Florida Department of Environmental Regulation

Twin Towers Office Bldg. ● 2600 Blair Stone Road ● Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

31 AVC 160 318

February 2, 1993

Mr. Karl Schmit
Project Engineer
Post, Buckley, Schuh & Jernigan, Inc.
Solid Waste Division
1560 Orange Avenue, Suite 700
Winter Park, FL 32789

Re: East Duval Sanitary Landfill -- Equivalent Flare

Dear Mr. Schmit:

We have reviewed the note you sent to Ms. Patty Adams of this Department on January 13, 1993, and the accompanying copy of the letter dated November 12, 1992 on this subject reference.

Please provide us a written analysis comparing the features, operating characteristics, limitations, schematic diagrams, etc., of the recommended LFG Specialities, Inc. Model No. EF840S4 to the IT-McGill Model No. EFG-60 flare.

As soon as we receive this information we will act on your request for approval for installation of the alleged equivalent flare.

If you have further questions please call me on 904-488-1344.

REV 5/4/92 2/15/93 Date
E. Parrish
AC 16-186047
City Jacksonville
Landfill Flare
Carl Schmit
PB&S
(407) 647-7275

Kind regards,

Thomas M. Cascio
Associate Engineer IV
Air Permitting and Standards Section

DEPARTMENT OF PUBLIC UTILITIES
Solid Waste Disposal Division

February 12, 1993

Mr. Preston Lewis
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blairstone Road
Tallahassee, Florida 32399

RE: East Duval County Sanitary Landfill
Flare Permit #AC16-186047

Per telephone call 3/17 They need more time They agreed to test April 1, 1993 & allow 45 days to get test in and 90 days for DER to issue Operating Permit

Dear Mr. Lewis,

The City of Jacksonville respectfully requests an extension of the referenced permit due to construction delay created by inclement weather. We will require an extension of 45 calendar days (~~April 1, 1993~~ SEPT 1, 1993).

Your favorable consideration of this request will be greatly appreciated.

Sincerely,

L. Chris Pearson
Sr. Assistant Engineer

LCP:lsm

cc: Karl Schmidt, PBS&J
Scott D. Kelly, P.E.
William C. Boyle
Reading File
LOFS

Florida Department of Environmental Regulation
Twin Towers Office Bldg • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400
Lawton Chiles, Governor
Virginia B. Wetherell, Secretary

February 16, 1993

Mr. L. Chris Pearson
Sr. Assistant Engineer
City of Jacksonville
Department of Public Utilities
Solid Waste Disposal Division
Jacksonville, FL 32206

Re: East Duval County Sanitary Landfill
Flare Permit AC16-186047

Dear Mr. Pearson:

Thank you for your letter dated February 12, 1993 on the referenced permit, requesting a construction extension through April 1, 1993. Please be advised that this is the second permit extension you have requested without providing the extension fee. The total processing fees due are $100.00. Once the extension fees are received we will extend the permit. You are encouraged to complete construction, demonstrate compliance, apply for the operating permit in an expeditious manner, and eliminate the need for any further extensions of this construction permit.

Sincerely,

G. Preston Lewis, P.E.
Supervisor,
Permitting and Standards

cc: Thomas Cascio
Patty Adams

Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Virginia B. Wetherell, Secretary

February 24, 1993

Mr. Karl Schmit
Project Engineer
Post, Buckley, Schuh & Jernigan, Inc.
Solid Waste Division
1560 Orange Avenue, Suite 700
Winter Park, FL 32789

Re: East Duval Sanitary Landfill -- Equivalent Flare

Dear Mr. Schmit:

Thank you for your letter dated February 18, 1993 on this referenced project, and the attached descriptive materials concerning the enclosed flare system proposed by LFG Specialities, Inc. (Model EF840S4).

Included with this letter is the Manufacturer's Design Specifications excerpt from the Information Package you provided in November 1992 for the proposed flare. As an aid to our review of the equivalence question, it would be most helpful if you would annotate the entries on each page of the Design Specifications with the appropriate reference (page number and paragraph) taken from the LFG Specialities, Inc. proposal, thus assuring that all specifications are indeed met.

Your early response to this request will expedite our review.

Kind regards,

Thomas M. Cascio
Associate Engineer IV
Permitting and Standards Section

Enclosure

PBSJ POST, BUCKLEY, SCHUH & JERNIGAN, INC.

ENGINEERING
PLANNING

February 24, 1993

Patty Adams
Florida Department of Environmental Regulations
Bureau of Air Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

RE: EAST DUVAL SANITARY LANDFILL
Flare Permit No. AC 16-186047
Permit Expiration Extension Fee

Dear Ms. Adams:

As we discussed on the telephone today, I have attached information concerning fees already paid to Florida Department of Environmental Regulation (FDER) by the City of Jacksonville for the first permit expiration extension.

I trust this will satisfy Mr. Preston Lewis' request for outstanding fees, issued in correspondence received today by the City of Jacksonville.

Thank you for helping me sort through this maze. In order for me to keep current, could you copy me on all future correspondence regarding these matters?

Please contact our office should you have any questions.

Sincerely,

Karl A. Schmit

Karl A. Schmit, E.I.
Project Engineer
Solid Waste Division

cc: C. Pearson/City of Jacksonville

KS/cla/EQFLARE.$
07-421.05/5.1

Equal Opportunity Employer

DEPARTMENT OF PUBLIC UTILITIES
Solid Waste Disposal Division

March 17, 1992

C.H. Fancy, P.E., Chief
Bureau of Air Regulation
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Re: East Landfill Air Permit

Dear Mr. Fancy,

Enclosed is a check made out to the Florida Department of Environmental Regulation--Bureau of Air Regulation, in the amount of $50.00 for the processing of the City of Jacksonville's air permit renewal for East Landfill closure. Please advise us of what further actions may be necessary on our part in order to complete this request.

Sincerely,

George R. Knecht, P.E.
Engineer Manager

GRK:lsm

cc: Post, Buckley, Schuh, and Jernigan
Scott D. Kelly, P.E.
Bill Boyle
Reading File
LOFS

CITY OF JACKSONVILLE, FLORIDA
DEPARTMENT OF FINANCE

633 4

DOCUMENT REFERENCE	INDEX CODE	SUB OBJ	NET AMOUNT	DESCRIPTION
DP17490	735720	5481	50.00	FLARE CONSTRUCTION PERMIT AC 16-196047, EA
	TOTALS		50.00	

DETACH BEFORE CASHING CHECK

VOID 90 DAYS FROM DATE
DATE 03/09/92

CHECK NUMBER 63 04

CITY OF JACKSONVILLE, FLORIDA

PAY EXACTLY **********50* DOLLARS AND 00 CENTS

$*********50.00

TREASURER WILL PAY TO THE ORDER OF

FLORIDA DEPT OF ENVIRONMENTAL REGULATION
BUREAU OF AIR REGULATION-TWN TOWERS BLDG
2600 BLAIR STONE RD
TALLAHASSEE, FL
323992400

TREASURER

FIRST UNION First Union National Bank of Florida Jacksonville, Florida

53-2
630

⑈63304⑈ ⑆063000021⑆ 1126004074⑈

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

191546

RECEIPT FOR APPLICATION FEES AND MISCELLANEOUS REVENUE

Received from City of Jacksonville Dept of Pub Utils Date April 7, 1992

Address 37-2 W. 1st St Jax FL 32206 Dollars $ 50.00

Applicant Name & Address GEORGE KNECHT SAME ADDR

Source of Revenue East Landfill Flare

Revenue Code 001031 CK# 63304 Application Number AC 16 - 211525

TALLAHASSEE DEP # 0023
CASH LSTG # 0009

By Gloria Badger

LOFS APR 21 10

PBS&J POST, BUCKLEY, SCHUH & JERNIGAN, INC.

ENGINEERING
PLANNING

March 9, 1993

Mr. Thomas M. Cascio
Associate Engineer IV
Florida Department of Environmental Regulations
Air Permitting and Standards Section
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

RE: **East Duval Landfill**
Permit No. AC 16-186047
Equivalent Flare

Dear Mr. Cascio,

In response to your letter dated February 24, 1993, I have attached information which will assist you in your review of the constructed flare.

The attachment includes the design specifications of the permitted flare with annotations alongside each item referencing the design specifications of the constructed flare, submitted to you on February 18, 1993.

I trust you will find this comparison satisfactory to complete the determination of equivalency and look forward to your response.

Please contact our office should you have further questions or comments.

Very truly yours,

Karl Schmit, E.I.
Project Engineer
Solid Waste Division

cc: E. Hilton/PBS&J
C. Pearson/City of Jacksonville

KS/cla/FLAREQ'S
07-421.05/3.0

KEY: 2,590 SCFM/1/P.S./P.1/SECTION I → LOCATION ON PAGE
2,590 SCFM = LFG PARAMETER OR COMMENT.
P.1 → PAGE NO.
P.S. → SUB-SECTION OF MECHANICAL INFO W/P.S. = PARAMETER SPECIFICS E.F.S. = ENCLOSED FLARE SYSTEM
1 → SECTION OF DOCUMENT (MECHANICAL) SUBMITTED TO FDEP ON FEB. 18, 1993

SECTION ONE - PROCESS SUMMARY

DESIGN BASIS - TYPICAL STANDARDS FOR LANDFILL GAS.

Gas Composition (Vol. %)

CH4	52% max.
CO2, Air, Inerts	48%
	100%
LHV	473 Btu/SCF
Temperature	100°F (45 - 120°F)
Mole Weight	29.46

Flare Gas

Type:	Landfill Gas
Max. Flow Rate:	2100 scfm 2,590 SCFM/1/P.S./PAGE 1 - SECTION I.
Waste Heat Release: *	59.6 MMBtu/hr (Design Basis) A FUNCTION OF LANDFILL GAS AND ITS TYPICAL
Min. Flow Rate:	10% of max. flow 260 SCFM/1/P.S./PAGE 11, Para. I.
Smokeless Flow: *	100% EQ. FLARE OPERATES AT SAME TEMP. AS PERMITTED
Pressure Drop:	12" WG FLARE, THEREFORE IT WILL BE 100% SMOKELESS. → 15" WG/1/P.S./P.1/I. & 1/P.S./P.10/A.

Unit Design

Operating Temp: *	1600 - 2000°F (2100°F shutdown)	EQUAL NO./1/P.S./P.10/B.c
Retention Time: *	1600°F .66 Seconds	
	1800°F .69 Seconds	
	2000°F .72 Seconds	
Overall Unit Turndown:	6:1 (to hold 2000°F) 10:1/1/P.S./P.11/Para G.	
Flame Stability Turndown:	20:1 minimum 10:1/1/P.S./P.11/Para. G	
Fired Fuel Req'd:	None (pilot only) EQUAL/1/P.S./P.4/1ST BULLET UNDER "FEATURES OF THE FLAME-TROL II"	

UTILITIES

Pilot Gas	22 SCFH propane (intermittent) EQUAL/1/P.S./P.4/1ST BULLET FOR "FEATURES OF THE FLAMETRO
Compressed Air	Not required
Electricity	460V/3Ph/60 Hz (McGill will step down to 110V for control usage.) - 110V./5000V/1/P.S./P.3 3rd BULLET FROM TOP.

EQUAL - SINCE WASTE GAS IS ENTERING SYSTEM UNDER PRESSURE.

* NOTE: COMPLIANCE TESTING IN ACCORDANCE TO EPA TEST METHODS WILL BE

MECHANICAL DESIGN

Design Wind Speed	90 mph	100 m.p.h /1/ EFS / P.3 / 2.01 (6) 100 m.p.h /1/ P.S / P.11 / NOTE @ BOTTOM OF PAGE
Ambient Temp	-20 to 120°F	EQUAL SINCE SENSING DEVICES REGULATE ALL OPERATIONS.
Electrical Area	Non-hazardous	EQUAL — NO MAT'L/CHEMICALS INVOLVED.

FLAME STABILITY

Low methane concentrations may require auxiliary fuel to initiate combustion and maintain temperature. SUPERIOR — SYSTEM IS DESIGNED ~~HIGH~~ FOR WASTE GAS TO BE INJECTED TO FLARE UNDER PRESSURE. METHANE WILL CONTINUE TO BE HIGH

Flashback will not occur if the landfill gas 02 level is 6% or less. — SUPERIOR — SYSTEM IS DESIGNED W/ O_2 METER PRIOR TO INJECTION TO FLARE TO MONITOR DANGEROUS LEVELS.

PLEASE NOTE, IN DETERMINING EQUIVALENCY, THE LFG FLARE OFFERS THE FOLLOWING PARAMETERS/OPTIONS NOT INCLUDED IN THE IT-McGILL FLARE:

1.) A MAXIMUM OF 80 dB AT A DISTANCE OF 3-FEET FROM STACK (1/E.F.S./ P.3/ 2.01 (5)).

2.) LOW-TEMPERATURE SHUT DOWN (1/P.S./P.5/"FLARE CHAMBER TEMPERATURE CONTROLLER").

3.) TIMER CONTROLS FOR AUTOMATED SYSTEMS (1/P.S./P.6/ "DOWN-TIME TIMER" & "INTERMITTENT "REAL TIME" TIMER").

SECTION TWO - EQUIPMENT DESCRIPTION

ITEM I - ENCLOSED FLARE SYSTEM

A. Enclosed Flare Stack

One McGill Landfill Gas Flare System, with:

.. 2" layer A.P. Green (or equal) ceramic fiber refractory on Inconel pins and keepers. (2600°F hot face refractory). EQUAL /1/ P.S./P. 2/6TH BULLET FROM TOP.

.. A-36 carbon steel shell (1/4" nom.). EQUAL/1/P.S./P.1/ "FLARE STACK" - 1ST BULLET

.. Stainless steel gas burner(s) with flame stabilizers for high temperature corrosion resistance. 304 S.S./1/P.S./P.2/" COMBUSTER ASSEMBLY 2nd BULLET.

.. 12" flanged flare gas inlet. EQUAL/1/P.S./P.2/3rd BULLET FROM TOP.

.. One (1) pilot assembly designed for 60,000 Btu/hr propane with electric spark ignitor. The pilot only operates during start-up. EQUAL/1/P.S./P.3/"IGNIT ASSEMBL

.. Heavy duty, galvanized, opposed blade combustion air dampers. Opposed blade design provides a 6:1 air turndown control. Galvanized finish and stainless steel press-fit bearings ensure smooth, long term operation. EQUAL /1/P.S./P.2/"COMBUSTER ASSEMBLY / BULLETS 1, 2, & 3.

.. Four 3" NPT sample ports at 90° located 1/2 diameter from the top for accurate emission testing. EQUAL/1/P.S./P.2/ BULLET #1.

.. Inorganic zinc primer coat for superior corrosion protection and 600°F temperature resistance. EQUAL/1/P.S./P.2/BULLETS 8 & 9.

.. Continuous base plate for high wind stability. SUPERIOR/1/P.S./P.1/"FLARE STAC BULLETS 3 & 5

.. Lift lugs to assist in erection. EQUAL/1/P.S./P.1/"FLARE STACK" BULLET # 4.

B. Control System Operation EQUAL /T/P.S./ PLEASE SEE PAGES 4-8.

The following is a brief outline of the control system start-up and operating sequence:

System start-up would begin with a timed air purge cycle to evacuate any fugitive hydrocarbons from the flare enclosure. After purge is completed, the pilot will be lit. Upon proving the pilot flame by the flame scanner, the landfill gas valve will be opened and the landfill gas blower (by others) will be started allowing landfill gas to flow to the flare enclosure. This allows use of the landfill gas for system warm-up.

Upon proving a flame on the pilot, the system will continue its warm-up sequence. The landfill gas valve will be opened allowing normal operation of the unit.

After the landfill gas valve has been opened, the pilot gas will then shut off to limit propane gas usage. If a flame is still sensed on the main burner the system will continue operation, if not it will shutdown on flame failure.

The unit temperature is set by adjusting the air dampers (manually or optional automatic). Opening the dampers will reduce the flue gas temperature by adding quench air. In the manual system, the operating temperature is set at 1800-2000°F at the maximum design flow and will fluctuate between 600-2100°F at variable gas flows.

Due to the presence of an open flame, the ground flare should be located in a "non-hazardous" electrical area.

C. Base Case Control Features - Manual Operation

.. Manually operated combustion air dampers to control the operating temperature. EQUAL / 1 / P.S. / P. 2 / 4th BULLET.

.. High temperature shutdown switch with panel mounted temperature indicator. EQUAL / 1 / P.S. / P. 5 / "FLARE CHAMBER TEMP CONTROLLER"

.. Pilot gas control system including pressure regulator, fail-closed shutdown valves, manual block valve and pressure indicator. → EQUAL SYSTEMS: 1 / P.S. / P.4 / "PILOT FLARE INDICATOR & SHUT DOWN." ALSO: 1 / P.S. / P.9 / 4th BULLET. ALS

.. Ignition system including ignition transformer, pilot spark electrode and ignition timer. EQUAL / 1 / P.S / P. 5 / "IGNITOR TIMER. 1/EFS/P Para. 2.07 2,3 & 4

.. Flame safeguard controls including self-checking flame scanner and panel mounted flame relay. EQUAL / 1 / P.S. / P. 5 / "UV SCANNER"

.. Purge air blower with pressure proved switch and motor starter. EQUAL / 1 / P.S. P.6 "PURGE TIMER

.. All high voltage (440/220V) items are enclosed in a separate panel for electrical safety including: EQUAL / 1 / P.S. / P.9 / "CONTROL RACK"

Main power supply disconnect. EQUAL / 1 / P.S. / P.7 / "KEY LOCK SWITCH"

Power transformer. Client will supply 220-460V/3Ph/60 Hz electricity. McGill will stepdown to 110V/1 Ph for use as required. → EQUAL / 1 / P.S. / P. 3 / TRANSFORMER - 3rd BULLET FROM TOP.

Motor starter for client's landfill gas blower motor. (Client to specify horsepower). EQUAL / 1 / P.S. / P. 9 / "CONTROL RACK" 1ST SENTENCE.

Amp meter for waste gas blower motor (200% scale). CONSTRUCTED SYSTEM INCORPORATES MULTIPLE BLOWERS (3 TO 4) W/ A METERS ON EACH ONE.

.. "Manual-Off-Auto" blower selector switch. EQUAL / 1 / P.S. / P. 9 / 2nd BULLET.

.. The following indicating lights: EQUAL / 1 / P.S. / P. 8 / "TOTAL OPERATIONS OPTIONS"

a. Panel Power ON
b. Purging
c. Purge Complete
d. Pilot Gas ON
e. Flame Proved
f. High Stack Temperature (SD)
g Flame Failure (SD)

.. Contacts for control room monitoring of the system. CONSTRUCTED DESIGN HAS MONITORING DEVICES INDEPENDANT OF FLARE.

.. 15A convenience outlet (duplex) with weatherproof cover. N/A

.. 100W high pressure sodium security light with manual switch and photocell (shipped loose). SUPERIOR - CONSTRUCTED DESIGN HAS FIVE (5) 200W SODIUM LIGHTS ON TOP OF 30' CONC. POLES.

