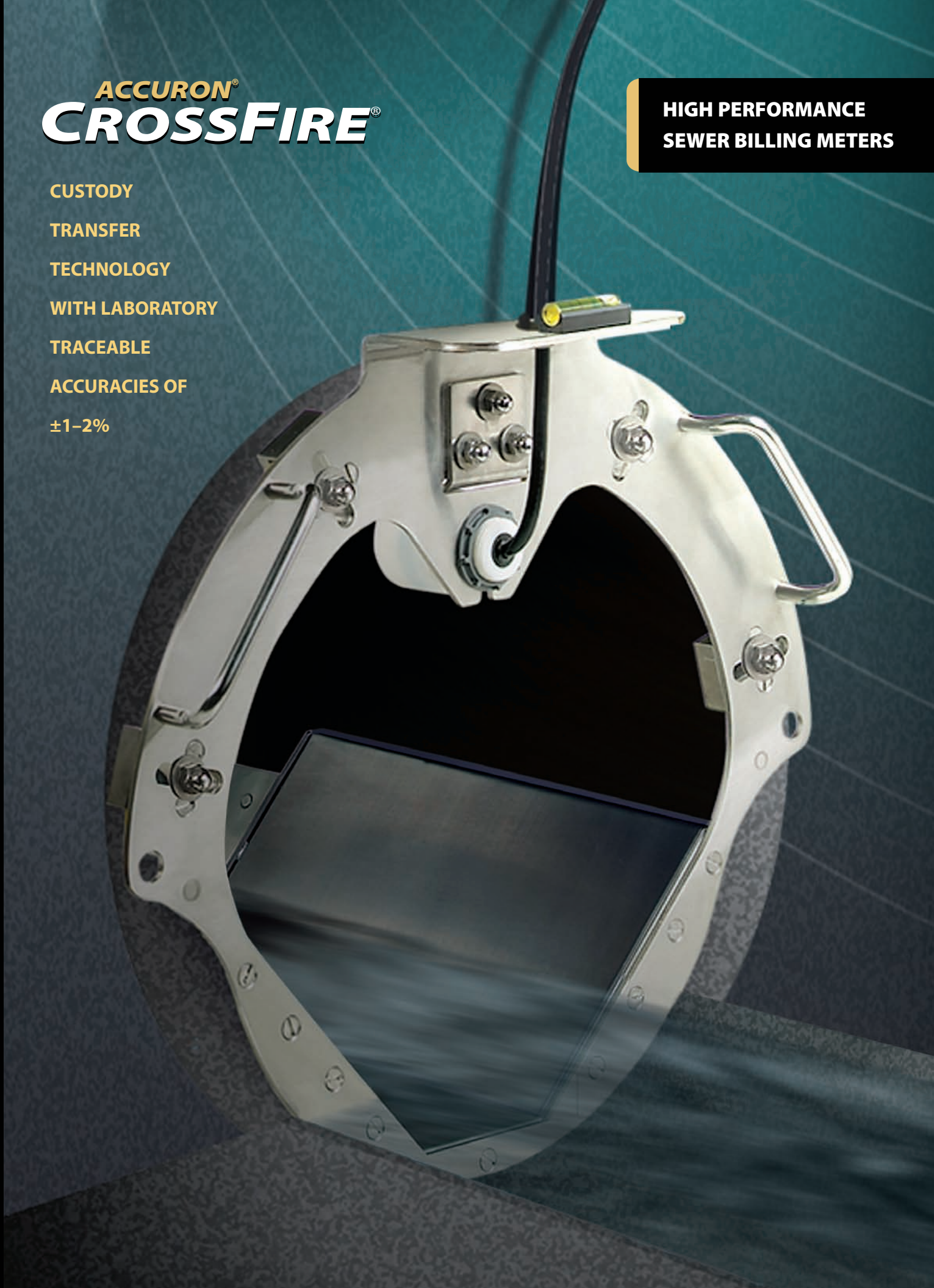
ACCURON® CROSSFIRE®

HIGH PERFORMANCE SEWER BILLING METERS

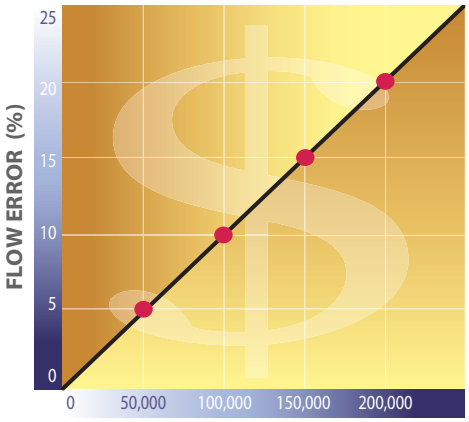
CUSTODY TRANSFER TECHNOLOGY WITH LABORATORY TRACEABLE ACCURACIES OF ±1–2%



The Economics of Wastewater Treatment

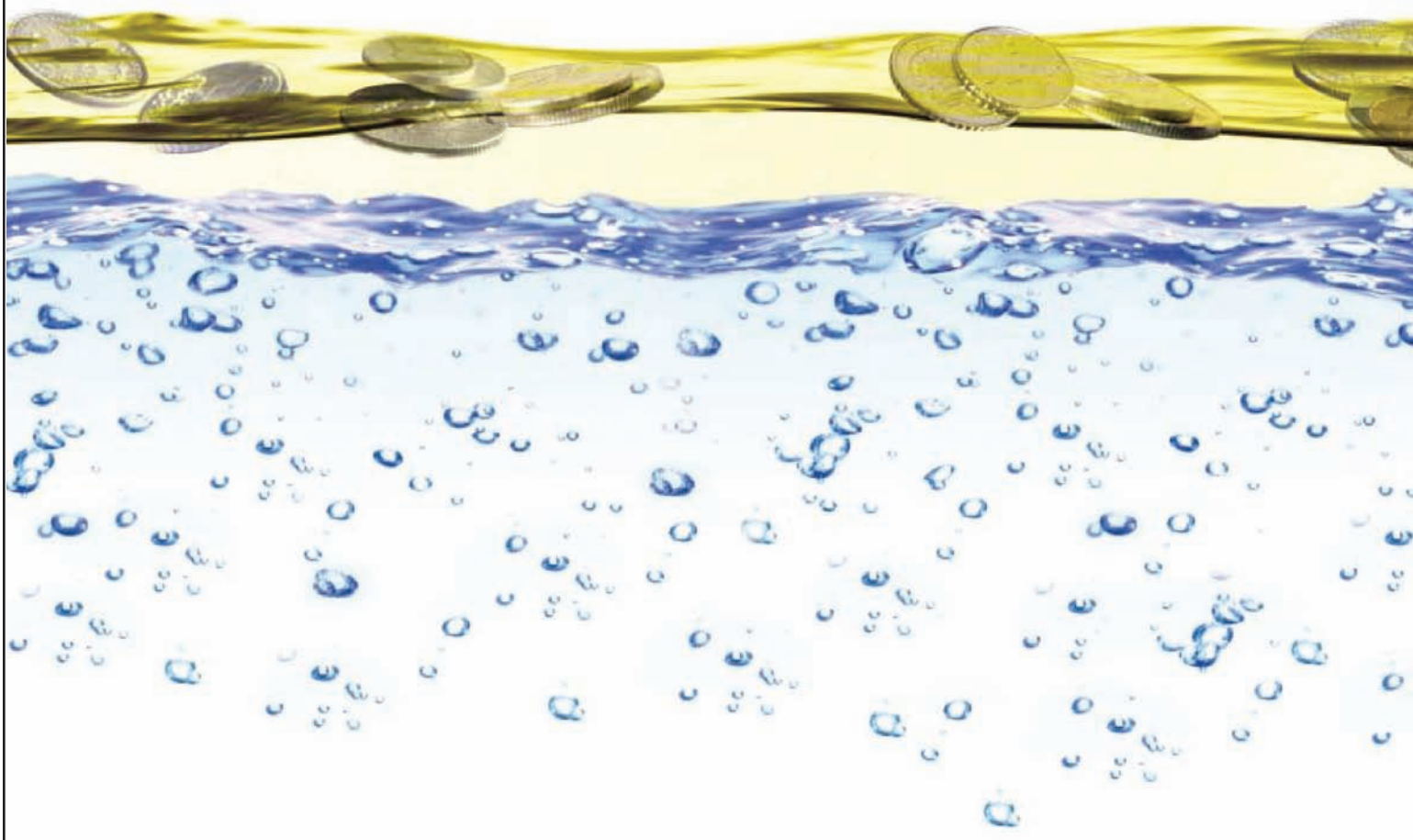
Sewer Billing Meters are the cash registers of wastewater treatment plants. Just like in any business transaction, the customer (in this case the municipality) does not want to be overcharged for the service and the service provider (in this case the treatment facility) cannot undercharge and remain in business profitably. This is why it is so important to both parties that when the cash register rings, the charge for the service provided is unquestionably accurate.

