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|               |               |
|---------------|---------------|
| AP-42 Section | <u>9.12.1</u> |
| Reference     | <u>12</u>     |
| Report Sect.  | <u>4</u>      |
| Reference     | <u>20</u>     |

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

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02\_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

Grain Dryer Diagnostic VOC Report  
for  
Coors Brewing Company

Report prepared by:  
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## Introduction

Air Pollution Testing, Inc. was contracted by Coors Brewing Company to conduct a series of source emissions tests on the grain dryer stack before the water spray scrubber unit. Testing was conducted to determine mass emission rates of volatile organic compounds. The testing took place on November 9 and 10, 1992. Three one hour sampling periods were conducted on each of the two days, and sampling was conducted continuously overnight between the two days.

## Summary of Procedures

Testing was conducted in accordance with EPA methods 1 through 4 and 25A as detailed in Code of Federal Regulations, Title 40, Part 60, Appendix A. Methods 1 through 4 were used to determine the volumetric air flow in the stack, and method 25A was used to determine the concentration of volatile organic compounds (VOCs) in the stack gas. The data from all of the methods was then combined to calculate mass flow rates of VOCs for each sampling period.

Each method 25A sampling period consisted of extracting a gas sample from the duct through a heated sample line and running it directly into the inlet port of a Model 3-100 Flame Ionization Analyzer manufactured by JUM. The organic concentration was displayed in real-time on the analyzer front panel (which was set to a range of 0 to 100 ppm) and recorded on a strip chart. Before and after the sampling program, the analyzer was calibrated with a high level propane calibration gas and zero gas, and then challenged with two mid level propane calibration gases to verify linearity of response. Before and after each one hour sampling period, the analyzer was challenged with one of the calibration gases and the zero gas to quantify any span and zero drift for the previous period. Additionally, the analyzer was re-calibrated at this point as necessary. To ensure accurate data collection, all calibration gases were prepared and certified in accordance with EPA Protocol 1 and were introduced to the analyzer at the sampling probe tip inside the stack, allowing the calibration gases to travel the entire sample handling and conditioning apparatus (including the in-stack glass wool particulate filter). VOC sampling was conducted at the approximate center of the stack after initial measurements indicated no VOC concentration gradient across the stack. The recorded data from each sampling period was averaged using 50 one-centimeter averages per one hour sampling period, with all data corrected for analyzer span and zero drift.

Concurrent with each VOC sampling period, a differential pressure and temperature traverse of the stack was conducted in accordance with method 2 at a grid of sampling points selected in accordance with method 1. Additionally, a gas sample was extracted from the stack and pulled through a series of chilled glass impingers and through a calibrated dry gas meter to determine the stack gas moisture content in accordance with method 4. The effluent gas from the method 4 sampling train was collected in a Tedlar gas bag and analyzed for oxygen and carbon dioxide content using Orsat analysis in accordance with method 3. This data was combined to determine volumetric flow rate in the stack during each sampling period.

### Additional Notes

On the first day of sampling, the differential pressure in the stack was measured with a standard inclined manometer with a resolution of approximately  $\pm 0.001$  inches water. Because the pressures measured were quite low ( $< 0.025$  inches water), the pressures were measured on the second day with a Microtector manufactured by Dwyer Instruments. This instrument allows a resolution of approximately  $\pm 0.0005$  inches water. No significant differences were apparent between the two instruments' measurements.

## Results

The results of the testing are presented in the following tables. Any testing variables not presented here may be found in *Appendix 1 - Testing Parameters / Sample Calculations*.

| run #                    | 1                    | 2                    | 3     | averages |
|--------------------------|----------------------|----------------------|-------|----------|
| start time               | 08:24                | 10:00                | 11:40 |          |
| stop time                | 09:49 <sup>(1)</sup> | 11:18 <sup>(1)</sup> | 12:40 |          |
| stack temp. (°F)         | 174                  | 175                  | 174   | 174      |
| stack moisture (vol %)   | 56.6                 | 56.4                 | 57.0  | 56.7     |
| gas velocity (ft/sec)    | 9.3                  | 9.6                  | 9.4   | 9.4      |
| gas flow (acfm)          | 4847                 | 4968                 | 4871  | 4895     |
| gas flow (dscfm)         | 1431                 | 1474                 | 1428  | 1444     |
| VOC (ppm wet as propane) | 28.8                 | 27.6                 | 37.9  | 31.4     |
| VOC (lb/hr as propane)   | 0.65                 | 0.64                 | 0.86  | 0.72     |

Table 1 - Grain Dryer VOC Results  
Day 1 - 11/9/92

<sup>(1)</sup> - total sampling duration is greater than one hour due to mid-test calibration verifications.

## Results (continued)

| run #                    | 1                    | 2     | 3     | averages |
|--------------------------|----------------------|-------|-------|----------|
| start time               | 07:42                | 08:57 | 10:14 |          |
| stop time                | 08:47 <sup>(1)</sup> | 09:57 | 11:14 |          |
| stack temp. (°F)         | 183                  | 180   | 178   | 180      |
| stack moisture (vol %)   | 56.3                 | 57.1  | 56.0  | 56.5     |
| gas velocity (ft/sec)    | 9.7                  | 9.6   | 9.5   | 9.6      |
| gas flow (acfm)          | 5051                 | 4969  | 4957  | 4992     |
| gas flow (dscfm)         | 1485                 | 1440  | 1476  | 1467     |
| VOC (ppm wet as propane) | 31.2                 | 25.0  | 31.3  | 29.2     |
| VOC (lb/hr as propane)   | 0.73                 | 0.58  | 0.72  | 0.68     |

Table 2 - Grain Dryer VOC Results  
Day 2 - 11/10/92

<sup>(1)</sup> - total sampling duration is greater than one hour due to strip chart paper change-over.

From 13:22 on 11-9-92 to 07:38 on 11-10-92, the analyzer was left running without re-calibration. The strip chart record was averaged and an average mass emission was calculated using the average stack volumetric flow from both days of sampling. The average emissions calculated were 23.9 ppm VOC (wet as propane) and 0.55 lb/hr (as propane). These numbers may be expected to understate the true average because the sampling probe tip became gradually clogged with particulate matter over the sampling period, and the post-test calibration check was conducted after this clog was accidentally dislodged. This gradual increase in sample pressure drop created a negative bias of unknown magnitude.

The overnight data averages do not include the periods from approximately 16:10 to 17:10 and 19:30 to 20:00. During these periods, the strip chart indicates that the emissions dropped off to near zero and spiked to off-scale values briefly at the end of the periods.



**Appendix 1**  
**Testing Parameters**  
**Sample Calculations**

**Coors Brewing Company****Grain Dryer****11-9-92****EPA Methods 1-4 : Determination of Volumetric Flow Rate and Molecular Weight**

| <u>Field Data</u>                     | Run #1 | Run #2 | Run #3 | Averages |
|---------------------------------------|--------|--------|--------|----------|
| sample volume (ft3)                   | 18.985 | 18.110 | 19.615 | 18.903   |
| sampling time (minutes)               | 30     | 40     | 35     | 35       |
| stack temp. (oF) (pre-test)           | 174    | 175    | 174    | 174      |
| stack temp. (oF) (post-test)          | 174    | 175    | 174    | 174      |
| meter temp. (oF)                      | 97     | 86     | 89     | 91       |
| barometric pressure (mbar)            | 829    | 829    | 829    | 829      |
| barometric pressure (" Hg)            | 24.485 | 24.485 | 24.485 | 24.485   |
| static press. (in. water) (pre-test)  | -0.28  | -0.28  | -0.28  | -0.28    |
| static press. (in. water) (post-test) | -0.28  | -0.28  | -0.28  | -0.28    |
| moisture (grams)                      | 426.0  | 409.0  | 452.0  | 429.0    |
| oxygen (%)                            | 20.9   | 20.9   | 20.9   | 20.9     |
| carbon dioxide (%)                    | 0.0    | 0.0    | 0.0    | 0.0      |
| delta H                               | 1.04   | 0.50   | 0.87   | 0.80     |
| (delta p) <sup>1/2</sup> (pre-test)   | 0.1214 | 0.1244 | 0.1219 | 0.1226   |
| (delta p) <sup>1/2</sup> (post-test)  | 0.1214 | 0.1244 | 0.1219 | 0.1226   |
| meter box Y                           | 1.0389 | 1.0389 | 1.0389 | 1.0389   |
| delta H@                              | 1.683  | 1.683  | 1.683  | 1.683    |
| pitot tube constant                   | 0.84   | 0.84   | 0.84   | 0.84     |
| stack diameter (inches)               | 39.875 | 39.875 | 39.875 | 39.875   |
| port length (inches)                  | 3.125  | 3.125  | 3.125  | 3.125    |
| <u>Calculations</u>                   |        |        |        |          |
| sample volume (dscf)                  | 15.344 | 14.908 | 16.076 | 15.443   |
| moisture volume (scf)                 | 20.052 | 19.252 | 21.276 | 20.193   |
| moisture content (%/100)              | 0.5665 | 0.5636 | 0.5696 | 0.5666   |
| molecular weight (dry)                | 28.836 | 28.836 | 28.836 | 28.836   |
| molecular weight (actual)             | 22.697 | 22.729 | 22.664 | 22.697   |
| gas velocity (ft/sec)                 | 9.31   | 9.55   | 9.36   | 9.41     |
| gas flow (acfm)                       | 4847   | 4968   | 4871   | 4895     |
| gas flow (dscfm)                      | 1431   | 1474   | 1428   | 1444     |

**Coors Brewing Company****Grain Dryer****11-10-92****EPA Methods 1-4 : Determination of Volumetric Flow Rate and Molecular Weight**

| <u>Field Data</u>                     | Run #1 | Run #2 | Run #3 | Averages |
|---------------------------------------|--------|--------|--------|----------|
| sample volume (ft3)                   | 16.161 | 16.200 | 15.715 | 16.025   |
| sampling time (minutes)               | 40     | 30     | 30     | 33       |
| stack temp. (oF) (pre-test)           | 183    | 180    | 178    | 180      |
| stack temp. (oF) (post-test)          | 183    | 180    | 178    | 180      |
| meter temp. (oF)                      | 66     | 72     | 73     | 70       |
| barometric pressure (mbar)            | 830    | 830    | 830    | 830      |
| barometric pressure (" Hg)            | 24.515 | 24.515 | 24.515 | 24.515   |
| static press. (in. water) (pre-test)  | -0.30  | -0.30  | -0.30  | -0.30    |
| static press. (in. water) (post-test) | -0.30  | -0.30  | -0.30  | -0.30    |
| moisture (grams)                      | 378.0  | 388.0  | 360.0  | 375.3    |
| oxygen (%)                            | 20.9   | 20.9   | 20.9   | 20.9     |
| carbon dioxide (%)                    | 0.0    | 0.0    | 0.0    | 0.0      |
| delta H                               | 0.60   | 1.00   | 1.00   | 0.87     |
| (delta p) <sup>1/2</sup> (pre-test)   | 0.1258 | 0.1238 | 0.1240 | 0.1245   |
| (delta p) <sup>1/2</sup> (post-test)  | 0.1258 | 0.1238 | 0.1240 | 0.1245   |
| meter box Y                           | 1.0389 | 1.0389 | 1.0389 | 1.0389   |
| delta H@                              | 1.683  | 1.683  | 1.683  | 1.683    |
| pitot tube constant                   | 0.84   | 0.84   | 0.84   | 0.84     |
| stack diameter (inches)               | 39.875 | 39.875 | 39.875 | 39.875   |
| port length (inches)                  | 3.125  | 3.125  | 3.125  | 3.125    |
| <u>Calculations</u>                   |        |        |        |          |
| sample volume (dscf)                  | 13.830 | 13.723 | 13.288 | 13.614   |
| moisture volume (scf)                 | 17.792 | 18.263 | 16.945 | 17.667   |
| moisture content (%/100)              | 0.5627 | 0.5710 | 0.5605 | 0.5647   |
| molecular weight (dry)                | 28.836 | 28.836 | 28.836 | 28.836   |
| molecular weight (actual)             | 22.739 | 22.649 | 22.763 | 22.717   |
| gas velocity (ft/sec)                 | 9.71   | 9.55   | 9.53   | 9.59     |
| gas flow (acfm)                       | 5051   | 4969   | 4957   | 4992     |
| gas flow (dscfm)                      | 1485   | 1440   | 1476   | 1467     |

## EPA Methods 1 - 4 : Determination of Volumetric Flow Rate and Molecular Weight

### Sample Calculations

sample volume (dscf)

$$\begin{aligned} &= [17.64 (\text{°R/in Hg})] V_m Y [P_{\text{bar}} + (\Delta H/13.6)] / T_m \\ &= (17.64 \text{ °R/in Hg})(18.985 \text{ ft}^3)(1.0389)[24.485 + (1.04/13.6) \text{ inches Hg}] / (97 + 460 \text{ °R}) \\ &= 15.344 \text{ dscf} \end{aligned}$$

moisture volume (scf)

$$\begin{aligned} &= (0.04707 \text{ ft}^3/\text{ml}) V_{\text{lc}} \\ &= (0.04707 \text{ ft}^3/\text{ml})(426.0) \\ &= 20.052 \text{ scf} \end{aligned}$$

moisture content (%/100)

$$\begin{aligned} &= V_{w(\text{std})} / (V_{m(\text{std})} + V_{w(\text{std})}) \\ &= (20.052 \text{ scf}) / (15.344 \text{ dscf} + 20.052 \text{ scf}) \\ &= 0.5665 \end{aligned}$$

molecular weight dry (grams/mole)

$$\begin{aligned} &= 0.440(\% \text{CO}_2) + 0.320(\% \text{O}_2) + 0.280(\% \text{N}_2 + \% \text{CO}) \\ &= 0.440(0.0 \% \text{CO}_2) + (0.320)(20.9 \% \text{O}_2) + (0.280)(79.1 \% \text{N}_2) \\ &= 28.836 \text{ grams/mole} \end{aligned}$$

molecular weight actual (grams/mole)

$$\begin{aligned} &= M_d(1 - B_{ws}) + 18.0(B_{ws}) \\ &= (28.836 \text{ grams/mole})(1 - 0.5665) + (18.0)(0.5665) \\ &= 22.697 \text{ grams/mole} \end{aligned}$$

gas velocity (ft/sec)

$$\begin{aligned} &= \{85.49 \text{ ft/sec} [( \text{lb/lb-mole})(\text{in. Hg}) / (\text{°R})(\text{in. H}_2\text{O})]^{1/2} \} C_p (\Delta p^{1/2})_{\text{avg}} (T_{s(\text{avg})} / P_s M_s)^{1/2} \\ &= (85.49)(0.84)(0.1214) \{ (174 + 460) / [(24.485 - 0.28/13.6)(22.697)] \}^{1/2} \\ &= 9.31 \text{ ft/sec} \end{aligned}$$

gas flow (acfm)

$$\begin{aligned} &= A v_s (60 \text{ seconds/minute}) \\ &= (\pi)(39.875/12 \text{ ft})^2 (9.31 \text{ ft/sec})(60)/4 \\ &= 4847 \text{ acfm} \end{aligned}$$

gas flow (dscfm)

$$\begin{aligned} &= (60 \text{ seconds/minute})(1 - B_{ws}) v_s A T_{\text{std}} P_s / (T_{s(\text{avg})} P_{\text{std}}) \\ &= (60)(1 - 0.5665)(9.31)(\pi)(39.875/12 \text{ ft})^2 (528)(24.485 - 0.28/13.6) / [(174 + 460)(29.92)(4)] \\ &= 1431 \text{ dscfm} \end{aligned}$$

## EPA Methods 1 - 4 : Determination of Volumetric Flow Rate and Molecular Weight

### Variables

A = Stack cross-sectional area (ft<sup>2</sup>)

B<sub>ws</sub> = Water vapor in the gas stream, proportion by volume

C<sub>p</sub> = Pitot coefficient (0.84 dimensionless)

ΔH = Average pressure differential across the orifice meter (in. H<sub>2</sub>O)

Δp = Velocity head of stack gas (in. H<sub>2</sub>O)

M<sub>d</sub> = Molecular weight of dry stack gas (lb/lb mole)

M<sub>s</sub> = Molecular weight of wet stack gas (lb/lb mole)

P<sub>bar</sub> = Barometric pressure (in. Hg)

P<sub>g</sub> = Sack pressure relative to ambient (in. H<sub>2</sub>O)

P<sub>s</sub> = Absolute stack pressure (in. Hg)

P<sub>std</sub> = Standard atmospheric pressure (29.92 in. Hg)

Q<sub>a</sub> = Actual volumetric air flow out of stack (acfm)

Q<sub>std</sub> = Volumetric air flow out of stack corrected to standard conditions (dscfm)

T<sub>m</sub> = Average meter temperature (°F + 460 = °R)

T<sub>s(avg)</sub> = Average stack temperature (°F + 460 = °R)

T<sub>std</sub> = Standard temperature (528 °R)

V<sub>lc</sub> = volume of moisture collected from gas sample (ml)

v<sub>s</sub> = Stack gas velocity (ft/sec)

V<sub>m</sub> = Volume of gas through dry gas meter (ft<sup>3</sup>)

V<sub>m(std)</sub> = Volume of gas through dry gas meter corrected to standard conditions (dscf)

V<sub>w(std)</sub> = Volume of water vapor in gas sample at standard conditions (scf)

Y = Dry gas meter calibration factor (dimensionless)

Q = Total sampling time (minutes)

**Coors Brewing Company**

**Grain Dryer**

**11-9/10-92**

**VOC Mass Emission Rates**

**Field Data (11-9-92)**

|                               | run #1 | run #2 | run #3 |      |
|-------------------------------|--------|--------|--------|------|
| VOC conc. (ppm wet)           | 28.8   | 27.6   | 37.9   | 31.4 |
| % H2O*                        | 56.6   | 56.4   | 57.0   | 56.7 |
| volumetric flow rate (dscfm)* | 1431   | 1474   | 1428   | 1444 |

**Calculations (11-9-92)**

|                                  |      |      |      |      |
|----------------------------------|------|------|------|------|
| VOC emissions (lb/hr as propane) | 0.65 | 0.64 | 0.86 | 0.72 |
|----------------------------------|------|------|------|------|

**Field Data (11-10-92)**

|                               | run #1 | run #2 | run #3 |      |
|-------------------------------|--------|--------|--------|------|
| VOC conc. (ppm wet)           | 31.2   | 25.0   | 31.3   | 29.2 |
| % H2O*                        | 56.3   | 57.1   | 56.0   | 56.5 |
| volumetric flow rate (dscfm)* | 1485   | 1440   | 1476   | 1467 |

**Calculations (11-10-92)**

|                                  |      |      |      |      |
|----------------------------------|------|------|------|------|
| VOC emissions (lb/hr as propane) | 0.73 | 0.58 | 0.72 | 0.68 |
|----------------------------------|------|------|------|------|

\* - flow and moisture data was collected concurrently with each VOC sampling period.

