





Extending the Use of Sigmafine® Data

Trusting
Data
for Action

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EXTENDING THE USE OF SIGMAFINE DATA SFUM 2015

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ABSTRACT



- Many users of Sigmafine are accustomed to using industry standard reports as a means of presenting reconciled data. This is often done to support financial or governmental reporting. How though can Sigmafine be extended beyond its fundamental role to support other important business groups or processes within an organization? In addition, how can the publishing of reconciled data be extended for more effective use within an organization?
- The Phillips 66 Billings Refinery will present an overview of how the value of Sigmafine's reconciled data is being increased within their refinery.

INTRODUCTION



- Phillips 66 is a global energy company.
 - Headquarters in Houston Texas.
 - 14,000 employees.
 - \$48.7 billion of assets as of Dec. 31, 2014.
 - Businesses include Midstream, Chemicals, Refining, and Marketing.
 - One of the largest refiners in North America and the world.
 - 14 refineries.
 - 2.17 million barrels per day of Net Crude Throughput Capacity.
- Phillips 66 Billings, MT Refinery.
 - High complexity refinery.
 - 59,000 barrels per day of Net Crude Throughput Capacity.
 - 300⁺ employees.

OUTLINE



- Fundamental use of Sigmafine at Phillips 66.
- Extended use of Sigmafine at the P66 Billings Refinery.
 - Sigmafine capabilities.
 - Publishing data.
 - Examples.

FUNDAMENTAL USE OF SIGMAFINE AT PHILLIPS 66



- Increase the quality of plant data to ensure accurate financial reporting.
- Result of this effort Industry Standard Reports.
 - Inventory Reports.
 - Sales / Receipts Reports.
 - FTZ Reports.
 - "Charge & Yield" Report.
 - Etc...

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- Increase the quality of plant data to ensure accurate financial reporting.
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 - Etc...
- But how do we move beyond that so Operations, Engineering, and Planning also benefit from Sigmafine data?



- First step in moving beyond the fundamentals was to explore Sigmafine's true capabilities.
- May not need to use some capabilities but always beneficial to at least know they are available for use if necessary.



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- First step in moving beyond the fundamentals was to explore Sigmafine's true capabilities.
- May not need to use some capabilities but always beneficial to at least know they are available for use if necessary.
 - Can be compared to learning spreadsheet capabilities.
 - Capability increases as extended functionality is learned.
 - Formatting.
 - Charting.
 - Formulas.
 - Pivot Tables.
 - Solver.



Understanding Sigmafine capabilities.

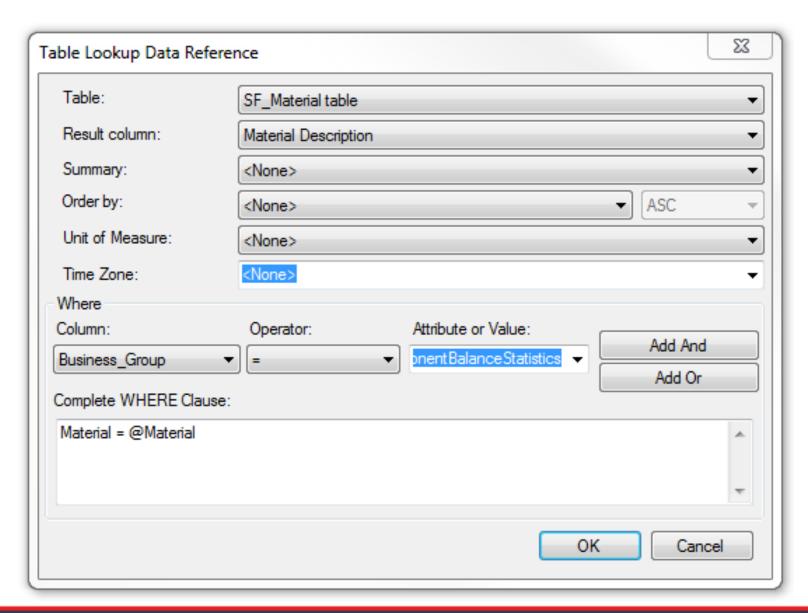
- Data References.
- Analyses.
- Layers.



Table Lookup.

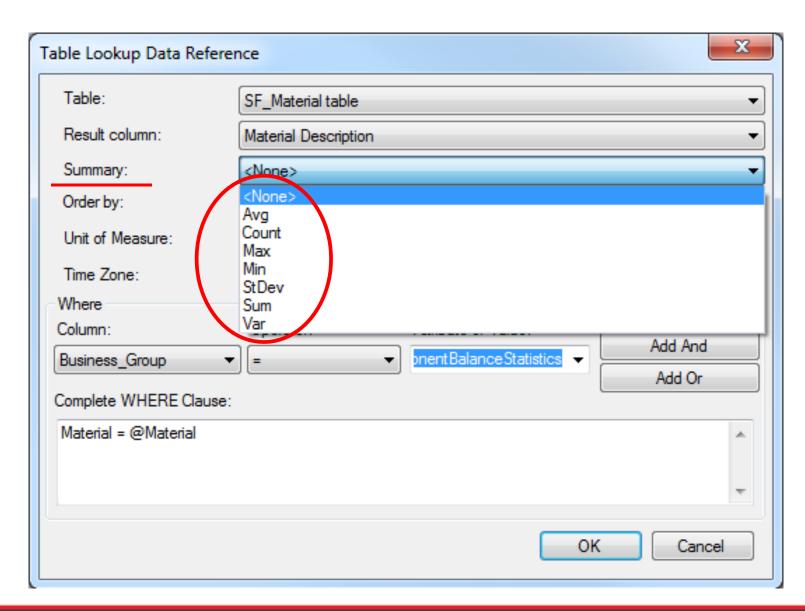


- Table Lookup
- Example of simple lookup.



