

UPDATE ON MANAGEMENT OF LEGACY ENVIRONMENTAL ISSUES IN GHANA



UPDATED IN JULY 2018

AngloGold Ashanti (AGA) continues to address the inherited legacy environmental concerns at both of its Ghana operations – Obuasi and Iduapriem. Although the majority of these issues resulted from historic operating practices prior to the merger with Ashanti Goldfields Corporation in 2004, the company has not only continued its work developing action plans to mitigate these legacies, but has also implemented appropriate environmental standards and operating systems to improve the ongoing sustainability of these operations. Correcting such legacy environmental issues takes time, but we are encouraged that the good progress of the past decade has continued, notwithstanding that the Obuasi has not been producing gold for almost four years. This ongoing work demonstrates our commitment to the future sustainability of our business in Ghana.

This report provides progress update since December 2015 and also highlights those items that have now been resolved and can now be removed from future progress reports.

Environmental Management Plans (EMPs) are prepared every three years, (and updated when there is a significant change to operations) and submitted to the Ghana Environmental Protection Agency (EPA) for approval that results in the Agency issuing an Environmental Certificate for each mine. These plans contain information pertaining to the key aspects and impacts at each operation and the management commitments to addressing such impacts.

Iduapriem: The site's 2011-2014 Environmental Certificate expired on 6 October 2014. The 2014-2017 EMP was submitted to the EPA in April 2014, 6 months prior to expiry, in line with the legal requirement. The EPA responded on 10 November 2014 by providing comments on the EMP which the mine addressed before subsequently re-submitting the final document on 9 January 2015. The mine has also paid the required processing and certificate fees to facilitate the issuing of the new permit which was not issued until the end of the EMP period. A new three-year EMP was submitted in April 2017 and the mine continues to await a response from the EPA.

Obuasi: The site's 2011-2014 Environmental Certificate expired on 31 March 2014. The 2014-2017 EMP was submitted to the EPA in September 2013, but the EPA in response has requested, instead, for an EMP that reflects the proposed future direction of the mine, given that it has been undergoing significant restructuring since 2014 in preparation for its redevelopment, which was earlier this year approved by the Board. The mine suspended underground operations at the end of 2014, and was operated on a Limited Operation basis in 2015. The operation (including the surrounding concession) was invaded by an estimated 12,000 illegal miners. This illegal occupation of the site started in February 2016, following the withdrawal of a state security protecting the mine, and lasted up to early December 2016 at which time the last remaining illegal miners vacated the fenced operational area of the site. During this time AngloGold Ashanti withdrew non-essential personnel from the site – which was on care and maintenance at the time -- for safety reasons. Notwithstanding this illegal occupation of the site, a feasibility study was conducted to establish the economic case for the redevelopment of the mine. In May 2017, an Environmental Management Plan together with the Amended

Programme for Mining Operations (APMO), was submitted to the Ghana EPA for the period May 2017 to April 2018, no feedback was received though the company continued to engage the EPA for approval. Following a successful outcome of the feasibility study, which saw the AngloGold Ashanti board of directors approve a c.\$500m recapitalisation of the mine pending approval of an investment framework by the Government of Ghana, we commenced the permitting and approval process from the regulatory institutions. The environmental permits have been issued by the EPA, and all investment agreements granted as well as ratified by the government of Ghana on 4 July 2018, allowing the redevelopment of the mine -- from one on care and maintenance to a modern, productive, long-life operation – to commence in earnest. We anticipate first production from the mine before the end of 2019.

In the meantime, and in parallel with the mine redevelopment plan, numerous engagements have been held with the EPA on the status of the programme to address the legacy environmental issues. AGA in Ghana has focussed on several initiatives including:

- **Fencing the operational area:** now complete with a 21km fence enclosing the bulk of the open pits and waste dumps, as well as all required infrastructure. Housing estates fall outside this area, as does the South TSF and pipeline. Legacy TSFs, open pits and waste dumps are also outside the fenced area. Detailed plans to address these have been prepared in the reclamation plan submitted as an appendix to the Obuasi Redevelopment EIS for implementation on approval.
- **Undertaking test work on how best to treat and dispose of the stockpiled Arsenic Trioxide, which predates AngloGold Ashanti's ownership of the mine:** Pre-Feasibility Study is underway to evaluate various stabilisation technologies for the treatment and stabilisation of the arsenic trioxide waste material stockpiled at Obuasi mine. The packaged material is stored in a concrete containment, sealed and encapsulated with an HDPE liner, and surrounded by a fence. AGAG sampled the stockpile of arsenic trioxide waste material in November 2014, and initially provided the samples to three technology providers or laboratories/technical institutions namely; BIOMIN, Toxfree and ARDADIS, then later in November 2015 to the fourth vendor, QEC Engineering Ghana Ltd (QEC), and to the fifth, Aquaminerals, in April 2017. All vendors, except QEC, have completed their studies and submitted final reports for evaluation. QEC in partnership with PRIMA Environmental Inc, California, USA have completed a benchscale-up testwork program to treat and stabilize the arsenic trioxide waste using a combination of treatment processes that uses a propriety reagent (N2) to mop up residual arsenic. AGAG is reviewing QEC's draft report, including laboratory results to enable QEC progress the testwork to a logical conclusion. AGA Ghana will then evaluate all five technologies submitted to select the preferred technology and communicate its findings to the Ghana EPA for implementation of the next phase. The conditions accompanying the recently issued environmental permits require AGAG to continue work on the QEC testwork, and to seek the EPA's prior approval for whatever solution is selected as a permanent solution in dealing with the arsenic trioxide.
- **Reclamation Plan for Obuasi:** the company conducted a detailed closure planning process as part of the Obuasi Gold Mine Optimised Feasibility Study with the intention to have a feasible reclamation plan over the life of mine, and to minimise the remaining liability when gold production has ceased (this is anticipated to be beyond 20 years from now, under the current mine plan). The Obuasi mine

reclamation plan, which includes legacy and future planned environmental disturbance, was submitted to the EPA as part of the Obuasi Mine redevelopment revised environmental impact statement (EIS) in April 2018.

- **Technologies for the treatment of brine:** Pre-feasibility studies on brine treatment have been completed. AGA Ghana has re-scoped the mine’s entire water management plan under the redevelopment project. A water service partner, with proven brine treatment technology, is being sought through a competitive tender process to manage the site-wide process water and operate the water treatment plants. A competitive tender process has been completed with the adjudication process currently ongoing to select the suitably qualified service provider.
- **Closure of the South TSF:** AGAG indicated in the EIS for the tailings and water infrastructure project submitted to the EPA on 6 April, 2018 for a 12 months co-disposal of Biox and flotation tails on the south TSF. This will be followed by deposition for closure to achieve the dome shape landform with only flotation tailings on the south TSF. The request for the further deposition was informed by comprehensive studies including seepage and plume model assessment, and Arsenic attenuation assessment of soils around Dokyiwa. The planned Dokyiwa TSF will have a separate Biox and flotation tailings compartment.

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<p>1 ENVIRONMENTAL STRUCTURE & STAFFING: Given the complexity of environmental issues at Obuasi and Iduapriem, the company should ensure that the Environmental Management Plan is supported by the appropriate structure and qualified staff.</p>	<p>Develop the appropriate operational strategy and organisational structure, then staff with competent personnel.</p>	<p>There have been no major changes with the environmental teams at both Obuasi and Iduapriem over the last 12 months. Any requisite technical support to both operations is provided by skilled personnel from the company’s corporate office. The employee numbers at Obuasi Mine are expected to increase significantly based on the mine Redevelopment project, and will include a full complement of professional staff tasked with various aspects of the Obuasi Gold Mine’s operational, financial and sustainability needs. This will include close compliance with the Environmental Management Plan.</p>
<p>2 WATER MANAGEMENT: In the past, water management has been a significant risk for the business at both Obuasi and Iduapriem. Both mines have positive water balances.</p>	<p>Water Treatment Facilities: Develop water balance models, redesign the overall site water management infrastructure and install sufficient water treatment plant capacity at both operations.</p>	<p>Obuasi mine continues to have positive-water-balance. Contaminated water from the mine is treated through the North and South water treatment plants with a combined installed capacity of 890m³/hr. The environmental management permit for the south water treatment plant issued in December 2015 will only be due for renewal in December 2018. An EMP has been submitted to the EPA</p>

