Got A Permit Renewal? Facing Shifting Regulations Using Collaborative Permitting

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A 5-mil-gal-per-day (mgd) advanced wastewater treatment facility in Fort Myers has a discharge permit that required renewal in 2013. It was originally built in the 1980s to serve communities in south Fort Myers and some unincorporated areas of Lee County and has expanded to increase its capacity to serve the growing population in the service area. The facility utilizes an oxidation ditch aeration/activated sludge process with nutrient removal and chlorination/dechlorination to treat raw wastewater. The plant's effluent is subsequently reused through reclaimed water irrigation of golf courses and public access residential reuse. When the effluent flow exceeds the demands of the reclaimed system, the facility directs the excess treated effluent to a surface water discharge into the Caloosahatchee River, which is a Class III marine water.

Due to impeccable operations by the staff and proactive repair and rehabilitation investments made by the utility/owner, in the five years that the current permit has been valid, the facility was mostly free of permit violations and nuisance complaints despite high population density within its service area. The only significant violation involved an exceedance of dichlorobromomethane (DCBM) limits, which led to a consent order from the Florida Department of Environmental Protection (FDEP) in 2011. Outside of this obstacle, the potential challenges this renewal process would face were mostly related to evolving regulations, either relatively new, such as the Biosolids Rule, or imminent, such as the Numeric Nutrient Criteria (NNC).

This article describes how the utility/owner worked with HDR to focus on three specific areas to meet permitting requirements. The initial discussion summarizes the impact of these regulations in the permit renewal process, as well as the resolution of the consent order through a mixing zone allowance, changes in groundwater monitoring, and reporting updates to make reuse flow data collection more efficient without losing significance in the results. Second, the article highlights the utility's continuous efforts to streamline its record keeping procedures, making the required data compilation for future applications a more straightforward endeavor in comparison to previous permit renewals. And third, it provides practical recommendations that the utility/owner and similar utilities can consider and apply in the permit renewal processes to facilitate navigation through any related regulatory and operational challenges.

Similar to many treatment facilities in large cities throughout Florida, the wastewater treatment plant (WWTP) is in close proximity to residences and schools that surround the facility on all sides. The sensitivity of these neighbors to odors and other nuisances, in combination with increased regulations, make it essential that the WWTP's operations and reporting protocols be managed and documented effectively.

Treatment Process

The WWTP has a permitted capacity of 5 mgd and can discharge its treated effluent to a public access reclaimed water system, or to the Caloosahatchee River. The treatment process follows this sequence:

- *Preliminary Treatment*: Raw wastewater is combined with return activated sludge (RAS) prior to screening and grit removal.
- *Biological Treatment*: Carbonaceous biochemical oxygen demand (CBOD) oxidation and some nitrification take place in oxidation ditches mixed by stationary brush aerators.
- *Clarification and Phosphorus Removal*: Alum is added for phosphorus removal downstream of the oxidation ditches. Settling of the active biomass takes place in the clarification basins and is pumped to sludge processing as waste activated sludge (WAS) or recycled to the oxidation ditches or the headworks as RAS.
- *Denitrification*: The clarified effluent goes through gravel and sand filters that provide further solids removal and denitrification aided by the addition of methanol. Filtration is followed by reaeration in the filter backwash basin.
- *Disinfection and Dechlorination*: Sodium hypochlorite is added to the reaerated effluent and sent to the chlorine contact chambers, which provides contact time for disinfection. The chlorinated effluent overflows into the dechlorination basin after addition of sodium bisulfite to remove the remaining chlorine from the water.
- *Effluent Pumping and Storage*: The final dechlorinated effluent is conveyed to the ground storage tank by the transfer pumps. Reclaim high-service pumps distribute this effluent to the reclaimed water system, an interconnection to another treatment facility, and/or the river outfall.
- *Solids Handling and Processing*: The WAS is pumped from the clarifiers to sludge holding tanks, where it is accumulated until it is dewatered on site by a mobile centrifuge or at another treatment facility for processing. The dewatered biosolids are taken to the Lee/Hendry County Class I landfill for further treatment and/or disposal.

Permit History

The last permit cycle for the WWTP started in 2008. In the five years of its validity, the WWTP had been exempt from several new regulations that would normally apply to the facility and could potentially impact its operation. These new regulations included the NNC and the Biosolids Rule.

