Denver Metropolitan Area and North Front Range 8-Hour Ozone State Implementation Plan

Technical Support Document For Proposed Pneumatic Controller Regulation



DRAFT

November 5, 2008

Colorado Department of Public Health and Environment Air Pollution Control Division 4300 Cherry Creek Drive South Denver, Colorado 80246 Colorado Department of Public Health and Environment / Air Pollution Control Division

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Colorado Department of Public Health and Environment / Air Pollution Control Division

1. Proposed Regulation

Regulation being proposed to the Air Quality Control Commission in Fall 2008 would require that high-bleed natural gas actuated pneumatic controllers in ozone non-attainment areas (NAAs) be replaced or retrofit (converted) to low-bleed controllers, unless they are exempt. The proposed regulation would also allow for other means to reduce emissions, such as using a solar device or a device that is actuated, or powered, using compressed air. Inspections, enhanced maintenance, and recordkeeping would be required for remaining exempt high-bleed controllers. Implementation of this proposed regulation would lead to a reduction in emissions of volatile organic compounds (VOCs), which are precursors to ozone.

Most background information and data used to develop the proposed regulation were obtained from either the Environmental Protection Agency (EPA) Gas STAR program or Independent Petroleum Association of Mountain States (IPAMS). Both sources use the term pneumatic "device", while the Colorado Air Pollution Control Division (Division) has chosen to be more specific by using the term pneumatic "controller" in the proposed regulation. A pneumatic device generally consists of a controller and a valve. The term "device" is used throughout this document to be consistent with data provided by EPA Gas STAR program and IPAMS.

2. What is a pneumatic device?

Many types of process control devices can be used to operate valves that regulate pressure, flow, temperature, and liquid levels. These devices can be operated pneumatically, electrically, or mechanically. A pneumatic device is an instrument that is actuated using gas. Most of the devices used by the natural gas industry are pneumatically operated. Although instrument air is commonly used to power pneumatic devices at gas processing facilities, since electricity is readily available to power air compressors at the facilities, the majority of natural gas industry pneumatic devices are powered by natural gas since electricity is not readily available at remote locations.¹

As part of normal operation, most pneumatic devices emit, or "bleed", gas to the atmosphere, either continuously or intermittently. Pneumatic devices generally consist of a controller and a valve. Bleed rates are associated with the controller. Gas is vented to atmosphere during actuation when valves open and/or close. However, vent rates are not significant and are the same whether a high-bleed or low-bleed controller is used. The proposed regulation would address bleed rates from controllers that are actuated by natural gas. It will not address valve vent rates or controllers actuated by compressed air.

By definition, high-bleed pneumatic devices emit in excess of 6 standard cubic feet gas per hour (scfh) to atmosphere. The highest bleed rate listed in a table published by the EPA is 42 cubic feet per hour (cfh).¹ The average bleed rate for high-bleed pneumatic devices in the Denver-Julesburg (DJ) Basin is 17cfh.² Bleed rates of 6, 17, and 42 cfh natural gas represent emission sources of 0.3, 0.8, and 2.1 tons per year (tpy) VOC, respectively, assuming a VOC molar fraction of 7.47 percent, which is representative of the DJ Basin.²

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3. Why was this proposed regulation developed?

A 2003 EPA study reported that emissions from pneumatic devices are collectively one of the largest sources of methane emissions in the natural gas industry. Natural gas is primarily composed of methane, but also contains VOCs and hazardous air pollutants (HAPs). Annual nationwide methane emissions are estimated to be approximately 31 billion cubic feet (Bcf) from the production sector, 16 Bcf from the processing sector, and 14 Bcf from the transmission sector.¹

VOC emissions from pneumatic devices within the 9-county Denver Metro Area/North Front Range (DMA/MFR) NAA were estimated to be 24.8 tons per day (tpd) for the 2006 baseline and have been projected to be 31.1 tpd for the 2010 baseline. These emissions represent 13 and 15 percent of the total VOC emissions from oil and gas sources in the DMA/MFR NAA in 2006 and 2010, respectively.³ This source category, pneumatic devices, has the second highest VOC emissions within the oil and gas industry. Therefore, emission reductions related to this source category have the potential to be significant. It is estimated that if this proposed regulated is implemented, 2010 VOC emissions will be reduced by approximately 23 tpd.

4. Why is this proposed regulation reasonable?

4.1. Timeframe

Many companies have already converted high-bleed devices to low-bleed devices voluntarily, as evidenced from responses to a Section 111 information request letter that the Division mailed to industry in June 2008. At a minimum, industry has committed to converting approximately 95 percent of high-bleed devices to low-bleed devices by November 2008. Therefore, if the proposed regulation is adopted in February 2009, it is anticipated that vendors would have enough supply on hand to satisfy orders for low-bleed devices and retrofit kits. There has been enough supply during the recent and ongoing conversions.

Under the proposed regulation, companies would be prohibited from installing a high-bleed device after February 1, 2009, unless the Division grants an exemption. The Division would approve use of a high-bleed device if a company can demonstrate that it is not technically feasible (e.g., safety or process concerns) to use a low-bleed device in a specific application. High-bleed pneumatic devices that are in place as of the anticipated regulation implementation date must be converted to low-bleed devices within three months (by May 1, 2009), unless the Division grants an exemption.

4.2. Associated Costs

Because implementation of this proposed regulation would increase the amount of natural gas that industry can sell, companies have the potential to save money. Calculations related to proposed regulation are available in Attachment 1 of this document. Costs (savings) associated with this proposed regulation include:

- Cost per ton of reduced VOC associated with converting existing pneumatic devices and performing enhanced maintenance on remaining high-bleed devices would represent an estimated savings of \$747
- Weighted average annualized cost associated with converting existing pneumatic devices and performing enhanced maintenance on remaining high-bleed devices would represent an estimated savings of \$1,505
- Weighted average annualized cost associated with installing low-bleed pneumatic devices for new applications and performing enhanced maintenance on remaining high-bleed devices would represent an estimated savings of \$1,630
- Payback time period of implementing this proposed regulation is estimated to be 3 to 24 months

4.3. Conversion Effectiveness

The service life and process control ability of low-bleed pneumatic devices is comparable to that of high-bleed devices in most applications. Low-bleed devices are no more likely to fail than high-bleed devices.⁴ If a device does fail, the process would no longer be controlled. For example, if a level controller fails, the dump valve would remain open. This would lead to a shortened residence time, which would not allow adequate separation between condensate and water. The mixed liquids would flow directly to a tank. This failure would be noticed during a regular site visit. It is anticipated that a device that fails would be repaired as soon as possible.

4.4. Emission Threshold

Typically, the threshold to require a permit for VOC sources in a Colorado NAA is 2 tpy. An average high-bleed pneumatic device emission rate in the DMA/MFR NAA is approximately 0.8 tpy of VOC. An average low-bleed pneumatic device emission rate in the DMA/MFR NAA is approximately 0.1 tpy of VOC.² The proposed regulation is targeting high-bleed devices, which have VOC emissions ranging from 0.3 to 2.1 tpy in the DJ Basin. While the low end of the emission range is a lower threshold than required for other emission sources, industry is already converting most high-bleed devices. Therefore, this proposed regulation represents a reasonably simple means of ensuring further VOC reductions. If the proposed regulation only applied to high-bleed devices emitting above typical thresholds, emission testing for high-bleed devices may be required to determine how many tons per year VOC were being emitted from each device. That could require additional resources both for industry and the Division.

4.5. Applying Regulation to only High-Bleed Devices

IPAMS estimated that in 2006 there were 41,494 pneumatic devices in the DMA/MFR NAA. Of those, 5,524 were high-bleed (13% of total), 34,847 were low-bleed (84% of total), and 1,122 were actuated with compressed air and therefore do not emit any natural gas or VOCs (3% of total).

If 5 percent of high-bleed devices receive an exemption from the Division, an estimated 276 devices would be allowed to remain in place based on 2006 data.² The percentage of exempt high-bleed devices, 5 percent, is based on the projection that 95 percent of devices would be converted from high-bleed to low-bleed devices. The regulation would require

that enhanced maintenance be performed on all high-bleed devices. Enhanced maintenance potentially reduces emissions. It includes cleaning, tuning, and repairing leaking gaskets, tubing fittings, and seals; tuning to operate over a broader range of proportional band; and eliminating unnecessary valve positioners. Routine inspection and recordkeeping would also be required for remaining high-bleed devices.

Emissions associated with low-bleed devices are a fraction of the emission threshold level, 2 tpy, and of high-bleed device emissions. Therefore, it is reasonable to avoid the burdens of inspection, enhanced maintenance, and record keeping for low-bleed devices.

5. Data and Calculations

Most data used in calculations performed to support proposed regulations regarding pneumatic devices are from an IPAMS report.³ Data used to determine the number of devices that would be converted or require enhanced maintenance and emission reductions as a result of the proposed rule include:

- Estimated number of devices in 2006 located within the DJ Basin, by device bleed rate
- 2006 VOC device emissions and fraction of wells in each DJ Basin county
- Average VOC fraction and molecular weight in DJ Basin natural gas

Most data used in cost analysis calculations were obtained from vendors. Costs include purchase, installation, operation, maintenance, and the benefit earned from sale of natural gas that had previously been emitted to the atmosphere. Costs were obtained to replace or retrofit two of the most common types of devices, liquid level controllers and pressure controllers. Costs of these four scenarios were averaged into one scenario.

All data and calculations used to support proposed regulations regarding pneumatic devices are available in Attachment 1, Pneumatic Device Proposed Regulation Data and Calculations.

5.1. Emission Reduction

To calculate the reduction of VOC emissions that would occur in the NAA if the proposed regulation is implemented, the following steps were followed. The calculations are available in Attachment 1.

- 1. Obtain emissions for baseline cases: 24.8 tpd (baseline 2006), 31.1 tpd (baseline 2010)
- 2. Obtain total bleed rate emissions from high bleed devices in the NAA by adding bleed rate emissions of each high bleed device in the NAA: 150,885 cfh (calculation for each type of high-bleed device based on number and bleed rate of each type of device; see Attachment 1 spreadsheet, sheet "device calc", column S)
- 3. Obtain total bleed rate emissions from low-bleed devices in the NAA by adding bleed rate emissions of each low-bleed device in the NAA: 30,823 cfh (calculation for each type of low-bleed device based on number and bleed rate of each type of device; see Attachment 1 spreadsheet, sheet "device calc", column T):
- 4. Obtain 2006 baseline emissions (emissions in terms of bleed rate) by adding the total bleed rate emissions of high bleed devices in the NAA to the total bleed rate

emissions of low-bleed devices in the NAA: 150,885 cfh + 30,823 cfh = 181,708 cfh

- 5. Obtain the 2006 total bleed rate emissions of low-bleed devices in the NAA (baseline): see step 3 (same parameter; 30,823 cfh)
- 6. Obtain the 2006 total bleed rate emissions of low-bleed devices in the NAA (converted from high-bleed if proposed regulation had been implemented) by adding bleed rate emissions of each converted low-bleed device in the NAA: 10,148 cfh (calculation for each type of converted low-bleed device based on number and bleed rate of each type of device; see Attachment 1 spreadsheet, sheet "device calc", column U)
- 7. Obtain the 2006 total bleed rate emissions of high-bleed devices in the NAA (remaining 5%, taking into account enhanced maintenance) by adding bleed rate emissions of each remaining high bleed device in the NAA taking into account bleed rate reductions from enhanced maintenance: 4,782 cfh (calculation for each type of high-bleed device based on number and bleed rate of each type of device taking into account bleed rate reductions from enhanced maintenance; see Attachment 1 spreadsheet, sheet "device calc", column W)
- 8. Obtain 2006 projected emissions (emissions in terms of bleed rate) by adding the total bleed rate emissions of low-bleed devices in the NAA (baseline) to the total bleed rate emissions of low-bleed devices in the NAA (converted from high-bleed if proposed regulation had been implemented) and total bleed rate emissions of high-bleed devices in the NAA (remaining 5%, taking into account enhanced maintenance): 30,823 cfh + 10,148 cfh + 4,782 cfh = 45,754 cfh
- 9. Obtain reduction percent obtained from implementing proposed regulation based on 2006 baseline emissions and 2006 projected emissions (as if proposed regulation had been in place) (emissions in terms of bleed rate): (181,708 cfh 45,754 cfh) / 181,708 cfh = 0.75 or 75%
- 10. Obtain 2010 projected emissions based on 2010 baseline emissions and reduction percent obtained from implementing proposed regulation: 31.1 * (1-0.75) = 7.8 tpd
- Obtain VOC emission reduction that would occur in NAA if proposed regulation is implemented by subtracting 2010 projected emissions from 2010 baseline emissions: 31.1 tpd – 7.8 tpd = 23.3 tpd

6. References

1. US EPA, Lessons Learned: Options for Reducing Methane Emissions from Pneumatic Devices in the Natural Gas Industry

2. ENVIRON, Buys and Associates, and IPAMS, Development of Baseline 2006 Emissions from Oil and Gas Activity in the Denver-Julesburg Basin, February 7, 2008

3. ENVIRON, Buys and Associates, and IPAMS, Development of Baseline 2006 Emissions from Oil and Gas Activity in the Denver-Julesburg Basin, March, 2008

4. Conversations between the Division and industry/vendors; additionally, document available at http://www.fossil.energy.gov/programs/oilgas/publications/environ benefits/14fsprod.pdf

Attachment 1 - Pneumatic Device Proposed Regulation Data and Calculations

Colorado Department of Public Health and Environment / Air Pollution Control Division

Technical Support Document for Proposed Pneumatic Controller Regulation Attachment 1 Draft - October 30, 2008

March 2008 Raw IPAMS Data

Parameter	Value	Units
Basinwide VOC Fraction (molar)	7.47%	
Well Count - surveyed producers	8247	wells
Well Count - basinwide	16894	wells
Basinwide VOC molecular weight	54.696	g/mol
Surveyed Producer Total Gas Emissions	989,848	MCF

County	2006 Pneumatic VOC Emissions (tpy)	Well Count Fraction
ADAMS	614	5.3%
ARAPAHOE	70	0.6%
BOULDER	172	1.5%
BROOMFLD	43	0.4%
DENVER	23	0.2%
ELBERT	41	0.4%
FREMONT	25	0.2%
KIT CARS	8	0.1%
LARIMER	92	0.8%
LINCOLN	8	0.1%
LOGAN	77	0.7%
MORGAN	45	0.4%
PHILLIPS	13	0.1%
SEDGWICK	2	0.0%
WASHNGTN	312	2.7%
WELD	8,164	70.7%
YUMA	1,834	15.9%
Grand Total	11,545	100.0%

