

## Overview and Guidance on the Management of Overrides

This NCOE technical note highlights the importance of the management of overrides and provides an overview and guidance on the aspects of override control.

Override control is an area of Safety Management which is an area which does not have the management controls and rigour as other areas of Safety Management. This may be due to the lack of publications and HSE guidance in this area. Similarly from an audit perspective, the management and recording of overrides can be subjective if the appropriate processes are not followed

**The UK Health & Safety Executive's Hazardous Installations Directive states:**  
“Logic systems are likely to incorporate provisions for overrides, for which there should be suitable management control arrangements. Procedures should be available which detail the operation of the protective system including, Override management (authorisation, security, recording, monitoring and review of overrides, reset requirements).”

This technical note details:

- What can go wrong with lost focus on Overrides
- Acumen – Override Management Software Tool
- Definition of an Override
- Categorisation of Overrides
- Risk Assessment
- Start-up Overrides
- Overrides on Isolated / Non-Operational Plant
- Verification of Plant Overrides
- Time Duration of Overrides
- Records
- Auditing

## What can go wrong with lost focus on Overrides

There have been a number of disastrous events within the last decade associated with plants and automated controlled systems, events where instrumented or controlled systems have been a contributing factor.

The poor and/or mis-management of system overrides where a contributing factor to the initiation and resulting consequences of some these events, to name a few examples :

### **Bhopal Accident 1984 (500,000 casualties):**

The flare tower designed to burn off MIC (Methyl IsoCyanate) was inhibited and removed from service. This unit could have safely disposed of the toxic gases.

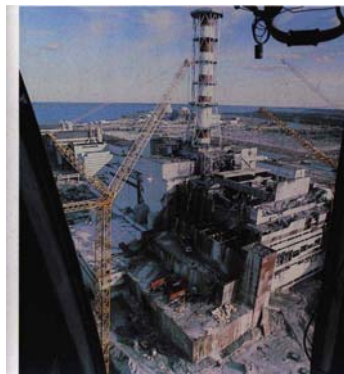
The gas scrubber was bypassed and isolated for maintenance. This unit could have neutralised the escaping MIC. The emergency sirens had been overridden. Providing no warning to the people surrounding the plant.



### **Chernobyl 1986**

**(53 direct casualties, indirect casualties mainly children)**

Safety systems were overridden to prevent the reactor from tripping at low power.



### **Piper Alpha 1988 (167 casualties)**

The automatic activation of deluge sea pumps were overridden. The deluge may have delayed and possibly prevented the second devastating gas explosion.



These events highlight the importance of not losing focus of live plant overrides, and also the requirement of understanding the hazards and consequences of overrides on plant items either for routine maintenance or as a result of equipment failure or malfunction to maintain production.

Many assets still use paper log books or “home made” spreadsheets or databases as logs for overrides, which are not truly in alignment with the rigour and auditable trail of other mandatory Safety Management Practices.

## Acumen – Override Management Software Tool



**Northern Offshore Federation –  
“Acumen” Winner of 2006  
Innovation Award**



As part of the safety management services offered by NCOE, the software tool named “Acumen” which harnesses the latest technology and robust proven software, has been developed to replace current out of date log books.

The aim of the Acumen System Override Logbook is:

- “create a step change in industry in the management and monitoring of overrides, on a parallel with the changes implemented in the management of electrical/electronic/programmable safety systems.

