

How Metropolitan Utilities District is leveraging SAC for – Live SCADA Water Plant and Reservoir Analytics

July 20, 2023

Hemanth Kumar Tatikonda
Metropolitan Utilities District



Agenda

- Who are we? - About MUD
- SAP Journey at MUD
- SAP Analytics Cloud (SAC) Journey at MUD
- Background on SCADA
- Business Scenario- Significance of Water Plant/Reservoir Analytics
- Data Flow - How MUD Leverages SAC for Live SCADA Water Plant Analytics
- Live SCADA Water Plant/Reservoir Analytics Demo
- Lessons Learned
- Q & A

Who are We ?

- Our first water treatment plant was built near the Missouri River in **1889** by a private company.
- The Nebraska Legislature created the Metropolitan Utilities District in the early **1913s** as a political subdivision of the State to provide water and natural gas to the metropolitan Omaha area.
- Metropolitan Water District name was changed to the Metropolitan Utilities District on March 3, **1921**.
- The District is fifth largest public gas utility in the United States.
- We provide a product and service at rates that are lower than area investor-owned utilities and among the lowest in the nation.

MUD Numbers

- Population served **600,000**
- Natural gas customers served **239,487**
- Water customers served **225,028**
- Water hydrants maintained **27,602**
- Miles of water main **3,155**
- Miles of gas mains **2,972**
- Employees **876**
- Figures current as of December 31, 2022

SAP Journey @M.U.D

- 2007 FICO/Logistics
- 2009 HCM
- 2013 CRB / **BW/ BOBJ**
- 2014 SF/Mobility Pilot
- 2016 Click/Full Mobility/OpenText
- 2018 MUDMAP/IM/ **BW4HANA/VIM**
- 2019 Customer Text Alerts/EC/Integration of Lemur/**SAC**
- 2020 Click FSE
- 2021 Vehicle integration with Open Text, **BPC**
- 2022 SAP GRC, Time & Attendance, Geographical Enablement Framework
- 2023 **S/4 Hana** Custom code analysis, Customer preferences.

SAP Analytics Cloud

- Overview of SAP Analytics Cloud
- Benefits of using SAC for water plant and reservoir analytics
- Existing SAC and BI reports inventory

Existing SAC Dashboards at MUD

- AR Aging and Dunning Dashboard
- Customer Payment Processing Dashboard
- SCADA - Plant & Reservoir Analytics
- Water Main Break Current Leak
- Water Main Event Dashboard
- Service order Analytics
- Dispatch Monthly Analytics Dashboard
- Technician – Customer Satisfaction Survey Analytics
- Customer Usage Dashboard
- Large Customer Analytics Dashboard



Existing BI Inventory- Application Level



Billing - 55



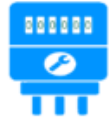
HCM - 77



**Corporate
Communications - 2**



**Customer
Accounting - 5**



**Device
Management - 19**



**EAM/Plant
Maintenance - 6**



FICO - 2



**Customer
Services - 3**



Fleet - 3



MM/Purchasing - 3



WM- 28



Gas Purchase- 12



QM- 2



FICA - 58

Total - 275

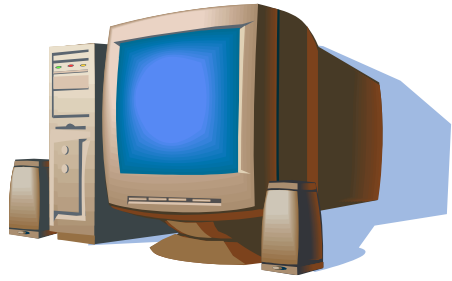


SCADA

- What is SCADA (Supervisory Control and Data Acquisition) system.
- Importance of SCADA in water management.



