Executive summary of draft report of September 18, 2006 from Black & Veatch

OBJECTIVES

In keeping with the Orange Water and Sewer Authority (OWASA)'s stated odor elimination goal of "no objectionable off-site odor", OWASA contracted with Black & Veatch to perform an odor study, which included warm-weather sampling, to determine sources that are being effectively controlled and sources that require treatment.

The objectives of this study included:

- Odor sampling and analysis;
- Evaluation of existing odor control, and observation of current operational procedures;
- Comparison of information obtained from previous odor study, which included winter sampling, with this study.

A plant-wide odor sampling/investigation was conducted at the Mason Farm Wastewater Treatment Plant (WWTP) over a period of three days from June 12 to June 14, 2006. This report presents results of the survey and source ranking, compares and analyzes findings from the previous odor study, and provides recommendations for operational adjustments & odor control improvements.

ODOR SAMPLING SURVEY

Odor sampling was conducted at the WWTP from June 12 to 14, 2006. The sampling included collection and measurements of air and liquid samples throughout the plant. Outdoor temperatures ranged from 62 to 72° F during the sampling period.

Odor Survey Results

Air and liquid samples were collected at numerous process locations throughout the plant. The sample locations were selected to ensure a comprehensive canvassing of all potential odor sources at the plant. As hydrogen sulfide (H_2S) is the most problematic odor causing compound at wastewater treatment plants all of the plant processes were surveyed for sulfide in the liquid and H_2S in the air. The results of the air-phase H_2S measurements, liquid-phase dissolved sulfide sampling are summarized in ***Table ES1***.

Additionally, odor bag samples were collected by Black & Veatch's personnel at twelve locations and the collected odor bags were sent to St. Croix Sensory laboratory after sampling for sensory evaluation. The results of the odor bag sampling are summarized in ***Table ES1***. The results of previous Hazen and Sawyer odor sampling in the winter of 2002 are also shown on ***Table ES1*** in brackets [ ] for comparison.

Table ES1- Summary of Odor Sampling Data

Location	Sulfide (mg/L)	H_2S (ppm)	Detection Threshold (DT)	Remarks
Liquid Process Units				
South Headworks (Pre Aerated Grit)	0.4 – 0.8	0.034 – 3.5	–	Liquid and air measured upstream of parshall flumes
North Headworks (Post Aerated Grit)	ND – 0.1	0.18 – 0.7	–	Liquid and air measured upstream of parshall flume
Primary Clarifier Influent Splitter Box (PC SB #1)	ND	0.27 – 1.1	1900 [2500]	H_2S & odor sampled @ parshall flume. Liquid sample downstream of parshall flume
Primary Clarifier – Inlet Well	–	0.06	1400	
Primary Clarifier – Surface	0.1 – 0.6	0.012 – 0.27	1900 [440]	
Primary Clarifier – Weir	–	0.07 – 0.47	450 [1200]	
Primary Clarifier Effluent Splitter Box (PC SB #2)	ND – 0.2	0.11 – 0.42	1600 [1200]	H_2S & odor sampled downstream of weirs. Liquid sampled upstream of weirs
Trickling Filter Inlet	–	0.025	–	
Intermediate Pump Station #1	–	0.006	–	
Intermediate Pump Station #2	ND	0.004 – 0.67	3100 [2800]	
Aeration Basin – Infl. Channel	ND	0.002 – 0.26	1500 [290]	
Aeration Basin – No Air Zones	–	0.004 – 0.39	1300 [1900]	Measured at cell 2A
Aeration Basin – Air Zones	–	0.001 – 0.007	150 – 320 [60-290]	Measured at cells 2C & 2D
Secondary Clarifier	–	0.002 – 0.003	140 [75]	Measured at surface
Secondary Scum Pump Station	–	ND	–	
Solids Processing Units				
Primary Sludge Fermenter PRV	–	> 250	–	
Anaerobic Digester PRVs	–	0.1	–	
Digester Gas Storage – Ambient	–	0.006	–	
Gravity Belt Thickener (GBT) – Waste Activated Sludge	–	2.9 – 4.1	–	2.9 measured when GBT was not in operation
Gravity Belt Thickener (GBT) – Primary Sludge	–	30 – 31	–	
Gravity Belt Thickener (GBT) – Room	–	4.9	–	
Sludge Loadout Truck Vent	–	20	–	
Existing Odor Control Units				
Scrubber Inlet	–	4.2 – 5.5	–	With mixing
Scrubber Outlet	–	0.03 – 0.08	–	
Biofilter Outlet	–	0.005 – 1.1	320 [85]	
Carbon Outlet	–	ND	–	

GBT = Gravity Belt Thickener; ND = Not detected; PRVs = Pressure Relief Valves.

