Marana Groundwater Treatment Campuses

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Corin Marron, PE (Carollo)
Today’s agenda

• Marana Water history
• Unregulated compound background
• Public outreach efforts
• Treated water operational targets & historical water quality
• Treatment options
• Design update
• Project funding
Marana Water Service Area
Gallons Billed 2018 – 742.59M
Enterprise Management

2018 Water Use by Type in Millions

- Single Family
- Multi-family
- Comm'l
- Gov't
- Construction
- Other Turf

Millions

Marana Water’s Unregulated Compound Background

2009
- EPA Drinking Water Health Advisories (HAs) for PFOA and PFOS established at 400 ppt and 200 ppt, respectively.

2011
- HA established for 1,4-dioxane at 0.35 ppb.

2016
- HAs for PFOA and PFOS reduced to 70 ppt combined.
  - **Late 2016** – Marana confirms 1,4-dioxane in wells and notifies the customer base.

2017
- Marana confirms the presence of PFAS in some of the water systems and notifies the customer base. Marana sends letter to ADEQ on behalf of Tucson Water and Metro Water asking for an investigation.
- Marana Water initiates a water quality assessment study to identify potential solutions to the issues. ADEQ launches study to collect data from public and private groundwater sources.
- **December 2017** – Marana finalizes the Water Quality Assessment Report.
The information on this page will give our customers information on the water quality, respond to questions and issues, and clarify the need to test for quality and the EPA click here.

### PROJECT WATER

Town Council approved Resolution No. 2018-091 on Tuesday, September 25 authorizing the creation of the Picture Rocks water treatment capital project and the Marana Water treatment capital projects. View the proposed project timeline here.

### RESIDENTIAL SERVICES SEARCH

Learn who provides water/wastewater to your address. Use the search bar below to determine which water provider serves your home. When searching for an address be sure to include the direction (S, E, N, W) for example 103 W 1st Ave, to get an address.

### UPDATES

April/May 2019

### CONSTRUCTION PROCESS

During the past two months, our engineering consultant, Cordis Engineering, completed a draft preliminary design report (PDR). This report includes proposed site layouts, preliminary engineering design, and treatment process selection. The Marana Water team has reviewed the PDR and the draft project is moving toward final design and construction. Additionally, a pilot test is underway to test the construction manager for the project. After the competitive process, Cordis Engineering was selected as the construction manager and will include all construction services.

### TREATMENT PROCESS

To the right is an example of the recommended treatment process that we will use at the water treatment plants. You can click on the image to enlarge. The process includes a series of filters and adsorption beds to remove settleable solids or substances that are not dissolved. After being filtered and adsorbed, the water passes through a series of filters and adsorption beds to remove settleable solids or substances that are not dissolved. After being filtered and adsorbed, the water passes through a series of filters and adsorption beds to remove settleable solids or substances that are not dissolved.
Marana Water Service Area

### Airline/Lambert Water Treatment Campus
- **Flow**: 1,000 gpm
- **Well**: Saguaro Bloom 1, Saguaro Bloom 2 (future)

### Picture Rocks Water Treatment Campus
- **Flow**: 1,400 gpm
- **Wells**: Continental Reserve 1, Continental Reserve 2
### 1,4-dioxane Water Quality Operational Target

<table>
<thead>
<tr>
<th></th>
<th>Units</th>
<th>1,4-dioxane</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011 Health Advisory</td>
<td>ppb</td>
<td>0.35</td>
</tr>
<tr>
<td>(1x10^-6 excess estimated lifetime cancer risk)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Marana Treated Water Quality Operational Target</strong></td>
<td>ppb</td>
<td>0.1</td>
</tr>
</tbody>
</table>

1. Treated water goal is set at current method reporting limit for 1,4-dioxane. Design includes an engineering safety factor for consistency of operational performance.
Concentrations of 1,4-dioxane

The graph shows the concentrations of 1,4-dioxane over time, with data points for Continental Reserve 1, Continental Reserve 2, and Saguaro Bloom. The x-axis represents dates from 8/18/2016 to 2/4/2019, while the y-axis represents concentrations in parts per billion (ppb). The graph includes two horizontal lines indicating the Health Advisory Level and the Treated Water Quality Operational Target.
## PFAS Water Quality Operational Target

<table>
<thead>
<tr>
<th></th>
<th>Units</th>
<th>PFOA</th>
<th>PFOS</th>
<th>PFHxS</th>
<th>PFNA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2009 USEPA Provisional Health Advisory</strong></td>
<td>ppt</td>
<td>400</td>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2016 USEPA Health Advisory</strong>&lt;sup&gt;(1)&lt;/sup&gt;</td>
<td>ppt</td>
<td>70 (combined)</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td><strong>2018 Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Level (MRL)</strong></td>
<td>mg/kg/day</td>
<td>$3 \times 10^{-6}$</td>
<td>$2 \times 10^{-6}$</td>
<td>$2 \times 10^{-5}$</td>
<td>$3 \times 10^{-6}$</td>
</tr>
<tr>
<td><strong>Equivalent Value based on ATSDR MRL</strong>&lt;sup&gt;(2)&lt;/sup&gt;</td>
<td>ppt</td>
<td>11</td>
<td>7</td>
<td>74</td>
<td>11</td>
</tr>
<tr>
<td><strong>Marana Treated Water Quality Operational Target</strong>&lt;sup&gt;(3)&lt;/sup&gt;</td>
<td>ppt</td>
<td>17.5 (combined)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. When both PFOA and PFOS are present in drinking water, combined levels are not to exceed 70 ppt.
2. Equivalent values calculated using the ATSDR MRLs and the same methodology that was used to determine the 2016 Health Advisory levels for PFOA and PFOS.
3. When both PFOA and PFOS are present in drinking water, combined levels are not to exceed 17.5 ppt. Operational target is set at 25% of the current health advisory for PFOA and PFOS.
Concentrations of PFAS

