Managing and optimizing midstream gross margin positions using a fully integrated, predictive business model

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ABSTRACT

In early 2008, Southern Union Gas Services (SUGS) commissioned eSimulation to build a predictive business model to help SUGS accurately manage and forecast plant gross margins. The business model encompasses SUGS's fully integrated gathering and processing assets located in the Permian Basin region of west Texas and southeast New Mexico (5 plant gathering and processing/treating supersystem).

SUGS chose eSimulation's midstream business modeling platform eSimEvaluator™ because of its ability to integrate both the commercial and physical interactions inherent in midstream businesses. eSimEvaluator is a predictive model-based planning, forecasting, and business optimization solution. The model is used for monthly plant margin estimates, annual forecasting / budgeting, sensitivity analyses in support of the financial reporting process, and operations for margin improvement simulations.

The project scope included modeling all physical and commercial aspects of the gathering and processing systems, including almost 2,000 wellhead meters, over 500 complex producer contracts, treating and processing facilities, compression fuel consumption, interplant transfers, and residue and NGL sales points. Wellhead and non-wellhead volume and composition data from the measurement system are captured through an integrated semi-automated interface.

The authors discuss the project objectives, the project implementation process, project benefits, and the lessons learned from applying the integrated solution to the SUGS gathering and processing systems.

Objectives

Most organizations function as a series of dynamic, interconnected groups where what happens in one department affects other departments. Many companies aren't able to see 'cause and effect' relationships between departments, because use of disconnected spreadsheets does not facilitate smooth information flows. Southern Union Gas Services (SUGS) management recognized a need for a tool that would allow users in all areas of the company to build business models that drive and help manage day-to-day operations.

What SUGS especially wanted was forward-looking analytics. The retrospective, historical analytics of the past doesn't meet their needs. They want to answer 'what if' questions with modeling and simulation.

In early 2008, SUGS commissioned eSimulation to develop a business modeling solution, specific to the mid-stream gas processing industry that would improve SUGS Commercial Business Processes. The important characteristics and capabilities would include:

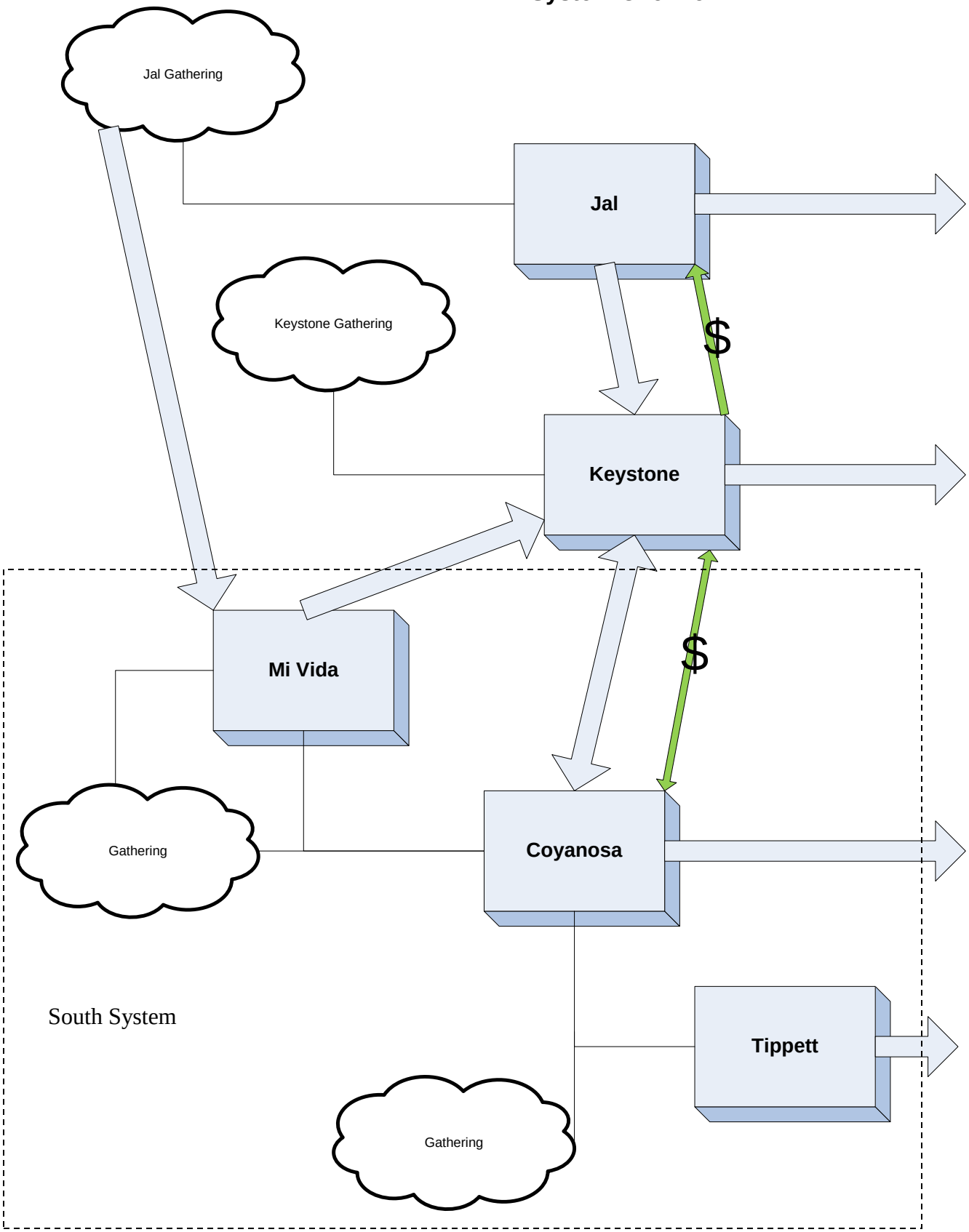
- Visual and intuitive in nature
- Common business modeling platform that can be utilized for multiple purposes
- Combines physical field and plant interactions with commercial aspects
- Accurately assess current business performance (Accruals)
- Run "what-if" scenarios to predict impacts of both economic and operational fluctuations (Forecasts, Budgets)
- Utilize PGAS actual volume and composition data

Implementation Process

The scope of the project included modeling of 5 processing/treating plants with their respective gathering systems. This system encompasses more than 2,000 wellhead meters and over 500 complex producer contracts. Producer contracts ran the gamut including POP, Equity or Wellhead, KeepWhole, Fixed Recovery, Allocated Recovery, Conditioning Fee, MMBTU settlement, and MCF settlement,.

Plant	Capacity	Configuration	Meters
Jal	90 mmcfd	Cryo	950
Keystone	135 mmcfd	Cryo	550
Coyanosa	130 mmcfd	Cryo	460
Tippett	60 mmcfd	Cryo	100
Mi Vida	110 mmcfd	Treating	100

System Overview



The initial approach was to model the Jal and Keystone plants separately, and the Coyanosa, Tippett, and Mi Vida plants as a system. Later, the Jal and Keystone plants would be integrated into a joint system.

The project began by assembling the necessary supporting documentation for each plant. This included Producer Contract Briefs, Plant I&D (Intake & Disposition) Reports, Settlement Detail Reports, Settlement Summary Reports, and Margin Summary Reports.

Models of each plant's gathering and processing systems were then built using the flowsheeting tool of the eSimEvaluator™ software. The eSimEvaluator software allows the user to construct the business model in a visually intuitive manner, with each flowsheet following the flow of gas from the Producer, through the gathering system, to the processing plant, ending with the flow of product and residue streams to their respective sales points.

The models can be as simple or complex as is necessary to achieve the desired results. In our case, the models are fairly complex. They include every wellhead meter, configured to accurately portray the respective plant's I&D Report, Producer Contract details for settlement calculation, field and plant compression, field and plant flares, condensate removal points, treating and processing, and multiple gas and NGL sales points.

One of the aspects of the eSimEvaluator software that we felt made it particularly unique was that it maintains a strict mass balance by component across each model. There is a mole balance from wellhead to tailgate. It calculates an unaccountable based on wellhead and product volumes. Simply, the sum of the ins equals the sum of the outs!

While a great deal of emphasis is placed on the physical modeling, which is very visual in nature, the model also connects the physical with the commercial relationships. Sales revenues, gas costs (producer contracts), and interplant transfers are accurately reflected.