[ ] Previous Hazen and Sawyer odor values shown in brackets

ODOR SURVEY DISCUSSION

Liquid Processes

Influent Structure. The two existing unenclosed headworks structures will be abandoned and replaced by new covered headworks facilities with foul air treated by the existing scrubber. H_2S near the parshall flumes ranged from 0.034 to 3.5 parts per million (ppm) at the south structure and 0.18 to 0.7 ppm at the north structure. The H_2S values are some of the highest at the plant, but are low compared to other facilities. No hydrogen peroxide was added to the influent at the time of sampling.

Primary Clarifier Influent Splitter Box (PC SB #1). Sulfide was non-detectable in samples taken downstream of the parshall flume in the splitter box, which indicates that most of the influent sulfide was released at the headworks. H_2S at the parshall flume ranged from 0.27 to 1.1 ppm. An odor value of 1900 detection threshold (D/T) was associated with an H_2S of 0.27 ppm. The threshold odor for H_2S is often reported as 0.0005 to 0.001 ppm, so 0.27 ppm H_2S would equal an odor value of 270 to 540 D/T. This indicates that other odorous compounds are present.

Primary Clarifiers. Sulfide ranged from 0.1 to 0.6 milligrams per liter (mg/L) in the basin, which indicates that sulfide is generated in the unit. The odor values at the inlet and quiescent surface are higher than from H_2S alone, so this indicates the presence of other compounds. In contrast, the odor at the weir is due to H_2S. Typically, most of the odor at primary clarifiers is from the weirs, but the Mason Farm WWTP has less odor at the weirs, perhaps due to a short drop. The H_2S at WWTP primary clarifiers is relatively low compared to other plants.

Primary Clarifier Effluent Splitter Box (PC SB #2). The high odor value of 1600 D/T associated with 0.12 ppm H_2S indicates that other compounds are present. High turbulence at PC SB#2 could strip out some compounds that were not emitted at the weirs.

Intermediate Pump Stations #1 & #2. Both intermediate pump stations are open to the atmosphere. The high odor value of 3100 D/T associated with 0.67 ppm H_2S indicates the presence of other compounds. Fermentate is discharged at this location to feed the “no air” zone of the aeration basins for biological phosphorus removal, so this could contribute to the odor.

Aeration Basins. The inlet channel odor value of 1500 D/T associated with 0.26 ppm H_2S indicates that other odorous compounds are present. The aeration in the influent channel would cause compounds to be stripped from solution. In the no air zones, the odor value of 1300 D/T associated with 0.39 ppm H_2S indicates the presence of other compounds. The no air zone odor is higher than similar tanks at other facilities, possibly due to a thick layer of scum. At the aerobic cells the odor values of 150 and 320 D/T are higher than for H_2S alone and are due to other organic compounds. These low odor values are typical for well-operated aeration basins.

Secondary Clarifiers. An odor value of 140 D/T associated with 0.002 ppm H_2S, indicates that the odor is due to organic emissions. The low odor value measured is typical for final clarifiers.

Solids Handling Processes

Primary Sludge Fermenter. H_2S samples were taken at the vent located on the top of the fermenter roof and the readings were greater than 200 ppm. This problem will be corrected by preventative maintenance of the vents.

Solids Thickening. H_2S inside the plastic screens of the GBT units in operation at the time of sampling averaged about 30 ppm for the fermenter sludge, and 4 ppm for the WAS. Ambient air samples taken in the room averaged about 5 ppm.

