



# **Pretreatment Program Cost Benefit Analysis**

April 2013

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**Acronyms**

ADEQ	Arizona Department of Environmental Quality
ADHS	Arizona Department of Health Services
APP	Aquifer Protection Permit
AWRF	Airport Water Reclamation Facility
BMPs	Best Management Practices
BOD <sub>5</sub>	Biochemical Oxygen Demand
CCTV	Closed-Circuit Television
City	City of Prescott
COD	Chemical Oxygen Demand
ERP	Enforcement Response Plan
FTE	Full-time Employee
FOG	Fats, Oils, and Grease
FY	Fiscal Year
gpm	gallons per minute
I&I	Infiltration and Inflow
ID	inner diameter
IWS	Industrial Waste Survey
lb	pound
LF	linear feet
NOV	Notice of Violation
OD	outer diameter
PCBs	Polychlorinated Biphenyls
Pests	Pesticides
POTW	Publicly Owned Treatment Works
SMRs	Self-Monitoring Reports
SSOs	Sanitary Sewer Overflows
SIUs	Significant Industrial Users
SVOCs	Semivolatile Organic Compounds
TKN	Total Kjeldahl Nitrogen
TSS	Total Suspended Solids
USEPA	U.S. Environmental Protection Agency
VOCs	Volatile Organic Compounds
WEECI	Western Environmental Equipment Company

## 1. Introduction

The City of Prescott (City) is developing a Pretreatment Program to protect its sewer collection system and wastewater treatment plants by controlling wastewater discharges from Industrial and Commercial Users. This Cost Benefit Analysis describes costs and potential savings to the City, industries, commercial businesses, and residents from the implementation of the Pretreatment Program.

## 2. Implementation of Pretreatment Program

The objectives of the City's Pretreatment Program are to:

- Control pollutant discharges into the sewer collection system
- Reduce collection system blockages and sewer overflows
- Protect the Publicly Owned Treatment Works (POTW) and the environment
- Maintain high quality effluent and biosolids
- Protect the public and City workers
- Maintain compliance with regulatory requirements [e.g., Aquifer Protection Permit (APP) effluent limits]

In order to achieve these goals, the City has developed several documents which describe the program requirements and implementation procedures. These documents include an updated Sewer Use Ordinance (City Code Chapter 2-1), Enforcement Response Plan (ERP), Local Limits Update Report, Industrial Waste Survey (IWS), and an ADEQ Pretreatment Deliverable, which describes procedures for permitting and conducting compliance monitoring.

The Pretreatment Program may require the City, Significant Industrial Users (SIUs), and Commercial Users to perform the following activities:

### City

- Compile results from the IWS and identify potential SIUs
- Work with SIUs to develop Industrial Wastewater Discharge Permit, which will describe the required pollutants to monitor, discharge limits, sampling frequency, and Best Management Practices (BMPs)
- Review SIU Self-Monitoring Reports (SMRs) for completeness, violations, pollutant trends in discharge, and potential issues
- Manage data and SMRs submitted by SIUs
- Perform site inspections of SIU facilities, including preparation for the inspection, site inspection, and documentation of inspection
- Respond to discharge violations using procedures detailed in ERP
- Prepare annual pretreatment report to be submitted to ADEQ
- Perform non-routine wastewater sampling in response to complaints, upsets at treatment plant, or in support of local limits development

- Assess IWS for potential impact from commercial dischargers and identify high risk groups of commercial dischargers
- Develop educational material for public outreach describing BMPs for commercial dischargers
- Develop educational material for public outreach describing BMPs for residential dischargers

#### Significant Industrial Users (SIUs)

- Complete IWS on-line survey
- Complete Industrial Wastewater Discharge Permit application
- Work with City to develop Industrial Wastewater Discharge Permit
- Install pretreatment equipment (if required) and develop operating and maintenance procedures
- Implement and document use of BMPs as described in the Industrial Wastewater Discharge Permit
- Perform self-monitoring per frequency specified in Industrial Wastewater Discharge Permit
- Prepare and submit SMRs to City
- Manage data and SMRs submitted to the City
- Communicate with City if any unexpected discharges, bypasses, or permit violations occur
- Communicate with the City regarding renewal of Industrial Wastewater Discharge Permit or transfer of permit to new owner/operator

#### Commercial Dischargers

- Complete IWS on-line survey
- Understand requirements for pretreatment equipment (if required), examples may include grease removal devices for restaurants and amalgam separators for dentists
- Implement and document use of BMPs as described in outreach brochures developed by the City

Some of these activities are performed on a one-time only basis (e.g., completing the Industrial Wastewater Discharge Permit application) and others may be on a routine frequency (e.g., twice a year submittal of SMR).