In terms of violations, proactive operation and maintenance (O&M) policies of the utility/owner kept such instances to a minimum. An indication of this trend can be found in the small amount of exceedances observed between December 2012 and March 2013. Only five instances were observed during this time period, mostly related to minor operational issues that

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were quickly corrected and upgrades to the WWTP's dechlorination system.

The only exceedance of significance between 2008 and 2013 was an annual average exceedance of the discharge permit's DCBM limits reported in 2010. This chemical is a disinfection byproduct (DBP), which is generated as a result of the WWTP's disinfection process. This violation resulted in the issuance of a consent order in May 2011, which is described later.

Additionally, there has only been a single nuisance complaint between 2008 and 2013 from the surrounding neighbors to the WWTP regarding fleeting odors originating from headworks improvements. This is yet another indication of the impeccable operation of the WWTP over the years.

In 2013, the utility/owner retained the services of HDR to prepare documentation for the discharge permit renewal application and provide support for additional permit requirements and preapplication meetings with FDEP. The prepared documents included a Capacity Analysis Report (CAR) that evaluated the WWTP's present and future flows and water quality demands, as well as a comprehensive O&M performance review that extensively assessed various aspects of the WWTP's operations and equipment.

Permit Renewal Development

Data Management

Up until April of 2011, the WWTP's operators would populate spreadsheets to track the treatment performance of the plant based on routine monitoring and laboratory testing. These spreadsheets would populate discharge monitoring reports (DMRs) that would be submitted monthly to FDEP. Several recognized drawbacks to this method of data entry include:

- High investment of time that could be used in other, more critical tasks.
- Unreliability of monthly output due to high potential of data entry errors.
- Inaccuracies in monthly data would cascade into quarterly, semiannual, and annual averages and/or reports.

In April 2011, the utility/owner implemented a program that provided a centralized data management system, dramatically cutting the time investment required to keep track of the WWTP's water quality parameters. This software also generated on-demand reports of relevant averages and trends of the collected data.

The combination of data sources proved to be a time-consuming endeavor for the compilation of the required data to be included in the permit renewal application documents.

Dichlorobromomethane Exceedance, Consent Order, and Mixing Zone Report

Due to the 2010 DBP violation, the util-

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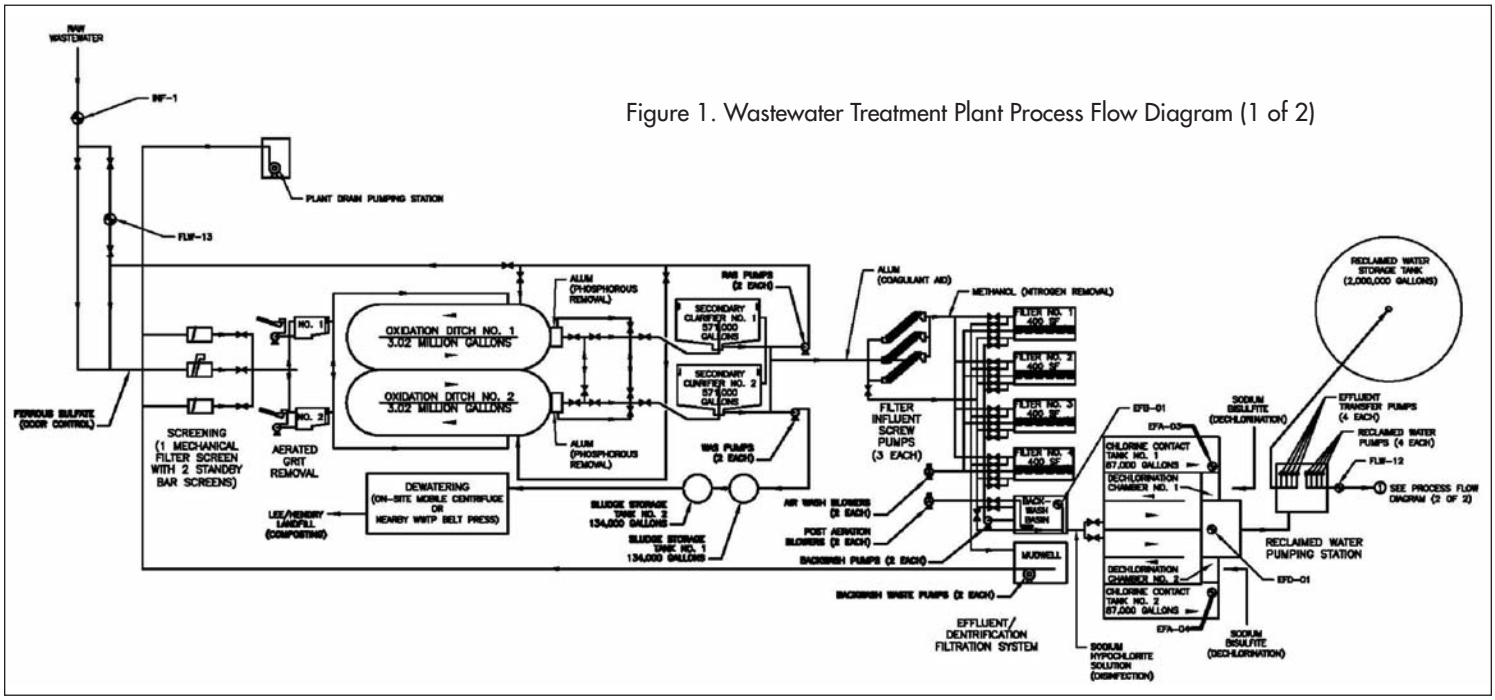

