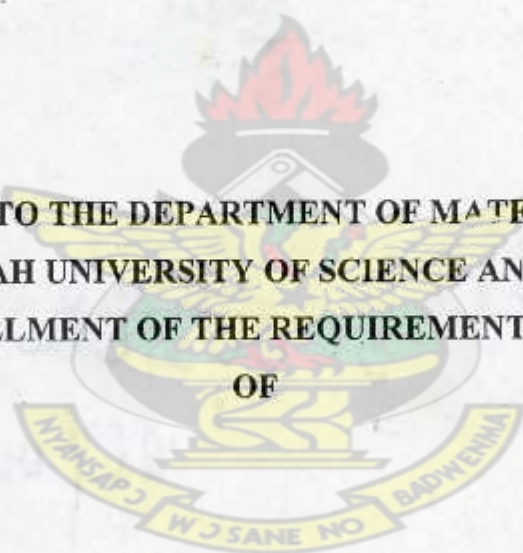


**PROMOTING SUSTAINABLE RELATIONSHIP BETWEEN MINING  
COMMUNITIES AND MINING COMPANIES: THE ROLE OF ENVIRONMENTAL  
IMPACT ASSESSMENT  
(CASE STUDY AT PRESTEA AND AHAFO KENYASE)**

**BY**

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**A THESIS SUBMITTED TO THE DEPARTMENT OF MATERIALS ENGINEERING,  
KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY  
IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE  
OF**



**MASTER OF SCIENCE  
IN  
ENVIRONMENTAL RESOURCES MANAGEMENT,  
COLLEGE OF ENGINEERING**

**JUNE, 2007**

# DECLARATION

I hereby declare that this submission is my own work towards the MSc and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

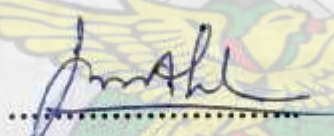
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## ABSTRACT

Environmental Impact Assessment (EIA) is the official appraisal of the likely effects of a proposed project on the environment and measures to be adopted to protect the environment. One of the primary objectives of EIA is to provide an opportunity for the participation of the various interest groups, particularly the affected communities, in the assessment and review of proposed developments so that their concerns and suggestions are taken into consideration at the final decision-making stage (see Appendices 2 and 3). It is generally hoped that the inclusion of these communities in the various decisions leading to the approval of the project will lead to social acceptability, or otherwise of the project and promote sustainable relationship between the affected communities and the proponent. Nonetheless, recent developments and reports from the Ghanaian media disclose that some conflicts continue to emerge between some mining communities and mining companies. The Prestea community was chosen as a study area following a Daily Graphic Report on October 7<sup>th</sup>, 2005 (Appendix 1) that there was serious conflict between the community and Bogoso Gold Limited (BGL). The Ahafo-Kenyase community, which was experiencing actual mining operations in less than a year as at the time of the study, was also chosen to assess how the concerns of the local communities were taken into consideration during the EIA process and also to determine whether or not there is the existence of a conflict between the community and the mining company operating in the area, and the immediate causes, if any. The study was undertaken with the purpose of identifying EIA's role in promoting that sustainable and cordial relationship between the two parties. The principal aim was to examine the conflicts, where they exist, in terms of the extent to which EIA influenced the final decisions prior to the onset of the two projects. The main objectives were:

1. To investigate if any conflicts have occurred between any of the affected communities and the mining company operating in that community, and the immediate causes.
2. To evaluate the extent to which EIA influenced the implementation of the two projects and explore the level of public participation in the EIA process.
3. To assess the nature and firmness of EIA compliance monitoring programmes together with the transparency of the process through public access to information; and
4. To identify the extent to which the EIA procedures provide a means by which an affected community can appeal against non-compliance with EIA decisions.



The study was conducted by reviewing the existing EIA Procedures and EIA Regulations in Ghana as well as reviewing the Environmental Impact Statements (EIS) of the two companies: Newmont Ghana Gold Limited (NGGL) and BGL; operating in Kenyase and Prestea respectively. Questionnaires were administered to the Environmental Protection Agency (EPA) and the Prestea community. Direct interviews in the form of community meetings were conducted at the Kenyase communities. The results revealed that there were high levels of Consultation and Public Participation (CPP) at the initial and subsequent stages in the EIA processes of both projects. However, the EIA was not able to prevent conflict in Prestea because the community's disagreement of opening the surface mining due to its perceived negative impacts was ignored at the final decision-making stage of the EIA process. Other reasons given by the respondents as the immediate causes of the conflict at Prestea included:

- The refusal of BGL to employ people from the local community,
- The negative impacts that the community experience from the mining activity; and
- The demand by the people for the **resettlement** of the entire Prestea community.

EIA was, however, able to prevent conflict in the Kenyase community following several consultative meetings between NGGL and the community who welcomed the commencement of the mining project. The study revealed that though the EIA system in Ghana provides comprehensive EIA procedures and guidelines that support public participation in projects necessitating EIA study, EIA in Ghana has not been able to achieve much in the area of conflict avoidance owing to certain omissions in the EIA procedures which include the following:

- The lack of public participation at the final decision-making stage prior to project approval,
- The lack of clear provision for EIA compliance or supervisory monitoring by the EPA in the EIA system in Ghana,
- There is also, no provision of a formal channel for the public to appeal against non-compliance with EIA decisions against proponents, and
- There is no involvement of the judicial agencies in resolving issues concerning challenging EIA decisions or actions of the EPA.

It is hoped that the above omissions will be introduced into the EIA system in Ghana through adequate EIA regulations to help prevent the occurrence of these conflicts in the future.



# ACKNOWLEDGEMENTS

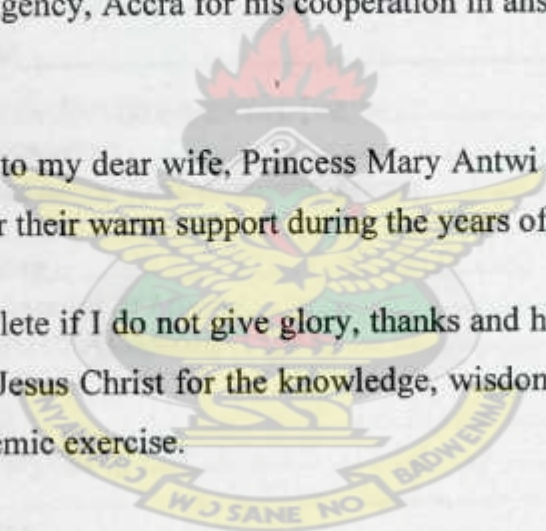
I would like to gratefully acknowledge my thesis supervisor Mr. Kwame Aboraa, a lecturer at the College of Engineering of Kwame Nkrumah University of Science and Technology for his patience, guidance, and constructive suggestions during the writing of this document. I am additionally grateful to Dr. Stephen K. Donyinah, a lecturer from the same College, as my second supervisor.

I am also indebted to the Environmental Manager at Newmont Ghana Gold Ltd at Ahafo Kenyase – Mr. James Badu as well as Mr. Anthony Loh – The Environmental Laboratory Supervisor - for their colossal cooperation in obtaining the pertinent background information.

My special thanks also goes to Mr. Anthony A. Andoh, the Principal Programme Officer of the Environmental Protection Agency, Accra for his cooperation in answering the Questionnaire to the Agency.

My heartfelt gratitude goes to my dear wife, Princess Mary Antwi and our kids, Nsiah Melody and Paul K. Nsiah Junior for their warm support during the years of study.

My report will not be complete if I do not give glory, thanks and honour to The Almighty God and The Lord and Saviour Jesus Christ for the knowledge, wisdom and understanding granted me to accomplish this academic exercise.



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# CHAPTER ONE

## INTRODUCTION

### 1.1 Background Information

Environmental Impact Assessment (EIA) is a procedure that ensures that the environmental implications of proposed projects are taken into account before decisions on those projects are made. The process involves an analysis or prediction of the likely effects on the environment, recording those effects in a report, undertaking a public consultation exercise on the report, taking into account the comments from interested parties and informing the public about the undertaking afterwards (European Commission Environmental Impact Assessment; Available <http://ec.europa.eu/environment/eia/home.htm> [May 19, 2006]).

EIA is acknowledged and applied in Ghana to development projects and other undertakings as an environmental permit prerequisite and a key environmental management tool. It is one of the environmental management tools that have the potential to contribute towards the sustainable use of environmental resources. Consequently, the Environmental Protection Agency (EPA) Act, (Act 490), was enacted in 1994 mandating the Agency to ensure compliance in the planning and execution of all development activities in accordance with EIA procedures in order to ensure efficient environmental and sustainable development. This led to the establishment of the EIA procedures in Ghana in 1995, which among other objectives, sought to provide an opportunity for the participation of the various actors, including the public, in the assessment and review of the proposed developments so that their concerns and reactions are taken into consideration prior to the commencement of the undertaking.

These procedures set up an EIA process of which one primary objective is the requirement to provide adequate relevant information to enable the EPA set an appropriate level of assessment of any proposal for the necessary review and to facilitate the decision-making process for the EIA approval. This information is generally gathered through EIA study and published in an Environmental Impact Statement (EIS) – a document prepared by a proponent to introduce the case for the assessment of his proposal as part of the EIA process.



Moreover the EIS is expected to provide enough relevant information on potential impacts of the proposed project from the environmental, social, economic and cultural aspect in relation to the different phases, as well as plans to mitigate any potential negative socio-economic, cultural and public health impacts on the environment. Besides, EIA for mining and extractive industries should include reclamation plans (Environmental Assessment Regulation, 1999).

As part of the EIS review, the Environmental Assessment Regulation (1999) further requires the EPA to conduct a public hearing whenever there is:

1. Great adverse public reactions to the commencement of the proposed project.
2. Dislocation or resettlement of communities; and
3. Existence of extensive and far reaching potential impacts.

The public hearing is to offer the affected community the opportunity to express their opinions and dissatisfactions as well as propose suggestions in order to influence the decision-making process. It is generally hoped that this will lead to the social acceptability or otherwise of the project and promote harmonious relationship between the proponent and the affected communities since both parties are given the opportunity to express their views.

## **1.2 The Problem Statement**

Recent developments and reports from the Ghanaian media reveal that several complaints and conflicts continue to emerge between some mining communities and mining companies, despite the existence of EIA procedures in Ghana. One such community that is frequently mentioned is the Prestea community in the Wassa West District of the Western Region where Bogoso Gold Limited (BGL) operates (Appendix 1).

The Kenyase community in the Asutifi District of the Brong Ahafo Region (a Greenfield mining area) and Newmont Ghana Gold Limited (NGGL), a mining company which had just started gold mining operation in the area at the time of this research work was also studied to assess how the concerns of the local communities were taken into consideration during the EIA process and also to determine whether such a conflict exists or not in the area, and how it could be solved, incase there is any.



The purpose of undertaking this research is to address the following:

- Is EIA really an environmental management tool that has the potential to contribute towards the sustainable use of environmental resources and also provide avenues for the involvement of the public, proponents, private and government agencies in the assessment and review of proposed undertakings prior to the commencement of those projects as stated in the Ghanaian EIA Procedures?
- If the answer to the question above is “yes”, why then are conflicts sometimes, after the project has passed through the EIA procedures?
- What actually happens in the EIA procedures regarding such projects?
- Do realities generally conform to expectations of the parties involved in the consultation process before the commencement of such projects?

These are important questions that need to be answered. The research study will therefore, focus on investigating if conflicts do exist between a company on one hand and the respective community on the other hand, and identify the immediate causes, as well as examine the role EIA played in promoting a sustainable and cordial relationship between the two parties. The principal aim is to examine the extent to which EIA influenced the final decisions prior to the onset of the mining projects and recommend possible ways to resolve the conflicts, if any, and use these ways as a model to avert future occurrences.

### **1.3 Objectives of the Research**

The main objectives are:

1. To investigate if any conflicts have occurred between any of the affected communities and the mining company operating in that community, and the immediate causes.
2. To evaluate the extent to which EIA influenced the implementation of the two mining projects and explore the level of public participation in the process.
3. To assess the nature and firmness of EIA compliance and follow-up monitoring programme in the EIA system in Ghana together with the transparency of the process through public access to information; and
4. To identify the extent to which the EIA procedures provide a means by which an affected community can appeal against non-compliance with EIA decisions.

## 1.4 Justification of the Research

Related problems of these conflicts occur in many mining communities in Ghana according to media reports and the earlier we begin finding solutions to them through adequate EIA regulations, the better it will be for the survival and development of the mining industry and mining communities as a whole. Again, gold reserves are generally believed to exist in almost all the regions in the country (Kesse, 1985). For Ghana to benefit positively from the contribution of the mining industry while at the same time ensuring the survival and welfare of those affected mining communities, is a great challenge that confronts the entire nation.

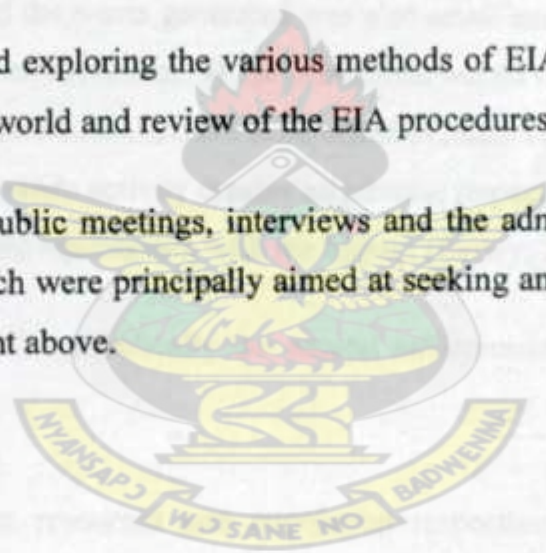
## 1.5 Research Methodology

The research methodology involved review of the following:

1. The Environmental Impact Statement on NGGL's mining project at Kenyase, and
2. The Environmental Impact Statement on BGL's mining project at Prestea.

Literature search comprised exploring the various methods of EIA procedures as practiced by other countries around the world and review of the EIA procedures as practiced in Ghana.

Data collection included public meetings, interviews and the administration of questionnaire, (Appendices 4 and 5), which were principally aimed at seeking answers to the questions posed under the problem statement above.





## CHAPTER TWO

### LITERATURE REVIEW

#### 2.0 General Overview of Environmental Issues

##### 2.1 Man and the Environment

The environment may be defined as the whole set of natural or biophysical and man-made or socio-cultural systems, in which man and other organisms live, work, and interact (Lartey, 2004). Man's influence on the environment started the moment he appeared in the biosphere. During the period of hunting, fishing and gathering, the activities of primitive tribes did not seriously disturb the balance of nature. At those times population was small, the use of resources was minimal and the waste generated was also small and of a character that could be easily assimilated into the environment. These conditions would thus maintain the equilibrium in the ecosystem and in such situation, there is no effect of human activity and waste generation on the environment; thus human activity creates no adverse impact and the ecosystem may then be assumed to be in dynamic equilibrium with the impact (Lartey, 2004).

According to Lartey (2004) symbolically the natural environment or ecosystem (E) may be represented as follows:

$$E = R + P + f(P, R)$$

Where R and P represent resources and population respectively and  $f(P, R)$ , a function (interaction) of R and P caused by human activity. This interaction produces what is generally termed environmental impact (I), thus

$$f(P, R) = I \text{ and } E = R + P + I$$

Under conditions of equilibrium (o),  $E_o = R_o + P_o + I_o$ , where the subscript (o) represents equilibrium position. With increasing population and the emergence of the industrial society, the rate of resource exploitation increased tremendously. One result of this is the fast depletion of natural resources, which has been recognized to be detrimental to the future generation. Attendant to the increase in resource exploitation is an increase in the impact on the environment. More and more waste is being generated and at a rate that the environment cannot easily assimilate. Besides, because of the nature of some of the materials used these days, part

of the waste is non-biodegradable. The overall result is an increasing accumulation of both domestic and industrial waste, degradation of land, pollution of water bodies and the air, depletion of the ozone layer and global warming, which are gradually disturbing the equilibrium in the ecosystem. Under this non-equilibrium condition (n),

$$En = Rn + Pn + In, \text{ where } In > Io \text{ and } In - Io = Ie \text{ excess.}$$

The excess impact beyond that which the environment can handle and be in equilibrium ( $Io$ ) is  $Ie$ , and the current environment may be described as

$$En = Rn + Pn + Io + Ie \text{ (Lartey, 2004).}$$

### 2.1.1 Public Awareness about Environmental Effects.

Public awareness of environmental effects began in the late 1960s to the early 1970s. Among the most effective crusaders were: *The Tragedy of the commons* (Harden, 1968); *The Population Bomb* (Ehrlich, 1968); *The Closing Circle* (Commoner, 1971); *The End of Affluence* (Ehrlich and Ehrlich, 1974); among others.

During the 1970s, environmental perceptions broadened enormously and environmental issues became established as a permanent feature of national policy. The United Nations Conference on the Human environment, in Stockholm (1972), was the most important event in the growth of environmental awareness. It came about because public pressure backed by scientific findings about the impacts of industrial emissions, persistent use of pesticides and other pollutants in the late 1960s, stimulated the necessary political will, at least in the developed world. Another important conference that took a critical look at the inter-relationship between environment and development was the United Nations Conference on Environment and Development, which took place in Rio in Brazil (1992). This was the Earth Summit (Earth Charter), which culminated with the Declaration of the Principles referred to as Agenda 21.

Ghana set up the Ministry of Science and Technology in 1992, after this Summit. Ghana established the Environmental Protection Council (EPC) in 1974 as its first attempt to create awareness of environmental issues among its citizens, but it was not until the unprecedented drought and bush fires which took place in 1983-1984 that Ghanaians began recognizing proper public environmental awareness (EPA, 1996).



## 2.2 Mining

Mining may be defined as the science, technique, and business of minerals discovery and exploitation; while a mine on the other hand is an opening or excavation in the earth for the purpose of mineral extraction (Aboraa, 2005).

### 2.2.1 Methods of Mining

Mining is usually classified into two main methods; namely surface mining and underground mining each of which has several sub-categories. The choice of method for mining a particular mineral deposit depends on several factors, including:

1. Physical and/or chemical characteristics of the ore body (geology).
2. Depth of occurrence of the ore.
3. Socio-economic considerations; and
4. Environmental constraints.

The primary objective for selecting a particular method of mining is to design a method of extraction that is the most conducive to the existing conditions, not only aimed at generating the highest economic benefit, but also safety of men, materials and surface facilities.

Surface mining is applied to deposits that outcrop or lie near the surface of the earth under shallow cover. Based on the physical characteristics, environment of deposition, depth, and other factors, a surface deposit may be mined by open-pit, open-cast, or one of several placer mining methods. Mineral deposits mined by surface methods range from very soft to very hard. Underground mining on the other hand is a man-made excavation underneath the surface of the earth for the purpose of extracting material that has valuable chemicals and/or physical characteristics. Access into an underground mine may be gained by a shaft, adit, tunnel or decline.

### 2.2.2 Environmental Impacts of Mining

Potentially, many adverse environmental impacts can result from mining activities. These impacts can be categorized as follows:

(i) **Land surface impacts:** essentially, mining is all about the exploitation and disturbance of earth material on or below the surface of the earth in order to extract mineral and energy requirements of mankind. The various ways the land surface and its resources are affected can be further categorized as:

(a) Topographical effects which includes:

1. Removal of material from its original location by moving equipment – hills may be reduced to flat ground, or depressions in the ground.
2. Dumping of waste rock which tends to raise the original ground elevation, fill original depressions, or the partial or complete filling of valleys to form flat or gently sloping tops but with steep sides.
3. Depressions caused by subsidence, land slides, slope failures into already excavated voids.

(b) Soils: certain activities of mining affect the soil in the following ways:

1. Overburden stripping: large volumes of soil is removed from its original location and deposited elsewhere. The original soil at the dump site is covered by the transported soil, obscuring its surface from direct sunlight and precipitation.
2. Waste dumping: the original soil at the dump site is completely covered by waste rock as it is disposed of in the course of mining.
3. Tailings disposal: large stretches of land is covered by tailings from processing plants. Chemicals might seep into the adjacent and underlying soil.
4. Acid-rock drainage: The exposure of certain minerals e.g. pyrite, to air and water leads to the production of acidity and elevated concentration of metals and sulphate.
5. Dredging: large pools of water impounded for dredging completely cover large volumes of soil. Excessive inundation of the soil definitely alters the nature of the soil, prevents sunlight from reaching the soil, thereby almost eliminating its ability to support plant life.

(c) Erosion: mining causes erosion by destroying the conditions and surface topography that existed in the pre-mining period. In all mining operations, especially, surface mining, large areas of vegetation is removed, then the overburden is removed to bedrock. As the overburden is exposed by the clearance of vegetation during surface mine development, erosion is imminent.

(d) Subsidence: it may be defined as the vertical and/or horizontal movement of surface, sub-surface and underground masses as a result of various natural and man-made activities. Movements are generally downward into subsurface openings, but lateral movement is possible along deflecting bedding planes.



Damage to buildings may be either functional (structural) which will impair the function and usage of the structure or cosmetic such as cracked walls and floors which spoil the original beauty of the building but not creating any danger.