The City will implement the Pretreatment Program in phases, beginning with identifying and permitting SIUs. Other elements of the Pretreatment Program, including General Permits for Commercial Dischargers may be considered in future phases.

**3. Cost Break Down for the City**

**3.1 Cost of APP Permit Exceedance**

The City is required to report effluent sampling results under the APP permit to ADEQ on a quarterly basis. For one-time or minor violations, ADEQ may issue a verbal or written warning. For pattern or more significant violations, ADEQ can issue a Notice of Violation (NOV), a Consent Order, or assess fines of up to \$25,000 per day per violation. The costs of responding to APP exceedances include additional interaction with ADEQ, required written responses to notices, time for City staff to investigate cause of violation, and possible repeat sampling. The City is taking a proactive stance in implementing the Pretreatment Program and working to maintain a good relationship with ADEQ; continued APP exceedances can erode these efforts. Table 1 presents the potential costs to the City for violating the APP permit.

<b>Table 1 Potential Costs for Violating APP Permit</b>	
Maximum fines	\$25,000 per day per violation
Consent Order	Additional time and effort by City staff to respond, investigate, and resample
Notice of Violation	

**3.2 Addition of Staff**

The City currently has one full-time employee (FTE) that splits time between Water System Cross-Connection Control and the Wastewater Pretreatment Program. In anticipation of implementing the Pretreatment Program, the City has included a budget request for an additional FTE in the FY2014 budget. The additional position will also be split between Water System Cross-Connection Control and the Wastewater Pretreatment Program. Duties for the Water System Cross-Connection Control include field inspections of backflow prevention devices; maintaining database of backflow assemblies; backflow assembly testing, repair, and maintenance records; keeping records of private contractors' certifications and test gauge calibration; installation, testing, and maintenance of City owned backflow prevention assemblies; publication of list of certified backflow assembly testers; public education about cross-connection control; development of standard details, specifications, and cross-connection control documents; and answering questions from the City's residences and businesses. Water System Cross-Connection Control staff are also required to maintain Certified Backflow Assembly General Tester certification. The Water System Cross-Connection Control staff are also responsible for public education, site surveys, and responding to customer inquiries regarding Sewer Backwater Valves.

Duties for the Wastewater Pretreatment Program include coordinating with industrial/commercial users on City Code pretreatment requirements; performing field inspections of pretreatment device installations; conducting compliance monitoring and inspections; initiating enforcement response activities, documenting pretreatment activities; preparing reports and correspondence to regulatory agencies; developing

educational public outreach material and BMP brochures; and conducting/updating the IWS. The Wastewater Pretreatment Program staff will also be responsible for performing monitoring activities for wastewater model updates and infiltration and inflow (I&I) studies for the wastewater collection system. Table 2 presents the annual costs to the City for additional staff.

<b>Table 2</b>			
<b>Annual Costs for Additional City Staff</b>			
<b>Title</b>	<b>Salary</b>	<b>Other Expenses</b>	<b>Total</b>
Water Protection Specialist	\$41,049	\$47,053	\$88,102

Notes: Other Expenses include required support equipment (vehicle, computer, etc.) and benefits (medical, retirement, etc.)

### **3.3 Cost of Managing High Strength Wastewater**

High strength wastewater is characterized as having concentrations of Biochemical Oxygen Demand (BOD<sub>5</sub>), Total Suspended Solids (TSS), or Fats, Oils, and Grease (FOG) greater than concentrations observed from residential sources. High strength wastewater can cause obstruction of flow in the sewer collection system, reduction of treatment efficiency of the POTW, and additional costs associated with responding to Sanitary Sewer Overflows (SSOs) and POTW operations (e.g., higher energy costs due to increased use of aeration blowers and extra chemicals required to treat excess bacterial growth).

