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equitrans Midstream

Using Seeq to measure and reduce compressor blowdowns

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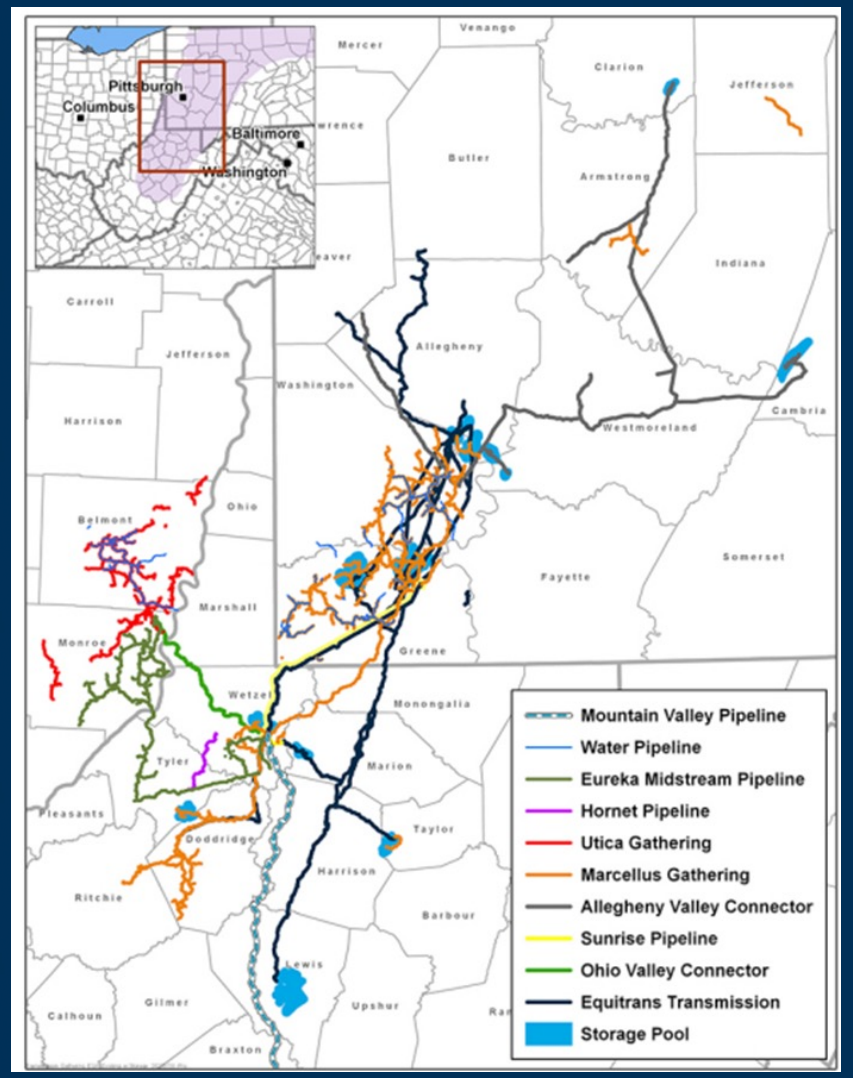
EQUITRANS MIDSTREAM

Agenda

- Equitrans Midstream - Company Profile
- Our Journey with the PI and Seeq
- Compressor Blowdowns - Explained
- Use Case – Compressor
- Perspectives on Best Practices & Lessons Learned
- Benefits
- Q&A

Company Profile



Strategic midstream network in the Appalachian Basin, with primary operations located in OH, PA, and WV

Gathering

- 1,180 miles of high-pressure lines
- 493k Hp - 135 compressor units

Transmission

- 940 miles of interstate lines
- 136k Hp - 43 compressor units
- 18 storage fields

- Water
  - 200 miles of water lines
  - 21 fresh-water impoundment facilities
  - Mixed-use water system in development

