SYSTEM-WIDE ODOR MANAGEMENT PROGRAM
Quarterly Report
July-September 2008

Pima County Regional Wastewater Reclamation Department

October 2008

Introduction

Pima County Regional Wastewater Reclamation Department's (PCRWRD) System-Wide Odor Control Team implements the System Wide Odor Control Management Plan. Third Quarter 2008 System-Wide Odor Control Management activities included:

- Refined odor complaint response procedure to include public outreach and technical support to avoid repeat complaints
- Procured a Continuous Odor Monitoring System (OdoWatch) for Roger Road Wastewater Reclamation Facility (WRF)
- Improved performance and efficiency of Activated Carbon Filters at Roger Road WRF
- Standardized granular activated carbon media based upon cost per unit of capacity saving an estimated $64,000 in carbon costs with the last change-out at Ina Road WRF.
- Developed Carbon Filter Change-Out Procedures and coordinated complete carbon change-out services.
- Initiated carbon media recycling program with vendor to avoid use of our limited landfill disposal resource.
- Continued System-Wide Odor Monitoring and Odor Control System Performance Testing

Odor Complaint Response Procedure

While odor complaints are responded to as emergency call and are addressed within a 30-minutes time frame, generally about half of the complaints are for odor being emitted from private systems. When staff responding to an odor call arrives at the site, standard actions include:

- speak with the complainant when possible
- determine the source of the odor by inspection
- conduct any necessary maintenance operations
- determine whether lines are clear and odor free
- try to determine if the odor source is a private system connected to the public sewer

If the odor source is a private system, it is the owner's responsibility to address. Typically, the owners fail to address odor with a permanent solution and invariably tenants or the owner become repeat complaints and emergency service calls. Department staff do contact private owners and offer advice on how to correct their odor problems.

The odor complaint response procedure includes steps for long-term problem resolution. First, the responding staff recognizes a repeat complaint that is likely the result of a private system and requests technical support from the Odor and Emissions group. The Odor and Emissions

group works with the complainant to identify the odor source and provides guidance to solve the odor problem while clarifying the responsibilities for the private system operator, restaurant owner, or homeowner – so that the complaint is not repeated.

This cooperative problem solving approach also applies to the public system and neighborhoods with recurring odor issues. When a neighborhood is identified by repeat complaints as an odor hot-spot, appropriate neighborhood-wide odor control methods are applied immediately and until permanent resolution of the odors is achieved and the complaints are eliminated.

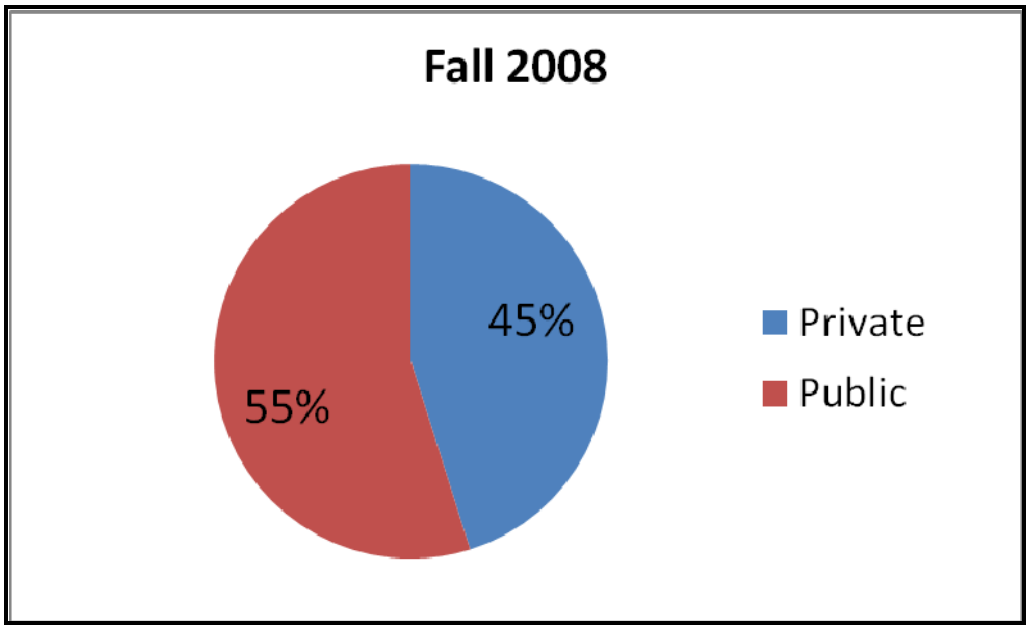
Conveyance system odor abatement tools available for odor control or mitigation include:

- Hydraulic flushing
- Chemical addition
- Placement of carbon filter manhole inserts
- Vapor treatment
- Sewer modifications

Quarterly Odor Complaint Summary

Because seasonal weather conditions, temperatures, and population-based flows affect metropolitan conveyance system odor generation, quarterly odor complaint frequencies are best compared year-to-year. From 2000 to 2006, the average number of odor complaints for this quarter was 205. In Figure 1, the number of third quarter complaints from years 2007 and 2008 are illustrated and show there was a slight percent reduction in complaints this year.

Figure 1. Odor Complaints for Third Quarter 2008



The Metropolitan Service area is divided into quadrants divided by Speedway Boulevard and Alvernon Road.

The odor complaint statistics for the third quarter indicate that for the total of 82 complaints:

- 55% (45) of all the complaints were the result of public conveyance system odors and 45% (37) were attributed to private sources, such as homes, businesses, or private sewer systems, not under the control of PCRWRD.

- 67% (55) of all the complaints originated west of Alvernon Road in the northwest (A) and southwest (C) quadrants

- 53% (or 29) of these 55 complaints were the result of private system odors.

The private system odor complaints result from either a private system requiring operational maintenance or a restaurant discharging through a septic grease interceptor.

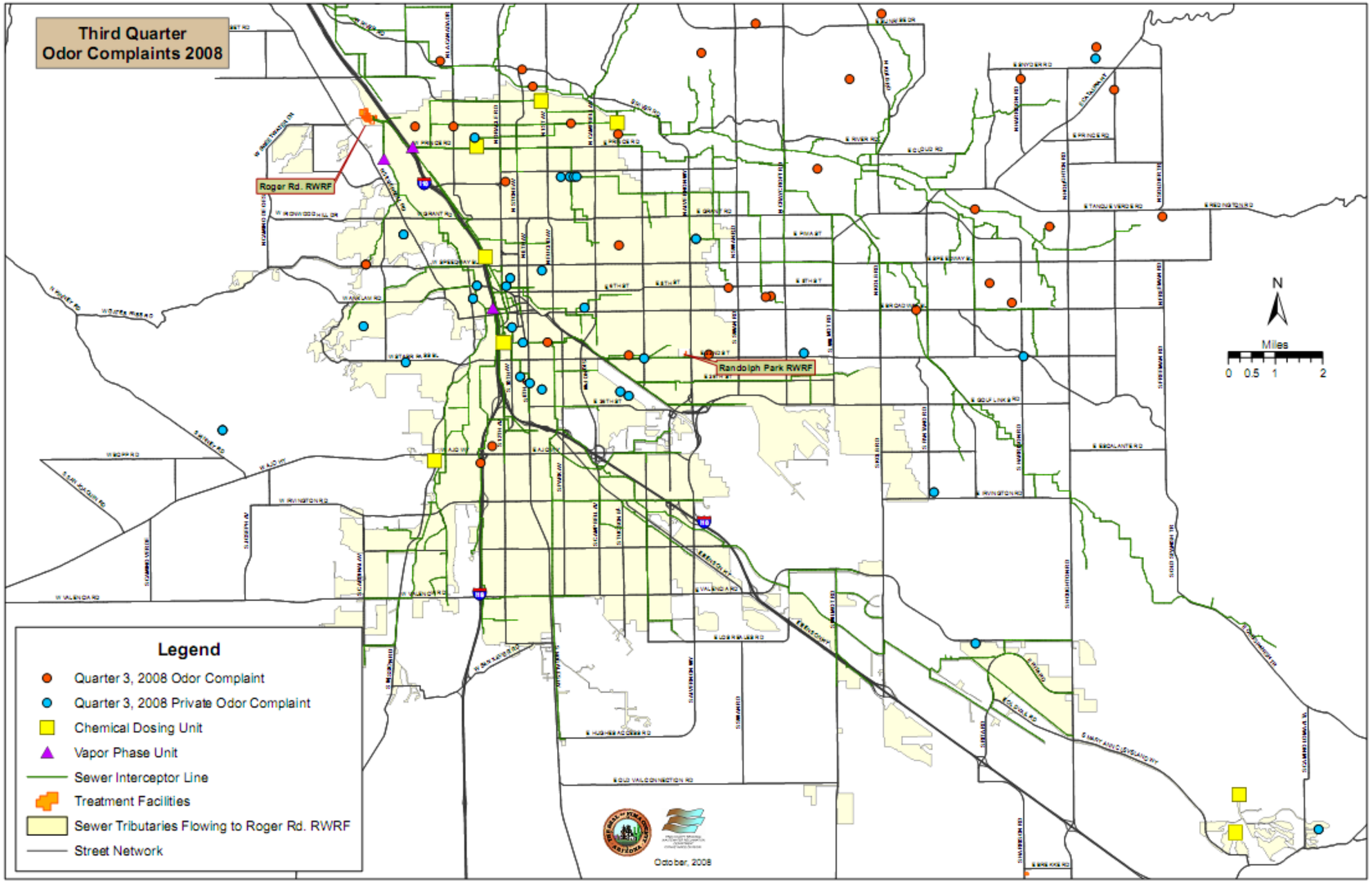
Although the map in Figure 2 does not depict the entire Metropolitan Service area (nor all complaint locations), it clearly illustrates the spatial distribution of odor complaints for the third quarter of 2008 as described above.

