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Guinea Infrastructure

Technical Needs Assessment

Final Report

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LIST OF ACRONYMS & ABBREVIATIONS

ADS	Automated Directives System
AfDB	African Development Bank
AGUIP	Agence Guineenne de Promotion de L'Emploi
AWAC	Alcoa Worldwide Alumina Company (60% Alcoa and 40% Alumina Ltd.)
BAC	Baccalaureat
BEP	Brevet d'Etudes Professionnelles
BEPC	Brevet d'Etudes du Premier Cycle
BTS	Brevet de Technicien Superieur
CBG	Cie des Bauxites de Guinée
CCC	Consolidated Contractors Company
CFP	Centre de Formation Professionnel
CNSS	Caisse Nationale de la Securite Sociale
EFA	Education for All
EGAT	Economic Growth, Agriculture and Trade
ENAM	Studes, Ecole Nationale des Arts et Metiers
EPC	Engineering, Procurement, and Construction
EU	European Union
FDI	Foreign Direct Investment
FS	Fragile State
FSA	Fragile State Assessment
HSE	Health, Safety and Environnent
GA	Global Alumina
GAC	Global Alumina Corporation
GDA	Global Development Alliance
GDP	Gross Domestic Product
GOG	Government of Guinea
I&E	Office of Infrastructure and Engineering
ISMGB	Institut Superieur des Mines et de Geologie de Boké
MDG	Millennium Development Goals
MOU	Memorandum of Understanding
MT	Metric Tonnes
NGO	Non-government Organization
ONFPP	Office National de Formation et de Perfectionnement Professionnels
PAUS	Project d'Usine d'Alumine de Sangarédi
PEPT	Programme d' Education pour Tous
PPP	Public-Private Partnership
SME	Small and Medium Enterprises
SO	Strategic Objective
TNA	Technical Needs Assessment
TPA	Tonnes per annum
USAID	United States Agency for International Development

Executive Summary

Guinea is richly endowed with minerals, possessing an estimated one-third of the world's proven reserves of bauxite and ample other mineral and natural resources. Despite this, it is amongst the poorest countries on earth with high unemployment, low literacy, and 40 percent of the population living below the poverty line. Hopes that its wealth in bauxite would improve the living conditions of average Guineans have failed to materialize. Citizens continue to lack basic services, such as electricity, clean water, and jobs. The process of "Africanization" (whereby expatriates are replaced by local Guineans) of jobs and management positions within the country's private sector has been held back by insufficient qualified personnel as well as difficulties in identifying those available on the labor market. The unavailability of local workers is mainly due to the inability of Guinean schools to provide training, which responds to employers' needs and insufficient numbers of students graduating. Presently the schools are producing just enough graduates to meet needs.

Guinea is a moderate Muslim country that maintains a moderate, secular orientation in its foreign policy. Most of its neighbors, however, have had serious levels of instability or conflict over the past several years; and as a result, Guinea has a significant refugee population, which could contribute to future instability. Guinea has been declared a "Fragile State" by the U.S. Government because it exhibits some of the four factors that are considered as prime sources of conflict. These four factors include (1) ethnic heterogeneity; (2) a long-running economic decline coupled with widespread and growing unemployment; (3) a youth bulge burdening the economy with large numbers of young adults who have few if any employment prospects; and (4) "lootable commodities" in the form of gold and diamonds, and abundant supplies of small arms. At this time, Guinea is a stable country, however, USAID/Guinea must therefore focus its immediate support to the country on activities that rapidly promote greater stability, security, reform, economic growth, and institutional capacity within the country. This report provides a phased program of labor market development initiatives that will promote the GOG and its citizens a greater role in the proposed expansion of bauxite industry and, in particular, downstream developments.

The Opportunity

Several mining sector investment projects are being proposed for Guinea during the next several years; including several proposed downstream projects within the bauxite industry. The proposed projects have the potential of creating significant short, medium and long term employment for Guineans and of retaining more of the economic benefits (directly and indirectly) within the country. In 2002, representatives of Global Alumina (GA), a U.S. company from New York, contacted the U.S. Ambassador and the USAID Mission Director seeking their support and possible participation in their plans to implement a large-scale training program to support construction of a \$ 2.2 billion alumina refinery project between Boké and Sangaredi. GA's preliminary estimate of the employment and monetary impact of its project in Guinea is significant. For example, GA anticipates spending over \$100 million on the purchase of Guinean products during the construction period of the various project components. In addition, it estimates that around 7500 - 8000 direct -- and significant additional indirect -- jobs could be created during the construction and operation of the facility.

GA's approach to this project is unique in that the company has made a very strong commitment to training and utilizing Guinean labor. GA recognizes that insufficient numbers of skilled Guineans are available for the project. Plans have therefore been made to train directly and through the funding of existing educational institutes Guinean laborers in skills that are needed by the project. Subsequently, through discussions, GA requested USAID assistance in training activities with the aim of increasing the local labor pool of trained Guineans that it could utilize for the construction of its refinery and associated projects (power plant, mine, port site, rail spurs, roadwork, reservoir, and operator's village). As a result, USAID decided to implement this assessment.

USAID/Guinea has recognized that GA's project and commitment to use of local labor offers a unique opportunity to promote the sustainable development of Guinea's socio-economic climate by maximizing the creation of Guinean jobs, creating saleable skills and contributing revenues to the country's economy. Further, the project offers an important opportunity for USAID to leverage its funds by supporting a private sector participant willing to invest in education directly itself. Consequently, the Mission sought the

assistance of the USAID/EGAT Energy Team in Washington, and the office agreed to fund a team of expert consultants (USAID Consultant Team) to conduct a technical needs assessment (TNA) under its Energy II IQC program. This assessment has looked at the possible and most effective roles that the Mission could take in supporting the training needs of the bauxite/ alumina industry in Guinea.

Although several mining sector projects are being proposed in Guinea the most advanced is the GA project which, because of the timing, size and complexity was chosen by the USAID Consultant Team as the benchmark against which to assess the current and future training needs of large-scale mining sector projects in Guinea.

Local Availability of Skilled Labor

Overall, the exact labor situation in Guinea is unclear because little documentation of available labor and labor skills is available within the country. No credible numbers are available at government or regional level on the labor market. As regards skills and training available the consultants identified various areas where the Guinean vocational and university training system failed to meet the hiring needs of employers in the country because of three main weaknesses:

- **Supply:** The Guinean system is unable to produce the volume of qualified workers to meet the hiring demands of an expanded nationally based downstream bauxite industry including GA's proposed project because of three problems with vocational schools: (1) *course duration:* vocational school courses are long (3 years on average), and this reduces the school's ability to quickly train students in the volumes that are necessary to meet the needs of industry, (2) *limited student spaces:* the existing education system is producing a larger number of high school graduates than the country's vocational schools and universities are able to absorb and these students are expected to fill positions available at CBG and Fria; and (3) *entrance requirements:* few courses are available to students who have diplomas below the BAC I level causing an imbalance in the availability of unskilled, semi-skilled, and qualified employees.
- **Quality:** The Guinean training system is unable to graduate students with skills that meet the exact needs of companies hiring within the country. The first problem is that courses do not meet industry needs. Guinean industry needs more graduates with more specific skills. The second problem is that courses do not meet international standards, where for example, students are not taught welding skills that meet the high standards required in the construction of complex projects.
- **Inefficiency:** The interaction and communication between all the participants in the Guinean educational system is insufficient and sometimes non-existent. This is reflected by (1) the lack of coordination between the key ministries, universities, and vocational institutions, and (2) the fact that many potential students are "being lost" between the various education levels.

Training Plans/ Needs of Project

To meet the urgent needs of the bauxite industry discussions have been held with the **Minister of Vocational Training** and relevant institutions nationally to investigate the possible upgrade and utilization of two Guinean vocational schools -- Boké CFP and ENAM -- for use in training Guineans for the first of several refinery project. GA may extract limited benefit from the schools' longer-term programs, they need to immediately train and hire heavy machinery operators, welding operators, pipe fitters, and civil works employees in periods less than 2-3 months. Over the life of the project the skill required will expand to include pipe fitters, trades helpers, welders, and mechanical heavy equipment and crane operators -- in addition to needing significantly more truck drivers, laborers, and carpenters.

Any program will need training using a combination of (1) class room training, (2) workshops and practical training, and (3) on-the-job training (including apprenticeships). It is expected that the training program will last throughout the first few years of the construction process, with smaller activities continuing throughout the construction phase. It also anticipates that standard training programs for trade skill areas will cater for two different types of hired employees. It plans to conduct:

- **Upgrading Training Programs:** that will be provided for those persons who have past experience in their field, and this training will include up-to-date relevant/approved qualification/certification.
- **Basic Training Programs:** that will be provided to those candidates who have minimal or no previous experience in a trade.

Recommendations

An appropriate strategy for modernizing the employment and training system of Guinea can be built on the hiring and labor skill requirements of the mining industry and GA refinery project. The TNA Team also feels that a phased approach for developing a strategy and program to develop the skills of the Guinean work force should be funneled through existing governmental and vocational structures within the country to ensure that the opportunities offered by GA and the bauxite industry are not lost.

1. Phase I: The Strengthening of Vocational Training System (1-5 months)

The Team recommends that efforts to strengthen Guinea's vocational training system should focus on the strengthening of the curriculum and improving the training equipment located at CFP – Boké. The school's strategic location amongst major project sites makes it advantageous to workers and to the needs of employers such as GA's. The school requires significant strengthening to be able to respond to the graduate volume requirements and quality of skills demanded by employers. During Phase I, the Team recommends that, in order to better leverage USAID, assistance efforts should be concentrated on:

- **Improving the vocational training facilities at Boké** with respect to: (1) increasing the number of classrooms since more teaching space is required to handle an increased number of students, (2) improving the equipment used for training and include more modern welding facilities, machinery labs, processing laboratories, and (3) providing reliable electric generating equipment since the school is often without electricity for several days and effective training cannot be conducted without electricity.
- **Reviewing and improving the curricula for training skilled students.** At present, Guinean school's curricula are typically based on a three year training schedule, which would thus be capable of producing only a small percentage of the skilled workers needed by Guinea's mining industry to construct and operate new projects. Thus, Boké and other schools need to develop new curricula – with Guinean industry's assistance where possible– that is shorter and more specific to produce a higher volume of qualified workers with a range of expertise (semi-skilled and qualified workers). Suggested activities supporting this efforts must include: (1) improving specific courses to meet international standards which will require teachers being brought up to date on those same standards, (2) developing health and safety courses in close collaboration with GA, CBG, and the Ministry of Health, (3) training of trainers by industry where engineers and staff from industry are engaged to train trainers in the skills which their companies will be needing, and (4) developing a worker evaluation program.

Once new trainers have been trained they will be able to act as supplementary teachers at other institutions potentially focusing specific segments of the labor market (unskilled, semi-skilled and qualified workers). Examples of Guinean educational programs and their educational specialties that could be utilized and expanded include:

- ENAM – short-term course development; continuation of training of trainers.
- Chamber of Mines – retraining of existing qualified workers.
- ONFPP – training of unskilled and illiterate workers; SME training.
- CFP Fria – course development of refinery workers.

2. Phase II: Identification and Evaluation of Labor Market (1 – 5 months)

The immediate hiring requirements and need for skilled laborers for GA's Sangaredi project requires a rapid response by the GOG in identifying and cataloging potential workers. Presently, there is no system in place that is capable of identifying, analyzing, tracking, or placing available skilled and unskilled laborers in the Guinean market. To help remedy this lack of information regarding available Guinean laborers, the TNA Team proposes the: (1) establishment of "Employment Centers" in Boké, Sangaredi and Kamsar perhaps at the vocational schools; (2) the creation of a register/databank of employable workers; (3) the development of a worker's evaluation program which should be developed in close collaboration with the mining industry and be used by the employment centers to complete a first filtering of potential workers, and (4) the development of an information campaign to bring potential workers into the employment centers. This final effort can be achieved through a combined media campaign through radio, newspapers, posters, and word-of-mouth in key cities.

3. Phase III: (month 6-month 24)

Beyond the immediate activities suggested in Phases I and II, the Team recommends further activities beginning beyond the first six months of support. These activities could include (1) the development of a shared strategy between the various Ministries involved in education which would seek to improve the imbalance of students between the various tiers of education to meet market needs and improve employment, (2) the development of new training facilities through branches of existing schools to train "lost" students where students who fail to get into regular institutions receive training and have alternatives to the existing system with lower entry levels and greater on the job experience, and (3) the development of local Public/Private employment agencies.

4. Phase IV (month 12 – month 36):

Additional activities that might be considered by USAID/Guinea include the development of a true on-the-job vocational training system that combines on-the-job training with short modular courses which can be built up to a recognized certificate.

I. The Republic of Guinea Today

1. Current Status and Description of Guinean Economy

The Republic of Guinea represents a significant paradox with respect to its potential and the actual results reflected in its present economy and living standards.

On one hand, Guinea is richly endowed with minerals, possessing an estimated one-third of the world's proven reserves of bauxite, more than 3 billion tons of high grade iron ore reserves with a grade exceeding 69%, significant deposits of diamonds, more than 200 millions tons of gold reserves with over 18 tons yearly production, undetermined quantities of uranium, large potential reserves of other valuable minerals¹, large hydroelectric power generation potential, and a considerable potential for growth in the agro-industry, fishing, and large-scale irrigated farming.

On the other hand, Guinea is amongst the poorest countries on earth with a population of 9.3 M. Years of continued authoritarian rule and poor economic management since the country's independence in 1958 have had a significant impact upon the country's economy. Guinea suffers from high labor force unemployment, low literacy, 40 percent of the population living below the poverty line, a \$376 GDP per capita, only 16 percent of the population having access to electricity, and a road and urban infrastructure that is poorly developed and in disrepair. The high hopes that the wealth in bauxite would improve the living conditions of average Guineans have failed to materialize. This has contributed to considerable political instability as people continue to lack the basics, electricity, clean water and jobs.

Since its independence from France in 1958, the country has had a history of generally poor economic performance. During the reign of its first ruler Sekou Touré, the country was run as a one-party dictatorship, with a closed, socialized economy which was alienated from the United States and which had no tolerance for human rights, free expression, or political opposition until 1984. His successor, the present ruler General Lansana Conte, made attempts to introduce democracy through the establishment of a National Assembly and through legislative and municipal elections in 1995. During the late 1990s, his government made several efforts to stimulate economic activity and attract private investment by returning commercial activity to the private sector, reducing the role of the state in the economy, improving the administrative and judicial framework, eliminating restrictions on agricultural enterprise and foreign trade, liquidating many parastatals, increasing spending on education, and vastly downsizing the civil service. These efforts were moderately successful, and they resulted in 4 percent annual increases in GDP growth, less than 5 percent inflation, and average fiscal and external deficits at 3 and 6 percent of GDP respectively.

However, by 2000, Conté reversed direction, and he made wholesale changes to his government. He replaced key positions in his cabinet with "homegrown" ministers particularly from his own Soussou ethnic group, which led to charges of increased cronyism, corruption, and a retrenchment on previous economic and political reforms. In addition, adverse external factors began to undermine the economy. They included a substantial weakening of terms of trade for bauxite, worsening security conditions in four neighboring countries², falling mining revenues, and worsening performance in the collection of taxes and duties. These events caused inflation to increase to 28 percent for 2004, compared with just 3.0 percent on average in 2002. Subsequently, many investors began to complain about government inefficiency and corruption, and many departed the country in frustration.

¹ Including cobalt, nickels, zinc, copper, platinum, uranium, titanium, graphite, limestone, chromium.

² In Côte d'Ivoire, Sierra Leone, Guinea-Bissau, and Liberia which cause the Government of Guinea (GOG) to spend more than 50% of its budget on military expenditures in 2003

Today, the major roadways connecting Guinea's trade centers are non-existent or in poor repair, electricity and water shortages are frequent and sustained, and many businesses are forced to use expensive power generators and fuel.

The limited data available with regard to Guinea's economy indicates that GDP growth has remained quite low: 2.9% in 2004 and is expected to fall to 2.5% in 2005. Due to the high inflation, GDP per capita is decreasing in real terms by approximately 0.50% a year causing a rise in poverty in Guinea. According to the AfDB, 49% of the population can be considered poor and 27.2% very poor for the year 2004.