Anaerobic Digesters. The H_2S samples taken at the vents of digesters no. 2, 3, and 4 averaged about 0.1 ppm. An ambient air sample near digester no. 1 showed 0.006 ppm H_2S.

Digested Biosolids Storage Tanks. The air inside the storage tanks is sent to a scrubber for odor treatment. No samples were taken at this location.

Sludge Loadout Truck. H_2S measurements at the top of the truck next to the vent while the truck was filling averaged about 20 ppm. The air volume is relatively low at about 67 cfm.

Existing Odor Control Units

Biofilter. The odor value at the biofilter was 320 D/T associated 0.039 ppm H_2S, indicates the odor was due to compounds other than H_2S. The low outlet odor indicates good removal based on the bag sample, which is collected over a 5 minute period. The higher H_2S measurements found at some locations indicates that H_2S may be breaking through in places where the media has dried out. Increased media sprinkling appears to alleviate this problem.

Scrubber. The odor scrubber treats odors generated by the existing biosolids storage tanks. The scrubber is oversized and will be used to treat the new headworks structure and new Morgan Creek pump station scheduled to be completed in the summer of 2007. Scrubber inlet H_2S was 4.2 to 5.5 ppm when the air in the biosolids storage tanks was turned on. The outlet H_2S ranged from 0.03 to 0.08 ppm, which yields an H_2S removal efficiency above 98 percent, and demonstrates good response to a slug load and effective treatment in the existing scrubber.

Carbon Adsorption. A carbon adsorption unit is currently used to treat the biogas storage tanks (digester no. 1) odors. The H_2S reading at the outlet of the carbon unit was non-detectable.

OWASA MONITORING

In addition to the sampling data collected during the B&V survey, extensive additional H_2S data was collected by OWASA both before and after the survey. This data was collected using continuous recording OdaLog meters, so that 24 hour data was collected. The meters were placed at various unit processes at the plant to measure how emissions vary at different times of day. This information was applied to adjust the odor values measured during the B&V survey to be more representative of the peak values that occur over a longer time span.

ODOR SOURCE RANKING

Based on the measured and calculated H_2S and odor values, odor sources at the Mason Farm WWTP were ranked according to the estimated severity of off-site impact. At the Mason Farm WWTP, all the remaining untreated sources of odor are relatively close to the ground with a low-velocity discharge from an open liquid surface. The main difference in the sources is their size, so a comparison must consider the overall surface area. The surface areas of the untreated sources at Mason Farm are shown in ***Table ES2***, along with the peak odor values measured during the B&V survey or calculated from the extended OWASA OdaLog data. The surface area is then multiplied times the odor value to obtain the relative magnitude of severity.

Table ES2 – Maximum Detection Threshold (D/T) x Surface Area (SA)

Group ID	**Units**	**Total Surface Area (SA, ft^2)**	**Maximum Detection Threshold (D/T)**	**DT x SA x 1000**	
				Subtotal	**Total**
Influent /Headworks					**62,688**
Old Headworks	1	2,188	28,350	62,030	
Old Morgan Creek PS	1	57	11,550	658	
Primary Clarifiers (PCs)					**30,308**
PC Influent Splitter Box	1	251	24,750	6,212	
PC Inlet Well	3	236	1,400	330	
PC Surface	3	10,989	1,900	20,879	
PC Weir	3	1,696	450	763	
PC Effluent Splitter Box	1	472	4,500	2,124	
Intermediate Pump Stations (IPSs)					**27,456**
IPS No. 1	1	140	62,400(1)	8,736	
IPS No. 2	1	300	62, 400	18,720	
Aeration Basins (ABs)					**14,088**
AB Influent Channel	1	1,925	1,500	2,888	
AB No Air Zones(2)	2	5,000	1,300	6,500	
AB First Aerobic Zones(3)	4	10,000	320	3,200	
AB Last Aerobic Zones(4)	4	10,000	150	1,500	

Notes:
(1) Odor data not available. Assume D/T value equal to IPS No. 2.
(2) Include AB Cells 2B & 2A
(3) Include AB Cells 1E, 1F, 2D & 3A
(4) Include AB Cells 1C, 1B, 3B & 2C

ODOR CONTROL TECHNOLOGY ASSESSMENT

The vapor-phase treatment technologies that are typically considered for wastewater applications include: wet scrubbers, carbon adsorption, biofiltration and biotrickling filter treatment. The report describes these technologies in detail and discusses their main advantages and disadvantages.