.. Additional relays, timers, controllers, etc. required for system operation. N/A

.. The appropriate items will be enclosed in a weatherproof (NEMA 4) panel. EQUAL / 1 / P.S / P. 9 / 1ST BULLET.

.. Controls and valving are prepiped and wired onto a support rack. N/A

The control system will be given a functional test simulating actual operation in our shop to ensure that it is properly wired and will perform as designed. EQUAL / 1 / P.S. / P. 3 / " PERIPHERAL EQUIPMENT " - 1ST BULLET

Units can be operated in the manual mode which requires an operator at the flare to start and restart the system using a pushbutton sequence. If the units shutdown for any reason, operator assisted restart is required.

The flare operating temperature is set by manually adjusting the air dampers. EQUAL / 1 / P.S. / P. 2 / 4th & 5th BULLETS FROM TOP.

The base case is recommended for sites with stable gas flow and constant electrical supply. EQUAL

OPTION I: AUTOMATIC START/RESTART EQUAL / 1 / P.S / P. 3 / "PERIPHERAL EQUIP." - 4th BULLET / P. 6 / "PURGE TIMER"

In the automatic mode, the unit will automatically start when power is applied. If the unit shuts down for any reason except high stack temperature, the auto mode will allow the unit to attempt to purge and restart for a specified time period. A remote signal is sent if the unit fails to restart.

OPTION II: INLET FLAME ARRESTOR EQUAL / 1 / P.S. / P. 3 / "PERIPHERAL EQUIP." - 2nd BULLET. / 1 / EFS / P. 3 / Para. 2.02(1).

Varec 12" flame arrestor (or equal). Aluminum housing and aluminum internals. Internal elements can be cleaned without removing the flame arrestor body from the pipe.

OPTION III: INLET BLOCK VALVE WITH PNEUMATIC ACTUATOR EQUAL/1/P.S./P.3/"PER. EQUIP." 3rd BULL ALSO: 1/EFS/P.3/Para 2.02(5).

12" Pliaxseal high performance butterfly valve, ANSI 150# with carbon steel body, 316 stainless steel disk, PTFE seal with Bettis pneumatic, fail-closed actuator, 3-way solenoid valve, speed control valves and Bettis Auxiliary switches. (Nitrogen bottles supplied by others).

Although nitrogen cylinders are required to be installed, the advantage of this option is that the actuator is a highly reliable standard industrial actuator that will have less maintenance than an electric fail-closed actuator.

OPTION V: AUTOMATIC TEMPERATURE CONTROL (AIR) EQUAL/1/P.S./P.2/BULLETS 4 & 5 FROM TOP ALSO: /1/P.S./P.5/"FLARE CHAMBER TEMP."

Flue gas temperature would be automatically controlled by adjusting the air flow into the unit. Lower waste gas flows or lower methane concentrations would automatically close the inlet air louvers. The control loop consists of a thermocouple and temperature indicator/controller and two electric operated actuators on the air louvers.

OTHER ENCLOSED FLARE OPTIONS — APPLICABLE ITEMS ARE NOTED:

McGill will design the Enclosed Flare system to meet most requirements or restrictions that our client's may have. Following are a number of optional features provided on previous projects:

.. Temperature recorder for the flue gas. May be required for some local authorities. EQUAL/1/P.S./P.7/"TEMP. RECORDER"

.. Landfill gas blower with explosion-proof motor (Arrg. 8). EQUAL, BUT NOT PART OF FLARE. SPECS ON BLOWERS REQUIRED EXPLOSION PROOF MOTORS.

.. Caged access ladder to 30' elevation for access to thermocouples and flame scanner. NONE — INSURANCE & SAFETY REASONS PREVENT ACCESS LOCATION.

.. 360° platform for access to sample connections. McGill does not recommend this option due to the proximity to the hot exit flue gas. NONE — SAME REASONS.

.. Hinged manway (18") for access into the flare base. Normal access is through the air dampers, however, this option should be considered if automatic louvers are used. EQUAL/1/P.S./P.2/"COMBUSTOR ASSEMBLY/3rd BULLET

.. Inconel mesh cover for the ceramic fiber refractory. The mesh provides additional mechanical strength. If the unit is not used for extended periods, the mesh will extend the refractory life. NONE — UNIT OPERATES CONTINUOUSLY.

.. Visual alarm beacon or audible alarm horn. EQUAL/1/P.S./P.8/WARNING OPTIONS/Para. 1 PROJECT INCLUDES ALARM HORN & LITE.

.. Automatic telephone dialing system (requires phone line at flare). EQUAL/1/P.S./P.8 WARNING OPTIONS/Para. 2. UTILIZED, BUT DIALER SYSTEM WAS NOT PART OF FLARE.

.. Finish coat of high temperature paint (aluminum color). 2 COATS/1/P.S./P.2/BULLETS 8 9.

.. Service agreement for a McGill technician to periodically check the operating characteristics and safety shutdown points. EQUAL/1/P.S./P.12/Para D & E

Safety Controls and Other Features EQUAL — W/IN TOTAL PACKAGE.

We are providing "self-checking" type flame scanners and relay system, which affords a fail-safe shutdown. Without this feature an unsafe failure mode may occur. A normal scanner may be substituted at a substantial cost deduct, but all liability resulting from such a change must be borne by the purchaser.

Heat Tracing

It is not necessary to heat trace the piping between the blower and the flare.

McGILL FLARE MANUFACTURING STANDARDS - COVERED IN WARRANTY 1/P.S. 1012/ Para. D&E.

Following is a summary of our fabrication standards as they apply to the supply of this equipment.

The McGill shop is qualified to meet ASME boiler and pressure vessel codes and maintains quality control documentation and welder's qualifications which are available for our client's review. Inspectors have access to our company and subcontractors upon short notice.

McGill regularly uses local subcontract shops to assist in fabrication and assembly of our products. These shops work under McGill direction and project management and will meet our fabrication quality control standards.

1. General Industry Standards

Welding - Gas Piping:	ASME IX	Electrical Wiring:	NEC
- Burners:	AWS	Pipe Flanges:	150 lb. ANSI
- Structural:	AWS	Pipe Threads:	NPT
Weld Inspection:	ASME V	Structural Design:	AISC A58.1
Drawing Dimensions:	English		

2. Nondestructive Testing

X	Dimensional Check:	All exterior and mounting dimensions
X	All Welds:	100% Visual Inspection
X	Ignition Transformers:	Functional Check
X	Control System:	Function Check

3. Quality Control Documentation

- X Welder Qualifications (on request)
- X Welding Procedures (on request)
- X Instrument Data Sheet/Catalog Sheet
- X Other Standard McGill Inspection Reports
- X Review Drawings (1R/3P)
- X As Built Drawings (1R/3P)
- X Operating & Maintenance Manual (3)

POST,
BUCKLEY,
SCHUH &
JERNIGAN, INC.

ENGINEERING
PLANNING

March 9, 1993

Mr. Thomas M. Cascio
Associate Engineer IV
Florida Department of Environmental Regulations
Air Permitting and Standards Section
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

RE: **East Duval Landfill**
Permit No. AC 16-186047
Equivalent Flare

Dear Mr. Cascio,

In response to your letter dated February 24, 1993, I have attached information which will assist you in your review of the constructed flare.

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Please contact our office should you have further questions or comments.

Very truly yours,

Karl A Schmit

Karl Schmit, E.I.
Project Engineer
Solid Waste Division

cc: E. Hilton/PBS&J
C. Pearson/City of Jacksonville

KS/cla/FLAREQ'S
07-421.05/3.0

KEY: 2,590 SCFM/1/P.S./P.1/SECTION I → LOCATION ON PAGE
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1 = PAGE NO.
P.S. = SUB-SECTION OF MECHANICAL INFO W/P.S. = PARAMETER SPECIFICS E.F.S. = ENCLOSED FLARE SYSTEM
SECTION = SECTION OF DOCUMENT (MECHANICAL) SUBMITTED TO FDEP ON FEB. 18, 1993

SECTION ONE - PROCESS SUMMARY

DESIGN BASIS - TYPICAL STANDARDS FOR LANDFILL GAS.

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	100%
LHV	473 Btu/SCF
Temperature	100°F (45 - 120°F)
Mole Weight	29.46

Flare Gas

Type:	Landfill Gas
Max. Flow Rate:	2100 scfm 2,590 SCFM/1/P.S./PAGE 1 - SECTION I.
Waste Heat Release: *	59.6 MMBtu/hr (Design Basis) A FUNCTION OF LANDFILL GAS AND IT'S TYPICAL
Min. Flow Rate:	10% of max. flow 260 SCFM/1/P.S./PAGE 11, Para. I.
Smokeless Flow: *	100% EQ. FLARE OPERATES AT SAME TEMP. AS PERMITTED FLARE, THEREFORE IT WILL BE 100% SMOKELESS.
Pressure Drop:	12" WG → 15" WG/1/P.S./P.1/I. & 1/P.S./P.10/A.

Unit Design

Operating Temp: *	1600 - 2000°F (2100°F shutdown)	EQUAL NO./1/P.S./P.10/B.C.D.
Retention Time: *	1600°F .66 Seconds	
	1800°F .69 Seconds	
	2000°F .72 Seconds	
Overall Unit Turndown:	6:1 (to hold 2000°F) 10:1 /1/P.S./P.11/ Para. G.	
Flame Stability Turndown:	20:1 minimum 10:1/1/P.S./P.11/ Para. G	
Fired Fuel Req'd:	None (pilot only) EQUAL /1/P.S./P.4/ 1ST BULLET UNDER "FEATURES OF THE FLAME-TROL II"	

UTILITIES

Pilot Gas	22 SCFH propane (intermittent) EQUAL /1/P.S./P.4/ 1ST BULLET FOR "FEATURES OF THE FLAMETROL"
Compressed Air	Not required
Electricity	460V/3Ph/60 Hz (McGill will step down to 110V for control usage.) - 110V./5000V/1/P.S./P.3 3rd BULLET FROM TOP.

EQUAL - SINCE WASTE GAS IS ENTERING SYSTEM UNDER PRESSURE.

* NOTE: COMPLIANCE TESTING IN ACCORDANCE TO EPA TEST METHODS WILL BE CONDUCTED TO ASSURE PERFORMANCE OF SYSTEM.

MECHANICAL DESIGN

Design Wind Speed	90 mph	100 m.p.h /1/ EFS / P.3 / 2.01 (G)
Ambient Temp	-20 to 120°F	100 m.p.h /1/ P.S / P.11 / NOTE @ BOTTOM OF PAGE
Electrical Area	Non-hazardous	EQUAL SINCE SENSING DEVICES REGULATE ALL OPERATIONS.
		EQUAL - NO MAT'L / CHEMICALS INVOLVED.

FLAME STABILITY

Low methane concentrations may require auxiliary fuel to initiate combustion and maintain temperature. SUPERIOR - SYSTEM IS DESIGNED ~~HIGHER~~ FOR WASTE GAS TO BE INJECTED TO FLARE UNDER PRESSURE. METHANE WILL CONTINUE TO BE HIGH.

Flashback will not occur if the landfill gas 02 level is 6% or less. - SUPERIOR - SYSTEM IS DESIGNED W/ O_2 METER PRIOR TO INJECTION TO FLARE TO MONITOR DANGEROUS LEVELS.

PLEASE NOTE, IN DETERMINING EQUIVALENCY, THE LFG FLARE OFFERS THE FOLLOWING PARAMETERS / OPTIONS NOT INCLUDED IN THE IT-McGILL FLARE:

1.) A MAXIMUM OF 80 dB AT A DISTANCE OF 3-FEET FROM STACK (1/E.F.S./ P.3/ 2.01 (S)).

2.) LOW-TEMPERATURE SHUT DOWN (1/P.S./P.5/"FLARE CHAMBER TEMPERATURE CONTROLLER").

3.) TIMER CONTROLS FOR AUTOMATED SYSTEMS (1/P.S./P.6/ "DOWN-TIME TIMER" & "INTERMITTENT "REAL TIME" TIMER").

SECTION TWO - EQUIPMENT DESCRIPTION

ITEM I - ENCLOSED FLARE SYSTEM

A. Enclosed Flare Stack

One McGill Landfill Gas Flare System, with:

.. 2" layer A.P. Green (or equal) ceramic fiber refractory on Inconel pins and keepers. (2600°F hot face refractory). EQUAL /1/ P.S./P. 2/ 6TH BULLET FROM TOP.

.. A-36 carbon steel shell (1/4" nom.). EQUAL /1/P.S./P.1/ "FLARE STACK" - 1ST BULLET

.. Stainless steel gas burner(s) with flame stabilizers for high temperature corrosion resistance. 304 S.S. /1/P.S./ P.2/ "COMBUSTOR ASSEMBLY 2nd BULLET.

.. 12" flanged flare gas inlet. EQUAL/1/P.S./P.2/3rd BULLET FROM TOP.

.. One (1) pilot assembly designed for 60,000 Btu/hr propane with electric spark ignitor. The pilot only operates during start-up. EQUAL/1/P.S./P.3/"IGNITOR ASSEMBLY"

.. Heavy duty, galvanized, opposed blade combustion air dampers. Opposed blade design provides a 6:1 air turndown control. Galvanized finish and stainless steel press-fit bearings ensure smooth, long term operation. EQUAL /1/P.S./P.2/"COMBUSTER ASSEMBLY / BULLETS 1, 2, & 3.

.. Four 3" NPT sample ports at 90° located 1/2 diameter from the top for accurate emission testing. EQUAL /1/P.S./P.2/ BULLET #1.

.. Inorganic zinc primer coat for superior corrosion protection and 600°F temperature resistance. EQUAL/1/P.S./P.2/BULLETS 8 & 9.

.. Continuous base plate for high wind stability. SUPERIOR/1/P.S./P.1/"FLARE STACK" BULLETS 3 & 5.

.. Lift lugs to assist in erection. EQUAL /1/P.S./P.1/"FLARE STACK" BULLET # 4.

B. Control System Operation EQUAL /1/P.S./ PLEASE SEE PAGES 4-8.

The following is a brief outline of the control system start-up and operating sequence:

System start-up would begin with a timed air purge cycle to evacuate any fugitive hydrocarbons from the flare enclosure. After purge is completed, the pilot will be lit. Upon proving the pilot flame by the flame scanner, the landfill gas valve will be opened and the landfill gas blower (by others) will be started allowing landfill gas to flow to the flare enclosure. This allows use of the landfill gas for system warm-up.

Upon proving a flame on the pilot, the system will continue its warm-up sequence. The landfill gas valve will be opened allowing normal operation of the unit.

After the landfill gas valve has been opened, the pilot gas will then shut off to limit propane gas usage. If a flame is still sensed on the main burner the system will continue operation, if not it will shutdown on flame failure.

The unit temperature is set by adjusting the air dampers (manually or optional automatic). Opening the dampers will reduce the flue gas temperature by adding quench air. In the manual system, the operating temperature is set at 1800-2000°F at the maximum design flow and will fluctuate between 600-2100°F at variable gas flows.

Due to the presence of an open flame, the ground flare should be located in a "non-hazardous" electrical area.

C. Base Case Control Features - Manual Operation

.. Manually operated combustion air dampers to control the operating temperature. EQUAL / 1 / P.S. / P. 2 / 4th BULLET.

.. High temperature shutdown switch with panel mounted temperature indicator. EQUAL / 1 / P.S. / P. 5 / " FLARE CHAMBER TEMP CONTROLLER"

.. Pilot gas control system including pressure regulator, fail-closed shutdown valves, manual block valve and pressure indicator. → EQUAL SYSTEMS: 1/P.S./P.4 / "PILOT FLARE INDICATOR & SHUT DOWN." ALSO: 1/P.S./P.9/4th BULLET. ALSO: 1/EFS/P.3 Para. 2.02 2,3 & 4

.. Ignition system including ignition transformer, pilot spark electrode and ignition timer. EQUAL/1/P.S/P.5/"IGNITOR TIMER.

.. Flame safeguard controls including self-checking flame scanner and panel mounted flame relay. EQUAL / 1 / P.S. / P. 5 / " UV SCANNER"

.. Purge air blower with pressure proved switch and motor starter. EQUAL / 1 / P.S. P.6 " PURGE TIMER"

.. All high voltage (440/220V) items are enclosed in a separate panel for electrical safety including: EQUAL / 1 / P.S. / P.9 / " CONTROL RACK "

Main power supply disconnect. EQUAL / 1 / P.S. / P.7 / " KEY LOCK SWITCH "

Power transformer. Client will supply 220-460V/3Ph/60 Hz electricity. McGill will stepdown to 110V/1 Ph for use as required. → EQUAL / 1 / P.S. / P.3 / TRANSFORMER - 3rd BULLET FROM TOP.

Motor starter for client's landfill gas blower motor. (Client to specify horsepower). EQUAL / 1 / P.S. / P. 9 / "CONTROL RACK" 1ST SENTENCE.

Amp meter for waste gas blower motor (200% scale). CONSTRUCTED SYSTEM INCORPORATES MULTIPLE BLOWERS (3 TO 4) W/ A METERS ON EACH ONE.

.. "Manual-Off-Auto" blower selector switch. EQUAL / 1 / P.S. / P.9 / 2nd BULLET.

.. The following indicating lights: EQUAL / 1 / P.S. / P. 8 / "TOTAL OPERATIONS OPTIONS"

a. Panel Power ON
b. Purging
c. Purge Complete
d. Pilot Gas ON
e. Flame Proved
f. High Stack Temperature (SD)
g Flame Failure (SD)

.. Contacts for control room monitoring of the system. CONSTRUCTED DESIGN HAS MONITORING DEVICES INDEPENDANT OF FLARE.

.. 15A convenience outlet (duplex) with weatherproof cover. N/A

.. 100W high pressure sodium security light with manual switch and photocell (shipped loose). SUPERIOR - CONSTRUCTED DESIGN HAS FIVE (5) 200 W SODIUM LIGHTS ON TOP OF 30' CONC. POLES.

.. Additional relays, timers, controllers, etc. required for system operation. N/A

.. The appropriate items will be enclosed in a weatherproof (NEMA 4) panel. EQUAL / 1 / P.S / P. 9 / 1ST BULLET.

.. Controls and valving are prepiped and wired onto a support rack. N/A

The control system will be given a functional test simulating actual operation in our shop to ensure that it is properly wired and will perform as designed. EQUAL / 1 / P.S. / P. 3 / " PERIPHERAL EQUIPMENT " - 1ST BULLET

Units can be operated in the manual mode which requires an operator at the flare to start and restart the system using a pushbutton sequence. If the units shutdown for any reason, operator assisted restart is required.

The flare operating temperature is set by manually adjusting the air dampers. EQUAL / 1 / P.S. / P. 2 / 4TH & 5TH BULLETS FROM TOP.

The base case is recommended for sites with stable gas flow and constant electrical supply. EQUAL

OPTION I: AUTOMATIC START/RESTART EQUAL / 1 / P.S / P. 3 / "PERIPHERAL EQUIP." - 4TH BULLET / P. 6 / " PURGE TIMER"

In the automatic mode, the unit will automatically start when power is applied. If the unit shuts down for any reason except high stack temperature, the auto mode will allow the unit to attempt to purge and restart for a specified time period. A remote signal is sent if the unit fails to restart.