The Guinean economy is dominated by the tertiary sector (administration, services, retail) which represented in 2002 (latest official data available) 46.3% of the total GDP; its share has been decreasing. The secondary sector (mining and manufacturing) accounted for 31% of the GDP; with mining alone representing 17% and construction 10%. The primary sector (agriculture, fishing) represented 18.3% of the GDP, and its share in the economy was increasing. Most of the existing data are estimates as the informal economy represents almost half of the GDP and is difficult to quantify.

Since the fall of Sekou Toure's socialist regime in 1984, Guinea has made only minimal progress instituting fundamental reforms needed to boost the economy, expand social services, and maintain steady inflows of donor resources; and its political will to continue reforms has severely declined in recent years. Despite abundance natural resources, excellent conditions for agriculture, and a strategic location favoring trade, its strengths are overwhelmingly offset by corruption and favoritism, unstable borders, questionable political stability, and a lack of government control and transparency in managing budget resources. These offsetting factors continue to hamper the progress of development, and they severely discourage needed foreign and domestic investment in Guinea. They also pose a potential threat to regional stability

Nevertheless, international mining corporations remain interested in increasing their investments in Guinea, typically in enclaves centered on major ore and bauxite deposits, and in the rail lines that connect those mining sites to ports in Conakry and Kamsar. Overall, however, Guinea's economy is generally stagnant, and it is suffering from high levels of unemployment.

2. Guinea as a "Fragile State"

Countries are considered to be "Fragile State (FS)" if they are judged to be on a downward spiral toward crisis and chaos, recovering from conflict and crisis, and/or are essentially failed states. The U.S. government believes that Guinea meets these criteria. Thus, given its circumstances, the primary challenge for Guinea is to strengthen its institutions, basic governance, and stability, subsequently allowing it to join countries where more conventional development cooperation and progress is possible. The point at which FS countries should be called fragile (as opposed to stable) is inevitably a judgment call. Most fragile states are to be found among low-income countries where governmental commitment to its institutions, good governance, and stability is relatively weak. At the same time, there are few countries where policy performance is relatively good, but fragility is still a significant issue.

Despite its potentially abundant natural resources, Guinea has experienced consistent poverty throughout its nearly half century of independence. Many families in the population live in impoverished circumstances, and public services are not provided at a level commensurate with Guinea's natural wealth, which in turn allows the country to slide comparatively further behind other emerging market economies. Because of these conditions, Guinea became USAID's first field test of its new Fragile State Assessment (FSA) methodology. The FSA strategy specified that USAID Missions in FSA countries must include major elements to address the needs of fragile states; they include: (1) better monitoring and analysis, (2) setting priorities that respond to the realities on the ground, (3) sponsor programs focused on the sources of fragility, and (4) implement streamlined operational procedures to support rapid and effective response. Achieving success in fragile states requires a clear understanding of the problems, which in turn points to priorities – such as stability,

security, reform and institutional capacity – and programs more closely targeted on the causes of the fragility rather than the symptoms.

U.S. strategic interests in Guinea are strong and multi-faceted. It is a moderate Muslim country that currently holds a non-permanent seat on the U.N. Security Council, and it maintains a moderate, secular orientation in its foreign policy. Four out of six of its neighboring countries, however, have had serious levels of instability or conflict over the past several years; and as a result, Guinea has currently become host to a significant refugee population. Keeping Guinea stable is important to the U.S. as it enhances its ability to resolve conflicts in this volatile region and to preventing conditions that could become a security threat to the United States.

Despite a strong, widespread antipathy to violence as a political tactic, Guinea as a designated FS exhibits some of the four factors that are considered as prime sources of conflict. These four factors include (1) ethnic heterogeneity; (2) a long-running economic decline coupled with widespread and growing unemployment; (3) a youth bulge burdening the economy with large numbers of young adults who have few if any employment prospects; and (4) “lootable commodities” in the form of gold and diamonds, and abundant supplies of small arms. Nonetheless, the antipathy to violence as a tactic is very broadly articulated across Guinea’s geographic regions and economic classes. People seem to have drawn the conclusion that, bad as the current situation may be, things can potentially be or become much worse. This general antipathy to violence is supported by the facts that:

- An *economic crisis* has been building for the past five years, as is evident by worsening annual inflation rates of 14% in 2003 and 28% in 2004. Guineans monitor the escalating price of rice and palm oil – the dietary staple and key price indicator for most Guineans – with mounting dread, particularly in urban areas where most residents lack access to arable, to say nothing of paddy land.
- *Uncertainty about the changing rules of the game* creates numerous opportunities to collect rents in a thoroughly corrupted economy. Lack of clarity about rules means that nearly everyone, including some of the most powerful economic elites, faces uncertainty in calculating the costs of existence or of staying in business.

These factors and ongoing violence continue to *undermine the general economic outlook*, creating a poor climate for investment at all levels, whether for international or domestic investors or informal sector entrepreneurs. Thus, entrepreneurs repeatedly will fail to create new jobs that would otherwise spell economic opportunities for the large numbers of urban under- and unemployed, as well as for the annual waves of university graduates who swell the ranks of the unemployed when they cannot find meaningful jobs.

3. Importance of Bauxite to the Guinean Economy

Despite having significant gold reserves, quantities of uranium, reserves of other valuable minerals, and potential large-scale irrigated farming and fishing industries, Guinea’s joint venture bauxite mining and alumina operations in the northwest part of the country are still the country’s most important industry. Guinea is the world’s largest exporter of raw bauxite material. Minerals produce ninety percent (90%) of Guinea’s export earnings, and approximately 90% of that amount is derived solely from bauxite exports. Guinean bauxite supplies nearly 50% of the U.S. and Canadian import markets; and on a global scale, it is estimated that approximately 15% of all finished aluminum is produced from Guinean bauxite. Despite periodic volatility in bauxite prices, it continues to remain Guinea’s most significant export product and subsequently its most important foreign exchange earner.

At present, Guinea has three active bauxite mining operations. They are located at Boké, Fria and Kindia, each of which has been in operation for over 25 years. The Boké mine exports more bauxite to offsite alumina refineries than any other bauxite mine in the world, supplying more than 12 mMTpa of bauxite to refineries in North America and Europe. The Kindia mine supplies bauxite primarily to alumina refineries in Russia and the Ukraine.

The bauxite produced at Boké is particularly rich in alumina content, and economically recoverable bauxite is spread over many square kilometers of the region. In many cases, recoverable deposits are located under merely ten meters of overburden, which greatly minimizes comparative mining costs of the product.

The largest single producer of bauxite within Guinea and likely the world is Cie des Bauxites de Guinée's (CBG), which exports over 12 million Mt of bauxite a year. CBG was established in 1973 as a 49:51 percent joint venture between the GOG and the Halco partnership, a group made up of international aluminium industry organizations. Alcoa and Alcan each have a 43% stake of Halco, with two other companies called Comalco and VAW sharing the remaining 14 percent. In 1999, the GOG asked Alcoa to assume a larger share and the management of the project. CBG's primary operations are located in west Guinea near the Guinea-Bissau border. To date, CBG has produced total exports of over 240Mt of bauxite from the region. The company's operations include a bauxite treatment plant in Kamsar and several open pit mines located inland near Sangarédi. Its production is typically 13 to 14Mt per year of raw bauxite, with close to 90 percent of it being exported from Kamsar.

4. Proposed New Investments in Guinea

Several, investment projects in the mining sector, are being proposed in Guinea over the next few years. More specifically, several companies have expressed their interest in investing in new bauxite/alumina-related projects in Guinea in response to increases in alumina demand being driven by the booming economies of China and India. Though limited data exists, and most of these projects are still in the very early planning or development stages, they nevertheless are indicative of the types of investment that may occur in the country and the type of human capacity building and human training activities that will need to take place if the use of Guinean labor and domestic Guinean job creation are to be maximized. The most prominent projects being proposed include:

- AWAC/Alcoa has signed a Memorandum of Understanding (MOU) with the Government of Guinea to investigate the building of a \$1.5 billion alumina refinery. The facility will transform Guinea's lower-grade, non exportable bauxite into higher-value, exportable alumina.
- Alcoa Guinea/CBG has announced its intention to build a billion-dollar alumina refinery about 300 kilometres from Conakry near the town of Boké in the north of the country. This proposed plant would be capable of processing 1.5 million Mt per year, starting operations sometime in 2008. In early 2004, Alcoa/ CBG started a preliminary feasibility study into the feasibility of constructing the project.
- Global Alumina Corporation (GAC) is in the process of implementing plans to build a two-billion-dollar refinery with an annual capacity of 2.8 million Mt in the Sangaredi area. Activities related to this project have been underway for several years, and subsequently, it is significantly further developed compared to the Alcoa Guinea/CBG proposal. The project received the formal ratification of the Guinean president and National Assembly in May 2005.
- EuroNimba and Rio Tinto are proposing to develop and construct a \$5.0 billion iron mine at Mount Nimba (which straddles the Guinea, Liberia and Cote d'Ivoire border) and in the Simandou Mountain Range in southeast Guinea. Rio Tinto has discovered mineral deposits that it estimates contain over one billion metric tons of exceptionally pure (66 percent) deposits of iron ore. In support off the mine, they have begun the necessary negotiations to construct a 1,000-kilometre rail link that will transport the mined ore to the deepwater port of Matakan in the west. BHP Billiton has te4h concession for Mount Nimba Iron Ore Project.
- An unnamed German company is proposing to construct a new cement factory at Sougueta in the Kindia prefecture, approximately 150 kilometres from Conakry. Construction on the \$10-16 million facility began in mid-May 2005 and is expected to be completed with the next 26 to 28 months. According to the Centre to Promote and Develop Mining, the cement production facility will have an annual capacity of 523,000 Mt, and it will create 260 construction jobs and employment for nearly 1,000 permanent workers.

- Dian Dian, a new joint venture between the government and Ukraine at Aye- Koye that is expected to ship 1 million metric tons of bauxite annually. This is currently under study.
- Two gold mining companies, Société de Minière de Dinguiraye (SMD) and Société Aurifère de Guinée made major investments in 2004, and SMD announced plans for a \$50-million expansion in 2005. A Canadian company, Semafo, has been expanding production rapidly since its initial investment in 2002. Another Canadian company, Cassidy Gold Corporation, is in the exploration phase.

II. Introduction and Background to the Proposed Training Program

1. Communications with USAID Mission in Conakry

Senior representatives of Global Alumina contacted the U.S. Ambassador, Mr. Jackson McDonald, and the USAID Mission Director, Annette Adams, in Guinea to seek USAID's participation and support in an effort to sponsor and implement a large-scale training program for their proposed alumina refinery project. Subsequently, through discussions, GA requested USAID assistance in training activities with the aim of increasing the local labor pool of trained Guineans that it could utilize for the construction of its refinery and associated projects (power plant, mine, port site, rail spurs, roadwork, reservoir, and operator's village). As a result, USAID decided to implement this assessment and work to identify how they can use the GA project combined with strategic support to benefit Guinea.

GA has met and discussed its plans for this training program on several occasions with the Mission in what could take the form of a Public-Private Partnership to train Guinean citizens to work on the project. The Mission Director believes that GA's proposed project can have a large impact on the sustainable development of Guinea's socio-economic climate, and strongly agrees with and wants to support GA's stated goal to maximize the creation of Guinean jobs on the project. As USAID Mission Director, she understands that several mining sector projects are being proposed for development and construction in Guinea, but that the GA project is most advanced in development and, thus, has the most imminent needs. As a mining sector project, she feels that the *training needs of constructing and operating the GA project will be very representative of, and similar to, the training needs of other mining sector projects being proposed in Guinea and that the training needs of GA can be used as an indicative template of current and future needs of the Guinean mining sector in general.*

The Mission Director also noted that USAID in Guinea has a specific mandate of poverty alleviation, and she noted that skills' training is one of her primary objectives. She also noted that she is interested in the premeditative approach that Global Alumina is taking towards addressing potential problems (such as HIV/AIDS education, lack of gender outreach) that have commonly been neglected by, and associated with, other large-scale construction projects in other parts of the world.

In light of these events, USAID/Guinea subsequently approached the USAID/EGAT Energy Team to assist in implementing a Technical Needs Assessment and investigating the potential for a Global Development Alliance (GDA) with Global Alumina. In response, the Energy Team agreed to fund a team of expert consultants under its Energy II IQC to conduct a Technical Needs Assessment (TNA) that would identify the training needs of the bauxite/ alumina industry in Guinea. Because the proposed GA project is indicative of a typical large-scale mining sector project and contains many diverse components to it (mining, refining, transport, electric generation etc.), it was suggested that the training needs of the GA project be analyzed and used as a generic template for subsequent mining sector projects in Guinea because its needs will likely be quite similar to and representative of the needs of subsequent projects in Guinea.

Subsequently, this report will analyze limited data on the specific needs of the GA project and assume that this data is representative of the training needs of the broader Guinean alumina and mining sector needs as a whole.

2. Purpose of Technical Needs Assessment (TNA)

The purpose of this TNA is to identify a range of training activities that USAID/Guinea can support through institutional and human capacity building programs that will allow USAID/Guinea to:

- Dually respond to supporting the training needs of an immediate large-scale project that is capable of bringing immediate benefit to the Guinean economy, while at the same time implementing measures and capacity building activities in the short, medium and long-term that will benefit the future training needs of anticipated Guinean mining sector projects and other investment projects.
- Allow USAID to take immediate measures that will allow it to respond to the needs of Guinea as a fragile state.
- Allow USAID to support the investment plans and needs of US industry in the form of projects by Alcoa and GA, by determining skill-sets required during different phases of this project, identifying educational qualifications of the laborers for required categories, and analyzing the availability of training options/facilities in Guinea to conduct the training.
- Increase the ability of the Guinean government to develop a local labor capacity to accomplish the construction and operations of refinery and power plant facilities.
- Rollover of these training skills to all Guinean industry sectors, and meet future employment construction needs of neighboring countries by having available a skilled labor force.

III. Guinean Labor Force

1. The Labor Market

The present labor situation in Guinea is largely unknown. This is primarily due to poor documentation of data and human resources and the physical challenge of collecting demographic data throughout the country. Available data relies mostly on general census information, the most recent of which -- according to government sources -- was completed in 1996. With limited structures such as regional registration and little monitoring of those who have graduated from the various training facilities available to support the unemployed, the ability to obtain reliable and timely employment or accurate unemployment figures is made more difficult. This includes even getting an accurate estimate of the population.

The total population in Guinea is estimated at 9.3 million (2005) with an annual growth rate of around 3%. 45.6% of the population is less than fifteen years old. The active working population is estimated to be 3,340,000, of which 80% of those employed are estimated to be employed in rural areas, although this remains inaccurate because of under-employment. Using rough estimates, the GOG has estimated unemployment at 1.6% globally and 6.6% within the city areas. These estimates are considered to be inaccurate partly because of the GOG's lack of efficient information gathering procedures, and perhaps most importantly because the estimates fail to take into consideration informal, black market, and part-time work.

The most accurate data available comes from industry and the private sector. It has been estimated that between 45,000 and 62,000 are active members of the private sector work force.

2. Private Sector and the Mining Industry

The private sector and the mining industry continue to be a major contributor to the economy. In particular the bauxite industry has continued to provide a steady source of employment and income to the country though royalties to the country have continued to fall despite a growing demand for alumina and aluminum internationally. This is due to a combination of poor infrastructure, aging plants, and failed developers' strategies, including the failure to develop downstream bauxite development as a way to keep more of the revenue in country. The industry, however, has been

marked by an Africanization of many of the non-management positions that were once held by Europeans.

The process of Africanization within the private sector has been held back by the inability to identify qualified personnel, high levels of illiteracy, as well as the need for the education system to provide more of the qualifications requested by industry. To help improve this situation, the private sector could:

- Create employment both directly and through associated SMEs;
- Create labor intensive work in some sectors;
- Reinforce professional and technical training to create a workforce capable of working in other industries and abroad; and
- Improve access to work for women.

