APPENDIX A

Malaria and HIV/AIDS Policies

APPENDIX A

APPENDIX A-1: MALARIA PROCEDURE FOR GHANA

APPENDIX A-2: HIV/AIDS POLICY

APPENDIX A-1: MALARIA PROCEDURE FOR GHANA

APPENDIX A -1

NGGL
MALARIA PROCEDURE FOR GHANA

NOTE : THE CONTENTS OF THIS PROCEDURE ARE SUBJECT TO CHANGE WITH CHANGING MEDICAL CONDITIONS AND WILL BE UPDATED APPROPRIATELY.

1. Procedure

Malaria is endemic in Ghana. Newmont Ghana is committed to reducing and controlling mosquito presence in and around company provided living, dining and recreational facilities and working locations thereby reducing the exposure to individuals of being bitten by mosquitoes and contracting malaria.

The Malaria Guideline addendum to this Malaria Procedure provides substantial additional information about malaria, prevention techniques, descriptions of malaria prophylaxis, treatment, etc.

IT IS STRONGLY RECOMMENDED THAT YOU THOROGHLY READ THE INFORMATION IN THE ADDENDUM AND FAMILIARIZE YOURSELF WITH THE PRACTICAL STEPS YOU CAN TAKE TO REDUCE YOUR RISK AND EXPOSURE TO MOSQUITO BITES AND CONTRACTING MALARIA.

2. Background

Despite major campaigns to eradicate malaria, the disease remains one of the most important health problems in many parts of the world. According to the World Health Organization (WHO) 110 million clinical cases of malaria occur each year, and most of these cases are reported from Sub-Saharan Africa.

The malaria parasites are transmitted to humans by the bite of an infected female Anopheles mosquito. Malaria is a parasitic infection of the liver and blood. When a person is bitten by an infected mosquito, it first injects saliva to prevent the blood from clotting and blocking its mouth parts. The saliva contains the infective form of the malaria parasite, which is transmitted into the human bloodstream. A maturing phase follows in which the parasite (sporozoite) will, within 6 days, develop into a mature liver form (Schizont). This is normally when the individual starts feeling ill. In the case of P. falsiparum, the period between the bite of the mosquito and the appearance of the first symptoms could vary between 7 to 30 days (usually around 10 days), and longer with other species. It may be very long in the case of P. ovale and P. vivax i.e. months or even more than a year. This is believed to be due to the dormant stage of the parasite in the liver.

3. Definitions

As noted in the body and text of this policy and the Malaria Guideline addendum.

4. Responsibilities

Director of Human Resources – For the development, implementation and maintenance of this policy and guideline addendum.

Managers of Environmental and Safety Departments – For the safe use and application of anti-mosquito chemicals used in spraying and fogging activities. For standing water control.

Contractor – for the implementation and management of mosquito control programs as outlined and directed by Newmont Ghana through purchase order or contract documents.

Employees – Take anti-malaria precautions seriously to protect you and your dependents from mosquito bites.

5. Implementation

Protective Measures

Effective prevention of malaria incorporates various approaches:

- Personal protection measures (including appropriate information/education and measures to avoid mosquito bites)
- Measures aimed at vector control (control of mosquito) in the environment.
- Chemoprophylaxis (anti-malaria drugs)

THESE PROTECTIVE MEASURES ARE FULLY EXPLAINED IN THE MALARIA GUIDELINES ADDENDUM. PLEASE READ AND FAMILIARIZE YOURSELF WITH THESE PROTECTIVE MEASURES.

In addition, Newmont Ghana will initiate and maintain the following mosquito control activities:

- A focused mosquito control spraying and/or fogging program in and around company living, dining and recreational facilities and working locations.
- Installation and maintenance of other types of mosquito control devices such as zappers, lights, propane powered traps, etc., in and around facilities where appropriate.
- Provide and/or install and maintain mosquito netting over beds in all company provided living/housing facilities. In addition, it is anticipated that all living quarters will be stocked with aerosol cans of mosquito spray for individualized mosquito spraying when needed.
- Mosquito repellant for individual application will also be available to employees, dependents and visitors in company facilities and work locations.
- Provide for early detection blood testing at all site clinical locations and Accra.
- Where possible, build houses and villages away from marshy areas and water, which are potential larvae breeding sites.
- Make provision for optimal drainage of rainwater and household water near houses….eliminate or control standing water.

- Install and maintain screening in front of outside doors and windows in houses and office facilities. Living areas (verandas) can also be screened off to minimize exposure to mosquitoes.

- Maintain good housekeeping and environmental practices to reduce and/or eliminate mosquito breeding habitats, i.e., unsanitary rubbish dumps, stacked tires, etc.

- Provide mosquito protection and anti-malaria prevention education and awareness sessions to all members of the workforce.

Chemoprophylaxis (Anti-malarial Drugs)

NOTE: WHEN CONSIDERING DRUGS, SPECIFIC RECOMMENDATIONS ARE BEST MADE ON AN INDIVIDUAL BASIS AFTER DISCUSSION WITH A DOCTOR FAMILIAR WITH TROPICAL MEDICAL CONDITIONS AND/OR YOUR PERSONAL DOCTOR FAMILIAR WITH YOUR PARTICULAR PERSONAL MEDICAL HISTORY.

NEWMONT GHANA IS NOT, BY THIS MALARIA PROCEDURE OR GUIDELINES ADDENDUM, REQUIRING OR DIRECTING INDIVIDUALS TO TAKE OR USE MALARIA PROPHYLAXIS. HOWEVER, IT IS STRONGLY RECOMMENDED YOU CONSIDER TAKING MALARIA PROPHYLAXIS AS A PROTECTIVE MEASURE.

THE USE OF MALARIA PROPHYLAXIS SHOULD ONLY BE DONE IN CONJUNCTION WITH YOUR DOCTORS ADVICE.

In considering malaria prophylaxis, one is always concerned with balancing the risk and benefit. One must remember that chemoprophylaxis never provides complete protection against malaria, and that one must take other personal protection measures.

Conclusion

In conclusion, it is clear that despite major campaigns to eradicate malaria, the disease remains one of the most important health problems in Africa.

Individual measures to prevent mosquito bites remain the mainstay of prophylaxis and people must be aware of the signs of malaria in order to seek medical treatment quickly.

Where possible, each case must be assessed individually, rather than using a blanket recommendation. Too often individualized advice also gets advertised as a general recommendation in the employee community, which more often than not ends up being the wrong advice to somebody! It cannot be overstressed that a visit to the doctor in Ghana is important and the advice received there is made to that specific individual.

It is recommended that the malaria control program form part of an overall medical plan, developed to address specific needs as identified by the company

MALARIA PROCEDURE ADDENDUM - GUIDELINE FOR GHANA

NOTE : THE CONTENTS OF THIS GUIDELINE ARE SUBJECT TO CHANGE WITH CHANGING MEDICAL CONDITIONS AND WILL BE UPDATED APPROPRIATELY.

Malaria is endemic in Ghana. Newmont Ghana is committed to reducing and controlling mosquito presence in and around company provided living, dining and recreational facilities and working locations thereby reducing the exposure to individuals for contracting malaria.

Despite major campaigns to eradicate malaria, the disease remains one of the most important health problems in many parts of the world. According to the World Health Organization (WHO) 110 million clinical cases of malaria occur each year, and most of these cases are reported from Sub-Saharan Africa. The majority of cases are infections with the Plasmodium falciparum parasite, which gives rise to the most virulent form of the disease and is often life threatening, particularly if not treated quickly. Other Plasmodium parasites e.g. P. vivax, P. ovale and P. malariae can also cause malaria, but more often present as a low grade chronic infection, with characteristic fever patterns and the potential to relapse over a number of years. P. vivax and P. ovale cause fever every 48 hours and P. malariae every 72 hours.

The high risk of malaria transmission is often associated with high rainfall. The risk in Central Africa is high (endemic proportions), except in some high altitude areas.

The malaria parasites are transmitted to humans by the bite of an infected female Anopheles mosquito. Malaria is a parasitic infection of the liver and blood. When a person is bitten by an infected mosquito, it first injects saliva to prevent the blood from clotting and blocking its mouth parts. The saliva contains the infective form of the malaria parasite, which is transmitted into the human bloodstream. A maturing phase follows in which the parasite (sporozoite) will, within 6 days, develop into a mature liver form (Schizont). This is normally when the individual starts feeling ill. In the case of P. falsiparum, the period between the bite of the mosquito and the appearance of the first symptoms could vary between 7 to 30 days (usually around 10 days), and longer with other species. It may be very long in the case of P. ovale and P. vivax i.e. months or even more than a year. This is believed to be due to the dormant stage of the parasite in the liver.

Clinical features

Infections caused by the four different malaria species have many clinical features in common.

People who live in endemic malaria areas could develop a type of immunity to the disease after being exposed to previous malaria infections and will have some degree of protection against the disease.
The onset of malaria can resemble influenza ("flu") infection. The most common symptoms are: rigors, fever, sweating, headache, muscular and joint pains, nausea, diarrhea, fatigue, a bitter or metallic taste in the mouth and abdominal discomfort. Other signs could include slight jaundice, anemia, and an enlarged liver and spleen. The symptoms may however be different if anti-malaria medication has been taken. Medical attention must be sought if any febrile disease occurs within 3 months after a visit to a malaria area. In

infants, signs of malaria can be very subtle and include poor appetite, restlessness and lethargy – in addition to fever. It can also be rapidly progressive and medical attention should be sought immediately. This especially applies to children under one year of age.

The important difference between P. falsiparum and the other plasmodia is the capability of P. falsiparum to cause severe (or complicated) malaria – especially if the diagnosis is neglected or delayed. These complications include severe anemia, cerebral malaria, acidosis and hypoglycemia and respiratory distress syndrome. Cerebral malaria is the most important lethal complication and mostly occurs in non-immune individuals. The most common characteristic is a diffuse disturbance of consciousness or convulsions. A minority of patients are however left with a neurological deficit if recovery does occur. Another complication that occurs is "Blackwater fever", a term used for the syndrome in severe malaria when there is severe haemolysis (breakdown) of the red blood cells. This is associated with hemoglobin urea (hemoglobin in urine) and renal failure.

Risk

The greater the risk of developing malaria and developing complications – the more likely it will be that chemoprophylaxis (prevention with medicine) will be necessary. The risk will depend on the following:

- Personal health status
- Pregnancy – higher risk
- Immunity – people with lower immunity (HIV /AIDS, babies) are higher at risk.
- Age – babies, young children and the elderly are at risk.
- Chloroquine- resistant malaria area – higher risk.
- High risk seasons – higher rainfall season.
- Type of accommodation / living infrastructure (houses, etc.)

Protective Measures

Effective prevention of malaria incorporates various approaches:

- Personal protection measures (including appropriate information/education and measures to avoid mosquito bites)

- Measures aimed at vector control (control of mosquito) in the environment.

- Chemoprophylaxis (anti-malaria drugs)

Personal Protective Measures

(Excluding anti-malaria chemoprophylaxis)

1. If possible, avoid going outside between dusk and dawn, when mosquitoes are commonly active.

2. Wear light-colored long sleeved clothing, long trousers and socks when going out at night.

3. Apply insect repellent sparingly to exposed skin and clothing.

a. The most effective repellents contain N,N-dimethyl-meta-toluamide DEET), an ingredient in many commercially available insect repellents. Commercial products include Peaceful Sleep, Tabard stick/lotion/spray, Mosi-guard, Rid and Mylol spray.

b. Some people exposed to DEET have experienced seizures, but adverse reactions to DEET will be minimized it the following precautions are taken: avoid applying high concentration products to the skin, especially children; do not inhale or ingest repellents; never use repellent on irritated skin or wounds; avoid applying repellents on children's hands that are likely to have contact with their eyes or mouth.

4. Spray the inside of the house with aerosol insecticide (pyrethrum containing spray for flying insects) at dusk, especially in the bedrooms and in the living areas, after the windows have been closed.

   Note: Newmont Ghana will maintain a focused mosquito control spraying and/or fogging program or other mosquito control mechanisms as appropriate in and around company living, dining and recreational facilities and working locations.

5. Use mosquito mats impregnated with pyrethrum (heated electrically or by a non-electric lamp), or burn mosquito coils in the living and sleeping areas during the night.

   Note: In addition to focused spraying/fogging, the company will also install and maintain other types of mosquito control devices such as zappers, lights, propane powered traps, etc.

6. Treat clothes with an insecticide registered for this purpose e.g. *permethrin*.

7. Use a mosquito-proof net over the bed, with edges tucked in under the mattress. Protection will be increased by periodically soaking and drying the net with insecticides e.g. P*ermethrin, Peripel and Responsor.*

   Note: Newmont Ghana will provide and/or install and maintain mosquito netting over beds in all company provided living/housing facilities where appropriate or as requested by the employee.

Protective Measures Aimed at Control of the Vector (Mosquito)

Residents in a malaria area. The following measures can be taken to reduce the number of mosquitoes people are exposed to:

1. Where possible, build houses and villages away from marshy areas and water, which are potential larvae breeding sites.

2. Make provision for optimal drainage of rainwater and household water near houses.

3. Install gauze screens in front of outside doors and windows in houses and office facilities. Living areas (verandas) can also be screened off to minimize exposure to mosquitoes.

4. Apply larvicides to standing water (near households) that cannot be drained - Commercial products include *Mosdop and Valleira Oil.*

5. Apply long-acting insecticides onto the interior walls of houses e.g. *Baythroid H.*

6. 2% DDT water-soluble powder is still used to spray mud huts in rural areas. This remains somewhat controversial, but is still considered an option.

7. Clean up rubbish heaps, especially those containing tins, etc. that can cause breading place for mosquito's.

8. Tires are probably of the best breeding spots for mosquito's due to the ease of collecting rain water and the almost impossibility of removing it. Cover new and unused tires or keep it in stores. Used tires that are exposed to rain can be treated by putting a small amount of oil in the tires.

9. Put some Tilapia fish in the big mine ponds.

10. Fill in the works of illegal small-scale miners, if politically possible, as this is huge source of mosquito breeding areas.

11. Provide mosquito protection and anti-malaria education and awareness sessions to all members of the workforce.

Chemoprophylaxis (Anti-malarial Drugs)

NOTE: WHEN CONSIDERING DRUGS, SPECIFIC RECOMMENDATIONS ARE BEST MADE ON AN INDIVIDUAL BASIS AFTER DISCUSSION WITH A DOCTOR FAMILIAR WITH TROPICAL MEDICAL CONDITIONS AND/OR YOUR PERSONAL DOCTOR FAMILIAR WITH YOUR PARTICULAR PERSONAL MEDICAL HISTORY.

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THE USE OF MALARIA PROPHYLAXIS SHOULD ONLY BE DONE IN CONJUNCTION WITH YOUR DOCTORS ADVICE.

In considering malaria prophylaxis, one is always concerned with balancing the risk and benefit. One must remember that chemoprophylaxis never provides complete protection against malaria, and that one must take other personal protection measures.

The World Health Organization recommends that the prophylaxis should be started one week before entering a malaria area, to ascertain how well the drug is tolerated and to establish the prophylaxis routine. The exceptions are proquanil (*paludrine*) and doxycycline (*Doryx*), which can be started 1-2 days beforehand, as they are taken in daily doses.

It is important to continue prophylaxis for a minimum of 4 weeks after leaving an endemic area, to ensure that a suppressive effect is achieved.

Drugs that must be taken weekly must be taken on the same day of each week. It is also recommended that it be taken after the evening meal so that the minor side effects are lost in sleep.

The following prophylaxis are suggested for consideration:

Options:	
a.	Mefloquine (Larium) or
b.	Chloroquine plus Proquanil (Paludrine) or
c.	Doxycyline or
d.	Atovaquine plus Proguanil (Malarone) Not available in Ghana

IMPORTANT ASPECTS OF DRUGS USED IN MALARIA PROPHYLAXIS

CHLOROQUINE (e.g. Nivaquine, paramal, Plasmaquine)

Chloroquine is an effective prophylactic against all forms of malaria, except chloroquine-resistant strains of P. falciparum. However, it may still be used in areas where chloroquine-resistant malaria is present as many strains of P. falsiparum in these areas are still sensitive to chloroquine. It also remains effective against other forms of malaria and patients who have been using chloroquine prophylaxis generally develop a less serious form than those that have not used prophylaxis.

Chloroquine can safely be used during pregnancy and in young children.

It is usually well tolerated, with most side effects being mild and reversible. These include:

- Nausea, vomiting (reduced when taken with a meal)
- Diarrhea
- Headache
- Skin eruptions and itching of pals, soles of feet and scalp.
- Impaired visual accommodation.

Serious side effects are rare, but may occur with long-term use. Periodic evaluation is recommended if chloroquine is used on a long-term basis.

MEFLOQUIN (Larium)

This drug is used for prophylaxis and treatment of malaria. It is not recommended as prophylactic for the general population as its indiscriminate use could create drug resistance. Many side effects such as gastrointestinal disturbances and dizziness tend to be transient and self-limited. Initial anxieties about this drug have diminished and it is now acceptable to recommend adult use of 250 mg weekly for periods of 12 months (not normally more than one year).

It should however not be taken by the following people:

- Pregnant women or for three months prior to conception

- Children weighing under 15 kg

- Patients with a history of epilepsy and psychiatric disorders
- Those with seizure disorders
- Those with cardiac conduction abnormalities
- Those suffering from depression
- People who require fine co-ordination e.g. pilots (it may interfere with fine motor-co-ordination.)
- People using the following medication: beta-blocker, calcium channel blockers, digitalis, or cyclic antidepressant therapy

Some of the side effects include:

- Sleep disturbances
- Dizziness or disturbances of balance
- Gastrointestinal disturbances

(To a lesser effect)

- headache, joint pains, weakness, and visual disturbances
- Palpitations, slow or irregular pulse
- Psychological changes e.g. depressive mood, confusion, anxiety, hallucinations, and paranoid reactions

NB If mefloquine is used for prophylaxis; halofantrine (Halfan) should not be used as treatment since it may lead to potentially fatal prolongation of the QTC interval.

PROQUANIL (Paludrine)

Proquanil is no longer recommended on it's own as widespread resistance has developed. It is however used in combination with chloroquine in areas where chloroquine resistant malaria exists.

It is considered to be one of the best tolerant anti-malarial drugs. It has a very good safety profile and can be used during pregnancy and for children.

Proquanil rarely causes side effects at prophylactic doses. These side effects include mouth ulcers, hair loss, vomiting and abdominal discomfort.

DOXYCYCLINE (e.g. Vibramycin, Doryx)

Doxycycline is a useful and effective prophylactic for people who travel to chloroquine resistant areas and can be used as an alternative when mefloquine or proquanil are unavailable or contra-indicated.

Doxycycline is usually well tolerated and the most common side effects are: gastrointestinal disturbances such as nausea and diarrhea, photosensitivity, various dermatological reactions and vaginal candidiasis.

It is not recommended for longer than 8 weeks. It is contra-indicated in pregnancy, children under 8 years of age, and in breast-feeding mothers.

Diagnosis

The most important element in the early diagnosis of malaria is a high index of suspicion. Any person, resident in or returning from a malaria area, who presents with fever and flu-like symptoms, should be tested for malaria.

The initial confirmation of malaria infection may be simplified by the availability of three rapid identification tests:

- Parasite-F - a plasma reagent dipstick, and
- ICT Malaria P.f. – a rapid immuno-chromatographic test
- ICT Malaria P.f./P.v. – now can test other strains of malaria as well.

The first two tests are only suitable for P. falciparum and the latter one for both P. falciparum and P. vivax. It has have been used with great success in detecting malaria cases. It should however be noted that these tests should not be used to determine treatment response, as the tests can remain positive after successful treatment for up to three weeks.

In the majority of cases, examination of blood smears will reveal malaria parasites. One cannot exclude malaria by a single negative blood film, for which at least three, taken at intervals during fever peaks, must be examined.

Another technique for identifying parasites is the quantitative buffy coat (QBC) technique. It make use of the fact that parasitized red blood cells have a different gravity from those red blood cells without parasites and can therefore be looked for in a particular segment of the blood in a centrifuged capillary tube. It also stains the parasites with a fluorescent dye. The positive yield is then substantially higher than the blood film technique.

Other laboratory examinations that can assist in the diagnosis and monitoring of the course of the infection are:

- Full blood count (including platelets)
- C-Reactive protein
- % of red blood cells infected
- Urine dipsticks (urobilinogen, protein, blood)
- LDH - blood

Follow-up blood-smear: It is recommended that a follow-up blood smear be taken 2-3 weeks after the completion of treatment to confirm elimination of the P. falsiparum parasites. (Both the Parasite-F and ICT Malaria P.f./P.v tests remain positive for up to three weeks after successful therapy of P. falsiparum infection).

Stand-by Treatment

Stand-by treatment should only be used if a person develops symptoms of malaria where no prompt medical attention is available. Once he/she has used the stand-by treatment, medical help should be sought as soon as possible.

Stand-by treatment – Adults

Degree of drug resistance	Standby treatment
No chloroquine resistance	If the risk of contracting malaria is low the traveler/employee may not need to take prophylaxis (however not recommended). Chloroquine can then be used for standby treatment. If chloroquine has been used for prophylaxis, use pyrimethamine-sulfadoxine (Fansidar) for treatment. Fansidar cannot be used if someone is allergic to "sulfas".
Degree of resistance	**Standby treatment**
Some resistance, where Chloroquine and proquanil are the first choice for prophylaxis	Pirimethamine-sulfadoxine (Fansidar) or mefloquine ("Larium") or quinine.
Areas with multi-drug resistance where mefloquine is first choice prophylaxis	Quinine with tetracycline or Fansidar.
Areas with very high drug resistance, where doximycin is first-choice prophylaxis.	Quinine with tetracycline.

Where no medical facilities are available, e.g. traveling geologists, Medical Services International advises Fansidar (assuming no allergies to "Sulphas"). The use of Halofantrine (Halfan) as a standby treatment must be actively discouraged.

INFORMATION ON ANTI-MALARIA DRUGS USED IN "STAND-BY TREATMENT"

CHLOROQUINE

Dose: 600mg on days 1 & 2, and 300mg on day 3 (Usually 4 tablets on days 1 & 2, and 2 tablets on day 3). Resistance is more common than Fansidar. Dizzyness and double vision is a common side effect.

SULPHADOXINE / PYRIMETHAMINE (FANSIDAR)

Although resistance does exist to this drug, it still offers advantages over other treatment in that it is administered as a single dose.

Dose - *Adults.* Three (3) tablets taken as a once-only dose

Dose – *Children*

< 1 year ----- ¼ tablet as a once-only dose
1 – 3 years ----- ½ tablet as a once-only dose

4-8 years	-----	1 tablet as a once-only dose
9-14 years	-----	2 tablets as a once-only dose
> 14 years	-----	3 tablets as a once-only dose

QUININE SULPHATE (QUININE)

Quinine is not recommended for stand-by treatment. Since major side effects can occur, it should not be used without a medical practitioner's supervision. Quinine toxicity presents with central nervous system (CNS) and cardiovascular (CVS) disturbances. Visual and auditory disturbances are most common CNS manifestations and cardiovascular abnormalities include low blood pressure, heart block and arrhythmia's. These can often be confused with severe (complicated) malaria. Quinine 600 mg 8 hourly should be given for 5-7 days in the treatment of malaria, but the side effects may not be tolerated for this length of time. A minimum course of 3 days is recommended.

MEFLOQUINE - "Lariam"

DoNewmonte: 500 mg (2 tablets) twice, with a 6-hour interval (15 mg/kg). There is a significant risk of neuropsychiatric side effects and this regime is therefore not recommended by Medical Services International.

HALOFANTINE (HALFAN) (NB - use with caution)

The use of halofantrine "Halfan" as a stand-by treatment is not recommended as it prolongs the QT interval (electrocardiogram - ECG) and can cause arrhythmias in susceptible individuals (fatalities have occurred). It should only be used after consultation with and under supervision of a doctor.

- Halofantrine should be administered on an empty stomach to prevent toxicity, since its administration with a fatty meal has shown to increase the rate of absorption six-fold. A significant breakthrough rate in non-immune individuals (new-comers to the tropics) after the recommended three-dose regime, necessitates an additional course one week after the initial therapy.

- **Halofantrine should not be used after mefloquine has been taken for chemoprophylaxis or treatment, due to the additive cardiotoxicity. It can lead to a fatality!** It should also not be used in-patients with known family history of QTC prolongation as this could result in a heart block.

- When used, the dose is as follows (on an empty stomach):

  - *Adults* Two tablets (500 mg) every 6 hours, for 3 doses.

  - *Children* Three doses of 8 mg / kg body weight at 6 hour intervals.

Various other treatment options exist such as Artesunate, Arthemeter, Amodiaquine, or combinations such as Artesunate plus lumifantrine (Coartem), etc., but this will be given to the patient as treatment at the discretion of the treating medical practitioner, and should not form part of the scope of this policy-guideline statement.

Conclusion

In conclusion – It is clear that despite major campaigns to eradicate malaria, the disease remains one of the most important health problems in Africa. This situation is further complicated by the socio-economic status in various countries and the ongoing conflicts that are present in many regions on the continent. All these factors and the increasing resistance to insecticides (vector) and drug resistance have significant implications on the approach to eradicate and control malaria.

Individual measures to prevent mosquito bites remain the mainstay of prophylaxis and people must be aware of the signs of malaria in order to seek medical treatment quickly.

Drug prophylaxis remains controversial and recommendations are constantly changing. It is also important to realize that no drug prophylaxis is 100 % effective – which again emphasizes the importance of personal protection measures. These measures can also be supported by large-scale community programs (education and vector control) aimed at control of the mosquito.

Where possible, each case must be assessed individually, rather than using a blanket recommendation. Too often individualized advice also gets advertised as a general recommendation in the employee community, which more often than not ends up being the wrong advice to somebody! It cannot be overstressed that a visit to the doctor in Ghana is important and the advice received there is made to that specific individual.

It is recommended that the malaria control program form part of an overall medical plan, developed to address specific needs as identified by the company.

APPENDIX A-2: HIV/AIDS POLICY

APPENDIX A-2

NGGL AND HIV/AIDS POLICY

I. PURPOSE AND PREAMBLE

The purpose of NGGL's HIV/AIDS program described below is to ensure a consistent and equitable approach to handling HIV/AIDS among NGGL employees and their families. NGGL management is conscious of the need to manage the social and economic consequences of HIV/AIDS on the company, and to reduce the risks of deteriorating health conditions and increasing HIV infection rates in the communities in the catchment areas of NGGL's Ahafo and Akyem mines.

HIV/AIDS is a pandemic that has far-reaching effects. Not only is it a public health challenge intertwined with complex social issues, AIDS is also a looming economic disaster in an increasingly globalized world. AIDS is a disease which shows no racial, gender or class boundaries. As of this date, there is no cure for the disease, and AIDS inevitably leads to death.

AIDS in Ghana is a growing concern, as the country is facing an increasing number of people infected and affected by the disease. The epidemic is having an impact on lives of all Ghanaians, and the public and private sector need to work together to prevent the spread of the disease, and develop compassionate ways of assisting those already infected. For this reason, NGGL believes it is necessary to set out a formal HIV/AIDS policy and develop programs for its workforce and the communities surrounding its mines.

The terms of the policy will be presented to employees for informational purposes only. They do not constitute or imply an employment contract between NGGL and an employee. The policy does not guarantee or ensure employment or continued employment for any employee. NGGL reserves the sole and exclusive right to interpret and apply its policy in the manner deemed appropriate. NGGL further reserves the right to change, modify, or revoke the policy at anytime and in any manner it deems appropriate. The company commits to reviewing the policy with its workers and taking into account their concerns. The policy will be reviewed annually and revised as necessary in the light of changing conditions and the findings of more information on how to reduce the impact of HIV/AIDS on NGGL's places of business in Ghana.

NGGL's workplace and community programs addressing HIV/AIDS are consistent with the company's philosophy of social license to operate in Ghana, and represent responsible responses to the threat of HIV/AIDS and the application of best practice to addressing the epidemic.

II. GUIDING PRINCIPLES FOR NGGL'S HIV/AIDS POLICY

NGGL respects the following principles that have guided the formulation of its policy. These are based on International Labour Organization (ILO) guidelines, best practice in the corporate world, and the recommendations of the Ghanaian government through its Ghana Aids Commission (GAC). These principles are:

1. HIV/AIDS is a workplace issue: NGGL recognizes that HIV/AIDS is a workplace issue, and should be treated like any other serious illness/condition at the company's places of business.

2. **Ensuring non-discrimination**: NGGL commits to ensuring that there should be no discrimination allowed or tolerated against workers on the basis of real or perceived HIV status.

3. Gender equality: NGGL recognizes that women are more likely to become infected by HIV and are more often adversely affected by the HIV/AIDS epidemic than men due to biological, socio-cultural and economic reasons.

4. A healthy work environment: NGGL's policy is to assure that the work environment be healthy and safe, so far as is practicable, for all concerned parties, in order to prevent transmission of HIV.

5. Social dialogue: NGGL recognizes that the successful implementation of its HIV/AIDS policy and programs requires cooperation and trust between management, workers and their representatives, and government, where appropriate, with the active involvement of workers infected and affected by HIV/AIDS.

6. Screening for HIV: NGGL recognizes that HIV/AIDS screening should not be required of job applicants or persons in employment, and rejects HIV testing as a precondition for recruitment or access to training or promotion.

7. Confidentiality: NGGL realizes that there is no justification for asking job applicants or workers to disclose HIV-related personal information, nor should co-workers be obliged to reveal such personal information about fellow workers. Access to personal data relating to a worker's HIV status should be bound by the rules of confidentiality.

8. Continuation of employment relationship: NGGL agrees that HIV infection is not a cause for termination of employment, and, as with many other conditions, persons with HIV-related illnesses should be able to work for as long as medically fit in available, appropriate work.

9. Preventing new infections: NGGL believes that HIV infection is preventable, and the prevention of all means of its transmission can only be achieved through a variety of strategies that are appropriately targeted, designed to Ghana-specific cultural realities, and communicated transparently to the NGGL workforce. Prevention can be furthered through changes in behavior, knowledge, treatment and the creation of a non-discriminatory environment.

10. Care and support: NGGL commits to assuring that all workers, including those who are HIV+, should be entitled to affordable health care services. NGGL will also provide directly, via insurance schemes or through a third party, anti-retroviral drugs, where medically appropriate.

III. WHO IS COVERED

NGGL is committed to maintaining a safe and healthy work environment for all employees at all its places of business in Ghana, and these policies apply to all full-time NGGL employees, at all company locations in Ghana.

IV. MONITORING AND EVALUATING NGGL'S HIV/AIDS POLICY AND PROGRAMS

1. NGGL HIV/AIDS Committee. NGGL will establish an HIV/AIDS committee to coordinate and implement its HIV/AIDS policy and programs. The committee will consist of employees representing all levels of the company, including general management in Accra and employees at the

mine sites.

2. Baseline data. In order to plan and evaluate its HIV/AIDS policy and programs effectively, NGGL will undertake surveys to establish baseline data regarding HIV infection rates at the mine sites, as well as regular risk and impact assessment studies. The surveys will include knowledge, attitudes and behavior/practices (KAP) and serological data. Studies will be carried out in consultation with, and with the consent of, employees and their representatives, and in conditions of complete confidentiality.

3. Communicating the policy. NGGL's corporate policy on HIV/AIDS and specific policies, and related information on HIV/AIDS, will be communicated to all NGGL employees, associated businesses and the wider public, using the full range of communication methods available to the Company and its network of contacts.

4. Reviewing the policy. This policy will be reviewed annually and revised as necessary in the light of changing conditions and the findings of surveys and studies

V. BASIC INFORMATION ON HIV/AIDS

1. What are HIV and AIDS? The Human Immunodeficiency Virus (HIV) is a virus that weakens the body's immune system, ultimately causing the Acquired Immune Deficiency Syndrome (AIDS). AIDS is a cluster of medical conditions, often referred to as opportunistic infections and cancers. To date, there is no cure for AIDS and HIV inevitably leads to the development of AIDS, and is almost always fatal.

2. How does HIV affect the body? HIV weakens the human body's immune system, making it difficult to fight infection. Without proper drug therapies, infected persons may live for ten years or more after HIV infection, much of this time without symptoms or sickness, although they can still transmit the infection to others.

3. What are the symptoms of AIDS? Early symptoms of AIDS include: chronic fatigue, diarrhea, fever, mental changes such as memory loss, weight loss, persistent cough, sever recurrent skin rashes, herpes and mouth infections, and swelling of the lymph nodes. Opportunistic diseases such as cancers, meningitis, pneumonia and tuberculosis may also take advantage of the body's immune systems weakened by HIV and are the main causes of death due to AIDS. Other diseases, such as typhoid fever, malaria, and hepatitis, can also be the cause of death for an HIV+ patient.

4. How is HIV transmitted? The transmission of HIV requires the exchange of bodily fluids containing the virus. HIV infection is transmitted in four ways, through:
Unprotected vaginal, anal or oral sexual intercourse with an infected partner;

- Blood and blood products via infected transfusion and organ or tissue transplants, or the sharing and use of contaminated injection (needle) or other skin-piercing instruments (razor blades, knives, needles) contaminated with HIV;
- Transmission from an infected mother to her child in the womb or at birth;
- Nursing with an infected mother's breast milk.

5. How is HIV NOT transmitted? HIV is not transmitted by everyday, casual physical contact with people at work, home, school or anywhere else, or by shaking hands. It is not transmitted by coughing, sneezing, tears or kissing, not by sharing toilet and washing facilities or clothes, nor by using eating utensils or consuming food and beverages handled by someone who has HIV. It is not spread by mosquitoes or other insect bites.

6. How to prevent HIV infection? Preventing HIV transmission can only be done by adopting specific behaviors. To reduce the risk of sexual transmission, one should:

- Get tested for HIV with his/her partner
- Postpone the age of initiating sexual activity
- Abstain from sexual intercourse when not with one's regular partner
- Reduce the number of sexual partners
- Use a latex condom

Health care workers should eliminate contact with blood by using protective materials. Needle, surgical knives and other skin-piercing instruments should be used only once, for only one person, and then discarded. Pregnant mothers should be encouraged to get tested for HIV infection, and, if they are HIV+, be assisted in receiving appropriate drug therapies before and after birth, and abstaining from breast feeding their new born babies.

7. How is AIDS treated? Currently there is no cure for AIDS, and treating the symptoms of AIDS is a complicated and multi-phased operation. HIV+ individuals should be given the opportunity to be evaluated for appropriate prophylaxis for opportunistic infections, and once they occur, opportunistic infections should be aggressively treated. The development of life-prolonging HIV/AIDS drugs (anti-retroviral therapies) can help an HIV+ individual live a longer and more productive life.

VI. NGGL'S COMMITMENTS

NGGL commits itself to the following provisions in ensuring that all NGGL employees understand and learn to deal with HIV/AIDS in the company's places of business throughout Ghana.

1. **NGGL commits** to assuring that non-discriminatory policies, procedures and practices regarding HIV+ workers are instituted and maintained.

2. **NGGL commits** to providing information and communication to its workers about the disease and how to prevent infection.

3. **NGGL commits** to treating HIV/AIDs in the same manner as any other progressive or debilitating illness.

4. **NGGL commits** to developing clearly-defined procedures that reflect Ghanaian practices, procedures, culture, and legislation.

VII. FEATURES OF NGGL'S HIV/AIDS POLICY

1. Creating a nondiscriminatory and caring environment. NGGL does not discriminate or tolerate discrimination against employees or job applicants on any grounds, including HIV status. While the company recognizes that there are circumstances unique to HIV infection, this policy rests on the principle that HIV infection and AIDS should be treated like any other serious condition or illness that may affect NGGL employees. Those employees with HIV may live full and productive lives for many years if the disease is managed.

NGGL employees who are HIV-positive will be protected against discrimination, victimization or harassment through the application of normal company disciplinary and grievance procedures, and the provision of information and education about HIV and AIDS to all company employees.

2. Employment opportunities and termination of employment. No employee should suffer adverse consequences, whether dismissal or denial of appropriate alternative employment opportunities, merely on the basis of HIV infection. NGGL will follow its guidelines for termination of employment arising from ill health/incapacity, when an employee no longer is able to work due to AIDS.

3. Testing. Testing an employee for the HIV virus will only be undertaken at his/her explicit consent. Such a request is to be submitted in writing by the relevant employee. The said employee is also to stipulate in his/her written consent who may be privy to the results of such a test.

NGGL promotes and will facilitate access to company and community-based Voluntary Testing and Counseling (VCT) services to all employees wishing to take advantage of the service. Pre- and post-test counseling services according to recognized guidelines will be provided by health personnel for employees wishing to be tested or for those who are infected with the virus.

Testing programs to establish local HIV prevalence will be the subject of appropriate consultation with recognized NGGL employee organizations, and will be subject to independent and objective evaluation and scrutiny. The results of epidemiological studies will not be used as a basis for discriminating against any class of NGGL employee in the workplace. All testing will comply with generally accepted international standards on pre- and post-test counseling, informed consent, confidentiality and support.

4. Confidentiality. NGGL recognizes the sensitive issues that surround HIV/AIDS and, therefore, undertakes to handle matters in a discreet and private manner. Where an employee with HIV has revealed his/her status to management, NGGL will keep the identity of the person confidential. However, in line with NGGL's philosophy of transparency, employees will be encouraged to be open about their HIV status.

At NGGL's clinics and offices, confidentiality of medical information is of utmost importance and will be assured. No flags, symbols or codes will be used on any employee's medical, personnel or other records to indicate his/her status. Only the employee and the medical officer or other qualified and authorized health workers are to have knowledge of the said employee's HIV status. It is the discretion of the employee to inform whomever else he/she wishes to.

Anyone found disclosing another person's HIV status without that person's explicit consent is liable for disciplinary action.

5. Information and communication: NGGL will facilitate the continuous education and awareness of its employees regarding HIV/AIDS by ensuring that:

- All NGGL employees will be offered time off to participate in educational programs in preventing HIV infection.
- Awareness and education programs will be conducted to inform NGGL employees about HIV and AIDS, and help them to protect themselves and others against infection. Programs will take into account the different needs of male and female employees, and some will include the families of employees and the local community.
- Employees and their representatives are involved in the planning and implementation of awareness, education and counseling programs, especially as peer educators and counselors.
- Practical measures to support behavioral change and risk management will include the treatment of sexually transmitted infections (STIs) and tuberculosis (TB) or referral to STI and TB treatment services in the community, sterile needle- and syringe-exchange programs and the distribution of male and female condoms.

6. Care and support for workers and their families: There will be no discrimination in the treatment of immediate members of NGGL employee's families: Solidarity, care and support should guide the

response to HIV/AIDS in the world of work. There should be no discrimination against them and their dependents in access to and receipt of benefits from statutory social security programs and occupational schemes.

- The promotion of employees' well being: The Company will treat employees who are infected or affected by HIV/AIDS with empathy and care. Consequently, the Company will provide all reasonable assistance, which may include counseling, time off, sick leave, family leave, and information regarding the virus and its effects.
- Work performance and reasonable accommodation: It is the policy of the Company to respond to the changing health status of employees by making reasonable accommodation. HIV+ employees may continue to work as long as they are able to perform their duties safely and in accordance with performance standards. If an employee with AIDS is unable to perform his/her tasks adequately, the manager or supervisor must resolve the problem according to the company's normal procedure on poor performance/ill-health.

7. Benefits. Employees living with HIV/AIDS will be treated no less favorably than staff with any other serious illness/condition, in terms of statutory and NGGL benefits and these include:

- Workplace compensation,
- Health and life insurance,
- Sick leave,
- Funeral and death benefits,
- Medical incapacitation, severance and other terminations,
- General bereavement policies, and
- Other available services.

NGGL will work to continually review and remodel its health-related employee benefits to meet the current and future HIV/AIDS impacts.

8. Comprehensive health care. Support and counseling services will be made available to all NGGL employees to prevent and manage HIV/AIDS-related symptoms and opportunistic infections, reproductive and sexual health services and advice on healthy living, including nutritional counseling and stress reduction. Where it is not practical or possible to provide such services, NGGL will help employees find appropriate services in the community. The NGGL HIV/AIDS program provides comprehensive healthcare, including:

- The syndromic approach to treating sexually-transmitted Infections (STI) in NGGL's and communities' health clinics.
- Voluntary counseling and testing for HIV for all employees.
- Employee wellness services and employee assistance.
- Condom availability and distribution.
- A commitment to provide access to anti-retroviral (ARV) drugs as they become affordable and available in Ghana, to treatment according to standard protocols, and to the appropriate treatment of opportunistic infections

9. Occupational HIV exposure: NGGL shall counsel and train all employees on ways to avoid exposure to HIV on the job. This shall include:

- Precautions regarding needles, sharp objects, and skin piercing,

- Supplying personal protective equipment for all health staff and enforce the practice of universal precautions on the job,
- Precautions regarding the handling and/or exposure to blood and other body fluids,
- For providers of first aid, providing all the necessary personal protective equipment and guidance for mouth-to-mouth resuscitation, and the respect of universal precautions,
- Make available the necessary medication to treat possible exposure to HIV in the workplace.

VIII. NGGL'S HIV/AIDS COMMITTEE

NGGL shall establish a company HIV/AIDS committee to coordinate and implement its HIV/AIDS policy and program at all of its places of business in Ghana. The committee should consist of representatives of top management, supervisors, workers, trade unions, human resources department, occupational health services, health and safety committee, and persons living with HIV/AIDS. Suggested steps in this process include:

1. The Committee will be either named or elected, and will decide its terms of reference and decision-making powers and responsibilities. The Committee draws up a budget, seeking funds from outside the enterprise, if necessary, and identifies existing resources in the local community. There will be one named HIV/AIDS coordinator/focal point to ensure implementation and action between Committee meetings.
2. The Committee assures that a review and update of relevant national laws and their implications for the enterprise are undertaken.
3. The Committee establishes what health and information services are already available, both in the workplace and in the local community: useful to avoid duplication.
4. The Committee reviews, edits and revises the draft NGGL HIV/AIDS Policy draft is circulated for comment, then revised and adopted.
5. The Committee assures that NGGL's policy on HIV/AIDS and specific policies, and related information on HIV/AIDS, will be communicated to all NGGL employees, associated businesses and the wider public, using the full range of communication methods available to NGGL and its network of contacts, through, for example, notice boards, mailings, pay slip inserts, special meetings, induction courses and training sessions, and programs of information, education and care are put in place.
6. The Committee establishes a plan of action, with timetable and lines of responsibility to implement the policy.
7. The Committee can mandate occasional behaviorial and/or serological surveys to establish baseline data on HIV. The committee may mandate regular risk and impact assessment studies. The survey will include knowledge, attitudes and behavior/practices. Studies will be carried out in consultation with, and with the consent of, employees and their representatives, and in conditions of complete confidentiality.
8. The Committee monitors the impact of the policy and revises it, as necessary.
9. The policy will be reviewed annually and revised as necessary in the light of changing conditions and the findings of surveys/studies. The Committee will oversee this process.