Source: Equitrans Midstream 10-K; data as of December 31, 2022

Our Journey

2016 – RCM Focus

- Pilot – one gathering site
  - 7 engine/compressor units
  - 9000 tags
  - 3 Seeq Solution users, on-prem

2023 – Multiple use cases

- 60 compressor stations
  - 170+ engine/compressor units
  - 500+ ultrasonic meters
  - 30 odorizers
  - ~ 20 users, SaaS

Transition To and Benefits of SaaS

- On Prem to SaaS in 3 Simple meetings
  - ***Pre-meeting:*** review the existing On Prem environment and walk through of the migration procedures
  - ***Migration-prep meeting:*** backup of the database, test connectivity to Seeq AWS environment, review connector configs, discuss migration process and timing
  - ***Migration day:*** one final backup to catch any new changes; turn down On Prem Seeq Server and convert Seeq Server to Seeq Agent; allow backup to be restored in Seeq AWS; initiate Seeq Agent and confirm configurations ; validate data
    - NOTE: our migration day was roughly 4 hours, with the majority of time used for backup and restoring. The Seeq team was available during the entire migration to provide assistance if needed.

SaaS offers more enhanced support and features compared to On Prem. Seeq Team always watching to ensure the system is running as optimally as possible.

Seeq Solution at Equitrans

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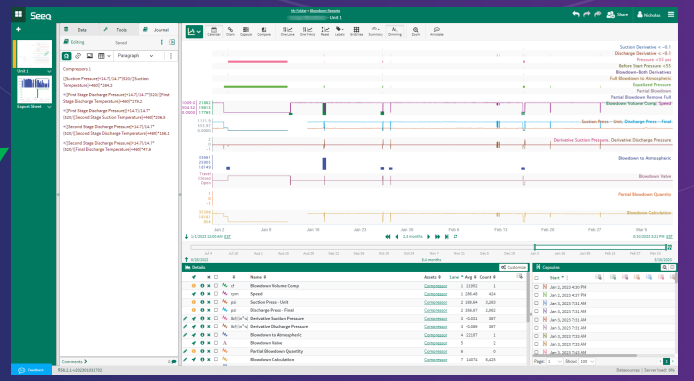
AVEVA

OSIsoft.

CygNet™

Compressor Blowdown Writeback to PI

Seeq®



Excel

Department	Use Cases
Compression Engineering & Maintenance	RCM, Troubleshooting, Event analysis
Field Operations	RCM, Pigging, Blowdown reporting, Odorizers
PI Admin	Track system performance, Sandbox
Environmental	Blowdowns, Emissions calcs, Operating hours, Data collection
Engineering	Ad-hoc troubleshooting
Gas Systems Analysis	Ad-hoc analysis
Water	Meter build-up

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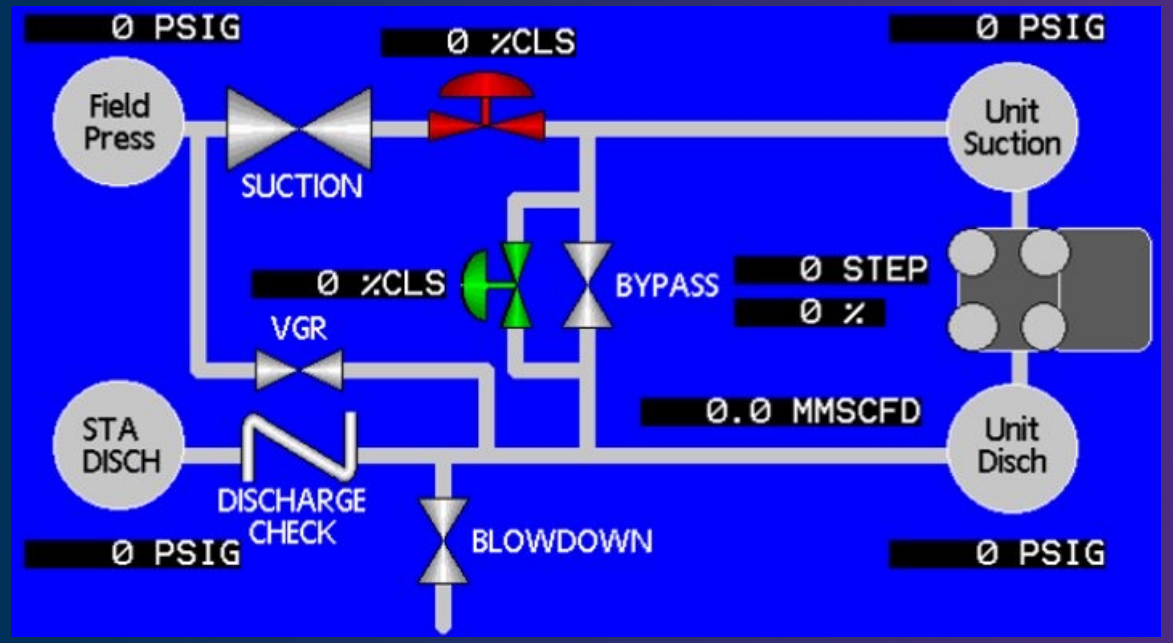
Compressor Blowdown Use Case