3. Role of Government in Training and Employment

Two governmental structures share the responsibility for employment policies, the *Direction de l'Emploi et de la Réglementation du Travail* and the *Agence Guinéenne de Promotion de l'Emploi* (AGUIPE). Both agencies deal with employment promotion, and statistics (in theory), while AGUIPE has some training responsibilities. A third institute is also involved specifically in the mining sector, the PAUS, which has been created as a temporary one stop shop for the Global Alumina refinery project (See diagram 1). Training is handled by a variety of Ministries and organizations:

- Ministry of Education
- Ministry of Vocational Education
- Ministry of Higher Education
- Ministry of Social Affairs and the Promotion of Women
- National Direction of Training and Professional Development
- Statistics and Planning Department

Through:

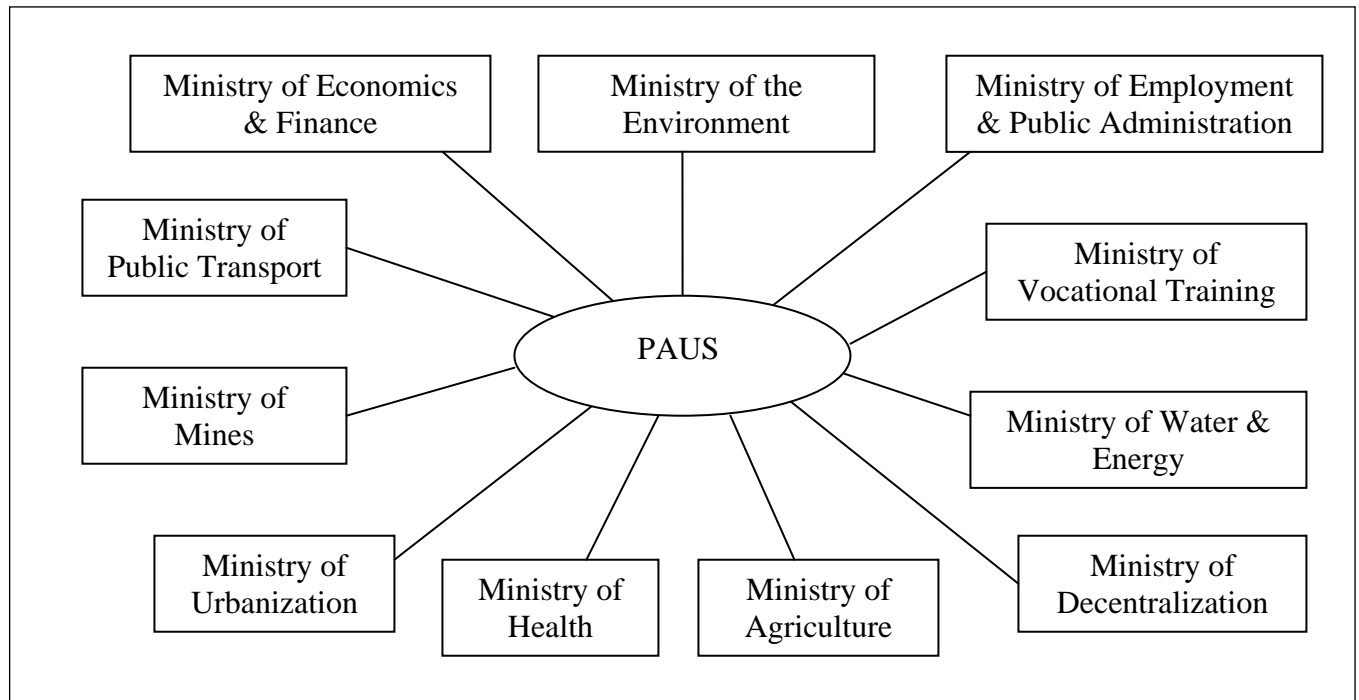
- Schools of Technical and Vocational Training (Implementer Centre de Formation (CFP) schools)
- Private Schools
- In-Service Education Center
- Office National de Formation et de Perfectionnement Professionnels (ONFPP)
- Chamber of Mines

The principal institutions are described in greater detail in the section on Guinean Training Resources.

Projet d'Usine d'Alumine de Sangarédi (PAUS)

To provide assistance to important major projects being developed in Guinea, the GOG established PAUS, an institution whose sole purpose is to assist Global Alumina (the first of the proposed mining projects) in the development of its \$2.2 B alumina refinery project. It reflected the GOG understands the need to facilitate procedures and strengthen relations between the various industry players and ministries. PAUS will assist and help GA identify potential workers help facilitate training through -- whenever possible -- existing vocational and technical institutions.

Figure 1. The Interaction of PAUS with the Ministerial Departments



IV. Guinean Training Resources

1. The Guinean Educational System

As in many former colony countries, Guinea's education system has been heavily influenced by its French heritage with the system undergoing few significant changes. The educational system in Guinea encompasses six years of primary, seven years of secondary, and three years of tertiary education. Courses are still taught in French after an unsuccessful attempt to develop curricula in the local languages. There has been a recent push to introduce English as well.

Concerted efforts have been made to improve the primary education system with support from the international donor organizations, but the system remains weak and it has created an imbalance between the various education levels while also failing to meet the changing employment needs of the economy. According to the World Bank, unemployment is higher among high school graduates, which is a clear indication that there is a mismatch between the educational system and the labor market's needs. Again, the lack of precise employment figures and a clear understanding of the informal and part-time worker markets make this difficult to prove precisely, but was nonetheless confirmed by a recent USAID Training needs assessment mission.

In 2004:

- 65,000 students took BAC II exam, of that 40,000 successfully passed (65% pass rate).
- ENAM received 1220 applicants in 2004 and had the capacity to accept 130 students into the program.
- CBG received 1700 applicants and had the capacity to accept 120 students in to the program.
- 23,000 students applied to the University of and Boké only 7000 were accepted.

Despite investments into the education system, it remains heavily handicapped by the insufficient funds dedicated to primary education and a disproportionate level of funds being allocated to universities and technical/vocational institutions. In fact, under the present circumstances, it is estimated that 50% of the resources go to only 10% of the students with little attention paid to (1) creating a true middle of the ground education system or (2) developing a true employment-focused vocational training system.

a. Primary Education

In 2003, the growth enrollment rate of schooling was 72%, but this was undermined by the low percentage (52-47%) of children actually completing the primary school cycle. The GOG has in recent years attempted a more concerted effort to improve primary education access, and a considerable amount of time, effort, and funds have been dedicated to the issue both by the government and the international donor community. As the proportion of children within the population remains high, the system continues to be put under considerable pressure. However, spending has not been increased sufficiently to match the growing number of students, thereby putting further pressure on the limited facilities and affecting the quality of teaching.

b. Secondary and Tertiary Education

Secondary education is composed of two parts in Guinea, reflecting the French system. The first part roughly corresponds to junior high, the *collège*, and it lasts for four years. Students then normally go on to *lycée* (high school) for three years. A final exam -- the *baccalauréat* -- marks the end of high school, and it is a gateway to universities.

In 2003, 32% of the pupils enrolled in junior high after completing the primary school cycle. According to government figures, there were 512 secondary education institutions in 2002, of which 206 were located in rural areas. Approximately 271,000 students (78,000 girls) were enrolled. The Government of Guinea has launched the Programme Education pour Tous (PEPT) 2001-2012 in order to increase enrollment and improve the educational system. The efforts seem to be successful with enrollment rates increasing within secondary education. Efforts are also being made to improve teachers' levels and training, update the curricula, and renovate schools.

c. Vocational Training Schools

Students in Guinea have few alternatives to traditional academic universities after high school, apart from government and private sector vocational schools. According to government figures, in 2004 there were 41 public and 42 private vocational training schools, for which the number of students applying is extremely high and few students are accepted. Vocational training institutions offered 47 programs in 13 different sectors, with several technical institutions offering three-year professional degrees.

Unlike schools found in the US or UK, these full time schools accept students that have graduated from the high school and generally excluding those students that have completed only part of their education. This would include students who may have failed to continue in education or who have failed their BAC exams. Most vocational training schools require a *baccalauréat*, and the deliver a 3-year technical degree, the *Brevet de Technicien Supérieur* (BTS). Other vocational schools only require the *Brevet d'Etudes du Premier Cycle* (BEPC), which is the end of junior high diploma, and they give lower-ranked degrees called *Brevet d'Etudes Professionnelles* (BEP).

Between 1993 and 2002, more than 80,000 students enrolled in vocational training (28,000 girls). However, only 27,000 actually obtained a diploma (8,000 girls), showing a substantial drop-out rate, which needs to be explained and minimized. The demand for places in the vocational schools far outweighs the places available, particularly in schools where a position post graduation is almost guaranteed.

The World Bank's assessment of Guinea's vocational schools is quite pessimistic. It describes outdated installations and outdated curricula, attracting very few students. Teachers for vocational training are trained by the Ecole Normale Supérieure d'Enseignement Technique; and requirements to enter this school include a good knowledge of French and a Baccalaureate (end of high school examination). Few people possess these skills, and as a result in 2003, the school only had 285 students. These students had received training in general and auto mechanics, welding, electricity, masonry, carpentry, plumbing, metalwork and operation of public works equipment. Due to the outdated curricula, which no longer correspond to the needs of the labor market, graduates subsequently experience difficulty in finding employment after vocational school. This fact further reduces the attractiveness of these schools.

A more detailed description of these training institutions follows, based on a recent mission from a USAID team. The team visited various representative schools to evaluate their ability to meet the training needs of industry and in particular the mining industry, in light of important major projects being developed in the country. These projects will offer an important opportunity for employment in the country and to students who have and will be graduating from the vocational schools, but only if the schools teach the skills needed by the projects.

d. Universities

As with the rest of the Guinean education system, its universities are modeled after the French system. In theory, any student with a *baccalauréat degree* is automatically ensured entry into university, though this has often not proven to be the case. According to government sources, in 2004 there were about 22,000 students in the various university and university-level institutions. Despite these small numbers, universities receive around 25% of the total educational budget of the government.

Most universities are public. There are two multi-disciplinary universities in Guinea -- one in Conakry and one in Kankan. Approximately 16,000 students attend the University of Conakry. In addition, several university-level institutions, such as the *Institut des Mines* in Boké, are specialized in one field. The first private university of the country, *Université Kofi Annan*, opened in 1999 and offers programs in law and business among others. The PEPT also includes universities. Two new public universities have been planned in Labé and N'Zérékoré, as well as an agricultural sciences institute in Faranah. Guinea has several cooperation agreements with North American universities to improve its research facilities and to offer new programs to students.

Similar to vocational training, current university curricula are not adapted to the needs of the labor market, and thus, unemployment is nevertheless quite high among graduates.

e. Other Institutions:

In parallel with the larger education structures, other institutions have been developed both with government and private sponsorship.

One such organization is ONFPP, which offers short courses for qualified workers and SMEs and has made a concerted effort to develop and provide training to those without basic schooling. Guineans are frequently illiterate. This is the only institution, which tries to provide a means to bring the lesser-educated members of population into the labor market and provide them with the skills to develop SME or micro enterprises.

The private sector, including the mining and bauxite industry, has also developed its own training institutions to develop workers with the technical and management skills directly needed by them. The trend has been to move away from creating ad hoc institutions to working through existing vocational schools such as the CFP School in Boké. One of the remaining semi-private industry sponsored schools, which is still very active and which works closely with the mining industry is the CBG School in Kamsar.

2. The Role of the GOG in the Guinea Education System

The management and monitoring of Guinea's education system is divided between several ministries:

- Ministry of Pre-University Education
- Ministry of Vocational and Technical Education
- Ministry of Higher Education

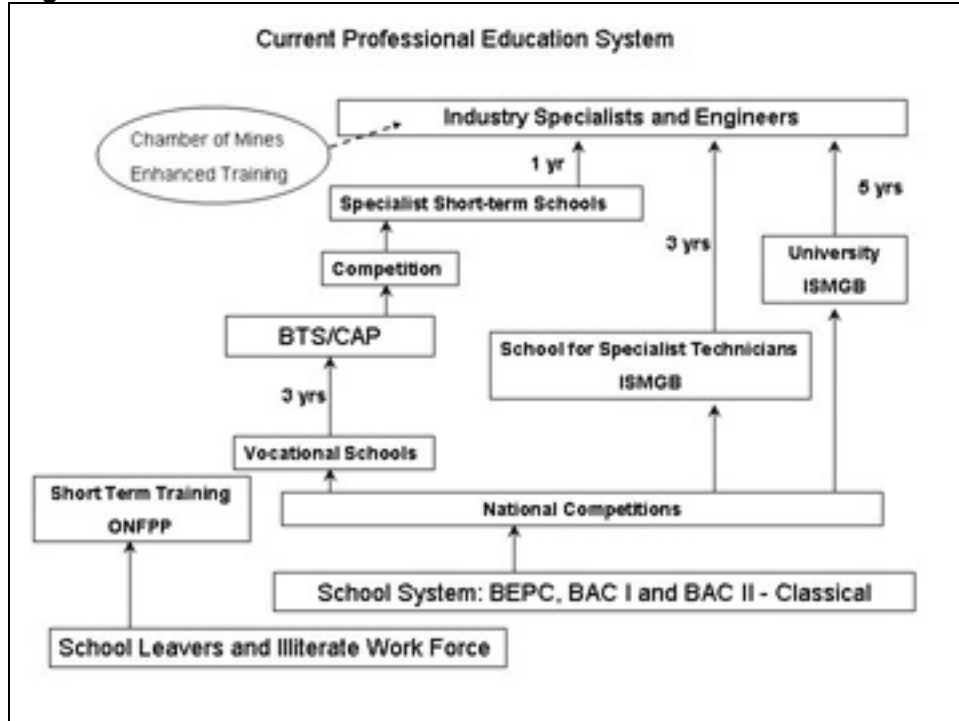
Qualification and exam management are handled by a national exam board for the primary secondary and tertiary school systems. The universities and the vocational schools handle their own entrance criteria and exams.

The Ministries are characterized by weak coordination and lack of a common strategy. This creates an imbalanced education system, which fails to take into consideration the needs of the economy and the final placement of students graduating from the different levels of education. The transition to the work force or between levels of education -- particularly high school to further education is uncoordinated and thereby limits the opportunity for students and workers to grow and take advantage of new opportunities. The need for a better-structured system is evidenced by the high level of unemployment amongst high school graduates in comparison to those leaving primary school. It is also reflected by the high number of students who graduate from school with BAC I and II, but who cannot get any form of further education. In the latter case, this is largely due to the limited number of spaces available to students. The fate of university graduates is not much better with some of the highest unemployment estimated to be amongst those leaving the university.

In order for the system to be better coordinated, the various Ministries need capacity building to:

- Develop a coordinated strategy which better meets industries actual and future needs;
- Create an information system to collate data on graduates and the flow of students between the various levels of education and training, as well as in the labor market;
- Rebalance the existing system to provide further education to minimize the number of students falling between the cracks because of high entry standards and/or limited spaces; and
- Develop a coordinated strategy to create gender equality throughout the system.

Figure 2



3. Description of Training for the Mining Sector

As previously described, over the years the GOG has developed a technical vocational system and university structure to support the mining industry. These institutions, however, fail to work together, frequently undermine each other, and fail to coordinate their programs with industry's wants. A review and improvement of the post high school system is of particular urgency if the country and its citizens are to be able to take full advantage of the increasing number of projects being planned in the mining sector -- in particular, the imminent GA project.

The following paragraphs describe the main training institutions, which are available to supply the mining industry with qualified staff and workers. It includes an evaluation of their strengths, weaknesses, and their ability to meet the future needs of the mining industry in response to possible alumina refinery projects that are scheduled for construction in the coming years.

a. ENAM

ENAM, was originally set up in Conakry in 1962 with USAID funds and has grown to become the historical leader of vocational training through continued support from International Donor Institutions, in particular the EU, as well as the private sector through equipment donations. The school has also benefited from close collaboration with partners in Morocco, Germany and the private sector in Guinea.

ENAM offers qualifications as:

- Engineering assistants
- Technicians
- Secretaries
- Engineers
- Mechanics
- Electro-mechanics
- General Maintenance technicians
- Civil Technicians

It is a 3-year program – the first year introduces high school graduates to technical education, which is necessary because Guinea does not offer a scientific BAC. Two years of technical training follow.

