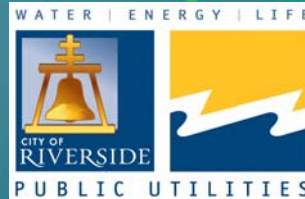




Digital Transformation: Using Data to Drive Operational Efficiency @ Riverside Public Utilities

Robin Glenney, Water Quality Administrator

Brando Crozier, Project Coordinator



Riverside Public Utilities

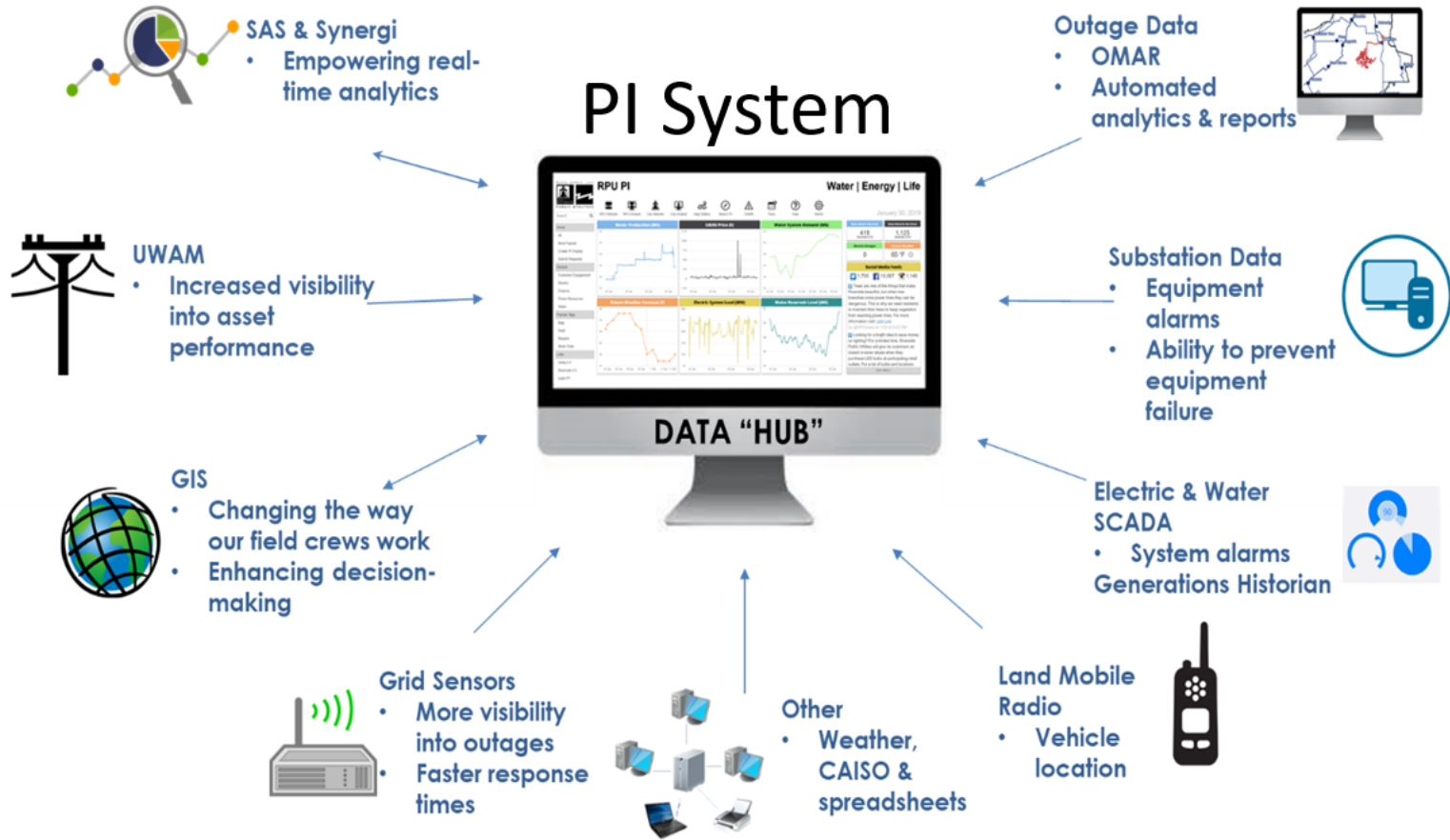
- Population - 324,000 residents
- Southern California - 60 miles east of Los Angeles
- Established in 1895
- Consumer-owned water & electric utility
- 81 square mile service territory
- 112,000 electric meters
- 65,000 water meters



Background

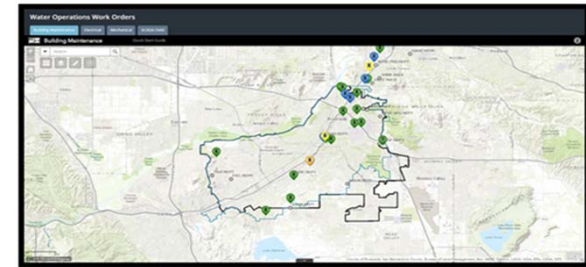
- All divisions within RPU rely on data to make operational and fiscal decisions
- Hundreds of Thousands of data points are collected daily
- RPU recognized the need to move away from storing data in various formats and disparate systems
- In response to this need, RPU implemented OSIssoft PI System in 2016

OSIsoft PI System – Data Hub



Examples of PI System Benefits

- Improved operational efficiencies
- Reduced staff time by automating processes
- Increased visibility into systems and assets
- Improved system reliability
- Reduced operating costs
- Advanced methods for monitoring CAISO market activity



Status of PI Implementation

- Currently in 4th year of 5-year Enterprise Agreement with OSIsoft
- PI team supports entire Utility (Water, Electric, Generation)
 - 2 full-time PI Consultants 
 - 1 Analyst (50% time)
 - 1 Database Developer (50%)
 - Sr. GIS Analyst (supports GIS integration)
- Training / developing Super Users
 - Intro, Advanced, Advanced 2.0, and customized on-site courses
 - OSIsoft self-paced on-line courses
- 30 integrated systems
- Many operating dashboards, display and alerts

Return on Investment (ROI)

- Since implementing PI, RPU has achieved a return on investment of over \$820,000 per year
- This far surpasses the annual enterprise service cost of the OSIsoft PI system
- Additionally, a significant amount of new development is currently underway that will continue to increase ROI

RPU'S STORY



CHALLENGES

- Lots of data in disparate systems
- Time intensive manual reporting
- Limited access to real time operational data

SOLUTION

- PI as a Data Hub
- Near real time PI Vision displays
- Automated PI DataLink Reports

BENEFITS

- Easy access to previously difficult to reach data
- Four hours a day saved from day late reporting