**(ii) Blasting Impacts:** the various ways through which blasting can affect the environment can be seen in the form of fly-rock, ground vibrations, air blast, dust and gaseous fumes. Fly-rock has a high potential to cause damage such as shattering glass windows, making holes in roofs, injury and death to humans, and damage to plants and equipment.

Blasting may adversely affect the environment in several ways. Two of these, noise and shock, are loosely classified as air impacts. Blasting noise and air shock can be troublesome if people live within close proximity to the blasting site (Gilpin, 1995). The magnitude of the problem is dependent primarily upon the depth, the powder factor, the amount of explosive detonated at a given instant, the population density in the vicinity of the blasting site, and the times of day during which blasting takes place. Common practice is to use millisecond delays between rows of blast holes in a given instant. Reduction of the powder factor, that is, use of less explosive per cubic yard of overburden, and restriction of blasting to daylight hours are additional mitigation measures which are sometimes used (Gilpin, 1995). Ground vibration that results from the blasting is another potential problem where people live near the mine site.

**(iii) Hydrologic Impacts:** disturbance of the land surface by mining promotes erosion that leads to the transportation of sediments into streams. Areas prone to erosion include tailings piles, waste rock dumps, soil piles, roadways, pit slopes, and other exposed surfaces during and after construction. Existing and potential community water wells may be lost temporarily or permanently as shallow aquifers and water tables are drained off by nearby surface mining activity. Underground mining might also cause subsidence and induced fractures of the overlying strata that can also cause streams to be diverted underground, drain shallow aquifers, or change the direction of groundwater flow. In addition, aquifers which are located below the mining level might be contaminated by poor quality mine water which might seep downwards.



## **2.3 Environmental Impact Assessment (EIA)**

EIA may be defined as a systematic process that examines the environmental impacts of a proposed project before a decision is made on whether to undertake the project or not. To assist this decision-making, assessments are carried out independently of the project developer, who prepares an Environmental Impact Statement (EIS). An EIS is a document prepared by a proponent, describing a proposed activity or development and identifying the probable impacts on the environment; examining the alternatives of the proposal; setting out the mitigation measures to be adopted; proposing a programme on environmental management; provision for monitoring and auditing; and plans for decommissioning and rehabilitation (Gilpin, 1995).

### **2.3.1 Evolution of EIA**

EIA, as a mandatory procedure, originated in the early 1970s, with the implementation of National Environmental Policy Act (NEPA) 1969 in the USA. The NEPA 1969 incorporated a requirement for assessing the environmental impacts of 'major federal actions significantly affecting the quality of the human environment'. Much of the initial phase of its subsequent development was in a small number of high income countries like Canada in 1973 and Australia in 1974, but some developing countries also adopted it at a relatively early stage. Colombia introduced it in 1974 while the Philippines established it in 1978 by presidential decree (Smith and Van der Waven, 1995).

The major expansion of project level Environmental Assessment (EA) took place in the mid-1980s. Virtually all high income countries by then possessed their own mandatory EIA procedures (Lee, 1995) as do a large and rapidly increasing number of low and middle income countries. Besides, most International and Bilateral Aid Agencies and Development Banks have adopted their own EIA procedures, which they apply when providing development assistance (OECD, 1996).

The development of EIA system in Ghana has been a gradual process as EIA was initially implemented through a non-statutory administrative requirement in 1989, and it was not until 1994 that EIA was made legally enforceable after the introduction of the EIA law in 1994 (EPA, 1996).



### **2.3.2 The Aims and Purpose of EIA**

The aim of EIA is to give the environment its due place in the decision-making process by clearly evaluating the environmental effects of a proposed activity before action is taken. The concept has ramifications in the long run for almost all development because sustainable development depends on protecting the natural resources which is the foundation for further development.

EIA is seen as the servant of development: promoting better development at best, and basically supporting economic growth. It is an aid to decision-making. It is not a substitute for decision-making but it does help to clarify some of the trade-offs associated with a proposed development action, which should lead to a more rational and structured decision-making (Glasson et al.1994). The EIA process has the potential, not always taken up, to be a basis for negotiation between the developer, the public interest groups and the planning regulator. This can lead to an outcome that balances the interests of the development and the environment.

The rationale behind EIA is to ensure that the environmental effects of development proposals are systematically assessed and taken into consideration in conjunction with their likely economic, social and other impacts, when determining development strategies and later, when approving individual development projects.

The major purpose of EIA includes the following:

1. To identify any potentially adverse environmental consequences of a development action, so that they may be avoided, reduced or otherwise taken into account during planning and design.
2. To ensure that any such consequences are taken into account, when planning and designing an action as well as when it is authorized.
3. To influence how it is subsequently managed during its implementation (Lee and George, 2000).

### **2.3.3 Benefits of EIA**

Some benefits of EIA include:

1. Improvement of project design and cost reduction; projects which integrate EIA at the early stages can identify and address unforeseen impacts thereby reducing capital and



recurrent costs as well as avoiding unnecessary environmental damage and social disruption.

2. Conflict avoidance; EIA provides information and guidance to help avoid conflicts between different objectives and interest groups.
3. Help predict and avoid long-term problems; the process can help identify and reduce the risk of short-term needs and interests which can jeopardize long-term development goals.
4. Improvement of institutional coordination; it provides a formal mechanism for inter-agency coordination and negotiation between stakeholder groups.
5. Consideration of alternative projects and design; without EIA, project appraisal techniques tend to examine alternatives in terms of minimizing financial costs while optimizing financial returns. EIA broadens the boundaries of project appraisal so that considerations can be made of alternative approaches, technologies and designs.
6. Accountability and transparency improvement; EIA contributes to planning that is more transparent and accountable by providing a framework for information sharing (EPA, 1996).

#### 2.3.4 Timing of the EIA

Although EIAs represent a very small proportion of the total cost of a project, they do involve additional costs, and sometimes tend to be commissioned at a fairly advanced stage in the project planning process, especially in most developing nations (Goodland and Mercier, 1999). In such unfortunate situations, the EIA is usually applied too late in the project cycle to have a real impact on environmental issues, or indeed on any sector or dimension not already targeted by the project. The EIA, therefore, simply becomes last minute procedural pre-requisite for final government authorization as the undertaking has fairly well developed before the EIA takes place. In such circumstances, an EIA can not easily affect the design of the activity or propose the consideration of the alternatives. Late occurrence of EIA in the planning process usually means environmental considerations are not incorporated into the proposed activity's construction/operation and the environmental license is generally granted because the activity has already received a substantial investment of time and money.

According to Lee and George (2000) ideally, EIA should precede both the decision to begin serious planning of any activity as well as the decision to begin its physical undertaking. Recent



EIA legislation tries to overcome the above shortcoming by ensuring that EIAs occur during the pre-feasibility stages of a project, i.e. before a decision has been taken to go forward with the activity. In several countries, EIA must form part of the standard feasibility study for an activity. This ensures that environmental factors are considered alongside traditional, technical, economic and financial factors. It also permits government officials to determine, at an early stage, whether further planning should be approved, significantly altered or ended.

## 2.4 The General EIA Procedures around the World

The EIA process is set within an institutional context and the context will vary from country to country; and even in one country, there may be variety of regulations for different projects. The various stages in the process can be taken in different sequences and some stages may be completely missing in certain cases. Furthermore, the process is not always linear but can be built in cycles, with feedback from later stages to earlier stages (Glasson et al. 1994).

According to Sive and Chartok (2005) the United States National Environmental Policy Act 1969 (US-NEPA) EIA process is designed to involve the public and gather the best available information in a single place so that decision makers can be fully informed when they make their choices. According to them the US-NEPA EIA process has the following steps:

- **Scoping:** When a project is first proposed by a proponent, the United States EPA announces it with a notice in the Federal Register notices in local media, and letters to citizens and groups that it knows are likely to be interested. Citizens and groups are welcome to send in comments helping the Agency identify the issues it must address in the EIS (or EA).
- **Draft EIS:** Based on both Agency expertise, and issues raised by the public and the affected community, the Agency prepares a Draft EIS with a full description of the affected environment, a reasonable range of alternatives, and an analysis of the impacts of each alternative. The public is then provided a second opportunity to provide comments.
- **Final EIS and Proposed Action:** Based on the comments on the Draft EIS, the agency writes a Final EIS, and announces its Proposed Action. The public is not invited to comment on this, but if they are still unhappy, or feel that the Agency has missed a major issue, they may protest the EIS to the Director of the Agency. The Director may

either ask the Agency to revise the EIS, or explain to the protester why their complaints are not actually taken care of.

- **Record of Decision:** Once all the protests are resolved the Agency issues a Record of Decision which is its final action prior to implementation. If members of the public are still dissatisfied with the outcome they may sue the Agency in Federal court.

Lee and George (2000) on their part, describe the general EIA procedures as comprising the following:

- i. Project Screening: determining whether the nature of the proposed action and its likely impacts are such that it should be subjected to EIA.
- ii. Consideration of alternatives: a review of alternatives to the proposed action.
- iii. Description of the action: describing the action in suitable form to enable its effects to be predicted.
- iv. Description of the environmental baseline: describing the current state of the environment likely to be affected and its expected future state in the absence of the proposed action.
- v. Impact identification and Scoping – determining which environmental impacts should be investigated in the assessment.
- vi. Prediction of impact magnitude and significance: determining how large the impacts are likely to be, and assessing their importance.
- vii. Identification of mitigation measures: defining what steps can be taken to eliminate or reduce any significant impacts or to compensate for them.
- viii. Preparing the documentation of the assessment: documenting the findings of the assessment (e.g. EIS) in a manner that is clearly understandable to those involved in consultations and decision-making.
- ix. Review: evaluating the documentation to determine its adequacy for consultation and decision-making purposes.
- x. Consultation and Public Participation (CCP): enabling the environmental authorities and the public to comment upon the proposed action and its environmental impacts, based upon the documentation of the assessment (N.B. CCP may also take place at other stages of the process, notably in scoping).



- xi. Decision-making: using the assessment documentation and consultation findings to reach a decision on the proposed action, with or without conditions attached.
- xii. Monitoring implementation: checking whether the action is implemented in accordance with any environmental conditions of the decision and whether its environmental performance is consistent with the assessment's predictions.

#### **2.4.1 The Participants in the EIA Process**

The various participants in the EIA process must be clearly identified. The following is a list of those that are normally involved:

- Decision Maker: can be a head of state, a group of ministers, an elected or designated individual.
- Assessor: the person, agency, or company having responsibility for preparing the EIS.
- Proponent: can be a government agency or private firm wishing to initiate the project.
- Reviewer: a person, agency, or board with responsibility for reviewing the EIS and ensuring compliance with published guidelines or regulations.
- Other Agencies of Government: Agencies with special interest in the project; they may be components of the national government services, or they may be associated with provinces, states, cities or villages.
- Experts (Advisors): persons with the specialized knowledge required to evaluate the proposed action; they may come from within or outside the government service.
- Public at large: includes citizens and the media.
- Special interest groups: includes environmental organizations, labour unions, professional societies and local associations (Glasson et al. 1994).

#### **2.4.2 The Contents of EIS**

Under the EU directive, an EIS has to provide certain information to comply. According to Watson (2003) there are seven key areas that EISs are required to focus on under the EU directive and these are:

##### **1. Description of the project:**

- Description of actual project, site etc.
- Break the project down into its key components, i.e. construction, operations, decommissioning.

- For each component, list all of the sources of environmental disturbance.
- For each component, all the inputs and outputs must be listed e.g. waste etc.

## 2. Alternatives that have been considered:

- Examine alternatives that have been considered e.g. - In a biomass power station, will the fuel be sourced locally or nationally?

## 3. Description of the environment:

- List of all aspects of the environment that may be effected by the development e.g. populations, fauna, flora, air, soil, water, humans, landscape, cultural heritage.
- This section is best carried out with the help of local experts.

## 4. Description of the significant effects on the environment:

The word significant is crucial here as the definition can vary. The most frequent method used is the Leopold Matrix which was developed for the US Geological Survey (Leopold et al. (1971). The Leopold matrix is a tool used in the systematic examination of potential interactions. Eg. In a windfarm development a significant impact may be collisions with birds.

## 5. Mitigation: This is where EIA is most useful.

Once section 4 has been completed it will be obvious where the impacts will be greatest. Using this information, ways to avoid negative impacts should be developed. It is best to work with the developer with this section as they know the project best. Using the windfarm example again construction could be out of bird nesting seasons.

## 6. Non-technical summary:

The EIA will be in the public domain and be used in the decision making process. It is important that the information is available to the public. This section is a summary that does not include jargon or complicated diagrams. It should be understood by the informed lay-person.

## 7. Lack of know-how/technical difficulties:

This section is to advise any areas of weakness in knowledge. It can be used to focus areas of future research. Some developers see the EIA as a starting block for good environmental management.



### 2.4.3 The Organization of EIS

Most EISs are broadly organized into four sections:

- a non-technical summary,
- a discussion of relevant methods and issues,
- a description of the project and of environmental baseline conditions, and
- a discussion of the project's likely environmental impacts (which may include the discussion of baseline environmental conditions and predicted impacts, proposed mitigation measures and residual impacts (Lee and George, 2000).

### 2.4.4 Decision-making in EIA

It is the process of using the assessment documentation and consultation findings to reach a decision on the proposed action, with or without conditions attached. Decisions are not made in a vacuum; they are made and influenced by:

1. Who is involved in taking the decisions and their motivations.
2. The social, political and economic circumstances and the regulatory, procedural and institutional constraints within which the decision is taken (Lee and George, 2000).

In the case of many projects there will be different decision-makers involved at different stages in the project cycle and their motivations and decision criteria will also differ. According to Lee and George (2000) a developer in the private sector may be motivated by profit and only be interested in complying with minimum environmental requirements at a least cost to him. The competent authority, which decides whether or not to authorize a project, will consider its statutory objectives. If it has a statutory responsibility to protect certain resources, its decision criteria may be confined to them. In other cases, an authority may also be required to take other kinds of material into considerations and its decision criteria will be broadened to reflect this. If the authority's main responsibilities lie in another sector, environmental considerations may be subordinated to its sectoral objectives.

One potential consequence of the above situation is that both appraisal and decision-making are prone to conflicts of interest between different stakeholders which have different goals and decision criteria. Hence, conflict avoidance and conflict resolution become an integral part of the appraisal and decision-making process and help to shape the appraisal and decision-making criteria which are finally applied.



These potential conflicts are handled in different ways in different decision-making contexts. Lee and George (2000) distinguish three different approaches:

1. The dictatorial approach – one dominant decision-maker makes his/her own decision according to his/her own criteria, with little reference to either professional analysis or the opinion of others.
2. The professional analysis approach – the decision-maker plays a passive role, relying upon the advice of his professional advisors which is based on clearly defined appraisal procedures and decision making rules; and
3. The consultative approach – the decision-maker plays a passive role and the professional's role is confined to being a facilitator of the consultative process. The principal stakeholders and interest groups are involved in identifying and negotiating a mutually acceptable outcome which the decision-maker can then endorse.

In principle, EIA contains elements of the three approaches. It has a strong technical element (reflected in the technical studies which underpin the whole process and which are documented in the EIS report). It has a consultative element (reflected in requirements for consultative and public participation) and it acknowledges the ultimate authority of the decision-maker in approving, modifying or rejecting the proposed action. However, if the mix of these three elements in the EIA process is at variance with the mix in the decision-making context to which it is linked, then:

1. Conflicts may occur and opposition to the Environmental Assessment process will intensify, rendering it ineffective; and
2. Non-compliance problems may arise which also makes it ineffective (Lee and George, 2000).

#### **2.4.5 Challenging the Adequacy of an EIS**

The adequacy of an EIS can be challenged in court. Major proposed projects have been blocked because of an agency's failure to prepare an acceptable EIS. One prominent example was the Westway landfill and highway development in and along the Hudson River in New York City. ( Available: [http://en.wikipedia.org/wiki/Environmental\\_impact](http://en.wikipedia.org/wiki/Environmental_impact) [June 16th, 2006]).

In the U.K. there are no official provisions for an appeal against development consent. However, if permission is granted, a third party may wish to challenge that decision on the



grounds, e.g. that no EIA was prepared when it should have been, or that the Competent Authority (CA) did not adequately consider the relevant environmental information. The only way to this is through judicial review proceedings in the U.K. High Court, or through the European Commission (Glasson et al. 1994).

#### **2.4.6 Links between the EIA Process and Project Implementation**

Goodland and Mercier (1999) observe that there are often weak links between the EIA process and later (post-authorization) stages of the project cycle due to:

1. Deficiencies in Environmental Management Plans (EMPs): EMPs, which indicate how projects are to be implemented in accordance with well-defined environmental criteria, are insufficiently prepared during the EA process and then used when formulating conditions in authorizations and permits.
2. Deficiencies in monitoring compliance and in enforcing compliance, through the use of legal instruments and financial penalties.

The use of environmental impact monitoring and management plans in implementing the findings and recommendations of EIA studies is a key issue, however, according to Smith and van der Wansem (1995) these plans are often neglected or not effectively enforced. In the same vein, Biswas and Agarwala (1992) mourn that EIA as it is practiced now, ends immediately after the environmental clearance certificate of a project has been received; while compliance monitoring is seldom carried out, either by the project authorities or by the responsible government agencies. Mwalyosi and Hughes (1998) further express the grief that “in most of the case studies reviewed in Tanzania, the EIA process ended with the submission of the EIS. In no case did the EIA practitioner involvement continue during the implementation or post-completion stages of the project. Post-completion monitoring seems to be particularly poor in this respect”.

#### **2.4.7 Sanctions and penalties**

It is essential to establish what sanctions will be applied if necessary, with appropriate legal backing as well as implementing any action that will be required as a result of monitoring. In case of impacts that are subject to specific legislation, the enforcement provisions of that legislation may suffice and where no such legislation exists, or for impacts not covered by it, sanctions may need to be provided for in the EIA approval. This is normally done by attaching



a set of conditions to the approval which identifies all those mitigation measures and potential impacts that are considered to be particularly important. The relevant EA legislation should define the sanctions which may be applied if those conditions are breached. To minimize the possibility of legal disputes over liability, binding commitments may also be included in the relevant contract document for the project.

As well as defining specific mitigation actions, these provisions may state what further action the contractor/developer must take if an impact is found to exceed the prediction. For developments in low and middle income countries, the developer or project sponsor is often a public authority. This can cause difficulties in applying sanctions, particularly when the political will to ensure EA is weak. When a development bank or aid agency is involved it can overcome this problem by applying its own sanctions.

## **2.5 Consultation and Public Participation (CPP) in EIA**

This is the process of enabling the environmental authorities and the public to comment upon the proposed action and its environmental impacts, based upon the documentation of the assessment. Public participation may also take place at other stages of the process, notably in scoping.

### **2.5.1 The meaning of "Public" in CPP**

The term 'the public' actually refers to a complex amalgam of interest groups, which changes over time and from project to project (Glasson et al. 1994). They classify the public into two main groups. The first consists of the voluntary groups, quasi-statutory bodies, or issue based pressure groups, which are usually concerned with the environment as a whole. The second group consists of the people living near the proposed development who may be directly affected by it. The organized groups may have extensive financial and professional resources at their disposal, may concentrate on specific aspects of the development and may see their participation as a way of gaining political points or national publicity. People living locally, instead, may lack the technical, educational and financial resources and familiarity with relevant procedures, to put their points across effectively, yet they are the ones who will be most directly affected by the development (Mollison, 1992).



### 2.5.2 Types of CPP

Consultation applies to the involvement of national and local government agencies, whose interests may be affected directly by a proposed project, and of the public and NGOs. Lee and George (2000) place emphasis on types of CPP involving the public and NGOs as:

1. Information dissemination: in this case, information is provided by the proponent, or an agency which is responsible for the EA, to the public on one occasion or at regular intervals. However, the flow of information is 'one way'. Usually, there is no opportunity for comment by the public or NGOs on the merits of the proposed project.
2. Consultation: this involves a 'two way' process of exchange of information between the public and a proponent/agency with the opportunity for the public to comment on the merits of the proposed project. Consultations may occur at varying times during the EA process. However, the proponent or agency is not required to take account of the views expressed in its decision-making, although it may do so if it considers it appropriately.
3. Collaboration and partnership: in this case, the public is considered to be a partner in the development initiative and in carrying out the EA. There is shared decision-making and control in the EA process and joint responsibility for the EA results. There is joint analysis and control over decisions and their implementation. The partnership may extend to the design and implementation of the proposed project.
4. Empowerment and local control: here, control over the scope, form and content of the EA is passed to the local community(ies) and it is exercised, usually, through community representatives.

### 2.5.3 Approaches and techniques in effecting consultation and public participation

There are numerous approaches and techniques that can be used to involve the public. Amongst the most common according to Lee and George (2000) are:

1. Public meetings. These may be specially convened meetings of traditional local decision-making fora such as the *khotla* in Botswana or the *pisto* system in Lesotho (Kakonge, 1996) which operate at village level. Their conduct is determined by customary rules. Public meetings may also be held in larger, urbanized communities and be conducted according to different sets of rules. Generally, they are open with no restriction as to who may attend. Not everyone is comfortable speaking in such 'non-traditional' events so the views expressed may not be representative of the urban community.