IX. NGGL POLICY GUIDELINES: HIV/AIDS IN THE WORKPLACE

The following 13 procedures will be followed by NGGL in implementing its HIV/AIDS policy at its places of business.

1. Recruitment: Many factors are taken into account in the selection of suitable applicants. The medical criterion for employment is fitness to fulfill the job requirements. The selection process

includes a medical examination designed to screen applicants. The screening is based on job-related criteria. NGGL will not routinely conduct pre-employment HIV screening for general recruitment, but may recommend testing for those individuals whose clinical examination or medical history suggest that testing is clinically required or those whose profession could put them at risk for HIV exposure. Such tests will only be done following counseling and consent of the individual.

2. Current employees: NGGL acknowledges that continued employment for an employee with a life threatening disease may sometimes be therapeutically important in the remission or recovery process or may prolong that employee's life. Employees who are aware that they have a life-threatening disease need only inform NGGL once they are unable to perform their tasks or if they are recommended to do so by a counselor or medical practitioner. As long as these employees are able to meet acceptable standards of work performance and work attendance and given the medical opinion indicating that their condition is not a threat to others, treatment of these employees should be sensitive, consistent and no different from treatment offered or given to other employees.

At the same time NGGL has an obligation to provide a safe working environment for all employees and customers. Thus appropriate precautions should be taken to ensure that an employee's condition does not present a health and/or safety threat to other employees or customers.

Granted that employees with HIV infection do not pose a threat to colleagues, it is expected that colleagues will work in the usual way with affected persons. The following conditions apply:

- An employee with HIV will be governed by the same contractual obligations as all other employees:
- HIV infection in itself will not be a justification for the non-performance of duties agreed between NGGL and the employee.
- An employee with HIV will not be dismissed on the basis of his/her HIV status, nor will it influence retrenchment procedures.

Consistent with NGGL's concern for an employee with a life threatening disease NGGL will provide:

- Advice on the rights of afflicted employees and their colleagues
- Education to employees and management on life-threatening diseases
- Referral to medical and other resources, such as counseling services
- Consultation with affected employees on suitable conditions of employment to assist them in managing their illness.

3. Counseling process. This is a process, which is very important in the initial management of the patient, and to serve its purpose adequately it should include both a pre and post-counseling service.

The pre-counseling serves as an opportunity for the health care provider to provide adequate information on the disease and the process that will go into the testing. This process will include enough and appropriate information so that the patient can give informed consent for the test. It is the counselor's duty to be able to gain the confidence of the patient and to ensure the confidentiality of the interview and the test results.

In the post-test counseling the result of the test will guide the interview. For a negative test the patient will be informed of the risk factors associated with HIV, the limitations of the test result and what precautions he should take to avoid risk factors. It should be emphasized that he returns for the follow up tests as and when required by the doctor.

For a positive test, the counselor must help the patient to accept the results. The patient must be informed of the disease process and plans to manage them. Patients who have recreationally acquired HIV may be referred to an HIV specialist and for anti-retroviral therapy at their own cost. It should be

advised that sexual partners are tested and counseled. Lifestyle changes will also need to be explained and emphasized. The patient should have a confirming test done and a repeat in two months.

The whole process must include empathy and ensure confidentiality. It should include a period for questioning by the patient. Follow up appointments should be arranged.

4. Testing of employees: HIV testing will not form part of the pre-employment medical examination. No employee will be obliged to undergo an HIV test. NGGL will only undertake testing for HIV at the written consent of the employee. Such tests will be paid for by NGGL, should an employees request to be tested, an appropriate pre and post-test counseling service will be made available by NGGL.

5. Guidelines for termination of employment arising from ill health/incapacity. Any person, in determining whether termination of employment arising from ill health is fair, should consider:

- Whether or not the employee is capable of performing the work.
- If the employee is not capable of performing work: The extent to which the employee is able to perform the work, and the extent to which the employee's work circumstances might be adapted to accommodate disability, or, where this is not possible, the extent to which the employee's duties might be adapted.

NGGL reserves the right to appoint a doctor to assess the effect an employee's illness has on his/her ability to work, as well as the risk (or lack thereof) to colleagues and customers.

6. Employees with AIDS-related diseases. In the case of an employee with HIV infection not being able to perform his/her duties, the following steps will be considered in consultation and by agreement with the employee:

- If the employee is temporarily unable to perform his/her duties, NGGL should investigate the extent of the incapacity.
- Ascertain the employee's status of fitness to work. If an employee's absence is unreasonably long (e.g. three months) NGGL should, in the first instance, investigate other alternatives to dismissal.
- In the process of the investigation in an employee's incapacity, the employee should be allowed the opportunity to state a case in response.
- NGGL will endeavor to find an alternative position for the employee that he/she is able to fulfill. The employee's remuneration will be adjusted according to the rates for the new position without discrimination. The employee will continue to be entitled to NGGL benefits, based on the benefits to which the employee was entitled to before the change in position was effected.
- In the case of certain kinds of incapacity, e.g., work-related, counseling and rehabilitation may be appropriate steps for NGGL to consider.
- Termination of employment will only be considered when the employee is too ill to continue employment or where no position suitable to the employee's state of health is available.

7. HIV clinical management: Patients with HIV related illnesses will be managed according to the severity of their illness and in accordance with current medical protocols for HIV/AIDS related illness and consistent with proven therapies and current industrial practice in Ghana.

8. HIV/AIDS prevention and education: NGGL will ensure the establishment of an AIDS surveillance program. The purpose of the program is to drive the educational process, to assist with testing and

counseling referrals, to keep abreast with developments, to reassess policy and to monitor the costs relating to the management of patients with HIV or AIDS.

- The program will be responsible for the dissemination of information, with an emphasis on the prevention of HIV/AIDS.
- Educational and prevention programs will be conducted at the workplace on a regular basis.
- Some of the programs will be conducted in vernacular (local language).
- Attendance at the educational programs would be encouraged.

9. Employees at risk: Health staff (including healthcare workers, first aiders, and mine rescue team members) who are involved in the treatment of employees may be at risk of being infected by HIV. However, this risk can be avoided by taking precautions or following infection control procedures.

Standard of operating procedure to ensure infection control regarding certain, specific tasks, will be provided, and must be adhered to by all health staff. NGGL will ensure that all health staff are educated regarding AIDS and HIV infection and that they understand and adhere to these standard operating procedures.

Health staff must treat all people as potential carriers of an infectious disease. All healthcare whether given by health staff must use universal precaution principles (as defined by World Health Organization Guidelines) as standard routine practice, when treating any patient.

10. Precautions regarding needles (sharp objects) and skin-piercing: It is important to restrict injections and other skin-piercing procedures to situations in which the indications are clearly and appropriately defined. In many situations medications are given orally. Reducing the number of unnecessary injection is therefore important in protecting the healthcare worker and the employee.

- NGGL will supply personal protective equipment for all health staff. Staff are required to wear disposable gloves when giving injections, which must then be discarded in disposal bins lined with plastic bags and disposed of according to recognized hazardous waste disposal protocol.
- All open wounds on hands and arms must be covered with a water-tight plaster or dressing.
- Standards procedures must be followed to reduce the risk of needle-stick and other injuries from sharp instruments, which must always be handled with extreme care. These methods include:
  - ✓ The handling of anything sharp must be reduced to a minimum.
  - ✓ To prevent needle-stick injuries, needles must not be recapped, bent, removed from disposable syringes, or otherwise manipulated by hand.
  - ✓ After use, needles and other sharp instruments must be placed in puncture-proof containers or needle incinerators located as close as possible to where they are to be used and then handled as infected material.
  - ✓ Hands must be washed thoroughly with soap and water immediately after removal of protective gloves.

11. Precautions regarding blood and other body fluids: Since blood and other body fluids are capable of transmitting HIV and other infectious agents, health staff and first aiders must always treat all blood and body fluids as if they were infectious.

- Healthcare staff and first aiders must wear disposable gloves for all direct contact with blood and other body fluids.
- Hands and other parts of the body that have been contaminated with blood or body fluids must be washed thoroughly with soap and water. Hands must also be washed immediately after removal of protective gloves.

- Spills of blood and other body fluids must be handled with care. Disposable gloves must be worn when cleaning up spills of blood and other body fluids. The area must first be flooded with an appropriate disinfectant (sodium hypochloride 0.5%). This may then be removed and the surface wiped again with disinfectant.
- Solid waste, such as dressings and disposable paper towels used to wipe up spills of blood and other body fluids, must be considered as infectious and treated by incineration or removed by a waste disposal company.
- Liquid waste, such as blood, excretions and secretions must be carefully disposed of in the sluice or toilet. Disposable gloves must be worn and hands must be washed thoroughly with soap and water after removing the gloves.
- Should mouth-to-mouth resuscitation be necessary mouthpieces, resuscitation bags or other resuscitation devices must be used.

12. Precautions in relation to first aid procedures: NGGL will provide all the necessary personal protective equipment in order to protect healthcare workers and first aiders. The person in charge of first aid boxes will be responsible for ensuring that these boxes contain the necessary personal protective equipment, at all times.

- Disposable gloves must be worn at all times when treating any employee. After having treated any employee the gloves must be disposed of and the hands washed thoroughly with soap and water.
- If a glove is torn whilst providing first aid treatment, the glove must be changed and the hands washed thoroughly as soon as the safety of the patient permits.
- If the injured employee or employees are bleeding profusely and blood splashes are likely, healthcare workers and first aiders must take additional precautions; this requires the wearing of protective glasses, a surgical mask, a gown or apron as well as disposable gloves. This equipment will be kept with first aid boxes.
- Should mouth-to-mouth resuscitation necessary, mouthpieces, resuscitation bags or other resuscitation devices must be used. These devices will be kept in all first aid boxes.
- Possible exposure to HIV in the workplace should be immediately reported to a supervisor and an incident report should be filed.
  - ✓ Important details to record include:
    Date/time of exposure,
    How the incident occurred,
    Name of probable infection source.
  - ✓ The exposed employee and the source should report to the mine clinic as soon as is practical after the incident.
  - ✓ Both parties involved will be offered counseling, and HIV testing. Informed consent should be obtained in the counseling process before undergoing any testing.
  - ✓ The exposed individual will be offered post exposure prophylaxis (PEP) consistent with the risk of infection and as described in separate standard medical protocols.

13. Colleagues of HIV-positive employees: Educational programs in the workplace informing employees of the facts of AIDS will assist and encourage appropriate work attitudes. Unless an HIV positive employee is acting in a threatening manner, it is not acceptable that colleagues refuse to work with that employee.

Should an employee, after reassurance and with all appropriate safety and health precautions being taken and supplied by NGGL, remain unwilling to work with the HIV positive employee and this refusal affects productivity, he/she will be warned that his/her reaction is unreasonable, medically unjustified and that disciplinary action may be taken against him/her.

Any colleague of an HIV positive employee who embarks on any form of discrimination towards that particular employee may be subjected to NGGL disciplinary procedure.

Signed
…s: Bill Zisch……

Bill Zisch
Managing Director

Date…10/06……./05
(June 10, 2005)

APPENDIX B

Bird Species

APPENDIX B

TABLE B-1. BIRD SPECIES RECORDED IN AHAFO PROJECT AREA			
Scientific Name	Common Name	Survey Sites	
		In Forest Reserves	Outside Forest Reserves
Milvus migrans	Black Kite	X	X
Gypohierax angolensis	Palm-nut Vulture	X	X
Polyboroides typus	African Harrier Hawk	X	X
Kaupifalco monogrammicus	Lizard Buzzard	X	X
Buteo auguralis	Red-necked Buzzard	X	X
Lophaetus occipitalis	Long-crested Eagle	--	X
Falco ardosiaceus	Grey Kestrel	--	X
Falco cuvierii	African Hobby	X	X
Francolinus ahantensis	Ahanta Francolin	X	X
Sarothrura pulchra	White-spotted Flufftail	X	--
Podica senegalensis	African Finfoot	X	
Treron calvus	African Green Pigeon	X	X
Turtur brehmeri	Blue-headed Wood Dove	X	--
Turtur tympanistria	Tambourine Dove	X	--
Turtur afer	Blue-spotted Wood Dove	X	X
Columba iriditorques	Western Bronze-naped Pigeon	X	--
Columba unicincta	Afep Pigeon	X	--
Streptopelia semitorquata	Red-eyed Dove	X	X
Psittacus erithacus	Grey Parrot	X	--
Poicephalus gulielmi	Red-fronted Parrot	X	X
Corythaeola cristata	Great Blue Turaco	X	--
Tauraco macrorhynchus	Yellow-billed Turaco	X	--
Pachycoccyx audeberti	Thick-billed Cuckoo	X	--
Cuculus clamosus	Black Cuckoo	X	X
Chrysococcyx cupreus	African Emerald Cuckoo	X	X
Chrysococcyx klaas	Klaas's Cuckoo	X	X

TABLE B-1. BIRD SPECIES RECORDED IN AHAFO PROJECT AREA			
Scientific Name	Common Name	Survey Sites	
		In Forest Reserves	Outside Forest Reserves
Ceuthmochares aereus	Yellowbill	X	--
Centropus leucogaster	Black-throated Coucal	X	--
Centropus senegalensis	Senegal Coucal	X	X
Bubo poensis	Fraser's Eagle Owl	X	--
Strix woodfordii	African Wood Owl	X	--
Rhaphidura sabini	Sabine's Spinetail	X	--
Telacanthura ussheri	Mottled Spinetail	X	X
Neafrapus cassini	Cassin's Spinetail	X	--
Apus apus	Common Swift	X	X
Apus affinis	Little Swift	X	--
Halcyon malimbica	Blue-breasted Kingfisher	X	X
Halcyon senegalensis	Woodland Kingfisher	X	X
Ceyx pictus	African Pygmy Kingfisher	X	X
Merops gularis	Black Bee-eater	X	--
Merops pusillus	Little Bee-eater	X	X
Merops albicollis	White-throated Bee-eater	X	X
Coracias abyssinicus	Abyssinian Roller	X	--
Eurystomus gularis	Blue-throated Roller	X	X
Eurystomus glaucurus	Broad-billed Roller	X	X
Phoeniculus castaneiceps	Forest Wood-hoopoe	X	--
Phoeniculus bollei	White-headed Wood-hoopoe	X	--
Tockus albocristatus	White-crested Hornbill	X	--
Tockus fasciatus	African Pied Hornbill	X	X
Tockus nasutus	African Grey Hornbill	X	X
Bycanistes fistulator	Piping Hornbill	X	--
Bycanistes cylindricus	**Brown-cheeked Hornbill**	X	--
Ceratogymna elata	Yellow-casqued Hornbill	X	--
Gymnobucco peli	Bristle-nosed Barbet	X	--

TABLE B-1. BIRD SPECIES RECORDED IN AHAFO PROJECT AREA			
Scientific Name	Common Name	Survey Sites	
		In Forest Reserves	Outside Forest Reserves
Pogoniulus scolopaceus	Speckled Tinkerbird	X	X
Pogoniulus atroflavus	Red-rumped Tinkerbird	X	--
Pogoniulus subsulphureus	Yellow-throated Tinkerbird	X	--
Pogoniulus bilineatus	Yellow-rumped Tinkerbird	X	X-
Tricholaema hirsuta	Hairy-breasted Barbet	X	--
Lybius vieilloti	Vieillot's Barbet	X	X
Trachyphonus purpuratus	Yellow-billed Barbet	X	--
Campethera maculosa	**Little Green Woodpecker**	X	--
Campethera nivosa	Buff-spotted Woodpecker	X	X
Campethera caroli	Brown-eared Woodpecker	X	--
Dendropicos lugubris	Melancholy Woodpecker	X	X
Dendropicos pyrrhogaster	**Fire-bellied Woodpecker**	X	X
Dendropicos goertae	Grey Woodpecker	X	X
Smithornis rufolateralis	Rufous-sided Broadbill	X	--
Hirundo semirufa	Red-breasted Swallow	X	--
Hirundo abyssinica	Lesser Striped Swallow	X	X
Hirundo preussi	Preuss's Cliff Swallow	X	--
Hirundo rustica	Barn Swallow	X	X
Motacilla flava	Yellow Wagtail	X	X
Anthus trivialis	Tree Pipit	X	--
Coracina azurea	Blue Cuckoo-Shrike	X	--
Andropadus virens	Little Greenbul	X	X
Andropadus gracilis	Little Grey Greenbul	X	--
Andropadus curvirostris	Cameroon Sombre Greenbul	X	--
Andropadus gracilirostris	Slender-billed Greenbul	X	--
Andropadus latirostris	Yellow-whiskered Greenbul	X	X

TABLE B-1. BIRD SPECIES RECORDED IN AHAFO PROJECT AREA			
Scientific Name	Common Name	Survey Sites	
		In Forest Reserves	Outside Forest Reserves
Calyptocichla serina	Golden Greenbul	X	--
Baeopogon indicator	Honeyguide Greenbul	X	--
Chlorocichla simplex	Simple Greenbul	X	X
Thescelocichla leucopleura	Swamp Palm Bulbul	X	X
Phyllastrephus icterinus	Icterine Greenbul	X	--
Phyllastrephus albigularis	White-throated Greenbul	X	--
Bleda syndactyla	Red-tailed Bristlebill	X	--
Bleda eximia	**Green-tailed Bristlebill**	X	--
Bleda canicapilla	Grey-headed Bristlebill	X	--
Criniger barbatus	Western Bearded Greenbul	X	--
Criniger calurus	Red-tailed Greenbul	X	--
Pycnonotus barbatus	Common Bulbul	X	X
Nicator chloris	Western Nicator	X	--
Saxicola rubetra	Whinchat	X	X
Alethe diademata	**White-tailed Alethe**	X	--
Neocossyphus finschii	Finsch's Flycatcher-Thrush	X	--
Acrocephalus arundinaceus	Great Reed Warbler	X	X
Hippolais polyglotta	Melodious Warbler	--	X
Hippolais icterina	Icterine Warbler	X	--
Eremomela badiceps	Rufous-crowned Eremomela	X	--
Sylvietta virens	Green Crombec	X	X
Sylvietta denti	Lemon-bellied Crombec	X	--
Phylloscopus sibilatrix	Wood Warbler	X	X
Macrosphenus kempi	**Kemp's Longbill**	X	--
Macrosphenus concolor	Grey Longbill	X	X
Hyliota violacea	Violet-backed Hyliota	X	--
Hylia prasina	Green Hylia	X	X

TABLE B-1. BIRD SPECIES RECORDED IN AHAFO PROJECT AREA			
Scientific Name	Common Name	Survey Sites	
		In Forest Reserves	Outside Forest Reserves
Cisticola erythrops	Red-faced Cisticola	X	X
Cisticola lateralis	Whistling Cisticola	X	X
Prinia subflava	Tawny-flanked Prinia	X	X
Heliolais erythroptera	Red-winged Warbler	X	--
Apalis sharpii	**Sharpe's Apalis**	X	--
Camaroptera brachyura	Grey-backed Camaroptera	X	X
Camaroptera superciliaris	Yellow-browed Camaroptera	X	--
Camaroptera chloronota	Olive-green Camaroptera	X	--
Muscicapa caerulescens	Ashy Flycatcher	X	X
Muscicapa epulata	Little Grey Flycatcher	X	--
Myioparus griseigularis	Grey-throated Tit-Flycatcher	X	--
Erythrocercus mccallii	Chestnut-capped Flycatcher	X	--
Trochocercus nitens	Blue-headed Crested Flycatcher	X	--
Terpsiphone rufiventer	Red-bellied Paradise-Flycatcher	X	--
Bias musicus	Black-and-White Flycatcher	X	X
Dyaphorophyia castanea	Chestnut Wattle-eye	X	--
Illadopsis fulvescens	Brown Illadopsis	X	--
Anthoscopus flavifrons	Forest Penduline Tit	X	--
Pholidornis rushiae	Tit-hylia	X	--
Anthreptes seimundi	Little Green Sunbird	X	X
Cyanomitra cyanolaema	Blue-throated Brown Sunbird	X	--
Cyanomitra obscura	Western Olive Sunbird	X	X
Chalcomitra adelberti	**Buff-throated Sunbird**	X	X
Hedydipna collaris	Collared Sunbird	X	X

TABLE B-1. BIRD SPECIES RECORDED IN AHAFO PROJECT AREA			
Scientific Name	Common Name	Survey Sites	
		In Forest Reserves	Outside Forest Reserves
Cinnyris chloropygia	Olive-bellied Sunbird	X	X
Cinnyris superba	Superb Sunbird	X	X
XZosterops senegalensis	Yellow White-eye	X	X
Tchagra australis	Brown-crowned Tchagra	X	--
Tchagra senegala	Black-crowned Tchagra	--	X
Dryoscopus sabini	Sabine's Puffback	X	--
Prionops caniceps	Red-billed Helmet-Shrike	X	--
Oriolus nigripennis	Black-winged Oriole	X	--
Dicrurus modestus	Velvet-mantled Drongo	X	X
Corvus albus	Pied Crow	X	X
Onychognathus fulgidus	Forest Chestnut-winged Starling	X	--
Lamprotornis splendidus	Splendid Glossy Starling	X	X
Malimbus scutatus	Red-vented Malimbe	X	--
Malimbus malimbicus	Crested Malimbe	X	--
Malimbus nitens	Blue-billed Malimbe	X	X
Malimbus rubricollis	Red-headed Malimbe	X	X
Ploceus nigricollis	Black-necked Weaver	X	X
Ploceus nigerrimus	Vieillot's Black Weaver	X	X
Ploceus tricolor	Yellow-mantled Weaver	X	--
Ploceus preussi	Preuss's Weaver	X	--
Quelea erythrops	Red-headed Quelea	X	X
Euplectes franciscanus	Northern Red Bishop	--	X
Euplectes hordeaceus	Black-winged Bishop	X	X
Nigrita canicapillus	Grey-crowned Negrofinch	X	--
Nigrita fusconotus	White-breasted Negrofinch	X	--
Lagonosticta rubricata	African Firefinch	X	X
Estrilda melpoda	Orange-cheeked Waxbill	X	X

TABLE B-1. BIRD SPECIES RECORDED IN AHAFO PROJECT AREA			
Scientific Name	**Common Name**	**Survey Sites**	
		In Forest Reserves	**Outside Forest Reserves**
Spermestes cucullatus	Bronze Mannikin	X	X
Spermestes bicolor	Black-and-White Mannikin	X	--
Vidua macroura	Pin-tailed Whydah	X	X
Species in Bold are considered Upper Guinea Forest Block endemics			
Source: SGS Environment 2005			

APPENDIX C

Surface Water Quality

TABLE C-1
SUMMARY OF SURFACE WATER DATA
FIELD MEASUREMENTS AND PHYSICAL PARAMETERS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Lab pH	Lab Conductivity (umhos/cm)	True Color (color units)	Lab Turbidity (NTU)	Total Dissolved Solids (mg/L)	Total Suspended Solids (mg/L)
Standards*		**5.0 - 9.0**	**500**	**150**	**5**	**500****	**50**
Suraw/Suntim Sub-Basin							
KSW-11	9/1/1999	7.5	33.5	30	<0.1	228	1
KSW-11	10/1/1999	7.4	33.6	--	28	232	3.3
KSW-11	11/1/1999	7.5	34.8	--	<0.1	232	3.8
KSW-11	12/1/1999	7.1	43.6	--	60	277	7.8
KSW-11	1/1/2000	7.5	49.8	--	1	349	16.8
KSW-11	2/1/2000	7.3	60.7	--	20	360	137
KSW-11	8/1/2000	--	--	--	--	--	--
KSW-11	12/1/2000	6.8	30.9	--	60	216	20.4
KSW-11	6/1/2003	7.7	15.6	5	3.7	105	19
KSW-11	10/1/2003	7.2	32.9	<5	18	210	11.2
KSW-11	4/1/2004	7.1	23.5	--	8.6	168	23.1
KSW-12	9/1/1999	7.3	24.6	30	<0.1	194	2.1
KSW-12	10/1/1999	6.9	20.7	--	105	128	4.7
KSW-12	11/1/1999	7.6	27.8	--	7.5	199	6.6
KSW-12	12/1/1999	6.8	30.9	--	60	216	20.4
KSW-12	8/1/2000	--	--	--	--	--	--
KSW-12	6/1/2003	7.5	29.9	<5	1.8	188	2.2
KSW-12	10/1/2003	7.0	28.1	<5	3.7	196	3.8
KSW-12	4/1/2004	7.0	23.9	--	3.3	184	15.9
NSW-1	8/1/2000	--	--	--	--	--	--
NSW-1	11/1/2000	6.9	31.7	30	26	222	5.3
NSW-1	12/1/2000	--	--	--	--	--	--
NSW-1	6/1/2003	7.4	28.6	<5	1.6	200	2.2
NSW-1	10/1/2003	6.9	26.8	5	3.8	164	3.8
Tano River							
KSW-1	11/1/1998	7.2	12.6	--	8	110	12.7
KSW-1	12/1/1998	7.1	13.1	--	4.9	102	4.6
KSW-1	1/1/1999	6.9	11	--	1	87	0.1
KSW-1	2/1/1999	7.1	13.2	--	<0.1	97	0.2
KSW-1	4/1/1999	7.2	20.3	--	165	161	0.1
KSW-1	5/1/1999	6.9	15.5	--	180	123	23.7
KSW-1	6/1/1999	7.0	14.3	150	630	141	34.7
KSW-1	7/1/1999	7.0	16.8	--	61	161	1.2
KSW-1	8/1/1999	7.3	13.5	--	23	94	1.2
KSW-1	9/1/1999	7.4	18.3	30	14	109	17.4
KSW-1	10/1/1999	7.2	18.6	--	140	132	10
KSW-1	11/1/1999	7.3	15.4	--	145	108	10.3
KSW-1	12/1/1999	6.8	12.8	--	90	92	13
KSW-1	1/1/2000	7.1	11.2	--	16	77.5	11.1
KSW-1	2/1/2000	6.9	13.1	--	13	91	17.7
KSW-1	8/1/2000	--	--	--	--	--	--
KSW-1	6/1/2003	7.6	16.4	10	1.7	125	12.7
KSW-1	10/1/2003	6.7	18.1	30	7.6	135	8.5

TABLE C-1
SUMMARY OF SURFACE WATER DATA
FIELD MEASUREMENTS AND PHYSICAL PARAMETERS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Lab pH	Lab Conductivity (umhos/cm)	True Color (color units)	Lab Turbidity (NTU)	Total Dissolved Solids (mg/L)	Total Suspended Solids (mg/L)
Standards*		**5.0 - 9.0**	**500**	**150**	**5**	**500****	**50**
KSW-1	4/1/2004	7.2	13.7	--	14	103	21.8
KSW-1	5/1/2004	7.2	12.3	--	50	97	50.8
KSW-1	6/1/2004	7.2	14.1	--	20	108	22.1
KSW-1	7/1/2004	7.1	11.2	--	2.5	88	18.1
KSW-1	8/1/2004	7.1	11.8	--	2.7	74	11.8
KSW-1	9/1/2004	7.3	18.1	--	65	140	51
KSW-1	10/1/2004	7.5	20.6	--	9.1	156	28.2
KSW-1	11/1/2004	7.7	18.7	--	15	119	26.5
KSW-1	12/1/2004	7.6	12.2	--	9.5	67	22.8
KSW-1	1/1/2005	7.6	11.4	--	11.8	89	10.9
KSW-8	11/1/1998	7.3	12.1	--	7.4	107.3	11.1
KSW-8	12/1/1998	7.3	12.4	--	4.7	97	2.7
KSW-8	1/1/1999	7.0	10.1	--	1.6	80	0.1
KSW-8	2/1/1999	7.2	11.1	--	<0.1	79	0.1
KSW-8	4/1/1999	7.2	18.5	--	139	144	0.1
KSW-8	5/1/1999	7.0	17.8	--	240	142	15.6
KSW-8	6/1/1999	6.7	13.6	10	160	125	38.2
KSW-8	7/1/1999	7.1	16.6	--	182	174	3.8
KSW-8	8/1/1999	7.4	14.1	--	31	119	7.1
KSW-8	9/1/1999	7.5	17.8	30	180	160	23.9
KSW-8	10/1/1999	7.2	17.2	--	135	122	6.9
KSW-8	11/1/1999	7.4	15	--	91	112	25.5
KSW-8	12/1/1999	7.0	12.4	--	120	90	11.2
KSW-8	1/1/2000	7.2	10.4	--	22	73	9.2
KSW-8	2/1/2000	7.1	10.5	--	1	73	4.9
KSW-8	8/1/2000	--	--	--	--	--	--
KSW-8	9/1/2001	--	--	--	--	--	--
KSW-8	6/1/2003	7.6	15.6	10	4.7	105	19
KSW-8	11/1/2003	6.9	18.2	10	7.6	134	8.6
KSW-8	3/1/2004	7.1	13.2	--	75	80	58.6
KSW-8	5/1/2004	7.1	11.2	30	75	80	58.6
KSW-8	6/1/2004	7.4	12.3	--	25	92	29.4
KSW-8	7/1/2004	7.1	11.7	--	6	92	15.1
KSW-8	8/1/2004	7.2	10.7	--	3.3	81	10
KSW-8	9/1/2004	7.2	17.3	--	7.5	128	37.6
KSW-8	10/1/2004	7.5	20.7	--	4.7	159	9.9
KSW-8	11/1/2004	7.7	17.6	--	8	114	24.7
KSW-8	12/1/2004	7.6	11.8	--	7.4	73	23.2
KSW-8	1/1/2005	7.7	10.7	--	20	85	29.6
Subri Sub-Basin							
KSW-2	11/1/1998	7.0	33.5	--	0.2	235.4	26
KSW-2	12/1/1998	6.2	33	--	6.3	213	14.1
KSW-2	1/1/1999	6.9	37.2	--	3.8	233	2.1
KSW-2	2/1/1999	7.0	38	--	101.8	257	267.7

TABLE C-1
SUMMARY OF SURFACE WATER DATA
FIELD MEASUREMENTS AND PHYSICAL PARAMETERS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Lab pH	Lab Conductivity (umhos/cm)	True Color (color units)	Lab Turbidity (NTU)	Total Dissolved Solids (mg/L)	Total Suspended Solids (mg/L)
Standards*		**5.0 - 9.0**	**500**	**150**	**5**	**500****	**50**
KSW-2	4/1/1999	6.7	19.8	--	73.5	184	0.1
KSW-2	5/1/1999	7.0	33.3	--	13	213	0.2
KSW-2	6/1/1999	7.3	31.6	30	12	221	32.6
KSW-2	7/1/1999	7.1	27.9	--	124	194	1.1
KSW-2	8/1/1999	7.1	28.1	--	7.6	129	6.2
KSW-2	9/1/1999	7.5	24.6	30	100	141	33.6
KSW-2	10/1/1999	7.0	19.8	--	20	138	22.9
KSW-2	11/1/1999	7.4	27.6	--	115	198	12.2
KSW-2	12/1/1999	6.7	30.3	--	31	203	14.7
KSW-2	1/1/2000	7.2	38.9	--	14	272	51.8
KSW-2	8/1/2000	--	--	--	--	--	--
KSW-2	6/1/2003	7.5	23.4	30	8.2	175	10.1
KSW-2	10/1/2003	6.7	23.4	30	80	171.5	24.9
KSW-2	5/1/2004	6.9	15.3	--	45	118	64.5
KSW-2	6/1/2004	7.4	22.5	--	14	169	10.3
KSW-2	7/1/2004	7.3	26.2	--	3.2	186	9.8
KSW-2	8/1/2004	7.0	29.1	--	0.5	176	14.7
KSW-2	9/1/2004	7.3	23	--	85	172	46.5
KSW-2	10/1/2004	7.4	18.6	--	50	124	43.5
KSW-2	11/1/2004	7.7	19.9	--	65	138	66
KSW-2	12/1/2004	7.7	27.6	--	9	168	15.6
KSW-2	1/1/2005	7.6	30.2	--	28	186	68
KSW-3	11/1/1998	7.2	40.3	--	7.7	270.2	8.1
KSW-3	12/1/1998	7.1	35.1	--	3.2	224	0.3
KSW-3	1/1/1999	7.1	42.9	--	2	242	0.1
KSW-3	2/1/1999	7.2	38.2	--	125.5	257	33.6
KSW-3	4/1/1999	6.7	27.9	--	8.3	224	0.2
KSW-3	5/1/1999	6.9	20.7	--	27	1520	20
KSW-3	6/1/1999	7.0	35.6	5	37	310	41.9
KSW-3	7/1/1999	6.9	32.5	--	13	221	0.1
KSW-3	8/1/1999	7.2	33.8	--	1.9	45	1.1
KSW-3	9/1/1999	7.3	23.5	30	55	193	2.5
KSW-3	10/1/1999	6.6	14.7	--	41	100	29
KSW-3	11/1/1999	7.6	32.9	--	3.5	224	5.4
KSW-3	12/1/1999	7.0	37	--	32	241	7.8
KSW-3	1/1/2000	7.3	42.6	--	11	276	16.7
KSW-3	8/1/2000	--	--	--	--	--	--
KSW-3	6/1/2003	7.0	13.6	30	17	111	38.4
KSW-3	10/1/2003	6.5	25.5	30	5.5	183	14.7
KSW-3	1/1/2004	7.2	41	--	1.3	243	17.4
KSW-3	4/1/2004	6.8	28.3	--	3	192	63.9
KSW-3	5/1/2004	6.8	20.7	--	27	152	20
KSW-3	6/1/2004	7.0	23.7	--	3.8	167	7.1
KSW-3	7/1/2004	7.1	33.9	--	2	235	16.6

TABLE C-1
SUMMARY OF SURFACE WATER DATA
FIELD MEASUREMENTS AND PHYSICAL PARAMETERS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Lab pH	Lab Conductivity (umhos/cm)	True Color (color units)	Lab Turbidity (NTU)	Total Dissolved Solids (mg/L)	Total Suspended Solids (mg/L)
Standards*		**5.0 - 9.0**	**500**	**150**	**5**	**500****	**50**
KSW-3	8/1/2004	7.0	40	--	0.9	235	32.7
KSW-3	9/1/2004	7.0	19.9	--	36	142	39.5
KSW-3	10/1/2004	7.3	15.7	--	18	121	16.1
KSW-3	11/1/2004	7.5	25.5	--	6.1	165	5.3
KSW-3	12/1/2004	7.8	37.3	--	1.2	230	9.4
KSW-3	1/1/2005	7.7	47.9	--	1.8	282	18.7
KSW-5	5/1/1999	7.0	32.4	--	45	216	29.3
KSW-5	6/1/1999	7.4	54	15	9.6	456.5	0.1
KSW-5	7/1/1999	7.3	54.6	--	4	328	0.1
KSW-5	8/1/1999	7.3	42.5	--	4.6	248	1.2
KSW-5	9/1/1999	7.5	46.6	10	3.4	290	2.5
KSW-5	10/1/1999	7.1	28	--	18	198	24.9
KSW-5	11/1/1999	7.8	60	--	3.5	378	17.1
KSW-5	8/1/2000	--	--	--	--	--	--
KSW-5	6/1/2003	7.3	41.6	10	2.9	260	18.7
KSW-5	10/1/2003	6.8	49.1	10	2	326	23.9
KSW-5	6/1/2004	7.4	34	--	1.6	233	10.4
KSW-5	9/1/2004	7.5	34.8	--	26	223	36.5
KSW-5	10/1/2004	7.6	28.5	--	20	200	16.8
KSW-5	11/1/2004	7.7	52	--	18	286	26.3
KSW-6	7/1/1999	7.2	58	--	54	298	1.9
KSW-6	9/1/1999	7.5	43.6	10	3.9	283	2.7
KSW-6	10/1/1999	6.8	15.5	--	340	107	84.4
KSW-6	8/1/2000	--	--	--	--	--	--
KSW-6	6/1/2003	7.2	28	10	7.1	208	52.3
KSW-6	5/1/2004	6.9	16.3	--	150	122	169.4
KSW-9	12/1/1998	6.9	41.7	--	0.1	247	0.1
KSW-9	1/1/1999	6.6	39.5	--	<0.1	223	0.1
KSW-9	2/1/1999	6.8	38.1	--	5.4	233	0.1
KSW-9	4/1/1999	6.6	36.1	--	1.1	196	0.1
KSW-9	5/1/1999	6.6	36	--	<0.1	210	0.1
KSW-9	6/1/1999	6.8	18.4	15	40	140	17.6
KSW-9	7/1/1999	6.9	24.1	--	5	144	6.1
KSW-9	8/1/1999	6.3	24.3	--	19	138	21.4
KSW-9	10/1/1999	6.2	31.6	--	16	189	34.4
KSW-9	1/1/2004	6.7	10	--	10.1	67	9.2
KSW-9	4/1/2004	7.2	11.8	--	2.8	84	15.2
KSW-13	9/1/1999	7.1	18.8	30	3.1	166	45.3
KSW-13	10/1/1999	6.5	10.6	--	346	71	56.8
KSW-13	11/1/1999	7.0	24.6	--	160	182	10.9
KSW-13	12/1/1999	6.7	22.1	--	55	163	12.1
KSW-13	8/1/2000	--	--	--	--	--	--
KSW-13	10/1/2000	6.5	23.5	30	240	164	19.3
KSW-13	11/1/2000	6.8	24.5	10	200	163	6.6

TABLE C-1
SUMMARY OF SURFACE WATER DATA
FIELD MEASUREMENTS AND PHYSICAL PARAMETERS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Lab pH	Lab Conductivity (umhos/cm)	True Color (color units)	Lab Turbidity (NTU)	Total Dissolved Solids (mg/L)	Total Suspended Solids (mg/L)
Standards*		**5.0 - 9.0**	**500**	**150**	**5**	**500****	**50**
KSW-13	4/1/2004	6.6	14.2	--	8	131.5	42.4
KSW-13	5/1/2004	7.0	13.2	--	34	88	25.1
KSW-13	9/1/2004	6.9	19.3	--	60	132	34
KSW-13	10/1/2004	7.3	14.5	--	17	116	20.7
KSW-13	11/1/2004	7.3	21.7	--	9.1	149	17.3
NSW-6	10/1/2000	7.0	25.4	30	50	175	10.5
NSW-6	11/1/2000	7.1	25.7	10	38	170	20.3
NSW-6	12/1/2000	--	--	--	--	--	--
NSW-6	5/1/2004	7.2	15.9	--	32	125	8.7
NSW-6	6/1/2004	7.4	22.6	--	5.6	176	9.5
NSW-6	7/1/2004	7.1	20	--	17	144	18.7
NSW-6	8/1/2004	7.2	24	--	1.7	154	6.1
NSW-6	9/1/2004	7.5	24.3	--	60	190	33
NSW-6	10/1/2004	7.6	20.4	--	40	156	26.1
NSW-6	11/1/2004	7.9	27.9	--	21	150	27.8
NSW-6	12/1/2004	7.9	27	--	10.8	161	18.7
NSW-6	1/1/2005	7.8	27.3	--	20	204	12.6
NSW-8	6/1/2004	7.4	22.3	--	6.7	172	11.5
NSW-8	7/1/2004	7.3	26.6	5	6	191	7.4
NSW-8	8/1/2004	7.2	29.4	--	1.1	177	12.1
NSW-8	9/1/2004	7.4	20.3	--	80	166	33.4
NSW-8	10/1/2004	7.5	19.2	--	33	152	29.3
NSW-8	11/1/2004	7.8	22.4	--	21	142	12.8
NSW-8	12/1/2004	7.8	29	--	3.7	155	10.6
NSW-8	1/1/2005	7.7	30.9	--	32	205	112.8
NSW-9	5/1/2004	6.9	15.3	150	0.5	121	12.9
NSW-9	10/1/2004	7.4	14.8	--	28	108	19
NSW-9	11/1/2004	7.4	28.1	--	3	161	6.8
Awonsu Sub-Basin							
KSW-7	4/1/1999	6.4	44.1	--	22	335	214.4
KSW-7	5/1/1999	6.6	34.9	--	38	227	0.2
KSW-7	7/1/1999	6.8	35.9	--	100	246	21.5
KSW-7	8/1/1999	7.0	41.8	--	19	281	454.9
KSW-7	9/1/1999	7.3	27.7	30	60	179	10.9
KSW-7	10/1/1999	6.6	13.8	--	385	89	96.9
KSW-7	11/1/1999	7.5	40	--	6	268	10.8
KSW-7	12/1/1999	7.0	43.1	--	34	264	23.1
KSW-7	8/1/2000	--	--	--	--	--	--
KSW-7	6/1/2003	7.1	35.8	10	10	244	74.4
KSW-7	5/1/2004	6.5	29.6	--	5.7	228	30.8
KSW-7	6/1/2004	7.1	34.1	--	2.3	212	8.2
KSW-7	7/1/2004	7.0	40.7	--	5	262	16.8
KSW-7	8/1/2004	7.1	48.6	--	6.4	283	16.7
KSW-7	9/1/2004	7.5	29.1	--	13	185	12.5

TABLE C-1
SUMMARY OF SURFACE WATER DATA
FIELD MEASUREMENTS AND PHYSICAL PARAMETERS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Lab pH	Lab Conductivity (umhos/cm)	True Color (color units)	Lab Turbidity (NTU)	Total Dis-solved Solids (mg/L)	Total Sus-pended Solids (mg/L)
Standards*		**5.0 - 9.0**	**500**	**150**	**5**	**500****	**50**
KSW-7	10/1/2004	7.3	12.8	--	39	100	71.5
KSW-7	11/1/2004	7.6	31.4	--	4.8	176	7.4
KSW-7	12/1/2004	7.8	45.5	--	2	266	7.6
KSW-7	1/1/2005	8.0	47.9	--	6.8	282	18.7
KSW-10	5/1/1999	6.9	20.6	--	1800	178	189.7
KSW-10	7/1/1999	7.1	54.6	--	9	347	57.7
KSW-10	8/1/1999	6.8	38.4	--	800	104	937
KSW-14	6/1/2004	6.8	22.8	--	4.9	172	28.8
KSW-14	8/1/2004	7.2	42.1	--	1.1	237	2.6
KSW-14	9/1/2004	7.3	30.3	--	11	194	9.8
KSW-14	10/1/2004	7.3	16	--	16	128	19.8
KSW-14	11/1/2004	7.1	26.7	--	15	173	12.1
KSW-14	12/1/2004	7.9	41.8	--	2.8	220	8.4
KSW-14	1/1/2005	7.8	46.1	--	4.7	255	6.9
KSW-15	6/1/2004	7.3	31.8	--	1.8	189	1.4
KSW-15	7/1/2004	7.2	39.1	--	0.5	228	3.1
KSW-15	9/1/2004	6.2	16.7	--	33	120	17.4
KSW-15	10/1/2004	7.5	18.6	--	25	146	25.2
KSW-15	11/1/2004	7.8	34.3	--	5.8	200	6.3
NSW-2	8/1/2000	--	--	--	--	--	--
NSW-2	11/1/2000	--	--	--	--	--	--
Ntotro Sub-Basin							
NSW-3	8/1/2000	--	--	--	--	--	--
NSW-3	11/1/2000	--	--	--	--	--	--
NSW-3	6/1/2003	7.6	65.1	<5	0.9	366	26.7
NSW-3	10/1/2003	6.9	54.7	10	1	302	20.5
NSW-3	6/1/2004	7.2	42.1	--	100	269	121.1
NSW-3	9/1/2004	7.2	38.6	--	90	265	71.1
NSW-3	10/1/2004	7.6	34.7	--	150	214	91
NSW-3	11/1/2004	7.9	51.4	--	31	290	41.5
Asuade Sub-Basin							
NSW-4	8/1/2000	--	--	--	--	--	--
NSW-4	11/1/2000	6.4	22.7	10	140	152	4.6
NSW-4	12/1/2000	--	--	--	--	--	--
NSW-7	11/1/2000	6.8	29.1	10	70	190	0.1
NSW-7	12/1/2000	--	--	--	--	--	--
NSW-7	1/1/2001	--	--	--	--	--	--
NSW-7	10/1/2003	6.6	32.2	30	6	198	31.4
NSW-7	5/1/2004	6.5	14.9	--	31	111	20.8
NSW-7	10/1/2004	7.0	11.6	--	110	90	125.9
NSW-7	11/1/2004	7.0	29.4	--	8.3	164	25.4
NSW-7	12/1/2004	7.2	35.4	--	21.1	225	67.5
Amama Sub-Basin							
NSW-5	8/1/2000	--	--	--	--	--	--

TABLE C-1
SUMMARY OF SURFACE WATER DATA
FIELD MEASUREMENTS AND PHYSICAL PARAMETERS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Lab pH	Lab Conductivity (umhos/cm)	True Color (color units)	Lab Turbidity (NTU)	Total Dissolved Solids (mg/L)	Total Suspended Solids (mg/L)
Standards*		**5.0 - 9.0**	**500**	**150**	**5**	**500****	**50**
NSW-5	11/1/2000	6.9	31.1	30	180	215	0.1
NSW-5	12/1/2000	--	--	--	--	--	--
NSW-5	6/1/2003	7.5	29	<5	2.3	217	3.7
NSW-5	10/1/2003	6.9	18.4	30	10	143	4.4
NSW-5	1/1/2004	6.7	46.6	--	3.1	272	162.2
NSW-5	4/1/2004	--	12.1	--	--	1.2	170
NSW-5	5/1/2004	7.0	14.5	--	25	111	15.1
NSW-5	6/1/2004	7.2	11.7	--	4.7	79	7.7
NSW-5	8/1/2004	7.1	24.9	--	1.9	199	14.8
NSW-5	9/1/2004	7.3	18.8	--	18	144	9
NSW-5	10/1/2004	7.5	21.4	--	16	171	19.4
NSW-5	11/1/2004	7.8	27.4	--	6.1	178	4.9
NSW-5	12/1/2004	7.7	29.1	--	2.2	179	3.9
NSW-5	1/1/2005	7.6	35.6	--	13	231	11.1

Notes:

<	Indicates analyte not detected above laboratory practical quantification limit (PQL)
--	Field data or laboratory samples were not collected or analyzed
(mg/L)	Milligrams per liter
(umhos/cm)	Micromhos per centimeter
(NTU)	Nephelometric Turbidity Unit
NE	Not Established
*	The surface water standards are the lowest of the drinking water standards from either the World Health Organization (WHO Guidlines for Drinking Water Quality, 3rd. edition), Ghana EPA, Nevada USA, or USEPA.
**	WHO Acceptability guidline or USEPA secondary standard for aesthetics.
	Shading indicates results above standards.