To save development time, all Producer Contracts were not explicitly modeled. Those Producer Contracts that would represent at least 80% of the total flow were modeled explicitly, with the remaining contracts grouped into aggregates of similar contract terms. Figures 1-3 show the flowsheets for the Keystone, Jal and Coyanosa business models respectively.

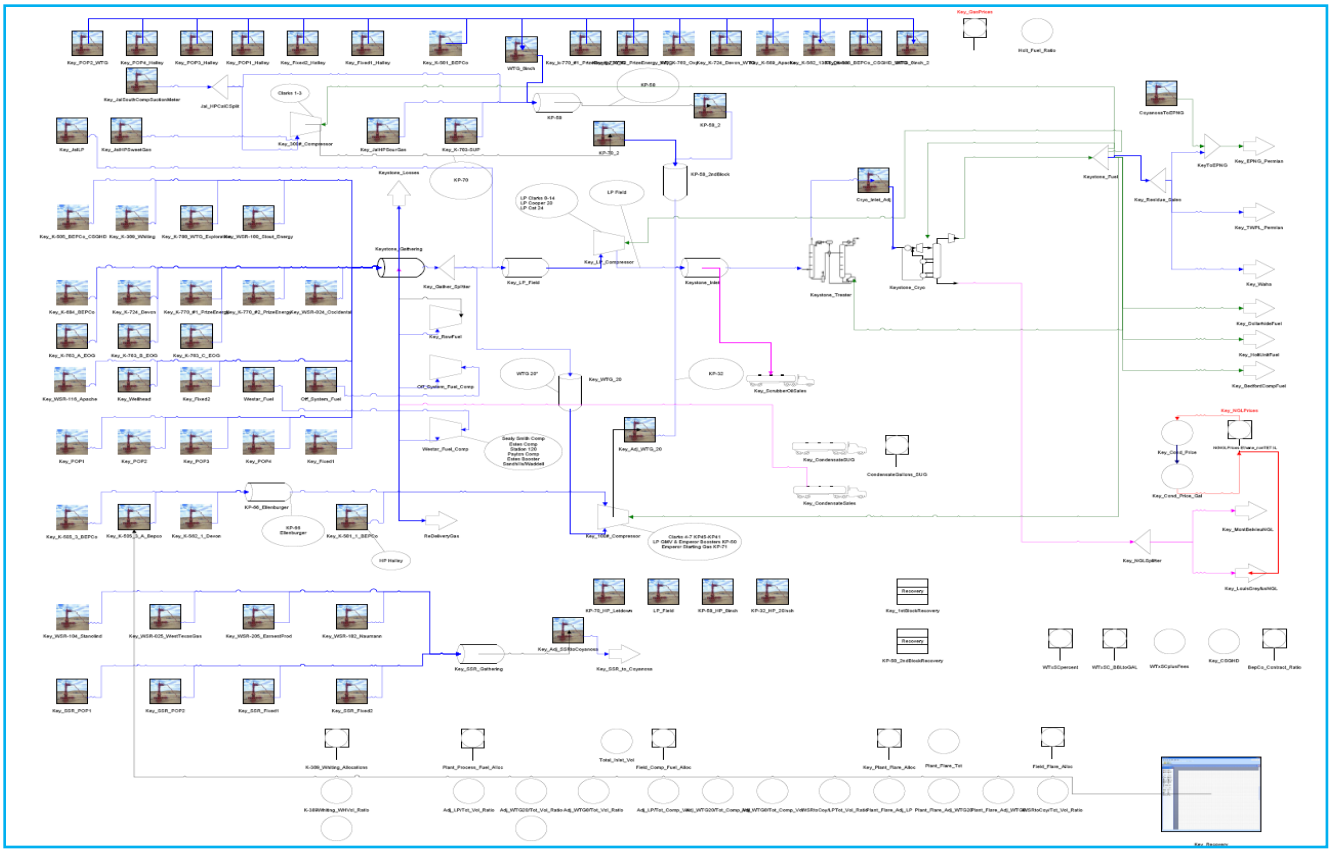


Figure 1 - Keystone Plant Flowsheet

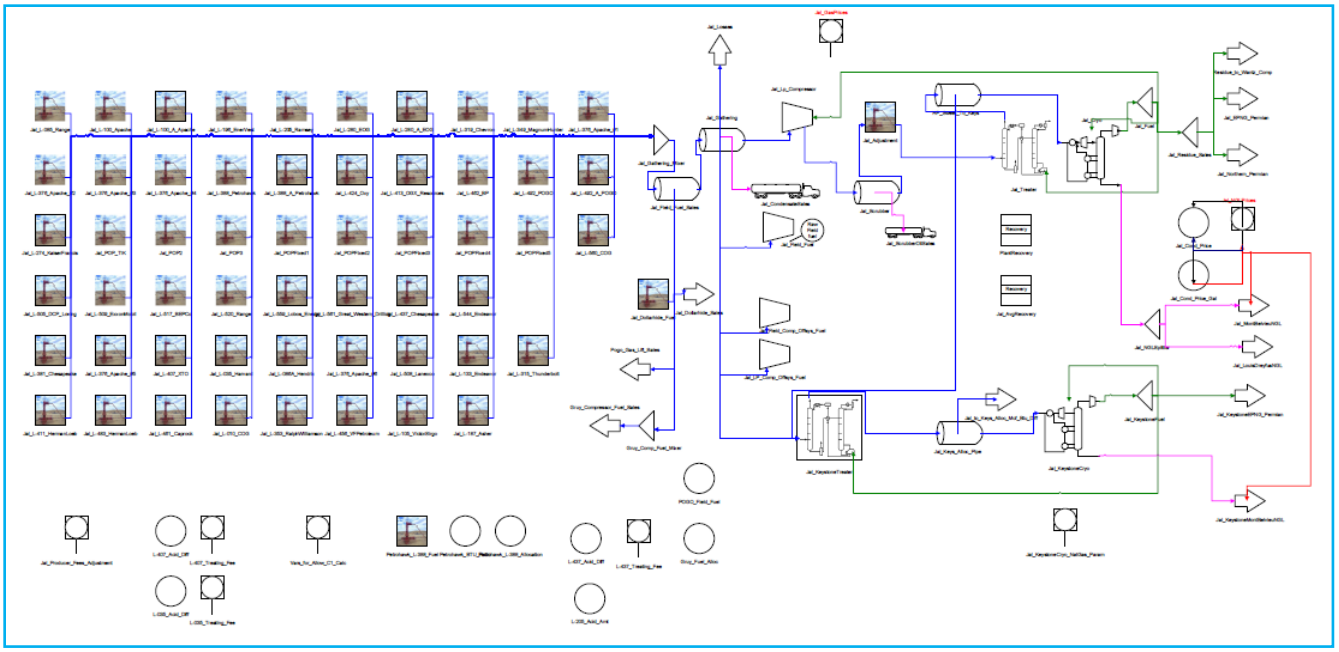


Figure 2 - Jal Plant Flowsheet

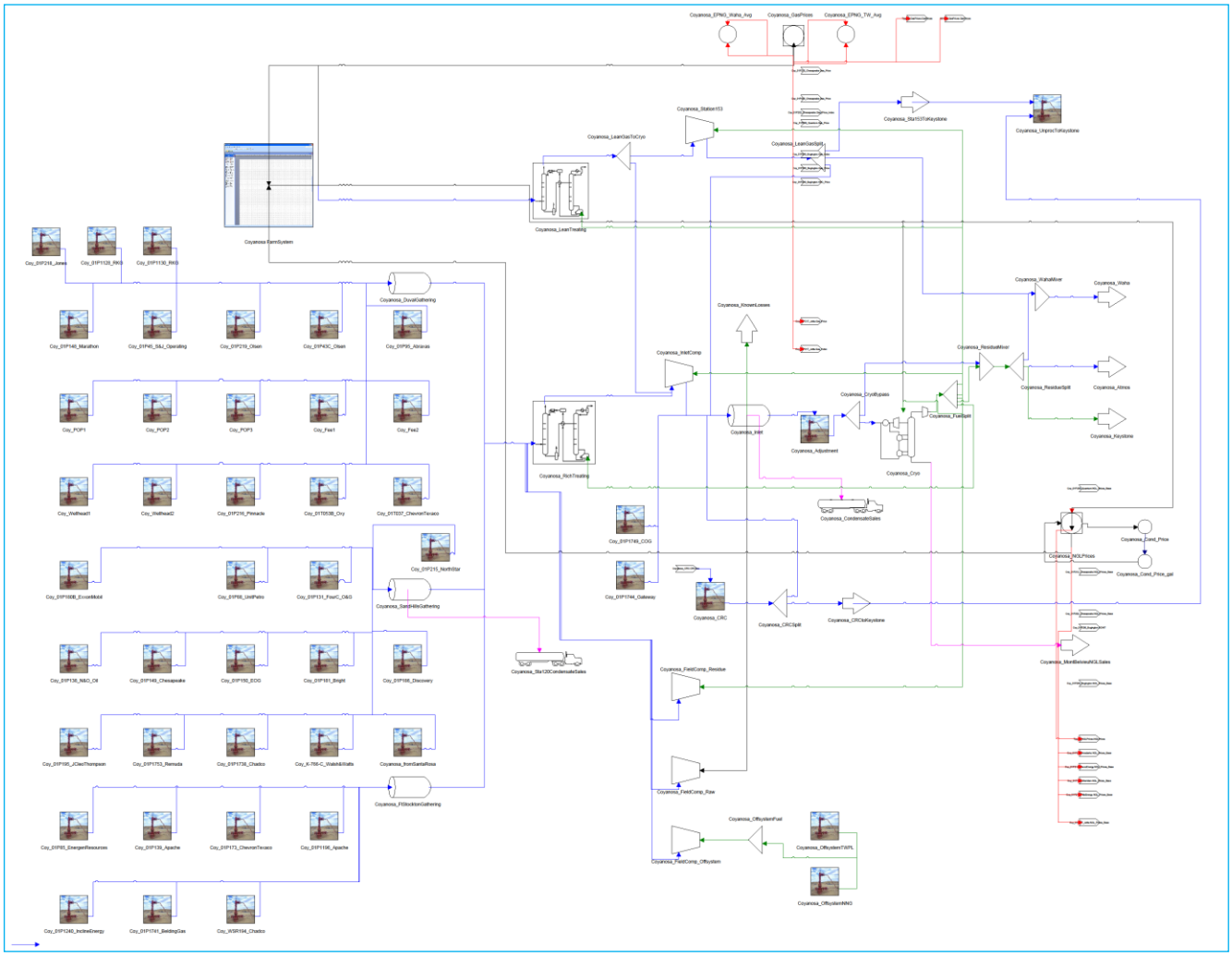


Figure 3 - Coyanosa Plant Flowsheet

As the project progressed, weekly meetings were held to discuss progress and problems. In the early stages of implementation, our weekly meetings included conference calls with plant managers, operators and engineers to include their input on how things really worked in the field. In later stages, their input was no longer required, while that of the commercial and accounting departments became more important.

All plant models were validated to producer contract settlement data for 5 months. Special spreadsheets for each model were built to allow side-by-side comparison of accounting data with that in the eSimEvaluator business models. We used an Excel Add-In that provides a direct interface between the eSimEvaluator MS SQL Server database, and an Excel spreadsheet. Using the Add-In, any variable in the eSimEvaluator database can be accessed, displayed and operated upon within Excel. Two major spreadsheets were used in this process; one for variance analysis, allowing comparison of producer settlement data and plant I&D data with that of the business model; and the second for margin analysis, allowing comparison between the eSimEvaluator and accounting's margin report for each plant. Examples are shown in Figures 4 and 5.

Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC
	Project	Jal 3.0c December Actual_0								Variance		
	Case	Dec Rev 17						Dec-09		esim-SUGS report		
Gas Intake		**Mcf**	**Btu factor**	**MMBtu**		**Mcf**	**Btu Factor**	**MMBtu**		Mcf	Btu Factor	MMBtu
Total Wellhead Volume		5,551,765	1.20563	6,693,360		5,551,764	1.2057	6,693,836		0	(0.0001)	(476)
Wellhead prior period adjustments		-	-	-		-	0.0000	-		-	0.0000	-