FLOW ERROR VS. BILLING ERROR
(1mgd facility @ $3/1000 gal.)



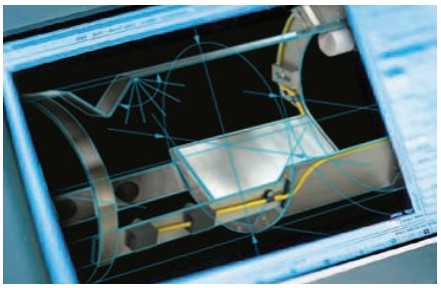
As can be seen from the graph, a 10% error in flow measurement at a 1MGD treatment facility will result in overcharges or under billings of more than $100,000 per year. At a 20% rate of error, a High Performance Billing Meter has the potential to pay for itself within the first month of operation while saving or adding over $200,000/year to the money stream. Increase the volume of treated wastewater and the money stream begins to get very serious, very quickly.

A High Performance Billing Meter has the potential to pay for itself within the first month of operation while saving or adding thousands of dollars to the money stream.



High Performance Hybrid Technology

The engineers at Eastech concluded that in order to provide a solution that was capable of achieving any degree of reasonable accuracy during the majority of the billing period, a new "application specific" flowmeter technology would have to be developed. The Accuron® CrossFire® (pat. pend.) couples WinFlume computer aided Hydraulic Structure design with high accuracy Custody Transfer technology. Today, multipath transit-time flow meters are the first choice for custody transfer applications in the oil and natural gas industry. This is why Eastech has chosen to provide this identical technology for custody transfer measurement of wastewater.



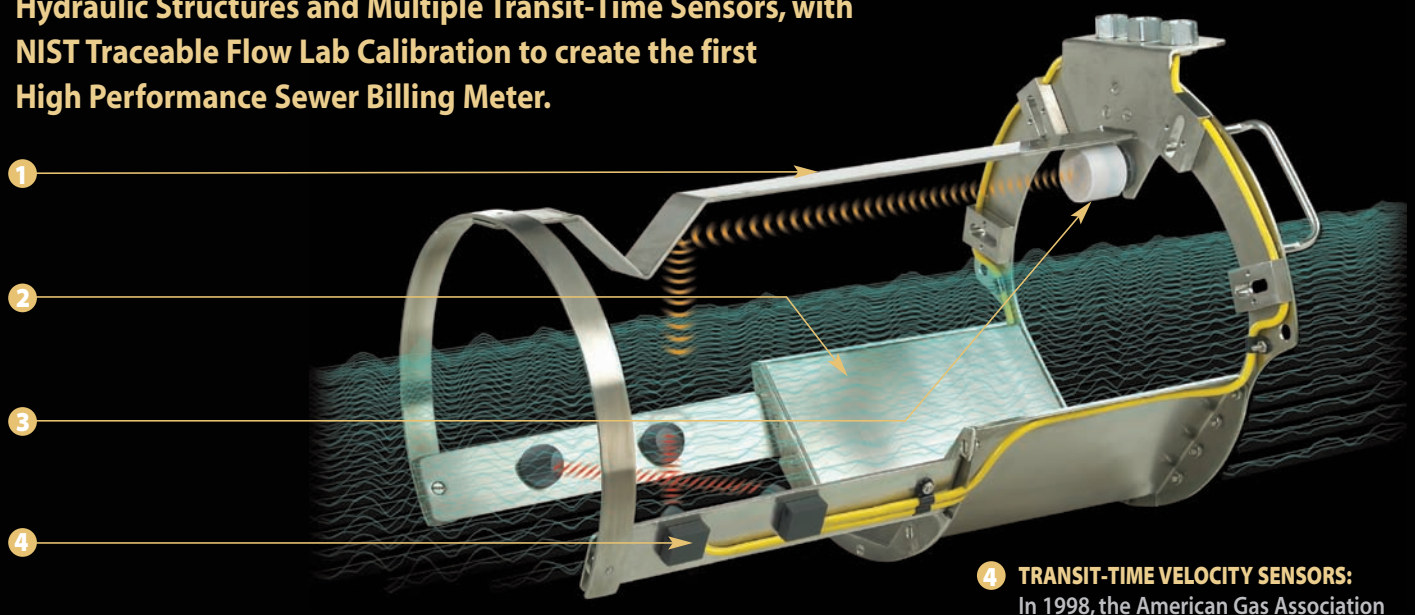
Measurement of minimal flows is accomplished through WinFlume* Hydraulic Structure technology supported by NIST traceable Flow Lab design confirmation.