2. **Advisory panels.** These consist of selected groups of individuals, chosen to represent stakeholders, which meet periodically to assess results and advise on future activities. The selection of the stakeholders and their representatives is crucial and particular care is needed to involve the poor, women and indigenous people if they are not already identified as stakeholders.
3. **Questionnaires.** A structured set of written questions is prepared to be answered by a sample of local communities. A sufficient level of literacy in the local community is assumed to be important since no interviewing may be undertaken. If interviewing is needed then the costs will rise.
4. **Interviews.** These may be structured or semi-structured. Usually, interviews are undertaken with selected community or group representatives. They can also be undertaken with individuals considered able to reflect the views of distinct social categories, e.g. the poor who may not be organized in a defined social group. This technique requires skilled personnel and adequate funding.
5. **Open houses.** These are accessible locations which contain information on the proposed project and EA. An EA team member should be present who can discuss issues and record the views/opinions/concerns of visitors. Any person should be able to visit an open house and the location and times of opening should be well publicized.

Lee and George (2000) advocate that public participation will need to take different forms in different countries, depending on factors such as: cultural and social considerations; local community structures; types of communication method available; the level of literacy among those groups likely to be affected by or interested in the EIA process; and the existence of distinct social and linguistic groups who may require the use of particular consultation methods. Effective public participation may require adaptations to the legal and institutional environment, including:

1. Full advance notification of EIA decisions.
2. Easy access to EIA documents, background reports and data.
3. Opportunities to be heard, via public hearings, community meetings, or written comments.



4. A written record of EIA decisions, outlining the key issues and concerns raised by the community, NGO or other participants in the EIA process, and describing how these concerns have or have not been addressed in the final decisions; and
5. Administrative or judicial review procedures in which the adequacy of the environmental review process can be tested (Lee and George, 2000).

They further give a wide variety of measures that can be taken to encourage and support public participation to include:

1. Mass communication efforts involving major stakeholders.
2. Creating project monitoring committees including community, NGO and private sector representatives and other relevant stakeholders, who are involved in the preparation of EIAs or in the compliance monitoring of completed projects.
3. Promoting the role of stakeholders and affected groups; and
4. Strengthening of NGOs to improve their ability to participate meaningfully.

The aim of the EIA process is to provide information about a proposal's environmental impacts to the developer, public and decision-makers so that a better decision may be made. As such how the information is presented, how the various interested parties use that information, and how the final decision incorporates the results of the EIA and the views of the various parties, are essential components in the EIA process. According to Mc Cormic (1991) the overall benefits of openness can exceed its costs, despite the expenditure and delays associated with full-scale public participation in the project planning cycle.

Dallas (1984) quotes the conservation manager of Europe's largest Zinc/Lead Mine, when speaking about EIA process in Ireland, as saying that:

"... properly defined and widely used, [EIAs is] an advantage rather than a deterrent. It is a mechanism for ensuring the early and orderly consideration of all relevant issues and for the involvement of affected communities. It is in this last area that its true benefits lies. We have entered an era when people decide. It is therefore in the interests of developers to ensure that they, the people, are equipped to do so with the confidence that their concern is recognized and their future life style is protected."



#### **2.5.4 The Role of Public Participation in EIA**

The role of public participation and consultation in the EIA process is to assure the quality, comprehensiveness and effectiveness of EIA, as well as to ensure that the public views are adequately taken into consideration in the decision-making process in:

1. Determining the scope of the EIA.
2. Evaluating the relative significance of the likely impacts.
3. Providing specialist knowledge about the site.
4. Proposing mitigation measures.
5. Ensuring that the EIS is objective, truthful and complete, and
6. Monitoring any conditions set on the development agreement (Glasson et al. 1994).

#### **2.5.5 Public hearing**

This is a form of public participation in which affected and interested parties together with proponents are brought together in a forum to express their opinions and offer suggestions on a proposed undertaking in order to influence the decision-making process. It is usually organized by the agency responsible for the environment within the project area and moderated by an independent panel.

The main objectives of organizing public hearings are:

- To provide a forum for the proponent to inform the affected community of the outcome of the EA of proposed undertaking.
- To verify the accuracy of the EIA findings in relation to the situation on the ground.
- To confirm that all the affected parties and stakeholders have been adequately consulted and have been part of the various decision-making process.
- To offer the affected and interested parties, as well as other stakeholders, the opportunity to express their opinions on any issues considered outstanding; and
- To promote effective public participation and ensure confidence in the EIA process as well as support for the proposed undertaking (Lee and George, 2000).

### **2.6 EIA in Ghana**

#### **2.6.1 History of EIA in Ghana**

EIA in Ghana can be traced back to the establishment of the Environmental Protection Council, (EPC) in 1974, immediately after the United Nations Conference on the Human Environment



was held in Stockholm, Sweden in 1972. The mandate of the EPC was to be advisory, coordinating, investigatory and educational in scope; and one of its functions was to ensure the observance of proper safeguards in the planning and execution of all development projects including those already in existence, that are likely to interfere with the quality of the environment (EPA, 1996).

In the late 1970s, EPC took the initiative to institute EIA with respect to industries. Nonetheless, proposed legislation to this effect was not passed. The opportunity came in 1985, when under the Ghana Investment Code, the Ghana Investment Centre (GIC), had regard to any effect an enterprise was likely to have on the environment and the measures proposed for the prevention and control of any harmful effects on the environment. Subsequent to this requirement, EPC in the same year set up an EIA Committee as one of its expert committees through which it operated, to examine how EIA could be put into operation in Ghana.

In March 1989, whilst this initiative was going on, the Government of Ghana initiated a major effort to put environmental issues as priority on the development agenda. The initiative resulted in a strategy to address major environmental issues known as the National Environmental Action Plan (NEAP) which was to be implemented over a ten year period (1991-2000). In that same year, before the completion of the preparation of the NEAP, efforts to institute EIA in Ghana got a boost when, during the presentation of the annual budget, environmental concerns were given prominence for the first time.

EIA, therefore, became an administrative requirement in Ghana in 1989, through the government directive which stated that the EPC was to be consulted formally on all development proposals and issue "Certificate of Clearance" stating either that no damaging environmental impact will result from the implementation of the project or that "adequate provisions have been made in the project proposals to contain potential adverse environmental impacts". In July 1989, the EPC published draft EIA Guidelines for EIA (EPA, 1996).

The establishment of an effective EIA system received further formal support when in December 1994, the EPA Act, (Act 490), was passed; and the EPA replaced EPC. In June 1995 and December 1996, EPA published the Procedures and the Guidelines for EIA in Ghana



respectively. Furthermore, in June 1999, EIA legislation came into force when the Environmental Assessment Regulation 1999, (L.I. 1652), was passed.

### **2.6.2 The EIA Procedures as Practiced in Ghana**

Lee and George (2000) commend the EIA procedures in Ghana as having a strong sectoral emphasis, particularly in the mining industry. The various stages and processes involved in EIA procedures, until an applicant can receive an environmental certificate, according to (EPA, 1995; EPA, 1996; and Environmental Assessment Regulation, 1999) include the following:

(a) Project Registration: every undertaking that may have an impact on the environment is required to be registered with the EPA. The responsibility for registering an undertaking lies with the proponent whilst that of determining what constitutes an impact on the environment lies with the EPA.

(b) Screening: within 25 days from the time a registration form is received the EPA reviews it together with a cross-sectoral review committee. Chapter nine of the manual on EIA procedures (EPA, 1995) states that "a nine-member cross-sectoral technical committee, including a representative from the Ministry of Environment and Science, two representatives from the EPA (one of whom shall be the secretary to the committee) and six other representatives from other government institutions or organizations, shall assist the EPA in the entire review (screening, Terms of Reference (TOR) evaluation, draft EIS review and Preliminary Environmental Report (PER) review process". This committee then makes a decision by placing the development at the appropriate level of assessment. In making the decision at this stage, an inspection by EPA officers may be necessary and consideration is given to the following:

1. The location, size and likely output of the proposed undertaking.
2. The technology to be used.
3. Concerns of the general public, especially those of the immediate residents.
4. Land use considerations.
5. Any other factors relevant to the particular undertaking to which the application relates.

After screening the Agency is to issue a report that summarizes the decision reached, which could be one the four decisions:

1. Objection to the undertaking (environmental permit declined).
2. No objection to the undertaking (environmental permit issued).



3. Requires submission of PER.

4. Full EIA required.

(c) **Scoping:** if the results reveal that there will be significant adverse impacts from the project the applicant is asked to submit an EIS. The first step for the applicant is to commission or undertake a scoping exercise of the proposed (alternative) site(s). This involves consultations with interested/affected parties such as government officials, traditional authorities and members of the public. Thus scoping is a procedure carried out to help ensure that the environmental assessment focuses on key environmental issues associated with the proposed activity. It involves meetings between the proponent and the environmental agency, members of the public, and the affected communities. The result of the scoping determines the extent and depth of the significant issues to be examined in the impending EIS.

(i) **TOR:** the proponent then prepares a scoping report which includes draft TOR for the EIA study, and submits 10 copies to the EPA. The draft TOR must indicate the content of the EIS which will include:

1. Description of the proposed undertaking.
2. An analysis of the need/reason for the undertaking.
3. Objective of the undertaking.
4. Other options for carrying the undertaking.
5. Alternatives to the undertaking including alternative situations where the undertaking is not proceeded with.
6. Matters on site selection including a statement of the reasons for the choice of the proposed site and whether any other alternative site was considered.
7. An indication of existing environmental conditions including social, economic and other aspects of major environmental concern.
8. Information on potential positive and negative impacts of the proposed undertaking from the environmental, social, economic and cultural aspects in relation to the different phases of the development of the undertaking.
9. The potential impact on the health of people.
10. Proposals to mitigate any potential negative socio-economic, cultural and public health impacts on the environment.

11. Proposals to be developed to monitor predictable environmental impact and proposed mitigating measures.
12. Contingency plans existing or to be evolved to address any unpredictable negative environmental impact and proposed mitigating measures.
13. Consultation with the members of the public likely to be affected by the operations of the undertaking.
14. Maps, plans, tables, graphs, diagrams and other illustrative material that will assist with comprehension of the contents of the EIS.
15. A provisional EMP.
16. Proposals for payment of compensation for possible damage to land or property arising from the operation of the undertaking.
17. An indication whether any area outside Ghana is likely to be affected by the activities of the undertaking.
18. Description of the present environment that would be affected, directly or indirectly.

The draft TOR is studied by the EPA and the cross-sectoral technical committee and where necessary, a visit to the site(s) is made. The outcome of the study on the TOR, which could either be a rejection or revision/modification or acceptance /approval, is communicated to the proponent within 15 days of receipt of the Scoping Report/TOR.

**(ii) Action on Scoping Report:** The EPA examines this scoping report and informs the applicant within 25 days whether it is acceptable or not. Where the report is acceptable, EPA informs the applicant to submit an EIS, otherwise the applicant is advised to revise the report as appropriate and re-submit it if he so desires (EPA, 1995).

**(d) Matters to be addressed in the EIS:** The EIS must address possible direct and indirect impacts of the undertaking on the environment at the pre-construction, construction, operation, decommissioning and post-decommissioning phases including:

1. Concentrations of pollutants in environmental media including air, water and land from mobile or fixed sources
2. Any direct ecological changes resulting from such pollutants concentrations as they relate to communities, habitats, flora and fauna.



3. Alteration in ecological processes such as transfer of energy through food chains, decomposition and bio-accumulation which could affect any community, habitat or species of flora and fauna.
4. Ecological consequences of direct destruction of existing habitats from activities such as dumping of waste, and vegetation clearance and fillings.
5. Noise and vibration levels.
6. Odour.
7. Vehicle traffic generation and potential increase in road accidents.
8. Changes in social, cultural and economic patterns relating to the development.
9. Decline in existing or potential use of valued resources arising from matters referred to the first four considerations above.
10. Direct or indirect employment generation.
11. Provision of infrastructure such as roads, schools and health facilities.
12. Local economy.
13. Cultural changes including possible conflict arising from immigration and tourism.
14. Potential land use in the area of the proposed undertaking.

In addition, an EIS is to also include:

1. Information on the possible health effects of the undertaking on persons within and around the vicinity of the proposed project.
2. An EIS for mining and other extractive industry is to include reclamation plans.

(e) **Consideration and Review of EIS:** The project developer submits 12 copies of the EIS to the EPA which reviews it together with the nine member cross-sectoral technical review committee. Besides, the Agency may direct the applicant to submit some copies to the relevant government ministries, departments and organizations. The EPA then publishes a 21-day public notice of the EIS for public comments and suggestions, in the mass media and at appropriate places (see Appendices 2 and 3).

(i) **Public Hearing:** The EPA is to hold a public hearing where:

1. There is great adverse public reaction to the proposal upon the notice issued above.
2. The expected environmental impacts are considered extensive and far reaching; and
3. The undertaking will involve dislocation or resettlement of communities.



The EPA appoints a Panel, composed of three to five persons, who organizes the hearing. The Chairman is not supposed to reside in the affected area, but at least a third of the Panel's membership must be resident in that area. The information received at the hearing, together with the final report and any other recommendations of the Panel is written to the EPA.

Whenever there is the organization of public hearing, the processing of the application may go beyond the normal 90-day period for application processing.

**(ii) EIS Review after public hearing:** the draft EIS is further reviewed after public hearing by the EPA, the cross-sectoral technical committee and other relevant agencies and if found to be unacceptable, the applicant shall be notified either:

1. To submit a revised version at a later date; or
2. To conduct such further studies as the Agency considers necessary.

**(f) Finalization of EIS and Grant of Environmental Permit:** where the draft EIS is accepted, the proponent is notified to finalize it; and to submit eight hard cover copies and a copy on a floppy diskette to the Agency.

The approval decision is valid for a period of 18 months from the date permit is given. If work has not commenced on the project within this period, the original decision becomes void and the project must be re-registered.

**(g) Issuance of an Environmental Certificate:** The project developer will be issued with an environmental certificate from the EPA within 24 months of the date of the commencement of operations. However, the issuance of the certificate is subject to the following conditions:

1. Evidence of actual commencement of operations.
2. Acquisition of other permits and approvals where applicable.
3. Compliance with mitigation commitments indicated in the EIS or PER; and
4. Submission of first annual environmental report to the agency.

### **2.6.3 Environmental Management Plans and Annual Environmental Reports**

All undertakings in Ghana are supposed to be covered by EMPs, and after one year of operation, a proponent is required to submit an EMP and afterward every three years. The



objective of the EMP is to act as an abridged operation manual for the project with respect to environmental issues during the operation of the project. It is to set out in practical terms how the mitigation measures proposed within the EIS should be implemented.

#### **2.6.4 Offences and Penalty: Any person who:**

1. Commences an undertaking without an environmental permit issued in respect of the undertaking contrary to regulation (1).
2. Fails to comply with directives of the agency to register an undertaking and obtain an environmental permit contrary to regulation (2).
3. Fails to conduct an EIA in respect of an undertaking specified in Schedule 2 to these Regulations before commencement of the undertaking or as may be directed by the Agency contrary to regulation (3).
4. Submits or provides the Agency with information required under any provision of these regulations which he knows to be false.
5. Fails to submit an Annual Environmental Report as required under Regulation 25.
6. Contravenes any provisions of these regulations.

Commits an offence and is liable on summary conviction to a fine not exceeding two million cedis or imprisonment for a term not exceeding one year or both and in the case of a continuing offence to a further fine not exceeding two hundred thousand cedis for each day the offence is committed.

#### **2.6.5 Appeal and Dispute Settlement**

A person aggrieved by a decision or action of the EPA is to submit a complaint in writing to the minister responsible for the environment within 30 days of the complainant becoming aware of the decision or action. Here the complainant is to state the issues objected to, attached a copy of the decision objected to and all relevant documents for considering and determining the complaint. The minister then appoints a panel, within 14 days of receipt of the complaint, composed of representative each of the following:

1. The ministry of environment not below the rank of director.
2. The attorney-general's department not below the rank of senior state attorney.
3. The ministry with responsibility for the undertaking, and
4. Two persons with specialization in the relevant field of the undertaking.



The panel after hearing all parties may alter the decision of the agency, request the agency to determine the application where applicable within specified period, or give any other directives as it considers just.

#### **2.6.6 Suspension, Cancellation or Revocation of Permit and Certificate**

The EPA may suspend, cancel or revoke an environmental permit or certificate under the Regulations, where the holder of the permit or certificate:

1. Fails to obtain any other authorization required by law in relation to his undertaking before commencement of operations.
2. Is in breach of any provision of the Regulations or any other enactment relating to environmental assessment.
3. Fails to make any payments required under the regulations on the due date.
4. Acts in breach of the conditions to which his permit or certificates is subject to; or
5. Fails to comply with mitigation commitments in his assessment report on EMP.

#### **2.7 Monitoring in EIA**

More positively, the next step in a good EIA procedure is the monitoring of the development's actual impacts, and the comparison between actual and predicted impacts. As Lee and George (2000) put it "If the road to hell is paved with good intentions environmental assessments which end at the decision-making stage make costly and misleading paving stones. Their good intentions are likely to come to nothing if they are not monitored". Thus after a decision has been taken to proceed with a project, the EIA process should continue on into the implementation stage, beyond into actual operation, and ultimately into decommissioning or next planning or policy-making cycle.

The aim of EIA is to ensure that before a project or relevant action is approved the environmental impacts which it is likely to have during its entire life cycle are understood and are acceptable. For this aim to be achieved in full, monitoring of the actions against the predictions made in the assessment must be carried out throughout the actions life cycle (Lee and George, 2000).

##### **2.7.1 Meaning of Monitoring**

Monitoring is a combination of observation and measurement for the performance of a project and its compliance with development consent conditions (Gilpin, 1995). Thus, it is the process



of checking whether the action is implemented in accordance with any environmental conditions of the decision and whether its environmental performance is consistent with the assessment's predictions. It involves the measuring and recording of physical, social and economic variables associated with development impacts.

In its broadest sense, monitoring embraces all relevant checks of activities, impacts and environmental parameters to ensure that they are in accordance with plans, predictions and approved conditions. This includes various forms of audits and inspections, as well as regular and ad hoc observations and measurements of the environmental parameters which may be affected. An audit is a check carried out by an independent body (Lee and George, 2000).

### **2.7.2 Monitoring and the EIA procedures**

Monitoring is an integral part of EIA; baseline data, project description, impact predictions and mitigation measures should be developed with monitoring implications in mind. An EIA should include a monitoring programme which has clear objectives, temporal and special controls, adequate durations, practical methodologies, sufficient funding, clear responsibilities and open and regular reporting (Glasson et al. 1994).

Some form of follow-up monitoring after the approval stage of EA together with measures for taking corrective actions when needed, are essential for the effectiveness of the EIA process. For a development project, the principal stages of the life cycle that need to be checked or monitored are the design, implementation, operation and decommissioning stages. Environmental assessment itself is a check on the design. To be effective, the EA needs to include provisions for further checks during the later stages of the cycle. Very few countries' EIA systems include comprehensive provision for supervisory monitoring by the competent authorities to ensure that an Environmental Management Plans (EMP) or its equivalent is actually implemented, and that impacts are no greater than predicted (Lee and George, 2000).

Requirements for some form of monitoring plan or EMP, to be submitted with the EIA report or as part of it, are reasonably common in many low and middle income countries, as they may also be provisions for follow-up monitoring by the competent authority. However, Lee and George (2000) lament that even in these cases where requirements for this follow-up are defined, they often lack sufficient detail to be fully effective.



### 2.7.3 Types of Monitoring

Tetteh (2005) quotes Davies and Sadler (1990) describe the three basic types of monitoring which are relevant as: baseline, effects or impact, and compliance monitoring.

**Baseline Monitoring:** This refers to the measurement of environmental variables during a representative pre-project period to try and determine existing conditions, ranges of variation, and processes of change. It is indeed the repeated measurement of parameters, pollutants etc. considered to be important and likely to be affected by a project development. Baseline monitoring should be planned and initiated during the scoping exercise.

**Effects or Impact Monitoring:** This refers to the measurement of environmental variables during project construction and operation to determine the changes which may have occurred as a result of the project. It involves repeated, periodic measurement of those parameters for which the EIA process predicts significant impacts. Impact predictions may be quantitative providing upper or lower limits for the relevant parameter. The aim of impact monitoring is to detect an impact occurrence and to quantify or qualify its magnitude and thus attribute the impact to the development in question. Using baseline monitoring information on the existing environment, the extent of the impact can be assessed.

**Compliance Monitoring:** This takes the form of periodic sampling and/or continuous measurement of waste discharge levels, noise, or similar emissions, to ensure that conditions are observed and standards are met. This type of monitoring normally involves random spot-checks or continuous monitoring to assess whether the development is able to comply with standards or other criteria.

### 2.7.4 Components of a Monitoring Programme

Glasson et al. (1994) propose the following as the components of a monitoring programme:

1. Summary of significant impacts identified in the environmental assessment report.
2. Mitigation measures recommended for each significant impact.
3. Monitoring requirements for each mitigation measure.
4. Person or agency responsible for the mitigation measure.
5. Timing and/or frequency of the monitoring.
6. Agency responsible for ensuring compliance with the monitoring programme, and
7. Reporting requirements.