Unmetered HP Transfer Pipeline Pigging Gas		-	-	-		-	0.0000	-		-	0.0000	-
OffSystem Fuel		147,035	1.01454	149,173		147,058	1.0144	149,173		(23)	0.0001	0
Total Gas Intake		5,698,800	1.20070	6,842,533		5,698,823	1.2008	6,843,009		(23)	(0.0001)	(476)
Gas Disposition												
Residue Gas Deliveries												
Northern Natural Gas		-	-	-		-	0.0000	-		-	0.0000	-
Residue Transfer to Keystone		-	-	-		-	0.0000	-		-	0.0000	-
El Paso Natural Gas		2,332,108	1.01058	2,356,788		2,330,965	1.0111	2,356,788		1,144	(0.0005)	-
Total Residue Gas Deliveries		2,332,108	1.01058	2,356,788		2,330,965	1.0111	2,356,788		1,144	(0.0005)	-
Off System Deliveries												
Low Press Gas transferred to keystone (95008)		-		-		-	0.0000	-		-		-
HP Cal C gas tranfered to Keystone (02240)		937,582	1.19767	1,122,914		24,657	1.1977	29,531		912,925	(0.0000)	1,093,383
High Press Sweet Gas to keystone (01912)		576,062	1.22527	705,829		576,062	1.2253	705,848		0	(0.0000)	(19)
High Press Sour gas to keystone (Calc'd)		461,326	1.17208	540,711		1,374,251	1.2375	1,700,657		(912,925)	(0.0654)	(1,159,946)
Dollarhide plant fuel		-		-		-	0.0000	-		-		-
Pogo Redbluff Gas Lift		368	1.14604	422		369	1.1456	423		(1)	0.0004	(1)
Total Off System Deliveries		1,975,338	1.19973	2,369,877		1,975,338	1.2334	2,436,459		0	(0.0337)	(66,583)
Fuel Usage												
Field Compressor fuel		123,321	1.04483	128,849		114,828	1.0486	120,410		8,493	(0.0038)	8,439
Plant low pressure compressor fuel		277,272	1.01025	280,113		285,320	1.0113	288,552		(8,048)	(0.0011)	(8,439)
Plant Process Fuel		128,807	1.01058	130,170		128,715	1.0113	130,170		92	(0.0007)	-
Total Fuel Usage		529,400	1.01838	539,133		528,864	1.0194	539,132		537	(0.0010)	0
Flare, known leaks and Blowdown												
Field Flare, Known leaks and Blowdown	incls unaccounta	14,506	1.20546	17,486		19,546	1.2057	23,566		(5,040)	(0.0002)	(6,081)
Plant Flare & Blowdown		21,176	1.24581	26,381		2,151	1.3083	2,814		19,025	(0.0625)	23,566
Total Flare, Known Leaks and Blowdown		35,681	1.22941	43,867		21,697	1.2159	26,381		13,984	0.0135	17,486
Plant Process Shrinkage												
Acid Gas Shrinkage		153,448		-		155,046		-		(1,598)	0.0000	-
Water vapor shrinkage		95,650		-		93,775		-		1,875	(2.5285)	-
Liquid Production Extraction		591,003	2.50939	1,483,058		586,546	2.5285	1,483,103		4,457	0.7340	(45)

