

PROCESS SAFETY FUNDAMENTALS TRAINING FOR FIRST LEVEL LEADERS

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As part of its Operations Essentials Project, BP is extending its formal training in the fundamentals of process safety to First Level Leaders, typically the supervisors, and shift team leaders who have direct control of production and manufacturing processes on a day to day basis. This paper describes the learning objectives and structured learning programme developed by BP in conjunction with kineo and Watson Integrity Limited. This programme raises e-learning to a new level with transfer of knowledge facilitated through simulation within a mix of mandatory and discretionary interactive modules, which are followed by exercises and discussion in a workshop environment. On-line assessments are used as gateways to allow the student to progress or return to the learning material as appropriate. At the conclusion of the workshops students take forward an individual action plan that drives continuous improvement and personal development. The programme was launched in 2008 and the paper includes accounts of experience gained in the early period of application.

INTRODUCTION

The Baker Panel Report¹ commissioned after the BP Texas City explosion in 2005 challenged BP to become a leader in process safety. Included in the company's response are three operations capability programmes: the top level for Senior Managers and Executives, the second comprising the Operations Academy focusing on senior production and manufacturing site management, and the third the Operations Essentials (OE) training aimed specifically at Operations and Maintenance First Level Leaders (FLLs) who are typically Supervisors in Operations and Maintenance teams.

The Executive Operations Programme and Operations Academy are a joint BP/Massachusetts Institute of Technology (MIT) initiative, whereas the OE programmes are all site based.

The three priorities this suite of programmes addresses are:

Safety: running safe, reliable and efficient operations

People: having the right people, with the right skills, in the right places, doing the right things

Performance: being more efficient and focused to give BP back its competitive edge.

To ensure consistency throughout, these programmes have been developed to ensure alignment with the top level BP health, safety, security and environment management programme, Operating Management System (OMS), which is the natural evolution of the previous high-level programme, 'getting HSE right'. In developing OMS, BP has integrated the elements of process safety into a

comprehensive health, safety, security and environmental management model. This provides a basis for objectives to be set for all levels of the organisation, from the most senior managers to individual employees, against which their performance can be assessed in terms of process safety and the other elements of HSSE, including at each individual's annual performance appraisal.

The primary aim of this paper is to describe the key innovations adopted in the development and implementation of the process safety eLearning training modules and workshop, the Process Safety module. In addition to creating an integrated learning process, these modules clearly demonstrate the expectations that FLLs should have of BP and vice versa, thereby providing a basis for challenge when these expectations are not being met.

OPERATIONS ESSENTIALS MODULES – AN OVERVIEW

OE is a modular and world-class capability programme aimed at Operations and Maintenance FLLs. It leverages the best and latest learning techniques. Middle Level Leaders (MLLs), typically Offshore Installations Managers/On-shore Plant Superintendents, also participate in the sessions. This allows for cross-level and team-based workshops in which local issues are worked on to embed the BP way of operating, which is to deliver safe, reliable and efficient operations.

The OE programme consists of 12 modules spread across four phases in order to deliver against its objectives.

Phase 1 – Site engagement and alignment – before training

Module	Description
Site engagement and needs analysis	This is conducted before any formal training is begun. It engages FLLs/MLLs and their leaders in prioritising key issues and helps identify which OE competencies should be targeted for training and how to customize them to maximize effectiveness.
Site alignment	Participants are trained to conduct structured interviews to obtain feedback from others on the site about key problems and barriers. Their findings are summarised and presented to site leaders who work with the OE participants to create an action plan to break down barriers.
Introduction to Operating Management System (OMS)	Participants discuss why they need to change the way they do things, what OMS is, how it impacts their business, their role in OMS, what the future environment will look like and how the culture will need to evolve.

