CENTRAL ARIZONA SALINITY STUDY --- PHASE I

Technical Appendix N

ARTIFICIAL BRINE in the SALT RIVER VALLEY (SRV)

Executive Summary

While there is limited authoritative data documenting the impacts of brine streams, (regardless of their source), on the local environment, it is clear that managing these streams will represent a long-term issue in many areas of the country. In the Phoenix metropolitan area, this is particularly true in light of the latest Maricopa Association of Governments (MAG) build-out population projection of 12,000,000. Water supplies to serve this population have not been secured, and the impact of drought on current supplies has not been considered. The lack of reliable information represents the most significant issue that must be addressed if long-term, cost effective, solutions are desired for managing the actual impact of brine on the local environment.

Undoubtedly, poor quality waters, such as saline aquifers and reclaimed effluent, will play an increasingly significant role in meeting the needs of the growth expected within the Salt River Valley (SRV). To make these poor quality waters acceptable for public use, advanced technologies will play an important role in meeting the long-term water supply needs of this community. Most important among these technologies will be reverse osmosis (RO) and nanofiltration (NF) membranes because of their ability to reject not only salt, but also the vast majority of the compounds now being considered as emerging contaminants. Both produce brine as a by-product; therefore, brine management will be the core issue that must be addressed when considering the deployment of these technologies. While brine must be considered as part of a comprehensive salinity management strategy, the need to utilize poor quality waters as a renewable potable source far outweighs this issue in this rapidly growing desert community.

To see the ramifications of applying the wrong solution to a salinity issue one needs to look no further than the Yuma Desalting Facility. This $250,000,000 facility has never been fully operated, and may never be operational again. It should serve as a valuable lesson to the SRV. That lesson should be that the valley's salinity issues should be addressed in a proactive manner, based on careful consideration of a wide range of scientifically valid data collected over a statistically relevant period of time.

Introduction

Brine enters water and wastewater systems by a variety of mechanisms. Natural introduction, such as saline springs can impact bulk raw water supplies; while a variety of treatment systems (RO, NF, water softeners and cooling towers) can either concentrate naturally occurring salts, or add new salt to wastewater streams. Irrespective of its source, concentrated salt, in sufficient quantities, can result in a variety of problems for downstream systems and users.

Other papers within this document will address naturally occurring brine, cooling towers, and the impact of salinity upon a variety of interests. While those issues may be touched on here, this paper will limit its focus to artificial brine sources. Scottsdale, Arizona, and its Water Campus Project (WCP), will serve as the primary example of the points addressed in this discussion.

The WCP is a state of the art water resources management facility internationally recognized as a leader in applying technology to meet the long-term water quality and supply issues faced by a growing number of communities worldwide. The facility consists of a 54 mgd conventional water treatment plant, a 12 mgd water reclamation plant, an advanced water treatment (AWT) facility (15 mgd microfiltration (MF), 12 mgd RO), a 20 mgd reclaimed water distribution system, and approximately 20 mgd of vadose-zone recharge capacity. This is an indirect potable reuse facility. Central Arizona Project (CAP) water is treated by MF, and effluent is treated by MF followed by RO, prior to vadose zone recharge. The recharged water percolates through several hundred feet of soil and will eventually be pumped from recovery wells as part the city's potable supply. Membrane systems, (in conjunction with vadose zone recharge) were selected for this project because they best met the water quality concerns associated with indirect potable reuse.

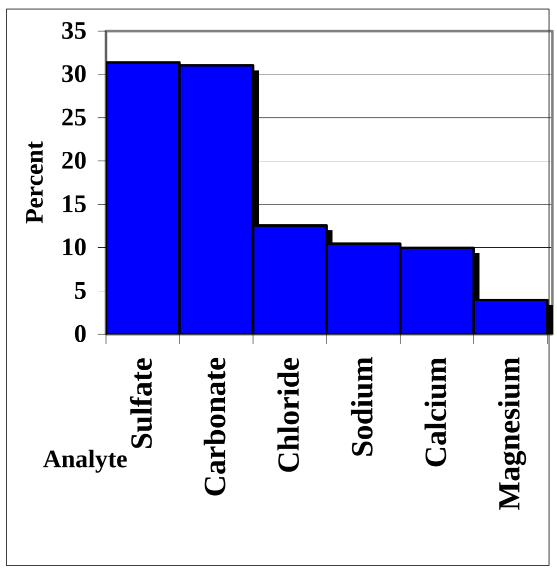
What is Brine?

Brine is often thought of as being concentrated sodium chloride (NaCl); however, this is not necessarily the case, particularly when considering brine streams in the SRV. In general, calcium and magnesium (hardness causing compounds) are very prevalent in the SRV's water supplies. Further, in many valley water sources, carbonate, (and in the case of Colorado River water, sulfate), are more common than chloride. The nature and variety of these salts influence the challenges associated with brine disposal issues. **Figure 1** illustrates this point by showing ion distribution, (as percent), of Central Arizona Project (CAP) water. This imported water source has become a significant component of the SRV's water supply. The ion distribution of CAP water has remained relatively stable since its introduction into the valley.

