BIGRLYI HEAP LEACHING TEST WORK

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Submitted to:

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This report has been prepared and checked in accordance with the RMD·STEM Limited QA/QC process.

QA/QC Review by:

Signed:

Executive Summary

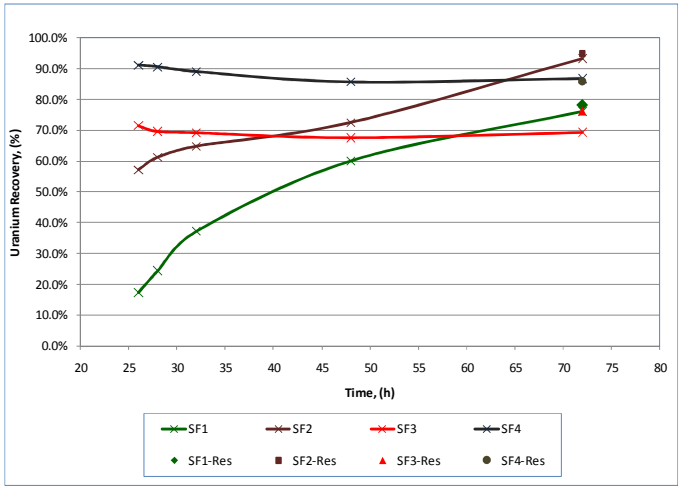
RMDSTEM was engaged by Metallurgical Project Consultants Pty Ltd, on behalf of Energy Metals Limited, to test the feasibility of applying Continuous Vat Leaching (CVL) to process for Bigrlyi uranium ore. The test procedures were provided by Innovat, the inventors of the CVL process, and comprised two steps: “Dry Attack, MnO2 oxidation” followed by a standard bottle roll tests at four (4) size fractions: (-6.3+3.35, -3.35+0.425, -0.425+0.075, -0.075 mm. The test results showed:

- >70% uranium metal recovery was achieved within 72 hrs test (24 hrs dry attack step + 48 hrs bottle roll step) across all size fractions;
- Moderate vanadium metal recoveries for different size fraction;
- Strong correlation between the size fraction and the leaching rate, especially for vanadium metal.

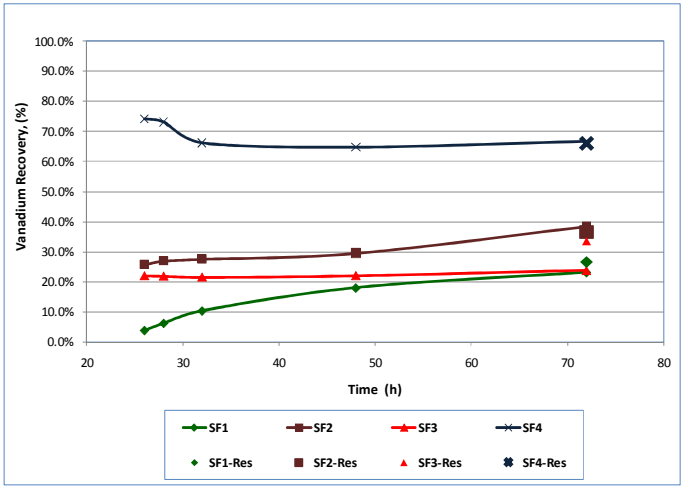
Following the bottle roll test, the residues were collected and screened to different size fraction before assay for uranium and vanadium. The analysis showed:

- Minor changes in the particle size distribution (particles’ fragmentation) during the bottle roll test;
- Higher metal concentration in the smaller size fraction whenever fragmentation was observed.

Upon reviewing these results, Innovat recommends conducting a pulsed column test. This test will provide data to confirm the economic viability of the CVL process



Uranium Recovery



Vanadium Recovery

Introduction

The Bigrlyi project, approximately 390 km north-west of Alice Springs, is a joint venture led by Energy Metals Limited. The project was put on a care and maintenance basis in 1983 following the adoption of the "Three Mines" policy and the prevailing low uranium prices. A Scoping Study based upon the March 2008 resource indicated that the Bigrlyi project has the potential to produce 16.2 million lbs of U_3O_8 and 14.5 million lbs V2O5 over 12 years of mine life. Further drilling indicates a likely increase in resource base. Detailed metallurgical test work is underway through Metallurgical Projects Consultants Pty Ltd (MPCP).

