Agenda

• Alarm Management Explained
• Organizations Making a Difference in Alarm Management
• Alarm Management Targets
• Metrics Benchmarking Research
• Results and Summary
What is Alarm Management?

• Wiki Definition
  – Alarm management is the application of human factors along with instrumentation engineering and systems thinking to manage the design of an alarm system to increase its usability.

• And this is important because........
  – A small process unit may easily have 5,000 or more alarms
  – An offshore platform may have 20,000 alarms
  – A refinery complex can have 250,000 alarms

Poor Alarm Management can Contribute to Incidents!
The Pembroke Accident

An HSE report quotes:

- 275 alarms in the 11 minutes before the explosion
- “... warnings of the developing problem were lost in the plethora of instrument alarms triggered in the control room, many of which were unnecessary and registering with increasing frequency, so operators were unable to appreciate what was actually happening …”

Too Many Alarms Can Contribute to Incidents
Texas City Incident

15th Body Pulled from Refinery Rubble
By KEVIN MORAN
Copyright 2005 Houston Chronicle

TEXAS CITY - The only worker still missing after the explosion of BP's Texas City refinery was found dead in the plant's rubble today, bringing the death toll to 15. At least seven other blast victims, meanwhile, are fighting for their lives in hospitals.

Alarms weren’t working at Texas City plant
18 August 2005
Federal investigators say managers authorized the start-up of a unit in March despite knowing key alarms weren't working. That start-up killed 15 people. The Wall Street Journal reported the U.S. Chemical Safety and Hazard Investigation Board called on BP to set up an independent panel immediately to review safety across its U.S. refining operations.

Missed and Malfunctioning Alarms Cause Problems Too!
 Organizations Addressing the Alarm Management Challenges

EEMUA - Engineering Equipment & Materials Users’ Association

ASM – Abnormal Situation Management

The Abnormal Situation Management (ASM) Consortium is a group of leading companies and universities involved with process industries that have jointly invested in research and development to create knowledge, tools and processes designed to prevent, detect and mitigate abnormal situations that affect process safety in the control operations environment.

Abnormal Situation Management®

In The News

- Chemical Processing.com
  Seminar: The Edge of the Summer Window
  Aug 6 - Twin new tools provide essential insights and guidance about plant safety.

- EEMUA – Engineering Equipment & Materials Users’ Association

EEMUA Vacancies

EEMUA is currently seeking Head of Information Services. To find out more, visit their website.

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EEMUA Publication 191

- Practical guidance with specific goals
- Heavy focus on redesign ("rationalisation"): 
  - Recommends areas to target
- Calls for other improvements
  - MOC – (Management of Change)
  - Alarm suppression
- Adopted and followed in many countries

A Huge Step Forward in Practical Alarm Management Advice
EEMUA Publication 191

Best practices for design, management and procurement of Alarm Systems

Setting goals for Industry

Often referred to as the ‘defacto-standard’

Endorsement by UK HSE and ASM Consortium

Second Edition Published in 2007

EEMUA - Engineering Equipment & Materials Users’ Association

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Recently published *Effective Alarm Management Practices*

Specific criteria to assess “health” of alarm management systems

Guidelines & examples on how to achieve compliance to standards and goals.

The guidance is prioritised so that users with limited resources can easily identify the most appropriate recommendation.

**Proven Techniques Provide Specific Directions and Priority**
Effective Alarm Management Practices

Complements the EEMUA document by explaining **why** and **how** to do effective alarm management.

Learn how to assess Alarm Management capability.

Written with collaboration of end users!

First Edition Published 2009

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Published 2009
EEMUA Alarm Targets

• The EEMUA guidance includes 2 very significant metrics
• These 2 metrics and their respective targets had been the focus of much discussion – with some experienced Engineers stating that neither was realistic.
• ASM Consortium Research to determine

<table>
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Are EEMUA Alarm Targets Realistic?
ASM Performance Metrics Benchmarking Project

• Approach:
  – Surveyed 37 consoles at ASM Members’ sites
    • Each console represented a portion of a plant that was managed by a single console operator under normal conditions
  – 90 months of data overall
  – Collected static alarm configuration information plus dynamic alarm information and operator actions
  – Also collected anecdotal data that related impact from applying best practices for alarm management

Actual End User Data Used in Research
ASM Performance Metrics Benchmarking Project

• Purpose:
  – Determine if EEMUA alarm recommendations are achievable
  – Determine what factors influence alarm performance

• Possible performance shaping factors:
  – Scope of control
  – Number of configured alarms
  – Degree of rationalization
  – Degree of automation
  – Type of process etc.

Research seeks to validate if goals are attainable
ASM Member Research
Results: Average Alarm Rates

- Sites can meet and sustain the EEMUA 191 “Manageable” and “Very likely to be acceptable” levels of overall average alarm rate performance.

Actual Configured Alarms vs. EEMUA Recommendation for Configured Alarms
Results: Percentages of Time at High Alarm Rates

- None of the consoles met the EEMUA flood target (of < 10 alarms per 10 minutes) for the entire duration of data collection.
- The peak alarm rate is not closely correlated with the degree of rationalization.
- Peak alarm rates exceeding 100 alarms per 10 minute window were experienced at least once by 60% of the consoles.
Benchmarking Project - Results

• Performance does not correlate well with any one factor
• In general, huge improvements in the “normal” alarm rate have been made in the last few years – mostly due to the application of the EEMUA 191 guidance.
• Peak alarm rates are still higher than recommended by EEMUA
• System performance depends on many factors – including issues like access to “Alarm Help” – which hasn’t been covered here.

Alarm Management Performance Varies Widely
Summary

• Considerable progress has been made in Alarm Management
• The ASM Consortium & EEMUA Guidance can help
• The potential improvements are huge – a big accident can cost > US $ 100 Million.
• Good graphics – with integrated functionality for “alarm help” give real benefits.
• Much remains to be done, particularly in the challenging area of “alarm floods”. (Scope for more academic involvement?)

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Good progress due to rationalization

The most difficult problem. More work needed!