

## **FURTHER SUCCESS AT DEMONSTRATION PLANT: PHASE 3 RESULTS**

Bannerman Resources Limited (ASX:BMN; TSX:BAN; NSX:BMN) is pleased to report further positive results from Phase 3 of the Etango Heap Leach Demonstration Plant Program. The Phase 3 results are similar to or better than the assumptions used in the Etango Definitive Feasibility Study (**DFS**) and have delivered the clear potential to further reduce operating cost estimates. Phase 3 involved trial leaching of Etango ore in three cribs (2m x 2m x 5m high) and six columns (185mm x 5m high) in a configuration designed to mirror the set-up of a full-scale heap operation.

### **PHASE 3 HIGHLIGHTS**

✓ **Fast leach extraction with high recoveries**

Total leach extraction of ~93% from a 90 tonne sample over 22 days for the three cribs and six columns (compared to the DFS projection for a scaled up heap of 87%).

✓ **Low sulphuric acid consumption**

On average 13.6 kg/tonne for the three cribs and 14.2 kg/tonne for the six columns (compared with the DFS projection of 17.6 kg/tonne).

✓ **Excellent material properties**

Clear and clean leach solution with uniform percolation through the material and integrity of the agglomerate.

✓ **High purity product**

No evidence of build-up of deleterious elements occurring during the recycling of leach solution.

✓ **Capability building**

Growing metallurgical database now reflects large scale testing of 273 tonnes of material since commencement of the heap leach demonstration plant program in April 2015.

Bannerman's Chief Executive Officer, Brandon Munro, said, *"We continue to be greatly encouraged by the results from the heap leach demonstration plant. This latest success further de-risks the Etango process route and adds to the significant body of high quality technical work that underpins the large in-ground resource at Etango. We continue to optimise the DFS with a focus on reducing operating and capital costs. The Phase 3 results give us plenty of scope for revisiting key assumptions such as acid consumption."*

### **PHASE 3 RESULTS**

Phase 3 of the Demonstration Plant work program entailed the closed circuit heap leach operation of three cribs (cribs 7, 8 & 9). Leach irrigation was conducted for a total of 22 days in two separate stages in order to simulate the conditions of a commercial heap leach operation. The leach solution collected was designated as the pregnant leach solution and was stored separately to be utilised for the solvent extraction (SX) work, which is part of the pending Phase 4 program.

Integrity of the agglomerates was again clearly evident during the unloading process and no percolation issues were observed. This together with rapid drainage occurring during the curing period suggests that the ore has high hydraulic conductivity (permeability) and low moisture retention.

Leach irrigation was stopped at day 22 and the overall uranium extraction achieved after the drain, rinse and post rinse drain phase was approximately 92.8% (compared with DFS projections for a scaled up heap of 86.9%). See Figure 1.