Sulfate, carbonate, calcium and magnesium comprise 77% of the six most predominant ions found in CAP water, while chloride and sodium constitutes only 23%. Conventional processes, such as lime softening, have historically been used to remove calcium and magnesium, while chloride removal requires membrane systems or evaporative processes. Fortunately, advances in membrane technology, (most notably the introduction of polyamide composites) have provided a common technological solution to both problems.

Figure 1.

CAP WATER ION DISTRIBUTION



Ion distribution in Salt River Project (SRP) water is highly variable due to the various feed sources delivered through the canal system. Further, groundwater quality in the SRV is also inconsistent. These two water sources represent the bulk of the SRV's supply, and given the variability in their TDS, will present the biggest challenge when selecting the appropriate combinations of technology needed to meet desired water quality goals.

Sources of Brine

Key sources of artificial brine within the SRV include cooling towers, water softeners and RO/NF systems. Each process contributes salt by a different mechanism, and is discussed briefly in the following paragraphs.

Cooling towers concentrate salt as water evaporates, (typically by four or more times). As an example, Scottsdale Arizona's water conservation regulations require a minimum total dissolved solids (TDS) of 2000 mg/L be maintained in cooling tower blow down water. Valley-wide, the water lost through this evaporative process is not recovered, and in most cases the concentrate stream is discharged to the sanitary sewer system. Most commercial buildings utilize cooling towers as part of their HVAC systems, and these systems operate almost year-round; therefore, their impact on TDS is expected to be significant in this desert environment. Cooling towers, and their contribution to the valley's salinity issues, are discussed in a separate paper.

RO and NF systems concentrate salts to varying degrees, depending on membrane chemistry, the size of the unit and its application. NF is similar to RO in that both concentrate salts by physical rejection mechanisms, and both are pressure driven. The key difference is that NF systems typically reject all divalent ions (such as calcium and magnesium) while allowing partial permeation of monovalent ions such as sodium. Brine issues are similar for both.

Systems commonly found in residential use operate at low product recoveries (33% or less); while large commercial, industrial and municipal systems may operate with recoveries as high as 90%. The product from these systems may or may not be lost from a given system. For example, a home RO system will probably cause no great difference in

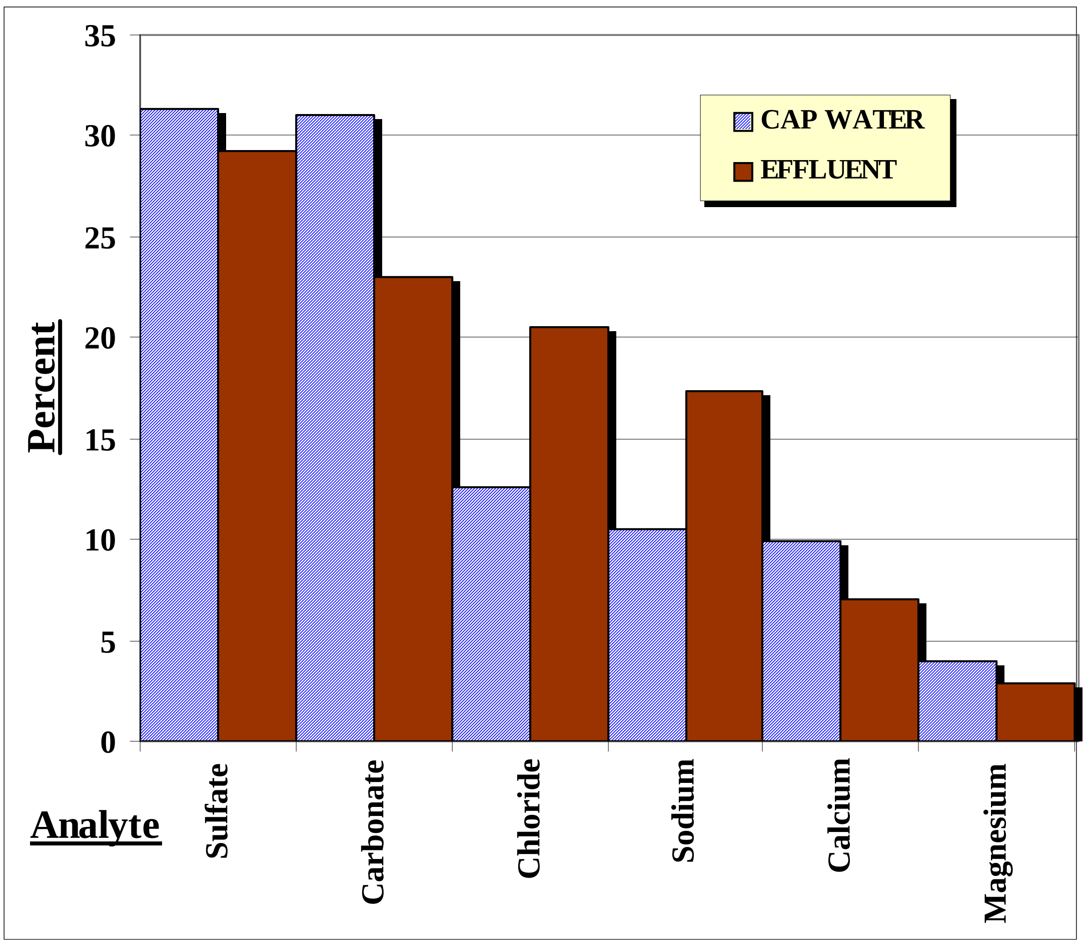
TDS levels discharged to the sewer system when compared to a home with no treatment device, since most of the product water is returned to the sewer system within the home, and no additional salt is added during the process. On the other hand, a large system, such as Scottsdale, Arizona's RO facility (11.9 MGD permeate, 2.1 MGD concentrate during peak production), sends product to one place (the aquifer beneath the facility), while sending brine to another (through the sewer system to the regional water reclamation plant (WRP), and eventually out of the system via stream bed discharge, irrigation, and delivery to a power generating facility). Others, such as the Chandler RO facility, discharge brine to evaporative ponds. This facility treats industrial wastewater for the adjacent Intel® microchip manufacturing facility.