Coors Brewing Company

Grain Dryer

11-9/10-92 (Overnight Run)

VOC Mass Emission Rates

Field Data

|                               |      |
|-------------------------------|------|
| VOC conc. (ppm wet)           | 23.9 |
| % H <sub>2</sub> O*           | 56.6 |
| volumetric flow rate (dscfm)* | 1456 |

Calculations

|                                  |      |
|----------------------------------|------|
| VOC emissions (lb/hr as propane) | 0.55 |
|----------------------------------|------|

\* - flow and moisture data is used is the average of all data collected over the two day period

Coors Brewing Company

Grain Dryer

11-9-92

Method 25A : Measurement of Total Organic Concentration Using a Flame

Ionization Analyzer

Strip Chart Data

Run #1

|       |       | Zero (%FS) | Span (%FS) | Actual Span (ppm) |
|-------|-------|------------|------------|-------------------|
| Start | 08:24 | 0.0        | 39.5       | 40.1              |
| Stop  | 09:49 | -2.0       | 39.5       |                   |

| point #   | %FS VOC | ppm VOC | point # | %FS VOC | ppm VOC |
|-----------|---------|---------|---------|---------|---------|
| 1         | 17.0    | 17.8    | 26      | 27.0    | 27.7    |
| 2         | 34.0    | 34.7    | 27      | 29.0    | 29.7    |
| 3         | 45.0    | 45.5    | 28      | 31.0    | 31.7    |
| 4         | 36.0    | 36.6    | 29      | 26.0    | 26.7    |
| 5         | 27.0    | 27.7    | 30      | 24.0    | 24.8    |
| 6         | 34.0    | 34.7    | 31      | 30.0    | 30.7    |
| 7         | 29.0    | 29.7    | 32      | 31.0    | 31.7    |
| 8         | 23.0    | 23.8    | 33      | 22.0    | 22.8    |
| 9         | 25.0    | 25.7    | 34      | 39.0    | 39.6    |
| 10        | 32.0    | 32.7    | 35      | 32.0    | 32.7    |
| 11        | 33.0    | 33.7    | 36      | 30.0    | 30.7    |
| 12        | 27.0    | 27.7    | 37      | 25.0    | 25.7    |
| 13        | 28.0    | 28.7    | 38      | 27.0    | 27.7    |
| 14        | 29.0    | 29.7    | 39      | 10.0    | 10.9    |
| 15        | 21.0    | 21.8    | 40      | 27.0    | 27.7    |
| 16        | 33.0    | 33.7    | 41      | 22.0    | 22.8    |
| 17        | 31.0    | 31.7    | 42      | 6.0     | 6.9     |
| 18        | 29.0    | 29.7    | 43      | 25.0    | 25.7    |
| 19        | 26.0    | 26.7    | 44      | 35.0    | 35.6    |
| 20        | 29.0    | 29.7    | 45      | 38.0    | 38.6    |
| 21        | 25.0    | 25.7    | 46      | 28.0    | 28.7    |
| 22        | 29.0    | 29.7    | 47      | 25.0    | 25.7    |
| 23        | 30.0    | 30.7    | 48      | 20.0    | 20.8    |
| 24        | 25.0    | 25.7    | 49      | 26.0    | 26.7    |
| 25        | 34.0    | 34.7    | 50      | 23.0    | 23.8    |
| averages: | 29.2    | 29.9    |         | 26.9    | 27.6    |

Drift Cal. Avg. VOC (ppm as propane) 28.8

Coors Brewing Company

Grain Dryer

11-9-92

Method 25A : Measurement of Total Organic Concentration Using a Flame

Ionization Analyzer

Strip Chart Data

Run #2

|       |       | Zero (%FS) | Span (%FS) | Actual Span (ppm) |
|-------|-------|------------|------------|-------------------|
| Start | 10:00 | 0.0        | 91.5       | 91.3              |
| Stop  | 11:18 | 2.0        | 83.0       |                   |

| point #   | %FS VOC | ppm VOC | point # | %FS VOC | ppm VOC |
|-----------|---------|---------|---------|---------|---------|
| 1         | 36.0    | 37.0    | 26      | 31.0    | 31.8    |
| 2         | 25.0    | 25.4    | 27      | 29.0    | 29.6    |
| 3         | 28.0    | 28.6    | 28      | 27.0    | 27.5    |
| 4         | 27.0    | 27.5    | 29      | 30.0    | 30.7    |
| 5         | 23.0    | 23.3    | 30      | 29.0    | 29.6    |
| 6         | 25.0    | 25.4    | 31      | 29.0    | 29.6    |
| 7         | 26.0    | 26.5    | 32      | 30.0    | 30.7    |
| 8         | 24.0    | 24.3    | 33      | 26.0    | 26.5    |
| 9         | 25.0    | 25.4    | 34      | 21.0    | 21.2    |
| 10        | 21.0    | 21.2    | 35      | 29.0    | 29.6    |
| 11        | 12.0    | 11.6    | 36      | 31.0    | 31.8    |
| 12        | 28.0    | 28.6    | 37      | 28.0    | 28.6    |
| 13        | 27.0    | 27.5    | 38      | 24.0    | 24.3    |
| 14        | 23.0    | 23.3    | 39      | 22.0    | 22.2    |
| 15        | 26.0    | 26.5    | 40      | 22.0    | 22.2    |
| 16        | 26.0    | 26.5    | 41      | 27.0    | 27.5    |
| 17        | 26.0    | 26.5    | 42      | 29.0    | 29.6    |
| 18        | 24.0    | 24.3    | 43      | 29.0    | 29.6    |
| 19        | 27.0    | 27.5    | 44      | 21.0    | 21.2    |
| 20        | 41.0    | 42.3    | 45      | 23.0    | 23.3    |
| 21        | 34.0    | 34.9    | 46      | 26.0    | 26.5    |
| 22        | 32.0    | 32.8    | 47      | 27.0    | 27.5    |
| 23        | 32.0    | 32.8    | 48      | 25.0    | 25.4    |
| 24        | 33.0    | 33.9    | 49      | 22.0    | 22.2    |
| 25        | 31.0    | 31.8    | 50      | 20.0    | 20.1    |
| averages: | 27.3    | 27.8    |         | 26.8    | 27.3    |

Drift Cal. Avg. VOC (ppm as propane) 27.6

Coors Brewing Company

Grain Dryer

11-9-92

Method 25A : Measurement of Total Organic Concentration Using a Flame

Ionization Analyzer

Strip Chart Data

Run #3

|       |       | Zero (%FS) | Span (%FS) | Actual Span (ppm) |
|-------|-------|------------|------------|-------------------|
| Start | 11:40 | 2.0        | 83.0       | 91.3              |
| Stop  | 12:40 | 1.5        | 91.0       |                   |

| point #   | %FS VOC | ppm VOC | point # | %FS VOC | ppm VOC |
|-----------|---------|---------|---------|---------|---------|
| 1         | 44.0    | 45.2    | 26      | 36.0    | 36.7    |
| 2         | 40.0    | 41.0    | 27      | 36.0    | 36.7    |
| 3         | 35.0    | 35.6    | 28      | 32.0    | 32.4    |
| 4         | 38.0    | 38.8    | 29      | 34.0    | 34.5    |
| 5         | 37.0    | 37.8    | 30      | 39.0    | 39.9    |
| 6         | 37.0    | 37.8    | 31      | 35.0    | 35.6    |
| 7         | 38.0    | 38.8    | 32      | 39.0    | 39.9    |
| 8         | 36.0    | 36.7    | 33      | 36.0    | 36.7    |
| 9         | 36.0    | 36.7    | 34      | 37.0    | 37.8    |
| 10        | 31.0    | 31.3    | 35      | 41.0    | 42.0    |
| 11        | 29.0    | 29.2    | 36      | 43.0    | 44.2    |
| 12        | 36.0    | 36.7    | 37      | 40.0    | 41.0    |
| 13        | 39.0    | 39.9    | 38      | 39.0    | 39.9    |
| 14        | 36.0    | 36.7    | 39      | 37.0    | 37.8    |
| 15        | 36.0    | 36.7    | 40      | 42.0    | 43.1    |
| 16        | 41.0    | 42.0    | 41      | 43.0    | 44.2    |
| 17        | 37.0    | 37.8    | 42      | 32.0    | 32.4    |
| 18        | 37.0    | 37.8    | 43      | 31.0    | 31.3    |
| 19        | 34.0    | 34.5    | 44      | 37.0    | 37.8    |
| 20        | 34.0    | 34.5    | 45      | 43.0    | 44.2    |
| 21        | 37.0    | 37.8    | 46      | 37.0    | 37.8    |
| 22        | 38.0    | 38.8    | 47      | 36.0    | 36.7    |
| 23        | 39.0    | 39.9    | 48      | 33.0    | 33.5    |
| 24        | 35.0    | 35.6    | 49      | 38.0    | 38.8    |
| 25        | 37.0    | 37.8    | 50      | 37.0    | 37.8    |
| averages: | 36.7    | 37.4    |         | 37.6    | 38.4    |

Drift Cal. Avg. VOC (ppm as propane) 37.9

Coors Brewing Company

Grain Dryer

11-9/10-92

Method 25A : Measurement of Total Organic Concentration Using a Flame

Ionization Analyzer

Strip Chart Data

Overnight Run

|       |       | Zero (%FS) | Span (%FS) | Actual Span (ppm) |
|-------|-------|------------|------------|-------------------|
| Start | 13:22 | 1.0        | 91.0       | 91.3              |
| Stop  | 07:38 | -4.0       | 113.0      |                   |

| point #   | %FS VOC | ppm VOC | point # | %FS VOC | ppm VOC |
|-----------|---------|---------|---------|---------|---------|
| 1         | 33.0    | 30.4    | 26      | 24.0    | 22.5    |
| 2         | 34.0    | 31.3    | 27      | 22.0    | 20.7    |
| 3         | 31.0    | 28.7    | 28      | 24.0    | 22.5    |
| 4         | 30.0    | 27.8    | 29      | 23.0    | 21.6    |
| 5         | 27.0    | 25.1    | 30      | 27.0    | 25.1    |
| 6         | 26.0    | 24.3    | 31      | 29.0    | 26.9    |
| 7         | 26.0    | 24.3    | 32      |         |         |
| 8         | 29.0    | 26.9    | 33      |         |         |
| 9         | 25.0    | 23.4    | 34      |         |         |
| 10        | 23.0    | 21.6    | 35      |         |         |
| 11        | 19.0    | 18.1    | 36      |         |         |
| 12        | 21.0    | 19.8    | 37      |         |         |
| 13        | 22.0    | 20.7    | 38      |         |         |
| 14        | 25.0    | 23.4    | 39      |         |         |
| 15        | 24.0    | 22.5    | 40      |         |         |
| 16        | 26.0    | 24.3    | 41      |         |         |
| 17        | 25.0    | 23.4    | 42      |         |         |
| 18        | 28.0    | 26.0    | 43      |         |         |
| 19        | 25.0    | 23.4    | 44      |         |         |
| 20        | 25.0    | 23.4    | 45      |         |         |
| 21        | 22.0    | 20.7    | 46      |         |         |
| 22        | 26.0    | 24.3    | 47      |         |         |
| 23        | 23.0    | 21.6    | 48      |         |         |
| 24        | 24.0    | 22.5    | 49      |         |         |
| 25        | 24.0    | 22.5    | 50      |         |         |
| averages: | 25.7    | 24.0    |         | 24.8    | 23.2    |

Drift Cal. Avg. VOC (ppm as propane) 23.9

Coors Brewing Company

Grain Dryer

11-10-92

Method 25A : Measurement of Total Organic Concentration Using a Flame

Ionization Analyzer

Strip Chart Data

Run #1

|       |       | Zero (%FS) | Span (%FS) | Actual Span (ppm) |
|-------|-------|------------|------------|-------------------|
| Start | 07:42 | 0.0        | 91.0       | 91.3              |
| Stop  | 08:47 | 2.0        | 87.0       |                   |

| point #   | %FS VOC | ppm VOC | point # | %FS VOC | ppm VOC |
|-----------|---------|---------|---------|---------|---------|
| 1         | 62.0    | 63.3    | 26      | 33.0    | 33.2    |
| 2         | 38.0    | 38.4    | 27      | 38.0    | 38.4    |
| 3         | 39.0    | 39.4    | 28      | 33.0    | 33.2    |
| 4         | 32.0    | 32.2    | 29      | 29.0    | 29.1    |
| 5         | 27.0    | 27.0    | 30      | 28.0    | 28.0    |
| 6         | 29.0    | 29.1    | 31      | 28.0    | 28.0    |
| 7         | 27.0    | 27.0    | 32      | 26.0    | 25.9    |
| 8         | 27.0    | 27.0    | 33      | 25.0    | 24.9    |
| 9         | 31.0    | 31.1    | 34      | 33.0    | 33.2    |
| 10        | 34.0    | 34.2    | 35      | 32.0    | 32.2    |
| 11        | 34.0    | 34.2    | 36      | 31.0    | 31.1    |
| 12        | 35.0    | 35.3    | 37      |         |         |
| 13        | 28.0    | 28.0    | 38      |         |         |
| 14        | 36.0    | 36.3    | 39      |         |         |
| 15        | 33.0    | 33.2    | 40      |         |         |
| 16        | 30.0    | 30.1    | 41      |         |         |
| 17        | 27.0    | 27.0    | 42      |         |         |
| 18        | 29.0    | 29.1    | 43      |         |         |
| 19        | 28.0    | 28.0    | 44      |         |         |
| 20        | 24.0    | 23.9    | 45      |         |         |
| 21        | 29.0    | 29.1    | 46      |         |         |
| 22        | 27.0    | 27.0    | 47      |         |         |
| 23        | 26.0    | 25.9    | 48      |         |         |
| 24        | 27.0    | 27.0    | 49      |         |         |
| 25        | 25.0    | 24.9    | 50      |         |         |
| averages: | 31.4    | 31.5    |         | 30.5    | 30.7    |

Drift Cal. Avg. VOC (ppm as propane) 31.2

Coors Brewing Company

Grain Dryer

11-10-92

Method 25A : Measurement of Total Organic Concentration Using a Flame

Ionization Analyzer

Strip Chart Data

Run #2

|       |       | Zero (%FS) | Span (%FS) | Actual Span (ppm) |
|-------|-------|------------|------------|-------------------|
| Start | 08:57 | 2.0        | 87.0       | 91.3              |
| Stop  | 09:57 | 2.0        | 81.0       |                   |

| point #   | %FS VOC | ppm VOC | point # | %FS VOC | ppm VOC |
|-----------|---------|---------|---------|---------|---------|
| 1         | 48.0    | 51.2    | 26      | 20.0    | 20.0    |
| 2         | 41.0    | 43.4    | 27      | 19.0    | 18.9    |
| 3         | 33.0    | 34.5    | 28      | 22.0    | 22.3    |
| 4         | 30.0    | 31.2    | 29      | 20.0    | 20.0    |
| 5         | 24.0    | 24.5    | 30      | 18.0    | 17.8    |
| 6         | 26.0    | 26.7    | 31      | 17.0    | 16.7    |
| 7         | 30.0    | 31.2    | 32      | 19.0    | 18.9    |
| 8         | 31.0    | 32.3    | 33      | 16.0    | 15.6    |
| 9         | 30.0    | 31.2    | 34      | 23.0    | 23.4    |
| 10        | 29.0    | 30.1    | 35      | 23.0    | 23.4    |
| 11        | 29.0    | 30.1    | 36      | 20.0    | 20.0    |
| 12        | 28.0    | 28.9    | 37      | 25.0    | 25.6    |
| 13        | 34.0    | 35.6    | 38      | 21.0    | 21.2    |
| 14        | 29.0    | 30.1    | 39      | 24.0    | 24.5    |
| 15        | 24.0    | 24.5    | 40      | 23.0    | 23.4    |
| 16        | 25.0    | 25.6    | 41      | 28.0    | 28.9    |
| 17        | 21.0    | 21.2    | 42      | 22.0    | 22.3    |
| 18        | 23.0    | 23.4    | 43      | 28.0    | 28.9    |
| 19        | 23.0    | 23.4    | 44      | 23.0    | 23.4    |
| 20        | 23.0    | 23.4    | 45      | 27.0    | 27.8    |
| 21        | 12.0    | 11.1    | 46      | 27.0    | 27.8    |
| 22        | 16.0    | 15.6    | 47      | 29.0    | 30.1    |
| 23        | 21.0    | 21.2    | 48      | 29.0    | 30.1    |
| 24        | 22.0    | 22.3    | 49      | 33.0    | 34.5    |
| 25        | 19.0    | 18.9    | 50      | 34.0    | 35.6    |
| averages: | 26.8    | 27.7    |         | 22.1    | 22.4    |

Drift Cal. Avg. VOC (ppm as propane) 25.0

Coors Brewing Company

Grain Dryer

11-10-92

Method 25A : Measurement of Total Organic Concentration Using a Flame

Ionization Analyzer

Strip Chart Data

Run #3

|       |       | Zero (%FS) | Span (%FS) | Actual Span (ppm) |
|-------|-------|------------|------------|-------------------|
| Start | 10:14 | 2.0        | 81.0       | 91.3              |
| Stop  | 11:14 | 2.0        | 82.0       |                   |

| point #   | %FS VOC | ppm VOC | point # | %FS VOC | ppm VOC |
|-----------|---------|---------|---------|---------|---------|
| 1         | 32.0    | 34.5    | 26      | 35.0    | 37.9    |
| 2         | 29.0    | 31.0    | 27      | 39.0    | 42.5    |
| 3         | 31.0    | 33.3    | 28      | 40.0    | 43.6    |
| 4         | 17.0    | 17.2    | 29      | 41.0    | 44.8    |
| 5         | 26.0    | 27.6    | 30      | 15.0    | 14.9    |
| 6         | 36.0    | 39.0    | 31      | 38.0    | 41.3    |
| 7         | 35.0    | 37.9    | 32      | 35.0    | 37.9    |
| 8         | 40.0    | 43.6    | 33      | 31.0    | 33.3    |
| 9         | 36.0    | 39.0    | 34      | 11.0    | 10.3    |
| 10        | 33.0    | 35.6    | 35      | 35.0    | 37.9    |
| 11        | 31.0    | 33.3    | 36      | 30.0    | 32.2    |
| 12        | 11.0    | 10.3    | 37      | 35.0    | 37.9    |
| 13        | 30.0    | 32.2    | 38      | 15.0    | 14.9    |
| 14        | 32.0    | 34.5    | 39      | 24.0    | 25.3    |
| 15        | 35.0    | 37.9    | 40      | 35.0    | 37.9    |
| 16        | 19.0    | 19.5    | 41      | 38.0    | 41.3    |
| 17        | 35.0    | 37.9    | 42      | 32.0    | 34.5    |
| 18        | 14.0    | 13.8    | 43      | 21.0    | 21.8    |
| 19        | 31.0    | 33.3    | 44      | 16.0    | 16.1    |
| 20        | 34.0    | 36.7    | 45      | 26.0    | 27.6    |
| 21        | 32.0    | 34.5    | 46      | 26.0    | 27.6    |
| 22        | 32.0    | 34.5    | 47      | 23.0    | 24.1    |
| 23        | 21.0    | 21.8    | 48      | 17.0    | 17.2    |
| 24        | 21.0    | 21.8    | 49      | 27.0    | 28.7    |
| 25        | 33.0    | 35.6    | 50      | 25.0    | 26.4    |
| averages: | 29.0    | 31.1    |         | 29.4    | 31.5    |

Drift Cal. Avg. VOC (ppm as propane) 31.3

**EPA Method 25A : Measurement of Total Organic Concentration Using a Flame Ionization Analyzer**

**Sample Calculations**

drift cal. ppm as propane

$$= \frac{[(\%FS \text{ analyzer stack value}) - (\%FS \text{ analyzer average 0 value})](\text{span gas value ppm})}{[(\%FS \text{ analyzer average span value}) - (\%FS \text{ analyzer average 0 value})]}$$

$$= \frac{(28.05 \%FS) - [(0.0 \%FS - 2.0 \%FS) / 2](40.1 \text{ ppm})}{[(39.5 \%FS + 39.5 \%FS) / 2] - [(0.0 \%FS - 2.0 \%FS) / 2]}$$

$$= 28.8 \text{ ppm VOC as propane}$$

VOC emissions (lb/hr)

$$= \frac{[\text{avg. VOC conc. (ppm)}](\text{stack flow (dscfm)})(60 \text{ min/hr})(28.317 \text{ liter/ft}^3)(44.09 \text{ g/mole})(2.205 \text{ lb/kg})}{(24.055 \text{ liters/mole @ STP})(1000 \text{ g/kg})(1 \times 10^6)(1 - \%H_2O/100)}$$

$$= \frac{(28.8 \text{ ppm})(1431 \text{ dscfm})(60)(28.317)(44.09)(2.205)}{(24.055)(1000)(1 \times 10^6)(1 - 0.5665)}$$

$$= 0.65 \text{ lb/hr VOC}$$



**Appendix 2**  
**Field Data**



|                           |                  |                            |          |
|---------------------------|------------------|----------------------------|----------|
| Plant                     | Comps Brewing Co | Date                       | 11-9-92  |
| Location                  | Grain Dryer      |                            |          |
| Operator                  | PO/MM            |                            |          |
| Run Number                | 1B               | Pilot Tube Coefficient     | .84      |
| Sample Box ID#            |                  | Meter Box ID#              |          |
| Meter Alt @               | 1.683            | C Factor                   |          |
| Pre-Test Pilot Leak Check | ✓                | Post-Test Pilot Leak Check | ✓        |
| Pre-Test Pump Leak Check  | 0.018 Hg         | Post-Test Pump Leak Check  | 0.018 Hg |

