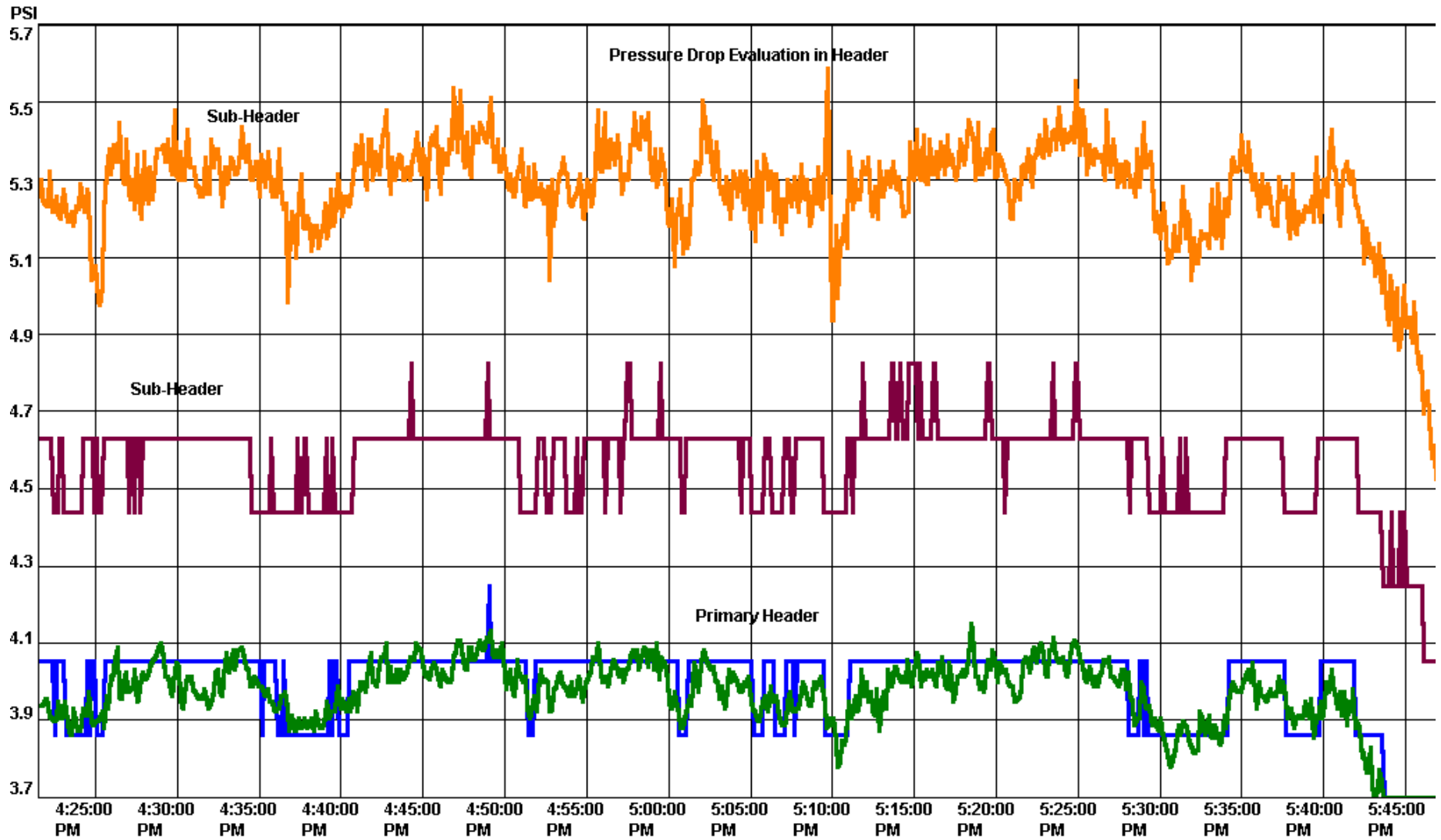
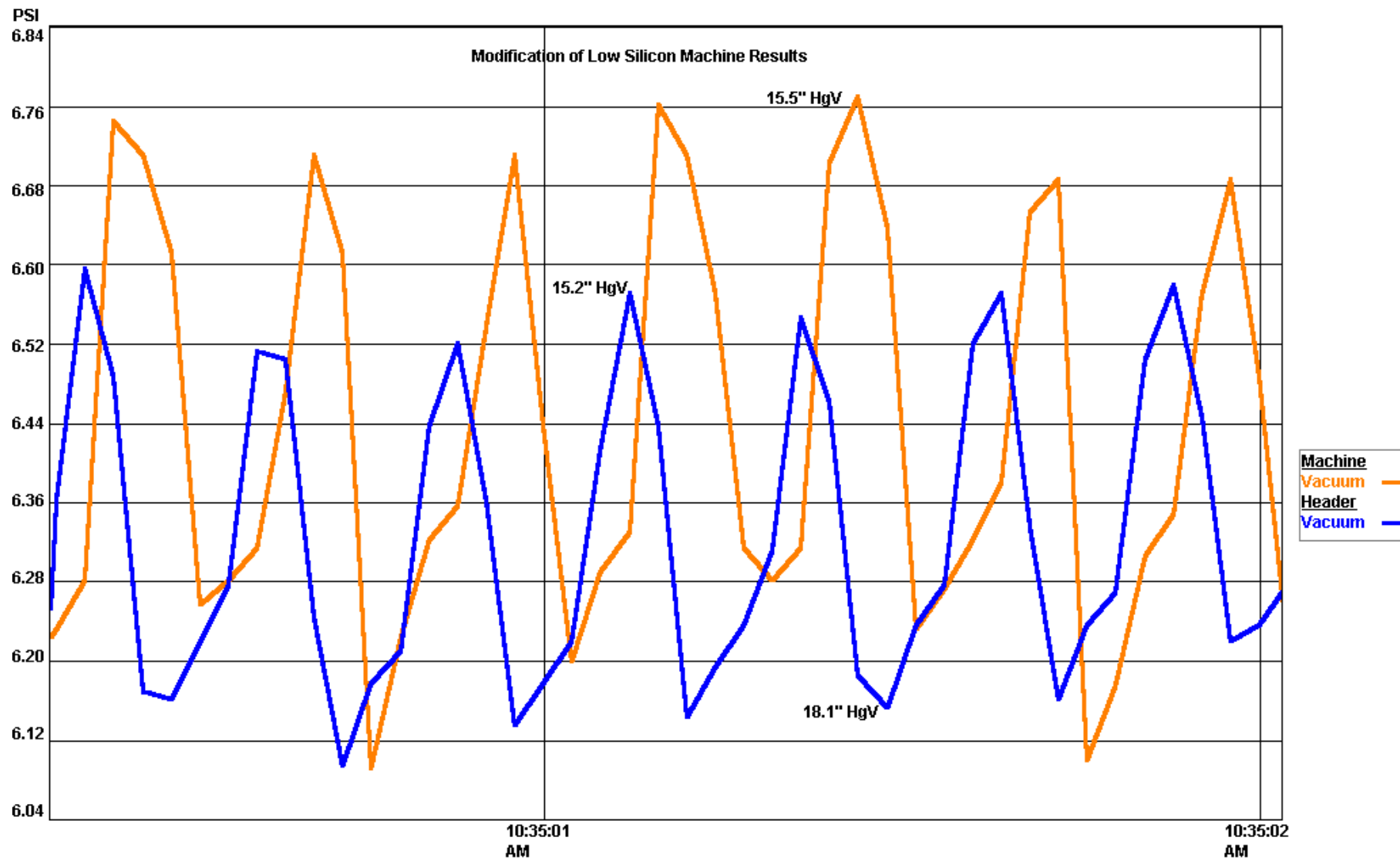