Courses and facilities at the school are considered to be good and staff well qualified. Nonetheless it is felt that the school would benefit from a review of its courses to ensure that it continues to meet industry's needs and starts to bring students up to international qualification standards particularly in welding and construction. The school would further benefit from increased student capacity as demand continues to far out pace places available. Presently the school is able to handle 400 students (across 3 years) with 128 students graduating in 2004.

Because of the high regard the institution is held within the international and local community and because of its staff's entrepreneurial skills the institution is being used to help develop and strengthen vocational and technical training. ENAM staff is actively working to create teaching branches in other regions of the country and teachers are being used to provide training of trainers to other institutions as an example of capacity building. As far as branches of ENAM the school has identified 300 potential students for training that will allow them to make use of idle staff and classrooms in other vocational training institutions such as CFP in Boké.

The school has not ignored the private sector and has successfully developed curricula and on site training for various players in the mining and non-mining fields.

b. CBG – Kamsar



The CBG School was set up specifically to train workers for the bauxite industry and port facilities in Kamsar. The school is set up as a public - private partnership (PPP) with the GOG owning 49% and the private sector 51%. It is an example of how the private sector can work together with local communities to train and create local work/employment. Like many of the other training institutions the school provides a technical and mechanical training, which are more closely tailored to the specific skills needed by CBG to whom the school provides qualified graduates. The school trains 246 students (double its real capacity) over a one-year course. The students then go on to be tested and interviewed by CBG. Of those graduating 92% succeed and are employed by CBG. Presently there are 2,446 former students working at CBG in Kamsar. Due to the high number of students guaranteed employment on graduation, the

school, like ENAM in Conakry, is extremely popular and receives a far greater number of applications than places available. In 2004 the school received 1,700 applications for 120 places of which 900 were turned away though qualified and considered strong candidates. This reinforces the view that the schooling system is in need of restructuring. The students turned away are often left with few alternatives for further training and could be a possible source of employees for the proposed projects being developed including GA's.

c. CFP – Boké

The school was established in 1980 and is run in a similar manner to ENAM, but has not benefited from the financial support that the school in Conakry, has received from international institutions and is hampered by a less entrepreneurial approach to training. The school offers many of the same courses as ENAM.

The school operates through two sister organizations each providing 45 courses for a total of 3240 hours. Like ENAM the diploma requires over 3 years with core courses held in common followed by special courses for the various qualifications.

Courses offered include:

- Mining operator
- Car mechanics
- Welding
- Masonry
- Carpentry

These courses provide students with a *Certificat d'Aptitude Professionnelle* and require those enrolling to have passed the national competition offered by the Ministry of Technical and Vocational Training, to have a BEPC diploma and, in the case of Mining operators a BAC I. The school also offers a course in Heavy Machinery Mechanics, which requires a BACII to enter. A full breakdown of the courses offered by CFP is presented as an Appendix to this report.

The school presently has 510 students of which 65 are women. The school is trying very hard to improve the number of girls attending and has recently benefited from a donation to build a dormitory for them.

In 1999 the school added new courses targeting the mining sector. The first 40 students recently graduated of which 38 were hired at CBG. The second edition of the course presently has 42 students. The plan is to introduce a course in residential and industrial wiring and plumbing.

Despite considerable effort, the school severely lacks the facilities it needs for teaching; in particular curricula, equipment and classrooms are in need of substantial modernization. The schools efforts to create courses that better meet the needs of the regional industries are undermined by its limited facilities as well as the teachers' knowledge of international construction standards. Plans are being developed for ENAM to provide assistance to Boké while CBG has put some money and equipment into the school recently to ensure graduating students have some of the specific skills they need to secure employment.

The school is a focal point in the region, which makes it a natural center for further development to meet the mining industry's needs. Despite the fact that recent graduates have obtained employment there are clearly many locals who have not found suitable employment, as demonstrated by the recent flow of past students back to the school to learn more about the proposed GA project. The school could become a recruitment and retraining point for the up coming projects in the region (300 welders and 200 masons recently returned to the school). However, the courses and the curricula will need to be rapidly modernized for this to happen. One example is welding where students will need to be brought up to international welding standards on up to date modern equipment.

d. University of Mining Boké

Guinea has a well developed university system follows the French system. Of the universities the most relevant to the needs assessment is the Institute Supérieur des Mines whose mission is to train engineers and mid –level engineers as well as PhD candidates in the mining sector. The 3 disciplines offered by the university are:

- Mining and geology – a 5-year course following graduation from high school. Entry is also dependent on a national competitive exam
- Brevet de Technicien Supérieur (BTS) – 3 years after baccalauréat and admission only through competitive exam. The course was created in 2002 based on a survey to fit with the demand of the mining industry. The first students will graduate from the course next year.
- Computer science – the program was developed based on a 2003 survey.

Several new specializations have been created:

- Topography
- Metallurgy and mineralogy: metal extraction and ore treatment (Will initiate next academic year)
- Mining operations, extraction and construction works: supervisor training

- Applied geology

The school would also like to introduce in the coming year:

- Waste treatment and management
- Computer science applied to mining: using specific software, databases
- Heavy machinery mechanics

These additional courses and changes in the curricula began to be introduced in 2005 in response to the results of a 2004 survey submitted to the mining industry. The aim was to adapt the curriculum to the skills demand of the mining sector.

Presently the school has 250 students (50 women) and last year 100. Those graduating are almost entirely hired by the mining industry.

The university has also produced tailored training for the mining and construction industries and has expressed a willingness to develop further curricula for project companies similar to the recently established GA who are the developers behind the major alumina refinery project.

e. **Other Potential Sources of Training for the Mining Sector**

The urgency of developing a diverse work force capable of meeting the various skill levels of the mining industry and the impending major projects has been recognized. Two organizations, not officially part of the mainstream education system is also working to meet the training needs.

- **ONFPP:** As previously described the ONFPP has developed a series of very brief, easily transportable courses for retraining as well as, importantly for the illiterate and informal industries. The school is capable of training people in a variety of settings including the use of idle classrooms, in ad hoc locations, and even under trees. A listing of the courses offered by the school is attached as Appendix 3.
- **Chamber of Mines:** The Chamber, as the official representative of the various mining interest in Guinea, has a strong grasp of its members' needs. One critical need is skilled workers capable of meeting international standards. Based on an analysis of the mining sector, the chamber has designed a series of short courses to fine tune workers to meet changing skill requirements. The full program is provided in annex. It has not been implemented due to the unavailability of funds even though estimates for the program's implementation are modest (in 2002 it was estimated \$100,000) and would take just over a month to execute.

V. **Guinea's Alumina Sector Technical Needs**

1. **The Global Alumina Project as a Model Project**

GLOBAL ALUMINA (GA) is a U.S. company that is proposing to build a large-scale, \$2.2 billion alumina refinery project between Boké and Sangaredi within the Republic of Guinea. GA's project will be the largest foreign direct investment (FDI) in the history of Guinea and one of the largest investments ever in West Africa. It is expected that construction and operation of this project will have a substantial impact on the economic growth of Guinea by contributing to the creation of direct cash income jobs and the development of associated micro, and small and medium enterprises (SMEs). GA has made poverty alleviation a chief priority of the project, and it has emphasized its commitment to maximizing local participation and job training for the construction of the refinery and the power plant.

The proposed GA project will include several major components. First and foremost will be the construction of the alumina refinery, which by itself will require a substantial investment just to develop and construct the facility. GA plans to construct the refinery facility through of a turnkey Engineering,

Procurement, and Construction (EPC) contract with a large international firm. In addition to the EPC contract that has already been let for the construction of the refinery, GA will potentially need to let and negotiate separate additional EPC contracts with other international and local contractors for additional major facilities that will support operation of the refinery. These facilities include:

- *A stand-alone electric generating station* -- rated at 90MW of electricity and 400 tonnes per hour of steam to provide the refinery with steam and electricity,
- *A new, dedicated bauxite mine* -- located adjacent to the refinery and capable of producing the 7.4 mtpa of dry bauxite and bauxite supply needs of future plant expansions,
- *A new commercial port, jetty, bulk storage area, and related industrial facilities* -- to export the finished alumina and the import of raw material at Kamsar, Guinea.
- *Two new rail spurs* -- at the refinery site and post facility will be added onto the existing 122 km rail system used by CBG to transport its bauxite from Sangaredi to ship loading facilities at Kamsar.
- *Improvements to the existing road network* -- GA will undertake necessary construction activity to reinforce the highway and bridges between Kamsar and Sangaredi to accommodate the oversized trucks and transport of equipment,
- *New water reservoir, sanitation, drainage and electricity supply* to the developments.
- *A new operators' village* -- constructed and located near the refinery site having all related social infrastructure.

GA is in the final stages of negotiating the specific terms of the EPC contract for the construction of the refinery. As a result, GA is still working with; preliminary information regarding the hiring and training needs of the project. They are presently in the process of conducting a much more detailed due diligence and are gathering additional information on the detailed labor needs that will be required to construct the refinery. But, it is important to note that this process is still incomplete. Thus, the information that has been given to the USAID consultant Team conducting this TNA and that is reflected in this report is still preliminary, and it represents only the "best estimates" of GA. As new information becomes available, it will be revised in the report.

2. Global Alumina's Hiring Needs

Global Alumina has indicated its commitment to maximize the hiring of qualified Guinean nationals in the construction and operation of the infrastructure, refinery, and power plant associated with its Sangaredi project. Partial data provided to the USAID Consultant Team suggests that the GA project could result in the creation of significant local jobs during the facility's construction phase. These may be followed by the creation of additional local jobs during the plant's operational phase and during a subsequent construction of a planned expansion of the facility to 2.8 million tpa. Though initially of direct benefit for GA the skills acquired training for and working for their project will be valuable on successive bauxite related projects sponsored by other developers.

The preliminary estimate of the direct monetary impact of GA's project in Guinea is significant. For example, GA could spend over \$100 million on the purchase of Guinean products during the construction period. During this phase, it is estimated that around 7500- 8000 direct -- and significant additional indirect -- jobs will be created. The company also estimates that expenditures by GA's expatriate and local employees will also have a significant annual impact on the Guinean economy during the peak years of construction of the project.³ The monetary impact of additional mining sector projects could be equally as significant.

³ It is further important to note that (1) GA's estimates reflect only the hiring and training needs associated with the construction and operation of the refinery project, and they do not include the hiring and training needs of the other EPC contracts that will eventually be let for the mine, power plant, the port site, the rail spurs, the roadwork, the reservoir, and the operator's village, and (2) they do not include any hiring needs from the other proposed Alcoa, Rio Tinto, Rusal, MD, Dian-Dian, or other mining sector projects being proposed for development in Guinea within the near future.

In addition to the creation of these immediate jobs, it is possible that an even larger number of jobs could be created -- having an even larger stimulation to the local Guinean economy -- through the creation of secondary and tertiary businesses and industries that provide services and goods to GA, or that provide services and goods to personnel employed by GA or associated organizations. The project will enable the creation of a large number of SMEs such as, the creation of fabrication shops, galvanizing shops, batch cement plants, as well as services such as meal, transportation, security, laundry, and others. The actual number of additional jobs and the direct impact upon the local and national economy has yet to be calculated by either GA or the GOG.

Other EPC contracts associated with the GA project are still in various stages of being solicited and negotiated by GA; and when negotiations are completed, they will have their own set of hiring needs that will include the need to hire local labor. Each of these additional EPC contractors will have the authority, and be responsible, for selecting and/or training their own personnel to assist in the operation and construction of each of those contracts. While it is GA's expressed intent to maximize the extent of local hires⁴ in each of those additional EPC contracts, ultimately the final decisions regarding the extent of local contracts will be made by the EPC companies that are finally selected to manage each of those contracts.

It should be emphasized that while some of the recommendations for training needs suggested to USAID/ Guinea in Section VIII of this TNA report may immediately assist and benefit the proposed GA project; in the medium- and longer-terms, these same recommendations will benefit the hiring and training needs of all other companies proposing projects for the Guinean mining sector as they seek trained local personnel for their projects.

a. Timing of Hiring Needs

GA's proposed training programs will be scheduled to coordinate with the project's construction of extensive civil works and heavy lifting. This initial work will require total new employment hires of nearly 1000 people in the first year. Table 1 presents an indicative illustration of how the hiring and employment needs of the project will be ramped up during the first two years of construction of the refinery. As the figure illustrates, GA will heavily hire personnel to support mostly civil work for the first year of construction, then new hires to support mechanical work will begin in earnest 6-9 months after the start of construction, and electrical work will begin and continue after the first year onward. GA employment needs could quickly ramp up by month 16 in the following 1 to 2 ½ years. Its overall construction schedule will span more than four years for the refinery and all associated EPC supporting projects. A total of expatriate and local hires for the refinery and the other EPC projects is expected to be approximately 8,500 -11,000 persons.

GA's construction contractor is still finalizing its plans and manpower requirements for the construction of the refinery, and thus, it has still produced only very preliminary man hour estimates and labor histograms by discipline. It has identified preliminary labor groups that will be needed in construction, and it has estimated the percentage of those labor categories that it will seek to hire local labor. Based on its familiarity with doing work in West Africa and its preliminary analysis of the Guinean labor market, it estimates that it should be able to hire at a minimum 45 percent of its construction work force from the local Guinean labor market. As it begins the process of seeking to identify, interview, and begin the process of recruiting locals for needed positions, it will give preference to any/all Guinean nationals who are qualified for the positions to be filled.

Exhibit 1 presents a preliminary estimate of the number and types of men/women that will be required by labor category during the 1st six semi-annual periods of the project. As is evident, the majority of the hires for refinery construction during this first six month period will include heavy equipment operators, laborers, trades helpers, riggers, and iron workers. During the second 6 month period, the

⁴ In fact, GA has signed a formal agreement with PAU that formalizes its commitment to maximize the hiring of local labor the maximum extent possible.

numbers of hires and skilled personnel could almost double over the previous period; and the skills of the workers hired during this period would need to expand to include pipe fitters, trades helpers, welders, and mechanical heavy equipment and crane operators -- in addition to needing significantly more truck drivers, laborers, and carpenters. Finally, during the third semi-annual period, the hiring needs of the refinery project would then likely peak, and the skills of the workers hired would also need to include boiler makers, more pipe fitters, electricians, and instrument fitters. Approximately by the end of the first 18 months of construction, most of the employees that are required for construction of the project would have been hired, and the needs for training of refinery construction personnel would end.

The hiring and training needs beyond the first 18 month period would then be more influenced by (1) the hiring and training of personnel necessary for operation of the refinery and (2) the hiring and training of personnel necessary to satisfy the hiring demands of the other EPC contracts, such as the mine, the power plant, and the port.

The types of skilled workers that would need to be hired during the first year and a half of construction are summarized in Exhibit 1. The table suggests the need to focus the initial training assistance on activities that would ensure that qualified truck drivers, laborers, rod buster, carpenters, pipe fitters, welders, heavy equipment/ crane operators, and heavy machinery operators are available during the first 6-month period.

Exhibit 1

**Summary of the Types of New Hire Skills Required
During the First Year and a Half of Refinery Construction**

SEMI-ANNUAL PERIOD	NEW HIRE SKILLS REQUIRED
1st	Heavy Machinery, Truck Drivers, Laborers, Rod Busters, some Carpenters and Welders
2nd	Truck Drivers, Laborers, Carpenters, Pipe Fitters, Welders, Trades Helpers, Heavy Equipment/ Crane Operators, some Heavy Machinery
3rd	Boiler Makers, Pipe Fitters, Electricians, Instrument Fitters,

If trained personnel with these skills are not available in the Guinean labor force at that time, then the construction contractor will have to consider the alternative of filling the positions with expatriate hires from neighboring countries.

Without the benefit of actual data regarding the availability of Guinean laborers by specific job category, Table 2 outlines the refinery construction company's initial estimate of job categories where it would maximize the hiring of Guinean locals. Based upon its preliminary analysis, the largest numbers of local hires are expected to occur among carpenters, chainmen, drivers, fabricators, electricians, watchmen, laborers, masons, operators, mechanics, plumbers, painters, and administrative personnel. Whenever it can, the company plans to will hire local Guinean personnel in job categories slated for expatriate if qualified local personnel are available. Where it appears in Table 2 that only expatriates will be hired qualified local personnel will be substituted should they be available.

