Determining industries' environmental training needs, with special reference to the manufacturing and engineering industries in the Eastern Cape

By Khensani Mabunda

A paper based on phase two of a research project into industries' environmental training needs

Two case studies and a survey of the manufacturing and engineering industries of the Eastern Cape.

Submitted in partial fulfilment of the requirements for the degree of Masters in Education (Environmental Education) of Rhodes University

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ABSTRACT

This paper presents the outcome of two case studies and a survey of manufacturing and engineering industries in the Eastern Cape, to explain their environmental education and / or training needs. The methods involved in case studies were interviews, observation and document analysis and for the survey a postal questionnaire. Respondents were generally able to identify their companies' environmental impacts and most thought that education and/training has a role to play in helping them deal with those impacts. While respondents identified environmental awareness for workers as the main role that education and / or training can play, it also has to help management understand its environmental role in dealing with environmental management systems and legislation, as well as supporting education and training. Education and\or training should take both managers and workers beyond the superficial understanding of the concept of environment. In-house and external trainers were identified as potential trainers as this would both overcome a current lack of capacity and make continuity possible when external trainers cease training. Trainers should be environmentally qualified. Respondents have mostly shown support for learning-on-the-job but less so on special environmental courses or including an environmental component in all training programmes. Some training sections consider their sections as already overladen and unable to accommodate other training programmes. The problem is therefore more logistic than environmental.

1. INTRODUCTION

1.1 Background

While industries have supported environmental education programmes for other institutions such as schools and universities (ICC, 1992) - Gold Fields and Murray Roberts are among the companies that continue to do so - very little attention has been given by industry to in-house environmental education and training. There are various environmental management training programmes offered in South Africa, for example at Potchefstroom University (Nell, 1997), but none of these deal with environmental education and training within industry itself. The need to formulate and institute suitable environmental education and training programmes for various industries becomes obvious when one considers industry's ongoing environmental impact (Chevrier, *et al. 1993).* This is very important for the country because of the important economic

role industries play (Quarie, 1992) and the enormous impact they have on the environment. According to Smuts and Hobbs (1989:334), industries and large corporations lead in the "altering of the environment", and these alterations in many instances exceed legal limitations (BESC,1997). Fien & Martin (1996) note that industries' activities regularly produce wastes which have negative effects on people, the environment and the country's potential future development. Industrial managers need to be educated to see the link between industrial pollutants and the world economy (Starke 1996). Environmental education and training for the environment is said to be the "most crucial factor in achieving economic progress and sustainable development" (Soutter & Mohr, citing international Chamber of Commerce, nd), moving towards cleaner production (Codner *et al.* 1993; Huising *et al.* 1993; Nowak 1993) by preventing pollution rather than treating it (WasteWise, 1997). To achieve these goals new training strategies are required at all levels in industry (Cortese, 1993).

Industries need to balance their business performance with environmental sensitivity. Management in industries must recognise that the need for environmental excellence is no longer an option, but a precondition for business success (Eisenhower in Elkington 1988), as good environmental management is good business. Should for example, the principle of the *polluter pays* is applied, companies could find themselves being charged a lot of money for pollution which could have been avoided through good environmental management. To meet this precondition, managers need education and training that will equip them with skills to enable them to develop education and training resources for the environment (Chevrier *et* al 993:4).

A review of the literature reveals that while there is a rich body of research on environmental education in general, there is very little that deals specifically with environmental training in industries. Similarly, the literature on industry and the environment seldom touches on the question of the educational requirements within industry, a very recent exception being the studies by Craffert and Fourie (August 1997) and KPMG and IEF (May 1997).

Craffert and Fourie (1997) emphasised the importance of sound environmental training as a "key to successful environmental practices and systems" which can determine the success or failure of environmental management. Their study focused on topics such as environmental policy and environmental impact, accessing and disseminating environmental information, environmental

environmental impact, accessing and disseminating environmental information, environmental training practices, business and the community and the way forward. The study found that: - there is a great need for environmental training in South African companies overall, and that training can contribute to cost savings and risk reduction; there is interdependence between environmental management and environmental training; and that, for any training to succeed, companies need to be clear about their environmental impact.

While the above-mentioned were large scale surveys, this is a small scale study focussed on the Eastern Cape. Its first phase was an in-depth case study of two industries conducted in order to inform a questionnaire survey in the second phase of research. The results of both phases have been used to prepare this paper.

1.2. Focus of the study

The aim of the study was to explore environmental education and training needs in industries in the Eastern Cape by conducting two case studies and a small survey of a sample of manufacturing and engineering industries.

2. METHODOLOGY

For the in-depth case studies, manufacturing and engineering industries in the Eastern Cape were approached and the first who agreed were studied. Industries were selected according to information about their nature of business supplied by the Port Elizabeth Regional Chamber of Commerce and Industry and the Border Chamber of Commerce and Industry. For the survey phase, stratified random sampling (Bless & Higson-Smith, 1995) was used to select one hundred industries from the population of manufacturing and engineering industries supplied by the chambers of commerce and industry.

The case studies were conducted through interviews, observation of the activities of the plant and document analysis. Interviews were conducted with representatives of senior and middle management, health and safety officers, training sections, occupational nursing staff, unions representatives and / or workers. Permission to access the participating companies was eventually granted after a series of refusals by several other companies.

Representatives of various sections were asked to participate in the survey. The questionnaires were posted with a covering letter explaining details and a stamped self-addressed envelope for the return of completed questionnaires.

The response to the questionnaire survey was very low. Five hundred questionnaires were sent to one hundred companies (five per company). Only twelve completed questionnaires were returned by five companies: four from training, three each from senior management and environmental section representatives, and one each from workers and operational management representatives. The poor response confirmed a general unwillingness to participate similar to that witnessed when requests for access were made for the case studies. The questionnaire return rate was a very serious limitation since reliable generalisations could not be made from so few returns.

3. RESULTS AND DISCUSSION

3.1 General impressions

Despite the limitations described above, the results to be presented are interesting. They show a variety of responses. While some respondents went all out to make their situation understood, others showed a lack of interest or did not want to give their time to the completion of the questionnaires. In several instances, the respondent either declined to answer specific questions or simply 'did not know'. Some respondents - workers in particular - either did not understand the question or did not give themselves time to complete the questionnaires.

3.2 Analysis

3.2.1. Introduction

The results presented below, gathered through the two case studies and the survey, offer some insight into how environment is seen by representatives of the sampled industries' workforce. They also show how the industries' workforce perceive the interaction between their industries and the environment, and how they imagine education and/or training might help in addressing the viewed situation. An acquaintance with these perceptions should give me and those interested in industries and environmental training a better understanding of how to plan for such

educational and/or training programmes.

3.2.2. Views on industries' interaction with the environment and management's responsibility

The following discussion is based on the findings recorded in **Table 1**. It aims to explore the environmental situation of industries as perceived by their workforce, in terms of **environmental impacts, environmental management systems and environmental legislation.**

Table 1: Views on industries' interaction with the environment

Respondents	What are the environmental impacts of your company?	Does your company have an environmental management system?	What environmental legislation is your company required to adhere to?
A	Waste (3); What to do with scrap (1) Chemicals (1) No response (1)	preparation for ISO 14000 next year (1) Waste collection (1) NOSA (1) ; No (1)	Currently SABS and NOSA ISO 14000 next year (2) Corporate Standards (1) None (1)
B	Water and air pollution (4) Effluent (1) Don't know (1)	Water pollution from effluent plant and air pollution from extraction system (1) To meet standards of the mother company in the USA (1) No (1)	Occupational Health and Safety Act (1) All local and international environmental acts (1) Don't know (1)
C	Noise, welding smoke hazardous chemicals disposal (1) Air pollution (2) Scrap dumping (1)	NOSA (2); Corporate world wide guidelines are monitored, measured and reported annually (1)	Environmental regulation for work places and hazardous substances regulation (1) Waste disposal, water and air (1) Scrap dumping (1)
D	No hazardous waste	To control non-hazardous waste removal	-

KEY: A: Training; B: Senior management; **C:** Environmental section; **D:** Operational

Most of the respondents in both the case studies and the survey recognised the environmental impacts of their companies' activities and, in some cases the companies dealt with those impacts.

Other companies did not cope with the impacts as indicated in Table 1, one company was struggling 'with what to do with scrap'. The identified impacts in all cases resulted from generated wastes and the companies were aware of this. It is important for the workforce to identify the impacts in their plants, but identification alone is not enough, identification must be supported by action which will deal with the impacts of these wastes. Companies should have good waste management strategies that could help them cope with the impacts of generated wastes. At the moment, respondents show that their companies have not yet started employing waste management strategies.

As indicated in Table 1, the situation concerning environmental management systems showed a wide range of responses among industries in respect of commitment, readiness and understanding. There were those respondents who were committed to environmental management systems, understood their role, and were ready to implement ISO 14000 next year, and others who showed no understanding at all, even among managers. The lack of understanding of environmental management systems is also shown by the tendency of respondents to confuse these with environmental issues and legislation such as water pollution as an environmental management system. To further explore the existing situation with respect to environmental management in industries, I asked about the perceived role of management in terms of the environmental performance of their companies.

Table 2 shows that most respondents thought that management has a role towards the environmental performance of their companies. What was surprising was how superficial some of the perceptions of management's role were. For instance, seeing that the floors are clean is usually a junior official's responsibility. It is also not really an environmental issue. There is again a range of understandings as others gave more realistic responses, indicating that working within the parameters of the law and maintaining standards were senior management's environmental role. This is an indication that communication between senior management and training is not as it should be. Management is not open to the training section so that the latter is not aware of what management is to do environmentally. This communication problem, is also an environmental problem (IBEE, 1996) as it will make it impossible for management and other members to have a common perception of the environment. Management shares the blame for not making sure that their departments are aware of its environmental role. I see communication

Table 2. Management's responsibility in terms of the environmental performance of companies.

Res-pondents	What is management's role towards their company's environmental performance?	How does management exercise this role?
Training	To supply waste bins for all and control waste gas. To ensure maintenance of corporate Health, Safety and Environment standards. To keep floors clean while getting rid of wastes. No response.	By supplying waste bins for all and control waste gas. By adhering to standards and ensuring correct waste disposal. Through quality control department. No response.
Snr Man-agement	To operate responsibly and within legal parameters. Regular review of environmental and safety issues. No idea.	By conforming to occupational Health and Safety Act. By conducting regular EA's. No response.

KEY: A: Training ; **B:** Senior management

a serious environmental training need. There is again a range of responses regarding the manner in which management is seen to perform its environmental role. Conforming to the Occupational Health and Safety Act and conducting regular Environmental Audits (EA) are 'ways' through which senior management exercises its environmental responsibility. Some training respondents, simply indicated quality control and supplying waste bins. This means that the results are not shared by all in companies. In one of the case studies, an EA was conducted but the results were seemingly not shared widely within the plant. Most interviewees were unaware of the findings. Again, education on the importance of communication within companies around environmental matters becomes obvious. In response to a question to workers concerning awareness of environmental problems, the only worker who responded identified water supply in residential areas, and indicating that the plant did not have any problems. Representatives from all other sections in his/her plant indicated various impacts. This worker seems to be from an informal settlement or rural area where supply of running water is still not good, and was possibly trying to please the management for fear of victimisation when he indicated that his company did not have any environmental problem. If this is the case it could show a lack of trust between management and workers, borne out by friendship from the first phase of the study (Mabunda, 1998). The problem of trust will need to be addressed in education and training for both workers and management in order to pave the way for effective communication and cooperation around

environmental issues.

In one of the plants where the case study was conducted, workers were clear about the environmental problems of their plant. They also knew of the possible solutions to the problems, especially those that could be linked to health and safety.

In sum, what emerges from respondents' views on environment and industry's interaction is that there is a relatively clear knowledge of environmental impacts (particularly among management but also some workers) but much less understanding of environmental management systems or legislation. The next section will focus on the role of education and / or training in trying to address these limitations in people's knowledge and understanding.

3.2.2. Training and education

This section identifies the role that education and/or training could play in helping industries understand and implement environmental management systems and legislation. **Table 4 shows** that all respondents except two believed that education and/or training could play a role in helping companies implement environmental strategies. They mainly indicated raising environmental awareness among workers as the key role of education and/or training - a finding also recorded in the case studies by KPMG (1997). One notable exception was the opinion of workers in one plant who were not in support of environmental education to improve the unhealthy situation in the plant, but rather felt that working conditions should be improved by a reluctant management which they thought had the financial capability to do so (Mabunda, 1998). The workers' views show that training programmes on environmental issues which are not accompanied by appropriate (management) action on such issues are likely to be unsuccessful because they will lack support from workers who will see no reason to attend training if what is perceived as a real issue is not given the necessary action it deserves. WWF (1986) in support of action in industry, maintain that management needs to support its policies (training policies included) with appropriate action.

Craffert and Fourie (1997) found that environmental awareness among workers was the most targeted aim in those companies that already included environmental content in their training -

a move seen as an investment (Nickson, 1988). It must be highlighted that managers and trainers need to have an understanding of what is meant by 'being environmentally aware'. If not, there is a danger of their not moving beyond the physical description of the environment, as in the case of reference to environment in terms of either good or bad house keeping and littering. Having established that education and/or training were generally seen to have a role to play in industries, if supported by appropriate environmental action, I wanted to know the existing state of affairs concerning training in the industries consulted.

Table 3: Environmental content, environmental training, environmental and % of environmental involvement.

