# SYSTEM-WIDE ODOR & EMISSIONS MANAGEMENT PROGRAM SUMMARY

1st Quarter - 2008

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**Pima County Regional Wastewater Reclamation Department**

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**APRIL 2008**

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## I. Summary

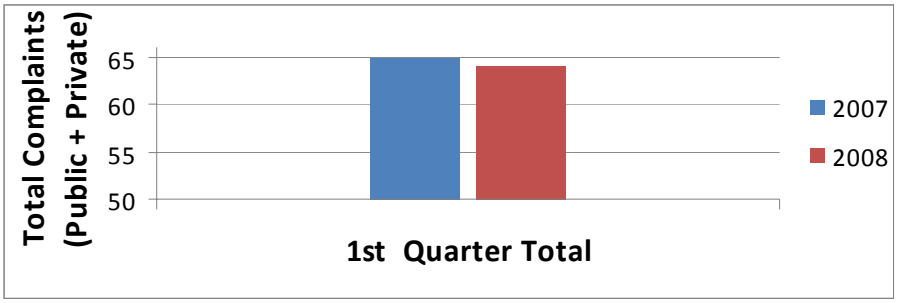
The first quarterly report of 2008 documents:

- Progress in Odor Control as measured by:
  - reduced odor complaints for 2008 compared to 2007
  - improved odor control system performance
- The initiation of the System-Wide Odor Control Management Program
- The extension of Odor Control Management to sub-regional water reclamation facilities (WRF):
  - Green Valley, Marana, Avra Valley, Corona de Tucson, & Randolph Park
- Odor Abatement and Mitigation Activities
  - Bio-tower Odor Control Systems
  - Granular Activated Carbon system maintenance
  - Randolph Park membrane-bank replacement
  - Green Valley Lagoon dewatering
- 1st Quarter Monitoring Results
  - Roger and Ina WRFs
  - Sub-Regional WRFs
  - Chemical Sulfide and Control in Conveyance System Interceptors

## II. Odor Complaint Summary

Since seasonal weather conditions, temperature, and population-based flows effect system-wide odor generation, odor complaint frequencies are best compared year-to-year for the same month. This is supported by eight years of complaint statistics; however, our calendar-based quarters do not coincide well with the "seasons" of complaint frequencies. As is apparent in Figure 1, the number of reported odor complaints for the first quarter of 2007 and 2008 are essentially unchanged.

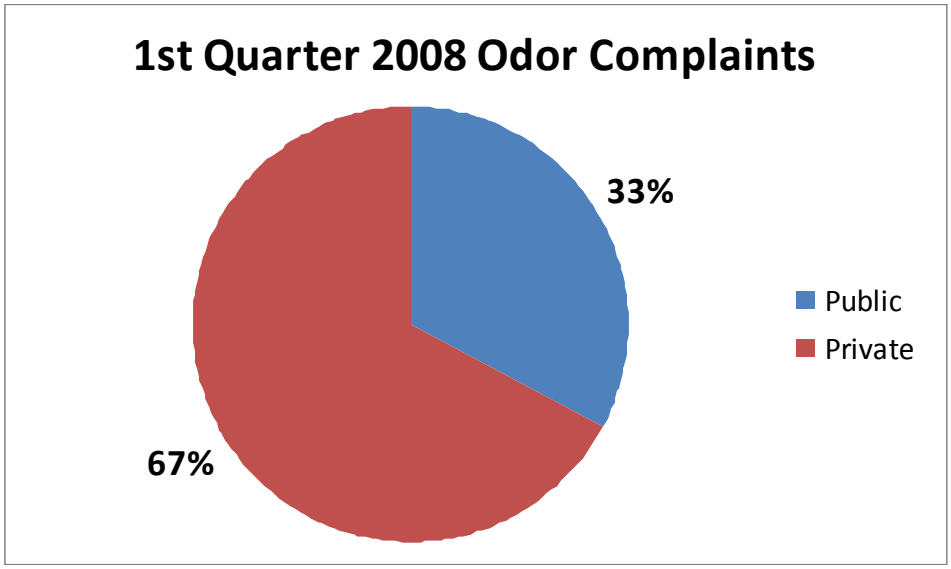
***Figure 1. Odor Complaints for 1st Quarter 2007 and 2008***



## II. **Odor Complaint Summary** (Continued)

Less apparent, is what has caused the proportion of odor complaints reported that are a result of private systems to nearly double from last quarter.

***Figure 2. Percentage of Odor Complaints from Private and Public Sources***




As indicated in Figure 2, two-thirds (67%) of the odor complaints reported for the first-quarter of 2008 were a result of fugitive emissions from private sewer systems or homes. Whereas, for the last quarter of 2007, just over a third (38%) of the odor complaints reported were the result of odors emitted from private systems.

Figures 3 through 5 are maps illustrating the monthly spatial distribution of odor complaints for January, February, and March (1st Quarter) for 2007 and 2008. For ease of viewing, these maps do not cover the entire metropolitan service area. These maps show that while few odor complaints in 1st quarter of 2007 are near the Roger Road Wastewater Reclamation Facility (WRF), none are near Roger Road in 1st quarter of 2008. Also notable is the absence of complaints downstream of chemical dosing units in the first quarter of 2008, indicating an improvement in control, particularly in downtown Tucson, downstream of the 18th Street Chemical dosing unit. All CDUs appear to be functioning as designed.