OPTION II: INLET FLAME ARRESTOR EQUAL / 1 / P.S. / P. 3 / "PERIPHERAL EQUIP." - 2ND BULLET. / 1 / EFS / P. 3 / Para. 2.02(1).

Varec 12" flame arrestor (or equal). Aluminum housing and aluminum internals. Internal elements can be cleaned without removing the flame arrestor body from the pipe.

OPTION III: INLET BLOCK VALVE WITH PNEUMATIC ACTUATOR EQUAL/1/P.S./P.3/"PER. EQUIP." 3rd BULLET ALSO: 1/EFS/P.3/Para 2.02(5).

12" Pliaxseal high performance butterfly valve, ANSI 150# with carbon steel body, 316 stainless steel disk, PTFE seal with Bettis pneumatic, fail-closed actuator, 3-way solenoid valve, speed control valves and Bettis Auxiliary switches. (Nitrogen bottles supplied by others).

Although nitrogen cylinders are required to be installed, the advantage of this option is that the actuator is a highly reliable standard industrial actuator that will have less maintenance than an electric fail-closed actuator.

OPTION V: AUTOMATIC TEMPERATURE CONTROL (AIR) EQUAL/1/P.S./P.2/BULLETS 4&5 FROM TOP ALSO: 1/P.S./P.5/"FLARE CHAMBER TEMP."

Flue gas temperature would be automatically controlled by adjusting the air flow into the unit. Lower waste gas flows or lower methane concentrations would automatically close the inlet air louvers. The control loop consists of a thermocouple and temperature indicator/controller and two electric operated actuators on the air louvers.

OTHER ENCLOSED FLARE OPTIONS – APPLICABLE ITEMS ARE NOTED:

McGill will design the Enclosed Flare system to meet most requirements or restrictions that our client's may have. Following are a number of optional features provided on previous projects:

.. Temperature recorder for the flue gas. May be required for some local authorities. EQUAL/1/P.S./P.7/"TEMP. RECORDER"

.. Landfill gas blower with explosion-proof motor (Arrg. 8). EQUAL, BUT NOT PART OF FLARE. SPECS ON BLOWERS REQUIRED EXPLOSION PROOF MOTORS.

.. Caged access ladder to 30' elevation for access to thermocouples and flame scanner. NONE – INSURANCE & SAFTEY REASONS PREVENT ACCESS LOCATION.

.. 360° platform for access to sample connections. McGill does not recommend this option due to the proximity to the hot exit flue gas. NONE – SAME REASONS.

.. Hinged manway (18") for access into the flare base. Normal access is through the air dampers, however, this option should be considered if automatic louvers are used. EQUAL/1/P.S./P.2/"COMBUSTOR ASSEMBLY"/3rd BULLET.

.. Inconel mesh cover for the ceramic fiber refractory. The mesh provides additional mechanical strength. If the unit is not used for extended periods, the mesh will extend the refractory life. NONE – UNIT OPERATES CONTINUOUSLY.

.. Visual alarm beacon or audible alarm horn. EQUAL/1/P.S./P.8/WARNING OPTIONS/Para.1 PROJECT INCLUDES ALARM HORN & LITE.

.. Automatic telephone dialing system (requires phone line at flare). EQUAL/1/P.S./P.8 WARNING OPTIONS/Para. 2 • UTILIZED, BUT DIALER SYSTEM WAS NOT PART OF FLARE.

.. Finish coat of high temperature paint (aluminum color). 2 COATS/1/P.S./P.2/BULLETS 8&9.

.. Service agreement for a McGill technician to periodically check the operating characteristics and safety shutdown points. EQUAL/1/P.S./P.12/Para D&E

Safety Controls and Other Features EQUAL – W/IN TOTAL PACKAGE.

We are providing "self-checking" type flame scanners and relay system, which affords a fail-safe shutdown. Without this feature an unsafe failure mode may occur. A normal scanner may be substituted at a substantial cost deduct, but all liability resulting from such a change must be borne by the purchaser.

Heat Tracing

It is not necessary to heat trace the piping between the blower and the flare.

McGILL FLARE MANUFACTURING STANDARDS - COVERED IN WARRANTY /1/P.S./R.12/ Para. D&E.

Following is a summary of our fabrication standards as they apply to the supply of this equipment.

The McGill shop is qualified to meet ASME boiler and pressure vessel codes and maintains quality control documentation and welder's qualifications which are available for our client's review. Inspectors have access to our company and subcontractors upon short notice.

McGill regularly uses local subcontract shops to assist in fabrication and assembly of our products. These shops work under McGill direction and project management and will meet our fabrication quality control standards.

1. General Industry Standards

Welding - Gas Piping:	ASME IX	Electrical Wiring:	NEC
- Burners:	AWS	Pipe Flanges:	150 lb. ANSI
- Structural:	AWS	Pipe Threads:	NPT
Weld Inspection:	ASME V	Structural Design:	AISC A58.1
Drawing Dimensions:	English		

2. Nondestructive Testing

X	Dimensional Check:	All exterior and mounting dimensions
X	All Welds:	100% Visual Inspection
X	Ignition Transformers:	Functional Check
X	Control System:	Function Check

3. Quality Control Documentation

- X Welder Qualifications (on request)
- X Welding Procedures (on request)
- X Instrument Data Sheet/Catalog Sheet
- X Other Standard McGill Inspection Reports
- X Review Drawings (1R/3P)
- X As Built Drawings (1R/3P)
- X Operating & Maintenance Manual (3)

Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Virginia B. Wetherell, Secretary

March 12, 1993

Mr. Karl Schmit
Project Engineer
Post, Buckley, Schuh & Jernigan, Inc.
Solid Waste Division
1560 Orange Avenue, Suite 700
Winter Park, FL 32789

Re: East Duval Sanitary Landfill -- Equivalent Flare

Dear Mr. Schmit:

Thank you for your letter dated March 9,1993 on this referenced project, and the attached annotated entries on appropriate pages of the Manufacturer's Design Specifications, referencing the key sections of the LFG Specialities, Inc. equivalent flare proposal. We have reviewed these documents and are satisfied that the LFG Specialities Inc. Model No. EF840S4 flare is equavalent to the IT-McGill Model No. EFG-60 flare.

Your request to install this equivalent flare system is therefore approved by this Department.

Sincerely,

G. Preston Lewis, P. E.
Supervisor
Permitting and Standards Section

cc: T. M. Cascio

1988 CAF/OK // 109 3.16.93

TO: Howard L. Rhodes

FROM: Clair Fancy

DATE: March 15, 1993

SUBJ: Amendment of Construction Permit-Expiration Date Extension
City of Jacksonville
East Duval County Sanitary Landfill Flare

Enclosed for your review and signature is an expiration date extension amendment to the above referenced permit prepared by the Bureau of Air Regulation. The extension will allow time to properly complete construction. This agency action should not be controversial.

The East Duval Sanitary Landfill started solid waste disposal operations in November 1974 and is located in Jacksonville, Duval County, Florida.

The City of Jacksonville holds a construction permit for the collection and disposal of active gases at the Landfill. Active gases from this facility are collected by producing a negative pressure in the twelve wells with a system of blowers. The twelve wells are manifolded together and routed to a flare system where the gas is burned to oxidize potential odor causing constituents and to destroy the potentially explosive gases.

The project was subject to the following limitations:

1. No visible emissions are allowed from the flare except for up to 5 minutes in two consecutive hours (no opacity limit).

2. Pollutant limits are:

CH_4	55.4	lbs/hr	and	242.7	tons/yr
CO	23.8	lbs/hr	and	104.4	tons/yr

H_2S .01 lbs/hr and .06 tons/yr

I recommend approval and signature of this amendment.

CHF/TC/plm

March 15, 1993 1988

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. L. Chris Pearson
Sr. Assistant Engineer
City of Jacksonville
Department of Public Utilities
Solid Waste Disposal Division
Jacksonville, Florida 32206

Dear Mr. Pearson:

Re: Request for Amendment to Construction Permit
AC16-186047: East Duval County Sanitary Landfill Flare
Expiration Date Extension

The Department has reviewed your letter received on February 17, 1993, which requested an extension of the expiration date for the above referenced project. The Department finds the request acceptable and the following will be changed and/or added:

Expiration Date:

FROM: February 15, 1993

TO: April 1, 1993

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Petitions filed by the permit applicant and the parties listed below must be filed within 14 days of receipt of this amendment. Petitions filed by other persons must be filed within 14 days of receipt of this amendment. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The Petition shall contain the following information:

(a) The name, address, and telephone number of each petitioner,

the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;

(b) A statement of how and when each petitioner received notice of the Department's action or proposed action;

(c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;

(d) A statement of the material facts disputed by Petitioner, if any;

(e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;

(f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and

(g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this amendment. Persons whose substantial interests will be affected by any decision of the Department with regard to the application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of receipt of this amendment in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

Sincerely,

Howard L. Rhodes
Director
Division of Air Resources
Management

HLR/TC/plm

Attachment to be Incorporated:
- o Letter and processing fee received February 17, 1993.

cc: J. Cole, NED
J. Braswell, Esq., DER

Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Virginia B. Wetherell, Secretary

March 17, 1993

Mr. Karl Schmit
Project Engineer
Post, Buckley, Schuh & Jernigan, Inc.
Solid Waste Division
1560 Orange Avenue, Suite 700
Winter Park, FL 32789

Re: East Duval Sanitary Landfill -- Equivalent Flare
Permit No. AC 16-186047

Dear Mr. Schmit:

Thank you for your letter dated March 9, 1993 on this referenced project, and the attached annotated entries on appropriate pages of the Manufacturer's Design Specifications, referencing the key sections of the LFG Specialties, Inc. equivalent flare proposal.

We have reviewed these documents and it appears that the LFG Specialties Inc. Model No. EF840S4 flare is equivalent to the flare approved on page 1 of the referenced Construction Permit (i. e., the IT-McGill Model No. EGF-60 flare).

In accordance with Specific Condition No. 1 on page 5 of the Permit, which allows the installation of an equivalent flare, your request to install this flare system is therefore conditionally approved by this Department, subject to verification of adequacy based on the results of the compliance tests required by Specific Conditions 3 through 7, and 10 (listed on pages 5 and 6 of the Permit).

Sincerely,

G. Preston Lewis, P. E.
Supervisor
Permitting and Standards Section

cc: T. M. Cascio

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

For Routing To Other Than The Addressee	
To:	Location:
To:	Location:
To:	Location:
From:	Date:

Interoffice Memorandum

TO: Howard L. Rhodes

FROM: Clair Fancy CHF

DATE: March 25, 1993

SUBJ: Amendment of Construction Permit-Expiration Date Extension
City of Jacksonville
East Duval County Sanitary Landfill Flare

Enclosed for your review and signature is an expiration date extension amendment to the above referenced permit prepared by the Bureau of Air Regulation. The extension will allow time to properly complete construction, demonstrate compliance, and obtain the operating permit. This agency action should not be controversial.

The East Duval Sanitary Landfill started solid waste disposal operations in November 1974 and is located in Jacksonville, Duval County, Florida.

The City of Jacksonville holds a construction permit for the collection and disposal of active gases at the Landfill. Active gases from this facility are collected by producing a negative pressure in the twelve wells with a system of blowers. The twelve wells are manifolded together and routed to a flare system where the gas is burned to oxidize potential odor causing constituents and to destroy the potentially explosive gases.

The project was subject to the following limitations:

1. No visible emissions are allowed from the flare except for up to 5 minutes in two consecutive hours (no opacity limit).

2. Pollutant limits are:

CH_4	55.4	lbs/hr	and	242.7	tons/yr
CO	23.8	lbs/hr	and	104.4	tons/yr
H_2S	.01	lbs/hr	and	.06	tons/yr

I recommend approval and signature of this amendment.

CHF/TC/plm

1988
OK
GPL
3/24
3/24/93

Clair - 3/31
This was in the sig. stack - I pulled it out yesterday to make a phone call on it
Patty

DEPARTMENT OF PUBLIC UTILITIES
Solid Waste Disposal Division

February 12, 1993

Mr. Preston Lewis
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blairstone Road
Tallahassee, Florida 32399

RE: East Duval County Sanitary Landfill
Flare Permit #AC16-186047

Dear Mr. Lewis,

The City of Jacksonville respectfully requests an extension of the referenced permit due to construction delay created by inclement weather. We will require an extension of 45 calendar days (April 1, 1993).

Your favorable consideration of this request will be greatly appreciated.

Sincerely,

L. Chris Pearson
Assistant Engineer

PERMIT # AC 16-186047

VOID 90 DAYS FROM DATE

DATE 02/16/93

CHECK NUMBER 77-82 43716

CITY OF JACKSONVILLE, FLORIDA

PAY EXACTLY ******50** DOLLARS AND *00* CENTS

$ *****50.00**
CHECK AMOUNT

TREASURER WILL PAY TO THE ORDER OF

FLA. DEPT. OF ENVIRONMENTAL REG
TWIN TOWERS OFFICE BLDG
2600 BLAIRSTONE RD.
TALLAHASSEE, FL 323992400

TREASURER

DIRECTOR ADM & FINANCE

FIRST UNION NATIONAL BANK
JACKSONVILLE, FLORIDA
63-2
630

⑈00043716⑈ ⑆063000021⑆ 1126004006⑆

For Routing To Other Than The Addressee	
To:	Location:
To:	Location:
To:	Location:
From:	Date:

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

Interoffice Memorandum

TO: Cost Center Air Regulation

FROM: Revenue Section
Bureau of Finance and Accounting

DATE: 02-17-93

SUBJECT: Cash Listing # 0057, Deposit # 0535

Please respond to the items marked below and return to the Revenue Section of the Bureau of Finance and Accounting.

O The monies on the attached cash listing have been deposited for your area by the Bureau of Finance and Accounting. A transaction needs to be recorded in PATS for:

Applicant	Amount	Date Received
CIty of Jacksonville Florida	$ 50.00	2/17/93

Please enter the transaction(s) and attach a copy of this memo to the PATS cash listing reflecting the payment(s).

O Receipt number _____ on your cash listing number _____ is out of balance by $ _____. Please correct and forward a corrected cash listing to the Bureau of Finance and Accounting.

O Other:

O/dg

Attachment(s)

POST,
BUCKLEY,
SCHUH &
JERNIGAN, INC.

ENGINEERING
PLANNING

October 28, 1993

Mr. Claire Fancy, P.E.
Chief, Bureau of Air Regulation
Florida Department of Environmental Protection
Air Permitting and Standards Section
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Preston, 11/1
Mirza did this permit - Do you want another engineer to look at this?
Give to Patty

RE: EAST DUVAL SANITARY LANDFILL CLOSURE
PERMIT NO. AC 16-186047
INQUIRY TO SPECIFIC CONDITION NO. 7

Dear Mr. Fancy:

On behalf of the City of Jacksonville, PBS&J submits for your review the methods proposed for monitoring the gas flow rate (cfm) from the landfill gas extraction wells. These methods are in response to Permit Specific Condition No. 7 found as Attachment 1 to this letter.

Attachments 2 through 5 include information outlining the proposed methods for measuring gas flow. The basis for each of the methods follows guidelines found in 40 CFR Part 60, Appendix A, Method 2C.

While initially the City proposes to utilize the Dwyer Air Velocity Calculator (Attachment 2), the other methods may be considered in the future. Therefore, the City would like to have the option to apply any of the proposed methods to record the flow rate data while remaining under the provisions of the permit.

Subject to the approval for the attached methods, the City of Jacksonville will proceed with the acquisition of their operating permit for the facility and begin recording data.

Please contact our office at (407)647-7275 if you should have any questions.

Sincerely,

Karl Schmit

Karl Schmit, P.E.
Project Engineer
Solid Waste Division

cc: E. Hilton/PBS&J C. Pearson/City of Jacksonville W. Walker/RESD

attachments
kas/SC7

ATTACHMENT ONE

(Specific Condition No. 7 of Permit AC16-186047)

6. Pursuant to Rule 17-2.620(2), F.A.C. and Chapter 376, Jacksonville City ordinance, objectionable odors from this source are prohibited.

7. The permittee shall measure the gas flow rate (cfm) from each of the twelve extraction wells using a method to be submitted by the applicant within 90 days of issuance of this permit and subject to the approval by the Department, on a monthly basis for at least three years from the date this system is put into operation. This data shall be recorded in a (bound) log book and shall contain at a minimum the following information: a) Date and time each well is sampled, b) Gas flow rate in cfm and, c) Person responsible for taking the measurement and performing any calibration and maintenance. In addition to this, the permittee shall install proper devices to continuously monitor and record the total gas flow rate in the input line to the flare and the flare temperature.

8. An operation and maintenance plan shall be submitted to the BESD office at least 90 days prior to the expiration date of this permit.

9. The Jacksonville Bio-Environmental Services Division (BESD) office and the Department's Jacksonville office shall be given at least 15 days written notice prior to compliance testing.

10. The pilot gas for flare shall be propane at 22 SCFH with a maximum heat input rate of 0.056 MMBtu/hr, and once fired, the flame shall be sustained by the landfill gas alone.

11. The permittee, for good cause, may request that this construction permit be extended. Such a request shall be submitted to the Bureau of Air Regulation prior to 60 days before the expiration of the permit (F.A.C. Rule 17-4.090).

12. An application for an operation permit must be submitted to the BESD office at least 90 days prior to the expiration date of this construction permit or within 45 days after completion of compliance testing, whichever occurs first. To properly apply for an operation permit, the applicant shall submit the appropriate application form, fee, certification that construction was completed noting any deviations from the conditions in the construction permit, and compliance test reports as required by this permit (F.A.C. Rule 17-4.220).

ATTACHMENT TWO

(PDM Micromanometer/Dwyer Air Flow Calculator)

DWYER AIR VELOCITY CALCULATOR (AVC) METHOD:

1. Assume gas density to be :

	EXAMPLE:
Density (D)	0.080 lbs./ft^3

2. Record the pressure in the 4-inch diameter duct by using the PDM-205 Micromanometer by placing the pitot tube into the center of the duct.

Pressure (P)	0.030 In. Water

3. Multiply GP by 0.90 to approximate a traverse average.

Average Pressure (AP)	0.027 In. Water

4. On the back of the AVC, determine Velocity by using D & AP.

Velocity (V)	640 ft/min

5. Multiply V by duct area (0.0873 sq. ft.) to determine Flow.

Flow (Q)	56 cfm

6. Record all information on worksheets to submit to FDEP.

Innovative Solutions to a World of Pressure.

PDM Micromanometers were developed as advanced alternatives to the more primitive mercury in glass manometers, cased dial gauges and similar instruments. **PDM** users are freed from the restraints and hazards associated with mercury gauges. For instance, no more time is wasted with fluid spillage or overload when setting-up and leveling operations. Fragility of the instrument and toxic leaks no longer cause worry. Also, frequent need of recalibration is not necessary in the **PDM**, unlike Magnahelic® gauges.

