PREVENTING THE THREAT OF *E.COLI* 0157:H7 IN OUR POTABLE WATER SUPPLY SYSTEMS

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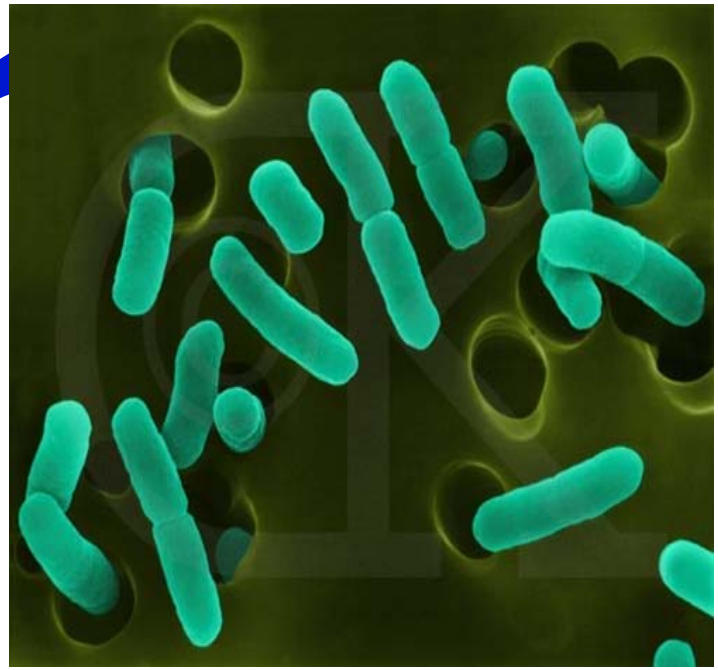
E coli 0157:H7



- *Escherichia coli* O157:H7 is the most notorious serogroup of