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DEVELOPING THE DECOMMISSIONING
–
A STUDY OF ORGANISATIONAL CHANGE DURING EARLY DECOMMISSIONING PHASES OF A NUCLEAR POWER PLANT

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Abstract

Decommissioning of a nuclear power plant is a complex process that includes several organisational- and technical changes. To maintain safe and efficient management of the power plant during the whole decommissioning process, understanding of organisational change principles and implementation of change strategies are of great importance

The two reactors at Barsebäck nuclear power plant were closed in 1999 and 2005 respectively. The closure of Barsebäck nuclear power plant was an early termination caused by a political decision by the Swedish government. Early termination can be difficult for employees to cope with, especially if the facility is well managed and has a good reputation as being safe and efficient.

The first of January 2007 the number of employees within BKAB, operating company of Barsebäck nuclear power plant, was decreased from 130 to 43. The dramatic organisational change in combination with new regulations raised a concern for oscillations of safety culture. This thesis gives an overview of existing change strategies to seek sources for, and understanding of, factors that may cause oscillations to the safety culture.

Finally, the single most important factor that has been identified in this study as having a large impact on the employees view on the organisational change is the vision of "Developing the decommissiong". Using this vision as a powerful tool, the management will be able to lead the new organisation into a model for decommissioning nuclear power plants.

Keywords:

Barsebäck, Organisational change, Downsizing, Safety culture, Decommissioning

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Chapter 1

Introduction

This chapter aims to present the study in general and describe the research question and how it has been addressed.

1.0.1 Background

Barsebäck nuclear power plant (NPP) has been shut down as a result of a political decision in the Swedish government. After the closure of the two units at Barsebäck nuclear power plant, a decommissioning process was started. The period between production was stopped until the deconstruction can start has been divided into three phases. This report focus on the transition from phase 2 to 3 when the operating company Barsebäck Kraft AB will be downsized from 130 to 43 persons.

The change from being a nuclear power plant, to become an organisation that maintains buildings and systems until deconstruction implies changes to the regulatory framework. The introduction of a new regulatory framework and a new organisational structure are assumed to introduce cultural changes. The main objective for this study is to identify and analyze factors that may cause oscillations in the safety culture until deconstruction can start.

1.0.2 Background to the organisational change at Barsebäck Kraft AB

The nuclear power industry in Sweden has been a source for several political controversies. After the Three Mile Island accident in the United States in 1979, a referendum was held in Sweden led to a parliament decision to eventually phase out the existing 12 nuclear power reactors in Sweden. The time schedule for the decommissioning of nuclear power plants, NPPs, has changed several times but in the spring of 1997, the Swedish parliament adopted a bill that included the closure of Barsebäck NPP. (Lekberg, 2002)

The two nuclear reactors at Barsebäck NPP were closed in 1999 (B1) and 2005 (B2). The last nuclear fuel and the control rods were removed in December 2006 and the facility goes from being a NPP to a facility that handles radioactive materials in form of decontaminated systems.

The deconstruction of the two reactors will not be started until there is a facility that can receive the large amounts of waste materials. According to the timeplan, the deconstruction will start in 2017. Until the deconstruction can start, Barsebäck NPP has to be maintained according to Swedish legislation.

The closure of the Barsebäck NPP decreases the needed work force and therefore has an organisational downsizing process been initiated. From being approximately 400 employees during normal operations of the two units, the new organisation will consist of 43 persons. The large proportions of this change will affect the whole organisation on all levels.

1.0.3 Background to this study

During the autumn of 2006 a questionnaire survey, “Barsebäck – Personalenkät 2006”, was carried out at BKAB. This survey covered the area of workplace satisfaction, management,

values and how the employees perceive the organisational change. The questions were of the kind "I don't agree – I agree fully" using the scale 0-99 where 99 represents total agreement. All questions were formulated in a positive manner e.g; "6. To which extent do you think that your managers involve you in quality improvements and the development of organisational activities, Small extent – Large extent"

The average value for all questions was 71,9 with a standard deviation of 7,44 between the mean values for each question. This shows a generally good result, but without the possibility to pinpoint certain areas of special attention. However, one question had a mean answer of only 55,7 which is 2,18 standard deviation from the mean value. This question was: "To which extent are the effect of performed measures evaluated."

The main purpouse of this study is therefore to work as an evaluation of the performed measures within the organisational change.

1.0.4 The research question

The research question for this study takes its stand in dynamic control theory, in which a step change from one fixed level to another will lead to oscillations before a steady state is reached. (Leigh, 2004) The research question is therefore:

> To seek sources for, and understanding of, factors that may cause oscillations during the transition from an existing level of safety culture into a new and lower level.

1.0.5 Limitations and delimitations

The limiting factors of a study can be divided into delimitations and limitations. Delimitations imply the limitations that are implied deliberately. Limitations refer to factors that cannot be controlled by the researcher. (Rudestam and Newton, 2001)

The main parts of the dissertation work has been carried out in Gothenburg where the supervisor at Chalmers University of Technology is located. The geographic distance between Gothenburg and Barsebäck creates a limit of participating observations and interviews. The participating observations aim to give an understanding of the organisation and the context of the studied change. The limited time at Barsebäck will therefore also limit the knowledge of the organisation but also limit the bias that otherwise would have been built up.

The main delimitations have been to focus on transitional changes during downsizing and the affect such change has to the corporate and safety culture within the context of Swedish nuclear industry.

Chapter 2
NPP decommissioning and safety culture

The first part of this chapter describes the general principles of decommissioning nuclear facilities. Different strategies are described and and an overview is provided that show which strategies that have been preferred in other European countries this far. The second part focus on safety culture within a the context of nuclear power plants. The general ideas and principles of creating and maintaining safety culture is presented.

2.1 Definition of decommissioning

This report uses the word decommissioning frequently. Therefore, it can be good to start this chapter by define the word decommissioning as it is used in this report. The chosen definition of decommissioning in this report is taken from the International Atom Energy Agency's (IAEA's) description of decommissioning:

> "The principle of decommissioning is to place a facility into such a condition that the decommissioned facility poses no unacceptable risk to the public, the workers or the environment." (IAEA, 2007, p2)

2.2 Decommissioning

According to IAEA (2007), there are thousands of facilities around the world that are using radioactive material that will require some form decommissioning within the next

forty-five years. These facilities reach from large complex facilities such as nuclear power plants to small facilities such as university laboratories.

2.2.1 Early decommissioning

A NPP can either be decommissioned because its technical lifetime is over, or by non-technical factors. The latter is known as early termination and the reason why a NPP will be terminated early is mainly: (IAEA, 2003)

- Economical

  When the power plant becomes older, the need for maintenance increases and at a certain point, it will be more profitable to replace the power plant with other production.

- Safety

  The power plant cannot meet the regulatory demands for safety.

- Political

  Political reasons for early termination are often a result of a new governmental strategy within the energy supply or due to new risk evaluations. Political reasons are often independent of the actual state of the nuclear power plant.

Early termination of a NPP may be the most difficult and sensitive change during the entire lifetime of a nuclear plant. The reasons for the closure are often hard to face by the personnel involved, especially if the early termination is based on political decisions.

The personnel may in these circumstances feel that the facility is well managed, and that it will be closed down for non-logical reasons or reasons beyond their control. (IAEA, 2003)

2.3 Decommissioning strategies

Decommissioning strategies can be divided into general- and unique strategies. The complexity of nuclear power plants creates a uniqueness of each reactor, which in turn, raises need for special concerns when it comes to decommissioning. (IAEA, 2007)

Irrespective of the chosen strategy, all decommissioning of nuclear facilities will include some degree of dismantling and generation of nuclear waste. For dismantling, there are three main strategies; intermediate dismantling, deferred dismantling and entombment. (Ibid)

2.3.1 Immediate dismantling

Intermediate dismantling is the strategy in which equipment, structures and parts of a facility containing radioactive material is removed or decontaminated to a level that allows the facility to be released for unrestricted use as soon as possible after a permanent shutdown. (Ibid)

Intermediate dismantling requires a possibility to remove the radioactive material from the facility to a long-term storage or disposal. According to IAEA (2007), is intermediate dismantling should be the preferred decommissioning strategy.

2.3.2 Deferred dismantling

The deferred dismantling strategy let the dismantling process wait and the facility is placed into a long-term storage where it is maintained in a safe condition. This caretaker mode can range from a few years to over fifty years, after which the decommissioning will be completed. The caretaker mode can be preceded by an initial decontamination or dismantling.

The deferred dismantling strategy is often used on sites with several nuclear facilities (reactors), when one or several facilities will be shut down and the remaining will continue to operate. (Ibid)

2.3.3 Entombment

The final decommissioning strategy is entombment. This strategy encases the radioactive contaminants within a long lasting material until the radioactivity decays to a level that permits release of the facility from regulatory control. (Ibid)

2.4 Review of dismantling strategies in other European countries

IAEA (2007) gives example of dismantling strategies for different European countries. These strategies shows which strategies that have been used this far and does not value however these should be used in the future.

2.4.1 United Kingdom

The choice of decommissioning strategy regarding the governmentally owned nuclear reactors in United Kingdom have been based on the criteria of creating largest value for the tax payers. This far, a combination of deferred dismantling and entombment has fulfilled these demands best. (Ibid)

The principle used, is that when fuel and other highly radioactive parts are removed, the facility is put into a caretaker mode for 30 years (deferred dismantling). Thereafter is buildings re-enforced for 100 years entombment until deconstruction starts. (Ibid)

2.4.2 France

The French method to decommission nuclear reactors starts by removing all highly radioactive material. Thereafter, deconstruction of buildings and systems not needed for the reactor containment are started. Finally, the reactor is either dismantled immediately or deferred for up to 40 years. (Ibid)

2.4.3 Germany

In Germany, two strategies are practiced, immediate dismantling and deferred dismantling. In the case of deferred dismantling, the facility is maintained and surveiled for 30 years. (Ibid)

2.4.4 Italy

Italy has decommissioned all commercial nuclear power plants as a result of a referendum held in 1987. The strategy that has been used in Italy is the deferred dismantling. This is because of a lack of disposal and storage facilities for nuclear waste. (Ibid)

2.4.5 Summary of decommissioning strategies

In spite, IAEA (2007) sees intermediate dismantling as the preferred strategy, it seems that the most common strategy is deferred dismantling. One reason for this can be the problem to dispose the waste such for the Italian NPPs.

Table 2.1 shows the preferred dismantling strategy chosen in different countries this far.

