FILE

77

RECEIVED-DOCKETING DIV

BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO 2014 MAR 17 PM 5:20

PUCO

IN THE MATTER OF THE COMPLAINT OF CUTTER EXPLORATION, INC.,	)	
Complainant,	)	**Case No. 09-1982-GA-CSS**
V.	)	
THE EAST OHIO GAS COMPANY d/b/a DOMINION EAST OHIO,	)	
Respondent.	)	

MEMORANDUM OF THE EAST OHIO GAS COMPANY d/b/a DOMINION EAST OHIO CONTRA MOTION TO COMPEL OF CUTTER EXPLORATION, INC.

David A. Kutik (0006418)
Counsel of Record
Jennifer B. Flannery (0078651)
JONES DAY
North Point
901 Lakeside Avenue
Cleveland, Ohio 44114-1190
Telephone: 216-586-3939
Facsimile: 216-579-0212
E-mail: dakutik@jonesday.com
jbflannery@jonesday.com

Grant W. Garber (0079541)
JONES DAY
Mailing Address:
P.O. Box 165017
Columbus, Ohio 43216-5017
Street Address:
325 John H. McConnell Blvd., Suite 600
Columbus, Ohio 43215-2673
Telephone: 614-469-3939
Facsimile: 614-461-4198
E-mail: gwgarber@jonesday.com

ATTORNEYS FOR RESPONDENT THE EAST OHIO GAS COMPANY
d/b/a DOMINION EAST OHIO

CLI-1882790v2

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

Page

I. INTRODUCTION

For nearly three years, Complainant Cutter Exploration, Inc. ("Complainant") has lobbed assorted claims and allegations attacking Respondent The East Ohio Gas Company d/b/a Dominion East Ohio's ("DEO's") decision to change the measurement devices at natural gas production wells from orifice meters to rotary meters. As demonstrated below, Complainant's various disputes reduce to one unfounded theory after another. When Complainant alleged that the rotary meters DEO installed at the metering stations serving its wells were not properly measuring gas, an independent third party tested them and found that all of those meters were accurate. *See* pp. 14-15, *infra*. When Complainant alleged that DEO was allowing other producers to plumb their meter runs differently than Complainant, DEO conducted an audit and found that this was not true. *See id.* at 15. And when Complainant sought to install check meters at some of its well sites to show differences in measurement between rotary and orifice meters, DEO allowed those installations, which showed that both types of meters yielded nearly identical measurements. *See id.* at 15-16. From the outset, Complainant's approach has been long on theories and short on factual support.

Now, with its purported Motion to Compel, Complainant ventures a new proposal: to remove from service the rotary meters at six of the metering stations serving its wells and to install orifice meters as the operative measuring device. As a procedural matter, Complainant's suggestion is fatally flawed. To be sure, the relief Complainant requests in its Motion and the ultimate outcome it seeks in this case are identical—a finding that DEO has violated its tariff and an order requiring DEO to replace rotary meters with orifice meters. In essence, Complainant seeks a mini-determination of the merits of this case, based on an incomplete discovery record and without a fair opportunity for DEO to challenge Complainant's purported "evidence" at hearing. *See id.* at 19-21. Complainant's Motion is contrary to the statutes and Commission rules governing complaint cases, and it should be denied for that reason alone.

Complainant's proposal fails substantively as well, for three reasons. First, although Complainant purportedly bases its Motion on DEO's General Terms and Conditions of Transportation Service tariff ("Tariff"), it fundamentally misconstrues that document. DEO's Tariff does not give Complainant or any other producer the right to select the type of meter that will be installed at production wells, to decide the volumes and pressures of incoming gas that DEO must accept, or to otherwise dictate how DEO will operate its system. Rather, the Tariff does just the opposite, authorizing DEO to decide the best way to accurately and efficiently measure gas coming onto its system. *See* pp. 24-25, *infra.* And as demonstrated below, DEO's decision to use rotary meters to measure gas from production wells—whether owned by Complainant or other producers—is consistent with the Tariff.

Second, Complainant alleges that its proposal will facilitate a "direct comparison" of rotary and orifice meters in terms of measurement accuracy, effect on well production and mechanical functioning. (Mot., p. 6.) But that is not so. The measurement and functioning of meters are dependent on variables specific to a particular location and time, not the least of which are the actual amount of gas being produced, temperature, the available capacity in DEO's lines, and factors largely within Complainant's own control, including the operation of the well and maintenance of filtering equipment. *See* pp. 26-28, *infra.* Thus, in order to have a meaningful comparison between a rotary and an orifice meter, those meters must be in operation at the same location, at the same time. But under Complainant's proposal, rotary meters at the six specified locations would be removed from service, would not be operational and would not be used to measure gas. (*See* Mot., Ex. A.) As such, Complainant's proposal would not facilitate a direct comparison between rotary and orifice meters—in fact, it would prevent such a comparison. Because Complainant has failed to show that its requested relief will lead to the discovery of relevant data, that relief should be denied.

Third, Complainant's proposal, if allowed, may result in substantial prejudice to DEO, its customers and other producers. As discussed below, Complainant has demonstrated a pattern of neglecting (or outright tampering with) its gas filtering and safety equipment, resulting in the repeated introduction of oil, salt water and other impurities through DEO's meters and into its system. *See* pp. 17-19, *infra*. This conduct has resulted in damage to DEO's equipment, disruption to its operations and outages to customers. *See id.* And if Complainant is permitted to utilize orifice meters at the proposed locations, this damage and disruption likely will get worse.

Further, by adopting Complainant's proposal to utilize high side measurement, the Commission would allow Complainant to gain an immediate unfair advantage over other producers and potentially pose a hazardous situation by having the pressure in the pipeline from the well exceed the line's maximum allowable operating pressure. *See id.* at 30.

At its core, Complainant's dispute is founded on the notion that DEO somehow benefits from inaccurate measurement and inefficient operation of its system, resulting in less gas being recorded and produced. But that is not so. DEO has no incentive to short-change producers. In fact, because DEO is paid based on the amount of gas that is produced and received into its system, inaccurate and inefficient measurement would harm DEO as much as its producers. (Breon Aff., ¶ 2 (attached as Ex. A hereto).) Complainant's proposal is contrary to the Tariff and would not lead to the discovery of relevant data. It would, however, pose the risk of substantial prejudice and danger to others. Complainant's Motion to Compel should be denied.

II. FACTUAL BACKGROUND

A. Background Regarding Rotary And Orifice Meters

There are two types of meters at issue in this case: (i) rotary meters, which are currently installed at Complainant's well sites; and (ii) orifice meters, which Complainant seeks to install in place of rotary meters at six of the metering stations serving its wells. A rotary meter, also known as a positive displacement meter, consists of a chamber that contains a known, fixed quantity of gas. (*See* Reinmann Aff., ¶ 2 (attached as Ex. B hereto).) As gas passes through the meter, two figure-eight-shaped impellers rotate, allowing the gas to travel from one end of the meter to the other:

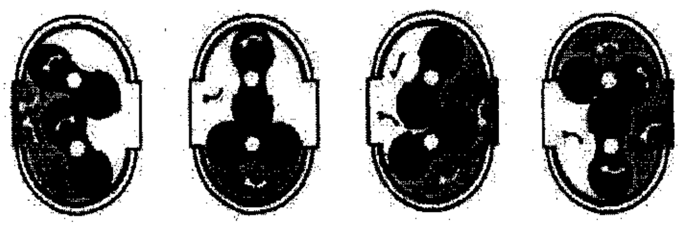


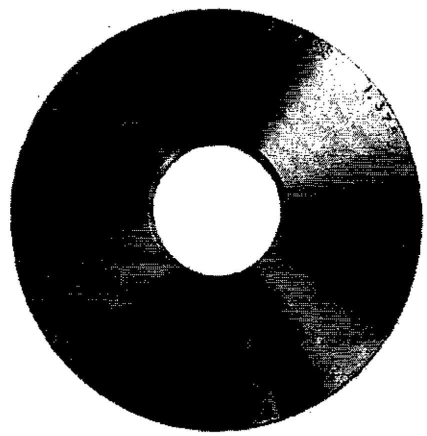
Figure 1 - Impellers rotating inside meter cylinder.

Each rotation of the impellers thus represents the movement (*i.e.*, displacement) of a known volume or quantity of gas through the meter. (*Id.*) Because a rotary meter actually measures the volume of gas that passes through, it is known as a direct method of measurement. And because rotary meters are precision instruments that directly measure the gas itself, they must be manufactured to tight tolerances. (*Id.*) The measurements taken by the meter itself are corrected for temperature and other variables[1] by an attached electronic device, such as a Mercury

[1] Under recognized principles of thermodynamics, the volume of a gas is proportional to temperature and inversely proportional to pressure. (Reinmann Aff., ¶ 3.) Thus, to determine the correct volume measured, the temperature and pressure existing in the meter must be known and considered. (*Id.*)

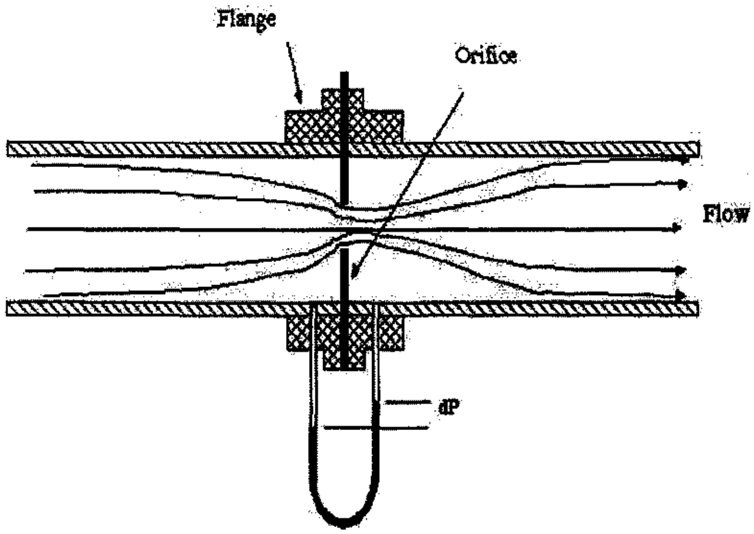
MiniMax data recorder, which calculates and stores volume, pressure, temperature and other data. (*Id.*)

An orifice meter operates differently and consists of a circular metal plate with a hole in the middle:



Unlike a rotary meter, an orifice meter does not directly measure a volume of gas. (*Id.* at ¶ 4.) Rather, an orifice meter is a form of indirect or inferential measurement that is inserted vertically into the meter run[2] and operates by measuring changes in the pressure of the gas as it passes through the hole in the device, as shown below:

[2] "Meter run" refers to the series of piping and equipment between the well head and the tie-in point to DEO's line.



From these changes in pressure, when the temperature of the gas is known, the device infers the volume of the gas passing through it. (*Id.*)

B. Problems With Orifice Meters

Over time, DEO has observed various problems with orifice meters. First, orifice meters are inherently less accurate than rotary meters. A key characteristic of a gas meter is its turndown ratio, which expresses the range over which the meter measures gas volumes with acceptable accuracy. (Reinmann Aff., ¶ 5.) Orifice meters have a turndown ratio of 3:1. (*Id.*) A turndown ratio of 3:1 means that for an orifice meter with a design flow rate of 200,000 cubic feet per day, the flow range that the meter can accurately measure will be between 100,000 and 300,000 cubic feet per day. Rotary meters, by contrast, have turndown ratios between 20:1 and 40:1, indicating that they can accurately measure gas over a much greater range of volumes. (*Id.*) This is a particularly important factor when evaluating the suitability of meters for use on intermittent production wells like Complainant's wells here. Intermittently producing wells produce gas over a relatively wide range of volumes—high volumes during the short "bursts" of production, followed by much lower volumes of "tail gas." For such wells, it is especially important to use a meter that is capable of accurately measuring those varying flows. (*Id.*)

Because of their larger turndown ratios, rotary meters are much better suited than orifice meters to measure gas from intermittent wells. (*Id.*)

Second, it is easier to introduce contaminants into DEO's system through orifice meters. Gas from production wells often contains fluids and other impurities such as water, salt water (brine) or oil.[3] (*Id.* at ¶ 6.) If these materials reach a meter, they can damage the meter or cause it to deteriorate over time. If these materials reach DEO's lines and they freeze in the line, they can stop gas flow that can cause gas outages, or more dangerously, they can damage gas control equipment, such as regulators,[4] and can cause fires or explosions. (*Id.*) For these reasons, DEO requires that producers deliver gas that meets certain gas quality specifications consistent with the safe operation of DEO's system. (*See* Breon Aff., ¶ 3.) DEO also requires that producers install and maintain the cleaning and filtering equipment necessary to remove these impurities from the gas before it reaches the meter and DEO's system. (*Id.* at ¶ 4.) The introduction of prohibited impurities into the meter chamber can cause the meter to fail, particularly if the material freezes in the meter. (Reinmann Aff., ¶ 6.) Although orifice meters may also fail due to the presence of impurities, the failure of these meters would require a greater amount of fluids to be present and to freeze than would be the case for the failure of rotary meters. (*Id.*) Thus, where there is an environment of lax compliance with the Company's gas specifications, orifice meters pose a greater risk for the introduction of impurities and contaminants into DEO's system without detection.

---

[3] As discussed further below, DEO's gas quality specifications and its tariffs prohibit producers from delivering gas with these types of impurities. *See* p. 17, *infra.*

[4] As discussed in more detail below, *see* pp. 8-9, *infra.*, a regulator is a device that controls or regulates the pressure in the pipeline. Thus, for example, DEO requires producers to install regulators on well runs to make sure that the gas in the lines does not exceed the maximum allowable operating pressure ("MAOP") of the system.

C. DEO's Decision To Transition To Rotary Meters With Low Side Measurement

Given these problems with orifice meters, and as part of its continuous improvement efforts, in 2006 DEO initiated a comprehensive review of the measurement devices used on production wells. (Breon Aff., ¶ 5.) This review was conducted according to a strategy known as "Six Sigma," a set of widely-accepted business management techniques used to identify problems in a process and analyze options for improvement. (*Id.*) Based on this process, DEO concluded that rotary meters are superior to orifice meters in production environments because, among other reasons:[5]

- Rotary meters measure gas more accurately at a much wider range of volumes, including both low and high flow rates, than orifice meters (*i.e.*, rotary meters have a much higher turndown ratio than orifice meters);
- Relatedly, because of their greater turndown ratios, rotary meters are more suitable measurement devices for intermittent production wells, which produce gas at a wide range of flows;
- Because DEO already was using rotary meters at many commercial and industrial sites, transitioning to rotary meters at production sites would streamline the types of meters in use on DEO's system, in turn allowing DEO to reduce training and procurement costs, and to obtain consistency of measurement among producers; and
- Rotary meter sets have a smaller "footprint" than orifice meter sets, and therefore benefit producers in their relationships with landowners.

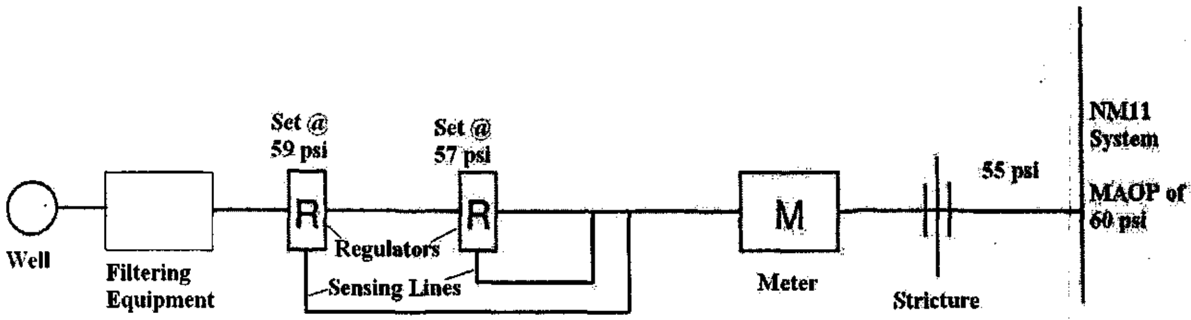
(Breon Aff., ¶ 5.)

In connection with these findings, DEO also determined the appropriate placement of the rotary meters within the meter run, particularly the location of the rotary meter relative to devices known as "regulators." As required by federal pipeline safety regulations, DEO monitors and regulates the pressure of its pipeline systems according to their corresponding maximum

[5] As will be demonstrated at the hearing in this matter, at the same time that DEO was studying the types of meters to use, DEO was also considering the types of devices used to record the meters' measurements. Ultimately, DEO determined to replace a system that relied on paper and pen charts with electronic measurement recording devices.

