

FOCUS: Drinking Water Treatment

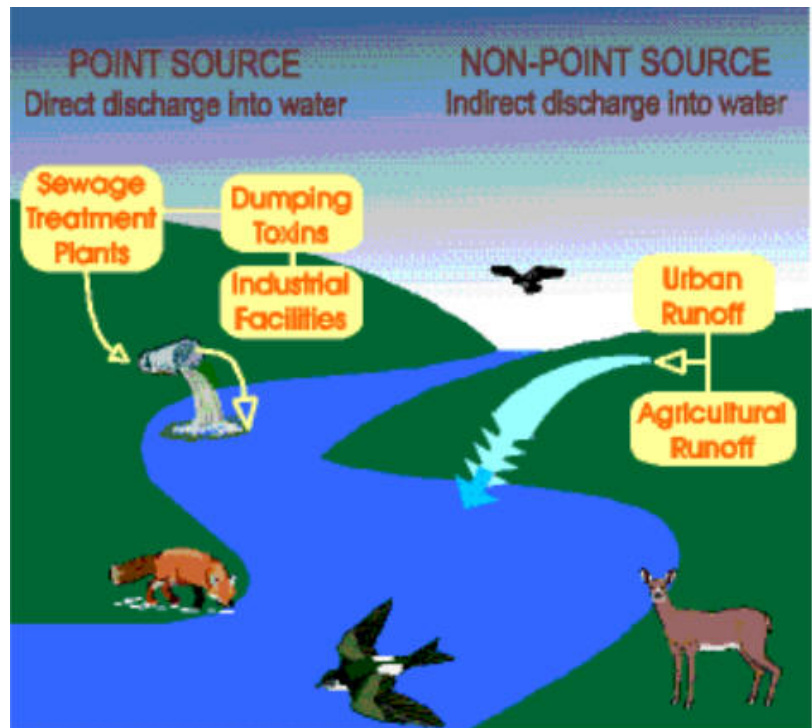
ESSENTIAL QUESTION: Who is responsible for developing and maintaining drinking water standards? How is drinking water treated to ensure safety for the population?

What do you already know?

- Most municipal (city) drinking water is supplied by SURFACE WATER (rivers, lakes, streams, and reservoirs).
- Hillsborough's municipal water is supplied by the ENO RIVER.

How do we know our municipal drinking water is safe?