Sample Data

Figure 4 - I&D Variance Analysis Spreadsheet

Preliminary Margin Analysis											
Data Base											
For the month of	Mar-09										
		Actual			eSimulation			Variance		
Gas Revenue	Account	**Gals/Mmbtu**	**Price**	**Amount**	**Gals/Mmbtu**	**Price**	**Amount**	**Gals/Mmbtu**	**Price**	**Amount**
Ethane Sales	4900106	137	0.296097	927	134	0.296097	926	2	-	1
Propane Sales	4900106	710	0.614932	829	776	0.614932	869	(66)	-	(41)
Iso-butane Sales	4900106	420	0.877146	795	376	0.877148	757	44	(0.000002)	38
Nor-butane Sales	4900106	652	0.763682	752	661	0.763682	759	(9)	-	(7)
Pentane Sales	4900106	820	0.972177	683	998	0.972177	856	(178)	-	(173)
Condensate Sales [Keystone]	4900106	398	0.991890	489	398	0.991890	489	-	(0.000000)	(0)
Scrubber Sales [Keystone]	4900106	772	0.991887	425	771	0.991890	424	1	(0.000003)	1
Condensate/Scrubber Sales [Halley]	4900106	563	0.991942	494	563	0.991890	494	-	0.000052	0
Condensate/Scrubber Sales [WSR]	4900106	154	0.991905	918	154	0.991890	918	-	0.000015	0
Condensate/Scrubber Sales [WTG]	4900106	16	0.991885	813	15	0.991890	812	1	(0.000005)	1
Residue Gas Sales	4810106	505	2.763299	577	254	2.763300	884	251	(0.000001)	693
Residue Gas Sales [AR Invoice - Holt	4810006	780	2.723077	124	781	2.722500	126	(1)	0.000577	(2)
Producer Fees [JE]	4950036			618			776	-	-	842
Other Income [Sulfur Invoice]	4950036			-			-	-	-	-
Total Gas Revenue		927		444	881		89	45		354
Gas Cost										
Ethane Purchased	8020206	741	0.282712	618	405	0.282936	446	664	(0.000224)	828
Propane Purchased	8020206	880	0.601289	217	777	0.601527	48	897	(0.000238)	831
Iso-butane Purchased	8020206	611	0.862998	580	959	0.863038	927	348	(0.000040)	347
Nor-butane Purchased	8020206	868	0.752965	569	168	0.754867	622	300	(0.001902)	53
Pentane Purchased	8020206	453	0.901468	197	312	0.905644	953	859	(0.004176)	756
Residue Gas Purchased	8000016	661	0.930408	615	661	1.000000	661	0	(0.069592)	(46)
Residue Gas Purchased	8020016	512	2.755981	387	443	2.763300	993	(931)	(0.007319)	607
Fuel Gas Purchased [SUIGP]	8020106			307			307			(0)
Fuel Gas Purchased [SUGE Accrual]	8020106			623			623			-
Other Gas Cost [Keystone - SUIGP]	8130016			354			354			(0)
Other Gas Cost [Keystone - SUIGP]	8130106			500			500			-
Other Gas Cost [Halley-Margin]	8130016			-			873			873
Other Gas Cost [Halley-Margin]	8130016			9			735			274
Other Gas Cost [WSR-Margin]	8130016			851			861			990
Other Gas Cost [WTG-Margin]	8130016			554			301			253
Other Gas Cost [Jal-Margin]	8130016			838			837			(0)
Other Gas Cost [SUPL-Margin]	8130016			-			-			-
Other Gas Cost [Halley-Margin]	8130016			-			873			873
Other Gas Cost [Halley-Margin]	8130016			9			735			274
Other Gas Cost [WSR-Margin]	8130016			851			861			990
Other Gas Cost [WTG-Margin]	8130016			554			301			253
Other Gas Cost [Sulfur]				810			810			-
Total Gas Cost		726		939	724		407	998		468
Gross Margin		201		505	157		682	44		823

Sample Data

Figure 5 - Margin Variance Analysis

An interface between the SUGS measurement data system (PGAS) and the eSimEvaluator database was developed, which provides fast and accurate updating of wellhead meter volumes and compositions. Other data, such as, plant meter volumes and compositions are also available through this interface. For this project, we were focused on monthly data, however, any timeframe in which measurement system data is updated could be used for forecasting activities.

Using the Models

The eSimEvaluator business model runs in any one of 4 different Solution Case Modes: Parameter, Simulate, Reconcile, and Optimize. These Solution Case Modes allow the easy automatic conversion of variable specifications between the different cases. For instance, the Parameter case mode is used to run accrual cases where the production variables are fixed and the recovery variables are calculated to match the production. The Simulate case mode is used when running forecast cases where the production rate is calculated but the recoveries are constant. Using the correct Variable specification makes the change from accrual case to forecast case very easy.

In performing an Accrual with the eSimEvaluator business model, data that reflects what has already happened is loaded into the model. In our project, the data input included meter volumes and compositions from the measurement system (PGAS), various pieces of data from I&D reports including production volumes, and pricing data.

After input of this data, the eSimEvaluator is run in "Parameter" solution mode. In this mode the eSimEvaluator solves for a set of parameters which would produce the input values provided.

For example, NGL production volumes and Residue composition are entered as input or Measured values, and the corresponding Cryo Recovery Percentages are calculated as Parameters. When the model is then run in Simulation solution mode, the Parameters become fixed values, and the Measured variables are then calculated.

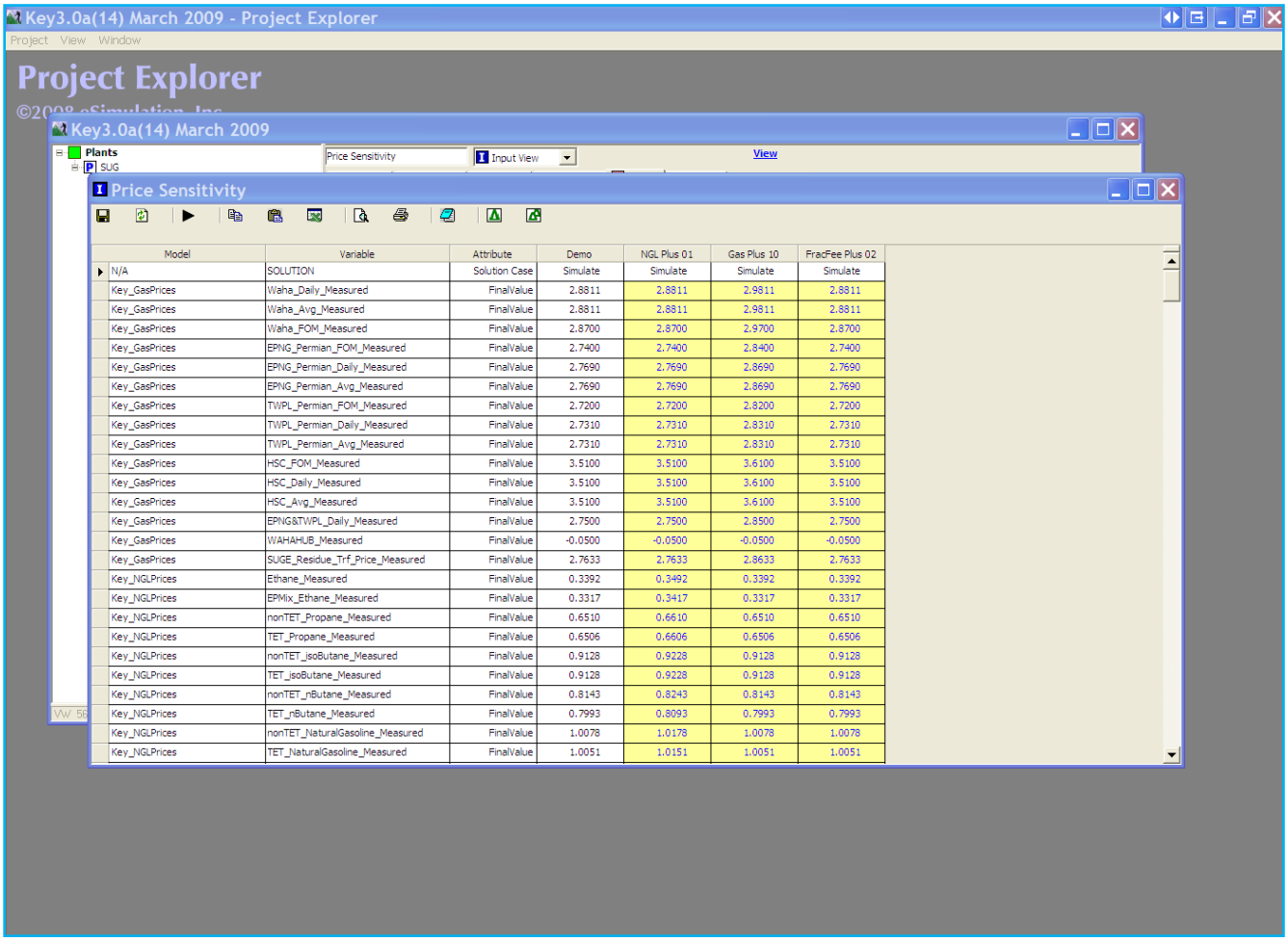
On a routine basis, the model must be kept current with field and commercial changes. New producer contracts, contract revisions and amendments, new well connects and disconnects, changes to field piping and compression must be updated in the models each month.

Price Sensitivities

One of the first uses of the eSimEvaluator models was to provide management with Price Sensitivity analysis. We ran case studies on each of the plants to examine the sensitivity to an increase in NGL prices of one cent ($0.01), an increase in gas price of ten cents ($0.10), and an increase of two cents ($0.02) in the T&F costs that SUGS incurs.

