



Artisanal and Small-Scale Gold Mining in Nigeria

*Recommendations to Address Mercury
and Lead Exposure*



Acknowledgements

This report was prepared by the Environmental Law Institute (ELI) with funding from the U.S. Department of State. The contents of this report do not necessarily represent the views of the State Department, and no official endorsement of the report or its findings by the State Department may be inferred.

Principal ELI staff contributing to the project were Lisa Goldman, John Pendergrass, David Roche, Narayan Subramanian, and Judy Amsalem. Any errors and omissions are solely the responsibility of ELI. The authors welcome additions, corrections, and clarifications for purposes of future updates to this report.

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Artisanal and Small-Scale Gold Mining in Nigeria: Recommendations to Address Mercury and Lead Exposure

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ELI Project No. 121001

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Introduction

Artisanal and small-scale gold mining (ASGM) has long been practiced in Nigeria and around the world. Bolstered by historically high gold prices, a lack of viable alternative livelihoods, and a ready – if expensive – supply of mercury, there has been a resurgence of ASGM activities in northern Nigeria in recent years. This resurgence, however, has come at a price – namely, devastating lead poisoning of children and others from lead-contaminated gold ore, in addition to extensive mercury exposure (whose effects have not yet fully materialized) and significant emissions of mercury into the air and soil. In 2010, unregulated small-scale mining in the northern state of Zamfara gave rise to an epidemic of childhood lead poisoning, with at least four hundred children (and probably many more) under the age of five dying within a six-month period. Despite the efforts of development, medical, and environmental experts both nationally and globally, lead contamination continues to afflict large numbers of children. The practice of mercury amalgamation at mining sites has also resulted in widespread contamination of miners and others working near the mines.

The use of mercury in ASGM has been identified as the single largest intentional-use source of mercury pollution in the world. In most cases, nearly all of the mercury from the processing of gold ore is either emitted into the air or dumped into the surrounding environment and waterways, where it can be absorbed by living organisms. Mercury is released into the atmosphere when miners heat the mercury-gold amalgam, driving off the mercury as a gas that is easily inhaled and poses a grave threat to human health. This exposure to mercury can cause serious damage to the central nervous system, including respiratory failure, nausea, vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, eye irritation, and kidney damage. In addition to these health impacts, ASGM is associated with significant environmental degradation, including toxic pollution of air, land, and water; destruction of flora and fauna; geological instability leading to landslides, flooding, erosion, and tremors; landscape degradation; and radiation hazards.

Unlike countries such as Ghana and Burkina Faso, Nigeria does not have a well-developed large-scale mining sector, and the majority of gold mining in the country is carried out by artisanal and small-scale miners. Artisanal mining activities in Nigeria are almost by definition informal – that is, operating outside current laws and regulations. While the current mining law and regulations do address artisanal and small-mining activities – mainly by focusing on the provision of extension services – they do not provide meaningful incentives and assistance for “formalizing” miners. For example, the requirement that artisanal miners form cooperatives in order to receive any technical assistance from the Ministry of Mines and Steel Development (MMSD) is a substantial obstacle for many miners, and means that most will continue to operate informally. It also means that these miners, in practice, are unable to seek a small-scale mining license -- the only license available to them under the mining law. And even where miners have formed cooperatives, it is not clear that they are currently receiving technical assistance from the Ministry.

Much research has been conducted on the factors contributing to the poor performance of the artisanal and small-scale mining sector. These include: the lack of simple and transparent legal and fiscal frameworks, weak institutional structures, a lack of capacity to implement existing

regulations, and sometimes lack of political will.¹ In Nigeria, identified contributing factors include: 1) a lack of organization and stability among miners; 2) illiteracy; 3) lack of technical assistance (particularly in the remote regions where miners work); 4) lack of financial assistance; 5) improper mining regulations; and 6) poverty and unemployment.² Perhaps most fundamentally, it is the lack of livelihood support for the artisanal gold mining sector that has driven the growth of unregulated mining activities in the region.³

While the pressing need to help miners move away from the use of mercury (as well as practices that expose people to lead) is clear, the solution is not. Any meaningful approach must address the economic motivations underpinning ASGM activities and present a viable alternative to mercury use. Appealing to public health concerns alone -- especially when this appeal is directed at young men -- is not sufficient to induce behavioral changes. In short, the current incentive structure must be altered. As such, this paper addresses fundamental legal and policy constraints that are hindering the ability of miners to strengthen and scale up their operations (and in the process, transition toward safer mining technologies and practices that do not require the use of mercury). Without addressing miners' need to access land, obtain permits, secure credit, form cooperatives or other associations, and obtain a better price for their gold, there is little chance of helping them transition away from the use of mercury during gold processing. The paper focuses on formalization of the ASGM sector as the framework for instituting these more fundamental changes, and presents recommendations that span a range of legal and policy reform measures. While new authority at the legal and regulatory level would certainly be useful – and this assessment does include suggestions for strengthening the legal framework – the recommendations also focus on how to make the best use of Nigeria's existing authorities to address lead and mercury contamination, understanding that the process to change the law might be too onerous for timely action.

In light of the challenges posed by Nigeria's deeply troubled petroleum sector, attention is turning to the potentially large role of solid minerals extraction in national (and local) economic development. Given the lack of large-scale mine operators and the prevalence of artisanal and small-scale miners, the time is ripe to ensure that ASGM operators are integrated into the formal economy. Such formalization of ASGM miners can benefit practically all actors in the gold mining sector – including the miners (by giving them the security and tools to invest in safer and more productive mining practices, which should increase their revenue while protecting their health), their communities (by reducing exposure to lead and mercury), medium- and large-scale operators (by reducing conflicts over access to mining lands), and the government (by capturing a portion of mining revenue in the form of royalties and taxes that is currently being lost). The government's stated interest in promoting mining as an alternative to oil and in incorporating lessons learned from the petroleum sector about transparent natural resource extraction makes this a key opportunity to improve the legal and policy framework. The recent signing of the Minamata Convention on Mercury by Nigeria, the U.S., and 92 other countries further reinforces the urgency and timeliness of addressing ASGM right now. And given that artisanal miners are also extracting other solid minerals including wolframite, columbite, and tantalite, which may also expose them to other toxic chemicals, a strengthened legal and regulatory framework will help an even greater number of artisanal miners develop safer and more productive mining practices.

Part 1: Health, Environmental, and Gender Impacts of ASGM Activities

Since the 2010 lead poisoning outbreak in Zamfara, much attention has been given to the collateral health and environmental impacts that arise from ASGM. While the Zamfara outbreak shifted much of the focus of the impacts of ASGM to lead, mercury poisoning is an equally important concern. ASGM is currently the largest contributor towards global anthropogenic mercury emissions, responsible for 37% of all such emissions.⁴ These emissions are also rapidly growing; from 2005-2013, ASGM mercury emissions doubled, causing total land and water emissions to exceed 800 tons per year. Factoring in air emissions, some estimates place the total figure as high as 1600 tons per year, although this may simply reflect more accurate reporting.⁵ The very serious (even deadly) impacts of lead and mercury exposure are compounded by the widespread poverty and general lack of access to health services in many ASGM regions. Adding to this are particular impacts on women and children as well as toxic releases to soils, water, and air. Addressing these health impacts is and will be quite expensive – current treatment for lead poisoning victims can run up to \$1500/child.

Health Impacts

The health impacts of both lead and mercury are not immediately noticeable and manifest themselves over time. A comprehensive review of scientific studies indicates that ASGM communities experience neurologic and kidney effects, as well as possible immunotoxic/autoimmune effects from mercury exposure.⁶ The most common effects of mercury exposure are mental retardation, delayed development, seizures, and vision and hearing loss,⁷ with the cardiovascular and central nervous systems the most vulnerable. Many of these same effects occur with lead poisoning, in addition to nerve damage, reproductive problems, liver and kidney damage, and muscle coordination.⁸ For both mercury and lead poisoning, the health effects are more pronounced in young children. Extreme exposure can lead to coma or even death.⁹ For women, exposure to mercury positively correlates with an increase in malformations and miscarriages during pregnancy.¹⁰ Many women have also reported menstrual cycle disorders.¹¹

Although they both derive from artisanal mining practices, it is important to consider lead and mercury exposure pathways separately. Concentrated lead in the soil from which the gold is mined is the exclusive source of lead poisoning. Lead concentrations in the soil at some locations have been measured to be greater than 100,000 ppm (or an astonishing 10 percent by weight), vastly exceeding US EPA's standards of 400 ppm.¹² As the mined ores are mechanically ground and processed, lead dust is released into the air. Dry milling, which is commonly employed during the processing stage, tends to magnify the level of dust produced.¹³ In many areas, lead processing was typically done within housing compounds, with women using the same mortars and pestles used to prepare food. Even where this processing occurs outside of the village, miners often return home with clothes contaminated with lead. Children who traveled to the

mines to sell food during the day are also exposed to lead and mercury contamination, and similarly facilitate cross-contamination by bringing unsold exposed food back into the village. Aside from the airborne transport of lead, the grinding and sluicing process often occurs near village water sources, contaminating surface water with lead.

Mercury is used in ASGM to amalgamate the gold and separate it from the fine-grained material. The residual mercury attached to the gold is later burned off and released in vapor form, which can be easily inhaled by people in the vicinity.¹⁴ This pathway can be particularly harmful,¹⁵ especially since more mercury is absorbed through inhalation than through ingestion or dermal exposure. Some of the mercury runoff also enters waterways, where it is converted into methylmercury by anaerobic organisms. This methylmercury is absorbed by phytoplankton and makes its way up the food chain before it is ingested by downstream residents through contaminated fish. Methylmercury is known to be far more toxic than pure mercury.¹⁶

The lead exposure is also defined by the particular geology of the region. The gold deposits in the Zamfara area are naturally associated with lead. Because these deposits are primary deposits, they require grinding and milling processes to liberate the gold, which generates dust, and therefore leads to extensive lead exposure.

Environmental Impacts

In addition to the health impacts described above, mercury and lead also impose detrimental environmental impacts. Up to 95% of mercury used in ASGM is released into the environment.¹⁷ Since mercury air emissions are globally transported, ASGM practices have a global impact.¹⁸ Dredging and sluicing during mining also cause severe land degradation and river siltation. The increases in suspended sediment from river siltation hinder the penetration of light into the water and greatly affect the supply of nutrients.¹⁹ The suspended sediment also tends to carry high concentrations of mercury. A recent UNEP report predicted that warmer temperatures induced by global climate change would increase rates of organic productivity and bacterial activity in water that could trigger a more rapid conversion of mercury to methylmercury, its more potent form.²⁰

Unlike mercury, lead dust does not travel very far, but dust that settles out on the ground can easily contaminate the soil. During periods of heavy rain, the lead can leach into groundwater systems, contaminating them in the process.²¹ Lead dust can also affect animals grazing nearby in many of the same ways it affects humans.²² And, while not the focus of this paper, artisanal mining activities cause still other environmental harms, such as the destruction of natural habitats at mining and waste disposal sites.

Efforts to minimize the health and environmental impacts of ASGM have mainly focused on lead exposure due to the 2010 lead poisoning outbreak in Zamfara. Basic improvements in ASGM practices, such as moving operations outside of household areas and villages, have already reduced lead exposure for children and others. Miners are also being encouraged to wash their hands and clothing before returning to their communities from the processing sites. The Nigerian government has recently been promoting the use of wet milling machines over dry machines to minimize the production of lead dust. In September 2013, the federal government received a

delivery of iGoli and wet milling machines from the South African government for the Safer Mining Programme in Zamfara.²³ However, many areas are still using dry milling machines and other unsafe practices (including mercury amalgamation) which are continuing to expose miners, their families, and their communities to harm.

Gender Impacts

Around 30 percent of the global workforce of artisanal miners is composed of women, with the highest percentage (40 to 100 percent) found in Africa.²⁴ Studies have shown that the smaller the size of the mining operation and the greater the degree of mechanization, the larger the role played by women. Women's roles and responsibilities within gold mining communities vary greatly. While women may dig and carry ore, they are more commonly involved in the processing stage, which includes crushing, grinding, sieving, washing, panning, and amalgamation with mercury. (As will be discussed below, women do not appear to be involved in mercury processing in Zamfara and possibly elsewhere in Nigeria). To a lesser extent, women may own mining concessions; serve as mine operators, dealers, or buying agents; or own mining equipment. Women also frequently provide goods and services to mining operations in the form of cooking and selling food, running shops, and sometimes working in the sex trade.

Because of their involvement in artisanal gold mining, particularly gold processing, women and their children working in artisanal gold mining are susceptible to their own set of health concerns. Generally speaking, women face the greatest risks from carrying heavy materials, washing ore in contaminated water, and becoming exposed to chemicals when burning gold amalgam.²⁵ Likely afflictions for women and children working in or around mines include gastroenteritis, lung inflammation, respiratory infections, spinal, joint, neck and back damage, frequent cuts and bruises,²⁶ in addition to the extremely hazardous effects of exposure to mercury and lead, as described below. These gender-differentiated impacts bring added challenges and considerations to addressing needs within the ASGM sector, as well as unique opportunities to improve the quality of artisanal miners' life and health.

Mercury Exposure

Exposure to mercury during the amalgamation process poses one of the greatest health threats to women working in artisanal gold mining.²⁷ While mercury exposure is dangerous for both women and men, sociocultural factors often lead to greater exposure for women, and women suffer more severe physical harm from such exposure. In a number of countries (though not necessarily Nigeria), mercury amalgamation and amalgam decomposition are often carried out by women, putting them in direct contact with mercury. This process can frequently take place in the home, especially in Muslim communities under Sharia law, where women typically must stay within their family compounds. Direct open-air burning to separate mercury from the mercury-gold amalgam may also take place in the home or small sheds near the mining site, leading to high exposure to mercury vapors in these enclosed spaces. The amalgamation process is also sometimes carried out with cooking stoves and kitchen utensils, items with which women, as the predominant food providers, frequently come into contact. Additionally, since women are usually responsible for caring for young children and babies, their participation in mining

activities is often done with babies tied to their backs or toddlers at their sides, exposing their children to the same health hazards.

While awareness of the risks associated with mercury is scarce among all miners, sociocultural inequities particularly hinder access to information for women, often leaving them unaware of the risks they and their children face with repeated mercury exposure.

Lead Exposure

In addition to mercury, lead also poses significant health threats to women and their children. In Zamfara State, lead poisoning has claimed the lives of hundreds of children, and even those who were treated and survived remain in danger. Exposure to the toxic effects of lead stems from the rock grinding conducted with flour mills and mortars and pestles in the home (although processing activities have now moved outside the housing compounds in at least some areas); the dust that miners, young girls selling food to miners, and others transport back to their families on their clothes and bodies; and the housing compounds' dirt floors and mud bricks, which contain lead-contaminated soil. Women spending considerable time with children inside the home experience even greater exposure. As girls between the ages of 6 and 15 marry and become pregnant, "their bodies will release lead stored like calcium in their bones," according to the Columbia University professor who developed Succimer, the treatment for lead poisoning.²⁸ This can cause miscarriages and reduced brain function of some form in their children.

Other Health and Safety Concerns

Other serious health and safety concerns for women living and working in artisanal mining communities include violence and threats to sexual and reproductive health from prostitution and sexual violence.²⁹ Illicit trade in drugs and prostitution, and the violence that often accompanies it, may be more prevalent in communities established as part of a gold rush than in more well-established communities that have a stronger government presence, family ties, and social cohesion. Nevertheless, violence against women in artisanal mining communities has been documented on a global scale. Along with such violence, the sex trade in artisanal mining communities leads to a high rate of infection with HIV/AIDS and other sexually transmitted diseases. Complicating this situation is the fact that women often work longer hours than men but earn less – studies have shown on average four times less – potentially leading them to seek other sources of income, even through such high-risk work as prostitution. Among the poorest households in rural communities are those in which the men have migrated to urban areas or mining centers, leaving the women as de facto heads of household. In these and other communities with few other options for generating revenue, women may work excessive hours, endangering their health and that of their children without benefits or security. Child prostitution can also occur in ASM communities, where virginity is held in high esteem and where fears of HIV/AIDS and other sexually transmitted diseases also exist.

Addressing Women's Vulnerability

Because of their position and roles in the social framework of ASGM communities, women hold the potential to induce positive change in their communities if their participation in gold mining

is strengthened and they are taught safer mining practices.³⁰ Women play a key role in community stability, cohesiveness, and morale, and can serve as primary change agents. In some mining communities, they have been identified as strong couriers of information who could help influence and improve the mining techniques practiced by their families. (Particular cultural challenges in Nigeria that may affect this dynamic are noted in the next paragraph.) When organized as a group, women are more likely to raise concerns about rights and safety and may be more willing to adopt alternative technologies. Additionally, since women bear primary responsibility for food preparation, they are best able to respond to education about the health risks of consuming mercury-contaminated foods. Women can help change their family's food habits, such as by reducing consumption of carnivorous fish in areas where mercury is used, or by keeping gold amalgamation separate from cooking areas and utensils.

Governments can also support policies and programs geared towards women in artisanal gold mining communities.³¹ Increased research on women's involvement in ASGM can help shed light on areas where government programs can be most useful. Information can be gathered not only through dedicated research programs, but also through gender-sensitive training of police and health workers. Health and security conditions in the communities in which ASGM takes place vary widely, and this research and information-gathering can help inform gender policies that take community-specific circumstances into account. Technical assistance and community development programs can help promote employment opportunities for women, support their participation in regional development, support women's organizations, incentivize use of improved technologies, and conduct public service announcements about the hidden health risks of mercury and lead exposure and the proper precautions miners should take. Training women in marketing, management, bookkeeping, and other aspects of artisanal gold mining can also empower them to benefit more from their involvement in ASGM and help transform gender stereotypes.

One example of an approach to addressing gold mining and gender issues can be seen in Mongolia, where the Sustainable Artisanal Mining Project – formed to help deliver reform to the ASM sector following a government resolution approving the regulation of ASM – has incorporated gender considerations throughout its activities.³² The project has developed gender-sensitive training materials and approaches for use in implementing its initiatives. These initiatives, which include capacity building and the development of community action plans, must all be gender-sensitive and include proportional participation of women and men. The project also conducts gender analysis on an ongoing basis to better understand gender-based inequities and demonstrate the link between gender roles and relations and the sustainability of ASM.

ASGM and Gender in Nigeria

Although it was difficult to obtain gender-specific information during the field visits in Zamfara in 2012-13, women are said to make up a percentage of the artisanal and small-scale mining workforce (not limited to gold) in Nigeria overall.³³ Women in Zamfara had previously taken an active role processing gold in residential compounds, using the same mortars and pestles that they used to prepare food. However, field visits to Daret, Abare, Bagega, and Bukuyyumu (Yargalma) in September 2012 and June 2013 suggest that women may no longer be

significantly involved in processing activities in at least some mining communities in Zamfara. This has likely resulted in part from education and outreach about the dangers of lead exposure following the 2010 lead poisoning outbreak, which emphasized the need to move processing activities outside of the villages. In addition, miners in Yargalma explained that women were no longer needed to help process the gold after the miners obtained dry milling machines in 2010. Others have contradicted this account, stressing that women continued to play a role in grinding and drying the ore, as well as using mercury to amalgamate the gold, after the arrival of the milling machines. Given the religious practice of “cloistering” women within household compounds, exposure to lead and mercury within such villages may still be high. Even where women’s participation in gold mining activities in Zamfara may have decreased, women miners in other States with significant ASGM activities that may not have been targeted by educational campaigns about safer practices may still be heavily involved in mining processing activities.

Interviews with women’s groups in Bagega in June 2013 illustrate both the importance of continued education and outreach about the hazards of mercury and the difficulty of engaging women in strategies to reduce mercury use. The women explained during these interviews that the (male) miners had stopped bringing mercury and mining materials back to the household concessions after they were informed about the dangers of lead poisoning two years earlier. The women also indicated that they did not know what the signs of mercury poisoning were and did not know if the mercury had caused any health problems. A separate group of women was unable to comment on the issue of mercury use, stating that it was not their work and they were not aware of any problems with it.

Even where women are not directly involved in ASGM activities, they may still play a role in influencing mining practices and the use of mercury. It is true that there are significant cultural factors that can make it difficult for women to speak out, particularly in northern Nigeria, about an issue that primarily (at least in some areas) concerns men. However, the role of women in managing core aspects of the household and their direct responsibility for their children, who may well be participating in mining processing activities (boys who work the mercury into the amalgam, and girls who sell food at mining sites), suggests that outreach efforts about mercury use and dangers should be geared at both women and men in mining communities.

Part 2: Overview of Safer Mining Technologies

While the use of mining methods that expose people and ecosystems to mercury and lead are the most direct cause of mercury and lead contamination in ASGM, the underlying causal factors are rooted in economic incentives and the lack of viable alternative livelihoods. Despite the environmental, health, and social impacts identified in Part 1 above, eschewing the use of mercury in ASGM poses difficult economic choices. Mercury is appealing to use because it is “cheap, simple, fast, independent, and reliable.”³⁴ With the proper incentives in place, mercury use and exposure can be minimized (and eventually eliminated) through improved gold processing practices. Similarly, lead exposure can also be minimized through alternative processing technologies along with safer practices. This section reviews the simplest and most feasible mining technologies to reduce or eliminate mercury use and lead exposure.

Technologies to Reduce Mercury Use

The first category of practices focuses on reducing mercury use. A range of options are available, including methods to concentrate the gold-containing ore as well as techniques to capture and re-use the mercury.

Gravity-Based Technologies

One of the primary methods for reducing mercury use is to concentrate the ore so that less mercury is required to amalgamate it. In the pre-amalgamation stage, the ore can be concentrated using gravity-based separation. This results in a smaller volume of ore with a higher concentration of gold, requiring less mercury to extract the gold.³⁵ Estimates show that pre-concentration of the ore to a 10:1 ratio (of ore to gold) can reduce mercury emissions by 90%.³⁶ Gravity-based separation takes advantage of the difference between the specific gravity of gold, which is the highest, and the other minerals mixed along with it.³⁷

Centrifuges, sluices, shaking tables, and jigs are the most commonly used technologies for gravity-based separation. Centrifuges have a vertical rotation bowl containing a series of concentric rings. As the feed slurry is added, the rotor is accelerated; the gravity naturally helps separate the particles. A sluice, instead of utilizing rotor acceleration, requires a simple inclined, flat-bottomed trough lined with a trapping mechanism. The feed slurry flows down the trough and the lighter particles are carried downstream and discharged at the end of the sluice. The heavier particles that remain contain a higher concentration of gold. Shaking tables similarly use an angled surface employing riffles. Instead of using a slurry for separation, the tables generate motion on the angled surface. Finally, jigs use a screen with a tank containing liquid and induce particle separation through a constant up-and-down motion.