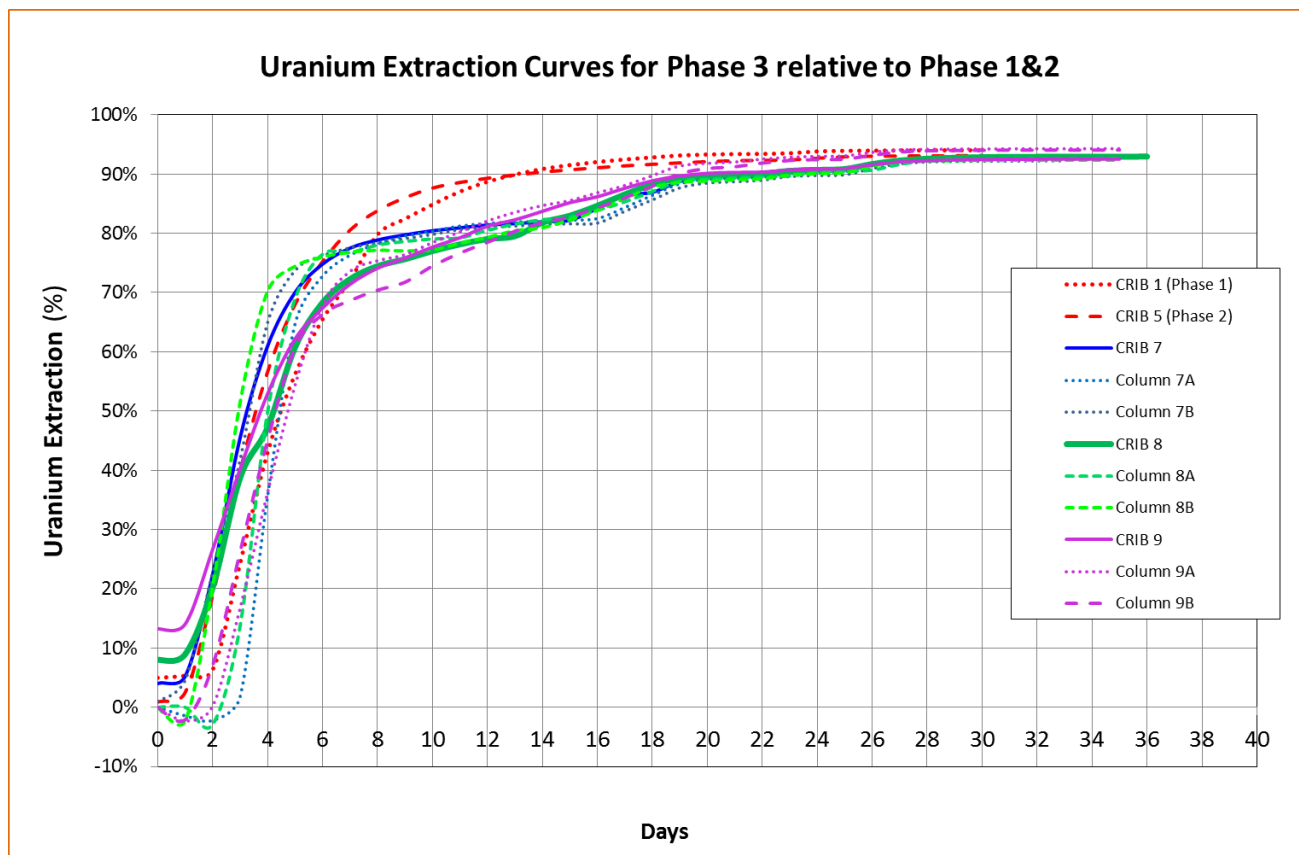


Figure 1 - Uranium extraction curves for Phase 3

The rate of acid consumption was in-line with previous testing and averaged 13.6 kg/tonne for the four cribs (compared with DFS projections of 17.6kg/t).

These results are in-line with or better than those obtained in laboratory scale test work performed at similar conditions during the DFS. There was also no evidence of 'channelling' and the agglomerated material retained integrity during the leaching process.

These crib results are considered to be highly significant as the conditions are more representative of the agglomeration, stacking, irrigation and drainage methodology expected during a commercial heap leach operation and as such would provide a more accurate picture of the expected results for the full scale plant.

A report detailing the Phase 3 results is attached to this announcement.

Phase 4 is the next step in the Demonstration Plant work program. This will utilise the Phase 3 pregnant leach solution to confirm the DFS assumptions relating to the solvent extraction circuit. This is planned to be followed by a further program in which a variety of scenarios will be tested to identify opportunities for further cost reductions (Phase 5).



**Figure 2 - Etango Heap Leach Demonstration Plant**

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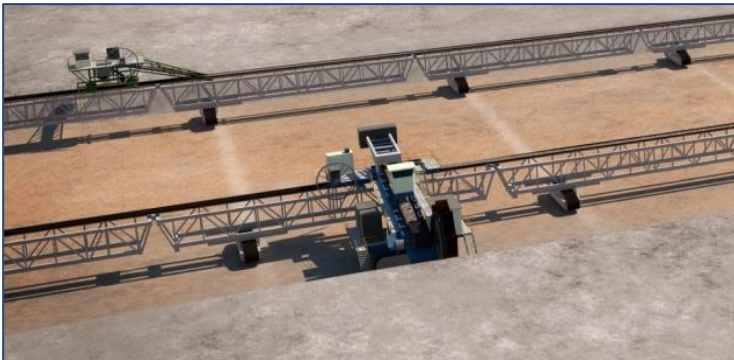
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**About Bannerman** - Bannerman Resources Limited is an ASX, TSX and NSX listed exploration and development company with uranium interests in Namibia, a southern African country which is a premier uranium mining jurisdiction. Bannerman's principal asset is its 100%-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 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. Since 2015, Bannerman has conducted 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](http://www.bannermanresources.com).

