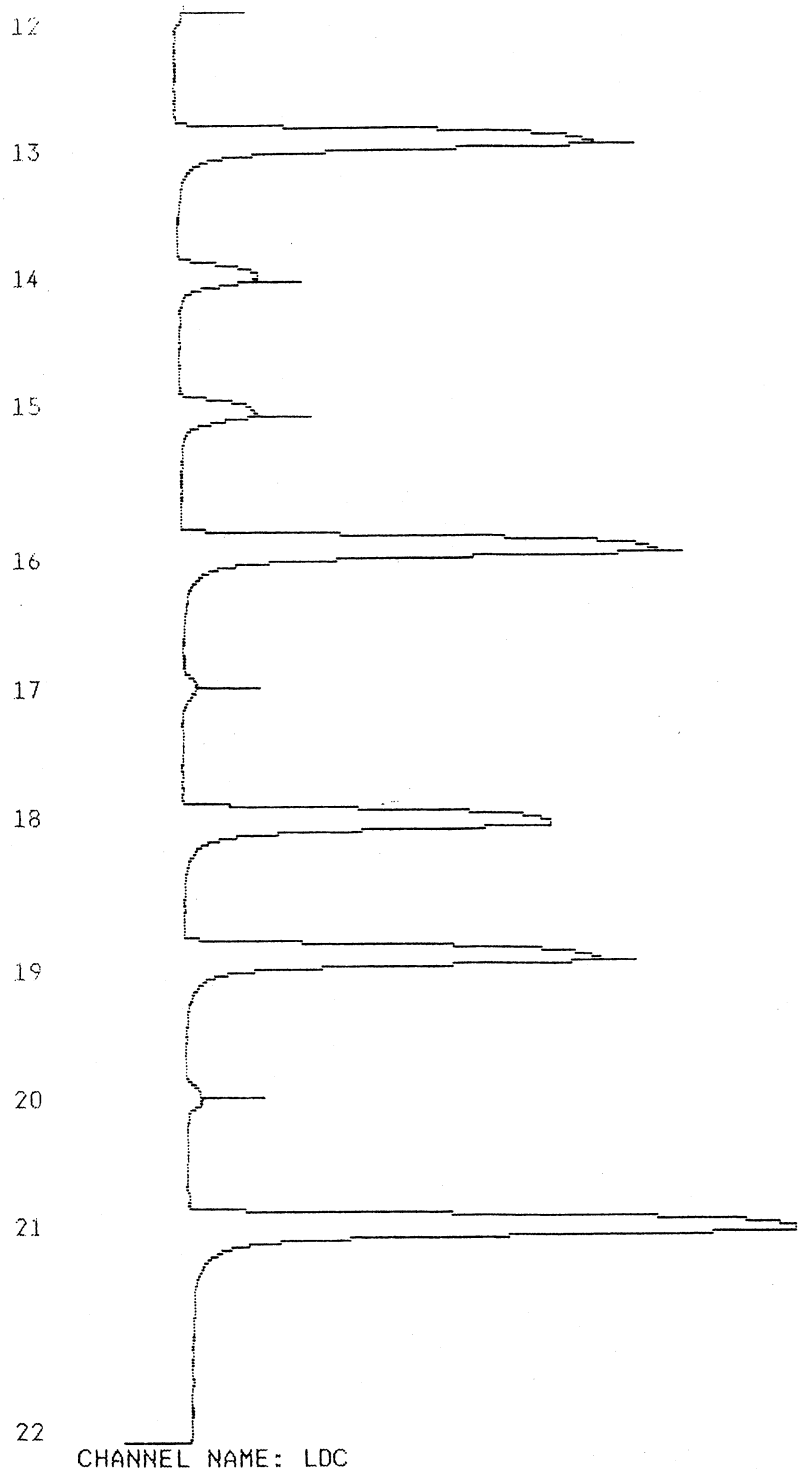
Prepare 0.5 ppm standards daily

nclude one External Reference Material (ERA 230 or NRC PACS-1) per run

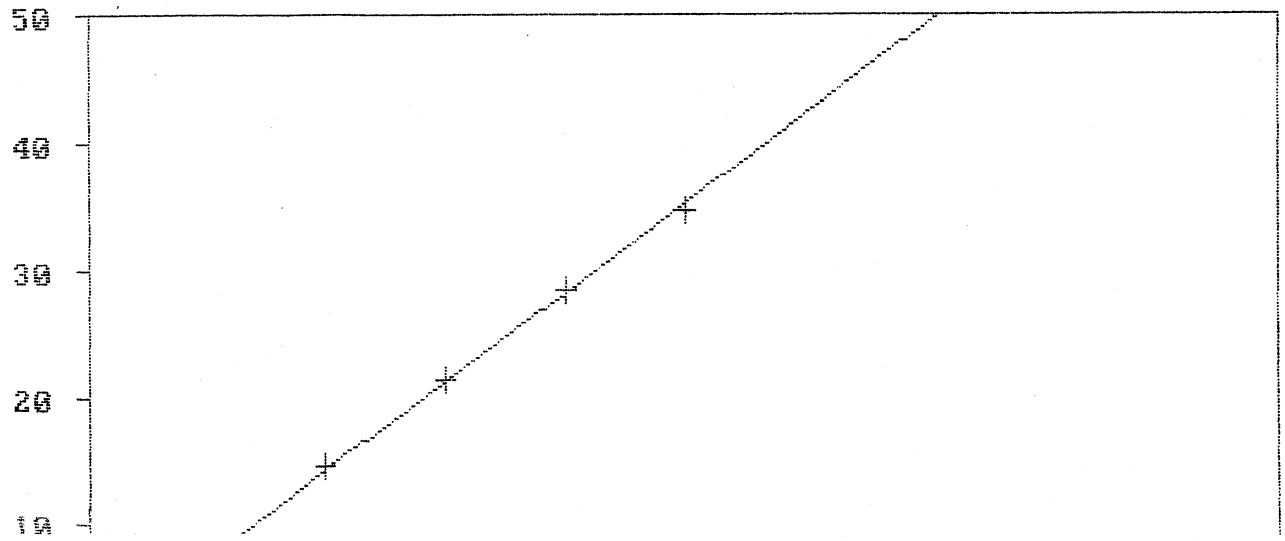
Prepared By: [signature] Date: Aug 30/99 Checked by: [signature]

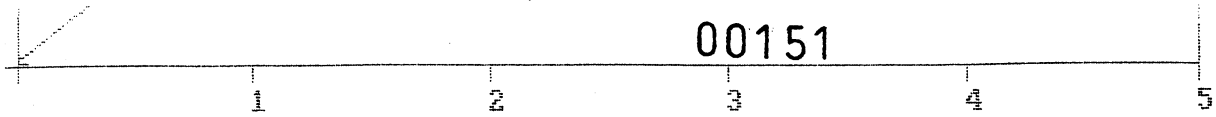
RUN DATE: 08-31-1999 CHART DATE: 08-31-1999
CHART SPEED: 30
DATA FILE NAME: C:\DP4\DATA\990830S.DAT






CHANNEL NAME: LDC
RUN NAME: 990830S






DATA TYPE: FIA
CALIBRATION ORDER: 1
INTERCEPT = 0.48
SLOPE = 13.90825

CORRELATION: .9997228

CHANNEL NAME: LDC
RUN DATE: 08-31-1999
SAMPLE TABLE NAME: 990830S
METHOD NAME: HGSOIL

| CUP# | SAMPLE ID | DIL | WGT | HEIGHT/AREA | CONCENTRATION | EF |
|---|---|---|---|---|---|---|
| 1 | PRIMER | 1 | 1 | 21.5 | 1.512 | s |
| 2 | DUMMY | 1 | 1 | 0.1 | -0.024 | I |
| 3 | S1: 0 | 1 | 1 | 0.2 | -0.020 | I |
| 4 | S2: .5 | 1 | 1 | 7.4 | 0.498 | |
| 5 | S3: 1 | 1 | 1 | 14.7 | 1.024 | |
| 6 | S4: 1.5 | 1 | 1 | 21.5 | 1.509 | |
| 7 | S5: 2 | 1 | 1 | 28.6 | 2.020 | |
| 8 | S6: 2.5 | 1 | 1 | 34.8 | 2.469 | |
| 9 | ICV | 1 | 1 | 21.7 | 1.525 | |
| 10 | B | 1 | 1 | 0.0 | -0.034 | b |
| 11 | D4 | 1 | 1 | 21.5 | 1.509 | d |
| 12 | BL0830-IIC1 | 1 | 1 | 0.1 | -0.027 | I |
| 13 | BL0830S | 1 | 1 | 14.8 | 1.033 | 103% |
| 14 | 44891 | 1 | 1 | 2.6 | 0.152 | |
| 15 | 44891D | 1 | 1 | 2.4 | 0.139 | |
| 16 | 44891S | 1 | 1 | 16.7 | 1.167 | 102% |
| 17 | 46625 | 1 | 1 | 0.0 | -0.031 | I |
| 18 | ERA 240 | 1 | 1 | 12.9 | 0.891 | |
| 19 | CCV | 1 | 1 | 14.5 | 1.005 | |
| 20 | B | 1 | 1 | 0.0 | -0.034 | b |
| 21 | D4 | 1 | 1 | 21.5 | 1.509 | d |

INTERCEPT: 0.48
LINEAR COEF: 13.90825
CORRELATION COEF: .9997228

# 4. SHIPPING/RECEIVING DOCUMENTS

Airbills (No. of shipments)
Chain-of-Custody Records
Sample Log-In Sheets
Miscellaneous Shipping/Receiving Records (describe or list)
fax notification

** TX STATUS REPORT ** AS OF AUG 18 1999 09:15 PAGE.01

PHILIP ANALYTICAL

| | DATE | TIME | TO/FROM | MODE | MIN/SEC | PGS | JOB# | STATUS |
|---|---|---|---|---|---|---|---|---|
| 29 | 08/18 | 09:14 | 19784531995 | EC--S | 00'34" | 003 | 106 | OK |

NOTICE OF SAMPLE RECEIPT-PHILIP ANALYTICAL SERVICES

Attention: Michael P. Martin
Client: TRC Environmental Corporation
Re Client Project: 26046
FAX #: 978-453-1995
Phone #: 978-970-5600

Samples for: Off Mercury (Travis)
were received in good condition unless
indicated below.

SAMPLE LISTING

| Philip ID # | Sample ID | Date Sampled | Date Received |
|---|---|---|---|
| 044796 | OHM-RB | 99/08/11 | 99/08/17 |
| 044797 | OHM-I-FB | 99/08/10 | 99/08/17 |
| 044798 | OHM-Ia-R1 | 99/08/11 | 99/08/17 |
| 044799 | OHM-Ib-R1 | 99/08/11 | 99/08/17 |
| 044800 | OHM-Ia-R2 | 99/08/11 | 99/08/17 |
| 044801 | OHM-Ib-R2 | 99/08/11 | 99/08/17 |
| 044802 | OHM-Ia-R3 | 99/08/12 | 99/08/17 |
| 044803 | OHM-Ib-R3 | 99/08/12 | 99/08/17 |
| 044804 | OHM-Oa-R1 | 99/08/11 | 99/08/17 |
| 044805 | OHM-Ob-R1 | 99/08/11 | 99/08/17 |
| 044806 | OHM-Oa-R2 | 99/08/11 | 99/08/17 |
| 044807 | OHM-Ob-R2 | 99/08/11 | 99/08/17 |
| 044808 | OHM-Oa-R3 | 99/08/12 | 99/08/17 |
| 044809 | OHM-Ob-R3 | 99/08/12 | 99/08/17 |
| 044888 | OHM-O-FB | 99/08/10 | 99/08/17 |

Comments: _____

Date 99/08/18

FedEx **Dangerous Goods Airbill** — **Recipient's Copy**

9946951

00154

81000643992 9

**Questions? Call 1•800•Go•FedEx** (800)463-3339

**1 From**

Date 2/16/99 Sender's FedEx Account Number [redacted]

Sender's Name Scott R. James Phone (978) 970-5600

Company TRC ENVIRONMENTAL CORP

Address 100 FOOT OF JOHN ST Dept./Floor/Suite/Room

City LOWELL State MA ZIP 01852

**2** Your Internal Billing Reference Information 2646-5030-00001

**3 To**

Recipient's Name Mr. Ron McLeod Phone (905) 332-7591 Ext. 256

Company Frey Regional Service

Address 287 Caroline Rd (If "HOLD" at FedEx location, print FedEx address here) Dept./Floor/Suite/Room

☐ Check here if residence (Extra charge applies for FedEx Express Saver)

City Cheektowaga State NY ZIP 14225

**For HOLD at FedEx Location check here**
☐ Hold Weekday ☐ Hold Saturday (Not available at all locations) (Available for FedEx Priority Overnight and FedEx 2Day only)

**For WEEKEND Delivery check here** (Extra Charge. Not available at all locations)
☐ Saturday Delivery (Available for FedEx Priority Overnight and FedEx 2Day only) ☐ NEW Sunday Delivery (Available for FedEx Priority Overnight only)

**4a Express Package Service** *Packages under 150 lbs.* Delivery commitment may be later in some areas.
☒ FedEx Priority Overnight (Next business morning) ☐ FedEx Standard Overnight (Next business afternoon)
☐ FedEx 2Day (Second business day) ☐ FedEx Express Saver (Third business day)

**4b Freight Service** *Packages over 150 lbs.* Delivery commitment may be later in some areas.
☐ FedEx Overnight Freight (Next business day) ☐ FedEx 2Day Freight (Second business day) ☐ FedEx Express Saver Freight (Up to 3 business days)
(Call for delivery schedule. Some restrictions apply. See back for detailed descriptions of freight services.)

**5 Packaging**
☒ Other Packaging
Dangerous Goods cannot be shipped in FedEx packaging.

**6 Special Handling**
☒ Dangerous Goods as per attached Shipper's Declaration
☒ Cargo Aircraft Only

**7 Payment**
Bill to: ☒ Sender (Account No. in Section 1 will be billed) ☐ Recipient ☐ Third Party ☐ Credit Card ☐ Cash/Check
(Enter FedEx Account No. or Credit Card No. below)

| Total Packages | Total Weight | Total Declared Value* | Total Charges |
|---|---|---|---|
| 1 | 132 | $ .00 | $ |

* When declaring a value higher than $100 per shipment, you pay an additional charge. See SERVICE CONDITIONS, DECLARED VALUE, AND LIMIT OF LIABILITY section for further information.

Credit Card Auth.

**Signature Release Unavailable**

PART #154251 • Rev. Date 4/98
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355 98 SRC

FedEx Tracking Number 810006439929 Form I.D. No. 0204

Page 1 of 1 Pages

*Two completed and signed copies of this Declaration must be handed to the operator.*

**WARNING**
**Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. This Declaration must not, in any circumstances, be completed and/or signed by a consolidator, a forwarder or an IATA cargo agent.**

## TRANSPORT DETAILS

This shipment is within the limitations prescribed for: (delete non-applicable)
~~PASSENGER AND CARGO AIRCRAFT~~ | CARGO AIRCRAFT ONLY

Airport of Departure: Boston MA

Airport of Destination: Buffalo NY

Shipment type: (delete non-applicable)
NON-RADIOACTIVE | ~~RADIOACTIVE~~

## NATURE AND QUANTITY OF DANGEROUS GOODS

Dangerous Goods Identification

| Proper Shipping Name | Class or Division | UN or I.D. No. | Packing Group | Subsidiary Risk | Quantity and Type of Packaging | Packing Inst. | Authorization |
|---|---|---|---|---|---|---|---|
| Corrosive liquid, N.O.S. (Nitric Acid / Sulfuric Acid) | 8 | UN 1760 | II | | 1 wooden Box x 6L | 212 | |

Additional Handling Information Cargo Aircraft Only

Prepared for AIR TRANSPORT according to: (Customer MUST check one)
☐ 49 CFR ☒ ICAO / IATA

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked, and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Name/Title of Signatory Scott James Environmental Service
Place and Date Lowell MA 2/16/99
Signature (see warning above)

Emergency Telephone Number (Required for US Origin or Destination Shipments) Chemtrec 1-800-424-9300

NOT ACCEPTABLE FOR PASSENGER AIRCRAFT. THIS SHIPMENT CONTAINS RADIOACTIVE MATERIAL INTENDED FOR USE IN, OR INCIDENT TO, RESEARCH, MEDICAL DIAGNOSIS, OR TREATMENT.

FedEx *Dangerous Goods Airbill* **Recipient's Copy**

9046931

0013

81000643994O

**Questions? Call 1•800•Go•FedEx** (800)463-3339

**1 From**

Date 2/16/99 Sender's FedEx Account Number [redacted]

Sender's Name Scott R James Phone (978) 970-5600

Company THE ENVIRONMENTAL CORP.

Address 100 FOOT OF JOHN ST Dept./Floor/Suite/Room

City LOWELL State MA ZIP 01852

**2** Your Internal Billing Reference Information 26546-0030-00001

**3 To**

Recipient's Name Mr. Ron [illegible] Phone (905) 332-7591 Ext 256

Company [illegible]

Address 393 [illegible] Rd Check here if residence (Extra charge applies, for FedEx Express Saver)

(To "HOLD" at FedEx location, print FedEx address here) Dept./Floor/Suite/Room

City [illegible] State ON ZIP 14225

**For HOLD at FedEx Location check here**

☐ Hold Weekday ☐ Hold Saturday (Not available at all locations) (Available for FedEx Priority Overnight and FedEx 2Day only)

**For WEEKEND Delivery check here** (Extra Charge. Not available at all locations)

☐ Saturday Delivery (Available for FedEx Priority Overnight and FedEx 2Day only) ☐ NEW Sunday Delivery (Available for FedEx Priority Overnight only)

**4a Express Package Service** *Packages under 150 lbs.* Delivery commitment may be later in some areas.

☒ FedEx Priority Overnight (Next business morning) ☐ FedEx Standard Overnight (Next business afternoon)

☐ FedEx 2Day (Second business day) ☐ FedEx Express Saver (Third business day)

**4b Freight Service** *Packages over 150 lbs.* Delivery commitment may be later in some areas.

☐ FedEx Overnight Freight (Next business day) ☐ FedEx 2Day Freight (Second business day) ☐ FedEx Express Saver Freight (Up to 3 business days)

(Call for delivery schedule. Some restrictions apply. See back for detailed descriptions of freight services.)