Based on field observations and research, sluicing is already used at some (if not all) mining processing sites in Nigeria. Sluices are the most commonly used gravity-based technology due to their simplicity, affordability, and speed. Jigs are simple as well and additionally require little maintenance. Shaking tables share the same advantages but are limited in their capacity by the range of grain size they can separate and are costly. Finally, centrifuges are highly effective in separating ore and reducing mercury use, but are overall more costly than the other gravity-based

separation processes. Some also require electricity, which is not consistently available in rural areas.

Mercury capture and reuse

Options such as retorting and the use of fume hoods enable the capture of mercury, limiting the quantity disposed to the environment. Retorts are a simpler and more affordable technology. Excess mercury is burned within the retort device, with the vapor condensed and captured. Used correctly, retorts can capture up to 95% of emissions; although in practice, recovery tends to be considerably less. The recovered mercury can be reused, reducing mercury discharge to the environment and cost for the miners. Fume hoods, which are primarily used in gold shops for the secondary burning of sponge gold, have been shown to be an inexpensive option to reduce mercury emissions. Fume hoods are operated by a fan that pulls the mercury vapor through the unit; the vapor is then cooled down and condensed as liquid mercury, which is then collected. This process can capture up to 62%-75% of mercury emitted during the burning process.³⁸

While fume hoods and retorts can capture a high percentage of emitted mercury, the recovered mercury may not be readily reusable due to the oxidation that occurs during the separation process. Reactivation converts mercury from its oxidized state back to its pure form for reuse. A simple technique to clean and reactivate the mercury involves employing an electrochemical cell with an ordinary battery to convert oxidized mercury back into its pure form.³⁹

The success of both technologies (especially retorts), however, is highly dependent on their proper use; otherwise, by collecting concentrated mercury, they can pose greater health risks than if they were not used. For example, if even 5% of the mercury emitted escapes from a fume hood or retort that is kept indoors, the indoor air concentration would be 50 times higher than the World Health Organization's safety limit.⁴⁰

Mercury capture and reuse options are ultimately viable, but pure economic incentives do not exist to implement them. The costs in terms of time and money to implement these technologies are not necessarily exceeded by the savings made through the reuse of mercury, particularly for small amounts of gold. In light of the health and environmental benefits, however, the savings far exceed the costs.⁴¹

Mercury-Free Processing Techniques

The next category of improved practices centers around mercury-free processing techniques. A number of mercury-free techniques exist for ASGM activities, although some entail other harmful impacts and are not recommended for use by artisanal miners.

Enhanced Gravity Concentration with Direct Smelting

In some cases, especially where the gold concentration in ore is naturally relatively high to begin with, the gravity techniques described above can be used alone, without mercury, to separate gold. Highly concentrated gold ore can then be directly smelted to create a high-purity gold product.

A common smelting chemical is borax. The addition of borax to a highly concentrated gold ore reduces the melting point of the other minerals in the ore, allowing the gold to be separated from these materials.⁴² This process enables the extraction of a higher-purity gold product.⁴³ Borax is not a replacement for mercury, but rather is used in the refining process, after gravity processes have been used to initially concentrate the gold.⁴⁴ From a health perspective, the main concern with borax is that its health effects are still being studied. Exposure to borax dust and powder can cause eye and skin irritation, but more serious acute effects are not expected.

From a technical perspective, the use of gravity-only methods will be limited to those ore deposits that can be sufficiently concentrated using available, affordable gravity methods.⁴⁵

Cyanide

Cyanide, which has been commonly used in industrial gold mining, is often suggested as a comparable substitute to mercury. While cyanide exposure does not occur as easily as mercury exposure, it causes far worse short-term environmental effects. Direct discharges of cyanide to water bodies can have devastating impacts on aquatic life.⁴⁶ Cyanide is also acutely toxic to humans. Given the largely unregulated nature of ASGM, enforcing the safe discharge of cyanide is likely to be difficult and impractical.⁴⁷ The time-consuming nature of the cyanide leaching process has largely deterred its adoption in ASGM thus far.⁴⁸ However, cyanide use is becoming more widespread in ASGM globally, and cyanide may become a more viable option in the future as the ASGM sector becomes more formalized.

iGoli

A safer but more expensive alternative to using mercury is the iGoli process, developed by Mintek. Using common chlorine compounds such as hydrochloric acid and sodium hypochlorite, the gold is concentrated and filtered to separate the solid and liquid.⁴⁹ The cost of iGoli machines has unfortunately posed a barrier to the technology's implementation,⁵⁰ and miners have also been slow to accept this new technology that they do not completely understand or trust. There is also a question of how to manage the waste products that result from the iGoli process.⁵¹

Other options

While leaching chemicals other than cyanide have been suggested for use in ASGM, none are currently in widespread use. Specialty products, such as magnetic sluices that can take advantage of the mineral properties of certain ores in order to separate out gold more effectively, also exist. It should be noted that there is no single alternative to mercury that will apply equally well in all circumstances. The selection of an appropriate alternative technology depends on the geology of the region, the technical capabilities of the miners, and a number of social and economic factors governing the ASGM sector locally.

Techniques to reduce lead exposure

In areas where the soil contains high concentrations of lead, lead exposure is triggered by the milling of gold ore, which liberates both gold and lead from the minerals and rocks contained in the soil. The dry milling process is the most prevalent practice and produces significant amounts of lead dust, which can be breathed in by miners and others in the area, and carried home on clothing, food, and equipment. Wet milling machines greatly reduce the level of dust produced, minimizing exposure pathways for lead contamination. Even with wet milling machines, safety equipment is still needed to prevent low levels of lead exposure.

Converted flour mills traditionally used for corn and millet are sometimes used as a dry milling method.⁵² These re-tasked mills are not designed for use on rocks, producing enormous amounts of dust, and miners must process the material several times before it is adequately fine, leading to lower efficiencies. Hammer mills are an alternative to flour mills and have become widespread in ASGM in many countries. These are typically powered by a 20-30 horsepower motor. Rock is manually delivered by the operator and the mills can be run wet or dry; hammers batter the material and it passes through a screen. Often when wet, it passes directed onto a sluice box included next to the hammer mill. Although simple, this approach also does not have a great recovery rate.

MMSD Safer Mining Programme

The Safer Mining Programme led by the Ministry of Mines and Steel Development (MMSD) in early 2013 has been taking steps to increase the availability of safer mining technologies in high-exposure areas in Zamfara and elsewhere. In September 2013, the federal government received a delivery of iGoli and wet milling machines from the South African government for Zamfara.⁵³ The machines will be distributed and installed in select areas. MMSD has also implemented a training program on safety, health, and environmental issues in Zamfara. The Safer Mining Programme is slated for expansion within Zamfara and into other mining states. While this is an important step, the fact that these improved technologies cannot be manufactured within Nigeria suggests they may not be the most sustainable approach for the ASGM sector.

Adopting Improved Technologies

While there are technologies available to reduce or eliminate mercury use that do not compromise – or that can even improve – yield or cost, many challenges exist in getting miners to actually adopt new technologies. The failure of assistance programs has been attributed to a range of factors, including:⁵⁴

- Introduction of technologies which require special technical knowledge or frequent maintenance in order to achieve acceptable economic returns
- Provision of technologies without mechanisms for financing
- Lack of consideration for the socio-cultural context, gender-differentiated roles, the organization of labor, and geoclimatic conditions (e.g. related to the availability of water)
- Inadequate training in the use of technology
- The imposition of technologies on miners who have not participated in their selection or development

Other reasons include a lack of local, reliable production for improved technologies, a lack of trust by miners in these technologies, and the presence of vested interests on the part of suppliers, dealers, and others in a continued mercury market and the division of profits that result from mercury use.

Economics ultimately drives the implementation and use of safer technologies in the artisanal and small-scale mining industry. Despite awareness on the part of some miners of the health and environmental risks associated with their trade, they have continued with their practices due to economic constraints. Hence, unless safer technologies are demonstrated to be effective and made more accessible (both financially and geographically), it is unlikely that wide-scale adoption will be seen. At the same time, technology transfer and the sharing of technical know-how between mining communities can serve an important role in disseminating safer mining practices. While this can occur organically, government support and assistance can play a key role. The next section addresses how formalization of the ASGM sector can help create these enabling conditions.

Part 3: Addressing Mercury and Lead Exposure: A Formalization Approach

Given the challenges posed by lead and mercury exposure linked to ASGM activities, the most fundamental question is how to enable and encourage miners to undertake safer mining practices. This challenge must be considered in light of the factors motivating informal artisanal mining activities – including extreme poverty coupled with a lack of viable alternative livelihoods, the ready supply of mercury, the high price of gold, and the availability and cost of improved mining technologies, among other things. In light of these factors, an approach to ban or even regulate mercury use is not likely to succeed in Nigeria right now, given the challenges of control and enforcement in rural areas, the lack of training programs on improved mining technologies (although this is changing with MMSD’s new Safer Mining Programme), and the absence of a more comprehensive approach to artisanal mining.⁵⁵ Similarly, attempts to prohibit the illegal importation of mercury by foreign nationals and other suppliers for use by artisanal miners are also not likely to deter mercury use. Rather, a more holistic approach is needed to provide the enabling conditions for safer and more productive mining practices by artisanal miners.

The United Nations Environment Program, which examined ASGM formalization approaches in a comprehensive report published in 2012,⁵⁶ notes that “formalization is a key factor in promoting mercury reduction and management as well as minimizing other social and wider environmental problems in ASGM communities.”⁵⁷ While different definitions of formalization exist, it can be broadly defined as the integration of artisanal mining activities into Nigeria’s legal, economic, and institutional framework. In other words, “[a] well-designed formalization process generates the enabling conditions for accountability within the sector so that it can ultimately be integrated into the formal economy.”⁵⁸ The idea is that by bringing artisanal miners under a legal framework that includes secure tenure, a valid license, and access to credit, among other things, they will have greater support, incentives, and resources to improve their operations, develop safer mining practices, obtain greater profits, and potentially scale up their operations to the level of small- and medium-scale mining. While formalization alone will not automatically solve all of the environmental and social problems facing the ASGM sector in Nigeria,⁵⁹ it is likely the single best long-term approach for addressing the mercury and lead problems associated with artisanal mining in Zamfara and elsewhere.

Legal frameworks are a key tool for transforming ASGM from an informal to a formal activity.⁶⁰ However, they must be used in a way that enables rather than restricts miners.⁶¹ For example, a licensing process that imposes extensive waiting periods, paperwork requirements, and fees can serve as an obstacle to the ability of miners to obtain mineral titles.⁶² Similarly, requiring miners to form and register cooperatives in order to obtain technical assistance from the government can prevent them from receiving needed extension services. And as mentioned above, formalization should not be viewed as a precursor to enforcement. While technically, unlicensed artisanal miners in Nigeria are operating illegally, it is widely acknowledged that trying to prevent miners from operating on the grounds that they are not licensed is futile (not to mention dangerous) and will only drive them farther from the formal economy and legal framework. Rather, the focus should be on how to make it easier for miners to comply with existing legal and regulatory requirements, and how to address the livelihood needs that are driving informal mining

activities.⁶³ Enforcement does become a more complicated question with respect to the use of child labor in mining practices – particularly since it is the adolescent and teenage boys who were observed in Zamfara working with mercury during the gold processing stage. But even here, a strict approach is likely to alienate communities and their families. The issues addressed with the use of child labor in mining are addressed in Part 5, below.

The formalization approach is rooted in a broader strategy to address the more structural factors, such as rural poverty and the lack of viable alternative livelihoods, underpinning the ASM sector. As UNEP has noted, “the overall complexity of the ASGM issue calls for a fresh, integrated, and holistic approach to formalize the sector and address its critical needs.”⁶⁴ As such, the development of enabling legal frameworks for ASGM activities is only the first step in a comprehensive formalization approach that integrates social, environmental, labor, health and safety, economic, commercial, gender, organizational, and technical considerations.⁶⁵ Without enhancing the financial capacity of miners or raising their awareness of their legal obligations, an improved legal framework cannot meaningfully address informal mining activities.⁶⁶ The UNEP formalization report outlines a set of core legal, institutional, and financial sub-topics that should be addressed as part of the formalization of ASGM activities, as set forth below.⁶⁷ While this paper focuses most closely on legal frameworks, it also addresses various aspects of institutional and financial reform.

Formalization: Legal Frameworks

- Definition of ASGM activities
- Mining titles and related obligations and rights
- Environmental licenses
- Pollution control, bans, restrictions, and safety measures
- Rehabilitation and mine closure

Formalization: Institutional Aspects

- Responsibility and engagement
- Financing the formalization process
- Revenue generation – taxation regimes and royalties
- Monitoring and enforcement

Formalization: Financing Sustainable Solutions

- Promoting access to credit
- Facilitating access to markets
- Ethical market initiatives

UNEP, “Analysis of Formalization Approaches in the Artisanal and Small-Scale Gold Mining Sector Based on Experiences in Ecuador, Mongolia, Peru, Tanzania, and Uganda” (2012)

Part 4: The Legal, Policy, and Institutional Framework Governing ASGM in Nigeria

In considering how to address mercury use and lead poisoning linked to artisanal mining, it is important to review the roles of various government institutions at the federal and state level, as well as their respective legal and regulatory authorities. While solid mineral extraction falls exclusively under the purview of the Ministry of Mines and Steel Development, other agencies have a role in regulating corollary aspects of mining activities, including the use of mercury itself. For example, issues associated with the environmental impact of mining activities come under the jurisdiction of the Federal Ministry of Environment and various state environmental authorities. State and local authorities (including Emirates and Local Government Areas) can also exert some authority over mining-related activities.

Overview of Key Institutions

The legal framework governing mining activities and their environmental impacts is implemented primarily by two federal agencies – the Federal Ministry of Mines and Steel Development (MMSD), and the Federal Ministry of Environment (FMENV). MMSD administers Nigeria’s mining law (the 2007 Minerals and Mining Act) and its regulations, while FMENV administers the country’s general environmental protection law (the National Environmental Standards and Regulation Enforcement Agency (NESREA) Act).

The **Ministry of Mines and Steel Development** (<http://www.mmsd.gov.ng/>) was established in 1985 to spur development of the country’s solid mineral resources. It is the principal actor with respect to information, policy, and regulatory oversight of the country’s solid minerals sector. Its roles include formulating policy; providing information and knowledge to enhance investment in the sector; regulating operations; and generating appropriate revenue for the government. The Ministry administers the 2007 Minerals and Mining Act and the 2011 Minerals and Mining Regulations. It contains four primary technical departments: (1) the Mining Cadastre Office; (2) the Mines Inspectorate Department; (3) the Mines Environmental Compliance Department; and (4) the Artisanal and Small-Scale Mining Department. These departments hold the following responsibilities:

Mining Cadastre Office (MCO) (<http://miningcadastre.gov.ng/>)

- Receive and dispose of applications for the transfer, renewal, modification, or relinquishment of mineral titles or extension of areas
- Maintain a chronological record of all applications for mineral titles

Mines Inspectorate Department

- Supervise all reconnaissance, exploration, and mining operations
- Enforce all health and safety regulations at mining sites
- Conduct inspections and investigations necessary to ensure compliance with applicable regulations

Mines Environmental Compliance Department

- Review all plans, studies, and reports required from holders of mineral titles with respect to their environmental obligations
- Monitor and enforce compliance by holders of mineral titles with all applicable environmental requirements and obligations
- Perform periodic environmental audits to ascertain that all regulations and obligations are being met by mineral title holders

Artisanal & Small-Scale Mining (ASM) Department

- Monitor and oversee artisanal and small-scale mining activities
- As explained in the 2020 Vision (see below), the ASM Department is focused on formalizing the ASM sector and providing extension services to artisanal and small-scale miners

Generally, the ASM Department seeks to support artisanal and small-scale miners. The Department's main responsibilities towards artisanal and small-scale miners is through the provision of extension services for mining cooperatives and small-scale miners, including organizing, support, and assisting ASM miners on exploration, exploitation, mineral processing, and entrepreneurial training.⁶⁸ The ASM Department aims to facilitate healthy relationships between miners and the community as well as between miners and large-scale corporations. In addition, the Department is tasked with coordinating involvement with international governments and multi-lateral organizations (including UNEP, the World Bank, and the Department for International Development).

The **Federal Ministry of Environment** (<http://environment.gov.ng/#>) was established in 1999 to ensure effective coordination of all environmental matters. Its mandates include, among other things, (1) monitoring and enforcing environmental protection matters; (2) prescribing standards and enacting regulations on water quality, effluent limitations, air quality, atmospheric protection, ozone protection, noise control, and the removal and control of hazardous substances; and (3) cooperating with Federal and State Ministries, Local Government, statutory bodies, and research agencies on matters relating to the protection of the environment and the conservation of natural resources.

Mining Law, Policy, and Regulations

The primary legal framework administered by MMSD consists of the 2007 Minerals and Mining Act and the 2011 Minerals and Mining Regulations. Three policy documents – the 2008 National Minerals and Metals Policy, the 2009 Vision 2020 National Technical Working Group on Minerals and Metals Development Report, and the 2012 Road Map for the Development of [the] Solid Minerals and Metals Sector – provide further guidance. These legal and policy tools address artisanal and small-scale mining to varying degrees. While they cumulatively give MMSD a wide range of authority to support artisanal and small-scale miners, in reality the Ministry's assistance to small-scale and artisanal miners has been predicated on the lawful existence of mining cooperatives, which are far fewer than the number of unregistered miners

currently engaged in mining activities. The barriers to forming cooperatives will be discussed in greater detail in the next section on recommendations.

Minerals and Mining Act of 2007 and 2011 Minerals and Mining Regulations

Seeking to strengthen practices in the mining sector, Nigeria passed the Minerals and Mining Act of 2007, to be administered by the MMSD through its five departments.⁶⁹ The Act, which repealed the Minerals and Mining Decree of 1999, vested title in all mineral resources to the federal government and prioritized mining over other land uses.⁷⁰ The Act established a Mining Cadastre Office to administer mineral titles and maintain registers of mining leases. It also created an Inspectorate Department and an Environmental Compliance Department, established a mine permitting system, and sets forth requirements relating to environmental protection and community benefits.

The Act empowers MMSD to issue six types of permits, licenses, and leases, as described below. Permits generally convey non-exclusive use rights, while licenses provide exclusive rights for a limited purpose and leases provide exclusive ownership rights for a broader purpose.⁷¹

- (1) Reconnaissance permits—right to access land to search for mineral resources on a non-exclusive basis⁷²
- (2) Exploration licenses—right to explore mineral resources on an exclusive basis, including right to erect machinery and plants, along with the right to conduct bulk sampling and sell samples⁷³
- (3) Mining leases—right to exclusively use, occupy, and carry out mineral exploitation in the area covered by the lease, not to exceed 50 km⁷⁴
- (4) Small-scale mining leases—right to exploit minerals in area between 5 acres and 3 square km using low level technology or application of methods not requiring substantial expenditure⁷⁵
- (5) Water use permits—right to use water for exploration, mining, or quarrying⁷⁶
- (6) Quarry leases—right to remove and dispose of any quarriable minerals, including necessary excavation and construction, in area not exceeding 5 square km⁷⁷

Under the Act, purchasers of gold are also required to apply for a license to purchase minerals. The Act specifically requires that gold obtained under a Small-Scale Mining Lease (which includes artisanally-mined gold) be sold to a licensed Mineral Buying Center.⁷⁸

Although most of the Act is directed at large-scale, commercial mining activities, it does include a short chapter (Chapter 2) on Small-Scale Mining, following the example of its predecessor, the 1999 Decree. The Act defines artisanal mining as a subset of small-scale mining; as such, artisanal mining is included in the requirements governing small-scale mining. Both artisanal and small-scale miners can apply for a small-scale mining lease (with artisanal miners first required to form a cooperative), but there is no lease available under the Act specifically for artisanal mining activities. The specific requirements for a small-scale mining lease are discussed further below.

In May 2011, MMSD finalized the Minerals and Mining Regulations under the 2007 Act. The regulations include a brief section on “Artisanal and Small Scale Mining Operation,” which allows miners to register as artisanal and small-scale mining cooperatives and obtain extension services from the Ministry, including assistance in securing financial support from the Solid Minerals Development Fund. As noted above, artisanal mining cooperatives are also eligible to apply for mineral titles in the form of a small-scale mining lease.

Small-Scale Mining Leases

Under the 2007 Act, the Mining Cadastre Office grants small-scale mining leases for operations between three acres and five square kilometers.⁷⁹ As noted above, the small-scale mining lease covers both artisanal and small-scale mining activity. Each small-scale lease application must be accompanied by a showing of technical competence (at minimum, a certificate in mining or a related field) and financial capability (evidence of sufficient working capital through a bank statement or reference letter).⁸⁰ In addition, applicants must provide a land survey and a pre-feasibility study.⁸¹ A small-scale mining leaseholder cannot engage in extensive and continued use of toxic chemicals, cannot dig more than seven meters, and cannot continually use explosives.⁸² In practice, the Mining Cadastre Office encourages small-scale (and artisanal) miners to form cooperatives in order to decrease transaction costs and formalize mining practices. Small-scale mining leases last five years, after which the lease must be renewed.⁸³ All leaseholders must apply in order to export minerals for commercial purposes.⁸⁴

An annual surface rent is payable to the owner or occupier of the land subject to the lease.⁸⁵ The holder of the small-scale mining lease (and any other mineral title holders) must also pay compensation to the occupier or owner of the land for any disturbance to the surface of the land.⁸⁶ In addition, a small-scale mining leaseholder may apply to transfer the ownership of the mineral title, subject to the fee below.⁸⁷ Fees for small-scale mining leases are as follows (all in Naira):⁸⁸

- Application Processing Fee: 10,000
- Annual Service Fee: 10,000
- Renewal Processing: 30,000
- Tailing Deposit Application: 10,000
- Application to Abandon Work: 20,000
- Application for Transfer: 50,000
- Permit to Export Minerals: 10,000

Mine operators are also required to ensure that all tailings are properly treated before disposal,⁸⁹ although in practice, many tailings are sold for further processing. In addition, all mineral processors must ensure that toxic materials are stored and used in a safe and secure manner. Mine health and safety is monitored through periodic inspections (conducted by the Mines Inspectorate) that analyze whether each mine is in compliance with technical requirements.⁹⁰ During extraction, a small-scale leaseholder must keep detailed records and must pay royalties based on production.⁹¹ The royalty is three percent for gold mining.⁹²

All leaseholders must submit an approved EIA to the Mines Environmental Compliance Department prior to mining, along with rehabilitation and environmental protection plans. The EIA is submitted to the Federal Ministry of the Environment with participation from the Mines Environmental Compliance Department (full requirements are discussed further below).⁹³ In addition, every leaseholder must contribute to an Environmental Protection and Rehabilitation Fund, in proportion to potential adverse impacts from that particular operation.⁹⁴ All small-scale miners must also submit a Community Development agreement, outlining the rights and arrangement between the miner and the community representatives.⁹⁵

2008 Minerals and Metals Policy

The 2007 Act served as a springboard for development of the 2008 Minerals and Metals Policy, which reflects a stated desire by the Ministry of Mines to expand the solid minerals sector and capitalize on increasing global minerals prices. The 2008 Policy calls for a comprehensive approach to mineral resources development that supports artisanal and small-scale miners. Related objectives include the promotion of small-scale mining activities and the formalization of informal mining activities, as well as the development of a legal and regulatory framework reflecting international best practices. The Policy also identifies social equity and benefit-sharing for mining communities, in addition to the contribution of ASGM to sustainable livelihoods, among its bases for action. Notably, it directs the Artisanal and Small Scale Mines Department to support artisanal and small-scale miners by organizing, supporting, and assisting small-scale mining operations; providing extension services to ASM operators, improving sustainable livelihoods in ASM communities; facilitating strong relationships between miners and communities; registering ASM operators and mineral buying centers; and maintaining ASM records and reports. The Policy also identifies seven specific objectives for government action, including access to funding, needs-driven research, training opportunities, information sharing, promoting small-scale mining activities, facilitating co-existence of large and small mining operations, and establishing the Solid Minerals Development Fund.