Phase 2 – People and performance training

Module	Description
Safety culture leadership	Participants gain an understanding of how safe and reliable operations depend on leaders at all levels to create and sustain a safe operating culture. Through a number of video case studies, group discussions and practical exercises, participants explore the root causes of major accidents and how these are “hard-wired” into the safety culture.
Safety culture coaching	Participants learn how to coach others to take accountability in resolving specific safety performance issues and the impact that coaching has on developing a strong safety culture.
Multicultural leadership	Site leaders experience a series of eye-opening activities designed to help them examine the current site culture and determine what they want the future culture to be.
Effective performance conversations	This module builds the skills, confidence, and commitment of BP managers and supervisors to conduct the everyday performance conversations needed to deliver improved business and personal performance.

Phase 3 – Process, Plant and Performance training

Module	Description
Process safety	The module uses a blended approach of scenario-based online modules and a highly interactive two-day workshop to build knowledge and awareness, as well as a “common language,” among Operations and Maintenance leaders about process safety at BP. The development of this part of the programme, including areas of key innovation, is discussed at length in the body of this paper.
Control of work	This module uses a blended approach consisting of eLearning modules and workshop training to provide an overview of the BP CoW standard, its 12 constituent elements, what good CoW looks like, hazard identification and task risk assessment, permit to work and safe isolation.
Regulatory compliance	This blended learning module provides basic application of regulatory compliance, including environmental regulatory compliance and key BP compliance requirements, and is designed specifically for US participants.
Prioritisation and planning	This module utilizes a series of scenario-based simulations and other tools to engage site management, MLLs and FLLs in the identification and resolution of the issues limiting the effectiveness of the planning and prioritisation process on their site.

Phase 4 – After training

Module	Description
introduction to continuous improvement	This module helps individuals to identify a short-term (1 to 4 months) project in which they can immediately apply what they have learned in the OE training module(s) they have just attended.

PROCESS SAFETY FUNDAMENTALS TRAINING STRUCTURE

The Phase 3 process safety training briefly described above allows an operating facility to provide an overview of the complex subject of process safety to their staff that is focussed on their role in the organisation without extensive classroom training lectures. The content is customised to



Figure 1. Overall structure of BP's operations capability programmes

match the needs of the facility and is designed to change the way Operations and Maintenance Leaders approach their job role and day-to-day tasks related to process safety. The overall structure of the programme is shown below in Figure 2.

The programme starts with a Process Safety Module Selection Diagnostics Tool. This is an on-line questionnaire designed to help participants prioritise which of the optional process safety eFundamentals modules they should complete in order to obtain the minimum level of knowledge required to allow them to progress to the next stage. On completion of the mandatory and optional eFundamentals modules (see below), participants apply the knowledge they have acquired to the three mandatory eSimulations. Skills are then practiced in the workshop sessions, with learning continuously embedded through continuous improvement.

eFUNDAMENTALS

The eFundamentals are designed to allow the participants to become familiar with fundamental process safety and integrity management concepts related to the FLL role. There are two mandatory eFundamental modules and eight optional ones. Each takes up to one hour.

Mandatory

- Introduction to Process Safety
- Introduction to Integrity Management Standard

Optional

- Risk Management
- Risk Assessment Techniques
- Design for Process Safety
- Procedures and Practices
- Operating Integrity
- Management of Change

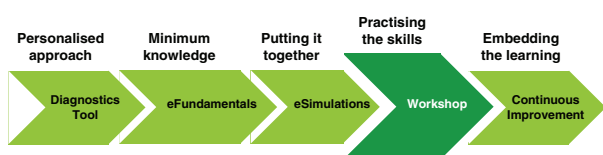


Figure 2. Overall structure of the process safety module

- Measurement and Audit
- Incident Management

The concepts and context are explained using a variety of interactive approaches, including audio and video, to maintain interest and facilitate learning. As participants progress through each module, they are faced with multiple choice questions that assess their understanding of the material at strategic places within the module. The correct answers are displayed after two incorrect selections, and the participant is invited to replay that stage of the module.