Continuous Vat Leaching (CVL), developed by Innovat Canada, has emerged as a potential high recovery process route. RMDSTEM has been engaged by MPCP, on behalf of Energy Metals Limited, to carry out the first stage of testing to identify whether CVL would be technically and commercially successful for Bigrlyi ore. The objective of this stage was to verify whether the 'Wet MnO2 Oxidation" process patented by Innovat is applicable to this ore as a first step. This will be followed by assessing the leachability of the ore via a standard bottle roll test

Scope

The scope of work was to:

- Assess how applicable "wet MnO2 oxidation" process was on sample AN4;
- Carry out bottle roll tests on different size fractions (-6.3+3.35, -3.35+0.425, -0.425+0.075, -0.075 mm) of the sample;
- Report the results of the test work to Innovat Limited to recommend future steps.

Samples

Approximately 10 kg of the core sample (about 24 mm radius granules) AN4 was delivered to RMDSTEM. The sample was subjected to the following treatment:

1. The whole sample was crushed repeatedly (crusher set at 8 mm) until it was completely reduced to a size of -6.5 mm.
2. The sample was screened to four (4) size fractions: -6.3+3.35, -3.35+0.425, -0.425+0.075 and -0.075 mm.
3. A 100 g sample of each size fraction was raffled out for head assay
4. A 500 g sample of each size fraction was used for the bottle roll test.

Test Conditions:

Bottle Roll Tests

Four samples (of different size fractions) were used to complete this test. Each sample was initially cured for 24 h at 70 ^{o}C (after addition of acid and manages oxide) to reproduce the dry attack test procedure described above. This was followed by a "standard" bottle roll test under the conditions described in Table 1.

The residue of each bottle roll test was collected, dried and sieved to different size fraction for assay.

Table 1. Test conditions for the dry attack and bottle roll tests

Step	Condition	Unit	Value
Dry Attack (MnO2 Oxidation)	Solid	g	500*
	Acid addition	kg/t	53.8
	MnO_2 addition	kg/t	8.0
	Curing Temperature	^{o}C	70
	Curing time	h	24
Bottle Roll	Slurry density	%	30
	pH		1.8
	Bottle roll total time	h	48

* Except for Sample No.4 (100 gm sample was used)

Results

Metal Recovery

Figures 1 and 2 show the uranium and vanadium metal recovery obtained from the tests described above. These results show the following:

- There is a good agreement between the recovery values calculated from the liquor analysis (SF1, SF2, SF3 and SF4) and those obtained by the residue analysis (SF1-Res, SF2-Res, SF3-Res and SF4-Res);
- There is a strong correlation between the size fraction and the leaching rate. The coarser sample (SF1 (-6.2+3.35mm)) shows slow uranium metal leaching rate in the first 24 hours of the test. This correlation was stronger for vanadium metal;
- High metal recovery (> 70%) was achieved within a total time of 72 hrs (24 h dry attack step + 48 h bottle roll step) for all size fraction;
- All samples showed lower vanadium recovery values compared to the uranium ones.

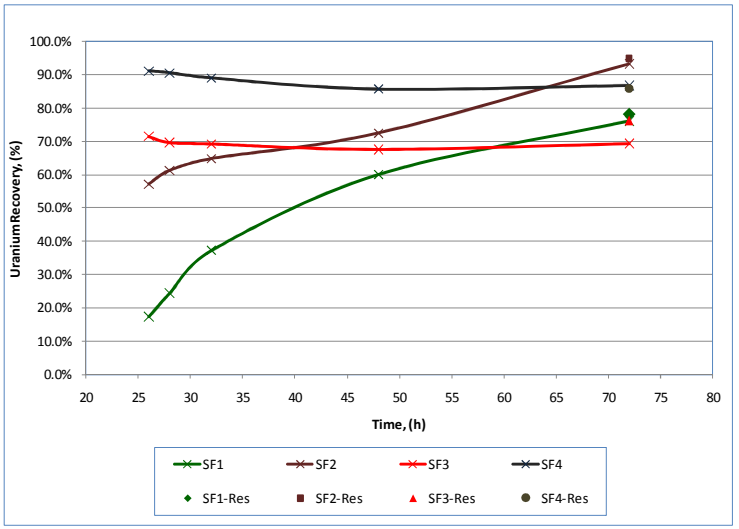


Figure 1: Uranium Recovery (%)

