

## **Attachment 9**

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Initial Study Report Meetings

Action Item for Study 5.7

March 23, 2016

**Susitna-Watana Hydroelectric Project  
(FERC No. 14241)**

**Initial Study Report Meetings  
March 23, 2016  
Action Items**

**Mercury Assessment and Potential for  
Bioaccumulation Study  
Study Plan Section 5.7**



**SUSITNA-WATANA HYDRO**

*Clean, reliable energy for the next 100 years.*

**Study 5.7 Mercury Assessment and Potential for Bioaccumulation Study Action Item**

**Action Item 5.7-1. AEA will provide a table of the Harris and Hutchison model inputs, outputs, and calculations.**

The method and calculations for the peak methyl-mercury increase factors using the Harris and Hutchison (2008) Model were presented in the Study 5.7 Revised Study Plan (RSP), Section 5.7.4.7.1, as follows:

$$\text{Peak Increase Factor} = 1 + K1 \times (\text{Area Flooded} / (\text{Mean Annual Flow} + K2 \times \text{Area Total}))$$

Where:

K1 Piscivorous Fish regression coefficient = 0.4616 (km/yr)

K2 Piscivorous Fish regression coefficient = 0.055 (1/yr)

K1 Non-Piscivorous Fish regression coefficient = 0.2215 (km/yr)

K2 Non-Piscivorous Fish regression coefficient = 0.035 (1/yr)

The origin of the regression coefficients were presented in the RSP Section 5.7.9 and can be found in Harris and Hutchinson (2008). For Susitna-Watana Reservoir, the values used to calculate the peak increase factor were: flooded area = 86.74 km<sup>2</sup>, total area = 103.38 km<sup>2</sup>, and mean annual flow = 7.23 km<sup>3</sup>/yr. The peak increase factor was multiplied by the measured mean methyl mercury concentration for each species of fish, derived from Tables 5.7-1 to 5.7-8 in the Study 5.7 SIR. The results were presented in Table 5.8-1 of the SIR, shown below.

*Study 5.7 SIR Table 5.8-1. Predicted Peak MeHg Concentrations in Fish*

| Species         | N  | Predicted peak increase factor (relative increase) | Current Mean Total Hg in fish tissue (ng/g ww) | Predicted Peak Mean Total Hg in fish tissue (ng/g ww) |
|-----------------|----|----------------------------------------------------|------------------------------------------------|-------------------------------------------------------|
| Lake Trout      | 9  | 4.25                                               | 247                                            | 1,047                                                 |
| Arctic Grayling | 16 | 2.75                                               | 44                                             | 121                                                   |
| Dolly Varden    | 7  | 2.75                                               | 43                                             | 119                                                   |
| Slimy Sculpin   | 7  | 2.75                                               | 41                                             | 114                                                   |
| Round Whitefish | 14 | 2.75                                               | 57                                             | 157                                                   |
| Burbot          | 6  | 4.25                                               | 68                                             | 289                                                   |
| Longnose Sucker | 7  | 2.75                                               | 77                                             | 212                                                   |

*Calculation performed using formula from Harris and Hutchison (2008)*

*MeHg = methylmercury*

*N = sample number*

*Hg = mercury*

*ng/g ww = nanograms per gram wet weight*

For comparison to the predicted Susitna-Watana reservoir conditions, the peak methyl-mercury increase factor in piscivorous and non-piscivorous fish was reported for several facilities throughout Alaska in the discussion section of Study 5.7 SIR Table 6.8-1, as shown below. The parameters for these calculations are included in the table.

*Study 5.7 SIR Table 6.8-1. Comparison between Predicted Peak MeHg Concentrations in Fish*

| <i>Facility</i> | <i>Capacity (MW)</i> | <i>Area Flooded (km<sup>2</sup>)</i> | <i>Area Total (km<sup>2</sup>)</i> | <i>Mean Annual Flow (km<sup>3</sup>/yr.)</i> | <i>Predicted piscivorous fish peak increase factor (times background)</i> | <i>Predicted non-piscivorous fish increase factor (times background)</i> |
|-----------------|----------------------|--------------------------------------|------------------------------------|----------------------------------------------|---------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Susitna-Watana  | 600                  | 86.74                                | 103.38                             | 7.23                                         | 4.24                                                                      | 2.77                                                                     |
| Bradley Lake    | 126                  | 10.43                                | 15.46                              | 0.62                                         | 4.27                                                                      | 2.99                                                                     |
| Solomon Gulch   | 12                   | 2.08                                 | 2.49                               | 0.11                                         | 4.81                                                                      | 3.39                                                                     |
| Swan Lake       | 22.4                 | 1.82                                 | 6.07                               | 0.39                                         | 2.69                                                                      | 1.67                                                                     |
| Terror Lake     | 20                   | 2.99                                 | 4.13                               | 0.22                                         | 4.18                                                                      | 2.82                                                                     |

*MeHg = methylmercury*  
*MW = megawatts*  
*Km<sup>2</sup> = square kilometers*  
*Km<sup>3</sup> = cubic kilometers*

**Reference:**

Harris, R., and D. Hutchinson 2008. Lower Churchill Hydroelectric Generation Project Environmental Baseline Report: Assessment of the Potential for Increased Mercury Concentrations, Prepared by Tetra Tech Inc., March 4, 2008.