



Stitching Together Disparate Data Systems to Create a 'Single Version of the Truth'

A Southwest Gas Case Study

Presented by Jim Mlachnik
and Jeremy Snider

Empowering Business in Real Time
PI Infrastructure for the Enterprise

Southwest Gas Corporation

1,813,000 Customers
49,600 Miles of Pipe
2,538 Employees

Corporate Headquarters

Carson City

Las Vegas

Victorville

Phoenix

Tucson

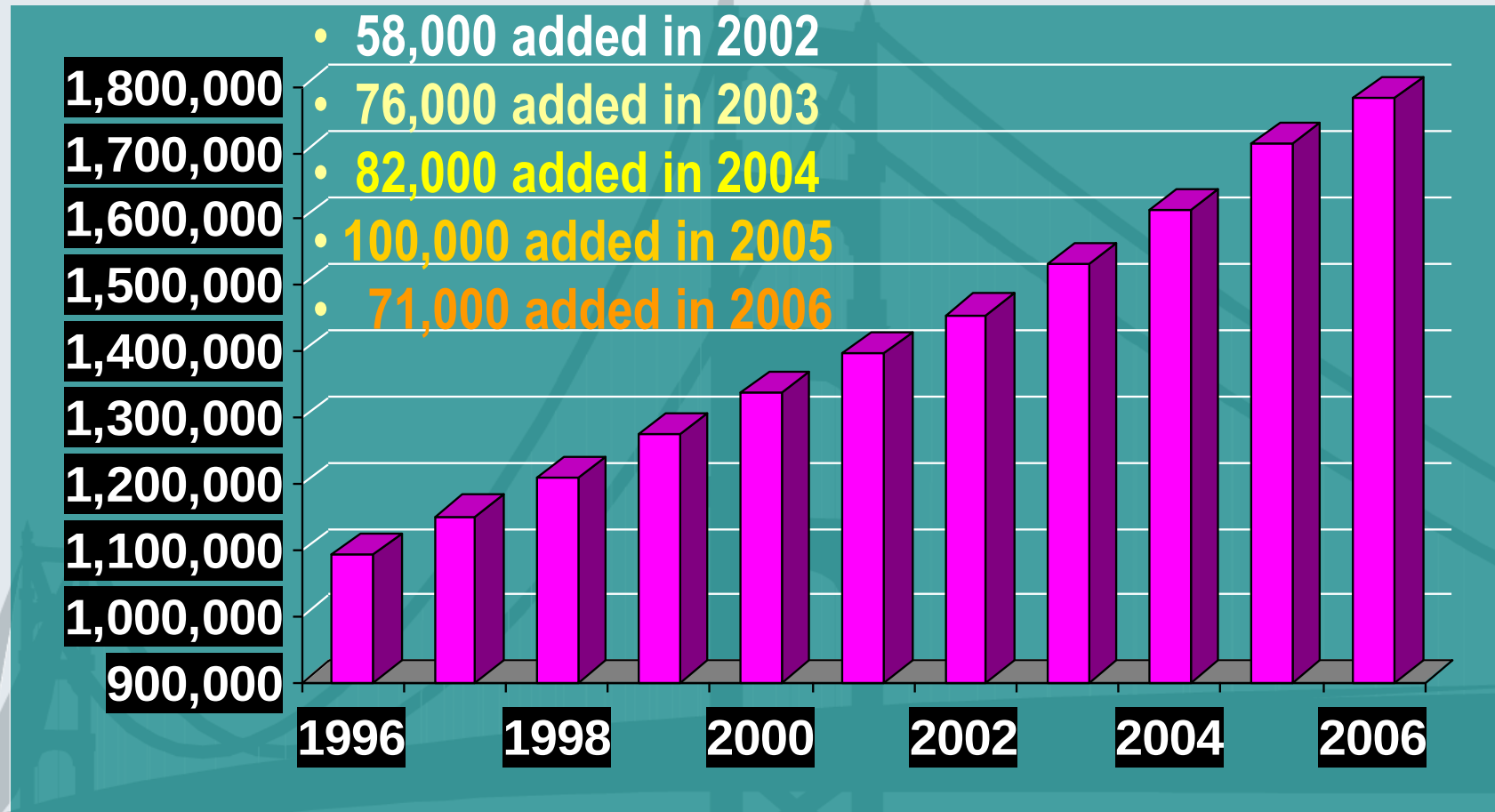
Southwest Gas Business Strategies

- Continue to work closely with regulators to improve the level and stability of earnings and cash flows
- Continue to aggressively manage growth
- Continue to maximize efficiency and productivity
- Continue to exceed customers' expectations
- Remain watchful and positioned to seize strategic growth opportunities