GA's EPC construction contractor plans to access the two primary sources of local manpower closest to the project -- the population centres in Sangaredi and Boké. It plans to bus labor from both of these locations to the Sangredi site, and it expects that any local staff or labor from further away will have to arrange for transport for themselves to these sites. CCC will not encourage daily individual travel to the construction site from other more distant locations.

b. Recruitment

GA expects to use several approaches in identifying and hiring employees for the refinery project. It plans to use media advertisements (such as newspapers, radio, and television), seek references from other employees or candidates, as well as use various governmental organizations, such as the CNSS (Caisse Nationale de la Sécurité Sociale) and the National Department for Social Security for recommendations, and apply recruitment experiences of other recent projects. As it assesses and hires candidates, it will use skills tests (such as psychological) to assess the skills and qualifications of individual candidates

c. Training Plans and Needs

GA has initiated the development of a two-phased jobs training program. The first phase will address the training and employment needs of the training of non-skilled positions in the construction phase of the project, and the second phase will address longer-term training programs to train workers for semi-skilled/skilled positions in the operation and maintenance of the facility. Its proposed training programs will focus on skills enhancement, safety, project protocols and communication, health education (including AIDS/HIV training), and welfare awareness. GA has already met and is working with, non-profit and profit organizations that specialize in these specific areas.

The GA refinery project expects to train its employees using a combination of (1) class room training, (2) workshops and practical training, and (3) on-the-job training. It is expected that the training program will last throughout the first few years of the construction process, with smaller activities continuing throughout the construction phase. By year 2 of construction, GA will be conducting a simultaneous training program for operation positions for the mine and power plant. The two phases of training will coincide with the ramp up needs of the project. Their objective will be to utilize existing training system and schools, re-enforcing and adapting -- where necessary -- the skills sets and competencies of graduates.

The training programs will be coordinated with the project's construction schedule. GA estimates that employment needs could ramp up to over 7500 - 8000 in the first 1 ½ to 2 ½ years. In years 1 and 2, the main thrust will be the construction training program, with smaller activities continuing throughout years 3 and 4. By the end of year 2, GA will need a simultaneous training program for construction training as well as training for the operation of the refinery, mine, and power plant.

GA and its contractors expect to work with the Ministry of Technical Education to upgrade its vocational schools. It is expected that these schools will produce a large number of future employees for the construction and operations phases of the Project. Their training will incorporate skill-set training, safety and health education, community relations training and communication protocol training.

GA estimates training activities during the construction phase of the refinery project will cost approximately \$6M. Furthermore, GA aims to develop a training program that fully addresses the culture and community of its surroundings ranging from cultural assessment, public health, and AIDS/HIV prevention education. GA has examined other training programs in other countries to assist it in formulating an effective design for their program, and they have sought to learn from the experiences of the Mozal I and Mozal II aluminium smelters of Mozambique in which over 9000 Mozambicans were trained.

Table 1														
Preliminary Estimate of Hiring/Training Requirements of Sangaredi Refinery Project														
Source: Global Alumina														
QUARTER	DATE	HEAVY MACHINERY	TRUCK DRIVERS	LABORERS	CARPENTER	ROD BUSTER	BOILER MAKER	PIPE FITTERS	WELDERS	TRADES HELPERS	HEAVY EQUIPMENT CRANE OPERATORS	ELECTRICIANS	INSTRUMENT FITTERS	TOTALS
1st	1-Nov-05	100	20	151	5									276
	1-Dec-05	300	30	151	5									486
	1-Jan-06	500	40	151	5	253								949
	1-Feb-06	550	50	851	5	253			20					1729
	1-Mar-06	600	60	851	5	253			40					1809
	1-Apr-06	650	70	851	15	253			50					1889
2nd	1-May-06	700	80	851	15	253			50					1949
	1-Jun-06	754	90	851	15	253			50	100	100			2213
	1-Jul-06	754	100	1341	15	253			50	150	150			2813
	1-Aug-06	754	120	1341	50	253			269	400	200			3387
	1-Sep-06	754	136	1341	75	253			269	600	300			3728
	1-Oct-06		151	1341	150	253		200	269	981	417			3762
3rd	1-Nov-06		151	1341	181	253		490	269	981	417	298		4381
	1-Dec-06		151	1667	181		265	756	269	981	417	298		4985
	1-Jan-07		151	1667	181		265	756	269	981	417	298		4985
	1-Feb-07		151	1667	181		265	756	269	981	417	298		4985
	1-Mar-07		151	1667	181		265	756	269	981	417	298	63	5048
	1-Apr-07		151	1667	181		265	756	269	981	417	298	63	5048
4th	1-May-07		151	1667	181		265	756	269	981	417	298	63	5048
	1-Jun-07		151	1667	181		265	756	269	981	417	298	63	5048
	1-Jul-07		151	1667	181		265	756	269	981	417	298	63	5048
	1-Aug-07		151	1667	181		265	756	269	981	417	298	63	5048
	1-Sep-07		100	1667			265	756	269	981	417	298	63	4816
	1-Oct-07		100	1667			265	756	269	981	417	298	63	4816
5th	1-Nov-07		100	1667			265	756	269		417	298	63	3835
	1-Dec-07		100	1667			265	756	269		417	298	63	3835
	1-Jan-08		100	1667			265	756	269			298	63	3418
	1-Feb-08		100	816			265	756	269					2206
	1-Mar-08		100	816			265		269					1450
	1-Apr-08			816			265		269					1350
6th	1-May-08			816			265							1081
	1-Jun-08			816			265							1081
	1-Jul-08			816										816
	1-Aug-08			816										816
	1-Sep-08			816										816
	1-Oct-08			816										816
7th	1-Nov-08			816										816
	1-Dec-08			816										816
	1-Jan-09			816										816

Table 2
 Estimated Split of Local and Expatriate Hires for the GA Alumina Refinery
 Project

by Specific Job Category

TRADES	Percentages			TRADES	Percentages		
	EXPAT	LOCAL	SUB TOTAL		EXPAT	LOCAL	SUB TOTAL
ADMINISTRATOR/ ADMIN ASST.	80	20	100	MECHANIC/MECH.ASST.H/D	65	35	100
ADMINISTRATOR LAN	100	0	100	NDT TECHNICIANS	100	0	100
CH HAND/LEADERMAN	80	20	100	NDT CO-ORDINATOR	100	0	100
CABLE JOINTER	100	0	100	OPERATOR CRANE/R/PLANT/MASTER	85	15	100
CARPENTER/CARP.SHUTTERING/ASST.	20	80	100	OPERATOR EXCAVATOR/BACKHOL	35	65	100
CHAINMAN	0	100	100	OPERATOR FORK LIFT	20	80	100
CLEANER / ROOM	0	100	100	OPERATOR HEAVY LIFT/CRANE	100	0	100
COOK/COOK ASST.	80	20	100	OPTR COMP./OPTR DATA	95	5	100
DOCTOR	100	0	100	OPERATOR TELEPHONE	100	0	100
DRAFTSMAN	100	0	100	PAINTER/ASST.PAINTER/SIGN WRITER	60	40	100
DRIVER H.D./TRAILER/DUMPER/BUS D.	10	90	100	PLUMBER/PLUMBER ASST.	25	75	100
DRIVER L.D.	0	100	100	PROJECT/ACCOUNTANT	100	0	100
ELECTRICIAN AUTO	95	5	100	QC INSPECTORS	100	0	100
ELECTRICIAN/ASST.ELEC/TECH ELE.	70	30	100	RIGGER	85	15	100
ELECTRICIAN POWER	100	0	100	SAFETY OFFICER	100	0	100
ENGINEER	100	0	100	SCAFFOLDER/ASST.	35	65	100
FABRICATOR PIPE	90	10	100	SECRETARY/CLERK	75	25	100
FABRICATOR STEEL	75	25	100	STEELELECTOR	75	25	100
FIRE WATCHER	0	100	100	STOREKEEPER/CAMP B.AST..	65	35	100
FITTER CABLE TRAY	90	10	100	SUPERVISOR	95	5	100
FITTER CONDUIT	90	10	100	SUPT	100	0	100
FITTER INSTRUMENT/ASST.	100	0	100	SURVEYOR / ASST.	100	0	100
FITTER MILLWRIGHT	100	0	100	TECHNICIAN A/C	90	10	100
FITTER PIPE/ASST.	90	10	100	TECHNICIAN INSTRUMENT	100	0	100
FOREMAN-G/F	100	0	100	TECHNICIAN PWHT	100	0	100
GRINDER	40	60	100	TIMEKEEPER/CHIEF TIME KEEPER	90	10	100
INSULATOR	100	0	100	TURNER	100	0	100
LABOUR/HELPER	0	100	100	TYRE MAN	0	100	100
LAUNDRY ATTENDANT	0	100	100	WATCHMAN	0	100	100
MALE NURSE/MEDICAL ASST.	100	0	100	WELDER GTAW-SMAW.	95	5	100
MANAGER	100	0	100	WELDER (STICK)	95	5	100
MASON	15	85	100	WELDER (STRUCTURE)	90	10	100
EST % TOTAL EXPATS & LOCALS:	55	45	100	EST % TOTAL EXPATS & LOCALS:			

3. Use of Guinean Training Schools

Developers and most recently Global Alumina have been in discussions with the Minister of Vocational Education on the possible upgrade and utilization of two Guinean vocational schools -- Boké CFP and ENAM -- for use in training Guineans for the refinery project. Although they expect that the schools' longer-term programs (> 2 years) can be used to help meet the longer-term needs of the project, GA needs to immediately train and hire heavy machinery operators, welding operators, pipe fitters, and civil works employees; thus, they have discussed and developed a budget with the Minister of Vocational Education's team wherein they would support the creation of more abbreviated training programs at those schools that could be more responsive to GA's immediate needs. Similar to their regular programs, these programs would require the testing of potential employees, the development of training stations for intensive training, as well as the construction of new buildings to conduct the trainings.

Boké CFP is strategically located near the proposed refinery site and is central to the bauxite industry as a whole, and it has concentrations in heavy machinery operations and welding. Overall, it is felt that the Boké School requires significant investment to upgrade its facilities in order to train to the levels required for employment with the project. These investments will have to be in the infrastructure of the building, equipment for training and training of trainers. Recognizing the strategic position of the Boké School GA tentatively plans to build separate building(s) at the school that would be dedicated for its exclusive usage. The building would be equipped with appropriate tools for training, welding equipment, and other equipment as appropriate; and after completion of construction, GA would leave the building and equipment to Boké CFP for the long-term benefit of Guineans.

Technical bauxite industry experts believe that the current Boké CFP training facility for plant fitters is acceptable to potentially meet its needs if additional equipment more relevant to the project's specific requirements are contributed to the school. It also plans to expand the school's current mechanical training for vehicles that would allow it to provide for all types of construction equipment. This would require the contribution of additional mechanical training equipment. It expects its training program at Boké would extend for an anticipated 4-6 week period, and then it would transfer the training candidates to the construction site to work in the workshop and continue with on-the-job training.

The second school that is being considering for certain types of training is ENAM. GA observes that ENAM has undergone recent renovations, but they strongly believe that it still needs new equipment for training purposes that are more relevant to construction of complex plants and refineries.

In addition to Boké and ENAM, additional facilities may have to be erected/procured at other possible locations to ensure that a sufficient volume of skilled vocational students are trained to meet the immediate hiring requirements of the GA project.

4. On-Site Training

In addition to possibly contributing to the construction of training facilities on site at Guinean vocational schools, GA expect that training facilities and a temporary camp for the construction workers close to the project area and construction site in Sangaredi will have to also be constructed. The facilities will be ready to accommodate the training program management, trainees and the necessary equipment, as well as being able to be used as a community liaison center as the project progresses. A temporary living quarters camp will be also required for the accommodation of the construction workers on the campsite.

5. Training Schedule

As EPC contracts associated with the refinery project are finalized, the selected EPC contractors will be able to direct their attention to more carefully defining the precise training needs of their respective projects as well as their associated training schedules. Whereas, GA does not have final information available relating to the timing of its training plans, it can reasonably be expected, however, that the timing of the project's training needs will be

directly related to the hiring of new personnel to perform civil, mechanical, and electrical construction activities related to the project.

Whereas Table 1 presented a summary of the types of new hire skills that would be necessary for the first year and a half of construction, it also provides some insight into the scheduling of the training that would be required to ensure that skilled local personnel are available to meet the demands of jobs created by the project. For example, Table 1 clearly suggests that training must begin *immediately* to ensure that trained personnel are available in heavy machinery, truck driving, general labor, rod busters, carpentry, and welding to meet the hiring needs of the first six months of the refinery project. In addition, it also suggest that significant planning and likely some training activities also need to begin during the same first six months to ensure that an ample supply of truck drivers, laborers, carpenters, pipe fitters, welders, trades helpers, heavy equipment/ crane operators, and heavy machinery operators are available for the second six month period of construction. Similarly, significant planning and training activities need to begin during the second six month period to ensure that skilled personnel are trained to meet the labor skill needs of the 3rd 6 month period of refinery construction.

6. Types of Training

As indicated, the refinery project expects to train employees using a combination of training techniques that include (1) class room training, (2) workshops and practical training, and (3) on-the-job training (apprenticeship), and (4) an evaluation of proficiency and qualification. Prior to its start of the implementation of a formal training process, the company and its EPC subcontractors would precede the start of a formal training program by conducting both a broad-scale and then more individually-oriented training needs assessments of their own. GA's tentative training plan is depicted in Exhibit 2.

a. Training Needs Analysis

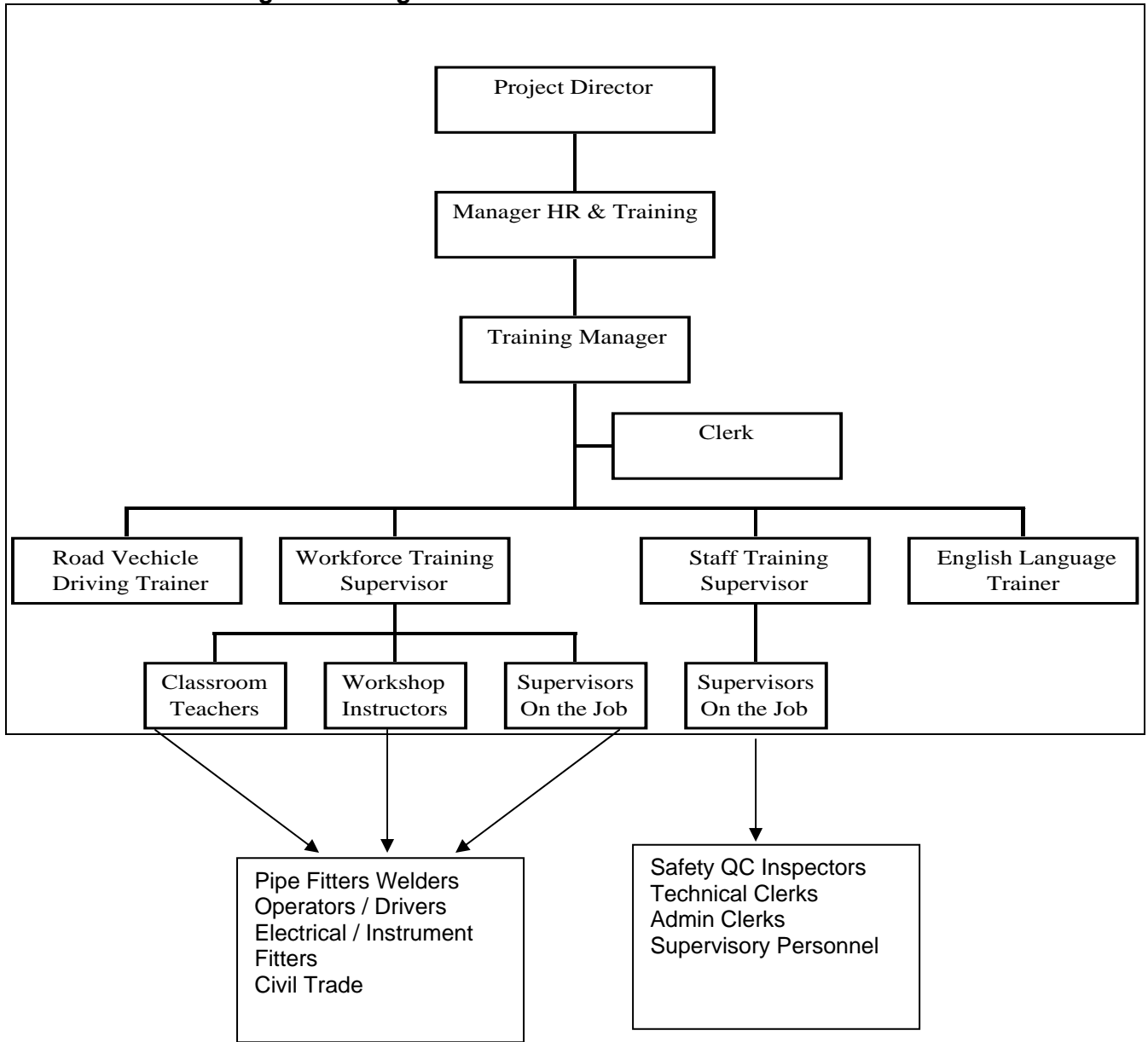
GA and each of its major EPC contractors will need to (1) clearly define the specific hiring needs of each of their EPC contracts (refinery, port, power plant, mine, etc) by labor skill category, (2) survey the Guinean market to determine the extent that these labor needs can be satisfied by hiring directly from the market, (3) determine which of these hiring needs can be satisfied in a timely manner by seeking to train locals to fill the positions., and then (4) determine which of the positions may have to be filled by importing more highly skilled workers from other countries.

