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Risk Assessment of Millsboro, DE Trichloroethylene Contamination

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Millsboro, DE Trichloroethylene Contamination

Rebecca Mills

BIOL364-50: Perspectives in Toxicology (Instructor: Dr. Erin Shanle), Longwood University

Background

- Location: Millsboro, DE (Figure 1).
- Site used to contain poultry vaccine factories (1).
- Factories caused contamination of trichloroethylene in water supply (1).
- After factories were demolished, residents experienced contaminated drinking water

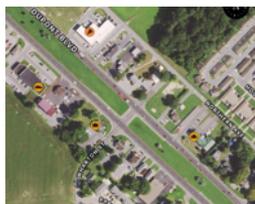


Figure 1. Current residential area of Millsboro experiencing water contamination.

Specific Aim

Develop a perspective on the risk management of the Millsboro, Delaware trichloroethylene contamination using multiple perspectives

Methods

Hazard characterization

Dose-response assessment

Describe/research surrounding community

Assess risk to surrounding community

Develop a perspective on risk management

Results

Hazard characterization:

- Exposure routes are oral ingestion and inhalation (2).
- Side effects include nausea, liver damage, death (3).
- TCE contains chlorine groups, which have similar side effects (Figure 2).
- Carcinogen: causes kidney cancer (3).

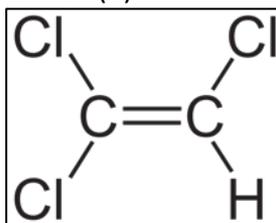


Figure 2. Structure of TCE

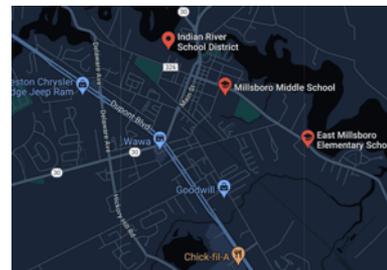


Figure 3: Map view of schools (red) and parks (green) in Millsboro.

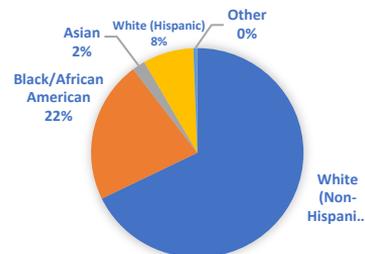


Figure 4. Racial demographics of Millsboro, DE

Dose- response assessment:

- RfD: 0.005 mg/kg/day (4).
- RdC: 0.002 mg/m³ (4).

Scientific Study:

- Children born from mothers exposed to TCE experienced lower birth weight (5).

Surrounding community: (6)

- Close-knit community (Figure 3).
- 15.9% poverty rate
- Median income: \$20,000
- Population: 6,863
- Racial demographics (Figure 4).

Conclusions

- Surrounding community is at risk for kidney cancer (Figure 5) (7).
 - Poverty
- Positive efforts done to remove contamination
- Constant water filtration necessary
- Education for surrounding community



Figure 5. New kidney cancer rates per state in 2018. Darker regions indicate a higher rate. Delaware in red circle

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