ENSV FY07
Inspection Transmittal Form

Todays Date:
6/23/2008

INSPECTION ACTIVITY

Media	Type of Inspection	Selection Criteria	Compliance Officer	Inspection Date
Air	Test Observation			06/04/2008

Inspector	Activity #
Postma- S	

REC'D
JUN 23 2008
APCO

FACILITY INFORMATION

Facility Name	ID Number	NAICS/SIC Code
Doe Run Herculaneum		

Address	City	County	State	ZIP
881 Main Street	Herculaneum		MO	63048

Facility Activity

INSPECTION FINDINGS

NOV/NOPF Issued? ○Yes ●No ○N/A

Preliminary SNC Finding? ○Yes ●No ○N/A

Preliminary Findings (briefly list regulatory deficiencies)

MULTIMEDIA FINDINGS

MM Participating Program* | MM Level | MM Type

Potential EJ? ○Yes ●No ○N/A

MM Screening completed? ○Yes ○No ●N/A

SBREFA handout provided? ●Yes ○No ○N/A

If yes, was MM Screening Checklist forwarded? ○Yes ●No

* A=CAA, W=CWA, R=RCRA, E/T=EPCRA/TSCA, U=UST, C=CFC, S=SPCC, U-I=UIC, Wet., PWS, All, EMS = EMS

If yes, who? > ☐CAA ☐EPCRA/TSCA ☐SPCC ☐CWA ☐UST ☐PWS ☐UIC ☐Wetlands ☐RCRA ☐CFC ☐EJ ☐All

EMS? ○Yes ○No

EMS ISO 14001 certified? ○Yes ●No

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

MEMORANDUM

SUBJECT: Performance Test Coordination for the Ventilation Study Conducted at the Doe Run Facility in Herculaneum, Missouri

FROM: Scott Postma
Environmental Engineer, ENSV/EFCB

TO: Gwen Yoshimura
Scientist, ARTD/APDB

A ventilation study test was planned on the Doe Run buildings in Herculaneum, Missouri. The buildings included the following processes:

1) The sinter process building with all related facilities operating normally.
2) The blast furnace building with all related facilities operating normally.
3) The refinery building with all related facilities operating normally.

We arrived at the Doe Run facility in Herculaneum, Missouri, at 1:00 p.m. on June 2, 2008. I did not observe any opacity plumes from any of the stacks at the facility from a publicly accessible location upon transit to the facility. I accompanied Mr. Royan Teter and Ms. Gwen Yoshimura, with the Air Permits and Compliance Branch and the Air Planning and Development Branch, with EPA Region VII.

We met with Mr. Rusty Keller, whom I have worked with in the past and have previously presented my credentials. We discussed the status and purpose for our visit. Mr. Darrin Clutts with Doe Run's Environmental Department was also present for the meeting. Mr. Keller indicated that John Rustage, with the Missouri Department of Natural Resources, was delayed and the meeting would start at 1:30 p.m.

RECYCLED FIBER

The meeting started at 1:30 p.m. after Mr. Rustage arrived. The following individuals were in attendance for the meeting: Rusty Keller, Darin Clutts, Aaron Miller, Gwen Yoshimura, Royan Teter, and Scott Postma. Numerous aspects were discussed. One of the primary reasons for the visit was to try to establish a reason for the recent increases in lead emissions. A ventilation study was proposed to determine the probable sources and causes for the emissions and the increases. It was decided that we should start the ventilation study on June 3, 2008. The ventilation study was intended to measure the face opening velocity of all doorways/openings in the Sinter building, Blast Furnace building, and Refinery building. An analysis of the airflows through these doorways and openings may lead to the identification of the source contributing to the lead emissions off the facility grounds.

We discussed numerous other aspects related to testing during the meeting. We also discussed the building ventilation, opening arrangement, and logistics for the ventilation study. Mr. Rustige had a competing activity and was not able to schedule attendance for the entire Ventilation study. Doe Run informed us that they had flow continuous emission monitoring systems (CEMS) installed on the #5 Baghouse duct, the small Ventilation Baghouse duct, and the #5 Baghouse duct. The Acid Plant duct has an amp meter on the fan. This amp meter can be correlated to a flowrate number. Attachment 1 contains a printout of the make, model, and manufacturer of the flow CEMS.

We commenced the ventilation study at approximately 7:00 a.m. on June 3, 2008, on the Sinter building. Mr. Darin Clutts and I both used hand held anemometers to measure the air velocity at multiple points in the openings. I used a Davis Instruments Turbo meter. Attachment 2 contains information on this meter. Mr. Clutts used a Doe Run owned instrument. I do not have any information on their meter.

Since the buildings are required to minimize the duration that the doorways are open, the buildings should be under a constant negative pressure from the induced draft (ID) fans. The Sinter building has a 50,000, 50,000, and a 300,000 actual cubic feet per minute (ACFM) fan from the Acid Plant, #6 Baghouse, and the #3 Baghouse, respectively. A combined inward airflow of approximately 400,000 ACFM is obtained for the Sinter machine, conveyor belts, other processes, doorways, and the incidental in-leakage from building holes/cracks/seams. These fans create a negative pressure in the Sinter building.

The Blast Furnace building has 600,000 ACFM of total ID airflow. The #5 baghouse ID fan and the #7 Baghouse ID fan are both rated at 300,000 ACFM. Both of these fans contribute to the inward flow.

The Refinery building has 320,000 ACFM of induced draft airflow. The #8 Baghouse fan and the #9 Baghouse fan have 70,000 and 250,000 ACFM of rated airflow capability, respectively. Both of these fans contribute to the inward flow.

Theoretically, openings that are at the lowest level and the furthest distance from the fans would exhibit the smallest inward air velocity. Conversely, the doorways that are closest to the

fans would provide the greatest air flow for the fans. Any doorways/openings that are simultaneously open would be additive for supplemental airflow. Any doorway/opening would have decreasing differential pressure as the number and effect of blockages and disturbances increase.

Meteorological conditions can significantly alter the building airflow patterns. Since the buildings are elongated in the north and south direction, a westerly or easterly wind would have the greatest impact due to the large building surface area in these directions. Attachment 3 contains aerial view diagrams of the Sinter, Blast Furnace and Refinery buildings. Attachment 4 contains the corresponding itemized list of doorways for the Sinter, Blast Furnace, and Refinery buildings, respectively. The positions of the itemized doors are indicated by their number in the Attachment 3 diagrams. It can be observed from these diagrams that the buildings are oriented on a north/south alignment and that these surfaces have a greater number of openings.

The hand written notes, on the left side of Attachment 3, indicate which doorways have been closed or are in a location which has no ventilation. These notes are also noted in Attachment 8.

The door air flows can be significantly affected by the meteorological conditions. During the day of our measurements on June 3, 2008, the wind was out of the south at 3 to 5 miles per hour. This is equivalent to 264 to 440 feet per minute of wind velocity. This is approximately the same range of airflows in the most of the openings, while not all of them were south facing. Several of the openings had velocities greater than 800 feet per minute. This could be due to the differential pressure induced by the fans or that the winds were being direct over/around upstream disturbances.

Attachment 5 contains Doe Run's proposed list of parameters to be measured in the ventilation study. This list shows the Sinter, Blast Furnace, and the Refinery buildings general list of processes and baghouse controls. Attachment 5 also contains some of my notes taken during the meeting on the first day, June 2, 2008.

During the ventilation study, we started taking velocity measurements on the Sinter building followed by the Blast Furnace and the Refinery buildings. We took two velocities using two different hand held anemometers. We made measurement in a matrix of approximately equivalent open areas. We made three measurements in the man doorways and at least six to nine measurements for the larger openings. Attachment 6 contains two photographs taken by Mr. Rusty Keller, of Doe Run, of two of the larger openings. The simultaneous measurements at nearly the same locations can be observed in the picture. One of the challenges was to try not to block the air flow while taking the measurements. To this end, we stood on the downstream side of the airflow to minimize the blockage effect. We made the measurements at approximately the same time. My anemometer reported values in hundreds of feet per minute and could only measure accurate in one direction of flow. Most of our measurements, correctly obtained, were reasonably close for instantaneous instruments. We also measured the height and width of each opening.

Attachment 7 contains the raw data for our velocity and physical opening measurements. Attachment 8 contains my spreadsheet reduction of the raw data. The opening number correlates with Attachments 3 and 4. The Attachment 7 uses the height and width to calculate the area. The list also indicates which of the opening have no ventilation air flow. We did not make any measurements of the "no ventilation" openings. "No ventilation" openings are doorways in areas that have no induced draft from a particulate matter (PM) control device or fan. The list computes the total opening area for the four sides of the buildings. The Sinter, Blast Furnace, and Refinery building have the most opening area on the east, east, and west sides with 47%, 49%, and 69% of the total, respectively. Consequently, fugitive emissions from these buildings are most provoked when the meteorological conditions are from the east and west. The total building opening areas are 514, 950, and 440 square feet, respectively.

This sheet also computes the ventilation rates. The Sinter, Blast Furnace, and Refinery buildings have ventilation rates of approximately 777, 630, and 727 actual cubic feet per minute (ACFM), respectively. These numbers are only theoretical approximations since the buildings will likely have substantial in-leakage from unmeasured openings.

Attachment 8 computes the percentage of opening area on the north, east, west, and south sides. The Sinter building has openings equal to 47 % on the East side and 20 % on both the west and south sides. Since the west face is blocked by the Blast Furnace, the sides prone to be influenced by winds are the east and west. The Blast Furnace building has 49 % on the east and 27 % on the west face. Since the east face is partially blocked by the Sinter building, the east and west side could be equally influenced by the wind. The Refinery building has 69% of the opening area on the west face and 27 % on the south. The Refinery buildings fugitive emissions will be substantially influenced by westerly winds and to a lesser extent, southerly winds. In general, the plant could be substantially influenced by easterly and westerly winds.

Attachment 9 contains a study that we performed back in 2000. The analysis shows that most of the PM has a particle size distribution in the range of 4 to 10 micrometers (particle length). All of the processes demonstrated that 60 to 77 percent of the total mass of PM was in this range.

Attachment 10 contains my calculations on the settling velocity of the PM in the buildings. I used the sizes reported in Attachment 9. I made a total of four calculations to bracket the expected range of particle sizes and densities. I calculated the minimum theoretical terminal settling velocities based on the Stokes principle and another set adjusting the Stoke's equation for empirical measurements by "Theodore and Buonicore, 1976". The Stoke's calculation is theoretical and resulted in number less than one foot per minute of settling velocity. Since the Stokes equation is more appropriately applied to liquids, I only recommend these results to inform. The adjusted Stoke's equations used actual settling velocities in air and corrected the Stoke's equation for this PM specific data. The results showed that the fugitive emissions had a terminal velocity of 1 to 20 feet per minute. This would indicate that any vertical airflow of greater that 20 feet per minute could permanently entrain the majority of the

PM from all of the buildings. This equates to a velocity of 0.22 miles per hour. It is possible that, due to the dynamic nature of gas fluid flow, a southerly wind of 3 to 5 miles per hours would have enough Brownian movement to meet the minimum vertical vector velocity of 0.22 miles per hour and suspend and transport the material. Additionally, the minimum of 200 feet per minute of inflow, as is currently directed, would be sufficient to keep the PM inside the building. However, high wind conditions could substantially affect the building internal flow dynamics.

