

## ASX: NWE

27 August 2012

### Arrowsmith-2 Update Stages 3 and 4 - Carynginia Formation

- **Hydraulic fracture stimulation of Stages 3 and 4 - Lower and Middle Carynginia Formation successfully completed**
- **Cleanup and flow back of the two Carynginia stages commenced jointly, with gas to surface early during flow back**

Norwest Energy (ASX:NWE) is pleased to announce that the hydraulic fracture stimulation of Stages 3 and 4 of the Arrowsmith-2 program – the **Lower Carynginia Formation** (2890–2940m) and the **Middle Carynginia Formation** (2824–2875m) are now successfully complete. The two stages are currently being cleaned up and flowed back together. Gas was visible at surface within 3 hours of flow back. It is planned to conduct the flow back of the co-mingled two stages up to a seven day period, with the objective to attain maximum clean-up of the well and to establish a combined stabilised gas flow rate during the time available. A promising sign with this zone is that the well is currently producing back a consistently high volume of injected water, along with gas. As the amount of total injected water returned to surface increases, it is expected that the gas rate will also continue to increase.

Mr. Peter Munachen, Norwest CEO commented “Results from the Carynginia stages 3 & 4 are excellent, and add to the successful results of stages 1 and 2, the High Cliff Sandstone and Irwin River Coal Measure targets. Norwest has now successfully fraced four stages from the Arrowsmith-2 program, with the remaining stage 5 being the Kockatea Shale, the shallowest target in the well. The Kockatea Shale is a well-known hydrocarbon source rock throughout the Basin, and is therefore another promising target to conclude the program.”



*Fig 1. Carynginia Formation gas flare, 26<sup>th</sup> August 2012, 21 hours after commencement of flow back*



Fig 2. Collage of images from Arrowsmith-2 location, August 2012

### Stage 1: High Cliff Sandstone –HCSS (3279-3301m)

The HCSS hydraulic fracture stimulation was completed on 29 July 2012 and successfully flowed gas to surface within 12 hours of opening of the well. The flow back and clean up phase was conducted over a ten day period and the well achieved a stabilized maximum gas rate of 777Mscf/d during that period. (Note: “Flow back” refers to the flow back of injected fluid (water), the prime ingredient of the hydraulic fracture process that has been pumped into the well to “fracture stimulate” the target rocks, and needs to be flowed back to surface in sufficient volume to enable the gas to flow and to be measured. The recovered injected fluids are stored in the “flow back” pond, and DMP approval has been granted to re-cycle these fluids in the ongoing Arrowsmith – 2 hydraulic fracture stimulation program. This has now been successfully applied during Stages 3 & 4 of this program, and significantly reduces the requirement for fresh water to be drawn from aquifers during the program).

The flow back period was constrained to ten days to enable the equipment package to be released by Norwest and mobilised to the Woodada Deep location under the equipment sharing agreement with AWE Limited.

The HCSS is a conventional tight sandstone gas target and is prevalent throughout the northern Perth Basin.

To fully evaluate the commercial potential of the HCSS interval, it will be necessary to conduct an extended flow test over several months that is not provided for in this current proof of concept campaign. Likewise to establish the potential GIP of the shale sequences within the Arrowsmith-2 evaluation program, it will be necessary to conduct other activities which could include 3D seismic and the drilling of further wells, in conjunction with the ongoing shale gas evaluation program. These are all matters for consideration by the Arrowsmith Joint Venture.

**Stage 2: Irwin River Coal Measures – IRCM (3000-3050M)**

A 50m interval in the IRCM was fraced successfully on 13<sup>th</sup> August, and within six hours of opening the well the flare was ignited. During the seven day clean-up and flow back phase, low frac fluid recovery rates were recorded and therefore it was not possible for the gas rate to stabilise, however a moderate increase in gas flow rate was achieved via a nitrogen lift using coil tubing.

The fact that a flow rate could not be established does not diminish the prospectivity of the IRCM formation, as it is extremely encouraging that gas was flared to surface not long after flow back commenced. The clean-up and flow back period for the IRCM was over seven days and indications are that a much longer flow back period would be required to increase injected fluid recovery and to therefore enable the well to establish a stabilized rate of gas flow.

This limited period for flow back and clean-up was due to the equipment sharing agreement. As a consequence of the limited flow back period, the JV will need to consider options that may be available to re-enter the well at some time in the near future to recommence flow back of the IRCM to further evaluate this prospective zone.

**Stage 5: Lower Kockatea (2639-2681m)**

The final stage of the Arrowsmith-2 hydraulic fracture stimulation campaign will be a 42m interval at the base of the Kockatea Shale formation. This frac will be conducted at the conclusion of the Carynginia flow back and testing period.

It was originally planned for the Kockatea Shale interval to be flowed back with the two stages from the Carynginia Formation, however due to the potential for condensate in the Kockatea Shale, it will be flowed back as an individual zone.

At the conclusion of the Kockatea stage, the campaign equipment will be de-rigged and mobilised back to the respective HQ bases.

Following the conclusion of the Arrowsmith -2 hydraulic fracture stimulation campaign the JV will evaluate the results of the program to determine future activities.

The participants in the EP413/Arrowsmith Joint Venture are:

Norwest Energy NL (Operator)	(ASX: NWE)	27.945%
AWE Limited (via subsidiary ARC Energy Ltd)	(ASX: AWE)	44.252%
Bharat PetroResources Ltd		27.803%

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