Figure 1. Wastewater Treatment Plant Process Flow Diagram (1 of 2)

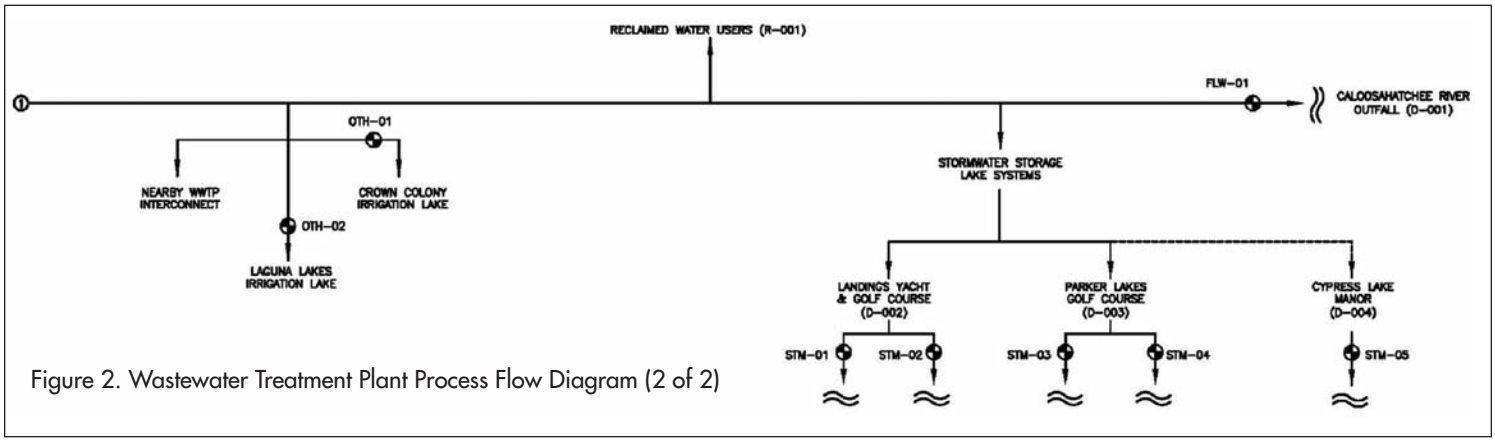

Figure 2. Wastewater Treatment Plant Process Flow Diagram (2 of 2)

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ity/owner was faced with the possibility of expensive changes to the WWTP's disinfection system, along with the difficulty of completing the design, construction, and implementation of such changes in a timely manner. After some negotiation with FDEP, the May 2011 consent order issued for this occurrence required the facility to apply for a DCBM mixing zone by June 2013 and to submit quarterly reports of the status and progress of these efforts.

The utility/owner procured the services of a consultant to evaluate the behavior of the treated effluent discharged by the WWTP into the Caloosahatchee River and the consequent receiving water quality variations. The results of this study were summarized in a mixing zone report issued in November 2012, which became the basis for the application required by the consent order.