What Is A Compressor Blowdown?

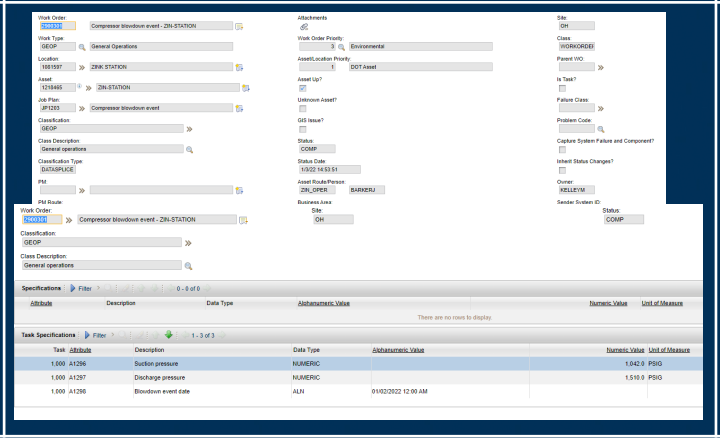
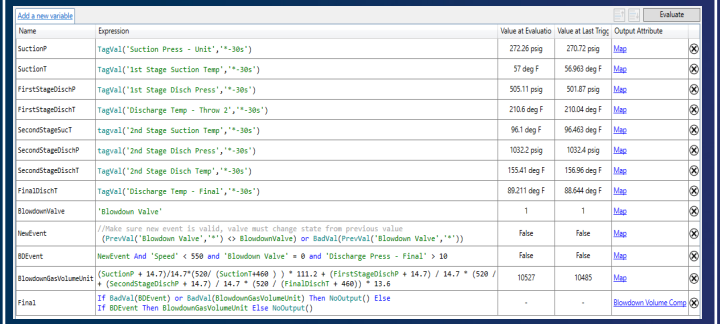
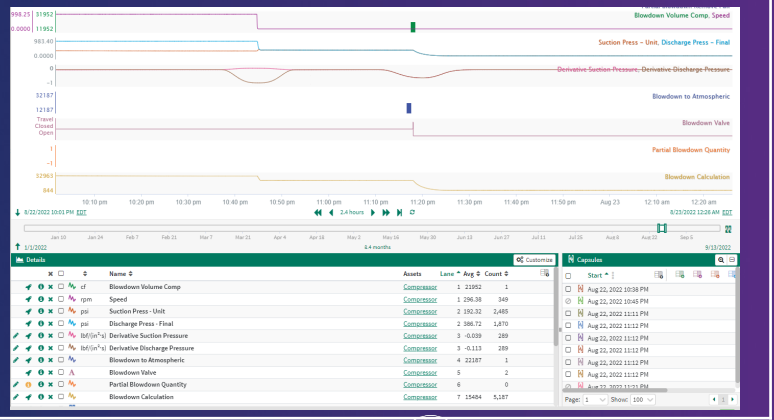
High-pressure gas within the compressor and associated piping (between the isolation valves) must be periodically relieved or vented

