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7001-0360-0001-6783-5672
CCN: 50990

March 14, 2008

Mr. Curt Thompson, Senior Regulatory Professional
Environmental Resource Regulation
South Florida Water Management District
P. O. Box 24680
West Palm Beach, FL 33416-4680
e-mail: cthompso@sfwmd.gov

Re: Miami-Dade County Consolidated PWS
Water Use Permit No. 13-00017-W
Calibrate Raw and Finished Venturi Meters at Alex Orr WTP; Submit Interim Report, Exhibit 33, Limiting Condition 48

Dear Mr. Thompson:

Enclosed is a copy of the Interim Report on the Plan to Address Raw Water Flow Measuring Adjustments in accordance with exhibit 33 and limiting condition number 48 of the subject permit.

If you have any questions concerning this submittal; please contact me at (786) 552-8979 or Ms. Bertha Goldenberg, P.E. at (786) 552-8120.

Sincerely,

L. Douglas Yoder,
Deputy Director,
Regulatory Compliance & Capital Improvements

Enclosure: Interim Report on the Plan to Address Raw Water Flow Measuring Adjustments

c: M. Elsner melsner@sfwmd.gov

L08069SFWMD

Water Use Permit No. 13-0017-W, Water Accounting

bc: J. Renfrow
J. Ruiz
L. Yoder
B. Goldenberg
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T. Segars
M. Balbin
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A. Baldwin
R. O'Rourke
A. Sanchez

Miami-Dade Water and Sewer Department

Plan to Address Raw Water Flow Measuring Adjustments (FY 2008)

Water Use Permit No. 13-00017-W
Limiting Condition No. 48

March 15, 2008

Interim Report

SUMMARY

On November 15, 2007, the South Florida Governing Board (SFWMD) approved the Miami-Dade Consolidated PWS Water Use Permit (WUP) No. 13-00017-W.

Limiting condition No. 48 of the WUP requires:

"By July 1, 2008, the permittee shall submit the final report comparing the volumes of water withdrawn using the cumulative calibrated wellhead flow meter data versus the methods formerly used to estimate flows into/out of the Hialeah-Preston and Alexander Orr water treatment plants. Based on the results of this report and upon District review, the permittee may be required to modify this permit. The necessity to modify the permit will be determined based on a) the degree to which the actual withdrawals (as determined by the calibrated wellhead meters) differs from the historic estimation method, and b) whether the difference is sufficiently large to affect the demonstration that conditions of permit issuance will be met over the life of the permit."

Mr. Rafael A. Terrero, Assistant Director, Miami-Dade Water and Sewer Department (MDWASD) submitted an eight point plan on October 23, 2007 to be undertaken during FY 2008 to reconcile raw water flow measurements in the water system. This plan is the continuation of MDWASD's attempt to reconcile and adjust historical raw water pumpage reports and records in its water supply system.

The status of each of the plan items is as follows:

1. Address comments from GE Well Water Flow Meter Installation Report. Optimize current raw water well meter installations and calibration.

    - Southwest Wellfield-Wells 11-15, Alexander Orr Plant-Well 8, & Hialeah-Wells 11, & 13 have been addressed.

2. Calibrate Raw and Finished Water Venturi meters at the Alexander Orr WTP. Submit Interim Report by March 15, 2008.

    - Meters were calibrated on September and December 2007. An independent firm, ADS, LLC, verified meter calibration on September 2007. (see Appendices A, B, C, and D)

3. Perform a water audit within Alexander Orr WTP to investigate raw to finished water flow differences. Initiate installation, calibration, and certification of process water flow meters (including transfers of water softening residuals to calcium carbonate lagoons and recalcining kilns), as appropriate.

    - A water audit study is underway at Alexander Orr WTP by CDM. A flowmeter was installed in softening residuals line. Troubleshooting and calibration of flowmeter installation is underway.

4. Revise the Oracle systems database and create the Oracle based report format to be compliant with SFWMD Water User Permit Allocation and Special Conditions submittal requirements.

   - A SQL Server Database Table was created. SQL based report format was created and implemented. Data is available in new Table starting on May 2007 to present.

5. Transition to all new meter reports during December 2007 using the new raw water well flow meters and reports generated by the Oracle system. Begin using the reports generated by the Oracle system meter recorder values for both FDEP and SFWMD reports on January 1, 2008.

   - Since January 1, 2008, all reports are available in both old and new format. The report to be submitted in April 2008, for the first quarter of 2008, will use the new format and data from the new raw water flow meters.

6. Undertake the following tasks to analyze raw water flow measuring issues: reconciliation of raw water meter reports between FDEP Monthly Operating Reports (MOR) and Oracle system, record instantaneous well readings to verify the average pumpage of each well, compare reported versus recorded flows for raw and finished water at each WTP, and develop pumpage results for each wellfield on a monthly basis for the first six months of 2008.

   - Ongoing

7. Summary report on flow measuring issues analysis by July 31, 2008.

   - Ongoing.

8. Submit request for allocation adjustment to SFWMD during the third Quarter of 2008 and no later than September 30, 2008.

   - To be determined.

Although the MDWASD letter of October 23, 2007 planned for a submittal by July 31, 2008, the WUP limiting condition number 48 requires the report submittal by July 1, 2008. MDWASD will comply accordingly.

STATUS OF INDIVIDUAL ITEMS

The following is MDWASD's Interim Status Report on the plan to address raw water flow measurements adjustments as of March 15, 2008. This plan was conceived to be undertaken during FY 2008 to reconcile raw water flow measurements in the water system. This plan is the result of new raw water well meter installations in almost 100 supply wells during FY 2007. This plan is the continuation of MDWASD's attempt to reconcile and adjust historical raw water pumpage reports and records in its water supply system.

Item 1 - Address Comments from GE Well Water Flow Meter Installation

Comments from GE Well Water Flow Meter Installation Report (August 30, 2007) are being addressed. Work has been completed on the Southwest Well Field, Alexander Orr Jr WTP, and two out of three wells have been address on the Hialeah Well Fields.

- Southwest Well Field - Wells 11-15 have pipe sizes that are difficult to match up on GE pipe data sheets and appear to have very thick walls. A section of pipe was replaced similar to Well No. 6. Work has been completed.

- Alexander Orr Plant - Well No. 8 has flow disturbances and appeared to have intermittent pockets of air that cause signal to be lost. This problem has been addressed.

- Hialeah - Wells 11, 12, & 13 piping and valves were replaced but the valves are throttled to create enough back pressure for the transducers to have good signals and sound speed. More work is required on these wells. Wells 11 & 13 have been shut down.

- Miami Springs - Some wells needed pipe replacement and were replaced. Wells 1, 2, 3, 4, 5, 6, 7 & 8 had pipe replaced but still have issues with air pockets…Valves were throttled to create backpressure for the transducers to have good signals and sound speed.

Some work is still pending on the GE well meter installation comments, namely Hialeah, and Miami Spring wells.

Item 2 - Calibrate Raw and Finished Water Venturi Meters at Alexander Orr Jr. Water Treatment Plant (WTP) by March 15, 2008

Calibration on the Venturi Meter Flowmeters' Electronic Transmitters at the Alexander Orr Jr. Water Treatment Plant (WTP) is being performed every 90 days. Venturi Meters Electronics were last calibrated on September and December 2007 (see Appendix A and B). All four raw water and five finished water venturi meters at the WTP passed the calibration process satisfactorily. Calibration of the venturi meters electronic transmitters employs a Fluke 744 Documenting Process Calibrator, Emerson Hart Field Communicator Model 375, and an Ametek Pneumatic Dead Weight Tester Model PK II. (See enclosed Appendix C electronic transmitter's for calibration procedures.)

In addition to the above transmitter calibration, an independent firm, ADS, LLC was contacted to verify venturi meter accuracy by performing pitometer tests on the production water meters at the WTP and some well meters in the West Well field. These testing took place between August 27, 2007 and September 24, 2007. (See enclosed appendix D) The test consisted of the following:

- Tested, in place, for accuracy four raw water meters and five finished water meters at the WTP
- Tested, in place, for accuracy three well meters in the West Well Field.
- Preparation of a report detailing the results of the tests including velocity profiles of each of the gauging points used to test the meters.

Pitometer tests results for the Alex Orr WTP raw water venturi meters installation were as follows:

Test Date	Location	Pitometer Flow (mgd)	Meter Flow (mgd)	Percent Accuracy	Comments
8/29/07	Orr WTP 48" Raw Water No.1	24.62	25.47	104%	Meter registers within allowable limits of accuracy
8/29/07	Orr WTP 54" Raw Water No. 2	41.71	43.39	104%	Meter registers within allowable limits of accuracy
9/05/07	Orr WTP 72" Raw Water No. 3	35.67	34.60	97%	Meter registers within allowable limits of accuracy
9/05/07	Orr WTP 72" Raw Water No. 2	78.59	78.76	100%	Meter registers within allowable limits of accuracy

This tests show that the raw water venturi meters as a group are registering on average within 1% of the pitometer flow readings.

Pitometer tests results for the Alex Orr WTP finished water venturi meters installation were as follows:

Test Date	Location	Pitometer Flow (mgd)	Meter Flow (mgd)	Percent Accuracy	Comments
9/24/07	Orr WTP 48" Finished Water No. 1	30.95	30.31	102%	Meter registers within allowable limits of accuracy
9/10/07	Orr WTP 48" Finished Water No. 2	40.56	38.89	96%	Meter registers within allowable limits of accuracy
8/29/07	Orr WTP 72" Finished Water No. 3	26.10	25.96	99%	Meter registers within allowable limits of accuracy
9/11/07	Orr WTP 72" Finished Water No. 4	58.16	60.84	105%	Meter registers within allowable limits of accuracy
9/10/07	Orr WTP 72" Finished Water No. 5	67.05	64.67	96%	Meter registers within allowable limits of accuracy

This tests show that the venturi meters as a group are registering within 1% of the pitometer flow readings.

Item 3 - Perform a water audit within Alexander Orr WTP

CDM has been retained to evaluate the various flow streams identified within the plant and to verify the calibration of the venturi meters at the WTP. A kick-off meeting was held at the WTP on March 11, 2008. CDM will perform a water audit within the WTP to investigate raw to finished water flow differences, and initiate installation, calibration, and certification of process water flow meters (including transfers of water softening residuals to calcium carbonate lagoons and recalcining kilns), as appropriate. CDM will consider the various methodologies required to reliably estimate unmetered or unknown flows. In addition, proper analytical methods for determining sludge density and water content in solids residuals will be identified.

MDWASD's instrumentation personnel installed a flowmeter on the water softening residuals line. Instrumentation personnel are still verifying and checking with the initial readings from this meter.

Item 4 - Revise the Oracle Systems database

The "Oracle systems database" has been revised and is now called the Normalized Database. It is a SQL Database Server Table which has integrated all raw and finished water SCADA meter reading reports within a single table. This table now holds data from May 2007 to present. A SQL based report format to be compliant with SFWMD Water User Permit Allocation and Special Conditions submittal requirements has been created (see enclosed Appendix F).

Item 5 - Transition to all new meter reports during December 2007

Currently, all raw and finished water meter reports are being prepared in both the old and new format while the new meter installations comments are being addressed and the new system's performance is being assessed.

Item 6 - Undertake the following tasks to analyze raw water flow measuring issues

MDWASD performed a Comparison of Measured Withdrawals from Wells and Surface Water Pumps for a three month period: December 2007, January 2008, and February 2008 (see Appendix E).

CDM was recently authorized to perform the following tasks for the Alexander Orr WTP system:

- Reconciliation of raw water meter reports between FDEP Monthly Operating Reports (MOR) and historical Normalized database (alias Oracle) system. CDM

will prepare an analysis of daily historical FDEP MOR and historical Normalized Data system meter records for a period of several months.

- Comparative analysis of reported versus recorded flows for raw and finished water. Pumpage results for each wellfield for the month of March 2008.

- Adjustment factor for raw water by wellfield based on WTP influent flow. CDM will derive a factor for the individual wellfield metered flows and plant raw water (Venturi) flows so that the sum of the adjusted wellfield metered flows match the plant raw water Venturi meter flows.

Item 7 - Summary report on flow measuring issues analysis by July 31, 2008 (July 1 on Limiting Condition No. 48)

The summary report is anticipated to be submitted by July 1, 2008.

Item 8 - Submit request for allocation adjustment to SFWMD during the third Quarter of 2008

To be determined based on the results of ongoing analyses and investigations.

The following Appendices are submitted in support of this Interim Report:

Appendix A	Water Report Alex Orr In-Plant Transmitters and Recorders for September 2007 (Venturi Meter Transmitter Calibration September 2007)
Appendix B	Water Report Alex Orr In-Plant Transmitters and Recorders for December 2007 (Venturi Meter Transmitter Calibration December 2007)
Appendix C	MDWASD Procedures for Venturi Flow Transmitter Calibrations for Plant and Pay Meters (Venturi Transmitter Calibration Procedure)
Appendix D	ADS, LLC Pitometer Testing Report, September 2007 (Venturi Calibration Verification August – September 2007)
Appendix E	Comparative of Measured Withdrawals from Wells and Surface Water Pumps (December 2007 thru February 2008)
Appendix F	Water Treatment Division Data Evaluation and Automation Project (Electronic Database Project)

WATER REPORTS

Alex Orr In-Plant
Transmitters & Recorders

FOR

Sep-07

Alex Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID FIT-505-RAW1
Raw Water #1 -- 48" Venturi

Serial Number 1597757
Rosemount 3051 HART

Setup

Flow Transmitter			Accuracy	0.075% of Span	
Input Low	0.00		Output Low	4.000	
Input High	282.50		Output High	20.000	
Input Units	in of H2O		Output Units	mA	
Tolerance mA	0.012	+/-	Square Root	Yes	
Tolerance inch	0.212	+/-			
Dampening	1.60	Seconds			

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.212	-0.212	4.012	3.988	4.000	4.000	**0.000**	**PASS**
71.00	71.212	70.788	12.033	12.009	12.021	12.022	**0.001**	**PASS**
141.00	141.212	140.788	15.316	15.292	15.304	15.305	**0.001**	**PASS**
212.00	212.212	211.788	17.872	17.848	17.860	17.862	**0.002**	**PASS**
282.00	282.212	281.788	19.998	19.974	19.986	19.994	**0.008**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.212	-0.212	4.012	3.988	4.000	4.000	**0.000**	**PASS**
71.00	71.212	70.788	12.033	12.009	12.021	12.017	**-0.004**	**PASS**
141.00	141.212	140.788	15.316	15.292	15.304	15.300	**-0.004**	**PASS**
212.00	212.212	211.788	17.872	17.848	17.860	17.856	**-0.004**	**PASS**
282.00	282.212	281.788	19.998	19.974	19.986	19.982	**-0.004**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
17-Sep-07	Schedule	AO-I-01

Comments

Testers
P.Anton

Alex Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID FIR-505-RAW1
Raw Water #1 -- 48" Venturi

Serial Number 9401-28153-AO1

Setup

Flow Recorder			
Input Low	4.000	Output Low	0
Input High	20.000	Output High	100
Input Units	mA	Output Units	MGD
Square Root	No		
Tolerance 0.5 % of reading + 0.05% of full scale		0.005 % of Reading 0.0005 % of Full Scale	

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0500**	**PASS**
8.000	25.00	25.00	**0.1750**	**PASS**
12.000	50.00	49.99	**0.3000**	**PASS**
16.000	75.00	74.99	**0.4250**	**PASS**
20.000	100.00	100.00	**0.5500**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0500**	**PASS**
8.000	25.00	25.00	**0.1750**	**PASS**
12.000	50.00	49.99	**0.3000**	**PASS**
16.000	75.00	74.99	**0.4250**	**PASS**
20.000	100.00	100.00	**0.5500**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
17-Sep-07	Schedule	AO-I-01-10

Comments

Testers
P.Anton

Alex Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID	**FIT-506-RAW2**			**Serial Number**	**1597755**	
	Raw Water #2 -- 54" Venturi			**Rosemount**	**3051**	**HART**
Setup	**Flow Transmitter**			**Accuracy**	**0.075% of Span**	
	Input Low	0		**Output Low**	4.000	
	Input High	84.32		**Output High**	20.000	
	Input Units	in of H2O		**Output Units**	mA	
	Tolerance mA	0.012	+/-	**Square Root**	**Yes**	
	Tolerance inch	0.063	+/-			
	Dampening	1.60	**Seconds**			

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.063	-0.063	4.012	3.988	4.000	4.000	**0.000**	**PASS**
21.00	21.063	20.937	11.997	11.973	11.985	11.989	**0.004**	**PASS**
42.00	42.063	41.937	15.304	15.280	15.292	15.295	**0.003**	**PASS**
63.00	63.063	62.937	17.842	17.818	17.830	17.835	**0.005**	**PASS**
84.00	84.063	83.937	19.982	19.958	19.970	19.975	**0.005**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.063	-0.063	4.012	3.988	4.000	3.999	**-0.001**	**PASS**
21.00	21.063	20.937	11.997	11.973	11.985	11.987	**0.002**	**PASS**
42.00	42.063	41.937	15.304	15.280	15.292	15.294	**0.002**	**PASS**
63.00	63.063	62.937	17.842	17.818	17.830	17.833	**0.003**	**PASS**
84.00	84.063	83.937	19.982	19.958	19.970	19.974	**0.004**	**PASS**

Test Equipment Used

Manufacturers	**Serial Numbers**
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	**Reason For Work**	**Procedure #**
17-Sep-07	Schedule	AO-I-01

Comments

Testers

P.Anton

Alex Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID FIR-506-RAW2
Raw Water #2 -- 54" Venturi

Serial Number 9710-78075-C05

Setup

Flow Recorder

Input Low	4.000	Output Low	0
Input High	20.000	Output High	100
Input Units	mA	Output Units	MGD
Square Root	No		

Tolerance 0.5 % of reading + 0.05% of full scale: 0.005 % of Reading; 0.0005 % of Full Scale

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.01	**0.0500**	**PASS**
8.000	25.00	25.00	**0.1750**	**PASS**
12.000	50.00	50.00	**0.3000**	**PASS**
16.000	75.00	75.00	**0.4250**	**PASS**
20.000	100.00	99.99	**0.5500**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0500**	**PASS**
8.000	25.00	25.00	**0.1750**	**PASS**
12.000	50.00	50.00	**0.3000**	**PASS**
16.000	75.00	75.00	**0.4250**	**PASS**
20.000	100.00	99.99	**0.5500**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
17-Sep-07	Schedule	AO-I-01-10

Comments

Testers
P.Anton

Alex Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID	**FIT-507-RAW3**		**Serial Number**	**2239317**	
	Raw Water #3 -- 72" Venturi		**Rosemount**	**3051**	**HART**
Setup	**Flow Transmitter**		**Accuracy**	**0.075% of Span**	
	Input Low	0	**Output Low**	4.000	
	Input High	289.00	**Output High**	20.000	
	Input Units	in of H2O	**Output Units**	mA	
	Tolerance mA	0.012 +/-	**Square Root**	**Yes**	
	Tolerance inch	0.217 +/-			
	Dampening	1.60 **Seconds**			

On-Line Communicator

As Found Input ($in H_2O$)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.217	-0.217	4.012	3.988	4.000	4.000	**0.000**	**PASS**
72.00	72.217	71.783	11.998	11.974	11.986	11.987	**0.001**	**PASS**
145.00	145.217	144.783	15.345	15.321	15.333	15.333	**0.000**	**PASS**
217.00	217.217	216.783	17.876	17.852	17.864	17.864	**0.000**	**PASS**
289.00	289.217	288.783	20.012	19.988	20.000	20.000	**0.000**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.217	-0.217	4.012	3.988	4.000	4.000	**0.000**	**PASS**
72.00	72.217	71.783	11.998	11.974	11.986	11.987	**0.001**	**PASS**
145.00	145.217	144.783	15.345	15.321	15.333	15.333	**0.000**	**PASS**
217.00	217.217	216.783	17.876	17.852	17.864	17.864	**0.000**	**PASS**
289.00	289.217	288.783	20.012	19.988	20.000	20.000	**0.000**	**PASS**

Test Equipment Used

Manufacturers	**Serial Numbers**
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	**Reason For Work**	**Procedure #**
17-Sep-07	Schedule	AO-I-01

Comments

Testers

P.Anton

Alex Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID FIR-507-RAW3
Raw Water #3 -- 72" Venturi

Serial Number 9310-22855

Setup

Flow Recorder

Input Low	4.000	Output Low	0
Input High	20.000	Output High	85
Input Units	mA	Output Units	MGD
Square Root	No		
Tolerance 0.5 % of reading + 0.05% of full scale		0.005 % of Reading 0.0005 % of Full Scale	

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.000	**0.0425**	**PASS**
8.000	21.25	21.250	**0.1488**	**PASS**
12.000	42.50	42.500	**0.2550**	**PASS**
16.000	63.75	63.750	**0.3613**	**PASS**
20.000	85.00	85.000	**0.4675**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.000	**0.0425**	**PASS**
8.000	21.25	21.250	**0.1488**	**PASS**
12.000	42.50	42.500	**0.2550**	**PASS**
16.000	63.75	63.750	**0.3613**	**PASS**
20.000	85.00	85.000	**0.4675**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
17-Sep-07	Schedule	AO-I-01-10

Comments

Testers
P.Anton

Alex Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID FIT-508-RAW4
Raw Water #4 -- 84" Venturi

Serial Number 1841929
Rosemount 3051 HART

Setup

Flow Transmitter			Accuracy	0.075% of Span	
Input Low	0		Output Low	4.000	
Input High	263.07		Output High	20.000	
Input Units	in of H2O		Output Units	mA	
Tolerance mA	0.012	+/-	Square Root	Yes	
Tolerance inch	0.197	+/-			
Dampening	1.60	Seconds			

On-Line Communicator

As Found Input (H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.197	-0.197	4.012	3.988	4.000	4.000	**0.000**	**PASS**
66.00	66.197	65.803	12.026	12.002	12.014	12.010	**-0.004**	**PASS**
132.00	132.197	131.803	15.346	15.322	15.334	15.331	**-0.003**	**PASS**
197.00	197.197	196.803	17.858	17.834	17.846	17.842	**-0.004**	**PASS**
263.00	263.197	262.803	20.010	19.986	19.998	19.995	**-0.003**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.197	-0.197	4.012	3.988	4.000	4.000	**0.000**	**PASS**
66.00	66.197	65.803	12.026	12.002	12.014	12.012	**-0.002**	**PASS**
132.00	132.197	131.803	15.346	15.322	15.334	15.332	**-0.002**	**PASS**
197.00	197.197	196.803	17.858	17.834	17.846	17.846	**0.000**	**PASS**
263.00	263.197	262.803	20.010	19.986	19.998	19.998	**0.000**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
4-Sep-07	Schedule	AO-I-01

Comments

Testers
P.Anton

Alex Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID FIR-508-RAW4A — **Serial Number** 9602-58414-003

Raw Water #4 -- 84" Venturi

Setup

Flow Recorder -- Chem. Bldg. #1

Input Low	4.000	Output Low	0
Input High	20.000	Output High	175
Input Units	mA	Output Units	MGD
Square Root	No		
Tolerance 0.5 % of reading + 0.05% of full scale		0.005 % of Reading 0.0005 % of Full Scale	

