# Municipal Wastewater Treatment Sector Concerns Re: Proposed Ch. 95 Revisions

Presented to DEP – WRAC
Chapter 95 Task Force
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# Municipal Wastewater Systems in PA

- 1,000 +/- Publicly-Owned Sewage Treatment Works (POTWs) in PA
- Many serve multiple municipal service areas
- Sizes range from 20,000 gal/day to 250 million gal/day
- Most have some amount of commercial customers (such as car washes, laundromats, restaurants)
- Many have a variety of industrial customers (landfill leachate, metal-fabrication/finishing, chemical mfg, food-processing, etc)

# POTWs and Gas Production Activities

- Some started to take gas-well wastewater but told to stop by DEP
- A few are currently taking, or plan to take, gas-well wastewater (with DEP permission) as a very small % of influent volume (and after some degree of pretreatment for solids, metals, hydrocarbon reduction)
- Some have been approached by gas companies to use POTW effluent for well fracing purposes
- There are financial incentives to do either, or both
- Protecting integrity and performance levels of POTW is of paramount concern

# Total Dissolved Solids (TDS)- What Is It ??

- “Solids” is matter suspended or dissolved in water
- Total Solids = All the matter
- Suspended Solids-Larger than 2 micrometers
- Dissolved Solids-Less than 2 micrometers
- Note:  Definition is Size Only, not further defined and does not relate to metal ions, could be any matter, organic or inorganic.
- [as per Standard Methods]

# Total Dissolved Solids (TDS)- What Is It ??

- It is not a “pollutant” in and of itself
- Some constituents of TDS, of course, can be polluting at high-enough levels (such as chlorides, sulfates, organic hydrocarbons)

# Sources of Dissolved Solids in Municipal Wastewater ?

- In public drinking water (natural background and/or from salt-based water softening)
- In urine and feces
- In food from kitchen garbage disposals
- In kitchen and laundry gray water
- Dissolved from water lines and plumbing, for example, copper and lead
- Industrial and commercial discharges
- Chemicals added during sewage treatment

# What Happens to TDS at Publicly Owned Treatment Works ?

- POTWs depend upon a variety of biological and physical treatment processes in order to achieve NPDES permit limits
- Each POTW can tolerate a certain level of TDS (generally related to inorganic constituents, such as chlorides) before the integrity and efficiency of the treatment process is compromised
- The “acceptable” level of incoming TDS therefore will become a limiting factor

# What Happens to TDS at Publicly Owned Treatment Works ?

- Depends somewhat on the treatment processes employed
  - Physical/chemical processes will reduce the solubility of certain dissolved solids and cause them to precipitate
    - For example, phosphorus precipitation by ferric chloride
  - Biological activity will incorporate dissolved solids in cells either through respiration or through cell synthesis
    - Both organic and inorganic TDS
- Depends on what the TDS is (organic or inorganic)

# Which TDS will a POTW Likely Remove?

- Not highly soluble metal ions like NaCl except through cell synthesis
- Many other metal ions, like barium, radium, strontium, aluminum, calcium, magnesium, manganese, iron, etc., can be removed to a large degree if P/C treatment applied (but end up in biosolids)
- Organic TDS to a large degree

# TDS Removals at the Pottsgrove POTW

**140 EDU POTW SYSTEM WITH SALT BASED HOME WATER SOFTENERS**

| | Influent | | | | |
|---|---|---|---|---|---|
| **Date** | **Flow (MGD)** | **TDS (mg/L)** | **TDS (lbs/day)** | **$Cl^-$ (mg/L)** | **$SO_4^{-2}$ (mg/L)** |
| 1/14/2009 | 0.01274 | 960 | 102 | 319 | |
| 3/17-18/09 | 0.02018 | 1416 | 238 | 626 | |
| 5/19-20/09 | 0.01512 | 1060 | 134 | 234 | 130 |
| 5/26-27/09 | 0.01600 | 968 | 129 | 255 | 45 |
| 6/9-10/09 | 0.01078 | 1400 | 126 | 507 | 144 |
| 6/17-18/09 | 0.01330 | 1552 | 172 | 607 | 100 |
| 8/11-12/09 | 0.01479 | 1096 | 135 | 353 | 90 |
| 8/25-26/09 | 0.01343 | 1232 | 138 | 512 | 80 |
| **Average** | | 1211 | 147 | 427 | 98 |