TABLE C-2
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR MAJOR IONS AND NUTRIENTS
AHAFO, GHANA
BASELINE STUDY

Site		Sample Date	Alkalinity Total (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Cyanide Free (mg/L)	Fluoride Undistilled (mg/L)	Hardness (mg/L)	Magnesium (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphate (mg/L)	Potassium (mg/L)	Silica (mg/L)	Sodium (mg/L)	Sulfate (mg/L)
Standards*			**NE**	**NE**	**250****	**0.07**	**1.5**	**300****	**NE**	**10**	**1.0**	**NE**	**NE**	**NE**	**200**	**250****
Suraw/Suntim Sub-Basin																
KSW-11	N	9/1/1999	140	26.9	8.2	--	--	133.1	16	<0.01	0.04	0.06	4.2	--	25.3	8
KSW-11	N	10/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-11	N	11/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-11	N	12/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-11	N	1/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-11	N	2/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-11	N	8/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-11	N	12/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-11	N	6/1/2003	137	25.9	7.9	--	--	126.9	15.1	0.44	<0.01	0.44	4.8	--	25	<0.1
KSW-11	N	10/1/2003	131	23.9	4.4	--	--	118.6	14.3	0.36	0.01	0.56	4.2	--	20	5
KSW-11	N	4/1/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-12	N	9/1/1999	100	19.7	2.7	--	--	86.3	9	<0.01	<0.01	0.22	4.1	--	27.7	10.5
KSW-12	N	10/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-12	N	11/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-12	N	12/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-12	N	8/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-12	N	6/1/2003	131	22.5	6	--	--	110.5	13.2	0.19	0.01	0.35	5.1	--	23	<0.1
KSW-12	N	10/1/2003	110	21.9	0.5	--	--	100.4	11.1	1.28	<0.01	0.49	4.8	--	20	4
KSW-12	N	4/1/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NSW-1	N	8/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NSW-1	N	11/1/2000	--	--	--	<0.01	--	101.6	--	<0.01	0.01	0.01	--	19.4	--	1.9
NSW-1	N	12/1/2000	--	--	--	0.01	--	--	--	--	--	--	--	--	--	--
NSW-1	N	6/1/2003	125	21.3	4	--	--	105.1	12.6	0.06	0.01	0.58	5.2	--	25	<0.1
NSW-1	N	10/1/2003	106	19.9	0.5	--	--	92.9	10.5	1.3	0.01	0.48	5	--	16	4.2
Tano River																
KSW-1	N	11/1/1998	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-1	N	12/1/1998	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-1	N	1/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-1	N	2/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE C-2
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR MAJOR IONS AND NUTRIENTS
AHAFO, GHANA
BASELINE STUDY

Site		Sample Date	Alkalinity Total (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Cyanide Free (mg/L)	Fluoride Undistilled (mg/L)	Hardness (mg/L)	Magnesium (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphate (mg/L)	Potassium (mg/L)	Silica (mg/L)	Sodium (mg/L)	Sulfate (mg/L)
Standards*			**NE**	**NE**	**250****	**0.07**	**1.5**	**300****	**NE**	**10**	**1.0**	**NE**	**NE**	**NE**	**200**	**250****
KSW-1	N	4/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-1	N	5/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-1	N	6/1/1999	42	8	7.3	--	--	50	7.3	<0.01	0.01	0.1	4.9	--	9.6	10.2
KSW-1	N	7/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-1	N	8/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-1	N	9/1/1999	74	14.8	3.6	--	--	53.4	4	<0.01	0.01	0.19	7.6	--	21.3	10.4
KSW-1	N	10/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-1	N	11/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-1	N	12/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-1	N	1/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-1	N	2/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-1	N	8/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-1	N	6/1/2003	60	12.7	0.5	--	--	51.5	4.8	1.07	0.02	0.93	6.6	--	9.2	<0.1
KSW-1	N	10/1/2003	62	13	0.5	--	--	52.6	4.9	1.18	<0.01	0.47	6	--	16	4
KSW-1	N	4/1/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-1	N	5/1/2004	38	8.9	0.5	<0.01	--	37	3.6	1.46	0.09	0.01	7	--	7.1	14.7
KSW-1	N	6/1/2004	--	9.4	0.5	<0.01	0.4	--	3.8	0.55	<0.01	--	6.1	--	10	9.9
KSW-1	N	7/1/2004	--	7.5	0.5	--	--	--	3.2	0.04	0.01	--	3.2	--	8.5	6.3
KSW-1	N	8/1/2004	42	7.3	1.5	--	0.1	--	3.3	0.46	0.02	--	4.3	--	8.3	5.1
KSW-1	N	9/1/2004	57	10.4	4.9	--	0.3	--	4.2	0.39	0.07	--	8.9	--	16	22.5
KSW-1	N	10/1/2004	85	15.7	0.5	--	0.4	--	6.5	0.03	0.02	--	8.2	--	17	7.9
KSW-1	N	11/1/2004	66	13.5	2.5	--	0.2	--	4.6	0.04	0.03	--	5.1	--	14	10.5
KSW-1	N	12/1/2004	36	8.8	2.5	--	0.2	--	3.6	0.01	<0.01	--	3.1	--	8.6	4.5
KSW-1	N	1/1/2005	41	8.1	3.9	--	0.1	--	3.4	0.1	0.03	--	3.3	--	8	7.5
KSW-8	N	11/1/1998	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-8	N	12/1/1998	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-8	N	1/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-8	N	2/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-8	N	4/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-8	N	5/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE C-2
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR MAJOR IONS AND NUTRIENTS
AHAFO, GHANA
BASELINE STUDY

Site		Sample Date	Alkalinity Total (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Cyanide Free (mg/L)	Fluoride Undistilled (mg/L)	Hardness (mg/L)	Magnesium (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphate (mg/L)	Potassium (mg/L)	Silica (mg/L)	Sodium (mg/L)	Sulfate (mg/L)
Standards*			**NE**	**NE**	**250****	**0.07**	**1.5**	**300****	**NE**	**10**	**1.0**	**NE**	**NE**	**NE**	**200**	**250****
KSW-8	N	6/1/1999	42	12	4.5	--	--	60	7.3	<0.01	<0.01	<0.01	5	--	8.8	<0.1
KSW-8	N	7/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-8	N	8/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-8	N	9/1/1999	67	14.4	2.7	--	--	56.6	5	<0.01	0.01	0.19	7.2	--	17.9	9.7
KSW-8	N	10/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-8	N	11/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-8	N	12/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-8	N	1/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-8	N	2/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-8	N	8/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-8	N	9/1/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-8	N	6/1/2003	58	12.9	2	--	--	50.7	4.5	0.79	0.01	0.64	6.6	--	8.8	<0.1
KSW-8	N	11/1/2003	62	13.3	0.5	--	--	53.8	5	1.37	0.01	0.51	5.7	--	12	3.8
KSW-8	N	3/1/2004	--	7.3	1.5	<0.01	--	--	2.9	2.24	0.11	--	7.7	--	5.9	15.2
KSW-8	N	5/1/2004	--	7.3	1.5	<0.01	--	--	2.9	2.24	0.11	--	7.7	--	5.9	15.2
KSW-8	N	6/1/2004	42	8.1	1	--	0.3	--	3.1	0.36	<0.01	--	6.4	--	8.9	8.8
KSW-8	N	7/1/2004	--	7.5	0.5	--	--	--	2.8	0.04	0.01	--	4	--	11	5.5
KSW-8	N	8/1/2004	--	7.4	0.5	--	0.1	--	3	0.32	0.02	--	4	--	7.8	5.1
KSW-8	N	9/1/2004	56	9.8	4.4	--	0.3	--	3.8	0.31	0.07	--	10	--	15	23.1
KSW-8	N	10/1/2004	84	16	2	--	0.4	--	5.6	0.36	0.01	--	8.7	--	14	6.8
KSW-8	N	11/1/2004	64	14.9	2	--	0.4	--	4.2	0.41	0.02	--	4.9	--	17	7.6
KSW-8	N	12/1/2004	36	8.3	5.5	--	0.4	--	3.5	0.07	0.01	--	2.9	--	8.1	4.9
KSW-8	N	1/1/2005	38	7.6	0.5	--	0.1	--	2.9	0.14	0.04	--	3.3	--	7.9	7.5
Subri Sub-Basin																
KSW-2	N	11/1/1998	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-2	N	12/1/1998	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-2	N	1/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-2	N	2/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-2	N	4/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-2	N	5/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE C-2
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR MAJOR IONS AND NUTRIENTS
AHAFO, GHANA
BASELINE STUDY

Site		Sample Date	Alkalinity Total (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Cyanide Free (mg/L)	Fluoride Undistilled (mg/L)	Hardness (mg/L)	Magnesium (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphate (mg/L)	Potassium (mg/L)	Silica (mg/L)	Sodium (mg/L)	Sulfate (mg/L)
Standards*			**NE**	**NE**	**250****	**0.07**	**1.5**	**300****	**NE**	**10**	**1.0**	**NE**	**NE**	**NE**	**200**	**250****
KSW-2	N	6/1/1999	128	24	18.2	--	--	120	14.6	<0.01	0.02	0.18	10	--	21.6	1.1
KSW-2	N	7/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-2	N	8/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-2	N	9/1/1999	83	16.7	4.5	--	--	54.1	3	<0.01	0.01	0.11	4.6	--	23.7	8.9
KSW-2	N	10/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-2	N	11/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-2	N	12/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-2	N	1/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-2	N	8/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-2	N	6/1/2003	96	16.5	5	--	--	77.9	8.9	0.5	0.02	0.88	6.5	--	21	--
KSW-2	N	10/1/2003	84	15.9	2.5	--	--	71.4	7.7	1.8	0.04	0.67	5.9	--	14	10.8
KSW-2	N	5/1/2004	--	9.3	0.5	<0.01	--	--	4.3	1.61	0.12	0.01	14	--	6.5	20.3
KSW-2	N	6/1/2004	94	16.8	0.5	--	0.3	--	7.8	0.1	<0.01	--	6.1	--	19	6.7
KSW-2	N	7/1/2004	--	17.2	4.4	--	--	--	8.5	0.03	0.01	--	6.2	--	19	6.4
KSW-2	N	8/1/2004	130	22.3	5.4	--	0.4	--	9.5	0.03	0.03	--	6.9	--	28	1.9
KSW-2	N	9/1/2004	81.5	15.1	5.2	--	0.3	--	7.7	0.2	0.1	--	8.1	--	17	31.2
KSW-2	N	10/1/2004	74	13.9	0.5	--	0.3	--	5.9	0.06	0.01	--	6.2	--	9.1	8.4
KSW-2	N	11/1/2004	70	16	0.5	--	0.2	--	6.7	0.09	0.08	--	4.3	--	14	17.1
KSW-2	N	12/1/2004	99.5	21.9	5.8	--	0.4	--	8.9	0.02	<0.01	--	4	--	25	5.3
KSW-2	N	1/1/2005	122	21.4	14.2	--	0.3	--	9.8	0.25	0.04	--	5.7	--	30	7.4
KSW-3	N	11/1/1998	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-3	N	12/1/1998	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-3	N	1/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-3	N	2/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-3	N	4/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-3	N	5/1/1999	--	9.6	10.8	--	--	--	4.5	4.34	0.05	<0.01	20	--	9.6	20.6
KSW-3	N	6/1/1999	160	36	15.4	--	--	130	9.7	<0.01	0.01	0.01	5.8	--	22	3.2
KSW-3	N	7/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-3	N	8/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-3	N	9/1/1999	82	19	9.1	--	--	63.9	4	<0.01	0.01	0.29	5.6	--	26.1	9.4

TABLE C-2
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR MAJOR IONS AND NUTRIENTS
AHAFO, GHANA
BASELINE STUDY

Site		Sample Date	Alkalinity Total (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Cyanide Free (mg/L)	Fluoride Undistilled (mg/L)	Hardness (mg/L)	Magnesium (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphate (mg/L)	Potassium (mg/L)	Silica (mg/L)	Sodium (mg/L)	Sulfate (mg/L)
Standards*			**NE**	**NE**	**250****	**0.07**	**1.5**	**300****	**NE**	**10**	**1.0**	**NE**	**NE**	**NE**	**200**	**250****
KSW-3	N	10/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-3	N	11/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-3	N	12/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-3	N	1/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-3	N	8/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-3	N	6/1/2003	51	11.1	0.5	--	--	46.2	4.5	2.71	0.02	0.6	6.9	--	5.4	<0.1
KSW-3	N	10/1/2003	84	18	8.9	--	--	75.8	7.5	2.21	<0.01	0.5	5.6	--	21	3.2
KSW-3	N	1/1/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-3	N	4/1/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-3	N	5/1/2004	--	9.6	10.8	<0.01	--	--	4.5	4.34	0.05	--	20	--	9.6	20.6
KSW-3	N	6/1/2004	--	19.3	4.4	--	--	--	6.9	0.01	<0.01	--	7.8	--	20	6
KSW-3	N	7/1/2004	--	25.4	12.3	--	--	--	10	0.02	<0.01	--	5.3	--	27	4.4
KSW-3	N	8/1/2004	185	35	10.4	--	0.3	--	12	0.85	0.11	--	3.6	--	34	0.3
KSW-3	N	9/1/2004	72	14.3	0.5	--	0.4	--	5.4	0.05	0.04	--	8.2	--	16	15.1
KSW-3	N	10/1/2004	64	13.8	0.5	--	0.3	--	5.2	0.03	0.03	--	6.3	--	7.6	7.4
KSW-3	N	11/1/2004	96	22.7	8.4	--	0.3	--	6.4	0.1	0.02	--	5.4	--	20	5.4
KSW-3	N	12/1/2004	140.4	35	13.9	--	0.5	--	10.9	0.02	<0.01	--	4.1	--	30	0.1
KSW-3	N	1/1/2005	217	34	18.1	--	0.3	--	17	0.61	0.02	--	6.3	--	37	0.5
KSW-5	N	5/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-5	N	6/1/1999	242	40	27.2	--	--	180	19.4	<0.01	<0.01	<0.01	2.6	--	44.7	<0.1
KSW-5	N	7/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-5	N	8/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-5	N	9/1/1999	200	42.9	20	--	--	160.7	13	<0.01	<0.01	0.11	3	--	46.1	6.7
KSW-5	N	10/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-5	N	11/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-5	N	8/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-5	N	6/1/2003	180	30.3	11.4	--	--	137.8	15.1	0.25	0.08	0.53	7.7	--	22	<0.1
KSW-5	N	10/1/2003	210	35.3	17.7	--	--	155.3	16.3	6.75	0.62	0.83	6.4	--	41	5
KSW-5	N	6/1/2004	--	25.2	8.8	--	--	--	11.5	0.21	<0.01	--	6.6	--	31	6.7
KSW-5	N	9/1/2004	136	23.5	14.3	--	0.4	--	10.4	0.12	0.03	--	6.5	--	33	10.9

TABLE C-2
SUMMARY OF SURFACE WATER DATA
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Site		Sample Date	Alkalinity Total (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Cyanide Free (mg/L)	Fluoride Undistilled (mg/L)	Hardness (mg/L)	Magnesium (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphate (mg/L)	Potassium (mg/L)	Silica (mg/L)	Sodium (mg/L)	Sulfate (mg/L)
Standards*			**NE**	**NE**	**250****	**0.07**	**1.5**	**300****	**NE**	**10**	**1.0**	**NE**	**NE**	**NE**	**200**	**250****
KSW-5	N	10/1/2004	133	26.8	1	--	0.5	--	1.7	0.04	0.02	--	6.1	--	19	8.8
KSW-5	N	11/1/2004	227	40	18.2	--	0.4	--	15.8	0.02	0.02	--	8.4	--	41	2.9
KSW-6	N	7/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-6	N	9/1/1999	190	61.9	9.1	--	--	216.3	15	<0.01	<0.01	0.09	17.6	--	18.7	3.9
KSW-6	N	10/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-6	N	8/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-6	N	6/1/2003	132	29.8	0.5	--	--	113.9	9.6	0.82	0.82	0.49	16	--	3.8	<0.1
KSW-6	N	5/1/2004	--	11.7	<0.5	<0.01	--	--	3.9	1.61	0.15	--	24	--	2.7	15.2
KSW-9	N	12/1/1998	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-9	N	1/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-9	N	2/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-9	N	4/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-9	N	5/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-9	N	6/1/1999	74	20	0.5	--	--	90	9.7	<0.01	0.01	0.03	2.9	--	5.1	6.4
KSW-9	N	7/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-9	N	8/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-9	N	10/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-9	N	1/1/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-9	N	4/1/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-13	N	9/1/1999	70	16.6	3.6	--	--	62	5	<0.01	0.01	<0.01	5.1	--	19.4	6
KSW-13	N	10/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-13	N	11/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-13	N	12/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-13	N	8/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-13	N	10/1/2000	96	15.9	10.9	--	--	66.5	6.5	<0.01	0.01	<0.01	2.6	--	12	1.6
KSW-13	N	11/1/2000	--	--	--	<0.01	--	68.5	--	0.01	0.12	<0.01	--	31.4	--	1.2
KSW-13	N	4/1/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-13	N	5/1/2004	--	9.7	0.5	<0.01	--	--	3.9	1.53	0.11	--	13	--	4.5	11.9
KSW-13	N	9/1/2004	69	14.3	2	--	0.3	--	5.4	0.06	0.06	--	7.2	--	15	15.1
KSW-13	N	10/1/2004	62	13.2	<0.5	--	0.4	--	4.4	2.82	0.04	--	5.3	--	6.7	5.9

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Standards*			**NE**	**NE**	**250****	**0.07**	**1.5**	**300****	**NE**	**10**	**1.0**	**NE**	**NE**	**NE**	**200**	**250****
KSW-13	N	11/1/2004	86	19.1	7.9	--	0.4	--	5.4	0.22	0.03	--	5	--	18	6.5
NSW-6	N	10/1/2000	100	16	9.1	--	--	71.7	7.7	<0.01	0.01	<0.01	2.9	--	13	8.5
NSW-6	N	11/1/2000	--	--	--	<0.01	--	73.5	--	<0.01	<0.01	<0.01	--	29.8	--	5
NSW-6	N	12/1/2000	--	--	--	0.01	--	--	--	--	--	--	--	--	--	--
NSW-6	N	5/1/2004	--	9.7	0.5	<0.01	--	--	4.7	0.68	0.09	--	13	--	7.1	26.1
NSW-6	N	6/1/2004	--	18.1	0.5	--	--	--	7.3	0.02	<0.01	--	5.5	--	19	6.5
NSW-6	N	7/1/2004	--	14.5	1	--	--	--	6.1	0.07	0.04	--	5.9	--	15	14.5
NSW-6	N	8/1/2004	98	15.7	4.5	--	0.4	--	7.5	0.32	0.02	--	6.9	--	25	4.3
NSW-6	N	9/1/2004	95	18.5	2	--	0.3	--	8	0.34	0.07	--	5.6	--	17	22.2
NSW-6	N	10/1/2004	102.5	18.5	0.5	--	0.3	--	7.2	0.06	0.04	--	4.4	--	9.2	12.6
NSW-6	N	11/1/2004	116.5	24.3	1.3	--	0.3	--	8.9	0.3	0.03	--	3.4	--	20	12.4
NSW-6	N	12/1/2004	90	19.7	7.4	--	0.4	--	8.5	0.04	<0.01	--	3.5	--	19	7.3
NSW-6	N	1/1/2005	110	19.8	13.7	--	0.3	--	8.5	0.26	0.05	--	4.3	--	28	8
NSW-8	N	6/1/2004	97	17.1	0.5	--	0.2	--	7.9	0.1	<0.01	--	5	--	18	6.2
NSW-8	N	7/1/2004	116	17	2.5	--	0.5	--	8.7	0.08	0.02	--	5.4	--	17	7.5
NSW-8	N	8/1/2004	131	20.6	5.4	--	0.4	--	10	0.1	0.03	--	5.4	--	30	2.6
NSW-8	N	9/1/2004	80	13.9	0.5	--	0.3	--	7.3	0.27	0.1	--	6	--	15	25.8
NSW-8	N	10/1/2004	87	15.7	0.5	--	0.3	--	6.6	0.09	0.05	--	5.1	--	9	14.2
NSW-8	N	11/1/2004	96	17.6	1	--	0.3	--	7.7	0.16	0.04	--	3.5	--	18	7.8
NSW-8	N	12/1/2004	104.4	23.1	7	--	0.5	--	9.3	0.06	<0.01	--	3.8	--	12	4.4
NSW-8	N	1/1/2005	132	22.4	12.2	--	0.3	--	10.5	0.1	0.02	--	4.8	--	30	6.6
NSW-9	N	5/1/2004	50	11.3	<0.5	<0.01	--	47.6	4.7	1.47	0.13	0.01	17	--	3.6	17.9
NSW-9	N	10/1/2004	63	16.3	<0.5	--	0.4	--	4.9	0.46	0.08	--	6.5	--	4.3	16.6
NSW-9	N	11/1/2004	122	33	0.5	--	0.4	--	9.8	0.96	0.07	--	9.1	--	9	6.6
Awonsu Sub-Basin																
KSW-7	N	4/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-7	N	5/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-7	N	7/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-7	N	8/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-7	N	9/1/1999	96	21.4	4.5	--	--	94.6	10	<0.01	0.01	0.17	5.7	--	22.1	10.1

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Site		Sample Date	Alkalinity Total (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Cyanide Free (mg/L)	Fluoride Undistilled (mg/L)	Hardness (mg/L)	Magnesium (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphate (mg/L)	Potassium (mg/L)	Silica (mg/L)	Sodium (mg/L)	Sulfate (mg/L)
Standards*			**NE**	**NE**	**250****	**0.07**	**1.5**	**300****	**NE**	**10**	**1.0**	**NE**	**NE**	**NE**	**200**	**250****
KSW-7	N	10/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-7	N	11/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-7	N	12/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-7	N	8/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-7	N	6/1/2003	132	27.6	11.4	--	--	129.5	14.7	0.53	0.45	0.24	8.3	--	2.7	<0.1
KSW-7	N	5/1/2004	--	15.3	10.8	<0.01	--	--	9.7	1.94	0.04	--	18	--	19	71.4
KSW-7	N	6/1/2004	--	26.9	5.9	--	--	--	13.7	0.01	<0.01	--	7.6	--	25	7.7
KSW-7	N	7/1/2004	--	28.1	11.8	<0.1	--	--	15.3	0.82	0.77	--	6.2	--	25	4.4
KSW-7	N	8/1/2004	--	35	13.9	--	--	--	19.5	0.21	0.09	--	6.5	--	35	0.9
KSW-7	N	9/1/2004	118	22.8	3.5	--	0.4	--	11.4	0.24	0.03	--	7.8	--	17	11.8
KSW-7	N	10/1/2004	50	10.8	0.5	--	0.3	--	4	0.93	0.06	--	6.5	--	5.6	8.2
KSW-7	N	11/1/2004	110	27.3	9.4	--	0.3	--	9.3	0.21	0.02	--	5.7	--	21	7.2
KSW-7	N	12/1/2004	178.2	32	13.4	--	0.6	--	18.9	0.03	<0.01	--	5.3	--	36	0.6
KSW-7	N	1/1/2005	217	34	18.1	--	0.3	--	17.4	0.61	0.02	--	6.3	--	37	3.5
KSW-10	N	5/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-10	N	7/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-10	N	8/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KSW-14	N	6/1/2004	92	18.3	2	--	0.5	--	7	0.77	<0.01	--	9.3	--	8.9	11.3
KSW-14	N	8/1/2004	208	28.9	9.4	--	0.6	--	16.6	0.03	0.01	--	5.1	--	35	0.3
KSW-14	N	9/1/2004	129	23.2	2.5	--	0.4	--	12.8	0.21	0.01	--	5.5	--	17	7.6
KSW-14	N	10/1/2004	64	15.3	<0.5	--	0.4	--	5.1	0.32	0.04	--	6.3	--	6.5	12.4
KSW-14	N	11/1/2004	96	21.1	10.4	--	0.4	--	6.8	47	0.12	--	6.4	--	22	8.4
KSW-14	N	12/1/2004	162	32	15.4	--	0.6	--	15.2	0.05	<0.01	--	4.4	--	37	2.1
KSW-14	N	1/1/2005	197	35	22.5	--	0.3	--	17.8	0.05	0.01	--	5.5	--	41	5.1
KSW-15	N	6/1/2004	145	23.6	1	--	0.6	--	13.3	0.01	<0.01	--	5.2	--	21	4.8
KSW-15	N	7/1/2004	--	26.2	2.9	--	--	--	16.2	0.03	0.01	--	4	--	24	4.8
KSW-15	N	9/1/2004	55	13	0.5	--	0.4	--	4.7	0.33	0.06	--	8.8	--	7	19.4
KSW-15	N	10/1/2004	84	17.1	<0.5	--	0.3	--	6.3	0.33	0.05	--	6.4	--	7.5	17
KSW-15	N	11/1/2004	140	27.2	7.4	--	0.3	--	11.5	0.19	0.02	--	4.9	--	24	6.7
NSW-2	N	8/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE C-2
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR MAJOR IONS AND NUTRIENTS
AHAFO, GHANA
BASELINE STUDY

Site		Sample Date	Alkalinity Total (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Cyanide Free (mg/L)	Fluoride Undistilled (mg/L)	Hardness (mg/L)	Magnesium (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphate (mg/L)	Potassium (mg/L)	Silica (mg/L)	Sodium (mg/L)	Sulfate (mg/L)
Standards*			**NE**	**NE**	**250****	**0.07**	**1.5**	**300****	**NE**	**10**	**1.0**	**NE**	**NE**	**NE**	**200**	**250****
NSW-2	N	11/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ntotro Sub-Basin																
NSW-3	N	8/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NSW-3	N	11/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NSW-3	N	6/1/2003	238	46	51.6	--	--	200.1	20.7	4.76	<0.01	0.02	29	--	42	<0.1
NSW-3	N	10/1/2003	190	46.3	36.4	--	--	191.4	18.4	2.29	<0.01	0.02	17	--	26	4.7
NSW-3	N	6/1/2004	--	29.6	23.6	--	--	--	11.9	2.11	<0.01	--	24	--	26	11.2
NSW-3	N	9/1/2004	135.5	29.3	21.7	--	0.3	--	12.7	0.1	0.09	--	16	--	21	18.8
NSW-3	N	10/1/2004	135	27.7	13.7	--	0.4	--	11.4	0.7	0.07	--	1.6	--	23	8.3
NSW-3	N	11/1/2004	190	37	27.6	--	0.4	--	16.9	0.84	0.04	--	12	--	33	7.7
Asuade Sub-Basin																
NSW-4	N	8/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NSW-4	N	11/1/2000	--	--	--	<0.01	--	58	--	0.32	0.3	<0.01	--	31.9	--	0.5
NSW-4	N	12/1/2000	--	--	--	<0.01	--	--	--	--	--	--	--	--	--	--
NSW-7	N	11/1/2000	--	--	--	<0.01	--	75.5	--	0.01	0.05	<0.01	--	28.1	--	<0.1
NSW-7	N	12/1/2000	--	--	--	0.01	--	--	--	--	--	--	--	--	--	--
NSW-7	N	1/1/2001	--	--	--	0.01	--	--	--	--	--	--	--	--	--	--
NSW-7	N	10/1/2003	114	28.4	4.4	--	--	113.3	10.3	3.32	0.04	0.31	5.7	--	16	--
NSW-7	N	5/1/2004	--	10.6	0.5	<0.01	--	--	4.1	2.74	0.11	--	8.8	--	6.5	30.9
NSW-7	N	10/1/2004	36	8.1	0.5	--	0.4	--	3.8	4.2	0.06	--	7.4	--	4.1	7.8
NSW-7	N	11/1/2004	105	25.1	9.9	--	0.3	--	9.3	1.53	0.2	--	5.9	--	18	10.1
NSW-7	N	12/1/2004	120.6	28	14.9	--	0.5	--	12.9	0.06	<0.01	--	5.1	--	28	6.9
Amama Sub-Basin																
NSW-5	N	8/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NSW-5	N	11/1/2000	--	--	--	<0.01	--	84.5	--	<0.01	0.01	0.05	--	26.7	--	3.3
NSW-5	N	12/1/2000	--	--	--	0.01	--	--	--	--	--	--	--	--	--	--
NSW-5	N	6/1/2003	97	13.9	22.3	--	--	70.5	8.7	0.82	0.01	1.5	16	--	25	<0.1
NSW-5	N	10/1/2003	70	16.9	0.5	--	--	65.3	5.6	0.76	0.01	1.26	8.6	--	6	4.1
NSW-5	N	1/1/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NSW-5	N	4/1/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE C-2
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR MAJOR IONS AND NUTRIENTS
AHAFO, GHANA
BASELINE STUDY

Site		Sample Date	Alkalinity Total (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Cyanide Free (mg/L)	Fluoride Undistilled (mg/L)	Hardness (mg/L)	Magnesium (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphate (mg/L)	Potassium (mg/L)	Silica (mg/L)	Sodium (mg/L)	Sulfate (mg/L)
Standards*			**NE**	**NE**	**250****	**0.07**	**1.5**	**300****	**NE**	**10**	**1.0**	**NE**	**NE**	**NE**	**200**	**250****
NSW-5	N	5/1/2004	--	10.7	0.5	<0.01	--	--	4	3.28	0.06	--	14	--	5.2	16.9
NSW-5	N	6/1/2004	--	10	<0.5	--	--	--	3.6	0.76	<0.01	--	9.7	--	3.6	12.5
NSW-5	N	8/1/2004	107	23.8	0.5	--	0.3	--	8.1	1.27	0.17	--	17	--	5	5.3
NSW-5	N	9/1/2004	55	13.7	7.9	--	0.4	--	4.6	0.05	--	--	12	--	9.3	13.4
NSW-5	N	10/1/2004	82	17.5	3.9	--	0.5	--	6.1	0.72	0.03	--	6.8	--	20	6.3
NSW-5	N	11/1/2004	103	23.4	10.8	--	0.3	--	7.4	0.31	0.02	--	11	--	20	5.8
NSW-5	N	12/1/2004	88.2	21.5	17.9	--	0.4	--	7.3	0.05	<0.01	--	13	--	24	2.8
NSW-5	N	1/1/2005	136	28	22	--	0.3	--	10.2	0.25	0.05	--	16	--	28	3.9

Notes:

<	Indicates analyte not detected above laboratory practical quantification limit (PQL)
(mg/L)	Milligrams per liter
N	Indicates natural sample.
--	Field data or laboratory samples were not collected or analyzed.
NE	Not Established
*	The surface water standards are the lowest of the drinking water standards from either the World Health Organization (WHO Guidlines for Drinking Water Quality, 3rd. edition), Ghana EPA, Nevada USA, or USEPA.
**	WHO Acceptability guidline or USEPA secondary standard for aesthetics.
	Shading indicates results above standards.

TABLE C-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Cadmium (mg/L)	Chromium [1] (mg/L)	Cobalt (mg/L)	Copper (mg/L)
Standards*				**0.05****	**0.006**	**0.01**	**0.003**	**0.05**	**NE**	**0.5**
Suraw/Suntim Sub-Basin										
KSW-11	9/1/1999	Total	N	0.2	--	<0.001	<0.01	<0.01	--	<0.01
KSW-11	10/1/1999	Total	N	--	--	--	--	--	--	--
KSW-11	11/1/1999	Total	N	--	--	--	--	--	--	--
KSW-11	12/1/1999	Total	N	--	--	--	--	--	--	--
KSW-11	1/1/2000	Total	N	--	--	--	--	--	--	--
KSW-11	2/1/2000	Total	N	--	--	--	--	--	--	--
KSW-11	8/1/2000	Total	N	0.1	--	0.001	<0.01	<0.01	--	--
KSW-11	12/1/2000	Total	N	--	--	--	--	--	--	--
KSW-11	6/1/2003	Total	N	0.1	--	0.001	<0.01	<0.01	--	<0.01
KSW-11	10/1/2003	Total	N	0.1	--	<0.001	<0.01	<0.01	--	<0.01
KSW-11	4/1/2004	Total	N	--	--	--	--	--	--	--
KSW-12	9/1/1999	Total	N	0.6	--	0.002	<0.01	<0.01	--	<0.01
KSW-12	10/1/1999	Total	N	--	--	--	--	--	--	--
KSW-12	11/1/1999	Total	N	--	--	--	--	--	--	--
KSW-12	12/1/1999	Total	N	--	--	--	--	--	--	--
KSW-12	8/1/2000	Total	N	0.2	--	0.001	<0.01	<0.01	--	--
KSW-12	6/1/2003	Total	N	0.2	--	0.001	<0.01	<0.01	--	<0.01
KSW-12	10/1/2003	Total	N	0.1	--	0.001	<0.01	<0.01	--	<0.01
KSW-12	4/1/2004	Total	N	--	--	--	--	--	--	--
NSW-1	8/1/2000	Total	N	0.1	--	0.001	<0.01	<0.01	--	--
NSW-1	11/1/2000	Total	N	--	--	0.001	<0.01	<0.01	--	<0.01
NSW-1	12/1/2000	Total	N	--	--	0.002	<0.01	<0.01	--	<0.01
NSW-1	6/1/2003	Total	N	0.1	--	<0.001	<0.01	<0.01	--	<0.01
NSW-1	10/1/2003	Total	N	0.1	--	0.001	<0.01	<0.01	--	<0.01
Tano River										
KSW-1	11/1/1998	Total	N	--	--	--	--	--	--	--
KSW-1	12/1/1998	Total	N	--	--	--	--	--	--	--
KSW-1	1/1/1999	Total	N	--	--	--	--	--	--	--
KSW-1	2/1/1999	Total	N	--	--	--	--	--	--	--
KSW-1	4/1/1999	Total	N	--	--	--	--	--	--	--
KSW-1	5/1/1999	Total	N	--	--	--	--	--	--	--
KSW-1	6/1/1999	Total	N	7.6	--	0.001	<0.01	<0.01	--	<0.01
KSW-1	7/1/1999	Total	N	--	--	--	--	--	--	--
KSW-1	8/1/1999	Total	N	--	--	--	--	--	--	--
KSW-1	9/1/1999	Total	N	2.3	--	0.001	<0.01	<0.01	--	<0.01
KSW-1	10/1/1999	Total	N	--	--	--	--	--	--	--
KSW-1	11/1/1999	Total	N	--	--	--	--	--	--	--
KSW-1	12/1/1999	Total	N	--	--	--	--	--	--	--
KSW-1	1/1/2000	Total	N	--	--	--	--	--	--	--
KSW-1	2/1/2000	Total	N	--	--	--	--	--	--	--
KSW-1	8/1/2000	Total	N	1.9	--	0.001	<0.01	<0.01	--	--
KSW-1	6/1/2003	Total	N	0.2	--	0.001	<0.01	<0.01	--	<0.01
KSW-1	10/1/2003	Total	N	0.1	--	0.001	<0.01	<0.01	--	<0.01
KSW-1	4/1/2004	Total	N	--	--	--	--	--	--	--

TABLE C-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Cadmium (mg/L)	Chromium [1] (mg/L)	Cobalt (mg/L)	Copper (mg/L)
Standards*				**0.05****	**0.006**	**0.01**	**0.003**	**0.05**	**NE**	**0.5**
KSW-1	5/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-1	5/1/2004	Total	N	6.7	--	0.001	<0.01	<0.01	<0.01	<0.01
KSW-1	6/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-1	6/1/2004	Total	N	1.9	<0.1	<0.001	<0.01	<0.01	<0.01	<0.01
KSW-1	7/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-1	7/1/2004	Total	N	0.7	<0.1	0.001	<0.01	<0.01	<0.01	<0.01
KSW-1	8/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-1	8/1/2004	Total	N	0.8	<0.1	0.001	<0.01	<0.01	<0.01	<0.01
KSW-1	9/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
KSW-1	9/1/2004	Total	N	4	<0.1	0.001	<0.01	<0.01	<0.01	0.01
KSW-1	10/1/2004	Dissolved	N	--	--	0.002	--	--	--	--
KSW-1	10/1/2004	Total	N	2.4	<0.1	0.002	<0.01	<0.01	<0.01	<0.01
KSW-1	11/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-1	11/1/2004	Total	N	1.9	<0.1	0.001	<0.01	<0.01	<0.01	<0.01
KSW-1	12/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
KSW-1	12/1/2004	Total	N	1.8	<0.1	0.001	<0.02	<0.01	<0.01	<0.01
KSW-1	1/1/2005	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-1	1/1/2005	Total	N	0.6	<0.1	0.002	<0.01	<0.01	<0.01	<0.01
KSW-8	11/1/1998	Total	N	--	--	--	--	--	--	--
KSW-8	12/1/1998	Total	N	--	--	--	--	--	--	--
KSW-8	1/1/1999	Total	N	--	--	--	--	--	--	--
KSW-8	2/1/1999	Total	N	--	--	--	--	--	--	--
KSW-8	4/1/1999	Total	N	--	--	--	--	--	--	--
KSW-8	5/1/1999	Total	N	--	--	--	--	--	--	--
KSW-8	6/1/1999	Total	N	4.8	--	<0.001	<0.01	<0.01	--	<0.01
KSW-8	7/1/1999	Total	N	--	--	--	--	--	--	--
KSW-8	8/1/1999	Total	N	--	--	--	--	--	--	--
KSW-8	9/1/1999	Total	N	2.9	--	<0.001	<0.01	<0.01	--	<0.01
KSW-8	10/1/1999	Total	N	--	--	--	--	--	--	--
KSW-8	11/1/1999	Total	N	--	--	--	--	--	--	--
KSW-8	12/1/1999	Total	N	--	--	--	--	--	--	--
KSW-8	1/1/2000	Total	N	--	--	--	--	--	--	--
KSW-8	2/1/2000	Total	N	--	--	--	--	--	--	--
KSW-8	8/1/2000	Total	N	2.1	--	0.001	<0.01	<0.01	--	--
KSW-8	9/1/2001	Total	N	2.1	--	0.001	<0.01	<0.01	--	--
KSW-8	6/1/2003	Total	N	0.6	--	<0.001	<0.01	<0.01	--	<0.01
KSW-8	11/1/2003	Total	N	--	--	<0.001	<0.01	<0.01	--	<0.01
KSW-8	3/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-8	3/1/2004	Total	N	8.2	--	0.001	<0.01	<0.01	<0.01	<0.01
KSW-8	5/1/2004	Total	N	8.2	<0.01	0.001	<0.01	<0.01	<0.01	<0.01
KSW-8	6/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-8	6/1/2004	Total	N	3.2	<0.1	0.001	<0.01	<0.01	<0.01	<0.01
KSW-8	7/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-8	7/1/2004	Total	N	0.9	<0.1	<0.001	<0.01	<0.01	<0.01	<0.01
KSW-8	8/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--