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.02	**0.0875**	**PASS**
8.000	43.75	43.75	**0.3063**	**PASS**
12.000	87.50	87.50	**0.5250**	**PASS**
16.000	131.25	131.25	**0.7437**	**PASS**
20.000	175.00	175.00	**0.9625**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0875**	**PASS**
8.000	43.75	43.75	**0.3063**	**PASS**
12.000	87.50	87.50	**0.5250**	**PASS**
16.000	131.25	131.25	**0.7437**	**PASS**
20.000	175.00	175.00	**0.9625**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
3-Sep-07	Schedule	AO-I-01-10

Comments

Testers

P.Anton

Alex Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID FIR-509-RAW4B
Raw Water #4 -- 84" Venturi

Serial Number 9401-28155-AO1

Setup

Flow Recorder -- Chem. Bldg. #2

Input Low	4.000	Output Low	0
Input High	20.000	Output High	175
Input Units	mA	Output Units	MGD
Square Root	No		
Tolerance 0.5 % of reading + 0.05% of full scale		0.005 % of Reading 0.0005 % of Full Scale	

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0875**	**PASS**
8.000	43.75	43.74	**0.3063**	**PASS**
12.000	87.50	87.49	**0.5250**	**PASS**
16.000	131.25	131.24	**0.7438**	**PASS**
20.000	175.00	174.99	**0.9625**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0875**	**PASS**
8.000	43.75	43.75	**0.3063**	**PASS**
12.000	87.50	87.50	**0.5250**	**PASS**
16.000	131.25	131.25	**0.7438**	**PASS**
20.000	175.00	175.00	**0.9625**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
4-Sep-07	Schedule	AO-I-01-10

Comments

Testers
P.Anton

Alex Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID FIT-500-FIN1 — **Serial Number** 1411231

Fininsh Water #1 -- 48" Venturi — **Rosemount** 3051 HART

Setup

Flow Transmitter				Accuracy	0.075% of Span
Input Low	0			Output Low	4.000
Input High	265.20			Output High	20.000
Input Units	in of H2O			Output Units	mA
Tolerance mA	0.012	+/-		Square Root	Yes
Tolerance inch	0.199	+/-			
Dampening	1.60	Seconds			

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv ±	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.199	-0.199	4.012	3.988	4.000	4.000	**0.000**	**PASS**
66.00	66.199	65.801	11.994	11.970	11.982	11.983	**0.001**	**PASS**
133.00	133.199	132.801	15.343	15.319	15.331	15.332	**0.001**	**PASS**
199.00	199.199	198.801	17.872	17.848	17.860	17.862	**0.002**	**PASS**
265.00	265.199	264.801	20.006	19.982	19.994	19.998	**0.004**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv ±	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.199	-0.199	4.012	3.988	4.000	4.000	**0.000**	**PASS**
66.00	66.199	65.801	11.994	11.970	11.982	11.983	**0.001**	**PASS**
133.00	133.199	132.801	15.343	15.319	15.331	15.332	**0.001**	**PASS**
199.00	199.199	198.801	17.872	17.848	17.860	17.862	**0.002**	**PASS**
265.00	265.199	264.801	20.006	19.982	19.994	19.998	**0.004**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
5-Sep-07	Schedule	AO-I-01

Comments

Testers

P.Anton

Alex Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID FIR-500-FIN1
Finish Water #1 -- 48" Venturi

Serial Number 101655-001-902-8716

Setup

Flow Recorder			
Input Low	4.000	Output Low	0
Input High	20.000	Output High	80
Input Units	mA	Output Units	MGD
Square Root	No		
Tolerance 0.5 % of reading + 0.05% of full scale		0.005 % of Reading 0.0005 % of Full Scale	

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.000	**0.0400**	**PASS**
8.000	20.00	20.000	**0.1400**	**PASS**
12.000	40.00	39.990	**0.2400**	**PASS**
16.000	60.00	59.990	**0.3400**	**PASS**
20.000	80.00	80.000	**0.4400**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.000	**0.0400**	**PASS**
8.000	20.00	20.000	**0.1400**	**PASS**
12.000	40.00	39.990	**0.2400**	**PASS**
16.000	60.00	59.990	**0.3400**	**PASS**
20.000	80.00	80.000	**0.4400**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
5-Sep-07	Schedule	AO-I-01-10

Comments

Testers
P.Anton

Alex Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID FIT-501-FIN2 — Fininsh Water #2 -- 60" Venturi

Serial Number 1101176 — **Rosemount** 3051 HART

Setup

Flow Transmitter			Accuracy	0.075% of Span	
Input Low	0		Output Low	4.000	
Input High	68.90		Output High	20.000	
Input Units	in of H2O		Output Units	mA	
Tolerance mA	0.012	+/-	Square Root	Yes	
Tolerance inch	0.052	+/-			
Dampening	1.60	Seconds			

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.052	-0.052	4.012	3.988	4.000	4.000	**0.000**	**PASS**
17.00	17.052	16.948	11.960	11.936	11.948	11.958	**0.010**	**PASS**
34.00	34.052	33.948	15.252	15.228	15.240	15.248	**0.008**	**PASS**
52.00	52.052	51.948	17.912	17.888	17.900	17.912	**0.012**	**FAIL**
69.00	69.052	68.948	20.024	20.000	20.012	20.031	**0.019**	**FAIL**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.052	-0.052	4.012	3.988	4.000	4.000	**0.000**	**PASS**
17.00	17.052	16.948	11.960	11.936	11.948	11.950	**0.002**	**PASS**
34.00	34.052	33.948	15.252	15.228	15.240	15.242	**0.002**	**PASS**
52.00	52.052	51.948	17.912	17.888	17.900	17.900	**0.000**	**PASS**
69.00	69.052	68.948	20.024	20.000	20.012	20.012	**0.000**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
5-Sep-07	Schedule	AO-I-01

Comments

Testers

P.Anton

Alex Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID FIR-501-FIN2
Finish Water #2 -- 60" Venturi

Serial Number 9602-58412C03

Setup

Flow Recorder			
Input Low	4.000	Output Low	0
Input High	20.000	Output High	128
Input Units	mA	Output Units	MGD
Square Root	No		No
Tolerance 0.5 % of reading + 0.05% of full scale		0.005 % of Reading 0.0005 % of Full Scale	

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0640**	**PASS**
8.000	32.00	32.00	**0.2240**	**PASS**
12.000	64.00	64.00	**0.3840**	**PASS**
16.000	96.00	96.00	**0.5440**	**PASS**
20.000	128.00	128.00	**0.7040**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0640**	**PASS**
8.000	32.00	32.00	**0.2240**	**PASS**
12.000	64.00	64.00	**0.3840**	**PASS**
16.000	96.00	96.00	**0.5440**	**PASS**
20.000	128.00	128.00	**0.7040**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
5-Sep-07	Schedule	AO-I-01-10

Comments

Testers
P.Anton

Alex Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID	**FIT-502-FIN3**		**Serial Number**	**1101177**	
	Fininsh Water #3 -- 72" Venturi		**Rosemount**	**3051**	**HART**
Setup	**Flow Transmitter**		**Accuracy**	**0.075% of Span**	
	Input Low	0	**Output Low**	4.000	
	Input High	193.30	**Output High**	20.000	
	Input Units	in of H2O	**Output Units**	mA	
	Tolerance mA	0.012 +/-	**Square Root**	**Yes**	
	Tolerance inch	0.145 +/-			
	Dampening	1.60 **Seconds**			

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.145	-0.145	4.012	3.988	4.000	4.000	**0.000**	**PASS**
48.00	48.145	47.855	11.985	11.961	11.973	11.971	**-0.002**	**PASS**
97.00	97.145	96.855	15.346	15.322	15.334	15.332	**-0.002**	**PASS**
145.00	145.145	144.855	17.870	17.846	17.858	17.857	**-0.001**	**PASS**
193.00	193.145	192.855	20.000	19.976	19.988	19.988	**0.000**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.145	-0.145	4.012	3.988	4.000	4.000	**0.000**	**PASS**
48.00	48.145	47.855	11.985	11.961	11.973	11.971	**-0.002**	**PASS**
97.00	97.145	96.855	15.346	15.322	15.334	15.332	**-0.002**	**PASS**
145.00	145.145	144.855	17.870	17.846	17.858	17.857	**-0.001**	**PASS**
193.00	193.145	192.855	20.000	19.976	19.988	19.988	**0.000**	**PASS**

Test Equipment Used

Manufacturers	**Serial Numbers**
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	**Reason For Work**	**Procedure #**
5-Sep-07	Schedule	AO-I-01

Comments

Testers

P.Anton

Alex Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID FIR-502-FIN3
Finish Water #3 -- 72" Venturi

Serial Number 9501-42407-C03

Setup

Flow Recorder			
Input Low	4.000	Output Low	0
Input High	20.000	Output High	150
Input Units	mA	Output Units	MGD
Square Root	No		
Tolerance 0.5 % of reading + 0.05% of full scale		0.005 % of Reading 0.0005 % of Full Scale	

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.01	**0.0750**	**PASS**
8.000	37.50	37.50	**0.2625**	**PASS**
12.000	75.00	75.00	**0.4500**	**PASS**
16.000	112.50	112.49	**0.6375**	**PASS**
20.000	150.00	149.99	**0.8250**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0750**	**PASS**
8.000	37.50	37.49	**0.2625**	**PASS**
12.000	75.00	75.00	**0.4500**	**PASS**
16.000	112.50	112.50	**0.6375**	**PASS**
20.000	150.00	150.00	**0.8250**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
5-Sep-07	Schedule	AO-I-01-10

Testers
P.Anton

Alex Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID FIT-503-FIN4
Fininsh Water #4 -- 72" Venturi

Serial Number 1101174
Rosemount 3051 HART

Setup

Flow Transmitter				Accuracy	0.075% of Span
Input Low	0			Output Low	4.000
Input High	257.10			Output High	20.000
Input Units	in of H2O			Output Units	mA
Tolerance mA	0.012	+/-		Square Root	Yes
Tolerance inch	0.193	+/-			
Dampening	1.60	Seconds			

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.193	-0.193	4.012	3.988	4.000	4.000	**0.000**	**PASS**
64.00	64.193	63.807	11.995	11.971	11.983	11.983	**0.000**	**PASS**
129.00	129.193	128.807	15.345	15.321	15.333	15.333	**0.000**	**PASS**
193.00	193.193	192.807	17.875	17.851	17.863	17.863	**0.000**	**PASS**
257.00	257.193	256.807	20.009	19.985	19.997	19.998	**0.001**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.193	-0.193	4.012	3.988	4.000	4.000	**0.000**	**PASS**
64.00	64.193	63.807	11.995	11.971	11.983	11.983	**0.000**	**PASS**
129.00	129.193	128.807	15.345	15.321	15.333	15.333	**0.000**	**PASS**
193.00	193.193	192.807	17.875	17.851	17.863	17.863	**0.000**	**PASS**
257.00	257.193	256.807	20.009	19.985	19.997	19.998	**0.001**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
6-Sep-07	Schedule	AO-I-01

Comments

Testers
P.Anton

Alex Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID FIR-503-FIN4
Finish Water #4 -- 72" Venturi

Serial Number 101655-8717

Setup

Flow Recorder			
Input Low	4.000	Output Low	0
Input High	20.000	Output High	173
Input Units	mA	Output Units	MGD
Square Root	No		
Tolerance 0.5 % of reading + 0.05% of full scale		0.005 % of Reading 0.0005 % of Full Scale	

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0865**	**PASS**
8.000	43.25	43.24	**0.3028**	**PASS**
12.000	86.50	86.49	**0.5190**	**PASS**
16.000	129.75	129.74	**0.7353**	**PASS**
20.000	173.00	172.97	**0.9515**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0865**	**PASS**
8.000	43.25	43.25	**0.3028**	**PASS**
12.000	86.50	86.50	**0.5190**	**PASS**
16.000	129.75	129.75	**0.7353**	**PASS**
20.000	173.00	173.00	**0.9515**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
6-Sep-07	Schedule	AO-I-01-10

Comments

Testers
P.Anton

Alex Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID FIT-504-FIN5
Fininsh Water #5 -- 72" Venturi

Serial Number 1101178
Rosemount 3051 HART

Setup

Flow Transmitter			Accuracy	0.075% of Span	
Input Low	0		Output Low	4.000	
Input High	257.10		Output High	20.000	
Input Units	in of H2O		Output Units	mA	
Tolerance mA	0.012	+/-	Square Root	Yes	
Tolerance inch	0.193	+/-			
Dampening	1.60	Seconds			

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.193	-0.193	4.012	3.988	4.000	4.000	**0.000**	**PASS**
64.00	64.193	63.807	11.995	11.971	11.983	11.984	**0.001**	**PASS**
129.00	129.193	128.807	15.345	15.321	15.333	15.331	**-0.002**	**PASS**
193.00	193.193	192.807	17.875	17.851	17.863	17.860	**-0.003**	**PASS**
257.00	257.193	256.807	20.009	19.985	19.997	19.994	**-0.003**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.193	-0.193	4.012	3.988	4.000	4.000	**0.000**	**PASS**
64.00	64.193	63.807	11.995	11.971	11.983	11.984	**0.001**	**PASS**
129.00	129.193	128.807	15.345	15.321	15.333	15.331	**-0.002**	**PASS**
193.00	193.193	192.807	17.875	17.851	17.863	17.862	**-0.001**	**PASS**
257.00	257.193	256.807	20.009	19.985	19.997	19.994	**-0.003**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
6-Sep-07	Schedule	AO-I-01

Comments

Testers
P.Anton

Alex Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID FIR-504-FIN5
Finish Water #5 -- 72" Venturi

Serial Number 101655-8717

Setup

Flow Recorder			
Input Low	4.000	Output Low	0
Input High	20.000	Output High	173
Input Units	mA	Output Units	MGD
Square Root	No		

Tolerance 0.5 % of reading + 0.05% of full scale

0.005 % of Reading
0.0005 % of Full Scale

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0865**	**PASS**
8.000	43.25	43.24	**0.3028**	**PASS**
12.000	86.50	86.49	**0.5190**	**PASS**
16.000	129.75	129.73	**0.7353**	**PASS**
20.000	173.00	172.98	**0.9515**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0865**	**PASS**
8.000	43.25	43.24	**0.3028**	**PASS**
12.000	86.50	86.49	**0.5190**	**PASS**
16.000	129.75	129.74	**0.7353**	**PASS**
20.000	173.00	172.99	**0.9515**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
6-Sep-07	Schedule	AO-I-01-10

Comments

Testers
P.Anton

WATER REPORT

SouthWest Wellfield
ASR Wells #4 & 5

FOR

September, 2007

MIAMI-DADE COUNTY

SouthWest Wellfield -- Alexander Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID FIT-1-ASR #4
Production / Recovery

Setup

Flow Transmitter				Serial Number	2124097 3/98	
Input Low	0.00			Rosemount	1151DP	HART
Input High	138.84			Accuracy	0.254019015	% of Span
Input Units	in of H2O			Pressure Range	4	
Tolerance mA	0.041	+/-		Output Low	4.000	
Tolerance inch	0.353	+/-		Output High	20.000	
				Output Units	mA	
				Square Root	Yes	
Dampening	6.40	Seconds		Upper Range Limit of TX (URL)	150	" H_2O

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0	0.353	-0.353	4.041	3.959	4.000	4.000	**0.000**	**PASS**
35	35.353	34.647	12.074	11.993	12.033	12.034	**0.001**	**PASS**
69	69.353	68.647	15.320	15.239	15.279	15.278	**-0.001**	**PASS**
104	104.353	103.647	17.888	17.807	17.848	17.848	**0.000**	**PASS**
139	139.353	138.647	20.050	19.969	20.009	20.009	**0.000**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0	0.353	-0.353	4.041	3.959	4.000	4.000	**0.000**	**PASS**
35	35.353	34.647	12.074	11.993	12.033	12.034	**0.001**	**PASS**
69	69.353	68.647	15.320	15.239	15.279	15.278	**-0.001**	**PASS**
104	104.353	103.647	17.888	17.807	17.848	17.848	**0.000**	**PASS**
139	139.353	138.647	20.050	19.969	20.009	20.009	**0.000**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
7-Sep-07	Schedule	AO-I-01

Comments

Testers
P.Anton

SouthWest Wellfield -- Alexander Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID FIT-2-ASR #4

Serial Number 2124095 3/98

Setup

Injection / Recharge			Rosemount	1151DP	HART
Flow Transmitter			Accuracy	0.254019015	% of Span
Input Low	0.00		Pressure Range	4	
Input High	138.84		Output Low	4.000	
Input Units	in of H2O		Output High	20.000	
Tolerance mA	0.041	+/-	Output Units	mA	
Tolerance inch	0.353	+/-	Square Root	Yes	
Dampening	6.40	Seconds	Upper Range Limit of TX (URL)	150	" H_2O

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0	0.353	-0.353	4.041	3.959	4.000	3.990	**-0.010**	**PASS**
35	35.353	34.647	12.074	11.993	12.033	12.034	**0.001**	**PASS**
69	69.353	68.647	15.320	15.239	15.279	15.281	**0.002**	**PASS**
104	104.353	103.647	17.888	17.807	17.848	17.849	**0.001**	**PASS**
139	139.353	138.647	20.050	19.969	20.009	20.010	**0.001**	**PASS**

n-Line Communicator

As Left Input (in H_2O)	Tolerance Pv ±	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0	0.353	-0.353	4.041	3.959	4.000	3.990	**-0.010**	**PASS**
35	35.353	34.647	12.074	11.993	12.033	12.034	**0.001**	**PASS**
69	69.353	68.647	15.320	15.239	15.279	15.281	**0.002**	**PASS**
104	104.353	103.647	17.888	17.807	17.848	17.849	**0.001**	**PASS**
139	139.353	138.647	20.050	19.969	20.009	20.010	**0.001**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
7-Sep-07	Schedule	AO-I-01

Comments

Testers

P.Anton

MIAMI-DADE COUNTY

SouthWest Wellfield -- Alexander Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID FIT-1-ASR #5

Setup

	Production / Recovery			Serial Number	2124094 3/98	
	Flow Transmitter			Rosemount	1151DP	HART
	Input Low	0.00		Accuracy	0.254019015	% of Span
	Input High	138.84		Pressure Range	4	
	Input Units	in of H2O		Output Low	4.000	
	Tolerance mA	0.041	+/-	Output High	20.000	
	Tolerance inch	0.353	+/-	Output Units	mA	
				Square Root	Yes	
	Dampening	6.40	Seconds	Upper Range Limit of TX (URL)	150	" H_2O

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0	0.353	-0.353	4.041	3.959	4.000	4.000	**0.000**	**PASS**
35	35.353	34.647	12.074	11.993	12.033	12.034	**0.001**	**PASS**
69	69.353	68.647	15.320	15.239	15.279	15.280	**0.001**	**PASS**
104	104.353	103.647	17.888	17.807	17.848	17.847	**-0.001**	**PASS**
139	139.353	138.647	20.050	19.969	20.009	20.012	**0.003**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0	0.353	-0.353	4.041	3.959	4.000	4.000	**0.000**	**PASS**
35	35.353	34.647	12.074	11.993	12.033	12.034	**0.001**	**PASS**
69	69.353	68.647	15.320	15.239	15.279	15.280	**0.001**	**PASS**
104	104.353	103.647	17.888	17.807	17.848	17.847	**-0.001**	**PASS**
139	139.353	138.647	20.050	19.969	20.009	20.012	**0.003**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
7-Sep-07	Schedule	AO-I-01

Comments

Testers

P.Anton

SouthWest Wellfield -- Alexander Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID FIT-2-ASR #5 — **Serial Number** 2124096 3/98

Setup

Injection / Recharge			Rosemount	1151DP	HART
Flow Transmitter			Accuracy	0.25401901	% of Span
Input Low	0.00		Pressure Range	4	
Input High	138.84		Output Low	4.000	
Input Units	in of H2O		Output High	20.000	
Tolerance mA	0.041	+/-	Output Units	mA	
Tolerance inch	0.353	+/-	Square Root	Yes	
Dampening	6.40	Seconds	Upper Range Limit of TX (URL)	150	" H_2O

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0	0.353	-0.353	4.041	3.959	4.000	3.999	**-0.001**	**PASS**
35	35.353	34.647	12.074	11.993	12.033	12.035	**0.002**	**PASS**
69	69.353	68.647	15.320	15.239	15.279	15.281	**0.002**	**PASS**
104	104.353	103.647	17.888	17.807	17.848	17.852	**0.004**	**PASS**
139	139.353	138.647	20.050	19.969	20.009	20.017	**0.008**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0	0.353	-0.353	4.041	3.959	4.000	4.000	**0.000**	**PASS**
35	35.353	34.647	12.074	11.993	12.033	12.031	**-0.002**	**PASS**
69	69.353	68.647	15.320	15.239	15.279	15.275	**-0.004**	**PASS**
104	104.353	103.647	17.888	17.807	17.848	17.845	**-0.003**	**PASS**
139	139.353	138.647	20.050	19.969	20.009	20.006	**-0.003**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
7-Sep-07	Schedule	AO-I-01

Comments

Testers
P.Anton

WATER REPORT

SouthWest Wellfield BA Wells
Transmitters & Recorders

FOR

Sep-07

MIAMI-DADE COUNTY

SouthWest Wellfield -- Alexander Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID	**SW-BA-Well32**			**Serial Number**	**1411208**	
	24" Venturi			**Rosemount**	**3051**	**HART**
Setup	**Flow Transmitter**			**Accuracy**	**0.075% of Span**	
	Input Low	0.00		**Output Low**	4.000	
	Input High	101.68		**Output High**	20.000	
	Input Units	in of H2O		**Output Units**	mA	
	Tolerance mA	0.012	+/-	**Square Root**	**Yes**	
	Tolerance inch	0.076	+/-			
	Dampening	6.40	**Seconds**			

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.076	-0.076	4.012	3.988	4.000	4.000	**0.000**	**PASS**
25.00	25.076	24.924	11.946	11.922	11.934	11.935	**0.001**	**PASS**
51.00	51.076	50.924	15.343	15.319	15.331	15.333	**0.002**	**PASS**
76.00	76.076	75.924	17.845	17.821	17.833	17.835	**0.002**	**PASS**
102.00	102.076	101.924	20.037	20.013	20.025	20.027	**0.002**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv ±	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.076	-0.076	4.012	3.988	4.000	4.000	**0.000**	**PASS**
25.00	25.076	24.924	11.946	11.922	11.934	11.935	**0.001**	**PASS**
51.00	51.076	50.924	15.343	15.319	15.331	15.333	**0.002**	**PASS**
76.00	76.076	75.924	17.845	17.821	17.833	17.835	**0.002**	**PASS**
102.00	102.076	101.924	20.037	20.013	20.025	20.027	**0.002**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
10-Sep-07	Schedule	AO-I-01