The compact, "go anywhere" concept of the **PDM** is a boon to engineers and technologists who must travel to job sites or reach remote test areas. **PDM**'s are unaffected by the growing restrictions placed by the airlines and shippers on transportation of mercury filled devices. Self-contained and miniaturized, the **PDM** Micromanometer provides speedy and precise readings in situations previously difficult or impractical. Readings can easily be taken from elevated access points, non-rigid platforms, and even during mobile work, such as on marine or railcar projects.

DESIGN FEATURES

The **PDM** is exceptionally rugged, made of high impact ABS casing. Thickness of the case and contoured shape give maximum protection to the **PDM**'s components, particularly during field use. A single nine (9) volt battery located in a "quick change" compartment provides a supply for up to 150 hours of continuous operation. The battery compartment is easily accessible from the outside, even to gloved hands.

The **PDM** has a bi-directional, piezoresistive silicon wafer-type pressure transducer with highly linear performance. The accuracy of the **PDM** surpasses that of all the competition. The unit also offers high grade glass/epoxy circuit boards for signal conditioning and associated circuitry. The readout of the digital display is high contrast and has a convenient wide viewing angle. You can select between a wide choice of pressure ranges available. Each **PDM** is built to monitor in two different ranges. Also standard is the "ten turn thumbwheel" for fine zero adjustment. The **PDM** is delivered as a handy "kit" housed in a sturdy leather carrying pouch (with belt loop) and two (2) sections of six (6) feet of silicone tubing. Also available is a certificate of calibration declaring traceability to NBS and NIST.

PDM AND NEGATIVE PRESSURE DOCUMENTATION DURING ASBESTOS REMOVAL

The **PDM 205** is an accurate, inexpensive and stable way to monitor negative pressures within asbestos removal areas. Since all **PDM**'s have a standard 0 to 1 volt output, they can be hooked up to chart recorders for negative pressure documentation.

With respect to asbestos abatement, OSHA Rules and Regulations 29 CFR 1926.58 state *"A sufficient amount of air should be exhausted to create a pressure of -0.02 inches of water within the enclosure with respect to the area outside the enclosure." The regulations also state "A manometer or pressure gauge for measuring the negative pressure within the enclosure should be installed and should be monitored frequently throughout all work shifts during which asbestos removal, demolition or renovation takes place."*

RADON MITIGATION

Another public concern these days is the presence of radon emissions in homes and buildings. NEOTRONICS' **PDM** offers an easy solution to monitoring differential pressure under the foundations of buildings during radon mitigation.

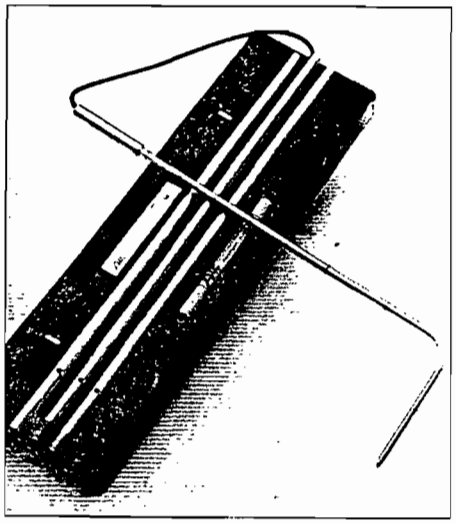
NEW INTRINSICALLY SAFE MODELS NOW AVAILABLE

NEOTRONICS' **PDM 505** is the world's most accurate certified intrinsically safe, digital, micromanometer. The **PDM 505** accurately displays positive, negative and differential pressures. The **PDM 505** is the perfect solution to companies needing the accuracy and convenience of a small, portable manometer and yet, are constantly plagued with the risks associated with monitoring in explosive environments. Typical applications of the instrument are found in Gas Utility Companies, where customer service, distribution and transmission departments will find the **PDM 505** accurate in measuring gas pressures from gas meters and transmission junctions.

The three (3) range **PDM 505** is certified intrinsically safe by BASEEFA *(British Approvals Service for Electrical Equipment in Flammable Atmospheres)* which is particularly reassuring when entering potentially flammable atmospheres. The ranges are 0-19.99 psi, 0-39.9" Hg and 0-199.9" H_2O. The **PDM 300 Series** instruments are certified intrinsically safe and are available by special order. Like the **PDM 200 Series**, these units have two (2) ranges.

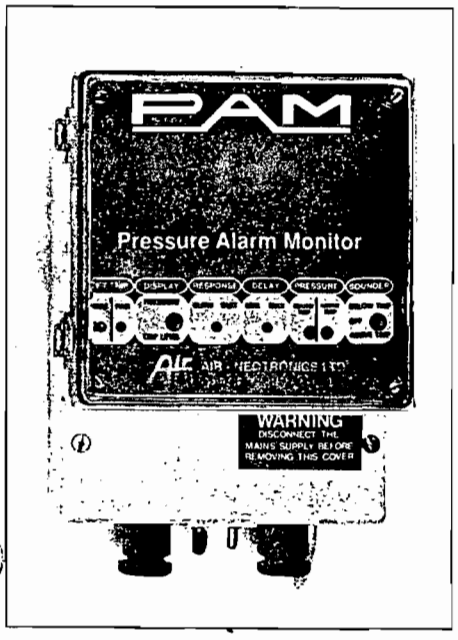
EXTENDABLE PITOT TUBE

The Extendable Pitot Tube (pictured below) is compact, portable, and frees the user from transport and access problems of old style, one-piece pitots. This pitot tube extends to four different lengths: a) 12", b) 24", c) 38", and d) 51". Other standard pitot tubes are available in an assortment of lengths.



NEW PRESSURE MONITOR AND CONTROLLER FOR PERMANENT APPLICATIONS

The **PAM (pressure alarm monitor)** is a wall mounted digital pressure monitor and controller using the same sensor technology as the **PDM.** The **PAM** was designed for clean room enclosures, pressurized stairwells, gloveboxes and other critical pressure containers. The **PAM** monitors in standard measuring ranges of 19.99" H_2O, 199.9 mm H_2O and 1999 pascals. The **PAM** has a unique autozero feature and is available with 4-20 mA output for computer interface.



GSA Pricing

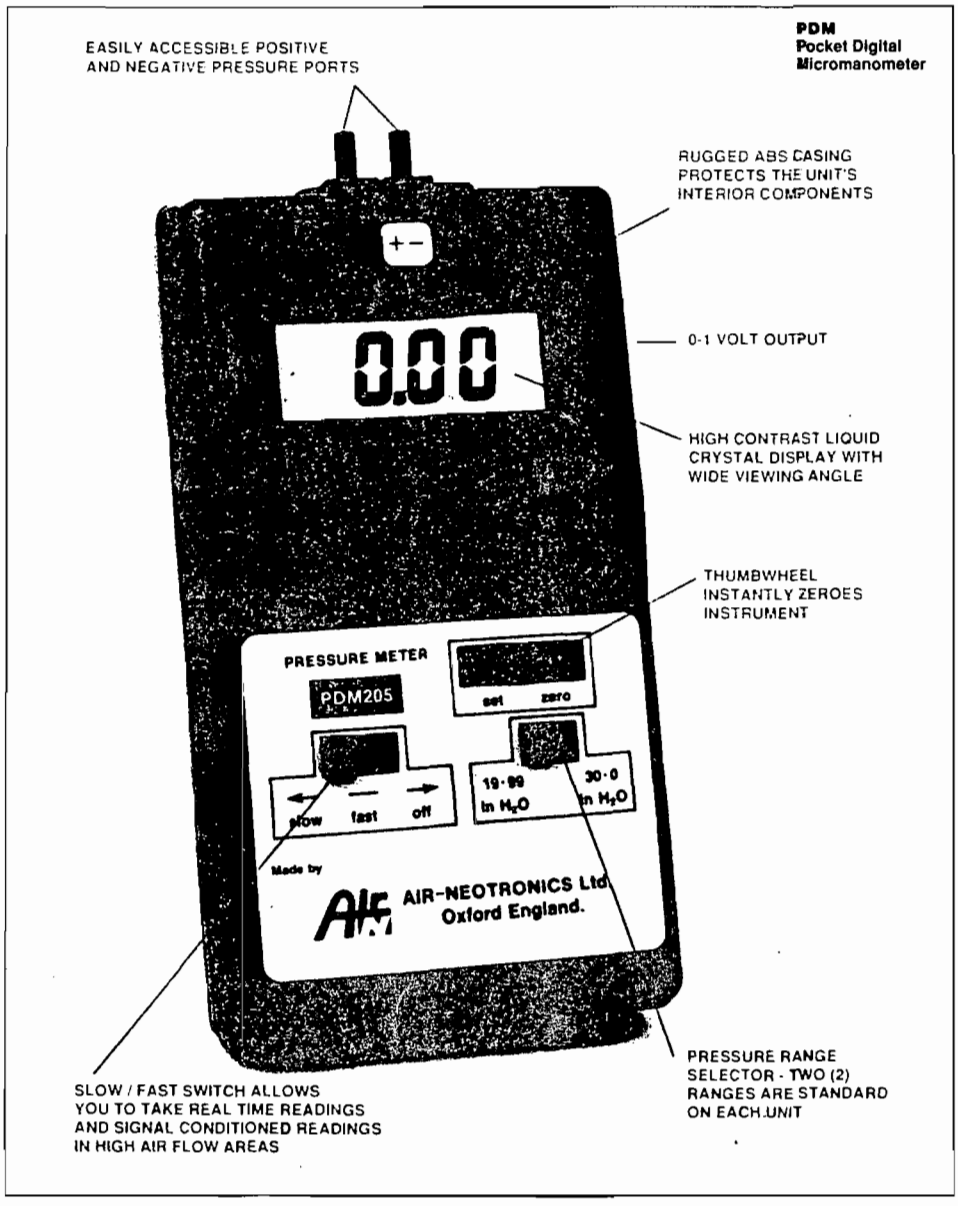
NEOTRONICS is proud to be a General Service Administration program participant. Our contract number is GSOOF 01886.

QUESTIONS? Call our sales representatives toll free at 1-800-535-0606 in the U. S. and Canada.

USES AND APPLICATIONS

PDM applications are found throughout industry, in laboratory, research and field test areas, such as:

- ○ Heating and Ventilating Plants
- ○ Asbestos Removal Documentation
- ○ Low Pressure Pneumatic Controls
- ○ Fan, Blower and Booster Testing
- ○ Burner and Combustion Systems
- ○ Vacuum and Leak Detection Work
- ○ Natural Gas Distribution
- ○ Pressurized Cables
- ○ Process Plants
- ○ Telephone Cables
- ○ Orifice and Venturi Rigs
- ○ Engineer and Plant Testing



AIR VELOCITY CALCULATOR

"THE LOW PRESSURE PEOPLE"

AIR DENSITY Lbs. per Cu. Ft. .07 .08 .05 .04 .03 .075

Pitot tube reading VELOCITY PRESSURE In. Water .01 .015 .02 .025 .03 .04 .05 .06 .07 .08 .09 .1 .15 .2 .25 .3

VELOCITY Ft. per Min. 550 800 700 800 900 1000 1200 1400 1600 1800 2000 2500 3000 3000 3500 4000 4500 5000 6000 7000 8000 9000 10,000 12,000 14,000 16,000 18,000

Pitot tube reading VELOCITY PRESSURE In. Water .3 .4 .5 .6 .7 .8 .9 1.0 1.2 1.4 1.6 1.8 2 2.5 3 4 5 6 7 8 9 10

DWYER INSTRUMENTS, INC. MICHIGAN CITY, INDIANA 46360 U.S.A.

INSTRUCTIONS

3 Set air density,* obtained from "2", at arrow.

4 Read velocity opposite pitot tube reading.

* If barometric pressure and temperature are unknown, use standard air density of .075 lbs. per cu. ft.

BACK

BACK ↑

AIR FLOW NOMOGRAPH

FRONT ↓

FRONT

RELATIVE HUMIDITY 60 50 40

DRY BULB TEMP. °F	CORRECTION FACTOR
40	
50	.998
60	.997
70	.996
80	.993
90	.990
100	.987
110	.983
120	.977

AIR VELOCITY CALCULATOR

DRY BULB TEMP. °F	CORRECTION FACTOR
130	.970
140	.961
150	.952
160	.937
170	.917
180	.898
190	.875
200	.849
210	.825

BAROMETRIC PRESSURE In. Hg. 31 30 29 28 27 26 25 24 23

TEMPERATURE °F 0° 400° 350° 300° 250° 200° 150° 100° 80° 60°

AIR DENSITY Lbs./Cu. Ft. .035 .040 .045 .050 .055 .060

CORRECTION FACTOR .64 .65 .70 .75 .80 .85 .90 .95 1.00

GAGES:
- MAGNEHELIC®
- PHOTOHELIC®
- MINIHELIC®

MANOMETERS:
- FLEX TUBE®
- SLACK TUBE®
- DURABLOCK®
- MICROTECTOR®

AIR FILTER GAGES
PRESSURE SWITCHES
AIR VELOCITY INST.
COMBUSTION TEST INST.
FLOWMETERS:
- RATE-MASTER®
- VISI-FLOAT®
- MINI-MASTER®

WIND INSTRUMENTS

INSTRUCTIONS

1 Set the relative humidity under the red arrow. Read correction factor opposite dry bulb temperature.

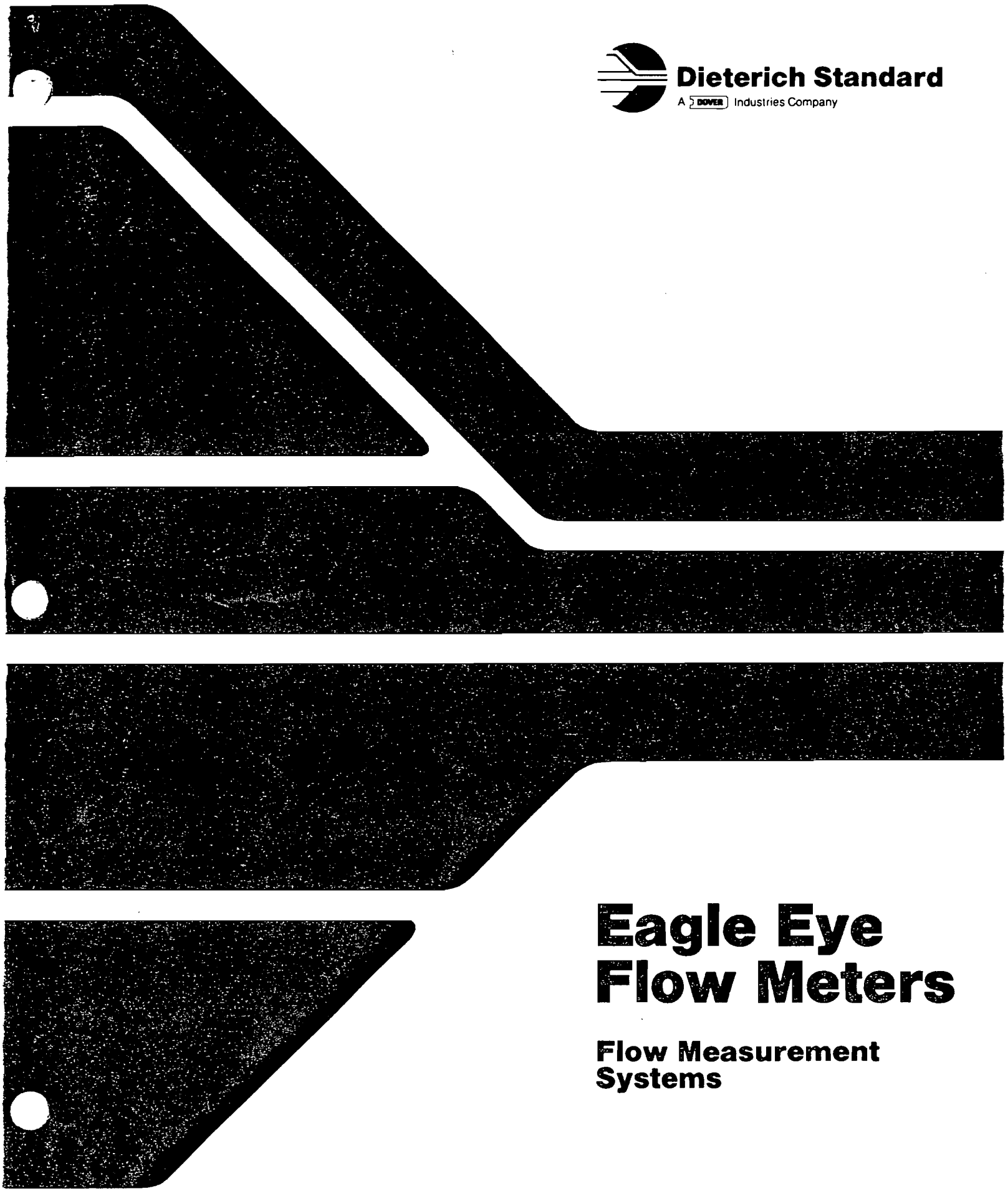
2 Set temperature under barometric pressure. Read density * of air over correction factor from "1".

* To determine density of dry air or if relative humidity is unknown, read air density over 1.00 correction factor.