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Etango Uranium Project  
Heap Leach Demonstration Program Phase 3  
April 2016



## KEY OBSERVATIONS, RESULTS & PRELIMINARY CONCLUSIONS – Phase 3

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

- Fast and high average leach extraction of 92.8% for the three cribs operated in closed circuit (compared to the DFS projection for a scaled up heap of 86.9%). The associated six columns recorded an average uranium extraction of 93.0% also operating in closed circuit.
- Average sulphuric acid consumption was 13.6 kg/tonne (compared to the DFS projection of 17.6kg/tonne) for the cribs whilst the columns recorded an acid consumption of 14.2 kg/tonne.
- The leach solution collected was clear and clean and subsequent visual observations during the unloading of the cribs again confirmed uniform percolation through the material and integrity of the agglomerate.
- The clarity of the solution raises the question as to whether there is any real requirement for the two pinbed clarifiers currently included in the DFS processing flowsheet.
- Analysis indicates no evidence of build-up of deleterious elements occurring during the recycling of leach solution.

### 2. Further enhancing project knowledge

- Continue to develop the understanding of the leach kinetics associated the Etango ore, in particular the management of oxidant demand during the leaching process.
- The metallurgical database continues to grow rapidly with the further testing of 90 tonnes of ore in the three cribs and 1.1 tonnes of material in the 6 column tests. The total sample tested in Phase 1 through to Phase 3 now amounts to approximately 273 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 improve project economics, in part through lower acid consumption.
- No noticeable reduction in leach extraction performance was observed between the larger scale cribs and the smaller columns whilst operating in closed circuit. This poses the question as to the appropriate scale up factors to be used in the detailed engineering of the heap leach operation, and thus whether the current DFS assumptions in this regard are too conservative.

## SUMMARY OF PHASE 3 METALLURGICAL PERFORMANCE

Parameter	Phase 3								
	CRIB 7	Column 7A	Column 7B	CRIB 8	Column 8A	Column 8B	CRIB 9	Column 9A	Column 9B
Sample Mass (dry tonnes)	30.7	0.189	0.186	30.9	0.184	0.188	31.4	0.185	0.186
Head Grade (ppm)	187.5	187.6	176.4	189.7	185.9	173.1	186.9	242.5	209.7
Tails Grade (ppm)	13.2	13.8	13.7	13.3	13.8	13.3	13.9	13.9	12.5
Uranium Extracted (%)	93.0	92.6	92.2	93.0	92.6	92.3	92.5	94.3	94.1
Acid Consumption (kg/t)	13.5	15.4	13.1	13.2	13.9	13.2	14.0	14.7	14.6



## 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 state 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 approximately 40 years. Road, rail, electricity and water networks are all located nearby.

## HISTORY OF FEASIBILITY STUDY

### DFS

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 which was valid for three years, this was renewed in 2015.

### Heap Leach Demonstration Plant

Bannerman announced on 8 April 2014 the progression to a heap leach demonstration plant program as an integral step 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 and DFS OS,
- Further enhancing project knowledge, and
- Pursuing value engineering.

On 15 July 2015 Bannerman announced the successful commissioning of the demonstration plant and the favourable results from Phase 1 of the program. Subsequently, favourable results from the Phase 2 program were reported to the market on 23 November 2015. Bannerman continued with Phase 3 of the program and completed the field activities in December 2015, which was followed by analysis of the results in the first quarter of 2016.