verotoxigenic *E. coli* (VTEC) and belongs to a subgroup of VTEC that is associated with human disease and referred to as enterohaemorrhagic *E. coli* (EHEC).

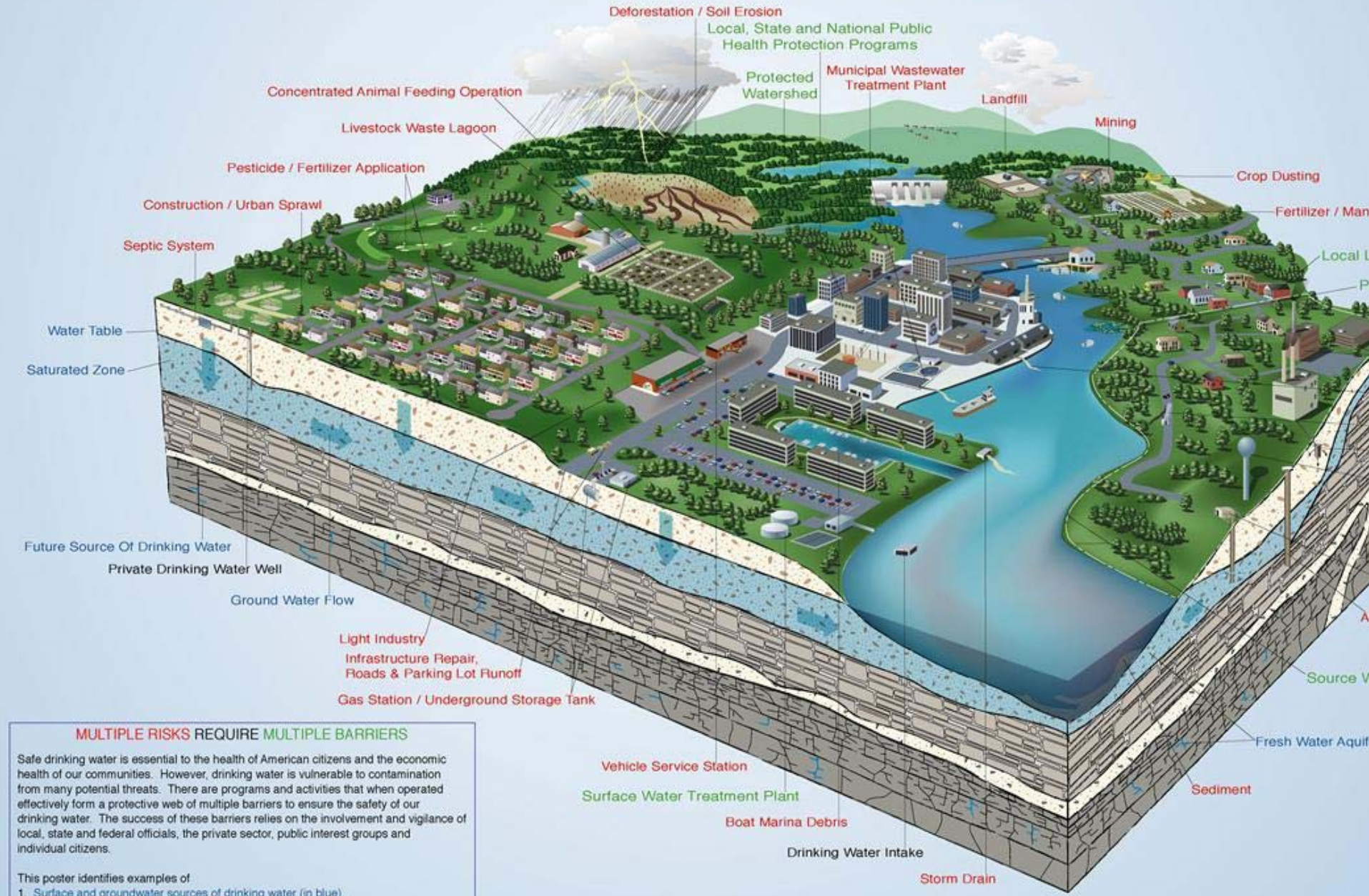
Special Populations:
30% of the population is at-risk