2.5 Safety culture

Management of NPPs raises concerns that are more demanding than for many other industries. The demands for a strong safety culture and good profitability creates a situation

Table 2.1: *Preferred dismantlig techniques (IAEA, 2007)*

Country:	Immediate Dismantling:	Deferred Dismantling:	Entombment:
UK		X	X
France	X	X	
Germany	X	X	
Italy		X	

where supporting concepts, tools and techniques becomes important. (Svenson et al, 2006)

According to Svenson et al (2006), researchers in the field of culture have been arguing for years about the extent to which culture can be managed, the difference between culture and climate and other issues of similar kind. However, there is no doubt that safety culture as a concept has fostered a more elaborated view on safety by attempting to make some subjects explicit that previously were more implicit in kind. (Ibid)

2.5.1 Safety culture and values

Lately, according to Svenson et al (2006), the focus of safety culture research has been turned to the concept of values. A perspective based on values and a specific context, in this case safety, can be of benefit to obtain better understanding of safety and also for the whole integrated socio-technical function of NPPs.

However, the theory of values and safety culture are dependent on the presence of management ideologies that can support the desired values. The problem that arises is that organisations of the size needed needed to operate a NPP will include several conflicting management ideologies. To understand the complex interaction between different management ideologies and values, a model is needed. (Ibid)

2.5.2 The multiple perspective model

To give a broader theoretical frame of cultural research, the multiple perspective model is used. This model argues for a measurement of organisational culture in terms several complementatary approaches as seen in figure.

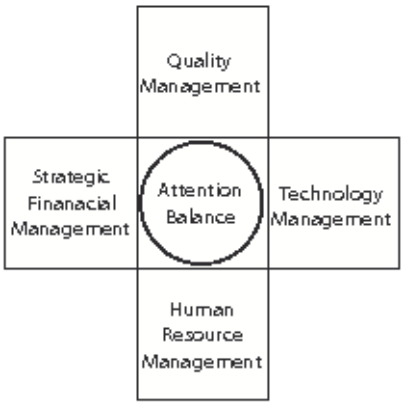

Figure 2.1: *The multiperspective model (Svenson et al, 2006)*

According to Svenson et al (2006), the model should be seen as the arena from where decision makers see the organisation and the several competing issues. The use of the model can be described as:

> "Imagine the model... folded as a cube where each side represents the four management issue areas and the top surface of the cube represents a safety management arena, such as a management group. Because none of the four issue areas are directly visible from the top, the actors in the safety management group are dependent on their own knowledge of the various areas together with symbolic representations in form of written reports, documents etc." (Svenson et al, 2006, p81)

Quality management

Quality management in this context means the set-up and use of a quality system with associated internal auditing functions. The external mirror image of these functions is comprise of regulatory bodies and related organizational structures, processes and rule systems. (Ibid)

Technology management

Strategies and issues associated with operative as well as long term maintenance and development of the technological production system. Technological long-term management and quality management are closely related in that norms, standards and regulations present restrictions for the technological change process. (Ibid)

Human resource management

Access, maintenance and development of human resources are crucial for safe operation of NPPs. Knowledge, experiences, attitudes and values held by managers and other personnel, especially seen in a longer time perspective, are associated with a host of external societal factors, such as; general changes in values, access to competence, contractor competence etc. (Ibid)

Financial management

This focus area represents the economic goals of the organisation and the associated strategies to handle financial expectations in a deregulated market. Increased demands in this area may lead to changes in focus that, if not monitored and balanced efficiently, may jeopardize safety and in the long run economy as well. (Ibid)

2.5.3 Interaction of values

The stream of issues that confronts management is of course, in some sense, an obvious observation, therefore priorities have to be made. Priorities have to be balanced so that

at least the most crucial subject areas are considered in the decision process. Conflicts of value may arise in this process. According to Svenson et al. (2006), management tends to perceive and attribute conflicts in individual terms rather than see them as conflicts among groups. A more fruitful and rational approach would be to increase knowledge and consciousness of the value systems associated with various issue domains.

According to Lekberg (2002), Granholm Rollhagen (1997) and Svenson et al (2006), has the attention on financial issues increased. Therefore will the following interactions be based on the interaction with financial management.

Financial management and quality management in interaction

Quality management focuses on determining required principles, structures and processes, making them explicit, and to provide a system for control and resolution of observed deviations. Values associated with quality management may be in direct conflict with at least short-term financial goals but also with long-terms financial goals due to several reasons:

- Quality system are based on the belief that it is important and essential to regulate, describe and control objects so that they remain within desired operational envelopes.
- Quality systems, thus, impose restrictions by stating what should and what should not be the case – they aim for making boundaries visible for actors.

A general problem with many quality systems is how actors with multiple goals perceive them. One aim of quality systems is to impose restrictions. This implies that quality systems and regulations, also can slow down safety development. (Ibid)

Human resource management and financial management in interaction

Human Resource Management (HRM) in terms of focus on teamwork between groups, general training, empowerment etc has been found to correlate with various output measures.

How different actors perceive management's values and attitudes towards safety in relation to the safety climate can, according to Sve be nson et al (2006), be divided into threefactors:

1. Perception of to what extent managers were concerned with well-being of their subordinates.
2. How active managers were in responding to concerns raised from actors.
3. Direct perception of physical risk.

Values that emphasize general well being and concern for people relates to a management ideology rooted in a humanistic orientations that may be in direct conflict with Rational Goal Models with their major focus on efficiency and power. A balanced attention approach in NPP-management implies sensitivity and need for communication and concern for the importance of the HRM-aspects.

Management of financial resources and personal resources are obviously connected in a multitude of aspects. It is reasonable to assume that different management practices, such as downsizing and outsourcing, may be associated with changes in value systems and thereby in cultures. However, yet known about how safety might be affected although there is some evidence that downsizing may have contributed to some spectacular accidents according to Svenson et al (2006).

Financial management and technology management in interaction

Values associated with technology management are both instrumental and terminal: technology may be valued for its own sake and not only as a mean to reach other values. People who participated in the construction and early operation of NPPs in Sweden did so because they found the industry "exciting", "new", "challenging" etc. Many engineers, thus, valued the technology for its own sake. It represented an interesting domain of technology.

Over time, it appears, according to Svenson et al (2006) to have been a gradual departure away from the close association between technology management and financial management with a resulting gap in a unified and shared cognition about NPPs. The subculture of technology management as an issue domain appears to create a new management subculture that departs from the previous more integrated view of financial and technological issues in interaction. This may not be a danger provided that balanced attention can be achieved.

Chapter 3
Organisational change

The only thing that is constant, is change

Heraclitus (500 BC)

This chapter presents the theoretical framework of organisational change in a general perspective. To work as tools for the analysis, some differfent change strategies are presented. In the end of this chapter are the communication process and different levels of organisational culture presented.

3.1 Historic background

The philosophic history of change is almost as old as philosophy itself. Known as the very first philosopher is Thales of Miletus. Thales' most famous belief was his hypothesis, which held that the world originated from water. This hypothesis was the beginning of the search for the origin of everything. Heraclitus, on the other hand, claimed that everything originated from change because this was the only thing he found constant. (Högnäs, 2003)

3.2 Different kind of changes

Generally, change strategies can be divided into three main categories: developmental, transitional and transformational change. Each of them is related to one certain type of change. This does not constitute any hinder that a change includes parts from more then one category. (Anderson and Ackerman, 2001)

3.2.1 Developmental change

Developmental change is the simplest of the three types of change. This change represents the improvement of an existing skill or method that does not measure up to the current or future need. The strategy is relying on two assumptions; first, people are capable of improving. Second, they will improve if they are provided with the appropriate reasons, resources, motivation and training. The risk associated with this change strategy is considerable lower then the two other change strategies. (Anderson and Ackerman, 2001)

3.2.2 Transitional change

Transitional change is more complex. Rather then improve what is, transitional change replaces what is with something entirely different. This type of change is suitable to be managed as a project with a specified start, end, budget and outcome. An important part of the transitional change is to identify the differences between the old state and the new. This process includes booth organisational as well as human aspects and gives good information to build a good change plan. (Anderson and Ackerman, 2001)

3.2.3 Transformational change

The transformational change is the most complex change and demands a shift in human awareness that completely alters the way the organisation sees the world.

Contrary to the two first types of change, transformational change cannot be quantified and require a significant change in culture and mindset in the organisation. The future state cannot be completely known in advance. Significant transformations of the organisation's culture and people's behaviour and mindset are required. The change process itself cannot be tightly managed or controlled because the future is unknown and the human dynamics are too unpredictable. (Anderson and Ackerman, 2001)

3.3 Overview of change strategies

To tackle the prevailing change in a systematic manner, tools in form of strategies are needed. The first and most fundamental of these strategies are Lewin's strategy for change.

3.3.1 Lewin

Lewin (1947), provided a linear model for a change process. In his model, Lewin observed that any living system is always in a state of change, but that the system will tend toward some kind of 'quasi-stationary equilibrium' (Lewin 1947). A balance of forces pushing in different directions achieves the equilibrium.The level of behavior of the system is the result of forces such as those striving to maintain the status quo and those pushing for change. When both sets of forces are similar, current levels of behavior are maintained. In order to change the equilibrium, one can either increase those forces pushing for change or decrease those forces maintaining the current state, or apply some combination of both. Lewin suggested that weakening those forces that are maintaining the status quo produces less tension and resistance than increasing forces for change and that the former consequently is a more effective change strategy. Lewin conceived change as a modification of those forces keeping a system's behavior stable. Lewin viewed the change process as consisting of three phases or stages:

1. *Unfreezing.* Unfreezing is accomplished by introducing information that shows discrepancies between behaviors desired by group members and those behaviors they currently exhibit.

2. *Moving.* It involves developing new behaviors and attitudes through changes ingroup structures and processes.

3. *Refreezing.* It is accomplished through the use of supporting mechanisms that reinforce the new state, such as systems, structures, and policies.

Levin's model provides a framework for understanding the phases of the change process.

3.3.2 Axelrod

According to Axelrod (2000), Organisational change efforts have historically followed four models. In leader-driven change, the heroic figure uses insight, charisma, and leadership skills to convinces a reluctant group of people to do something that they might otherwise not want to do. In process-driven change, consulting firms drive the change process with leaders serving as cheerleaders. In team-driven change, crossdisciplinary teams lead the change process, operating in a parallel organisation with leaders again serving as cheerleaders. These models have largely given way in contemporary organisations to the change-management paradigm in which process- and team-driven change models are integrated.