**5 Packaging**

☒ Other Packaging

Dangerous Goods cannot be shipped in FedEx packaging

**6 Special Handling**

☒ Dangerous Goods as per attached Shipper's Declaration ☒ Cargo Aircraft Only

**7 Payment**

Bill to: ☒ Sender (Account No in Section 1 will be billed) ☐ Recipient ☐ Third Party ☐ Credit Card ☐ Cash/Check

(Enter FedEx Account No. or Credit Card No. below)

| Total Packages | Total Weight | Total Declared Value* | Total Charges |
|---|---|---|---|
| 1 | 106 | $ .00 | $ |

* When declaring a value higher than $100 per shipment, you pay an additional charge. See SERVICE CONDITIONS, DECLARED VALUE, AND LIMIT OF LIABILITY section for further information.

Credit Card Auth.

**Signature Release Unavailable**

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355

98 SRC

FedEx Tracking Number 81000643994O Form [illegible]

Page 1 of 1 Pages

*Two completed and signed copies of this Declaration must be handed to the operator.*

**WARNING**

**Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. This Declaration must not, in any circumstances, be completed and/or signed by a consolidator, a forwarder or an IATA cargo agent.**

**TRANSPORT DETAILS**

This shipment is within the limitations prescribed for: (delete non-applicable) ~~PASSENGER AND CARGO AIRCRAFT~~ / CARGO AIRCRAFT ONLY

Airport of Departure: Boston MA

Airport of Destination: Buffalo NY

Shipment type: (delete non-applicable) NON-RADIOACTIVE / ~~RADIOACTIVE~~

**NATURE AND QUANTITY OF DANGEROUS GOODS**

Dangerous Goods Identification

| Proper Shipping Name | Class or Division | UN or I.D. No. | Packing Group | Subsidiary Risk | Quantity and Type of Packaging | Packing Inst. | Authorization |
|---|---|---|---|---|---|---|---|
| Corrosive Liquid, N.O.S. (Nitric Acid / Sulfuric Acid) | 8 | UN 1760 | II | | 1 Drum - Box x 6L | 812 | |

Additional Handling Information: Cargo Aircraft Only

Prepared for AIR TRANSPORT according to: (Customer MUST check one) ☐ 49 CFR ☒ ICAO / IATA

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked, and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Name/Title of Signatory: Scott James Environmental Corp

Place and Date: Lowell MA 2/16/99

Signature (see warning above): [illegible]

Emergency Telephone Number (Required for US Origin or Destination Shipments): Chemtrec 1-800-424-9300

NOT ACCEPTABLE FOR PASSENGER AIRCRAFT. THIS SHIPMENT CONTAINS RADIOACTIVE MATERIAL INTENDED FOR USE IN, OR INCIDENT TO, RESEARCH, MEDICAL DIAGNOSIS, OR TREATMENT.

# CHAIN OF CU Y RECORD

Project Name: PG&E Logan
Project No.: 26046
Sampling Date(s): 8/10/99
Laboratory: Philip
Laboratory P.O. #:
Shipping Airbill No.:
Shipping Date(s):
Shipper's Name:

| Sample Code | Sampled Date | Container Size | Container G/P | Aqueous | Organic Solvent | Ash/Soil/Sediment | Acidic | Basic | Other | Source Description | Trace Metals* | Mercury | Hexavalent Chromium | HCl | Cl2 | Particulate Matter | PCDD/PCDF | Semi-Volatile Organics | Volatile Organics | Physical Parameters* | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PG&E-L-OHM-O-FB-PR-HNO3-Hg | 8/10/99 | 125ml | G | | | | ✓ | | | Outlet Field BLK | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-O-FB-PF-Hg | | 125ml | | | | | | ✓ | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-O-FB-KCl-Hg | | 500ml | | | | | ✓ | | | | ✓ | ✓ | | | 44888 | | | | | | |
| PG&E-L-OHM-O-FB-KMnO4-Hg | | 500ml | | | | | ✓ | | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-O-FB-HNO3/H2O2-Hg | | 125ml | | | | | ✓ | | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-I-FB-PR-HNO3-Hg | 8/10/99 | 125ml | G | | | | ✓ | | | Inlet Field BLK | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-I-FB-PF-Hg | | 125ml | | | | | | ✓ | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-I-FB-KCl-Hg | | 500ml | | | | | ✓ | | | | ✓ | ✓ | | | 44797 | | | | | | |
| PG&E-L-OHM-I-FB-KMnO4-Hg | | 500ml | | | | | ✓ | | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-I-FB-HNO3/H2O2-Hg | | 125ml | | | | | ✓ | | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-RB-PF-Hg | 8/11/99 | Petri | | | | | | ✓ | | Reagent BLK | ✓ | ✓ | | | | | | | | | Filter |
| PG&E-L-OHM-RB-KMnO4-Hg | 8/11/99 | 125ml | G | | | | ✓ | | | | ✓ | ✓ | | | | | | | | | 4% KMnO4/10% H2SO4 |
| PG&E-L-OHM-RB-KCl-Hg | | 125ml | | | | | ✓ | | | | ✓ | ✓ | | | | | | | | | KCl Solution |
| PG&E-L-OHM-RB-HNO3-Hg | | | | | | | ✓ | | | | ✓ | ✓ | | | 44796 | | | | | | 0.1 N HNO3 |
| PG&E-L-OHM-RB-HNO3/H2O2-Hg | | | | | | | ✓ | | | | ✓ | ✓ | | | | | | | | | 5% HNO3/10% H2O2 |
| PG&E-L-OHM-RB-Hydro-Hg | | | | | | | ✓ | | | | ✓ | ✓ | | | | | | | | | 10% Hydroxylamine Sulfate |

| | | | |
|---|---|---|---|
| Relinquished by: | Date/Time: 8/16/99 1403 | Relinquished by: | Date/Time: |
| Received by: | Date/Time: 990817 1200 | Received by: | Date/Time: |

REMARKS (*): Measure and Record all volumes prior to analysis

00156

№ 02401

WHITE — LABORATORY YELLOW — LABORATORY COPY PINK — OFFICE COPY GOLD — FIELD COPY

TRC
TRC Environmental Corporation

,5-44795 MG-44812.

# CHAIN OF CU JY RECORD

Project Name: PG&E Logan
Project No.: 26046
Sampling Date(s): 8/11/99
Laboratory: Philip
Laboratory P.O. #:
Shipping Airbill No.:
Shipping Date(s):
Shipper's Name:

| Sample Code | Sampled Date | Container Size | Container G/P | Aqueous | Organic Solvent | Ash/Soil/Sediment | Acidic | Basic | Other | Source Description | Trace Metals* | Mercury | Hexavalent Chromium | HCl | Cl2 | Particulate Matter | PCDD/PCDF | Semi-Volatile Organics | Volatile Organics | Physical Parameters* | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PG&E-L-OHM-Ia-1-A-Hg | 8/11/99 | 125 | G | | | | | | | Inlet Run 1A | ✓ | ✓ | | | | | | | | | 44812 |
| PG&E-L-OHM-Ia-1-PF-Hg | | Petri | | | | | | | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ia-1-PR-HNO3-Hg | | 250 | G | | | | | | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ia-1-KCl-Hg | | 1L | | | | | | | | | ✓ | ✓ | | | | 44798 | | | | | |
| PG&E-L-OHM-Ia-1-HNO3/H2O2-Hg | | 250 | | | | | | | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ia-1-KMnO4-Hg | | 1L | | | | | | | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ib-1-A-Hg | 8/11/99 | 125 | G | | | | | | | Inlet Run 1 B | ✓ | ✓ | | | | | | | | | 44814 |
| PG&E-L-OHM-Ib-1-PF-Hg | | Petri | | | | | | | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ib-1-PR-HNO3-Hg | | 250ml | G | | | | | | | | ✓ | ✓ | | | | 44799 | | | | | |
| PG&E-L-OHM-Ib-1-KCl-Hg | | 1L | | | | | | | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-IB-1-HNO3/H2O2-Hg | | 250ml | | | | | | | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ib-1-KMnO4-Hg | | 1L | | | | | | | | | ✓ | ✓ | | | | | | | | | |

| | | | |
|---|---|---|---|
| Relinquished by: | Date/Time: 8/18/99 1328 | Relinquished by: | Date/Time: |
| Received by: | Date/Time: 990817 12:00 | Received by: | Date/Time: |

REMARKS (*): Measure and record all volumes prior to analysis

№ 02400

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TRC
TRC Environmental Corporation

00157

# CHAIN OF CU[illegible] / RECORD

Project Name: PG&E Logan
Project No.: 26046
Sampling Date(s): 8/11/99
Laboratory: Philip
Laboratory P.O. #:
Shipping Airbill No.:
Shipping Date(s):
Shipper's Name:

| Sample Code | Sampled Date | Container Size | Container G/P | MATRIX: Aqueous | Organic Solvent | Ash/Soil/Sediment | Acidic | Basic | Other | Source Description | ANALYSIS: Trace Metals* | Mercury | Hexavalent Chromium | HCl | Cl2 | Particulate Matter | PCDD/PCDF | Semi-Volatile Organics | Volatile Organics | Physical Parameters* | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PG&E-L-OHM-Ia-2-A-Hg | 8/11/99 | 1250g | G | | | ✓ | | | | Inlet Run 2 A | ✓ | ✓ | | | | | | | | | 44815 |
| PG&E-L-OHM-Ia-2-PF-Hg | | Petri | | | | | | ✓ | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ia-2-PR-HNO3-Hg | | 500mlg | | | | | ✓ | | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ia-2-KCl-Hg | | 1Lcg | | | | | ✓ | | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ia-2-HNO3/H2O2-Hg | | 250cg | | | | | ✓ | | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ia-2-KMnO4-Hg | | 1Lcg | | | | | ✓ | | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ib-2-A-Hg | 8/11/99 | 125 | G | | | ✓ | | | | Inlet Run 2 B | ✓ | ✓ | | | | | | | | | 44816 |
| PG&E-L-OHM-Ib-2-PF-Hg | | Petri | | | | | | ✓ | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ib2-PR-HNO3-Hg | | 500 | G | | | | ✓ | | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ib-2-KCl-Hg | | 1L | | | | | ✓ | | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ib-2-HNO3/H2O2-Hg | | 250 | | | | | ✓ | | | | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ib-2-KMnO4-Hg | | 1L | | | | | ✓ | | | | ✓ | ✓ | | | | | | | | | |

44902

44901

| | | | |
|---|---|---|---|
| Relinquished by: [signature] | Date/Time: 8/16/99 1326 | Relinquished by: | Date/Time: |
| Received by: [signature] | Date/Time: 990817 12:00pm | Received by: | Date/Time: |

REMARKS (*): Measure & Record all volumes prior to analysis

00158

№ 02404

WHITE — LABORATORY YELLOW — LABORATORY COPY PINK — OFFICE COPY GOLD — FIELD COPY

TRC
TRC Environmental Corporation

# CHAIN OF CU[illegible]DY RECORD

Project Name: PG&E Logan
Project No.: 26046
Sampling Date(s): 8/12/99
Laboratory: Philip
Laboratory P.O. #:
Shipping Airbill No.:
Shipping Date(s):
Shipper's Name:

| Sample Code | Sampled Date | Container Size | Container G/P | Aqueous | Organic Solvent | Ash/Soil/Sediment | Acidic | Basic | Other | Source Description | Trace Metals* | Mercury | Hexavalent Chromium | HCl | Cl2 | Particulate Matter | PCDD/PCDF | Semi-Volatile Organics | Volatile Organics | Physical Parameters* | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PG&E-L-OHM-Ia-3-PF-Hg | 8/12/99 | Petri | | | | | | | ✓ | Inlet Run3A | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ia-3-A-Hg | ↓ | 125 | G | | | ✓ | | | | ↓ | ✓ | ✓ | | | | | | | | | - 44817. |
| PG&E-L-OHM-Ia-3-PR-HNO3-Hg | ↓ | 500 | ↓ | | | | ✓ | | | ↓ | ✓ | ✓ | | | | | 44802 | | | | |
| PG&E-L-OHM-Ia-3-KCl-Hg | ↓ | 1L | ↓ | | | | ✓ | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ia-3-HNO3/H2O2-Hg | ↓ | 250 | ↓ | | | | ✓ | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ia-3-KMnO4-Hg | ↓ | 1L | ↓ | | | | ✓ | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ib-3-PF-Hg | 8/12/99 | Petri | | | | | | | ✓ | Inlet Run3B | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ib-3-A-Hg | ↓ | 125 | G | | | ✓ | | | | ↓ | ✓ | ✓ | | | | | | | | | - 44818. |
| PG&E-L-OHM-Ib-3-PR-HNO3-Hg | ↓ | 500 | ↓ | | | | ✓ | | | ↓ | ✓ | ✓ | | | | | 44803 | | | | |
| PG&E-L-OHM-Ib-3-KCl-Hg | ↓ | 1L | ↓ | | | | ✓ | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ib-3-HNO3/H2O2-Hg | ↓ | 250 | ↓ | | | | ✓ | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ib-3-KMnO4-Hg | ↓ | 1L | ↓ | | | | ✓ | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-RB-10%HNO3-Hg | 8/12/99 | 125 | G | | | | ✓ | | | Reagent BIK | ✓ | ✓ | | | | | 44810 | | | | Archive |
| PG&E-L-OHM-RB-5%KMnO4-Hg | ↓ | ↓ | ↓ | | | | ✓ | | | Reagent BIK | ✓ | ✓ | | | | | 44811 | | | | Archive |

| | | | |
|---|---|---|---|
| Relinquished by: [signature] | Date/Time: 8/16/99 1325 | Relinquished by: | Date/Time: |
| Received by: [signature] | Date/Time: 990817 12:00p | Received by: | Date/Time: |

REMARKS (*): Measure & Record all volumes prior to Analysis.

00159

№ 02405

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TRC
TRC Environmental Corporation

# CHAIN OF CU[illegible]Y RECORD

Project Name: PG&E Logan
Project No.: 26046
Sampling Date(s): 8/11/99
Laboratory:
Laboratory P.O. #:
Shipping Airbill No.:
Shipping Date(s):
Shipper's Name:

| Sample Code | Sampled Date | Container Size | Container G/P | Aqueous | Organic Solvent | Ash/Soil/Sediment | Acidic | Basic | Other | Source Description | Trace Metals* | Mercury | Hexavalent Chromium | HCl | Cl2 | Particulate Matter | PCDD/PCDF | Semi-Volatile Organics | Volatile Organics | Physical Parameters* | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PG&E-L-OHM-Oa-1-PF-Hg | 8/11/99 | Petri | | | | | | | ✓ | Outlet Run 1A | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Oa-1-PR-HNO3-Hg | ↓ | 250 | G | | | ✓ | | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Oa-1-KCl-Hg | ↓ | 1L | ↓ | | | ✓ | | | | ↓ | ✓ | ✓ | | | | 44804 | | | | | |
| PG&E-L-OHM-Oa-1-HNO3/H2O2-Hg | ↓ | 250 | ↓ | | | ✓ | | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Oa-1-KMnO4-Hg | ↓ | 1L | ↓ | | | ✓ | | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ob-1-PF-Hg | 8/11/99 | Petri | | | | | | | ✓ | Outlet Run 1B | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ob-1-PR-HNO3-Hg | ↓ | 250 | G | | | ✓ | | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ob-1-KCl-Hg | ↓ | 1L | ↓ | | | ✓ | | | | ↓ | ✓ | ✓ | | | | 44805 | | | | | |
| PG&E-L-OHM-Ob-1-HNO3/H2O2-Hg | ↓ | 250 | ↓ | | | ✓ | | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ob-1-KMnO4-Hg | ↓ | 1L | ↓ | | | ✓ | | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Oa-2-PF-Hg | 8/11/99 | Petri | | | | | | | ✓ | Outlet Run 2A | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Oa-2-PR-HNO3-Hg | ↓ | 250 | G | | | ✓ | | | | ↓ | ✓ | ✓ | | | | 44806 | | | | | |
| PG&E-L-OHM-Oa-2-KCl-Hg | ↓ | 1L | ↓ | | | ✓ | | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Oa-2-HNO3/H2O2-Hg | ↓ | 250 | ↓ | | | ✓ | | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Oa-2-KMnO4-Hg | ↓ | 1L | ↓ | | | ✓ | | | | ↓ | ✓ | ✓ | | | | | | | | | |

| | | | |
|---|---|---|---|
| Relinquished by: [signature] | Date/Time: 8/16/99 1329 | Relinquished by: | Date/Time: |
| Received by: [signature] | Date/Time: 990817 12:00 | Received by: | Date/Time: |

REMARKS (*): Measure and record volumes prior to analysis

00160

№ 02402

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TRC
TRC Environmental Corporation

