

## ACCELERATING LEARNING THROUGH CROSS-SECTOR PEER REVIEWS

Gordon Sellers<sup>1</sup>, Dave Mason<sup>2</sup> and Keith Hemmings

<sup>1</sup>Safety Management Consultant, 34 Westbury Road, Northwood HA6 3BX, United Kingdom; Tel: +44(0) 7775 601320, e-mail: gordon.sellers@dsl.pipex.com

<sup>2</sup>Eskdale Limited (previously Director Environment, Health, Safety and Quality Sellafield Ltd); Tel: +44(0) 7929 670 462, e-mail: davidjmason51@aol.com

In April 2008 HSE held a conference called 'Leading from the top – avoiding major incidents' which was attended by CEOs and Directors from the full range of UK major hazard industries (nuclear, offshore, gas, petrochemical etc.). One of the actions from the conference was a challenge from HSE to establish a means to spread learning and good practice across all the major hazard industries through a peer review process. Currently each industry tends to keep learning within its own discipline (i.e. nuclear companies talk to nuclear companies, offshore talk to offshore etc.) but we don't talk across industry (i.e. nuclear talk to offshore). However, we are all struggling with the same issues and could get to a better solution more quickly if we worked together.

The Hazardous Industries Group of IOSH has now run two successful pilot peer reviews. The first was of control rooms in three very different safety-critical industries: nuclear, offshore and utilities. The second was of maintenance systems in a nuclear weapons manufacturing site, a submarine construction facility and a gas processing and distribution site. We are now going on to launch the process more widely.

### RISING TO THE CHALLENGE FROM HSE

'Leading from the top – avoiding major incidents' was attended by CEOs and Directors across UK major hazard industries (nuclear, offshore, gas, petrochemical etc.) in April 2008. During this conference, one of the authors (DM) described the value gained by the nuclear industry from its well established peer review process, run through WANO (World Association of Nuclear Operators, 2009). In her closing address, the HSE Chair Judith Hackett recognised that many major hazard organisations benchmark themselves against other organisations in their own industry sector, but not across industry sectors; therefore she challenged industry to spread learning and good practice across all the major hazard industries, through a high level cross sector practical peer review process.

In response to this challenge, the Hazardous Industries Group of the Institution of Occupational Safety and Health (IOSH) set up a Working Party, which decided to lead cross-industry peer review on behalf of industry. Three members of the Working Party volunteered to get agreement from within their respective organisations (nuclear, offshore and utility) to participate in a pilot study of cross-sector peer review. We decided at an early stage to widen the scope from 'hazardous industries' (with its implication of process plants subject to the Control of Major Hazards Installations Regulations) to 'safety-critical industries' to allow us to include other 'businesses' such as nuclear, rail, air transport and military facilities.

### PLANNING THE STAGE 1 PILOT

For peer review at a typical nuclear power station, a team of up to 10 highly qualified staff from other nuclear companies will spend two to three weeks observing activities and physical conditions, conducting interviews and reviewing

performance-related documentation, across all relevant activity areas in the power station.

Such a large scale peer review (up to 150 man days per site) was clearly far beyond the scope that we could hope to persuade organisations to invest their staff resources in our IOSH pilot project. So we chose the minimum possible scope to demonstrate whether peer review could be effective across different industry sectors; namely one working week focussing on the same activity area on each of three sites:

- Day 1 – training peer reviewers and planning the review
- Day 2 – peer review: site 1
- Day 3 – peer review: site 2
- Day 4 – peer review: site 3
- Day 5 – drafting observations and reporting back to Working Party

We decided to focus on a control room on each site, as this is a clearly identifiable area which is central to all safety and production activities.

Therefore we requested each of the three organisations to nominate as their peer reviewer a specialist from their selected control room, to work with one of the authors (GS) whom the Working Party had requested to be the facilitator/team leader. Once we received the nominations, we then had the task of finding a suitable 5-day period for the peer review, which is never easy with the inevitable constraints of prior commitments, holidays and plant shutdowns, but eventually we settled on a week in August 2008.

