dugan production corp.

February 21, 2002

OIL CONSERVATION DIV.
02 FEB 22 PM 4:28

Mr. David Catanach
New Mexico Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, NM 87505

Re: NMOCD Commingling Order PLC-191 dated 10/05/01
Dugan Production's Big Band Gas Gathering System

Dear Mr. Catanach:

Attached for your review and file is a copy of the BLM's approval dated 02/15/02 for the subject gas gathering system. In addition, I'm sending copies of five letters and information submitted to the BLM subsequent to our application dated 09/06/01. We do not believe this supplemental information has any significant affect upon our application and is being sent for your information and file.

The BLM's primary concern regarding our application was PNM's intended use of a positive displacement meter rather than an orifice meter for the CDP sales meter. We are not sure why this became such an important issue, as the BLM's Onshore Order No. 5 (which contains their gas measurement regulations) does recognize positive displacement meters as being an acceptable method for gas measurement, and it is the standard meter in use on PNM's pipeline system.

Should you have any questions or concerns, please let me know.

Thanks for your prompt approval of our application.

Sincerely,

John D Roe

John D. Roe
Engineering Manager

JDR:sh

Attachments

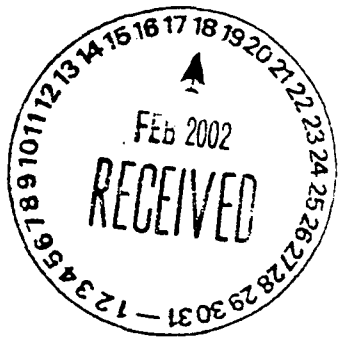
xc: NMOCD - Aztec

709 E. MURRAY DR. • P. O. BOX 420 • FARMINGTON, N.M. 87499-0420 • PHONE: (505) 325-1821 • FAX# (505) 327-4613

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Farmington Field Office
1235 La Plata Highway, Suite A
Farmington, New Mexico 87401



IN REPLY REFER TO:
3162.7-3
Big Band Gas Gathering System

FEB 15 2002

Mr. John Roe
Dugan Production Corporation
P.O. Box 420
Farmington, NM 87499

Dear Mr. Roe:

Reference is made to your application for surface commingling and off-lease measurement and sales of gas from your Big Band Gas Gathering System (BBGGS). You propose to measure and sell gas at the Public Service Company of New Mexico (PNM) metering facility located in the:

NENE sec. 27, T. 22 N., R. 8 W., San Juan County, New Mexico.
Meter Serial No. 0149963

See the enclosed list for wells included in the BBGGS.

Your application indicates that measurement at a centralized location is necessary to effectively and economically operate these wells and extend the economic life of the properties. We have reviewed your application and the supplemental information you supplied and concur with these findings. In addition, your supplemental information indicated that PNM will be using a Roots rotary positive displacement meter with a digital read out. This meter has an accuracy of +/- 1% over the range of flow rates anticipated from the gathering system. A review of the meter documentation, standards, and validation requirements indicates that to properly validate the meter accuracy, both upon installation and periodically thereafter, a meter bypass is necessary to regulate incremental flow rates across the meter. Pursuant to Onshore Order Nos. 3 and 5, meter bypasses are not allowed without special consideration of relevant factors.

After careful consideration, you are hereby authorized to commingle, measure and sell natural gas off lease at the PNM facility referenced above. The effective date of this authorization is February 4, 2002, the date acceptable meter validation results were determined. Commingling, measurement, and sales at this facility will be based on the procedures outlined in your application. The following are conditions of this approval:

- Dugan Production Company will be required to install a seal and maintain a seal record for any and all activities on the meter bypass valve. Failure to maintain these records will result in immediate rescission of this approval.

- Based on the results of the meter validation conducted February 4, 2002, the Roots PD meter must be validated at least biennially with the results filed with this office 30 days thereafter. Contact the Bureau of Land Management so a representative can be present to witness the meter validation.

- Allocation methodology must be made on an MMBTU basis. By March 15, 2002, file a report of wellhead versus allocated volumes and MMBTUs for each well under this approval. This report must include the previous month's production for our review.

- Measurement of natural gas at the PNM facility must be conducted in accordance with the requirements outlined in Onshore Order No. 3, Site Security and Onshore Order No. 5, Gas Measurement.

- In order to prevent waste and conserve natural gas, periodic review of each well's venting procedures must be conducted in accordance with the requirements outlined in NTL-ADO-93-1.

- No other wells can be added to this system of measurement without the prior approval of this office. Contact this office in the event of any lost or vented hydrocarbons between the wells and the PNM facility.

Failure to maintain and operate this facility in accordance with the conditions outlined above may subject this approval to immediate rescission. In addition, this office reserves the right to rescind this approval should future evaluation of this method of measurement indicate that federal royalties would be reduced. Long term shut-in provisions for any well committed to this system will cease within 30 days of the effective date of this approval.

If you have any questions regarding the above please contact me at (505) 599-6367.

Sincerely,

Jim Lovato
Senior Technical Advisor,
Petroleum Management Team

1 Enclosure:
1 - List of Contributing wells

cc:
NMOCD, Santa Fe
NMOCD, Aztec

Big Band Gas Gathering System CDP
Well List

Well Name and No.	API No.	Lease No.	Formation	Location
Billie No. 2	3004523386	NM-8902	Chacra	NWSW Sec. 35, T. 22 N., R. 8 W.
Dorsey No. 1	3004529909	NM-90472	Chacra	SENW Sec.26, T. 22 N. R. 8 W.
Ellington No. 2 #1	3004529907	NM-94067	Chacra	SESW Sec.26, T. 22 N., R. 8 W.
Goodman No. 2	3004529191	NM-90471	Chacra	NWSW Sec.23, T. 22 N., R. 8 W.
Goodman No. 3	Pending	NM-90471	Chacra	NESE Sec.23, T. 22 N., R. 8 W.
James No. 1	3004529910	NM-93253	Chacra	NESE Sec. 24, T. 22 N., R.8 W.
James No. 2	Pending	NM-93253	Chacra	NWSW Sec. 24, T. 22 N., R.8 W.
Zappa No. 3	3004529908	NM-57445	Chacra/ Fruitland Coal	SESE Sec. 27, T. 22 N.R. 8 W.
Zappa No. 91	3004529997	NM-57445	Fruitland Coal	NENE Sec. 27, T. 22 N., R. 8 W.

dugan production corp.

January 9, 2002

HAND DELIVERED

Mr. Jim Lovato
Bureau of Land Management
Farmington Field Office
1235 La Plata Highway
Farmington, NM 87401

Re: Supplemental Information
Dugan's Application dated 09/06/01
Proposed Big Band Gas Gathering System
San Juan County, New Mexico

Dear Mr. Lovato,

I'm writing to provide the information requested for your consideration of the captioned application.

Attached is a schematic of the central battery for the CDP, which is located just west of Dugan's Zappa No. 91 well. The system drip and compressor are actually on the Zappa #91 well pad, and the CDP meter and dehydrator are approximately 200 feet to the west. There will be a minimal amount of equipment required to operate this CDP. Initially, we will be using a rental compressor, and at some future date when production volumes are more established, it is likely we will purchase a compressor. The drip, dehydrator and dehydrator tank are in place. The compressor and the drip water storage tank will be installed upon completion of PNM's meter run.

The compressor to be installed has a 3306 NA Caterpillar engine, which will be operating to produce 117hp, if fully loaded. It is anticipated that this compressor will be operating at approximately 75% loading and will produce 88 hp. Fuel requirements for this compressor, and any subsequent compressor, will be calculated using equipment specific data, i.e. engine hp x fuel requirements in Btu/hp-hr. The fuel requirements at 75% loading (from Caterpillar) are 7,813 Btu/hp-hr, which produces a fuel requirement of 15.0 mcfd, assuming an average gas heating value of 1,100 Btu/scf ((88hp x 7,813 Btu/hp-hr x 24 hr/day)/1,100 Btu/scf). If the compressor is ever replaced, a new daily fuel requirement will be similarly computed.

In addition to the compressor, we will be operating a dehydrator, which has a gylcol regenerator equipped with a 125,000 Btu/hr burner. We anticipate the heater will operate approximately 25% of the time and will require a fuel volume of 0.7 mcfd ((125,000 Btu/hr x 6 hr/day)/1,100 Btu/scf).

Also attached are copies of three pressure charts that were recorded during our testing of the mechanical integrity of the newly installed gathering system.

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Each chart is labeled as to which section of the system was being tested. All testing was done using compressed air. The tests are summarized as follows:

Chart No.	Test Period	Test Time	Test Pressure	Test Results
1	08/29-08/30/01	21 hrs.	120 psig	No loss – See note below*
2	08/31-09/01/01	24 hrs.	115 psig	No loss – See note below*
3	09/10-09/11/01	23 hrs.	155 psig	No loss – See note below*

*NOTE: On each of the charts there is a slight drop in pressure that starts to occur around 2:00 a.m. This is believed to be the result of cooling since the drop begins to return to the initial test pressures starting between 6:00 and 7:00 a.m.

To insure continued system integrity, we will periodically inspect the entire system, using our gas sniffer. The frequency of testing will depend upon many factors, but will likely be at least once per year.

Should you have questions or need additional information, please let me know.

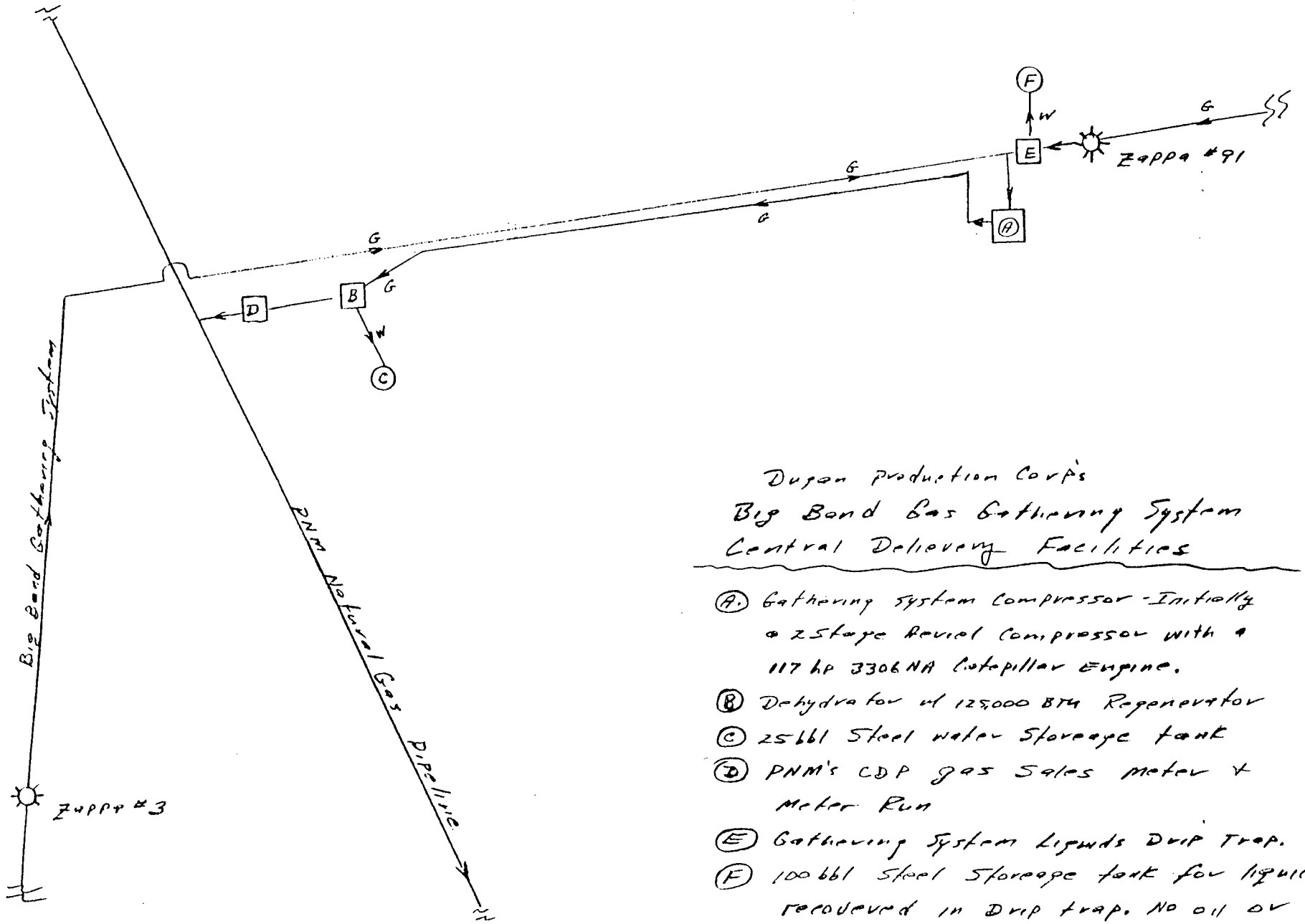
Sincerely,

John D. Roe

John D. Roe
Engineering Manager

JDR/sh

C:\TF\Johnroe\bigbandsuppinfoltr



Dugan Production Corp's
Big Bend Gas Gathering System
Central Delivery Facilities

(A.) Gathering system compressor - Initially a 2 stage Reviel Compressor with a 117 hp 3306 NA Catepillar Engine.
(B) Dehydrator w/ 125,000 BTU Regenerator
(C) 2566l Steel water Storeage tank
(D) PNM's CDP gas Sales meter & Meter Run
(E) Gathering System Liquids Drip Trap.
(F) 100 66l Steel Storeage tank for liquids recovered in Drip trap. No oil or condensate is anticipated - only water.