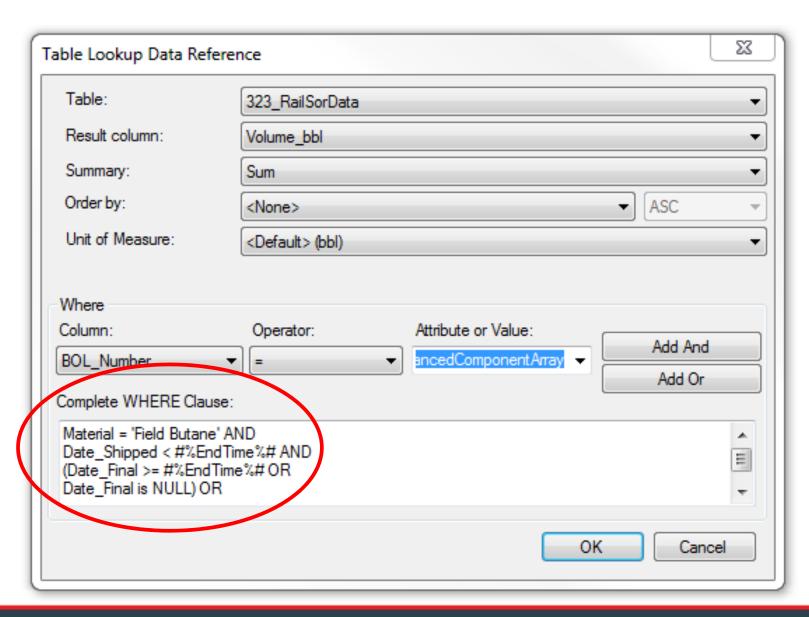


- Table Lookup.
- Example of aggregation functions.



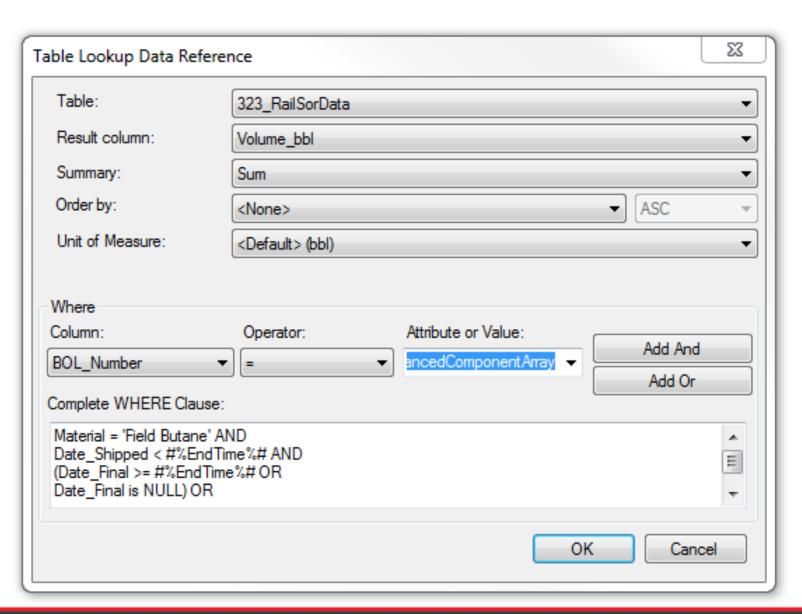


- Table Lookup.
- Example WHERE Clause.





- Table Lookup.
- Example WHERE Clause.
- Result = Allows
 Sigmafine to utilize
 much larger and richer
 table data sources.

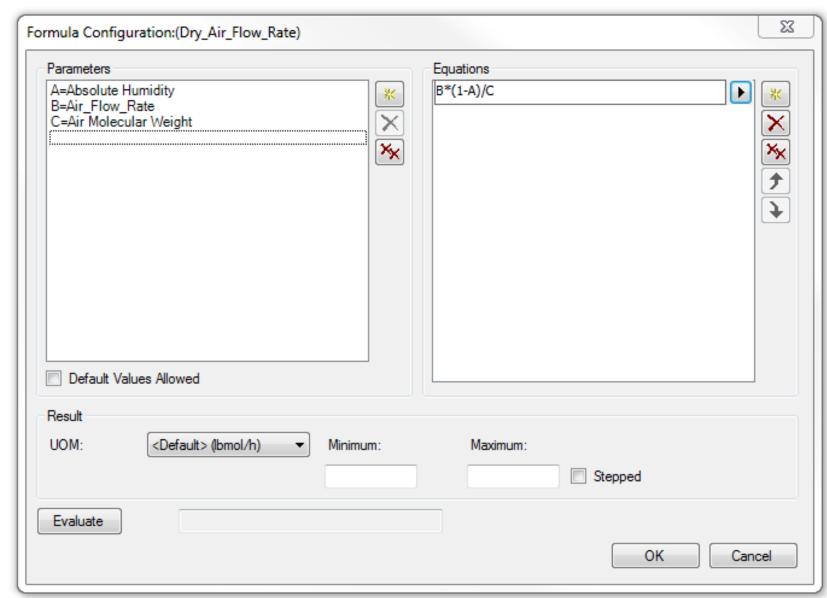




Formula.