		Survey			
		Supplied	Estimated	Utilized	
		Bleed	Bleed rate	Bleed rate	
Device Type	Total Devices	Rate (cfh)	(cfh)	(cfh)	Notes
no/low-bleed liquid level controller	1654		0.867833	0.867833	use average of all no/low bleed liquid level controllers
no/low-bleed pressure controller	0		2.62	2.62	
high bleed liquid level controller	118		22	22	Fisher device
high bleed pressure controller	70		16.82143	16.82143	use average of all high bleed pressure controllers
Instrument Air Pneumatics	30		0	0	air utilized
Gas Pneumatics	32		16.94048	16.94048	average of all high bleed devices
Instrument Air Pneumatics	26		0	0	air utilized
Instrument Air Pneumatics	473		0	0	air utilized
Gas Pneumatics	2		16.94048	16.94048	average of all high bleed devices
Instrument Air Pneumatics	25		0	0	air utilized
Instrument Air Pneumatics	45		0	0	air utilized
Instrument Air Pneumatics	30		0	0	air utilized
Gas Pneumatics	7		16.94048	16.94048	average of all high bleed devices
Instrument Air Pneumatics	25		0	0	air utilized
Gas Pneumatics	32		16.94048	16.94048	average of all high bleed devices
Instrument Air Pneumatics	35		0	0	air utilized
Instrument Air Pneumatics	9		0	0	air utilized
CEMCO Cantilever Liquid Level Con	1875	30.41697		30.41697	
Fisher Wizard HiLo Controller	370	12.84272		12.84272	
Fisher 4660 HiLo Controller on Singl	2005	0.777323		0.777323	
Fisher 4660 HiLo Controller on Dual	125	0.811119		0.811119	
Well Plunger Lift Controller	4200	0.054075		0.054075	
Temperature Controllers	4250	0.371763		0.371763	
Wellmark/CEMCO Oil Dump Control	2375	0.054075		0.054075	
Wellmark/CEMCO Water Dump Con	2375	0.033121		0.033121	
liquid level controller	381	35		35	
liquid level controller	548	25		25	
liquid level controller	4686	3		3	
Total Counted Devices for DJ Basin	25,803				

Total Devices for DJ Basin 52,858

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Calculations for Oil and Gas Ozone Reduction Strategy "Pneumatic Devices"

Table 1: Determine 2006 VOC Emissions

		2006
	Estimate of Devices	Pneumatic VOC
County	in NAA*	Emissions (tpy)
ADAMS	2,810	614
ARAPAHOE	322	70
BOULDER	788	172
BROOMFLD	197	43
DENVER	106	23
DOUGLAS	0	0
JEFFERSON	0	0
LARIMER	309	67
WELD	36,961	8,073
Total	41,494	9,063

* Calculated by multiplying total number of devices in DJ Basin by well count fraction for each county. Multiplied that result by production rates for Larimer and Weld county to obtain device count for portions of counties in nonattainment area

Table 2: Data from Dale Wells

Parameter	Value	Units
VOC Emissions 2006 - NAA	24.83	tpd
VOC Emissions 2010 - NAA	31.11	tpd
% bbl production Larimer - 2006	73.14	%
% bbl production Weld - 2006	98.88	%
Gas Production in DJ Basin - 2006	241,263,240	MCF
Gas Production outside DJ Basin - 2006	1,369,821,425	MCF

Table 3: Calculating Emission Reductions and Costs

Parameter	Value	Units
Bleed Rates		
High-bleed device, definition of pneumatic device	6	scfh
Average high-bleed	16.82	cfh
Average low- and no-bleed	0.868	cfh
Maximum low- and no-bleed ²	3.000	cfh
Average of avg. and max. low- and no-bleed	1.934	cfh
Average of retrofitted/replaced (HB to LB/NB)	1.934	cfh
Reduction if perform enhanced maintenance ¹	10	scfh
Percentage of emissions in NAA by bleed rate ³		
high-bleed	13.3	%
low-/no-bleed	84.0	%
compressed air	2.7	%
Percentage of devices in NAA by controller type ³		
liquid level controller	35.9	%

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Calculations for Oil and Gas Ozone Reduction Strategy "Pre	eumatic Devices"	
Parameter	Value	Units
pressure controller	10.0	%
other/unknown - natural gas	51.4	%
other/unknown - compressed air	2.7	%
liquid level controller percentage if only consider liquid/pressure controllers	78.3	%
pressure controller percentage if only consider liquid/pressure controllers	21.7	%
HB Devices Converted to LB - NAA		
Percent of HB devices that can be converted to LB/NB in NAA ⁶	95	%
Number of high bleed devices in NAA - 2006	5 524	
Number of NAA HB devices that can be converted to LB/NB @ 95 % - 2006	5 248	
NAA Emissions and Reductions 2008	0,210	
Pasolino omissione	191 709	ofb
Emissions if convert 05 % LP >L P/NP w/o onb maint	101,700	ofh
Enlissions if convert 95 % HB->LB/NB w/o enh maint	40,010	
Reductions if convert 95 % HB->LB/NB w/o enin maint	1 3%	70 ofb
Emissions il convert 95 % HB->LB/NB W/ enn maint on remaining HB	45,/54	cin
Reductions if convert 95 % HB->LB/INB w/ enn maint on remaining HB	/5%	%
NAA Emissions and Reductions - 2010		
Emissions if convert 95 % HB->LB/NB w/o enh maint	8.3	tpd
Reductions if convert 95 % HB->LB/NB w/o enh maint	22.8	tpd
Emissions if convert 95 % HB->LB/NB w/ enh maint on remaining HB	7.8	tpd
Reductions if convert 95 % HB->LB/NB w/ enh maint on remaining HB	23.3	tpd
Reductions from enh maint on remaining HB @ 5 %	0.5	tpd
Cost Analysis ⁵ NAA, Device Costs		
Annualized Cost to Retrofit HB to LB Liquid Level Controller	(1223)	\$ per device
Annualized Cost to Replace HB to LB Liquid Level Controller	(1225)	\$ per device
Annualized Cost to Retrofit HB to LB Pressure Controller	(1214)	\$ per device
Annualized Cost to Replace HB to LB Pressure Controller	(946)	\$ per device
Annualized Cost to perform enhanced maintenance	(312)	\$ per device
Weighted Average Annualized Cost to Retrofit HB to LB	(1221)	\$ per device
Weighted Average Annualized Cost to Replace HB to LB	(1164)	\$ per device
Weighted Average Annualized Cost to Retrofit or Replace HB to LB	(1193)	\$ per device
Weighted Average Annualized Cost to Retrofit or Replace HB to LB and	· · · · /	
perform enh maint on remaining HB	(1505)	\$ per device
Cost Analysis NAA, Program Costs and Benefits	· · · · ·	
Cost to retrofit 95 % NAA HB->LB/NB	(6.408.658)	\$ in NAA
Cost to replace 95 % NAA HB->LB/NB	(6,110,376)	\$ in NAA
Cost to retrofit or replace 95 % NAA HB->L B/NB	(6,259,517)	\$ in NAA
Cost to perform enhanced maint, on 5 % NAA HB devices	(86,144)	\$ in NAA
Cost to retrofit or replace 95 % NAA HB->L B/NB and to perform enhanced	(00), 111	*
maint on 5 % NAA HB devices	(6 345 661)	\$ in NAA
Cost per ton reduced if retrofit 95 % NAA HB->I B/NB	(770)	\$/ton in NAA
Cost per ton reduced if replace 95 % NAA HR->L B/NR	(734)	\$/ton in NAA
Cost per ton reduced if retrofit or replace 95 % NAA HB->L B/NB	(752)	\$/ton in NAA
Cost per ton reduced to perform enhanced maint on 5 % NAA HB devices	(499)	\$/ton in NAA
Cost per ton reduced to retrofit or replace 95 % NAA HR-SI R/NR and to	(-100)	within the A
perform enhanced maint on 5 % NAA HB devices	(747)	\$/ton in NAA
perform enhanced main, on o 30 NAA TIB devices	((4))	- WIGHTINAA

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DRAFT - Denver Metro Area/North Front Range 8-hr Ozone SIP Technical Support Document for Proposed Pneumatic Controller Regulation

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Calculations for Oil and Gas Ozone Reduction Strategy "Pneumatic Devices"

Notes

1 EPA Gas STAR Lessons Learned "Options for Reducing Methane Emissions from Pneumatic Devices in the Natural Gas Industry", page 6, states "Cleaning and tuning, in addition to repairing leaking gaskets, tubing fittings, and seals, can save 5 to 10 scfh per device. Tuning to operate over a broader range of proportional band often reduces bleed rates by as much as 10 scfh. Eliminating unnecessary valve positioners can save up to 18 scfh per device." Using 75% of each type of maintenance leads to a savings of 28.5 scfh per device. However, bleed rates for HB in this study range from 13 to 30 scfh; therefore, will use a savings of 10 scfh as it is unrealistic that emissions would be reduced to zero or even become negative

2 Maximum bleed rate for low- and no-bleed pneumatic devices was obtained from industry by Jerry Dilley (RAQC)

3 Percentage of devices in the NAA by bleed rate is calculated based on 2006 data. 2010 calculations assume that the percentage will be the same as 2006; better data was not available.

4 Percentage of emission reductions via options in this strategy were based on 2006 data. 2010 calculations assume that the percentage will the be the same as 2010

5 Annualized cost data for retrofit/replacement from July 2008 LeSair report to CDPHE. Annualized cost data for performing enhanced maintenance based on EPA Gas STAR Lessons Learned "Options for Reducing Methane Emissions from Pneumatic Devices in the Natural Gas Industry"

6 Initially, used value of 80% of high bleeds being converted to low/no bleeds per EPA Gas STAR Lessons Learned "Options for Reducing Methane Emissions from Pneumatic Devices in the Natural Gas Industry". Industry in CO NAA indicates that close to 100% of the high bleeds will be converted to low/no bleeds. Therefore, raised the percentage to 95%.

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Attachment 1 Draft - October 30, 2008		
Economic Impact Analysis Summary		
Parameter	NAA	Units
Number of high bleed devices in NAA - 2006	5,524	
Percent of HB devices that can be converted to LB/NB in NAA (%)	95	%
Number of HB devices in NAA to be converted	5,248	
Reductions if convert 95 % HB->LB/NB w/ enh maint on remaining HB (tpd)	23.3	tpd
Weighted Average Annualized Cost to Retrofit HB to LB	(1,221)	\$ per devic
Weighted Average Annualized Cost to Replace HB to LB	(1,164)	\$ per devic
Weighted Average Annualized Cost to Retrofit or Replace HB to LB	(1,193)	\$ per devic
Annualized Cost to perform enhanced maintenance	(312)	\$ per devic
Weighted Average Annualized Cost to Retrofit or Replace HB to LB and perform enh maint on remaining HE	(1,505)	\$ per devic
Cost to retrofit 95 % NAA HB->LB/NB	(6,408,658)	\$ per NAA
Cost to replace 95 % NAA HB->LB/NB	(6,110,376)	\$ per NAA
Cost to retrofit or replace 95 % NAA HB->LB/NB	(6,259,517)	\$ per NAA
Cost to perform enhanced maint. on 5 % NAA HB devices	(86,144)	\$ per NAA
Cost to retrofit or replace 95 % NAA HB->LB/NB and to perform enhanced maint. on 5 % NAA HB devices	(6,345,661)	\$ per NAA
Cost per ton reduced if retrofit 95 % NAA HB->LB/NB	(770)	\$/ton in NA
Cost per ton reduced if replace 95 % NAA HB->LB/NB	(734)	\$/ton in NA
Cost per ton reduced if retrofit or replace 95 % NAA HB->LB/NB	(752)	\$/ton in NA
Cost per ton reduced to perform enhanced maint. on 5 % NAA HB devices	(499)	\$/ton in NA
Cost per ton reduced to retrofit or replace 95 % NAA HB->LB/NB and to perform enhanced maint. on 5 % NAA HB device:	(747)	\$/ton in NA

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		Deter	mining How P	lood Date Dr	lator to Emir	scione			Ť
		Deten		need Rate Re	elates to Emis	sions			
Parameter	Eq.	Value	Units						
Surveyed Producer Total Gas Emissions	A	989848	MCF						
Annual Hours of Operation	B	8760	hrs						
Well Count - surveyed producers	<u>C</u>	8247	wells	1					
Well Count - basinwide		7 479/	wells						
Basinwide VOC Fraction (molar)		1.4/70	a/mol						
Basiliwide VOC Ilioleculai weight	E	54.7	g/moi						
R	G	0.08206	L atm / K-mo	pl					
standard temp	Н	H 273.15 K							
standard press	1	1	atm						
MCF to 1000 liter conversion	J	28.317	1000L/MCF						
Basin-wide VOC mass emissions Basin-wide VOC mass emissions	M N	10,473,301 11,545	kg/year tons/year						
			High Bleed	High Bleed	High Bleed	High Bleed	Bleed Rate		
			(by	(highest	(avg.,	(EPA Gas	that gives 1	Avg Low/No	
		TPAIVIS Calc	definition)	1PAIVI)	16.9	(12.0	20.1	1 02	off total cas
IPAMS calc (use as example modified)			52.56	306.6	147.4	367.9	176.1	16.94	MCF natural das/year
K = AxD/CxE		151,567	3.9	22.9	11.0	27.5	13.2	1.3	MCF VOC/vear
									,
L = K x J		4,291,903	111	649	312	779	373	36	1000L VOC/year
$M = I \times L \times 1000 / (G \times H) \times F / 1000$		10,473,301	271	1,584	761	1,900	909	88	kg VOC/year
N = M / 907.185		11.545	0.30	1.75	0.84	2.09	1.00	0.10	tov VOC
		1	0.000.76.75(0)	1000 No.	0.000			1000	and a submotion
MCF = thousand cubic feet									

		Propos	sed Regulati	on Paybacl	(
		•	Avrit	h enhancer	Imaintenan	<u></u>		
			VVIL	IT et indriced	i maintenan			
	liquid level retr	l controller ofit	liquid leve repl	l controller ace	pressure retr	controller ofit	pressure repl	controlle lace
Parameter	typical	high	typical	high	typical	high	typical	high
Value of Gas Saved (\$/yr)	1898	5947	1898	5947	1898	5947	1898	5947
Cost of Implementation (\$)	637	1590	619	1681	733	1741	3769	4314
Payback (months)	4	3	4	3	5	4	24	9
Average Value of Gas Sav Average Cost of Implemer	ved (\$/yr) = ntation (\$) = (months) =	3923 1885 7						
Average Cost of Implemen	ntation (\$) = (months) =	1885 7						

