

SAFETY CULTURE IN NUCLEAR INSTALLATIONS
DEVELOPMENT AND FORMATION OF A SAFETY CULTURE

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ABSTRACT

The Thermal Oxide Reprocessing Plant (THORP) is the largest project ever undertaken by British Nuclear Fuels plc (BNFL) and its success is important for the future of the company. The company recognised at the planning stage that to be profitable, THORP had to operate both safely and with a smaller workforce. The establishment of an appropriate culture which saw safety and productivity as essential and complimentary at the beginning of the life of the plant was therefore vital for the future success of THORP.

The key factors in the THORP Culture formation were :

- The recruitment policy
- The training policy
- Measures taken to ensure participation from the workforce.
- Teamworking support
- Communication initiatives.
- Clear statement of Cultural Principles
- Clear and demonstrable leadership

The current stage of evolution has seen some positive results namely:

- A clear commitment to involving all personnel in problem solving and task organisation, including safety..
- A confident workforce with an improved ability to communicate.
- The capability of the majority of the workforce to work as a team.
- Safety awareness of the workforce is generally high along with an awareness of environmental, commercial and (political) external issues affecting the THORP business.
- A commitment to continuous improvement.

The development of the safety culture within THORP has also had challenges, some as a result of the composite nature of the workforce, and others as side effects of the culture shaping measures. Management have recognised these, and using the results of attitude surveys, are working with the workforce to overcome their effects. Clear recognition has been achieved that the establishment of positive behaviours is a key step in generating the culture required.

Summarising, there is recognition that the design of safety management systems and improvement programmes, should be based on the principles of human psychology and behaviour, which includes wide participation by the workforce.

1. INTRODUCTION

The Thermal Oxide Reprocessing Plant (THORP) is the largest project ever undertaken by British Nuclear Fuels plc (BNFL) and its success is important for the future of the company. The plant was designed using modern technology and contains one of the largest distributed control systems in the world. THORP will reprocess irradiated fuel from advanced gas cooled reactors (AGRs) and Light Water Reactors (LWR) from reactors in the UK and overseas. When fully operational, the average direct employment supported by THORP's future operation will be some 2,100. In terms of financial importance to BNFL, the THORP plant capital costs run to some £1.75 Bn (1989 mvs), and will earn BNFL a profit of £500m in the first 10 years of operation. Reprocessing business has already been obtained for the second decade of THORP's operation.

The company recognised at the planning stage that to be profitable, THORP had to operate with a smaller workforce relative to that traditionally employed in other plants located at the Sellafield Site. In conjunction with this, the company also recognised the paramount importance of safety in THORP operations, which could only be achieved through a participative approach by all THORP employees. The establishment of an appropriate safety culture ~~at the~~ at the beginning of the life of the plant was therefore vital for the future success of THORP. Many of the attitudes essential for good safety performance are the same attitudes and behaviours required for successful performance in other areas of the business, and it was therefore considered essential to generate a culture which regarded excellent safety performance as synonymous with excellent business performance.

A significant proportion of the workforce were recruited from outside of the company, and the rest were from the workforce already on site. This posed a double challenge in that the external recruits needed to be assimilated into a new evolving plant culture i.e. no pre-existing experience or rules, whilst the internal recruits entered a culture which was trying to organise and work in a different way from the rest of site. The opportunity of trying a different approach to managing a nuclear plant, therefore, also had to recognise the cultural changes the workforce was going to have to undergo.

2. KEY FACTORS IN THE FORMATION OF THE THORP SAFETY CULTURE

The technology of the plant had an obvious impact on the capability and skills of personnel required to both commission and operate the plant. In response to that need, but also recognising that recruited personnel were required to work in a new and more flexible way, the personnel recruitment policies were derived using personality profiling

(psychometric testing) and other tests of ability before interviews took place. This covered not only technical ability but the ability to learn, and the capability to act as a team member. Job profiles were developed before the interviews with person specifications for the job.

The planning and co-ordination of training for THORP personnel was developed early in the organisation's life. All THORP recruits attended a core training programme, which was developed and given by THORP personnel. Training modules to cover the requirements of the different areas of plant were also developed. The training aimed to launch people in the organisation from the same starting point and deliver a portfolio of training in a timely and structural fashion. Safety courses formed part of the core training programme.