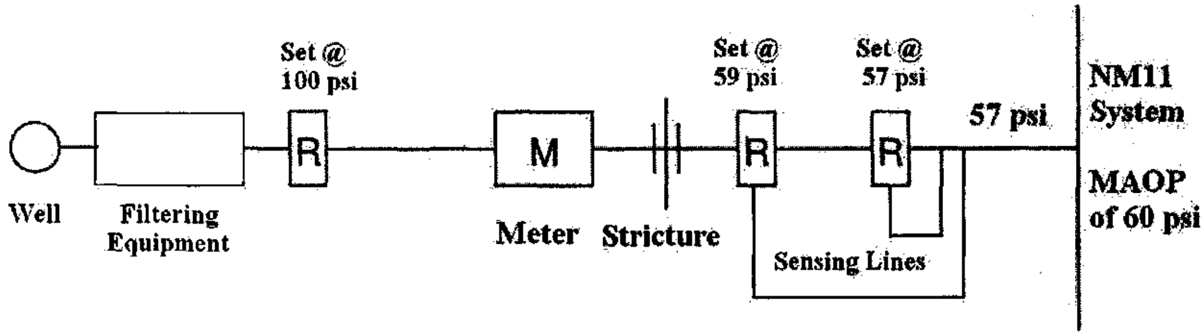
allowable operating pressure ("MAOP"), which is the maximum pressure at which gas is allowed to flow through a pipeline, given that pipeline's size, composite material and other characteristics. (Reinmann Aff., ¶ 7.) Because gas from production wells can emerge at high and/or uneven pressures, DEO requires the installation of regulators in production meter runs. (*Id.*) These regulators lower and control the pressure of the gas traveling into DEO's lines from the wells, such that the pressure within DEO's lines remains at or below the MAOP of DEO's system. (*Id.*) Most of the wells at issue in this case produce into a DEO pipeline system known as NM11. The MAOP for the NM11 system is 60 pounds per square inch ("psi"). For new well runs, DEO requires two regulators. One is known as the "worker" or "feed" regulator. The other is called the "monitor" or "check" regulator. (*Id.* at ¶ 10.) Thus, the meter run at production wells generally consists of: (i) filtering equipment designed to remove water, oil and other impurities from the gas before it reaches DEO's system; (ii) two regulators, a "monitor" regulator and a "worker" regulator; (iii) the meter; (iv) a stricture plate, which is designed to prevent overspinning of the meter; and (v) piping that runs from the well-head, through these devices, to DEO's tie-in point. (*Id.* at ¶ 8.)

In connection with its decision to use rotary meters at production wells, DEO chose to place those meters in a low side measurement configuration. "Low side measurement" refers to placement of the meter on the downstream side of the regulator, such that measurement of the gas occurs after the gas pressure has been lowered by the regulator (*i.e.*, measurement on the "low pressure side" of the regulator). (Reinmann Aff., ¶ 9.) A low side measurement configuration like the one in place at Complainant's wells appears as follows:



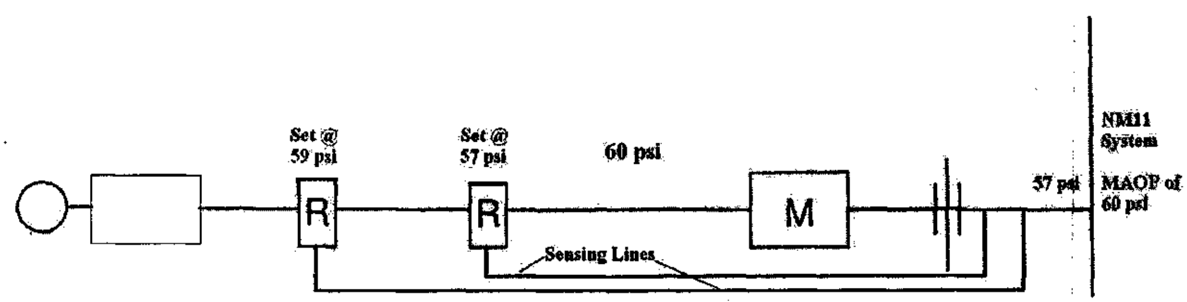
In this diagram, the flow of gas moves from left to right. After exiting the well and passing through the filtering equipment, the gas enters a series of two regulators (marked "R"). The first regulator is the "monitor" regulator, and the second is the "worker" regulator. The "worker" regulator acts as the operative regulator and can be partially "closed" to reduce the pressure of the gas. (Reinmann Aff., ¶ 10.) In rare instances, however, regulators have been known to malfunction by "opening," thus potentially resulting in an unrestricted flow of gas above the MAOP of the line. (*Id.*) To guard against this possibility, the "monitor" regulator acts as a back-up device to maintain pressure below the system MAOP in the event the worker regulator "opens." (*Id.*) Monitor regulators typically are set to a pressure level just above the worker regulator setting (but still below the MAOP). (*Id.*) In the example above, as is typically the case on the NM11 system, the (upstream) monitor regulator is set to 59 psi and the (downstream) worker regulator is set to 57 psi. (*Id.*) When the gas enters the meter, it is at 57 psi, as regulated by the worker regulator. When the gas crosses the meter and stricture plate, though, there is a small pressure drop, usually around 2 or 3 psi. (*Id.* at ¶ 12.) Thus, as shown in the example here, when the gas enters DEO's system on the far right-hand side of the diagram, it is at 55 psi.

By contrast, in a high side measurement configuration, the meter is placed upstream of the regulators (*i.e.*, measurement occurs on the high pressure side of the regulators):



In this diagram, again, the flow of gas is from left to right. After passing through the filtering equipment and an initial regulator set to a high psi, the gas enters the meter. After a small pressure drop, it passes through the monitor regulator and then is reduced to 57 psi by the worker regulator, such that the gas enters DEO's line at 57 psi. As these two diagrams show, gas that is produced through high side measurement typically enters DEO's system at a higher pressure than gas produced through low side measurement.

High side measurement can also be achieved even if the regulators are set upstream of the meter. This can happen if the sensing lines connected to the regulators are tied into the line downstream of the meter. The following diagram shows such a modified high side measurement configuration:



The regulators are sensing (and reacting to) the pressure as measured downstream of the meter. The meter and stricture plate cause a drop in pressure. Thus, the pressure immediately upstream of the meter will be higher than the pressure immediately downstream of the meter. With the regulators controlling pressure with sensing lines downstream of the meter, the downstream pressure will be at the pressure set by the regulator, in this example, 57 psi. Because of the pressure drop across the meter and the stricture plate, if the pressure downstream of the meter is 57 psi, the pressure upstream of the meter will be higher. In one instance in which DEO agreed to have the regulators and sensing lines configured this way, DEO observed that the pressure immediately upstream of the meter was over 60 psi. (Breon Aff., ¶ 10.) Under DEO's standard operating procedures, as soon as the gas exits the regulators, it cannot exceed the MAOP for the line. (Reinmann Aff., ¶ 12.) In this situation, there is an MAOP violation after the gas exits the regulators. (*Id.*) Because the modified high side measurement configuration jeopardizes DEO's system by posing this risk of over-pressurization, DEO immediately ceased operations under this configuration and restored the run to DEO's normal low side measurement design. (Breon Aff., ¶ 10.)

D. Implementation Of DEO's Decision

Although not required to do so, DEO initiated discussions with representatives of the Ohio Oil and Gas Association ("OOGA") in order to gain producers' acceptance of the use of rotary meters and input regarding how to best smooth the transition to those devices. (*See* Breon Aff., ¶ 6.) As a result of those discussions, DEO proposed and the OOGA agreed, on September 27, 2007, that producers would have three options with respect to existing meters: (i) convert existing orifice meters to rotary meters with an electronic gas measurement corrector at DEO's cost; (ii) convert existing orifice master meter stations using paper charts to electronic gas measurement at the producer's cost using DEO approved electronic gas measurement equipment for orifice meters, including Total Flow, Eagle, and New Flow; or (iii) do nothing and continue to use existing orifice meters with paper chart gas measurement and integration. (*See id.*) DEO and the OOGA further agreed that all new meters installed at gathering, distribution or transmission meter stations on or after September 1, 2008 would be rotary meters using electronic measurement recording devices. (*See id.*)

E. Complainant's Agreement To Transition Well Sites To Rotary Measurement

Beginning in August 2007, and consistent with DEO's agreement with the OOGA, Complainant requested that DEO begin installing rotary meters at certain of its wells. (Breon Aff., ¶ 7.) Given that these well sites pre-dated the September 1, 2008 cut-off, Complainant was not obligated to request installation of rotary meters there; rather, it voluntarily chose to do so.

In October and November 2007, again at Complainant's request, DEO installed rotary meters at the Kokay (P158) and Monticello Nursery (P167) sites.[6] (Breon Aff., ¶ 8.) By January 2008, however, the rotary meters at those sites overspun, meaning that the impellers in the meters turned too fast. This damaged the meters and prevented them from operating. (*Id.*) An investigation into those incidents revealed the reason for the overspinning. Given the volumes of gas Complainant expected to produce from those sites, and before DEO installed those meters, DEO had informed Complainant that the appropriate meter would be 5M meter, which DEO did not have in stock at the time. (*Id.*) Not wanting to wait to receive the properly-sized meter, Complainant requested that DEO install smaller 3M meters, which were immediately available. (*Id.*) The use of those undersized meters, combined with the absence of a stricture plate (which protects rotary meters from overspinning), resulted in the damage to the meters.[7] (*Id.*)

In May 2008, DEO took corrective action at those sites. Specifically, DEO installed new meters and stricture plates at the Kokay (P158) and Monticello Nursery (P167) sites. (*Id.*) DEO

---

[6] Meter sites may be denominated by the name of the well (usually the name of the landowner) or the letter and number designation of the well, or both.

[7] A rotary meter installed in August 2007 at the Kirby / Perko (P094) site was found to have oil in the impellers in May 2008. Although a stricture plate was not originally installed at that location, one was subsequently installed there. (Breon Aff., ¶ 9.)

also worked with Complainant to determine a fair estimate of the amount of lost production, and the parties agreed on a resolution of those issues in August 2008. (*Id.*)

F. Complainant's Subsequent Objections To Rotary Meters And DEO's Responses

After these initial problems were resolved, Complainant launched a series of complaints against DEO's decision to use rotary meters and demanded various investigations that Complainant believed would show that rotary meters were malfunctioning. But each of those investigations proved the opposite: that the rotary meters at Complainant's well were accurate and that DEO's requirement of low side measurement was appropriate and reasonable.

1. Re-plumbing of the Monticello Nursery (P167) site

In September 2008, Complainant asked that the Monticello Nursery (P167) site be re-configured to a modified high side measurement configuration—*i.e.*, to place the regulator sensing lines downstream of the rotary meter. (Breon Aff., ¶ 10.) In order to accommodate Complainant's concerns, DEO allowed this modification. (*Id.*) However, DEO subsequently determined that because the sensing lines were placed downstream of the meter, the meter at that location began to experience pressures higher than the MAOP of the NM11 system, in violation of DEO's standard operating procedures. (*Id.*; *see* p. 11, *supra.*) The run was reconfigured so that the regulator sensing lines remained upstream of the meter (*Id.*)

2. Complainant's request for meter prover tests

Although the rotary meters installed by DEO were functioning properly, Complainant alleged that they were incorrectly measuring gas because those meters were recording lower volumes of gas than were recorded by producer-operated orifice check meters at the same locations. Based on this allegation, Complainant requested that DEO prover test all of the rotary meters serving its sites. (*See* Reinmann Aff., ¶ 13.) A prover test involves blowing equal amounts of air through the rotary meter to be tested and a certified "master" rotary meter, which is known to be accurate. (*See id.*) Under R.C. 4933.09, a gas meter that varies no more than +/- 3% from the known control volume is deemed accurate.

In March 2009, DEO arranged for the prover testing of all of the rotary meters then in operation at Complainant's sites. (*See id.*) Indeed, most of those prover tests were conducted by R.L. Laughlin Co., the same company Complainant now proposes to manage installation of replacement orifice meters. (*See id.*) The results of those prover tests were clear: all of the rotary meters proved to within the +/- 3% standard, and thus proved accurate. (*Id.*) All of these results were contemporaneously provided to Complainant. (*Id.*) Complainant has not (and cannot) point to a single instance in which a rotary meter at its wells has proved inaccurate.

3. Audit of NM11 system

After these theories floundered on the evidence, Cutter tried another, claiming that DEO was discriminating against it by requiring Complainant's meter runs to be placed on low side measurement with stricture plates while allowing other producers to use high side measurement without stricture plates. In response, in July 2009, DEO conducted a field audit of approximately 36 sites, finding that only one site—Complainant's Monticello Nursery (P167) site—had high side measurement. (Breon Aff., ¶ 11.) DEO also found that of the 25 rotary meter sites examined during that audit, eight did not have stricture plates at that time, since they had been constructed in accordance with an older version of the meter run specifications that did not include stricture plates. (*Id.*) Stricture plates subsequently were installed at those eight sites. (*Id.*)

4. Installation of check meters

Next, in April 2009, Complainant hired Eagle Research Corporation ("Eagle"), an independent manufacturer of equipment for both rotary and orifice meters, to install electronic orifice check meters at three of Complainant's sites: Christ Presbyterian (K974), Pizzino / Kaucic (P223) and Meisz / Hood (P399). (*See* Reinmann Aff., ¶¶ 14-15; E-mail dated Apr. 22, 2009 (Ex. JPR-1).) A check meter is a supplemental meter installed to "check" the data recorded by the operative meter. Complainant's ostensible purpose was to show widely varying readings among the operative rotary meter and the orifice check meter. Over a two-day period in late April 2009, Eagle recorded hourly volume data on the three orifice check meters and compared it to data recorded on the rotary meters at those locations. (*Id.*)

The results of the check meter audit conducted by Eagle were unambiguous: the rotary and orifice meters at the Meisz / Hood (P399) and Pizzino / Kaucic (P223) locations were in "very close agreement," with less than a 2% difference between the meters at Meisz / Hood and less than a 1% difference at Pizzino / Kaucic. (*Id.*)

Initially, Eagle observed a larger difference between the rotary and orifice meter measurements at the Christ Presbyterian (K974) location. (*See* Ex. JPR-2.) However, upon subsequent examination, Eagle determined that the difference was not attributable to the metering. (*Id.*) Rather, Eagle discovered "considerable fluid" in the piping at that location, which it concluded was the source of the measurement deviation. Eagle also concluded that the fluid was allowed to build up in the line because of Complainant's improper installation of the pipe, including the lack of shut-off values, the improper type and size of the pipe, and the lack of any self-draining capacity. (*Id.*) After Eagle drained the water from the line, the rotary and orifice meters at the Christ Presbyterian (K974) site came into "much better agreement." (*Id.*) Eagle's audit of orifice check meters thus showed minimal, if any, difference between measurement by rotary and orifice meters at those locations. (*Id.*)

5. Orientation of monitor and worker regulators

No doubt disappointed by the outcome of these investigations, Complainant then selected another aspect of DEO's operations to dispute—the orientation of monitor and worker regulators in the meter runs. As indicated above, on the NM11 system, DEO generally uses the first (upstream) regulator as the monitor regulator and the second (downstream) regulator as the worker regulator. *See* p. 9-10, *supra*. Beginning in May 2010, however, Complainant's counsel requested that DEO reverse the orientation of those regulators—*i.e.*, use the upstream regulator as the worker and the downstream regulator as the monitor. According to Complainant, a worker-monitor configuration is necessary to prevent disruption to the operation of a rotary meter, where the regulators are close to the meter.

This dispute misses the mark. According to the manufacturer's specifications, "[t]he upstream or downstream regulator can serve either function." (*See* "Flowgrid Regulators" Manual, p. 4, attached as Ex. D.) There simply is no basis for Complainant's dispute regarding the orientation of the regulators. Nonetheless, DEO agreed to reconfigure the regulators as requested by Complainant. However, Complainant never followed up to schedule this work. (*See* Baker Aff., ¶ 2 (attached as Ex. C hereto).)

G. Gas Quality Problems And Related Shut-Ins At Complainant's Wells.

Despite the evolving nature of Complainant's disputes in this case, one theme has remained constant: Complainant's repeated introduction of impurities such as oil and salt water (brine) from its production wells into DEO's meter and system, and resulting violations of DEO's gas quality specifications. As noted above, DEO requires producers to meet its gas quality specifications, which among other things require that delivered gas be free of "objectionable odors, dust, gums, gum-forming constituents, impurities, solid or liquid matter which might interfere with its merchantability or cause injury to or interference with the proper operation of the facilities and equipment of the Company or its customers." (*See* Ex. BDB-1.) Those specifications also provide that "[i]t is the Supplier's responsibility to furnish, install, maintain and operate such dehydrators, drips, separators, heaters and/or other devices as may be necessary to effect compliance with these specifications." (*Id.*) These specifications were distributed to producers, including Complainant, in connection with new tap requests.

Complainant has repeatedly violated these standards. Complainant's gas quality problems began as early as May 2008, when DEO shut-in the Kirby / Perko (P094) well site for the presence of oil on the impellers. (Breon Aff., ¶ 9.) In December 2008, DEO experienced gas quality issues at the Christ Presbyterian (K974) and Pizzino / Kaucic (P223) sites, including the presence of fluids in sensing lines of orifice check meters. (*Id.* at ¶ 12.) In February 2009, DEO personnel discovered that Complainant had tampered with the gas cleaning and safety equipment at three of its locations,[8] bypassing the cleaning equipment and allowing free fluids and debris to flow through the rotary meters at those locations and into DEO's NM11 system. (Baker Aff., ¶ 3.) This is not only a serious violation of DEO's gas quality standards, but also a threat to the safety and reliability of DEO's distribution service. DEO shut-in those locations in order to require Complainant to install and maintain adequate cleaning and filtering equipment. (*Id.*)

More recently, DEO has shut-in three additional wells for gas quality problems related to the failure of Complainant's filtering and cleaning equipment. In August 2010, after a gas outage was reported by a customer and fluid found at the equipment in the customer's home, DEO embarked on an investigation to discover the cause of the outage, *i.e.*, the source of the fluids. DEO discovered oil in the lines at the nearby Murfello (P441) and Armstrong (P349) sites and consequently shut-in those wells. (Baker Aff., ¶ 4.) DEO discovered oil in the lines at

[8] The tampering occurred at the Petronzio Mayfield (P368), Komidar / Oberle (P449) and Hoenigman (P222) sites. (*See* Baker Aff., ¶ 3.)

the Kokay (P158) site in October 2010, and shut-in that site as well. (*Id.*) And earlier this month, DEO discovered more oil in the lines from the Armstrong (P349) site when customers surrounding that well reported gas outages. (*Id.*) As a result, DEO shut-in the Armstrong site for thirty days. (*Id.*)

Simply put, Complainant has demonstrated a pattern of noncompliance with DEO's gas quality specifications and requirements regarding installation and maintenance of cleaning equipment, either through neglect or through active tampering.