TABLE C-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Cadmium (mg/L)	Chromium [1] (mg/L)	Cobalt (mg/L)	Copper (mg/L)
Standards*				**0.05****	**0.006**	**0.01**	**0.003**	**0.05**	**NE**	**0.5**
KSW-8	8/1/2004	Total	N	0.9	<0.1	<0.001	<0.01	<0.01	<0.01	<0.01
KSW-8	9/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-8	9/1/2004	Total	N	3	<0.1	<0.001	<0.01	<0.01	<0.01	<0.01
KSW-8	10/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-8	10/1/2004	Total	N	0.1	<0.1	0.001	<0.01	<0.01	<0.01	<0.01
KSW-8	11/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-8	11/1/2004	Total	N	1.1	<0.1	<0.001	<0.01	<0.01	<0.01	<0.01
KSW-8	12/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-8	12/1/2004	Total	N	2.1	<0.1	0.001	<0.01	<0.01	<0.01	<0.01
KSW-8	1/1/2005	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-8	1/1/2005	Total	N	0.9	<0.1	<0.001	<0.01	<0.01	<0.01	<0.01
Subri Sub-Basin										
KSW-2	11/1/1998	Total	N	--	--	--	--	--	--	--
KSW-2	12/1/1998	Total	N	--	--	--	--	--	--	--
KSW-2	1/1/1999	Total	N	--	--	--	--	--	--	--
KSW-2	2/1/1999	Total	N	--	--	--	--	--	--	--
KSW-2	4/1/1999	Total	N	--	--	--	--	--	--	--
KSW-2	5/1/1999	Total	N	--	--	--	--	--	--	--
KSW-2	6/1/1999	Total	N	1.1	--	0.002	<0.01	<0.01	--	<0.01
KSW-2	7/1/1999	Total	N	--	--	--	--	--	--	--
KSW-2	8/1/1999	Total	N	--	--	--	--	--	--	--
KSW-2	9/1/1999	Total	N	3.4	--	0.001	<0.01	<0.01	--	<0.01
KSW-2	10/1/1999	Total	N	--	--	--	--	--	--	--
KSW-2	11/1/1999	Total	N	--	--	--	--	--	--	--
KSW-2	12/1/1999	Total	N	--	--	--	--	--	--	--
KSW-2	1/1/2000	Total	N	--	--	--	--	--	--	--
KSW-2	8/1/2000	Total	N	1.9	--	0.001	<0.01	<0.01	--	--
KSW-2	6/1/2003	Total	N	1.3	--	0.001	<0.01	<0.01	--	<0.01
KSW-2	10/1/2003	Total	N	4	--	0.001	<0.01	<0.01	--	0.01
KSW-2	5/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-2	5/1/2004	Total	N	57	<0.01	0.002	<0.01	<0.01	--	<0.01
KSW-2	6/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-2	6/1/2004	Total	N	1.7	<0.1	0.001	<0.01	<0.01	<0.01	<0.01
KSW-2	7/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-2	7/1/2004	Total	N	0.8	<0.1	0.001	<0.01	<0.01	<0.01	<0.01
KSW-2	8/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-2	8/1/2004	Total	N	0.1	<0.01	0.001	<0.01	<0.01	<0.01	<0.01
KSW-2	9/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
KSW-2	9/1/2004	Total	N	7.3	<0.1	0.002	<0.01	<0.01	<0.01	0.01
KSW-2	10/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-2	10/1/2004	Total	N	5.1	<0.1	0.003	<0.01	<0.01	<0.01	<0.01
KSW-2	11/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-2	11/1/2004	Total	N	4.9	<0.1	0.001	<0.01	<0.01	<0.01	<0.01
KSW-2	12/1/2004	Dissolved	N	--	--	0.002	--	--	--	--
KSW-2	12/1/2004	Total	N	0.7	<0.1	0.003	<0.01	<0.01	<0.01	<0.01

TABLE C-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Cadmium (mg/L)	Chromium [1] (mg/L)	Cobalt (mg/L)	Copper (mg/L)
Standards*				**0.05****	**0.006**	**0.01**	**0.003**	**0.05**	**NE**	**0.5**
KSW-2	1/1/2005	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-2	1/1/2005	Total	N	1.7	<0.1	0.003	<0.01	<0.01	<0.01	<0.01
KSW-3	11/1/1998	Total	N	--	--	--	--	--	--	--
KSW-3	12/1/1998	Total	N	--	--	--	--	--	--	--
KSW-3	1/1/1999	Total	N	--	--	--	--	--	--	--
KSW-3	2/1/1999	Total	N	--	--	--	--	--	--	--
KSW-3	4/1/1999	Total	N	--	--	--	--	--	--	--
KSW-3	5/1/1999	Total	N	--	--	--	--	--	--	--
KSW-3	6/1/1999	Total	N	1.3	--	0.002	<0.01	<0.01	--	<0.01
KSW-3	7/1/1999	Total	N	--	--	--	--	--	--	--
KSW-3	8/1/1999	Total	N	--	--	--	--	--	--	--
KSW-3	9/1/1999	Total	N	0.4	--	0.003	<0.01	<0.01	--	<0.01
KSW-3	10/1/1999	Total	N	--	--	--	--	--	--	--
KSW-3	11/1/1999	Total	N	--	--	--	--	--	--	--
KSW-3	12/1/1999	Total	N	--	--	--	--	--	--	--
KSW-3	1/1/2000	Total	N	--	--	--	--	--	--	--
KSW-3	8/1/2000	Total	N	0.2	--	0.001	<0.01	<0.01	--	--
KSW-3	6/1/2003	Total	N	1	--	0.001	<0.01	<0.01	--	<0.01
KSW-3	10/1/2003	Total	N	0.3	--	0.001	<0.01	<0.01	--	<0.01
KSW-3	1/1/2004	Total	N	--	--	--	--	--	--	--
KSW-3	4/1/2004	Total	N	--	--	--	--	--	--	--
KSW-3	5/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-3	5/1/2004	Total	N	1.8	--	0.001	<0.01	<0.01	<0.01	<0.01
KSW-3	6/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
KSW-3	6/1/2004	Total	N	0.2	<0.1	0.002	<0.01	<0.01	<0.01	<0.01
KSW-3	7/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-3	7/1/2004	Total	N	0.3	<0.1	0.002	<0.01	<0.01	<0.01	<0.01
KSW-3	8/1/2004	Total	N	0.3	--	0.001	<0.01	<0.01	--	<0.01
KSW-3	9/1/2004	Dissolved	N	--	--	0.002	--	--	--	--
KSW-3	9/1/2004	Total	N	1.4	<0.1	0.004	<0.01	<0.01	<0.01	0.01
KSW-3	10/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
KSW-3	10/1/2004	Total	N	2.4	<0.1	0.003	<0.01	<0.01	<0.01	<0.01
KSW-3	11/1/2004	Dissolved	N	--	--	0.002	--	--	--	--
KSW-3	11/1/2004	Total	N	0.6	<0.1	0.003	<0.01	<0.01	<0.01	<0.01
KSW-3	12/1/2004	Dissolved	N	--	--	0.002	--	--	--	--
KSW-3	12/1/2004	Total	N	<0.1	<0.1	0.004	<0.01	<0.01	<0.01	<0.01
KSW-3	1/1/2005	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-3	1/1/2005	Total	N	0.5	<0.1	0.001	<0.01	<0.01	<0.01	<0.01
KSW-5	5/1/1999	Total	N	--	--	--	--	--	--	--
KSW-5	6/1/1999	Total	N	1.1	--	0.003	<0.01	<0.01	--	<0.01
KSW-5	7/1/1999	Total	N	--	--	--	--	--	--	--
KSW-5	8/1/1999	Total	N	--	--	--	--	--	--	--
KSW-5	9/1/1999	Total	N	0.4	--	0.001	<0.01	<0.01	--	<0.01
KSW-5	10/1/1999	Total	N	--	--	--	--	--	--	--
KSW-5	11/1/1999	Total	N	--	--	--	--	--	--	--

TABLE C-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Cadmium (mg/L)	Chromium [1] (mg/L)	Cobalt (mg/L)	Copper (mg/L)
Standards*				**0.05****	**0.006**	**0.01**	**0.003**	**0.05**	**NE**	**0.5**
KSW-5	8/1/2000	Total	N	0.8	--	0.001	<0.01	<0.01	--	--
KSW-5	6/1/2003	Total	N	0.7	--	0.003	<0.01	<0.01	--	<0.01
KSW-5	10/1/2003	Total	N	0.2	--	0.001	<0.01	<0.01	--	<0.01
KSW-5	6/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
KSW-5	6/1/2004	Total	N	0.4	<0.1	0.002	<0.01	<0.01	<0.01	<0.01
KSW-5	9/1/2004	Dissolved	N	--	--	0.002	--	--	--	--
KSW-5	9/1/2004	Total	N	1	<0.1	0.002	<0.01	<0.01	<0.01	0.01
KSW-5	10/1/2004	Dissolved	N	--	--	0.002	--	--	--	--
KSW-5	10/1/2004	Total	N	3.7	<0.1	0.005	<0.01	<0.01	<0.01	<0.01
KSW-5	11/1/2004	Dissolved	N	--	--	0.004	--	--	--	--
KSW-5	11/1/2004	Total	N	1.6	<0.1	0.005	<0.01	<0.01	<0.01	<0.01
KSW-6	7/1/1999	Total	N	--	--	--	--	--	--	--
KSW-6	9/1/1999	Total	N	0.7	--	<0.001	<0.01	<0.01	--	<0.01
KSW-6	10/1/1999	Total	N	--	--	--	--	--	--	--
KSW-6	8/1/2000	Total	N	0.2	--	0.001	<0.01	<0.01	--	--
KSW-6	6/1/2003	Total	N	0.4	--	0.001	<0.01	<0.01	--	0.01
KSW-6	5/1/2004	Total	N	15.3	--	0.002	<0.01	<0.01	<0.01	<0.01
KSW-9	12/1/1998	Total	N	--	--	--	--	--	--	--
KSW-9	1/1/1999	Total	N	--	--	--	--	--	--	--
KSW-9	2/1/1999	Total	N	--	--	--	--	--	--	--
KSW-9	4/1/1999	Total	N	--	--	--	--	--	--	--
KSW-9	5/1/1999	Total	N	--	--	--	--	--	--	--
KSW-9	6/1/1999	Total	N	0.7	--	0.014	<0.01	<0.01	--	<0.01
KSW-9	7/1/1999	Total	N	0.8	--	0.011	<0.01	<0.01	--	<0.01
KSW-9	8/1/1999	Total	N	0.4	--	0.007	<0.01	<0.01	--	<0.01
KSW-9	10/1/1999	Total	N	0.2	--	0.013	<0.01	<0.01	--	<0.01
KSW-9	1/1/2004	Total	N	--	--	--	--	--	--	<0.01
KSW-9	4/1/2004	Total	N	--	--	--	--	--	--	--
KSW-13	9/1/1999	Total	N	3.2	--	0.004	<0.01	<0.01	--	<0.01
KSW-13	10/1/1999	Total	N	--	--	--	--	--	--	--
KSW-13	11/1/1999	Total	N	--	--	--	--	--	--	--
KSW-13	12/1/1999	Total	N	--	--	--	--	--	--	--
KSW-13	8/1/2000	Total	N	0.4	--	0.002	<0.01	<0.01	--	--
KSW-13	10/1/2000	Total	N	0.5	--	0.002	<0.01	<0.01	--	<0.01
KSW-13	11/1/2000	Total	N	--	--	0.004	<0.01	--	--	<0.01
KSW-13	4/1/2004	Total	N	--	--	--	--	--	--	--
KSW-13	5/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-13	5/1/2004	Total	N	1.6	--	0.001	<0.01	<0.01	<0.01	<0.01
KSW-13	9/1/2004	Dissolved	N	--	--	0.002	--	--	--	--
KSW-13	9/1/2004	Total	N	1.3	<0.1	0.003	<0.01	<0.01	<0.01	0.01
KSW-13	10/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
KSW-13	10/1/2004	Total	N	2.7	<0.1	0.003	<0.01	<0.01	<0.01	<0.01
KSW-13	11/1/2004	Dissolved	N	--	--	0.002	--	--	--	--
KSW-13	11/1/2004	Total	N	1.2	<0.1	0.006	<0.01	<0.01	<0.01	<0.01
NSW-6	10/1/2000	Total	N	0.5	--	<0.001	<0.01	<0.01	--	<0.01

TABLE C-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Cadmium (mg/L)	Chromium [1] (mg/L)	Cobalt (mg/L)	Copper (mg/L)
Standards*				**0.05****	**0.006**	**0.01**	**0.003**	**0.05**	**NE**	**0.5**
NSW-6	11/1/2000	Total	N	--	--	0.001	<0.01	<0.01	--	<0.01
NSW-6	12/1/2000	Total	N	--	--	0.003	<0.01	<0.01	--	<0.01
NSW-6	5/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
NSW-6	5/1/2004	Total	N	3.4	--	0.001	<0.01	<0.01	<0.01	<0.01
NSW-6	6/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
NSW-6	6/1/2004	Total	N	1.5	<0.1	0.002	<0.01	<0.01	<0.01	<0.01
NSW-6	7/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
NSW-6	7/1/2004	Total	N	1.4	<0.1	0.001	<0.01	<0.01	<0.01	<0.01
NSW-6	8/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
NSW-6	8/1/2004	Total	N	0.2	<0.1	<0.001	<0.01	<0.01	<0.01	<0.01
NSW-6	9/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
NSW-6	9/1/2004	Total	N	4.6	<0.1	0.002	<0.01	<0.01	<0.01	0.01
NSW-6	10/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
NSW-6	10/1/2004	Total	N	3.5	<0.1	0.003	<0.01	<0.01	<0.01	<0.01
NSW-6	11/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
NSW-6	11/1/2004	Total	N	2.7	<0.1	0.001	<0.01	<0.01	<0.01	<0.01
NSW-6	12/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
NSW-6	12/1/2004	Total	N	0.9	<0.1	0.003	<0.01	<0.01	<0.01	<0.01
NSW-6	1/1/2005	Dissolved	N	--	--	<0.001	--	--	--	--
NSW-6	1/1/2005	Total	N	1	<0.1	0.002	<0.01	<0.01	<0.01	<0.01
NSW-8	6/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
NSW-8	6/1/2004	Total	N	1.7	<0.1	0.001	<0.01	<0.01	<0.01	<0.01
NSW-8	7/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
NSW-8	7/1/2004	Total	N	0.5	<0.1	<0.001	<0.01	<0.01	<0.01	<0.01
NSW-8	8/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
NSW-8	8/1/2004	Total	N	0.3	<0.1	<0.001	<0.01	<0.01	<0.01	<0.01
NSW-8	9/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
NSW-8	9/1/2004	Total	N	5.6	<0.1	0.002	<0.01	<0.01	<0.01	0.01
NSW-8	10/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
NSW-8	10/1/2004	Total	N	2.2	<0.1	0.003	<0.01	<0.01	<0.01	<0.01
NSW-8	11/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
NSW-8	11/1/2004	Total	N	2.1	<0.1	<0.001	<0.01	<0.01	<0.01	<0.01
NSW-8	12/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
NSW-8	12/1/2004	Total	N	0.5	<0.1	0.002	<0.01	<0.01	<0.01	<0.01
NSW-8	1/1/2005	Dissolved	N	--	--	<0.001	--	--	--	--
NSW-8	1/1/2005	Total	N	0.6	<0.1	0.002	<0.01	<0.01	<0.01	<0.01
NSW-9	5/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
NSW-9	5/1/2004	Total	N	1.2	--	<0.001	<0.01	<0.01	<0.01	<0.01
NSW-9	10/1/2004	Dissolved	N	--	--	0.003	--	--	--	--
NSW-9	10/1/2004	Total	N	1	<0.1	0.007	<0.01	<0.01	<0.01	<0.01
NSW-9	11/1/2004	Dissolved	N	--	--	0.01	--	--	--	--
NSW-9	11/1/2004	Total	N	<0.01	<0.1	0.016	<0.01	<0.01	<0.01	<0.01
Awonsu Sub-Basin										
KSW-7	4/1/1999	Total	N	--	--	--	--	--	--	--
KSW-7	5/1/1999	Total	N	--	--	--	--	--	--	--

TABLE C-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Cadmium (mg/L)	Chromium [1] (mg/L)	Cobalt (mg/L)	Copper (mg/L)
Standards*				**0.05****	**0.006**	**0.01**	**0.003**	**0.05**	**NE**	**0.5**
KSW-7	7/1/1999	Total	N	--	--	--	--	--	--	--
KSW-7	8/1/1999	Total	N	--	--	--	--	--	--	--
KSW-7	9/1/1999	Total	N	0.7	--	0.001	<0.01	<0.01	--	<0.01
KSW-7	10/1/1999	Total	N	--	--	--	--	--	--	--
KSW-7	11/1/1999	Total	N	--	--	--	--	--	--	--
KSW-7	12/1/1999	Total	N	--	--	--	--	--	--	--
KSW-7	8/1/2000	Total	N	0.3	--	0.001	<0.01	<0.01	--	--
KSW-7	6/1/2003	Total	N	0.5	--	0.004	<0.01	<0.01	--	0.01
KSW-7	5/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-7	5/1/2004	Total	N	1.2	--	0.002	<0.01	<0.01	<0.01	<0.01
KSW-7	6/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
KSW-7	6/1/2004	Total	N	0.1	<0.1	0.001	<0.01	<0.01	<0.01	<0.01
KSW-7	7/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-7	7/1/2004	Total	N	0.2	<0.1	0.002	<0.01	<0.01	<0.01	<0.01
KSW-7	8/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-7	8/1/2004	Total	N	<0.1	<0.1	0.001	<0.01	<0.01	<0.01	<0.01
KSW-7	9/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
KSW-7	9/1/2004	Total	N	0.7	<0.1	0.002	<0.01	<0.01	<0.01	<0.01
KSW-7	10/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
KSW-7	10/1/2004	Total	N	1.9	<0.1	0.001	<0.01	<0.01	<0.01	<0.01
KSW-7	11/1/2004	Dissolved	N	--	--	0.002	--	--	--	--
KSW-7	11/1/2004	Total	N	0.7	<0.1	0.003	<0.01	<0.01	<0.01	<0.01
KSW-7	12/1/2004	Dissolved	N	--	--	0.002	--	--	--	--
KSW-7	12/1/2004	Total	N	0.1	<0.1	0.003	<0.01	<0.01	<0.01	0.01
KSW-7	1/1/2005	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-7	1/1/2005	Total	N	0.5	<0.1	0.001	<0.01	<0.01	<0.01	<0.01
KSW-10	5/1/1999	Total	N	--	--	--	--	--	--	--
KSW-10	7/1/1999	Total	N	--	--	--	--	--	--	--
KSW-10	8/1/1999	Total	N	--	--	--	--	--	--	--
KSW-14	6/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
KSW-14	6/1/2004	Total	N	0.1	<0.1	0.004	<0.01	<0.01	<0.01	0.01
KSW-14	8/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-14	8/1/2004	Total	N	<0.1	<0.1	<0.001	<0.01	<0.01	<0.01	<0.01
KSW-14	9/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
KSW-14	9/1/2004	Total	N	0.4	<0.1	0.001	<0.01	<0.01	<0.01	0.01
KSW-14	10/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
KSW-14	10/1/2004	Total	N	2.7	<0.1	0.002	<0.01	<0.01	<0.01	<0.01
KSW-14	11/1/2004	Dissolved	N	--	--	0.002	--	--	--	--
KSW-14	11/1/2004	Total	N	0.1	<0.1	0.003	<0.01	<0.01	<0.01	<0.01
KSW-14	12/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
KSW-14	12/1/2004	Total	N	<0.1	<0.1	0.002	<0.01	<0.01	<0.01	<0.01
KSW-14	1/1/2005	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-14	1/1/2005	Total	N	<0.01	<0.1	0.001	<0.01	<0.01	<0.01	<0.01
KSW-15	6/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-15	6/1/2004	Total	N	<0.1	<0.1	<0.001	<0.01	<0.01	<0.01	<0.01

TABLE C-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Cadmium (mg/L)	Chromium [1] (mg/L)	Cobalt (mg/L)	Copper (mg/L)
Standards*				**0.05****	**0.006**	**0.01**	**0.003**	**0.05**	**NE**	**0.5**
KSW-15	7/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KSW-15	7/1/2004	Total	N	<0.1	<0.1	<0.001	<0.01	<0.01	<0.01	<0.01
KSW-15	9/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
KSW-15	9/1/2004	Total	N	1.1	<0.1	0.001	<0.01	<0.01	<0.01	<0.01
KSW-15	10/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
KSW-15	10/1/2004	Total	N	1.9	<0.1	0.002	<0.01	<0.01	<0.01	<0.01
KSW-15	11/1/2004	Dissolved	N	--	--	0.002	--	--	--	--
KSW-15	11/1/2004	Total	N	0.3	<0.1	0.003	<0.01	<0.01	<0.01	<0.01
NSW-2	8/1/2000	Total	N	0.2	--	0.002	<0.01	<0.01	--	--
NSW-2	11/1/2000	Total	N	--	--	0.002	<0.01	<0.001	--	--
Ntotro Sub-Basin										
NSW-3	8/1/2000	Total	N	0.3	--	0.002	<0.01	<0.01	--	--
NSW-3	11/1/2000	Total	N	--	--	0.002	<0.01	<0.01	--	--
NSW-3	6/1/2003	Total	N	0.6	--	0.001	<0.01	<0.01	--	<0.01
NSW-3	10/1/2003	Total	N	<0.1	--	0.005	<0.01	<0.01	--	<0.01
NSW-3	6/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
NSW-3	6/1/2004	Total	N	6.7	<0.1	0.007	<0.01	<0.01	<0.01	0.01
NSW-3	9/1/2004	Dissolved	N	--	--	0.004	--	--	--	--
NSW-3	9/1/2004	Total	N	3.4	<0.1	0.009	<0.01	<0.01	<0.01	0.01
NSW-3	10/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
NSW-3	10/1/2004	Total	N	4.9	<0.1	0.007	<0.01	<0.01	<0.01	<0.01
NSW-3	11/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
NSW-3	11/1/2004	Total	N	2.3	<0.1	0.002	<0.01	<0.01	<0.01	<0.01
Asuade Sub-Basin										
NSW-4	8/1/2000	Total	N	0.3	--	0.002	<0.01	<0.01	--	--
NSW-4	11/1/2000	Total	N	--	--	0.005	<0.01	<0.01	--	<0.01
NSW-4	12/1/2000	Total	N	--	--	0.008	<0.01	<0.01	--	<0.01
NSW-7	11/1/2000	Total	N	--	--	0.003	<0.01	<0.01	--	<0.01
NSW-7	12/1/2000	Total	N	--	--	0.003	<0.01	<0.01	--	<0.01
NSW-7	1/1/2001	Total	N	--	--	0.008	<0.01	<0.01	--	<0.01
NSW-7	10/1/2003	Total	N	0.1	--	0.021	<0.01	<0.01	--	<0.01
NSW-7	5/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
NSW-7	5/1/2004	Total	N	2.5	--	0.001	<0.01	<0.01	<0.01	<0.01
NSW-7	10/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
NSW-7	10/1/2004	Total	N	5.4	<0.1	0.007	<0.01	<0.01	<0.01	<0.01
NSW-7	11/1/2004	Dissolved	N	--	--	0.009	--	--	--	--
NSW-7	11/1/2004	Total	N	0.8	<0.1	0.02	<0.01	<0.01	<0.01	<0.01
NSW-7	12/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
NSW-7	12/1/2004	Total	N	0.4	<0.1	0.003	<0.01	<0.01	<0.01	0.01
Amama Sub-Basin										
NSW-5	8/1/2000	Total	N	0.2	--	0.001	<0.01	<0.01	--	--
NSW-5	11/1/2000	Total	N	--	--	0.001	<0.01	<0.01	--	<0.01
NSW-5	12/1/2000	Total	N	--	--	0.002	<0.01	<0.01	--	<0.01
NSW-5	6/1/2003	Total	N	0.2	--	0.001	<0.01	<0.01	--	<0.01
NSW-5	10/1/2003	Total	N	<0.1	--	0.001	<0.01	<0.01	--	<0.01

TABLE C-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Cadmium (mg/L)	Chromium [1] (mg/L)	Cobalt (mg/L)	Copper (mg/L)
Standards*				**0.05****	**0.006**	**0.01**	**0.003**	**0.05**	**NE**	**0.5**
NSW-5	1/1/2004	Total	N	--	--	--	--	--	--	<0.01
NSW-5	4/1/2004	Total	N	--	--	--	--	--	--	--
NSW-5	5/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
NSW-5	5/1/2004	Total	N	1.5	--	<0.001	<0.01	<0.01	<0.01	<0.01
NSW-5	6/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
NSW-5	6/1/2004	Total	N	0.5	<0.1	0.001	<0.01	<0.01	<0.01	<0.01
NSW-5	8/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
NSW-5	8/1/2004	Total	N	0.3	<0.1	<0.001	<0.01	<0.01	<0.01	<0.01
NSW-5	9/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
NSW-5	9/1/2004	Total	N	1	<0.1	0.001	<0.01	<0.01	<0.01	0.01
NSW-5	10/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
NSW-5	10/1/2004	Total	N	0.2	<0.1	0.002	<0.01	<0.01	<0.01	<0.01
NSW-5	11/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
NSW-5	11/1/2004	Total	N	0.3	<0.1	0.002	<0.01	<0.01	<0.01	<0.01
NSW-5	12/1/2004	Dissolved	N	--	--	0.001	--	--	--	--
NSW-5	12/1/2004	Total	N	<0.1	<0.1	0.003	<0.01	<0.01	<0.01	<0.01
NSW-5	1/1/2005	Dissolved	N	--	--	<0.001	--	--	--	--
NSW-5	1/1/2005	Total	N	0.3	<0.1	0.002	<0.01	<0.01	<0.01	<0.01

Notes:

N	Indicates natural sample.
NE	Not Established
<	Indicates analyte not detected above laboratory practical quantification limit (PQL)
(mg/L)	Milligrams per liter
--	Field data or laboratory samples were not collected or analyzed.
[1]	Total Chromium
*	The surface water standards are the lowest of the drinking water standards from either the World Health Organization (WHO Guidlines for Drinking Water Quality, 3rd. edition), Ghana EPA, Nevada USA, or USEPA.
**	WHO Acceptability guidline or USEPA secondary standard for aesthetics.
	Shading indicates results above standards.

TABLE C-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Zinc (mg/L)
Standards*				**0.3****	**0.01**	**0.05****	**0.001**	**0.0134**	**0.01**	**2.0**
Suraw/Suntim Sub-Basin										
KSW-11	9/1/1999	Total	N	1.35	<0.01	0.03	<0.001	<0.01	--	0.32
KSW-11	10/1/1999	Total	N	1.22	--	0.05	--	--	--	--
KSW-11	11/1/1999	Total	N	0.5	--	0.11	--	--	--	--
KSW-11	12/1/1999	Total	N	0.94	--	1.09	--	--	--	--
KSW-11	1/1/2000	Total	N	--	--	--	--	--	--	--
KSW-11	2/1/2000	Total	N	--	--	--	--	--	--	--
KSW-11	8/1/2000	Total	N	--	<0.01	--	<0.001	<0.01	--	--
KSW-11	12/1/2000	Total	N	2.33	--	0.54	--	--	--	--
KSW-11	6/1/2003	Total	N	0.98	<0.01	0.01	<0.001	<0.01	--	<0.01
KSW-11	10/1/2003	Total	N	0.73	<0.01	0.01	<0.001	<0.01	--	0.01
KSW-11	4/1/2004	Total	N	--	--	--	--	--	--	--
KSW-12	9/1/1999	Total	N	1.27	<0.01	0.02	<0.001	<0.01	--	0.38
KSW-12	10/1/1999	Total	N	1.77	--	0.02	--	--	--	--
KSW-12	11/1/1999	Total	N	0.33	--	<0.01	--	--	--	--
KSW-12	12/1/1999	Total	N	2.33	--	0.54	--	--	--	--
KSW-12	8/1/2000	Total	N	--	<0.01	--	<0.001	<0.01	--	--
KSW-12	6/1/2003	Total	N	0.51	<0.01	0.01	<0.001	<0.01	--	0.08
KSW-12	10/1/2003	Total	N	0.35	<0.01	<0.01	<0.001	<0.01	--	0.03
KSW-12	4/1/2004	Total	N	--	--	--	--	--	--	--
NSW-1	8/1/2000	Total	N	--	<0.01	--	<0.001	<0.01	--	--
NSW-1	11/1/2000	Total	N	4.67	--	1.47	--	<0.001	--	0.01
NSW-1	12/1/2000	Total	N	3.39	<0.01	0.54	--	<0.01	--	0.18
NSW-1	6/1/2003	Total	N	0.54	<0.01	0.03	<0.001	<0.01	--	<0.01
NSW-1	10/1/2003	Total	N	0.46	<0.01	0.01	<0.001	<0.01	--	<0.01
Tano River										
KSW-1	11/1/1998	Total	N	2.08	--	0.06	--	--	--	--
KSW-1	12/1/1998	Total	N	1.99	--	0.03	--	--	--	--
KSW-1	1/1/1999	Total	N	1.14	--	0.02	--	--	--	--
KSW-1	2/1/1999	Total	N	1.47	--	0.03	--	--	--	--
KSW-1	4/1/1999	Total	N	2.13	--	0.04	--	--	--	--
KSW-1	5/1/1999	Total	N	3.53	--	0.07	--	--	--	--
KSW-1	6/1/1999	Total	N	3.71	<0.01	0.04	<0.001	<0.01	--	0.05
KSW-1	7/1/1999	Total	N	1.92	--	<0.01	--	--	--	--
KSW-1	8/1/1999	Total	N	1.71	--	0.03	--	--	--	--
KSW-1	9/1/1999	Total	N	2.99	<0.01	0.07	<0.001	<0.01	--	0.25
KSW-1	10/1/1999	Total	N	3.26	--	0.09	--	--	--	--
KSW-1	11/1/1999	Total	N	2.13	--	0.03	--	--	--	--
KSW-1	12/1/1999	Total	N	1.79	--	0.03	--	--	--	--
KSW-1	1/1/2000	Total	N	--	--	--	--	--	--	--
KSW-1	2/1/2000	Total	N	--	--	--	--	--	--	--
KSW-1	8/1/2000	Total	N	--	<0.01	--	<0.001	<0.01	--	--
KSW-1	6/1/2003	Total	N	1.99	<0.01	0.08	<0.001	<0.01	--	<0.01
KSW-1	10/1/2003	Total	N	0.84	<0.01	0.01	<0.001	<0.01	--	0.02
KSW-1	4/1/2004	Total	N	--	--	--	--	--	--	--
KSW-1	5/1/2004	Dissolved	N	--	--	--	--	--	--	--

TABLE C-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Zinc (mg/L)
Standards*				**0.3****	**0.01**	**0.05****	**0.001**	**0.0134**	**0.01**	**2.0**
KSW-1	5/1/2004	Total	N	3.88	<0.01	0.06	0.001	<0.01	--	0.03
KSW-1	6/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-1	6/1/2004	Total	N	2.59	<0.01	0.04	<0.001	<0.01	<0.001	<0.01
KSW-1	7/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-1	7/1/2004	Total	N	2.03	<0.01	0.04	<0.001	0.09	--	0.01
KSW-1	8/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-1	8/1/2004	Total	N	1.29	<0.01	0.03	<0.001	<0.01	<0.001	0.03
KSW-1	9/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-1	9/1/2004	Total	N	4.23	<0.01	0.08	0.002	<0.01	<0.001	<0.01
KSW-1	10/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-1	10/1/2004	Total	N	2.24	<0.01	0.08	0.001	<0.01	<0.001	0.03
KSW-1	11/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-1	11/1/2004	Total	N	2.32	<0.01	0.08	0.004	<0.01	0.004	<0.01
KSW-1	12/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-1	12/1/2004	Total	N	2.56	<0.01	0.07	<0.001	<0.01	<0.001	0.02
KSW-1	1/1/2005	Dissolved	N	--	--	--	--	--	--	--
KSW-1	1/1/2005	Total	N	1.74	<0.01	0.04	<0.001	<0.01	<0.001	0.05
KSW-8	11/1/1998	Total	N	2.13	--	0.05	--	--	--	--
KSW-8	12/1/1998	Total	N	1.9	--	0.03	--	--	--	--
KSW-8	1/1/1999	Total	N	1.09	--	<0.01	--	--	--	--
KSW-8	2/1/1999	Total	N	1.29	--	0.03	--	--	--	--
KSW-8	4/1/1999	Total	N	1.86	--	0.03	--	--	--	--
KSW-8	5/1/1999	Total	N	3.59	--	0.06	--	--	--	--
KSW-8	6/1/1999	Total	N	2.78	<0.01	0.04	<0.001	<0.01	--	0.13
KSW-8	7/1/1999	Total	N	1.84	--	<0.01	--	--	--	--
KSW-8	8/1/1999	Total	N	167	--	0.02	--	--	--	--
KSW-8	9/1/1999	Total	N	3.11	<0.01	0.21	<0.001	<0.01	--	0.38
KSW-8	10/1/1999	Total	N	3.93	--	0.04	--	--	--	--
KSW-8	11/1/1999	Total	N	2.67	--	0.08	--	--	--	--
KSW-8	12/1/1999	Total	N	1.59	--	0.05	--	--	--	--
KSW-8	1/1/2000	Total	N	--	--	--	--	--	--	--
KSW-8	2/1/2000	Total	N	--	--	--	--	--	--	--
KSW-8	8/1/2000	Total	N	--	<0.01	--	<0.001	<0.01	--	--
KSW-8	9/1/2001	Total	N	--	<0.01	--	<0.001	<0.01	--	--
KSW-8	6/1/2003	Total	N	2.38	<0.01	0.09	<0.001	<0.01	--	0.01
KSW-8	11/1/2003	Total	N	1.01	<0.01	0.02	<0.001	<0.01	--	0.03
KSW-8	3/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-8	3/1/2004	Total	N	5.63	<0.01	0.06	<0.001	<0.01	--	0.13
KSW-8	5/1/2004	Total	N	5.63	<0.01	0.06	<0.001	<0.01	<0.001	0.13
KSW-8	6/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-8	6/1/2004	Total	N	3.09	<0.01	0.05	0.001	<0.01	<0.001	0.01
KSW-8	7/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-8	7/1/2004	Total	N	1.8	<0.01	0.04	<0.001	<0.01	<0.001	0.13
KSW-8	8/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-8	8/1/2004	Total	N	1.38	<0.01	0.03	<0.001	<0.01	<0.001	<0.01
KSW-8	9/1/2004	Dissolved	N	--	--	--	--	--	--	--

TABLE C-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Zinc (mg/L)
Standards*				**0.3****	**0.01**	**0.05****	**0.001**	**0.0134**	**0.01**	**2.0**
KSW-8	9/1/2004	Total	N	3.28	<0.01	0.05	<0.001	<0.01	<0.001	<0.01
KSW-8	10/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-8	10/1/2004	Total	N	1.19	<0.01	0.03	<0.001	<0.01	<0.001	<0.01
KSW-8	11/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-8	11/1/2004	Total	N	198	<0.01	0.07	0.002	<0.01	0.001	<0.01
KSW-8	12/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-8	12/1/2004	Total	N	2.87	<0.01	0.07	<0.001	<0.01	0.001	0.07
KSW-8	1/1/2005	Dissolved	N	--	--	--	--	--	--	--
KSW-8	1/1/2005	Total	N	1.69	<0.01	0.03	<0.001	<0.01	<0.001	0.09
Subri Sub-Basin										
KSW-2	11/1/1998	Total	N	1.04	--	0.5	--	--	--	--
KSW-2	12/1/1998	Total	N	5.85	--	0.76	--	--	--	--
KSW-2	1/1/1999	Total	N	5.05	--	0.65	--	--	--	--
KSW-2	2/1/1999	Total	N	17.7	--	0.7	--	--	--	--
KSW-2	4/1/1999	Total	N	2.29	--	0.09	--	--	--	--
KSW-2	5/1/1999	Total	N	1.78	--	0.27	--	--	--	--
KSW-2	6/1/1999	Total	N	2.83	<0.01	0.15	<0.001	<0.01	--	0.05
KSW-2	7/1/1999	Total	N	2	--	<0.01	--	--	--	--
KSW-2	8/1/1999	Total	N	2.65	--	0.51	--	--	--	--
KSW-2	9/1/1999	Total	N	3.76	<0.01	0.05	<0.001	0.01	--	0.03
KSW-2	10/1/1999	Total	N	2.49	--	0.05	--	--	--	--
KSW-2	11/1/1999	Total	N	1.69	--	0.04	--	--	--	--
KSW-2	12/1/1999	Total	N	2.37	--	1.18	--	--	--	--
KSW-2	1/1/2000	Total	N	--	--	--	--	--	--	--
KSW-2	8/1/2000	Total	N	--	<0.01	--	<0.001	<0.01	--	--
KSW-2	6/1/2003	Total	N	3.34	<0.01	0.04	0.001	<0.01	--	0.04
KSW-2	10/1/2003	Total	N	3.59	<0.01	0.01	<0.001	<0.01	--	0.06
KSW-2	5/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-2	5/1/2004	Total	N	2.87	<0.01	0.04	<0.001	<0.01	--	0.05
KSW-2	6/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-2	6/1/2004	Total	N	2.16	<0.01	0.08	<0.001	<0.01	<0.001	0.02
KSW-2	7/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-2	7/1/2004	Total	N	1.86	<0.01	0.08	<0.001	<0.01	<0.001	0.08
KSW-2	8/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-2	8/1/2004	Total	N	1.37	<0.01	0.37	<0.001	<0.01	<0.001	0.02
KSW-2	9/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-2	9/1/2004	Total	N	6.09	<0.01	0.45	0.001	<0.01	<0.001	<0.01
KSW-2	10/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-2	10/1/2004	Total	N	5.18	<0.01	0.05	0.003	<0.01	<0.001	<0.01
KSW-2	11/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-2	11/1/2004	Total	N	4.65	<0.01	0.08	0.005	<0.01	0.003	<0.01
KSW-2	12/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-2	12/1/2004	Total	N	2.55	<0.01	0.16	<0.001	<0.01	<0.001	0.04
KSW-2	1/1/2005	Dissolved	N	--	--	--	--	--	--	--
KSW-2	1/1/2005	Total	N	3.66	<0.01	0.43	<0.001	<0.01	<0.001	0.08
KSW-3	11/1/1998	Total	N	3.15	--	0.7	--	--	--	--

TABLE C-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Zinc (mg/L)
Standards*				**0.3****	**0.01**	**0.05****	**0.001**	**0.0134**	**0.01**	**2.0**
KSW-3	12/1/1998	Total	N	2.07	--	0.5	--	--	--	--
KSW-3	1/1/1999	Total	N	2.5	--	0.6	--	--	--	--
KSW-3	2/1/1999	Total	N	7.19	--	0.83	--	--	--	--
KSW-3	4/1/1999	Total	N	2.25	--	1.86	--	--	--	--
KSW-3	5/1/1999	Total	N	4.43	--	0.5	--	--	--	--
KSW-3	6/1/1999	Total	N	3.57	<0.01	1.43	<0.001	<0.01	--	1.42
KSW-3	7/1/1999	Total	N	1.13	--	0.29	--	--	--	--
KSW-3	8/1/1999	Total	N	0.56	--	0.12	--	--	--	--
KSW-3	9/1/1999	Total	N	2.98	<0.01	0.03	<0.001	<0.01	--	0.06
KSW-3	10/1/1999	Total	N	2.79	--	0.07	--	--	--	--
KSW-3	11/1/1999	Total	N	1.1	--	0.09	--	--	--	--
KSW-3	12/1/1999	Total	N	1.41	--	0.27	--	--	--	--
KSW-3	1/1/2000	Total	N	--	--	--	--	--	--	--
KSW-3	8/1/2000	Total	N	--	<0.01	--	<0.001	<0.01	--	--
KSW-3	6/1/2003	Total	N	13.8	<0.01	0.16	0.002	<0.01	--	<0.01
KSW-3	10/1/2003	Total	N	1.63	<0.01	0.04	<0.001	<0.01	--	0.02
KSW-3	1/1/2004	Total	N	--	--	--	--	--	--	--
KSW-3	4/1/2004	Total	N	--	--	--	--	--	--	--
KSW-3	5/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-3	5/1/2004	Total	N	1.91	<0.01	0.03	0.001	<0.01	--	0.04
KSW-3	6/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-3	6/1/2004	Total	N	1.95	<0.01	0.36	<0.001	<0.01	<0.001	0.04
KSW-3	7/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-3	7/1/2004	Total	N	2.93	<0.01	0.58	<0.001	<0.01	<0.001	<0.01
KSW-3	8/1/2004	Total	N	2.09	<0.01	0.37	<0.001	<0.01	--	0.04
KSW-3	9/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-3	9/1/2004	Total	N	3.47	<0.01	0.01	<0.001	<0.01	<0.001	0.003
KSW-3	10/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-3	10/1/2004	Total	N	2.9	<0.01	0.05	<0.001	<0.01	<0.001	0.19
KSW-3	11/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-3	11/1/2004	Total	N	2.35	<0.01	0.07	<0.001	<0.01	<0.001	<0.01
KSW-3	12/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-3	12/1/2004	Total	N	1.81	<0.01	0.23	<0.001	<0.01	<0.001	0.08
KSW-3	1/1/2005	Dissolved	N	--	--	--	--	--	--	--
KSW-3	1/1/2005	Total	N	1.84	<0.01	0.71	<0.001	<0.01	<0.001	0.04
KSW-5	5/1/1999	Total	N	3.3	--	0.03	--	--	--	--
KSW-5	6/1/1999	Total	N	1.03	<0.01	0.19	<0.001	<0.01	--	0.07
KSW-5	7/1/1999	Total	N	0.6	--	0.07	--	--	--	--
KSW-5	8/1/1999	Total	N	0.55	--	0.05	--	--	--	--
KSW-5	9/1/1999	Total	N	0.89	<0.01	0.11	<0.001	<0.01	--	0.6
KSW-5	10/1/1999	Total	N	2.09	--	0.03	--	--	--	--
KSW-5	11/1/1999	Total	N	0.99	--	1.67	--	--	--	--
KSW-5	8/1/2000	Total	N	--	<0.01	--	<0.001	<0.01	--	--
KSW-5	6/1/2003	Total	N	1.9	<0.01	0.19	<0.001	<0.01	--	<0.01
KSW-5	10/1/2003	Total	N	0.85	<0.01	0.21	<0.001	<0.01	--	0.17
KSW-5	6/1/2004	Dissolved	N	--	--	--	--	--	--	--