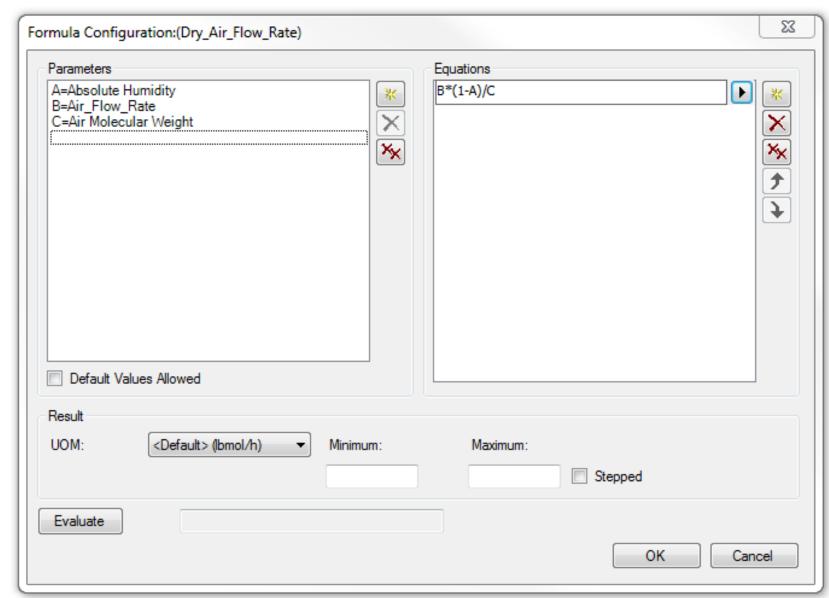


- Formula.
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- Formula.
- Many are accustomed to using the formula editor to retrieve attribute values and then perform a calculation.
- NEXT STEP Bring many formulas together in an element to solve a new problem.





- Formula.
- Example-Coke Burn.
 - 1 element.
 - 3 Table Lookups.
 - 12 PI Points.
 - 21 Formulas.

Name	△ Value	Data Reference	Settings	
Absolute Humidity	0.0058111270861679314	Absolute Humid	HumidityAttribute=Relative_Humidity;TempAttribute=Ambient_Air_Temperature	
Air Molecular Weight	28.84 lb/lbmol	<none></none>		
Air_Flow_Rate	181019.973726388 lb/h	Fomula	F=Air_to_Regenerator_Flow_Rate;UOM=Mscf/d;W=Air Molecular Weight;UOM=lb/lbmol;[F*1000/24/0.7302/520*W]	
Air_Inlet_N2_+_Ar	4930.40053020004 lbmol/h	Formula	A=Dry_Air_Flow_Rate:[A*0.7901]	
Air_Inlet_02	1307.32680809633 lbmol/h	Formula	A=Dry_Air_Flow_Rate;[A*0.2095]	
Air_to_Regenerator_Flow_Rate	57198.8971737622 Mscf/d	PI Point	\bilaspi\34Fl904;TimeRangeMethod=Average	
Ambient_Air_Temperature	62.5357251469677 °F	PI Point	\bilaspi\55TI603;TimeRangeMethod=Average	
Ø Blower_Outlet_Temperature	387.22658489086 °F	PI Point	\\bilaspi\34TI566;TimeRangeMethod=Average	
■ C_LHV	14093 Btu/lb	Table Lookup	SELECT [NetHeatingValue (Mass Basis)] FROM [SF_Component table] WHERE Component = 'C'	
Carbon Flow Rate	12733.1180161715 lb/h	Fomula	A=CO2_Flow_Rate;B=CO_Flow_Rate;[(A+B)*12]	
CO2_Flow_Rate	1060.83827311138 lbmol/h	Formula	A=Stack_CO2_Concetration;D=Dry_Flue_Gas_Flow_Rate;[A*D/100]	
CO_Flow_Rate	0.254894902906779 lbmol/h	Fomula	A=Dry_Air_Flow_Rate;B=Stack_CO_Concentration:[A*B/1000000]	
Coke_Formed	13361.7398989266 lb/h	Fomula	A=Sulfur_Flow_Rate;B=Hydrogen_Flow_Rate;C=Carbon Flow Rate;[A+B+C]	
Coke_LHV	15840.501881537 lb/h	Fomula	A=Regenerator_Heat_Release_Rate;B=Coke_Formed;[A*1000000/B]	
Coke_Yield	4.89795775623429 %	Formula	A=Coke_Formed;B=Gasoil_Feed_Rate;[A/B*100]	
Dry_Air_Flow_Rate	6240.22342766743 lbmol/h	Fomula	A=Absolute Humidity;B=Air_Flow_Rate;C=Air Molecular Weight;[B*(1-A)/C]	
■ Dry_Flue_Gas_Flow_Rate	6081.97659120784 lbmol/h	Formula	A=Air_Inlet_N2_+_Ar;S=Stack_N2_Ar_Concentration;[A/(S/100)]	
FCC_Charge_T-59_API_GRV	26 API	PI Point	\\bilaspi\\34GOAPIG.B;TimeRangeMethod=Average	
FCC_Gas_Oil_Charge	20803.8254383831 bbl/d	PI Point	\bilaspi\34FC310;TimeRangeMethod=Average	
Gasoil_Feed_Rate	272802.26910735 lb/h	Formula	A=FCC_Gas_Oil_Charge;B=FCC_Charge_T-59_API_GRV;UOM=SG;[A/24*B*350.3]	
■ H2_LHV	51557 Btu/lb	Table Lookup	SELECT [NetHeatingValue (Mass Basis)] FROM [SF_Component table] WHERE Component = 'H2'	
Hydrogen_Flow_Rate	624.396368786246 lb/h	Formula	A=Water_Formed:[A*2*1]	
O2_Flow_Rate	90.1299480254031 lbmol/h	Fomula	A=Stack_O2_Concentration;D=Dry_Flue_Gas_Flow_Rate;[A*D/100]	
Object Status	IS	<none></none>		
Regenerator_Heat_Release_R.	211.656666009555 MM Btu/h	Formula	A=S_LHV;B=C_LHV;C=H2_LHV;D=Sulfur_Flow_Rate;E=Carbon Flow Rate;F=Hydrogen_Flow_Rate;[(A*D+E*B+C*F)/1000000]	
Relative_Humidity	48.3585182359484 %	PI Point	\bilaspi\34MI600;TimeRangeMethod=Average	
✓ RMII_Coke	15054.627239252 lb/h	PI Point	\bilaspi\FCCCOKECO2.C;TimeRangeMethod=Average	
■ S_LHV	3983 Btu/lb	Table Lookup	SELECT [NetHeatingValue (Mass Basis)] FROM [SF_Component table] WHERE Component = 'S'	
SO2_Flow_Rate	0.132047311528181 lbmol/h	Fomula	A=Stack_SO2_Concentration;D=Dry_Flue_Gas_Flow_Rate;[A*D/1000000]	
Stack_CO2_Concetration	17.4423274605321 %	PI Point	\bilaspi\34Al694;TimeRangeMethod=Average	
Stack_CO_Concentration	40.8470795735686 ppm	PI Point	\bilaspi\34Al693CC;TimeRangeMethod=Average	
Stack_N2_Ar_Concentration	81.0657597289583 %	Formula	A=Stack_O2_Concentration;C=Stack_CO_Concentration;K=Stack_CO2_Concetration;N=Stack_NOx_Concentration;S=Stack_SO2_Concentration;[100-(S+N+C)/10000-K-C)/10000-K-C)/10000-K-C-C-C-C-C-C-C-C-C-C-C-C-C-C-C-C-C	
Stack_NOx_Concentration	37.3828432741439 ppm	PI Point	\bilaspi\34Al691;TimeRangeMethod=Average	
Stade 02 Concentration	1 40101000222001 %	DI Doint	\\hillandi\2/A/CO2-TimePmenMathed=Average	