I performed wind velocity calculations which are included in Attachment 8. These calculations show the wind velocity, perpendicular to the plane of the openings, which would be equivalent to providing all of the air flow for the ID fans. These calculations to not account for the following influences: 1) higher/lower velocities due to up upstream disturbances. 2) higher/lower velocities due to winds that intersect the openings at an angel. 3) Aerodynamic effects influencing the building airflow dynamics due to the openings on the downstream side of the buildings.

These calculations indicate that the ambient wind can supply all of the ID fans airflow. When the winds are from the East, the equivalent wind velocities are 15 and 19 miles per hour for the Blast Furnace and Sinter Plant. The Refinery building calculations indicate that a westerly wind at 12 miles per hour equate to a null point of building fugitive control. Theoretically, wind velocities nearing and greater than these could cause building outflows. It would follow that additional attention should be implemented when the winds near these velocities. Easterly winds also drive any fugitive emissions directly to the ambient monitors and the population surrounding the facility. An additional ventilation study when the winds are easterly may prove to be very informative.

In-leakage from outside air could occur on the impact side of the building under significant wind velocity, even when the doors are closed. This is due to the probably fact that air will find a way into the building. The downstream side of the building could experience an outflow of air under the same wind conditions, even when the doors are closed. This is due to the venturi effect as indicated by Torricelli's and Bernoulli's theorems.

Attachment 11 contains a copy of the chemical mass balance (CMB) analysis of the ambient filters for the periods where excessive emissions occurred. Attachment 12 contains a copy of the Source Apportionment CMB modeling report, August 25, 2000. This report contains background apportionment information for comparison to the Attachment 11 data. Since I received the Attachment 11 data at a late date, I was not able to provide an analysis of the data.

An exit meeting was held at 10 a.m. on June 4, 2008. Attachment 13 contains a copy of the attendee list for the exit meeting. Mr. Royan Teter and Ms. Gwen Yoshimura discussed many aspects of the checklist. These items are not discussed in this report.

Attachment 14 contains the Confidential Business information document. Attachment 15 contains the Receipt for Documents and Samples.

If you have any questions or comments concerning the review of this report, please contact N. Scott Postma at (913) 551-7048.

Attachments:

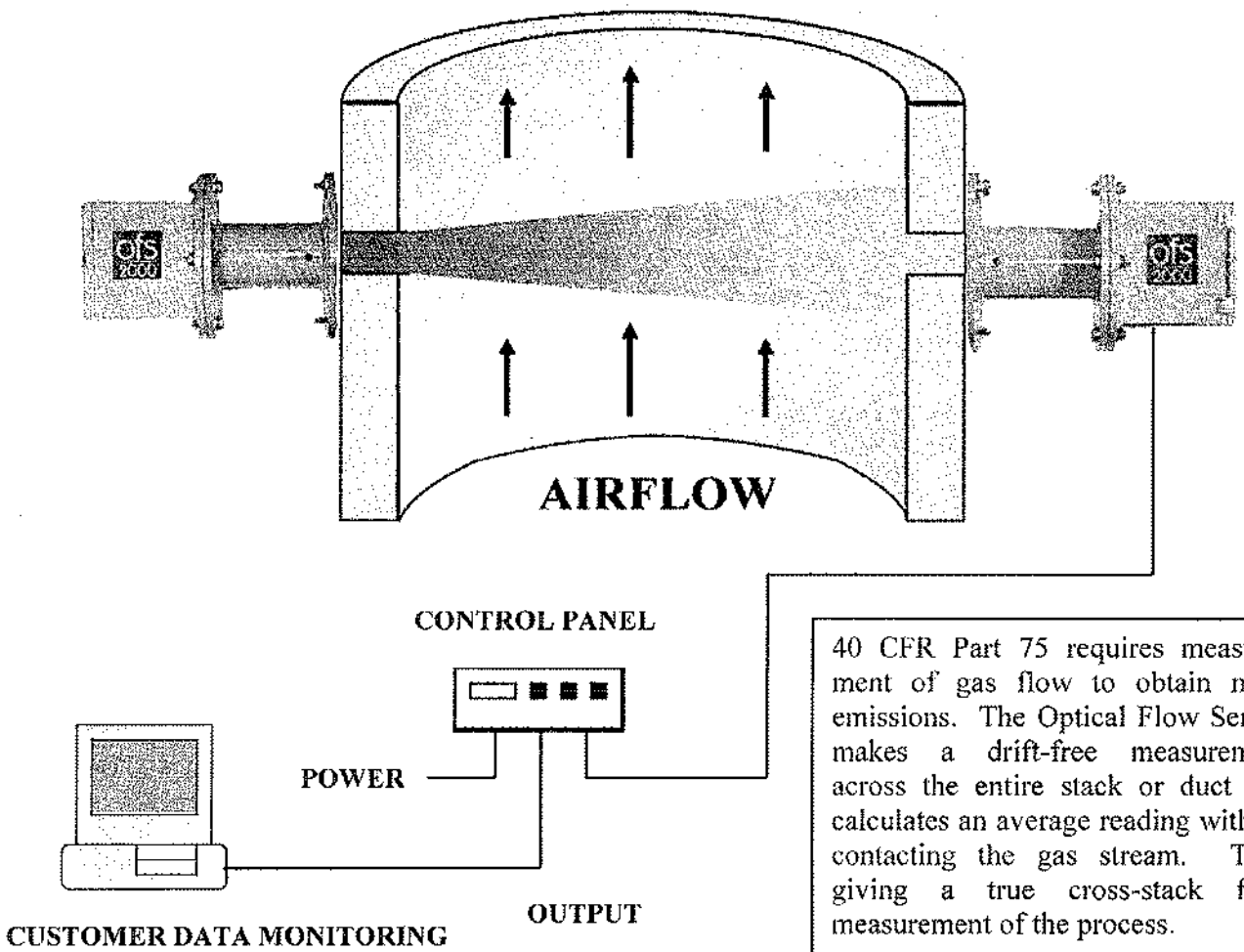
1. Optical Flow Monitor, 2 pages.
2. TurboMeter Information, 4 pages.
3. Aerial View of Buildings, 3 pages.
4. List of Building Openings, 3 pages.
5. Fan and Building Data provided by Doe Run, 3 pages.
6. Pictures of Measuring Velocity, 2 pages.
7. Velocity Measurement Raw Data, 10 pages.
8. Opening Area, Velocity Calculations, 1 page.
9. Particle Size Distribution Data, numerous pages.
10. Settling Velocity Calculations, 2 pages.
11. Speciation Data, 1 page.
12. Source Apportionment Study, 81 pages.
13. Exit Meeting Attendee List, 1 page.
14. Confidentiality Notice, 1 page.
15. Receipt for Documents and Samples, 1 page.

cc: Royan Teter, USEPA, Region VII, APCO/ARCM

ATTACHMENT 1

Optical Flow Sensor

- True straight across the stack flow measurement - Costly 45 degree angle offset or extra platforms are not required
- Path-averaged result; more representative than point sensors
- No moving parts, non-intrusive, non-contacting, no parts are directly exposed to stack gases
- OFS measurement is independent of stack diameter, media, temperature, pressure, moisture, or opacity levels



40 CFR Part 75 requires measurement of gas flow to obtain mass emissions. The Optical Flow Sensor makes a drift-free measurement across the entire stack or duct and calculates an average reading without contacting the gas stream. Thus giving a true cross-stack flow measurement of the process.

OFS Features

Revolutionary, non-intrusive setup greatly reduces maintenance

The OFS is a patented, advanced, continuous flow measurement system for large and small stacks or ducts. The instrument is isolated from the flue gas. This non-contacting method ensures reduced maintenance over traditional flow sensors.

True cross-stack, path-averaged result is exceptionally accurate... long-term drift less than +/-1%

OFS provides the true, average velocity across the diameter between the optical sensors along this path. The accuracy of the OFS is traced back to the NIST wind tunnel standard. Long term drift for the system is less than +/-1% over the entire life of the instrument.

Calibration and other checks verify all system components

OFS meets all 40 CFR 75 requirements, including daily calibration zero and span checks. System components and interference checks are completed on a continuous basis.

Velocity measurement independent of temperature, pressure and density of flue gas

OFS measures flue gas velocity. Path angle and gas composition, whether wet or dry, hot or cold, has no adverse effect on the measurement of velocity.

***OFS has CE, CSA, and UL marks. Optical Scientific Inc. is ISO-9001 certified.**

To order OFS or for more details please contact us at:

Optical Scientific Inc.

2 Metropolitan Ct., Suite 6
Gaithersburg, MD 20878 USA

Tel.: 301-963-3630
Fax: 301-948-4674
Email: info@opticalscientific.com
Web: www.opticalscientific.com

Specifications subject to change without notice

OFS Description*

The OFS is easier, more accurate, and cost-effective than current sensors to measure flow. The OFS uses EPA approved technology. The sensor consists of control panel teamed with an optical transmitter and optical receiver which are easily installed on opposite sides of a smokestack, duct, vent or other confined space. The OFS resides outside the stack chamber behind optical windows for easy access, more accurate measurements, and greater durability. The instrument mounts on the same level, in order to transmit the LED beam directly across and perpendicular to the flow.

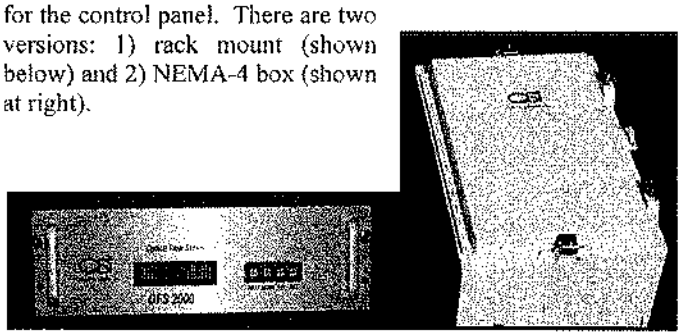
The optical scintillation technique measures the movement of the turbulence found in exhaust flow streams to provide highly accurate, path-average air velocity measurements. Using fast and highly efficient DSP (digital signal processing), the control panel processes the data, and then transmits it to a PC, PLC, DAS or other data collection device that accepts 4-20 ma or digital input. The OFS's self-testing and diagnostics monitors its own performance to alert the user to any maintenance issues. In addition, the OFS can be easily installed temporarily with "C" clamps, facilitating its use if your existing flow sensor fails (existing angled flanges can be used).