At the end of each module the participant has to complete a final assessment consisting of a number of multiple choice questions. While the participant is told whether they have successfully or unsuccessfully answered each question correctly before passing onto the next, the correct multiple choice options are not shown if they are unsuccessful. A score is given at the end with a pass mark of 80%, which is required before participants can progress to the next stage, the eSimulations. Those who are unsuccessful are required to retake the module and repeat the final assessment to achieve the pass mark. Scores are made available to the Local eLearning Facilitator who acts as a gatekeeper to the eSimulations.

eSIMULATIONS

The eSimulations are a different concept entirely. These have more of a "game play" situation or feel as the participant has to take on the role of a FLL in three different situations. They are expected to progress through a scenario, which is designed to test their understanding of the fundamental process safety concepts, as they apply to their role. These simulations are interactive eLearning sessions which challenge the participant with exercises, questions, and tasks. Depending on their responses, the participant progresses or is given advice and direction by a Virtual Coach who intervenes as appropriate.

The eSimulation scenarios were created in consultation with operations personnel in different segments of BP to make sure the scenarios are relevant to Operations and Maintenance Leaders across the varied parts of BP from offshore platforms to refineries to small gas terminals. They reflect where FLLs spend most of their time in day-to-day activities related to process safety. While the scenarios are based on plant and equipment that are specific to individual segments, they are addressed in a way that the challenges and principles will be understood across the different locations in BP. The subjects for the eSimulations fall into four areas:

1. The ability to identify change, and then to manage change through multiple discipline inputs to a Management of Change procedure.
2. Operating procedures, and managing operations in response to changing conditions.
3. Maintenance of plant and equipment with fault finding as the main activity.