### **2.7.5 The Characteristics of Effective Monitoring Programme**

Effective monitoring programmes according to UNEP (1996) should have the following characteristics:

1. Have realistic sampling programmes.
2. Use relevant sampling methods.
3. Collect quality data.
4. Have compatibility of old and new data.
5. Have cost-effective data collection.
6. Are innovative.
7. Use appropriate databases.
8. Use multidisciplinary interpretation.
9. Report internally and have external checks
10. Respond to third party input, and
11. Present data to the public.

In receiving the EMP, the competent authority should also pay particular attention to the proposed reporting procedures. It is through this that the competent authority becomes aware of whether or not mitigation measures have been carried out, of the results of monitoring, and of the actual impacts of the project, as identified by the developer, in accordance with the predefined plan. By ensuring, in consultation with other relevant authorities, that details are provided of how this information will be reported, in a thorough and timely fashion, the competent authority can minimize the amount of supervisory monitoring that it will need to do itself (UNEP, 1996).

### **2.7.6 Benefits and Purpose of Monitoring Programmes**

Monitoring can be used to improve project management and as an early-warning system to identify harmful trends in a locality before it is too late to take remedial action. It can help identify and correct unanticipated impacts and also provide an accepted database, which can be useful in mediation between interested parties. Monitoring is also essential for successful environmental impact auditing, and can be one of the most effective guarantees of commitment to undertakings and to mitigation measures (Glasson et al.1994).

Lee and George (2000) maintain that even if an EMP and an EMS are included in the EIA system, they may still be no more than good intentions, any more than the EIA, unless an independent check is made; and as such the competent authority must arrange for a supervisory



level of monitoring or auditing to be carried out, over and above that done by the developer; and even if monitoring reports are being provided by the developer in accordance with a sound EMP, a small number of spot-checks by the competent authority is still necessary. Most Development Banks and Aid Agencies have their own procedures for supervisory visits by their own staff. The World Bank e.g. undertakes general project visits, and ex-post project evaluation visits and reports, both of which should include examination of environmental aspects (World Bank, 1996). It has also identified environmental monitoring of projects which it funds as an important weakness in its system, which it has taken steps to rectify (World Bank, 1997).

Within the EA process, monitoring serves two prime purposes according to Lee and George (2000):

1. To ensure that an action is implemented as described in the EA.
2. To ensure that its impacts are no greater than those predicted.

In addition, monitoring can provide valuable feedback for use in future assessment.

### **2.7.7 Actors Involved in Monitoring**

Monitoring involves numerous actors in the EIA process including investors, developers, operators, NGO's, the public and all relevant competent authorities. Glasson et al. (1994) recommend that ideally, a monitoring activity should include a partnership between the parties involved e.g. the collection of information could include the developer, local authority and local community. These all have different interests and responsibilities, all of which have to be coordinated for the process to be fully effective.

In particular, both NGOs and the public at large have potentially a very valuable role to play in low and middle income countries, by extending the amount of time and effort devoted to monitoring very considerably at no cost to the developer or authorities, other than in taking remedial action (Lee and George, 2000). According to them a bad EIA system (EMP) makes no reference to this potential source of information, while a slightly better one may describe a compliant procedure which investigates the validity of complaints received. A good one will show how the developer positively encourages information from these extra sources e.g. by establishing a more responsive procedure for complaints and other information received, or by setting up local liaison committees and for specific NGO monitoring programmes. They quote



Eckman (1996) and Rasid (1996) as giving examples of monitoring programmes which involve the corporation of NGO's and local communities.

Although several developing countries and countries in transition include requirements for monitoring in their EIA procedures, few are as explicit as they might be (Lee and George, 2000). Arts (1998) praises the Taiwanese system as having a very strong one. Leu et al. (1997) mentions Article 18 of the Taiwanese EIA Law as stating that "the competent authority should carry out follow-up monitoring throughout the phases of project construction and operation, and the EPA is responsible for monitoring the implementation of the IEE and EIA decisions, and also the EPA may require the project proponents to submit Environmental Impact Investigation Reports on a regular basis (if necessary)". The Taiwanese EPA plays the leading role in the programme of EIA compliance monitoring and enforcement. The EPA contracts out an independent NGO to coordinate the work. The NGO in turn co-ordinates a task force, which consists of subject experts to carry out this work. Some experts from local universities or institutes may be invited to assist the task force. The task force undertakes site visits in association with relevant agencies and local governments to ensure compliance (Leu et al. 1997). Glasson et al. (1994) advocate that if monitoring reveals that mitigation measures are ignored or are not completed, sanctions could be imposed; these can include e.g. "stop work" orders, fines and restitution.

## **2.8 Environmental Management Plans (EMPs) and Environmental Management Systems (EMSs).**

### **2.8.1 EMP.**

The World Bank (1999) defines an EMP as "The set of mitigation, monitoring and institutional measures to be taken during implementation and operation to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels". By implication an EMP should include some form of environmental management system by which is meant a similar description of actions that will be taken by the operator, including monitoring of impacts, during the subsequent operational phase of the project, up to and including decommissioning.

At the project approval stage, the competent authority for EA can ensure that the developer makes suitable provisions for appropriate management and monitoring during all the latter stages of the project's life cycle, by requiring an EMP to be submitted at the same time as the



EIA (or as part of it), and by requiring an EMS to be defined at the time also (or as part of the EMP). When this is the case, the competent authority will not approve the project unless the EIA, EMP and EMS proposals are all satisfactory.

### ***The World Bank Policy on EMP***

The World Bank's Policy (1999) specifies that an EMP should include:

1. Summary of all potentially significant adverse impacts that are anticipated. This can be taken directly from the EIA report.
2. Full details of each planned mitigation measure, referenced to the anticipated impacts, including any environmental impacts of mitigation measures and linkages to any other relevant plans. This too should be a summary of what is stated in the EIA report, in addition to, where appropriate, design details, equipment descriptions and operating procedures. The measures covered should include all those which, if not undertaken, would lead to impacts greater than those predicted, whether or not the EIA report specifically describes them as mitigation measures.
3. Monitoring and reporting procedures. These should cover both the monitoring of impacts (to detect when particular mitigation measures may be needed) and the monitoring progress of mitigation and its results. Reporting procedures should define in detail what monitoring results will be reported to the competent authorities, when, and in what form.
4. Capacity development, training and responsibilities for mitigation and monitoring. These measures cannot be carried out unless the developer specifies who will carry them out, and provide suitable trained staff.
5. Implementation schedule and cost estimation. This schedule should show how each mitigation is phased and coordinated with overall project implementation plan. It is essential to demonstrate that all mitigation measures proposed have been fully costed by the developer before project approval, and that these costs have been included in the developer's financial appraisal of project viability.
6. Integration of EMP to the project. Many low and middle income countries either make no reference to an EMP, or are fairly vague in their requirements.



### 2.8.2 Environmental Management Systems (EMSs)

Many of the most serious environmental impacts that have resulted from development projects have arisen not because the project was badly designed, nor it was badly implemented, but because it was badly managed in operation (Lee and George, 2000). The impacts during construction and after commissioning may have been no greater than were predicted, but some years later something has gone badly wrong, because the operation was badly managed. The purpose of EMS is to avoid this.

An EMS, at its simplest, consists of no more than a written description of how the operator's normal management procedures prevent significant adverse environmental impacts. Its benefit is that by writing it down, the developer or operator is forced to think about whether or not his normal management procedures really do achieve that aim, and amend them if necessary. To be effective, the EMS needs to be monitored, in the first place by the operator himself. This can be done through regular audits, (known as internal audits), of the implementation of the relevant procedures and of its effectiveness in avoiding significant adverse impacts. These are carried out by staff members independent of the activities being audited. However, to demonstrate to the world outside that the operator's management system really does achieve its aim, some independent external check is needed as well. In part at least, this independent external check can and should come from inspection visits or audits carried out by the relevant environmental authorities. If pollution control and other environmental legislative is comprehensive and is readily enforced, with heavy penalties for non-compliance, it is in the operator's own interest to manage the operation effectively, so as to avoid such penalties (Lee and George, 2000).

As well as defining what a sound EMS should comprise, ISO 14001 makes it possible for operators to obtain independent certification that their EMS do indeed meet the requirement of the standard. The independent external check (in this case a management audit) is then carried out by a nationally or internationally accredited certification body, at the operator's own expense. Many organizations throughout the world are increasingly calling for their suppliers of goods or services to have certification under ISO 14001, whether they are located in high income countries, low or middle income ones.

The basic elements of an EMS under ISO 14001 are:

1. A list of potential impacts.



2. A set of operational procedures for monitoring, controlling and reducing the impacts and recording the results.
3. A procedure for internal audits of the procedures (ISO, 1996).

If monitoring reports are being provided by the developer in accordance with a sound EMP, and if there is close coordination between the competent authorities, a small number of spot check visits by the appropriate authorities should be sufficient. These should be planned to take place at critical points in the construction/implementation programmes when certain key actions and construction impacts can be inspected and when any necessary remedial actions can most readily be taken. A final post implementation visit may also be necessary, to cross check the developer's reports on monitoring of operational impacts.

## **2.9 Environmental Auditing**

As Glasson et al. (1994) put it "one new area of environmental activity that will undoubtedly have a major impact on EIA is environmental auditing". It involves the review and assessment of an existing organization's impacts on the environment. The EC defines environmental audit as "a management tool comprising a system, documented, periodic and objective evaluation of how well organization, management and equipment are performing with the aim of contributing to safeguard the environment by facilitating management control of environmental practices, and assessing compliance with company policies, which would include meeting regulatory requirements and standard applicable" (CEC, 1991).

### **2.9.1 Purpose of Environmental Audit**

The prime purpose of an environmental audit is to make sure that developments take place under terms and conditions imposed by an initial EIA process and its associated development consent or planning approval. A United Nations Economic Commission for Europe (UNECE, 1990) task force concluded that environmental auditing is very effective and necessary for continuing the EIA process into the implementation phase, and serve the following purposes:

1. To monitor compliance with the agreed conditions set out in construction permits and operating licenses.
2. To review predicted EIS for proper management of risks and uncertainties.
3. To modify the activity or develop mitigation measures in case of unpredicted harmful effects on the environment.



4. To determine the accuracy of past impact predictions and the effectiveness of mitigation measures in order to transfer this experience to future activities of the same type, and
5. To review the effectiveness of environmental management for the activity.

### 2.9.2 Types of Environmental Audits

Environmental audits carried out by private firms include acquisition/divestiture audits, which test environmental liabilities that could arise from the purchase or sale of a company; risk audits, which consider safety and occupational health; compliance audits, which test compliance with relevant environmental and safety standards; corporate audits, which consider the workings of the entire organization; and associate audits, which assess subsidiary or supplier companies. The term environmental auditing is currently used in two main ways. Environmental impact auditing; which involves comparing the impacts predicted in the EIS with those that actually occur after implementation, in order to assess whether the impact prediction performs satisfactorily. The audit can be of both impact predictions; (how good were the predictions?) and of mitigation measures/conditions attached to the development; (is mitigation effective? are the conditions being honoured?) (Buckley, 1991).

### 2.9.3 Functions of Environmental Audit

As with financial auditing, reserve auditing, and other similar activities, environmental auditing provides an opportunity to bring fresh minds to bear on environmental compliance at a project site. Auditing provides a mechanism to learn from experience, and to refine project design and implementation procedures. It also provides regulatory agencies with a structure for checking compliance with, and performance of, an EMP. Auditing, in most instances, depends heavily on the existence of relevant and good quality monitoring data.

Environmental auditing is an excellent tool to improve site environmental compliance by providing an outside perspective of site activities and compliance matters. It also helps corporate officers and directors demonstrate diligence in environmental oversight. These functions can only be achieved, however, if problems found during an audit are immediately addressed and reported in accordance with applicable regulations. Thus an audit programme should only be undertaken when there is clear will and means to resolve any problems identified as a result of the programme.

# CHAPTER THREE

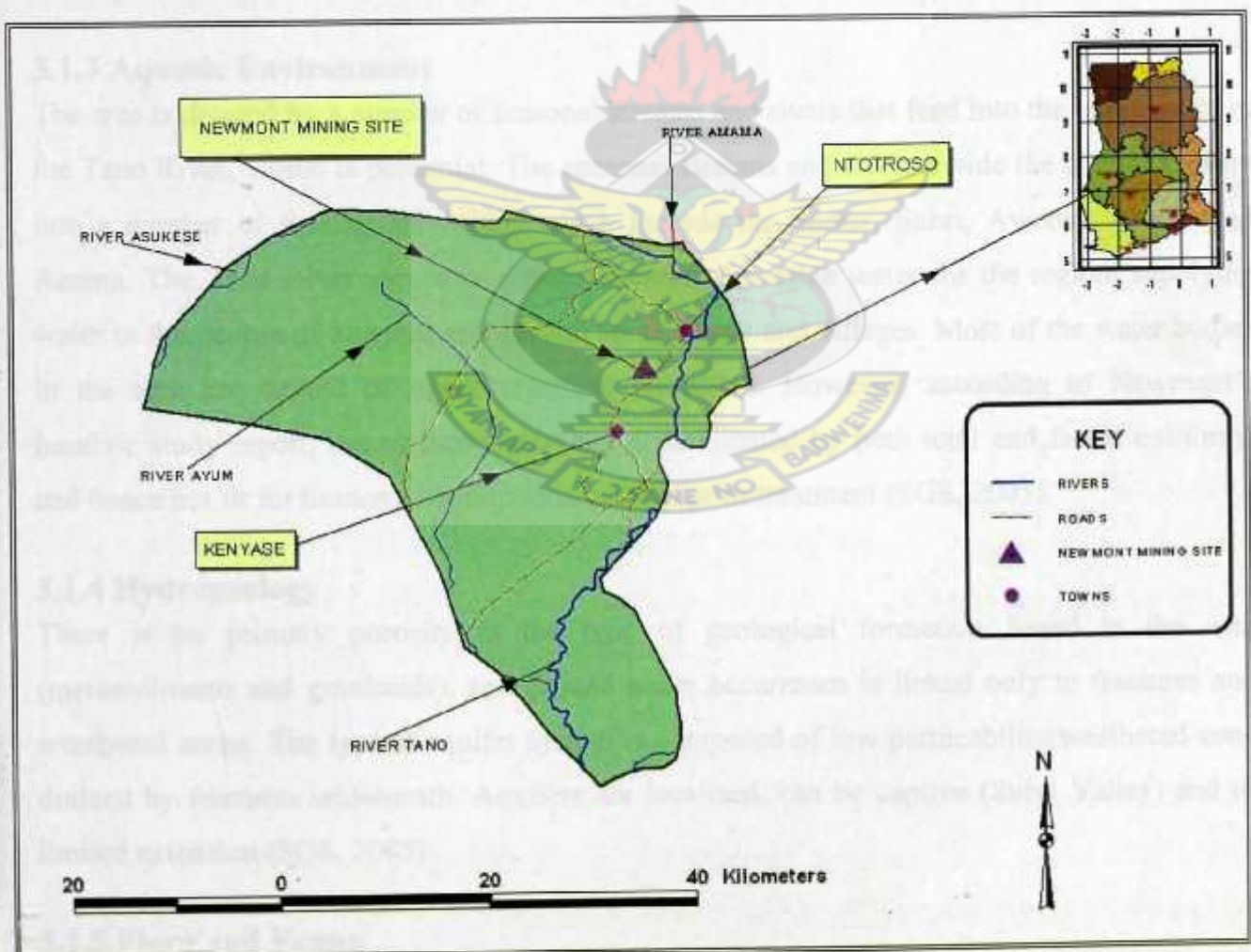
## MATERIALS AND METHODS

### 3.0 The Study Areas

#### 3.1 Newmont Ghana Gold Limited (NGGL) – Ahafo Kenyase

##### 3.1.1 Geographical Location

The project is located within the Asutifi District of the Brong Ahafo Region at Latitude  $7^{\circ} 1' 30''$  North and Longitude  $2^{\circ} 20' 31''$  West, and is about 300km north-west of the capital city, Accra; 107 km north-west of Kumasi and 40 km south east of the regional capital, Sunyani. The project is situated half-way between Kenyase, the district capital and Ntotroso as shown in Appendix 8 and Map 3.1.



Map 3.1. A Map of the Asutifi District showing NGGL Mining Site



### 3.1.2 The Atmospheric Environment

The area falls within the wet semi-equatorial climatic zone of Ghana and it is characterized by an annual double maxima rainfall pattern occurring in the months of May to July and from September to October.

Mean monthly temperature within the area ranges from 23.9°C to 28.4°C. In general, March is the hottest month of the year with a mean temperature of 28.4°C. August is the coolest month with a mean temperature of 24.6°C.

The project area is entirely rural and ambient air quality is good. There are no specific sources of gaseous or particulate emissions except from local and project traffic along the un-tarred roads of the concessions and the area in general. The area is under the influence of the dust-laden Harmattan particularly from December to February.

### 3.1.3 Aquatic Environment

The area is drained by a number of seasonal streams and rivers that feed into the upper basin of the Tano River, which is perennial. The seasonal streams and rivers divide the project area up into a number of smaller sub-basins which include the Suraw, Subri, Awonsu, Ntotro and Amana. The Tano River serves as a major source of potable water for the region; supplying water to the people of Sunyani and several small towns and villages. Most of the water bodies in the area are devoid of major chemical pollutants. However, according to Newmont's baseline study report, the surface-waters are contaminated by both total and faecal coliforms and hence not fit for human consumptions without prior treatment (SGS, 2005).

### 3.1.4 Hydrogeology

There is no primary porosity in the type of geological formation found in the area (metasediments and granitoids), and ground water occurrence is linked only to fractures and weathered zones. The typical aquifer system is composed of low permeability weathered zone drained by fractures underneath. Aquifers are localized, can be captive (Subri Valley) and of limited extension (SGS, 2005).

### 3.1.5 Flora and Fauna

The area lies within the Semi-Deciduous Agro-Ecological zone of Ghana and belongs to the Celtis-Triplochiton Association (Taylor, 1962). Hall and Swaine (1981), however, classified



the area under the Moist Semi-Deciduous Zone Northwest Sub-type. This is characterized by three-story structure with emergent tall trees often exceeding 50 meters in height. The upper canopy consists of a mixture of deciduous and evergreen species; sometimes with gregarious under-storey.

The area is much degraded due to agriculture and logging activities. A total of 302 species comprising tree species, shrubs, herbs, grasses and climbers were identified within the project area. No species of high conservation concern (Black and Gold Star) have been recorded within or without the forest reserve sections as well as the outside reserves. The area is one of the most productive forest areas in Ghana in terms of economic timber species, with Economic Index values as high as 89 having been recorded. Within the project area itself, however, extremely low-to-low Economic Index values of 7.2 – 41.1 have been recorded. There are only a few isolated timber trees of merchantable size worth salvaging within the area (SGS, 2005).

### **3.1.6 Soil**

The Soil Associations identified within the area are the Bekwai, Hwidiem, Kumasi and Birim-Kyekyewere Associations. The soil resources inventory and assessment exercises encountered 19 soil types at soil series level (SGS, 2005).

### **3.1.7 Land Use**

The area occurs within the cocoa-based system of the semi-deciduous forest zone of Ghana. Agricultural land use dominates with the majority of the people depending on farming as the source of livelihood and the principal means of employment. Shifting cultivation is the primary practice. The major agricultural land uses are: cocoa farming, food crop farming, rice farming in inland valleys and bush fallows. The non-agricultural land uses include: human settlements, undeveloped inland valleys with swamp vegetation and tarred roads, feeder roads and tracks.

Major food crops include: maize, cassava, cocoyam and plantain in mixtures. In some of the cocoa growing areas and on the fringes of the forest reserves, plantain cultivation are extensive and associated with cocoa farming with *Black sigatoka* disease seriously affecting plantain production in the area. A study involving interpretation of satellite imagery sheets in conjunction with sample ground proofing by NGGL enabled a detailed estimate to be made of the land use coverage of the mine footprint and surrounding areas. The main land use coverage



is comprised of cocoa plantation (22%), mixed food crops farms (27%), fallow thicket (15%) and elephant grass stand (12.5%) (SGS, 2005).

### **3.1.8 Socio- Economic Environment**

Agricultural production is the main economic activity in the District and is practiced mainly on the subsistence level with a few farmers engaged in plantation agriculture. Agriculture accounts for about 65% of the labour force. In both rural and urban areas of the district, most people cultivate food crops. Manufacturing and processing activities in the District, though practiced on a small scale, represent important economic activities. The agricultural and forest resource base of the District facilitates the establishment of manufacturing and processing industries. Most of the road networks are feeder roads that are in extremely poor condition, especially during the rainy season. As a result, transportation of food crops to the market centers is very difficult and expensive. These conditions coupled with lack of suitable storage and preservation facilities, are a major impediment to increased agricultural production.

Communication services are very restricted. Government post offices and commercial telephone/postal agencies are located at Kenyase and Hwidiem. Health facilities in the District include a hospital and primary healthcare centers, traditional birth attendants, maternal and childcare as well as traditional healers. The major sources of drinking water are pipe borne, boreholes, streams and hand-dug wells. There are 41 kindergartens, 81 primary, 48 junior and four senior secondary schools in the district (SGS, 2005).

