Content

- What is the need for alarm management
- Implementation Cycle @ Ravva site
- Implementation Cycle @ Suvali site
- Where do we stand
Introduction

What is an Alarm?

- An audible and/or a visible means of indicating a problem such as equipment malfunction, process deviation or abnormal process condition.

Why alarm management?

- Since humans can only do one thing at a time and can pay attention to a limited number of things at a time, there needs to be a way to ensure that alarms are presented at a rate that can be assimilated by a human operator, particularly when the plant is upset or in an unusual condition.
EMERGENCE OF INDUSTRY STANDARDS

Abnormal situation Management (ASM) Consortium formed

Ineffective Alarm Management
- Excessive number of alarms
- Alarms not meaningful to operator
- Alarms are disabled often

Establishment of systems and practices
- Emergence of EEMUA and ISA standards
- Implementation of Alarm Management Lifecycle

Understanding the consequence of excessive alarms
- Major accidents and losses
- Production losses
- Operator burnout factor

EEMUA 191 1st Edition
- 1999

ASM Alarm Management Guidelines 1st Edition
- 2003

EEMUA 191 2nd Edition
- 2007

Emergence of Standards and Regulations
- ISA 18.02
- 2009
ALARM SYSTEM MANAGEMENT LIFE CYCLE

PHILOSOPHY: Define processes for alarm management & prepare specific alarm management philosophy document

IDENTIFICATION: Determination of potential alarms

RATIONALIZATION: Rationalization, Classification, Prioritization and documentation – Master Alarm Database

DETAILED DESIGN: Alarm response procedures, Basic alarm design, HMI principles & Advanced Alarming features

IMPLEMENTATION: Implement alarm, testing and training

OPERATION: Operator response to alarms

MAINTANENCE: Repairs and periodic testing

MONITORING: Performance monitoring and reporting

MANAGEMENT OF CHANGE: Process to authorize change

AUDITS: Periodic audits and recommendations
ALARM MANAGEMENT STRATEGIES USED IN RAVVA

Aim is to develop & impart alarm management system, assess & improve system performance and target for continual improvement towards system performance excellence and sustainability of achieved results.

Below are the steps carried out in Ravva plant as part of operationalization of Alarm Management:

- Alarm Philosophy Procedures and related documents preparation
- Imparted Training to all relevant personnel’s
- Identify and formed task force team for system implementation
- Carried out Alarm Rationalization process for the existing system
- Documented the outcome and implemented changes related to alarm attributes
- Monitored system performance and conducted review meetings – Bi-weekly and Monthly
- Carried out Audits, Periodic surveys - Operator Questionnaire Survey & Alarm Effectiveness Survey
- Reviewed Alarm set points with accordance to the operating conditions of the plant
- Implementation of Highly Managed Alarms concept
- Implementation of FIRST-OUT ALARM SCHEMES coupled with LIVE C&E
ALARM MANAGEMENT STRATEGIES USED IN RAVVA

- Implementation of Advanced Alarm Management Techniques to curb alarm rates such as:
  - Alarm Latching concept
  - Alarm DEADBAND settings
  - Alarm ON/OFF DELAY settings
  - COUNTER Technique
  - DE-BOUNCE TIMER Technique
ALARM MANAGEMENT STRATEGIES USED IN RAVVA

STATISTICAL DATA – NO. OF ALARMS PER DAY ON AVG FROM Jun-14 to JUL-16

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Alarm Management System Key Performance Indicators (KPIs) are:

- Alarm Rate per day
- Peak Alarm Rate
- Number of Alarm floods
- Frequently Occurring Alarms – Top 10s
- Stale Alarms
- Annunciated Alarm Priority Distribution
- Number of Alarm occurrences for a particular group of systems
- Number of Chattering Alarms
- Number of Fleeting Alarms
- Audits, Periodic surveys - Operator Questionnaire Survey and Alarm Effectiveness Survey
ALARM MANAGEMENT STRATEGIES USED IN RAVVA