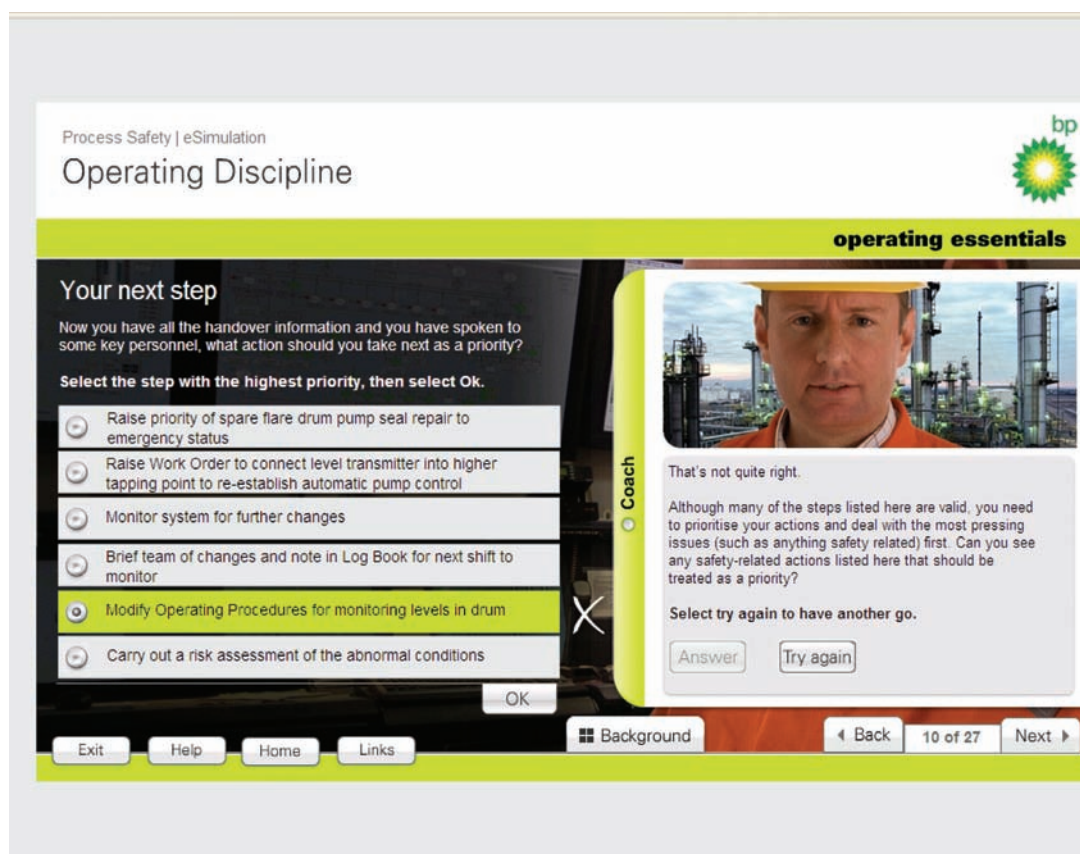


Figure 3. Example of eSimulation showing intervention of the virtual coach

4. Managing non routine activities such as maintenance work on the site through Control of Work or permitting activities.

A major area of FLL activity, Control of Work, is not included in the Process Safety module because there is already a full OE Control of Work module being developed.

At various stages, participants can choose to consult on the best course of action with a number of virtual roles representing those typically found at a production or manufacturing site, including: Engineering Authority, Process Engineer, Maintenance Engineers and Technicians, and HSE Advisor. In addition, the Virtual Coach provides support by intervening when an incorrect decision has been made or by suggesting an alternative when appropriate. In this way, the role play is directed to a successful end point, with learning focused appropriately.

WORKSHOPS

After successful completion of the mandatory and optional eFundamentals modules, as well as all the eSimulations, the participant is allowed to enter the workshop phase. These extremely interactive workshops are site or business unit focused and can accommodate between 20 and 24 participants. They are focused on the application of the

learning achieved through the eFundamentals modules and eSimulations. At the completion of the workshop, participants are able to:

- Identify in practical terms how process safety relates to their role at their site
- Share a common language for process safety at their site
- Make a link between BP's OMS and process safety at their site
- Develop a personal action plan relating to process safety in their day-to-day jobs.

Each of the scenarios covered by the eSimulation modules is developed further in the workshops through a variety of case histories and exercises designed to vary the pace and maintain interest. There is almost no formal lecturing. At the conclusion of the workshop each participant has to write their own Personal Action Plan which requires them to reflect on the learnings from the workshop and to identify what they will take forward personally and with their teams. Actions are required to be SMART: Specific, Measurable, Actionable, Realistic and Timely. Line managers are required to follow up with each participant after one month and three months to assess progress and provide support and further coaching as required. After training is complete, continuous improvement kicks in with participants

introduced to concepts at a half-day workshop that provides the platform for the long-term development of action plans founded in the preceding workshop sessions.

DEVELOPMENT PROCESS

The Process Safety module was developed from existing process safety awareness training material from across the BP Group. The fundamental process safety concepts employed by BP and the basic principles that FLLs would be expected to be aware of were identified and included in the eLearning modules.

All parts of the Process Safety module were extensively commented on and tested through the development stages. The eLearning modules, including the technical eFundamentals and the “game play” eSimulations, were presented to various Subject Matter Experts across the Segments and Functions in BP to test content and approach.

As this was a significant and important module for BP, the structure and content was presented to the Heads of Departments (HoDs) in the central Safety and Operations function for their “sign off” and approval. This was an unusual step for a training course in BP, and the HoDs or their subject experts all reviewed the content in detail (some 10 hours of eLearning) before final approval.

In the second half of 2008 the Process Safety module, consisting of the eLearning modules and the two day workshops, was piloted to over 80 FLLs.

As part of the project’s own continuous improvement process, feedback on all the elements of the module was monitored and regular updates were made to the content and approach. Following the first pilots and extensive user consultation, the team was able to enhance the e-learning, the workshop, and the site engagement processes.

Enhancements after the first phase have included:

- Splitting some eLearning modules into shorter items to help shorten access times

- Re-orienting the simulations to be more reflective learning experiences
- Re-designing and re-ordering some of the workshop sessions to make them more time efficient.