## *Figure 3. Odor Complaint Map for January 2007 and 2008*

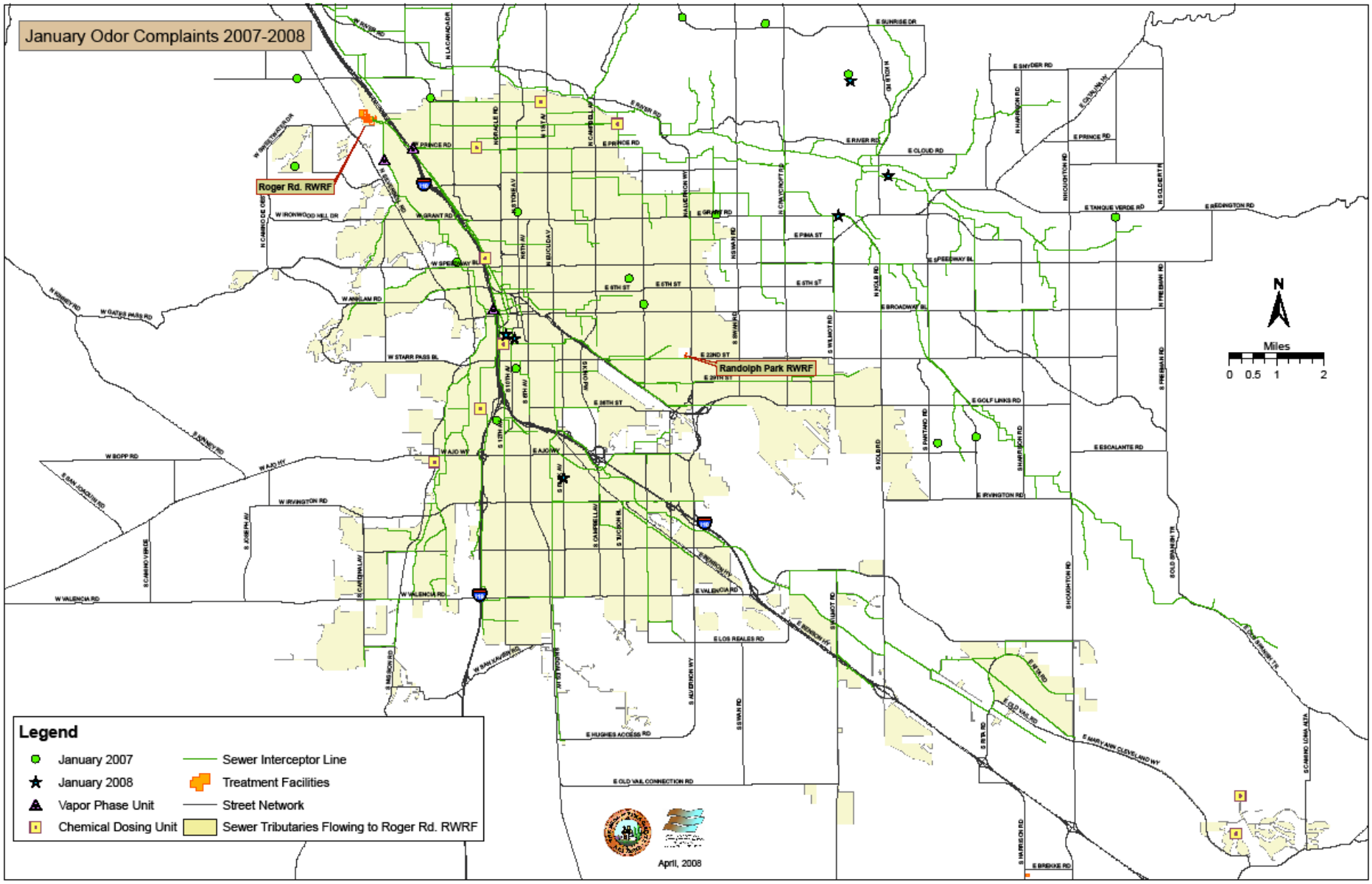


*Figure 4. Odor Complaint Map for February 2007 and 2008*

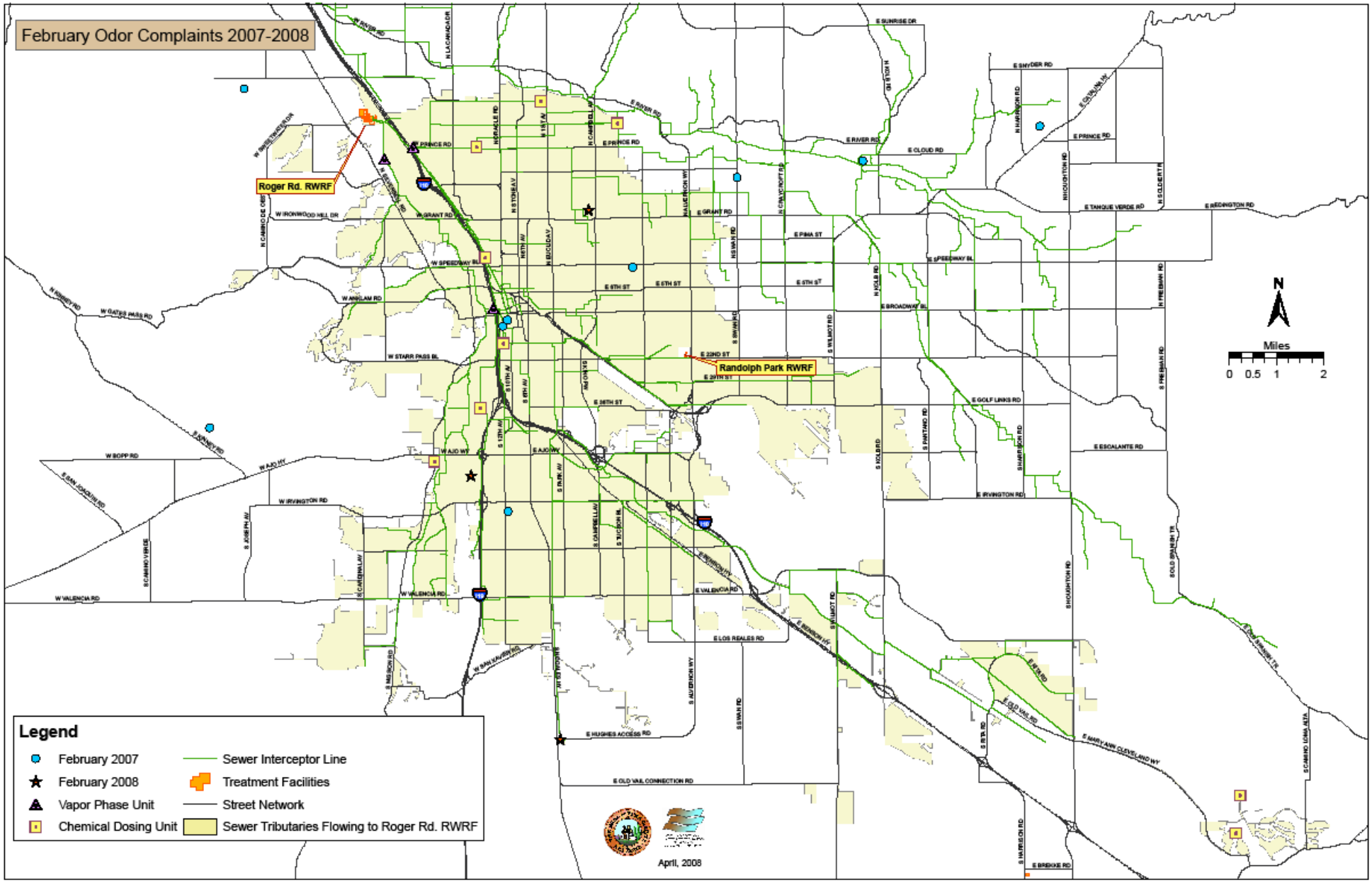
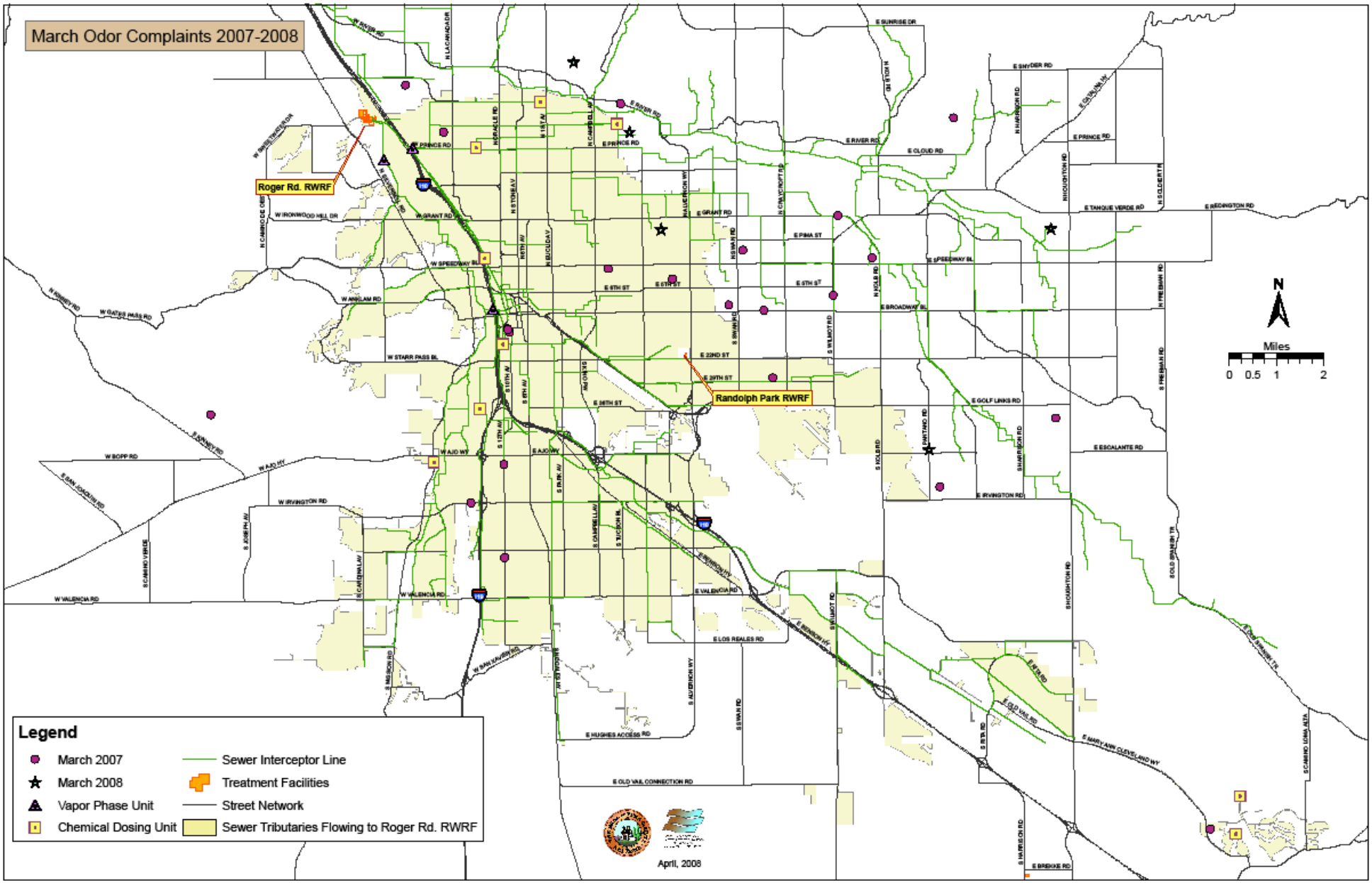


*Figure 5. Odor Complaint Map for March 2007 and 2008*



## III. The System-Wide Odor & Emissions Management Program

The System-Wide Odor and Emissions Management Program addresses odor and emissions in a holistic manner considering odor and emission sources in the context of the conveyance system and wastewater reclamation facilities as coupled processes. This program was both a recommendation in the System-Wide Odor Management Plan and a requirement of the Community Involvement Committee.