On a smaller-scale, the company will need to identify the available skills of each new recruit that it hires by having an experienced supervisor or qualified instructor trade test the skills of all short-listed applicants. Based on this assessment, they will need to accordingly recommend the level of training required, if any, for each candidate. The trade of the employee being sought will determine the type of training that is required for each candidate. GA anticipates that standard training programs for trade skill areas will cater for two different types of hired employees. It plans to conduct:

- **Upgrading Training Programs:** that will be provided for those persons who have past experience in their field, and this training will include up-to-date relevant/approved qualification/certification.
- **Basic Training Programs:** that will be provided to those candidates who have minimal or no previous experience in a trade.

Table 3 outlines the specific types of training that GA typically would expect to plan for its new hires and trade employees. As is evident, certain trade categories such as welders, mechanical, and electrical are likely to receive all three types of classroom, on-the-job, and workshop training, while other trades such as operators and semi-skilled are likely to receive more limited, mostly on-the-job training.

Exhibit 2: GA Training Center Organization



b. Classroom Training

In addition to the health, safety and environment (HSE) induction course, other class room courses will fall under two broad categories; they will include (1) *Basic Course Modules*, that address the basic knowledge required per trade and where course subjects will be different and tailored to suit the particular trade, and (2) *Specific Course Modules*, that will focus on the specific elements of work / activities that are directly pertinent to the trade. Qualified teachers sponsored by GA or the vocational school will conduct the classroom training, and when necessary, translators will be provided to support those teachers not fluent in either English, French or local languages. GA is still in the process of finalizing its training plan for the refinery.

c. On-the Job Practical Training:

Newly hired employees that have completed the previous relevant phases of training will then receive relevant on-the-job training at or near the refinery construction site at Sangaredi. On-the-job training candidates will either be in a “Staff” position or a “Labor” position.

Staff training positions will be split into two categories:

- **Non-Technical Staff:** who will receive their training by being assigned to the appropriate section of the organization to be established on site. The section head and his team will be responsible for the proper training of personnel included in this category in actual day-to-day tasks. Job descriptions typically included in this category include clerical, administration, accounts, storekeeping, and the like.
- **Technical Staff:** (i.e. Welders, Fabricators, Fitters, Operators etc.) After completing their training, the Guinea technical staff will be assigned to the project organization for an “initiation period” determined by the performance of the trainee.

Labor training positions will include all other trades with the exception of the highly skilled labor categories. This phase of training will be conducted and presented on/ at the project site itself, and the on-site supervisor will ensure their compliance with all HSE, quality, and technical standards. The training will incorporate immediate task observation, and feedback from their direct supervisors will determine the level of their proficiency.

A major feature that is used in this type of training is the use of training cards that enable the trainers to actively participate in the process and successfully integrate into the work force. These training cards more or less represent task lists that are to be used by the experienced trainers during on the job training. The lists reflect the practical exercise that a trainee may have applied in the workshop. The training cards usually reflect the actual atmosphere that may be found on site.

In addition to providing new employees with a more hands-on, on-the-job experience, an integral part of all on-the-job training programs will cover (1) safety awareness instruction and practical training on safety issues and (2) the teaching of actual trade skills. There will be an overlap of the practical safety training and trade skills and the training will be designed to reinforce the safety instruction. It is intended to have the safety awareness training centre on site, this will also be used on a regular basis to reinforce the importance of the safety message as work progresses and enters different phases of construction and hence the safety risks alter.

Plant operators will be trade tested on-site and asked to perform simple tasks to establish aptitude. Those people selected will then be trained for the type of machine to be used. For cranes and excavators this will be extensive duration to ensure their competence.

As well as manual skills described there will be much on the job training in office skills and computer aided skills drafting, planning, measurement. As aptitude is displayed then the training will be adapted to ensure these employees leave with an appropriate and usable skill.

Table 3
Summary of Types of Training Utilized Trades for Different Trade Categories

TRADES	HSE Induction	Class Room	Practical training/Workshop	On the Job training
Welders	◆	◆	((
Operators	(-	-	(
Drivers	((-	(
Civil	((-	(
Mechanical	((((
Electrical	((-	(
Non Technical	(-	-	(
Semi skilled/ Unskilled	(-	-	(

Source: Global Alumina

d. Workshop/ Practical Training

Workshop and practical training is an important phase in training with respect to effectively imparting knowledge associated with technology transfer. This training requires careful planning and systematic performance, and the process needs to be carefully controlled to secure success. This phase will be provided to complement classroom training for certain technical trades, and it will be applied using three different approaches. They include: (1) training that occurs inside a workshop which is used for trades that require a shop equipped with necessary tools and equipment, (2) practical training occurring outside the workshop, and finally (3) the application of tests that will measure the trainee's skills and aptitude pre- and post the training. Similar to classroom training, qualified instructors from the training team will conduct the Workshop / Practical Training process, and translators will be provided to support those instructors not fluent in English, French or local languages.

7. Evaluation of Proficiency and Qualification

The training modules will be given in the classrooms and for the implementation courses trainees will go on to site or to simulators. Trainers will follow the development of each trainee and prepare a weekly report for each trainee. These reports will be entered in to the training management tool, and the progress that each trainee makes in the training process will be tracked. For each training module, Site Orientation, Health and Safety, Quality Management, and Emergency Actions courses will be mandatory. Trainees will be required to have a certain level of success in these courses to continue to the skills courses. After each course, a written and an applied exam will be performed. Trainees' success will be assessed with the results of these tools and trainer's comments. These will be entered into the system.

8. Trainer Recruitment Strategy

GA anticipates that trainers for each phase of the proposed training will come from a variety of sources. GA expects that a skilled team of trainers can be assembled from the following sources:

- Guinea's vocational training schools – Vocational schools such as Boke and ENAM already have a staff of skilled trainers who could be used by GA to train Guineans in skills necessary to construct and operate the refinery and other associated projects. The constraints on using these trainers might be (1) they are already fully booked teaching classes at the school and may not be available to teach additional courses, (2) they may not have the necessary level of specialized training that is required and directly relevant to the construction and operation of the refinery and who themselves may have to be trained.
- The Guinean skilled professional labor market – there are likely numerous highly skilled professionals in Guinea that may be interested in becoming a trainer, and who themselves may require additional training,
- The EPC contractors – EPC contractors are likely to assign members of their teams to assist in classroom and workshop trainings, and they will definitely be direct participants in the on-the-job training activities.
- Training consultants and advisors to GA's EPC contractors – GA and its EPC contractors are likely to hire additional foreign consultants to assist in the training of Guinean laborers as the need arises.

9. Training of Trainers

Experienced candidates need to be trained to become trainers so that they can work on-site and/or be available to teach refinery specific skills at select vocational training schools. Experienced trainers need to be taught in the following skills: laborers, carpenters, iron workers, metal workers (welders, fitters, helpers, electrical workers, raceway, and terminators), instrumentation workers (fitters and technicians), painters, and insulators. Trainer candidates and graduates will be asked to create Training Modules Content (job specific manuals) for the trainees, their own training plan and proposed teaching methodology, and be able to develop detailed teaching strategies and action plans.

In addition, English/French language training will be available to non-English speaking staff.

10. Employee Selection Criteria

The selection criteria of potential new trainees will be dependent upon the specific trade that is being hired by the company. For skilled trades, GA will attempt to hire those candidates who have past experience and/or those who are graduates of technical schools in the field of the required discipline. For the hiring of persons for unskilled trades, no preference criteria will be set other than establishing a professional personnel assessment of the candidate and his/her skills before hiring, them based on willingness to learn, and compliance with HSE standards.

VII. Comparison of Needs and Resources

1. Identification of Potential Labor Resources

Overall, the mining industry in Africa has been undergoing an “Africanization” process, but this process appears to have greatly stalled in Guinea because of the lack of available local workers with the necessary skills. This inavailability of local workers is mainly due to the inability of Guinean schools to provide training and graduates who match the needs of employers in the market. It is also due to the difficulty encountered by employers in identifying qualified candidates from the market. The GOG and local industry have almost no resources dedicated to monitoring employment opportunities and to tracking and documenting worker skills. This makes it extremely difficult to match qualified workers to business hiring requirements. Presently, potential jobs are announced primarily through word of mouth that often leads to announcement of potential jobs leading to substantial, unorganized surges by employment candidates to project sites.

For example, the recent news of the GA project has spread to former students of CFP – Boké spontaneously returning to the school to seek more information about possible jobs. The school received inquiries from 300 welders and 200 masons despite neither the school nor GA having made any public announcement about possible jobs. Separately, GA’s own preliminary analysis estimates that there are potentially 3,000 people who might be interested in working on their project, even though their skills remain unknown.

The GOG needs to be provided with Technical assistance to develop a system to better monitor the labor market.

2. Gaps in Skills and Training

Guinea benefits from a large number of vocational schools and some university programs that are intended to impart training skills, and to reinforce the professional and technical experience, of its students. The Guinean vocational and university training system, however, is inadequate to meet the hiring needs of employers in the country in three main areas:

- **Supply:** The Guinean training system is unable to produce the number of qualified workers demanded by industry due to:
 - *Course duration:* the courses are long (3 years on average), which reduces the school’s ability to quickly train students in volumes that are sufficient to meet the needs of industry.
 - *Limited student spaces;* the existing education system is producing a larger number of high school graduates than the vocational schools and universities are able to absorb and these students are expected to fill positions available at CBG and Fria; and
 - *Entrance requirements:* few courses are available to students who have diplomas below the BAC I level which causes an imbalance in the availability of unskilled, semi-skilled and qualified employees.
- **Quality:** The Guinean training system is unable to provide students with skills desired by companies hiring in the country:
 - *Courses do not meet industry needs:* Guinean industry needs more graduates with more specific skills; and
 - *Courses do not meet international standards:* It is generally agreed within industry that does not meeting international standards. Welding is an example where students are taught and develop skills that do not meet the standards required in the construction of complex projects where welding is often critical. In other cases there are limited courses in the skills required by industry such as heavy machinery mechanics.
- **Inefficiency:** Interaction and communication between all the participants in the Guinean educational system is insufficient and sometimes non-existent, and the system fails to meet education demand:
 - There is little coordination between the key ministries, universities and vocational institutions, and industry

- Many potential students are “being lost’ between the various education levels because of insufficient places and high entry requirements.

These inadequacies are largely due to little knowledge regarding the availability and qualifications of candidates, unemployment figures, as well as of industry’s needs. Despite the Guinean education system having numerous structures capable of providing training and technical education to Guinean students, it is clear that the system falls short in numerous areas.

3. Specific institutions/organizations for development

It is clear that the human resources and educational facilities exist in Guinea, even though they are generally in need of modernization. In particular, curricula and training equipment are the areas most in need of being brought into line with industry’s needs.

On the positive side, there are numerous institutions, which are already aware of the need to better answer the hiring trends within the labor market. There is also extra capacity within the vocational structures, such as empty classrooms in schools where teaching only takes place in the morning and idle staff which can be rapidly brought into play.

Therefore, it is apparent that the Guinean vocational training system needs greater coordination and a strategic plan for re-organization. It is the opinion of the USAID Team that assistance efforts should be concentrated on a few select institutions through which curricula and teaching staff can be funneled to answer the hiring needs of industry through phased projects.

VIII. Conclusions and Recommendations

It is clear that Guinea has failed to take effective advantage of its rich natural resources and that its mining industry has failed to deliver the hoped for long-term employment and significant improvements to the quality of life of average Guineans.

There has been considerable renewed interest in the bauxite industry in recent years that has been triggered by the growing international demand for aluminum. Significant downstream refinery projects are being proposed and developed, and some of these projects are noteworthy because of the developer’s commitment to employing the maximum number of local workers possible. The first of these projects is the \$ 2.2 billion Global Alumina project. This project offers the GOG an important opportunity to ensure that a greater proportion of the income generated by earnings and the Value Added from the project will remain in the country, increased benefits are accrued to the economy as a whole, and unlike in the past, rewards from the project are passed on to the general population.

The recently completed TNA mission had, as its objective, to assess Guinea’s ability to take advantage of the proposed mining projects -- especially bauxite -- and to ensure the maximum benefit both in the short- and long-term to the economy. The team specifically looked at the ability of the Guinean labor market and education system to meet the demand for new workers by industry, based on needs envisaged for various upcoming projects starting with the construction of the GA’s refinery project scheduled to begin at the end of 2005.

The Guinean labor market’s ability to provide unskilled, semiskilled, and fully qualified workers as well as engineers for the GA project is difficult to judge as the GOG has no structure in place to assess and facilitate employment. The education system has suffered from inconsistent support, insufficient resources and inconsistency between the various education levels. The existing vocational schools visited by the USAID Team were felt to be lacking in available space for students, specially qualified teachers, and up-to-date equipment (such as CFP – Boké). The serious lack of adequate facilities and specifically teachers has meant that a significant number of students are unable to obtain desired specialist qualifications which would qualify them for jobs by companies such as GA. Further, the schools’ curricula are felt to be ill-matched to the needs of the market. Courses need to be brought up-to-date and in-line with international standards if they are to meet industry demands. Similarly, there is an urgent need to create shorter, more intensive courses which will by nature be more limited, but at the same time, more specialized and matching the needs of prospective employers. These

courses could then be combined as modules in order to allow workers to develop their skills as they work and potentially help to create opportunities for some of the high school graduates as well as for those who are presently slipping through the system. It will be important when developing these courses that entry level requirements be carefully established to ensure the full range of skill levels meet those that are most desired by industries within the country.

Recommendations for a Strategy:

It is the USAID Consulting Team's opinion that an appropriate strategy for modernizing the employment and training system of Guinea could be built on the present employee needs of GA's refinery project, since the project could be considered to be a template for the types of skills that will be needed by other projects likely to be proposed for, or constructed in Guinea in the near future.

The Team also feels that a phased approach for developing a strategy and program to develop the skills of the Guinean work force should be funneled through existing governmental and vocational structures within the country to ensure that the opportunities offered by GA and the bauxite industry are not lost.