Pilot workshops were delivered in a variety of locations and types of operations:

Pakistan – Onshore oil production
US, Cooper River – Onshore chemical plant
Angola (2 pilots) – Offshore oil production
US, Alaska – Offshore oil production

The pilot sessions were invaluable in testing the various exercises and identifying what worked and what did not. The structure, content and timing of the workshop was fine-tuned so that it is now a repeatable course that delivers a consistent message to the participants.

The intent is to train a number of OE Facilitators to lead these workshops across BP. The OE facilitator will be supported at each workshop by a Local Facilitator from the site or facility. The need for local support was identified early in the development process as a necessary step to ensure the successful delivery of the Process Safety module.

The OE Facilitator will control the structure and pace of the workshop but the Local Facilitator has an important role to play in providing knowledge about the technical aspects of the local facility and what the local underlying process safety issues are. The OE Facilitator will not have this local knowledge, and the Local Facilitator will help with dealing with the group feedback from the exercises and relating it to the local environment.

The other key role for the Local Facilitator is to present and lead some of the later exercises which relate to the local facility and to help the participants to create and develop their personal actions.

The pilot workshops confirmed that the ideal Local Facilitator is one of the participant’s line managers, and

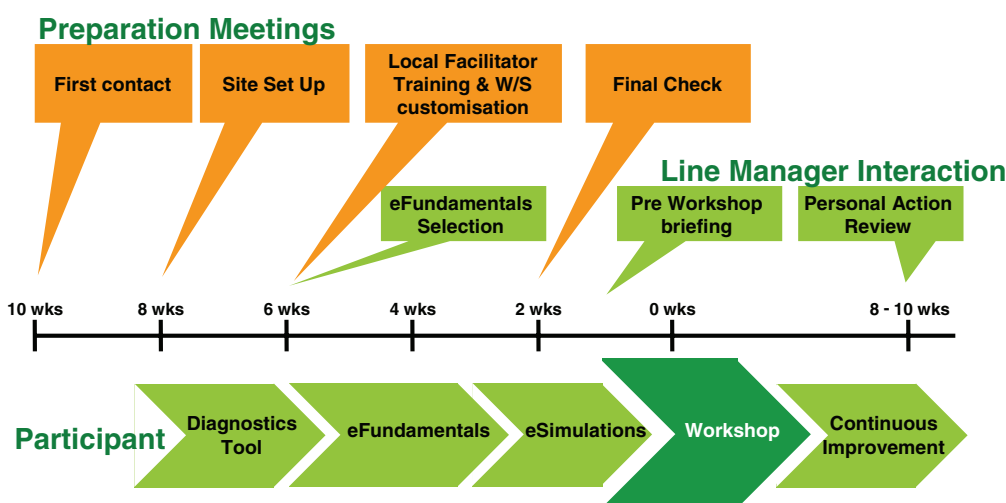


Figure 4. Preparation overview

this is now a standard request by the OE programme. If a line manager is not available, this role should be performed by someone with sufficient knowledge of the technical and procedural aspects of operations at the local facility who has access to the leadership team to take back issues raised in the Workshop. It is NOT a role for the young chemical engineer looking for a development opportunity because of the need to bring issues back to the leadership team.

The recent roll out in the large Gulf of Mexico business unit was supported by the strong commitment that all line managers or Offshore Installation Managers (OIMs) would attend the workshops and more than half would act as Local Facilitators.

PREPARATION

During the pilot phase it was discovered that structured preparation activity at the site or facility is vitally important. The Process Safety module does not just consist of a two day workshop. There are several different phases and requirements, so it is important that a site understands these and can prepare their participants.

The process starts 2 months ahead of workshop delivery to engage the Process Safety Lead and site Project Manager for OE. This preparation extends to the line managers of the participants who have a key role and commitment to enable the success of the Process Safety module. This lead time is also necessary to give time for the participants and line managers to complete the eFundamentals and eSimulations materials before the workshops.

The preparation phase is enabled through at least four facilitated web-based meetings to identify key site roles and share materials. One of these meetings will be set up to train the Local Facilitator in their role and to identify any customisation of the workshop for the local facility.