The following are reasons for more odor complaints being west, rather than east of Alvernon Road:

- The population density west of Alvernon Way is greater and includes older housing stock.

- There is higher density of food-service related discharges west of Alvernon Way.

Figure 2. Odor Complaint Map for second Quarter 2007 and 2008



This map shows that while few of the odor complaints in the third quarter of 2008 are near the Roger Road Wastewater Reclamation Facility (WRF), only six complaints were attributable to the Roger Road WRF, and five of these complaints were reported by Departmental Staff.

Also notable is the general absence of complaints downstream of chemical dosing units (CDU) in the second quarter of 2008, indicating consistent control, and well functioning CDUs.

Roger Road WRF Odor Control

RWRD's odor study originally identified five significant odor sources at the Roger Road WRF. These sources and corresponding odor control systems are listed below:

1) **The headworks** tent building was constructed in June 2007 and ventilated with a carbon odor scrubber.
2) **The six primary clarifiers'** overflow weirs and launders were covered in June 2007. All are ventilated in pairs to three carbon adsorbers. Odor control has been further improved with the addition of an odor-reducing chemical (Biocope).
3) **Yard-structure number-one**, a flow diversion structure controlling influent and flows to the primary clarifiers, was covered and ventilated to a carbon adsorber in June 2007.
4) **No. 2 biotower** (north) odor control went into service on April 1, 2008. **No. 1 biotower** (south) odor control went into service on June 10, 2008. Both towers were equipped with fans to reverse air flow downward into four carbon adsorbers (two adsorbers service each tower).
5) **No. 3 gravity thickener** and the **gravity belt thickener**, went into service on June 6th, 2008. **No. 1 and No. 2 gravity thickeners** went into service on June 25, 2008. Chemical scrubbers were replaced with more efficient carbon adsorbers.