### OVERVIEW OF THE STAGE 1 PILOT PARTICIPANTS

The three control rooms were quite different in detail so provided a good test of cross-sector peer review.

#### SELLAFIELD LIMITED, THORP CONTROL ROOM, CUMBRIA

The Thermal Oxide Reprocessing Plant (THORP) at Sellafield processes fuel from British Advanced Gas Cooled Reactors and fuel from Light Water Reactors around the world. It has ~1,400 employees and 3 operating units – Fuel Services, Chemical Plants and THORP Operational Services.

There are eight control consoles in the THORP Central Control Room:

- There is a high level of automation from a Distributed Control System.
- The two Control Room Operators (CROs) per console are supported by process operators on the plant (except Head End Chemical where 3 CROs do their own process operations).
- Operations are supervised by five Shift Team Managers, one of whom was nominated as Sellafield's peer reviewer.

#### CENTRICA STORAGE LIMITED, EASINGTON TERMINAL CONTROL ROOM, EAST YORKSHIRE

A top tier COMAH site, CSL Easington provides onshore facilities for 3 offshore gas fields, with a combined production capacity ~30% of the UK supply:

- Rough Gas Storage Facility – the largest gas storage facility in the UK.
- BP Amethyst Field – a normally unmanned offshore installation.
- Langede Reception Facilities – a remotely operated dry gas reception facility from Norway.

A five-man shift operations team (one Team Leader and four technicians), is cross trained on all systems. Normally two control room technicians (one on the Rough & Amethyst desk, another on the Langede desk) and two on outside duties plus one relief, work 12 hour shifts, supported by a day maintenance team working seven days a week. The Deputy Terminal Manager (who had previously been an offshore and onshore operator, then a Shift Team Leader) was nominated as the Centrica Storage peer reviewer.

#### NATIONAL GRID, DISTRIBUTION NATIONAL CONTROL CENTRE, HINCKLEY, LEICESTERSHIRE

DNCC controls 12 Local Distribution Zones (LDZs) which take high pressure gas from 128 connections to the National Transmission System, reduce it in pressure and distribute it to commercial and domestic premises throughout Britain.

- The 12 control desks are each manned on shift by an Operations Engineer, supported by three Principal Operations Engineers and a Network Manager – one of whom was nominated as National Grid's peer reviewer.
- The Operations Engineers supervise more than 500 LDZ sites, (e.g. metering, pressure reduction, gasholder, 'bullet' storage or cavern storage) all normally unmanned.

- Connection between DNCC and each LDZ site is by satellite telemetry, backed up by ISDN landlines, data are transmitted to DNCC, which can control key valves.
- DNCC communicates through a computer network with LDZ depots, who despatch LDZ maintenance technicians to sites. The technicians communicate with DNCC by telephone.
- Between October 2008 and October 2009, seven of the 12 LDZs moved to three independent network operators' control rooms, leaving five National Grid LDZs to be controlled from DNCC – but our peer review was conducted on DNCC as it existed in August 2008.

#### TRAINING AND PLANNING

A few days before the start of the peer review, we had bad news and good news.

The bad news was that, for unavoidable reasons, one of the peer reviewers had to stay at his own site for the first two days of the review, in order to provide management cover in the event of a sudden emergency. We reacted to this by involving him by telephone and eMail in the training & planning day, and then by briefing him on the findings of the site 1 review when we met up with him for days 3 to 5; this worked better than we dared to hope and did not reduce the value of the pilot peer review.

The good news was that Sellafield offered to second one of their most experienced peer reviewers as an adviser to the team. Any concerns that he might be over-prescriptive about nuclear-style peer reviews quickly proved unfounded and his expert advice got the team off to a flying start.

