Parameter Group	Relevance	Relevant Case Study
Physical Parameters		
Dissolved Oxygen	Dissolved oxygen is a measure of oxygen in the water. Dissolved oxygen can affect geochemistry in aquifers, resulting in decreasing or increasing levels of arsenic. The sediment composition in the aquifer can affect release potential (Fakhreddine et al. 2020).	Orange County, CA (Fakhreddine et al. 2020).
Temperature	Temperature differentials might play a role in bacterial growth and clogging. Temperature gradients can also be used as tracer for analysis of water movement (Caligaris, Agostini, and Rossetto 2022). Temperature can also change water viscosity (AWWA 2015).	
Turbidity	Turbidity is a way to measure particles in the water. The units are nephelometric turbidity units (NTU), a measure of light scatter.	Salisbury, South Australia (Page et al. 2015)
Total Dissolved Solids (TDS)	The sum of all substances dissolved in water, including organic and inorganic substances. A high number of dissolved solids can hinder water use (USGS Water Resources 2019). Dissolved solids could leach into the receiving aquifer if the source water is high in TDS (Waterhouse et al. 2020).	Perth, Western Australia (Johnston, Martin, and Higginson 2013)
Total Suspended Solids (TSS)	The sum of solids suspended in the water, greater than 2 microns in size.	Perth, Western Australia (Johnston, Martin, and Higginson 2013)
Chemical Parameters		
Disinfection By-products	Adding chlorine or other disinfecting substances, such as chlorine dioxide or ozone, to water for disinfection can result in reactions that produce chemicals that pose human or environmental risks. Examples are chloroform, bromoform, bromate, chlorodibromomethane, and N-nitrosodimethylamine (NDMA). Conditions within the aquifer may determine whether disinfection by-products degrade or remain (Imig et al. 2022; Landmeyer, Bradley, and Thomas 2007; Liu et al. 2018).	

Emerging Contaminants PFAS Pharmaceuticals Microplastics	There are currently several contaminants in drinking water that are not regulated. These are often called emerging contaminants or unregulated contaminants. The USEPA has an unregulated contaminant monitoring rule and has set some proposed MCLs for some contaminants, such as six PFAS contaminants as PFOA and PFOS, though these proposed values are not enforced by USEPA. There are also health advisories for some contaminants that are not enforced. More information can be found at USEPA's page called Monitoring Unregulated Contaminants in Drinking Water (https://www.epa.gov/dwucmr). Potential risks of PFAS in MAR, for example, are outlined in Page et al. (2019).	City of Tucson, AZ (Cáñez et al. 2021)
Inorganic Chemicals	Inorganic chemicals are natural elements, such as arsenic, manganese, iron, or compounds such as sodium chloride or hydrogen peroxide. Inorganic chemicals may affect aquifer water quality. Sometimes inorganic chemicals are mobilized from the surrounding geologic structures through interaction with the source water chemistry.	Green Bay, WI (Bilotta et al. 2021)
Nutrients	Nutrients such as nitrogen or phosphorus can encourage the growth of microbes such as bacteria and algae. There are water quality parameters in place in some states to ensure nutrient levels are kept low. Nitrate and nitrite can also affect potability of drinking water, as it can cause health conditions like blue baby syndrome.	(Waterhouse et al. 2020)
Pesticides	Pesticides are chemical formulations that are intended to manage populations of pests such as insects, rodents, and weeds. Pesticides can be found in stormwater or irrigation runoff, particularly in agricultural or developed areas, including residential areas. Infiltration into an aquifer could affect possible end uses of the water, such as drinking water, without further treatment.	A potential concern in agricultural MAR. (Levintal et al. 2023)
pH	pH is a measure of how acidic or basic the water is, based on the number of hydrogen atoms. pH can influence geochemical reactions that release minerals into the water.	Perth, Western Australia (pH buffering) (Seibert et al. 2016)
Salinity	Salinity is a measure of salts in the water—often sodium chloride—but other salts can be measured as well. Water that has high salinity is unsuitable for humans or animals to drink and often unsuitable for other purposes, such as irrigation (USGS Water School of Science 2018) In certain areas, salt water might intrude into freshwater aquifers.	Southwestern U.S. (Zektser, Loaiciga, and Wolf 2005)
Sodicity	High sodium can cause swelling of clays, followed by possible mobilization of metals (AWWA 2015).	
Total Organic Carbon (TOC)	Total organic carbon is how much organic carbon is in water. This is a measure of how many organic contaminants (plant material, animal material, microbes, and synthetic organic chemicals) that a water body contains. High TOC can result in low oxygen levels if materials start to decompose, and low oxygen levels can have geochemical effects.	Finland (Jokela et al. 2017)

Volatile Organic Compounds	Volatile organic compounds (VOCs) might be present in receiving aquifers because of previous contamination, such as from improper disposal practices. Source waters may also be contaminated. There are state and federal limits on VOCs.	Copenhagen, DK and Gothenburg, SE (Kuster et al. 2010)
Biological Parameters		
Algae/Cyanobacteria	Cyanobacteria blooms (also called algae blooms) can emit cyanotoxins into the water that can be very toxic to humans and animals if ingested and cause skin irritation on contact. USEPA has an MCL for microcystin, one type of cyanotoxin, and health advisories for others, such as anatoxin and cylindrospermopsin (USEPA 2022e). Some states also have their own requirements or guidelines. MAR via bank infiltration might be a good means to remove cyanotoxins.	Lagoa do Peri, Brazil (Brookes et al. 2021)
Bacteria	Bacteria such as *Escherichia coli (E. coli*), *Salmonella, Campylobacter,* or other pathogens with animal or human sources may cause human illness if the water is ingested or contacted.	Salisbury, South Australia (Page et al. 2015) Llobregat MAR system, Spain (Barba et al. 2019)
Protozoa	Protozoa are parasites often shed into the water from ill animals or humans. When ingested by humans, they can cause illness. Many states have specific requirements for MAR water quality.	Shafdan, Israel; Nardò, Italy; Bolivar, Australia; and Sabadell, Spain (Ayuso-Gabella et al. 2011)
Viruses	Viruses such as norovirus or enterovirus, often from human sources, can cause human illnesses in others when the water is ingested or contacted.	Parafield, Australia (Sasidharan et al. 2017)
Radiological Parameters		
Naturally Occurring Radioactive Materials (NORM)	Naturally occurring radioactive elements can be found in the aquifer water when it is extracted. Radioactive particulates, called radionuclides, can be harmful to human health. Many states use the federal MCL or their own water quality measures to determine whether water is safe for drinking purposes ((USEPA 2022f), (USEPA 2022g)).	