Respondents	A	B	C	D
Training	**Yes** (2); **No** (4)	-	**Yes** (1); **No** (5)	
Sen. Management	-	**Yes** (1) ; **No** (5)	-	-
Enviro. Section	-	**Yes** (1) ; **No** (4)	**Yes** (2); **No** (1)	**25%** (2) **20%** (2) **100%** (1)
Op.management	-	**Yes**. Awareness meetings every Monday	-	-

A: Environmental content in existing programme; **B:** Company/section conduct environmental training; **C:** Are you environmentally qualified? **D: %** of environmental involvement at work

I thought it appropriate to gather information about existing training programmes, as these would provide guidance as to what needs to be done about environmental training. It was found that training was structured to meet job-related aims, health and safety and Adult Basic Education and Training. **Table 3** shows that no environmental component was included in any of the existing training programmes, with the exception of two respondents who indicated that their training included an environmental component, training implemented by the Quality department. In one of these companies, the environmental component was attended voluntarily and dealt with 'quality' and 'house keeping'. In another company, it was implemented by the Health and Safety department and was either compulsory or voluntary. The absence of an environmental component in most existing programmes and its voluntary and part time nature in other instances (see Table 3), clearly shows that most companies investigated did not regard environmental concerns as part and parcel of their daily business. For the environmental component to deal with 'house-keeping', also indicates a superficial knowledge of environment referred to earlier. In addition

only two of the eleven training and environmental section respondents indicated that they were environmentally qualified (Table 3). It would seem that qualification of the trainers and environmental sections needs urgent attention if environmental performance is to be improved.

Table 4. Views on who should attend training programmes (A-E) and role of training programmes (F)

Respondents	A	B	C	D	E	F
Training	5	1	-	1	-	To improve workers awareness
Senior management	6	-	-	2	-	To improve workers' environmental awareness (all)
Environ-mental section		-	1	2	-	To improve workers' environmental awareness (2); To help companies implement an environmental management system (2)
Operational management	-	-	-	-	1	-
Workers	4	-	-	-	-	-

Key: **A:** All employees; **B:** Operational management and supervisors; **C:** Medical / maintenance safety staff and all involved with hazardous work; **D**: Management, supervisors and health and safety representatives; **E**: Management and supervisors , **F:** Aim(s) of training programmes

The most striking finding in Table 4 is the emphasis on the need to educate workers. Senior management and training respondents lead in identifying this need. What becomes clear is that management see workers as being responsible for littering and bad house keeping, as was evident in the case studies (Mabunda, 1998). This means that senior management themselves need educational programmes to change this perception and see environment as a central part of their business management, rather than a concern to workers only. Only then will they support training fully. Operational management, were reported as wanting to use every available time for production and often resist releasing workers for training. They too therefore need to be educated to see the need to balance production and training and to see production and environmental performance as two sides of the same coin, and not aspects that have to compete against each other for time. My findings would therefore suggest that environmental education is necessary for all members of the work force in different sections.

Table 5. Views on who should conduct training programmes

Respondents	Responses					
	A	B	C	D	E	F
Training	2	2	2		-	-
Senior management	-	-	3	1	-	1
Environmental section	1	1	1	-	1	-
Operational management	-	-	1	-	-	-
Workers		-	-	1	4	-

Key: **A:** External consultants; **B:** In-house officers; **C:** In-house and/or external trainers **D:** Informed and /or qualified people either from internal or external; **E:** Training should be conducted by the company that implements it and **F**: Did not know

In this section, I wanted to know who were seen as best placed to educate and/or train in the industry. Different people in different different departments were indicated. Some respondents also included qualifications as a condition to conduct training. It is clear from **Table 5** that in-house officers and external consultants were seen by most respondents as the best candidates to conduct training programmes. The nomination of the former might merely be an indication they are the ones generally responsible for training and in a position to continue training when training by external trainers cease. Another reason for focussing on in-house training is that it might be difficult for external trainers to conduct programmes particularly for the shop floor workers, given issues of time, language and numbers of possible trainees. In one plant for instance, language problem was so serious that in-house training was affected; also, external trainers need not be non-conversant with workers language.

It is of significance that both a member of senior management and a worker indicated that qualifications and knowledge are the primary considerations when training is to be conducted. BESC (1997) maintain that environmental officers lacked professional expertise, authority and financial support. How can they be expected to conduct effective environmental education and / or training in such a situation? This might be the reason for seeking external consultants. The results tend to support Craffert and Fourie (1997), whose respondents identified the lack of expertise on the part of internal trainers as one of the training problems. Having been informed as to who should attend and who should conduct education and / or training, I wanted to know

the preferred training models in industry.

Table 6: Views on different models for environmental training and education

Respo-ndents	Learning-on-the-job/ action learning	Special environ-mental courses	Including environmental component in all training programmes
A	Very practical and easy way to learn. Very good in applying learnt concepts. Appropriate and easy way to learn. Only part of others	-	An easy method to conduct training to all employees Unnecessary Worth looking at
B	It is the best way of learning Excellent Not always possible	No response For selected employees Ideal	No response Could be useful No. Training is the only relevant topic
C	Good only if it is conducted by a well trained and well paid officer	-	-
D	It helps the company achieve its goals	-	-

KEY: A: Training; **B:** Environmental section; **C:** Operational management and **D:** Workers

Table 6 records respondents' views on different models of training. The aim was to ascertain the different training models preferred, and how respondents viewed the suggested ones. It shows that action learning / learning-on-the-job was the most preferred as it can provide the opportunity for linking theory with practice in an environment with which the workers are familiar. Six respondents out of nine were direct in their support of action learning. That these respondents endorsed action learning might be an indication that some companies were already employing it at the time of the study. This supports Craffert and Fourie (1997) in their finding that action learning was used in training, especially in training specific members of the workforce such as artisans and unskilled shopfloor workers. Only one training respondent supported including an environmental component in all training programmes. The respondents who did not support the inclusion of an environmental component in every training programme might either have thought that environmental training would bring more work to an already congested programme, or that there might be an attempt to tamper with their existing training programmes. This is supported

by the training manager's indication in one of the case studies that his training section was already overloaded and it would be difficult to bring in new programmes. The training manager's and the other respondents' responses highlight that existing training programmes have problems which need to be considered when environmental education and training programmes are to be started. Environmental education and training programmes will have to be conducted through models which both workers and trainers are familiar and make gradual changes where necessary.

Finally, I wanted to know how the workforce perceived senior and operational management's and workers' support for training. Senior management was perceived as fully supporting training by one respondent, and supporting it 'in theory' by others. This shows that senior management needs education which can help it see the need to support training. Respondents also indicated operational managers supported training begrudgingly, indicating that training was time-wasting. In one instance, an operational manager would not even release workers for routine medical examinations. One training officer indicated the frustration trainers experience because they don't have the authority, as indicated earlier to force operational managers to release workers for training (BESC 1997). These findings highlight the problems as indicated earlier on and supplement those of Craffert and Fourie (1997) and KPMG(1997), who gave no indication as to how training could be hampered or strengthened by managerial support. Management should be educated to understand its role to make sure that its company has harmonious interaction among its departments.

Workers, on the other hand, were alleged to either demand more payment after obtaining a particular skill (1), lacking motivation (1). Motivation is seen as important for workers to cope with the demands of sustainable development (ICC, 1992). Other respondents however, indicated that workers enjoy training sessions (1). Companies need to investigate why workers are not motivated for training. What had been found in this study was that workers knew the problems and what was needed was action to address the environmental threats. Companies also need to know the role that incentives could play in motivating workers.

This study has confirmed many of the results relating to lack of commitment to environmental training, environmental management systems, workers' environmental awareness level and the need for environmental education and/or training for trainers found in the two large surveys,

especially Craffert and Fourie's (1997). It has also added new findings relating to the role of senior management and operational management in training and workers' views that training is not always what is needed. These confirmations and additions should be seen as increasing our knowledge of the state of affairs concerning training in industry.

4. CONCLUSION AND RECOMMENDATION

The study has revealed that environmental education and training in industry is new and still lacking in many respects. Some companies have started to include an environmental component in their training programmes, others which have not yet started have indicated through their training respondents that an environmental component is important and should be included. Environmental duties are mostly handled, if at all, by environmentally unqualified officers on a part-time basis, with more of their time devoted to non-environmental duties. Industry will have to realise that they have no option but to take environmental education and training as a starting point for environmental management. In order to do so, they might consider the following:

- Make sure that everybody in the plant is environmentally trained by including an environmental component in all training;
- Educate all trainers with regards to environment so that they can in turn train others
- Start implementing environmental management systems;
- Educate senior managers and operational managers to see the need to support training;
- Engage knowledgeable external consultants to work with in-house trainers to equip them with environmental knowledge.

The data presented indicates that there is a definite need for education and training for the environment in industry. The poor response to the survey might suggest that this only relates to those companies that participated in the study. But this is unlikely: the literature from which the background of the study was compiled, especially Craffert and Fourie (1997) and KPMG (1997) indicates that the need is general and hence probably shared by all industries in the Eastern Cape. Since there was a considerable variation among the responses of different companies, education and training should be conducted according to the needs of each company; but in general, the following recommendations can be made:

-Environmental education and training should be implemented as soon as is practically possible:

there is no need to wait any further while environmental degradation is continuing;

- Environmental education and training should be conducted in a continuous form;
- Qualified external trainers should work in close cooperation with in-plant trainers;
- Content of the programmes should include
  * Environmental awareness
  * Domestic and work environment
  * Responsibilities for health
  * Environmental legislation
  * Waste prevention management and pollution
  * Pollution.

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DEDICATION

I dedicate this study to my late brother **Israel** - who passed away while I was busy with this project.

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EXECUTIVE SUMMARY

The Rhodes Environmental Education Unit is about to embark on environmental education and training programmes for industry. This study forms part of the broader research initiative to explore the training needs of industries in the light of the general lack of literature on environmental education and training in industry.

This report presents the outcome of case studies conducted in two participating Eastern Cape companies - Murray and Roberts Foundry in Port Elizabeth and Volkswagen of South Africa in Uitenhage. In both cases the methodology involved observation, document analysis and interviews with representatives of senior management, environmental sections, health and safety sections, training sections, workers and/or unions.

The study indicated that both plants' activities impact on both their internal and external environments. Pollution resulting from generated wastes is the major environmental issue. Some of these fallouts can cause various occupational diseases and aggravate existing conditions among workers in particular.

Health and safety is a priority in both plants. Both have health and safety policies which govern safety measures in the plant in accordance with legal requirements. Because health and safety is a priority, pre-and post-employment examinations are conducted. Safety training is conducted by designated health and safety departments and protective equipment is issued for use in designated areas. The use of the latter is unsatisfactory, however, for a number of reasons.

There is a need to address a number of environmental problems in the plants cited by the interviewees. Management maintained that the awareness of the environment was low among shopfloor workers and yet Workers in the Foundry were able to identify several environmental issues.

The study has found that Volkswagen has a comprehensive social responsibility programme

called the VW Trust, which offers advice and assistance to workers and their families. Murray and Roberts has Vision and Values, a mission statement document which indicates the company's immediate future social responsibilities. However, there is still a need to address existing environmental problems, which will require appropriate education and training for both management and workers. Training currently offered in the plants is structured to meet job-related aims and health and safety requirements. None of the training programmes offered includes environmental content, but interviewees supported the implementation of such programmes.

Training programmes, especially those that are not job-related, are hampered by the following problems:

- Time: trainers in both cases complained about the difficulty of having workers released from production lines to attend training sessions.
- Literacy: course materials and presentation styles do not currently take the literacy levels of workers sufficiently into account.
- Language: Participants are often not adequately conversant with the medium through which programmes are conducted.
- Lack of integration between training and action: training programmes on environmental issues which are not accompanied by appropriate (management) action on such issues are likely to be unsuccessful.
- Line managers are reluctant to release workers for training
- Senior management only give theoretical support.

Whilst both plants have well-formulated health and safety policies because of clear legislative requirements, they do not have one for the environment. Volkswagen in the interim is using the general environmental policy of the German parent company. This might be contributing to the absence of a dedicated environmental budget.

All those interviewed, except workers in the Foundry, indicated that they were in support of environmental education and training programmes. Foundry workers indicated that education

and training was not necessary to help the company cope with workers' health problems but that it was simply up to management to improve working conditions which posed a threat to workers' health.

The content of the training programmes should help the plant management and workers to gain a profound understanding of the environment, the negative impacts resulting from the activities of their plant and the possible consequences of such impacts. On the basis of the above the following should form the content of environmental and training programmes:

- Environmental awareness
- Waste management (prevention)
- Environmental legislation
- Importance of the use of protective equipment
- Pollution

Whereas interviewees and the literature indicated that the above concepts are widely used in industries, the study also suggested that they are superficially understood by workers and some managers. Course developers should guard against perpetuating superficial understanding of relevant issues and aim at courses to enable clarification of concepts and offer a deeper understandings for all participants. Courses should, for example, clarify what is meant by 'being environmentally aware' and 'good management of waste'.

The data summarised above indicate that there is a need for education and training for the environment in the plants where the study was conducted. The following recommendations are therefore presented to the Rhodes Environmental Education Unit for consideration:

- Environmental education and training programmes could be started as soon as it is practically possible.
- Programme developers should carefully examine the strengths and weaknesses of current training programmes and try where possible to build theirs from the current ones.
- Programme developers should consider that the success of programmes will depend

mainly on the strive to serve this.

- People who attend the courses should be those who would be able to teach others on completion.
- The venue of the programme should be Rhodes University or any other central venue determined by the Unit in close co-operation with the participating industries.
- The Unit's staff should conduct the programmes and the duration of the programmes should be determined by the Unit in close co-operation with the participating industries.

CHAPTER 1
INTRODUCTION

1.1. BACKGROUND

People the world over have for the past few years begun to include environmental issues as important features in their agendas (Frost *et al.*1994*)*. This movement has been joined by industry, with increasing recognition of its role in environmental changes.

Industries play a very important role in providing employment and boosting the economy; but "economy and environment are inextricably linked in industries"(Yeld 1997:61), and so this positive contribution is undermined by the negative environmental impact of many of the activities of the same industries. Smuts and Hobbs in Huntley (1989:334) indicate that industries and large corporations "have been at the forefront in altering our environment by both improvement and destruction". Industry and business' bottom line is to make a profit. This goal is often pursued without due regard for the consequences of the activities that lead to its achievement, which can be seen from the patterns of consumption of natural resources that make the production of a particular product possible (Frost *et al.* 1994). These patterns, together with pollution resulting from such activities, have a major share in degrading the environment. Environmental issues therefore "arise from many conscious and deliberate actions of people set in a context of values, needs, opportunities and circumstances"(Frost et al 1994:1). These issues, of environmental degradation and the actions and values which give rise to them, can only be addressed successfully through deliberate education and training programmes.