Road Map for the Development of Solid Minerals and Metals Sector

Released by MMSD in April 2012, the Road Map sets forth the goal of establishing a vibrant minerals and metals industry and outlines a set of policy priorities for the solid minerals sub-sector (including a shift from low-level technology mining to modernized mining and processing; forming linkages between ASGM miners and expected medium and large-scale mining investors; promoting a participatory policy process; and ensuring community benefits, among other things). It also identifies challenges to development of the solid minerals sub-sector, which include a number of ASM-related factors such as the high proportion of ASM operations leading to environmental degradation and health hazards; the occurrence of illegal mining activities; mineral smuggling; and a lack of appropriate technology. In addition, the Road Map presents a set of nine performance targets. While the performance targets do not directly address ASGM issues, one target entails “protecting the rights of host communities and ensuring that mining activities lead to greater economic empowerment of the people.”

Vision 2020 Minerals and Metals Report

Although not an official policy, the Vision 2020 National Technical Working Group on Minerals and Metals Development Report, released in July 2009, presents a blueprint for improving Nigeria's minerals and metals sector. The report includes an assessment of Nigeria's minerals and metals sector, a 2020 vision and strategic plan, and an implementation roadmap and monitoring framework. It also addresses the ASM sector in part, emphasizing the need to minimize the adverse environmental impacts of artisanal mining and the importance of helping the miners form cooperatives and participate more formally in the mining sector. Its recommendations include a provision calling for MMSD to "control and strengthen" artisanal and small-scale mining operations by (1) encouraging the formation of mining cooperatives with a view to empowering them towards sustainable growth in the industry; (2) establishing license buying centers to serve as an interface between mining cooperatives/licensed miners, local users and export markets; (3) providing extension services to artisanal and small-scale miners in the form of technical assistance and support services; and (4) providing micro-credit to artisanal and small-scale miners.

Federal Environmental Laws, Policies, and Regulations

In 1999, Nigeria replaced the Federal Environmental Protection Agency with the Federal Ministry of the Environment.⁹⁶ Then, in 2007, under the authority of Section 20 of the Constitution, Nigeria passed the National Environmental Standards and Regulation Enforcement Agency (NESREA) Act, which supplanted FEPA as the primary law governing environmental protection.⁹⁷ NESREA is a parastatal organization of the Federal Ministry of the Environment (FMENV) that conducts environmental impact assessments and has a mandate to enforce international environmental agreements such as the Minamata and Basel Conventions.⁹⁸

Environmental Impact Assessment

Under the Environmental Impact Assessment Decree No. 86 of 1992, the Ministry of the Environment must complete pre-construction review of activities raising environmental concerns.⁹⁹ No activity falling under the mandatory list provided in the Decree, including mining activities in new areas exceeding 250 hectares, in addition to ore processing (including concentrating for gold), can be executed without an EIA.¹⁰⁰ The Minerals and Mining Act and its regulations supplement the Decree by mandating a pre-construction EIA for all mining leases.¹⁰¹ All completed EIAs are reviewed by the Ministry of the Environment and the Mines Environmental Compliance Department within the MMSD.

Under the Decree, EIAs must include a description of the activity, the potential affected environment, and the practical alternatives, along with an assessment of likely or potential environmental impacts, identification and description of mitigation measures, and an indication of gaps in knowledge.¹⁰² Mining-specific requirements include a surface infrastructure plan (including water pollution management), and surface water, groundwater, and air pollution analysis.¹⁰³

Prescriptive Environmental Regulation

In addition to complying with requirements from the Minerals and Mining Act and the EIA decree, mining operations must comply with background environmental law carried out by the Ministry of the Environment through NESREA. The NESREA Act tasks the Ministry of Environment with passing regulations with the purpose of protecting public health or welfare.¹⁰⁴ With respect to mining, the FMENV passed regulations in 2009 governing Pollution Abatement in Mining and Processing of Coal, Ores and Industrial Minerals.¹⁰⁵ The regulations seek to minimize pollution from the mining and processing of coal, ores, and industrial minerals and contain emissions limits for specific pollutants, among other things.¹⁰⁶ However, the regulations do not address mercury use in ASGM activities and Nigeria does not currently have any laws or regulations that restrict mercury use in ASGM.¹⁰⁷

International Law

The Ministry of the Environment must also “enforce compliance with the provisions of international agreements, protocols, conventions and treaties on the environment.”¹⁰⁸ Three international environmental agreements are implicated by ASGM: the Minamata Convention, the Basel Convention, and the Strategic Approach to International Chemicals Management (SAICM).

Minamata Convention

The Minamata Convention, named after a Japanese port city that experienced decades of mercury poisoning after chronic industrial discharges into the Minamata Bay, was finalized in January 2013 and opened for signature in October 2013. Nigeria and the U.S. are among 94 countries that had signed the Convention as of December 2013 (the U.S. was also the first country to become party to the agreement). The Convention seeks to reduce mercury pollution across many sectors, including ASGM, by prohibiting trade of certain mercury-added products and by requiring national plans to reduce anthropogenic mercury emissions.¹⁰⁹

Article 7 of the Convention is devoted entirely to mercury emissions from ASGM, which the Convention defines as “gold mining conducted by individual miners or small enterprises with limited capital investment and production.”¹¹⁰ Countries with ASGM activities must take steps to reduce or eliminate the use and emissions of mercury from mining and processing.¹¹¹ If a country determines that ASGM within its borders is more than insignificant, it must submit a National Action Plan within three years after the Convention enters into force or after notification to the Secretariat.¹¹² The National Action Plan must include eleven elements designated in Annex C of Minamata, as set forth in Box 1 below.

Box 1: Requirements for ASGM National Action Plans under Minamata Annex C

- National objectives and reduction targets
- Actions to eliminate: (i) whole ore amalgamation; (ii) open burning of amalgam or processed amalgam; (iii) burning of amalgam in residential areas; (iv) cyanide leaching in sediment, ore or tailings to which mercury has been added without first removing the mercury
- Steps to facilitate the formalization or regulation of the artisanal and small-scale gold mining sector
- Baseline estimates of the quantities of mercury used and the practices employed in artisanal and small-scale gold mining and processing within [a state's] territory
- Strategies for promoting the reduction of emission and releases of, and exposure to, mercury in artisanal and small-scale gold mining and processing, including mercury-free methods
- Strategies for managing trade and preventing the diversion of mercury and mercury compounds from both foreign and domestic sources to use in artisanal and small-scale gold mining and processing
- Strategies for involving stakeholders in the implementation and continuing development of the national action plan
- A public health strategy on the exposure of artisanal and small-scale gold miners and their communities to mercury. Such a strategy should include, inter-alia, the gathering of health data, training for health-care workers and awareness-raising through health facilities
- Strategies to prevent the exposure of vulnerable populations, particularly children and women of child-bearing age, especially pregnant women, to mercury used in artisanal and small-scale gold mining
- Strategies for providing information to artisanal and small-scale gold miners and affected communities
- A schedule for the implementation of the national action plan

The requirement in Annex C that countries take steps to facilitate the formalization or regulation of the ASGM sector is particularly striking, by recognizing that mercury use can only be addressed by targeting the economic factors underpinning its role in ASGM activities.¹¹³ In addition to the National Action Plan requirements, the Convention also encourages cooperation among signatories on the development of strategies to reduce mercury use in ASGM; education, outreach and capacity-building initiatives; research into sustainable non-mercury alternative practices; technical and financial assistance; and the promotion of best practices and alternative technologies that are environmentally, technically, socially, and economically viable.¹¹⁴ While the Convention regulates trade in mercury, it does not ban mercury use in ASGM. However, restrictions on the supply and trade of mercury under the agreement may make it more expensive and difficult to secure.¹¹⁵

“Each Party that has artisanal and small-scale gold mining and processing subject to this Article within its territory shall take steps to reduce, and where feasible eliminate, the use of mercury and mercury compounds in, and the emissions and releases to the environment of mercury from, such mining and processing.”

Although it was written before the Minamata Convention was finalized and will need to be updated, the UNEP document, “Developing a National Strategic Plan to Reduce Mercury Use in Artisanal and Small Scale Gold Mining”¹¹⁶ provides some guidance on drafting a National Action Plan. Ultimately, while the focus of a strategic or national action plan is on mercury releases from ASGM, the plan should also address relevant economic, social, environmental, and

legal issues within the sector.¹¹⁷ The formalization approach discussed in Part 3 of this paper presents an opportunity to incorporate these related matters into the action plan in order to best address the use of mercury in ASGM activities.

Strategic Approach to International Chemicals Management (SAICM)

Unlike Minamata, which provides concrete policy requirements such as the National Action Plan, SAICM is a 2006 framework agreement that forms a template for international chemical management.¹¹⁸ The agreement relies on voluntary actions undertaken by governments, NGOs, and private sector stakeholders in order to integrate chemicals management into the broader policy discussion, encourage standard-setting at internationally recognized levels, and promote the reduction of illegal chemical trade. Using this template, Nigeria and UNEP reached an agreement in August 2013 that aims “to strengthen institutional capacity, build the capacity of professional officers and raise the level of understanding of the populace about risk of chemicals in order to reduce environmental pollution.”¹¹⁹ The plan uses a life-cycle approach to chemicals management and aims for implementation by early 2014.¹²⁰

Basel Convention

The Basel Convention controls the transboundary movement of hazardous wastes.¹²¹ Impetus for the Convention arose after the 1988 toxic waste incident in Koko, Nigeria that spurred the development of Nigerian environmental law. While ASGM practices are not directly regulated under Basel, technical documents do call for education of artisanal miners, treatment of mining residue, and environmental remediation of mining sites.¹²² Basel also regulates the intrastate storage of wastes that contain mercury. Under the Convention, the generation of mercury waste should be reduced to a minimum, “taking into account social, technological and economic aspects.”¹²³ Countries must also provide adequate disposal facilities to ensure environmental sound management.¹²⁴ Under these two provisions, appropriate storage and management practices hold the potential to prevent mercury use, including in ASGM activities.

Extractive Industries Transparency Initiative

The Extractive Industries Transparency Initiative (EITI) brings together governments, companies and civil society to improve openness and accountable management of natural resources revenue.¹²⁵ This includes maintaining the EITI Standard, a voluntary country-wide standard that ensures complete disclosure of taxes and other payments that oil, gas, and mining companies make to governments. According to the standard, resource companies must disclose payments, and governments must disclose their revenues. Annual EITI reports, which must be comprehensible and actively promoted, provide citizens the opportunity to learn how much their government receives from natural resources extraction and to demand equitable management of resource wealth. Countries must meet seven requirements to become EITI Candidates and become EITI Compliant when the EITI Board determines that they have satisfactorily met all requirements. Currently 41 countries implement the EITI, twenty-five of which have been deemed compliant.¹²⁶

The Nigeria Extractive Industries Transparency Initiative (NEITI) is tasked with developing a framework for accountability in reporting and disclosure of revenue due to the Nigerian federal government by extractive industries.¹²⁷ Under NEITI, extractive industries are defined as “any company” engaging in prospecting, mining, extracting, and processing gas or minerals, including gold.¹²⁸

NEITI was designed to “eliminate all forms of corrupt practices” in extractive industry payments.¹²⁹ To this end, NEITI is constituted as an autonomous self-accounting body (albeit one funded by the Government of Nigeria) that must submit biannual reports to the Nigerian President, the National Assembly, and the international EITI Secretariat in Oslo on budgeting, contracts, production costs, and other financial parameters.¹³⁰ In addition, NEITI is required to employ independent auditors to examine payments and receipts from extractive industries to ensure accuracy.¹³¹ Upon a finding that a company gave false information or submitted false receipts, the company is required to pay the actual amount of revenue due; may be fined; and may have its permit revoked at the discretion of the President.¹³² Managers, directors, and government officials are subject to personal liability unless they can prove that the relevant act occurred without their consent and that they performed due diligence.¹³³ It is not clear, however, that full compliance with NEITI’s requirements has been achieved.

While NEITI has succeeded in increasing financial transparency and accountability in the oil industry, it has not yet been applied to artisanal gold mining. In October 2011, a scoping study on the Nigerian mining sector found a consensus supporting the inclusion of small-scale mining in the NEITI framework.¹³⁴ Currently, there are no large-scale mineral mining operations in Nigeria. In order to apply to smaller-scale operators (primarily cement manufacturers and construction companies), the scoping study recommended using royalties paid to provide a baseline “materiality point” at which NEITI would apply. However, under the suggested materiality point for royalties recommended by the scoping study (N5,000,000), no companies extracting gold or using ASGM were covered at that time.¹³⁵

In 2011, the Civil Society Legislative Advocacy Centre (CISLAC) released a policy brief recommending that NEITI apply to artisanal gold mining.¹³⁶ The brief cited health concerns, environmental degradation, and water pollution as primary incentives to spur legislative action.¹³⁷ However, CISLAC’s recommendation to extend the financial accountability framework to gold mining has yet to be followed.

State Environmental Laws and Policies

Nigerian states possess the authority to enact environmental laws that are not preempted by conflicting laws passed by the National Assembly.¹³⁸ However, Nigeria has a constitutional provision that enumerates an “exclusive legislative list” that vests legislative power solely in the National Assembly, including with respect to “mines and minerals.”¹³⁹ Therefore, the Minerals and Mines Act of 2007 and its regulations would preempt most state regulation of ASGM, with some exceptions.

All Nigerian states have environmental agencies and environmental laws.¹⁴⁰ These state agencies act under the principle of cooperative federalism, where states have concurrent authority over most environmental matters, subject to a “floor” established by regulations promulgated by the Ministry of Mines and the Ministry of the Environment.¹⁴¹ State agencies often monitor and enforce the EIA process, conduct surveys, engage in outreach, and issue permits.¹⁴²

Mineral Resources and Environmental Management Committees (MIREMCO)

The Minerals and Mining Act calls for the establishment of a Mineral Resources and Environmental Management Committee for each state in the Federation, composed of the following representatives:¹⁴³

- a representative of the Mines Environmental Compliance Department (to serve as chair)
- a representative of the Ministry responsible for land or mineral-related matters in the State
- the federal Mines Officer responsible for the State
- a representative of the State Ministry of Agriculture or Forestry
- a representative of the State Surveyor-General
- a representative of the relevant Local Government Council (when the committee is considering issues affecting a particular Local Government Area)
- a representative of the State Environmental Department or Agency
- a representative of the Federal Ministry of Environment in the State

The MIREMCOs are intended to discuss, consider, and advise on environmental issues affecting local interests, including the sustainable management of mineral resources and potential pollution and degradation of land.¹⁴⁴ They are also responsible for deciding all disputes between a mineral title holder and the local community.¹⁴⁵ MIREMCOs are required to meet once every three months and report their findings to the Minister of the Environment.¹⁴⁶ Despite their enumerated list of tasks, MIREMCOs thus far “have been slow to take up their responsibility and are yet to fulfill the rationale behind their establishment,”¹⁴⁷ and many MIRECOs have yet to be formed.

State Environmental Laws

Even though states do not have authority over mining activities, as mentioned above, they can regulate environmental pollution. In Zamfara, for example, the State Assembly created the Zamfara Environment Sanitation Agency (ZESA) under the Zamfara Ministry of Environment & Solid Minerals. The role of the agency is to protect and improve the environment by helping communities understand their environmental responsibilities. ZESA is charged with regulating activities that can cause harmful pollution and monitoring air, soil, and water quality. The agency’s seven departments include Finance and Supply, Operations, Street & Drainage, Pollution, Solid Waste, Enforcement & Inspectorate, and Administration. The Pollution Department is charged with regulating activities that cause harmful pollution by monitoring the quality of air, land, and sewages. The Department has participated in remediation activities undertaken by ZESA in the areas affected by lead poisoning.

Other state environmental laws that purport to address water quality and sanitation in areas with ASGM activities include:

- Borno State Rural Water & Sanitation Agency Law
- Jigawa State Rural Water Supply and Sanitation Agency Law
- Kaduna State Waste & Sanitation Agency Law
- Katsina State Rural Water Supply & Sanitation Agency Law
- Yobe State Environmental Protection Agency Law

Traditional Rulers

Although not part of Nigeria's formal government, traditional rulers wield a significant amount of authority at the local level, particularly in the Muslim north. Nigeria's Emirs have been identified as potential change agents in addressing women's health issues,¹⁴⁸ and in Zamfara, the Emir of Anka (the Local Government Area that includes Bagega and other ASGM sites) has been involved in lead remediation and outreach activities. The Emir of Anka has also sought to help mining communities deal with issues of land access and consent, as discussed further in Part 5 below.

Local Government Areas

Each of Nigeria's 36 states is subdivided into a number of local government areas (LGAs). The system of elected local government authorities was established by the military in 1976 with 300 initial LGAs.¹⁴⁹ Currently, there are 774 LGAs throughout the country. State law determines the functions, structure, finance and composition of each state's LGAs; however, the vast majority of LGAs use the "presidential model."¹⁵⁰ This consists of an elected Chairman, who is the Chief Executive of the LGA, and an elected Local Government Council (LGC) as the legislative branch of the LGA¹⁵¹ (although it is unclear how many LGAs actually have elected officials in practice). These local governments constitute the third tier of government below the federal and state levels.¹⁵²

LGAs are tasked with supplying basic necessities to their jurisdictions, such as maintaining public conveniences, licensing vehicles, constructing and maintaining roads, and registering births, deaths and marriages.¹⁵³ The Local Government Councils also work extensively with their state governments, which provide funding to LGAs. LGCs and their State governments work hand-in-hand on the delivery and maintenance of primary education and health services, as well as agriculture and natural resource development (this does not include mineral exploitation).¹⁵⁴ The interaction between Emirs and LGAs varies. Some LGAs make use of Emirs and other traditional leaders in conflict prevention and mediation, but give them formal political and administrative support far less frequently.¹⁵⁵

Part 5: Recommendations for Strengthening Nigeria’s Legal, Policy, and Institutional Frameworks Governing ASGM

The recommendations presented in this section are drawn from desk research, interviews, and field visits. They focus on how to enhance formalization of the ASGM industry in order to make it both possible and desirable for miners to process gold more safely, primarily by phasing out the use of mercury and by reducing exposure to lead-contaminated ore. By touching on the legal, institutional, and financial frameworks underpinning ASGM activities, the recommendations reflect the fact that a holistic approach is needed to address the problem. That is, “[p]utting an efficient legal framework into place without enhancing the financial capacity of miners or raising their awareness of their legal obligations does not help to eradicate illegal mining activities.”¹⁵⁶ The recommendations include steps that can be taken immediately or in the near term, as well as over the long term. These recommendations stem from several key observations.

First, there must be sufficient incentives for all parties involved in artisanal mining operations for a formalization approach to succeed. For example, the benefits to miners of registering and acquiring title must outweigh the cost of registering and seeking a license, paying taxes or royalties, and complying with environmental and other requirements. Regulators, mining companies, and the public should also have an interest in the formalization of miners, and this interest should outweigh any costs that formalization might impose on them (although it is not clear what form these costs would justifiably even take). Some incentives that formalization can bring to other parties include the capturing of taxes or royalties that are currently being lost by the federal government; the availability of skilled workers for employment by mining companies (while Nigeria has relatively few large companies right now, this number is likely to increase); reduced environmental and public health harms to the public; fewer conflicts with mining companies, miners, and communities over land access and other issues; and, if revenues are managed properly, stronger economic development for communities, states, and the national economy.

Second, formal title in the form of a mining license is a critical element of safer mining practices. Currently, relatively few miners hold title to the land on which they are working. Often, title has already been acquired by another party or parties, or miners do not know how to (or have not been able to) obtain a small-scale mining lease. While the absence of title does not prevent artisanal miners from carrying out their mining activities, it can lead to conflicts with landowners and discourage miners from investing in improved technologies or practices. It also means that miners cannot use their land as collateral to secure formal credit, an important means of obtaining new technology and scaling up mining operations – even if the mechanisms for accessing formal credit are not yet in place in Nigeria.

Third, the focus on lead contamination should not detract from the issue of mercury use in gold processing, as both lead and mercury exposure pose serious risks to public health and the environment. While the more visible short-term effects of lead contamination in Zamfara State eventually triggered a comprehensive response in the villages that were identified as

contaminated (even if the resources for that response have not been entirely adequate, and many other villages have not received lead remediation assistance), it is critical that miners and regulators understand both the short- and long-term health and environmental impacts linked to mercury use in ASGM, which is the leading source of mercury emissions worldwide.

Fourth, and building on the prior point, implementation of the recommendations would ideally be considered as part of Nigeria's obligations under the Minamata Convention, the first-ever international instrument on mercury that opened for signature in October. Given Nigeria's participation in the negotiation process and its early signing of the convention, thinking about how to integrate these and other recommendations into the required preparation of a National Action Plan to address the use of mercury in ASGM activities is critical.

Fifth, the Nigerian government is taking a number of positive steps with respect to some of these areas (note that this paper does not address the remediation and treatment efforts related to lead-poisoning). For example, the Ministry of Mines' Safer Mining Programme, launched earlier this year, has been helping to register more artisanal mining cooperatives, train miners on safer mining practices, and introduce improved mining processing technologies, including three iGoli machines. The Ministry is also working to establish gold buyers & sellers associations at some of the larger mining towns, such as Bagega in Zamfara State (currently, the main buyers & sellers association is in Gusau, over an hour's drive away). In addition, it is taking steps to enforce some of its existing legal authorities, such as the "use it or lose it" provision governing mineral titles, to free up lands for artisanal miners. In 2012, the Mining Cadastre Office cancelled 600 licenses due to inactivity. The MCO has also posted cadastre maps online showing the status of mining lands, and is looking at how people can apply for licenses electronically¹⁵⁷ (although this would require access to a computer and internet service). While these and other initiatives are helping to pave the way for greater formalization of artisanal miners, the recommendations focus on remaining gaps in the legal, regulatory, and policy framework.

In light of these considerations, the recommendations presented below can be grouped under four principal themes. These themes can help inform the process of designing and implementing changes to the legal and policy framework as well as the institutional and financial backdrop.