		Draft	 October 30 	2008					
r				, 2000					
	Ble	eed Rate and	Emission Da	ta by Device	Туре				
		1						1 1	-
					Is this Device		# of	# of	Rate
	Total				High or	# of High	Low/No	Device	High
	Devices	Total	Total	IPAMS	Low/No	Bleed	Bleed	Using	Bleed
	(counted)	Devices in	Devices in	Bleed Rate	Bleed? (or	Device in	Device in	Comp Air	Devic
Device Type	(raw data)	DJ Basin	NAA	(cfh)	comp air?)	NAA	NAA	in NAA	(cfh)
no/low-bleed liquid level controller	1654	3388	2660	0.87	low/no		2,660		
no/low-bleed pressure controller	0	0	0	2.62	low/no		0		
high bleed liquid level controller	118	242	190	22	high	190			22
high bleed pressure controller	70	143	113	16.82	high	113			17
Instrument Air Pneumatics	30	61	48	0	comp air			48	_
Gas Pneumatics	32	66	51	16.94	high	51			17
Instrument Air Pneumatics	26	53	42	0	comp air			42	
Instrument Air Pneumatics	473	969	761	0	comp air			761	
Gas Pneumatics	2	4	3	16.94	high	3			17
Instrument Air Pneumatics	25	51	40	0	comp air			40	
Instrument Air Pneumatics	45	92	72	0	comp air			72	
Instrument Air Pneumatics	30	61	48	0	comp air			48	
Gas Pneumatics	7	14	11	16.94	high	11			17
Instrument Air Pneumatics	25	51	40	0	comp air			40	
Gas Pneumatics	32	66	51	16.94	high	51			17
Instrument Air Pneumatics	35	72	56	0	comp air			56	
Instrument Air Pneumatics	9	18	14	0	comp air			14	
CEMCO Cantilever Liquid Level Control	1875	3841	3015	30.42	high	3,015			30
Fisher Wizard HiLo Controller	370	/58	595	12.84	high	595	0.004		13
Fisher 4660 Hillo Controller on Single Colls	2005	4107	3224	0.78	Iow/no		3,224		
Mall Dupper Lift Centreller	120	200	201	0.01	IOW/IIO		201		-
Temperature Controllers	4200	8706	6834	0.05			6,754	-	5
Wellmark/CEMCO Oil Dump Controllers	2375	4865	3810	0.37			3,810		-
Wellmark/CEMCO Water Dump Controllers	2375	4865	3819	0.03	low/no		3,819		
liquid level controller	381	780	613	35	high	613	0,010		35
liquid level controller	548	1123	881	25	high	881			25
liquid level controller	4686	9599	7536	3	low/no	001	7 536		20

Page 1 of 2

				T. Service and					
	BI	eed Rate ar	nd Emission [ata by Devid	се Туре				
	Rate of High Bleed Device w/enhanc	Rate of Low/No Bleed Device	2006 Emissions from HB in	2006 Emissions for existing LB/NB in	2006 Emissions of HB converted to LB/NB in	2006 Emissions HB not converted to LB/NB in NAA (w/ enh	Number of liquid level controllers	Number of pressure controllers	Numb unkno other contro in N (NG,
Device Type	maint (cfh)	(cfh)	NAA (cfh)	NAA (cfh)	NAA (cfh)	maint) (cfh)	IN NAA	in NAA	incl
no/iow-bleed liquid level controller		0.867833		2,308	-		2660		<u> </u>
no/low-bleed pressure controller	10	2.62	4.475	0	0.40	110 050005	100	0	
nign bleed liquid level controller	12		4,1/5		349	113.852895	190	110	<u> </u>
high bleed pressure controller	1		1,894		207	38.3931904		113	
Instrument Air Pneumatics			070		05	47.057.4750			-
Gas Pneumatics	/		872		95	17.8574759			5
Instrument Air Pneumatics									<u> </u>
Instrument Air Pneumatics	7		E 4		0	4 44 000005	9		
Gas Pheumatics	/		54		0	1.11609225			3
Instrument All Pheumatics					· · · · · · · · · · · · · · · · · · ·	-			-
Instrument Air Pneumatics							-		
Instrument Air Pneumatics									
Gas Pneumatics	7		191		21	3.90632286			1
Instrument Air Pneumatics									
Gas Pneumatics	7		872		95	17.8574759			5
Instrument Air Pneumatics					2				
Instrument Air Pneumatics					5.5.10		0015		L
CEMCO Cantilever Liquid Level Control	20		91,712		5,540	3078.03372	3015	505	
Fisher Wizard HiLo Controller	3	0 777000	7,641	0.500	1,093	84.5700695		595	<u> </u>
Fisher 4660 HiLo Controller on Single Colls		0.777323		2,506				3224	
HISNEF 4660 HILO CONTROLLER ON DUAL COILS		0.811119		163				201	07
Vell Plunger Litt Controller		0.0540/5		365					6/
I emperature Controllers		0.3/1/63		2,541					68
Weilmark/CEMCO Oil Dump Controllers		0.0540/5		207					38
Venmark/CEMCO Water Dump Controllers	05	0.033121	01.444	126	1 1 0 0	765 952600	610		- 38
	20		21,444		1,120	765.853692	013		<u> </u>
liquid level controller	15	2	22,031	22.607	1,619	000.920706	7526		<u> </u>
		3	150.005	22,607			/036		

Draft - October 30, 2008

Data Used in Economic Ca	alculations
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IPAMS Data

Bleed Ra	ates Natural C	Gas (cfh)
High Bleed (highest)	High Bleed (average)	Low/No Bleed (average)
35	16.8	1.93

VOC	C Emissions ((tpy)
High Bleed (highest)	High Bleed (average)	Low/No Bleed (average)
1.75	0.84	0.10

Misc. Data Cost of Natural Gas (\$/Mcf)¹:

10.82

Note:

¹ source: Energy Information Administration, Official Energy Statistics from the US Government, June 2008

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Colorado Department of Public Health and Environment / Air Pollution Control Division

Summary o	f Costa Associated with From Times of Door	natia Davias Conversione
	f Costs Associated with Four Types of Pneun	natic Device Conversions
Emission Source: _	Liquid Level Controller	T
Control Device: _	Retro-Fit High to Low Bleed	l otal Annual Cost (\$)
Emission Reduction:	89%	(\$1,223.25)
Emission Source:	Liquid Level Controller	No.
Control Device:	Replace High with Low Bleed	Total Annual Cost (\$)
Emission Reduction:	89%	(\$1,224.98)
Emission Source: _ Control Device: _	Pressure Controller Retro-Fit High to Low Bleed	Total Annual Cost (\$)
Emission Reduction:	89%	(\$1,214.05)

Colorado Department of Public Health and Environment / Air Pollution Control Division

				Draft - Octob	er 30, 2008				
		Liquid Le	evel Controller	Cost Analaysis to	Retrofit from Hi	gh-Bleed to Low	Bleed		
Emiss	ion Poursou	Liquid Los	al Controllor						
Cor	atrol Device:	Retro-Eit I	ligh to Low B	leed					
M	anufacturer:	Wellmark	Inginto Low D						
	Model No:	Mizer-Cen	nco 1110-111						
	Model No:	Mizer-Inva	alco 4010-111						
	Model No:	Mizer-Fish	ner 2500						
Emission	Reduction:	89%							
Control Device I	Description:	The Liquid	Level Controll	er is used to dete	ct and/or mainta	in the liquid leve	l within a vessel.		
Contr	ol Benefits:	The Liquid	Level Controll	er is a reliable, lov	v maintenance (device designed	to maintain a liqu	id level.	
C	limitations	The low m	aintenance req	uirements make t	he controller ide	al for application	ns in remote area	S.	
Control	Limitations:	Liquid Lev	ei Controllers b	y design, are an i	emission source	and nave poter	iual environmenta	ITISKS.	
	r		Emission			Annual Emission			
		Targeted Pollutant	Factor	Emission Basis (hrs)	High Bleed	Low Bleed	Reduction		
		VOC	(scf/hr) 1,93	8760	(TPY) 0.839	(TPY) 0.096	(TPY) 0.743		
	L			0100	2.000	5.000	0.140		
System Life	Interest	Capital	0.111	Durahasa Cast	Annualized	Annual	Annual	Capital	Realize
(yr)	(%)	Factor	Investment	Furchase Cost	Cost ¹	Costs	Costs	Cost	Benefi
n	i	CRF	Р	Pp	Pi	Po	Pm	CRC	REB
		$CRF = \frac{i}{4}$	$\frac{(1+i)^n}{(1+i)^n-1}$	Capital Recover	y Factor allows	for calculation of	f end-of-year payr	nent to repay	in∨estment es tax
		() (P = P _r CRC = CRF x F	Capital investme Capital Recover	nt includes bas y cost is paymer	e instrument cos nt required to rep	t, instrumentation bay capital in∨estr	nent at end of	fterm
	TAC	(P = Pr CRC = CRF x F + CRC - REB	Capital investme Capital Recover The Total Annua and maintenanc	ent includes basing y cost is payment I Cost is the sur e costs, the Cap	e instrument cos nt required to re m of the installat ital Recovery C	it, instrumentation bay capital investr ion cost, annual c osts less the Real	n cost, and sain ment at end of operational lized Economi	f term c Benefit.
	TAC	$\mathbf{F} = \mathbf{P}_t + \mathbf{P}_o + \mathbf{P}_t$ TAC	P = P _r CRC = CRF x F n + CRC - REB	Capital investme Capital Recover The Total Annua and maintenanc The Cost of Con	nt includes basing y cost is payment of Cost is the sur e costs, the Cap trol is the Total.	e instrument cos nt required to rep m of the installat ital Recovery C Annual Cost divi	t, instrumentation oay capital investr ion cost, annual c osts less the Real ded by the Emiss	r cost, and sain ment at end of operational ized Economi ion Reduction	f term c Benefit.
Cost of Co	TAC $ntrol = \frac{1}{Er}$	$= P_1 + P_0 + P_1$ TAC <i>TAC nission</i> Re	$P = P_{\rm p}$ $RC = CRF \times F_{\rm n} + CRC - REB$ $\overline{duction}$	Capital Investme Capital Recover The Total Annua and maintenanc The Cost of Con achieved throug	nt includes bas y cost is paymen I Cost is the sur e costs, the Cap trol is the Total h the installation	e instrument cos nt required to rej m of the installat bital Recovery C Annual Cost divi n of the control d	t, instrumentation bay capital investr ion cost, annual c osts less the Real ded by the Emiss evice.	n cost, and sai ment at end of operational ized Economi ion Reduction	f term c Benefit.
Cost of Co	TAC $ntrol = \frac{1}{Er}$	$= P_1 + P_0 + P_1$ TAC mission Re	$P = P_{f}$ $RC = CRF \times F$ $h + CRC - REE$ $duction$	Capital investme Capital Recover The Total Annua and maintenanc The Cost of Con achieved throug	ent includes base y cost is payment of Cost is the sur e costs, the Cap trol is the Total h the installation	e instrument cos nt required to rej m of the installat vital Recovery C Annual Cost divi n of the control d	t, instrumentation bay capital investr ion cost, annual c osts less the Real ded by the Emiss evice.	n cost, and sai ment at end of operational lized Economi lion Reduction	f term c Benefit.
Cost of Co Notes: 1 Annualized 2 Based on C Section 1, Ch	TAC $introl = \frac{1}{Ei}$ Installation C office of Air Quapter 2	() = P _i + P _o + P _i <u>TAC</u> mission Re ost includes fr uality Planning	$P = P_{p}$ $P = CRF \times F$ $r + CRC - REE$ $duction$ eight costs and and Standard	Capital investme Capital Recover The Total Annua and maintenanc The Cost of Con achieved throug t is calculated by s, EPA, OAQPS C	nt includes bas y cost is paymen il Cost is the sur e costs, the Cap trol is the Total . h the installation dividing installat Control Cost Man	e instrument cos nt required to rej m of the installat ivital Recovery C Annual Cost divi n of the control d ion costs by sys nual, Sixth Editio	t, instrumentation bay capital investr ion cost, annual o osts less the Real ded by the Emiss evice. tem life years on, EPA/452/B-02	roost, and sai ment at end of ized Economi ion Reduction	(term c Benefit.