Notes -
1. Drawing is Not to Scale
2. Gathering System pressure ≈ 530 PSI
PNM Pipeline pressure ≈ 550 - 590 PSI

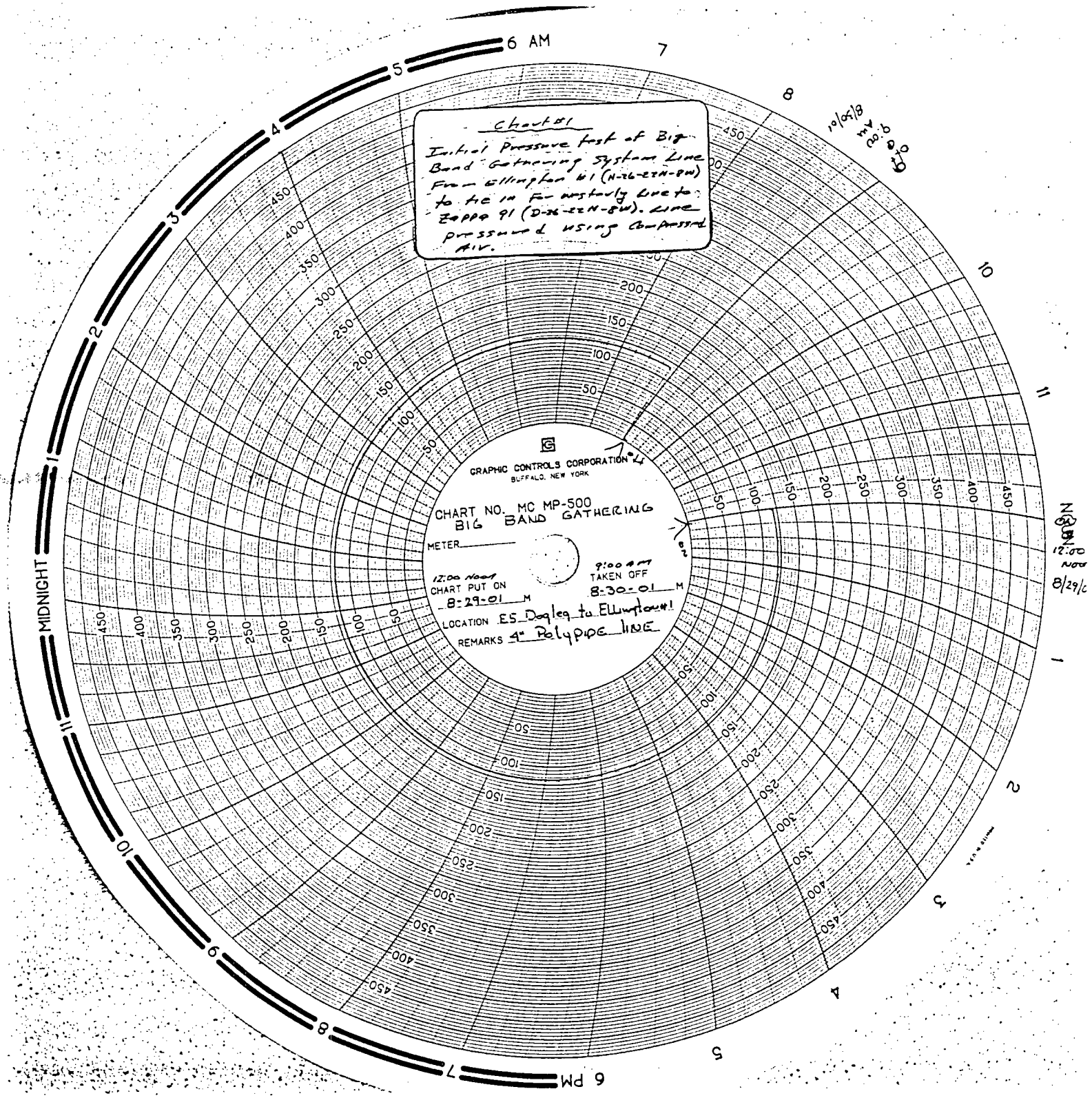


Chart #1
Initial Pressure test of Big Band Gathering System Line From Ellington 61 (N-26-22N-8W) to the in for westerly line to Zappa 91 (D-26-22N-8W). Line pressured using Compressed Air.
GRAPHIC CONTROLS CORPORATION
BUFFALO, NEW YORK
CHART NO. MC MP-500
BIG BAND GATHERING
METER
12:00 Noon
CHART PUT ON
8-29-01 M
9:00 AM
TAKEN OFF
8-30-01 M
LOCATION E5 Dogleg to Ellington
REMARKS 4" Polypipe LINE
6 AM
MIDNIGHT
6 PM
10/9/8 9:00 AM
12:00 Noon 8/29/01

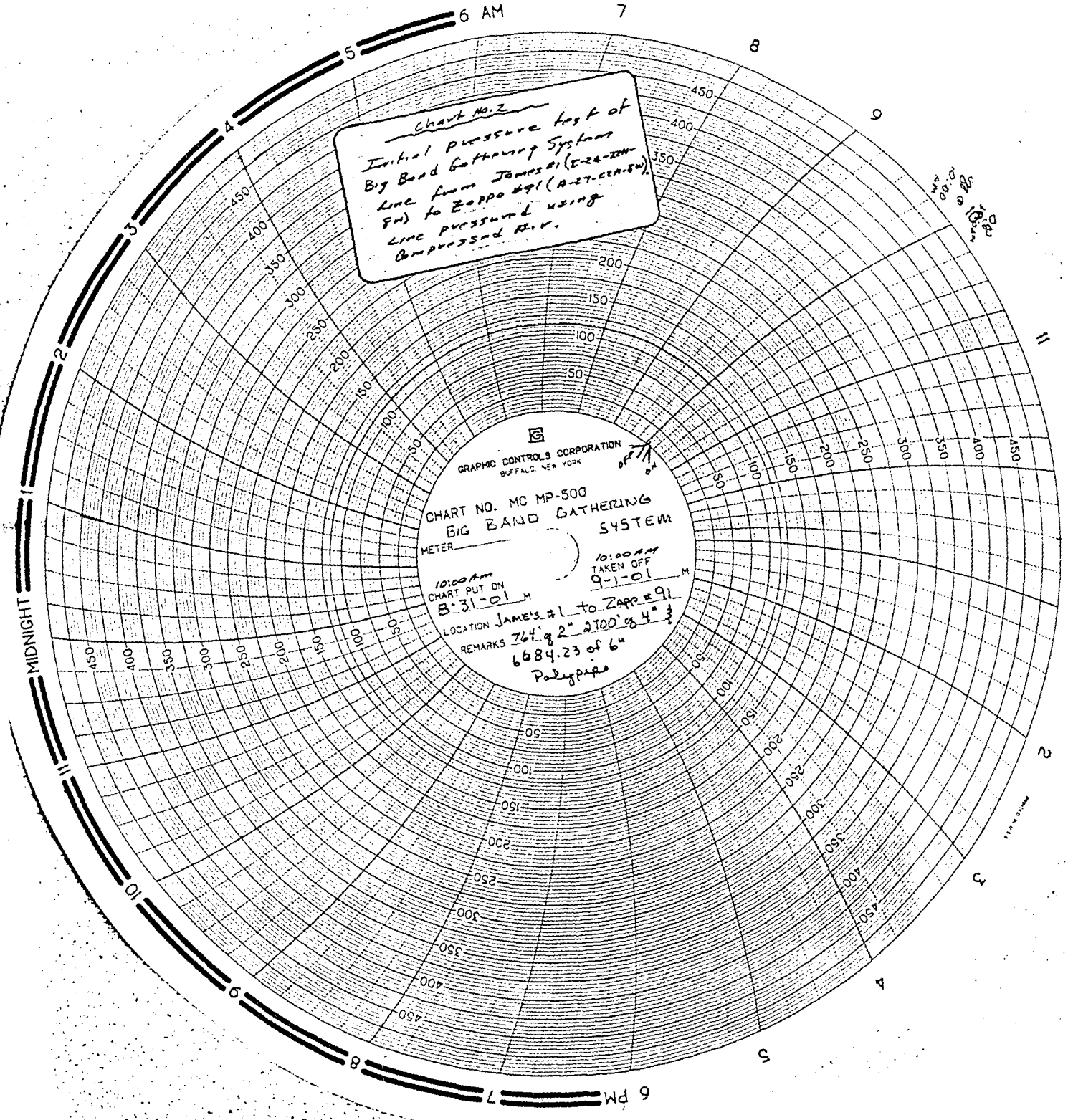


Chart No. 2
Initial pressure test of Big Band Gathering System Line from James #1 (T-24-12N-8W) to Zappo #91 (A-27-12N-8W). Line pressured using Compressed Air.
GRAPHIC CONTROLS CORPORATION
BUFFALO NEW YORK
CHART NO. MC MP-500
BIG BAND GATHERING SYSTEM
METER
10:00 AM
CHART PUT ON
8-31-01 M
10:00 AM
TAKEN OFF
9-1-01 M
LOCATION James's #1 to Zapp #91
REMARKS 764' of 2" 2700' of 4"
6684.23 of 6"
Polypipe
6 AM
NOON
6 PM
MIDNIGHT