OFS Specifications

Technique	Patented Optical Scintillation
Range	0.1 to 40 m/s velocity (consult factory for other ranges)
Accuracy	+/-0.1 m/s basic or <5% of reading, whichever is greater
Repeatability	+/-0.1 m/s basic or <2% of reading, whichever is greater
Long Term Drift	< 1% per year
Stack/Duct Diameter	1-10 m standard, consult factory for other ranges
Light Source	670 nm red LED, 10 degree divergence
Optics	Quartz
Calibration	Automatic 2-point calibration once per day
Diagnostics	Continuous monitoring of sensor status including power supply voltage check, performance check, optics contamination, etc.
Ambient Temperature	-40 to 60 C
Temperature/Pressure	No effect
Moisture	0-99%
Transparency	Up to 95% opacity
Data Interface	RS-232 ASCII fixed data string, 4-20ma current loop output or Fiber Optic digital output
User Interface	Remote display w/ key pad for data entry; Serial port for setup from user provided laptop computer

Control Panel Description

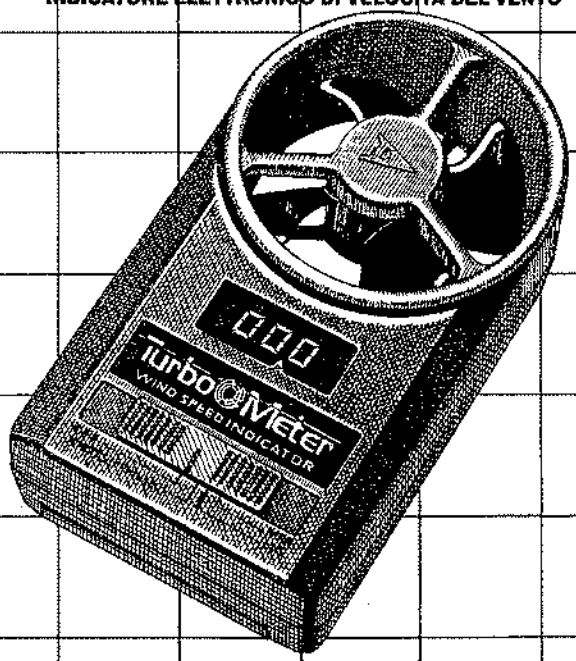
The panel receives the signals from the stack electronics, displays the data, and produces the digital and analog outputs from the system. Instrument malfunction, and limit alarms are available for the control panel. There are two versions: 1) rack mount (shown below) and 2) NEMA-4 box (shown at right).



ATTACHMENT 2

TurboMeter™

ELECTRONIC WIND SPEED INDICATOR
INDICATEUR ÉLECTRONIQUE DE VITESSE DU VENT
ELEKTRONISCHES WINDGESCHWINDIGKEITS-ANZEIGEGERÄT
MEDIDOR ELECTRÓNICO DE LA VELOCIDAD DEL VIENTO
INDICATORE ELETTRONICO DI VELOCITÀ DEL VENTO



DAVIS

OPERATOR'S MANUAL
NOTICE D'EMPLOI
BEDIENUNGSANWEISUNG
MANUAL DE INSTRUCCIÓN
MANUALE D'IMPIEGO

The Turbo Meter provides uncommon accuracy, sensitivity, and pocket-size convenience. It is based on the principal that a freely turning turbine will rotate at a speed directly proportional to the wind speed. To insure maximum sensitivity and accuracy, the turbine is suspended on sapphire jewel bearings, and its rotation is sensed by an infrared light beam, which adds no friction. The resulting signal is processed electronically by a LSI (Large Scale Integrated) circuit for improved reliability and reduced size. A special three digit display is used for extra resolution and provides excellent viewing contrast in bright sunlight. A handy switch selects between four different scales for unmatched versatility. Also, the totally enclosed turbine and compact size make it easy to carry, so you always have it when you need it.

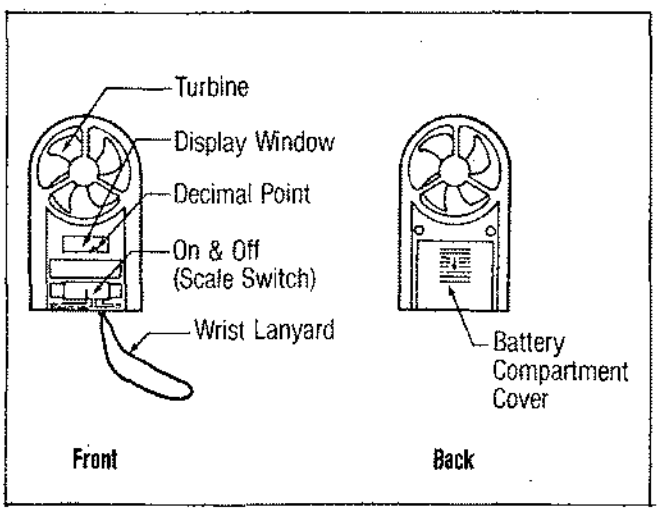


Figure 1

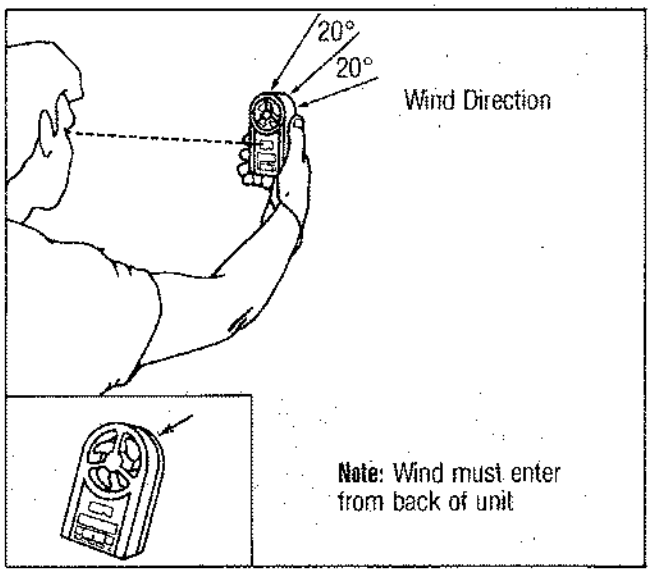


Figure 2

Directions for Use

1. For best results, select a position away from buildings, trees, and other obstructions that cause wind turbulence.

2. Move the slide switch to the desired scale. Refer to Fig. 1. It will take about 4 seconds before the correct wind speed is shown in the display window. If there is not enough wind to make the turbine rotate, the display will read either 000 or 001.

3. Determine the approximate wind direction from the way flags, clouds, kites, windsocks, etc. are moving. Hold the Turbo Meter so that the wind will pass through it as shown in Fig. 2. For best results try to keep the axis of the turbine within 20° of the direction of the wind.

Reading the Display

1. The three digit display is calibrated so that the far-right digit ALWAYS represents the "tenths" place. A raised decimal point is engraved on the case as a reminder.

Example: If the display shows [04 . 8] it should be read as 4.8.

2. The "knots" scale is shared with the "feet per minute" (FPM) scale. The "knots" scale is read directly and FPM is obtained by multiplying the display reading by 100.

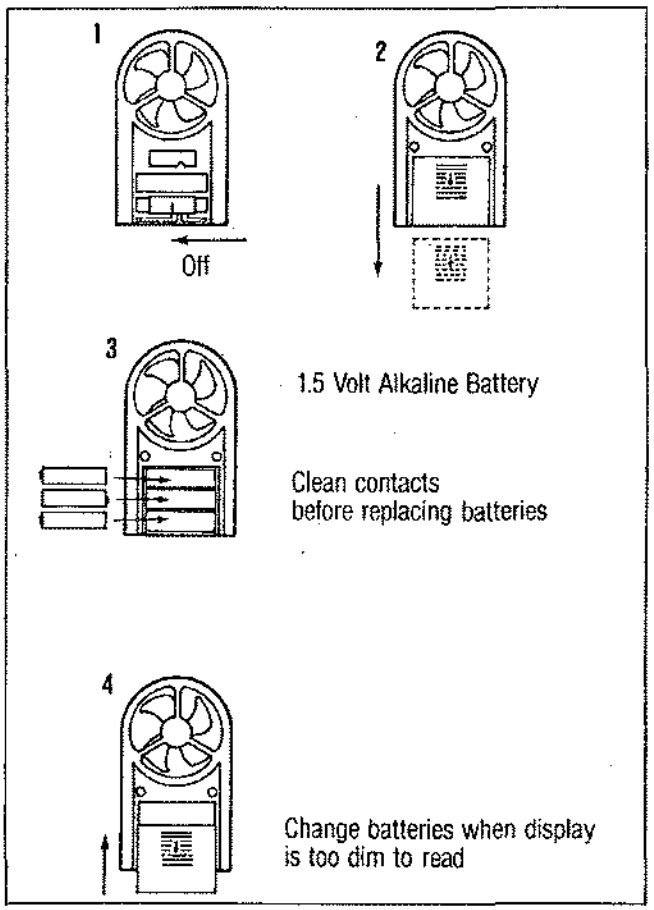
Example: If the display shows [24 . 6] it could be read as either 24.6 knots or 2460 FPM (24.6 X 100).

3. The "knots (FPM X 100)" scale is factory calibrated to read in "FPM". A small built-in error of 1.3% results when the knots scale is read. The error is due to the fact that the true conversion factor from "knots" to "FPM" is 101.3. Therefore the "knots" readings are always 1.3% high. For applications where this much error is unacceptable, the "knots" reading can be multiplied by .987 to give the true wind speed.

Maintenance

The Turbo Meter requires no regular maintenance other than proper storage in a clean, dry location. Occasionally the red display window may need to be cleaned. Use only a soft cloth and tap water. Chemical cleaners or solvents should not be used because they may cloud the window. The Turbo Meter has been designed to be reasonably shock and weather resistant. Like any quality instrument, it will give the best results if some care is used to avoid dropping it or letting water enter the case. If water does get into the case it should not be turned on again until dry. In the event of salt water immersion, the unit should be IMMEDIATELY and THOROUGHLY rinsed in fresh water and then allowed to completely air dry. Do not use an external heat source to dry, as it may warp the plastic parts. Make sure battery contacts are free of corrosion. Clean occasionally with wire brush or sandpaper.

Battery Replacement



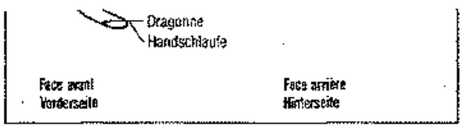


Figure 1 Abbildung 1

Le Turbo Meter offre une exactitude, une sensibilité et une compacité peu communes. Sa conception repose sur le principe selon lequel la vitesse de rotation d'une turbine tournant librement est directement proportionnelle à la vitesse du vent. Pour assurer une sensibilité et une exactitude maximales, la turbine est montée sur saphirs et sa rotation est détectée par un rayon de lumière infrarouge, d'où minimum de frottement. Le signal résultant est traité électroniquement par un circuit intégré à grande échelle (LSI) offrant une fiabilité accrue et un encombrement réduit. L'affichage spécial à trois chiffres confère une résolution supérieure ainsi qu'un contraste excellent qui permet la lecture en plein soleil. Un commutateur très pratique assure une sélection entre quatre échelles différentes, ce qui confère à l'instrument une polyvalence sans pareille. En outre, la turbine est entièrement incluse dans le boîtier et l'appareil est très compact; vous pourrez donc aisément emmener le Turbo Meter partout avec vous.