After the base case selection and modification of the required model variables, the sensitivity cases are automatically generated and run.

The most current month we had modeled was March 2009, so we used that as the Base Case. The variables selected for the MultiView included all gas prices, all NGL prices, and all T&F related prices used in the business model. The data in the MultiView is modified to meet the needs of the study; then the Cases are run in a queue. A screen-shot of the MultiView is shown in Figure 6.



Model	Variable	Attribute	Demo	NGL Plus 01	Gas Plus 10	FracFee Plus 02
N/A	SOLUTION	Solution Case	Simulate	Simulate	Simulate	Simulate
Key_GasPrices	Waha_Daily_Measured	FinalValue	2.8811	2.8811	2.9811	2.8811
Key_GasPrices	Waha_Avg_Measured	FinalValue	2.8811	2.8811	2.9811	2.8811
Key_GasPrices	Waha_FOM_Measured	FinalValue	2.8700	2.8700	2.9700	2.8700
Key_GasPrices	EPNG_Permian_FOM_Measured	FinalValue	2.7400	2.7400	2.8400	2.7400
Key_GasPrices	EPNG_Permian_Daily_Measured	FinalValue	2.7690	2.7690	2.8690	2.7690
Key_GasPrices	EPNG_Permian_Avg_Measured	FinalValue	2.7690	2.7690	2.8690	2.7690
Key_GasPrices	TWPL_Permian_FOM_Measured	FinalValue	2.7200	2.7200	2.8200	2.7200
Key_GasPrices	TWPL_Permian_Daily_Measured	FinalValue	2.7310	2.7310	2.8310	2.7310
Key_GasPrices	TWPL_Permian_Avg_Measured	FinalValue	2.7310	2.7310	2.8310	2.7310
Key_GasPrices	HSC_FOM_Measured	FinalValue	3.5100	3.5100	3.6100	3.5100
Key_GasPrices	HSC_Daily_Measured	FinalValue	3.5100	3.5100	3.6100	3.5100
Key_GasPrices	HSC_Avg_Measured	FinalValue	3.5100	3.5100	3.6100	3.5100
Key_GasPrices	EPNG&TWPL_Daily_Measured	FinalValue	2.7500	2.7500	2.8500	2.7500
Key_GasPrices	WAHAHUB_Measured	FinalValue	-0.0500	-0.0500	-0.0500	-0.0500
Key_GasPrices	SUGE_Residue_Trf_Price_Measured	FinalValue	2.7633	2.7633	2.8633	2.7633
Key_NGLPrices	Ethane_Measured	FinalValue	0.3392	0.3492	0.3392	0.3392
Key_NGLPrices	EPMix_Ethane_Measured	FinalValue	0.3317	0.3417	0.3317	0.3317
Key_NGLPrices	nonTET_Propane_Measured	FinalValue	0.6510	0.6610	0.6510	0.6510
Key_NGLPrices	TET_Propane_Measured	FinalValue	0.6506	0.6606	0.6506	0.6506
Key_NGLPrices	nonTET_isoButane_Measured	FinalValue	0.9128	0.9228	0.9128	0.9128
Key_NGLPrices	TET_isoButane_Measured	FinalValue	0.9128	0.9228	0.9128	0.9128
Key_NGLPrices	nonTET_nButane_Measured	FinalValue	0.8143	0.8243	0.8143	0.8143
Key_NGLPrices	TET_nButane_Measured	FinalValue	0.7993	0.8093	0.7993	0.7993
Key_NGLPrices	nonTET_NaturalGasoline_Measured	FinalValue	1.0078	1.0178	1.0078	1.0078
Key_NGLPrices	TET_NaturalGasoline_Measured	FinalValue	1.0051	1.0151	1.0051	1.0051

Figure 6 -MultiView Inputs

After the Cases are run, the data is then available for further analysis. Results for the Price Sensitivity analysis are shown in Figure 7.

Key			Key3.0a(14) March 2009	Key3.0a(14) March 2009	Key3.0a(14) March 2009
			Demo.NGL Plus 01	Demo.Gas Plus 10	Demo.FracFee Plus 02
			Mar-09	Mar-09	Mar-09
			31	31	31
			evaluator	evaluator	evaluator
Propane	gal		1,464,810	1,464,810	1,464,810
Isobutane	gal		196,518	196,518	196,518
nButane	gal		580,065	580,065	580,065
Natural Gasoline	gal		694,820	694,820	694,820
Residue	mmbtu		935	935	935
Residue	mmbtu		587,525	587,525	587,525
Equity NGLs					
Ethane	gal		2,665,410	2,665,410	2,665,410
Propane	gal		1,395,828	1,395,828	1,395,828
Isobutane	gal		167,467	167,467	167,467
nButane	gal		532,441	532,441	532,441
Natural Gasoline	gal		278,157	278,157	278,157
Condensates	gal		482,107	482,107	482,107
Residue	mmbtu		175,575	175,575	175,575
Summary					
Residue Sales	$		2,114,263	2,190,776	2,114,263
NGL Sales	$		5,864,548	5,759,107	5,557,866
Producer Fees	$		100,092	100,092	100,092
Other Income	$		-	-	-
Producer Payments	$		4,376,774	4,385,614	4,275,477
Other Costs	$		(7,147)	(3,042)	(7,147)
Other Costs (Sulfur)			40,743	40,743	40,743
Gross Margin	$		3,668,534	3,626,660	3,463,148
Delta Gross Margin from Mar09	$		55,645	13,771	(149,741)