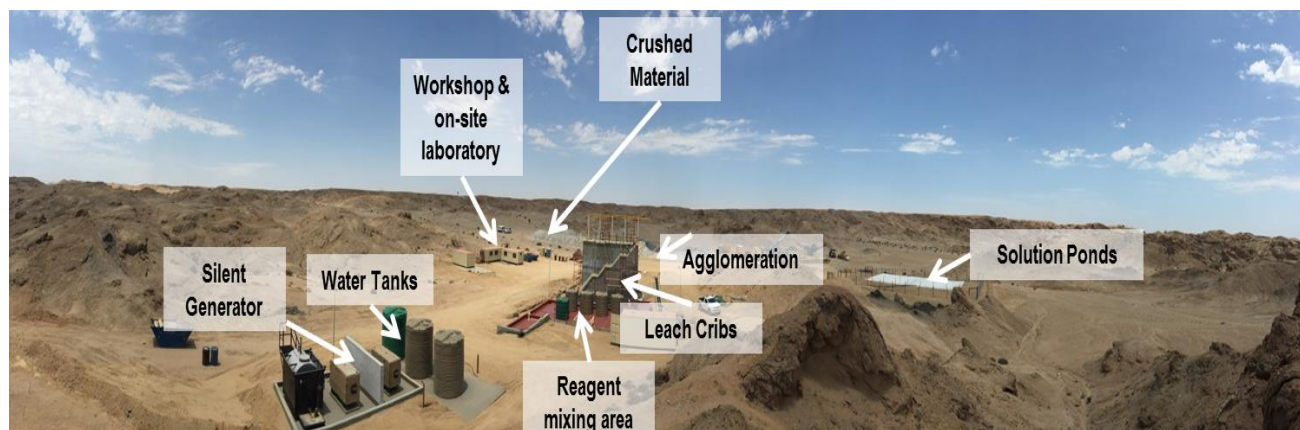
### Demonstration Plant Program

Phase	Objective(s)	Activities	Schedule
<b>1 Commissioning</b>	<ul style="list-style-type: none"><li>• Commissioning of Plant.</li><li>• Validate leaching assumptions in DFS.</li></ul>	<ul style="list-style-type: none"><li>• Open cycle operation of cribs 1,2,3,4 and columns 1a&amp;b, 2a&amp;b, 3a&amp;b, 4a&amp;b.</li><li>• Identify issues and correct plant and operating procedures as required.</li></ul>	<b>Completed</b> in June 2015 Quarter
<b>2 Reproducibility</b>	<ul style="list-style-type: none"><li>• Demonstrate consistent operation of plant.</li></ul>	<ul style="list-style-type: none"><li>• Open cycle operation of cribs 5,6 and columns 5a&amp;b, 6a&amp;b..</li><li>• Utilize same blended sample in both cribs.</li></ul>	<b>Completed</b> in September 2015 Quarter
<b>3 Solution Recycle</b>	<ul style="list-style-type: none"><li>• Validate leaching assumptions in DFS.</li><li>• Simulate the heap leach pad cycle to generate an enriched Pregnant Leach Solution (PLS).</li><li>• Assess the possible impacts of the build-up of deleterious elements due to the recycling of intermediate solution.</li></ul>	<ul style="list-style-type: none"><li>• Closed cycle operation of cribs 7,8,9 and columns 7a&amp;b, 8a&amp;b,9a&amp;b.</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>Completed</b> in March 2016 Quarter

Phase	Objective(s)	Activities	Schedule
4 Solvent Extraction	<ul style="list-style-type: none"> <li>Demonstrate the solvent extraction process and assumptions in the DFS.</li> </ul>	<ul style="list-style-type: none"> <li>Operate SX circuit at demonstration plant.</li> </ul>	Commenced in March 2016 Quarter
5 Value Engineering	<ul style="list-style-type: none"> <li>Conduct optimisation studies in               <ul style="list-style-type: none"> <li>Conventional crushed ore</li> <li>Binder</li> <li>Coarser crushed ore</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Primarily utilise 8 columns to evaluate the opportunities to improve the project economics.</li> </ul>	Target June 2016 Quarter

## PLANT OVERVIEW

The photograph below shows the plant site viewed 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 an open (i.e. individually) or closed (i.e. in series) circuit. The latter allows simulation of the full scale operation of heap leach pads, as defined in the DFS.

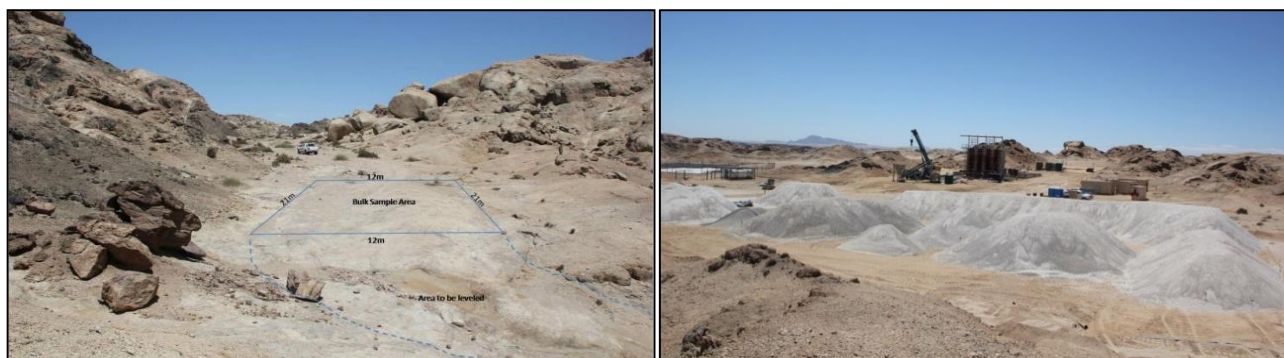


Acid leaching of agglomerated ore stacked to 5m occurs in four 2m x 2m x 6m leach cribs. In addition to the cribs, eight 5m high columns (as shown below) with an internal diameter of 0.185m enable parallel leaching. This arrangement enables direct comparison of the leaching performance of the respective 200kg and 30 tonne samples, and hence allows 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.