Comments

Testers

P.Anton

SouthWest Wellfield -- Alexander Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID	**SW-BA-Well32R**		**Serial Number**	**9803-81828-C4**
	24" Venturi			
Setup	**Flow Recorder**			
	Input Low	4.000	**Output Low**	0
	Input High	20.000	**Output High**	16
	Input Units	mA	**Output Units**	MGD
	Square Root	No		
	Tolerance 0.5 % of reading + 0.05% of full scale		0.005 **% of Reading** 0.0005 **% of Full Scale**	

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0080**	**PASS**
8.000	4.00	4.00	**0.0280**	**PASS**
12.000	8.00	8.00	**0.0480**	**PASS**
16.000	12.00	12.00	**0.0680**	**PASS**
20.000	16.00	16.00	**0.0880**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0080**	**PASS**
8.000	4.00	4.00	**0.0280**	**PASS**
12.000	8.00	8.00	**0.0480**	**PASS**
16.000	12.00	12.00	**0.0680**	**PASS**
20.000	16.00	16.00	**0.0880**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
10-Sep-07	Schedule	AO-I-01-10

Comments	Testers
Pen goes up & down erratically- Respondes to calibration, baut returns to erratic behavior.	**P.Anton**

SouthWest Wellfield -- Alexander Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID	**SW-BA-Well33**			**Serial Number**	**2031056**	
	24" Venturi			**Rosemount**	**3051**	**HART**
Setup	**Flow Transmitter**			**Accuracy**	**0.075% of Span**	
	Input Low	0.00		**Output Low**	4.000	
	Input High	101.68		**Output High**	20.000	
	Input Units	in of H2O		**Output Units**	mA	
	Tolerance mA	0.012	+/-	**Square Root**	**Yes**	
	Tolerance inch	0.076	+/-			
	Dampening	6.40	**Seconds**			

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.076	-0.076	4.012	3.988	4.000	4.000	**0.000**	**PASS**
25.00	25.076	24.924	11.946	11.922	11.934	11.937	**0.003**	**PASS**
51.00	51.076	50.924	15.343	15.319	15.331	15.333	**0.002**	**PASS**
76.00	76.076	75.924	17.845	17.821	17.833	17.834	**0.001**	**PASS**
102.00	102.076	101.924	20.037	20.013	20.025	20.027	**0.002**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv ±	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.076	-0.076	4.012	3.988	4.000	4.000	**0.000**	**PASS**
25.00	25.076	24.924	11.946	11.922	11.934	11.937	**0.003**	**PASS**
51.00	51.076	50.924	15.343	15.319	15.331	15.333	**0.002**	**PASS**
76.00	76.076	75.924	17.845	17.821	17.833	17.834	**0.001**	**PASS**
102.00	102.076	101.924	20.037	20.013	20.025	20.027	**0.002**	**PASS**

Test Equipment Used

Manufacturers	**Serial Numbers**
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	**Reason For Work**	**Procedure #**
10-Sep-07	Schedule	AO-I-01

Comments

Testers

P.Anton

SouthWest Wellfield -- Alexander Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID SW-BA-Well33R
24" Venturi

Serial Number 9803-81829-C4

Setup

Flow Recorder			
Input Low	4.000	Output Low	0
Input High	20.000	Output High	16
Input Units	mA	Output Units	MGD
Square Root	No		
Tolerance 0.5 % of reading + 0.05% of full scale		0.005 % of Reading 0.0005 % of Full Scale	

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0080**	**PASS**
8.000	4.00	4.00	**0.0280**	**PASS**
12.000	8.00	8.00	**0.0480**	**PASS**
16.000	12.00	12.00	**0.0680**	**PASS**
20.000	16.00	16.00	**0.0880**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0080**	**PASS**
8.000	4.00	4.00	**0.0280**	**PASS**
12.000	8.00	8.00	**0.0480**	**PASS**
16.000	12.00	12.00	**0.0680**	**PASS**
20.000	16.00	16.00	**0.0880**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
10-Sep-07	Schedule	AO-I-01-10

Comments
Pen goes up & down erratically- Responds to calibration, but returns to erratic behavior.

Testers
P.Anton

SouthWest Wellfield -- Alexander Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID	**SW-BA-Well34**			**Serial Number**	**1761462**	
	24" Venturi			**Rosemount**	**3051**	**HART**
Setup	**Flow Transmitter**			**Accuracy**	**0.075% of Span**	
	Input Low	0.00		**Output Low**	4.000	
	Input High	101.68		**Output High**	20.000	
	Input Units	in of H2O		**Output Units**	mA	
	Tolerance mA	0.012	+/-	**Square Root**	Yes	
	Tolerance inch	0.076	+/-			
	Dampening	6.40	Seconds			

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.076	-0.076	4.012	3.988	4.000	3.999	**-0.001**	**PASS**
25.00	25.076	24.924	11.946	11.922	11.934	11.937	**0.003**	**PASS**
51.00	51.076	50.924	15.343	15.319	15.331	15.333	**0.002**	**PASS**
76.00	76.076	75.924	17.845	17.821	17.833	17.835	**0.002**	**PASS**
102.00	102.076	101.924	20.037	20.013	20.025	20.027	**0.002**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv ±	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.076	-0.076	4.012	3.988	4.000	3.999	**-0.001**	**PASS**
25.00	25.076	24.924	11.946	11.922	11.934	11.937	**0.003**	**PASS**
51.00	51.076	50.924	15.343	15.319	15.331	15.333	**0.002**	**PASS**
76.00	76.076	75.924	17.845	17.821	17.833	17.835	**0.002**	**PASS**
102.00	102.076	50.924	20.037	20.013	20.025	20.027	**0.002**	**PASS**

Test Equipment Used

Manufacturers	**Serial Numbers**
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	**Reason For Work**	**Procedure #**
11-Sep-07	Schedule	AO-I-01

Comments

Testers
P.Anton

SouthWest Wellfield -- Alexander Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID SW-BA-Well34R
24" Venturi
Setup Flow Recorder

Serial Number 9803-81827-C4

Input Low	4.000	Output Low	0
Input High	20.000	Output High	16
Input Units	mA	Output Units	MGD
Square Root	No		

Tolerance 0.5 % of reading + 0.05% of full scale: 0.005 % of Reading, 0.0005 % of Full Scale

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0080**	**PASS**
8.000	4.00	4.00	**0.0280**	**PASS**
12.000	8.00	7.99	**0.0480**	**PASS**
16.000	12.00	11.99	**0.0680**	**PASS**
20.000	16.00	15.98	**0.0880**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0080**	**PASS**
8.000	4.00	4.00	**0.0280**	**PASS**
12.000	8.00	8.00	**0.0480**	**PASS**
16.000	12.00	11.99	**0.0680**	**PASS**
20.000	16.00	15.98	**0.0880**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
11-Sep-07	Schedule	AO-I-01-10

Comments

Testers
P.Anton

WATER REPORT

West Wellfield BA Wells
Transmitters & Recorders

FOR

Sep-07

West Wellfield -- Alexander Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID	**WW-BA-Well29**			**Serial Number**	**2124099**
	24" Venturi			**Rosemount**	**3051** **HART**
Setup	**Flow Transmitter**			**Accuracy**	**0.075% of Span**
	Input Low	0.00		**Output Low**	4.000
	Input High	66.70		**Output High**	20.000
	Input Units	in of H2O		**Output Units**	mA
	Tolerance mA	0.012	+/-	**Square Root**	**Yes**
	Tolerance inch	0.050	+/-		
	Dampening	0.00	**Seconds**		

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.050	-0.050	4.012	3.988	4.000	4.000	**0.000**	**PASS**
17.00	17.050	16.950	12.090	12.066	12.078	12.079	**0.001**	**PASS**
33.00	33.050	32.950	15.266	15.242	15.254	15.255	**0.001**	**PASS**
50.00	50.050	49.950	17.865	17.841	17.853	17.854	**0.001**	**PASS**
67.00	67.050	66.950	20.048	20.024	20.036	20.037	**0.001**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv ±	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.050	-0.050	4.012	3.988	4.000	4.000	**0.000**	**PASS**
17.00	17.050	16.950	12.090	12.066	12.078	12.079	**0.001**	**PASS**
33.00	33.050	32.950	15.266	15.242	15.254	15.255	**0.001**	**PASS**
50.00	50.050	49.950	17.865	17.841	17.853	17.854	**0.001**	**PASS**
67.00	67.050	66.950	20.048	20.024	20.036	20.037	**0.001**	**PASS**

Test Equipment Used

Manufacturers	**Serial Numbers**
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	**Reason For Work**	**Procedure #**
12-Sep-07	Schedule	AO-I-01

Comments

Testers
P.Anton

West Wellfield -- Alexander Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID	**WW-BA-Well30**			**Serial Number**	**1441538**	
	24" Venturi			**Rosemount**	**3051**	**HART**
Setup	**Flow Transmitter**			**Accuracy**	**0.075% of Span**	
	Input Low	0.00		**Output Low**	4.000	
	Input High	66.70		**Output High**	20.000	
	Input Units	in of H2O		**Output Units**	mA	
	Tolerance mA	0.012	+/-	**Square Root**	**Yes**	
	Tolerance inch	0.050	+/-			
	Dampening	0.00	**Seconds**			

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.050	-0.050	4.012	3.988	4.000	4.000	**0.000**	**PASS**
17.00	17.050	16.950	12.090	12.066	12.078	12.081	**0.003**	**PASS**
33.00	33.050	32.950	15.266	15.242	15.254	15.256	**0.002**	**PASS**
50.00	50.050	49.950	17.865	17.841	17.853	17.854	**0.001**	**PASS**
67.00	67.050	66.950	20.048	20.024	20.036	20.037	**0.001**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv ±	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.050	-0.050	4.012	3.988	4.000	4.000	**0.000**	**PASS**
17.00	17.050	16.950	12.090	12.066	12.078	12.081	**0.003**	**PASS**
33.00	33.050	32.950	15.266	15.242	15.254	15.256	**0.002**	**PASS**
50.00	50.050	49.950	17.865	17.841	17.853	17.854	**0.001**	**PASS**
67.00	67.050	66.950	20.048	20.024	20.036	20.037	**0.001**	**PASS**

Test Equipment Used

Manufacturers	**Serial Numbers**
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	**Reason For Work**	**Procedure #**
12-Sep-07	Schedule	AO-I-01

Comments

Testers

P.Anton

West Wellfield -- Alexander Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID WW-BA-Well31

Setup

24" Venturi			Serial Number	2299718	
Flow Transmitter			Rosemount	3051	HART
Input Low	0.00		Accuracy	0.075% of Span	
Input High	66.70		Output Low	4.000	
Input Units	in of H2O		Output High	20.000	
Tolerance mA	0.012	+/-	Output Units	mA	
Tolerance inch	0.050	+/-	Square Root	Yes	
Dampening	0.00	Seconds			

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv ±	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.050	-0.050	4.012	3.988	4.000	4.000	**0.000**	**PASS**
17.00	17.050	16.950	12.090	12.066	12.078	12.077	**-0.001**	**PASS**
33.00	33.050	32.950	15.266	15.242	15.254	15.255	**0.001**	**PASS**
50.00	50.050	49.950	17.865	17.841	17.853	17.855	**0.002**	**PASS**
67.00	67.050	66.950	20.048	20.024	20.036	20.037	**0.001**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv ±	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.050	-0.050	4.012	3.988	4.000	4.000	**0.000**	**PASS**
17.00	17.050	16.950	12.090	12.066	12.078	12.077	**-0.001**	**PASS**
33.00	33.050	32.950	15.266	15.242	15.254	15.255	**0.001**	**PASS**
50.00	50.050	49.950	17.865	17.841	17.853	17.855	**0.002**	**PASS**
67.00	67.050	66.950	20.048	20.024	20.036	20.037	**0.001**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
12-Sep-07	Schedule	AO-I-01

Comments

Testers
P.Anton

West Wellfield -- Alexander Orr Water Treatment Plant

CALIBRATION SHEET

As of October, 2003:
All recorders have been removed; S.C.A.D.A. system will be powering the transmitters and recording the flow data.

WATER REPORT

West Wellfield
ASR Wells #1 & #3

FOR

Sep-07

AMJ Engineered Solutions
PO Box 1648, Lakeland, FL 33802
5101 Great Oak Drive, Lakeland, FL 33815
-800-881-1487 • 863-682-4500 • Fax 863-687-0077
csr@amjequipment.com

Flow Meter Verification Report

Report no 20080

Customer

Miami-Dade Water & Sewer Department
Alexander-Orr Stores
6800 SW 87th Avenue
Miami
FL 33173

Site ASR # 1
Location Sunset & Krome

Primary device

Manufacturer	Isco
Model no	UM14F1A1R
Serial no	F03E1528

Transmitter

Manufacturer	Aftco
Model no	DSM110 - 4411e
Serial no	C05C1445
Measuring range	0 - 7.1999 MGD
Meter factor	.2164
C Factor	
Scale multiplier	
Totalizer start	.99999
Totalizer stop	.31 Mg

Installation information

Wires in separate conduit	Yes
Splice in wire runs	No
Proper splices	NA
Direction of flow correct	Yes
Non-full pipe condition	Yes
Cathodic protection	No
Sensors orientated properly	Yes
Junction box wiring correct	Yes
Moisture around wiring	Yes
Grounding rings	No
Straight diameters upstream	10
Cable length	15'
Distance to nearest pump	20'
Distance to nearest valve	15'

Resistance Measurements

Coil + -	6.0 Ohm	Ref + -		Elec + -	20.4k	Shields C+R		Line gnd / Coil Shd	0.6 Ohm
Coil + Shd	21.04M	Ref + Shd		Elec + Shd	69.7k	Shields C+E	0.7 Ohm	Line gnd / Elec Shd	0.7 Ohm
Coil - Shd	21.37M	Ref - Shd		Elec - Shd	76.3k	Shields R+E		Line gnd / Ref Shd	

Voltage Measurements

Coil voltage	90Vac	Ref voltage		Elec + to Sh ac volts	0.8mV	Elec + to Sh dc volts	.052V
Coil Hz	40	Ref Hz		Elec - to Shd ac volts	0.22mV	Elec - to Sh dc volts	.091V

Line voltage	120.1	Line Hz	60	Line to Gnd	120.9

Technician Kris Harrelson | Arrival date 6/6/2007 | Completion date 6/6/2007 | Total time

Warranty service No | Follow up service required No | Media

Remarks The measured parameters are within manufacturers published specifications.

Customer signature

AMJ Engineered Solutions
PO Box 1648, Lakeland, FL 33802
5101 Great Oak Drive, Lakeland, FL 33815
1-800-881-1487 • 863-682-4500 • Fax 863-687-0077
csr@amjequipment.com

Flow Meter Verification Report

Report no 20081

Customer

Miami-Dade Water & Sewer Department
Alexander-Orr Stores
6800 SW 87th Avenue
Miami
FL 33173

Site ASR # 2
Location Sunset & Krome

Primary device

Manufacturer	Isco
Model no	UM14F1A1S
Serial no	F02K0986

Transmitter

Manufacturer	Aftco
Model no	DSM110 - 4411e
Serial no	C05C1442
Measuring range	0 - 7.1999 MGD
Meter factor	.2155
C Factor	
Scale multiplier	

Totalizer start 34.5Mg Totalizer stop 34.7Mg

Installation information

Wires in separate conduit	Yes
Splice in wire runs	No
Proper splices	NA
Direction of flow correct	Yes
Non-full pipe condition	Yes
Cathodic protection	No
Sensors orientated properly	Yes
Junction box wiring correct	Yes
Moisture around wiring	Yes
Grounding rings	No
Straight diameters upstream	10
Cable length	15'
Distance to nearest pump	20'
Distance to nearest valve	15'

Resistance Measurements

Coil + -	6.0 Ohm	Ref + -		Elec + -	27.53k	Shields C+R		Line gnd / Coil Shd	0.3 Ohm
Coil + Shd	25.62M	Ref + Shd		Elec + Shd	11.19k	Shields C+E	1.0 Ohm	Line gnd / Elec Shd	0.3 Ohm
Coil - Shd	25.62M	Ref - Shd		Elec - Shd	16.15k	Shields R+E		Line gnd / Ref Shd	

Voltage Measurements

Coil voltage	91Vac	Ref voltage		Elec + to Sh ac volts	8.3mV	Elec + to Sh dc volts	.077V
Coil Hz	39.98	Ref Hz		Elec - to Shd ac volts	0.6mV	Elec - to Sh dc volts	.083V
Line voltage	121.72	Line Hz	60	Line to Gnd	120.97		

Technician Kris Harrelson Arrival date 6/6/2007 Completion date 6/6/2007 Total time

Warranty service No Follow up service required No Media

Remarks The measured parameters are within manufacturers published specifications.

Customer signature

AMJ Engineered Solutions
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5101 Great Oak Drive, Lakeland, FL 33815
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csr@amjequipment.com

Flow Meter Verification Report

Report no 20082

Customer

Miami-Dade Water & Sewer Department
Alexander-Orr Stores
6800 SW 87th Avenue
Miami
FL 33173

Site ASR # 3
Location Sunset & Krome

Primary device

Manufacturer	Isco
Model no	UM14FA1R-35.4
Serial no	F03E1527

Transmitter

Manufacturer	Aftco
Model no	DSM110 - 4411e
Serial no	C03E1527A
Measuring range	0 - 7.1999 MGD
Meter factor	.2121
C Factor	
Scale multiplier	

Totalizer start 37.5Mg Totalizer stop 37.5Mg

Installation information

Wires in separate conduit	Yes
Splice in wire runs	No
Proper splices	NA
Direction of flow correct	Yes
Non-full pipe condition	Yes
Cathodic protection	No
Sensors orientated properly	Yes
Junction box wiring correct	Yes
Moisture around wiring	Yes
Grounding rings	No
Straight diameters upstream	10
Cable length	15'
Distance to nearest pump	20'
Distance to nearest valve	15'

Resistance Measurements

Coil + -	6.0 Ohm	Ref + -		Elec + -	26.52k	Shields C+R		Line gnd / Coil Shd	1.0 Ohm
Coil + Shd	17.5M	Ref + Shd		Elec + Shd	7.62k	Shields C+E	0.2 Ohm	Line gnd / Elec Shd	0.3 Ohm
Coil - Shd	17.88M	Ref - Shd		Elec - Shd	161.1k	Shields R+E		Line gnd / Ref Shd	

Voltage Measurements

Coil voltage	90.7 Vac	Ref voltage		Elec + to Sh ac volts	0.8mV	Elec + to Sh dc volts	.062V
Coil Hz	40	Ref Hz		Elec - to Shd ac volts	0.8mV	Elec - to Sh dc volts	.071V

Line voltage 121.1 Vac Line Hz 60 Line to Gnd 121.12 Vac

Technician Kris Harrelson Arrival date 6/6/2007 Completion date 6/6/2007 Total time

Warranty service No Follow up service required No Media

Remarks The measured parameters are within manufacturers published specifications.

Customer signature

WATER REPORTS

Alex Orr In-Plant
Transmitters & Recorders

FOR

Dec-07

Alex Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID	**FIT-505-RAW1**			**Serial Number**	**1597757**	
	Raw Water #1 -- 48" Venturi			**Rosemount**	**3051**	**HART**
Setup	**Flow Transmitter**			**Accuracy**	**0.075% of Span**	
	Input Low	0.00		**Output Low**	4.000	
	Input High	282.50		**Output High**	20.000	
	Input Units	in of H2O		**Output Units**	mA	
	Tolerance mA	0.012	+/-	**Square Root**	**Yes**	
	Tolerance inch	0.212	+/-			
	Dampening	1.60	**Seconds**			

On-Line Communicator

As Found Input ($in H_2O$)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.212	-0.212	4.012	3.988	4.000	3.997	**-0.003**	**PASS**
71.00	71.212	70.788	12.033	12.009	12.021	12.021	**0.000**	**PASS**
141.00	141.212	140.788	15.316	15.292	15.304	15.302	**-0.002**	**PASS**
212.00	212.212	211.788	17.872	17.848	17.860	17.861	**0.001**	**PASS**
282.00	282.212	281.788	19.998	19.974	19.986	19.987	**0.001**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.212	-0.212	4.012	3.988	4.000	3.997	**-0.003**	**PASS**
71.00	71.212	70.788	12.033	12.009	12.021	12.021	**0.000**	**PASS**
141.00	141.212	140.788	15.316	15.292	15.304	15.302	**-0.002**	**PASS**
212.00	212.212	211.788	17.872	17.848	17.860	17.861	**0.001**	**PASS**
282.00	282.212	281.788	19.998	19.974	19.986	19.987	**0.001**	**PASS**

Test Equipment Used

Manufacturers	**Serial Numbers**
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	**Reason For Work**	**Procedure #**
1-Dec-07	Schedule	AO-I-01

Comments

Testers

C.Gordon/J.Carvajal

Alex Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID FIR-505-RAW1
Raw Water #1 -- 48" Venturi

Serial Number 9401-28153-AO1

Setup

Flow Recorder

Input Low	4.000	Output Low	0
Input High	20.000	Output High	100
Input Units	mA	Output Units	MGD
Square Root	No		

Tolerance 0.5 % of reading + 0.05% of full scale: 0.005 % of Reading; 0.0005 % of Full Scale

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0500**	**PASS**
8.000	25.00	25.00	**0.1750**	**PASS**
12.000	50.00	49.99	**0.3000**	**PASS**
16.000	75.00	74.98	**0.4250**	**PASS**
20.000	100.00	99.99	**0.5500**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0500**	**PASS**
8.000	25.00	25.00	**0.1750**	**PASS**
12.000	50.00	49.99	**0.3000**	**PASS**
16.000	75.00	74.98	**0.4250**	**PASS**
20.000	100.00	99.99	**0.5500**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
1-Dec-07	Schedule	AO-I-01-10

Comments

Testers
C.Gordon/J.Carvajal

Alex Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID	**FIT-506-RAW2**			**Serial Number**	**1597755**	
	Raw Water #2 -- 54" Venturi			**Rosemount**	**3051**	**HART**
Setup	**Flow Transmitter**			**Accuracy**	**0.075% of Span**	
	Input Low	0		**Output Low**	4.000	
	Input High	84.32		**Output High**	20.000	
	Input Units	in of H2O		**Output Units**	mA	
	Tolerance mA	0.012	+/-	**Square Root**	**Yes**	
	Tolerance inch	0.063	+/-			
	Dampening	1.60	**Seconds**			

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.063	-0.063	4.012	3.988	4.000	4.000	**0.000**	**PASS**
21.00	21.063	20.937	11.997	11.973	11.985	11.985	**0.000**	**PASS**
42.00	42.063	41.937	15.304	15.280	15.292	15.295	**0.003**	**PASS**
63.00	63.063	62.937	17.842	17.818	17.830	17.834	**0.004**	**PASS**
84.00	84.063	83.937	19.982	19.958	19.970	19.976	**0.006**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.063	-0.063	4.012	3.988	4.000	4.000	**0.000**	**PASS**
21.00	21.063	20.937	11.997	11.973	11.985	11.985	**0.000**	**PASS**
42.00	42.063	41.937	15.304	15.280	15.292	15.295	**0.003**	**PASS**
63.00	63.063	62.937	17.842	17.818	17.830	17.834	**0.004**	**PASS**
84.00	84.063	83.937	19.982	19.958	19.970	19.976	**0.006**	**PASS**

