

## Bid Addendum (In accordance with ITB 8)

Reference Number:  
**RZ042100-PCG-COM-0003**

### Dominica Geothermal Risk Mitigation Project Contract

#### Subject: Bid Document Addendum 0003 – Injectivity information

The following Addenda shall be made to the Bid Documents for the Dominica Geothermal Risk Mitigation Project.

Enclosures:

- Attachment 1
- Attachment 2

The Employers Requirements allows for the reinjection of condensate from a steam turbine plant to be reinjected into WW-03. In the case of an Organic Rankin Cycle (ORC) Plant, the Employer will allow a maximum of 5 kg/s of combined Brine plus Condensate to be reinjected into WW-03.

During the Guarantee Tests of an ORC Plant the Contractor may inject a maximum of 5 kg/s of combined Brine plus Condensate into WW-03.

Accordingly the following modifications are implemented into the Bid Documents.

#### Part 2, Section VII, Specification

##### SECTION 1.1.4 – Steam Gathering System

In addition to the text presented in this section, the following text is added:

*“In the case of an Organic Rankine Cycle Plant and the brine / condensate is recombined, the Contractor may use WW-01, WW-R1 and WW-03 for reinjection purposes. A maximum amount of 5 kg/s may be reinjected to WW-03 in order to optimise operational plant performance. When the Specification refers to the “brine” reinjection system, where appropriate this may be read as applying to the combined Brine / Condensate system in the case of an Organic Rankine Cycle Plant.*

*In the case of a Steam Condensing Plant, all brine shall be reinjected at WW-01 and WW-R1. All remaining condensate that is not evaporated through the cooling process shall be reinjected at WW-03.*

##### Section 10.10.1

In addition to the text presented in this section, the following text is added to the end of the section:



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*“In the case of an Organic Rankine Cycle Plant, the Contractor may elect to reinject some of the combined brine / condensate flow at the nominated “condensate” well, no more than the maximum flow allowable as stated in the Interface Schedule and Section X, Appendix 8 of the Contract.”*

#### Section 10.12.4

Delete the following text and table from this section:

*“The minimum brine pipeline sizes have been determined by the Employer as indicated below.”*

| IP Chainage                           | Line Size | Description                                                                |
|---------------------------------------|-----------|----------------------------------------------------------------------------|
| WW-P1 Separator to Upstream of Bridge | DN 300    | Cross-country reinjection line starting from WW-P1 Separator Pad to Bridge |
| Bridge                                | DN 250    | Pipe bridge (80m length)                                                   |
| Downstream of Bridge to IP/405        | DN 250    | Cross-country reinjection line to WW-01 Injection Pad                      |
| IP/405 to IP/580                      | DN 250    | Cross-country reinjection line to WW-R1 Injection Pad                      |

Add the following text to this section:

*“The minimum sizes for the reinjection cross country line are as stated in the pipeline Bill Of Materials included in Part 2, Section VII, Drawings. Bidders / Contractor shall determine any sizing beyond the minimum and include the requirements in their Bid.”*

#### Part 2, Section VII, Interface Schedule

##### Section 3.2.2.1

Delete the original table and replace with the table included as Attachment 1 of this Addendum.

##### Appendix A

Replace the WW-01, WW-R1 curves with the curves included as Attachment 2 of this Addendum.



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#### Part 3, Section X, Appendix 8

##### Section 1

Add the following definition to the Abbreviations and Definitions:

*“MP13 In the case of Organic Rankine Cycle Plant, the interior of the piping upstream of WW-03. Measuring point used for the combined brine / condensate flow to WW-03.”*

##### Section 2

Add the following to the tabulated list of NCR conditions:

|                                                                                       |             |             |             |
|---------------------------------------------------------------------------------------|-------------|-------------|-------------|
| <i>9. Brine and Condensate reinjection flow at WW-03 (Organic Rankine Cycle only)</i> | <i>MP13</i> | <i>kg/s</i> | <i>5.00</i> |
|---------------------------------------------------------------------------------------|-------------|-------------|-------------|

##### Section 5

Add the following text:

*“5.7 Organic Rankine Cycle technology Guaranteed Maximum fluid flow into WW-03*

*In the case of Organic Rankin Cycle technology, the Contractor guarantees the combined Brine plus Condensate flow as measured at point MP13 shall not be more than 5 kg/s.”*

##### Section 6

Add the following text:



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*"6.8 Combined Brine plus Condensate Flow for Organic Rankin Cycle Plant at WW-03*

*If the Combined Brine plus Condensate Flow at WW-03 as measured at the same location as MP13 during the tests is greater than the corresponding guaranteed figure, the Contractor shall make such changes, modifications and/or additions to the Facility as are necessary to achieve the guaranteed requirements.*

*Liquidated Damages shall not be applicable."*

**Please acknowledge receipt of this addendum by completing the below information and returning to the sender:**

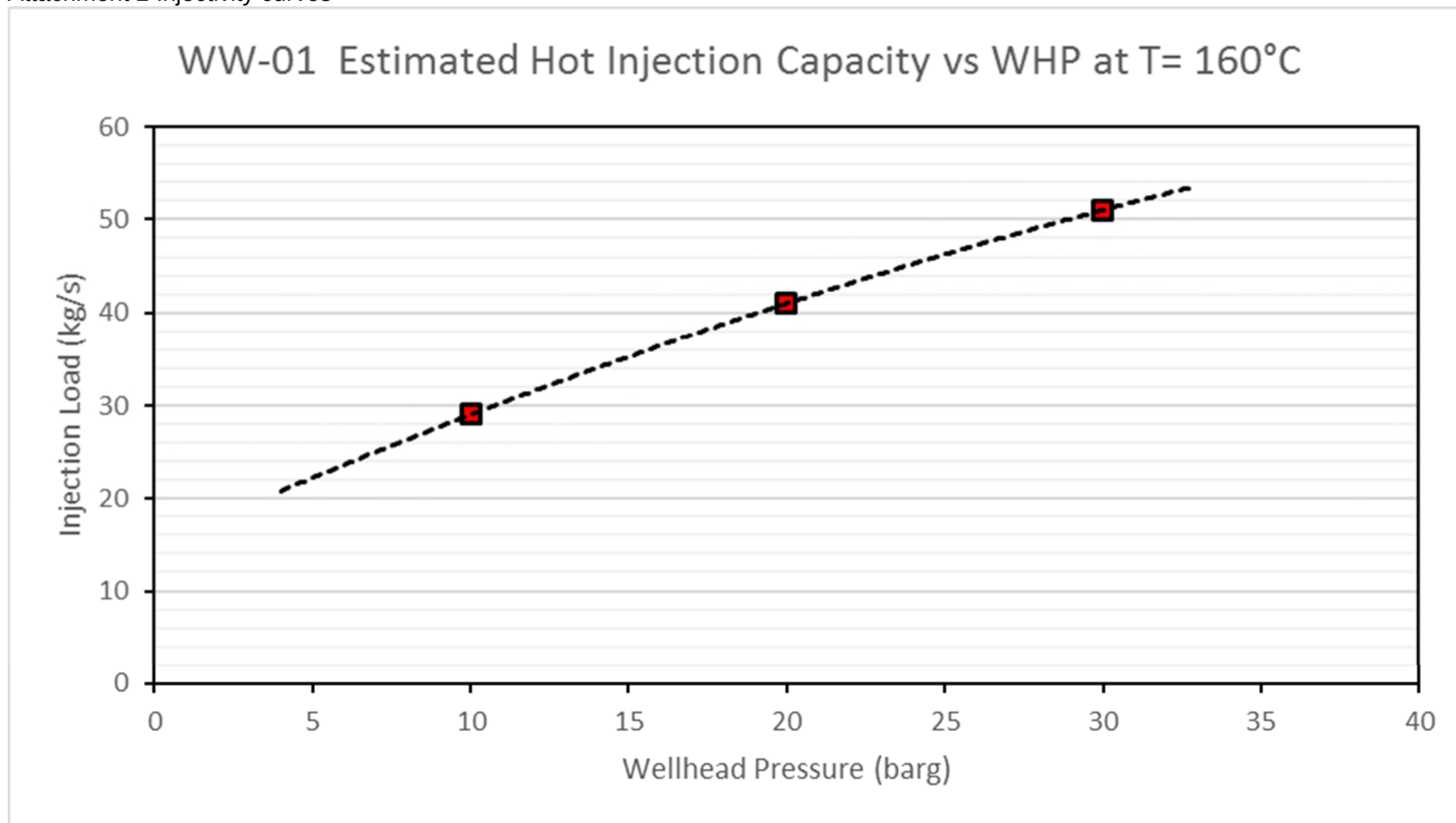
**Bidder Company Name** \_\_\_\_\_

**Bidder Contact Name** \_\_\_\_\_

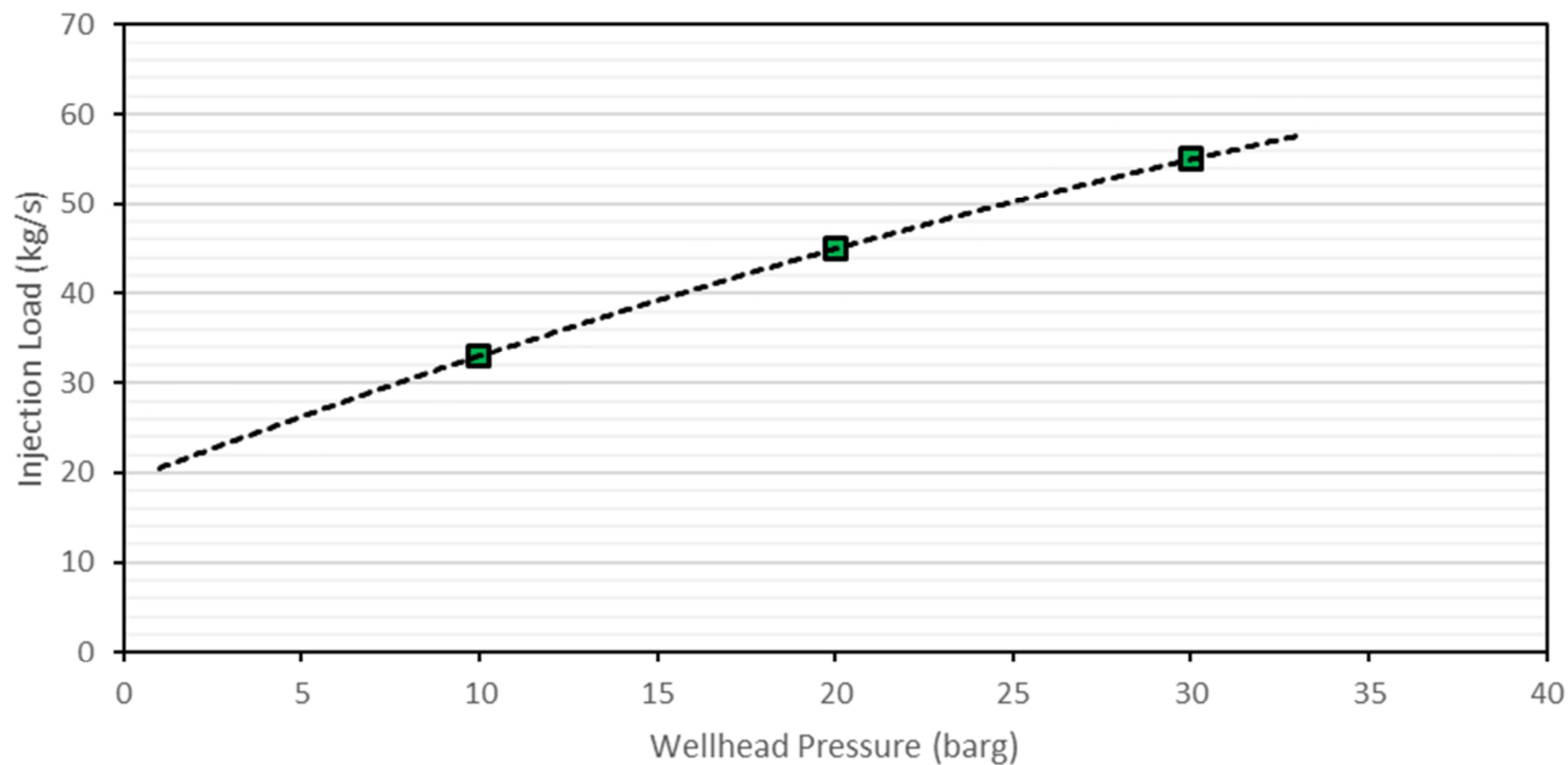
**Date Received** \_\_\_\_\_

Attachment 1 Injectivity table

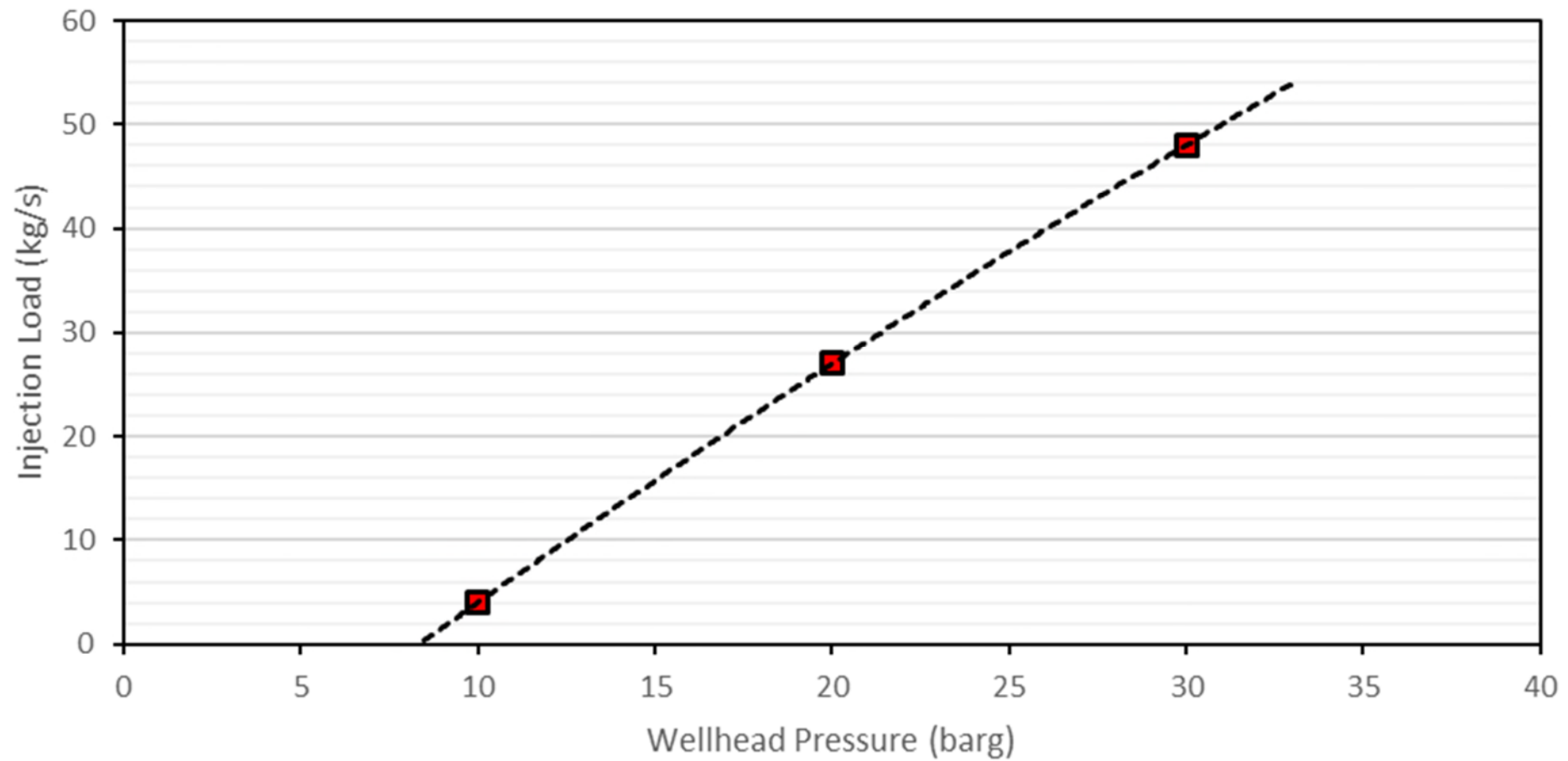
| Item                  |                                                | Well WW-03                                            |                                                                                                               | Well WW-01                                                                                                                                                                                     |                                           | Well WW-R1                                               |                                           | Unit |
|-----------------------|------------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|----------------------------------------------------------|-------------------------------------------|------|
| 1. Fluid              |                                                | Condensate<br>(@40 ° C)<br>Steam Turbine<br>case      | Mixed Brine / Condensate<br>(@120 ° C)<br>Organic Rankine Cycle case                                          | Brine<br>(@ 160°C)<br>Steam Turbine<br>case                                                                                                                                                    | Mixed Brine /<br>Condensate<br>(@120 ° C) | Brine<br>(@ 160°C)<br>Steam Turbine case                 | Mixed Brine /<br>Condensate<br>(@120 ° C) |      |