On April 17th, the Odor and Emissions Management Program was initiated by Director, Michael Gritzuk with a kick-off meeting presenting the program and the management plan for implementing the program.

The following is excerpted from the program description:

*The Pima County Regional Wastewater Reclamation Department Odor Control Management Program (OCMP) describes an integrated approach to improving odor control and reducing odor control system lifecycle costs and defines key performance measures. The integrated approach requires a realignment of roles and responsibilities within a modified organizational structure.*

*The OCMP will be executed by an Odor and Emissions Control Group operating system-wide. The control of odor and emissions shall have the same significance as Regulatory Compliance for wastewater reclamation facilities or pumping stations. Additionally, appropriate redundancy, backup and emergency procedures and other identified needs to maintain sustainable operation will be implemented.*

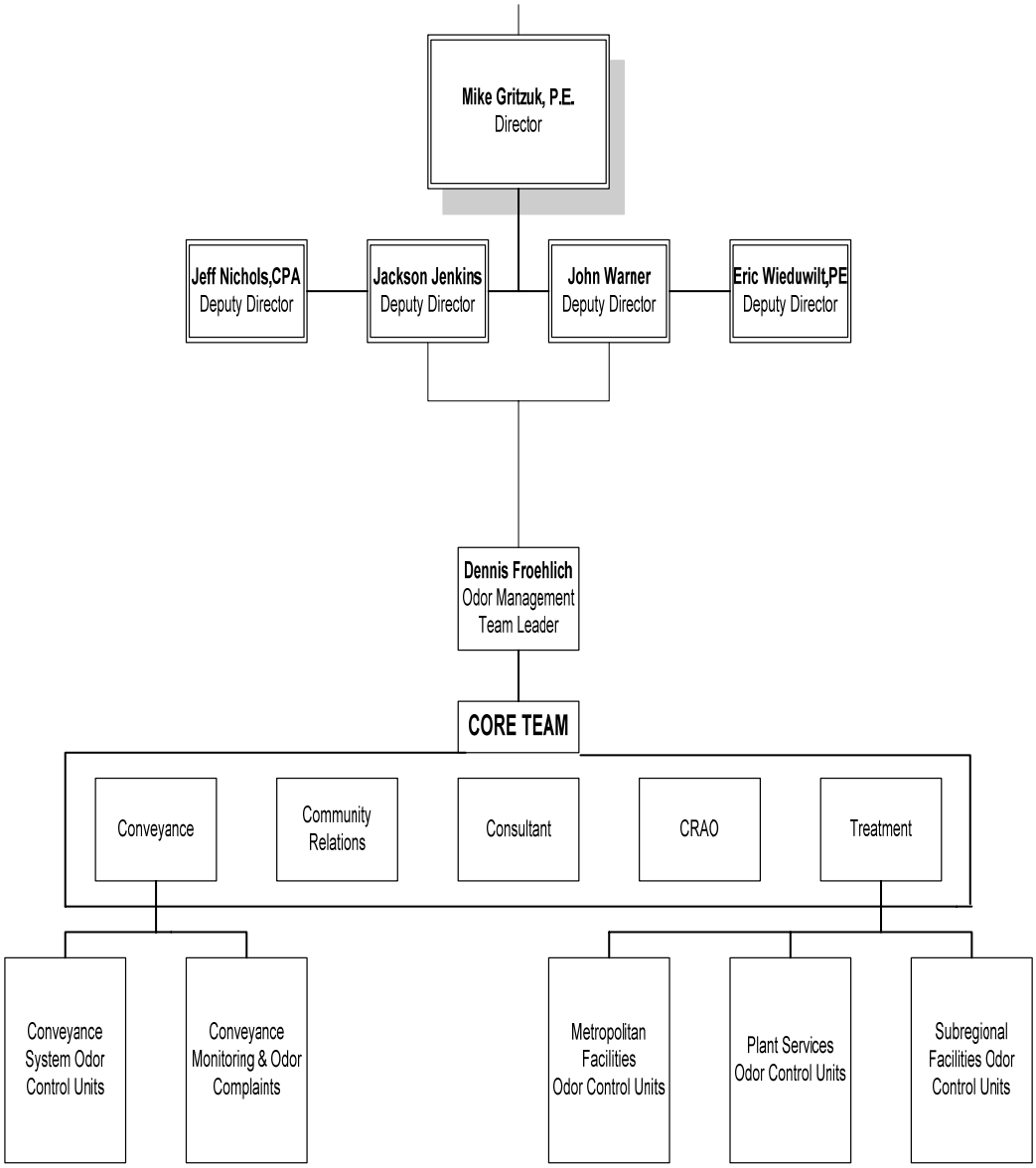
*A system wide odor control management program is necessary to span departmental boundaries (conveyance, treatment, engineering, planning, industrial waste, permits and community relations); a cross-functional team representing these groups is instrumental in developing, continually improving, and adopting this cooperative implementation. Critical to the success of system wide odor management is the communication of the organizational structure and the definition of functional roles and responsibilities of all involved staff.*

*The organizational structure of the Odor Control Management Program is defined in the following organizational chart:*

The Core Team and Task Teams are meeting weekly in order to accelerate adoption of the program.

# RWRD ODOR CONTROL MANAGEMENT PROGRAM

April 2008




**SYSTEM-WIDE TASK TEAM**

| | | |
|---|---|---|
| IWC | Engineering | Subregional WRFs |
| Pump Stations | Roger WRF | Gravity Conveyance |
| Ina WRF | Plant Services | Flow Metering |
| Training | Chemical Supplier | Quality,Safety,Environment |
| Mechanical Contractor | Engineering Contractor | |

## IV. Subregional Wastewater Reclamation Facility (WRF) Odor Management

The subregional WRF's currently included in the Odor Management Program are: Green Valley, Avra Valley, Marana, and Corona de Tucson.

