TRC TOXICITY CALCULATIONS

Facility Name: Entergy Arkansas, Inc. - Lake Catherine Plant
Permit No.: AR0001147 Outfall 001 & 002 Daily Max. Flow = 476 + 240 = 716 MGD

Is the initial receiving stream one of the following rivers?

- Mississippi River
- Arkansas River
- Red River
- White River below conflu. with Black River
- Ouachita River below conflu. with Little Missouri River

All calculations based on the Mass-Balance Equation:

\[(C_d \times Q_d) = (C_u \times [Q_u \times Z]) + (C_e \times Q_e)\]

where:

- \(C_d\) = downstream pollutant concentration (mg/l) [aka Instream Waste Concentration (IWC)]
- \(Q_d\) = downstream flow (cfs) = \((Q_u \times Z) + Q_e\)
- \(C_e\) = effluent pollutant concentration (mg/l)
- \(Q_e\) = effluent flow (cfs)
- \(C_u\) = upstream pollutant concentration (mg/l)
- \(Q_u\) = upstream flow (cfs)

\[Z = MZ - Mixing Zone - \% of Upstream Flow (Chronic)\]
\[or \ MZ \times ZID [ZID - Zone of Initial Dilution - \% of Mixing Zone (Acute)]\]

### Toxicity-based Effluent Limits (\(C_e = EPA "Gold Book" WQ Criteria for TRC\))

\[C_e = \frac{(C_d \times Q_d) - (C_u \times [Q_u \times Z])}{Q_e}\]

<table>
<thead>
<tr>
<th></th>
<th>(Q_u) (cfs)</th>
<th>(C_u) (mg/l)</th>
<th>(Q_e) (MGD)</th>
<th>(Z) (Chronic)</th>
<th>(Q_e) (cfs)</th>
<th>(C_d) EPA &quot;Gold Book&quot; (mg/l)</th>
<th>MZ Flow</th>
<th>ZID Flow</th>
<th>(C_e) Max. Allowable Effluent TRC Conc. (mg/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic</td>
<td>200.00</td>
<td>0.00</td>
<td>716.00</td>
<td>25%</td>
<td>1107.82</td>
<td>0.011</td>
<td>50.00</td>
<td>0.011</td>
<td></td>
</tr>
<tr>
<td>Acute</td>
<td>200.00</td>
<td>0.00</td>
<td>716.00</td>
<td>13%</td>
<td>1107.82</td>
<td>0.019</td>
<td>26.00</td>
<td>0.019</td>
<td></td>
</tr>
</tbody>
</table>

Mixing Zone = 25% of critical upstream flow for large streams (7Q10 > 100 cfs)
= 67% of critical upstream flow for small streams (7Q10 < 100 cfs)

\[ZID = 50\% of mixing zone for all streams (except as noted below)\]
\[= 25\% of mixing zone for Mississippi River, Arkansas River, Red River\]
\[White River below confluence with Black River,\]
\[and Ouachita River below confluence with Little Missouri River\]

- user entered value
- calculated value