Change-management process and assumptions

In the change-management paradigm, a sponsor group of senior leaders initiates the process, champions the effort, and provides founding. A steering committee of people representing a cross section of the organisation is responsible for the day-to-day management of the change process. Cross-functional, multi-level design groups develop the plan for the change process. Cross-functional, multi-level change management paradigm is used to make organizational change possible by increasing employee support and commitment.

Axelrod (2000) argues that the change management paradigm has failed to fulfill its promise of increased employee support for, and commitment to, the organisational change. The change-management paradigm allows the few to decide for the many, isolates leaders from organisation members, separates the design process from the implementation process. Further on, it adopts the parallel organisation without adopting participatory management practices, makes process improvements primary and cultural shifts secondary. The change management paradigm often fails to achieve the desired outcomes, instead producing employee cynicism, resistance and disengagement with the change process.

The engagement paradigm

The engagement paradigm was born out of the work of The Axelrod Group, Inc. as they set out to develop a change process to address the shortcomings of traditional change management models. The engagement paradigm is based on four principles; widening the circle of involvement, connecting people to each other and ideas, creating communities of action, and embracing democracy.

1. Widening the circle of involvement involves expanding participation in the change process beyond a few dozen hand-selected employees to hundreds, even thousands of employees. This allows new and different voices to emerge and contribute to the change process and creates a critical mass for change so the few are no longer left in the position of deciding for the many.

2. Connecting people to each other and ideas involves lowering barriers to the flow of information and new ideas as people forge links with other. When people connect with each other, they become human beings with their own real-life issues and concerns. Connection allows people to get to know others beyond the facade of role and title.

3. Creating communities of action involves moving beyond people who have connections with others to developing a group of connected people with the will and willingness to work together to accomplish a goal with meaning.

4. Embracing democracy involves people coming together, discussing and resolving issues, and acting. The democratic process involves dealing with issues of self-interest versus the common good and minority versus majority opinion in a way that ensures support and follow-through for the chosen course of action. Democratic principles are universal principles that speak to the human spirit, desire to be free, desire to have a say and the desire to shape one's own destiny.

The engagement model is implemented through what Axelrod (2000) calls the Conference Model, which consists of an integrated series of large and small group sessions. Large

conferences are held every four to six weeks involving large numbers of employees from all levels to identify change opportunities and engage in planning the implementation process. "Walkthrus" are held as mini conferences for employees not able to attend the conferences to engage them in the change process. In both conferences and Walkthrus, employees are given an active opportunity to express their ideas and concerns that are incorporated into planning and implementation processes. The engagement paradigm does not mean excluding leaders, rather, leaders play crucial roles throughout the process. Leaders identify what needs to be changed and why and determine boundary conditions for the change effort. Leaders set the engagement process in motion, determine whose voice needs to be heard, and establish the conditions for employees to have a voice in the change process. Most importantly, the leader's role is not to provide the answers, but to ensure that the answers are discovered.

According to Axelrod (2000), the engagement model offers several benefits. People grasp the big picture, fully understanding the dangers and the opportunities facing their organizations through participation in the change process. There is urgency and energy as people become aligned around a common purpose, creating new directions and accountability. Collaboration across organisational boundaries increases because people are connected to the issues and to each other. Creativity is sparked when people from all levels and functions along with customers, suppliers, and other stakeholders contribute their best ideas. Capacity for future changes increases as people develop the skills and processes to meet not just the current but future challenges as well.

Axelrod (2000) recognizes that while his engagement paradigm is intuitively simple, in practice, it is quite difficult to do. He cautions that there is a downside to engagement, i.e. when it goes wrong. Cynicism and doubt become endemic. When leaders breaks the promise of engagement, the resulting damage can take years to repair. Before attempting to follow the engagement paradigm, leaders must be prepared to walk the talk, recognizing that the truth of what one says lies in what one does. Leaders who create false or manip-

ulative engagement strategies or cancel the engagement process midstream may be worse off than those that never start.

3.3.3 Kotter's eight phases

John Kotter (2007), teacher in Leadership at Harvard Business School, has been studying over 100 companies and their efforts to implement change in their organisations. From these studies, he defined eight phases that all changes goes through. The general lesson that he learned from the successful companies were:

> "Change process goes through a series of phases that, in total, usually require a considerable length of time. Skipping steps creates only the illusion of speed and never produces satisfactory results" ... "making critical mistakes in any of the phases can have a devastating impact, slowing momentum and negating hard-won gains" (Kotter, 2007, p 97)

Below follows a short explanation of the eight phases in kotter's model. The most important issues in each phase have been itemized in order to provide a fast overview.

1. Establish a sense of urgency

- Examining market and competitive realities.
- Identifying and discussing crises, potential crises or major opportunities.

Even if the first step seems to be easy, Kotter () have found that more then 50% of the companies that he have watched, fail in this phase. This can be caused by an underestimation of hard it is to drive people out of their comfort zones or it can caused by impatience or because of a weak leadership. The main objective of this phase is:

> "to make the status quo seem more dangerous than launching into the unknown." (Kotter, 2007, p 98)

2. Form a powerful guiding coalition

- Assembling a group with enough power to lead the change effort.
- Encouraging the group to work together as a team.

In order to be able to start the change process, a critical mass of executives and influential managers. This group will, according to Kotler, never include the all the senior executives in a company because some people will not buy in, at least not first.

3. Create a vision

- Create a vision to help direct the change efforts.
- Developing strategies for achieving that vision.

The main purpose of vision is to clarify and visualize the direction, in which an organisation needs to move. Without a vision, the change effort will dissolve into a list of confusing and incompatible projects that can take the organisation in the wrong direction. In failed change projects, there are usually plenty of plans, directives and programmes, but no vision.

> "Martin Luther King Jr. had a dream, not a strategy or goal, and he showed us his dream, his picture of the future." (Kotter, 2005, p 3)

4. Communicate the vision

- Using every vehicle possible to communicate the new vision and strategies.
- Teaching new behaviours by the example of guiding coalition.

The importance of communicating the vision is to capture the heart and minds of the persons that will be affected by the change. Employees will not make sacrifices, even if they are unhappy with the status quo, unless they believe that useful change is possible.

5. Empower others to act on the vision

- Getting rid of obstacles to change.
- Changing systems or structures that seriously undermine the vision.
- Encouraging risk taking and non-traditional ideas, activities, and actions.

In the first half of a change, no organisation has the momentum, power or time to get rid of all obstacles. However, action is essential, both to empower others and to maintain the credibility of the change effort as a whole.

6. Plan for a create short-term wins

- Planning for visible performance improvements.
- Creating those improvements.
- Recognizing and rewarding employees and involved improvements.

Without short-term wins, too many people give up or actively support those who have been resisting change. Creating short-term wins is an active process

7. Consolidate improvements and sustain the momentum for change

- Using increased credibility to change systems, structures, and policies that don't fit the vision.
- Hiring, promoting, and developing employees who can implement the vision.
- Reinvigorating the process with new projects, themes, and change agents.

Until the change sink deeply into the enterprise culture, the change is fragile and subject to regression. The important thing is not to declare victory too soon.

8. Institutionalize the new approaches

- Articulating the connections between the new behaviours and corporate success.
- Developing the means to ensure leadership development and succession.

Change are fully implemented when it is seen as "the way we do things around here". Until new behaviours are rooted in social norms they are subject to degradation as soon as the pressure for change is removed.

3.3.4 Mark's four elements of workplace recovery

Mitchell Lee Marks (2003) introduces four elements that are needed for the workplace to recover after a downsizing.

Empathy

> "Let people know leadership acknowledges that it has been difficult, currently is difficult, and will continue to be difficult for a while. " (Marks, 2003, p161)

Expressing empaty is important according to Marks (2003) because it contributes to unfreeze people. In many organisations are the employees not accustomed to hear their susperiors admit that times have been tough. This creates thoughts like "If the big guns are owing up to – rather than denying – the problems stemming from transition, maybe I should too". (Marks, 2003, p161)

Other ways for the management to demonstrate empathy for what the employees have experienced during the change is to use symbols, ceremonies and creating forums to help people to loosen their grip of the old. Knowing that the emotional realities they experience during, and after the change, are legitimate and recognized helps the employees to move faster through the of ending the old. (Ibid)

Engagement

Empathy creates an emotional ground for the recovery, the intellectual understanding and support is created by engagement. Marks (2003) describes three streams of activity that engage people in the workplace recovery and weaken forces against the new organisational order.

- Help people accomplish their immediate work objectives
  Clarifying priorities and providing resources to get the job done increases the motivation of people. When people know what is expected of them and have the information, tools, and time they need to get it done, the "Why bother?" attitude is weakened.

- Enhanced communication and employee involvement
  The communication within the organisation should be enhanced so that there is a full sharing of information within the organisation, both up and down, as well as across the organisation. To enhance involvement it is important to give people sufficient time to problem-solve and give recommended ways of working smarter as the organisation moves from the old to the new order.

- Engage people in identifying and eliminating barriers
  The best way to engage people to eliminate barriers is if the management ask them. This involves them and enhances a better upward communication.

Energy

The energy required for recovery after transition is sustained by maintaining the human touch. This demands that the leaders don't acts as the transition is over. Instead, the management should continue the contact with employees on an human level and provide support, both practical and emotional. (Ibid)

To focus the energy from each employee into one desired direction, it is important to formulate a vision of the future. The content of the vision provides a direction but it is the manner through which the vision is developed and communicated that creates expectations, perceptions, behaviours and mental models in the desired direction. (Ibid)

The vision should reach the employees both emotionally and on a practical level. Marks (2003) points out four important factors that are needed to create a vision that are motivating:

1. The vision must be seen as important as a tool to create success.
2. The vision must be credible by relating to the work situation.
3. The vision must be attractive; people have to find it desirable.
4. The vision must be realistic.