Source: 2006 Annual Report

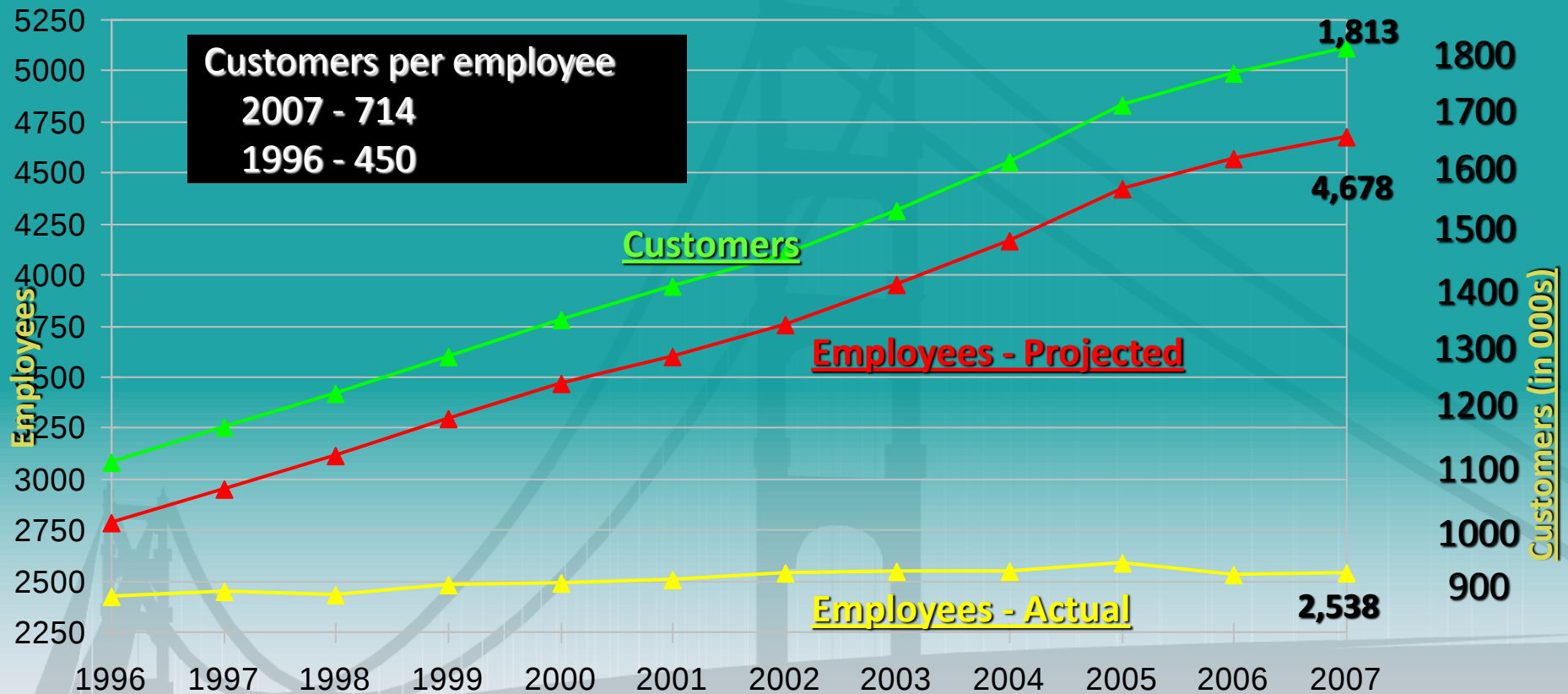
The Growth Challenge

Total SWG Customers



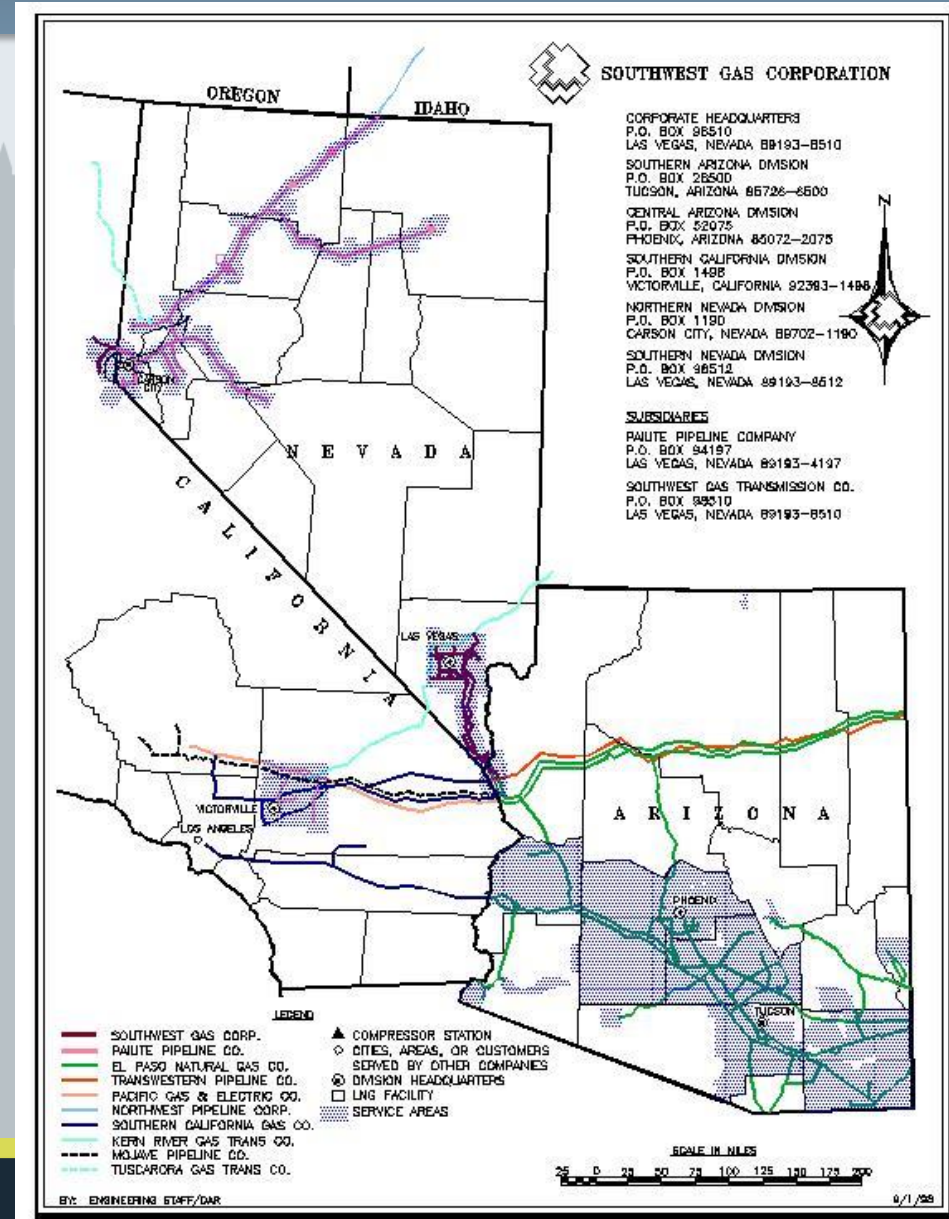
Using Technology to Meet Business Challenges

Southwest Gas has used technology to meet “The Growth Challenge”



Southwest Gas System Assets

- Arizona, California & Nevada
- 2,000 miles gas transmission pipeline
- 27,000 miles gas distribution main
- 34 Districts in 6 Divisions
- Single SCADA System



Transmission and Distribution

- Southwest Gas operates 2 natural gas transmission systems
 - Transporting natural gas from Idaho to customers and Southwest's distribution systems in Northern Nevada and Lake Tahoe in California
 - Transporting natural gas from points in Arizona to customers and Southwest's distribution system in the Las Vegas area
- Southwest also operates distribution systems receiving natural gas from other transmission system operators in Southern California and in Central and Southern Arizona
- From its transmission and distribution systems natural gas is delivered to two classes of customers
 - Direct sales of gas purchased by Southwest to residential and commercial customers billed monthly
 - Transporting gas purchased daily by industrial, power generation and large commercial customers to their facilities

Our Business Challenges

- Using technology opposed to hiring full time employees to meet business needs
- Information is available but not necessarily in a useable format
- The daily and hourly tracking of ordered versus received gas for transportation customers
- Avoid penalties from upstream pipelines during an Operational Flow Order (OFO)

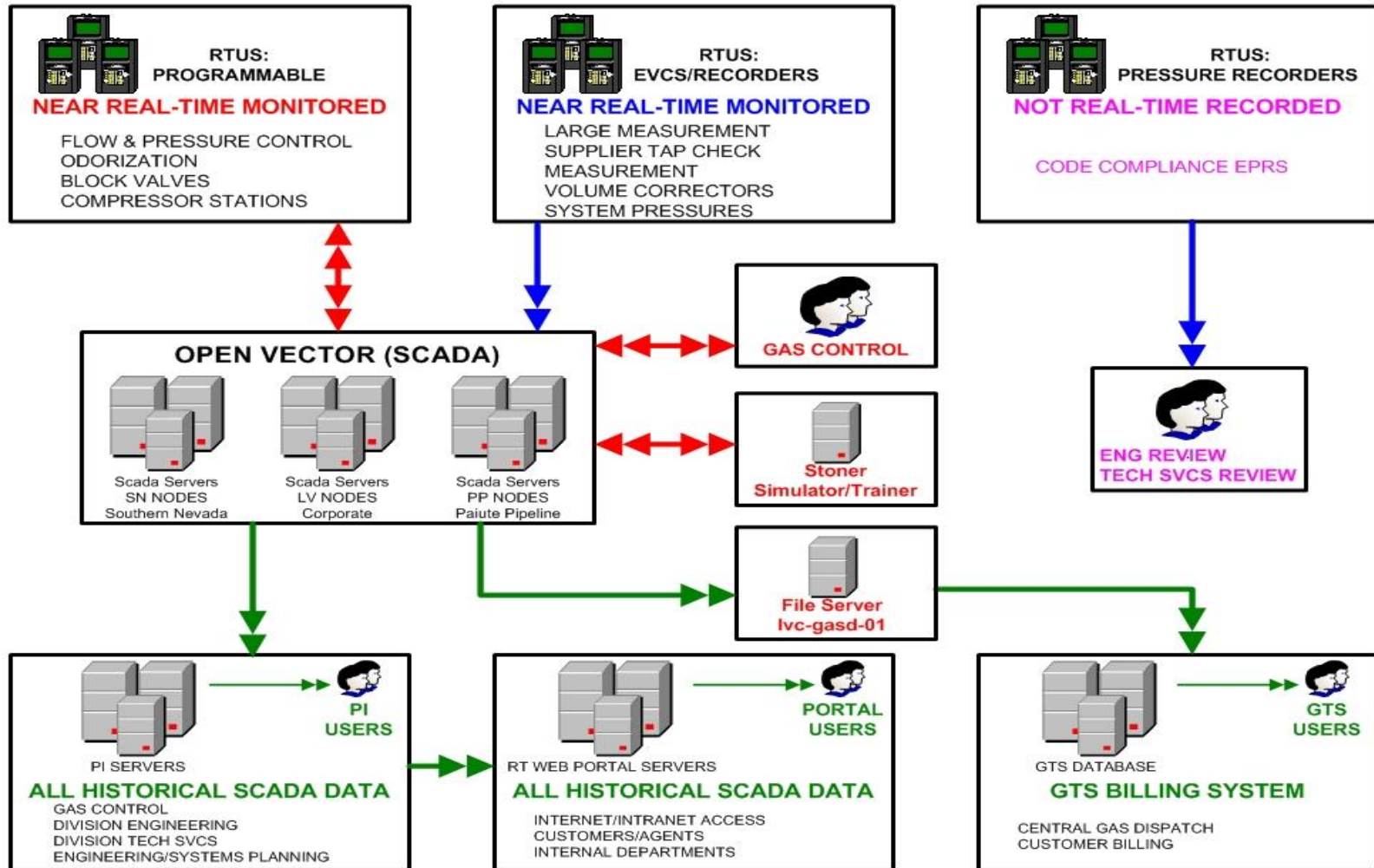
From SCADA Historian to Critical Infrastructure

- PI application was deployed in 2001 as a replacement to the SCADA application's historical subsystem
- Access to real-time SCADA data was provided to internal users via DataLink and ProcessBook
- RtPortal was deployed to provide gas usage information to external agents and customers as well as internal users
- Over next 2-3 years PI will support SWG data integration, compliance and maintenance system initiatives