To support team working, workshops were developed to assist multidisciplinary teams form an effective team, appreciative of each others skills and role within the tasks assigned to them. This was particularly important for workers coming from the rest of site, as their experience was primarily working with teams of their own trade or function, with demarcation of function being prevalent. Additional workshops were also developed to support the concept of flexible working, where team members, in tackling tasks, were trained to integrate skills previously carried out by dedicated skill teams.

Team building methods became part of the personnel development activities. All THORP personnel were trained to tackle problems and tasks using a structured approach to task management introduced with the support of the Coverdale Consultancy organisation.. This method, developed in the 1970s is a way of task/problem solving in a team environment. This enabled all personnel to have a common approach to structuring their team interactions from shop floor to top management and assumed workforce involvement from the very beginning of THORP life. This common training has proven beneficial to worker groups who traditionally have problems with presenting information or their arguments to management.

Total Quality Management tools have also been used from the beginning of the organisation's life and is the accepted normal practice for problem solving, again with involvement from all personnel.

Recognising that communication is an important 'key stone' to any successful organisation, THORP has been innovative in trying to look at new and improved ways of presenting and distributing information. This includes electronic information retrieval and multimedia technology. One example of this, is a video that is produced regularly, which has information on the progress of THORP commissioning highlighting personnel involved, and other topics of interest such as an interviews with a THORP customer or supplier. The video is produced by THORP personnel and distributed throughout the plant. These are ongoing and developing projects which have achieved some success bearing in mind the volume of information and official documents requiring to be produced, distributed and recorded. From the point of view of safety culture, availability of information is crucial when attempting to raise the safety awareness within a workforce, or ensuring the smooth operation of a safety management system.

The THORP management has also tried to adopt a self auditing style, backed by independent auditing, which examines the readiness for operation, and assists managers to develop its safety management systems from a self regulation stance. In this way a more pro-active style of safety management can develop, which may eventually reduce the need for regulator audit.

The organisational measures described above are shaping a culture which has within it a pro-active, highly aware, learning safety culture, working within an effective safety management system.

3. CURRENT STAGE OF EVOLUTION

From a safety culture point of view the planning and organisation of the THORP workforce appears to have positive results, namely:

- A clear commitment to involving all personnel in problem solving and task organisation, which including safety..
- A *confident workforce with an improved ability to communicate.*
- The incapability of the majority of the workforce to work as a team.
- Safety awareness of the workforce is generally high along with an awareness of environmental, commercial and political issues affecting the THORP business. (The workers joined in the campaigns to gain political acceptance of the plant through the efforts of the Trade unions).
- As personnel are seen to be involved within the plant improvement process, personnel have the expectation of being able to raise issues and develop resolutions. This leads to a continuous improvement culture.
- Clear recognition by management of their responsibilities to lead and facilitate the safety culture.

The THORP management approach to safety is anchored on the belief that good safety performance will only be achieved by ensuring that the workforce have a positive attitude towards safety and that their behaviour is consistent with that required to achieve the desired level of performance. Many of the attitudes essential for good safety performance are the same attitudes and behaviours required for successful performance in other areas of the business. Some of the indicators of the general health of an organisation are:

- the degree of confidence of trust amongst employees
- the extent to which people are enabled to solve problems in their local areas
- the extent of information sharing
- the extent of employee participation
- the recognition of accomplishment

The above are particularly important when endeavouring to improve safety, and develop the organisations safety culture.

THORP has also developed 16 cultural principles on which they wish to build the organisation (see appendix 1). Working practices and management policy are regularly examined by groups of workers in the different areas to see how they support and mirror the principles. The principles were developed by a team of people early on in the organisations life, which included senior management, (indeed the Divisional Director participated as a member of the team that developed the 16 cultural principles).

Senior management have clearly stated their views on the importance of safety, and hold an annual conference which examines aspects of safety and employs workshops to identify further safety improvements. One output of these conferences has been the Departmental Safety Plans, and the development of safety action schedules. The conference also serves to broaden the workforce's appreciation of safety issues, as external speakers from the regulators and other industries are brought in to speak on their experiences. The outcome has been to reinforce ownership of safety as an integral part of everybody's job.