Components and Importance of SCADA



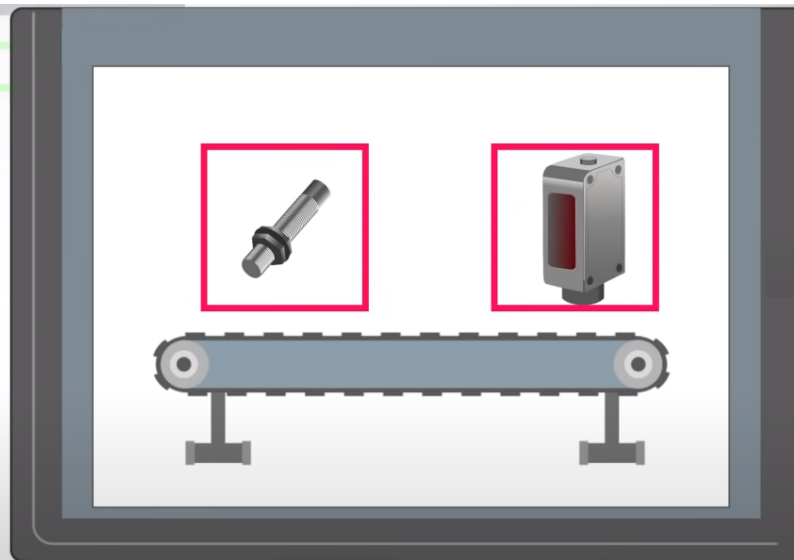
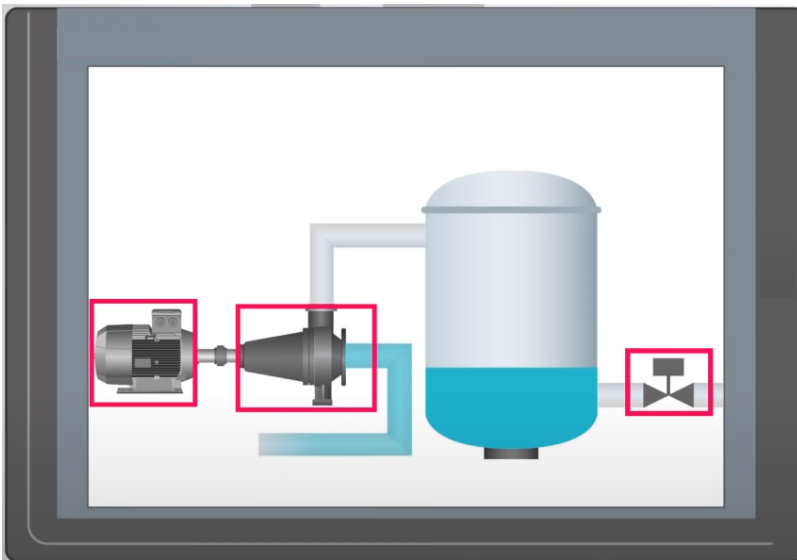
HMI – Human Machine Interface



PLC – Programmable Logic Controller



End Device – Pump, Meter, Valve, PT, Etc



SCADA (Supervisory Control and Data Acquisition)

- **SCADA** combines software and hardware to create a control system that is frequently referred to as automation technology.
- Control industrial processes locally or remotely
- Monitor, gather, and process real-time data
- Achieve high-performance data archiving
- Efficiently analyze process values (trends) and messages (alarm control)
- Interact with a wide range of devices using extended communication infrastructure

Business Scenario

- Mud Water and Water Treatment Facilities Plants, Reservoirs, Repump stations.
- Business KPI's

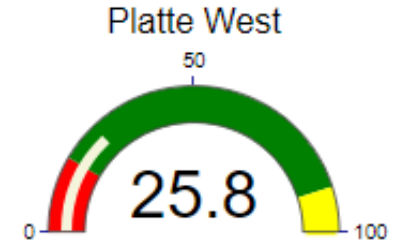
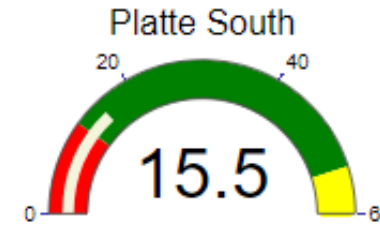
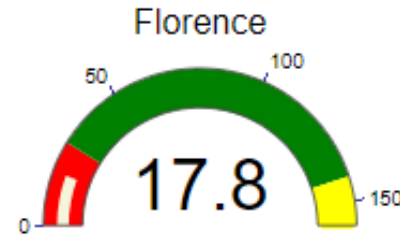
Business KPI's