TABLE C-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Zinc (mg/L)
Standards*				**0.3****	**0.01**	**0.05****	**0.001**	**0.0134**	**0.01**	**2.0**
KSW-5	6/1/2004	Total	N	1.28	<0.01	0.29	<0.001	<0.01	<0.001	0.01
KSW-5	9/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-5	9/1/2004	Total	N	2.64	<0.01	0.4	<0.001	<0.01	<0.001	<0.01
KSW-5	10/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-5	10/1/2004	Total	N	2.85	<0.01	0.03	<0.001	<0.01	<0.001	0.51
KSW-5	11/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-5	11/1/2004	Total	N	1.39	<0.01	0.04	<0.001	<0.01	0.001	<0.01
KSW-6	7/1/1999	Total	N	1.24	--	5.16	--	--	--	--
KSW-6	9/1/1999	Total	N	0.79	<0.01	0.85	<0.001	<0.01	--	0.16
KSW-6	10/1/1999	Total	N	5.16	--	0.04	--	--	--	--
KSW-6	8/1/2000	Total	N	--	<0.01	--	<0.001	<0.01	--	--
KSW-6	6/1/2003	Total	N	4.29	<0.01	3.11	<0.001	<0.01	--	<0.01
KSW-6	5/1/2004	Total	N	8.9	<0.01	0.06	<0.001	<0.01	<0.001	0.06
KSW-9	12/1/1998	Total	N	0.02	--	0.12	--	--	--	--
KSW-9	1/1/1999	Total	N	0.04	--	0.16	--	--	--	--
KSW-9	2/1/1999	Total	N	0.31	--	0.14	--	--	--	--
KSW-9	4/1/1999	Total	N	0.03	--	0.16	--	--	--	--
KSW-9	5/1/1999	Total	N	0.09	--	0.1	--	--	--	--
KSW-9	6/1/1999	Total	N	1.07	<0.01	0.74	<0.001	<0.01	--	0.01
KSW-9	7/1/1999	Total	N	0.81	<0.01	0.06	--	<0.01	--	3.98
KSW-9	8/1/1999	Total	N	1.23	<0.01	0.22	<0.001	<0.01	--	2.4
KSW-9	10/1/1999	Total	N	1.67	<0.01	0.21	<0.001	<0.01	--	1.33
KSW-9	1/1/2004	Total	N	1.42	--	--	--	--	--	0.02
KSW-9	4/1/2004	Total	N	--	--	--	--	--	--	--
KSW-13	9/1/1999	Total	N	7.07	<0.01	0.1	<0.001	<0.01	--	0.56
KSW-13	10/1/1999	Total	N	3.86	--	0.04	--	--	--	--
KSW-13	11/1/1999	Total	N	2.85	--	0.14	--	--	--	--
KSW-13	12/1/1999	Total	N	3.45	--	0.2	--	--	--	--
KSW-13	8/1/2000	Total	N	--	<0.01	--	<0.001	<0.01	--	--
KSW-13	10/1/2000	Total	N	5.99	<0.01	0.67	<0.001	<0.01	--	<0.01
KSW-13	11/1/2000	Total	N	4.2	<0.001	0.6	<0.01	<0.01	--	0.13
KSW-13	4/1/2004	Total	N	--	--	--	--	--	--	--
KSW-13	5/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-13	5/1/2004	Total	N	1.64	<0.01	0.01	<0.001	<0.01	--	<0.01
KSW-13	9/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-13	9/1/2004	Total	N	3.97	<0.01	0.21	<0.001	<0.01	<0.001	<0.01
KSW-13	10/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-13	10/1/2004	Total	N	2.86	<0.01	0.03	<0.001	<0.01	0.001	0.08
KSW-13	11/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-13	11/1/2004	Total	N	4.28	<0.01	0.31	0.009	<0.01	0.005	<0.01
NSW-6	10/1/2000	Total	N	2.17	<0.01	0.09	<0.001	<0.01	--	0.06
NSW-6	11/1/2000	Total	N	3.49	<0.01	0.38	<0.001	--	--	<0.01
NSW-6	12/1/2000	Total	N	11	<0.01	3.8	--	<0.01	--	0.11
NSW-6	5/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-6	5/1/2004	Total	N	1.66	<0.01	0.02	<0.001	<0.01	--	0.06
NSW-6	6/1/2004	Dissolved	N	--	--	--	--	--	--	--

TABLE C-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Zinc (mg/L)
Standards*				**0.3****	**0.01**	**0.05****	**0.001**	**0.0134**	**0.01**	**2.0**
NSW-6	6/1/2004	Total	N	2.59	<0.01	0.05	<0.001	<0.01	<0.001	<0.01
NSW-6	7/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-6	7/1/2004	Total	N	1.77	<0.01	0.05	<0.001	<0.01	<0.001	0.08
NSW-6	8/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-6	8/1/2004	Total	N	1.21	<0.01	0.04	<0.001	<0.01	<0.001	<0.01
NSW-6	9/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-6	9/1/2004	Total	N	4.58	<0.01	0.06	<0.001	<0.01	<0.001	0.04
NSW-6	10/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-6	10/1/2004	Total	N	2.98	<0.01	0.05	<0.001	<0.01	<0.001	0.22
NSW-6	11/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-6	11/1/2004	Total	N	2.96	<0.01	0.08	<0.001	<0.01	<0.001	<0.01
NSW-6	12/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-6	12/1/2004	Total	N	2.83	<0.01	0.1	<0.001	0.01	0.001	0.03
NSW-6	1/1/2005	Dissolved	N	--	--	--	--	--	--	--
NSW-6	1/1/2005	Total	N	2.07	<0.01	0.13	<0.001	<0.01	<0.001	0.11
NSW-8	6/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-8	6/1/2004	Total	N	1.88	<0.01	0.04	<0.001	<0.01	<0.001	0.01
NSW-8	7/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-8	7/1/2004	Total	N	1.76	<0.01	0.04	<0.001	<0.01	<0.001	<0.01
NSW-8	8/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-8	8/1/2004	Total	N	1.07	<0.01	0.04	<0.001	<0.01	<0.001	0.04
NSW-8	9/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-8	9/1/2004	Total	N	4.68	<0.01	0.07	<0.001	<0.01	<0.001	<0.01
NSW-8	10/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-8	10/1/2004	Total	N	3.03	<0.01	0.04	<0.001	<0.01	<0.001	<0.01
NSW-8	11/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-8	11/1/2004	Total	N	2.15	<0.01	0.05	<0.001	<0.01	<0.001	<0.01
NSW-8	12/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-8	12/1/2004	Total	N	2.02	<0.01	0.09	<0.001	<0.01	<0.001	0.08
NSW-8	1/1/2005	Dissolved	N	--	--	--	--	--	--	--
NSW-8	1/1/2005	Total	N	1.89	<0.01	0.11	<0.001	<0.01	<0.001	0.03
NSW-9	5/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-9	5/1/2004	Total	N	1.14	<0.01	0.02	<0.001	<0.01	--	0.02
NSW-9	10/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-9	10/1/2004	Total	N	2.86	<0.01	0.04	0.002	<0.01	<0.001	<0.01
NSW-9	11/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-9	11/1/2004	Total	N	5.56	<0.01	0.88	0.002	<0.01	<0.001	<0.01
Awonsu Sub-Basin										
KSW-7	4/1/1999	Total	N	23.04	--	5.01	--	--	--	--
KSW-7	5/1/1999	Total	N	2.7	--	1.01	--	--	--	--
KSW-7	7/1/1999	Total	N	4.62	--	0.32	--	--	--	--
KSW-7	8/1/1999	Total	N	80.6	--	2.11	--	--	--	--
KSW-7	9/1/1999	Total	N	4.18	<0.01	0.11	<0.001	<0.01	--	1.13
KSW-7	10/1/1999	Total	N	5.87	--	0.03	--	--	--	--
KSW-7	11/1/1999	Total	N	1.26	--	0.49	--	--	--	--
KSW-7	12/1/1999	Total	N	4	--	0.08	--	--	--	--

TABLE C-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Zinc (mg/L)
Standards*				**0.3****	**0.01**	**0.05****	**0.001**	**0.0134**	**0.01**	**2.0**
KSW-7	8/1/2000	Total	N	--	<0.01	--	<0.001	<0.01	--	--
KSW-7	6/1/2003	Total	N	20.7	<0.01	1.37	0.003	<0.01	--	0.13
KSW-7	5/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-7	5/1/2004	Total	N	1.93	<0.01	0.09	<0.001	<0.01	--	0.02
KSW-7	6/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-7	6/1/2004	Total	N	1.89	<0.01	0.42	<0.001	<0.01	<0.001	0.01
KSW-7	7/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-7	7/1/2004	Total	N	10	<0.01	1.45	0.001	<0.01	<0.001	<0.01
KSW-7	8/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-7	8/1/2004	Total	N	4.98	<0.01	5.4	<0.001	<0.01	<0.001	<0.01
KSW-7	9/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-7	9/1/2004	Total	N	2.29	<0.01	0.22	<0.001	<0.01	<0.001	0.01
KSW-7	10/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-7	10/1/2004	Total	N	4.09	<0.01	0.07	0.001	<0.01	<0.001	<0.01
KSW-7	11/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-7	11/1/2004	Total	N	2.2	<0.01	0.04	<0.001	<0.01	0.002	<0.01
KSW-7	12/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-7	12/1/2004	Total	N	2.77	<0.01	0.95	<0.001	<0.01	0.001	0.13
KSW-7	1/1/2005	Dissolved	N	--	--	--	--	--	--	--
KSW-7	1/1/2005	Total	N	1.84	<0.01	0.71	<0.001	<0.01	<0.001	0.04
KSW-10	5/1/1999	Total	N	14.61	--	0.08	--	--	--	--
KSW-10	7/1/1999	Total	N	7.18	--	1.95	--	--	--	--
KSW-10	8/1/1999	Total	N	119.9	--	3.98	--	--	--	--
KSW-14	6/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-14	6/1/2004	Total	N	18.1	<0.01	0.99	0.001	<0.01	<0.001	0.02
KSW-14	8/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-14	8/1/2004	Total	N	0.85	<0.01	3.21	<0.001	<0.01	<0.001	<0.01
KSW-14	9/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-14	9/1/2004	Total	N	2.09	<0.01	0.15	<0.001	<0.01	<0.001	<0.01
KSW-14	10/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-14	10/1/2004	Total	N	3.56	<0.01	0.04	0.004	<0.01	<0.001	0.17
KSW-14	11/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-14	11/1/2004	Total	N	6.66	<0.01	0.94	0.009	<0.01	<0.001	<0.01
KSW-14	12/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-14	12/1/2004	Total	N	1.31	<0.01	0.31	<0.001	<0.01	0.001	0.03
KSW-14	1/1/2005	Dissolved	N	--	--	--	--	--	--	--
KSW-14	1/1/2005	Total	N	0.64	<0.01	0.34	<0.001	<0.01	<0.001	0.02
KSW-15	6/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-15	6/1/2004	Total	N	0.49	<0.01	0.19	<0.001	<0.01	<0.001	0.01
KSW-15	7/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-15	7/1/2004	Total	N	0.7	<0.01	0.26	<0.001	<0.01	<0.001	<0.01
KSW-15	9/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-15	9/1/2004	Total	N	3.14	<0.01	0.07	0.001	<0.01	<0.001	<0.01
KSW-15	10/1/2004	Dissolved	N	--	--	--	--	--	--	--
KSW-15	10/1/2004	Total	N	3.51	<0.01	0.06	<0.001	<0.01	<0.001	<0.01
KSW-15	11/1/2004	Dissolved	N	--	--	--	--	--	--	--

TABLE C-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Zinc (mg/L)
Standards*				**0.3****	**0.01**	**0.05****	**0.001**	**0.0134**	**0.01**	**2.0**
KSW-15	11/1/2004	Total	N	1.65	<0.01	0.22	<0.001	<0.01	0.001	<0.01
NSW-2	8/1/2000	Total	N	--	<0.01	--	<0.001	<0.01	--	--
NSW-2	11/1/2000	Total	N	--	--	--	<0.01	<0.01	--	--
Ntotro Sub-Basin										
NSW-3	8/1/2000	Total	N	--	<0.01	--	<0.001	<0.01	--	--
NSW-3	11/1/2000	Total	N	--	<0.01	--	<0.001	--	--	--
NSW-3	6/1/2003	Total	N	2.28	<0.01	1.1	<0.001	<0.01	--	<0.01
NSW-3	10/1/2003	Total	N	2.57	<0.01	1.04	<0.001	<0.01	--	<0.01
NSW-3	6/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-3	6/1/2004	Total	N	14.6	<0.01	1.18	0.001	<0.01	<0.001	0.02
NSW-3	9/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-3	9/1/2004	Total	N	8.25	<0.01	103	0.003	<0.01	<0.001	<0.01
NSW-3	10/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-3	10/1/2004	Total	N	9.37	<0.01	0.11	0.003	<0.01	<0.001	<0.01
NSW-3	11/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-3	11/1/2004	Total	N	3.13	<0.01	0.31	0.005	<0.01	0.002	<0.01
Asuade Sub-Basin										
NSW-4	8/1/2000	Total	N	--	<0.01	--	<0.001	<0.01	--	--
NSW-4	11/1/2000	Total	N	5.16	<0.01	0.49	0.002	--	--	0.22
NSW-4	12/1/2000	Total	N	17.9	<0.01	0.55	--	<0.01	--	<0.01
NSW-7	11/1/2000	Total	N	3.22	<0.01	1.29	<0.001	--	--	<0.01
NSW-7	12/1/2000	Total	N	3.89	<0.01	0.33	--	<0.01	--	0.07
NSW-7	1/1/2001	Total	N	2.25	<0.01	0.95	--	<0.01	--	0.51
NSW-7	10/1/2003	Total	N	7.79	<0.01	0.85	0.002	<0.01	--	0.01
NSW-7	5/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-7	5/1/2004	Total	N	2.03	<0.01	0.04	0.002	<0.01	--	0.07
NSW-7	10/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-7	10/1/2004	Total	N	8.88	<0.01	0.05	0.003	<0.01	<0.001	2.12
NSW-7	11/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-7	11/1/2004	Total	N	8.45	<0.01	1.04	0.009	<0.01	<0.001	<0.01
NSW-7	12/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-7	12/1/2004	Total	N	22.3	<0.01	1.18	<0.001	0.02	0.001	0.05
Amama Sub-Basin										
NSW-5	8/1/2000	Total	N	--	<0.01	--	<0.001	<0.01	--	--
NSW-5	11/1/2000	Total	N	3.51	<0.01	0.33	<0.001	--	--	0.19
NSW-5	12/1/2000	Total	N	3.76	<0.01	1.19	--	<0.01	--	0.22
NSW-5	6/1/2003	Total	N	1.34	<0.01	0.09	<0.001	<0.01	--	<0.01
NSW-5	10/1/2003	Total	N	1.9	<0.01	0.03	<0.001	<0.01	--	0.01
NSW-5	1/1/2004	Total	N	5.05	--	--	--	--	--	0.02
NSW-5	4/1/2004	Total	N	--	--	--	--	--	--	--
NSW-5	5/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-5	5/1/2004	Total	N	1.91	<0.01	0.03	<0.001	<0.01	--	0.05
NSW-5	6/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-5	6/1/2004	Total	N	2.01	<0.01	0.03	<0.001	<0.01	<0.001	<0.01
NSW-5	8/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-5	8/1/2004	Total	N	3.91	<0.01	1.72	<0.001	<0.01	<0.001	0.06

TABLE C-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Zinc (mg/L)
Standards*				**0.3****	**0.01**	**0.05****	**0.001**	**0.0134**	**0.01**	**2.0**
NSW-5	9/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-5	9/1/2004	Total	N	2.18	<0.01	0.03	<0.001	<0.01	<0.001	<0.01
NSW-5	10/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-5	10/1/2004	Total	N	1.63	<0.01	0.03	<0.001	<0.01	0.001	0.5
NSW-5	11/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-5	11/1/2004	Total	N	2.25	<0.01	0.1	0.004	<0.01	<0.001	<0.01
NSW-5	12/1/2004	Dissolved	N	--	--	--	--	--	--	--
NSW-5	12/1/2004	Total	N	2.49	<0.01	0.21	<0.001	<0.01	0.001	0.03
NSW-5	1/1/2005	Dissolved	N	--	--	--	--	--	--	--
NSW-5	1/1/2005	Total	N	1.76	<0.01	0.5	<0.001	<0.01	<0.001	0.03

Notes:

N	Indicates natural sample.
NE	Not Established
<	Indicates analyte not detected above laboratory practical quantification limit (PQL)
(mg/L)	Milligrams per liter
--	Field data or laboratory samples were not collected or analyzed.
1	Total Chromium
*	The surface water standards are the lowest of the drinking water standards from either the World Health Organization (WHO Guidlines for Drinking Water Quality, 3rd. edition), Ghana EPA, Nevada USA, or USEPA.
**	WHO Acceptability guidline or USEPA secondary standard for aesthetics.
	Shading indicates results above standards.

TABLE C-4
SURFACE WATER STATISTICS
AHAFO, GHANA
BASELINE STUDY

Sample Location	Range Min	Range Max	Mean	Standard Deviation	Population
Suraw/Suntim Sub-Basin					
SC (umhos/cm) (lab)	16	61	32	10.1	20
True Color (color units)	5	30	13	13	9
TSS	1.0	137.0	15.5	29.53	20
TDS	105.0	360.0	213.4	61.15	20
Turbidity (NTU) (lab)	0.1	105.0	20.6	28.74	20
pH (s.u.) (lab)	6.8	7.7	7.2	0.29	20
Calcium	19.7	26.9	22.8	2.64	8
Chloride	0.5	8.2	4	2.99	8
Cyanide Free	0.01	0.01	0.01	0.000	2
Magnesium	9.0	16.0	12.7	2.41	8
Potassium	4.1	5.2	4.7	0.44	8
Sodium	16.0	27.7	22.8	3.82	8
Sulfate	0.1	10.5	3.8	3.69	9
Total Alkalinity	100.0	140.0	122.5	15.13	8
Total Hardness	86.3	133.1	108.4	15.45	9
Silica	19.4	19.4	19.4		1
Nitrate	0.01	1.30	0.41	0.525	9
Nitrite	0.01	0.04	0.01	0.010	9
Phosphate	0.01	0.58	0.35	0.212	9
Aluminum (Total)	0.10	0.60	0.17	0.149	11
Antimony (Total)					0
Arsenic (Total)	0.001	0.002	0.001	0.0004	13
Cadmium (Total)	0.01	0.01	0.01	0.000	13
Chromium (Total)	0.010	0.010	0.010	0.0000	13
Cobalt (Total)					0
Copper (Total)	0.01	0.01	0.01	0.000	10
Flouride (Total)					0
Iron (Total)	0.33	4.67	1.39	1.196	17
Lead (Total)	0.010	0.010	0.010	0.0000	12
Manganese (Total)	0.01	1.47	0.26	0.437	17
Mercury (Total)	0.001	0.001	0.001	0.0000	11
Nickel (Total)	0.001	0.010	0.009	0.0025	13
Selenium (Total)					0
Silver (Total)					0
Zinc (Total)	0.010	0.380	0.104	0.1410	10

Notes:

umhos/cm - micromhos per centimeter
s.u. - standard units
NTU - Nephelometric Turbidity Unit

Units are mg/l unless otherwise indicated

Sample population includes below detection data. Below detectable concentrations are set equal to the detection limit value for statistical calculations.

TABLE C-4
SURFACE WATER STATISTICS
AHAFO, GHANA
BASELINE STUDY

Sample Location	Range Min	Range Max	Mean	Standard Deviation	Population
Tano River					
SC (umhos/cm) (lab)	10	21	14	3.0	54
True Color (color units)	10	150	34	44	9
TSS	0.1	58.6	17.2	14.75	54
TDS	67.0	174.0	109.4	27.76	54
Turbidity (NTU) (lab)	0.1	630.0	60.4	101.36	54
pH (s.u.) (lab)	6.7	7.7	7.2	0.25	54
Calcium	7.3	16.0	10.6	3.06	27
Chloride	0.5	7.3	2	1.88	27
Cyanide Free	0.01	0.01	0.01	0.000	4
Magnesium	2.8	7.3	4.2	1.28	27
Potassium	2.9	10.0	5.9	1.99	27
Sodium	5.9	21.3	11.2	4.18	27
Sulfate	0.1	23.1	8.4	5.81	27
Total Alkalinity	36.0	85.0	54.9	15.42	21
Total Hardness	37.0	60.0	51.7	6.33	9
Silica					0
Nitrate	0.01	2.24	0.52	0.658	27
Nitrite	0.01	0.11	0.03	0.031	27
Phosphate	0.01	0.93	0.34	0.317	9
Aluminum (Total)	0.10	8.20	2.55	2.382	29
Antimony (Total)	0.01	0.10	0.09	0.022	17
Arsenic (Total)	0.001	0.002	0.001	0.0003	30
Cadmium (Total)	0.01	0.02	0.01	0.002	30
Chromium (Total)	0.010	0.010	0.010	0.0000	30
Cobalt (Total)	0.01	0.01	0.01	0.000	19
Copper (Total)	0.01	0.01	0.01	0.000	27
Flouride (Total)	0.1	0.4	0.3	0.13	14
Iron (Total)	0.84	198.00	9.76	36.157	49
Lead (Total)	0.010	0.010	0.010	0.0000	30
Manganese (Total)	0.01	0.21	0.05	0.032	49
Mercury (Total)	0.001	0.004	0.001	0.0006	30
Nickel (Total)	0.010	0.090	0.013	0.0146	30
Selenium (Total)	0.001	0.004	0.001	0.0007	16
Silver (Total)	0.01	0.01	0.01	0.000	18
Zinc (Total)	0.010	0.380	0.062	0.0863	27

Notes:

umhos/cm - micromhos per centimeter
s.u. - standard units
NTU - Nephelometric Turbidity Unit

Units are mg/l unless otherwise indicated

Sample population includes below detection data. Below detectable concentrations are set equal to the detection limit value for statistical calculations.

TABLE C-4
SURFACE WATER STATISTICS
AHAFO, GHANA
BASELINE STUDY

Sample Location	Range Min	Range Max	Mean	Standard Deviation	Population
Subri Sub-Basin					
SC (umhos/cm) (lab)	10	60	29	10.5	114
True Color (color units)	5	150	25	30	22
TSS	0.1	267.7	23.7	33.12	114
TDS	45.0	1520.0	202.0	140.07	114
Turbidity (NTU) (lab)	0.1	346.0	34.7	58.67	114
pH (s.u.) (lab)	6.2	7.9	7.1	0.37	114
Calcium	9.3	61.9	21.0	9.57	66
Chloride	0.5	27.2	6	6.36	66
Cyanide Free	0.01	0.01	0.01	0.000	9
Magnesium	1.7	19.4	8.3	3.62	66
Potassium	2.6	24.0	7.2	4.48	66
Sodium	2.7	46.1	19.0	10.44	66
Sulfate	0.1	31.2	8.7	6.98	67
Total Alkalinity	50.0	242.0	113.2	46.53	54
Total Hardness	46.2	216.3	99.2	47.79	21
Silica	29.8	31.4	30.6	1.13	2
Nitrate	0.01	6.75	0.60	1.201	68
Nitrite	0.01	0.82	0.06	0.123	68
Phosphate	0.01	0.88	0.24	0.296	23
Aluminum (Total)	0.01	57.00	2.42	6.837	73
Antimony (Total)	0.01	0.10	0.10	0.020	41
Arsenic (Total)	0.001	0.016	0.003	0.0029	76
Cadmium (Total)	0.01	0.01	0.01	0.000	76
Chromium (Total)	0.010	0.010	0.010	0.0000	75
Cobalt (Total)	0.01	0.01	0.01	0.000	45
Copper (Total)	0.01	0.01	0.01	0.000	72
Flouride (Total)	0.2	0.5	0.4	0.08	35
Iron (Total)	0.02	17.70	2.90	2.538	109
Lead (Total)	0.001	0.010	0.010	0.0010	76
Manganese (Total)	0.01	5.16	0.37	0.722	108
Mercury (Total)	0.001	0.010	0.001	0.0015	74
Nickel (Total)	0.010	0.010	0.010	0.0000	75
Selenium (Total)	0.001	0.005	0.001	0.0007	41
Silver (Total)	0.01	0.01	0.01	0.000	47
Zinc (Total)	0.003	3.980	0.189	0.5815	72

Notes:

umhos/cm - micromhos per centimeter
s.u. - standard units
NTU - Nephelometric Turbidity Unit

Units are mg/l unless otherwise indicated

Sample population includes below detection data. Below detectable concentrations are set equal to the detection limit value for statistical calculations.

TABLE C-4
SURFACE WATER STATISTICS
AHAFO, GHANA
BASELINE STUDY

Sample Location	Range Min	Range Max	Mean	Standard Deviation	Population
Awonsu Sub-Basin					
SC (umhos/cm) (lab)	13	55	34	10.9	33
True Color (color units)	10	30	20	14	2
TSS	0.2	937.0	73.4	178.38	33
TDS	89.0	347.0	212.7	64.31	33
Turbidity (NTU) (lab)	0.5	1800.0	105.7	339.15	33
pH (s.u.) (lab)	6.2	8.0	7.2	0.44	33
Calcium	10.8	35.0	24.4	7.06	23
Chloride	0.5	22.5	8	6.31	23
Cyanide Free	0.01	0.10	0.06	0.064	2
Magnesium	4.0	19.5	12.1	4.79	23
Potassium	4.0	18.0	6.8	2.79	23
Sodium	2.7	41.0	21.6	11.51	23
Sulfate	0.1	71.4	9.8	14.35	23
Total Alkalinity	50.0	217.0	126.3	51.09	18
Total Hardness	94.6	129.5	112.1	24.68	2
Silica					0
Nitrate	0.01	47.00	2.39	9.736	23
Nitrite	0.01	0.77	0.08	0.176	23
Phosphate	0.17	0.24	0.21	0.049	2
Aluminum (Total)	0.01	2.70	0.57	0.694	25
Antimony (Total)	0.10	0.10	0.10	0.000	20
Arsenic (Total)	0.001	0.004	0.002	0.0010	26
Cadmium (Total)	0.01	0.01	0.01	0.000	26
Chromium (Total)	0.001	0.010	0.010	0.0018	26
Cobalt (Total)	0.01	0.01	0.01	0.000	21
Copper (Total)	0.01	0.01	0.01	0.000	23
Flouride (Total)	0.3	0.6	0.4	0.12	16
Iron (Total)	0.49	119.90	11.01	24.227	33
Lead (Total)	0.010	0.010	0.010	0.0000	25
Manganese (Total)	0.03	5.40	0.99	1.432	33
Mercury (Total)	0.001	0.010	0.002	0.0024	26
Nickel (Total)	0.010	0.010	0.010	0.0000	26
Selenium (Total)	0.001	0.002	0.001	0.0002	20
Silver (Total)	0.01	0.01	0.01	0.000	21
Zinc (Total)	0.010	1.130	0.080	0.2335	23

Notes:

umhos/cm - micromhos per centimeter
s.u. - standard units
NTU - Nephelometric Turbidity Unit

Units are mg/l unless otherwise indicated

Sample population includes below detection data. Below detectable concentrations are set equal to the detection limit value for statistical calculations.

TABLE C-4
SURFACE WATER STATISTICS
AHAFO, GHANA
BASELINE STUDY

Sample Location	Range Min	Range Max	Mean	Standard Deviation	Population
Ntotro Sub-Basin					
SC (umhos/cm) (lab)	35	65	48	11.4	6
True Color (color units)	5	10	8	4	2
TSS	20.5	121.1	62.0	39.51	6
TDS	214.0	366.0	284.3	50.14	6
Turbidity (NTU) (lab)	0.9	150.0	62.2	60.64	6
pH (s.u.) (lab)	6.9	7.9	7.4	0.36	6
Calcium	27.7	46.3	36.0	8.51	6
Chloride	13.7	51.6	29	13.30	6
Cyanide Free					0
Magnesium	11.4	20.7	15.3	3.87	6
Potassium	1.6	29.0	16.6	9.54	6
Sodium	21.0	42.0	28.5	7.77	6
Sulfate	0.1	18.8	8.5	6.31	6
Total Alkalinity	135.0	238.0	177.7	43.42	5
Total Hardness	191.4	200.1	195.8	6.15	2
Silica					0
Nitrate	0.10	4.76	1.80	1.680	6
Nitrite	0.01	0.09	0.04	0.035	6
Phosphate	0.02	0.02	0.02	0.000	2
Aluminum (Total)	0.10	6.70	2.61	2.529	7
Antimony (Total)	0.10	0.10	0.10	0.000	4
Arsenic (Total)	0.001	0.009	0.004	0.0030	8
Cadmium (Total)	0.01	0.01	0.01	0.000	8
Chromium (Total)	0.010	0.010	0.010	0.0000	8
Cobalt (Total)	0.01	0.01	0.01	0.000	4
Copper (Total)	0.01	0.01	0.01	0.000	6
Flouride (Total)	0.3	0.4	0.4	0.06	3
Iron (Total)	2.28	14.60	6.70	4.925	6
Lead (Total)	0.010	0.010	0.010	0.0000	8
Manganese (Total)	0.11	103.00	17.79	41.747	6
Mercury (Total)	0.001	0.005	0.002	0.0015	8
Nickel (Total)	0.010	0.010	0.010	0.0000	7
Selenium (Total)	0.001	0.002	0.001	0.0005	4
Silver (Total)	0.01	0.01	0.01	0.000	4
Zinc (Total)	0.010	0.020	0.012	0.0041	6

Notes:

umhos/cm - micromhos per centimeter
s.u. - standard units
NTU - Nephelometric Turbidity Unit

Units are mg/l unless otherwise indicated

Sample population includes below detection data. Below detectable concentrations are set equal to the detection limit value for statistical calculations.

TABLE C-4
SURFACE WATER STATISTICS
AHAFO, GHANA
BASELINE STUDY

Sample Location	Range Min	Range Max	Mean	Standard Deviation	Population
Asuade Sub-Basin					
SC (umhos/cm) (lab)	12	35	25	9.0	7
True Color (color units)	10	30	17	12	3
TSS	0.1	125.9	39.4	44.03	7
TDS	90.0	225.0	161.4	48.19	7
Turbidity (NTU) (lab)	6.0	140.0	55.2	52.89	7
pH (s.u.) (lab)	6.4	7.2	6.8	0.30	7
Calcium	8.1	28.4	20.0	9.88	5
Chloride	0.5	14.9	6	6.27	5
Cyanide Free	0.01	0.01	0.01	0.000	6
Magnesium	3.8	12.9	8.1	3.99	5
Potassium	5.1	8.8	6.6	1.50	5
Sodium	4.1	28.0	14.5	9.60	5
Sulfate	0.1	30.9	9.4	11.29	6
Total Alkalinity	36.0	120.6	93.9	39.13	4
Total Hardness	58.0	113.3	82.3	28.26	3
Silica	28.1	31.9	30.0	2.69	2
Nitrate	0.01	4.20	1.74	1.704	7
Nitrite	0.01	0.30	0.11	0.104	7
Phosphate	0.01	0.31	0.11	0.173	3
Aluminum (Total)	0.10	5.40	1.58	2.062	6
Antimony (Total)	0.10	0.10	0.10	0.000	3
Arsenic (Total)	0.001	0.021	0.007	0.0069	11
Cadmium (Total)	0.01	0.01	0.01	0.000	11
Chromium (Total)	0.010	0.010	0.010	0.0000	11
Cobalt (Total)	0.01	0.01	0.01	0.000	4
Copper (Total)	0.01	0.01	0.01	0.000	10
Flouride (Total)	0.3	0.5	0.4	0.10	3
Iron (Total)	2.03	22.30	8.19	6.829	10
Lead (Total)	0.010	0.010	0.010	0.0000	11
Manganese (Total)	0.04	1.29	0.68	0.452	10
Mercury (Total)	0.001	0.009	0.003	0.0027	8
Nickel (Total)	0.010	0.020	0.011	0.0033	9
Selenium (Total)	0.001	0.001	0.001	0.0000	3
Silver (Total)	0.01	0.01	0.01	0.000	4
Zinc (Total)	0.010	2.120	0.308	0.6555	10

Notes:

umhos/cm - micromhos per centimeter
s.u. - standard units
NTU - Nephelometric Turbidity Unit

Units are mg/l unless otherwise indicated

Sample population includes below detection data. Below detectable concentrations are set equal to the detection limit value for statistical calculations.

TABLE C-4
SURFACE WATER STATISTICS
AHAFO, GHANA
BASELINE STUDY

Sample Location	Range Min	Range Max	Mean	Standard Deviation	Population
Amama Sub-Basin					
SC (umhos/cm) (lab)	12	47	25	10.0	13
True Color (color units)	5	30	22	14	3
TSS	0.1	170.0	32.8	59.43	13
TDS	1.2	272.0	164.6	71.08	13
Turbidity (NTU) (lab)	1.9	180.0	23.5	49.83	12
pH (s.u.) (lab)	6.7	7.8	7.3	0.36	12
Calcium	10.0	28.0	17.9	6.05	10
Chloride	0.5	22.3	9	9.09	10
Cyanide Free	0.01	0.01	0.01	0.000	3
Magnesium	3.6	10.2	6.6	2.15	10
Potassium	6.8	17.0	12.4	3.42	10
Sodium	3.6	28.0	14.6	9.65	10
Sulfate	0.1	16.9	6.8	5.20	11
Total Alkalinity	55.0	136.0	92.3	24.71	8
Total Hardness	65.3	84.5	73.4	9.93	3
Silica	26.7	26.7	26.7		1
Nitrate	0.01	3.28	0.75	0.930	11
Nitrite	0.01	0.17	0.04	0.050	10
Phosphate	0.05	1.50	0.94	0.777	3
Aluminum (Total)	0.10	1.50	0.43	0.436	11
Antimony (Total)	0.10	0.10	0.10	0.000	7
Arsenic (Total)	0.001	0.003	0.001	0.0007	13
Cadmium (Total)	0.01	0.01	0.01	0.000	13
Chromium (Total)	0.010	0.010	0.010	0.0000	13
Cobalt (Total)	0.01	0.01	0.01	0.000	8
Copper (Total)	0.01	0.01	0.01	0.000	13
Flouride (Total)	0.3	0.5	0.4	0.08	6
Iron (Total)	1.34	5.05	2.59	1.109	13
Lead (Total)	0.010	0.010	0.010	0.0000	13
Manganese (Total)	0.03	1.72	0.36	0.545	12
Mercury (Total)	0.001	0.004	0.001	0.0009	12
Nickel (Total)	0.010	0.010	0.010	0.0000	12
Selenium (Total)	0.001	0.001	0.001	0.0000	7
Silver (Total)	0.01	0.01	0.01	0.000	8
Zinc (Total)	0.010	0.500	0.088	0.1419	13

Notes:

umhos/cm - micromhos per centimeter
s.u. - standard units
NTU - Nephelometric Turbidity Unit

Units are mg/l unless otherwise indicated

Sample population includes below detection data. Below detectable concentrations are set equal to the detection limit value for statistical calculations.

TABLE C-5
SURFACE WATER STATISTICS - ALL SITES
AHAFO, GHANA
BASELINE STUDY

Sample Location	Range Min	Range Max	Mean	Standard Deviation	Population
Surface Water					
SC (umhos/cm) (lab)	10	65	27	11.9	247
True Color (color units)	5	150	23	28.3	50
TSS	0.1	937.0	30.1	73.22	247
TDS	1.2	1520.0	183.0	110.42	247
Turbidity (NTU) (lab)	0.1	1800.0	49.4	140.76	246
pH (s.u.) (lab)	6.2	8.0	7.2	0.36	246
Calcium	7.3	61.9	20.1	9.50	145
Chloride	0.5	51.6	6.8	7.96	145
Cyanide Free	0.01	0.10	0.01	0.018	26
Magnesium	1.7	20.7	8.5	4.46	145
Potassium	1.6	29.0	7.5	4.60	145
Sodium	2.7	46.1	18.1	10.10	145
Sulfate	0.1	71.4	8.4	8.27	149
Total Alkalinity	36.0	242.0	106.1	48.66	118
Total Hardness	37.0	216.3	94.0	43.76	49
Silica	19.4	31.9	27.9	4.60	6
Nitrate	0.01	47.00	0.96	3.923	151
Nitrite	0.01	0.82	0.05	0.112	150
Phosphate	0.01	1.50	0.30	0.346	51
Aluminum (Total)	0.01	57.00	1.85	4.816	162
Antimony (Total)	0.01	0.10	0.10	0.016	92
Arsenic (Total)	0.001	0.021	0.002	0.0030	177
Cadmium (Total)	0.01	0.02	0.01	0.001	177
Chromium (Total)	0.001	0.010	0.010	0.0007	176
Cobalt (Total)	0.01	0.01	0.01	0.000	101
Copper (Total)	0.01	0.01	0.01	0.000	161
Flouride (Total)	0.1	0.6	0.4	0.11	77
Iron (Total)	0.02	198.00	5.64	19.080	237
Lead (Total)	0.001	0.010	0.010	0.0007	175
Manganese (Total)	0.01	103.00	0.84	6.740	235
Mercury (Total)	0.001	0.010	0.001	0.0016	169
Nickel (Total)	0.001	0.090	0.010	0.0062	172
Selenium (Total)	0.001	0.005	0.001	0.0006	91
Silver (Total)	0.01	0.01	0.01	0.000	102
Zinc (Total)	0.003	3.980	0.140	0.4369	161

Notes:

umhos/cm - micromhos per centimeter
s.u. - standard units
NTU - Nephelometric Turbidity Unit

Units are mg/l unless otherwise indicated

Sample population includes below detection data. Below detectable concentrations are set equal to the detection limit value for statistical calculations.

APPENDIX D

Groundwater Quality

TABLE D-1
SUMMARY OF GROUNDWATER DATA
FIELD MEASUREMENTS AND PHYSICAL PARAMETERS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Lab pH	Lab Conductivity (umhos/cm)	True Color (color units)	Lab Turbidity (NTU)	Total Dissolved Solids (mg/L)	Total Suspended Solids (mg/L)
Standards*		**5.0 - 9.0**	**500**	**150**	**5**	**500****	**50**
Awonsu Sub-Basin							
KBH5	11/1/1999	6.6	32.3	--	6.5	208	4.9
KBH5	12/1/1999	6.3	38.6	--	9.5	230	70.4
KBH5	2/1/2000	6.6	37.7	--	5.6	235	20.6
KBH5	12/1/2000	6.1	22.2	--	<0.1	165	0.2
KBH5	10/1/2003	6.3	23.5	<5	4.9	137	39
KBH5	1/1/2004	6.6	40.4	--	1.8	271	22.8
KBH6	1/1/2004	6.9	--	--	1.1	212	15.4
KBH6	4/1/2004	6.9	--	--	3	137	17.2
KBH6	6/1/2004	7.3	--	--	0.9	462	0.3
Subri Sub-Basin							
KBH-1	8/1/1999	5.4	5.6	--	17	45	193.9
KBH-1	10/1/1999	5.6	10.8	--	9	60	304.5
KBH-1	11/1/1999	5.9	9.1	--	5	51	79.3
KBH-1	12/1/1999	5.5	9.8	--	3.5	68	57.6
KBH-1	1/1/2000	6.1	44.5	--	2.7	225	229.4
KBH-1	10/1/2003	6.0	33.9	<5	9	175	228.7
KBH-2	8/1/1999	7.3	53.1	--	1400	420	691.5
KBH-2	10/1/1999	7.2	52.5	--	3000	370	668.9
KBH-2	11/1/1999	7.3	53.1	--	1400	398	375.1
KBH-2	12/1/1999	7.0	57.1	--	2600	400	418.3
KBH-2	2/1/2000	7.2	56.4	--	2500	398	739.8
KBH-2	10/1/2003	6.8	101.5	<5	150	775	399.3
KBH-3	8/1/1999	6.5	39.9	--	55	168	177.3
KBH-3	10/1/1999	6.5	35.2	--	4	205	111.1
KBH-3	11/1/1999	6.8	33.2	--	2.3	208	113.2
KBH-3	12/1/1999	6.5	33.7	--	6.1	193	285
KBH-4	11/1/1998	7.0	56.4	--	6.8	242	0.1
KBH-4	12/1/1998	6.7	51.5	--	6	291	0.1
KBH-4	1/1/1999	6.8	54.8	--	4.2	336	0.1
KBH-4	2/1/1999	6.9	51.3	--	<0.1	333	0.1
KBH-4	4/1/1999	6.9	52.9	--	15	356	0.1
KBH-4	5/1/1999	6.8	52.1	--	65	314	0.1
KBH-4	6/1/1999	7.1	48.6	<5	6	351	0.1
KBH-4	7/1/1999	7.0	54.2	--	42	354	57.1
KBH-4	8/1/1999	6.9	48.5	--	24	348	0.8
KBH-4	10/1/1999	6.8	49.2	--	14	342	0.8
KBH-4	11/1/1999	7.0	47	--	1	302	4.4
KBH-4	12/1/1999	6.9	49.6	--	50	354	2.9
KBH-4	2/1/2000	7.0	48.2	--	4.3	334	3.7
KBH-4	8/1/2000	--	--	--	--	--	--
KBH-4	10/1/2003	6.7	48.2	<5	7.6	324	5.1
KBH-4	1/1/2004	6.9	47.4	--	13	310	2
KBH-4	6/1/2004	7.0	50.5	--	2	356	2.9
KDBH1	11/1/1999	6.3	20.8	--	<0.1	154	0.6
KDBH1	12/1/1999	6.1	22.2	--	<0.1	165	0.2

TABLE D-1
SUMMARY OF GROUNDWATER DATA
FIELD MEASUREMENTS AND PHYSICAL PARAMETERS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Lab pH	Lab Conductivity (umhos/cm)	True Color (color units)	Lab Turbidity (NTU)	Total Dissolved Solids (mg/L)	Total Suspended Solids (mg/L)
Standards*		**5.0 - 9.0**	**500**	**150**	**5**	**500****	**50**
KDBH1	2/1/2000	6.2	21.5	--	<0.1	149.5	0.3
KDBH1	8/1/2000	--	--	--	--	--	--
KDBH1	10/1/2003	6.1	22.9	<5	0.4	167	<0.1
KDBH1	6/1/2004	6.2	66.1	--	0.1	501	<0.1
KDBH2	12/1/1999	6.4	33.8	--	<0.1	218	0.5
KDBH2	1/1/2004	6.4	33.8	--	<0.1	218	0.5
KDBH2	6/1/2004	6.4	22.8	--	0.8	174	0.3

Notes:

<	Indicates analyte not detected above laboratory practical quantification limit (PQL)
--	Field data or laboratory samples were not collected or analyzed
(mg/L)	Milligrams per liter
(umhos/cm)	Micromhos per centimeter
(NTU)	Nephelometric Turbidity Unit
NE	Not Established
*	The groundwater standards are the lowest of the drinking water standards from either the World Health Organization (WHO Guidlines for Drinking Water Quality, 3rd. edition), Ghana EPA, Nevada USA, or USEPA.
**	WHO Acceptability guidline or USEPA secondary standard for aesthetics.
	Shading indicates results above standards.