Enforcement

Energised by a clear vision, an openness to new ways of doing things, and support by their leadership, employees are ready to march up the hill to capture post transition opportunities. The task of the fourth element of workplace recovery is to strengthen the forces that lead the change in the desired direction, to contribute to the desired mental models among the employees. (Ibid)

Enforcement contributes to the refreezing phase of Lewin's organizational change model. According to Marks (2003), some critics say that "refreezing" into a new organisational order is not appropriate for today's business realities. (Marks, 2003)
To create mental models, steering is needed in form of enforcement. The enforcement can be in form of communication and information, including both what kind of information that flows through the organisation, but also the paths that are used for formal and informal communication. Further on, compensation models can be used as a powerful tool to

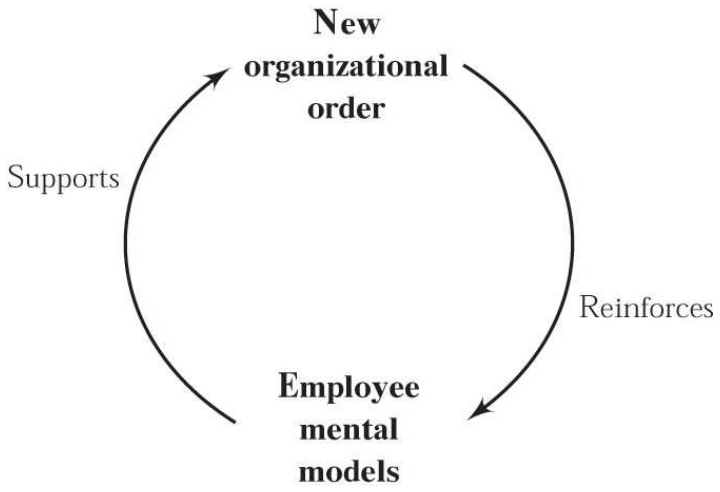

Figure 3.1: *The communication process according to Kotler et al (2005)*

show the new organisational values. The compensation model must not only be fair but also be consistent with the business strategy, management philosophy and the employee's needs. If the valued behaviours cannot be adequately measured, a recognition program can be a better alternative then financial incentive. (Ibid)

To make the compensation program successful, Marks (2003) suggests that it should be combined with training to provide the knowledge base that is needed for the employee to carry out the work. An organization may have identified attractive rewards and have every intention of paying out for a job well done, but employees who feel they lack the skills to get the job done will not have the motivation to perform. (Ibid)

3.4 Communication

The word 'communication' has its origin in the Latin word 'communicare' that means to make something common. The base for all communication is therefore to make information common to persons. (Nilsson and Waldemarsson, 1990)

3.4.1 The communication process

Kotler et al. (2005) decribes a model of the communication between a company and its market. This model is very general and is therefore used as a base for the communication model that is used in this study.

As seen in Figure 1, this is a communication process that is based on one-way communication. First, the communication is from the sender to the receiver and thereafter from the receiver to the sender.

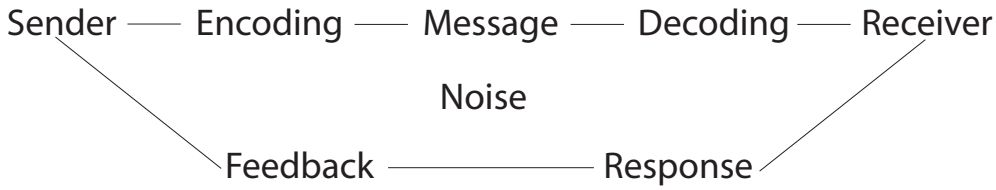

Figure 3.2: *The communication process (Kotler et al, 2005)*

The communication between management and employees will include another feedback, i.e. the feedback from management to the employees. Of this reason, the communication model for this study will be as seen in Figure 2.

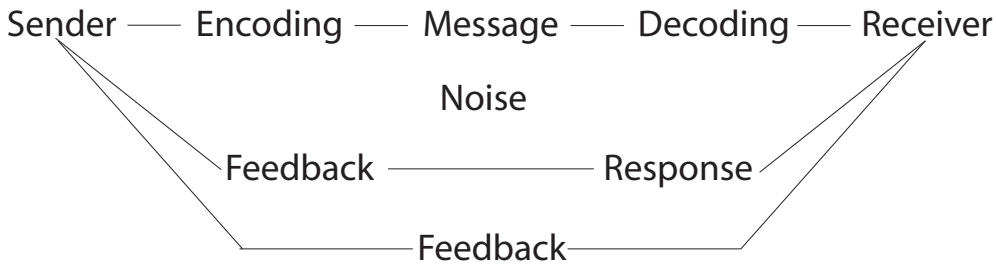

Figure 3.3: *The communication process with feedback from management (Kotler et al, 2005)*

The communication process is sensitive and there are several factors that can affect the message from its way from the sender to the receiver. An effective communication is when the receiver interprets and responds in the same way as the sender intended. (Jacobsen and Thorsvik, 1997)

The best communication is achieved when the sender's encoding process corresponds to the receiver's decoding process. This however, is dependent on that the sender's expertise overlaps with the receiver's expertise and that the sender use words and symbols that are familiar to the receiver. (Kotler et al, 2005)

3.4.2 One- and two-way communication

During an organisational change, many important and difficult decisions have to be made. These decisions can be difficult to understand and creates a resistance among the employees. Therefore is one important factor that the communication is held in a manner that allows the employees to respond and to create a discussion around the communicated topic. (Carnall, 1995)

This makes the two-way communication far more efficient in order to involve the employees in the ongoing change. The risk that arises when a message are communicated to a large group is, however, that the sender thinks that a two-way communication is settled when, in fact, there is a one-way communication. (Ibid)

3.4.3 Verbal and written communication

According to Robbins (2003), a personal communication between two persons is the most efficient. In this case, the information is not only communicated by words, but also by body language, gestures, intonation et cetera. The sender will have a good opportunity to confirm (both verbal and nonverbal) that the information has been interpreted correctly.

3.4.4 Richness of communication channels

To create possibilities for response, Robbins (2003) describes that there is a variety of communication channels and what characterises the rich channels are:

1. Handle multiple cues simultaneous.

2. Facilitates rapid feedback.

3. Be very personal.

The richness of different communication channels can also be described in figure, where the

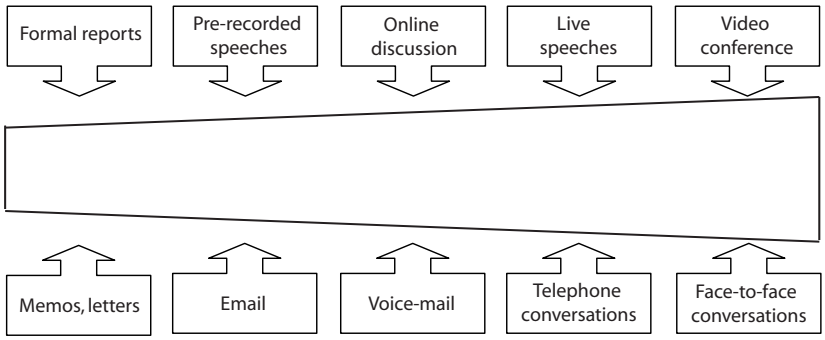

Figure 3.4: *Information richness of communication channels (Robbins 2003)*

3.5 Organisational culture

As well as communication and leadership, culture has a great impact on how a group work. Mead describes the affect that culture have on people as; "*A person is a personality because he belongs to a community, [and] because he takes over the institutions of that community into his own conduct.*" (Mead 1934, p162)

That the individual and culture is closely linked together stresses the importance of a sound culture that can inspire the employees. Thomas J Watson (1963) describes the factor behind IBM's success as a set of values that positively contributed to the organisational culture. From his own experience, Watson claims:

> "Any organization, in order to survive and achieve success, must have a sound set of believes that the most important single factor on which it premises all its

> policies and actions. Next, I believe that the most important single factor in corporate success is faithful adherence to these beliefs. And, finally, I believe if an organization is to meet the challenges of a changing world, it must be prepared to change everything about itself except those beliefs as it moves through corporate life." (Watson T.J., p 6)

3.5.1 Levels of organisational culture

According to Schein (1992), organisational cultures are built up of three levels; artefacts, espoused values and basic assumptions. The first level, artifacts, is the easiest to study. The espoused values and basic assumptions are more difficult to study but these are the base for the artefacts and therefore can these be seen through the artefacts that the organisation has built up.

3.5.2 Artefacts

Artefacts is the first level of a culture is what can be seen as a surface of the culture and involves everything that can be seen and heard when the organisation is studied. Artefacts include how the workplace environment is built up, the dress code, anecdotes and the jargon within the organisation.

Artefact can be easy to detect but can be difficult to interpret and to understand. To create tools to interpret and understand, the cultural values and basic assumptions must be studied (Ibid)

3.5.3 Espoused values

The second level of organisational culture is the espoused values, which helps the organisation to act in situations where they otherwise would have been uncertain of what is right or wrong. The espoused values are conscious to the members of the organisation but are nothing they reflect on. (Ibid)

3.5.4 Basic assumptions

The third cultural level is the basic assumptions that act as the reality for the organisation's members. The basic assumptions are routed deep into the organisation and are taken for granted. These assumptions have an effect on how members of the organisations think and feel.

The basic assumptions are subconscious and are therefore difficult to bring up to discussion. Shared assumptions create security and a good communication climate. (Ibid)

Chapter 4
Scientific approach

This chapter aims to give an understanding about the methods and the scientific base that this study relays on. This provides information on how the researcher has designed the study and why different practical choices have been made.

4.1 Scientific approach in general

The scientific approach is made up of different parts tha each support information and constraints to the other. Accroding to Crotty (2003), the scientific approach can be split into four major parts:

- **Methods:** The techniques or procedures used to gather and analyse data related to some research question.
- **Methodology:** The strategy, plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes.
- **Theoretical perspective:** The philosophical stance informing the methodology and thus providing a context for the process and grounding its logic and criteria.
- **Epistemology:** The theory of knowledge embedded in the theoretical perspective and thereby in the methodology.

The relationship between the four elements can also be described as figure 1 where each element inform the underlying element with information.

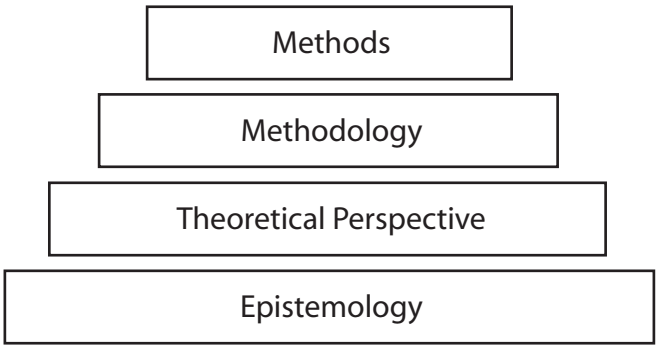

Figure 4.1: *The relationship between the different parts of the scientific approach (Crotty, 2003)*

4.1.1 Method

This study includes elements of both qualitative and quantitative methods. The main sources of primary data have been interviews and participating observations, which are found within the qualitative range. Further on, the first interview occasion included questions that can be quantified and finally have an already performed survey given inputs to this report.