KPI's Definition	Source
Plant pump day total for Florence, Plate South & Plate West	"MUDPROJECT"."SCADAHIST_History"
Reservoir Capacity Levels	
Pump Station Flow/ On/Off	
Pump Station discharge Pressure points - On/Off	
Minimum TD/Maximum TD/ Maximum Consumption	
Weather Information	Weather API(Visual Crossing)
Outage Notes (Plant in outage / Expected Return Date?)	Direct/Manual Entry
Cost per million Gallons pumped	ZAD_CCA9 (Cost Centers: Actual Costs Using Delta Extraction)
Average Cost per Main break	ZAD_OPA10 (Orders: Actual Line Items Using Delta Extraction)
Active Water Main breaks	ZWARERMANLEAK
Average OOS (Out of Service) time per Main break	
Main breaks by Month & attributes	

Business KPI's

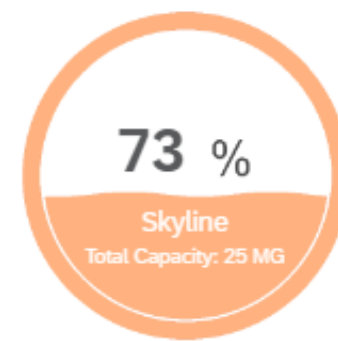
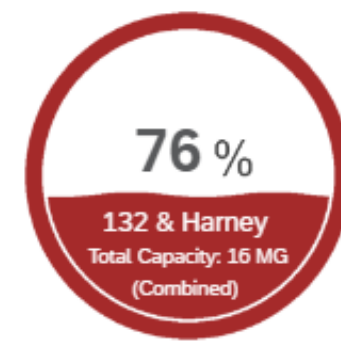
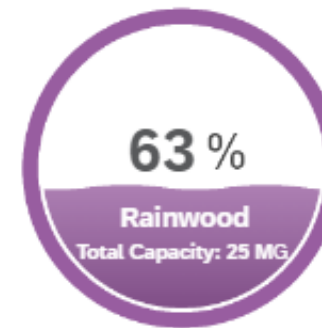
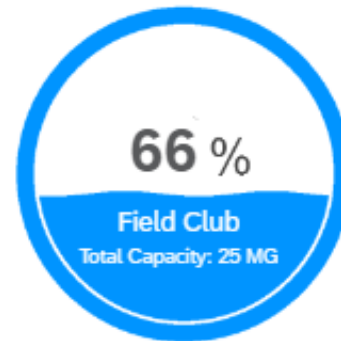
Live Pump Day Total (MGD) as on Jul 17, 2023 12:07:03 PM