Given an average reclaimed water TDS of 884 mg/l, and product recovery of 85%, a theoretical worst-case TDS of 5900 mg/L would be produced at the WCP.

Water softeners result in a net addition of salt into the SRV environment via the ion-exchange process. Basically, calcium and magnesium are replaced by sodium or potassium. These treatment devices use a saturated (~250,000 mg/L) NaCl or potassium chloride (KCl) solution to regenerate the ion exchange media, and all streams are usually discharged to the collection system. The TDS from these units far exceed that of seawater (~30,000 mg/L). Most water softeners are set up to remove all hardness when installed, and are never adjusted again. Unfortunately, there are no data detailing the amount of salt introduced into the SRV environment by these systems. Estimates are that approximately 110 mg/L of TDS (over background) are contributed by in-home water softeners (Salinity Management Study, Final Report; MWD, USBR; 1999). Because of significant differences in water quality between coastal California and central Arizona, this figure probably understates the impact of water softeners in the SRV. Arizona produces or imports 107,000 metric tons of salt annually (SALT, USGS, 1999) for a variety of uses. The amount of this salt actually used, and subsequently discharged to the sewer system, is not provided in that report.

Figure 2 compares CAP water (the predominant water source in north and central Scottsdale) ion data (shown in **Figure 1**), with reclaimed water treated at the WCP AWT facility, which serves the same area. These data indicate there is a significant increase in sodium and chloride (from 23% to 38%). Overall, TDS in this area increases from approximately 625 mg/L to 884 mg/L between distribution and collection.

Figure 2.



Regulations Governing Brine Disposal

Most brine is discharged to local water bodies, (including sewerage systems), when available. Thirty four percent of RO/NF plants discharged brine to a sewerage system in 2001, up from 23% prior to 1993 (Mickley & Associates; American Membrane

Technology Association; Technology Transfer Workshop; Mesa, Arizona; April 2003). Deep well injection increased from 12 to 15% over the same period, while all other disposal methods (surface water, evaporation ponds, etc.) decreased.

There are no federal regulations governing the discharge of brine streams to a publicly owned treatment works (POTW). Regulations do exist that limit the concentration of specific contaminants discharged to wastewater treatment plants (WWTPs) as part of the pretreatment program required under the National Pollution Discharge Elimination System (NPDES) program.

The Environmental Protection Agency (EPA) has established a secondary, (guidance-only), maximum contaminant limit (MCL) for TDS of 500 mg/L for potable water; however, few water sources within the SRV meet this limit. Additionally, the variability in Salt River TDS (roughly 300 – 1000 mg/L) would make the establishment of regional regulations difficult, and the loss of water required to meet these regulations would be prohibitive in this desert environment.

Federal Underground Injection Control (UIC) regulations provide some control over the sub-surface injection of brines (40 CFR 144); however, these are general in nature due to the variety of geologic conditions existing throughout the country. As a result, considerable flexibility is given to states maintaining primacy over UIC programs.

Local regulations governing brine discharges are limited and vary widely across the United States. One community has established rules banning chloride discharge based on site-specific environmental conditions, while others have actually reduced restrictions on brine discharges. Two examples are provided below which should serve to “book-end” the variability in which communities deal with this issue.

- **Santa Clarita, California** has placed a total ban on the use of all self-regenerating softening systems (Attachment 1) in order to limit the amount of chloride discharged from two reclamation facilities, (the Saugus and Valencia

WWTPs). These facilities discharge into an environmentally sensitive river (the Santa Clara), which is the last natural river in California, as well as home to several endangered species. A study, conducted as part of the regulatory process, attributes 42% of the chloride load to residential use, and of that, 69% from water softeners. These restrictions affect approximately 70,000 people. Other treatment plants in the area, not discharging to this river, have no restrictions on chloride discharge.