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Emission Source: Liquid Level Controllers Mandfacturer: Weimark Control Device: Reto-Fit High to Low Bleed Model Ne: Mizer-Cancel 0101111 Model Ne: Mizer-Cancel 0101111 Model Ne: Mizer-Cancel 0101111 Mizer-Cancel 0100111 Mizer-Cancel 0100111 Model Ne: Mizer-Cancel 0100111 Mizer-Cancel 010011 Mizer-Cancel 0100111 Mizer-Cancel 0100111 Mizer-Cancel 0100111 Mizer-Cancel 010011 Mizer-Cancel 0100111 Mizer-Cancel 010010001 Mizer-Cancel 0100100001 Mizer-Cancel 010011 Mizer-Cancel 010011 Mizer-Cancel 0100100001 Mizer-Cancel 010000 Mizer-Cancel 010011 Mizer-Cancel 010011 Mizer-Cancel 010000000 Mizer-Cancel 0100000000000000000000000000000000000	Liquid Le	vel Controller Cost Breakdown to Retrofit from	High-Bleed to Low B	Bleed
Limitstant source: Legud version controllers Control Device: Retro-Fit High to Low Bired Middull N: Mittered-value 4010-1111 Model No: Mittered-value 4010-111 Model No: Mittered-value 4010-111 Model No: Mittered-value 4010-111 Model No: Mittered-value 4010-111 Model No: Mittered-value 4010-01	Emission Source: Liquid L	val Controllers	Manufacturer	Wellmark
Control Certite: Nuclei Territy Purchase Cost: Typical Base Equipment Cost: ¹¹ 26.50 Instrumentation Cost: ¹² 26.50 Base Territy 26.50 Instrumentation Cost: ¹³ 26.50 Base Territy 20.50 Instrumentation Cost: ¹³ 20.50 Base Territy 20.00 Installation Cost: 13.25 Participation Cost: ¹⁴ 13.25 Sile Preparation Cost: ¹⁵ 20.00 Installation Cost: 190.00 Participation Cost: ¹⁶ 0.00 Cost provided by Manufactures and Admin. ¹¹ 0.00 Operating Cost: 154.30 3317.41 Low Bleed Gas Consumption Cost: ¹⁶ 158.20 Maintenance Labor Cost: ¹⁷ 73.00 182.50 Total: Hab.09 3317.41 Low Bleed Gas Consumption Cost: ¹⁷ 1594.39 3317.41 Low Bleed Gas Consumption Cost: ¹⁷ 163.30 183.30 Total: Hab.09 335.41 Cost provided by Manufacturers and Distributos 163.30 133.31 Total: Hab.09 </th <th>Control Douison Botro Eit</th> <th>High to Low Blood</th> <th>Manuracturer:</th> <th>Weimark</th>	Control Douison Botro Eit	High to Low Blood	Manuracturer:	Weimark
Model No: Mitter-Fisher 2500 Purchase Cost: Typical High Instrumentation Cost! 265:00 475:00 Sales Tax ⁻¹⁵ 16:00 26:50 475:00 Sales Tax ⁻¹⁵ 16:00 26:50 475:00 Sales Tax ⁻¹⁵ 16:00 26:50 475:00 Sales Tax ⁻¹⁵ 10:00 20:00 0.00 0.00 Auxiliary Cost ⁻¹⁶ 10:00 0.00 0.00 Auxiliary Cost ⁻¹⁶ 0.00 0.00 0.00 Cost network 0.00 0.00 0.00 Cost network 0.00 0.00 0.00 Cost network 0.00 0.00 0.00 Total Total 183:25 323:75 Maintenance Material Cost ¹⁶ 73:00 102:50 Total Total 183:26 100 Cost netimated using the Offse off AC CastRy Planning and Standards, EPA, OAOPS Control Cost Manual, Stath Edition Cost netimated using the Offse off AC CastRy Planning and Standards, EPA, OAOPS Control Cost Manual, Stath Edition Cost netimated using the Offse off AC CastRy Planning and Standards, EPA, OAOPS Control Cost Manual, Stath Edition <t< th=""><th>Control Device: Retro-Fit</th><th>High to Low Bleed</th><th>Model No:</th><th>Mizer-Invalco 4010-111</th></t<>	Control Device: Retro-Fit	High to Low Bleed	Model No:	Mizer-Invalco 4010-111
Purchase Cost: Typical Atp High Cost: Base Equipment Cost: 26500 475.00 Sales Tac: 307.40 551.90 Installation Cost: 13.25 23.75 Sales Tac: 20.00 0.00 Installation Cost: 13.25 23.75 Sales Tac: 20.00 0.00 Installation Cost: 100.00 0.00 Installation Cost: 0.00 0.00 Installation Cost: 0.00 0.00 Cost operation 0.00 0.00 Total: 0.00 0.00 Maintenance Material Cost: 73.00 182.50 Annual Maintenance Baterial Cost: 73.00 182.50 Total: 143.09 3317.41 Low Beed Gas Consumption Cost: 143.30 3317.41 Cost provided by Manuficturers and Distributors 154.39 3317.41 Cost provided by Manuficturers and Distributors 154.39 3317.41 Cost provided by Manuficturers and Distributors 154.39 317.41 Cost provided by Manuficturers and Distributors 164.30 163.30			Model No:	Mizer-Fisher 2500
Purchase Loss: projectal right matumentation Cost ²¹ 265.00 47.50 Instrumentation Cost ²¹ 265.00 47.50 Sales Far ^{2,23} 15.50 25.50 Total: 307.40 551.00 Installation Cost ²¹ 20.00 50.00 Marcial Cost ²¹ 20.00 50.00 Installation Cost ²¹ 20.00 50.00 Installation Cost ²¹ 10.00 0.00 Installation Cost ²¹ 10.00 0.00 Installation Cost ²¹ 10.00 0.00 Total 183.25 323.75 Annual Maintenance Labor Cost ²¹ 73.00 192.50 Maintenance Labor Cost ²¹ 73.00 192.50 Maintenance Material Cost ³¹ 145.00 353.11 Low Bieled Gas Consumption Cost ³¹ 153.0 317.41 Low Bieled Gas Consumption Cost ³¹ 153.20 313.41 Low Bieled Gas Consumption Cost ³¹ 153.20 313.41 Low Bieled Gas Consumption Cost ³¹ 153.20 313.41 Low Bieled Gas Consumption Cost ³¹ 153.20 153.10 1 Co	Purchase Cost		Tuminal	Ulah
intramentation Cost ¹¹ 28.00 47.90 Sale Tax ^{1,12} 15.90 28.90 Installation Cost ¹¹ 307.40 20.00 Auxiliary Cost ¹² 20.00 0.00 Auxiliary Cost ¹² 0.00 0.00 Auxiliary Cost ¹² 0.00 0.00 Cost Provide Dy Cost 0.00 0.00 Cost Provide Dy Cost 0.00 0.00 Cost Provide Dy Mandriterres and Distribution 0.00 0.00 Cost Provide Dy Mandriterres and Distribution 1594.39 317.41 Low Bleed Gas Consumption Cost ¹² 193.30 173.30 Total 1411.09 313.411 Low Bleed Gas Consumption Cost ¹² 193.30 133.20 Total 1411.09 313.411 Low Bleed Gas Consumption Cost ¹² 193.30 133.20 Total 1411.09 313.411 Low Bleed Gas Consumption Cost ¹² 193.30 133.20 Total 1411.09 313.11 Low Bleed Gas Consumption Cost ¹² 183.30 133.20 Total 1411.09 3131.41 Low Bleed Gas Co	Furchase cost	Base Equipment Cost ⁻³	265 00	475.00
Sale Tax ¹⁰³ 15.00 28.50 Tota: 307.40 551.00 Installation Cost: 13.25 23.75 Site Preparation Cost: 0.00 60.00 Auxing Cost: 0.00 0.00 Installation Cost: 150.00 250.00 Total 183.25 323.75 Annual Operating Cost: 0.00 0.00 Total: 0.00 0.00 Total: 0.00 0.00 Maintenance Labor Cost: 73.00 182.50 Total: 144.00 385.00 Realized Economic Benefit: High Bleed Gas Consumption Cost: 1584.39 3317.41 Low Bleed Gas Consumption Cost: 1584.30 183.30 183.30 Total: Use Bleed Gas Consumption Cost: 1584.39 3317.41 Low Bleed Gas Consumption Cost: 1584.30 183.30 183.30 Total: - Cost provided by Manufactures and Distribution: Notes a: Cost provided by Manufactures and Distribution: Cost provided by Manufactures and Distribution: a: Cost provided by Manufactures and Distribution: Cost prov		Instrumentation Cost. ^b	26.50	47.50
Tota: 307.40 \$14.00 Installation Cost: Site Preparation Cost: 13.25 23.75 Site Preparation Cost: 0.00 0.00 Auxiliary Cost: 0.00 0.00 Installation Cost: 0.00 0.00 Total 183.25 323.75 Annual Operating Cost: 0.00 0.00 Overhead: 0.00 0.00 Maintenance Labor Cost: 73.00 182.50 Maintenance Material Cost: 73.00 182.50 Total: Total: 1584.39 3317.41 Low Bleed Gas Consumption Cost:		Sales Tax: ^{b,3}	15.90	28.50
Installation Cost: Freight Cost: 1.3.25 2.3.75 Auxiliary Cost: 0.00 0.00 Installation Cost: 1.3.2.6 2.3.75 Auxiliary Cost: 0.00 0.00 Installation Cost: 0.00 0.00 Installation Cost: 0.00 0.00 Installation Cost: 0.00 0.00 Total 1.33.25 3.3.75 Annual Operating Cost: 0.00 0.00 Total: 0.00 0.00 Total: 0.00 0.00 Maintenance Labor Cost' 73.00 182.50 Total: 1.46.00 365.00 Realized Economic Benetic: high Bleed Gas Consumption Cost: 159.43 3317.41 Low Bied Gas Consumption Cost: 159.43 3317.41 100 313.01 Low Bied Gas Consumption Cost: 159.43 3317.41 100 313.01 Low Bied Gas Consumption Cost: 159.43 3317.41 100 313.01 Low Bied Gas Consumption Cost: 159.43 3317.41 100 102.55 Total: Low Bied Gas Consumpt		Total:	307.40	551.00
Freight Cost. ¹⁰ 13.25 23.75 Site Fregaration Cost. ¹¹ 20.00 50.00 Auxiliary Cost. ¹⁰ 0.00 0.00 Installation Cost. ¹¹ 150.00 250.00 Total 183.25 323.75 Annual Operating Cost. 0.00 0.00 Cortal 0.00 0.00 Maintenance Labor Cost. ¹⁰ 73.00 182.50 Total: 1594.39 3317.41 Low Bleed Gas Consumption Cost. ¹⁰ 1594.39 317.41 Low Bleed Gas Consumption Cost. ¹⁰ 183.30 183.30 Total: Notes 182.59 313.41 Low Bleed Gas Consumption Cost. ¹⁰ 183.30 183.30 Total: Status 182.59 313.41 Low Bleed Gas Consumption Cost. ¹⁰ 183.30 183.30 Cost provided by Manufacturers and Distributors 159.439 313.41 </td <td>Installation Cost</td> <td></td> <td></td> <td></td>	Installation Cost			
Site Preparation Cost: ¹ 20.00 50.00 Auxinary Cost: ² 0.00 0.00 Total 183.25 323.75 Amual Operating Cost: 183.25 323.75 Annual Operating Cost: 0.00 0.00 Overhead: 0.00 0.00 Overhead: 0.00 0.00 Total: 0.00 0.00 Maintenance Labor Cost: 17.00 182.50 Maintenance Material Cost: 1504.39 3317.41 Low Died Gas Consumption Cost: 121.21 121.21 PhydStop2-007.1 Anauy Alote Cost Anauy Alote Cost	instandion 605t	Freight Cost: ^b	13.25	23.75
Auxiliary Cost: ⁴¹ 0.00 0.00 Installation Cost: ⁴¹ 180.00 220.00 Installation Cost: ⁴¹ 183.22 323.75 Annual Operating Cost: Taxes, Insurance, and Admin. ⁴¹ 0.00 0.00 Overhead: 0.00 0.00 0.00 Total: 0.00 0.00 0.00 Maintenance Material Cost: ¹⁰ 73.00 182.50 Total: 146.00 385.00 Realized Economic Benefit: High Bleed Gas Consumption Cost: ¹⁰ 153.30 183.30 Low Bleed Gas Consumption Cost: ¹⁰ 153.30 183.30 183.30 Total: 1411.09 3134.11 Low Bleed Gas Consumption Cost: ¹⁰ 163.30 163.30 163.30 Total: 1411.09 3134.11 Low Bleed Gas Consumption Cost: ¹⁰ 163.30 163.30 163.20 Cost provided by Manufacturers and Distributors Notafer 2 160.00 100.00 100.00 Cost provided by Industry and based on an houry rate of 520 - 550 multiplied by 1 hour for length of task; task will include subting in the well and isolating the vessel so that well and isolating the vessel so thoury rate of 520 - 550 multiplied by 2 hours for le		Site Preparation Cost:	20.00	50.00
Installation Cost: 150,00 250,00 Total 133,25 323,75 Annual Operating Cost: Taxes, Insurance, and Admin.! 0.00 0.00 Overhead: 0.00 0.00 0.00 Total: 0.00 0.00 0.00 Annual Maintenance Cost: Maintenance Labor Cost." 73.00 182.50 Total: Total: 73.00 182.50 Total: Total: 146.00 365.00 Realized Economic Benefit: High Bleed Gas Consumption Cost." 1594.39 3317.41 Low Bleed Gas Consumption Cost." 143.30 133.30 133.30 Total: 1411.09 3134.11 143.30 133.41 Description of totak: Total: * Cost provided by Manufacturers and Distributors Cost provided by Industry and based on an houry rate of 520-550 multiplied by 1 hour for length of task; task wil include shufting in the well and isolating the vessel so that the work can be performed safety. • Cost provided by Distributors and based on an houry rate of 527-5125 multiplied by 3.65 hours annually for length of task; this information is available in the documentation binder provided • Cost provided by multiplying bibeed consumption rate wi		Auxiliary Cost: ^d	0.00	0.00
Total 183.25 323.75 Annual Operating Cost: Taxes, Insurance, and Admin. ¹¹ 0.00 0.00 Total: 0.00 0.00 0.00 Total: 0.00 0.00 0.00 Annual Mintenance Cost: Maintenance Labor Cost. ¹⁵ 73.00 182.50 Maintenance Material Cost. ¹⁶ 73.00 182.50 Total: High Bleed Gas Consumption Cost. ¹⁰ 159.30 133.30 Total: Low Bleed Gas Consumption Cost. ¹⁰ 133.30 133.20 Total: Low Bleed Gas Consumption Cost. ¹⁰ 133.30 134.11 Notice of provided by Manufacturers and Distributors Pace Cost provided by Manufacturers and Distributors Ecot provided by Manufacturers and Distributors Pace Cost provided by Undustry and based on an houry rate of \$20 - \$50 multiplied by 1 hour for length of task; task will include shufting in the well and isolating the vessel so that the work can be performed safety Cost provided by Industry and based on an houry rate of \$20 - \$50 multiplied by 2 hours for length of task; this information is available in the documentation bindiary provided by 20 scores for length of task; this Cost provided by Industry and based on an houry rate of \$20 - \$50 multiplied by 2 hours for length of task; this Cost calculated by multiphy		Installation Cost: ^e	150.00	250.00
Annual Operating Cost: Taxes, Insurance, and Admin. ¹ 0.00 0.00 Overhead. ¹ 0.00 0.00 Total: 0.00 0.00 Annual Maintenance Cost: Maintenance Labor Cost. ¹⁷ 73.00 182.50 Total: 146.00 365.00 Realized Economic Benefiti Low Bleed Gas Consumption Cost. ¹⁹ 1594.39 3317.41 Low Bleed Gas Consumption Cost. ¹⁰ 1433.30 133.41 Dotte: Antice Addition of Cost. ¹⁰ Total: Cost provided by Manufacturers and Distributors Booto Cost is estimated using the Office of Air Coulity Planning and Standards, EPA, OACPS Control Cost Manual, Sixth Edition EPA4527b-02-001, January 2002, Section 1, Chapter 2 Cost provided by Industry and based on an hourly rate of \$20-550 multiplied by 1 hour for length of task; task will include shutting in the well and isolating the versel so that the work can be performed safely Cost provided by Manufacturers and Distributors Cost provided by Manufacturers of \$20-550 multiplied by 2 hours for length of task; this information is available in the downnentation hinder provided Cost provided by Manufacturers of \$20-550 multiplied by 2 hours for length of task; this informatinon is available in the downnentation hinde		Total	183.25	323.75
Taxes, Insurance, and Admin. ¹ 0.00 0.00 Overhead. ¹ 0.00 0.00 Total: 0.00 0.00 Maintenance Cost: Maintenance Labor Cost. ¹ 73.00 182.50 Maintenance Material Cost. ¹⁰ 73.00 182.50 Total: 146.00 365.00 Realized Economic Benefit: High Bleed Gas Consumption Cost. ¹⁰ 1594.39 3317.41 Low Bleed Gas Consumption Cost. ¹⁰ 183.30 183.30 Total: 1411.09 3134.11	Appual Operating Cost			
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Total: 0.00 0.00 Annual Maintenance Cost: Maintenance Material Cost: 73.00 192.50 Maintenance Material Cost: 73.00 182.50 Realized Economic Benefit: High Bleed Gas Consumption Cost: 1594.39 3317.41 Low Bleed Gas Consumption Cost: 183.30 183.30 Total: 1411.09 3134.11 Decomposition Cost: * Cost provided by Manufacturers and Distributors * Cost provided by Industry and based on an hourly rate of \$20-\$50 multiplied by 1 hour for length of task; task will include shutting the well and isolating the vessel is an hourly rate of \$25-\$50 multiplied by 2 hours for length of task; tisk information is available in the documentation binder provided • Cost provided by Jindustry and based on an hourly rate of \$25-\$50 multiplied by 3 hours annually for le		Overhead. ¹	0.00	0.00
Annual Maintenance Cost: Y3.00 182.50 Maintenance Material Cost. ⁵⁰ 73.00 182.50 Total: 146.00 365.00 Realized Economic Benefit: High Bleed Gas Consumption Cost. ⁶¹ 1594.39 3317.41 Low Bleed Gas Consumption Cost. ⁶¹ 183.30 183.30 183.30 Total: 1411.09 3134.11 Notes a. Cost provided by Manufacturers and Distributors b. Cost is estimated using the Office of Air Quality Planning and Standards, EPA, OAQPS Control Cost Manual, Sixth Edition EPA/452/B-02-001, January 2002, Section 1, Chapter 2 c. Cost provided by Jindustry and based on an houtry rate of \$20 - \$50 multiplied by 1 hour for length of task; task will include shutting in the well and isolating the versel so that the work can be performed safely d. Cost provided by Jindustry and based on an houtry rate of \$75 - \$125 multiplied by 2 hours for length of task; this information is available in the documentation binder provided q. Cost actualized by multiphying high bleed consumption rate with current Natural Gas rate c. Cost antited by multiphying high bleed consumption rate with current Natural Gas rate c. Cost antited by multiphying high bleed consumption rate with current Natural Gas rate c. Cost antited by multiphying bl		Total:	0.00	0.00