The diagram shows the concentrations of PFOS, PFOA, PFBS, PFDA, PFHpA, PFHxS, PFHxA, and PFNA in Picture Rocks Wells and Airline/Lambert Well. The health advisory level, treated water quality, and operational target are indicated on the graph.

Concentration (ppt)
What treatment options do we have for PFAS and 1,4-dioxane?

PFAS

- Ion Exchange (IX)
- Carbon Adsorption (GAC)
- Reverse Osmosis (RO or NF)

1,4-dioxane

- Advanced Oxidation Process (UV-H$_2$O$_2$)

Brine disposal
Water Quality Assessment Report (2017) evaluated two treatment options for the Water Treatment Campuses:

- **UV AOP + GAC**
  - Sediment Removal
  - UV-\(\text{H}_2\text{O}_2\)
  - GAC Lead/Lag
  - Reservoir
  - \(\text{H}_2\text{O}_2\)
  - IX placed upstream of UV AOP to remove PFAS
  - GAC quenches excess \(\text{H}_2\text{O}_2\) and removes PFAS

- **IX + UV AOP + GAC**
  - Sediment Removal
  - Ion Exchange Lead/Lag
  - UV-\(\text{H}_2\text{O}_2\)
  - GAC for quenching
  - Reservoir
  - Backwash
UV AOP and GAC selected for full-scale treatment

- Prefilters for Solids Removal
  - Desander
  - Bag Filter
- UV-H₂O₂
- GAC for Adsorption & H₂O₂ Quenching
- Ca(ClO)₂
- Reservoir
- Booster Station
- Backwash
- To Sewer or Recycle
### UV AOP Design Criteria

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Picture Rocks</th>
<th>Airline/Lambert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow</td>
<td>gpm (mgd)</td>
<td>1,400 (2.0)</td>
<td>1,000 (1.4)</td>
</tr>
<tr>
<td>UV AOP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log Reduction of 1,4-dioxane</td>
<td>--</td>
<td>1.25</td>
<td>1.25</td>
</tr>
<tr>
<td>UV Transmittance</td>
<td>%</td>
<td>97</td>
<td>97</td>
</tr>
<tr>
<td>Number of Duty Trains</td>
<td>No.</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Peroxide Dose</td>
<td>mg/L</td>
<td>11-20</td>
<td>5-8</td>
</tr>
</tbody>
</table>

Same number of UV reactors and duty trains at each site
## GAC Design Criteria

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Picture Rocks</th>
<th>Airline/Lambert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow</td>
<td>gpm (mgd)</td>
<td>1,400 (2.0)</td>
<td>1,000 (1.4)</td>
</tr>
<tr>
<td>GAC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Media Type</td>
<td>--</td>
<td>Re-agg. bit. coal-derived</td>
<td>Re-agg. bit. coal-derived</td>
</tr>
<tr>
<td>Number of Trains</td>
<td>No.</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Number of Contactors per Train</td>
<td>No.</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Total Number of Contactors</td>
<td>No.</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Contactor Diameter</td>
<td>ft</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Liquid Loading Rate</td>
<td>gpm/ft²</td>
<td>6.2</td>
<td>4.4</td>
</tr>
<tr>
<td>Total EBCT per Train</td>
<td>min</td>
<td>14.2</td>
<td>20.0</td>
</tr>
</tbody>
</table>

Same number of trains and GAC contactors at each site
Airline-Lambert Site Layout

- ACCESS ROAD
- DESANDERS
- BAG FILTERS
- PURGE TANK
- UV AOP BUILDING
- GAC CONTACTORS
- GAC BACKWASH TANK
Project Funding

ESTIMATED $15M FOR BOTH SITES

Excise Tax
Added to overall Town pledged revenue requirements. Might limit other Town projects.

Utility Revenue Obligations
Not enough capacity in current system revenues

Grants and similar
Likely not enough cash flow

Internal fund transfers
Currently obligated for other Town projects

CIP reallocation
Likely not enough cash flow; impact to other projects

Water Infrastructure Financing Authority Loan
External funding; federal requirements
Debt Repayment Options

**LEGAL SETTLEMENT**
Unknown if/when might occur

**REVENUE SAVINGS**
Too volatile for annual use

**SALES TAX REDISTRIBUTION**
Allocate a portion of current rate to the project. Restricted to this project only.

**SALES TAX INCREASE**
Increase the current rate as a dedicated resource for ongoing revenues
Questions