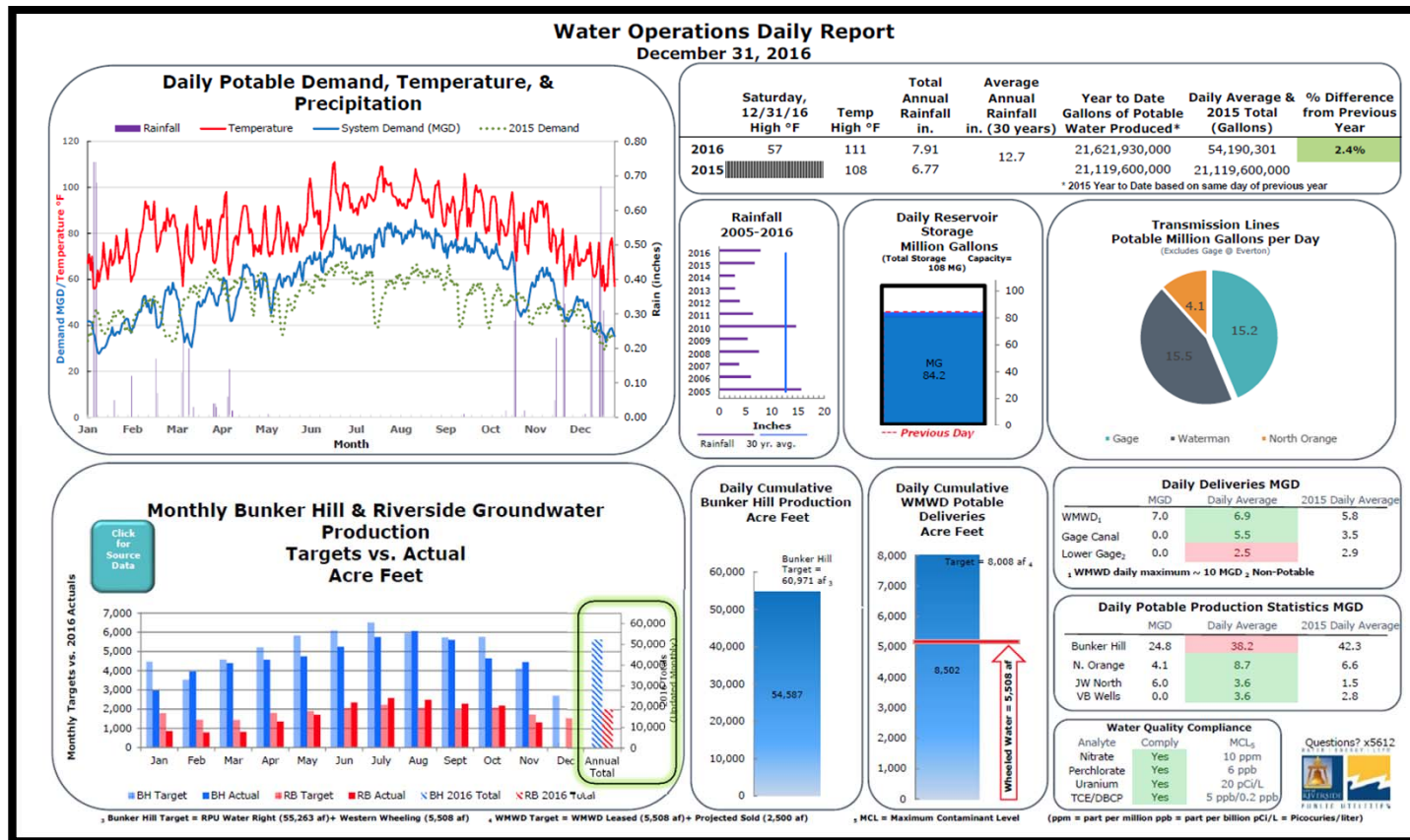


Utilizing PI provides insight into our system in real time, allowing us to make effective operational decisions.

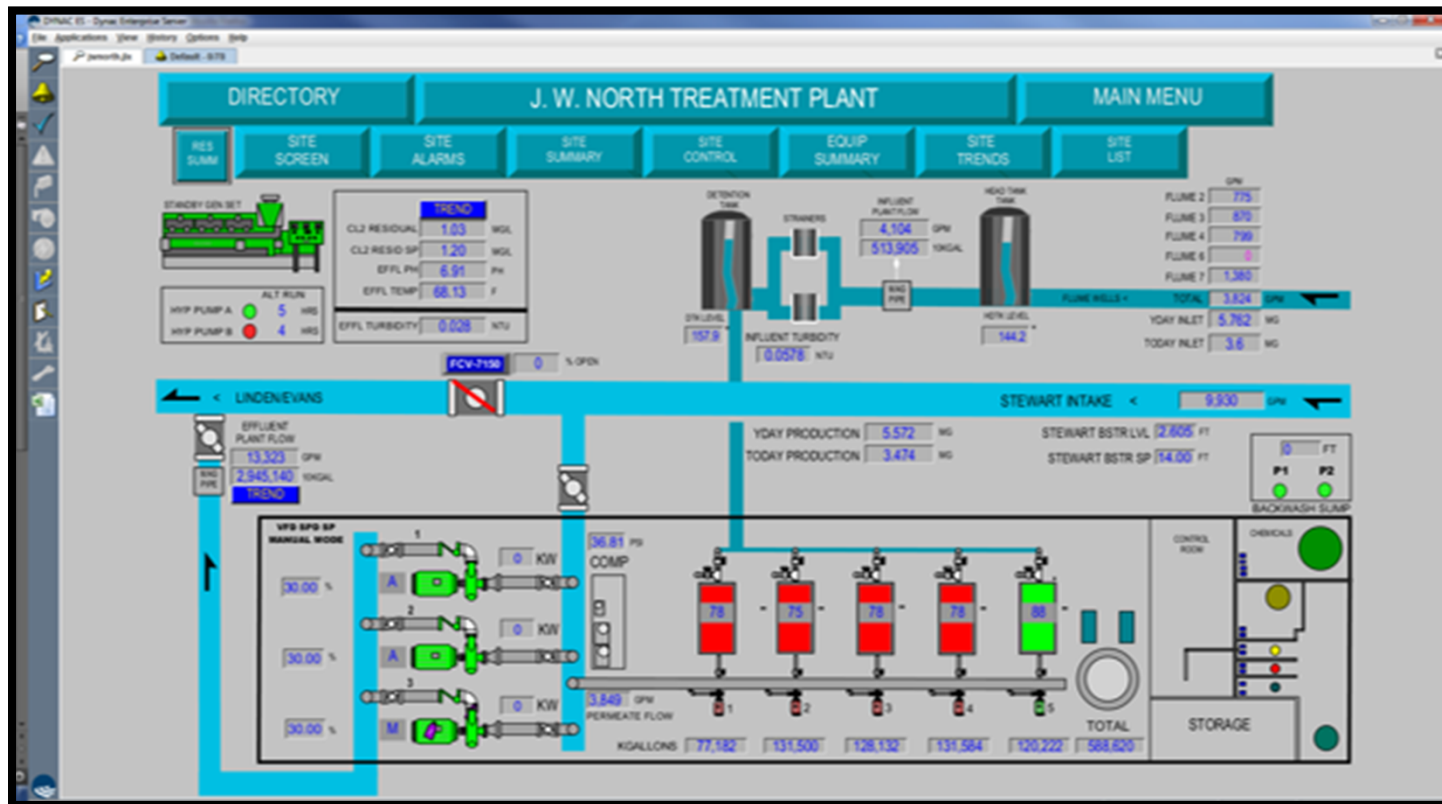


David Garcia, Water Systems Operations Manager, Riverside Public Utilities

Water Operations Dashboard – Prior State



SCADA Display



SCADA Extraction

Time	RESERVOIR points/RESTOTAL	WATERMAN WELLS points/R041FI1TOTAL	GARNER B points/R021FLOWTOT	GARNER C points/R022FLWTOT	GARNER D points/R023FLOWTOT
12/14/15 12:00 AM	87515048	2329124	1803192	342773	1831967
12/14/15 1:00 AM	87491520	2329202	1803284	342773	1831967
12/14/15 2:00 AM	87486800	2329280	1803376	342773	1831967
12/14/15 3:00 AM	87202728	2329358	1803468	342773	1831967
12/14/15 4:00 AM	86810568	2329436	1803560	342773	1831967
12/14/15 5:00 AM	86649176	2329514	1803651	342773	1831967
12/14/15 6:00 AM	86581776	2329593	1803742	342773	1831967
12/14/15 7:00 AM	86534392	2329671	1803833	342773	1831967
12/14/15 8:00 AM	86664640	2329748	1803925	342773	1831967
12/14/15 9:00 AM	86998768	2329827	1804017	342773	1831967
12/14/15 10:00 AM	87244784	2329905	1804109	342773	1831967
12/14/15 11:00 AM	87636840	2329983	1804201	342773	1831967
12/14/15 12:00 PM	88031360	2330061	1804293	342773	1831967
12/14/15 1:00 PM	88374232	2330139	1804384	342773	1831967
12/14/15 2:00 PM	88745960	2330215	1804476	342773	1831967
12/14/15 3:00 PM	89196304	2330293	1804567	342773	1831967
12/14/15 4:00 PM	89451472	2330371	1804658	342773	1831967
12/14/15 5:00 PM	89588120	2330449	1804750	342773	1831967
12/14/15 6:00 PM	89664688	2330527	1804841	342773	1831967
12/14/15 7:00 PM	89482056	2330606	1804932	342773	1831967
12/14/15 8:00 PM	89161888	2330684	1805023	342773	1831967
12/14/15 9:00 PM	88717064	2330762	1805114	342773	1831967
12/14/15 10:00 PM	88431480	2330839	1805205	342773	1831967
12/14/15 11:00 PM	88238008	2330917	1805296	342773	1831967
12/15/15 12:00 AM	88103736	2330995	1805388	342773	1831967