Current PI System Footprint

Supervisory Control and Data Acquisition

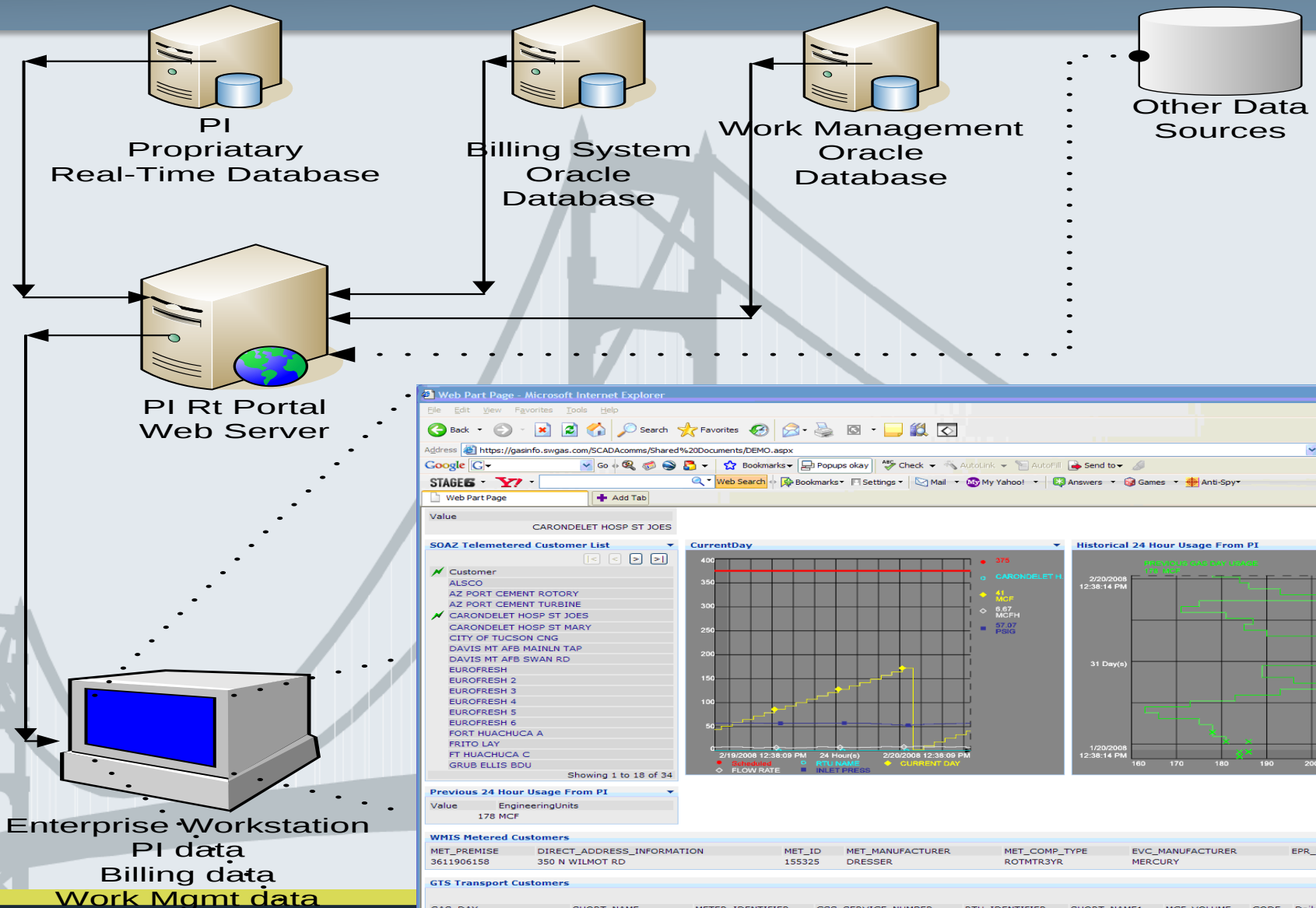
Revised 09/27/06



S:\GSSS\Documentation\Drawings & Procedures\SCADA_Structure

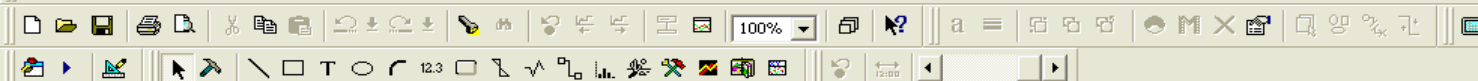


Data Flow: From Database Storage to WebServer to Thin Client Display



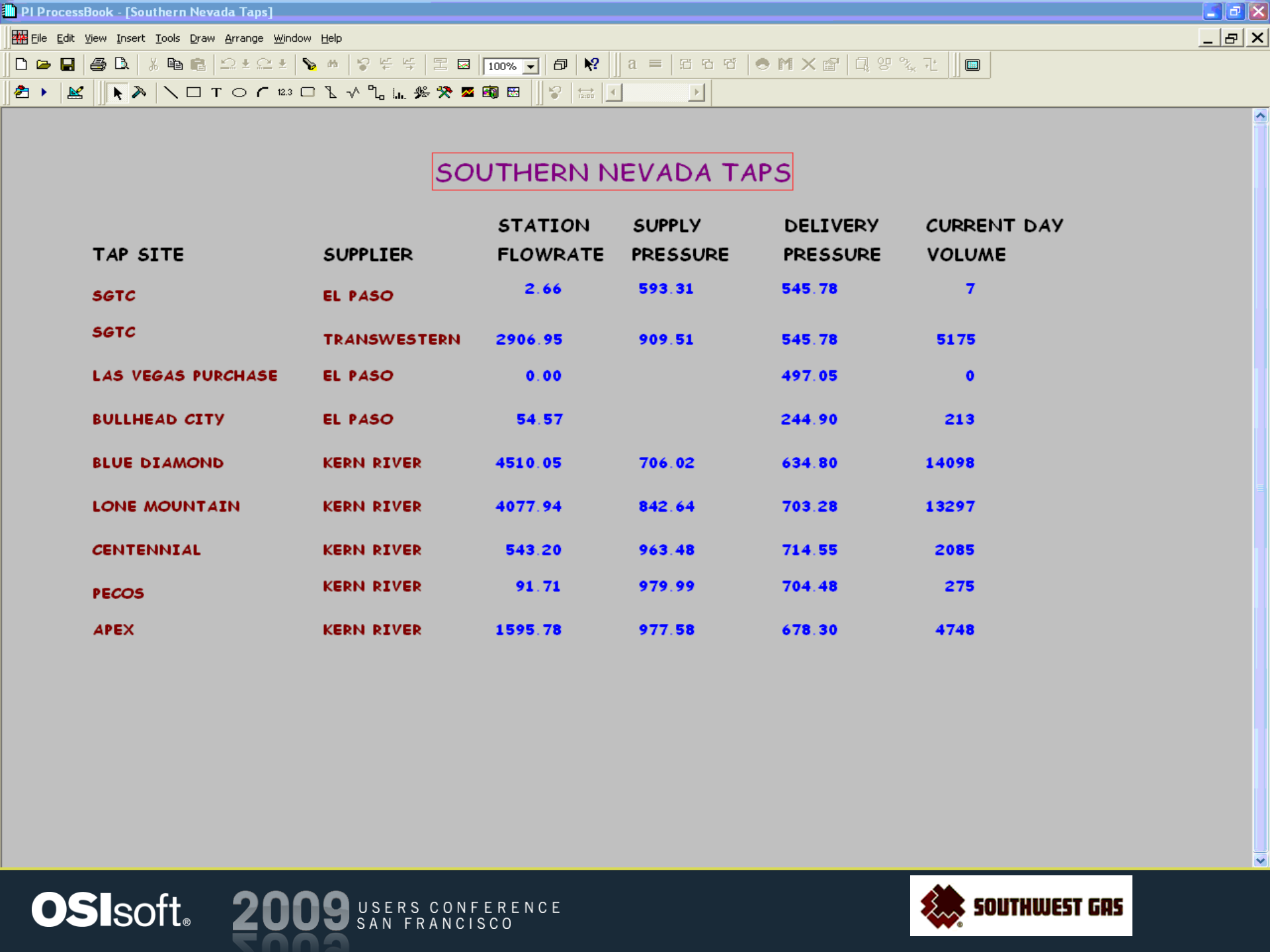
Let Everyone Look at SCADA Data

- **Challenge:** Put SCADA data to work for the rest of the company (not just Gas Control)
- **Before PI:** Information had to be extracted from the SCADA historical subsystem in a very cumbersome and time consuming method to provide data to end users
- **After PI:** End users are now able to extract data themselves using the PI client tools
- **Benefits Derived:**
 - Easy access to SCADA data for planning purposes and engineering studies
 - Access to SCADA data during an emergency situation
 - Ability to provide PI data to internal and external customers via the WEB



	Inlet	Outlet
Flow Rate	Pressure	Pressure
Apex Limit	126	645
Craig Limit	201	704
Red Coac	1538	705
Charleston	2127	689
Durango	0	638
Patrick	565	645
Apex Tap	1611	978
Pecos	136	979
Centennial	609	964
Lone Mtn	4152	842
Blue Diam	4612	705
SGTC TW	2930	910
SGTC EPNG	0	593
Gibco Lo	0	429
Gibco Hi	0	480