1) Live Plant pump day total



Reservoir capacity in % as on Jul 17, 2023 12:07:03 PM

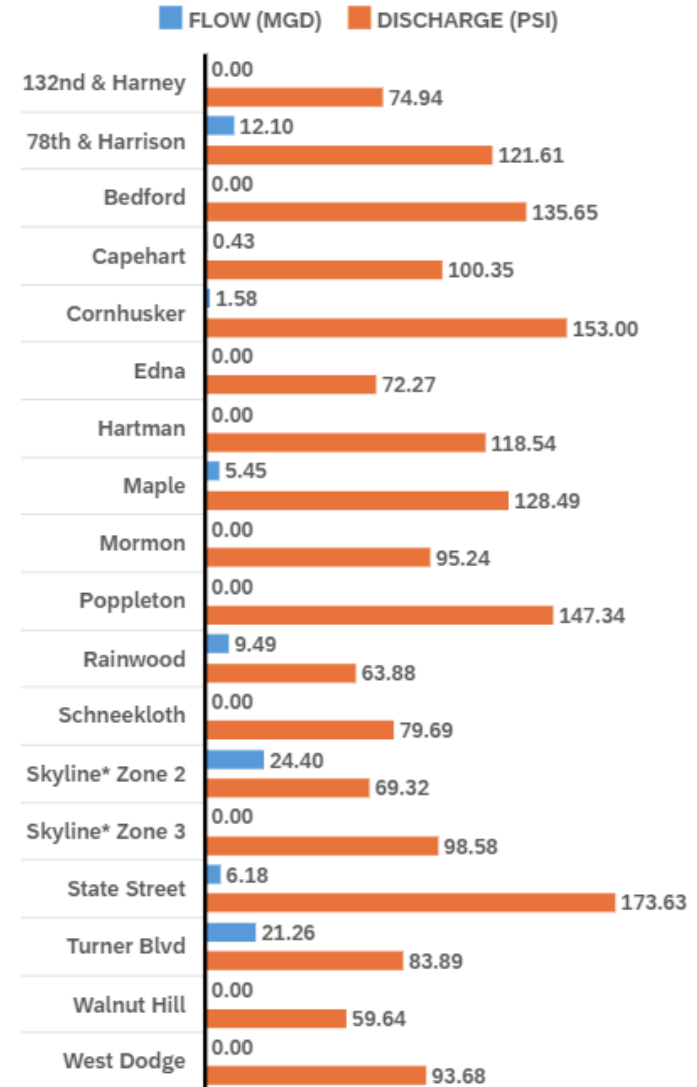
2) Reservoir Capacity levels in %



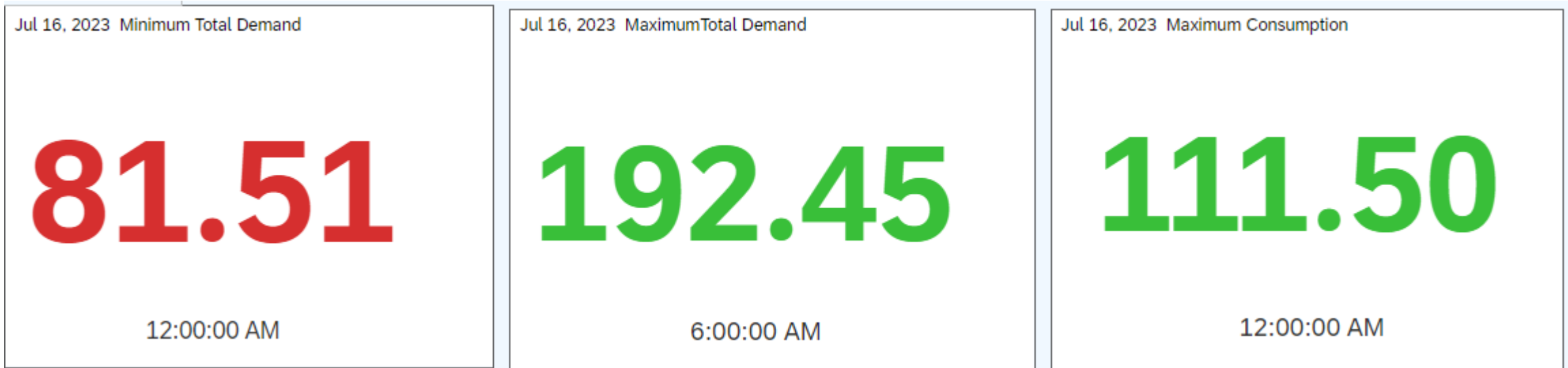
Business KPI's