Test Equipment Used

Manufacturers	**Serial Numbers**
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	**Reason For Work**	**Procedure #**
2-Dec-07	Schedule	AO-I-01

Comments

Testers

C.Gordon/J.Carvajal

Alex Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID FIR-506-RAW2
Raw Water #2 -- 54" Venturi

Serial Number 9710-78075-C05

Setup

Flow Recorder

Input Low	4.000	Output Low	0
Input High	20.000	Output High	100
Input Units	mA	Output Units	MGD
Square Root	No		

Tolerance 0.5 % of reading + 0.05% of full scale: 0.005 % of Reading; 0.0005 % of Full Scale

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0500**	**PASS**
8.000	25.00	25.00	**0.1750**	**PASS**
12.000	50.00	50.00	**0.3000**	**PASS**
16.000	75.00	75.00	**0.4250**	**PASS**
20.000	100.00	100.00	**0.5500**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0500**	**PASS**
8.000	25.00	25.00	**0.1750**	**PASS**
12.000	50.00	50.00	**0.3000**	**PASS**
16.000	75.00	75.00	**0.4250**	**PASS**
20.000	100.00	100.00	**0.5500**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
2-Dec-07	Schedule	AO-I-01-10

Comments

Testers
C.Gordon/J.Carvajal

Alex Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID	**FIT-507-RAW3**			**Serial Number**	**2239317**	
	Raw Water #3 -- 72" Venturi			**Rosemount**	**3051**	**HART**
Setup	**Flow Transmitter**			**Accuracy**	**0.075% of Span**	
	Input Low	0		**Output Low**	4.000	
	Input High	289.00		**Output High**	20.000	
	Input Units	in of H2O		**Output Units**	mA	
	Tolerance mA	0.012	+/-	**Square Root**	**Yes**	
	Tolerance inch	0.217	+/-			
	Dampening	1.60	**Seconds**			

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.217	-0.217	4.012	3.988	4.000	3.998	**-0.002**	**PASS**
72.00	72.217	71.783	11.998	11.974	11.986	11.985	**-0.001**	**PASS**
145.00	145.217	144.783	15.345	15.321	15.333	15.334	**0.001**	**PASS**
217.00	217.217	216.783	17.876	17.852	17.864	17.868	**0.004**	**PASS**
289.00	289.217	288.783	20.012	19.988	20.000	20.005	**0.005**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.217	-0.217	4.012	3.988	4.000	3.998	**-0.002**	**PASS**
72.00	72.217	71.783	11.998	11.974	11.986	11.985	**-0.001**	**PASS**
145.00	145.217	144.783	15.345	15.321	15.333	15.334	**0.001**	**PASS**
217.00	217.217	216.783	17.876	17.852	17.864	17.868	**0.004**	**PASS**
289.00	289.217	288.783	20.012	19.988	20.000	20.005	**0.005**	**PASS**

Test Equipment Used

Manufacturers	**Serial Numbers**
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	**Reason For Work**	**Procedure #**
5-Dec-07	Schedule	AO-I-01

Comments

Testers

C.Gordon/J/Carvajal

Alex Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID **FIR-507-RAW3** **Serial Number** **9310-22855**

Raw Water #3 -- 72" Venturi

Setup

Flow Recorder			
Input Low	4.000	**Output Low**	0
Input High	20.000	**Output High**	85
Input Units	mA	**Output Units**	MGD
Square Root	No		
Tolerance 0.5 % of reading + 0.05% of full scale		0.005 **% of Reading**	
		0.0005 **% of Full Scale**	

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0425**	**PASS**
8.000	21.25	21.25	**0.1488**	**PASS**
12.000	42.50	42.49	**0.2550**	**PASS**
16.000	63.75	63.74	**0.3613**	**PASS**
20.000	85.00	85.00	**0.4675**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0425**	**PASS**
8.000	21.25	21.25	**0.1488**	**PASS**
12.000	42.50	42.49	**0.2550**	**PASS**
16.000	63.75	63.74	**0.3613**	**PASS**
20.000	85.00	85.00	**0.4675**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
5-Dec-07	Schedule	AO-I-01-10

Comments

Testers

C.Gordon/J.Carvajal

Alex Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID	**FIT-508-RAW4**			**Serial Number**	**1841929**	
	Raw Water #4 -- 84" Venturi			**Rosemount**	**3051**	**HART**
Setup	**Flow Transmitter**			**Accuracy**	**0.075% of Span**	
	Input Low	0		**Output Low**	4.000	
	Input High	263.07		**Output High**	20.000	
	Input Units	in of H2O		**Output Units**	mA	
	Tolerance mA	0.012	+/-	**Square Root**	**Yes**	
	Tolerance inch	0.197	+/-			
	Dampening	1.60	**Seconds**			

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.197	-0.197	4.012	3.988	4.000	3.999	**-0.001**	**PASS**
66.00	66.197	65.803	12.026	12.002	12.014	12.023	**0.009**	**PASS**
132.00	132.197	131.803	15.346	15.322	15.334	15.342	**0.008**	**PASS**
197.00	197.197	196.803	17.858	17.834	17.846	17.851	**0.005**	**PASS**
263.00	263.197	262.803	20.010	19.986	19.998	20.002	**0.004**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.197	-0.197	4.012	3.988	4.000	4.000	**0.000**	**PASS**
66.00	66.197	65.803	12.026	12.002	12.014	12.013	**-0.001**	**PASS**
132.00	132.197	131.803	15.346	15.322	15.334	15.333	**-0.001**	**PASS**
197.00	197.197	196.803	17.858	17.834	17.846	17.849	**0.003**	**PASS**
263.00	263.197	262.803	20.010	19.986	19.998	20.001	**0.003**	**PASS**

Test Equipment Used

Manufacturers	**Serial Numbers**
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	**Reason For Work**	**Procedure #**
6-Dec-08	Schedule	AO-I-01

Comments

Testers

C.gordon/J.Carvajal

Alex Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID **FIR-508-RAW4A** — **Serial Number** 9602-58414-003

Raw Water #4 -- 84" Venturi

Setup

Flow Recorder -- Chem. Bldg. #1

Input Low	4.000	Output Low	0
Input High	20.000	Output High	175
Input Units	mA	Output Units	MGD
Square Root	No		
Tolerance 0.5 % of reading + 0.05% of full scale		0.005 % of Reading 0.0005 % of Full Scale	

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0875**	**PASS**
8.000	43.75	43.75	**0.3063**	**PASS**
12.000	87.50	87.50	**0.5250**	**PASS**
16.000	131.25	131.26	**0.7437**	**PASS**
20.000	175.00	175.00	**0.9625**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0875**	**PASS**
8.000	43.75	43.75	**0.3063**	**PASS**
12.000	87.50	87.50	**0.5250**	**PASS**
16.000	131.25	131.26	**0.7437**	**PASS**
20.000	175.00	175.00	**0.9625**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
6-Dec-07	Schedule	AO-I-01-10

Comments

Testers

C.Gordon/J.carvajal

Alex Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID **FIR-509-RAW4B** — **Serial Number** 9401-28155-AO1

Raw Water #4 -- 84" Venturi

Setup

Flow Recorder -- Chem. Bldg. #2

Input Low	4.000	Output Low	0
Input High	20.000	Output High	175
Input Units	mA	Output Units	MGD
Square Root	No		

Tolerance 0.5 % of reading + 0.05% of full scale: 0.005 % of Reading; 0.0005 % of Full Scale

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0875**	**PASS**
8.000	43.75	43.75	**0.3063**	**PASS**
12.000	87.50	87.50	**0.5250**	**PASS**
16.000	131.25	131.25	**0.7438**	**PASS**
20.000	175.00	175.01	**0.9625**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0875**	**PASS**
8.000	43.75	43.75	**0.3063**	**PASS**
12.000	87.50	87.50	**0.5250**	**PASS**
16.000	131.25	131.25	**0.7438**	**PASS**
20.000	175.00	175.01	**0.9625**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
6-Dec-07	Schedule	AO-I-01-10

Comments

Testers

C.Gordon/J.Carvajal

Alex Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID FIT-500-FIN1 — Fininsh Water #1 -- 48" Venturi

Serial Number 1411231 — **Rosemount** 3051 HART

Setup

Flow Transmitter			Accuracy	0.075% of Span	
Input Low	0		Output Low	4.000	
Input High	265.20		Output High	20.000	
Input Units	in of H2O		Output Units	mA	
Tolerance mA	0.012	+/-	Square Root	Yes	
Tolerance inch	0.199	+/-			
Dampening	1.60	Seconds			

On-Line Communicator

As Found Input ($in H_2O$)	Tolerance Pv ±	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.199	-0.199	4.012	3.988	4.000	3.999	-0.001	PASS
66.00	66.199	65.801	11.994	11.970	11.982	11.983	0.001	PASS
133.00	133.199	132.801	15.343	15.319	15.331	15.338	0.007	PASS
199.00	199.199	198.801	17.872	17.848	17.860	17.868	0.008	PASS
265.00	265.199	264.801	20.006	19.982	19.994	20.005	0.011	PASS

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv ±	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.199	-0.199	4.012	3.988	4.000	4.000	0.000	PASS
66.00	66.199	65.801	11.994	11.970	11.982	11.979	-0.003	PASS
133.00	133.199	132.801	15.343	15.319	15.331	15.327	-0.004	PASS
199.00	199.199	198.801	17.872	17.848	17.860	17.856	-0.004	PASS
265.00	265.199	264.801	20.006	19.982	19.994	19.993	-0.001	PASS

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
7-Dec-07	Schedule	AO-I-01

Comments

Testers

C.Gordon/J.Carvajal

Alex Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID FIR-500-FIN1
Finish Water #1 -- 48" Venturi

Serial Number 101655-001-902-8716

Setup

Flow Recorder

Input Low	4.000	Output Low	0
Input High	20.000	Output High	80
Input Units	mA	Output Units	MGD
Square Root	No		
Tolerance 0.5 % of reading + 0.05% of full scale		0.005 % of Reading 0.0005 % of Full Scale	

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0400**	**PASS**
8.000	20.00	20.00	**0.1400**	**PASS**
12.000	40.00	40.00	**0.2400**	**PASS**
16.000	60.00	59.97	**0.3400**	**PASS**
20.000	80.00	79.95	**0.4400**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0400**	**PASS**
8.000	20.00	20.00	**0.1400**	**PASS**
12.000	40.00	40.00	**0.2400**	**PASS**
16.000	60.00	59.97	**0.3400**	**PASS**
20.000	80.00	79.95	**0.4400**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
7-Dec-07	Schedule	AO-I-01-10

Comments

Testers
C.Gordon/J.Carvajal

Alex Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID	**FIT-501-FIN2**			**Serial Number**	**1101176**	
	Fininsh Water #2 -- 60" Venturi			**Rosemount**	**3051**	**HART**
Setup	**Flow Transmitter**			**Accuracy**	**0.075% of Span**	
	Input Low	0		**Output Low**	4.000	
	Input High	68.90		**Output High**	20.000	
	Input Units	in of H2O		**Output Units**	mA	
	Tolerance mA	0.012	+/-	**Square Root**	Yes	
	Tolerance inch	0.052	+/-			
	Dampening	1.60	Seconds			

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.052	-0.052	4.012	3.988	4.000	3.998	**-0.002**	**PASS**
17.00	17.052	16.948	11.960	11.936	11.948	11.956	**0.008**	**PASS**
34.00	34.052	33.948	15.252	15.228	15.240	15.230	**-0.010**	**PASS**
52.00	52.052	51.948	17.912	17.888	17.900	17.896	**-0.004**	**PASS**
69.00	69.052	68.948	20.024	20.000	20.012	20.018	**0.006**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.052	-0.052	4.012	3.988	4.000	3.998	**-0.002**	**PASS**
17.00	17.052	16.948	11.960	11.936	11.948	11.956	**0.008**	**PASS**
34.00	34.052	33.948	15.252	15.228	15.240	15.230	**-0.010**	**PASS**
52.00	52.052	51.948	17.912	17.888	17.900	17.896	**-0.004**	**PASS**
69.00	69.052	68.948	20.024	20.000	20.012	20.018	**0.006**	**PASS**

Test Equipment Used

Manufacturers	**Serial Numbers**
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	**Reason For Work**	**Procedure #**
8-Dec-07	Schedule	AO-I-01

Comments

Testers

C.Gordon/J.Carvajal

Alex Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID FIR-501-FIN2 — **Serial Number** 9602-58412C03

Finish Water #2 -- 60" Venturi

Setup

Flow Recorder

Input Low	4.000	Output Low	0
Input High	20.000	Output High	128
Input Units	mA	Output Units	MGD
Square Root	No		No

Tolerance 0.5 % of reading + 0.05% of full scale: 0.005 % of Reading, 0.0005 % of Full Scale

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0640**	**PASS**
8.000	32.00	32.00	**0.2240**	**PASS**
12.000	64.00	64.01	**0.3840**	**PASS**
16.000	96.00	96.01	**0.5440**	**PASS**
20.000	128.00	128.00	**0.7040**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0640**	**PASS**
8.000	32.00	32.00	**0.2240**	**PASS**
12.000	64.00	64.01	**0.3840**	**PASS**
16.000	96.00	96.01	**0.5440**	**PASS**
20.000	128.00	128.00	**0.7040**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
8-Dec-07	Schedule	AO-I-01-10

Comments

Testers

C.Gordon/J.Carvajal

Alex Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID	**FIT-502-FIN3**			**Serial Number**	**1101177**	
	Fininsh Water #3 -- 72" Venturi			**Rosemount**	**3051**	**HART**
Setup	**Flow Transmitter**			**Accuracy**	**0.075% of Span**	
	Input Low	0		**Output Low**	4.000	
	Input High	193.30		**Output High**	20.000	
	Input Units	in of H2O		**Output Units**	mA	
	Tolerance mA	0.012	+/-	**Square Root**	**Yes**	
	Tolerance inch	0.145	+/-			
	Dampening	1.60	**Seconds**			

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.145	-0.145	4.012	3.988	4.000	3.999	-0.001	PASS
48.00	48.145	47.855	11.985	11.961	11.973	11.966	-0.007	PASS
97.00	97.145	96.855	15.346	15.322	15.334	15.329	-0.005	PASS
145.00	145.145	144.855	17.870	17.846	17.858	17.853	-0.005	PASS
193.00	193.145	192.855	20.000	19.976	19.988	19.985	-0.003	PASS

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.145	-0.145	4.012	3.988	4.000	3.999	-0.001	PASS
48.00	48.145	47.855	11.985	11.961	11.973	11.966	-0.007	PASS
97.00	97.145	96.855	15.346	15.322	15.334	15.329	-0.005	PASS
145.00	145.145	144.855	17.870	17.846	17.858	17.853	-0.005	PASS
193.00	193.145	192.855	20.000	19.976	19.988	19.985	-0.003	PASS

Test Equipment Used

Manufacturers	**Serial Numbers**
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	**Reason For Work**	**Procedure #**
9-Dec-07	Schedule	AO-I-01

Comments

Testers

C.Gordon/J.Carvajal

Alex Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID FIR-502-FIN3
Finish Water #3 -- 72" Venturi

Serial Number 9501-42407-C03

Setup

Flow Recorder			
Input Low	4.000	Output Low	0
Input High	20.000	Output High	150
Input Units	mA	Output Units	MGD
Square Root	No		
Tolerance 0.5 % of reading + 0.05% of full scale		0.005 % of Reading 0.0005 % of Full Scale	

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0750**	**PASS**
8.000	37.50	37.52	**0.2625**	**PASS**
12.000	75.00	75.04	**0.4500**	**PASS**
16.000	112.50	112.55	**0.6375**	**PASS**
20.000	150.00	150.07	**0.8250**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0750**	**PASS**
8.000	37.50	37.52	**0.2625**	**PASS**
12.000	75.00	75.04	**0.4500**	**PASS**
16.000	112.50	112.55	**0.6375**	**PASS**
20.000	150.00	150.07	**0.8250**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
11-Dec-08	Schedule	AO-I-01-10

Comments

Testers
C,Gordon/J.Carvajal

Alex Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID	**FIT-503-FIN4**			**Serial Number**	**1101174**	
	Fininsh Water #4 -- 72" Venturi			**Rosemount**	**3051**	**HART**
Setup	**Flow Transmitter**			**Accuracy**	**0.075% of Span**	
	Input Low	0		**Output Low**	4.000	
	Input High	257.10		**Output High**	20.000	
	Input Units	in of H2O		**Output Units**	mA	
	Tolerance mA	0.012	+/-	**Square Root**	**Yes**	
	Tolerance inch	0.193	+/-			
	Dampening	1.60	**Seconds**			

On-Line Communicator

As Found Input ($in H_2O$)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.193	-0.193	4.012	3.988	4.000	3.999	**-0.001**	**PASS**
64.00	64.193	63.807	11.995	11.971	11.983	11.980	**-0.003**	**PASS**
129.00	129.193	128.807	15.345	15.321	15.333	15.332	**-0.001**	**PASS**
193.00	193.193	192.807	17.875	17.851	17.863	17.863	**0.000**	**PASS**
257.00	257.193	256.807	20.009	19.985	19.997	20.002	**0.005**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.193	-0.193	4.012	3.988	4.000	3.999	**-0.001**	**PASS**
64.00	64.193	63.807	11.995	11.971	11.983	11.980	**-0.003**	**PASS**
129.00	129.193	128.807	15.345	15.321	15.333	15.332	**-0.001**	**PASS**
193.00	193.193	192.807	17.875	17.851	17.863	17.863	**0.000**	**PASS**
257.00	257.193	256.807	20.009	19.985	19.997	20.002	**0.005**	**PASS**

Test Equipment Used

Manufacturers	**Serial Numbers**
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	**Reason For Work**	**Procedure #**
12-Dec-07	Schedule	AO-I-01

Comments

Testers

C.Gordon/J.Carvajal

Alex Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID FIR-503-FIN4
Finish Water #4 -- 72" Venturi

Serial Number 101655-8717

Setup

Flow Recorder			
Input Low	4.000	Output Low	0
Input High	20.000	Output High	173
Input Units	mA	Output Units	MGD
Square Root	No		
Tolerance 0.5 % of reading + 0.05% of full scale		0.005 % of Reading 0.0005 % of Full Scale	

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0865**	**PASS**
8.000	43.25	43.26	**0.3028**	**PASS**
12.000	86.50	86.51	**0.5190**	**PASS**
16.000	129.75	129.76	**0.7353**	**PASS**
20.000	173.00	173.01	**0.9515**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0865**	**PASS**
8.000	43.25	43.26	**0.3028**	**PASS**
12.000	86.50	86.51	**0.5190**	**PASS**
16.000	129.75	129.76	**0.7353**	**PASS**
20.000	173.00	173.01	**0.9515**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
13-Dec-07	Schedule	AO-I-01-10

Comments

Testers
C.Gordon/J.Carvajal

Alex Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID FIT-504-FIN5 — **Serial Number** 1101178

Fininsh Water #5 -- 72" Venturi — **Rosemount** 3051 HART

Setup

Flow Transmitter				Accuracy	0.075% of Span
Input Low	0			Output Low	4.000
Input High	257.10			Output High	20.000
Input Units	in of H2O			Output Units	mA
Tolerance mA	0.012	+/-		Square Root	Yes
Tolerance inch	0.193	+/-			
Dampening	1.60	Seconds			

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.193	-0.193	4.012	3.988	4.000	4.000	0.000	PASS
64.00	64.193	63.807	11.995	11.971	11.983	11.982	-0.001	PASS
129.00	129.193	128.807	15.345	15.321	15.333	15.333	0.000	PASS
193.00	193.193	192.807	17.875	17.851	17.863	17.864	0.001	PASS
257.00	257.193	256.807	20.009	19.985	19.997	19.999	0.002	PASS

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0.00	0.193	-0.193	4.012	3.988	4.000	4.000	0.000	PASS
64.00	64.193	63.807	11.995	11.971	11.983	11.982	-0.001	PASS
129.00	129.193	128.807	15.345	15.321	15.333	15.333	0.000	PASS
193.00	193.193	192.807	17.875	17.851	17.863	17.864	0.001	PASS
257.00	257.193	256.807	20.009	19.985	19.997	19.999	0.002	PASS

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
13-Dec-07	Schedule	AO-I-01

Comments

Testers

C.Gordon/J.Carvajal

Alex Orr Water Treatment Plant

CALIBRATION SHEET

Tag ID FIR-504-FIN5
Finish Water #5 -- 72" Venturi

Serial Number 101655-8717

Setup

Flow Recorder			
Input Low	4.000	Output Low	0
Input High	20.000	Output High	173
Input Units	mA	Output Units	MGD
Square Root	No		
		0.005	% of Reading
Tolerance 0.5 % of reading + 0.05% of full scale		0.0005	% of Full Scale

Results

As Found Input (mA)	Expected Output (MGD)	As Found Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0865**	**PASS**
8.000	43.25	43.26	**0.3028**	**PASS**
12.000	86.50	86.53	**0.5190**	**PASS**
16.000	129.75	129.78	**0.7353**	**PASS**
20.000	173.00	173.03	**0.9515**	**PASS**

As Left Input (mA)	Expected Output (MGD)	As Left Output (MGD)	Total Calculated Error ±	Pass / Fail
4.000	0.00	0.00	**0.0865**	**PASS**
8.000	43.25	43.24	**0.3028**	**PASS**
12.000	86.50	86.50	**0.5190**	**PASS**
16.000	129.75	129.74	**0.7353**	**PASS**
20.000	173.00	172.99	**0.9515**	**PASS**

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
13-Dec-07	Schedule	AO-I-01-10

Comments

Testers
C.Gordon/J.Carvajal

WATER REPORT

SouthWest Wellfield
ASR Wells #4 & 5

FOR

Dec-07

SouthWest Wellfield -- Alexander Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID	**FIT-1-ASR #4**			**Serial Number**	**2031059**		
	Production / Recovery			**Rosemount**	**1151DP**	**HART**	
Setup	**Flow Transmitter**			**Accuracy**	**0.254019015**	**% of Span**	
	Input Low	0.00		**Pressure Range**	**4**		
	Input High	138.84		**Output Low**	4.000		
	Input Units	in of H2O		**Output High**	20.000		
	Tolerance mA	0.041	+/-	**Output Units**	mA		
	Tolerance inch	0.353	+/-	**Square Root**	**Yes**		
	Dampening	6.40	**Seconds**	**Upper Range Limit of TX (URL)**	**150**	**" H_2O**	

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0	0.353	-0.353	4.041	3.959	4.000	4.000	**0.000**	**PASS**
35	35.353	34.647	12.074	11.993	12.033	12.033	**0.000**	**PASS**
69	69.353	68.647	15.320	15.239	15.279	15.280	**0.001**	**PASS**
104	104.353	103.647	17.888	17.807	17.848	17.849	**0.001**	**PASS**
139	139.353	138.647	20.050	19.969	20.009	20.010	**0.001**	**PASS**