III. ARGUMENT

A. With Its Motion To Compel, Complainant Inappropriately Seeks To Short-Cut The Hearing Process And Obtain A Mini-Determination Of The Merits Of Its Case.

As an initial matter, the Commission should see Complainant's Motion for what it is: an inappropriate attempt to short-cut thorough consideration of a full record at hearing and to gain a mini-determination of the merits of its case. This is flatly contrary to the Commission's procedural rules. Notably, there is no Commission rule providing for "summary judgment" or other accelerated final disposition of the merits of a case. Rather, in Commission proceedings there is (i) a right to full and complete discovery (*see* R.C. 4903.082; Rule 4901-1-16 through Rule 4901-1-22); (ii) an ordered presentation of admissible evidence at hearing (*see* Rule 4901-1-27; *see Kingsville Apartments v. Columbia Gas of Ohio, Inc.*, No. 05-1229-GA-CSS, Op. and Order dated Apr. 4, 2007, p. 10 (acknowledging that although not formally bound by the Ohio Rules of Evidence, "[Commission] do[es] use the rules of evidence for guidance in evaluating the evidence presented at hearing"); (iii) careful consideration and discussion of that complete record by the Commission in a written order, which is subject to an application for rehearing and appeal (*see* R.C. 4903.09; R.C. 4903.10); and (iv) a requirement that Complainant bear the burden of proving its case (*See Ohio Bell Tel. Co. v. Pub. Util. Comm.* (1990), 49 Ohio St. 3d 123, 126; *Grossman v. Pub. Util. Comm.* (1966), 5 Ohio St. 2d 189, 190).

Complainant's approach allows for none of this. To be sure, the allegations and relief Complainant seeks in its Amended Complaint are indistinguishable from what appears in its Motion to Compel. For example, in the Amended Complaint, Complainant alleges that DEO violated its tariff by requiring the use of rotary meters with low side measurement, particularly on intermittent production wells. (*See, e.g.*, Am. Compl., ¶¶ 41-44.) And based on these allegations—which Complainant bears the burden of proving at hearing—Complainant asks the Commission to order DEO to replace the rotary meters at its well sites with orifice meters plumbed for high side measurement. (*See, e.g.*, *id.* at ¶¶ (g), (j) (relief requested).)

In its Motion, Complainant offers the same allegations (*see* Mot., pp. 9-11 (alleging that rotary meter requirement violates tariff)), and seeks exactly the same relief: "enforcement of the Tariff so that [Complainant] is able to at least have orifice meters installed at [] six meter stations . . . ." (*Id.* at p. 6.) Complainants' Motion is nothing more than a repackaged version of its Amended Complaint, aimed at the same result.

This approach is inappropriate. Discovery in this case is still on-going, and the hearing is over two months away. As such, the factual "record" available for consideration with the Motion is incomplete (and has not yet been subject to admissibility and credibility determinations). For example, although the Motion is founded on the affidavit of Michael Cutter, DEO has yet to have an opportunity to cross-examine him or otherwise challenge his claims (as would be allowed at hearing). Moreover, although Complainant will bear the burden of proving its claims at trial, Complainant couches its filing here as a "Motion to Compel," ostensibly to attempt to take advantage of the Commission's more liberal approach to discovery and to avoid subjecting its claims to the formal burden of proof.

In essence, Complainant asks the Examiner to rule on the merits of this case and to order the relief it seeks, but to do so only part way through this litigation, without the appropriate evidentiary scrutiny. Given the Examiner's stated intent to rule quickly on this Motion, there simply is not enough time to allow for full consideration of the complex issues presented by it. A summary disposition in this way is inappropriate, particularly when Complainant has failed to justify the relief it seeks (*see* p. 26-28, *infra.*), and given that this relief would prejudice both DEO, its customers and other producers (*see* pp. 29-31, *infra.*). The Commission should deny Complainant's Motion for this reason alone.

B. Complainant's Interpretation Of DEO's Tariff Is Wrong.

Complainant's Motion also fails on the merits. Complainant claims that it is entitled to compel the replacement of rotary meters at low side measurement with orifice meters at high side measurement on the basis of its interpretation of DEO's Tariff. (*See, e.g.*, Mot., p. 6 (seeking "enforcement of the Tariff").) But because Complainant's interpretation fails, so too does its Motion.

1. Complainant misinterprets the Tariff provisions it cites.

Complainant cites four separate Tariff provisions, but its discussion of those provisions is selective and misleading. Complainant claims that Sections 10.1 and 10.4 of the Tariff allows it to choose what kind of meter will be used to measure its production gas. (*See* Mot., p. 8.) But those provisions say no such thing.

(a) Section 10.1

Complainant quotes part of Section 10.1:

> All gas delivered to East Ohio by the Customer or its Supplier shall be measured by orifice, rotary or other measurement facilities constructed, installed and operated in accordance with standard industry practices and East Ohio's requirements for such facilities, except where superseded by a Measurement Operating Agreement.[9]

This provision establishes the types of measurement devices that may be used for production gas—orifice, rotary or "other measurement facilities" acceptable to DEO—but it expresses no preference for one type of meter over another. Moreover, this provision expressly states that such measurement devices must be "in accordance with . . . East Ohio's requirements for such facilities . . . ."

(b) Section 10.4

Similarly, Complainant quotes part of Section 10.4:

> The Production Receipt Points for Production Volumes from physical meters specified by the Customer or its Supplier and accepted by East Ohio shall be at measuring stations constructed to East Ohio's standards, where the measurement and regulation equipment will be operated and maintained by East Ohio, except where superseded by a Measurement Operating Agreement.

Complainant casts this provision as giving it authority to choose the type of meter (*i.e.*, orifice or rotary) at a given location, focusing on the language, "specified by the Customer or its supplier." (*See* Mot., p. 8.) This interpretation fails for two reasons.

First, Section 10.4 does not relate to ***type of meter*** at a "Production Receipt Point." Rather, it governs the ***location*** of a "Production Receipt Point." Indeed, this is why the phrase "Production Receipt Point," which refers to the "meters at which Ohio produced gas is delivered into East Ohio's system," uses the term "Point" (*i.e.*, the specific place at which gas delivery is deemed to occur).

[9] Production sites delivering less than an average of ten thousand cubic feet per day may be required to be operated pursuant to a "Measurement Operating Agreement," at DEO's discretion. (*See* Tariff, § 10.3.) None of the sites at issue in this case are subject to this provision.

Other portions of Section 10.4 (tellingly not cited by Complainant) confirm this interpretation. In fact, the sentence immediately following the portion cited by Complainant provides:

> The measuring station ***will be located at such points*** as East Ohio and the Customer or its Supplier shall agree, on East Ohio's lines as now constructed or on any extensions thereof that East Ohio may hereafter construct.

(Tariff, § 10.4 (emphasis added).)

The next sentence provides:

> The ***sites for said measuring station*** may be furnished by East Ohio, or, if furnished by the Customer or its Supplier, shall provide rights of ingress and egress to East Ohio.

(*Id.* (emphasis added).)

The next two sentences identify the party who bears the costs of moving the "Point" at which DEO receives production gas:

> In the event the Customer or its Supplier wishes to change any Production Receipt Points, the Customer or its Supplier shall reimburse East Ohio in advance for East Ohio's costs in connection with the change. The Customer or its Supplier shall be directly responsible for all other costs associated with the change.

And the final sentence of Section 10.4 governs applicability of these rules to metering stations in place as of the effective date of the Tariff:

> Measuring stations on East Ohio's lines existing as of the effective date of these terms and conditions and owned by the Customer, its Supplier or any other person, shall, subject to the approval of East Ohio, also be designated as Production Receipt Points, where the measurement and regulation equipment will be operated and maintained by East Ohio, except where superseded by a Measurement Operating Agreement.

Setting aside Complainant's selective quotation of only a portion of Section 10.4, it is clear that this provision applies to the designation of "Points" where DEO receives production gas, not the type of meter used at those locations. Thus, the provision quoted by Complainant merely gives producers the ability—subject to DEO's acceptance—to choose the point along the pipeline where the producer will deliver gas to DEO's system.[10]

Second, contrary to Complainant's claim, Section 10.4 does not give Complainant or any other producer the right to unilaterally choose ***anything***. Rather, it expressly conditions a producer's selection of the Production Receipt Point on acceptance by DEO. Thus, even under Complainant's erroneous interpretation, DEO still retains the right to accept (or, implicitly, to deny) a Production Receipt Point suggested by a producer.

Further, as even the portion of Section 10.4 quoted by Complainant show, "the metering stations must be "constructed to East Ohio's standards." The metering station obviously includes the meter and East Ohio's standards include specifications for the specific type and size of the meter. A producer simply does not have a "right" to unilaterally choose a Production Receipt Point (however that term is interpreted), and consequently there is no Tariff provision to "enforce" in favor of Complainant here.[11]

2. Complainant ignores other relevant Tariff provisions.

Notably, Complainant ignores several Tariff provisions that bear directly on this case. First, Complainant alleges that "rotary meters are prone to stoppages and mechanical failures." (Mot., p. 11.) Complainant not only fails to discuss any evidence of those "stoppages and mechanical failures," it ignores the evidence indicating that rotary meter "stoppages" at

[10] Notably, Complainant does not purport to cite ***any*** Tariff provision entitling it to high side measurement.

[11] Moreover, Section 10.8 of the Tariff supports DEO's position. Complainant essentially objects that it is not able to produce onto DEO's system all of the gas it wishes to produce. But there is no guarantee that any producer, including Complainant, will be able to produce an unlimited amount of gas at any time. Rather, as Section 10.8 indicates, DEO's acceptance of production gas is on a "best efforts basis at all times at full flow against the varying pressures maintained from time to time in East Ohio's pipelines." Here, the NM11 system is "tight," with operating pressures often approaching its MAOP. Under those circumstances, and given Section 10.8, Complainant simply has no basis to claim a right to produce whatever it wants, whenever it wants.

Complainant's sites resulted from oil, sand, salt water and other contaminants introduced into those meters by inadequately cleaned gas. Moreover, Complainant ignores the Tariff provision that unambiguously makes Complainant responsible for such failures:

> The Customer or its Supplier shall install and maintain at the Customer's or its Supplier's own expense, the necessary equipment for separating and removing oil, water, water vapor, salt, dust, and other foreign substances from Production Volumes upstream of the Production Receipt Points. The gas delivered to East Ohio at the Production Receipt Points ***shall be free from all foreign matter or fluid contamination*** that could interfere with its marketability ***or interfere with the operation of East Ohio's lines, regulators, meters*** or other appliances connected with East Ohio's system. ***East Ohio may refuse at any time any Production Volumes that contain contamination*** or objectionable odors ***or otherwise do not meet East Ohio's gas quality standards in effect at the time.*** East Ohio may bill the Customer or its Supplier for any and all costs associated with removing oil, water, water vapor, salt, dust and other foreign substances erroneously delivered into East Ohio's system.

(Tariff, § 10.10 (emphasis added).) Under the Tariff, (i) Complainant is required to install and sufficiently maintain cleaning equipment adequate to make its gas "free from all foreign matter or fluid contamination"; and (ii) DEO is entitled to refuse gas from Complainant that does not meet its gas quality standards. Given Complainant's demonstrated history of tampering with cleaning equipment and repeated violations of those standards, it is not entitled to the relief it seeks. And as discussed below, this is especially true given that this relief likely would ***increase*** the risk of introduction of dangerous contaminants into DEO's lines. *See* pp. 29-30, *infra*.

Second, despite Complainant's contorted view of its provisions, the Tariff is clear as to who retains the authority to operate production metering:

> East Ohio shall furnish, install, and maintain all meters and gauges at the Production Receipt Points, except where superseded by a Measurement Operating Agreement.

(Tariff, § 10.11.) At bottom, the Tariff thus reinforces the Commission's rules and practice holding gas distribution utilities responsible for the safe, reliable operation of their systems. And consistent with those requirements, DEO's Tariff gives DEO the right to operate its systems—including metering—in the way it reasonably believes accomplishes that purpose. Complainant's attempt to usurp this responsibility—all while DEO no doubt remains accountable for the consequences—should not be allowed. Given Section 10.11 of the Tariff, implementation of Complainants' proposal would be inappropriate and unreasonable. The Commission should not force DEO to relinquish its right to control the design and operation of its custody transfer meters to R.L. Laughlin, the entity Complainant proposes to perform the plumbing work. The installation and control of those meters is a core function reserved by the Tariff to DEO.

C. Complainant Has Not Shown Sufficient Grounds For Forcing DEO To Change Its Meters.

1. Complainant has failed to show that its proposed relief would lead to relevant, admissible evidence.

Even if Complainant's requested relief is construed as a mere discovery request, the Commission should deny it. Under Rule 4901-1-16(B), discovery requests must be "relevant to the subject matter of the proceeding" and must be "reasonably calculated to lead to the discovery of admissible evidence."

Complainant has failed to make even this basic showing. In fact, Complainant barely attempts to explain why its requested relief would be relevant. All Complainant says in this regard is that the installation of orifice meters with high side measurement will allow for a "direct comparison" of rotary meters and orifice meters in terms of (i) "measurement accuracy"; (ii) "well production"; and (iii) "meter stoppages [and] mechanical failures." (Mot., p. 6.)

But it is hard to see how Complainant's proposed relief would show any such thing. In fact, by removing rotary meters from service, Complainant's proposal would ***entirely preclude*** a "direct comparison," not facilitate one. At any given time, measurement, "well production" and meter performance will be influenced by numerous time and site-specific factors, including the frequency of operation of the well, temperature and the available capacity in DEO's lines. Because of these variables, the only meaningful comparison between orifice meters and rotary meters is a comparison between meters at one site, under the same conditions, at the same time.

Complainant's proposal ignores this. First, Complainant argues that its proposal will afford a comparison of "measurement accuracy." (Mot., p. 6.) But it is unclear how that could be. Without an operating rotary meter, there will be no rotary measurement results to "compare" to orifice measurement results. Moreover, even though Complainant no doubt would argue that orifice meter measurements that are higher than historical rotary meter measurements are therefore "more accurate," such "comparison" says nothing about the "accuracy" of either device. Rather, it simply could indicate that there was more gas traveling through the orifice meter than went through the rotary meter on previous days. Because Complainant proposes to remove the rotary meters from service, there will be no way to test Complainant's claims of measurement accuracy or inaccuracy.

Complainant also argues that its proposal will allow a comparison of "well production." This claim also fails. How much gas can be produced from a well into DEO's system depends on things other than the type of meter and configuration of equipment on a well run. For example, Complainant can decide to change the frequency of the operation of its well. To the extent Complainant decides to increase production after installation of orifice meters, that increased production would speak to Complainant's operational decisions, not the type of meter in place. Similarly, Complainant's ability to produce gas onto DEO's system is a function of the pressure on that system (which in turns depends on the level of production of other producers and gas consumption by customers on the system). The fact that Complainant may be able to produce more (or less) in the coming months is a function of the available capacity on DEO's system, not the type of meter in place at Complainant's wells.

Complainant also argues that its proposal will allow a comparison of "meter stoppages and mechanical failures." Again, this is not true. As demonstrated above, rotary meter stoppages have occurred because Complainant tampered with or failed to adequately maintain (or install) cleaning equipment required by DEO's Tariff. To the extent Complainant chooses to clean the gas it produces more diligently, one might reasonably expect fewer problems with meters. That outcome would be caused by Complainant's changed behavior, not the change in meters. Similarly, a common problem with Complainant's production is that it introduces prohibited fluids into the rotary meters. In winter temperatures, these fluids could cause the meters to freeze and stop. Yet now, Complainant proposes to change the meters just as spring approaches and temperatures rise. Accordingly, a decrease in meter problems could easily be attributed to the change in temperatures.

Given the influence of site and time-specific variables, Complainant's proposal would not remotely facilitate a "direct comparison" of rotary and orifice meters—it prevents one. And given the varying influence of those factors—and the fact that many of them largely are within Complainant's control—its proposal would simply raise more questions than it would answer. Complainant has failed to show how its proposal will contribute meaningfully to the discovery of relevant facts in this case. The Commission should reject it.

2. Complainant has numerous alternatives for obtaining the "comparison" it seeks.

The Commission also should reject Complainant's proposal because Complainant already has several alternatives for "comparing" rotary and orifice meters. For example, Complainant could arrange for a new round of prover tests of DEO's rotary meters. In fact, the first round of prover tests, which found that all of the rotary meters serving Complainant's wells were accurate, was conducted by R.L. Laughlin, the same party Complainant proposes to install the orifice meters here. Further, as it has already tried, Complainant could install properly-constructed check meters. Still further, Complainants could retain a testing laboratory to construct and test two different set ups and determine relative gas flow and accuracy under strict laboratory controlled conditions. This would be a true comparison, and would leave operational control of DEO's system with DEO and not imperil the safe and reliable operation of the system. There are several ways in which Complainant could obtain a true comparison of the "measurement accuracy" of rotary and orifice meters. Removing a rotary meter from service and replacing it with an orifice meter is not one of them.