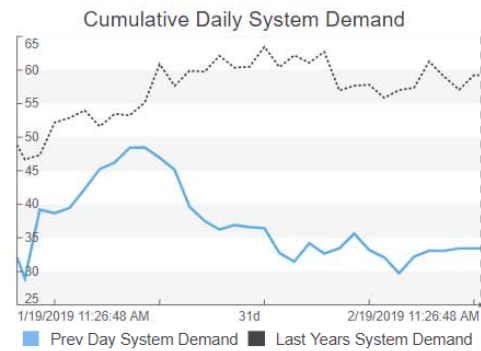
SCADA Data Manipulation

Date	Day of Year	Temperature	Precipitation	Gage - Bunker Hill	Deberry + Van Buren Well (flowing to Gage)	Total Gage Production (mgd)	Waterman Wells
01/01/15	1	54	0.00	14.7	3.8	18.5	12.4
01/02/15	2	60	0.00	14.6	3.8	18.4	14.5
01/03/15	3	61	0.00	14.6	3.8	18.4	13.9
01/04/15	4	69	0.00	14.5	3.8	18.3	15.0
01/05/15	5	76	0.00	13.3	3.8	17.1	20.3
01/06/15	6	81	0.00	13.1	3.8	16.9	28.4
01/07/15	7	81	0.00	12.3	3.7	16.0	29.7
01/08/15	8	74	0.00	13.1	3.7	16.8	29.6
01/09/15	9	65	0.00	14.6	3.8	18.3	18.9
01/10/15	10	65	0.00	14.9	3.8	18.6	13.0
01/11/15	11	59	0.20	14.2	3.8	18.0	14.4
01/12/15	12	64	0.01	14.1	3.8	17.9	12.6
01/13/15	13	67	0.00	13.8	3.8	17.5	10.6
01/14/15	14	69	0.00	14.8	3.7	18.5	12.4
01/15/15	15	72	0.00	14.7	3.7	18.4	13.0
01/16/15	16	77	0.00	14.7	3.7	18.4	17.5
01/17/15	17	80	0.00	14.6	3.7	18.3	19.9
01/18/15	18	76	0.00	14.6	3.7	18.3	15.5
01/19/15	19	74	0.00	14.7	3.7	18.4	16.4
01/20/15	20	67	0.00	14.5	3.7	18.3	19.8
01/21/15	21	72	0.00	14.4	3.7	18.2	16.5
01/22/15	22	75	0.00	14.1	3.7	17.8	14.9
01/23/15	23	73	0.00	13.5	3.7	17.2	21.4

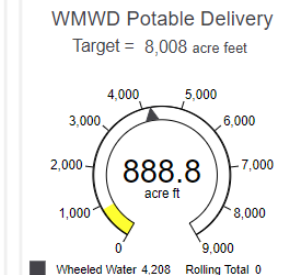
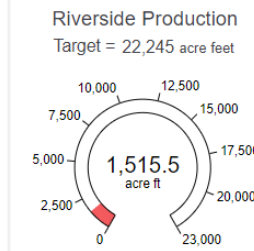
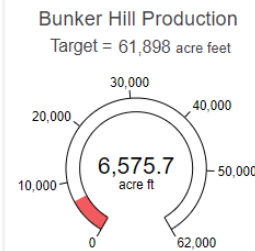
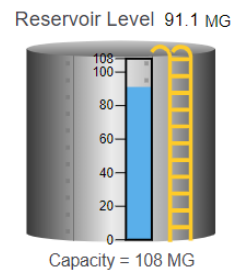
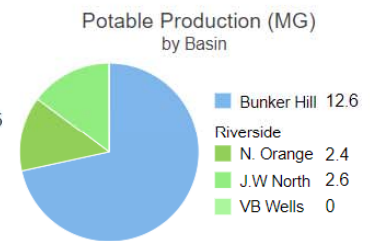
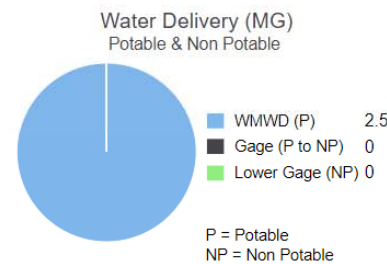
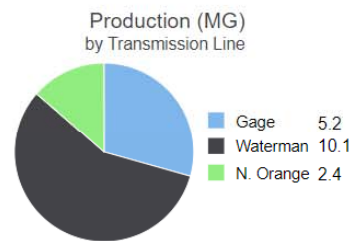
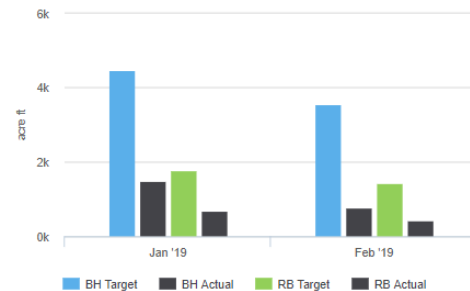


Water Operations Dashboard

Home / Water / [Water Operations](#)



Monthly Bunker Hill & Riverside Groundwater Production Target vs Actual (AF)



Water Operations Blend Summary – Prior State

Print

Close

Blended Averages

1/31/2019

	Flow	Gross Alpha (PC/L)	Uranium (PC/L)	PCE (ug/L)	TCE (ug/L)	DBCP (ug/L)	Nitrates (Mg/L)	Perchlorate (ug/L)	Arsenic (ug/L)	Cr +6 (ug/L)
San Bernardino 42	18143	2.43	6.35	0.00	0.45	0.01	24.68	3.73	3.45	2.18
Gage Inlet	7500	1.00	23.78	0.00	0.08	0.01	26.99	0.25	0.59	1.58
North Orange	4840	1.00	11.25	0.00	0.00	0.00	46.97	2.99	1.03	0.72
G.T. Turnout	0	2.43	6.35	0.00	0.45	0.01	24.68	3.73	3.45	2.18

Booster Flow	Gross Alpha MCL=15 DLR=7.5	Uranium MCL=20 DLR=10	PCE MCL=5 DLR=2.5	TCE MCL=5 DLR=2.5	DBCP MCL=0.2 DLR=0.1	Nitrates MCL=45 DLR=22.5	Perchlorate MCL=6 DLR=4	Arsenic MCL=10 DLR=2	Cr +6 MCL=10 DLR=5
30483	1.85	11.42	0.00	0.29	0.01	28.79	2.76	2.36	1.80