3) Pump Station Flow and Discharge pressure points – On/Off

Pump Flow and Discharge Jul 17, 2023 12:07:02 PM

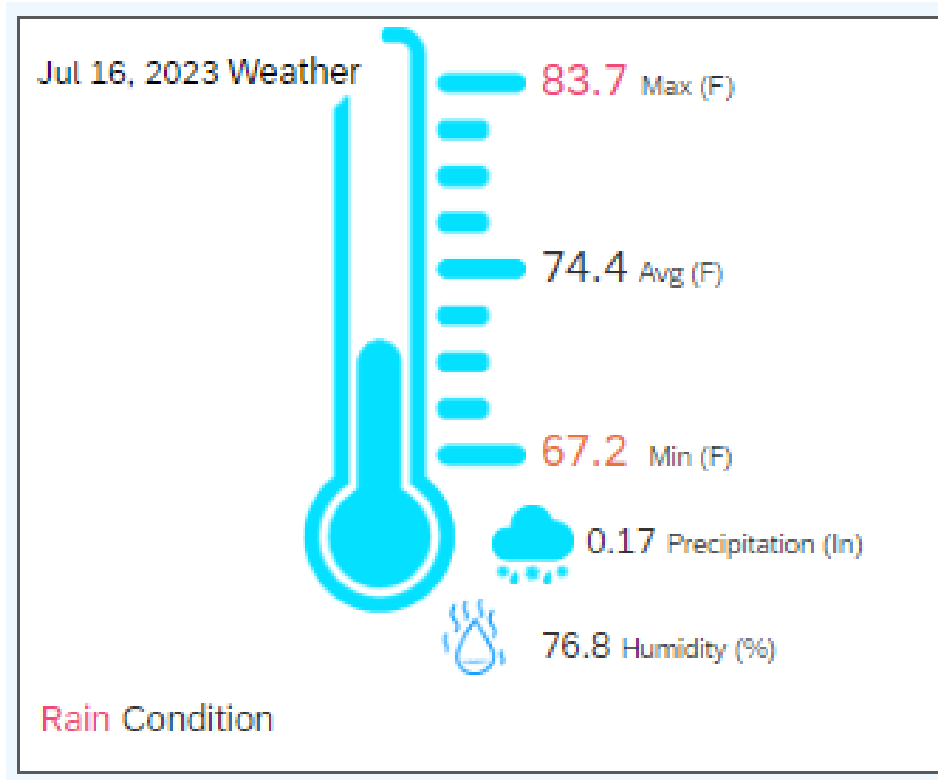


4) Current Consumption/Min Demand/ Peak hour Demand