TABLE D-2
SUMMARY OF GROUNDWATER DATA
ANALYSIS FOR MAJOR IONS AND NUTRIENTS
AHAFO, GHANA
BASELINE STUDY

Site		Sample Date	Alkalinity Total (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Cyanide Free (mg/L)	Fluoride Undistilled (mg/L)	Hardness (mg/L)	Magnesium (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphate (mg/L)	Potassium (mg/L)	Silica (mg/L)	Sodium (mg/L)	Sulfate (mg/L)
Standards*			**NE**	**NE**	**250****	**0.07**	**1.5**	**300****	**NE**	**10**	**1.0**	**NE**	**NE**	**NE**	**200**	**250****
Awonsu Sub-Basin																
KBH5	N	11/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH5	N	12/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH5	N	2/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH5	N	12/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH5	N	10/1/2003	86	20.7	11.3	--	--	78.5	6.5	5.89	<0.01	0.01	0.9	--	12	<0.1
KBH5	N	1/1/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH6	N	1/1/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH6	N	4/1/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH6	N	6/1/2004	--	42.5	6.4	<0.01	--	--	23	0.06	<0.01	--	1.5	--	24	16.3
Subri Sub-Basin																
KBH-1	N	8/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-1	N	10/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-1	N	11/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-1	N	12/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-1	N	1/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-1	N	10/1/2003	126	10.8	14.8	--	--	36.4	2.3	179.5	3.78	2.8	7.3	--	7.4	<0.1
KBH-2	N	8/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-2	N	10/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-2	N	11/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-2	N	12/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-2	N	2/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-2	N	10/1/2003	5.7	64.3	16.2	--	--	244.2	20.3	268.1	1.99	6.64	20	--	72	0.7
KBH-3	N	8/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-3	N	10/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-3	N	11/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-3	N	12/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-4	N	11/1/1998	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-4	N	12/1/1998	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-4	N	1/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-4	N	2/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE D-2
SUMMARY OF GROUNDWATER DATA
ANALYSIS FOR MAJOR IONS AND NUTRIENTS
AHAFO, GHANA
BASELINE STUDY

Site		Sample Date	Alkalinity Total (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Cyanide Free (mg/L)	Fluoride Undistilled (mg/L)	Hardness (mg/L)	Magnesium (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphate (mg/L)	Potassium (mg/L)	Silica (mg/L)	Sodium (mg/L)	Sulfate (mg/L)
Standards*			**NE**	**NE**	**250****	**0.07**	**1.5**	**300****	**NE**	**10**	**1.0**	**NE**	**NE**	**NE**	**200**	**250****
KBH-4	N	4/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-4	N	5/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-4	N	6/1/1999	274	60	1.8	--	--	210	14.6	<0.01	<0.01	<0.01	0.8	--	19	<0.1
KBH-4	N	7/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-4	N	8/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-4	N	10/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-4	N	11/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-4	N	12/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-4	N	2/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-4	N	8/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-4	N	10/1/2003	233	59.3	3	--	--	195.8	11.6	1.08	0.03	0.2	1.4	--	18	<0.1
KBH-4	N	1/1/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KBH-4	N	6/1/2004	--	52.5	7.9	--	--	--	11.6	0.15	0.01	--	1.1	--	26	<0.1
KDBH1	N	11/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KDBH1	N	12/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KDBH1	N	2/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KDBH1	N	8/1/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KDBH1	N	10/1/2003	89	16.1	8.9	--	--	62.4	5.4	1.1	<0.01	0.36	1.5	--	17	2.1
KDBH1	N	6/1/2004	15.4	37	0.03	--	--	56.5	2.6	13.5	--	--	51.6	--	77.5	--
KDBH2	N	12/1/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KDBH2	N	1/1/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--
KDBH2	N	6/1/2004	5.7	25	0.02	--	--	15.8	1.7	0.3	--	--	0.32	--	8.8	--

TABLE D-2
SUMMARY OF GROUNDWATER DATA
ANALYSIS FOR MAJOR IONS AND NUTRIENTS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Alkalinity Total (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Cyanide Free (mg/L)	Fluoride Undistilled (mg/L)	Hardness (mg/L)	Magnesium (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphate (mg/L)	Potassium (mg/L)	Silica (mg/L)	Sodium (mg/L)	Sulfate (mg/L)
Standards*		**NE**	**NE**	**250****	**0.07**	**1.5**	**300****	**NE**	**10**	**1.0**	**NE**	**NE**	**NE**	**200**	**250****

Notes:

<	Indicates analyte not detected above laboratory practical quantification limit (PQL)
(mg/L)	Milligrams per liter
N	Indicates natural sample.
--	Field data or laboratory samples were not collected or analyzed.
NE	Not Established
*	The groundwater standards are the lowest of the drinking water standards from either the World Health Organization (WHO Guidlines for Drinking Water Quality, 3rd. edition), Ghana EPA, Nevada USA, or USEPA.
**	WHO Acceptability guidline or USEPA secondary standard for aesthetics.
	Shading indicates results above standards.

TABLE D-3
SUMMARY OF GROUNDWATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Cadmium (mg/L)	Chromium[1] (mg/L)	Cobalt (mg/L)	Copper (mg/L)
Standards*				**0.05****	**0.006**	**0.01**	**0.003**	**0.05**	**NE**	**0.5**
Awonsu Sub-Basin										
KBH5	11/1/1999	Total	N	--	--	0.01	<0.01	<0.01	--	<0.01
KBH5	12/1/1999	Total	N	--	--	0.002	<0.01	<0.01	--	<0.01
KBH5	2/1/2000	Total	N	--	--	0.012	<0.01	<0.01	--	<0.01
KBH5	12/1/2000	Total	N	--	--	0.002	<0.01	<0.01	--	<0.01
KBH5	10/1/2003	Total	N	0.1	--	0.007	<0.01	<0.01	--	<0.01
KBH5	1/1/2004	Total	N	--	--	--	--	--	--	<0.01
KBH6	1/1/2004	Total	N	--	--	--	--	--	--	<0.01
KBH6	4/1/2004	Total	N	--	--	--	--	--	--	--
KBH6	6/1/2004	Dissolved	N	--	--	<0.002	--	--	--	--
KBH6	6/1/2004	Total	N	<0.1	<0.1	0.002	<0.01	<0.01	<0.01	<0.01
Subri Sub-Basin										
KBH-1	8/1/1999	Total	N	4.4	--	0.008	<0.01	<0.01	--	0.01
KBH-1	10/1/1999	Total	N	8	--	0.001	<0.01	<0.01	--	0.02
KBH-1	11/1/1999	Total	N	--	--	0.001	<0.01	<0.01	--	<0.01
KBH-1	12/1/1999	Total	N	--	--	--	<0.01	<0.01	--	<0.01
KBH-1	1/1/2000	Total	N	--	--	--	--	--	--	<0.01
KBH-1	10/1/2003	Total	N	1.4	--	0.001	<0.01	<0.01	--	0.02
KBH-2	8/1/1999	Total	N	27.2	--	0.006	<0.01	0.07	--	0.07
KBH-2	10/1/1999	Total	N	25.3	--	0.001	<0.01	<0.01	--	0.09
KBH-2	11/1/1999	Total	N	--	--	0.001	<0.01	0.1	--	0.08
KBH-2	12/1/1999	Total	N	--	--	0.004	<0.01	<0.01	--	0.14
KBH-2	2/1/2000	Total	N	--	--	0.002	<0.01	0.1	--	0.07
KBH-2	10/1/2003	Total	N	8.5	--	0.005	<0.01	<0.01	--	0.06
KBH-3	8/1/1999	Total	N	5.3	--	0.004	<0.01	<0.01	--	0.1
KBH-3	10/1/1999	Total	N	4.3	--	0.005	<0.01	<0.01	--	0.07
KBH-3	11/1/1999	Total	N	--	--	0.002	<0.01	<0.01	--	0.11
KBH-3	12/1/1999	Total	N	--	--	0.002	<0.01	<0.01	--	0.13
KBH-4	11/1/1998	Total	N	--	--	--	--	--	--	--
KBH-4	12/1/1998	Total	N	--	--	--	--	--	--	--
KBH-4	1/1/1999	Total	N	--	--	--	--	--	--	--
KBH-4	2/1/1999	Total	N	--	--	--	--	--	--	--
KBH-4	4/1/1999	Total	N	--	--	--	--	--	--	--
KBH-4	5/1/1999	Total	N	--	--	--	--	--	--	--
KBH-4	6/1/1999	Total	N	<0.1	--	0.001	<0.01	<0.01	--	<0.01
KBH-4	7/1/1999	Total	N	0.2	--	0.003	<0.01	<0.01	--	<0.01
KBH-4	8/1/1999	Total	N	<0.1	--	0.002	<0.01	<0.01	--	<0.01
KBH-4	10/1/1999	Total	N	<0.1	--	<0.001	<0.01	<0.01	--	<0.01
KBH-4	11/1/1999	Total	N	--	--	<0.001	<0.01	<0.01	--	<0.01
KBH-4	12/1/1999	Total	N	--	--	0.001	<0.01	<0.01	--	<0.01
KBH-4	2/1/2000	Total	N	--	--	<0.001	<0.01	<0.01	--	<0.01
KBH-4	8/1/2000	Total	N	<0.1	--	0.002	<0.01	<0.01	--	--
KBH-4	10/1/2003	Total	N	<0.1	--	0.002	<0.01	<0.01	--	<0.01
KBH-4	1/1/2004	Total	N	--	--	--	--	--	--	<0.01
KBH-4	6/1/2004	Dissolved	N	--	--	0.001	--	--	--	--

TABLE D-3
SUMMARY OF GROUNDWATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Cadmium (mg/L)	Chromium[1] (mg/L)	Cobalt (mg/L)	Copper (mg/L)
Standards*				**0.05****	**0.006**	**0.01**	**0.003**	**0.05**	**NE**	**0.5**
KBH-4	6/1/2004	Total	N	<0.1	<0.1	0.004	<0.01	<0.01	<0.01	<0.01
KDBH1	11/1/1999	Total	N	--	--	0.001	<0.01	<0.01	--	<0.01
KDBH1	12/1/1999	Total	N	--	--	0.002	<0.01	<0.01	--	<0.01
KDBH1	2/1/2000	Total	N	--	--	<0.001	<0.01	<0.01	--	<0.01
KDBH1	8/1/2000	Total	N	<0.1	--	0.003	<0.01	<0.01	--	--
KDBH1	10/1/2003	Total	N	<0.1	--	<0.001	<0.01	<0.01	--	0.03
KDBH1	6/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KDBH1	6/1/2004	Total	N	<0.1	<0.1	0.001	<0.01	<0.01	<0.01	0.03
KDBH2	12/1/1999	Total	N	--	--	0.002	<0.01	<0.01	--	0.01
KDBH2	1/1/2004	Total	N	--	--	0.002	<0.01	<0.01	--	0.01
KDBH2	6/1/2004	Dissolved	N	--	--	<0.001	--	--	--	--
KDBH2	6/1/2004	Total	N	0.1	<0.1	<0.001	<0.01	<0.01	<0.01	0.01

Notes:

N	Indicates natural sample.
NE	Not Established
<	Indicates analyte not detected above laboratory practical quantification limit (PQL)
(mg/L)	Milligrams per liter
--	Field data or laboratory samples were not collected or analyzed.
1	Total Chromium
*	The groundwater standards are the lowest of the drinking water standards from either the World Health Organization (WHO Guidlines for Drinking Water Quality, 3rd. edition), Ghana EPA, Nevada USA, or USEPA.
**	WHO Acceptability guidline or USEPA secondary standard for aesthetics.
	Shading indicates results above standards.

TABLE D-3
SUMMARY OF GROUNDWATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Zinc (mg/L)
Standards*				**0.3****	**0.01**	**0.05****	**0.001**	**0.0134**	**0.01**	**2.0**
Awonsu Sub-Basin										
KBH5	11/1/1999	Total	N	0.74	<0.01	0.18	--	<0.01	--	0.43
KBH5	12/1/1999	Total	N	2.45	<0.01	0.23	--	<0.01	--	0.64
KBH5	2/1/2000	Total	N	1.14	<0.01	0.25	--	<0.01	--	0.62
KBH5	12/1/2000	Total	N	0.01	<0.01	<0.01	--	<0.01	--	<0.01
KBH5	10/1/2003	Total	N	12.4	<0.01	0.15	0.001	<0.01	--	0.07
KBH5	1/1/2004	Total	N	0.54	--	--	--	--	--	0.29
KBH6	1/1/2004	Total	N	2.01	--	--	--	--	--	0.03
KBH6	4/1/2004	Total	N	--	--	--	--	--	--	--
KBH6	6/1/2004	Dissolved	N	--	--	--	--	--	--	--
KBH6	6/1/2004	Total	N	0.36	<0.01	0.15	<0.001	<0.01	<0.001	<0.01
Subri Sub-Basin										
KBH-1	8/1/1999	Total	N	5.74	--	0.58	<0.001	<0.01	--	0.18
KBH-1	10/1/1999	Total	N	5.74	--	1.01	0.003	<0.01	--	0.48
KBH-1	11/1/1999	Total	N	1.68	--	1.16	--	<0.01	--	0.67
KBH-1	12/1/1999	Total	N	4.36	--	1.54	--	<0.01	--	0.18
KBH-1	1/1/2000	Total	N	3.94	--	--	--	--	--	0.09
KBH-1	10/1/2003	Total	N	5.02	--	1.02	<0.001	<0.01	--	0.08
KBH-2	8/1/1999	Total	N	24.1	--	0.62	<0.001	<0.01	--	0.19
KBH-2	10/1/1999	Total	N	23.67	--	0.66	0.001	<0.01	--	0.34
KBH-2	11/1/1999	Total	N	35.6	--	0.58	--	0.1	--	0.12
KBH-2	12/1/1999	Total	N	13.7	--	0.67	--	<0.01	--	0.28
KBH-2	2/1/2000	Total	N	27.9	--	0.78	--	<0.01	--	0.42
KBH-2	10/1/2003	Total	N	10.8	--	0.68	0.001	<0.01	--	0.27
KBH-3	8/1/1999	Total	N	10.52	--	0.31	<0.001	0.02	--	0.08
KBH-3	10/1/1999	Total	N	6.35	--	0.24	0.001	<0.01	--	0.38
KBH-3	11/1/1999	Total	N	4.67	--	0.61	--	<0.01	--	0.32
KBH-3	12/1/1999	Total	N	12.6	--	0.65	--	<0.01	--	0.5
KBH-4	11/1/1998	Total	N	1.72	--	0.35	--	--	--	--
KBH-4	12/1/1998	Total	N	1.55	--	0.29	--	--	--	--
KBH-4	1/1/1999	Total	N	1.54	--	0.3	--	--	--	--
KBH-4	2/1/1999	Total	N	1.52	--	0.29	--	--	--	--
KBH-4	4/1/1999	Total	N	0.54	--	0.3	--	--	--	--
KBH-4	5/1/1999	Total	N	1.15	--	0.27	--	--	--	--
KBH-4	6/1/1999	Total	N	0.4	--	0.28	<0.001	<0.01	--	0.03
KBH-4	7/1/1999	Total	N	1.64	--	0.27	--	<0.01	--	0.09
KBH-4	8/1/1999	Total	N	1.4	--	0.31	<0.001	<0.01	--	0.15
KBH-4	10/1/1999	Total	N	1.64	--	0.32	<0.001	<0.01	--	0.39
KBH-4	11/1/1999	Total	N	0.63	--	0.29	--	<0.01	--	0.63
KBH-4	12/1/1999	Total	N	0.77	--	0.35	--	<0.01	--	0.64
KBH-4	2/1/2000	Total	N	0.53	--	0.33	--	<0.01	--	0.52
KBH-4	8/1/2000	Total	N	--	--	--	<0.001	<0.01	--	--
KBH-4	10/1/2003	Total	N	1.23	--	0.24	<0.001	<0.01	--	<0.01
KBH-4	1/1/2004	Total	N	1.83	--	--	--	--	--	0.01
KBH-4	6/1/2004	Dissolved	N	--	--	--	--	--	--	--
KBH-4	6/1/2004	Total	N	1.16	--	0.18	<0.001	<0.01	<0.001	<0.01

TABLE D-3
SUMMARY OF GROUNDWATER DATA
ANALYSIS FOR METALS
AHAFO, GHANA
BASELINE STUDY

Site	Sample Date	Type	QC	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Zinc (mg/L)
Standards*				**0.3****	**0.01**	**0.05****	**0.001**	**0.0134**	**0.01**	**2.0**
KDBH1	11/1/1999	Total	N	0.02	<0.01	<0.01	--	<0.01	--	0.44
KDBH1	12/1/1999	Total	N	--	<0.01	0.01	--	<0.01	--	<0.01
KDBH1	2/1/2000	Total	N	0.02	<0.01	<0.01	--	<0.01	--	0.42
KDBH1	8/1/2000	Total	N	--	<0.01	--	<0.001	<0.01	--	--
KDBH1	10/1/2003	Total	N	0.04	<0.01	<0.01	<0.001	<0.01	--	0.01
KDBH1	6/1/2004	Dissolved	N	--	--	--	--	--	--	--
KDBH1	6/1/2004	Total	N	0.09	<0.01	0.17	<0.001	0.02	<0.001	0.01
KDBH2	12/1/1999	Total	N	0.12	<0.01	0.02	--	<0.01	--	0.05
KDBH2	1/1/2004	Total	N	0.12	<0.01	0.02	--	<0.01	--	0.05
KDBH2	6/1/2004	Dissolved	N	--	--	--	--	--	--	--
KDBH2	6/1/2004	Total	N	0.12	<0.01	0.01	<0.001	<0.01	<0.001	<0.01

Notes:

N	Indicates natural sample.
NE	Not Established
<	Indicates analyte not detected above laboratory practical quantification limit (PQL)
(mg/L)	Milligrams per liter
--	Field data or laboratory samples were not collected or analyzed.
1	Total Chromium
*	The groundwater standards are the lowest of the drinking water standards from either the World Health Organization (WHO Guidlines for Drinking Water Quality, 3rd. edition), Ghana EPA, Nevada USA, or USEPA.
**	WHO Acceptability guidline or USEPA secondary standard for aesthetics.
	Shading indicates results above standards.

TABLE D-4
GROUNDWATER STATISTICS
AHAFO, GHANA
BASELINE STUDY

Sample Location	Range Min	Range Max	Mean	Standard Deviation	Population
Exploration Borehole					
SC (umhos/cm) (lab)	6	102	43	17.4	38
True Color (color units)	5	5	5	0.0	5
TSS	0.1	739.8	130.3	202.82	41
TDS	45.0	775.0	279.6	133.56	41
Turbidity (NTU) (lab)	0.1	3000.0	279.5	754.39	41
pH (s.u.) (lab)	5.4	7.3	6.7	0.48	41
Calcium	10.8	64.3	44.3	20.90	7
Chloride	1.80	16.20	8.77	5.571	7
Cyanide Free	0.01	0.01	0.01		1
Magnesium	2.3	23.0	12.8	7.26	7
Potassium	0.80	20.00	4.71	7.125	7
Sodium	7.4	72.0	25.5	21.50	7
Sulfate	0.1	16.3	2.5	6.09	7
Total Alkalinity	5.7	274.0	144.9	109.12	5
Total Hardness	36.4	244.2	153.0	90.20	5
Silica					0
Nitrate	0.01	268.10	64.97	111.494	7
Nitrite	0.01	3.78	0.83	1.493	7
Phosphate	0.01	6.64	1.93	2.886	5
Aluminum (Total)	0.1	27.2	5.0	8.50	17
Antimony (Total)	0.1	0.1	0.1	0.00	2
Arsenic (Total)	0.001	0.012	0.003	0.0029	30
Cadmium (Total)	0.01	0.01	0.01	0.000	31
Chromium (Total)	0.01	0.10	0.02	0.024	31
Cobalt (Total)	0.01	0.01	0.01	0.000	2
Copper (Total)	0.01	0.14	0.03	0.040	34
Flouride (Total)					0
Iron (Total)	0.01	35.60	5.88	8.412	40
Lead (Total)	0.01	0.01	0.01	0.000	6
Manganese (Total)	0.01	1.54	0.46	0.326	36
Mercury (Total)	0.001	0.003	0.001	0.0005	16
Nickel (Total)	0.01	0.10	0.01	0.016	31
Selenium (Total)	0.001	0.001	0.001	0.0000	2
Silver (Total)	0.001	0.010	0.006	0.0064	2
Zinc (Total)	0.01	0.67	0.27	0.221	34

Notes:

umhos/cm - micromhos per centimeter
s.u. - standard units
NTU - Nephelometric Turbidity Unit

Units are mg/l unless otherwise indicated

Sample population includes below detection data. Below detectable concentrations are set equal to the detection limit value for statistical calculations.

TABLE D-4
GROUNDWATER STATISTICS
AHAFO, GHANA
BASELINE STUDY

Sample Location	Range Min	Range Max	Mean	Standard Deviation	Population
Potable Water Supply					
SC (umhos/cm) (lab)	21	66	30	15.4	8
True Color (color units)	5	5	5		1
TSS	0.1	0.6	0.3	0.19	8
TDS	149.5	501.0	218.3	117.24	8
Turbidity (NTU) (lab)	0.1	0.8	0.2	0.25	8
pH (s.u.) (lab)	6.1	6.4	6.3	0.13	8
Calcium	16.1	37.0	26.0	10.49	3
Chloride	0.02	8.90	2.98	5.124	3
Cyanide Free					0
Magnesium	1.7	5.4	3.2	1.93	3
Potassium	0.32	51.60	17.81	29.272	3
Sodium	8.8	77.5	34.4	37.52	3
Sulfate	2.1	2.1	2.1		1
Total Alkalinity	5.7	89.0	36.7	45.55	3
Total Hardness	15.8	62.4	44.9	25.37	3
Silica					0
Nitrate	0.30	13.50	4.97	7.401	3
Nitrite	0.01	0.01	0.01		1
Phosphate	0.36	0.36	0.36		1
Aluminum (Total)	0.1	0.1	0.1	0.00	4
Antimony (Total)	0.1	0.1	0.1	0.00	2
Arsenic (Total)	0.001	0.003	0.002	0.0007	9
Cadmium (Total)	0.01	0.01	0.01	0.000	9
Chromium (Total)	0.01	0.01	0.01	0.000	9
Cobalt (Total)	0.01	0.01	0.01	0.000	2
Copper (Total)	0.01	0.03	0.02	0.009	8
Flouride (Total)					0
Iron (Total)	0.02	0.12	0.08	0.048	7
Lead (Total)	0.01	0.01	0.01	0.000	9
Manganese (Total)	0.01	0.17	0.03	0.056	8
Mercury (Total)	0.001	0.001	0.001	0.0000	4
Nickel (Total)	0.01	0.02	0.01	0.003	9
Selenium (Total)	0.001	0.001	0.001	0.0000	2
Silver (Total)	0.010	0.010	0.010	0.0000	2
Zinc (Total)	0.01	0.44	0.13	0.189	8

Notes:

umhos/cm - micromhos per centimeter
s.u. - standard units
NTU - Nephelometric Turbidity Unit

Units are mg/l unless otherwise indicated

Sample population includes below detection data. Below detectable concentrations are set equal to the detection limit value for statistical calculations.

TABLE D-5
GROUNDWATER STATISTICS - ALL SITES
AHAFO, GHANA
BASELINE STUDY

Sample Location	Range Min	Range Max	Mean	Standard Deviation	Population
Groundwater					
SC (umhos/cm) (lab)	6	102	41	17.5	46
True Color (color units)	5	5	5	0.0	6
TSS	0.1	739.8	109.1	191.41	49
TDS	45.0	775.0	269.6	131.88	49
Turbidity (NTU) (lab)	0.1	3000.0	233.9	696.51	49
pH (s.u.) (lab)	5.4	7.3	6.6	0.47	49
Calcium	10.8	64.3	38.8	19.84	10
Chloride	0.02	16.20	7.04	5.860	10
Cyanide Free	0.01	0.01	0.01		1
Magnesium	1.7	23.0	10.0	7.58	10
Potassium	0.32	51.60	8.64	16.256	10
Sodium	7.4	77.5	28.2	25.29	10
Sulfate	0.1	16.3	2.5	5.64	8
Total Alkalinity	5.7	274.0	104.4	102.64	8
Total Hardness	15.8	244.2	112.5	89.23	8
Silica					0
Nitrate	0.01	268.10	46.97	95.601	10
Nitrite	0.01	3.78	0.73	1.413	8
Phosphate	0.01	6.64	1.67	2.660	6
Aluminum (Total)	0.1	27.2	4.1	7.85	21
Antimony (Total)	0.1	0.1	0.1	0.00	4
Arsenic (Total)	0.001	0.012	0.003	0.0026	39
Cadmium (Total)	0.01	0.01	0.01	0.000	40
Chromium (Total)	0.01	0.10	0.02	0.022	40
Cobalt (Total)	0.01	0.01	0.01	0.000	4
Copper (Total)	0.01	0.14	0.03	0.037	42
Flouride (Total)					0
Iron (Total)	0.01	35.60	5.02	8.023	47
Lead (Total)	0.01	0.01	0.01	0.000	15
Manganese (Total)	0.01	1.54	0.38	0.338	44
Mercury (Total)	0.001	0.003	0.001	0.0004	20
Nickel (Total)	0.01	0.10	0.01	0.014	40
Selenium (Total)	0.001	0.001	0.001	0.0000	4
Silver (Total)	0.001	0.010	0.008	0.0045	4
Zinc (Total)	0.01	0.67	0.24	0.221	42

Notes:

umhos/cm - micromhos per centimeter
s.u. - standard units
NTU - Nephelometric Turbidity Unit

Units are mg/l unless otherwise indicated

Sample population includes below detection data. Below detectable concentrations are set equal to the detection limit value for statistical calculations.

APPENDIX E

Public Consultation and Disclosure Plan

PUBLIC CONSULTATION AND DISCLOSURE PLAN

AHAFO SOUTH PROJECT

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August 2005

DRAFT
PUBLIC CONSULTATION AND DISCLOSURE PLAN
AHAFO SOUTH PROJECT

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1.0 INTRODUCTION

Newmont Ghana Gold, Ltd. (NGGL) recognizes potential social and environmental effects can be created through development of mining projects. Such effects may range from bad publicity reflecting perceived problems or issues due to lack of communication and stakeholder engagement to actual and measurable environmental and social impacts resulting from poor design, construction, operation, or closure of specific mine developments around the world. To ensure proper and appropriate mine developments occur in Ghana, NGGL as a subsidiary of Newmont Mining Corporation (Newmont), endorses the concept that communication with project stakeholders is an essential component of any environmental and socio-economic assessment process. NGGL is committed to pro-active and ongoing communication with all agencies, organizations, and individuals with an interest in development of the Ahafo South Project (Project).

This Public Consultation and Disclosure Plan (PCDP), outlines and documents NGGL's consultation and disclosure practices implemented for the Project. The PCDP includes details of public involvement activities occurring:

- Before Newmont acquired the Ahafo concession;
- During development of Environmental Impact Statements (EISs) developed for the revised Ahafo Project design which integrated two mining leases into one Project;
- During implementation of a public involvement program designed to collaborate with stakeholders and address resettlement and compensation processes and agreements as well as resolve issues resulting from implementation of these processes and agreements;
- During development of the Project; and
- Continuing throughout the life of the Project.

The PCDP seeks to define a technically and culturally appropriate approach to consultation and disclosure. The goal of this Plan is to ensure adequate information is provided to project-affected people and other stakeholders in a timely manner, and that these groups are provided sufficient opportunity to voice their concerns and opinions that influence Project decisions. And that the approach gave recognition to and was carried out in a manner consistent with local cultural norms of the area and of Ghana.

1.1 OBJECTIVES OF THE PCDP

This PCDP is a useful tool for managing communications between NGGL and stakeholders. The goal of the PCDP is to improve and facilitate decision making and create an atmosphere of understanding that actively involves individuals, groups, and organizations that can affect, or be affected by, development of the Project. Emphasis of the Plan is to document implementation of a formal program in an objective, simple manner to focus efforts on improving communications between NGGL and other interested parties. Monitoring and evaluation of program results and behavior of the respective parties will enable evolution and improvements to the program over time.

Objectives of the PCDP

Keep stakeholders informed of NGGL activities;

Generate and document broad community support for the Project;

Improve communications between interested parties;

Document development of formal public consultation; and

Establish formal complaint submittal / resolution mechanisms.

Key aspects of the consultation and disclosure process include:

- Regular release of Project-related information, including NGGL policies, Project details, answers to frequently asked questions, and rights and responsibilities of affected people presented as required in a manner consistent with local cultural norms of the area and of Ghana;
- Articulation and delivery of clear, consistent messages from key staff to stakeholders and the public, ensuring that community workers are aware of NGGL's position regarding the Project and are capable of responding to question/comments appropriately;
- Consultation is undertaken in both Twi and English;
- Regular meetings and forums are documented by NGGL community workers to present Project-related information, answer questions, and assuage concerns;
- Identification of multi-stakeholder committees, including a Chairperson acceptable to all parties to discuss and make decisions regarding Project impacts and community concerns;
- Maintenance of an open-door policy for community workers, such that stakeholders feel comfortable approaching them directly to ask questions and raise concerns; and
- Creation of a responsive management system for recording and responding to comments and concerns.

1.2 PROJECT HISTORY

The current resource is the result of exploration by various interests, which were consolidated by NGGL following acquisition of Normandy Mining Ltd. and purchase of Moydow Mines International, Inc. interests in Rank Mining Company Ltd. in 2003. The Ahafo Project is part of Newmont's 2002 acquisition of Normandy Mining Ltd. In December 2003, Newmont formalized its involvement in the Project by gaining approval of its foreign investment agreement with the Government of Ghana. Newmont has three subsidiaries organized under the laws of Ghana: Newmont Ghana Gold Ltd. (NGGL); Rank Mining Company Ltd. (Rank); and Golden Ridge Resources Ltd. (GRRL).

Existing mining operations in southwest Ghana include Anglogold Ashanti mines at Obuasi, Iduapriem/Teberebie, and Bibiani and GoldFields operations at Tarkwa and Damang. Together these operations account for about 80 percent (52 tonnes) of gold annually produced in Ghana. Rising gold prices have generated increased interest and infusion of new capital by Anglogold Ashanti, Newmont, and Golden Star Resources that gold production over the next several years is expected to reach 84 tonnes annually which would consolidate Ghana's position as the second largest gold producer in Africa.

1.3 PROJECT DESCRIPTION

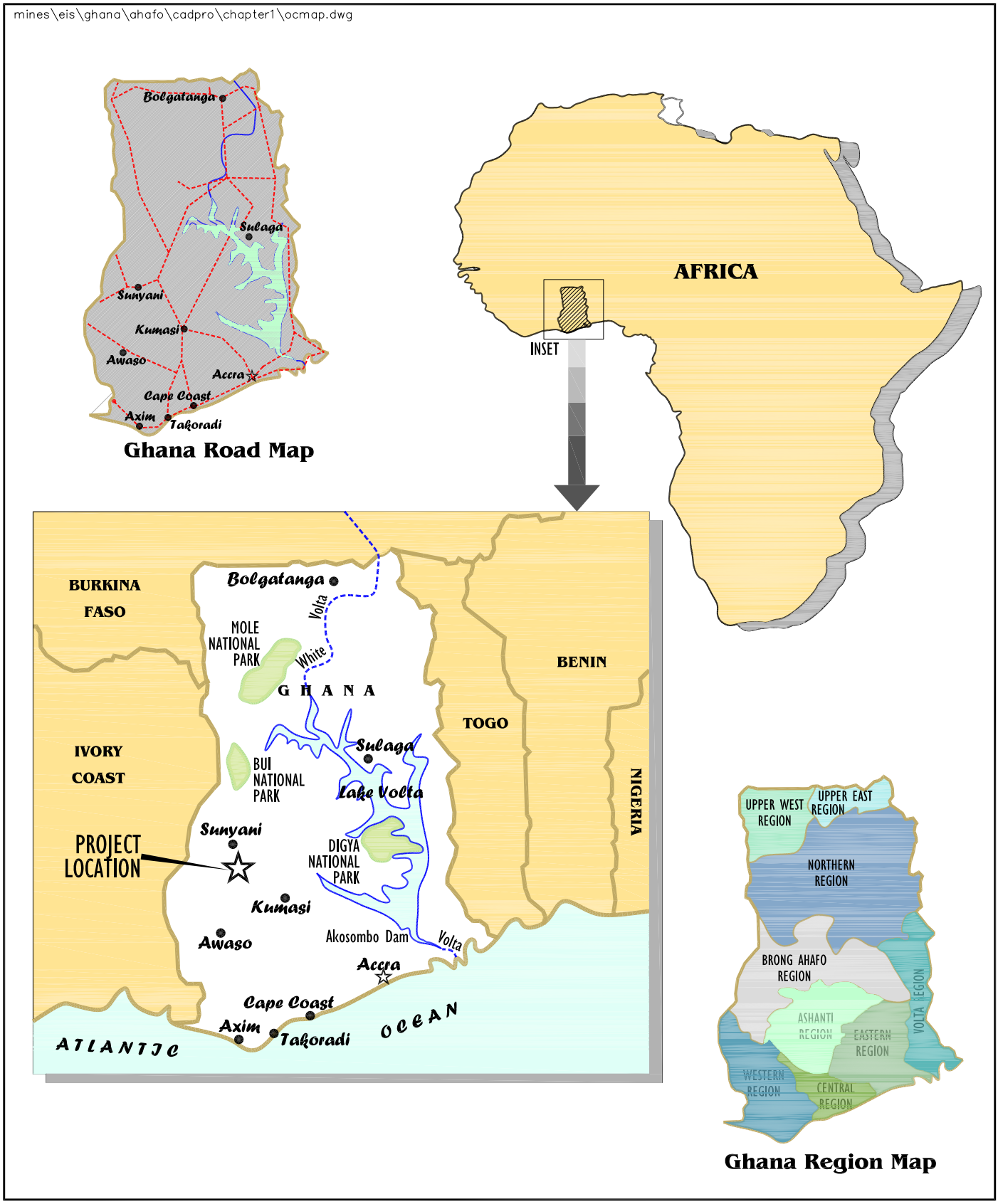
NGGL is developing gold reserves at the Ahafo Project in the Brong Ahafo Region of Ghana, West Africa. The Ahafo South Project Area is located approximately 300 km northwest of the capital city, Accra, 107 km northwest of Kumasi, and 40 km south of the regional capital of Sunyani as shown on **Figure 1**.

The ***Study area*** generally extends from the Amama Shelterbelt/Bosumkese Forest Reserve on the north and east; the communities of Kenyase 1 and 2 on the south; and to the headwaters of the Subri and Awonsu drainages in the west. In addition to Kenyase 1 and 2, the surrounding communities of Wamahinso, Gyedu, and Ntotoroso, and eight hamlets near those communities are in the Project-affected area (**Figure 2**).

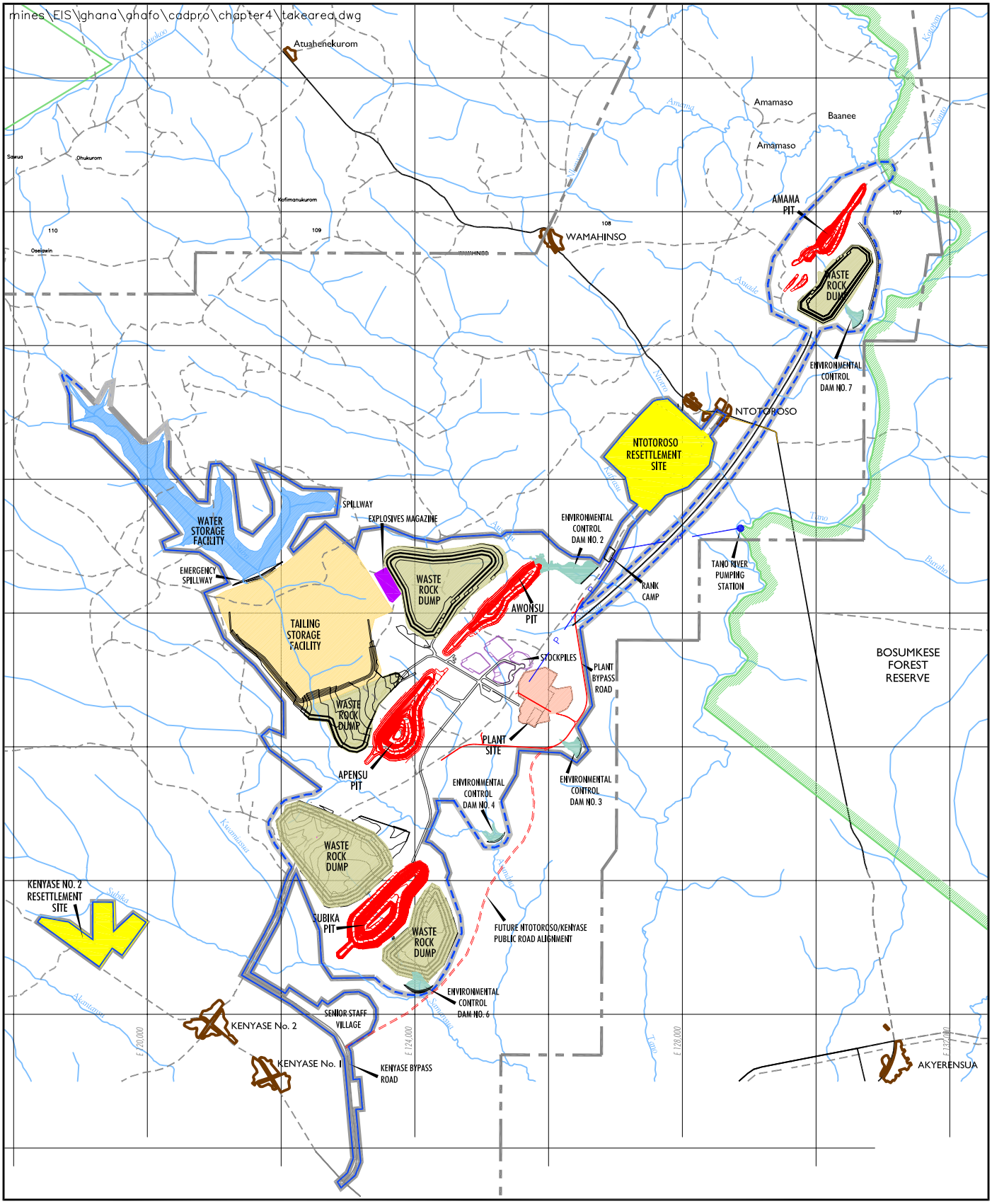
NGGL's life-of-mine plan for the Ahafo South Project involves development of 4 mine pits to produce and process approximately 7 Mt of ore annually over a 15-year period. Current resources are estimated at 105 Mt of ore producing 6.8 million ounces of gold. Initial development in the mine take area (***Project area***) involves approximately 2,994 hectares (ha) for construction and operation of the following facilities and mine components:

- Four open-cut mine pits (Amama, Subika, Awonsu, and Apensu);
- Waste rock disposal facilities;
- Mill and processing plant;
- Water storage facility to provide water for processing plant;
- Tailing storage facility;
- Environmental control dams and other stormwater and sediment control structures; and
- Ancillary facilities (buffer zones, resettlement sites, bypass roads, accommodation camps, and mine services).

The Ahafo South Project has the necessary mining leases and permits from the Ghanaian Government and Environmental Protection Agency (EPA) respectively to proceed with Project development and is currently being developed, including construction of the mill facility, tailing storage facility, water storage facility, construction camp, and access roadways.



General Location Map
Ahafo South Project
Brong Ahafo Region, Ghana
FIGURE 1



Project/Study Area
Ahafo South Project
Brong Ahafo Region, Ghana
FIGURE 2

2.0 PREVIOUS PUBLIC CONSULTATION AND DISCLOSURE EFFORTS

Ghana does not have specific guidelines or regulations concerning public participation and consultation for resettlement, relocation, and compensation for mine development projects. Public participation occurs during the Scoping Study and development of Draft Terms of Reference required by the Ghanaian EPA mine permitting process.

Public involvement with the Ahafo South Project began in March 1998 at a community meeting, or "*durbar"* in Ghana, held in Bechem with Assemblymen/women, Chiefs, Elders, farmers, and other interested parties regarding development of the Sefwi Belt and Ntotoroso Gold Projects. Numerous formal and informal meetings followed and continue to the present time. A summary of public meetings (including minutes and list of attendees) held during initial stages of Project development is contained in **Attachment 1** – *Summary of Previous Public Outreach Efforts.* In addition, Scoping Studies, Draft Terms of Reference, and EISs (SGS 2000a, 2000b) prepared for the respective projects as part of the Ghana EPA permitting process contain documentation of public participation associated with mine development in the area.

Reviews conducted by the Ghanaian EPA for both projects included analysis of environmental baseline conditions; alternatives and options for siting facilities; displacement and resettlement of individuals in the project areas; and closure and reclamation of areas disturbed by proposed mining.

Through merger and acquisition, NGGL has obtained rights to develop the Ntotoroso and Sefwi Belt Projects (Ahafo Project). NGGL evaluated these mining leases (Mining Leases LVB 7523/2001 and LVB 7524/2001) acquired from previous owners and determined that development of the Ahafo Project would be modified from previously approved plans. As a consequence, NGGL has separated the Ahafo Project into two components; Ahafo South Project and Ahafo North Project.

In March 2004, Ghanaian EPA (2004) informed NGGL that changes arising from integration of the Ahafo Project and revised Project design as a result of NGGL's studies would require submittal of an updated EIS that addressed the changes. The primary changes NGGL made to the existing mine and reclamation plans was to combine two mine concessions into one operable mine unit. The modification also addressed additional resource information collected since transfer of ownership to NGGL, and NGGL's interest in seeking increased efficiency in overall project development and enhanced environmental design safeguards. An EIS addressing these changes was prepared and submitted to the Ghanaian EPA in September 2004 (SGS 2004). The Ghana EPA issued Environmental Permit No. EPA/EIA/143 for the Ahafo South Project in April 2005.