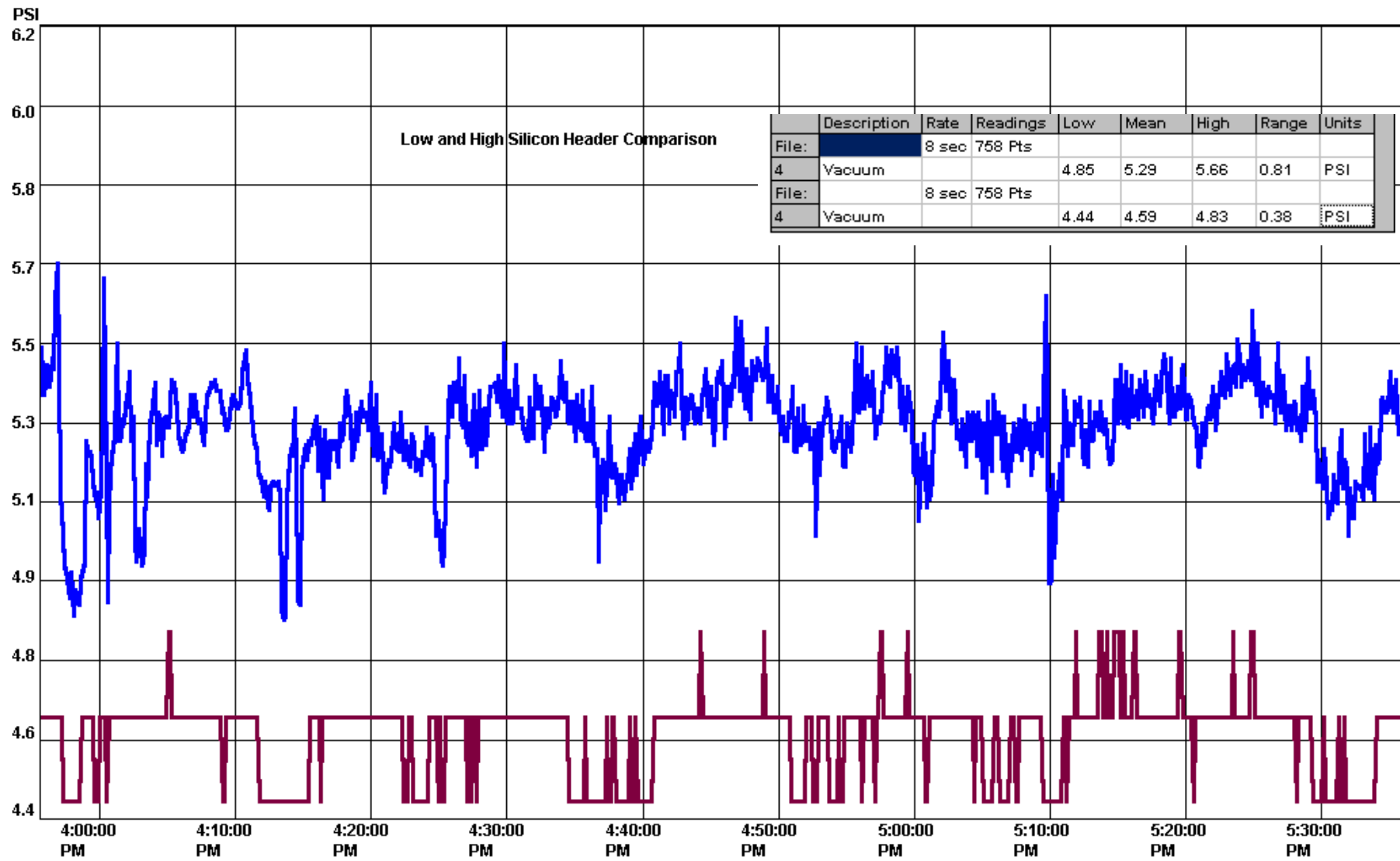
Attachment A

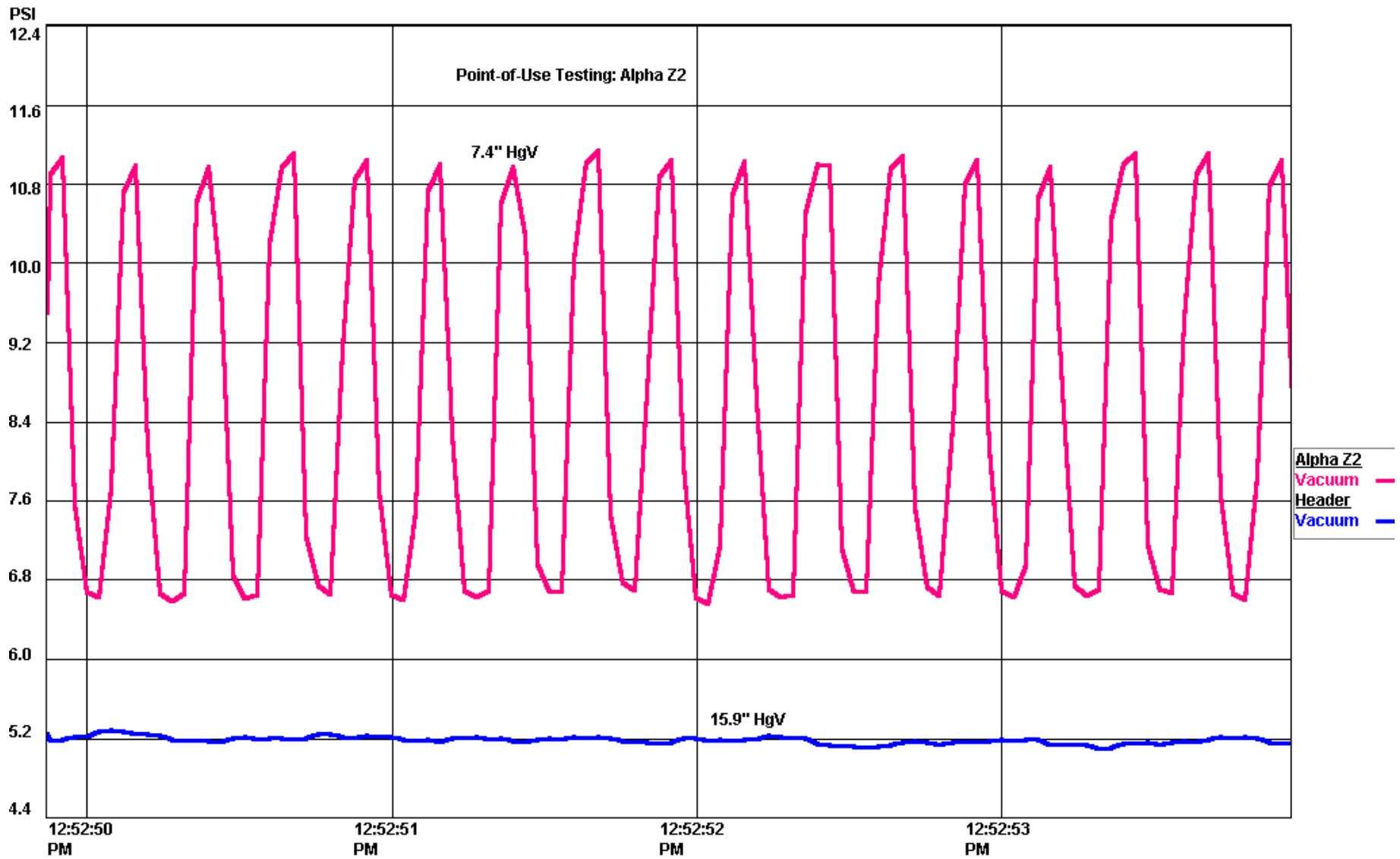
General Process Mobile, AL

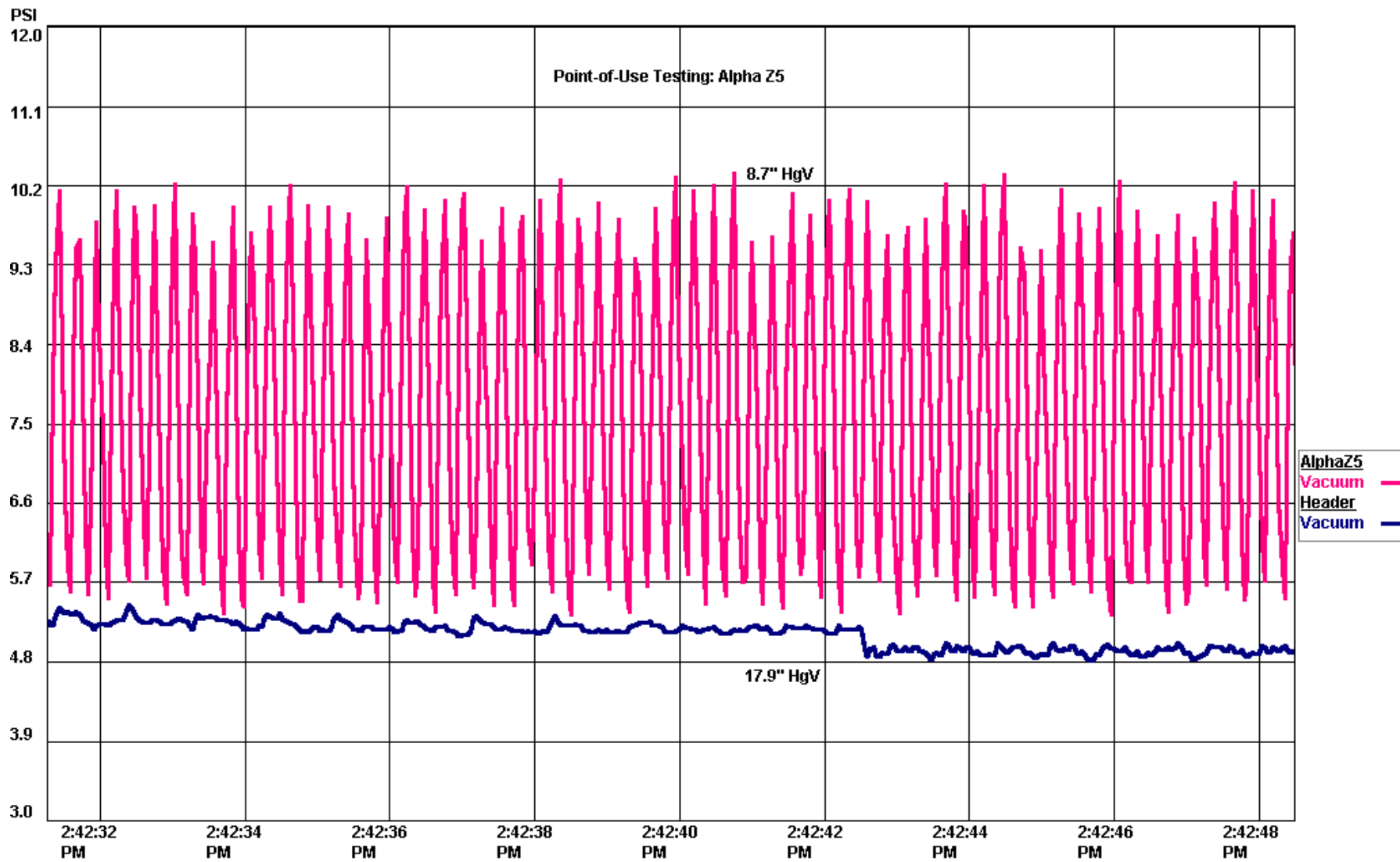
Constituents of Demand in ACFM					
	Normal Production			Peak Production	
	existing	<i>proposed</i>		existing	<i>proposed</i>
Low Pressure					
Low Silicon Production	1,536	<i>1,536</i>		1,686	<i>1,686</i>
High Silicon Production	1,587	<i>1,587</i>		1,737	<i>1,737</i>
Artificial Demand	2,668	<i>0</i>		2,668	<i>0</i>
High Temperature Seal Water	0	<i>0</i>		0	<i>0</i>
Leak Load	65	<i>65</i>		65	<i>65</i>
Totals:	5,856	3,188		6,156	3,488
	7,200			7,500	
<i>Notes:</i>					
<i>Peak demand assumes an additional 150 ACFM for both Low and High Silicon. Leak rate is estimated at 3% of Low and High Silicon demand. Artificial demand is additional ACFM needed to overcome pressure drop in distribution and filtration systems.</i>					