Instead of pursuing a stand-alone application process for the mixing zone, the utility/owner decided to integrate the proposed mixing zone report and application into the permit renewal process. This approach, welcomed by the FDEP, consolidated the two permits and streamlined the regulatory process.

Numeric Nutrient Criteria and Total Maximum Daily Load Report

After many years of using narrative criterion to regulate nutrients in Florida's waters, the FDEP moved in conjunction with the U.S. Environmental Protection Agency (EPA) to enact rules based on the NNC. At the time of the permit's renewal, an implementation plan[1] illustrating plans for statewide application of the proposed regulation was published.

In order to interpret the potential impact of the NNC regulations on the WWTP, the hierarchical approach described in the document was reviewed. Given that a total maximum daily load (TMDL) report for nutrients[2] was issued for the Caloosahatchee River Basin, the hierarchy presented in the implementation plan dictates that the limits would be based on the existing TMDL. The TMDL concluded that none of the facilities permitted to discharge at the time of its issue (including the WWTP) were "expected to cause or contribute substantially to the nutrient load," and were assigned their permitted loads at the time.

The final form of the implementation plan was released in April 2013 with no changes to the approach described. Consequently, no changes to the permitted limits were expected stemming from enactment of the NNC or the 2009 TMDL on the 2013 renewal cycle. Any updates or changes to the Caloosahatchee's TMDLs for total nitrogen or other constituents (if any) may be relevant to future permit renewals.