71-350435-01

ATTACHMENT THREE

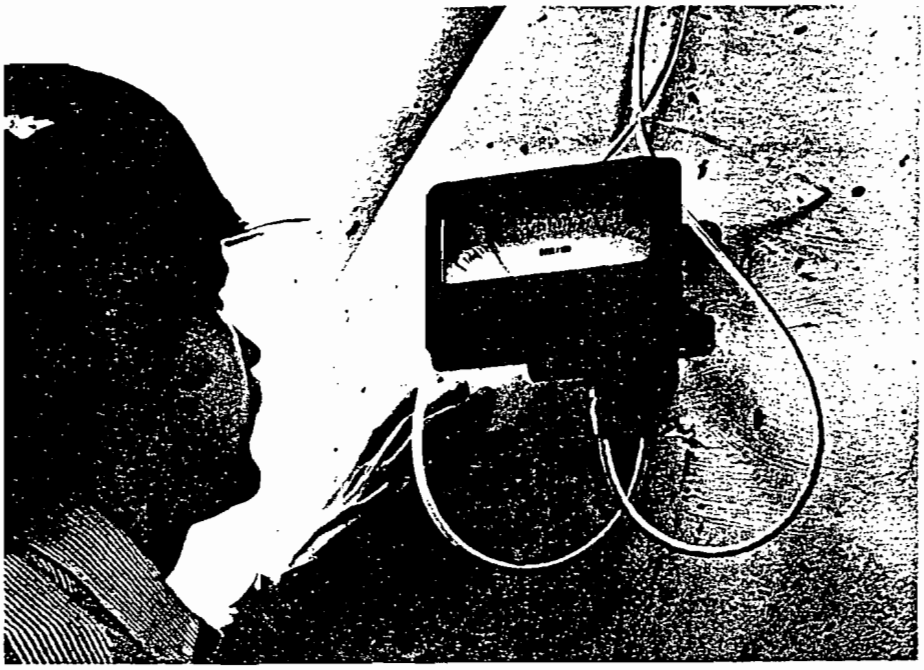
(Dieterich's Annubar Flow Sensor & Eagle Eye Flow Meter)

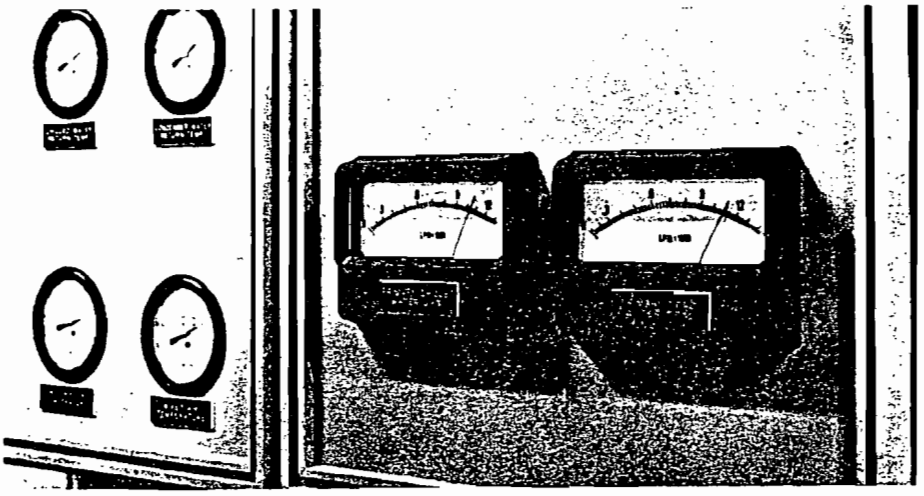


Dieterich Standard
A DOVER Industries Company

Eagle Eye Flow Meters

Flow Measurement Systems





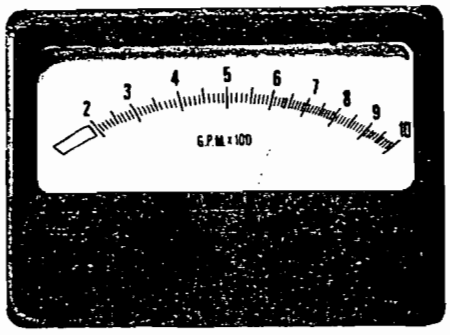
Eagle Eye shows you what Annubar senses

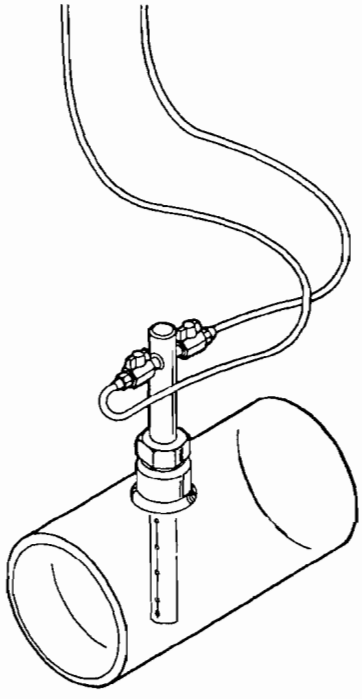
In hundreds of applications, Eagle Eye® Flow Meters are the ideal choice for accurate, low cost, secondary readout devices.

With Dieterich Standard Annubar Primary Flow Sensors, they are the final components in an integrated, well-balanced flow measurement system. Plus, Eagle Eye Flow Meters are compatible with all differential pressure primaries such as orifice, venturi and flow nozzle.

If your flow measurement requirements encompass heating, ventilating and air conditioning or other air and water applications including irrigation and fire service, look to Eagle Eye to provide the optimum combination of economy, accuracy and versatility.

® Eagle Eye Registered Trademark of Dieterich Standard Corporation, U.S. Patent No. 3,998,179 and various foreign patents. Other U.S. and foreign patents pending.



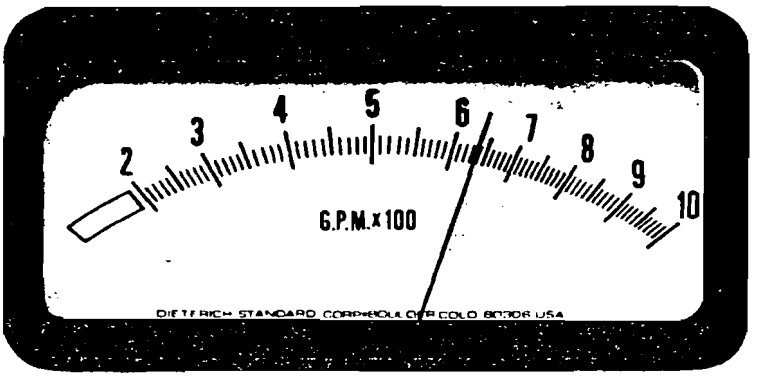


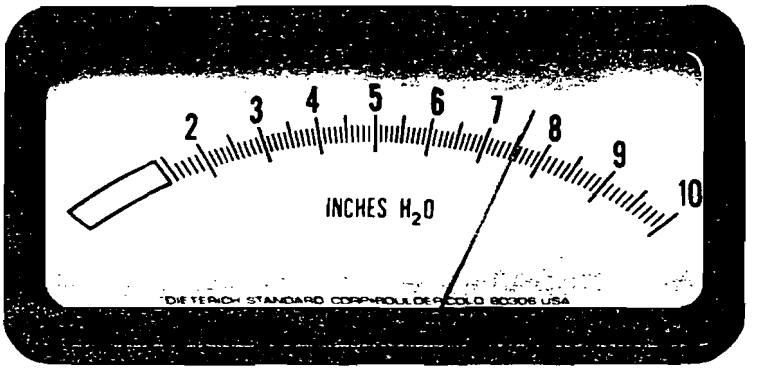
Two basic models to solve flow measurement problems

1. Linear to Flow Eagle Eyes – The flow meter can be specified with an easy-to-read, linear to flow scale for direct, continuous reading in flow units (GPM, SCFM, etc), thus eliminating potential error in calculating or using conversion tables when extracting the square root of the differential pressure. There are numerous local flow rate indicating applications for this model, such as monitoring pumps, fans and blowers for volume efficiency.

2. Linear to DP Eagle Eyes – You can opt for a linear to DP (differential pressure) scale for applications such as measuring the drop across filters, liquid level measurement, static pressure measurement in air ducts or point-to-point measurement of multiple primaries, such as an Annubar, regardless of line size.

All Eagle Eyes come completely assembled and calibrated from the factory to eliminate field adjustments.

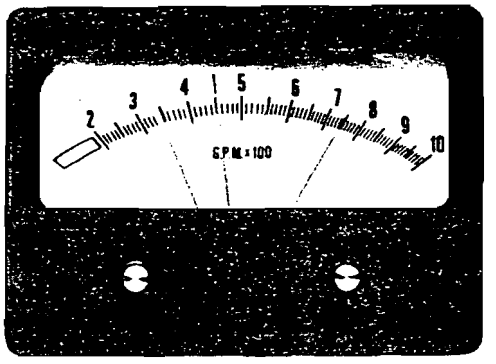


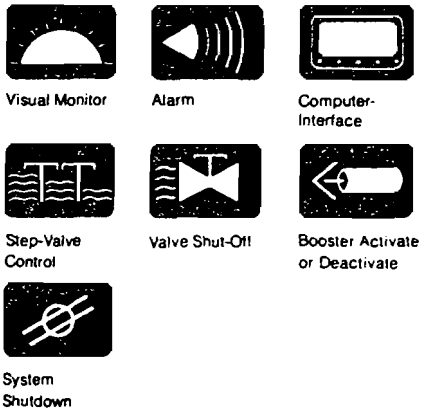


Electronic on-off control option

An electronic on-off control option is available for interface to warning devices or control valves to give you an unlimited variety of high-low control and alarm functions.

With this option, Eagle Eye can be an integral part of a process early warning system for equipment failure or under-overuse of fluids.



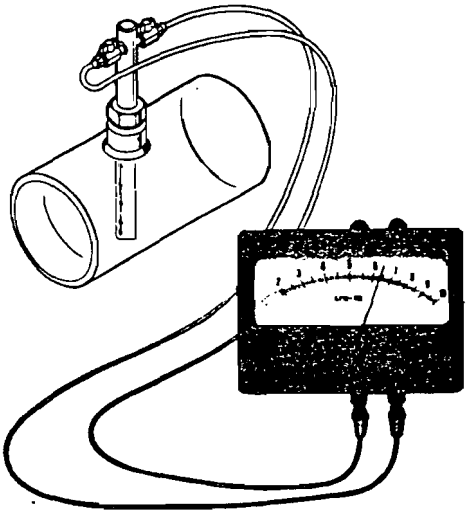


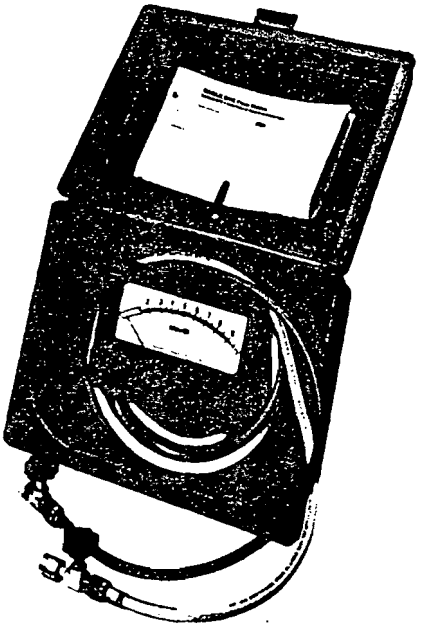
Simple installation No maintenance

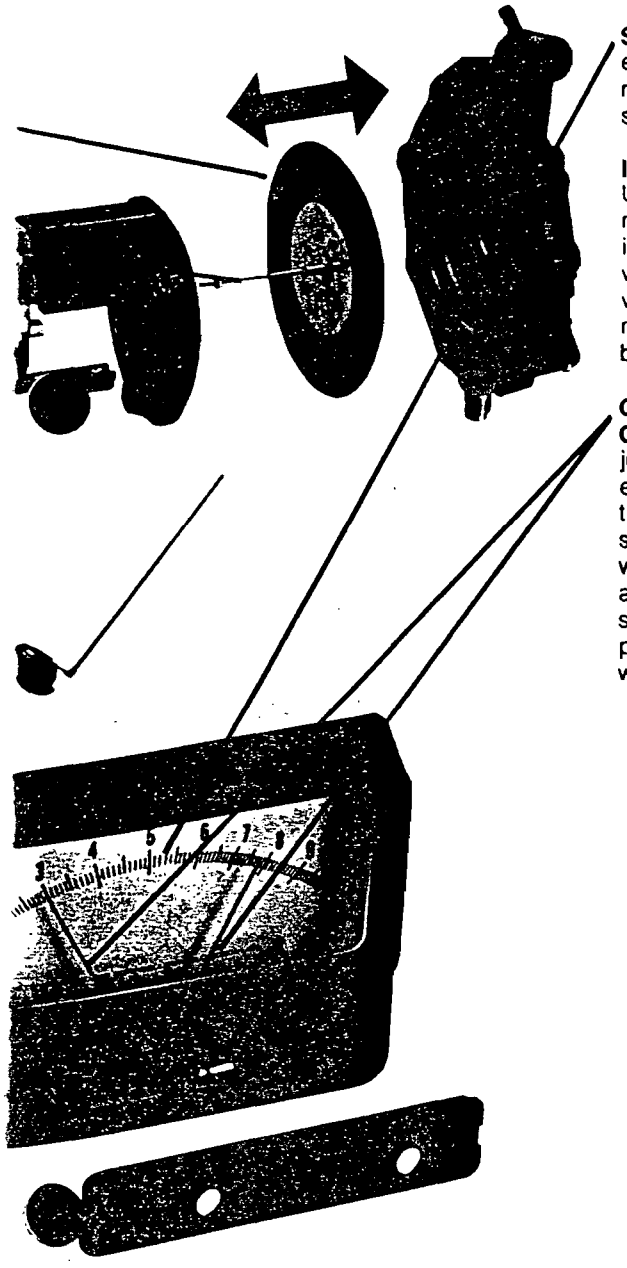
Ordinarily, an Eagle Eye can be installed in 30 minutes or less. No special valving, by-pass piping or tools are needed.

Eagle Eyes can be permanently mounted – flush panel, wall or pipe. Remote mounting is no problem, either. The meter can be mounted up to 200 feet away from the primary and still maintain accuracy of ±2%. Or you can select a portable Eagle Eye for point-to-point measurement of multiple Annubars regardless of line size. These portable meters can be specified with quick disconnect couplings to speed monitoring at various checkpoints.

Eagle Eyes have no hazardous pressurized glass to leak, break, clean or replace. The measured air or water never touches the meter's scale.



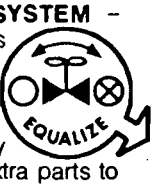




EASY TO USE FRONT PANEL CONTROLS – Eagle Eye offers the convenience of having all of its controls up front for optimum accessibility. And they may be covered with a protective panel to prevent accidental misuse or tampering, or may be externally accessible.

SCALE – Eagle Eye can be specified with either a linear to flow scale for direct readout in flow units, or with a linear to DP scale for readout in differential pressure.

INTEGRAL EQUALIZING SYSTEM – Until Eagle Eye, all flow meters needed special by-pass valving or "add-on" equalizer valves. With Eagle Eye, the valving is built right into every meter. It's simple to use, no extra parts to buy, no extra cost.



OPTIONAL ELECTRONIC ON-OFF CONTROL – This option provides two adjustable setpoints to allow switching of electrical circuits. A single-pole, double-throw relay is provided for each of the two setpoints. The relays are de-energized when the meter pointer is between the high and low setpoints. A non-contact proximity system is utilized to sense meter pointer position and operate the appropriate relay whenever either setpoint is exceeded.

CERTIFICATION – Fire Pump Eagle Eyes are approved by Factory Mutual and listed by Underwriter's Laboratories of Canada as well as FIA (Factory Insurance Association).

FM
APPROVED

For further information on Fire Pump Eagle Eyes, consult catalog DS-2500.

Engineered for accuracy and dependability

INPUT SIGNAL – All Eagle Eyes measure a differential pressure signal.

TRANSDUCER – The input signal is carried to the Eagle Eye Meter through standard tubing. Here one signal is applied to each side of the diaphragm. The diaphragm reacts to the difference in pressures and produces axial motion.

MOTION BALANCE – The axial motion of the diaphragm is transmitted to the range spring through a unique "flex-link" coupling. The "flex-link" allows the received axial motion to be converted to the pivoted motion of the range spring without measurable hysteresis due to its high non-yielding design.

MAGNETIC TRANSFER – Integral with the bottom of the range spring is a permanent magnet. As it moves, it causes a follower magnet to rotate. The follower magnet is located outside of the meter's pressure cavity and is directly connected to the pointer. The magnetic transfer actually transmits motion through a pressure barrier without mechanical drag.

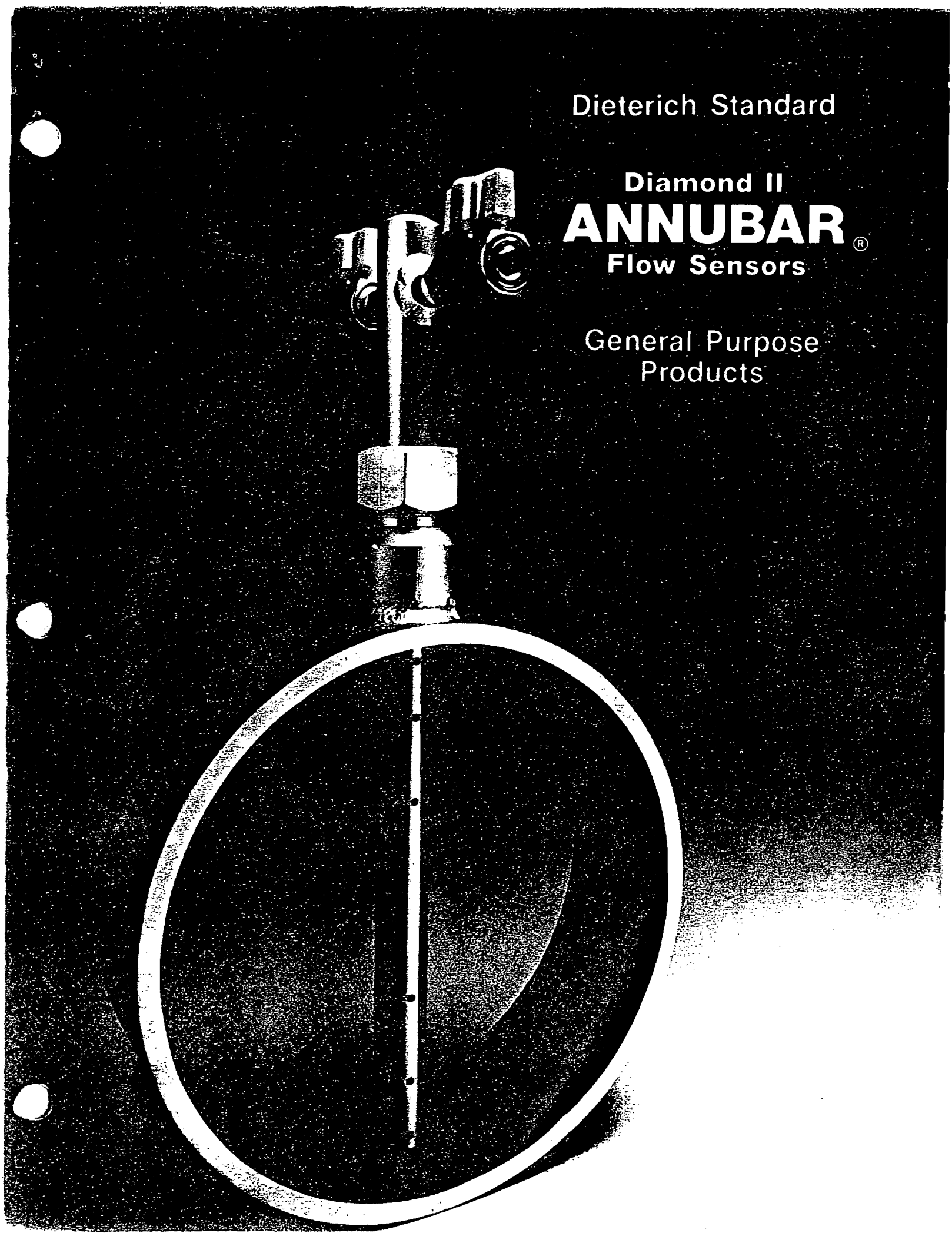
MOTION MULTIPLIER – As a result of a new engineering concept, the motion between the "magnetic transfer" can be selected for output which is either linear to DP or nominally linear to flow.

Dieterich Standard

Diamond II ANNUBAR®

Flow Sensors

General Purpose Products



Diamond II Annubar General Purpose products

The General Purpose Annubar is a primary flow sensor designed to produce a differential pressure that is proportional to flow.

Annubar is compatible with a variety of secondary instrumentation for easy monitoring of gas and liquid* flow rates for totalizing, recording or control.