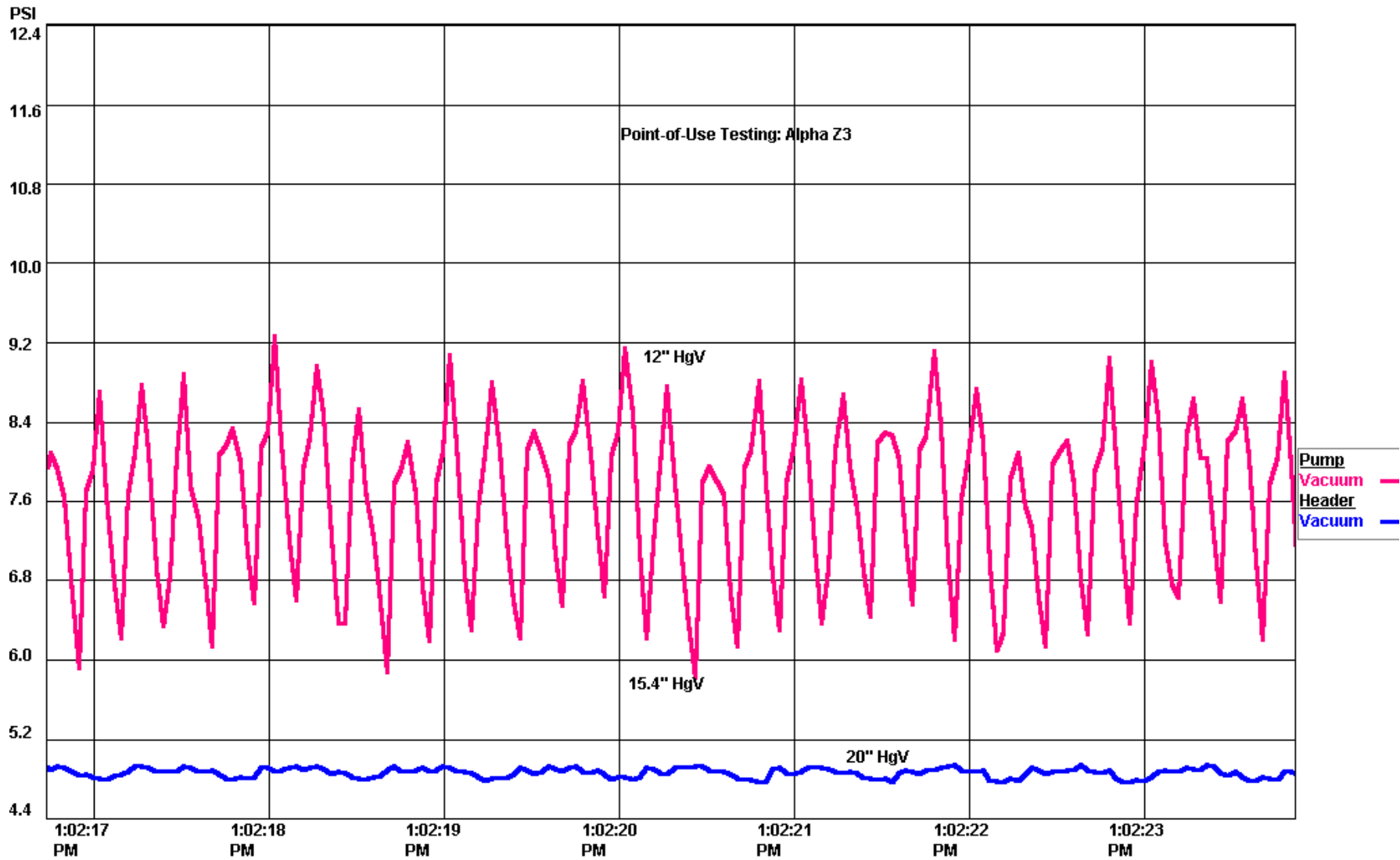


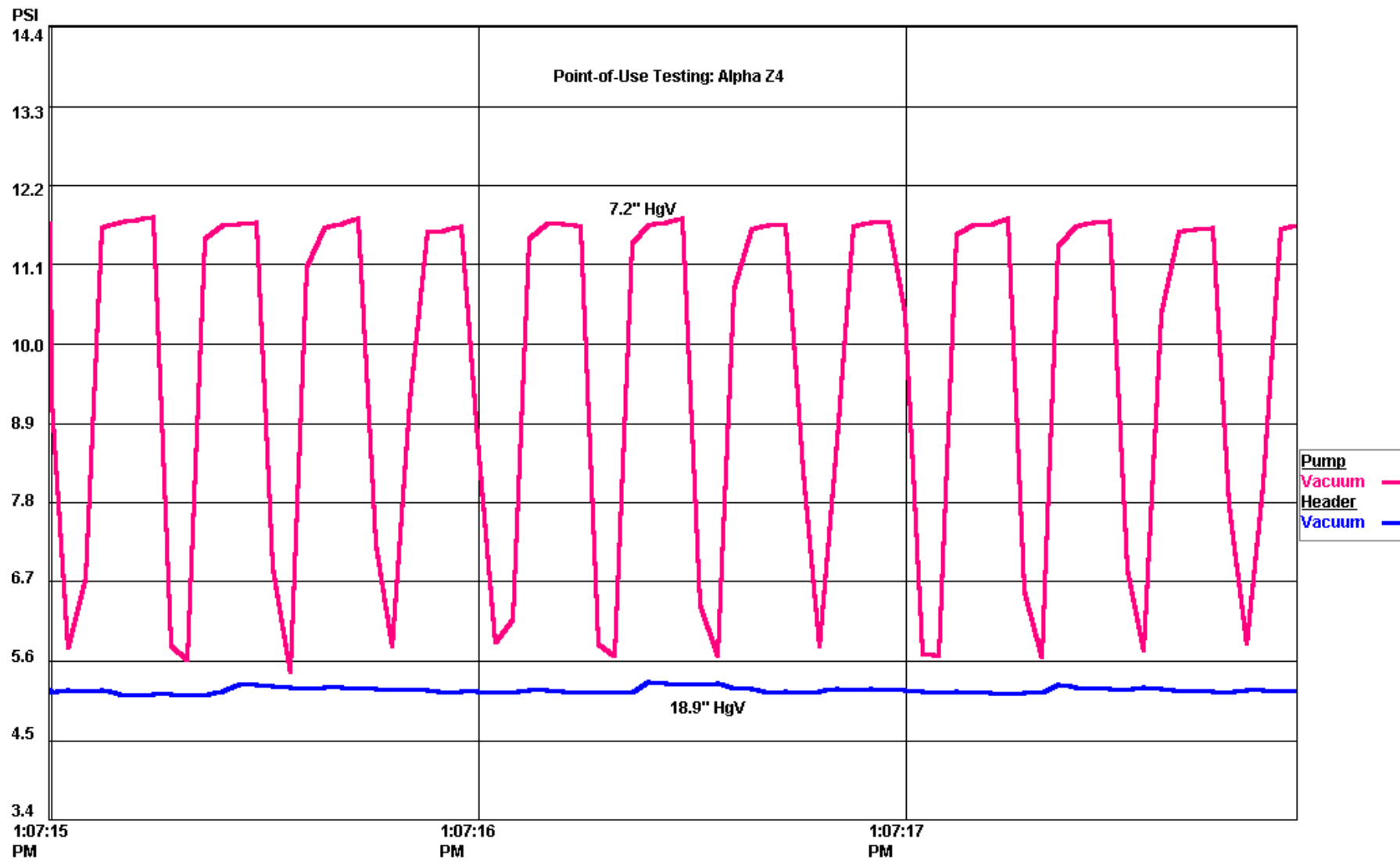


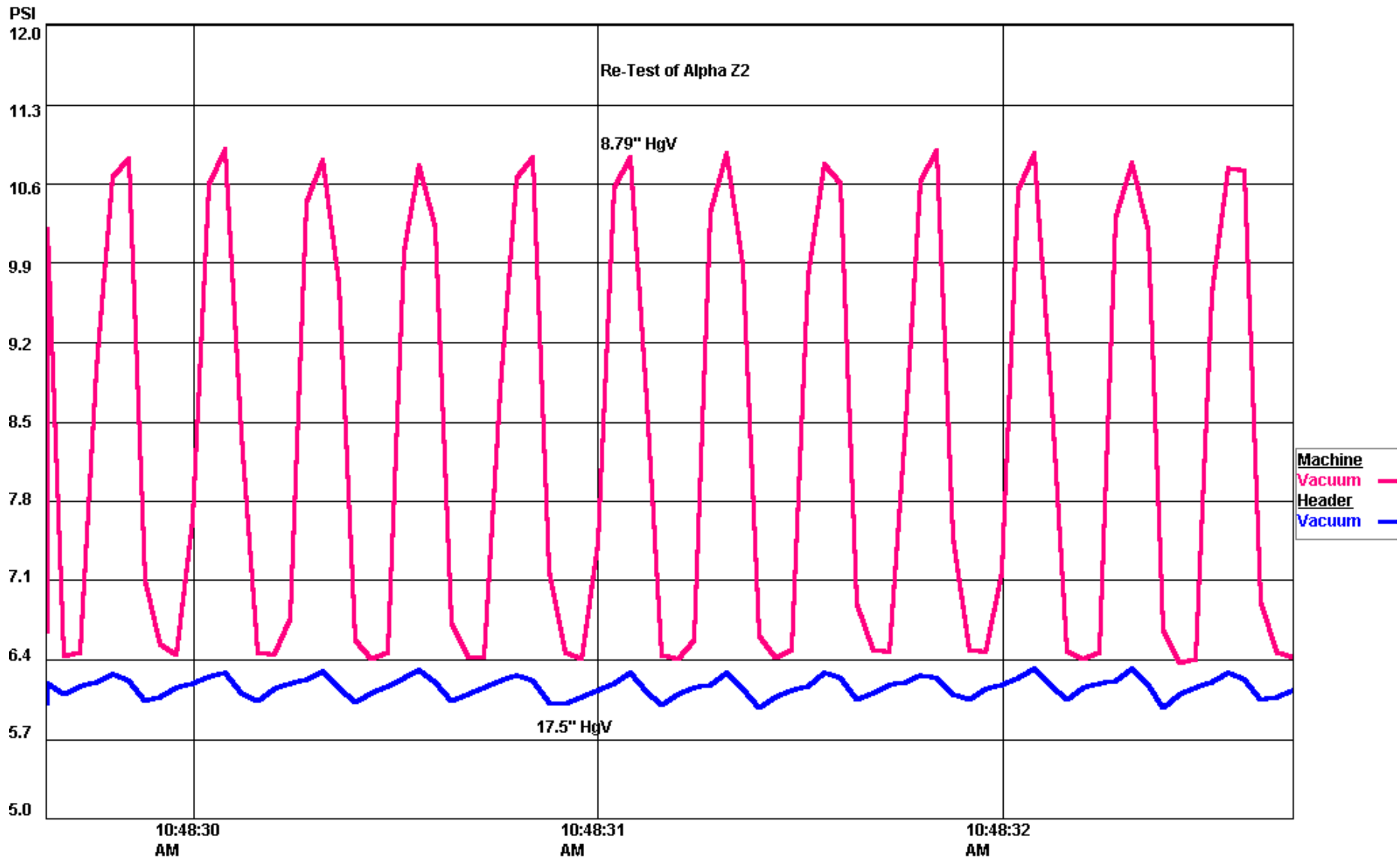


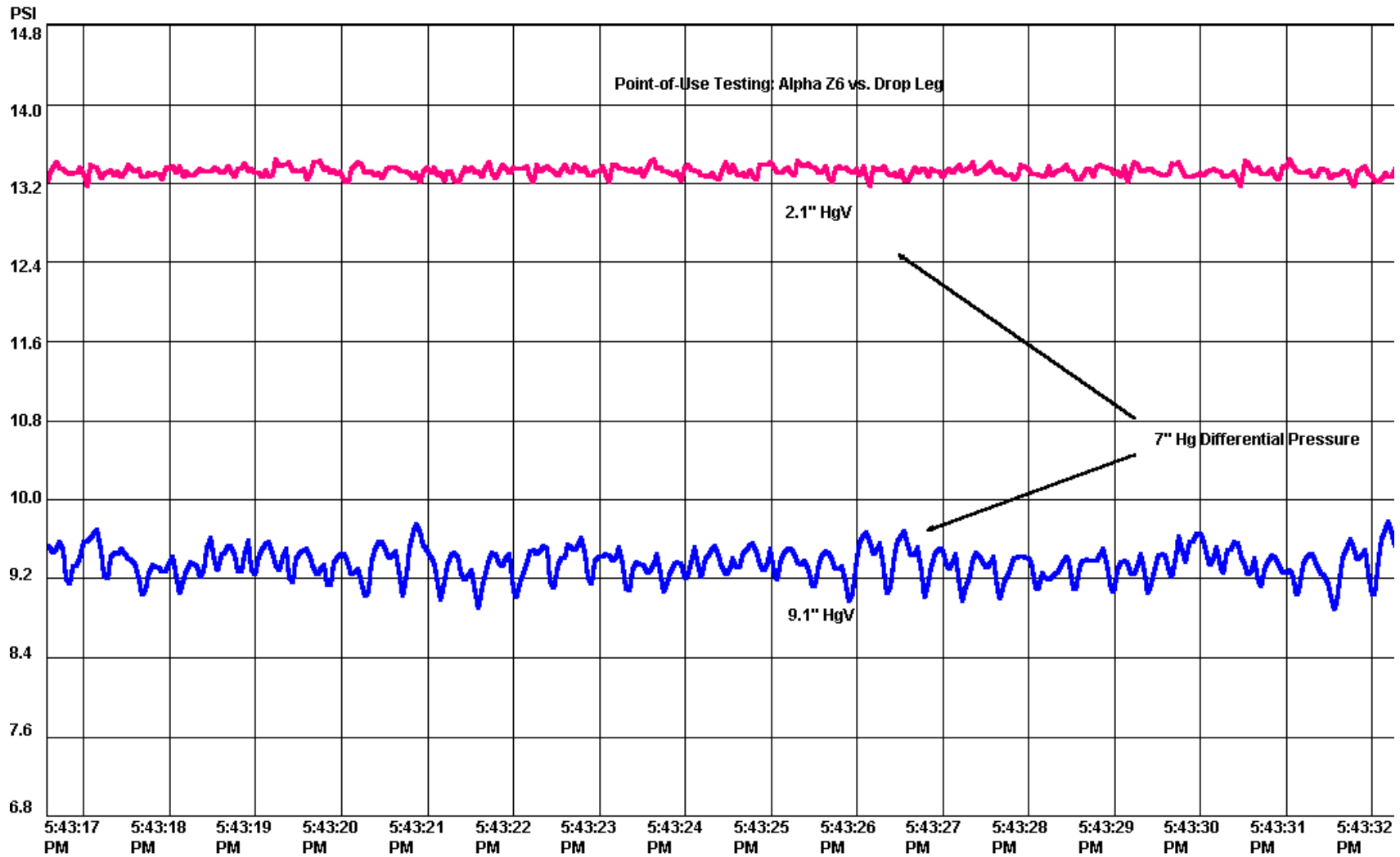


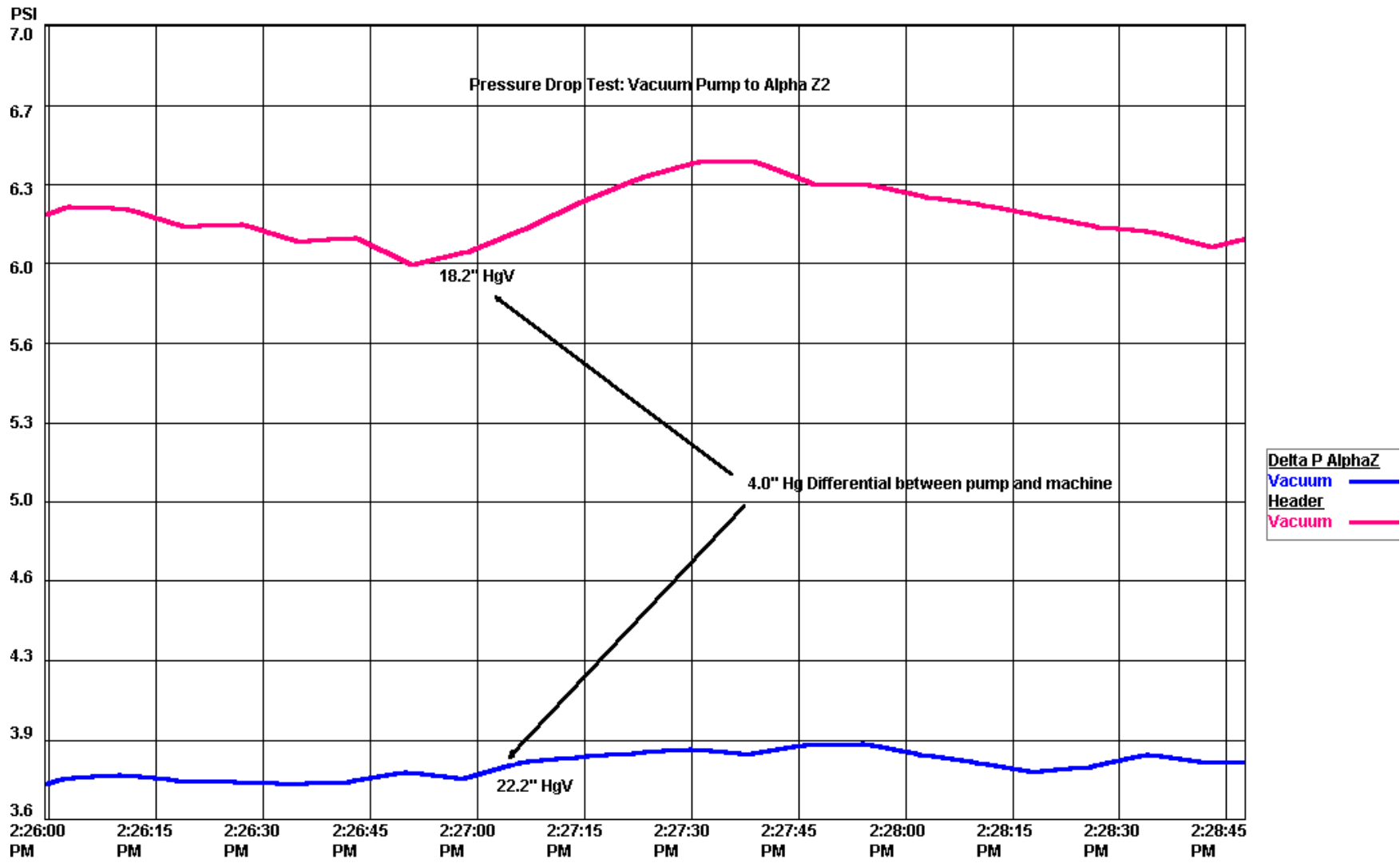


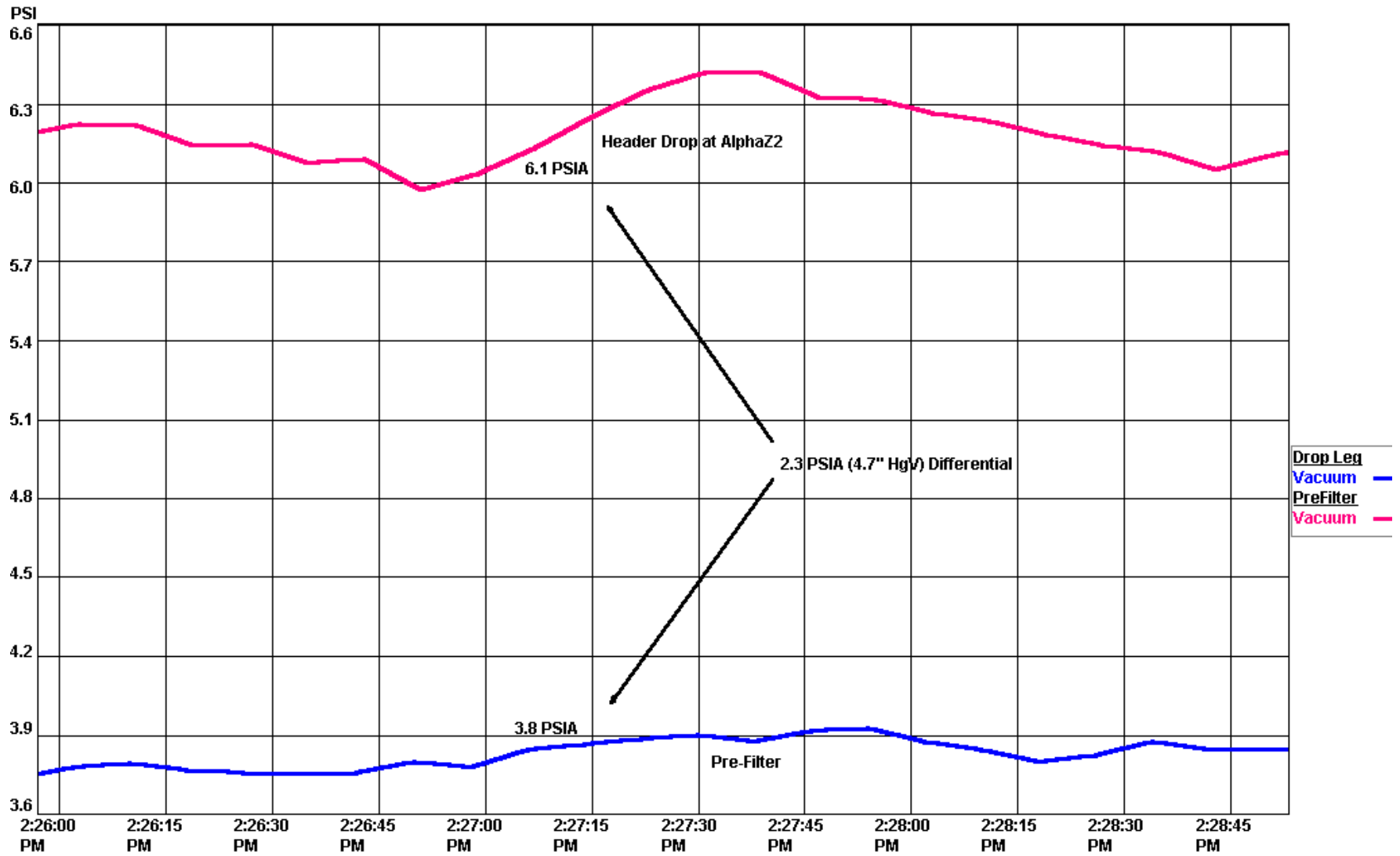


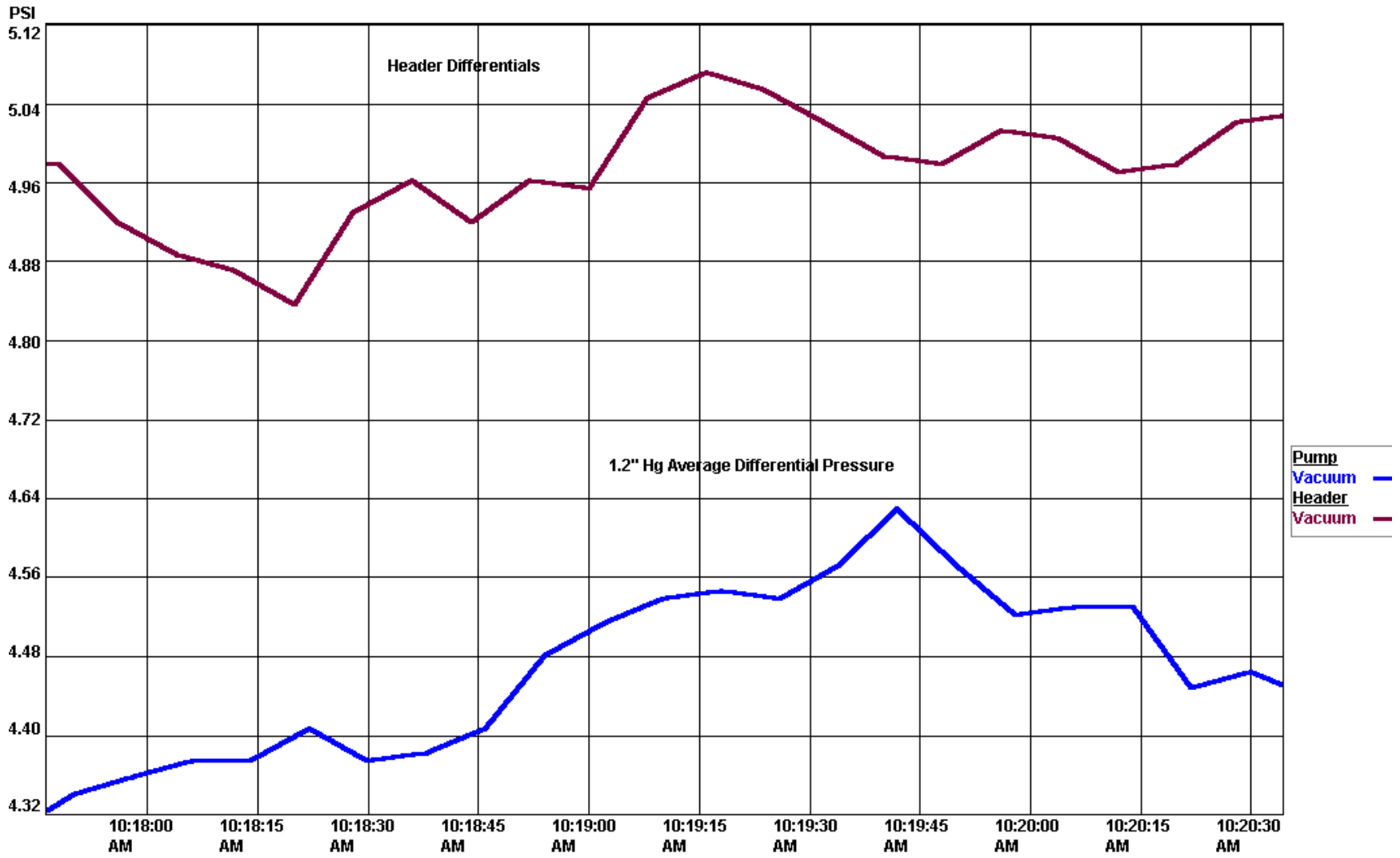












Holding Force For Various Orifices

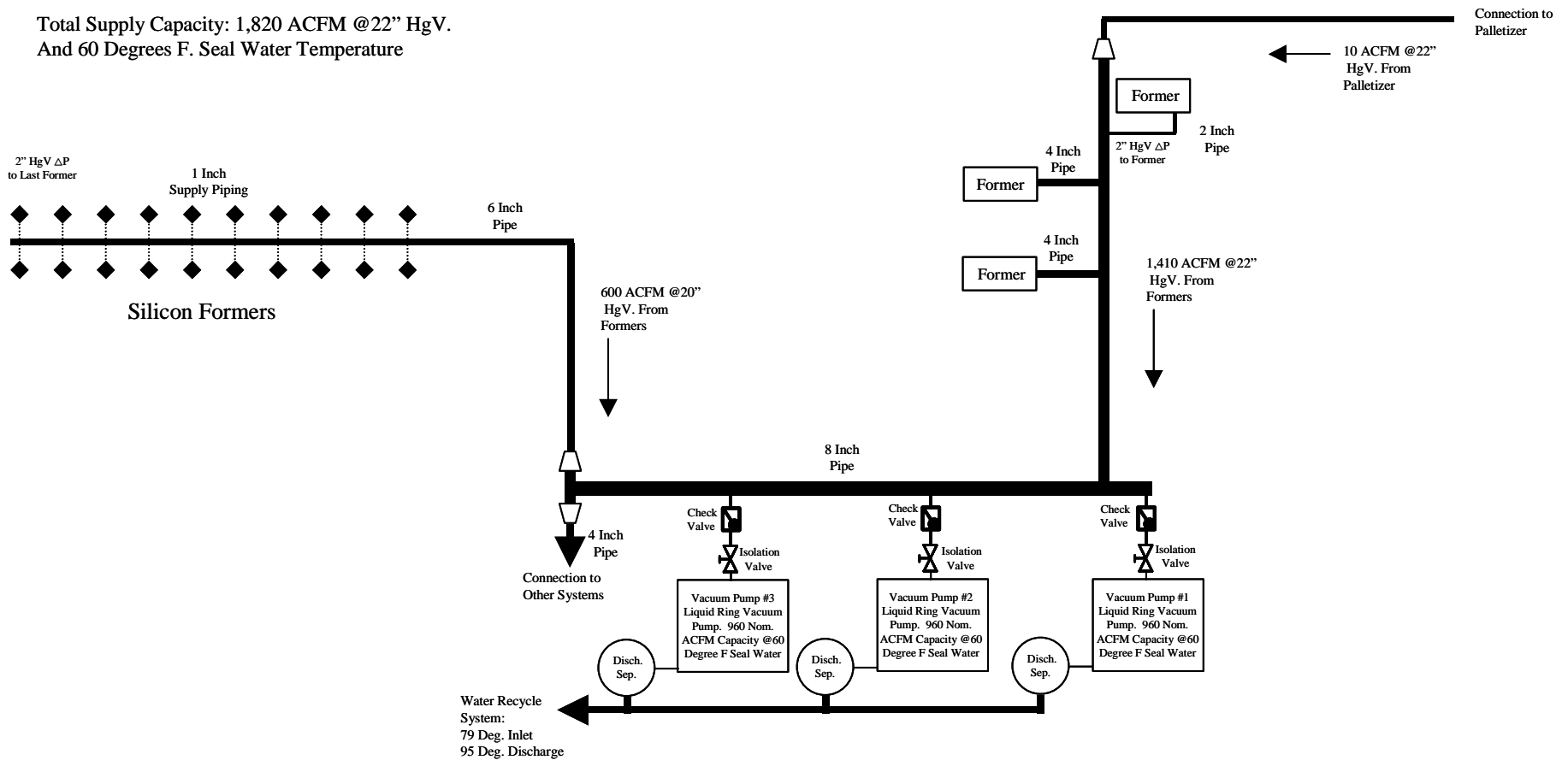
Holding Force in PSI@ ("HgV):											
Hole I.D. (in.)	I.D. (mm)	Sq. Inches	15	16	17	18	19	20	21	22	23
0.04	1	0.0012	0.0090	0.0096	0.0102	0.0108	0.0114	0.0120	0.0126	0.0132	0.0138
0.06	1.5	0.0027	0.020	0.022	0.023	0.024	0.026	0.027	0.028	0.030	0.031
0.08	2	0.0049	0.036	0.038	0.041	0.043	0.045	0.048	0.050	0.053	0.055
0.10	2.5	0.0076	0.056	0.060	0.064	0.067	0.071	0.075	0.079	0.082	0.086
0.12	3	0.0110	0.081	0.086	0.092	0.097	0.102	0.108	0.113	0.118	0.124
0.14	3.5	0.0149	0.110	0.117	0.125	0.132	0.139	0.147	0.154	0.161	0.169
0.16	4	0.0195	0.144	0.153	0.163	0.172	0.182	0.192	0.201	0.211	0.220
0.18	4.5	0.0247	0.182	0.194	0.206	0.218	0.230	0.242	0.254	0.267	0.279
0.20	5	0.0304	0.225	0.240	0.255	0.269	0.284	0.299	0.314	0.329	0.344
0.22	5.5	0.0368	0.272	0.290	0.308	0.326	0.344	0.362	0.380	0.398	0.416
0.24	6	0.0438	0.324	0.345	0.366	0.388	0.409	0.431	0.452	0.474	0.495
0.28	7	0.0597	0.440	0.470	0.499	0.528	0.557	0.587	0.616	0.645	0.674
0.31	8	0.0779	0.575	0.613	0.652	0.690	0.728	0.766	0.804	0.843	0.881
0.35	9	0.0986	0.728	0.776	0.825	0.873	0.921	0.970	1.018	1.066	1.115
0.39	10	0.1217	0.899	0.958	1.018	1.078	1.137	1.197	1.257	1.316	1.376
