

B-SAFE® Applied to a Maintenance Shutdown at ICI Wilton

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Introduction

In April/May 1997 the Olefines JVO6 plant underwent a four yearly maintenance overhaul. Prior to this a decision had been made to extend the use of B-Safe®, from its ongoing JVO6 operational role, to form part of the overall safety initiative during the plants shutdown. The intention was to attempt to proactively involve approximately 2750 contractor personnel in ensuring a safe place to work during the shutdown period.

In essence B-Safe® proactively focuses people's attention on sets of unsafe behaviours that are commonly associated with an organisation's historical accident record. This is usually achieved by examining the organisation's accident records, near-miss reports, risk assessments, etc., to develop a measure of safety behaviours for each work area involved in the initiative. This measure is then used by workgroup based observers as a means of monitoring ongoing safety performance. The first few weeks of data are used to discover each workgroup's current levels of safety performance, to enable a baseline to be established, which is then used as a comparison point for future ongoing safety performance. The baseline is also used as the basis by which safety performance targets are set by each workgroup. The results of ongoing monitoring are then fed back on a regular basis (i.e. weekly) to the workgroup so that any remedial actions can be taken.

In contrast with the normal long-term application of B-Safe® which operates over six monthly phase periods, involving weekly feedback meetings, B-Safe® was adapted to cater for the relatively short time period (6 weeks) of the shutdown schedule. In essence, this meant treating each day as a period of a week. In other words, rather than establishing a baseline over a 4-6 week period, the shutdown baseline was established by using the data collected over the first four days of the shutdown. Thereafter, feedback was given on a daily, rather than a weekly basis.

Developing the B-Safe® shutdown initiative

The first task undertaken was the development of a generic Observation Checklist that would be suitable for all the working areas on the JVO6 plant. Various categories for these were established, based on work conducted in 1989-1992 by Dr Cooper of BSMS in the Construction Industry on behalf of the HSE. Analysing the accident and incident reports from previous shutdown operations completed this task. The analysis showed certain behavioural trends present in a large number of accidents and incidents. These behaviours were then used to indicate the desired behaviours on the observation checklist. This framework of Observation Checklist behaviours was then further refined and discussed until an Observation Checklist that was considered practical and relevant was developed. The Observation Checklist focused on Four key categories, i.e. Access and Egress, Use of Tools & Equipment, Housekeeping and use of Personal Protective Equipment (PPE).

As mentioned above, a system for providing feedback on a daily basis had to be set up. This took the form of a table of daily scores, a graphical representation of daily scores, and an area specific analysis of worst scoring items and comments. In addition, 3 large graphical feedback boards were placed on site to ensure that the workforce would see the daily performance scores. These were placed opposite the main entrance to the plant, and next to the safety cabin on the plant.

Training and briefings

The safety manager informed all the major contractors of the need to recruit volunteer observers. The plant had previously been divided up into 10 areas for management purposes, and it was decided to use the same area division for the purpose of the B-Safe® observations. This meant a requirement for at least one contractor observer for each area.

Although there was a good response from the major contractors to recruit observers, it became clear at the beginning of the training sessions that the "volunteers" did not know what they had volunteered for. They all stated that they were just told to report at the venue for safety training. They were not briefed by their management about B-Safe® and did not know anything about it. This resulted in four observers from the same company deciding not to continue as observers and dropping out of the training at various stages, as they feared reprisals from their management if they were seen to "rock the boat". One of these employees made a suggestion to improve the effectiveness of PPE, but then stated that he wished he had not said anything. When asked why he replied that if ICI decided to take up his suggestion it would mean that his company would have to supply them with the relevant equipment. He would then be seen by his management as the instigator of this additional cost, and as such would be victimised.

The remainder of the observers did not know at this stage in which area they would be working. As such it was not clear whether the aim to have an observer in each area had been achieved. Members of the Safety Team were also trained as observers and it was decided that they would do observations in areas where no observers were forthcoming.

As the JV06 plant was being shut down at the time, practical training had to take place in a non-shutdown plant area that did not lend itself to observation with the specific Observation Checklist that had been developed for the shutdown. Increased support and constant co-observation by the B-Safe consultant and the ICI B-Safe® Co-ordinator during the baseline observation period on the shutdown plant overcame any difficulties arising. As a further measure of support, it was decided to have a regular weekly meeting with all observers to provide them with feedback, and discuss and address common problems.