# TDS Removals at the Pottsgrove POTW

**140 EDU POTW SYSTEM WITH SALT BASED HOME WATER SOFTENERS**

| | Effluent | | | |
|---|---|---|---|---|
| **Flow** | **TDS (mg/L)** | **TDS (lbs/day)** | **$Cl^-$** | **$SO_4^{-2}$** |
| 0.01274 | 938 | 100 | | |
| 0.02018 | 880 | 148 | | |
| 0.01512 | 1078 | 136 | 280 | 60 |
| 0.016 | 1042 | 139 | 282 | 60 |
| 0.01078 | 952 | 86 | 291 | 92 |
| 0.0133 | 970 | 108 | 305 | 50 |
| 0.01479 | 1108 | 137 | 337 | 60 |
| 0.01343 | 852 | 95 | 316 | 50 |
| AVERAGE | 978 | 119 | 302 | 62 |
| PERCENT REMOVAL | 19% | 19% | 29% | 37% |

# TDS Removals at the MRSA POTW
# Large Amounts of Organic TDS from ConAgra Grocery Group

| | ConAgra Influent | | | | |
|---|---|---|---|---|---|
| **Date** | **Flow (MGD)** | **TDS (mg/L)** | **TDS (lbs/day)** | **$Cl^-$** | **$SO_4^{-2}$** |
| 1/14/2009 | 1.544 | 964 | 12413 | | |
| 3/18-19/09 | 1.556 | 848 | 11005 | 65.7 | |
| 5/6-7/09 | 1.215 | 1688 | 17105 | 140 | 100 |
| 6/17-18/09 | 1.710 | 968 | 13805 | 84.8 | 90 |
| 6/24-25/09 | 1.760 | 800 | 11743 | 105 | 88 |
| 8/19-20/09 | 1.356 | 640 | 7238 | 88.3 | 90 |
| 8/25-26/09 | 1.391 | 1300 | 15081 | 124 | 100 |
| **Average** | | 1030 | 12627 | 101 | 94 |