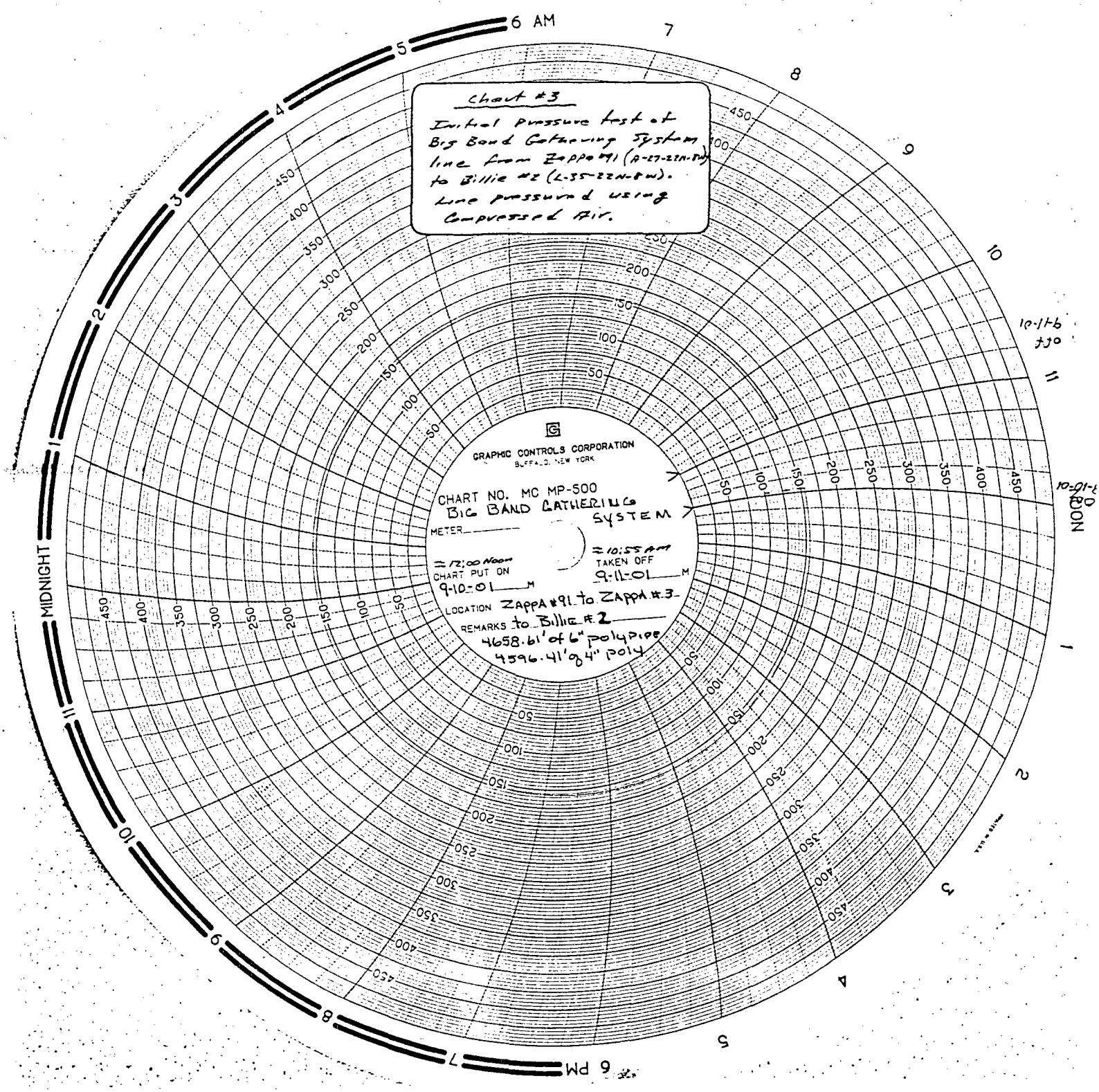


Chart #3
Initial pressure test of Big Bend Gathering System line from Zappa #91 (A-27-22N-8W) to Billie #2 (L-35-22N-8W). Line pressured using Compressed Air.
GRAPHIC CONTROLS CORPORATION
BUFFALO, NEW YORK
CHART NO. MC MP-500
Big Band Gathering Co
SYSTEM
METER
= 12:00 Noon
CHART PUT ON
9-10-01 M
= 10:55 AM
TAKEN OFF
9-11-01 M
LOCATION Zappa #91 to Zappa #3
REMARKS to Billie #2
4658.61' of 6" polypipe
4596.41' of 4" poly
6 AM
MIDNIGHT
6 PM
NOON

dugan production corp.

January 11, 2002

Mr. Jim Lovato
Bureau of Land Management
Farmington Field Office
1235 La Plata Highway
Farmington, NM 87401

HAND DELIVERED

Re: Supplemental Information No. 2
Dugan's Application dated 09/06/01
Proposed Big Band Gas Gathering System
San Juan County, New Mexico

Dear Mr. Lovato:

I'm writing to provide the meter by-pass information requested for your consideration of the captioned application.

The CDP gas sales meter and meter run for Dugan's Big Band Gas Gathering System will be installed, operated, and maintained by PNM. As you've brought to our attention, the CDP sales meter run does have a by-pass, which PNM advises is standard for all PNM meter installations. A by-pass is necessary to safely work on the meter or pressure regulator should either ever need to be repaired or replaced. PNM does not plan to ever use the by-pass, unless there is no other option.

Should it ever be necessary to work on the meter run or metering equipment, PNM would first consider shutting in the gathering system if at all possible. If shutting in the gathering system and all wells connected to it is not feasible, then upon coordinating with Dugan Production, the by-pass will be opened for only the time necessary to perform the required work or maintenance. Gas volumes moving through the by-pass can easily be estimated using flow data from the meter immediately before opening the by-pass and immediately after returning the meter to service. Typically, the by-pass will only be used for very short periods of time, if at all, and any gas volumes not measured, but estimated, will be small.

As an example, should it be necessary to by-pass the meter for 30 minutes (which is a realistic time to perform an inspection or to repair a component), this would represent 2.1% of a day, and assuming an average production volume of 400 mcfd (which is our anticipated initial production), 8.3 mcf will not be measured (of which the royalty share will be approximately 1.0 mcf), but can be estimated with a fairly high degree of confidence using the meter data. Should it be necessary to verify the estimated gas volumes, each well connected to the gathering system will have standard metering equipment, which can be used to support the estimated gas volumes.

PNM has agreed to keep the by-pass valve locked in the closed position. Dugan Production will install seals on the valve and will maintain a log of the seals. Should PNM ever have a need to open the by-pass valve, they will notify Dugan Production prior to opening the valve. We will replace the seal upon closing and locking the by-pass valve.

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It should be noted that PNM is only a transporter for this gas. Dugan will be marketing the gas to a company other than PNM. Thus, it is important to PNM to have accurate determinations of the gas volumes placed into their line in order to receive their transportation fee and to balance the space within their pipeline. Of course, accurate volume determinations are also important to Dugan Production, since this is how we will get paid for not only the BLM's 12-1/2%, but also our 87-1/2%. In addition, it is also important for the purchaser to have accurate volumes because the purchaser can only re-sell gas volumes that they can demonstrate they purchased.

The use of a meter by-pass is fairly common throughout the industry, especially when it is not possible, or is at least undesirable or unsafe, to shut in the site to do such things as equipment maintenance, orifice plate changes, or orifice plate inspections (which are required by Onshore Order No. 5). Without a by-pass, it will be necessary to shut in all wells, pumping units, and compressors upstream of the metering facility in order to do minor maintenance, repair and/or inspection on the metering equipment. Not only will this create a substantial work effort for Dugan Production's field people, but there is always a risk of not being able to restore production after shutting in a well. We typically go to great lengths to avoid shutting in wells unnecessarily.

We respectfully request that the BLM approve the use of the metering facilities proposed by PNM, which includes the use of a meter by-pass. This will allow the safe and efficient operation of the metering facility and will not have a significant affect upon our ability to properly account for volumes of gas produced from wells connected to the Big Band Gas Gathering System. Should you have questions or need additional information, please let me know.

Sincerely,

John D. Roe

John D. Roe
Engineering Manager

JDR:sh

xc: PNM
NMOCD

dugan production corp.

January 16, 2002

HAND DELIVERED

Mr. Jim Lovato
Bureau of Land Management
Farmington Field Office
1235 La Plata Highway
Farmington, NM 87401

Re: Supplemental Information No. 3
Dugan's Application ~~dated~~ 09/06/01
Proposed Big Band Gas Gathering System
San Juan County, New Mexico

Dear Mr. Lovato:

I'm writing to request BLM approval to use a turbine meter for gas measurement at the central delivery (CDP) sales meter for Dugan's Big Band Gas Gathering System. The CDP sales meter is being installed and will be operated and maintained by PNM Gas Services (PNM). The turbine meter is a standard gas measurement method used by PNM and will be used in lieu of an orifice meter, as stipulated in Onshore Order No. 5.

The turbine meter will be a 2" Model 3M1440 Roots Meter, manufactured by Dresser Industries, Inc. This is a positive displacement rotary type device routinely used by PNM for continuously measuring gas. The meter has a maximum operating pressure of 1440 psig (The pressure at our CDP should not exceed 550 psig.). This meter is currently being used by PNM at all other CDP meters on PNM's pipeline. The meter will be equipped with a Bristol Telecorrector, which will have an electronic display for on-site monitoring and will also transmit the flow data to PNM gas control. The meter run will be equipped with a YZ gas sampler, which will continuously sample the gas stream, and will be analyzed monthly by PNM for gas content and heating values. PNM will also continuously monitor the water content and temperature of the gas stream, using a MEECO Accupoint 2 Moisture Analyzer. The meter accuracy curve published by Dresser Industries is attached for your reference. PNM plans to test this meter for accuracy every two years, which is the standard testing frequency recommended for this meter.

In summary, PNM Gas Services is installing their standard CDP Sales Meter for Dugan's Big Band Gas Gathering System. Since the gas will be measured by a Dresser Industries Roots gas turbine meter, we are requesting BLM approval to use an "alternative gas measurement method", in lieu of an orifice meter.

Should you have questions or need additional information, please let me know.

Sincerely,

John D. Roe

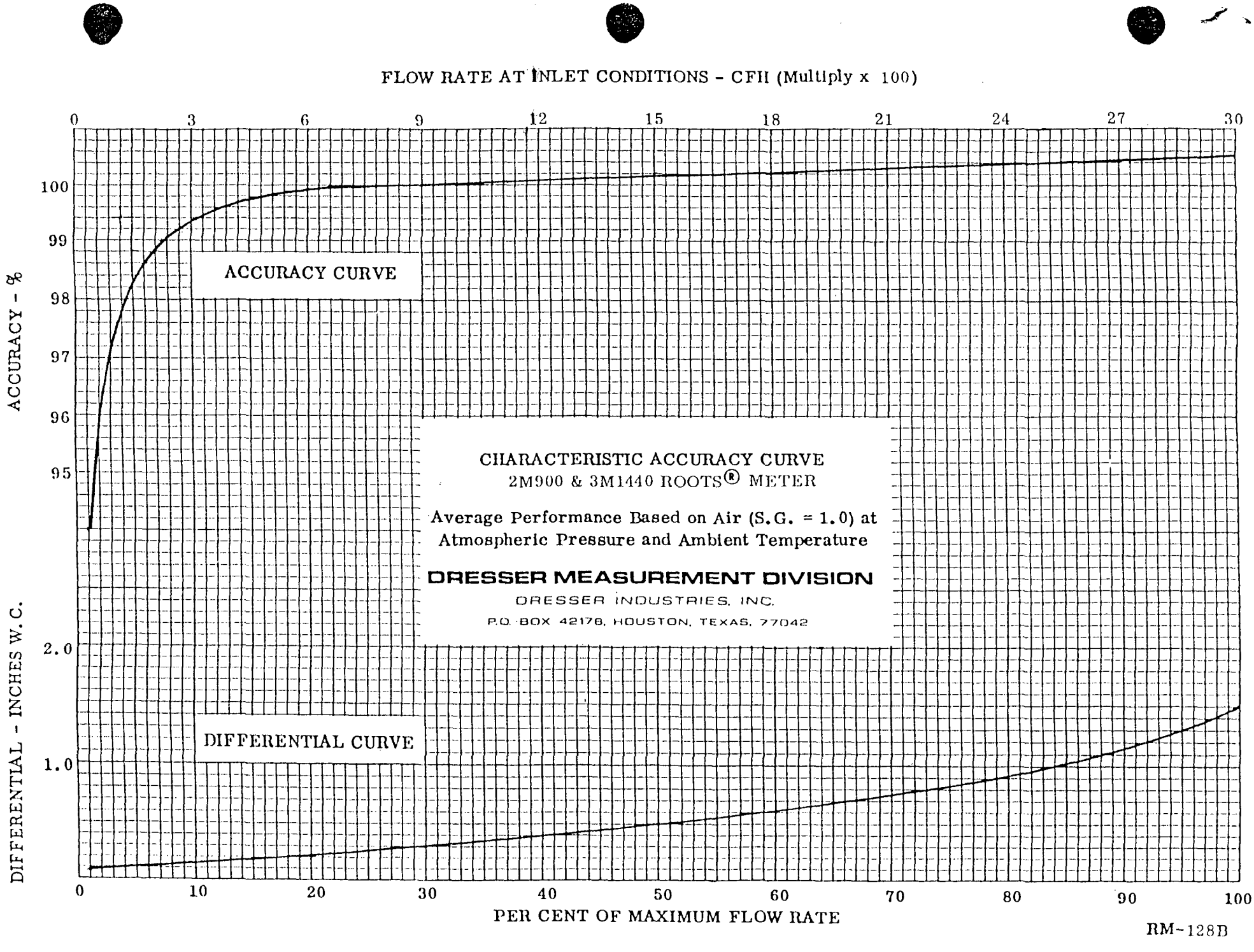
John D. Roe
Engineering Manager

JDR:sh

Attachment

xc: PNM
NMOCD

709 E. MURRAY DR. • P. O. BOX 420 • FARMINGTON, N.M. 87499-0420 • PHONE: (505) 325-1821 • FAX # (505) 327-4613


FLOW RATE AT INLET CONDITIONS - CFH (Multiply x 100)
0
3
6
9
12
15
18
21
24
27
30
100
99
98
97
96
95
2.0
1.0
ACCURACY - %
DIFFERENTIAL - INCHES W.C.
ACCURACY CURVE
DIFFERENTIAL CURVE
CHARACTERISTIC ACCURACY CURVE
2M900 & 3M1440 ROOTS® METER
Average Performance Based on Air (S.G. = 1.0) at
Atmospheric Pressure and Ambient Temperature
DRESSER MEASUREMENT DIVISION
DRESSER INDUSTRIES, INC.
P.O. BOX 42178, HOUSTON, TEXAS, 77042
0
10
20
30
40
50
60
70
80
90
100
PER CENT OF MAXIMUM FLOW RATE
RM-128B

dugan production corp.

