

23 November 2015

# **DEMONSTRATION PLANT PHASE 2 SUCCESS**

Bannerman Resources Limited (ASX:BMN; TSX:BAN; NSX:BMN) is pleased to report further positive results from Phase 2 of the Etango Heap Leach Demonstration Plant Program. The results continue to strongly support the assumptions and projections incorporated in the Etango Definitive Feasibility Study ("DFS") and DFS Optimisation Study.

## **PHASE 2 HIGHLIGHTS**

- Fast and high leach extraction on a 60 tonne sample within 20 days average total leach extraction of 93% for the two cribs and 91% for the columns (compared to the DFS projection for a scaled up heap of 87%).
- Low sulphuric acid consumption on average 15 kg/tonne (compared with the DFS projection of 18 kg/tonne).
- Material properties visual observations during the unloading of the cribs again confirmed uniform percolation through the material and integrity of the agglomerate.
- Once again, no noticeable reduction in leach extraction performance was observed between the larger scale cribs and the smaller columns – which increasingly indicates that DFS scale-up factors could be conservative.
- Capability building growing metallurgical database that now reflects large scale testing
  of 180 tonnes of material since commencement of the heap leach demonstration plant
  program in April 2015.

Bannerman's Chief Executive Officer, Len Jubber, said:

"The Etango heap leach demonstration plant program continues to strongly support the DFS (2012) and DFS Optimisation Study (2015) assumptions. The team in Namibia has now done large scale testing on 180 tonnes of ore which substantially de-risks the planned utilisation of heap leaching at the Etango deposit.

We are excited by the results which point to additional potential to unlock further value in the Etango Project."

Len Jubber

Chief Executive Officer
23 November 2015

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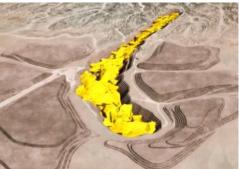
**About Bannerman** - Bannerman Resources Limited is an ASX, TSX and NSX listed exploration and development company with uranium interests in Namibia, a southern African country which is a premier uranium mining jurisdiction. Bannerman's principal asset is its 80%-owned Etango Project situated near Rio Tinto's Rössing uranium mine, Paladin's Langer Heinrich uranium mine and CGNPC's Husab uranium mine currently under construction. A definitive feasibility study (dfs) and dfs optimisation study has confirmed the technical, environmental and financial (at consensus long term uranium prices) viability of a large open pit and heap leach operation at one of the world's largest undeveloped uranium deposits. In 2015, Bannerman completed the dfs optimisation study and is conducting a large scale heap leach demonstration program to provide further assurance to financing parties, generate process information for the detailed engineering design phase and build and enhance internal capability. More information is available on Bannerman's website at www.bannermanresources.com.



# Etango Uranium Project Heap Leach Demonstration Program Phase 2 - November 2015









#### **KEY OBSERVATIONS, RESULTS & PRELIMINARY CONCLUSIONS – Phase 2**

## 1. Demonstrating the design and projected performance reflected in the Definitive Feasibility Study ("DFS")

- Fast and high average leach extraction of 93% for the two cribs (compared to the DFS projection for a scaled up heap of 86.9%) and 91% for the four columns within 20 days. Average sulphuric acid consumption was 15kg/tonne (compared to the DFS projection of 17.6kg/tonne).
- Visual observations during the unloading of the cribs again confirmed uniform percolation through the material and integrity of the agglomerate.
- Testing continues to confirm the simple chemistry and efficient leaching nature of the granite host rock and uranium mineralisation.

## 2. Further enhancing project knowledge

- Improved the safe handling of the sulphuric acid by way of further reducing manual handling.
- Platform scales installed under all of the pregnant liquor solution tanks to further enhance the metallurgical accounting and hence process control ability.
- The metallurgical database continues to grow dramatically with the further testing of 60 tonnes of ore in the two cribs and 0.8 tonnes of material in the 4 column tests. The total sample tested in Phase 1 and Phase 2 now amounts to approximately 182 tonnes.

## 3. Pursuing value engineering

- Rapid and uniform percolation, coupled with rapid and high leach extraction at a larger scale point towards the potential to further optimise the heap leach configuration.
- Surprisingly no noticeable reduction in leach extraction performance was observed between the larger scale cribs and the smaller columns. This poses the question as to the appropriate scale up factors to be used in the detailed engineering of the heap leach operation. Further work is required to address this matter.