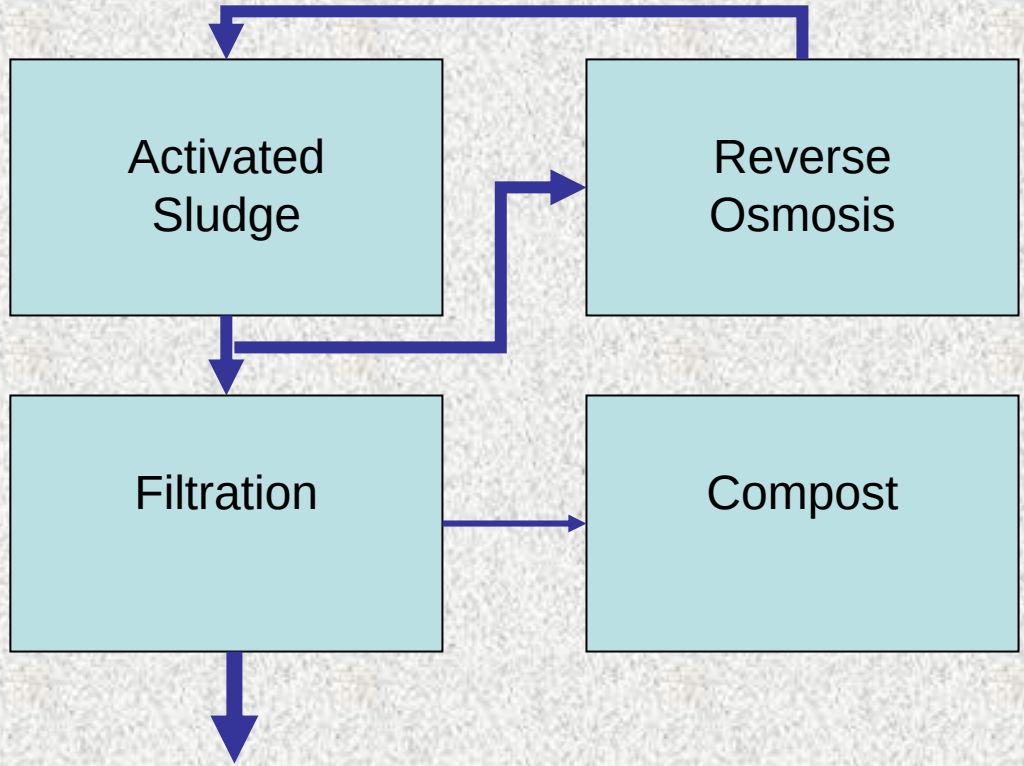
# TDS Removals at the MRSA POTW

| Municipal Influent Without ConAgra | | | | |
|---|---|---|---|---|
| **Flow (MGD)** | **TDS (mg/L)** | **TDS (lbs/day)** | **$Cl^-$ (mg/L)** | **$SO_4^{-2}$ (mg/L)** |
| 0.741 | 184 | 1137 | 67.1 | |
| 0.603 | 244 | 1227 | 46.9 | |
| 0.740 | 260 | 1605 | 53.9 | 72 |
| 0.839 | 244 | 1707 | 50 | 56 |
| 0.664 | 336 | 1861 | 49.5 | 68 |
| 0.995 | 296 | 2456 | 36.6 | 60 |
| 0.627 | 312 | 1632 | 51.7 | 50 |
| Average | 268 | 1661 | 51 | 61 |

# TDS Removals at the MRSA POTW

| | Milton Final Effluent | | | |
|---|---|---|---|---|
| **Flow** | **TDS (mg/L)** | **TDS (lbs/day)** | **$Cl^-$** | **$SO_4^{-2}$** |
| 2.348 | 510 | 9987 | | |
| 2.255 | 294 | 5529 | | |
| 2.133 | 430 | 7649 | 147 | 100 |
| 2.635 | 350 | 7692 | 134 | 56 |
| 2.433 | 380 | 7711 | 120 | 68 |
| 2.452 | 420 | 8589 | 130 | 50 |
| 2.166 | 420 | 7587 | 144 | 40 |
| Average | 401 | 7821 | 135 | 63 |
| Percent Removal | | 45% | | |

# Fate of TDS at UAJA Facility




TDS is rejected by RO returned to Activated Sludge

Small percentage is found in the waste solids

TDS concentration discharged to stream increases but mass remains the same or slightly less

# Proposed limits are concentration based limits

- As water reuse increases, TDS discharge concentration increases
- In UAJA's case, and many water reuse cases, water reuse results in more water in the stream
- Net result is no change downstream of the POTW

# UAJA Water Reuse System Costs

- $17 million capital cost
- $330,000 annual operating cost

# Survey of POTWs Effluent TDS

- PMAA and PWEA E-Alerts and Survey of POTWs for TDS Levels and Other Info [September 2009]
- Relatively few responses (short notice, lack of routine TDS monitoring data)
- Of the responses received:
  - Many POTWs have effluent TDS > 500 mg/l
  - Some have effluent TDS > 1,000 mg/l
  - Occasionally see effluent TDS > 2,000 mg/l
- Reasons for TDS levels:
  - Drinking water source and treatment technique
  - Industrial customers
  - Chemical treatment within the POTW

# Impacts of TDS Regulation to POTW's

- Increased cost of monitoring
- Change in POTWs lab accreditation may be needed ?

If TDS reduction required-

- Additional Capital and O&M costs on top of the existing $36 Billion in PA infrastructure needs
- Additional treatment residuals production
- Possibility of biosolids dewatering difficulty
- Death to water reuse (TDS concentrated in part of discharge not reused)
- Increased user fees

# POTW Questions / Concerns

- Proposed reg will potentially burden many POTWs un-necessarily with stringent TDS limits that will be impossible to meet
- Need to focus more specifically on the problem of Marcellus Shale wastewater handling and disposal

# Recommendations

- Exempt POTW's from technology based TDS standard
  - No documented problems caused by POTW's
  - Impose no monitoring/reporting requirements
  - Apply WQ based standards as necessary
  - Clarify that a POTW receiving hauled in wastewaters is not a CWT
- Other Existing Discharges and types of discharges (non-CWT's)
  - Exempt from any new technology based standard
  - Apply WQ based standards as necessary
- Frac Water CWT's and Frac Water CWT's discharging to POTW's
  - Apply technology based standard of 500/250/250 where discharge is above a water intake
  - Apply WQ based standard if more stringent
  - If not above a potable water intake, no technology limit applies, but apply WQ based standards as necessary

# Recommendations continued

- For the POTW community:
  - Focus on inorganic constituents of TDS
  - Recognize TDS levels in systems' drinking water and provide a credit for it
- In general, it would make sense to encourage the use of treated sewage and treated mine drainage as major sources of water for gas well fracing activities