- **Incentives** for all parties to facilitate the formalization of ASG miners
- **Decentralization** of cooperative and licensing processes
- **Communication** with miners about requirements and status
- **Coordination** with other actors working on mining issues

Legal and Policy Recommendations

Nigeria has much to gain from reorienting its legal and policy framework towards ASGM miners, who currently carry out the bulk of solid minerals mining activities. Although the Mining Act and Regulations include a number of incentives to attract larger investors, there has been no large-scale gold rush in Nigeria by larger mining companies at this level so far. In the meantime, artisanal miners are extracting and processing gold using dangerous methods, without sufficient

access to land, equipment, and financing, while their revenues are going untaxed. The Minerals and Mining Act and Mining Regulations only briefly address the needs of artisanal miners, primarily by requiring miners to form cooperatives in order to access extension services. Now is the time to get the framework and incentives right so that ASGM activities can better contribute to economic development, both on a national and a local scale, without the negative impacts on human health and the environment that are currently taking place.

The legal and policy recommendations presented below are intended to enable and encourage formalization of artisanal miners by focusing primarily on licensing and the related issues of access to land and organization into mining cooperatives or other associations. They range from specific amendments or additions to the mining laws and regulations to concrete steps that MMSD and others can take to improve the ability of miners to navigate the mineral licensing process and to secure access to land.

Priority 1: Address the Cooperative Barrier

The Challenge: Under the Minerals and Mining Act and Regulations, artisanal miners are strongly encouraged, and in some cases required, to form a cooperative in order to proceed with their activities. Miners must be part of a registered cooperative in order to receive extension services from the Ministry,¹⁵⁸ and while both individuals and cooperatives are allowed to apply for a small-scale mining lease, the Ministry holds the view that the only way for artisanal miners to obtain such a lease is through a registered cooperative. The requirements for forming a cooperative are specific to each state, but commonly include the preparation of bylaws and payment of a registration fee, among other things. Once miners have legally formed a cooperative, they must also register it with MMSD's central office in Abuja, which imposes additional steps and fees.

These dual registration requirements impose financial and time-consuming burdens that are difficult for many miners to meet. A number of miners may not even be aware that the cooperative requirement exists. It is also unclear who is supposed to register the miners within each state. For example, in Zamfara, the State Ministry of Rural Development and Cooperatives is supposed to register artisanal miners, but in reality, it is the State Ministry of Environment and Solid Minerals that is helping the miners to form cooperatives. MMSD is said to be assisting some miners as well, but there appears to be no organized approach for systematically registering artisanal mining cooperatives. As such, groups of miners who might wish to form a cooperative do not necessarily know whom to contact for help with the process. In the end, the greatest effect of the cooperative requirement may be to prevent many miners from receiving needed extension services from MMSD.

The most commonly articulated justification for the cooperative requirement is that artisanal miners are numerous, unorganized, and highly mobile, thus making it impossible to regulate them as individuals. However, field visits suggest that many artisanal miners have already organized themselves by processing task and/or other means of labor division, with large mining sites functioning in what appears to be a fairly regularized manner. These “spontaneous self-organizing social systems” may appear uncontrollable to governments¹⁵⁹ – as seems to be the

case in Nigeria – but in reality they may provide a more organic structure that can enable regulators to work with large groups of miners just as effectively as with mining cooperatives. In some cases, this might even be a more effective approach, as mining cooperatives are sometimes composed of arbitrarily-formed groups that might not have chosen to work together. Moreover, with a minimum requirement of 10 persons, it is not clear how large mining processing groups should break themselves down into cooperatives. In Bagega, where hundreds of miners work together, a single large cooperative apparently exists, but field interviews indicated at least some of the miners had no idea they belonged to one.

All of this is not to say that mining cooperatives – or other organizational entities – should not be formed or encouraged. Given the collective nature of artisanal mining activities, it makes sense for miners to work together in groups and for the legal framework to recognize such groups. Indeed, there are a number of benefits to combining resources and efforts, and where cooperatives or other organized groups can enhance this approach, they should be promoted. Moreover, miners may perceive additional benefits to forming cooperatives beyond access to MMSD’s extension services. For example, members of the mining cooperative in Bagega explained that they were motivated to form one when they saw how another cooperative helped one of its members who had fallen ill. The problem is not that artisanal miners cannot or should not work together, but that the legal and regulatory framework makes it so difficult for them to do so in a way that MMSD recognizes as legitimate. Cooperatives and other recognized mining associations should constitute a path towards formalization, not a barrier that serves to prevent it. This might best be achieved by encouraging rather than requiring miners to form cooperatives, as well as by providing assistance to miners to form such groups. Ideally, miners would have a choice as to whether or not to join a cooperative, and the legal framework would allow individual miners to seek an artisanal mining license (discussed in more detail under Priority 3) under appropriate circumstances.

Overview of Recommendations

Incentives and assistance are needed to help miners form cooperatives or other (potential) legally recognized groups. Ideally, MMSD will continue to work with miners and state-level counterparts to support the formation of mining cooperatives. Greater focus should also be placed on **streamlining and decentralizing the cooperative requirements** as much as possible. Once mining cooperatives or other groups have formed, MMSD can also provide **organizational training and assistance** so they can function optimally.

- **The legal requirement that artisanal miners form cooperatives in order to obtain a mining license and/or extension assistance should be reconsidered.** MMSD might wish to consider alternative approaches that would build on the organizational systems already in existence at mining processing sites (such as by letting existing groups of miners apply for a license without having to formally register as a cooperative beforehand). At the same time, or alternatively, MMSD could still use incentives (such as enhanced access to credit and other benefits) to encourage miners to form cooperatives, but without *requiring* them to do so as a precondition to obtain technical assistance and mining licenses.

- If the cooperative requirement is retained, **MMSD could work with States** (including the State-level Ministry responsible for cooperatives and the State-level Ministry responsible for environmental protection) **to streamline and decentralize the cooperative registration process**. This includes reducing the filing fees, simplifying the filing requirements, and allowing miners to register their cooperatives with MMSD zonal and federal mines officers in the field, rather than having to submit their forms to the headquarters in Abuja.
- MMSD can also **help miners understand how cooperatives work and the benefits of forming a cooperative** – which include technical assistance, eligibility to obtain a small-scale mining license, and even financial assistance on a project-specific basis (e.g., the World Bank’s Sustainable Management of Mineral Resources project made small grants available to registered mining cooperatives). Understanding these benefits can help encourage miners to form cooperatives.
- MMSD might consider developing new incentives, such as a **government purchasing scheme** (at an above-market price) exclusively for gold produced by mining cooperatives. Gold produced outside of a cooperative would not be eligible for purchase by the government.
- MMSD could **consult with the Miners’ Association of Nigeria** (<http://nigerianminers.org/>) **and traditional rulers** to identify other ways to help encourage the formation of cooperatives, as well as the potential role of sub-chapters of the miners’ association as an alternative organizational entity.

Address the Cooperative Barrier: Short-Term Recommendations

- a) Determine who should be registering artisanal miners in each state, either alone or working together with other entities (e.g., the state ministry responsible for cooperatives, MMSD zonal and federal mines officers, the state environmental ministry, and any other groups).
- b) Consider having MMSD’s zonal and federal mines officers work with state officials to sensitize miners about the benefits of formalization.
- c) Develop a training program for newly-formed cooperatives to help ensure they are operating effectively.
- d) Consider having MMSD’s zonal and federal mines officers meet regularly with the state environmental ministry and state ministry responsible for registering cooperatives for updates on which new cooperatives have formed.
- e) Consider having MMSD’s zonal and federal mines officers reach out to the Nigerian Miners’ Association and traditional rulers for help encouraging miners to form cooperatives.
- f) MMSD might consider designating a specific time period for a cooperative registration drive (e.g., one or two months) and devoting a significant amount of resources into helping miners register. The relevant desk at MCO could coordinate with the state ministry that registers cooperatives in each State, as well as other groups including the Nigerian Miners’ Association, traditional rulers, civil society groups, and others.

Address the Cooperative Barrier: Long-Term Recommendations

- g) Consider dropping the requirement (in Section 91 of the Mining Act) that miners form cooperatives in order to obtain extension services from MMSD; or
- h) Amend the legal requirements to make it easier to form cooperatives and/or register them at MMSD.
- i) Develop a system in which the government would purchase gold at above-market rates at mine processing centers, but only if it were produced by mining cooperatives.
- j) Create MCO zonal offices to coordinate with state ministries to help miners form cooperatives (or other recognized organizational entities)
- k) State offices that register cooperatives could create some outposts in larger villages or towns to help miners register
- l) Given the large number of migratory laborers working as artisanal miners, MMSD and state authorities could clarify that foreign national ASM miners can join cooperatives or other recognized legal entities, so that these miners will not be marginalized and possibly undermine the progress of other miners.

Priority 2: Strengthen Access to Land

The Challenge: Many miners do not hold title (in the form of a Small-Scale Mining Lease) to the lands where they are working to extract gold-containing ore. This may be because they do not know how to obtain a mining lease, they lack the resources to obtain a lease, or because title to the land in question is already held by somebody else. A lack of formal title can discourage artisanal miners from making longer-term investments to improve their mining activities, without the assurance that they can recover their investment.¹⁶⁰ It also means that miners cannot use the land on which they are working to secure credit for obtaining new tools and developing improved technologies. Nor do they have the security of knowing they can continue to mine in a given location for a specific length of time. In Ghana, the lack of available land has been tied to the reluctance of artisanal miners to register, even under a strengthened legal framework, and the resulting expansion of the informal artisanal gold mining economy.¹⁶¹

In Nigeria, these challenges are rooted in the country's complex land tenure history, the rapid assignment of mineral titles (including for lands under customary title) to speculators and investors following passage of the 2007 Mining Act, and the often-fraught relationship between artisanal and larger-scale miners. Many mineral deposits lie on lands that have been formally registered to titleholders (predominantly small- and medium-scale operators, as Nigeria has few large-scale gold mining operators at present).¹⁶² This creates a significant problem of access for artisanal miners, and can lead to conflicts with the license holders. Moreover, although applicants for mineral titles on private land are required to obtain consent from the owner or occupier of the land, such consent is not always lawfully obtained. In some cases, mining companies are alleged to have collaborated with traditional rulers to take title to lands.

This set of recommendations addresses access-to-land challenges where title to mineral lands is already held, or is in the process of being obtained, by another party. (The challenges for artisanal miners seeking to obtain title in the form of a small-scale mining lease will be addressed in Priority 3, below). The recommendations focus on finding creative ways to give artisanal and

small-scale miners access to titled lands, as well as how to improve accountability in the licensing process for mining companies and landowners. While MMSD is taking some steps to address these needs, such steps are voluntary and not currently required under the mining law or regulations.

There is a sizable body of research on how to improve the often-tense relations between artisanal miners and larger companies, with continued development of best practices and approaches.¹⁶³ With few large-scale gold mining operators to date, Nigeria still has a chance to develop a model for engagement that could set a standard for addressing this problem going forward. Experiences from a number of countries reflect the potential benefits that can result when companies engage artisanal miners in a non-confrontational manner. At the same time, issues of mistrust remain and an effective model of how large-scale companies can work with artisanal miners proactively (rather than simply co-existing) has yet to be developed. In the meantime, examples of efforts to bridge the divide between these two groups include:

- In **Mongolia**, the establishment and institutionalization of multi-stakeholder councils consisting of mining companies, artisanal miners, and local governments and communities has facilitated dialogue on issues such as mitigation of negative environmental impacts, reducing conflict between stakeholders, and sharing responsible mining practices.¹⁶⁴
- Also in **Mongolia**, 50 artisanal miners signed an agreement with the Mundalaan Trade Company to mine marginal deposits that the firm is unable to use. The agreement also enables the miners to sell their products directly to Mongolia's central bank, rather than engaging in the risks of illicit trade.¹⁶⁵
- In **Tanzania**, several mining companies are working cooperatively with artisanal and small-scale miners. A joint venture between the government and South African company Triennex, known as MEREMETA Limited, has provided mining and processing equipment to small-scale miners in exchange for the ability to buy gold from the miners.¹⁶⁶ The company also began production-sharing with the ASM producers, participating fully in mining and processing and sharing the final products. This initiative led to the creation of Tembo mine in Geita, now owned by the Canadian company Tembo Gold Corp, which is pursuing a strategy for a community development partnership.¹⁶⁷
- Also in **Tanzania**, companies like AngloGold Ashanti are participating in a Multi Stakeholder Partnership (MSP) on ASM with the Tanzanian government. AngloGold will pilot the Partnership, which seeks to actively engage ASM stakeholders to enhance formalization and to support alternative livelihoods for artisanal and small-scale miners.¹⁶⁸
- In **Ghana**, Abosso Gold Fields Ltd (AGL) developed a "Live and Let Live" plan with ASM miners. Under the plan, AGL agreed to accommodate artisanal miners on its concession as long as the miners' activities did not threaten the company's operations. The plan was administered by a management committee consisting of members from AGL, ASM operators, local government officials, traditional chiefs, police and opinion leaders. When the miners began to encroach on areas earmarked for active mining, AGL would demarcate an alternative site on one of its concessions for their operations. AGL mounted educational campaigns to reassure miners of the miners' ownership and control

over their mining activities and profits. The project enjoyed success during the mid-1990's until rising gold prices made marginal concession lands more valuable to AGL.¹⁶⁹

Overview of Recommendations

The first set of recommendations focuses on **bringing mining companies and artisanal miners together** to reach an agreement or arrangement regarding access to titled land. There are two ways that this can be done. First, and more preferable, is for **the titleholder to cede a portion of the area under title** to the artisanal miners, or to MMSD to make available for mining licenses. Typically, the area ceded consists of a plot of land with marginal deposits of little use to larger operators but that can be effectively mined using artisanal techniques; however, artisanal miners should not necessarily be restricted to low-grade deposit areas under this approach. The strategy of ceding a portion of land should be encouraged particularly for larger titleholders, whose concession areas may take up more space than needed for actual mining operations.¹⁷⁰ This approach is preferable because the miners would receive full rights to the land and to the activities they conduct on it, and could choose to apply for a small-scale mining lease. Incentives in the form of tax benefits could be used to encourage title holders to cede land to artisanal miners; other advantages include fewer conflicts over access to mineral deposits on concession areas. Because artisanal miners would be responsible for paying royalties on gold produced on ceded lands, there is also an incentive for the government to facilitate this type of arrangement. In Zamfara, the Ministry of Environment and Solid Minerals is said to be helping miners negotiate with landowners for mineral titles.

If the title holder is not willing to sever a portion of its land for the miners, it can still **negotiate an agreement with artisanal miners to give them access to marginal land on its concession**. Often, such an agreement gives miners access to marginal lands that are of little use to the mining companies, while helping companies avoid conflicts with artisanal miners. As described above, this approach has been used successfully in Mongolia and Ghana. Reportedly in Nigeria, the company Savannah Gold has executed a Memorandum of Agreement with local miners in Kebbi State. The federal government can use such agreements to collect royalties (via the mineral title holder) from artisanal miners, which it is not currently capturing. While they can go a long way towards helping companies avoid conflicts with artisanal miners, these agreements can impose restrictions on miners' activities that can limit their ability to scale up their operations. For example, near the town of Bukuyyum in Zamfara State, an informal agreement with one of the title holders prevents the miners from using any kind of machinery to mine their allocated plot of land. In addition, there does not appear to be a template for such agreements and there appear to be no legal standards that would govern their content. It is important to develop oversight mechanisms for these agreements in order to protect both parties.

A related issue is how MMSD can help **provide oversight and enforcement of the negotiated agreements** between miners and title holders. Although Sections 15-16 of the Mining Regulations empower the Minister to establish procedures for resolving disputes between mineral title holders and third parties, it is not clear that any such procedures have been established, and nothing currently compels MMSD to provide oversight and enforcement of land-access agreements between the two groups. Additional recommendations are made below to address these concerns.

The second set of recommendations revolves around **improving accountability in the mineral licensing process**. One key issue concerns landowner consent. Section 100 of the Mining Act requires mineral title applicants to obtain consent from the landowner or lawful occupant, but compliance can be spotty. Some applicants are said to have submitted false consent forms from landowners (many of whom are illiterate) to the Mining Cadastre Office. In the case of concessions that cut across multiple Local Government Areas (LGAs), consent might only be obtained from one Area. Another problem, as related by the Emir of Anka, is that local communities do not know how to approach miners who come from elsewhere to work on community land, because the communities are unsure whether the miners hold lawful title. Separately, it has been noted that sometimes communities give consent to more than one company for the same piece of land.¹⁷¹

Another accountability question is whether MMSD is **sufficiently enforcing the “use it or lose it” principle** expressed in Sections 70(1)(a) and 151(g) of the Mining Act, which together require all mineral title holders to begin mine development within 18 months and production within three years, or face revocation of their title. This enforcement question has arisen in light of allegations of widespread land speculation shortly after passage of the 2007 Act, which created the mining cadastre system. MMSD is taking steps to address this problem. It has instructed its zonal and federal mines officers to contact title holders, inspect licensed mining sites, and report back on whether title holders are complying with their obligations to actively develop their mineral concessions. The Mines Inspectorate also recently established a computerized “framework” to track mineral licenses.¹⁷² Based on the results of its inspections, MMSD could cancel inactive mining licenses under Section 151 of the Mining Act, thus freeing up scarce lands for artisanal miners.

A related approach that MMSD might consider is to require large-scale mining companies to return a certain percentage of their concessions to the federal government after a designated time period. This would make lands available for ASGM activities while at the same time putting meaningful pressure on mining companies to complete exploratory work within the required timeframe.

Strengthen Access to Land: Short-Term Recommendations

- a) Take testimony from villagers as evidence regarding the issue of false consent in order to determine the scope of the problem and how to address it.
- b) Designate an entity to hear and help resolve disputes between mineral title holders and artisanal miners related to land access.
- c) Adopt the proposal by the President of the Miners Association for MCO and the Miners Association to organize an educational campaign for traditional rulers about the landowner consent provision (Section 100) of the Minerals and Mining Act. This would include the requirement that it is the landowner, not the Emir, who must give consent. As part of the training events, copies of the Mining Act and Regulations and contact information for relevant officials at MMSD and the MCO could be given to the traditional authorities.

Strengthen Access to Land: Long-Term Recommendations

- d) Develop a mechanism by which title holders can grant permanent, temporary, or conditional access to marginal deposits by artisanal miners, and prepare a template or model agreement to help facilitate this process.
- e) Develop a regulation requiring regular inspections of mining sites at designated intervals in order to enforce the “use it or lose it” principle expressed in Sections 70(1)(a) and 151(g) of the Minerals and Mining Act.
- f) Amend Section 100 of the Mining Act (regarding notice and consent to private landowners or a proposed mineral title) to require community consultation before mineral rights are allocated.
- g) Consider requiring large-scale mining companies to return a certain percentage of their concessions to the federal government after a designated time period, to encourage timely exploration and to make more lands available to artisanal and small-scale miners.

Priority 3: Improve the ASGM Licensing Process

The Challenge: Perhaps the most fundamental tenet of formalization involves the ability to obtain a mineral title. As mentioned above, secure title can go a long way towards helping artisanal miners improve their operations by investing in safer and more effective mining technologies. While Nigeria’s Mining Act and regulations do allow artisanal miners to obtain a Small-Scale Mining Lease, the process is difficult and costly. The license fee of 10,000 naira (approximately \$63 U.S. at current exchange rates), while not prohibitive – particularly for mining cooperatives – is still a substantial sum for poor communities. In addition to the fee, the mineral lease application requires a pre-feasibility study, proof of sufficient working capital and technical competence, and details such as coordinates about the location of the proposed lease, among other things.

The approach taken by MMSD thus far has focused on encouraging miners to form cooperatives in order to apply for a Small-Scale Mining Lease (so as to share the costs and administrative burdens of submitting an application), but this does not resolve the more fundamental question of the appropriateness of a small-scale mining lease for artisanal mining activities. It also raises questions about the challenges in forming mining cooperatives that are addressed in Priority 1, above. As an examination of ASM legislation has concluded, mineral rights should be simple to administer, easily understood by the miners, and enable miners to scale up to the next level of mining operation.¹⁷³ As such, use of the Small-Scale Mining Lease as the primary vehicle for licensing artisanal miners should be revisited. Rather, it would be more effective to create a separate Artisanal Mining License for artisanal miners – one that is tailored to their specific needs and operations.

Overview of Recommendations

Rather than requiring artisanal miners to seek a small-scale mining lease, MMSD could simplify the licensing process by **creating a new license category for artisanal mining activities**. (This

would be in addition to the Small-Scale Mining Lease and Mining Lease already provided under the 2007 Minerals and Mining Act.) Several countries, including South Africa, Ethiopia, and Zambia, among others, already differentiate between artisanal and small-scale mining licenses.¹⁷⁴ The new license could be available to individuals as well as cooperatives and other recognized mining associations or groups (as addressed in Priority 1). MMSD can also require training on health, safety, and environmental protection measures as a condition for receiving a license.

The design of the new mining license should be informed by a number of considerations. One issue is how to define ASGM activities (e.g. the level of mechanization permitted) so that the license provision is not abused by applicants with greater resources, but at the same time does not prevent artisanal miners from upgrading their operations. An effective licensing process should be transferable, renewable, and long-lasting,¹⁷⁵ with a reasonable application fee¹⁷⁶ and processing time. The Mining Cadastre Office has stated that mineral licenses in Nigeria are now processed in 30-45 days under a computerized system,¹⁷⁷ and it is critical to ensure that a new ASGM permit will also be available in a timely manner (in Ghana, delays in the permitting process have been identified by artisanal miners as a major deterrent to registering).¹⁷⁸ Because the new ASGM license category would require amending both the Minerals and Mining Act and the Minerals and Mining Regulations, it will take some time to develop and implement, but it holds great potential to enable more artisanal miners to register mineral titles. (In the meantime, MMSD can also explore opportunities under its existing legal authority to make it easier for artisanal miners to meet the requirements for a small-scale mining lease.) UNEP's formalization study identifies the following key considerations for designing artisanal mining licenses:¹⁷⁹

- Criteria for defining ASGM
- Duration and renewal of the title
- Transfer and upgrade of titles
- Types of entities allowed to operate under an ASM mining title
- Environmental considerations
- Safety

While the new ASGM license is being developed, MMSD can also take steps to **decentralize the license application process** and **work with miners** to help them submit license applications. When properly used, decentralization can reduce delays in the processing of license applications, enable greater control and management of environmental impacts, and reduce informal activities and security problems in mining camps and surrounding areas.¹⁸⁰ The recommendation to decentralize the licensing process is also consistent with calls for reform within Nigeria. For example, the working group in Zamfara State (composed of representatives from the federal and state ministries and civil society organizations) that has been working to address the health issues associated with mining has submitted a request to the Ministry to make it easier for miners to obtain a small-scale mining license.

