WATER TREATMENT ON NPP

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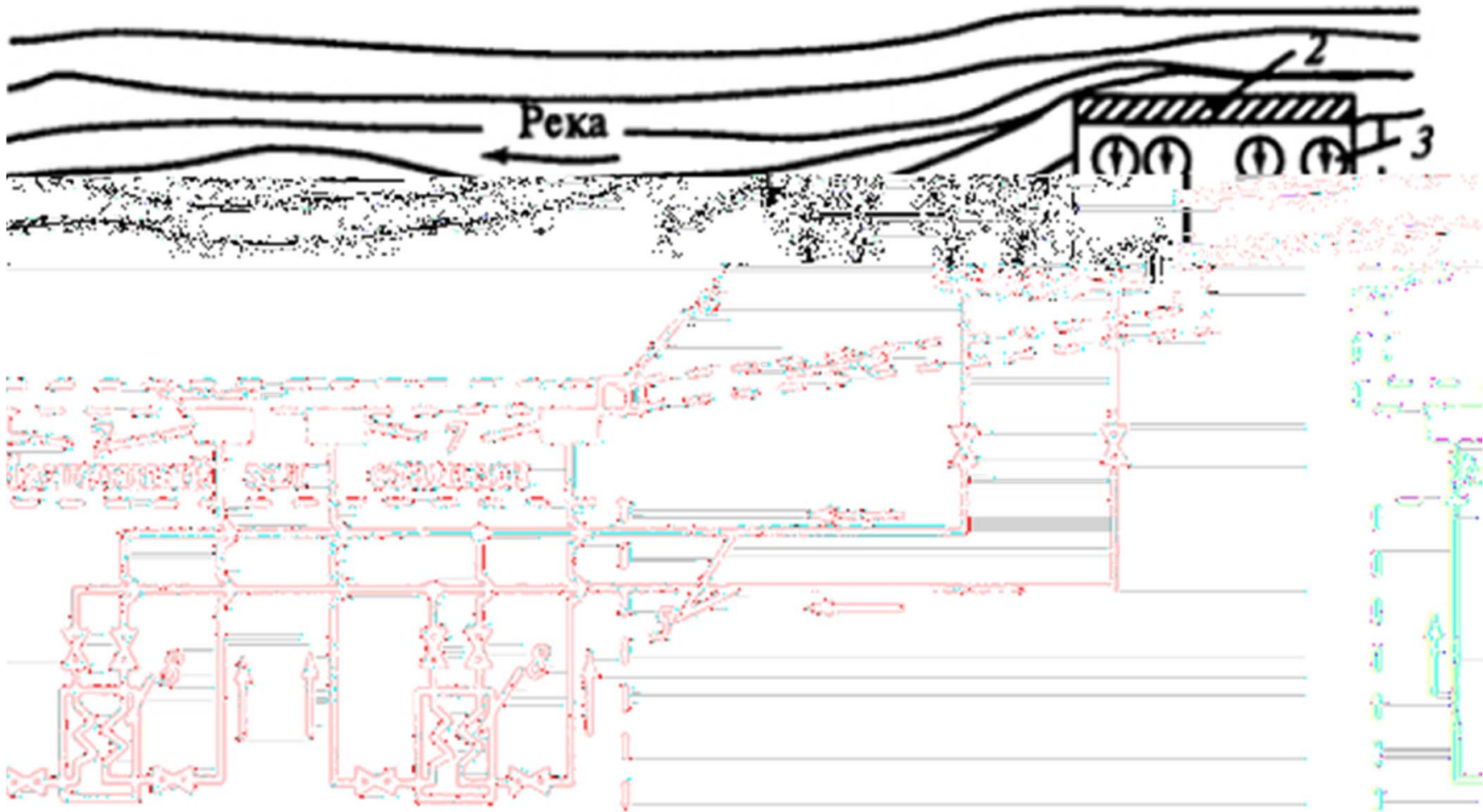
Purpose of water treatment on NPP

- WTS (water treatment system) includes all coolers of NPP.
- The reliability of nuclear power plant is directly connected to reliability of WTS.
- Dependence of NPP efficiency and reliability of cooling water temperature is following:
  - Lesser cooling water temperature → lesser energy consumption on cooling water pumping and lower pressure into condenser → higher reliability of NPP.
  - Obtaining lower possible temperature of cooling water is one of the most important purposes of NPP WTS.

- Choice of cooling water source is one of the determining during NPP design.

Types of WTS

- **Once-through WTS** (the water is taken directly from source, used once and then returned to source).
    - The highest vacuum into condenser.
    - The higher thermal efficiency.

- **Closed WTS** (the water is used, threatened and returned into cycle to use it once more).
    - Lower risks of thermal, radioactive contamination.
    - Natural instability of water source.

Due to high risk of contamination by radioactive elements the once-through systems are avoided on new NPP.

Principal scheme of once-through WTS

Features of once-through WTS

- Natural source of water:
  - Lake of river;
  - Sea.
- The flow rate in the natural source should be at least 5 times higher than NPP need for cooling water.
- To limit thermal contamination of water source the increasing of temperature should be limited by 5 ^{0}C at summer and by 3 ^{0}C at winter.
- If sea water is used the presence of salts into cooling water should be considered. To prevent it:
  - The special water regime should be kept.
  - The special materials should be used.

Closed-type WTS

- In closed-type WTS the cooling water circulated by contour: NPP → circulating pump → cooling water cooler → NPP.

- Coolers of cooling water:
  - Cooling basins;
  - Spray basins;
  - Cooling towers.