*Bureau of Reclamation

Measurement of average to maximum flows is accomplished through dual path transit-time technology specifically developed for the custody transfer of hydrocarbons.

Measurement of non-uniform flows is accomplished through crossed path transit-time technology specifically developed for the custody transfer of natural gas.

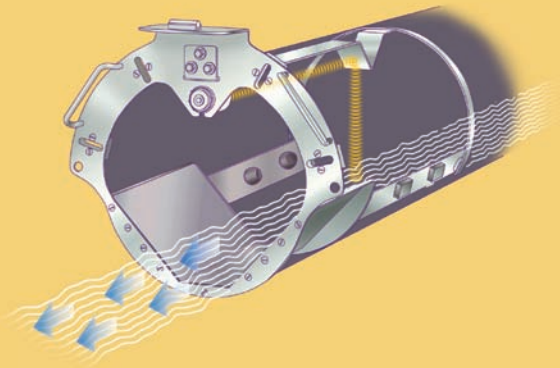
Eastech combines two proven flow measurement technologies, Hydraulic Structures and Multiple Transit-Time Sensors, with NIST Traceable Flow Lab Calibration to create the first High Performance Sewer Billing Meter.



1. **CARTRIDGE:** 304 Stainless Steel.
2. **TRAPEZOIDAL FLUME:** Bureau of Reclamation WinFlume software is utilized for the design of every trapezoidal flume. Winflume software was developed to meet unique operational requirements while eliminating the need for laboratory calibrations.
3. **ULTRASONIC LEVEL SENSOR:** In a 5 year level sensor study by the Bureau of Reclamation, Eastech was the only sensor to successfully penetrate through dish soap foam while displaying almost perfect linearity, hysteresis close to zero, and excellent long-term reliability.
4. **TRANSIT-TIME VELOCITY SENSORS:** In 1998, the American Gas Association approved AGA Report #9. AGA-9 sets the standard for multiple path transit-time flow meters in natural gas custody transfer applications. Eastech has followed the lead of the AGA by utilizing the identical technology in order to provide the municipal market with a Custody Transfer Wastewater Billing Meter.

Minimal Flows
(Accuracy: ±1–2%)

In 95% of sanitary sewers, average flow is only 30% - 40% of the pipe diameter with nighttime flows hovering around 5% - 10%. The trapezoidal flume permits for a wider measurement range than other flumes while efficiently passing sediment and debris. Eastech's Flow Laboratory has confirmed accurate measurements down to 15 GPM in a 12" I.D. pipe.

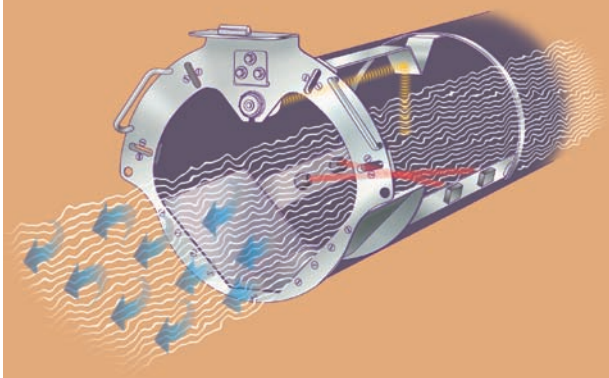


During periods of minimal flow (0 - 30% Pipe I.D.), trapezoidal flume technology in combination with an "above the flow" precision accuracy (+/-.02") ultrasonic level sensor is utilized to ascertain the correct volume of wastewater.