Elderly

The Very Young

Immune-suppressed

Safe Drinking Water Act - Protecting America's Public Health



MULTIPLE RISKS REQUIRE MULTIPLE BARRIERS

Safe drinking water is essential to the health of American citizens and the economic health of our communities. However, drinking water is vulnerable to contamination from many potential threats. There are programs and activities that when operated effectively form a protective web of multiple barriers to ensure the safety of our drinking water. The success of these barriers relies on the involvement and vigilance of local, state and federal officials, the private sector, public interest groups and individual citizens.

This poster identifies examples of

1. Surface and groundwater sources of drinking water (in blue),
2. Potential threats to those drinking water sources (in red), and
3. The multiple barriers that together protect our nation's public health (in green).
   - Risk Prevention Barrier
   - Risk Management Barrier

Drinking-water quality management

There are two principal components to drinking-water quality management:

- Product quality control [QC]
- Monitors compliance with standards

•*QC tells you something has gone wrong after it had happened*

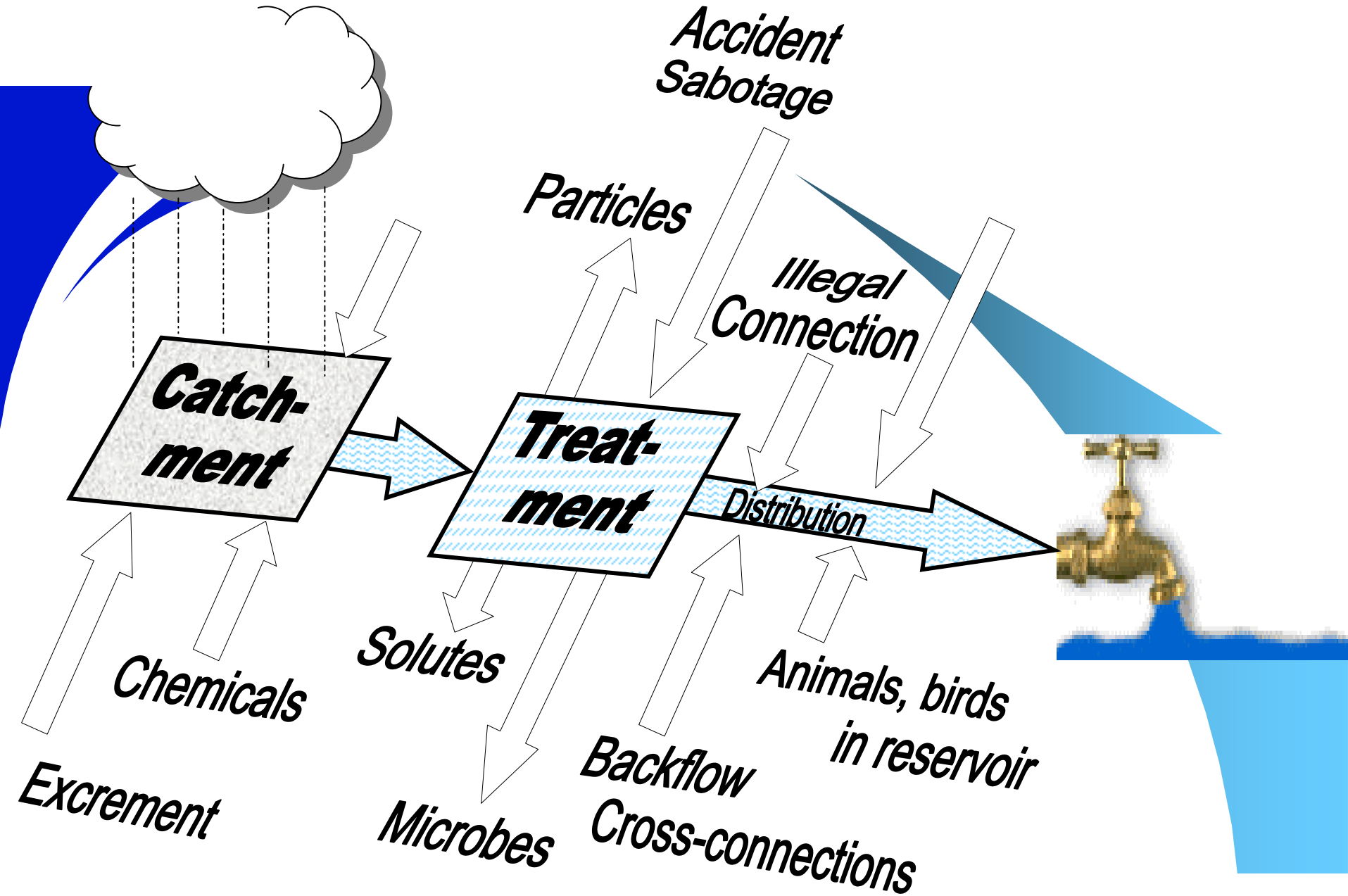
- Process quality assurance [QA]
- Uses risk management

•*QA tries to stop something going wrong*

Components of a water supply

The four components of a water supply system are:

- The catchment
  Supplies the raw water for the supply
- The treatment plant
  Purifies the raw water to make it safe for drinking
- The reticulation [or distribution system]
  Conveys the drinking-water from the treatment plant to the user's system
- The user's system
  May be a complex system of pipes and tanks, or as simple as a water jug.