# CHAIN OF CU[illegible]Y RECORD

Project Name: PG&E Logan
Project No.: 26046
Sampling Date(s): 8/11/99, 8/12/99
Laboratory: Philip
Laboratory P.O. #:
Shipping Airbill No.:
Shipping Date(s):
Shipper's Name:

| Sample Code | Sampled Date | Container Size | Container G/P | MATRIX: Aqueous | Organic Solvent | Ash/Soil/Sediment | Acidic | Basic | Other | Source Description | ANALYSIS: Trace Metals* | Mercury | Hexavalent Chromium | HCl | Cl2 | Particulate Matter | PCDD/PCDF | Semi-Volatile Organics | Volatile Organics | Physical Parameters* | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PG&E-L-OHM-Ob-2-PF-Hg | 8/11/99 | Petri | | | | | | | ✓ | Outlet Run 2B | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ob-2-PR-~~HNO3~~-Hg | ↓ | 250 | G | | | | ✓ | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ob-2-KCl-Hg | ↓ | 1L | ↓ | | | | ✓ | | | ↓ | ✓ | ✓ | | | | | | 44807 | | | |
| PG&E-L-OHM-Ob-2-~~HNO3/H2O2~~-Hg | ↓ | 250 | ↓ | | | | ✓ | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ob-2-KMnO4-Hg | ↓ | 1L | ↓ | | | | ✓ | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Oa-3-PF-Hg | 8/12/99 | Petri | | | | | | | ✓ | Outlet Run 3A | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Oa-3-PR-Hg | ↓ | 250 | G | | | | ✓ | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Oa-3-KCl-Hg | ↓ | 1L | ↓ | | | | ✓ | | | ↓ | ✓ | ✓ | | | | | | 44808 | | | |
| PG&E-L-OHM-Oa-3-KMnO4-Hg | ↓ | 1L | ↓ | | | | ✓ | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Oa-3-~~HNO3/H2O2~~-Hg | ↓ | 250 | ↓ | | | | ✓ | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ob-3-PF-Hg | 8/12/99 | Petri | | | | | | | ✓ | Outlet Run 3B | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ob-3-PR-Hg | ↓ | 250 | G | | | | ✓ | | | ↓ | ✓ | ✓ | | | | | | 44809 | | | |
| PG&E-L-OHM-Ob-3-KCl-Hg | ↓ | 1L | ↓ | | | | ✓ | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ob-3-~~HNO3/H2O2~~-Hg | ↓ | 250 | ↓ | | | | ✓ | | | ↓ | ✓ | ✓ | | | | | | | | | |
| PG&E-L-OHM-Ob-3-KMnO4-Hg | ↓ | 1L | ↓ | | | | ✓ | | | ↓ | ✓ | ✓ | | | | | | | | | |

| | | | |
|---|---|---|---|
| Relinquished by: [signature] | Date/Time: 8/16/99 1400 | Relinquished by: | Date/Time: |
| Received by: [signature] | Date/Time: 990817 12:00 | Received by: | Date/Time: |

REMARKS (*): Measure & Record all volumes prior to analysis

№ 02403

WHITE — LABORATORY YELLOW — LABORATORY COPY PINK — OFFICE COPY GOLD — FIELD COPY

TRC
TRC Environmental Corporation

00161

00162

Page ___ of ___

# US SAMPLE LOG IN SHEET

TRC

**Lab Name:** Philip Analytical Services Corporation, Burlington Laboratory

**Received By (Print Name):** K. Cararo

**Received By (Signature):**

**Client Project ID:**

**REMARKS:**

**Condition of Samples/Sample Shipment:**

Samples rec'd intact.

| | | |
|---|---|---|
| Custody Seal(s) | Present ___ | Absent ✓ |
| Chain of Custody Records | Present ✓ | Absent ___ |
| Airbill | Present ✓ | Absent ___ |
| Airbill No. | 810006439929 | |
| | " | 40 |
| Does Information on Custody Records and Samples Agree? | Yes ✓ | No ___ |
| Date Received at Lab | 08-17-99 | |
| Time Received | 12:30 pm | |

**Temperature of Coolers**

| Cooler ID: | Temperature |
|---|---|
| 2 crates. | not taken |
| | |
| | |
| | |

Relinquished By:

Date: 08-17-99

Logbook No:

Logbook Page No.

NOTICE OF SAMPLE RECEIPT-PHILIP ANALYTICAL SERVICES

Attention: Michael P. Martin
Client: TRC Environmental Corporation
Re Client Project: 26046
FAX #: 978-453-1995
Phone #: 978-970-5600

Samples for: Off Mercury (Travis)
were received in good condition unless
indicated below.

SAMPLE LISTING

| Philip ID # | Sample ID | Date Sampled | Date Received |
|---|---|---|---|
| 044796 | OHM-RB | 99/08/11 | 99/08/17 |
| 044797 | OHM-I-FB | 99/08/10 | 99/08/17 |
| 044798 | OHM-Ia-R1 | 99/08/11 | 99/08/17 |
| 044799 | OHM-Ib-R1 | 99/08/11 | 99/08/17 |
| 044800 | OHM-Ia-R2 | 99/08/11 | 99/08/17 |
| 044801 | OHM-Ib-R2 | 99/08/11 | 99/08/17 |
| 044802 | OHM-Ia-R3 | 99/08/12 | 99/08/17 |
| 044803 | OHM-Ib-R3 | 99/08/12 | 99/08/17 |
| 044804 | OHM-Oa-R1 | 99/08/11 | 99/08/17 |
| 044805 | OHM-Ob-R1 | 99/08/11 | 99/08/17 |
| 044806 | OHM-Oa-R2 | 99/08/11 | 99/08/17 |
| 044807 | OHM-Ob-R2 | 99/08/11 | 99/08/17 |
| 044808 | OHM-Oa-R3 | 99/08/12 | 99/08/17 |
| 044809 | OHM-Ob-R3 | 99/08/12 | 99/08/17 |
| 044888 | OHM-O-FB | 99/08/10 | 99/08/17 |

Comments: _____

Date 99/08/18

NOTICE OF SAMPLE RECEIPT-PHILIP ANALYTICAL SERVICES

Attention: Michael P. Martin
Client: TRC Environmental Corporation
Re Client Project: 26046
FAX #: 978-453-1995
Phone #: 978-970-5600

Samples for: Hg via 7491A
were received in good condition unless indicated below.

SAMPLE LISTING

| Philip ID # | Sample ID | Date Sampled | Date Received |
|---|---|---|---|
| 044813 | OHM-Ia-R1 Flyash | 99/08/11 | 99/08/17 |
| 044814 | OHM-Ib-R1 Flyash | 99/08/11 | 99/08/17 |
| 044815 | OHM-Ia-R2 Flyash | 99/08/11 | 99/08/17 |
| 044816 | OHM-Ib-R2 Flyash | 99/08/11 | 99/08/17 |
| 044817 | OHM-Ia-R3 Flyash | 99/08/12 | 99/08/17 |
| 044818 | OHM-Ib-R3 Flyash | 99/08/12 | 99/08/17 |
| 044891 | NIST 1633b Reference | 99/08/18 | 99/08/18 |

Comments: _____

Date 99/08/18

NOTICE OF SAMPLE RECEIPT-PHILIP ANALYTICAL SERVICES

Attention: Michael P. Martin
Client: TRC Environmental Corporation
Re Client Project: 26046
FAX #: 978-453-1995
Phone #: 978-970-5600

Samples for: Hold
were received in good condition unless indicated below.

SAMPLE LISTING

| Philip ID # | Sample ID | Date Sampled | Date Received |
|---|---|---|---|
| 044810 | OHM-RB-10% HNO3 | 99/08/12 | 99/08/17 |
| 044811 | OHM-RB-5% KMNO4 | 99/08/12 | 99/08/17 |

Comments:

Date 99/08/18

# *Appendix D.2*

# *Process Streams*

# COMMERCIAL TESTING & ENGINEERING CO.

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ADDRESS ALL CORRESPONDENCE TO:
RT. 2, BOX 162A
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TEL: (606) 248-4205
FAX: (606) 248-0044


September 22, 1999

TRC ENVIRONMENTAL CORPORATION
5 WATERSIDE CROSSING
WINDSOR, CT 06095

**Sample identification by**
TRC ENVIRONMENTAL CORPORATION

SAMPLE BROUGHT IN
P.O. NO. 033841
PG&E - LOGAN GENERATING STATION
SAMPLING PROGRAM
COAL SAMPLE RUN 1A & 1B
CODE: PG&E-L-OHM-1-CA & 1-CB

**Kind of sample reported to us** COAL

**Sample taken at**

**Sample taken by**

**Date sampled** August 11, 1999

**Date received** September 9, 1999

**Analysis Report No.** 49-121885

**PROXIMATE ANALYSIS**

| | As Received | Dry Basis | | |
|---|---|---|---|---|
| % Moisture | 1.08 | xxxxx | | |
| % Ash | 10.10 | 10.21 | | |
| % Volatile | 32.32 | 32.67 | | |
| % Fixed Carbon | 56.50 | 57.12 | | |
| | 100.00 | 100.00 | | |
| Btu/lb | 13609 | 13758 | MAF | 15322 |
| % Sulfur | 1.12 | 1.13 | | |

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Jerry Wheeler

Middlesboro Laboratory

MEMBER ACIL

**COMMERCIAL TESTING & ENGINEERING CO.**
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FAX: (606) 248-0044

September 22, 1999

TRC ENVIRONMENTAL CORPORATION
5 WATERSIDE CROSSING
WINDSOR, CT 06095

**Sample identification by**
TRC ENVIRONMENTAL CORPORATION

SAMPLE BROUGHT IN
P.O. NO. 033841
PG&E - LOGAN GENERATING STATION
SAMPLING PROGRAM
COAL SAMPLE RUN 1A & 1B
CODE: PG&E-L-OHM-1-CA & 1-CB

**Kind of sample reported to us** COAL

**Sample taken at**

**Sample taken by**

**Date sampled** August 11, 1999

**Date received** September 9, 1999

**Analysis report no.** 49-121885

| PARAMETER | RESULTS |
|---|---|
| Mercury, Hg | 0.19 ppm |
| Chlorine, Cl | 0.15 % |

Procedure: The sample was prepared according to ASTM, Part 05.05, Method D 3683. The sample was analyzed for trace elements by Inductively Coupled Plasma Emission Spectroscopy.
Mercury was determined by Manual Coal Vapor Atomic Absorption.

Results: Results are reported in parts per million (ppm).

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Jerry Wheeler
Middlesboro Laboratory

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FAX: (606) 248-0044


September 22, 1999

TRC ENVIRONMENTAL CORPORATION
5 WATERSIDE CROSSING
WINDSOR, CT 06095

**Sample identification by**
TRC ENVIRONMENTAL CORPORATION

SAMPLE BROUGHT IN
P.O. NO. 033841
PG&E - LOGAN GENERATING STATION
SAMPLING PROGRAM
COAL SAMPLE RUN 2A & 2B
CODE: PG&E-L-OHM-2-CA & 2-CB

**Kind of sample reported to us** COAL

**Sample taken at**

**Sample taken by**

**Date sampled** August 11, 1999

**Date received** September 9, 1999

**Analysis Report No.** 49-121883

**PROXIMATE ANALYSIS**

| | As Received | Dry Basis | | |
|---|---|---|---|---|
| % Moisture | 1.02 | xxxxx | | |
| % Ash | 9.96 | 10.06 | | |
| % Volatile | 32.84 | 33.18 | | |
| % Fixed Carbon | 56.18 | 56.76 | | |
| | 100.00 | 100.00 | | |
| Btu/lb | 13627 | 13767 | MAF | 15307 |
| % Sulfur | 1.07 | 1.08 | | |

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Jerry Wheeler

Middlesboro Laboratory

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September 22, 1999

TRC ENVIRONMENTAL CORPORATION
5 WATERSIDE CROSSING
WINDSOR, CT 06095

**Sample identification by**
TRC ENVIRONMENTAL CORPORATION

SAMPLE BROUGHT IN
P.O. NO. 033841
PG&E - LOGAN GENERATING STATION
SAMPLING PROGRAM
COAL SAMPLE RUN 2A & 2B
CODE: PG&E-L-OHM-2-CA & 2-CB

**Kind of sample reported to us** COAL

**Sample taken at**

**Sample taken by**

**Date sampled** August 11, 1999

**Date received** September 9, 1999

**Analysis report no.** 49-121883

| PARAMETER | RESULTS |
|---|---|
| Mercury, Hg | 0.18 ppm |
| Chlorine, Cl | 0.15 % |

Procedure: The sample was prepared according to ASTM, Part 05.05, Method D 3683. The sample was analyzed for trace elements by Inductively Coupled Plasma Emission Spectroscopy.
Mercury was determined by Manual Coal Vapor Atomic Absorption.

Results: Results are reported in parts per million (ppm).

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Jerry Wheeler

Middlesboro Laboratory

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September 22, 1999

TRC ENVIRONMENTAL CORPORATION
5 WATERSIDE CROSSING
WINDSOR, CT 06095
ACCOUNTS PAYABLE

**Sample identification by**
TRC ENVIRONMENTAL CORPORATION

SAMPLE BROUGHT IN
P.O. NO. 033841
PG&E - LOGAN GENERATING STATION
SAMPLING PROGRAM
COAL SAMPLE RUN 3A & 3B
CODE: PG&E -L-OHM-3-CA & 3-CB

**Kind of sample reported to us** COAL

**Sample taken at**

**Sample taken by**

**Date sampled** August 12, 1999

**Date received** September 9, 1999

**Analysis Report No.** 49-121884

**PROXIMATE ANALYSIS**

| | As Received | Dry Basis | | |
|---|---|---|---|---|
| % Moisture | 1.12 | xxxxx | | |
| % Ash | 9.84 | 9.95 | | |
| % Volatile | 33.39 | 33.77 | | |
| % Fixed Carbon | 55.65 | 56.28 | | |
| | 100.00 | 100.00 | | |
| Btu/lb | 13603 | 13757 | MAF | 15277 |
| % Sulfur | 1.07 | 1.08 | | |

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Middlesboro Laboratory

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FAX: (606) 248-0044


September 22, 1999

TRC ENVIRONMENTAL CORPORATION
5 WATERSIDE CROSSING
WINDSOR, CT 06095
ACCOUNTS PAYABLE

**Sample identification by**
TRC ENVIRONMENTAL CORPORATION

SAMPLE BROUGHT IN
P.O. NO. 033841
PG&E - LOGAN GENERATING STATION
SAMPLING PROGRAM
COAL SAMPLE RUN 3A & 3B
CODE: PG&E -L-OHM-3-CA & 3-CB

**Kind of sample reported to us** COAL

**Sample taken at**

**Sample taken by**

**Date sampled** August 12, 1999

**Date received** September 9, 1999

**Analysis report no.** 49-121884

| PARAMETER | RESULTS |
|---|---|
| Mercury, Hg | 0.17 ppm |
| Chlorine, Cl | 0.15 % |

Procedure: The sample was prepared according to ASTM, Part 05.05, Method D 3683. The sample was analyzed for trace elements by Inductively Coupled Plasma Emission Spectroscopy.
Mercury was determined by Manual Coal Vapor Atomic Absorption.

Results: Results are reported in parts per million (ppm).

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Jerry Wheeler

Middlesboro Laboratory

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September 28, 1999

TRC ENVIRONMENTAL CORPORATION
5 WATERSIDE CROSSING
WINDSOR, CT 06095
ACCOUNTS PAYABLE

**Sample identification by**
TRC ENVIRONMENTAL

SAMPLE BROUGHT IN
PG&E - LOGAN STATION
LIME SLURRY RUN 1
CODE:PG&E-L-OHM-1-L GRAB

**Kind of sample reported to us** LIME SLURRY

**Sample taken at**

**Sample taken by**

**Date sampled** August 11, 1999

**Date received** September 1, 1999

**Analysis report no.** 49-123040

| ANALYZED PARAMETER | CAS NO. | RESULT | LOQ | UNITS | METHODS | DATE/TIME/ANALYST |
|---|---|---|---|---|---|---|
| METALS-TOTAL BASIS | | | | | | |
| MERCURY (Hg) | 7439-97-6 | ND | 0.0002 | mg/L | SW7470 | 9/03/99 16:19 JC2 |

ND: Not detected at a concentration greater than the LOQ - Limit of Quantitation.

Method Reference: USEPA: Test Methods For Evaluating Solid Waste; 3rd Edition; Nov. 1986

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Jerry Wheeler

Middlesboro Laboratory

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FAX: (606) 248-0044


September 28, 1999

TRC ENVIRONMENTAL CORPORATION
5 WATERSIDE CROSSING
WINDSOR, CT 06095
ACCOUNTS PAYABLE

**Sample identification by**
TRC ENVIRONMENTAL

SAMPLE BROUGHT IN
PG&E - LOGAN STATION
LIME SLURRY RUN 1 PJP
CODE:PG&E-L-OHM-1-LDUP GRAB

**Kind of sample reported to us** LIME SLURRY

**Sample taken at**

**Sample taken by**

**Date sampled** August 11, 1999

**Date received** September 1, 1999

**Analysis report no.** 49-123041

| ANALYZED PARAMETER | CAS NO. | RESULT | LOQ | UNITS | METHODS | DATE/TIME/ANALYST |
|---|---|---|---|---|---|---|
| METALS-TOTAL BASIS | | | | | | |
| MERCURY (Hg) | 7439-97-6 | ND | 0.0002 | mg/L | SW7470 | 9/03/99 16:20 JC2 |

ND: Not detected at a concentration greater than the LOQ - Limit of Quantitation.

Method Reference: USEPA: Test Methods For Evaluating Solid Waste; 3rd Edition; Nov. 1986

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Jerry Wheeler
Middlesboro Laboratory

MEMBER ACIL

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MIDDLESBORO, KY 40965
TEL: (606) 248-4205
FAX: (606) 248-0044


September 28, 1999

TRC ENVIRONMENTAL CORPORATION
5 WATERSIDE CROSSING
WINDSOR, CT 06095
ACCOUNTS PAYABLE

**Sample identification by**
TRC ENVIRONMENTAL

SAMPLE BROUGHT IN
PG&E - LOGAN STATION
LIME SLURRY RUN 2
CODE:PG&E-L-OHM-2-L GRAB

**Kind of sample reported to us** LIME SLURRY

**Sample taken at**

**Sample taken by**

**Date sampled** August 11, 1999

**Date received** September 1, 1999

**Analysis report no.** 49-123042

| ANALYZED PARAMETER | CAS NO. | RESULT | LOQ | UNITS | METHODS | DATE/TIME/ANALYST |
|---|---|---|---|---|---|---|
| METALS-TOTAL BASIS | | | | | | |
| MERCURY (Hg) | 7439-97-6 | ND | 0.0002 | mg/L | SW7470 | 9/03/99 16:21 JC2 |

ND: Not detected at a concentration greater than the LOQ - Limit of Quantitation.