Water Operations Blend Summary

- Data Input

1/30/2019																			
Ken Olson																			
	GPM	Gross Alpha		Uranium		PCE		TCE		DBCP		Nitrates		Perchlorate		Arsenic		Cr +6	
		PC/L	WT. AVG	PC/L	WT. AVG	ug/L	WT. AVG	ug/L	WT. AVG	ug/L	WT. AVG	Mg/L	WT. AVG	ug/L	WT. AVG	ug/L	WT. AVG	ug/L	WT. AVG
Gage Delivery																			
Van Buren1	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Van Buren2	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Gage 56-1	1625	1	1625.00	13	21125.00	0	0.00	0	0.00	0.03	48.75	19	30875.00	1.4	2275.00	1.21	1966.25	1	1625.00
Gage 46-1	2175	1	2175.00	30	65250.00	0	0.00	0.32	696.00	0	0.00	28	60900.00	8.3	2	0	0.00	0.9	1957.50
Gage 31-1	0	1	0.00	32	0.00	0	0.00	0	0.00	0	0.00	29.18	0.00	3.89	0.00	1.21	0.00	1.3	0.00
Gage 29-3	0	1	0.00	31	0.00	0	0	10	0	0.02	0	35.41	0.00	18.19	2	0	0.00	1.4	0.00
Gage 29-2	0	1	0.00	27	0.00	0	0	18.9	0	0.01	0	28.27	0.00	8.86	2	0.36	0.00	2	0.00
Gage 51-1	0	1	0.00	12	0.00	0	0	9.4	0	0.22	0	41.72	0.00	39.24	2	0.72	0.00	2.5	0.00
Gage 26-1	0	1	0.00	49	0.00	0	0.00	1.05	0.00	0	0.00	34	0.00	6.3	0.00	1.15	0.00	3.4	0.00
Gage 27-1	0	1	0.00	27	0.00	0	0.00	0.51	0.00	0	0.00	34.48	0.00	7.5	0.00	0	0.00	4.2	0.00
Gage 66-1	0	1	0.00	8.7	0.00	0	0	2.88	0	0.08	0	53	0.00	14.7	2	0	0.00	8.8	0.00
Gage 27-2	0	1	0.00	11	0.00	0	0.00	0	0.00	0	0.00	42.69	0.00	9	0.00	0	0.00	4.8	0.00
Gage 29-1	0	2	0.00	5.2	0.00	0	0.00	0	0.00	0	0.00	51.99	0.00	11.46	0.00	2.78	0.00	4.9	0.00
Gage DeBerry	0	1	0.00	2.2	0.00	0	0.00	0	0.00	0	0.00	17	0.00	0.6	0.00	0	0.00	0.14	0.00
Gage 92-1	2580	1	2580.00	11	28380.00	0	0	1.9	0	0.04	0	25.27	65196.60	16.05	2	1.3	3354.00	1.9	4902.00
Gage 92-2	0	3	0.00	5	0.00	0	0.00	0	0.00	0	0.00	15	0.00	1.27	0.00	1.33	0.00	2.2	0.00
Gage 92-3	0	1	0.00	7.4	0.00	0	0.00	0	0.00	0	0.00	13	0.00	1.22	0.00	1.4	0.00	2	0.00
Gage 98-1	0	3.1	0.00	2	0.00	0	0.00	0.67	0.00	0	0.00	4	0.00	3	0.00	2.7	0.00	3.8	0.00
Tippecanoe	2600	1	2600.00	38	98800.00	0	0	7.69	0	0.15	0	32.83	85358.00	29.26	2	0	0.00	2.2	5720.00
TOTALS	8980.00		8980.00		213555.00		0.00		696.00		48.75		242329.60		2289.00		5320.25		14204.50
GAGE WT. AVG			1.00		23.78		0.00		0.08		0.01		26.99		0.25		0.59		1.58
North Orange																			
Garner B	1350	1	1350.00	3.4	4590.00	0	0.00	0	0.00	0	0.00	27	36450.00	0.82	1107.00	1.32	1782.00	0.44	594.00
Garner C	0	1	0.00	2.4	0.00	0	0.00	0	0.00	0	0.00	28	0.00	1.18	0.00	1.2	0.00	0.61	0.00
Garner D	0	1	0.00	2	0.00	0	0.00	0	0.00	0	0.00	28	0.00	2.15	0.00	1.2	0.00	1.2	0.00
Brunton 1R	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Electric Street	1465	1	1465.00	14	20510.00	0	0	0	0	0.37	0	46.41	67990.65	2.75	4028.75	2.2	3223.00	0.59	864.35
Twin Springs	0	1	0.00	6.1	0.00	0	0	0	0	0.25	0	33	0.00	3.56	0.00	0	0.00	1.1	0.00
Moore Griffith	0	1	0.00	3.6	0.00	0	0	0	0	0.22	0	28.5	0.00	3.77	0.00	0	0.00	2	0.00
Palmyrita	2025	1	2025.00	14.5	29362.50	0	0	0	0	0.52	0	60.7	122917.50	4.61	9335.25	0	0.00	1	2025.00
TOTALS	4840		4840.00		54462.50		0.00		0.00		0.00		227358.15		14471.00		5005.00		3483.35
N.O. WT. AVG			1.00		11.25		0.00		0.00		0.00		46.97		2.99		1.03		0.72

Data Collection

Weather:		260 Daily Flow Chart	
Wells		Date: 01/30/19	
Stiles		Y Total Res. Gal. @ 07:00	85,400,000
Scheuer /	2927	T Total Res. Gal. @ 07:00	89,149,856
Garner 1		Change in Ft. = Loss/Gain in Gal:	+ 3,749,856
Garner 4			
Garner 5			
Garner 6			
Garner 7			
Cooley H			
Cooley I			
Cooley J			
Raub 4 R			
Raub 5 R /	2717		
Raub 6 /	1798		
Raub 7 /	2321		
Raub 8 /	2309		
Thorne 12 /	1946		

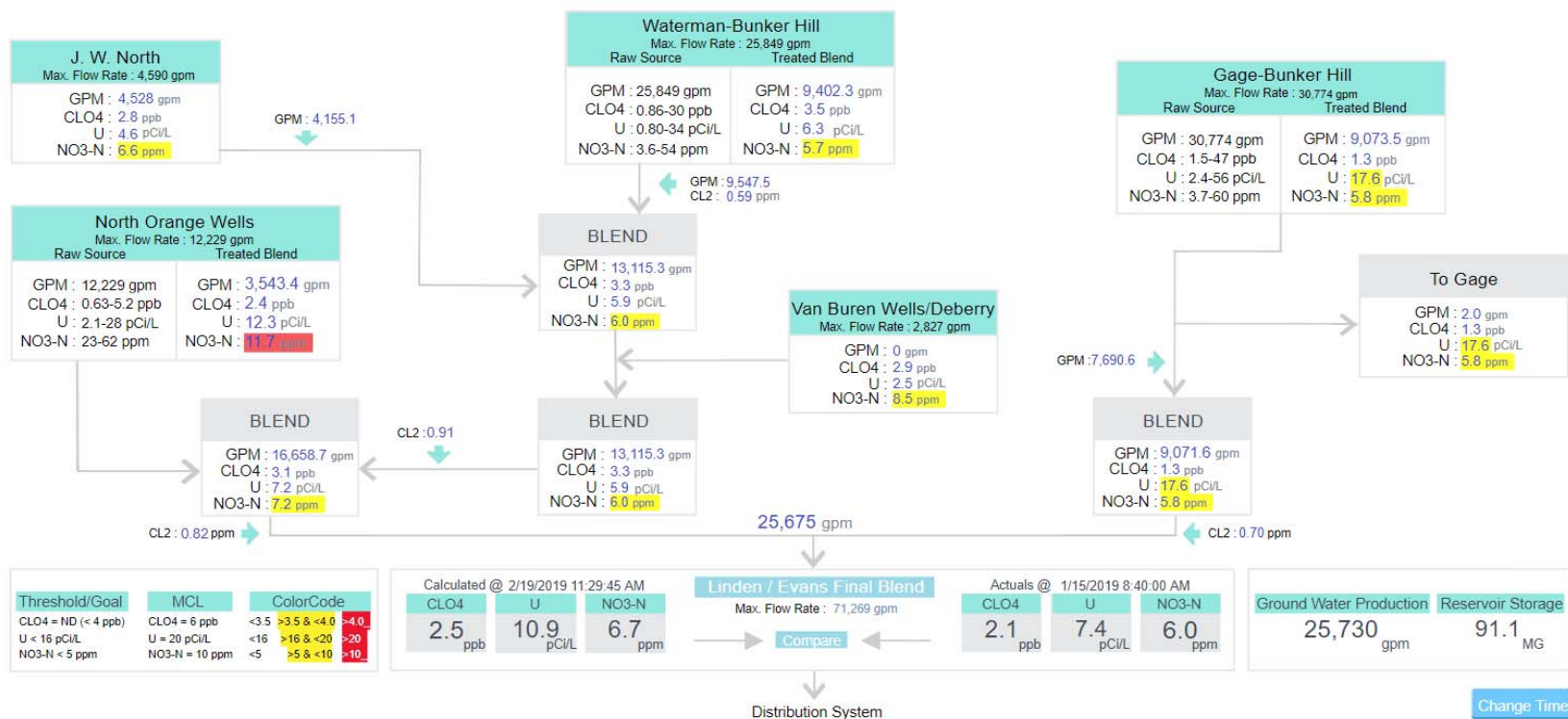
Calculated Totals:	
Linden/Gage Calculated Flow:	
JW North Read:	
42":	
Total Res. Gal:	

Operator Notes :
Twin Springs & Warren 1 to be sampled today. Gage dialing in booster's @ Sunnyside.