Annual Maintenance Cost: Maintenance Cost: 73.00 182.50 Maintenance Material Cost: 73.00 182.50 Total: 146.00 385.00 Realized Economic Benefit: High Bleed Gas Consumption Cost: 1594.39 3317.41 Low Bleed Gas Consumption Cost: 183.30 183.30 Total: 1411.09 3134.11 Notes a. Cost provided by Manufacturers and Distributors b. Cost is estimated using the Office of Air Quality Planning and Standards, EPA, OAQPS Control Cost Manual, Sixth Edition EPA/452/B-02-001, January 2002, Section 1, Chapter 2 c. Cost provided by Industry and based on an hourly rate of \$20 - \$50 multiplied by 1 hour for length of task; task will include shutting in the well and isolating the vessel so that the work can be performed safely d. Cost provided by Distributors and based on an hourly rate of \$20 - \$50 multiplied by 2 hours for length of task; this information is available in the documentation binder provided f. Cost provided by Justimate and biot provided g. Cost provided by Justimate and hourly rate of \$20 - \$50 multiplied by 3.65 hours annually for length of task; g. Cost provided by Justimate an hourly rate of \$20 - \$50 multiplied by 3.65 hours annually for length of task; g.				
maintenance Material Cost. ¹⁰ 73.00 102.50 Tota: 146.00 365.00 Realized Economic Benefit: Low Bleed Gas Consumption Cost. ¹⁰ 1594.39 3317.41 Low Bleed Gas Consumption Cost. ¹⁰ 183.30 183.30 Total: 1411.09 3134.11 Notes a. Cost provided by Manufacturers and Distributors b. Cost is estimated using the Office of Air Quality Planning and Standards, EPA, OAQPS Control Cost Manual, Sixth Edition EPA/45276-2001, January 2002, Section 1, Chapter 2 c. Cost provided by Industry and based on an hourly rate of \$20 - \$50 multiplied by 1 hour for length of task; task will include shutting in the well and isolating the versel as othat the work can be performed safely d. Cost provided by Industry and based on an hourly rate of \$27 - \$125 multiplied by 2 hours for length of task; this information is available in the documentation binder provided f. Cost provided by Multiplying high bleed consumption rate with current Natural Gas rate h. Cost omitted from report because there is no difference in annual operation between a high or low bleed f. Cost omitted form report because there is no difference in annual operation between a high bleed controller for maintanence which totals 18.25 hrs annually. Jow bleed controllers require slightly more maintenance than high bleed; as such the assumpti	Annual Maintenance Cost	Maintenance Labor Cost [†]	73.00	182.50
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Realized Economic Benefit: high Bleed Gas Consumption Cost: ³ 1594.39 3317.41 Low Bleed Gas Consumption Cost: ³ 183.30 183.30 Tota: 1411.09 3134.11 Octor provided by Manufacturers and Distributors B Cost provided by Manufacturers and Distributors B Cost is estimated using the Office of Air Quality Planning and Standards, EPA, OAQPS Control Cost Manual, Sixth Edition EPA/452/8-02-001, January 2002, Section 1, Chapter 2 C Cost provided by Industry and based on an hourly rate of \$20 - \$50 multiplied by 1 hour for length of task; task will include shutting in the well and isolating the vessel so that the work can be performed safely. C Cost provided by Industry and based on an hourly rate of \$20 - \$50 multiplied by 2 hour for length of task; task will include shutting in the well and isolating the vessel so that the verok can be performed safely. C Cost provided by Jindustry and based on an hourly rate of \$20 - \$50 multiplied by 3.65 hours annually for length of task; this information is available in the documentation binder provided. F Cost provided by Industry and based on an hourly rate of \$20 - \$50 multiplied by 3.65 hours annually for length of task; Cost provided by Industry and based on an hourly rate of \$20 - \$50 multiplied by 3.65 hours annually for length of task; Cost calculated by multiplying bing bleed consumption rate with current Natural Gas rate Cost anited from r		Total:	146.00	365.00
Realized Economic Benefit: High Bleed Gas Consumption Cost: ⁰ 1594.39 3317.41 Low Bleed Gas Consumption Cost: ⁰ 183.30 183.30 Total: 1411.09 3134.11 Notes a- Cost provided by Manufacturers and Distributors b- Cost is estimated using the Office of Air Quality Planning and Standards, EPA, OAQPS Control Cost Manual, Sixth Edition EPA/452/0-20-01, January 2002, Section 1, Chapter 2 c- Cost provided by Industry and based on an hourly rate of \$20 - \$50 multiplied by 1 hour for length of task; task will include shutting in the well and isolating the vessel so that the work can be performed safely d- Cost provided from report ; however there are auxiliary cost associated with installation (i.e. piping and painting) e- Cost provided by Distributors and based on an hourly rate of \$20 - \$50 multiplied by 3.65 hours annually for length of task; this information is available in the documentation binder provided f- Cost calculated by multiplying high bleed consumption rate with current Natural Gas rate h- Cost aniced by multiplying low bleed consumption rate with current Natural Gas rate h- Cost aniced from report because there is no difference in annual operation between a high or low bleed Decounted from report because there is no difference in annual operation between a high or low bleed Low cost induced from report because				
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Low Bleed Gas Consumption Cost:: 183.30 183.30 Total: 1411.09 3134.11 a. Cost provided by Manufacturers and Distributors b. Cost is estimated using the Office of Air Quality Planning and Standards, EPA, OAQPS Control Cost Manual, Sixth Edition EPA/452/B-02-001, January 2002, Section 1, Chapter 2 c. Cost provided by Industry and based on an hourly rate of \$20 - \$50 multiplied by 1 hour for length of task; task will include shutting in the well and isolating the vessel so that the work can be performed safely d. Cost ormitted from report; however there are auxiliary cost associated with installation (i.e. piping and painting) e. Cost provided by Distributors and based on an hourly rate of \$75 - \$125 multiplied by 2 hours for length of task; this information is available in the documentation binder provided f. Cost calculated by multiplying high bleed consumption rate with current Natural Gas rate b. Cost calculated by multiplying by bleed consumption rate with current Natural Gas rate b. Cost calculated by multiplying by bleed consumption rate with current Natural Gas rate b. Cost calculated by multiplying by bleed consumption rate with current Natural Gas rate b. Cost calculated by multiplying low bleed consumption rate with current Natural Gas rate b. Cost omitted from report because there is no difference in annual operation between a high or low bleed. Assumed that 3 minutes per day would be allocated to each high bleed controller for maintanence which totals 18.25 hrs annually; low bleed controllers require slightly more maintenance than high bleed; as such the assumption made for the difference in required maintenance is 20%; 18.25 hrs*20% = 3.65 hrs		High Bleed Gas Consumption Cost:"	1594.39	3317.41
A cost provided by Manufacturers and Distributors Cost is estimated using the Office of Air Quality Planning and Standards, EPA, OAQPS Control Cost Manual, Sixth Edition EPA/452/B-02-001, January 2002, Section 1, Chapter 2 Cost provided by Industry and based on an hourly rate of \$20 - \$50 multiplied by 1 hour for length of task; task will include shutting in the well and isolating the vessel so that the work can be performed safely Cost omrited from report; however there are auxiliary cost associated with installation (i.e. piping and painting) Cost provided by Distributors and based on an hourly rate of \$75 - \$125 multiplied by 2 hours for length of task; this information is available in the documentation binder provided Cost calculated by multiplying high bleed consumption rate with current Natural Gas rate Cost calculated by multiplying low bleed consumption rate with current Natural Gas rate Cost calculated by multiplying low bleed consumption rate with current Natural Gas rate Cost calculated from report because there is no difference in annual operation between a high or low bleed Cost omitted from report because there is no difference in annual operation between a high or low bleed Cost and that 3 minutes per day would be allocated to each high bleed controller for maintanence which totals 18.25 hrs annually; low bleed controllers require slightly more maintenance than high bleed; as such the assumption made for the difference in required maintenance is 20%; 18.25 hrs*20% = 3.65 hrs		Low Bleed Gas Consumption Cost:"	183.30	183.30
Notes a- Cost provided by Manufacturers and Distributors b- Cost is estimated using the Office of Air Quality Planning and Standards, EPA, OAQPS Control Cost Manual, Sixth Edition EPA/452/B-02-001, January 2002, Section 1, Chapter 2 c- Cost provided by Industry and based on an hourly rate of \$20 - \$50 multiplied by 1 hour for length of task; task will include shutting in the well and isolating the vessel so that the work can be performed safely d- Cost provided by Distributors and based on an hourly rate of \$75 - \$125 multiplied by 2 hours for length of task; this information is available in the documentation binder provided f- Cost covided by multiplying high bleed consumption rate with current Natural Gas rate p- Cost omitted from report because there is no difference in annual operation between a high or low bleed k- Cost omitted from report because there is no difference in annual operation between a high or low bleed f- Cost omitted from report because there is no difference in annual operation between a high or low bleed maintenance Cost: Assumed that 3 minutes per day would be allocated to each high bleed controller for maintanence which totals 18.25 hrs annually; low bleed controllers require slightly more maintenance than high bleed; as such the assumption made for the difference in required maintenance is 20%; 18.25 hrs*20% = 3.65 hrs		Total.	1411.09	5154.11
 a- Cost provided by Manufacturers and Distributors b- Cost is estimated using the Office of Air Quality Planning and Standards, EPA, OAQPS Control Cost Manual, Sixth Edition EPA/452/B-02-001, January 2002, Section 1, Chapter 2 c- Cost provided by Industry and based on an hourly rate of \$20 - \$50 multiplied by 1 hour for length of task; task will include shutting in the well and isolating the vessel so that the work can be performed safely d- Cost provided by Distributors and based on an hourly rate of \$75 - \$125 multiplied by 2 hours for length of task; this information is available in the documentation binder provided f- Cost provided by Industry and based on an hourly rate of \$20 - \$50 multiplied by 3.65 hours annually for length of task g- Cost calculated by multiplying high bleed consumption rate with current Natural Gas rate h- Cost provided by multiplying low bleed consumption rate with current Natural Gas rate i- Cost omitted from report because there is no difference in annual operation between a high or low bleed 		Notes		
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 Cost of mitted nonineport, noweed intere are adviately obsit associated with installation (i.e., piping and painting) e- Cost provided by Distributors and based on an hourly rate of \$75 - \$125 multiplied by 2 hours for length of task; this information is available in the documentation binder provided f- Cost provided by Industry and based on an hourly rate of \$20 - \$50 multiplied by 3.65 hours annually for length of task; g- Cost calculated by multiplying high bleed consumption rate with current Natural Gas rate Cost calculated by multiplying low bleed consumption rate with current Natural Gas rate Cost calculated by multiplying low bleed consumption rate with current Natural Gas rate Cost omitted from report because there is no difference in annual operation between a high or low bleed Maintenance Cost: Assumed that 3 minutes per day would be allocated to each high bleed controller for maintanence which totals 18.25 hrs annually; low bleed controllers require slightly more maintenance than high bleed; as such the assumption made for the difference in required maintenance is 20%; 18.25 hrs*20% = 3.65 hrs 	shutting in the well and iso	lating the vessel so that the work can be perfo	med safely	ing and pointing)
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For cost calculated by multiplying low bleed consumption rate with current Natural Gas rate For cost omitted from report because there is no difference in annual operation between a high or low bleed Security and that 3 minutes per day would be allocated to each high bleed controller for maintanence which totals 18.25 hrs annually; low bleed controllers require slightly more maintenance than high bleed; as such the assumption made for the difference in required maintenance is 20%; 18.25 hrs*20% = 3.65 hrs	g- Cost calculated by multiply	ing high bleed consumption rate with current l	vatural Gas rate	
Assumptions Maintenance Cost: Assumed that 3 minutes per day would be allocated to each high bleed controller for maintanence which totals 18.25 hrs annually; low bleed controllers require slightly more maintenance than high bleed; as such the assumption made for the difference in required maintenance is 20%; 18.25 hrs*20% = 3.65 hrs	i- Cost calculated by Multiply	ecause there is no difference in annual operat	ion between a high or	r low bleed
Assumptions Maintenance Cost: Assumed that 3 minutes per day would be allocated to each high bleed controller for maintanence which totals 18.25 hrs annually; low bleed controllers require slightly more maintenance than high bleed; as such the assumption made for the difference in required maintenance is 20%; 18.25 hrs*20% = 3.65 hrs				
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totals 18.25 hrs annually; low bleed controllers require slightly more maintenance than high bleed; as such the assumption made for the difference in required maintenance is 20%; 18.25 hrs*20% = 3.65 hrs	Maintenance Cost: Assumed	that 3 minutes per day would be allocated to e	each high bleed control	oller for maintanence which
ure assumption made for the unifience in required maintenance is 20%, 10.25 hts 20% = 3.05 hts	totals 18.	25 hrs annually; low bleed controllers require s	lightly more maintena	ance than high bleed; as such
	the assum	iprovi made for the difference in required main	nemance is 20%; 18.2	.5 ma 2076 = 5.05 ms

