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East Side Water Supply Project
CAP Advisory

Title: **Unit Wells 7 and 8, Iron and Manganese Management Options**

Author(s): Various CAP members

Introduction.

The Madison Water Utility is developing a system evaluation, capital project development, and water quality project for the east side of the Utility's main pressure zone (Zone 6-East.) The Water Utility has established a "CAP", Citizens Advisory Panel, to advise the Utility and the Water Utility Board and to facilitate the public review on this project. The CAP operates by the direction provided in the Madison Water Utility's Standard Operation Manual, ENG-001, entitled Public Participation Process for Water Utility Facilities.

The CAP began meeting October 8, 2010. On April 25, 2011, the CAP received a Technical Memorandum from Black & Veatch entitled, Unit Well NOS. 7 & 8 – Iron and Manganese Management Options. The memorandum presented three management options, Treatment, Mixing, and Flushing and then developed in detail five scenarios:

1. Mixing only by mixing water from Well 7 paired with Well 45 and Well 8 paired with Well 11
2. Treatment only at Well 7 and mixing the water of Well 8 and Well 11
3. Treatment only at Well 8 and mixing at Well 7 and Well 45
4. Treatment at Well 7 and at Well 8
5. Pumping water from Well 7 and Well 8 to another site for treatment ("regional treatment")

The CAP has considered the Technical Memorandum as a part of the agenda of two meetings and then reviewed individual concerns on May 23, 2011.

Purpose of the Advisory

The objective of this advisory is to advise the Water Utility Board regarding reducing the iron and manganese levels from Unit Wells 7 and 8, which exceed the EPA's Secondary Maximum Contaminant Levels (SMCL) for these compounds.

Main Point

Unit Wells 7 and 8 are not available for continuous service because of dirty water due to manganese and iron levels. Based upon our review of the data presented by Black & Veatch and Water Utility staff, the reduction of the levels of iron and manganese in the water pumped from Unity Wells 7 & 8 can be more fully and economically accomplished with the construction of treatment facilities constructed at or in close proximity to the each Unit Well site.

This action also provides the Water Utility with the greatest flexibility in the operation of the Water Works and maintains the Water Utility's century old concept of the "Unit Well".

In formulating this point, the authors recognize that:

- It is incumbent on the Madison Water Utility to provide a reliable source of clean water for its customers.

- The alternatives studied include treatment, mixing and flushing. Treatment removes the iron and manganese from the water before being distributed to the public.

  Mixing dilutes the iron and manganese using water from another unit well with lower levels of those compounds but does not remove these compounds from the water supply. It may not reduce iron and manganese to acceptable levels consistent with the current water utility policy for new wells and may be problematic if and when more restrictive standards are developed. Mixing requires a lot more energy to "move water around."

  Flushing involves the dumping of considerable water to the storm sewers whereas treatment only requires the wasting of a minimal amount of water to backwash the filters.

- Redundancy and contingency plans are a form of insurance necessary in providing a reliable source of clean water (i.e., plan for the worst and hope for the best).

- Providing more wells rather than fewer provides greater assurance, flexibility, and opportunity to address other water quality and quantity challenges faced by the Water Utility and its customers.

- Reducing manganese and iron levels in the water may reduce health issues associated with high levels of these compounds. In addition, other benefits accrue from the removal of these compounds, e.g. less pipe flushing and all customers enjoying high quality water including customers, such as hospitals and the food industry, that require the highest quality of water.

- Mixing increases the "moving parts" in the Water Works. If one well is down for repairs, maintenance, or pollutant intrusion, other wells that depend on it for proper mixing may be affected.

- Treatment is the least costly and results in the cleanest water of the five (5) Scenarios considered.

- The five Scenarios considered represent a broad appraisal of the options. The CAP does not suggest that additional options be studied.

Recommendations

We recommend that Madison Water Utility:

- Construct treatment facilities for Well 7 and 8, similar to the filtration process used for Well 29 at or in close proximity to the each Unit Well site to reduce the levels of iron and manganese. Separate CAPs for Unit Wells 7 and 8 should be established.

- Plan the expansion of existing sells with "additional room" for to accommodate the design and installation of additional treatment facilities required for removal of volatile organic compounds (VOCs) should treatment prove necessary given the potential for future VOC contamination.

- Establish an interim or contingency plan to ensure that water from Well 7 and Well 8 is safe and acceptable for use during the several years it will take to install these treatment facilities.

- Plan for "emerging contaminants" such as Chromium 6 (Hexavalent Chromium) with the goal of becoming proactive in the study and treatment of newly identified contaminants and the

provision of full and accurate information to Madison water users. What is the next Chromium 6 (Hexavalent Chromium)? How can the Water Utility move from a reactive to a proactive position?

Priority

We recommend that these projects be scheduled as soon as practicable and in conformance with the financial ability of the Utility.

Pumping water into the system with visible levels of iron and manganese will not meet the standards of the Utility or generate customer support.