SOUTHERN NEVADA PRESSURE LIMIT STATIONS

LS SITE	FLOWRATE	INLET PRESSURE	DELIVERY PRESSURE	CURRENT DAY VOLUME	SETPOINT FLOW	SETPOINT PRESSURE	SETPOINT U/S PRESSURE
EL DORADO S	1007.36	483.08	451.13	3017	1000.00	454.00	
EL DORADO N	2038.14	643.93	451.13	6813	3600.00	452.00	
BOULDER		292.56	190.22				
FOOTHILLS	282.38		291.73	1165			
PABCO E	0.00	479.59	246.24	0	6500.00	275.00	480.00
PABCO W	0.00	429.65	246.51	0	3500.00	240.00	340.00
GIBSON W	401.36	646.35	598.82	735	12000.00	600.00	
GIBSON S	0.00	646.35	598.82	0	10000.00	500.00	
PATRICK	382.96	644.90	242.75	1615	5000.00	243.00	
APEX	126.24	644.87	244.50	374			
CRAIG	116.41	Scan Off	248.93	456	150.00	287.00	685.00
BELTWAY	2072.37	688.51	259.94	6837	4500.00	260.00	
REDCOACH							
DURANGO	0.00	637.22	255.10	0	4600.00	255.00	

[illegible]

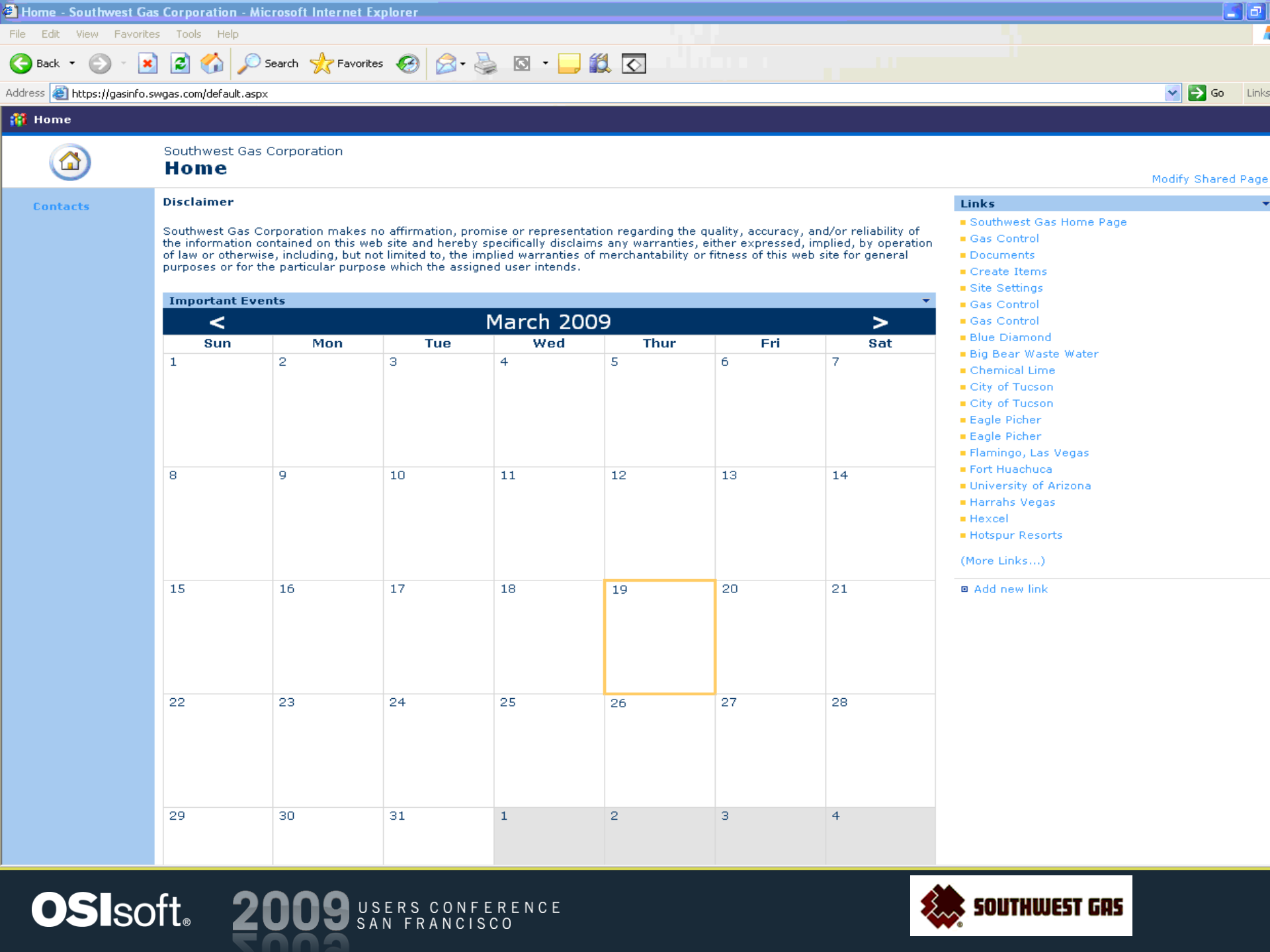
TIME	BarstowB	DaleEvansTap	ExeterTap	FederalBureauofPrisons	FoxboroCogen	MnMCogen	Rancho	SCLACogen	SEGS8	SEGS9	TPSTECH
2/18/2009 1:41:03 PM											
2/18/2009 1:39:03 PM											
2/18/2009 1:37:03 PM											
2/18/2009 1:35:03 PM											
2/18/2009 1:33:03 PM											
2/18/2009 1:31:03 PM											
2/18/2009 1:29:03 PM											
2/18/2009 1:27:03 PM											
2/18/2009 1:25:03 PM											
2/18/2009 1:23:03 PM											
2/18/2009 1:21:03 PM											
2/18/2009 1:19:03 PM											
2/18/2009 1:17:03 PM											
2/18/2009 1:15:03 PM											
2/18/2009 1:13:03 PM											
2/18/2009 1:11:03 PM											
2/18/2009 1:09:03 PM											
2/18/2009 1:07:03 PM											
2/18/2009 1:05:03 PM											
2/18/2009 1:03:03 PM											
2/18/2009 1:01:03 PM											
2/18/2009 12:59:03 PM											
2/18/2009 12:57:03 PM											
2/18/2009 12:55:03 PM											
2/18/2009 12:53:03 PM											
2/18/2009 12:51:03 PM											
2/18/2009 12:49:03 PM											
2/18/2009 12:47:03 PM											
2/18/2009 12:45:03 PM											
2/18/2009 12:43:03 PM											
2/18/2009 12:41:03 PM											
2/18/2009 12:39:03 PM											
2/18/2009 12:37:03 PM											
2/18/2009 12:35:03 PM											
2/18/2009 12:33:03 PM											
2/18/2009 12:31:03 PM											
2/18/2009 12:29:03 PM											
2/18/2009 12:27:03 PM											

SOCAL GPRS EQUIPPED

TAGREF	SITENAME	DIVISION	PATH	CURRENTPATH	% Good24HourInterval	COMMUNICATIONSTYPE	IPCIRCUITID	LEG	PORT	ADDRESS	LatitudeANDLongitude
VTPSTCS	TPS TECH	SWG Southern California	PA.05B8	Single Path RTU	100	CINGULAR GPRS	167.207.114.120		5715	12328 HIBISCUS AVE	
VDALEVT	Dale Evans Tap	SWG Southern California	PA.05B5	Single Path RTU	100	CINGULAR GPRS	167.207.114.117		5715	20654 Dale Evans Parkway, Apple Valley, Ca. 92307	
VSCLACG	SCLA Cogen	SWG Southern California	PA.05A9	Single Path RTU	100	CINGULAR GPRS	167.207.114.4		5715	13010 Aerospace Rd, Victorville	N 34.4794056387494 W 117.283976561607
VRANCHT	Rancho	SWG Southern California	PA.05A8	Single Path RTU	100	CINGULAR GPRS	167.207.114.9		5715	12105 Rancho Rd, AD	N 34.5688010458215 W 117.322541107701
VEBCCOG	Foxboro Cogen	SWG Southern California	PA.05A6	Single Path RTU	100	CINGULAR GPRS	167.207.114.254		5715	12864 ENTERPRISE WAY	N 34.5643399249866 W

Turn Regulations into Value for Our Customers

- **Challenge:** To comply with tariffs requiring SWG to provide key natural gas parameters like pressure, temperature, flow and quality to both agents and customers.
- **Before PI:** SWG provided agents and customers with phone numbers and passwords for direct access to system RTUs.
- **After PI:** Direct RTU access was revoked. PI-RtWebParts was used to configure Agent and Customer specific web views of tariff data in a secure environment.
- **Benefits Derived:**
 - Securing RTUs
 - The ability for agents and customers to access gas parameters in near real-time
 - PI-RtWebParts provides trending and data downloading via the web



Southwest Gas Corporation

Home

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Contacts

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Important Events						
March 2009						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	1	2	3	4