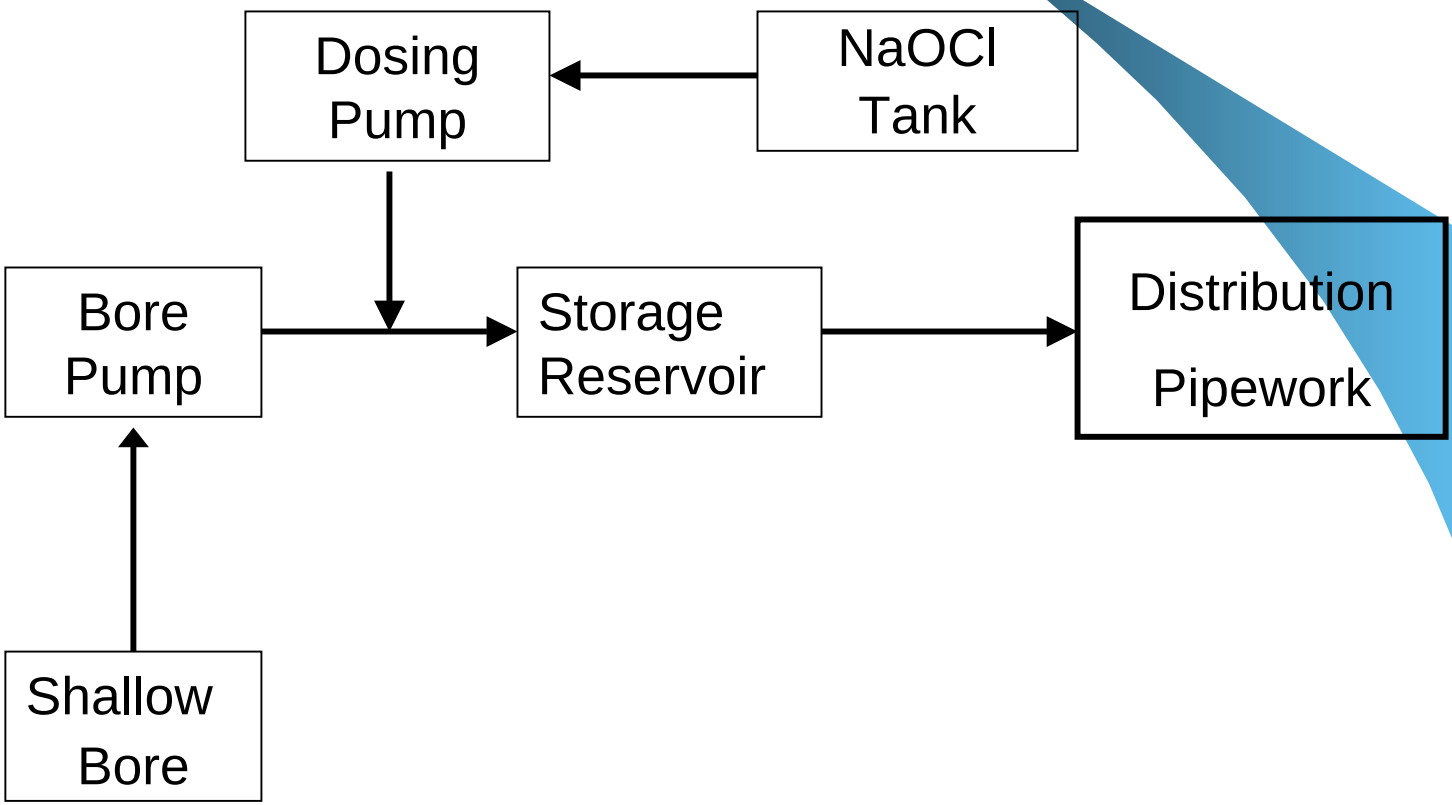

Accident
Sabotage
Particles
Illegal
Connection
Catch-
ment
Treat-
ment
Distribution
Chemicals
Solutes
Animals, birds
in reservoir
Excrement
Microbes
Backflow
Cross-connections

Barriers to contamination

Check the presence of the four barriers to contamination:

- Prevention of contamination of the raw water
- Removal of particles from the water
- Inactivation of any germs in the water
- Prevention of recontamination after treatment

Water Supply Flow Chart



Summary of the QA process

- Make a flow chart of the supply
- Identify the supply elements in the supply

Risk Assessment

- Identify the public health risks for each supply element
- Rank the risks according to their magnitude

Risk Management

- Identify the options [preventive & remedial] for managing each risk
- Assess the resources [dollars, staff, expertise,equipment] needed for each option
- Decide on the order of priority for managing each risk [use a cost benefit approach]
- Develop a programme for managing each risk.

Risk Assessment

The components of risk assessment are:

(i) hazard identification (identification of the biological, chemical, or physical agent, disease, or adverse health outcome),

(ii) exposure assessment (determination of the frequency of disease, the number of people exposed to contaminated water, and the prevalence, growth, contamination, survival, or destruction of pathogens in water),

(iii) hazard characterization (identification of the adverse health effects associated with the hazard), and

(iv) risk characterization (estimation of the risk, the numbers of cases and severity)

The Seven Principles of Hazard Analysis Critical Control Points (HACCP)

- Prepare a list of steps in the process where a significant hazard may occur and describe the preventative measures (Figure 2).
- Determine the Critical Control Points (CCP) in the process.
- Establish the critical limits for preventative measures associated with each identified CCP.Establish CCP monitoring requirements.
- Establish procedures for using the results of monitoring to adjust the process and maintain control.
- Establish corrective action to be taken when monitoring indicates that there is a deviation from an established critical limit.
- Establish procedures for verification that the HACCP system is working correctly.
- Establish effective record-keeping procedures that document the HACCP system.

