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Alarm Management: Transitioning between DeltaV Analyze and AgileOps

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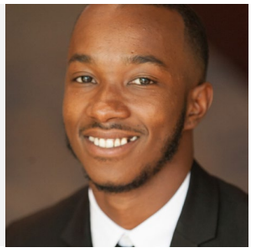

Quincy Evans

Senior Automation Engineer / R.E. Mason Company

Zachary Farell

Process Controls Engineer / Sylvamo

Agenda

Zach Farell	Site History and Alarm Management Program
Quincy Evans	Alarm Management Results
Quincy Evans	Agileops Version 3
Quincy Evans	Agileops Version 5
Quincy Evans	Future Direction of AgileOps onsite

Sylvamo Paper Mill

Location: Eastover, SC

First Production Line commissioned in 1984 on Provox DCS.

Expanded to a second production line in 1990.

Primary products are uncoated free sheet paper primarily used for copy paper, envelopes, and printing paper.

2011 - Migration to DeltaV began in a phased approach across the mill with replacement of Provox operator consoles, leading to Provox I/O Interface, and eventually to CHARMs.

2023 – Final process area migration to DeltaV controllers completed during fall outage.

Sylvamo Alarm History

- Provox DCS had limited alarm management or customization tools
  - CBAD
- Site implementation of control system over-specified alarm limits
- Operator Console and HMI provided limited information to operator and made it more difficult for operators to identify the root cause and take proper action.
- Constant attention of the process was required as a large amount of alarms were annunciating at a very frequent rate.

Sylvamo Alarm History

- Migration of Provox to DeltaV involved reverse engineering of the Provox data. All alarms from Provox were configured into DeltaV control modules.
- Newer control system, computers, graphics interface…..however same issues with managing alarms propagated in DeltaV as the alarm definition and limits were not properly reviewed to provide the correct alarm rationalization.
- As more process areas migrated to DeltaV system, more interest from site to manage their alarms more efficiently.

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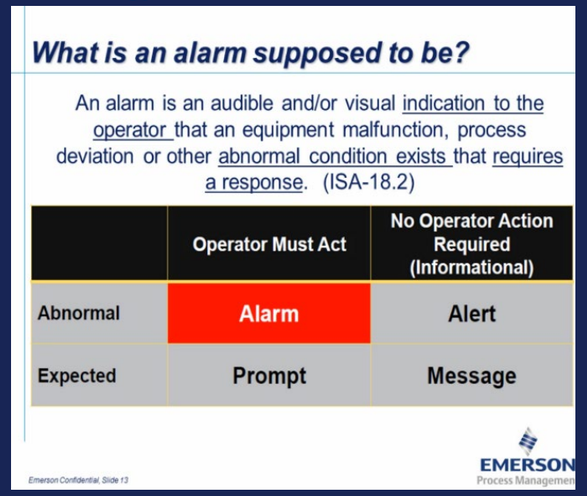
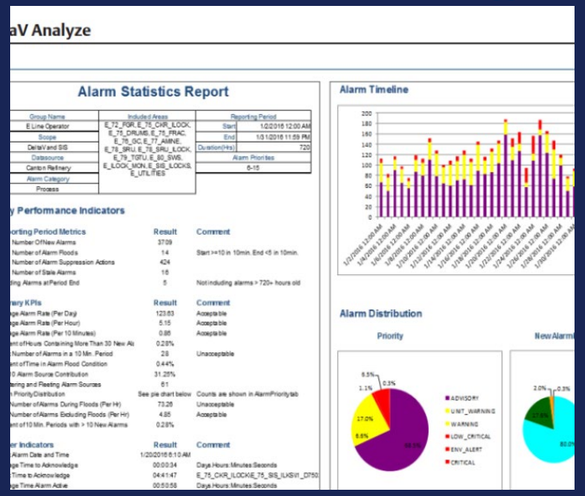
Alarm Management

Timeline of Sylvamo Program

Dashboard Warning Alarms

Sylvamo Alarm Management Program





	Type	Priority	Alarm Limit (non-DI)	Actions to be Taken (CA = Conditional Alarming)
	Hi	Warning	6	Enable Conditional Alarming: On-Delay = 0 sec to 90-120 sec. Custom Conditional Alarming = If Hi Alarm & Output <85.1, Change On-Delay =
	Hi	Critical	1500	Enable Conditional Alarming: Hystersis = 0.5% to 0.003125%. Modified from default to achieve a 5 PSI dead Hi Lim = 1475 to 1500 On-Delay = From 0 to 5 min (300 sec)
	Dev Hi			Disable Alarm
	Dev Lo	Advisory	-50	Enable Conditional Alarming: Hystersis = 0.5% to 0.003125%. Modified from default to achieve a 5 PSI dead
	Lo	Critical	1350	Enable Conditional Alarming: Hystersis = 0.5% to 0.003125%. Modified from default to achieve a 5 PSI dead Low Lim = 1350
	HIHI	Critical	1525	Enable Conditional Alarming: Hystersis = 0.5% to 0.003125%. Modified from default to achieve a 5 PSI dead Hi Lim = 1525
	Hi (Alert)	Alert	1450	Same settings as Hi with different limit. Set as Alert Priority
	Process (HI/Low)			Non-DeltaV Alarms (Provox Alarms) - Redundant thus should be disabled
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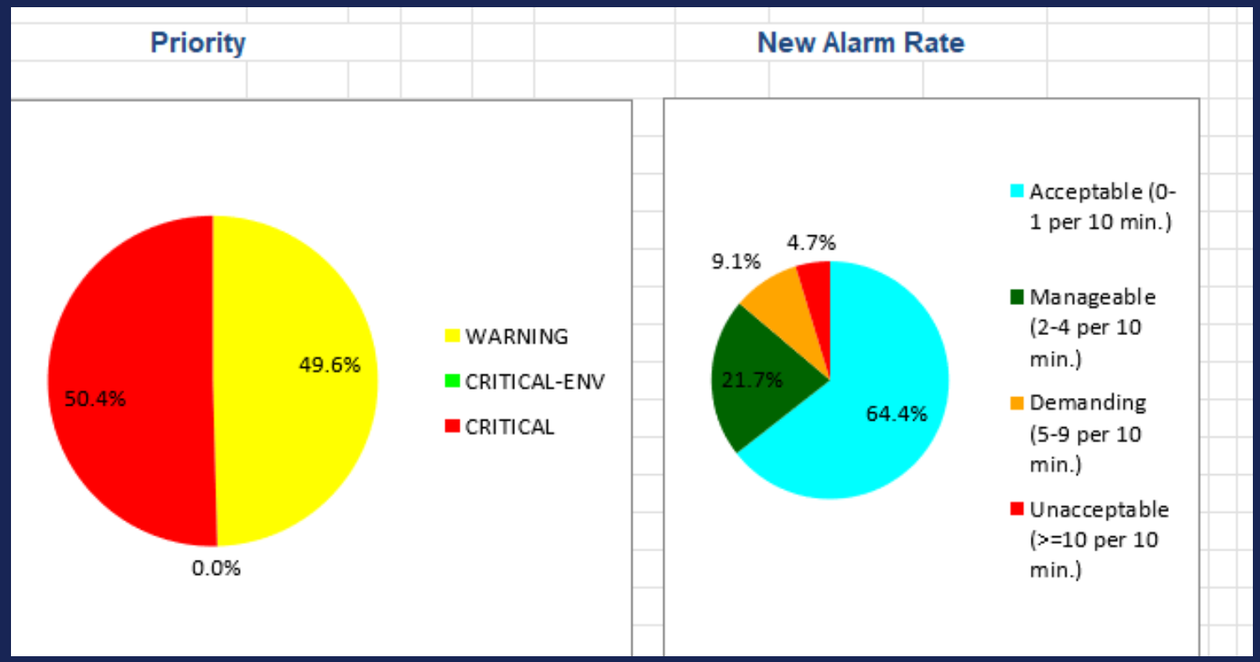
	Process (HI/Low)			Non-DeltaV Alarms (Provox Alarms) - Redundant thus should be disabled
	Process (HI/Low)			Non-DeltaV Alarms (Provox Alarms) - Redundant thus should be disabled
	DISC_ALM	Advisory		Enable Conditional Alarming: On-Delay = 0 to 120 sec (2 min)
		Advisory		This is a Group Alarm coming from a PLC panel. Normally, it is advised to de these alarms to Alert Level categories, pull individual alarms, or disable th altogether. However as per operations some (but not all alarms) are importar the response will always be to check this alarm. The COI is process upset. R

- R.E. Mason proposed an alarm management study in 2017.
- Sylvamo agreed to deploy a DeltaV Analyze server in 2018.
- Regular visits were scheduled between a service engineer and each process area to review the analysis and come up with plan of action.
- Tracked progress across service visits to document and approve process control changes and run updated reports.