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0	0.353	-0.353	4.041	3.959	4.000	4.000	**0.000**	**PASS**
35	35.353	34.647	12.074	11.993	12.033	12.033	**0.000**	**PASS**
69	69.353	68.647	15.320	15.239	15.279	15.280	**0.001**	**PASS**
104	104.353	103.647	17.888	17.807	17.848	17.849	**0.001**	**PASS**
139	139.353	138.647	20.050	19.969	20.009	20.010	**0.001**	**PASS**

Test Equipment Used

Manufacturers	**Serial Numbers**
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	**Reason For Work**	**Procedure #**
21-Dec-07	Schedule	AO-I-01

Comments

Testers

C.Gordon/J.Carvajal

SouthWest Wellfield -- Alexander Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID FIT-2-ASR #4

Serial Number 2031058

Setup

Injection / Recharge				Rosemount	1151DP	HART
Flow Transmitter				Accuracy	0.254019015	% of Span
Input Low	0.00			Pressure Range	4	
Input High	138.84			Output Low	4.000	
Input Units	in of H2O			Output High	20.000	
Tolerance mA	0.041	+/-		Output Units	mA	
Tolerance inch	0.353	+/-		Square Root	Yes	
Dampening	6.40	Seconds		Upper Range Limit of TX (URL)	150	" H_2O

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0	0.353	-0.353	4.041	3.959	4.000	4.004	0.004	PASS
35	35.353	34.647	12.074	11.993	12.033	12.056	0.023	PASS
69	69.353	68.647	15.320	15.239	15.279	15.294	0.015	PASS
104	104.353	103.647	17.888	17.807	17.848	17.858	0.010	PASS
139	139.353	138.647	20.050	19.969	20.009	20.019	0.010	PASS

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv ±	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0	0.353	-0.353	4.041	3.959	4.000	3.999	-0.001	PASS
35	35.353	34.647	12.074	11.993	12.033	12.033	0.000	PASS
69	69.353	68.647	15.320	15.239	15.279	15.280	0.001	PASS
104	104.353	103.647	17.888	17.807	17.848	17.848	0.000	PASS
139	139.353	138.647	20.050	19.969	20.009	20.008	-0.001	PASS

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
22-Dec-07	Schedule	AO-I-01

Comments

Testers

C.Gordon/J.Carvajal

SouthWest Wellfield -- Alexander Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID FIT-1-ASR #5 — **Serial Number** 2124099

Setup						
	Production / Recovery			Rosemount	1151DP	HART
	Flow Transmitter			Accuracy	0.254019015	% of Span
	Input Low	0.00		Pressure Range	4	
	Input High	138.84		Output Low	4.000	
	Input Units	in of H2O		Output High	20.000	
	Tolerance mA	0.041	+/-	Output Units	mA	
	Tolerance inch	0.353	+/-	Square Root	Yes	
	Dampening	6.40	Seconds	Upper Range Limit of TX (URL)	150	" H_2O

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0	0.353	-0.353	4.041	3.959	4.000	4.000	0.000	PASS
35	35.353	34.647	12.074	11.993	12.033	12.034	0.001	PASS
69	69.353	68.647	15.320	15.239	15.279	15.282	0.003	PASS
104	104.353	103.647	17.888	17.807	17.848	17.849	0.001	PASS
139	139.353	138.647	20.050	19.969	20.009	20.008	-0.001	PASS

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0	0.353	-0.353	4.041	3.959	4.000	4.000	0.000	PASS
35	35.353	34.647	12.074	11.993	12.033	12.034	0.001	PASS
69	69.353	68.647	15.320	15.239	15.279	15.282	0.003	PASS
104	104.353	103.647	17.888	17.807	17.848	17.849	0.001	PASS
139	139.353	138.647	20.050	19.969	20.009	20.008	-0.001	PASS

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
23-Dec-07	Schedule	AO-I-01

Comments

Testers

C.Gordon/J.Carvajal

SouthWest Wellfield -- Alexander Orr Water Treatment Plant

CALIBRATION CERTIFICATE

Tag ID FIT-2-ASR #5

Serial Number 2299718

Setup

Injection / Recharge			Rosemount	1151DP	HART
Flow Transmitter			Accuracy	0.25401901	% of Span
Input Low	0.00		Pressure Range	4	
Input High	138.84		Output Low	4.000	
Input Units	in of H2O		Output High	20.000	
Tolerance mA	0.041	+/-	Output Units	mA	
Tolerance inch	0.353	+/-	Square Root	Yes	
Dampening	6.40	Seconds	Upper Range Limit of TX (URL)	150	" H_2O

On-Line Communicator

As Found Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0	0.353	-0.353	4.041	3.959	4.000	4.000	0.000	PASS
35	35.353	34.647	12.074	11.993	12.033	12.033	0.000	PASS
69	69.353	68.647	15.320	15.239	15.279	15.285	0.006	PASS
104	104.353	103.647	17.888	17.807	17.848	17.857	0.009	PASS
139	139.353	138.647	20.050	19.969	20.009	20.020	0.011	PASS

On-Line Communicator

As Left Input (in H_2O)	Tolerance Pv +	Tolerance Pv -	Tolerance AO+	Tolerance AO-	Expected Output (ma)	Output (Ma)	Error	Pass/ Fail
0	0.353	-0.353	4.041	3.959	4.000	4.000	0.000	PASS
35	35.353	34.647	12.074	11.993	12.033	12.031	-0.002	PASS
69	69.353	68.647	15.320	15.239	15.279	15.276	-0.003	PASS
104	104.353	103.647	17.888	17.807	17.848	17.847	-0.001	PASS
139	139.353	138.647	20.050	19.969	20.009	20.009	0.000	PASS

Test Equipment Used

Manufacturers	Serial Numbers
Fluke 744 DPC	8495027
Emerson Hart Field Communicator Model 375	11007890
Ametek Pneumatic Dead Weight Tester Model PK II	85348

ADDITIONAL INFORMATION

Date	Reason For Work	Procedure #
26-Dec-07	Schedule	AO-I-01

Comments

Testers

C.Gordon/J.Carvajal

South West Wellfield -- Alexander Or
Water Treatment Plant

CALIBRATION SHEET

As of October, 2003:
All recorders have been removed; S.C.A.D.A. system will be powering the transmitters and recording the flow data.

MIAMI DADE WATER AND SEWER

MIAMI-DADE COUNTY
MIAMI-DADE WATER AND SEWER

Procedure# AO-I-01-0

August 18, 2005

Procedures For Venturi Flow Transmitter Calibrations For Plant And Pay Meters

BENCH CALIBRATIONS
Note: for field calibrations, ignore step 2 and 11
Use a pressure input source at least three times more accurate than the transmitter, and allow the input pressure to stabilize for ten seconds before entering any values

Inform operations and remove unit from process
Install a temporary preconfigured transmitter if required by operations (Steps 12-16)

STEP	
1	Drain all water from transmitter (use a compressed air source to remove all water)
2	Secure transmitter on bench (do not move)
3	Connect a pressure source, HART communicator, & digital readout device to transmitter (need > 250 Ohms of loop resistance for communication)
4	Establish communication between transmitter and communicator.
5	Open bleed valve on Low side, (close equalizing valve)
6	Perform a Zero Trim
7	Perform a 5 step "As Found" test by applying five pressure points and record data (Apply pressures approximately 0%, 25%, 50%, 75%, 100% of span) (record input pressure, and analog output on digital readout for each step)
8	Compare the applied pressure to the Process Variable (PV) line on the communicator's On-Line Menu. IF the PV reading on the communicator is *outside the expected pressure reading,* perform a sensor trim as follow: Apply a Zero pressure and Perform a Lower Sensor Trim Apply Span pressure and Perform Upper sensor Trim *Note: A full sensor trim is recommended even if unit passes test.* *This will ensure continous compliance with plant standards*
9	Compare the Analog Output (AO) line on the communicator on-line menu to the digital readout device IF the AO reading on the communicator is *outside the expected analog reading,* perform an Output Trim
10	Perform a 5 step "As Left" test by applying five pressure points and record data (Apply pressures approximately 0%, 25%, 50%, 75%, 100% of span) (record input pressure, and analog output on digital readout for each step)
	Returning to process
11	Inform operations if to remove a temporary transmitter
12	Flush out impulse lines to remove sediment and trapped air from venturi before reinstallation
13	Reinstall transmitter back on process, attach all connections and impulse lines.
14	Bleed all air out of transmitter and impulse lines
15	Colse the Hi side manifold valve of the transmitter and open the Equalizing valve.
16	Perform a Zero Trim by applying a "Zero" to the transmitter.
17	Place unit back in service. Verify reading with operations

MIAMI DADE WATER AND SEWER

MIAMI-DADE COUNTY
MIAMI-DADE WATER AND SEWER

Procedure# AO-I-01-10

August 18, 2005

Procedures For Flow Recorder Calibrations For Plant And Pay Meters

FIELD CALIBRATIONS

Note:
Use a current input source at least three times more accurate than the recorder
With HART transmitters, may use the loops calibrated analog out to generate the 4-20ma test signals

Inform operations and remove unit from process
Calibration using transmitter for source ma

STEP	
1	Connect a HART communicator, and establish communication
2	Perform a 5 point "Loop Test" by applying five current points and record data "As Found" (Apply current 0%, 25%, 50%, 75%, 100%)
3	Compare the applied current to the recorder digital readout If recorder readings are outside the accuracy limits, perform a calibration
Note:	Observe reading on SCADA system on all points and report out of tolerance reading to SCADA
4	Perform a recorder pen adjustment if needed Perform a 5 point "Loop Test" by applying five current points and record data "As Left" (Apply current 0%, 25%, 50%, 75%, 100%)
5	Perform a totalizer verification by applying a known % signal and check for proper counts If totalizer is out of tolerance, perform necessary corrections and retest.
6	Place unit back in service. Verify reading with operations
7	Log calibration on chart by writing the Technicians name and the words "Calibration Test"

MIAMI-DADE COUNTY

MIAMI–DADE WATER AND SEWER

Linear and Square Root output Calculations

Perform calculations for expected output with or without square root extraction

Transmitter accuracy on the Rosemount 1151 is [0.2 + 0.05 X URL/SPAN]% of span for a square root output transmitter on flow application
URL = Upper Range Limit of Transmitter
Example: URL for an 1151 transmitter range 4 is 150 inches of water column
Intrument Configured 0-130" of water
[0.2 + 0.05 X 150/130] =0.258 % of span + or -

Milliamp tolerance: 0.258% or .00258 X 16(ma) = +/- 0.0413 ma

Milliamp calculation for a given input:
Convert input pressure to a percent of the span
Transmitter configured for 0-130 in. 4-20 ma output
32.5 in / 130% = 25%
25/100=0.25

Standard output	(0.25 X 16) + 4 = 8.00 ma
Square root output	(0.25 Sq Root) X 16 + 4 = 12.00ma

Recorder Accuracy on 392 is 0.5% of Reading + 0.05% of full scale
for recorder 1-5 volt input (4-20 ma)
Example: recorder configured to 0-100
Total accuracy at 25% input is 100 X .05% =.05 + 0.5% X 25 = 0.125
Total accuracy then is + or - 0.175

Table of Contents

Introduction

ADS, LLC has completed Pitometer Tests on production water meters at the Alexander Orr Water Treatment Plant and well meters in the West Well field. The work consisted of the following:

- Tested, in place, for accuracy four raw water meters and five finished water meters at the Alexander Orr Water Treatment Plant
- Tested, in place, for accuracy three well meters in the West Well field.
- The preparation of this report detailing the results of the tests including velocity profiles of each of the gauging points used to test the meters.

Meter Test Procedures

Master meter tests compared the registration on the meters at supply sources to Pitometer measurements. Pitometer measurements used a pitot tube that was inserted into a pipe carrying the same flow as the meter. The pitot tube had two orifices, one facing upstream and the other facing downstream. The velocity of the flowing water produced a differential pressure between the orifices. The water velocity was calculated from the following equation:

$$V = c \times (2 \times g \times d/12)^{0.5}$$

Where:

- V = Velocity in feet per second (fps)
- c = A coefficient established by laboratory calibration
- g = 32.174 feet per second per second
- d = Differential pressure in inches of water

The flow in a pipe can be calculated from the average velocity. Average velocities were measured by conducting a traverse, in which point velocities were measured along the diameter. The measurement points were chosen such that averaging the point velocities calculated the average velocity. The average velocity was divided by the center velocity to calculate the velocity factor, a constant summarizing the shape of the profile.

Flow was calculated from center velocity measurements using the following equation:

$$Q = 0.6463 \times VC \times VF \times A$$

Where:

- Q = Quantity of flow in million gallons per day (MGD)
- VC = Velocity at the center of the pipe in fps
- VF = Velocity factor
- A = Area of the pipe in square feet

Summary of Results

The table below summarizes the master meter test results.

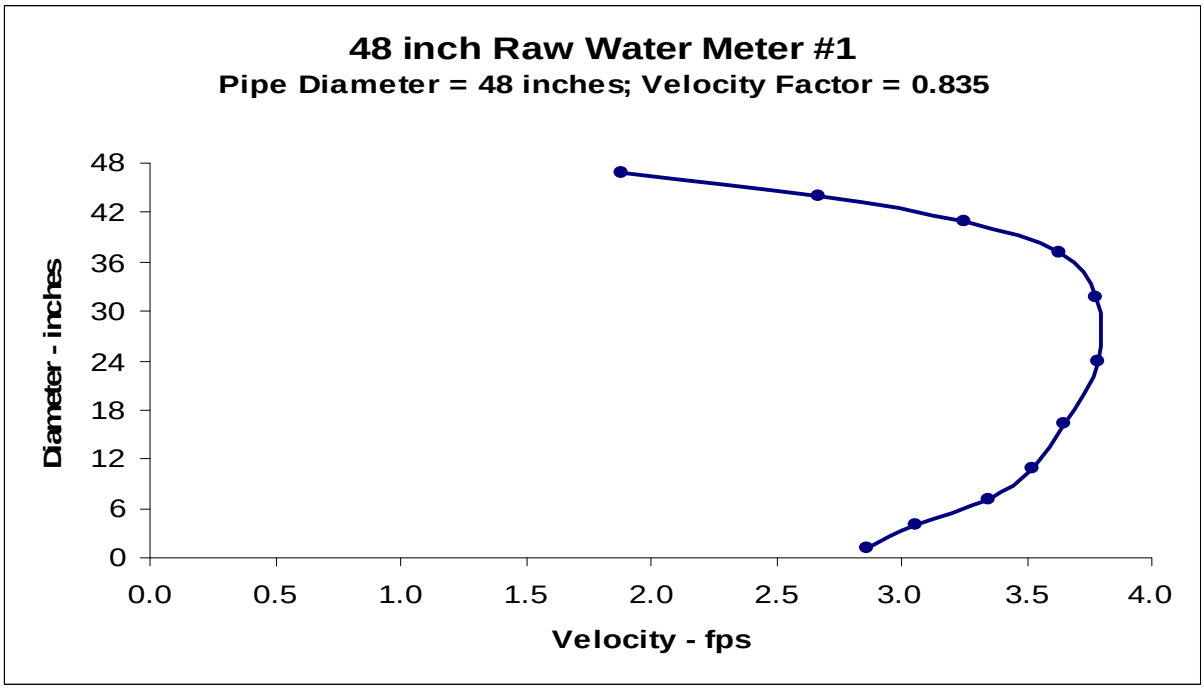
Pitometer Flow Measurement Results					
Test Date	Location	Pitometer Flow (MGD)	Meter Flow (MGD)	Percent Accuracy	Comments
8/29/2007	ORR WTP 48 Raw Water # 1	24.62	25.47	104%	Meter registers within allowable limits of accuracy
8/29/2007	ORR WTP 54 Raw Water # 2	41.71	43.39	104%	Meter registers within allowable limits of accuracy
9/10/2007	ORR WTP 60 Finish Water # 2	40.56	38.89	96%	Meter registers within allowable limits of accuracy
8/29/2007	ORR WTP 72 Finish Water # 3	26.10	25.96	99%	Meter registers within allowable limits of accuracy
9/5/2007	ORR WTP 72 Raw Water # 3	35.67	34.60	97%	Meter registers within allowable limits of accuracy
9/24/2007	ORR WTP 48 Finish Water # 1	30.95	30.31	102%	Meter registers within allowable limits of accuracy
9/11/2007	ORR WTP 72 Finish Water # 4 West High Service PS – West A	58.16	60.84	105%	Meter registers within allowable limits of accuracy
9/10/2007	ORR WTP 72 Finish Water # 5 West High service PS – West B	67.05	64.67	96%	Meter registers within allowable limits of accuracy
9/5/2007	ORR WTP 84 Raw Water # 4	78.59	78.76	100%	Meter registers within allowable limits of accuracy
9/21/2007	BA Well #29 @ West Well Field – GE Meter	4.19	4.60	110%	Meter is over-registering
9/21/2007	BA Well #29 @ West Well Field - TOTALIZER	4.19	3.09	74%	Meter is under-registering
8/27/2007	ASR Well #3 @West Well Field	3.84	3.88	101%	Meter registers within allowable limits of accuracy
9/24/2007	BA Well #34 @ Southwest Well Field	15.12	14.41	95%	Meter registers within allowable limits of accuracy

Meter Tests

The following tables show the results of the individual meter tests and the velocity profile at the gauging point used to test the individual meter.

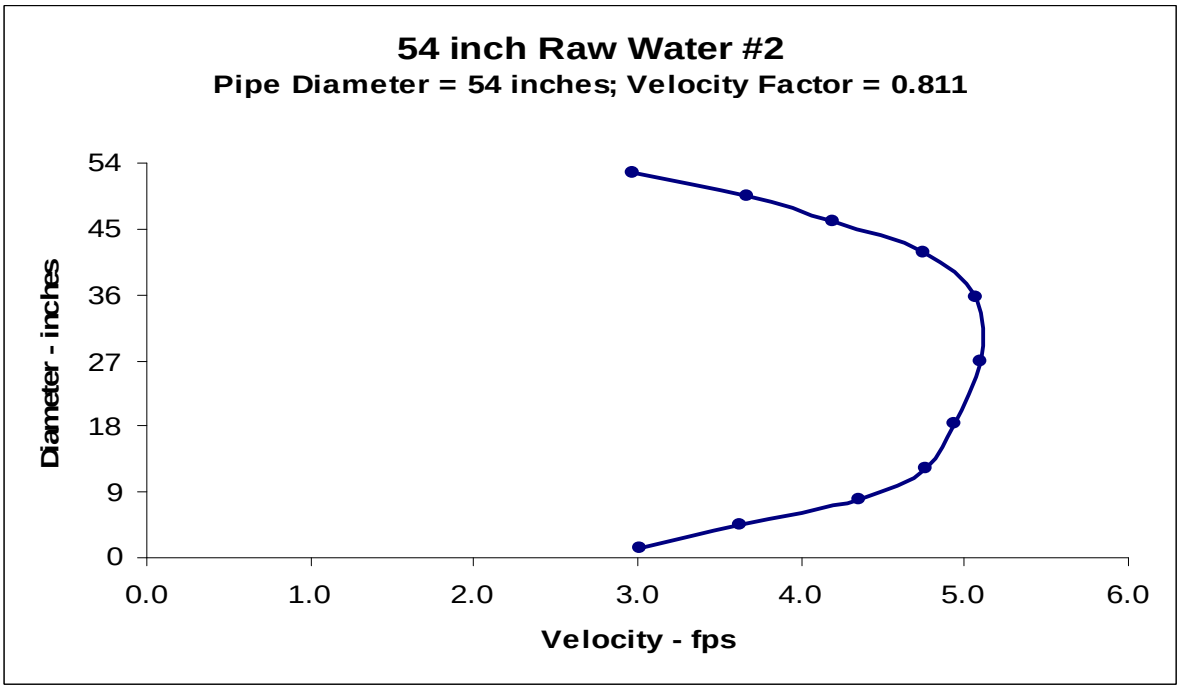
ORR WTP - 48 Raw Water # 1

Meter Data	Make/Model	B I F
	Size of Meter	48-inch
	Serial Number	23810
	Size of Pipe at the Pitometer	48 –inch
Test No. 2 Data	Date of Test	August 29-30, 2007
	Length of Test	24 Hours
	Condition of Test	Normal operations
Results of Test No. 2	Pitometer Rate of Flow (gpd)	24,620,000 gpd
	Metered Rate of Flow (gpd)	25,474,000 gpd
	Difference (gpd)	854,000 gpd
	Percentage Difference	3.5% over-registration Meter registers within allowable limits of accuracy.



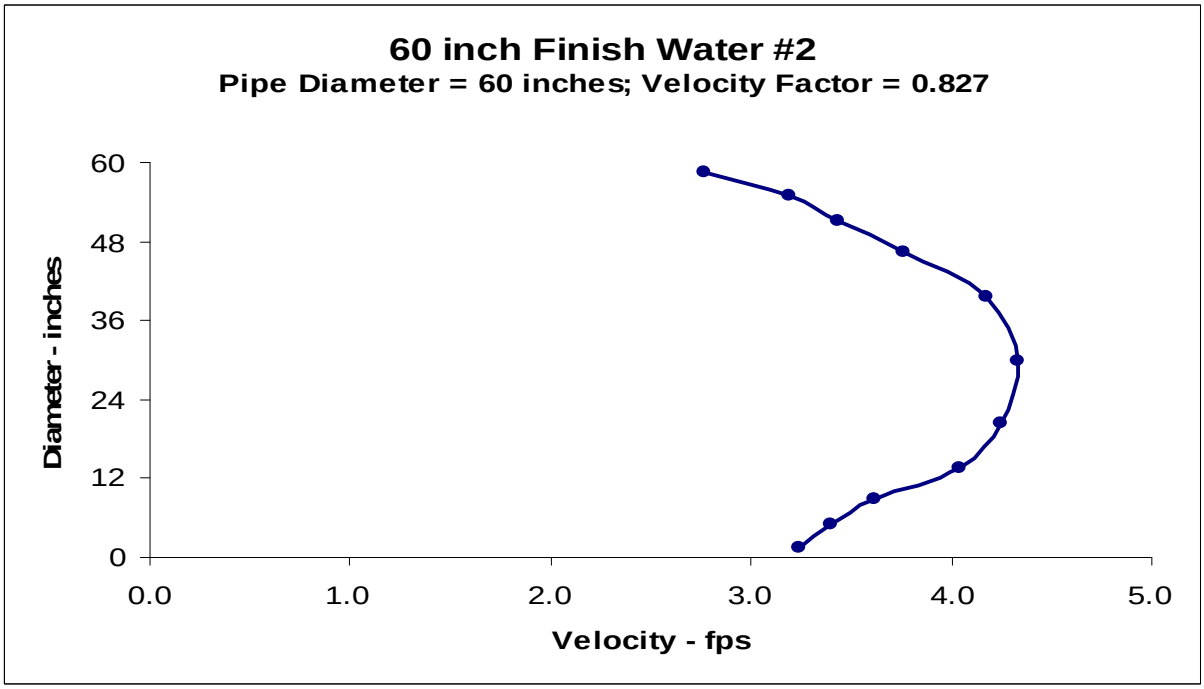
ORR WTP - 54 Raw Water # 2

Meter Data	Make/Model	B I F
	Size of Meter	54-inch
	Serial Number	34303
	Size of Pipe at the Pitometer	54 –inch
Test Data	Date of Test	September 5-6, 2007
	Length of Test	24 Hours
	Condition of Test	Normal operations
Results of Test	Pitometer Rate of Flow (gpd)	41,710,000 gpd
	Metered Rate of Flow (gpd)	43,394,000 gpd
	Difference (gpd)	1,684,000 gpd
	Percentage Difference	4% under-registration Meter registers within allowable limits of accuracy.