The conclusion is therefore that the study is mainly qualitative with quantitative elements. This type of study is defined by Crosswell (2003) as a mixed method study.

Data collection

The data sources that have been used in this study contains both written material in form of reports, plans and earlier quantitative surveys on safety culture, as well as participating observations and interviews.

Participating observations

The participating observations have been conducted in order to give understanding of the routine within the studied organisation. Silverman (2001) states that the participating observations, in a general sense, are more then just a method. He describes it as a basic resource of all social research:

> "in a sense, all social research is a form of participant observation, because we cannot study the social world without being a part of it. From this point of view, participant observation is not a particular research technique but a mode of being-in-the-world characteristic of researchers." (Silverman, 2001, p45)

Interviews

Two interview sessions have been held for this study. The first one was held as a structured interview and the second as a semi-structured interview. According to Bryman & Bell (2003) are qualitative interviews often more flexible then quantitative. The reason for this is that in quantitative studies, the structure is maximized to increase the validity and reliability of the used instruments. In qualitative interviewing, the researcher wants rich, detailed answers and can therefore follow up the interviewee's replies with new questions and depart from the original interview guide.

Generally, qualitative interviewing is much greater interested in the interviewee's point of view; in quantitative research, the interview reflects the researcher's concerns. (Bryman & Bell, 2003)

The structured interview

The structured interview was held first and followed the questions found in Appendix B. These interviews were approximately 45 minutes long with a relatively low variation of approximately +/- 10 minutes.

The semi-structured interview

The semi-structured interview followed an interview guide where certain topics were listed but the interview was mainly held as an open discussion. These interviews had an average duration that corresponded with the structured interviews but the variation was much larger. The shortest interview was 30 minutes and the longest were almost 2 hours.

The problem with semi-structured and unstructured interviews is that it can be difficult to gain access to senior managers and receive their understanding of the method while this category of respondents are used to have large amount of structure in their daily work. (Bryman & Bell, 2003)

Anonymity

To protect the respondents' identity, full anonymity has been given all respondents. These include transcription of interviews and that the respondents not have filled their names into any participant consent form. Full anonymity has been seen as the most crucial factor to achieve comprehensive answers.

Sampling

The sample of people that have been interviewed in this study has been selected so that half of the people will remain in the organisation (phase 3 members) after the downsizing in January 2007. The sample has also been chosen so that the people within the sample should represent the main categories of people within the organisation (maintenance staff, operational staff, administration and management).

The studied population have consisted of 12 persons. This corresponds to Rudestam and Newton's (2001) opinion that a suitable sample size for a qualitative study is approximately 10 persons. The selection of people within the sample has been made in cooperation with Göran Larsson who is the supervisor at BKAB for this study.

Documents

The main source for documents from BKAB has been from the supervisor at BKAB, from interviewees, and directly from the internal information system Darwin. To receive documents from persons within the organisation has been seen as a risk to the study while this introduces some amount of bias.

Reports from external studies, especially from the time before BKAB became a part of RAB have not been able to find in Darwin. Göran Larsson, supervisor for this study at BKAB, has provided influential reports from this time but several of these documents contain confidential parts that have been removed.

Comparison of the used data sources

4.1.2 Methodology – case study

Because the object to this study is a particular change within a particular organisation, a case study seems to be the most suitable approach. The general characteristic of a case study is that it explores a specific event that often is bound in time and activity. (Creswell, 2003) This corresponds well to the change at BKAB.

An alternative methodology could be action research. Action research has a lot in common with the case study methodology but would have been more suitable if the study would have been carried out during a longer time period. (Crotty, 2003)

4.1.3 Theoretical perspective - hermeneutics

The theoretical perspective that is claimed for this study is close to the hermeneutic mode of understanding. Hermeneutics has to do with interpretation especially in the communication between persons. Within the communication, intentions and relations are seen as important. The word 'hermeneutic' derives from the Greek word 'hermeneuein', which means to interpret or to understand. (Crotty, 2003)

Historically, hermeneutics was, and is, the science of interpretation of scripts. The interpretation of biblical text is known as exegesis and hermeneutics came to be the complex principles, methods and rules that lie behind the interpretation. (Ibid)

Table 4.1: *The four elements of the scientific approach (Crotty, 2003)*

Data types:	**Advantages:**	**Limitations:**
Observations	• Researcher has a first-hand experience with participant. • Researcher can record information as it is revealed. • Unusual aspects can be noticed during observation. • Useful in exploring topics that may be uncomfortable for participants to discuss.	• Researcher may be seen as intrusive. • 'Private' information may be observed that the observer cannot report. • Researcher may not have good attending and observation skills.
Interviews	• Useful when participants cannot be observed directly. • Participants can provide historical information. • Allow researcher 'control' over the line of questioning.	• Provides 'indirect' information filtered through the views of interviewees. • Provides information in a designated 'place' rather than the natural field setting. • Researcher's presence may bias the responses. • People are not equally articulate and perceptive.
Documents	• Enables a researcher to obtain the language and words of participants. • Can be accessed to a time convenient to the researcher – an unobtrusive source of information. • Represents data that are thoughtful, in that participants have given attendance to compiling.	• May be protected information unavailable to public or private access. • Requires the researcher to search out the information in hard-to-find places. • Material may be incomplete. • The documents may not be authentic or accurate.

Characteristic for the hermeneutics is to view texts as strange and far off. This is used to separate the intentio operis, the intention of the work, from intentio lectoris, the intention of the reader. (Ibid)

The use of a hermeneutic perspective has influenced the number of quotes in this report. Quotes have been seen as the main source of interpretations in this study.

4.1.4 Epistemology - Social constructionism

The constructionist view on the world suggests that meaning is not discovered, but constructed. This can be explained as:

> "all knowledge, and therefore all meaningful reality as such, is contingent upon human practices, being constructed in and out of interaction between human beings and their world, and developed and transmitted within an essentially social context." (Crotty, 2003, p 42)

The social constructionism takes this further and sees the culture as the most important factor that constructs the reality, as people see it. This can be seen as:

> "Culture is best seen as the source rather than the result of human thoughts and behaviour" (Crotty, 2003, p 53)

Seeing culture as a factor of crucial importance to this study will demand an epistemology that does the same. Constructionism, and especially the social constructionism are therefore seen as a good epistemology for this study.

Choosing social constructionism as the epistemology are however not the most common choice for a hermeneutic study. The hermeneutic mode of understanding is often connected to the interpretivism (Crotty, 2003) so this would have been a good alternative to the constructionism as the chosen epistemology. Combining these two epistemologies is possible and will most likely be done in this study.

4.1.5 Induction and deduction

The relation between theory and empirics are usually described as inductive, deductive, abductive or as a mix of those. (Rudestam and Newton, 2001) This study is mainly deductive with elements of induction. These two concepts are described by Swanson & Holton (2005) as:

- An inductive research process builds abstractions, concepts, hypotheses from the data with the belief that themes will be revealed from the close inspection of accumulated observations and cases.
- A deductive research process, on the other hand, aims to test a theory by collecting data and testing whether those data confirm or disconfirm the theory.

4.1.6 Trustworthiness

According to Swanson & Holton (2005) should a qualitative researcher be concerned with three key issues during the research process:

1. Internal validity
2. Consistency of the findings
3. External validity

The internal validity deals with question of how the research findings match the reality i.e. the extent that the findings makes sense and are credible to the people we study as well as to the reader. (Ibid)

The consistency of the findings focus on the dependability and consistency of the results obtained from the data. This should be based on the extent to which other researchers agrees to that, given the purpose of the study, its methods, analysis, and the information collected, the results are consistent and dependable. (Ibid)

The final factor is the external validity. The validity for a qualitative study differ from the validity for a qualitative study. For the latter is validity a question of genaralizability, but for the qualitative research it's a question of understanding. The validity therefore describes the extent to which findings from one study can be used as a guide to what might occur in another situation. (Ibid)

4.1.7 Measures to increase trustworthiness

In order to increase the internal validity has all interviews been recorded and notes have been taken directly after the interview session. During the participating observations has a research diary been used to write down all impressions and ideas that have arised.

4.1.8 Criticism to the scientific approach

This section

Interviews

According to (Silverman, 2001), there are three main sources for errors when interview are used for data collection: instrumentation errors, respondent errors and the interviewer effect.Instrumentation errors are caused by the questions, they can be unclear, be formulated in a leading manner or contain language that are emotionally charged to the respondent. Respondent errors are caused by that the respondent gives answers that don't reflect the reality. A reason for respondent errors is that the respondent tries to give what he, or she, thinks is the 'correct' answer. Another threat can be the the interviewer effect, which means that the interviewer affects the respondent in a certain direction. The interviewer's age, sex, clothes and body language can be factors that cause the interviewer effect. Silverman (2001)

> "Wheter or not people have knowledge of social research, they are often more

> concerned with what kind of person the researcher is than the research itself." (Silverman, 2001, p 57)

Using quotes

Finally, including quotes in a text to describe certain opinions and thoughts can be a risk while these will be taken from a larger context that the reader are unaware of, or which is biased by the readers own experiences. (Denscombe, 2000)

Chapter 5
Empirics

"And let it be noted that there is no more delicate matter to take in hand, nor more dangerous to conduct, nor more doubtful in its success, than to set up as a leader in the introduction of changes."

(Machiavelli, 1992, p13)

This chapter describes the studied organisation and presents the collected data.

5.1 Object to study – Barsebäck Kraft AB

Barsebäck Kraft AB (BKAB) is a Swedish company that operates the Barsebäck NPP in southern Sweden. The power plant is today closed down and a decommissioning process has started.

5.1.1 Location of Barsebäck Nuclear Power Plant

Barsebäck NPP is located in southern Sweden approximately 20 km North of Malmoe and 20 km east of Copenhagen.

