

Technology in Practice

What, Why & How?



TIP 10 - Mixing Water Quality for Concrete

This TIP outlines qualification tests and documentation for use of non-potable water as mixing water

WHAT is Mixing Water?

Water is an important constituent in concrete. It chemically reacts with cement (hydration) to produce the desired properties of concrete. Mixing water is the quantity of water that comes in contact with cement, impacts slump of concrete and is used to determine the water to cementitious materials ratio (w/cm) of the concrete mixture. Strength and durability of concrete is controlled to a large extent by its w/cm. Mixing water in concrete includes batch water measured and added to the mixer at the batch plant, ice, free moisture on aggregates, water included in any significant quantity with chemical admixtures, and water added after batching during delivery or at the jobsite. Water absorbed by aggregates is excluded from mixing water.

Besides its quantity, the quality of mixing water used in concrete has important effects on fresh concrete properties, such as setting time and workability; it also has important effects on the strength and durability of hardened concrete.

WHAT Sources of Water Can be Used in concrete?

In general, water that is fit for human consumption (potable) is acceptable for use as mixing water. However, non-potable sources of water can also be used provided the source does not negatively impact the properties of concrete. Most concrete plants have a source of municipal water that supplies potable water and this can be used as mixing water without any qualification testing. In rural areas, or for portable plants set up on project sites, the concrete producer may have to rely on non-potable sources such as wells, streams or other bodies of water. All concrete producers will also generate process water by cleaning mixers and plant components, also referred to as wash water. Additionally, precipitation on the site of the concrete plant generates storm water that may be collected at the plant. Environmental regulations typically require concrete plants to treat process and storm water to achieve certain characteristics like pH or solids content before it is discharged from the property. Process and storm water at concrete plants is referred to as *water from concrete production operations* in ASTM C1602.

Process water is also generated when returned concrete is washed out in concrete reclaimer systems. These systems collect process water with the cement and aggregate fines in the form of a slurry that can be re-used as mixing water in concrete.

WHY Should Non-Potable Water be Qualified for use?

Water is an important resource for human existence. In some areas potable water supply is in short supply. Use of non-potable sources of water for production of concrete supports sustainable production of concrete by conserving potable water resources. Managing water from concrete production operations for compliance with environmental regulations represents a cost to the concrete producer and using this water can represent considerable savings for producing concrete. The producer should realize that there is, however, a cost to evaluate, manage and reliably use non-potable water as mixing water in concrete.

When non-potable sources of water are used, it is important to verify and document that the impurities in the water do no harm to concrete. Non-potable sources of water can contain oils, grease, dissolved salts, and