Sylvamo Alarm Management Program

- ISA 18.2 provided key metrics that could be tracked on an alarm system.
- Key Metrics included:
  - Total Alarm Rate per hour per Station (6-12 max)
  - Standing Alarms (< 5)
  - Alarm Floods:
    - Peak Alarm Rate (<10 in any 10min period)
    - % of Time in Flood (< 1%)
  - Alarm priority Distribution:
    - >80% Advisory
    - < 15% Warning
    - > 5 % Critical



Sylvamo Alarm Management Program

DeltaV Analyze provides a cumulative percent of all alarms in a specific area. Helpful to identify the alarms making the most significant impact on the KPIs.

Punch List maintained for each area of the mill converted to DeltaV controls. Specific alarms were investigated, and action items documented and reviewed by operations before implementing changes.

Top Twenty Alarm Sources

Module/Node	Description	Total Alarm Quantity	Average Per Hour	Sum	Percent All	Area
351AC007	EVAP1 DUMP TAN	1499	2.01	1499	15.38%	EVAPORATOR
351LV067		705	0.95	2204	22.61%	EVAPORATOR
352LC642	EVAP-2 HSC PROI	447	0.60	2651	27.2%	EVAPORATOR
351LC067	EVAP1 CLEAN CO	341	0.46	2992	30.69%	EVAPORATOR
352AI643	EVAP-2 PRODUCT	309	0.42	3301	33.86%	EVAPORATOR
EV2EFF1_HISOL	EVAP-2 1st EFFEC	303	0.41	3604	36.97%	EVAPORATOR

Type	Priority	Alarm Limit (non-DI)	Actions to be Taken (CA = Conditional Alarming)	Alarm Help (TTR)	Alarm Help (COI)	Alarm Help COI Functional Classification
Lo	Critical	1350	Enable Conditional Alarming: Hystersis = 0.5% to 0.003125%. Modified from default to achieve a 5 PSI deadband. Low Lim = 1350	<5	Severe	Process Upset (Plant Outage) & Equipment Damage
HIHI	Critical	1525	Enable Conditional Alarming: Hystersis = 0.5% to 0.003125%. Modified from default to achieve a 5 PSI deadband. Hi Lim = 1525			Process Upset (Plant Outage) & Equipment Damage
Hi (Alert)	Alert	1450	Same settings as Hi with different limit. Set as Alert Priority			
Process (HI/Low)			Non-DeltaV Alarms (Provox Alarms) - Redundant thus should be disabled.			
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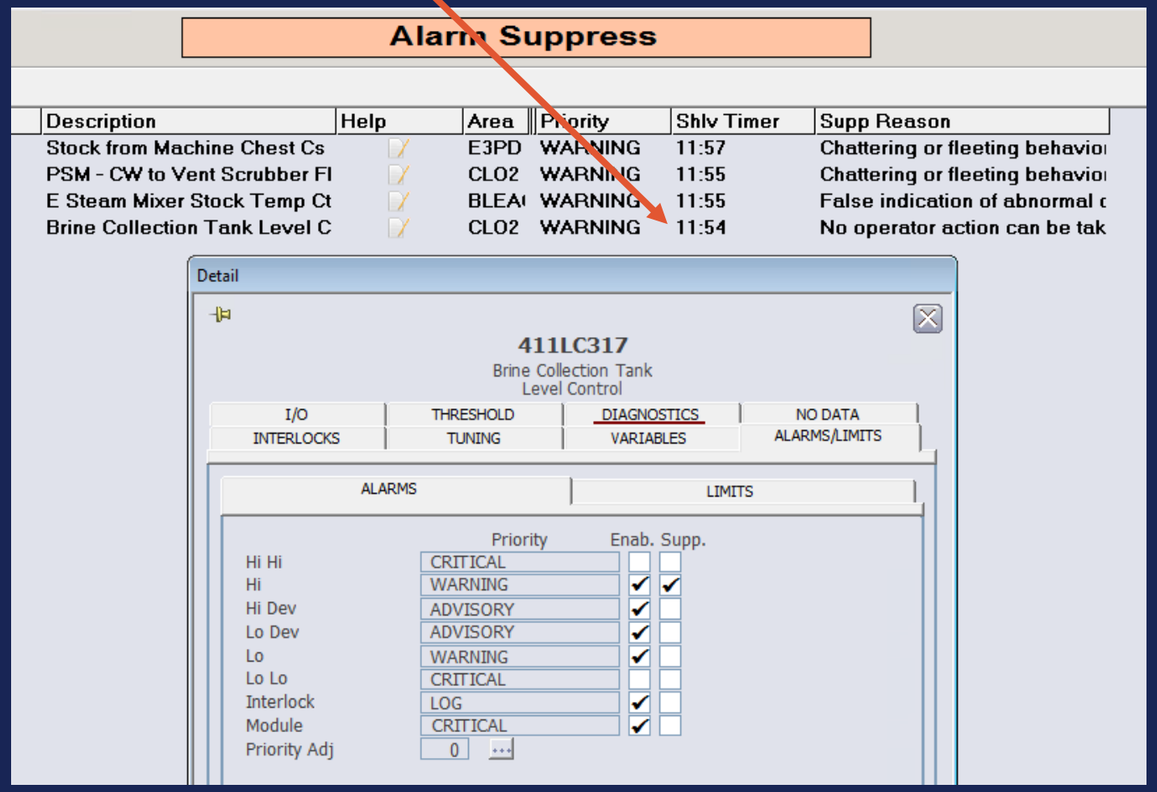
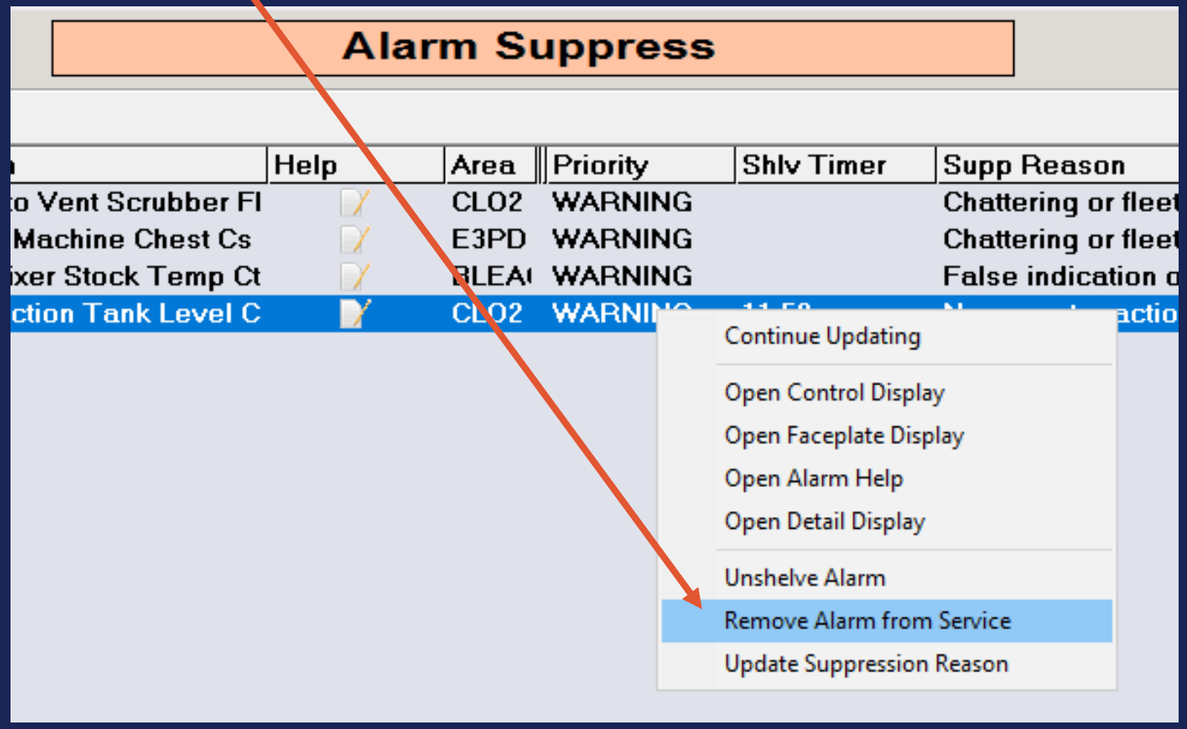
Process (HI/Low)			Non-DeltaV Alarms (Provox Alarms) - Redundant thus should be disabled.			
DISC_ALM	Advisory		Enable Conditional Alarming: On-Delay = 0 to 120 sec (2 min)	15-30	Minor	Equipment Damage & Product Quality
	Advisory		This is a Group Alarm coming from a PLC panel. Normally, it is advised to demote these alarms to Alert Level categories, pull individual alarms, or disable them altogether. However as per operations some (but not all alarms) are important, thus the response will always be to check this alarm. The COI is process upset. Revisit	15-30	Major	Process Upset
			Suppress and Investigate			
			Suppress and Investigate			
			Suppress until bad instrument can be repaired			
			Suppress until bad instrument can be repaired			