- **Tampa Bay Water** has built the largest potable water RO system in the U.S. (as of 2003). The project met the requirements of a significant environmental review, and began operation in 2003. Its feed water will be taken from the cooling tower feed of an adjacent power plant, and the concentrate will be discharged into the cooling tower's discharge line. The combined brine streams will then be returned to Tampa Bay. This approach (locating RO facilities at power plants) is referred to as co-siting, and some of its key advantages are:
    - The use of cooling tower discharge to dilute the concentrate from the RO system,
    - Pre-heated RO feed water significantly reduces the power required to force water through a membrane and,
    - "Inside the fence" power costs significantly reduce operating costs for RO systems.

Florida has a long history of utilizing RO to treat brackish ground water for potable use, and as a result, has significant experience when it comes to dealing with brine disposal. In the early 1990s, most RO and NF plants were failing Whole Effluent Toxicity (WET) tests that were required to be performed on their brine streams, endangering issuance or renewal of discharge permits for these facilities. The state legislature has recently amended state law 403.0882, F.S. (Attachment 2) precluding the use of WET tests as the sole basis for denying discharge permits for RO facilities if the failure is due to "constituents naturally occurring in the source water."

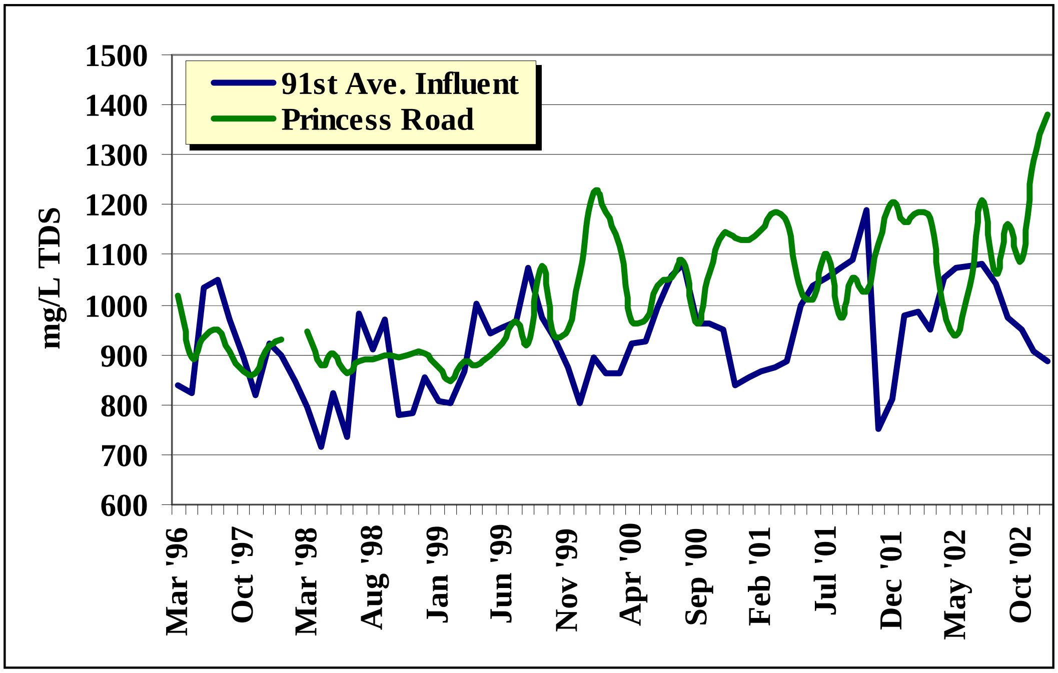
Interestingly, both Texas and California are investigating co-siting for converting brackish coastal waters into potable supplies.

Impact

Most brine streams in the SRV are discharged to a sewer system, and unfortunately, there are no data available documenting actual impacts attributable to these discharges. WWTPs typically rely on biological processes, and the hypothesis has been put forward that increasing salinity may adversely impact the treatment process. In low-lying coastal communities, wide swings in TDS are often experienced at treatment facilities (due to infiltration) as tides rise and fall. WWTPs treating these waters consistently meet compliance requirements. There are exceptions to this. Plants experiencing extreme infiltration episodes have reported problems with the settling characteristics of the biomass. It is safe to assume that given sufficient volumes and concentrations, brine discharges would adversely impact treatment facilities and other downstream users.