# **SUMMARY OF METALLURGICAL PERFORMANCE – Phase 2**

	Phase 2						
Parameter	CRIB 5	Column 5A	Column 5B	CRIB 6	Column 6A	Column 6B	
Sample Mass (dry tonnes)	30.3	0.184	0.184	30.3	0.179	0.176	
Head Grade (ppm)	179.7	165.8	173.1	177.7	174.0	163.4	
Tails Grade (ppm)	12.4	14.2	16.3	13.9	13.5	14.9	
Uranium Extracted (%)	93.1	91.4	90.6	92.2	92.3	90.9	
Acid Consumption (kg/t)	15.3	16.4	15.3	14.6	15.9	15.1	

#### **INTRODUCTION**

The Etango Project is one of the world's largest undeveloped uranium deposits, located in the Erongo uranium mining region of Namibia which hosts the Rössing and Langer Heinrich mines and the Husab Project which is currently under construction by the Chinese stated owned enterprise, China General Nuclear Power Company (CGNPC). Etango is 73km by road from Walvis Bay, one of southern Africa's busiest deep water ports through which uranium has been exported for over 35 years. Road, rail, electricity and water networks are all located nearby.

#### HISTORY OF FEASIBILITY STUDY

Bannerman completed a Definitive Feasibility Study ("DFS") and Environmental and Social Impact Assessment ("ESIA") on the Etango Project in 2012. The respective studies, as announced to the market on 10 April 2012, confirmed the technical, economic and environmental viability of the project at historical term uranium prices. In 2012 Bannerman also received environmental approval for the Etango Project.

Bannerman announced on 8 April 2014 the progression to a heap leach demonstration plant program as an integral step in progress towards the project's detailed engineering and financing phases. The program is specifically aimed at:

- Demonstrating the design and projected performance reflected in the DFS,
- Further enhancing project knowledge, and
- Pursuing value engineering.

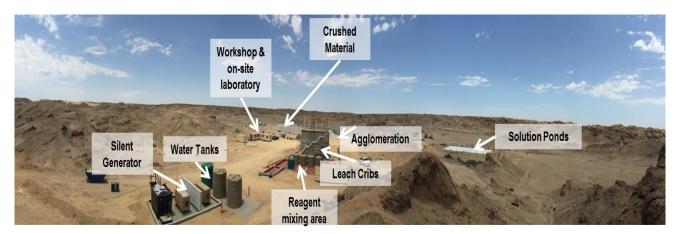
On 22 September 2014 Bannerman announced award of the major contracts to construct and operate the Etango Heap Leach Demonstration Plant. Activities at the site commenced in early October, with completion of the construction and official opening on 24 March 2015. On 15 July 2015 Bannerman announced the successful commissioning of the demonstration plant and the favourable results from Phase 1 of the program.

#### **DEMONSTRATION PLANT PROGRAM**

Phase	Objective(s)	Activities	Schedule
1 Commissioning	<ul> <li>Commissioning of Plant.</li> <li>Validate leaching assumptions in DFS.</li> </ul>	<ul> <li>Open cycle operation of all cribs and columns.</li> <li>Identify issues and correct plant and operating procedures as required.</li> </ul>	Completed in June 2015 Quarter
2 Reproducibility	<ul> <li>Demonstrate consistent operation of plant.</li> <li>Validate leaching assumptions in DFS.</li> </ul>	<ul> <li>Operate 2 cribs and 4 columns.</li> <li>Utilize same blended sample in both cribs.</li> </ul>	Completed in September 2015 Quarter
3 Solution Recycle	<ul> <li>Simulate the heap leach pad cycle to generate Pregnant Leach Solution (PLS).</li> <li>Assess the possible impacts of the build-up of deleterious elements emanating from the recycling of solution.</li> </ul>	<ul> <li>Operate three cribs in closed cycle.</li> <li>Analyse the possible build-up of deleterious elements.</li> <li>Generate and store sufficient PLS to enable the validation of SX assumptions in Phase 4.</li> </ul>	<b>Underway</b> in December 2015 Quarter
4 Solvent Extraction & Value Engineering	<ul> <li>Demonstrate the solvent extraction process and assumptions in the DFS.</li> <li>Conduct optimisation studies.</li> </ul>	<ul> <li>Operate SX plant in laboratory in Swakopmund.</li> <li>Primarily utilize 8 columns to evaluate various opportunities to improve the project economics.</li> </ul>	March 2016 Quarter
5 Value Engineering	Conduct optimisation studies	Primarily utilize 8 columns to evaluate various opportunities to improve the project economics.	June 2016 Quarter

#### **PLANT OVERVIEW**

The photograph below shows the plant site from the north east. The plant is self-sufficient with respect to electricity and operates on a continuous cycle. The cribs are able to be operated in open (i.e. individually) or closed cycle (i.e. in series) circuit. The latter allows simulation of the full scale operation of heap leach pads, as defined in the DFS.