0.43	11	0.1473	1.087	1.160	1.232	1.304	1.376	1.448	1.521	1.593	1.665
0.47	12	0.1753	1.294	1.380	1.466	1.552	1.638	1.724	1.810	1.896	1.982
0.51	13	0.2057	1.519	1.620	1.720	1.821	1.922	2.023	2.124	2.225	2.326
0.55	14	0.2386	1.761	1.878	1.995	2.112	2.229	2.346	2.463	2.580	2.697
0.59	15	0.2739	2.022	2.156	2.291	2.425	2.559	2.693	2.828	2.962	3.096
0.63	16	0.3116	2.301	2.453	2.606	2.759	2.912	3.065	3.217	3.370	3.523
0.67	17	0.3518	2.597	2.770	2.942	3.115	3.287	3.460	3.632	3.804	3.977
0.71	18	0.3944	2.912	3.105	3.298	3.492	3.685	3.879	4.072	4.265	4.459
0.75	19	0.4395	3.244	3.460	3.675	3.891	4.106	4.321	4.537	4.752	4.968
0.79	20	0.4869	3.595	3.833	4.072	4.311	4.550	4.788	5.027	5.266	5.504
0.83	21	0.5369	3.963	4.226	4.490	4.753	5.016	5.279	5.542	5.805	6.069
0.87	22	0.5892	4.350	4.639	4.927	5.216	5.505	5.794	6.083	6.371	6.660
0.91	23	0.6440	4.754	5.070	5.385	5.701	6.017	6.333	6.648	6.964	7.280
0.94	24	0.7012	5.176	5.520	5.864	6.208	6.551	6.895	7.239	7.583	7.926
0.98	25	0.7609	5.617	5.990	6.363	6.736	7.109	7.482	7.855	8.228	8.601

General Process Inc. Mobile, AL

Existing Process Flow Diagram

Total System Demand: 1,820 ACFM @22" HgV.

Total Supply Capacity: 1,820 ACFM @22" HgV.
And 60 Degrees F. Seal Water Temperature



Attachment B

**General Process
Mobile, AL**

Vacuum Pump Data						
	#1	#2	#3	#4	#5	#6
Vacuum Pump	Recip A	Recip B	Rotary Screw A	Rotary Screw B	Liquid Ring A	Liquid Ring B
Rated ACFM	1,350	1,350	400	400	4,200	3,300