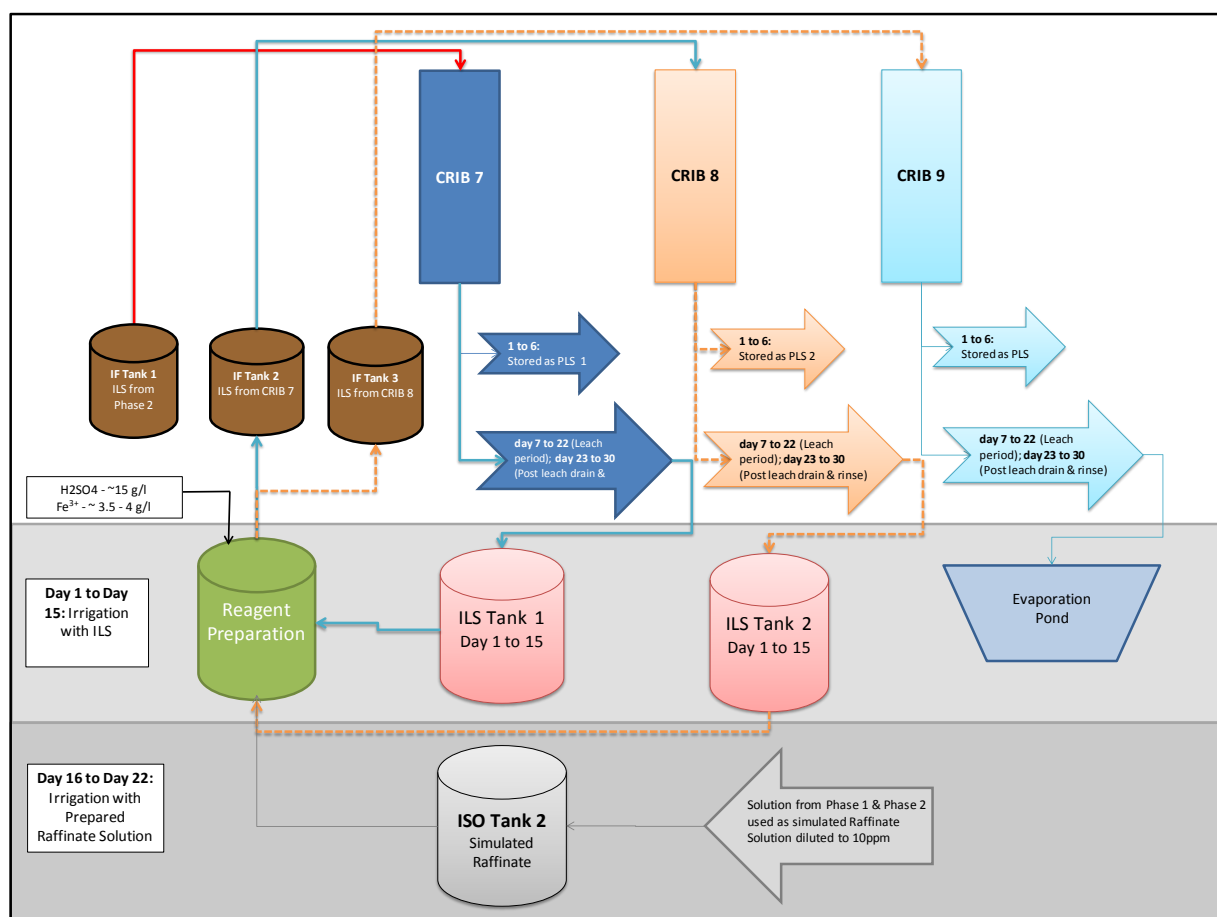


The original 3,000 tonne bulk sample (shown on the right below) was sourced from the northern end of the Etango ore body (as shown on the left below).



### SUMMARY OF PHASE 3 OPERATIONS

Phase 3 of the Demonstration Plant work program entailed the closed circuit heap leach operation of three cribs. The configuration was designed to mirror the configuration of the full scale heap operations. Two columns were operated in parallel with each crib also configured in a closed circuit. The configuration of the Phase 3 layout is depicted schematically below.





The agglomeration and stacking procedure was similar to that in the preceding phases of the work program. After stacking, the cribs and columns were left to cure for 2 days, before initiating the leach irrigation phase. The curing time was one day shorter than during Phase 1 and one day longer than during Phase 2. The curing time was selected based on the performance of the cribs during previous test work and taking into consideration the likely practical operational constraints that would be encountered during commercial operation.