January 24, 2002

Mr. Jim Lovato
Bureau of Land Management
Farmington Field Office
1235 La Plata Highway
Farmington, NM 87401

HAND DELIVERED

Re: Supplemental Information No. 4
Dugan's Application dated 09/06/01
Proposed Big Band Gas Gathering System
San Juan County, New Mexico

Dear Mr. Lovato:

I'm writing to correct the meter description presented in Dugan's letter dated 01/16/02 and to provide the additional information you have requested.

In Dugan's 01/16/02 letter, the CDP sales meter was referred to as a turbine meter, which is not correct. The meter to be installed is actually a rotary positive displacement meter. For your reference, Attachment No. 1 is a copy of the 01/16/02 letter on which I've noted these corrections.

In addition, PNM's initial meter design was for a Roots Model 3M1440 rotary positive displacement meter manufactured by Dresser Industries. The meter to be installed is a Roots Model 3M1480 rotary positive displacement meter. PNM advises the 3M1480 is basically the same meter as the 3M1440, but is a newer and improved design with a maximum operating pressure of 1480 psig, rather than 1440 psig for the 3M1440 (the pressure at our CDP should not exceed 550 psig). Attachment No. 2 presents meter specifications and data provided by Dresser Industries. The meter accuracy curve for the 3M1480 meter is presented on Page No. 9 of this attachment and replaces the meter accuracy curve for the 3M1440 meter, which was attached to our 01/16/02 letter.

Regarding PNM's policy on meter inspection frequency, PNM advises their policy is based upon American National Standards Institute (ANSI) Specification B 109.3, which requires rotary positive displacement meters to have an accuracy of ±1% over the range of 10 to 100% of their rated flow volume capacities.

Based upon their many years of experience using rotary displacement meters, not only on the subject pipeline, but all other systems operated by PNM, PNM has established a schedule for inspection frequencies which is based upon gas volumes moving through the meter. Attachment No. 3 is a copy of PNM's policy. This test frequency has proven to be sufficient to maintain the desired ±1% meter accuracy. According to Dresser Industries, considering that the gas being measured from Dugan's Big Band Gathering System will have been dehydrated and filtered prior to measurement, the meter should have little exposure to wear and degradation of metering accuracy. PNM notes that some of their positive displacement meters have been able to operate efficiently for up to seven years between testing. PNM's testing frequency is approved by the New Mexico Public Utilities Commission as being sufficient to provide accurate measurement for the gas markets served by PNM. Attachment No. 4 is a copy of a letter dated 01/21/02 from PNM which addresses their policy on testing. Although PNM considers it to be

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unnecessary for gas measurement accuracy, PNM is willing to test the meter more often, but all costs associated with the additional testing (which are estimated to be in excess of $400 per test) will be charged to Dugan Production. Attached to PNM's letter is a copy of the initial "Prove Test Data" recorded on 01/11/02 for the meter to be installed. The subject meter was tested to be 100.52% accurate at a flow rate of 99.9% of the maximum, and 100.12% accurate at a flow rate of 9.8% of the maximum. Thus, Roots has certified the subject meter to be capable of measuring volumes between 10 and 100% of rated capacities to within a 0.52% accuracy.

Attachment No. 5 presents testing information for Roots rotary meters published by Dresser Industries. This information addresses testing frequency for Roots meters on Page No. 4 and concludes "there are no set time requirements for frequency of differential testing meters... Current information suggests that a five- year interval is usually more than adequate". Table No. 1 of Attachment No. 5 presents the test frequency accepted for use in six states with frequencies ranging from one to five years.

Dugan Production Corp. typically owns 87-1/2% of the gas produced from each of the wells delivering gas into the Big Band Gathering System and is convinced that PNM's use of a rotary positive displacement meter will provide the necessary measurement accuracy to insure proper accountability and will not adversely affect royalty income. In addition, we agree with the two-year test frequency, which has been established by PNM after many years of actual testing on other similar meters on the subject pipeline, as well as other lines throughout the state. Dugan Production intends to equip each well with conventional orifice meters, which will serve as allocation meters and will provide a check of gas volumes moving through the CDP sales meter. Should there ever be any question as to the operation of the CDP sales meter, we will request PNM to verify the meter accuracy, after all 7/8 of the gas belongs to us.

I hope this information will be sufficient for your consideration of our 09/06/01 application for off-lease measurement and surface commingling, plus our 01/16/02 application to use a rotary positive displacement meter for the CDP sales meter.

Should you have any questions or need additional information, please let me know.

Sincerely,

John D. Roe

John D. Roe
Engineering Manager

JDR:sh

Attachments

xc: PNM
NMOCD

dugan production corp.

Attachment No. 1 Pg 1 of 1

January 16, 2002

HAND DELIVERED

Mr. Jim Lovato
Bureau of Land Management
Farmington Field Office
1235 La Plata Highway
Farmington, NM 87401

Re: Supplemental Information No. 3
Dugan's Application dated 09/06/01
Proposed Big Band Gas Gathering System
San Juan County, New Mexico

Dear Mr. Lovato:

I'm writing to request BLM approval to use a turbine* meter for gas measurement at the central delivery (CDP) sales meter for Dugan's Big Band Gas Gathering System. The CDP sales meter is being installed and will be operated and maintained by PNM Gas Services (PNM). The turbine* meter is a standard gas measurement method used by PNM and will be used in lieu of an orifice meter, as stipulated in Onshore Order No. 5.

The turbine* meter will be a 2" Model 3M1440 Roots Meter, manufactured by Dresser Industries, Inc. This is a positive displacement rotary type device routinely used by PNM for continuously measuring gas. The meter has a maximum operating pressure of 1440 psig (The pressure at our CDP should not exceed 550 psig.). This meter is currently being used by PNM at all other CDP meters on PNM's pipeline. The meter will be equipped with a Bristol Telecorrector, which will have an electronic display for on-site monitoring and will also transmit the flow data to PNM gas control. The meter run will be equipped with a YZ gas sampler, which will continuously sample the gas stream, and will be analyzed monthly by PNM for gas content and heating values. PNM will also continuously monitor the water content and temperature of the gas stream, using a MEECO Accupoint 2 Moisture Analyzer. The meter accuracy curve published by Dresser Industries is attached for your reference. PNM plans to test this meter for accuracy every two years, which is the standard testing frequency recommended for this meter.

In summary, PNM Gas Services is installing their standard CDP Sales Meter for Dugan's Big Band Gas Gathering System. Since the gas will be measured by a Dresser Industries Roots gas turbine* meter, we are requesting BLM approval to use an "alternative gas measurement method", in lieu of an orifice meter.

Should you have questions or need additional information, please let me know.

Sincerely,

John D. Roe

John D. Roe
Engineering Manager

JDR:sh

Attachment

xc: PNM
NMOCD

* The word turbine should be replaced with the words rotary positive displacement

709 E. MURRAY DR. • P. O. BOX 420 • FARMINGTON, N.M. 87499-0420 • PHONE: (505) 325-1821 • FAX # (505) 327-4613

DRESSER
Measurement

Attachment No. 2 Pg 1 of 7

TO: John Roe
505-327-4613

Wednesday, January 23, 2002

FROM: Amy Mauney
2135 Hwy 6 South
Houston, TX 77077
P: 281-966-4421
F: 281-966-4721

PAGES: 1 of

RE: 3M1480 Meter information

I have also mailed the originals and an MPS catalog.

DRESSER
Measurement

S:B3-HPC

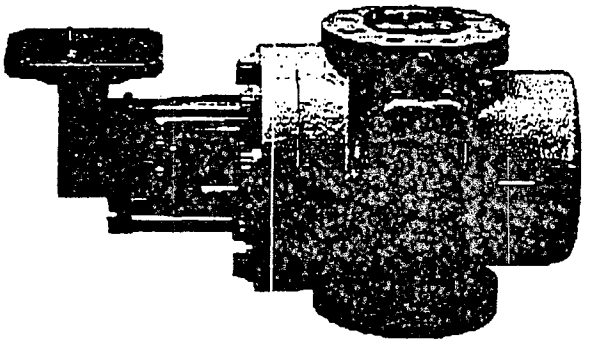
Attachment No 2
Pg 2 of 7

Series B3-HPC ROOTS® Meter

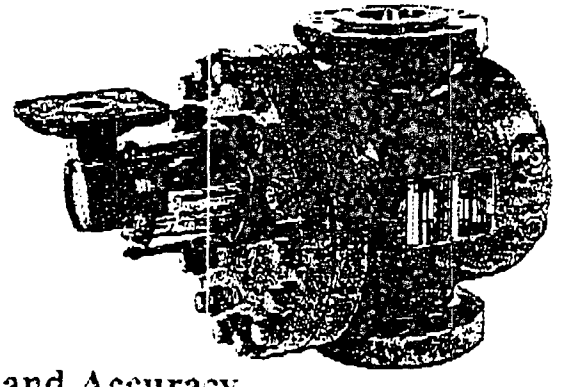
High Pressure Cartridge Meters
1M 740/1480, 3M 740/1480, 5M/7M 1480 MAOP

Introducing new innovations in rotary meter measurement, the High Pressure Cartridge ROOTS® meters in four models.

These advancements to the time tested and accepted ROOTS® meters now provide measurement solutions to other obsolete positive displacement style meters, oversized inferential style meters, or less accurate styles of insertion inferential meters.



- **Cartridge Design**
  - Easy maintenance
- **Internal By-Pass**
  - Full capacity
- **Two castings, 4 sizes**
  - As Needs change
- **Flexibility**
  - Multiple heads
  - Change sizes



- **Improved Rangeability and Accuracy**

DRESSER ROOTS® Meters & Instruments

Attachment NO.2
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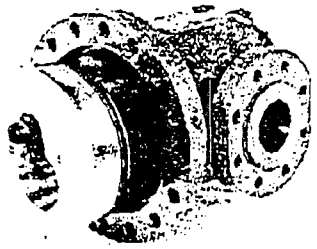
DRESSER ROOTS Meters & Instruments

Series B3
HIGH PRESSURE
Cartridge Rotary Meters

Description



Series B3-HPC High Pressure Cartridge Rotary Meters employ the same positive displacement operating principle in other ROOTS® rotary meters where gas volumes are displaced by two figure 8 impellers rotating in a chamber of known volume. Precision machining to exact tolerances ensures measurement accuracy, while materials of construction ensure measurement performance in the most severe of conditions.

High Pressure Cartridge (HPC) ROOTS® meters utilize 2 common body castings to accommodate 4 meter sizes. The 1M and 3M share a common body with 2" ANSI Class 600 (1480 psig) raised face flanges, or as an option with ANSI Class 300 (740 psig) raised face flanges. 5M and 7M meters share a common body with 3" ANSI Class 600 (1480 psig) raised face flanges.