We thought carefully about the training and planning day, recognising that the peer reviewers had never done anything like this before; they were confident in their knowledge of their own control room but very apprehensive about their abilities to review a control room which was associated with very different plant equipment. So, after brief introductions, we began by brainstorming "What are the key features for an excellent control room in a safety-critical organisation?" and we came up with about 30 of them. Then from various sources we selected 14 topics which covered all of our key features:

1. Leadership, accountability & commitment
2. Competence
3. Identifying and managing risk
4. Communication
5. Human factors & human performance
6. Security and access to control room
7. Work management
8. Plant status and configuration control
9. Managing maintenance activities
10. Emergency planning & response
11. Incident investigation & learning from experience
12. Deviations from normal conditions
13. Managing change
14. Continuous improvement

We assigned each team member three topics and asked them to draft a headline Principle for each topic and several associated criteria by which to judge whether that Principle was being met. Below are two examples:

### Principle 2 – Competence

*Personnel are selected and trained to have the required range of skills and knowledge, and these are regularly checked.*

- Processes are in place for recruitment, appointment, promotion, succession planning and career development to ensure that personnel are capable to discharge their roles effectively, with a range of competences appropriate to the business.
- Training, supervision and guidance are provided as required for personnel roles and experience.
- Personnel performance is monitored and feedback provided.
- Control room, personnel understand field operations, and vice versa.
- Personnel are coached to balance conflicting priorities, demonstrating flexibility and adaptability, and supporting requests from all parties.
- Personnel are encouraged to identify opportunities for enhanced performance, supported by objective analysis.
- Personnel are encouraged to take a lead role within their area of competence.

### Principle 6 – Control room security, access and integrity

*Control room access is controlled to ensure that only authorised personnel can gain entry and the control room is protected against accidental damage.*

- Security arrangements ensure that physical access to the control room is controlled commensurate with the hazard and risk.
- The number of personnel in the control room, and communication links to it, are limited to reduce distractions to the operators.
- Control room access is available to personnel who need to maintain face-to-face communications, but is limited to those required for safe and reliable plant operations.
- All personnel wishing to enter the control room must report to the person in charge of the control room.
- Arrangements are in place to ensure that personnel entering the control room minimise the potential to carry in contaminants or inadvertently to interfere with plant operations.
- The control room and its equipment are protected against accidental damage.

Note that the Principles and Criteria specify WHAT should be achieved but leave HOW it should be achieved to local arrangements.

This process by which the peer reviewers developed the Principles and Criteria, rather than having them handed to them, proved an important part of the training

and increased the confidence of the team that they now knew what they should be looking for.

The training then emphasised that these were not checklists to be taken into the control rooms, but reference documents for use prior to the review, at intermediate points and as a reporting structure. The peer review is based on observing activities, supplemented by discussions with the staff being observed and by checking relevant documents such as handover logs.

Having discussed how the peer reviewer should best introduce him or herself to the person being observed, the core of the training was on how to write each observation as a ‘fact’, making clear whether it referred to an observed activity, an operator comment or an entry in a log, and the consequences. Facts are less likely to be disputed than opinions and assumptions and can be verified. This is based on a mantra developed by one of the authors for all his inspectors and assurance teams that “the advice we generate (good practice and opportunities to improve) is compelling because it is based in fact, it is targeted on business need and it is proportional to risk”. This is exactly what Peer Review aims to do.

We documented both ‘improvement opportunities’ and outstanding ‘best practices’ to pass on to other organisations, but not normal good practices. To encourage openness, an important principle of peer review is that observation reports of improvement opportunities are confidential to the organisation being observed, with only anonymous summaries being published more widely.

### PEER REVIEW IN ACTION

We began each peer review with a kick off meeting with site management, to explain how we would carry out the review, and for them to give us a brief overview of the site and its activities. Then we spent the rest of the morning in the control room, with the peer reviewers singly or in pairs observing activities, holding discussions with the operators and team leader, and looking at control room displays and logs. When we broke for lunch, we each wrote up several of our observations and then discussed them as a team, with our advisor highlighting reports which were unclear or based on opinion not fact. Then we returned to the control room to observe the critical activity of shift handover, and continued our observations with the afternoon shift, taking care to gather data to back up some of the observations from the morning shift.