Copies of environmental documents listed above are available for review at the NGGL Ahafo South Project Public Outreach Office located within the NGGL Kenyase office complex where staff is available to answer stakeholder questions and to translate documents for interested stakeholders.

3.0 REGULATIONS AND REQUIREMENTS

As noted above, specific guidelines and requirements outlining a public participation process to address potential environmental and socio-economic impacts from mine development are not clearly defined but occur as a secondary effect from implementation of other requirements or regulations. To this end, NGGL has developed a comprehensive Public Consultation and Disclosure Plan to address these issues that is culturally sensitive, transparent, provides timely, accurate information to Project-affected people and other stakeholders, and allows sufficient opportunity for stakeholder input.

This section includes a listing and brief description of relevant Ghanaian and international requirements, as well as Newmont's Corporate policies that are being implemented for the Ahafo South Project.

3.1 ENVIRONMENTAL REGULATIONS GHANA

An Environmental Impact Assessment (EIA) for developments, projects or undertakings has been a requirement in Ghana since 1989. In June 1995, the Ghana Environmental Protection Agency (EPA) established new procedures for EIA's involving gradual phases depending upon the nature, complexity and location of the undertaking (Ghana Environmental Impact Assessment Procedures, 1995). Between 1995 and 1999, the EPA reviewed and revised the aforementioned procedures. In June 1999, the revised procedures were adopted and passed by Parliament as Legislative Instrument 1652 Environmental Assessment Regulations (L.I. 1652). These procedures require that an Environmental Impact Statement (EIS) be submitted to the EPA for review and be approved in order to obtain an Environmental Permit, which allows the Project to proceed on environmental grounds.

Minerals and Mining Law (1986)

The legislative framework for mining in Ghana is stated in the Minerals and Mining Law, 1986, PNDCL 153 (Law 153) as amended by the Minerals and Mining Amendment Act (MMA) 1992, and modified by the provisions of the Constitution of 1993 (the Constitution). Within this legal framework, the State is the owner of all minerals occurring in their natural state within Ghana's land and sea territory, including its exclusive economic zone. All minerals in Ghana are vested in the President on behalf of and in trust for the people of Ghana. Thus, regardless of the land ownership upon or under which minerals are situated, the exercise of any mineral right requires, by law, a license granted by the Minister of Lands, Forestry, and Mines (the sector Minister) acting as an agent of the State for the exercise of powers relating to minerals.

Mineral rights are legally defined to include the rights to reconnoiter, prospect for, and mine minerals. The sector Minister is also authorized to exercise, within defined limits, powers relating to the transfer, amendment, renewal, cancellation and surrender of mineral rights. The powers conferred upon the Minister must be exercised contingent upon the advice of the Minerals Commission (MINCOM), which has the authority under the Constitution to regulate and manage the use of mineral resources and co-ordinate policies in relation to minerals.

Lawful occupants retain the right to use the land within lease areas (i.e., graze livestock, cultivate crops) provided such use does not interfere with mining operations. Occupants must obtain permission from the mining company to erect any building or structure on land covered by a mining lease.

A mineral rights holder must compensate for any disturbance to the rights of owners or occupiers and for damage done to the surface of the land, buildings, works or improvements, livestock, crops or trees in the area of mineral operations. However, the Act does not provide compensation for the land itself.

According to the MMA, the amount of compensation, subject to the approval of the Land Valuation Board (LVB), is determined by agreement between the parties concerned. In practice, this agreement involves a broad section of stakeholders, including affected farmers and local traditional and political leaders. If an agreement cannot be reached, the Minister of Lands, Forestry, and Mines arbitrates.

MMA states that mineral right holders should affect as little as possible the interest of any lawful occupier of the land. Mining leases also state that a mining company shall, as long as it is safe to do so, not hinder or prevent members of the local population from exercising certain customary rights and privileges such as hunting game, gathering firewood for domestic purposes, collecting snails, cultivating farms, and observing rites in respect of graves and other areas held to be sacred.

The Minerals and Mining Law provides that efforts should be made to settle disputes amicably. In the event that this fails, then arbitration will be the available dispute resolution mechanism. Such arbitration may be in accordance with the rules of procedure for arbitration of the United Nations Commission on International Trade Law; or within the framework of any bilateral or multilateral agreement on investment protection to which the Government and the USA are parties; or in accordance with any other international machinery for the settlement of investment disputes agreed to by the parties. In the event that neither of the mechanisms is considered satisfactory, the judicial process may also be used.

According to Mining and Environmental Guidelines (1996), mining houses must pay compensation for damage to land, land uses and structures according to a schedule of compensation rates provided in the EIA / EAP using LVB rates as a minimum. In practice these rates are only available if LVB is contracted to undertake the assessment.

The Mining and Environmental Guidelines also provide for resettlement:

- Any pre-existing settlement located close to mining operations where the pre-existing inhabitant's public safety is at risk, or where the inhabitants are subjected to unreasonable nuisance, shall be resettled at a more distant site with at least an equal standard of accommodation and services at the cost of the company.

- Proposed amendments to the Minerals and Mining Law were introduced in 2003 in an effort to address, among other issues, ambiguities related to compensation rules and procedures. It is understood that the proposed amendments are now with the Attorney General awaiting submission to Parliament.

Other legislation and/or regulation relevant to the Project include:

- Environmental Protection Law

- EPA Act 490 (1994)

- Environmental Assessment Regulations (1999)

- Planning Standards for All Settlements in Ghana

- District Assembly Planning Guidelines
- National Development Planning Act (1994)
- Housing Standards, Building Code
- Local Planning Requirements.

3.2 WORLD BANK/IFC GUIDELINES

The International Finance Corporation (IFC) has published policies and requirements regarding public consultation and disclosure to ensure projects in which it invests are implemented in an environmental and socially responsible manner. The following IFC procedures, policies, and practical manuals were reviewed and considered when developing this PCDP.

OP 4.01 – Environmental Assessment: Requires public consultation and information disclosure for Category "A" projects, which includes open pit mining. Because issues addressed in an EIS are frequently of public concern, the EIS process should be used as the framework for procedures within which IFC promotes public consultation and information disclosure, and monitors compliance by NGGL. After an EIS has been accepted, IFC requires public consultation as an on-going process to be conducted during the construction and operational phases of the project.

IFC Consultation Requirements under EIS

Consultation with Relevant Stakeholders: During the EIS process, NGGL should conduct consultations with affected groups, non-governmental organizations (NGOs), local authorities, and other interested parties about environmental and socio-economic aspects of the project, and consider stakeholders' views. Consultation should start as early as possible with information made available in advance. The project sponsor should consult stakeholders at least twice, during scoping and before the Terms of Reference for the EIS are finalized and once a draft is prepared. In addition, NGGL should consult with such groups throughout project implementation, as necessary, to address EIS related issues that affect them.

Public Consultation and Disclosure Plan: Consultations to be undertaken by NGGL during construction and operation of the Project should be incorporated into the Public Consultation and Disclosure Plan.

EIS Summaries and Draft EIS Report: For the initial consultation NGGL should provide summaries of project objectives, descriptions, and potential impacts. When the draft EIS is ready NGGL should present findings of the EIS to the public. In both cases, the information should be disseminated among the relevant stakeholders proactively, and in the local language. After consultations have been held, NGGL adds details to the EIS report of the consultation conducted, and discusses measures on how public comments will be incorporated into project design and implementation.

Releasing the EIS Report In-Country and to IFC InfoShop: The draft EIS report should be made readily available to the public in public places, and should contain responses to public consultation process. A non-technical summary of the document should be made available in the local language to local stakeholders. The report is made available to a wider public through IFC's internet InfoShop website.

Ongoing Consultation, Annual Reporting, and Disclosure of Addenda after Release of EIS: Public consultation is an ongoing process and should continue throughout construction and operational phases.

IFC's Good Practice Manual *Doing Better Business through Effective Public Consultation and Disclosure (IFC 1998)*: IFC guidelines on best practice in public consultation and disclosure outline issues to consider while undertaking public consultation and disclosure, as follows:

- Written and oral communication in local languages and readily understandable formats;
- Accessibility by relevant stakeholders to both written information and to the consultation process;
- Use of oral or visual methods to explain information to non-literate people;
- Respect for local traditions or discussion, reflection and decision-making;
- Care in assuring groups being consulted are representative, with adequate representation of women, vulnerable groups, ethnic or religious minorities, and separate meetings for various groups, where necessary; and
- Clear mechanisms to respond to people's concerns, suggestions and grievances.

Operational Directive 4.30 – Involuntary Resettlement

International best practice for private sector-related resettlement is commonly defined by the June 1990 World Bank Operational Directive 4.30 (**Annex F of the Resettlement Action Plan**). This Operational Directive is applied around the world by private investors to govern involuntary resettlement associated with natural resource and infrastructure development. The Directive sets the benchmark against which such projects are gauged by international financial institutions, both private and multi-lateral. Operational Directive 4.30 is internationally acknowledged as one of the most comprehensive and efficient set of international standards with respect to the protection of the rights of affected people.

The key principles of this policy are:

- Physical and economic dislocation should be avoided or minimized where feasible.
- Unavoidable displacement should involve the preparation and implementation of a resettlement plan. All involuntary resettlement should be conceived and executed as development programs, with resettlers provided with sufficient investment resources and opportunities to share in project benefits.
- Displaced persons should be (i) compensated for their losses at full replacement cost prior to the actual move; (ii) assisted with the move and supported during the transition period in the resettlement site; and (iii) assisted in their efforts to improve their former living standards, income earning capacity, and production levels, or at least to restore them. Particular attention should be paid to the needs of the poorest groups to be resettled.
- Community participation in planning and implementing resettlement should be encouraged. Appropriate patterns of social organization should be established, and existing social and cultural

institutions of resettlers and their hosts should be supported and used to the greatest extent possible.

- Resettlers should be integrated socially and economically into host communities so that adverse impacts on host communities are minimized.

- Land, housing, infrastructure, and other compensation should be provided to the adversely affected population. The absence of legal title to land should not be a bar to compensation.

OP 11.03 – Management of Cultural Property: IFC sponsored projects define "cultural property" as "sites having archaeological, paleontological, historical, religious, and/or unique natural values." IFC normally requires determination of what is known about cultural aspects of proposed projects. The consultation process should involve scientific institutions and NGOs as part of this process.

1998 – Disclosure Policy: IFC is open about its activities and welcomes input from affected communities, interested members of the public, and business partners and will seek out opportunities to explain its work to the widest possible audience. This policy was developed in recognition of the importance of accountability and transparency in the development process.

1998 – General Environmental Guidelines: For financed projects in which no other specific environmental guidelines have been developed, general environmental guidelines may be used. These guidelines emphasize pollution prevention, and are intended to minimize resource consumption, including energy use, and to eliminate or reduce pollutants at the source. General Environmental Guidelines include requirements for air emissions, liquid effluents, hazardous chemicals and wastes, solid wastes, and ambient noise.

3.3 INTERNATIONAL POLICIES AND STANDARDS

Newmont is a founding member of the International Council on Mining and Metals (ICMM). As such, the Ahafo South Project will adhere to ICMM's principles for sustainable development throughout the life of the Project. The ICMM Principles include:

- Implement and maintain ethical business practices and sound systems of corporate governance;

- Integrate sustainable development considerations within the corporate decision-making process;

- Uphold fundamental human rights and respect cultures, customs and values in dealing with employees and others who are affected by our activities;

- Implement risk management strategies based on valid data and sound science;

- Seek continued improvement of environmental, health, and safety performance;

- Contribute to conservation of biodiversity and integrated approaches to land use planning;

- Facilitate and encourage responsible product design, use, re-use, recycling and disposal of products;

- Contribute to social, economic and institutional development of communities in which we operate; and

- Implement effective and transparent engagement, communication, and independently verified reporting arrangements with stakeholders.

Newmont includes these principles in its Policies, Five Star Standards, and in operations, including the Ahafo South Project. The 2004 *Now and Beyond Report* (Newmont 2004) presents an independent assurance report which comments on Newmont's commitment to the ICCM principles.

Newmont is a signatory to the International Cyanide Management Code (ICMC) and will comply with ICMC requirements. In addition, Newmont is a signatory to the United Nation's Global Compact and will comply with World Bank Group's (WBG) draft guidelines for Precious Metal Mines and applicable WBG policies and guidelines.

GLOBAL REPORTING INITIATIVE &
INTERNATIONAL COUNCIL ON MINING & METALS

"Now & Beyond 2004 was prepared in accordance with the Global Reporting Initiative Guidelines. The 2004 report addresses 89 percent of the criteria specified in the GRI Content Index, in addition to some supplemental indicators, in contrast to 75 percent in 2003. This achievement is evidence of increasingly disciplined attention to the public reporting process. In particular, there are more economic and environmental data elements included this year, and they are presented with greater detail and specificity than in 2003. Increased detail in environment and governance indicators would further improve the report. Newmont's full commitment to the ICMM principles is apparent from the recent accession of its Chairman and CEO, Wayne W. Murdy, to the Chair of the ICCM. In Now and Beyond *(2004), Newmont has addressed the ten issues articulated in the ICMM Principles."*

Equator Principles

The Equator Principles represent an approach by financial institutions to determine, assess and manage environmental and social risk in project financing. The Principles were adopted in June 2003 by 10 of the world's leading financial institutions to ensure that projects financed are developed in a manner that is socially responsible and reflect sound environmental management practices. Some 25 banks in 14 countries have now adopted the Principles.

Adopting institutions undertake not to make loans directly to projects where the borrower will not or is unable to comply with environmental and social policies and processes outlined in the Principles. Compliance with host country legislation and, for project located in middle and low-income countries such as Ghana, relevant World Bank Safeguard Policies, including OP 4.12 is a pre-requisite. Public consultation and disclosure requirements are also stipulated in the Principles.

3.4 NEWMONT CORPORATE POLICIES

NGGL, in keeping with Newmont's corporate philosophy, is designing and operating the Ahafo South Project to be a model corporate citizen in terms of recognition of social and environmental concerns in communities where the Project may have an effect.

Newmont Corporate Social Responsibility Policy

NGGL, as a subsidiary of Newmont Mining Corporation, will develop and operate the Ahafo South Project under the Newmont Corporate Social Responsibility Policy and Five Star Management System (Five Star), which includes management systems and discipline specific standards on Community and External Relations (Newmont 2003).

Newmont believes public consultation and collaboration are vital components of its Social Responsibility Policy. The Company, through its External Affairs Department, is actively and continually seeking stakeholder involvement in its deliberations not only to improve decision-making and build understanding, but also ensure long-term project viability and benefit enhancement to Project-affected people and other relevant stakeholder groups.

Newmont's Social Responsibility Policy
Goals Regarding Engaging Stakeholders

Demand leadership from all employees;

Seek to share success by partnering with stakeholders in appropriate community development programs;

Consult stakeholders in matters that affect them;

Strive to communicate performance in an accurate, transparent and timely manner;

Understand that the actions and conduct of every Newmont employee and contractor are the basis on which stakeholders will evaluate Newmont's commitment to achieving the highest standards of social responsibility; and

Carry out our Social Responsibility Policy in conjunction with Newmont's Environment and Health and Safety Policies since environmental, health and safety issues can affect the communities where we operate.

The challenge for Newmont is to perform – in all its activities – in ways in which stakeholder expectations are known and are evaluated fully to provide adequate feedback and understanding to stakeholders about whether or not Newmont can meet and/or exceed these stakeholder expectations. This means creating mutually respectful relationships around its mines and conducting its business through sound and responsible methods. Management and employees will be informed of responsibilities to external stakeholders through training and supervision. All levels of development and operation will consider the needs and interests of local stakeholders in the decision process. Through awareness of social responsibility and cooperation from employees, Newmont will develop and maintain its social responsibility in Ghana.

As part of the commitment to the Newmont Social Responsibility Policy, in January 2004 NGGL commissioned SRK (SRK 2004) to review the social issues that could be expected to arise during Project construction and to collaborate with NGGL managers and staff to draft a Project-specific Social Action Plan (SAP) designed to serve as an internal guide for:

- Managing key social issues by the Community Relations Department
- Directing related departments about their role in managing key social issues

- Directing NGGL, Projects and Corporate, personnel of the key social issues that NGGL Community Relations has identified to be managed.

The SAP identified the following issues for the construction phase of the Ahafo Project:

- Local procurement
- Local infrastructure
- Local employment
- Natural resources harvesting
- HIV/AIDS
- Security
- Relocation & resettlement
- Compensation - exploration
- Population influx
- Galamsey (artisanal miners)
- Occupational health and safety
- Public disclosure and consultation
- Government relations
- Newmont internal relations
- Cross cultural awareness

The SAP contains an analysis for each issue that includes

- An issue description, including identification of the stakeholders who would be affected by the issues and potential impacts
- Mitigation measures were developed that are appropriate to the issue, impacts, and affected stakeholders and include decisions on:
    - The Internal NGGL department that is responsible for the managing and tracking of the issue
    - The time frame when the issue will surface and/or any critical deadlines for managing the issue
    - The indicators that the issue is being properly managed were identified
- Management justification for each issue; why successfully managing an issue is beneficial not only for NGGL but also for the community.

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A third party assessment of NGGL's progress regarding the effectiveness of its Social Responsibility Policy in Ghana was favorable. NGGL has, for example, been commended for its proactive stakeholder

engagement activities, partnership building efforts, local recruitment and procurement policies, resettlement planning, and initiatives for health and safety.

In April 2004, NGGL commissioned Associates for Global Change (AGChange 2004) to conduct a comprehensive progress review of the Project's commitment to the corporate Social Responsibility Policy. AGChange reached the following conclusions and recommendations:

"It is clear that NGGL's early and ongoing efforts to proactively engage local communities has significantly contributed towards mitigating the potential social and other risks faced in starting up mining operations in Ghana. Evidence of this diminished risk includes:

- The inability of outside anti-mining activists to gain significant support in the local communities to date
- Repeated expressions of gratitude from community leaders, residents and other stakeholders at being approached and solicited by the company for their issues and concerns, although this also may lead to inflated expectations of what the company is able to do
- Community unrest to date appears to be limited largely to young, poorly-informed and/or impatient job seekers, possibly urged on by certain opportunists who seek to incite others to join them in hopes of gaining leverage in company hiring decisions. Local government officials and traditional leaders have generally been helpful in cooling tensions within their communities, although constant outreach and communications are required to manage this issue
- Comments from the Chamber of Mines and other observers suggest that Newmont is raising the bar for how other mining companies in Ghana handle resettlement, compensation and employment issues, an early indication that the company is establishing its reputation as the "miner of choice" for communities.

Also, working with partners such as OICI and planningAlliance has given the company access to skill-sets and expertise that are proving useful in creating responsive and informed social and community relations programs. In particular, working with an NGO such as OICI gives both NGGL and community a "third party" communications and conflict resolution conduit for issues that the company or community may be unable to successfully broach directly with each other. In addition, having OICI—an NGO that promotes self-reliance as an antidote to poverty— conduct the livelihood survey and develop the alternative livelihood program helps deflect expectations that NGGL is the sole benefactor for the communities".

Five Star Management System

NGGL has developed Five Star to include an evaluation of successful implementation of each standard. Evaluation criteria include assessments of performance and general perception regarding the system.

NGGL will achieve consistent and disciplined management of social responsibility issues through Five Star, a global management system developed in-house by Newmont and administered by the corporate office to drive outstanding performance and continual improvement in areas of Health, Safety and Loss Prevention and Environmental and Social Responsibility. Although Five Star is founded on internationally accepted management system principles (e.g., ISO14001), it is unique in that it also includes discipline-specific standards to manage Health Safety and Loss Prevention and Environmental Social Responsibility risks that are specific to the mining industry.

The objective of Newmont and the Ahafo South Project is to operate in accordance with generally accepted International Standards and Practices and in full compliance with all applicable Ghanaian regulations in all aspects and with particular reference to social issues and pertaining to local stakeholders. The 5 Star Management system will play a significant role in achieving these objectives and in managing the evolving state of the regulatory structure in Ghana, and meeting requirements from shareholders and financial institutions. Consideration of the above mentioned objective will be included in planning and implementation of all aspects of the operation. Regular audits by external social assessors will provide the Ahafo South Project management with ongoing analysis of system performance to meet its objectives.

4.0 PUBLIC CONSULTATION AND DISCLOSURE PLAN

NGGL established a stakeholder involvement program in Ghana in 2003, which includes a comprehensive suite of stakeholder consultation, disclosure activities, and engagement exercises, and media interactions. The objectives of the Communications Plan include:

- Set up a process for identifying information and communication needs of NGGL.
- Undertake activities to supply the identified information and communication needs of NGGL.
- Develop and assess a process to ensure that NGGL has timely access to information and identification of communications support required for various activities.
- Provide support to the Human Resource Department to ensure effective intra and inter departmental communications.
- Identify NGGL external stakeholders, their issues and information needs.
- Develop appropriate and consistent key messages in support of NGGL values and activities.
- Train relevant communicators to communicate NGGL key messages.
- Develop communication support material for NGGL key messages.
- Work with the Community Relations department to develop appropriate corporate social responsibility policy initiatives.
- Establish and maintain cordial relations with all stakeholders including government, media, traditional authorities, local communities, and the general public as well as employees.
- Assess effectiveness of the communication process evolved in developing those relations.
- Develop a crises communication manual relevant to NGGL.
- Train relevant personnel in crises communications
- Conduct quarterly crisis communications drill.

Project stakeholders – individuals, groups, and organizations with a legitimate interest in the Project, as listed in **Attachment 2**, have been actively engaged in the consultation process to provide opportunities to actively contribute toward development of the Project.

4.1 RESOURCES AND RESPONSBILITIES

As Project sponsor NGGL has overall responsibility for stakeholder consultation and involvement program. NGGL External Affairs Department is responsible for implementing the PCDP, with assistance from the StratComm Africa communications Officers, OICI community development officers, and the

Resettlement Project Manager from planningAlliance. The Newmont Corporate Vice-President for External Affairs is responsible for communicating with international stakeholders.

NGGL Responsibilities

Responding to the concerns and issues expressed during public consultations

Allocating sufficient funds to implement a viable PCDP

Ensuring that all public consultation and information disclosed is documented.

StratComm Africa is an independent Ghanaian strategic communications consulting firm, providing a full range of communications services to Newmont Ghana. Since November 2003, StratComm Africa has supported NGGL's engagement process in tandem with Newmont Corporate Communications Policy through a team of communications experts at the Project site and in Accra. Execution of Newmont Ghana's engagement strategy is heavily supported by the team through community education activities, formal and informal stakeholder engagement exercises, development and initiation of an issues log, stakeholder engagement register, contact reports and feedback systems, as listed below. These approaches allowed NGGL to consistently track issues of concern among community constituents including the media, regulatory agencies, government, traditional authorities, youth groups, various social groups and NGO's in relation to the project. Proposals for enhancing internal communications systems arming employees with consistent key messages, speaking points, Frequently Asked Questions on various issues related to the Project were developed.

An understanding of the economic/political/socio-cultural context in which NGGL proposes to communicate has informed the structure of various workshops, seminars, and public meetings facilitated by StratComm Africa to introduce NGGL to and draw feedback from a cross section of stakeholders on issues of concern with respect to the Project. StratComm Africa employed a variety of innovative communication techniques and tactics including interactive use of traditional channels of communication, local theater, puppetry and proposals for radio programming based on communications research including audience channel analyses and knowledge attitudes and perception studies. These approaches were focused on ensuring that audiences at varying literacy levels could understand and participate in discourse about project-related activities. Extensive documentation of community education, around project milestones including initiation of a local labor pool, the start of stage one and two civil works as well as public relations support for project events including EPA-facilitated public hearings and the Livelihood, Enhancement and Empowerment Program (LEEP) all supported the public disclosure and consultation process.

Below are community communication support materials, project-related community education activities, and documented stakeholder engagement carried out by StratComm Africa:

- Communications Support Material
    - Translated Newmont Values Statements Presented to Communities by Newmont Chairman and CEO December 2003

- Posters on How Gold is Produced in English & Twi
- Poster Flip Charts/ Cartoon Strips/ Pamphlets on Local Labor Pool
- Poster Flip Charts/ Posters – How Gold is Produced
- Poster Flip Charts/ Pamphlets – Who is Newmont? - Public Hearing
- Brochure – LEEP
- Newmont Ghana Fact Sheets

- Project-Related Community Education Activities
  - Durbar of Chiefs to introduce CEO to Communities
  - Initiation of Local Labor Pool –
    - Communications Skills Training for Traditional Town Criers
    - Puppetry
    - Local Theater
  - Local Theater – Resettlement and Relocation
  - Interactions with Media (Brong Ahafo and Accra)2004
  - Interactions with Regulatory Agencies (Brong Ahafo and Accra)2004
  - Interactions with Chiefs from project Area 2004
  - Interactions with Chief Farmers from project Area 2004
  - Interactions with over 200 Representatives from various Social Groups in project area 2004
  - Interactions with NGO's (Brong Ahafo and Accra) 2004
  - Stage One civil Works 2004
  - Follow up One-on-One/ Small Focus Group Informal Discussions on Project – Related Issues
  - Stage Two civil Works 2004
  - Public Hearing 2004

- Documented Stakeholder Engagement
  - Quarterly Photo shots of changing scope and size of project development
  - Video and Photo documentation of Durbar of Chiefs introducing CEO to Communities December 2003
  - Video and Photo documentation of
    - Livelihood Study 2003-2004
    - RNC Meetings 2004
    - Community Education – Local Labor Pool 2004
  - Community Education – Resettlement/ Relocation 2004
  - Public Hearing – 2004
  - Launch of LEEP 2004
- Reports and Miscellaneous Documentation
  - Report – Interactions with Media (Brong Ahafo and Accra)2004
  - Report – Interactions with Regulatory Agencies (Brong Ahafo and Accra)2004
  - Report – Interactions with Chiefs from project Area 2004
  - Report – Interactions with Chief Farmers from Project Area 2004
  - Report – Interactions with over 200 Representatives from various social groups in project area 2004
  - Report – Interactions with NGOs (Brong Ahafo and Accra) 2004

- Stakeholder Engagement Register
- Stakeholder Contact Reports
- Issues Log
- Daily Newspaper Clippings
- Weekly Media Summaries

Opportunities Industrialization Centers International (OICI) is a non-profit, non-governmental organization (NGO) headquartered in the United States. An affiliate, OICI Ghana currently operates four centers in Ghana at Tamale (Northern Region), Kumasi (Ashanti Region), Takoradi (Western Region) and Accra (Greater Accra Region). OICI Ghana's current portfolio of programs includes Mining for Sustainable Development, Vocational Skills for Life Training, Money Management Training, Food Security Training and Outreach Services, Micro Credit and Income Improvement, Cooperative Development and Export Promotion, FarmServe Ghana, HIV/AIDS Prevention Care and Support, and Street Children and Orphans.

NGGL retained OICI as an NGO-partner to undertake a census and socio-economic survey (OICI 2004) of the Study area. The resulting socio-economic profile has been used for resettlement planning and implementation, including livelihood enhancement and community development. The 13-member OICI team, in their tripartite role as socio-economic surveyors, household case workers, and community development planners, are integral to community outreach efforts. Immersed in the community since late 2003, they enjoy exceptional stakeholder access and serve an important intermediary function between NGGL and the local community.

planningAlliance, an independent Canadian consulting firm specializing in resettlement planning, has been contracted by NGGL to conduct baseline inventories in support of resettlement and compensation efforts and prepare a Resettlement Action Plan (pA 2005). Physical asset surveyors from planningAlliance interface regularly with community level Project stakeholders, further enhancing the proactive outreach strategy adopted by the Project. planningAlliance staff participate on the Resettlement Negotiation Team.

Maxim Technologies, an independent engineering and environmental consulting firm in the United States, has been contracted by NGGL to assemble existing baseline data, evaluate impacts, and prepare a draft Environmental and Social Impact Assessment (ESIA) which includes this PCDP.

4.2 SUMMARY OF ISSUES

Three primary issues have been identified that relate to the Ahafo South Project. These issues and the manner in which NGGL has addressed them are summarized below.

Social and Economic Effects

The Ahafo South Project is projected to add an additional 6.8 million ounces to Ghana's overall export of gold. Compared to the number of total ounces exported in 2002, the addition of the Ahafo South Project would add approximately 500,000 ounces per year (an additional 22 percent above the 2002 volume). Long-term employment in the gold mining sector is expected to grow. Royalties generated by

the Project and paid by the Company to the Internal Revenue Service of Ghana over the life of the Project would add to economic development of Ghana.

Besides strengthening Ghana's position in the international and national gold arena, the increased economic activity in the area as a result of the development of NGGL's Ahafo South Project will strengthen revenues of the Brong-Ahafo Region, the Asutifi District governments and Paramount and local chiefs, as well as increasing income of local residents. Approximately 97 percent of households were engaged in farming as their primary livelihood activity prior to Project construction activities. Only 6 percent were salaried employees. As of April 30, 2005, 458 Ghanaians have been employed in the 29-month construction effort, and up to 750 local residents will be able to find long-term employment with either NGGL or an associated contractor when the mine is operational in 2006. On February 9, 2004, NGGL opened a National Technical Vocational Training Center in Yamfo to provide education and training necessary for jobs with the Project and to provide skills for future employment. As of August 12, 2005, 696 local people have completed work orientation training and have entered the semi-skilled labor pool, and 314 people have completed semi-skilled training in Metals, Administration, and Masonry.

NGGL launched a sustainable community development program known as the Livelihood Enhancement and Empowerment Program (LEEP) (OICI 2005), a high impact, results oriented, sustainable integrated community development plan that is anticipated to last 5 years. Phase 1 of the program, launched in February 2005, is designed to focus on economic growth, wealth creation, quality of life, and empowerment to give value to those people that have been relocated/resettled because of the Project. Phase 2 of the LEEP will be initiated following construction (projected to be July 2006). Local residents will have an opportunity to participate in the Phase 2 programs. In addition to the 5-year LEEP program, NGGL will work with local communities and regional development planning boards in a participatory fashion to assess additional opportunities to support sustainable community development that will continue throughout the life of the mine.

Resettlement and Relocation

Development of the Ahafo South Project involves approximately 2,994 hectares (ha) for construction and operation of mine facilities. Based on surveys completed by planningAlliance (2005), construction of the Project would result in physical and economic displacement of 710 households (4,513 people) who live in the Project area. The Project would also result in economic displacement of an additional 871 households (4,355 people) that possess farmland within the area. The total number of households impacted by the Project is 1,581 (up to 8,868 people) (pA 2005).

planningAlliance designed the resettlement planning effort as a collaborative process with Project-affected persons. Resettlement principles, policies, procedures, and compensation rates have been determined through multi-stakeholder involvement in a Resettlement Negotiation Committee (RNC). The RNC includes representatives of Project-affected hamlets, villages, traditional authorities, district and regional government representatives, non-governmental organizations, and NGGL (see *Implementation of the PCDP* section).

NGGL has not started resettlement planning for the Amama mine pit, associated waste rock disposal facility, environmental control dam, and connecting haul road. A separate RAP will be prepared in due course as this area is not covered by the Ahafo South RAP. Resettlement and compensation associated with this area would be negotiated on the basis of principles, policies, procedures, and rates previously applied in the Project area, as applicable, and as outlined in the Resettlement Action Plan (RAP) (pA 2005).

Biodiversity and Forest Reserves

Biodiversity is a measure of the variety of life, and its processes; including the variety of living organisms, genetic differences among them, and the communities and ecosystems in which they occur (Langner and Flather 1994). Biodiversity is often interpreted as a measure of biological complexity and variation within the Study area.

NGGL recognizes that the activities of exploring and developing mineral resources may have an impact on biodiversity. Likewise companies engaged in exploration and mineral resource development can be a positive force for biodiversity conservation. Through sound environmental management many potential impacts to biodiversity from mineral resource development can be avoided or mitigated. Further, there are good business reasons for mining companies, including NGGL, to ensure the healthy functioning of ecosystems in and around their areas of operation. To this end NGGL is committed to work in effective business-NGO-government partnerships focused on biodiversity conservation in the Project area.

Areas of Productive Forest Reserves have been designated in the vicinity of the Project area. These areas include the Bosumkese and Amama Shelterbelt Forest Reserves. The Ahafo South Project is not expected to directly impact the Bosumkese Forest Reserve; however, NGGL recognizes that future actions, indirect impacts, or induced impacts may result from mine development.

Potential impacts on the Forest Reserves include the creation of access into the reserves via new roads, power line access routes, and general proximity of the mine to reserve areas. NGGL proposes to use an existing Biodiversity Management Program to address management needs of Forest Reserves near the Ahafo South Project.

Other Issues

Additional issues and concerns raised by local people during consultation exercises include:

- Safety of people;
- Water pollution;
- Air pollution;
- Perceived deleterious effect of blasting on buildings;
- Proliferation and regeneration of mine-related diseases;
- Dust and noise pollution;
- Mosquito infestation and related health problem, such as malaria;
- Delay in compensation payment;
- Increased traffic on rural streets/roads;
- Disrespect for traditional cultural values;
- Disrespect for the elderly;
- Negative consequences of population growth on social infrastructure (e.g., water, toilets, schools, rents/housing, crime, prostitution); and
- Increased prevalence of HIV/AIDS.

4.3 INFORMATION DISCLOSED

NGGL used a variety of communication techniques to announce major Project milestones and decision points. When the investment agreement between Newmont and the government of Ghana was signed in December 2003, Newmont communicated its reputation and values in statements in Twi and English to community representatives during a *durbar* of Chiefs from Ahafo to introduce Newmont's Chief Executive Officer (CEO) to local people. The CEO and other staff were briefed with key messages, speaking points, position papers, and answers to frequently asked questions to provide consistent, accurate information to local people. A similar plan was also developed when ground was broken at the Ahafo Project with the same purpose in mind. Formal ceremonies were structured to include input from local community trainees who had been through Newmont orientation programs.

NGGL believes that it is good business, as well as common sense, for companies planning and developing new mining ventures to understand and respond to stakeholder concerns. Therefore NGGL has adopted a community-centered approach where the Company not only tries to gain the support of the stakeholders for the Project, but also involves stakeholders in making sure the project develops for the benefit of everyone. For instance, in responding to concerns expressed by stakeholders, which include: perceived dust pollution, perceived noise pollution, safety, perceived water pollution, damage to vegetation, wildlife, loss of agricultural land, cultural values, employment, and business opportunities, NGGL applies a comprehensive range of techniques. These techniques include visits by community representatives to comparable operations; survey on attitudes and perceptions of mining; face-to-face meetings with individuals; establishing links with the community, business, and schools; forming the community liaison committee; information contact points; displays; invited comments; media briefings; public meetings; community demonstration projects; information material such as videos and printed materials; and workshops. These techniques are tailored to suit individual stakeholder concerns. For instance, NGGL has taken local representatives of the people to other mines in Ghana to show them the general nature of mining as well as to let them see comparable factors as surface operations, site rehabilitation success, the operations of other community liaison groups or committees, and how a project manages environmental impacts, and so on. NGGL evaluates the effectiveness of these techniques through feedback from communities, reduction in expression of stakeholder concerns as shown in compliant log book/register, and NGGL's own monitoring program.

NGGL announces events and involvement opportunities in culturally appropriate ways, on public notice boards and through the traditional *gong gong* community announcement system in Project area communities. All personnel who work directly with local people are bilingual in Twi and English. StratComm Africa, a Ghanaian communications firm, provided communication support specifically to inform and educate area residents of the local labor pool that was to be used by construction contractors. The consultation process included use of traditional Ghanaian communication methods to share information with communities, including engagement with Chiefs; a request to Chiefs to use traditional town criers to inform communities of the impending exercise or public meeting (*durbar)*; and use of local theater, dance and drama as communication tactics to educate and inform communities where up to 50 percent may be not be able to read and/or write.

4.4 REPORTING

The PCDP is an appendix to the ESIA, which will be submitted to the IFC. Comments submitted to IFC will be conveyed to NGGL for a response.

Ongoing public consultation, meeting minutes, and reports will be submitted within seven days to the NGGL Ahafo Project General Manager. NGGL maintains an active file regarding all public consultation and disclosure documentation collected throughout the program, which are available for public review upon request.

The NGGL Regional Manager and General Manager of the Ahafo South Project compile and submit a report summarizing PCDP results to IFC annually. The report will provide a summary of all public consultation issues, grievances, and resolutions. The report will also provide a summary of relevant public consultation findings from informal meetings held at the community level.

4.5 IDENTIFICATION OF STAKEHOLDERS

The Ahafo South Project has a wide variety of stakeholders, people, agencies, or organizations that could be directly or indirectly affected (positively or negatively) by the Project or that could influence the Project (positively or negatively). In order to develop an effective stakeholder involvement program, it is necessary to identify the various stakeholder groups as different outreach methods may be required for different groups. In addition, primary concerns will likely vary between respective stakeholder groups.

NGGL introduced the concept that stakeholder groups should elect individuals as their representatives to assure stakeholders of a consultative and collaborative approach to conflict resolution free from coercion and based on informed consent. Representatives to the various stakeholder committees are elected by acclamation during community gatherings and group meetings. NGGL does observe these meetings to ensure election of representatives are fair and transparent, and the election process had widespread public support. After selection and presentation of representatives, NGGL asks groups to confirm that their representatives are genuine advocates of the views of their members. To do so, it issues Authorization for Representation Forms, which members of each group sign and submit to NGGL.

A list of stakeholders identified for the Ahafo South Project is contained in **Attachment 2**. Major stakeholder groups are summarized below.

Government Agencies

Departments and agencies of Ghanaian government such as Agriculture; Lands, Forestry, and Mines; and the EPA influence the Project through a regulatory process of monitoring for compliance, issuing licenses and permits. Agencies of the Brong-Ahafo Region and the Asutifi District provide services to local residents and are active in future planning efforts for the area.

Traditional Authorities

Paramount and Divisional Chieftancy areas (or Autonomous Chieftancies) are located within the Study area. These are the Paramount Chieftancies of Kenyase No. 1 and No. 2 as well as the Ntotroso Divisional Chieftancy area which includes Ntotoroso, Gyedu and Wamahinso. Paramount and Divisional chiefs exert control over various sub-chiefs, who represent communities within their respective stools (chiefdoms), and village chiefs, who represent smaller communities. At the settlement level, sub-chiefs or village chiefs, in consultation with elders, typically resolve disputes. Chiefs also play an important role in allocating land within their stool.

Local Communities

Up to 35,000 people live in the Study area in 5 settlements and 8 hamlets, as well as individual farms. Approximately 9,000 local residents will be directly impacted by the Ahafo South Project; some of the people will have to move, others will lose farm land. Many local residents will likely be employed by mining and related economic activities.

Special Interest Groups

Farmers are the primary special interest group in the Study area, headed by a Chief Farmer in each settlement. Youth groups are particularly interested in employment opportunities. There is reluctance among Ghanaian women, particularly in rural communities, to involve themselves in both political and communal activities. For instance, activities like community representation in committees formed to interact with NGGL had few women representation (i.e., maximum of 2 out of 55 members). This is due partly to the chauvinistic nature of the Ghanaian society where men dominate almost every facet of social life. To ensure that women's voices and concerns are heard and considered in decision-making process, NGGL will meet with and propose the development of a Women's Committee in its operational area and determine the level of interest in participating of the various stakeholders. The Committee will provide a platform for women to freely express their views about NGGL operations. The Committee would be moderated by a woman.

Non-governmental Organizations

NGOs fall into two categories, national and international with increasing interaction between them, which has lead Newmont to assign the task of interacting with NGOs to the Corporate Vice-President for External Affairs. Mining projects throughout the world are under increasing scrutiny due to the large scale and potential impacts to mostly rural groups of people. NGGL is actively seeking knowledge of and engagement with NGO's within the study area and within the Brong Ahafo Region as well as national.

4.6 INFORMAL STAKEHOLDER CONSULTATIONS

NGGL has pursued a vigorous community outreach strategy throughout the planning process, building trust and facilitating open information exchange among stakeholders. NGGL External Affairs interacts with the community daily, consulting on a broad range of issues with local leadership – traditional and political – and the general population. These interactions happen as NGGL representatives are on their daily rounds, meeting with local people, providing informal updates on the progress of the Project, and

answering questions. NGGL's decision to include all stakeholders into the dialogue when the concession was acquired has helped develop broad community support as documented in **Attachment 3**.

4.7 FORMAL STAKEHOLDER CONSULTATIONS

Workshops and briefings on the Project have been provided to the following:

- Members of Parliament
- National ministries/agencies:
    - Environment
    - Lands, Forestry, and Mines
    - Lands Commission
    - Land Valuation Board
    - Local Government and Rural Development
    - Education
- The United States Ambassador
- International, national, and local environmental, and human rights non-governmental organizations
- International, national, regional, and local media
- Regional officials and agencies:
    - Brong Ahafo Regional Directorate of Health
    - Brong Ahafo Regional Coordinating Council
    - Brong Ahafo Regional Town and Country Planning
    - Brong Ahafo Lands Commission
    - Brong Ahafo Regional Office of the Administration of Stool Land
    - Brong Ahafo Regional Office of Land Valuation Board
    - Brong Ahafo Regional Youth Council
    - Brong Ahafo Social Welfare Directorate
    - Asutifi District Assembly
    - Asutifi District Directorate of Health
    - Asutifi District Coordinating Council
    - Asutifi District Town and Country Planning
    - Asutifi District Youth Council
    - Asutifi District Social Welfare Directorate
    - Asutifi District Education Service
    - District Commission of Human Right and Administrative Justice (CHRAJ)
    - Kenyase Circuit--Teachers Association
- Local officials:
    - Chiefs and elders, including authorities on traditional religion
    - Chief Farmers
    - Youth Associations
    - Assembly Members Association

Special presentations have been made at local festivals and international conferences/exhibition to share NGGL's objectives and key messages. NGGL consultations with stakeholders have occurred in the area since 2003. A chronological listing is shown in **Table 1**. Community outreach activities coordinated by the previous owner of the Ahafo Project are presented in **Attachment 1**.

In addition, selected Project-affected people have toured an operational mine (Tarkwa) and a decommissioned mine (Resolute Amansie) for a first-hand look at mining operations and their impacts on local communities.