D. Complainant's Proposal Would Be Prejudicial To DEO, Its Customers And Other Producers.

1. Complainant's proposal is likely to lead to increased contamination of DEO's NM11 system.

Complainant's attitude toward its obligation to deliver clean, dry gas is well-demonstrated. Complainant repeatedly has violated DEO's gas quality specifications by delivering gas filled with impurities, jeopardizing DEO's equipment and the integrity of its operations, not to mention reliable service to and the safety of nearby customers who use that gas. *See* pp. 17-18, *supra*. Complainant's representative has tampered with DEO's cleaning equipment, not once, but at three separate locations. *See id.* Moreover, the frequency of

Complainant's gas quality violations is increasing, with four such cases in just the past seven months, including at least three outages. *See id.* Complainant evidently understands the connection between its negligence in cleaning its gas and this litigation: every time Complainant introduces contaminants into DEO's meter and lines, and every time DEO shuts-in one of Complainant's wells, Complainant believes it can add another claim to this case. In recent months, Complainant has behaved as if it has little incentive to deliver clean, dry gas to DEO.

If the Commission grants Complainant's proposal, it can expect more of the same. As described above, orifice meters are not impervious to contamination. In fact, because orifice meters continue to operate (though more inaccurately) when subjected to contaminants, it is even riskier to use them in the presence of dirty gas or at a well operated by a producer who regularly disregards gas quality standards. Section 10.10 of DEO's Tariff reflects a reasonable approach to ensuring gas quality. The Commission should uphold this provision by requiring Complainant to adjust its gas quality to be consistent with operation of rotary meters, and not allow Complainant to simply adjust the meter type to fit its dilatory approach to meter cleaning.

2. Complainant's proposal would risk over-pressurization to DEO's NM11 system.

Complainant's proposal to plumb six of the metering stations serving its wells for high side measurement also would risk over-pressurization to DEO's NM11 system. As discussed above, a high side measurement configuration, with sensing lines placed downstream of the meter, risks allowing gas at pressures above the MAOP to enter DEO's NM11 system. *See* p. 11, *supra*. This is dangerous, and such a condition already has been observed at one of Complainant's wells. It is likely to happen again. It is also unnecessary. For this additional reason, the Commission should deny Complainant's request to re-plumb the specified sites for high side measurement.

3. Complainant's proposal would give it an unfair advantage over other producers.

Complainant's proposal also would prejudice other producers who deliver gas onto the NM11 system. As discussed above, because of the pressure decrease that occurs as gas passes through a meter, a low side measurement meter run regulated to 57 psi will result in delivery of gas to the system at a pressure lower than 57 psi. To DEO's knowledge all producers on the NM11 system currently have meter runs arranged in this configuration.[12]

With its Motion to Compel, Complainant asks for an exception from that practice. Should the Commission grant it, Complainant will be allowed to replumb its meter runs so that either the regulators or the sensing lines for the regulators are downstream of the meter. And as discussed above, where the worker regulator is set to 57 psi in this configuration, the gas is delivered to the system at 57 psi. By re-setting its meter runs for high side measurement, Complainant thus will have an unfair advantage because it would be delivering gas at a higher pressure than gas from other producers, making it easier for Complainant to move its gas onto the system. This is unfair to other producers. It undermines the integrity of a system whereby every producer is required to operate under the same rules. The Commission should deny Complainant's requested relief.

IV. CONCLUSION

For the foregoing reasons, DEO respectfully requests that the Commission or Attorney Examiner deny Complainant's Motion to Compel.

[12] A handful of producers who own very low-flow wells may have sensing lines downstream of the meter. Because those wells produce such little gas, any variation in the regulator configuration at those locations would have minimal, if any, effect on larger producers' ability to deliver gas onto the system.

Respectfully submitted,

David A. Kutik (0006418)
dakutik@jonesday.com
(Counsel of Record)
Jennifer B. Flannery (0078651)
jbflannery@jonesday.com
JONES DAY
North Point
901 Lakeside Avenue
Cleveland, OH 44114
Telephone: (216) 586-3939
Facsimile: (216) 579-0212

Grant W. Garber (0079541)
gwgarber@jonesday.com
JONES DAY
Mailing Address:
P.O. Box 165017
Columbus, OH 43216-5017
Street Address:
325 John H. McConnell Boulevard, Suite 600
Columbus, OH 43215-2673
Telephone: (614) 469-3939
Facsimile: (614) 461-4198

Counsel for Respondent The East Ohio Gas Company d/b/a Dominion East Ohio

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing was sent by first class U.S. mail, postage prepaid, and e-mail to the following person this 17th day of March, 2011:

John W. Bentine
Sarah Daggett Morrison
Stephen C. Fitch
Chester Willcox & Saxbe LLP
65 E. State Street, Suite 1000
Columbus, Ohio 43215
jbentine@cwslaw.com
smorrison@cwslaw.com
sfitch@cwslaw.com

Mark J. Skakun
Clay K. Keller
Buckingham Doolittle & Burroughs, LLP
4518 Fulton Drive NW
P.O. Box 35548
Canton, Ohio 44735-5548
mskakun@bdblaw.com
ckeller@bdblaw.com

An Attorney for The East Ohio Gas Company
d/b/a Dominion East Ohio

Exhibit A

BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO

IN THE MATTER OF THE COMPLAINT OF CUTTER EXPLORATION, INC.,	)	
Complainant,	)	**Case No. 09-1982-GA-CSS**
v.	)	
THE EAST OHIO GAS COMPANY d/b/a DOMINION EAST OHIO,	)	
Respondent.	)	

AFFIDAVIT OF BRENT D. BREON

STATE OF OHIO)
) ss:
COUNTY OF STARK)

Brent D. Breon, being first duly sworn, states as follows:

1. I am the Manager for Planning and Revenue Generation at The East Ohio Gas Company d/b/a Dominion East Ohio ("DEO"). In that position, I am responsible for DEO's conversion of production meters in Northeast Ohio to rotary meters. I also am a certified Six Sigma Black Belt, and I have completed over twenty process improvement projects using Six Sigma techniques, including the project that resulted in the rotary meter conversion. I am on the Board of Trustees of the Ohio Oil and Gas Association ("OOGA"), was involved in DEO's negotiation with the OOGA regarding the conversion to rotary meters, and participated in OOGA's vote approving of that conversion. In my position, I am familiar with DEO's measurement of gas at production receipt points. I also am familiar with DEO's gas quality

specifications. I earned both my Bachelor of Science in Mechanical Engineering and my Master of Business Administration degrees from the University of Akron.

2. Pursuant to heat content agreements between DEO and nearly all of the producers who deliver gas onto its systems, including Complainant Cutter Exploration, Inc. ("Complainant"), each producer is to pay DEO approximately 31 cents per Mcf of gas it delivers. Thus, DEO is contractually entitled to this payment for every Mcf of gas Complainant delivers, and under-measurement of that gas would deprive DEO of this revenue.

3. DEO requires producers to abide by gas quality specifications pertaining to the gas they deliver onto DEO's systems. A true and accurate copy of those specifications is attached to my affidavit as Exhibit BDB-1.

4. DEO also requires that producers install and maintain cleaning and filtering equipment necessary to remove impurities from the gas they deliver before it reaches the meter and DEO's system.

5. In 2006, DEO initiated a Six Sigma process to determine how to improve measurement in production environments. I led that process. Based on that process, DEO came to the following conclusions, among others, regarding the use of rotary meters and orifice meters in production environments:

(a) Rotary meters have better turndown ratios and thus measure gas more accurately at a much wider range of volumes than orifice meters.

(b) Rotary meters are more suitable measurement devices for intermittent production wells.

(c) Because DEO already was using rotary meters at many commercial and industrial sites, transitioning to rotary meters in production environments will help streamline the types of meters on DEO's system, in turn allowing DEO to reduce training and procurement costs and to obtain consistency of measurement among producers.

(d) Rotary meter sets have a smaller "footprint" than orifice meter sets.

DEO also studied the advantages of using electronic recording of meter measurements over using paper and pen charts or records.

6. Beginning in 2006, DEO began discussions with the OOGA to gain producers' acceptance of rotary meters, as well as producers' input regarding how best to transition from orifice to rotary devices. On September 27, 2007, the OOGA approved DEO's proposal to give producers three options with respect to existing meters: (i) convert existing orifice meters to rotary meters with an electronic gas measurement corrector at DEO's cost; (ii) convert existing orifice master meter stations using paper charts to electronic gas measurement at the producer's cost using DEO approved electronic gas measurement equipment for orifice meters, including Total Flow, Eagle, and New Flow; or (iii) do nothing and continue to use existing orifice meters with paper chart gas measurement and integration. DEO and the OOGA also agreed that all new meters installed at gathering, distribution or transmission meter stations on or after September 1, 2008 would be rotary meters.

7. In August 2007, Complainant requested that DEO convert one of its existing orifice meters to rotary meters.

8. In October and November 2007, DEO installed at Complainant's request rotary meters at the Kokay (P158) and Monticello Nursey (P167) sites. By January 2008, those rotary meters had overspun and become damaged. An investigation revealed that part of the reason for the overspinning was that the meters were undersized, which in turn occurred because, although DEO advised Complainant that the appropriately-sized meter for those sites would be a 5M meter, Complainant had requested installation of a smaller 3M meter because it did not want to wait until DEO was able to obtain a 5M meter. The absence of a stricture plate at those sites also contributed to the overspinning. To remedy this issue, DEO installed new meters and stricture

plates at those sites and worked with Complainant to determine a fair estimate of the amount of lost production. The parties agreed on a resolution of those issues in August 2008.

9. A rotary meter installed in August 2007 at the Kirby / Perko (P094) site was found to have oil in the impellers in May 2008. A stricture plate was not originally installed at that location, and one was subsequently installed there.

10. In September 2008, Complainant asked that the Monticello Nursery (P167) site be re-configured to high side measurement such that the regulator sensing lines were placed downstream of the rotary meter. DEO allowed this modification. However, DEO subsequently determined that because the sensing lines were placed downstream of the meter, the meter at that location began to experience pressures higher than the MAOP of the NM11 system, in violation of federal gas pipeline safety regulations and DEO's standard operating procedures. At DEO's insistence, the sensing lines were placed back upstream of the meter, to a low side measurement configuration.

11. In July 2009, DEO conducted a field audit of approximately 36 well sites, finding that only one site—Complainant's Monticello Nursery (P167) site—had high side measurement. DEO also found that of the 25 rotary meter sites examined during that audit, eight did not have stricture plates at that time, since they had been constructed in accordance with an older version of the meter run specifications that did not include stricture plates. Stricture plates subsequently were installed at those eight sites.

12. In December 2008, DEO experienced the presence of fluids in sensing lines of orifice check meters and other gas quality issues at the Christ Presbyterian (K974) and Pizzino / Kaucic (P223) sites.

Brent D. Breon

Sworn to before me

this 17th day of March, 2011.

Notary Public

CARL G. VON ALLMAN, JR.
Notary Public, State of Ohio
My Commission Expires
3/29/15

Exhibit BDB-1

EAST OHIO GAS

Specifications for Quality of Gas Delivered Into the East Ohio Gas System

1. Heating Value: The minimum heating value of delivered gas shall be 1000 BTU per cubic foot at 60° F and 14.73 psia, dry basis. The maximum heating value of delivered gas shall be 1150 BTU per cubic foot at 60° F and 14.73 psia, dry basis.

2. Temperature: The temperature of delivered gas shall not exceed 120° F. The temperature of delivered gas shall not be less than 40° F.

3. Sulfur: The sulfur content of delivered gas shall not exceed either of the following: a maximum of 4 ppm (by volume) of hydrogen sulfide, a maximum of 10 ppm (by volume) of total sulfur.

4. Water Vapor: The delivered gas shall be free of water and shall not contain more than 7 pounds of water vapor per million cubic feet of gas at 60° F and 14.73 psia.

   Water Dewpoint: The water dewpoint of the delivered gas shall not exceed 20°F at 14.73 psia.

5. Nitrogen: The delivered gas shall not contain more than 3% (by volume) of nitrogen.

6. Oxygen: The delivered gas shall not contain more than 0.02% (by volume) of oxygen. Every reasonable effort must be made to keep the gas free of oxygen.

7. Carbon Dioxide: The delivered gas shall not contain more than 2% (by volume) of carbon dioxide.

8. Liquid Hydrocarbons: Delivered gas shall be free of hydrocarbons in liquid form and shall not contain any hydrocarbons which might condense to free liquids under the pipeline's operating conditions.

   Hydrocarbon Dewpoint: The hydrocarbon dewpoint of the delivered gas shall not exceed 25°F at 14.73 psia.

9. All Nonhydrocarbon Gases Combined: The delivered gas shall not contain more than 4.5% (by volume) of all nonhydrocarbon gases combined.

10. Hydrocarbons: The delivered gas' hydrocarbon concentrations (by volume) shall comply with the following: methane 88% minimum, ethane 6% maximum, propane and higher 3% maximum, hexanes and higher 0.2% maximum.

Other Considerations

The delivered gas shall not contain deleterious substances in concentrations that are hazardous to health, injurious to pipeline facilities or adversely affect merchantability. The delivered gas shall be merchantable natural gas and shall be commercially free from objectionable odors, dust, gums, gum-forming constituents, impurities, solid or liquid matter which might interfere with its merchantability or cause injury to or interference with the proper operation of the facilities and equipment of the Company or its customers. The delivered gas shall not contain any toxic or hazardous materials or substances, or any deleterious material potentially harmful to persons or to the environment, including but not limited to polychlorinated biphenyls. The delivered gas shall not contain any microbiological organism, active bacteria or bacterial agent, including but not limited to sulfate reducing bacteria and acid producing bacteria.

It is the Supplier's responsibility to furnish, install, maintain and operate such dehydrators, drips, separators, heaters and/or other devices as may be necessary to effect compliance with these specifications. The Company may require evidence that satisfactory arrangements have been made on the Supplier's system for adherence to these standards.

The Company reserves the right to sample and test gas for conformance to these specifications. Sampling may occur at any time, without prior notice to the Supplier. Tests to determine conformance to these specifications shall be made by standard methods in general use in the gas industry which are currently available or which become available at any time.

Failure to Meet Specifications

Should any gas tendered for delivery fail at any time to conform to any of these specifications, or in the Company's reasonable judgment may be detrimental to its operations or diminish the quality of gas in the system, the Company shall notify (by written, oral or telephonic notice) the Supplier of such failure and the Company may at its option suspend all or a portion of the receipt of such nonconforming gas. The Company may at its option waive any quality specification where the acceptance of the nonconforming gas will not in the Company's reasonable judgment adversely affect its operation.

The Supplier shall reimburse the Company for any loss, cost, damage or expenses incurred by the Company as a direct or indirect result of the Supplier's failure to comply with these specifications, except when such expense occurs as a direct result of the Company's deliberate decision to accept the Supplier's nonconforming gas. The Company shall be relieved of its obligations to the Supplier for the duration of such time as the gas does not meet these specifications. The Supplier shall not be relieved of its obligations to the Company for the duration of such time as the gas does not meet these specifications.

Failure of the Supplier to correct any quality deficiency within a reasonable period of time may result in the Company's termination of the gas service contract, or at the Company's option, the Company may make changes necessary to bring such gas into conformity and the Supplier shall reimburse the Company for any reasonable expense incurred by it in effecting such change. The Company shall have the right to collect from all Suppliers delivering gas to the Company at a common receipt point their pro rata share of the cost of any additional gas analysis and quality control equipment which the Company, at its reasonable discretion, determines is required to be installed at such receipt point to monitor and/or maintain the quality of gas delivered. . .

Exhibit B

BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO

IN THE MATTER OF THE COMPLAINT OF CUTTER EXPLORATION, INC.,	)	
Complainant,	)	**Case No. 09-1982-GA-CSS**
v.	)	
THE EAST OHIO GAS COMPANY d/b/a DOMINION EAST OHIO,	)	
Respondent.	)	

AFFIDAVIT OF JAMES P. REINMANN

STATE OF OHIO)
) ss:
COUNTY OF CUYAHOGA)

James P. Reinmann, being first duly sworn, states as follows:

1. I am a Measurement Engineer employed by The East Ohio Gas Company d/b/a Dominion East Ohio ("DEO"). I have held this position for the past seventeen years. As Measurement Engineer, I am responsible for consulting with DEO's personnel regarding measurement and pressure regulation, customer equipment and investigations of alleged meter problems. I have been a Registered Engineer in Ohio since 1995. In 1990, I graduated from Ohio State University with a degree in mechanical engineering.

2. A rotary meter is known as a positive displacement meter. It consists of a chamber that contains a known quantity of gas. As gas passes through the meter, two figure-eight-shaped impellers rotate, allowing the gas to travel from one end of the meter to the other. Each rotation of the impellers thus represents the movement of a known quantity of gas. Rotary

meters are direct methods of measurement because they actually measure the volume of the gas passing through the meter. Rotary meters are precision instruments that must be calibrated to tight tolerances. The measurements taken by rotary meters are corrected for temperature and other variables by an electronic device such as a Mercury MiniMax data recorder, which can calculate volumes for very small increments of time—less than a second. The figure on page 4 of the Memorandum of DEO Contra Motion to Compel of Cutter Exploration, Inc. ("Memo Contra") is an accurate diagram of the movement of impellers inside a rotary meter chamber.