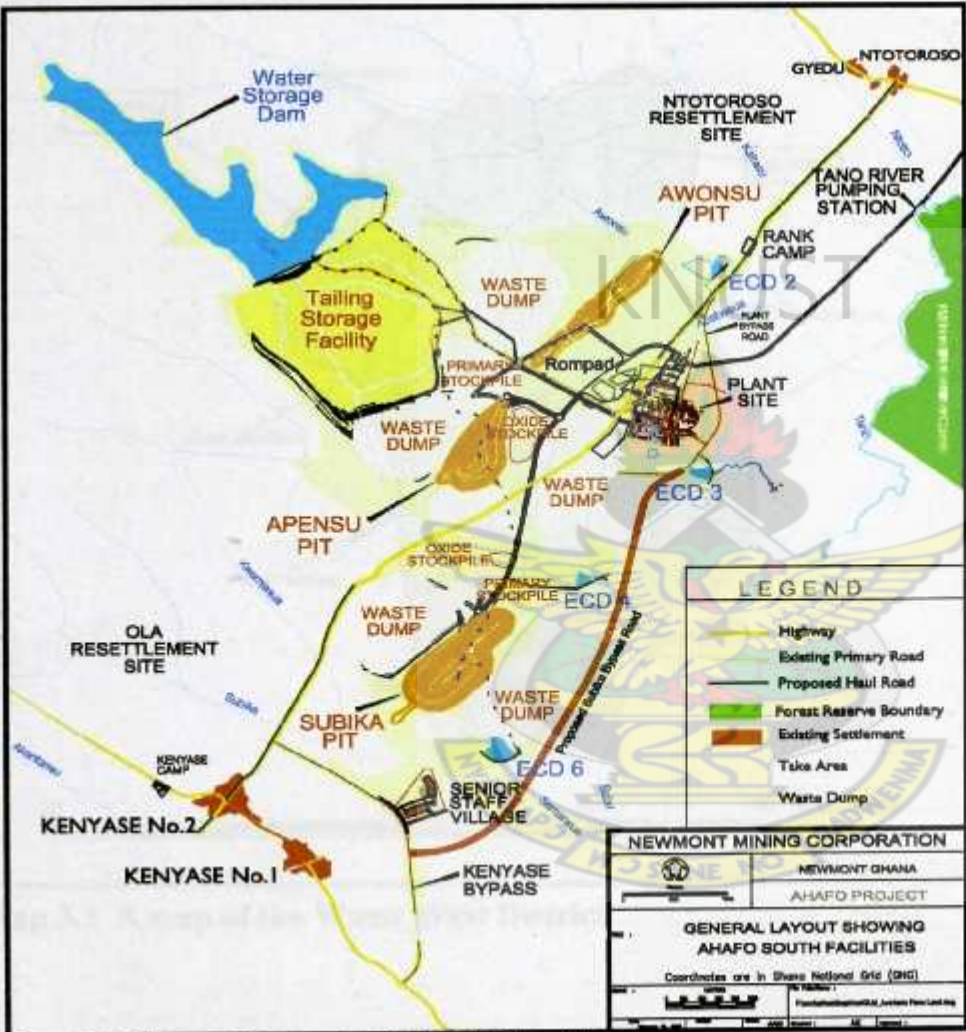
### **3.1.9 Technical Operations (NGGL– Ahafo South)**

The Newmont project at Ahafo (South) comprises facilities and services for mining and processing of approximately 105 million tonnes of ore to be extracted by open-pit mining from four different deposits. The ore is processed in a Carbon In Leach (CIL) process plant at Kenyase with a capacity of 7.5 mega tonnes per annum (Mtpa). The mineable ore resource is estimated at 105 Mt at 2.02 gram per tonne (gpt) containing 6.8 Million ounces (Moz).

The first phase involves the development and mining of four pits and the construction and operation of processing, waste disposal (rock waste and tailings) facilities and associated infrastructure in the southern half of the project area. The mine has been currently planned for 15 years excluding the initial development commissioning period (9 months), and post-mining processing of stockpiled ore (12 months).



The total area required for the project is approximately 2174 ha. Major facilities that have been built for the project include three pits (Awonsu, Subika and Apensu Pits) and associated waste dumps, the treatment plant and associated facilities (28 ha), and the tailings storage facilities (TSF) as illustrated in Map 3.2. In addition, a water storage dam (280 ha) has been created upstream of the facility.



Map 3.2 General Layout of NGGL Facilities

Source: <http://www.newmont.com/en/operations/Ghana/ahafo/index.asp>

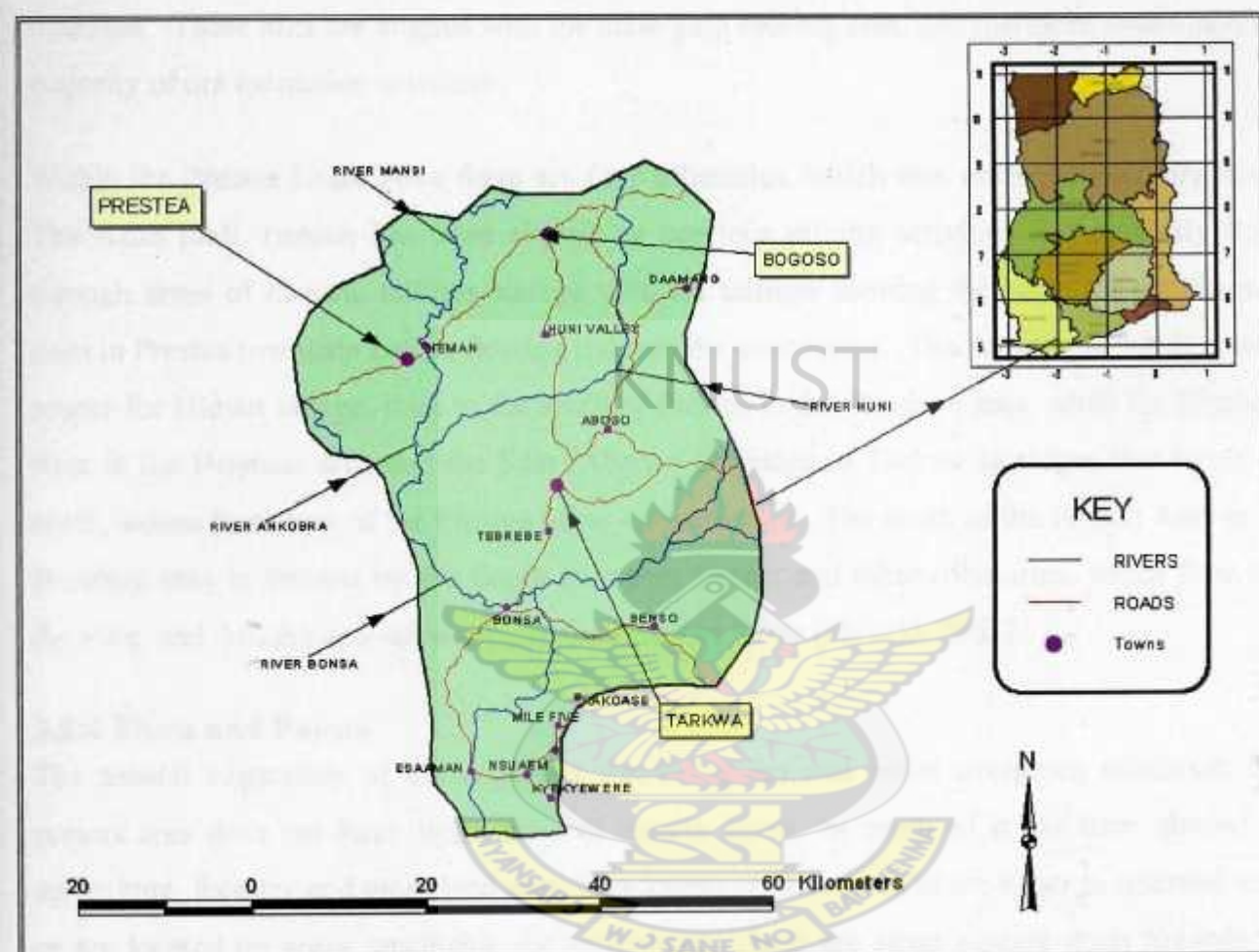
### 3.2 BGL –Prestea

#### 3.2.1 Geographical location

The project is located within Bogoso/Prestea in the Wassa-West District of the Western Region of Ghana, at Latitude 5° 31' North and Longitude -2° 5' West, approximately 200 km west of the capital, Accra, and is accessible by sealed road. It has Takoradi and Tarkwa as its regional



and district capitals respectively. The district covers an area of 2448.5 km<sup>2</sup>. The principal settlement to the project area is Prestea and Heman as well as Bogoso as a nearby town as shown in Appendix 9 and Map 3.3.



**Map 3.3 A map of the Wassa West District**

### 3.2.2 The Atmospheric Environment

The climate of the project area is hot and humid and is characterized by seasonal weather patterns, which involve a double wet season from April to June and October to November, and a main dry season from December to February.

The mean annual temperature is 26°C with daily maximum temperatures reaching 28 to 30°C during the wet season and 31 to 33°C during the dry season. The annual mean humidity is 86%, ranging from 70 to 90%. It is highest in August/September and lowest in January/February. Mean annual rainfall is 1,803.7 mm, ranging from 984 to 2,414 mm.

Calculated pan evaporation is 1,524 mm per annum. The prevailing winds in the area are in the south-west and north-east directions (Piesold, 2002).

### **3.2.3 Aquatic Environment**

The landscape of the area is dominated by a range of hills that run in a northeast-southwest direction. These hills are aligned with the main gold bearing ores, and therefore accommodates majority of ore extraction activities.

Within the Prestea Lease Area there are four tributaries, which also enter the Ankobra River. The Asuo Kofi, (which has been altered by previous mining activities and currently flows through areas of historic tailings storage with the tailings forming the banks of the channel) rises in Prestea township before flowing through the concession. The Asisere, which is a water source for Himan village, rises to the south of Prestea in the Bondaye area, while the Bimbong rises in the Brumasi area and the Subri/Aboabo Drainage in Tarkwaian ridges that forms the north eastern boundary of the Prestea Mine infrastructure. The south of the Project Area in the Bondaye area is drained by the South Kurapem stream and other tributaries, which flow into the Fure, and Ankasa and subsequently the Ankobra River (Piesold, 2002).

### **3.2.4 Flora and Fauna**

The natural vegetation of the region is wet evergreen and moist evergreen rainforest. The project area does not have large areas of mature forest, as much of it has been cleared for agriculture, forestry and other land uses. The fragments that do exist are either in reserved areas or are located on areas unsuitable for agriculture. These are steep sloping areas towards the southern and to lesser extent northern borders of the Prestea and Bogoso leases respectively. The degraded nature of the original ecology has resulted in a patchy and fragmentary mosaic of habitats across the Project area.

With regards to the fauna, most species of interest are associated with the areas of forest refuge, including areas of closed canopy that have a sparse ground flora and areas of more broken canopy with a dense undergrowth and ground flora (Piesold, 2002).

### **3.2.5 Soils**

Soils within the Project area are broadly described as ferrasols with Dystric Gleysols based on FAO/UNESCO soil classification system as described by Piesold (2002). These are common



along streams within the area and the Ankobra River. The ferrasols are weathered soils with strong acidity and very low base saturation. The soils have a weak blocky structure, and breaks down into fine crumbly aggregates when they come under stress. Their generally fine structure enhances root penetration and good moisture retention, however, the high rainfall regime of the area promotes leaching, such that soil nutrients e.g. nitrates and phosphates are easily leached out. The forest thicket and secondary vegetation are the main sources of organic matter enrichment for these soils. When these are cleared, the rate of decomposition of the organic reserves in the soil becomes faster than the rate of replenishment. These factors interplay to lower the fertility of the soils (Piesold, 2002).

### **3.2.6 Land Use**

The principal land uses in the project area are mining, agriculture and forestry. Mining occurs both as a large scale and small scale operation. Forestry activities usually include plantation crops such as rubber and timber species, which provide raw materials such as latex for the rubber industry and timber for wood processing. With respect to food production, the area supports several cash crops such as cocoa, oil and coconut palm and staple crops such as plantain, cassava, cocoyam and cereals. The area also supports horticultural crops including citrus, tomatoes and banana, which are produced for domestic use.

### **3.2.7 Socio- Economic Environment**

The population in the area is predominantly rural, although Bogoso and Prestea are well known with the mining of gold. The local population is dominated by Wassa people who inhabited Prestea area prior to mining. Many other ethnic groups (e.g. Frafras, Dagates, Dagombas, Ewes, Gas etc.) are also represented in the townships, villages and hamlets. Inheritance is matrilineal, but positions of authority are almost exclusively a male preserve.

Most of the scattered settlements within the mineral concession are occupied by migrant seekers. While some inhabitants obtained the land on which they subsist from the local chiefs through customary procedures under various tenancy agreements, others are by outright purchase. The main religions in the area are Christianity and Islam.

All the major settlements are supplied with potable water from bore-holes, although streams are used for washing and in some instances to supplement water supply. Electrical power is present in all these communities and provided through the national power grid (Piesold, 2002).



The main sources of employment are mining (including small-scale), subsistence farming and small-scale business activities. The major commercial mining companies are BGL, Prestea Sankofa Gold (PSG) and New Century Mine (NCM).

The key civil administration body in Prestea is the Urban Council, which has the responsibility of providing basic services to the community and whose principal source of income are royalties from mining companies in the Wassa West District and a common fund administered by the District Chief Executive. Administration on the traditional level for the project area falls under the chief of Himan.

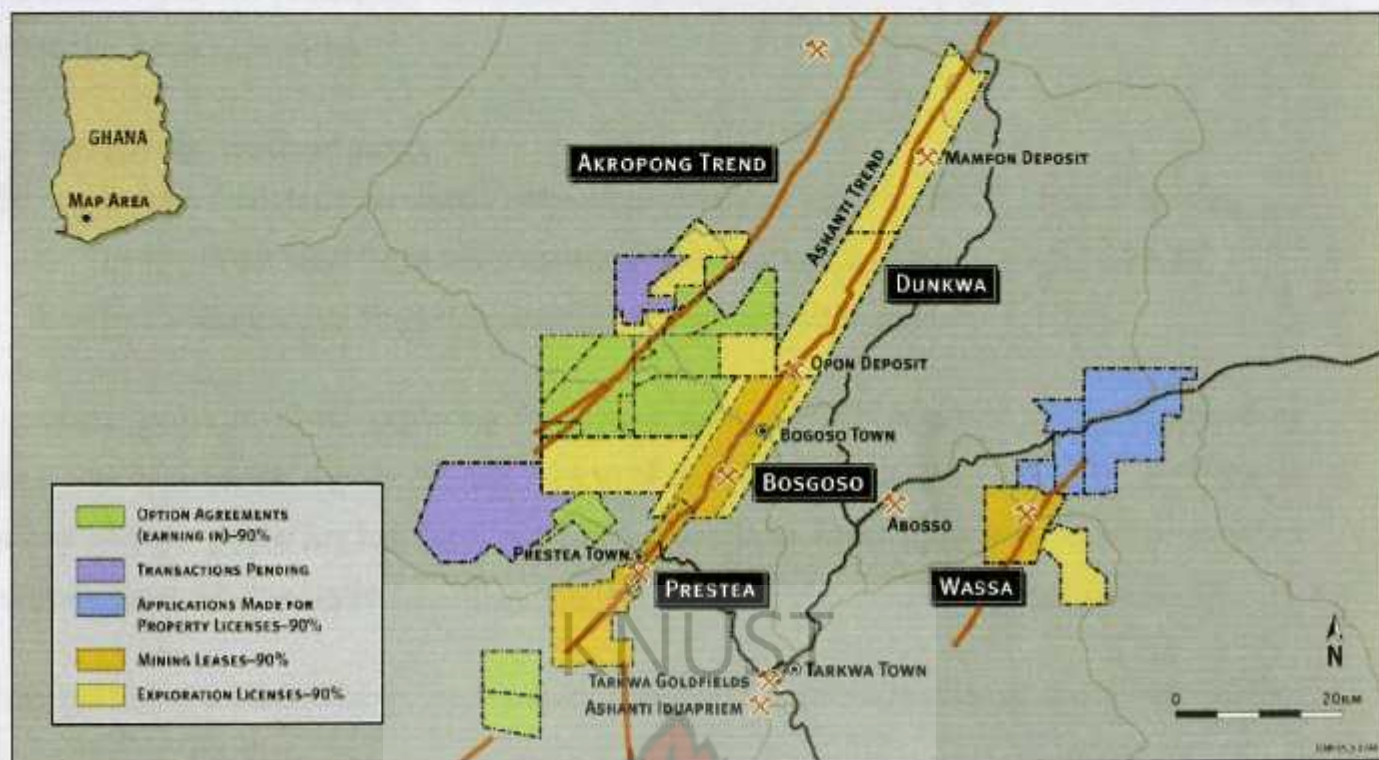
### 3.2.8 Geology

Bogoso/Prestea lies within the Eburnean Tectonic Province in the West African Precambrian Shield. The palaeo-proterozoic rocks that comprise most of the West African craton and host the major gold mineralization in Ghana are subdivided into meta-sedimentary and volcanic rocks of the Tarkwaian and Birimian sequence (Kesse, 1985). The area is dominated by a major northeast-southwest trending structural fault zone referred to as the Ashanti Trend, which hosts the Prestea, Bogoso, Obuasi and Konongo gold deposits, among others. Parallel to the Ashanti Trend is the Akropong trend, which hosts the Ayanfuri deposit. The Akropong Trend is about 15 km west of the Ashanti Trend in the Bogoso region, and gradually converges with it, coalescing at Obuasi and forming the basis for the world class Obuasi deposit, owned and operated by AngloGold Ashanti Ltd.

### 3.2.9 BGL Concession Areas

The Bogoso concession passes through the central part of the Bogoso mine for its entire 18.5 km concession length, while the Prestea one covers a 22 km stretch of the Ashanti Trend located immediately south of the Bogoso concession as shown in Map 3.4. The total concession area is **224** square kilometers.





**Map 3.4 A Map Showing BGL Concession Areas**

Source: <http://www.gsr.com/map2004071901.gif>

### 3.2.10 Technical Operations (BGL – Prestea)

The whole project of BGL's mining activities in Prestea involves the surface mining of a 5.1 metric tonnes of gold reserve identified at the Plant North Site, which is located south of BGL's former activities in the Prestea Township. The project has a four year life span with an average mining rate of 1.7mtpa, producing 135,000 ounces of gold annually. The principal components of the project, which was new to the former BGL operation and were examined by the EIA included:

1. Creation of one open pit- The Plant-North Pit, which comprise two sections: North Shaft and Main Plant.
2. Construction of an ore stockpile to the north of the pit.
3. Restoration of the Asuo Kofi valley using waste rock.
4. Temporary storage of waste in a stockpile in the northern end of Asuo Kofi valley.
5. Ore haulage from the pit to Bogoso mine site.
6. Relocation of shell filling station, the police station, post office, labour office, and access routes in close vicinity of the proposed pit and the central shaft complex.
7. Construction of new Tailings Storage Facility (TSF II) at the previous Bogoso mine site to accommodate tails.



The Plant North Site principally comprises the pit and waste rock storage areas which is located within the Asuo Kofi valley.

### 3.3 Research Methodology

The research methodology involved comprehensive and systematic review of the following:

3. The Environmental Impact Statement on NGGL's mining project at Ahafo South.
4. The Environmental Impact Statement on BGL's mining project at Prestea.

Literature search involved exploring for various methods of EIA procedures as practiced by some countries around the world and review of the EIA procedures as practiced in Ghana as well as how the public are involved in the EIA procedures. Much emphasis was also placed on environmental monitoring and auditing, not leaving out environmental management plans.

Data collection included interviews, public meetings and administration of questionnaires (see Appendices 4 and 5).

Review of the EIS of the two companies was done for the following purposes:

1. To evaluate the extent to which EIA influenced the implementation of both projects and identify how the public were involved.
2. To identify the proposed impacts from the project (both positive and negative).
3. To identify the mitigation measure(s) for each predicted impact.

An interview was conducted at the EPA Headquarters in Accra on Thursday April 6<sup>th</sup>, 2006. A two-day trip was made to Prestea on Thursday 20<sup>th</sup> and Friday 21<sup>st</sup> April, 2006. Some days were also spent in Kenyase and its communities. Questionnaires were administered in Prestea (in the form of personal interviews) on randomly selected individuals whereas group meetings were held with the communities in Kenyase. In all 30 individuals were interviewed at Prestea whereas community meetings were held with four communities that are very close to the mining area (Kenyase No. 2, Ntotroso, Hwidiem and Dokyikrom).