Air Pollution Testing, Inc.  
Schematic of Stack Cross Section

ID = 39 3/8"  
P = 38 1/4"  
A = 8672

|                                       |       |                             |      |
|---------------------------------------|-------|-----------------------------|------|
| CO <sub>2</sub> (%)                   | 0.0   | O <sub>2</sub> (%)          | 20.9 |
| Assumed Moisture (%)                  |       | Barometric Pressure (mbars) | 829  |
| Ambient Temperature (oF)              |       | Probe Material              | PTFE |
| Probe Length (ft)                     | 4     | Filler Temperature (oF)     | —    |
| Probe Temperature (oF)                | —     | Moisture (grams)            | 426  |
| Nozzle Diameter (in)                  | —     | Start Time                  | —    |
| Static Pressure (in H <sub>2</sub> O) | -0.28 | Stop Time                   | —    |
| Filler ID#                            | —     | Method                      | 1-4  |

| Transverse Point | Sampling Time (minutes) | Vacuum (in Hg) | Velocity Head (in H <sub>2</sub> O) | Pressure Differential (in H <sub>2</sub> O) | Gas Volume (ft <sup>3</sup> )<br>Initial Volume | Suck Temp. (oF) | Probe Temp. (oF) | Pilot Temp. (oF) | Inlet (oF)<br>Gas Temp. | Outlet (oF) | Condenser Temp. (oF) | Notes |
|------------------|-------------------------|----------------|-------------------------------------|---------------------------------------------|-------------------------------------------------|-----------------|------------------|------------------|-------------------------|-------------|----------------------|-------|
| 2-1              |                         |                | .025                                |                                             |                                                 | 174             |                  |                  |                         |             |                      |       |
| 2                |                         |                | .015                                |                                             |                                                 | 174             |                  |                  |                         |             |                      |       |
| 3                |                         |                | .015                                |                                             |                                                 | 173             |                  |                  |                         |             |                      |       |
| 4                |                         |                | .012                                |                                             |                                                 | 173             |                  |                  |                         |             |                      |       |
| 5                |                         |                | .015                                |                                             |                                                 | 174             |                  |                  |                         |             |                      |       |
| 6                |                         |                | .018                                |                                             |                                                 | 174             |                  |                  |                         |             |                      |       |
| 7                |                         |                | .020                                |                                             |                                                 | 174             |                  |                  |                         |             |                      |       |
| 8                |                         |                | .022                                |                                             |                                                 | 174             |                  |                  |                         |             |                      |       |
| 9                |                         |                | .018                                |                                             |                                                 | 175             |                  |                  |                         |             |                      |       |
| 10               |                         |                | .015                                |                                             |                                                 | 174             |                  |                  |                         |             |                      |       |
| 11               |                         |                | .014                                |                                             |                                                 | 174             |                  |                  |                         |             |                      |       |
| 12               |                         |                | .010                                |                                             |                                                 | 173             |                  |                  |                         |             |                      |       |
|                  |                         |                | 0.1278                              |                                             |                                                 | 173.83          |                  |                  |                         |             |                      |       |
|                  |                         |                | 0.1214                              |                                             |                                                 | 174             |                  |                  |                         |             |                      |       |

yd = 1.0389



Air Pollution Testing, Inc.  
Schematic of Stack Cross Section

|                                      |     |  |  |  |  |       |      |
|--------------------------------------|-----|--|--|--|--|-------|------|
| CO <sub>2</sub> (%)                  | 0.0 |  |  |  |  |       |      |
| Assumed Moisture (%)                 |     |  |  |  |  |       |      |
| Ambient Temperature (oF)             |     |  |  |  |  |       |      |
| Probe Length (ft)                    | 4   |  |  |  |  |       |      |
| Probe Temperature (oF)               |     |  |  |  |  |       |      |
| Moisture (grams)                     |     |  |  |  |  |       |      |
| Nozzle Diameter (in)                 |     |  |  |  |  |       |      |
| Subic Pressure (in H <sub>2</sub> O) |     |  |  |  |  | -0.78 |      |
| Filter ID#                           |     |  |  |  |  |       |      |
| Start Time                           |     |  |  |  |  |       |      |
| Stop Time                            |     |  |  |  |  |       |      |
| Method                               |     |  |  |  |  |       | 1-4  |
| Barometric Pressure (inbar)          |     |  |  |  |  |       | 82.9 |
| Probe Material                       |     |  |  |  |  |       | PTE  |
| Filter Temperature (oF)              |     |  |  |  |  |       |      |
| 20.9                                 |     |  |  |  |  |       |      |
| O <sub>2</sub> (%)                   |     |  |  |  |  |       |      |

[illegible]

Plant COORS Date 11-9-92

Location Grain Dryer

Operator mm/pe

Run Number 3A Pilot Tube Coefficient .84

Sample Box ID# 1.683 Meter Box ID# ✓

Meter Aff# 1.683 C Factor ✓

Pre-Test Pilot Leak Check 2 Post-Test Pilot Leak Check ✓

Pre-Test Pump Leak Check 0.0514 Post-Test Pump Leak Check 0.0814

Air Pollution Testing, Inc.  
Schematic of Stack Cross Section

D = 39 7/8"  
P = 3 1/8"  
A = 8.672"

CO2 (%) 0.0 O2 (%) 20.9

Assumed Moisture (%) 74 Barometric Pressure (mbar) 829

Ambient Temperature (oF) 4 Probe Material PTFE

Probe Length (ft) 4 Filler Temperature (oF) ✓

Probe Temperature (oF) ✓ Moisture (grams) ✓

Nozzle Diameter (in) ✓ Start Time 12:30

Static Pressure (in H2O) -0.28 Stop Time 13:00

Filler ID# 1-4 Method 1-4

| Traverse Point | Sampling Time (minutes) | Vacuum (in Hg) | Velocity Head (in H2O) | Pressure Differential (in H2O) | Gas Volume (ft3)<br>Initial Volume | Stack Temp. (oF) | Probe Temp. (oF) | Pilot Temp. (oF) | Gas Temp. Inlet (oF) Outlet (oF) | Condenser Temp. (oF) | Notes                                                       |
|----------------|-------------------------|----------------|------------------------|--------------------------------|------------------------------------|------------------|------------------|------------------|----------------------------------|----------------------|-------------------------------------------------------------|
| 1-1            | 10                      | 7.0            | 0.070                  | 1.7                            | 144.900                            | 174              |                  |                  | 90 87                            |                      | moisture (440mL) + (12g) 452<br>1st 10 min moisture stopped |
| 2              | 20                      | 8.5            | 0.085                  | 1.0                            | 155.500                            | 174              |                  |                  | 91 88                            |                      |                                                             |
| 3              | 30                      | 9.0            | 0.095                  | .93                            | 161.540                            | 174              |                  |                  | 91 87                            |                      |                                                             |
| 4              | 35                      | 9.5            | 0.095                  | .85                            | 164.515                            | 173              |                  |                  | 91 88                            |                      |                                                             |
| 5              |                         |                | 0.08                   |                                | 174.615                            | 174              |                  |                  |                                  |                      |                                                             |
| 6              |                         |                | 0.020                  |                                |                                    | 174              |                  |                  |                                  |                      |                                                             |
| 7              |                         |                | 0.021                  |                                |                                    | 173              |                  |                  |                                  |                      |                                                             |
| 8              |                         |                | 0.05                   |                                |                                    | 174              |                  |                  |                                  |                      |                                                             |
| 9              |                         |                | 0.08                   |                                |                                    | 174              |                  |                  |                                  |                      |                                                             |
| 10             |                         |                | 0.04                   |                                |                                    | 174              |                  |                  |                                  |                      |                                                             |
| 11             |                         |                | 0.02                   |                                |                                    | 175              |                  |                  |                                  |                      |                                                             |
| 12             |                         |                | 0.00                   |                                |                                    | 174              |                  |                  |                                  |                      |                                                             |
|                |                         |                |                        |                                |                                    | 173.9            |                  |                  |                                  |                      |                                                             |
|                |                         |                | 0.127                  |                                |                                    |                  |                  |                  |                                  |                      |                                                             |
|                |                         |                | 0.129                  |                                |                                    | 174              |                  |                  |                                  |                      |                                                             |

Air Pollution Testing, Inc.  
Schematic of Stack Cross Section

|                                       |      |
|---------------------------------------|------|
| CO <sub>2</sub> (%)                   | 0.0  |
| Assumed Moisture (%)                  |      |
| Ambient Temperature (°F)              | 4    |
| Probe Length (in)                     |      |
| Probe Temperature (°F)                |      |
| Moisture (grams)                      |      |
| Start Time                            |      |
| Stop Time                             |      |
| Static Pressure (in H <sub>2</sub> O) |      |
| Filter ID#                            |      |
| Method                                | 1-4  |
| Probe Material                        | PtFE |
| Barometric Pressure (inbar)           | 829  |
| O <sub>2</sub> (%)                    | 20.9 |

| Traverse Point Number | Sampling Time (minutes) | Vacuum (in Hg) | Velocity Head (in H <sub>2</sub> O) | Pressure Differential (in H <sub>2</sub> O) | Gas Volume (ft <sup>3</sup> ) Initial Volume | Stack Temp. (°F) | Probe Temp. (°F) | Pitot Temp. (°F) | Inlet (°F) Gas Temp. Outlet(°F) | Condenser Temp. (°F) | Notes |
|-----------------------|-------------------------|----------------|-------------------------------------|---------------------------------------------|----------------------------------------------|------------------|------------------|------------------|---------------------------------|----------------------|-------|
| 2-1                   |                         |                | .020                                |                                             |                                              | 174              |                  |                  |                                 |                      |       |
| 2                     |                         |                | .015                                |                                             |                                              | 173              |                  |                  |                                 |                      |       |
| 3                     |                         |                | .015                                |                                             |                                              | 174              |                  |                  |                                 |                      |       |
| 4                     |                         |                | .012                                |                                             |                                              | 174              |                  |                  |                                 |                      |       |
| 5                     |                         |                | .012                                |                                             |                                              | 174              |                  |                  |                                 |                      |       |
| 6                     |                         |                | .013                                |                                             |                                              | 174              |                  |                  |                                 |                      |       |
| 7                     |                         |                | .015                                |                                             |                                              | 175              |                  |                  |                                 |                      |       |
| 8                     |                         |                | .010                                |                                             |                                              | 175              |                  |                  |                                 |                      |       |
| 9                     |                         |                | .012                                |                                             |                                              | 174              |                  |                  |                                 |                      |       |
| 10                    |                         |                | .012                                |                                             |                                              | 175              |                  |                  |                                 |                      |       |
| 11                    |                         |                | .017                                |                                             |                                              | 175              |                  |                  |                                 |                      |       |
| 12                    |                         |                | .012                                |                                             |                                              | 175              |                  |                  |                                 |                      |       |
|                       |                         |                | 0.1167                              |                                             |                                              | 174.3            |                  |                  |                                 |                      |       |
|                       |                         |                | 0.1219                              |                                             |                                              | 174              |                  |                  |                                 |                      |       |

|                           |                            |
|---------------------------|----------------------------|
| Plan Coors                | Date 11-10-92              |
| Location 6041N Dwyer      |                            |
| Operator mm/PO            |                            |
| Run Number 19             | Pilot Tube Coefficient .84 |
| Sample Box ID#            | Meter Box ID#              |
| Meter ΔH 1.682            | C Factor                   |
| Pre-Test Pilot Leak Check | Post-Test Pilot Leak Check |
| Pre-Test Pump Leak Check  | Post-Test Pump Leak Check  |

yd = 10389

Air Pollution Testing, Inc.  
Schematic of Stack Cross Section

ID = 39.3"  
R = 3 1/8"  
A = 8672

|                          |       |                            |      |
|--------------------------|-------|----------------------------|------|
| CO2 (%)                  | 0     | O2 (%)                     | 20.9 |
| Assumed Moisture (%)     |       | Barometric Pressure (mbar) | 830  |
| Ambient Temperature (oF) |       | Probe Material             | RPE  |
| Probe Length (ft)        | 4     | Filter Temperature (oF)    |      |
| Probe Temperature (oF)   |       | Moisture (grams)           | 378  |
| Nozzle Diameter (in)     |       | Start Time                 |      |
| Static Pressure (in H2O) | -0.30 | Stop Time                  |      |
| Filter ID#               |       | Method                     | 1-4  |

| Traverse Point Number | Sampling Time (minutes) | Vacuum (in Hg) | Velocity Head (in H2O) | Pressure Differential (in H2O) | Gas Volume (ft3) Initial Volume | Stack Temp. (oF) | Probe Temp. (oF) | Pilot Temp. (oF) | Inlet (oF) Gas Temp. | Outlet(oF) | Condenser Temp. (oF) | Notes                                                                               |
|-----------------------|-------------------------|----------------|------------------------|--------------------------------|---------------------------------|------------------|------------------|------------------|----------------------|------------|----------------------|-------------------------------------------------------------------------------------|
| 1-1                   | 10                      | 17.5           | .015                   | 1.3                            | 215.845                         | 183              |                  |                  | 68                   | 61         |                      | moisture = 376 ml + 2g<br>= 378<br><br>ΔP read w/ Microfactor,<br>need factor of 2. |
| 2                     | 20                      | 17.5           | .013                   | .44                            | 222.450                         | 182              |                  |                  | 69                   | 62         |                      |                                                                                     |
| 3                     | 30                      | 21             | .008                   | .35                            | 225.96                          | 182              |                  |                  | 70                   | 61         |                      |                                                                                     |
| 4                     | 40                      | 21             | .006                   | .31                            | 229.15                          | 182              |                  |                  | 71                   | 63         |                      |                                                                                     |
| 5                     |                         |                | .006                   |                                | 232.006                         | 183              |                  |                  |                      |            |                      |                                                                                     |
| 6                     |                         |                | .007                   |                                |                                 | 182              |                  |                  |                      |            |                      |                                                                                     |
| 7                     |                         |                | .009                   |                                |                                 | 182              |                  |                  |                      |            |                      |                                                                                     |
| 8                     |                         |                | .006                   |                                |                                 | 183              |                  |                  |                      |            |                      |                                                                                     |
| 9                     |                         |                | .005                   |                                |                                 | 182              |                  |                  |                      |            |                      |                                                                                     |
| 10                    |                         |                | .007                   |                                |                                 | 182              |                  |                  |                      |            |                      |                                                                                     |
| 11                    |                         |                | .006                   |                                |                                 | 183              |                  |                  |                      |            |                      |                                                                                     |
| 12                    |                         |                | .004                   |                                |                                 | 183              |                  |                  |                      |            |                      |                                                                                     |
|                       |                         |                | .1216                  |                                |                                 | 182.5            |                  |                  |                      |            |                      |                                                                                     |
|                       |                         |                | .1258                  |                                |                                 | 183              |                  |                  |                      |            |                      |                                                                                     |

|                           |                  |                            |           |
|---------------------------|------------------|----------------------------|-----------|
| Plant                     | Coors Brewing Co | Date                       | 11-10-92  |
| Location                  | Brain Drift      |                            |           |
| Operator                  | PO / M H         |                            |           |
| Run Number                | 13               | Pilot Tube Coefficient     | .84       |
| Sample Box ID#            |                  | Meter Box ID#              |           |
| Meter ΔH <sub>0</sub>     | 1.683            | C Factor                   |           |
| Pre-Test Pilot Leak Check | ✓                | Post-Test Pilot Leak Check | ✓         |
| Pre-Test Pump Leak Check  | 0.018" Hg        | Post-Test Pump Leak Check  | 0.018" Hg |

$V_d = 1.0389$

|                                                                 |  |
|-----------------------------------------------------------------|--|
| Air Pollution Testing, Inc.<br>Schematic of Stack Cross Section |  |
|                                                                 |  |

|                                       |       |                           |      |
|---------------------------------------|-------|---------------------------|------|
| CO <sub>2</sub> (%)                   | 0.0   | O <sub>2</sub> (%)        | 20.9 |
| Assumed Moisture (%)                  |       | Barometric Pressure (mba) | 330  |
| Ambient Temperature (oF)              |       | Probe Material            | PTFE |
| Probe Length (ft)                     | 4     | Filter Temperature (oF)   | ✓    |
| Probe Temperature (oF)                | ✓     | Moisture (grams)          | 3.78 |
| Nozzle Diameter (in)                  | ✓     | Start Time                |      |
| Static Pressure (in H <sub>2</sub> O) | -0.30 | Stop Time                 |      |
| Filter ID#                            | ✓     | Method                    | 1-24 |

| Traverse Point Number | Sampling Time (minutes) | Vacuum (in Hg) | Velocity Head (in H <sub>2</sub> O) | Pressure Differential (in H <sub>2</sub> O) | Gas Volume (ft <sup>3</sup> )<br>Initial Volume | Stack Temp. (oF) | Probe Temp. (oF) | Filter Temp. (oF) | Inlet (oF)<br>Gas Temp. | Outlet (oF)<br>Condenser Temp. | Notes                                |
|-----------------------|-------------------------|----------------|-------------------------------------|---------------------------------------------|-------------------------------------------------|------------------|------------------|-------------------|-------------------------|--------------------------------|--------------------------------------|
| 2-1                   |                         |                | .011                                |                                             |                                                 | 183              |                  |                   |                         |                                | ΔP measured w/ microbar<br>(need x2) |
| 2                     |                         |                | .012                                |                                             |                                                 | 183              |                  |                   |                         |                                |                                      |
| 3                     |                         |                | .009                                |                                             |                                                 | 183              |                  |                   |                         |                                |                                      |
| 4                     |                         |                | .008                                |                                             |                                                 | 182              |                  |                   |                         |                                |                                      |
| 5                     |                         |                | .008                                |                                             |                                                 | 182              |                  |                   |                         |                                |                                      |
| 6                     |                         |                | .007                                |                                             |                                                 | 183              |                  |                   |                         |                                |                                      |
| 7                     |                         |                | .005                                |                                             |                                                 | 183              |                  |                   |                         |                                |                                      |
| 8                     |                         |                | .010                                |                                             |                                                 | 183              |                  |                   |                         |                                |                                      |
| 9                     |                         |                | .009                                |                                             |                                                 | 183              |                  |                   |                         |                                |                                      |
| 10                    |                         |                | .010                                |                                             |                                                 | 182              |                  |                   |                         |                                |                                      |
| 11                    |                         |                | .008                                |                                             |                                                 | 183              |                  |                   |                         |                                |                                      |
| 12                    |                         |                | .006                                |                                             |                                                 | 182              |                  |                   |                         |                                |                                      |
|                       |                         |                | .1301                               |                                             |                                                 | 182.17           |                  |                   |                         |                                |                                      |
|                       |                         |                | .1258                               |                                             |                                                 | 183              |                  |                   |                         |                                |                                      |



|                           |                  |                            |          |
|---------------------------|------------------|----------------------------|----------|
| Plant                     | Coors Brewing Co | Date                       | 11-10-92 |
| Location                  | Grain Dryer      |                            |          |
| Operator                  | PO/MM            |                            |          |
| Run Number                | 2B               | Pilot Tube Coefficient     | .84      |
| Sample Box ID#            |                  | Meter Box ID#              |          |
| Meter dH@                 | 1.683            | C Factor                   |          |
| Pre-Test Pilot Leak Check | ✓                | Post-Test Pilot Leak Check | ✓        |
| Pre-Test Pump Leak Check  | 0.0846           | Post-Test Pump Leak Check  | 0.0846   |

