

Spring 2021
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Design Project 2021:
Water Chemistry

The general instructions for your design project did not include a very thorough chemical analysis of the contaminated water. Here is additional information that you might want to use in completing your design project. Recall that the contaminated water is pumped out of the ground at a variable rate and is stored in a large holding tank (equalization basin); then the water is drawn out of the equalization basin at a constant flow rate of 120 gallons per minute, which is the design flow rate for each of your three treatment options.

Temperature (upon extraction from ground): 13 °C
 Temperature (in equalization basin): 18 °C

pH: 7.1 ± 0.1
 Specific conductance: 460 ± 40 μS/cm
 Total organic carbon: 2.0–2.1 mg/L
 Total phosphorus: 0.07 ± 0.01 mg/L
 Dissolved oxygen: 1.0–2.0 mg/L

Turbidity (upon extraction from ground): 0.9 ± 0.1 NTU
 Turbidity (exiting equalization basin): < 0.15 NTU

Concentrations of chemical species (all in mg/L):

TCE	2.0
1,1,2,2-TeCA	0.018
cis-DCE	0.5
Cl ⁻	4
F ⁻	0.2
NO ₃ ⁻	1.4 (as N)
SO ₄ ⁻	11
Ba ²⁺	0.03
Ca ²⁺	78
Fe ³⁺	0.2
K ⁺	4.3
Mg ²⁺	24
Na ⁺	1
SiO ₂	22

Total dissolved solids: 320 ± 20 mg/L
 Total alkalinity as CaCO₃: 280 ± 15 mg/L