The motives behind the interviews were to identify:

1. How the local communities were involved in the entire EIA procedure before the commencement of the projects.



3. The direct impacts they are experiencing from the implementation of the projects (positives and negatives).
4. Whether the impacts they are currently experiencing are the same as what were predicted in the EIS (both positive and negative impacts).
5. How these impacts are affecting their daily living.
6. How the issue of resettlement was considered and addressed in both projects.
7. The differences between the predicted and the manifested impacts from the projects.
8. Whether they are aware of any formal procedure(s) they are to follow to present their grievances or seek redress as a result of non compliance of EIA decisions by mining companies, and
9. From their opinion, the best form of development undertaking that will ensure their survival, welfare, employment and income generation.



# CHAPTER FOUR

## RESULTS

**Table 4.1 Technical Details about the Two Mining Projects**

	BGL	NGGL
Method of mining	Surface	Surface
No. of Pits	1	4
Existing old mining facilities before current mining	Present	Absent
Life span	4 years	15 years
Quantity of estimated Gold (metric tonnes)	5.1	105
Tonnes Produced per annum (metric tonnes)	1.7	7.5
Resettlement of community members	Not discussed during EIA study	Took the major part of EIA Study
Distance from pit to Township	0.35 kilometers	1.7 kilometers
Total land area required	520 hectares	2,174 hectares
Need for crop and Building moratorium	Not needed	Needed
Number of facilities resettled/relocated	Police station, post office, Shell fuel station, labour office	450 houses at Ntotroso and Kenyase resettlement sites
Time taken for the CPP	1 year	2 years, 6 months

Source: EIS on BGL and NGGL Projects.

### 4.1 Consultation and Public Participation at Kenyase

**4.1.1 Community Outreach Programmes.** NGGL established a Community Relations and Development Department (CRDD) which organized community outreach programmes, setting strategy and coordinating the outreach activities of other resettlement team members. The CRDD were tasked to carry messages and other support initiatives of other groups within the company. The company also set up a Resettlement Team that engaged with the community on a daily basis, consulting on a broad range of issues with local leadership – traditional and political – as well as the general population.

In addition, the company established a thirteen-member Opportunity Industrialization Center International (OICI) team that played the role of socio-economic surveyors and community development planners; serving as an important intermediary between the company and the



community. The company likewise retained Stratcom, an Accra based communications and public relations firm to lead complementary communication/stakeholder engagement exercises. Stratcom placed a team of communications experts at the project site who organized regular workshops and seminars for stakeholders to introduce the company and the project, explaining the likely socio-economic impacts and mitigation measures (SGS, 2005).

To assist in formal negotiations, NGGL in consultation with the affected communities and other stakeholders undertook the following:

1. Designation of Mr. Ernest Owusu Poku, a former Inspector General of Police, a highly respected citizen of the district, as chair of the Resettlement Negotiation Committee (RNC).
2. Identification of Company Negotiating Team, comprising a Resettlement Manager, Community Relations Manager, Community Relations Site Supervisor and Resettlement Site Supervisor (all being NGGL employees); and Consulting Resettlement Project Manager (Planning Alliance).
3. Discussion of the project, including all anticipated impacts, with a broad cross-section of stakeholder groups.
4. Identification and capacity building of Affected Peoples' Representatives of landholders, caretakers and traditional leaders affected by the project.
5. Notification of relevant traditional leaders, political leaders, government agencies and non-governmental organizations with a potential interest in the project, and invitation to participate as observers at the RNC meetings.

**4.1.2 Major Issues Discussed at the Meetings:** Some of the major issues raised during the company's early consultative meetings with the local communities in Kenyase included:

1. Resettlement programme including: process, timeliness, compensation modality and livelihood restoration.
2. Crop compensation procedures and rates.
3. Formation of Resettlement Negotiation Committee (RNC).
4. Local employment policy, local contracts and community health (SGS, 2005).

**4.1.3 The Site Selection Committee (SSC).** The RNC established a subcommittee – the Site Selection Committee. The four main assignments given to the SSC were as follows:



1. Selection of sites for resettlement villages and review of planning and engineering.
2. Review of resettlement house design and plot layouts.
3. Determination of eligibility for relocation, both the definition of an overall policy and review of household applicants.
4. Management of speculative activities.
5. Discussion of many aspects of the resettlement package (SGS, 2005).

#### **4.1.4 Main Results of the SSC.** The major results of the SSC meetings included:

1. Creation of a collaborative relationship between the representatives of impacted/households, traditional leaders and the company.
2. Establishment of a crop and building moratorium in the project impacted area.
3. Definition of crop compensation rates to be used in the calculation of compensation for all loss of crops by the project.
4. Establishment of a relocation package (SGS, 2005).

#### **4.1.5 Compensation for Impacted Persons.** NGGL, in consultation with the RNC identified the following as the means for compensating impacted persons:

1. Identification of project impacts that physically or economically affect households or communities as a result of relocation.
2. Designation and negotiating means to mitigate identified impacts, such that affected persons, households and communities are better off than or equal to before project impact (SGS, 2005).

### **4.2 Consultation and Public Participation in Prestea**

The EPA organized public hearing on the BGL's operations at Prestea on 28<sup>th</sup> May, 2002 at Prestea, while a reconnaissance visit was made to the area on 22<sup>nd</sup> August, 2002 by the EPA after the public hearing. The participants included representatives from the following areas:

Ghana Telecom, Ghana Water Company, Minerals Commission, Ministry of Mines, Mines Department, Ghana Highway Authority, Ghana Railway Corporation, Ghana Education Service, Ghana Police Service (Tarkwa and Prestea), Ghana Post, Volta River Authority, GPRTU, Water Resources Commission, Shell Ghana, Prestea Gold Resources, Prestea Sankofa Gold, State Gold Mining Corporation, Prestea Goldfields, District Labour Office, District



Town and Country Planning, Tarkwa, Urban Council, Prestea Senior Secondary School, International School. Others included the Chiefs and Leaders of the affected areas, Himan and Prestea Student's Union, Political Parties (NPP and NDC), Religious Groups (Christian, Islamic and Traditional), Heads of major ethnic groups (Piesold, 2002).

The study indicated that the community was not in agreement to opening the surface mining. Consequently, the reconnaissance visit was made to the area on 22<sup>nd</sup> August, 2002 by the EPA after the public hearing. BGL then organized consultative meetings with the various groups and organizations in the Prestea community from the 2<sup>nd</sup> - 21<sup>st</sup> September, 2002.

Key issues raised during the consultative meetings included:

1. Employment opportunities.
2. Financial assistance for community services.
3. Confirmation of the closure of the underground operations and its relationship to the proposed surface mining operations.
4. The location of the Plant North Pit with respect to the Prestea Township.
5. Mining plans for the future after the Plant North Pit is completed.
6. Control of dust and noise by the project (Piesold, 2005).

### **4.3 Predicted Impacts and their Proposed Mitigation Measures at both Project Areas**

Details of the above subject can be seen in Appendices 6 and 7.

### **4.4 Resettlement of communities**

It was revealed from this study by the respondents that resettlement of the entire Prestea community was not mentioned at the public hearing. Some facilities which were cited within 150 meters from the pit were to be relocated. These were: The Police Station, Post Office, Shell Filling Station and Labour Office, all of which have been relocated. The issue of resettlement took major part of the discussions during the Consultation and Public Participation at the Kenyase communities. All the communities that were situated within the company's concession boundary were made to be resettled at the Kenyase and Ntotroso resettlement sites. All such communities have since been resettled. The company, in addition to resettling the people, has created a 500-meter buffer zone of which no activity is to be carried out.



What could become a resettlement problem in the near future in Kenya is that some communities which were not within the company's concession boundary were anticipating resettlement and so invested in speculative buildings and are now agitating for resettlement.

## 4.5 The Proposed Monitoring Plans

**4.5.1 NGGL:** The monitoring programmes that were designed to evaluate potential impacts that could result from the development of the project included:

1. Meteorological data collection.
2. Hydrological data collection.
3. Monitoring of ground water levels.
4. Monitoring of surface water quality.
5. Monitoring of groundwater quality.
6. Dust monitoring using PM 10 Air Monitor (Plate 4.1).
7. Noise and vibration monitoring.
8. Monitoring of the ecological environment.
9. Erosion and sediment control through the provision of Environmental Control Dams (ECD) (Plate 4.2) and other measures.
10. Monitoring of socio-economic conditions.



**Plate 4.1** PM 10 Air Monitor at a Village near NGGL Project area



**Plate 4.2** An ECD to control sediment at NGGL project area

**4.5.2 BGL:** This is how the entire operations of the company were proposed to be monitored:

1. Potable water quality monitoring within boreholes in the affected communities.



2. Surface water monitoring at the locations established during baseline data collection, upstream and downstream of the proposed Plant-North Site.
3. Establishment of surface water quality monitoring of water accumulating in the pit, to assess lime dosing requirements and ensure levels meet or are below the EPA criteria before discharge to stream.
4. Installation of surface water monitoring stations and ground water observation boreholes in the vicinity of the new TSF II to monitor for potential seepage.
5. Monitoring of gases and suspended particles in active mining areas.
6. Establishment of dust deposition monitoring at sensitive receptors, e.g. VRA substations and residential areas closest to the proposed workings.
7. Selective monitoring of trace elements within ore deposits.
8. Maintenance of noise monitoring programme during construction and operation of the Plant-North Pit (PNP).
9. Establishment of an operational blast monitoring regime.
10. Reporting through monthly internal environmental reports which summarize the environmental monitoring programme data for previous month to the EPA.

#### **4.6 Adverse Impacts Affecting People in the Prestea Community**

Some respondents cited the following as negative impacts they are experiencing as a result of mining activities in the Prestea community:

1. Pollution and destruction of water bodies through cyanide spills. The people alleged that a BGL tailings dam spilled cyanide into River Ankobra (Plate 4.5) in October 2004. The River provides drinking water and fish to the Prestea community. As a result, the people now fetch water from bore-holes (Plate 4.6).
2. Excessive noise, dust, and property damage resulting from blasting activities (Plate 4.7).
3. Reduction of crop yields resulting from sulphur dioxide emissions. This could, however, not be verified scientifically by this study.
4. The proximity of the mine to some bungalows and the government hospital at Prestea as shown in Plates 4.3 and 4.4 respectively.



**Plate 4.3 Waste rock dump near a Bungalow at Prestea**



**Plate 4.4 The Plant-North Pit near the Government Hospital at Prestea**



**Plate 4.5 The Ankobra River at Prestea**



**Plate 4.6 People Drawing Water from a Bore-hole at Prestea**



**Plate 4.7 A Damage to the Prestea Government Hospital from intense blasting activities of the mine**



These negative impacts were said to be very seriously affecting their health, water supply, farm produce and general daily living.

#### 4.7 Causes of Conflict at Prestea

All the 30 people interviewed at Prestea admitted that there was a conflict between the community and BGL and further gave four major reasons (provided in Table 4.2) as being the immediate causes of the conflict.

**Table 4.2 Immediate causes of the Prestea conflict according to respondents**

Reasons given	No. of respondents	Percentage (%)
Due to BGL's refusal to employ people from the Prestea community	4	13
Due to the negative effects of the mining activities	11	37
Because we demand resettlement	7	24
Because community concerns were not taken into consideration at public hearing	5	16
No idea about the causes	3	10
Total	30	100

#### 4.8 Potential Causes of Future Conflict in Kenyase

There is no conflict in Kenyase between the community and NGGL. However, the following fears expressed by communities at Kenyase were found to have the potential of generating future conflict:

1. Community members dread of the potency of cyanide and other chemicals used in mining.
2. The community members additionally fear that the quality of water in the Tano River may be affected by the mining activities.
3. The communities further perceive that blasting can pollute the rain water.
4. Some communities perceive that water is continually being pumped out of the Tano River by NGGL.

Other factors that might generate future conflict include some community reactions that NGGL is not employing people from the local communities as well as pressure from some owners of speculative buildings demanding compulsory resettlement.

#### **4.9 EIA Compliance Monitoring in the EIA System in Ghana**

It was revealed from the study that there is no clear provision for EIA compliance monitoring or supervisory monitoring by the EPA in the EIS system in Ghana. However, it is a requirement that, details of the future monitoring programme is included in the EIS by the proponent. The proponent does the monitoring and submits the results in the form of monthly and annual environmental reports to the EPA.

Each of the two companies has set up an environmental department tasked with the responsibility of conducting its own monitoring to ensure compliance with relevant standards. Monitoring cost is borne by the proponent.

The potential positive impacts proposed from the two projects comprise the following:

1. Provision of direct revenue for the entire nation.
2. Indirect wealth generation and revenue to the local communities.
3. Employment opportunities.
4. Relocation of community buildings (Prestea).
5. Resettlement of communities within the NGGL mining area as shown in Plate 4.8.
6. Provision of potable water to the affected communities by NGGL as shown in Plate 4.9.



**Plate 4.8 The Ntotroso Resettlement Village built by NGGL**



**Plate 4.9 Supply of Potable Water to an Affected Community by NGGL**



## **CHAPTER FIVE**

### **DISCUSSIONS**

#### **5.1 The Development of EIA in Ghana**

Ghana has a comprehensive EIA system which is clearly defined legally and with guidelines available to back proponents in implementing the EIA system in their undertakings. This development of the legal basis of EIA system has, however, been a gradual process as EIA was initially an administrative requirement in 1989. The EIA law came into effect on 30<sup>th</sup> December, 1994 by the EPA Act, (EPA, 1996).

The enactment of this law gave birth to the EPA and marked an important landmark in the system of EIA in Ghana as the law - Section 2(i) - mandates the EPA to ensure compliance with any laid down EIA procedures in the planning and execution of development projects, including compliance in respect of existing projects. Furthermore, Section 12 Subsection 1 empowers the Agency to request for EIA of all development projects as it states "the Agency may by notice in writing require any person responsible for any undertaking which in the opinion of the Agency has or is likely to have adverse effect on the environment to submit to the Agency in respect of the undertaking an EIA containing such information within such period as shall be specified in the notice". The EPA published Ghana's EIA procedures in June 1995 which was followed in 1996 by a Guide that provides detailed explanation on screening and scoping as well as effective management of EIA. EIA was finally formalized in Ghana in June 1999 by the implementation of the Environmental Assessment Regulations 1999 (LI 1652). The requirements concerning the contents and formats of the reports of EIA, both preliminary environmental assessment and EIS have been defined by this regulation.

#### **5.2 Consultation and Public Participation**

It is a requirement for all proponents to consult the public, particularly, the interested and affected parties at the initial stages of the scoping, and preparation of the Terms of Reference. The public has, therefore, got the formal channel to participate in the EIA process during the scoping exercise through public consultation and participation. Chapter 3.3 of the EIA Procedures Manual (1995) commands a proponent to consult interested and affected parties in



the preparation of the EIS whiles Regulation 16(1) of the Environmental Assessment Regulation, 1999 further demands the EPA to publish a 21 day public notice of the EIS in the mass media and at appropriate places. This exercise thus, provides a forum for the proponent to inform the entire community and the general public of the outcome of the environmental assessment and also offers an opportunity for them to express their opinions and offer suggestions. It will therefore imply that all the interested and affected parties have been fully consulted on all matters concerning the development of the project.

### **5.2.1 Consultation and Public Participation at Kenyase and Prestea**

There were high levels of consultation and public participation in the initial and subsequent stages in the EIA processes of both projects. For instance, in the case of NGGL project, formal consultation relating to the issue of resettlement begun in February 2004 and by August 6<sup>th</sup> of that same year, a total of 14 formal consultative meetings had taken place and it took about two and a half years to complete the whole EIA procedure (SGS, 2005). BGL on the other hand, conducted public fora from the 2<sup>nd</sup> to 21<sup>st</sup> of September, 2002 in addition to the main public hearing held from the 28<sup>th</sup> May, 2002, the period for the EIA procedure was less than a year (Piesold, 2002).

#### ***(a) Kenyase Community***

The early consultation in Kenyase created awareness among the local communities that enabled them to express their opinions and offered suggestions at the initial stages. The concerns of the local communities which were mainly about resettlement and compensation packages were taken into consideration at the final decision-making stage. All the communities who were affected by the project were resettled at the OLA and Ntotroso Resettlement Sites (Plate 4.8). All the compensations were also paid to the deserving owners of properties within the area before the Company received the approval to operate. This allowed the communities to welcome the commencement of the project.

The CPP at the Kenyase communities took a relatively longer period owing to the fact that the project covered a comparatively very large area. In addition, the area is a Greenfield mining community that needed a lot of education about mining activities unlike Prestea which has witnessed mining activities since time immemorial. Furthermore, there were more resettlement and compensation packages issues in Kenyase, which requires more time for consultation.



### ***(b) Prestea Community***

On the contrary, at Prestea, the communities claimed that their disagreement of opening the surface mining due to its perceived negative impacts was ignored at the final decision-making stage. They further asserted that BGL was not employing people within the local community as did the previous underground mining companies. These problems coupled with the failure of the EIA Procedures to provide an effective means through which an aggrieved community can appeal against non-compliance with EIA decisions, so as to prevent conflict occurrences, as well as lack of clear comprehensive provision for supervisory monitoring programme in the EIS system in Ghana have immensely contributed to the conflict. Thus, despite the high level of CPP at Prestea, the EIA could not serve as a means of conflict prevention.

### **5.3 Final Decision on Consultation and Public Participation before Project Approval**

This study has revealed that the final decision as to implement a project, or otherwise, in Ghana, after the CPP is left to the EPA. This makes the whole process of CPP incomplete despite the high level of CPP at the initial and subsequent stages in the EIA process, since there is no involvement of the public at the final decision-making point. It implies that the final control of the entire EIA process is firmly held by the government of the day (The EPA) and as such the EIA can be seen as a tool for governmental decision-making rather than as an issue of community resolution. For instance, the affected communities in Prestea claim they did not agree with the decision to open the surface mining of BGL at the public hearing based on the perceived impacts they realized from the project. The EIS was, however, accepted and the company was given the approval to operate. The misunderstanding here has been a major factor that has contributed to the conflict between the company and the community. A statement issued by Wassa Association of Communities Affected by Mining (WACAM) on the 2<sup>nd</sup> November, 2005 attributed the source of the conflict in Prestea to this fact as it states in paragraph five "The problems between the Prestea, Himan and BGL have resulted from the fact that EPA ignored the concerns the communities raised against the mining operations of BGL at Prestea at the very onset of the project". It continues to add "the conflict that had resulted has been very expensive to the company, the communities and the nation" ([.minesandcommunities.org/Action/press787.htm](http://minesandcommunities.org/Action/press787.htm) [December 15th, 2005]).



This implies that the mix up of the technical, consultative and authoritative elements was at variance with that in decision-making, hence the conflict. This is in support of what was explained by Lee and George (2000) that if the mix of the three elements - technical, consultative and ultimate authority - in the EIA process is at variance with the mix in decision-making, conflicts may occur and opposition to the EIA process will intensify, rendering it ineffective.

Hence, ignoring public concerns at the decision-making stage, which normally results from the dictatorial approach as seen in the Ghanaian EIA system, has got the strong potential to sham the entire EIA procedure which will be akin to the era when there were no EIAs prior to the approval of projects. Such instances will definitely lead to conflicts and problems for project implementation, acceptability and sustainability.

#### **5.4 Challenging EIA Decisions**

The procedure for appealing against EIA decisions is clearly stated in the Environmental Assessment Regulation, 1999. This is analogous to the U.K. EIA system where a third party may challenge EIA decisions on the grounds that no EIA was prepared when it should have been, or that the competent authority did not adequately consider the relevant environmental information (Glasson et al. 1994). The only difference is that whereas the procedure is through judicial review proceedings in the U.K. High Courts, that in Ghana is through the Minister responsible for the Environment, implying once again that, an appeal for challenging EIA decisions is controlled by the government.

#### **5.5 EIA Compliance Monitoring and Follow-up Programme**

There is no provision of comprehensive programme for EIA compliance monitoring and follow-up or supervisory monitoring by the EPA in the EIA system in Ghana. This is in contrast to the EIA systems in some countries like Taiwan, where Leu et al. (1997) report that the Taiwanese EPA plays the leading role in the compliance monitoring and follow-up programme. This lack of supervisory monitoring renders the entire EIA system in Ghana incomplete considering, again, the statement by Lee and George (2000) that "after a decision has been taken to proceed with a project, the EIA process should continue on into the implementation stage, beyond into actual operation, and ultimately into decommissioning or



next planning or policy-making cycle". It is only through supervisory monitoring that one would be able to effect the above statement.

The only place in the EIA legislation of the Ghanaian EIA system that makes mention of the phrase 'ensuring compliance' is Section 15(2) of Act 490, where it is stated that "an inspector or any person appointed by the Board may at any reasonable time enter any premises for the purpose of ensuring compliance with this or any other law pertaining to the protection of the environment and shall, if required to do so by the person in charge of the premises, produce his authority to the person". This law, therefore, allows representatives from the Mines Inspectorate to visit the mines from time to time, and these visits coupled with the monthly and annual reports submitted by the proponents are used to determine environmental compliance.

In my opinion, however, these inspections and reports are not adequate for environmental compliance determination. What should be done instead is that the EPA should set up its own laboratory, the staff of which should include trained representatives from the affected areas, to conduct their own monitoring to verify the authenticity of those reports they receive from the companies as it is being practiced in Taiwan (Leu et al. 1997). The EPA can also create project monitoring committees that would involve NGO's and private sector representatives and other relevant stakeholders in the compliance-monitoring programmes as suggested by Lee and George (2000). The results of all such monitoring programmes should be made public so as to generate confidence in the entire programme.