Real-Time Blend Summary Dashboard

Home / Water / Blend



Water Operations Water Well Flow Rates – Prior State

DIRECTORY

PRODUCTION WELL SUMMARY

MAIN MENU

BUNKER HILL/WATERMAN

RIV N BASIN

RIV S BASIN

BUNKER HILL/GAGE

RIV CANAL

SITE	GPM	SITE	GPM	SITE	GPM	SITE	GPM	SITE	GPM
STILES	0	FLUME 2	775	GARN B	0	51-1	0	FILL ST	0
SCHUELER	2908	FLUME 3	870	GARN C	0	56-1	1652	FIRST ST	0
GARNER 1	0	FLUME 4	797	GARN D	0	66-1	0	FLUME 6	0
GARNER 4	0	FLUME 5	0	BRUNTON 1R	0	92-1	2557	MULBERRY	0
GARNER 5	0	FLUME 7	1382	PALMYRITA	2052	92-2	0	OLIVEVIEW 1	0
GARNER 6	0			MOORE GRIFF	0	92-3	0	OLIVEVIEW 2	0
GARNER 7	0			ELECTRIC ST.	1491	96-1	0	OLIVEVIEW 3	0
COOLEY H	0			TWIN SPRING	0	TIPPIE	2541	PALM WELL	N/A
COOLEY I	0					MAIN # 1	7967	PALMYRITA	0
COOLEY J	0			GAGE CANAL		VB 1 WELL	0	JOHNSON 4	0
THORNE 12	0			25-1	0	VB 2 WELL	0		
RAUB 4R	0			27-1	0	DBERRY	0		
RAUB 5R	2701			27-2	0	MAIN # 2			
RAUB 6	0			29-1	0		7,528		
RAUB 7	1796			29-2	0				
RAUB 8	2374			29-3	0	EVERTON			
WARREN 1	0			31-1R	0		0		
WARREN 4	0			45-1	2157				
HUNT 10	0	JWN PERM GPM				LINGAGE			
10,010		3,837				7,244		2,443	36,774
									25,538

DIRECTORY

RES
SUM

SITE
SCREEN

VOLTS

AMP

475 A 25

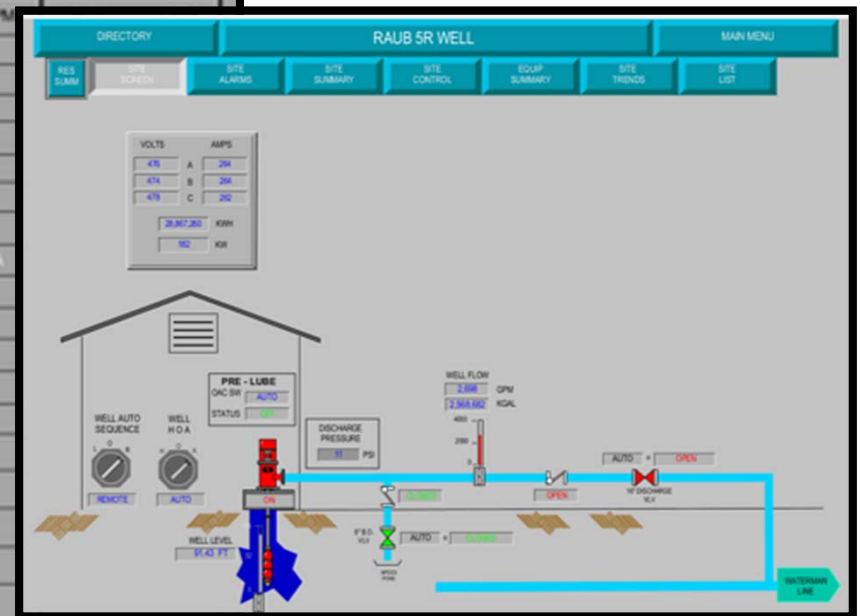
475 B 25

475 C 25

20,907.200

10

WELL DATA
SCA T1





Current Water Production Well Flow Rate

Home / Water / GPM



Waterman

Name	Value ▲	Trend ▲	Average	Maximum	Units
Cooley H Flow Rate GPM	0		0	0	gpm
Cooley I Flow Rate GPM	0		0	0	gpm
Cooley J Flow Rate GPM	0		0	0	gpm
Garner 1 Flow Rate GPM	0		2,313.3	298.75	gpm
Garner 4 Flow Rate GPM	0		0	0	gpm
Garner 5 Flow Rate GPM	0		0	0	gpm
Garner 6 Flow Rate GPM	0		0	0	gpm
Garner 7 Flow Rate GPM	0		0	0	gpm
Hunt 10 Flow Rate GPM	0		0	0	gpm
Raub 5R Flow Rate GPM	0		1,862.1	2,794.1	gpm
Raub 6 Flow Rate GPM	0		517	1,940	gpm
Raub 8 Flow Rate GPM	0		95,371	2,494.9	gpm
Stiles Flow Rate GPM	0		0	0	gpm
Warren 1 Flow Rate GPM	0		0	0	gpm
Warren 4 Flow Rate GPM	0		0	0	gpm
Raub 7 Flow Rate GPM	1,902.9		1,656.7	1,974.6	gpm
Thorne 12 Flow Rate GPM	1,936.8		1,713.1	2,137.7	gpm
Raub 4R Flow Rate GPM	2,599.6		589.69	2,724.5	gpm
Scheuer Flow Rate GPM	2,962		2,639.5	3,199	gpm

Flow rate @
2/19/2019 11:32:00 AM

[View 365 Day Flow Trends](#)

Gage

Name	Value ▲	Trend ▲	Average	Maximum	Units
Gage 26-1 Flow Rate GPM	0		0	0	gpm
Gage 27-1 Flow Rate GPM	0		0	0	gpm
Gage 27-2 Flow Rate GPM	0		0	0	gpm
Gage 29-1 Flow Rate GPM	0		0	0	gpm
Gage 29-2 Flow Rate GPM	0		0.089512	1.5	gpm
Gage 29-3 Flow Rate GPM	0		145.63	1,672	gpm
Gage 31-1R Flow Rate GPM	0		0	0	gpm
Gage 51-1 Flow Rate GPM	0		6,688	1,389	gpm
Gage 66-1 Flow Rate GPM	0		0	0	gpm
Gage 92-2 Flow Rate GPM	0		0	0	gpm
Gage 92-3 Flow Rate GPM	0		0	0	gpm
Gage 98-1 Flow Rate GPM	0		149	3,082.5	gpm
Gage 56-1 Flow Rate GPM	1,724.6		1,688.6	1,894	gpm
Gage 46-1R Flow Rate GPM	2,161.2		2,159.5	2,233.1	gpm
Tippecanoe Flow Rate GPM	2,587.8		2,573	2,730.9	gpm
Gage 92-1 Flow Rate GPM	2,607		2,169.7	2,659	gpm

Transmission Mains

Name	Value ▲	Trend ▲	Average	Maximum	Units
Weir #2 Weir Flow Rate GPM	0		0.2	7.9	gpm
North Orange Flow Rate	3,557		3,977.7	7,944.4	gpm
JW North JW North Flowrate	4,058		3,508.8	6,516.5	gpm
Gage Flow Rate GPM	7,323.4		7,560.8	11,537.5	gpm
Gage - Bunker Hill Flow Rate G	8,079.8		8,079.7	8,184.4	gpm
Linden Evans Flow Rate GPM	25,893.8		25,064.2	32,037.5	gpm

North Orange

Name	Value ▲	Trend ▲	Average	Maximum	Units
Brunton 1R Flow Rate GPM	0		0	0	gpm
Garner B Flow Rate GPM	0		507.84	1,648.6	gpm
Garner C Flow Rate GPM	0		228.82	2,816	gpm
Garner D Flow Rate GPM	0		7,530.3	2,104	gpm
Moore Griffith Flow Rate GPM	0		0	0	gpm
Twin Springs Flow Rate GPM	0		30,258	2,662	gpm
Electric Street Flow Rate GPM	1,514.8		1,140.6	1,796.6	gpm
Palmyrita Flow Rate GPM	2,042.2		2,062.5	2,377.2	gpm

Riverside North

Name	Value ▲	Trend ▲	Average	Maximum	Units
Flume 6 Flow Rate GPM	0		0	0	gpm
Gage DeBerry Flow Rate GPM	0		0	0	gpm
Van Buren 1 Flow Rate GPM	0		1,869.7	932.53	gpm
Van Buren 2 Flow Rate GPM	0		0	0	gpm
Flume 2 Flow Rate GPM	812.88		771.75	4,000	gpm
Flume 3 Flow Rate GPM	891.72		857.65	902.89	gpm
Flume 4 Flow Rate GPM	1,273.8		1,136.8	1,371.1	gpm
Flume 7 Flow Rate GPM	1,550.5		901.29	1,564.8	gpm