Odor Management monitoring for each subregional WRF is on a quarterly schedule. Monitoring includes an inventory and monitoring of odor emission sources for hydrogen sulfide ($H_2S$), total reduced sulfides (TRS), and volatile organic compounds (VOCs), the performance testing of odor control systems, and monitoring of $H_2S$ concentrations along each facility's perimeter fence line.

### Green Valley WRF

There are five odor emission source locations identified at this facility: the influent grit chamber, sludge drying beds, belt filter press, and two solids holding tanks. All locations had low hydrogen sulfide levels in the 2-5 PPM range, although the solids holding tanks did have one spike that was almost 60 PPM, and the highest fence line hydrogen sulfide concentrations were downwind of this location.

The perimeter fence line was also tested for hydrogen sulfide emissions to satisfy the County's 0.050 PPM fence line $H_2S$ goal. Fence line $H_2S$ concentrations were near background levels at each location, averaging 0.0025 PPM for the whole perimeter, although some odors were observed along the western fence line downwind of the solids holding tanks, and registered hydrogen sulfide peaks of 0.034 PPM during this test.

The single-stage U.S. Filter/Siemens headworks screens biofilter odor scrubber was evaluated on January 29, 2008. The treatment facility's headworks screens biofilter odor scrubber performed well for this quarterly test. With peaks of only 0.24 PPM $H_2S$ during the test, removal rates of 90% would be considered good. The airflow rate on the biofilter was 2,750 CFM.

Samples were collected for total reduced sulfides (TRS) and volatile organic compounds (VOC) and sent to Columbia Analytical for analyses. Three locations were sampled the biofilter outlet stack, grit chamber, and one solids holding tank. All three locations had TRS concentrations below 0.10 PPM. All samples were tested for VOC compounds and only Isopropyl Alcohol and Toluene were found above the non-detect level of the gas chromatograph.

### Avra Valley WRF

There are five odor emission source locations identified at this facility: the influent channel, equalization basin (both east and west), and the two solids holding tanks. The influent channel had moderate concentrations in the 0-33 PPM range with an average of 8 PPM. The other locations generally had low $H_2S$ levels in the 0-3 PPM range, although the solids holding tanks did have some spikes up to 11 PPM, and the highest fence line $H_2S$ concentrations were downwind of this location.

The perimeter fence line concentrations were near background levels at each location, averaging 0.0034 PPM at the water reclamation facility, although some odors were observed along the northern fence line downwind of the solids holding tanks, and registered $H_2S$ peaks of 0.010 PPM during this test.

Avra Valley WRF does not have any current odor control equipment on the facility.

Samples were collected for TRS and VOCs at the influent channel, screens chamber, and one solids holding tank and sent to Columbia Analytical for analyses. All samples were tested for VOC compounds and only Isopropyl Alcohol and Toluene were found above the non-detect level of the gas chromatograph. These two compounds were found at each location but at very low concentrations under 0.10 PPM. A couple other compounds were recognized but at under 0.010 PPM.

**Marana WRF**

Marana WRF has no apparent odor emission sources that are not currently controlled.

Perimeter fence line $H_2S$ concentrations were near background levels at each location, averaging 0.0031 PPM at the water reclamation facility. No odors were observed along the fence line during this test.

The single-stage Bohn headworks screens biofilter odor scrubber was evaluated on February 13, 2008. The treatment facility's headworks screens biofilter odor scrubber performed well for this quarterly test. The excellent >99.99% removal rate at the water reclamation facility biofilter was better than specified. Inlet concentrations were moderate, averaging 8.2 PPM $H_2S$.

**Corona De Tucson WRF**

There are three odor emission source locations identified at this facility: the headworks and the two solids holding tanks. The headworks location had moderate $H_2S$ concentrations in the 0-36 PPM range with an average of 2 PPM. The two other locations generally had low $H_2S$ levels in the 0-2 PPM range with spikes up to 3 PPM.

Perimeter fence line concentrations were near background $H_2S$ levels at each location, averaging 0.0042 PPM $H_2S$ at the water reclamation facility. No odors were observed along the fence line during this test.

Corona De Tucson WRF does not have any current odor control equipment on the facility.

Samples were collected for total reduced sulfurs (TRS) and volatile organic compounds (VOC) and sent to Columbia Analytical for analyses. Only one location was sampled, one of the solids holding tanks. This location had TRS concentrations below 0.10 PPM. This location was also tested for VOC compounds and only Isopropyl Alcohol, Toluene and carbon disulfide were found above the non-detect level of the gas chromatograph.

## V. Odor Abatement Activities

Odor Abatement Activities in this quarter included maintenance activities at the Roger Road, Ina Road, Green Valley, and Randolph Park WRFs and within the sanitary sewerage conveyance system.

At the Roger Road WRF, the activated carbon in the adsorbers serving the primary clarifiers was replaced and the ducting for a primary system was repaired.

At the Ina Road WRF the activated carbon for the dry scrubbers at the Centrifuge Building odor control was replaced.

Within the Conveyance Division, Field Operations serviced 242 reaches of the sewer system in response to odor complaints. Of these serviced reaches, a significant proportion were serviced in response to odor complaints that were determined to be of emissions from private sources not under the operational control of the RWRD.

Odor abatement activities taking place this quarter included tasks at the Roger Road WRF consisting of the replacement of granular activated carbon (GAC) in the carbon adsorbers for the primary clarifiers and repairs to the associated ducting. Both of these activities were completed in March of 2008.