TABLE 1
Formal Stakeholder Consultation Meetings

Date	Venue	Participants	Issues Discussed
Mar. 29, 2003	Asutifi District Assembly, Kenyase	Traditional and political leaders, government functionaries, NGO representatives	Introductory resettlement program discussion, including: process, timelines, compensation modalities, livelihood restoration.
Apr. 01	Kodiwohia	General community	Crop compensation; resettlement housing plans; training programs
Apr. 04	Kwakyekrom	Chiefs and Elders of community and vicinity	Resettlement timelines; housing policy; proposed household survey; resettlement vs. relocation
Apr. 26	Kenyase I	Chiefs and Queen Mothers	Resettlement planning information exchange; consultation meeting protocols; general Project related information dissemination
May 09	Kwakyekrom	Caretakers and sharecroppers	Crop compensation procedures; resettlement policy; local employment policy; farm survey; formation of resettlement committee
May 13		Landlords	Resettlement policy; employment policy; rental payment to chiefs; farm survey.
May 16	Asutifi District Assembly Hall	Political leaders, government functionaries and NGO officials	Formation of resettlement committee; land acquisition policy; rental payments to chiefs; compensation; resettlement program progress
Sept. 11	Kenyase 1, Kenyase II, Ntotoroso, Gyedu	Political and traditional leaders, government functionaries, community members	Company local recruitment policy; crop compensation
Sept. 23	Kwakyekrom	Farmers	Letter from Asutifi Concerned Farmers Association
Jan. 11, 2004	Kenyase I	Political and traditional leaders, and government functionaries	General discussion of stakeholder engagement
Jan. 14	Ntotoroso	Youth Association	Local employment; local contracts; community health; crop compensation; SLTO
Jan. 24	Kenyase II	Youth Association	Local employment; local contracts; community health; crop compensation; SLTO
Apr. 29	Kenyase I	Youth Association	Local employment; local contracts; community health; crop compensation; SLTO
Jun. 02	Ntotoroso	Chiefs and community of Ntotoroso	Resettlement site; planning
Jul. 08	NGGL Kenyase Camp	Kenyase I, Kenyase II and Ntotoroso Youth Associations	Speculative farming activities
Nov. 11	NGGL Kenyase Camp	Traditional Authorities	NGGL Activity Update
Nov. 15	NGGL Kenyase Camp	Assembly Members	NGGL Activity Update
Nov. 16	NGGL Kenyase Camp	Youth Association Executives	NGGL Activity Update
Nov. 19	NGGL Kenyase Camp	Chiefs and Elders	NGGL Activity Update
Nov. 23		Public Forum	EPA Public Forum for the Project

TABLE I Formal Stakeholder Consultation Meetings			
Date	**Venue**	**Participants**	**Issues Discussed**
Dec. 04	St. Peters RCC Kenyase	Assembly members, all traditional councils, all youth associations	Resettlement Room Size
Jan. 25, 2005	Home of Nana Ntotoroso	Nanom Ntotoroso, ECD2 Legal Landowners, Chairman of Site Selection Subcommittee	Speculation Management

Source: pA 2005.

4.8 COMPLAINT PROCESS

NGGL adheres to the corporate policy of facilitating expression by stakeholders of questions and concerns regarding the resettlement and relocation process. Newmont

> *"… aims to engage, as much as possible, with local communities to ensure interactions are relevant, conflicts are resolved quickly and to the mutual benefit of both parties and in such a way that stakeholders feel positive about their involvement with the Company."* (www.newmont.com, 2004)

To meet its policy objectives, NGGL maintains both informal and formal grievance mechanisms. NGGL External Affairs staff attempt to answer questions and address issues during formal and informal stakeholder consultations; if they are able to do so, documentation is not recorded. If a stakeholder raises an issue that requires follow-up, that stakeholder's contact information and question/issue is documented and addressed by NGGL External Affairs staff, according to the complaint process described below.

As complaints registration is a recurring activity, the External Affairs staff designed a Complaint Register Form on which are recorded all complaints received everyday for which no immediate answers are provided. Also a special reception area has been constructed solely for local residents who come to NGGL Kenyase Camp Office to register complaints. This is to expeditiously process and address residents' complaints in a very respectful and timely fashion to prevent potential misunderstandings. These Complaint Forms are submitted to the External Affairs Administrator for entry into the Complaints Database. Where a written complaint is made, it is also captured in the Database. NGGL community outreach workers are skilled in conflict resolution techniques and are fluent in both Twi and English. NGGL staff routinely seeks advice and, where appropriate, intervention of traditional authorities to assist in resolving disputes. Traditional authorities possess considerable institutional relevance, particularly at the rural level where traditional status continues to command respect.

The External Affairs Department holds special meetings every Monday, Wednesday and Friday to discuss, among other things, appropriate responses and approaches to resolving the complaints received during the week. Where it is required that answers to complaints are provided in writing, the Administrator issues a written letter to that effect. Where it becomes necessary to invite the complainant to the office for face-to-face meeting, a letter or verbal invitation is also issued and / or hand delivered to the complainant. The complaint register procedure outlined above has been one of the repetitive messages in almost all formal and informal consultations NGGL has had with the local residents using the techniques enumerated in section 4.3 above.

The purpose of the process is to ensure that complaints from local residents are appropriately addressed and complainants can see the outcome of the issue. All complaints are referred to the on-site

NGGL External Affairs Department, which is responsible for ensuring complainants are provided an explanation of the complaint process and an estimate of when to expect a response. Comments or requests for help are not considered complaints. From March 2004 to the end of July 2005, 517 complaints had been received.

Responses to complaints must be initiated within four weeks of being received. This may be a summary of the process needed to resolve the complaint and when it is likely to be implemented.

This complaint procedure described above and in the Table below is designed to accommodate all types of complaints. Complaints that are specific to the resettlement and compensation process are handled according to the procedure described in Section 5.5 of this document, Grievance Mechanism.

SUMMARY of the COMPLAINT PROCESS

STEP 1: Receive the complaint letter and put the date of receipt on it

STEP 2: Enter the complaint in a Complaint Database

STEP 3: Acknowledge receipt of each complaint in writing to each person. This is done as soon as complaints are received.

STEP 4: Where complaint relates to compensation dispute, notify the bank to withhold payments on all disputed compensation until parties resolve the dispute and notify NGGL accordingly

STEP 5: File all original complaint letters chronologically by month. All building and crop-related complaints are filed in separate files in chronological order

STEP 6: Complaint letters with specific issues are photocopied and forwarded to persons responsible to comment or resolve the case/issue e.g., CR/CD personnel, Legal Department, HR or others as the case may be

STEP 7: Update the database periodically to indicate those cases that have been resolved; those with or without embargo placed on them; and those pending at the court, Commission on Human Rights & Administrative Justice

STEP 8: All resolved cases are documented and filed in a separate file.

5.0 IMPLEMENTATION OF THE PCDP

5.1 AHAFO SOUTH PROJECT RESETTLEMENT PROGRAM

Public consultation has occurred in a variety of venues at the Ahafo South Project. The venue most familiar to the public is the resettlement planning process, which addresses resettlement and compensation issues.

Negotiations lie at the heart of stakeholder involvement in resettlement planning and implementation process, which has:

- Involved formation of the RNC, which is comprised of elected representatives from a broad cross-section of interested groups, including NGGL, government agencies, traditional authorities, representatives of Project-affected hamlets / villages, and other Project stakeholders;
- Entailed intensive, ongoing collaboration between stakeholder groups at RNC meetings, through which it has successfully secured the participation of all people affected by the Project in their own resettlement planning and implementation;
- Resulted in agreement of compensation principles, policies, procedures, and rates;
- Served to alleviate pressures, fears, and anxieties for Project-affected persons and NGGL; and
- Contributed to broad community support for the Project.

5.2 SELECTION OF RNC REPRESENTATIVES

In order to ensure resettlement compensation negotiations were free from coercion and based on informed consent, NGGL introduced the concept that stakeholder groups should elect individuals as their representatives. The goal of the RNC was to ensure each stakeholder group was fully informed of potential impacts the Project could have on economic, social, cultural, environmental, and/or physical resources. NGGL developed a selection process that assured stakeholders of a consultative and collaborative approach to conflict resolution free from coercion and based on informed consent.

The Project has a variety of stakeholders, people, organizations, and agencies whose behavior could positively or negatively influence the Project. In late 2003, NGGL requested groups to elect one or more representatives to participate on the RNC. Representatives were elected by acclamation during community gatherings and group meetings. NGGL did observe these meetings to ensure election of representatives are free, fair and transparent, and the election process had widespread public support. A list of stakeholders identified for the Project and a description of the categories of Project-affected persons considered are contained in **Attachment 2**. Not all stakeholder groups are represented on the RNC.

After selection and presentation of representatives, NGGL asked groups to confirm that their representatives were genuine advocates of the views of their members. To do so, it issued Authorization for Representation Forms, which members of each group signed and submitted to NGGL. These authorizations are contained in *Annex D* of the *Resettlement Action Plan* (pA 2005).

Stakeholder groups were informed that representatives could be replaced if they were not attending meetings regularly or accurately representing their group. In the case of government agencies, representatives were appointed from each of the stakeholder agencies involved in the negotiation and accepted by NGGL as members of the RNC. RNC members received training to improve communication skills with their respective constituents.

5.3 INFORMAL STAKEHOLDER CONSULTATIONS

NGGL's Resettlement Team pursued a vigorous community outreach strategy throughout the resettlement planning process, building trust and facilitating open information exchange among stakeholders. The Team engaged residents of communities on a daily basis, consulting on a broad range of issues with local leadership – traditional and political – and the general population. All NGGL and contractor personnel who work directly with local people are bilingual in Twi and English. Physical asset surveyors from planningAlliance interface regularly with community level Project stakeholders, which further enhances the proactive outreach strategy adopted by the Project. planningAlliance staff also participate on the Resettlement Negotiation Team. The 13-member OICI team, in their tripartite role as socio-economic surveyors, household case workers, and community development planners, are integral to community outreach efforts. Immersed in the community since late 2003, they enjoy exceptional stakeholder access and serve an important intermediary function between NGGL and the local community.

NGGL's decision to include all stakeholders in the resettlement planning process at an early stage through a comprehensive, multi-pronged consultation, community outreach and information disclosure program has helped pave the way for cooperative resettlement planning as well as developing broad community support.

5.4 FORMAL STAKEHOLDER CONSUTLATIONS

Since March 2003, NGGL has held 22 formal stakeholder consultation meetings regarding resettlement. These meetings have:

- Provided information about the Project to stakeholders;
- Responded to questions and record concerns;
- Notified stakeholders that a collaborative negotiation process would be undertaken to develop compensation policies, procedures, and rates and that they should elect representatives to participate on their behalf (prior to February 2004); and
- Created understanding and consensus around agreements reached by the RNC.

Consultation and information disclosure activities on resettlement and compensation issues involved a mix of formal RNC meetings and extensive informal dialogue with stakeholders by the Resettlement Negotiation Team as part of their regular visits to communities. Throughout negotiations, information was disclosed transparently and in a manner consistent with local cultural norms. A wide range of Project stakeholder expertise was brought to bear on issue resolution and overall resettlement planning, fostering a broad sense of ownership in the process. RNC meetings and major topics discussed between February 2004 and February 2005 are listed in **Table 2**.

TABLE 2
Resettlement Negotiation Committee Meetings
Ahafo South Project

Date	Topics Addressed
10 Feb. 2004	Project overview; NGGL guiding principles; Committee nominations and procedures; crop and building moratorium.
20 Feb.	Negotiation procedures; crop rates; crop and building moratorium.
02 Mar.	Crop rates; resettlement and relocation definitions; general discussion, including status of observers.
05 Mar.	Crop rates; potential allowances and community development programs; resettlement and relocation package details / distinctions.
12 Mar.	Alternative resettlement sites; potential resettlement house designs; KVIP latrine discussions; money management training and other community development initiatives; status of physical asset survey; dissemination of RNC discussions by people's representatives to constituents..
19 Mar.	Authorization of representatives; Kenyase Bypass Inspection Committee report; moratorium; money management training update; crop densities assumed in crop rates; milestones and agreed definitions and criteria.
26 Mar.	Nursery seedlings; authorization of representatives; alternative resettlement sites and house designs; mobilization allowance; temporary accommodation for resettlers; land rent/royalty payments; crop compensation payment schedule.
02 Apr.	Calculation of mobilization allowance; potential house design committee; transportation for seedlings; bypass resettlement; presentation from StratComm Africa; contracting procedures; discussion of concerns / complaints, including crop compensation delays.
13 Apr.	Resettlement/relocation preferences; moratorium-affected areas; validation of farm/crop status; Kenyase bypass status; general discussion, including compensation delays.
16 Apr.	Relocation package; feedback on preference for resettlement or relocation; progress on crop compensation payment.
23 Apr.	General matters, including breaches of building moratorium; review of relocation conditions/criteria for payment; update on Kenyase bypass resettlement/relocation; process/strategy for crop compensation payment; site safety; Site Selection Committee report; relocation contract form
30 Apr.	Special Farm Inspection Committee report; Site Selection Committee report on Kenyase bypass resettlement / relocation; NGGL resettlement philosophy, relocation contract agreement form; feedback on farms/crops status validation form; feedback from representatives on resettlement or relocation; education fund/scholarship schemes; process/strategy for crop compensation payment.
14 May	Feedback on relocation contract agreement; Newmont employment procedure; update on Kenyase bypass relocation and compensation; take area boundary demarcation and erection of "Stop Farm" signboards; proposal for disturbance allowance for resettled landlords; fate of local contractors.
28 May	Speculative house construction; Site Selection Committee report; transport for construction workers to and from work.
11 Jun.	Speculative structures and buildings; Site Selection Committee report; Project area boundary demarcation; resettlement package; validation exercise for skilled jobs postings; alternative livelihoods program.
09 Jul.	Speculative farming; feedback from General Youth Association meeting; Resettlement/Relocation Preference Form; final proposed resettlement package; tour of resettlement communities in the Western Region; status of crop compensation payments; small-scale mining activity alert; proposals for outstanding and unresolved issues.
23 Jul.	Proposed resettlement village infrastructure; persons not showing up for farm measurement; feedback on tour of resettlement communities; nominating representatives to sign negotiation minutes.
06 Aug.	Memorandum of understanding; feedback on the Site Selection Committee meetings; feedback on Kwakyekrom plot selection process at the Ntotoroso Resettlement Village; information on planning for Kwakyekrom school replacement; warranty for structural defects of buildings; video clip on community tour to mining areas.
20 Aug.	Feedback on site selection committee meetings; field trip with Nana Ama Bonsu; feedback on money management training; road safety; resettlement village landscaping.
03 Sept.	Feedback on abandoned houses in water storage facility; Site Selection Committee feedback; structure and crop survey and valuation demonstration; labor statistics on local labor pool; replacement farmland for resettlers.
01 Oct.	Blasting information and process; Site Selection Committee feedback; feedback on abandoned houses in water storage facility; feedback on Kwakyekrom school move.
22 Oct.	Site Selection Committee feedback; progress on resettlement sites; transition from RNC to Consultative Liaison Committee.

TABLE 2
Resettlement Negotiation Committee Meetings
Ahafo South Project

Date	Topics Addressed
30 Nov.	Revision of room size for resettlement housing.
09 Dec.	Revision of room size for resettlement housing.
14 Jan. 2005	Feedback on community development workshop; speculative building and farming in Project area; employment up-date.
21 Jan.	Up-grading Kenyase Health Centre; speculative building and farming in Project area; labor pool briefing; closing of Area E mop-up list.
28 Jan.	Feedback on Community Development Workshop, and the launch of the Livelihood Enhancement and Community Empowerment Program; speculative building and farming in Project area; employment update
04 Feb.	Moving Kwakyekrom community to Ntotoroso Resettlement Village; update of crop compensation at Environmental Control Dam #2 and Kenyase East; expansion in Project area required for new Environmental Control Dam and for Water Dam Spillway; employment update.
08 Feb.	Speculation in Environmental Control Dam #2 and Kenyase East.
18 Feb.	Livelihood Enhancement and Community Empowerment Program Launch; Feedback of Site Selection Committee Visit to Ntotoroso Resettlement Village; feedback on crop and building compensation at Environmental Control Dam #2 and Kenyase East; expansion in Project area for new environmental control dam; employment update

Source: pA 2005.

Minutes of individual meetings are available upon request.

5.5 GRIEVANCE MECHANISM

NGGL currently maintains an informal grievance mechanism for resettlement and compensation issues through the RNC, NGGL External Affairs Department, and the Resettlement Team. The public may express concerns and issues at the Project Office in Kenyase and/or to Resettlement Team and other outreach workers during normal daily activities. Informal grievances are treated as complaints and are resolved according to the Complaint Process previously described; grievances are more serious as they involve resettlement and compensation issues that could result in legal action and are addressed using the formal grievance process, as described in the Resettlement Action Plan (pA 2005).

NGGL established a formal grievance mechanism to address actual, measurable concerns relating to the resettlement and compensation process which is described as follows:

- First Order Mechanism: First order mechanism is a face-to-face discussion with appropriate NGGL personnel. Most grievances are heard and resolved in the presence of family members or other "witnesses." Agreement is normally reached or 'proved' without the complainant continuing into another forum.

  Except in complex cases where additional investigation or involvement of third parties is required NGGL responds to written grievances within thirty days. Responses generally include a settlement proposal.

  NGGL staff routinely seeks advice and, where appropriate, intervention of traditional authorities and members of the RNC, to assist in resolving disputes.

Grievances of a legal nature are forwarded to NGGL's Legal Department in Accra for redress. Responses/settlements are coordinated through the on-site management team.

- Second Order Mechanism: The Resettlement Negotiation Committee will be restructured as the Consultative Liaison Committee with broadened stakeholder participation. The Committee, to convene on a regular basis (i.e. monthly), will provide a forum at which individual and community grievances may be raised, discussed, and resolved with Company officials.

- Court Action: Ghanaian citizens and legal entities have access to court recourse in conformance with applicable laws.

Newmont's December 2003 Investment Agreement with the Government of Ghana details a compensation and dispute resolution protocol. Paragraph 18.1c states:

> *"(Newmont), the Government, and any owner or other lawful occupier of affected land, in addition to any other right or remedy granted by Law, shall each have the right to refer any disputed matter relating to compensation under this Agreement or under any Law for resolution by binding arbitration to be conducted in Ghana by not more than three arbitrators agreed upon by the parties to such arbitration or, failing agreement, then jointly chosen by the Minister and the principal officer of the Chamber of Mines of Ghana. The arbitrators shall be Persons trained in the common law tradition, but need not be citizens of Ghana. Their decision shall be based upon the laws of Ghana and the terms of this Agreement, shall be final and binding, and shall not be subject to appeal to any court except on the grounds of fraud or dishonesty by the arbitrators, or that they have decided matters beyond the scope of the authority granted in this Agreement. Any award made to the lawful occupier of land shall fully offset any claim asserted by the owner of the affected land against (Newmont). Any award made to an owner of land shall foreclose any claim against (Newmont) on the part of a lawful occupier of that same land."*

6.0 ONGOING PUBLIC CONSULTATION AND COMMUNITY RELATIONS

6.1 FUTURE CONSULTATION ACTIVITIES

NGGL believes that public consultation is an ongoing process and plans to continue the stakeholder efforts throughout the construction, operations, and closure phases of the Project. As the Project progresses through its phases, Newmont's message will change to reflect the issues and concerns of each phase. The pre-construction/construction public consultation and disclosure focused on imparting key messages about Newmont and their approach to mining, social investment and the specific Project. Future key messages will contain more information about employment and training, safety, the LEEP program, environmental monitoring and health awareness.

NGGL is committed to maintaining its ongoing program and will:

- Maintain regular communications with all stakeholders, including the media per Newmont's Communication Plan;
- Provide local residents with regular information on the progress of work and related implications;
- Provide local residents with information on employment and training opportunities;
- Maintain awareness of safety issues around transport and road alignments;
- Maintain awareness of malaria and HIV/AIDS policies and programs available to local residents through the HIV/AIDS coordinator;
- Maintain constructive relationships between local residents and NGGL Project development team by continuing regular information meetings and informal interactions;
- Identify and respond to new stakeholder issues and concerns by reviewing the complaints file and listening to stakeholders;
- Monitor implementation of mitigations measures for resettlement and compensation programs;
- Monitor implementation and effectiveness of mitigation measures such as LEEP, community development plan, and other social investment programs;
- Monitor community attitudes toward NGGL and the Project;
- Ensure complaints are addressed according to the established process;
- Ensure gender sensitive and culturally appropriate processes are used in communication and interactions;

- Monitor and evaluate the effectiveness of public involvement techniques according to the 5 Star System criteria; and

- Employ independent social assessors to evaluate the public consultation and disclosure process, as well as the mining operations, LEEP, resettlement activities, community development plan, and other social investment programs.

NGGL's External Affairs Department is responsible for implementing the PCDP, with assistance from the StratComm Africa Communication Officer, OICI Development Officers, planningAlliance team and the Resettlement Project Manager. The Corporate Vice-President of External Affairs and the Director of Community Relations and Social Development is responsible for communicating with international stakeholders and NGOs.

Future consultation activities envisioned for the Ahafo South Project by the NGGL External Affairs staff include a series of meetings in settlements and hamlets to present:

- Project updates;
- Opportunities to discuss / address Community concerns;
- Information about General Project operations;
- Relevant mining laws;
- Information on monitoring and management of Project impacts;
- Progress reports on resettlement and compensation;
- Status of and ongoing development of LEEP; and
- Information on and discussion about Community Investment initiatives.

6.2 CONSULTATIVE LIAISON COMMITTEE

Upon conclusion of its mandate in the coming months, the Resettlement Negotiation Committee will be concluding their work. A Consultative Liaison Committee (CLC) will then be formed with broader stakeholder representation to provide a structured and sustainable consultation mechanism for the life of the Project. The CLC will be extended to cover all communities in the Study area and will be responsible for addressing all issues that may arise.

Table 3. NGGL Commitments to Ongoing Consultation and Community Relations

Topic	Frequency (Note 1)
Consultations	
Updates to information boards re: employment, training, safety issues	Weekly (as appropriate)
Meetings with Paramount and Stool chiefs	Monthly
Meeting with RNC/CLC, including representatives of the Resettlement villages	Monthly
Consultation with identified vulnerable peoples	Monthly
Community meetings re: : General project operations; progress report on resettlement and compensation; status of LEEP, information on community development planning	Quarterly

Community meetings re: results of external assessments	Annually, at the close out of the assessment
Dissemination of Information	
Updates to public notice boards	Weekly
5 Star Community Relations Annual Assessment Report	Annual (Note 2)
Ahafo Now and Beyond Report	Annual (Note 2)
Regular visits to each community, asking for the *gong gong* to call a community meeting	Monthly
Committees	
Establishment of the CLC	December 2005
Propose establishment of Women's Consultation Committee	October, 2005
Complaint Process	
Audit of complaint log to ensure effectiveness of process, screen for outstanding issues, monitor reoccurring issues.	Monthly

Note 1: Frequencies may vary depending on stakeholder interest.
Note 2: Initial reports will be prepared the year following operation initiation.

6.3 CONSULTATION AND DISCLOSURE OF PROJECT DOCUMENTS

NGGL will initiate a specific public consultation and disclosure process for project related documents in compliance with International Finance Corporation (IFC) requirements. The following consultation and disclosure activities are in addition to those previously documented in the PCDP which include community outreach, participation and engagement activities with traditional authorities, community members, institutions and government agencies. The following specifically details consultation and disclosure activities which will be conducted during a period of 120 days from initial public notifications.

Documents for Disclosure

The following documents will be disclosed at the initiation of the 120 day consultation and disclosure period. These documents are considered to be primary project documents which form the basis for project evaluation from both a social and environmental perspective.

Primary Project Related Documents

- Document No. 1: Resettlement Action Plan-Ahafo South Project, Planning Alliance, 2005.
- Document No. 2: Environmental Social Impact Assessment-Ahafo South Project, Maxim Technologies Inc., 2005.
- Document No. 3: Public Consultation and Disclosure Plan-Ahafo South Project, Maxim Technologies Inc., 2005.
- Document No. 4: Newmont Ghana Gold LTD., Ahafo South Project, Independent Assessment of Resettlement Implementation, Frederic Giovannetti, 2005.

Additionally, NGGL will disclose secondary project related documents which are considered of interest to local stakeholders related to both current and future activities of NGGL in the Ahafo South Project area. NGGL's intent is to demonstrate interest in transparency, stakeholder engagement, and feedback related to the companies activities.

Secondary Project Related Documents

- Document No. 5: Guide to Land Access and Compensation, Newmont Ghana Gold LTD., Ahafo Project Area, 2005
- Document No. 6: Social and Community Development Commitment, Newmont Ghana Gold LTD., 2005.
- Document No. 7: Summary, Environmental Social Impact Assessment-Ahafo South Project, Maxim Technologies Inc., 2005 (translation into *Twi*).
- Document No. 8: Summary, Resettlement Action Plan-Ahafo South Project, Planning Alliance, 2005. (translation into *Twi*)

Consultation and Disclosure Implementation

The following details the consultation and disclosure implementation plan indicating the various activities which will occur during the 120 day period (16 weeks). NGGL will maintain an open door policy at both Accra and Kenyase offices to meet with interested stakeholders and community members to receive and document comments and respond to questions or information inquiries.

Any stakeholder or member of the public who has a question concerning the above mentioned documents being disclosed should please contact the following personnel for information:

Newmont Mining Corporation
Director of Social Responsibility and Sustainable Development
Colorado, USA Telephone + (1) 303 – 837 – 5215

Newmont Ghana Gold Limited
Director External Affairs – Europe and Africa
Ghana Telephone + (233) 21 – 7011852
Or by visiting Newmont Ghana Gold limited Accra Office at 825 / 26 Lagos Avenue, East Legon, Accra, Ghana

Newmont Ghana Gold Limited
Communication Manager
Ghana Telephone + (233) 21 – 7011852 Extension 50044
Or by visiting Newmont Ghana Gold limited Accra Office at 825 / 26 Lagos Avenue, East Legon, Accra, Ghana

Newmont Ghana Gold Limited
External Affairs Manager
Ahafo Project
Ghana Telephone + (233) 21 – 7011852 Extension 51022
Or by visiting Newmont Ghana Gold Limited office in Kenyase No. 2, Asutifi District of Brong Ahafo District.

Newmont Ghana Gold Limited
StratComm Africa Senior Communications Officer
Ahafo Project
Ghana Telephone + (233) 21 – 7011852 Extension 51056
Or by visiting Newmont Ghana Gold Limited office in Kenyase No. 2, Asutifi District of Brong Ahafo District.

A website has been developed to provide information on Newmont projects being developed in Ghana : http://www.newmont.com/en/operations/projectpipeline/ghana/index.asp
The focus of the website will be environmental and socio-economic information on potential impacts and mitigations and allow visitors to review environmental documents, resettlement planning documents, and livelihood enhancement and community development plans. The website will include the ability to interactively pose questions and record comments on the Project. The principal audience for the Newmont Ghana Website is expected to be the media and national and international NGOs.

Comments and / or questions may be forwarded to: NGGL.AhafoComments@Newmont.com.

Table 4. Consultation and Disclosure Implementation Schedule-NGGL Ahafo South Project.

Disclosure Objective	Activity	Location	Time Period
Initial Disclosure	Press Notice/Radio Announcement	Project Area	Week 1
	Press Notice	Accra, Ghana	Week 1
	Web Site Release of Primary Documents	Newmont Mining Corporation Web Site	Week 1-16
	Info Shop Release of Primary Documents	World Bank Group Web Site	Week 1-16
	Hard Copies Primary Project Related Documents formally presented to 5 Traditional Authorities with presentation and brief explanation of document content to be done in English and *Twi* language	NGGL Kenyase Office Traditional Authorities - Kenyase 1 and 2 - Ntotoroso - Gyedu - Wamahinso Asutifi District Assembly	Week 1-16
	Hard Copies Primary Project Related Documents	NGGL Accra Office	Week 1-16
	RAP to Land Valuation Board		Week 1
Broad Disclosure	Hard Copies Primary Project Related Documents	Town and Country Planning - National Office - Regional Office - District Office Brong Ahafo Regional Coordinating Council Office	Week 2-16
	Public Information Sessions presented in English	Kenyase 1 and 2 Ntotoroso, Gyedu, Wamahinso, Resettlement sites of Ntotroso and Kenyase	Week 2 and 3
	Hard Copies Secondary Project Related Documents formally presented with presentation and brief explanation of document content to be done in English and *Twi* language	Traditional Authorities - Kenyase 1 and 2 - Ntotoroso - Gyedu - Wamahinso Town and Country Planning - National Office - Regional Office - District Office	Week 5-16

Table 4. Consultation and Disclosure Implementation Schedule-NGGL Ahafo South Project.

Disclosure Objective	Activity	Location	Time Period
		Asutifi District Assembly NGGL Kenyase Office NGGL Office, Accra Land Valuation Board Brong Ahafo Regional Coordinating Council Office	
	Web Site Release of Secondary Documents	Newmont Mining Corporation Web Site http://www.newmont.com/en/operations/projectpipeline/ghana/index.asp	Week 5-16
	Info Shop Release of Secondary Documents	World Bank Group Web Site	Week 5-16
	ESIA Summary (*Twi*)	Traditional Authorities - Kenyase I and 2 - Ntotoroso - Gyedu - Wamahinso Town and Country Planning - National Office - Regional Office - District Office Asutifi District Assembly NGGL Kenyase Office NGGL Office, Accra Brong Ahafo Regional Coordinating Council Office	Week 3-16
	RAP Summary (*Twi)*	Traditional Authorities - Kenyase I and 2 - Ntotoroso - Gyedu - Wamahinso Town and Country Planning - National Office - Regional Office	Week 3-16

Table 4. Consultation and Disclosure Implementation Schedule-NGGL Ahafo South Project.

Disclosure Objective	Activity	Location	Time Period
		Asutifi District Assembly NGGL Kenyase Office NGGL Office, Accra Brong Ahafo Regional Coordinating Council Office	
Community & Institutional-Level Engagement	NGGL Resource person available one day per week in each community/institution location. Verbal questions will be recorded and responses provided the following week. Responses provided in English and *Twi* as necessary.	Traditional Authorities - Kenyase 1 and 2 - Ntotoroso - Gyedu - Wamahinso Town and Country Planning - Regional Office - District Office Asutifi District Assembly Brong Ahafo Regional Coordinating Council Office	Week 2-8 (Note 1)
	NGGL Resource person available one day per week in the NGGL Kenyase Office Verbal questions will be recorded and answered immediately. Questions not answered immediately will be rescheduled at an agreed upon time. Responses provided in English and *Twi* as necessary.	NGGL Kenyase Office	Week 2-8 (Note 2)

Note 1: May be extended as necessary depending upon community/institution interest.

Note 2: Availability may be increased from one day per week up to three day per week depending upon interest.

7.0 REFERENCES

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ATTACHMENT 1

Summary of Previous Public Outreach Efforts

ATTACHMENT 2

Identification of Stakeholders

ATTACHMENT 2

Identification of Stakeholders

The Ahafo South Project has a wide variety of stakeholders, people, agencies, or organizations that could be directly or indirectly affected (positively or negatively) by the Project or that could influence the Project (positively or negatively). Not all stakeholders are represented in each activity; consultation activities are tailored to specific needs and interests of respective stakeholders.

Project Proponents

Newmont Mining Corporation
Newmont Ghana Gold Ltd.

Government of Ghana

Ministry of Agriculture

Ministry of Environment, Science and Technology
- Environmental Protection Agency
- Town & Country Planning

Ministry of Lands, Forestry, and Mines
- Lands Commission
- Land Valuation Board
  - Stool Lands Administration
- Minerals Commission
- Mines Department

Ministry of Finance and Economic Planning
- National Development Planning Commission
- Ministry of Local Government and Rural Development
- Ministry of Manpower Development & Social Welfare
- Ministry of Health
- Ghana Health Service

University of Ghana

Regional Government of Brong-Ahafo

Office of the Minister for Brong-Ahafo
- Regional Coordinating Council
- Regional Ministry of Energy and Mines
  - Minerals Commission
  - Mines Department
- Regional Ministry of Environment, Science & Technology

Environmental Protection Agency
Town and Country Planning
Regional Ministry of Lands and Forests
Lands Commission
Land Valuation Board
Stool Lands Administration
Regional Ministry of Local Government and Rural Development
Regional Ministry of Manpower Development & Social Welfare
Regional Ministry of Health
Ghana Health Service

District Government of Asutifi

Asutifi District Assembly
District Administration Department
Ghana Education Service
District Health Department
Agriculture Department
Forestry Department
Social Welfare and Community Development Department
Physical Planning Department
Works Department
Commission for Human Right and Administrative Justice
Industry and Trade Department

Traditional Leadership in Study Area

Paramouncy of Kenyase I
Paramouncy of Kenyase II
Divisional Council of Ntotoroso
Wamahinso Stool
Gyedu Stool
Kwakyekrom Headmen
Kodiwohia Headmen
Dokyikrom Headmen

Social Groups and Associations

Kenyase 1 Youth Association
Kenyase 2 Youth Association
Ntotoroso Youth Association
Wamahinso Youth Association
Landlord Farmers' Association
Caretaker Farmers' Association

Settlements

Kenyase I

Kenyase 2
Ntotroso
Gyedu
Wamahinso

Hamlets

Kwakyekrom
Dokyikrom
Manushed
Dormaa
Jamankrom
Kkusikrom
Soussakrom
Kodiwohia

Persons Directly or Indirectly Affected by Resettlement or Relocation Efforts

1. People who have custodial rights to the land, or who own other assets that would be affected by the Ahafo Project including chiefs, traditional and district authorities, house and property owners/users
2. People who don't own lands but are using agricultural lands that would be affected by the project, including settler/tenant farmers
3. People living in potential resettlement sites (i.e., host communities)
4. People who own culturally significant sites and tourist destinations that would be impacted by the Project, including fetish priests and priestesses, tourist operators; and
5. Highly and likely disadvantaged groups, including vulnerable populations of the poor and women.

Non-governmental Organizations

Opportunities Industrialization Centers International, Ghana
Conservation International
Friends of the Earth
Friends of the Rivers
Third World Network
Ghana Wildlife Society
Action Aid
Friends of the Vulnerable
League of Environmental Journalists
ISODEC - Integrated Social Development Centre
Friends of the Earth Ghana
The Ghana Wildlife Society
World Vision Ghana
The Living Earth Foundation
WACAM – Wassa Association of Communities Affected by Mining
Conservation International Ghana
Center for Active Development
Action Aid

Center for Public Interest Law
Guardians of the Earth
Network of Non-Governmental Organizations

International Non-governmental Organizations

Oxfam America
International Alert
Conservation International
Fund for Peace
Transparency International
Collaborative Development Action
Global Witness
EarthWorks

Media

ATTACHMENT 3

INDICATIONS OF BROAD COMMUNITY SUPPORT

.

ATTACHMENT 3

DATE	TYPE OF FILE	SUMMARY OF COMMUNITY SUPPORT
15-02-05	❖ Speech by Krontihene of K-2 during LEEP Launch.	➢ I express confidence in the transparent deliberations that has eased people's anxiety and increased hope for fruitful relationship between Newmont and the Communities. ➢ I see the LEEP as the beginning of Newont Social Development agenda which Traditional Leaders have always asked for. ➢ Now people are benefiting directly or indirectly from the mining project and I advise the youth to follow normal procedures in getting direct employment with Newmont. ➢ I confirm our total support for the LEEP to enhance the livelihood of the people.
25-08-04	❖ Speech by the Youth of **Ahafo South** on the visit of the Chief Executive of Newmont – Wayne Murdy.	➢ We the Youth of Ahafo together with the Nananom and other stakeholders are proud to have the first ever and the largest mining company coming to operate in Brong Ahafo Region. ➢ We present this gift to you Mr. Wayne for having fulfilled your promise to build the Ahafo Project during your first visit to Ghana to sign the Investment Agreement with Ghana Government
25-08-04	❖ Speech by the Youth of **Ahafo North** on the visit of the Chief Executive of Newmont – Wayne Murdy.	➢ I commend the Government for giving NGGL the assistance to enable it start operations, which has created job opportunities for the youth in Operational Areas. ➢ In fact the relationship between the company and the communities has been very cordial and decisions are taken in consultation with chiefs and the youth who have attended talks, seminars and workshops to be equipped with NGGL operations and future plans for communities. ➢ NGGL has operated for short time in this area but its achievements in the communities so far show that if the company is allowed to operate for a longer period, benefits to communities will be very enormous. ➢ We the youth have resolved only to dialogue in all our dealings with the company.
06-06-05	❖ An invitation to prospect for Gold.	➢ We the chief and elders of Sefwi Achiachen have the pleasure to invite you to come and prospect for and work in our area abound in gold.
25-08-04	❖ Certificate of Recognition	➢ Certificate presented to NGGL by the Youth Associations of Ntotoroso/Gyedu, Kenyase 1, and Kenyase 2 in recognition of the cordial relationship between the company and the Youth and resolved to consolidate that relationship. ➢ Nananom and the Royals say thank you and may the

		God and the ancestors bless the company.
26-05-05	❖ Letter of Appreciation from Kenyase No.1 Traditional Council.	➢ One objective of the Association is to promote healthy relations with Newmont by assuring the company the necessary peace to carry out their operations.
20-01-05	❖ ***Kenyase No. 1*** Youth Development Association Constitution	➢ One objective of the Association is to promote healthy relations with Newmont by assuring the company the necessary peace to carry out their operations.
04-03-05	❖ ***Kenyase No.2*** Youth Development Association Constitution.	➢ One objective of the Association is to promote healthy relations with Newmont by assuring the company the necessary peace to carry out their operations.
04-03-05	❖ ***Gyedu*** Youth Development Association Constitution.	➢ One objective of the Association is to promote healthy relations with Newmont by assuring the company the necessary peace to carry out their operations.
04-03-05	❖ ***Ntotoroso*** Youth Development Association Constitution.	➢ One objective of the Association is to promote healthy relations with Newmont by assuring the company the necessary peace to carry out their operations.
22-05-05	❖ ***Wamahinso*** Youth Development Association Constitution.	➢ NGGL application for gold prospecting on Abesim Stool Land should be granted and may God support all efforts by the company to achieve its objective.
01-12-03	❖ ***Dormaa*** Traditional Council's letter to the DCE of Sunyani copied Newmont	➢ We the people of ***Kenyase No.2*** have democratically elected 3 people to represent us on Newmont's Crop Rate Review Committee.
12-04-05	❖ Authorization for Community Representation in Committee.	➢ We the people of ***Kenyase No.1*** have democratically elected 4 people to represent us on Newmont's Crop Rate Review Committee.
April 05	❖ Authorization for Community Representation in Committee.	➢ We the people of ***Obengkrom*** have democratically elected 2 people to represent us on Newmont's Crop Rate Review Committee.
14-04-05	❖ Authorization for Community Representation in Committee.	➢ We the people of ***Kodiwohia*** have democratically elected 1 person to represent us on Newmont's Crop Rate Review Committee.
April 05	❖ Authorization for Community Representation in Committee.	➢ We the people of ***Gyedu*** have democratically elected 2 people to represent us on Newmont's Crop Rate Review Committee.
10-04-05	❖ Authorization for Community Representation in Committee.	➢ We the people of ***Dokyikrom*** have democratically elected 1 person to represent us on Newmont's Crop Rate Review Committee. ➢ We the people of ***Terchere*** have democratically elected 3 people to represent us on Newmont's Crop Rate Review Committee.

April 05	❖ Authorization for Community Representation in Committee.	➢ We the people of ***Yamfo*** have democratically elected 5 people to represent us on Newmont's Crop Rate Review Committee.
April 05	❖ Authorization for Community Representation in Committee.	➢ We the people of ***Susuanso*** have democratically elected 2 people to represent us on Newmont's Crop Rate Review Committee.
April 05	❖ Authorization for Community Representation in Committee.	➢ We the people of ***Donkorkrom*** have democratically elected 1 person to represent us on Newmont's Crop Rate Review Committee.
April 05	❖ Authorization for Community Representation in Committee.	➢ We the people of ***Ntotoroso*** have democratically elected 5 people to represent us on Newmont's Crop Rate Review Committee.
April 05	❖ Authorization for Community Representation in Committee.	➢ We the people of ***Bisi*** have democratically elected 1 person to represent us on Newmont's Crop Rate Review Committee.
April 05	❖ Authorization for Community Representation in Committee.	➢ We the people of ***Subinso*** have democratically elected 1 person to represent us on Newmont's Crop Rate Review Committee.
05-04-05	❖ Authorization for Community Representation in Committee.	➢ We the people of ***Afirisipa*** have democratically elected 1 person to represent us on Newmont's Crop Rate Review Committee.
05-04-05	❖ Authorization for Community Representation in Committee.	➢ It is the wish of Nananom that the cordial relationship should remain between Kenyase No.1 Traditional Council and NGGL and may God bless the Company.
05-04-05	❖ ***Kenyase No. 1*** Traditional Council's second Letter of Appreciation.	➢ We appreciate the smooth transfer of Kwakyekrom L/A Primary School to Ntotoroso St. Lawrence L/A Primary by your outfit and your plans to put up modern structures for the school.
07-06-05	❖ A letter from **Ghana Education Service** to NGGL.	➢ Community members were happy with the manner the President Special Initiative (PSI) on Oil Palm as against mining activities were explained to their understanding and accepted to hold on, on PSI to make way for mining activities.
23-09-04	❖ Report on PSI/NGGL/ ***TanoDistrict Assembly*** meetings with communities in Ahafo North Concession.	➢ It is our prayer that the almighty God should bless and expand your activities in the Ahafo Sub-Region. ➢ The rates of compensations being paid by NGGL in 2004/2005 was very attractive to encourage farmers to make farms in the areas earmarked for mine construction.
12-04-05	❖ Letter of Appreciation from **National Service Secretariat** of Asunafo District to NGGL. ❖ Press Statement by **the Asutifi**	➢ Farmers were clearly aware of upcoming construction of the mine as sufficient information and communication through durbars and many other means have been done.

01-08-05 14-07-05 25-05-05 13-07-05	**District Director of Agriculture** on Post Moratorium cropping patterns and Food Production in Asutifi District. ❖ Letter of Appreciation from a Crop Rate Review Committee member to External Affairs Manager. ❖ Report on NGGL Community members' visit to other comparable Mining Operations in Ghana.	➢ I am grateful to NGGL for what they have done throughout the days of our meetings. ➢ We have through this period benefited a lot by acquiring knowledge. ➢ There is something beneficial I have observed in you and your men and that is great sense of maturity. ➢ The External Affairs Department has great men, who cannot be compared to any other mining company in Ghana. ➢ The trip offered the visitors food for thought and an insight to mining activities, which would go a long way to strengthen NGGL/Community relations. Overall, the perception of the Newmont visitors was that NGGL would bring more blessings than curses, as initially anticipated.

NOTE: These are extracts from hard copy files, which are available at NGGL Ahafo External Affairs Department

APPENDIX F

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APPENDIX G

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