Industries have many training programmes which help workers improve their occupational skills and prevent accidents and injuries. The success of these training programmes ought to be enough proof that education and training for the environment could also be successfully implemented. However, managers in different industries are judged to be managing successfully only in terms of the financial performance of their industries and not through the various training programmes conducted in their companies. The unfortunate result is that, this successful industrial management is not translated into environmental management in their industries. This was observed in the two companies where case studies were conducted in the Port Elizabeth /Uitenhage metropolitan area. In both companies, there was no programmed education and

training for the environment.

The Port Elizabeth / Uitenhage metropolitan area is one of the Eastern Cape's major industrial areas. It accounts for 61% of total manufacturing activity in the Eastern Cape (Jefferson, 1996/1997), with 34% of all cars manufactured in South Africa coming from this area. According to Jefferson (1996/1997) the manufacturing industry provides 34% employment to the inhabitants of Port Elizabeth / Uitenhage. This is one of the reasons why both case studies were conducted in this area of the province. As every manufacturing and /or engineering industry impacts on the environment it stands to reason that the Eastern Cape might be one of the areas suffering the high industrial impact in the country. At the same time, this concentration means that education and training programmes for the environment in the industries might easily reach many people if implemented. Companies in this metropolitan area were then approached to participate in the study, with the aim of gathering data that could identify the need for environmental education and training programmes.

Many companies approached were not willing to participate in the study. The choice of the two cases covered in this study was thus motivated partly by the size of the companies and partly by their willingness to participate in the study. Both the Murray and Roberts Foundry and Volkswagen are classified as corporate businesses by the Port Elizabeth Regional Chamber of Commerce and Industry. In such a context, education and training for the environment can go a long way forward in addressing many of the environmental issues resulting from the activities of these types of businesses and their sister corporations.

Education and training, if developed appropriately, can help industries understand environmental management not only as managing wastes and impacts, but also as having to do with relationship issues within industry (IBBE, 1996). When the relationship between management and workers is not healthy, the plant concerned can be said to have environmental problems. In many industries, management and workers live worlds apart and therefore see environmental problems differently. A plant in this type of situation will always find it difficult to adopt a policy that is acceptable to all, which is why something must be done about it. All parties in the industry will have to see environmental problems in similar ways in order to make common and correct environmental decisions (Huntly, 1989). Such decision making is possible only through access

to information which can encourage broad participation.

Industries mainly have what is referred to as an uneducated and unskilled labour force. As part of the social responsibilities of such companies workers need to be supported and equipped with skills that will enable them make good decisions concerning primary health care and family planning, as well as environmental practices in the workplace. Many industries presently do not have some of these services and only assistance from elsewhere can help.

Furthermore, senior decision makers in industry need to have knowledge and understanding of possible environmental changes and the consequences that might result from such changes (Frost, *et al.* 1994). This knowledge can help in preparing their companies for the mitigation of such changes.

This study was motivated by the need to support industry in the development of environmental education and training programmes and courses. Industries tend to support the idea of sustainable development, particularly when it comes to developing environmental programmes for others. ICC (1992) shows that industries have already established formal programmes for working with educators at different types of schools. The same cannot however be said about education and training programmes for themselves. In South Africa, several environmental management courses are on offer, notably of Potchefstroom University (Nel, 1997). However, there are very few if any environmental programmes which actually prepare industrial trainers and managers to implement environmental education and training in their plants. It is on the need for such training programmes that this study focuses. At this stage, there is not enough information to guide the development of such courses and programmes, except for recent contributions by Craffert and Fourie (1997) and KPMG and IEF (1997). The success of the programmes would help industries implement environmental management systems which would balance production with environmental responsibility.

1.2. FOCUS OF THE STUDY

The aim of the study was to determine environmental education and training needs in industries in the Eastern Cape by examining two cases in depth. The value of in-depth case study, phase

I was to complement and prepare for the broader survey termed phase II. Phase I results led to the development of questionnaires for phase II.

1.3. STRUCTURE OF THE REPORT

This report is presented in five chapters. This chapter introduced the study, its background and focus. Chapter two briefly outlines the methodology employed in the study and gives an indication of how the data was gathered and analysed. Chapters three and four present the data gathered during the two independent case studies of Murray and Roberts Foundry and Volkswagen plant, respectively. The findings of these case studies are discussed in chapter five. The recommendations of the study to course developers are also made in this chapter.

CHAPTER 2
METHODOLOGY

This chapter gives a brief description of the research method and data collection techniques used in the study. In addition, it informs the reader of problems experienced during the study and the way in which these may have influenced the findings, and assesses the overall strengths and shortcomings of the study.

The method of research was the **case study**, which "typically observes the characteristics of an individual unit" (Cohen and Manion, 1980:106). In both cases, three data collection techniques were used. The techniques were interviews (Stake, 1995), observation (Anderson, 1990) and document analysis (Stake, 1995), the findings of which were used to support other findings in a process called triangulation (Stake, 1995).

Research **interviews** have been defined as

> a two-person conversation initiated by the interviewer for the specific purpose of obtaining research-relevant information and focussed by him on content specified by research objectives of systematic description, prediction or explanation.
> (Cohen & Manion 1994:27 citing Cannel & Kahn).

Interviews were conducted with representatives of the following sections working in the plants: Senior management, middle management, health and safety officers, training sections, occupational nursing staff, Unions (where applicable) and workers. Interview questions were mainly unstructured, what Bless and Higson-Smith (1995) call a non-scheduled interview. This gave interviewees the opportunity to give detailed information in response to the questions which were asked. Cohen and Manion (1980: 272) say: "Interviews allow for a greater depth than is the case with other methods of data collection". Responses were cassette recorded with permission granted by the interviewees, except in cases where interviewees requested not to be recorded. I also wrote notes to supplement what was being recorded. Prepared questions were mainly used to start discussion on a sub-topic. Follow-up questions were also asked, depending on the responses given.

The **observation technique** applied was non-participatory in nature, as it was not possible for me as an outsider to be involved with the daily activities of the plants. I spent three days at the foundry and two days at the Volkswagen plant. Observations were made during a tour of the different working areas, led by one of the workers who knew what took place in those areas.

Documents analysed consisted mainly of various pamphlets, in-house publications and the documents of related industries. Many relevant documents such as environmental impact assessment (EIA) reports could not be given to me as they were said to contain classified information. This was unfortunate as I regarded such documents as important for the study, containing as they did formal reports on assessments conducted. Many documents analysed supported what was found during the interviews.

Methodological problems centred mainly on access to the plants and to interviewees. Telephonic enquiries, followed by official letters were used to request permission to conduct interviews and observations at the plants. The data collection phase was scheduled to be completed within a month, but it took more than three months to set up, because several companies which were approached were unwilling to participate. They were very reluctant to grant me access to their plants. Three tire manufacturers were invited to participate, for example, but all of them declined after I was kept waiting three weeks for a reply. It was also difficult to ascertain whether a company had an environmental manager or not. Several receptionists were unsure of what I was asking for. In one company, the woman who answered my call told me their business was to "make tyres and has nothing to do with the environment". This experience will be discussed in chapter five, as it reflects a number of companies' attitudes to the environment and research around 'environment' .

In some companies unions wanted to be contacted directly without the involvement of the company's management. When approached as requested, however, they declined to participate. A situation arose where one section of the plant agreed to participate and another section (the union representatives) declined. I therefore decided to involve workers in their capacity as workers and not as union representatives. In short, most companies approached, from management to workers, were on the whole uncomfortable about participating in the project.

This led to the decision to focus the study on the two cases of the M&R Foundry and Volkswagen, as in these cases both management and the environmental sections accepted the invitation to take part in the study without any conditions. This can be ascribed to the fact that one company had a full-time environmental controller who wanted to improve their environmental performance. In the other company, even though the environmental officer was not responsible for environmental matters on a full- time basis, he might have seen the importance of cooperating with people wanting to contribute towards a better understanding of the environment.

My experience indicates some of the difficulties one might expect to encounter when approaching industry around the issue of 'environment'.

When making observations on the activities of the plant, a researcher should always try to ask questions which will elicit answers relevant to the study and not allow the guide to give information which might not be relevant. As I observed, guides usually gave information that was not environmentally-related but which had to do with how good the company was in producing a particular item in a particular shop. Even when asked specifically to give environmentally-related information, associated with a particular shop, they were reluctant to do so. This could be ascribed to the fact that they were not significantly orientated to the subject I was researching, arriving only minutes before the site visit. Again, documents are seldom written to answer the researcher's questions. Researchers need to have the skill to sift relevant information from documents.

Even in the two chosen cases I worked under constraints. For example, in one company, a senior management member had very little time for the interview, even though the time table for the interviews was prepared by his plant. This situation was unsatisfactory as it was not possible to ask all the questions planned.

CHAPTER 3

THE PORT ELIZABETH FOUNDRY: MURRAY AND ROBERTS

3.1. INTRODUCTION

This chapter presents data gathered at the Murray and Roberts Foundry during the first case study of the project. It starts by describing the situation and history of the plant and the raw material used in the casting of different automotive components. The Foundry's size is shown by the number of people it employs. Data follows on different aspects associated with Foundry business, including workers' health and safety and various social, economic, and legal matters.

The study revealed that workers in this plant have to cope with various environmental issues which can at times put their health and safety at serious risk. This chapter also deals with how the plant tries to manage such risks. It concludes by looking at the existing training programmes offered in the plant and problems associated with these programmes. Current training programmes are hampered by a lack of time and managerial support.

3.2. SITUATION AND HISTORY OF THE PLANT

The Port Elizabeth Foundry is situated in Korsten, a suburb north of the city. The plant is just across the street - about fifty metres away - from a residential area which borders the industrial area. The foundry was bought from Ferrovorm in 1981 and then named Murray and Roberts Foundries- Port Elizabeth, after its owners Murray and Roberts Limited (*Murray and Roberts* nd. a: 14). It is one of the company's three Foundries, the others being in Cape Town and Brits.

3.3. MATERIALS AND NATURE OF BUSINESS

In the Foundry silica sand, bentonite, scrap generated from body panel offcuts and ferro-alloys are used to manufacture different automotive components. It is equipped with facilities including electric melting and holding facilities, a well equipped laboratory for chemical and physical testing with "quality systems complying with the requirements of ISO 9002 and Ford's Q101" (Murray and Roberts nd. b :2) and disametic and jolt squeeze moulding facilities. The facilities

have the holding capacity for 12000 tons of castings per hour. These facilities enable the Foundry to produce ductile and grey irons, silicon molybdenum irons and vermicular irons (Murray and Roberts nd. b). The different engineered and manufactured components are made from these irons depending on what is to be produced.

The Foundry manufactures steel and iron castings. Its activities are focussed exclusively on the automotive industry (de Nysschen 1995:18), producing automotive components such as cylinder blocks, exhaust manifolds, steering knuckles and carriers, flywheels, ventilated brake discs and brake drums. The Foundry's major customers are Toyota SA, Volkswagen SA, Nissan SA and Samcor (Murray and Roberts nd.a).

3.4. THE FOUNDRY'S MANAGEMENT AND STAFF

The Foundry's workers are divided into hourly employed workers and staff. It is headed by the Divisional Manager, who serves as a link between the Foundry and Corporate Head Office. He is supported by seven managers, divided into finance, production, engineering, development and human resources. Each manager is supported by at least three superintendents. Foremen work directly under the superintendents and each of the foremen has a sizeable number of line operators. As at the 30th April 1997, there were **335** hourly employed workers and **49** staff members, consisting of both management and clerical staff.

The relationship between management and workers was said to be 'improving' and a lot better than in previous years. This was supported by the fact that for the past two years, ending in May 1997, the plant had not experienced any industrial strike. The management attributed the improving relationship to regular meetings between Union representatives and management to solve the Foundry's problems.

The education level of the hourly employed workers is generally low. On average, they have passed only standard seven or standard eight, while the average of staff members is standard ten.

There are two Unions operating in the Foundry. They are the National Union of Metal Workers of South Africa (NUMSA) and the National Employees Trade Union (NETU). The two Unions

co-exist harmoniously, according to both management and workers interviewed. Communication between management and workers is mainly via the shop stewards if the matter relates to the entire plant. If the matter is job-related, foremen in the particular lines are the first people to be contacted by the workers under them. This seems to indicate that the plant has good communication channels.

3.5. HEALTH AND WORKERS

The full-time occupational nursing sister is responsible for the workers' health. She renders primary health care, treats minor ailments and injuries and refers serious ones to a doctor. As indicated below, some shops in the plant are very hot and dusty, and large quantities of smoke are emitted during its operations. These fallouts put workers' health at serious risk.

3.5.1. OCCUPATIONAL DISEASES RESULTING FROM THE ACTIVITIES OF THE PLANT

Occupational disease is " a physical condition which has specific signs and symptoms caused by exposure to substances in the workplace, and which is limited to and affects a certain part of the body" (Ambler, 1994:19). The activities of the Foundry and fallouts can result in workers contracting the following occupational diseases:

- Silicosis.

Dust generated in the plant is from silica sand. Prolonged inhalation of silica sand dust can cause silicosis (Murray and Roberts, nd. d), which is a chronic disease of the lungs (Microsoft 1995). All interviewees indicated that silica sand is the major industrial fallout and can cause silicosis, which is at this stage incurable. A worker who is diagnosed as suffering from 70% silicosis is declared disabled and qualifies for compensation when he goes on early retirement. Silicosis is considered a disability.

- Heat stroke and heat cramps.

