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From Data to Dollars: The Rapid Integration of AVEVA™ PI System™ into bpx Energy Upstream Operations

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Agenda

- About bpx Energy

- Baseline and initial challenges

- Rapid integration of AVEVA™ PI System™

- Use cases and examples
  - Increased ESP Production
  - Improved Compressor Efficiency
  - Improved performance of air-assist flares
  - Digital Allocation Flow Diagrams

- Results achieved

- The path ahead: bpx and AVEVA™ PI System™

About bpx Energy

bpx Energy is bp's US onshore upstream and midstream operations

bpx energy

- Premier, US onshore oil and gas producer operating within the Eagle Ford, Permian, and Haynesville plays

- Achieving operational excellence with safety and environmental stewardship at the forefront

Oil

Gas

X Denver, CO
bpx energy Headquarters

Permian

Haynesville

X Houston, TX
bpx energy Office

Eagle Ford

Initial Challenges

After acquiring BHP assets, bpx had limited access to adequate historical data & visualization tools

- **Limited data granularity**

  o We could only access 10-minute or daily averages of data, lacking the granularity needed for effective decision making and analysis

- **Limited historical data**

  o Historical data access was restricted to 3 years, limiting our ability to derive insights from long-term trends

- **Pivot from data lake attempt**

  o Our company attempted to build a data lake for onshore upstream oil and gas operations but faced challenges

  o Real-time series data couldn't be effectively managed using relational database management systems (RDBMS)

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Rapid Integration of AVEVA™ PI System™ into bpx Operations

The AVEVA PI System was rapidly integrated into bpx Energy operations

- **Decision to leverage AVEVA PI System** – leverage existing systems

- **Swift implementation** and integration within 4 months

- **Leveraged PI Asset Framework** (PI AF) providing a structured, organized approach to data management, enhancing data accessibility and visibility

- **Leveraged PI Vision displays** for intuitive, interactive data visualization, improving data interpretation and enabling quicker, more-accurate decision making

- **Integrated AVEVA PI System into the corporate network**, ensuring secure, efficient data transfer and access

- **Leveraged PI Notifications for alerting and notifications** for ESP pumps, enhancing real-time monitoring and enabling proactive response to operational issues

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Use Case Examples

Enhancing operations with the AVEVA PI System

Improved ESP Production with AVEVA™ PI System™

Challenge

- Before AVEVA PI System, bpx Energy could only trend ESP performance with 90 days of data
- ESP wells could not be aggregated for troubleshooting
- Well performance could not be easily compared
- Downhole ESP data could not be easily correlated with surface Cygnet data on one screen

Solution

Through PI Vision, bpx Energy gained:
- Easier diagnostic trending capabilities
- The ability to quickly identify issues with oil/water/gas meters in entire well areas
- Compare individual well performance
- Monitor key parameters
- Efficiently filter data to identify the highest producing wells
- Reducing well downtime and improving issue resolution

Benefit

After adopting AVEVA PI System, bpx Energy experienced
- .5% BBLS production improvement
- Significant reduction in well downtime
- Enhanced diagnostic capabilities
- Improved visibility of meter data
- More effective well-to-well performance comparisons
- Efficient monitoring of key parameters and easy identification of highest and lowest producing wells

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Improved ESP Production with AVEVA™ PI System™

- **Easier diagnostic trending capabilities** resulting in easier troubleshooting and less well downtime

- **Easy to see if oil/water/gas meters are showing zero for all wells in an area**

- **Able to trend separate wells against each other** (ex. motor temp for casing leak investigation)

- **Able to monitor and trend key parameters**

- **Able to sort/filter parameters from highest to lowest** (easily ID highest producing wells)

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Improved Compressor Run Time with AVEVA™ PI System™

Challenge

- Difficult to achieve high compressor efficiency throughout bpx Energy
- Disparate compressor data sources operated by several 3rd party vendors
- Before AVEVA PI System, quick RCFAs following compressor failures were challenging and diagnosis often took over 6 hours after production ceased
- Comparing and sorting compressor performance data was also impractical, as compressor data came from multiple sources

Solution

- Incorporate all compressor data from multiple sources into AVEVA PI System, and build PI Vision displays to enable diagnostic trending and filter capabilities
- Create alerts and notifications for compressor performance to simplify troubleshooting and reduce deferment while enabling bpx Energy to effectively trend and filter parameters for better analysis

Benefit

- Prior to AVEVA PI System, diagnosing compressor failures was often delayed, while performance comparisons and parameter monitoring were efficient
- After AVEVA PI System, we could swiftly identify repeat failures, conduct timely RCFA, enhance performance analysis and efficiently monitor and detect anomalies for improved maintenance

