

UPDATE ON MANAGEMENT OF LEGACY ENVIRONMENTAL ISSUES IN GHANA

DECEMBER 2016

AngloGold Ashanti (AGA) continue 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 strived to develop action plans to mitigate these, but also implemented appropriate environmental standards and operating systems. Correcting such legacy environmental issues takes time, however good progress has been made over the past decade. 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 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 and subsequently re-submitted 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 is still outstanding from the authorities since beginning of October 2015.

Obuasi: The 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 the mine has been undergoing significant restructuring since 2014. The mine suspended underground operations at the end of 2014, and operated on a Limited Operation basis in 2015. (Whilst the mine has been in Care and Maintenance in 2016, you will likely be aware of the invasion of the mine and surrounding concession by an estimated 12,000 illegal miners. This illegal occupation of the site started end of January, following the withdrawal of a state security protecting the mine, and has lasted up to early December at which time the last remaining illegal miners are thought to be vacating the site. During this time AngloGold Ashanti withdrew non-essential personnel from the site for safety reasons. Notwithstanding the illegal occupation of the site, a feasibility study has been conducted to establish the future direction for the redevelopment of the mine. This study will need to be updated once the site has been rendered safe for AngloGold Ashanti staff to return and gauge the damage done by large-scale illegal mining for the greater part of the year). The mine has prepared an EMP covering the Care and Maintenance period which shall be submitted to EPA. In addition, a new EMP aligned to the feasibility study will be submitted as and when operations resume.

In the meantime, and in parallel to the feasibility study, numerous engagements have been held with the EPA on the status of the programme to address the legacy environmental issues. AGA Ghana has focussed on a number of initiatives including:

- **Reduction of the lease area from 474km² to 201km²:** approval received from the Minerals Commission in March 2016
- **Fencing the operational area:** now complete with a 21km fence enclosing the bulk of the open pits and waste dumps, plus all required infrastructure. Housing estates fall outside this area, as does the South TSF and pipeline. Numerous legacy TSFs, open pits and waste dumps are also outside the fenced area. Detailed plans to address these have been prepared in the Feasibility Study
- **Undertaking test work on how best to treat and dispose of the stockpiled Arsenic Trioxide, which predates AngloGold Ashanti's ownership of the mine:** Bench scale tests for the N2 technology to treat and stabilise the Arsenic Trioxide material have been completed but the final report is being reviewed. A proposed scope of works to undertake a scaled bench scale test work is underway
- **Drafting a Reclamation Plan for Obuasi:** conducted a detailed closure planning process as part of the Obuasi Gold Mine Optimised Feasibility Study with the intent to have a feasible reclamation plan over the LOM and minimise the liability that will remain when gold production has ceased. Planned site visits with EPA were scheduled to take place in 2016, but have been rescheduled to 2017
- **Technologies for the treatment of brine:** Pre-feasibility studies on brine completed. Piloting and feasibility studies on the brine treatment technology are at an advanced planning stage, with piloting expected to take place in 2017. Continuous engagement with EPA on the technology is ongoing.
- **Closure of the South TSF:** Seepage and Plume model assessment studies on the TSF conducted. Geochemistry studies on cover materials for creating a water shedding landform on the TSF completed. Presented the closure concept to EPA and follow up discussions continue

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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 from the company's corporate office. The company considers the current staffing levels at both mines adequate and this point is considered closed and will not be addresses in future updates.</p>

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<p>2 WATER MANAGEMENT:</p> <p>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:</p> <p>Develop water balance models, redesign the overall site water management infrastructure and install sufficient water treatment plant capacity at both operations.</p>	<p>During the care and maintenance period in 2016, the water-positive environment at Obuasi continues to be catered for through the use of the South and North water treatment plants which discharge compliant water to the environment. These plants have a combined maximum capacity to treat 890m³/hr. EPA has permitted the South Water Treatment plant. Permit for the North Water Treatment Plant is outstanding</p> <p>The water treatment plant at Iduapriem continues to operate optimally, even during the wet season.</p>
	<p>Underground water at Obuasi:</p> <p>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 during the care and maintenance phase, plans for the diversion works and backfilling of some pits has been temporarily suspended.</p>
	<p>Return Water Dam at Obuasi:</p> <p>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 utilize Ponds 1 and 2 for the future Process Water and Return Water ponds respectively. The construction of these facilities will form part of the broader Implementation Phase following management's decision on the project. This forms part of the Environmental Impact Statement (EIS) process for Tailings and Water Infrastructure Project initiated with the EPA this year.</p>
	<p>Water Balance at Obuasi:</p>	<p>At Obuasi a mine wide water balance model (OPSIM) has been updated and calibrated to</p>