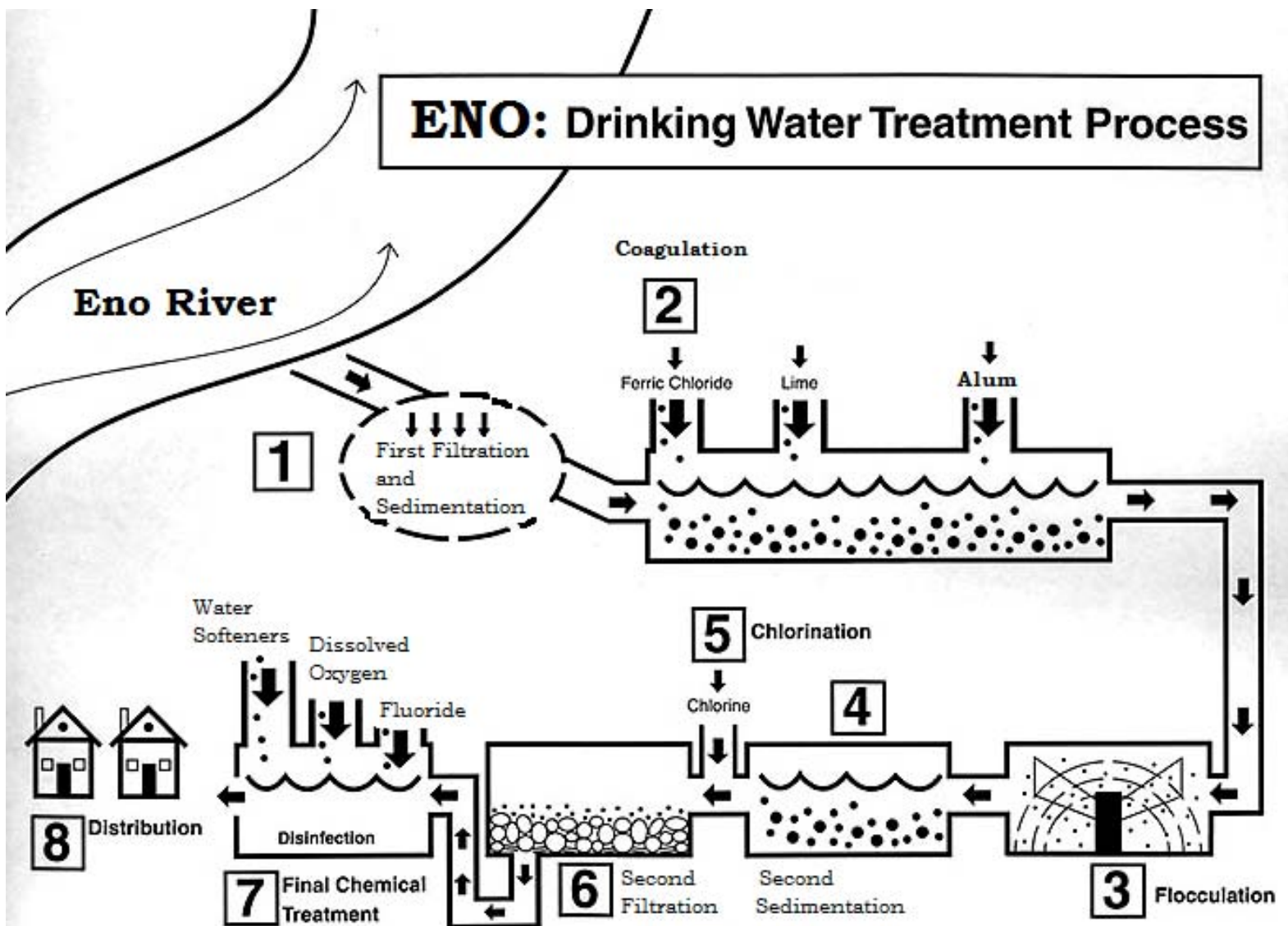
- The EPA (ENVIRONMENTAL PROTECTION AGENCY) is responsible for ensuring the safety of municipal drinking water supplies.
- Clean water has a long history in the United States and we are fortunate to live in a nation where it has been a national priority for almost a century:
 - 1914 – Drinking water standards implemented for COLIFORM COUNTS in public and private wells (*E. coli* bacteria found in fecal waste)
 - 1940 – Drinking water standards begin to apply to municipal (CITY) water supplies.
 - 1972 – CLEAN WATER ACT (CWA) passed to regulate the discharge of pollutants into waters of the United States. Made it illegal to discharge any pollutant from a POINT SOURCE into a body of water.
 - Point source of pollution: A SINGLE, IDENTIFIABLE, LOCALIZED SOURCE OF POLLUTION
 - Ex: Industrial discharge, wastewater treatment discharge
 - Nonpoint source of pollution: POLLUTION FROM A DIFFUSE OR DIFFICULT TO TRACE



SOURCE

- Ex: Urban runoff (gasoline, litter), agricultural runoff (fertilizers, pesticides), eroded sediments
- 1974 – SAFE DRINKING WATER ACT (SDWA) passed to set minimum/maximum standards for factors found in drinking water
- 1980s – Technology developed to create membranes for REVERSE OSMOSIS (uses pressure to filter out pollutants on the molecular level)

How is drinking water treated before consumption?



1) First Filtration & Sedimentation

- Water is FILTERED through screens to remove large items such as FISH, LEAVES, and TRASH.
- Natural Sedimentation: Large SUSPENDED PARTICLES naturally SETTLE to the bottom of the settling pool.
- Filtered, settled water passes to the COAGULATION tank.

2) Coagulation

- Chemicals are added (FERRIC CHLORIDE, LIME, ALUM) that cause sticky FLOCS to form.
- Floccs: CLUSTERS of solids. Mud, bacteria, and other sediments STICK to the floccs.

3) Flocculation

- The water is SLOWLY MIXED by large paddles to encourage the small FLOCS to form larger and larger FLOCS.

4) Second Sedimentation

- The remaining solids (FLOCS) sink to the bottom of a SETTLING BASIN.
- The solids will either be removed to an ORGANIC WASTE facility or broken down further by BACTERIA before removal.

5) Chlorination

- Chlorine is added to kill any remaining MICROORGANISMS.

6) Second Filtration

- The water is allowed to trickle through SAND or GRAVEL to slowly filter out ALGAE, BACTERIA or CHEMICALS.

7) Final Chemical Treatment

- WATER SOFTENERS are added to remove calcium and potassium from water.
- DISSOLVED OXYGEN is added to improve taste and smell.
- FLUORIDE is added to help prevent tooth decay.

8) Distribution

- Water is either passed directly into the MUNICIPAL distribution pipes or is stored in a WATER TOWER for later use.