1M and 3M Measurement cartridges are interchangeable between their common body casting, as are the 5M and 7M versions. This allows the operator to "right-size" the meter for a particular application. Also, cartridges are field replaceable for ease of maintenance.

All Series B3-HPC cartridges have an optional full capacity internal by-pass. Since the by-pass is self-resetting, an optional electronic/mechanical differential pressure sensor is available to indicate if the meter has been in the by-pass mode.

Applications

The High Pressure Cartridge design meters are ideal for gas measurement of low volume applications at high pressures. Recommended applications include:

- Custody transfer (gas distribution, gathering, and transmission systems)
- Town border measurement
- Direct wellhead production measurement
- Gas leg of production seperators and test seperators
- Compressor fuel gas measurement
- High pressure industrial gas measurement.

Standards

As with all ROOTS® meters, the High Pressure Cartridge design meters are documented to ANSI B109.3 specifications for Rotary Type Gas Displacement Meters. Additionally, the High Pressure Cartridge design meters meet NACE Standard MR 111075 for corrosion resistant applications.

Attachment No. 2
Pg 4 of 7

Features

- Full capacity internal by-pass with optional indicator
- Meter body and flanges that are rated at 1480 psig (740 psig optional for 1M and 3M versions).
- Designed to NACE corrosion resistance standards.
- Compatible with a wide assortment of pulsing devices and auxiliary instrumentation for ROOTS® products - see brochures S:SSP, S:VCC, S:RA100, and S:CEX

Advantages

Operating differentials can be monitored while in service.

Positive displacement measurement is not sensitive to the changes in the density of the gas being measured.

Positive displacement measurement is not affected by pulsations in the pipeline.

Positive displacement meters (side or top inlet) do not require a complicated installation since they are not sensitive to velocity profiles.

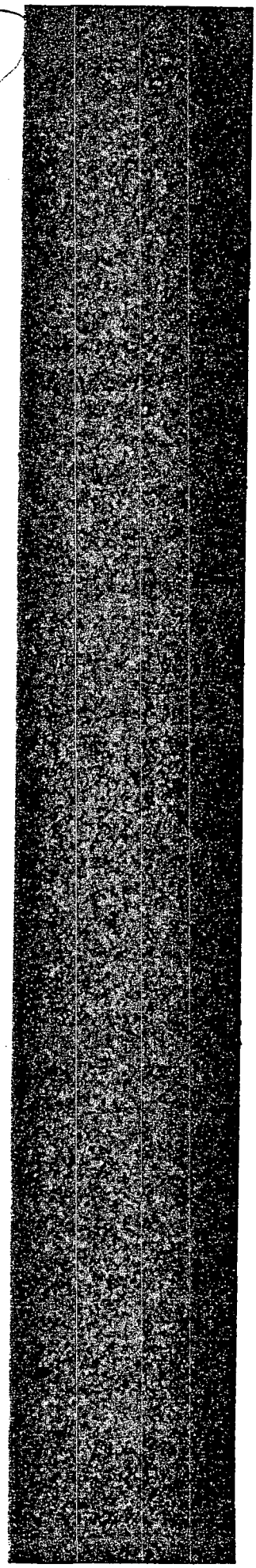
Cartridge design for simplified repair and maintenance. Calibrated cartridges can be installed in the field.

Cartridge design is interchangeable as measurement needs change.

Cartridge replacements typically available within 24 hours.

Technical Specifications :

	1M740/1480	3M740/1480	5M1480	7M1480
Maximum Capacity	1000 cfh	3000 cfh	5000 cfh	7000 cfh
Minimum Capacity	98 cfh	197 cfh	175 cfh	117 cfh
Rangeability ± 1 %	10:1	15:1	28:1	60:1
Oil capacity	4.2 oz (124 ml)	2.8 oz (83 ml)	17.5 (518ml)	13.5 (399ml)
Pressure Rating	ANSI 600 / 1480 MAOP (ANSI 300 optional)	ANSI 600 / 1480 MAOP (ANSI 300 optional)	ANSI 600/1480 MAOP	ANSI 600 MAOP
Connection Size	2" (50 mm)	2" (50mm)	3" (75mm)	3" (75mm)
Temperature Rating	-40°F to +140°F	-40°F to +140°F	-40° F to +140°F	-40° F to +140°F
Piping Configuration	Top or side inlet	Top or side inlet	Top or side inlet	Top or side inlet
Drive Rate	10 cf (1 ml)	10 cf (1 ml)	10 cf (1 ml)	10 cf (1 ml)



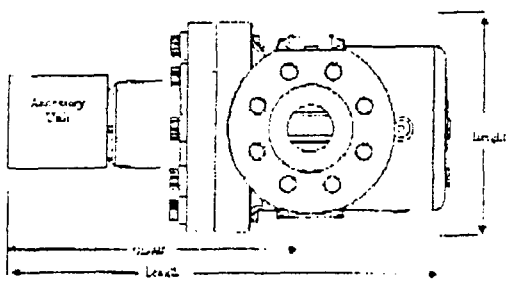
Attachment No. 2 Pg 5 of 7

Compressibility Ratio	Meter Pressure	Maximum Flow Rate	Maximum Flow Rate	Maximum Flow Rate	Maximum Flow Rate
$(Fpv)^2$	psig	scfh	scfd	scfh	scfd
		Performance of 1M 740/1480*		Performance of 5M1480*	
1.0000	0.25	1000	24000	5000	120000
1.0162	100	7930	192480	39460	947040
1.1050	600	46090	1222320	230452	5530848
1.1435	800	63220	1517280	316132	7586712
1.1826	1000	81440	1954560	503103	12081672
1.2212	1200	100680	2416320	606906	14565744
1.2641	1400	121360	2913120	649400	15585600
1.2808	1480	129940	3118560	649704	15592890
		Performance of 3M 740/1480*		Performance of 7M1480*	
1.0000	0.25	3000	72000	7000	168000
1.0162	100	23680	568320	55246	1325904
1.1050	600	138270	3318480	322604	7743216
1.1435	800	189670	4552080	442557	10621368
1.1826	1000	244325	5863800	570089	13682136
1.2212	1200	302240	7252760	704764	16914336
1.2641	1400	364145	8739480	849667	16914336
1.2808	1480	389820	9355680	909586	21830064

*All performance figures are based on P=14.73 psia (101.325 kPa), T=60°F (15°C), and S with AIR as test medium.

Dimensions

Version	Overall Length	Overall Height	Width (flange/flange)	Centerline to Accessory End (CL-AE)	Drawing No
1M/3M					
CTR	16-1/32 407mm	8-5/8 218mm	10-3/4 273mm	10-1/4 260mm	D054757-000
CD	19-27/32 504mm	8-5/8 218mm	10-3/4 273mm	14-1/16 358mm	D054434-000
CPS	18-7/32 462mm	8-5/8 218mm	10-3/4 273mm	12-7/16 316mm	D054758-000
5M/7M					
CTR	19-9/32 490mm	13-1/16 332mm	14-3/4 375mm	12-13/32 315mm	D056135-000
CD	23-3/32 587mm	13-1/16 332mm	14-3/4 375mm	16-13/16 412mm	D056136-000
CPS	21-18/32 545mm	13-1/16 332mm	14-3/4 375mm	14-9/16 370mm	D056137-000



How to Order: Specify Series B3-HPC ROOTS® meter, 1M1480 or 3M1480 (optional: 1M740 or 3M740), 5M 1480 or 7M1480 plus the Accessory Type.

Accessory Types: Series 3 Counter (CTR), Counter with Instrument Drive (CD), or Counter with Solid State Pulser (CPWS - Single Connector, CPWD - Dual Connector, or CPWX - Conduit Connection). For the CD option, specify Top or Side Inlet and Clockwise (E) or Counter Clockwise (A) rotation.

For compatible ROOTS® Accessories, see brochures S:VCC, S:RA-100, S:SSP, and S:CEX.

DRESSER Measurement

Dresser Measurement
P.O. Box 42176
Houston, TX 77242-2176
website: www.DRESSER.com

Dresser, Inc.
Inside US: Ph: 800-521-1114 Fax: 800-335-5224
Outside US: Ph: 281-966-4300 Fax: 281-966-4308
e-mail:DMD_Roots@Dresser.com

Attachment No. 2 Pg 6 of 7

Series B3-HPC
3M1480 ROOTS® Meter

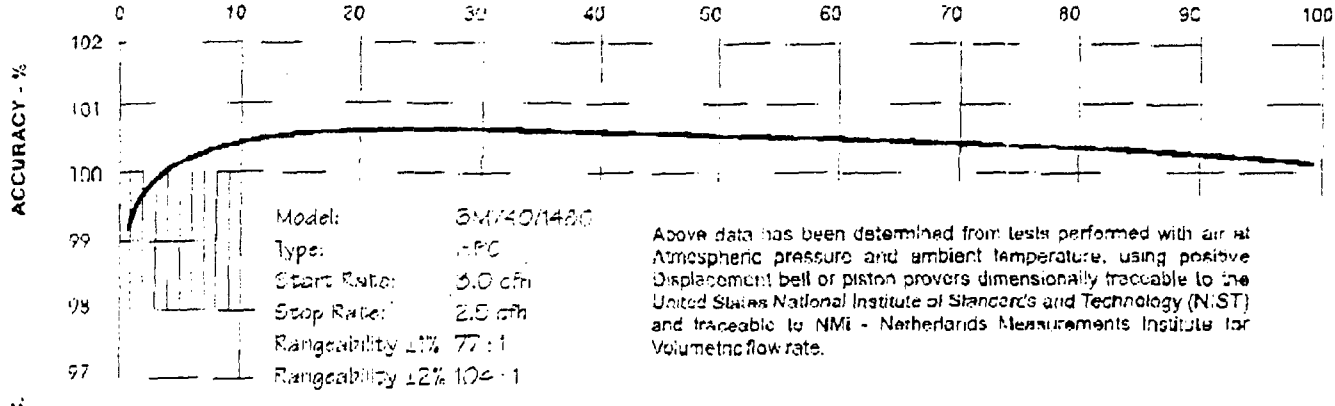
3M1480 Series B3-HPC

	UNITS	Imperial	UNITS	Metric
Temperature Range	Deg. F	-40 to +140	Deg. C	-40 to +60
Base Rating (Q Max.)	acfh	3000	m³/h	85
Max. Operating Pressure (MAOP)	psig	1480	kPa	5102
Leak Test (125% MAOP)	psig	1850	kPa	6378
Static Test (2 x MAOP)	psig	2960	kPa	10204
Rangeability +/- 1%	ratio	77 : 1	ratio	77 : 1
Rangeability +/- 2%	ratio	104 :1	ratio	104 : 1
Start Rate	cfh	2.0	m³/h	0,06
Stop Rate	cfh	2.5	m³/h	0.07
Flow Rate @ 0.5" w.c., Gas	cfh	1860	m³/h	53,0
Differential, 100% Flow	in. w.c.	1.31	mbar	3,3
Max. Pressurization Rate	psig/sec	5	kPa/sec	35
Max. Operating Speed	rpm	2500	rpm	2500
Gear Ratio	ratio	500:1	ratio	500 : 1
Displaced Volume/Rev	cf	0.0200	m³	0,0005786
Drive Rate, CD	cf/rev	10	m³/rev	0,1
Min. Odometer Reading	cf	0.2	m³	0,002
Odometer Turnover	yrs.	3.8	yrs.	3,8
Nominal Pipe Size	in.	2.0	mm	50
Flange-to-Flange	in.	10.75	mm	273
Flange Connection	ansi	600# RF	ansi	600# RF
Bolts per Flange	qty.	8	qty.	8
Bolt Size* *	in.	5/8-11	in.	5/8 - 11
Flange Bolt Hole Depth	in.	1-5/8	mm	29
Torque: Lubricated / Non-Lub.	ft. lb.	378	N-m	506
Restricting Orifice (120%)	in.	.438	mm	11
Oil Capacity - Meter Body				
Side Inlet	oz.	2.9	ml	82
Top Inlet	oz.	8.3	ml	245
Counter Version (CTR)				
Net Weight	lbs.	107	kg	48,5
Shipping Weight	lbs.	132	kg	59,9
Carton Size	in.	26 x 14 x 14	cm	66 x 36 x 36
Counter w/ Inst. Drive (CD)				
Net Weight	lbs.	110	kg	49,9
Shipping Weight	lbs.	135	kg	61,2
Carton Size	in.	26 x 14 x 14	cm	66 x 36 x 36