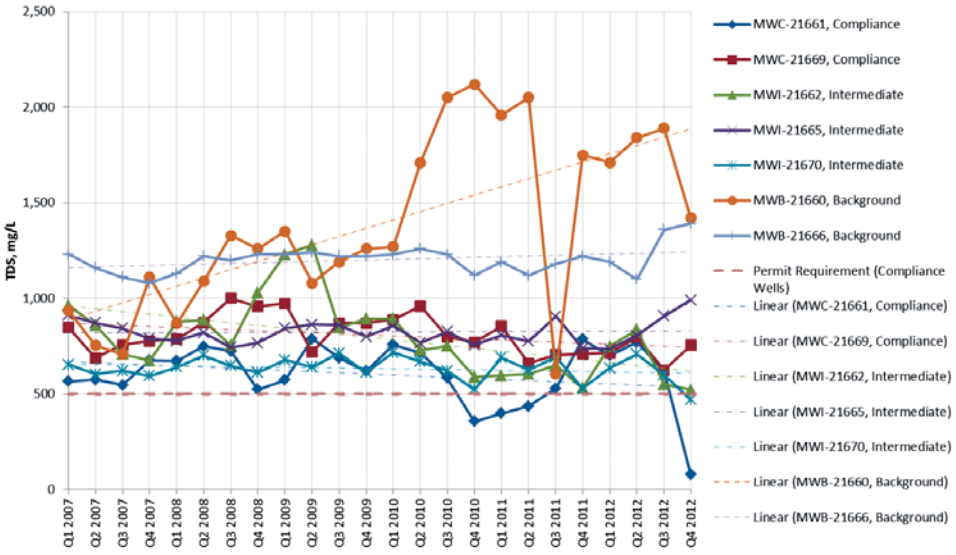

Figure 3. Groundwater Wells: Total Dissolved Solids, mg/L

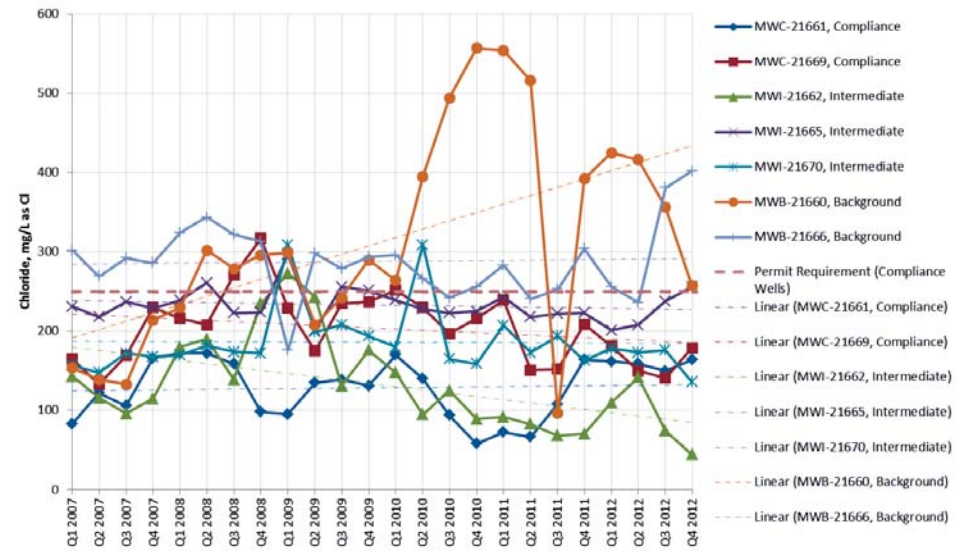

Figure 4. Groundwater Wells: Chloride, mg/L as Cl

Biosolids Rule

In 2010, sweeping changes in the guidelines for the management of biosolids generated at WWTPs were enacted. In the case of this particular facility, the impact of this update would be largely in the reporting associated with the disposal of its biosolids.

For the permit application, FDEP agreed in a preapplication meeting that additional language in the O&M performance report could satisfy the requirements of this rule. The section provided details regarding a biosolids storage and disposal plan reflecting the current procedures used to manage biosolids in the WWTP and future efforts to improve their solids handling facilities that are expected to include onsite dewatering.

Groundwater Monitoring Wells Relocation

The 2008 permit required groundwater monitoring of a network of seven 15-ft-deep wells that help assess the surficial aquifer in the proximity of reclaimed water users. A July 2011 inspection from FDEP found several deficiencies in these wells, noting in particular, multiple exceedances of groundwater quality standards in background monitoring wells. This could indicate that the location of the monitoring wells may not be suited to accurately represent the effects of reclaimed water application on groundwater quality. This phenomenon was verified in the review of groundwater monitoring reports for the permit renewal application, particularly

in total dissolved solids, chloride, total sulfate, and dissolved sodium measurements, as shown in Figures 3 through 6, respectively.

As a result of this inspection, the utility/owner requested a revision of the groundwater monitoring plan based on an evaluation completed by a consultant. This update would eliminate the existing wells and replace them with four new ones at a new location in order to get a more representative assessment of the impact of reclaimed water application in groundwater quality. The FDEP issued a minor permit modification in February 2011, updating the groundwater monitoring plans as requested.

Inclusion of the updated groundwater monitoring plan in the permit renewal, along with discussions with FDEP staff at the preapplication meeting, allowed the utility/owner to incorporate additional information into the permit renewal, consolidating and formalizing the regulatory process.

Lessons Learned for Future Permit Applications

In a normal situation, some of the items described may have warranted stand-alone permitting processes. In this case, close collaboration among the utility/owner, HDR, and FDEP allowed this permit renewal to be streamlined through open dialogue and preapplication meetings. This team endeavor saved time, cost, and effort for all the parties involved by addressing all regulatory drivers impacting the WWTP into a single permitting process.

Additional lessons that can be applied in permit renewal applications include:

- Efficient water quality data management is crucial for ongoing compliance, as well as the preparation of reports required for the renewal application. This may require an upfront investment from utilities/owners, but the return on the investment for day-to-day operations in treatment plants would be recognized immediately.
- Utilities/owners should continuously monitor the status of regulations as they apply to their facilities. Some of the regulations may not apply until such facilities are up for permit renewal, but it gives utilities/owners a good idea of impending changes to expect in the new permit. Ultimately, this would help utilities/owners prepare for significant regulatory requirements in the future.
- Mixing zones are a viable avenue to mitigate the expense of costly treatment changes that may be required due to ongoing violations, as long as they fulfill the criteria outlined by FDEP.
- If a groundwater monitoring plan is part of the permit, utility/owners should keep an eye on background well readings. Elevated concentrations and exceedances could be a sign that an accurate representation of the groundwater conditions is not being provided.
- Ensure that at least three thorough laboratory tests are performed throughout the permit cycle. Review Section 3A (parts 12 through 14) of FDEP's Form 2A[3] for the applicable schedules, methodologies, and constituents, depending on permitted flow capacity and pretreatment program requirements.