The Mining Cadastre Office at MMSD has posted cadastre maps online showing the status of mining lands, and is exploring how to enable people to apply for licenses electronically.¹⁸¹ These improvements are an important step, although they are more likely to benefit financially capable miners with access to a computer and the capability of applying for small-scale licenses on their own, rather than artisanal miners who may not even know that they can apply for a license.

(Another approach, used successfully in Suriname, is to give miners GPS devices to specifically identify target mining areas with GPS coordinates, and therefore minimize disputes among themselves).

Another useful step would be to enable applicants to apply for licenses at the ASM zonal offices or another accessible location within individual states, ideally with assistance from the relevant zonal or federal mining officer. To assist in setting up an electronic application system, MMSD could make computers available at its state-office locations where applicants could prepare and submit applications with technical assistance from office staff. The MCO can also work with traditional authorities, state entities (such as the environmental ministry), and civil society organizations to educate miners about decentralized licensing procedures.

A third recommendation with respect to licensing focuses on the **designation of ASGM lands** to help artisanal miners identify areas suitable for mining licenses. Such designation can help miners determine whether particular areas are already under title and whether or not they are productive, before spending valuable time on the licensing process.¹⁸² Designation can also help miners identify specific areas that are suitable for small-scale mining techniques,¹⁸³ although care should be taken so that this process is not used to exclude miners from high-grade areas. As noted above, the Mining Cadastre Office has been working to create a functional online mining cadaster in order to view and search existing mining titles (<http://server.miningcadastre.gov.ng/>). Once the system is in place, it would also be useful for zonal or federal mining officers to share this information with miners in the field.

Improve the ASGM Licensing Process: Short-Term Recommendations

- a) Establish MCO zonal offices to work more closely with mining cooperatives and individual applicants to obtain licenses (although Section 6 of the Mining Act requires “an appropriate number of Zonal offices” to be maintained by the MCO, it is unclear whether this has yet happened).
- b) Continue developing a system for miners to apply for licenses online, along with an electronic database of mineral titles.
- c) Include maps showing the availability of near-surface deposits suitable for artisanal mining technologies in MCO’s online mining cadaster tool, and encourage MMSD zonal and federal mining officers to work to educate miners about the information available in these maps (including in areas without access to online information).
- d) Explore opportunities under the current Mining Act and Regulations to make it easier for artisanal miners to meet the requirements for a Small-Scale Mining Lease, including through possible revisions to the fee structure and technical requirements.

Improve the ASGM Licensing Process: Long-Term Recommendations

- e) Establish a new Artisanal Mining Lease category under Part IV of the Minerals and Mining Act and Part II of the Minerals and Mining Regulations. Ideally, consultation would be held with artisanal miners, civil society groups, state and federal ministries, and other stakeholders as part of the process to design the new mining lease.

- f) Decentralize the license application process by establishing a system for mining license applicants to apply through MCO zonal offices and/or MMSD field offices. As part of this system, MMSD's zonal and field offices could set up computers for miners to use (with technical assistance) to submit applications electronically to a central database.
- g) State environmental ministries, traditional authorities, the miners' association, and civil society groups could work (individually and together) to help educate and enable miners to take advantage of a decentralized mining license application system.

Priority 4: Ensure Environmental Protection

The challenge: Artisanal miners are generally not taking steps to assess or mitigate the adverse environmental impacts of their activities, which include the release of mercury into the air and water, soil degradation, river siltation, and groundwater contamination, among other things. While applicants for a Small-Scale Mining Lease *are* required to submit an Environmental Impact Assessment statement and an Environmental Protection and Rehabilitation Program under Section 119 of the Mining Act, the associated costs and requirements (including hiring a consultant to produce an extensive report) can exceed their financial ability, making it difficult for them to comply and to achieve a measure of environmental protection. As a comprehensive study of small-scale mining in Africa noted, the development of simple regulations for environmental protection is a prerequisite for miners' compliance.¹⁸⁴ The recommended design of a new Artisanal Mining License presents an opportunity to move away from the existing EIA requirement towards alternative approaches.

UNEP's analysis of formalization approaches identified the following considerations for environmental licenses in ASGM:¹⁸⁵

- 1) Environmental licenses for ASGM should build, to the extent possible, on established environmental legislation and policy instruments. In many cases, license may need to be adapted to the unique conditions of ASGM.
- 2) Evaluation of the impacts of ASGM and specific guidelines for addressing the impacts should be required for all categories of ASGM. Given that this is not practical or efficient for individual small-scale miners, the local authority should develop a simple process for the evaluation of environmental impacts and a management plan for the designated ASGM mining and processing area, given that it is to deliver these independently.
- 3) Environmental requirements should be simplified to the extent possible (e.g., Environmental Impact Assessments and management plans based on the size of the operation) without reducing the quality of environmental management.

These considerations can inform improvements to Nigeria's environmental protection standards for ASGM licenses, as recommended below.

Overview of Recommendations

The recommendations presented below seek to simplify the environmental requirements of the licensing process (including environmental impact assessment and remediation, among other

things) without undermining environmental protection. Some of the options include a **general EIA or environmental permit**, a **collective EIA** for groups of miners or mining areas, or a streamlined **environmental information sheet**. These approaches can be used with the existing Small-Scale Mining License as well as with the recommended new Artisanal Mining License. In order to reform the environmental permitting requirements, **improved coordination between MMSD and FMENV** would be useful – a topic which is also addressed under Priority 8, below. MMSD can also take steps to strengthen environmental protection by including educational programs addressing environmental management (along with health and safety requirements) in its extension services.¹⁸⁶ Although MMSD is responsible for reaching out to artisanal miners about some of these topics,¹⁸⁷ it is not clear that the Ministry is providing such extension services to mining communities right now.

General permits are typically used to regulate a large number of similar, smaller facilities and pollution sources with manageable or moderate environmental impacts.¹⁸⁸ Because the activities are similar and require the same environmental protection measures, the regulating agency can establish a general permit with pre-existing requirements. Thus, MMSD and FMENV could devise a list of specific requirements for environmental protection and remediation that miners seeking an artisanal mining license must follow, rather than requiring them to complete a separate, costly, and time-consuming EIA. It might be best to develop regional requirements that take into account the specific geographic and ecological features of different areas throughout the country.

Another approach is the use of **collective EIAs**, which function on the assumption (similar to the general permit) that mining facilities or operations entail similar environmental impacts and require similar environmental management plans.¹⁸⁹ The use of collective EIAs can help relieve miners from the financial burden of conducting individual and costly assessments by allowing them to pool their resources to fulfill environmental requirements. Under the current legislative scheme, groups of mining cooperatives could apply for a collective EIA as part of a Small-Scale Mining License.

A third approach is to streamline the environmental impact assessment requirement by requiring a **simplified environmental information sheet** that is easier for miners (with assistance from extension agents and/or the state environmental ministry) to complete. MMSD and FMENV can use the environmental information sheet to evaluate the environmental impacts of artisanal mining activities and create a plan for managing these impacts in cooperation with the mining license applicant.

In the longer term, the government of Nigeria may wish to consider the **appropriateness of legislation to restrict mercury importation and/or use** in ASGM activities. No prohibition against mercury use in ASGM currently exists, and it is not recommended that such an approach be considered unless and until alternative mining technologies are more widely available and cost-feasible for artisanal miners. As the UNEP analysis of formalization approaches noted:

Often blanket bans and restrictions, without accompanying support for alternatives or options, have pushed artisanal and small-scale miners into non-compliance with their licences, to locations outside of the practical reach of

formal monitoring and enforcement measures, or into illegal trade of toxic inputs or gold. Successful restrictions have been established when they are coupled with assistance and incentive measures to help miners adapt to the restrictions without undermining the profitability of their activity.¹⁹⁰

One example of the development and implementation of a mercury ban can be seen in Mongolia, whose experience reflects both the positive and negative consequences of such a step.¹⁹¹ Thus, while regulating mercury use is not desirable under Nigeria's current ASGM legal framework, it may become a desirable approach at some point in the future, once the formalization of ASGM miners has progressed.

Ensure Environmental Protection: Recommendations

- a) MMSD and FMENV can work together to simplify the environmental protection requirements for artisanal miners seeking a small-scale or artisanal mining license. Options include the development of a general environmental permit, a collective EIA process, or an environmental information sheet (or similar approach) in place of the formal Environmental Impact Assessment and Environmental Protection and Rehabilitation Program currently required under Section 119 of the Mining Act.
- b) Use MMSD extension services and state environmental ministries to help miners meet environmental requirements for obtaining a mining license.
- c) Educate miners about the environmental impacts of mining activities and importance of environmental protection measures, as well as resources available to help them comply with environmental requirements. Demonstration sites of best practices for environmental protection could also be created to help educate miners.
- d) Strengthen coordination between FMENV and MMSD regarding environmental protection from ASGM activities, including by defining more clearly the respective roles of FMENV and MMSD's Mines Environmental Compliance Department at both the federal and state level.

Institutional Recommendations

Priority 5: Collect Royalties from Artisanal Mining Activities

The Challenge: In order to successfully encourage the formalization of artisanal miners, the economic incentives must be aligned for all parties. Currently, a three-percent royalty is required to be paid on mined gold under Section 33 of the Mining Act and Section 99 of the Mining Regulations, to be collected by MMSD's Mines Inspectorate. While historically, Nigeria's solid minerals sector was neglected in order to focus on the high-revenue petroleum sector,¹⁹² MMSD has recently begun to collect royalties from groups such as the Gold Buyers and Sellers' Association in Gusau, and miners who use mineral buying centers (which have not been fully developed) or a portion of titled land (as discussed in Priority 2) would also be responsible for paying royalties. Artisanal miners who are not registered with MMSD are presumably not paying royalties, although it is quite possible that they are making informal payments to certain officials

at the traditional or state/local government level.¹⁹³ The federal government would undoubtedly benefit from capturing a legitimate share of the royalties from artisanal mining activities that are currently being lost to informal trade and export. States, who are supposed to receive a share of royalties paid to the federal government under the derivation principle, would also benefit. On the other hand, enforcing the royalty requirement may create disincentives not only to unlicensed miners, but also to other actors (at any and all levels of government) who may be collecting an informal share of mining revenues under the current system. Moreover, miners who are already making informal payments would be subject to a form of double payment under a more formal royalty system. The challenge is therefore how to incorporate royalty payments into a formal licensing system without discouraging miners from obtaining mineral licenses. In essence, registered miners should still be better off economically even after paying royalties, compared to unlicensed miners. This section does not comprehensively address the restructuring of Nigeria's current royalty scheme for artisanal miners, but presents a few suggestions for creating the proper incentives for paying royalties as a part of the formalization process.

Overview of Recommendations

Historically, Nigeria and other African countries have kept royalty rates relatively low in order to attract large-scale investment¹⁹⁴ (which, in the case of Nigeria, has not fully materialized for gold mining). While the issue of whether Nigeria's royalty rate is capturing a sufficient share of gold mining revenues exceeds the scope of this assessment, the government might wish to consider whether to **restructure the royalty rate for artisanally-mined gold** in order to accommodate the different circumstances of artisanal miners relative to medium- and large-scale operators. Options include assigning the royalty rate based on the size of operation (as in Ecuador) or market price of gold (as in Bolivia), among other approaches.¹⁹⁵ This could help set the proper incentives for artisanal miners to become licensed.

In thinking through alternative royalty schemes and the design of a system that addresses the needs of all participants, the government might also wish to **discuss with traditional rulers** how to incorporate a viable profit-sharing arrangement or other approach as part of the royalty structure. Traditional authorities are not formally included under Nigeria's federalist government structure, although they are accorded wide deference by communities and officials alike and may already be receiving informal payments from miners. Regardless, it is important to ensure that they are not left out of the equitable sharing of mining revenues. This is especially true given the significant role that they play in the daily lives of rural communities where much artisanal mining takes place, and the corresponding influence they wield.

Another way to incentivize the payment of royalties might be to develop something like a **Community Mining Improvement Fund** that would allocate a share of ASGM royalties to local communities for development purposes. In Ghana, for example, mining royalties are said to be directed to district assemblies for the purpose of developing mining communities.¹⁹⁶ While Nigeria's 2007 Mining Act does provide for a Solid Minerals Development Fund, the fund is not composed of royalty payments and is not intended to support community development activities. The Mining Act does separately require all mineral leaseholders to sign a Community Development Agreement with local communities, which is intended to transfer social and economic benefits to the community. Since some miners have expressed the view that they

would be more willing to pay royalties if the proceeds were used to benefit their communities, the establishment of a community-based fund derived from royalty payments could help incentivize royalty payments at the artisanal level.

Ultimately, the government's ability to successfully collect royalties from artisanal miners will hinge on the understanding and perception by miners that formalization will bring them benefits (such as technical assistance, access to credit, security of tenure, etc.) that exceed the costs of royalty payments.

Collect Royalties from Artisanal Mining Activities: Recommendations

- a) Consider restructuring the current 3 percent royalty rate for gold revenues from artisanal mining activities (e.g., based on size of mining operation or market price of gold).
- b) Consult with traditional rulers about an equitable revenue-sharing approach for gold mining revenues.
- c) Consider adopting a provision that directs a designated percentage of royalties paid by artisanal and small-scale gold miners to a Community Mining Improvement Fund. The fund could be modeled to a certain extent on the Solid Minerals Development Fund, but would be tailored to the needs and conditions in mining communities.

Priority 6: Strengthen Extension Services and the Dissemination of Improved Mining Technologies

The Challenge: There exist a range of technologies that can help miners reduce their use of mercury, or to stop using it all together, but miners are not aware of these alternatives or how to adopt them. The low success rate of programs to introduce cleaner gold processing technologies has been attributed to both a lack of awareness and limited access to alternative technologies (as well as the ease of use and effectiveness of mercury in gold recovery).¹⁹⁷ Mining extension services can play a key role in disseminating improved technologies. While Section 91 of the Mining Act directs MMSD to provide extension services to small-scale and artisanal mining cooperatives across a wide range of areas, these services do not appear to be reaching a large number of artisanal miners in Zamfara State and other areas with ASGM activities.

The implementation in 2013 of MMSD's Safer Mining Programme is addressing some of these needs, as the program includes the distribution of mine safety kits and clothing, the use of field demonstrations on best mining practices, and the importation of iGoli and wet milling machines for installation in three areas in Zamfara State.¹⁹⁸ It is critical that MMSD adheres to its plans to extend the program beyond Zamfara State. Ideally, this work would be incorporated into the ongoing functions of MMSD's zonal and federal mining officers. MMSD has begun to implement training programs on safety, health, and environmental issues in Gusau, Zamfara, including the distribution of mining safety kits, and has also appointed an Extension Service Officer in the town of Bagega, where a large amount of ASGM activity occurs.¹⁹⁹

Overview of Recommendations

It is important for MMSD's ASM Department to be well-versed in the range of alternative mining technologies available to reduce as well as eliminate mercury use. While the Safer Mining Programme has been working to bring a few iGoli machines to Zamfara, the small number of machines and their high cost means that all available alternatives should be considered in the near term. Greater focus could be spent on enabling artisanal miners to adopt the use of retorts and other interim measures to reduce mercury use while mercury-free technologies are being deployed.

To make better use of its limited resources, MMSD can employ a “**train-the-trainers**” **approach**²⁰⁰ that would train a range of stakeholders on safer mining practices, improved techniques, permitting requirements, and other related issues. These stakeholders can in turn help train local mining communities to reduce the burden on MMSD's extension agents. The state ministries of environment could play a role in these training efforts, and participation and assistance could also be solicited from other groups and associations including traditional authorities (Emirs), local authorities (Local Government Areas), and miners' associations, among others.

If it has not already done so, MMSD might also wish to consider establishing (or reestablishing) **gold processing centers** to showcase and enable miners to use improved processing technologies. Processing centers can attract private investment and promote more formal economic arrangements, while giving miners access to improved technologies.²⁰¹ At the same time, there are concerns about the potential for exploitation of miners at such centers, particularly if the centers deliberately employ less efficient technologies (such as mercury) to ensure that miners leave behind gold-rich tailings, which the centers can then reprocess using cyanide or other chemicals.²⁰² Such practices can also generate large mercury emissions and other forms of environmental pollution. Given the risk of inefficient processing practices as well as the mistrust that can exist between miners and processors, any processing centers that are established should be subject to meaningful oversight and assistance to ensure that they do not contribute to further environmental and health problems²⁰³ and do not take advantage of financially-vulnerable miners. Maintaining security at such centers (which may process large amounts of gold) is another challenge.

Another way to introduce new technologies to mining communities is through **pilot demonstration projects**. These projects could be organized, first for MMSD's ASM staff, and then for mining communities, to showcase the range of technologies available to reduce and eliminate mercury use. In planning these demonstration projects, which can be incorporated into the ongoing work of the Safer Mining Programme, the ASM Department could determine which technologies can be locally produced, how much they would cost, and whether and how to arrange for local production.

Greater resources should also be devoted to educating miners about the range of alternative mining techniques (including the use of retorts, centrifuges, and other methods to reduce or eliminate mercury use), the process of obtaining a small-scale (and, if it becomes available, artisanal) mining license, how to comply with environmental requirements, and the health impacts of mercury use and lead exposure in areas where this is a hazard. It is particularly

important to focus on technologies that can be obtained or built relatively easily in-country, as the iGoli machines can require a significant amount of work to introduce and disseminate. The ASM Handbook for Nigeria prepared by the Geological Survey of Denmark and Greenland (GEUS)²⁰⁴ contains detailed information on gold processing and alternative techniques as well as a training module for disseminating knowledge.

Strengthen Extension Services and Dissemination of Improved Mining Technologies: Recommendations

- a) Train MMSD's ASM Department about the range of alternative mining technologies that can reduce as well as eliminate mercury use, including the use of retorts and gravity-based separation methods.
- b) Incorporate technical assistance to miners into the ASGM licensing process.
- c) Train representatives from the Nigerian Miners' Association, mining communities and cooperatives, and civil society organizations on improved mining technologies so they can replicate the training for artisanal miners. Training courses can also address the process of obtaining a mining license, how to comply with environmental requirements, and the health impacts of mercury use and lead exposure.
- d) Organize pilot demonstration projects for mining communities to showcase the range of alternative mining technologies.
- e) Consider establishing gold processing centers for miners that would employ improved mining technologies, such as the iGoli machines currently being introduced as part of MMSD's Safer Mining Programme.
- f) Strengthen the Solid Minerals Development Fund under Section 34 of the Mining Act, which is intended in part to help enable the provision of extension services to artisanal miners.

Priority 7: Strengthen Community Education and Outreach

Education and awareness-raising is a key component of strategies to reduce mercury and lead exposure. While health concerns alone will not trigger a shift to improved ASGM technologies absent other enabling factors (such as those addressed under priorities 1 through 6), they can play an important motivational role and complement other strategies intended to accelerate the formalization of artisanal and small-scale miners. Awareness-raising is especially important for reaching vulnerable population groups such as women and children. As has been noted, "a more 'bottom up' approach to ASM policymaking, and implementation which stresses sensitization and education as a prerequisite to formalization [] would be a logical first step toward safeguarding livelihoods."²⁰⁵

Activities around mining safety have already been launched in Zamfara, although these efforts have been focused more on the immediate and visible effects of lead contamination, rather than mercury exposure and use. MMSD's Safer Mining Programme has been targeting miners about safer practices, and the medical group MSF had previously worked with communities through its Health Education Unit to educate them about mining safety. The Unit created men's and

women's committees and sub-committees to monitor mining conditions and whether people were bringing their children to health facilities for treatment of lead poisoning. The women's committees also worked to educate the men's committees on general health issues. The Health Education Unit is not currently operating, however.

Education and outreach on the health impacts of mercury for miners and their communities is also required as part of a country's National Action Plan under Minamata. This must take the form of a public health strategy that includes the gathering of health data, training for health-care workers, and awareness-raising through health facilities.²⁰⁶ The involvement of the Ministry of Health in the preparation of such a strategy will be critical.

Overview of Recommendations

Many options exist for educating miners, their families, and their communities about the hazards of lead and mercury exposure linked to ASGM activities. MMSD and other government entities can work with local authorities to organize **community-based meetings** about health and safety concerns linked to artisanal mining, including the risks of mercury exposure and lead contamination. In order for these meetings to be successful, however, they should include robust participation and be led by trained facilitators. As the authors Gavin Hilson, Christopher Hilson, and Sandra Pardie noted, "The most effective mediums for disseminating information about retorts, mercury and the environment [in Ghana] are the laborious, participatory training exercises that the government and donor agencies have avoided sponsoring."²⁰⁷ MMSD can also **require education and training about safer mining practices as a condition for obtaining a small-scale (or artisanal) mining license**. In Mali, for example, the gold washer's card (a local form of mining license) was successfully used to formalize miners because it was accompanied by training, assistance, and sensitization campaigns.²⁰⁸

Another approach is to **engage groups with ties to local communities**, including gold buyers and sellers' associations, community-based organizations, and other stakeholders in education workshops and outreach. It is also important to **develop educational materials** (including illustrations to convey their messages to illiterate populations) to be disseminated to miners and communities. These materials can also be shared with community-based organizations and civil society groups to incorporate into their own outreach work. In the Philippines, educational materials on mining safety have been incorporated into school curricula, and a similar approach could be used in Nigeria. **Creative formats** should be explored for disseminating safer mining messages (some of which may have already been employed in connection with the lead poisoning crisis in Zamfara), including the use of **village town criers or messengers, printed messages on traditional fabrics** (such as women's pagnes, or wrap skirts), and **booths at local markets** and any other traditional community meeting points. In Zimbabwe, plays and storytelling at local fairs have been used to raise awareness about safer mining.

Finally, given that resources may be a limiting factor, it is critical to **allocate funds** and to **fundraise** in order to undertake educational activities. One possibility is to encourage medium- and large-scale mining companies to support education and awareness programs in ASM communities.²⁰⁹ Although there are few if any large-scale gold mining companies in Nigeria at present, such efforts could target other companies in the solid minerals sector. Education and

outreach activities around lead and mercury issues could also be incorporated into the activities of health organizations and workers operating in-country, wherever they are not inconsistent with organizational mandates.

Strengthen Community Education and Outreach: Recommendations

- a) The Ministry of Health could develop a public health strategy on mercury as part of Nigeria's National Action Plan and coordinate the strategy with health education efforts at the state, local, and community level.
- b) The Ministry of Health, ideally in coordination with MMSD, FMENV, and state ministries, could work with traditional authorities in local government areas, towns, and villages to organize educational meetings for men and women (including teens and adolescents) about health and safety concerns linked to ASGM activities, including lead and mercury contamination.
- c) Engage community groups such as gold buyers and sellers' associations, community-based organizations, and other stakeholders in community education workshops and outreach.
- d) Require a mining safety educational course as part of the process for obtaining an artisanal or small-scale mining license.
- e) Develop educational materials (including those using illustrations to convey their messages to illiterate populations) to be disseminated at markets and other community meeting points.
- f) Encourage medium- and any existing large-scale mining companies to support education and awareness programs in ASM communities.
- g) Seek funds from government educational ministries, international organizations, and agency discretionary spending to support outreach activities around safer mining practices.