The objectives of the Acumen system logbook are :

- Simplify the monitoring of plant overrides
- Simple Navigation via web browser
- Remote access potential to log book from any location worldwide and from any number of users
- Unique User login
- Automatic Audit trail
- Perform Analysis and run reports
- Operational improvements for the Site Personnel
- Enhance visibility for Engineers & Management
- Compliant to HSE requirements
- Easy to install and administrate

## Selection of Screen Shots

The screenshots illustrate the Acumen software interface for Matlock Fibers Co. and Gas Terminal. The top-left screenshot shows a table of tag overrides with columns for Tag Name, Tag Descriptor, Category, Area/Zone, Permit To Work, Type, Time Added, and Added By. The top-right screenshot shows the details for tag 'XV 402', including its description, category, area/zone, and reason. The bottom-left screenshot shows a log of events with columns for ID, Event, Detail, and Date. The bottom-right screenshot shows a summary view of tag overrides with callouts for 'Clarity', 'Flexible', 'Efficient', 'Intuitive', 'Protective', and 'Increased Safety'.

**Table 1: Tag Overrides (from top-left screenshot)**

Tag Name	Tag Descriptor	Category	Area/Zone	Permit To Work	Type	Time Added	Added By	Auth
SZ 203	Compressor Overspeed Trip	Process Shutdown	Compression	683948	Input	30-Sep-05 14:07	Andrew Thomas	Jill Robi
FD 721	Burner 1 Flame Detection	Burner Management	Heat Generation	679543	Input	30-Sep-05 14:03	Andrew Thomas	Jill Robi
FAL 801	Fuel Gas Low Flow	Process Control	Fuel Gas Metering		Input	30-Sep-05 10:33	Carl Blake	Jill Robi
Time Threshold 12 (Hours)								
PAZ 501	Reactor 2 High Pressure Trip	Process Shutdown	Reactor 2 Stream	783940	Input	29-Sep-05 22:57	Andrew Thomas	Jill Robi
LAZLL 101	Import Tank Low Low Level Trip	Process Shutdown	Tanker Loading Bay	792040	Input	28-Sep-05 23:36	Andrew Thomas	Jill Robi
Time Threshold 168 (Hours)								
XV 402	Reactor 1 Outlet Valve	Process Shutdown	Reactor 1 Stream	478309	Output	23-Sep-05 10:29	Andrew Thomas	Jill Robi

**Table 2: Tag Details (from top-right screenshot)**

ID	3
Tag Number	XV 402
Tag Descriptor	Reactor 1 Outlet Valve
Category	Process Shutdown
Area/Zone	Reactor 1 Stream
SIL Value	SIL 1
Startup	No
Reason	Under isolation to permit work.
Procedure/Risk Assessment	RA 210405
Permit To Work	478309
Type	Output
Time Added	23-Sep-05 10:29
Added By	Andrew Thomas
Comments when added	
Authorised By	Jill Robinson
Cautions	Comment: This needs to be reviewed in the weekly meeting.
Reviewer	Jill Robinson
Date	30-Sep-05 23:03
Reviews	Jill Robinson 30-Sep-05 23:03 Colin Doe 02-Oct-05 16:52

