

MIXING ZONE GUIDANCE TO DETERMINE WHOLE EFFLUENT TOXICITY (WET) REQUIREMENTS. ZID/MIXING ZONE CRITERIA.

ZID CRITERIA

ZID means “Zone of Initial Dilution.” It is the first of two allowable mixing zones. The effluent concentration of a pollutant is allowed to exceed its permissible acute value inside the ZID. Its permissible acute value must not be exceeded at the edge of the ZID. ADEM’s ZID is synonymous with the TDZ discussed in CORMIX documentation. TDZ means “Toxic Dilution Zone.”

The length of the ZID is calculated as the most stringent of the following three criteria:

1. Ten percent (10%) of the mixing zone distance in any spatial direction. For ZID calculations, mixing zone distance is determined using the following methodology:
 - a) One-half (½) times the stream width.
 - b) 750 feet, if the discharge is considered to go to a reservoir/lake environment.
 - i. To determine if the discharge goes to a reservoir/lake environment, plot the discharge location in a GIS application overlain with Water Quality’s reservoir/lake GIS layer. If the discharge lies within one of the layer’s polygons (or on one of the layer’s lines), then it is considered to go to a reservoir/lake.
 - c) 400 feet, if the discharge is considered to go to a coastal environment.
 - i. To determine if the discharge goes to a coastal environment, plot the discharge location in a GIS application overlain with Water Quality’s GIS coastal layer. If the discharge lies within one of the layer’s polygons (or on one of the layer’s lines), then it is considered to go to a coastal environment.
 - d) If the discharge goes to a reservoir/lake environment, compare 750 feet with the value determined in part a) and employ the more stringent of the two. If the discharge goes to a coastal environment, compare 400 feet with the value determined in part a) and employ the more stringent of the two. If the discharge goes to neither a reservoir/lake nor a coastal environment, employ only the criterion in part a).
2. Five times the local water depth in any horizontal direction.
3. Fifty times the discharge length scale (DLS) in any spatial direction. The DLS is equal to the square root of the cross-sectional area of the smallest port of a wastewater diffuser.

MIXING ZONE CRITERIA

The mixing zone is the second of two allowable zones. The effluent concentration is allowed to exceed its permissible chronic value inside the mixing zone. Its permissible chronic value must not be exceeded at the edge of the mixing zone. ADEM’s mixing zone is synonymous with the Regulatory Mixing Zone discussed in CORMIX documentation.

Mixing zones have several restrictions:

1. Mixing zone width cannot exceed half the stream width.
2. Mixing zone area cannot exceed one-quarter of the stream cross-sectional area.
3. Mixing zone length cannot exceed 2.5 times the stream width.
4. Mixing zones may not encompass drinking water intakes.
5. The total area of all mixing zones in a lake may not encompass more than 10% of the lake’s surface area.

SPECIAL MIXING ZONES

1. The radius of the mixing zone in a reservoir/lake is 750 feet.
2. The radius of a mixing zone in the coastal area is 400 feet. It is referred to as the Discharge Information Zone (DIZ).

SPECIAL COMMENTS

1. Within the ZID, effluent concentration can exceed both its acute and chronic values. At the edge of the ZID, effluent concentration can exceed its chronic value but must be less than, or equal to, its acute value. Between the edge of the ZID and the edge of the mixing zone, effluent concentration can exceed its chronic value but must be less than its acute value. At the edge of the mixing zone, effluent concentration must be less than its acute value and less than, or equal to, its chronic value. Outside the mixing zone, effluent concentration must be less than both its acute and chronic values. For WET, effluent concentration is typically given in units of percentage. For individual pollutants, effluent concentration would be given in more conventional units such as mg/L or ug/L. Also, **water quality standards must be met at the edge of the mixing zone. This includes temperature and bacteria criteria.**
2. Due to the way in which the ZID and mixing zone are defined, it necessarily follows that the ZID is always a smaller zone located inside of the larger mixing zone. Another way to think of it is that the ZID can be considered a “subset” of the mixing zone.