Colorado Department of Public Health and Environment / Air Pollution Control Division

				Attachn Draft - Octob	nent 1 er 30, 2008				
		Liquid I	evel Controlle	r Cost Analaysis to	Replace High-	Bleed with Low	Bleed		
Emiss	sion Source:	Liquid Le	vel Controller						
Cor	ntrol Device:	Replace H	ligh with Low	Bleed					
Manufactu	rer & Model:	Kimray; 2	IN Gen II LLC	RH					
Manufactu	rer & Model:	Norriseal;	1001, A, XL, I	EVS, S					
Manufactu	rer & Model:	Norriseal;	1001, A, XL, I	EVS, T					
Manufactu	rer & Model:	Wellmark	ST4UP						
Manufactu	rer & Model:	Wellmark	2001NB Serie	es					
Emission	Reduction:	89%							
Control Device Cont Control	Description: rol Benefits: Limitations:	The Liquid The Liquid The low m Liquid Le∨	Level Controll Level Controll aintenance req el Controllers b	er is used to detec er is a reliable, lov juirements make t by design, are an e	et and/or mainta v maintenance o he controller ide emission source	in the liquid leve device designed al for application and have poten	l within a vessel. to maintain a liqu is in remote area tial environmenta	iid level. s. al risks.	
						194			
		Targeted	Emission Factor	Emission Basis	High Bleed	Annual Emission	s Reduction	1	
		Pollutant	(scf/hr)	(hrs)	(TPY)	(TPY)	(TPY)		
		VOC	1.93	8760	0.839	0.096	0.743	I,	
System Life	Interest	Capital	Oracital	Burebase Cost	Annualized	Annual	Annual	Capital	Realized
(yr)	(%)	Factor	Investment	Furchase Cost	Cost ¹	Costs	Costs	Cost	Benefit
n	1	CRF	Р	Pp	Pi	Po	Pm	CRC	REB
			Total Ar (\$1,2	nnual Cost (\$) 224.98)					
c	alculations:	$CRF = \frac{i}{c}$	$\frac{(1+i)^n}{(1+i)^n - 1}$ $P = P_i$ $CRC = CRF \times F$	Capital Recovery Capital investme Capital Recovery	/ Factor allows t nt includes bas / cost is paymer	for calculation of e instrument cos nt required to rep	end-of-year payr t, instrumentatior pay capital invest	ment to repay n cost, and sal ment at end of	investment es tax fterm
	TAC	$= \mathbf{P}_{i} + \mathbf{P}_{0} + \mathbf{P}_{i}$	+ CRC - REE	The Total Annua	I Cost is the sur	m of the installati	on cost, annual c	operational	
				and maintenance	e costs, the Cap	oital Recovery Co	osts less the Rea	lized Economi	c Benefit.
Cost of Co	$ontrol = \frac{1}{E}$	TAC nission Re	duction	The Cost of Con achieved through	trol is the Total the installation	Annual Cost divi n of the control de	ded by the Emiss evice.	ion Reduction	
		ost includes fr	eight costs and and Standard	l is calculated by s, EPA, OAQPS C	dividing installat ≎ontrol Cost Mai	tion costs by syst nual, Sixth Editio	em life years n, EPA/452/B-02	2-001, January	2002,
Notes: 1 Annualized 2 Based on C Section 1, Ch	Installation C Office of Air Q apter 2	Jality Planning							
Notes: 1 Annualized 2 Based on C Section 1, Ch	Installation C Office of Air Q apter 2	Jality Planning							

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	Liquid Le	vel Controller Cost Breakdown to Repla	ace High-Bleed with Low Bl	eed
Emi	ission Source: Liquid Lev	el Controller	Manufacturer & Model	Kimray: 2 IN Gen II LLC RH
C	ontrol Device: Replace H	igh with Low Bleed	Manufacturer & Model:	Norriseal; 1001, A, XL, EVS, S
			Manufacturer & Model:	Norriseal; 1001, A, XL, EVS, T
			Manufacturer & Model:	Wellmark; ST4UP
			mandracturer & model.	Weimark, 200 IND Selles
	Purchase Cost:		Typical	High
		Base Equipment Cost:*	250.00	550.00
		Instrumentation Cost: ^b	25.00	55.00
		Sales Tax: ^{b,3}	15.00	33.00
		Total:	290.00	638.00
	Installation Cost:			
		Freight Cost: ^b	12.50	27.50
		Site Preparation Cost: ^c	20.00	50.00
		Auxiliary Cost: ^a	0.00	0.00
		Installation Cost: [©]	150.00	250.00
		Total	162.50	327.50
	Annual Operating Cost:			
		Taxes, Insurance, and Admin:	0.00	0.00
		Overhead:	0.00	0.00
		Total.	0.00	0.00
	Annual Maintenance Cost:			
		Maintenance Labor Cost:	73.00	182.50
		Maintenance Material Cost:"	73.00	182.50
		Total:	146.00	365.00
	Realized Economic Benefit:			
		High Bleed Gas Consumption Cost	^{.9} 1594.39	3317.41
		Low Bleed Gas Consumption Cost:	183.30	183.30
		Total:	1411.09	3134.11
		Notes		
2-	Cost provided by Manufactu	rers and Distributors		
b-	Cost is estimated using the	Office of Air Quality Planning and Stan	dards, EPA, OAQPS Contr	ol Cost Manual, Sixth Edition
	EPA/452/B-02-001, January	2002, Section 1, Chapter 2		56 36 45 12 10 1/ 000421 1/30
C-	Cost provided by Industry a	nd based on an hourly rate of \$20 - \$50) multiplied by 1 hour for lei	ngth of task; task will include
d-	Cost omitted from report ; h	owever there are auxiliary cost association	ted with installation (i.e. pip	ing and painting)
e-	Cost provided by Distributor	s and based on an hourly rate of \$75 -	\$125 multiplied by 2 hours	for length of task; this
	information is available in th	e documentation binder provided	multiplied by 9.65 have a	nnually for length of tasts
T- 0-	Cost provided by industry a Cost calculated by multiplying	ng blased on an nounly rate of \$20 - \$50 Ing high bleed consumption rate with cur	rrent Natural Gas rate	initially for length of task
h-	Cost calculated by multiplying	ng low bleed consumption rate with cur	rent Natural Gas rate	
ŀ	Cost omitted from report be	cause there is no difference in annual o	operation between a high o	r low bleed
		Assumpti	ons	
Maintenanc	e Cost: Assumed H	hat 3 minutes per day would be allocate	ed to each high bleed contr	oller for maintanence which
	totals 18.25	hrs annually; low bleed controllers req	uire slightly more maintena	ance than high bleed; as such
	the assumption	tion made for the difference in required	d maintenance is 20%; 18.2	25 hrs*20% = 3.65 hrs



Pressure	Controller Cost Breakdown to Retrofit from I	ligh-Bleed to Low Ble	ed	
Emission Source: Pressure Co	ontroller	Manufacturer:	Wellmark	
Control Device: Retro-Fit Hi	gh to Low Bleed	Model No:	Mizer-Fisher Wizard	
	-	Model No:	Mizer-Fisher 4150/4160	_
Burchase Cost		Turnical	High	
Fulliase cost.	Base Equipment Cost ³	345.00	00,000	
	Instrumentation Cost: ^b	34.50	60.00	
	Sales Tax: ^{b,3}	20.70	36.00	
	Total:	400.20	696.00	
Installation Cost:				
	Freight Cost: ^b	17.25	30.00	
	Site Preparation Cost:	20.00	50.00	
	Auxiliary Cost:"	0.00	0.00	
	Installation Cost:"	150.00	250.00	
	Total	107.25	550.00	
Annual Operating Cost:				
	Taxes, Insurance, and Admin:	0.00	0.00	
	Overhead: Total:	0.00	0.00	
	, out	0100		
Annual Maintenance Cost:				
	Maintenance Labor Cost."	73.00	182.50	
	Total:	146.00	365.00	
			1.000-00000	
Realized Economic Benefit:	Uteb Blood One One working One bill			
	High Bleed Gas Consumption Cost:	1594.39	3317.41	
	Total:	1411.09	3134.11	
			. The second	
	Notes			
a- Cost provided by Manufactur	ers and Distributors			
b- Cost is estimated using the C	ffice of Air Quality Planning and Standards	EPA, OAQPS Contro	l Cost Manual, Sixth Edition	
EPA/452/B-02-001, January	2002, Section 1, Chapter 2	aliad by 1 baur far lan	ath of tools tools will include	
shutting in the well and isolat	ing the vessel so that the work can be perfo	med safely	gui or task, task will include	
d- Cost omitted from report ; ho	wever there are auxiliary cost associated wi	h installation (i.e. pipi	ng and painting)	
e- Cost provided by Distributors	and based on an hourly rate of \$75 - \$125	multiplied by 2 hours f	for length of task; this	
f- Cost provided by Industry an	d based on an hourly rate of \$20 - \$50 multi	plied by 3.65 hours ar	nnually for length of task	
g- Cost calculated by multiplying	high bleed consumption rate with current l	latural Gas rate		
h- Cost calculated by multiplying	g low bleed consumption rate with current N	atural Gas rate	low blood	
F Cost onlined non-report bec	ause there is no unterence in annual operation	on between a nigh of	low bleed	
	Assumptions	3		
Maintenance Cost: Assumed the	at 3 minutes per day would be allocated to a	ach high bleed contro	ller for maintanence which	
totals 18.25	hrs annually; low bleed controllers require s	ightly more maintena	nce than high bleed; as such	
the assumpt	ion made for the difference in required main	tenance is 20%; 18.2	5 hrs*20% = 3.65 hrs	