Links

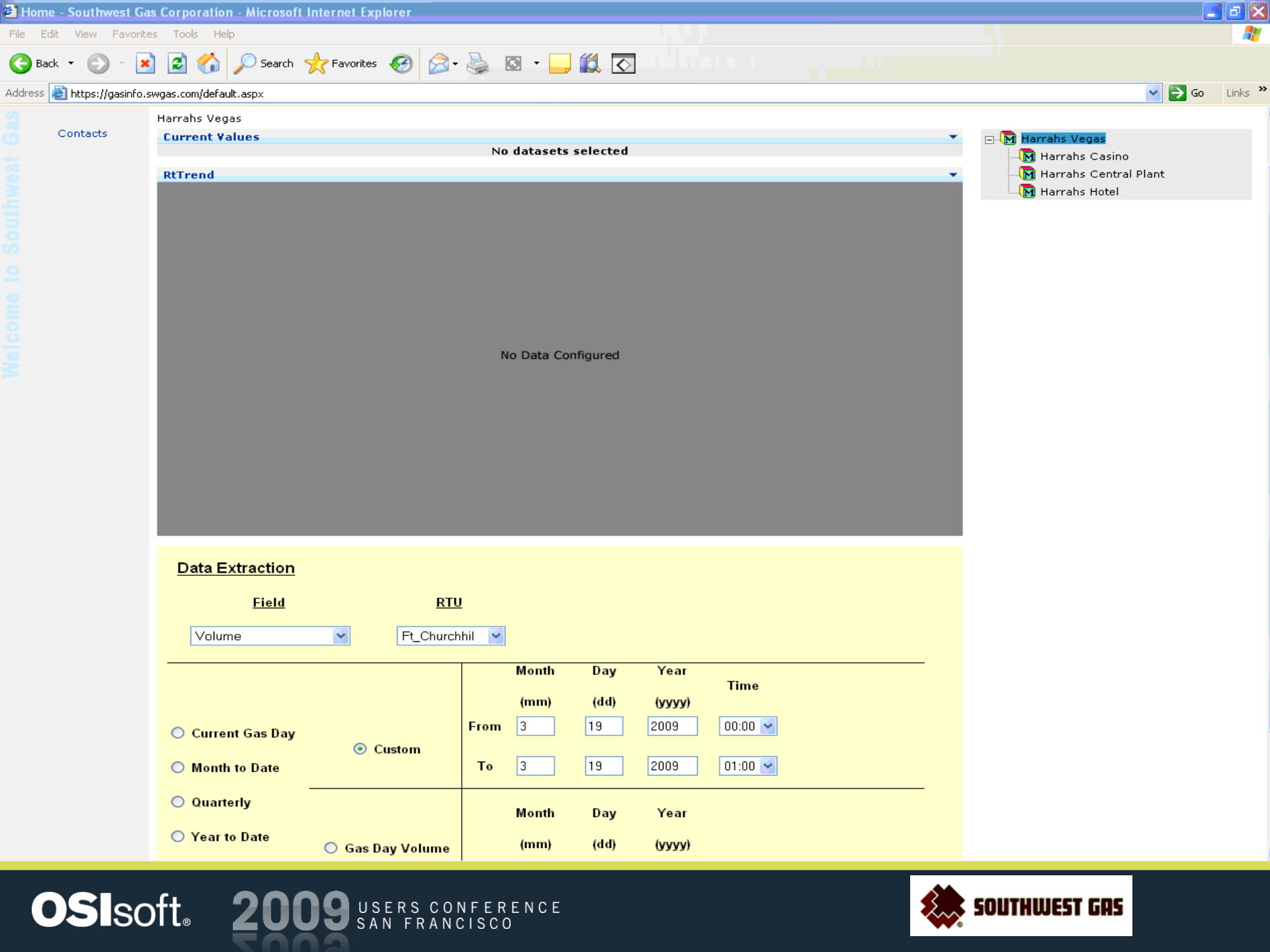
- Southwest Gas Home Page
- Gas Control
- Documents
- Create Items
- Site Settings
- Gas Control
- Gas Control
- Blue Diamond
- Big Bear Waste Water
- Chemical Lime
- City of Tucson
- City of Tucson
- Eagle Picher
- Eagle Picher
- Flamingo, Las Vegas
- Fort Huachuca
- University of Arizona
- Harrahs Vegas
- Hexcel
- Hotspur Resorts

(More Links...)

[Add new link](#)



	AIPC	American Italian Pasta Company	2 years ago	X
	Arizona Portland Cement	Arizona Portland Cement	3 years ago	X
	Asarco Ray	Asarco Ray	3 years ago	X
	Audit	Audit Test	3 years ago	X
	Ballys	Ballys Hotel / Casino	3 years ago	X
	Basic Foods	Basic Foods	3 years ago	X
	Bellagio	Bellagio	3 years ago	X
	Big Bear Area Regional Wastewater...	Big Bear Area Regional Wastewater Agency	3 years ago	X
	Blue Diamond		2 years ago	X
	Boardwalk	Boardwalk Casino	2 years ago	X
	Boulder Station	Station Casinos	2 years ago	X
	BPB Gypsum	BPB Gypsum, Inc.	3 years ago	X
	Buffalo Bills	Buffalo Bills Hotel / Casino	2 years ago	X
	Building Products	Building Products	3 years ago	X
	caacct	Central Arizona Monitors	2 years ago	X
	Caesars Palace	Caesars Palace	3 years ago	X
	Central Arizona		2 years ago	X
	Central Gas Dispatch	Central Gas Dispatch	17 months ago	X
	Chemical Lime Company	Chemical Lime Company	3 years ago	X
	Circus Circus	Circus Circus Hotel / Casino	2 years ago	X
	City of Tucson	City of Tucson	3 years ago	X
	City of Victorville	City of Victorville	2 years ago	X
	Colorado Belle		2 years ago	X
	Cyanco	Cyanco	3 years ago	X
	Dolphin	Dolphin Inc	2 years ago	X
	Eagle Picher	Eagle Picher	2 years ago	X
	Edgewater	Edgewater Hotel / Casino	2 years ago	X
	El Dorado		8 months ago	X
	Eurofresh	Eurofresh	3 years ago	X
	Excalibur	Excalibur Hotel / Casino	2 years ago	X
	Fiesta Rancho	Station Casinos	2 years ago	X



Welcome to Southwest Gas

Contacts

Harrahs Vegas

Current Values

No datasets selected

RTTrend

No Data Configured

- Harrahs Vegas
 - Harrahs Casino
 - Harrahs Central Plant
 - Harrahs Hotel

Data Extraction

Field

RTU

Volume

Ft_Churchhill

☐ Current Gas Day

☐ Month to Date

☐ Quarterly

☐ Year to Date

☒ Custom

☐ Gas Day Volume

	Month	Day	Year	Time
	(mm)	(dd)	(yyyy)	
From	3	19	2009	00:00
To	3	19	2009	01:00

Month	Day	Year
(mm)	(dd)	(yyyy)

Data Extract

All Values are in MCF

Scan Time	Value
3/19/2009 7:16:16 AM	101
3/19/2009 7:17:27 AM	109
3/19/2009 7:18:45 AM	117
3/19/2009 7:19:56 AM	125



Address <https://gasinfo.swgas.com/default.aspx> Go Links

Home Clark 4 Clark 5 Clark 6 Clark 7 Clark 8 Sunrise 1 Sunrise 2 Sunrise 3 LV Cogen 1 LV Cogen 2 LV Cogen 3 LV Cogen 4 LV Cogen 5 Ft Churchill Reno CG 1 Reno CG 2 Reno



Current Values

Descriptor	Time	Value	EngineeringUnits
CURRENT DAY 7	3/24/2009 7:27:01 AM	114	
FLOW RATE 7	3/24/2009 7:27:42 AM	532.32 MCFH	
PREVIOUS 24 HOUR RUN 7	3/24/2009 7:01:21 AM	2978	

Volume History

\\lvc-pi-03\LNVPCELEAC7V

Time	Value
3/23/2009 8:11:09 AM	NON-UPDATE
3/23/2009 8:16:02 AM	0
3/23/2009 8:26:29 AM	NON-UPDATE
3/23/2009 8:31:19 AM	0
3/23/2009 8:46:57 AM	10

Showing 1 to 5 of 101

Flow History

\\lvc-pi-03\LNVPCELEFL7A

Time	Value
3/23/2009 7:32:06 AM	0
3/23/2009 7:39:51 AM	NON-UPDATE
3/23/2009 7:41:25 AM	0
3/23/2009 7:43:36 AM	NON-UPDATE
3/23/2009 7:48:50 AM	0