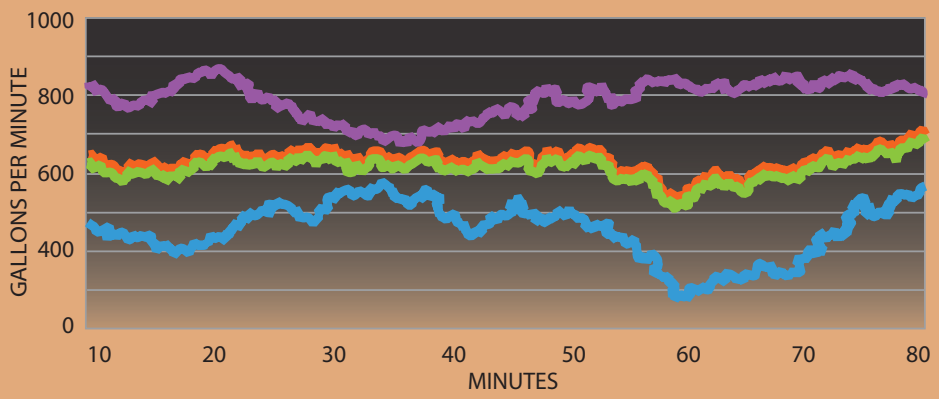
Average to Maximum Flows
(Uniform & Non-uniform)
(Accuracy: ±1–2%)

The recently published EPA Report 600/R-06-120-2006 states that "Accuracy of flow measurements vary greatly depending on flow conditions. Depending upon the assumed flow profile, errors can exceed 25% of the true flow rate under poor conditions. MULTIPATH INSTRUMENTS MAY HAVE ERRORS AS LOW AS 1% TO 3% OF THE TRUE FLOW RATE."

Borrowing from the multipath technology utilized for custody transfer of oil and natural gas, a dual pair of transit-time velocity sensors are strategically positioned within the Cartridge at 30% of the sewer I.D. Depending upon severity and type of non-uniformity, the crossed pattern sensors will provide high accuracy measurement during turbulent, disturbed and asymmetrical flow conditions.



During periods of average to maximum flows (30 –100% Pipe I.D.), wastewater volume is measured by a dual pair of highly accurate transit-time velocity sensors in conjunction with a precision (±.02") ultrasonic level sensor.



As can be seen from the following graph generated during months of testing at our Flow Metrology Lab, a non-uniform flow disturbance is negated by averaging the volumetric totals of each separate Path. Path 1 and Path 2 added together and then averaged creates the volumetric average shown as Dataline A. When compared to the actual volume, Dataline B, calculated simultaneously from volumetrically determined reference measurements recorded at the Flow Lab, we see that the average of both paths, Dataline A, and the actual volume, Dataline B recorded by the Flow Lab, are practically identical.

ALL FLOW CONDITIONS

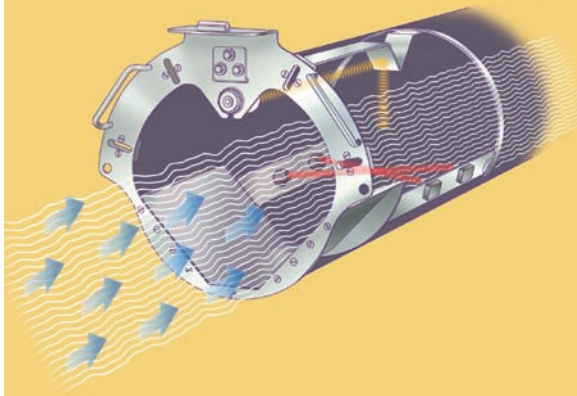
REVERSE FLOW

STAGNATION

SURCHARGE

Reverse Flow
(Accuracy: ±1–2%)