Priority 8: Improve Coordination Among Institutions and Stakeholders

The challenge: The lead and mercury problems associated with ASGM activities, along with the challenges posed by formalization, implicate a wide range of government institutions, community members, and civil society groups at the federal, state, and local level. International organizations also play a role. While the Federal Ministry of Mines and Steel Development has exclusive jurisdiction over solid mineral activities, the Federal Ministry of Environment has authority over environmental degradation, environmental impact assessment, and exposure to toxic chemicals. The Federal Ministry of Health has also been involved in remediation and treatment of lead poisoning, but, as noted above, it also has a role to play in developing a public health strategy on mercury as part of Nigeria's National Action Plan. State environmental ministries also have authority over pollution-related aspects of mining activities. A wide range of stakeholders are also implicated in ASGM and its environmental, health, and economic impacts, including miners and their communities, traditional rulers, miners' associations, and civil society groups, among others.

The lead poisoning outbreak in Zamfara State has brought many of these actors together, including through the formation of a working group that has been meeting on a monthly basis in Gusau to address outstanding concerns with mining safety. However, a number of divisions and coordination challenges exist within and between groups at all levels of government, community, and civil society. In many cases, actors working on the same issues do not appear to be communicating with one another and combining forces to maximize their effectiveness. Rather, their efforts are disjointed and may even hinder one another's efficacy. While the "clear allocation of mandates among public bodies is the key to strong and efficient governance,"²¹⁰ some of the federal ministries seem to be more focused on protecting their respective jurisdictional authority than on finding ways to work together. The need for greater coordination and communication is clear: during the research for this assessment, the author was asked by both government and civil society groups within Nigeria for each other's contact information, as they did not seem to have any preexisting relationships. Similarly, officials within MMSD's ASM department and FMENV's Department of Pollution Control did not know each other when asked by the author.

Overview of Recommendations

There are a number of ways to strengthen coordination among the various groups working on formalization and/or mercury and lead contamination issues. The requirement under Minamata to prepare a **National Action Plan** presents one key opportunity to bring stakeholders together, as the plan's requirements under Annex C implicate the full range of public health, environmental, and mining interests that are bound up in the challenge of reducing mercury exposure and use in ASGM. A **working group or advisory council** composed of all relevant government ministries and other stakeholders could be formed to help prepare the national action plan. Out in the field, **regular meetings between MMSD's zonal/federal mining officers and State environmental ministries** would help maximize the effectiveness of their efforts while bringing MMSD closer to miners at the community level. An **ASGM Roundtable** could be established that meets monthly or quarterly on formalization and mercury issues, modeled on the monthly meetings currently held in Zamfara to address mining problems and lead poisoning concerns (a similar roundtable was recently established in Washington DC for organizations working on ASGM issues). Finally, a **directory with contact information** listing everyone who is working on formalization/mercury/lead issues in Nigeria could help people communicate with one another. The directory could be published both in print and online, although it would need to be updated on a regular basis. Responsibility for preparing the directory should therefore be assigned to a specific ministry or stakeholder group.

Improve Coordination Among Institutions and Stakeholders: Recommendations

- a) Use the requirement to draft a National Action Plan under Minamata as an opportunity to bring stakeholders together around formalization and the need to address lead/mercury contamination.
- b) Form a working group or advisory council to focus on formalization and mercury/lead contamination issues.
- c) MMSD zonal and federal mines officers can meet with state environmental ministries to discuss their respective activities around mercury use and safer mining practices.

- d) Publish a directory in print and online with names of everyone working on artisanal mining and mercury/lead issues, including their names, affiliations, roles, and contact information. The directory could be disseminated within state and government ministries, civil society organizations, miners' associations, and other relevant groups. It could be compiled and maintained by a national commission or working group (as recommended in Part 6 on Approaches for Implementation); alternatively, the federal government could fund a nongovernmental organization working on ASGM issues to produce it and keep it up-to-date.

Financial Recommendations

Priority 9: Improve Access to Markets

The challenge: Although the Minerals and Mining Act requires all gold obtained under a Small-Scale Mining Lease (which includes artisanally-mined gold) to be sold to a licensed Mineral Buying Center,²¹¹ the majority of artisanal gold miners sell their gold to unlicensed buyers. Despite generally reliable access to market information via their cellular phones, many miners are obligated to sell their gold onsite to “middlemen” who have already loaned cash to them for various financial needs. This enables the middlemen (sometimes known as “retailers”) to set the price at which they will purchase the gold, which is often below market value, and which is in turn sold to the buyers (sometimes known as “wholesalers”). Foreign nationals have been identified as one of the primary purchasers of artisanally-mined gold,²¹² with purchased gold smuggled out of the country on the black market. While miners can generally obtain a higher price through gold buyers' and sellers' associations (such as the one in Gusau in Zamfara State), the location of such associations in capital cities can be quite far from processing sites. There can also be uncertainty about the fluctuating market price and method for measuring gold yields, rendering the benefits of making the trek to town difficult for miners to gauge.

Direct or indirect market access is essential for miners to receive a fair price for gold and avoid the black market.²¹³ Without an effective purchasing system in place, illegal gold smuggling will continue. Fair prices can also help miners build sustainable livelihoods while increasing government revenue through royalty payments. By keeping gold out of the black market, fair prices also improve traceability, which is an important requirement for conflict-free mineral certification (should Nigeria decide to seek such certification). Strategies to supplant the black market fall under two general frameworks: (1) Using government parastatals to bring the market to the miners; and (2) Incentivizing private action to bring the miners to the market. Ideally, the middlemen would be incorporated into improved marketing approaches, as the miners often trust them (they may be from the same community as the miners), they have been involved in the gold trade for an extended period of time, and they are a necessary part of the solution.

Overview of Recommendations

There must be an **effective purchasing system** in place for artisanally-mined gold, with **simplified licensing procedures** to make legal mineral trading attractive to both buyers and sellers. Currently, only registered mineral buying centres can be licensed to purchase artisanally-mined gold, and anecdotal evidence suggests the registration process can be challenging. Innovative licensing strategies provide an opportunity for liberalization of mineral markets, to the benefit of both the economy and the environment. If the government acts as a licensed buyer, it must offer fair prices in an open market in order to incentivize artisanal gold miners to avoid illegal trading. Even when licensed buyers may be private parties, the government has a role in monitoring the process to ensure that miners have adequate bargaining power.

One approach, used successfully in both Ghana and Ethiopia, is for the **government to act as a licensed buyer** of gold. In 1989, Ghana enacted the Precious Minerals Marketing Corporation Law.²¹⁴ The law created the Precious Minerals Marketing Company (PMMC; <http://www.pmmcghana.com/>) as a parastatal that would buy gold from licensed miners and brokers at prices determined weekly by international markets. The PMMC also licenses and finances local agents to buy gold in remote areas, asserting control over the agents to assure that they do not seek an unreasonable economic windfall. Private dealers are free to purchase minerals as well, creating a less restrictive, more open market. In Ethiopia, the National Bank guarantees international market prices for artisanally-mined gold and mandates that artisanal miners conduct transactions with the Bank.²¹⁵ This requirement increased the amount of gold purchased by the National Bank from artisanal miners twenty-fold between 2008-09 and 2011-12.²¹⁶

Where a government may not wish to act as a licensed buyer, it can alternatively establish a system for **licensing private mineral buyers**. For example, Tanzania created a system in its Mining Act of 1998 under which miners could interact with licensed private minerals dealers.²¹⁷ The mandatory, three-tiered licensing system consists of miners, dealers, and brokers. Mining rights holders can sell their minerals freely. Dealers may export minerals, but cannot buy locally. Conversely, brokers can buy and sell minerals locally, but cannot export them. All gold miners, brokers, and dealers must submit reports indicating, among other things, the amount of minerals bought and sold. Officers from the 11 regional and 12 district offices of the Mining Department can inspect the records at any time, with or without notice. Dealers and foreign mineral buyers are not allowed to go directly to small-scale mining areas—rather, they must operate from the regional and district offices. The miners can sell to licensed brokers in the small-scale mining areas, or to dealers and foreign mineral buyers at the Mining Department offices. If a miner wishes to export gold, all that is required is a same-day permit from any of the regional offices.

While Tanzania's structuring of a licensing system for mineral buyers appears sound, in reality the system does not appear to be functioning effectively. Anecdotal evidence from those who have visited Tanzania within the last five years suggests that very little of the gold that is mined is actually sold through licensed buyers – rather, it is purchased by illegal buyers who pay approximately 6 percent more than the rate offered by the licensed buyers. In order to make a licensed buyer system work, then, attention must be paid to the rates that are being offered and whether illegal buyers are offering a premium. Government price support may be needed to ensure that licensed buyers can compete with smugglers.

While current law provides for the establishment of mineral buying centers, it is not clear how many centers have been registered. **Improving the licensing process for mineral buying centers** would help more buying centers to become established. For example, the Zamfara State Gold Buyers & Sellers' Cooperative has struggled to register as a buying center. In June 2013, the Cooperative learned through an informal meeting with one of MMSD's ASM officers that its application to MMSD had been pending for over one year because certain requirements have not been met, even though no notice had been provided to the cooperative about the delay or the missing requirements. The cooperative had even paid money to the northwest zonal officer for assistance (although this is not required under the Act or Regulations) without receiving any help. (The cooperative was only able to discover the reason for the delay through an informal meeting in Gusau with the author of this paper and a representative of MMSD's ASM Department in June 2013, which had been scheduled to discuss current mining issues in Zamfara.)

MMSD has sought to construct some buying centers itself, including one in Gusau, but the center closed after the contractor was said to have misappropriated some of the funding. The center was also reputed to be paying a below-market price for gold, which discouraged miners from bringing their gold there. Both the Zamfara State Government and the Zamfara Gold Buyers & Sellers' Cooperative have expressed interest in purchasing the abandoned center, but without financial assistance they will be unable to acquire it.

Establishing more buying centers in processing areas would also help bridge the gap between miners and gold buying centers. Recognizing this need, MMSD has already started to construct a buying center in Bagega, one of the larger mining areas in Zamfara State, and similar centers could be built in other major ASGM areas. Adding **value-added processing capability** to the buying centers, as in the case of Ghana's Precious Minerals Marketing Company, which is engaged in the jewelry business,²¹⁸ would also help miners receive better prices for their gold. Helping buying centers **obtain an export permit** (under Section 116 of the Minerals and Mining Regulations) would help them expand their operations, as most of their business is domestic in nature.

In the longer term, the Government of Nigeria may wish to consider the feasibility of **meeting a certification standard** for artisanally-mined gold. While certification may not be a realistic goal in the near term, given the conditions under which gold is currently produced, it does present an opportunity to encourage sustainable environmental practices while also increasing international market reach. At its core, certification is an environmental and human health label, representing a product produced with minimally polluting methods and sold using fair prices and practices. It also presents an economic opportunity for miners to gain access to new markets, in which consumers pay a premium to incentivize economic, social, and environmental sustainability and support mining communities.²¹⁹

One example of certification was introduced in 2010 by the Alliance for Responsible Mining and Fairtrade Labelling Organizations International, whose Fairtrade and Fairmined Standard for Gold from Artisanal and Small-Scale Mining applies to community-based artisanal and small-scale mining organizations (ASMOs). To qualify as an ASMO, an organization must be a registered legal entity in its country of operation, have a clearly defined System of Production,

and have obtained its mining and environmental permits.²²⁰ Among other substantive requirements, the ASMO must be operated with accountability and transparency and must have the logistic, administrative, and technical resources to produce a quality product. Environmentally, the ASMO must minimize the use of toxic chemicals like mercury while also implementing best practices for environmental protection and restoration. This includes the responsible disposal of mine tailings and compliance with applicable environmental requirements. In exchange for implementing certified environmental, administrative, and labor practices, the ASMO receives the following assurances:

- (1) Certified miners receive at least 95% of international market price; plus
- (2) A 15% premium for gold produced without mercury or cyanide; and
- (3) A 10% fair-trade premium for community development.

In April 2013, Fairtrade International and the Alliance for Responsible Mining ended their partnership on the Fairtrade and Fairminded dual label. Although they are phasing out their dual label, both organizations will continue to offer separate gold certification programs.²²¹

Improve Access to Markets: Short-Term Recommendations

- a) Improve the registration process for licensed buying centers, including by providing notice to applicants when their application is deemed incomplete, along with an explanation of the problems with their application. MMSD could also assist applicants with the application process for mineral buying centers.
- b) Assist mineral buying centers in obtaining export permits to sell gold internationally.
- c) Support the establishment of additional licensed mineral buying centers near mineral processing sites to provide greater options to miners for selling their gold.
- d) Consider whether the government should provide price support to mineral buying centers to make them more competitive with unlicensed dealers.

Improve Access to Markets: Long-Term Recommendations

- e) Consider whether the government should play a role in the marketing chain by acting as an official buyer, in order to enable miners to receive a fair market price for their gold and to monitor the gold trade more closely.
- f) In conjunction with long-term recommendation (c) under Priority 1, work to establish a government purchasing scheme to buy gold at an above-market price from licensed gold mining cooperatives.
- g) Consider allowing individuals to register for a license to purchase artisanally-mined gold.
- h) Consider whether to pursue fair trade certification for artisanally-mined gold.
- i) Strengthen miners' access to credit (see recommendations in next section) so that they are not obligated to accept predatory loans from middlemen for supplies and equipment.

Priority 10: Strengthen Access to Credit

One of the most fundamental constraints to the ability of miners to upgrade equipment and engage in safer mining practices is their lack of finances. With limited cash on hand, miners cannot invest in equipment and supplies without access to credit. As the UNEP formalization study notes, longer term financing for mining operations is a key prerequisite for sustainable formalization and the promotion of better practices.²²² Currently, miners rely on what are sometimes referred to as predatory lenders for materials and supplies, which obligates them to sell their gold to the lenders at below-market prices. This creates a cycle of dependence that is a barrier to the implementation of change in mining practices. Strengthening access to credit facilitates greater profitability because it allows miners to participate in the broader market and greater stability because miners can make longer-term investments.

Overview of Recommendations

A prerequisite for many financing systems is to create property rights in mineral licenses that allow miners to trade or transfer their interest, as recommended in Priority 3. After establishing license rights, it is possible to work with government parastatals or banks to establish a line of credit for artisanal miners. Given that artisanal miners often lack collateral and do not qualify for conventional commercial credit, it is important to address their needs through a variety of strategies.²²³

The most likely sources of finance for artisanal miners include public loan programs, community-based private financing, or public-private partnerships. The first option, **public (government) loan programs**, has been used in Tanzania, Zimbabwe, South Africa, and Mozambique. In Tanzania, the government established a **revolving fund** that allowed it to provide low-interest loans to artisanal and small-scale miners.²²⁴ The program is designed to “revolve” based on loan repayment by individual miners, creating a constant flow of credit. Tanzania’s Geological Survey Department is tasked with evaluating the lease area and making recommendations to the fund managers. The revolving fund focuses on small loans to specific targets, primarily financing mine development, equipment acquisition, and emergency-response efforts.

Similarly, after some formal miners emigrated to segregated countries following Independence, Zimbabwe provided **government-financed loans** to reinvigorate the mining sector.²²⁵ The loans focused on facilitating the purchase and development of mine operations, along with a short-term financing option for unanticipated emergencies. Zimbabwe’s Mining Industry Loan Fund is credited with establishing a large number of small-scale mines and, before country-wide economic difficulties halted the financing scheme, the program illustrated best practices in how governments can respond to the problem of financing constraints faced by small-scale miners.

South Africa and Mozambique provide examples of possible variations in successful government loan programs for small-scale miners. In Mozambique, miners apply to the Fundo de Fomento Mineiro with details of the project and the intended use of funds.²²⁶ Applications must include a copy of the mining license, proof of collateral at 20% of the requested financing, and property guarantees that provide a mortgage at the requested amount, among other requirements. South Africa, meanwhile, has a National Steering Committee of Service Providers that supplies financial assistance, in-kind services, and commercial bank loans.²²⁷ Miners applying for

commercial bank loans must provide a business plan and are responsible for 10% of the total financing. The South Africa and Mozambique models present challenges, however, because it may be difficult for small-scale miners to draft business plans and they may not have adequate collateral.

Outside of government loan programs, some miners may be able to acquire private financing through **community savings banks**. In Tanzania, mining cooperatives have set up Savings and Credit Cooperative Societies (SACCOS) that provide loans to members.²²⁸ The Tupendane SACCOS began in 2001 and raised \$7000 by selling shares to its 40 members. Interest payments and consistent loan repayment allowed Tupendane to establish a formal office that administers a revolving micro-finance fund for members. In order for community funds to gain traction, miners may require education and assistance from the government on the formation and administration of cooperatives.

Partnerships and buyer credit programs are strategies where small-scale miners work with large-scale miners to strengthen access to credit. For example, in South Africa, the Dumpco Project partners with DeBeers to treat diamond tailings.²²⁹ In exchange for a R1.2 million interest-free loan, Dumpco treats over 400 tons of tailings a day and keeps up to 50% of the profits. Similarly, in Tanzania, the Maremeta Gold Buying Scheme provides equipment and expertise—in exchange, small-scale miners sell gold back to Maremeta at a 20% discount.²³⁰ Notably, both programs potentially suffer from the predatory lending problems discussed above, indebting the miners to large-scale partners that could undercut market prices.

Public-private partnerships (such as government partnerships with banks to create micro-credit schemes) also hold promise, though they have not been widely implemented. For example, Tanzania's 1997 Mining Policy includes the goal of working with "financial institutions to formulate affordable credit schemes for the miners and establish mobile banking systems."²³¹ One proposal involves granting a domestic bank exclusive purchasing rights in exchange for developing credit relationships with mining cooperatives.²³² The government would then set up central processing plants to encourage best practices from the mine to the market. However, the required initial investment of political and financial capital can make such partnerships difficult to implement.

Strengthen Access to Credit: Short-Term Recommendations

- a) States and community-based organizations can work with miners to develop improved financial management practices to reduce their reliance on predatory buyers.
- b) Research the successes and failures of different financing mechanisms developed and used throughout Africa, including the approaches highlighted above, to determine which strategies might work best in Nigeria.

Strengthen Access to Credit: Long-Term Recommendations

- c) Create property rights in mineral licenses through a new ASGM license, as proposed in Priority 3.
- d) Work with banks to establish a line of credit for artisanal miners.

- e) Work with miners to develop revolving community savings banks that generate interest and can be used to make loans.

Part 6: Approaches for Implementation

The recommendations presented above vary in their complexity and expected timeline. Some proposals (such as conducting education and outreach) can be adopted relatively quickly, while others (drafting or amending a law or regulation) will require a more extensive investment of time and resources. Should it decide to take on any or all of these recommendations, the Nigerian government, working with miners, civil society groups, traditional authorities, and other stakeholders, will wish to consider how to develop a proposed plan of action based on the collective prioritization of these recommendations.

At the implementation stage, it will be critically important to strengthen the capacity of the Nigerian government. The Federal Ministry of Mines and Steel Development, Federal Ministry of Environment, and other agencies at the federal and state level must play a primary role in developing any new legal or regulatory authorities, as well as in making any institutional and policy changes. Local authorities in the form of traditional rulers (Emirs) can also be particularly influential, especially since much of northern Nigeria functions under customary Sharia law. Implementation of a strengthened legal and policy framework will also require educating artisanal miners about their legal obligations and, ideally, technical assistance to help them meet these obligations.

To be successful, any implementation plan must include participation from the full range of stakeholders involved in, or affected by, ASGM activities. This includes miners, their families and communities, and mining associations; as well as relevant government agencies and ministries at the state and federal level (including the ministries of mining, environment, and health), customary authorities, civil society organizations, and pertinent international actors, among others. Involving all of these stakeholders will require improved coordination and communication, particularly between the different federal ministries as well as state and federal authorities. Ideally, the development of an implementation plan, which could take the form of, or be closely incorporated into, a National Plan of Action under Minamata, would lay the groundwork for continued coordination and cooperation among all of these different actors. This chapter highlights particular ideas and directions for consideration in developing a plan for implementing the recommendations presented in Part 5.

1) Prepare a National Action Plan under the Minamata Convention

The National Action Plan that is required under the Minamata Convention provides a natural platform for developing an implementation strategy for addressing mercury (and lead) contamination from ASGM activities. The Plan's requirements, set forth in Annex C, include steps to facilitate the formalization or regulation of the ASGM sector, strategies to promote the reduction of mercury in ASGM activities, and a public health strategy about mercury for miners and their communities, among other things. In 2011, the Philippines prepared a National Strategic Plan for the Phaseout of Mercury in ASGM, which provides a detailed set of objectives, activities, lead agencies/partners, timeline, and indicators.²³³ Since this plan was drafted before the Minamata Convention came into force, it does not necessarily meet all of Minamata's requirements; nevertheless, it may provide useful guidance. Other countries, including Cote D'Ivoire, Colombia, and Indonesia are working to develop their own national

action plans. While these documents are not public yet, Nigeria should keep an eye out for their release and the strategies they contain as it prepares to draft its own plan.

In thinking about a national action plan under Minamata, the Government of Nigeria might also wish to reference the UNEP Guidance Document on developing a National Strategic Plan to reduce mercury use in ASGM, although this guidance document was also written before Minamata and may not address all of the Convention's National Action Plan requirements. Now that Minamata has been signed, the guidance document will likely undergo revision; in the meantime, it provides a suggested outline and six-step process that may assist Nigeria to begin drafting its plan:

National Action Plan: Outline

1. Executive Summary
2. Introduction and Background
3. National Overview
4. Priority Goal and Objectives
5. Implementation Strategy (10-20 pages)
6. Evaluation Mechanism
7. Annexes

National Action Plan: Six-Step Process

- STEP 1: Establishing a coordinating mechanism/process
STEP 2: Gathering baseline information and developing the National Overview
STEP 3: Setting a Goal and Objectives
STEP 4: Formulating the Implementation Strategy
STEP 5: Evaluation Mechanism
STEP 6: Endorsing the National Strategic Plan

Source: UNEP Guidance Document: Developing a National Strategic Plan to Reduce Mercury Use in ASGM (Version 2.0: 11 July 2011).

In drafting the national action plan, the government might pay particular attention to the need to clearly define all roles and responsibilities among different government entities, in order to lessen the jurisdictional tussles between Ministries (such as Mines and Environment).

2) *Form a National Commission, Working Group, and/or Stakeholder Advisory Group*

Whether Nigeria chooses to develop an ASGM approach through the preparation of a National Action Plan or some other means, it is important to establish some sort of coordinating mechanism to move implementation forward. The UNEP guidance document recommends forming a working group to guide development of the ASGM plan as well as a stakeholder

advisory group to inform the decision-making process of the working group, along with a work plan (including timeline).²³⁴ It is essential to include all relevant stakeholders in the development of a formalization plan to reduce mercury and lead exposure in ASGM activities, particularly since stakeholder engagement is a required element of National Action Plans under Minamata Annex C.