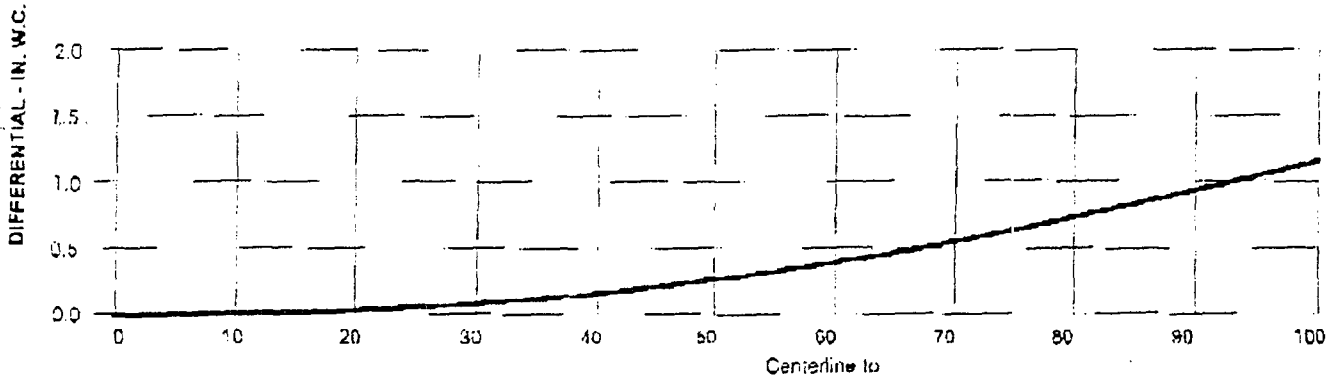
Weights & dimensions available for CPS upon request.

* * Bolt Length varies by application

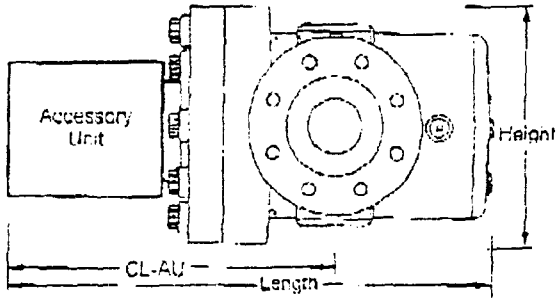
Attachment No. 2 Pg 7 of 7



Above data has been determined from tests performed with air at Atmospheric pressure and ambient temperature, using positive Displacement bell or piston provers dimensionally traceable to the United States National Institute of Standards and Technology (NIST) and traceable to NMi - Netherlands Measurements Institute for Volumetric flow rate.



3M1480 Series B3-HPC	Overall Length inches	mm	Width (Flange/Flange) inches	mm	Centerline to Accessory End (CL-AU) inches	mm	Request Detailed Drawing Number
CTR	16-1/32	407	10-3/4	273	10-1/4	260	D054757-000
CD	19-27/32	504	10-3/4	273	14-1/16	359	D054434-000
CPS	18-7/32	462	10-3/4	273	12-7/16	316	D054758-000
VCC	18-13/32	467	10-3/4	273	12-5/8	321	D054748-000



To order:

Specify, meter Series, Size and Type (i.e., ROOTS Meter Series B3-HPC 3M1480 CTR).
For CD, specify Inlet (Top or Side) and ID Rotation (CW-B or CCW-A)
For Pulser, specify Single or Dual Connectors and Connector Type (Amphenol or Conduit).
For more specific ordering information on the electronic products, request S:SSP or S:VCC.
Contact the factory for other available information, options, or special requests.

DMD DRESSER

ROOTS®
Measurement
Products

DMD DIVISION - MEASUREMENT OPERATION
P. O. Box 42176 • Houston, TX 77242-2176
Tel: 713-972-5000 • Fax: 713-972-5003

DRESSER UK LTD. Warrington Operations
Rufford Court, Hardwick Grange Warrington, Cheshire WA1 4RF
Phone: 44-1925-814545

DRESSER INDUSTRIAL PRODUCTS B.V.
Industrieterrein 4- NL 5981 P. O. Box 7103
NL 5980 AD Panningen, The Netherlands Phone: 31 7750 77122

Attachment No. 3
PSI-051

PNM®

Gas Measurement Policies and Procedures

Revised January 2001

3. Blow down all filters, separators, drips, control lines, and similar items where dirt or liquid may collect. Inspect filter elements and clean or replace as necessary. Inspect strainer screens for damage or erosion and clean or replace as necessary.

4. Check miscellaneous station equipment for hazardous conditions, leaks, and proper operation.

5. Check regulators, relief valves, vent stacks, and safety equipment to ensure they are protected from dirt, liquids, or other conditions that might prevent proper operation.

6. All district regulator stations and border stations are required to have signs on at least two sides facing outward. The signs must be current PNM warning signs with a 24 hour emergency number and a "Call Before You Dig" phone number shown on the signs.

Diaphragm, Rotary, Turbine Meter Testing and Inspection

Test meters in place or change out for shop testing at the following time intervals:

Meter Capacity (measured in cubic feet per hour)	Test Period
0 - 300 cfh	*
301 - 900 cfh	7 years
901 - 1150 cfh	5 years
1151 - 1999 cfh	3 years
2000 - 4000 cfh	2 years
4001 cfh and over	1 year
Orifice/Ultrasonic Meters	3 months
Correcting Instruments	1 year**

3M 1440 →

8C
1M, 60B
1.5M, 80B, 140 #L
3M, 250B, 250 #L
5M →, 500B, 11M, RB

* Change out residential size meters according to the Gas Meter Performance Control Program administered by the Manzano Meter Shop.

** Correcting instruments on high-consumption installations must be calibrated whenever the meter is field tested.

Meters on border stations, district regulator stations, mainline check meters, and interconnect check meters are to be tested according the schedule shown above.

Orifice Meter Inspection

Meter tubes should be internally inspected periodically because surface irregularities can occur. Accumulation of foreign substances or factors resulting in surface roughness inside the meter tube can materially affect measurement accuracy.

The condition and internal diameter of the meter tube must be inspected for internal pitting or surface roughness immediately prior to installation at a

Public Service Company of New Mexico
P.O. Box 4750
603 W. Elm St.
Farmington, New Mexico 87499
505 324-3752
505 325-7365 Fax
E-Mail: RDembow@pnm.com

Rich Dembowski
District Engineer

Attachment No. 4
PS 1 of 2

PNM

January 21, 2002

Mr. John Roe
Dugan Production Company
P.O. Box 420
Farmington, NM 87499-0420

VIA FAX 327-4613

RE: Roots 3M1440 Rotary Positive Displacement Meter

Dear John:

I had previously provided you with manufacturer and company information concerning rotary meter calibration/inspection frequencies. PNM Company Policy is based upon ANSI Specification B 109.3 covering rotary type gas displacement meters. This ANSI standard is approved by both the Office of Pipeline Safety (Department of Transportation) and the New Mexico Public Utilities Commission. These two entities, rather than the BLM, regulate PNM.

Our inspection frequency, based upon usage/flow rate will be 1-5 years, and will be once every two years for this meter. Any additional inspection would require a full man day per inspection and would result in a minimum charge of $400.00 per inspection to meet anyBLM requirements over and above the two year inspection frequency. Dugan Production would be required to pay these charges. Note that the inspection standard is based upon the prover test data standards submitted by the manufacturer (see attached copy). This standard is ½ of 1% (0.5%). Any variation would require a meter replacement.

Note that flow tolerances of 0.5% are significantly higher than the standard orifice meter (2-5% variances are normal). If the BLM is actually concerned with royalty accounting, this type of installation is more accurate and reliable and less likely to introduce errors into the royalty accounting system.

If I may be of further assistance please feel free to call.

Sincerely,

Richard K. Dembowski
District Engineer

Attachment: AS

Cc: Ms. Diana Luck

DRESSER DMD ROOTS
DMD Roots Division
Dresser Equipment Group, Inc

ROOTS® Meters & Instruments
2135 Hwy 6 S., Houston TX 77077
Ph: 800.521.1114 Fx: 800.335.5334

Attachment No. 4
Page 1 of 2

DM QA 9

Date Printed : 11-JAN-02
Bill of Material : 053465-023
Model : 3M1480
Serial No. : 0149963
Accessory S/N :
Sales Order No. : 126554-1
Spec. Req. No. :
Prover Used : 50 cu. ft.

Unit Description

3M1480 SSM, SERIES B3-HPC ROOTS METER, COUNTER WITH INSTRUMENT DRIVE VERSION

Customer Information
Name: PNM GAS SERVICES
PO No. : 00031173
Badge No. : NONE

MIN STATIC TEST PRESSURE	MIN LEAK TEST PRESSURE	MAX ALLOWABLE OPER PRESSURE
2960 psig	1850 psig	1480 psig

TC Acc at (deg. F)	Accuracy	Proof	% Error

This meter has been tested and successfully passed a Shell Pressure Test and Leak Test at the above condition.

P R O V E R T E S T D A T A

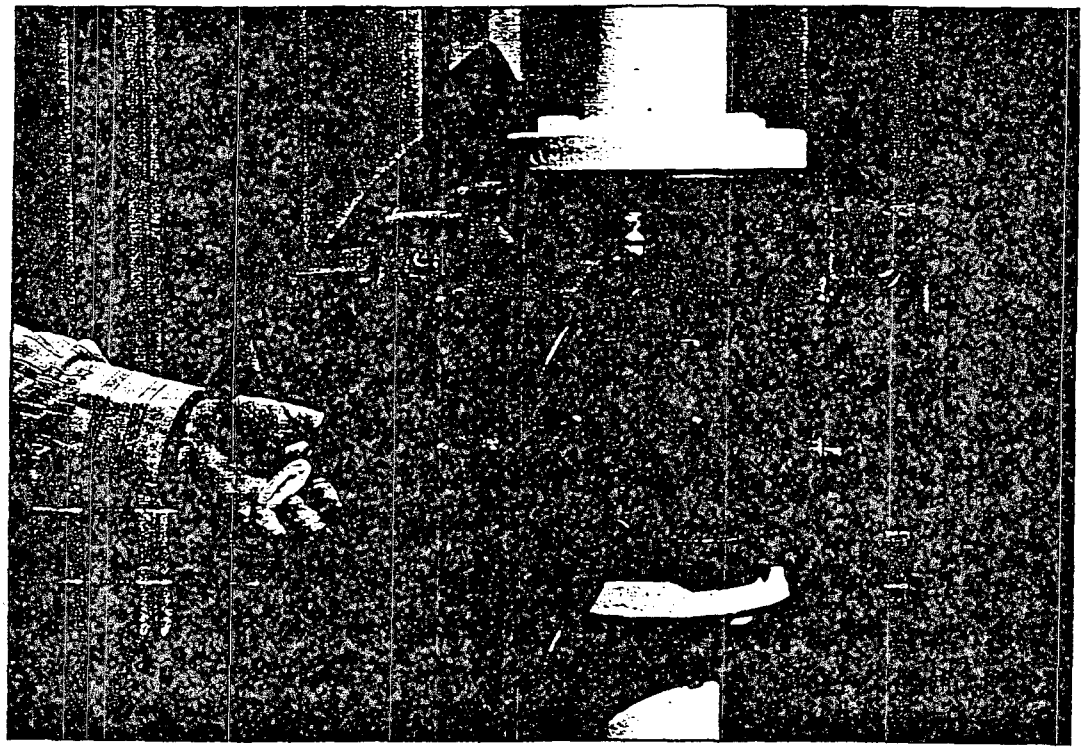
Test Point	Flow Rate Disp. Vol. cfh	% Rated Capacity	Meter Accuracy %	Error +/- %	Diff Pressure in. w.c.	TC Meter Accuracy %	TC Meter Proof %	Error +/- %
01	2997.1	99.9 %	100.52	0.52	1.31			
02	294.0	9.8 %	100.12	0.12	0.05			

Above data has been determined from tests performed with air at atmospheric pressure and ambient temperature, using positive displacement bell or piston provers dimensionally traceable to the United States National Institute of Standards and Technology (NIST) and traceable to NMi - Netherlands Measurement Institute for volumetric flow rate. This meter conforms to purchaser specifications.