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- Problem Flow meter orifices may be operating at a different temperature, pressure or density than designed.
- Solution Meter compensation (Currently, this may be done in the DCS, Data Historian, not at all or a mixture of all the above).
- Good to know how to do this in Sigmafine in case it is the solution of choice.



- Sigmafine Data Reference.
- Basic steps.
 - Elicit help from Engineering.
 - Obtain flow orifice original design data.
 - Use the UOM Data Reference to convert PI value to "Actual" flow.
 - Use the Sigmafine Data Reference to convert the "Actual" flow to "Compensated" flow.
 - Validate results.



- Sigmafine Data Reference.
- Result -
 - You now have a working example of meter compensation for future use.
 - Engineering now knows Sigmafine is capable of doing meter compensation.
 - Engineering trusts the results because they were part of the process.



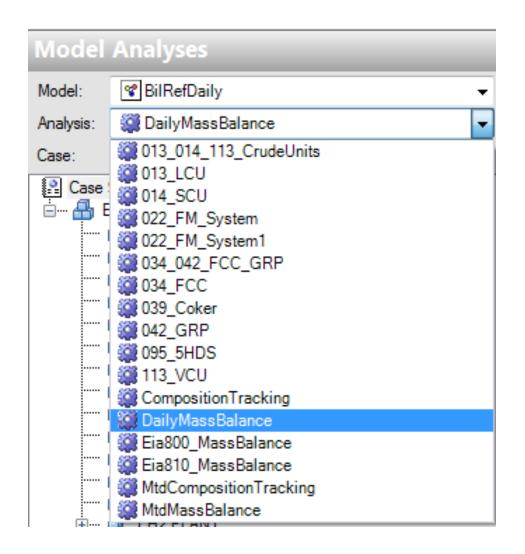
Analyses.



- Analyses.
- Important to move beyond the SF 3.xx concept of only one model and one type of balance/analysis.
 - May choose different types of analyses.
 - Analyses may be used to cover different time periods and frequencies.
 - Analyses may be used to balance different portions of a model.



- Examples of different analyses used in the Billings Refinery.
- Works in conjunction with layers.





- Single layer adds simplicity.
- Multiple layers can add extensibility.
 - "The use of multiple layers in a model is optional. However, working with two or more layers adds considerable flexibility to the operation of the model." – Sigmafine Reference Manual (pg. 94)

PHILLIPS 66

 At Billings we have broken each unit into it's own layer.

LAYERS

- An analysis can then be assigned to use only certain layers.
- Gives us sub-modeling capability.
- Balance portions of the plant, which is often a request by the plant engineers.

General	Results	Adjustments	Elements	Layers	Connections	Attributes					
Filter	-										
Name			Description								
-	■			Elements needed for submodel analysis of Tanks							
	☐ 5 013 LCU			Elements needed for submodel analysis of Large Crude Unit							
	■ 5 014_SCU			Elements needed for submodel analysis of Small Crude Unit							
	☐			Elements needed for submodel analysis of Cryo Debutanizer Unit							
				Elements needed for submodel analysis of Butamer Unit							
	□			Elements needed for submodel analysis of Feed Prep Unit							
	_					-	f Fuel Mix System				
5	_		Eleme	ents need	led for submode	el analysis of	f Fluid Catalytic Cracking Unit				
5	039_Coke	er	Eleme	ents need	ded for submode	el analysis o	f Coker Unit				
5	042_GRP		Eleme	ents need	ded for submode	el analysis of	f Gas Recover Plant				
5	5 043_Alky		Elements needed for submodel analysis of Alkylation Unit								
5			Elements needed for submodel analysis of PB Merox Unit								
5			Elements needed for submodel analysis of Depentanizer Unit								
	■ 5053_Flare		Elements needed for submodel analysis of Flare System								
=	■			Elements needed for submodel analysis of 2 HDS							
=				Elements needed for submodel analysis of 2 Amine Unit							
=			Elements needed for submodel analysis of Saturate Gas Plant								
	Ø 074_HPU		Elements needed for submodel analysis of Hydrogen Purification Unit								
				Elements needed for submodel analysis of Cryogenics Unit							
				Elements needed for submodel analysis of 4 HDS							
				Elements needed for submodel analysis of 3 Amine Unit							
				Elements needed for submodel analysis of 5 HDS							
	■ ## 113_VCU			Elements needed for submodel analysis of Vacuum Crude Unit							
V	Refinery_Complete			Elements needed for full refinery Mass Composition balances							