| 2. Injection Capacity |                                                |                                                       |                                                                                                               |                                                                                                                                                                                                |                                           |                                                          |                                           |      |
| 2.1                   | Not Used                                       | -                                                     | -                                                                                                             | -                                                                                                                                                                                              | -                                         | -                                                        | -                                         | -    |
| 2.2                   | Capacity at 0 barg                             | 60                                                    | 50<br>(actual reinjection flow shall not<br>exceed 5 kg/s reinjection flow for<br>Organic Rankine Cycle case) | 16                                                                                                                                                                                             | 18                                        | 0                                                        | 0                                         | kg/s |
| 2.3                   | Capacity at 10 barg                            | -                                                     | -                                                                                                             | 29                                                                                                                                                                                             | 33                                        | 4                                                        | 15                                        |      |
| 2.4                   | Capacity at 20 barg                            | -                                                     | -                                                                                                             | 41                                                                                                                                                                                             | 45                                        | 27                                                       | 37                                        |      |
| 2.5                   | Capacity at 30 barg                            | -                                                     | -                                                                                                             | -                                                                                                                                                                                              | -                                         | 48                                                       | 57                                        |      |
| 3. pH                 |                                                |                                                       |                                                                                                               |                                                                                                                                                                                                |                                           |                                                          |                                           |      |
| 3.1                   | Range                                          | > 5                                                   | 6-8                                                                                                           | 6 - 8                                                                                                                                                                                          |                                           | 6 - 8                                                    |                                           |      |