3. Under recognized principles of thermodynamics, the volume of a gas is proportional to temperature and inversely proportional to pressure. Thus, to determine the correct volume measured, the temperature and pressure existing in the meter must be known and considered.

4. An orifice meter consists of a circular metal plate with a hole in the middle. Orifice meters do not directly measure a volume of gas but rather infer the volume of gas by measuring the change in pressure and velocity through the hole in the orifice plate. The diagrams on page 5 of the Memo Contra are accurate depictions of an orifice meter plate and a side view of an orifice meter run.

5. For intermittently producing wells, orifice meters are inherently less accurate than rotary meters. An orifice meter has a turndown ratio, which expresses the range over which the meter measures gas volumes with acceptable accuracy, of 3:1. This means, for example, that such orifice meter, if it has a design flow rate of 200,000 cubic meters per day, would accurately measure between 100,000 and 300,000 cubic meters per day. Rotary meters have turndown ratios between 20:1 and 40:1, making them suitable to measure gas over a relatively wide range of volumes, such as those produced by intermittent wells.

6. Production gas often contains fluids and other impurities such as water, brine or oil. These materials can damage or harm meters over time, can damage gas control equipment such as regulators, and can cause gas outages or fires and explosions if they reach DEO's lines. Such materials also can cause rotary meters to fail, given that rotary meters are engineered to relatively tight tolerances. While orifice meters may also fail due to the presence of impurities, they normally require a greater volume of impurities to fail than do rotary meters. Thus, in an environment where producers are not meeting their obligation to deliver clean gas to DEO, orifice meters pose a greater risk that more fluids will be delivered into DEO's system.

7. Gas from production wells can emerge at high and/or uneven pressures. Therefore, DEO requires installation of regulators in production meter runs, which lower and control the pressure of the gas traveling into DEO's lines, such that the pressure within DEO's lines remains at or below the Maximum Allowable Operating Pressures ("MAOP"). The MAOP for the NM11 system is 60 pounds per square inch ("psi").

8. Meter runs at production wells generally consist of: (i) filtering equipment designed to clean the gas before it reaches DEO's system; (ii) two regulators; (iii) the meter; (iv) a stricture plate; and (v) piping that runs from the well-head, through these devices, to DEO's tie-in point.

9. "Low side measurement" means the placement of the meter downstream of the regulators. The diagram that appears on page 10 of the Memo Contra is an accurate depiction of low side measurement. The diagram that appears at the top of page 11 of the Memo Contra is an accurate depiction of traditional "high side measurement," where the meter is placed upstream of the regulators.

10. The standard rotary meter run, like the meter runs in place at Cutter Exploration, Inc.'s ("Complainant's") wells, includes two regulators. The "worker" or "feed" regulator is the operative device and functions by partially closing to reduce the pressure of the gas. In order to guard against the possibility that the worker regulator will fail "open," thus potentially resulting in an unrestricted flow of gas above the MAOP of the line, the "monitor" or "check" regulator acts as a back-up device to maintain pressure below the system MAOP in the event the worker regulator "opens." Monitor regulators typically are set to a level just above the worker regulator setting (but still below the MAOP). For example, on the NM11 system, monitor regulators typically are set to 59 psi and worker regulators typically are set to 57 psi.

11. Federal pipeline safety regulations require DEO to monitor and regulate the pressure of its pipeline systems according to the corresponding maximum allowable operating pressure ("MAOP") of that system, which is based on the pipeline's size, composite material and other characteristics.

12. When gas crosses a meter, there usually is a small pressure drop, typically around 2 or 3 psi. Under DEO's standard operating procedures, and consistent with federal pipeline safety regulations, by the time gas reaches the meter, it cannot exceed the MAOP for the line. The example on page 11 of the Memo Contra thus reflects a scenario where there is a risk of an MAOP violation.

13. In the spring of 2009, Complainant requested that the rotary meters at its wells be prover tested. A prover test involves blowing equal amounts of air through the rotary meter to be tested and a certified "master" rotary meter that is known to be accurate. In March 2009, DEO hired R.L. Laughling Co. to prover test those rotary meters. All of the rotary meters proved to

within the Commission's +/- 3% standard for gas meters, and thus proved accurate. These results were provided to Complainant.

14. In April 2009, Complainant hired Eagle Research Corporation ("Eagle") to install orifice check meters at three of Complainant's sites: Christ Presbyterian (K974), Pizzino / Kaucic (P223) and Meisz / Hood (P399). I was present for all of the site visits that occurred in connection with this investigation. At all of those three locations, the operative meter was a rotary meter. Over a two-day period in late April 2009, Eagle recorded hourly volume data on the three orifice check meters and compared it to data recorded on the rotary meters at those locations. Those tests showed that both the rotary and orifice meters at all three locations were in "very close agreement," with less than a 2% difference between the meters at the Meisz / Hood (P399) location and less than a 1% difference at the Pizzino / Kaucic (P223) location.

15. Attached to my affidavit are true and accurate copies of (i) an e-mail dated April 22, 2009 from Eagle's representative Dave Kimberling to me, Brent Breon, Jeremy Grabowski, Jeff Isner and John Booth (attached hereto as Exhibit JPR-1); and (ii) an e-mail dated May 11, 2009, from Dave Kimberling to myself and several others, with attachment (attached collectively hereto as Exhibit JPR-2).

James P. Reinmann

Sworn to before me

this 16th day of March, 2011.

Notary Public

[illegible] M. JONES, ATTY.
NOTARY PUBLIC - STATE OF OHIO
My Commission Has No Expiration Date
Section 147.03 O.R.C.

Exhibit JPR-1

Unknown

From: Dave Kimberling [dave.k@eagleresearchcorp.com]

Sent: Wednesday, April 22, 2009 12:02 PM

To: Jim P Reinmann (Energy - 5)

Cc: Brent D. Breon (Energy - 5); Jeremy D Grabowsky (VirginiaPower - 5); 'Jeff Isner'; 'John Booth'; 'Ray Schnebelen'; 'Mike Cutter'; jimb@eagleresearchcorp.com

Subject: K974 - Pizzino - Meisz Hood Evaluations

Good morning Jim,

As we discussed when we met the other day, I have been directly involved in measurement (orifice/turbine/rotary) and control systems applications/technology since 1972 and have been participated in many, many metering evaluations like these. I also trust that everyone involved understands from Eagles perspective this is a measurement fact finding and clue gathering/evaluation exercise and not one drawing conclusions and/or passing any judgment. As you know we manufacture Volume Correctors as well as Orifice RTU's so from our perspective measurement is measurement and the type of meter really is incidental. This effort has been centered on assimilating accurate time matched data and our hopes are that we can assist both parties in evaluating the true measurement issues in terms of actual time matched data from a purely measurement perspective. A meter is a meter and if correctly installed and properly applied any two types of meters can be brought into very precise agreement regardless of pressure and temperature variables, a point that has been proven over and over again in flow labs around the world.

I wanted to share some information with you before we meet tomorrow to give you time to look at it and raise any questions. This is in no way a complete comprehensive investigation, rather more of a looking for clues exercise. The data I took was as of yesterday morning for an 18 hour period, while not a perfect sampling I feel it appears (after looking at this morning's data attached) to be representative of the three sites. I did not have Pizzino data yesterday morning as the well was shut in, however this morning's data shows that we are in very close agreement between the two meters now that the well is back on line.

K974 is another story. As you will see in the spreadsheet there are several more graphs and numbers to look at. The Meisz Hood is the second tab in the spreadsheet, but I saw no reason to investigate further as the deviation between the meters is very minimal. Basically on K974 I was looking for any clues to explain the offset or bias I saw in the hourly data. On the very first graph (left top) down at the bottom, I plotted the hourly volumes between the two meters. A very consistent offset appears between the red and green lines. I then started trying to uncover what might contribute to that offset based on the data in hand. It did not appear related to either temperature or pressure, so I kept digging looking for clues as you will see in several of the other graphs.

The final graph in the upper right may be the most telling. The offset/bias appears to be related to meter capacity on the rotary at that site if I am correct in that it is a 7M Roots meter. As the meter goes higher on the capacity curve, the Pct. Vol Error and the Hourly Mcf deviation between the meters trend together. Realizing that there is a compressor upstream here I questioned what our Honeywell does in terms of sampling and integration and found that we do both in 200 ms slices over an 800 ms period continuously for DP and P. Honeywell does this averaging/integration in an attempt to minimize pulsation and other flow line noise/distortion errors in attempting to calculate the true DP and P variables.

For the purposes of this evaluation, I assumed that the meter pressure at the rotary would be the same as the orifice and while not a perfect assumption, it is representative when looking only for trends. Once Jeremy gets me the hourly MiniMax Press/Temp numbers for K974 later this week I will plug them in, but doubt that from a trend/offset perspective it will cause any real change in the data relationship. There could be other anomalies contributing here as well, but this is what I have found based on current data in hand. I think our Thursday on site should let us evaluate further and gather any additional data we need.

I am providing this data to everyone as a baseline to look at and review and am certainly looking to all above for any suggestions or other paths that you would like me to explore. I believe that the high side vs low side measurement location is moot as both the Pizzino and Meisz Hood track very well together and should unless a piping configuration or other operational variable at higher flow rates intercedes. Should the hourly volume data at the other sites begin to diverge at some point and offset/bias is introduced we can look at it then. As you and I agree, measurement is measurement and if the meter application/installation is proper, the process variables measured correctly, other meter factors are entered consistently, and field calibration kept up that the location of the meters in relationship with each other really doesn't matter.

My personal expectation is that the two of us working together can bring these two meters into the same general level of agreement as the other two sites and hopefully uncover/explain where the current offset/bias is coming from.

There should be four documents attached, the overall spreadsheet and three PDF Reports from our Website.

Look forward to our discussions tomorrow – see you then.

Regards,

Dave Kimberling
Director – Producer Sales
Eagle Research Corporation

Exhibit JPR-2

Unknown

From: Dave Kimberling [dave.k@eagleresearchcorp.com]

Sent: Monday, May 11, 2009 1:23 PM

To: Brent D. Breon (Energy - 5); Jim P Reinmann (Energy - 5); Jeremy D Grabowsky (VirginiaPower - 5)

Cc: 'John Booth'; 'Jeff Isner'; 'Mike Cutter'; 'Jim Butch'; 'Ezra Schoolcraft'

Subject: Metering evaluation of K974

Gentlemen,

I am providing you with the attached review of the K974 metering site. This evaluation is based on measurement results obtained since the addition of the MiniMax Corrector corrected and uncorrected volume pulses to the onsite Eagle RTU at the K974, Meisz Hood and Pizzino #1 sites.

I would be happy to answer or respond to any questions that you may have regarding this information or the data results.

Eagle has been pleased to participate in the evaluation of this data and thanks everyone for using our products and services.

Best regards,

Dave Kimberling
Director – Producer Sales
Eagle Research Corporation

Eagle Research - Measurement Findings – Cutter K974

On the April 23rd the calibration of the two electronic meters transducers were verified with representatives from Cutter Exploration, DEO and Eagle Research on site. No calibration changes were made to either instrument. The Eagle RTU had considerable fluid in the downstream lead line which was improperly installed without self draining ability thus trapping fluid in the line – this was a source of measurement error. Eagle replaced the bent copper tubing with self draining 3/8" stainless steel and left room for a five valve manifold to be installed. Without a five valve manifold in place, there was no way to set the zero differential parameter under pressure which is a normal part of the check and calibration procedure for this type of electronic instrument. There were no other physical or software changes directly affecting the measurement calculation made to either meter by Eagle or DEO. All of the electronic transducers involved were well within calibration parameters so no adjustments were made.

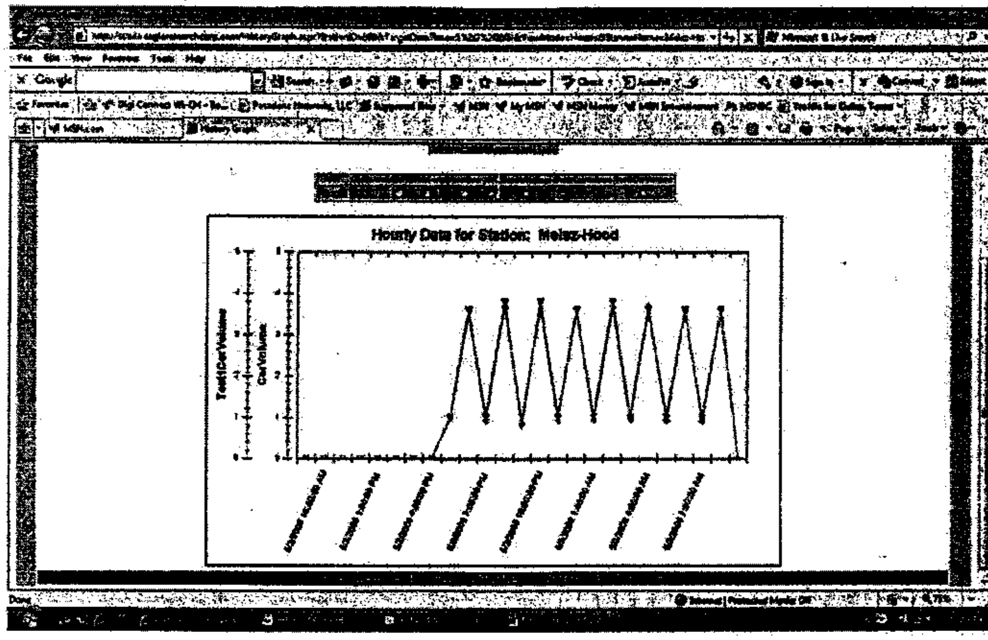
The fluid in the lead line appeared to be creating a false differential to be seen by the Eagle RTU. There could also have been leakage in any of the copper/brass fittings which we replaced with stainless steel fittings and tubing. Once the fluid and potential leakage was eliminated, measurement accuracy has improved as has been observed in reviews of the hourly data since this time. It is not possible to directly quantify the amount of error involved due to the fluid in the lead lines as it was unexpected when we found the high side to be dry. This would also have contributed to a higher error at lower flow rates due to the downstream sense line not seeing an accurate downstream pressure reading.

As indicated above, we made no parameter or calibration changes to either device that would have affected the measurement results. The only physical change was to replace the 1/4" copper tubing leads with 3/8" stainless and install the sense lines in a fully self draining configuration. The variables in both devices were already set to the same values for the measurement parameters being used to calculate. One additional request that was made to Mark with Cutter Exploration was to reinstall the temperature probe in the correct measurement location downstream rather than upstream of the Eagle RTU. This could easily be accomplished by replacing an elbow immediately downstream of the orifice flanges with a tee and locating the RTD temperature probe into the flowing stream – not a huge source of error, but yet a contributor to the overall accuracy of the measurement facility.

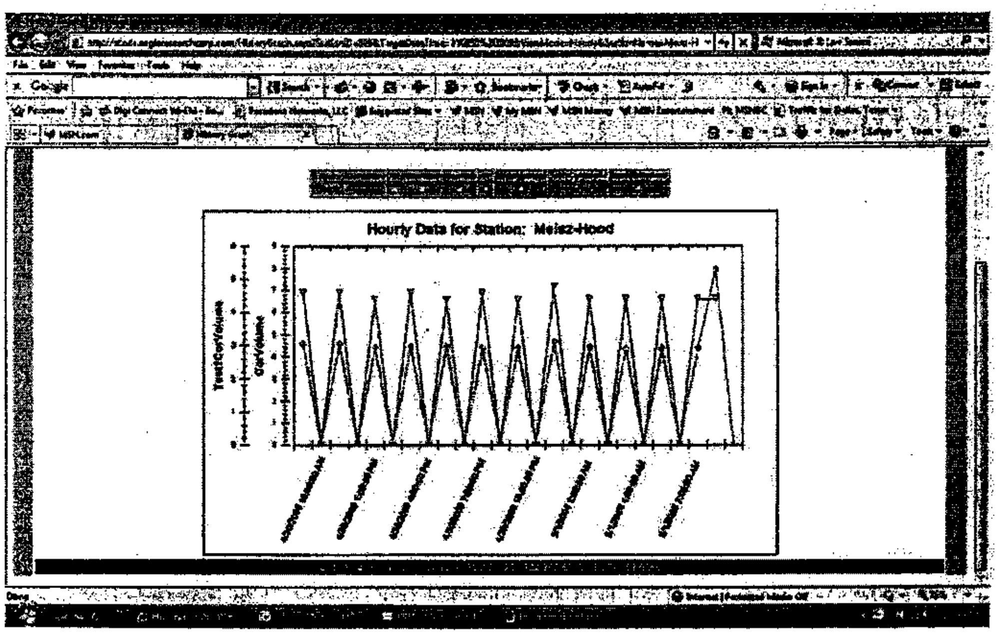
There were no parameter changes made either by Eagle or Dominion on this date. As I have stated previously, I believe the perceived measurement discrepancy at this site is far more related to periods of low flow rate than electronic error in the two devices. I can with absolute certainty assure all parties that other than replacing the lead lines to the Eagle RTU, there were no major changes or changes at all made to either measuring device or any internal measurement correction parameters.

All of the parameter settings in the Eagle RTU were set up according to DEO published specifications. Supercompressibility is set to 1.0, Atmospheric base is set to 14.4, Temperature Base is set to 60 Deg. F and Base Pressure set to 14.73. Specific gravity is set to .64 as also specified in the DEO documentation. These values were all correct on the date in question when we reviewed them. They are also correctly set in the Meisz-Hood and Pizzino #1 which Eagle recently installed and verified with Jim Reinman on site with us.

Several screen captures are depicted below with some additional comments following.