EXTENDING SIGMAFINE CAPABILITIES PUBLISHING

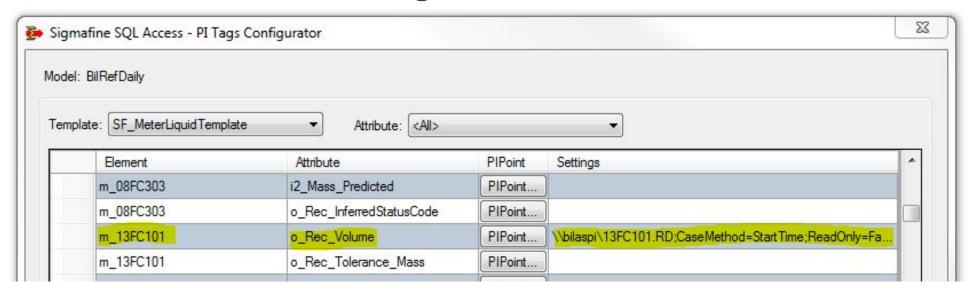


- Publishing is a critical step in extending Sigmafine.
 - No one else can really benefit from our reconciliation unless you can give them the results in a form they can readily use.

EXTENDING SIGMAFINE CAPABILITIES PUBLISHING



- Publishing is a critical step in extending Sigmafine.
 - No one else can really benefit from our reconciliation unless you can give them the results in a form they can readily use.
- Billings makes extensive use of the SQL Access Publish to PI feature.
 - Any attribute from any element can be setup to send it's value to PI.
 - Then available to all (Engineers, Optimization, etc...) using PI-Data Link (Excel).
 - Then available to all for trending.



EXTENDING SIGMAFINE CAPABILITIES PUBLISHING



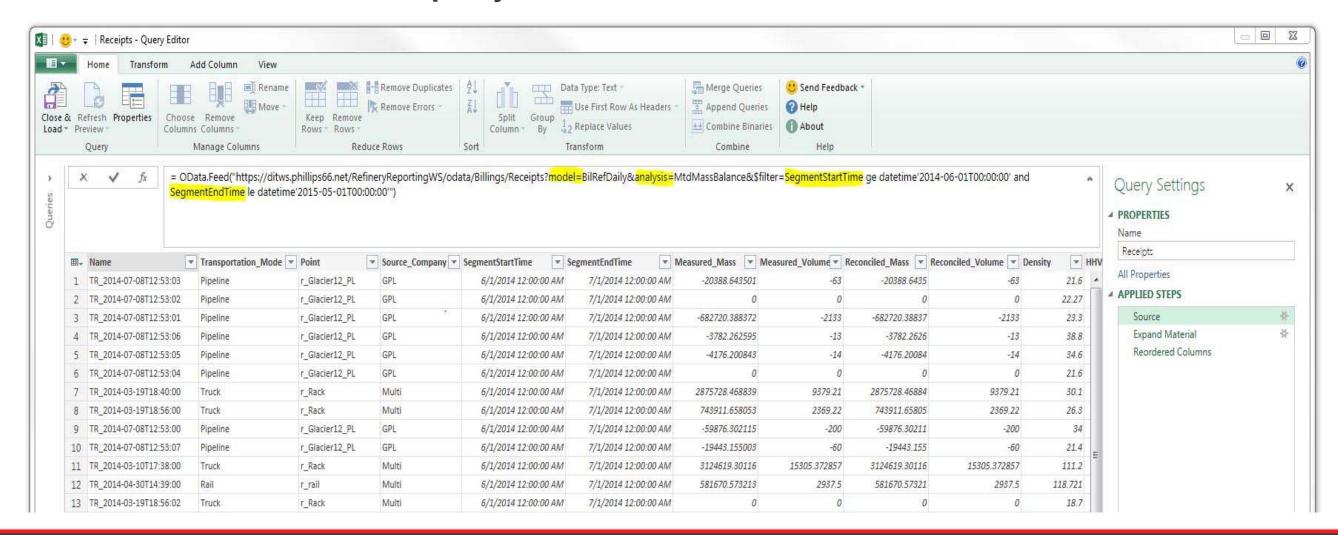
- Another powerful option is to build a web service.
- At P66, we now:
 - Export reconciled data to SQL.
 - Access reconciled data with a Web Service using the REST and Odata Protocol.
 - Retrieve Odata using Power Query for Excel.
 - Gives all users full capability to query and transform data to perfectly suit their needs.
 - Makes data "self-serve".



EXTENDING SIGMAFINE CAPABILITIES PUBLISHING



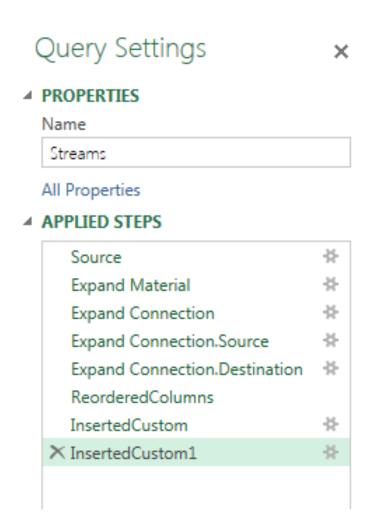
Odata allows for the query to be embedded into a URL.



EXTENDING SIGMAFINE CAPABILITIES PUBLISHING



 Power Query then allows multiple transformations to be performed on that data.





So how might all these capabilities be harnessed to bring real world value?



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- P66 Billings Refinery has found many uses:
 - Energy intensity can be calculated across the entire refinery daily.
 - Forecasting software capability can be enhanced as we demonstrated last year.
 - Model "backcasting" tools can be built.



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- P66 Billings Refinery has found many uses:
 - Energy intensity can be calculated across the entire refinery daily.
 - Forecasting software capability can be enhanced as we demonstrated last year.
 - Model "backcasting" tools can be built.
- Rather than covering each example briefly, let's look at a single example in depth...