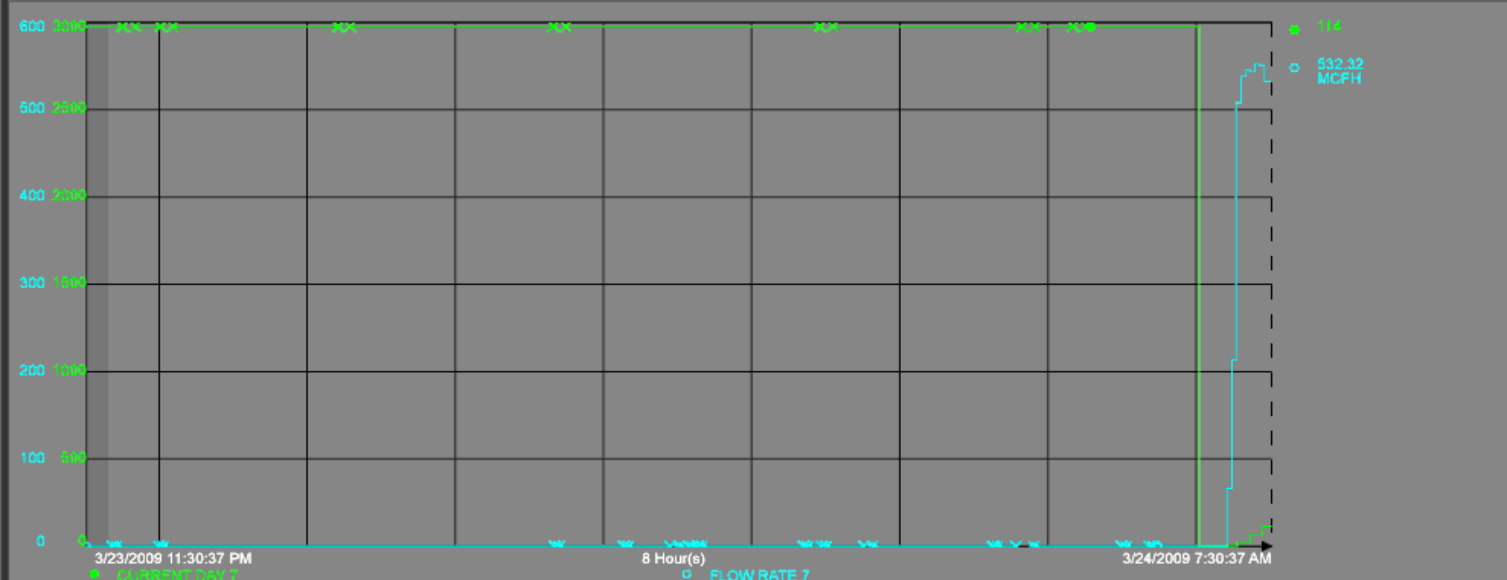
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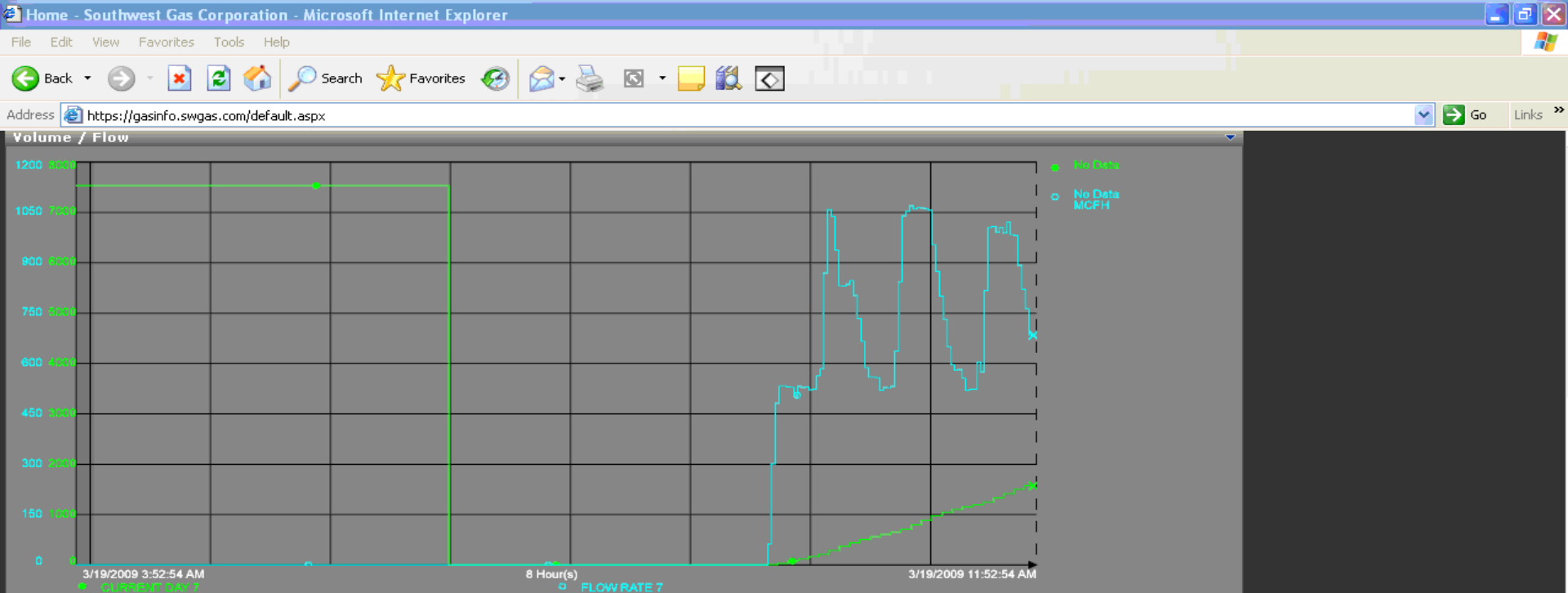
Prev Day Volume History

\\lvc-pi-03\LNVPCELEYA7V

Time	Value
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12/24/2008 12:57:50 PM	
12/25/2008 12:05:18 AM	
12/25/2008 12:10:19 AM	
12/25/2008 5:38:51 AM	

Volume / Flow





Data Extract

All Values are in MCF

Scan Time	Value
3/19/2009 7:16:16 AM	101
3/19/2009 7:17:27 AM	109
3/19/2009 7:18:45 AM	117
3/19/2009 7:19:56 AM	125
3/19/2009 7:21:13 AM	133
3/19/2009 7:22:31 AM	141
3/19/2009 7:23:42 AM	149
3/19/2009 7:25:00 AM	157

Reduce and Control Project Risk

- **Challenge**: To provide a single 'window' for users to look through for viewing distribution operations data alongside business data held in other databases.
- **Before PI**: SWG conceived and roughed in a RFP for an extensive 'data warehouse' project designed to consolidate data held in various database applications across every major department.
- **After PI**: Data Warehouse project was avoided. SWG introducing portal pages to various internal user groups that leverages RtBaseLine Services and RtWebParts to view data held within critical database applications.
- **Benefits Derived**:
 - Avoided a very costly, complicated project
 - Avoided future maintenance of custom system
 - Used technology (OSIsoft and Microsoft) that we already owned



Value

SOAZ Telemetered Customer List

Customer

ALSCO
AZ PORT CEMENT ROTORY
AZ PORT CEMENT TURBINE
CARONDELET HOSP ST JOES
CARONDELET HOSP ST MARY
CITY OF TUCSON CNG
DAVIS MT AFB MAINLN TAP
DAVIS MT AFB SWAN RD
EUROFRESH
EUROFRESH 2
EUROFRESH 3
EUROFRESH 4
EUROFRESH 5
EUROFRESH 6
FORT HUACHUCA A
FRITO LAY
FT HUACHUCA C
GRUB ELLIS BDU