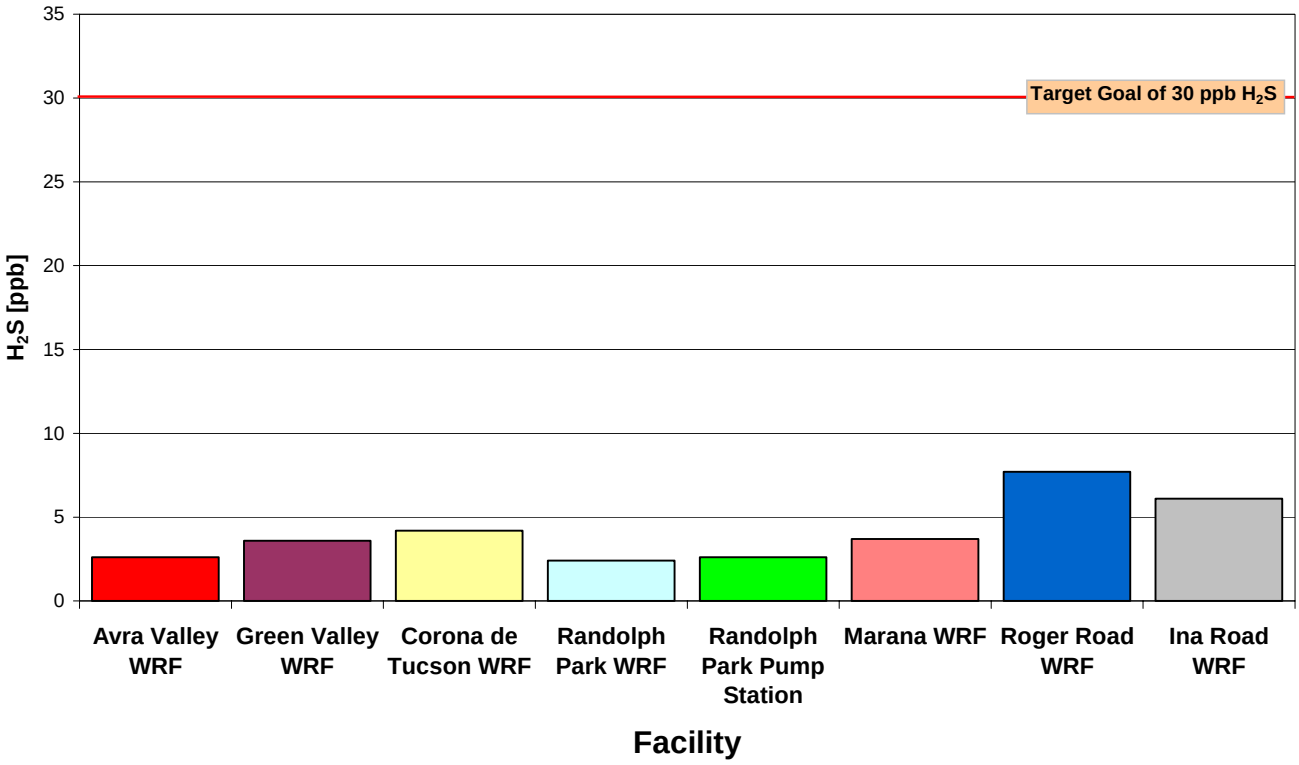
All of these odor sources are now controlled with the installed odor control equipment. The effectiveness of this equipment is validated by monthly fenceline monitoring conducted with over 450 measurements during the last quarter. Monitoring results indicate a 90% compliance with the 30 parts per billion H_2S control goal at the fenceline.

Perhaps the more remarkable result of the monitoring is that 75% of the measurements were below the odor threshold for H_2S.

Wastewater Reclamation Facilities Fence Line Monitoring

An independent consultant performs monthly fence line monitoring. This entails collecting measurements at 50-foot intervals along the linear perimeter of the fence line at each facility. The measurements are recorded in parts per billion, (which is equivalent to one second of time in a 32-year span). The 30 parts-per-billion (ppb) hydrogen sulfide fence line goal is considered to be below the nuisance threshold. The following graphs depict peak and average fence line concentrations measured at each facility.

Figure 3: Average Fenceline Hydrogen Sulfide By Facility



Roger Road WRF Fence Line Performance

The fenceline consists of 6,000 linear feet requiring 150 separate sample measurements. A one-time peak value, 76 ppb, was measured at the west fenceline approximately 200-feet west the biogas flares. The peak value was attributed to the four biogas pressure relief flares which are not enclosed and when exposed to a breeze the flames fluctuate resulting in inefficient flaring and odors. A biogas flare enclosure project has been requested and is planned. As indicated in Figure 3, the average fenceline concentrations are well below the target goal.

A continuous monitoring system (Odowatch) will be installed at Roger Road WRF during the next quarter. The system will measure various odors from processes that can be problematic and will provide immediate alarms for corrective action to abate any fugitive odor emissions.

Ina Road WRF Fence Line Performance

All of the odor control systems operating at Ina Road WRF performed at greater than 99.9 percent removal. Fence line monitoring indicates that the odor control systems in operation successfully control odors at the fence line.