Pressure Controller Cod Analaysis to Replace High-Eled with Low Bleed Emission Source: Pressure Controller Control Davice: Replace High with Low Bleed Manufacturer & Model: Fisher; C1 Series Emission Reduction: B95 Device Description: Pressure controllers are used to regulate and/or maintain a certain level of pressure. Control Benefits: The Pressure Controllers is a reliable, low maintenance device designed to regulate pressure. The low maintenance requirements make the controller deal for applications in remote areas. Control Limitations: Pressure Controllers by design, are an emission source and have potential environmental risks. System Life Interest Capital Meditari Copital Purchase Cost Installation VOC 1.93 6760 0.839 0.096 0.743 System Life Capital Purchase Cost Installation Annual Annual Costs Costs Benefits (y') Rate Capital Purchase Cost Installation Costs Costs Economic (y') Rate Capital Purchase Cost Installation Costs Costs	Pressure Controller Control Device: Pressure Controller Control Device: Replace High with Low Bleed Manufacturer & Model: Fisher; C1 Series Emission Reduction: BY Device Description: Pressure controllers are used to regulate and/or maintenance device designed to regulate pressure. Control Benefits: The Pressure Controllers are used to regulate and/or maintenance device designed to regulate pressure. Control Limitations: Pressure Controllers by design, are an emission source and have potential environmental risks. Targeted Emission Emission for finance requirements make the controller deal for applications in remote areas. Control Limitations: Pressure Controllers by design, are an emission source and have potential environmental risks. System Uie Targeted Emission for finance (regoint) Cost for Costs Reduction (v) Retate Cospital Purchase Cost Installation Annual Emissions Cost for Costs Recovery Economin for the finance (regoint) Cost for Costs Recovery Economin for Cost for Costs Recovery Economin for Cost for Costs Recovery Economic (regoint) Cost for Costs Recovery Economic (regoint) Cost for Costs Recovery Economic (regoint) Recove			Attachme raft - October	ed Pneumatic ent 1 30, 2008	Controller Regul	ation		
Emission Source:Pressure ControllerControl Device:Replace High with Low BleedManufacturer & Model:Fisher; C1 SeriesEmission Reduction:89%Device Description:Pressure controllers are used to regulate and/or maintain a certain level of pressure.Control Benefits:The Pressure Controllers is a reliable, low maintenance device designed to regulate pressure.Control Limitations:The Pressure Controllers by design, are an emission source and have potential environmental risks.TargetedEmissionEmissionEmission BasisPaintantControl Limitations:Pressure Controllers by design, are an emission source and have potential environmental risks.TargetedEmission Emission BasisMight BleedAnnual EmissionsPaintantCostingCostingCosting(%)RateCostingCosting(%)Factor(%)Factor(%)Factor(%)Factor(%)Costing(%)Costing(%)Costing(%)Costing(%)Costing(%)Costing(%)Costing(%)Costing(%)Costing(%)Costing(%)Costing(%)Costing(%)Costing(%)Factor(%)Costing(%)Costing(%)Costing(%)Costing(%)Costing <tr< th=""><th>Emission Source: Persure Controller: Control Device: Replace High with Low Bled Mundacturer & Model: Fisher; C1 Series: Emission Reduction: 89% Mundacturer & Model: Fisher; C1 Series: Emission Reduction: 89% Mundacturer & Model: Fisher; Control lers are used to regulate and/or maintain a certain level of pressure. Control Benefit: Pressure Controllers is a reliable, low maintenance device designed to regulate pressure. Control Limitation: Pressure Controller is a reliable, low maintenance device designed to regulate involvemental risks. Terrigate maintenance: Control Limitation: Pressure Controller is a reliable, low maintenance device designed to regulate involvemental risks. System Unit Interrest: Capital Purchase Cost Installation Operational Maintenance Recovery Deconeril Docidition State.00 2514.5 51,411.0 System Unit Interrest: Capital Purchase Cost Installation Operational Maintenance device dev</th><th>Cost An</th><th>e Controller C</th><th>alaysis to R</th><th>eplace High-B</th><th>leed with Low B</th><th>leed</th><th></th><th></th></tr<>	Emission Source: Persure Controller: Control Device: Replace High with Low Bled Mundacturer & Model: Fisher; C1 Series: Emission Reduction: 89% Mundacturer & Model: Fisher; C1 Series: Emission Reduction: 89% Mundacturer & Model: Fisher; Control lers are used to regulate and/or maintain a certain level of pressure. Control Benefit: Pressure Controllers is a reliable, low maintenance device designed to regulate pressure. Control Limitation: Pressure Controller is a reliable, low maintenance device designed to regulate involvemental risks. Terrigate maintenance: Control Limitation: Pressure Controller is a reliable, low maintenance device designed to regulate involvemental risks. System Unit Interrest: Capital Purchase Cost Installation Operational Maintenance Recovery Deconeril Docidition State.00 2514.5 51,411.0 System Unit Interrest: Capital Purchase Cost Installation Operational Maintenance device dev	Cost An	e Controller C	alaysis to R	eplace High-B	leed with Low B	leed		
Control Device:Replace High with Low BleedManufacturer & Model:Fisher; C1 SeriesEmission Reduction:9%Device Description:Pressure controllers are used to regulate and/or maintain a certain level of pressure.Control Benefit:The Pressure Controller is a reliable, low maintenance device designed to regulate pressure.Control Benefit:The Pressure Controller is a reliable, low maintenance device designed to regulate pressure.Control Benefit:The Pressure Controller is a reliable, low maintenance device designed to regulate pressure.Control Limitations:Pressure Controllers by design, are an emission source and have potential environmental risks.TargetedFinission Emission Basis High BleedPollutant(estiny)VOC1.82System LifeInterestCapitalReslicer(w)RateCooperational(w)RateCooperational(w)RateCooperational(w)RateCooperational(w)RateCooperational(w)RateCooperational(w)RateCooperational(w)RateCooperational(w)RateCooperational(w)RateCooperational(w)RateCooperational(w)RateCooperational(w)RateCooperational(w)RateCooperational(w)RateCooperational(w)RateCooperational(w)RateCooperationa	Control Device:Replace High with Low BleedManufacturer & Model:Fisher; C1 SeriesEmission Reduction:8%Device Description:Pressure controllers are used to regulate and/or maintain a certain level of pressure. En to ormaintenance requirements make the controller deal for applications in remote areas. Control Limitations:Pressure Controllers by design, are an emission source and have potential environmental risks.Targeted Emission Emission Emission Basis High Bleed Cover (Prev) (PPV)Pesture Controllers by design, are an emission source and have potential environmental risks.System Life Interest Gapitat George (Series Cover) (PPV) (ntroller						
Manufacturer & Model:Fisher; C1 SeriesEmission Reduction:B3%Device Description:Pressure controllers are used to regulate and/or maintenance device designed to regulate pressure. The low maintenance requirements make the controller ideal for applications in remote areas.Control Benefit:The Pressure Controllers by design, are an emission source and have potential environmental risks.TargetedEmission FactorPollutariCapital (rins)Annual Emissions 	Manufacture 1 Model:Finher; C1 SeriesEmission Reduction:93%Device Description:Pressure controllers are used to regulate and/or maintain a certain level of pressure.Control Benefit:The Pressure controllers are used to regulate pressure.The low maintenance requirements make the controller ideal for applications in remote areas.Control Limitation:Pressure Controllers by design, are an emission source and have potential environmental risks.The fore maintenance requirements make the controller ideal for applications in remote areas.Control Limitation:Pressure Controllers by design, are an emission source and have potential environmental risks.The dow maintenance requirements make the controller ideal for applications in remote areas.Control Limitation:Pressure Controllers by design, are an emission source and have potential environmental risks.System LifeImitation:Capital Purchase Cost Imitation Operational Maintenance Requery Resource (resonant Resource)System LifeInterest:Capital Purchase Cost Imitation Operational Maintenance Recovery Resonant Cost is to a source (source)System LifeImitation Cost Imitation Cost (source)Source (source)System LifeCRF = fix(1 + i)^T (1 + i)^T	Bleed	h with Low						
Emission Reduction: B9% Device Description: Pressure controllers are used to regulate and/or maintain a certain level of pressure. Control Benefit: The Pressure Controller is a reliable, low maintenance device designed to regulate pressure. Control Limitation: Pressure Controllers by design, are an emission source and have potential environmental risks. Targeted Emission Pollutant (ccffthr) Thigh Bleed (hrs) Annual Emissions (PV) Reduction (PV) System Life Interest Capital Pollutant (ccffthr) Purchase Cost (stall Costs) Costs Costs System Life Interest Capital Purchase Cost (stall Purchase Cost (stall Costs) Annual Cost Costs Costs Costs Recovery Costs Recovery Pa Pa Pa Cost Recovery (Costs) Recovery (Costs) Stall Costs Costs Costs Costs Stall Purchase Cost Stall Purchase Cost Stall Purchase Cost Recovery Costs Costs Stall Purchase Cost Stall Purchase Cost Costs Costs Stall Purchase Cost Stall Purchase Cost	Emission Reduction: 9% Device Description: Pressure Controllers are used to regulate and/or maintain a certain level of pressure. Control Benefit: The Pressure Controller is a reliable, low maintenance device designed to regulations in more area: Control Limitation: Pressure Controllers by design, are an emission source and have potential environmental risks. Image: Image: Emission Environce Control Limitation: Pressure Controllers by design, are an emission source and have potential environmental risks. System Life Image: Emission Emission Annual Emissions Vocc 1.83 8760 O.020 0.743 System Life Interest Capital Purchase Cost Installation Operational Maintenance Coert Encourt		eries						
Description:Pressure controllers are used to regulate and/or maintain a certain level of pressure.Control Benefits:The Pressure Controller is a reliable, low maintenance device designed to regulate pressure. The low maintenance requirements make the controller ideal for applications in remote areas.Control Limitations:Pressure Controllers by design, are an emission source and have potential environmental risks.TargetedEmission Factor (certiny)Voc1.9397600.8390.09960.743System LifeInterest CostialCapital InvestmentVoc1.9397600.8390.0980.743InterestCapital CostialVoc1.9397600.8390.09960.743InterestCapital CostialAnnual Capital CostialCostial CostialVoc1.9397600.8390.09960.743System LifeInterest Rate covery (%%)Capital FactorPpPpPp01.9397600.8390.09960.743System LifeInterest Rate covery (%%)Capital Purchase Cost (sold 0.00Scots)CostsVoc1.9397609.75050.00\$146.00\$251.451.901.919.009.01\$2,610.00\$2,610.00\$2,610.001.910.10\$2,610.00\$2,610.00\$2,610.00\$2,610.001.929.909.7439.909.90\$2,612.001.929.909.909.90	Device Description:Ressure controllers are used to regulate and/or maintain a certain level of pressure.Control Benefit:The Pressure Controller is a reliable, low maintenance requirements make the controller ideal of angulate pressure.Control Limitation:Pressure Controllers by design, are an emission source and have potential environmental risks. $\overline{urgeted}$ EmissionEmission Basis $\overline{urgeted}$ EmissionEmission Basis $\overline{urgeted}$ EmissionEmission Basis $\overline{urgeted}$ EmissionEmission $\overline{urgeted}$ CapitalPurchase Cost $\overline{(urget)}$ CostCost $\overline{(urget)}$ CostCost $\overline{(urget)}$ FactorCost $\overline{(urget)}$ FactorPa $\overline{(urget)}$ PaPa $\overline{(urget)}$ CostCost $\overline{(urget)}$ CostSo $\overline{(urget)}$ CostCost $\overline{(urget)}$ FactorPa $\overline{(urget)}$ PaPa $\overline{(urget)}$ CostSo $\overline{(urget)}$ CostCost $\overline{(urget)}$ CostCost $\overline{(urget)}$ CostCost $\overline{(urget)}$ CostCost $\overline{(urget)}$ CostCost<								
Device Description:Pressure controllers are used to regulate and/or maintain a certain level of pressure.Control Benefits:The Pressure Controller is a reliable, low maintenance device designed to regulate pressure.Control Limitations:Pressure Controllers by design, are an emission source and have potential environmental risks.Control Limitations:Pressure Controllers by design, are an emission source and have potential environmental risks.TargetedEmissionEmission BasisMaintenanceAnnual EmissionsVOC1.9387600.8330.0960.743System LifeInterestCapitalV(%)FactorInvestmentniCapitalV(%)FactorInvestmentniCapitalV(%)StactorInvestmentniCRFP0.10\$2,610.00\$67.50\$0.00\$146.00\$251.45\$1,411.0LightInterestCapital InvestmentniCRFP0.10\$2,610.00\$67.50\$0.00\$146.00\$251.45\$1,411.0LightInterestCapital Investment includes base instrument cost, instrumentation cost, and sales taxCRC = CRF x PCapital Recovery cost is payment required to repay capital investment at end of termTAC = Pi+P_6 + P_n + CRC - REBTotal Annual Cost is the sum of the installation cost, annual operational and maintenance costs, the Capital Recovery cost is ess the Realized Economic Benefit.TAC = Fi+P_6 + P_n + CRC - REB <td< td=""><td>Device Description:Pressure controllers are used to regulate and/or maintain a certain level of pressure. Control Benefix: The Pressure Controller is a reliable, low maintenance device designed to regulate pressure. Control Limitation: The low maintenance requirements make the controller ideal for applications in remote areas: Control Limitation: The ressure Controllers by design, are a emission source and have potential environmental risks.The Dressure Controllers by design, are a emission source and have potential environmental risks.The Dressure Controllers by design, are a emission source and have potential environmental risks.The Dressure Controllers by design, are a emission source and have potential environmental risks.The Dressure Controllers by design, are a emission source and have potential environmental risks.The Dressure Controller by design, are a emission source and have potential environmental risks.The Dressure Controller by design, are a emission source and have potential environmental risks.The Dressure Controller by design, are a emission conce and have potential environmental risks.The Dress Concert term is the design of the Dress Controller by design of the Dress Controller by design.The Dress Controller by design.Control Control = TAC</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	Device Description:Pressure controllers are used to regulate and/or maintain a certain level of pressure. Control Benefix: The Pressure Controller is a reliable, low maintenance device designed to regulate pressure. Control Limitation: The low maintenance requirements make the controller ideal for applications in remote areas: Control Limitation: The ressure Controllers by design, are a emission source and have potential environmental risks.The Dressure Controllers by design, are a emission source and have potential environmental risks.The Dressure Controllers by design, are a emission source and have potential environmental risks.The Dressure Controllers by design, are a emission source and have potential environmental risks.The Dressure Controllers by design, are a emission source and have potential environmental risks.The Dressure Controller by design, are a emission source and have potential environmental risks.The Dressure Controller by design, are a emission source and have potential environmental risks.The Dressure Controller by design, are a emission conce and have potential environmental risks.The Dress Concert term is the design of the Dress Controller by design of the Dress Controller by design.The Dress Controller by design.Control Control = TAC								
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Targeted PollutantEmission Factor (csffhr)Emission Basis (rrs)Annual Emissions Low (TPY)Reduction (TPY)VOC1.9397600.8390.0960.743System Life (yr)Interest (Rate (%)Capital Factor (%)Purchase Cost (nstallation CostAnnual Operational CostsAnnual CostsCapital CostsRealized 	Targeted PollulariEmission Factor (hrs)Emission Basis High Bled (hrs)Annual Emissions Reduction (hrs)Reduction ReductionSystem Life (y)Interest Rate (y)Capital Recovery FactorCapital Capital Purchase CostAnnual Annual CostAnnual Cost CostsCapital Recovery Economi BenefitNumber Life (y)Interest Rate (y)Capital Recovery FactorCapital Purchase CostAnnual Cost CostsAnnual Costs CostsCapital Recovery Economi Benefitn(y)(%) FactorCapital InvestmentP P	iesign, e	ni onero by a	are an emis	sion source an	la nave potential	environmentarin	ing.	
$\frac{\left argeted \\ result}{(scflhr)} \right ^{2}}{\frac{VOC}{(scflhr)}} \frac{VOC}{(rs)} \frac{1.93}{(rs)} \frac{1.93}{$	Image of the second state state	Frains	Emission	in Desis		Annual Emission	IS		
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Image:	Emission Source: Pressure Controller Control Device: Replace High with Low Bleed Purchase Cost: Base Equipment C Instrumentation Co Sales Tax: ^{0,3} Total: Installation Cost: Freight Cost: ⁰ Site Preparation C Auxiliary Cost: ^d Installation Cost: Total Annual Operating Cost: Taxes, Insurance, Overhead: ¹ Total: Annual Maintenance Cost: Maintenance Labo Maintenance Mate Total: Realized Economic Benefit: High Bleed Gas Co	ANDOWN TO Replace Fligh-Bleed with Low Bleed Manufacturer: Fisher Model No: C1 Series Cost: ^a 2250.00 2250.00 tost: ^b 225.00 225.00 135.00 81.00 2610.00 2610.00 2556.00 Cost: ^c 20.00 50.00 0.00 0.00 880.00 880.00 880.00 1042.50 , and Admin: ¹ 0.00 0.00 or Cost: ¹ 73.00 182.50 erial Cost: ^b 73.00 182.50 146.00 365.00 365.00
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Realized Economic Benefit: High Bleed Gas Consumption Cost: ⁰ 1594.39 3317.41 Low Bleed Gas Consumption Cost: ⁰ 183.30 183.30 Total: 1411.09 3134.11 Octors provided by Manufacturers and Distributors B- Cost is estimated using the Office of Air Quality Planning and Standards, EPA, OAQPS Control Cost Manual, Sixth Edition EPA/452/B-02-001, January 2002, Section 1, Chapter 2 c- Cost provided by Industry and based on an hourly rate of S20 - S50 multiplied by 1 hour for length of task; task will include shutting in the well and isolating the vessel so that the work can be performed safely. d- Cost provided by Industry and based on an hourly rate of S20 - S50 multiplied by 2 hours for length of task; task will include shutting in the well and isolating the vessel so that the work can be performed safely. d- Cost provided by Industry and based on an hourly rate of S20 - S50 multiplied by 2 hours for length of task; then multiplied again by 2 because of a 2 technician requirement; this information is available in the documentation binder e- Cost provided by Industry and based on an hourly rate of S20 - S50 multiplied by 3.65 hours annually for length of task; then multiplied again by 2 because of a 2 technician requirement; this information is available in the documentation binder f- Cost provided by Industry and based on an hourly rate of S20 - S50 multiplied by 3.65 hours annually for length of task; then multiplied again by 2 because there is no diff	Realized Economic Benefit: High Bleed Gas Co Low Bleed Gas Co	
High Bleed Gas Consumption Cost: ⁹ 1594.39 3317.41 Low Bleed Gas Consumption Cost: ¹⁰ 183.30 183.30 Total: 1411.09 3134.11 Notes a- Cost provided by Manufacturers and Distributors b- Cost is estimated using the Office of Air Quality Planning and Standards, EPA, OAQPS Control Cost Manual, Sixth Edition EPA/452/B-02-001, January 2002, Section 1, Chapter 2 c- Cost provided by Industry and based on an hourly rate of 520 - \$50 multiplied by 1 hour for length of task; task will include shutting in the well and isolating the vessel so that the work can be performed safely d- Cost provided by Industry and based on an hourly rate of 520 - \$50 multiplied by 2 hours for length of task; task will include shutting in the well and isolating the vessel so that the work can be performed safely d- Cost provided by Industry and based on an hourly rate of \$20 - \$50 multiplied by 2 hours for length of task; then multiplied again by 2 because of a 2 technician requirement; this information is available in the documentation binder f- Cost provided by Industry and based on an hourly rate of \$20 - \$50 multiplied by 3.65 hours annually for length of task g- Cost calculated by multiplying low bleed consumption rate with current Natural Gas rate h- Cost calculated by multiplying low bleed consumption rate with current Natural Gas rate h- Cost calculated by multiplying low	High Bleed Gas Co	
Low Bleed Gas Consumption Cost: ⁿ 183.30 183.30 Total: 1411.09 3134.11 Notes a- Cost provided by Manufacturers and Distributors b- Cost is estimated using the Office of Air Quality Planning and Standards, EPA, OAQPS Control Cost Manual, Sixth Edition EPA/452/B-02-001, January 2002, Section 1, Chapter 2 c- Cost provided by Industry and based on an hourly rate of \$20 - \$50 multiplied by 1 hour for length of task; task will include shutting in the well and isolating the vessel so that the work can be performed safely d- Cost provided by Distributor and based on an hourly rate of \$10 (minimum of 4 hrs) multiplied by 2 hours for length of task; then multiplied again by 2 because of a 2 technician requirement; this information is available in the documentation binder f- Cost provided by Multistry and based on an hourly rate of \$20 - \$50 multiplied by 3.65 hours annually for length of task then multiplied again by 2 because of a 2 technician requirement; this information is available in the documentation binder f- Cost calculated by multiplying high bleed consumption rate with current Natural Gas rate h- Cost orwited from report because there is no difference in annual operation between a high or low bleed h- Cost calculated by multiplying low bleed consumption rate with current Natural Gas rate i- Cost omitted from report because there is no difference in annual operation between a high or low bleed	Low Bleed Gas Co	Consumption Cost: ⁹ 1594,39 3317,41
Total: 1411.09 3134.11 Notes a- Cost provided by Manufacturers and Distributors b- Cost is estimated using the Office of Air Quality Planning and Standards, EPA, OAQPS Control Cost Manual, Sixth Edition EPA/452/B-02-001, January 2002, Section 1, Chapter 2 c- Cost provided by Industry and based on an hourly rate of \$20 - \$50 multiplied by 1 hour for length of task; task will include shuting in the well and isolating the vessel so that the work can be performed safely d- Cost provided by Distributor and based on an hourly rate of \$110 (minimum of 4 hrs) multiplied by 2 hours for length of task them multipled again by 2 because of a 2 technician requirement; this information is available in the documentation binder f- Cost provided by Multify and based on an hourly rate of \$20 - \$50 multiplied by 3.65 hours annually for length of task them multiplied again by 2 because of a 2 technician requirement; this information is available in the documentation binder f- Cost provided by Multifylying high bleed consumption rate with current Natural Gas rate b- Cost calculated by multiplying low bleed consumption rate with current Natural Gas rate i- Cost omitted from report because there is no difference in annual operation between a high or low bleed b- Cost calculated by multiplying low bleed consumption rate with current Natural Gas rate i- Cost omitted from report because there is no difference in annual operation between a high or low	LOW DICCU Gas CO	onsumption Cost. ^{In} 183.30 183.30
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e- Cost provided by Distributor and based on an hourly rate of \$110 (minimum of 4 hrs) multiplied by 2 hours for length of task then multiplied again by 2 because of a 2 technician requirement; this information is available in the documentation binder Cost provided by Industry and based on an hourly rate of \$20 - \$50 multiplied by 3.65 hours annually for length of task Cost calculated by multiplying high bleed consumption rate with current Natural Gas rate Cost calculated by multiplying low bleed consumption rate with current Natural Gas rate Cost omitted from report because there is no difference in annual operation between a high or low bleed Maintenance Cost: Assumed that 3 minutes per day would be allocated to each high bleed controller for maintanence which totals 18.25 hrs annually; low bleed controllers require slightly more maintenance than high bleed; as such the assumption made for the difference in required maintenance is 20%; 18.25 hrs*20% = 3.65 hrs	d- Cost omitted from report ; however there are auxil	iliary cost associated with installation (i.e. piping and painting)
then multiplied again by 2 because of a 2 technician requirement; this information is available in the documentation binder f- Cost provided by Industry and based on an hourly rate of \$20 - \$50 multiplied by 3.65 hours annually for length of task g- Cost calculated by multiplying high bleed consumption rate with current Natural Gas rate h- Cost calculated by multiplying low bleed consumption rate with current Natural Gas rate i- Cost omitted from report because there is no difference in annual operation between a high or low bleed Assumptions Maintenance Cost: Assumed that 3 minutes per day would be allocated to each high bleed controller for maintanence which totals 18.25 hrs annually; low bleed controllers require slightly more maintenance than high bleed; as such the assumption made for the difference in required maintenance is 20%; 18.25 hrs*20% = 3.65 hrs	e- Cost provided by Distributor and based on an hou	urly rate of \$110 (minimum of 4 hrs) multiplied by 2 hours for length of task
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h- Cost calculated by multiplying lay object consumption rate with current Natural Gas rate i- Cost calculated by multiplying low bleed consumption rate with current Natural Gas rate i- Cost omitted from report because there is no difference in annual operation between a high or low bleed Maintenance Cost: Assumed that 3 minutes per day would be allocated to each high bleed controller for maintanence which totals 18.25 hrs annually; low bleed controllers require slightly more maintenance than high bleed; as such the assumption made for the difference in required maintenance is 20%; 18.25 hrs*20% = 3.65 hrs	 cost provided by industry and based on an hourly Gost calculated by multiplying biob bleed consumption 	y rate or o∠o - ooo multiplied by 3.00 nours annually for length of task notion rate with current Natural Gas rate
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Maintenance Cost: Assumed that 3 minutes per day would be allocated to each high bleed controller for maintanence which totals 18.25 hrs annually; low bleed controllers require slightly more maintenance than high bleed; as such the assumption made for the difference in required maintenance is 20%; 18.25 hrs*20% = 3.65 hrs		Assumptions
Maintenance Cost: Assumed that 3 minutes per day would be allocated to each high bleed controller for maintanence which totals 18.25 hrs annually; low bleed controllers require slightly more maintenance than high bleed; as such the assumption made for the difference in required maintenance is 20%; 18.25 hrs*20% = 3.65 hrs		
the assumption made for the difference in required maintenance is 20%; 18.25 hrs*20% = 3.65 hrs	Maintenance Cost: Assumed that 3 minutes per day totals 18 25 hrs annually: low black	vould be allocated to each high bleed controller for maintanence which and controllers require slightly more maintenance than high bleed; as such
	the assumption made for the diffe	ference in required maintenance is 20%; 18.25 hrs*20% = 3.65 hrs