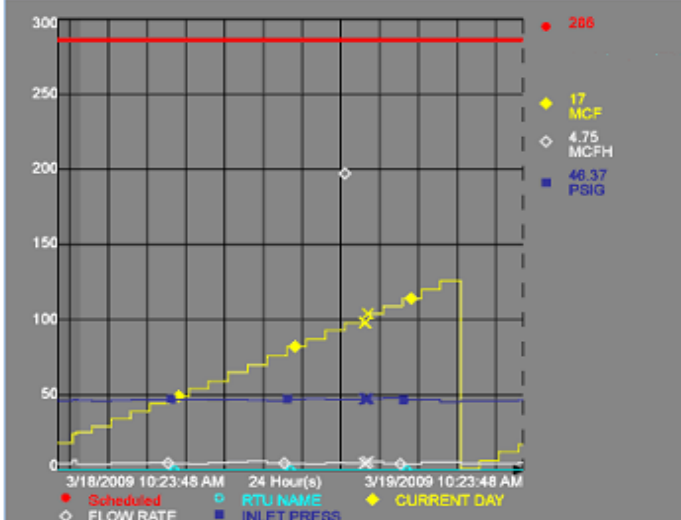
Showing 1 to 18 of 34

Previous 24 Hour Usage From PI

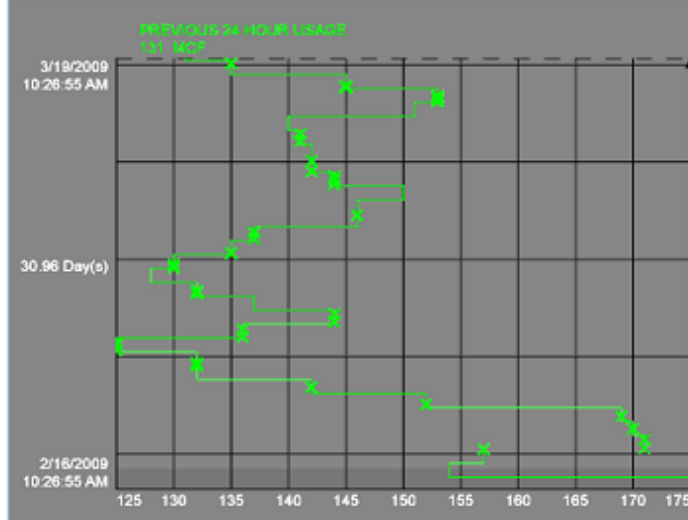
Value EngineeringUnits

131 MCF

CurrentDay



Historical 24 Hour Usage From PI



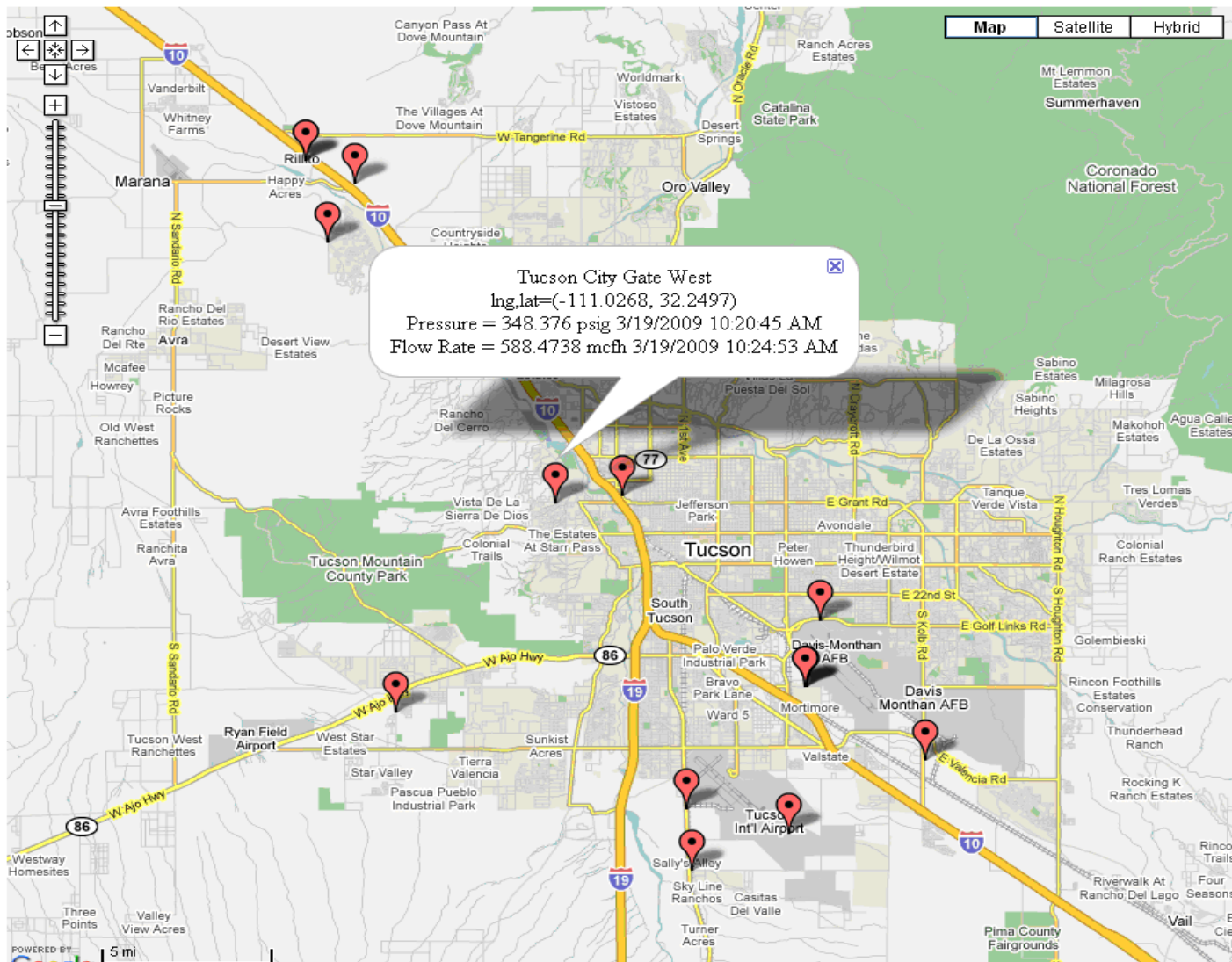
WMIS Metered Customers

MET_PREMISE	DIRECT_ADDRESS_INFORMATION	MET_ID	MET_MANUFACTURER	MET_COMP_TYPE	EVC_MANUFACTURER	EPR_MANUFACTURER
3611906162	1601 W ST MARYS RD	155191	DRESSER	ROTMTR2YR	MERCURY	

GTS Transport Customers

GAS_DAY	SHORT_NAME	METER_IDENTIFIER	CSS_SERVICE_NUMBER	RTU_IDENTIFIER	SHORT_NAME1	MCF_VOLUME	CODE	Daily Scheduled	CODE1
3/18/2009 12:00:00 AM		00569943	3611906162021	TCARSMSS	SOAZ	131	TRANS	286	CYCLE 1
3/18/2009 12:00:00 AM		00569943	3611906162021	TCARSMSS	SOAZ	131	TRANS	286	CYCLE 2
3/18/2009 12:00:00 AM		00569943	3611906162021	TCARSMSS	SOAZ	131	TRANS	286	CYCLE 3
3/18/2009 12:00:00 AM		00569943	3611906162021	TCARSMSS	SOAZ	131	TRANS	286	CYCLE 4
3/17/2009 12:00:00 AM		00569943	3611906162021	TCARSMSS	SOAZ	135	TRANS	286	CYCLE 1
3/17/2009 12:00:00 AM		00569943	3611906162021	TCARSMSS	SOAZ	135	TRANS	286	CYCLE 2
3/17/2009 12:00:00 AM		00569943	3611906162021	TCARSMSS	SOAZ	135	TRANS	286	CYCLE 3
3/17/2009 12:00:00 AM		00569943	3611906162021	TCARSMSS	SOAZ	135	TRANS	286	CYCLE 4
3/16/2009 12:00:00 AM		00569943	3611906162021	TCARSMSS	SOAZ	145	TRANS	286	CYCLE 1

Refresh PI





CONFIGURE EXCEPTIONS (VALUES GREATER THAN..)

Flows over 8000

Blue Diamond Tap (Flow Rate Exceptions - Last 100 Days)