**Table 3: Event Log (from bottom-left screenshot)**

ID	Event	Detail	Date
77	ADD	Carl Blake added the following Tag Number : GA 404	02-Oct-05 14:28
76	SUPERVISOR LOGIN	James Dunn logged in	02-Oct-05 14:27
75	SUPERVISOR LOGOUT	Jill Robinson automatically logged out	30-Sep-05 23:44
74	REVIEW	Jill Robinson reviewed the following Tag Number : XV 402	30-Sep-05 23:03
73	CAUTION RAISED	Jill Robinson raised a caution on the following Tag Number : XV 402	30-Sep-05 23:03
72	REVIEWER LOGIN	Jill Robinson logged in	30-Sep-05 23:03
71	DELETE	Andrew Thomas deleted the following Tag Number : FAL 801	30-Sep-05 18:37
70	REMOVE	Carl Blake removed the following Tag Number : FD 721	30-Sep-05 16:15
69	SUPERVISOR APPROVED	Jill Robinson approved the following Tag Number : FD 721	30-Sep-05 16:11
68	CONTROL ROOM OPERATOR APPROVED	Andrew Thomas approved the following Tag Number : FD 721	30-Sep-05 16:11
67	REMOVE	Gary Smith removed the following Tag Number : GA 404	30-Sep-05 14:11
66	SUPERVISOR APPROVED	Jill Robinson approved the following Tag Number : FAL 801	30-Sep-05 14:10
65	SUPERVISOR APPROVED	Jill Robinson approved the following Tag Number : PAZ 501	30-Sep-05 14:10
64	REMOVE	Gary Smith removed the following Tag Number : MAC 203	30-Sep-05 14:10
63	SUPERVISOR APPROVED	Jill Robinson approved the following Tag Number : LAZLL 101	30-Sep-05 14:10
62	ASSET MANAGER APPROVED	Gary Smith approved the following Tag Number : SZ 203	30-Sep-05 14:09
61	SUPERVISOR APPROVED	Jill Robinson approved the following Tag Number : SZ 203	30-Sep-05 14:08
60	ADD	Andrew Thomas added the following Tag Number : SZ 203	30-Sep-05 14:08
59	SUPERVISOR APPROVED	Jill Robinson approved the following Tag Number : XV 402	30-Sep-05 14:06
58	ADD	Jayne Sugden added the following Tag Number : FD 721	30-Sep-05 14:04
57	ADD	Andrew Thomas added the following Tag Number : SA 404	30-Sep-05 10:55

**Table 4: Tag Summary (from bottom-right screenshot)**

Tag Name	Tag Descriptor	Category	Area/Zone	Permit To Work	Type	Time Added	Added By	Auth
H2H-1002A-100	Hoop Tanks	Process Shutdown	Landfall R, Suprastrator	499201	Input	03-Jun-06 02:50	Gary Bennett	Jill Robinson
FSA-3102-09A	Zone 2 - Fire Gas	Process Shutdown	Fire & Gas, FSG Zone 2	244321	Input	03-Jun-06 02:50	Gary Bennett	Jill Robinson
Time Threshold 12 (Hours)								
SDW-3100-09A	Confirmed Gas LEL 60%	Process Shutdown	Fire & Gas, FSG Zone 1	22452	Input	02-Jun-06 10:52	Gary Bennett	Jill Robinson
L2H-3101	Condensate Storage Tank	Emergency Shutdown	Tank Storage	56331	Input	01-Jun-06 10:57	Sally	Jill Robinson
Time Threshold 168 (Hours)								
MAC-2105-09A	Manual Callpoint 2 - LER	Process Shutdown	Zone 2	394763	Input	25-May-06 11:55	Jill Robinson	Jill Robinson

## Overview and Guidance in the Management of Overrides

This section of the technical note presents an overview and guidance in the operational practices used to control overrides that are applied to : process control, protective systems, Fire & Gas (F&G), logic systems, emergency shutdown (ESD), High Integrity Pressure Protective System (HIPPS) and the end elements including valves and electrical interface equipment.

### Definition of an “Override”

Many definitions of an override exist, some industries may refer to overrides as bypasses and/or inhibits. For the purpose of this technical note the following definition shall be used throughout :

“An override is any arrangement that interrupts a device or system from performing its function”

This includes:

- Purposely designed override switches (key switches, Human Machine Interface buttons.)
- Forced software values
- Temporary wired links
- Blocking the view of “line of sight” devices
- Valve jammers
- Equipment out of service

Does not include:

- Process controllers being put into manual (though it is important that such action is taken only after consultation with the override log.)

## Categorisation of Overrides

Plant overrides shall fall into two categories:

- i. Integrity rated overrides
- ii. Non-integrity rated overrides

It is important to minimise the number of categories to simplify the process.

### Integrity rated overrides

This includes all instrument loops that have a Integrity Level (IL) of 1 or greater and will include all loops associated with fire and gas detection. Instrument protective function loops provide a higher level of protection against:

- Hazards
- Harm to people
- Damage to the Environment
- Production loss
- Asset damage

### Non-Integrity rated overrides

This category includes general control loops and logic functions either on non-critical plant or on plant that have additional protection. Thus the loss of this instrument function would not result in a safety, environment or asset risk.