Leach solution was introduced at the top of each crib via dripper lines. Leach irrigation was conducted for a total of 22 days in two separate stages in order to simulate the conditions of a commercial heap leach operation:

- Stage one extended from day 1 to day 15 where the freshly stacked ore was irrigated with intermediate leach solution (ILS);
- Stage two extended from day 16 to day 22 when irrigation was conducted with a simulated raffinate<sup>1</sup> solution.

The ILS utilised for Crib 7 was collected during the Phase 2 work program conducted in 2015, whilst ILS for Crib 8 and Crib 9 was collected from Crib 7 and Crib 8 respectively. In both cases the solution was collected from day 7 onwards.

The raffinate solution was made up by diluting the stored solution from Phase 2 test work to obtain a uranium tenor consistent with that of the DFS design.

The leach solution collected from Crib 7, Crib 8 and Crib 9, during the first six days of operation of each crib, was designated as the pregnant leach solution (PLS). The PLS was stored separately and will be utilised for the solvent extraction (SX) work that is part of the Phase 4 program.

The leach phase was followed by a post leach drain of 2 days and then a rinse and post rinse drain phases of 6 days and 5 days, respectively. A weak sulphuric acid solution (2g/l) was used as rinse solution.

### Redox Potential of Irrigate Solution

In the DFS planning, the operation of the full scale heap ferric to ferrous ratio will be controlled by addition of Hydrogen Peroxide (an oxidant which converts ferrous back to ferric). In order to reduce the health and safety risks during the Phase 3 program it was decided to simulate the latter reaction by continuing to add additional ferric, thereby eliminating the need to add Hydrogen Peroxide. It was found that it was more difficult to manage the ferric/ferrous ratio due to the recirculation of the ferrous in solution. However, despite the difficulties experienced in managing the ferric/ferrous ratio the final leach extraction were in line with previous results, demonstrating the overall robustness of the process.

### Sampling and Unloading of Ripios from Cribs and Columns

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

Integrity of the agglomerates was again clearly evident during the unloading process and no percolation issues were observed. This together with rapid drainage occurring during the curing period suggests that the ore has high hydraulic conductivity (permeability) and low moisture retention.

### Data collection and sampling

Monitoring of the solution inventory was conducted on a daily basis. Analytical services were again provided by the Bureau Veritas laboratory in Swakopmund.

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<sup>1</sup> The return solution from solvent extraction from which the U<sub>3</sub>O<sub>8</sub> has been removed.

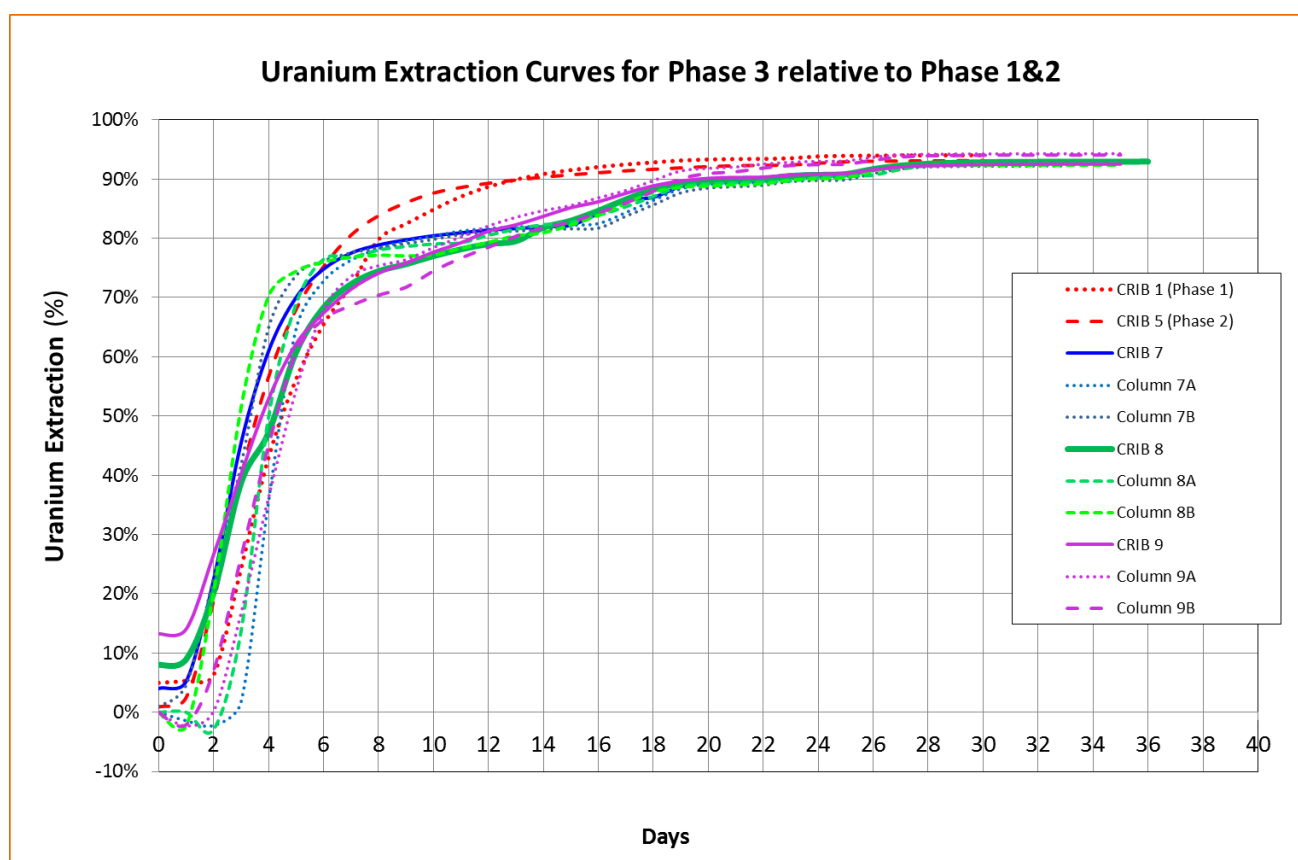
Head grade samples were taken during ore blending and quartering activities as well as during the agglomeration phase as the ore was fed into the agglomeration drum. Agglomerate samples were taken during the agglomeration phase and ripios (tails) samples during unloading of the cribs.