Thus, the statement in Section 15(2) of the EPA Act, (Act 490) is too weak to achieve its objective. This is because the word "Inspection" is different from the word "Monitoring". An inspector will only see the effects with the physical eyes, apart from being told of the results by an analyst who may cook the results as the company demands; while someone conducting monitoring will take the samples and analyze them by himself to see actual results and determine the real effects.

The entire proposed monitoring programmes by the companies were observed to be ongoing. For instance, Newmont's Environmental Department is divided into three sections – monitoring, compliance and reclamation with each section performing its own functions. The monitoring section is in charge of monitoring all the activities of the company by taking daily,



weekly as well as monthly samples, testing and analyzing them at the environmental laboratory. Some of the samples are also taken to the SGS laboratory in Accra for analyses.

The results from these laboratories are sent to the compliance section which then assesses whether the results- meet ISO 14001, EPA and Newmont standards. The company has set a higher standard than that of the EPA and ISO 14001. For instance, the EPA standard for Total Suspended Solids (TSS) is 100 milligrams per liter while that of Newmont is 50 milligrams per liter (NGGL, 2006 May).

Although Newmont does not include the local authority and local community in its monitoring programme as proposed by Lee and George (2000) it has allowed herself to be both monitored and audited by Geomatrix Consultant Inc (GCI), an internationally recognized institution, so as to demonstrate to the outside world that the operations of the company do really meet the ISO standard. The institution conducts its own sampling from all the sampling locations of the company and distributes the samples at different laboratories for the appropriate tests to be conducted.

The inclusion of such internationally certified institutions far outweighs the situation of including the local authority and local community in monitoring, since the former have the required experience and skill in performing the activities well. What could be done to help the latter will be creating the awareness among them that such institutions who care for their (local community) welfare and survival is at work in conducting the monitoring activities. Furthermore, the results of such monitoring programmes should be presented to the local community and the public at large for them to have confidence that their lives are not in endangered.

However, it would still be better for the companies to involve representatives from the affected communities (who would be selected by the communities themselves) and the local district assembly in their day to day monitoring activities in addition to those conducted by the external auditors. This will generate confidence in the communities about the activities of the companies.



## **5.6 Formal Procedure for Seeking Redress as a Result of Non-Compliance with EIA Decisions**

The formal procedure through which an affected community can present her grievances or seek redress as a result of 'non-compliance' with EIA decisions is not stated anywhere in the Ghana EIA legislations. However, the Interview with the EPA indicated that it is the responsibility of the community to report all 'non-compliance' cases to the EPA, after which the EPA does the follow-up. This is a major omission in the EIA system which is inappropriate if one is seriously trying to use EIA as a means of conflict resolution among different interest groups.

Nevertheless, it was discovered from the studies that the companies have established complaint registers for recording all the complaints they receive and documented follow-up plans. For instance, NGGL quickly organized meetings with the various communities around the mine site when there were rumours that waste water from the processing plant was being discharged into the Tano River and again, blasting done by the company was polluting rain water, according to some community members. The author was among the environmental representatives who were part of those meetings. What really happened concerning the perception of the polluted rain water was that, it had not been raining for some weeks in the area, and as is normally the case, the first rains after such periods contain greater amount of deposited dust on the roofing sheets which contaminate the rain water, even in non-mining environments. This was exactly what happened during that time; and after explanations and discussions, there was mutual understanding. It was then recommended that rain water from each of the nearby communities should be sampled for laboratory analysis.

## **5.7 Auditing as a means of Ensuring EIA Compliance**

All proponents are to submit monthly and annual environmental reports and also, within 18 months of operation, a proponent is expected to submit an EMP and there after, every three years to the EPA (EPA, 1995). The EPA in turn audits these reports when it suspects anomalies or deception in the monitoring results. The auditing process (the results of which are not made public), therefore, depends heavily on the existence of relevant and good quality monitoring data. This means that the whole monitoring programme can be described as being effective only when the proponent presents sincere and accurate reports to the Agency and also the equipment and personnel responsible for sampling and testing parameters for the proponent are efficient. This reason still emphasizes the need for the EPA to conduct their own monitoring in



order to demonstrate to the public as well as the outside world that a proponent management system does meet standards (Lee and George, 2000).

The Ghanaian EPA may, in addition, choose independent auditors to audit projects as done in Chile, where the CONAMA, (which is the government agency in charge of the environment), in addition to enforcing compliance laws and conditions as stated in the Environmental Qualification Resolution, also choose independent auditors in auditing projects; the auditing costs of which are covered by the developer (Lee and George, 2000). This will ensure confidence in the EIA system in Ghana as well as support for proposed undertakings by the general public as a whole and the local communities in particular. The penalties/sanctions for non-compliance with EIA decisions in Ghana is similar to that of the Taiwanese except that there is no involvement of the judiciary in Ghana.

Auditing has been conducted once since BGL begun surface mining in Prestea by the EPA according to Mr. Anthony A. Andoh during personal interview at the EPA Headquarters in Accra on Thursday, April 6<sup>th</sup>, 2006. According to him, another one is to be soon conducted. The auditing results were neither communicated to the public nor the community and is not in public domain.

### **5.8 Resettlement of Community Buildings**

Though the entire Prestea community is now seriously asking for resettlement, it would be impossible for the company to embark on such activity considering the size of the township. The problem of the resettlement of the entire Prestea community clearly demonstrates that the EIS lack proper sensitization of the community about the potential impacts of the project from the very onset. This lack of community sensitization was one of the reasons for the suspension of BGL's activities in the Prestea community by the EPA on 28<sup>th</sup> September, 2005. Other reasons for the suspension included failure to complete the following commitment mitigations:

1. Relocation of the Prestea police station;
2. Erection of a fence around the Phase 3 pit development; and
3. The construction of a bypass road to divert traffic away from the southern end of the pit development and closure of the existing road ([http://www.gsr.com/News\\_Release](http://www.gsr.com/News_Release) [October 25th, 2005]).



The identification of these unfulfilled mitigation measures came to light when Members of Parliamentary Select Committee on Environment, Science and Technology visited some mining companies in the Wassa West District. This clearly reveals that, despite the fact that BGL submits its monthly and annual environmental reports as well as EMP to the EPA as stipulated by the EIA Law, all these mitigation measures would not have been completed without the timely intervention of the Parliamentary Select Committee. This is in support of what was declared by Lee and George (2000) that “though an EMP and an EMS are called for, they may still be no more than good intention, any more than the EIA, unless an independent check is made that the developer or operator is acting as intended”. The company was suspended for approximately four weeks through which time the above mitigation measures were completed before the suspension order was lifted. Most of the respondents confirmed this fact and added that even now the intensity of land vibration resulting from the blasting has been reduced.

### **5.9 Adverse impacts affecting communities at Prestea and Kenyase**

The potential impacts to surface water were anticipated to be effectively mitigated through the proposed treatment and water management, and as such no significant impacts either to surface water flows or water quality were anticipated in the EIS. However, according to the people, on October 23<sup>rd</sup> 2004, a tailing dam of BGL spilled cyanide into Apepra stream, a tributary of River Ankobra which serves as a source of drinking water for Dumasi community. The community declared they were not informed by the company in a timely manner and as such ate and drank the contaminated fish and water which seriously affected their health. Thus regardless of all the measures proposed to mitigate the adverse impacts to surface waters the people still face negative impacts from surface water.

Other negative impacts facing the community include excessive noise, dust, and property damage resulting from blasting activities. Despite all the mitigation measures proposed in the EIS to control excessive noise, dust and property damage resulting from blasting activities, the people still stress that the operations of the company are in such proximity to the towns of Prestea and Himan that television sets, video decks and other electrical appliances are routinely damaged by the impacts of blasting. They also complained during interview that the intensity of the blasting has caused cracking on their buildings and has led some to collapse. The proximity of BGL to the Prestea Government Hospital is of great concern to the community as



the blasting and the dumping of mine waste are less than 30 meters from the hospital. Relating the situation here with what Gilpin (1995) stated that blasting noise and air shock can be troublesome if people live within close proximity to the blasting site, it could be inferred that the impacts were really serious as the blasting site was only 350 meters from the township.

According to the community, they have tried to raise their concerns in the time past but have not received the needed attention. A special case is when on 13<sup>th</sup> June 2005, the community organized what they termed "a peaceful demonstration" to draw attention to the negative impacts resulting from the activities of the company. According to WACAM the leaders of the demonstration had informed the police of the demonstration as required by law and even sought out protection from the police for the demonstrators. The community alleged that nearly 5000 people had gathered for the demonstration when security forces fired at the group and injured some people.

The people further claimed that the activities of the company have had a serious impact on their farms. They say BGL's ore roaster have resulted in reduced crop yields and destroyed crops such as cocoa, and that past emissions from the roaster have caused permanent damage to some farms. This, however, could not be verified scientifically in the study. It may also be that since Prestea has had more than a century of mining, most of the environmental damage had already been done before the creation of the Plant-North Pit.

The communities at Kenyase, on the other hand, could not mention any possible impacts being faced currently from the activities of the company. This could be attributed to the fact that the community is a green field mining area which is seeing actual mining operations in less than a year at the time of this study, hence too early to determine any immediate mining impacts. Though there is no such serious conflict in Kenyase as seen in Prestea, the fears expressed by the communities in Kenyase together with the community's credence that Newmont is not recruiting people from the local communities have the potential of generating conflict in the near future if not addressed.



## **CHAPTER SIX**

### **CONCLUSIONS AND RECOMMENDATIONS**

#### **6.1 CONCLUSIONS**

The study has shown that although the EIA system in Ghana provides comprehensive EIA procedures and guidelines that support public participation in projects necessitating EIA study, EIA in Ghana has not been able to accomplish much in the area of conflict avoidance owing to the fact that, there are certain limitations in the entire EIA system which include the following:

The performance of EIA process is based on the degree of success in integrating the affected parties concerns into the various decisions that will eventually lead to the approval or otherwise of a proposed project. Though the study showed that there is high level of public participation at the initial and subsequent stages in the EIA process in Ghana, there is lack of public participation at the final decision-making point before project approval.

The research further revealed that although the EIA procedures make room for proponents to predict the potential negative impacts that may result from the execution of their projects and further propose measures to mitigate those impacts, most of these impact predictions are too uncertain. This then calls for some form of compliance or supervisory monitoring after the approval stage of a proposed development to determine the development's actual impacts against the predicted ones together with measures for taking corrective actions when needed, in order to ensure effective implementation of EIA. There is lack of clear provision for EIA compliance or supervisory monitoring by the EPA in the EIA system in Ghana.

Though there is a provision for the public to challenge any decision or action of the EPA in the EIA system in Ghana, there is no provision of a channel for the public to appeal against non-compliance with EIA decisions against proponents.

Again, there is no involvement of the judicial agencies in resolving issues concerning challenging EIA decisions or actions of the EPA.



It is therefore hoped that consideration would be given to the above limitations in the EIA system in Ghana as this will bring significant change that would complete the entire EIA system to ensure effective conflict prevention. This will further promote the image of Ghana at the international level as far EIA system is concerned.

It is also hoped that this research will contribute greatly to the EIA study in the Prestea and Kenyase communities and other communities facing similar projects.

In addition, representatives from the host communities and local District assemblies where a project is being carried out should be involved in the monitoring programme. Such representatives must be composed of people within the affected communities with adequate professional knowledge. Highly skilled individuals from the affected communities can be recruited and trained in the relevant aspects of monitoring from the environmental themselves, in collaboration with the EPA, regarding the monitoring activities. The participation of the employees of the host communities in matters belonging to the respective communities. The results of the monitoring programme should be made available to the public, especially the host communities.

Furthermore, the EIA system should be revised at the final decision-making stage to wider its public participation. The consultative approach in decision-making proposed by Lee and Goss (1994) can be employed. Here, the decision maker (the EPA) will play a passive role and the professional's role will be confined to being a facilitator of the consultative process. The principal stakeholders and interest groups are first incorporated in identifying and negotiating a mutually acceptable outcome which the decision maker can then endorse.

It will also be appropriate to involve the judiciary in resolving conflicts arising from the non-compliance of EIA decisions as well as challenging EIA decisions. This can be achieved by providing an appeal procedure through an independent judiciary that will clearly take the decisions out of government hands.



## 6.2 RECOMMENDATIONS

The following recommendations are made based on the findings of the study:

There should be a clear provision for supervisory and follow-up monitoring in the EIA system in Ghana in order to guarantee the completeness of the whole system and also, to confirm the authenticity of compliance monitoring results submitted to the EPA by proponents. This can be accomplished by the establishment of, at least, one environmental laboratory at the EPA Headquarters that will be equipped with trained staff to conduct their own sampling from the various mines, and carry out the necessary analyses.

In addition, representatives from the local communities and local district assemblies where a project is being carried out should be included in such supervisory monitoring programmes. Such representatives must be composed of people within the affected communities with adequate professional knowledge. Highly educated individuals from the affected communities can be recruited and trained in the relevant fields, with sponsorship from the communities themselves, to collaborate with the EPA in effecting the monitoring activities. The remuneration of the employees can be paid from the gold/mineral royalties belonging to the respective communities. The results of all such compliance monitoring programmes should be made accessible to the public, especially, the affected communities.

Furthermore, the EIA system in Ghana should engage the public at the final decision-making stage in order to generate confidence in the entire system. The consultative approach in decision-making proposed by Lee and George (2000) can be employed. Here, the decision-maker (the EPA) will play a passive role and the professional's role will be confined to being a facilitator of the consultative process. The principal stakeholders and interest groups are then incorporated in identifying and negotiating a mutually acceptable outcome which the decision-maker can then endorse.

It will also be appropriate to involve the judiciary in resolving conflicts arising from the non-compliance of EIA decisions as well as challenging EIA decisions. This can be achieved by providing an appeal procedure through an independent judiciary that will clearly take the decision-making partially out of government hands.

It is hoped that when the above measures are put in place, EIA will not be seen as a tool for governmental decision-making but rather as an issue of community resolution. This will ensure social acceptability of projects and promote sustainable relationship between affected communities and proponents as well create confidence in the entire EIA system in Ghana.

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## MEDIA REPORT ON A CONFLICT BETWEEN BGL AND THE PRESTEA COMMUNITY

BBQ — \$59.34 per barrel  
Light Crude — \$62.16 per barrel

Source: Associated Press.

## Prof spends 21 yrs with mother's corpse

2. **Adjusted on Unit**

A brand new car for  
loyal readers of Daily Graphic  
*See Page 8*

FRIDAY, OCTOBER 7, 2005. NO. 149553. PRICE: \$3,000

## Daily Graphic

Media Organization  
of the Year

Story: Kwame Asiedu  
Marfo, Prestea

**T**HE chiefs and people of Prestea have vowed to resist any attempt by Bogoso Gold Limited (BGL) to reopen the surface mines in Prestea until it relocates them.

The people said they had shown that doing so is a result of the negative effects of the various mining activities of Ecol, which was ordered by the Environmental Protection Agency (EPA) to close its operations about a week ago.

The people's reaction, because of the increased amount in the centre of the zone in itself, would be harmful to the people.

But the Public Relations Officer of the Ministry of Agriculture, explained that the landlessness was out of the question because it had to be granted.

Besides, the government should be recommended by regulatory bodies such as the

# ESTHIA ON WARPAATH

They threatened to attack, including, hurry

They said and during a public hearing on the Environmental Impact Assessment (EIA) a number of exercises were raised, including debating, which created a view that doing so well as themselves which had created serious

The people said the company had unfairly one of the unions, which was the replacement of a union at Kichika Village which was close to the company's head-

• Continued on Page 3

## APPENDIX 1 (CONTINUED)

### Prestea on warpath

• Continued from P.1

route.

They also mentioned other effects the surface mining was having on them as the pollution of water bodies with cyanide solution and pollution of the air because of the blasting at the company's mining pit in the Prestea township.

According to them, some of their recreational facilities and social amenities had been demolished to make way for the surface mining, but they expressed regret that some of them had been replaced as contractually agreed.

The people also contended that lives and property were at risk because of the blasting of rocks by the company in the town, sometimes immobilising children.

They also said the mining activities disturbed the hospital, schools and other activities of the people in the area.

The Secretary of the Concerned Citizens' Association of Prestea, Mr. Kwesi Blay, said the people were demanding resettlement, since BGL's surface mines were in the centre of the town.

"If we are not resettled, we will not allow them to mine," he emphasised, adding, "We will do this at the peril of our lives."

According to Mr. Blay, the company had demolished 23 bungalows and a senior staff club house it inherited from the defunct Prestea Gold Resources to pave the way for its surface mining activities but had failed to replace them.

He said they were calling for the resettlement of the people of Prestea, Hemang and Bondaye because the company's operations cut across those communities.

Aunt Araba, a resident, complained that any time she inhaled air which was contaminated with dust, she had severe headache and that the blasting was really creating a panic situation in the town.

Madam Esther Kumi, a teacher, also called for the resettlement of the people in the area, but she was not sure whether the company would be able to resettle them because of the huge amount of money it would involve.

Mr. Moses Opare-Barnor, a teacher of the Prestea Goldfields Schools, said the people had

demonstrated against the company, yet its management would not listen to them.

He said the company had drilled an area very close to the school to begin another surface mining, which he said would disturb teaching and learning in the school, which has an enrolment of about 2,000.

The Headmaster of the school, Mr. Samuel Arthur, was worried about the surface mining activities which were going to become very close to the school.

He said if the mining must go on, then the school must be relocated.

The Odikro of Aketawa/Mankresin, Nana Nuhu Adamu, corroborated what the other people had said, adding that they would no longer stand the negative effects of surface mining.

Madam Adwa Nkansah, a resident whose concrete roofing had been seriously affected by the blasting, said her granddaughter always fell down any time the company blasted the rocks.

Explaining further, Mr. Adjah Kodjoe said the regulatory bodies were also mandated to determine the site and time for any resettlement.

He said the company had completed the pit fence and the erection of a safety and vibration barrier around the south-west corner of its Giant North Pit as directed by the EPA.

Mr. Adjah Kodjoe said the company had also completed the first phase of the construction of a bypass on the western side of the central shaft area.

He said the Ghana Highway Authority (GHA) had completed construction tests and that the company was currently laying the base course for the road.

Touching on the blocking of the post office road, he said there was an agreement between the company and EPA that instead of blocking the road, a gate should be constructed and that any time the company was going to blast, the gate would be closed.


He said the company had also completed the construction of the new police station as directed by the Environmental Impact Statement (EIS) and that it had presented a cheque for \$25 million to the Western Regional Police Commander to purchase furniture for the police station.



## APPENDIX 2

### EIA NOTICE ON PROPOSED BUI HYDROPOWER PROJECT

**Daily Graphic, Wednesday, October 18, 2006.**

**ENVIRONMENTAL PROTECTION  
AGENCY**  
**ENVIRONMENTAL IMPACT ASSESSMENT (EIA) NOTICE**  
**PROPOSED BUI HYDROPOWER PROJECT**

The Environmental Protection Agency (EPA) has received an Environmental Impact Statement from Bui Development Secretariat on the proposed Hydro-electric Power Project, as required under the Environmental Protection Agency Act 490, Section 12(i) and Regulation 16 of LI 1652.

Copies of the report are available at the EPA Library, Accra; EPA Northern Regional Office, Tamale; EPA Brong Ahafo Regional Office, Sunyani; Ministry of Energy, Accra and the Energy Commission for public notice and information.

Any person (s) having an interest or concern relating to the potential environmental implications of the said project shall within twenty-one (21) days from the date of publication of this notice submit in writing such concerns, etc to:


<b>The Executive Director</b> <b>Environmental Protection Agency</b> P.O. Box M326 Accra. Tel: 021-664697/8 Fax: 233 (021) 662690	<b>Or</b>	<b>The Regional Director</b> <b>EPA Northern Region</b> P.O. Box 626 Tamale. Tel: 071-22294
<b>The Ag. Regional Director</b> <b>EPA Brong Ahafo Region</b> P.O. Box 1505 Sunyani. Tel: 061-27480/1		

Source: Daily Graphic October 18<sup>th</sup>, 2006

## APPENDIX 3

### SCOPING PUBLIC HEARING NOTICE ON A PROPOSED MINING PROJECT AT NZEMA AND JOMORO TRADITIONAL AREAS BY ADAMUS RESOURCES LTD

**ENVIRONMENTAL PROTECTION AGENCY**



**SCOPING PUBLIC HEARING NOTICE**  
**PROPOSED MINING PROJECT AT NZEMA AND JOMORO TRADITIONAL AREAS BY ADAMUS RESOURCES LIMITED**

The Environmental Protection Agency (EPA) has received a Scoping Report and Terms of Reference on the proposed Gold Mining Project to be located in and around Teleko—Bokazo, Anwia, Salman and Akanko Communities by Adamus Resources Limited in the Nzema East and Jomoro Traditional Areas of the Western Region as required under the EPA Act 490, Section 12 (1). Copies of the Scoping and Terms of Reference are available at the EPA Head Office Library, Accra, EPA Western Regional Office, Sekondi, and Nzema East District Assembly, Asum.