Towards the end of the afternoon, we met as a team to discuss the main ‘facts’ that we had observed – both best practices and improvement opportunities – and decided which to report back to site management at a short close-out meeting, at which we also agreed the next steps, namely within one month to provide management with a detailed report which the site’s peer reviewer would then take a lead role in converting into an action plan. Good close-out meetings are an essential part of the peer review process and all led to site management agreeing that their peer reviewer would take a lead role in converting the report into an action plan for the site. Then we climbed

into the minibus and headed off on a two- to four-hour journey to the next site.

## REPORTING BACK

On our final day, we spent the morning writing up further observations, reviewing them as a team, and preparing an overview report for the IOSH Working Party, covering both findings (anonymous of course) and our comments on the peer review process itself. For the latter, we answered three questions:

### 1. Did the Peer Reviewers find it worthwhile?

- “Extremely worthwhile to give context to the journey that we’re on at our site and to ensure we’re going in the correct direction”
- “I’ve been most struck by the commonality of the problems we face, despite being in very different industries and different environments. It’s put my issues into perspective”
- “We tend to be blinkered in our control room environment and it’s allowed me to step outside my industry to see how others tackle similar issues to ourselves”
- “Normally I go into my control room to deal with a particular issue then I go out again. This has allowed me the time and given me the skills to look around objectively and critically. It has opened my eyes!”
- “It’s given me the drive and focus to tackle our issues”
- “I’ve now got a network of like-minded experienced diverse colleagues who I can contact”

**Conclusion:** it was very worth while for peer reviewers, who are now driving action plans in their own organizations.

### 2. Was the Pilot Peer Review any better than audits?

- The peer review observed activities and so in a very short time it identified deviations from good practice, irrespective of what the procedures specified. But most audits check the paper trail – procedures and records.
- The peer reviewers were perceived as control room experts who were genuinely looking for best practices which they could share and helping the control room personnel to identify improvement opportunities, rather than as auditors who had never run a control room. As a result, control room personnel were very open with the team.
- The greatest potential benefit of the peer review is that the peer reviewers themselves are now very committed agents for change back in their own control rooms. The reviewers have already agreed to network with each other to share experiences of implementing change.

**Conclusion:** the Peer Review process offers significant demonstrated and potential advantages over auditing.

### 3. Could the Stage 1 pilot peer review have been performed any better?

- **Number and diversity of locations:** good – three gives sufficient differences without overloading the team, excellent diversity
- **Scope:** control rooms are central to operations, excellent choice for 1st pilot
- **Roles and experience of peers:** excellent – all had good hands-on experience (>5 years) and sufficient credibility to implement change
- **Planning schedule (1 day):** should have had 1 day training + 1 day to prepare Principles & Expectations
- **Peer review schedule on each site (1 day):** should be minimum 2 days – 1st day fact-finding in control room, 2nd day drafting report/clarifying facts/finalising site report/close out meeting
- **Consecutive reviews on three sites:** depending on geography, must allow for travel time
- **Report back schedule (1 day):** would have been OK if there had been 2 days per site and adequate travelling time

The report-back meeting was valuable for the Working Party members to hear from those directly involved about the stage 1 pilot. But more importantly, they were also senior managers of the participating organisations and their enthusiastic feedback to the peer reviewers sent them away with heads held high and fired up to make improvements back home. We have subsequently been in contact and each peer reviewer has made substantial progress, albeit more slowly than they had first hoped. One of the peer reviewers was apologetic that he had agreed with his shift team leaders that each of them would take responsibility for some of the actions, rather than trying to handle them all himself; he was pleasantly surprised when we complimented him on dealing with the actions in a way that would achieve great buy-in on site!

The team leader then pulled together all the observation reports and prepared a detailed report for each participating organisation. Examples of the best practices and improvement opportunities are:

## Principle 12 – Deviations from normal conditions

- **Best Practice:** *Observation revealed three separate alarm display windows on the control room console – one each for Critical, Medium and Alert alarms, which reduces the likelihood of a critical alarm being missed.*
- **Best Practice:** *Whilst observing a control room operator responding to alarm activation, a global alarm response database was used to assess the appropriate response required for the alarm.*
- Whilst observing a control room operator (CRO), it was noted that on 30 separate occasions in 1 hour the CRO pressed the ‘Alarm Acknowledge’ button several times in quick succession, which could lead to a critical safety alarm being missed.