Business KPI's

5) Weather Information



6) Outage Notes (Plant in Outage / Expected Return Date?)

Outage Notes

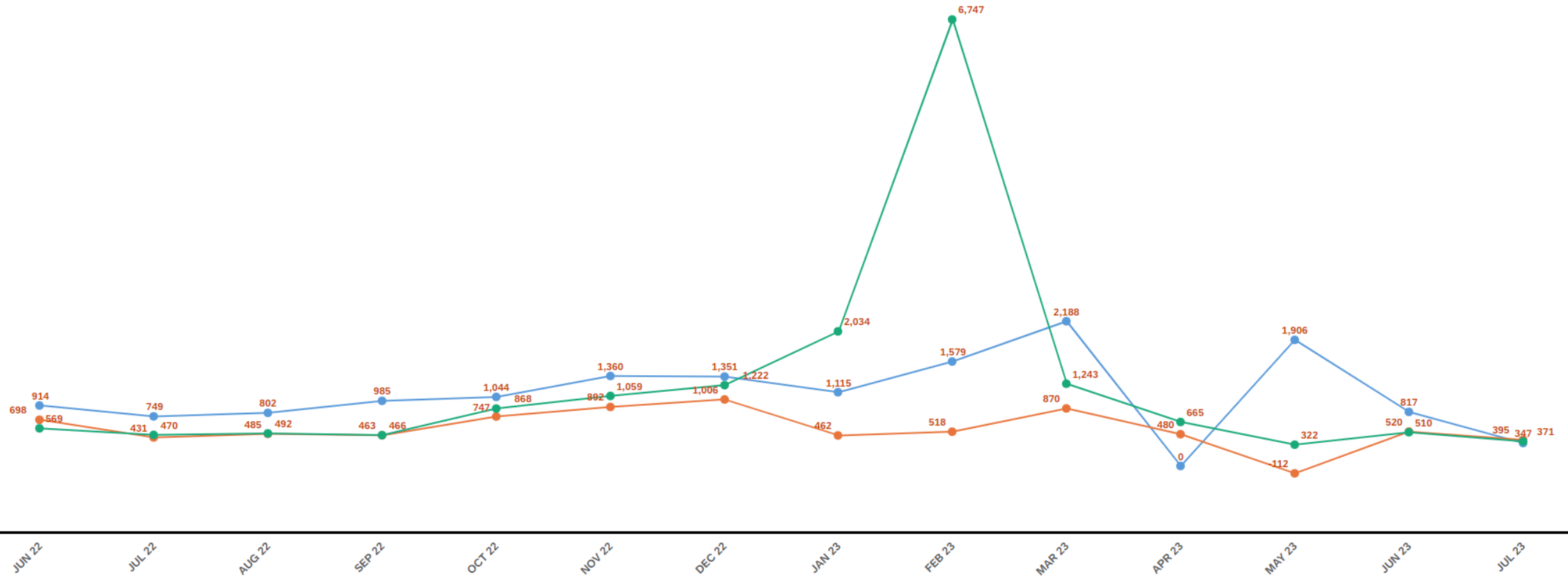
Plant / Pump outage Information:
you can write your own data.