Method Reference: USEPA: Test Methods For Evaluating Solid Waste; 3rd Edition; Nov. 1986

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Jerry Wheeler

Middlesboro Laboratory

MEMBER ACIL

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FAX: (606) 248-0044


September 28, 1999

TRC ENVIRONMENTAL CORPORATION
5 WATERSIDE CROSSING
WINDSOR, CT 06095
ACCOUNTS PAYABLE

**Sample identification by**
TRC ENVIRONMENTAL

SAMPLE BROUGHT IN
PG&E - LOGAN STATION
LIME SLURRY RUN 3
CODE:PG&E-L-OHM-3-L GRAB

**Kind of sample reported to us** LIME SLURRY

**Sample taken at**

**Sample taken by**

**Date sampled** August 12, 1999

**Date received** September 1, 1999

**Analysis report no.** 49-123043

| ANALYZED PARAMETER | CAS NO. | RESULT | LOQ | UNITS | METHODS | DATE/TIME/ANALYST |
|---|---|---|---|---|---|---|
| METALS-TOTAL BASIS | | | | | | |
| MERCURY (Hg) | 7439-97-6 | ND | 0.0002 | mg/L | SW7470 | 9/03/99 16:23 JC2 |

ND: Not detected at a concentration greater than the LOQ - Limit of Quantitation.

Method Reference: USEPA: Test Methods For Evaluating Solid Waste; 3rd Edition; Nov. 1986

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Jerry Wheeler

Middlesboro Laboratory

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FAX: (606) 248-0044


September 28, 1999

TRC ENVIRONMENTAL CORPORATION
5 WATERSIDE CROSSING
WINDSOR, CT 06095
ACCOUNTS PAYABLE

**Sample identification by**
TRC ENVIRONMENTAL

SAMPLE BROUGHT IN
PG&E - LOGAN STATION
A GASOUS SLURRY LIME & FLY ASH
REACTOR SLURRY RUN 1
CODE:PG&E-L-OHM-1R GRAB

**Kind of sample reported to us** SLURRY LIME & FLY ASH

**Sample taken at**

**Sample taken by**

**Date sampled** August 11, 1999

**Date received** September 1, 1999

**Analysis report no.** 49-123044

| ANALYZED PARAMETER | CAS NO. | RESULT | LOQ | UNITS | METHODS | DATE/TIME/ANALYST |
|---|---|---|---|---|---|---|
| METALS-TOTAL BASIS | | | | | | |
| MERCURY (Hg) | 7439-97-6 | 0.19 | 0.010 | mg/L | SW7470 | 9/03/99 17:17 JC2 |

Method Reference: USEPA: Test Methods For Evaluating Solid Waste; 3rd Edition; Nov. 1986

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Jerry Wheeler

Middlesboro Laboratory

MEMBER ACIL

**COMMERCIAL TESTING & ENGINEERING CO.**
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RT. 2, BOX 162A
MIDDLESBORO, KY 40965
TEL: (606) 248-4205
FAX: (606) 248-0044

September 28, 1999

TRC ENVIRONMENTAL CORPORATION
5 WATERSIDE CROSSING
WINDSOR, CT 06095
ACCOUNTS PAYABLE

**Sample identification by**
TRC ENVIRONMENTAL

SAMPLE BROUGHT IN
PG&E - LOGAN STATION
A GASOUS SLURRY LIME & FLY ASH
REACTOR SLURRY RUN 1 D
CODE:PG&E-L-OHM-1RDUP GRAB

**Kind of sample reported to us** SLURRY LIME & FLY ASH

**Sample taken at**

**Sample taken by**

**Date sampled** August 11, 1999

**Date received** September 1, 1999

**Analysis report no.** 49-123045

| ANALYZED PARAMETER | CAS NO. | RESULT | LOQ | UNITS | METHODS | DATE/TIME/ANALYST |
|---|---|---|---|---|---|---|
| METALS-TOTAL BASIS | | | | | | |
| MERCURY (Hg) | 7439-97-6 | 0.16 | 0.010 | mg/L | SW7470 | 9/03/99 17:18 JC2 |

Method Reference: USEPA: Test Methods For Evaluating Solid Waste; 3rd Edition; Nov. 1986

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Jerry Wheeler
Middlesboro Laboratory

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September 28, 1999

TRC ENVIRONMENTAL CORPORATION
5 WATERSIDE CROSSING
WINDSOR, CT 06095
ACCOUNTS PAYABLE

**Sample identification by**
TRC ENVIRONMENTAL

SAMPLE BROUGHT IN
PG&E - LOGAN STATION
A GASOUS SLURRY LIME & FLY ASH
REACTOR SLURRY RUN 2
CODE:PG&E-L-OHM-2R GRAB

**Kind of sample reported to us** SLURRY LIME & FLY ASH

**Sample taken at**

**Sample taken by**

**Date sampled** August 11, 1999

**Date received** September 1, 1999

**Analysis report no.** 49-123046

| ANALYZED PARAMETER | CAS NO. | RESULT | LOQ | UNITS | METHODS | DATE/TIME/ANALYST |
|---|---|---|---|---|---|---|
| METALS-TOTAL BASIS | | | | | | |
| MERCURY (Hg) | 7439-97-6 | 0.18 | 0.010 | mg/L | SW7470 | 9/03/99 17:20 JC2 |

Method Reference: USEPA: Test Methods For Evaluating Solid Waste; 3rd Edition; Nov. 1986

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Jerry Wheeler

Middlesboro Laboratory

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# COMMERCIAL TESTING & ENGINEERING CO.

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FAX: (606) 248-0044


September 28, 1999

TRC ENVIRONMENTAL CORPORATION
5 WATERSIDE CROSSING
WINDSOR, CT 06095
ACCOUNTS PAYABLE

**Sample identification by**
TRC ENVIRONMENTAL

SAMPLE BROUGHT IN
PG&E - LOGAN STATION
A GASOUS SLURRY LIME & FLY ASH
REACTOR SLURRY RUN 3
CODE:PG&E-L-OHM-3R GRAB

**Kind of sample reported to us** SLURRY LIME & FLY ASH

**Sample taken at**

**Sample taken by**

**Date sampled** August 12, 1999

**Date received** September 1, 1999

**Analysis report no.** 49-123047

| ANALYZED PARAMETER | CAS NO. | RESULT | LOQ | UNITS | METHODS | DATE/TIME/ANALYST |
|---|---|---|---|---|---|---|
| METALS-TOTAL BASIS | | | | | | |
| MERCURY (Hg) | 7439-97-6 | 0.14 | 0.010 | mg/L | SW7470 | 9/03/99 17:21 JC2 |

Method Reference: USEPA: Test Methods For Evaluating Solid Waste; 3rd Edition; Nov. 1986

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Jerry Wheeler

Middlesboro Laboratory

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September 28, 1999

TRC ENVIRONMENTAL CORPORATION
5 WATERSIDE CROSSING
WINDSOR, CT 06095
ACCOUNTS PAYABLE

**Sample identification by**
TRC ENVIRONMENTAL

SAMPLE BROUGHT IN
PG&E - LOGAN STATION
AMMONIA
27.5% AMMONIA SOLUTION
RUNS 1,2,3
CODE:PG&E-L-OHM-1,2,3,-A GRAB

**Kind of sample reported to us** AMMONIA

**Sample taken at**

**Sample taken by**

**Date sampled** August 11, 1999

**Date received** September 1, 1999

**Analysis report no.** 49-123048

| ANALYZED PARAMETER | CAS NO. | RESULT | LOQ | UNITS | METHODS | DATE/TIME/ANALYST |
|---|---|---|---|---|---|---|
| METALS-TOTAL BASIS | | | | | | |
| MERCURY (Hg) | 7439-97-6 | ND | 0.002 | mg/L | SW7470 | 9/15/99 19:45 JC2* |

ND: Not detected at a concentration greater than the LOQ - Limit of Quantitation.

Method Reference: USEPA: Test Methods For Evaluating Solid Waste;
3rd Edition; Nov. 1986

*; Because of Matrix interference the Limit of Quantitation (LOQ) has been raised.

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Jerry Wheeler

Middlesboro Laboratory

MEMBER ACIL

Appendix E

# *APPENDIX E*

# *AUDIT DATA SHEETS*

**COMMERCIAL TESTING & ENGINEERING CO.**

**ROUTE 2, BOX 162-A**

**MIDDLESBORO, KENTUCKY 40965**

**FAX NO. (606) 248-0044**

**FAX TRANSMISSION COVER SHEET**

FROM: Jerry Wheeler

TO: Ed

COMPANY: TRC

FAX NO.: 978-453-4215

DATE: 11-22-99

NUMBER OF PAGES: 1
(Not including cover sheet)

If you do not receive all of these pages, please contact us immediately at (606) 248-4205.

Thank you!

MESSAGE:

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RT. 2, BOX 162A, MIDDLESBORO, KY 40965
TEL: (606) 248-4205
FAX: (606) 248-0044

NIST Standard Results for Mercury
Nist 1630A (0.106) ± .023

| Date | Lab Results |
|---|---|
| 9/3/99 | 0.11 |
| 9/15/99 | 0.09 |
| 9/22/99 | 0.09 |
| 9/28/99 | 0.11 |
| 10/8/99 | 0.10 |
| 10/12/99 | 0.09 |
| 10/20/99 | 0.10 |

Mercury Standard used NIST 1630 A
Standard Results (0.106) ± .023

Test run Results.

| Date | Results |
|---|---|
| 9-3-99 | 0.11 |
| 9-15-99 | 0.09 |
| 9-22-99 | 0.09 |
| 9-28-99 | 0.11 |
| 10-8-99 | 0.10 |
| 10-12-99 | 0.09 |
| 10-20-99 | 0.10 |

**PARAMETER REPORT: Calorific Value, Dry BTU/lb**

6H0035: High Rank Coal - 60 Mesh
Sample ID: 1

Customer No: 004900

Issued Date: 10/20/99
mm/dd/yy

COMMERCIAL TESTING & ENGINEERING
Middlesboro

## STATISTICS

| Lab Value | |
|---|---|
| Mean | SD |
| 15078 | 16.3 |

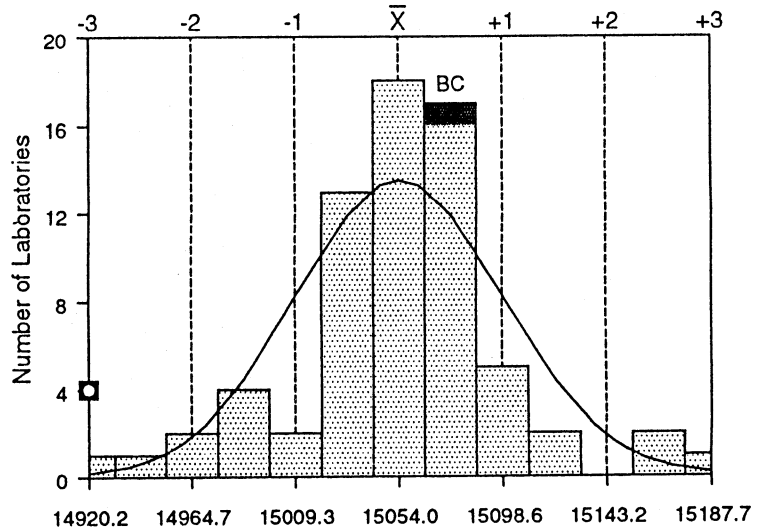
| Group Value | | |
|---|---|---|
| Mean | SD | n |
| 15054 | 44.6 | 68 |

| Accuracy | Laboratory | Ref. Standard |
|---|---|---|
| Mean Difference | 24.0 | within +/- 89.2 |
| Standard Score | 0.52 | within +/- 2.0 |
| Relative Difference(%) | 0.159 | within +/- 0.592 |
| Precision Ratio | 1.0 | < 2.8 |

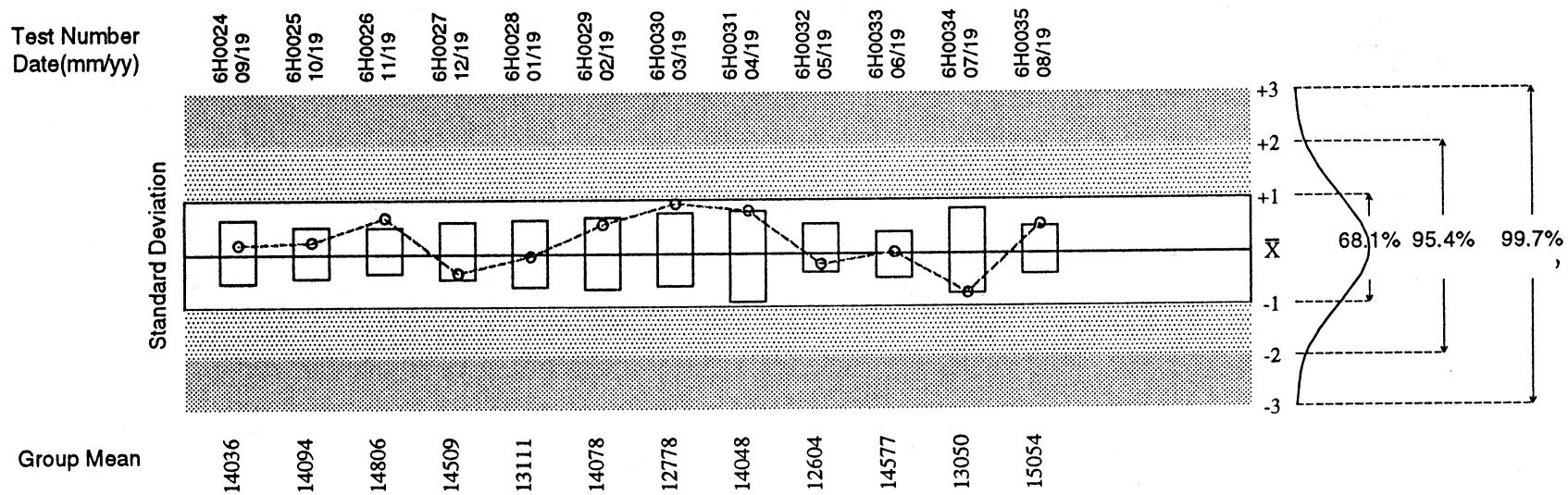
Precision Estimates

| Precision Factors | Group |
|---|---|
| Repeatability (r) | 45.03358 |
| Reproducibility (R) | 128.9395 |
| Confidence Interval | 21.6023 |

## FREQUENCY DISTRIBUTION




## HISTORICAL PERFORMANCE

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F-355

**PARAMETER REPORT: Calorific Value, As Rec'd BTU/lb**

6H0035: High Rank Coal - 60 Mesh
Sample ID: 1

Customer No: 004900

Issued Date: 10/20/99
mm/dd/yy

COMMERCIAL TESTING & ENGINEERING
Middlesboro

## STATISTICS

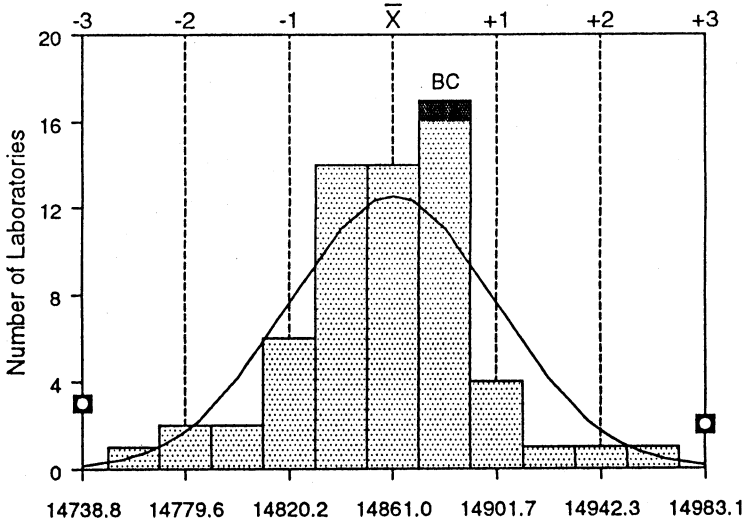
| Lab Value | |
|---|---|
| Mean | SD |
| 14888 | 21.9 |

| Group Value | | |
|---|---|---|
| Mean | SD | n |
| 14861 | 40.7 | 64 |

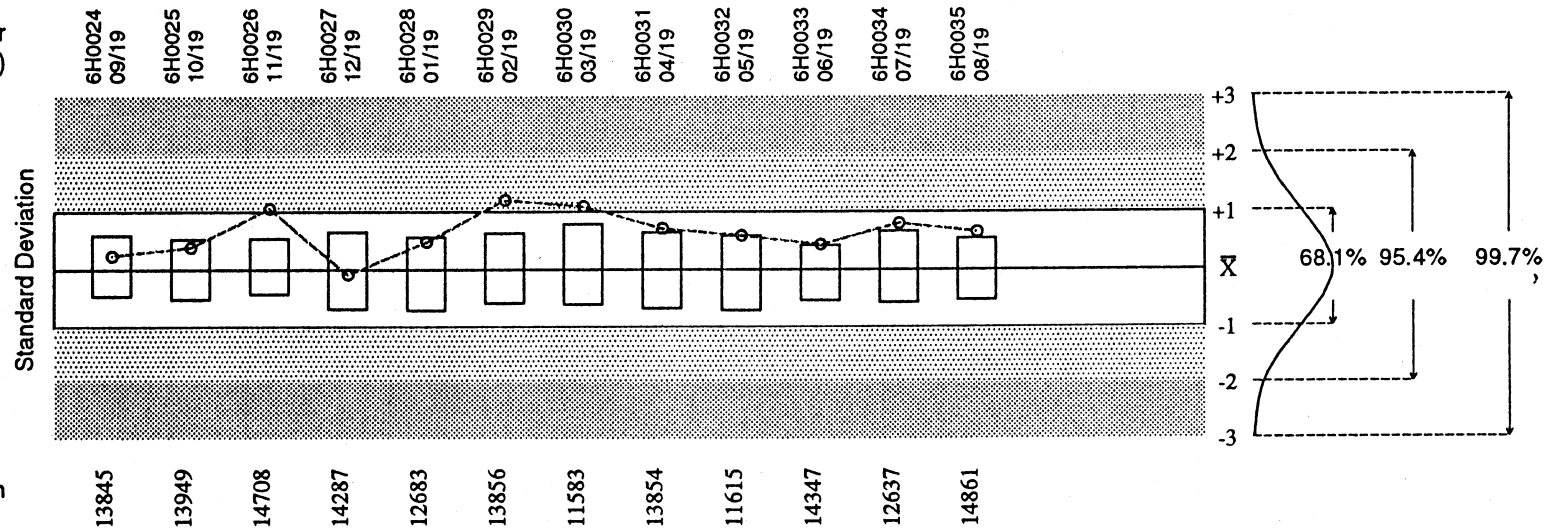
| Accuracy | Precision Estimates: Laboratory | Precision Estimates: Ref. Standard |
|---|---|---|
| Mean Difference | 27.0 | within +/- 81.4 |
| Standard Score | 0.64 | within +/- 2.0 |
| Relative Difference(%) | 0.181 | within +/- 0.547 |
| Precision Ratio | 1.3 | < 2.8 |

| Precision Factors | Group |
|---|---|
| Repeatability (r) | 43.80387 |
| Reproducibility (R) | 117.9812 |
| Confidence Interval | 20.3118 |