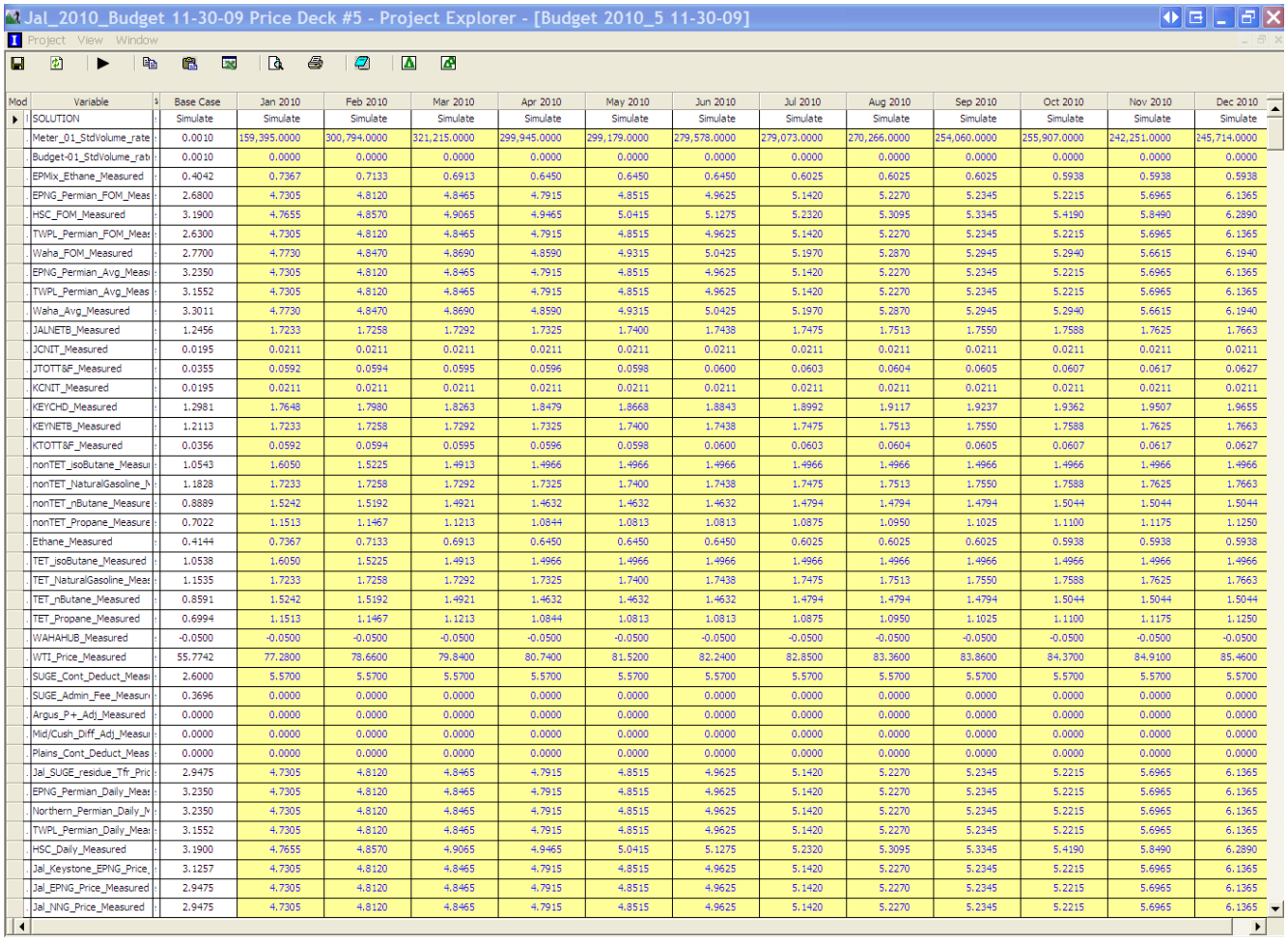
Sample Data

Figure 7 - Price Sensitivities Output

When running and comparing Case results it is advantageous to display the data in single columns as shown. The data in each column references the Project and Case names shown at the top of each column. Each Case is saved independently in the eSimEvaluator database. The significance of this is that any variable in the Case can be changed, the Case can then be re-run and the new results will be displayed when the spreadsheet is refreshed. Also, since each case results are stored in the database, if additional analysis is required, new case calculations can be added without rerunning and changing the existing cases.

Budget 2010

The next use of the eSimEvaluator business models was to assist in the 2010 Budget process. The eSimEvaluator was used to provide margin projections for the 5 plants. Previously, an Excel model had been used. It was anticipated that the new models would provide more accurate projections with less time and effort.



Jal_2010_Budget 11-30-09 Price Deck #5 - Project Explorer - [Budget 2010_5 11-30-09]

Project View Window

Mod	Variable	Base Case	Jan 2010	Feb 2010	Mar 2010	Apr 2010	May 2010	Jun 2010	Jul 2010	Aug 2010	Sep 2010	Oct 2010	Nov 2010	Dec 2010
▶	SOLUTION	Simulate	Simulate	Simulate	Simulate	Simulate	Simulate	Simulate	Simulate	Simulate	Simulate	Simulate	Simulate	Simulate
	Meter_01_StdVolume_rate	0.0010	159,395.0000	300,794.0000	321,215.0000	299,945.0000	299,179.0000	279,578.0000	279,073.0000	270,266.0000	254,060.0000	255,907.0000	242,251.0000	245,714.0000
	Budget-01_StdVolume_rat	0.0010	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	EPMix_Ethane_Measured	0.4042	0.7367	0.7133	0.6913	0.6450	0.6450	0.6450	0.6025	0.6025	0.6025	0.5938	0.5938	0.5938
	EPNG_Permian_FOM_Meas	2.6800	4.7305	4.8120	4.8465	4.7915	4.8515	4.9625	5.1420	5.2270	5.2345	5.2215	5.6965	6.1365
	HSC_FOM_Measured	3.1900	4.7655	4.8570	4.9065	4.9465	5.0415	5.1275	5.2320	5.3095	5.3345	5.4190	5.8490	6.2890
	TWPL_Permian_FOM_Meas	2.6300	4.7305	4.8120	4.8465	4.7915	4.8515	4.9625	5.1420	5.2270	5.2345	5.2215	5.6965	6.1365
	Waha_FOM_Measured	2.7700	4.7730	4.8470	4.8690	4.8590	4.9315	5.0425	5.1970	5.2870	5.2945	5.2940	5.6615	6.1940
	EPNG_Permian_Avg_Meas	3.2350	4.7305	4.8120	4.8465	4.7915	4.8515	4.9625	5.1420	5.2270	5.2345	5.2215	5.6965	6.1365
	TWPL_Permian_Avg_Meas	3.1552	4.7305	4.8120	4.8465	4.7915	4.8515	4.9625	5.1420	5.2270	5.2345	5.2215	5.6965	6.1365
	Waha_Avg_Measured	3.3011	4.7730	4.8470	4.8690	4.8590	4.9315	5.0425	5.1970	5.2870	5.2945	5.2940	5.6615	6.1940
	JALNETB_Measured	1.2456	1.7233	1.7258	1.7292	1.7325	1.7400	1.7438	1.7475	1.7513	1.7550	1.7588	1.7625	1.7663
	JCNIT_Measured	0.0195	0.0211	0.0211	0.0211	0.0211	0.0211	0.0211	0.0211	0.0211	0.0211	0.0211	0.0211	0.0211
	JTOTT&F_Measured	0.0355	0.0592	0.0594	0.0595	0.0596	0.0598	0.0600	0.0603	0.0604	0.0605	0.0607	0.0617	0.0627
	KCNIT_Measured	0.0195	0.0211	0.0211	0.0211	0.0211	0.0211	0.0211	0.0211	0.0211	0.0211	0.0211	0.0211	0.0211
	KEYCHD_Measured	1.2981	1.7648	1.7980	1.8263	1.8479	1.8668	1.8843	1.8992	1.9117	1.9237	1.9362	1.9507	1.9655
	KEYNETB_Measured	1.2113	1.7233	1.7258	1.7292	1.7325	1.7400	1.7438	1.7475	1.7513	1.7550	1.7588	1.7625	1.7663
	KTOTT&F_Measured	0.0356	0.0592	0.0594	0.0595	0.0596	0.0598	0.0600	0.0603	0.0604	0.0605	0.0607	0.0617	0.0627
	nonTET_isoButane_Measu	1.0543	1.6050	1.5225	1.4913	1.4966	1.4966	1.4966	1.4966	1.4966	1.4966	1.4966	1.4966	1.4966
	nonTET_NaturalGasoline_M	1.1828	1.7233	1.7258	1.7292	1.7325	1.7400	1.7438	1.7475	1.7513	1.7550	1.7588	1.7625	1.7663
	nonTET_nButane_Measure	0.8889	1.5242	1.5192	1.4921	1.4632	1.4632	1.4632	1.4794	1.4794	1.4794	1.5044	1.5044	1.5044
	nonTET_Propane_Measure	0.7022	1.1513	1.1467	1.1213	1.0844	1.0813	1.0813	1.0875	1.0950	1.1025	1.1100	1.1175	1.1250
	Ethane_Measured	0.4144	0.7367	0.7133	0.6913	0.6450	0.6450	0.6450	0.6025	0.6025	0.6025	0.5938	0.5938	0.5938
	TET_isoButane_Measured	1.0538	1.6050	1.5225	1.4913	1.4966	1.4966	1.4966	1.4966	1.4966	1.4966	1.4966	1.4966	1.4966
	TET_NaturalGasoline_Meas	1.1535	1.7233	1.7258	1.7292	1.7325	1.7400	1.7438	1.7475	1.7513	1.7550	1.7588	1.7625	1.7663
	TET_nButane_Measured	0.8591	1.5242	1.5192	1.4921	1.4632	1.4632	1.4632	1.4794	1.4794	1.4794	1.5044	1.5044	1.5044
	TET_Propane_Measured	0.6994	1.1513	1.1467	1.1213	1.0844	1.0813	1.0813	1.0875	1.0950	1.1025	1.1100	1.1175	1.1250
	WAHAHUB_Measured	-0.0500	-0.0500	-0.0500	-0.0500	-0.0500	-0.0500	-0.0500	-0.0500	-0.0500	-0.0500	-0.0500	-0.0500	-0.0500
	WTI_Price_Measured	55.7742	77.2800	78.6600	79.8400	80.7400	81.5200	82.2400	82.8500	83.3600	83.8600	84.3700	84.9100	85.4600
	SUGE_Cont_Deduct_Meas	2.6000	5.5700	5.5700	5.5700	5.5700	5.5700	5.5700	5.5700	5.5700	5.5700	5.5700	5.5700	5.5700
	SUGE_Admin_Fee_Measur	0.3696	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Argus_P+_Adj_Measured	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Mid/Cush_Diff_Adj_Measu	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Plains_Cont_Deduct_Meas	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Jal_SUGE_residue_Tfr_Pric	2.9475	4.7305	4.8120	4.8465	4.7915	4.8515	4.9625	5.1420	5.2270	5.2345	5.2215	5.6965	6.1365
	EPNG_Permian_Daily_Meas	3.2350	4.7305	4.8120	4.8465	4.7915	4.8515	4.9625	5.1420	5.2270	5.2345	5.2215	5.6965	6.1365
	Northern_Permian_Daily_M	3.2350	4.7305	4.8120	4.8465	4.7915	4.8515	4.9625	5.1420	5.2270	5.2345	5.2215	5.6965	6.1365
	TWPL_Permian_Daily_Meas	3.1552	4.7305	4.8120	4.8465	4.7915	4.8515	4.9625	5.1420	5.2270	5.2345	5.2215	5.6965	6.1365
	HSC_Daily_Measured	3.1900	4.7655	4.8570	4.9065	4.9465	5.0415	5.1275	5.2320	5.3095	5.3345	5.4190	5.8490	6.2890
	Jal_Keystone_EPNG_Price_	3.1257	4.7305	4.8120	4.8465	4.7915	4.8515	4.9625	5.1420	5.2270	5.2345	5.2215	5.6965	6.1365
	Jal_EPNG_Price_Measured	2.9475	4.7305	4.8120	4.8465	4.7915	4.8515	4.9625	5.1420	5.2270	5.2345	5.2215	5.6965	6.1365
	Jal_NNG_Price_Measured	2.9475	4.7305	4.8120	4.8465	4.7915	4.8515	4.9625	5.1420	5.2270	5.2345	5.2215	5.6965	6.1365