Some sections of the plant, particularly the melting shop, are very hot. Workers in these sections may suffer from heat-related problems such as heat stroke, heat exhaustion and heat cramps. Heat

stroke is "a response to extreme heat characterised by high body temperature and disturbance of the sweating mechanism" (Murray and Roberts, nd.d:3). Heat stroke can be fatal if untreated. Legislation has laid down maximum heat levels for continuous exposure. Unfortunately, the environmental impact assessment (EIA) conducted in the plant in 1996 by Pol Tech indicated that the heat levels were too high. Recommendations about the situation were given to the plant.

- Eye strain.

This is an ailment mainly affecting people working in welding sections and where the light is poor. I observed that in some sections of the plant light was poor. Workers interviewed indicated that eye strain was a serious problem . They indicated that it was common to see workers strugling to "find their way during breaks".

- Hearing loss and deafness.

These conditions are caused by exposure to high noise for an extended period of time. Some sections of the plant observed are very noisy. Both the occupational nurse and workers indicated that the high noise levels caused hearing loss. If it is not attended to, hearing loss, which is the inability to hear certain sounds, can lead to complete deafness.

- Tuberculosis

Industrial fallout can aggravate tuberculosis conditions in some workers. This view was also supported by the occupational health nurse. Workers on the other hand maintained that industrial fallout *caused* tuberculosis. They also indicated that management did not attribute tuberculosis to dust inhalation in the plant and the doctors who diagnosed them usually sided with management. This indicates a misunderstanding on the part of the workers. It also shows the need for better education and more trusting relationships.

3.5.2. PRECAUTIONARY MEASURES TO PROTECT WORKERS' HEALTH

3.5.2.1. PRE-EMPLOYMENT AND POST-EMPLOYMENT EXAMINATIONS

Workers' health is mainly the responsibility of the occupational health nurse employed in the plant, in close co-operation with the medical doctor who is called when the need arises. As a

precautionary measure, every worker undergoes a lung function test, eye function test, audiometric test and chest X-rays when joining and leaving the plant. Apart from the above tests, a medical doctor conducts a complete physical examination. Because the Foundry's work is hard and risky, good hearing and good eyesight are very important. A person who has either poor eyesight or poor hearing can pose a serious risk to himself and other workers. The tests are aimed at determining workers' health before they start working for the plant and when they leave. On both occasions, test results are shown to the workers, this enabling them to know their health condition. Records are kept for future reference.

Apart from the above tests, there are also three routine tests which act as continuous monitoring of the workers' health condition. These comprise lung functioning and eye functioning tests, every eighteen and six months respectively. The plant also has a dust sampling tube which is used to measure the amount of dust released in a particular section. The tube is attached to a worker's garment collar for seven hours per day. The tube is taken for testing. From it, the plant is able to establish which sections are too dusty.

3.5.2.2. PROTECTIVE EQUIPMENT AND CLOTHES

Much of the protective clothing and equipment was introduced in 1995 on the visiting doctor's advice. The plant supplies and washes these clothes free of charge. Wearing of protective clothing in the plant is in some instances policy and in some instances mandatory. Workers have to know areas where they have to wear specified clothing. Amongst the protective clothing used are safety footwear, hearing protection, dust masks, respirators, safety spectacles and different types of gloves.

Workers interviewed indicated that some of the clothing supplied was not effective. It was found from the interviews that the plant supplies protective equipment of varying quality which is expected to perform the same function: for example, ear plugs of different quality are used at two different shops. According to workers interviewed, this practice was due to the belief of management and the health and safety section that different sections of the plant do not pose the same danger to human health, even when the fallouts are of the same type.

From the interview with the occupational nurse and the health and safety coordinator, it was clear that workers' attitudes to protective clothing left much room for improvement. The health and safety co-ordinator did not see workers' failure to wear protective equipment as "anti-policy", but merely as forgetfulness. The occupational nurse pointed out that some workers use their long service as an excuse for not putting on protective equipment (some of the workers had joined the plant long before she started working there). They seem to be undermining her authority on the basis of the number of years they have been with the plant.

Workers' responses to interview questions showed clearly that they were aware of and concerned about the unhealthy conditions in which they were working. Workers interviewed indicated that they did not believe that education and training would be a solution to the health risks posed by the activities of the plant. They maintained that management should work hard to have conditions improved, for instance by installing dust extraction machines in all sections and improving the quality of protective clothing and equipment. The occupational nurse indicated that education and training could be helpful, specifically to raise workers awareness of the dangers of not putting on protective equipment in identified areas. The occupational nurse indicated that her section had difficulty in conducting education programmes which would help workers prevent contracting occupational diseases. It was very difficult to have workers released in order to attend the programmes offered by the section. Education, advice and counselling is therefore mainly done during consultation times.

3.6. SAFETY AND WORKERS

Safety in the plant is headed by the Health, Safety and Environment co-ordinator, who is governed by the plant's Health and Safety Policy. Management sees safety in the plant as one of its managerial priorities, as stated in the policy. In the policy management undertakes to ensure that "all unsafe conditions, unsafe acts and health hazards are eliminated and that the workplace complies with legally accepted standards of health and safety" (Murray and Roberts 1993). The policy was signed by the Divisional Manager as required by law (Dalton, 1996).

The Foundry is a very busy place and there is a high potential for accidents, particularly as the lighting is dim in some sections. Objects pass regularly overhead and usually with no warning

at all. Locomotives also move around loading and off-loading heavy objects. According to all those interviewed, however, serious accidents do not often occur.

The plant has a notice board mounted next to the main entrance. On that notice board, workers are reminded to work safely in order to keep accidents to a minimum. On this board, the management request workers to think before they act and to work safely (Murray and Roberts, 1997). The plant was targeting working for one million hours, that is five hundred and seventy working days, without a disabling injury. The notice board indicated that the last serious accident happened on the 17th February 1997, about three months before the study was conducted.

The Foundry's Health, Safety and Environment section undertakes a number of precautionary measures. Firstly, every new employee is given the handbook of safety instructions, and is required to sign as an indication that they have understood both the policy and the safety instructions. This is in line with the Occupational Health and Safety Act, which requires that the Health and Safety Policy signed by the Head of the plant should be displayed to all workers (Dalton, 1996). The instructions are written in English, Xhosa and Afrikaans. The Health, Safety and Environment co-ordinator acknowledged that not all workers were literate and in a position to read the instructions. The management has identified some of the potential causes of accidents as workers' conduct, failure to wear protective clothing by workers, traffic, welding and flame cutting and fire. The handbook of safety instructions gives detailed guidelines and instruction on how to use and work with the potential causes of accidents.

The co-ordinator does however make sure that continuous training of the workers is conducted in order to prevent accidents. Their training programmes are developed by the National Occupational Safety Association (NOSA). The courses are conducted by the in-house Health, Safety and Environment Co-ordinator. The main problems the Health, Safety and Environment coordinator experienced in conducting the safety training courses was that the Afrikaans and English abilities of the Port Elizabeth Foundry workers were too low for these languages to be used as medium of instruction. On the other hand, his Xhosa was not good enough either. There was therefore a communication problem from both sides. If the plant was serious about addressing this problem it should consider appointing someone who could speak at least Xhosa and Afrikaans or Xhosa and English.

3.7. FOUNDRY AND THE ENVIRONMENT

Besides training in the plant, the Health, Safety and Environment co-ordinator is also responsible for both internal and external environmental impacts resulting from activities in the plant.

3.7.1. ENVIRONMENTAL ISSUES RESULTING FROM THE ACTIVITIES OF THE PLANT

From both interviews with workers, management, the Health, Safety and Environmental section and observations, it was found that the activities of the plant result in the following environmental impacts:

3.7.1.1. POLLUTION

- Air pollution

Air pollution results from the smoke of the burning furnaces where metals are melted. The emitted smoke contributes to the general air pollution in the Port Elizabeth area. The plant also generates a lot of silica sand dust from its on-site milling, sanding, crushing and grinding operations, coal dust also resulting in air pollution (Murray and Roberts, nd d). The occupational nurse revealed that residents and some neighbouring factories are affected by smoke and dust released from the Foundry. Residents are mainly affected by the smoke, which soils and damages their curtains. Other factories in the area are mainly affected by dust.

- Noise pollution

The Foundry activities are very noisy, which is particularly noisome at night. Since the plant is just across the street from them, nearby residents are affected by the noise. All interviewees, from workers to management, considered the noise level to be unacceptably high. The EIA (mentioned in 3.7.4) conducted by Pol Tech (1996) listed the Foundry noise as an environmental impact. This shows the need for training workers to put on protective equipment and for management to supply only equipment that is effective, thus helping workers change their attitude towards the equipment.

- Storm water drain pollution

The above-mentioned EIA indicated that the plant was polluting the storm water drain. Both the member of management interviewed and the *contents page* of the EIA report (mentioned in 3.7.4) only mentioned this impact without elaborating on it.

- Waste products

Waste is "any undesirable or useless matter... resulting from human activity" (DEA&T, 1996). The activities of the plant generate sand, slag and small pieces of scrap metal which have to be disposed of. Slag is "impure residue, consisting largely of calcium, iron, aluminium and magnesium silicate, derived during the ... smelting of irons..." (Encarta 1995).

These wastes are dumped in temporary bins before they are disposed of in the municipal dumping site by a waste disposal company. The disposal of the wastes is a continuous activity and over-accumulation of wastes is prevented. Members of management interviewed indicated that the Port Elizabeth Technikon was conducting a study to find out if the sand generated could be used to make building bricks. The plant hoped for positive results from the study as this would result in a great reduction of dumping and land pollution.

3.7.1.2. ENERGY CONSUMPTION

Interviews revealed that the Foundry may be the highest consumer of electricity in the Port Elizabeth area. Considering that most of South Africa's power is coal generated, many tons of coal are being used in order to produce and supply electricity for the plant. A research-related visit to a coal generated power station in Mpumalanga revealed the large-scale and continuous burning of coal necessary for the station to operate. Coal burning generates tons of ash which are disposed of as wastes - resulting in land, water and aesthetic pollution. Sulphurous gas emission results in air pollution and the aggravation of the greenhouse effect. Tons of coal are stored on uncovered ground, thus aggravating water pollution.

3.7.2. ENVIRONMENTAL POLICY AND LEGISLATION

The plant does not have an environmental policy. Instead a document called *Vision and Values*

was adopted in 1996 by all parties attached to the three Murray and Roberts Foundries. This document indicates in one sentence that Murray and Roberts Foundries "care for the environment" (Murray and Roberts 1996). Management representatives interviewed conceded, however, that it might be necessary to have a clearer environmental policy for their plant, as companies dealing with them might require that they be clearer on the environmental statements of their plant. This finding indicates that management may be primarily motivated by the wish to protect business interests. The wish to protect business interests and not, in the first place, the interests of the environment and workers, is picked up in the discussion section.

According to members of management and the Health, Safety and Environmental co-ordinator, the plant's operations are controlled by the following legislation
- the Atmospheric Pollution Prevention Act no 45 of 1965.
- the Environmental Conservation Act no 73 of 1989.
- the Hazardous Substances Act no 15 of 1973.

Management indicated that the required compliance with the above legislation does not hamper the plant's business. Workers interviewed indicated that they were not aware of any legislation they have to comply with. They did not in fact even know about the existence of the *Vision and Values* document. The policy for the environment, such as it is, was thus not seen as be shared by all inside the company. All interviewees, including workers, believed that education and training is necessary to teach about policy and legislative issues. Workers and management thought that education and training programmes could be conducted at a University initiating the programmes, but the Health, Safety and Environment co-ordinator thought that training rooms in the plant could be used, especially if workers are to be trained. He also indicated that should the programmes include the workers, line managers would have to be part of the agreement.

3.7.3. VIEWS ON THE PLANT'S ENVIRONMENT

All workers and members of management interviewed were aware of both the internal and external negative environmental impacts of their plant. They were aware that the Foundry is internally dusty from silica sand, hot, poorly ventilated and poorly lit in some sections. Management, however, thought that the plant was a lot cleaner than it was about five years ago.

Workers on the other hand indicated that the improvements in the working environment indicated by management were not adequate at all. This was the main difference observed between management's and workers' responses. Management believed that they were doing their best to address the environmental conditions, but due to reported financial constraints, they were unable to improve them as fast as they would have liked to. They supported their position by indicating that one dust extraction machine was installed in 1996, at a cost of one million rand. Workers interviewed believed however that management were deliberately dragging their feet on the improvement of the conditions in the plant. These differing perceptions are picked up in discussion in chapter five. For any environmental policy to work, management needs to address different perception among different parties in the plant. Union representatives interviewed also did not agree among themselves on the pace of improving conditions. Representatives of one union were of the opinion that since the cost of installing equipment that would improve working conditions was high, the pace of installation was fast. Representatives of the other union, on the other hand, believed that the plant had sufficient funds to improve conditions faster.

Members of management interviewed were also very aware of the external environmental impact of their operations. One member however indicated that smoke did not pose a serious problem to people living within the vicinity of the plant, as he said it would get diluted long before it reached the residential area. Union representatives on the other hand indicated that the entire area in the vicinity of the plant is covered with a cloud of black smoke when the furnaces are being started. This shows both the seriousness of air pollution caused by the activities of the plant, and the differences in reported perceptions on the same issue.

3.7.4. ENVIRONMENTAL IMPACT ASSESSMENT

In 1996, the plant employed Pol Tech, a private company, to conduct an EIA. The objective of the assessment was "to identify the impacts or environmental problems experienced in terms of the environmental conditions, while the Foundry is in full operation" (Pol Tech, 1996:1). According to members of management interviewed, the impact assessment results indicated air pollution, storm water drain pollution and noise pollution as the main impacts of the plant on both internal and external environment.

The contents page of the impact assessment report (the only part of the of the document I had access to), however indicated recommendations on "proposed mitigation actions" (Pol Tech, 1996: iV) in respect of air pollution, water pollution, visual and aesthetic impact, noise, cumulative impact and an environmental management system. Both workers and members of management only talked of the dust extraction measure as having been implemented.