Rated Base Pressure	28"	28"	28"	28"	26"	26"
Shop/Test Number	A1	A2	A4	A5	A6	A7
Size	19 x5	19 x 5	19 x 5	19 x 5	001	002
Rated RPM	600	600	1780	1780	530	530
Nameplate HP	60	60	30	30	250	250
Voltage	460	460	460	460	460	460
Power Factor	0.87	0.87	0.87	0.87	0.87	0.87
Pkg. Electr. Consumption (KW)	48	48	48	48	190	190
Nameplate Amps	65	65	65	65	260	260
Actual Amps @22" HgV	62	61	68	59	180	192
Motor Efficiency	91.7%	91.7%	95.0%	91.7%	91.7%	91.7%
Calculated kW	43.0	42.3	47.1	40.9	124.8	133.1
Calculated BHP	53	52	60	50	153	164
Inlet Filter Delta P	n/a	n/a	n/a	n/a	1" Hg	0.75" Hg
Notes: Power factor estimated at 0.88. Back pressure tests were conducted on all vacuum pumps to determine if that was the cause of the high power rating and it was found that the back pressure on all pumps was less than 5 PSIG.						

**General Process
Mobile, AL**

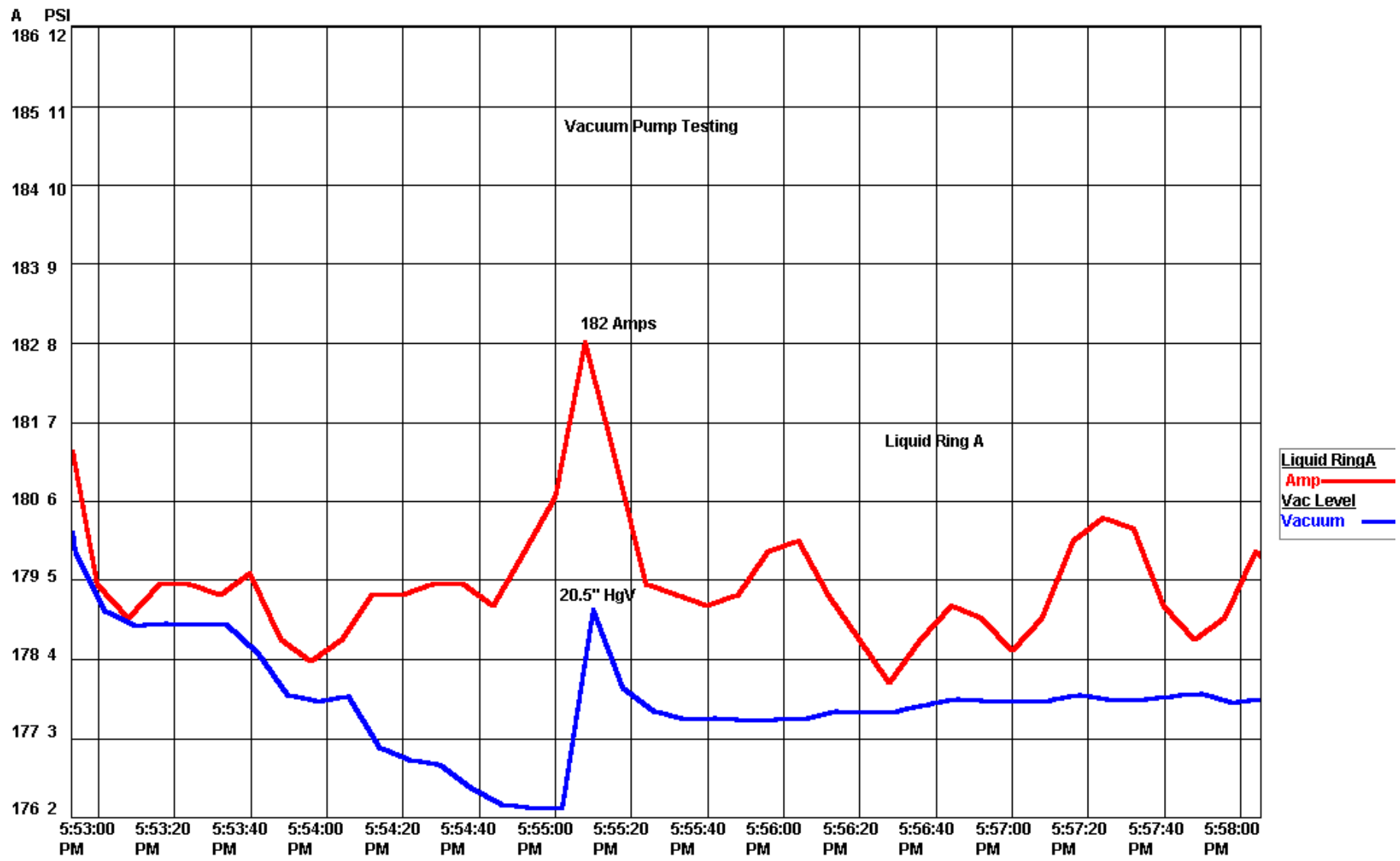
Vacuum Pump Temperatures						
Temperatures °F	#1	#2	#3	#4	#5	#6
Vacuum Pump	Recip A	Recip B	Rotary Screw A	Rotary Screw B	Liquid Ring A	Liquid Ring B
Operating Vacuum Level	22" HgV	22" HgV	22" HgV	22" HgV	22" HgV	22" HgV
Ambient	81	81	81	81	81	81
Relative Humidity	42%	42%	42%	42%	42%	42%
Discharge Temperature	250	252	280	255	88	88
Water-In	72	72	72	72	72	72
Water-Out	85	88	82	79	83	87
<i>Notes: All pumps were tested for approximately 30 minutes which did not give discharge temperatures time to stabilize. All vacuum pump temperatures are normal although Rotary Screw A was higher than expected and should be investigated.</i>						