Mode d'emploi

1. Pour assurer l'obtention de résultats optimaux, se placer à l'écart de bâtiments, d'arbres et d'autres obstacles susceptibles de créer des turbulences.

2. Sélectionner l'échelle désirée à l'aide du commutateur coulissant. Se référer à la figure 1. L'appareil affiche la vitesse correcte du vent au bout de 4 secondes environ. Si le vent n'est pas assez fort pour faire tourner la turbine, l'instrument affiche 000 ou 001.

3. Pour déterminer la direction approximative du vent, observer drapeaux, nuages, cerfs-volants, manches à vent, etc. Tenir le Turbo Meter de façon à ce que le vent le traverse selon l'illustration de la figure 2. Pour des résultats optimums, orienter l'axe de la turbine selon un angle de 20° maximum par rapport à la direction du vent.

Lecture de l'affichage

1. L'affichage à trois chiffres est fabriqué de sorte que le chiffre situé à l'extrême droite corresponde TOUJOURS aux chiffres des dixièmes, ce qui est rappelé par un point décimal gravé en relief sur le boîtier.

Exemple : Lorsque l'affichage indique [04 8], il faut lire 4,8.

2. Il y a une seule échelle pour les « nœuds » (knots) et les « pieds/minute » (FPM). Les vitesses en nœuds sont lues directement et celles en FPM sont obtenues en multipliant la valeur indiquée par 100.

Exemple : Un affichage de [24 6] indique soit 24,6 nœuds, soit 2460 FPM (24,6 X 100).

3. L'échelle « nœuds (FPM X 100) » est étalonnée de façon pour indiquer les FPM. Le facteur de conversion nœuds/FPM étant en fait de 101,3, les valeurs exprimées en nœuds comportent une petite erreur de 1,3 % ; elles sont donc toujours supérieures de 1,3 % à la valeur réelle. Dans le cas des applications pour lesquelles cette erreur serait inacceptable, on peut multiplier le nombre de nœuds par 0,987 pour obtenir la vitesse réelle du vent.

Entretien

Le Turbo Meter ne requiert aucun entretien régulier; il suffit de prendre soin de le ranger dans un endroit propre et sec. Il se peut qu'il soit nécessaire de temps en temps de nettoyer la fenêtre claire de l'affichage. Pour ce faire, utiliser uniquement un chiffon doux et de l'eau du robinet. Ne pas employer de nettoyants chimiques ni de solvants, ce qui risquerait de ternir la fenêtre. De par sa conception, le Turbo Meter présente une assez bonne résistance aux chocs et aux intempéries. Comme pour tout instrument de qualité, éviter de le faire tomber ou de laisser entrer de l'eau à l'intérieur du boîtier, pour assurer l'obtention de résultats optimums. Au cas où de l'eau aurait pénétré le boîtier, attendre que l'instrument soit sec avant de le mettre en marche. En cas d'immersion dans de l'eau salée, rincer l'élément IMMÉDIATEMENT et ABONDAMMENT à l'eau fraîche et le laisser sécher complètement à l'air libre. Ne pas employer de source de chaleur artificielle pour le faire sécher, ce qui risquerait de déformer les pièces en plastique. S'assurer que les contacts des piles ne sont pas corrodés. Les nettoyer de temps en temps au moyen d'une brosse métallique ou de papier de verre.

Caractéristiques techniques

Dimensions (H x l x L)	29,5 mm x 66 mm x 118 mm
Poids (sans les piles)	85 g
Température de fonctionnement	0 à 50 °C
Température de rangement	-40 à 60 °C
Type de piles	Piles alcalines AAA de 1,5 volt (3 piles requises)
Durée de vie des piles	7 heures, typiquement (usage intermittent)
Type de pivots	Saphirs
Temps d'établissement d'une moyenne pour la mesure de la vitesse du vent	
Nœuds (FPM)	1 seconde 1/2
Mètres par seconde	3/4 de seconde
Miles par heure	1 seconde 5/6

ÉCHELLE	PLAGE DE MESURE	RÉSOLUTION	SEUIL	EXACTITUDE (% de la valeur indiquée)
Nœuds	0-87,9	0,1 nœud	0,9 nœud	+ 4 % / − 2 % ou* ± 0,1 nœud
Pieds par minute	0-8790	10 FPM	90 FPM	± 3 % ou* ± 10 FPM
Mètres par seconde	0-44,8	0,1 m/s	0,5 m/s	± 3 % ou* ± 0,1 m/s
Miles par heure	0-99,9	0,1 MPH	1 MPH	± 3 % ou* ± 0,1 MPH

* Soit la plus élevée de ces valeurs

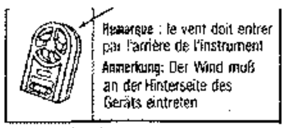


Figure 2 Abbildung 2

Das Turbo Meter bietet außergewöhnliche Genauigkeit, hohe Empfindlichkeit und bequemes Taschenformat. Es beruht auf dem Prinzip, daß eine sich frei drehende Turbine mit einer Geschwindigkeit rotiert, die direkt proportional zur Windgeschwindigkeit ist. Um eine maximale Empfindlichkeit und Genauigkeit zu gewährleisten, ist die Turbine in Saphir-Edelsteinlagern aufgehängt, und ihre Drehung wird durch einen Infrarot-Lichtstrahl abgelesen, der keine zusätzliche Reibung hinzufügt. Das resultierende Signal wird elektronisch durch einen großintegrierten Schaltkreis (LSI) verarbeitet. Für bessere Zuverlässigkeit und kleinere Abmessungen. Für zusätzliche Auflösung wird eine spezielle dreistellige Anzeige verwendet, und sie bietet ausgezeichneten Betrachtungskontrast in hellem Sonnenschein. Ein praktischer Schalter wählt zwischen vier verschiedenen Bereichen, für unerreichte Vielseitigkeit. Die vollständig umschlossene Turbine und die kompakten Abmessungen machen das Tragen leicht, so daß Sie es immer dabei haben, wenn Sie es brauchen.

Bedienungsanleitung

1. Um optimale Ergebnisse zu erzielen, wählen Sie bitte einen Ort, der sich nicht in der Nähe von Gebäuden, Bäumen und anderen Hindernissen befindet, die Windturbulenzen verursachen.

2. Bewegen Sie den Schiebeschalter zum gewünschten Bereich. Siehe Abb. 1. Es dauert ungefähr 4 Sekunden, bis die genaue Windgeschwindigkeit im Anzeigefenster angezeigt wird. Wenn der Wind nicht ausreicht, um die Turbine in Drehung zu versetzen, zeigt die Anzeige entweder 000 oder 001.

3. Bestimmen Sie die ungefähre Windrichtung aus der Bewegung von Fahnen, Wolken, Drachen, Windsäcken usw. Halten Sie das Turbo Meter so, daß der Wind es wie in Abb. 2 gezeigt durchströmt. Um optimale Ergebnisse zu erzielen, versuchen Sie bitte, die Achse der Turbine in einem Winkel weniger als 20° zur Windrichtung zu halten.

Ablesen der Anzeige

1. Die dreistellige Anzeige ist so kalibriert, daß die Stelle ganz rechts IMMER die „Zehntel"-Stelle darstellt. Zur Erinnerung ist ein erhobener Dezimalpunkt auf dem Gehäuse angebracht.

Beispiel: Wenn die Anzeige [04 8] anzeigt, sollte sie als 4,8 abgelesen werden.

2. Der Bereich „Knoten" (knots) wird mit dem Bereich „Fuß pro Minute" (FPM) geteilt. Der Bereich „Knoten" wird direkt abgelesen, und die FPM werden erhalten, indem der angezeigte Wert mit 100 multipliziert wird.

Beispiel: Wenn die Anzeige [24 6] anzeigt, kann Sie entweder als 24,6 Knoten oder als 2460 FPM (24,6 x 100) abgelesen werden.

3. Der Bereich „Knoten (FPM x 100)" wird im Werk bei der Ablesung in „FPM" kalibriert. Es ergibt sich ein geringer eingebauter Fehler von 1,3%, wenn der Bereich Knoten abgelesen wird. Der Fehler beruht auf der Tatsache, daß der wahre Umrechnungsfaktor von Knoten in FPM 101,3 beträgt. Deshalb sind die Knoten-Werte immer 1,3% zu hoch. Für Anwendungen, bei denen ein solcher Fehler nicht akzeptabel ist, kann der Knoten-Wert mit 0,987 multipliziert werden, um die wahre Windgeschwindigkeit zu erhalten.

Wartung

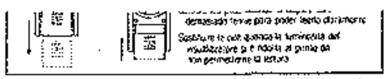
Das Turbo Meter benötigt keine regelmäßige Wartung außer der geeigneten Lagerung an einem sauberen, trockenen Ort. Gelegentlich, wenn es nötig sein, das rote Anzeigefenster zu reinigen. Verwenden Sie nur ein weiches Tuch und Leitungswasser. Chemische Reinigungsmittel oder Lösungsmittel sollten nicht verwendet werden, weil sie das Fenster trüben könnten. Das Turbo Meter wurde so entworfen, daß es in vernünftigen Rahmen schock- und wetterbeständig ist. Wie jedes Qualitätsinstrument wird es optimale Ergebnisse erzielen, wenn etwas Sorgfalt darauf verwendet wird, es nicht fallen zu lassen und kein Wasser in das Gehäuse eindringen zu lassen. Falls Wasser in das Gehäuse gelangt, sollte es nicht wieder eingeschaltet werden, bis es trocken ist. Im Falle des Eintauchens in Salzwasser sollte das Gerät SOFORT und GRÜNDLICH in Süßwasser gespült und ihm dann Gelegenheit gegeben werden, an der Luft zu trocknen. Verwenden Sie keine zusätzliche Wärmequelle für das Trocknen, da das die Kunststoffteile verziehen könnte. Stellen Sie sicher, daß die Batteriekontakte frei von Korrosion sind. Reinigen Sie sie gelegentlich mit einer Drahtbürste oder Sandpapier.