3.7.5. SOCIAL ASPECTS

As noted in section 3.4 the Port Elizabeth Foundry employs more than 300 workers. These men and a few women are mainly from the Port Elizabeth area. A member of management indicated that apart from being a source of employment, the Foundry was not involved in any social projects at that stage. Plans for the plant's social involvement were however, as recorded in the *Vision and Values,* at an advanced stage. In the *Vision and Values* document, it is stated that in the next five to ten years, Murray and Roberts Foundries want to be seen as a part of the community striving to "help communities where we operate, in a meaningful and *visible* way" (Murray and Roberts, 1996). According to a member of management interviewed, the management of Murray and Roberts Foundries are in the process of forming a community service group to look at the involvement of the plant in the community. At the time of the interview, only a steering committee was in place. The Committee was composed of the Managing Director, union representatives and union organisers.

Both members of management and union representatives indicated that the relationship between the workers and management was improving from what it had been in previous years. The improving relationship was attributed to organised communication channels which had been put in place by both the management and the unions. Meetings between management and unions are held regularly and issues which could easily bring bad blood between the two are ironed out. It was however observed from workers' responses that workers did not generally trust management on some issues.

3.7.6. ECONOMIC ASPECTS

All persons interviewed indicated that the plant was performing well economically. It enjoyed

good support from the local car manufacturing companies such as Volkswagen, Samcor and Nissan.

Interviewees from management differed in their comments on the environmental budget issue. Two interviewees indicated that the plant did not have an environmental budget and that environmental equipment was bought from a capital expenditure budget. A third interviewee representing senior management indicated that the plant had an environmental budget for the past three years. According to him, the budget was adequate, considering that they had already installed one expensive dust extractor.

3.7.7. TRAINING

The Foundry's training section is headed by the Human Resources Manager. There is only one training officer who conducts courses which are not directly job-related, such as Adult Basic Education and Training (ABET), and courses which are directly job-related such as Quality Awareness training where workers are trained to see to it that whatever is produced meets customers' specifications. The plant's training rooms are used for training sessions. The main aim of ABET is literacy. The existing programmes do not include any environmental topics.

The ABET programmes are attended by workers with the lowest levels of education. Though training sessions are conducted during working hours, attendance at ABET training programmes is on a voluntary basis, and the training section and the training officer in particular have no control over attendance at all. Because attendance is voluntary, nobody knows the total number of illiterates in the plant. A total of 132 workers attended the training programme from February 1995 to February 1997. Three of those attending the programmes had no formal education at all, while 24 of them had passed standard ten. All the others had received formal education ranging between standard one and standard nine. The following courses form the main content of the programmes. Breakthrough to Literacy, English Literacy Project, Quality awareness and Numeracy. Unlike in the safety training programmes, lessons are conducted in both English and Xhosa.

Both the senior management representative and the Health, Safety and Environment co-ordinator

indicated that the plant had a training budget, which at the time of the study was R 300 000-00 per annum. Training equipment was bought as requisitioned. The main problem the section experienced was workers' attendance. It was always difficult for workers to be released from their production lines and management had to "sort it out with line managers". The training officer saw that as management's problem. He indicated that management in theory supported training but did not do enough to make line managers also show support by releasing workers to attend training sessions. Management has to balance production with training. When a worker is absent, the line manager simply substitutes him with the one who is scheduled to attend training. The training officer saw the introduction of environmental education and training programmes as important because the level of workers' environmental knowledge was very low. The programmes should be conducted with those people who would be able to educate others. He however indicated that management should support the programmes if they were to succeed. According to him, management only supported those programmes which they thought would benefit the company. It would therefore be important for anyone who wants to introduce educational programmes to bear this in mind.

3.7.8. EDUCATION AND TRAINING FOR THE ENVIRONMENT

According to earlier data reported, all interviewees including workers indicated that education and training could help in dealing with the different environmental issues resulting from the plant's operations. According to the Health, Safety and Environment co-ordinator and workers, training should be attended by management, supervisors and workers. Because of the difference in educational levels, the courses could be graded to meet specific needs. Both members of management and workers believed that the courses should be conducted by someone from outside the plant as he / she would fully devote his / her time only to training and no other in-house commitments. The Health, Safety and Environment co-ordinator, on the other hand, indicated that should environmental programmes be developed for the plant, trainers and Health and Safety officials could be in the position to offer such programmes, as they are presently able to offer NOSA programmes. The co-ordinator also indicated that it would be logistically sensible for courses to be conducted in the plant. Workers however wanted the programmes to be conducted somewhere other than in the plant.

The management representative interviewed on this aspect wanted education and training to be conducted with those people who would be able to educate and train others after completion of their training. This arrangement would make it possible for workers to be educated and trained on continuous basis in the plant. He felt that trainers, supervisors, training officers and some members of management should attend the education and training programmes.

The training duration should be reasonably short in order not to disrupt their full time employment activities. People should be trained in terms of both the internal and external environment.

According to the member of management interviewed, the environmental training programmes should include the following content:

- Micro and macro content of the concept 'environment'
- The environmental do's and don'ts
- People's environmental responsibilities (do they have any responsibility) in their homes, local communities and work environments
- Waste management
- Pollution
- Government's position on specific environmental subjects.

CHAPTER 4

VOLKSWAGEN OF SOUTH AFRICA

4.1. INTRODUCTION

The design of chapter four is similar to that of chapter three. Data gathered at the Volkswagen of South Africa plant is presented, starting with the situation of the plant and its history. The chapter continues by looking at the plant's management and staff and how they relate. Like the previous chapter, chapter four also looks at social, economic and legal aspects of the plant. As noted in chapter two, the information presented in this chapter was gathered through interviews with representatives of different sections of the plant, such as training, environment, health and safety. The data in chapter four was collected in the same way as that in chapter three.

The Volkswagen plant is far bigger than the Murray and Roberts Foundry. Because of the greater size of the plant, there are several additional aspects to be considered. The chapter concludes by looking at the training programmes offered in the plant and problems associated with them.

4.2. SITUATION AND HISTORY OF THE PLANT

Volkswagen of South Africa (Pty) Ltd is situated in the industrial area of Uitenhage. It is a wholly-owned subsidiary of Volkswagen Group which has its head office in Germany. The company was formed in 1946 as South African Motor Assemblers and Distributors at its present site. (Volkswagen, nd a). It was renamed Volkswagen of South Africa (Pty) Ltd in 1966.

4.3. MATERIALS AND NATURE OF BUSINESS

Their business is to assemble Volkswagen and Audi brands using metal sheets which are shaped on site, using different dies in the plant, according to the part and the model to be produced. Parts to be assembled arrive at the plant as plain metal sheets and the plant shapes them according to the part and the model of the car. Paint and metal sheets are the major materials used. Other parts used are obtained from different countries such as South Africa, Germany and Spain. Assembled cars are sold locally, in some other African countries and a few countries abroad.

4.4. MANAGEMENT AND STAFF

The plant employs more than 6000 staff members and hourly paid workers. Volkswagen has seven major divisions: Technical, Quality Analysis, Finance, Human Resources, Marketing, Communication and Internal Auditing. Each of these divisions is composed of different sub-sections. The environmental section is under Technical Production which is one of the sub-sections of the technical division. The National Union of Metal Workers of South Africa (NUMSA) is the major Union operating in the plant. The member of management interviewed indicated that the relationship between management and workers was "improving".

4.5. HEALTH AND WORKERS

The Volkswagen management supports the RSA constitution which states that workers have the right to work in an "environment that is not harmful to their health or well being" (*The Constitutional Assembly*, 1996:11). The plant did not have an environmental policy, but what it calls a corporate quality policy. It was however governed by the Group's environmental policy.

4.5.1. OCCUPATIONAL DISEASES RESULTING FROM THE ACTIVITIES OF THE PLANT

Health and welfare in the plant is the responsibility of Corporate Health Services, which is the umbrella service provider to the workers. The service has six sections, each of them with specific services to render. The sections are Occupational Medical Services, Social Work Services, Occupational Safety Services, Occupational Hygiene, Hazardous Substance Control and the Community Health Project. Occupational Medical Services operates from the industrial clinic which is manned by four nursing staff members, a full-time and a part-time doctor. The clinic operates for sixteen hours every day and it always has a sister on call when it is closed. According to the occupational sister in charge and interviewed, workers do not suffer from serious diseases resulting from the activities of the plant, except back aches. This view was also supported by the Health and Safety officer and workers' representatives interviewed. Workers' representatives did not mention any of the ailments mentioned by both the nursing sister and the safety officer. The most common ailment of the workers was back ache and athletes' foot, a fungal infection between

the toes (Microsoft, 1995). Athlete's foot, attributed to the wearing of boots without woollen socks, is a condition common among the workers. The clinic successfully treats these ailments.

Even though there are no occupational diseases, it has been found that some sections of the plant do aggravate certain conditions in the workers. These sections are the painting and welding shops, where asthma and tuberculosis can be aggravated by excessive inhalation of paint particles and welding fumes. According to the occupational nurse interviewed, the occupational medical services make arrangements for such people to be transferred to sections where their conditions are not likely to be aggravated.

4.5.2. PRECAUTIONARY MEASURES FOR WORKERS' HEALTH

4.5.2.1. PRE-EMPLOYMENT AND POST EMPLOYMENT EXAMINATION

Occupational Medical Services takes the following precautionary measures to ensure that workers work in a healthy condition.

Pre-employment and post-employment physical examinations are conducted. They include *inter alia* eye tests, audiometric tests, lung function tests, weight and a urine test. These tests help the plant to employ only those people who are healthy and not addicted to drugs such as dagga, according to the occupational health nurse. They also help in determining where new employees, especially those suffering from tuberculosis and asthma, might be stationed without aggravating their existing conditions. Both pre-employment and post-employment examinations results are shown to the worker concerned. The Occupational Medical Services also conduct routine examinations on and for drivers' medicals, spray painters and executive health.

The counselling and education section counsels and educates workers on sick absence, alcoholism and drugs, Aids and general health. Education and counselling is hampered mainly by the non-availability of workers, as it is not always easy for them to be released from the production lines. This problem is similar to case 1. In some instances the occupational health nurse had to literally "grab workers out of the production lines for medication". Through their four main sections, the occupational medical services give a comprehensive service to workers and seem to provide satisfactory precautionary measures for the plant.

4.5.2.2. PROTECTIVE EQUIPMENT

It is company policy for workers on specific lines to wear protective equipment, which might include boots, ear plugs, dust coats and safety gloves.

Workers know that they have to wear protective equipment, but when I was observing the activities of the plant, I noticed that some workers were without them. On this issue, the environmental and health officer thinks that while there is room for improvement, workers' attitudes towards the equipment cannot be classified as negative.

4.6 WORKERS' SAFETY

Workers' safety is directed by the Management Safety and Loss Control Policy, which was produced in accordance with the Occupational Health and Safety Act. The policy was signed by the former Managing Director of the plant. Section 7 (1b) of the Occupational Health and Safety Act states that "The chief inspector may direct any group of employers...to prepare a written policy concerning the protection of the health and safety of his employees..." (Dalton *et al* 1996:2-150). The policy lays down steps and procedures to ensure that injuries and accidents are kept to the minimum. The Occupational Safety Services, a branch of Corporate Health Services, is responsible for the workers' safety and is headed by a qualified environmental health officer with a B.Tech in Environmental Health. Health and safety representatives, who have been elected in terms of the Occupational Health and Safety Act, conduct monthly inspections in the plant checking safety, health and environmental issues in the workplace, and reporting their findings and recommendations to the safety and health officer. According to the safety officer, the Occupational Safety Services is mainly responsible for machine safety, personal safety, accident and incident investigation, Occupational Health and Safety Act administration, risk assessment and safety auditing.

4.6.1. TRAINING - A PRECAUTIONARY MEASURE

As a precautionary measure, Occupational Safety Services conducts training on health and safety representatives, safety courses for workers, First Aid, safety counselling and the environment (Volkswagen, nd b). When training is being conducted in the handling of hazardous chemicals,

without a disabling injury, an indication of the effectiveness of the Corporate Safety Services in dealing with safety in the plant.

4.7. THE PLANT AND THE ENVIRONMENT

The environmental controller monitors the day-to-day environmental performance of the plant, and is responsible for environmental issues both inside and outside the work place. She works closely with Safety, Process and Plant Engineering Departments. However, the Managing Director bears final responsibility of the plant's environmental performance. The plant's operations have to respond to various environmental acts such as the Atmospheric Pollution Act and Water Pollution Act.

4.7.1. CONDITIONS OF THE WORKING ENVIRONMENT

In general terms, the plant' s working environment is clean, well-lit, well-ventilated and spacious. However, I observed that the press shop was very noisy although the noise levels, according to the environmental controller were below the stipulated limit of 85 dB (Occupational Health and Safety Act). The painting shop, which is out of bounds for visitors (no reasons given), has been said to be releasing paint particles when work is in progress. Tuberculosis and asthma can be aggravated by continuous inhalation of these particles. The welding points also release flames and fumes which can seriously affect the eyes.

4.7.2. ENVIRONMENTAL ISSUES RESULTING FROM THE ACTIVITIES OF THE PLANT

The activities of the plant might impact negatively on both the internal and external environments of the plant. The environmental controller indicated that negative impact on the environment was at that stage a possibility. However, air pollution was cited as one of the major environmental issues. The plant's boiler house which emits smoke, the paint shop which releases paint particles, and the bodyshop and metal finish line which release metal particles were obvious pollution sources. Used dirty oil was also said to be posing a serious risk to the nearby river if not well

information on their impact on the environment is included.

Training is conducted by Occupational Safety Services staff in the section's training rooms. Education and training is hampered by the non-availability of trainees, as it is not always easy to take them from the production lines. This problem was classified by the safety officer as a "sensitive" issue, as people who conduct training find it difficult to get cooperation from line managers.

4.6.2. HAZARDOUS SUBSTANCE CONTROL

Hazardous Substances Control is responsible for the registration and control of all hazardous substances used in the plant. This involves registration and control of the chemical substances and their toxic effects, personal protection and treatment of exposure (VWSA, nd b). The document analysed has however not recorded how the above services are conducted.