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		<p>for the permit renewal. The north water treatment plant EMP was also submitted to the EPA, though no response has been received from the EPA since its submission in November 2015.</p> <p>The water treatment plant at Iduapriem continues to operate optimally, even during the wet season.</p>
	<p>Underground water at Obuasi: Install flexibility to pump to either the water treatment plants or to the processing plant where it is used as process water or treated and discharged.</p>	<p>The underground water system has been integrated into the site-wide water balance. Further test work has been completed, which was aimed at identifying water ingress points to underground with a view to minimising ingress where possible. It was recommended that surface runoffs around underground workings should be diverted to the main streams given that this water is not impacted by the mine's activities. Due to limited activities at the current care and maintenance phase, plans for the diversion will be implemented on recommencement of operations.</p>
	<p>Return Water Dam at Obuasi: A new return water dam or process water dam is planned to provide water holding capacity.</p>	<p>The Feasibility Study design has been completed to use Ponds 1 and 2 for the future Process Water and Return Water ponds respectively. This has been incorporated into the Environmental Impact Statement (EIS) for Tailings and Water Infrastructure Project submitted to the EPA for environmental permit. This permit has been received.</p>
	<p>Water Balance at Obuasi: Develop a predictive mine-wide water balance model which can cater for different stages in the operation including opening and closing TSFs and changes to water storage facilities.</p>	<p>At Obuasi a mine-wide water balance model (OPSIM) has been updated and calibrated to simulate the proposed operational periods through the life of mine. A suite of 24 flow meters were installed in 2014 to aid with the calibration.</p> <p>OPSIM is working and will continue to be monitored. The same OPSIM model was used to develop and manage the Iduapriem water balance.</p>

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	<p>Water Storage at Obuasi: Construct an additional pond for storage and re-use of process water. Ultimately decommission the existing ponds by treating the water and removing the silted material to enable ultimate use as a fresh water pond.</p>	<p>As the water balances at both mines are now fully operational this issue is considered closed.</p> <p>In the updated water management strategy Ponds 1 & 2 will be utilised for process water containment. Further works on diverting storm water away from the ponds is in progress. Survey and sediment analysis and dredgeability studies are in progress, and will provide information for the remediation of Pond 3 and conversion of Pond 2 into a process water dam in the future. The design and construction for all ponds has been planned under the tailings and water infrastructure project.</p>
<p>3 WASTE MANAGEMENT: Domestic and general waste in Obuasi town is managed by the municipality. The municipal waste disposal facility was poorly managed and had a significant environmental impact.</p>	<p>In compliance with a 2010 directive from the Environmental Protection Agency, Obuasi mine stopped using the municipal refuse facility for its domestic and general waste. The mine has an approved landfill facility.</p>	<p>The mine continues to operate a landfill facility at a designated and permitted area. The extended cell completed in December 2016 is still being used. AGAG has agreed with the EPA that a separate waste management project will cover the use and management of the site landfill, sewage treatment and bioremediation farm. The Redevelopment Project covers only the storage and handling of hazardous and non-hazardous wastes, with disposal to be covered in the Waste Management Project.</p>
<p>4 TAILINGS MANAGEMENT: Operations at Iduapriem mine were suspended by the Environmental Protection Agency in February 2010 due to a lack of tailings storage deposition capacity. The previous environmental certificate at Obuasi (2011) was conditional on the decommissioning of the current tailings storage facility and commissioning of a new facility</p>	<p>Iduapriem: A new facility (Greenfields TSF) was built and deposition started in 2011.</p> <p>Obuasi: A new tailings management strategy is being developed at Obuasi, which will separate tailings into two streams: the BIOX® stream (contain cyanide) which will be deposited within a new high-density polyethylene plastic lined facility and the floatation stream</p>	<p>The facility has received all of the progressive subsidiary permits from the EPA and is fully operational. This point is now considered closed.</p> <p>AGAG completed the clean-up of the legacy tailings during the Limited Operating Phase effective from 2014, with tailings residue being deposited on the South TSF. This programme was completed at the end of 2015, enabling normal deposition to cease in accordance with the EPA permit. Progressive revegetation commenced and was partially completed on the tailings footprint. A</p>

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<p>by December 2014. This deadline was extended by the EPA by one year to December 2015.</p>	<p>(does not contain cyanide) which will be utilised in underground backfill and deposited within either a clay-lined facility, on top of the South TSF to create the closure landform or in disused pits.</p>	<p>completion progress report was submitted to EPA in line with regulatory requirements at the end of 2015.</p> <p>Since the mass incursion of illegal miners on the mine, including the Diawuosu area in January 2016, the cleaned-up Diawuosu area was encroached upon and disturbed. A report on the disturbance at the Diawuosu tailings site has been submitted to the EPA and a follow-up letter was sent in July 2017, inviting the EPA to visit the site for decision to be taken on the liability. AGAG awaits the EPA's decision.</p> <p>Feedback was received from the EPA on the Tailings and water infrastructure scoping document. AGAG subsequently reviewed this feedback, and submitted a revised scoping and Environmental impact statement (EIS) to the EPA on 18 July 2017 and 26 July 2017 respectively, after the EPA gave approval for the submission of the EIS on 24 July 2017. A revised EIS was submitted on 6 April 2018, based on comments received from EPA. The permits have since been issued by the EPA.</p> <p>The Tailings and Water Infrastructure Project covers the construction of a new double-lined facility (HDPE and clay) immediately to the North of the South TSF which will be utilised for the BIOX® stream and the flotation tailings will have a separate, single-lined Flotation Compartment (Clay lined). AGA Ghana proposes relatively benign flotation tailings to deposit on the South TSF to create the closure landform (rather than trucking up the equivalent volume from borrow pits).</p> <p>Approval for Paste-fill, rather than Hydracell, for underground stope void filling is being sought through the Obuasi redevelopment EIS, which takes both the full</p>