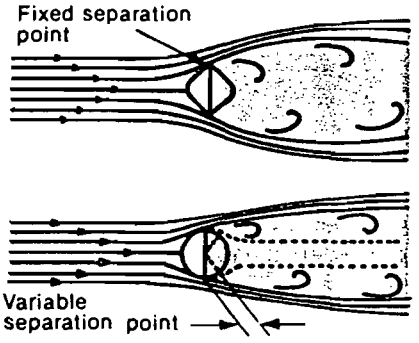
*For steam applications, consult industrial product catalog (DS-1001).

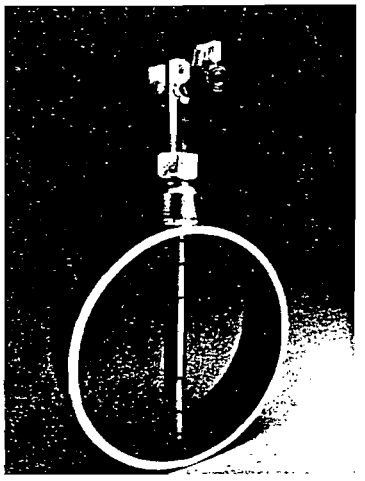
Annubar accuracy

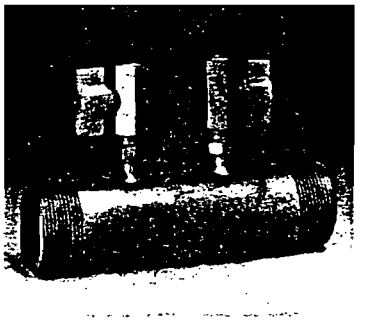
Accuracy: ±1.0% of actual value
Flow turndown: greater than 10:1
Repeatability: ±0.1% of actual value

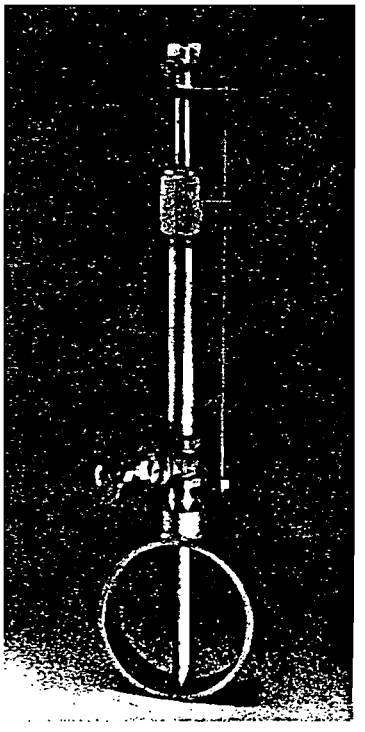
The diamond shape—key to accuracy.

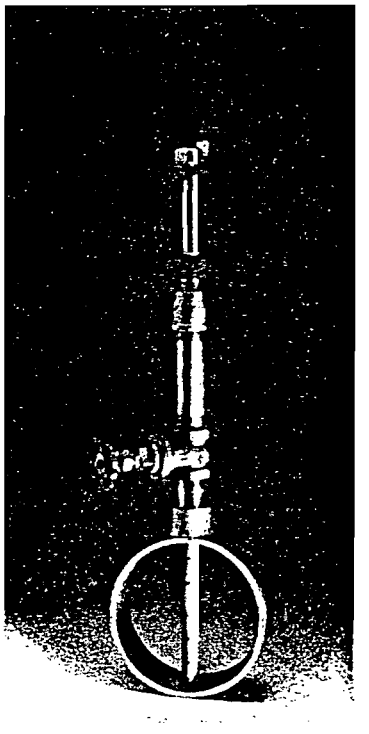
The diamond shape establishes a fixed separation point of the fluid from the sensor. The accuracy of the Diamond II Annubar is maintained regardless of the fluid velocity. Round sensors have a variable separation point of the fluid from the sensor. This causes the inaccuracy or error to increase with velocity (up to ±10%).




Model GCR


Model GNT


Model GMT


Model GLT

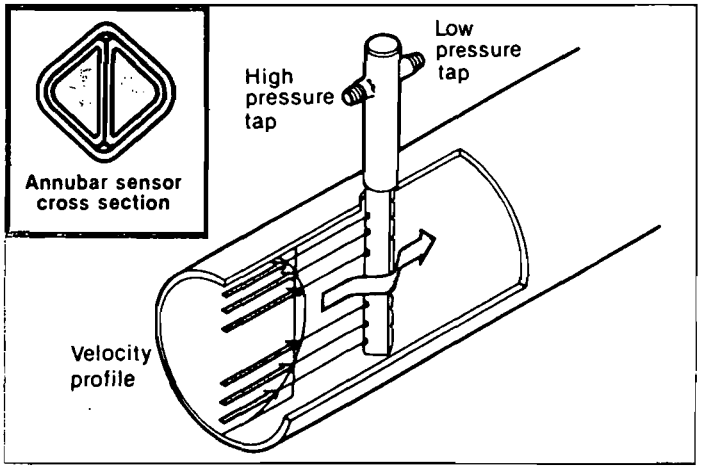
How Annubar works

High pressure averaging. The high pressure is sensed by impact ports located at specific points along the sensor facing upstream. Inside the high pressure chamber, an average pressure is transmitted to the high pressure tap.

Low pressure sensing. The rear ports pointing downstream sense the average low pressure.

Differential pressure (h_w). The difference between the high and the low pressure is the differential pressure or DP. This difference in pressure is proportional to the flow rate.

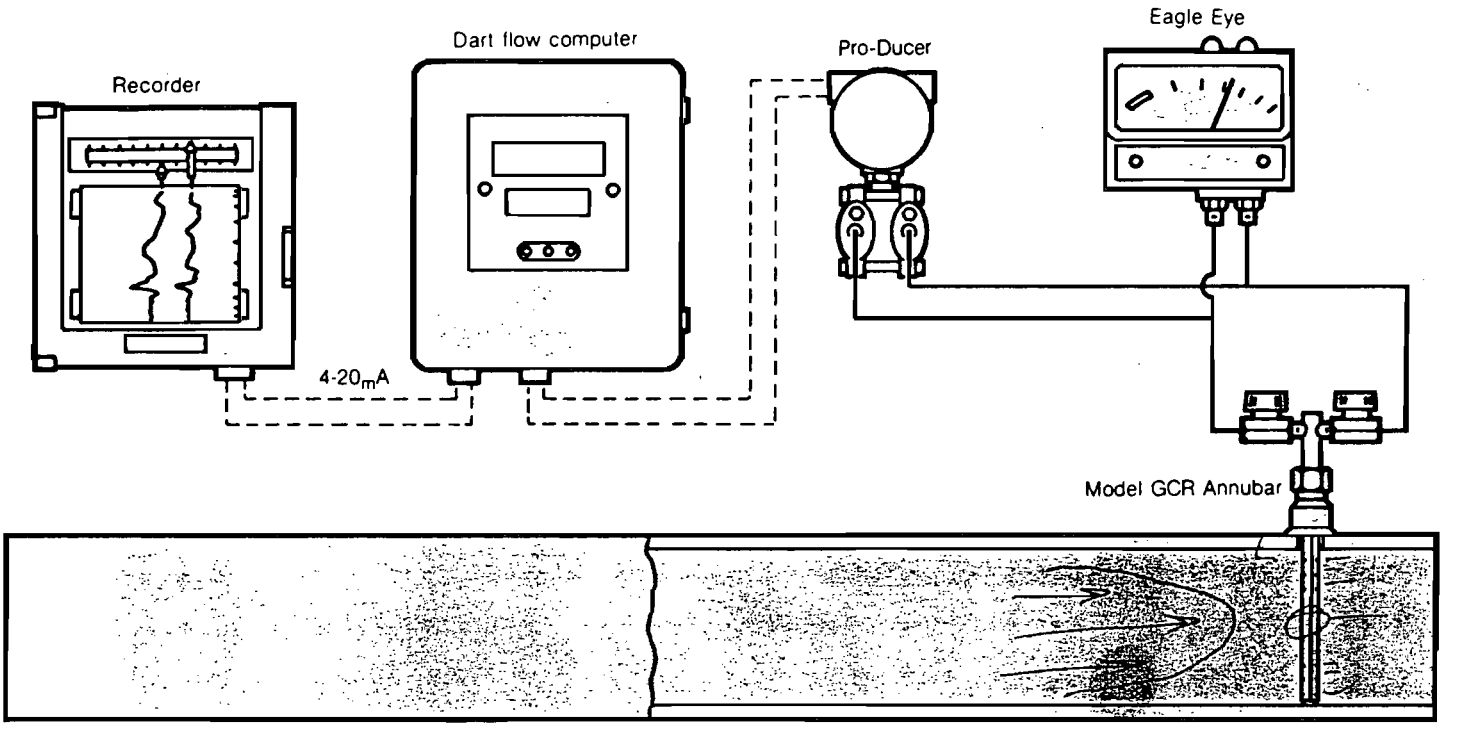
Instrument connections. The instrument connections transmit the high and low pressure to a local indicator, electronic transmitter, or other secondary devices where the signal is read as a flow rate.

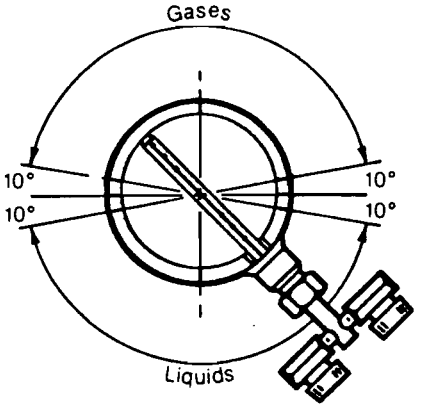


® Annubar Registered Trademark of Dieterich Standard U.S. Patent No. 4,559,836 and various foreign patents. Other U.S. and foreign patents pending.

Dart flow computer

Dart is a programmable microcomputer that takes up to four measurement variables, then calculates and averages flow rate and total.





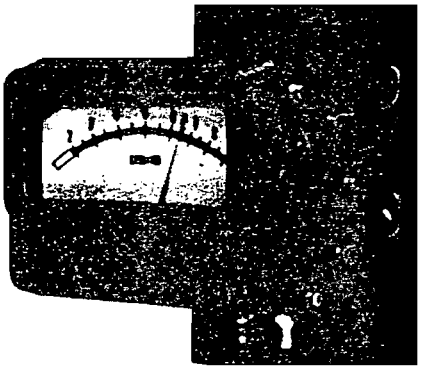
Note: instrument connections rotated 90° for clarity.

Simple, fast installation

Annubar is installed with a minimum of set-up, welding and clean-up time. Complete installation can be made in less than 30 minutes.

Annubar—Eagle Eye flow sets

If your flow measurement requirements encompass heating, ventilating and air conditioning or other air and water applications, the Annubar Eagle Eye flow package is the ideal choice for accurate, low cost measurement of flow rates.



- Linear to flow rate
- Linear to differential pressure
- Electronic on-off control

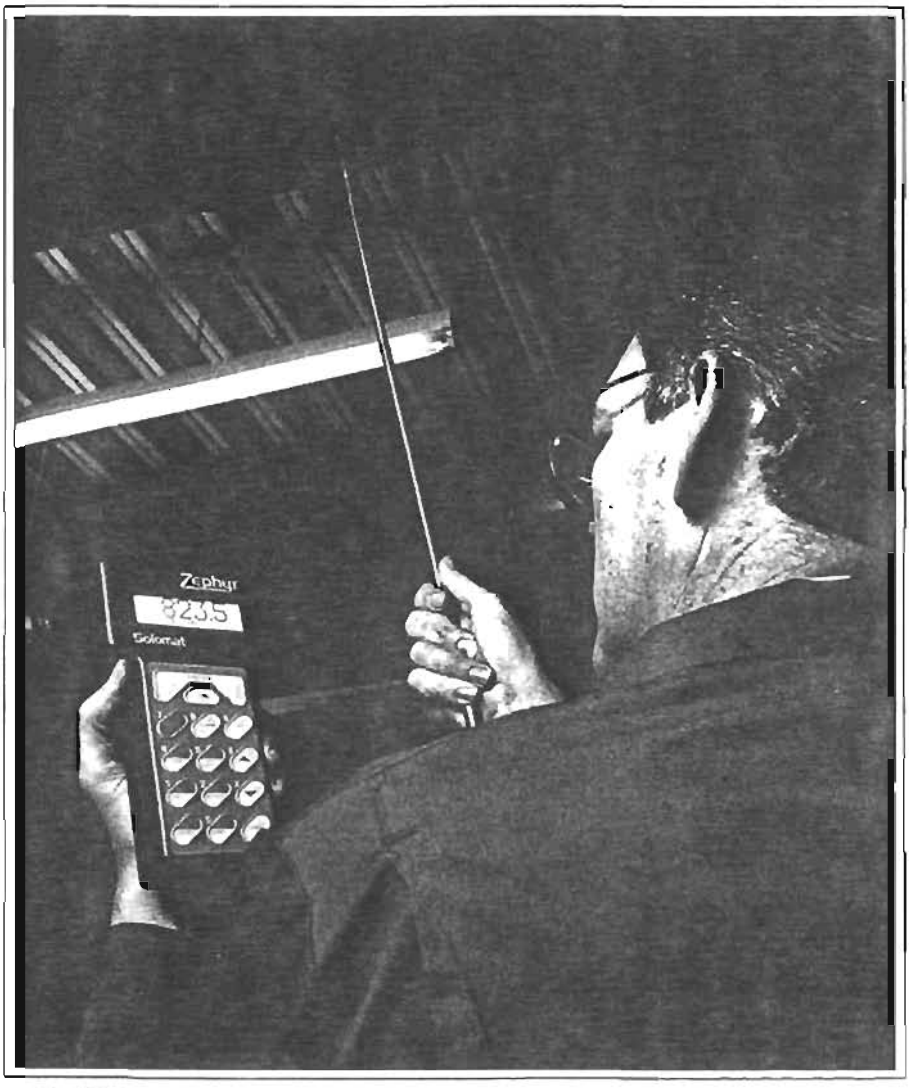
Dieterich Standard A DOVER Industries Company Box 9000 Boulder, Colorado 80301 USA 303/530-9600 TLX 6837012 FAX 303/530-7064

Reprinted DS-3001 (6/89)
Replaces DS-3001 (3/89)
Replaces DS-3001 (7/88)

ATTACHMENT FOUR

(Solomat's Zephyr)

THE ZEPHYR:
Easy-to-use, all-electronic design utilizes the latest in precision sensor and surface mount technology.



▲
Portable, volumetric flow measurements are as easy as keying in a duct size and reading the display

The Zephyr portable micromanometer measures not only air/gas pressure, but velocity, temperature and volumetric flow over a wide measurement range. The highly accurate Zephyr is easy to use and can be handheld or carried in a neck cradle strap for hands-free operation. A number of unique features make the Zephyr a leader in its field and an ideal tool for HVAC, safety and industrial plant engineers.

The Zephyr is the first instrument to provide direct volumetric flow readings from standard dynamic pressure measurements using a temperature compensated pitot tube. Velocity and volumetric flow are measured by means of a combined pitot static and thermocouple probe. Readings can also be corrected for atmospheric pressure changes by entering the current atmospheric pressure value.

The Zephyr has a membrane keypad designed so that minimal keystrokes are required to perform each function. The Zephyr is powered by either dry cell (50 hours usage) or rechargeable (25 hours usage) batteries. The all-electronic design uses the latest in surface mount technology and incorporates two solid state pressure sensors. This design overcomes the many problems associated with metallic membrane instruments.

Electronic re-zeroing and an automatic balancing valve minimize zero drift and eliminate frequent manual re-zeroing which other electronic micromanometers require. Measurements are digitally displayed in a wide choice of engineering symbols for pressure, velocity, temperature and volumetric flow to suit individual applications. Readings are shown on a high definition dot matrix display with multi-language capability. The Zephyr has an averaging facility which is ideal for traversing ducts. Both instantaneous and averaged measurements are shown simultaneously on the display. In addition, a "meter slow" function averages out the slight pressure fluctuations which are characteristic of fanned systems and other pressurized circuits.

The Zephyr has a user-selectable choice of data logging: manual for spot checks or fixed interval readings for more investigatory applications. An alphanumeric location coding feature allows measurements to be coded for later display or subsequent analysis. Data can be downloaded to a printer or personal computer. Solomat-Neotronics' advanced CS4 Software enables graphs, histograms and detailed reports to be generated.

FEATURES

- ▲ Wide span of measurement.
- ▲ Multiple ranges displayed.
- ▲ Clear digital display.
- ▲ Simultaneously displayed average.
- ▲ Built in volumetric flow calculation.
- ▲ Automatic temperature compensated measurements.
- ▲ Atmospheric pressure compensation.
- ▲ Autozero.
- ▲ Data Logging.
- ▲ Location coded measurements.
- ▲ "Hands-free" operation.
- ▲ Fast / slow response selector.
- ▲ Dry cell or rechargeable batteries.
- ▲ Easy operation.
- ▲ Optional Analog Output.

APPLICATIONS

Zephyr applications include measurement and data acquisition for HVAC Balancing and Servicing Engineers, Safety Managers and Industrial Hygienists, Plant and Public Works Engineers, Research Laboratories and Educational Institutions.

Air balancing engineers. The Zephyr provides the ability to log a large number of readings together with their location for subsequent analysis. It is the first instrument to provide direct volumetric flow readings from standard dynamic pressure measurement using a temperature compensated pitot tube.

HVAC service engineers. The Zephyr provides a wide range of spot check measurements for delivered air flows, pressure drops across filters, and differential pressure measurement for clean rooms and containment areas.

Safety Managers and Industrial Hygienists. For measurement and logging of fume hoods, paint spray booths, extraction and other personal protection systems the Zephyr is the practical solution. Monitoring ventilation or containment systems assists in governmental legislation compliance.