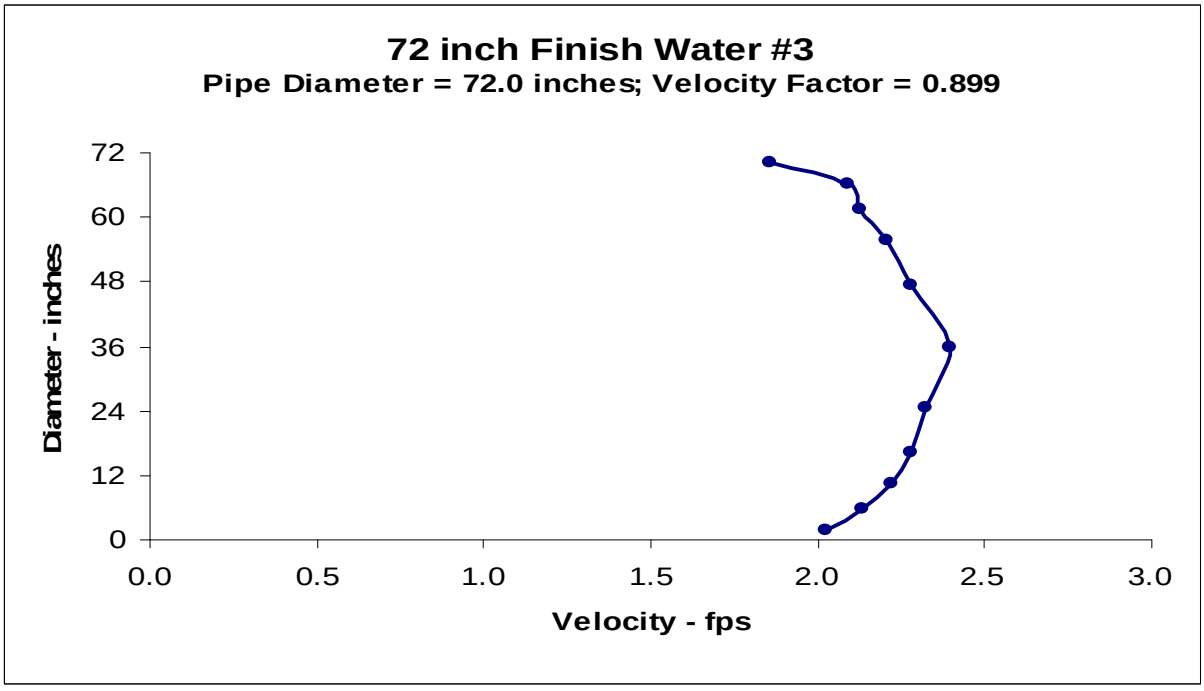
ORR WTP – 60 Finish Water # 2

Meter Data	Make/Model	B I F
	Size of Meter	60-inch
	Serial Number	31796
	Size of Pipe at the Pitometer	60 –inch
Test Data	Date of Test	September 10-11, 2007
	Length of Test	24 Hours
	Condition of Test	Normal operations
Results of Test	Pitometer Rate of Flow (gpd)	40,560,000 gpd
	Metered Rate of Flow (gpd)	38,894,000 gpd
	Difference (gpd)	1,400,000 gpd
	Percentage Difference	4.1% under-registration Meter registers within allowable limits of accuracy.



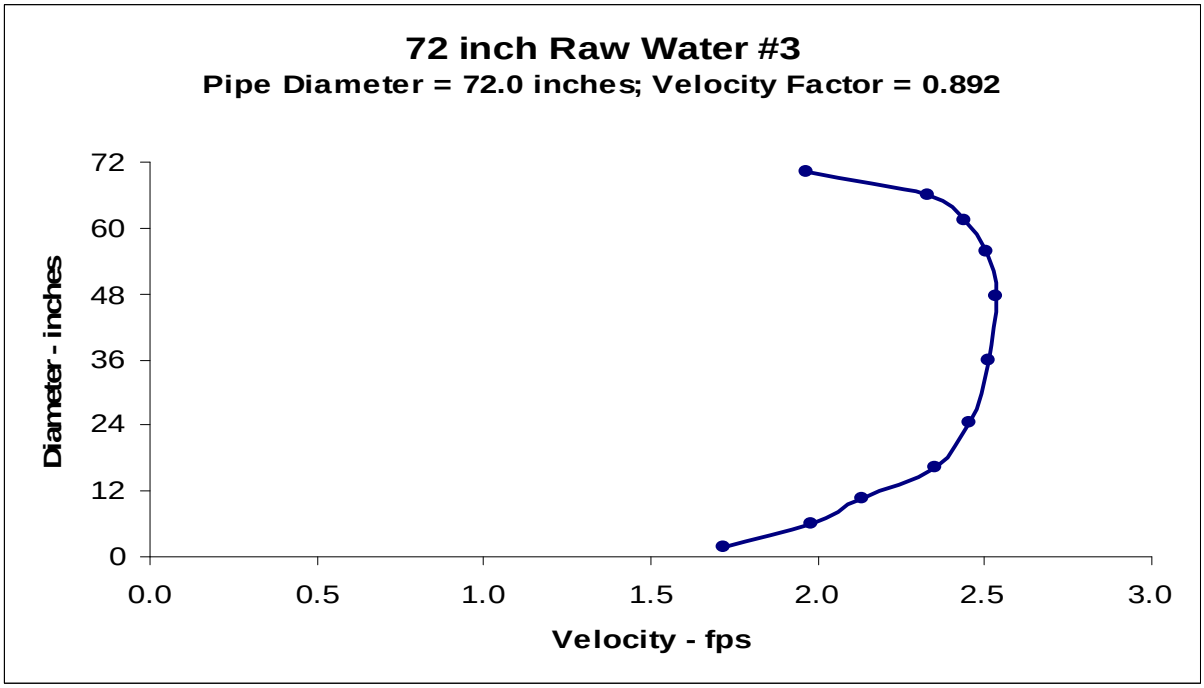
ORR WTP – 72 Finish Water # 3

Meter Data	Make/Model	Badger
	Size of Meter	72-inch
	Serial Number	960658
	Size of Pipe at the Pitometer	72 –inch
Test No. 2 Data	Date of Test	September 6-7, 2007
	Length of Test	24 Hours
	Condition of Test	Normal operations
Results of Test No. 2	Pitometer Rate of Flow (gpd)	26,100,000 gpd
	Metered Rate of Flow (gpd)	25,960,000 gpd
	Difference (gpd)	140,000 gpd
	Percentage Difference	0.5% Under-registration Meter registers within allowable limits of accuracy.



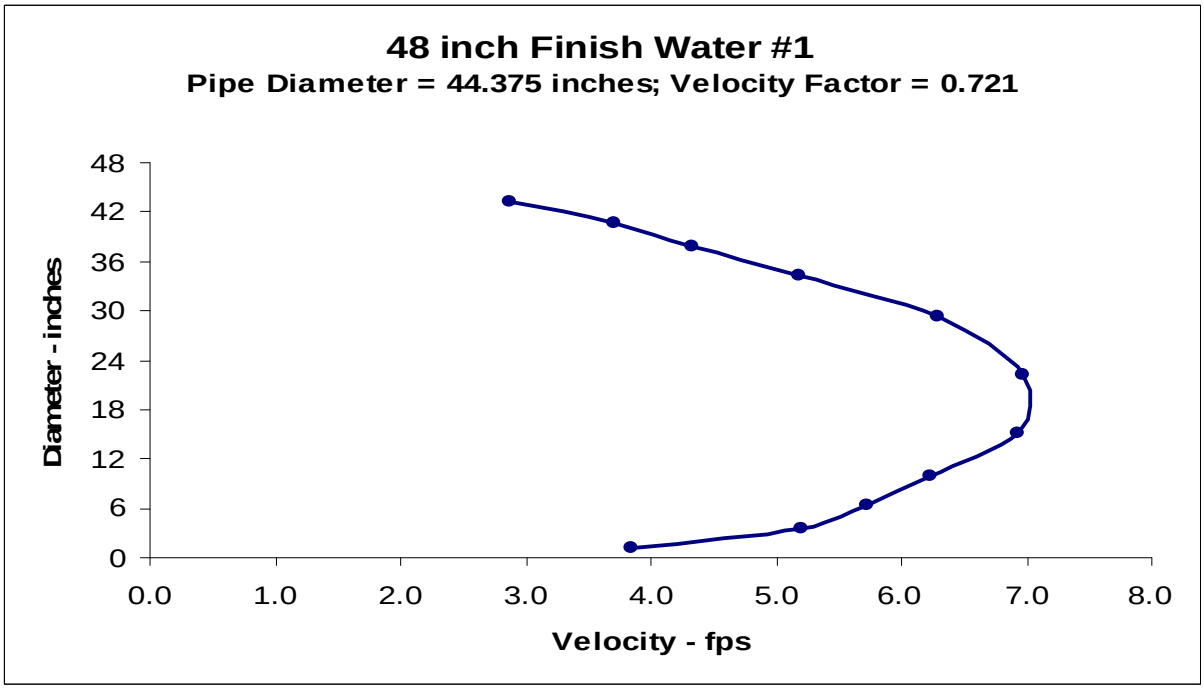
ORR WTP - 72 Raw Water # 3

Meter Data	Make/Model	Badger
	Size of Meter	72-inch
	Serial Number	972253
	Size of Pipe at the Pitometer	72 –inch
Test Data	Date of Test	September 5-6, 2007
	Length of Test	24 Hours
	Condition of Test	Normal operations
Results of Test	Pitometer Rate of Flow (gpd)	35,670,000 gpd
	Metered Rate of Flow (gpd)	34,601,000 gpd
	Difference (gpd)	1,069,000 gpd
	Percentage Difference	3% Under-registration Meter registers within allowable limits of accuracy.



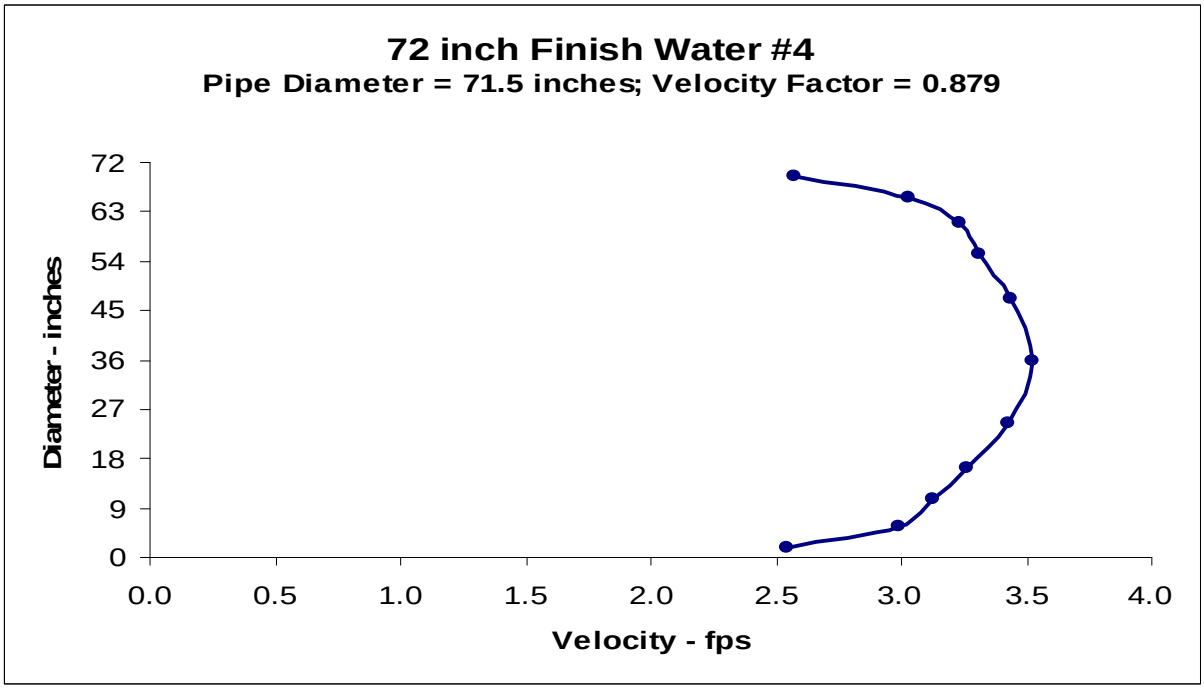
ORR WTP 48 Finish Water #1

Meter Data	Make/Model	BIF
	Size of Meter	48-inch
	Serial Number	26622
	Size of Pipe at the Pitometer	44.375-inch
Test Data	Date of Test	September 24-25 ,2007
	Length of Test	24 Hours
	Condition of Test	Normal operations
Results of Test	Pitometer Rate of Flow (gpd)	30,950,000 gpd
	Metered Rate of Flow (gpd)	30,310,000 gpd
	Difference (gpd)	640,000 gpd
	Percentage Difference	2.1 % under-registration Meter registers within allowable limits of accuracy.



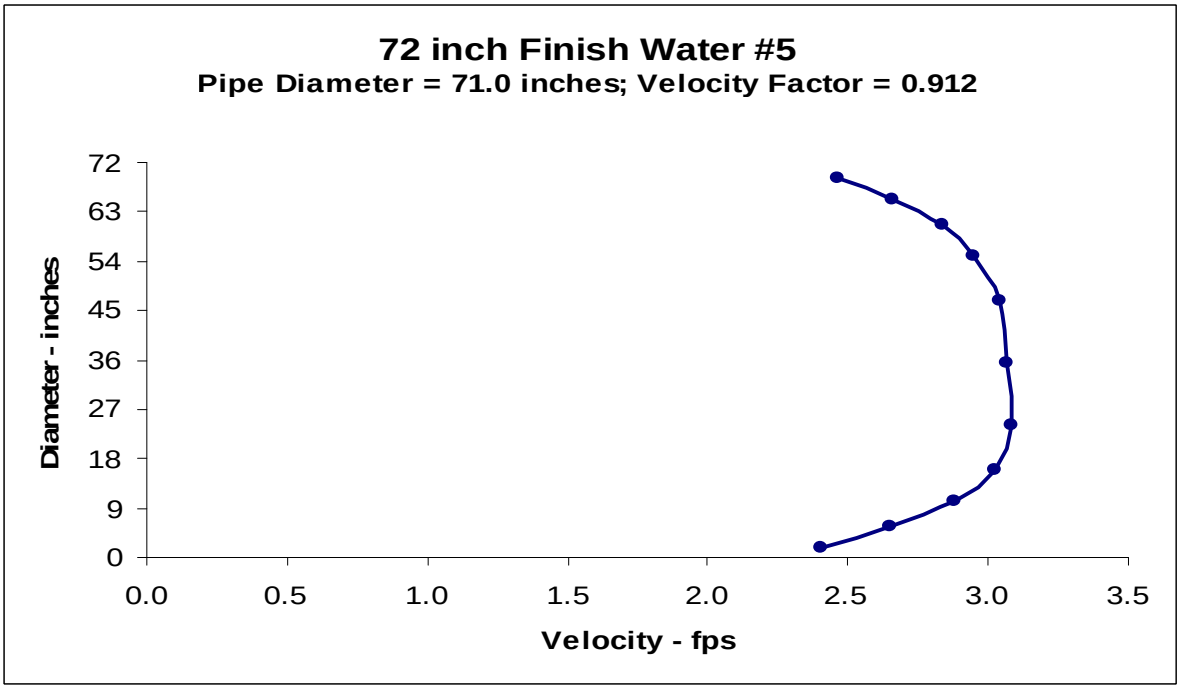
ORR WTP – West High Service PS – 72 Finish Water # 4 West A

Meter Data	Make/Model	Badger
	Size of Meter	72-inch
	Serial Number	945303 – A
	Size of Pipe at the Pitometer	71.5 –inch
Test Data	Date of Test	September 11-12, 2007
	Length of Test	24 Hours
	Condition of Test	Normal operations; pump West –B was not running
Results of Test	Pitometer Rate of Flow (gpd)	58,160,000 gpd
	Metered Rate of Flow (gpd)	60,836,000 gpd
	Difference (gpd)	2,676,,000 gpd
	Percentage Difference	4.6% over-registration Meter registers within allowable limits of accuracy.



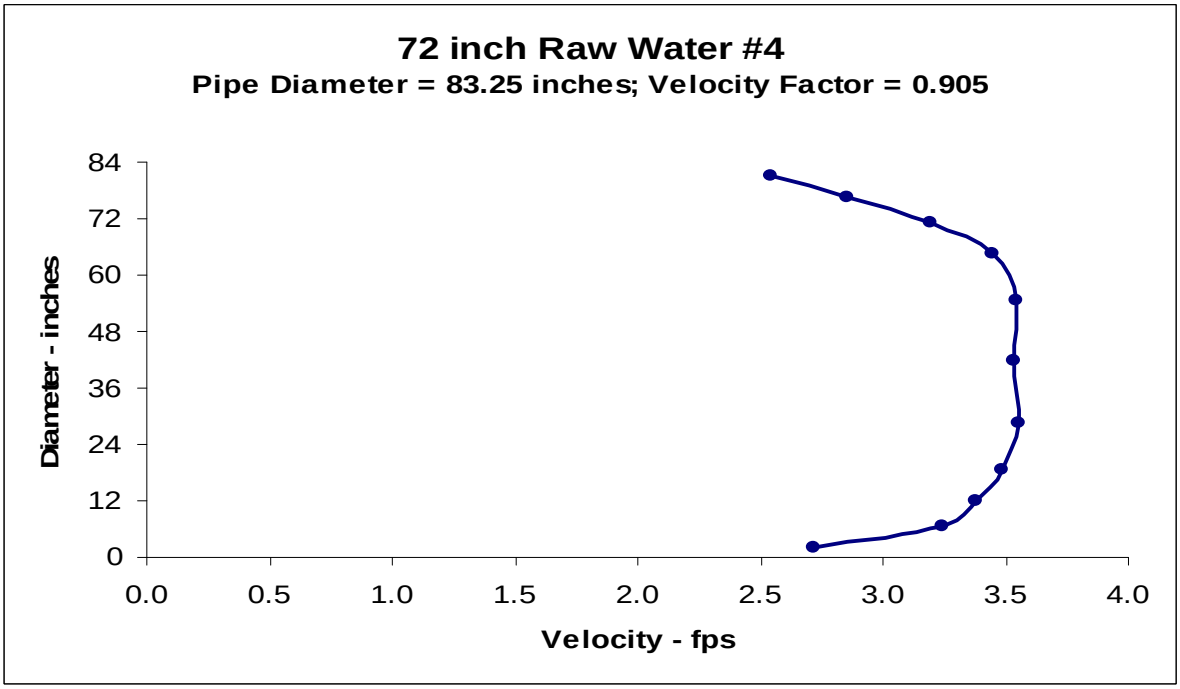
ORR WTP – West High Service PS – 72 Finish Water # 5 West B

Meter Data	Make/Model	Badger
	Size of Meter	72-inch
	Serial Number	945303 – B
	Size of Pipe at the Pitometer	71 –inch
Test Data	Date of Test	September 10-11, 2007
	Length of Test	24 Hours
	Condition of Test	Normal operations; pump A was not running
Results of Test	Pitometer Rate of Flow (gpd)	67,470,000 gpd
	Metered Rate of Flow (gpd)	64,669,000 gpd
	Difference (gpd)	2,801,000 gpd
	Percentage Difference	4.2% under-registration Meter registers within allowable limits of accuracy.



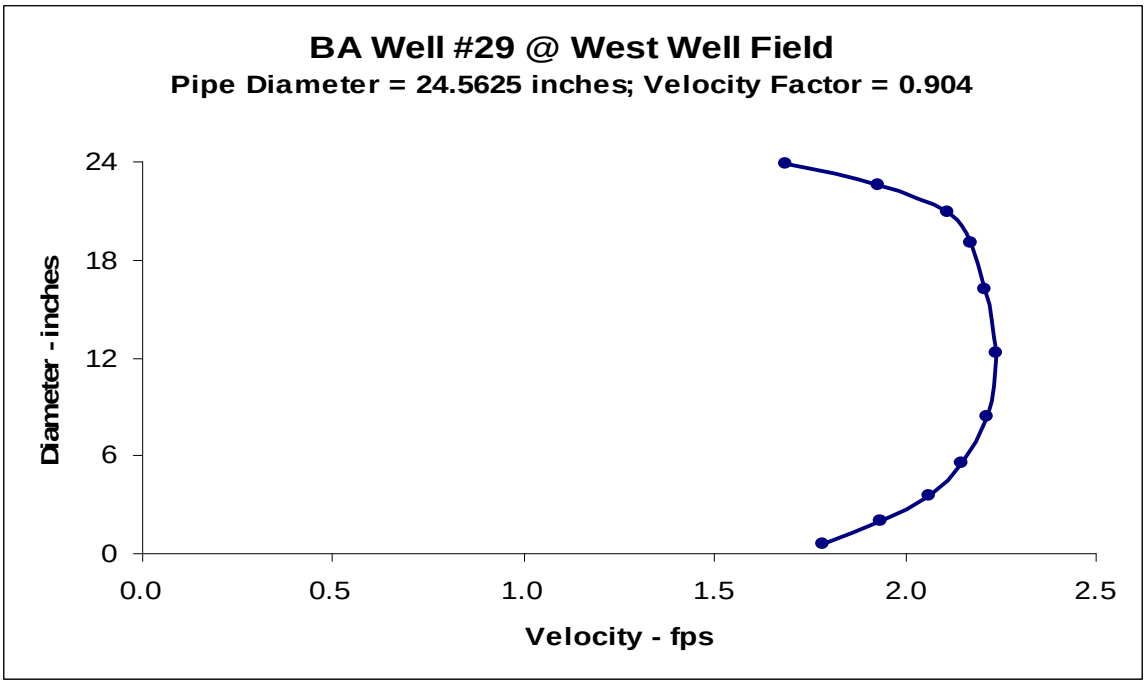
ORR WTP - 72 Raw Water # 4

Meter Data	Make/Model	Badger Venturi
	Size of Meter	72 x 35.982 - inch
	Serial Number	928358
	Size of Pipe at the Pitometer	83.25 –inch
Test Data	Date of Test	September 5-6, 2007
	Length of Test	24 Hours
	Condition of Test	Normal operations
Results of Test	Pitometer Rate of Flow (gpd)	77,730,000 gpd
	Metered Rate of Flow (gpd)	78,764,000 gpd
	Difference (gpd)	1,034,000 gpd
	Percentage Difference	1.3 % over-registration Meter registers within allowable limits of accuracy.