Business KPI's

7) Cost per million gallon pumped

Jul 17, 2023 Cost per Million Gallon Pumped (\$)

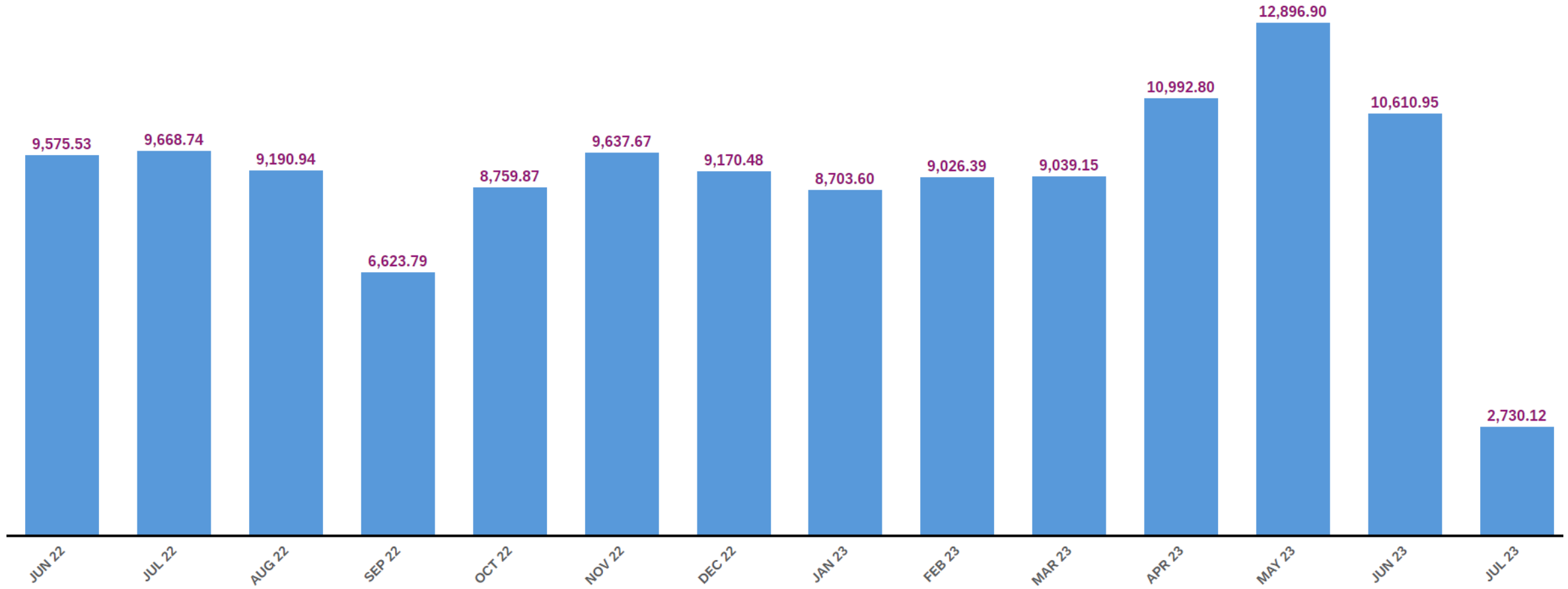
FL_MGD_COST PS_MGD_COST PW_MDG_COST



Business KPI's

8) Average Cost per Main-Break

Jul 17, 2023 Average Cost for Water Main Break (\$)



Business KPI's

8) Water main breaks and Active water main breaks

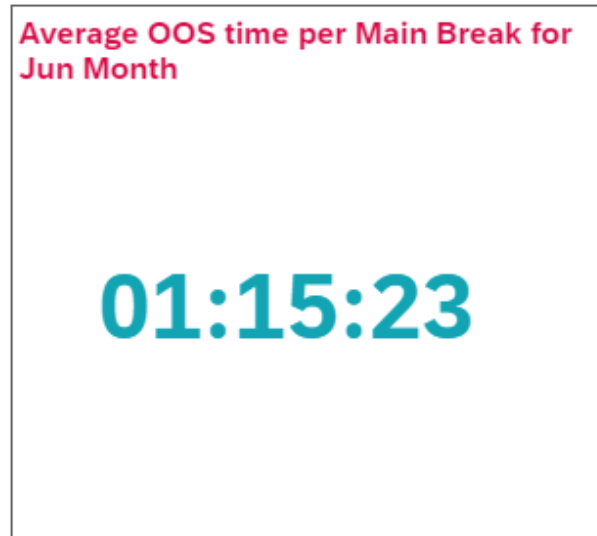
- According to the American water works Association and American society of civil engineers there are 240000 main breaks are wasting 8 billion Cubic meters of water in US every year.
- According to Utah state university study found that the water main break rate has increased by 27% since 2012.

Water Main Events - Statistics											
METROPOLITAN UTILITIES DISTRICT											
Past 10 Years											
YEAR	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
JANUARY	98	96	51	57	90	90	44	32	62	72	93
FEBRUARY	65	80	29	35	32	56	51	43	75	55	61
MARCH	46	29	45	26	26	31	63	22	53	41	48
APRIL	41	25	20	27	28	28	34	22	19	34	32
MAY	20	26	26	19	24	26	28	26	26	23	31
JUNE	32	38	28	49	53	43	51	43	48	37	59
JULY	46	30	44	45	57	28	78	61	57	61	2
AUGUST	42	29	61	39	41	39	47	67	55	58	0
SEPTEMBER	33	27	37	31	40	23	40	46	38	39	0
OCTOBER	38	25	36	33	31	36	35	40	28	45	0
NOVEMBER	42	49	29	38	57	52	56	68	54	55	0
DECEMBER	51	45	53	100	80	45	48	68	51	77	0
Totals	554	499	459	499	559	497	575	538	566	597	326

Business KPI's

9) Average OOS (Out of Service) time per Main break

- Considering Service Shutdown Date/Time and Service Restoration Date/Time.