Sub-Regional Facilities Fence Line Performance

The sub-regional wastewater reclamation facilities include:

- Green Valley WRF
- Avra Valley WRF
- Marana WRF
- Corona de Tucson WRF
- Randolph Park WRF

Sub regional facilities are scheduled for quarterly fence line monitoring. As indicated in the previous two graphs, fence line performance is significantly below target goals.

Conveyance System Odor Monitoring and Control Performance

Seventy-seven unscheduled sampling work orders were completed this quarter; over half of these were for the resolution of private odor problems. Resolution of chronic odor problem cooperatively achieved for Saint Mary's Tortilla Factory, El Minuto, State Building (400 West Congress), and Gallego School.

Conveyance system odor control has improved significantly in terms of total complaints and hydrogen sulfide control has been very good at CDU performance monitoring locations. Three odor control systems (Silverbell, Alameda and Prince Road sites) had removal efficiencies of over 99 percent and are doing an excellent job of keeping odor emissions under control at these positive pressure locations.

Operating and Maintenance Costs

During the second quarter, the following costs were incurred:

• Roger WRF - 20,000 lbs. Carbon	$ 31,200
• Roger WRF - BioCope Chemical Cost	$ 82,800
• Ina WRF – 75,500 lbs Carbon	$117,780
• CDUs – 226,949 gallons Sodium Hypochlorite	$222,410
• State Prison Site – 5,425 gallons Thioguard	$ 10,579
• Pump Station – 1650 gallons Sodium Hypochlorite	$ 2,063
• Pump Station Odor Labor and Vehicle Costs	$ 28,033
• CDU Labor and Vehicle Costs	$ 16,535
• Manhole Monitoring and Flushing Treatments	$ 4,852
• Independent Monitoring Services	$ 59,360
Total costs for second quarter operating and maintenance	$601,094

Conveyance System Odor Control Capital Improvements

The Conveyance System Odor Control CIP program for FY 2008/2009 will begin with the third quarter. Projects included in this fiscal year's CIP include: CDU Safety and Improvements, Vapor Treatment Systems, and CDU Expansions. These projects will improve odor control through hot-spot control, improved reliability and control, and strategic system expansion.

RWRD currently treats approximately 35 miles of interceptor with the current CDU system. The strategic CDU expansion is anticipated to treat over 100 miles of interceptor with significant benefits to the treatment plant odor system and treatment processes. In addition to odor control, the chemical treatment program results in significant reductions in corrosion rates of the sanitary sewer system.

Hydrogen Sulfide and Health Effects

The health impacts of exposure to hydrogen sulfide is frequently a point of concern among members of the public. RWRD employees who must work in areas where there can be high concentrations of hydrogen sulfide (i.e.: inside manholes and confined spaces at treatment facilities) are trained to measure levels of this gas and use appropriate safety equipment when there is the potential for high-level exposure. Both the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH) have defined the Hydrogen Sulfide limit exposure for American workers. A table outlining those levels appears below:

Table 1: Exposure Limits Defined for Hydrogen Sulfide (H_2S)		
Agency	**Limit**	**H_2S [ppm]**
OSHA	**Permissible Exposure Limit (PEL) for 8-hour work shift**	**10**
NIOSH	**Recommended Exposure Limit (REL)**	**10**

The following table details hydrogen sulfide measurements that have been recorded both on and off the Roger Road plant site on a monthly basis over the last quarter. The results of those measurements indicate that hydrogen sulfide levels in the ambient air at the Roger Road Plant and within 1000 feet of the plant do not even remotely approach the limits set by OSHA and NIOSH.

Table 2: Ambient H_2S Measurements On and Off Plant Site	
Location	**H_2S [ppm]**
Headworks	0.012
Primary Clarifiers 5&6	0.092
Primary Clarifiers 7&8	0.021
Primary Clarifiers 9&10	0.067
Top of Biotowers	0.234
Gravity Thickeners	0.055
Digester Overflow Box	0.225
250 ft North of Fenceline	0.004
1000 ft North of Fenceline	0.007
250 ft West of Fenceline	0.005
1000 ft West of Fenceline	0.003
250 ft South of Fenceline	0.24
1000 ft South of Fenceline	0.003
250 ft East of Fenceline	0.01
1000 ft East of Fenceline	0.008

While plant odors can be bothersome, both plant-site employees and the public at large can safely live, work and travel in and around the Roger Road facility.