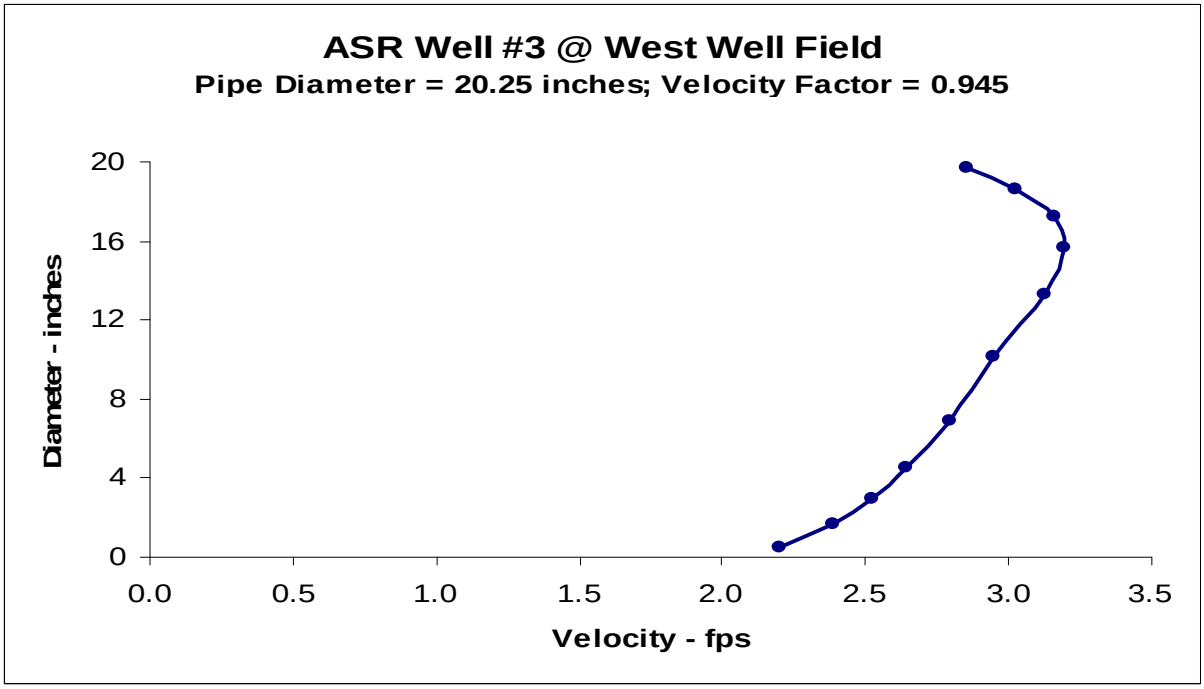
BA Well # 29 @ West Well Field – Venturi Totalizer and GE Meters

Meter Data	Make/Model	Badger - Totalizer	GE
	Size of Meter	24- inch	24 - inch
	Serial Number	540948-C	
	Size of Pipe at the Pitometer	24.5625 inch	24.5625 inch
Test Data	Date of Test	September 21, 2007	September 21, 2007
	Length of Test	30 minutes	30 minutes
	Condition of Test	Normal	Normal
Results of Test	Pitometer Rate of Flow (gpd)	4,190,000 gpd	4,190,000 gpd
	Metered Rate of Flow (gpd)	3,089,000 gpd	4,600,000 gpd
	Difference (gpd)	1,101,000 gpd	410,000 gpd
	Percentage Difference	26% under-registration	10% over-registration



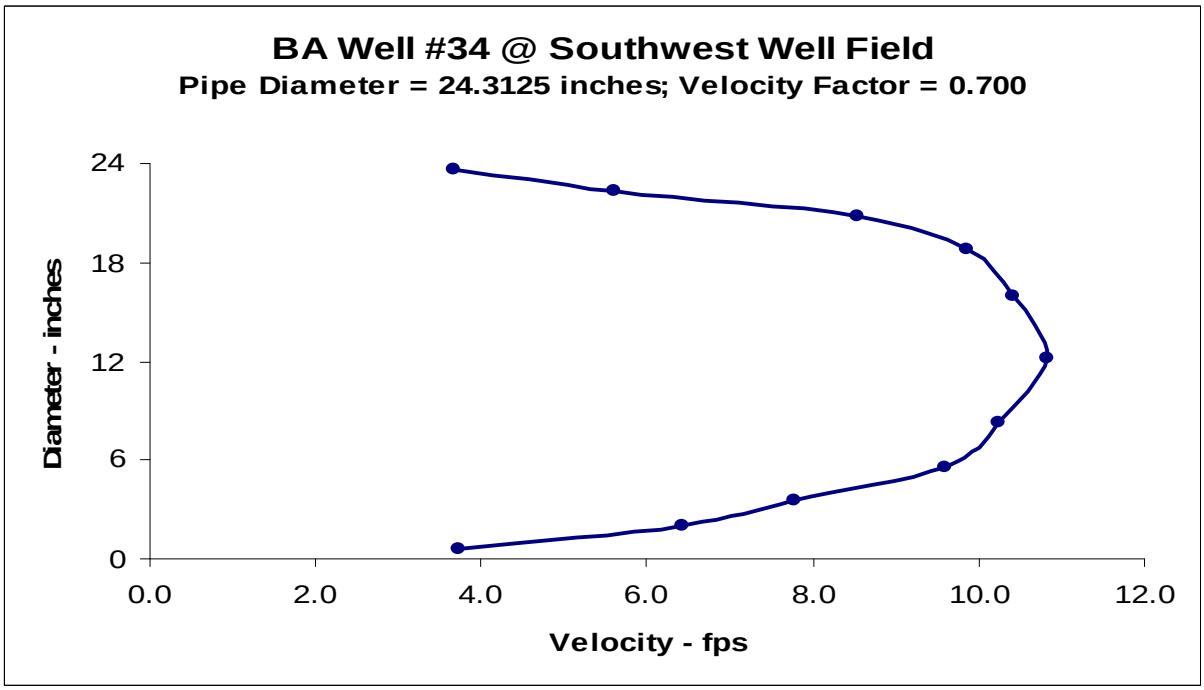
ASR Well # 3 @ West Well Field

Meter Data	Make/Model	Primary Flow Signal/B HVT-BC Bi-directional Venturi
	Size of Meter	24 x 14 inch
	Serial Number	4453-1 and 4453-2
	Size of Pipe at the Pitometer	20 – inch
Test Data	Date of Test	August 27, 2007
	Length of Test	30 minutes
	Condition of Test	Normal operations; one pump running
Results of Test	Pitometer Rate of Flow (gpd)	3,840,000 gpd
	Metered Rate of Flow (gpd)	3,880,000 gpd
	Difference (gpd)	40,000 gpd
	Percentage Difference	1% over-registration Meter registers within allowable limits of accuracy.



BA Well #34 @ Southwest Well Field

Meter Data	Make/Model	Primary Flow Signal
	Size of Meter	24.00"x14.00"
	Serial Number	4454-2
	Size of Pipe at the Pitometer	24.3125 – inch
Test Data	Date of Test	September 24, 2007
	Length of Test	25 minutes
	Condition of Test	Normal operations; one pump running
Results of Test	Pitometer Rate of Flow (gpd)	15,120,000 gpd
	Metered Rate of Flow (gpd)	14,410,000 gpd
	Difference (gpd)	710,000 gpd
	Percentage Difference	5% under-registration Meter registers within allowable limits of accuracy.



Analysis of Results

Each of the venturi meters at Alexander Orr were tested for a period of twenty four (24) hours while each of the west wells were tested for a thirty minute period. After the set up, Miami Dade instrumentation crew person went to the operations center and took readings of the totalizer. Stopwatches at both locations were synchronized so that readings at the totalizer and the PCR were taken during the same time period. The totalizer readings were compared to the PCR results. Visual readings were taking from the transmitter at each of the wells. The meters at Alexander Orr are registering within allowable limits of accuracy. The 48 inch finished water meter was determined to be accurate after the internal pipe diameter at the gauging point was measured to be 44⅜ inches. Two of the West Well Field meters, West Well field No. 34 and West Well field ASR 3, were registering within allowable limits of accuracy. The West Well field No. 29 meter was not registering within allowable limits of accuracy. Two meters were tested at this well, the GE meter and the venturi meter. The GE meter is 10% over–registering when compared to the flow measured with the Pitometer while the venturi meter is 26% under-registering when compared to the flow measured with the Pitometer.

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Water Use Limiting Condition Compliance Report

Comparitive of Measured Withdrawals From Wells and Surface Water Pumps

This report must be completed and submitted to the District at the address shown as required by your permit

Permit Number 13-00017-W
Project Name MIAMI-DADE WATER CONSOLIDATED PWS
Issued to MIAMI-DADE WATER AND SEWER DEPARTMENT
Address P.O. BOX 330316
City, State, Zip: MIAMI FL 33233-0316
Phone / Fax Number: (786)552-8156 / (786)552-8647
E-mail Address: RenfrJ@miamidae.gov

Return To:
South Florida Water Management District
Attn: Water Use Regulation Division (4320)
PO Box 24680
West Palm Beach, FL 33416 - 4680

Water Withdrawals, Comparison Million Gallons

Well/Pump Name or Number	District Identification Number	Wellhour report: FEB___ Year: 2008	SCADA report: FEB___ Year: 2008	Difference MG	Wellhour By wellfield	SCADA by Wellfield	Difference as %
West Wellfield well 29	27187	88.1	87.5	0.6			1.00716
West Wellfield well 30	27188	0.0	2.7	-2.7			0.00000
West Wellfield well 31	27189	0.0	0.0	0.0	88.1	90.1	0.00000
Orr Wellfield well 4	26304	68.2	72.2	-4.0			0.94408
Orr Wellfield well 5	26306	20.7	20.3	0.4			1.02071
Orr Wellfield well 6	26309	83.5	83.4	0.1			1.00168
Orr Wellfield well 7	26310	93.0	92.3	0.7			1.00747
Orr Wellfield well 8	26311	239.4	240.5	-1.1			0.99551
Orr Wellfield well 9	26312	0.0	0.0	0.0			0.00000
Orr Wellfield well 10	26313	0.0	0.0	0.0	714.8	719.8	0.00000

Name of Person Completing Form: Arthur Baldwin

Signature:_____ Date: March 4, 2008

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Water Withdrawals, Comparison Million Gallons

Well/Pump Name or Number	District Identification Number	Wellhour report: FEB Year: 2008	SCADA report: FEB Year: 2008	Difference MG	Wellhour By wellfield	SCADA by Wellfield	Difference as %
SW Wellfield well 18	27176	356.3	369.4	-13.1			0.96454
SW Wellfield well 19	27177	169.5	177.4	-7.9			0.95558
SW Wellfield well 20	27178	95.7	96.6	-0.9			0.99078
Snapper Creek well 21	27179	97.0	97.3	-0.3	299.4	299.3	0.99703
Snapper Creek well 22	27180	0.0	0.2	-0.2			0.00000
Snapper Creek well 23	27181	202.4	201.9	0.5			1.00264
Snapper Creek well 24	27182	0.0	0.0	0.0			0.00000
SW Wellfield well 25	27183	340.3	340.0	0.3			1.00093
SW Wellfield well 26	27184	133.5	134.2	-0.7			0.99479
SW Wellfield well 27	27185	191.9	200.8	-8.9			0.95547

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Water Withdrawals, Comparison Million Gallons

Well/Pump Name or Number	District Identification Number	Wellhour report: FEB___ Year: 2008	SCADA report: FEB___ Year: 2008	Difference MG	Wellhour By wellfield	SCADA by Wellfield	Difference as %
Floridan Withdrawal Well ASR-2W	27195	52.6	52.8	-0.1636			0.99690
ASR Injection Well ASR -2W	27195	0.0	0.1	-0.1			0.00000
ASR Withdrawal ASR-2W	27195	0.0	0.0	0.0	87.6	88.4	0.00000
Floridan Withdrawal Well ASR-4SW	27196	0.0	0.0	0.0			0.00000
ASR Injection Well ASR -4SW	27196	0.0	0.0	0.0			0.00000
ASR Withdrawal ASR-4SW	27196	0.0	0.0	0.0			0.00000
Floridan Withdrawal Well ASR-5SW	27197	0.0	0.0	0.0			0.00000
ASR Injection Well ASR -5SW	27197	0.0	0.0	0.0			0.00000
ASR Withdrawal ASR-5SW	27197	0.0	0.0	0.0	0	0	0.00000
Raw Water South Miami Heights	101047	0.0	0.0	0.0			0.00000

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Water Withdrawals, Comparison Million Gallons

Well/Pump Name or Number	District Identification Number	Wellhour report: FEB___ Year: 2008	SCADA report: FEB___ Year: 2008	Difference MG	Wellhour By wellfield	SCADA by Wellfield	Difference as %
Well FP1	128173	0.0	0.0	0.0			0.00000
Well CP 1	128175	0.0	0.0	0.0			0.00000
Well CP 2	128176	0.0	0.0	0.0			0.00000
Well RHP 1	128178	0.0	0.0	0.0			0.00000
Well RHP 2	128179	0.0	0.0	0.0			0.00000
Well RHP 3	128180	0.0	0.0	0.0			0.00000
Well RHP 4	128181	0.0	0.0	0.0			0.00000
Well RHP 5	128182	0.0	0.0	0.0			0.00000
Well RHP 6	128183	0.0	0.0	0.0			0.00000
Well RHP 7	128184	0.0	0.0	0.0			0.00000

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Well/Pump Name or Number	District Identification Number	Wellhour report: FEB Year: 2008	SCADA report: FEB Year: 2008	Difference MG	Wellhour By wellfield	SCADA by Wellfield	Difference as %
Well FB2 NWWF	217721	0.0	0.0	0.0			0.00000
Well FB3 NWWF	217722	0.0	0.0	0.0	0	0	0.00000
Well RO 1 Hialeah	217724	0.0	0.0	0.0			0.00000
Well RO 2 Hialeah	217725	0.0	0.0	0.0			0.00000
Well RO 3 Hialeah	217726	0.0	0.0	0.0			0.00000
Well RO 4 Hialeah	217727	0.0	0.0	0.0			0.00000
Well RO 5 Hialeah	217728	0.0	0.0	0.0			0.00000
Well RO 6 Hialeah	217730	0.0	0.0	0.0			0.00000
Well RO 7 Hialeah	217731	0.0	0.0	0.0	0	0	0.00000
Well EVRGL 3	23821	0	0.0	0			0.00000

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Well/Pump Name or Number	District Identification Number	Wellhour report: FEB___ Year: 2008	SCADA report: FEB___ Year: 2008	Difference MG	Wellhour By wellfield	SCADA by Wellfield	Difference as %
Well 3 MS Lower	28263	2.53	1.63	0.90			1.55124
Well 4 MS Lower	28264	2.15	0.00	2.15			#DIV/0!
Well 5 MS Lower	28265	41.25	31.00	10.25			1.33054
Well 7 MS Lower	28266	18.22	14.41	3.81			1.26443
Well 8 MS Lower	28267	10.24	8.1	2.14			1.26383
Well 6 MS Lower	28268	101.05	95.32	5.73			1.06012
Well 9 MS Upper	28269	16.62	14.43	2.19			1.15195
Well 23 MS Upper	28270	40.14	32.12	8.02			1.24965
Well 14 MS Upper	28271	82.23	75.10	7.13			1.09490
Well 15 MS Upper	28272	0.61	0.97	-0.36			0.62415

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Well/Pump Name or Number	District Identification Number	Wellhour report: FEB Year: 2008	SCADA report: FEB Year: 2008	Difference MG	Wellhour By wellfield	SCADA by Wellfield	Difference as %
Well 3 Preston	28283	84.87	68.20	16.67			1.24448
Well 4 Preston	28284	198.00	129.57	68.43			1.52814
Well 5 Preston	28285	138.31	94.21	44.10			1.46810
Well 6 Preston	28286	99.85	80.51	19.34			1.24016
Well 7 Preston	28287	155.80	164.96	-9.16	948.25	712.98	0.94444
Well 11 Hialeah	28288	0.09	3.21	-3.12			0.02750
Well 12 Hialeah	28289	2.98	0.48	2.50			6.21663
Well 13 Hialeah	28290	3.22	3.82	-0.60	6.29	7.51	0.84245
Well 1 NWWF	28291	348.99	348.69	0.29			1.00084
Well 2 NWWF	28292	353.50	363.47	-9.97			0.97256

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SOUTH FLORIDA WATER MANAGEMENT DISTRICT

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Water Withdrawals, Comparison Million Gallons

Well/Pump Name or Number	District Identification Number	Wellhour report: FEB Year: 2008	SCADA report: FEB Year: 2008	Difference MG	Wellhour By wellfield	SCADA by Wellfield	Difference as %
Well 13 NWWF	28303	239.23	276.09	-36.86			0.86650
Well 14 NWWF	28304	55.41	35.53	19.88			1.55970
Well 15 NWWF	28305	237.75	282.47	-44.72	2459.96	2543.63	0.84168
Pump SMH recharge	217931	0.00	0.00	0.00			0.00000
Pump SWWF recharge	217932	0.00	0.00	0.00			0.00000
Pump SWWF recharge 2	217933	0.00	0.00	0.00	0	0	0.00000

Name of Person Completing Form: Arthur Baldwin

Signature:_____ Date: March 4, 2008

Water Treatment Division Data Evaluation and Automation Project

Project Overview

This effort is a prelude to; and in support of the systems analyses leading to the development of a Sequel Server DB and associated ASP.Net application for capturing the various data fields representing the activities associated with the production of potable water. The following information is task specific, based on report development needs. ASP.Net is suggested because of its ability to provide a secure multilevel data entry/query environment for selectable data generation responsibilities and requirements. Additionally, the deployment of an application using this program provides a unique opportunity to better utilize network resources for periodic inquiries for essential process monitoring. The suggestion of Sequel Server DB is based on the need to maintain the data, from a historical perspective, in a manner which reduces problems with localized data retention/restoration requirements, and also supports multilevel secure data interrogation without the additional requirement of an interface device such as a "Citrix" server. The use of these functional programs and data storage systems does however require a software interface for report generation. In the absence of clearly focused requirements, it is suggested that "Crystal Report Writer" and "Cognos" software products be evaluated for inclusion in this project. Each of these products can translate data strings in either "Oracle" or "Microsoft SQL" formats

The present system of capturing data for reporting purposes has been developed over a number of years and has evolved into an enormous task centered on a single reporting format managed by a single individual. The absence of uniquely trained staff is a major problem area in this regard. This enormous vulnerability has, and continues, to expose the regulatory reporting process to multiple failures. Conceptually, the systems as outline above eliminate this vulnerability by automating the data capture and report generation process and allows the data entry tasks to be apportioned throughout the treatment facilities. Management reports as well as operating reports will be available to authorized on-line users using ASP.NET routines. Data integrity can be managed effectively using "scripts" programmatically assigned to specific data entry fields. This also eliminates the need for local data storage capably because validated data is stored in a database which resides on mainframe storage.

Background

The Division is required to produce and submit a number of regulatory reports monthly. These reports are commonly referred to as MOR's (Monthly Operating Reports). The agencies that receive these reports are the Florida Department of Environmental Protection (DEP), the Florida Department of Health (DOH), Miami-Dade Department of Environmental Management (DERM) and the South Florida Water Management District (SFWMD). The completion of each of these respective report formats is the basis of the design effort for this project. These reports must be submitted to the above referenced agencies by the 10^{th} of the month following the data collection period. Additional, this data must be maintained in accordance with Florida Administrative Code (FAC) guidelines for a period of 10 years. This process also generates management data for inventory control and balancing

Backround cont:

equipment runtimes. The reports generated by this data are only available after all of the monthly data has been tabulated which limits its effective use for daily process management activities.

The manual collection of required reporting data is presently accomplished through a number of EXCEL spreadsheets which are included in the attached diskette. Facility specific operational data, and chemical application data, is transferred from shift operating reports directly into a preliminary MOR by senior operating staff for review by Plant Managers. Laboratory data is handled in a similar manner with the exception that this data is first entered into a spreadsheet generated by each laboratory and later transferred to the referenced preliminary MOR. The chemical application data is also used to develop additional process management reports including inventory reports in support of procurement activities. Operational data, which includes "equipment run times" and "flow rates" are manually captured by specific spreadsheets and transferred to the required multi-agency regulatory reports. The Excel Spreadsheets listed below are the actual MOR reports for December 2005 and are presently being manually produced.

Folder Name: DEP MOR's – Hialeah, Preston, Orr, South Dade System (5 sheets) and Parks Department Plants (5 sheets). Included in this folder is an actual copy of the completed 12-05 MOR for the Hialeah WTP

These reports are the essentially the primary reporting elements for the system. They are produced at the end of each operating month and are unique to each facility. Additionally, data for the various management reports (detailed later in this discussion) will be developed based on the data captured by the system

Folder Name: DOH MOR's - Main System (combined plant data), and Rex System (combined plant data)

Folder Name: SFWMD MOR's - Hia PP Quarterly Well Withdrawal, AO Quarterly Well Withdrawal, and Rex Quarterly Well Withdrawal.

Folder Name: ASR Reports - PDF Report format

Supporting Spreadsheets

The following spreadsheets are used to develop the data by range with the necessary calculated values for each field (column) in the associated MOR. The data is entered in the entry fields and transferred to the MOR's using cut and paste technique.

Folder Name: Lab Data Reports - Hia Daily Raw Water Lab Report, Hia Daily Finished Water Lab Report, PP Daily Raw Water Lab Report, PP Daily Finished Water Lab Report, AO Daily Raw and Finished Water Lab Report.

Folder Name: Well Hours - Hia PP Well Hour Report, AO Well Hour Report

Supporting Spreadsheets cont:

Folder Name: Pumpage Balancing Report - WTP Finished Water Balancing Report

Folder Name: Bulk Chemical Reports - Inventory Report for each WTP

Folder Name: ASR Reports - Operational data for ASR Facilities

Folder Name: Lime Plant Reports - Operational data for Lime Plants

As mentioned earlier, a number of these excel spreadsheets contain calc fields which generate data which is transfer to the actual report. At this juncture, it is anticipated that these calc fields will not be part of the MOR's reports; rather the values should be calculated programmatically, which will allow both the raw data and the calculated data to be accessed for reporting purposes. This concept includes any planned daily reports.

The MOR spreadsheets contain the name and licensing information for the plant staff at each respective WTP. For security and management purposes any data values entered for a specific operating shift should be linked to the actual personnel who reported the data. This is also true for Lab personnel, Water Administrative personnel, or other management staff that perform data entry. The application should also include a table for access authority for additional users which will be identified after the application is on-line.

The various spreadsheets which have been developed during the report generation process are also the data collection points for historical operating records mentioned earlier. This historical data must be preserved in its present "XLS" format because at this point, it appears that we will not be able to migrate or transfer this information to a Sequel Sever DB. In that regard, the data cannot be used for historical data inquiries used in the new application. This means that we must continue to store this data for future reference until it becomes historically obsolete.

The following information is a general over-view of the data generation and input process.