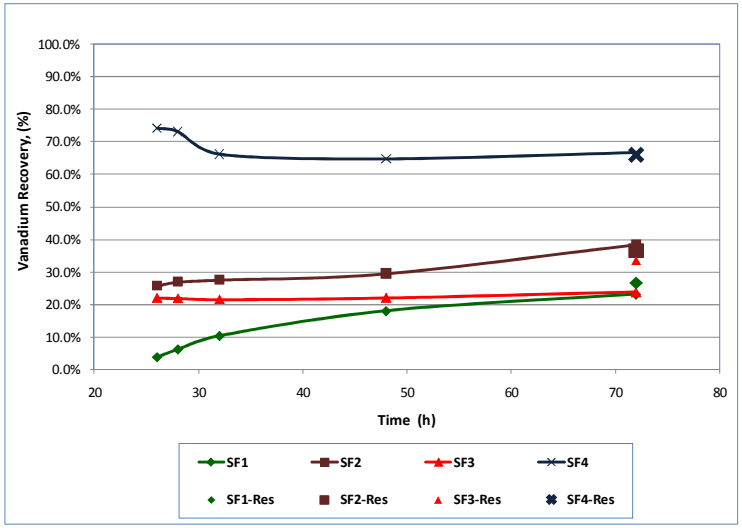


Figure 2: Vanadium Recovery (%)

Metal distribution in residues

One of the key goals of the test work is to understand the changes in the particle size and metal distribution in different size fraction during the bottle roll test. This was achieved by collecting the residues from each bottle roll and screening them to different size fractions. These sub-samples were analysed for uranium and vanadium assay. The mass of each size fraction is shown in Table 2. The distribution of uranium and vanadium metals is shown in Figures 3 and 4.

The results in Table 2 show minor change in the particle size distribution (particles' fragmentation) during the bottle roll test within each size fraction. The level of fragmentation within the coarser fractions (SF1 and SF2 were around 25% and 10%, respectively.

Figure 3 and Figure 4 show the uranium and vanadium metals distribution in the residue after the completion of the bottle roll tests. These results indicate that the metals tend to report to the smaller size fraction whenever fragmentation is observed.

Table 2. Post-test size distribution of different samples

Sample (starting size fraction)	Mass (g)				
	Total	+3.35	+0.425	+0.075	-0.07
SF1 (-6.5+3.35 mm)	495.0	370.0	94.0	1.3	29.6
SF2 (-3.35+0.425 mm)	473.0	-	430.0	13.0	30.0
SF3 (-0.425+0.075 mm)	156.9	-	-	87.0	69.9
SF4 (-0.075 mm)	417.0	-	-	-	417.0

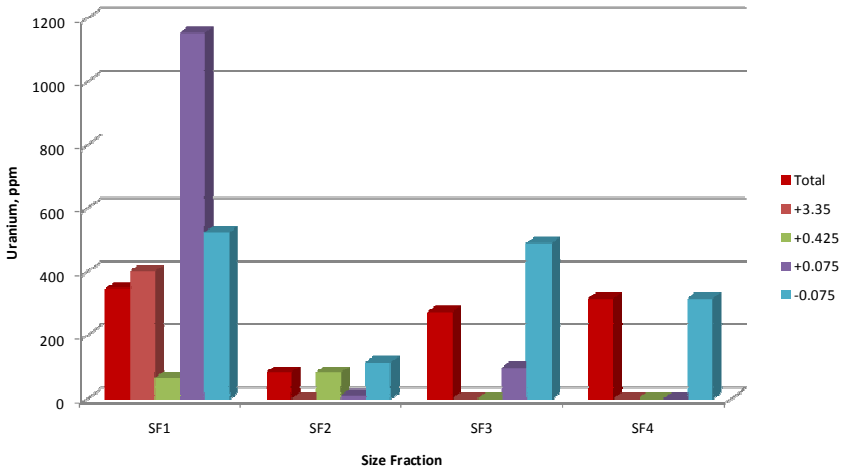


Figure 3: Uranium distribution in post bottle roll test residues at different size fraction

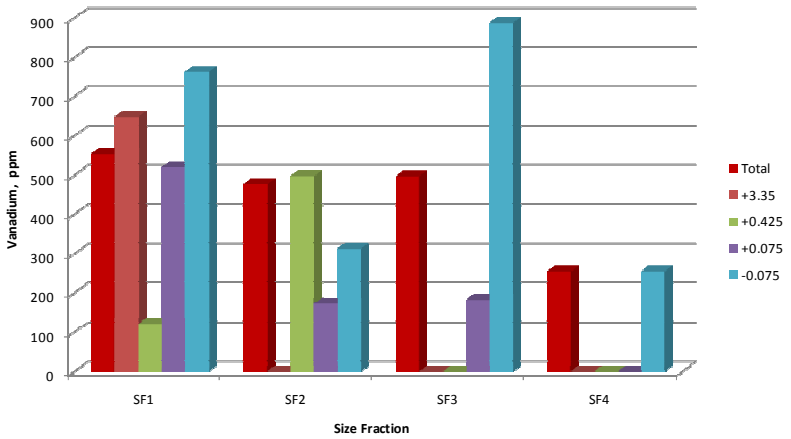


Figure 4: Vanadium distribution in post bottle roll test residues at different size fraction

