

## Letter Report on Kaiser Mead Project Status Update

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The following events highlight the status of the laboratory wetland study and EC study that has been initiated at Alcoa Technical Center and at Baker Corp's laboratory, respectively to evaluate the feasibility of treating cyanide and fluoride from impacted groundwater at the Kaiser's decommissioned smelter location in Mead, WA.

- **Completed Low Strength Water Testing Phase (Well No.: TW-1B; Tot CN ~ 10 ppm; Tot F ~6 ppm):** Duration – 7.5 weeks, Start Date: 4/26/16 – 6/21/16; Objective: to test the wetland with its flora and fauna under various environmental conditions using a relatively low strength water
  - Variation 1: Standard conditions
    - Flow rate – 12ml/min (~ 7 day HRT)
    - Light intensity – 153 W/m<sup>2</sup> (Spokane, WA yearly average)
    - Water Temperature – ambient
    - Duration - 4 week, 4/25 – 5/25
    - Avg. pH – 8.5
    - Average total cyanide removal efficiency – 70%, with highest removal observed at ~ 93%
    - Average WAD and Free cyanide at the effluent: ~ 0.1 ppm
    - Wetland effluent sample sent to BakerCorp for EC testing to assess fluoride removal indicates F levels < 4 ppm is achievable
  - Variation 2: High flow, low HRT
    - Flow rate – 22ml/min (~ 4 day HRT)
    - Light intensity – 153 W/m<sup>2</sup> (Spokane, WA yearly average)
    - Water Temperature – ambient
    - Duration - 1 week, 5/25 – 6/3
    - Average total cyanide removal efficiency – 60%, with highest removal observed at ~ 92%
    - Average WAD and Free cyanide at the effluent: ~ 0.07 and 0.06 ppm, respectively
  - Variation 3: Low flow, high HRT
    - Flow rate – 8.5 ml/min (~ 10 day HRT)
    - Light intensity – 158 W/m<sup>2</sup> (Spokane, WA yearly average)
    - Water Temperature – ambient
    - Duration – 1.5 weeks, 6/3 – 6/13
    - Average total cyanide removal efficiency – 80%,
    - Average WAD and Free cyanide at the effluent: ~ 0.04 and 0.03 ppm, respectively

- Variation 4: Cold weather conditions
  - Flow rate – 12ml/min (~ 7 day HRT)
  - Light intensity – 94 W/m<sup>2</sup> (Spokane, WA winter average)
  - Water Temperature – 2 - 5°C
  - Duration - 1 week, 6/14 – 6/21
  - Average total cyanide removal efficiency – 60%,
  - Average WAD and Free cyanide at the effluent: ~ 0.035 and 0.03 ppm, respectively
  
- **Medium Strength Water Testing Phase is Ongoing (Well No.: KMCP-4B; Tot CN ~ 20 ppm, Tot F ~ 16 ppm):** Following the completion of the low strength water testing, testing has commenced with the medium strength water.
  - Variation 1: Standard conditions
    - Flow rate – 12ml/min (~ 7 day HRT)
    - Light intensity – 153 W/m<sup>2</sup> (Spokane, WA yearly average)
    - Water Temperature – ambient
    - Duration - 4 week, 6/21 – 7/18
    - Avg. pH – 8.5
    - Average total cyanide removal efficiency – 73% till date
    - Average WAD and Free cyanide at the effluent: not reported yet
    - Wetland effluent sample has been acquired for shipment to BakerCorp for EC testing to assess fluoride removal

#### Laboratory Wetland at Alcoa Technical Center