WMWD

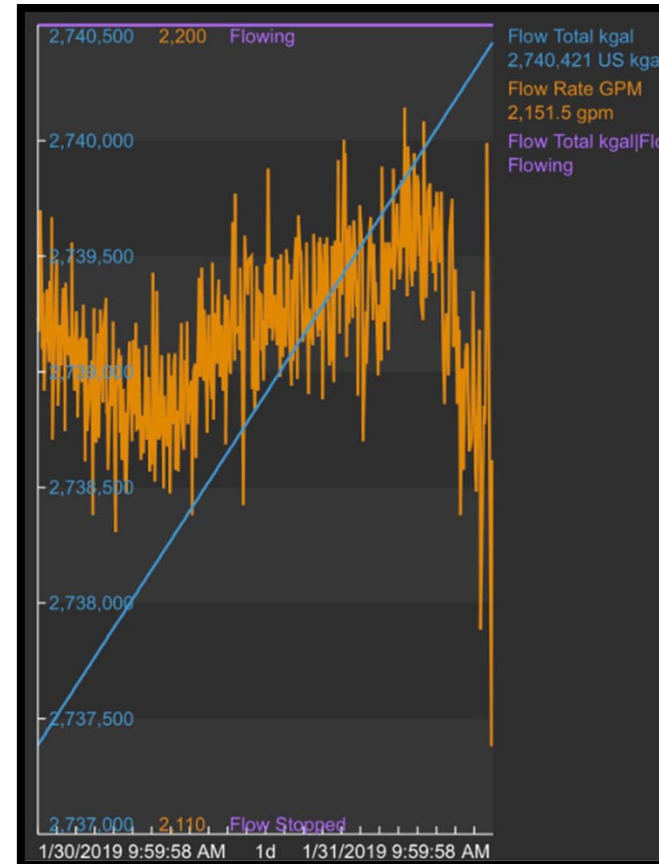
Name	Value ▲	Trend ▲	Average	Maximum	Units
WMWD WMWD Warrington Fl	0		0	0	gpm
WMWD WMWD Green Orchard	0.98438		0.43322	1.3125	gpm
WMWD WMWD Mockingbird Fl	2,589.8		4,161.7	4,366.4	gpm

Water Operations Mobile App

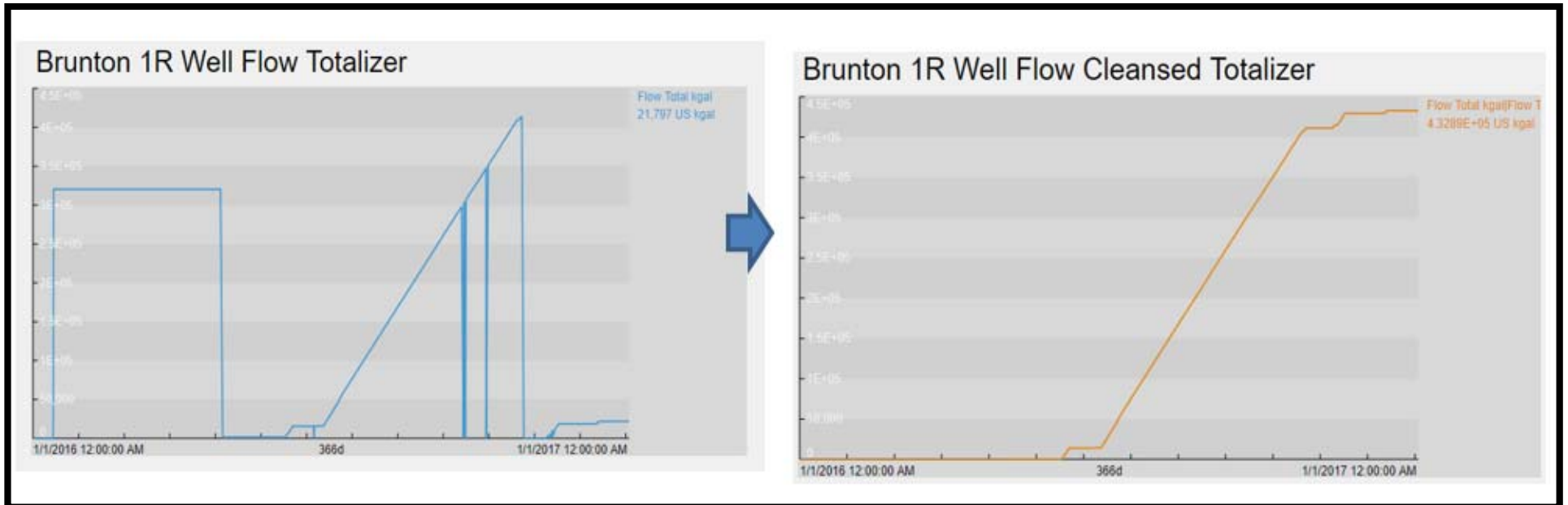
AT&T LTE 9:59 AM

Water_Wells_Mobile

Asset ▲	Flow Rat...	Flow Tota...	Flow Status
Brunton 1R	0	553,481	Flow Stopped
Cooley H	0	2,157,646	Flow Stopped
Cooley I	0	3,530,168	Flow Stopped
Cooley J	0	3,083,074	Flow Stopped
Electric Street	1,491.9	1,982,172	Flowing
Flume 2	747.88	677,269	Flowing
Flume 3	873.64	785,325	Flowing
Flume 4	790.16	1,578,278	Flowing
Flume 6	0	0	Flow Stopped
Flume 7	1,390.5	4,497,171	Flowing
Gage 26-1	0	885,825	Flow Stopped
Gage 27-1	0	192,128	Flow Stopped
Gage 27-2	0	144,830	Flow Stopped
Gage 29-1	0	163,580	Flow Stopped
Gage 29-2	0.125	441,605	Flow Stopped
Gage 29-3	0	896,463	Flow Stopped