Alarm Shelving

Alarm Shelving and Shelving Timeout



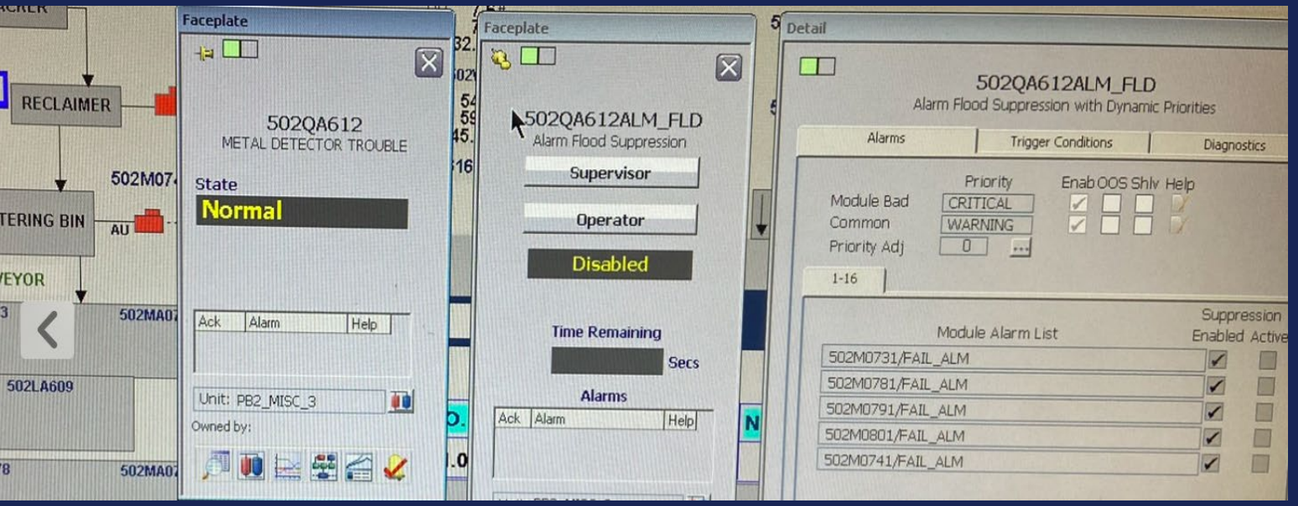
Alarm Suppression

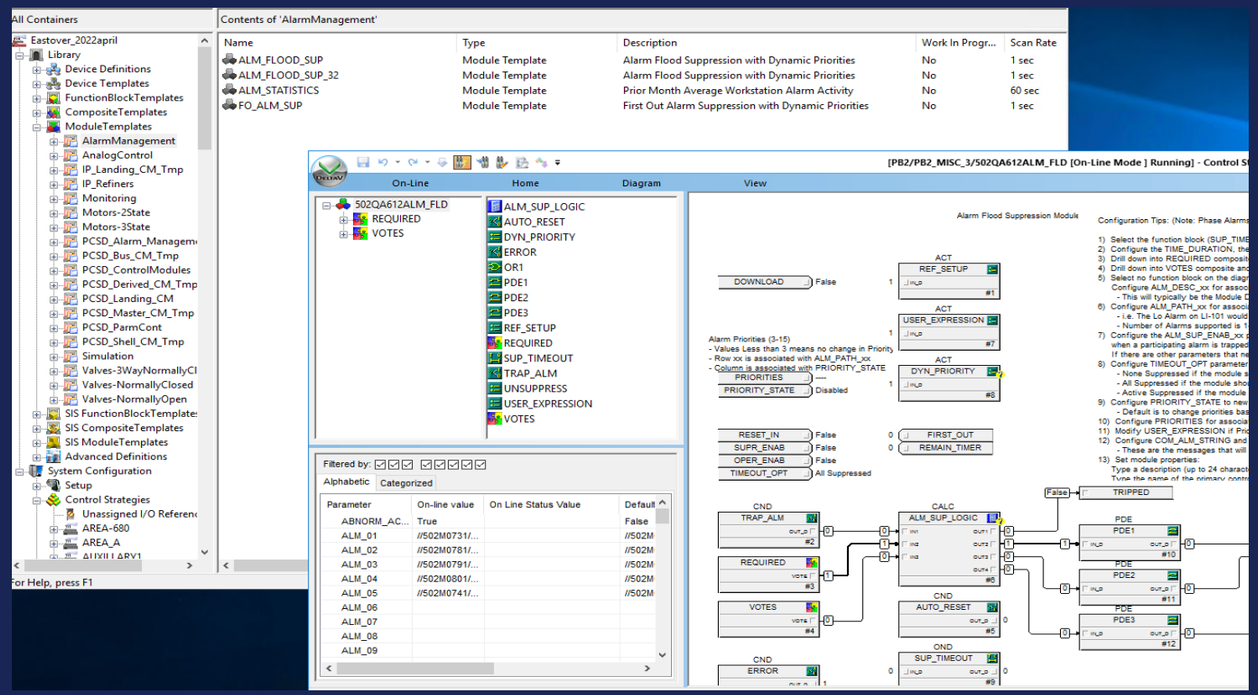


Alarm Floods

Some areas of the mill have tried to be more proactive on identifying alarm floods and implementing software resolutions to suppress alarms when a condition occurs.

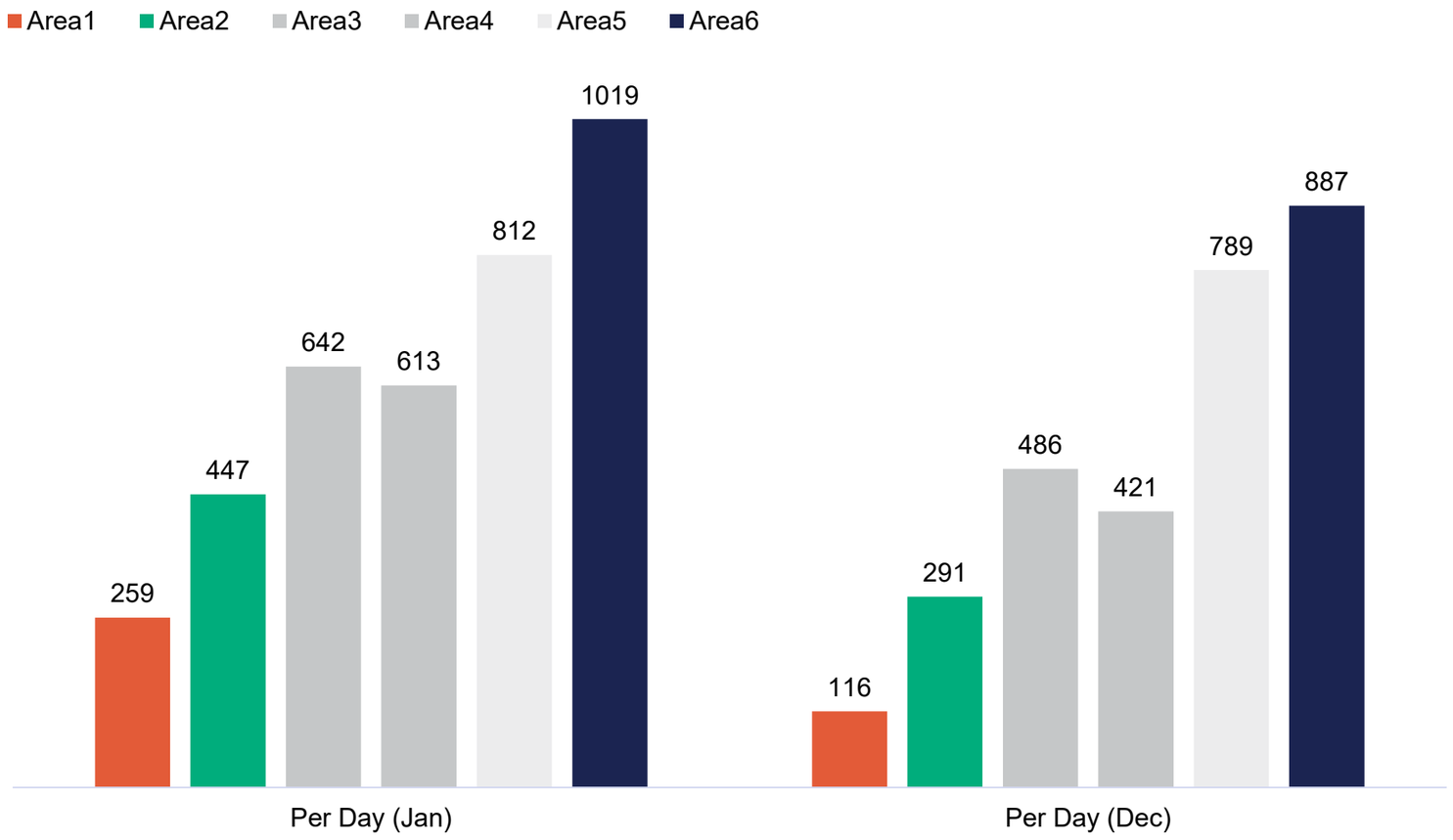
DeltaV Library has standard alarm flood templates that are easy to implement to handle these situations.