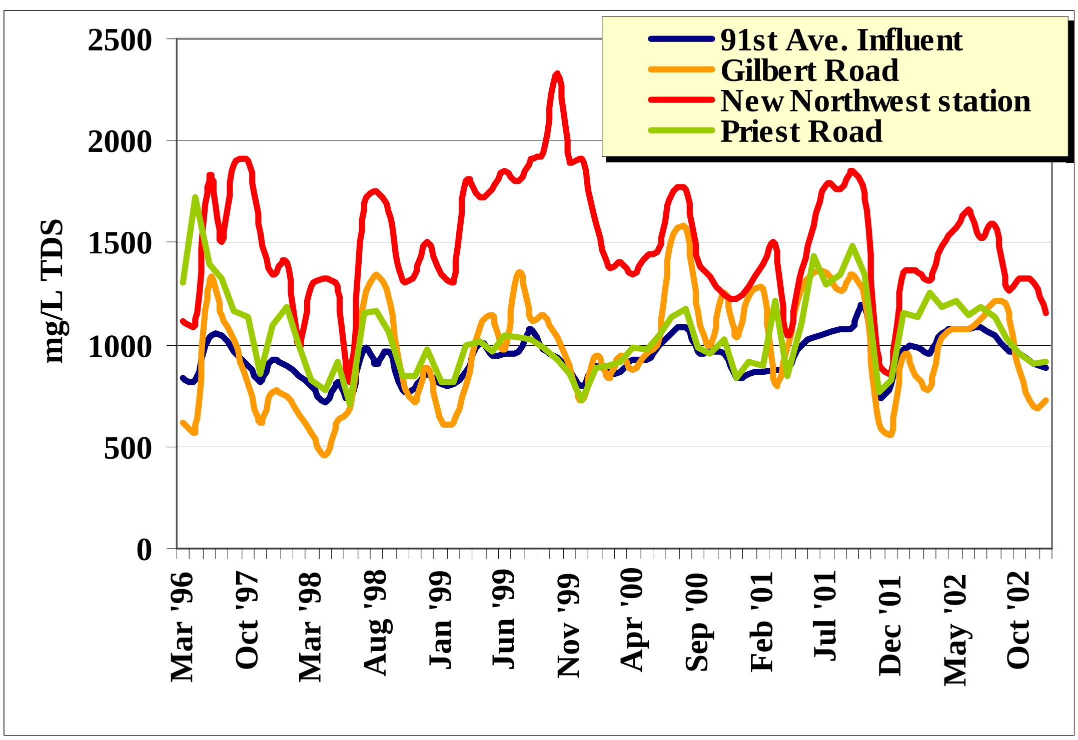
When evaluating the impact of brine streams on WWTPs in the SRV, a particularly difficult challenge comes into play due to the drought cycles routinely experienced in this area. Drought cycles cause wide background swings in TDS concentrations at local water and wastewater facilities. When rainfall is plentiful, TDS is diluted and it appears that there are no salinity issues in the SRV. When drought returns, TDS again increases. **Figure 3** compares the TDS at the Princess Road metering station (which includes WCP brine beginning in the fall of 1999) with the 91st Ave. WWTP influent. Wintertime TDS increases at Princess Road can be clearly seen once brine production begins at the WCP; however, there is no correlation between brine production at the WCP and TDS at the 91st Ave. WRP. Recognizing that the WCP sends most of its reclaimed water to irrigation during warmer months, and treats effluent through the AWT prior to recharge during colder months, this pattern of higher wintertime Princess Road TDS is to be expected.
A correlation with 91st Ave. WWTP TDS is seen at three other sampling sites (Gilbert Road, Priest Road, and New Northwest station), as shown in **Figure 4**.

Figure 3.



Source Data – SROG database

Figure 4.



Source Data – SROG database

Increasing TDS contributions, coupled with drought conditions, could eventually cause impacts to treatment facilities. These impacts could range from increased operations and maintenance costs, to non-compliance issues attributable to the presence of specific contaminants. Unfortunately, there is no real data available to make that determination at this time. The impact of TDS on wastewater treatment facilities is discussed further in a separate paper.

Treatment and Disposal

Treatment and disposal costs of brine streams are important considerations when evaluating the use of advanced technologies for large-scale water purification, as well as advanced water reclamation. The significance of these costs is primarily a function of the value of water in a particular region. Generally, brine disposal methods, and issues, tend to be geographically segregated, and are highlighted in the following paragraphs:

> In coastal areas, brine is usually discharged to local brackish waters or piped out into the ocean. Issues that arise when discharging brine streams to brackish waters center around the impact on young marine species, which use these protected areas as nurseries. With ocean discharges, there have been some concerns raised regarding the development of salt gradients along the ocean floor, and whether or not these gradients result in impacts upon bottom dwelling species. Regardless of these concerns, facilities disposing of brine via these methods routinely meet regulatory requirements and receive discharge permits.

> Inland brine disposal methods consist of deep well injection, evaporation in solar ponds, and crystallization using traditional brine concentrators. All are expensive, waste valuable water, and face significant regulatory restrictions.

Technologies for Brine Management

Many of today's technologies and management strategies are impediments to the widespread implementation of membrane technologies. Brine disposal methods, in the absence of direct discharge, are expensive. Fortunately, alternate technologies, and approaches, are being explored to address concentrate disposal issues. Among these are:

- Salt-gradient ponds,
- Newer generations of brine concentrators that are more energy efficient,
- Membrane processes which have improved significantly over the last several years,
- Irrigation practices that move high TDS waters through fields of multiple crops, with each subsequent crop species being more salt tolerant than its predecessor and,
- Co-siting membrane facilities with power plants to minimize power costs.

Selecting the appropriate combination of technologies and management practices will afford cost-effective solutions to the long-term salinity issues this region faces.