Reasons	Mitigants
Maintenance	VGR Work stacking
Emergency Shutdowns	
Unloading during start-up	VGR Partial blowdowns



Blowdown events are minimized; however, must be accurately tracked for reporting purposes

Compressor Blowdown Evolution

Method	Work Orders and SCADA	PI Calculated	PI & Seeq **(better together)**
Benefit	• Capture information	• Event based • Automated & high resolution	• Standard methodology, capital savings • Seeq writeback to PI • Improved accuracy & real time data
Challenges	• Manual, conservative process with low data resolution • Aggregation performed annually	• Equipment and capital needed, many assumptions	• Multiple calculations and workbooks to manage
			

Seeq Solution Methodology

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Data to calculate blowdown volume

Blowdown Calculation

Variables | + Add Variable | Details

Name	Item
$spu	Suction Press - Unit
$ssst	1st Stage Suction Temp
$ssdp	1st Stage Disch Press
$nsst	2nd Stage Suction Temp
$rsdt	3rd Stage Disch Temp
$nsdp	2nd Stage Disch Press
$nsdt	2nd Stage Disch Temp

Derivative Suction Pressure

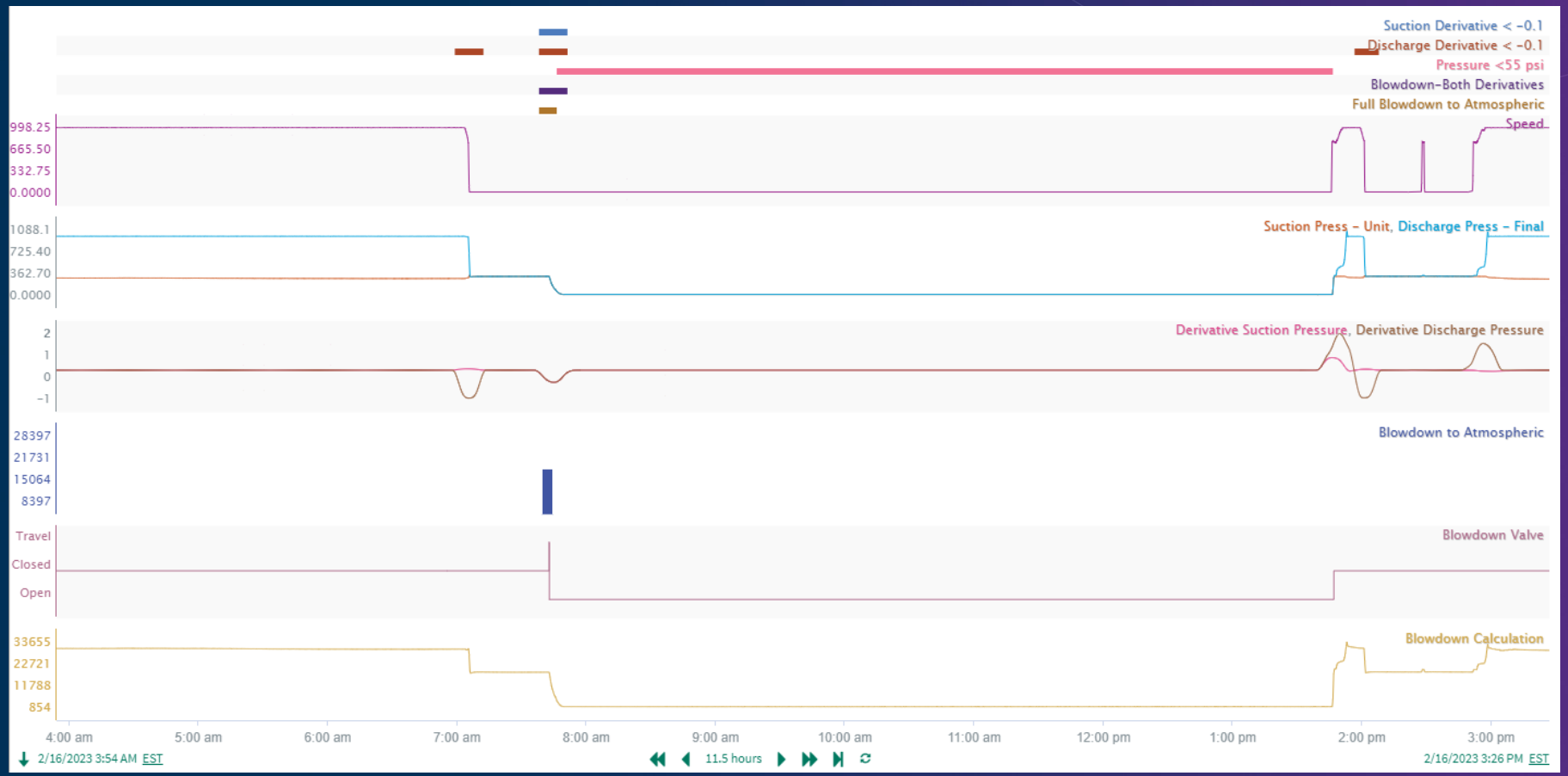
Variables | + Add Variable | Details

Name	Item
$spu	Suction Press - Unit (psi) EQT (Midstream) » All Assets » Europa » Unit 1 » Compressor

Formula

```
1 $spu.agileFilter(30sec).derivative().setMaxInt
```

Leverage derivative function and capsules to determine when event occurs



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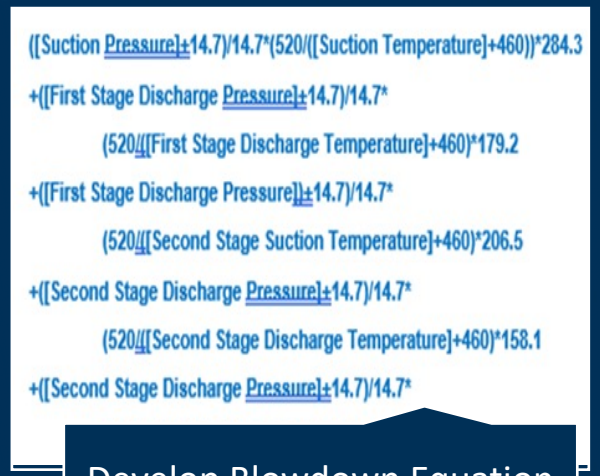
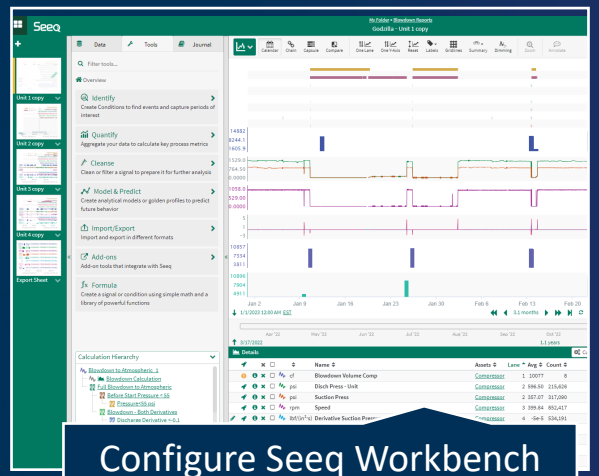
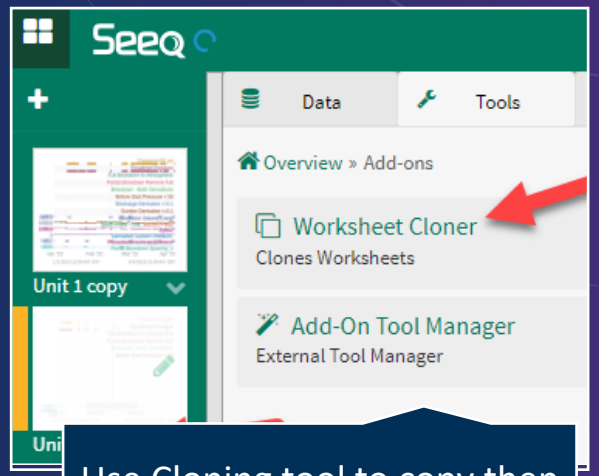
Process Scaling Using Seeq Solution