41 = 1.0389

Air Pollution Testing, Inc.  
Schematic of Stack Cross Section

ID = 39 7/8"  
R = 38 1/4"  
A = 8.672

|                                       |       |                            |      |
|---------------------------------------|-------|----------------------------|------|
| CO <sub>2</sub> (%)                   | 0.0   | O <sub>2</sub> (%)         | 20.9 |
| Assured Moisture (%)                  |       | Barometric Pressure (mbar) | 830  |
| Ambient Temperature (oF)              |       | Probe Material             | PTFE |
| Probe Length (ft)                     | 4     | Filter Temperature (oF)    | ✓    |
| Probe Temperature (oF)                | ✓     | Moisture (grams)           | 388  |
| Nozzle Diameter (in)                  | ✓     | Start Time                 |      |
| Static Pressure (in H <sub>2</sub> O) | -0.30 | Stop Time                  |      |
| Filter ID#                            | ✓     | Method                     | 1-4  |

| Traverse Point Number | Sampling Time (minutes) | Vacuum (in Hg) | Velocity Head (in H <sub>2</sub> O) | Pressure Differential (in H <sub>2</sub> O) | Gas Volume (ft <sup>3</sup> ) Initial Volume | Stack Temp. (oF) | Probe Temp. (oF) | Filter Temp. (oF) | Inlet Gas Temp. (oF) | Outlet Gas Temp. (oF) | Condenser Temp. (oF) | Notes                                  |
|-----------------------|-------------------------|----------------|-------------------------------------|---------------------------------------------|----------------------------------------------|------------------|------------------|-------------------|----------------------|-----------------------|----------------------|----------------------------------------|
| 2-1                   |                         |                | .010                                |                                             |                                              | 180              |                  |                   |                      |                       |                      | AP measured by Microtherm<br>(0.8 x 2) |
| 2                     |                         |                | .011                                |                                             |                                              | 180              |                  |                   |                      |                       |                      |                                        |
| 3                     |                         |                | .008                                |                                             |                                              | 181              |                  |                   |                      |                       |                      |                                        |
| 4                     |                         |                | .008                                |                                             |                                              | 180              |                  |                   |                      |                       |                      |                                        |
| 5                     |                         |                | .007                                |                                             |                                              | 180              |                  |                   |                      |                       |                      |                                        |
| 6                     |                         |                | .006                                |                                             |                                              | 181              |                  |                   |                      |                       |                      |                                        |
| 7                     |                         |                | .006                                |                                             |                                              | 180              |                  |                   |                      |                       |                      |                                        |
| 8                     |                         |                | .009                                |                                             |                                              | 180              |                  |                   |                      |                       |                      |                                        |
| 9                     |                         |                | .010                                |                                             |                                              | 179              |                  |                   |                      |                       |                      |                                        |
| 10                    |                         |                | .009                                |                                             |                                              | 179              |                  |                   |                      |                       |                      |                                        |
| 11                    |                         |                | .009                                |                                             |                                              | 180              |                  |                   |                      |                       |                      |                                        |
| 12                    |                         |                | .007                                |                                             |                                              | 180              |                  |                   |                      |                       |                      |                                        |
|                       |                         |                | <del>.1238</del> .1285              |                                             |                                              | 180              |                  |                   |                      |                       |                      |                                        |
|                       |                         |                | .1238                               |                                             |                                              | 180              |                  |                   |                      |                       |                      |                                        |

|                           |                  |                            |          |
|---------------------------|------------------|----------------------------|----------|
| Plant                     | Cross Brewing Co | Date                       | 11-10-92 |
| Location                  | Grain Dryer      |                            |          |
| Operator                  | DO/AMM           |                            |          |
| Run Number                | 3A               | Pilot Tube Coefficient     | .84      |
| Sample Box ID#            |                  | Merit Box ID#              |          |
| Meter ΔH <sub>0</sub>     | 1.683            | C Factor                   |          |
| Pre-Test Pilot Leak Check | ✓                | Post-Test Pilot Leak Check | ✓        |
| Pre-Test Pump Leak Check  | 0018'44"         | Post-Test Pump Leak Check  | 0018'44" |

Air Pollution Testing, Inc.  
Schematic of Stack Cross Section

ID = 39 7/8"  
P = 3 1/8"  
A = 8672

|                                       |       |                            |      |
|---------------------------------------|-------|----------------------------|------|
| CO <sub>2</sub> (%)                   | 0.0   | O <sub>2</sub> (%)         | 20.9 |
| Assumed Moisture (%)                  |       | Barometric Pressure (mbar) | 830  |
| Ambient Temperature (oF)              |       | Probe Material             | PTFE |
| Probe Length (ft)                     | 4     | Filter Temperature (oF)    |      |
| Probe Temperature (oF)                |       | Moisture (grams)           |      |
| Nozzle Diameter (in)                  |       | Start Time                 |      |
| Static Pressure (in H <sub>2</sub> O) | -0.30 | Stop Time                  |      |
| Filter ID#                            |       | Method                     | 1-4  |

| Traverse Point Number | Sampling Time (minutes) | Vacuum (in Hg) | Velocity Head (in H <sub>2</sub> O) | Pressure Differential (in H <sub>2</sub> O) | Gas Volume (ft <sup>3</sup> ) Initial Volume | Stack Temp. (oF) | Probe Temp. (oF) | Filter Temp. (oF) | Inlet (oF) Gas Temp. Outlet(oF) | Condenser Temp. (oF) | Notes                               |
|-----------------------|-------------------------|----------------|-------------------------------------|---------------------------------------------|----------------------------------------------|------------------|------------------|-------------------|---------------------------------|----------------------|-------------------------------------|
| 1-1                   |                         |                | 1009                                |                                             |                                              | 178              |                  |                   |                                 |                      | ΔP measured w/ microbar<br>(5e x 2) |
| 2                     |                         |                | 1009                                |                                             |                                              | 178              |                  |                   |                                 |                      |                                     |
| 3                     |                         |                | 1006                                |                                             |                                              | 178              |                  |                   |                                 |                      |                                     |
| 4                     |                         |                | 1007                                |                                             |                                              | 179              |                  |                   |                                 |                      |                                     |
| 5                     |                         |                | 1005                                |                                             |                                              | 179              |                  |                   |                                 |                      |                                     |
| 6                     |                         |                | 1008                                |                                             |                                              | 178              |                  |                   |                                 |                      |                                     |
| 7                     |                         |                | 1006                                |                                             |                                              | 178              |                  |                   |                                 |                      |                                     |
| 8                     |                         |                | 1007                                |                                             |                                              | 179              |                  |                   |                                 |                      |                                     |
| 9                     |                         |                | 1006                                |                                             |                                              | 178              |                  |                   |                                 |                      |                                     |
| 10                    |                         |                | 1010                                |                                             |                                              | 178              |                  |                   |                                 |                      |                                     |
| 11                    |                         |                | 1006                                |                                             |                                              | 179              |                  |                   |                                 |                      |                                     |
| 12                    |                         |                | 1005                                |                                             |                                              | 178              |                  |                   |                                 |                      |                                     |
|                       |                         |                | 1117.0                              |                                             |                                              | 178.33           |                  |                   |                                 |                      |                                     |
|                       |                         |                | 1240                                |                                             |                                              | 178              |                  |                   |                                 |                      |                                     |





81165

## AIR POLLUTION TESTING, INC.

4535 West 68th Avenue • Westminster, CO 80030 (303) 426-0402 Fax (303) 426-1922

Client Coors Brewing Co.

Plant Golden, CO

Date 11-9-92 / 11-10-92

Analyst PO/MM

|          |             |      |      |                 |     |                                  |      |                |
|----------|-------------|------|------|-----------------|-----|----------------------------------|------|----------------|
| Location | Grain Dryer | Date | 11-9 | CO <sub>2</sub> | 0.0 | CO <sub>2</sub> + O <sub>2</sub> | 20.9 | O <sub>2</sub> |
| Run #    | 1           |      |      |                 | 0.0 |                                  | 20.8 |                |
| Notes    |             |      |      |                 | 0.0 |                                  | 20.9 |                |
|          |             |      |      |                 | 0.0 |                                  |      | 20.9           |

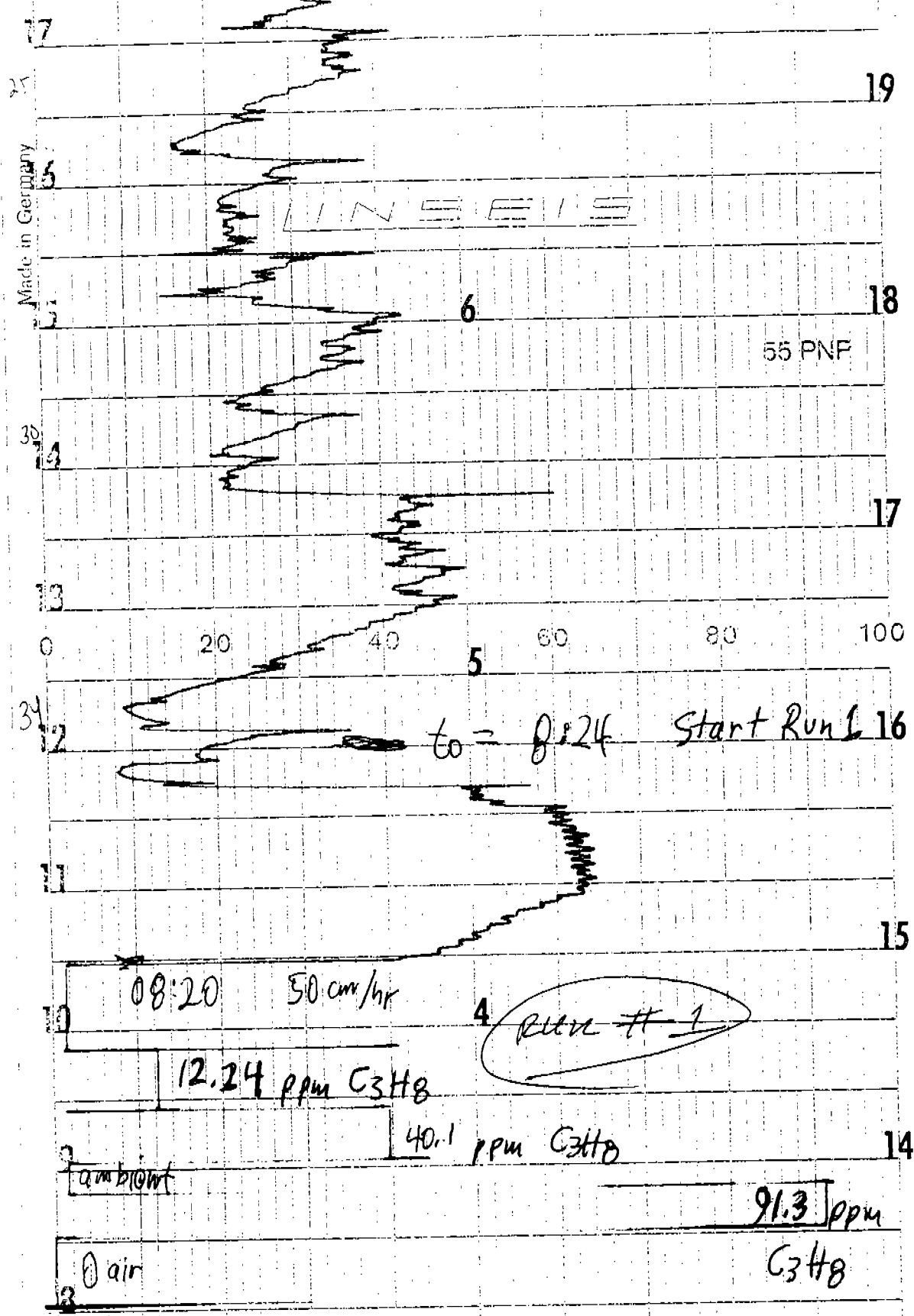
|          |             |      |      |                 |     |                                  |      |                |
|----------|-------------|------|------|-----------------|-----|----------------------------------|------|----------------|
| Location | Grain Dryer | Date | 11-9 | CO <sub>2</sub> | 0.0 | CO <sub>2</sub> + O <sub>2</sub> | 20.9 | O <sub>2</sub> |
| Run #    | 2           |      |      |                 | 0.0 |                                  | 20.9 |                |
| Notes    |             |      |      |                 |     |                                  |      |                |
|          |             |      |      |                 | 0.0 |                                  |      | 20.9           |

|          |             |      |      |                 |      |                                  |      |                |
|----------|-------------|------|------|-----------------|------|----------------------------------|------|----------------|
| Location | Grain Dryer | Date | 11-9 | CO <sub>2</sub> | -0.1 | CO <sub>2</sub> + O <sub>2</sub> | 20.8 | O <sub>2</sub> |
| Run #    | 3           |      |      |                 | 0.0  |                                  | 20.9 |                |
| Notes    |             |      |      |                 | 0.0  |                                  | 20.9 |                |
|          |             |      |      |                 | 0.0  |                                  |      | 20.9           |

|          |             |      |       |                 |     |                                  |      |                |
|----------|-------------|------|-------|-----------------|-----|----------------------------------|------|----------------|
| Location | Grain Dryer | Date | 11-10 | CO <sub>2</sub> | 0.1 | CO <sub>2</sub> + O <sub>2</sub> | 20.9 | O <sub>2</sub> |
| Run #    | 1           |      |       |                 | 0.0 |                                  | 20.9 |                |
| Notes    |             |      |       |                 | 0.0 |                                  | 20.9 |                |
|          |             |      |       |                 | 0.0 |                                  |      | 20.9           |

|          |             |      |       |                 |     |                                  |      |                |
|----------|-------------|------|-------|-----------------|-----|----------------------------------|------|----------------|
| Location | Grain Dryer | Date | 11-10 | CO <sub>2</sub> | 0.0 | CO <sub>2</sub> + O <sub>2</sub> | 20.4 | O <sub>2</sub> |
| Run #    | 2           |      |       |                 | 0.0 |                                  | 20.9 |                |
| Notes    |             |      |       |                 | 0.0 |                                  | 20.9 |                |
|          |             |      |       |                 | 0.0 |                                  |      | 20.9           |

|          |             |      |       |                 |     |                                  |      |                |
|----------|-------------|------|-------|-----------------|-----|----------------------------------|------|----------------|
| Location | Grain Dryer | Date | 11-10 | CO <sub>2</sub> | 0.1 | CO <sub>2</sub> + O <sub>2</sub> | 21.0 | O <sub>2</sub> |
| Run #    | 3           |      |       |                 | 0.0 |                                  | 20.9 |                |
| Notes    |             |      |       |                 | 0.0 |                                  | 20.9 |                |
|          |             |      |       |                 | 0.0 |                                  |      | 20.9           |



Coors Brewing Company

Grain Dryer

11-9-92

m25 A

...

7

17

100

24

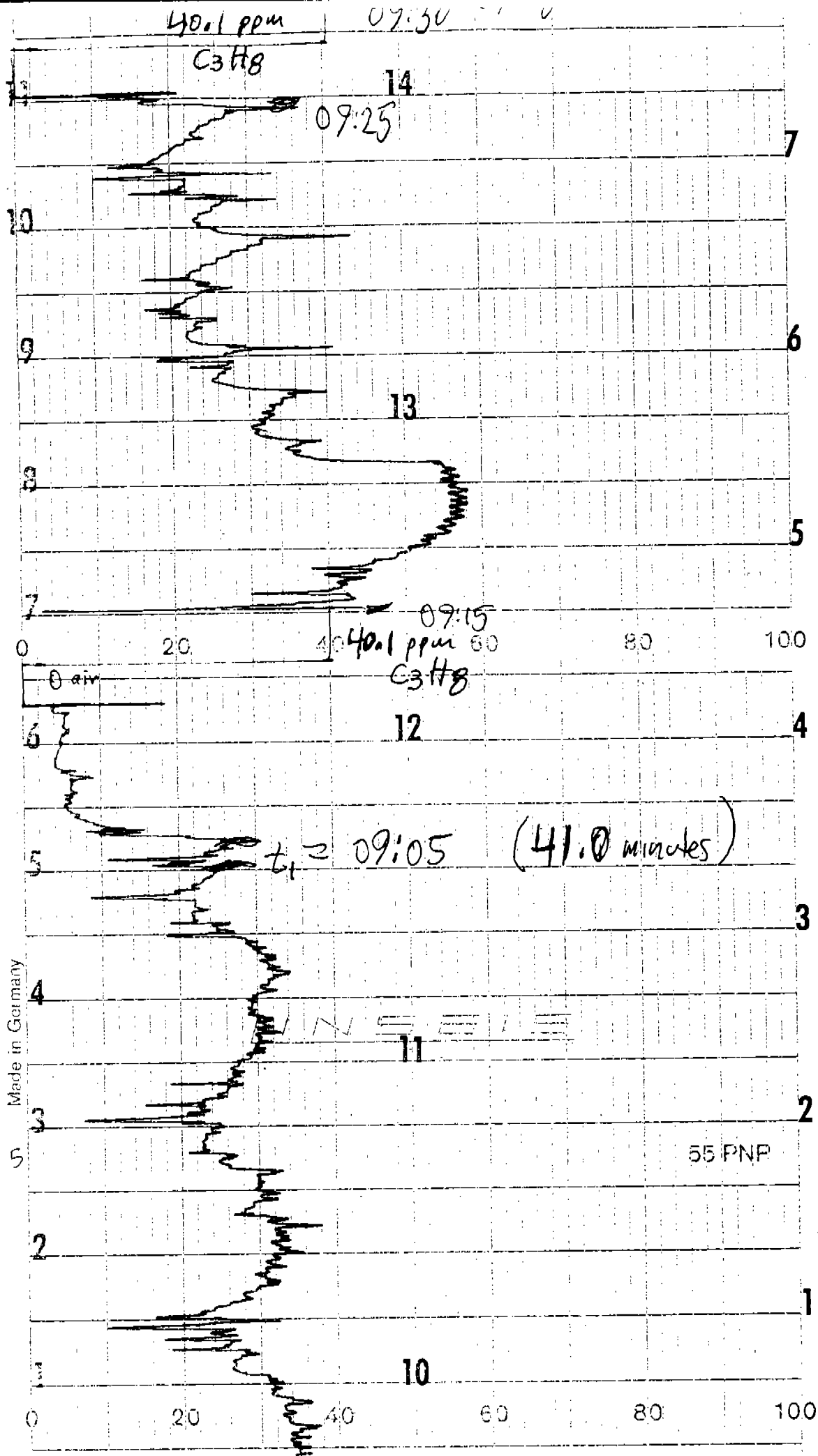
23

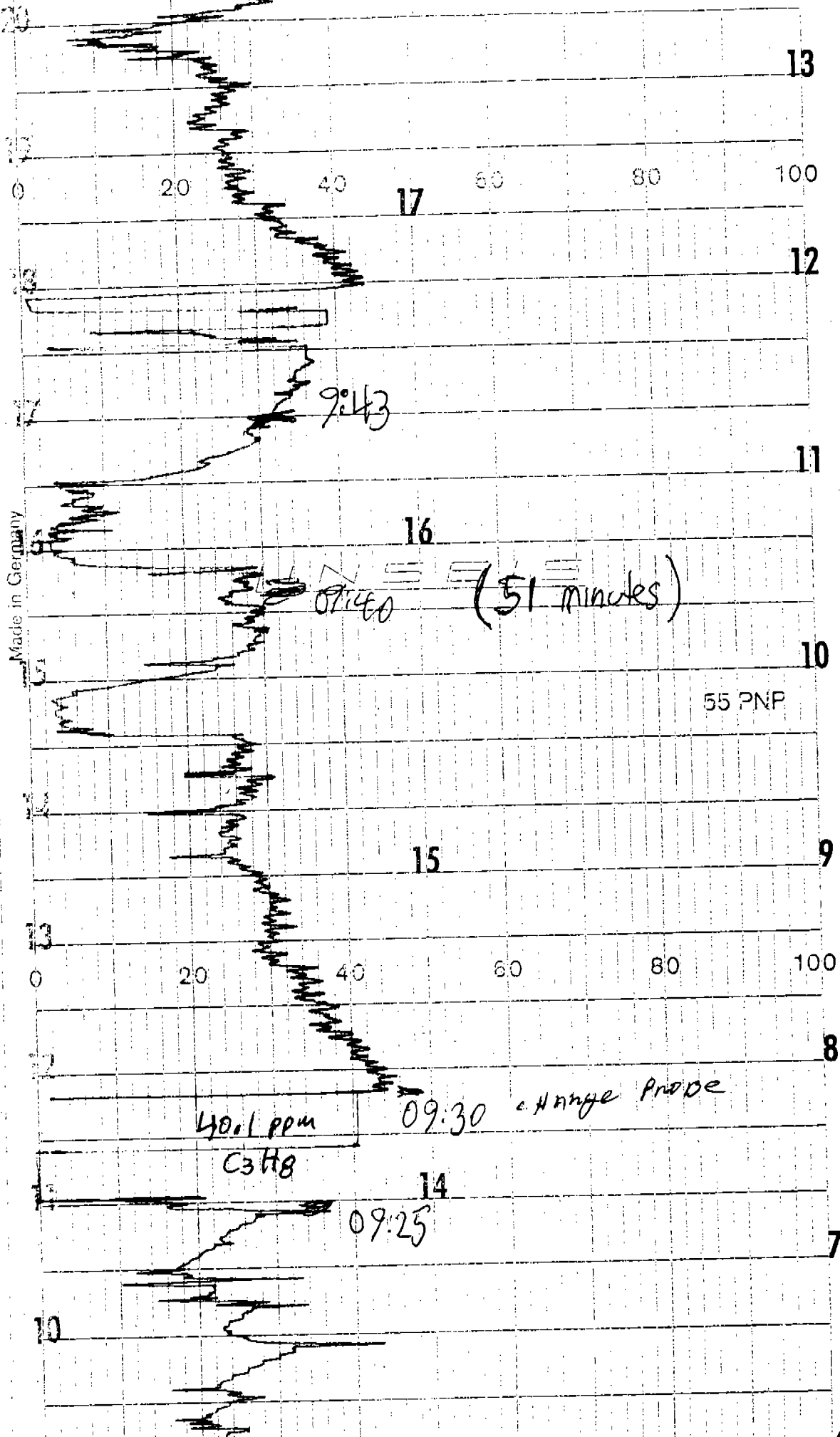
22

21

20

1





Made in Germany

9:43

09:40 (51 minutes)