Future Brine Generation

Brine production will probably increase in the SRV; however, the rate at which this occurs is undefined at this time. Current estimates are that the use of RO and NF systems are increasing by 15-18% per year nationally, with many of these facilities treating brackish coastal waters. As population increases, the use of cooling towers and water softeners will also increase. Further, as finite water resources are spread across an ever-increasing demand base, and water quality regulations become more stringent; an increasing number of municipalities and private interests will turn to reliable, high-recovery treatment processes to meet their water resource needs. This is particularly true in the west valley, where ground water tends to be much higher in TDS than ground water in the east valley.

Summary

The generation of brine will, in all probability, increase in the SRV, particularly as population growth requires the utilization of poor quality waters in the southwest valley. More data is needed to determine the amount of brine that will be generated, the impact this will have upon the environment, and the best combination of technologies and management strategies that should be utilized to cost effectively address these issues. Fortunately, technological improvements and innovative planning strategies are providing a greater range of opportunities for managing this long-term SRV issue.

References and Relevant Literature

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Desalination and Water Purification Research and Development Program Report No. 69, Membrane Concentrate Disposal: Practices and Regulation; Mickley and Associates, for the U.S. Department of Interior, Bureau of Reclamation, Technical Services Center, Water Treatment and Engineering Group.

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Major Ion Toxicity in Membrane Concentrate; American Water Works Research Foundation

W. Vernon, The Application of Membrane Systems in Scottsdale Arizona, 2003 American Water Works Membrane Technology Conference, Atlanta, Georgia.

Current Management of Membrane Plant Concentrate; American Water Works Research Foundation

Sub Regional Operating Group (SROG) Database

ATTACHMENT 1

August 28, 2002

Notification of the Continued Prohibition on Brine Discharges from Self-Regenerating Water Softeners and the Imposition of New Chloride Discharge Requirements at Santa Clarita Valley Businesses

This letter is being sent to all businesses in the Santa Clarita Valley as a reminder that it is illegal to discharge salt waste from water softening or conditioning appliances, such as self-regenerating water softeners, to the sewer. If your business has a water softener or conditioning appliance that regenerates on-site, any discharge of concentrated salt waste, also called brine, must be discontinued immediately. As background, the Sanitation Districts of Los Angeles County (Districts) are a confederation of special districts serving the wastewater and solid waste management needs of over five million people in Los Angeles County. The Districts operate eleven wastewater treatment plants, including two water reclamation plants in the Santa Clarita Valley. The two water reclamation plants (the Saugus and Valencia Water Reclamation Plants) discharge tertiary-treated wastewater to the Santa Clara River. While the extensive treatment processes at the water reclamation plants provide a high-quality reclaimed water, they do not remove salt from wastewater. Salt passes through the plants into the river and, if present at high levels, could harm wildlife and interfere with downstream beneficial uses such as agriculture. In the Santa Clarita Valley, the component of salt that is of most concern is chloride. Chloride is best known as one of the two main parts of table and rock salt (sodium chloride).

The Los Angeles Regional Water Quality Control Board (Regional Board), a state regulatory agency, has proposed to further restrict the amount of chloride that can safely be discharged to the Santa Clara River. The Regional Board has announced that it will soon be adopting a water quality plan for the river that will result in the imposition of very stringent chloride limits on discharges from the Saugus and Valencia Water Reclamation Plants. To date the Districts are not in agreement with the Regional Board's proposed permit requirements, but have been actively participating in the process for adopting the water quality plan and providing information to the Regional Board to hopefully ensure that the final chloride limits are reasonable and based on sound science. Because the Saugus and Valencia Water Reclamation Plants do not remove chloride, it will be necessary for all Santa Clarita-area businesses to do their part to reduce the amount of chloride entering sewers, in addition to complying with the prohibition on the discharge of brine wastes. To this end, the Districts are actively investigating potential sources of chloride discharged into the sewerage system and regulating them to the extent feasible. **If source reduction is not successful, the alternative in light of the Regional Board's proposed action is to install very costly treatment processes at the Saugus and Valencia Water Reclamation Plants, which unfortunately would mean that sewer bills for Santa Clarita Valley businesses and residences would increase by four to five times over the current rate.** One significant source of chloride in sewers is self-regenerating water softeners, to which rock salt is added at the point of use on a regular basis for the purpose of resin regeneration. When water softeners regenerate, they produce a waste stream that contains significant amounts of chloride. In Santa Clarita, virtually all of the chloride that is added to a self-regenerating water softener as salt eventually ends up in the Santa Clara River. To protect the quality of the Santa Clara River, the discharge of brine to the sewer from softeners at businesses has been prohibited in Santa Clarita since 1961. Through on-site inspections, the Districts have found that self-regenerating water softeners have been illegally installed at several commercial businesses in the Santa Clarita Valley, and, due to the impending regulations of chloride discharges, we are taking actions to ensure that the prohibition is being strictly observed by all businesses. If your business is currently operating a self-regenerating water softener or other water conditioning system that generates a brine waste, you must immediately stop discharging brines from the unit and adopt an alternative brine disposal method. This prohibition applies regardless of whether you add the salt to a water-softening unit yourself or if you employ water conditioning service provider to add salt to a softener. The prohibition also applies to any business that uses a point-of-use treatment system, such as a reverse osmosis system, that generates a brine waste. Note that it is also illegal to discharge brines into gutters or storm drains, as these structures flow directly to the Santa Clara River without treatment. If soft water is necessary for your business, you may use water softening exchange tanks that are regenerated off-site at a facility that is permitted to accept salt discharges. There are local businesses that offer exchange tank services. Another option is to collect the brine waste and arrange for a service to properly dispose of it. Please be advised that representatives of the Districts' Industrial Waste Section are visiting businesses in the Santa Clarita Valley to make sure the prohibition on the discharge of brine wastes is being followed. In addition to water softener brines, your business may generate other types of chloride waste that is sewered. The Districts are currently conducting a study to identify practices that can reduce sources of chloride-containing wastewater at commercial businesses in Santa Clarita to the extent that is economically and technically feasible. The Districts, along with their representatives, will be performing inspections of local businesses over the next several months as part of this study. Based on the study results, the Districts will be developing a set of available best management practices and requiring Santa Clarita-area businesses to adopt those that are economically and technologically feasible to reduce the discharge of chlorides. You will be notified by mail of any new requirements imposed on your business.