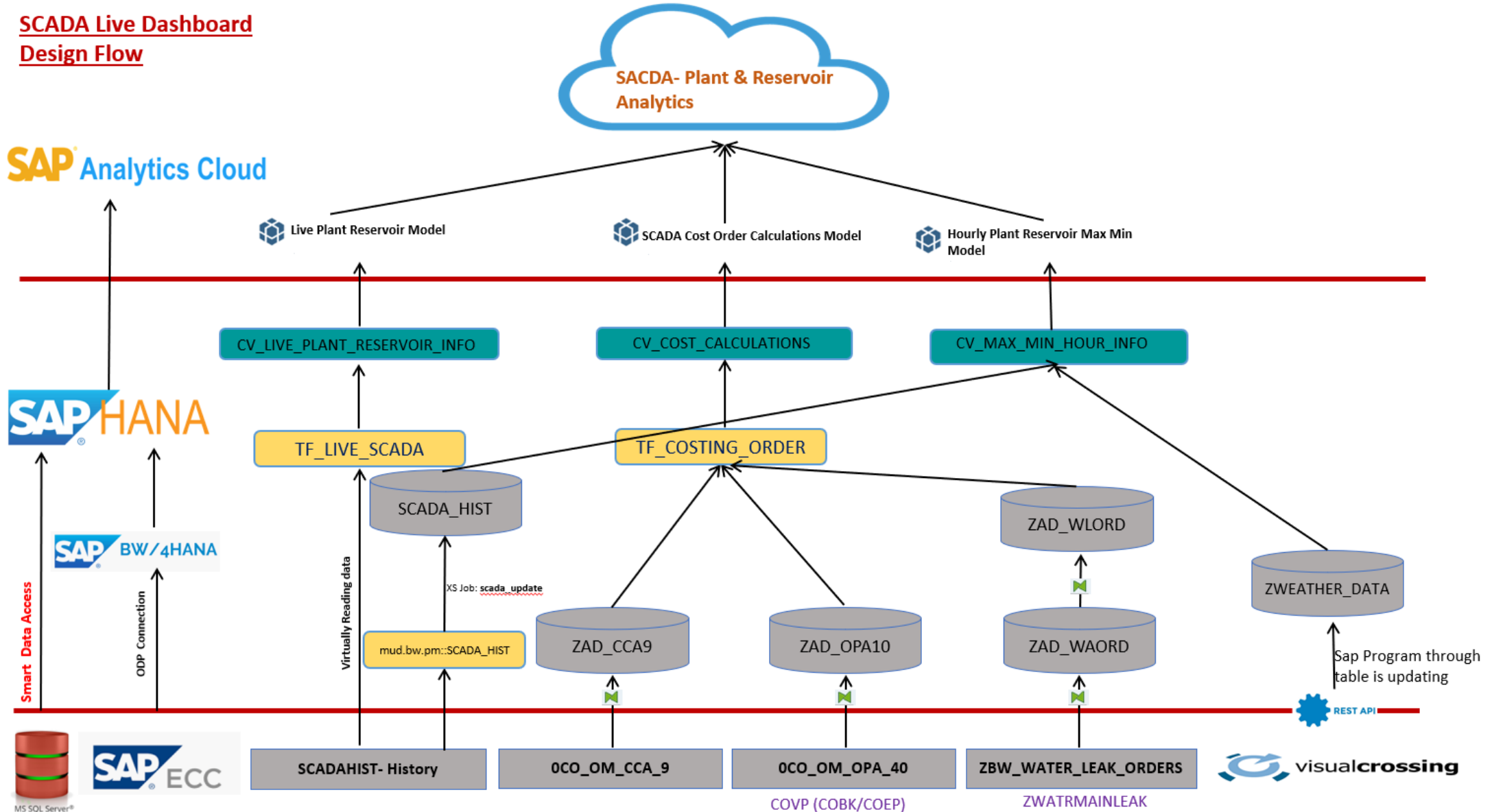
10) Water Main Break attributes for Previous Month

- Including Service order, address, Material, Failure Category, Repair date, Technician, Leak cause etc...

Data Flow

SCADA Live Dashboard Design Flow

SCADA Live Dashboard Design Flow



Live SCADA Story Demo



Demo

SCADA Live Story

Lessons Learned

- Understand the Business Requirement.
- Integration with SQL data with SAP Data.
- Use Custom widget instead of R widgets.

Questions?

For questions after this session, contact us
Hemanthakumar_Thatikonda@mudnebr.com.

Thank you.

Additional text here.