Construction of the South Biotower odor control was completed in the end of March, ahead of schedule and under budget. 24-7 operation began on April 1st.

Also in March, at Randolph Park WRF odor emissions were monitored during a change-out of membrane cassettes – and no odors were detected at the nearby fence line.

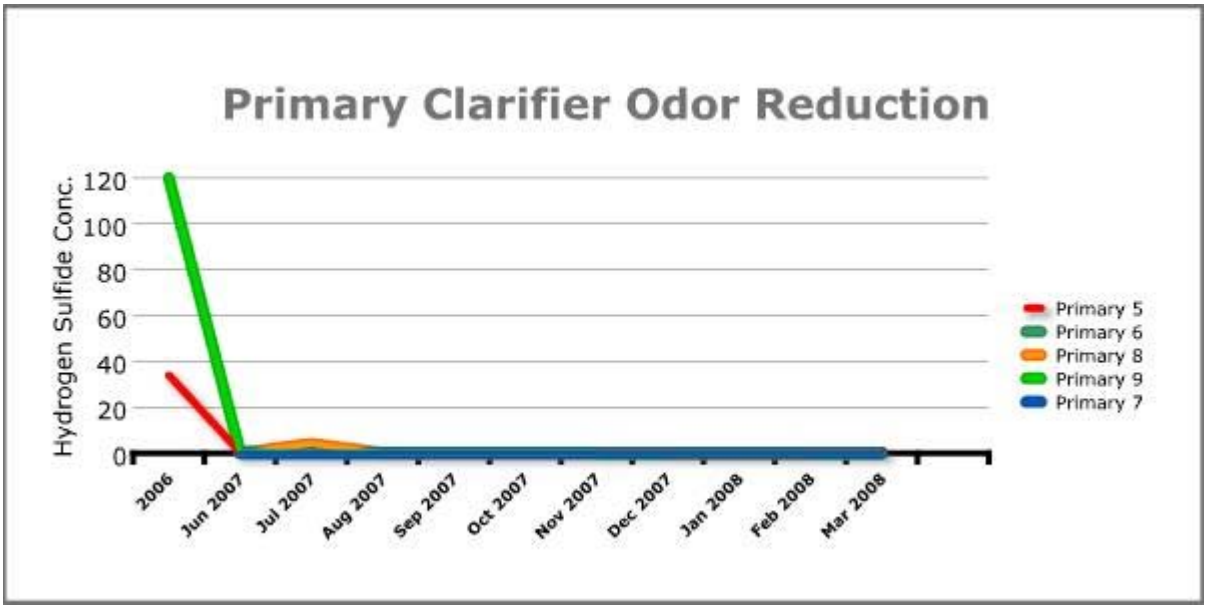
Also in March, the Green Valley one of the secondary aerated lagoons was taken out of service for dredging and the other was put back into service. An odor mitigation plan of chemical addition was executed to control odors when the aerators were taken out of service and while the accumulated residual solids dried. No odor emissions were detected during monitoring.

## VI. Monitoring Program

RWRD monitors odors throughout the sanitary conveyance system and wastewater reclamation facilities:

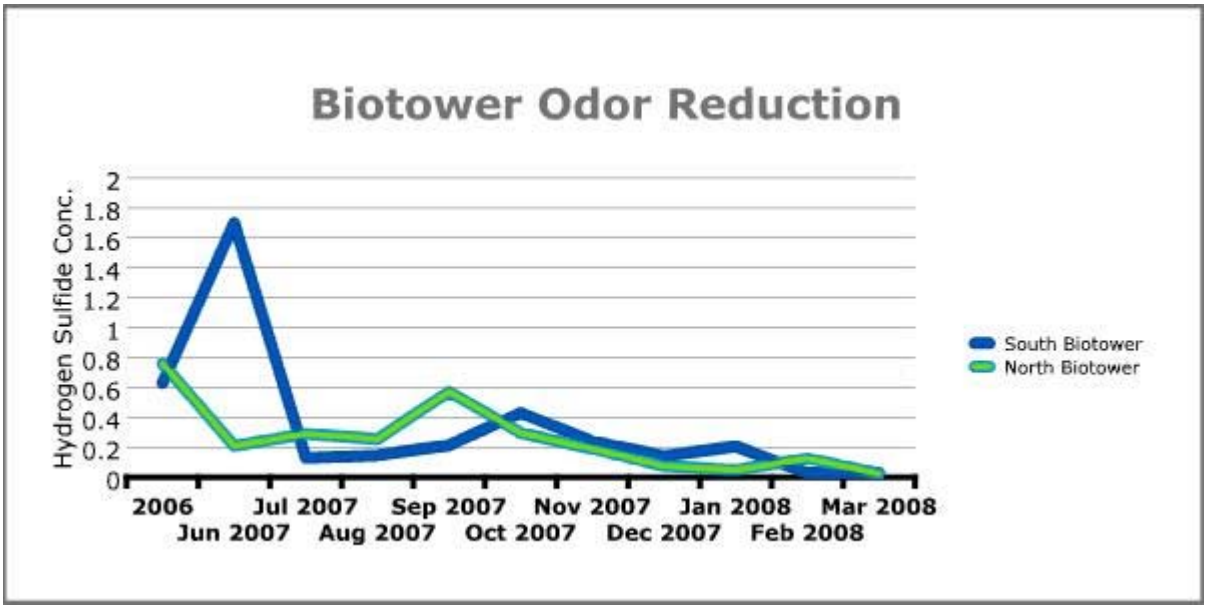
- Conveyance interceptors with chemical treatment are monitored at least quarterly.
- Manholes are monitored in the vicinity of complaints to investigate and for mitigation performance
- At reclamation facilities, individual treatment processes identified as odor sources are monitored and hydrogen sulfide measurements are taken along the fence line. Figures 6 and 7 depict the levels of hydrogen sulfide reduction for different treatment processes at the Roger Road Wastewater Reclamation Facility.