- An alarm screen displayed 42 alarms, the oldest of which were initiated 3 months ago, which could lead to a critical safety alarm being missed by the CRO, and is inefficient in use of operator resources.

### STAGE 2 PILOT PEER REVIEW

The Stage 2 Pilot followed a similar process to Stage 1, but with a different topic – maintenance – and three different participating organisations.

- Centrica nominated its gas processing and distribution site, Hydrocarbon Resources Limited. This provided continuity and the opportunity for comparison with the first review which involved Centrica Easington.
- The AWE nuclear weapons site and that of BAE Submarine Solutions were nominated through the Nuclear Industry Safety Directors Forum.

Again the Stage 2 pilot was very successful, which gave us the confidence to proceed further.

### MANAGEMENT SUPPORT

The peer review process is one that fundamentally challenges a company's *status quo* and therefore requires senior operational leadership support if full value is to be achieved. Normally improvements are driven 'top down' while in peer review they come 'bottom up'. And, as we found with behavioural safety, it's not just enough to get the support of top management for a shopfloor behavioural safety team because middle management can then feel bypassed – Sir John Egan once described middle management as 'the reflective layer' which quietly bounces back all suggested changes whether they come from above or below. So the key is to get support from senior operational management and all the managers between them and the peer reviewers. Otherwise the peer review process will result in a comprehensive report of best practices and improvement opportunities but no significant changes will result.

### NEXT STEPS

We are now developing a plan for long term implementation, including commercial arrangements (possibly as an IOSH- and industry-badged scheme). This includes a discussion with WANO on possible collaboration. We will also prepare a formal training package for peer reviewers and review the peer review process, including whether we can make use of previous Principles and Criteria without losing the involvement of the peer reviewers in developing ones which are appropriate to their topic and sites.

### FUNDING

The Working Party members (or their employers) covered their time and travel costs for their various meetings.

The participating organisations for the Stage 1 and Stage 2 Pilot Peer Reviews covered the time and travel costs for their peer reviewers and they shared the travel costs for the team leader and a consulting fee for the days that he spent on site.

We presented a summary report (Sellers and Mason, 2008) to the IOSH Networks conference 08 and circulated it to the IOSH Hazardous Industries Group committee. As a result of the favourable response which we received, we requested the IOSH Development Fund to support travel and materials for developing a training package, developing a long-term implementation plan and promoting the cross-sector peer review process. We were able to demonstrate that the peer review project contributes to all but one of the IOSH targets from 2008 to 2012:

- Raising the profile of health and safety and the influence of IOSH – *YES, through involvement with hazardous industry organisations and HSE*
- Increasing membership – *indirectly, by increasing the number of safety-critical organisation employees exposed to IOSH.*
- Developing internationally – *while the initial focus is on UK, once established the process can readily be rolled out internationally.*
- Leading occupational safety and health thought – *absolutely*
- Growing financial security in an ethical and sustainable way – *potential revenue source for IOSH*
- Developing people – *this was identified as a major benefit to themselves by the peer reviewers from Sellafield, Centrica Storage & National Grid*
- Managing the Institution efficiently and effectively – *not applicable*

We have now been awarded a grant from the IOSH Development Fund to support our out-of-pocket expenses (but not the time that we are investing) for the 'next steps' described above.

### CONCLUSIONS

Following the success in the nuclear industry of a very comprehensive Peer Review process, we have demonstrated that a more focussed version can provide significant value to a wide range of safety critical industries so are now planning how to roll it out more widely.

### REFERENCES

- World Association of Nuclear Operators, 2009, Peer Review Programme, [http://www.wano.org.uk/WANO\\_Programmes/Peer\\_Review\\_Programme.asp](http://www.wano.org.uk/WANO_Programmes/Peer_Review_Programme.asp)
- Sellers, J.G, and Mason, D.J., 2008, Cross-sector safety peer review for accelerated learning – Stage 1 Pilot, Summary Report by Peer Review Team to IOSH Networks conference 08 – Leicester.