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

### PHASE 3 METALLURGICAL PERFORMANCE

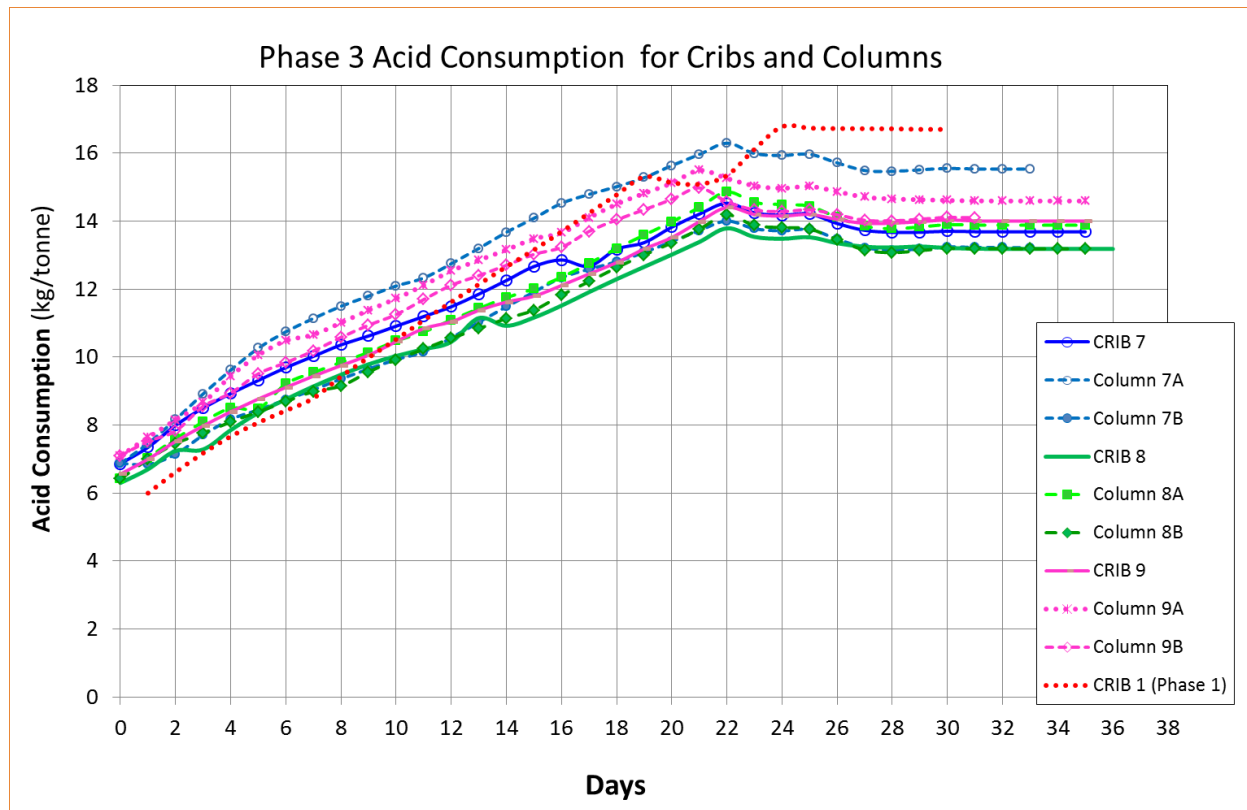
#### Leach Extraction

On average, approximately 85% uranium extraction was achieved by day 16 and over 90% by day 20 (refer graph below). Leach irrigation was stopped at day 22 and the overall uranium extraction achieved after the drain, rinse and post rinse drain phase was approximately 92.8% (compared with DFS projections for a scaled up heap of 86.9%). The extraction curves for Crib 7, 8 & 9 are similar in final profile but differ from those recorded during Phase 1 and Phase 2 between day 7 and day 18. This is due to the adverse ferric/ferrous ratios during this time as discussed previously. However as can be seen below the terminal extractions are in line with those recorded during Phase 1 and Phase 2.



#### Acid Consumption

The rate of acid consumption was similar with previous testing and averaged 13.6 kg/tonne for the four cribs (compared with DFS projections of 17.6kg/t).



## PRELIMINARY CONCLUSIONS

- Generally the demonstration plant results are similar or better than those obtained in laboratory scale test work performed at similar conditions during the DFS.
- The agglomeration process performed with the agglomerating drum unit using DFS parameters has been validated.
- Despite slight segregation of particles there was no evidence of channelling and the agglomerated material retained its integrity.
- During the curing period, a significant amount of solution drained from the cribs, indicating that the agglomerated ore reached its saturation moisture content.
- All cribs achieved uranium extractions in excess of 90% and with an average of 92.8% for all three. This recovery result might be slightly optimistic if 5.3 mm F80 leach feed is targeted rather than the 4.0 mm P80 leach feed tested to date. However this also suggests that all factors apart from the leach recovery are conservative for heap leaching.
- The final acid consumption (after drain, rinse and drain) for all three cribs was less than 14kg/t and on average achieved 13.6kg/t.