5.1.2 History of Barsebäck NPP

Barsebäck NPP consists of two reactors R1 and R2. The two reactors where built in the 1970s and where commissioned in 1975 (B1) and 1977 (B2). The closeness to Copenhagen and the fact that Barsebäck was one of the first NPPs to be built in Sweden made the

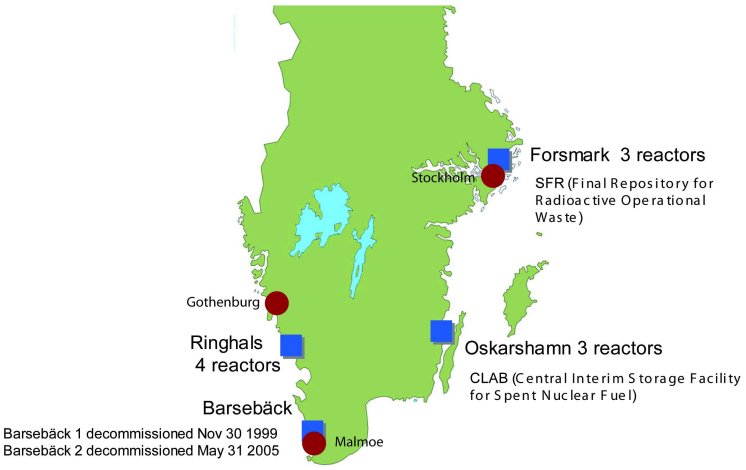

Figure 5.1: *Location Swedish Nuclear Power Plants (Courtesy of Ringhals AB)*

Barsebäck NPP to a symbol for anti-nuclear activists.

The two reactor at Barsebäck where decommissioned in 1999 (B1) and 2005 (B2) after a decision by the Swedish government. After the decision to stop the first reactor at Barsebäck, an agreement was made between the government and the owner Sydkraft. In this agreement Sydkraft (which later became a part of E.ON) where given 29.7% of the shares in the Ringhals AB, operator of Ringhals NPP, and BKAB became a sister company to Ringhals AB. This was possible because Vattenfall AB that, in turn, is owned by the Swedish government owns Ringhals AB.

5.1.3 Facts about the Barsebäck NPP

The two reactor at Barsebäck NPP are both of the type boiling water reactor, BWR. The principle of a BWR is shown in figureXX. The water are heated to boil within the reactor, the steam are thereafter led to the turbines that power the generators.
Thereafter, the steam is cooled down and condesated back to water before it is pumped back into the reactor. All Swedish NPPs use seawater to cool down the steam. This is the reason why these NPPs don't have cooling towers that are characteristic for nuclear- and

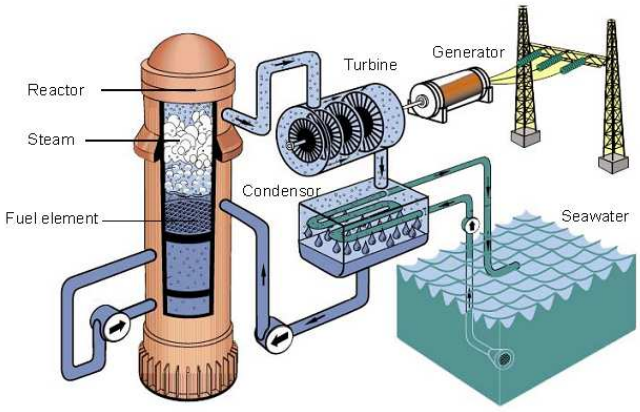

Figure 5.2: *Principle of Boiling Water Reactors (Courtesy of Ringhals AB)*

thermal power plants in many other countries.

Data Barsebäck 1

Type: BWR (Boiling Water Reactor)

Power: 1800 MWt (thermal power) 615 MWe (electric power)

Commissioned 1975

Supplier: ASEA Atom

Owner: E.ON Kärnkraft Sverige AB

Operator: Barsebäck Kraft AB, Vattenfall

Total production: 93,4 TWh electricity (1999)

Data Barsebäck 2

Type: BWR (Boiling Water Reactor)

Kapacitet: 1800 MWt (thermal power) 615 MWe (elektric power)

Commissioned 1977

Supplier: ASEA Atom

Owner: E.ON Kärnkraft Sverige AB, EKS

Operator: Barsebäck Kraft AB, Vattenfall

Total production: 108 TWh electricity (2005)

5.2 History of the organisational culture at Barsebäck

The organisational culture at Barsebäck NPP is influenced of the management and senior management that reqruited when Barsebäck was commissioned. These persons where mainly recruited form other power plants and from the merchant fleet. The influence of these people was accentuated by the lack of a strong organisational culture among the other employees. This lack of organisational culture was because many of the employees came directly from school, military service or other types of businesses.

Several of the managers from the earliest years had been employed during the construction phase and had already built up knowledge of the power plant before it was commissioned. This created a strong knowledge power, which created natural hierarchical structure. (verbal source)

5.2.1 Creation of an informal organisational culture

Barsebäck NPP is the smallest commercial NPP that have been operated for electrical generation in Sweden. This created a need for a flexible way to conduct work. This flexible way to conduct work led to that the nominal manning could be held relatively low, which in turn, created a need for a flexible way to work. This flexibility did however influence the organisational culture, so that a informal culture slowly was created. (Granholm & Rollhagen, 1997)

This slowly emerging change from a formal culture to an informal culture created several advantages within the organisation. The slow change and the many advantages with the informal culture, led to that the management lately acted to the change in organisational culture. (Ibid)

The fact that Barsebäck NPP had a very good reputation could have been another reason why the management acted late. The following quotes from IAEA OSART (Operational Safety Review Team) reports from 1986 was probably factors that made the management reluctant to change the way how the workforce conducted their work (Ibid):

> "The operation of Sydkraft's Barsebäck nuclear power station has been characterized for many years by a high availability and load factors, few unplanned shutdowns, short refuelling outages, few reportable events, low individual and collective doses to the workforce, and negligible environmental impact' (Granholm & Rollhagen, 1997, p8)

> "The team found at Barsebäck a nuclear power plant of distinctly good design and construction and operated by a highly qualified, efficient dedicated staff with an excellent attityde (sic!) to safety. There are good assurance that the outstanding operational record of the Barsebäck station will continue." (Granholm & Rollhagen, 1997, p8)

The informal culture started to be a problem when the power plant aged and the amount of maintenance rose. During the same period, a first wave of retirements led to recruitments of new staff. These two factors led to a need for a more formal cultural. (Ibid)

However, several years past by and the informal culture at Barsebäck continued. Reports continued to give good judgements of Barsebäck NPP, even though the Swedish nuclear inspectorate, SKI, criticised Barsebäck for having a too informal culture (verbal source).

5.2.2 Creation of an organisational self-righteousness

The good reputation of the Barsebäck NPP led to the creation of an organisational self-righteousness. (verbal source) The two quotes in the previous section give the impression that the management of Barsebäck was top of the line.

Twelve years after the OSART report quoted in the previous section, a benchmarking study was conducted in which 21 nuclear generation units was compared. This study was sponsored by German PreussenElektra and conducted by ATKEARNEY (1998) and gives the following judgement on the management of B1:

> "With respect to direct influencable costs which finally allow to draw conclusions on quality of plant management, Barsebäck 1 sets the standard for all other participants through clear best practice positions in cost categories operation, maintenance, and overhead, although Barsebäck 1 is one of the smallest and oldest units analyzed. Cost leadership is obtained by low plant operation personnel, superior purchase of third party supplies and services in maintenance and in a very lean administration." (ATKEARNEY, 1998, p1)

Another factor that worked as a seedbed for self-righteousness within the organisation was that Barsebäck NPP was the largest and most expensive power plant that the owner Sydkraft owned. The organisation and its employees were lavished with privileges and benefits. (respondent I)

All three quotes praise the management at Barsebäck and this could have been one factor that worked as a seedbed for.

5.2.3 Creation of competition within the organisation

The latent need for an organisational change led to a change in 1994. This change introduced an internal competition between the two reactors, and groups within the organisation. The new organisational structure failed and the internal competition was later removed. According to respondent F in this study, did the organisation suffer from this failed change during several years and some of the psychological walls that were created during that time, still have not been removed.

5.2.4 Threat of closure

After the Chernobyl accident in 1986 started a political debate of however the Swedish NPPs should be decommissioned. This debate led to that the Swedish parliament created an administrative authority for environment and energy. This authority followed the principle of successive decommissioning and in 1988 did the Swedish parliament approve a bill on closure of two nuclear reactors in 1995 and 1996. (Hahlberg, 1999).

The time plan has been changed several times but the threat was intensified in 1997 when the parliament decided to approve a bill on closure of the two reactors at Barsebäck NPP. (Lekberg, 2002)

5.2.5 Incorporation into Ringhals

To compensate Sydkraft, the owner of Barsebäck NPP, for the loss of production that the early decommissioning caused, Sydkraft were given shares in Ringhals AB, RAB. The new ownership of BKAB introduced a more formal organisational culture that was a result of the much larger organisation at Ringhals AB.

5.3 The decommissioning process

5.4 Decommissioning phases

The time between the energy production have been ended until the deconstruction can start has been split into three phases:

- Phase 1

  The time period from the energy production has ended until all fuel has been removed from the reactor. This phase was finished summer 2005

- Phase 2

The time period from the end of phase 1until all fuel has been removed from the power plant. This phase was finished in December 31, 2006.

- Phase 3

  The time period from the end of phase 2 until deconstruction can start in 2017.

5.4.1 Downsizing of staff

After B1 was stopped, there has been a decreasing need for staff within the ordinary organisation. As seen in figure , three large downsizings have been done at BKAB. The first downsizing was when B1 entered phase 2, the second downsizing was when B2 entered and the final downsizing was when phase 3 was entered.

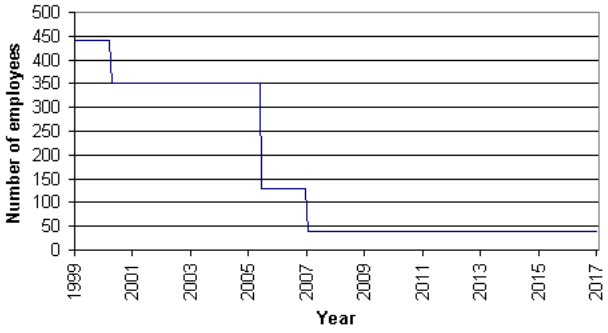

Figure 5.3: *Location Swedish Nuclear Power Plants (Courtesy of Ringhals AB)*

5.4.2 Organisational structure

In April 2002 was a new structured created, including the two companies BKAB and RAB that together formed Ringhalsgruppen. This organisation consisted of approximately 1500 employees.

When the production ended at Barsebäck NPP, the organisational structure was changed in order to match the needs in phase 2. The number of employees needed had during this

period decreased from approximately 352 down to 127. This led to that the administrative service, technical service and the maintenance organisation was moved from BKAB to RAB. This organisational structure can be seen in figure.