Technische Daten

Abmessungen (H x B x L)	29,5 x 66 x 118 mm
Gewicht (ohne Batterien)	85 g
Betriebstemperatur	0° bis 50°C
Lagertemperatur	-40° bis 60°C
Batterietyp	1,5 Volt AAA, Alkaline (3 Stück erforderlich)
Batterie-Lebensdauer	Typisch 7 Stunden (unterbrochener Betrieb)
Lagertyp	Saphir-Edelsteinlager
Mittelungsperiode für die Windgeschwindigkeitsmessung	
Knoten (FPM)	1 1/2 Sekunden
Meter pro Sekunde	3/4 Sekunde
Meilen pro Stunde	1 5/6 Sekunden

BEREICH	MESS-BEREICH	AUFLÖSUNG	SCHWELLENWERT	GENAUIGKEIT (% vom Meßwert)
Knoten	0-87,9	0,1 Knoten	0,9 Knoten	+ 4% / - 2% oder* ± 0,1 Knoten
Fuß pro Minute	0-8790	10 FPM	90 FPM	± 3% oder* ± 10 FPM
Meter pro Sekunde	0-44,8	0,1 m/s	0,5 m/s	± 3% oder* ± 0,1 m/s
Meilen pro Stunde	0-99,9	0,1 MPH	1 MPH	± 3% oder* ± 0,1 MPH

* Was immer größer ist



Changement des piles
Ersetzen der Batterien
Cambio de pilas
Sostituzione delle pile

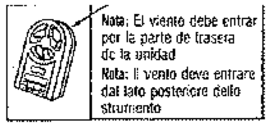


Figura 2

El Turbo Meter proporciona exactitud y sensibilidad superlativas, además de la comodidad de su tamaño de bolsillo. El diseño está basado en el principio de que una turbina que gira libremente rotará a una velocidad proporcional a la velocidad del viento. Para asegurar la máxima exactitud y sensibilidad, la turbina está suspendida en cojinetes de piedras de zafiro artificial, y su rotación va medida por un haz de luz infrarroja, que no agrega fricción alguna. La señal resultante se procesa electrónicamente mediante un circuito integrado de gran escala (LSI) logrando de este modo mayor fiabilidad y menor tamaño. Se utiliza un display (visualizador) especial de tres dígitos que provee una mayor resolución y un excelente contraste a plena luz solar. Cuenta con un conveniente conmutador para seleccionar entre las cuatro escalas disponibles, lo cual ofrece una versatilidad incomparable. Además, debido a que la turbina está completamente encerrada y a su tamaño compacto, es fácilmente transportable, lo que le permite tenerlo a mano cuando lo necesite.

Instrucciones para el uso

1. Para obtener los mejores resultados, escoja un lugar alejado de edificios, árboles u otras obstrucciones que producen turbulencia.

2. Mueva el conmutador deslizante a la escala deseada. Consulte la Fig. 1. Pasarán unos 4 segundos hasta que la velocidad del viento correcta aparezca en la ventanilla del display. Si no hay suficiente viento para hacer rotar la turbina, el display presentará 000 ó 001.

3. Determine la dirección aproximada del viento observando cómo se mueven las banderas, las nubes, las cometas, las mangaveletas, etc. Sostenga el Turbo Meter de manera que el viento pase a través del aparato según se muestra en la Fig. 2. Para obtener resultados óptimos, trate de mantener el eje de la turbina en un ángulo menor de 20° con respecto a la dirección del viento.

Lectura del display

1. El display de tres dígitos está calibrado de modo que el dígito de la derecha SIEMPRE represente la posición de las décimas. Hay un punto decimal grabado en relieve en la caja para recordarle esta posición.

Ejemplo: Si el display muestra [04 8], debe leerse como 4,8.

2. La escala de «nudos» (knots) es la misma que la de «pies por minuto» (FPM, feet per minute). La escala de «nudos» debe leerse tal como aparece en el display, mientras que los FPM se obtienen multiplicando la lectura del display por 100.

Ejemplo: Si el display muestra [24 6], puede leerse tanto como 24,6 nudos o como 2460 FPM (24,6 x 100).

3. La escala de «nudos (FPM x 100)» está calibrada en fábrica para leerse en «FPM». Se produce un pequeño error de 1,3% inherente al sistema al leerse la escala de nudos. El error se debe a que el verdadero factor de conversión de nudos a pies por minuto es 101,3. Por lo tanto, la lectura de nudos es siempre 1,3% mayor que la velocidad real. En usos en los que un error de esta magnitud sea inaceptable, la lectura de nudos puede multiplicarse por 0,987 para obtener la velocidad real del viento.

Mantenimiento

El Turbo Meter no requiere mantenimiento regular alguno, salvo el almacenamiento en un lugar seco y limpio. Cada tanto puede limpiarse la ventanilla roja del display. Use solamente un paño suave y agua de grifo. No deben usarse limpiadores químicos ni solventes debido a que pueden oscurecer la ventanilla. El Turbo Meter ha sido diseñado para resistir moderadamente los golpes y la intemperie. Al igual que cualquier otro instrumento de calidad, proporcionará los mejores resultados si se evitan las caídas y la entrada de agua en el aparato. Si entra agua en la caja no deberá encenderse el aparato hasta que esté seco. En caso de inmersión en agua de mar, la unidad deberá enjuagarse INMEDIATA y COMPLETAMENTE con agua corriente y dejarse secar totalmente al aire. No use una fuente externa de calor, dado que podrá deformar las piezas de plástico. Asegúrese de que los contactos de las pilas no estén corroídos. Límpielos periódicamente con un cepillo de alambre o con papel de lija.

Características técnicas

Tamaño (Alto x Ancho x Largo)	29,5 mm x 66 mm x 118 mm
Peso (sin pilas)	85 g
Temperatura de operación	0° a 50°C
Temperatura de almacenamiento	-40° a 60°C
Tipo de pilas	Alcalinas AAA, 1,5 voltios (se precisan tres)
Duración de las pilas	7 horas típica (uso intermitente)
Tipo de cojinetes	Zafiro
Tiempo de promediación para la medición de la velocidad del viento	
Nudos (FPM)	1 1/2 segundos
Metros por segundo	3/4 segundo
Millas por hora	1 5/6 segundos

ESCALA	GAMA	RESOLUCIÓN	UMBRAL	EXACTITUD (% de la lectura)
Nudos	0-87,9	0,1 nudos	0,9 nudos	+ 4% / - 2% ó* ± 0,1 nudos
Pies por minuto	0-8790	10 FPM	90 FPM	± 3% ó* ± 10 FPM
Metros por segundo	0-44,8	0,1 m/s	0,5 m/s	± 3% ó* ± 0,1 m/s
Millas por hora	0-99,9	0,1 MPH	1 MPH	± 3% ó* ± 0,1 MPH

* La mayor de las dos

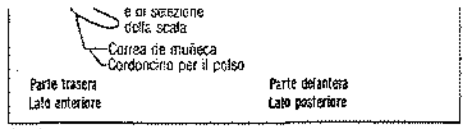


Figura 1

Il Turbo Meter offre un grado di accuratezza e sensibilità non comune, unito alla praticità del formato tascabile. La sua concezione si incardina sul principio secondo il quale una turbina che gira liberamente assume una velocità di rotazione direttamente proporzionale alla velocità del vento. Per assicurare la massima sensibilità e accuratezza, la turbina è sospesa su cuscinetti di zaffiro e la sua rotazione è avvertita da un fascio di luce infrarossa, che non comporta nessun ulteriore attrito. Il segnale che ne risulta viene elaborato elettronicamente da un circuito integrato complesso (LSI) per una più elevata affidabilità e dimensioni ridotte dello strumento. Per una maggiore risoluzione si utilizza un visualizzatore a tre cifre, che assicura un ottimo contrasto nel caso di lettura in pieno sole. Un pratico comando permette di scegliere tra quattro diverse scale ed offre quindi un grado di versatilità ineguagliato. Inoltre, la turbina completamente racchiusa ed il formato ridotto dello strumento ne rendono facile il trasporto, consentendo di averlo a portata di mano quando occorre.

Istruzioni per l'impiego

1. Per i migliori risultati, scegliere una posizione lontana da edifici, alberi e quant'altro possa provocare turbolenza dell'aria.

2. Portare l'apposito comando a cursore in corrispondenza della scala desiderata. Riferirsi alla Fig. 1. L'esatto valore di velocità del vento apparirà sul visualizzatore dopo circa 4 secondi. Se la forza del vento non è sufficiente a far ruotare la turbina, sul visualizzatore si leggerà 000 o 001.

3. Stabilire la direzione approssimativa del vento in base all'osservazione del movimento di bandiere, nubi, aquiloni, maniche a vento, o simili. Tenere il Turbo Meter in modo che il vento passi attraverso lo strumento come mostrato nella Fig. 2. Per i migliori risultati, cercare di disporre l'asse della turbina in modo che l'angolo formato con la direzione del vento non sia superiore a 20°.

Lettura del visualizzatore

1. Il visualizzatore a tre cifre è tarato in modo che la cifra all'estrema destra rappresenta SEMPRE i decimi. Per richiamare l'attenzione su ciò, sulla scatola è impressa una virgola in rilievo.

Esempio: Se sul visualizzatore appare [04 8], il valore va letto come 4,8

2. La scala dei «nodi» (knots) è utilizzata anche per quella dei «piedi al minuto» (FPM, feet per minute). La scala dei «nodi» si legge direttamente, mentre il valore in FPM si ottiene moltiplicando il valore di lettura per 100.

Esempio: Se sul visualizzatore appare [24 6], il valore si può leggere come 24,6 nodi o 2460 FPM (24,6 x 100).

3. La scala dei «nodi (FPM x 100)» è tarata in fabbrica per la lettura in «FPM». Quando si legge il valore in nodi si ha un errore implicito dell'1,3%, dovuto al fatto che il vero fattore di conversione dei nodi in FPM è 101,3. Pertanto, i valori di lettura in nodi sono sempre più alti dell'1,3%. Negli impieghi in cui questo margine di errore non è ammissibile, per ottenere il reale valore della velocità del vento si dovrà moltiplicare il valore di lettura in nodi per 0,987

Manutenzione

Il Turbo Meter non richiede alcuna regolare manutenzione, ma deve essere opportunamente riposto in un luogo pulito ed asciutto. Potrà essere di tanto in tanto necessario pulire la finestrella rossa del visualizzatore; in tal caso, servirsi di un panno morbido inumidito con acqua di rubinetto, evitando l'uso di detergenti chimici o solventi perché possono appannare la finestrella. Il Turbo Meter è stato concepito come strumento ragionevolmente resistente all'urto ed agli elementi. Come tutti gli strumenti di qualità, assicurerà i migliori risultati se si avrà cura di non farlo cadare e di impedire che penetri acqua nella scatola. Se si dovesse verificare quest'ultimo inconveniente, attendere che sia completamente asciutto prima di riaccenderlo. Nel caso di immersione accidentale in acqua salata, risciacquare IMMEDIATAMENTE ed ACCURATAMENTE lo strumento in acqua dolce e lasciarlo asciugare completamente all'aria, evitando di ricorrere ad una fonte di calore perché può deformare le parti in plastica. Assicurarsi che i contatti delle pile non presentino segni di corrosione e pulirli di tanto in tanto con uno spazzolino metallico o carta vetrata.