The End

Figure 1. Source water contamination

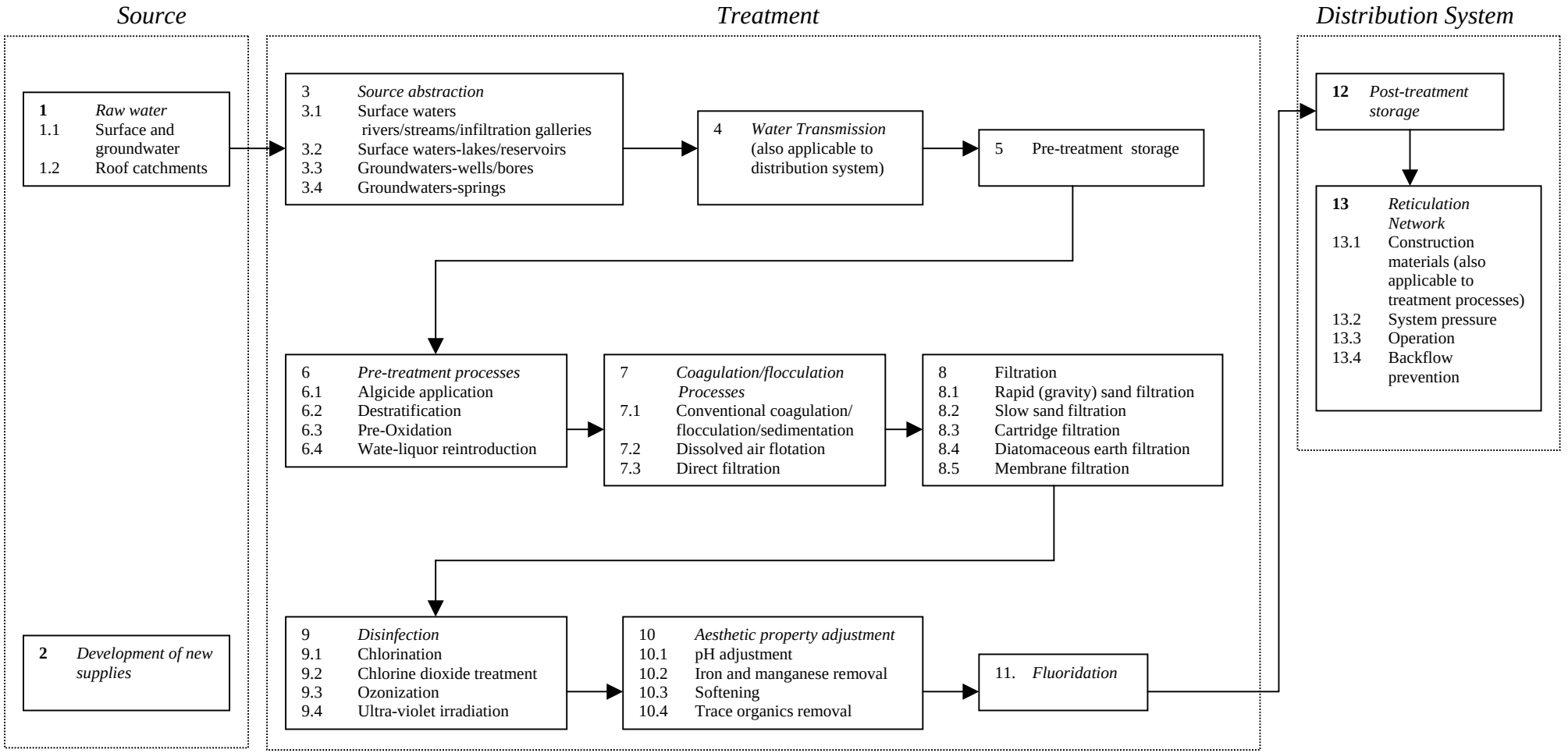


Figure 2: Generalized flow diagram which could be used in HACCP (Adapted from the Ministry of Health, 2001)