Figure 8 - MultiView Budget Input

The model variables we wanted to change for each case were:

- Meter volumes including new wellhead volumes and field decline assumptions
- Prices

Volume information and assumptions were provided by Gas Supply, and pricing was developed by Marketing.

The Base Case we chose to start from was May 2009. The model Parameters for each plant were thoroughly examined to make sure they were reasonable. Small changes were made as deemed necessary. In one instance, there was by-pass around one of the plants in May, but for the budget projection, it was decided that there would be no by-pass.

It was expected that multiple budget projections would be made throughout the third and fourth quarter, the frequency depending primarily on how prices fluctuated. The first projection was completed near the end of August 2009. This first pass, as might be expected, took some time (about 1 day) to complete. The most time consuming part of its preparation was getting the output into the format that the Accounting Department wanted.

In total, 5 budget projections were made.

T	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI
Jal_2010	Price Deck #5		10-09 Price Deck #5	Price Deck #5	Price Deck #5	Price Deck #5	Price Deck #5	Price Deck #5	Price Deck #5	Price Deck #5	Price Deck #5	Price Deck #5	Price Deck #5	Price Deck #5
	Case -3500 gal		gal (Sim).Jan 2010	(Sim).Feb 2010	Sim).Mar 2010	(Sim).Apr 2010	Sim).May 2010	(Sim).Jun 2010	(Sim).Jul 2010	Sim).Aug 2010	(Sim).Sep 2010	(Sim).Oct 2010	Sim).Nov 2010	(Sim).Dec 2010
	May-09		Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10
	31		31	28	31	30	31	30	31	31	30	31	30	31
	31		31	28	30	30	31	29	30	30	30	31	29	31
Purchased NGLs														
Ethane	8,737,400		9,151,216	9,517,602	9,570,466	9,515,404	9,513,421	9,462,668	9,461,360	9,438,552	9,396,577	9,401,361	9,365,985	9,374,956
Propane	6,138,536		6,361,228	6,558,712	6,587,228	6,557,526	6,556,457	6,529,084	6,528,379	6,516,080	6,493,448	6,496,027	6,476,955	6,481,792
Isobutane	987,546		1,021,360	1,051,334	1,055,661	1,051,154	1,050,992	1,046,838	1,046,731	1,044,864	1,041,430	1,041,821	1,038,927	1,039,661
nButane	2,324,443		2,388,638	2,445,554	2,453,772	2,445,213	2,444,904	2,437,016	2,436,813	2,433,268	2,426,746	2,427,489	2,421,993	2,423,387
Natural Gasoline	3,316,001		3,422,440	3,516,880	3,530,520	3,516,313	3,515,801	3,502,709	3,502,371	3,496,489	3,485,665	3,486,898	3,477,777	3,480,090
Residue	2,790,024		2,904,562	3,006,229	3,020,917	3,005,619	3,005,068	2,990,971	2,990,608	2,984,275	2,972,621	2,973,949	2,964,130	2,966,620
Equity NGLs														
Ethane	1,781,382		1,815,754	1,846,945	1,851,499	1,846,756	1,846,585	1,842,226	1,842,114	1,840,159	1,836,568	1,836,977	1,833,957	1,834,722
Propane	1,253,302		1,276,704	1,297,523	1,300,534	1,297,398	1,297,285	1,294,396	1,294,322	1,293,024	1,290,636	1,290,908	1,288,897	1,289,407
Isobutane	198,632		201,890	204,801	205,222	204,783	204,767	204,363	204,352	204,170	203,836	203,874	203,593	203,664
nButane	402,281		408,629	414,286	415,105	414,252	414,221	413,436	413,415	413,063	412,414	412,488	411,941	412,080
Natural Gasoline	-968,686		-1,007,309	-1,041,593	-1,046,546	-1,041,387	-1,041,202	-1,036,448	-1,036,325	-1,034,190	-1,030,260	-1,030,708	-1,027,397	-1,028,236
Condensate	2,035,402		2,092,227	2,142,636	2,149,917	2,142,334	2,142,061	2,135,073	2,134,893	2,131,753	2,125,976	2,126,634	2,121,766	2,123,000
Residue	733,795		761,870	786,715	790,299	786,566	786,431	782,990	782,902	781,355	778,509	778,833	776,435	777,043
Summary														
Residue Sales	**10,386,455**		**17,344,055**	**18,251,647**	**18,471,055**	**18,170,252**	**18,394,458**	**18,728,285**	**19,403,388**	**19,682,948**	**19,635,291**	**19,595,155**	**21,308,125**	**22,972,987**
NGL Sales	**17,408,173**		**29,261,941**	**29,745,176**	**29,360,853**	**28,399,608**	**28,423,788**	**28,356,776**	**28,002,259**	**28,043,837**	**28,047,126**	**28,119,041**	**28,114,118**	**28,202,779**
Producer Fees	**205,135**		**205,135**	**205,135**	**205,135**	**205,135**	**205,135**	**205,135**	**205,135**	**205,135**	**205,135**	**205,135**	**205,135**	**205,135**
Other Income	**0**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Producer Payments	**21,987,971**		**37,369,160**	**38,487,766**	**38,299,921**	**37,215,167**	**37,390,218**	**37,567,428**	**37,785,386**	**38,022,663**	**37,966,906**	**37,980,580**	**39,311,292**	**40,686,718**
Other Costs	**558,841**		**585,344**	**588,337**	**589,065**	**588,065**	**588,816**	**589,940**	**592,200**	**593,140**	**592,987**	**592,852**	**598,595**	**604,169**
Gross Margin	**5,452,952**		**8,856,627**	**9,125,854**	**9,148,057**	**8,971,762**	**9,044,347**	**9,132,827**	**9,233,196**	**9,316,118**	**9,327,658**	**9,345,899**	**9,717,491**	**10,090,014**

Sample Data

Figure 9 – 12 Month Budget Forecast Example

Recovery Sensitivity Analysis

A Recovery Sensitivity Analysis was requested to determine the effect on gross margin of a +5% or -5% change in Ethane recovery for each of the plants. In particular, we wanted to examine how Equity NGL's would change with a change in recovery percentages.

On the surface, this seems like a simple request that could be calculated on the back of an envelope. What is difficult to see is the complexity of the interactions created by the contract mix. Both the Jal and Keystone plants have a group of allocated contracts, there are inter-plant transfers, and one plant is settled on an mmbtu basis, while the other is settled on an mcf basis.

In concept, there were three cases to be run for each plant or system:

1. Base Case
2. +5% Ethane Recovery
3. -5% Ethane Recovery

In the case of the Jal plant, a sizeable stream of gas is sent to the Keystone plant for processing each month. The resultant quantities of residue and NGL's from this stream is then allocated back to the Jal plant and its producers. For this reason, the overall effect on gross margin at the Jal plant is also dependent upon the operating results at the Keystone plant. For the Jal plant, the cases to be run for this study became the following matrix:

Base Case	Delta Case 1	Delta Case 2
Jal Base / Key Base	**Jal +5pct / Key Base**	**Jal -5pct / Key Base**
Jal Base / Key +5pct	**Jal +5pct / Key +5pct**	**Jal -5pct / Key +5pct**
Jal Base / Key -5pct	**Jal +5pct / Key -5pct**	**Jal -5pct / Key -5pct**

The MultiView was fairly simple for this study, as the only variable to be changed was the Ethane Product Recovery Percentage, shown in Figure 10.

