A Chemical Manufacturer

COMMERCIAL CASE STUDY No 1

The site featured in this case study is the subject of a recently completed documentary video. The video covers three sites which are considered to illustrate the successful implementation of the BS 8800 standard.

This video is available from Human Focus Video Producers E-mail humfocus@macline.co.uk

This case study focuses on a chemical manufacturing site in the North of England. It employs 170 personnel who work a five shift system on a 40 acre site. Their interest in the behavioural approach came through a perception that the law of diminishing returns was clearly beginning to apply to traditional safety interventions and that a radically different approach was required to drive the next meaningful improvement in safety performance.

Two factors made the intervention slightly unusual. First an exclusive focus on PPE. Second, the wide distribution of personnel around the site and the occasional nature of any hazardous work performed (typically being at risk only when dealing with a breakdown in an automated system or performing maintenance where hazardous materials are present).

Method

Measure. A review was made of all written material relating to the use of Personal Protective Equipment on site. This included standard operating procedures and permits to work, as well as the instructions enclosed with PPE. The key behaviours identified were incorporated into a draft behavioural measure which was refined and finalised by site management in consultation with their work force. This consultation process aimed to ensure that the items and their definitions were both valid and acceptable to the work force. Two categories were identified: First, 'Mandatory (or General) PPE' - focusing on the 'uniform' of overalls, boots, hats and glasses. Second, 'Job Specific PPE' - such as the correct face mask or correct glove for a particular task. In addition, separate scores were recorded for employees and sub-contractors.

Training. 12 volunteer individuals were given two days formal training in the principles of behavioural safety, the correct use of the measure and appropriate interpersonal skills (assertion, active listening and goal-setting facilitation). Two days training in the practical use and scoring of the measure was also given over the following three weeks in half day sessions.

Base-Line Data. Once observers were trained, base-line data commenced. 40 site observations were collected and aggregated into the four base-line figures 'Mandatory PPE employees', 'Mandatory PPE contractors', 'Job Specific PPE employees' and 'Job Specific PPE Contractors'. These figures were expressed in percentage safe terms by using the simple equation of dividing the number of safe observations by the total number of observations (both safe and unsafe).

Goal-setting. Because of the nature of the site it was impossible to get all personnel together for a participate goal-setting session - so the briefings were conducted using supervisors who distributed a briefing pack (an eight page overview of the intervention which included base-line scores) and then showed a short video prepared specially by the site which covered the same material. Personnel then voted on the goals using voting slips provided.

Self Reporting. As detailed above the site involved in the study is highly mechanised and operatives only need to use 'Job Specific PPE' infrequently. As a result, it was clear that the amount of observation data would be minimal and that some form of self-report data would be required.

Previous studies which have used self-report data (for example, Krause et al 1986) found that, at first, self-report data tends to be much more lenient than third party observational data but that over a period of weeks - as operatives realise that reporting is anonymous and that there

will genuinely be no negative consequence for 'admitting' transgressions - the self report and observed scores converge.
It was therefore intended to use a substantial number of third person observations initially to ensure the accuracy of the self report data until this convergence occurred - then to reduce the number of third person observed measures to lower levels with the sole aim of monitoring the accuracy of self report scores. After an initial burst of enthusiasm, however, the number of self report measures returned plummeted to unacceptable levels. An attempt to relaunch the system also failed.

Amount of Data. Although the third party observers kept to their schedules well and took the required number of observations, the data collected - particularly for 'Job Specific PPE' was, as expected, somewhat limited and weekly totals tended to fluctuate dramatically, making the analysis of trends difficult. It was therefore decided to use a five week rolling average instead of a weekly score (which matched the shift cycle). Although this artificially stabilised the scores, it still allowed for weekly feedback and the meaningful appreciation of trends. The results are shown below.

Results. Figure 1 shows the result over twenty seven week period for employees compliance with 'General' and 'Job Specific PPE'. Figure 2 shows results for the same categories over the same period for contractors. It can be seen that on all four measures a significant increase in compliance was recorded. (statistical analysis confirms that these increases are highly statistically significant - details available on request). As well as formal inter-rater reliability checks that attempted to ensure that these results were not an artefact of more lenient scoring a qualitative group discussion was held with all observers. The group confirmed that they felt a meaningful shift in behaviour and site 'culture' towards the wearing of PPE had occurred. (Technically, it can be argued that a 27 week study period only gives evidence for a positive change to the shorter term 'site climate' rather than the longer term 'site culture').

Management agreed with the qualitative data collected at these sessions - also feeling strongly that there had indeed been a genuine reduction in transgressions and a general increase in safety awareness.