Well Totalizer Trend Cleansing



Data Validation Reporting



SCADA Data Validation Report

Select Date

Start Time

1 Jan

2019

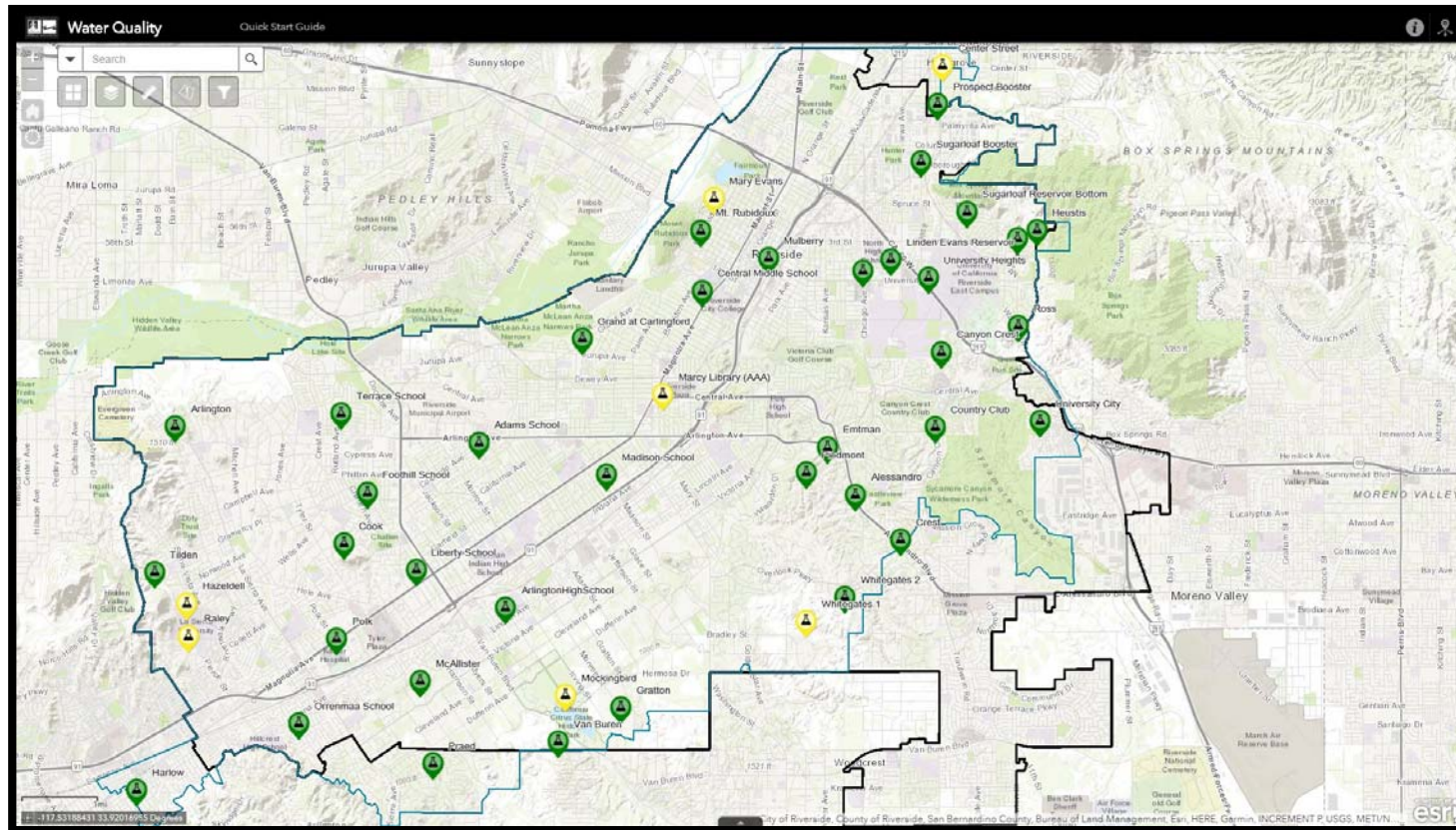
End Time

20 Jan

2019

FLOW			PI TOTALS				Diff
Row Labels	Sum of VALUE	AF	Row Labels	Min of VALUE	Max of VALUE2	AF	
BRUNTON 1R GPM	7559.275	1.392	BRUNTON 1R X 1000	553024	553481	1.40248273	-0.01057
COOLEY H GPM	0	0.000	COOLEY H X 1000	2157529	2157529	0	0
COOLEY I GPM	0	0.000	COOLEY I X 1000	3528852	3528852	0	0
COOLEY J GPM	1.933333333	0.000	COOLEY J X 1000	3083074	0	-9461.614968	9461.615
ELECTRIC GPM	574589.8375	105.801	ELECTRIC X 1000	1924124	1958485	105.4501293	0.3509580
EVERTON MID	106173.7505	19.550	EVERTON X 1000	6361531	6419376	177.5199421	-157.97
FILL IRR GPM	0	0.000	FILL IRR X 1000	1051626	1051626	0	0
FIRST ST IRR GPM	0	0.000	FIRST ST IRR X 1000	542993	542993	0	0
FLUME 2 GPM	319563.3146	58.842	FLUME 2 X 1000	644000	664388	62.56852932	-3.7263
FLUME 3 GPM	355732.4232	65.502	FLUME 3 X 1000	752960	774183	65.13105247	0.371111
FLUME 4 GPM	477926.3497	88.002	FLUME 4 X 1000	1531335	1559944	87.79787401	0.204253
FLUME 5 CANAL GPM	0	0.000	FLUME 5 CANAL X 1000	0	0	0	0

OSIsoft PI and ESRI GIS



Layer List

Operational Layers

☒ Lab Data

Chlorine Lab (ppm)

 > 0.5

 > 0.25 to 0.5

 0 to 0.25

PI Datalink

The screenshot shows the PI Datalink Excel add-in interface. The ribbon includes tabs for File, Home, Insert, Page Layout, Formulas, Data, Review, View, Developer, and ACROBAT. The PI Datalink tab is active, showing options like Current Value, Archive Value, Compressed Data, Sampled Data, Timed Data, Calculated Data, Time Filtered, Explore, Compare, Search, Asset Filter, Properties, Update, Settings, About, and Help. The main spreadsheet area displays data for '72\"/>

Start Date	End Date	Sample Point	Previous Day Flow Total MG	Previous Day Flow Total	Number of Values:	72\" - Retail Sales
1/1/2019	1/31/2019	\\PU-PIAFAPPRD\Water AF\City of Riverside\Delivery\Potable\Linden Evans\Flow Total 10kgal	49.0	US Mgal	31	41.8
		\\PU-PIAFAPPRD\Water AF\City of Riverside\Delivery\Potable\Retail / Others\WMWD\WMWD	46.6		31	39.5
			50.7		31	43.8
			55.4		31	47.8
			51.7		31	44.2
			48.2		31	40.8
			47.7		31	40.3
			47.6		31	40.5
			44.6		31	37.9
			46.6		31	39.8
			47.6		31	40.7
			42.3		31	35.1
			40.7		31	33.8
			42.1		31	35.2
			43.8		31	37.1
			35.5		31	29.5
			35.9		31	29.7
			37.1		31	33.8
			36.0		31	36.0
			30.8		31	30.8
			33.2		31	30.0
			34.5		31	28.5
			43.2		31	37.1
			40.2		31	36.0
			40.7		31	34.8
			45.4		31	39.4
			45.9		31	39.9
			47.9		31	41.9
			47.7		31	41.7
			49.8		31	43.8
			47.6		31	41.6

Monthly Compliance Reports - Contact Time

File Home Insert Page Layout Formulas Data Review View Help Acrobat PI DataLink PI Builder Power Pivot Search

Current Value Compressed Sampled Timed Calculated Time Filtered Explore Compare Search Asset Properties Update Settings About Help

Single Value Multiple Value Calculation Events Search Properties Update Resources

C18 [=PITimeDet("Gage C15C56","Gage C15A510:\$A\$40","", "Interpolated")]

Gage CT Calc	Start Time	End Time	WPU-PIDMSDNGAGC	WPU-PIDMSD	WPU-PIDMSDNGAGC	LEMONABE	WPU-PIDMSDNGAGC	LEMONABSTR	FLV1PHV	01/18/2020 2:00	01/18/2020 4:00
Minimum CT each day	Associated GPI	Associated Temp	Temp in C	Associated pH							
01-Jan-20 05:40:00	0.60	8054.6975	67.144270	20	7.09					0.650937	
02-Jan-20 03:40:00	0.63	7500.75	67.403425	20	7.13					0.5250375	
03-Jan-20 06:26:00	0.56	7948.4375	67.144270	20	7.12					0.27565018	
04-Jan-20 03:02:00	0.53	7957.8125	67.731556	20	7.08					0.076306647	
05-Jan-20 07:20:00	0.53	8407.8125	67.147489	20	7.08					0.193281	
06-Jan-20 21:42:00	0.50	12546.875	67.364059	20	7.18					0.252031	
07-Jan-20 20:24:00	0.51	18221.875	67.879082	20	7.18					0.361875	
08-Jan-20 00:00:00	0.52	17335.3375	67.403425	20	7.19					0.527856	
09-Jan-20 02:00:00	0.54	18071.0000	67.347026	20	7.10						
10-Jan-20 04:06:00	0.59	30731.25	67.70427	20	7.20						
11-Jan-20 12:44:00	0.57	18081.25	67.100313	20	7.16						
12-Jan-20 09:48:00	0.62	17650.9375	66.487960	19	7.15						
13-Jan-20 07:20:00	0.51	18585.8375	66.707809	19	7.15						
14-Jan-20 09:20:00	0.53	11235	66.35672	19	7.10						
15-Jan-20 21:44:00	0.52	14853.125	66.168405	19	7.17						
16-Jan-20 07:20:00	0.55	11728.125	66.340209	19	7.16						
17-Jan-20 20:28:00	0.51	7357.8125	66.681557	19	7.10						
18-Jan-20 03:10:00	0.11	6848.4375	66.088591	19	7.09						
19-Jan-20 11:42:00	0.51	0007.1075	67.679362	20	7.03						
20-Jan-20 08:54:00	0.53	7173.4375	69.066710	20	7.03						
21-Jan-20 22:00:00	0.51	5326.5625	69.756591	20	7.12						
22-Jan-20 07:36:00	0.64	5342.1875	68.942345	21	7.09						
23-Jan-20 07:04:00	0.64	7425	68.754259	21	7.06						
24-Jan-20 22:02:00	0.53	8548.4375	68.784843	20	7.08						
25-Jan-20 03:50:00	0.63	8151.5625	68.384529	20	7.12						
26-Jan-20 21:28:00	0.61	8538.4375	68.61622	20	7.09						
27-Jan-20 08:22:00	0.51	8371.875	69.378746	21	7.08						
28-Jan-20 21:32:00	0.51	7139.0625	69.528405	21	7.04						
29-Jan-20 21:56:00	0.51	7445.3125	69.057162	21	7.07						
30-Jan-20 22:10:00	0.51	0001.5625	69.71707	21	7.21						
31-Jan-20 08:24:00	0.53	7359.4375	69.542093	21	7.06						

Timed Data

☐ Data Item

☐ Expression

Root path (optional)

Data item(s)

Gage C15C56:9D96

Time stamp(s)

Gage C15A510:\$A\$40

Retrieval mode

Interpolated

Output cell

Gage C15C510

OK Apply

File Home Insert Page Layout Formulas Data Review View Help Acrobat PI DataLink PI Builder Power Pivot Search