55 PNP

40.1 ppm  
C<sub>3</sub>H<sub>8</sub>

09:30 change probe

09:25

Made in Germany

LINSEIS

55 PNP

20

10.00 Start Run 2

40.1 ppm  
 $C_3H_8$

0 air

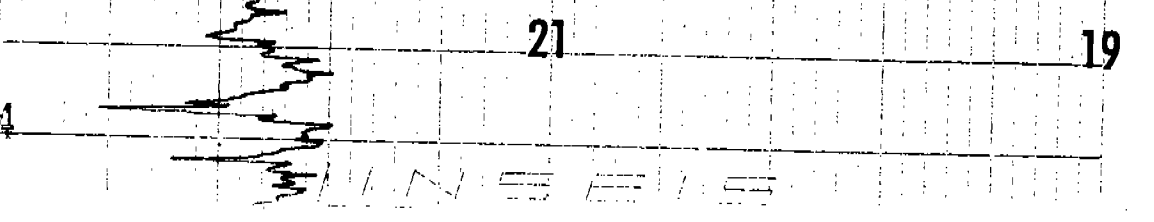
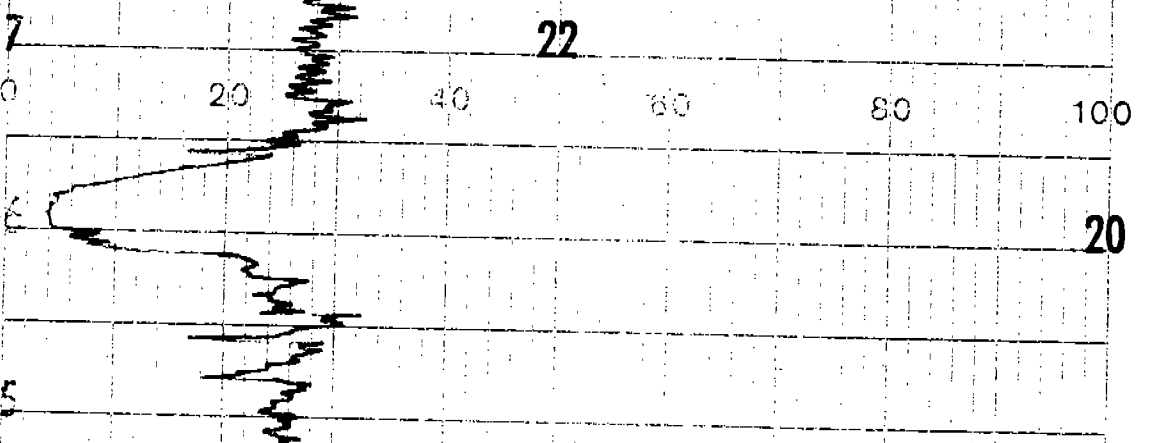
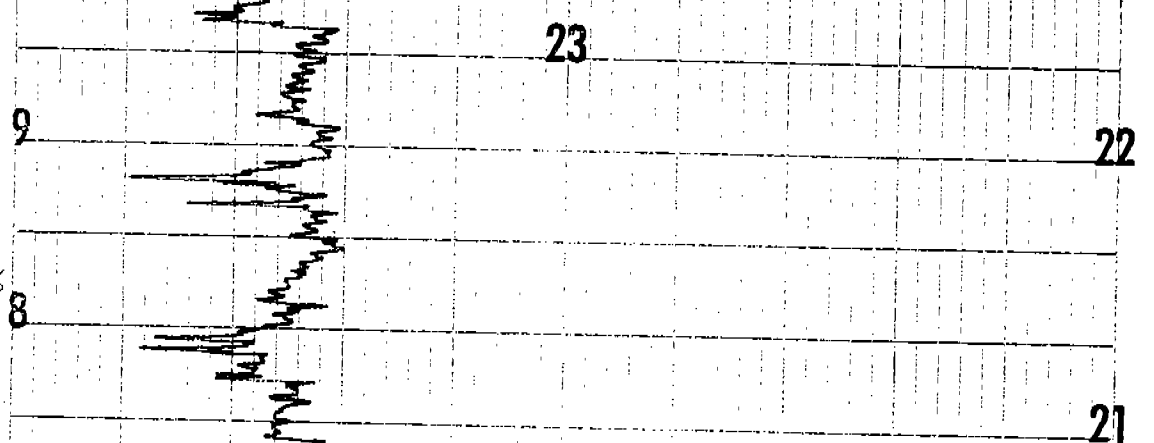
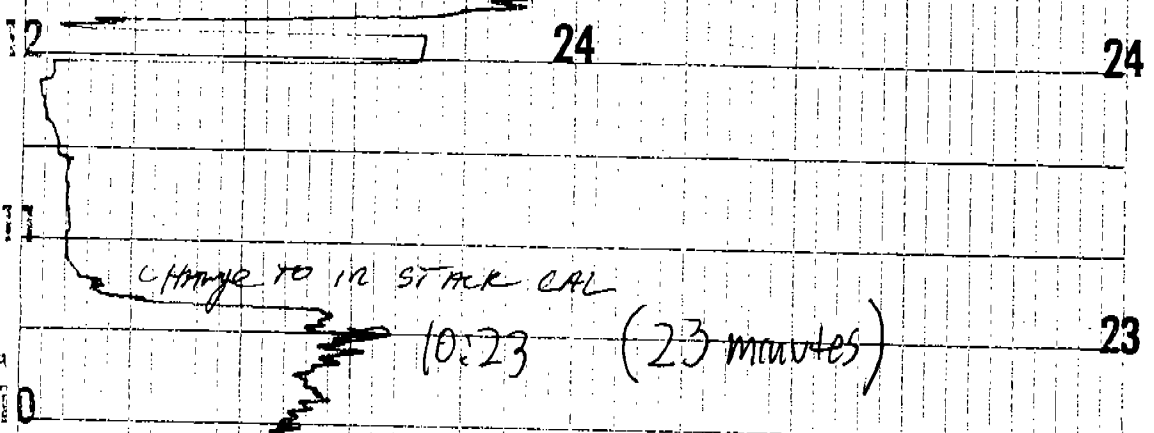
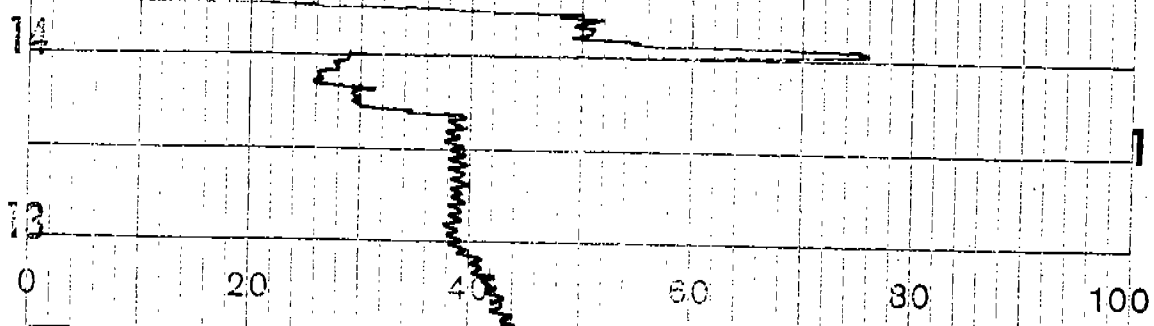
0 air post-test

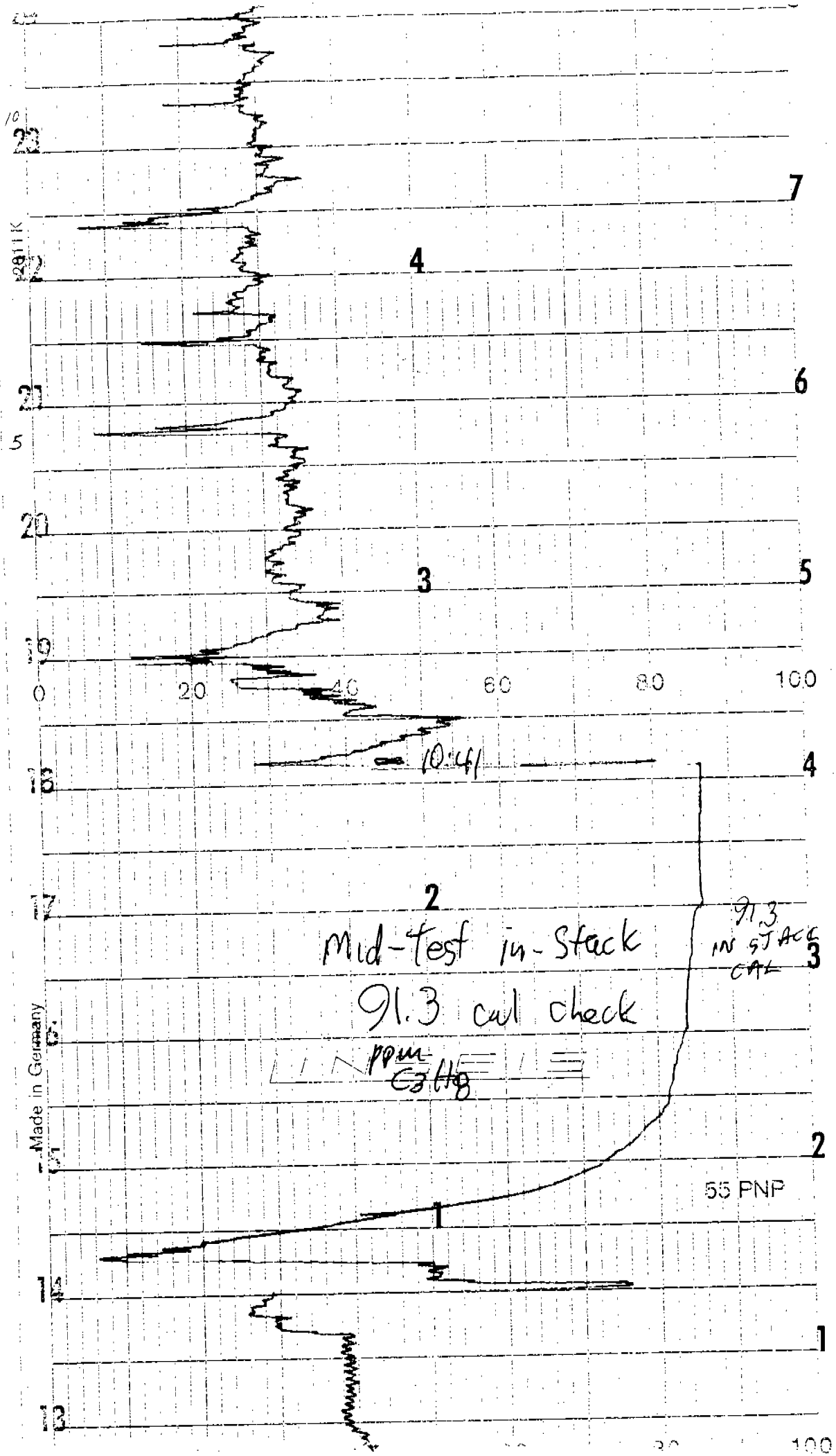
40.1 ppm  $C_3H_8$

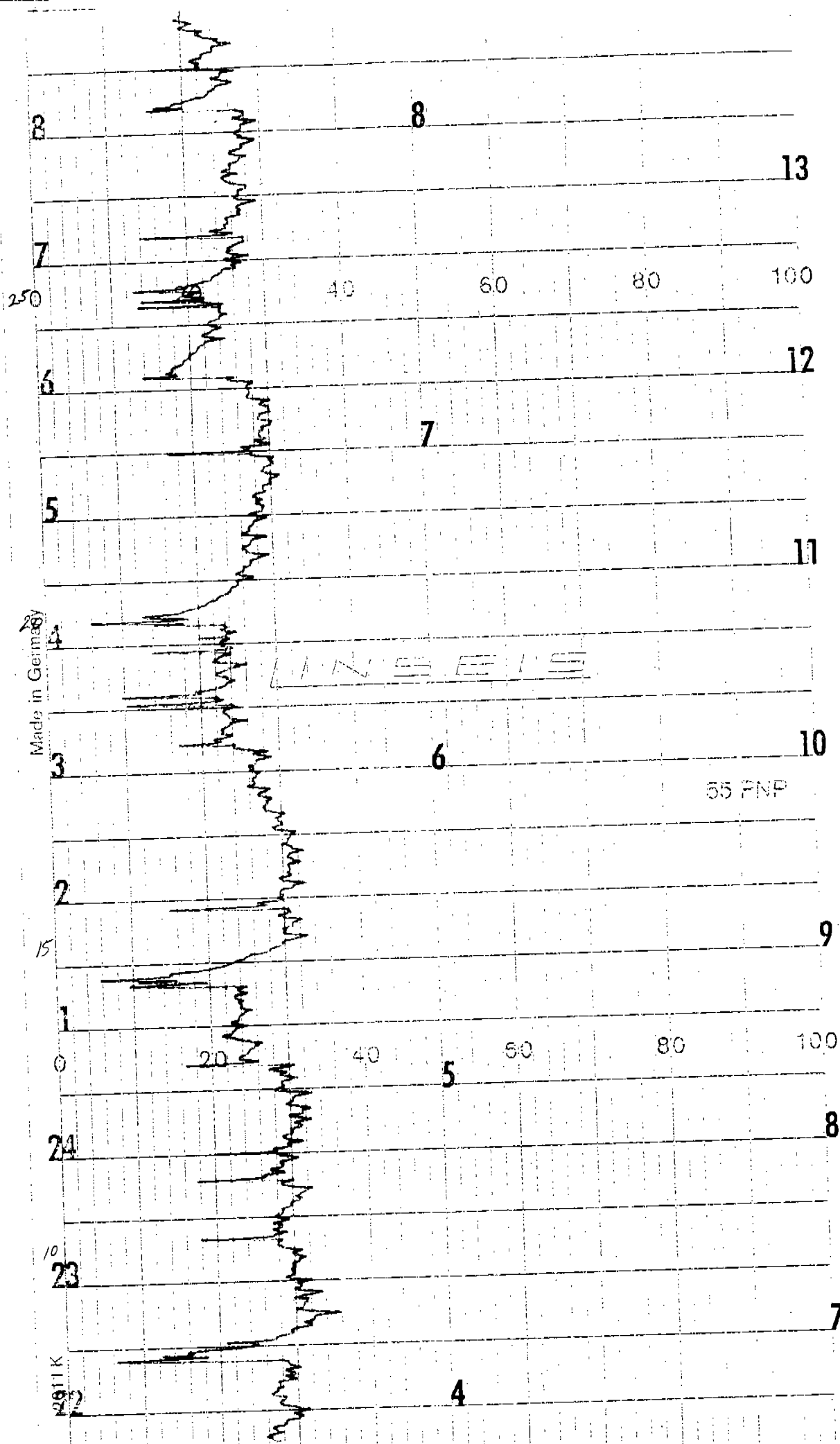
End Run 1

(60 minutes)