## FREQUENCY DISTRIBUTION




## HISTORICAL PERFORMANCE

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## PARAMETER REPORT: Sulfur % by wt

6H0035: High Rank Coal - 60 Mesh
Sample ID: 1

Customer No: 004900

Issued Date: 10/20/99
mm/dd/yy

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Middlesboro

### STATISTICS

| Lab Value | |
|---|---|
| Mean | SD |
| 0.835 | 0.0071 |

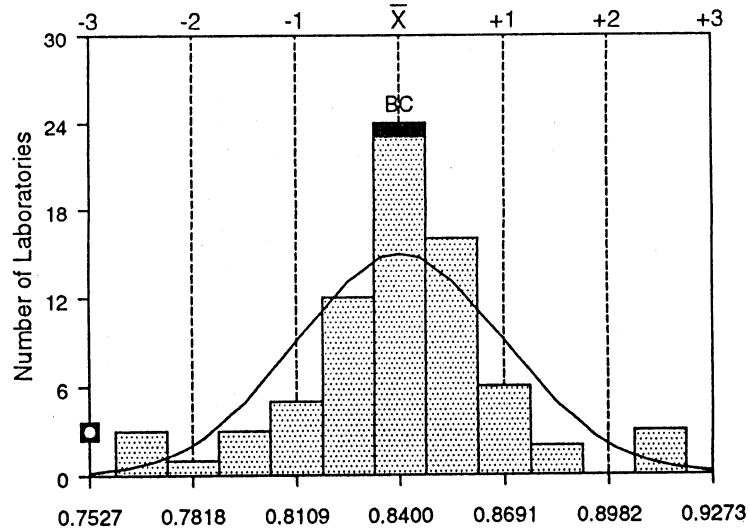
| Group Value | | |
|---|---|---|
| Mean | SD | n |
| 0.840 | 0.0291 | 74 |

| Accuracy | Laboratory | Ref. Standard |
|---|---|---|
| Mean Difference | -0.00500 | within +/- 0.0582 |
| Standard Score | -0.17 | within +/- 2.0 |
| Relative Difference(%) | -0.595 | within +/- 6.9 |
| Precision Ratio | 0.759 | < 2.8 |

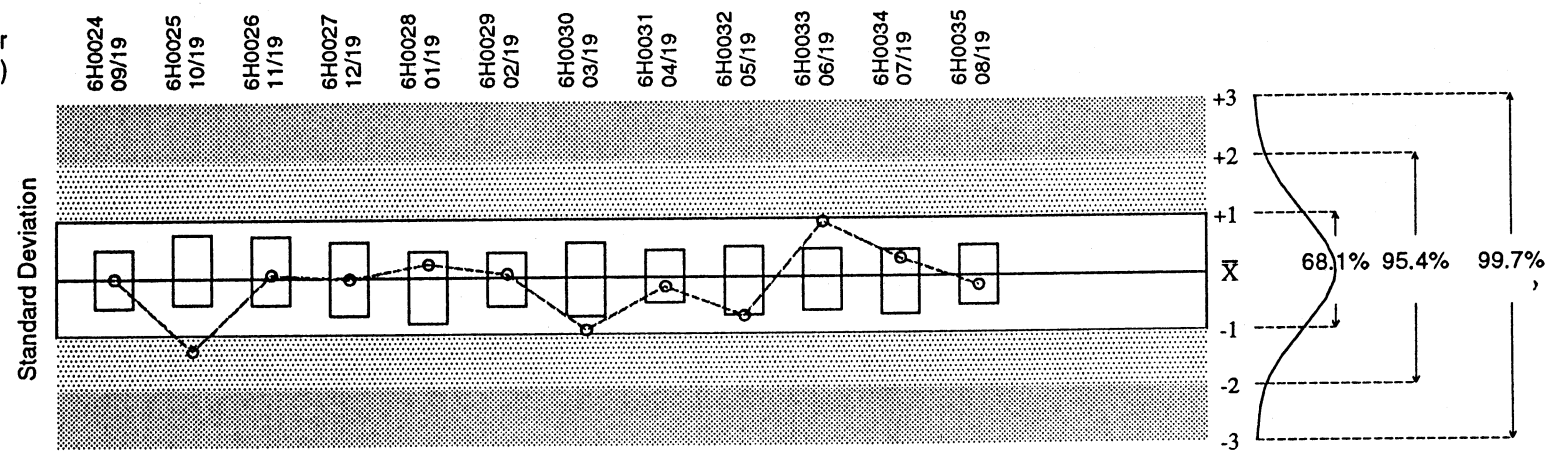
Precision Estimates

| Precision Factors | Group |
|---|---|
| Repeatability (r) | 0.02616 |
| Reproducibility (R) | 0.08369 |
| Confidence Interval | 0.0135 |

### FREQUENCY DISTRIBUTION




### HISTORICAL PERFORMANCE

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## PARAMETER REPORT: Ash % by wt

6H0035: High Rank Coal - 60 Mesh
Sample ID: 1

Customer No: 004900

Issued Date: 10/20/99
mm/dd/yy

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Middlesboro

### STATISTICS

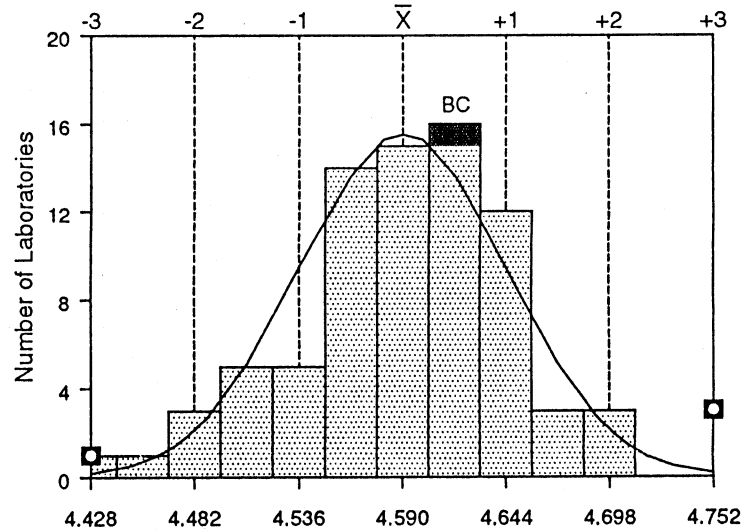
| Lab Value | |
|---|---|
| Mean | SD |
| 4.63 | 0.035 |

| Group Value | | |
|---|---|---|
| Mean | SD | n |
| 4.59 | 0.054 | 77 |

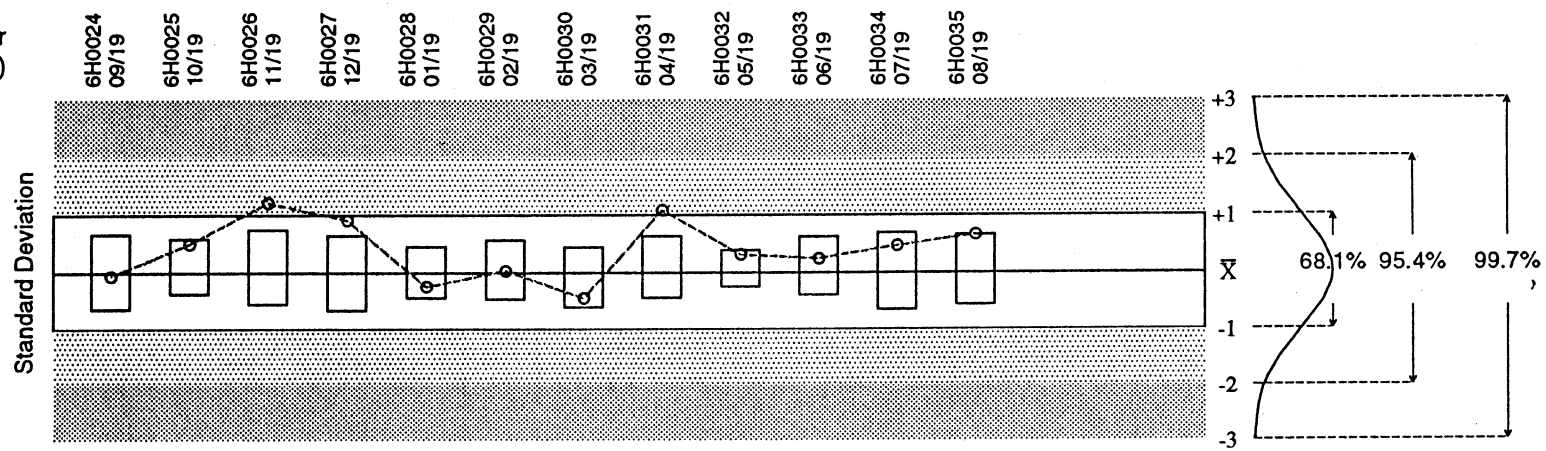
| Accuracy | Laboratory | Ref. Standard |
|---|---|---|
| Mean Difference | 0.0400 | within +/- 0.108 |
| Standard Score | 0.65 | within +/- 2.0 |
| Relative Difference(%) | 0.871 | within +/- 2.3 |
| Precision Ratio | 1.0 | < 2.8 |

| Precision Factors | Group |
|---|---|
| Repeatability (r) | 0.08971 |
| Reproducibility (R) | 0.16359 |
| Confidence Interval | 0.0244 |

### FREQUENCY DISTRIBUTION




### HISTORICAL PERFORMANCE




| Test Number | Group Mean |
|---|---|
| 6H0024 09/19 | 9.00 |
| 6H0025 10/19 | 6.82 |
| 6H0026 11/19 | 5.66 |
| 6H0027 12/19 | 5.96 |
| 6H0028 01/19 | 11.14 |
| 6H0029 02/19 | 7.17 |
| 6H0030 03/19 | 9.77 |
| 6H0031 04/19 | 8.99 |
| 6H0032 05/19 | 12.20 |
| 6H0033 06/19 | 5.32 |
| 6H0034 07/19 | 11.11 |
| 6H0035 08/19 | 4.59 |

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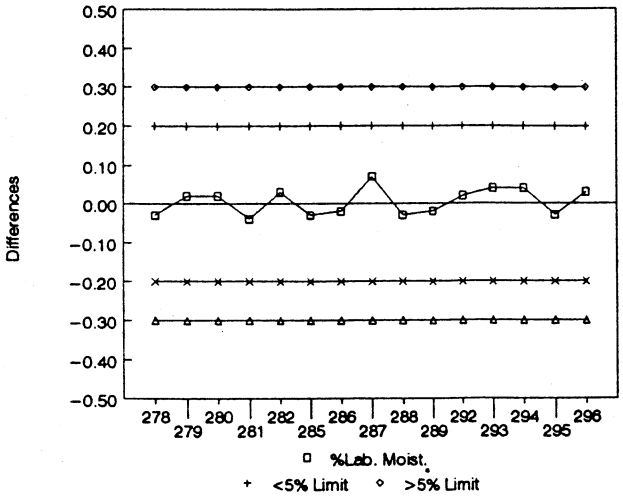
# Daily 60 Mesh Replicate Analysis Differences
## 04900 – Middlesboro, KY