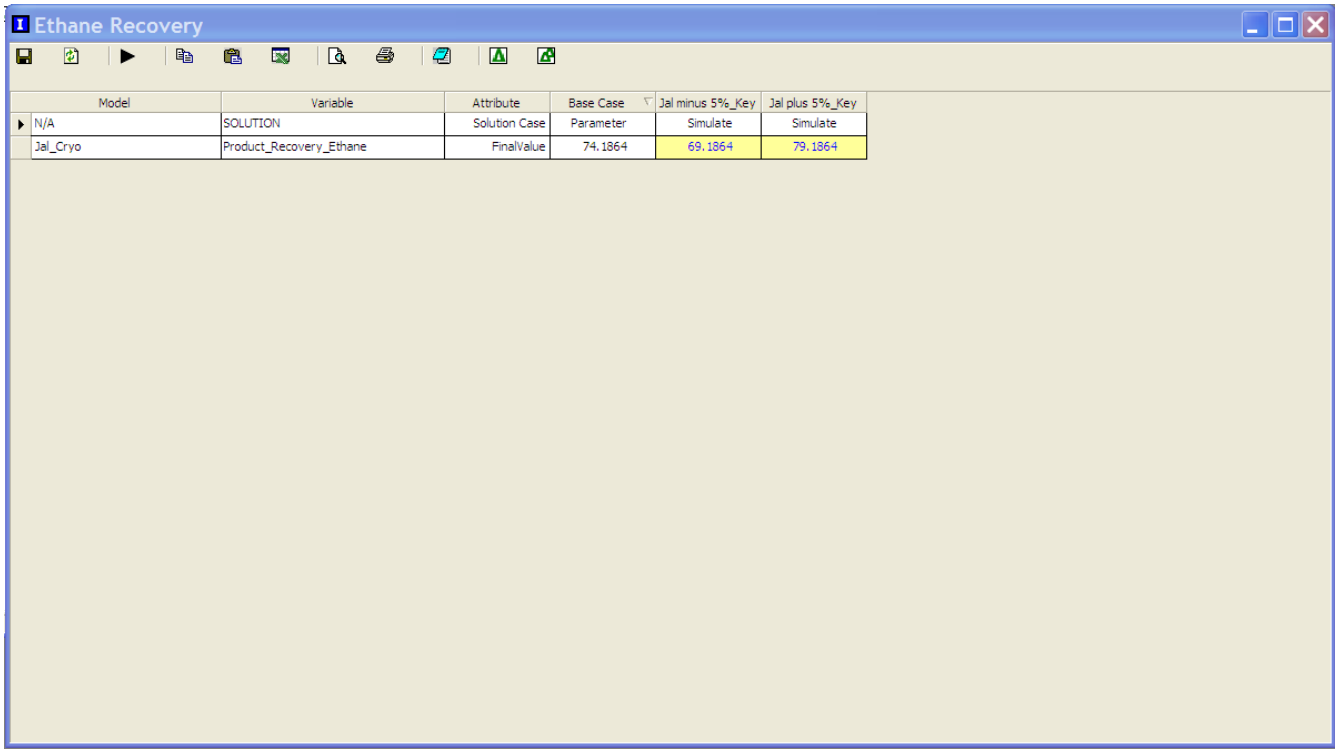


Figure 10 – Recovery Study MultiView

Results for the Jal Plant case matrix are shown in Figure 11.

		Jal_ Recovery Case St	Jal_ Recovery Case St	Jal_ Recovery Case St	Jal_ Recovery Case St	Jal_ Recovery Case St	Jal_ Recovery Case St	Jal_ Recovery Case St
		Jal Base/Key Base	Jal Base/Key +5pct	Jal Base/Key -5pct	Jal +5pct/Key Base	Jal -5pct/Key Base	Jal +5pct/Key +5pct	Jal -5pct/Key -5pct
		Jal Base/Key Base	Jal Base/Key +5pct	Jal Base/Key -5pct	Jal +5pct/Key Base	Jal -5pct/Key Base	Jal +5pct/Key +5pct	Jal -5pct/Key -5pct
Jal Ethane Recovery %		74.19	74.19	74.19	79.19	69.19	79.19	69.19
Total NGL's								
Ethane	gal	10,920,107	11,204,985	10,635,231	11,339,140	10,501,082	11,624,018	10,216,206
Propane	gal	7,704,733	7,704,733	7,704,733	7,704,733	7,704,733	7,704,733	7,704,733
Isobutane	gal	1,227,215	1,227,215	1,227,215	1,227,215	1,227,215	1,227,215	1,227,215
nButane	gal	2,847,088	2,847,088	2,847,088	2,847,088	2,847,088	2,847,088	2,847,088
Natural Gasoline	gal	2,493,066	2,493,066	2,493,066	2,493,066	2,493,066	2,493,066	2,493,066
Equity NGLs								
Ethane	gal	1,781,382	1,964,544	1,598,220	2,050,799	1,511,969	2,233,962	1,328,807
Propane	gal	1,253,302	1,253,302	1,253,302	1,253,302	1,253,302	1,253,302	1,253,302
Isobutane	gal	198,632	198,632	198,632	198,632	198,632	198,632	198,632
nButane	gal	402,281	402,281	402,281	402,281	402,281	402,281	402,281
Natural Gasoline	gal	-968,686	-968,686	-968,686	-968,686	-968,686	-968,686	-968,686
Condensate	gal	2,035,402	2,035,402	2,035,402	2,035,402	2,035,402	2,035,402	2,035,402
Residue	mmbtu	733,795	721,903	745,688	716,058	751,531	704,166	763,427
Summary								
Residue Sales	$	**10,386,455**	**10,335,064**	**10,437,851**	**10,310,140**	**10,462,770**	**10,258,749**	**10,514,171**
NGL Sales	$	**17,408,173**	**17,511,233**	**17,305,114**	**17,557,540**	**17,258,808**	**17,660,600**	**17,155,749**
Producer Fees	$	**205,135**	**205,135**	**205,135**	**205,135**	**205,135**	**205,135**	**205,135**
Other Income	$	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Producer Payments	$	**21,987,971**	**22,007,878**	**21,968,063**	**22,017,253**	**21,958,688**	**22,037,161**	**21,938,781**
Other Costs	$	**558,841**	**558,841**	**558,841**	**558,841**	**558,841**	**558,841**	**558,841**
Gross Margin	$	**5,452,952**	**5,484,713**	**5,421,195**	**5,496,720**	**5,409,184**	**5,528,481**	**5,377,434**
Delta Gross Margin from Jal Base/Key Base			**31,761**	**-31,756**	**43,769**	**-43,768**	**75,529**	**-75,518**

Sample Data

Figure 11 – Jal Plant Recovery Study Results

Going Forward

The accuracy of the eSimEvaluator models while very good now, can be improved. As the models are currently constructed, there are some Producer Contracts that are in Aggregated Contract models, or "buckets". These Aggregated Contract models are groups of producer flows that are similar in their contract terms, and through variance analysis are known to contribute most, if not all, of the variance between the model and actual values. As time permits, we will convert the Aggregated Contracts to explicit contracts in the eSimEvaluator model.

Currently, our use of the business model is in the beginning stages. We have used the model to:

1. Determine Price Sensitivities
2. Determine Recovery Sensitivities
3. Forecast 2010 Plant Margins
4. Perform Accruals on a monthly basis with variance analysis
5. Examine effects of changes in process streams
6. Forecast effects of contract terms changes

As we go forward, we will be making even greater use of the eSimEvaluator business models. In the upcoming year we expect to use the business model to assist in:

1. Business Interruption Impact Case Study
2. Forecasting a rolling annual Plant Margin performance
3. Comparison of monthly Accruals with Budget forecasts

We found the process of actually building the models is a comprehensive examination of many aspects of our company's business processes. Since the majority of the work to build the models was done by

eSimulation employees, it afforded an opportunity to have a third party eye to look at how well we agree between our physical data and business processes and our commercial and accounting processes. In most cases it confirmed that our existing methods made sense and were accurate. In a few cases, it caused us to rethink our processes and even make changes.

We expect the models may be utilized by other Departments within the company, and we expect to see some creative new ways to use the eSimEvaluator will emerge.