The organisational culture formed gave the opportunity for all personnel to become actively involved in developing and shaping the safety management on the plant, as it carried out commissioning. The culture continues to exhibit a proactive style in which ideas have a formal framework for consideration. The culture also developed a style of meeting which tries to recognise successes as well as identifying improvements. This, in theory has led to a more supportive working style, and openness in communications with personnel within THORP. From the point of view of safety culture, this encourages freer communications of lessons learnt and a willingness to tackle complex problems involving managerial and organisational factors. The opportunity for involvement from the workers also encouraged the "questioning attitude" desired by the IAEA INSAG-4 [1].

In all management processes there is the need to monitor and review. Similarly with respect to safety culture, management need to know whether they are achieving their objectives in the area of safety attitude and meeting their cultural principles. In 1991 a Site wide review of safety attitudes [2] was undertaken, which had been initiated by THORP management. This study was and remains the largest review of safety attitude in an industrial organisation using a questionnaire technique. The findings also served to demonstrate that there were still areas in which the organisation needed to increase efforts towards attitude change. Since this time other reviews have been undertaken including a corporate survey. Individual departments within THORP also conduct their own culture reviews. The results are used to target THORP efforts to develop in line with the 16 cultural principles and departmental safety plans.

The development of the safety culture within THORP has also had difficulties, some as a result of the composite nature of the workforce, and others as side effects of the culture shaping measures. These are described below:

- There is still a strong current of functionalism that can impede progress of flexible working
- THORP has to work within the centralised pay negotiation arrangements which can impede progress in changing working practices.
- The influence of external safety cultures, particularly the parent company, can have a significant effect on the developing THORP safety culture.
- Other external safety cultures such as Regulator cultures, can also impact on the THORP safety culture. For example, the attitude towards self regulation can affect the workforce attitude towards, and the management's relationship with the regulator. There are signs that the regulators are starting to take a greater interest in safety culture, and the development of effective self-regulation.
- *With the participative style of working*, the expectations of the workforce are raised, and so can be disappointed by slower progress or occasional lapses into inappropriate styles of management.
- Strong teams can sometimes become over competitive, which does not engender co-operation between teams, and can also create almost a 'THORP brand' culture which can encourage an elitist attitude. This latter attitude can affect the development of the working relationship with the rest of site.
- Common training in approaching tasks or problems can sometimes lead to 'group think', and stifle innovative solutions.
- The sheer intensity of the commissioning programme of the most complex plant has at times stood in the way of developing culture at the desired rate.

4. THE FUTURE

THORP is an evolving culture which has put into place a number of cultural shapers in an attempt to develop a culture able to compete successfully whilst balancing business needs including safety, and quality. The work force must be the equal of the challenges to ensure success.

The immediate future challenge is to ensure that the safety culture is sufficiently developed and resilient to support a smooth transition from commissioning into operation. This smooth transition will be assisted by continuing to emphasise the role of safety culture in meeting the business needs of THORP. The attributes of a good commissioning team are not necessarily the required attributes of a team that is responsible for routine operations. The review process should assist this move into operation by identifying the areas of difficulty, and with the strong foundation of workforce involvement, the safety culture should be able to adapt to the new working requirements.

Summarising, there is clear recognition of the requirement to move into a new era of safety management where the design of safety management systems and improvement programmes are based on the principles of human psychology and behaviour, which includes wide participation by the workforce.

References

- [1] IAEA SAFETY SERIES, >5 INSAG-4, "Safety Culture", IAEA, 1991.
- [2] COOTE, J.A., MACDONALD, S.M., LEE, T.R., "Perceptions of Risk and Attitudes to Safety at a Nuclear Reprocessing Plant". SRA Conference, Rome 1993.

APPENDIX 1

**THORP Division's
16 Cultural Principles**

**Understanding and
commitment to common
goals.**

**Decisions are made by the
most appropriate person.**

**Self and system imposed
barriers are eliminated.**

**Support and encouragement
is given to all.**

**Individuals strive to work
together.**

Everyone's views are valued.

**Those most affected are consulted
in decision making.**

**People are enabled to reach
their potential.**

**Safety is never
compromised.**

Information is shared.

**Achieving high standards
through continuous
improvement.**

**Strive to exceed customers
expectations.**

**Individuals share
responsibility for their own
development.**

**Individuals are aware and
contribute to business
aims.**

**Individual skills are
identified and utilised.**

**Visible recognition of effort
and achievement.**