In designing a coordinating mechanism, Nigeria could build on existing approaches to address lead poisoning and mine safety issues in Zamfara State, such as the working group composed of state environmental officials, miners' groups, community-based organizations, and other stakeholders that has been meeting in Zamfara on a monthly basis; the Safer Mining Programme launched this year by MMSD; or any other inter-agency working groups that may already exist. Given the overlapping mandates and assertions of jurisdiction between some of the ministries, it would be helpful to have a representative from the Office of the President take charge of the working group.

A partial list of key participants and stakeholders to include in the dialogue is presented below:

Government: MMSD, FMENV, the Federal Ministry of Health, State Commissioners for Environment, State Environmental Ministries, representatives of the National Assembly

Miners' Associations: the Nigeria Miners' Association, gold buyers and sellers' associations, existing mining cooperatives

Traditional and Local Authorities: Emirs, village chiefs, women's leadership groups

Civil Society Groups: Global Rights, Follow the Money, Zamfara State Center for Community Excellence (CENCEX), Civil Society Legislative Advocacy Research Center (CISLAC), Sustainable Research and Action for Environmental Development (SRADev)

International Organizations and Groups: MSF, WHO, UNEP, Artisanal Gold Council, TerraGraphics, Human Rights Watch, UNIDO, World Bank, bilateral development agencies (USAID, Canada Department of Foreign Affairs, Trade, and Development, Danish GEUS, etc.), Embassies, the Centers for Disease Control, and others.

Academics: Ahmadu Bello University, Bayero University

3) *Build the capacity of government ministries & agencies*

The successful development and implementation of a strengthened formalization approach for ASGM will hinge on the ability of Nigeria's federal government to mobilize resources and work with states and other partners on a wide spectrum of activities. The potential for long-term impacts from ASGM reforms can be undermined by poor institutional effectiveness and capacity, in addition to funding constraints.²³⁵ Ministries can advocate for funding to strengthen their capacity and improve the allocation of resources towards activities such as extension services. This is a prime area where assistance from international organizations would be useful. More intensive training that brings different ministries and agencies together would also

strengthen inter-agency communication and cooperation around ASGM activities. One way to address some of the jurisdictional struggles would be for international partners to fund a sort of interministerial working group composed of representatives from different ministries, rather than allocating funding to individual agencies.

4) Educate miners, their families, and mining communities about new legal and regulatory requirements

Just as it is important to undertake education and outreach about the health impacts of lead and mercury (as discussed under Priority 7), so it will also be important to educate miners and others about new legal and regulatory requirements and other new steps. In particular, MMSD and other ministries can work to address misconceptions about such things as the length of time it takes to receive a mining license.²³⁶ It would also be helpful to prepare educational materials (such as illustrated pamphlets) to disseminate to miners, their families, and their communities. Workshops can also be organized to inform miners about new legal, institutional, and financial developments, drawing on the same approach recommended under Priority 7.

5) Engage the private sector

Although Nigeria does not yet have the well-developed large-scale gold mining sector found in other countries (such as Tanzania and Ghana), medium-scale operators composed of foreign nationals also have an interest and can also play a constructive role in formalization efforts. A more formal, operational ASGM sector can benefit these operators through fewer conflicts over land, the availability of better-trained miners as a potential labor pool, a partnership that can yield the opportunity to reprocess tailings from ASGM operations (as is already being done in some areas) as well as other forms of cooperation, and a more secure and safe mining environment overall. Attention should also be paid to the incentives that private companies may or may not have to help miners adopt improved mining techniques to reduce their use of mercury. This is because some private companies may benefit from miners' currently inefficient recovery of gold, which leaves greater amounts for companies to recover from the tailings.

6) Identify a role for enforcement

As Nigeria transitions towards a more formal ASGM sector, identifying a role for enforcement in a strengthened legal and regulatory framework will be essential. This is not to say that any particular enforcement approach must be taken at all, but that there are areas in which it might be appropriate. One potential area is the vexing problem of child labor. The Nigerian Miners' Association has been considering making a recommendation to restrict children under ten years of age from working in ASGM, and Zamfara State has considered drafting a law that would ban child labor in mining as well. Given cultural traditions around children's contributions to livelihoods, a gradual approach to phasing out child labor in ASGM activities, such as that taken in Mali, may have a greater chance of success.²³⁷ Recognizing this problem, in 2012, the U.S. Department of Labor funded a project to reduce child labor in ASGM in Burkina Faso by supporting government efforts at the local, regional, and national levels, specifically citing the lack of official actions to enforce safety regulations as impetus for the project.²³⁸ A similar project, which may provide further guidance, was recently launched in Colombia.²³⁹

Another area in which an enforcement approach may become relevant in the future, as referenced in the discussion under Priority 4 (Ensuring Environmental Protection), is the role of mercury in ASGM activities. While restricting or prohibiting mercury use in ASGM is not recommended at this time, given the absence of practical alternatives and the dubious effectiveness of a hard-line approach, a law to regulate the distribution, use, storage, and/or trading of mercury might become desirable once the enabling conditions to facilitate a transition to mercury-free alternatives have been established.

At the same time, Nigeria might wish to start tracking mercury supply and use, including where it is coming from, who is importing it, and how it is making its way to the mining sites. Gaining an understanding of the current trade pathways for mercury will help Nigeria consider how to restrict its importation and use in the future. This will also help the country comply with its obligations under Minamata, which restricts gold exports to countries that have provided prior informed consent.

From a broader perspective, mining communities can also play a role in the implementation of a strengthened legal, institutional, and financial framework for ASGM. Groups such as traditional rulers, gold buyers and sellers cooperatives, and mining cooperatives and associations can draw on customary approaches to encourage safer mining practices, the licensing of artisanal miners, and environmental protection, among other things. In Mali, for example, the organization of “gold washing” activities known as *orpaillage* is regulated largely at the village level, with site access controlled by chiefs or heirs of village lands and landowners’ representatives assigned to police sites, arbitrate disputes, and keep peace.²⁴⁰ Aspects of this approach could be modified for use in Nigeria as part of a more comprehensive formalization strategy.

Notes

1. United Nations Economic Commission for Africa, *Compendium on Best Practices in Small-Scale Mining in Africa*, at 2 (2002). [Short cite: “UNECA Compendium”]
2. Opafunso, Zacheus Olaniyan, *Overview of Best Practices and Field Experience in Artisanal and Small Scale Gold Mining in Nigeria*, <http://www.unep.org/hazardoussubstances/Portals/9/Mercury/Documents/ASGM/Nigeria/Presentations/Tech%20session/Overview%20of%20Best%20Practices%20and%20Field%20Experience%20in.ppt>.
3. R. Maconachie & G. Hilson, *Safeguarding Livelihoods or Exacerbating Poverty? Artisanal Mining and Formalization in West Africa*, NATURAL RESOURCES FORUM, 35, 293-303, at 302 (2011). [Short cite: “Maconachie & Hilson, Safeguarding Livelihoods or Exacerbating Poverty”]
4. United Nations Environment Programme, UNEP Chemicals Branch, *Global Mercury Assessment 2013: Sources, Emissions, Releases and Environmental Transport* (2013), <http://www.unep.org/PDF/PressReleases/GlobalMercuryAssessment2013.pdf>. [Short cite: “UNEP Global Mercury Assessment 2013”]
5. United Nations Environment Programme, *Second Global Forum on Artisanal and Small Scale Gold Mining* (2013), [http://www.unep.org/chemicalsandwaste/Portals/9/Mercury/GF2/NewFolder/Global%20Forum II_meeting%20report.pdf](http://www.unep.org/chemicalsandwaste/Portals/9/Mercury/GF2/NewFolder/Global%20Forum%20II_meeting%20report.pdf).
6. H. Gibb and K.G. O’Leary, *Mercury Exposure and Health Impacts among Individuals in the Artisanal and Small-Scale Gold Mining Community: A Comprehensive Review*, ENVIRONMENTAL HEALTH PERSPECTIVES (2014), <http://dx.doi.org/10.1289/ehp.1307864>.
7. United Nations Environment Programme, *Mercury: Time to Act* (2013), http://www.unep.org/PDF/PressReleases/Mercury_TimeToAct.pdf.
8. Agency for Toxic Substances and Disease Registry, *Toxic Substances Portal – Lead*, <http://www.atsdr.cdc.gov/toxfaqs/TF.asp?id=93&tid=22>. [Short cite: “ATSDR Lead Portal”]
9. ATSDR Lead Portal (note 8).
10. Gerhard, I. et al., *Heavy Metals and Fertility*, JOURNAL OF TOXICOLOGY AND ENVIRONMENTAL HEALTH, Part A, 54:593-611 (1998).
11. Human Rights Watch, *Protecting Child and Adult Gold Miners Against Mercury: A Right to Health Issue* (2011), <http://www.hrw.org/news/2011/10/17/protecting-child-and-adult-gold-miners-against-mercury-right-health-issue>.
12. Dooyema, CA et al., *Outbreak of Fatal Childhood Lead Poisoning Related to Artisanal Gold Mining in Northwestern Nigeria, 2010*, ENVIRONMENTAL HEALTH PERSPECTIVES 120:601–607 (2012), <http://www.ncbi.nlm.nih.gov/pubmed/22186192>; Agency for Toxic Substances and Disease Registry, *Lead Toxicity: What are the U.S. Standards for Lead Levels?*, <http://www.atsdr.cdc.gov/csem/csem.asp?csem=7&po=8>.

13. Telmer, K., and Stapper, D., United Nations Environment Programme, *A Practical Guide: Reducing Mercury Use in Artisanal and Small-Scale Gold Mining* (2012). [Short cite: “Telmer & Stapper, Reducing Mercury Use in ASGM”]
14. Telmer & Stapper, Reducing Mercury Use in ASGM (note 13).
15. U.S. EPA & Agency for Toxic Substances and Disease Registry, *Mercury Quick Facts: Health Effects of Mercury Exposure*, <http://www.atsdr.cdc.gov/mercury/docs/HealthEffectsMercury.pdf>.
16. World Health Organization, *Mercury Exposure and Health Impacts among Individuals in the Artisanal and Small-Scale Gold Mining (ASGM) Community* (2013), http://www.who.int/ipcs/assessment/public_health/mercury_asgm.pdf.
17. Global Alliance on Health and Pollution, *Promoting Mercury-Free Artisanal Gold Mining Practices in Indonesia*, http://www.gahp.net/new/wp-content/uploads/2013/04/GAHP_Indonesia-pilotproject-firstreport.pdf.
18. U.S. EPA, *International Actions for Reducing Mercury Exposure and Use*, <http://www.epa.gov/international/toxics/mercury/index.html>.
19. Telmer, Kevin H., and Marcello M. Veiga, *World Emissions of Mercury from Artisanal and Small Scale Gold Mining*, in *MERCURY FATE AND TRANSPORT IN THE GLOBAL ATMOSPHERE 131-172* (Springer Science + Business Media 2009). [Short cite: “Telmer & Veiga, World Emissions of Mercury”]
20. UNEP Global Mercury Assessment 2013 (note 4).
21. U.S. EPA, *Human Health and Lead*, <http://www.epa.gov/superfund/lead/health.htm>.
22. Agency for Toxic Substances and Disease Registry, *Interaction Profile for Toxic Substances: Lead, Manganese, Zinc, and Copper* (2004) <http://www.atsdr.cdc.gov/interactionprofiles/IP-metals1/ip04-a.pdf>.
23. Ugeh, Patrick, *FG Receives Machines for Safer Mining in Zamfara*, THIS DAY (Sept. 6, 2013), <http://www.thisdaylive.com/articles/fg-receives-machines-for-safer-mining-in-zamfara/158347/> [Short cite: “Ugeh, FG Receives Machines for Safer Mining”]
24. Information in this paragraph comes from the following sources: Hinton, J.J. et al., *Women, Mercury and Artisanal Gold Mining: Risk Communication and Mitigation*, JOURNAL DE PHYSIQUE IV, 107, 617-620 (2003). [Short cite: “Hinton et al., Women, Mercury and AGM”]; Hinton, J.J. et al., *The Socio-Economic Impacts of Artisanal and Small-Scale Mining in Developing Countries* in *WOMEN AND ARTISANAL MINING: GENDER ROLES AND THE ROAD AHEAD* (G. Hilson ed., Swets Publishers 2003). [Short cite: “Hinton et al, Women and Artisanal Mining”]; Hinton, J.J. et al., *Women in Artisanal and Small Scale Mining in Africa* in *WOMEN MINERS IN DEVELOPING COUNTRIES: PIT WOMEN AND OTHERS* (K. Lahiri-Dutt & M. Macintyre eds., Ashgate Publishing Co. 2006). [Short cite: “Hinton et al., Women in ASM in Africa”]; Kaiser, J., *Gender Analysis of the GIZ Technical Cooperation Programme “Natural Resource Governance in the Fragile States of West Africa*. Monrovia. (2011). [Short cite: “Kaiser, Gender Analysis”]

25. Kaiser, Gender Analysis (note 24).
26. Eftimie, A. et al., *Gender Dimensions of the Extractive Industries: Mining for Equity*, EXTRACTIVE INDUSTRIES AND DEVELOPMENT SERIES #8 (The World Bank 2009). [Short cite: “Eftimie et al., Gender Dimensions of Extractive Industries”]
27. Information in this paragraph is attributed to the following sources: Hinton et al., Women, Mercury and AGM (note 25); Grossman, E., *How a Gold Mining Boom is Killing the Children of Nigeria*, YALE ENVIRONMENT 360 (2012), http://e360.yale.edu/feature/how_a_gold_mining_boom_is_killing_the_children_of_nigeria/2500/. [Short cite: “Grossman, Gold Mining Boom”]; Hinton et al., Women and Artisanal Mining (note 24).
28. Information in this paragraph can be attributed to the following sources: Katz, A., *African Gold Rush Kills Children as Miners Discover Lead Dust*, BLOOMBERG NEWS (2010), <http://www.bloomberg.com/news/2010-12-21/gold-rush-in-nigeria-kills-children-as-miners-belatedly-discover-lead-dust.html>; Grossman, Gold Mining Boom (note 27).
29. Information in this paragraph can be attributed to the following sources: Hinton et al., Women and Artisanal Mining (note 24); Eftimie et al., Gender Dimensions of Extractive Industries (note 26); Hinton et al., Women in ASM in Africa (note 24).
30. Information in this paragraph can be attributed to the following sources: Hinton et al., Women, Mercury and AGM (note 24); Veiga, M.M., United Nations Industrial Development Organization, *Introducing New Technologies for Abatement of Global Mercury Pollution in Latin America* (1997), http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CCIQFjAA&url=http%3A%2F%2Fcommunitymining.org%2Fattachments%2F222_Mercury_LA_veiga_97.pdf&ei=At6RU6KWG47IsAT0ioCoDQ&usq=AFQjCNEdJ7k36B0TRB3DXMFCCBADYyc5L2A&sig2=eWrwgmeBWv5pFM_RwkQF8Q&bvm=bv.68445247,d.cWc [short cite: Veiga, “Introducing New Technologies”]; Hinton et al., Women and Artisanal Mining (note 24).
31. Information in this paragraph can be attributed to the following sources: Hinton et al., Women, Mercury and AGM (note 24); Hinton et al., Women and Artisanal Mining, (note 24); Eftimie et al., Gender Dimensions of Extractive Industries, (note 26).
32. Purevjav, B., *Artisanal and Small-Scale Mining: Gender and Sustainable Livelihoods in Mongolia* in GENDERING THE FIELD: TOWARDS SUSTAINABLE LIVELIHOODS FOR MINING COMMUNITIES (K. Lahiri-Dutt ed., ANU E Press, The Australian National University 2011).
33. Tychsen, J., Appel, P.W.U., Hassan, U.A., Jorgensen, T. & Azubike, O.C. 2011: ASM HANDBOOK FOR NIGERIA (Geological Survey of Denmark and Greenland (GEUS)), at 132-34. [Short cite: “ASM Handbook for Nigeria”]
34. Telmer & Veiga, World Emissions of Mercury (note 19).
35. United Nations Environmental Programme, *Squeezing Gold from a Stone: Addressing the Toxic Health Risks and Pollution Caused by Mercury Use in the Small Scale and Artisanal Gold Mining Sector*, http://www.unep.org/hazardoussubstances/Portals/9/Mercury/Documents/Publications/UNEP_Squeezing_gold%20april%202010.pdf.

36. Swiss Agency for Development and Cooperation, *SDC Experiences with Formalization and Responsible Environmental Practices in Artisanal and Small-scale Gold Mining in Latin America and Asia (Mongolia)* (2011), http://www.sdc.admin.ch/en/Home/Events/Agenda_Detailed_view?itemID=216073. [Short cite: “SDC Experiences with Formalization”]
37. Veiga, M. et al., *Manual for Training Artisanal and Small-Scale Gold Miners*, GLOBAL MERCURY PROJECT (2006), <http://iwlearn.net/iw-projects/1223/reports/manual-for-training-artisanal-and-small-scale-gold-miners/view>.
38. Rehani, Haji, *Reducing Mercury Exposures and Transitioning Miners Away from Mercury Use*, ANGLOPHONE WEST AFRICA REGIONAL AWARENESS-RAISING WORKSHOP ON MERCURY IN ARTISANAL & SMALL-SCALE MINING (2011), http://www.unep.org/hazardoussubstances/Portals/9/Mercury/Documents/ASGM/Nigeria/Presentations/Tech%20session/Haji_Rehani_Reducing%20emissions%20&Transitioning%20from%20mercury.pdf.
39. Pantoja, F. & Alvarez, R., *Decrease of Pollution by Mercury in Gold Mining in Latin America*, in MINE CLOSURE IN IBEROAMERICA 178-190 (Villas Boas, R.C. & Berreto, M.L. eds. 2000).
40. Moher, P.B., *Mercury Recycling in Artisanal Gold Mining: The Good and the Bad*, ARTISANAL GOLD COUNCIL (July 16, 2013), <http://artisanalgold.blogspot.com/2013/07/retorts-good-and-bad.html>. [Short cite: “Moher, Mercury Recycling in AGM”]
41. Moher, Mercury Recycling in AGM (note 40).
42. Geological Survey of Denmark and Greenland, *Borax Replacing Mercury in Small-scale Mining*, http://www.geus.dk/program-areas/common/the_borax_method_2011.pdf.
43. Peter W.U. Appel & Jesper Bosse Jønsson, *Borax – An Alternative to Mercury for Gold Extraction by Small-scale Miners: Introducing the Method in Tanzania*, GEOLOGICAL SURVEY OF DENMARK AND GREENLAND BULLETIN 20, 87-90 (2010).
44. Telmer, K., *Is Borax the Miracle Chemical that will Replace Mercury in Artisanal Gold Mining?*, ARTISANAL GOLD COUNCIL (May 16, 2012), <http://artisanalgold.blogspot.com/2012/05/is-borax-miracle-chemical-that-will.html>.
45. Telmer & Stapper, Reducing Mercury Use in ASGM (note 13).
46. Mudder, T. et al., *A Global Perspective on Cyanide Use and Management* (2006), <http://www.edumine.com/xutility/html/menu.asp?category=xcourse&course=Xcynara0>.
47. J.J. Hinton et al., *Clean Artisanal Gold Mining: A Utopian Approach?*, JOURNAL OF CLEANER PRODUCTION 11, 99-115 (2003). [Short cite: “Hinton et al., Clean Artisanal Gold Mining”]
48. Telmer & Veiga, World Emissions of Mercury (note 19).
49. Ballman, Richard, *Mercury Emissions and the Waste Problem*, EXECUTIVE BODY OF UNECE WORKING GROUP ON STRATEGIES AND REVIEW, INFORMAL DOCUMENT NO. 8, Session 13-17

- (Dec. 2010),
http://www.unece.org/fileadmin/DAM/env/documents/2010/eb/eb/Informal%20documents/Info.%20doc.8_Mercury%20emissions%20and%20the%20waste%20problem.pdf; see also Faurie, Jonathan, *Mercury-free Gold Extraction Process Makes African Footprint*, MINING WEEKLY (Mar. 28, 2008), <http://www.miningweekly.com/article/mercuryfree-gold-extraction-process-makes-african-footprint-2008-03-28>.
50. Anglophone West Africa Regional Awareness Raising Workshop on Mercury in Artisanal Small Scale Gold Mining (ASGM), organized by the Federal Ministry of Environment (Nigeria), U.S. EPA, & UNEP (June 8-10, 2011),
http://www.unep.org/hazardoussubstances/Portals/9/Mercury/Documents/ASGM/Nigeria/Report.ANGLOPHONE_ASGM.Nigeria.FINAL.pdf.
51. Mahlatsi, S., *The Igoli Mercury - Free Gold Extraction Process* (2006),
http://www.researchgate.net/publication/242372423_THE_IGOLI_MERCURY_FREE_GOLD_EXTRACTION_PROCESS.
52. Telmer & Stapper, Reducing Mercury Use in ASGM (note 13).
53. Ugeh, FG Receives Machines for Safer Mining (note 23).
54. Hinton, J., C. Beinhoff, *Report to the UNEP GC Meeting, Nairobi, February 2005, on Mercury and Artisanal Gold Mining* (Global Mercury Project report to the U.N. Environmental Program Governing Council Meeting, Nairobi, Kenya, February 2005), at 13. [Short cite: “Report to the UNEP GC Meeting”]
55. SDC Experiences with Formalization (note 36), at 16.
56. United Nations Environment Programme, UNEP Chemicals Branch, *Analysis of Formalization Approaches in the Artisanal and Small-Scale Gold Mining Sector Based on Experiences in Ecuador, Mongolia, Peru, Tanzania, and Uganda* (2012),
http://www.unep.org/chemicalsandwaste/Portals/9/Mercury/Documents/ASGM/Formalization_ARM/Formalization%20Document%20Final%20June%202012.pdf. [Short cite: “UNEP Analysis of Formalization Approaches”]
57. UNEP Analysis of Formalization Approaches (note 56), at 2.
58. UNEP Analysis of Formalization Approaches (note 56), at 2.
59. See, e.g. Maconachie & Hilson, *Safeguarding Livelihoods or Exacerbating Poverty* (note 3), at [].
60. SDC Experiences with Formalization (note 36), at 11.
61. SDC Experiences with Formalization (note 36), at 11.
62. SDC Experiences with Formalization (note 36), at 15.
63. Maconachie & Hilson, *Safeguarding Livelihoods or Exacerbating Poverty* (note 3), at 301.
64. UNEP Analysis of Formalization Approaches (note 56), at 1.
65. SDC Experiences with Formalization (note 36), at 16.