Test date 11-JAN-02 by BUSHART, DAVID

Attachment No. 5
Pg 1 of 4

Differential Testing of Roots® Rotary Meters



ROOTS DRESSER

DRESSER MEASUREMENT DIVISION
DRESSER INDUSTRIES, INC.

Attachment No. 5
Page 1 of 4

Introduction

During the more than half century history of ROOTS rotary gas meters, a variety of different field tests have been employed for field testing the meters. Perhaps the oldest and most efficient method of field testing ROOTS meters is by measuring the pressure drop from the inlet of the meter. This process is known as differential testing.

Variables Affecting Meter Accuracy

History shows us that rotary meter accuracy remains relatively constant. In fact, the U.S. National Bureau of Standards reported in 1946 in its paper No. 1741 entitled "Testing Large Capacity Gas Meters" that the accuracy of a rotary meter is non-adjustable. There are no linkages, cams, valves or parts which can be used to adjust or change the meter accuracy. The meter has fixed, non-wearing and non-contacting internal parts in the measuring chamber, and the static volumetric displacement is constant. Therefore, only three possible variables exist which will affect meter accuracy: 1) change in static displacement, 2) enlarging meter clearances, 3) increase in the meter's internal resistance. Research paper No. 1741 states on page 187: "The static displacement of a rotary gas meter appears to be almost unaffected by deposits, even those resulting from unpurified gas. Hence, having once been determined, it wil seldom be redetermined."

It is also known that clearances do not change between the impellers and cylinder. Hence, there is no wearing of parts or change in clearances.

However, the third variable, change in the meter's internal resistance, can affect rotary meter accuracy. Any significant increase on the meter's internal resistance to flow will increase the pressure drop across the meter, thereby increasing the differential. Principal causes of internal resistance are: binding of impellers, dirt, worn bearings and too heavy or too much oil. Therefore, the meter differential pressure appears as a prime indicator of meter condition.

Differential Testing

A differential test consists of a series of differential pressure readings taken across the meter at several gas flow rates, within the meter's range of capacity. It should be performed when the meter is initially installed, under actual conditions of gas flow rate, line pressure, and specific gravity that will exist during service (25% to 100% of meter rating). This is particularly important when line pressure will be higher than 15 PSIG, so that direct comparison with later tests can be made.

To make a differential test, pressurize the meter by slowly opening the inlet and discharge line valves. Adjust the bypass and inlet valves until the meter is operating at some selected flow rate in the lower range of its capacity. With flow stabilized, time the passage of a predetermined volume of gas as registered on the counter or instrument, and record the differential pressure reading. Repeat the test to obtain an accurate average reading. Also record the line pressure.

It is advisable to construct a graph and plot a point for each differential at each level of capacity tested. Three points are required within the 25% to 100% range to establish an accurate curve. From the registered volumes and times, calculate the gas flow in displaced CFH and plot a curve matching the differential versus flow rate. (See figure 2, back cover)

Below 15 PSIG the field tests on gas can, for all practical purposes, be compared directly with Factory test results on air. These test results can be obtained from either an individual Prover Test Curve or Characteristic Accuracy and Differential Curves, available from the factory. This latter differential data for ROOTS meters has been established from a comprehensive study of meter data. Although accuracy cannot be directly determined by a differential test, test results have shown that an increase of up to 50% in differential pressure can be tolerated without affecting meter accuracy at the higher flow rates (25% and above) by more than 1%.

Figure 2 for example, shows the possible results of a differential test performed five years later on the same meter at the same line pressure at similar capacities. In the comparison, notice that differential pressure has increased slightly, but is still within the acceptable range of a 50% increase. This slight differential pressure increase is due to a small amount of internal resistance.

Figure 2 also shows the hypothetical results of a differential test performed on the same meter under the same condition of pressure in its 10th year of use. The differential increased by more than 50% of the initial test results derived at the installation. These results would therefore be unacceptable.

If the differential is found to be more than 50% higher than the initial test, the first step is to flush the metering chamber with kerosene or some other approved solvent. Dust and material tend to collect on impeller and cylinder surfaces which generally causes a higher differential pressure. A simple flushing may easily remove the material and bring the meter back into specification. Figure 2 also shows the results of flushing the meter and a reduction of differential pressure to an acceptable level.

Differential Testing Equipment

A differential test requires only a pressure gauge, a manometer, or equivalent differential pressure gauge, and a stop watch for timing the dial rate of the meter. The manometer should be suitable for the maximum operating line pressure and it should be readable to 0.1 inches water column. (See Figure 1)

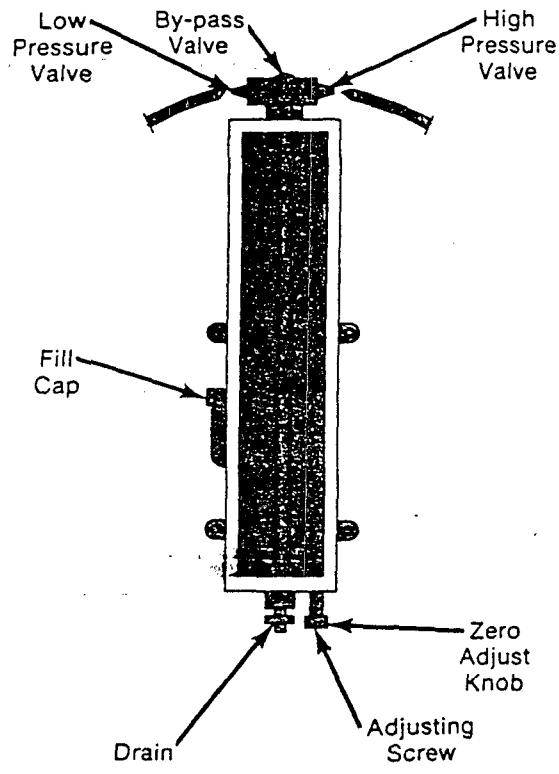
The range of the manometer or gauge is important since the valves of the differentials are often relatively small. An inclined manometer is desirable to get good readings of small differentials.

Permanent valves or appropriate fittings are often mounted on the meters to reduce connection and test time. Meter forms or graphs for logging the readings are used by some companies to provide simple data comparison.

The training of test personnel is important to assure good field results. These personnel may test many rotary meters before finding one needing attention, and they must remain alert to detect significant results.

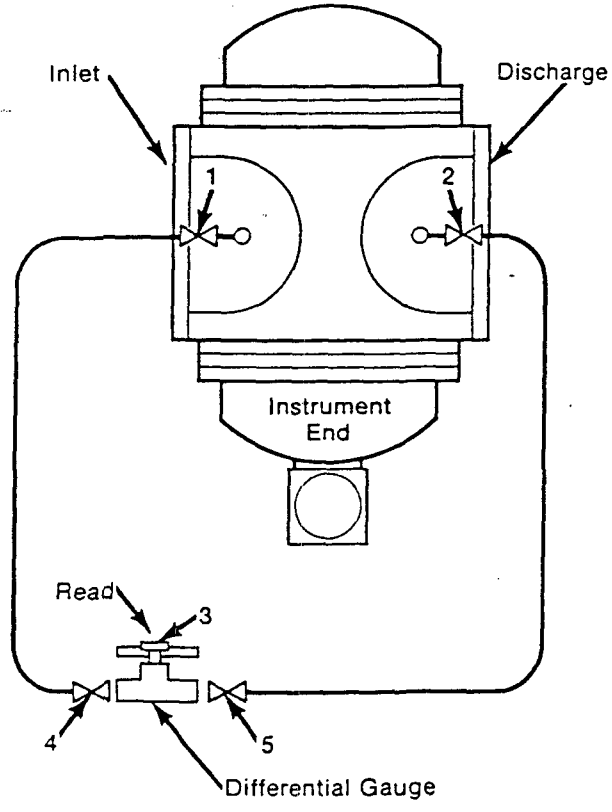
Attachment No. 5
Pg 3 of 4

Figure 1



Differential Gauge Filling & Calibration

1. Open high and low pressure valves.
2. Close by-pass valve.
3. Remove fill cap with wrench provided in case.
4. With adjusting screw flush with bottom of adjusting knob, fill gauge to zero mark. If over or under-filled, gauge may be calibrated with adjusting knob.
5. Replace fill cap and gauge is ready for operation.
6. Before closing case after each test be sure that high and low pressure valves are closed and that hoses, wrench, and oil container are secured in holders.
7. Prior to any subsequent operation after initial filling, open high and low pressure valves and gently blow through each hose to return fluid to zero position.



Differential Gauge Operation Instructions

A. Connect the high pressure hose of the gauge to the inlet valve 1.
B. Connect the low pressure hose of the gauge to the discharge valve 2.
C. Open the gauge by-pass valve 3, then open the gauge high pressure 4 and the gauge low pressure 5 valves.
D. Slowly open the inlet and discharge valves 1 & 2 simultaneously.
E. Close the gauge by-pass valve 3 and take the required readings.
F. To disconnect the differential gauge, open the gauge by-pass valve 3.
G. Close the inlet and discharge valves 1 & 2.
H. Remove the high and low pressure hoses, allowing the pressure to bleed off slowly.
I. Close the gauge valves 4 & 5.
J. Replace caps on meter valves.

Attachment No. 5
Pg 4 of 4

Frequency of Differential Testing

It is recommended that the meter be checked periodically for change in differential. There is no set time requirements for frequency of differential testing meters, but Table I shows the states which have formally accepted differential testing and the time intervals pertaining to the testing. Current information suggests that a five year interval is usually more than adequate.

Conclusion

It has been found over decades of experience that differential testing is an effective method of detecting changes in meter condition. At present, the most effective differential comparison appears to be directly with the initial field data, although factory supplied characteristic data may also be used.

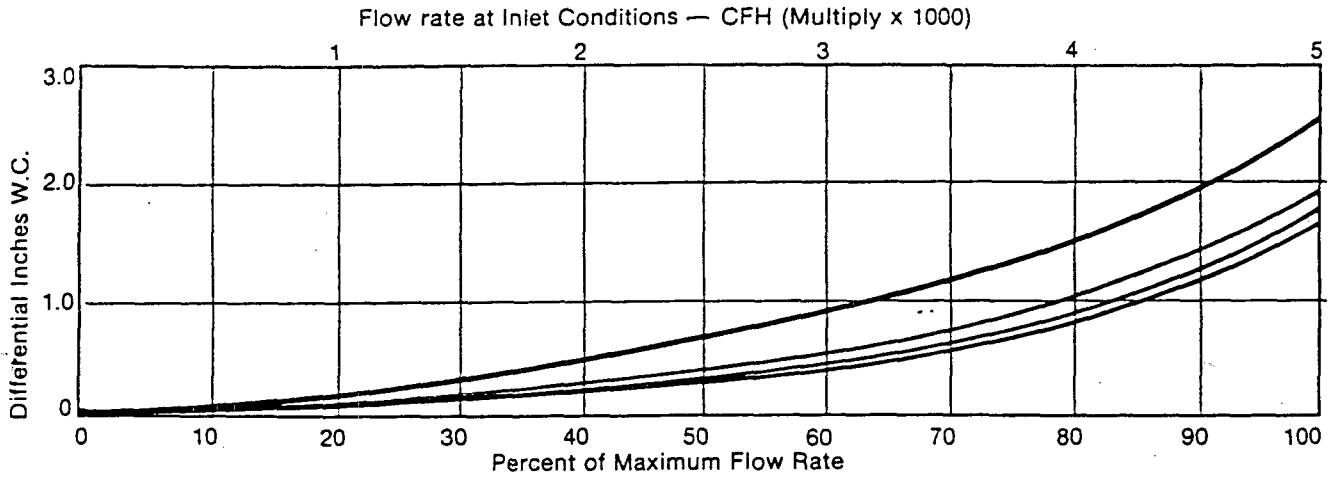
Other progress in differential testing is expected as better testing standards are developed and the benefits of experience are realized.