1. We perform a Mass Balance Analysis of the entire refinery.



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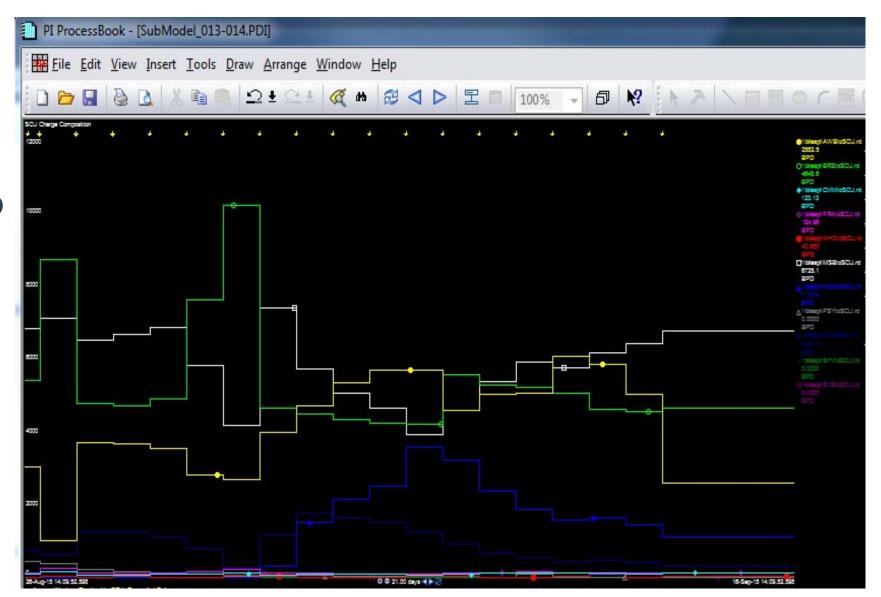
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- 5. Finally, we build specialized elements to retrieve this data in the context of a case.



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- 6. The RESULT...

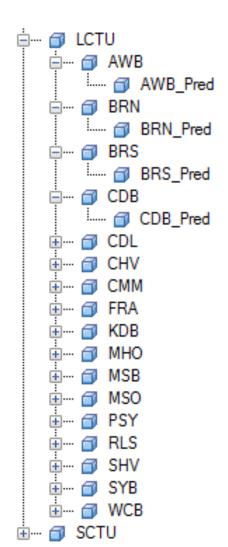


 Based on crude compositioning, we can daily report to Pl the volume of each crude being charged to the crude units.





- Then we built special elements that have nested children elements to read a table of crude assay information.
- Following slide shows the details of this type of parent/child element approach.