In both of the graphs shown, there is excellent agreement in the data. While one graph appears to show a deviation, the scales are not the same. When closely observed, the MiniMax actually shows slightly higher readings. Instantaneous value comparisons between two meters should not be utilized for comparative purposes as the while the trends should parallel, the actual observed instantaneous numbers will not generally be in agreement. As seen by the graph above plotted from hourly integrated historical information, the two meters match almost exactly on an integrated basis.



Due to a number of factors, evaluation based on instantaneous or even short duration data may show exaggerated errors – this is primarily due to the difference in the data gathering techniques of various manufacturers' electronics devices and is true where in this case the Eagle RTU continuously integrates the flow and the MiniMax wakes up on each revolution of the instrument drive and integrates. Obviously on a short duration test the rates would visually appear to diverge. This visual evaluation is further compounded when the duration between wake ups and integration on the MiniMax is much longer on low flow rates – drive spins slower, less pulses causing integration. Over time the two will begin to catch up and normalize with each other. The wake up on each revolution is typical of most every device sold in the marketplace, including Eagles corrector. This can be configured differently in Eagles devices; however it does drive up the cost and power requirements on the volume corrector. Using a high speed pulse and more rapid sampling rate would potentially improve the shorter duration comparability, but not necessarily the accuracy.

Throughout this process, Eagle has taken a purely measurement approach to this evaluation without regard to either personalities or past discussions on either side. The only evaluation that can be made relative to measurement systems must be based on actual data and facts where measurement is concerned. We will keep our comments below in that regard.

Measurement is measurement and can only be based on measured variables and contract agreements. As such DEO publishes their basic set of measurement parameters and fixed values to be used on their gas purchase sites. A meter is a meter, and if all of the metrics agree, the pressure and temperature measurements accurately made, the results of any two meters should be able to be brought into very close agreement on an integrated time basis regardless of the measured temperature and pressure parameters at the meter location.

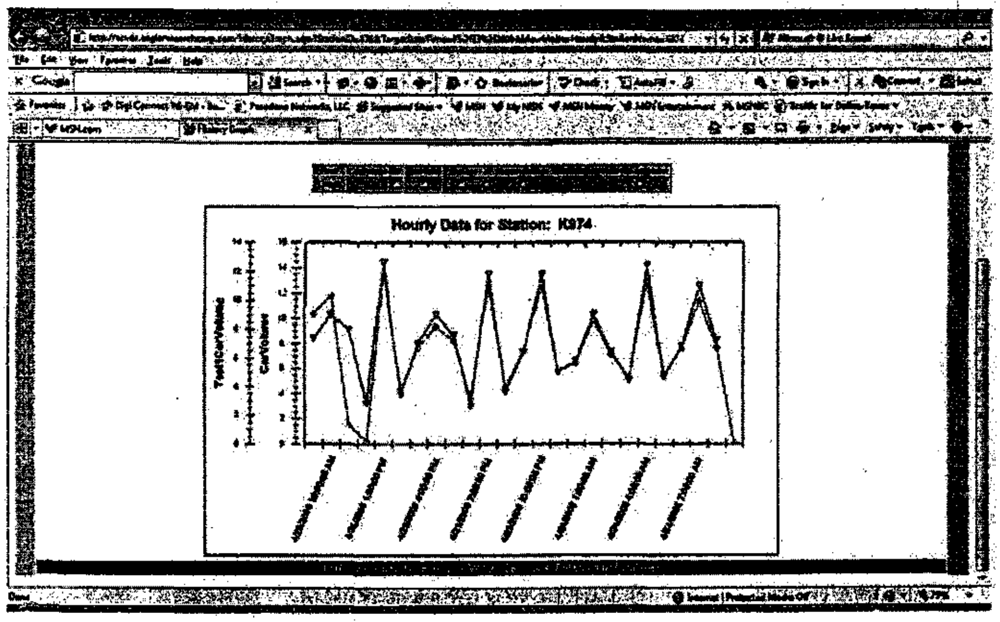
Things which more directly affect the measurement accuracy are properly sized meters for the given flow rate, piping conditions affecting the delivery capability, downstream load (consumers or other off takes) and physical piping constraints in terms of reduced port valves, etc. that create pressure drop between the meter and the delivery point.

From our evaluation, there are several factors at work. As an example at the Pizzino #1, by the time that the gas reaches the DEO pipeline there is only in Eagles and DEO's estimate about a pound of pressure differential remaining to push the gas into the DEO system. The contention that this is a low side meter causing the issue is only partially correct. The meter does introduce additional pressure drop, but this is not related in any way to measurement error as we have seen since we actually could see the integrated values of both meters on the web. What does cause a problem is all of the reduced port valves and fittings downstream of the regulators which protect the DEO pipeline. When, as has been observed, the meter is on the high side of the regulators, the gas flows better (less pressure drop) and the meters seem to agree from a measurement perspective better with what you expect to be able to produce. This is actually not a measurement issue but a physical piping one creating an image of being better and more accurate measurement.

On the K974 site, once the issue was cleaned up with respect to the differential lines going to the Eagle RTU, the measurements came into much better agreement. The agreement gets better as the flow rate goes up for several reasons. Higher differential is generally better measurement, more so on a circular chart than an electronic auto ranging transmitter (Honeywell) which is far more accurate in very low differentials than a circular chart. Rotary meters are typically more inaccurate in the low end of their flow range and we verified this during our prover test where the error was considerably higher once the meter got to less than

5% of max flow range. Since the proof is based on atmospheric conditions, the actual volumetric error at flowing conditions when operating in this low range must be multiplied by the pressure and temperature factors. In the case of K974 this is approximately a multiplier of 13 at an average line pressure of 180 psi. Once the meter gets into the 10-14% of rate range it does fall into normal meter accuracy tolerances. The low flow rate is also contributing to the short term integration values as the meter only wakes up on the revolution of the instrument drive under the MiniMax Corrector.

For these reasons, and the fact that K974 is now running on an hourly basis in the higher flow rates (typically above 10% currently) with the addition of the sixth well, the agreement between the meters is much better. This is very predictable given the prover results.



The graph shown above is for the period of 10 AM on 23 April to 10 AM on 24 April. DEO and Eagle arrived on site at approximately 10:30 AM on the 23rd and proceeded to check the two meters. When the tubing leads to the Eagle RTU were disconnected for calibration, the downstream lead showed a significant amount of fluid built up in the lead line; the upstream lead was virtually dry with very little if any condensation or fluid present. Calibration of the Differential and Pressure transducer showed very minimal error on calibration and neither was recalibrated or adjusted. There was no manifold on the Eagle RTU and as such a zero under pressure adjustment could not be made. The copper leads were replaced with stainless steel in a self draining configuration and space left for a standard five valve manifold to be installed per proper measurement practice.

The pressure measurement on the MiniMax was also verified and found to be well within acceptable measurement specifications for accuracy of the transmitter. No other adjustments were made to the MiniMax Corrector.

Data concurrence between the two meters began within an hour of completion of the installation of the new lead lines and the two meters being placed back in service. This agreement has continued at the range of flow rates seen by the two meters since this time in the samplings that have been reviewed.

Subsequent to this test, a transfer prover test was run using Eagles Transfer Prover on the DEO Roots Meter. This test showed that the Roots meter was within acceptable measurement tolerance above the 10% of capacity flow values and deteriorated as the flow rate dropped below the 10% mark. The meter showed approximately 8% error at the 5% of capacity point at atmospheric conditions.

I would be happy to discuss this in further detail at anyone's convenience and hope that the data and services Eagle has provided assist in clearing up any measurement questions.

Regards,

Dave Kimberling
Director – Producer Sales
Eagle Research Corp.

Exhibit C

BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO

IN THE MATTER OF THE COMPLAINT OF CUTTER EXPLORATION, INC.,	)	
Complainant,	)	**Case No. 09-1982-GA-CSS**
v.	)	
THE EAST OHIO GAS COMPANY d/b/a DOMINION EAST OHIO,	)	
Respondent.	)	

AFFIDAVIT OF JEFFREY A. BAKER

STATE OF OHIO)
) ss:
COUNTY OF LAKE)

Jeffrey A. Baker, being first duly sworn, states as follows:

1. I am Supervisor of Gas Operations for The East Ohio Gas Company d/b/a Dominion East Ohio ("DEO"). In that position, I am responsible for a wide range of operations functions related to DEO's transmission, distribution, production and high-volume industrial lines and equipment. Specifically, I am responsible for operations on portions of the NM11 distribution system, and I supervise the maintenance of DEO's lines and equipment, including meters and regulators, on that system. I am familiar with the operations of Complainant Cutter Exploration, Inc. ("Complainant") on that system, and I was responsible for the shutting-in of various metering stations associated with wells owned by Complainant.

2. Although Complainant requested that DEO reset the regulators associated with Complainant's wells so that the upstream regulator was the worker regulator and the downstream

regulator was the monitor regulator, and although DEO agreed to this change, Complainant has never followed up to schedule that work.

3. In February 2009, I saw that Complainant had tampered with the gas cleaning and safety equipment at the Petronzio Mayfield (P368), Komidar / Oberle (P449) and Hoenigman (P222) sites. This tampering consisted of bypassing the cleaning equipment and allowing free fluids and debris to flow through the rotary meters at those locations and into DEO's NM11 system. Such tampering poses a threat to the safety and reliability of DEO's distribution service. DEO shut-in production from those locations for thirty days.

4. In August 2010, field personnel discovered oil in the lines at the Murfello (P441) and Armstrong (P349) sites, which resulted in customers experiencing gas outages. DEO shut-in those wells. We also discovered oil in the lines at the Kokay (P158) site in October 2010, and shut-in that site. In March 2011, field personnel discovered more oil in the lines from the Armstrong (P349) site when one customer reported a gas outage. As a result, DEO shut-in the Armstrong site for a thirty days.

Jeffrey A. Baker

Sworn to before me

this 17th day of March, 2011.

Notary Public

Michael S. McGeady

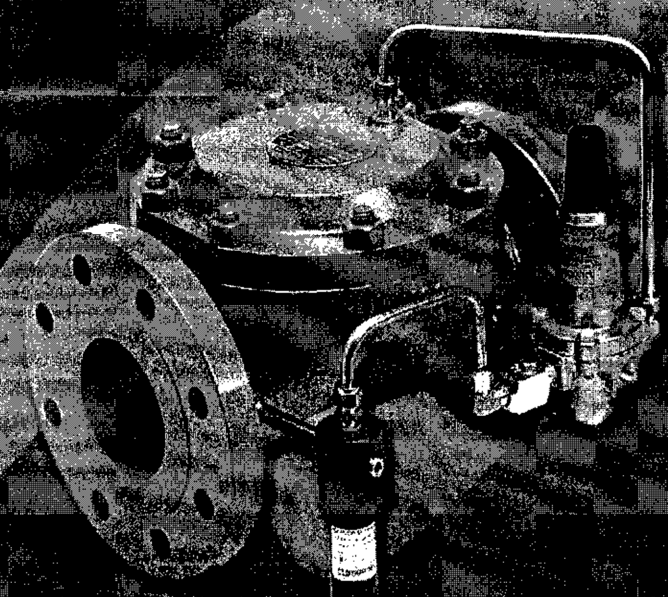
10-19-2013

Exhibit D

DRESSER

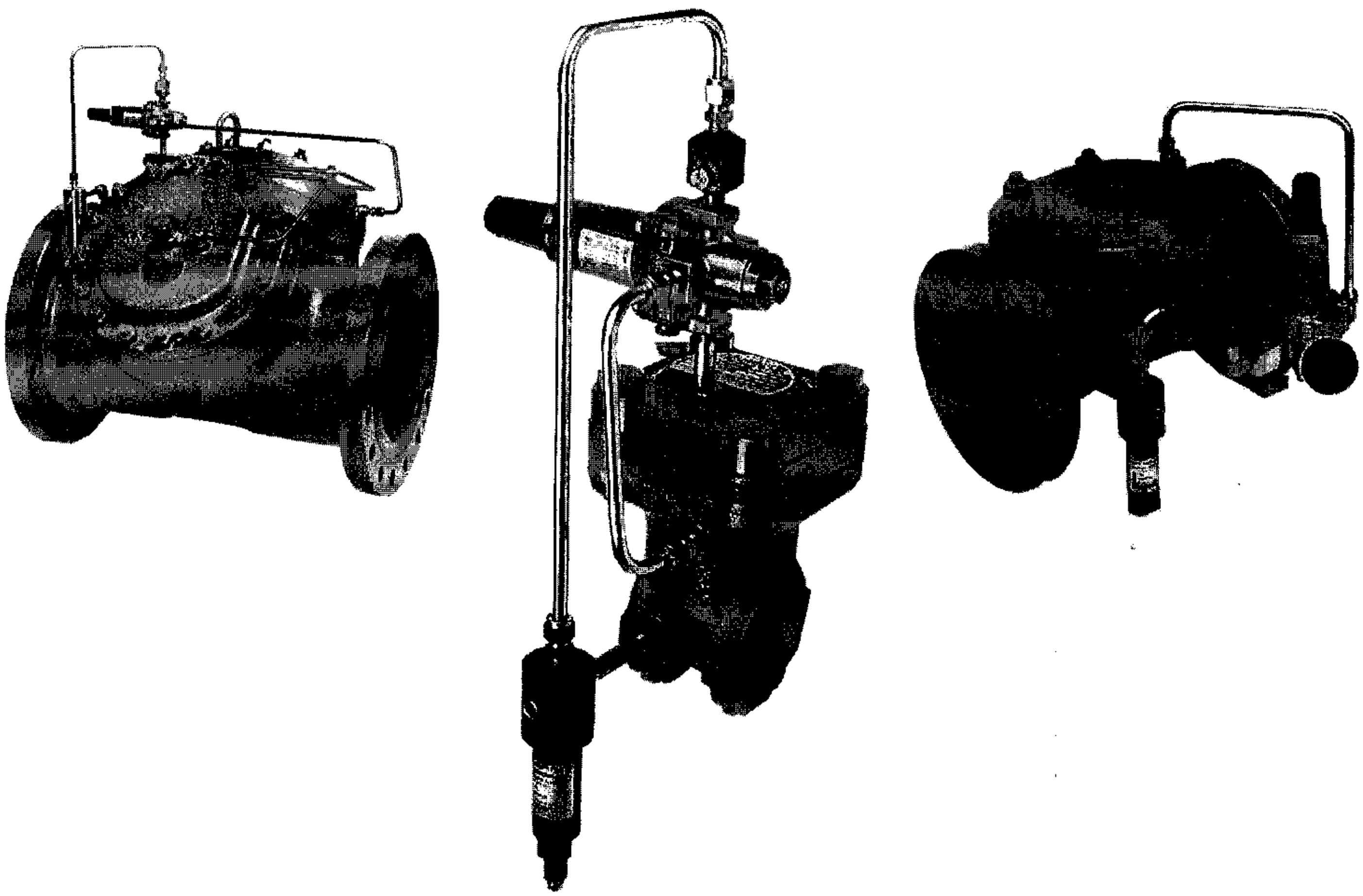
mooney CONTROLS

flowgrid

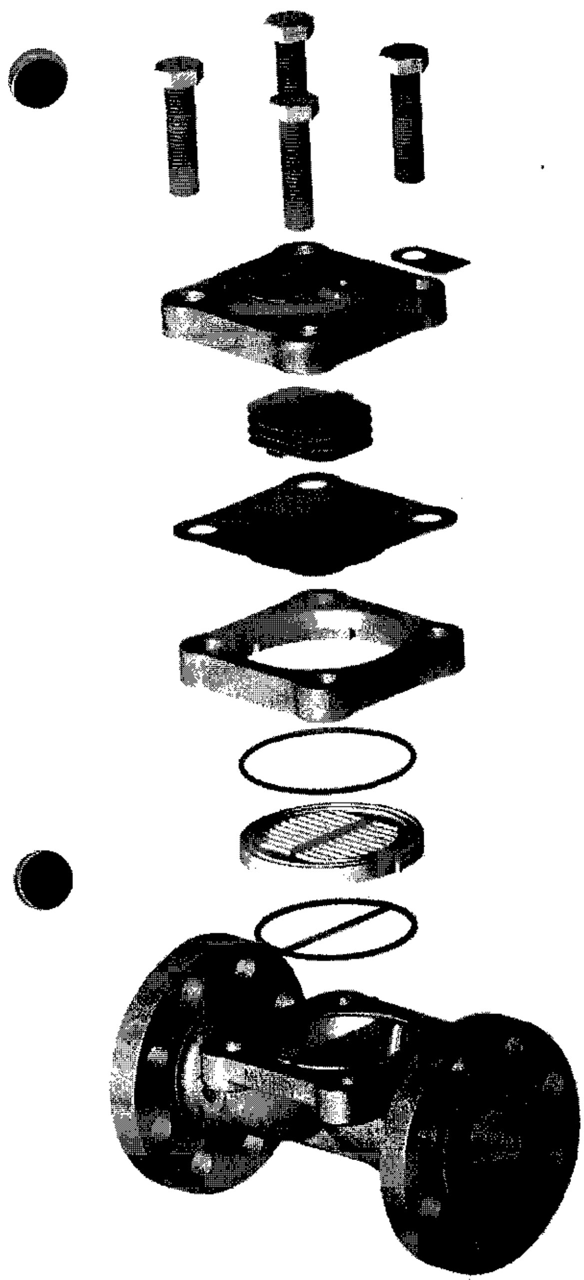


regulators

FLOWGRID® REGULATORS



The information presented in this brochure is for informational purposes only. For actual design assistance please visit our website at www.mooneycontrols.com or see your local representative.