The Pretreatment Program includes controls for eliminating pollutant discharges that cause interference at POTWs, including interference caused by the discharge of FOG from restaurants and other food service establishments. More specifically, City Code Chapter 2-1-39(B) prohibits the discharge of “fats, oils, or greases of animal or vegetable origin in amounts that will cause or contribute to obstruction of the flow or reduced treatment effectiveness in the POTW.”

The USEPA identified that “grease from restaurants, homes, and industrial sources are the most common cause (47 percent) of reported blockages” (EPA-833-F-07-001, July 2007). Discharged FOG material solidifies in the sewer collection system, causing reduced flow capacity and operational issues at the POTWs. Controlling FOG discharges will reduce blockages that cause SSOs.

In 2011, the City had a total of 39 SSOs, with grease being described as the primary cause for 10 of the SSOs and five more where grease was noted as a secondary cause. During 2012, 25 SSOs were recorded with FOG described as the primary cause in five and four others where grease was noted as a secondary cause.

The City’s costs responding to FOG-related maintenance and SSOs, summarized on Table 3, are associated with cleaning and maintenance activities, including closed-circuit television (CCTV) inspection, jet rodding, removal of debris using vacuum truck, and investigating the source of FOG discharges.

<b>Task</b>	<b>Labor Cost</b>	<b>Equipment Cost</b>	<b>Total Costs</b>
Lift Station Maintenance	\$19,115.22	\$31,688.46	\$50,803.68
Collection System Maintenance	\$47,016.70	\$78,544.35	\$125,561.05
POTW Maintenance	\$13,318.31	\$21,951.04	\$35,269.35
<b>Annual Average Cost:</b>			<b>\$211,634.08</b>

Notes: Costs are annual averages, based on 8/2008 to 12/2012 data from the City's maintenance management software (Lucity); Costs are further detailed in Appendix A

The costs related to treatment operations and maintenance issues associated with high strength wastewater are related with increased blower run time, defoaming agents for the digester, cleanup at the headworks and digester, chemical treatment of filamentous bacteria in the aeration basins, odor control, and increased polymer usage to improve solids settling. Although direct costs were not available for these elements, the aeration process in activated sludge wastewater treatment plants consumes approximately 40 to 60 percent of a POTW's total energy usage; therefore, increased blower run time required due to high strength wastewater results in a significant increase in energy costs.

**4. Cost Break Down for Significant Industrial Users (SIUs)**

Costs incurred by SIUs in complying with the Pretreatment Program will be associated with the following activities:

- Installing, operating, and maintaining pretreatment equipment (if required)
- Collecting samples and analyzing wastewater discharge
- Monitoring wastewater discharge flow
- Adopting BMPs
- Interacting with the City (e.g., completing the IWS, permit application, notification of any discharge issues)

These costs will vary depending on the industry's operations, applicable categorical pretreatment standards and requirements, process water flow characteristics and volume, and existing pretreatment equipment. The Industrial Wastewater Discharge Permit will describe the required pretreatment equipment, sampling parameters and frequency, and BMPs for each SIU.

Table 4 presents several examples to illustrate how the pretreatment requirements vary between SIUs. Cost estimate for pretreatment equipment is not included since this is dependent on the individual SIU's conditions (e.g., wastewater characteristics, current plumbing of process water). Additional information regarding analytical and flow monitoring equipment costs are provided in Section 6.