Task 1

Plant Operators record Raw Water and Finished Water totalizer readings, Filter Operational Data, Well Hour Run Time Readings, and Chemical Addition Data including inventories, on the daily reports for each facility. Data entry personnel enter the totalizer reading into a excel spreadsheet (Plant Name – Balanced Raw and Finished Readings.xls). Well Hour run time readings which are taken by Plant Shift Operators and recorded on the Daily Report. They are manually entered into an Excel spreadsheet for each Month (Plant Name month year.xls). A special note regarding these spreadsheets; it contains the SFWMD ID# for each well and also it design rated capacity in MGD, which should be included in the finished application as separate tables which reduces the need for DB "Restructures" as equipment or facilities are added to Divisional responsibilities. There are several individual data and calc fields in these files which calculate the individual well pumpage

Task 1 cont:

rates based on run time in hours x capacity. The data is summed for an accuracy check against the daily Raw Water Pumpage for each plant. These fields are transferred (copy/paste) to the main Balanced Raw and Finished Water spreadsheet mentioned under Task 3. Chemical Data is entered into the calc fields on the MOR's which are outside of the printable ranges on the spreadsheet which populate the dosage fields and pound fields on the MOR. This data is also entered on the Bulk Chemical spreadsheet for accounting purposes.

Task 2

Laboratory Data for each day is entered on a preliminary MOR in the facilities operations room. This data is later entered manually into the MOR spreadsheet for each facility.

Task 3

The calculated data developed by the Balanced Raw and Finished spreadsheet is transferred to the MOR Spreadsheet. This data is also used to populate the fields on the SFWMD MOR spreadsheet. Special note concerning the Balanced Spreadsheet. It must be reconciled with anticipated values to ensure accuracy. An error at this point can cause the Raw and Finished Flow ranges on all associated spreadsheets to be understated or overstated. This is a glaring mistake that undermines the integrity of the submittals.

Task 4

The Lime Reconciliation spreadsheets are used to reconcile inventories plus purchased materials with actual treated water parameters. This report component is necessary because the instrumentation used to tabulate the actual amount of chemical fed is highly inaccurate.

Task 5

Aquifer Storage and Recovery (ASR) report is a relatively new component for the divisional reporting process. Originally, the data was tabulated manually by field visits supporting operational and laboratory records. The task has become extremely protracted, taking almost 1 week of administrative time per operating month to compile into a completed report. This task should be

Task 5 cont:

automated programmatically and reduce the exorbitant administrative time presently required. The Excel spreadsheets in the attached diskette are developed from data manually extracted from the SCADA system. Laboratory data is still being compiled and entered into the finished report manually.

Task 6

Shift operating data is compiled manually by plant staff for inclusion into the monthly report for each plant. The associated tables use generalized calc fields to determine production rates and operational costs.

Each of the tasks mention above interacts with each other to some extent. Although extreme diligence was used in preparing this project outline, there maybe a number of areas which were not thoroughly addressed or even mistakenly omitted. In addition, there are a number of time constraints which need to be considered. This is especially true for laboratory data. Generally lab data is available by noon for the previous operating day. Weekends and holidays are a notable exception. The availability of "SCADA" data is another area which needs further study. Informational requirements for other user Divisions also have not been addressed. Presently the MOR's are circulated to these Divisions, and they use whatever data they need to generate their respective reports.

There are several areas that also need to be addressed regarding interfacing additional sources of automated data. The Department operates an extensive Supervisory Control and Data Acquisition System "SCADA" system which in addition to its primary control functionality, can alternatively provide data logs for operational equipment. Data for reports is presently collected manually because of the lack of an effective automated data interface. This system utilizes both "SQL" and "Oracle" based formats for data storage. The Departments also operates a "LIMS" system for the management of its Laboratory data. This system stores data in an "Oracle" data base format. The system functionally uses a "Citrix" server to isolate data queries form the database structure for security purposes. Both of these active systems can provide a portion of the necessary data to populate fields used to produce regulatory and management reports while enhancing overall Water Treatment management activities by providing periodic observations of process or treatment system stability.

The development of this system is not intended to eliminate daily operational logs or manual data sheets presently used by any division. It is intended to eliminate the double and triple data entry tasks the Water Production Division currently uses. The realization of this system will require involvement of Departments MIS Division and Miami Dade County's ESTD as well as divisional data and MIS specialists. Once completed, the streamlined data management process will provide a vehicle to consistently meet regulatory reporting guidelines and provide easily assessable data for needs assessment the management of treatment plant activities.

Project Scope Document

Project Name:
Monthly Operating Reports On Demand

Business Background:

The Water Production Division of the Miami-Dade Water and Sewer Department (WASD) is responsible for the safe and efficient provision of water to the Miami-Dade County populace, numbering around three million. The Division pumps water from wells and treats the water at one of three plants: Alexander Orr, Hialeah, and Preston. Various regulatory agencies, including Miami-Dade County's Health Department and Department of Environmental Resources Management, the South Florida Water Management District and the State of Florida's Department of Environmental Protection and Department of Health, require periodic reports concerning the production of water, known collectively as Monthly Operating Reports (MOR's). Most of the reports are due by the 15th of each month, although there are some that are quarterly, semi-annual or annual. WASD personnel collect data readings from all pertinent pumps, treatment devices and laboratory analyses. The readings are then entered on one or more working forms, and are combined into multiple layers of spreadsheets until a final report can be produced. Some of the data on these MOR's include: amounts of raw and treated water pumped, hours of operation of each pump, chemicals used to treat the water, and laboratory results of water analysis.

At present, all readings are either keyed in to one of dozens of spreadsheets, or handwritten on preprinted forms and later transferred to spreadsheets. It happens that an operator jots down readings on scrap paper, then transfers the entries to a paper form. Another employee transfers from the paper form to a spreadsheet, then faxes the results to another office, where the figures are transcribed from the fax to a "master" spreadsheet. In addition to the recopying of data entries, the operators who record the entries very often have to arithmetically manipulate the data from one form to another, such as reading the height of a chemical storage bin in feet, yet converting that figure and entering the amount stored in pounds.

Another example of laborious data entry is that, on many worksheets, a meter's current reading and a previous reading are both entered and the data entry person calculates the difference, which he also enters. This is repeated at each reading, so that rather than merely entering 12 two-hourly readings for the day, the existing data entry consists of 36 items, requiring 12 separate subtractions, two separate summations of the readings, and an averaging of the readings. The operator's arithmetic is simply accepted at face value, and is carried along with no verification.

The recopying and calculations by hand can have consequences beyond imposing an extra work load on the operators. Errors, whether in copying data entries or in arithmetic, may trickle through the MOR's, and may not be noticed until the middle of the next month when the reports are produced, or even later. The person responsible for the reports must examine them all for anomalies. If erroneous reports are actually filed, WASD can be subject to significant penalties. If any mistakes are found (whether before or after the reports are filed), he must work backwards to determine where errors crept in, so that he can correct them and revise the report.

Project Objectives:

This project's goal is to automate the handling of the data required for the monthly and other reports to the extent possible, to make the reports quicker and simpler to produce, and to improve the integrity of the data reporting process. A guiding principle is that no datum should be entered more than once, and any calculations should be automatically verified or flagged if seemingly incorrect. To help insure accuracy in data entry, rules are to be developed and applied specifying allowable values, indicating unexpected inputs, and providing override permission as required. In addition, the entry and modification of data should be governed by specific rights, such as who can do so and when. Any changes that are made to database entries should leave a clear audit trail as to what was done, when and by whom it was done, and require an explanation as to why it was done. Finally, to the extent practicable, data entry and retrieval should be done via a web-based front end.

Four levels of reports are required: Exceptions, Trial, Final, and Revised.

- Exceptions reports are working documents that should be produced on screen daily, showing supervisors any unexpected results that may be possible errors in the most recently entered data. By keeping current with these exceptions reports, supervisors would be able to either document the explanations for questionable data, or quickly find and correct the causes if they are actual errors.
- Trial reports are to be created as an aid to preparing the required reports to the agencies mentioned above, and also as a tool for tuning plant operations. It should not be necessary to wait for month's end to prepare these. They should be producible "on demand." That is, at any time, the current month's trial reports should be able to be produced, incorporating the data to date. On the 11th of a month, that month's report should be able to be viewed with data included through the 10th of the month, etc. This is to enable corrective action to be taken before problems can affect later operations and decisions. (For example, recordings that show a pump producing significantly less than its capacity may not be erroneous - they may indicate the need for repairs.) Producing such reports on an interim basis also makes much simpler the task of discovering where the problems lie.
- Final reports, of course, can only be created when all data has been input.
- Revised reports can only be made after a final one has been prepared.

These last two types of reports are to be saved in report form for the same 10 year minimum as the raw data. Besides the Water Production personnel who create the reports, other users should be able to easily retrieve them via a web-based request. This is in contrast to the current situation wherein a user from another division has to ask Water Production for copies to be faxed, sometimes with no notice, yet with great urgency.

Justification:

- More efficient report handling

  The basic aim of the project is, as the name indicates, the production of Monthly Operating Reports On Demand. The current regulatory requirements dictate the production of monthly reports. The reports are very time consuming to prepare, requiring the combined efforts of several people in order to meet the deadlines. Treatment Plant Operators (TPO's) enter the original data by pencil on dozens of disparate forms; any errors may not be noticed for weeks, or even years, when some governing agency investigates, or perhaps not ever

  A tangible benefit also accrues to the Department by the avoidance of regulatory infractions. If we are found to be not in compliance with a given regulation, we can be assessed fines of up to $100,000 per day. From a broader viewpoint, users will be able to get reports when requested, even before the end of a month. More timely preparation of reports will lead to earlier discovery of errors and will provide the lead time for corrections to the reports to be made.

- More efficient monitoring of plant operations

  The data collected for the MOR's is interconnected, and the use of a relational database to store readings will enable related bits of data to be usefully combined. For example, if an operator notices the pH of the water is too high, he has many choices as to how to react. Among other choices, he can: do nothing and hope it gets better on its own, he can increase chemicals to lower the pH, or he can notice that a water pump has shut down, and then take appropriate action for it. Currently, the various bits of information are separate. By having the data automatically correlated, we will receive the earliest possible warning of problems that may occur, and be in a better position to correct them in a timely fashion, enabling the plants to be run more smoothly, efficiently, and safely.

Deliverables:

- Database
  This project will ultimately provide a relational SQL database to include tables of personnel, tasks, equipment, inventory, rules and readings, from which the MOR's can be generated at will. The database will support standard production security.

- Interface
  For most users, the primary interface will consist of a series of data entry forms, suitable for easy viewing on a tablet or laptop PC. Some of the forms/tasks would include:
  - Administrative
    - adding employees
    - revising employee assignments
    - adding equipment
  - Supervisory
    - modifying equipment parameters (e.g., maximum flow, acceptable temperatures, etc.)
    - preparing a MOR for review and for submittal
    - adding inventory purchases
  - Operational
    - entering readings (e.g., amount of chlorine fed, pH of finished water, etc.)
    - recording inventory

  The forms should have a generally uniform look and feel, and be easily navigable, such as by a "tab system" or on-screen menu boxes. They will be created in an ASP.Net framework and be available with a full screen view, on a laptop or standard desktop monitor of a PC connected to the WASD intranet. As a subsequent phase, the application can be configured to use mobile devices for data acquisition. The device will need to be wirelessly connected to the database and operate in real time, or the input will be uploaded to the database via a docking procedure (whether connected by wire or wirelessly).

- LIMS Extraction Service
  The laboratory staff uses a LIMS (Laboratory Information Management System) that provides for creating various forms of output. The lab personnel will produce an Excel spreadsheet via the LIMS. The MOR On Demand will provide a background service that will extract the required information from the spreadsheet for storage into the SQL database. It will not be necessary for them to incorporate a new means of data entry, and certainly will not require any cut and paste or other resending of readings.

- Reports
  There are various reports currently being produced for the State or County agencies mentioned before that will be duplicated in an "on demand" environment. Users will be able to generate these reports during the middle of the month, rather than having to wait until the end.

In addition, there will be new reports for internal use that will be created to improve the functioning of the TPO's. For example, a report will be compiled showing residual chlorine and chlorine flow - items that are currently tracked, but on different forms, perhaps in different places, and by different people. By having them on a single view, a TPO can adjust the flow to raise or lower the level of residual as necessary.

The deliverable for Reports, then, will consist of two steps. The first will deliver the report formats requested by TPO's or Water Production management. These reports will have sample (although realistic) data, and will serve to confirm the structure and handling of data for the reports. A second step will consist of the reports produced with real and current figures, which will confirm the actual gathering of data, and serve as a test of the project.

- Training sessions

  Using the principle of "Train the trainers", a short series of sessions will be provided for the different levels of users:
  - Liaison - John Spanioli (for overall technical background and first responder support)
  - Administrative functions -Jack Epaves, Ed Turner, Jon Hansen
  - Report preparers - Art Baldwin, Sameena Ahmed
  - Treatment Plant Operators - *to be selected*

Key Milestones:

Milestones will include:
- Acceptance of this document
- Delivery and acceptance of user interface illustrating the tasks that will able to be done
- Delivery and acceptance of standard reports that can be produced On Demand
- Walkthrough with real data (parallel to old method) producing MOR On Demand and "extra" requested reports. This will constitute the testing phase of the project and will conclude with user acceptance.
- User Training completion and project adoption

Key Resource Requirements:

The Water Production Division contacts and subject matter experts include:
- Project Sponsor: Tom Segars
- Project Manager: John Spanioli
- Subject Matter Experts
  - Report Preparers: Art Baldwin, Sameena Ahmed
  - Administrators: Jack Epaves, Ed Turner
  - Plant Supervisors: Jon Hansen, Art Baldwin

The MIS analysts that have been provided for this project are:
- Technical Lead: Yaakov Rudd
- Technical Support: Arsenio Gonzalez

NetAdvantage for .Net, from Infragistics, is a software tool that has been identified as important to the project's success. This tool will enable rapid and consistent development of the user GUI interface, and will be useful in all future .Net projects.

Schedule:

A schedule will be established to allow for the following:

- Approval to proceed
- Requirements definition
- Completion of database design
- Delivery and acceptance of user interface illustrating the tasks that will be able to be done
- Delivery and acceptance of dummy regulatory forms and additional reports (automatically filled in by sample database data)
- Testing
- User Training completion and project adoption
- Production

Personnel Affected:

This project will impact a variety of personnel in the Water Production Division. In addition to "general" users who will have access to view data and generate their own copies of reports, etc., the following groups of individuals will be directly involved either in data entry, supervisory or administrative capacities:

- Division Chief 1
- Treatment Plant Chief 2
- Treatment Plant Supervisor 3
- Treatment Plant Operator II 12
- Treatment Plant Operator I 20

Constraints:

The timeframe of this project will be reduced by the use of Infragistics' NetAdvantage, a .Net development tool that assists in rapid application development. It is expected to be a re-usable part of all the .Net applications designed in WASD. Without it, the timeframe will need to be expanded to allow for in-house development of the same functions.

Assumptions:

The data that currently populates the MOR's generally comes from instrument readings, but not always. Our assumption is that the readings will be used as the source of the monthly entries, but that they may be overridden by individuals with sufficient authorization. Any overrides will need to be given a justification that will be made available for audit purposes.

There are some readings that are currently being captured by a SCADA system, especially for the Aquifer Storage and Recovery (ASR) wells. However, there was no immediate interest in trying to use these readings or to increase the equipment that is being monitored. It may be that a future follow-up project will be requested to interface with current and/or future automatic data capture. The Water Production representatives indicated they do want the ASR wells to be included, but they preferred to delay inclusion of the ASR data until a later phase of this project.

IT contract staff will be retained for the duration of the project.

Risks:

Additional equipment, such as pumps or chemical feeders, may be placed into operation, and although the database is being developed to allow for such expansion, it is possible there may be unanticipated requirements for tracking the operation of the new equipment such that the database needs to be revised. If so, a then-current analyst will need to make the appropriate modifications.

Additional reports, or modifications of existing ones, may be required by external agencies, for which new interfaces would need to be developed. If so, a then-current analyst will need to accommodate the requirements.

Inability to keep IT contract staff will delay project completion.

Concerns:

- Calculations by hand

  Although most data entry consists of single readings, the current data forms also demand some calculations. All of them are able to be done by computer, and the results can be automatically filled in where needed. For example, "the rate of chemical flow times the number of hours equals the amount of chemical." Rather than automating this entirely, the management has indicated they would prefer some calculations still to be done by the Treatment Plant Operators (TPO's). Accordingly, reports that require calculated results will (in the event of miscalculations) signal the user that his results are incorrect, but will not display the correct results. This has the double benefit of helping train the user, and also catching such incorrect input as typos, forgotten decimals, etc. The computer will compare the operator-entered result with the "right" one, and signal when discrepancies occur; however, it seems a waste of the computer's usefulness to still require such tasks as performing long division by hand.

- Not making use of SCADA

  Each recopying of data naturally provides more chances for entry errors, the minimization of which should be a significant goal of this project. It follows that the first transcription of a data reading creates the first opportunity for error. Some of the data is available through a SCADA system already in use. However, the Division's management prefers that even those readings be entered manually. They do, however, wish to use the SCADA data for a sort of verification, to insure readings entered by hand are "reasonable" when compared to the SCADA information. The use of SCADA to provide equipment readings would reduce the likelihood of entry errors wherever SCADA is available. If this is done, a backup method for data entry must be provided for those times when the SCADA system is not operational.

- Personnel supervision

  The automation of the data collection and report preparation are the prime objectives of this project. However, the Water Production Division is asking to design the proposed solutions in such a way as to incorporate certain oversight functions, also.

  For example, the division's management considers that there is a tendency for employees to assume all equipment is correctly working. At the end of a shift, readings for the entire shift might be entered all at one time, without actually having checked at the required intervals. Additionally, one employee might enter readings that his colleague should have made, "covering" for him and calling into

question the integrity of the entire data collection process. To prevent those types of misconduct, management has requested that the system enforce automatic logoffs after periods of inactivity, and require periodic logins of the operators, in addition to requiring the arithmetic to be done by the operator (as mentioned before), and setting time limits as to when readings can be entered.

It's true that one can claim benefits to such an approach (beyond being likely to catch employees not performing their assigned duties appropriately): TPO's will better understand the workings of the plant and be more likely to notice anomalies; requiring the entry of quite a few data items every hour or two can simply serve to make sure the TPO stays awake throughout his shift. Nonetheless, it is hard to escape the feeling that this is a use of technology to enforce what is essentially, and more properly, a personnel supervision issue.

Current Status:

A series of meetings have been held with key personnel from the Water Production Division in order to better understand the current processes of data collection and report preparation, and what is being requested of this project. At each meeting, Yaakov Rudd and Arsenio Gonzalez were in attendance representing the MIS Division. The main Water Production personnel interviewed at each meeting are shown

September 1	Alex Orr	Spanioli, Baldwin, Epaves, Ureña(MIS)
September 4	Alex Orr	Spanioli, Baldwin
September 12	Alex Orr	Spanioli, Meacham
September 18	Douglas	Baldwin
September 22	Hialeah	Spanioli, Baldwin, Segars, Hansen
September 27	Alex Orr	Spanioli, Baldwin
October 24	Alex Orr	Spanioli, Baldwin, Epaves, Ahmed

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miamidade.gov

Electronic Correspondence/
Original via Certified Mail/
Return Receipt Requested
7003-1680-0004-5544-0331

October 23, 2007

CCN: 50401
File No.: 8DC.14.28.2

Ms. Carlyn Kowalsky, Managing Attorney
Office of Counsel
South Florida Water Management District
P.O. Box 24680
West Palm Beach, FL 33416-4680
Email: ckowalsk@sfwmd.gov

Re: Miami-Dade County Interim Consumptive Use Authorization and Agreement (Order No. 2006-072-CO-WU).
Revised Plan To Address Raw Water Flow Measuring Adjustments
Table 1, Item II c

Dear Ms. Kowalsky:

Please find enclosed Miami-Dade Water and Sewer Department's (MDWASD) Revised *Plan to Address Raw Water Flow Measuring Adjustments.*

If you have any questions concerning this submittal, please contact me at 786-552-8112 or Ms. Bertha Goldenberg, P.E. at 786-552-8120.

Sincerely,

Rafael A. Terrero, P.E.
Assistant Director

Enclosure

cc: S. Burns sburns@sfwmd.gov
M. Elsner melsner@sfwmd.gov
K. Smith karsmith@sfwmd.gov
K. Guerrero kguerrer@sfwmd.gov

MIAMI-DADE WATER AND SEWER DEPARTMENT
WATER USE PERMIT (10/23/2007)
PLAN TO ADDRESS RAW WATER FLOW MEASURING ADJUSTMENTS (FY2008)

The following is MDWASD's plan to be undertaken during FY 2008 to reconcile raw water flow measurements in the water system. This plan is the result of new raw water well meter installations in almost 100 supply wells during FY 2007. This plan is the continuation of MDWASD's attempt to reconcile and adjust historical raw water pumpage reports and records in its water supply system. The attached Exhibit B presents the schedule of activities associated with this program.

1. Address comments from GE Well Water Flow Meter Installation Report. Optimize current raw water well meter installations and calibration.

2. Calibrate Raw and Finished water Venturi meters at the Alex Orr WTP. Submit interim report by March 15, 2008.

3. Perform a water audit within Alexander Orr WTP to investigate Raw to Finished water flow differences. Initiate installation, calibration, and certification of process water flow meters (including transfers of water softening residuals to calcium carbonate lagoons and recalcining kilns), as appropriate.

4. Revise the Oracle systems database and create the Oracle based report format to be complaint with SFWMD Water User Permit Allocation and Special Conditions submittal requirements.

5. Transition to all new meter reports during December 2007 using the new raw water well flow meters and reports generated by the Oracle system. Begin using the reports generated by the Oracle system meter recorded values for both FDEP and SFWMD reports on January 1, 2008.

6. Undertake the following tasks to analyze raw water flow measuring issues: reconciliation of raw water meter reports between FDEP Monthly Operating Reports (MOR) and Oracle system, record instantaneous well readings to verify the average pumpage of each well, compare reported versus recorded flows for raw and finished at each WTP, and develop pumpage results for each wellfield on a monthly basis for the first six months of 2008.

7. Summary report on flow measuring issues analysis by July 31, 2008.

8. **Submit request for allocation adjustment to SFWMD during the third Quarter of 2008 and no later than September 30, 2008.**

Exhibit B
Miami-Dade Water and Sewer Department
Plan to Address Raw Water Flow Measuring Adjustments
10/23/2007

	Task	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08
1	Address Issues from GE Well Water Flow Meter Installation Report		◆	———	———	———	———	———	———	◆			
2	Calibrate Raw and Finished Venturi meters at Alex Orr WTP. Submit Interim Report			◆	———	———	◆						
3	Alexander Orr WTP Water Budget Analysis					◆	———	———	◆				
4	Revise Oracle Report Format		◆	———	◆								
5	Transition reports to new recording system			◆	◆								
6	Reconciliation of Historical Records			◆	———	———	———	———	———	———	◆		
7	Summary Report										◆		
8	Submit Request for Allocation Adjustment								◆	———	———	———	◆