Baseline and goal setting

Because of the time span of the shutdown it was decided to limit the baseline period to four days. During this time an additional contractor company came on site and expressed a desire to be part of the observation team. To accommodate the limited time available both to the contractors and to the B-Safe team, a condensed version of the observer training was conducted. This condensed training again had to be followed up with intensified individual support..

The support of observers during this baseline period cannot be over emphasised. During this phase the observers are very new to the concept of observing colleagues, as well as unfamiliar

with the plant areas as well as the behaviors on the Observation Checklist. The B-Safe team endeavoured (and succeeded) to complete one observation with every observer every day during this time. This ensured that each observer learnt the value of strict, consistent observing very early in the project.

From these baseline observations the B-Safe team calculated the baseline score for each of the 10 areas as well as the average baseline score for the whole plant. Because of the impracticality of asking the whole workforce to set a safety performance target, it was decided to let the observers set a target for the plant based on the plant's average baseline. This was done during the first observer meeting. This was not an easy task as the observers were strange to each other, the concept and the environment and was as a result very reserved. After a lot of coaxing and explanation from the B-Safe team, a target of 85% was eventually set. This target was then briefed on to the shutdown management and also published in the shutdown newsletter.

Phase observations and scoring

As a result of the spread of trades it was not possible to get a "resident" observer for each area. For example, three of the observers were working on the furnaces. Due to the size of the area it was decided to split the area in two for observation purposes. This meant that the third observer was asked to do observations in a neighbouring area where he himself was not employed. Also, due to a lack of observers on the "shop floor", two contractor safety personnel from the safety team were doing full time observations in two of the other areas. This was not an ideal situation, as the observer doing observations in an area where he is not employed himself, cannot have any "ownership" in that area. For example, one of the observers was quite proactive in his approach to safety in the area where he worked but was not the observer. When he saw a colleague behaving unsafely in his own work area, he discussed the issues with that colleague in a positive manner, and was successful in changing his colleague's unsafe behaviour. When he observed the same unsafe behaviour in his observation area, he merely reported it on his Observation Checklist and did not feel it was his place to discuss the problem with the individual concerned. This also applied to the other observers in general, where the B-Safe team felt that the observers observing in their own work area were more proactive than observers observing in areas other than their own work areas.

The observers were set a target to do two observations per day in their respective work areas. In general, the observers responded very well to this, although there were occasions when observers could not do an observation because of specific work that they were doing at the time. In general, the B-Safe team covered these observations because the observers had, as requested, forewarned them of the occasion. In all, an observation rate of above 90% of the requirement was maintained throughout the shutdown.

Towards the end of the shutdown some problems did start to occur when contractors started to trim down their resources. A request was made to the shutdown management that observers were kept on, but a few observers were still lost due to de-manning and nightshift work. Although the observers that were switched to nightshift still carried out their observations at night, it put an extra burden on the B-Safe team to cover the observations during the day.

Because the shutdown management meeting was scheduled for 16h00 each day, it was decided to do one AM and one PM observation each day. The observers were requested to ensure that the AM Observation Checklist was handed in by 12h00 and the PM observation by the end of the day. This meant that the B-Safe team could calculate a daily score using the previous day's PM Observation Checklist and the current day's AM Observation Checklist in time to provide feedback at the shutdown management meeting and to provide feedback to each area for the toolbox talk first thing each day.

Each completed Observation Checklist was first entered into the B-Safe Software. This calculated the percentage safe performance scores for each individual area and the total plant average score, and were presented in graphical form. In addition, particular worst scoring behaviours and observer comments were used for feedback during toolbox talks

Feedback

The Safety Team had set up a system to give daily toolbox talks to all contractors. The format of this was to provide the area engineers with a toolbox talk written by the safety team. This was used by the area engineer to brief the supervisors in his area, who then in turn cascaded the briefing to their employees. This provided the B-Safe team with a method of providing feedback to all areas. Direct feedback was also given on a daily basis to all area engineers during the daily shutdown management meeting at 16.00hrs. This was done by a member of the B-Safe team. Plant average scores were posted in graphical form on the three strategically placed notice boards in the plant.