Table I

The differential rate test is used in all states and in countries throughout the world. In addition to Canada, which has formally approved this test, the following states have formally ruled on the differential rate test period:

State	Commission Reference	Time Interval
Illinois	Rule 8	5 years
Iowa	Para. 19.6 (5)	2 years
Maryland	Order # 56487, Rule 607.7	2 years
Pennsylvania	Rule 11	2 years
West Virginia	Rule 27	1 year
Wisconsin	Rule 134.30 (4)	4 years (less than 15,000 CFH) 2 years (over 15,000 CFH)

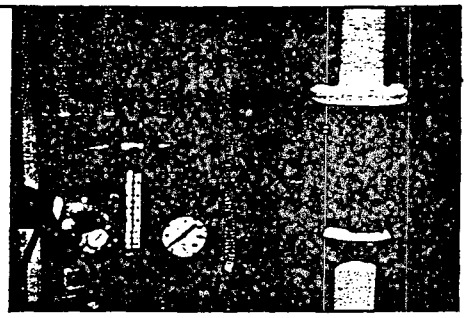
Figure 2



Differential-Rate Test Data

Meter Model 5M125 Mfg. Serial No. 6500321 Utility Serial No. _____
Location _____ Date Installed 1/1/65 Register Reading _____

Line Press.	Gas Temp.	Sp. Grav.	Volume Measured	Run Time	Rate CFH	Diff. Pressure ins. W.C.	Diff. Pressure % Chg.	Date	Tester
Initial Tests - New Meter									
2 PSIG	60°F	.6	10 cf	28.8s	1250	.1	—	1/1/65	
2 PSIG	60°F	.6	10 cf	14.4s	2500	.3	—	1/1/65	
2 PSIG	60°F	.6	10 cf	7.6s	4750	1.3	—	1/1/65	
Periodic Check Tests									
2 PSIG	60°F	.6	10 cf	28.8s	1250	.14	40	1/1/70	
2 PSIG	60°F	.6	10 cf	14.4s	2500	.4	33	1/1/70	
2 PSIG	60°F	.6	10 cf	7.6s	4750	1.5	15	1/1/70	
2 PSIG	60°F	.6	10 cf	28.8s	1250	.2	100	1/1/75	
2 PSIG	60°F	.6	10 cf	14.4s	2500	.7	233	1/1/75	
2 PSIG	60°F	.6	10 cf	7.6s	4750	2.2	169	1/1/75	
2 PSIG	60°F	.6	10 cf	28.8s	1250	.12	20	1/2/75	
2 PSIG	60°F	.6	10 cf	14.4s	2500	.35	16	1/2/75	
2 PSIG	60°F	.6	10 cf	7.6s	4750	1.4	7	1/2/75	



For additional information, write or call our general office.

DRESSER MEASUREMENT DIVISION
DRESSER INDUSTRIES, INC.
Post Office Box 42176
Houston, Texas 77042
(713) 972-5000 Telex 762-387

ROOTS DRESSER

10M-10/79-B6

→ charged to 800-521-1119

dugan production corp.

February 5, 2002

HAND DELIVERED

Mr. Jim Lovato
Bureau of Land Management
Farmington Field Office
1235 La Plata Highway
Farmington, NM 87401

Re: PNM Meter Test Report
Dugan's Big Band CDP Sales Meter

Dear Mr. Lovato:

Attached is the Meter Test Report prepared by PNM reflecting their verification of the meter accuracy for the Roots 3M/1480 Rotary Positive Displacement Meter installed as the CDP sales meter on Dugan's Big Band Gas Gathering System. This test was taken on 02/04/02, just prior to commencing delivery of gas into PNM's pipeline at 2:00pm.

According to PNM's tester, Mr. Ron Hickey, the meter was tested to have an accuracy of 99.5 to 99.8% at rates of 300, 600, and 3,000 cubic feet/hour. In addition, at the rates of 300 and 3,000 cubic feet/hour, differential pressures of .04 and .60, respectively, were observed, both of which are within the manufacturer's recommendations and will establish the initial differential pressures to be used for monitoring future meter performance.

PNM has not yet designated a unique meter number; however, the serial number for this meter is 0149963. Upon receiving the meter number, I will forward it to you.

Please let me know if you have questions or need additional information.

Sincerely,

John D. Roe

John D. Roe
Engineering Manager

JDR:sh

Attachment

xc: PNM

709 E. MURRAY DR. • P. O. BOX 420 • FARMINGTON, N.M. 87499-0420 • PHONE: (505) 325-1821 • FAX # (505) 327-4613

POSITIVE METER TEST REPORT

Form 755-047 Rev. 08/2000

Related Policies: MP-03; M-013; M-014; M-015; M-016; M-023

CUSTOMER DATA

Test Type (Check all that apply): Annual Prover Test ☐ Annual Press. Factor Check ☐ Instrument Calibration ☐ Turbine Spin Test ☐ Differential Test ☐

Public Service Company of New Mexico
503 W. Elm - P.O. Box 1750
Las Cruces, NM 88004

Customer Premise No.

Customer or Station Name: Bill Baird (Dugan Delivery)

Date: 02/04/02

Address: Fax 505 325-7365

Sta #

Town

Corr Rdg

Working Press.	Flowing Press.	Contract Hour	Base Press	Uncorr Rdg
1480			14.73	

METER TEST DATA

Transfer Prover	Meter Found			Meter Left		
Flow Rate (CFH)	300		3000			
Prover Reading	N/A		N/A			
Prover Correction	N/A		N/A			
Pressure Correction	.10		1.3	SAME		
Temperature Correction	.60		.40			
Corrected Readings	N/A		N/A			
Percent Error	.5		.3			
Proof	99.5		99.7			

Rotary Meter Differential Test	FOUND			LEFT		
	Flow Rate	Ideal Diff.	Act. Diff	Flow Rate	Ideal Diff.	Act. Diff
Open Flow Rate	3000	1.31	.60			
Intermediate Flow Rate				SAME		
Check Flow Rate	300	.05	.04			

Data to be Entered into Banner

Serial Number	0149963
District-Town Code	7036
Make-Size Code	104-91
Year Last Tested	01
Year Diaphragms Installed	01
Year Meter Purchased	01
Reason Tested	1
Dial Reading Found CCF	
Found Open Proof	997
Found Check Proof	995
Type Repair	6
Dial Reading Left CCF	

PNM

Turbine Meter Spin Test

Meter Make

Model

Req'd Spin Time-Secs

Visual Rotor Inspection OK Not OK

Lubrication OK Not OK

Actual Spin Time: First / Second / Third

INSTRUMENT DATA

Make	Model	Serial #	Temp Range to °F	Cu Ft/Cycle	Base Pressure–psia
			Press Range to psig	Battery Changed YES ☐ NO ☐	

Dead Weight Gauge Press	Pressure Element Found	Pressure Element Left	Test Temp.	Temp Element Found	Temp Element Left	Test Range	Counter Reading Found	Counter Reading Left	% Error + or -	FPV Included in Instrument Calibration	Verification of Instrument Calculation Accuracy
										YES ☐ NO ☐	YES ☐ NO ☐
											Date & Time Current YES ☐ NO ☐

METER FACTOR

Pressure Correction Factor	Factor Required?	Meter Pressure	Proper Factor	FPV Included in Pressure Factor	Meter k-Factor: Cubic Feet per Pulse
	YES ☐ NO ☐	psig		YES ☐ NO ☐	

OFFICE

Year Repaired and Proof Readings Updated in Banner Meter Inventory	Billing Information Checked For Pressure Factor	Customer Consumption History Checked for Reasonableness.	Customer Bill Correction (Average Error)
Date: By:	YES ☐ NO ☐	YES ☐ NO ☐	%

RECEIVED FEB 2002

REMARKS

Witness: Company: PNM Measurement Tech: Rachel M. Hicks

PLC-191

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Farmington Field Office
1235 La Plata Highway, Suite A
Farmington, New Mexico 87401

IN REPLY REFER TO:
3162.7-3
Big Band Gas Gathering System

FEB 15 2002

Mr. John Roe
Dugan Production Corporation
P.O. Box 420
Farmington, NM 87499

Dear Mr. Roe:

Reference is made to your application for surface commingling and off-lease measurement and sales of gas from your Big Band Gas Gathering System (BBGGS). You propose to measure and sell gas at the Public Service Company of New Mexico (PNM) metering facility located in the:

NENE sec. 27, T. 22 N., R. 9 W., San Juan County, New Mexico.
Meter Serial No. 0149963

See the enclosed list for wells included in the BBGGS.

Your application indicates that measurement at a centralized location is necessary to effectively and economically operate these wells and extend the economic life of the properties. We have reviewed your application and the supplemental information you supplied and concur with these findings. In addition, your supplemental information indicated that PNM will be using a Roots rotary positive displacement meter with a digital read out. This meter has an accuracy of +/- 1% over the range of flow rates anticipated from the gathering system. A review of the meter documentation, standards, and validation requirements indicates that to properly validate the meter accuracy, both upon installation and periodically thereafter, a meter bypass is necessary to regulate incremental flow rates across the meter. Pursuant to Onshore Order Nos. 3 and 5, meter bypasses are not allowed without special consideration of relevant factors.

After careful consideration, you are hereby authorized to commingle, measure and sell natural gas off lease at the PNM facility referenced above. The effective date of this authorization is February 4, 2002, the date acceptable meter validation results were determined. Commingling, measurement, and sales at this facility will be based on the procedures outlined in your application. The following are conditions of this approval:

- Dugan Production Company will be required to install a seal and maintain a seal record for any and all activities on the meter bypass valve. Failure to maintain these records will result in immediate rescission of this approval.

- Based on the results of the meter validation conducted February 4, 2002, the Roots PD meter must be validated at least biennially with the results filed with this office 30 days thereafter. Contact the Bureau of Land Management so a representative can be present to witness the meter validation.

- Allocation methodology must be made on an MMBTU basis. By March 15, 2002, file a report of wellhead versus allocated volumes and MMBTUs for each well under this approval. This report must include the previous month's production for our review.

- Measurement of natural gas at the PNM facility must be conducted in accordance with the requirements outlined in Onshore Order No. 3, Site Security and Onshore Order No. 5, Gas Measurement.

- In order to prevent waste and conserve natural gas, periodic review of each well's venting procedures must be conducted in accordance with the requirements outlined in NTL-ADO-93-1.

- No other wells can be added to this system of measurement without the prior approval of this office. Contact this office in the event of any lost or vented hydrocarbons between the wells and the PNM facility.

Failure to maintain and operate this facility in accordance with the conditions outlined above may subject this approval to immediate rescission. In addition, this office reserves the right to rescind this approval should future evaluation of this method of measurement indicate that federal royalties would be reduced. Long term shut-in provisions for any well committed to this system will cease within 30 days of the effective date of this approval.

If you have any questions regarding the above please contact me at (505) 599-6367.

Sincerely,

/s/ Jim Lovato

Jim Lovato
Senior Technical Advisor,
Petroleum Management Team

1 Enclosure:
1 - List of Contributing wells

cc:
NMOCD, Santa Fe
NMOCD, Aztec

Big Band Gas Gathering System CDP
Well List

Well Name and No.	API No.	Lease No.	Formation	Location
Billie No. 2	3004523386	NM-8902	Chacra	NWSW Sec. 35, T. 22 N., R. 8 W.
Dorsey No. 1	3004529909	NM-90472	Chacra	SENW Sec.26, T. 22 N. R. 8 W.
Ellington No. 2	3004529907	NM-94067	Chacra	SESW Sec.26, T. 22 N., R. 8 W.
Goodman No. 2	3004529191	NM-90471	Chacra	NWSW Sec.23, T. 22 N., R. 8 W.
Goodman No. 3	Pending	NM-90471	Chacra	NESE Sec.23, T. 22 N., R. 8 W.
James No. 1	3004529910	NM-93253	Chacra	NESE Sec. 24, T. 22 N., R.8 W.
James No. 2	Pending	NM-93253	Chacra	NWSW Sec. 24, T. 22 N., R.8 W.
Zappa No. 3	3004529908	NM-57445	Chacra/ Fruitland Coal	SESE Sec. 27, T. 22 N.R. 8 W.
Zappa No. 91	3004529997	NM-57445	Fruitland Coal	NENE Sec. 27, T. 22 N., R. 8 W.