Sylvamo Alarm Management Program

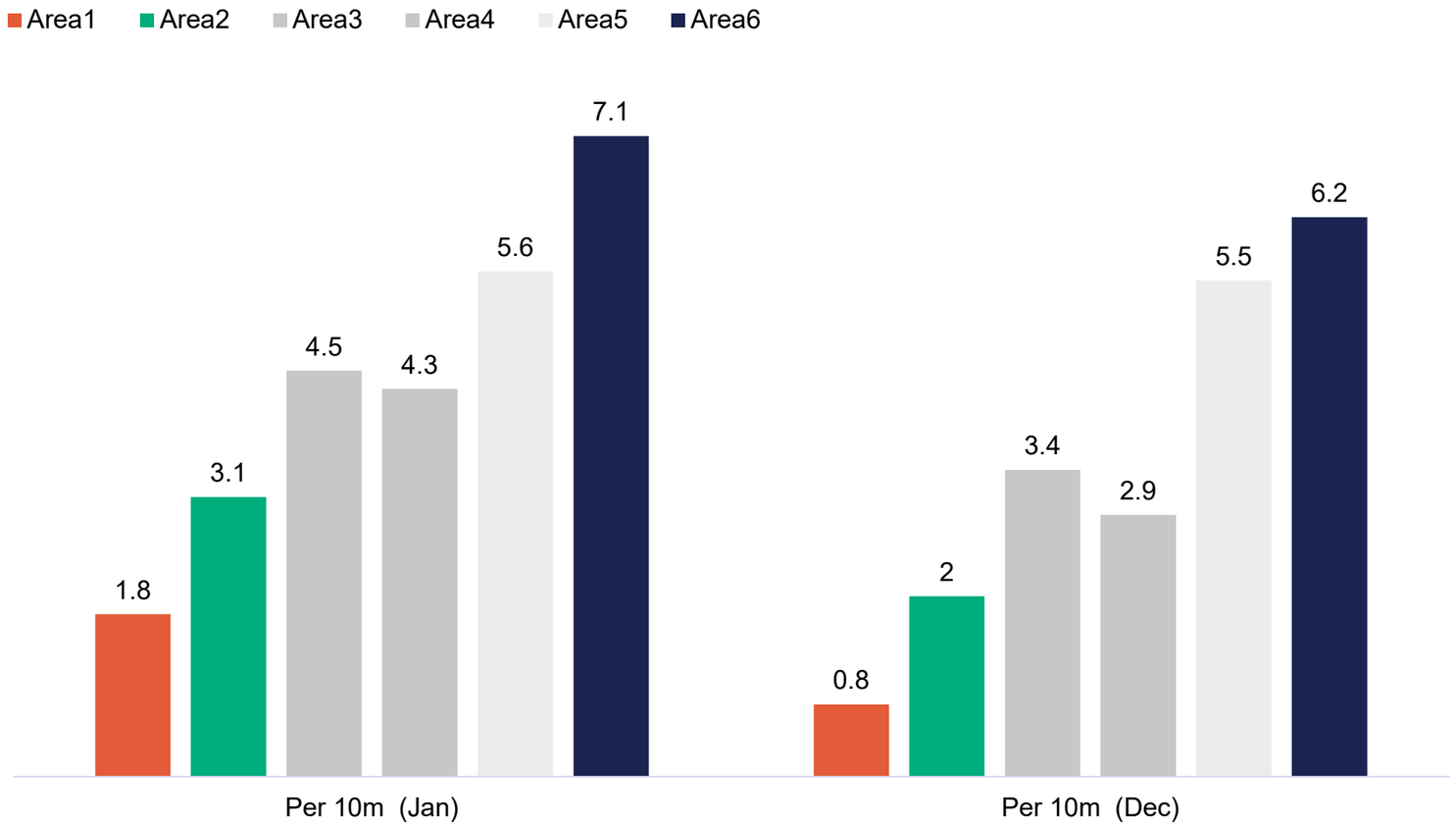
Alarm Remediation Status by Area per Day (2021)



Overall a ***28% reduction*** *of alarms was quantified across all areas of the mill* ***in one year*** *due to the efforts of the alarm management program implemented!*

Sylvamo Alarm Management Program

Alarm Remediation Status by Area per 10 minutes (2021)



Average Alarm Rate KPI reduced from ***4.4*** *to* ***3.5*** *across all areas of the plant. (21% reduction)*

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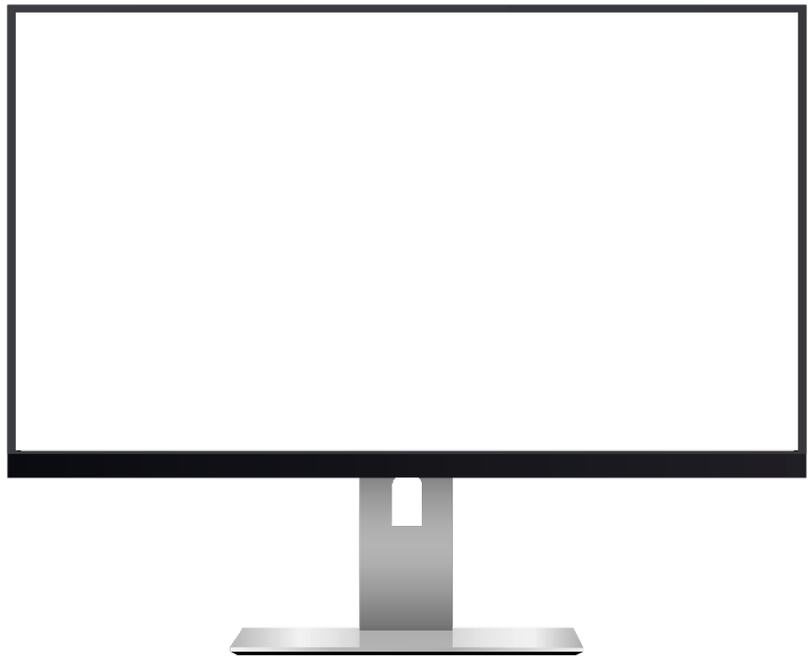
AGILEOPS VERSION 3

AgileOps™ Operations Management Software

Monitor key operational performance metrics to improve the safety, reliability, sustainability, and profitability of your process