Acid leaching of agglomerated ore stacked to 5m occurs in four 2m x 2m x 6m leach cribs. In addition to the cribs, eight 5m high columns (as shown below) with an internal diameter of 0.185m enable parallel leaching. This arrangement enables direct comparison of the leaching performance of the respective 200kg and 30 tonne samples, and hence an assessment of the scale—up factors as well as the opportunity to conduct optimisation studies on smaller volumes.

The gates on the front of the cribs (as shown below) allow for the progressive stacking from the bottom up, instead of dropping the material in at the top. Thereby simulating the practice envisaged in the full scale operation.





The original 3,000 tonne bulk sample (shown on the right below) was sourced from the northern end of the Etango ore body (as shown on the left below).



#### **SUMMARY OF PHASE 2 OPERATIONS**

Phase 2 entailed the open circuit heap leach operation of two cribs and four columns. The stacking procedure was similar to that in Phase 1. After stacking, the cribs and columns were left to cure for 1 day, before initiating the leach irrigation phase. This period was one third of that in Phase 1 as it was decided that due to the rapid percolation the extra curing period was not required.

Leach solution was introduced at the top of each crib via dripper lines. The photograph on the right below shows improved design in the dripper feed system to improve the irrigation consistency across the cribs.



Leach irrigation was conducted for 20 days followed by a post leach drain of 2 days and then a rinse and post rinse drain phase of 3 days and 5 days respectively. A weak sulphuric acid solution (2g/l) was used as rinse solution.

# Sampling and Unloading of Ripios from Cribs and Columns

At the completion of the post rinse drain phase, both cribs and their respective columns were as per Phase 1 again carefully unloaded to enable taking samples for assaying of uranium and moisture. The location of these samples was accurately recorded to enable developing three dimensional profiles of the leach performance. The information was also used to determine the final extraction in each crib.



Integrity of the agglomerates (as shown on the right above) was again clearly evident during the unloading process and no percolation issues were observed.

#### Data collection and sampling

Monitoring of the solution inventory was conducted on a daily basis following the installation of larger solution tanks and therefore holding capacity. The reduction in assaying frequency coupled with the introduction of platform scales under the tanks improved the operational control of the plant and reduced the potential for human error in the assaying process. Analytical services were provided by the Bureau Veritas laboratory in Swakopmund.

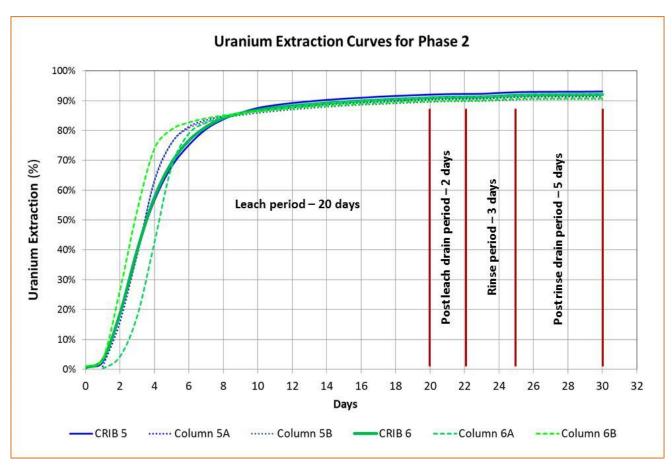
Head grade samples were taken during ore blending and quartering activities as well as during agglomeration phase as ore was fed into the agglomeration drum. Agglomerate samples were taken during the agglomeration phase and ripios (tails) samples during unloading of the cribs.

The assaying of solution and ore samples was also done by the Bureau Veritas laboratory in Swakopmund.