4.6.3. PHYSICAL AND CHEMICAL ENVIRONMENTAL MONITORING

The plant's operations result in various industrial fallouts which could impact negatively on both the internal and external environments. The Occupational Hygiene section is therefore responsible for the monitoring of the working environment. Because of the nature of the fallouts, working environmental conditions are for control purposes classified as physical and chemical environments. According to the Volkswagen Corporate Services document (nd b), noise, heat, ventilation, radiation, illumination and air velocity are monitored under physical environment, whilst lead, welding fumes, solvents, exhaust fumes and vapours are monitored under chemical environment. Risk assessments, occupational hygiene audits and hygiene facilities are also the responsibility of the Occupational Hygiene section.

4.6.4. COMMON OCCUPATIONAL INJURIES IN THE PLANT

Common injuries in the plant include cuts on the hands from metal plates. These injuries occur as a result of workers' failure to wear correct gloves or not wearing them at all. This finding implies that if the correct protective equipment were put on at all times, workers would not experience these injuries. The plant has several awards for working above maximum man hours

handled. The plant had conducted what the environmental controller called an air quality survey to look at the extent to which the air was being polluted by the activities of the plant. The results of the survey could not be given as they were classified as confidential. Recommendations to deal with specific fallouts had been made.

4.7.3. SCRAP

The plant generates scrap of different kinds, mainly as waste products of its activities. These include cardboard, paper, second hand tyres, plastic sheets, scrap solvents, steel, car bodies, panel offcuts and old car parts.

The different scraps are collected at the temporary dumping site in the plant before they are sold to different companies which have alternative uses for them. This helps the plant in scrap disposal. It also proved to be a good business for the company. In 1996 alone, the plant profited more than R5m in scrap sales. This shows the role recycling can play in a company, both economic and environmental. Scrap that is not sold is disposed of by Waste Bin Services, a waste transporter contracted by the company. All non-hazardous waste is disposed of at Koederkloof - a Uitenhage municipal land fill site.

4.7.4. EFFLUENT

The operations of the plant generate many litres of effluent. Effluent is " any contaminating substance, usually a liquid, that enters the environment via an industrial, agricultural or sewage plant" (Jones *et al.* 1990:141). The composition of the effluent is usually water, oil and paint sludge from shops and washing bays. The effluent is collected in temporary holding tanks before being pumped to the effluent treating plant, where oil is separated from the effluent and treated with neutralizing chemicals as directed by the ACT (Teurlings,1993). When the water has been treated, both the plant and the municipality take samples for tests and compares results. The tests are conducted to check the pH, a term indicating " the hydrogen ion concentration of a solution, a measure of a solution's acidity" (Microsoft, 1995), oxygen absorbent (shows permanganate value) and chemical oxygen demand (shows the degree of the water's contamination). If the

water does not meet the minimum requirements of the municipality on these tests, it is not to be discharged into the municipal sewer. The plant is then charged a penalty according to the level at which the water is contaminated before it is disposed of into the municipal sewer. Oil on the other hand is disposed of by Waste Bin Services in the municipal disposal pit.

4.7.5. ENVIRONMENTAL POLICY AND LEGISLATION

The senior management representative interviewed that the plant had an environmental policy, and indicated what they call Corporate Quality Policy, formulated in April 1996. The environmental controller, however, indicated that the plant's environmental policy was in the process of being formulated and that VWSA was in the interim governed by the VW Group environmental policy. In the Corporate Quality Policy, management commits itself to ensurring that their company's "processes and products meet local environmental regulations" (Volkswagen 1996a:1). The Volkswagen Group as a whole, however, has an environmental policy which has been distributed to all their branches in the tri-monthly newsletter (Volkswagen Group, April 1997). In this more strongly worded policy, the Volkswagen Group "accepts responsibility for the improvement of the environmental acceptability of its products and the reduction of the demands made on natural resources" (Volkswagen Group, April 1997:14).

According to the environmental controller, the plant's operations have to respond to the following environmental legislation and regulations:

- *The Constitution of the Republic of South Africa* of 1996, chapter 2 section 24.
  Everyone has the right :
  (a) to an environment that is not harmful to their health or well being
  (b) to have the environment protected, for the benefit of the present and future generations
- Water Act no 54 of 1956 sections 12, 12A, 22, 22A and 23.
  GN 991 (18-05-1984) and R2834 (27-12-1985)
- Uitenhage Municipal Drainage By-law
- Atmospheric Pollution Prevention Act no 45 of 1965, sections 9, 15 and 36-40
- Environmental Conservation Act no 73 of 1989, sections 20-22, 24 and 26.
- Hazardous Substances Act no 15 of 1973

- Water Act no 54 of 1956, sections 1-26
  Regulation 991 in GN 9225
  Regulation 2834 in Government Gazette 10048 27-12-85

4.7.6. WORKERS' ENVIRONMENTAL AWARENESS

All the people interviewed, including workers themselves, indicated that workers' environmental awareness was very low. Some labelled workers' environmental knowledge as "superficial". They all indicated that workers lack an understanding of the complexities of the environment. According to workers' representatives, some workers know that there are different environmental issues but they do not have an understanding of what the issues really mean and do not see themselves as contributing to the environmental problems associated with their activities in the plant. However, workers' environmental awareness differs from person to person. The difference is shown by some workers' deliberate action, such as "spilling of oil in the water drain", even after being told of the consequences. The action might show that they do not believe that their actions do contribute to the environmental issues arising from their plant. These findings indicate the serious need for environmental education among workers. Such education should also be directed towards management, in order to keep the flame of environmental education in their companies burning.

4.7.7. MANAGEMENT'S POSITION ON THE ENVIRONMENT

According to a management representative, management believe that they do act to minimise the damaging environmental impact of their plant. He referred to The Corporate Quality Policy as clear indication of this. There were, however, different opinions on this matter. Workers declined to be specific in answering the question concerning management's position on the environment, but said that changes that are taking place in the plant might be an indication that management is aware of the environmental impact of their plant and wants to do something about these impacts. They also indicated that changes in the types of the machines used in the plant might have been brought about by international pressure and business partners, rather than by an understanding of environmental issues. Members of Corporate Health interviewed supported

workers' views that management produced good policy statements that were never implemented. Failure to implement a policy is just as good as not having one, except that having a policy is good Public Relations. Again, the above findings reinforce the need to educate management members about the environment. Good environmental knowledge might influence management to draw up policies for the benefit of environment rather than to merely satisfy external parties.

According to the corporate safety services representative, education and training needs to start with management as they make the rules and decisions for all in the plant. He indicated that shopfloor workers put into practice what management have agreed upon. This finding indicates that education and training for the environment has to be implemented in stages according to the different levels of the plant.

4.7.8. SOCIAL ASPECTS

Volkswagen of South Africa, apart from being one of the major employers in the Port Elizabeth / Uitenhage area, is also involved in the social activities of the residents of the area. Through VWSA Trust, which was started in 1989, the company runs youth development programmes, leadership programmes, sport and culture, education and women development programmes in the area (Volkswagen nd a). The Board of Trustees running the Trust consists of representatives of VWSA management, the Union, employees, local authorities and the community. VWSA has also started a housing project which is aimed at helping its employees with access to affordable houses. The plant offers financial support to farm schools in the area and is involved in environmental weekend camps, where children are taken out to be taught and learn about the environment. The excursions are aimed at increasing environmental awareness.

The Social Work Services, a branch of Corporate Health Services in the plant, provides in-house advice and education on various subjects for both individuals and families. Family subjects include:

- Helping workers cope with transitional periods such as bereavement and divorce
- Emotional stress

- Follow up work.

Educational services concerning mental health, health and budgeting, special populations, pre-retirement planning, self help, alcoholism, dagga and Aids are offered to the workers. According to the occupational nursing sister, the programmes have proved to be very helpful to many workers. Workers are thus seen as people who have problems beyond those immediately related to their work. As observed earlier, however education and training on the above topics is hampered by the difficulty of securing workers to attend the programmes. The regularity with which the question of the non-availability of workers is recurring in this study shows that no successful educational programme can be implemented unless the problem is addressed by plant management. Perhaps a broad programme is required, dealing with the need to show the relationship between production and the environment.

4.7.9. ECONOMIC ASPECTS

Volkswagen of South Africa, like other car industries in the country, is being threatened economically by the influx of other car manufacturing companies which did not do business in the country in the past. It was indicated by the member of management interviewed that in the past, the South African motor industry was well protected by legislation. That protection no longer exists, and hence the competition. Workers, on the other hand, see the whole issue differently. They maintain that it has been more than ten years that the company has claimed not to be making a good profit and yet it has continued to operate. They seem to take the fact that new models keep coming, and that new contracts are being signed, as evidence that the company is making good profits.

The plant does not have a central environmental budget. At the moment environmental costs are carried by different departments such as Plant Engineering, Process Department and Manufacturing Planning.

4.8. TRAINING

Volkswagen of South Africa believes that education and training is essential for the plant to

achieve its corporate goals (Volkswagen, 1996b). They have well-coordinated training programmes which are administered and conducted by the different training subsections as mentioned in the third paragraph of this section, below. Corporate Education and Training is the "central Training Division which provides training based on Corporate needs" (Volkswagen,1996b:1), and is headed by the training manager. Much of the data presented here was obtained in an interview with him. The aim of the training programmes is to assist all employees and staff to improve their job-specific performance in the plant. The plant clearly distinguishes between 'education' and 'training' and sees them as different but related. To them, education "comprises both formal qualifications gained at formal institutions, as well as internal qualification programmes" (Volkswagen, 1996b:1). Training refers to additional skills obtained which increases a worker's competence.

The plant's training programmes are decentralised in the sense that managers identify the education and training needs of their departments. Corporate Education and Training then designs the programmes as identified and conducts training through its training officers. The Corporate Education and Training section is responsible for the following:

- Technical training
- Management / Staff development training
- Specialised manufacturing training and
- Education programmes

Apart from the above, the plant has the following training divisions which conduct specific job-related training programmes:

Marketing Division:

- Service Technical training
- Dealership training

Information Services Division

- Technology training (computer training).

A range of programmes can be conducted at a given time to suit the needs of the departments as the plant has about thirty training officers. Employees to attend training are nominated by their respective departments.

Employees can attend formal education programmes on a part-time basis, but Corporate Education and Training takes full administrative control of the programmes. To further support the programmes, the plant financially subsidises the student's study.

At the time of the interview, none of the above-mentioned programmes included environmental training. The training manager however supported the idea of having it introduced, although he had reservations about its implementation. It was indicated that the programmes should be integrated into the existing ones as it might not be easy to find suitable time for them. Line managers might also not release people for such sessions. Because of the level of environmental awareness in the plant, all employees and management should attend the programmes.

According to the training manager, environmental programmes should be conducted in phases as follows:
Phase 1 should deal with me, my family and domestic environment.
Phase 2 should deal with me, my colleagues and my work environment.
According to the manager, environmental education for workers which fails to include both home and work environments will never achieve its objectives. The programmes should be practical and real. Above all, workers should be able to see the importance of the programmes.

CHAPTER 5
DISCUSSION OF THE FINDINGS

5.1. INTRODUCTION

Chapter five discusses the findings of the two case studies. While the focus is on the environmental education and training needs of the two studied industries, the discussion also covers the general background to industry and 'environment' as observed in the study; the nature of the environmental impacts of the two industries studied; legislation and policy; in-house relationships and communications; the social aspects of the plants; health, safety and protective measures. The discussion leads to an outline of the implications of the findings for the studied industries' environmental education and training needs. The chapter concludes by making recommendations to the Rhodes Environmental Education Unit to inform its development of environmental education and training programmes for industry in general.

5.2 INDUSTRY AND 'ENVIRONMENT' - GENERAL BACKGROUND

The Eastern Cape industries approached to participate in this study did not generally speaking see 'environment' as a concern. This was reflected in the in the fact, firstly, as discussed in chapter two, few industries were willing to participate in the study. This could have been due to a lack of concern about their environmental impacts, or to sensitivities around those. Secondly, some industries when contacted indicated directly that 'environment' was not a concern of theirs. An example is the telephone operator who maintained that their company's business was to manufacture tyres, and did not have anything to do with 'environment'. Thirdly, several telephone operators found it hard to identify the person tasked with environmental responsibility in the company.

5.3 ENVIRONMENTAL IMPACTS IN THE CASES STUDIED

Interviews and document analysis indicated that both companies had environmental impacts in both their external and internal environment. Examples of external impacts are air, water and

noise pollution and the generation of waste that had to be accommodated away from the plants. Certain areas within the internal environments of the plants featured high levels of heat, noise, and air pollution due to silicon dust, smoke, welding fumes, volatile organic compounds and air-borne metal and paint particles. All of these have the potential to impact on workers' health in a significant way, as outlined in chapters three and four. The findings would indicate that the two industries studied had significant internal and external environmental impacts which warranted action.

This finding was supported in the case of the M&R Foundry by an EIA commissioned by the plant in 1996, in response to complaints from near-by industries about the plant's external environmental impacts. The EIA has revealed the seriousness of the plant's impacts on the environment and made several recommendations as to how these could be dealt with. It has motivated management to install an effective dust extraction machine in one section of the plant. The impact assessment seems to have brought to light many more impacts than what interviewees reported. This may be because interviewees were reluctant to disclose information about the plant's environmental impacts, or because there was a lack of knowledge or agreement on the nature of these impacts. The EIA for example made recommendations on several forms of pollution which were not even mentioned by interviewees. It would seem that the EIA was not only not widely available to researchers, but also not readily shared within the plant itself. The recommendations of the EIA were also only partially implemented by management.

Should the findings of the EIA be shared more widely within the plant, it could have at least two positive educational and managerial effects. Firstly, workers who seem to be unaware of the link between their own actions and the environmental impacts of the plants could be better informed in this regard through the EIA, thus being encouraged them to change ways of acting that impact negatively on the environment. The blockage of storm water drains, and the kinds of effluent washed down these, is an example of an impact which can be addressed by workers' actions. Secondly, management could experience more pressure to implement the EIA recommendations more fully to address those impacts that workers cannot affect.