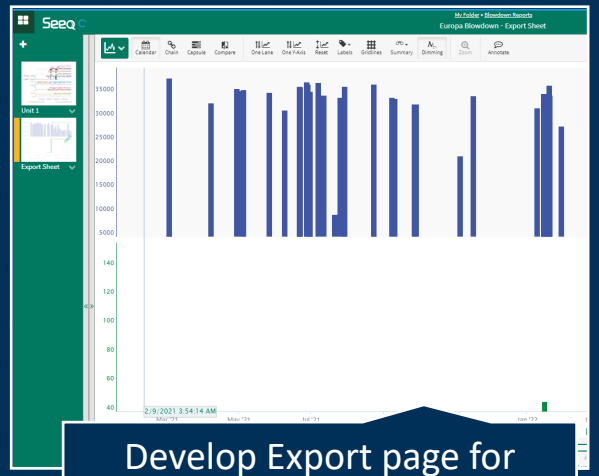
Develop Blowdown Equation for Asset



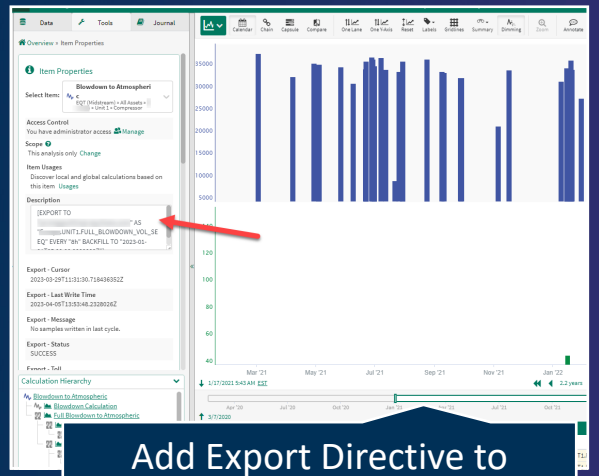
Configure Seeq Workbench Analysis for one compressor unit