Paste Font Alignment Number Conditional Formatting Styles Cell Styles Cells Editing

B13 Date

CT Compliance Worksheet

Water System Name: City of Riverside
System Number: 3310031
Month and Year: Jan-20

Section - Gage Transmission Line 2,966,721 Gallons
Short Circuiting Factor for Pipeline 1.00 T₁₀/T
Required Log Inactivation of Virus: 4.0 Log

Clear Data

Date	Hourly Flow Rate (gpm)	Lowest Chlorine Residual (mg/l)	Temperature	Max pH	Effective Contact Time (T ₁₀) minutes	Calculated CT ₁₀	Sum of Calculated CT ₁₀	Required CT	CT Ratio (CT ₁₀ /CT ₁₀)	Calculated Log Inactivation
1	0.025	19.5	0.60	7.1	388	221	221	3	72	206
2	7.569	19.7	0.63	7.1	382	213	213	3	81	205
3	7.848	19.8	0.58	7.1	373	209	209	3	87	270
4	7.555	19.9	0.53	7.1	373	198	198	3	85	261
5	8.450	19.5	0.53	7.1	393	190	190	3	61	243
6	12.247	19.0	0.50	7.2	328	173	173	3	29	155
7	18.222	19.8	0.51	7.2	167	83	83	3	27	119
8	17.858	19.7	0.52	7.2	168	86	86	3	38	112
9	18.072	19.6	0.54	7.2	164	88	88	3	29	115
10	18.131	19.0	0.52	7.2	164	97	97	3	32	120
11	18.081	19.5	0.57	7.2	164	94	94	3	30	124
12	17.681	19.2	0.62	7.1	169	104	104	3	33	131
13	11.558	19.9	0.51	7.1	266	131	131	3	42	187
14	11.225	19.1	0.53	7.1	264	139	139	3	44	175
15	11.453	19.0	0.52	7.2	259	134	134	3	42	169
16	11.228	19.1	0.55	7.2	259	129	129	3	44	174
17	7.358	19.3	0.51	7.1	493	204	204	3	85	258
18	8.645	19.4	0.50	7.1	446	89	89	3	29	114
19	8.067	19.6	0.51	7.1	380	155	155	3	62	247
20	7.773	20.4	0.53	7.1	382	204	204	3	70	270
21	5.327	20.1	0.51	7.1	957	262	262	3	17	285
22	5.342	20.8	0.64	7.1	896	357	357	3	123	493
23	7.425	20.7	0.54	7.1	480	215	215	3	75	301
24	8.645	20.4	0.53	7.1	387	153	153	3	63	261
25	8.752	20.2	0.63	7.1	384	229	229	3	77	293
26	8.388	20.9	0.64	7.1	345	220	220	3	78	300
27	8.872	20.8	0.51	7.1	428	218	218	3	77	306
28	7.139	20.8	0.51	7.0	491	210	210	3	74	297
29	7.445	20.6	0.51	7.1	399	202	202	3	70	280
30	8.022	20.5	0.51	7.2	345	174	174	3	69	241
31	7.898	20.9	0.53	7.1	371	197	197	3	70	278
Average							3.0		88.7	

Monthly Compliance Reports - Turbidity

Start Time	End Time	0.00	4:00	8:00	12:00
01-Jan-20 18:08:00	02-Jan-20 00:00:00	0.112109	0.034188	0.033455	0.031013
02-Jan-20 00:34:00		0.085156	0.030281	0.036142	0.03199
03-Jan-20 12:42:00		0.0875	0.031013	0.029548	0.031258
04-Jan-20 07:32:00		0.088281	0.030525	0.038584	0.031502
05-Jan-20 16:24:00		0.121109	0.032234	0.033944	0.033455
06-Jan-20 13:24:00		0.134375	0.030769	0.034676	0.032234
07-Jan-20 14:26:00		0.117578	0.032723	0.030037	0.031258
08-Jan-20 10:56:00		0.312891	0.02906	0.027595	0.029548
09-Jan-20 14:38:00		0.03125	0.026374	0.027839	0.034432
10-Jan-20 14:06:00		0.030078	0.026374	0.02735	0.027595
11-Jan-20 00:04:00		0.250781	0.02735	0.027839	0.027595
12-Jan-20 14:14:00		0.096875	0.026374	0.03199	0.029304
13-Jan-20 08:58:00		0.049609	0.02735	0.028816	0.025885
14-Jan-20 20:10:00		0.030078	0.026129	0.026374	0.025885
15-Jan-20 17:06:00		0.030078	0.029304	0.027595	0.028883
16-Jan-20 01:44:00		0.031641	0.025885	0.027595	0.029304
17-Jan-20 21:02:00		0.107813	0.026618	0.028083	0.031746
18-Jan-20 15:54:00		0.034766	0.030037	0.025885	0.027595
19-Jan-20 15:18:00		0.035156	0.031013	0.031013	0.028083
20-Jan-20 10:24:00		0.825391	0.025885	0.031258	0.028571
21-Jan-20 09:42:00		0.041797	0.027595	0.02735	0.027106
22-Jan-20 23:56:00		0.049609	0.028816	0.026862	0.032967
23-Jan-20 20:34:00		0.052734	0.028327	0.02735	0.032967
24-Jan-20 12:30:00		0.062891	0.025885	0.027595	0.033211
25-Jan-20 23:10:00		0.061328	0.033211	0.030769	0.030769
26-Jan-20 21:20:00		0.065234	0.026862	0.027106	0.029792
27-Jan-20 19:54:00		0.073047	0.026618	0.025885	0.026129
28-Jan-20 23:46:00		0.069922	0.026129	0.02735	0.031013

Enter Turbidity Performance Standard (i.e., 0.1, 0.2, 0.3, 0.5, or 1.0): **0.1 NTU**

MONTHLY SUMMARY OF MONITORING FOR SURFACE WATER TREATMENT REGULATIONS

System Name: **CITY OF RIVERSIDE** System Number: **3310031**

Plant Name: **J.W. North** Month/Year: **January-20**

Date	Peak Raw Water Turbidity (S2)	Peak Settled Water Turbidity (S3)	Midnight to 4:00 am	4:00 am to 8:00 am	8:00 am to noon	Noon to 4:00 pm	4:00 pm to 8:00 pm	8:00 pm to Midnight	Average
Wed 1	0.11		0.0342	0.0335	0.0310	0.0357	0.0317	0.0313	0.0329
Thu 2	0.09		0.0303	0.0361	0.0320	0.0337	0.0337	0.0337	0.0333
Fri 3	0.11		0.0310	0.0395	0.0313	0.0359	0.0300	0.0300	0.0312
Sat 4	0.16		0.0286	0.0259	0.0281	0.0230	0.0246	0.0313	0.0284
Sun 5	0.08		0.0295	0.0364	0.0266	0.0286	0.0261	0.0261	0.0289
Mon 6	0.12		0.03	0.03	0.03	0.03	0.03	0.03	0.03

For continuous turbidity monitoring, a discrete turbidity value must be taken off the record chart at four hour intervals for S9.

Note: See Directions on reporting peak recycle, raw, and settled water turbidities.

Total Number of Samples: **186** Number of readings <= 0.1 NTU: **186**

% Readings <= 0.1 NTU: **100.0%** Average Effluent NTU: **0.03**

Meets Standard (i.e. More than 95% of readings are <= 0.1 NTU) (Y/N)? **Yes**

Maximum discrete turbidity value: **0.09**

Average percent reduction during the month = [(Average Raw NTU) - (Average Effluent NTU)] / (Average Raw NTU) x 100% = **74.3%**

Meets Standard (i.e. Reduction is greater than 80%) (Y/N)? **NO**

Percentile Results:

50th =	0.03
90th =	0.03
95th =	0.04
98th =	0.04
99th =	0.04

Water Operations - Tomorrow

- Future PI enhancements / new development
 - Mobile entry of meter reads for collecting hard read data
 - PI Manual Logger
 - Replication of SCADA screens in PI Vision for increased visibility
 - Tokay integration

Contact Us!



- Robin Glenney
- Water Quality Administrator
- Riverside Public Utilities
- RGlenney@RiversideCA.gov



- Brando Crozier
- Project Coordinator
- Riverside Public Utilities
- BCrozier@RiversideCA.gov

Questions?

Please wait for
the **microphone**

State your
name & company



Save the Date...



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AMSTERDAM

October 26-29, 2020