Programme developers for the industries could take the role and use of existing or proposed EIA's

into consideration when designing programmes for industry.

5.4. LEGISLATION AND POLICY

At this stage, industries are not compelled to have an environmental policy. At the time of the study Murray and Roberts Foundry had no environmental policy, while Volkswagen was governed by the Volkswagen Group environmental policy which had been developed in Germany. Both companies have health and safety policies in place because of a clear legislative requirement to do so. Because of these policies, health and safety training programmes are in place and staff are employed to be responsible for their implementation. It would therefore seem to be useful to develop and implement environmental policies to help the plants perform in an environmentally responsible manner. Without such a policy it seems difficult for Murray & Roberts to be consistent when dealing with environmental issues. Furthermore, a locally-based environmental policy for Volkswagen would possibly be more appropriate than the one they are presently using, as it could take into account the local situation, worker demands and the number of illiterate workers, for example.

Since management in both case studies seemed to realise the need for an environmental policy, environmental education and training programmes could support management and workers to participate in the development of such policies. The policy resulting from such educational process and involvement of all parties might have more value and be acceptable to all parties.

Neither plant has a dedicated environmental budget, possibly because of the absence of an environmental policy. Health and safety in the plants, on the other hand, are well co-ordinated and have good financial support. Legislative requirements for industries to have health and safety policies are being supported by NOSA's provision of health and safety training programmes (The Foundry only). Just as it is to the benefit of industries to train employees in safety aspects, it would be to their benefit to have environmental training programmes, policies and budgets. With changing legislation this can in the long run prevent financial losses by the companies.

5.5. IN-HOUSE RELATIONSHIPS AND COMMUNICATION

Some aspects of communication in the industries studied are problematic. For example, the M&R EIA and Volkswagen's internal air quality survey were not made available for research purposes. Also, the EIA has not been reviewed widely within the Foundry, and a general absence of communication around environmental matters seems to be the cause of divided opinions on the existence of an environmental budget, for example.

However, both the Murray and Roberts Foundry and Volkswagen plants have well-coordinated channels of communication in place to deal with worker grievances, and these are reported as having contributed to improved relationships between workers and management. Such communication channels can be utilised for the collaborative development and/or introduction of environmental education and training programmes in industry.

Whether relationships between workers and management are indeed as they should be is not clear. There seemed to be a tendency in the Foundry for workers to blame management for environmental issues not being adequately addressed, and to allege that management was not serious in addressing their working conditions. In one company, unions were not willing to respond to the researcher if approached via management, and workers interviewed declined to be specific about management's view on environment, possibly for fear of victimisation. These workers might not trust environmental education or training programmes implemented by or through management. Whereas course developers and trainers should consider this when planning their programmes, educational and training programmes should also be designed to help address the lack of trust in management. One of the best ways in which to do this would be the exceptional idea of running joint programmes for both management and workers on an issue on which both groups clearly need more awareness and commitment, and indeed a common understanding and commitment. Common commitment can only be possible if all parties in the plant understand 'environment' and environmental problems in the same way.

Better relations between management and workers should be fostered and, where good relations exist, they should be utilised in order to address environmental issues jointly. The accusations

and counter accusations observed in one of the cases studied indicates that better working relationships have not filtered through to environmental issues. What is required is for all parties to have a common commitment towards the environment.

5.6 SOCIAL RESPONSIBILITY OF THE PLANTS

Examples of collaboration between different groups within industry do exist in the cases studied. Volkswagen's community involvement is spearheaded by the **VW Trust** which is managed by the Board of Trustees, which in turn consists of members of management, unions, local authorities and community members. The Foundry's ideals are encapsulated in the **M&R Vision and Values** document, which has also been drawn up by a representative group. It can be seen that people from different levels can work together for their common good. This approach can also be used for education and training purposes.

Better housing for workers is seen by many as part of the social responsibility of industry, and VW Trust has sought to meet this responsibility . Winter (1988) maintains that between 30% and 40% of all environmental problems have their roots in private households. It is therefore both logical and sensible to start environmental awareness from home. A worker who learns at home the consequences of polluting the kitchen drain, may easily understand the consequences of polluting storm water drains in the factory long before the undesired consequences actually take place. The same can be said about the wise use of any factory supply, and industry can save from workers' willingness to use supplies such electricity and water sparingly. This implies that environmental education programmes, should strive to link the home environment with the work environment and ultimately the external environment. The provision of better housing for workers can thus provide an entry point into environmental awareness programmes. Courses can also be designed in a way that will encourage management to continue this service to their workers. Finally, environmental education programmes can address the social responsibility of industry, including the provision of housing for workers, as a means of improving home environments.

5.7 HEALTH, SAFETY AND PROTECTIVE MEASURES

5.7.1. GENERAL SUMMARY

Various occupational diseases can be contracted and other diseases aggravated by working in an automotive industry. As indicated above, both companies have policies for health, safety and the environment. They have safety officers in charge and at least one occupational nurse attached to the plants' clinics who is mainly responsible for the primary health care of the workers. Both plants conduct pre- and post-employment and routine examinations on employees through their health and safety sections. Both plants' management require that protective equipment should be used by all workers when working in specifically identified areas.

5.7.2. DISCUSSION

Companies take the possibility of their operations affecting workers' health seriously. Pre-employment tests help companies to employ only those fit enough for the job and /or protect the company from compensation claims for prior conditions. Post-employment examinations protect the companies from compensation claims by ex-employees who might try to make occupational claims for diseases contracted when they were no longer working for the plant. The care taken by industry is presumably related to the fact that workers' health is directly linked to production. Weak, unhealthy or injured workers can cause profit losses in the form of man-hours and medical costs.

What one learns from this is that industry might take environmental concerns seriously if their link to production and profit is made clear. This implies that environmental education and training programmes for management should clarify this link.

Examinations conducted by the plants also help them to know whether there is a need to improve protective equipment for workers in particular sections. Occupational diseases and injuries can be reduced or prevented if correct protective equipment is worn when necessary. Workers' attitudes and the use of inferior quality protective equipment seem to be two things which make

the use of the equipment ineffective. The fact that both officers dealing with safety indicated that improvement in the use of protective equipment could still be made, shows that management will have to work hard in order to address the problem. There is definitely a need for education and training for both management to provide better equipment and for workers to change their attitudes towards equipment.

It has been reported that some workers use their long experience in the industry to undermine the occupational nurse's authority on the use of protective equipment. Environmental mismanagement could also be attributed to this type of thinking and behaviour. This implies that education and training should be designed to deal with the way in which employees may use the history of how things were done in the past to avoid change and learning to act in the interest of the environment.

Various shops in both plants can be dangerous to workers if they can work negligently. But serious and disabling injuries are not common as safety is a priority, and the Occupational Health and Safety Act has some clear guidelines on what is expected from the employees whilst at work. The existence of health and safety committees helps in identifying potentially dangerous and hazardous situations, which are promptly dealt with. The success of health and safety committees should serve as an indication of the value of such committees for the tackling of environmental issues in the plants. They might from time to time identify issues on which environmental training is needed. As reported on the need for working with committees in section 5.7, the safety, health and environment committees or similar structures can be used also for environmental education and training.

NOSA training programmes serve as the core curriculum for health and safety at the Foundry. Volkswagen has a different programme, but both sets of programmes are aimed at informing workers on how to deal with a potentially dangerous situation in order to avoid accidents. However, these programmes have no environmental content, even though, in the case of the Foundry, the safety co-ordinator is also responsible for the environment, and the new NOSA programmes include reference to environment (Haarlhof, 1996). Volkswagen's training programmes also did not include any environmental content. The plants' impacts on the external

environment in particular are therefore not addressed in any training programme. The inclusion of such environmental content in NOSA and Volkswagen's own training programmes will go a long way in addressing environmental problems. (Note that NOSA is one of the key providers of training programmes in industry.)

Furthermore, it would be important for staff designated with an environmental responsibility, such as the environmental controller in Volkswagen, to work closely with the training section to ensure and support the inclusion of environmental content in existing training programmes.

Whereas many interviewees believed that environmental education and training could contribute to the improvement of the working environment, health and safety, workers in the Foundry did not believe that training programmes would help in addressing the working conditions in the plant. They called instead for management to install equipment to improve the internal work environment. Environmental programme developers and trainers will have to consider that the training of workers without appropriate environmental action on the part of management would not adequately address environmental issues. Education and training programmes would have to be realistic and focus practically on environmental problems in the plant. Management would have to be educated to know that the understanding of environmental problems should be supported by appropriate action towards the improvement of working conditions. Otherwise, training programmes would be seen as having no role to play.

5.8 EDUCATION AND TRAINING

All the people interviewed, including workers, were in support of environmental education and training programmes for industry. This section will focus on what is required to implement such programmes, starting with a brief review of the nature of existing training programmes.

The training programmes offered by the two plants include ABET programmes such as Breakthrough to Literacy, health-and-safety programmes and quality control courses. They aim at literacy, and the improvement of occupational performance, and compliance with safety procedures in the plant. In other words, training is structured to meet the direct business-related

aims of the plants and to prevent injuries and accidents that would directly affect that business. As has already been pointed out above, education and training programme developers would have to consider the need to place environmental programmes in direct relationship to core business concerns.

Training programmes also need financial support. The need to ensure that management understands the link between core business and environmental concerns, environmental performance and environmental training, is also related to the need for financial support for training and the likelihood of its being forthcoming.

With regard to the structure of the environmental education and training programmes, it would be important to consider the negative reactions both management and workers may display towards programmes that differ significantly from the structure of the programmes currently offered. If environmental courses are part of or similar to existing courses, this may ensure their smooth inclusion or a smooth transition to the environmental course content.

On the other hand, existing training programmes are clearly not entirely satisfactory, as can be seen from the following:

(1) Time - trainers in both cases complained about the difficulty of having workers released from production to attend training sessions. This could be addressed by using models for on-the-job education and training.
(2) Literacy - course materials and presentation styles need to take the literacy levels of workers into account.
(3) Language - the medium through which programmes are conducted should favour the participants.
(4) Lack of integration between training and action - training programmes on environmental issues which are not accompanied by appropriate (management) action on such issues are likely to be unsuccessful, as in the case of training around the use of protective equipment, which seems to be hampered by the issuing of ineffectual equipment.
(5) The voluntary nature of non-job-related training - Course developers will have to liaise with

the companies they wish to serve to know where to fit programmes if they do not want them to be voluntary.

Training sessions always compete with actual production for time. This was a strong recurrent response from both training departments. No training programme can succeed if it does not take this concern into consideration. Line managers seem to be exclusively concerned with using all available time to produce as much as possible; they are thus reported to be unwilling to release their workers for training sessions that are not seen as production-related. As this situation can make training very difficult if not impossible, there is a definite need for education programmes which can inform line managers in particular of the need to balance production and training, to see production and environmental performance as two sides of the same coin and not as aspects that have to compete against each other for time.

In the next section I consider who should conduct environmental training programmes, and who they should be for. Training officers interviewed suggested that those who attend environmental education programmes should be those who would be able to educate and train others in-house on completion of their own training. This would make continuous forms of on-the-job-training possible. Continuous training was regarded as superior to once-off training, as it would remind workers of the need to work towards environmental sustainability, something for which there is not a high level of commitment at this stage. Another reason for focussing environmental training on in-house trainers is that it might not be possible for outsiders to conduct programmes, particularly for the shop floor workers, given issues of time, language and the numbers of people who can attend such programmes at any one time.

This study has also shown the need for education and/or training programmes for management, particularly line management, perhaps focussing on the links between environmental performance and production, and environmental training. Such programmes should also take into account improved communication with workers, particularly around environmental issues.

Finally, it also seemed that workers are on the whole unaware of the link between their own actions and the quality of the work environment. Their perceptions of environmental issues also

differed from those of management. In the absence of environmental programmes, the situation continues to disadvantage workers in their environmental needs.

With regard to the possible content of environmental programmes as stated in the findings, 'awareness' seems to be the key concept in the industries. Both the senior management and people responsible with environments indicated the need for workers to be made aware of the environment. Findings however indicated that workers were aware of their company's environmental impacts. What was lacking on the part of workers was an awareness of their own actual involvement as having a direct impact on the environment. This implies that training programmes would have to be conducted in away that would expose and address this.

Some senior management members still perceive the concept of environment in narrow physical terms. This was seen by their constantly referring to concepts such as "littering" when linking environmental problems to workers. Workers are always associated with littering and good or bad house-keeping. In this way, I suspect, that management influences workers to hold narrow view of the environment. The inclusion of a holistic meaning of the concept "environment" would go a long way toward changing the views of the entire industry's workforce. Programme developers would have to consider this and would have to present their programmes in a way that would change this view.

Both the Foundry and Volkswagen have contracted private companies to dispose of their wastes. Both waste disposal companies seem to be doing fairly well, but pollution of various kinds still exists. Companies still have to improve on managing their generated wastes. The fact that a member of senior management included waste management as a topic to be covered indicates the realisation that the current methods of managing waste still need improvement. Course developers would have to first consider the current ways in which waste is being managed and possibly come up with new systems that are built around the current ones.

Pollution was identified by almost all interviewees as one of the main environmental issues in the plants. Even though people have some idea of what pollution is, it is still a major concern. Course developers will have to consider that pollution is a well known concept but can still occur

without people recognising it. This should be the point of departure for a programmed aimed at linking the theory and the practice of the concept.

5.9. SUMMARY OF IMPLICATIONS AND RECOMMENDATIONS

The data discussed above indicate that there is a need for education and training for the environment in the plants where the study was conducted. The following recommendations are hereby presented to the Rhodes Environmental Education Unit for consideration.