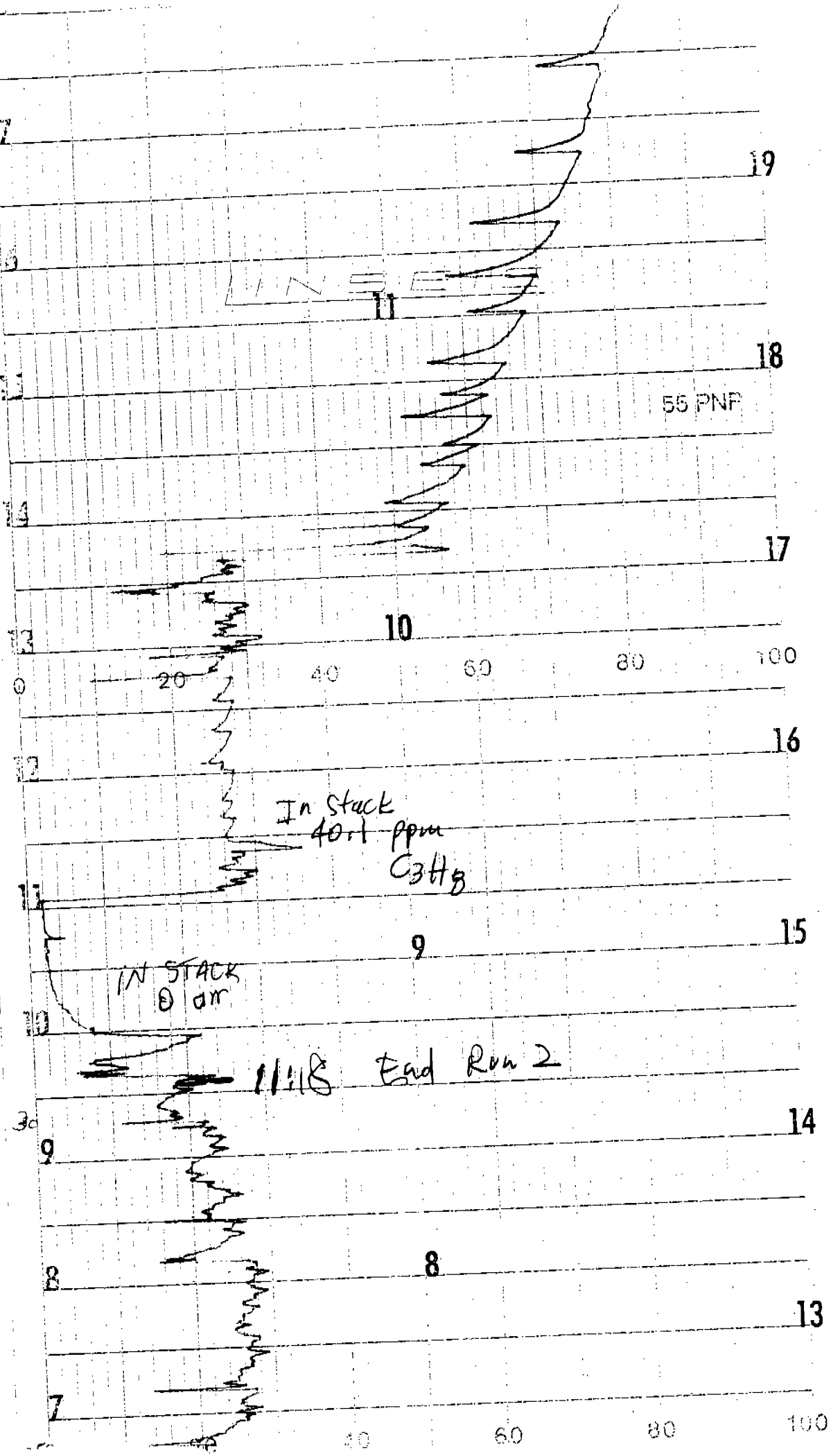
55 PNP

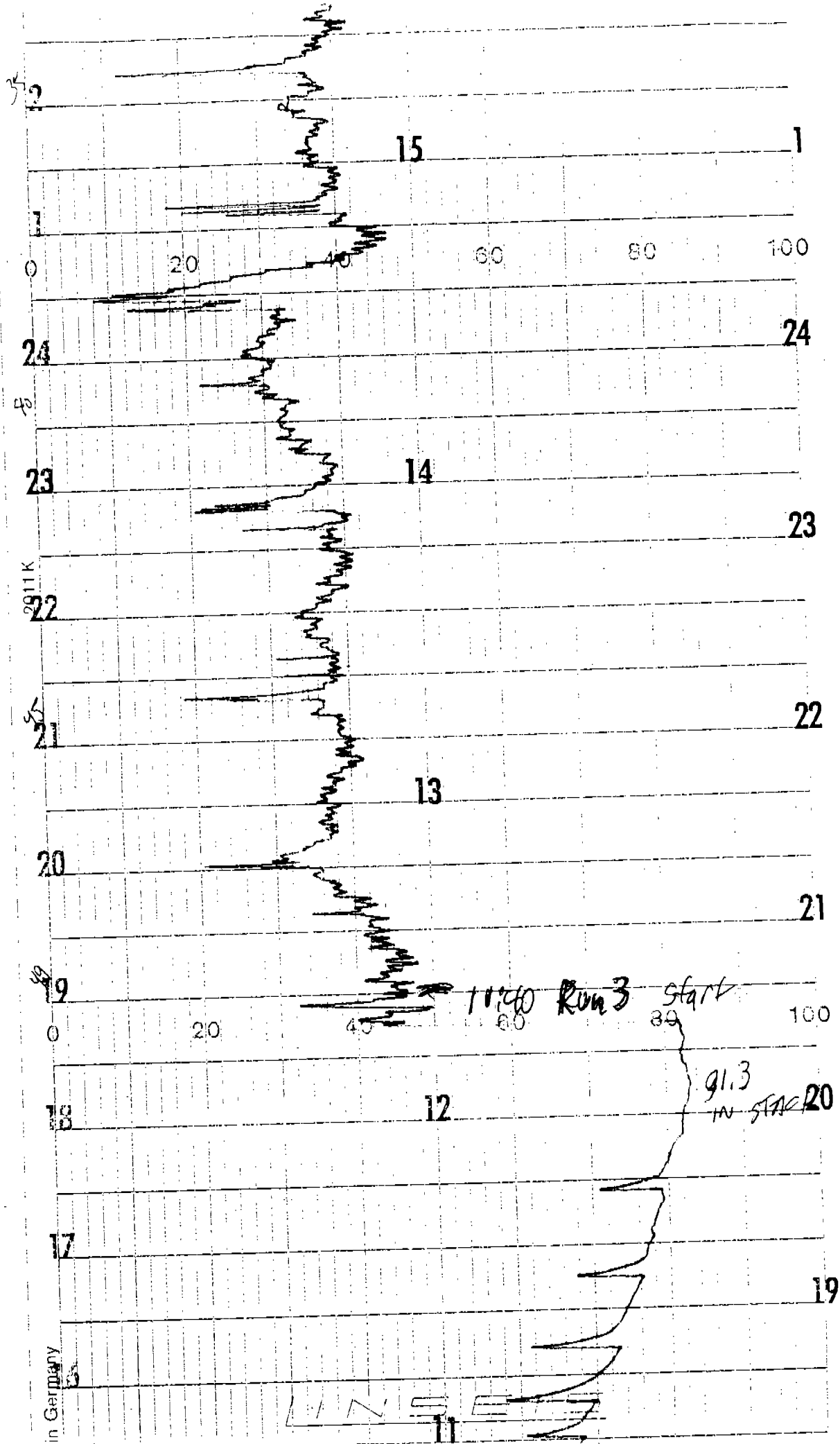


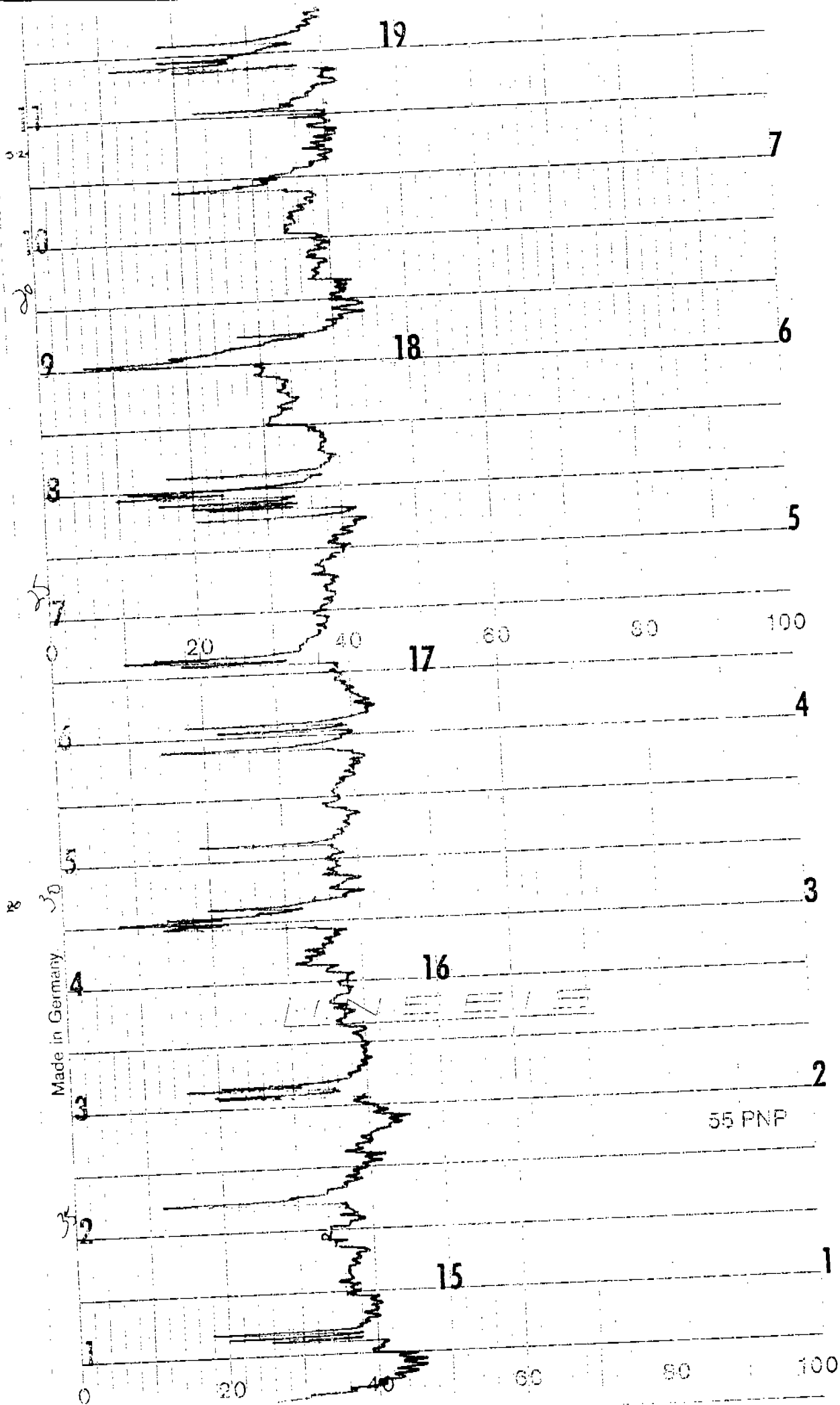


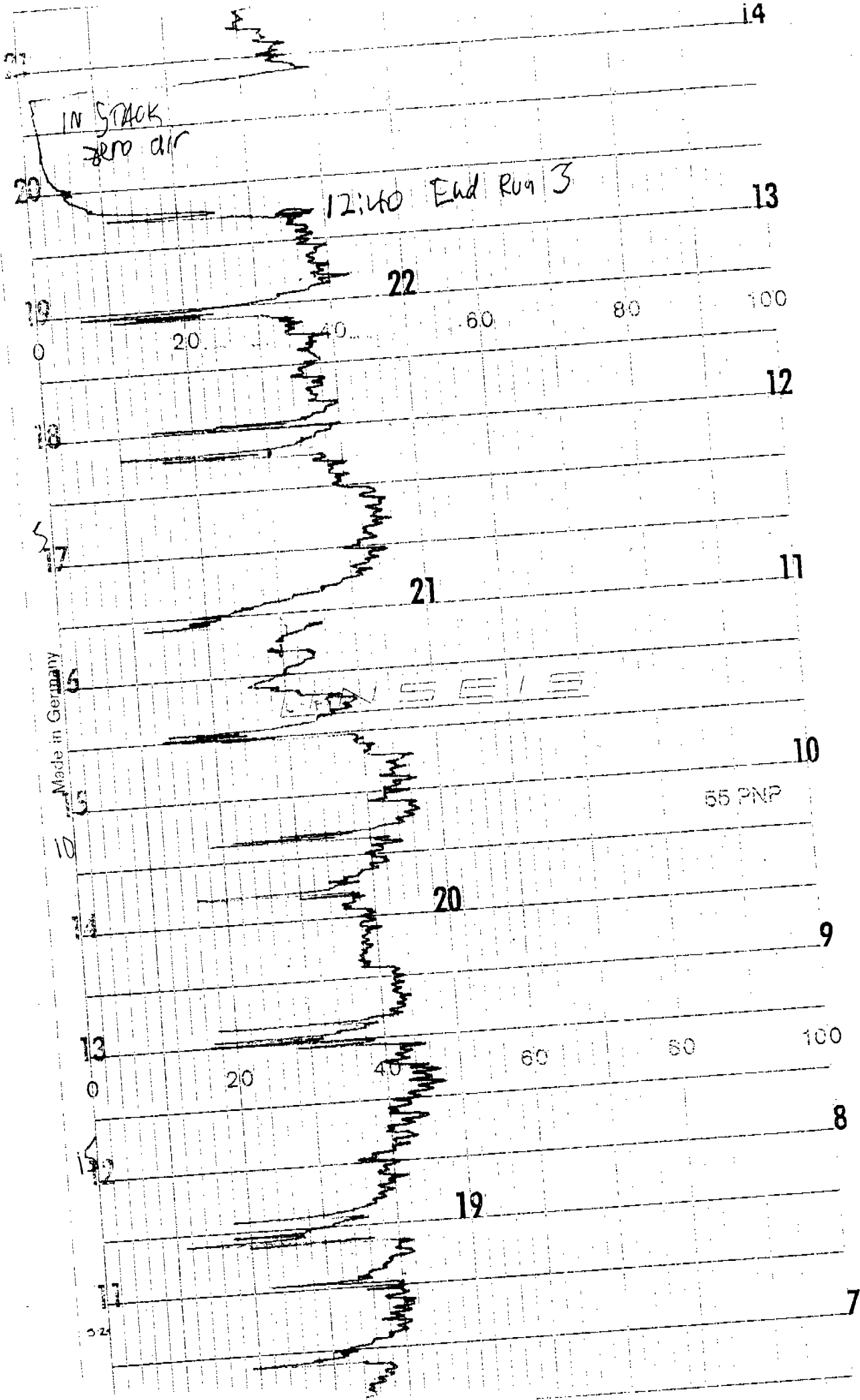


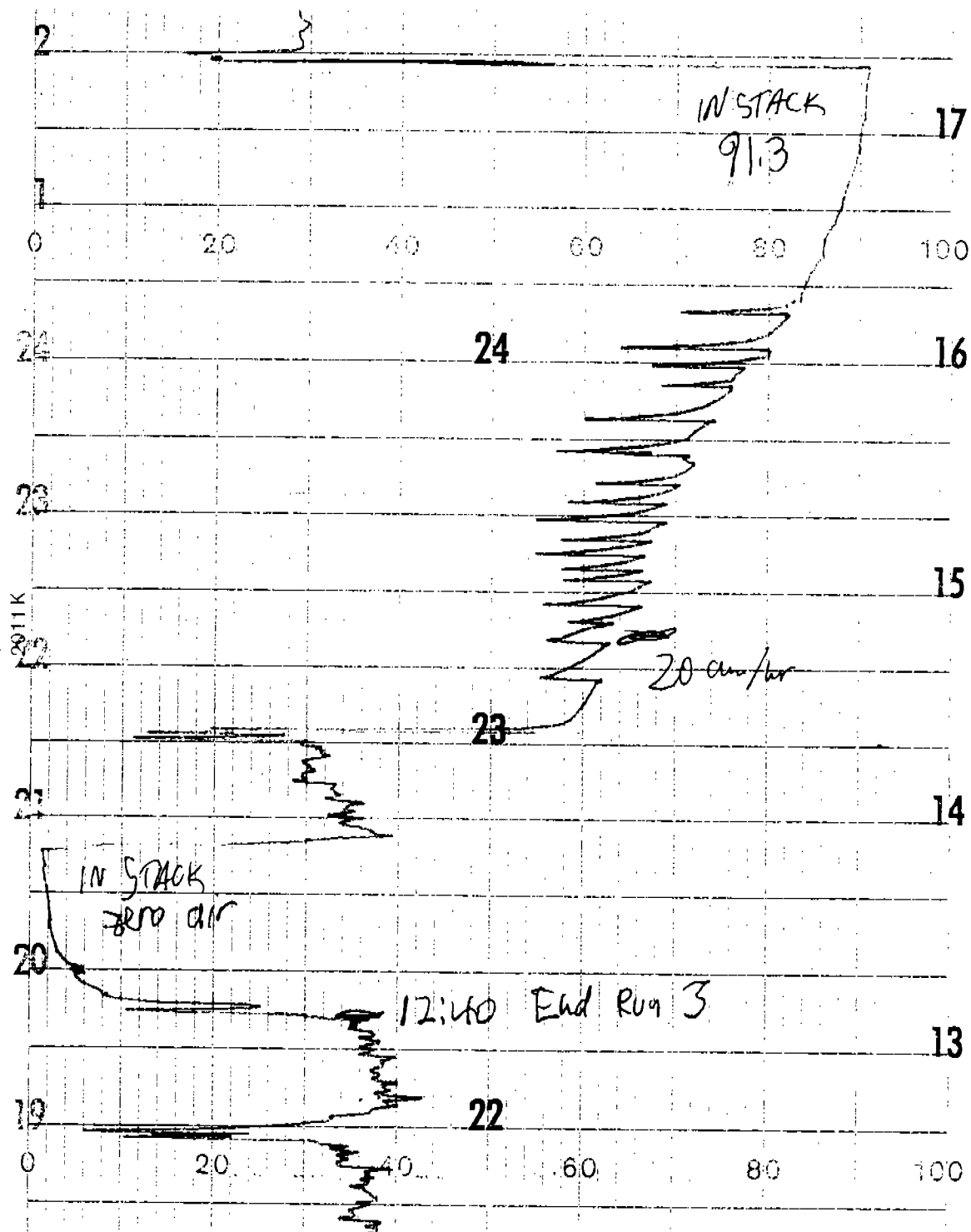
Made in Germany

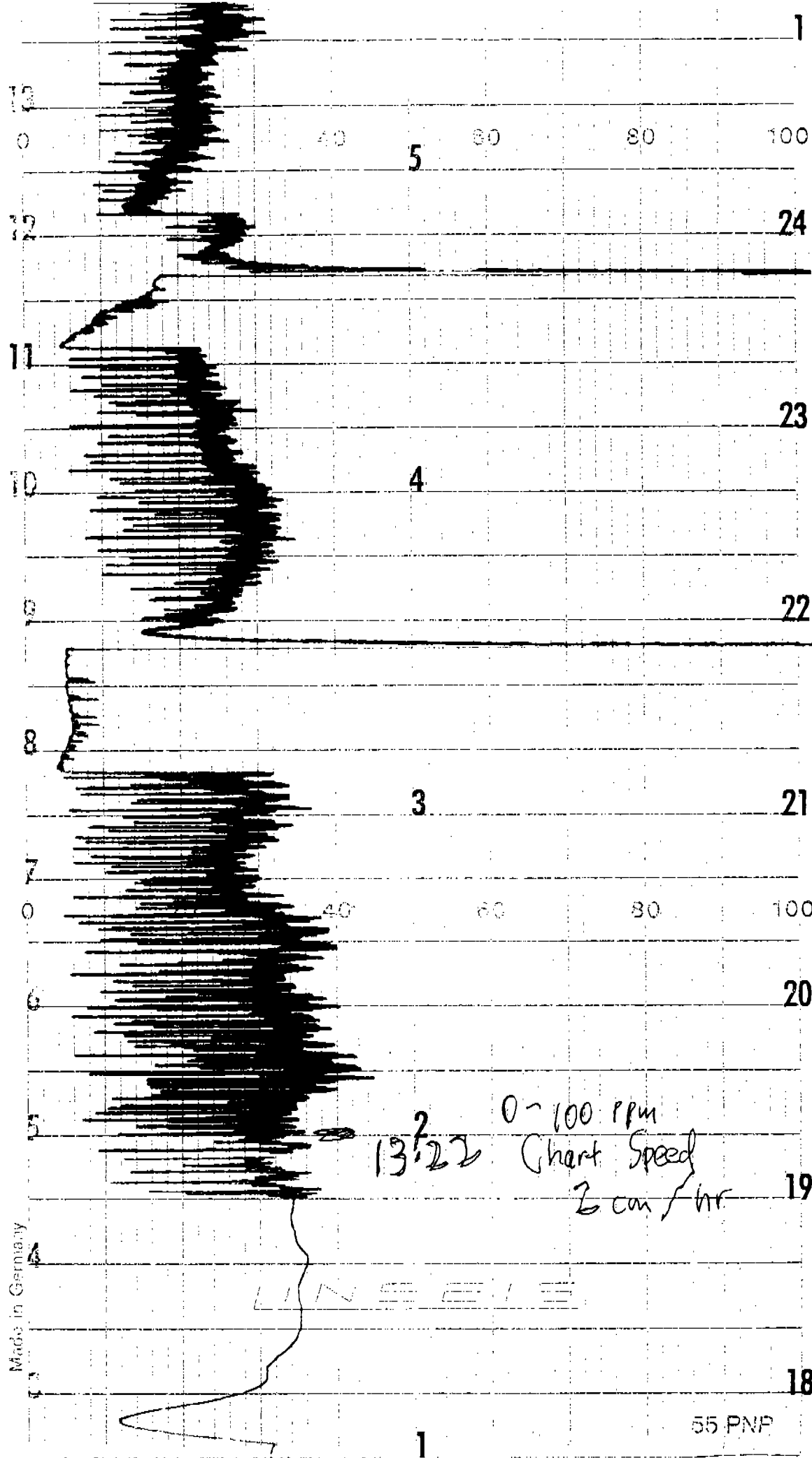












Made in Germany

LISE

0-100 ppm  
Chart Speed  
2 cm/hr

55 PNP

0

20

40

60

80

100

24

air

11-10-92

Grain Dryer

07:42  
Start Run 1

91.3

Appm GPH 8

113 road  
91.3

8

4 read

07:38

9

7

22

21

6

20

8

5

19

0

40

60

80

100

18

4

7

17

3

16

15

14

13

12

11

10

9

Made in Germany

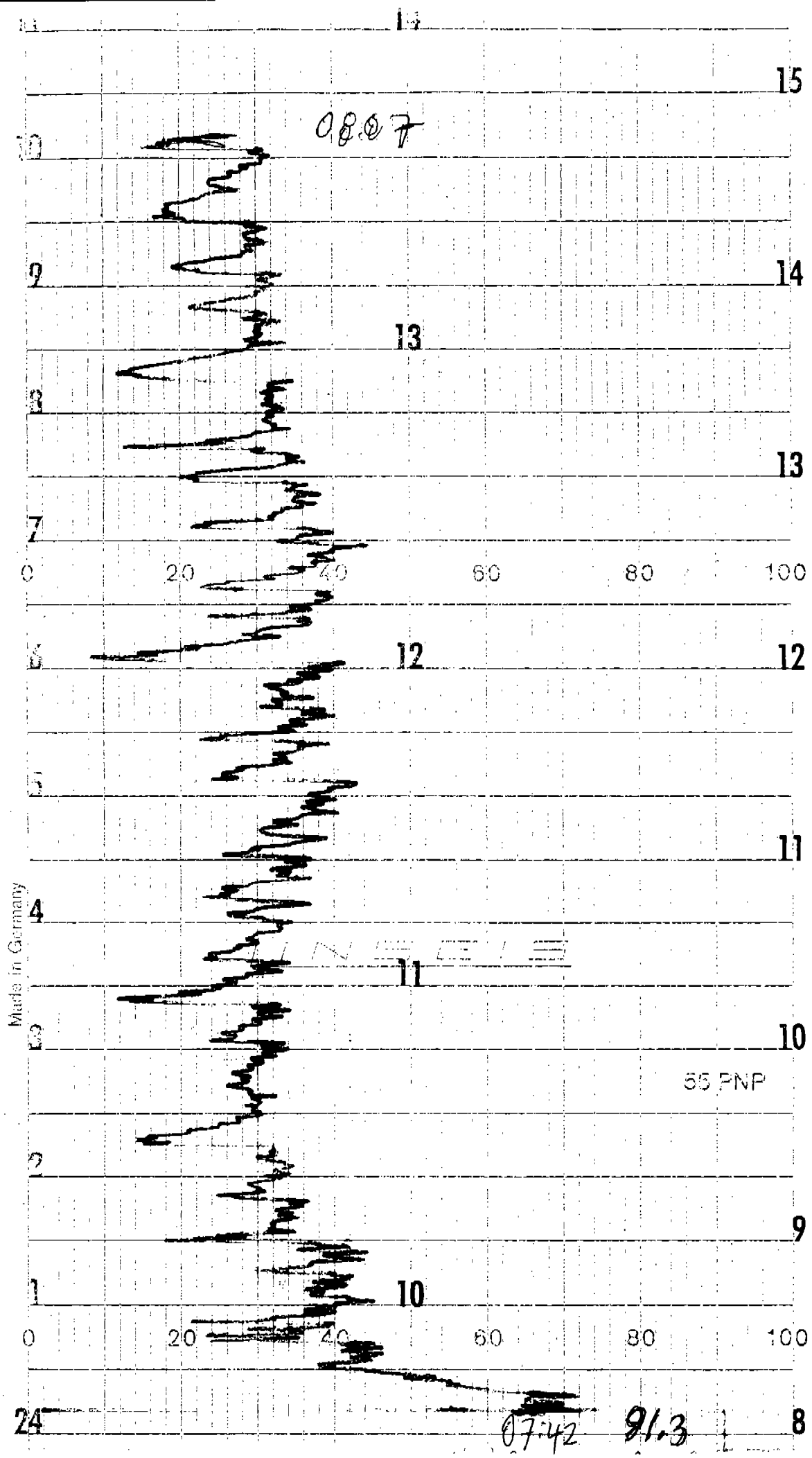
INSEIS

6

2

55 PNP