Conclusions and Recommendations

The test results of the completed testwork provide a strong indication that CVL process is potentially applicable to processing the Bigrlyi uranium ore. The results showed:

- >70% uranium metal recovery was achieved within 72 hrs of the test (24 hrs dry attack step + 48 hrs bottle roll step) across all size fractions;
- Moderate vanadium metal recoveries for different size fraction;
- Minor change in the particle size distribution (particles' fragmentation) during the bottle roll test.

Upon reviewing these results, Innovat recommendation was to move to the second stage of the test program, the pulsed column test. This test will confirm the applicability of the CVL process to the ore and provide enough data to asses the economic viability of this option.

Appendix 1 – Data and Calculation

Head assay (at different size fractions):

A 100 gm sample of each size fraction was assayed:

	Mg	Al	Si	K	Ca	V	Fe	U
	%	%	%	%	%	ppm	%	ppm
-6.3+3.35	0.96	4.06	76.54	1.66	1.13	755	1.41	1589
-3.35+0.425	0.89	3.88	69.78	1.87	2.03	751	1.22	1612
-0.425+0.075	0.98	4.29	70.64	1.83	2.72	747	1.82	1150
-0.075	1.68	5.35	69.11	1.94	3.01	752	2.75	2247

Uranium and Vanadium Recovery based on residue analysis

After completion the test (24 h curing time + 48 h bottle roll time) residues of each size fraction were collected, dried and assayed to the residual amount of uranium and vanadium. These values were used to calculate the portion of metal leached into solution (metal recovery) as shown in the tables below:

	Mg	Al	Si	K	Ca	V	Fe	U
	%	%	%	%	%	%	%	%
SF1-Res	-	-	-	-	-	26.5%	-	78.1%
SF2-Res	-	-	-	-	-	36.5%	-	94.9%
SF3-Res	-	-	-	-	-	33.5%	-	76.3%
SF4-Res	-	-	-	-	-	66.1%	-	85.9%

Uranium and Vanadium Recovery based on liquor analysis

For each size fraction, liquor samples collected during the bottle roll test were analysed for the metals shown in the tables below. The results of the analysis were also used to confirm the metal recovery values calculated based on the residue analysis as shown in the tables below:

Metal Recovery: SF1 (-6.3 + 3.35 mm)

Time (h)*	Metal Recovery (%)							
	Mg	Al	Si	K	Ca	V	Fe	U
26	12.0%	2.3%	0.0%	1.3%	13.0%	3.9%	13.6%	17.4%
28	17.6%	3.3%	0.0%	1.8%	13.3%	6.2%	17.7%	24.4%
32	26.4%	4.8%	0.0%	2.7%	14.3%	10.4%	25.7%	37.2%
48	42.7%	7.8%	0.0%	4.3%	14.4%	18.0%	39.9%	60.1%
72	51.1%	9.6%	0.0%	4.9%	14.2%	23.2%	46.6%	76.2%

* Curing time (24 h) is included

Metal Recovery: SF2 (-3.35 +0.425 mm)

Time (h)	Metal Recovery (%)							
	Mg	Al	Si	K	Ca	V	Fe	U
26	51.2%	13.2%	0.0%	4.4%	6.6%	25.8%	44.7%	57.1%
28	53.3%	13.7%	0.0%	4.5%	6.8%	27.0%	46.3%	61.2%
32	53.2%	13.5%	0.0%	4.6%	6.5%	27.6%	46.6%	64.7%
48	56.9%	14.3%	0.0%	5.0%	6.8%	29.6%	50.8%	72.4%
72	72.7%	18.4%	0.0%	6.6%	8.3%	38.4%	65.6%	93.2%

* Curing time (24 h) is included

Metal Recovery: SF3 (-0.425+0.075 mm)

Time (h)	Metal Recovery (%)							
	Mg	Al	Si	K	Ca	V	Fe	U
26	52.6%	12.7%	0.0%	6.2%	21.9%	22.0%	45.0%	71.5%
28	52.3%	12.6%	0.0%	6.2%	22.3%	21.8%	44.3%	69.6%
32	52.5%	12.5%	0.0%	6.1%	22.4%	21.5%	44.3%	69.2%
48	52.3%	12.4%	0.0%	6.0%	22.4%	22.0%	44.9%	67.5%
72	53.0%	12.9%	0.0%	6.3%	21.6%	23.8%	46.0%	69.3%