Phase I: Strengthening of Vocational Training System (1-5 months)

The Team recommends that efforts to strengthen Guinea's vocational training system should begin with focused assistance aimed at revamping and strengthening of the curriculum and training equipment located at CFP – Boké. Due to the school's strategic location amongst major project sites, it would be advantageous to workers and to the needs of employers to concentrate capacity building efforts at the school. The school has more students than it is capable of fully handling due to limited resources and the inefficient use of those resources. Classrooms are empty both in the afternoons and the evenings when there is a demand for places and a need of skilled graduates. Therefore, during Phase I, the Team recommends that project efforts should be concentrated on:

- **Improving existing facilities** with respect to:
 - *Classrooms* – more teaching space needs to be constructed to handle an increased number of students
 - *Equipment for training* – more modern welding facilities, machinery labs, processing laboratory need to be purchased and made available to students
 - *Electric generating equipment* – when the Team visited the school, the school had been without electricity for 3 days; effective education needs reliable electricity.

- **Reviewing and improving curricula** -- short intensive courses need to be created for specific skill sets. At present, the school's curricula are based on a three year training schedule, which is capable of producing only a small percentage of the skilled workers needed by Guinea's mining industry to construct and operate new projects. Therefore, the school needs to develop new curricula – possibly with Guinean industry's assistance -- which are shorter and more specific to produce a higher volume and range of unskilled, semi-skilled and qualified workers. Suggested activities might include:
 - *Improve specific courses to meet international standards* –though the school produces skilled welders, electricians, and construction workers, the qualifications of graduating students are better matched to non-critical construction, and they do not meet the specific needs of companies such as GA. The planned refinery and power projects -- as well as the associated supporting infrastructure projects -- will require a much higher level of skills than presently taught. Curricula and teachers need to be developed to train students who can graduate to meet the higher standards.
 - *Develop a health and safety course* – though most companies prefer to train their staff on Health and Safety on their own, it is felt that the students could benefit from a course within the vocational school curricula. The course should be developed in close collaboration with GA, CBG, and the Ministry of Health.

- *Training of trainers by industry* – in order to get the new courses up and running rapidly (for example, GA plans to initiate construction on the Sangarédi project by the end of 2005), engineers and staff from industry should be engaged to train trainers in the skills which their companies will be needing most urgently. Representative teachers from other institutions should be encouraged to attend (ENAM, Chamber of Mines, ONFPP, and CFP Fria). These courses should also include a number of students as a first wave of workers.
- *Development of a worker evaluation program*

Once new trainers have been trained in skills that are immediately required by industry they can act as supplementary teachers at other institutions focusing training on specific segments of the labor market (unskilled, semi-skilled and qualified workers). Examples of Guinean educational programs and their target markets which could be utilized at Boke' and elsewhere include:

- ENAM – short-term course development; continuation of training of trainers
- Chamber of Mines – retraining of existing qualified workers
- ONFPP – training of unskilled and illiterate workers; SME training
- CFP Fria – course development of refinery workers

When training unskilled and illiterate the value of visual/video training should be considered.

Phase II: Identification and Evaluation of Labor Market (month 1 – month 5)

The imminent start-up of at GA's Sangarédi project requires a rapid response by the GOG in identifying and cataloging potential workers. As indicated earlier in the report, no present system currently exists that is capable of identifying, analyzing, tracking, or placing available skilled and unskilled laborers in the Guinean market.

To help remedy this lack of information regarding the available Guinean work force, the Team proposes the:

- *Establishment of "Employment Centers"* in Boké, Sangarédi and Kamsar,
- *Creation of a register/databank of employable workers* -- together with their qualifications, which could take the form of a census,
- *Development of a worker's evaluation program*. The evaluation criteria should be defined in close collaboration with the mining industry, which can be used by the employment centers to complete a first filtering of potential workers. The filter could identify fully qualified staff and/or those needing further training (refresher courses or more specific intensive training), and
- *Development of an information campaign to bring potential workers into the employment centers*. It is envisaged that there will need to be a combined media campaign through radio, newspapers, posters, and word-of-mouth in key cities.

Institutions, which could assist in, or themselves host, the process might include:

- Regional governments.
- CFP – Boké.

The Team recommends a process, which starts at a grass roots level and then becomes more centralized at the national level within the government in a later phase of government capacity building.

Phase III: (month 6-month 24)

As part of its phased-in approach, the Team also recommends that USAID/Guinea support assistance activities that could be implemented beyond the immediate recommended activities suggested in Phases I and II. They include the:

- *Development of a shared strategy between the various Ministries involved in education.* Presently, there is little or no coordination between the various Ministries involved in education that has led to an imbalance of students between the various tiers of education and unemployment.
- *Development of new training facilities through branches of existing schools to train “lost” students.* It is apparent that the number of applications to further education, whether vocational or university, out strips the number of places. The students who fail to get into existing institutions are left with few alternatives. The Guinean system therefore needs to both increase the number of institutions providing training and develop alternatives to the existing system with lower entry levels.
- *Development of local Public/Private employment agencies.*

Phase IV (month 12 – month 36)

Additional activities that might be considered by USAID/ Guinea that would take place beyond the first year would include the:

- *Development of a true on-the-job vocational training system* – development of life skills capable of facilitating employment. The present vocational education system is a lengthy full time course unlike other vocational training systems developed in the UK and US. This limits the type of students who can apply to the school because they cannot afford to be in “full time” education. There is a distinct need to develop a vocational training system that recognizes on the job experience combined with short modular courses, which can be built up to a recognized certificate.
- *Strengthening of ISMGB* – Support the implementation of some of ISMGB’s programs. Provide further facilities to increase the number of students attending. Develop a strategy for positive discrimination to encourage more women to enter technical education and engineering.
- *Capacity building of Ministry of Employment to monitor labor market.* This program phase would aim to build on the Phase II grass roots program, which identified workers and their qualifications through a census. The program completed in Phase II should be copied in other regions of the country and information collated at national level. Assistance should be provided to the Ministry to ensure data obtained are utilized to develop policies for the promotion of employment and to develop education policies to match the labor market’s needs.

Risks Associated and Mitigation

Some risk are associated with the proposed project both because of the environment in which activities are to take place as well as those associated with the development of the bauxite sector itself and the complex financing structure of GA project.

Risk	Mitigation
Lack of Commitment from Government	Ensure the full involvement of GOG and ensure they buy into the project through the clear identification of benefits
Inability to attract sufficient qualified staff at early stages of GA project	Early launch of recruitment campaign; Expansion beyond the region of the project. Risk that fewer locals employed as project is financed and therefore has some time line restrictions positions will have to undergo Africanization at a later stage.
Slow development of professional training schools	Use experience of ENAM
Procurement delays	US government has strict rules on procurement. To minimize delay use GA contributions at early and strategic points of project e.g. equipment purchase

Appendix 1

Technical Needs Assessment Meeting Agenda

MEETING SCHEDULE FOR GUINEAN TRAINING NEEDS ASSESSMENT

First Week

June 6, 2005

Meet with Alpha (DAS) Diallo, Deputy Program Officer and Tidiane Diallo, Senior Education Policy Advisor (a Sangaredi resident) to provide background and to review the agenda.

Meet with Tom Crubaugh, Acting Mission Director

Meet with Haskell Ward, Vice President and Chris Albert, Global Alumina

June 7, 2005

Meet with USAID Program Staff (Natural Resources, Democracy and Governance, Education and Agriculture and Trade)

Meet with Mr. I.S. Sankhon, Chief of Cabinet, Ministere de L'Enseignement Technique et de la Formation Professionnelle and key staff.

Meet with Mr. Bangali Thaim, Directeur des Studes, Econle Nationale des Arts et Metiers (ENAM - Vocational School in Conkary) and key staff

June 8 2005

Departure for Kamsar to tour project site

Tour Global Alumina Port site

Tour CBG port facility

Meet with CBG training facility Director

June 9, 2005

Depart for Boké

Meeting with Fode Camara, Diecteur du Centre de Formation (CFP – vocational school in Boké) and key staff

Tour CFP facility

Meet with local authorities – Perfect and Governor

Depart for Sangeredi to tour refinery site

June 10, 2005

Return to Conakry

June 11, 2005

Meet with Pierre Maalouly, Project Administrator, Consolidated Contractors Company (CCC)

Second Week:

June 13, 2005

Meet with Annette Adams, USAID Mission Director

Review material and arrange meetings for the week.

June 14, 2005

Meet with Mr. Saidou Kamissoko, Chef de la Division, Ministere des Mines et de la Geologie, Division Resource Humaines

Meet with Mr. Dialo Nounlcouman, Director National de l'euplor, Ministere Emploi

Meet with Mr. Albert Dramou, Adminstrateur Civil, Director General Adjoint, Office National de Formation et de Perfectionnement Professionnels (ONFPP)

Meet with Dr. Marcel Tamba Milimouno, Professeur, Directeur General Adjoint, Agence Guineenne Pour La Promotion de L'Emploi
Meet with Mr. Bian Herlihey, Vice President, Global Alumina

June 15, 2005

Meet with Mr. Oumar Barara Toure, Permanent Executive Secretary, Chambre Des Mines De Guinee
Meet with Ms. Naima Pages, Economiste, Union europeenne
Pick up materials at ENAM

June 16, 2005

Meet with Antoine Cissoks,
Meet with Annette Adams, USAID Mission Director and key staff, TNA Team and Global Alumina
Meet with Mission staff to debrief on TNA
Jeff Humber and Roxanne Suratgar (TNA Team) depart for Paris

June 17, 2005

Jeff Humber and Roxanne Suratgar (TNA Team) meet with Technip and CCC team in Paris – John Wright.

Ellen Dragotto meets with Mr. Kelefa Diallo, Rez de Chaussee at MEPU-EC Building
Meet with Ide Ghandou, World Bank - Cancelled

TNA Team departs for US.

Appendix 2

Description of Class Curriculum at CFP Boké

Mining

- mining maps
- mining areas exploration
- mining hydrology
- water extraction
- evaluating ore deposits
- using explosives
- material handling
- mineralogical separation
- control of mining grounds

Car mechanics

- maintenance of distribution circuits
- maintenance of connecting rods
- maintenance of cooling systems
- maintenance of greasing systems
- maintenance of igniting systems
- maintenance of fuelling systems
- maintenance of gear system
- maintenance of frames, shock absorbers, brakes
- maintenance, breakdown diagnosis, tuning of engines and generators
- soldering

Metal works

- metal carpentry
- making doors, windows, gates
- making brick molds
- making shovels, wheelbarrows, rakes, buckets, watering cans
- making furnaces
- soldering

Masonry

- general building skills
- making foundations and balconies
- tiling

Woodwork

- roofing
- ceilings
- making doors, windows, furniture, wooden floors

Mechanics for public works machinery

- maintenance of cylinder heads and valves
- maintenance of pistons, connecting rods, and other engine parts
- maintenance of greasing and cooling systems
- maintenance of fueling systems
- maintenance of gear parts
- maintenance of igniting, lighting and control systems

- maintenance of electric systems and parts
- maintenance of hydraulic systems
- maintenance of frames, shock absorbers, brakes
- maintenance, breakdown diagnosis, tuning of engines and generators
- soldering

Appendix 3

Description of Courses Offered by ONFPP

Title	Description	Target
Initiation to painting	Basic painting skills, 42 hours	Beginners
Initiation to tiling	Basic tiling skills, 51 hours	Beginners
Improved skills for painters	Painting level 2, 20 hours	Skilled workers
Improved skills for tiling workers	Tiling level 2, 25 hours	Skilled workers
Improved skills for supervisors	30 hours	Supervisors
Initiation to woodwork	Basic woodwork, 150 hours	Beginners
Improved skills in woodwork	Woodwork level 2, 10 to 70 hours	Skilled workers
Improved skills in masonry	Masonry level 2, 60 hours	Skilled workers
Improved skills in plumbing	Plumbing level 2, 60 hours	Qualified plumbers
Initiation and improved skills in soldering	Soldering levels 1 and 2, 70 hours	Beginners and skilled workers
Electricity for construction work	Basic skills, 2 courses of 60 hours	Beginners
Improved skills in electricity for construction work	Electricity level 2, 60 hours	Skilled workers
Hygiene, workplace safety		Beginners and skilled workers
Using measuring devices	20 hours	Repairmen, qualified workers in electronics
Assembling using transistor amplifiers	20 hours	Repairmen, qualified workers in electronics
Assembling circuits and receiving antennas	20 hours	Repairmen, qualified workers in electronics
Repairing TV sets	6 hours	Repairmen, qualified workers in electronics
Repairing cooling facilities and air conditioning	60 hours	Skilled, literate workers
Air conditioning in cars	40 hours	Skilled cooling technicians and mechanics
Initiation and improved skills in repairing TV and radios	50 hours	Beginners
Initiation and improved skills in industrial electricity	60 hours	Beginners and skilled workers
Engines: identification of injection pumps and breakdown diagnosis	60 hours	Skilled mechanics, garage supervisors
Diesel engines fueling circuits	40 hours	Skilled mechanics, garage supervisors
Propping up injection pumps	40 hours	Skilled mechanics, garage supervisors
Diesel engines preheating circuits	40 hours	Skilled mechanics, garage supervisors
Start and charging circuits	30 hours	Skilled mechanics, garage supervisors
Mechanic fuel injection	40 hours	Skilled mechanics, garage supervisors

Controlling axles	30 hours	Skilled mechanics, garage supervisors
Fueling: diagnosis and operating principles	40 hours	Skilled mechanics, garage supervisors
Diagnosis and repairing of gear shifts	40 hours	Skilled mechanics, garage supervisors
Braking circuits	30 hours	Skilled mechanics, garage supervisors
Classic ignition circuits	20 hours	Skilled mechanics, garage supervisors
Electronic ignition circuits	40 hours	Skilled mechanics, garage supervisors
Soldering	20 hours	Skilled mechanics, garage supervisors
Repairing plastic body components	40 hours	Skilled mechanics, garage supervisors
Controlling a car's body	30 hours	Skilled mechanics, garage supervisors
Spray painting, color mixing	40 hours	Skilled mechanics, garage supervisors
Drivers' manual	Driver improvement, 40 hours	Beginners and drivers
Truck driving	60 hours	Beginners and drivers
Driver improvement	30 hours	Beginners and drivers
Checking and discovering breakdowns on electric machinery	30 hours	Technicians, repairmen
Protecting electric machinery	30 hours	Technicians, repairmen
Automated command of electric engines	30 hours	Technicians, repairmen
Choosing and installing generators	30 hours	Electricians
Starting different kinds of engines	15 hours (2 courses, one for each kind of engine)	Skilled workers, technicians, engineers
Braking tri-phased engines	15 hours	Skilled workers, technicians, engineers
Programming a command system for engines	45 hours	Skilled workers, technicians, engineers
Industrial pneumatic facilities	40 hours	Workers using these facilities
Industrial hydraulic facilities	40 hours	Workers using these facilities
Choosing programmable industrial automats	42 hours	Workers using these facilities
Planning maintenance	20 hours	Workers responsible for maintenance
Maintenance and repair of electric systems	60 hours	Engineers and electro-mechanics
Improved skills in machine tools	50 hours	Technicians, skilled workers

Appendix 4

Description of Training Needs of Representative Large-scale, Alumina Refinery Project in Guinea

During the Development Stage the training materials and the courses will be prepared for the following skills, grouped by professions.