323 SubModel 034		Billings Predictive Sub Models					
InputVol	Model Input Volume	0	MDL VariableInputs		Double	Formula	A=\m 34FC310 o Rec Volume;[A]
ObjectStatus	In service / out - of- service flag	IS	SF_AnalysisInput;SF_CaseInputData		String		
Test 1	Absolute Error	0 °F	MDL_OperatingVariables	degree Fahrenheit	Double		
Test 2	% Model Closure	0	MDL_VariableInputs		Double		
		T					
323_SM_034_Variables			_SubModel_Unit 034-Fluid Catalytic				
55T	Percent off at 550 °F, TBP	0%	MDL_FeedVariables	percent	Double	Table Lookup	SELECT [%Attribute%] FROM [323_SubModel_034] WHERE ROWNAMES = @RowName
70T	Percent off at 700 °F, TBP	0%	MDL_FeedVariables	percent	Double	Table Lookup	SELECT [%Attribute%] FROM [323_SubModel_034] WHERE ROWNAMES = @RowName
85T A0T	Percent off at 850 °F, TBP Percent off at 1000 °F, TBP	0% 0%	MDL_FeedVariables MDL FeedVariables	percent	Double	Table Lookup Table Lookup	SELECT [%Attribute%] FROM [323_SubModel_034] WHERE ROWNAMES = @RowName SELECT [%Attribute%] FROM [323_SubModel_034] WHERE ROWNAMES = @RowName
ACT	Ecat Activity, %	0%	MDL_OperatingVariables	percent percent	Double Double	Table Lookup	SELECT [%Attribute%] FROM [323_SubModel_034] WHERE ROWNAMES = @RowName SELECT [%Attribute%] FROM [323_SubModel_034] WHERE ROWNAMES = @RowName
BAS	Basic Nitrogen, Ib/Mbbl		MDL FeedVariables	pound per barrel	Double	Table Lookup	SELECT [XAKITIOUTES] FROM [323_SubModel_034] WHERE ROWNAMES = @ROWName SELECT [%Attribute%] FROM [323_SubModel_034] WHERE ROWNAMES = @RowName
BPB	Base Feed, BBL	0 bbl	MDL VariableInputs	barrel	Double	Table Lookup	SELECT [%Attribute%] FROM [323_SubModel_034] WHERE ROWNAMES = @RowName
CAP	Feed Rate Adj, BBL	0 bbl	MDL_OperatingVariables	barrel	Double	Table Lookup	SELECT [%Attribute%] FROM [323_subModel_034] WHERE ROWNAMES = @RowName
CCN	Concarbon, Ib/bbl		MDL FeedVariables	pound per barrel	Double	Table Lookup	SELECT [%Attribute%] FROM [323_SubModel_034] WHERE ROWNAMES = @RowName
G90	Gasoline D86 90%, °F	0 °F	MDL_OperatingVariables	degree Fahrenheit		Table Lookup	SELECT [%Attribute%] FROM [323_SubModel_034] WHERE ROWNAMES = @RowName
HCR	HCO Recycle, BBL	0 bbl	MDL_OperatingVariables	barrel	Double	Table Lookup	SELECT [%Attribute%] FROM [323_SubModel_034] WHERE ROWNAMES = @RowName
LCS	LCO D86 90%, F	0 °F	MDL_OperatingVariables	degree Fahrenheit	Double	Table Lookup	SELECT [%Attribute%] FROM [323_SubModel_034] WHERE ROWNAMES = @RowName
PHT	Feed Preheat, F	0 °F	MDL_OperatingVariables	degree Fahrenheit	Double	Table Lookup	SELECT [%Attribute%] FROM [323_SubModel_034] WHERE ROWNAMES = @RowName
RXT	Reactor Temp. F	0 °F	MDL_OperatingVariables	degree Fahrenheit	Double	Table Lookup	SELECT [%Attribute%] FROM [323_SubModel_034] WHERE ROWNAMES = @RowName
SPB	Sulfur, lb/Bbl		MDL_FeedVariables	pound per barrel	Double	Table Lookup	SELECT [%Attribute%] FROM [323_SubModel_034] WHERE ROWNAMES = @RowName
SPG	Specific Gravity, 60/60	0 SG	MDL_FeedVariables	specific gravity	Double	Table Lookup	SELECT [%Attribute%] FROM [323_SubModel_034] WHERE ROWNAMES = @RowName
ZSM	ZSM5 Total Wt, Lbs	0 lb	MDL_OperatingVariables	pound	Double	Table Lookup	SELECT [%Attribute%] FROM [323_SubModel_034] WHERE ROWNAMES = @RowName
DawMana	Cultura dal Davi Nama	_	MDI Vesiablelanuta		Chairman		
RowName ObjectStatus	Submodel Row Name In service / out - of- service flag	IS	MDL_VariableInputs SF_AnalysisInput;SF_CaseInputData		String		
BPBa	Basic Nitrogen, ppmw		MDL_VariableInputs	parts per million	String Double		
CAPa	Feed Rate Adj, Lbs	0 lb	MDL VariableInputs	pound	Double		
CCNa	Concarbon, Wt.%	0 %wt	MDL VariableInputs	percent in weight	Double		
SPBa	Sulfur, Wt.%		MDL VariableInputs		Double		
323_SM_034_Predictions Billings_SubModel_Unit 034-Fluid Catalytic Cracking Unit_Predictions					dictions		
55T	Percent off at 550 °F, TBP	0%	MDL_Predictions	percent	Double	Formula	A=\\MEASURED_Var %Attribute%;B=\\BASE_Var %Attribute%;C=\\DELTA_Var %Attribute%;D=\ %Attribute%;[((A-B)/C)*D]
70T	Percent off at 700 °F, TBP	0%	MDL_Predictions	percent	Double	Formula	A=\\MEASURED_Var %Attribute%;B=\\BASE_Var %Attribute%;C=\\DELTA_Var %Attribute%;D=\ %Attribute%;[((A-B)/C)*D]
85T	Percent off at 850 °F, TBP	0%	MDL_Predictions	percent	Double	Formula	A=.\\MEASURED_Var %Attribute%;B=.\\BASE_Var %Attribute%;C=\.\DELTA_Var %Attribute%;D=\ %Attribute%;[((A-B)/C)*D]
AOT ACT	Percent off at 1000 °F, TBP	0% 0%	MDL_Predictions	percent	Double	Formula	A=.\.\MEASURED_Var %Attribute%;B=.\.\BASE_Var %Attribute%;C=.\.\DELTA_Var %Attribute%;D=.\ %Attribute%;[((A-B)/C)*D]
BAS	Ecat Activity, %		MDL_Predictions	percent	Double	Formula	A=.\\MEASURED_Var %Attribute%;B=\\BASE_Var %Attribute%;C=\\DELTA_Var %Attribute%;D=\ %Attribute%;[((A-B)/C)*D]
BPB	Base Vector Basic Nitrogen, Ib/Mbbl	0% 0%	MDL_VariableInputs MDL_Predictions	percent percent	Double Double	Formula Formula	A=\ BAS;[A] A=\\MEASURED_Var %Attribute%;B=\\BASE_Var %Attribute%;C=\\DELTA_Var %Attribute%;D=\ %Attribute%;[((A-B)/C)*D]
CAP	Feed Rate Adj, BBL	0%	MDL_Predictions	percent	Double	Formula	A=\\MEASURED_Var %Attribute%;B=\\BASE_Var %Attribute%;C=\\DELTA_Var %Attribute%;D=\ %Attribute%;[((A-B)/C)*D] A=.\\MEASURED_Var %Attribute%;B=\\BASE_Var %Attribute%;C=\.\DELTA_Var %Attribute%;D=\ %Attribute%;[((A-B)/C)*D]
CCN	Concarbon, Ib/bbl	0%	MDL_Predictions	percent	Double	Formula	A=.\\MEASURED_Var %Attribute%;B=.\\BASE_Var %Attribute%;C=.\\DELTA_Var %Attribute%;D=\ %Attribute%;[((A-B)/C)*D]
G90	Gasoline D86 90%, °F	0%	MDL Predictions	percent	Double	Formula	A=.\.\MEASURED_Var %Attribute%;B=.\.\BASE_Var %Attribute%;C=.\.\ELIA_Var %Attribute%;D=.\\%Attribute%;[(A-B)/C)*D]
HCR	HCO Recycle, BBL	0%	MDL_Predictions	percent	Double	Formula	A=\\MEASURED_Var %Attribute%;B=\\BASE_Var %Attribute%;C=\\DELTA_Var %Attribute%;D=\ %Attribute%;[((A-B)/C)*D]
LCS	LCO D86 90%, F	0%	MDL_Predictions	percent	Double	Formula	A=\\MEASURED_Var %Attribute%;B=\\BASE_Var %Attribute%;C=.\\DELTA_Var %Attribute%;D=.\\;%Attribute%;[((A-B)/C)*D]
PHT	Feed Preheat, F	0%	MDL_Predictions	percent	Double	Formula	A=\\MEASURED_Var %Attribute%;B=\\BASE_Var %Attribute%;C=\\DELTA_Var %Attribute%;D=\ %Attribute%;[((A-B)/C)*D]
RXT	Reactor Temp. F	0%	MDL_Predictions	percent	Double	Formula	A=\\MEASURED_Var %Attribute%;B=\\BASE_Var %Attribute%;C=\\DELTA_Var %Attribute%;D=\ %Attribute%;[((A-B)/C)*D]
SPB	Sulfur, lb/Bbl	0%	MDL_Predictions	percent	Double	Formula	A=\\MEASURED_Var %Attribute%;B=\\BASE_Var %Attribute%;C=\\DELTA_Var %Attribute%;D=\ %Attribute%;[((A-B)/C)*D]
SPG	Specific Gravity, 60/60	0%	MDL_Predictions	percent	Double	Formula	A=\\MEASURED_Var %Attribute%;B=\\BASE_Var %Attribute%;C=\\DELTA_Var %Attribute%;D=\ %Attribute%;[((A-B)/C)*D]
ZSM	ZSM5 Total Wt, Lbs	0%	MDL_Predictions	percent	Double	Formula	A=\\MEASURED_Var %Attribute%;B=\\BASE_Var %Attribute%;C=\\DELTA_Var %Attribute%;D=\ %Attribute%;[((A-B)/C)*D]
ObjectStatus	In service / out - of- service flag	IS	SE AnalysisInnut-SE CasalnoutData		String		
•	Prediction Output	0%	SF_AnalysisInput;SF_CaseInputData MDL Predictions	percent	Double	Formula	A=55T:B=70T:C=85T:D=A0T:E=ACT:F=BAS:G=BPB:H=CAP:I=CCN:J=G90:K=HCR:L=LCS:M=PHT:N=RXT:O=SPB:P=SPG:Q=ZSM:IA+B+C+D+E+F+G+H+I+J+K+L+M+N+O+P+Q1
	Prediction Output	0	MDL_Predictions	percent	Double	Formula	A=PredOutputPct;B=.\\ InputVol;[A*B*-1]
		-					

