# Fish Passage Plan (FPP) Change Request Form

**Change Form # & Title**: 17IHR007 – Unit 5 Operating Range w/ Welded Blades

**Date Submitted**: April 21, 2017

**Project**: IHR

**Requester Name, Agency**: NWW

**Final Action:** **APPROVED at FPOM May 11, 2017**

**FPP Section**: IHR 4.2. Turbine Unit Operating Range.

**Justification for Change**: Unit 5 blades were welded in 2016, which restricted the unit to operate in a smaller range in the middle of the full 1% range. This new table defines peak efficiency and the restricted operating range for Unit 5 with welded blades.

**Proposed Change**: Add new Table IHR-9.

**Table IHR-9. Ice Harbor Dam Turbine Unit 5 Power (MW) & Flow (kcfs) at Upper and Lower Limits of Restricted Operating Range. a**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Project** | **Turbine Unit 5with STS** | | | | | |
| **Head** | **Lower Limit** | | **Peak Efficiency** | | **Upper Limit** | |
| **(ft)** | **MW** | **kcfs** | **MW** | **kcfs** | **MW** | **kcfs** |
| **75** | **72.5** | **13.2** | **74.6** | **13.4** | **76.1** | **13.9** |
| 76 | 73.6 | 13.2 | 75.7 | 13.4 | 77.2 | 13.9 |
| 77 | 74.7 | 13.2 | 76.8 | 13.4 | 78.4 | 13.9 |
| 78 | 75.8 | 13.2 | 77.9 | 13.4 | 79.5 | 13.9 |
| 79 | 76.9 | 13.2 | 79 | 13.5 | 80.6 | 13.9 |
| **80** | **77.9** | **13.3** | **80** | **13.5** | **81.7** | **13.9** |
| 81 | 78.8 | 13.2 | 81.1 | 13.5 | 82.9 | 13.9 |
| 82 | 79.7 | 13.2 | 82.2 | 13.5 | 83.8 | 13.9 |
| 83 | 80.6 | 13.2 | 83.3 | 13.5 | 84.7 | 13.8 |
| 84 | 81.5 | 13.2 | 84.4 | 13.5 | 85.6 | 13.8 |
| **85** | **82.4** | **13.1** | **85.5** | **13.5** | **87.5** | **13.9** |
| 86 | 83.8 | 13.2 | 86.6 | 13.5 | 88.5 | 13.9 |
| 87 | 85.2 | 13.2 | 87.8 | 13.5 | 89.5 | 13.9 |
| 88 | 86.6 | 13.3 | 88.9 | 13.5 | 90.5 | 13.9 |
| 89 | 88 | 13.3 | 90.1 | 13.5 | 91.5 | 13.9 |
| **90** | **89.4** | **13.4** | **91.2** | **13.5** | **92.5** | **13.9** |
| 91 | 90.4 | 13.4 | 92.4 | 13.5 | 93.7 | 13.9 |
| 92 | 91.5 | 13.4 | 93.5 | 13.5 | 94.9 | 13.9 |
| 93 | 92.5 | 13.4 | 94.6 | 13.5 | 96 | 13.9 |
| 94 | 93.6 | 13.4 | 95.8 | 13.6 | 97.2 | 13.9 |
| **95** | **94.6** | **13.4** | **96.9** | **13.6** | **98.4** | **13.9** |
| 96 | 95.5 | 13.4 | 98 | 13.6 | 99.6 | 13.9 |
| 97 | 96.3 | 13.3 | 99.1 | 13.6 | 100.8 | 14.0 |
| 98 | 97.1 | 13.3 | 100.3 | 13.6 | 102.1 | 14.0 |
| 99 | 97.9 | 13.3 | 101.4 | 13.6 | 103.3 | 14.0 |
| **100** | **98.7** | **13.2** | **102.5** | **13.6** | **104.5** | **14.0** |
| 101 | 99.8 | 13.2 | 103.6 | 13.6 | 105.7 | 14.0 |
| 102 | 100.9 | 13.3 | 104.6 | 13.6 | 106.9 | 14.0 |
| 103 | 102 | 13.3 | 105.7 | 13.6 | 108. 1 | 14.1 |
| 104 | 103.2 | 13.3 | 106.8 | 13.6 | 109.4 | 14.1 |
| **105** | **104.3** | **13.3** | **107.8** | **13.6** | **110.6** | **14.1** |

**a.** Unit 5 has welded runner blades (2016) and is restricted to a smaller operating range. Table values based on the

1962 Model Test, 2006 Unit 6 Index Test, and 2017 Unit 8 Abbrev. Index Test.

**Comments**:

**Record of Final Action**: **APPROVED at FPOM May 11, 2017**