***Figure 6. Primary Clarifier Odor Reduction***




Primary clarifier odors were reduced by effective chemical addition and odor scrubbing upstream of the clarifiers and by capturing and scrubbing odors coming off the clarifier overflow weirs.

***Figure 7. Biotower Odor Reduction***




Even though the biotower odor abatement projects have not been implemented to date, a marked decrease in $H_2S$ emissions has been realized as a result of the upstream odor mitigation efforts. Even though the hydrogen sulfide odor levels are low, the mass of air

## VI. Monitoring Program (Continued)

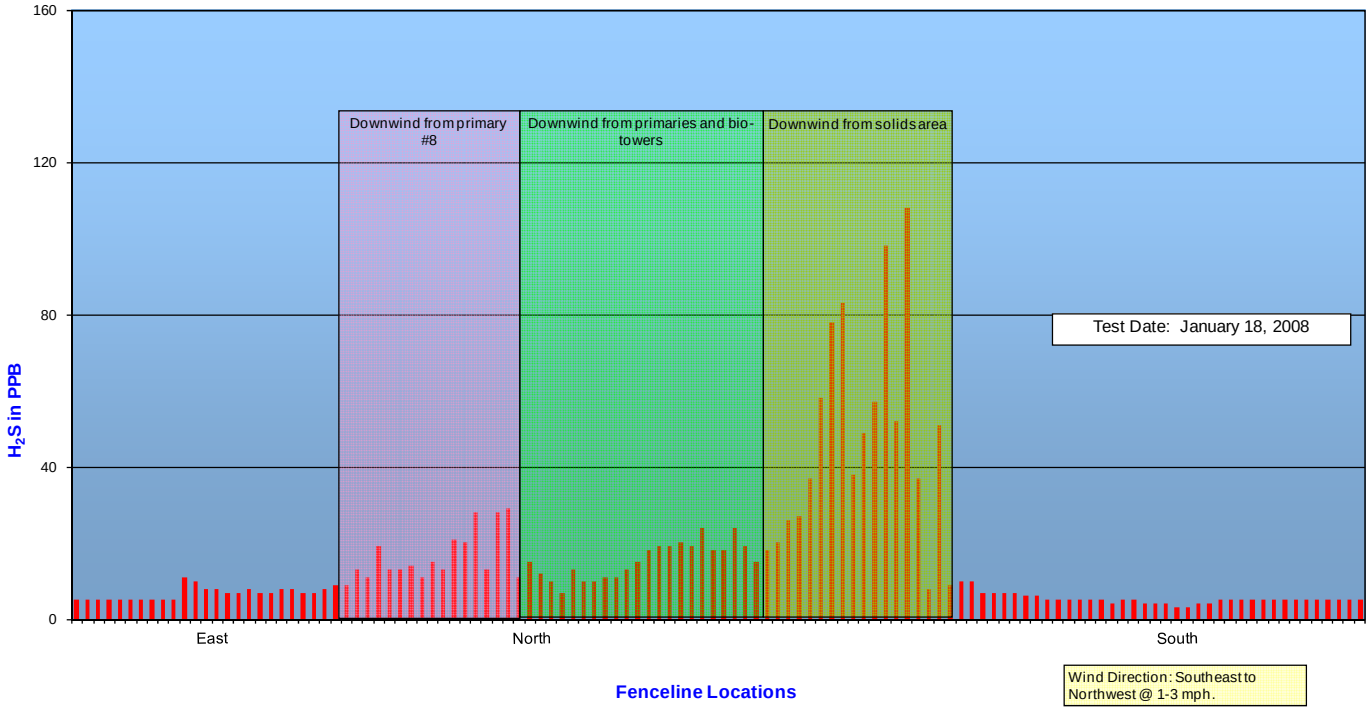
that is exhausted through the biotowers is quite large and therefore the cumulative loading of $H_2S$ and other reduced sulfides and amine compounds in the atmosphere can be significant at times.

Figures 8 through 10 depict the results of fence line monitoring conducted at the Roger Road Wastewater Reclamation Facility. The odor control objective is to maintain less than 10 odor units at the fence line or approximately 0.050 PPM $H_2S$. Odors are comprised numerous compounds, including $H_2S$ which currently serves as a surrogate measure of odor strength. Concentration measured at the perimeter fence line will typically be approximately 10-times greater than odor levels that could be experienced within the nearby surrounding community. Therefore for odors consistent in strength with $H_2S$, odors will be less-than or equal to the threshold value perceiving odor.