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	<p>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> <hr/> <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>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. OPSIM is working and will continue been monitored. The same OPSIM model was used to develop and manage the Iduapriem water balance. As the water balances at both mines are now fully operational this issue is considered closed.</p> <hr/> <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. Further studies – survey and sediment analysis and dredgeability studies are currently in progress which 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 included in the current Obuasi Mine Feasibility Study currently underway.</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 the landfill facility at a designated and permitted area. The EPA is yet to respond to an application for the extension of the use of the temporary landfill facility as the permanent landfill facility. A new cell adjacent the existing cell is currently under construction and shall be completed before the end of 2016, expected to be operational in 2017. Despite this not being a material risk given the reduction of waste volumes generated as a result of reduction in staff numbers, we continue to pursue the application for a permanent landfill facility. As the mine continues to use a site permitted by the EPA, this matter is considered closed.</p>

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<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 by December 2014. This deadline was extended by the EPA by one year to December 2015.</p>	<p>Iduapriem: A new facility (Greenfields TSF) was built and deposition started in 2011.</p> <hr/> <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 (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>The facility has received all of the progressive subsidiary permits from the EPA and is fully operational. This point is now considered closed.</p> <hr/> <p>During the Limited Operating Phase effective from 2014, legacy tailings were cleaned up and processed, with tailings residue being deposited on the South TSF. This programme was completed at the end of 2015 to enable normal deposition to cease in accordance with the current EPA directive. More specifically, the clean-up of the legacy at the Diawuoso Tailings is complete and partial revegetation completed. Progress report has been submitted to EPA in line with regulatory requirements. Since the incursion of illegal miners on the mine, the Diawuoso cleaned-up area has been encroached and disturbed. Periodic updates of the disturbance at the Diawuoso area has been provided to the Ghana EPA.</p> <p>An Environmental Impact Statement (EIS) process for a Tailings and Water Infrastructure Project has commenced including stakeholder consultations. AGA Ghana is awaiting EPA's comments on the Scoping report submitted in March 2016.</p> <p>The Tailings and Water Infrastructure Project covers the construction of a new double-lined facility immediately to the North of the South TSF which will be utilised for the BIOX[®] stream and the floatation tailings will have a separate Floatation Compartment. AGA Ghana is proposing to utilise relatively benign floatation tailings to deposit on the South TSF to create the closure landform (rather than truck up the equivalent volume from borrow pits).</p>

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		<p>The EIS includes the use of Pastefill rather than Hydrasfill for underground stope void filling which takes both the full floatation stream particle range and a higher percentage than the previous method, requiring less storage space on surface.</p>
<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>Care and maintenance of Coral Snake waste rock dump ongoing. Revegetation of Diawuoso Tailings is partially completed but was halted due to the incursion of illegal miners on site.</p> <p>T2 pit, Adubirem pit and Sansu Waste Dump have been remediated. All are in care and maintenance stage.</p> <p>AGA continues to engage the EPA towards relinquishment of pits and waste rock dumps that has met part of the completion criteria but have been encroached on, and are being used by, the communities.</p> <p>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.</p> <p>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</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</p>	<p>See water treatment facilities response above.</p> <p>International Cyanide Management Institute (ICMI) compliance certificate for Obuasi remains valid.</p> <p>Iduapriem has achieved compliance with ICMI requirements at the TSF due to interventions in the</p>

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pollution impacts and sites are remediated.	implemented to ensure that effluent water discharge is compliant with Environmental Protection Agency standards.	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>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 addresses these risks.</p>	<p>The final phase of the Diawuoso tailings re-mining was completed. 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.</p> <p>Planning for the closure of the South, Pompora and Kokoteasua TSFs is part of the Feasibility Study currently underway.</p> <p>The Environmental Impact Statement (EIS) process and design of the new Dokyiwa TSF lined facility has commenced and the Scoping report has been submitted to the EPA. Additional boreholes were drilled around these TSFs and monitoring is ongoing. Seepage and plume model assessments studies have been completed and shall be form part of the EIS review.</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. Agreed closure options 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.</p>