- The acid consumption during leaching is linear with respect to the time which indicates that the longer the time required to achieve a specific extraction target, the higher the acid consumption will be.
- Cribs results are considered to be more representative, since the conditions are more representative to the agglomeration, stacking, irrigation and drainage methodology expected during a commercial heap leach operation and as such would provide a more accurate picture of the expected results for the full scale plant.

## 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.





## Appendix – Summary of Phase 1, 2 & 3 Results

### SUMMARY OF METALLURGICAL PERFORMANCE – Phase 1

Parameter <i>Units</i>	Phase 1											
	CRIB 1	Column 1A	Column 1B	CRIB 2	Column 2A	Column 2B	CRIB 3	Column 3A	Column 3B	CRIB 4	Column 4A	Column 4B
Sample Mass (dry tonnes)	29.5	0.2	0.2	30.1	0.2	0.2	30.7	0.2	0.2	30.2	0.2	0.2
Head Grade (ppm)	207	207	207	195	195	195	193	193	193	195	195	195
Tails Grade (ppm)	11.8	13.4	14.2	10.7	12.7	12.2	12.9	13.4	12.9	11.6	14.4	14.7
Uranium Extracted (%)	94.3	93.5	93.2	94.5	93.5	93.8	93.3	93.0	93.3	94.1	92.6	92.4
Acid Consumption (kg/t)	16.6	18.9	18.8	14.7	16.2	16.2	16.6	16.3	17.3	15.6	16.4	17.5

### SUMMARY OF METALLURGICAL PERFORMANCE – Phase 2

Parameter	Phase 2					
	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

### SUMMARY OF METALLURGICAL PERFORMANCE – Phase 3

Parameter	Phase 3								
	CRIB 7	Column 7A	Column 7B	CRIB 8	Column 8A	Column 8B	CRIB 9	Column 9A	Column 9B
Sample Mass (dry tonnes)	30.7	0.189	0.186	30.9	0.184	0.188	31.4	0.185	0.186
Head Grade (ppm)	187.5	187.6	176.4	189.7	185.9	173.1	186.9	242.5	209.7
Tails Grade (ppm)	13.2	13.8	13.7	13.3	13.8	13.3	13.9	13.9	12.5
Uranium Extracted (%)	93.0%	92.6%	92.2%	93.0%	92.6%	92.3%	92.5%	94.3%	94.1%
Acid Consumption (kg/t)	13.5	15.4	13.1	13.2	13.9	13.2	14.0	14.7	14.6

## 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](http://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.