References

[1] Florida Department of Environmental Protection (March 2013). *Implementation of Florida's Numeric Nutrient Standards.* Retrieved from http://www.dep.state.fl.us/secretary/news/2013/03/NNC_Implementation_3-11-13.pdf

[2] Florida Department of Environmental Protection (September 2009). *Final TMDL Report – Nutrient TMDL for the Caloosahatchee Estuary.* Retrieved from http://www.dep.state.fl.us/water/tmdl/docs/tmdls/final/gp3/tidal-caloosa-nutr-tmdl.pdf

[3] Florida Department of Environmental Protection (June 2001). *Wastewater Permit Application Form 2A for Domestic Wastewater Facilities.* Retrieved from http://www.dep.state.fl.us/water/wastewater/forms/pdf/620_2_.pdf

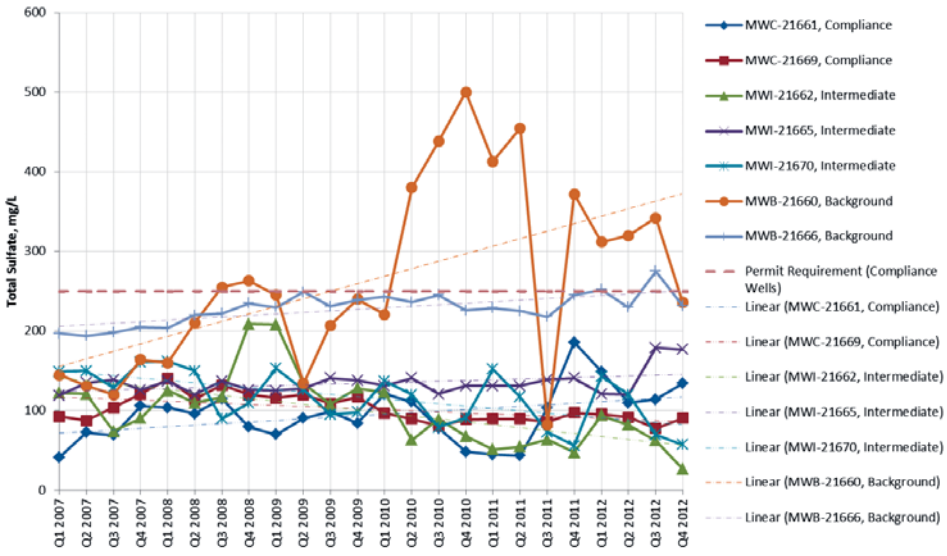

Figure 5. Groundwater Wells: Total Sulfate, mg/L

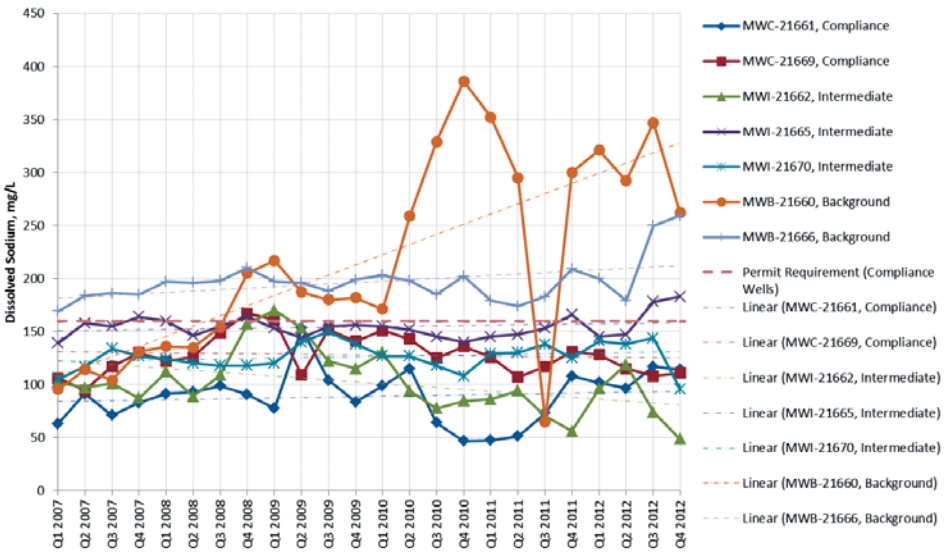

Figure 6. Groundwater Wells: Dissolved Sodium, mg/L