Effective feedback is one of the pillars upon which the success of B-Safe® rests. The B-Safe team had asked the observers to provide them with information on the regularity and content of the toolbox talk that they received from their own supervisors. From comments received it was clear that the toolbox talks excluded the B-Safe feedback. It was also made clear that the toolbox talk was just read out to the employees with no discussion of issues taking place. The area engineers were made aware of this and the B-Safe team attended as many as possible toolbox talks to monitor the situation and to help where possible. However, it was impossible to attend all toolbox talks and the status of feedback in some areas remained suspect during the whole shutdown.

Performance analysis

The Observation Checklist was developed by analysing accident and incident reports from the previous shutdown. From this analysis the behavioural aspects of the accident or incident was extracted to form the framework of the Observation Checklist. This framework was then further developed by discussion of each item between the safety team and the B-Safe team. This eventually resulted in a Observation Checklist that was considered to be practical and relevant to all parties concerned.

The Observation Checklist concentrated on four main categories i.e. access, use of tools and equipment, working area and PPE.

Category 1: Access

The first item in this category dealt with working at heights within the confines of platforms. As a lot of the work being done on the shutdown involved work at heights, this item was easy to observe. Due to the high risk involved in working at height, it was disappointing to note how often this item was marked as unsafe. On a few occasions the B-Safe team had observed people working outside the confines of a platform at heights greater than 20 ft without any fall arresting equipment, with the supervisor watching the job. When this was discussed with the supervisor, the comment was always made that platform could not be modified due to time or resource constraints.

Item 2,3, and 4 in this category dealt with climbing or descending steps, scaffold ladders and cat ladders respectively. A debate broke out on whether one should hold onto the stiles or the rungs of a scaffold ladder. Although the B-Safe team found that the correct procedure is to hold onto the stiles (CITB guidance), there was some disagreement about this, which pointed to a lack of consistency in training.

Category 2: Use of Tools and Equipment

One of the issues that arose from this category is the difficulty of personnel ensuring that their hands are away from the impact point, or that they are out of the line of fire, when using flogging spanners. There are flogging spanners available on the market which have a hole drilled in the shaft to accept a shackle so that tension can be kept on the spanner from a distance to prevent it flying off. Unfortunately these were not available during the shutdown which led to people putting themselves at risk by holding the spanner.

Category 3: Working Area

This category dealt with housekeeping in the work area and with placing tools and equipment where they cannot fall or cause trip hazards. This is by far the category that attracted the most number of unsafe behaviour scores. The B-Safe team had a squad of cleaners at their disposal to deal with some of the housekeeping issues. Unfortunately this squad found themselves constantly cleaning up after contractors who did not bother to clean up after themselves. They found themselves regularly returning to an area that they had clean as little as 2 hours ago, just to find the area in a mess again.

The major problem with tools and equipment seemed to be caused by loose bolts and scaffold clips. These items were constantly left on walkways and Kennedy gratings where they could fall through or cause trip hazards.

Category 4: PPE

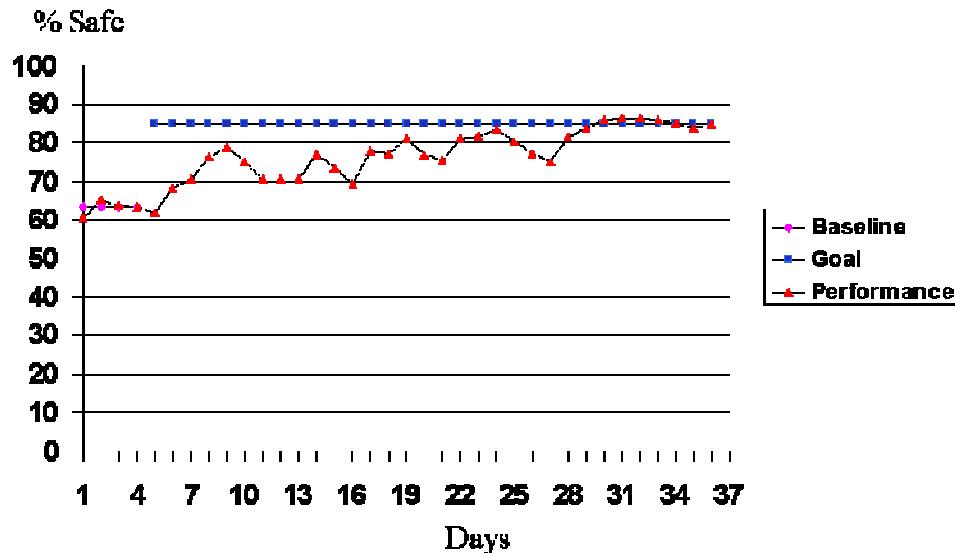
This category was again audited by the Safety team as well as the B-Safe observers. Compliance to minimum PPE requirements were high although this dropped during periods of perceived low levels of supervision like nightshifts and weekends. The other factor that influenced the wearing of PPE was the hot weather when safety was readily compromised for comfort.