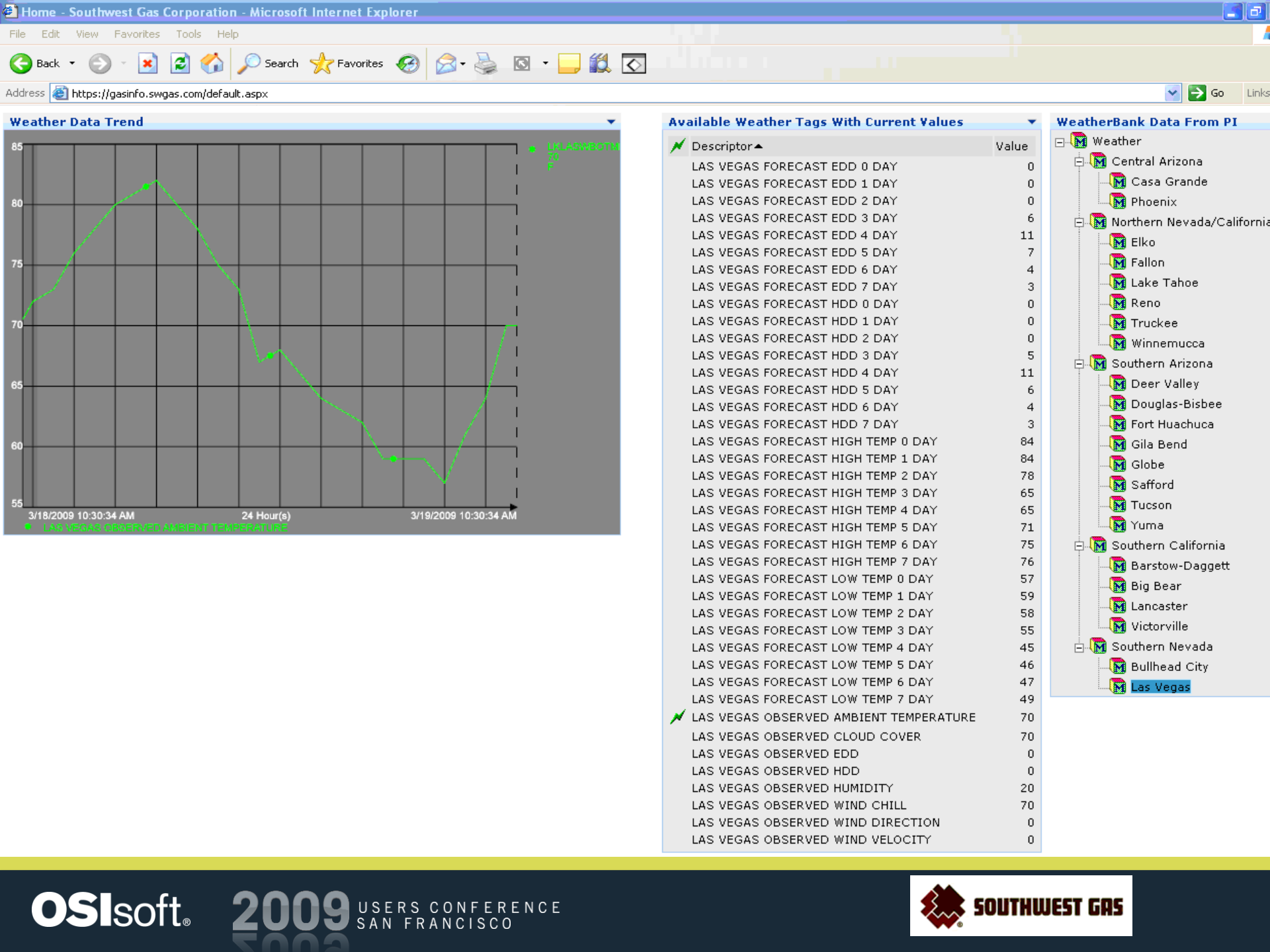
time	value
12/10/2008 6:35:50 AM	8022.934
12/10/2008 6:36:19 AM	8007.312
12/10/2008 6:36:59 AM	8018.134
12/10/2008 6:41:38 AM	8018.706
12/10/2008 7:00:52 AM	8032.919
12/10/2008 7:01:27 AM	8009.77
12/10/2008 7:05:29 AM	8043.211
12/10/2008 7:06:12 AM	8044.977
12/10/2008 7:07:15 AM	8064.059
12/10/2008 7:08:28 AM	8007.166
12/10/2008 7:15:29 AM	8073.386
12/10/2008 7:16:03 AM	8017.518
12/10/2008 7:16:54 AM	8017.518
12/10/2008 7:17:46 AM	8000.238
12/10/2008 7:18:23 AM	8020.1
12/10/2008 7:19:31 AM	8007.762
12/10/2008 7:25:31 AM	8058.157
12/10/2008 7:25:53 AM	8187.9
12/10/2008 7:26:34 AM	8157.529
12/10/2008 7:27:09 AM	8094.337
12/10/2008 7:27:42 AM	8122.222
12/10/2008 7:28:16 AM	8040.082
12/10/2008 7:31:14 AM	8007.339
12/12/2008 7:29:54 AM	8060.92
12/14/2008 6:50:45 AM	8362.718
12/14/2008 6:51:17 AM	8343.757
12/14/2008 7:07:39 AM	8035.404
12/14/2008 7:10:32 AM	8023.685
12/14/2008 7:11:04 AM	8029.949
12/14/2008 7:11:44 AM	8056.65
12/14/2008 7:12:16 AM	8038.722
12/14/2008 7:14:00 AM	8056.65
12/14/2008 7:15:49 AM	8062.05
12/14/2008 7:19:14 AM	8001.126
12/14/2008 7:21:37 AM	8025.297
12/14/2008 7:23:19 AM	8031.552
12/14/2008 7:23:57 AM	8003.644
12/14/2008 7:25:40 AM	8110.68
12/14/2008 7:26:18 AM	8131.876
12/14/2008 7:26:50 AM	8225.563

Showing 1 to 40 of 10388

Blue Diamond (Pressure Exceptions - Last 100 days)

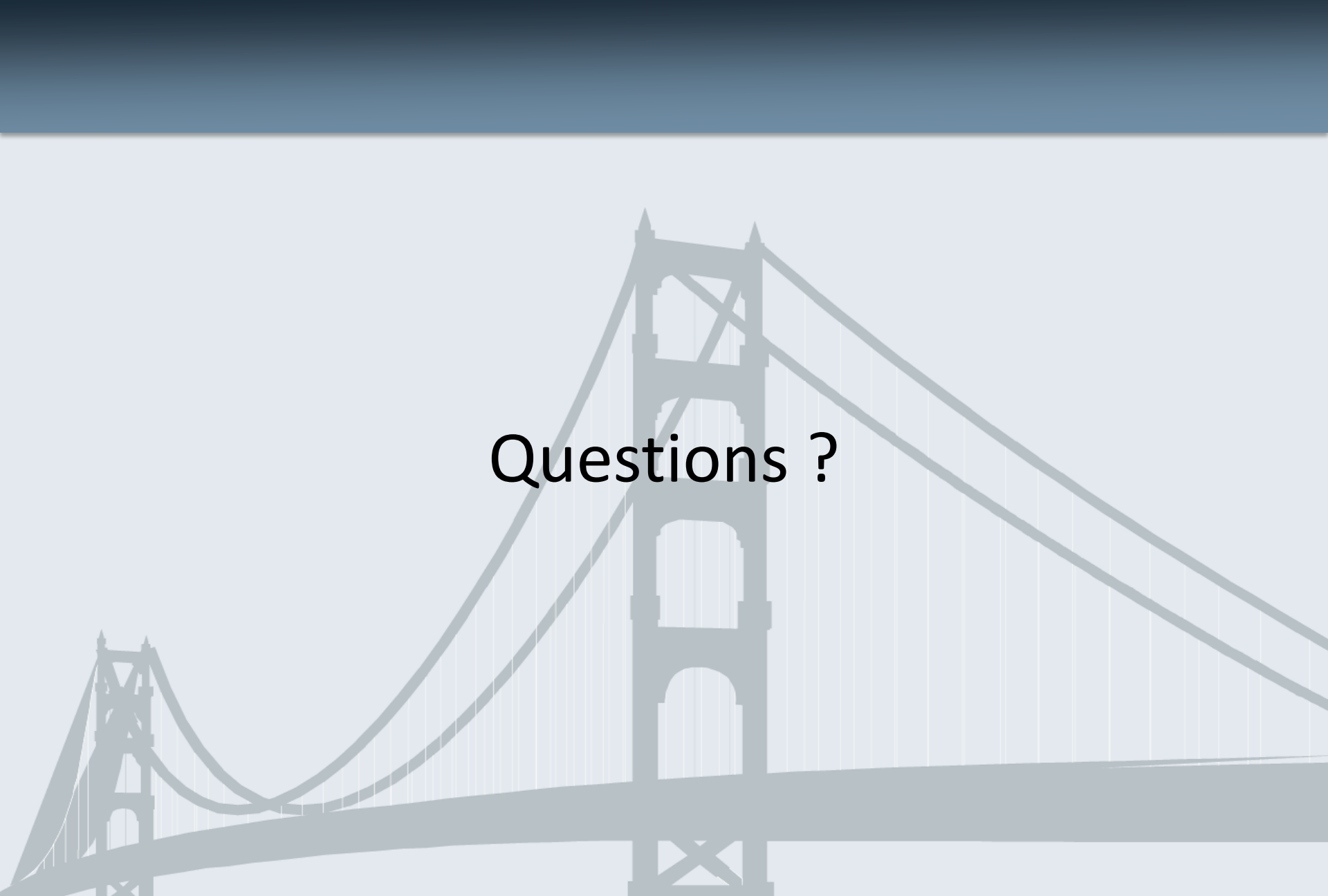
time	value
3/19/2009 8:28:48 AM	635.1235
3/19/2009 8:30:30 AM	634.8013
3/19/2009 8:32:18 AM	635.1235
3/19/2009 8:33:59 AM	634.8013
3/19/2009 8:34:35 AM	635.1235
3/19/2009 8:36:58 AM	634.8013
3/19/2009 8:38:04 AM	635.1235
3/19/2009 8:40:28 AM	634.8013
3/19/2009 8:40:58 AM	635.1235
3/19/2009 8:48:02 AM	634.8013
3/19/2009 8:51:32 AM	634.4791
3/19/2009 8:55:02 AM	635.1235
3/19/2009 8:56:43 AM	635.4458
3/19/2009 8:58:40 AM	635.1235
3/19/2009 8:59:09 AM	635.4458
3/19/2009 8:59:53 AM	635.1235
3/19/2009 9:00:15 AM	635.4458
3/19/2009 9:00:51 AM	635.1235
3/19/2009 9:09:38 AM	634.8013
3/19/2009 9:20:44 AM	634.4791
3/19/2009 9:21:20 AM	634.8013
3/19/2009 9:21:50 AM	634.4791
3/19/2009 9:22:27 AM	634.8013
3/19/2009 9:24:09 AM	634.4791
3/19/2009 9:24:46 AM	634.8013
3/19/2009 9:25:23 AM	635.1235
3/19/2009 9:26:00 AM	635.4458
3/19/2009 9:29:24 AM	635.768
3/19/2009 9:30:00 AM	635.4458
3/19/2009 9:30:37 AM	635.1235

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Vision for SW Gas

- Continue to use technology to meet business needs versus hiring more employees
- Integrate disparate systems to provide a “single version of the truth” to end users
- Continue to explore uses of the PI system to accomplish future goals



Questions ?