Monitor and optimize plant operations



DeltaV AgileOps Performance Analytics

Monitor alarm & event metrics across the unit, site or enterprise

DeltaV AgileOps Database

Online database compatible with ISA 18.2 and IEC 62682

DeltaV AgileOps Dynamics

Allows the alarm configuration to change based on operating state

DeltaV AgileOps Alarm Shelving

Advanced alarm shelving to reduce nuisance alarms

DeltaV AgileOps Safety Integrity

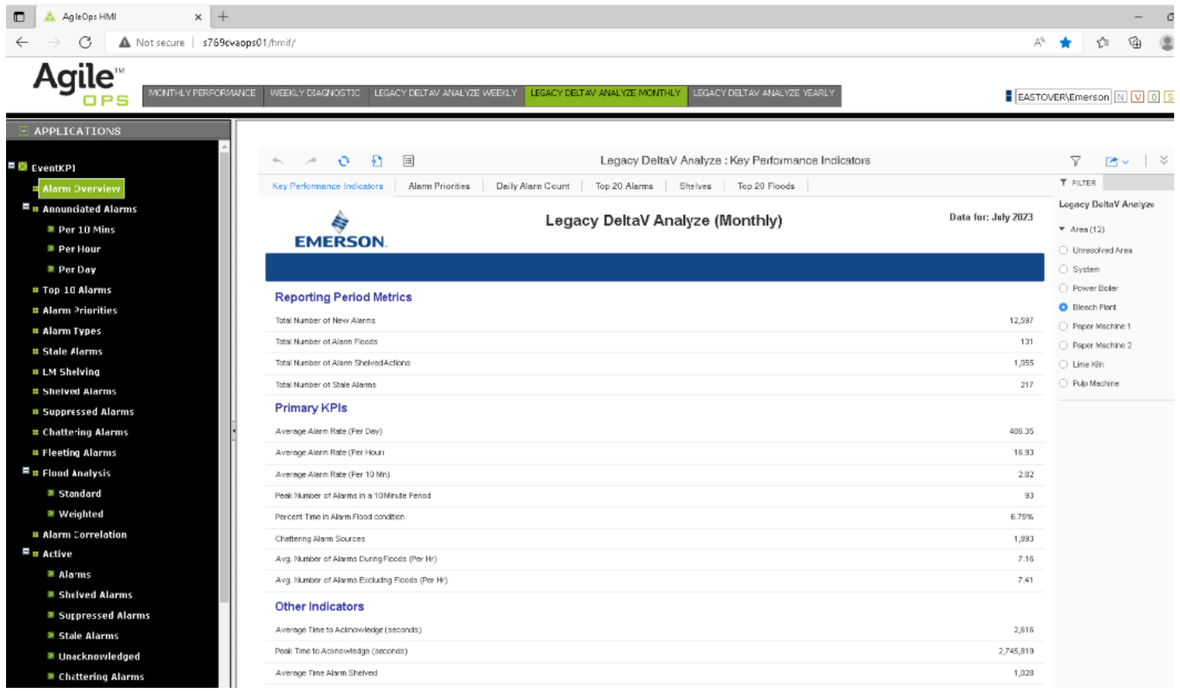
Track the integrity of safety systems

DeltaV AgileOps Operational Limits

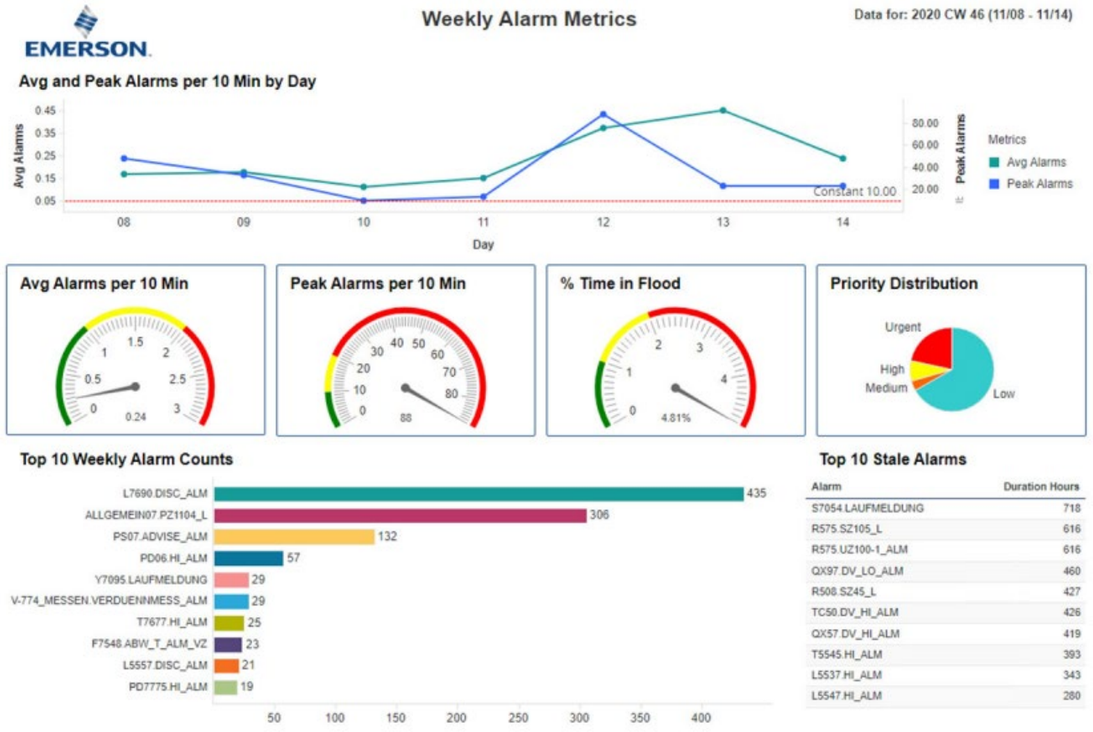
Monitor bypasses, interlocks, operating envelopes & IOWs

AgileOps Performance Analytics

- Version 3 provided DeltaV AgileOps Performance Analytics that provided legacy DeltaV Analyze reports to allow an easy transition to the new software platform. Reports can be setup by area and scheduled on weekly, monthly or annual basis.



- Dashboards provided on key alarm metrics give a consistent and repeatable approach to event analysis and reporting.



AgileOps Deployment

- Reviewing Installation Requirements

- Defining Site Information document assists in providing a smooth transition to AgileOps.

DCS Areas Organization Area Locations

Plant areas and how they are mapped to AgileOps

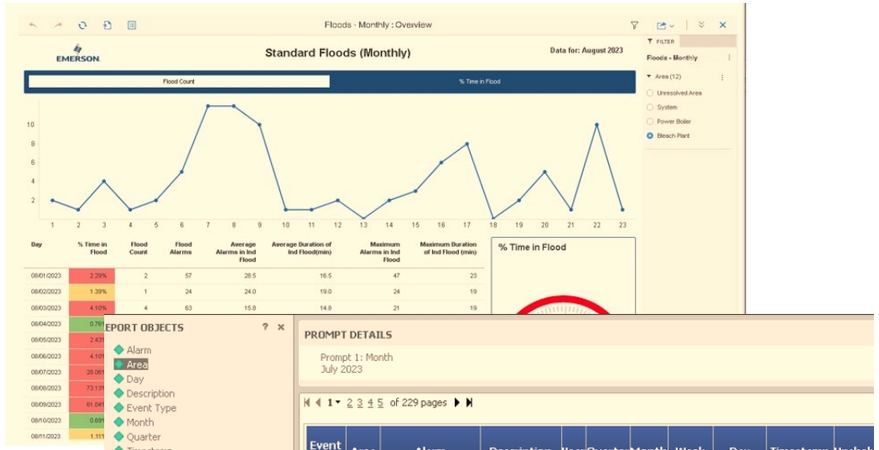
AgileOps Server Name	AgileOps Connection	AgileOps Location (Optional)	AgileOps Area	Control System Location
Example Data for AgileOps (Collector) Server	APPSTATIONNAME		PLANTAREA1	AREA_A
Example Data for AgileOps (Collector) Server	APPSTATIONNAME		PLANTAREA1	AREA_B
Standalone	EOPROPLUS			AREA-680
Standalone	EOPROPLUS			AREA_A
Standalone	EOPROPLUS		Power Boiler	AUXILLARY1
Standalone	EOPROPLUS		Bleach Plant	BLEACH_PLANT
Standalone	EOPROPLUS		Bleach Plant	BLEACH_PLANT_1
Standalone	EOPROPLUS		Bleach Plant	BLEACH_PLANT_2
Standalone	EOPROPLUS		Bleach Plant	BP_DG_SHARED
Standalone	EOPROPLUS		PaperMachine1	BP_E1_SHARED
Standalone	EOPROPLUS		PaperMachine2	BP_E2_SHARED
Standalone	EOPROPLUS		Bleach Plant	BP_HIGH_DENSITY

s also requires alignment on the next tab for the alarm template.