* Curing time (24 h) is included

Metal Recovery: SF4 (-0.075)

Time (h)	Metal Recovery (%)							
	Mg	Al	Si	K	Ca	V	Fe	U
26	86.3%	26.9%	0.0%	12.2%	11.6%	74.2%	69.4%	91.1%
28	84.3%	25.5%	0.0%	11.6%	13.5%	73.1%	65.7%	90.5%
32	80.0%	24.2%	0.0%	11.4%	38.3%	66.2%	60.0%	88.9%
48	80.0%	24.2%	0.0%	11.3%	67.9%	64.8%	60.3%	85.6%
72	81.8%	24.8%	0.0%	11.7%	69.6%	66.7%	61.7%	86.7%

* Curing time (24 h) is included

Residue assay by size fraction

Residues from each bottle toll test were collected and screened to different size fractions for uranium and vanadium assay. The mass of each size fraction and the metal distribution are shown in the tables below.

Particle size distribution:

Sample (starting size fraction)	Mass (g)				
	Total	+3.35	+0.425	+0.075	-0.07
SF1 (-6.5+3.35 mm)	495.0	370.0	94.0	1.3	29.6
SF2 (-3.35+0.425 mm)	473.0	-	430.0	13.0	30.0
SF3 (-0.425+0.075 mm)	156.9	-	-	87.0	69.9
SF4 (-0.075 mm)	417.0	-	-	-	417.0

Uranium post-test size distribution of different samples

Sample (starting size fraction)	Assay (ppm)				
	Total	+3.35	+0.425	+0.075	-0.07
SF1 (-6.5+3.35 mm)	348.0	402.0	65.0	1155.0	525.0
SF2 (-3.35+0.425 mm)	83.0	-	83.0	10.0	114.0
SF3 (-0.425+0.075 mm)	273.0	-	-	98.0	490.0
SF4 (-0.075 mm)	316.0	-	-	0	316.0

Vanadium post-test size distribution of different samples

Sample (starting size fraction)	Assay (ppm)				
	Total	+3.35	+0.425	+0.075	-0.07
SF1 (-6.5+3.35 mm)	555.0	648.0	121.0	519.0	762.0
SF2 (-3.35+0.425 mm)	477.0	-	498.0	172.0	313.0
SF3 (-0.425+0.075 mm)	497.0	-	-	183.0	887.0
SF4 (-0.075 mm)	255.0	-	-	-	255.0

Residue Assay : SF1 (-6.3 + 3.35 mm)

	Mg	Al	Si	K	Ca	V	Fe	U
	%	%	%	%	%	ppm	%	ppm
Total	0.70	5.49	76.68	2.07	1.29	555	1.22	348
+3.35	0.73	5.56	77.35	2.20	1.37	648	1.21	402
+0.425	0.26	2.84	85.70	1.28	0.40	121	0.68	65
+0.075	1.18	11.94	56.41	0.49	3.43	519	2.31	1155
-0.075	1.75	12.82	40.65	3.04	2.88	762	3.07	525

Residue Assay : SF2 (-3.35 +0.425 mm)

	Mg	Al	Si	K	Ca	V	Fe	U
	%	%	%	%	%	ppm	%	ppm
Total	0.28	5.22	70.93	2.41	0.24	477	0.69	83
+0.425	0.26	4.84	71.50	2.29	0.20	498	0.58	83
+0.075	0.37	7.37	76.75	4.05	0.27	172	1.67	10
-0.075	0.66	9.66	60.22	3.49	0.83	313	1.85	114

Residue Assay : SF3 (-0.425+0.075 mm)

	Mg	Al	Si	K	Ca	V	Fe	U
	%	%	%	%	%	ppm	%	ppm
Total	0.67	6.36	61.86	2.28	3.20	497	1.66	273
+0.075	0.22	3.61	83.23	1.92	0.52	183	0.52	98
-0.075	1.24	9.78	35.26	2.72	6.54	887	3.08	490

Residue Assay : SF4 (-0.075)

	Mg	Al	Si	K	Ca	V	Fe	U
	%	%	%	%	%	ppm	%	ppm
Total	0.60	5.11	70.33	2.25	1.50	255	1.60	316
-0.075	0.60	5.11	70.33	2.25	1.50	255	1.60	316