Constraints:
• Add-on projects and integration of control system
• Limitations with the existing PLC/SCADA Software

Key Results achieved post operationalization of Alarm Management in Ravva are:
• Achieved better priority distribution of alarms as per the recommended standards
• Improved and precise Alarm Message Composition
• Establishment and Availability of Alarm response procedures
• Segregation of events from Alarm logs
• Better Animations were provided in HMI graphics to support alarm systems
• Better survey results were achieved
• Considerable reduction in High priority alarms – 60% as per data analysis
• 60% Reduction in Alarm Flood condition
• Average Alarm rate per day in Ravva is being reduced from 4200 to 1100 alarms per day
ALARM MANAGEMENT SYSTEM -CB/OS-2 SITE

Following information/reports can be generated for study & analysis at Suvali site:

- **Alarm count over time** - To determine alarm rate.
- **Alarm distribution priority** - For checking priority wise alarms.
- **Most frequent alarms** - Alarms occurring on a frequently basis.
- **Chattering Alarms** - Most repetitive alarms over a duration.
- **Intervention count over time** - Manual intervention over a duration.
- **Most frequent intervention** - Most manual intervention of control valves.
- **Alarm distribution over time** - Shift wise.
- **Alarm enable & disable report** - Duration the particular system remained bypassed.
- **Plant status** - Standing alarms.
- **Alarm count per process unit** -
Alarm Rate
Reduction to 4% from 30% in Urgent alarms, 5% from 41% from in High Alarms, 2% from 13% in Low from
Alarm by Unit Tags

Alarms By Tag

- 3rd Stage oil side level transmitter
- 3rd Stage Interface level transmitter
- Oil Transfer Pump C Discharge
- Oil Transfer Pump B Discharge
- Slug Catcher Condensate Level
- ALHF New 2nd stage separator Interface
- Oil Transfer Pump A Discharge
- Fire Water Pump
- Fire System
- HC Liquid Heater shell side outlet Temp.
- Fire Water Pump System
- ALHF Engine Speed
- GLC Engine Speed
- HCDP BC-B Booster Comp Suction
- HCDP BC-B Booster Comp suction
- HCDP BC-B Booster Comp suction
- LA#9 well FTHP pressure transmitter
- LB Instrument gas drum Level transmitter
- PGBC-B Suction Scrubber V-2310
- PGC-B Aftercooler Discharge Temp.
- Degasser V-7810 Level Shutdown
- Raw Water Sump D-7510
- Degaser V-7810 Level Shutdown
- Water Systems
Alarm distribution over the time - Shift wise comparison
Standing alarms - Day wise

Online Equipment Standing Alarms

- **PGBC-B**: 3 (Urgent), 4 (Low), 1 (High)
- **LIQ HANDLING**: 1 (Urgent), 4 (Low), 2 (High)
- **SLUG CATCHER**: 2 (Urgent), 2 (Low), 1 (High)
- **TANKER LOADING**: 4 (Urgent), 2 (Low), 1 (High)
- **PGC-B**: 1 (Urgent), 2 (Low), 2 (High)
- **FLARE**: 2 (Low), 1 (High)
- **TEG-1**: 1 (Low), 1 (High)
- **ALHF**: 2 (Low)
- **GTG-B**: 1 (Low)
Alarm count for different units

Alarm Count By Unit
Daily total no. of Alarms

Total alarms stand at around **875** from **1900** = **46%** reduction
Average Alarm Rate vs Maximum Alarm Rate

- Overloaded
- Reactive
- Robust
- Stable
- Predictive

Peak Alarm Rate /10 minutes (per operator)

Alarm Rate /10 minutes (per operator)
INDUSTRY VS CAIRN STANDARD COMPARISION

- Benchmark of alarm for oil and gas industry
- The Engineering Equipment and Materials Users Association

### Table 4.7.3. Cross-industry activation study

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Cairn Suvali Site - 875 alarms/day  Cairn Ravva - 1100 alarms/day

- Before - 1900 alarms/day  4200 alarms/day