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			Technicai Sup	port Document for A Draft -	Attachment 1 - October 30, 2009	matic Controller R	egulation				
			Low	v Bleed Liquid Level	Pneumatic Devic	es Costs Analyses					
			Retro-Fit and Repla	acement Liquid Leve	ei Pheumatic Devi	ces Operated by In	strument Gas				
Monufasturar	Model	Bleed Type		Capital	Installation Cost ^a		Maintenance Cost ^b		Life of	Expected Life	Bleed
Manufacturer	Model	Bleed Type	Type	Capital	motanau	in cost	mannenan	ice cost	Life of	Expected Life	Dieeu
Manufacturer	Model	Bleed Type	Туре	Cost ¹	Low ²	High ²	Low ¹	High ¹	Control ^{1,c}	of Control	Rate ¹
Manufacturer Wellmark ¹	Model Cemco 1110-111	Bleed Type Retro-fit	Type Liquid Level	Cost ¹ \$265.00	Low ² \$150.00	High ² \$250.00	Low ¹ \$73.00	High ¹ \$182.50	Control ^{1,c}	of Control	Rate ¹
Manufacturer Wellmark ¹ Wellmark ¹	Model Cemco 1110-111 Invalco 4010-111	Bleed Type Retro-fit Retro-fit	Type Liquid Level Liquid Level	Cost ¹ \$265.00 \$295.00	Low ² \$150.00 \$150.00	High ² \$250.00 \$250.00	Low ¹ \$73.00 \$73.00	High ¹ \$182.50 \$182.50	Control ^{1.c} 15+ 15+	of Control	Rate ¹ 0.2
Manufacturer Wellmark ¹ Wellmark ¹ Wellmark ¹	Model Cemco 1110-111 Invalco 4010-111 Fisher 2500	Bleed Type Retro-fit Retro-fit Retro-fit	Type Liquid Level Liquid Level Liquid Level	Cost ¹ \$265.00 \$295.00 \$475.00	Low ² \$150.00 \$150.00 \$150.00	High ² \$250.00 \$250.00 \$250.00	Low ¹ \$73.00 \$73.00 \$73.00	High ¹ \$182.50 \$182.50 \$182.50	Control ^{1.c} 15+ 15+	of Control 15 15	Rate ¹ 0.2 0.2
Manufacturer Wellmark ¹ Wellmark ¹ Wellmark ¹ Wellmark ¹	Model Cemco 1110-111 Invalco 4010-111 Fisher 2500 ST4UP	Bleed Type Retro-fit Retro-fit Retro-fit Low Bleed	Type Liquid Level Liquid Level Liquid Level Liquid Level	Cost ¹ \$265.00 \$295.00 \$475.00 \$275.00	Low ² \$150.00 \$150.00 \$150.00 \$150.00	High ² \$250.00 \$250.00 \$250.00 \$250.00	Low ¹ \$73.00 \$73.00 \$73.00 \$73.00 \$73.00	High ¹ \$182.50 \$182.50 \$182.50 \$182.50 \$182.50	Control ^{1,c} 15+ 15+ 15+ 15+	of Control 15 15 15 15 15	Rate ¹ 0.2 0.2 0.2
Manufacturer Wellmark ¹ Wellmark ¹ Wellmark ¹ Wellmark ¹	Model Cemco 1110-111 Invalco 4010-111 Fisher 2500 ST4UP 2001NB Series	Bleed Type Retro-fit Retro-fit Retro-fit Low Bleed Low Bleed	Type Liquid Level Liquid Level Liquid Level Liquid Level Liquid Level	Cost ¹ \$265.00 \$295.00 \$475.00 \$275.00 \$550.00	Low ² \$150.00 \$150.00 \$150.00 \$150.00 \$150.00 \$150.00	High ² \$250.00 \$250.00 \$250.00 \$250.00 \$250.00	Low ¹ \$73.00 \$73.00 \$73.00 \$73.00 \$73.00 \$73.00	High ¹ \$182.50 \$182.50 \$182.50 \$182.50 \$182.50 \$182.50	Control ^{1,c} 15+ 15+ 15+ 15+ 15+ 15+	of Control 15 15 15 15 15 15 15 1	Rate ¹ 0.21 0.21 0.21 0.21 0.21
Manufacturer Wellmark ¹ Wellmark ¹ Wellmark ¹ Wellmark ¹ Wellmark ¹ Norriseal ¹	Model Cemco 1110-111 Invalco 4010-111 Fisher 2500 ST4UP 2001NB Series 1001, A, XL, EVS, S	Bleed Type Retro-fit Retro-fit Low Bleed Low Bleed Low Bleed	Type Liquid Level Liquid Level Liquid Level Liquid Level Liquid Level Liquid Level	Cost ¹ \$265.00 \$295.00 \$475.00 \$275.00 \$550.00 \$250.00	Low ² \$150.00 \$150.00 \$150.00 \$150.00 \$150.00 \$150.00 \$150.00	High ² \$250.00 \$250.00 \$250.00 \$250.00 \$250.00 \$250.00	Low ¹ \$73.00 \$73.00 \$73.00 \$73.00 \$73.00 \$73.00 \$73.00	High ¹ \$182.50 \$182.50 \$182.50 \$182.50 \$182.50 \$182.50 \$182.50	Control ^{1,c} 15+ 15+ 15+ 15+ 15+ 15+ 15+ 15+	of Control 15 15 15 15 15 15 15 1	Rate ¹ 0.21 0.21 0.21 0.21 0.21 0.21
Manufacturer Wellmark ¹ Wellmark ¹ Wellmark ¹ Wellmark ¹ Wellmark ¹ Norriseal ¹ Norriseal ¹	Model Cemco 1110-111 Invalco 4010-111 Fisher 2500 ST4UP 2001NB Series 1001, A, XL, EVS, S 1001, A, XL, EVS, S	Bleed Type Retro-fit Retro-fit Low Bleed Low Bleed Low Bleed Low Bleed	Type Liquid Level Liquid Level Liquid Level Liquid Level Liquid Level Liquid Level Liquid Level	Cost ¹ \$265.00 \$295.00 \$475.00 \$275.00 \$550.00 \$250.00 \$250.00	Low ² \$150.00 \$150.00 \$150.00 \$150.00 \$150.00 \$150.00 \$150.00	High ² \$250.00 \$250.00 \$250.00 \$250.00 \$250.00 \$250.00 \$250.00 \$250.00	Low ¹ \$73.00 \$73.00 \$73.00 \$73.00 \$73.00 \$73.00 \$73.00 \$73.00	High ¹ \$182.50 \$182.50 \$182.50 \$182.50 \$182.50 \$182.50 \$182.50 \$182.50	Control ^{1,c} 15+ 15+ 15+ 15+ 15+ 15+ 15+ 15+	expected Life of Control 15 15 15 15 15 15 15 15 15	Rate ¹ 0.21 0.21 0.22 0.22 0.22 0.22 0.21 0.21

Notes:

a- Cost provided by Distributors and based on an hourly rate of \$75 - \$125 multiplied by 2 hours for length of task

b- Cost provided by Industry and based on an hourly rate of \$20 - \$50 multiplied by 3.65 hours annually for length of task

c- Life of control value reports 15+ because the majority of manufacturers claim devices will last indefinitiley if properly maintained; this information

is available in the interview notes section of the documentation binder provided

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			Technical Sup	oport Document fo	r Proposed Pneu Attachment 1 - October 30, 200	matic Controller F B	Regulation				
			Low B	leed Pressure Pr	neumatic Devic	es Costs Analys	ses				
		Reti	o-Fit and Replace	ement Pressure i	Pheumatic Dev	ices Operated b	y instrument c	bas			
Manufacturer	Model	Bleed Type	Туре	Capital	Installation Cost ^{a,c}		Maintenance Cost ^b		Life of	Expected Life	Bleed
Manufacturer	Model	Bleed Type	Type	Capital	installatio	n Cost"	Maintena	nce cost	Life of	Expected Life	Breed
Manufacturer	Model	Bleed Type	Туре	Cost ¹	Low ²	High ²	Low ¹	High ¹	Control ^{1,d}	of Control	Rate ¹
Manufacturer Wellmark ¹	Model Fisher Wizard	Bleed Type Retro-fit	Type Pressure	Cost ¹ \$345.00	Low ² \$150.00	High ² \$250.00	Low ¹ \$73.00	High ¹ \$182.50	Control ^{1,d}	of Control	Rate ¹
Manufacturer Wellmark ¹ Wellmark ¹	Model Fisher Wizard Fisher 4150/4160	Bleed Type Retro-fit Retro-fit	Type Pressure Pressure	Cost ¹ \$345.00 \$600.00	Low ² \$150.00 \$150.00	High ² \$250.00 \$250.00	Low ¹ \$73.00 \$73.00	High ¹ \$182.50 \$182.50	Control ^{1,d} 15+ 15+	of Control	Rate ¹ 0.28

Notes:

a- Cost provided by Distributors and based on an hourly rate of \$75 - \$125 multiplied by 2 hours for length of task

b- Cost provided by Industry and based on an hourly rate of \$20 - \$50 multiplied by 3.65 hours annually for length of task

c- Cost provided by Distributor and based on an hourly rate of \$110 (minimum of 4 hrs) multiplied by 2 hours for length of task

then multiplied again by 2 because of a 2 technician requirement

d- Life of control value reports 15+ because the majority of manufacturers claim devices will last indefinitiey if properly maintained; this information

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