66. UNECA Compendium (note 1), at iv.
67. UNEP Analysis of Formalization Approaches (note 56).
68. Nigerian Minerals and Mining Regulations 2011, § 231.
69. Nigeria Minerals and Mining Act (2007), § 1, ¶ 2 [Short cite: “Minerals and Mining Act”]
70. Minerals and Mining Act (note 69), Part 1, § 1 (“The entire property in and control of all mineral resources in, under or upon any land in Nigeria, its contiguous continental shelf and all rivers, streams and watercourses throughout Nigeria, any area covered by its territorial waters or constituency and the Exclusive Economic Zone is and shall be vested in the Government of the Federation for and on behalf of the people of Nigeria.”)
71. Minerals and Mining Act (note 69), Part 4, § 46(1).
72. Minerals and Mining Act (note 69), Sec. 56-58.
73. Minerals and Mining Act (note 69), Sec. 59-63.
74. Minerals and Mining Act (note 69), Sec. 65-70.
75. Minerals and Mining Act (note 69), Sec. 90-91 (establishing area of small-scale lease); 164 (defining small-scale mining).
76. Minerals and Mining Act (note 69), Sec. 52 (establishing qualifications for water use permit).
77. Minerals and Mining Act (note 69), Sec. 78.
78. Minerals and Mining Act (note 69), Sec. 94-96.
79. Minerals and Mining Act (note 69), Part IV, § 49.
80. Nigerian Minerals and Mining Regulations 2011, § 26(1)(iii), § 27 [Short cite: “Minerals and Mining Regulations”]
81. Minerals and Mining Regulations (note 80), § 28, § 46.
82. Minerals and Mining Regulations (note 80), § 48.
83. Minerals and Mining Regulations (note 80), § 50, § 51.
84. Minerals and Mining Regulations (note 80), § 131.
85. Minerals and Mining Regulations (note 80), § 100.
86. Minerals and Mining Regulations (note 80), § 12(2)(d), § 162.
87. Minerals and Mining Regulations (note 80), § 91.
88. Minerals and Mining Regulations (note 80), SCHEDULE 1: FEES.
89. Minerals and Mining Regulations (note 80), § 124.
90. Minerals and Mining Regulations (note 80), § 140–44.
91. Minerals and Mining Regulations (note 80), § 99.
92. Minerals and Mining Regulations (note 80), SCHEDULE 4: ROYALTIES.

93. Minerals and Mining Regulations (note 80), § 157–60.
94. Minerals and Mining Regulations (note 80), § 182.
95. Minerals and Mining Regulations (note 80), § 193.
96. *Federal Ministry of the Environment*, FEDERAL REPUBLIC OF NIGERIA, <http://www.nigeria.gov.ng/2012-10-29-11-06-51/executive-branch/94-federal-ministry-of-environment/182-federal-ministry-of-environment>.
97. National Environmental Standards and Enforcement Agency Act, § 36 (2007) (repealing FEPA), <http://www.placng.org/new/laws/nesrea.pdf>. [Short cite: “NESREA Act”]
98. NESREA Act (note 97).
99. ENVIRONMENTAL IMPACT ASSESSMENT DECREE 86 (1992), <http://www.nigeria-law.org/Environmental%20Impact%20Assessment%20Decree%20No.%2086%201992.htm>. [Short cite: “EIA Decree”]
100. EIA Decree (note 99), § 13(1); see also SCHEDULE 1, § 11.
101. Minerals and Mining Act (note 69), § 119; Minerals and Mining Regulations (note 80), § 157–60.
102. EIA DECREE (note 99), § 1(a)-(h).
103. Minerals and Mining Regulations (note 80), § 157–60.
104. NESREA Act (note 97), § 20(1) (“The Agency may make regulations setting specifications and standards to protect and enhance the quality of Nigeria's air resources, so as to promote the public health or welfare.”).
105. *National Environmental (Pollution Abatement in Mining and Processing of Coal, Ores and Industrial Minerals) Regulations*, 96 FEDERAL REPUBLIC OF NIGERIA OFFICIAL GAZETTE 63 (2009).
106. Muhammed Tawfiq Ladan, *Review of NESREA Act 2007 and Regulations 2009-2011: A New Dawn in Environmental Compliance and Enforcement in Nigeria*, 8 LAW, ENVIRONMENT AND DEVELOPMENT JOURNAL 116, 132–33 (2012) (describing the contents of the mining regulations), <http://www.lead-journal.org/content/12116.pdf>.
107. Anglophone West Africa Regional Awareness-Raising Workshop on Mercury in Artisanal Small Scale Gold Mining (ASGM), at 9 (June 2011).
108. NESREA Act (note 97), at § 7(c) (“[NESREA shall] enforce compliance with the provisions of international agreements, protocols, conventions and treaties on the environment . . .”).
109. Minamata Convention on Mercury (2013), http://www.mercuryconvention.org/Portals/11/documents/conventionText/Minamata%20Convention%20on%20Mercury_e.pdf. [Short cite: “Minamata Convention”]
110. Minamata Convention (note 109), Art. 2(a).
111. Minamata Convention (note 109), Art. 7.2.

112. Minamata Convention (note 109), Art. 7.3(a).
113. Keane, Susan Egan, Natural Resources Defense Counsel, *The Minamata Convention – What It Means for Artisanal and Small-Scale Gold Mining* (Mar. 4, 2013), http://switchboard.nrdc.org/blogs/skeane/the_minamata_convention_-_what.html.
114. Minamata Convention (note 109), Art. 7.3.
115. Keane, Susan Egan, Natural Resources Defense Counsel, *The Minamata Convention – What It Means for Artisanal and Small-Scale Gold Mining* (Mar. 4, 2013), http://switchboard.nrdc.org/blogs/skeane/the_minamata_convention_-_what.html.
116. United Nations Environment Programme, *Developing a National Strategic Plan for Artisanal and Small Scale Gold Mining* (Guidance Document) (2009), <http://www.eisourcebook.org/cms/End%20June%202013/Developing%20a%20National%20Strategic%20Plan%20to%20Reduce%20Hg%20ASM%20Au%20Use.pdf>. [Short cite: “UNEP Guidance Document”]
117. UNEP Guidance Document (note 116), at 8.
118. United Nations Environment Programme, *Strategic Approach to International Chemicals Management* (2006), http://www.saicm.org/images/saicm_documents/saicm%20texts/SAICM_publication_ENG.pdf.
119. *Nigeria/UNEP Develop Business Plan for Chemical Management*, PREMIUM TIMES NIGERIA (Aug. 23, 2013), <http://premiumtimesng.com/news/143319-nigeriaunep-develop-business-plan-for-chemical-management.html> [Short cite: “Nigeria/UNEP Develop Business Plan”]
120. *Nigeria/UNEP Develop Business Plan* (note 119).
121. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (1992), <http://www.basel.int/Portals/4/Basel%20Convention/docs/text/BaselConventionText-e.pdf>. [Short cite: “Basel Convention”]
122. BASEL CONVENTION TECHNICAL GUIDELINES (2012), <http://www.basel.int/TheConvention/Publications/TechnicalGuidelines/tabid/2362/Default.aspx>.
123. Basel Convention (note 121), Art. 4.2.
124. Basel Convention (note 121), Art 4.2.
125. Extractive Industries Transparency Initiative (EITI), *What is the EITI?*, <http://eiti.org/eiti>. [Short cite: “What is the EITI?”]
126. *What is the EITI?* (note 125); Extractive Industries Transparency Initiative (EITI), *EITI Countries*, <http://eiti.org/countries>.
127. Nigeria Extractive Industries Transparency Initiative Act (2007), <http://neiti.org.ng/sites/default/files/documents/uploads/neitiact.pdf>. [Short cite: “NEITI Act”]
128. NEITI Act (note 127), at § 21.
129. NEITI Act (note 127), at § 2(c).

130. NEITI Act (note 127), at § 3, 4.
131. NEITI Act (note 127), at § 4.
132. NEITI Act (note 127), at § 16.
133. NEITI Act (note 127), at § 16.
134. Geological Survey of Denmark and Greenland, *Scoping Study on the Nigerian Mining Sector* (2011), <http://neiti.org.ng/sites/default/files/publications/uploads/neiti-mining-scoping-study-report.pdf>. [Short cite: GEUS Scoping Study”]
135. The 19 companies that are covered operate in the construction sector or cement industry.
136. Civil Society Legislative Advocacy Centre, *Policy Brief on Solid Mineral Sector for the National Assembly*, <http://www.cislacnigeria.net/wp-content/uploads/2012/07/Policy-brief-on-solid-minera-sector.pdf>. [Short cite: “CISLAC Policy Brief”]
137. CISLAC Policy Brief (note 136).
138. Constitution of the Federal Republic of Nigeria, Part II, § 4(7). [Short cite: “Constitution of Nigeria”]
139. Constitution of Nigeria (note 138), Second Schedule, Part I: Exclusive Legislative List, § 39.
140. Oghogho Makinde & Temitayo Adeyoke, *Nigeria: Environmental Law in Nigeria*, in THE INTERNATIONAL COMPARATIVE GUIDE TO PFI / PPP PROJECTS (2007), <http://www.mondaq.com/x/53804/Energy+Law/Environment+Law+In+Nigeria>. [Short cite: “Enviromental Law in Nigeria”]
141. Environmental Law in Nigeria (note 140).
142. Environmental Law in Nigeria (note 140).
143. Minerals and Mining Act (note 69), § 19.
144. Minerals and Mining Act (note 69), § 19(3).
145. Minerals and Mining Act (note 69), § 163.
146. Minerals and Mining Act (note 69), § 19(3), (4).
147. Onwuemenyi, Oscarline, *Zamfara Mining Disaster: Still a Human Rights Debacle*, VANGUARD (Aug. 7, 2012), <http://www.vanguardngr.com/2012/08/zamfara-mining-disaster-still-a-human-rights-debacle/>.
148. Simpson, Brian W., *In Nigeria, Emirs Mobilize Change*, MAGAZINE OF THE JOHNS HOPKINS BLOOMBERG SCHOOL OF PUBLIC HEALTH (Spring 2011); http://magazine.jhsph.edu/2011/spring/news_briefs/in_nigeria_emirs_mobilize_change/.
149. Barkan, J.D. et al., *State and Local Governance in Nigeria*, Public Sector and Capacity Building Program, Africa Region, The World Bank (2001). [Short cite: “State and Local Governance in Nigeria”]
150. State and Local Governance in Nigeria (note 149).

151. OnlineNigeria, *The Local Government*, retrieved Jan. 10, 2014, from <http://www.onlinenigeria.com/government/?blurb=143>. [Short cite: “*The Local Government*”]
152. Embassy of the Federal Republic of Nigeria, *Nigeria: Past, Present and Future*, <http://www.nigeriaembassyusa.org/index.php?page=nigeria-past-present-and-future>.
153. *The Local Government* (note 151).
154. *The Local Government* (note 151).
155. Blench, R. et al., *The Role of Traditional Rulers in Conflict Prevention and Mediation in Nigeria* 106 (2006), <http://www.rogerblench.info/Conflict/TR%20Interim%20Report.pdf>.
156. UNECA Compendium (note 1), at iv.
157. Patrick Ugeh, *Revocation of Mining Licenses in Order*, THIS DAY LIVE (Oct. 23, 2012), <http://www.thisdaylive.com/articles/revocation-of-mining-licences-in-order/128441/> [Short cite: “Ugeh, Revocation of Mining Licenses”]
158. Minerals and Mining Act (note 69), § 91; Minerals and Mining Regulations (note 80), § 231.
159. SDC Experiences with Formalization (note 36), at 8.
160. SDC Experiences with Formalization (note 36), at 40.
161. Maconachie & Hilson, *Safeguarding Livelihoods or Exacerbating Poverty* (note 3), at 299.
162. GEUS Scoping Study (note 134), at 6.
163. International Council on Mining and Metals et al., *Working Together: How Large-scale Mining Can Engage with Artisanal and Small-scale Miners* (2010), <http://www.icmm.com/page/17638/new-publication-on-engaging-with-artisanal-and-small-scale-miners> [Short cite: “Working Together”]; SDC Experiences with Formalization (note 36), at 17.
164. The Asia Foundation, *The Asia Foundation in Mongolia Holds Closing Workshop for “Engaging Stakeholders for Environmental Conservation” Program* (June 13, 2013), <http://asiafoundation.org/news/2013/06/the-asia-foundation-in-mongolia-holds-closing-workshop-for-engaging-stakeholders-for-environmental-conservation-program/>.
165. Stanway, D., *Mongolia’s “Ninja” Miners Help Sate China Lust for Gold*, REUTERS (Apr. 19, 2012), <http://www.reuters.com/article/2012/04/19/us-mongolia-gold-idUSBRE83I08V20120419>.
166. Tesha, A.L., *Cooperation Between Small-Scale and Large-Scale Mining – Tanzania Experience*, Growth and Diversification in Mineral Economies Regional Workshop for Mineral Economies in Africa Cape Town, at 13 (2000).
167. Kulekana, J., *Geita Gold Mine: Keen on Safety, Good Corporate Citizenship*, TANZANIA DAILY NEWS (Nov. 19, 2013), <http://allafrica.com/stories/201311190157.html>; [Short cite: “Geita Gold Mine: Keen on Safety”]; Benita de Wet & Jeannette McGill, *Strategy for Community Development Partnership for the Tembo Gold Licence Area*, http://www.tembogold.com/pdf/Tembo_CSIR_Community_Development_Strategy.pdf.
168. Geita Gold Mine: Keen on Safety (note 167).

169. Working Together (note 163).
170. SDC Experiences with Formalization (note 36), at 16-17.
171. Bode Gbadebo, *Nigeria: Mining Cadastre Office has Inspired Confidence Among Investors – Amate*, ALLAFRICA.COM (May 27, 2013), <http://allafrica.com/stories/201305270371.html>.
172. Olayemi Okeniyi, *Nigeria: Solid Minerals – 10,000 Licenses Not Used by Miners*, DAILY TRUST (June 16, 2013), <http://allafrica.com/stories/201306171712.html>.
173. UNECA Compendium (note 1), at 22.
174. UNECA Compendium (note 1), at 22.
175. Maconachie & Hilson, *Safeguarding Livelihoods or Exacerbating Poverty* (note 3), at 299.
176. Gavin Hilson & Clive Potter, *Structural Adjustment and Subsistence Industry: Artisanal Gold Mining in Ghana*, DEVELOPMENT AND CHANGE 36(1): 103-131 (2005), at 117. [Short cite: “Hilson & Potter, Structural Adjustment and Subsistence Industry”]
177. Gbadebo, Bode, *Nigeria: Mining Cadastre Office has Inspired Confidence Among Investors – Amate*, ALLAFRICA.COM (May 27, 2013), <http://allafrica.com/stories/201305270371.html>.
178. Gavin Hilson & Clive Potter, *Structural Adjustment and Subsistence Industry: Artisanal Gold Mining in Ghana*, DEVELOPMENT AND CHANGE 36(1): 103-131 (2005), at 115-16.
179. UNEP, *Analysis of Formalization Approaches* (note 56), at 4.
180. UNECA Compendium (note 1), at 26.
181. Ugeh, *Revocation of Mining Licenses* (note 157).
182. Hilson & Potter, *Structural Adjustment and Subsistence Industry* (note 176), at 117.
183. UNECA Compendium (note 1), at 88.
184. UNECA Compendium (note 1), at 90.
185. UNEP *Analysis of Formalization Approaches* (note 56), at 5.
186. UNECA Compendium (note 1), at 90.
187. *Minerals and Mining Act* (note 69), § 91.
188. For a good description of how general permits work, see the Arizona Department of Environmental Quality’s page on general permits, <http://www.azdeq.gov/function/permits/general.html>.
189. SDC Experiences with Formalization (note 36), at 22-23.
190. UNEP *Analysis of Formalization Approaches* (note 56), at 6.
191. UNEP *Analysis of Formalization Approaches* (note 56), at 6; United Nations Environment Programme, Division of Technology, Industry and Economics (DTIE) Chemicals Branch, *Analysis for Stakeholders in the Artisanal and Small-Scale Gold Mining Sector Based on Experiences in Ecuador, Mongolia, Peru, Tanzania and Uganda: A Compendium of Case Studies* at 46-51 (2012).

192. Civil Society Legislative Advocacy Center, Policy Brief on The Ways of Maximizing Tax Revenue from the Extractive Industries.
193. Civil Society Legislative Advocacy Center, Policy Brief on Expanding the Tax Base in the Informal Sector in Nigeria, at 5 (noting that “many informal businesses are subject to illegal extortion of monies by corrupt elements within the society”).
194. Gajigo, Ousman et al., African Development Bank Group, *Gold Mining in Africa: Maximizing Economic Returns for Countries* at 1-2 (2012).
195. UNEP Analysis of Formalization Approaches (note 56), at 8.
196. GNA, *Mining Communities to Benefit from Royalties*, MODERN GHANA (July 28, 2013).
197. Report to the UNEP GC Meeting (note 54), at 13.
198. Federal Republic of Nigeria, *Programme on Safer Mining in Zamfara State is in Progress*, <http://www.nigeria.gov.ng/2012-10-29-11-09-25/news/489-programme-on-safer-mining-in-zamfara-state-is-in-progress>.
199. Ugeh, FG Receives Machines for Safer Mining (note 23).
200. Report to the UNEP GC Meeting (note 54).
201. Hinton et al., Clean Artisanal Gold Mining (note 47), at 110-11.
202. Veiga, M.M et al., *Processing Centers in Artisanal Gold Mining*, JOURNAL OF CLEANER PRODUCTION 64, 535-44 (2014).
203. Veiga, M., *UNEP Global Mercury Project – Protocols for Environmental and Health Assessment of Mercury Released by Artisanal and Small-Scale Gold Miners* at 16 (2004), <http://www.unep.org/hazardoussubstances/Portals/9/Mercury/Documents/ASGM/PROTOCOLS%20FOR%20ENVIRONMENTAL%20ASSESSMENT%20REVISION%2018-FINAL%20BOOK%20sb.pdf>.
204. ASM Handbook for Nigeria (note 33).
205. Maconachie & Hilson, Safeguarding Livelihoods or Exacerbating Poverty (note 3), at 302.
206. Minamata Convention (note 109), Annex C, 1(h).
207. Hilson, G. et al., *Improving Awareness of Mercury Pollution in Small-Scale Gold Mining Communities: Challenges and Ways Forward in Rural Ghana* (2006), at 285.
208. Maconachie & Hilson, Safeguarding Livelihoods or Exacerbating Poverty (note 3), at 301.
209. Report to the UNEP GC Meeting (note 54), at 14.
210. UNEP Analysis of Formalization Approaches (note 56), at 7.
211. Nigerian Minerals and Mining Act (note 69), Sec. 95.
212. Haruna Yahaya & Co., *Nigeria Extractive Industries Transparency Initiative (NEITI) Financial Audit: An Independent Report Assessing and Reconciling Financial Flows Within Nigeria’s Solid Minerals Industry 2007-2010*, at 81,

http://www.neiti.org.ng/sites/default/files/pdf_uploads/NEITI-EITI-Core-Audit-Report-Solid-Minerals-Financial-Flows-2007-2010-310113.pdf.

213. UNEP Analysis of Formalization Approaches (note 56), at 11.

214. UNECA Compendium (note 1), at 60-62.

215. A Proclamation to Promote and Regulate Transactions of Precious Minerals, Proclamation No.651 /2009 (describing transaction rules for gold mining license holders); see also National Bank of Ethiopia, *Gold Purchasing Rate*, <http://www.nbe.gov.et/market/goldrate.html> (listing the gold-buying rate for the National Bank).

216. Ethiopia Ministry of Mines, *Artisanal Mining Activities in Ethiopia: Challenges & Opportunities* (2012), [http://www.globaldialogue.info/Artisanal%20Mining%20Activities%20in%20Ethiopia%20-%20Challenges%20and%20Opportunities%20\(Oct%202012\)%20-%20Abayneh%20Tilahun.pdf](http://www.globaldialogue.info/Artisanal%20Mining%20Activities%20in%20Ethiopia%20-%20Challenges%20and%20Opportunities%20(Oct%202012)%20-%20Abayneh%20Tilahun.pdf) (gold purchased by the National Bank increased from 426 tons in 2008-2009 to 8328 tons in 2011-2012).

217. UNECA Compendium (note 1), at 59-62.

218. UNECA Compendium (note 1), at 63.

219. Communities and Small-Scale Mining, *Certification and Artisanal and Small-Scale Mining: An Emerging Opportunity for Sustainable Development* (2008), at 3.

220. Alliance for Responsible Mining, *Fairtrade and Fairmined Gold: The Benefits and Process of Fairtrade and Fairmined Certification* at 10-20 (2012).

221. Jackson, Amy, *Fairtrade International and Alliance for Responsible Mining End Partnership on Gold* (2013), <http://www.isealalliance.org/online-community/news/fairtrade-international-and-alliance-for-responsible-mining-end-partnership-on-gold>.

222. UNEP Analysis of Formalization Approaches (note 56), at 10.

223. UNEP Analysis of Formalization Approaches (note 56), at 34.

224. UNEP Analysis of Formalization Approaches (note 56), at 11.

225. UNECA Compendium (note 1), at 68.

226. UNECA Compendium (note 1), at 69.

227. UNECA Compendium (note 1), at 69.

228. United Nations Environment Programme, *Analysis of Formalization Approaches in the Artisanal and Small-scale Gold Mining Sector Based on Experiences in Ecuador, Mongolia, Peru, Tanzania and Uganda: Tanzania Case Study 21* (2012), http://www.unep.org/chemicalsandwaste/Portals/9/Mercury/Documents/ASGM/Formalization_ARM/Case%20Study%20Tanzania%20June%202012.pdf. [Short cite: “Tanzania Case Study”]

229. Tanzania Case Study (note 228), at 71.

230. Tanzania Case Study (note 228), at 71; UNEP Analysis of Formalization Approaches (note 56), at 10.

231. Tanzania Case Study (note 228), at 21.
232. Imperato, N., *Artisanal Gold and Transformational Exchange: Toward a Public-private Partnership in Tanzania*, JOURNAL OF CLEANER PRODUCTION, 18, 462-70, at 467 (2010).
233. Philippine Department of the Environment and Natural Resources, Environmental Management Bureau & United Nations Environment Programme, *National Strategic Plan for the Phaseout of Mercury in Artisanal and Small-scale Gold Mining in the Philippines*, <http://www.unep.org/hazardoussubstances/Portals/9/2011-06-03%20NSP-ASGM.FINAL.2011.pdf>.
234. UNEP Guidance Document (note 116), at 9.
235. UNECA Compendium (note 1), at 80.
236. Ugeh, Revocation of Mining Licenses (note 157).
237. Maconachie & Hilson, Safeguarding Livelihoods or Exacerbating Poverty (note 3), at 301.
238. U.S. Department of Labor, Bureau of International Labor Affairs, *Project to Reduce Child Labor in Burkina Faso*, Funding Opportunity SGA 12-09 (2012), <http://www.dol.gov/ilab/grants/SGA12-09.pdf>.
239. U.S. Department of Labor, *Technical Cooperation Project Summary: Reducing Child Labor in Colombia*, http://www.dol.gov/ilab/projects/summaries/Colombia_CL.pdf.
240. Maconachie & Hilson, Safeguarding Livelihoods or Exacerbating Poverty (note 3), at 300.