#### PHASE 2 METALLURGICAL PERFORMANCE

#### **Leach Extraction**

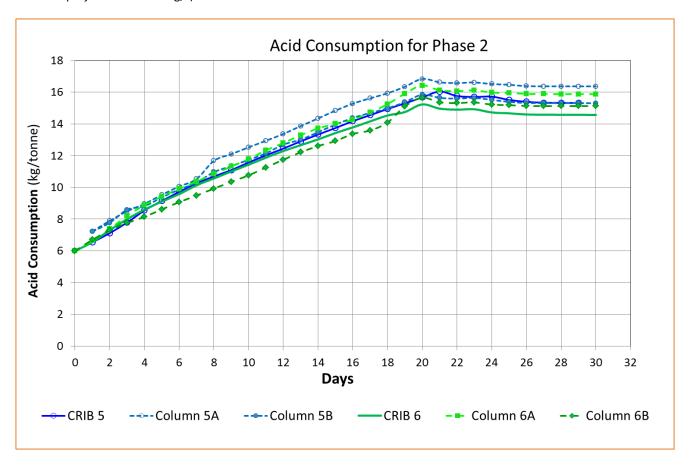
On average, approximately 85% uranium extraction was achieved by day 10 and over 90% by day 15 (refer graph below). Leach irrigation was stopped at day 20 and the overall uranium extraction achieved after the drain, rinse and post rinse drain phase was approximately 93% (compared with DFS projections for a scaled up heap of 86.9%). The extraction curves for Crib 5 and 6 are similar in profile to that recoded during Phase 1 and that recorded in previous column testing. The latter formed the basis of the DFS design of leach irrigation period of 32 days. This provides further support to the preliminary observation that the initial scale-up interpretations were conservative, and that the leach time may be shorter than predicted.



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## **Acid Consumption**

The rate of acid consumption was similar with previous testing and averaged 15 kg/tonne for the four cribs (compared with DFS projections of 17.6kg/t).



# **HEALTH, SAFETY & ENVIRONMENT**

The photographs below show the attention to detail with regards to sample storage, general housekeeping and site security at the demonstration plant site.



#### **TECHNICAL DISCLOSURES**

Certain disclosures in this report, including management's assessment of Bannerman's plans and projects, constitute forward looking statements that are subject to numerous risks, uncertainties and other factors relating to Bannerman's operation as a mineral development company that may cause future results to differ materially from those expressed or implied in such forward-looking statements. Full descriptions of these risks can be found in Bannerman's various statutory reports, including its Annual Information Form available on the SEDAR website, sedar.com. Readers are cautioned not to place undue reliance on forward-looking statements. Bannerman expressly disclaims any intention or obligation to update or revise any forward-looking statements whether as a result of new information, future events or otherwise.

Mineral Resources that are not Ore Reserves do not have demonstrated economic viability.

Bannerman Resources Limited ("Bannerman") manages its drilling and assaying activities in accordance with industry standard quality assurance/quality control (QA/QC) procedures. Samples are collected by Bannerman personnel and prepared in accordance with specified procedures at the relevant assay laboratories. Drill samples were analysed for uranium by the Bureau Veritas Laboratory in Swakopmund, Namibia. Bureau Veritas is an International Laboratory Group with operations in 140 countries, including Ultratrace and Amdel in Australia. Assay QA/QC involves the use of assay standards (sourced from African Mineral Standards (AMIS) in Johannesburg, made from Bannerman pulp rejects and cross-checked through umpire laboratories for which the round robin reports are available), field duplicates, blanks and barren quartz flushes. A third party "umpire" laboratory (Genalysis in Perth) is used to cross-check and validate approximately 5% of the assay results in accordance with standard procedures. Sample coarse rejects are retained and approximately 5% of samples are re-submitted for further assay verification. All sample pulps, half-core and rock-chip samples are retained at Bannerman's Goanikontes Warehouse Facility (GWS) on site.

The information in this report relating to the Ore Reserves of the Etango Project is based on information compiled or reviewed by Mr Leon Fouché. Mr Fouché is a Fellow of The Australasian Institute of Mining and Metallurgy. Mr Fouché is employed by Bannerman Resources. Mr Fouché has sufficient experience relevant to the style of mineralisation and types of deposits under consideration and to the activity which is being undertaken to qualify as a Competent Person as defined in the 2012 Edition of the "Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves", and a Qualified Person as defined by Canadian National Instrument 43-101.

The information in this report that relates to Mineral Resources or Ore Reserves was prepared and first disclosed under the 2004 JORC Code. It has not been updated since to comply with the 2012 JORC Code on the basis that the information has not materially changed since it was last reported. All material assumptions and technical parameters underpinning the estimates of mineral resources continue to apply and have not materially changed.

All material assumptions detailed in this report and underpinning the production target and forecast financial information in the DFS (as previously announced on 10 April 2012 and reported on 30 January 2014 in compliance with Listing Rule 5.16 and 5.17) continue to apply and have not materially changed.