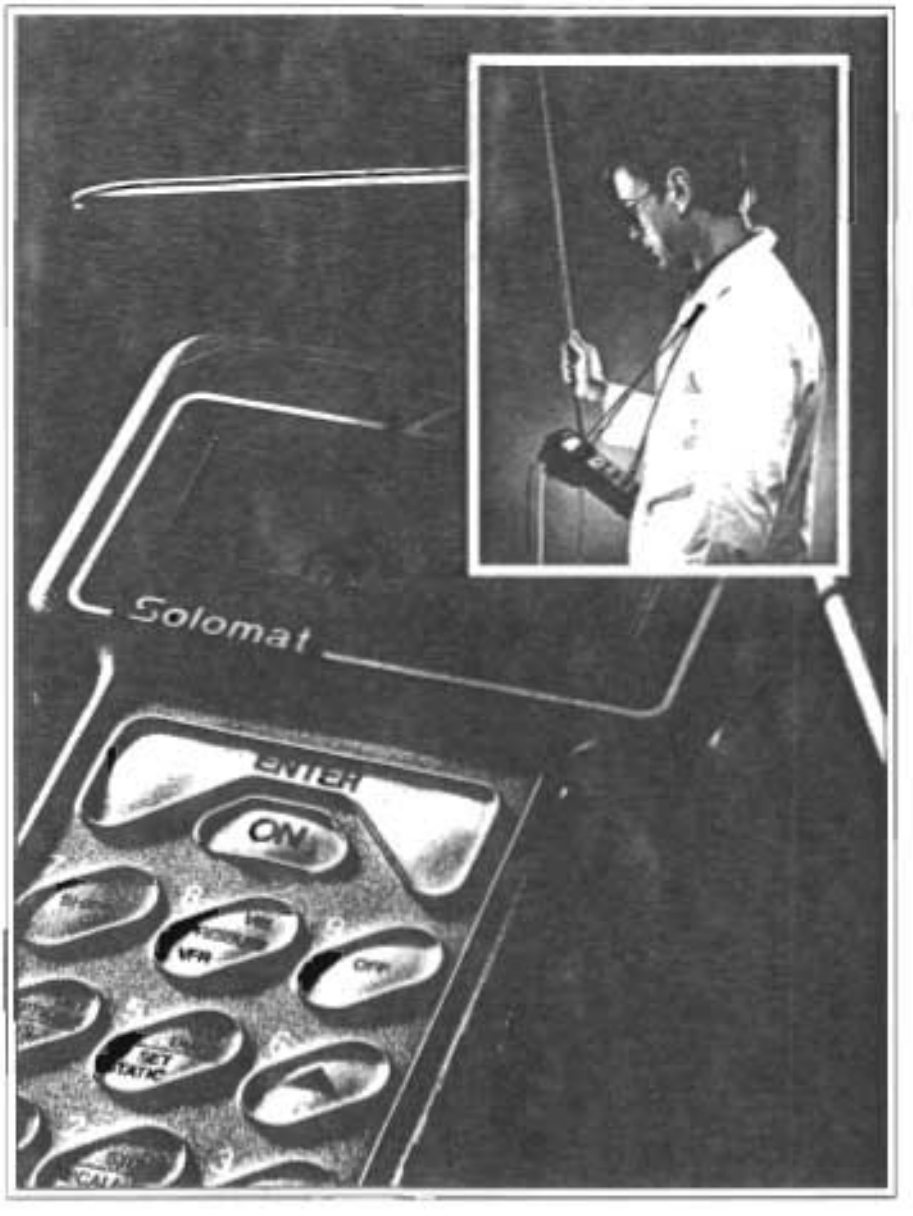
Plant and Public Works Engineers. The Zephyr is ideal for general differential pressure measurements on low pressure air or gas systems.

Research Laboratories and Academic Establishments. The Zephyr enables you to carry out precise and accurate instantaneous and continuous differential pressure measurements.

ACCESSORIES

The Zephyr instrument is supplied complete with a hands free cradle and six (6) feet of silicone tubing in contrasting colors. A variety of accessories is available including:

- ▲ Combined pitot/temperature probe.
- ▲ Instrument Case, to accommodate the instrument, cradle and tubing.
- ▲ Test Set Case, to accommodate the instrument, cradle, tubing and pitot tube.
- ▲ Battery Charger.
- ▲ Extendable Pitot Static tubes without temperature compensation.



TECHNICAL SPECIFICATIONS

INSTRUMENTS

RANGES / RESOLUTION

PRESSURE (AUTORANGING):

in H_2O	±9.999	±10 to 99.99	
mm H_2O	±99.99	±100 to 999.9	±1000 to 1200
mbar	±9.999	±10 to 99.99	±100 to 120
Pa	±999.9	±1000 to 9999	
kPa	±.9999	±1 to 9.999	±10 to 12

VELOCITY (AUTORANGING):

ft / min	295 to 999.9	1000 to 9999
ft / sec	4.9 to 463	
meters / sec	1.5 to 141	

VOLUMETRIC FLOW (AUTORANGING):

ft^3 / min (CFM)	3 to 999.9	1000 to 9999	
ft^3 / hr	180.0 to 999.9	1000 to 9999	
liters / sec	30 to 99.99	100 to 999.9	1000 to 9999
m^3 / sec	.0030 to 9999	1 to 9.999	10 to 99.99
m^3 / min	0.10 to 99.99	10 to 999.9	1000 to 6000

TEMPERATURE:

°F	-110° to 999.9°	1000° to 1825°
°C	-80° to 538°	538° to 996°

ACCURACY:
Pressure (at 70°F): Better than 1% of reading ±1 count (in + ve region).

VELOCITY / VOLUMETRIC FLOW:
1% of reading ±1 count above 300 fpm, plus errors due to accuracy of static pressure and temperature within the duct, of approximately 1% of reading.

VARIATION WITH TEMPERATURE:
Less than 0.1% of reading per °F.

ZERO DRIFT WITH TEMPERATURE OR TIME:
Negligible after five (5) minutes warm-up.

DISPLAY:
Dot matrix, liquid crystal display.

OUTPUTS:
RS232 digital output. Optional ±2v analog output.

POWER SOURCE:
Dry cell (3 x C size) or Ni-Cad rechargeable battery pack.

BATTERY LIFE:
Dry Cell: 50 hours. Rechargeable: 25 hours.

OPERATING TEMPERATURE:
32°F to 122°F; 0°C to 50°C.

OPERATING HUMIDITY:
0 to 90% RH.

STORAGE TEMPERATURE:
23°F to 122°F; -5°C to 50°C.

STORAGE HUMIDITY:
0 to 95% RH.

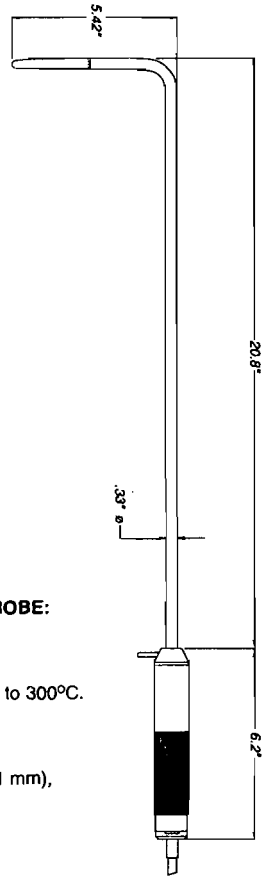
SEALING:
Splashproof IP54 (equivalent to NEMA 4).

CASE MATERIAL:
High impact strength molded ABS.

DIMENSIONS:
Approximately 3" (75 mm) wide x 1.5" (40 mm) deep, widening to 4.5" (112 mm) wide x 2.5" (65 mm) deep, x 8.25" (210 mm) long.

WEIGHT:
1.1 lb; 0.5 kg.

T/C 500



PITOT STATIC TUBES

T/C 500
COMBINED PITOT / THERMOCOUPLE PROBE:
Diameter: .25" (6 mm).
Length: 19.5" (500 mm).
Weight: .5 lb. (400 g).
Temperature Range: 32°F to 572°F; 0°C to 300°C.

TYPE 50-4 EXTENDABLE:
Diameter: Head .25" (6 mm)
Extension Tubes: .42" (10 mm), .46" (11.1 mm), .5" (12 mm).
Pitot Length: 51" (130 cm) fully extended.
Weight: .95 lb. (.43 kg).

DISCLAIMER:

All Solomat instrumentation has outstanding performance qualities. However, regular prudent checks must be made as to the suitability for use — including calibration. That responsibility lies solely with the user of the instrument. No claims as to suitability are expressed or implied by Solomat.

WARRANTY:

The ZEPHYR™ carries a one (1) year warranty, excluding misuse, abuse and unauthorized modifications.

Solomat
a NEOTRONICS company

The Waterside Building
26 Pearl St., Norwalk, CT 06850
Telephone: (203) 849-3111
Toll Free: (800) SOLOMAT
Facsimile: (203) 847-9320

DISTRIBUTED BY

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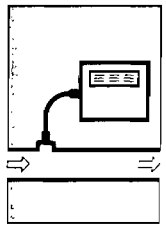
ATTACHMENT FIVE

(Landtec's GA-90 & GEM-500)

NON - CONFINED SPACE

GA-90™



LANDTEC
LANDFILL CONTROL TECHNOLOGIES

METERS/INSTRUMENTATION
Infrared Gas Analyzer

GA-90 Integrates Six Landfill Gas Field Instruments with On-Board Computer

Portable, Computerized Instrument Simplifies Landfill Gas Analysis

Accurate landfill gas (LFG) analysis is essential in meeting today's strict environmental and safety regulations. The GA-90 is a compact field instrument designed to analyze the methane (CH_4), carbon dioxide (CO_2) and oxygen (O_2) levels in LFG. It is used by landfill field technicians in monitoring migration probes, active and passive gas extraction systems and measuring LFG at flares or other approved control systems. The GA-90 does not measure or record gas temperature or flow data, which are additional features found in the GEM-500. The GA-90 introduces computer technology that uses instructional menus to simplify accurate data analysis and recording while eliminating the need to carry as many as six separate instruments (CH_4, CO_2, O_2 analyzers, barometer, static pressure meter, data logger and sample pump). The collected information is date and time stamped and readings are stored in memory. Later the data can be down-loaded to a personal computer or printer to provide error-free data management. These features result in faster, error-free monitoring information.

Multi-Functional Features

LCD screen menus prompt the technician through sampling and analysis of the methane, carbon dioxide and oxygen content of landfill gas as well as static or barometric pressure. Alarms can be easily set to monitor for high methane and carbon dioxide or low oxygen levels. The GA-90 also can display the CH_4 concentration in % LEL (Lower Explosive Limit) of methane. The automatic data logging function allows unattended sampling and analysis of gas concentrations and atmospheric pressure. Results can be displayed in either Imperial (USA) or SI (metric) units.

The GA-90 can store 1200 sets of readings (one reading has three gas concentrations and atmospheric pressure or well pressure) with date and time of reading plus well I.D. code. The readings may be viewed on the GA-90 screen, printed or down-loaded to an IBM or compatible computer.

GA-90 Compared with the GEM-500

The GA-90 Gas Analyzer, is designed for all landfill gas monitoring applications. LANDTEC's GEM-500 Gas Extraction Monitor has additional pressure and temperature sensors and software necessary to measure and calculate flow.

Rugged, Compact, User-Friendly Design

The GA-90 is an all-weather, notebook-sized instrument that uses a self-compensating, infrared bench, long-life galvanic cell oxygen sensor and an internal gas sample pump. It has an internal, rechargeable power supply.

An easy to follow, on-screen menu simplifies use, guiding the operator through the sampling process, that can usually be completed in less than a minute. I.D. codes allow the user to store and recall measurements for each monitoring point. An optional cable and PC software allow easy downloading of stored data to a personal computer for further analysis and report generation. The same cable can be used to print directly to a printer.

LANDTEC's Family of Landfill Products

The GA-90 is part of LANDTEC's family of products developed specifically for the landfill industry. These products are based on a decade of operating and regulatory experience at multiple landfill gas to energy sites by LANDTEC's parent, Pacific Energy.

GA-90 Analyzer Enables Immediate, Portable and Computerized Monitoring and Analysis of Landfill Gas

Key GA-90 Features

Multi-Functional Analyzer... provides automatic sampling and analysis of gas composition CH_4 (0-100% & LEL) CO_2 (0-50%), and O_2 (0-21%).

Light-Weight Compact Size... is easy to carry. It is the size of a notebook and weighs less than five pounds.

Quick Analysis... samples, analyzes and displays gas composition results in usually less than one minute.

Infrared Bench... provides accurate measurements of CH_4 and CO_2 and is not poisoned by presence of other gases.

Durable Oxygen Sensor... is a long-life galvanic cell, unaffected by other gases such as CO_2, CO or H_2S.

Field Calibration...enables improved accuracy. Technicians can calibrate the GA-90 using calibration gases.

User Friendly On-Screen Menu... simplifies operation, shortens training, guiding the user step by-step through all functions and options.

PC/Printer Data Down-Loading... provided by RS232 interface with PC compatible computers and printers.

Data Storage/Retrieval...stores last set of readings for each monitoring point, up to 1,200 readings total.

Date/Time Stamp...recorded for all stored data.

Monitoring Point I.D. Codes... provides alphanumeric identification of monitoring points for data storage.

Durable All-Weather Construction...including a membrane keypad that is designed to operate in hot, wet weather extremes from 32°F to 104°F found at landfill sites.

Unattended Auto-Log Feature...allows readings to be taken automatically (unattended) at user selected intervals.

Built-in Adjustable Alarms...allows user to set alarm limits for CH_4, CO_2 and O_2.

Rechargeable Batteries & Auto Off Feature...provide a full day's use.

Flowfail Alarm...alerts user of wet inlet port filter.

Complete Package...GA-90 is shipped in a sealed, impact resistant hard case and comes with a hose kit, filters, protective soft carrying case, battery charger and instructional manual.

Available Options...computer interface cable, data download software, well ID upload software and water trap.

Quality Landfill Gas Management Begins with Accurate Field Data Correctly Recorded

How it Works

A small electric pump draws a quantity of gas through the sample hose, in-line water trap and a user replaceable particulate filter, into a sample chamber. An infrared beam is projected, via sapphire windows, through the gas sample. On the other side of the chamber the beam is sensed by methane and carbon dioxide detectors. A microprocessor calculates the amount of infrared light absorbed at different wavelengths and determines the various gas concentrations.

The oxygen concentration is measured by the Galvanic Cell method. The oxygen molecules diffuse through a Teflon membrane into a cell containing a gold electrode. The molecules are reduced and a current flows between the gold electrode and a lead electrode. The resulting cell output is measured as a voltage which is proportional to the oxygen concentration. The entire system has a very high resistance to poisoning caused by the presence of other gases, such as carbon dioxide, carbon monoxide or nitrogen.

When a sufficient amount of gas has entered the sample chamber, gas readings shown on the display will stabilize. By pressing the keyboard, the reading can be stored in the GA-90 memory with I.D. code, date and time.

GA-90 Sampling Resolution

	Sensor Range Imperial	Resolution Imperial
Methane-CH_4	0-100%	0.1%
Carbon dioxide-CO_2	0-50%	0.1%
Oxygen-O_2	0-21%	0.1%
Static pressure	0-100" H_2O	1.0" H_2O

GA-90 Typical Accuracy

CH_4	0-5% (LEL) ±0.5%	5-15% (UEL) ±1.0%	15-100% ±3.0%
CO_2	0-50% ±3.0%		
O_2	0-21% ±1.0%		

Additional Information

Additional Technical information is available on the GA-90 including product specifications and user instructions. Information is also available on LANDTEC's family of integrated landfill products including: automatic landfill gas monitoring systems, wellheads, wellbore seals, knock-outs, instrumentation, condensate/leachate treatment systems, integrated flare stations and landfill gas management software.

LANDTEC also provides technical and educational literature on specific landfill subjects and issues. Please call our toll free telephone number (800) 821-0486 (8 a.m. - 5 p.m. Pacific Time) for additional information and placement on our mailing list.

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Commerce, California 90040
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FAX (213) 724-5742

LANDTEC
LANDFILL CONTROL TECHNOLOGIES

GEM
Series: 500

METERING/INSTRUMENTATION
Gas Extraction Monitor

GEM-500 Integrates Nine Landfill Gas Field Instruments with On-Board Computer

Versatile Analyzer Simplifies LFG Monitoring and Control

The GEM-500 was specifically designed by Landfill Control Technologies (LANDTEC) for use on landfills to monitor landfill gas (LFG) migration control systems, gas collection systems, flares, migration probes, LEL levels, subsurface fires, and more.

The light-weight, portable unit links nine field instruments with an on-board computer. The versatile monitor provides landfill technicians with an array of analysis and computation functions. The results can be stored and later down-loaded to a personal computer to provide error-free data management.

Multi-Functional Features

The GEM-500 automatically samples and analyzes the methane, carbon dioxide and oxygen content of landfill gas. The easy to read LCD screen shows the results as percentages of CH_4, CO_2, O_2 and "balance" gas (typically nitrogen). The GEM-500 also calculates and displays gas flow rate, Btu content, temperature, pressures and LEL (Lower Explosive Limit).

In addition, the user can recall prior data stored at up to 500 monitoring points for contrast with current data. Alarms can easily be set for methane, oxygen and temperature measurements.

The GEM-500 can automatically calculate gas flow rates, adjusted to standard temperature and pressure. The results can be displayed in either Imperial (USA) or SI (metric) units.

LANDTEC'S versatile GEM-500 can be used on orifice plate and Pitot tube meters, but most effectively on LANDTEC's Accu-Flo wellheads, which incorporates a built-in precalibrated gas flow meter and quick-connect sample ports.

The Accu-Flo wellhead and GEM-500 were designed to work together to expedite information required by environmental regulations.

Rugged, User Friendly Design

The GEM-500 is an all-weather, self-contained portable monitor which uses a self-compensating infrared gas analyzer, rechargeable power supply for all day use, an internal sample pump capable of drawing a gas sample at up to 70" vacuum.

An easy to follow on-screen menu guides the operator through the sampling process which can be completed in less than a minute. I.D. codes allow the user to store and recall the last set of measurements for each monitoring point. Preset maintenance codes can be used to note field work required. The stored data can be later retrieved or down-loaded to a personal computer for use in a database, such as LANDTEC's LFG management software.

Time Saving Conveniences

Users will readily appreciate the built-in, time-saving conveniences provided by the GEM-500. Instead of fumbling with data sheets, temperature gauges, Pitot tubes, methane/oxygen/carbon dioxide analyzers, pressure gauges, calculators and other field equipment, the GEM-500 provides it all, and more, in an easy to carry light-weight case.

LANDTEC's Family of Landfill Products

The GEM-500 is part of a family of products developed by LANDTEC for the landfill industry. These products are based on a decade of corporate operating and regulatory experience at multiple sites by LANDTEC's parent, Pacific Energy.

LANDTEC's GEM-500 Analyzer Provides a Convenient Link Between Your Landfill Data and Office Computer

Key GEM-500 Features:

Multi-Functional Analyzer provides automatic sampling and analysis of gas composition (% by volume CH_4 (100% & LEL), CO_2, O_2 and % remaining gas balance), temperature, pressures. Also calculates gas flow rates as well as Btu rates.

Diverse Field Applications monitors migration control systems, gas collection systems, flares, migration probes, temperatures, and more.

Light-Weight Compact Size is easy to carry. Weighs less than five pounds.

Quick Analysis displays gas analysis and flow results in usually less than one minute.

Infrared Gas Analyzer provides high-tech accurate measurements of methane (CH_4) and carbon dioxide (CO_2).

Reference Beam provided by infrared analyzer for self compensation.

Durable Oxygen Analyzer provided by the galvanic cell principle, unaffected by other gases such as CH_4, CO_2, or H_2S.

User Friendly On-Screen Menu guides the user step-by-step through all functions and options available.

PC Data Down-Loading provided by RS232 interface with compatible computers.

Data Storage/Retrieval stores last set of measurements taken for each monitoring point, up to 500 monitoring points total.

Prior Data Recall allows user to recall last stored data for each monitoring point.

Methane Analysis displayed as either $\%CH_4$ by volume or LEL.