Once the TEMPLATES are configured - these are the only fields that need to be customized when adding a new ELEMENT

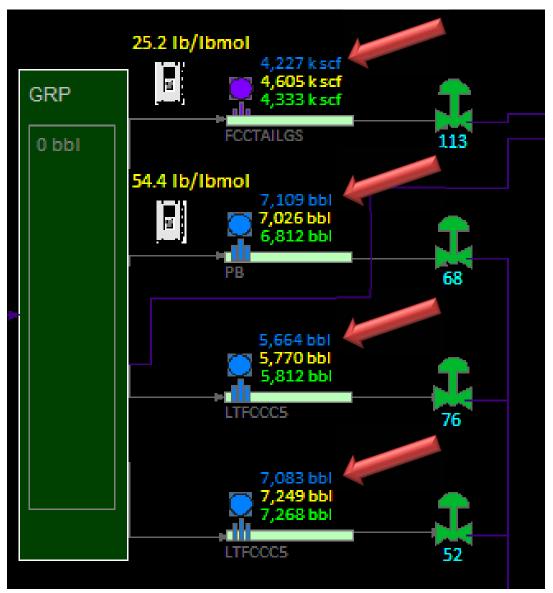


- Finally we use these combined sources of information to predict the qualities of many process streams based on crude assays and reconciled data.
 - API
 - Sulfur.
 - TAN.
 - Asphaltenes.
 - Conradson Carbon.
 - Etc...



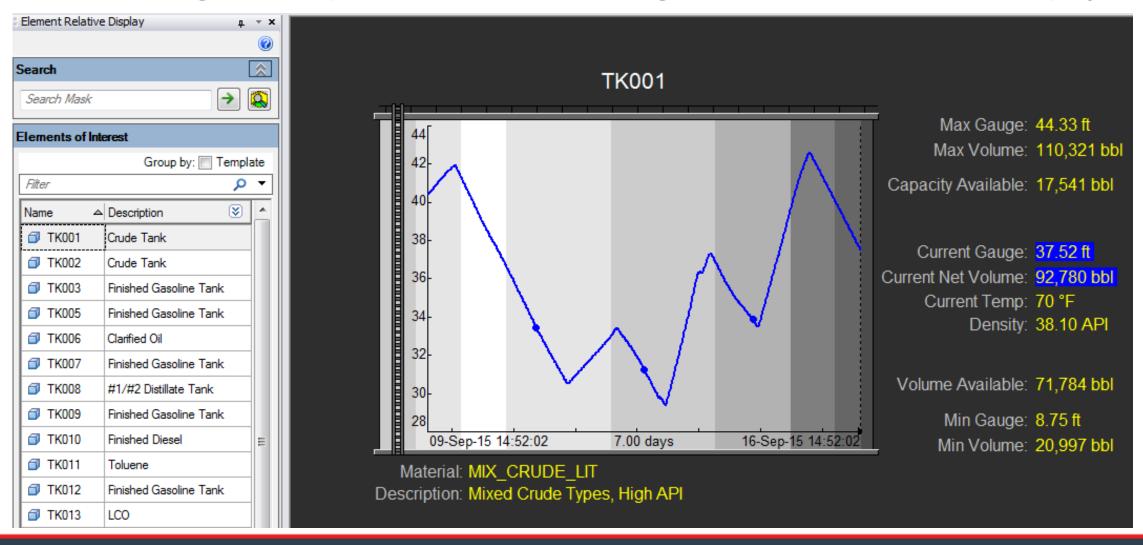


- Using the same approach, we have found that SF can use spreadsheet based submodels just like LPs can.
- Gives us the ability to display predicted values right next to reconciled values and then publish to PI.





One more thing that has proved valuable for our organization is AF Relative PI Displays.



EXTENDING SIGMAFINE CAPABILITIESTHANK YOU





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