The Districts are firmly committed to continuing to provide an environmentally sound and low cost sewerage service to the residents and businesses in the Santa Clarita Valley. However, as set forth above, this goal is threatened by the action proposed by the Regional Board to unreasonably limit the discharge of chloride to the Santa Clara River. The Districts believe that the environmental integrity of the river and its beneficial uses can be protected without resorting to the extremely restrictive discharge limitations being proposed by the Regional Board.

The Districts appreciate your cooperation in minimizing your company's chloride discharges to the sewer and thus helping to significantly reduce chloride discharges to the Santa Clara River without the addition of extraordinarily expensive treatment processes at the Districts' facilities. For more information on chloride and water quality, please visit the following web-site: www.santaclarita.com/cityhall/pbs/environment/chlorides.htm. If you have any questions about the requirements outlined in this letter, contact Dave Whipple of the Districts' Industrial Waste Section at 562/699-7411, extension 2909.

Very truly yours,
James F. Stahl

Paul C. Martyn
Head, Industrial Waste Section

PCM:dfd
PC Docs: 147048

ATTACHMENT 2

CHAPTER 2001-188
Senate Bill No. 536
An act relating to demineralization concentrate; amending s. 403.0882, F.S.; reorganizing and clarifying the section; directing the Department of Environmental Protection to enter into rulemaking; creating a technical advisory committee to assist in rule development; providing permitting requirements relating to failure of toxicity tests due to naturally occurring constituents; amending s. 403.061, F.S.; providing an exemption allowing demineralization concentrate mixing zones in Outstanding Florida Waters with specific requirements; providing an effective date.
Be It Enacted by the Legislature of the State of Florida:
Section 1. Section 403.0882, Florida Statutes, is amended to read:
(Substantial rewording of section. See
s. 403.0882, F.S., for present text.)
403.0882 Discharge of demineralization concentrate.—
(1) The Legislature finds and declares that it is in the public interest to conserve and protect water resources, provide adequate water supplies and provide for natural systems, and promote brackish water demineralization as an alternative to withdrawals of freshwater ground water and surface water by removing institutional barriers to demineralization and through research, including demonstration projects, to advance water and water byproduct treatment technology, sound waste byproduct disposal methods, and regional solutions to water resources issues. In order to promote the state objective of alternative water supply development, including the use of demineralization technologies, and to encourage the conservation and protection of the state's natural resources, the concentrate resulting from demineralization must be classified as potable water byproduct regardless of flow quantity and must be appropriately treated and discharged or reused.
(2) For the purposes of this section, the term:
(a) "Demineralization concentrate" means the concentrated byproduct water, brine, or reject water produced by ion exchange or membrane separation technologies such as reverse osmosis, membrane softening, ultrafiltration, membrane filtration, electrodialysis, and electrodialysis reversal used for desalination, softening, or reducing total dissolved solids during water treatment for public water supply purposes.
(b) "Small water utility business" means any facility that distributes potable water to two or more customers with a concentrate discharge of less than 50,000 gallons per day.
(3) The department shall initiate rulemaking no later than October 1, 2001, to address facilities that discharge demineralization concen-

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CODING: Words stricken are deletions; words underlined are additions.

trate. The department shall convene a technical advisory committee to assist in the development of the rules, which committee shall include one representative each from the demineralization industry, local government, water and wastewater utilities, the engineering profession, business, and environmental organizations. The technical advisory committee shall also include one member representing the five water management districts and one representative from the Florida Marine Research Institute. In convening the technical advisory committee, consideration must be given to geographical balance. The rules must address, at a minimum:

(a) Permit application forms for concentrate disposal;
(b) Specific options and requirements for demineralization concentrate disposal, including a standardized list of effluent and monitoring parameters, which may be adjusted or expanded by the department as necessary to protect water quality;
(c) Specific requirements and accepted methods for evaluating mixing of effluent in receiving waters; and
(d) Specific toxicity provisions.
(4)(a) For facilities that discharge demineralization concentrate, the failure of whole effluent toxicity tests predominantly due to the presence of constituents naturally occurring in the source water, limited to calcium, potassium, sodium, magnesium, chloride, bromide, and other constituents designated by the department, may not be the basis for denial of a permit, denial of a permit renewal, revocation of a permit, or other enforcement action by the department as long as the volume of water necessary to achieve water quality standards is available within a distance not in excess of two times the natural water depth at the point of discharge under all flow conditions.
(b) If failure of whole effluent toxicity tests is due predominately to the presence of the naturally occurring constituents identified in paragraph (a), the department shall issue a permit for the demineralization concentrate discharge if:
1. The volume of water necessary to achieve water quality standards is available within a distance not in excess of two times the natural water depth at the point of discharge under all flow conditions; and
2. All other permitting requirements are met.
A variance for toxicity under the circumstance described in this paragraph is not required.
(c) Facilities that fail to meet the requirements of this subsection may be permitted in accordance with department rule, including all applicable moderating provisions such as variances, exemptions, and mixing zones.
(5) Blending of demineralization concentrate with reclaimed water shall be allowed in accordance with the department’s reuse rules.

CODING: Words stricken are deletions; words underlined are additions.
(6) This subsection applies only to small water utility businesses.
(a) The discharge of demineralization concentrate from small water utility businesses is presumed to be allowable and permittable in all waters in the state if:
1. The discharge meets the effluent limitations in s. 403.086(4), except that high level disinfection is not required unless the presence of fecal coliforms in the source water will result in the discharge not meeting applicable water quality standards;
2. The discharge of demineralization concentrate achieves a minimum of 4-to-1 dilution within a distance not in excess of two times the natural water depth at the point of discharge under all flow conditions; and
3. The point of discharge is located at a reasonably accessible point that minimizes water quality impacts to the greatest extent possible.
(b) The presumption in paragraph (a) may be overcome only by a demonstration that one or more of the following conditions is present:
1. The discharge will be made directly into an Outstanding Florida Water, except as provided in chapter 90-262, Laws of Florida;
2. The discharge will be made directly to Class I or Class II waters;
3. The discharge will be made to a water body having a total maximum daily load established by the department and the discharge will cause or

contribute to a violation of the established load;
4. The discharge fails to meet the requirements of the antidegradation policy contained in the department rules;
5. The discharge will be made to a sole-source aquifer;
6. The discharge fails to meet applicable surface water and groundwater quality standards; or
7. The results of any toxicity test performed by the applicant under paragraph (d) or by the department indicate that the discharge does not meet toxicity requirements at the boundary of the mixing zone under subparagraph (a)2.
(c) If one or more of the conditions in paragraph (b) has been demonstrated, the department may:
1. Require more stringent effluent limitations;
2. Require relocation of the discharge point or a change in the method of discharge;
3. Limit the duration or volume of the discharge; or
4. Prohibit the discharge if there is no alternative that meets the conditions of subparagraphs 1.-3.

(d) For facilities owned by small water utility businesses, the department may not:
1. Require those businesses to perform toxicity testing at other than the time of permit application, permit renewal, or any requested permit modification, unless the initial toxicity test or any subsequent toxicity test performed by the department does not meet toxicity requirements.
2. Require those businesses to obtain a water-quality-based effluent limitation determination.
(7) The department may adopt additional rules for the regulation of demineralization and to administer this section and s. 403.061(11)(b).
Section 2. Paragraph (b) of subsection (11) of section 403.061, Florida Statutes, is amended to read:
403.061 Department; powers and duties.—The department shall have the power and the duty to control and prohibit pollution of air and water in accordance with the law and rules adopted and promulgated by it and, for this purpose, to:
(11) Establish ambient air quality and water quality standards for the state as a whole or for any part thereof, and also standards for the abatement of excessive and unnecessary noise. The department is authorized to establish reasonable zones of mixing for discharges into waters.
(b) No mixing zone for point source discharges shall be permitted in Outstanding Florida Waters except for:
1. Sources that which have received permits from the department prior to April 1, 1982, or the date of designation, whichever is later;
2. Blowdown from new power plants certified pursuant to the Florida Electrical Power Plant Siting Act; and
3. Discharges of water necessary for water management purposes which have been approved by the governing board of a water management district and, if required by law, by the secretary; and.
4. The discharge of demineralization concentrate which has been determined permittable under 403.0882 and which meets the specific provisions of s. 403.0882(4)(a) and (b), if the proposed discharge is clearly in the public interest.
Nothing in this act shall be construed to invalidate any existing department rule relating to mixing zones. The department shall cooperate with the

Department of Highway Safety and Motor Vehicles in the development of regulations required by s. 316.272(1).

Section 3. This act shall take effect upon becoming a law.

Approved by the Governor June 8, 2001.

Filed in Office Secretary of State June 8, 2001.

CODING: Words stricken are deletions; words underlined are additions.

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