Caratteristiche tecniche

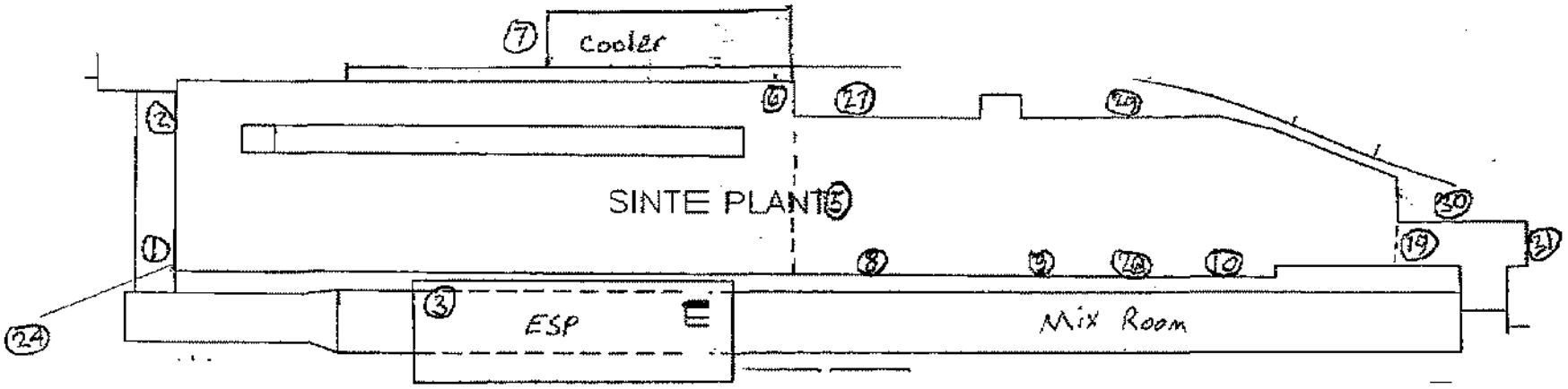
Dimensioni (altezza x larghezza x lunghezza)	29,5 x 66 x 116 mm
Peso (senza pile)	85 g
Temperatura d'impiego	da 0° a 50° C
Temperatura di conservazione	da -40° a +60° C
Tipo di pile	No. 3 pile alcaline AAA da 1.5 Volt
Durata delle pile (tipica)	7 ore (uso intermittente)
Tipo di cuscinetti	Zaffiro
Tempo per il calcolo della media di misurazione delle velocità del vento	
Nodi (FPM)	1 1/2 secondi
Metri al secondo	3/4 secondi
Miglia orarie	1 5/6 secondi

SCALA	CAMPO	RISOLUZIONE	VALORE DI SOGLIA	ACCURATEZZA (% valore di lettura)
Nodi	0-87,9	0,1 nodi	0,9 nodi	+ 4% / - 2% oppure* ± 0,1 nodi
Piedi al minuto	0-8790	10 FPM	90 FPM	± 3% oppure* ± 10 FPM
Metri al secondo	0-44,6	0,1 m/s	0,5 m/s	± 3% oppure* ± 0,1 m/s
Miglia orarie	0-99,9	0,1 MPH	1 MPH	± 3% oppure* ± 0,1 MPH

* Si tiene conto del più alto tra i due valori.

ATTACHMENT 3

Sinter Plant

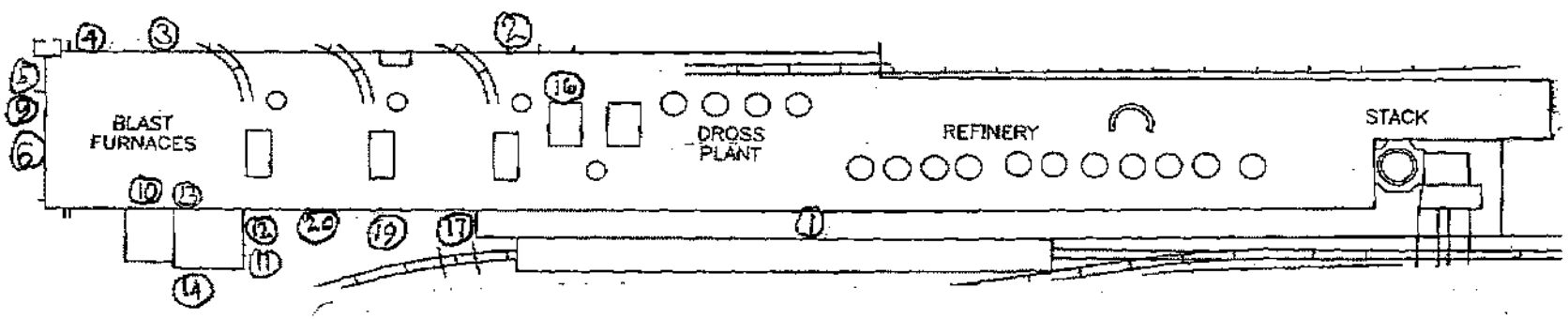


N

Note: Did not measure doors 11-18, 20-23 since these are doors in mix room that does not have a building ventilation system.

Note: Doors 25, 26 sealed off

Blast Furnace



Note: Door 23 actually under Sinter Plant and not under building ventilation system.

Note: Doors 7,8,&15 are permanently Sealed

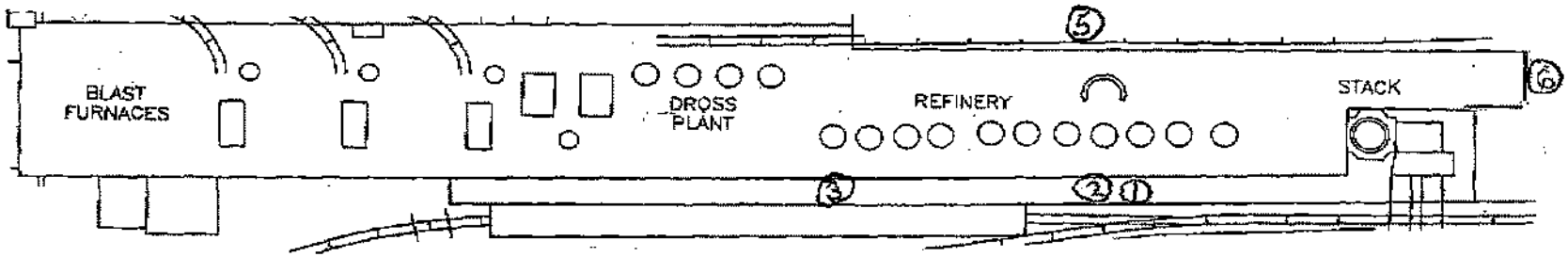
Note: Air curtains on Doors 17 & 20 replaced with actual self closing doors.

Note: Air curtain on Door 18 replaced with self closing door. Door 18 and 24 is to enclosed Belt 12 that is not under building ventilation system.

Note: Doors 21 and 22 are to enclosed conveyor belt 10 that is not under building ventilation system.

N

Refinery



Note: Door 4 actually is in open dock area that is not under building ventilation system.

N

ATTACHMENT 4

A-2

SINTER PLANT DOORS INFLOW CHECK

DATE : _____

	Time	WS mph (<5)	Flow (fpm)	Flow (fpm)	Flow (fpm)	
1 Man door on 4th floor west of Control Rm.						
2 Man door on 4th floor east of Control Rm						
3 Northwest Man door at ESP unit						
4 Southwest Man door at ESP unit						
5 South end Man door on 4th floor						
6 Southeast Man door 4th floor at Cooler bghse						
7 East Man door 2nd floor at Cooler bghse						
8 Northwest Man door to mix room						
9 Middle Man door to mix room 2nd floor						
10 Southwest Man door to mixing room						
11 Upsairs Man door on Mix room northeast side						
12 Mix room Northwest side #1 man door upstairs						
13 Mix room Northwest side #2 man door upstairs						
14 Mix Room East Middle Man door upstairs						
15 Mixing Room Northwest Man door #3 upstairs						
16 East mix room man door upstairs to RD-2						
17 Southwest man door upstairs in mixing room						
18 South mix room man door upstairs						
19 Man door South of top side of 76" Rolls						
20 South man door Bottom of mixing room						
21 Man door east of #5 bin in mix room to Sinter Plant						
22 Northwest man door @ bottom of mix room						
23 Northeast man door @ bottom of mixing room						
24 Main equipment door bottom floor North end						
25 #1 west man door from North on Bottom floor						
26 #3 west man door from North on Bottom floor						
27 East man door on bottom floor @ 12 fan						
28 #4 west side man door on bottom floor						
29 Equip. doors East side Bottom floor under FE-11						
30 Southeast man door @ Head of CV-37-B						
31 South equipment doors @ tail of CV-23						

No Ventilation

No Ventilation

Seals closed

Cooler Baghouse

A-4

BLAST FURNACE DOORS INFLOW CHECK

DATE : _____

	Time	WS mph (<5)	Flow (fpm)	Flow (fpm)	Flow (fpm)	
1 Equipment Door North of CV10 Grizzly						
2 Equipment Door South side of office						
3 Equipment Door North end of slag track						
4 Man door East wall to slag track alley						
5 Man door North wall bottom floor, East side						
6 Equipment door North end center						
7 Man door North wall West of #6 door						
8 Equipment door North wall, West side						
9 Man door North end @ mixer rack level						
10 Man door West wall CV13 tail pulley area						
11 Man door South wall @ scale belt floor						
12 Service doors South wall scale belt floor						
13 Man door Northeast corner on crow's nest floor						
14 Man door West wall @ crow's nest floor						
15 Man door on South wall on crow's nest floor						
16 Man door South end of CV14 walkway						
17 Man door curtains on West @ #1 Fce feed floor						
18 Man door curtains on West wall to CV12 belt stairs						
19 Man door West wall from trestle area to balloon flue						
20 Man door curtains West wall to blower valves						
21 Man door curtains East side to CV10						
22 Man door curtains West side of CV10						
23 Man door North end to CV9 & sinter bins						
24 Man door curtains East side CV12 @ old feed floor						
25						
26						
27						
28						
29						
30						
31						

Sealed Closed

CLOSED

No Vent

No Vent

No Vent

A-6

REFINERY DOORS INFLOW CHECK

DATE : _____

		Time	WS mph (<5)	Flow (fpm)	Flow (fpm)	Flow (fpm)	
1	Equipment door, West wall near #9 kettle						
2	Man door West Wall Near #8 kettle						
3	Man door West Wall Near #1 kettle						
4	Man door West Wall near old stack area						
5	Man door East wall under #9 baghouse area						
6	Equipment curtains from stacker to dock area						
7							
8							
9							
10							
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500,000 (SA)² cfm # 5 outlet of Baghouse Flow Cems
April 2005