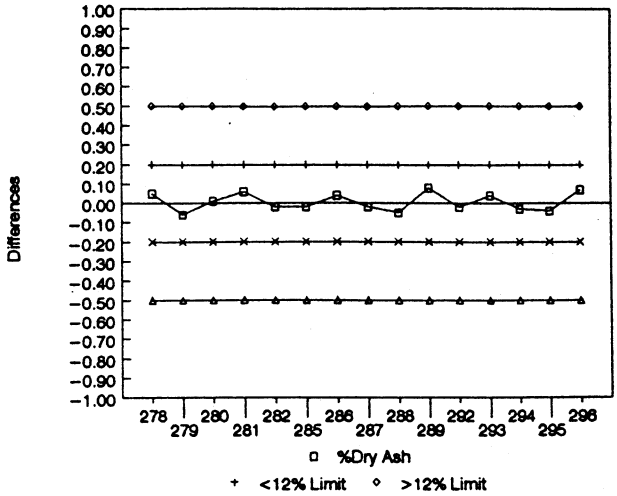
### Daily 60 Mesh – %Lab. Moisture

Actual Difference



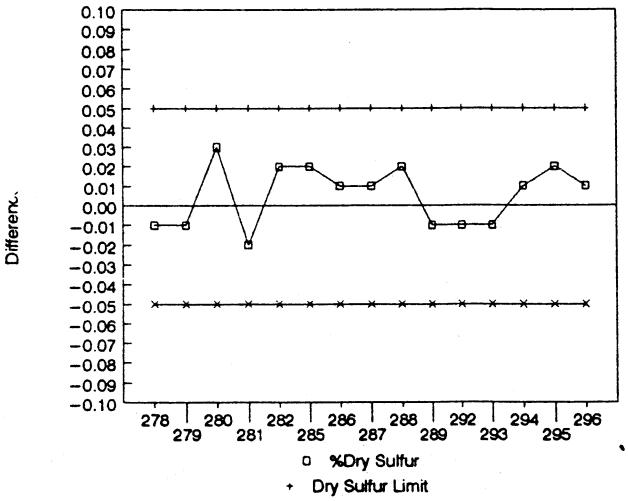

### Daily 60 Mesh – %Dry Ash

Actual Difference



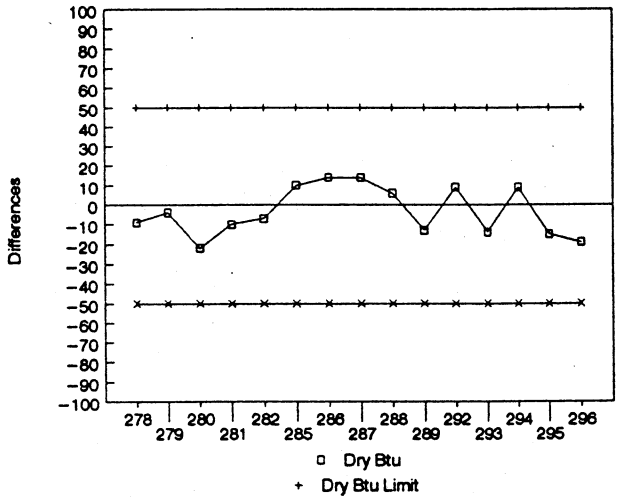

### Daily 60 Mesh – %Dry Sulfur

Actual Difference



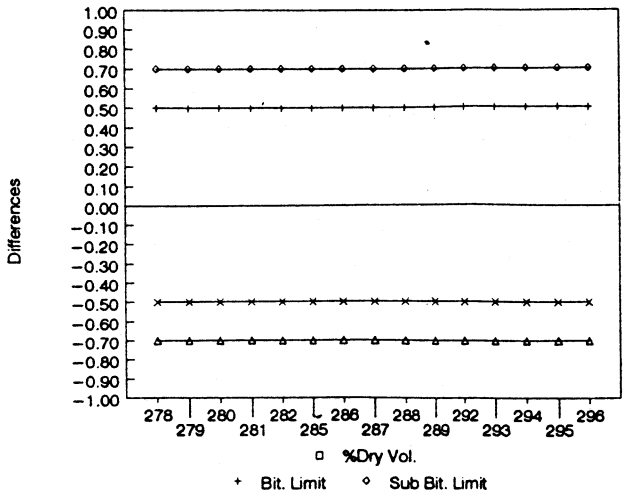

### Daily 60 Mesh – Dry Btu/lb

Actual Difference



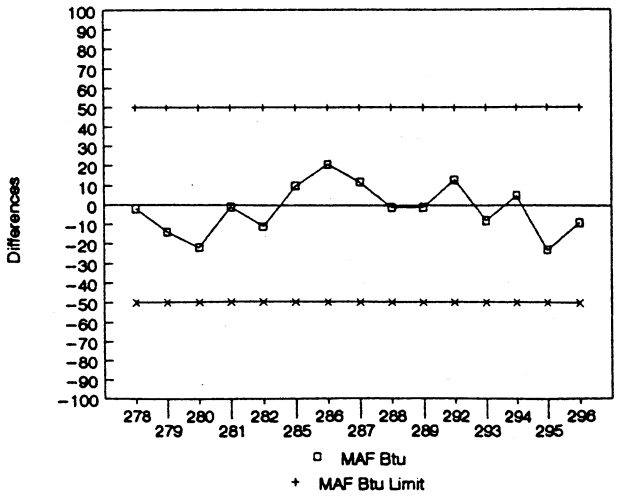

### Daily 60 Mesh – %Dry Volatile

Actual Difference




### Daily 60 Mesh – MAF Btu/lb

Actual Difference

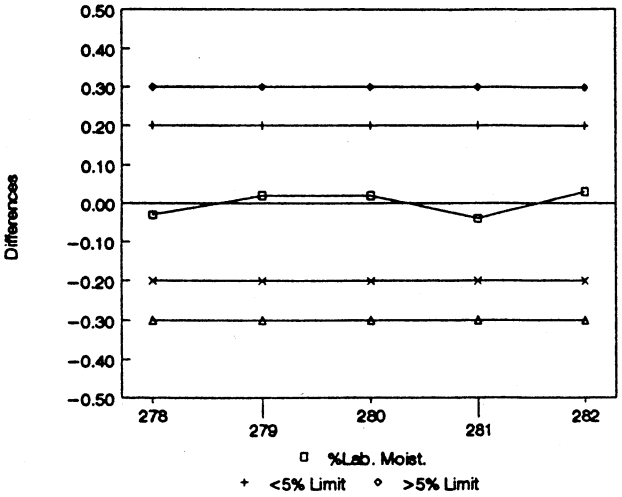



From: October 5, 1998 To: October 23, 1998

# Daily 60 Mesh Replicate Analysis Differences
## 04900 – Middlesboro, KY

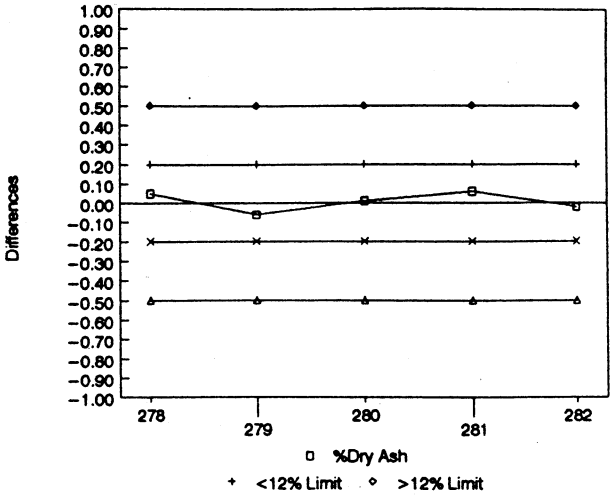
### Daily 60 Mesh – %Lab. Moisture

Actual Difference



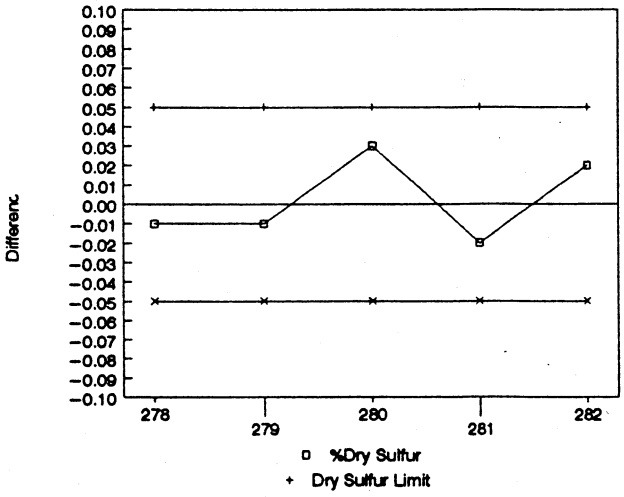

### Daily 60 Mesh – %Dry Ash

Actual Difference



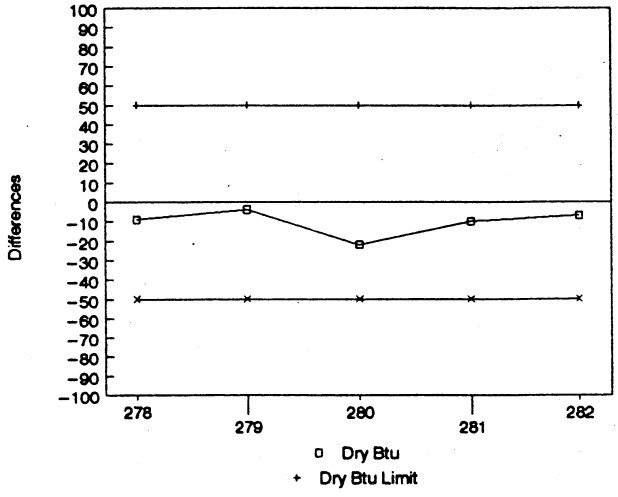

### Daily 60 Mesh – %Dry Sulfur

Actual Difference



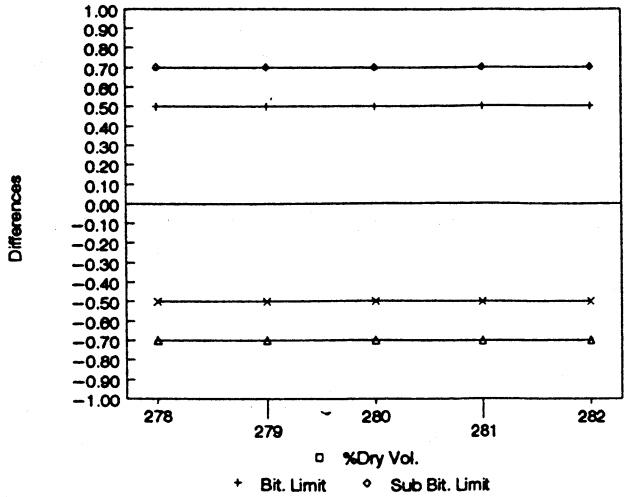

### Daily 60 Mesh – Dry Btu/lb

Actual Difference



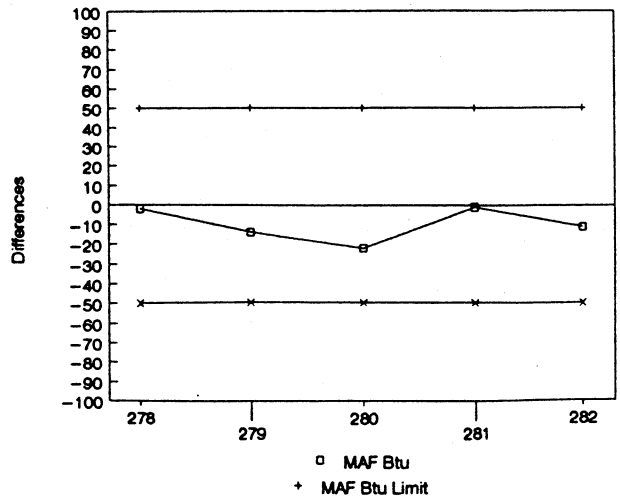

### Daily 60 Mesh – %Dry Volatile

Actual Difference




### Daily 60 Mesh – MAF Btu/lb

Actual Difference

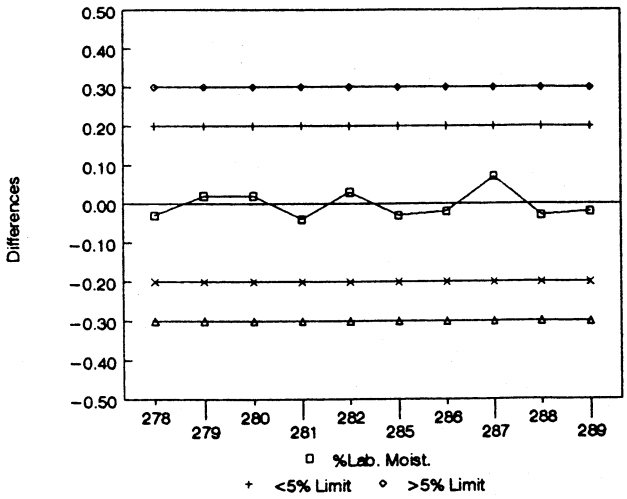



From: October 5, 1998 To: October 9, 1998

# Daily 60 Mesh Replicate Analysis Differences
## 04900 – Middlesboro, KY

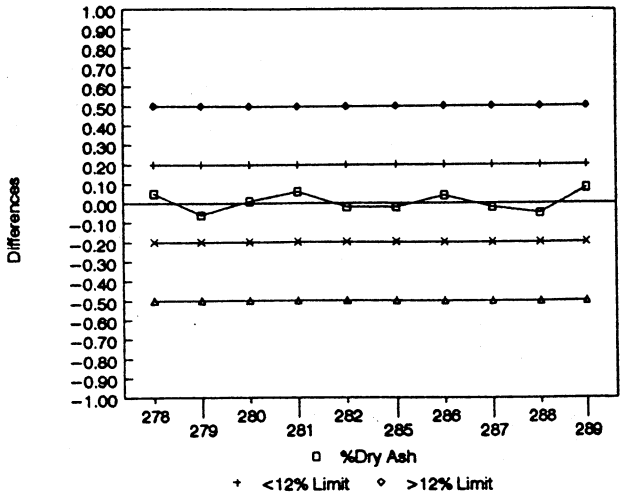
### Daily 60 Mesh – %Lab. Moisture

Actual Difference



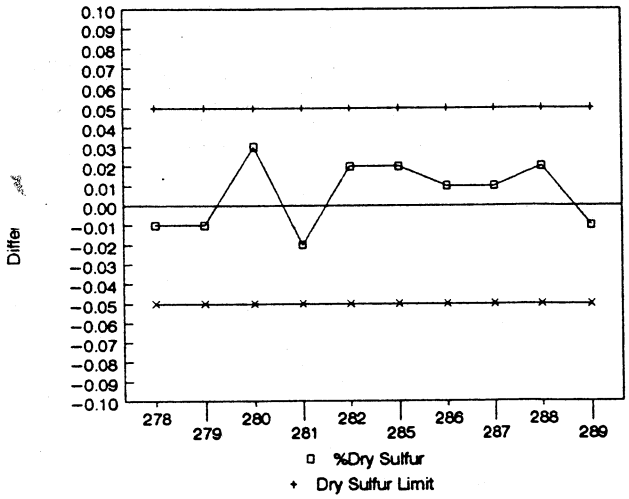

### Daily 60 Mesh – %Dry Ash

Actual Difference



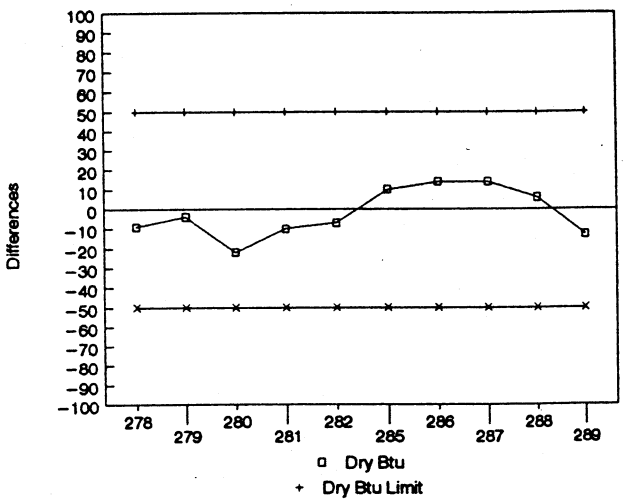

### Daily 60 Mesh – %Dry Sulfur

Actual Difference



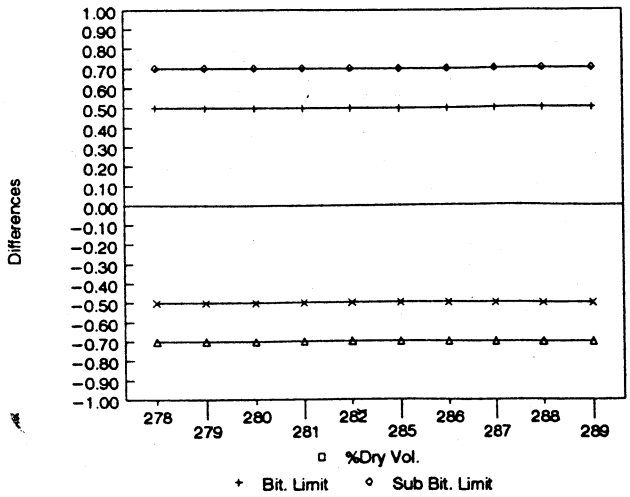

### Daily 60 Mesh – Dry Btu/lb

Actual Difference



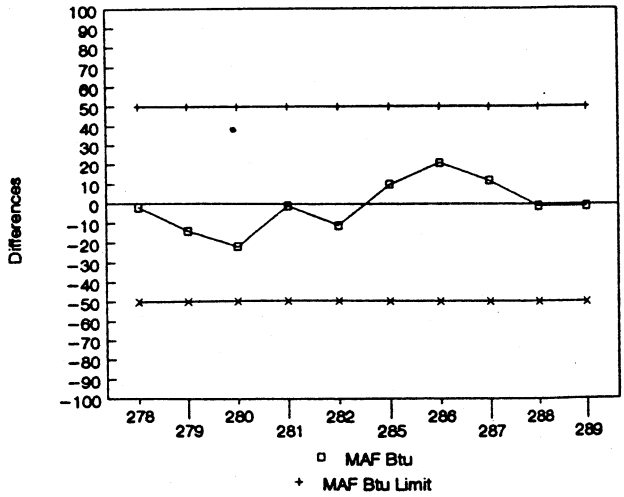