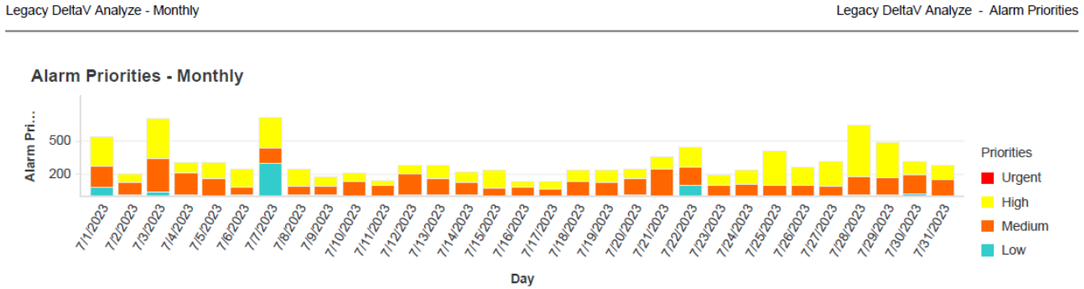
State	Access	Generic Priority
Active	Read	N/A
Inactive	Read	N/A
Enabled	ReadWrite	N/A
Disable	ReadWrite	N/A
LOG	ReadWrite	Journal (Default)
ADVISORY	ReadWrite	Low (Default)
WARNING	ReadWrite	Medium (Default)
BMS_CRITICAL	ReadWrite	Medium
BYPASS	ReadWrite	Low
CRITICAL-ENV	ReadWrite	High
HARDWARE	ReadWrite	High

AgileOps Deployment – Differences to Analyze Reports

- More Reports available to provide details on shelving, suppression, chattering, and fleeting alarms.
- AgileOps Alarm priorities consolidate alarm information in a more meaningful way for alarm rationalization.

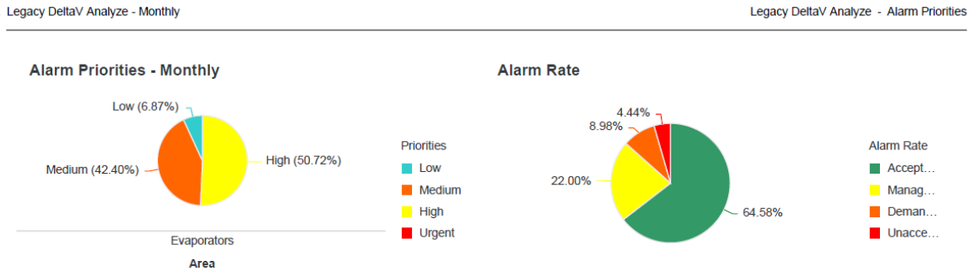


Event Type	Area	Alarm	Description	Year	Quarter	Month	Week	Day	Timestamp	Unshelv
Shelved	Power Boiler	502TC107.HI_ALM	PB2 OUTLET STEAM TEMPERATURE	2023	2023 Q3	July	2023 CW 31 (07/30 - 08/05)	7/30/2023 12:00:00 AM	7/30/2023 8:54:00 AM	7/30/2023 8:55:00 PM
Shelved	Power Boiler	522QA104.DISC_ALM	SCe&G CALL	2023	2023 Q3	July	2023 CW 27 (07/02 - 07/08)	7/3/2023 12:00:00 AM	7/3/2023 11:11:00 PM	7/4/2023 6:31:00 AM
Shelved	Power Boiler	522QA104.DISC_ALM	SCe&G CALL	2023	2023 Q3	July	2023 CW 27 (07/02 - 07/08)	7/4/2023 12:00:00 AM	7/4/2023 6:31:00 AM	7/4/2023 6:31:00 AM
Shelved	Power Boiler	522QA104.DISC_ALM	SCe&G CALL	2023	2023 Q3	July	2023 CW 27 (07/02 - 07/08)	7/4/2023 12:00:00 AM	7/4/2023 10:49:00 PM	7/5/2023 6:59:00 AM
Shelved	Power Boiler	522QA104.DISC_ALM	SCe&G CALL	2023	2023 Q3	July	2023 CW 27 (07/02 - 07/08)	7/5/2023 12:00:00 AM	7/5/2023 6:59:00 AM	7/5/2023 6:59:00 AM
Shelved	Power Boiler	522QA104.DISC_ALM	SCe&G CALL	2023	2023 Q3	July	2023 CW 27 (07/02 - 07/08)	7/5/2023 12:00:00 AM	7/5/2023 11:07:00 PM	7/6/2023 7:06:00 AM
Shelved	Power Boiler	522QA104.DISC_ALM	SCe&G CALL	2023	2023 Q3	July	2023 CW 27 (07/02 - 07/08)	7/6/2023 12:00:00 AM	7/6/2023 7:05:00 AM	7/6/2023 7:05:00 AM
Shelved	Power Boiler	522QA104.DISC_ALM	SCe&G CALL	2023	2023 Q3	July	2023 CW 27 (07/02 - 07/08)	7/6/2023 12:00:00 AM	7/6/2023 11:23:00 PM	7/7/2023 11:24:00 AM



Alarm Priorities - Monthly

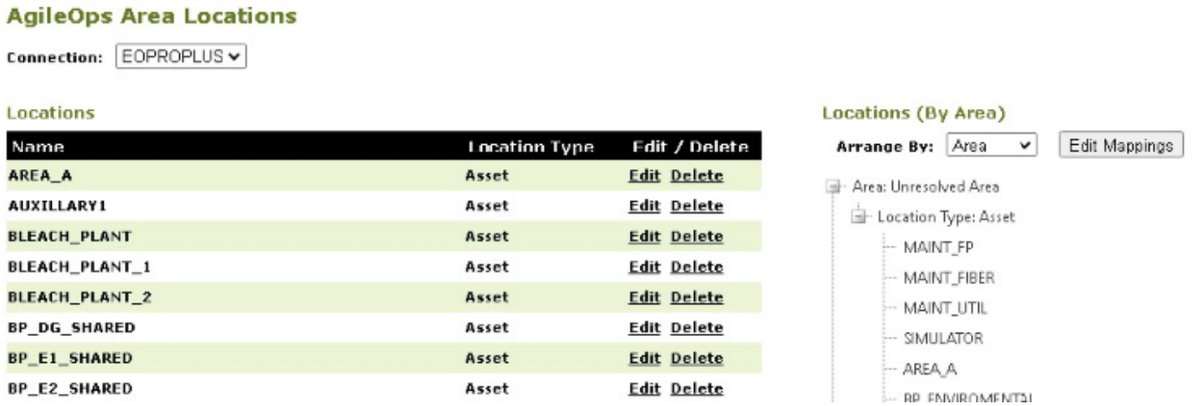
Priorities	Low	Medium	High	Urgent
Day	Alarm Priority Count	Alarm Priority Count	Alarm Priority Count	Alarm Priority Count
07/01/2023	77	193	271	0
07/02/2023	7			



AgileOps Deployment – Lessons Learned

- Understanding server and OS installation requirements.
- Understanding access points to reports

- Data Verification required understanding differences in AgileOps areas and alarm priorities configured. Version 3 slides below have been enhanced in version 5.



AgileOps Area Locations

Connection: EOPROPLUS

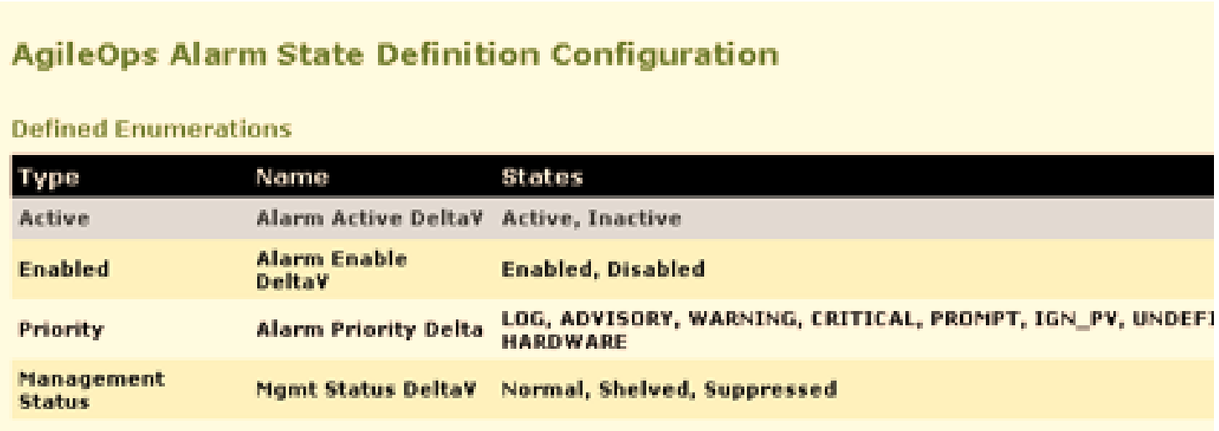
Locations

Name	Location Type	Edit / Delete
AREA_A	Asset	Edit Delete
AUXILLARY1	Asset	Edit Delete
BLEACH_PLANT	Asset	Edit Delete
BLEACH_PLANT_1	Asset	Edit Delete
BLEACH_PLANT_2	Asset	Edit Delete
BP_DG_SHARED	Asset	Edit Delete
BP_E1_SHARED	Asset	Edit Delete
BP_E2_SHARED	Asset	Edit Delete

