

# Chlorine Tablet Study

Dennis Hill Microbiologist - Des Moines Water Works - November 2008

To determine the life of an intact chlorine tablet dropped into a 2600 feet deep well, a study was performed.

I.

A tablet was dropped into a 500 milliliter graduated cylinder and was determined to fall through one foot of 78 °F water at one foot per second. This value was considered the slowest value, because free fall causes an object to accelerate with time, until its rate of fall is offset by air or water resistance. The maximum time to reach the bottom of the 2600 foot deep well was calculated to be 43 minutes.

The tablet was allowed to remain at rest in the cylinder for the 43 minutes to observe the diffusion rate of the chlorine. The chlorine concentration of the top layer of water was tested at five, twenty-one, and forty three minutes. It measured at 13 mg/L, 28mg/L, and 44 mg/L respectively. The chlorine value at the bottom of the cylinder was tested at the end of the test period, and was 160,000 mg/L. These values indicate a very slow upwards diffusion of the chlorine in water at rest.



II.

A second chlorine tablet was added to a 4000 milliliter beaker of 78 °F water. The water was slowly stirred for forty-three minutes to duplicate the turbulent effects of water on a falling chlorine tablet.

The tablet slowly dissolved, and was approximately one-fourth gone at forty-three minutes. The stirring was stopped at this time to duplicate a tablet at rest at the bottom of the well. The rate of dissolution was dramatically slowed, requiring a few hours more to dissolve.



This study indicates if chlorine tablets were dropped into an ASR well, that they would reach the bottom largely intact. They would dissolve creating a zone of concentrated chlorine that would likely diffuse horizontally more than vertically.