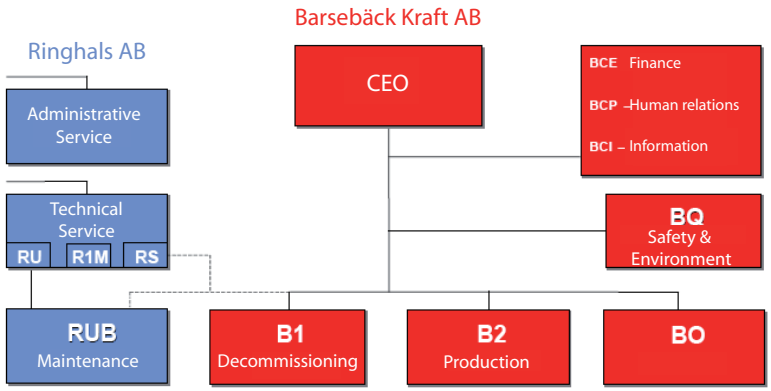

Figure 5.4: *Old organisational structure at BKAB ()*

When the organisation goes into phase 3, the amount of employees decrease further and the organisational structure will be adjusted to the much smaller organisation. The phase 3 organisation is shown in figure

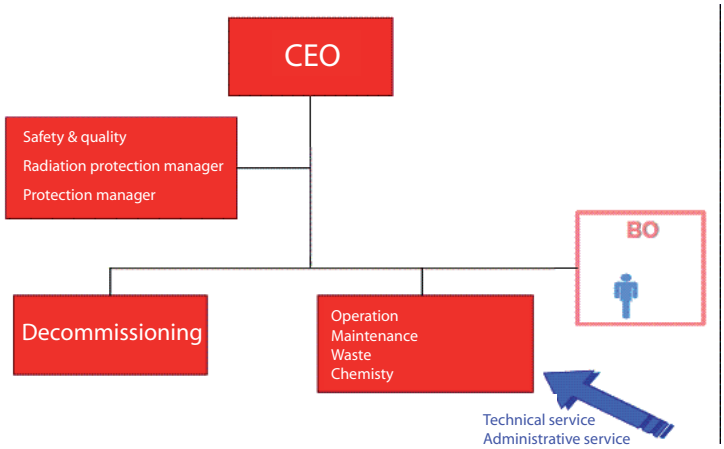

Figure 5.5: *Old organisational structure at BKAB ()*

5.5 Collected data

The collected data comes primarily from three sources:

- Participating observations
- Interviews (two occasions)
- Reports and documents from BKAB

5.5.1 Categories within the sample

To maintain the anonymity of the respondents but to be able to present the results and trace opinions within different groups, the sample of people has been divided into:

1. Management personnel
2. Administrative personnel
3. Operational personnel
4. Maintenance personnel

5.5.2 The Organisational culture

The majority of the respondent in the interview study emphasizes that BKAB is the best company they have been working for. This reflect on that the respondent in general are very proud of their work and the organisation. Another important factor of this pride is that many employees at BKAB have been working at Barsebäck NPP for many years and started to work at Barsebäck during a time period when the balance of attention was mainly focused on technology and not finance. One respondent describes that time as:

> "We were the largest and most expensive power plant that Sydkraft ever had built. This made us the locomotive that run before all other parts of Sydkraft. We were always given the latest things and we always had good equipment."

Respondent within operation

5.5.3 Experiences from earlier organisational changes

Earlier organisational changes have, according to one respondent from the operational unit, created a more informal organisational culture. Respondents in maintenance generally thinks the organisational culture have been more formal because of the influence of Ringhals AB. One respondent in maintenance described the new situation as:

> "Barsebäck don't care about us as much now. They (the management) never comes down here and speaks with us... The management group are enormously sympathetic and social, competent and easy to speak with, so it can't be the personalities that prevent them to come to us, it is the organisation."

Respondent within maintenance

From these two perspectives it seems that the organisational culture in the company has diverted into two directions. The operational, adminsitrative and management groups seems to have developed a more informal culture at the same time as maintenance has experienced the culture as more formal. This can therefore be another factor that can have caused a larger distance between the maintenance and other units.

5.5.4 Starting the organisational change

The organisational change at BKAB differs from many other organisational changes due to the change was forced to the organisation. The legislative process before the final decision led to a situation where step 1 in Kotter's (2005) change model more or less was passed through when the final decision of closure came.

Guiding coalition vs. the strong leader

The answers from the interview sessions indicate that there has been a guiding coalition of people involved in the change process. When the respondents have related to influential

persons in the organisational change process there are mainly three senior managers and the CEO that are mentioned.

The importance of the guiding coalitions seems to have been of secondary importance after the CEO as the strong leader. The importance of the CEO as the strong leader seems to have been increased by the strong association between the CEO and the new vision.

5.5.5 Planning of the organisational change

The planning process seems to have been a large source of irritation and polarisation between different groups within BKAB. When the decision to close down Barsebäck NPP, a planning group was appointed to start the planning for the different phases during the decommissioning. The planning group consisted of employees from the operational units.

In addition to this planning group, the management group was involved and formed the strategic constraints. That no one from maintenance was involved in the planning group seems to have created a feeling of "them and us" between the operational units and the maintenance unit. This can be seen in quotes such as:

> "When they (management and the planning group) split the different functions that are up there (management and operation), it is very well described and defined into functions, our (maintenance) tasks are only lumped as a single function. They don't see the depth in other persons competence."
>
> *Respondent in maintenance*

Another source of much irritation seems to be the number of persons within the organisation for phase 3. The issue of how many persons that should be within the new organisation seems to have been stealing attention from other important issues.

The issue of the number of people and the low involvement of the maintenance personnel seems to be very closely linked to the communication between the management and the maintenance unit. One respondent describes the situation as:

> "It feels like there is a lot to do and that the management not has a clue about it and that they only thinks it is to turn off the light and walk away. But it can also be that the management has full knowledge of the amount of money that is available and what that can be done. Whatsoever, the management can be in full control but in such case should they inform"

Respondent within maintenance

5.5.6 Vision

Within BKAB are two visions prevailing, 'to develop the decommissioning' and 'to become the company that other benchmark against'. The former is well grounded among all respondents within this study. Respondent within administration and management mainly uses the latter.

When respondents are asked to describe the most challenging and positive factors within the change to phase 3, they generally refer to the vision of developing the decommissioning.

> "The best thing CEO Leif Öst has done is when he introduced the vision: to develop the decommissioning" (Sw.Att utveckla avvecklingen)

Respondent within operation

Any vision for Ringhalsgruppen (including both Ringhals and Barsebäck) has not been mentioned neither during interviews participating observations nor during meetings.

5.5.7 Individual factors

Involvement and engagement

The involvement in the

> "We at the maintenance department have not been given the opportunity to give our point of view regarding the future way of working, neither in phase 2 or 3. It has gradually been worse. BKAB has earlier been very good at making everyone involved but since we became a smaller organisation has this been worse."
>
> *Respondent within maintenance*

Social life

5.6 Leadership and communication

5.6.1 Leadership

What seems

5.6.2 Communication between management and employees

The general opinion among the respondents is that the communication between management and employees has been very good historically. One respondent describes that he was very surprised of the openness and good communication at BKAB when he started his employment. The communication climate was far better then other companies that he had worked at before.

During the time period when the treat of closure was very intensive, the management started to gather the staff into general meetings where the latest information was pre-

sented. This seems to have had a very positive effect on how well informed and involved the staff felt. One of the respondents describes a metaphor that was used during this time:

> "Information is like water in a spoon. To have it full you constantly need to supply more water so that the old water not vaporises. The same works for information. If the supply of information is constant, there will be no room for anything else. But as soon as the supply is ceased, rumours and preconceived ideas that easily can be turned into facts."
>
> *Respondent within operation*

What seemed to happen is that the supply of information gradually ceased after the closure of B1. However this was caused by the fact that there was less to inform about, the management was to busy to inform or the management withheld information is unclear to respondents within operation and maintenance. Respondent in management positions describe the amount of information during this time as decreasing combined with a massive workload.

The main strategy to share information seems to have been through general meetings that can be compared with the conference principle described by Axelrod (2000).

Within the maintenance group, which has felt

5.6.3 Feedback

The possibility to give feedback is generally the factor that defines a two-way communication. However, two-way communication can be built up up two-one way communications. From the first interview session, the issue of feedback was raised from several of the respondents, especially within maintenance. The concern was that they didn't know if their opinions and ideas was taken into account because they didn't get any feedback.

The possibility to get feedback has been a factor that has influenced feeling of involvement among the respondents. Those who feel that they don't get feedback on their ideas and opinions are generally feeling less involved into the change process.

5.6.4 Importance of informal communication

A clear tendency that can be seen in this study is that the respondent who have informal information paths directly to the management or to the planning group are all feeling that they have enough information. Those who don't have these informal information paths are generally disappointed on the management and how they have managed the communication to the employees.

5.6.5 Focus on financial management

The opinion by Granholm and Rollhagen (1997), Lekberg (2002) and Svenson et al (2006), that the financial management gradually have been given larger importance is confirmed by this study.

From the model of balanced attention (Svenson et al,), it is possible to see that the major change in attention has been from technology management to financial management. The picture that is given by the respondents in this study is that the technology management was the main focus until late 1980s. During this time was the main focus to maintain and manage the power plant as good as possible. The media focus, and the prestige to have a perfectly managed plant created the view of "only the best is good enough". This slowly started to change in the early 1990s when the middle managers were given a financial responsibility. One respondent that during this time were given training in financial- and business administration describes that the training as a matter of facts only focused on accountings and the different chart of accounts that would be used in order to classify costs.

When the electricity market was deregulated in 1996, the large change appeared. From now on, the price was not based on the production cost as earlier, but on the spot price.

This introduced a new focus, to decrease costs to maintain good profitability.

When B1 was stopped the focus was further intensified. At the same time was BKAB incorporated as a subsidiary company to Ringhals AB. Of this reason has the respondents in this study not clearly been able to pinpoint which parts that originated from Vattenfall's values.

The final step to strengthen the financial management was, according to the respondents, when B2 was stopped. From that point, the financial management have been superior to all other factors. The second most prioritised area seems to be the focus on safety and regulations.

Chapter 6

Analysis

This chapter gives a deeper analysis of the collected data that was presented in the Empirics chapter.

6.1 Changed power bases

The first factor that will be analysed in this chapter as a source for oscillations in safety culture is the change of power bases that the organisational change will imply.

The largest source for irritation among the maintenance personnel seems to be the large amount of operational personnel. From the maintenace point of view, this seems to be proportions that do not reflect the actual work load.

