



# Operational Human Factors – Safe Staffing Arrangements

Pegasus Consulting Support (Pegasus) provides highly skilled and experienced consultants across a wide range of sectors to solve problems, improve performance and manage risk. Pegasus specialises in analysing and understanding the combined performance of technology, people and organisational processes. Pegasus consultants have extensive experience in applying these skills to complex and critical organisations and activities to develop practical and accessible tools and solutions.

A large number of major incidents have been contributed to by weaknesses in operational human factors, which influence the reliability and timeliness of detecting, diagnosing and responding to abnormal events. Buncefield (2005), Texas City (2005), Longford (1998), Pembroke (1994) are just a few examples. In Pegasus' experience, the same weaknesses continue to appear when reviewing organisations, whether or not they have had a major incident.



Pegasus' consultants have particular expertise in assessing and improving operational human factors. Pegasus' lead consultant was joint author and main contributor to the development of a method 'Assessing the Safety of Process Operations Staffing Arrangements' on behalf of UKHSE (published as CRR348/2001).

The method comprises:

- Physical Assessment: A fundamental check on the ability to reliably detect, diagnose and respond to scenarios (principle based); and
- Ladder Assessment: Assessment of individual and organisational factors to assess sustainability (capability maturity based – a form of benchmarking using an anchored rating scale).

The method won awards (highly commended in the 2001 IChemE Severn Trent Safety Award (2001) and an article published in 'The Chemical Engineer' won the 2000 IChemE Safety & Loss Prevention Subject Group's Frank Lees Medal). The method caused great interest when it was launched and has continued to be widely used across UK high hazard sectors and internationally.

The method is used to assess existing arrangements as well as the potential implications of any proposed changes. Stakeholder collaborative involvement is core to the assessment.

## Typical operating company experience of applying the staffing assessment method (BASF Seal Sands)

- First site /company experience of applying HF within process safety
- Practical results obtained from Physical and Ladder Assessments
- Highlighted areas of weakness
  - Fatigue: Led to fatigue monitoring system and a change to the shift system
  - Competence: Led to a competence management system
  - CR and alarm system design
- Led to further exploration of other areas of the SMS e.g. Process Hazard Review and HF, work pattern research
- Subsequent site activity has been influenced by the findings and experience gained during method application
- Site introduced a defined role: Human Factors and Development Specialist



### Example Study: Combined Organisational and Technological Change at a Large Refinery

- CR move (from local to remote)
- Roles and responsibilities change
- Process units and Utilities
- CR and Field
- Changes to delivery of Supervision
- Technology changes
- Control system including alarms
- Communications
- CR layout

Pegasus consultants have undertaken many staffing arrangement studies including the following examples:

- Major marine oil terminal over two sites – Could the operation be overseen from a single Control Room remote from one site? How?
- Addition of new process units at a large refinery – What, who, how for Field, Control Room and Supervision.
- Shutdown of multiple process units and reconfiguration of refinery process flows, product mix, storage and loading and organisation – What, who, how for Field, Control Room, Supervision, Management and Support Functions.

### Example Study Findings

- One change was assessed as being unacceptable
- Remainder were assessed as acceptable given implementation of recommendations
- Recommended order and transition stages for change implementation
- KPIs to monitor factors assessed as likely to be affected by the change e.g. number of 12 hr shifts worked (normal was 8hrs) as a KPI for Alertness and Fatigue
- Weaknesses in existing arrangements identified e.g. competence assurance
- Weaknesses in preparedness for particular MAH scenarios e.g. cooling water failure

### Example Study Benefits

- Provided a framework for change implementation
- Greatly increased and improved ownership and support for changes from operational staff
  - Particularly as the most unpopular change was dropped based on the assessment findings
- Five years after the assessment most of the assessed changes were implemented successfully
- And so were the majority of recommendations

Pegasus supports public and private sector organisations to explore, define, implement, review and improve their:

- Processes and systems;
- Organisational design and culture;
- Leadership
- Technology;
- Performance; and
- Reduce risk.

### Pegasus Consulting Support Clients

Aquatera	Tata Steel Projects
Bindmans LLP	TOTAL LOR
Ecologic	Unilever
GrowHow	
Murco Petroleum	
Tata Steel	

### Contact Details

Helen Conlin

T +44 (0)1490 720450 M +44 (0)7891 841154

E [helen@pegasusconsultingsupport.com](mailto:helen@pegasusconsultingsupport.com)

### Pegasus Consulting Support

Paradwys, Bryneglwys  
Near Corwen, Denbighshire  
LL21 9LL, UK