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<p>5 REHABILITATION:</p> <p>There are a significant number of pits and waste rock dumps, from previous surface mining at Obuasi that should be rehabilitated to safe, stable and sustainable conditions which are approved by the Environmental Protection Agency.</p> <p>There are three decommissioned tailings facilities at Iduapriem that must be rehabilitated in the short term.</p>	<p>Obuasi: There is an on-going rehabilitation plan as per the submitted EMP which is being implemented.</p> <p>Iduapriem: Rehabilitation plan includes the old pits that were backfilled using tailings (Blocks 1, 2 and 3) as well as the interim tailings storage facility.</p>	<p>flotation stream particle range and a higher percentage than the previous method, requiring less tailings storage space on surface.</p> <p>Care and maintenance is underway at the following reclaimed sites: Coral Snake waste rock dump, T2 pit, T3 pit, Nhyiaeso pit, Sansu shaft and Sansu Waste Dump. AGAG continues to engage the EPA towards relinquishment of pits and waste rock dumps that have met part of the completion criteria, but have been encroached on, and are being used by the communities. This has been through the annual completion reports and site visit by representatives from Minerals Commission, EPA and ministry of lands and natural resources. A reclamation plan has been submitted to the EPA for review and approval.</p> <p>Rehabilitation of the Block 1 tailings storage facility was completed in 2012. Rehabilitation of Block 2 and the Interim tailings storage facility was completed in 2014. The western corner of Block 3 pit is being utilised for additional water storage as part of optimising the mine-wide water management. This point is now considered closed.</p>
<p>6 POLLUTION RISKS AND IMPACTS:</p> <p>There is need to ensure that pollution risks at Obuasi mine are mitigated going forward, and that the legacy pollution impacts and sites are remediated.</p>	<p>Effluent water discharge:</p> <p>The commissioning of new water treatment plants, clean-dirty water separation (diversion trenches), cyanide code compliance and building of a new process water dam are all projects being implemented to ensure that effluent water discharge is compliant with Environmental Protection Agency standards.</p>	<p>See water treatment facilities response in point 2 above. Renewal of the International Cyanide Management Institute (ICMI) compliance certificate for Obuasi will be done when the mine resumes operation. Iduapriem has achieved compliance with ICMI requirements at the TSF due to interventions in the slurry thickening process through the operation of the leach at a more suitable pH, and using a coagulant to settle fines (as opposed to settling through additional lime 'dosing'). This point is now considered closed.</p>

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	<p>Ground water seepage (mainly from TSFs):</p> <p>Historically unlined tailings storage facilities have been identified as a potential source of groundwater seepage.</p> <p>At Obuasi the Feasibility Study into the mine's redevelopment addresses these risks.</p>	<p>The final phase of the Diawuoso tailings clean-up was completed in 2015. Rehabilitation of the first phases has also been completed but the clean-up site has been encroached and disturbed by illegal miners since the incursion on site. AGA Ghana is engaging the EPA for a decision to be taken on the way forward regarding accountability for the resultant liability.</p> <p>Planning for the closure of the South, Pompora and Kokoteasua TSFs is part of the reclamation plan.</p> <p>Additional boreholes were drilled around these TSFs and monitoring is ongoing. Seepage and plume model assessments, hydrogeological studies have been completed and information has been used to update the revised EIS submitted to EPA for approval. To prevent seepage to groundwater, the Biox compartment of the Dokyiwa TSF will be double lined and the flotation element will be lined with clay.</p>
	<p>Polluted Land: Obuasi TSF footprints:</p> <p>Geochemical studies will be done to delineate polluted areas. Optimal clean up techniques are being studied.</p>	<p>Geochemical studies on the TSF footprints have been completed and the immediate planned action is to fence off identified areas. Closure options per the studies, including community/stakeholder engagements are to be implemented when redevelopment of Obuasi commences.</p>
	<p>Stream Sediments:</p> <p>Complete the stream sediments de-silting.</p>	<p>Dredging of the Jimi Water Dam has been completed. A total volume of 100,000m³ of silt was dredged from the dam and the EPA notified. The silt was tested and found to be suitable as a vegetative growth medium and has been stockpiled for future revegetation activities. This point is now considered closed.</p>