Another factor that can be of importance to this irritation can be the changed power base in while the operational personnel in the new group will be given a larger range of power in the organisation. Earlier, the operational units where found between operational and tactical level within the company (as defined in figure) operational level, in the phase 3 organisation, they will have duties within a range from operational up to management.

Level:	Operation	Phase 2:	Phase 3:
Strategic level	Management	Management	Management
	Administrative staff	Operational staff	Former operational staff
Tactical level:		Administrative staff	
	Operational staff	Operational staff	
Operational level:			Maintenance staff
	Maintenance staff	Maintenance staff	

captionOrganisational group structures within different phases

6.2 Vision

The single most successful in the unfreezing process of the change into phase 3 seems to be the vision of "Developing the decommissioning" and in some extent to "become the one that other benchmark against". These visions are excellent in their simplicity and seem to have been very well received by the employees at BKAB. This can be explained by the good correspondence to Mark's (2003) four criteria needed to create a successful vision;

1 The vision must be seen as important as a tool to create success.

2 The vision must be credible by relating to the work situation.

3 The vision must be attractive and desirable.

4 The vision must be realistic.

6.3 Further research

One question that was raised during one interview was that many other organisational downsizings, a polarisation between those who stays and those who have to quit. At BKAB, any such polarisation has not aroused. Actually, no respondent in this study has experienced any such polarisation at all. When the respondent in this study was asked how they had experienced those in BO (the), they either had good experiences or neutral

(as with any other employees).

Why the relation has been so good at BKAB, however it is caused by the generous agreements for those who have left the ordinary organisation or if it is caused by the external threat that the organisation experienced during several years would be interesting area of further research.

6.4 Summary

The main conclusion that can be drawn in this study is that the vision is the strongest tool that the management group has access to. Holding on to this vision and developing it further will be the single largest success factor that can be identified in this study.

References

Anderson D and Ackerman Anderson L S (2001), *Beyond Change Management,* Jossey-Baff/Pfeiffer, San Francisco

ATKEARNEY (1998), *Benchmarking report number 0062529*

Boddy D (2002), *Managing Projects, Building and leading the team,* Pearson Education, Harlow

Bruce R & Wyman S (1998), *Changing organizations: Practicing action training and research,* Sage Publications, Thousand Oaks

Brunsson N (1986), *Företagsekonomi – Sanning eller moral*, Studentlitteratur, Lund

Bryman A. & Bell E. (2003), *Business Research Methods,* Oxford University Press, Oxford

Carnall C (1995), *Managing Change in Organizations*, Prentice Hall, Harlow

Cameron E and Green M (2004), *Making Sence of Change Management,* Pearson Education, Harlow

Creswell J.W. (2003), *Research design: Qualitative, Quantitative, and Mixed methods Approaches 2nd edition,* Sage Publications, Thousand Oaks

Crotty M (2003), *The Foundation of Social Research, Meaning and perspective in the research process,* Sage Publications, London

Dahlberg H (1999), *Hundra år i Sverige: Krönika av ett dramatiskt sekel,* Albert Bonniers Förlag, Stockholm

Denscombe M (2000), Forskningshandboken – för småskaliga forskningsprojekt inom samhällsvetenskape
Studentlitteratur, Lund

Eriksson-Zetterquist, Kalling, Styhre (2005), *Organisation och organisering*, Liber, Malmö, Sweden

Friedland M and Evans S (1997), *Influence of Organizational Culture on Human Error,* IEEE 6th Annual Human Factors Meeting, Orlando Florida, Institute of Electrical and Electronics Engineers, New York

Granholm A and Rollhagen C (1997), *Barsebäck: Fördjupad analys av MTO 1-3/96*

Högnäs S (2003), *Idéernas historia: En översikt,* Historiska Media, Lund

IAEA (2001), *Managing change in Nuclear Utilities,* International Atom Energy Agency, Vienna

IAEA (2002), *Safe and effective nuclear power plant life cycle management towards decommissioning,* International Atom Energy Agency, Vienna

IAEA (2003), *Safety reports series no. 31, Managing the Early Termination of Operation of Nuclear Power Plants*, International Atom Energy Agency, Vienna

IAEA (2007), *Safety reports series no. 50, Decommissioning Strategies for Facilities Using Radioactive Material*, International Atom Energy Agency, Vienna

Jacobsen D.I. and Thorsvik J (1997), *Hur moderna organisationer fungerar: introduction I organisation och ledarskap,* Studentlitteratur, Lund

Kotler P, Wong V, Sauders J Armstrong G (2005), *Principles of Marketing, fourth European version,* Prentice Hall, Harlow

Kotter J (2001), *The best of HBR: What Leaders Really Do,* Harvard Business Review, December 2001

Kotter J (2005), *Change Leadership: Many starts but few finish well,* Leadership Excellence, December 2005, Vol. 22, Issue 12

Kotter J (2006), *Transformation: Master three key tasks,* Leadership Excellence, January 2006, Vol. 23, Issue 11

Kotter J (2007), *The best of HBR: Leading Change: Why transformation efforts fail,* Harvard Business Review, January 2007

Leigh J R (2004),*Control Theory, Second Edition*, The Institution of Electrical Engineers, London

Lekberg A (2002), *Safety culture and organizational issues during decommissioning of nuclear power plants*, IEEE 7^{th} Human Factor Meeting, Scottsdale Arizona, Institute of Electrical and Electronics Engineers, New York

Nilsson B and Waldemarsson A.K (1990), *Kommunikation: Samspel mellan människor,* Studentlitteratur, Lund

Machiavelli N (1992) *The Prince: unabridged,* Dover Publications, New York

Marks M L (2003), *Charging Back Up the Hill: Workplace Recovery After Mergers, Acquisitions and Downsizings,* Jossey-Bass, San Francisco

Mintzberg H (1973), *The nature of managerial work,* Harper & Row Publishers, New York

OECD, Organisation for Economic Co-Operation and Development (2003), *The Regulatory Challenges of Decommissioning Nuclear Reactors,* OECD Publications, Paris

Pugh D S, Editor (1990), *Organizational theory, Selected readings 3^{rd} ed.*, Penguin books, Harmondsworth

Robbins S.P (2003), *Organizational behaviour:,10^{th} International Edition,* Prentice Hall, New Jersey

Rudestam K E and Newton R R (2001), *Surving your dissertation, A comprehensive guide to content and process,* Sage Publications, London

Schein E (1992), *Organizational culture and leadership, Jossey-Bass, San Francisco*

Silverman D (2001), *Interpreting Qualitative data, Methods for Analysing Talk, Texts and Interaction,* Sage Publications, London

Svenson O, Salo I, Skjerve A B, Reiman T and Oedewald P, Editors (2006), *Nordic Perspectives on safety management in high reliability organizations: Theory and applications,* Stockholm University, Stockholm

Swanson R.A and Holton E.F (2005), *Research in Organizations: Foundations and Methods of Inquiry,* Berrett-Koehler Publishers, San Francisco

Volkmann B and Löschhorn U (1995), *Technical Engineering Note, Aspects on Decommissioning of the Greifswald nuclear power plant,* Nuclear Engineering and design 159, pp 117-121

Watson T. J. (1963), *A Business and its beliefs: The ideas that helped to build IBM,* McGraw-Hill, New York

Appendix

Swedish:	English translation:
Bakgrundsfrågor:	**Background questions:**
1. Vilken är din befattning inom BKAB?	1. What is your position within BKAB?
2. Hur länge har du arbetat på BKAB, vad gjorde du innan dess?	2. For how long have you been working at BKAB and what did you do before?
3. Vilka är dina ansvarsområden? Har du personalledande befattning?	3. What is your area of responsibility? Do you have responsibility of employees?
4. Kommer du att ingå i fas 3?	4. Will you be part of phase 3?
Dagsläget:	**Current situation:**
5. På en skala 1-7, där 7 är bäst: Hur väl är du insatt i vad som händer i förändringsprocessen inom BKAB?	5. On a scale between 1-7, where 7 is best: How well are you updated about the change process within BKAB?
6. Hur har du fått denna information?	6. How have you achieved this information?
7. Rangordna, vilka är de tre mest prioriterade frågeställningarna i dagsläget?	7. Rank the three most prioritized issues at the moment.
8. Hur har din inställning till förändringen ändrats med tiden?	8. How has your attitude towards the change, changed by time?
9. Hur delaktig har du varit/känt dig i förändringsarbetet?	9. How participating have you been/felt during the change?
10. Känner du trygghet i din situation?	10. Do you feel secure in your situation?

Tiden fram tills nu:	**The time until now:**
11. På en skala 1-7, där 7 är bäst: Hur har kommunikationen mellan företagsledningen och anställda fungerat hittills?	11. On a scale between 1-7, where 7 is best: How well has communication between management and employees worked until now?
12. I vilken omfattning tycker du att personal från BO har påverkat stämningen inom din avdelning.	12. In which extent do you think that personnel from BO affected the work climate within your unit?
13. Hur har förändringen påverkat ditt sociala liv?	How has the change affected your social life?
14. Hur har ditt sociala liv påverkat din yrkesroll?	14. How has your social life affected your role as a professional?
15. Rangordna, vilka tre problem har varit mest påtagliga?	15. Rank the three most noticeable problems this far?
16. Är ditt jobb lika viktigt nu som förr?	16. Are your work as important now as before?

Framtiden:	**Future:**
17. Vad ser du som de största problemen i närtid?	17. What do you see as the major problems in nearby future?
18. Vad ser du som mest problematiskt vid övergången till fas 3?	18. What do you see as the main problems during the transition to phase 3?
19. På en skala 1-7, där 7 är bäst: Hur väl är övergången till fas 3 förankrad i organisationen?	19. On a scale between 1-7, where 7 is best: How well is the transition to phase 3
20. Ser du några problem i övergången till fas 3 som ledningen verkar ha missat?	20. Do you see any problems that the management seems to have missed in the transition into phase 3?
21. Vad ser du som de största utmaningarna på lång sikt? (10 årsperiod)	21. What do you see as the greatest long-term challenges? (10 years period)
22. Om du skulle ge ledningen ett gott råd, vad skulle det vara?	22. If you would give the management a good advice, what would that be?
23. Känner du att ta ansvar för dina nya arbetsuppgifter? (kompetens, överlämning)	23. Do you feel that you can take responsibility for your new job assignment? (competence, handling over of tasks)
24. Har vi glömt några viktiga delar i den här intervjun?	24. Have we forgot any important parts in this interview?