Durable Construction *built of strong, durable* plastic material for harsh landfill environment. Sealed keyboard.

All Weather Use designed to operate in hot/wet weather *extremes from* 14°F to 104°F. Weather proof.

Built-in Adjustable Alarms allows user to set alarm limits for CH_4, O_2 and temperature.

Rechargeable Batteries provides all day field use.

Battery Check monitors battery life remaining.

Monitoring Point I.D. Codes provides alphanumeric identification of monitoring points for data storage.

Maintenance Codes allows user to note typical maintenance needs using eight preset maintenance codes.

Date/Time Stamp recorded for all stored data.

Imperial vs. SI Units displays measurements in Imperial (USA) or SI (metric) units.

Unattended Auto-Log Option allows readings to be taken automatically (unattended) at user selected intervals.

Interfaces to LANDTEC Data Management Software which provides statistical management and reporting of LFG data.

Multiple Flow Meter Analysis supported by GEM-500 to calculate gas flow rates from Accu-Flo wellheads, orifice plates and Pitot tubes.

Quality Landfill Gas Management Begins with Accurate Field Data Correctly Recorded

GEM-500 Packs Nine LFG Instruments and Computer into Five Pound Case

The highly accurate and reliable GEM-500 provides field technicians with the most commonly used LFG instrumentation, linked to an on-board computer for quick data calculations, storage and retrieval – all within a compact, all weather case the size of a dictionary.

The GEM-500 was designed by LANDTEC to support the ever-increasing instrumentation requirements of LFG monitoring. The multi-functional unit expedites the analysis and storage of field data. Software allows easy downloading of stored data to a personal computer for further analysis and reporting.

Couple the GEM-500 with a LANDTEC Accu-Flo landfill gas wellhead, and field monitoring becomes faster and more efficient. With the GEM-500 and Accu-Flo combination, you can forget about carrying analyzers for methane, carbon dioxide and oxygen. You can also eliminate handling high and low pressure and temperature gauges, Pitot tube, orifice plate or other cumbersome flow meters, vacuum pump, flow calculator and data sheets.

The GEM-500 and other LANDTEC products are based on a decade of hands-on landfill gas experience and are designed to provide an integrated and more effective approach to landfill gas management for regulatory compliance or energy production.

GEM-500 Specifications

	Sensor Range Imperial	Resolution Imperial
Methane - CH_4	0 - 100%	0.1
Carbon dioxide - CO_2	0 - 100%	0.1
Oxygen - O_2	0 - 100%	0.1
Pressures (diff)	0 - 10" W.C	0.01
(static)	0 - 100" W.C	0.1

GEM- 500 Typical Accuracy

Concentration	% CH_4 by Volume	% CO_2 by Volume	% O_2 by Volume
5% (LEL CH_4)	±0.3%	n.a	±0.25%
15% (UEL CH_4)	±1.0%	n.a	n.a
100%	±1.9%	±3.0%	n.a

Additional Information

Technical information is available on the GEM-500 including product specifications, and user instructions. Information is also available on LANDTEC's family of integrated landfill products including: wellheads, wellbore seals, knock-outs, instrumentation, condensate/leachate treatment, flares and landfill gas management software. LANDTEC also provides technical and educational literature on specific landfill subjects and issues.

Please call our toll free West Coast number 1-800-821-0496 (8 a.m.- 5 p.m.) for additional information or placement on our mailing list.

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FAX (213) 724-5742

LANDTEC's GEM-500 Analyzer Provides a Convenient Link Between Your Landfill Data and Office Computer

Key GEM-500 Features:

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Diverse Field Applications monitors migration control systems, gas collection systems, flares, migration probes, temperatures, and more.

Light-Weight Compact Size is easy to carry. Weighs less than five pounds.

Quick Analysis ..displays gas analysis and flow results in usually less than one minute.

Infrared Gas Analyzer provides high-tech accurate measurements of methane (CH_4) and carbon dioxide (CO_2).

Reference Beam provided by infrared analyzer for self compensation.

Durable Oxygen Analyzer provided by the galvanic cell principle, unaffected by other gases such as CH_4, CO_2, or H_2S.

User Friendly On-Screen Menu ..guides the user step-by-step through all functions and options available.

PC Data Down-Loading .. provided by RS232 interface with compatible computers.

Data Storage/Retrieval ..stores last set of measurements taken for each monitoring point, up to 500 monitoring points total.

Prior Data Recall .. allows user to recall last stored data for each monitoring point.

Methane Analysis..displayed as either $\%CH_4$ by volume or LEL.

Durable Construction ..built of strong, durable plastic material for harsh landfill environment. Sealed keyboard.

All Weather Use .. designed to operate in hot/wet weather extremes from 14°F to 104°F. Weather proof.

Built-in Adjustable Alarms.. allows user to set alarm limits for CH_4, O_2 and temperature.

Rechargeable Batteries ..provides all day field use.

Battery Check monitors battery life remaining.

Monitoring Point I.D. Codes provides alphanumeric identification of monitoring points for data storage.

Maintenance Codes allows user to note typical maintenance needs using eight preset maintenance codes.

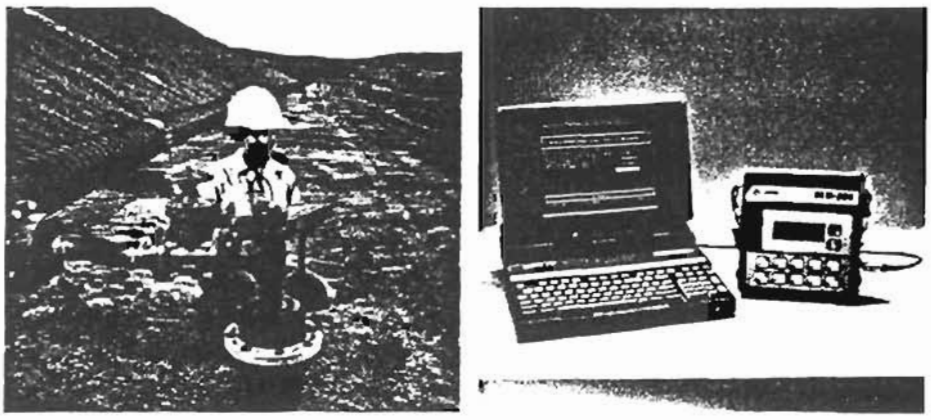
Date/Time Stamp recorded for all stored data.

Imperial vs. SI Units displays measurements in imperial (USA) or SI (metric) units.

Unattended Auto-Log Option allows readings to be taken automatically (unattended) at user selected intervals.

Interfaces to LANDTEC Data Management Software which provides statistical management and reporting of LFG data.

Multiple Flow Meter Analysis supported by GEM-500 to calculate gas flow rates from Accu-Flo wellheads, orifice plates and Pitot tubes.



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Couple the GEM-500 with a LANDTEC Accu-Flo landfill gas wellhead, and field monitoring becomes faster and more efficient. With the GEM-500 and Accu-Flo combination, you can forget about carrying analyzers for methane, carbon dioxide and oxygen. You can also eliminate handling high and low pressure and temperature gauges, Pitot tube, orifice plate or other cumbersome flow meters, vacuum pump, flow calculator and data sheets.

The GEM-500 and other LANDTEC products are based on a decade of hands-on landfill gas experience and are designed to provide an integrated and more effective approach to landfill gas management for regulatory compliance or energy production.

GEM-500 Specifications

	Sensor Range Imperial	Resolution Imperial
Methane - CH_4	0 - 100%	0.1
Carbon dioxide - CO_2	0 - 100%	0.1
Oxygen - O_2	0 - 100%	0.1
Pressures (diff)	0 - 10" W.C	0.01
(static)	0 - 100" W.C	0.1

GEM- 500 Typical Accuracy

Concentration	% CH_4 by Volume	% CO_2 by Volume	% O_2 by Volume
5% (LEL CH_4)	±0.3%	n.a	±0.25%
15% (UEL CH_4)	±1.0%	n.a	n.a
100%	±1.9%	±3.0%	n.a

Additional Information

Technical information is available on the GEM-500 including product specifications, and user instructions. Information is also available on LANDTEC's family of integrated landfill products including wellheads, wellbore seals, knock-outs, instrumentation, condensate/leachate treatment, flares and landfill gas management software. LANDTEC also provides technical and educational literature on specific landfill subjects and issues.

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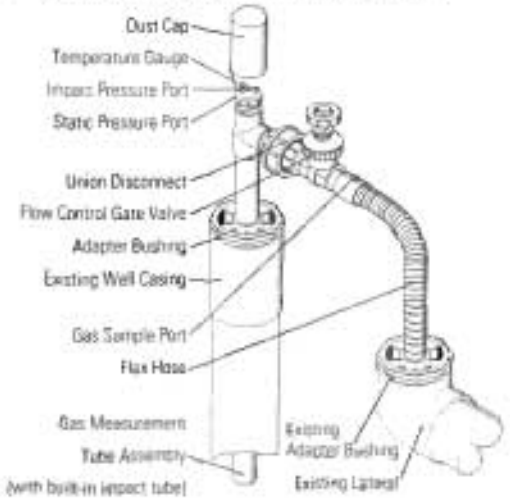
Accu-Flo Offers Time-Saving, Multi-Functional Wellheads at Less Than Field Fabrication Prices

Vertical – Accu-Flo well casing configuration



(impact tube design) The gas measuring assembly incorporates a pre-positioned and modified impact tube within a pre-calibrated measurement tube (Accu-Flo body). The assembly extends into a well casing or branch lateral to provide installation compactness.

Provides gas flow temperature required for calculating accurate gas flow rates and detecting subsurface fires.

Provides quick-connect, positive sealing convenience when taking impact tube, static and differential pressure measurements.

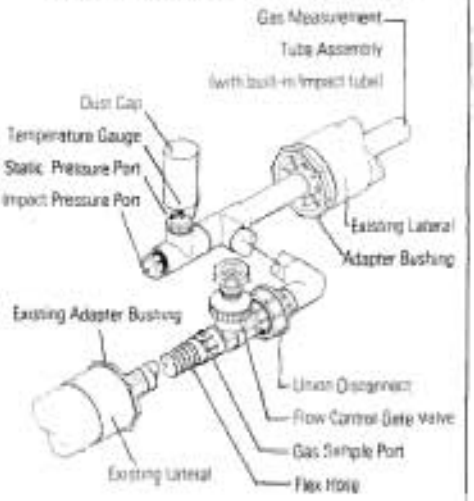
Provides controlled throttling of gas flow and positive shut-off. Incorporates durable PVC construction and inert seal materials.

Provides convenient, quick-connect gas sampling port immediately downstream of the flow control gate valve.

Provides versatile mounting utilizing standard fittings or convenient Accu-Flo adapter kits.

Provides convenient removal of Accu-Flo assembly for inspection or periodic maintenance.

Horizontal – Accu-Flo lateral configuration



Flow Accuracy and Reliability

The Accu-Flo system is designed to operate in the wet, abrasive environment typical of landfill gas and still provide accurate flow measurements with high dependability and repeatability.

A unique feature of the Accu-Flo design is the pre-calibrated gas measurement tube assembly (Accu-Flo body) which extends into a standard vertical or horizontal well casing or branch lateral, creating a compact installation.

The measurement tube assembly houses a modified stainless steel impact tube specifically designed by LANDTEC for harsh landfill gas applications. Pressure readings between the impact tube and measurement tube are used to calculate flow.

To help protect the impact tube from condensate and particulate clogging, common with conventional designs, LANDTEC uses an enlarged total pressure port opening and a separate protected static pressure port. Also, pre-calibration of the measurement tube with a pre-positioned impact tube eliminates the need to take time-consuming traverse measurements normally required for data accuracy.

Expedite LFG Measurements with Accu-Flo and GEM-500

Standard Accu-Flo Models

Model Size/Dia Inches	Flow Rate SCFM	Pressure Drop (Inches H-O)
150 1.5"	0 - 50+	0.1 - 1.5
200 2.0"	5 - 75+	0.1 - 3.5
300 3.0"	10 - 500+	0.1 - 11.5

Specify vertical or horizontal design. Optional adapter kits are available.

Key Accu-Flo Benefits

- Compact size
- Easy installation and maintenance
- Built-in gas flow measurement
- Built-in flow control gate valve
- Quick connect measurement ports
- High accuracy and repeatability of measurements
- Durable Materials: Sch. 80 PVC housing and couplings, stainless steel impact tube, acetal and polypropylene fittings.

LANDTEC - Ready To Help You

At LANDTEC we take pride in the quality and experience built into our products. We are equally proud of our warranty and technical support which back these products. As a Pacific Energy company, with a diversity of operating and regulatory experience in gas recovery, we can help you provide practical solutions to your landfill requirements.

Please call our toll free West Coast number 1-800-821-0496 (8 a.m.- 5 p.m.) and ask for a sales engineer to discuss your landfill needs. We're here to help.

Additional Information

Technical information is available on the Accu-Flo wellhead including product specifications, installation instructions and drawings.

Additional product information is available on well-bore seals, knock-outs, traps, instrumentation, condensate/leachate treatment , flares and landfill gas management software.

LANDTEC also has technical and educational literature available on specific subjects and issues. Please call for additional information and/or to be placed on our mailing list.

SWANA MEMBER

An involved and contributing member of the Solid Waste Association of North America

LANDTEC
Landfill Control Technologies
6065 E. Washington Blvd.
Commerce, California 90040
(213) 725-1139, (800) 821-0496
FAX (213) 724-5742

POST,
BUCKLEY,
SCHUH &
JERNIGAN, INC.

ENGINEERING
PLANNING

Dave ? Pls draft response for Comments. Thanks. my signature. Preston 11/8/93

November 3, 1993

Mr. Preston Lewis, P.E.
Florida Department of Environmental Protection
Air Permitting and Standards Section
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

RE: EAST DUVAL SANITARY LANDFILL CLOSURE
PERMIT NO. AC 16-186047
SPECIFIC CONDITION NO. 7 INTERPRETATION

Dear Mr. Lewis:

On behalf of the City of Jacksonville, PBS&J submits to you an interpretation of Specific Condition No. 7 (see attachment) from the above referenced permit for your review and comment. I have discussed the matter with Mr. Tom Cascio on October 27, 1993 and he suggested I submit a letter to you.

Specifically regarding the continuous monitoring and recording of the total gas flow rate for the input line to the flare, PBS&J feels that compliance with the intent of the permit would be attained if the flow to the flare is recorded on a routine monthly basis. Monthly recording would be consistent with the schedule for recording the flow at the twelve extraction wells.

The flare temperature is currently being continuously monitored by a thermocouple sensor positioned within the flame chamber near the top of the flare stack. Sensors are at 180° spacing to ensure an accurate averaging of the stack temperature. Readings are sent to a Honeywell DR4500 Truline circular chart recorder, which yields a continuous record of the flare's temperature and time.

Permit compliance would be verified by the information collected from monthly flow recordings and continuous flare operating temperatures.

Your consideration in this matter is appreciated. Please contact our office at (407)647-7275 if you should have any questions.

Sincerely,

Karl Schmit

Karl Schmit, P.E.
Project Engineer
Solid Waste Division

cc: E. Hilton/PBS&J C. Pearson/City of Jacksonville W. Walker/RESD

ATTACHMENT ONE

(Specific Condition No. 7 of Permit AC16-186047)

6. Pursuant to Rule 17-2.620(2), F.A.C. and Chapter 376, Jacksonville City ordinance, objectionable odors from this source are prohibited.

7. The permittee shall measure the gas flow rate (cfm) from each of the twelve extraction wells using a method to be submitted by the applicant within 90 days of issuance of this permit and subject to the approval by the Department, on a monthly basis for at least three years from the date this system is put into operation. This data shall be recorded in a (bound) log book and shall contain at a minimum the following information: a) Date and time each well is sampled, b) Gas flow rate in cfm and, c) Person responsible for taking the measurement and performing any calibration and maintenance. In addition to this, the permittee shall install proper devices to continuously monitor and record the total gas flow rate in the input line to the flare and the flare temperature.

8. An operation and maintenance plan shall be submitted to the BESD office at least 90 days prior to the expiration date of this permit.

9. The Jacksonville Bio-Environmental Services Division (BESD) office and the Department's Jacksonville office shall be given at least 15 days written notice prior to compliance testing.

10. The pilot gas for flare shall be propane at 22 SCFH with a maximum heat input rate of 0.056 MMBtu/hr, and once fired, the flame shall be sustained by the landfill gas alone.

11. The permittee, for good cause, may request that this construction permit be extended. Such a request shall be submitted to the Bureau of Air Regulation prior to 60 days before the expiration of the permit (F.A.C. Rule 17-4.090).

12. An application for an operation permit must be submitted to the BESD office at least 90 days prior to the expiration date of this construction permit or within 45 days after completion of compliance testing, whichever occurs first. To properly apply for an operation permit, the applicant shall submit the appropriate application form, fee, certification that construction was completed noting any deviations from the conditions in the construction permit, and compliance test reports as required by this permit (F.A.C. Rule 17-4.220).

Florida Department of
Environmental Protection

Lawton Chiles
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Virginia B. Wetherell
Secretary

November 23. 1993

Mr. Karl Schmit, P.E.
Project Engineer
Post, Buckley, Schuh & Jernigan, Inc.
Solid Waste Division
1560 Orange Avenue
Suite 700
Winter Park, Florida 32789

Re: **East Duval Sanitary Landfill Flare**
Permit No. AC 16-186047

Dear Mr. Schmit:

In response to your letter of October 28, 1993 to Mr. Clair H. Fancy, Chief of the Bureau of Air Regulation, your request to implement one of the gas flow measurement methods described in satisfaction of Specific Condition No. 7 of Permit No. AC 16-186047 is hereby approved.

As outlined in your correspondence, these methods utilize the following measurement devices:

1. PDM Micromanometer and Dwyer Air Velocity Calculator
2. Dieterich Standard Eagle Eye Flow Meter and Annubar Flow Sensor
3. Solomat's Zephyr
4. Landtec's GA-90 Gas Analyzer and GEM-500 Gas Extraction Monitor

Please keep us informed as to your progress with this project.

Sincerely,

G. Preston Lewis, P.E.
Supervisor
Air Permitting and Standards

Florida Department of
Environmental Protection

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Lawton Chiles
Governor

Virginia B. Wetherell
Secretary

December 7, 1993

Mr. Karl Schmit, P.E.
Project Engineer
Post, Buckley, Schuh & Jernigan, Inc.
Solid Waste Division
1560 Orange Avenue
Suite 700
Winter Park, Florida 32789

Re: **East Duval Sanitary Landfill Flare**
Permit No. AC 16-186047

Dear Mr. Schmit:

In response to your letter of November 3, 1993, your request to implement the described procedures (i.e., 1) the manual monthly measurement and recording of the total volumetric gas flow rate for the input line to the flare, and 2) the automated continuous measurement and recording of the flame temperature utilizing the Honeywell chart equipment), as clarifications of Specific Condition No. 7 of Permit No. AC 16-186047, is hereby approved.

Please keep us informed as to your progress with this project.

Sincerely,

G. Preston Lewis, P.E.
Supervisor
Air Permitting and Standards

cc: T. M. Cascio