KEY POINT: Concentrate disposal to sanitary sewer systems has the potential to adversely affect water quality downstream of the waste water treatment plan (WWTP). These impacts are typically minor.

SUMMARY OF ISSUES

- The viability of discharge to the sewer is primarily dependent on 1) how much the discharge increases the salt load entering the WWTP and 2) whether the WWTP has the hydraulic capacity to take the additional flow.

- In many cases, sewer discharge is relatively low in cost and energy use but retains the potential for adverse environmental impacts due to elevated concentrations of salt or trace elements in the treated effluent.

- Inland facilities that desalinate river water (or alluvial aquifers) and blend the concentrate with treated wastewater prior to river discharge should see only minor net downstream increases in river salinity caused by evaporative concentration and other salination processes (NRC 2008). In theory the recombination of desal product water (treated at the WWTP) and concentrate differs in volume from the original water only by the consumptive use.

- Depending on source water composition, brackish groundwater concentrate may add toxic trace and radioactive constituents leached from the subsurface, such as selenium, arsenic, uranium, or radium (NRC 2008). This is typically more of a concern for direct surface water discharge rather than discharge to sewer, however, potential impacts should be evaluated.

- The potential for major ion toxicity for aquatic organisms, due to “imbalance” of ions in the concentrate compared to the receiving water, can be a concern but one that is usually minor due to the low relative volume of concentrate to the total WWTP effluent volume - a condition dictated by other issues (NRC 2008, Mickley pers. comm).

- If the effluent from the wastewater treatment plant is designated for water reuse, the amount of concentrate that can be accepted by the wastewater treatment plant is limited by the content of sodium, chlorides, boron, and bromides in the blend. All of these compounds could have a profound adverse effect on reclaimed water quality, especially if the effluent is used for irrigation (NRC 2008).
A permit from the local sewage agency is typically required to ensure that potential adverse impacts on the wastewater treatment processes, if any, are within acceptable limits. The permit may impose some discharge limits in order to protect sewer lines and treatment plant infrastructure, wastewater treatment processes (mainly biological), and final effluent and biosolid quality. The local sewage agency may also require treatment of the concentrate prior to discharge to meet NPDES permit requirements. Permitting is usually facilitated when the desal plant and the WWTP plant are owned by the same entity.

This method is typically not practical or suitable for large-volume discharges.

STRATEGIES

To minimize environmental effects, concentrate discharge to sewers needs to be coordinated with background water quality, the composition of the concentrate, discharge rates, blending characteristics, and local water quality standards.

BENEFITS & COSTS

Benefits

Sanitary sewer discharge of a small volume of concentrate relative to the total WWTP capacity usually represents a low cost disposal method with limited permitting requirements.

Costs

The feasibility of this disposal method is limited by the hydraulic capacity of the wastewater collection system and by the treatment capacity of the wastewater treatment plant receiving the discharge (Xu et al. 2009). Large-volume discharges are typically not practical or suitable.

While general feasibility is determined largely by relative volumes and salt loads, this method is typically limited to desal of mildly brackish groundwater.

The WWTP may charge a discharge and/or connection fee. According to Mickley 2004, sewer connection and treatment fees can vary significantly for a given location from none to several orders of magnitude larger than the conveyance costs. Connection fees typically depend on the wastewater utility's willingness to take on the volume and the
waste stream discharge characteristics such as TDS and heavy metal loads. These fees can be quite large and prohibitive.

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KEY UNCERTAINTIES

Inland facilities are facing increasingly difficult challenges related to concentrate management (Mickley 2004). Challenges related to concentrate disposal to sewers include:

- Larger concentrate flows of increasing plant size limiting disposal options;
- Cumulative environmental impacts on receiving waters from an increasing number of desal plants in a region; and
- More stringent discharge regulations making disposal more difficult and complicating the permitting process.

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ADDITIONAL RESOURCES


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