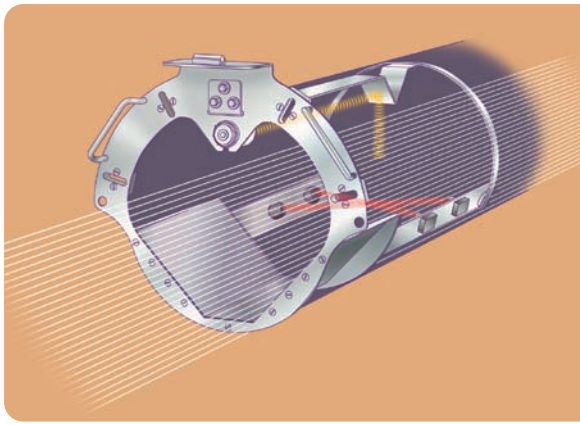
Reverse flows, caused by instances of back-watering or surcharges, may cause errors in the billing process. Hydraulic structures, in combination with a level sensor, recognize all manner of flow as traveling in a forward direction. The CrossFire provides redundant monitoring of flow under both forward and reverse conditions.



Once the level of sewage rises above the capacity of the flume, which is normally the condition during back-watering caused by down-stream blockages or surcharge events, reverse flows are redundantly confirmed by each individual pair of transit-time sensors.

Stagnant Conditions

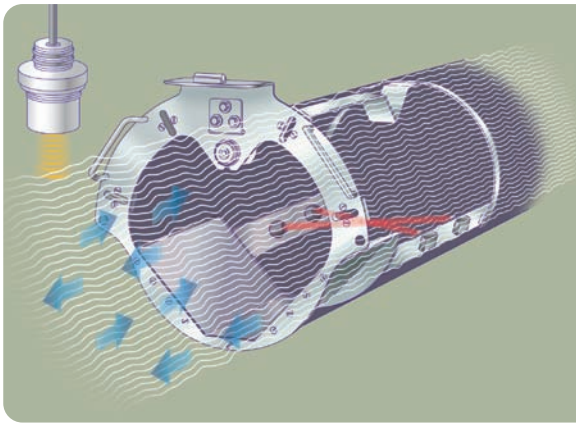
Stagnation is primarily caused by a down-stream blockage requiring maintenance for reinstatement of normal flow conditions. Since this type of blockage will usually cause a rise in level, a hydraulic structure only Billing System will consider these high levels of sewage as maximum periods of flow, thereby elevating treatment charges.



The possibility of paying for treatment of sewage that has never arrived at the process-ing facility is now eliminated through redundant velocity sensor monitoring of "zero flow" conditions. In addition, alarms may be initiated to alert maintenance personnel of the situation.

Surcharge Conditions
(Accuracy: ±1–2%)

To allow for the monitoring of conditions that change from normal open channel flow to submerged flow, as experienced during a storm event or downstream blockage, an independent, maintenance-free level sensor is located at the highest point of the manhole capable of immediately detecting surcharging conditions.



The optional Surcharge Monitor, in conjunction with each pair of velocity sensors, maintains uninterrupted mon-itoring of forward and reverse flows. Field personnel may now oversee both dry and wet weather flow conditions with-out encountering the need for repetitive manhole entry.

Laboratory Traceability

Prior to shipment, every High Performance Billing Meter is individually tested, calibrated and certified at Eastech's in-house Flow Metrology Lab. All flow meter calibrations are directly traceable to Standards established by the NIST and are available for real time viewing through scheduled Internet access.

METER SPECIFICATIONS (Bi-directional)

FACTORY PROGRAMMED FLOWMETERS

Pre-programmed at the factory for specific customer applications, the CrossFire flowmeter is a highly advanced microprocessor-based ultrasonic flow transmitter for extremely precise measurement of flow in open channels.

DATA LOGGING

The CrossFire has a built-in datalogger with eight distinct channels for logging flow and totals. The storage capacity for a single channel at 5 minute intervals is 113 days. Logger data may be visually accessed on the display of the meter in pre-programmed time intervals or retrieved through a laptop or optional modem installed within the enclosure of the meter.

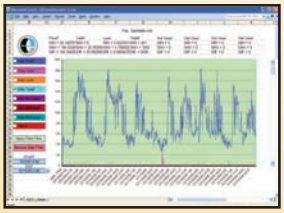
Daily Averages: Daily summary allows viewing of the previous eight days. This includes times, dates, averages, minimums, maximums and totals.