### Daily 60 Mesh – %Dry Volatile

Actual Difference




### Daily 60 Mesh – MAF Btu/lb

Actual Difference

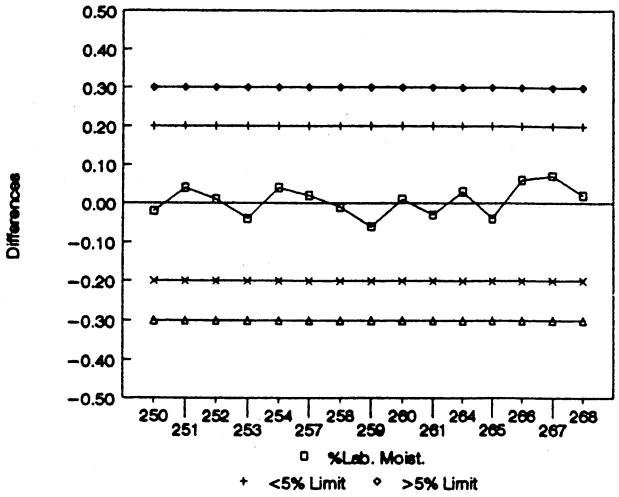



From: October 5, 1998 To: October 16, 1998

# Daily 60 Mesh Replicate Analysis Differences
## 04900 – Middlesboro, KY

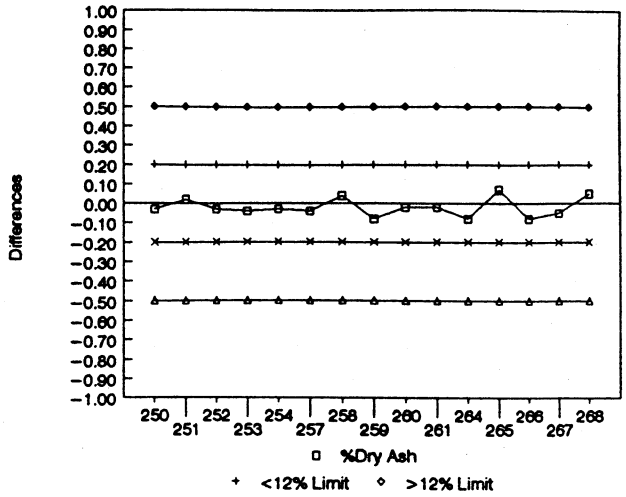
### Daily 60 Mesh – %Lab. Moisture

Actual Difference



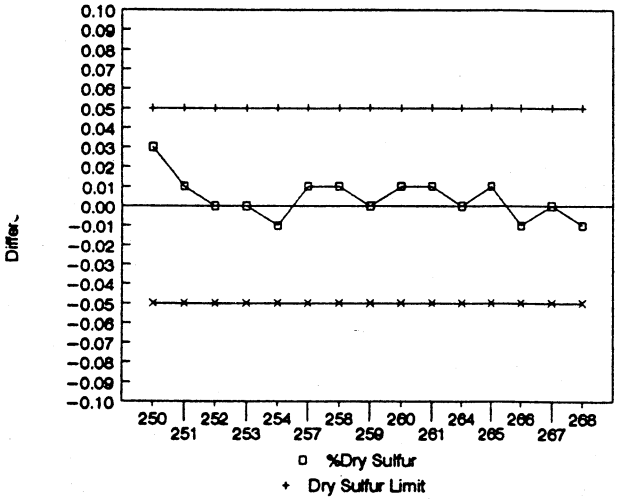

### Daily 60 Mesh – %Dry Ash

Actual Difference



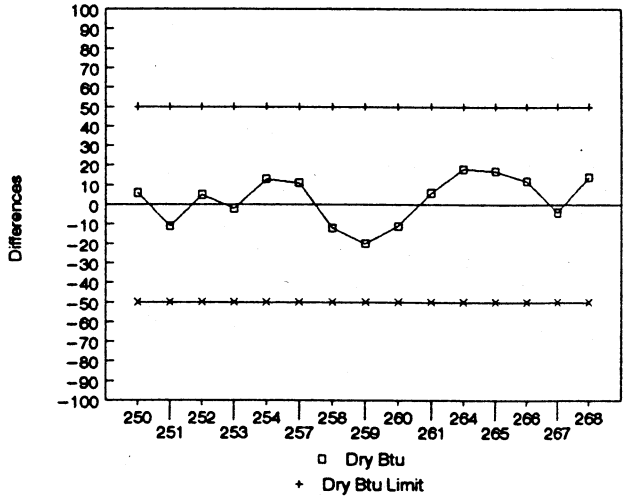

### Daily 60 Mesh – %Dry Sulfur

Actual Difference



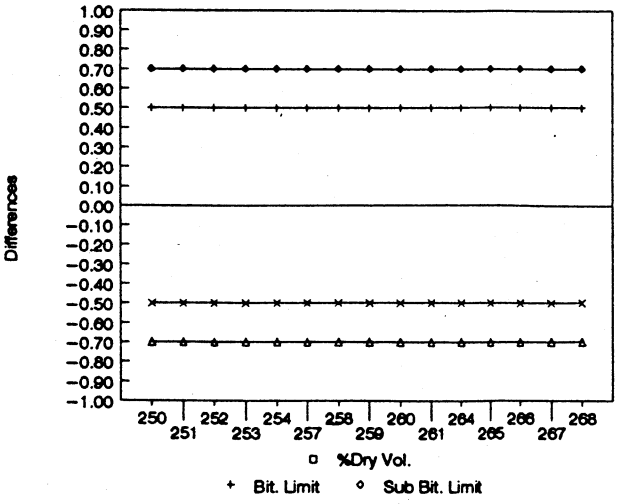

### Daily 60 Mesh – Dry Btu/lb

Actual Difference



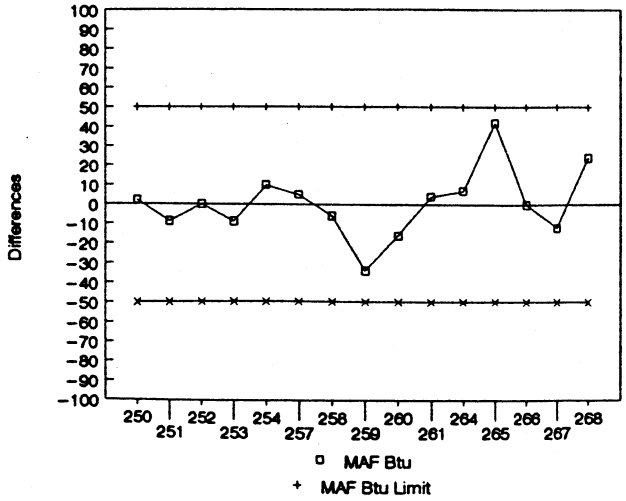

### Daily 60 Mesh – %Dry Volatile

Actual Difference




### Daily 60 Mesh – MAF Btu/lb

Actual Difference

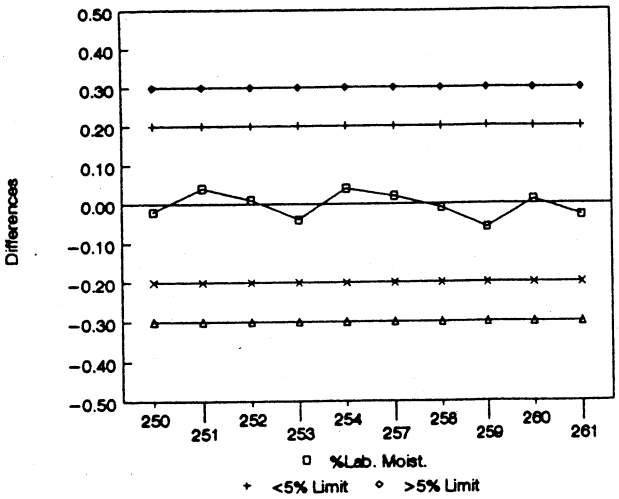



From: September 7, 1998 To: September 25, 1998

# Daily 60 Mesh Replicate Analysis Differences
## 04900 – Middlesboro, KY

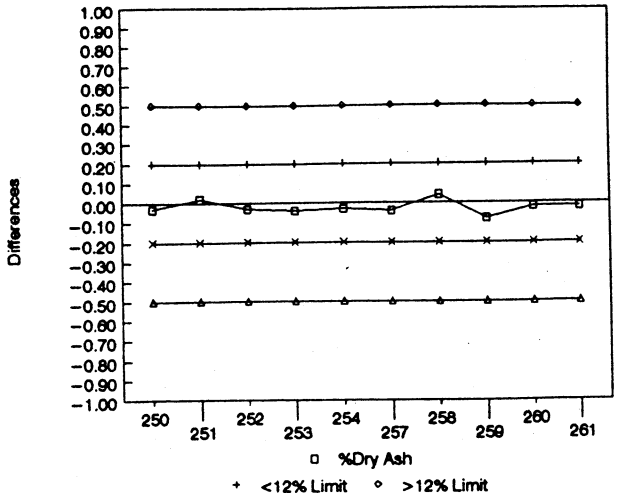
### Daily 60 Mesh – %Lab. Moisture

Actual Difference



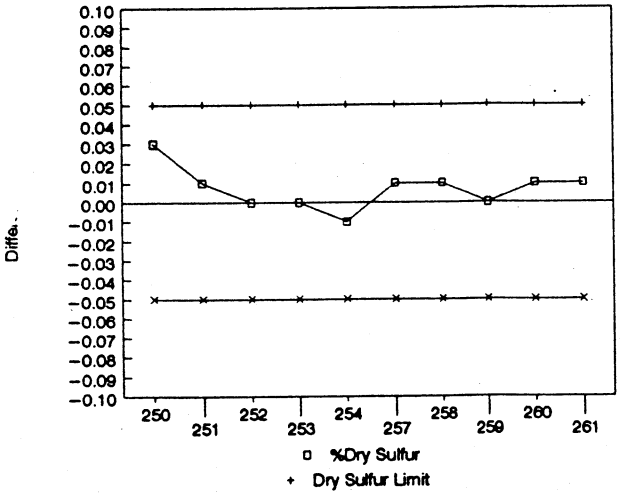

### Daily 60 Mesh – %Dry Ash

Actual Difference



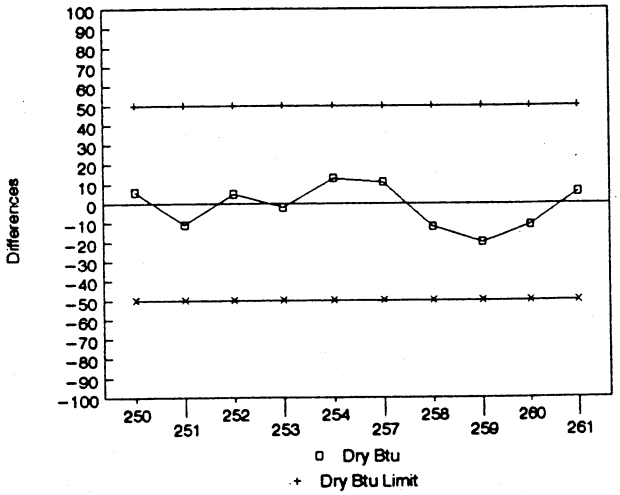

### Daily 60 Mesh – %Dry Sulfur

Actual Difference



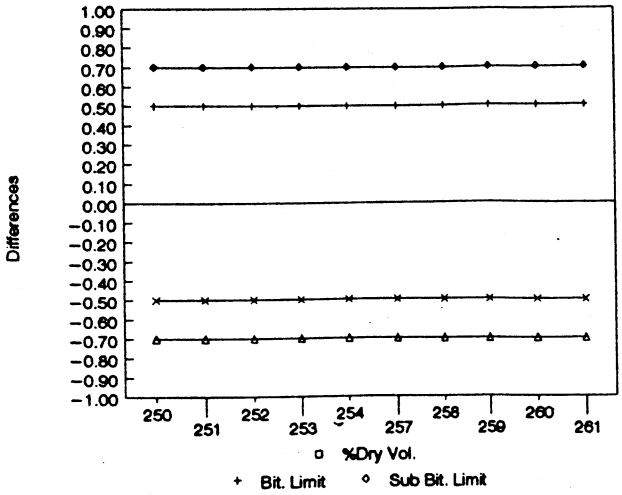

### Daily 60 Mesh – Dry Btu/lb

Actual Difference



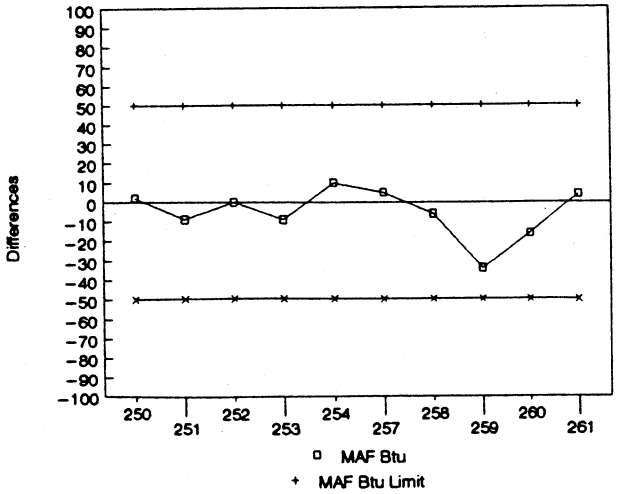

### Daily 60 Mesh – %Dry Volatile

Actual Difference




### Daily 60 Mesh – MAF Btu/lb

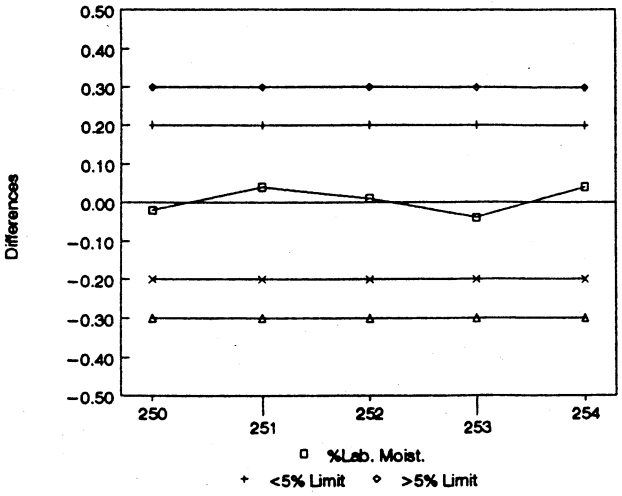
Actual Difference



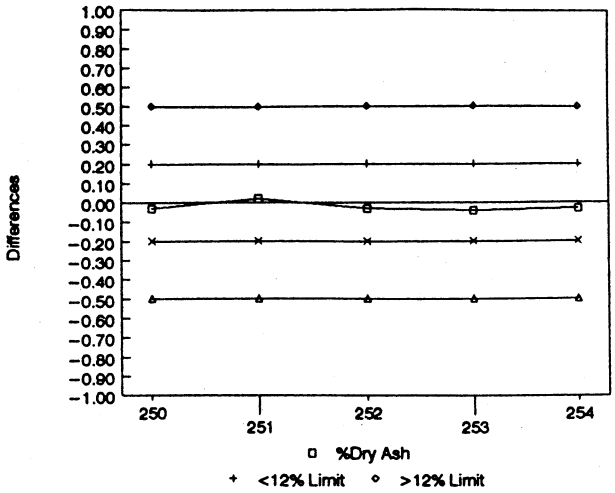

From: September 7, 1998 To: September 18, 1998

# Daily 60 Mesh Replicate Analysis Differences
## 04900 – Middlesboro, KY

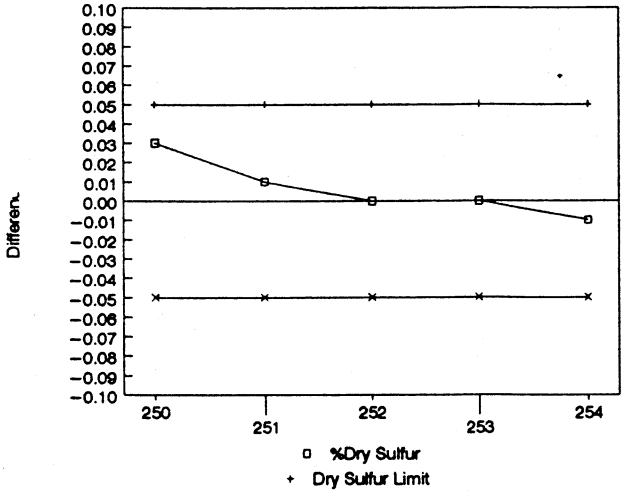
### Daily 60 Mesh – %Lab. Moisture
Actual Difference