Locations (By Area)

Arrange By: Area | Edit Mappings

- Area: Unresolved Area
  - Location Type: Asset
    - MAINT_FP
    - MAINT_FIBER
    - MAINT_UTIL
    - SIMULATOR
    - AREA_A
    - BP_ENVIROMENTAL



AgileOps Alarm State Definition Configuration

Defined Enumerations

Type	Name	States
Active	Alarm Active DeltaV	Active, Inactive
Enabled	Alarm Enable DeltaV	Enabled, Disabled
Priority	Alarm Priority Delta	LOG, ADVISORY, WARNING, CRITICAL, PROMPT, IGN_PV, UNDEFI HARDWARE
Management Status	Mgmt Status DeltaV	Normal, Shelved, Suppressed

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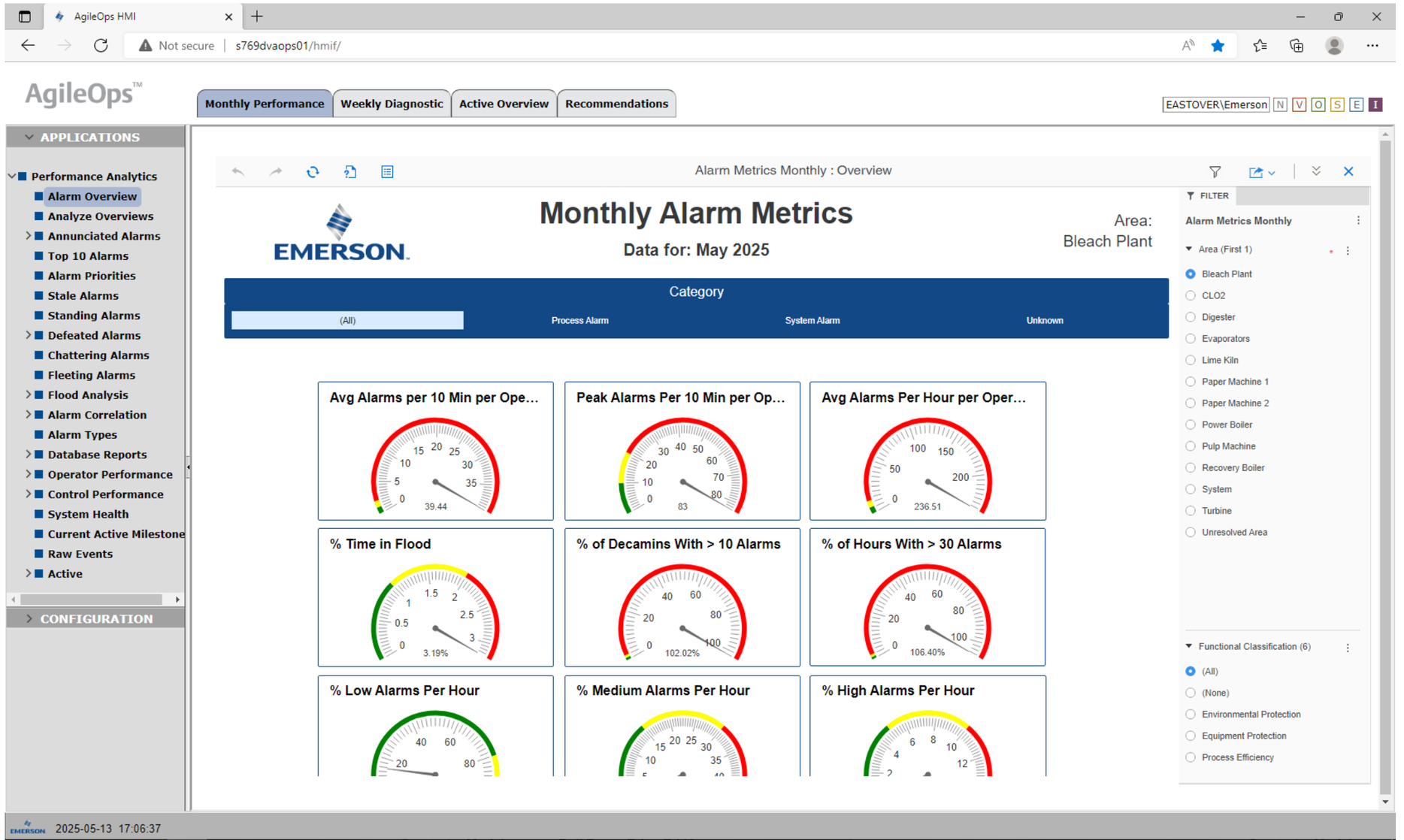
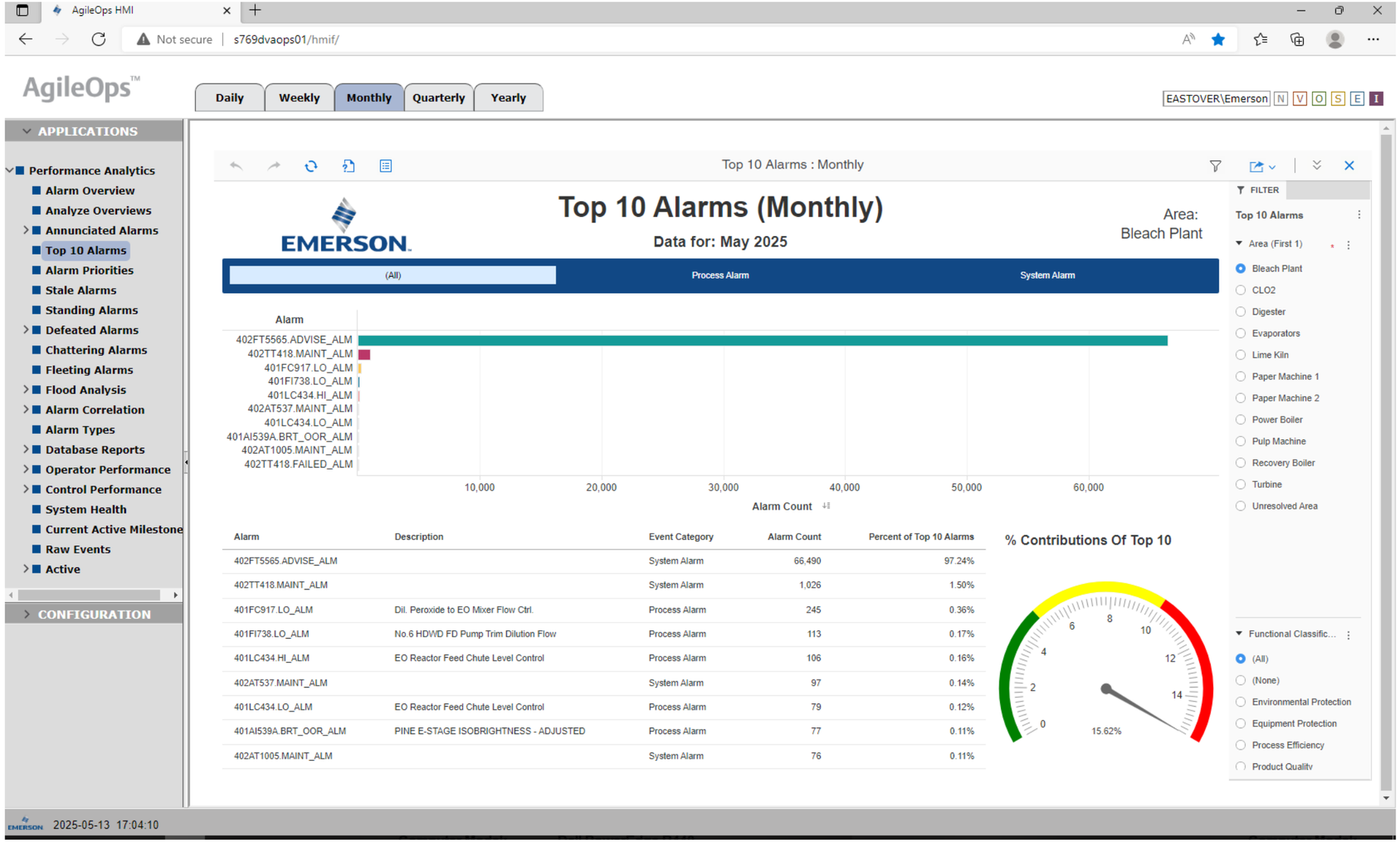
AGILEOPS Version 5