<b>Table 4</b>	
<b>Examples of Industrial Wastewater Discharge Permit Requirements</b>	
<b>Pretreatment Requirements</b>	<b>Permit Requirements</b>
<b>SIU #1 - Brewery</b>	
Pretreatment Equipment	Inline pH adjustment, filtration system, and equalization tank
Flow Monitoring	Inline flow meter
Sampling	2/year for BOD <sub>5</sub> , TSS, copper, ammonia, nitrate, TKN; daily for pH (inline pH meter); limits as daily max values
<b>SIU #2 – Wafer Reclaim Industry</b>	
Pretreatment Equipment	pH adjustment system, chemical precipitation, and equalization tank
Flow Monitoring	Flow meter associated with existing weir
Sampling	4/year for metals (cadmium, chromium, copper, lead, nickel, silver, zinc), cyanide, total toxic organics, oil & grease, TSS, pH; daily for fluoride and pH (inline meters)
<b>SIU #3 – Nutraceutical Manufacturer</b>	
Pretreatment Equipment	Inline pH adjustment, filtration system, and equalization tank
Flow Monitoring	Inline flow meter
Sampling	4/year for BOD <sub>5</sub> , TSS, pH, COD, total nitrogen, pH; 1/year for metals (barium, beryllium, cadmium, chromium, copper, lead, nickel, zinc), cyanide Daily for pH (inline meter)

Notes: BOD<sub>5</sub> = biochemical oxygen demand; TSS = total suspended solids; TKN = total Kjeldahl nitrogen; COD = chemical oxygen demand

**5. Cost Break Down for Commercial Users**

Costs incurred by Commercial Users in complying with the Pretreatment Program will be associated with the following activities:

- Installing, operating, and maintaining pretreatment equipment (if required)
- Adopting BMPs
- Interacting with the City (e.g., completing the IWS, notification of any discharge issues)

These costs will vary depending on the Commercial User’s operations (e.g., restaurant, medical facility etc.). Based on the results of the IWS, the City may decide that a particular category of Commercial User poses a potential impact to the POTW and implement BMP requirements for that business category. These BMPs may be implemented through issuing General Wastewater Permits. General Wastewater Permits are not currently part of the Pretreatment Program, but may be phased in at a later date depending on information obtained from the IWS and interaction with Commercial Dischargers. Future implementation of General Permits will include a public process and require council action. Table 5 presents examples of potential requirements of General Wastewater Permit for Commercial Users.

<b>Table 5</b>	
<b>Examples of Potential General Permit Requirements for Commercial Users</b>	
<b>Pretreatment Requirements</b>	<b>Potential General Permit Requirements</b>
<b>Commercial User #1 – Restaurant with char-broiler, deep fryer, and grill</b>	
Pretreatment Equipment	Grease removal device
<b>Commercial User #2 – Limited food prep establishment, only reheats food</b>	
Pretreatment Equipment	Grease removal device not required
<b>Commercial User #3 – Dental Practice</b>	
Pretreatment Equipment	Amalgam separator and chair-side traps to collect fine amalgam particles and dissolved mercury
<b>Commercial User #4 – Auto Body Shop</b>	
Pretreatment Equipment	Oil/water separator

USEPA estimates that the annual production of collected grease trap waste and uncontrolled grease entering sewer collection systems ranges from 800 to 17,000 pounds per year per restaurant. Food service establishments can reduce the amount of FOG discharged to the sewer by adopting BMPs, including installation of grease removal devices (traps or interceptors), employee training, “dry wiping” pots and pans, and recycling used oils.

For grease removal devices, proper design, sizing, installation, and maintenance procedures (especially cleaning) are critical to efficient operation. Grease removal devices use gravity and coalescence to separate grease from the wastewater. The following are examples of different types of grease removal devices:

- Grease Trap – typically smaller reservoir connected into wastewater piping a short distance from fixture (e.g., sink), uses internal baffles in reservoir in conjunction with external vented flow control device to retain wastewater long enough for grease to congeal and rise to surface
- Gravity Grease Interceptor – typically vault constructed of concrete or steel located on exterior of building, larger capacities can range from 1,000 to 2,500 gallons or more, includes a minimum of two compartments with the flow between compartments restricted through a 90° fitting, capacity allows adequate residence time for grease to congeal and rise to surface and solids to settle out
- Automatic Grease Removal Device – hydromechanical interceptor that uses timer or sensor to actively remove (skim) the grease and place in storage receptacle, recovered grease can be recycled

Table 6 presents costs associated with different types of grease removal devices. These costs do not include installation, which will be highly dependent on the individual Commercial User’s physical layout. The type of grease removal device selected depends on the potential to discharge grease to the sewer system (e.g., the Commercial User’s fixture count and size, number of meals prepared, seating capacity, type of facility, etc.).