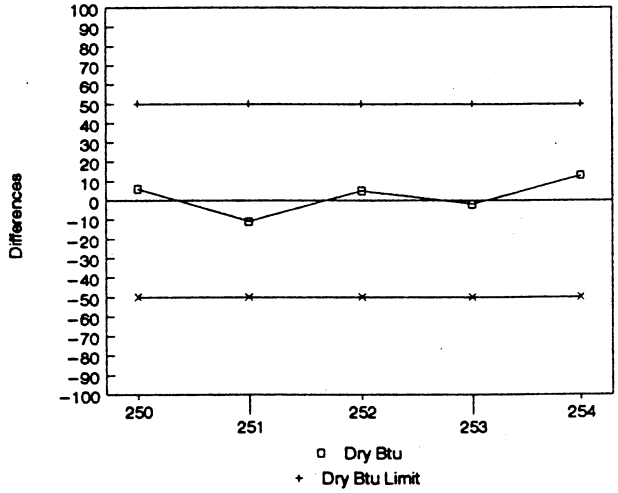

### Daily 60 Mesh – %Dry Ash
Actual Difference



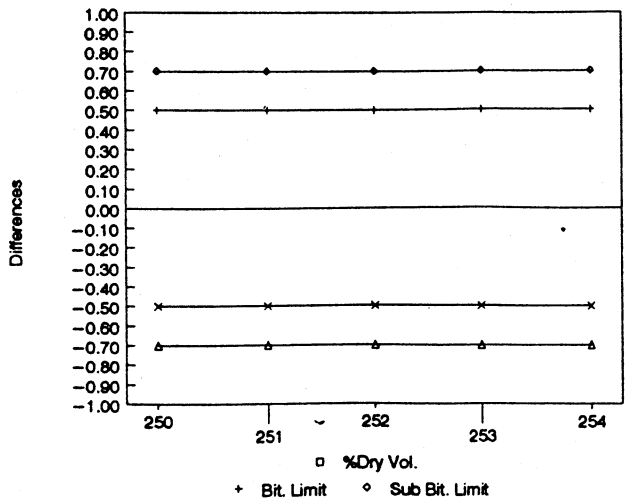

### Daily 60 Mesh – %Dry Sulfur
Actual Difference



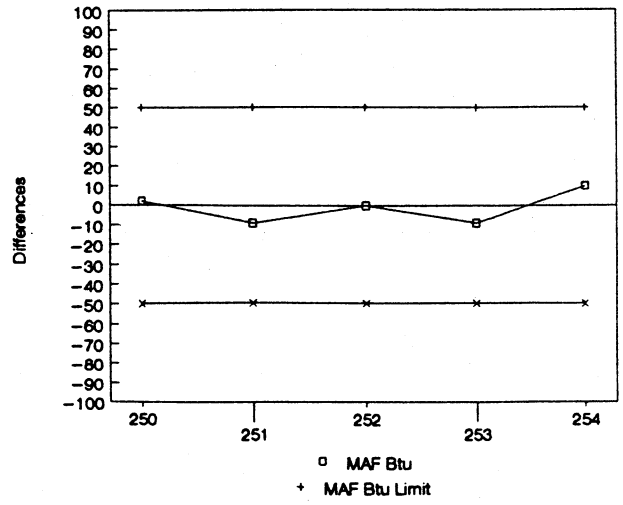

### Daily 60 Mesh – Dry Btu/lb
Actual Difference




### Daily 60 Mesh – %Dry Volatile
Actual Difference




### Daily 60 Mesh – MAF Btu/lb
Actual Difference




From: September 7, 1998 To: September 11, 1998

# Appendix F

# *APPENDIX G*

# *ADDITIONAL INFORMATION*

# EPA Testing for Mercury
# PG&E Generating Company - Logan Generating Plant
# August 11th & 12th, 1999

## Run #3

Start: 8/12/99 8:35
End: 8/12/99 13:05

| Point ID | Point Name | Units | Average | Std Dev | Min | Max | # of points archived |
|---|---|---|---|---|---|---|---|
| JLST018A | COAL FEEDER A1 FLOW RATE | TPH | 29.24 | 8.42 | 18.78 | 39.99 | 522 |
| JLST018B | COAL FEEDER A2 FLOW RATE | TPH | 10.76 | 10.41 | - | 22.80 | 110 |
| JLST056A | COAL FEEDER B1 FLOW RATE | TPH | 20.10 | 0.62 | 18.80 | 21.51 | 93 |
| JLST056B | COAL FEEDER B2 FLOW RATE | TPH | 20.38 | 0.52 | 19.09 | 22.27 | 533 |
| JPFT138 | ATOMIZER A SLURRY FLOW | GPM | (0.00) | - | (0.00) | (0.00) | No Data/Erro |
| JPFT168 | ATOMIZER B SLURRY FLOW | GPM | 31.64 | 7.25 | 5.94 | 47.46 | 216 |
| JPFT198 | ATOMIZER C SLURRY FLOW | GPM | 30.63 | 1.47 | 26.89 | 34.33 | 381 |
| JPFT228 | ATOMIZER D SLURRY FLOW | GPM | 0.00 | 0.00 | (0.00) | 0.01 | 1 |
| JPFT258 | ATOMIZER E SLURRY FLOW | GPM | 38.93 | 0.73 | 37.11 | 41.24 | 362 |
| JPFT288 | ATOMIZER F SLURRY FLOW | GPM | 47.61 | 2.87 | 42.41 | 54.10 | 28 |
| MAJT002 | GENERATOR WATT | MW | 232.98 | 4.01 | 221.77 | 239.35 | 13 |
| ABFI001C | MAIN STEAM FLOW (1STG PRES | KPPH | 1,586.97 | 30.54 | 1,502.76 | 1,624.54 | 13 |
| ABTE009 | MAIN STEAM HEADER TEMPERAT | DEGF | 1,002.12 | 2.52 | 991.91 | 1,011.07 | 66 |
| ABPT009 | MAIN STEAM HEADER PRESSURE | PSIG | 2,430.57 | 27.45 | 2,396.60 | 2,498.08 | 21 |
| CV139 | HOT REHEAT FLOW | KLB/H | 1,401.69 | 35.75 | 1,331.95 | 1,509.93 | 30 |
| AEFI010A | FDWTR FLOW A TO ECON - COM | KPPH | 1,519.91 | 52.62 | 1,439.69 | 1,680.79 | 53 |
| AEFI010B | FDWTR FLOW B TO ECON - COM | KPPH | 1,521.67 | 51.41 | 1,454.58 | 1,684.42 | 41 |
| JPPT001A | FURNACE PRESSURE XMTR | INWC | (0.47) | 0.20 | (1.34) | 0.37 | 1207 |
| JPPT001B | FURNACE PRESSURE XMTR | INWC | (0.24) | 0.20 | (0.87) | 0.64 | 1235 |
| JPPT001C | FURNACE PRESSURE XMTR | INWC | (0.48) | 0.19 | (1.26) | 0.25 | 1103 |
| BAPT016 | WINDBOX TO FURNACE DIFF (L | INWC | 1.98 | 0.22 | 1.08 | 2.75 | 448 |
| JRTE020A | SCR INLET TEMPERATURE A | DEGF | 694.36 | 5.87 | 681.98 | 703.72 | 9 |
| JRTE020B | SCR INLET TEMPERATURE B | DEGF | 690.21 | 6.10 | 679.01 | 699.43 | 8 |
| JRTE020C | SCR INLET TEMPERATURE C | DEGF | 694.11 | 6.34 | 682.00 | 704.32 | 10 |
| JPTE012A | AIR HEATER FLUE GAS OUT TE | DEGF | 284.02 | 1.64 | 281.20 | 288.12 | 4 |
| JPTE012B | AIR HEATER FLUE GAS OUT TE | DEGF | 291.76 | 2.07 | 288.31 | 297.11 | 4 |
| JPTE012C | AIR HEATER FLUE GAS OUT TE | DEGF | 255.43 | 1.94 | 251.08 | 259.80 | 4 |
| | Mills I/S | | 2 | | | | |
| | Burners I/S | | 12 | | | | |
| BAFI001A | TOTAL AIR FLOW | KPPH | 1,698.02 | 28.48 | 1,614.01 | 1,737.34 | 41 |
| JPAT008A | FLUE GAS O2 ANALYZER | PCT | 2.61 | 0.23 | 1.83 | 3.30 | 211 |
| JPAT008B | FLUE GAS O2 ANALYZER | PCT | 2.71 | 0.22 | 2.08 | 3.42 | 177 |
| REAY006 | O2 MONITOR CEMS OUTPUT | PCT | 3.80 | 0.13 | 3.61 | 4.05 | 2 |
| REAY012 | CEMS STACK DRY O2 | PCT | 4.52 | 0.17 | 4.10 | 5.10 | 130 |
| REAY004 | CO MONITOR CEMS OUTPUT | PPM | 62.17 | 25.82 | 17.84 | 146.29 | 1160 |
| JPTE504 | STACK FLUE GAS TEMPERATURE | DEG F | 190.19 | 0.91 | 189.26 | 192.64 | 3 |
| JPTT031 | REACTOR A INLET TEMP | DEG F | 270.14 | 2.82 | 265.57 | 277.58 | 39 |
| JPTT033 | REACTOR B INLET TEMP | DEG F | 298.04 | 3.24 | 292.72 | 305.91 | 64 |
| JPTT032 | REACTOR A OUTLET TEMP | DEG F | 171.45 | 6.54 | 150.99 | 198.46 | 212 |
| JPTT034 | REACTOR B OUTLET TEMP | DEG F | 170.92 | 0.91 | 168.28 | 173.94 | 13 |
| JPTT043 | FABRIC FILTER INLET TEMP | DEG F | 171.33 | 5.30 | 155.09 | 193.48 | 192 |
| JPTT093 | BAGHOUSE OUTLET FLUE GAS T | DEG F | 171.00 | 1.63 | 169.15 | 176.97 | 5 |
| JPPT051 | FAB FILTER DIFF. PRES RAW | INWC | | | | | |
| | Baghouse DP | Tag not found: -5 | | | | | |
| JRFT003 | AQ AMMONIA INLET FLOW | GPH | 76.59 | 6.61 | 54.67 | 89.08 | 326 |

# EPA Testing for Mercury
## PG&E Generating Company - Logan Generating Plant
## August 11th & 12th, 1999

**Run #2**

Start: 8/11/99 16:15
End: 8/11/99 19:40

| Point ID | Point Name | Units | Average | Std Dev | Min | Max | # of points archived |
|---|---|---|---|---|---|---|---|
| JLST018A | COAL FEEDER A1 FLOW RATE | TPH | 21.28 | 0.39 | 20.02 | 22.59 | 246 |
| JLST018B | COAL FEEDER A2 FLOW RATE | TPH | 21.39 | 0.35 | 20.55 | 22.26 | 119 |
| JLST056A | COAL FEEDER B1 FLOW RATE | TPH | 20.38 | 0.25 | 19.59 | 21.12 | 89 |
| JLST056B | COAL FEEDER B2 FLOW RATE | TPH | 21.06 | 0.35 | 19.88 | 22.26 | 350 |
| JPFT138 | ATOMIZER A SLURRY FLOW | GPM | (0.00) | - | (0.00) | (0.00) | No Data/Erro |
| JPFT168 | ATOMIZER B SLURRY FLOW | GPM | 26.70 | 1.03 | 21.49 | 29.54 | 47 |
| JPFT198 | ATOMIZER C SLURRY FLOW | GPM | 26.60 | 1.37 | 20.84 | 30.29 | 289 |
| JPFT228 | ATOMIZER D SLURRY FLOW | GPM | 32.17 | 0.47 | 30.97 | 33.38 | 77 |
| JPFT258 | ATOMIZER E SLURRY FLOW | GPM | 28.39 | 0.84 | 26.32 | 30.86 | 273 |
| JPFT288 | ATOMIZER F SLURRY FLOW | GPM | 34.69 | 0.53 | 33.27 | 36.06 | 32 |
| MAJT002 | GENERATOR WATT | MW | 239.03 | 1.64 | 236.46 | 241.92 | 6 |
| ABFI001C | MAIN STEAM FLOW (1STG PRES | KPPH | 1,629.93 | 5.71 | 1,619.45 | 1,642.07 | 4 |
| ABTE009 | MAIN STEAM HEADER TEMPERAT | DEGF | 1,002.34 | 2.54 | 994.26 | 1,009.20 | 45 |
| ABPT009 | MAIN STEAM HEADER PRESSURE | PSIG | 2,477.59 | 9.49 | 2,458.03 | 2,503.42 | 21 |
| CV139 | HOT REHEAT FLOW | KLB/H | 1,430.45 | 16.58 | 1,374.98 | 1,482.83 | 26 |
| AEFI010A | FDWTR FLOW A TO ECON - COM | KPPH | 1,526.05 | 41.82 | 1,430.57 | 1,650.20 | 49 |
| AEFI010B | FDWTR FLOW B TO ECON - COM | KPPH | 1,527.93 | 40.71 | 1,437.11 | 1,637.12 | 41 |
| JPPT001A | FURNACE PRESSURE XMTR | INWC | (0.45) | 0.22 | (1.47) | 0.88 | 939 |
| JPPT001B | FURNACE PRESSURE XMTR | INWC | (0.20) | 0.22 | (1.18) | 1.14 | 960 |
| JPPT001C | FURNACE PRESSURE XMTR | INWC | (0.47) | 0.20 | (1.45) | 0.74 | 821 |
| BAPT016 | WINDBOX TO FURNACE DIFF (L | INWC | 2.12 | 0.19 | 1.37 | 3.15 | 337 |
| JRTE020A | SCR INLET TEMPERATURE A | DEGF | 698.68 | 0.94 | 696.99 | 700.99 | 4 |
| JRTE020B | SCR INLET TEMPERATURE B | DEGF | 693.44 | 1.43 | 690.00 | 696.29 | 6 |
| JRTE020C | SCR INLET TEMPERATURE C | DEGF | 700.01 | 2.03 | 694.99 | 702.97 | 5 |
| JPTE012A | AIR HEATER FLUE GAS OUT TE | DEGF | 286.75 | 0.90 | 286.10 | 288.78 | 2 |
| JPTE012B | AIR HEATER FLUE GAS OUT TE | DEGF | 293.98 | 0.85 | 293.07 | 296.19 | 3 |
| JPTE012C | AIR HEATER FLUE GAS OUT TE | DEGF | 257.96 | 0.68 | 257.40 | 259.09 | 2 |
| | Mills I/S | | 2 | | | | |
| | Burners I/S | | 12 | | | | |
| BAFI001A | TOTAL AIR FLOW | KPPH | 1,731.43 | 9.02 | 1,714.73 | 1,754.81 | 30 |
| JPAT008A | FLUE GAS O2 ANALYZER | PCT | 2.45 | 0.12 | 1.79 | 2.90 | 127 |
| JPAT008B | FLUE GAS O2 ANALYZER | PCT | 2.57 | 0.11 | 2.02 | 2.96 | 115 |
| REAY006 | O2 MONITOR CEMS OUTPUT | PCT | 4.01 | 0.14 | 3.70 | 5.50 | 7 |
| REAY012 | CEMS STACK DRY O2 | PCT | 4.42 | 0.26 | 4.00 | 6.00 | 72 |
| REAY004 | CO MONITOR CEMS OUTPUT | PPM | 44.22 | 11.29 | 22.37 | 90.63 | 780 |
| JPTE504 | STACK FLUE GAS TEMPERATURE | DEG F | 190.13 | 0.28 | 189.13 | 190.30 | 1 |
| JPTT031 | REACTOR A INLET TEMP | DEG F | 272.09 | 1.02 | 268.01 | 274.94 | 16 |
| JPTT033 | REACTOR B INLET TEMP | DEG F | 296.96 | 1.41 | 290.37 | 300.14 | 35 |
| JPTT032 | REACTOR A OUTLET TEMP | DEG F | 171.21 | 1.64 | 159.88 | 179.80 | 18 |
| JPTT034 | REACTOR B OUTLET TEMP | DEG F | 170.75 | 0.61 | 169.84 | 172.08 | 13 |
| JPTT043 | FABRIC FILTER INLET TEMP | DEG F | 171.26 | 1.33 | 162.81 | 179.32 | 20 |
| JPTT093 | BAGHOUSE OUTLET FLUE GAS T | DEG F | 170.78 | 0.87 | 168.18 | 171.50 | 3 |
| JPPT051 | FAB FILTER DIFF. PRES RAW | INWC | | | | | |
| | Baghouse DP | Tag not found: -5 | | | | | |
| JRFT003 | AQ AMMONIA INLET FLOW | GPH | 80.26 | 4.20 | 68.72 | 90.79 | 249 |

# EPA Testing for Mercury
# PG&E Generating Company - Logan Generating Plant
# August 11th & 12th, 1999

## Run #1

Start: 8/11/99 9:45
End: 8/11/99 14:35

| Point ID | Point Name | Units | Average | Std Dev | Min | Max | # of points archived |
|---|---|---|---|---|---|---|---|
| JLST018A | COAL FEEDER A1 FLOW RATE | TPH | 21.45 | 0.35 | 20.36 | 22.80 | 381 |
| JLST018B | COAL FEEDER A2 FLOW RATE | TPH | 21.54 | 0.31 | 20.32 | 22.76 | 153 |
| JLST056A | COAL FEEDER B1 FLOW RATE | TPH | 20.19 | 0.32 | 19.11 | 21.20 | 129 |
| JLST056B | COAL FEEDER B2 FLOW RATE | TPH | 20.84 | 0.39 | 19.63 | 22.19 | 488 |
| JPFT138 | ATOMIZER A SLURRY FLOW | GPM | 0.31 | 2.59 | (0.00) | 32.27 | 10 |
| JPFT168 | ATOMIZER B SLURRY FLOW | GPM | 27.15 | 6.75 | 8.35 | 49.17 | 143 |
| JPFT198 | ATOMIZER C SLURRY FLOW | GPM | 21.00 | 9.25 | (0.00) | 32.49 | 382 |
| JPFT228 | ATOMIZER D SLURRY FLOW | GPM | 31.79 | 1.92 | 28.44 | 37.48 | 120 |
| JPFT258 | ATOMIZER E SLURRY FLOW | GPM | 27.78 | 1.48 | 24.38 | 33.06 | 366 |
| JPFT288 | ATOMIZER F SLURRY FLOW | GPM | 34.89 | 3.24 | 29.08 | 44.44 | 63 |
| MAJT002 | GENERATOR WATT | MW | 238.20 | 0.76 | 236.20 | 239.11 | 4 |
| ABFI001C | MAIN STEAM FLOW (1STG PRES | KPPH | 1,624.56 | 4.71 | 1,615.75 | 1,629.38 | 2 |
| ABTE009 | MAIN STEAM HEADER TEMPERAT | DEGF | 1,003.79 | 2.18 | 994.55 | 1,009.31 | 76 |
| ABPT009 | MAIN STEAM HEADER PRESSURE | PSIG | 2,468.73 | 10.87 | 2,438.26 | 2,491.67 | 27 |
| CV139 | HOT REHEAT FLOW | KLB/H | 1,427.54 | 12.86 | 1,382.73 | 1,469.47 | 34 |
| AEFI010A | FDWTR FLOW A TO ECON - COM | KPPH | 1,544.19 | 32.05 | 1,464.47 | 1,621.36 | 61 |
| AEFI010B | FDWTR FLOW B TO ECON - COM | KPPH | 1,546.95 | 31.03 | 1,476.22 | 1,619.65 | 50 |
| JPPT001A | FURNACE PRESSURE XMTR | INWC | (0.44) | 0.25 | (1.61) | 0.51 | 1349 |
| JPPT001B | FURNACE PRESSURE XMTR | INWC | (0.22) | 0.25 | (1.37) | 0.76 | 1357 |
| JPPT001C | FURNACE PRESSURE XMTR | INWC | (0.48) | 0.24 | (1.55) | 0.54 | 1152 |
| BAPT016 | WINDBOX TO FURNACE DIFF (L | INWC | 2.12 | 0.23 | 1.30 | 3.04 | 530 |
| JRTE020A | SCR INLET TEMPERATURE A | DEGF | 699.07 | 1.35 | 696.55 | 701.97 | 6 |
| JRTE020B | SCR INLET TEMPERATURE B | DEGF | 694.15 | 1.98 | 691.89 | 699.01 | 5 |
| JRTE020C | SCR INLET TEMPERATURE C | DEGF | 700.65 | 2.52 | 696.99 | 706.99 | 8 |
| JPTE012A | AIR HEATER FLUE GAS OUT TE | DEGF | 282.21 | 2.53 | 278.24 | 286.01 | 4 |
| JPTE012B | AIR HEATER FLUE GAS OUT TE | DEGF | 289.22 | 2.61 | 285.28 | 293.08 | 4 |
| JPTE012C | AIR HEATER FLUE GAS OUT TE | DEGF | 252.78 | 3.21 | 248.43 | 256.85 | 4 |
| | Mills I/S | | 2 | | | | |
| | Burners I/S | | 12 | | | | |
| BAFI001A | TOTAL AIR FLOW | KPPH | 1,728.61 | 7.08 | 1,711.58 | 1,752.57 | 43 |
| JPAT008A | FLUE GAS O2 ANALYZER | PCT | 2.63 | 0.17 | 1.96 | 3.11 | 278 |
| JPAT008B | FLUE GAS O2 ANALYZER | PCT | 2.75 | 0.18 | 2.13 | 3.27 | 261 |
| REAY006 | O2 MONITOR CEMS OUTPUT | PCT | 4.05 | 0.14 | 3.81 | 4.70 | 5 |
| REAY012 | CEMS STACK DRY O2 | PCT | 4.48 | 0.21 | 4.10 | 5.61 | 134 |
| REAY004 | CO MONITOR CEMS OUTPUT | PPM | 40.55 | 13.03 | 24.12 | 127.53 | 1039 |
| JPTE504 | STACK FLUE GAS TEMPERATURE | DEG F | 190.23 | 1.45 | 187.64 | 192.46 | 2 |
| JPTT031 | REACTOR A INLET TEMP | DEG F | 267.43 | 3.44 | 262.05 | 275.73 | 38 |
| JPTT033 | REACTOR B INLET TEMP | DEG F | 291.81 | 4.32 | 277.00 | 299.16 | 58 |
| JPTT032 | REACTOR A OUTLET TEMP | DEG F | 171.94 | 8.03 | 138.00 | 214.97 | 133 |
| JPTT034 | REACTOR B OUTLET TEMP | DEG F | 171.20 | 1.91 | 159.10 | 181.85 | 30 |
| JPTT043 | FABRIC FILTER INLET TEMP | DEG F | 171.85 | 5.62 | 142.88 | 202.76 | 120 |
| JPTT093 | BAGHOUSE OUTLET FLUE GAS T | DEG F | 170.28 | 1.50 | 166.80 | 175.11 | 5 |
| JPPT051 | FAB FILTER DIFF. PRES RAW | INWC | | | | | |
| | Baghouse DP | Tag not found: -5 | | | | | |
| JRFT003 | AQ AMMONIA INLET FLOW | GPH | 76.42 | 2.83 | 66.14 | 84.00 | 370 |