In accordance with the Ghana EIA Procedures, the EPA shall hold a Public Hearing on the proposed Gold Mining Project. The decision to hold the Public Hearing relates to the social concerns and the potential environmental implications of the proposal.

**DATE :** WEDNESDAY 4TH OCTOBER 2006  
**VENUE :** SALMAN, FOOTBALL FIELD  
**TIME :** 09:30 A.M. - 2:00 P.M.

The public is hereby invited to participate in this important national exercise.

**THE EXECUTIVE DIRECTOR**  
**ENVIRONMENTAL PROTECTION AGENCY**  
P. O. BOX M 326  
ACCRA

Source: Daily Graphic September 14<sup>th</sup>, 2006



## APPENDIX 4

### QUESTIONNAIRE TO THE PRESTEA COMMUNITY

1. Age:                below 18 ( )        18-30 ( )        31-45 ( )        46-60 ( )        above 60 ( )
2. Sex :                male ( )                female ( )
3. Marital status:   married ( )        single ( )        divorced ( )
4. Educational background:   never ( )        primary ( )        middle/JSS ( )        secondary ( )        tertiary ( )
5. Occupation .....
- 6.a. Have you ever lived near a mining area before?        Yes ( )        No ( )
- 6.b. If yes, for how long? .....
7. Have you worked in a mining company before?        Yes ( )        No ( )
8. Do you have any knowledge about mining?        No ( )        very little ( )        little        a lot ( )
9. Can you mention the names of some mining companies in Ghana?
10. Which of these companies work in this community?
11. Can you mention some of the benefits of mining to yourself?
12. What are some mining benefits to this community and the entire nation as a whole?
13. What are some of the negative impacts/problems that mining activities can cause that you know of?
14. Which of these negative impacts/problems are being faced by this community?
15. How are these impacts affecting your
  - (a) Health.                no effect ( )        serious ( )        very serious ( )
  - (b) Farm produce.        no effect ( )        serious ( )        very serious ( )
  - (c) Water supply.        no effect ( )        serious ( )        very serious ( )
  - (d) Other areas of concern

16. Do you know any organization called Environmental Protection Agency (EPA) in Ghana?

Yes ( ) No ( ).

17. What do you know about them? Very little ( ) little ( ) a lot ( ).

18a. Do you know anything called Environmental Impact Assessment (EIA) in Ghana? Yes ( )

No ( ).

18b. What do you know about it? Very little ( ) little ( ) a lot ( ).

19a. Were you aware of any public hearing in this community before Bogoso Gold Limited commenced mining activities? Yes ( ) No ( ) No idea ( )

19b. Was there a reconnaissance trip made this community by EPA to find out the key areas of concern that were likely to come up during the public hearing? Yes ( ) No ( ).

19c. Were you able to attend the public hearing? Yes ( ) No ( ).

19d. When and where did it take place?

19e. How did you hear of it? Posters ( ) Radio ( ) TV ( ) Newspapers ( ) Gongong ( ).

20. In your opinion what should be the best medium for advertising such hearings?

Posters ( ) Radio ( ) TV ( ) Newspapers ( ) Gongong ( ).

21a. Which of the positive impacts/benefits above were mentioned at the public hearing?

21b. Which of the negative impacts/problems above were predicted at the hearing?

22a. Was the issue of resettlement mentioned at the hearing?

Yes ( ) No ( ).

22b. How was it considered and addressed?

23. What were some of the mitigation measures the company promised to adopt to reduce, if not eliminate, these negative impacts?

24. How are the impacts you are facing now different from what were predicted at the public hearing?



## APPENDIX 5

24a. Positive impacts:

24b. Negative impacts:

25. Were you aware of any post project analysis/auditing of the company's activities by EPA?

Yes ( ) No ( )

26. How were you informed about the final decision after the public hearing?

Were you satisfied with the final decision? Yes ( ) No ( ).

27a. How was your understanding of the public hearing?

Not Clear ( ) Clear ( ) Very clear ( ).

27b. In your opinion what are some of the causes of the conflicts between mining communities and mining companies?

28a. In your opinion what should be the best forms of development undertaking that will ensure survival, welfare, employment and income generation in this community as it stands now?

28b. Why?

29a. As a citizen in this community do you know any procedure to follow in order to present your grievances against any company that fails to comply with EIA decisions?

Yes ( ) No ( ).

29b. State the procedure.

## APPENDIX 5

### QUESTIONNAIRE TO THE ENVIRONMENTAL PROTECTION AGENCY (EPA)

( mark (✓) to indicate **yes** and (Λ) to indicate **no** for any questions demanding a **yes** or **no** answer.)

1. Does EIA implementation in Ghana have a secure legal basis for:
  - (i) Compliance monitoring and enforcement? ( )
  - (ii) Appeal and dispute settlement? ( )
2. What are the formal stages involved the EIA procedure in Ghana?
3. Do the public have formal channels to participate in the EIA procedure?
  - (i) before the EIA study ( )
  - (ii) during the EIA study ( )
  - (iii) after the EIA study (formal mechanisms for public notification and inspection) ( )
4. Do the public have access to the EIA reports? ( )
5. If yes, where specifically?
6. Are the public involved in the
  - (i ) EIA review process ( )
  - (ii) Decision-making ( )
7. If yes, which classes of people are normally involved?
8. Does the EIA procedure provide a place for compliance monitoring and follow-up? ( )
9. Which groups of people are normally involved in conducting the EIA compliance monitoring and follow-up?
10. Do the public have access to the results of EIA compliance monitoring and follow-up? ( ).
11. How often is the compliance monitoring and follow-up supposed to be conducted?



12. Who bears the cost of compliance monitoring and follow-up?
12. Who bears the cost of EIA?
13. What penalties/sanctions apply to non-compliance with EIA decisions?
14. How many companies have fallen victim to EIA decisions since its implementation in Ghana?
15. How many of them have been sanctioned before?
16. Can they be named? ( )
17. What were the sanctions?
18. Does the EIA system provide a formal procedure through which an affected community can present their grievances or seek redress as a result of non compliance with EIA decisions in order to avoid disputes? ( )
19. If yes, state the procedure.
20. Does the EIA procedure provide a formal channel for either a proponent or an affected community to appeal against final EIA decisions? ( )
21. What are the formal channels, if yes?
22. Does EIA procedure mandate all proponents to submit annual monitoring/management reports? ( )
23. Does EPA conduct independent audit of such management/ monitoring reports?
24. Has EPA ever organized any public hearings in connection with Bogoso Gold limited operations at Prestea? ( )
25. Where and when did it take place?
26. Was there a reconnaissance trip made to Prestea in order to find out the key areas of concern that were likely to come up during the public hearing? ( )
27. Who were the participants at the public hearing?

## APPENDIX 6

28. Who were the panelists?
29. What were some of the positive impacts or benefits the company promised to bring to the community?
30. What were some of the negative impacts that were predicted to occur in the community?
31. What were some of the measures proposed to mitigate the predicted negative impacts?
32. How are the real positive impacts now different from the predicted ones?
33. How do the real negative impacts presently differ from those predicted?
34. What were some of the measures proposed to mitigate any unpredicted negative impacts?
35. Was it agreed at the hearing that the entire Prestea community would be resettled? ( )
36. Did the community and the entire public get access to the results of the final decision at the hearing? ( )
37. Were both BGL and the Prestea community satisfied with the final decision? ( )
38. How was monitoring of the activities of the company planned to be conducted to ensure compliance with the final decisions made?
39. Has post project analysis/auditing been ever conducted since BGL's operations in Prestea?
40. How many times and when?
41. Were the auditing results satisfactory? ( )
42. If no, did the company face any sanctions? ( )
43. What were the sanctions?
44. Were the auditing results communicated to the public in general and the local community in particular? ( )
45. Did the community react positively or negatively to the auditing results?
46. How were their reactions addressed by the EPA?
47. Does EPA organize annual excellence awards of good EIA practice for proponents? ( )



## APPENDIX 6

### PREDICTED IMPACTS AND THEIR MITIGATION MEASURES AT AHAFO-KENYASE

Impact	Mitigation Measure
<b>Site Preparation</b>	
Demarcation of area to be cleared for project development	<p>NGGL to co-ordinate with mining team according to mining schedule phases (two phases).</p> <p>Demarcation of areas to be cleared for project development according to EMS procedures and EMP and as per the mining schedule.</p>
Clearing of vegetation.	<p>Clearing of vegetation will be a progressive process under NGGL close supervision in accordance with procedure, and according to the mining schedule.</p> <p>Opportunity for recovery of commercialized sized trees and for segregation of wood for community firewood will be evaluated at the time of the demarcation and clearing process.</p> <p>Clearing will be required for the haul road, mine waste areas, mining area and administration area.</p>
Dust generated from site clearing activities	<p>NGGL to implement dust suppression measures through the application of water in accordance with established procedures. This measure should be sufficient to prevent the formation of quantities of dust considered to be a nuisance. The use of chemical surfactants on roads and other working areas may be considered if water spraying is determined to be ineffective.</p>
<b>Site preparation activities</b>	
Segregation of topsoil	<p>Topsoil resources in the project area will be stripped and recovered, as areas are required for the project, to extent practicable.</p> <p>Materials to be stockpiled in a secure manner in accordance with established procedures.</p> <p>Topsoil will be recovered and stockpiled according to mining</p>

	<p>scheduled.</p> <p>Topsoil from construction of the haul road and the mining area will be used for rehabilitation according to requirements at the time of construction.</p> <p>Topsoil will be used for early revegetation requirements such as the stabilization of embankments or structural earthworks, and will be stored until areas become available for rehabilitation.</p>
Soil erosion control	<p>NGGL will ensure that appropriate drainage control measures to minimize soil erosion are put in place during preparation of all areas of the site.</p> <p>Measures will include construction of settlement ponds, culverts, road cambers, drains, ditches, use of vetiver, etc.</p>
Public safety – Security around the pits and waste dump	<p>Earth protective bunds to be constructed around the pits.</p> <p>Preventive signboards are placed to prevent access to the pits.</p> <p>Employment of local security personnel to prevent access to the pits and mining area.</p>
<b>Construction phase</b>	
Instruction to contractors	<p>All NGGL contracts require that contractors understand and follow the NGGL environmental operating procedures including safety and environmental policies and procedures.</p> <p>NGGL to ensure that environmental clauses become part of contract agreements. Such clauses will refer to blasting techniques, blasting time information, road watering, solid and liquid waste management, haul road crossing management, clearing activities, topsoil management, workers and public safety (as part of EMS implementation and procedures).</p>
Construction of the haul roads	<p>Process under NGGL supervision according to requirements of site preparation activities.</p> <p>Important aspects to check are engineering design for river crossings and road drainage.</p>
Construction of mining	Process under NGGL supervision according to requirements of



contractor area	<p>site preparation activities.</p> <p>Important design aspects included are drainage. Containment area, oil separation and waste management facilities.</p>
Dust generation during construction	<p>NGGL to implement dust suppression measures through the application of water in accordance with established procedures. This measure should be sufficient to prevent the formation of quantities of dust considered to be nuisance. The use of</p>
<b>Operation Phase</b>	
Dust from excavation activities of the pits (and some limited blasting)	<p>Chemical surfactants on roads and other working areas may be considered if water spraying is determined to be ineffective.</p> <p>NGGL to implement specific measures to implement over speeding of vehicles when driving through or near towns and villages on their way to the site as on the site itself. Speed limit sign boards are posted at appropriate locations and both NGGL drivers and contractors are obliged to comply with the speed limits along access roads and the NGGL mining lease in general. As soon as the majority of the haul road is constructed, project traffic will use it for access to the site.</p> <p>NGGL to implement the blasting control procedures currently being used and approved by the Mines Inspectorate for the limited blasting expected to be required at Ahafo pits.</p> <p>NGGL's mining contractors to use modern blasting technologies (electric detonators), which enable good control of detonation sequencing and quantities of blasting agent to be used, hence reducing the potential of fly rock and dust generation. The company procedure controls blasting times and ensures that no blasting will be undertaken during the extreme weather conditions (high winds)</p> <p>NGGL to monitor dust levels on surrounding environment through dust deposition monitoring.</p>

<p>Dust from haulage transportation of ore and waste</p>	<p>NGGL to use appropriate dust control/suppression measures including the use of water tankers to water the haul and access roads to significantly reduce dust generation and associated nuisances. The number of times water will be applied daily will in accordance with NNGL procedures and will vary according to weather conditions and the intensity of vehicle movements on particular roads. In addition, NGGL has in place a vehicle over-speeding prevention programme.</p> <p>The use of chemical surfactants on roads and other working areas may be considered if water spraying is determined to be ineffective.</p> <p>All ore transfer points on conveyer systems will have sprayers for dust suppression.</p> <p>NGGL to monitor dust levels on surrounding environment through dust deposition monitoring.</p>
<p>Gaseous emissions and PM10 from diesel engines.</p>	<p>NGGL to check equipment is well maintained.</p> <p>NGGL to use controlled blasting technology, which includes initiation of blast holes through electronic detonators and establishment of a maximum instantaneous charge.</p>
<p>Noise and vibration from blasting</p>	<p>NGGL to a safe blasting perimeter of 500m around all blasting sites.</p> <p>Blasting procedures and effect to be discussed publicly at meetings such as the Ahafo Mine Community Consultative Committee.</p> <p>NGGL to monitor noise/vibrations at boundary of "safe blasting perimeter".</p>
<p>Noise from machinery</p>	<p>Contractor to ensure all heavy machines are equipped with standard muffler.</p> <p>NGGL to monitor noise levels.</p>



Public safety – Security around the pits, waste dumps, Tailing Management Facility	<p>NGGL to ensure a bund is constructed around the pits and preventive signboards are placed to prevent access to the pits by non-authorized persons.</p> <p>NGGL will construct a fence around the entire Tailings Management Facility.</p> <p>NGGL will actively patrol the areas around the entire TSF.</p> <p>NGGL to monitor effectiveness of this safety measure.</p>
Surface water management:	<p>Mine water not required for dust suppression will be released in a controlled manner provided the water meet Ghanaian water quality discharge standards. Water not meeting standards will be treated prior to release.</p> <p>Sediment run-off from the waste dump areas will be trapped by the establishment of appropriate setting ponds or sediment management structures in the area down gradient of the Ahafo waste dumps.</p>
Surface water quality	<p>Necessary earthworks will be undertaken to ensure effective drainage control and diversion around the perimeter of the pits, the haul road and maintenance yard</p> <p>Maintenance facilities will be provided with containment facilities and oil-water separators in accordance with NGGL procedures and standards.</p> <p>Early revegetation of disturbed areas will be undertaken as much as practicable using topsoil segregated during the preparation phase.</p> <p>Water quality will be tested regularly and all mine water from the pits will be directed to one or more sediment management facilities where sediment loading is to be reduced.</p> <p>NGGL to monitor water quality parameters (pH, TSS, Conductivity, nitrates, and heavy metals) downstream of project facilities.</p>

	<p>NGGL to monitor water quality parameters (pH, TSS, Conductivity, Nitrates, and heavy metals) down stream gradient of project facilities</p> <p>All processing tanks and pipelines containing processed fluids will have secondary containment to prevent accidental releases to the environment.</p> <p>All tanks and ancillary pipelines will be constructed above ground to facilitate frequent inspections and to rapidly identify accidental leaks and implement repair.</p>
Groundwater quality	<p>NGGL to monitor groundwater levels and water quality parameters (pH, TDS, conductivity, nitrates and heavy metals) up and down gradient of Tailing Management Facility and waste rock dumps.</p> <p>Tailing Management Facility constructed with engineered soil liner, leak recovery system, and geosynthetic liner under supernatant pond to prevent seepage.</p>
Soil erosion from site	<p>NGGL to monitor erosion through visual inspections.</p> <p>NGGL to verify compliance to site preparation processes.</p> <p>NGGL to take appropriate corrective measures such as stabilization with Vetiver grass, early revegetation and construction of settlement pond.</p>
Land use and social issues	<p>NGGL to monitor success of compensation policy and resettlement process</p> <p>NGGL to continue alternative livelihood projects.</p> <p>NGGL to continue dialogue and engagement of communities through formal and informal meetings.</p>
Waste Management	<p>NGGL to ensure implementation of waste management policy.</p> <p>NGGL to monitor implementation of waste management policy.</p>
<b>Rehabilitation / Closure Phase</b>	
Rehabilitation Programme.	NGGL to implement Closure Plan with the following general



Rehabilitation of Ahafo waste dumpsite.	<p>principles:</p> <ol style="list-style-type: none"> <li>1. All structures will be removed from the site, according to the terms of the mining agreement.</li> <li>2. Any hazardous material, equipment or contaminated soils will be safely disposed.</li> <li>3. Ensure that the project area is in a suitable and safe condition.</li> <li>4. Rehabilitation of disturbed areas to an acceptable end land use for the benefit of neighbouring communities whenever practicable.</li> <li>5. Consideration of post-closure socio-economic conditions in the neighbouring communities.</li> </ol>
Consultation with stakeholders.	NGGL to liaise with Ahafo Mine Community Consultative Committee and relevant stakeholders (in particular local communities) and obtain their input for the mining land-use plan.
Rehabilitation of exposed slopes in pits.	Rehabilitation activities to be undertaken where feasible and safe under NGGL management/control at closure.

Rehabilitation of Ahafo waste dumps. Passive care.	<p>Rehabilitation activities to start at closure under NGGL management and control.</p> <p>NGGL to ensure that the length and gradient of structure slopes will be managed to be at minimum – slopes battered to be less than 22 degrees and any long slopes to be provided with erosion control and water structures (such as interception ditches, drop structures or other energy dissipation structures, sculpted areas and sediment control features).</p> <p>Final landforms to conform surroundings hills and valleys.</p> <p>Topsoil to be re-handled from stockpiles and used to provide growth medium on the oxide stockpiles in accordance with NGGL topsoil management and rehabilitation procedures.</p> <p>The waste areas to be returned to a beneficial end-land use in accordance with regulatory requirements and in consultation with stakeholders.</p> <p>Monitoring of rehabilitation criteria (plant growth, soil erosion, stream water quality).</p>
Site stability (sustainability).	Monitoring of rehabilitation criteria to declare after care status of rehabilitated site.

Source: Environmental Impact Statement on NGGL Project



## APPENDIX 7

### PREDICTED IMPACTS AND THEIR MITIGATION MEASURES AT PRESTEA

Potential impact	Mitigation measure
Impact due to noise, dust, ground induced vibration	<p>Efficient plant engine exhaust emissions. Watering of haul roads, using coarse blast hole stemming materials (not drilling dust). Control blasting, the use of acoustic barriers either earth mounds in various forms of solid fencing. BGL would ensure that the entire fleet of vehicles is in good order and all are fitted with appropriate noise muffler systems, primarily exhaust silencers.</p> <p>Adoption of best practice for blast design with designed on an individual basis, ensuring accurate blast-hole drilling, correct charging of blast holes including sufficient length of stemming materials. Optimization of detonator delay sequence, avoidance of secondary blasting, routine monitoring of each blast at specific sensitive locations, assessment of the results of such monitoring and adjustments of blast design and practice as required.</p> <p>Maintenance of communication channels with local communities including the establishment of complaint procedure.</p> <p>Control of haul vehicle speed.</p>
Closeness of the PNP to settlements within Prestea.	A number of community buildings which are located within 150m from the pit would be relocated to enable public access to the area immediately adjacent to the pit to be restricted.
Proximity of proposed haulage route to a	BGL agreed to finance building of additional

school at Ankobra village	classrooms to enable this section of the school to be closed and relocated thereby eliminating any potential nuisance from the proposed project and the school.
Demolition of the old Prestea processing plant and the resulting effect on the underground operations.	The demolition of the plant has been undertaken following an official application to EPA for this work and is therefore not within the remit of this EIA.
The anxiety expressed by the workers of Prestea Gold Resources Limited about possibility of permanent closure of underground works.	The closure of the underground operation is not associated to the proposed PNP and is therefore not assessed in this EIS
Effects of surface operations on underground potential	Agreements were reached with PGR/NMC for control measures to be put in place to deal with such potentially damaging issues as flooding, vibration damage and ventilation restriction. Once implemented, these control measures will mitigate these impacts and ensure that both surface and underground can operate simultaneously.
Impacts resulting from the creation of the new TSFII	Mitigation measure for TSF II include the progressive backfilling and rehabilitation of the dam walls and vegetation trails to optimize knowledge on the re-vegetation of the surface for closure of the project
Potential impacts to surface water	Seepage and run-off collection, use of settlement ponds (to reduce suspended solid levels), monitoring and treatment as (require) of all discharged water to streams. This would be effectively controlled and mitigated



	through the proposed treatment and water management
Traffic impact on Ankobra bridge	Short- term use only of the public road for haulage. Improvement/provision of an alternative access route to the Himan township.

Source: Environmental Impact Statement on BGL's Project at Prestea

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First Edition  
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APPENDIX 9 A SECTION OF TOPOGRAPHICAL MAP OF THE STUDY AREA (PRESTIA) SHOWING THE CONCESSION OF B.C.L. (SHOWN IN D)

105

SCALE 1:50,000