<b>Table 6</b>	
<b>Example Costs for Grease Removal Devices</b>	
<b>Equipment</b>	<b>Cost Range</b>
<b>Grease Traps</b>	
4 gpm, 8 lb capacity	\$120 - \$150
20 gpm, 40 lb capacity	\$290 - \$590
50 gpm, 100 lb capacity	\$399 - \$819
<b>Grease Interceptors</b>	
35 – 75 gpm, 150 lb capacity	\$1,530 - \$2,930
250 to 750 gallon	\$3,500 - \$5,510
1000 to 2000 gallon	\$3,200 - \$6,000
<b>Automatic Grease Removal Device</b>	
15 - 20 gpm, 40 lb capacity	\$4,000 - \$4,780
50 gpm, 100 lb capacity	\$6,930 - \$9,990

Notes: gpm = gallons per minute; lb = pounds; Costs from following manufacturers: Thermaco, Josam, Zurn, J.R. Smith, Jensen Pre-Cast, and Goslyn; costs are for information only and is not an endorsement or recommendation by the City

Sand/oil interceptors designed for use in vehicle service facilities (e.g., auto body shops, maintenance garages, and car washes) can range in costs from \$2,300 for a 350 gallon capacity to \$4,600 for a 1,500 gallon capacity interceptor. Items to consider for selection of sand/oil interceptors include: volume and characteristics of wastewater, location of installation (on floor, flush with floor, or recessed), and placement of flow control fittings and venting requirements.

For dental offices, the types of amalgam separators are based on removal technique: sedimentation, filtration, centrifugation, chemical removal by ion exchange, or combination of these methods. Costs for amalgam separators range from \$525 to \$825 depending on unit features. Items to consider in evaluating amalgam separators include: model dimensions, flow capacity (i.e., number of chairs per separator), maintenance requirements, and available recycling programs.

**6. Costs Associated with Wastewater Sampling and Flow Monitoring**

Requirements for sampling wastewater discharge will be included in the Industrial Wastewater Discharge Permits. The sampling requirements and associated costs will vary depending on the SIU's operations and wastewater characteristics. Table 7 presents cost information on analytical methods from three laboratories certified by the Arizona Department of Health Services (ADHS).

Parameter	Analytical Method	Range of Unit Cost		
		Test America	Legend	Xenco
Metals	200.7	\$270	\$157	\$95
Mercury	245.1	\$40	\$40	\$35
BOD <sub>5</sub>	SM5210	\$40	\$48	\$40
TSS	SM2540D	\$20	\$17	\$15
Fluoride	300.0	\$20	\$20	\$15
Cyanide	335.4	\$45	\$55	\$45
Ammonia	350.1	\$25	\$30	\$40
TKN	351.2	\$50	\$40	\$35
Nitrate+Nitrite	353.2	\$20	\$25	\$20
VOCs	624	\$110	\$200	\$115
SVOCs	625	\$225	\$390	\$275
Pests & PCBs	608	\$220	\$200	\$115

Notes: Prices from Test America, Legend, and Xenco laboratories are provided for information only and is not an endorsement or recommendation by the City; Metals list includes arsenic, cadmium, chromium, copper, lead, nickel, silver, selenium, zinc; BOD<sub>5</sub> = biochemical oxygen demand; TSS = total suspended solids; TKN = total Kjeldahl nitrogen; VOCs = volatile organic compounds; SVOCs = semivolatle organic compounds; Pest & PCBs = pesticides and polychlorinated biphenyls

Laboratories that are certified by ADHS are found on the following web site: <http://www.azdhs.gov/lab/license/env.htm>. Communicating with the analytical laboratory prior to sampling is strongly encouraged. The laboratories will be able to advise on sampling and provide clean sampling containers appropriate to the requested methods.

The Industrial Wastewater Discharge Permit will also include information about sampling frequency and sample type (grab or composite) requirements for each requested parameter. How the sample is collected impacts the overall quality of the results. Table 8 presents costs for different types of sampling equipment that may be used for wastewater monitoring.