Requested Cem manual

← Drawings

(3) 300,000 Sinter Plant Duct Ventilation Baghouse

(2) 326,000 cfm

(1) 85,000 cfm AP outlet

Comments 10:90 Rule
WIND Direction on exceeding Days
Doors could be changed Out
Flow Cems info

ATTACHMENT 5

A-1

The DoE RUN Company - Herculaneum Smelter

Walk Thru

How tested Hotwire

Flow meters

Acid Plant Outlet has its own Fan

SINTER PLANT VENTILATION

SINTER MACHINE TO ACID PLANT — 50 cfm — Damper — AP — Strong

① From AP

DATE	TIME	amps	Pitot (in. H_2O)	AP FLOW (acfm)
AP				
			50k acfm	

H2 = AP AP

SINTER MACHINE TO #3 BAGHOUSE — 223k acfm — #3 Bghse — weak Gases — Flow meter

② #3 Baghouse/AP Outlet Trail to Main Stack

DATE	TIME	TOTAL (amps)	Pitot (in. H_2O)	combined acfm	- AP (acfm)	= #3 Baghouse (acfm)
	Full	Up	ON/off			

250/300 K acfm

	DATE	TIME	Damper (% open)	amps	Pitot (in. H_2O)	FLOW (acfm)
WHEEL TUNNEL TO #3 BAGHOUSE						
FAN Amps						

Flow Meter

VENTILATION BAGHOUSES TO MAIN STACK

	BAGHOUSE	DATE	TIME	DAMPER % OPEN	ΔP (in. H_2O)	Pitot (in. H_2O)	FLOW (acfm)
mix Drum Prior to Sinter Feed	MIX DRUM Baghouse						
After Sinter & AP	CRUSHER Baghouse						
After Crusher	COOLER Baghouse						
Fine Seperator but Res	Cage Paktor						
Fines Crusher Recycled to Sinter	76" Smooth Rolls						
	V 22 2000 cfm Baghouse						

mix Run

③ VENTILATION Baghouses TO MAIN STACK

DATE	TIME	Pitot (" H_2O)	FLOW (acfm)

① OSI's Flow Monitor

31 Doors on Sinter Plant

Sealing up

Keeping all Doors closed

open up to sample

	AMPS
#6 Bghse pulls out of Doghouse	
TO MAIN 50,000 cfm	
STACK	

From Furnace old Drass Plant Baghouse from Feed floor diff. Build.

Turn Air

A-3

The DOE RUN Company - Herculaneum Smelter
BLAST FURNACE VENTILATION / DROSS

Amp reqd

	DATE	TIME	DAMPER(S) % OPEN	AMPS	ΔP ("H_2O)	Pitot ("H_2O)	flow (acfm)
BF1							
BF2							
			1) 2)	1) 2)			
			1) 2)	1) 2)			
			1) 2)	1) 2)			

pulse — BUILDING TO #7 BAGHOUSE → 300K acfm Building Vent Fan

shake — FURNACES TO #5 BAGHOUSE → 300K acfm

#8 Bag Vent 10 Belt — VENTILATION FANS TO #5 Baghouse

flow monitor

9 Baghouse

	DATE	TIME	DAMPER % Open	Pitot ("H_2O)	FLOW (acfm)	
Conveyor Belts CV 10 (5 Baghouse)						To #5 Baghouse
Grizzly (10 Belt) Vent. FAN	Part of					
CV10/CV11/CV12 Vent. FAN	5 Baghouse					To #5
CV13/CV14 Vent. FAN	5 Baghouse					
Scale belt Vent. Fan	5 Baghouse					
Crow's Nest Vent. Fan	5 Baghouse					
"D" Kettle Flux Vent.	5 Baghouse					
Furnace Front end Vent.	5 Baghouse					

		#8 ΔP "H_2O	#8 amps
CV10 LEG To #8 Baghouse → #8 STACK	Near Op & Skim to Feed Back to Furnace		
Furnace Feed Floor to #6 Baghouse → MAIN STACK			

pulse

pulse

A-5

The DOE RUN Company - Herculaneum Smelter

REFINERY VENTILATION

7/9 Bag House Stack

BUILDING TO #9 BAGHOUSE

~50,000 → #9 Bghse

70,000 cfm → #8 Bghse

DATE	TIME	DAMPER (% OPEN)	amps	ΔP ("H_2O)	Pitot ("H_2O)	FLOW (acfm)

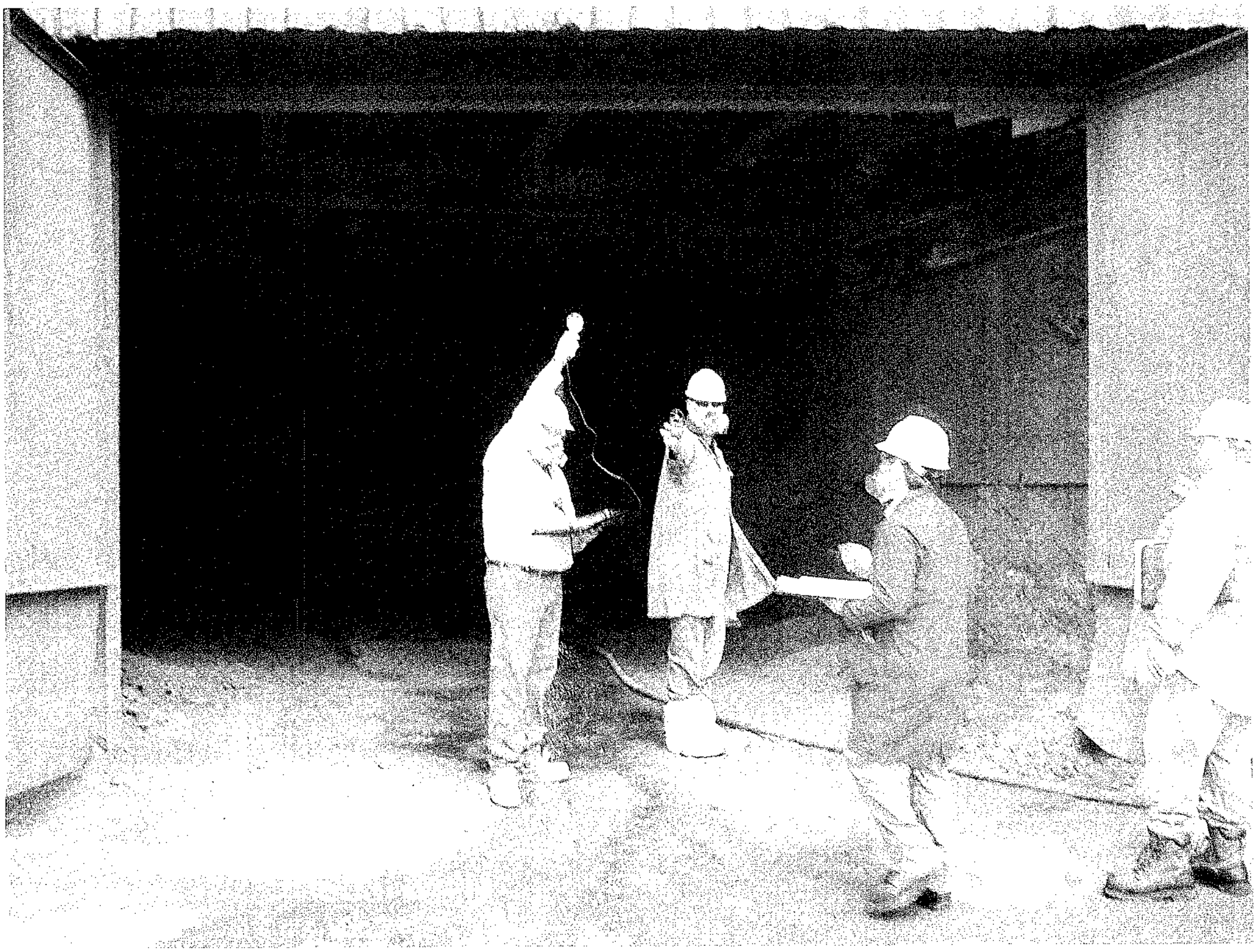
KETTLE VENTILATION

	Kettle Damper(s) (% OPEN)	Pitot ("H_2O)	FLOW (acfm)
Kettle #1 VENT			
Kettle #2 VENT			
Kettle #3 VENT			
Kettle #9 VENT			
Kettles #10 & #11 VENT	10) 11)		
	10) 11)		
	10) 11)		

Amps

7 & 8 & 9

ATTACHMENT 6



ATTACHMENT 7

Tuesday June 3, 2008
6:30 - 7:00 -
Doe Run Ventilation Survey
Tim Streisel - Electrical Engineer

1st door accumulation of Dust >6" high below conveyor belt

Bldg is not well sealed - in need of maintenance

South end of sinter plant lot of dust accumulation.

Housekeeping + maintenance

Large door opened on north end of sinter plant creates good draft & so possibly dust goes out other small openings at that time

Cadimum + Inorganic Arsenic Hazards

4.5" H_2O on SM BH Baghouse?

#30 TR 323 947
TL 425
BR 469
BL 490

#20
TL 345 BR 317
TC 1.3 BL 307, 1.6
TR CL 345, 2.2

#29

~~BL — 219~~
~~BL~~
~~BR 1.6~~

17'W x ? ~12

BL — 1.2, 215
BL 2.4, 284
BR 2.1, 287

BR 2.6, 347
CC 2.8, 339
CL 2.7, 353

TL — 3.3 372
TC — 3.01 347
TR — 2.7, 345

pluto 2.5, 339

#27 4'7" x 6'.5"
TL — 4.6, 1244
TC — 4.6 472
TR — 1.9 3.50

BR — 5.2, 469
CC 4.9, 403
CL 4.7, 462

BR — 2.9, 325

BL 3.7 274
BC 4.7 290

#24 2'5' x 6' 9"

TC - 3.2 384
CC 2.6 380
BC 3.5 362
} Man door

TR - 1.9, 248
TC - 2.4 285
TL - 3.3, 3[illegible]

BR 1.2, 132
BC 2.4, 278
BL 280, 2.3

CR 1.85, 1.5
CC 2.8 282
CL 2.9 339

#19

TRC 366, 3.3
CC 3.8 402
BRC 3.3 413

2'6" x 6'6"

#5 upper level

TC 0, 93
CC 0 124
BC 0 26

flow out of building

visible emissions

6'6' x 2' 7"

#5 baghouse fume
- rider - visible emissions

2' x 6"

#6	TC	258	2.8	outflow
	CC	278	1.9	visible
	BC	246	1.7	emissions

# 3	TC	1.1	219	
	CC	1.0	390	visible
	BC	1.3	417	emissions

#4	TC	971	540	5.3	
	CC	1030	9.9	3.3	too
	BC	1120	10.[illegible]	3.0	windy

24.0
22.0

#1 too much smoke
from sinter machine
visible emissions
high % of outward flow
20-40% opacity

#2 large hole to left of door
debris preventing closure

1.5
0
.5

#7 TC 93 | .3 outflow
CC 24.1 | 348
BC 3.4 | 386

4' x 3' ~~large~~ hole for Motor Sail No Vent

#16 TC 3.4 | 433
CC 2.9 | 386
BC 2.7 | 364

2' x 28"

#14 TC - 3.9 | 459
CC 3.5 | 419
BC 3.9 | 325

#?