1



PART NO. 10/5015

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100 80 60 40 20 0

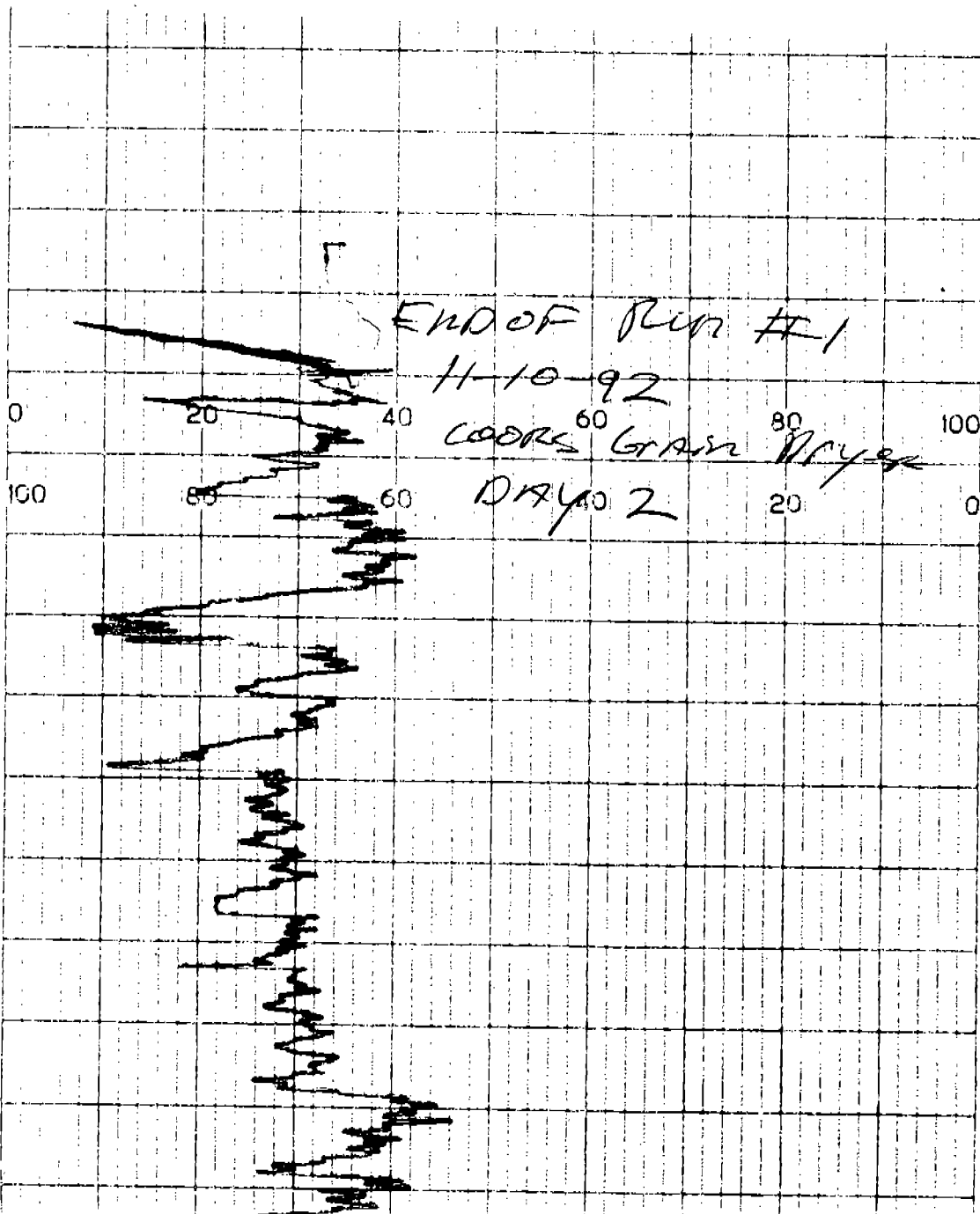
08:12

INSEIS

Coors Brewing Co  
Grain Drier  
11-10-92

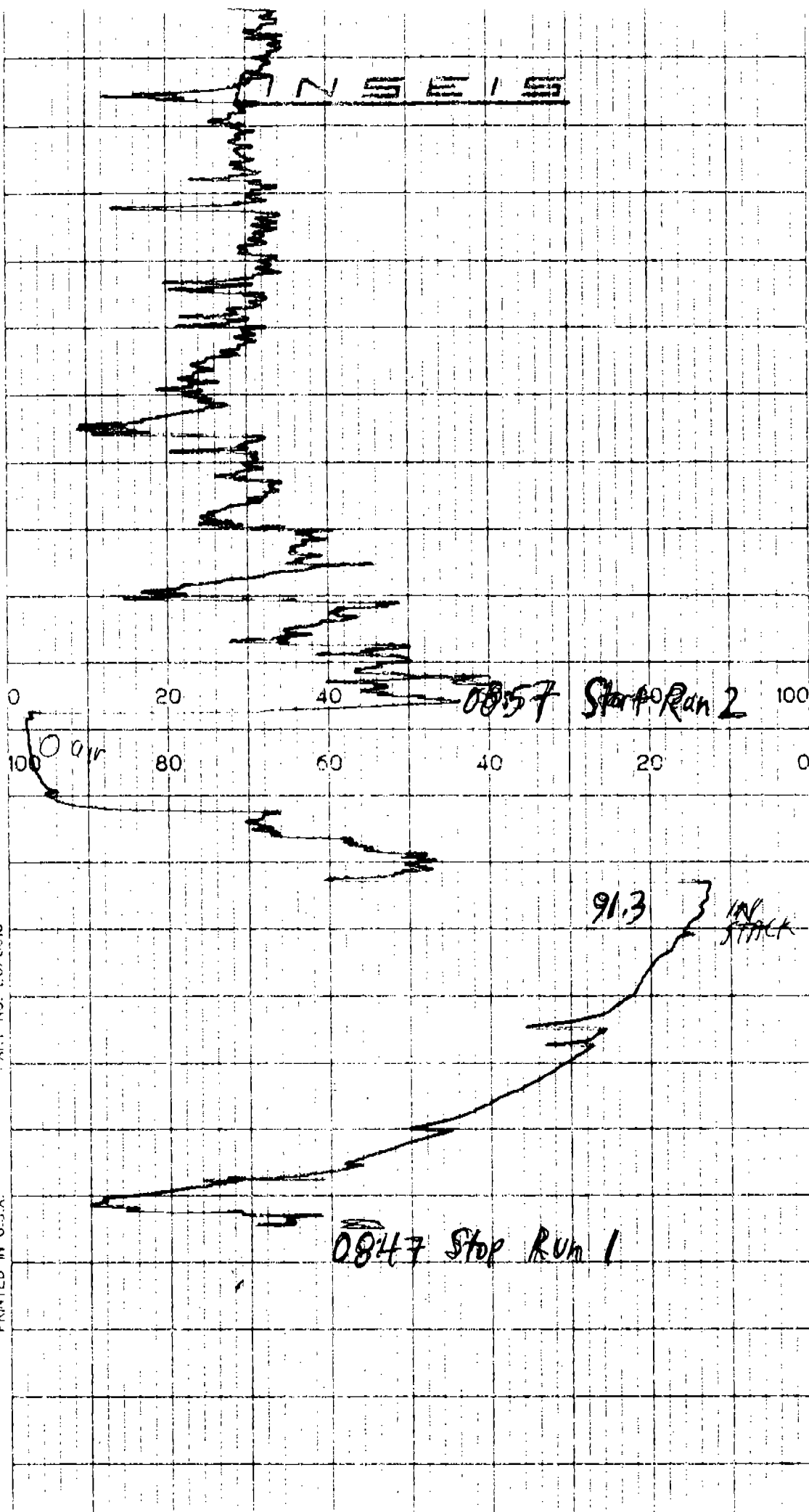
PART NO. 1375015

PRINTED IN U.S.A.



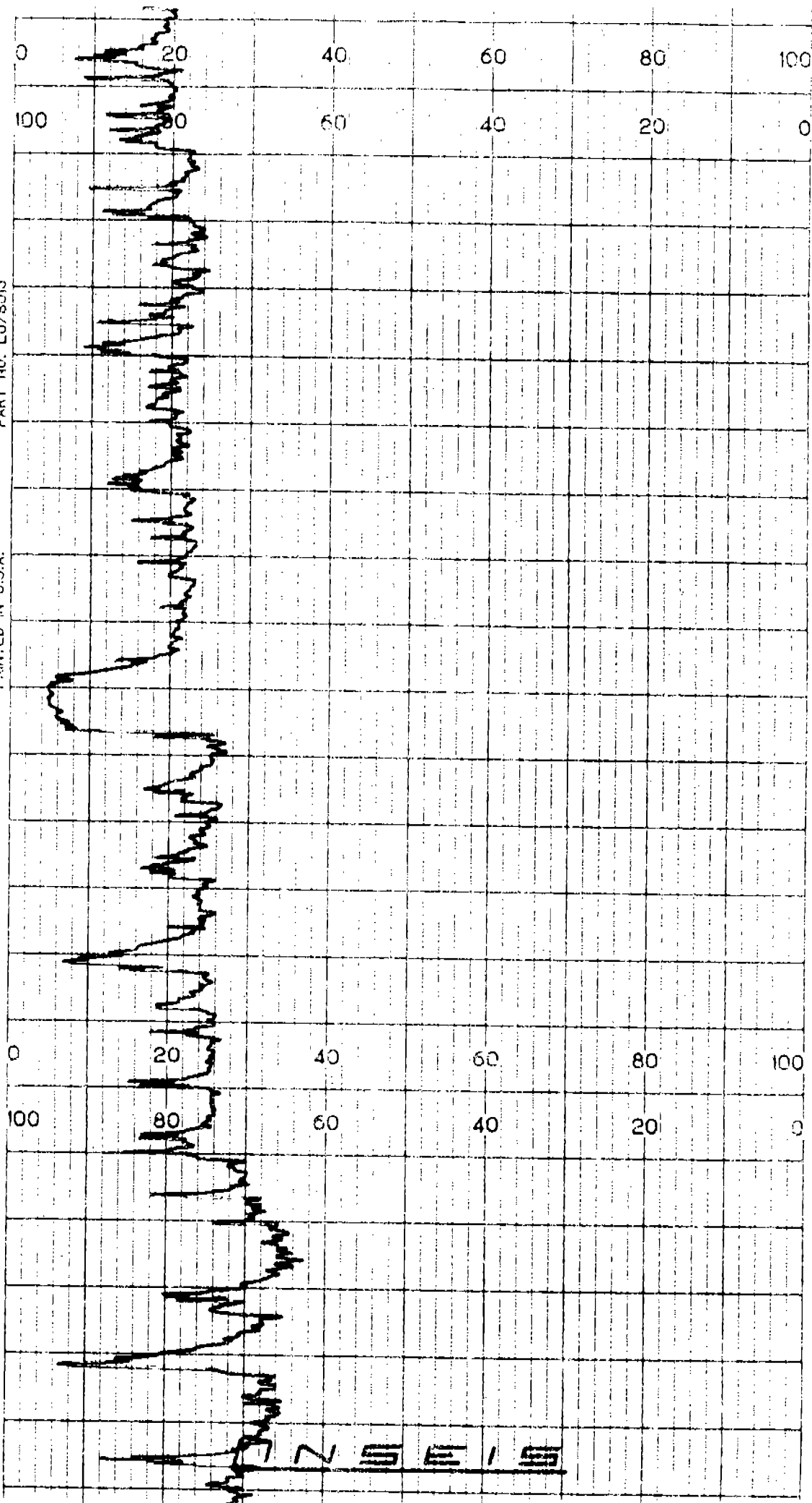
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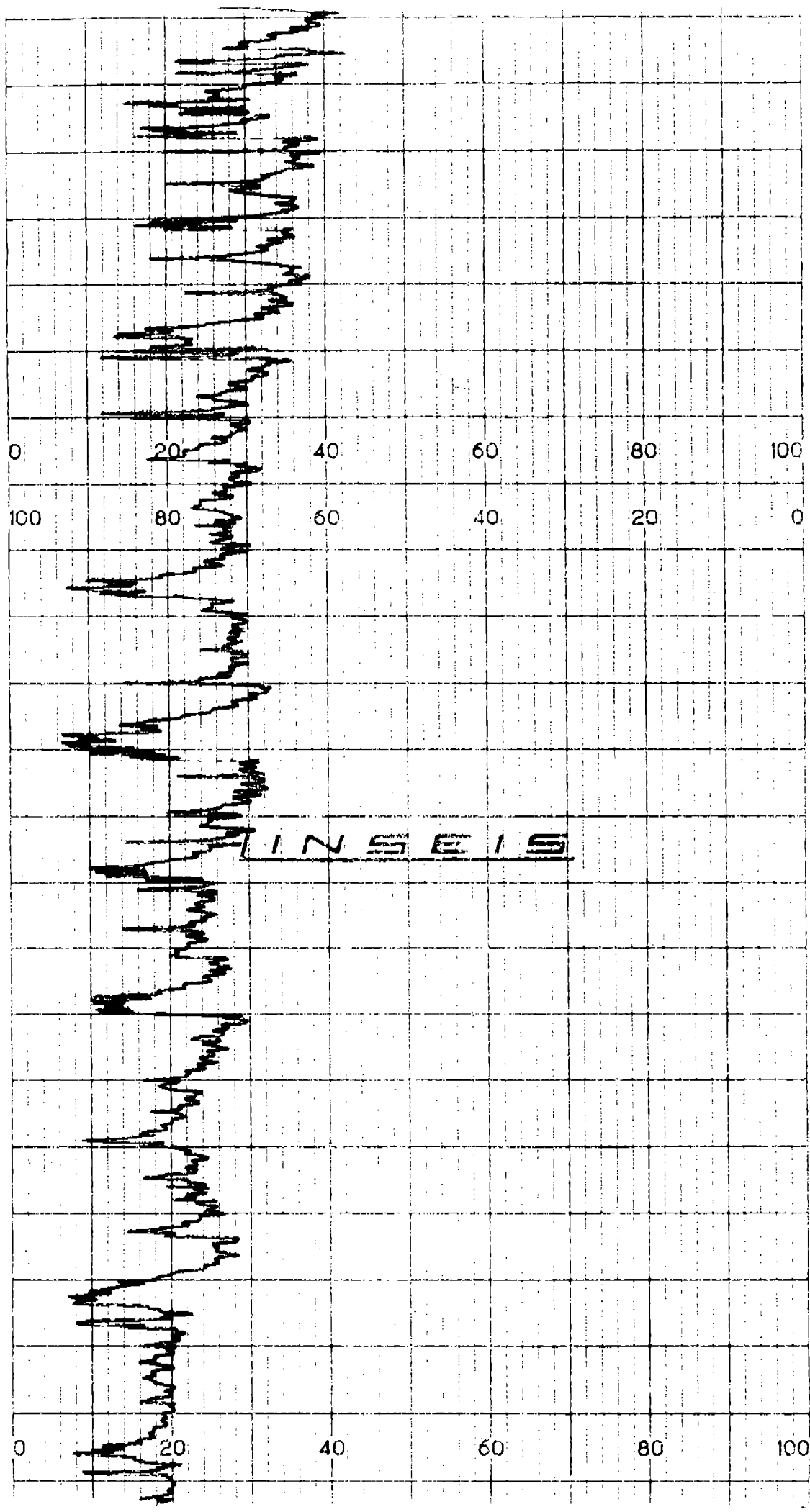
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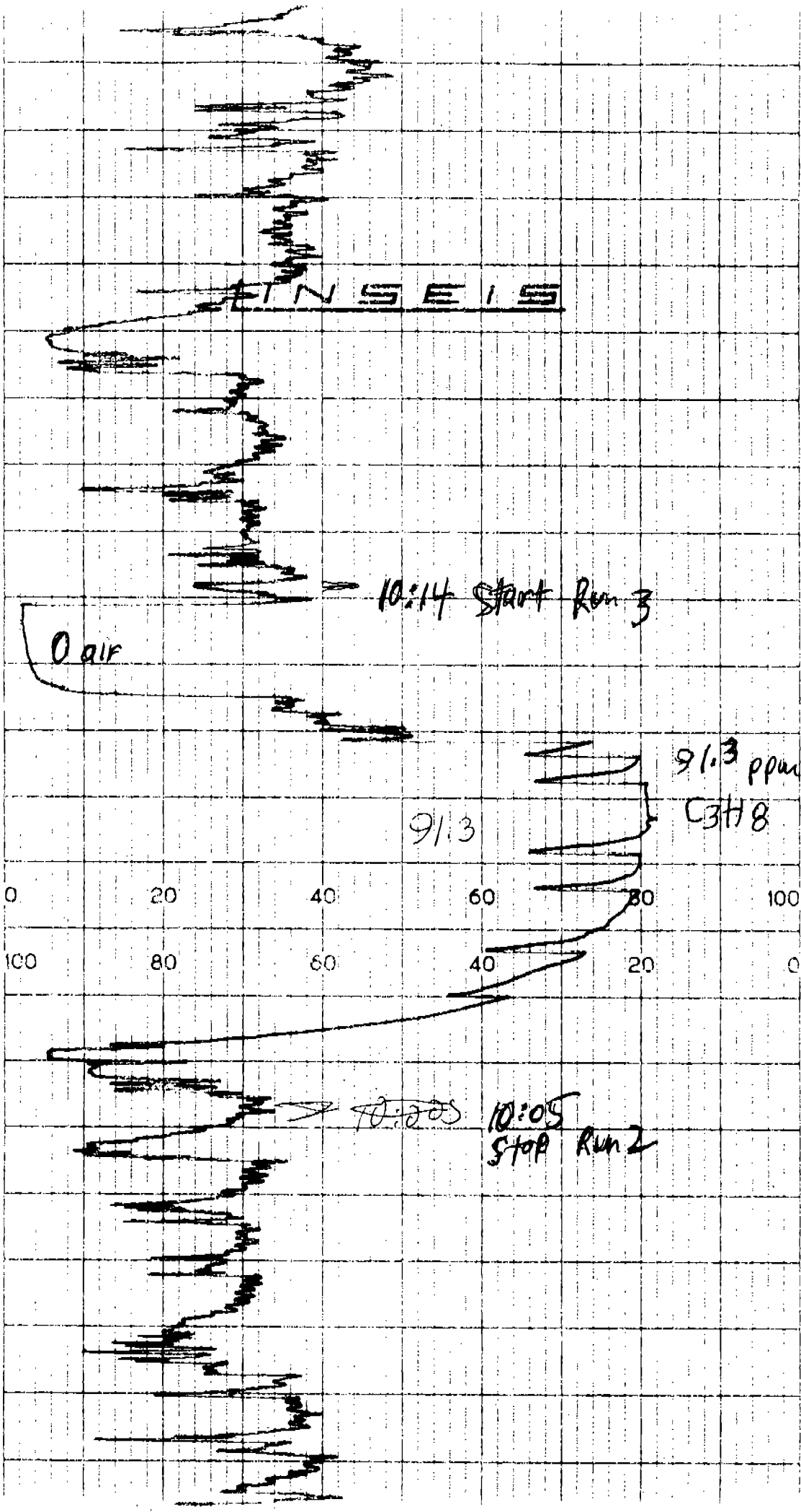
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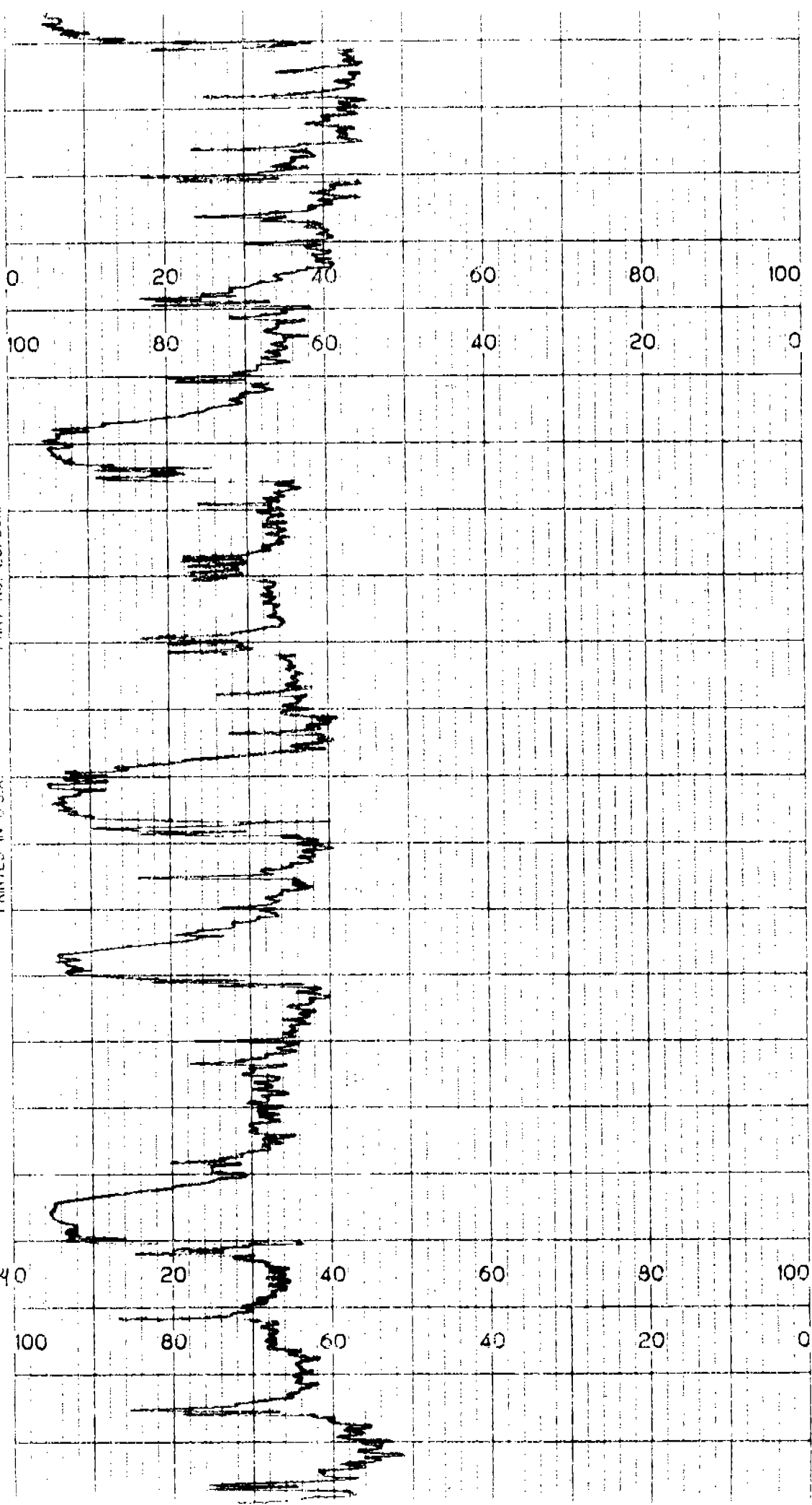
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PART NO. LO/80/3