## Risk Assessment

The requirement for a risk assessment and the type of risk assessment used will be dependant on which category the override is assigned too, and the estimated duration for the override to be applied. It is important that the appropriate engineering competencies are involved in the risk assessment.

When a risk assessment has been produced, no matter which method is employed, its reference should be recorded on the override log.

### Multiple Overrides

There is a danger that the cumulative risk of multiple overrides applied on the same unit or in the same area may provide a greater hazard than the sum of the individual hazards. Therefore the Operation Team Leader/Supervisor shall take this into account before approving a permit to work that requires an override.

## Start-up Overrides

A start-up override is a defeat that is identified within the Operations start-up procedure, which is required to enable the unit to be started. A start-up override must be removed as soon as it is possible and it is preferred that this may be done automatically.

Start-up overrides with manual resets do not require any risk assessment but they do require to be recorded in an override logbook.

If any start-up override is required on a unit that has already got additional (non start-up related) overrides applied, then the start-up overrides shall require a risk assessment.

## Overrides on Isolated / Non-Operational Plant

In some cases, there may be a requirement to override equipment units that may have been positively isolated for long periods of time. In these cases the override(s) are applied to prevent the shutdown of operational plant, caused by process parameters that are normal during isolation but undesired when operational e.g. low pressures, low levels, low flows, etc.

During this period of plant isolation the hazard, that the instrument function is protecting against, may no longer exist. Therefore during this period the process controlling the risk associated to the override shall be managed differently dependent on the category of override.

## Verification of Plant Overrides

Verification of the “live” overrides should be routinely carried out to ensure that the current plant risks are known and fully understood. In addition it is an opportunity to evaluate progress towards reducing the number of overrides. When ever a verification exercise is carried out, it should be recorded in the override log. The table below provides guidance as to who should be involved as a minimum in the verification of “live” overrides and how often:

### Review Table

	Control Room Operator / Technician	Responsible Person, Operations Team Leader	Site Manager	Engineering Review (Technical Authority)	Engineering Authority (Engineering Manager)
Every shift	Yes	Yes			
Weekly			Yes		
Monthly				Yes	
3 Monthly					Yes

**TECHNICAL AND MANAGEMENT SERVICES SAFETY CRITICAL SYSTEMS AUDITS AND ASSESSMENTS**

Furthermore the Operations Team Leader, at crew change, should arrange for the override log to be compared against the actual override status, so as to ensure that the log is up to date. Of course the roles and responsibilities of the individuals named in the above table will vary between organisations.

## Time Duration of Overrides

The longer an override is in place the higher the risk to the plant and its personnel becomes. Therefore a recommended time duration of 1 week is recommended, any override, applied to operational plant, which exceeds this time limit will be deemed a 'Long-term' override and shall be immediately reported to the Operations Team Leader and the Technical Authority.

- i. Due to the increasing risk additional controls will be required for managing the override over an extended period. The Technical Authority shall provide guidance as to the method of control required;

## Records

Records perform two necessary functions, firstly they need to be informative to all those involved in managing overrides and secondly they need to demonstrate that a 'safe management of work' process is being effectively employed.

During the lifecycle of the override application, information will be generated and may be stored in a number of locations. However the override log, recommended to be located in the control room, will be the primary source of information.

Due to the requirement for all the records to be auditable and secure it is recommended that either paper or a purposely designed electronic override logbook be used. Logs built on Access and Excel should be avoided.

All override records are to be held for a minimum of two years. All records < 1 year old should be easily accessible by the operations team, records that are > 1 year old should be held in a centralised archive.

## Auditing

As override control is part of the safety management system it must be audited on a periodical bases to ensure that the override procedure is working effectively. This audit process should be high level and adaptable.