Mooney® Flowgrid® Regulator

The Mooney® Flowgrid® regulator was designed to fill the need for an easy-to-maintain valve that would be used primarily with self-contained pilot systems for pressure or flow control of almost any gas or liquid.These key design elements equate to increased productivity.

Extremely high accuracy of control, incredible responsiveness, wide rangeability, minimal parts and top entry access to all components makes the Mooney Flowgrid regulator the regulator of choice. Our customers tell us what they like most about the Mooney Flowgrid regulator is... ***"you just set it and forget it".***

Key features and benefits are:

- In-line maintenance with minimal parts
- Rugged fabric-reinforced throttling element/diaphragm provides wide-rangeability, stability and fast response in severe service conditions
- Elliptical main spring provides a high frequency response, proportional action for stability, a consistent low minimum differential and shut off force
- Spring case has small volume to enhance speed of response and stability
- Over eighty-eight valve body options to fit any application
- Throttle plates offered in four standard capacities 100%, 50%, 75% and 35% or any custom capacity desired
- Symmetrical throttle plate design inhibits debris from accumulating under the seat and effecting shut-off
- Drilled-hole throttle plates for reduced noise and extended diaphragm life
- Equal inlet/outlet pressure rating for all sizes assures easy operation with no special start-up procedures
- Dual-port valve design provides redundancy with dual pilots and extra capacity with one pilot
- Compact size for easy installation in any position

Principle of Operation

Pressure Reducing Valve

At no flow, when the outlet pressure is greater than the set point of the Series 20™ pilot regulator, the pilot is closed and full inlet pressure loads the main valve spring case through the pilot loading connection. In this condition, the main throttling element is closed tightly against the throttling plate. The pressure differential across the outlet half of the diaphragm adds to the spring force to close the valve *(Fig 1).*

As demand for flow occurs in the downstream system, the outlet pressure drops, causing the pilot to open and start bleeding pressure out of the spring case faster than it can enter through the restricting valve. Reducing the loading pressure above the diaphragm allows inlet pressure to progressively lift the diaphragm off the throttling plate, opening the valve and satisfying the demand for the flow in the downstream system *(Fig 2).*

When demand for flow ceases or is reduced, the downstream pressure increases, causing the pilot regulator to close. Inlet pressure continues to pass through the restriction until the loading pressure equals the inlet pressure. The spring force, plus the pressure differential across the outlet half of the throttling plate closes the throttling element against the throttling plate closing the main valve *(Fig 1).*

Adjustment of the variable restricting valve affects the response rate, stability and sensitivity of the regulator. Smaller restrictor openings result in higher gain (sensitivity) and slower closing speeds. Larger openings result in lower gain (greater proportional band), greater stability, and faster closing speed.

Back Pressure Valve

In a back pressure relief application (BPV) the valve functions in the exact same way as previously described except that the sense line for the control pilot is located upstream of the regulator. The action of the pilot is the reverse of a pressure reducing pilot such that the pilot opens when system pressure increases above its set-point. The pilot will close when the system pressure is less than its set-point *(Fig 3).*

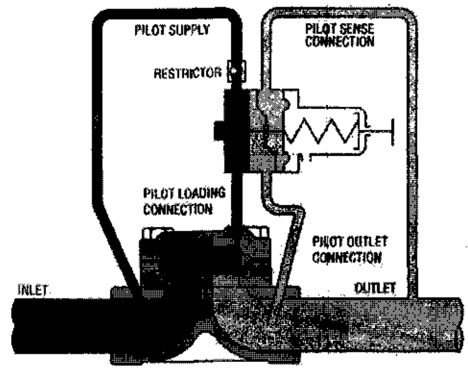


Fig 1. Pressure Reducing Configuration Fully Closed.

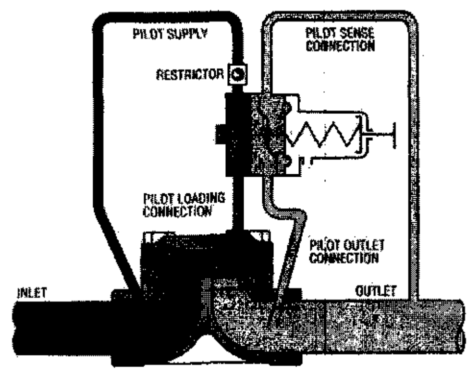


Fig 2. Pressure Reducing Configuration Partially Open.

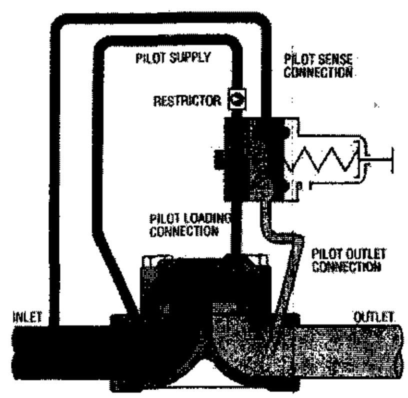


Fig 3. Back Pressure Valve

Applications

The Flowgrid® is ideal for pressure reducing (PRV), back pressure or relief (BPV), flow-control, and multi-function control applications where good regulation, simplicity, and ease of maintenance are of prime importance.

The Flowgrid can handle gas and liquids that are relatively clean, noncorrosive, and compatible with standard carbon steel/17-4ph stainless steel/nitrile rubber construction. The normal temperature range is -20°F to 150°F. Alternative materials for conditions outside the normal temperature range are available.

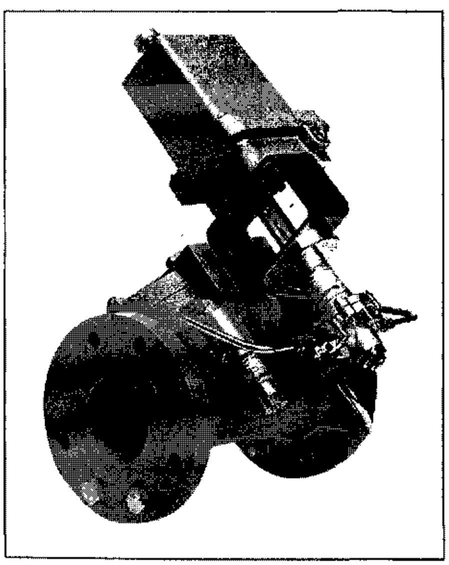
The Flowgrid can easily be interfaced with conventional pneumatic, electronic or microprocessor-based controllers for a variety of pressure and flow control applications. These applications can often result in lower overall costs and substantial energy savings.

Natural Gas Industry Applications

- ✔ District Regulator
- ✔ Monitor Regulator
- ✔ Relief Valve (BPV)
- ✔ Flow Control
- ✔ Compressor Fuel Gas
- ✔ Co-generation Fuel Supply

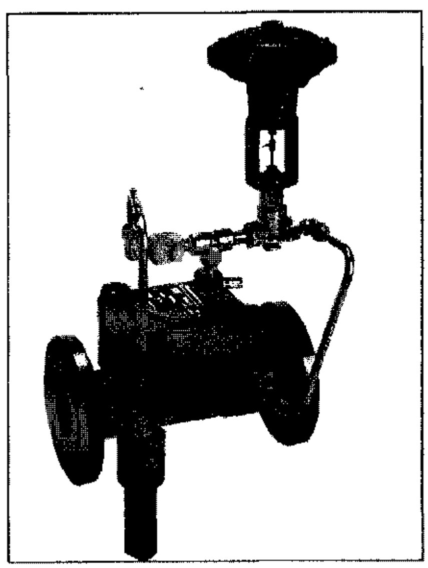
Industrial Applications

- ✔ Boiler Fuel Gas
- ✔ Oil
- ✔ Water
- ✔ Industrial Gasses (e.g., air, nitrogen, argon)
- ✔ Bi-directional Pressure Control
- ✔ Check Valve
- ✔ Differential Control Pressure or Flow



Set-Point Control

The Jordan® 1020 Actuator connected directly to any Series 20™ pilot allows remote control of any set point between 5 i.w.c. and 900 psig. The actuator is available in a variety of electrical classifications, voltages and input signals.



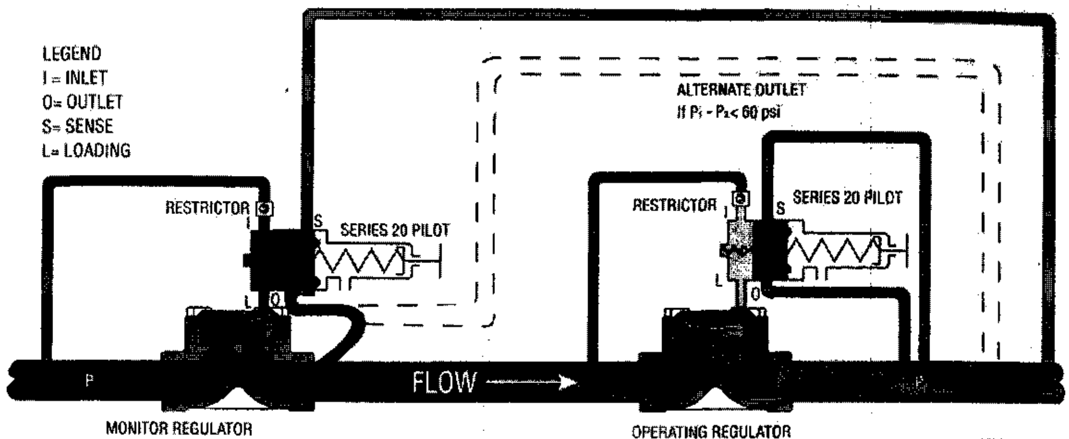
Pneumatic Control Application

A pneumatic input signal to a Badger® Control Pilot mounted on a Flowgrid® valve offers a variety of pressure, flow and remote set point options.

Remote control of the Series 20™ pilot set point is also possible by pressure loading the spring case through the tapped vent connection.

Jordan is a registered a trademark of Rotork Co.
Badger Control is a registered trademark of Badger Meter Inc.

Over Pressure Protection



(Fig 4)

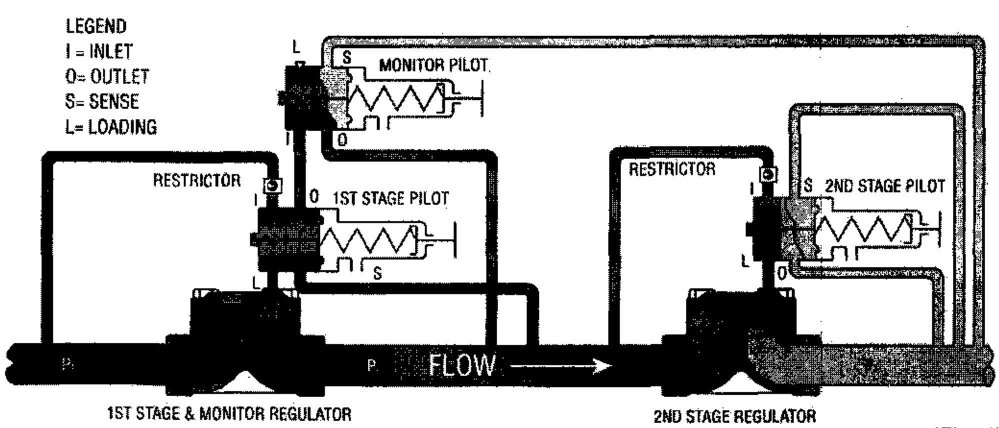
Standby Monitor System *(Fig 4)*

Under normal operating conditions, one of the Flowgrid® regulators operates as a worker while the other acts as a monitor of the system. The upstream or downstream regulator can serve either function.

The monitor pilot is set at a slightly higher pressure than the worker (e.g., +5%). If the operating regulator should fail, P_2 will increase until it reaches the set point of the monitor pilot, allowing the monitor regulator to take over protecting the downstream system P_2 from being over pressured.

NOTE: *On dead-end systems, a token relief downstream of the second stage regulator is recommended to compensate for slight leaks due to wear or debris in the monitor regulator and/or operating regulator.*

NOTE: *Ref. Fig 4. Use alternative outlet to insure full capacity when the pressure drops across the regulator are less than 60 psid. NOTE: System will shut off at upstream pilot setting.*



(Fig 5)

Working Monitor System *(Fig 5)*

Under normal conditions, both Flowgrid® regulators are working to reduce pressure in a two-stage sequence. If a problem occurs in the upstream regulator, the downstream regulator takes over the entire pressure cut, maintaining P_3 at the same pressure. If the downstream regulator fails, P_3 will rise, causing the monitor pilot on the upstream regulator to take over maintaining the pressure in the downstream system P_3 at the set point of the monitor pilot.

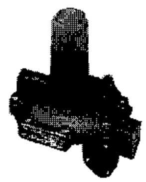
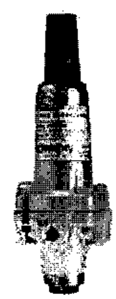
NOTE: *On dead-end systems, a token relief downstream of the second stage regulator is recommended to compensate for slight leaks due to wear or debris in the monitor regulator.*

NOTE: *An additional benefit of this system is the lower noise level that results when the pressure is reduced in two stages.*

SPECIFICATIONS

	Valve
Sizes	1" - 12"
Body Styles	Single & Dual Port
Body Materials	Steel, Ductile Iron, & SST*
End Connections	Screwed, Socket Weld, Flanged, Flangeless, & Buttweld
Outlet Pressure Range	5 i.w.c. - 900 psig
Max Operating Differential	800 psid, 1" 1000 psid
Max Emergency Differential	1000 psid (unless limited by body rating) 1" 1500 psid
Cracking Differential	4 ± 1 psid
Temperature Range	-20°F - 150°F
Minimum/Maximum	-40°F - 175°F
Flow Direction	Bi-Directional

* Not available in all sizes.

Spring Color	Type 20 Pilot	Outlet Pressure Range
 WHITE	20L	5-15 i.w.c
BROWN	20L	10-40 i.w.c.
YELLOW	20L	1-3 psig
ORANGE	20L	2-5 psig
GRAY	20L	4-8 psig
 RED	20	3-12 psig
CADMIUM	20	10-40 psig
BLUE	20	25-90 psig
PURPLE	20	60-200 psig
BLACK	20	100-260 psig
WHITE/GREEN	20	200-450 psig
BLACK	20HP	200-520 psig
WHITE/GREEN	20HP	400-900 psig

* *Pilot available in: 20L Aluminum & Bronze, 20 Brass and SST, 20H Brass and SST*

Guidelines for Diaphragm Selection

Compound	Temperature Range (degrees F)	Max Differential 1" Valve	Max Differential All Others	Characteristics	Recommended Applications
75 Duro (standard)	-20 to 150	1000 psid	800 psid	Best all around material	60 psid to max differential
60 Duro*	-25 to 150	300 psid*	300 psid*	Best shutoff at low differential pressure	Low differential (100 psid or less) or low temp.
80 Duro High ACN	-5 to 175	1000 psid	800 psid	Higher abrasion & swelling resistance	High differential (400 psid or higher) or abrasive conditions with distillates
80 Duro Low ACN	-20 to 150	1000 psid	800 psid	Higher abrasion resistance & low temp. flexibility	High Differential (400 psid or higher) or abrasive conditions at low temperature

Note: Minimum temperature is defined as lowest temperature for normal valve operation. Valve will operate below this temperature, but response times may increase and bubble-tight shutoff may be impaired. At extreme low temperatures (below -40° F), flexure of the diaphragm may result in cracking of the material. This will require replacement of the diaphragm.

Maximum differentials listed are recommended for best diaphragm life. Exceeding these differentials will not result in diaphragm damage, but may accelerate wear of the part.