Use Cloning tool to copy then asset swap to create next unit



Develop Export page for parameters to export to PI – delete duplicates



Add Export Directive to Parameter being Exported back to PI

Seeq Solution Helps to Measure Success

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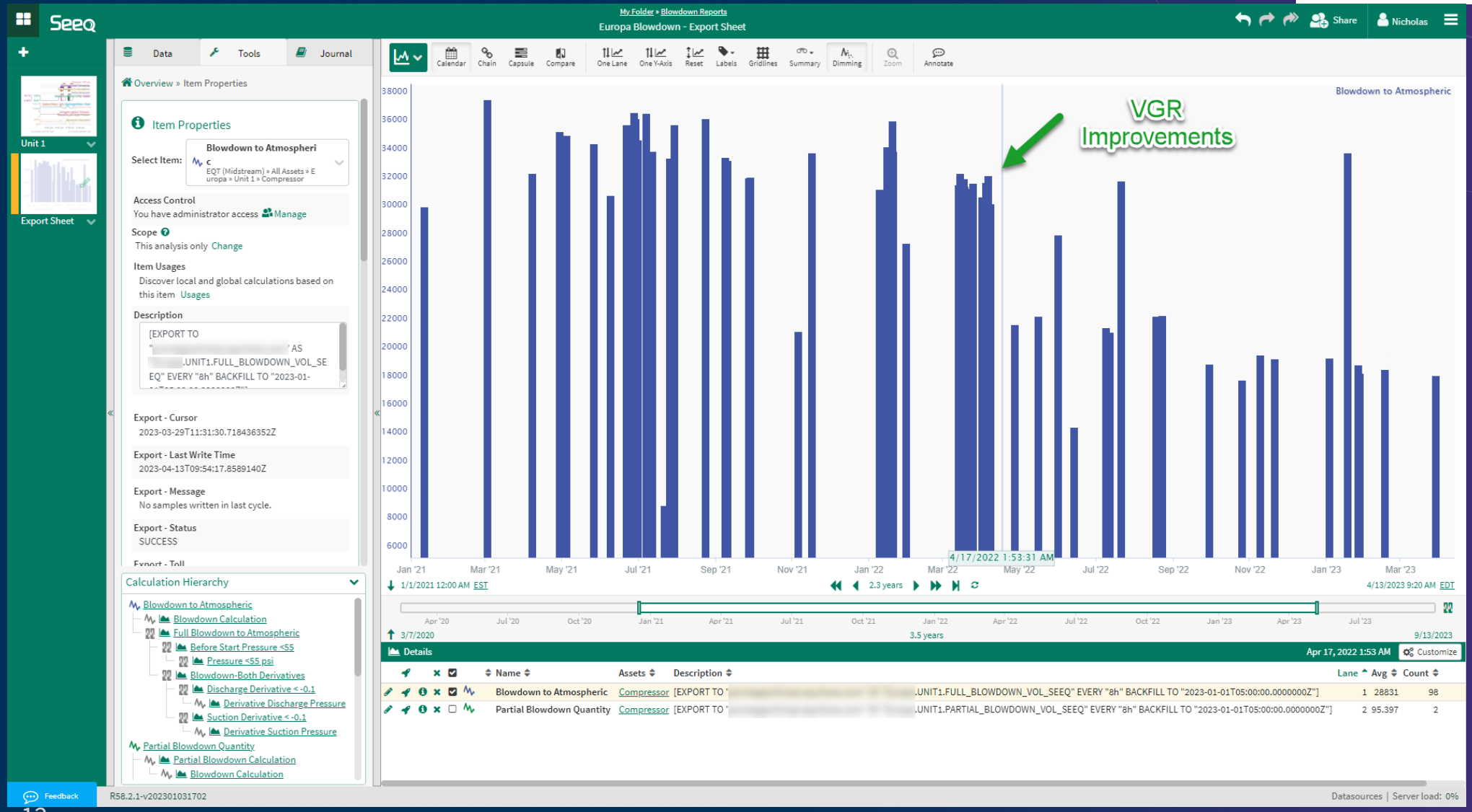

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Best Practices and Lessons Learned

Best Practices

- **Standardize methodology**
  - Standard PI templates help with asset switching
  - Cloning tool creates unique IDs
  - Workbook per station, worksheet per compressor
- **Document using journal (asset-specific equations)**
- **Automatic tag generation for writeback**

Lessons Learned

- **Asset differences make it difficult to scale calculations**
- **Consider frequency of data writebacks (data quantity)**
- **Be wary of template changes and database migrations**

Realized Benefits

	Improved Emissions Calculation	Capital Savings	Work Order Reduction	Opportunity Discovery	Data Integrity
Details	~20% compressor blowdown volume reduction compared to baseline	Eliminated the need to install automated blowdown valves on units without them	Eliminated the need for compressor blowdown Maximo work orders	Early identification of stations with emissions issues, ability to quantify improvements	Continuously identify and calculate compressor blowdowns, reduces manual involvement of data interaction
Savings	Methane reduction (ESG)	$>1 MM capital savings	~3000 work orders eliminated	$ / Ton methane, reduced downtime, reduced corrective maintenance	Improved data accuracy and report frequency


Questions?
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Thank you
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