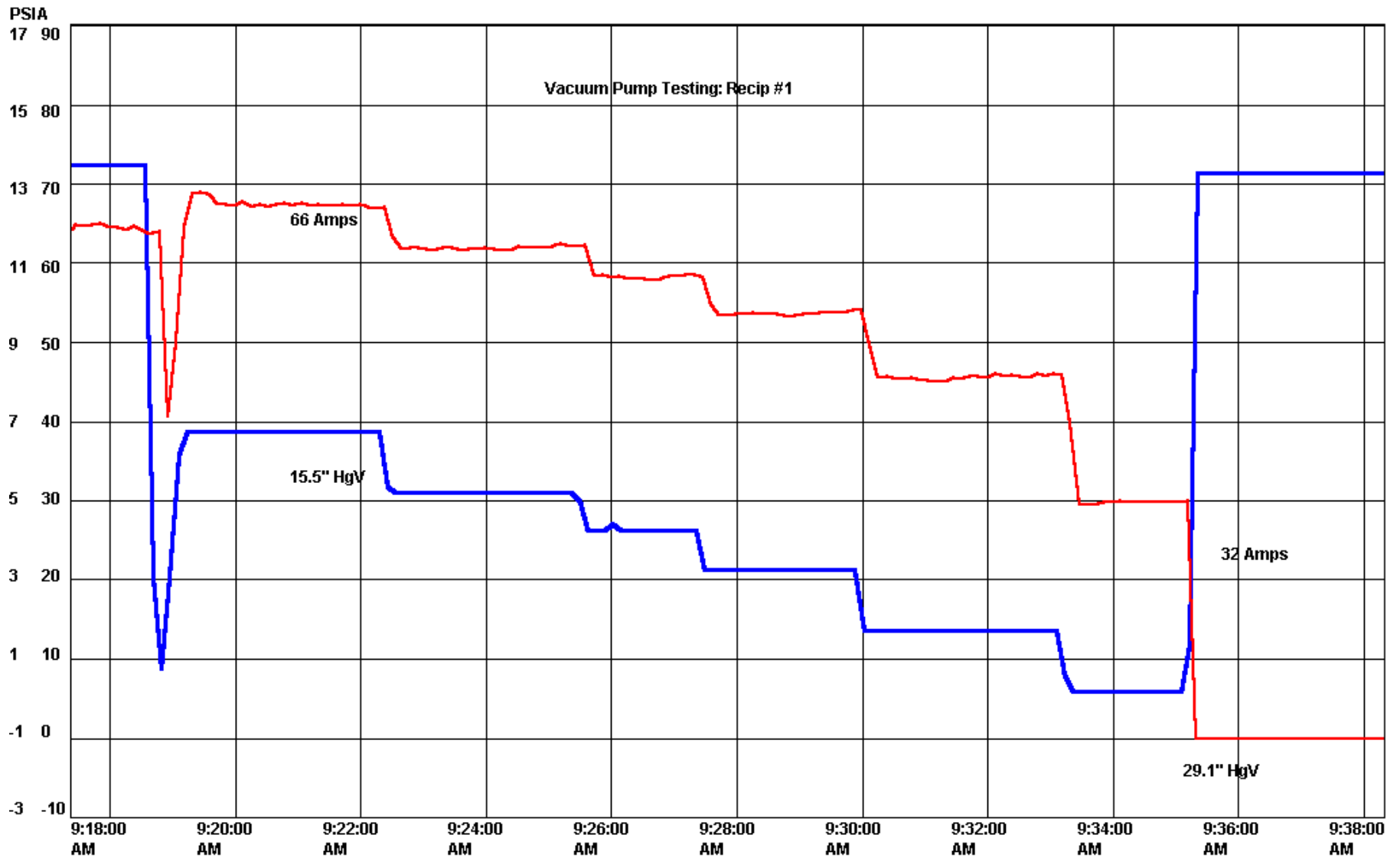
**General Process
Mobile, AL**

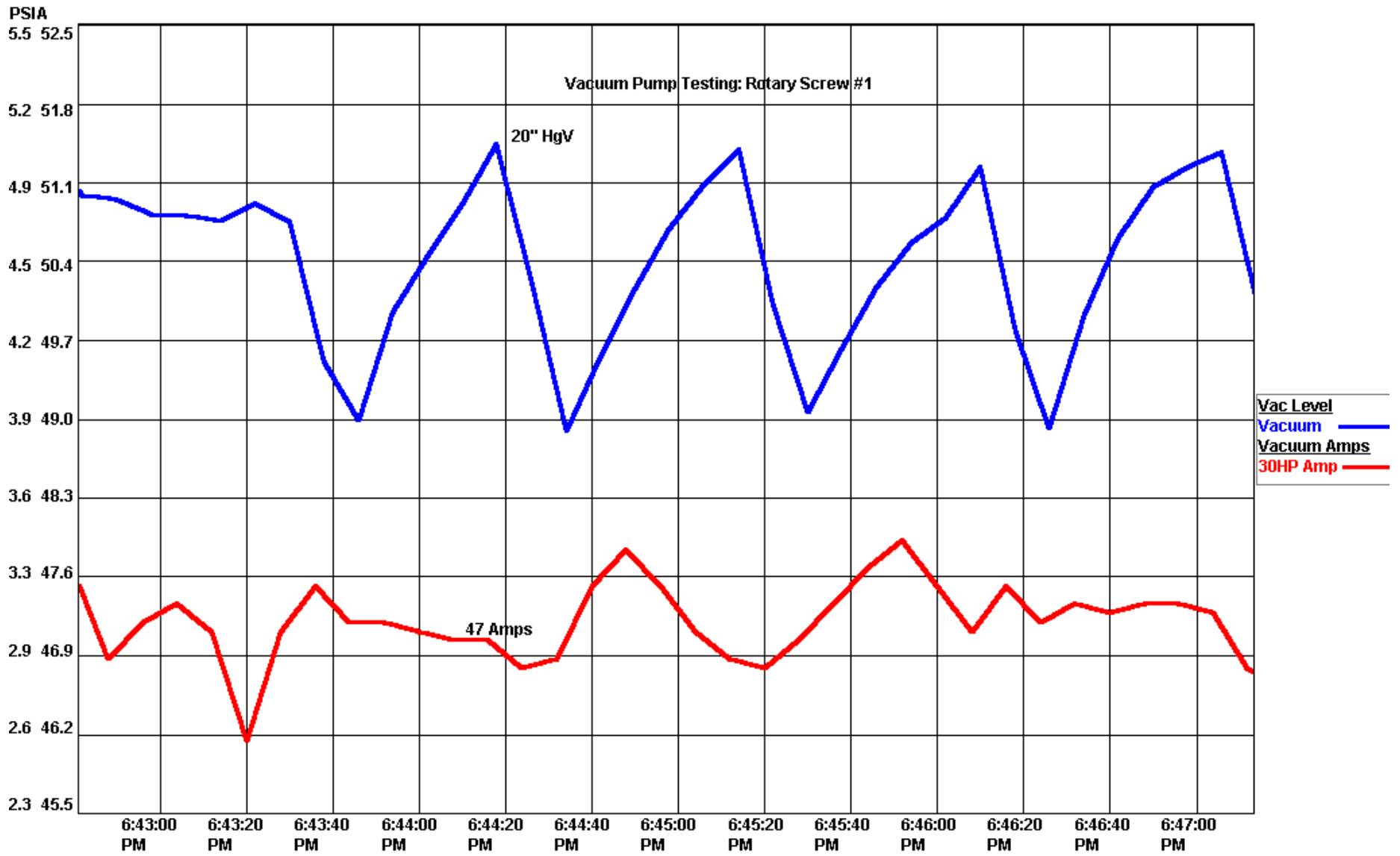
Filtration Data						
	#1	#2	#3	#4	#5	#6
Vacuum Pump	Recip A	Recip B	Rotary Screw A	Rotary Screw B	Liquid Ring A	Liquid Ring B
Mfg	Solberg	Solberg	Solberg	Solberg	Solberg	Solberg
Model #	CSL-245-600	CSL-245-600	CSL-245-800	CSL-245-800	CSL-485-1000	CSL-485-1000
Type	Cartridge	Cartridge	Cartridge	Cartridge	Cartridge	Cartridge
Element	Paper	Paper	Paper	Paper	Paper	Paper
Nominal Micron Efficiency	10	10	10	10	10	10
SCFM rating @ Inlet Cond. of 0" HgV	800	800	800	800	3,000	3,000
Housing	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel
Connections	4"	4"	8"	8"	10"	10"
Full Vacuum Rating	29" HgV	29" HgV	29" HgV	29" HgV	29" HgV	29" HgV
# of Elements	1	1	2	2	4	4
Prefilter	Yes	Yes	Yes	Yes	Yes	Yes
Delta P at Full Flow	5" H2O	5" H2O	5" H2O	5" H2O	5" H2O	5" H2O
<i>Notes: pressure drop through inlet filters was elevated for this application. Pressure drop through clean vacuum inlet filters should be under 5" H2O (0.4" HgV). Reduction in pressure drop in inlet filtration is directly applicable to end-use vacuum applications in manufacturing.</i>						

**General Process
Mobile, AL**

Existing Vacuum Pump Performance										Gas Stream Temperature				
										Voltage	Volt Corr	Low	Average	High
										460	*	68	78	90
ATM Pressure:										29.90	29.90	29.90		
Vacuum Pump	Displaced ACFM	Rated "HgV	Nameplate BHP	Actual "HgV	Rated BHP @ Vacuum	Actual BHP	% of capability	Actual ACFM	Inlet SCFM	Inlet SCFM	Inlet SCFM			
#1	Recip A	1,350	28"	60	22	40	53	132%	875	232	227	223		
#2	Recip B	1,350	28"	60	22	40	52	130%	875	232	227	223		
#4	Rotary Screw A	400	28"	30	22	40	60	150%	875	232	227	223		
#5	Rotary Screw B	400	28"	30	22	40	50	126%	875	232	227	223		
#6	Liquid Ring A	4,200	26"	250	22	162	153	95%	4,032	1,068	1,048	1,025		
#7	Liquid Ring B	3,300	26"	250	22	162	164	101%	3,168	839	824	806		
Total Plant Vacuum BHP:						532								
<i>Notes: Actual BHP calculated by formula: volts*amps*1.732*PF/1000/0.7457*motor efficiency. Note the distinction between displaced ACFM and actual ACFM. Actual capacity of liquid ring pumps with 79 degree F seal water temperature is reduced by 5% at 23" HgV.</i>														