| 4. Pressure           |                                                |                                                       |                                                                                                               |                                                                                                                                                                                                |                                           |                                                          |                                           |      |
| 4.1                   | Maximum non-<br>operating (shut-in)            | 55                                                    |                                                                                                               | 20                                                                                                                                                                                             |                                           | 55                                                       |                                           | barg |
| 4.2                   | Minimum operating<br>pressure (at<br>wellhead) | Full vacuum                                           |                                                                                                               | Full vacuum                                                                                                                                                                                    |                                           | Full vacuum                                              |                                           |      |
| 4.3                   | Maximum operating<br>pressure (at<br>wellhead) | WW-P1 steam relief pressure plus static head to WW-03 |                                                                                                               | Design must result in pressure not<br>greater than 20 barg at 190 Deg C.<br><br>Must not be greater than 18.9 barg at<br>160 Deg C.<br><br>Must not be greater than 17.5 barg at<br>120 Deg C. |                                           | WW-P1 steam relief pressure plus static head<br>to WW-R1 |                                           |      |



### WW-01 Estimated Hot Injection Capacity vs WHP at T= 120°C



## WW-R1 Estimated Hot Injection Capacity vs WHP at T= 160°C





## WW-R1 Estimated Hot Injection Capacity vs WHP at T= 120°C