Another problem that came to light was the use of non-safety prescription glasses. Most contractor employees could not get prescription safety glasses from their employers and as a result had to wear safety "over glasses" which people very often forgot to bring to the workplace.

Safety Performance Scores

As illustrated in figure 1, in terms of safety performance over the shutdown period, improvements were in the region of about 20% for all ten areas as a whole. Specifically, the average baseline performance was 63.5%. By the 37th day average performance had reached 84.83%, thereby reaching the goal set by the observers at the beginning of the initiative.

Figure 1: JVO6 Shutdown - Plant Average



In addition, the number of minor accidents was restricted to about 40, with 3 classified injuries and no recordables occurring. Table 1 shows how this compares with safety performance on previous shutdown

Table 1:

YEAR	Man Hours worked	Classified	Reportable	Injury Rates
1990	346,000	9	2	Classified 3.18 Reportable 0.58
1993	288,000	1	2	Classified 1.04 Reportable 0.67
1997	550,000	3	0	Classified 0.55 Reportable 0

Given that 2768 contractors who were unfamiliar with the plant, who worked approximately 500,000 man hours were involved in the shutdown, and the attendant problems found with the delivery of feedback, these results testify to the effectiveness of the whole safety effort, by both the B-Safe team and the resident safety team.

LESSONS LEARNT

The Observation Checklist is pivotal to the success of B-Safe®. As such it must be relevant, observable and all the items contained in it must be within each employee's control. It would therefore be advisable to ensure that the Observation Checklist is discussed with as many interested parties as possible before the start of any shutdown. This discussion should include representatives from all contractor company management, and even potential observers if possible. The Observation Checklist used for the shutdown was considered practical and relevant, but if the Observation Checklist is seen as being dynamic rather than static, it can always be improved.

It is important that initial briefings to contractor management about B-Safe are extensive and specific. B-Safe® requires management commitment to succeed and as such contractor management must "buy in" to the system. This will help to ensure that observers are true volunteers that know what B-Safe® is about before they receive training.

It is also important to ensure contractor induction's make people aware of the B-Safe principles at all levels, and that the induction's spell out the implications for all personnel.

The number of observers should not be limited to the number of work areas, as more observers mean more observations, which has a stabilising effect on safety performance. The other obvious benefit from this is that there is a greater "safety presence" created on the plant without increasing resources.

It is very important that observers undertake observations in the areas where they are actually working. This promotes a sense of ownership and makes it easier for the observer to be proactive. It also makes it easier for the observer to give people direct feedback when he observes unsafe behaviours, as he is more familiar with the job, the people and the environment.

To ensure feedback reaches the work force it is essential that the whole management structure, including supervisors, be extensively briefed on their role in B-Safe® and the importance of their commitment to it. This can help to ensure that the quality of the feedback to the workforce is maintained. Specifically, the timing of the feedback meetings to both management and the workforce should be such that the feedback received is pertinent only to the previous day's safety performance. In other words, feedback about the previous days safety performance should be given at early morning meetings, preferably before each workgroup begins their daily tasks.

Support to the observers proved to be an important factor. It helped them to do their observations in a consistent manner. It was evident that as soon as the area managers had conducted an observation with the observers, there was a significant improvement in that area's score. The message that safety is of paramount importance must never be compromised. This message was

loud and clear from Olefines senior management, and should always be as clear from all levels of management, regardless of operational pressures.

CONCLUSIONS

Although it must be realised that long term changes in behaviour takes time to achieve, it is possible to raise standards of expected behaviour in the short-term, and achieve that standard. To do this, however, requires an intense and highly visible safety presence on the plant.

This was the first time that a behavioural based approach had been attempted in a shutdown environment. Due to the hard work by all the people involved there can be no doubt that it was proven successful. There were some important lessons learnt that could be applied in future shutdowns.

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