#8 3.3 | 469
1.8 | 323
2.4 | 337

#31 6'x6'

TL	TC	TR
2.0, 291	4.0 429	3.7, 496

CR	4.8, 290
CC	2.3 323
CL	3.1, 461

BL	2.7, 333
BC	3.5, 382
BR	3.5, 538

Blast Furnace

#20 TC 2.3 364
CC 3.9 488
BC 4.0 534

#18 TC 274, 2.1
CC 244, 1.7
BC 136, 1.5

#17 TC 301 4.4
CC 3.8 372
BC 2.3 276

3'x9'

#16 TC 813, 8.0
CC 722, 5.6
BC 482 5.0

~3x6'

openers 2'x4 6.3

#10 TC 9.8 530
CC 4.6 510
BC 4.1 399

~3x6'

#11 526, 4.0 ~3'x6'
489 4.1
537 4.3

~ 800'/m

Too windy #12

TC	224, 3.2	TC	TR
TC		CC	RC
BR		BC	BR

Flow into door

#14

T	451	6.1
C	467	4.4
B	427	4.0

#13

1.4	311
1.6	289
1.3	280

#9 TC 772, 7.2
CC 679, 6.5
BC 669 6.4

Not on the list
Man door by office ?

705, 7.5
685, 7.3
705 7.0

#2 TC ~~6.7~~, TC ~~5.8~~, Ø TR ~~6.9~~ Ø
CL 6.7, 439 CC 5.8, 469 CR 6.9, 642 (~8 ft)
15 ft x BC 6.4, 248 BC 6.3, 669 BR 6.0 644
15 ft

#3 T Ø
15 ft CL 474 CC 465, 6.0 CR 376, 5.7
~~15 ft~~ x BC 634, 4.2 BC 656, 6.2 BR ~~357~~ 354, 5.4
15 ft

#4 TC 437, 6.0
CC 675, 7.1
BC 652, 6.5
man door

#5 TC 679, 6.7
man door CC 553, 5.9
BC 695, 5.2

#6 TL 5.5, 534 TC 5.9, 561 TR 7.5, 713
CL CC CR
equip doors BL 6.1, 718 BC 6.6, 622 BR 665, 6.9
6ft ↑ x 12ft →

#1 TL
equip doors CL 8.1, 839 CC 8.2, 785 CR 7.2, 573
BL 7.1, 539 BC 5.7, 656 BR 4.3, 429
12ft x 14ft

Refinery

#3 TC 8.1, 860
CC 7.5, 673
BC 7.4, 604
main doors refinery

#2 TC 7.5, 752
CC 7.8, 675
BC 7.7, 667

#1 CL 6.5, 626 CC 4.5, 382 CR 6.5, 632
equip doors BL 6.5, ~~[illegible]~~ 630 BC 5.5, 640 BR 7.1, 687
15ft x 17ft

#6 12 ft x 10 ft ↑

TL 675, 7.4 TC 789, 5.0 TR 628, 9.4

CL CC CR

BL 628, 7.5 BC 568, 8.3 BR 598, 3.2

#5

TC 660, 4.9

CC 406, 4.7

BC 581, 4.2

ATTACHMENT 8

Sinter Plant ?

Facing		Height	Width	Area (Ft**2)
N	1	2.5	6.5	16.25
N	2	2.5	6.5	16.25
W	3	2.5	6.5	16.25
W	4	2.5	6.5	16.25
S	5	2.58	6.5	16.77
S	6	2.5	6.5	16.25
N	7	2.5	6.5	16.25
W	8	2.5	6.5	16.25
W	9	2.5	6.5	16.25
W	10	2.5	6.5	16.25
	11	No Ventilation		
	12	No Ventilation		
	13	No Ventilation		
	14	No Ventilation		
	15	No Ventilation		
	16	No Ventilation		16.25
	17	No Ventilation		
	18	No Ventilation		
S	19	6.5	2.5	16.25
	20	No Ventilation		
	21	No Ventilation		
	22	No Ventilation		
	23	No Ventilation		
N	24	6.75	2.5	16.875
	25	Sealed Closed		
	26	Sealed Closed		
E	27	4.58	6.41	29.3578
W	28	2.5	6.5	16.25
E	29	12	17	204
S	30	2.5	6.5	16.25
S	31	6	6	36
		TOTAL		514.2528
		Total FD Ventilation		400000 ACFM

Blast Furnace ?

Facing					
W	1		12	14	168
E	2		15	15	225
E	3		13	15	195
E	4		3	6.5	19.5
N	5		3	6.5	19.5
N	6		12	6.5	78
	7	Sealed Closed			
	8	Sealed Closed			
N	9		3	6	18
W	10		2	6	12
S	11		3	6	18
S	12		10	7	70
W	13		3	6	18
W	14		3	6	18
	15	Sealed Closed			
E	16		2	6	12
N	17		3	8	24
	18	No Ventilation			16.25
W	19		2.5	6.5	16.25
W	20		2.5	6.5	16.25
	21	No Ventilation			
	22	No Ventilation			
	23	No Ventilation			
	24	No Ventilation			
		HOLE in floor	2 X 4		8
		Total			951.75
		Total FD Ventilation			600000 ACFM

Refinary

Facing				
W	1	15	17	255
W	2	2.5	6.5	16.25
W	3	2.5	6.5	16.25
W	4	2.5	6.5	16.25
E	5	2.5	6.5	16.25
S	6	12	10	120
		Total		440
		Total FD Ventilation		320000 ACFM

Sinter Plant	Feet**2	%	Miles per hour to re
NORTH	65.625	0.13	69.264
EAST	233.3578	0.47	19.478
WEST	97.5	0.20	46.62
SOUTH	101.52	0.20	44.774
TOTAL Area of	498.0028		

TOTAL INL 110,387 ACFM
Extra 289,613
% EXTRA 0.72

Easterly Wind Dominated but is blocked from blast furnace
Southerly wind influenced
Westerly wind influenfed with no disturbances

Ventilation Rate 777.8276 ACFM/FT**2

Blast Furnace		%	Miles per hour to reach equal volumes
NORTH	139.5	0.15	48.876 m/hr
EAST	451.5	0.49	15.101
WEST	248.5	0.27	27.437
SOUTH	88	0.09	77.479
TOTAL Area of	927.5		

TOTAL INLE 206,642 ACFM
EXTRA 393,358
% EXTRA 0.66

EASTERLY Wind Dominated
Westerly Influenced but blocked somewhat from Sinter building
Southerly Influenced
Ideal if the wind is from the East

Ventilation Rate 630.4176517 ACFM/FT**2

Refinary		%	Miles per hour to rea
NORTH	0	0.00	#DIV/0!
EAST	16.25	0.04	223.776
WEST	303.75	0.69	11.9715
SOUTH	120	0.27	30.3029
TOTAL Area of openir	440		

TOTAL INLET 269,362 ACFM
EXTRA 50,638
% EXTRA 0.16

Westerly Wind Dominated
Southerly Influenced
North Wind uneffected

Ventilation Rate 727.273 ACFM/FT**2

PLANT WIDE: The three process building are most dominated by strong Easterly and Westerly winds

ATTACHMENT 13

Name	6/4/08 10 a.m. Affiliation	Phone #
Scott Postma	EPA	(913) 551-7048
Darin Clutts	Doe Run	(636) 933-3033
Rusty Keller	Doe Run	(636) 933-3143 - 3150 FAX
Gwen Yoshimura	EPA	(913) 551-7073
Rick Batts	Doe Run	636-933-3141
Patrick Dwyer	DNR St. Louis	(314) 416-2960
Bruce Chamberlain	Doe Run	(636)-933-3155
Steve Batts	Doe Run	636-933-3213
Aaron Miller	Doe Run	636-933-3180
Dave Bailey (Engineering) DBailey@DoeRun.com	Doe Run	636-933-3077 933-3028 Fax
John Rustige	MDNR/APCP	573-751-4817
Gary Hughes	Doe Run	636-933-3187
Roman Teter	EPA	913-551-7609
Not in Attendance Jim Lamza Fame		573-626-3406

ATTACHMENT 14

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
CONFIDENTIALITY NOTICE

Facility Name The Dog Run Company	
Facility Address 581 Main Street, Herculaneum MO 63048	
Inspector (print) Scott Postma	
U.S. EPA, Region VII, 901 N. 5th St., Kansas City, KS 66101	Date 6/4/08

The United States Environmental Protection Agency (EPA) is obligated, under the Freedom of Information Act, to release information collected during inspections to persons who submit requests for that information. The Freedom of Information Act does, however, have provisions that allow EPA to withhold certain confidential business information from public disclosure. To claim protection for information gathered during this inspection you must request that the information be held CONFIDENTIAL and substantiate your claim in writing by demonstrating that the information meets the requirements in 40 CFR 2, Subpart B. The following criteria in Subpart B must be met:

1. Your company has taken measures to protect the confidentiality of the information, and it intends to continue to take such measures.

2. No statute specifically requires disclosure of the information.

3. Disclosure of the information would cause substantial harm to your company's competitive position.

Information that you claim confidential will be held as such pending a determination of applicability by EPA.

I have received this Notice and DO NOT want to make a claim of confidentiality at this time.	
Facility Representative Provided Notice (print)	Signature/Date

I have received this Notice and DO want to make a claim of confidentiality.	
Facility Representative Provided Notice (print)	Signature/Date
Calvin R. Keller	Calvin R. Keller 6-4-08

Information for which confidential treatment is requested:

NONE

(Rev: 11/15/99)

ATTACHMENT 15

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RECEIPT FOR DOCUMENTS AND SAMPLES

Facility Name
Doe Run Company

Facility Address
881 MAIN STREET, Herculaneum MO 63048

Documents Collected? YES ✓ (list below) NO___

Samples Collected? YES___ (list below) NO ✓ Split Samples: YES___ NO___

Documents/Samples were: 1)Received no charge ✓ 2)Borrowed___ 3)Purchased___

Amount Paid: $_____ Method: Cash___ Voucher___ To Be Billed___

The documents and samples described below were collected in connection with the administration and enforcement of the applicable statute under which the information is obtained.

==========

Receipt for the document(s) and/or sample(s) described below is hereby acknowledged:

- Building Ventilation Study, Work Plan
- Flow Monitor information
- Picture of openings
- Building and Ventilation opening schematics
- Specification data

Facility Representative (print)	Signature/Date	
Calvin R. Keller	Calvin R. Keller	6/4/08
Inspector (print)	Signature/Date	
Scott Poshma	[signature]	6/4/08

U.S. EPA, Region VII, 901 N. 5th Street, Kansas City, KS 66101

(rev:1/20/93)