**The 60 durometer diaphragm is standard on the Flowgrid® 250 Valve which is a ductile iron and aluminum construction with a maximum inlet and differential rating of 250 psi.*

Valve Performance

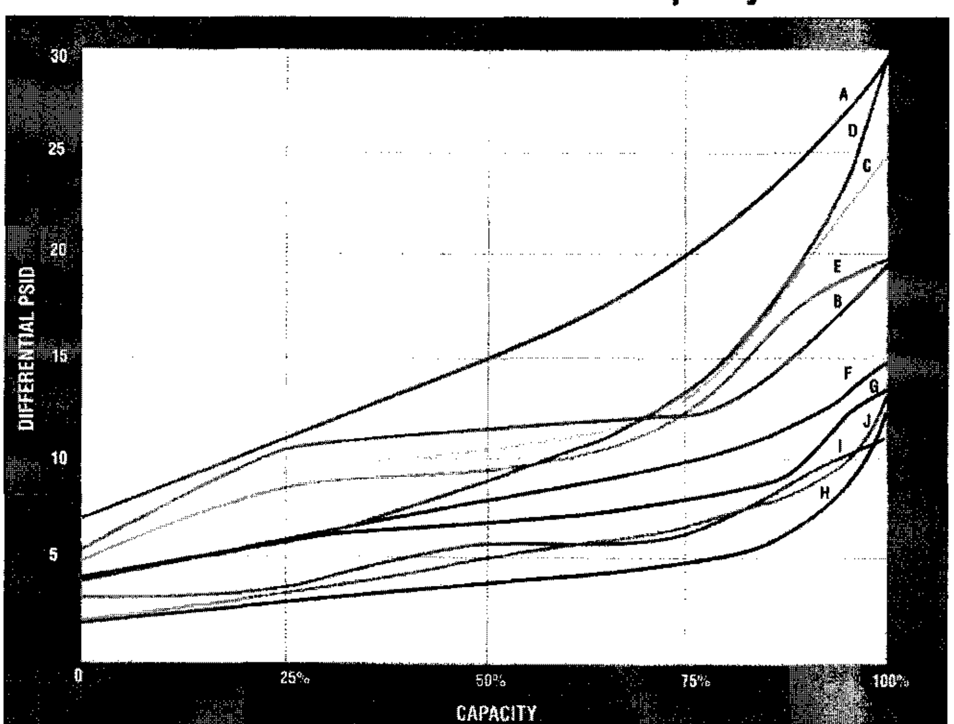
Performance with Series 20L™ and Series 20™ Pilot

Mooney® Series 20L Pilot		Pressure Reducing Mode Restrictor Set at 4		
Pilot Spring	**Range**	**Lockup**	**Droop Max Capacity [1]**	**Boost @ Constant Flow [2]**
White	5 i.w.c. -15 i.w.c.	1.0 i.w.c.	0.5 i.w.c.	0.7 i.w.c.
Brown	10 i.w.c. - 40 i.w.c.	1.0 i.w.c.	2 i.w.c.	0.7 i.w.c.
Yellow	1-3 psig	0.2 psig	0.15 psig	0.25 psig
Orange	2-5 psig	0.35 psig	0.25 psig	0.25 psig
Gray	4-8 psig	.5 psig	0.30 psig	0.25 psig

Mooney® Series 20 Pilot		Pressure Reducing Mode Restrictor Set at 4			Back Pressure Mode Restrictor Set at 4	
Pilot Spring	**Range**	**Lockup**	**Droop [1] Max Capacity**	**Boost @[2] Constant Flow**	**Build up Max Capacity**	**Lockup**
Red	3-12 psig	1.0 psig	.30	.70 psig	[4]	[4]
Cadmium	10-40 psig	1.0 psig	.30	.70 psig	+.50 psig	-1.0 psig
Blue	25-90 psig	2.0 psig	.60	.70 psig	+.50 psig	-1.0 psig
Purple	60-200 psig	2.0 psig	1.30	.70 psig	+1.0 psig	-1.0 psig
Black	100-260 psig	5.0 psig	2.00	.70 psig	+3.0 psig	-1.5 psig
Green	200-450 psig	10.0 psig	4.00	.70 psig	+5.0 psig	-2.0 psig
HP Black	200-520 psig	10.0 psig	4.00	1.50 psig	+5.0 psig [3]	-3.0 psig
HP Green	400-900 psig	20.0 psig	8.00	1.50 psig	+12.0 psig [3]	-5.0 psig

1 Inlet pressure (P_1) constant
2 Per 100 psi decrease in inlet pressure (P_1)
3 SST/Delrin trim required
4 Minimum set point for the Flowgrid Valve and Pilot when used as a relief valve is 15 psig or the minimum differential, whichever is greater.

Minimum Pressure Differential Versus Capacity



A 1" 75 Duro, STD Spring
B 1" 60 Duro, Low Spring
C 2" LP 75 Duro, STD Spring
D 3" 75 Duro, STD Spring
E 2" STD 75 Duro, STD Spring
F 4", 6" 75 Duro, STD Spring
G 2" STD 60 Duro, Low Spring
H 4", 6" 60 Duro, Low Spring
I 2" LP 60 Duro, Low Spring
J 3" 60 Duro, Low Spring

Use the chart at left to determine the amount of available capacity through a Flowgrid® valve when the differential pressure across the regulator falls below 30 psid.

For example: At 15 psid a 1" single port valve with a standard main spring and 75 durometer diaphragm (A) can flow 50% of total calculated capacity in this condition. With a low differential main spring and 60 durometer diaphragm is installed (B) the valve can flow 100% of its calculated capacity.

Universal Gas Sizing Equation

$$Q = \sqrt{\frac{520}{G \cdot T}}\ Cg \cdot P_1 \cdot \text{Sin}\left[\frac{3417}{C_1}\sqrt{\frac{\Delta P}{P_1}}\right] \text{deg.}$$

$$Cg = \frac{Q}{P_1 \cdot \underbrace{\sqrt{\frac{520}{G \cdot T}}}_{\substack{\textbf{Simplifies}\\ \textbf{1.29}\\ \text{Natural gas @ 60°F}\\ \text{\& 0.6 Sg}}} \cdot \text{Sin}\ \underbrace{\left[\sqrt{\frac{P_1 - P_2}{P_1}}\right]}_{\substack{\textbf{Simplifies}\\ \textbf{1.00}\\ \text{Critical flow}}} \text{deg.}}$$

Q = Flow Rate (SCFH)
Cg = Gas Sizing Coefficient
P_1 = Inlet Pressure (psia)
ΔP = Pressure Drop Across Valve ($\Delta P = P_1 - P_2$) (psid)
P_2 - Outlet Pressure (psia)
C_1 = Valve Recovery Coefficient ($C_1 = Cg/Cv$)
Cv = Liquid Sizing Coefficient
G = Specific Gravity (0.6 for Natural Gas) (1.0 for Air)
T = Gas Temperature (°Rankine) ($T = 460 + °F$)

Simplified Gas Sizing Equation

In the following term $(P_1 - P_2)/P_1$ equals .64 or greater, then sonic velocity is present in the valve and the simplified version of the gas-sizing equation may be used.

Air: $Q = P_1\ Cg$ **Natural Gas:** $Q = P_1\ Cg\ 1.29$

Note: Valve sizing and selection software is available for download at: mooneycontrols.com

Liquid Sizing

$$Q = CvF_p \sqrt{\frac{\Delta P_A}{G}}$$

ΔP_A or ΔP Allowable

$$\left.\begin{aligned} \Delta P_A &= P_1 - P_2 \text{ or} \\ \Delta P_A &= .8\,(P_1 - P_V) \end{aligned}\right\} \text{whichever is less}$$

Q = Flow gpm (Gallons per minute)
Cv = Liquid Sizing coefficient (see valve selection)
G = Liquid Specific Gravity
P_1 = Inlet Pressure (psia)
P_2 = Outlet Pressure (psia)
Pv = Vapor Pressure (psia)
F_p = Piping Swage Factor

Gas Velocity

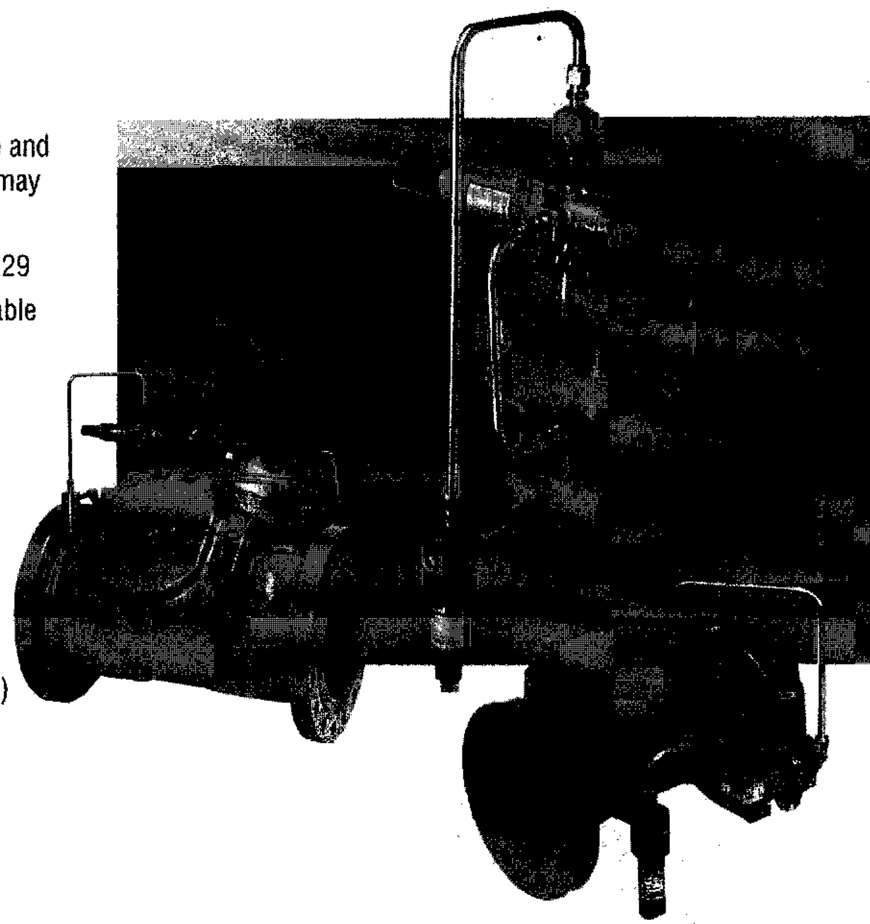
To avoid generating additional noise in the outlet piping, it is recommended that the body outlet velocity be limited to approximately 0.5 of Mach. This equates to approximately 500 ft/sec for air and 700 ft/sec for natural gas. Swages (reducers) should be used to further reduce the outlet piping velocity to approximately 200 ft/sec or less to minimize pressure loss. The formulas for velocity and pipe size are as follows:

$$V = \frac{748\,Q}{d^2 P_2}$$

V = Velocity in ft/sec
d = Internal pipe diameter in inches
Q = Flow in MSCFH
P_2 = Outlet pressure (psia)

***NOTE:** To avoid the possibility of excessive noise, vibration, and damage to the regulator and piping, the outlet velocity should not exceed 70% of sonic velocity.*

Air: 770 ft/sec **Natural Gas:** 1000 ft/sec



Use the minimum inlet and maximum flow conditions for a given application and solve the equation for Cg. For optimum performance, select a regulator to operate in the 10-80% range. A Mooney Control representative can help you select and size a Flowgrid® regulator.

Single Port Designs

Nominal Size (inches)	Stock No.	End Connections	Max Pressure (psig)	Nominal Port Size	Cg	Cv	C_1	Face to Face (inches)	Weight (Valve only)
1	FG 11 & 12	Npt/Swe	1480	1"	450	13.4	34	7.00	11 lbs.
1	FG 54**	150 Cl Flg	285	1"	450	13.4	34	7.25	14 lbs.
1	FG 55**	300 Cl Flg	740	1"	450	13.4	34	7.75	16 lbs.
1	FG 56**	600 Cl Flg	1480	1"	450	13.4	34	8.25	18 lbs.
1-1/4	FG 13 & 14	Npt/Swe	1480	1"	450	13.4	34	7.00	11 lbs.
1-1/2	FG 47 & 48	Npt/Swe	1480	1"	480	13.4	36	7.00	11 lbs.
1	FG 24	Npt	250*	1"	428	13.1	32	7.00	8 lbs.
1-1/4	FG 25	Npt	250*	1"	432	13.6	31	7.00	8 lbs.
1-1/12	FG 26	Npt	250*	1"	457	14	32	7.00	8 lbs.
2 x 1	FG 29 & 50	Npt/Swe	1480	1"	500	13.4	37	7.00	14 lbs.
2 x 1	FG 51	150 Cl Flg	285	1"	500	13.4	37	10.00	23 lbs.
2 x 1	FG 52	300 Cl Flg	740	1"	500	13.4	37	10.50	26 lbs.
2 x 1	FG 53	600 Cl Flg	1480	1"	500	13.4	37	11.25	30 lbs.
2	FG 1 & 2	Npt/Swe	1480	2" Std	1130	32	35	8.00	25 lbs.
2	FG 3	150 Cl Flg	285	2" Std	1130	32	32	10.00	37 lbs.
2	FG 4	300 Cl Flg	740	2" Std	1130	32	35	10.50	39 lbs.
2	FG 5	600 Cl Flg	1480	2" Std	1130	32	35	11.25	43 lbs.
2	FG 27 & 28	Npt/Swe	1480	2" Lp	1420	40	35	8.00	25 lbs.
2	FG 29	150 Cl Flg	285	2" Lp	1420	40	35	10.00	34 lbs.
2	FG 30	300 Cl Flg	740	2" Lp	1420	40	35	10.50	37 lbs.
2	FG 31	600 Cl Flg	1480	2" Lp	1420	40	35	11.25	40 lbs.
2	FG 82	NPT	250*	2" Lp	1600	46	35	8.00	17 lbs.
2	FG 83	150 Cl Flg RF	250*	2" Lp	1600	46	35	10.00	22 lbs.
2	FG 84	150 Cl Flg FF	250*	2" Lp	1600	46	35	10.00	22 lbs.
3	FG 16	150 Cl Flg	285	3"	3450	96	36	11.75	73 lbs.
3	FG 17	300 Cl Flg	740	3"	3450	96	36	12.50	85 lbs.
3	FG 18	600 Cl Flg	1480	3"	3450	96	36	13.25	94 lbs.
4	FG 39	150 Cl Flg	285	4"	6500	172	38	13.88	103 lbs.
4	FG 40	300 Cl Flg	740	4"	6500	172	38	14.50	117 lbs.
4	FG 41	600 Cl Flg	1480	4"	6500	172	38	15.50	143 lbs.
6	FG 44	150 Cl Flg	285	6"	12500	313	40	17.75	200 lbs.
6	FG 45	300 Cl Flg	740	6"	12500	313	40	18.62	240 lbs.
6	FG 46	600 Cl Flg	1480	6"	12500	313	40	20.00	330 lbs.
8	FG 72	150 Cl Flg	285	8"	20200	530	38	21.38	450 lbs.
8	FG 73	300 Cl Flg	740	8"	20200	530	38	22.38	500 lbs,
8	FG 80	600 Cl Flg	1480	8"	20200	530	38	24.00	650 lbs.

* Ductile Iron & Aluminum Construction ** Special welded assembly

Dual Port Designs

Nominal Size (inches)	Stock No.	End Connections	Max Pressure (psig)	Nominal Port Size	Cg	Cv	C_1	Face to Face (inches)	Weight (Valve only)
2	FG 8	150 CI Flg	285	2" Std	1960	56	35	10.00	52 lbs.
2	FG 9	300 CI Flg	740	2" Std	1960	56	35	10.50	55 lbs.
2	FG 10	600 CI Flg	1480	2" Std	1960	56	35	11.25	59 lbs.
2	FG 32	150 CI Flg	285	2" Lp	2050	59	35	10.00	50 lbs.
2	FG 33	300 CI Flg	740	2" Lp	2050	59	35	10.50	52 lbs.
2	FG 34	600 CI Flg	1480	2" Lp	2050	59	35	11.25	54 lbs.
4	FG 21	150 CI Flg	285	3"	6700	185	36	13.88	145 lbs.
4	FG 22	300 CI Flg	740	3"	6700	185	36	14.50	160 lbs.
4	FG 23	600 CI Flg	1480	3"	6700	185	36	15.50	194 lbs.
10	FG 57	150 CI Flg	285	6"	22000	550	40	26.50	590 lbs.
10	FG 58	300 CI Flg	740	6"	22000	550	40	27.88	670 lbs.
10	FG 59	600 CI Flg	1480	6"	22000	550	40	29.60	900 lbs.
12	FG 74	150 CI Flg	285	8"	40400	1060	38	29.00	1097 lbs.
12	FG 75	300 CI Flg	740	8"	40400	1060	38	30.50	1195 lbs.
12	FG 81	600 CI Flg	1480	8"	40400	1060	38	32.25	1383 lbs.

Flangeless Port Designs*

Nominal Size (inches)	Stock No.	End Connections	Max Pressure (psig)	Nominal Port Size	Cg	Cv	C_1	Face to Face (inches)	Weight (Valve only)
2	FG 15	150 CI Flg	285	2" Std	1120	32	35	4.187	27 lbs.
2	FG 15	300 CI Flg	740	2" Std	1120	32	35	4.187	27 lbs.
2	FG 15	600 CI Flg	1480	2" Std	1120	32	35	4.187	27 lbs.
2	FG 35	150 CI Flg	285	2" Lp	1300	37	35	4.187	27 lbs.
2	FG 35	300 CI Flg	740	2" Lp	1300	37	35	4.187	27 lbs.
2	FG 35	600 CI Flg	1480	2" Lp	1300	37	35	4.187	27 lbs.
4 x 3	FG 19	150 CI Flg	285	3"	3400	95	36	5.81	92 lbs.
4 x 3	FG 20	300 CI Flg	740	3"	3400	95	36	5.81	92 lbs.
6 x 4	FG 42	150 CI Flg	285	4"	6400	172	37	8.00	115 lbs.
6 x 4	FG 43	300 CI Flg	740	4"	6400	172	37	8.00	115 lbs.

* Same face-to-face dimensions as Grove Models 82 and 83 regulators.

Type-A Flangeless Port Designs*

Nominal Size (inches)	Stock No.	End Connections	Max Pressure (psig)	Nominal Port Size	Cg	Cv	C_1	Face to Face (inches)	Weight (Valve only)
2	FG 100	150 CI Flg	285	2" Lp	1420	40	35	3.03	29 lbs.
2	FG 101	300 CI Flg	740	2" Lp	1420	40	35	3.03	29 lbs.
2	FG 102	600 CI Flg	1480	2" Lp	1420	40	35	3.41	29 lbs.
3	FG 103	150 CI Flg	285	3"	3240	95	36	3.72	60 lbs.
3	FG 104	300 CI Flg	740	3"	3240	95	36	3.72	60 lbs.
4	FG 106	150 CI Flg	285	4"	5800	168	35	4.50	85 lbs.
4	FG 107	300 CI Flg	740	4"	5800	168	35	4.50	85 lbs.

* Same face-to-face dimensions as American Meter Axial® Flow Valves.