PRINTED IN U.S.A.



PA

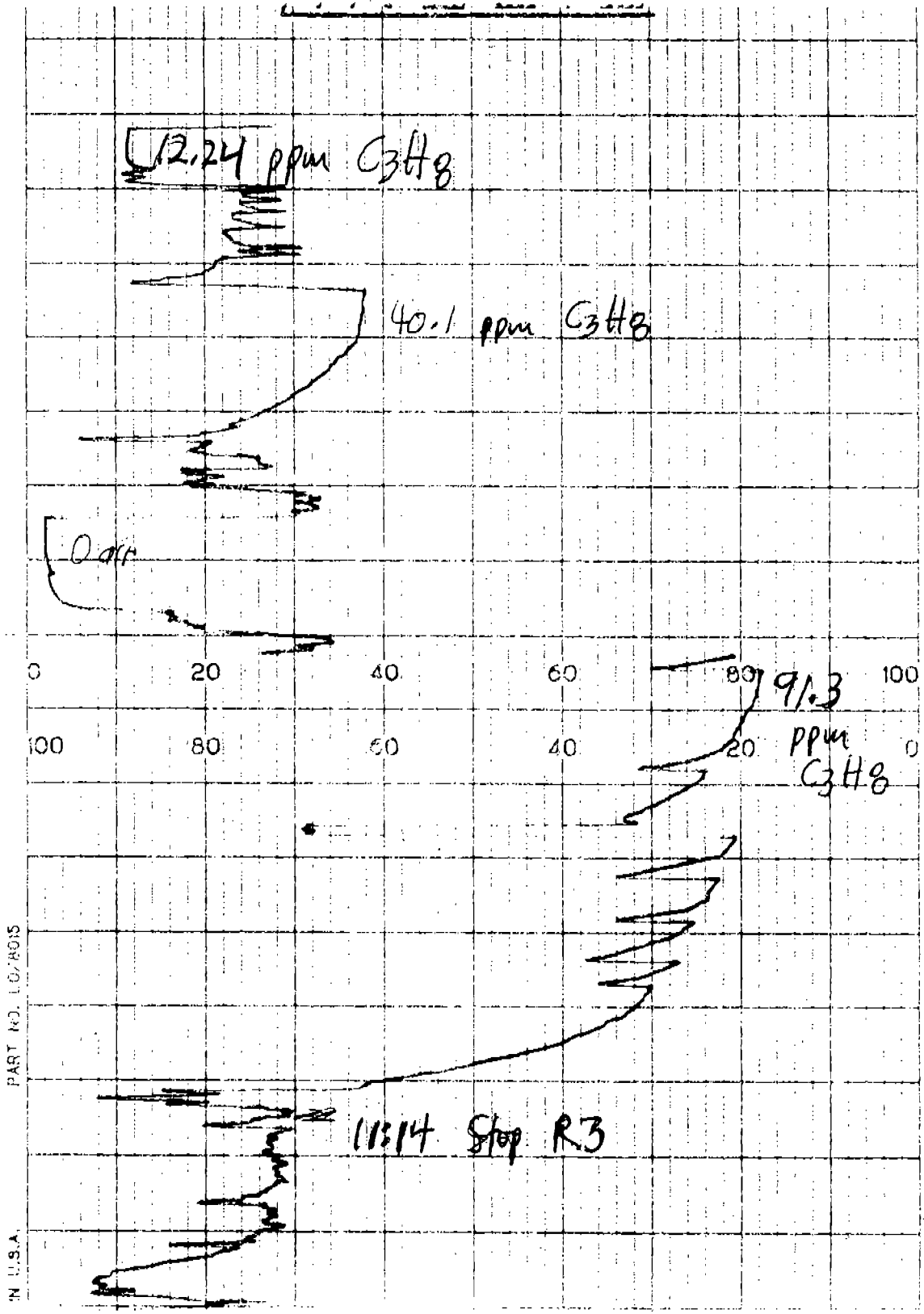
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11:14 Stop R3

0 20 60 80 100  
100 90 80 40 20 0

145E15

26



PART NO. L072015

IN U.S.A.



**Appendix 3**  
**Calibration Certificates**



Shipped from:  
Scott Specialty Gases  
Route 611  
Plumsteadville, PA 18949  
Purchase order :  
91047

Shipped to:  
AIR POLLUTION TESTING INC  
ATTN: POW91047  
4535 W 68TH AVE  
WESTMINSTER, CO 80030

Certified per E.P.A. Protocol # 1 Procedure #G1 Section # 3.0.4  
 Certified accuracy +/- 1 X NIST Traceable

|                 |           |                         |                  |         |
|-----------------|-----------|-------------------------|------------------|---------|
| Cylinder number | ALM019712 | Cylinder pressure       | Date of assay:   | 1/23/92 |
|                 |           | 2000 psig.              |                  |         |
| Component       |           | Certified concentration | Expiration date: | 7/23/93 |
| PROPANE         |           | 91.3 ppm                |                  |         |
| NITROGEN        |           | Balance                 |                  |         |

|               |           |
|---------------|-----------|
| Standard      |           |
| Type          | GMIS      |
| Concentration | 98.21 ppm |
| Cylinder #    | CAL4282   |

Analyzer  
Make : VARIAN  
Model : VA3300  
Serial number : 7945  
Analytical principle : FID  
Date of calibration : 1/23/92

[illegible]

Analyst

Approved by

Mark S. Sirinides/Ted Neeme



Shipped from:  
Scott Specialty Gases  
Route 611  
Plumsteadville, PA 18949  
Purchase order :  
91047

Shipped to:  
AIR POLLUTION TESTING INC  
ATTN: POW91047  
4535 W 68TH AVE  
WESTMINSTER, CO 80030

Project No 0134629

Certified per E.P.A. Protocol # 1 Procedure #G1 Section # 3.0.4  
 Certified accuracy +/- 1 % NIST Traceable

|                 |           |                         |                  |         |
|-----------------|-----------|-------------------------|------------------|---------|
| Cylinder number | ALM016822 | Cylinder pressure       | Date of assay:   | 1/23/92 |
|                 |           | 2000 psig.              |                  |         |
| Component       |           | Certified concentration | Expiration date: | 7/23/93 |
| PROPANE         |           | 40.1 ppm                |                  |         |
| NITROGEN        |           | Balance                 |                  |         |

|               |           |
|---------------|-----------|
| Standard      |           |
| Type          | GMIS      |
| Concentration | 98.21 ppm |
| Cylinder #    | CAL4282   |

Analyzer  
Make : VARIAN  
Model : VA3300  
Serial number : 7945  
Analytical principle : FID  
Date of calibration : 1/23/92

[illegible]

Analyst

Approved by \_\_\_\_\_

Mark S. Sirinides/Ted Neeme



# Scott Specialty Gases, Inc.

## E. P. A. PROTOCOL CERTIFICATE OF ANALYSIS

Shipped from:  
Scott Specialty Gases  
Route 611  
Plumsteadville, PA 18949  
Purchase order :  
91047

Shipped to:  
AIR POLLUTION TESTING INC  
ATTN: POW91047  
4535 W 68TH AVE  
WESTMINSTER, CO 80030  
Project No 0134629

Certified per E.P.A. Protocol # 1 Procedure NG1  
Certified accuracy +/- 1 % NIST Traceable

Section # 3.0.4

|                 |           |                         |                  |         |
|-----------------|-----------|-------------------------|------------------|---------|
| Cylinder number | ALM002673 | Cylinder pressure       | Date of assay:   | 1/23/92 |
|                 |           | 2000 psig.              |                  |         |
| Component       |           | Certified concentration | Expiration date: | 7/23/93 |
| PROPANE         |           | 12.24 ppm               |                  |         |
| NITROGEN        |           | Balance                 |                  |         |

Standard  
Type  
Concentration  
Cylinder #

GMIS  
14.99 ppm  
AAL-12327

Analyzer  
Make : VARIAN  
Model : VA3300  
Serial number : 7945  
Analytical principle : FID  
Date of calibration : 1/23/92

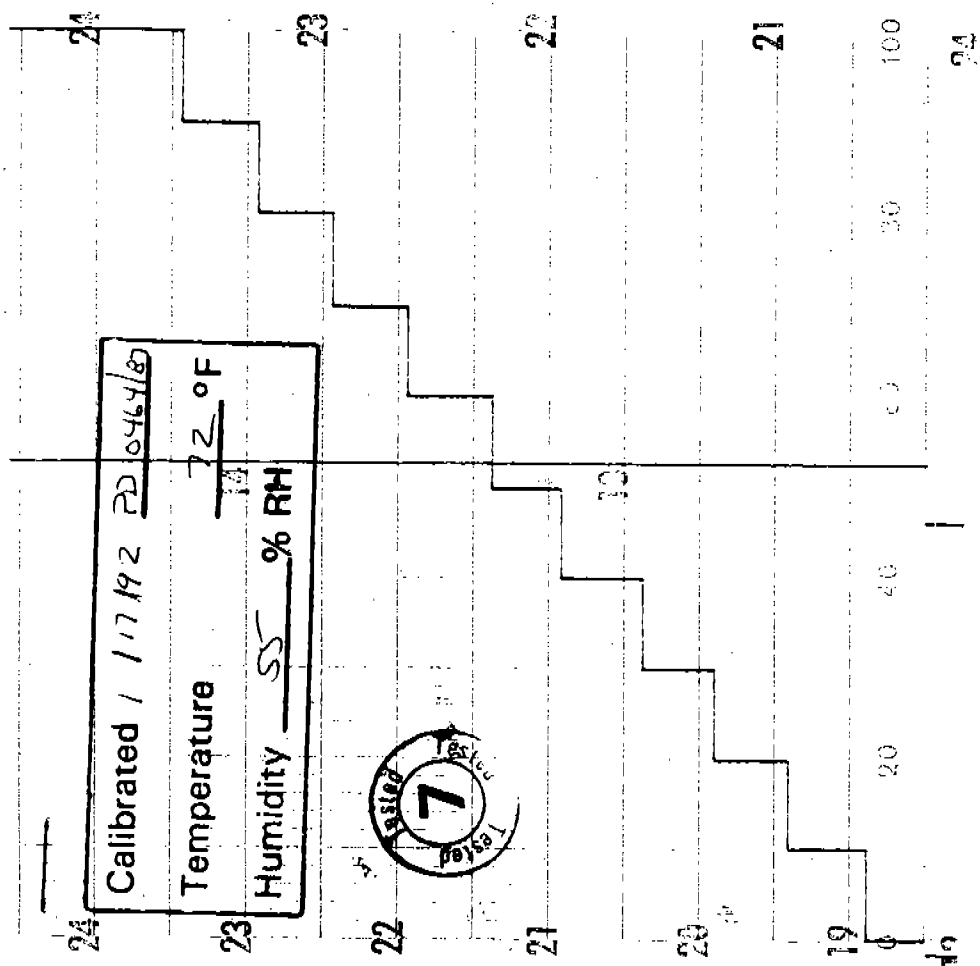
|                 |          |          |   |               |   |
|-----------------|----------|----------|---|---------------|---|
| Raw data units: | AREA     | :        | : | Concentration | : |
|                 |          | :        | : | of Customer   | : |
|                 |          | :        | : | Cylinder      | : |
| Analysis        | 1/23/92  | :        | : |               | : |
|                 |          | :        | : |               | : |
| Z1=0.00         | R1=67168 | T1=54766 | : | 12.22 ppm     | : |
| R2=67173        | Z2=0.00  | T2=54787 | : | 12.23 ppm     | : |
| Z3=0.00         | T3=54905 | R3=67021 | : | 12.28 ppm     | : |
|                 |          | :        | : |               | : |
|                 |          | :        | : |               | : |
|                 |          | :        | : |               | : |
|                 |          | :        | : |               | : |
|                 |          | :        | : |               | : |
|                 |          | :        | : |               | : |
|                 |          | :        | : |               | : |
|                 |          | :        | : |               | : |
|                 |          | :        | : |               | : |

Analyst

*Paul W. H.*

Approved by

*Mark S. Sirinides*  
Mark S. Sirinides/Ted Neeme





**Appendix 4**  
**Diagrams**

## Diagrams

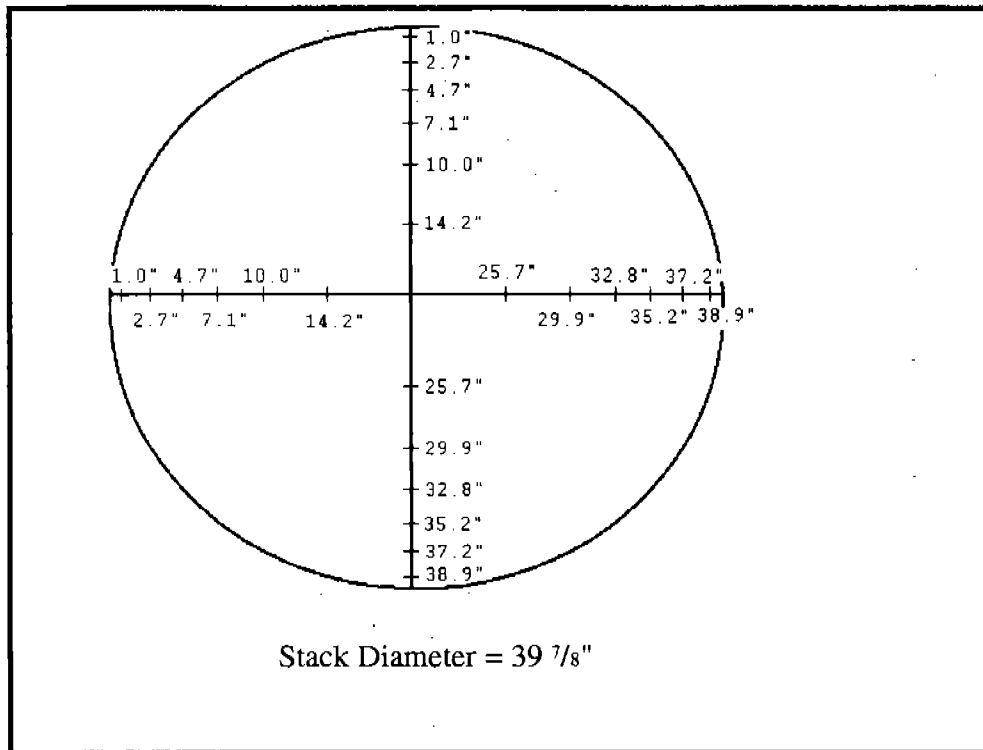


Diagram 1 - Grain Dryer Stack Cross-Section and Sampling Points