The benefit of this approach is that participants are aligned with their managers about the training process, roles and expectations, and the potential benefits for them. They come to the workshops with the same baseline knowledge from the pre-workshop eLearning and have a common language for process safety. Using eLearning removes the lecture component from the workshop and allows application of core knowledge and skills through the simulations. As the eLearning is tracked, it allows sites to ensure all pre-requisite learning is completed on time.

FIRST RESULTS

The Operations Essentials programme was extensively piloted in 2008 with over 800 participants working through Phases 1, 2 and the Phase 3 Process Safety modules of the curriculum.

The first results from the Process Safety modules consisting of five pilot workshops in 2008 and the three early sessions by end of April 2009 are encouraging and can be summarised as:

eLearning

- The eLearning materials are regarded as interesting and enjoyable.

- The eLearning materials are relevant to their role.
- The modular nature of the eLearning modules, which allows participants to complete the modules at their own pace, is appreciated.
- The modules are seen as relevant to their plant and equipment, but some note they should have more local examples.

Workshops

- There has been very positive feedback of the structure and content of the workshops. This confirms the decision to make the workshops exercise-based with little or no formal lecture material.
- The participants found it beneficial when there were other members of the “team” attending, such as the line managers, process safety engineers, HSSE advisors etc.
- The material is focussed on their day-to-day role and tasks and allows them to identify where they can influence process safety.
- For the more experienced FLLs, there was nothing particularly new in the module BUT it did allow them the chance to see how all the elements fit together and how they relate to their role.
- It has allowed all participants to find a new way to look at process safety.
- The participants found the exercises and case histories explored through out the two days the best part of the workshops.

Some unexpected results from the workshops include the issues and subjects raised about the local facility. The exercises towards the end of the workshop focus on participants’ role in the local facility and what issues they think need to be addressed in their facility.

This, of course, does lead to a number of issues which the Local Facilitator either deals with in the workshop or notes and takes back to site leadership for action. So far there have been some significant issues raised that need to be addressed in areas such as MoC Procedures, Temporary Operating Procedures, and Measurement.

CONCLUSIONS

The first results clearly support the OE objective to design process safety modules that provide a platform for improvement of process safety performance at BP sites in a way that can be tailored to individual site requirements.

The eLearning materials have received very positive feedback, with participants stating that these are of a much higher standard than they have experienced with previous eLearning modules. The eLearning has allowed BP to deliver a large part of this module by a “long reach” method employing a web based system that allows participants to access it at their own convenience. This approach ensures that consistent concepts, language, and messages are delivered globally across the BP Group.

These concepts and messages are reinforced through the highly interactive workshop which has proved

to be equally effective for large facilities and small depot based sites. The ability for the local facility to customise the workshop has delivered a structure to allow the participants to relate to the exercises and examples discussed over the two days. Assisted by the Local Facilitator, the workshop has the ability to draw out local issues for further follow up.

One very positive aspect of the Process Safety modules is the involvement of the line manager in the module. The requirement for them to appraise what eLearning the participant is taking leads to a better understanding by all the team of the process safety concepts. The involvement of the line manager in the actual workshops as another participant or as the Local Facilitator has greatly improved the interactions and discussions of local issues during the two days.

Finally, the participants set Personal Action Plans which facilitate process safety continuous improvement for the individual and their teams.

NEXT STEPS

As the Process Safety module moves into the full rollout phase, the activities in the 2009 are:

- The workshop is now being scaled up for global delivery through a network of BP accredited trainers.
- Deliver the 46 workshops already requested for 2009 and train up to 900 participants.
- Review the selection and completion of the optional eFundamentals to establish the effectiveness of the Module Selection Tool.
- Review feedback from participants and Local Facilitators and determine if improvements need to be made to the eLearning or the workshop structure.

REFERENCE

1. Baker et al., The BP U.S. Refineries Independent Safety Review Panel, published on the BP website, January 2007.