Logger Graph: In addition, a bar graph may be visually displayed on the CrossFire. The graph will display the stored logger data in pre-programmed time intervals.

Data Retrieval: Logger data can be collected by using a laptop computer or an optional modem installed within the CrossFire enclosure.

DATA GRAPHING PACKAGE

QTrend



QTrend 2007 is an Excel Workbook Flow Data Graphing Package specifically designed to interface with every meter offered within the Eastech product line.

QTrend incorporates specific formulas capable of automating the process of charting and displaying all data contained within the onboard logger of the meter. Each individual Worksheet presents an OPEN FILE button. Upon initiation, the file browser is displayed with a complete list of all CSV files contained within the directory. Choosing a file of interest will automatically import the data from that file into the QTrend Excel Workbook. By simply clicking on the tab labeled CHART, a comprehensive flow evaluation and trend analysis Worksheet is displayed.

ENCLOSURE	
Standard	IP66 / Nema 4, 4X polycarbonate enclosure
Optional	Explosionproof, Aluminum Enclosure
	Class I ,Grps. C & D, Class II, Grps. E, F, G. Div. 1 & 2
Accessories	Heater and thermostat, Door Lock
TEMPERATURE	
Standard	-4° to 158°F (-20 to 70°C)
With Heater	-40° to 158°F (-40 to 70°C)
OUTPUTS	
3) 4-20 mA (Flow, Level, Velocity)	Analog isolated into 800 ohms max, monitored to detect open circuits. RFI and gas discharge surge protection and two fuses.
Relay Alarms	3 SPDT (plug-in) 2.5 Amps
RS-232 Serial Port	1200-38400 Baud, Modbus RTU
RS-485 Serial Port	Optically isolated, Modbus RTU
Network Protocols	Modbus, Profibus or DeviceNet
DC Power Out	12 VDC. 750mA maximum
DISPLAY	
Backlit LCD	Graphical LED
POWER	
Wattage	30 (Dual Path)
Voltage	80/240 VAC, 50/60 Hz / 12-28VDC @ 150 mA.
DATA LOGGING	
Non-volatile flash memory, storage of up to 32768 records.	

SENSOR SPECIFICATIONS	
LEVEL SENSOR	
Sensor Housing	Teflon®, Submersible Nema 4, 4X
Sensor	Temperature Compensated
Temperature	-40° to 158°F (-40° to 70°C)
Accuracy	± 0.02" or 0.05% of target distance
Warranty	18 months
VELOCITY SENSOR	
Environmental Rating	Submersible Nema 4, 4X
Sensor Housing	PVC
Temperature	-40° to 158°F (-40° to 70°C)
Warranty	18 months
Accuracy	± 0.015 FPS
Repeatability	± 0.25%
Linearity	± 0.5%
Turndown	60:1

SUGGESTED SPECIFICATIONS: An ultrasonic microprocessor-based Crossed Path Cartridge Meter shall be installed at the location on the plans in accordance with the manufactures recommendation. A field-ready_____(pipe size) stainless steel cartridge, containing a stainless steel trapezoidal flume/ultrasonic level sensor/transit-time velocity sensor combination shall be provided with each flowmeter. The IP66/Nema 4,4X flowmeter (or Chartmeter) shall be factory programmed for the specific application and be provided with a datalogger integral to the electronics. The Cartridge Meter must be capable of field validation prior to installation of permanent power. The unit shall be Model CrossFire 7300 as manufactured by Eastech Flow Controls, Tulsa, OK or equal.

ORDERING GUIDE

CARTRIDGE	METER	NOMINAL PIPE SIZE	PIPE MATERIAL	PIPE SCHED.	PIPE CONST.	SENSOR CABLE	OPTIONS	PROGRAM	DATA RETRIEVAL
CARTRIDGE **73** 	METER **10**  Nema 4,4X • IP66 3-4-20mA • RS232/485 3 Relays • Datalogger Bi-directional	please specify	please specify	please specify	please specify	please specify in 50ft increments	Surcharge Monitor **SM-15** Chart Recorder **G** Circular Chart (please specify) 1 Day, 7 Day, 31 Day Heater & Thermostat **B** Keylock **C**	Gal/Min. **A** Other (please specify)	Modem (phone line) **M** Profibus **E** DeviceNet **F**

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