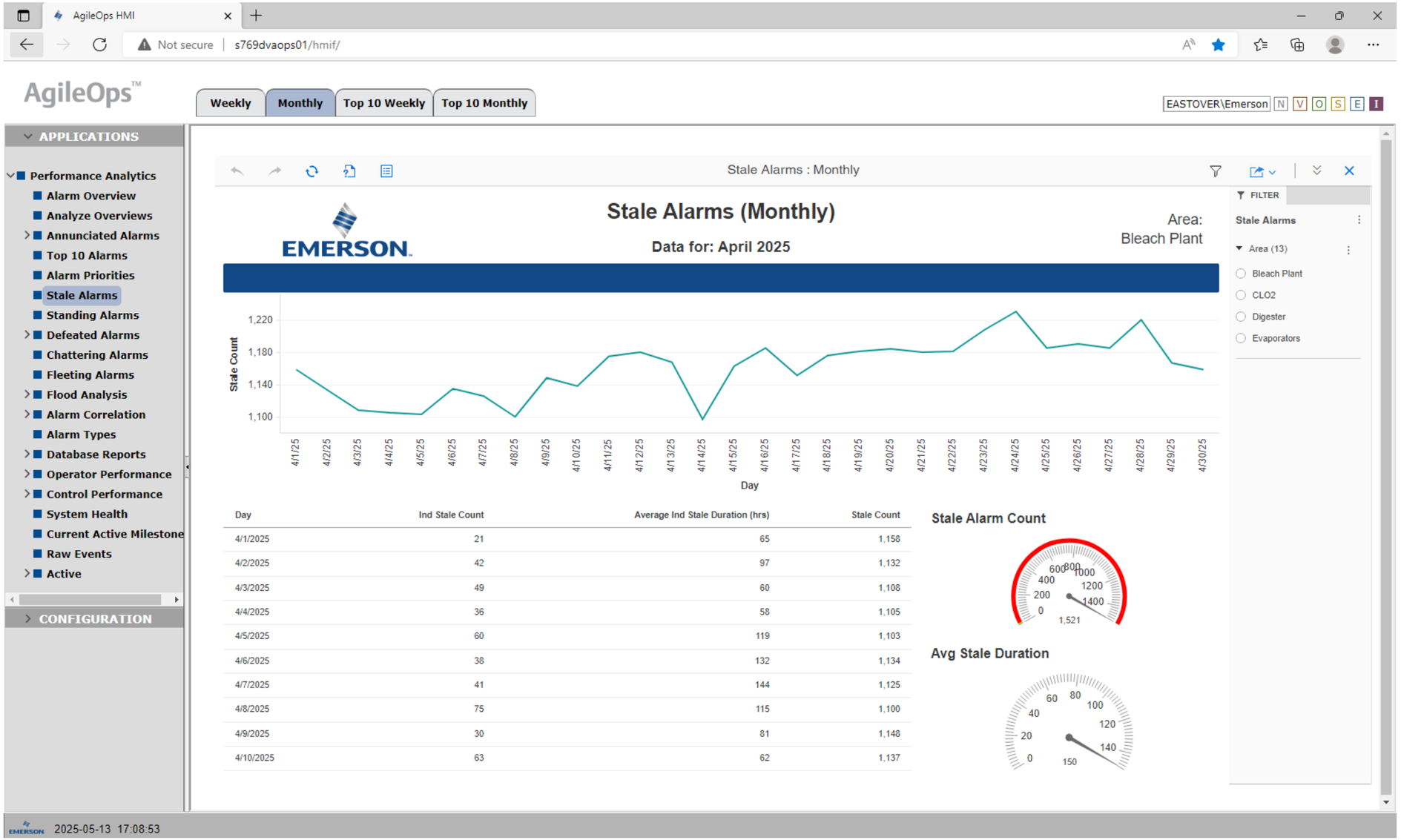
Alarm Overview



Top 10 Alarms

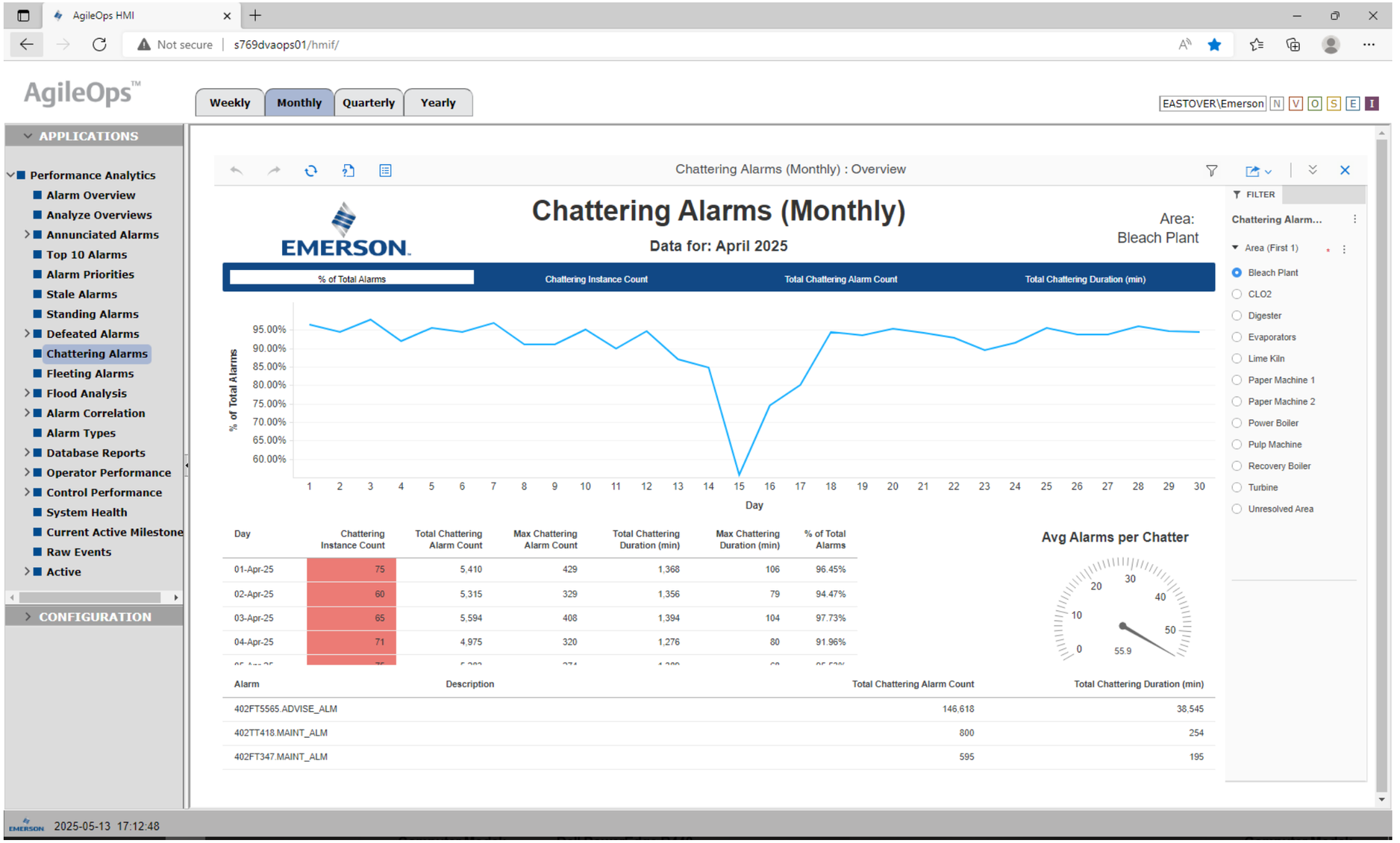


Stale Alarms



Day	Ind Stale Count	Average Ind Stale Duration (hrs)	Stale Count
4/1/2025	21	65	1,158
4/2/2025	42	97	1,132
4/3/2025	49	60	1,108
4/4/2025	36	58	1,105
4/5/2025	60	119	1,103
4/6/2025	38	132	1,134
4/7/2025	41	144	1,125
4/8/2025	75	115	1,100
4/9/2025	30	81	1,148
4/10/2025	63	62	1,137

Chattering Alarms



Lesson Learn

- Smooth Upgrade Process
- Easy and Smooth Installer
- Easy User Interface and Guideance
- Remember your MicroStrategy Password

Future Direction

IN SUMMARY

- A successful alarm management program needs three things in order for it to work.
- The right people
- The right methodology
- The right tools

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WHERE TO FIND MORE INFORMATION

Booth 239 Exhibit Floor

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Thank You