Environmental education and training programme developers should :

- consider the lack of support current training programmes have from management in general and line management in particular
- the possibility of a lack of support from workers when they perceive issues to be better addressed by management action
- consider management support training programmes which show clear company benefit
- consider how to deal with voluntary attendance of current programmes as this can affect attendance of the new programmes to be implemented
- consider that the ineffectiveness of current programmes may be due to a failure to meet workers' literacy and language needs
- consider that ongoing programmes will be more effective than once-off programmes
- consider that training programmes should be realistically focussed on a company's specific environmental issues and integrated with appropriate action to address such issues, where possible
- consider using existing communication channels between management and workers for the implementation of the programmes
- consider that workers do not generally trust management and that programmes implemented by or through management, without inputs from unions, may not be supported
- consider the use of committees or existing structures to form environmental committees
- consider the link between home and work environments
- indicate the link between environment and production
- consider link between the individual action and environmental impacts and conditions

- take note that work histories can be used to undermine authority and resist new ways of operating

- courses could be developed for management and for the training section, and the latter should be encouraged to run training programmes for workers, particularly supervisors who can in turn run sectional training programmes

- joint courses which would bring management and workers together around environmental understandings should also be considered

- consider course content which will improve the entire workforce's theoretical knowledge of the environment and build from the current waste management systems in order to improve same.

- Environmental education and training programmes should be implemented as soon as is practically possible as there is no need to wait any further when environmental degradation is continuing.

- As interviewees differed on the venues and duration of courses, course developers need to discuss these aspects with individual industries.

- The following might attend environmental courses:

* Management representatives
* Training section representatives
* Supervisors
* Health and safety representatives
* Union representatives

5.10. CONTENT OF THE PROGRAMMES

As proposed by the senior management representative and the occupational health nurse (both of Murray and Roberts Foundry), the training department representative and the environmental controller (both of Volkswagen) the content should help the plant management and workers to have profound understanding of the environment and the negative impacts resulting from the activites of their plants amd the possible consequenses of such impacts. On the basis of the above, the following is recommended to form the content of the training programmes.

- Environmental awareness

- Awareness of the importance of the use of protective equipment
- Domestic and work environment
- Environmental legislation
- Waste prevention and management
- Pollution
- Environmental management systems

It was observed that workers and some managers only have a superficial knowledge of the above concepts even thogh they are widely used in industries. Course developers should clarify what is meant by environmental awareness and waste management for instance as they are some of the widely used but superficially understood concepts. It has to be clear what is meant by being environmentally aware and good management of waste. The same can be said about all above concepts. Course developers should then avoid perpetuating this superficial understanding.

Because industres are difficult to access as reported in chapter two, the University could contact different industries through the different chambers of commerce and industry and other industrial organisations, such as the Industrial Environmental Forum of Southern Africa.

5.11. VALUE OF THE FINDINGS

This study has succeeded in identifying the environmental education and training needs in the plants where it was conducted. It makes a contribution in a field in which there is a shortage of research and relevant (environmental education and training-related) literature. The environmental training programmes developed from this study could help workers increase both their environmental awareness and capacity to act on the basis of such awareness. Management can increase their environmental understanding and thereby implement good management systems. The report will hopefully help all parties involved to see the need to have education and training for the environment. It also indicates the need for further research on the topic on a broader scale in order to include as many industries as possible.

As case studies do not aim at generalising their findings, the next stage of this research was to draw up questionnaires as the basis for a survey of greater general validity. This study helped

in the drawing up of these questionnaires by informing the researcher about the general activities of the manufacturing and engineering industries. These questionnaires are attached, as appendix 1 as the main outcome of this phase of the study.

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APPENDICES

A. SENIOR MANAGEMENT

Please answer all questions and be honest.

NB: You don't have to give your name or the name of your company.

Write all your answers in the spaces provided. In some cases you just need to **tick** your choice.

SECTION I: INFORMATION ABOUT YOURSELF AND YOUR COMPANY

1. Your position in the company .....

2. Location of your company P.E/U'hage /___/ E.London /___/ King W'Town. /___/

3. What is your company's business? Engineering /___/ Manufacturing /___/ (please tick and elaborate if you wish) .....

4. What is the total number of people working in your company?

- Less than 100
- Between 100 and 200
- Between 200 and 300
- Between 300 and 400
- Between 400 and 500
- More than 500

SECTION II: YOUR COMPANY AND THE ENVIRONMENT

5. What, in your opinion, are the environmental impacts of the operations of your company, if any?.....

.....

.....

6. Does your company have an environmental management system? If **yes**, please explain briefly its nature .....

.....

.....

7. What environmental legislation is your company required to adhere to, if any? .....

.....

.....

8. What is senior management's responsibility in terms of the environmental performance of the company .....

.....

.....

9. How does senior management exercise this responsibility?.....

.....

SECTION III: TRAINING AND EDUCATION

10. What role can education and /or training have in helping your company implement an environmental strategy? .....

.....

11. Is your company involved in any environmental education and/or training for staff? YES /___/ NO /___/. If **yes**, please elaborate. If **no**, do you think there is a need for such programmes or courses? .....

.....

12. If environmental training and educational programmes or courses can play a role in industry,

12.1. Who should attend such programmes or courses? .....

.....

12.2. Who should conduct such programmes or courses? .....

.....

12.3. What should be the aim of such programmes or courses? .....

.....

13. Any further comment you may have on environmental training an education in industry.

.....

.....

.....

THANK YOU FOR YOUR TIME

You may return this information to our contact(one who gave you this form) in your company or to us directly: Khensani Mabunda

Rhodes University
P.O.Box 94
6140 GRAHAMSTOWN

B: ENVIRONMENTAL SECTION REPRESENTATIVES

Please answer all questions and be honest.

NB: You don't have to give your name or the name of your company.

Write all your answers in the spaces provided. In some cases you just need to tick your choice.

SECTION I. INFORMATION ABOUT YOURSELF AND YOUR COMPANY

1. Your position in the company? .....

2. Your environmental role in the company? .....

.....

.....

3. What percentage of your job involved environmental tasks in the past year, approximately?

.....

4. Do you have any environmental qualifications you can use in performing your environmental tasks? YES /___/ NO /___/

5. Location of your company? PE /U'hage /___/ E.London /___/ King W' town /___/ (Please tick and elaborate if you wish).....

6. What is your company's business? Engineering /___/ Manufacturing /___/ (Tick and expand if you wish._____

SECTION II. YOUR COMPANY AND THE ENVIRONMENT

7. What, in your opinion, are the environmental impacts of the operations of your company, if any? .....

.....

.....

8. Does your company have an environmental management system? If **yes**, please explain its nature .....

.....

.....

9. What environmental legislation is your company required to adhere to, if any?.....

.....

.....

10. What is your section's responsibility in terms of the environmental performance of the company?.....

.....

.....

11. Does your company have an environmental management policy?

YES /___/ NO /____/

SECTION III. TRAINING AND EDUCATION

12. What role can education and /or training have in helping your company implement an environmental strategy? .....

.....

.....

13. Is your company involved in any environmental education or training for staff? YES /___ / NO /___/. If **yes,** please elaborate. If **no,** do you think there is a need for such programmes or

courses?.....

.....

.....

14. If environmental training and education for staff can play a role in industry,

14.1. Who should attend such courses or programmes?.....

.....

14.2 Who should conduct such training courses or programmes? .....

.....

14.3. What should be the aim of such programmes or courses? .....

.....

.....

.....

15. What are your views on the following models for environmental training?

15.1. Learning on - the - job/ action learning .....

.....

.....

.....

15.2. Special environmental training courses / programmes .....

.....

.....

.....

15.3. Including environmental component in all training .....

.....

.....

.....

15.4. Any other you may want to suggest .....

.....

.....

.....

.....

THANK YOU FOR YOUR TIME

You may return this information to our contact in the company (one who gave this form to you) or to us directly:

Khensani Mabunda
Dept of Education (Environmental Education)
Rhodes University
Box 94
Grahamstown
6140

C. WORKERS

NB: You don't have to give your name or the name of your company.
Write all your answers in the spaces provided. In some cases you just need to tick your choice.

SECTION I. INFORMATION ABOUT YOURSELF AND YOUR COMPANY

1. What is your job in the company?.....

.....

2. How long have you been working for the company?.....

3. Are you a member of any Union in the company? YES /____/ NO /____/ (Please tick).

SECTION II. YOUR COMPANY AND THE ENVIRONMENT

4. What environmental problems are you aware of? (Environmental problems are problems to do with health, water, air, land and so on).....

.....

.....

5. What environmental problems do you experience at home? .....

.....

.....

6. What environmental problems do you experience at work? .....

.....

.....

7. What does your company do about the environmental problems at work? .....

.....

.....

SECTION III. TRAINING AND EDUCATION

8. Do you think education and training can help the company and its workers deal with environmental problems? YES /___/ NO/___/ (Please tick and explain your answer.

.....

.....

.....

9. Are you aware of any training programmes or courses offered at your company?

YES /__/ NO /___/. If **yes**,

9.1. What are your views on the training offered? .....

.....

.....

9.2. Does the training include topics on environment? YES /____/ NO /___/.

10. If you belong to a Union, do you (the Union) do anything about the environmental problems at work? YES /____/ NO /___/. If **yes**, please explain

.....

.....

.....

11. Would you want training to help you deal with environmental problems at work?

YES/___/ NO/___/ Please explain your answer .....

.....

.....

12. Would you want training to help you deal with environmental problems at home?

YES /____/ NO /____/. Please explain your answer .....

.....

.....

13. If **yes** in questions 11 or 12, where would you like your training to be conducted?

.....

14. If **yes** in questions 11 or 12, who should conduct the training?

.....

.....

15. What do you think of training -on-the

job?.....

.....

.....

THANK YOU FOR YOUR TIME

You may return this information to our **contact** in the company (one who gave you this form) or to us directly:

Khensani Mabunda
Dept of Education (Environmental Education)
Rhodes University
P.O. Box 94
6140 GRAHAMSTOWN

D. TRAINING

Please answer all questions and be honest.

NB: You don't have to give your name or the name of your company.

Write all your answers in the spaces provided. In some cases you just need to tick your choice.

SECTION I. INFORMATION ABOUT YOURSELF AND YOUR COMPANY

1. What is your role in the company? .....

2. Location of your company: PE/U'hage /__/ E. London /__/ King W' Town /__/ (Please tick)

3. What is your company's business? Engineering /___/ Manufacturing /___/ (Please tick and elaborate if you wish)

.....

4. What is the size of your company's in - house training section?

.....

.....

SECTION II. YOUR COMPANY AND THE ENVIRONMENT

5. What, in your opinion, are the environmental impacts of your company, if any?

.....

.....

.....

6. Does your company have an environmental management system? YES /___/ NO /___/. If yes, please explain briefly its nature.....

.....

.....

7. What environmental legislation is your company required to adhere to, if any?.....

.....

.....

8. What is management's responsibility in terms of the environmental performance of your

company?.....

.....

.....

9. How does management exercise this

responsibility?.....

.....

.....

SECTION III. TRAINING AND EDUCATION

10. What role can education and /or training have to help your company implement an environmental

strategy?.....

.....

.....

11. Does your current training programme have any environmental content? YES /__/ NO /__

/_11.1. If **yes**, Please elaborate

briefly.....

.....

.....

11.2. If **no**, do you think there is a need for environmental training or education programmes for staff in your

company?.....

.....

11.3. Are these programmes voluntary or compulsory? .....

12. If environmental training and education can play a role in industry,

12.1. Who should attend such training programmes or courses?.....

.....

12.2. Who should conduct such programmes or courses?.....

.....

13. Do you have any environmental qualifications you can use during

training?.....

.....

.....

14. What are your views on the following models for environmental training and education?

14.1. Learning - on- the job / action learning.....

.....

.....

14.2. Special environmental training

courses.....

.....

.....

14.3. Including an environmental component in all training

programmes.....

.....

.....

14.4. Any other you may want to suggest.....

.....

.....

15. What training programmes do you currently run at your

plant?.....

.....

.....

16. What support do your training programmes receive from?

16.1. senior

management?.....

.....

.....

16.2. operational management?.....

.....

.....

16.3. workers?.....

THANK YOU FOR YOUR TIME

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Rhodes University
Box 94
GRAHAMSTOWN
6140

E. OPERATIONAL MANAGEMENT

Please answer all questions and be honest.

NB: You don't have to give your name or the name of your company

Write all your answers in the spaces provided. In some cases you just need to tick your choice.

SECTION I: INFORMATION ABOUT YOURSELF AND YOUR COMPANY

1. Your position in the company.....

2. Location of your company: P.E/U'hage /__/ E. London /__/ King W' Town /__/ (Please tick).

3. How many people do you manage in your section? (Please tick).

- Less than 50
- Between 50 and 100
- Between 100 and 150
- Between 150 and 200
- Between 200 and 250
- More than 250

4. What is your company's business? Engineering /_____/ Manufacturing /_____/ (Tick and elaborate if you wish).....

.....

SECTION II . YOUR COMPANY AND THE ENVIRONMENT

5. What, in your opinion, are the environmental impacts of the operations of your section, if any?.....

.....

.....

.....6. Does your section have an environmental management system? YES /_____/ NO /_____/ If **yes**, please explain briefly its nature.....

.....

.....

7. What environmental legislation is your section required to adhere to, if any? .....

.....

.....

.....

8. What is operational management's responsibility in terms of the environmental performance of their

sections?.....

.....

9. How does operational management exercise this responsibility?.....

.....

.....

SECTION III. TRAINING AND EDUCATION

10. What role can education and/or training play in helping your section to implement an environmental strategy?.....

.....

.....

11. Is your section involved in any environmental education and /or training for staff? YES /_____/_NO /_____/. If **yes**, please elaborate. If **no**, do you think there is a need for such programmes o courses? .....

.....

.....

12. If environmental training and education for staff can play a role in industry,

12.1. Who should attend such programmes or courses .....

.....

.....

12.2. Who should conduct such programmes or courses?.....

.....

.....

.....

12.3. What should be the aim of such programmes or courses? .....

.....

.....

.....

12.4. When should staff attend such programmes or courses? .....

.....

.....

.....

13. What do you think of on-the- job environmental training ? .....

.....

.....

.....

THANK YOU FOR YOUR TIME

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