Vacuum Piping Capacitance Chart

Pipe	Supply Side				Demand Side					
Pipe Size	Total Length Supply	Cubic Feet per 100 Linear Feet	Cubic Feet	Cu Ft/ "Hg	Total Length Demand	Cubic Feet	Cu.Ft/"Hg			
16"	0	126.8			0					
14"	0	95.8			0					
12"	0	78.5			0					
10"	0	54.8			0					
8"	0	34.7			2,000	694.8	23.2			
6"	0	20.1			1,920	385.2	12.9			
5"	0	13.9			0					
4"	0	8.8			510	45.1	1.5			
3"	0	5.1			720	37.0	1.2			
2-1/2"	0	3.3			0					
2"	0	2.3			0					
1-1/2"	0	1.4			0					
		Total Cubic Feet:			Total Cubic Feet: 1,162.1					
		Cub. Feet/"Hg: 0.0		+	38.8		=	38.8 Cubic Feet/"Hg		
					Total Pipe Capacitance					
PLANT BAROMETRIC PRESSURE:					29.9 "HgV					
Reservoirs										
Gallons	Cubic Feet	Cubic Feet/"Hg	# of Tanks	Total Ft3/"Hg	Gallons	Cubic Feet	Cubic Ft/"Hg	# of Tanks	Total Ft3/"Hg	
600	80.2	2.7	1	2.7	0	0.0	0.0	1	0.0	
400	53.5	1.8	1	1.8	0	0.0	0.0	1	0.0	
0	0.0	0.0	1	0.0	0	0.0	0.0	1	0.0	
0	0.0	0.0	1	0.0	0	0.0	0.0	1	0.0	
0	0.0	0.0	1	0.0	0	0.0	0.0	1	0.0	
0	0.0	0.0	1	0.0	0	0.0	0.0	1	0.0	
0	0.0	0.0	1	0.0	0	0.0	0.0	1	0.0	
0	0.0	0.0	1	0.0	0	0.0	0.0	1	0.0	
0	0.0	0.0	1	0.0	0	0.0	0.0	1	0.0	
0	0.0	0.0	1	0.0	0	0.0	0.0	1	0.0	
0	0.0	0.0	1	0.0	0	0.0	0.0	1	0.0	
		Total cubic Feet/"Hg: (rsvr)		4.5			Total cubic Feet/"Hg: (resvr)		0.0	
		Total Supply Capacitance:		4.5			Total Demand Capacitance:		38.8	
Total System Capacitance:				43.3 cubic feet/"Hg						

Attachment C

**General Process
Mobile, AL**

Vacuum Supply Power and Volume										
Existing Arrangement										
Vacuum Pump	Normal Production					Peak Production				
	bhp	kW	ACFM	% load	acfm /bhp	bhp	kW	ACFM	% load	acfm /bhp
Recip A	0	0	0	0%	0.00	0	0	0	0%	0.00
Recip B	0	0	0	0%	0.00	0	0	0	0%	0.00
Rotary Screw A	0	0	0	0%	0.00	0	0	0	0%	0.00
Rotary Screw B	0	0	0	0%	0.00	0	0	0	0%	0.00
Liquid Ring A	147	123	4,032	99%	27.38	156	130	4,182	98%	26.86
Liquid Ring B	146	123	3,168	99%	21.76	154	130	3,318	99%	21.55
Totals	293	245	7,200		24.58	310	259	7,500		24.22

Notes: Differences in peak and normal production amperage is very little on liquid ring vacuum pumps. Peak production assumed to be 7,500 ACFM and system vacuum level drops to 19" HgV or lower.

Vacuum Supply Power and Volume										
Proposed Arrangement										
Vacuum Pump	Normal Production					Peak Production				
	bhp	kW	ACFM	% load	acfm /bhp	bhp	kW	ACFM	% load	acfm /bhp
Recip A	0	0	0	0%	0.00	0	0	0	0%	0.00
Recip B	0	0	0	0%	0.00	0	0	0	0%	0.00
Rotary Screw A	0	0	0	0%	0.00	0	0	0	0%	0.00
Rotary Screw B	57	46	875	98%	15.40	57	46	875	98%	15.40
Liquid Ring A	0	0	0	0%	0.00	0	0	0	0%	0.00
Liquid Ring B	146	123	3,168	99%	21.76	146	123	3,168	99%	21.76
Totals	202	168	4,043	3,188	19.97	202	168	4,043	3,488	19.97

Note: Extra ACFM capacity over required in proposed will increase vacuum level to over 14" HgV.

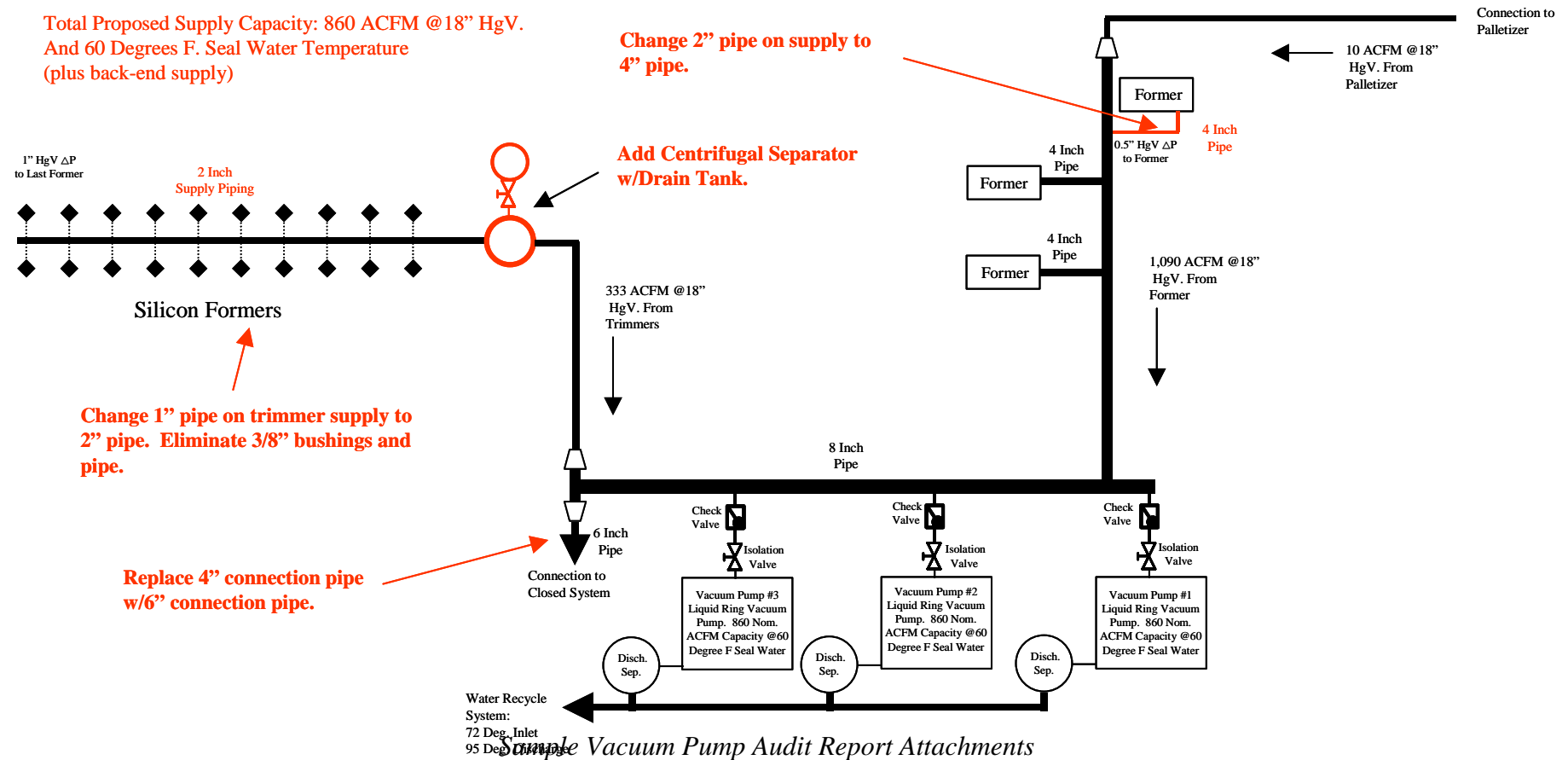
General Process Inc.

Mobile, AL

Proposed Process Flow Diagram

Total Proposed System Demand: 1,432 ACFM @18" HgV.

Total Proposed Supply Capacity: 860 ACFM @18" HgV.
And 60 Degrees F. Seal Water Temperature
(plus back-end supply)



Attachment D

**General Process
Mobile, AL**

Energy Calculations					
Existing Arrangement	bhp	kW	Hours	KWH	Costs
Normal Production	293	245	6,580	1,614,665	\$ 104,953
Peak Production	310	259	2,180	565,518	\$ 36,759
Totals			8,760	2,180,183	\$ 141,712

**based upon an average electrical rate \$ 0.0650 /kWh*

Proposed Arrangement	bhp	kW	Hours	KWH	Costs
Normal Production	202	168	6,580	1,107,199	\$ 71,968
Peak Production	202	168	2,180	366,823	\$ 23,843
Totals			8,760	\$ 1,474,021	\$ 95,811
<i>*based upon an average electrical rate \$ 0.0650 /kWh</i>					
Projected Savings:				706,162	\$ 45,901

**General Process
Mobile, AL**

Vacuum Systems Financials Summary			
<i>in US \$ dollars</i>			
Constituent	Existing	Proposed	Variance
1. Electricity	\$141,712	\$95,811	\$45,901
2. Internal Labor & Overhead	\$10,628	\$7,186	\$3,443
3. Contract Maint. & Repair	\$0	\$0	\$0
4. Water and Treatment	\$0	\$0	\$0
5. Depreciation	\$0	\$0	\$0
6. Rental compressors	\$0	\$0	\$0
7. Other Charges	\$0	\$0	\$0
Totals	\$152,340	\$102,997	\$49,343
Estimated retrofit minus costs avoidance	\$74,500		
Estimated simple payback	18.1	months	

1. Electrical costs for vacuum pumps.
2. Internal labor and overhead for the vacuum system should be reduced
3. Outside contract maintenance should remain the same.
4. Water cost include. electricity , makeup water, and water treatment chemicals will remain the same.
5. Depreciation has not been included.
6. Average rental costs will remain the same.
7. Other departmental charges.

Please note that the savings require completion of all demand side actions.