Accident Data. Although behavioural safety exponents have many reservations about the use of accident data (see above) it is also true that they would not want accident figures to actually contradict an apparent improvement in safety behaviour. (At least not in the medium to long term). It is well worth reporting that the number of working days lost as a result of accidents was, during the period, only one sixth (or just 16%) of its rate over the previous years. The results of this study can be graphically illustrated in diagrammatic from.

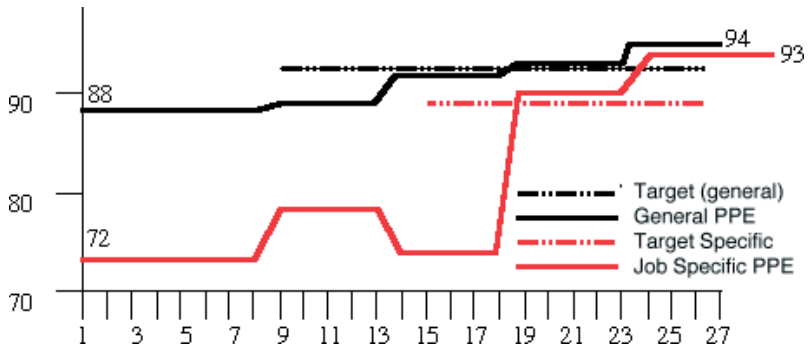

Figure 1
P.P.E. Usage -
Employees

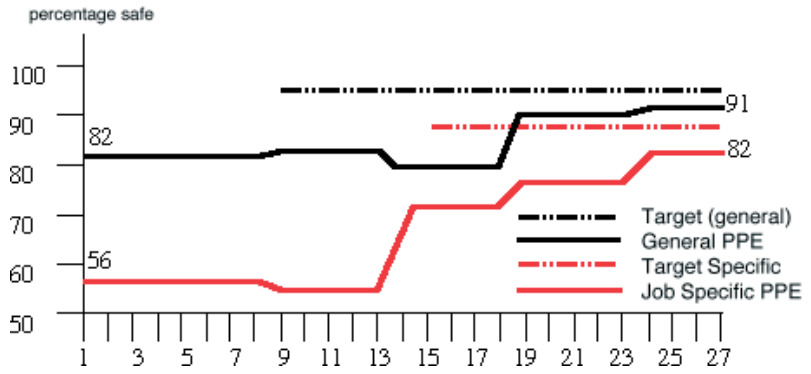

Figure 2
P.P.E. Usage -
Contractors
(5 week average)

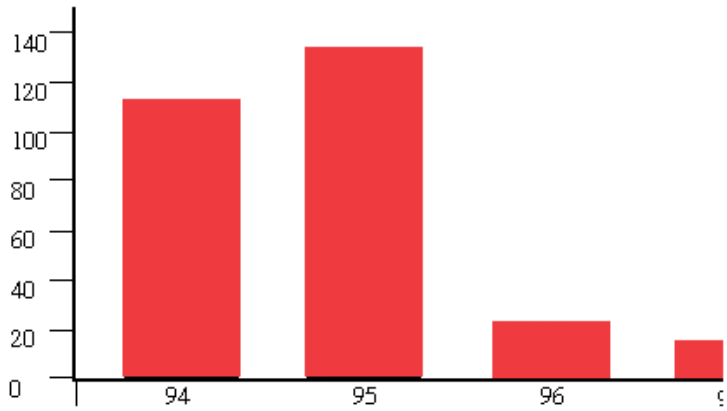

Figure 3
Number of working days lost from accidents

It must be noted that there was a substantial safety programme completed towards the end of 1995 that will have impacted on these accident figures. Having said that, the effects of this training programme will have preceded the base-line data quoted in Figures 1 and 2 (baseline data collected Spring 1996). Clearly , therefore, this data does not in any way contradict the qualitative finding that the improvement in safety behaviour generalised to other areas of safety.

Discussion

The figures recorded above suggest strongly that the intervention led to a substantial improvement in compliance with PPE requirements - a finding in accord with ever growing numbers of studies that validate the effectiveness of the behavioural approach. Confirming this, site management suggested that there had been 'a genuine improvement in both awareness and usage' and further that ' the observers themselves were clearly enthusiastic about the process as well as the outcomes'.

One interesting finding is that whilst the study focused exclusively on PPE (and not on such usual categories as housekeeping or plant and equipment), management and observers felt that the improved behaviour generalised to other aspects of site safety - a finding supported by the accident figures quoted above.

Causal Factors. Management felt this generalised improvement had been caused by an increase in communication about safety first issues, particularly with contractors. This is, of course, a direct aim of the approach. In the first instance inconsistencies in site rules were uncovered during the finalisation of the behavioural measure item.