(i) Carpenters

- Cutting
- Fitting
- Assembling wood
- Shaping wood
- Using blueprints
- Measuring
- Marking
- Arranging materials
- Use of hand and power tools
- Joining materials using nails, adhesives, screws, staples, etc.
- Checking accuracy using levels, rules and other instruments of measurement

(ii) Iron workers

- Determining number, sizes, shapes and locations of reinforcing material from blueprints, sketches or oral instructions
- Selecting proper reinforcing material to ensure public safety
- Cutting materials
- Placing reinforcing materials in forms
- Bending materials
- Ensuring that all materials are in their proper positions so that it receives the intended structural load
- Fastening the materials together with wire or welding
- Attaching reinforcing materials to supports in concrete form
- Using the following equipment:
 - ✓ Rod bending machines
 - ✓ Acetylene torches
 - ✓ Arc-welding equipment
 - ✓ Bar cutters
 - ✓ Tape measures
 - ✓ Safety belts
 - ✓ Wood or metal support material
 - ✓ Blueprints and sketches
 - ✓ Hand tools, ladders and scaffolds
 - ✓ Steel rods, steel bars and wire mesh
 - ✓ Hammers, pliers, hacksaws and levels

(iii) Metal workers

(A) Welders

- Knowledge of metallurgy
- Ability to follow blueprints
- Operate hand and power tools
- Mechanical properties of welding
- Safety
- Shearing and sawing of metal using power tools
- Drill, grind, chip and brush metal using common hand tools
- Use and maintain oxyacetylene, electric arc and spot welding equipment
- Weld ferrous and nonferrous metals
- Braze and solder metals
- Perform inert gas welding, flame cutting, flame heating and heat treating techniques on metal
- Form, bend and straighten metals by forging

(B) Fitters

- Read and interpret blueprints, sketches and diagrams
- Fit and assemble prefabricated metal parts
- Move and align subassemblies and components using lifting and transporting devices such as overhead cranes
- Install major components such as gears, pumps, motors or hydraulic assemblies
- Inspect parts, subassemblies and finished products to ensure quality

(C) Helpers

(iv) Electrical workers

- Reading and interpreting drawings, blueprints and electrical code specifications
- Installing, examining, replacing or repairing electrical wiring, receptacles, switch boxes, conduits, feeders, case assemblies, lighting fixtures and other electrical components
- Testing electrical and electronic equipment and components
- Maintaining, repairing, installing and testing electrical motors, generators, industrial storage batteries and various electrical control systems
- Maintaining, repairing, installing and testing switchgears, transformers, switchboard meters, regulators and reactors

(A) Raceway

(B) Terminator

(C) Helpers

(v) Instrumentation workers

- Pneumatics
- Electropneumatics

- Hydraulics
- Electricity
- Electronics
- Ability to use and install, repair, maintain, calibrate and program:
 - Indicators
 - Recording devices
 - Control loops
 - Computers
- Consult manufacturer's manuals, circuit diagrams and blueprints to determine tests and maintenance procedures for instruments used for measuring and controlling flow, level, pressure, temperature, chemical composition and other variables in manufacturing and processing
- Inspect and test operation of instruments and systems to diagnose faults using pneumatic, electrical and electronic testing devices and precision measuring instruments
- Repair and adjust system components, such as sensors, transmitters and programmable logic controllers, or remove and replace defective parts
- Calibrate components and instruments according to manufacturers' specifications
- Perform scheduled preventive maintenance work and complete test and maintenance reports
- Install control and measurement instruments on existing and new plant equipment and processes
- Consult with and advise process operators.

(A) Fitters [insulation fitters]

- Erection and checking of working and protective scaffolding;
- Fitting of lightweight walls and suspended ceilings;
- Design and manufacture of simple sheet metal parts;
- Selection of insulating materials, casing materials and fastening devices appropriate to the intended
- Function and taking account of noise-proofing and fire-proofing considerations;
- Fitting of insulation materials: laying, joining, winding, bonding, wiring, strapping;
- Application of insulation materials: pouring, blasting, packing, foaming;
- Manufacture and fitting of mattresses made of insulating materials;
- Building and mounting of support and bearing systems;
- Encasing the insulation material with metal, foil, sheeting, strapping and hard plastic jacketing; and
- Monitoring the finished work

(B) Technicians

- Test and record effects of varying conditions (actual or simulated) such as vibration, temperature, humidity, pressure, liquid flow/level, altitude, acceleration and so forth. They prepare graphs and written reports translating test results into meaningful terms.
- Make sketches and build or modify fixtures and instruments and related apparatus
- Verify the acceptability of devices fabricated by other technical personnel

- Troubleshoot, repair and perform preventive maintenance on test apparatus and peripheral equipment
- Operation of:
 - Calculators
 - Computers
 - Testing devices
 - Laboratory equipment
 - Drafting tools
 - Electronic/mechanical instruments
 - Engineering handbooks

(vi) **Painters**

- Select appropriate paint or mix paints using automated paint mixing equipment according to a pre determined formula
- Tend or operate equipment to clean, wash or otherwise prepare items for application of paint, lacquer or other protective or decorative coatings
- Tend or operate automated spray paint, dip or flow coating equipment or other mechanized painting or product coating application equipment
- Operate hand held spray guns to spray paint or coat stationary items or items on moving conveyor system with protective or decorative coatings
- Paint small items and apply touch ups using paint brushes
- Clean and maintain painting and coating equipment
- May prepare and apply stencils, decals or other decorative items on finished products.
- Methods and techniques of preparing surfaces and applying protecting coatings
- Techniques of sand and water blasting
- Techniques of taping and drywall texturing
- Safety and disposal of hazardous materials

(vii) **Insulators**

- Read and interpret drawings and specifications to determine insulation requirements and select type of insulation required
- Measure and cut insulating material to required dimensions using hand and power tools
- Apply and secure insulation using spraying, blowing, pasting, strapping, taping and other application and installation methods
- Fit insulation around obstructions and between studs and joists

- Install vapour barriers
- Apply waterproofing cement over insulating materials to finish surfaces
- Remove asbestos or urea-formaldehyde insulation from buildings when required.

Appendix 5

Basic Requirements for Training Centers

Initially, training may take place in rented facilities or in prefabricated units.

Training facilities usually consists of:

Class Room:

- Chairs / desks as required.
- Equipment including 1 VCR, 1 large size monitor, 1 slide projector, 1 flip chart & 1 white board as required.
- Training materials depending on the subject such as pipe & safety equipment, small tools, sample project materials, etc.
- Training documents depending on the subject such as sample ISOS, drawings, and procedures
- Booklets for classroom lessons

Workshops:

Workshops, when required, will be equipped with all necessary tools and equipment to suit the task. The main equipment to be provided may include but not be limited to:

Piping Workshop:

<u>Available</u>	<u>Quantity</u>
Work benches	As required
Pipe stands	As required
Oxy-fuel equipment	As required
Plasma cutter	As required
Cold cutting equipment	As required
Welding machine	As required
Clamps	As required
Tool boxes	As required

Welding Workshop:

<u>Available</u>	<u>Quantity</u>
Work benches	As required
SMAW	As required
TIG	As required
SAW	As required
Oxy-fuel	As required
Cold cutter	As required
Accessories	As required

Electrical / Instrumentation Workshop:

<u>Available</u>	<u>Quantity</u>
Work benches	As required
Tool boxes	As required
Measuring and testing equipment	As required
Project materials and consumables	As required

Carpentry / Rebar:

<u>Available</u>	<u>Quantity</u>
Work benches	As required
Measuring tools	As required
Bar bending tools	As required
Accessories	As required

Appendix 6

Institut Supérieur des Mines d' Géologie de Boke (ISMGB) Proposed Course on Metallurgy and Treatment of Metals

The ISMGB of Guinea is proposing to conduct the following series of courses for the Guinean mining industry.

1. Basic Technical Education:

- Valorization of resources and reserves
- Mineral technology
- Physical and mechanical properties of metals
- Physics of Metals
- Crystallography
- Industrial electricity
- Operational research
- Hydraulics
- Information Technology (I & II)

2. Optional Courses:

- Metal technology
- Treatment of Calcium based minerals
- Treatment of diamonds
- Thermal treatment
- Preparation of ornamental gems
- Fragmentation and enrichment
- Maintenance of treatment equipment
- Control of treatment processes
- Treatment of iron materials (I & II)
- Treatment of non-ferrous materials (I & II)
- Automation of treatment processes
- Systems for aeration and air conditioning
- Lifting Machinery and maintenance
- Treatment of precious metals
- Study of the impact of treatment processes
- Treatment of rare metals
- Visits to the treatment plants
- Practical industrial internship
- Open internship and research
- Personal study
- English I, II and III
- Economics of the metals sector
- Safety at work
- Analysis of and management of stock
- Management

3. Business Studies

- Business management
- Industrial Project management
- Management of industrial operations
- Marketing of products
- Legal studies

4. Training of Senior Technicians

Course was recently established. First year has still to graduate.

Year One:

1. Common Trunk Courses

- Measurement Science
- Mathematics
- Statistics
- Physics
- General Chemistry
- Computer Science (initial course)
- Guinean Geology
- Industrial Drafting
- Introduction to General Economics
- English I
- Land surveying
- Industrial minerals
- Mineralogy
- Mine development
- Mine Operations
- Mine machinery
- Mine exploitation I
- Elementary electricity
- Internship

2. Specializations:

a. Option Mine Surveying

Year Two	Year Three
<ul style="list-style-type: none"> • Plans and maps • Surveying II • Surface determination • Land mapping • Goniométrie • Height and level measurements • Mine legislation • Efficiency and management of production • Communication science • English II • Internship • 	<ul style="list-style-type: none"> • Levés spéciaux • Topographic information • Mapping of mining fields • Prospecting and calculations of reserves • Official surveys and mapping • Company creation • Economic evaluation of mining projects • Roads and public works design • Site and road construction • Ecology and environmental studies • Health and safety • Project management • Internship • Thesis

b. Mineral and Metallurgy Option

Year Two	Year Three
<ul style="list-style-type: none"> • Instrumentation and control mechanisms • Electronics • Mineral Chemistry • Applied thermodynamics • Hydraulics • Specific Technical • Fluid Mechanics • Chemical analysis • Concassage Criblage • Material handling • Mining Legislation • Efficiency and management of production • Communication science • English II • Internship 	<ul style="list-style-type: none"> • Process control • Crushed Ore– classification • Drying and Calcification • Techniques for the valorization of minerals • Metallurgy • Cement production • Economic evaluation of a project • Treatment of rejected material • Health and safety • Corrosion • Preventative management • Treatment projects • Internship • Thesis

c. Mineral and Public Works Career

Year Two	Year Three
<ul style="list-style-type: none"> • Hydrogeology • Rock mechanics • Prospecting and reserve calculations • Mining Techniques • Technique d'abattage 	<ul style="list-style-type: none"> • Special technical drafting • Mine Exploitation • Maintenance and Transport • HVAC • Economic evaluation of mining projects

<ul style="list-style-type: none"> • Quarry products • Concassage Criblage (Seperation) • Techniques for the valorization of minerals • Computer Science II • Mining Legislation • Efficiency and Management of Production • Communications Science • English II • Internship 	<ul style="list-style-type: none"> • Roads and public works design • Site and road construction • Ecology and environmental studies • Health and Safety • Project Technique • Internship • Thesis
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d. Applied Geology

<p>Year Two</p> <ul style="list-style-type: none"> • Stratification of minerals and Paleontology • Topography II • Petrographie • Structural geology • Prospection Geochimique (Geochemical Prospective) • Gites Mineraux • Geotechnique • Mine Geology • Mining techniques • Hydrogeology • Applied Geophysics • Mine Legislation • Efficiency and management of production • Communication science • English II • Internship 	<p>Year Three</p> <ul style="list-style-type: none"> • Material Science for Construction • Prospecting and reserve calculation • Dam Hydraulics • Mine evaluation and Mineral economics • Ecology and Environment • Geological project • Mining techniques • Surveying • Health and Safety • Internship • Thesis
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e. Techniques d'Assainissement

<p>Year Two</p> <ul style="list-style-type: none"> • Surveying II • Hydraulics • Electricity II • Hydrogeology • Architecture and Town Planning • Civil Engineering drafting • Computer Science LL • Water Analysis • Water Treatment for Human Consumption • Waste Water Treatment • Site and Road construction • Mining Legislation 	<p>Year Three</p> <ul style="list-style-type: none"> • Atmospheric Pollution • Ecology and Environmental • Plumbing and Sanitation • Solid waste Management • Assainissement • Economic evaluation of mining projects • Establishing a Company • Project Technique • Health and Safety • Internship • Thesis
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<ul style="list-style-type: none"> • Efficiency and management of production • Communications Science • English II • Internship 	
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f. Information Science for Mining

Year Two	Year Three
<ul style="list-style-type: none"> • Instrumentation and Control mechanisms • Electronics • Electronic elements • Initiation aux methode numerique • Architecture and design of LAN computer system • CAD • Rock Mechanics • Prospecting and Mine reserve calculations • Technique d'abattage • Mining legislation • Efficiency and management of production • Communications Science • English II • Internship 	<ul style="list-style-type: none"> • Base de Donnees • Treatment in real time • Mine planning • Creation of a company • Economic evaluation of a mining project • Human Resource management • Management • Special software • Marketing • Research and Internet • IT Maintenance • Project techniques • Internship • Thesis

Proposed Courses from the Guinea Chamber of Mines

The Chambre des Mines de Guinee has prepared and is proposing to offer a series of brief classroom courses that will be targeted at improving the general skill level of professional working in the Guinean bauxite industry. The courses that it is proposing to offer include:

Course 1: Techniques and Technology of Mining Prospecting

Duration: 5 days

Level: technicians, geologists

Content: new prospecting techniques in the Guinean environment, drilling techniques

Course 2: Evaluating Small Mines

Duration: 4 days

Level: technicians, geologists

Content: evaluating reserves, feasibility studies

Course 3: Evaluating Large Mines

Duration: 6 days

Level: technicians, geologists

Content: evaluating reserves, feasibility studies, applying the integrated method in a tropical zone

Class 4: Innovative Mining Techniques

Duration: 6 days

Level: technicians, geologists

Content: open air and underground mining techniques, small and large-scale exploitation, drilling

Class 5: Techniques and Technology for Mining and Mineral Treatment for Small Mines

Duration: 2 days

Level: technicians, geologists

Content: new mining techniques for small mines, mineral treatment techniques

Class 6: Importance of Environmental Impact Studies and Post-exploitation Rehabilitation Plans

Duration: 2 days

Level: engineers, technicians, geologists, environmental specialists

Content: conducting an environmental impact assessment study, managing waste, preparing a rehabilitation plan

Class 7: Issues in Water and Mining Activities Management

Duration: 2 days

Level: technicians, geologists, engineers

Content: water and mining, impact of mining on water resources, hydrogeology

Class 8: Impact on Environmental Regulations on Mining

Duration: 2 days

Level: engineers, technicians, geologists, employees of the mining administration

Content: Guinean mining law and its impact

Class 9: Mining Law and Farmable Land Expropriation

Duration: 2 days

Level: technicians, geologists, engineers, employees of the mining administration, community representatives

Content: relation between mining and agriculture

Class 10: Fair Sharing of Mining Revenues as a Factor of Stability in Mining Areas

Duration: 2 days

Level: engineers, technicians, geologists, employees of the mining administration, community representatives

Content: mining revenue and repartition mechanisms

Class 11: Mining Contracts

Duration: 2 days

Level: engineers, technicians, geologists, employees of the mining administration

Content: various types of mining contracts

Class 12: Economics of Mining Exploration

Duration: 2 days

Level: engineers, technicians, geologists, employees of the mining administration

Content: managing risk in mining exploration, profitability, valuation of mining projects

Class 13: Profitability Studies of Mining Projects

Duration: 2 days

Level: engineers, technicians, geologists

Content: valuating the costs of a mining project, determining profitability, finding strategic investors

Class 14: Marketing Mining Materials

Duration: 2 days

Level: engineers, technicians, geologists, company executives, employees of the Ministry of Economy

Content: pricing mechanisms for ore, metals, marketing base and precious metals

Class 15: Separation Techniques in Metallurgy

Duration: 3 days

Level: engineers

Content: hydrometallurgy, pyrometallurgy techniques

Class 16: New Methods and Analysis Techniques in Analytic Geochemistry

Duration: 2 days

Level: engineers, technicians, geologists

Content: sampling techniques, sample analysis, chemical techniques

Class 17: Preparing, Evaluating and Managing a Mining Exploration Project

Duration: 2 days

Level: engineers, geologists, mining companies top executives, employees of the mining administration

Content: stages of a mining exploration project, risk management, financing, evaluation techniques

Class 18: Preparing, Evaluating and Managing a Mining Exploitation Project

Duration: 2 days

Level: engineers, geologists, mining companies top executives, employees of the mining administration

Content: stages of a mining exploitation project, feasibility studies, risk management, financing, evaluation techniques

List of References

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White Paper, U.S. Foreign Aid, Meeting the Challenges of the Twenty-first Century, Bureau of Policy and Program Coordination, U.S Agency for International Development, January 2004
(<http://www.usaid.gov/policy/pdabz3221.pdf>)