Attachment E

**General Process
Mobile, AL**

Prioritized Costed Action Plan				
Item	Description	Capital/Install		Vendor
1	Implement a leak detection program to reduce system leak rate. Target top 20% of all leaks with ultrasonic leak detector.	\$2,500		Supplier
2	Purchase and install Solberg CSL-685P(1)-1000 filters on liquid ring vacuum pumps. (2) 10" inlet/outlet canister-cartridge style filters @ \$2,123 each plus install.	\$8,000		Supplier
3	Intstall point-of use vacuum filters where necessary in production area to remove glycol mist prior to ingestion into individual vacuum systems. Filters require no elements. \$730 each.	\$8,000		Supplier
4	Purchase and install (4) 6" reciever tanks on both existing 6" diameter pipes that connect vacuum pump to production area. Requires (4) filters @ \$1,600 ea. plus \$4,000 install.	\$8,000		Supplier
5	Install a 6" diameter copper sub header over machines. Connect header in 7 places to 4" primary header and allow for 2" connections for each production machine. \$4,000 material plus install.	\$8,000		Supplier
6	Replace both 3" diameter headers in machining area to 3" diameter copper sub-headers. \$700 material plus install.	\$8,000		Supplier
7	Replace 2" diameter drop legs in shipping areas with 3" diameter copper drop legs. Replace any standard port isolation valves with full port isolation valves. \$2,300 materials plus install.	\$8,000		Supplier
8	Modify production machinery by installing 3" diameter tubing in place of 2" diameter tubing. Install automatic isolation valves on header to machines. (5) machines @ \$350 ea. Note: modifications can be done during normal machine maintenance.	\$8,000		Supplier
9	Modify production machinery by replacing point of use tubing with large diameter tubing, eliminating flow restrictions, cleaning blocks and increasing diameter of square vacuum supply tubing. (2) machines @ \$3,550 ea. Note: modifications can be done during normal machine maintenance.	\$8,000		Supplier
10	Connect second 10" diameter pipe in production area to primary 12" diameter header with a 10" diameter copper pipe to reduce pressure restriction between primary header and vacuum pump.	\$8,000		Supplier
Sub Total		\$74,500		
Grand Total		\$74,500		

Attachment F

General Comments on Savings Potential

1. The production, distribution, and its final use of vacuum are integrated processes in which every component has an effect on all other portions of the system. In the overall scheme of things, air is removed from a system so that a differential pressure is created and with that differential pressure work can be accomplished. In order for work to be done at the point of use, air must be drawn through some sort of mechanical fixture, into and through a distribution system and finally into a vacuum pump where it is compressed back to atmospheric pressure. The efficiency of each step in this process determines just how much cost will be incurred to produce the desired result. Each step along the way has an impact on the final results. The way that the system is configured and the way that its parts interact together influence the potential for efficiency gains at each point.
2. Vacuum pumps are designed for their peak performance when delivering full volumetric flow at a pressure close to the original design point. Depending on the pumping technology, injection or restriction of air intake for control purposes can introduce inefficiency in the compression process and even though it helps in the matching of vacuum pump output to system demand, there can be an electrical cost tied to this practice. Operating a vacuum pump in a load/unload mode can increase the efficiency of the compression process, but it gives a fluctuating distribution pressure in conventionally designed systems. Some form of pressure fluctuation is usually accounted for in the vacuum system since most vacuum systems are dynamic with constantly changing conditions. Rarely is the demand of a system matched exactly with the capacity of the installed vacuum pumps. It is very important therefore to have the correct technology vacuum pump installed in any given application to avoid not only excessive electrical costs, but also to ensure an adequate life expectancy of the pump itself.
3. Distribution systems that have leaks or that introduce excessive restrictions to the airflow use part of the energy that was imparted by the vacuum pump. This is a loss of the potential energy needed to accomplish the desired task but it is still a part of the cost of performing the desired work. Some of the losses in the distribution process occur in

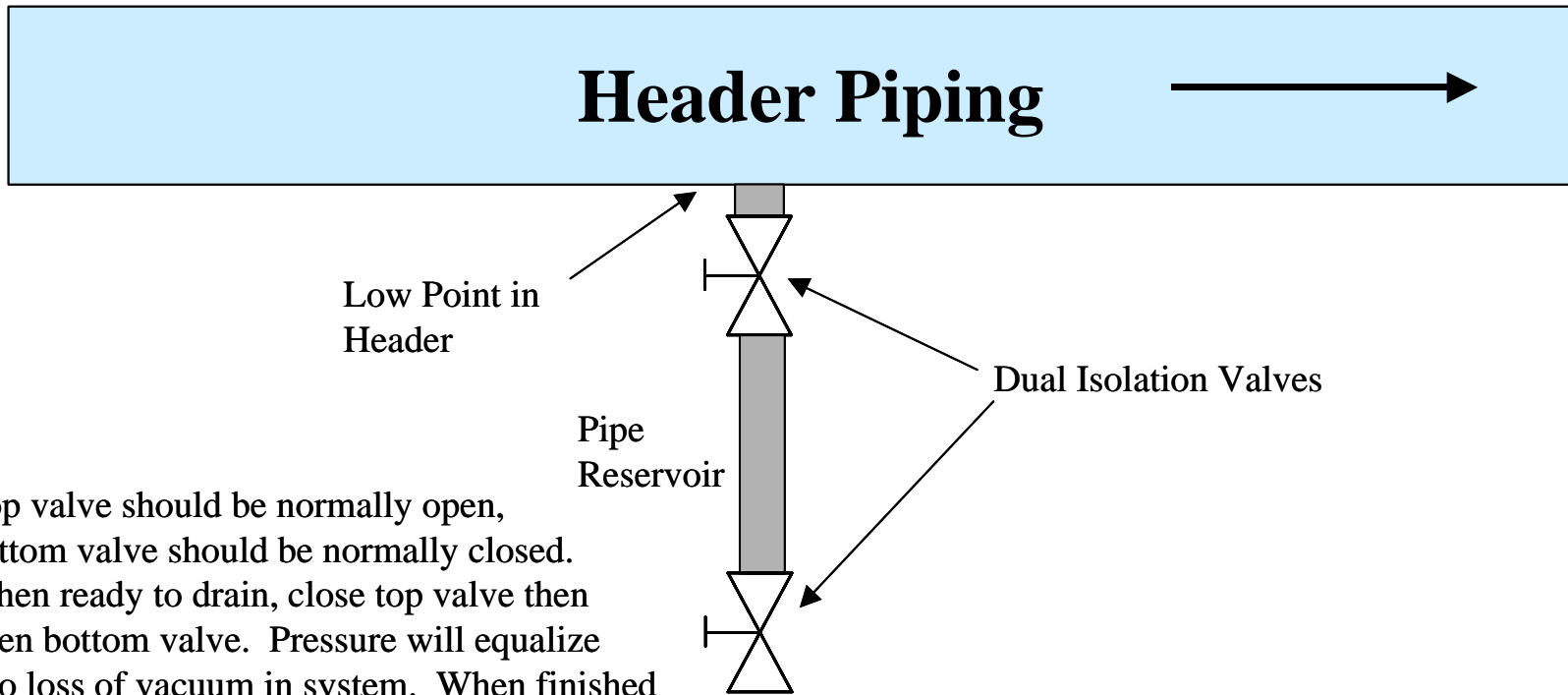
the main plant headers that are designed and installed by the owner. However, the highest distribution losses generally occur within the work producing equipment prior to the point of work. This is the result of OEM's using smaller components that are easier and cheaper to install. It may reduce the first cost and increase OEM profits, but it leaves the user with years of increased costs to accomplish the needed task. Better specifications for new equipment provide long-term reductions in installed operating costs.

4. The end users in vacuum systems obviously have an impact on the system. If the demand for higher vacuum requires the installation and operation of additional vacuum pumps, the entire facility ends up paying for this requirement. If increased capacity is installed, filters and cleanup equipment may become overloaded, leading to particulate, water or harmful vapors in the distribution system and vacuum pumps.
5. There are no "flip of the switch" solutions to vacuum system problems. Gaining control in the central vacuum pump room will definitely lead to increased efficiency in the supply side. However, the larger benefit derives from the fact that it enables the end user to optimize the actual production operation. When the end user reduces the volume of vacuum used in the production process, automation equipment in the central equipment room can select the most efficient pumps to meet the demand. This further lowers the cost of generating vacuum and shuts down equipment that can provide backup and respond to online equipment failures. This standby equipment will allow routine maintenance to take place, which will further help the reliability of the system.

6. No one sector can accomplish all the desired results while operating alone. However, when all sectors that are associated with the production, distribution, or use of vacuum are committed to making progress, then and only then, can significant progress be made. As each party is committed to correcting the items under their control, steady, meaningful results will be obtained. Moving an existing system to a state of high efficiency and low cost is a process that requires commitment, diligence, and time. The final results may require one to two years of commitment to meet the goal. By that time, a new thought

process concerning vacuum should be prevalent. The end results that can be achieved are well worth the effort that it takes.

General Layout For A Vacuum Liquid Drain

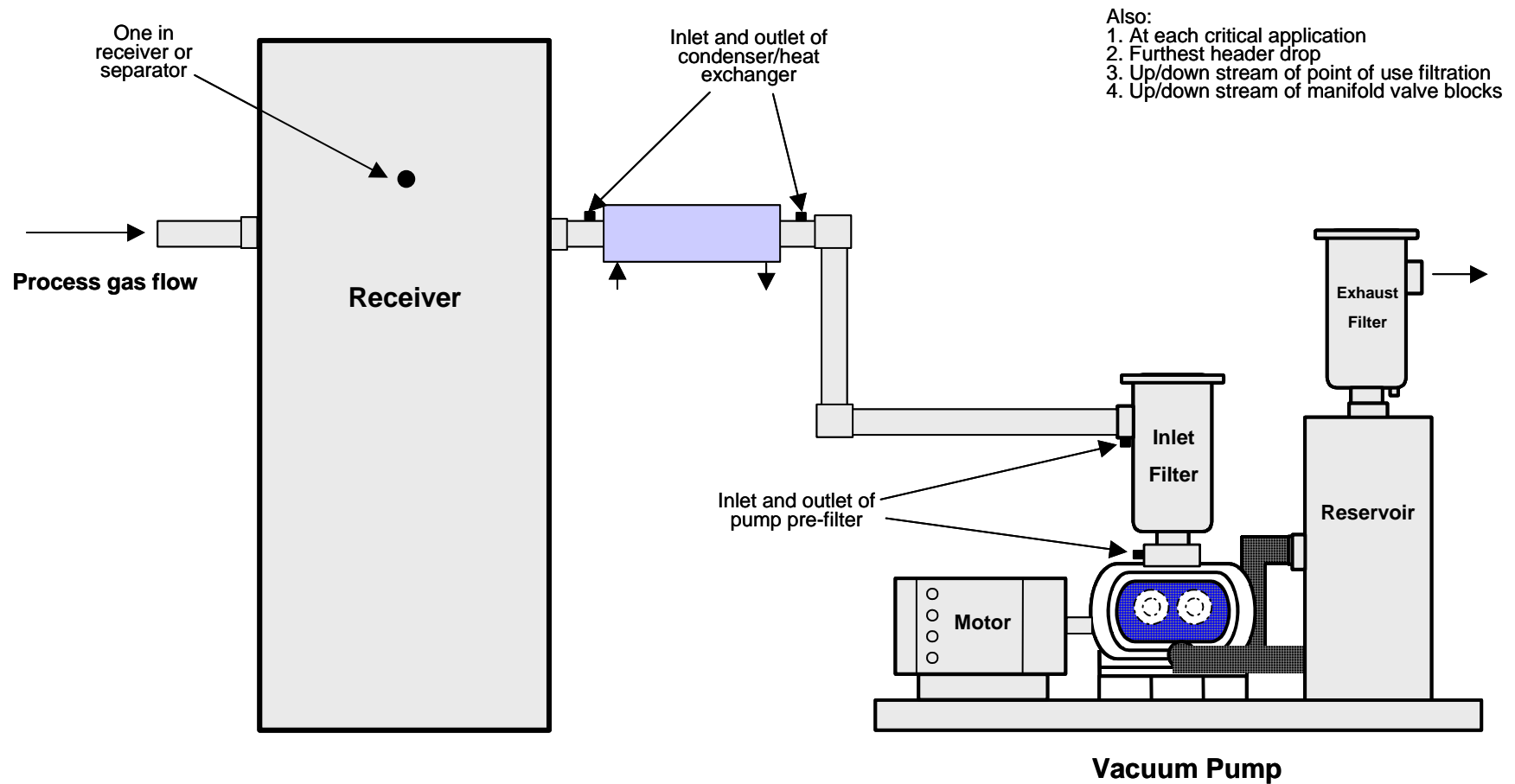


Top valve should be normally open, bottom valve should be normally closed. When ready to drain, close top valve then open bottom valve. Pressure will equalize w/o loss of vacuum in system. When finished close bottom valve and slowly open top valve. This can be accomplished automatically with solenoid valves and timers.

Vacuum Pump System

Placement of Pete's Plugs Taps

NOTE: All taps should be ¼" NPT



Attachment G

Vendor Quotations