Equipment	Cost	Cost Type
ISCO 6712	\$150 – \$300; \$4,000 /each	Weekly rental rate; Purchase cost
Pump tubing, with blue bands	\$26.10/LF	Expendable purchase
Pump tubing, silicone 3/8 ID x 5/8 OD	\$3.50/LF	Expendable purchase
Intake tubing PV 3/8 ID x 5/8 OD	\$27.50/LF	Expendable purchase
Bottle, poly 2.5 gallon	\$108/each	One time purchase

Notes: Pricing is from Pine Environmental and Western Environmental Equipment Company (WEECI) and is for information only and is not an endorsement or recommendation by the City; ID = inner diameter; OD = outer diameter; LF = linear feet

Flow measurements will be required in association with wastewater samples. The required frequency and equipment for flow measurements will be described in the

Industrial Wastewater Discharge Permit. Table 9 presents costs for several different types of flow measurement devices.

<b>Table 9 Costs for Flow Measurement Equipment</b>		
<b>Equipment</b>	<b>Cost (\$)</b>	<b>Application</b>
<b>Permanent Installation</b>		
Signature Area Velocity meter	\$3,400 (add \$345 for cable if needed to connect to autosampler)	Assumes no primary device (flume, weir box, etc) is available; sensor installed in bottom of pipe using spring ring, electronics box is mounted aboveground
Signature Ultrasonic meter	\$3,000 (add \$345 for cable if needed to connect to autosampler)	Assumes primary device (flume, weir box, etc) is available; sensor installed above primary device to measure level in primary device and convert to flow
<b>Temporary Installation</b>		
ISCO 2150 Area Velocity meter	\$300 – \$350 (weekly rental)	Sensor installed in bottom of pipe using spring ring, electronics is hung in manhole during test and then retrieved and data downloaded to computer
<b>Primary Devices</b>		
Flume	\$1,500 – \$3,500	Device that constricts an open channel flow
Weir box	\$2,500 – \$5,000	Low dam or overflow structure built across channel
Metering manhole	\$8,000+	Includes flume for flow measurement

Notes: Pricing is from Pine Environmental and Western Environmental Equipment Company (WEECI) and is for information only and is not an endorsement or recommendation by the City

Laboratories and equipment rental firms listed in Tables 7, 8, and 9 are provided for information only and are not intended to reflect endorsement or recommendation by the City.

**7. Summary**

The City is mandated to implement and enforce a Pretreatment Program by both the USEPA and ADEQ. Due to exceedances of the APP permit at the Airport Water Reclamation Facility (AWRF), ADEQ has issued the City a Notice of Violation and Consent Order, which required updating and adopting the Sewer Use Ordinance and establishing the Pretreatment Program. The consequences of not controlling Industrial and Commercial User dischargers could have significant financial impact to the City (i.e., fines up to \$25,000 per day per violation). The costs to SIUs and commercial dischargers will be spread out over time and will depend on a number of variables (e.g., process operations, wastewater characteristics and flow, existing pretreatment equipment) that will be identified during the Industrial Wastewater Discharge Permit process.

During the initial phase of the Wastewater Pretreatment Program, the City will be interacting (via education, outreach, and the IWS) with Commercial Dischargers to assess which category of Users may warrant General Permits. Site visits during this City of Prescott Pretreatment Program

initial phase will document and develop a database of site-specific conditions (business practices, physical limitations, existing pretreatment equipment, etc.). These conditions will be documented to develop a more definitive estimate of costs that may result in the potential implementation of General Wastewater Discharge Permits.

## 8. References

USEPA, 2007. *EPA Model Pretreatment Ordinance*, Office of Wastewater Management / Permits Division, EPA 833-B-06-002, January 2007

ADEQ, 2004. *The Pretreatment Program Procedures and Guidance Manual*, December 2004

USEPA, 1987. *Guidance Manual on the Development and Implementation of Local Discharge Limitations*. EPA 833-B-87-202, November 1987.

USEPA, 2004. *Local Limits Development Guidance*, EPA 833-R-04-002A, July 2004.

USEPA, 2011. *Introduction to the National Pretreatment Program*, EPA 8330B-11-001, June 2011

USEPA, 1994. *Guidance Manual for Multijurisdictional Pretreatment Programs*, June 1994.