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Improved Compressor Run Time with AVEVA™ PI System™
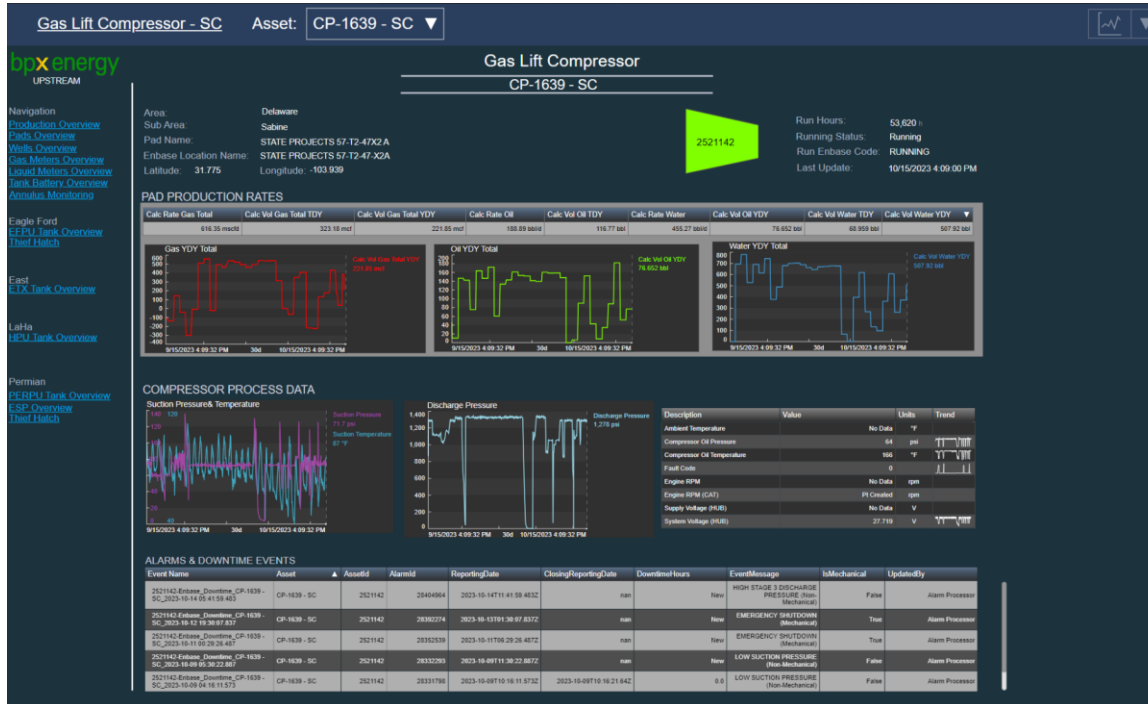
- Easier diagnostic trending capabilities resulting in **easier troubleshooting and less deferment**

- **Easy to identify repeat compressor failures** and perform adequate RCFA to deploy appropriate resources

- **Able to trend compressors against each other by location and type**

- **Able to monitor and trend key parameters** and set up alerts for failures and anomalies

- **Able to sort/filter parameters from highest to lowest** (easily ID best and worst performing compressors)

Air-Assist Flare | AVEVA™ PI Vision Example

PI Vision assisted in reducing fuel gas usages enabling more fuel gas to be sent to sales

Air-assist flare - Introduces high velocity air into the flare tip, which improves the combustion efficiency and reduces the emissions of unburned hydrocarbons and other pollutants

AVEVA PI System- Used to optimize air-assist flare performance by rolling up all air-assist flare historical data, displaying performance metrics (ie. combustion efficiency) and comparing and contrasting performance data for each flare; alerts and notifications can be established that enable engineers to take immediate action if necessary
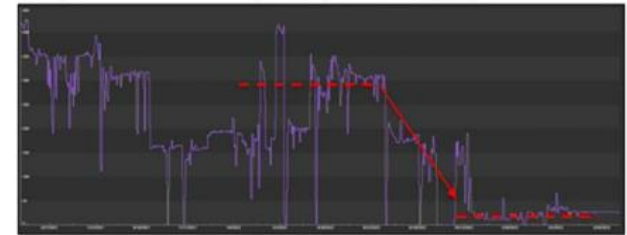
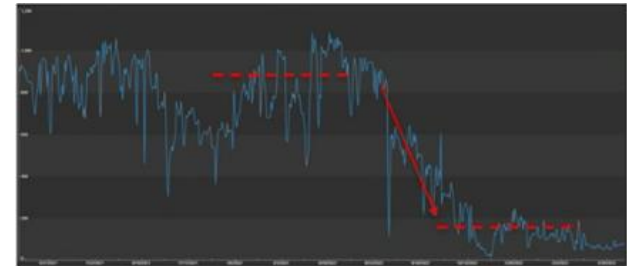**Impact -** Increased revenue, reduced cost, reduced emissions

Fuel Gas Reduction
- Fuel gas reduced by 150-200Mscfd for each air-assist flare
- Extreme cases can range over 400Mscfd of assist gas
- Existing flares require frequent tuning and are susceptible to failure due to wet gas

PI Vision

Single site reduces fuel gas usage by 300 Mscfd:

5 site cumulative fuel gas reduction ~1MMscfd:

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Digital Allocation Flow Diagrams (AFD) in AVEVA™ PI Vision
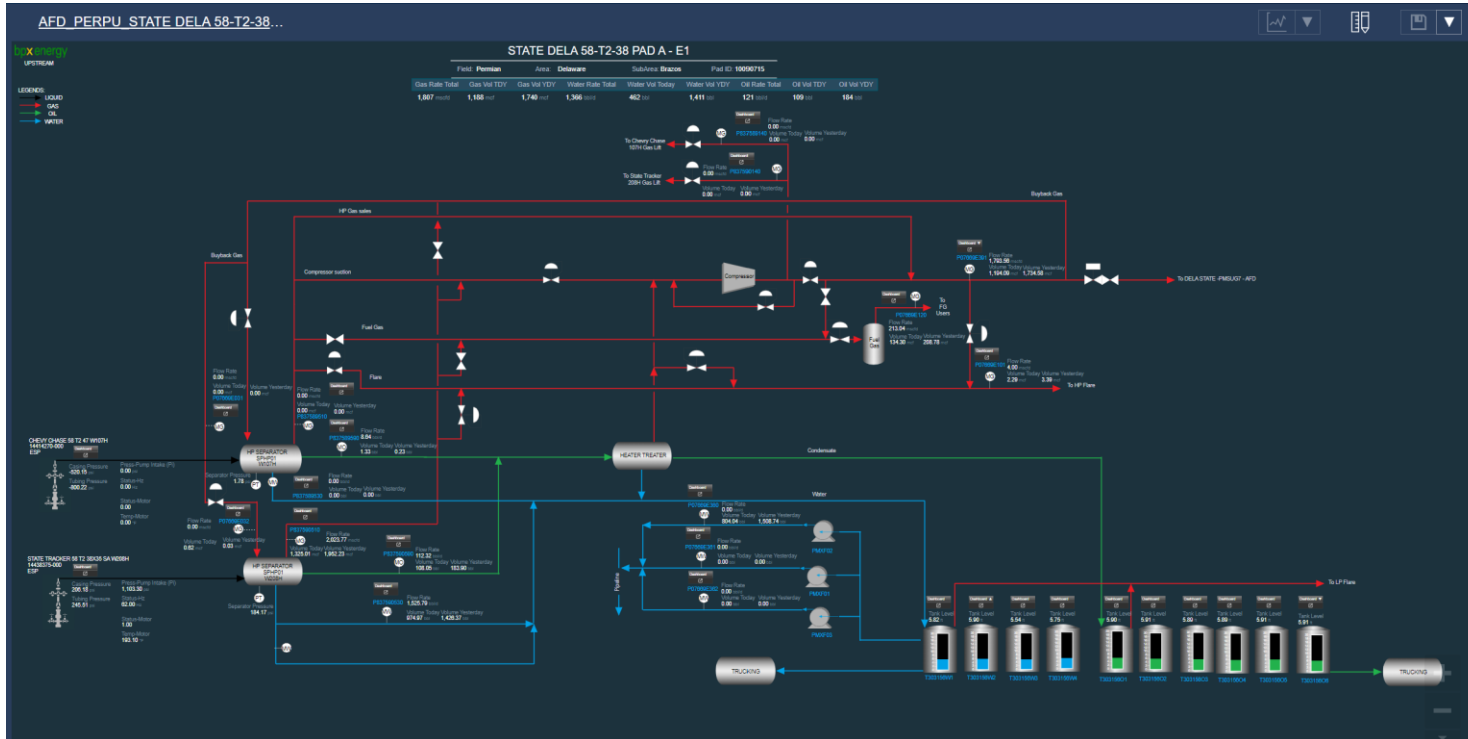
- **Quick access to real-time data** organized by production process

- **Easier to identify and troubleshoot issues**

- **Easier to implement condition-based monitoring, reducing number of unplanned events, minimize emissions and improve safety**

Industrial-Strength ETL Data Connector

bifrost By Techneaux

To maximize our investment in AVEVA PI System, bpx Energy needed to stream data without:

Data Gaps

Reliability Issues

Capacity Constraints

Maintenance Challenges

bpx Energy leveraged bifrost for industrial-strength ETL for Cygnet and AVEVA PI System

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Future Uses and Enhancements for the bpx Energy AVEVA™ PI System™

The path ahead

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What's Next?

The path ahead for the bpx Energy AVEVA™ PI System™

- **Support bpx Energy maintenance practices by moving organization from continuous surveillance to exception-based surveillance**
  - o Implement condition-based monitoring into daily operations
  - o Empower teams with more time for optimization
  - o Save on labor and equipment expenses
  - o Improve asset uptime and production efficiency

- **Support data science group with historical data to solve complex problems**
  - o AVEVA PI System to Snowflake
  - o Enhance data-driven decision-making capabilities and anomaly detection
  - o Improve process optimization

- **Explore possibilities for plunger optimization**

Contact Information

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Over 20,000 enterprises in over 100 countries rely on AVEVA to help them deliver life's essentials: safe and reliable energy, food, medicines, infrastructure and more. By connecting people with trusted information and AI-enriched insights, AVEVA enables teams to engineer efficiently and optimize operations, driving growth and sustainability.

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