This is frequently the first benefit of implementing a behavioural intervention and was considered in this case to have both positive and negative consequences. Positively, it meant that site rules were able to be amended to be more up-to-date and consistent. Negatively, management felt that they had to face issues it would have been more convenient to ignore in the short term.

One specific example of increased communication was that when asked why they were not wearing the correct gloves two operatives in the same section claimed they 'did not fit'. One said that the available gloves were far two small, the other said they were too large. This situation had existed for years with operatives with small or large hands making do with the most appropriate alternative style. Management were able to solve this problem by simply ordering a variety of sizes that were available. Previously, it was suggested, this situation would most probably have come to light only through an accident or near miss investigation.

Another factor considered important is that the high profile of the intervention gave a clear demonstration of management's genuine commitment to safety. Consideration of Figures 1 and 2 show that the improvement in performance did not occur instantly. Although correlation does not necessarily equal causation it is interesting to note that the improvement largely coincided with management's visible action on several suggestions put forward by operatives in discussions with observers. In retrospect it is clear from discussions with operatives that these suggestions were seen as a 'good test' of management's commitment to act on practical suggestions to problems as they were identified.

Random Timing of Observations. One very typical methodological problem experienced during this intervention was that there was a clear 'drift' towards taking measures at the end of shifts and at other 'convenient' times for observers. Obviously, as this becomes systematic it can undermine the accuracy of the weekly scores and the representativeness of the data. The monitoring programme used by management to ensure that this did not occur was only partially successful but this issue has been addressed effectively by other organisations we have worked with through the use of random number tables. These ensure that observation times are truly randomised with observers told at the start of each week when their observations are to be taken and they only vary from this timetable under exceptional circumstances. For example, when the inevitable eventually happened and one observer found he had to take both his observations that week within the space of half an hour).

Self-Report Data. The major methodological issue was that of self-report data, however. Although only a few studies have been performed, several problems with this approach have been noted. Brooks (1995), for example, found problems with van drivers' self-report data because of difficulty ensuring reliability of response on items with a subjective element. Frankly, the research described here did not need to concern itself with the reliability of the data as, within a period of weeks, too little was being collected to be at all usable. After an initial burst of enthusiasm (or compliance) the amount of self-report data diminished to unsuitable levels and the intervention had to rely solely on third party observations. Several factors seemed to combine in causing this failure.

First, the employees of this organisation displayed an attitude towards new initiatives typical to virtually all organisations, namely, the cynical 'What's the point, nothing ever changes'. This actually worked in the intervention's favour when some suggestions were actioned and operatives found themselves positively surprised (see above) - but this positive reaction did not occur soon enough. A second problem was that because self-reporting systems did not take hold long enough for the operatives to overcome their natural suspicions responses really were anonymous - the perception of 'You'd be foolish to admit anything, just in case' was never overcome. Indeed operatives interviewed rather felt that suggesting it could ever be overcome was rather naive.

Clearly, what was needed was a sustained period of live operations of self reporting that would have shown that the forms were genuinely anonymous. The logistics of the operation rather prevented this from happening, however, and management admitted in retrospect that the mechanics of self-report data collection they implemented could have been thought through more clearly. One problem was that the distribution of the self-report forms broke down on occasions and it really was naive to expect individuals to seek out forms themselves to complete. A further problem was that of completed forms. The rather ad hoc process used meant that not all self report forms that were completed actually reached the appropriate co-ordinating individual and further, having to leave them on a desk for a supervisor to 'pass on' gave operatives severe concerns as to the anonymity of the process. Rather ironically because the process actually was anonymous, it was impossible to chase up the operatives who had ceased to return scores. Although this was noted by site personnel after some weeks - it was by then too late.

Self-Reporting - Solution. It is evident that a prerequisite for the successful introduction of a self-reporting programme under similar circumstances is the establishment of an initially robust, and perhaps slightly authoritarian, data collection system. Although far from ideal symbolically, this should ensure a suitable number of forms are returned for a period of weeks regardless of cynicism or suspicion - and will allow individuals to see for themselves over a period of time that the process is genuinely anonymous. Hopefully, (and commonly) an improvement in safety performance will be both noted and appreciated by site personnel during this time.

It has been suggested that utilising a system similar to that used with research questionnaires would be the most controllable process. The way this works is that each response sheet is coded to allow those who have not responded to be identified and chased up. The major problem with this approach is that individuals have to trust 'management' not to abuse the process - that is to use the codes only to identify non respondents not individual responses. Obviously, however, this will increase the level of wariness and, of course, quite possibly the accuracy of the data. In the short term, however, it may be a price worth paying to ensure the successful launch of the process.

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