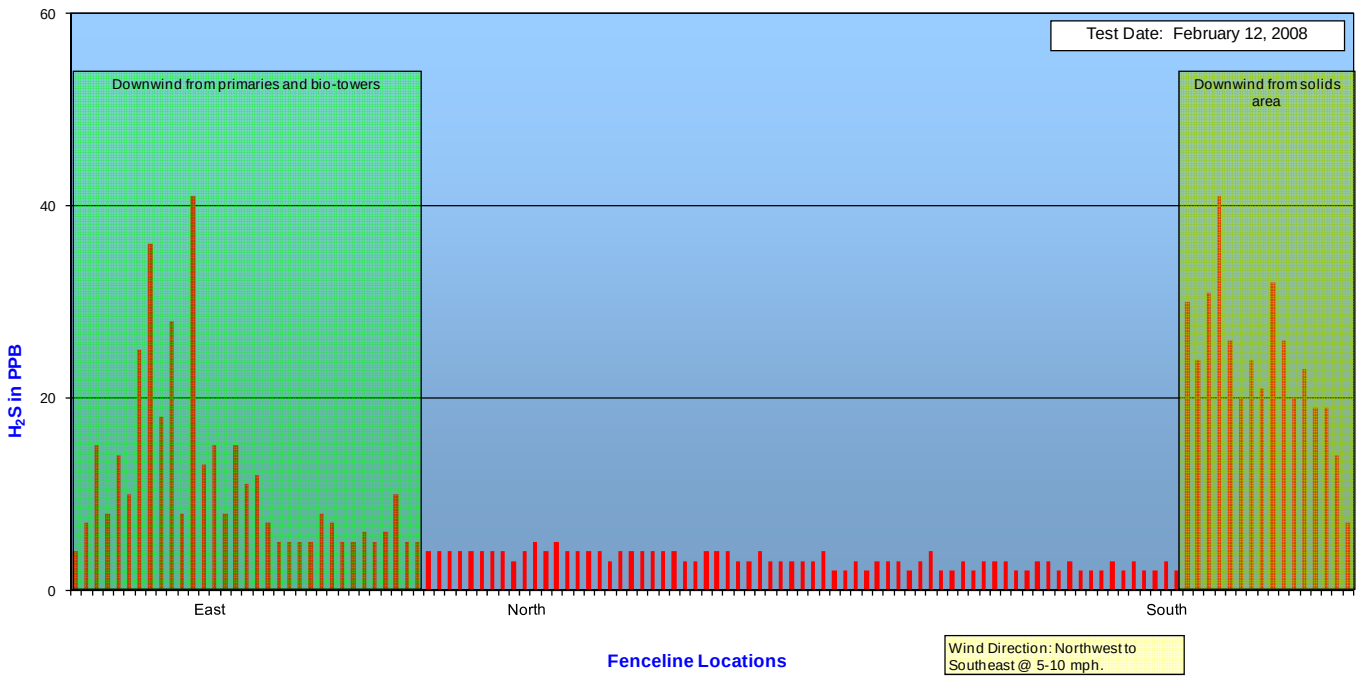
Figure 8 indicates that the January 2008 perimeter fence line average $H_2S$ concentration was well below 40 parts per billion (PPB) of $H_2S$, surpassing the control objective of less than 50 PPB at the fence line. Note however that with the prevailing southeasterly wind, fence line concentrations downwind of the solids (digesters and thickeners) area exceed the emission control goal.

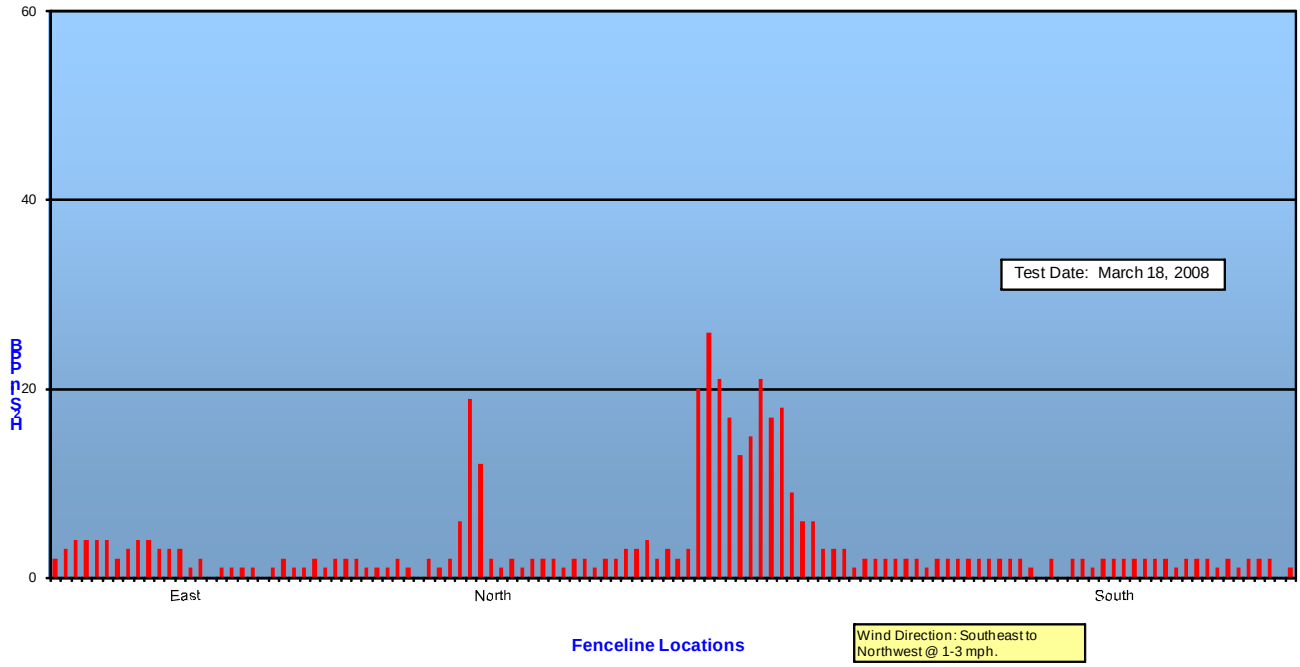
As indicated in Figure 9, the February 2008 fence line average $H_2S$ concentration was well below 10 parts per billion (PPB) of $H_2S$, surpassing the control objective of less than 50 PPB at the fence line. However, consistent with monitoring results for January, albeit with a reverse wind direction, fence line concentrations downwind of the solids area again exceeded the control objective.

***Figure 8. January 2008 $H_2S$ Concentrations Measured at Fenceline***



### *Figure 9. February 2008 $H_2S$ Concentrations Measured at Fence line*




As indicated in Figure 10, the March 2008 fence line average $H_2S$ concentration was again well below 10 parts per billion (PPB) of $H_2S$, surpassing the control objective of less than 50 PPB at the fence line. In March, the peak fence line $H_2S$ concentrations also met the control objective.

### *Figure 10. March 2008 $H_2S$ Concentrations Measured at Fence line*