ODOR CONTROL METHODOLOGIES SURVEY

As part of the OWASA odor study project, Black & Veatch compiled information on odor control from 31 wastewater treatment facilities in the U.S. The purpose of the investigation was to determine how "best in class" facilities are addressing odor control. The key findings of the plant survey are summarized in ***Table ES3***.

Facility Survey Findings

All but one of the facilities surveyed have covered and treated headworks. The existing headworks at the Mason Farm WWTP is not covered and treated, so it may be a strong source of off-site odor. In keeping with the best practice at other facilities, OWASA has planned to cover the new headworks and treat the exhaust air in the existing wet scrubber which was sized to accommodate the airflow and H_2S loading. When this is accomplished in 2007, the Mason Farm WWTP will have provided headworks treatment equal to the best in class.

Nineteen of the facilities have contained and treated solids handling processes. Similar to the most conscientious facilities, OWASA currently provides odor control for their solids processes. Eighteen facilities have covered and treated primary clarifiers. The H_2S emissions measured at the Mason Farm facility are low compared with other facilities we have tested. At the present time, the primary clarifiers at the Mason Farm WWTP are not covered and treated, but the units are operated to minimize sulfide generation and were found to have lower H_2S emissions than most plants.

Few of the plants have covered and treated aeration basins. Emissions from aeration basins are organic odors that are not strong or offensive. Like most of the facilities surveyed, the Mason Farm aeration basins have low odor levels and are not covered and treated.

The odor control technologies at the plants surveyed are generally accepted technologies that can be considered "best in class." The odor control technologies currently employed at the Mason Farm WWTP are well-suited to their specific applications and recent measurements verified that they are providing highly effective treatment.

One element that "best in class" facilities share is a strong commitment to maintaining good odor control. OWASA has demonstrated their commitment to the public by setting an odor elimination goal of no offensive off-site odor from the Mason Farm WWTP. As part of the Mason Farm expansion, OWASA included extensive new odor control improvements. OWASA has kept neighbors well informed and has encouraged participation in public meetings to discuss odor issues and obtain feedback, so that further improvements can be implemented, if necessary.

Table ES3 – Plant Survey Summary

Number	Facility Name	Capacity mgd	Location	Receptor Data: Buffer	Receptor Data: Neighborhood	Receptor Data: Complaints	Covered Processes: H	Covered Processes: P	Covered Processes: A	Covered Processes: F	Covered Processes: S	Odor Control: H	Odor Control: P	Odor Control: A	Odor Control: F	Odor Control: S
1	Central San WWTP	45	CA	M	I, H	Few	●		●		●	WS		NT		NT
2	Corona WWTP #1/#2	10	CA	W	I	0	●	●			●	BF	BF			WS
3	El Toro Water Recycling Plant	6	CA	M	P,H	Few	●	●				BF	BF			
4	Elsinore Regional WRF[1]	8	CA	M	I,R	0	●					WS				
5	Encina Water Pollution Control Facility	36	CA	N	R,H	2	●	●	●		●	BT,AC	BT,AC	WS		WS,AC
6	Goleta WWTP[2]	6	CA	W	U	0	●					AC				
7	Hale Ave. Resource Recovery Facility	18	CA	N	R	0	●	●				WS	WS			
8	Joint Water Pollution Control Plant	350	CA	N	R,H,I	Few	●	●	●[3]		●	WS,AC	WS,AC			AC,BF
9	Meadowlark Water Reclamation Plant	2	CA	N	R,I	Few	●			●		WS			WS	
10	Moreno Valley WRF	16	CA	W	U,I,A	0	●				●	WS				WS
11	Orange Co. San District - Plant[2]	153	CA	N	R	0	●	●				WS	WS			
12	Oso Creek WRP	2	CA	N	R	0	●				na	WS				
13	Oxnard Wastewater Treatment Plant	32	CA	N	R,I,A	0	●				●	WS				WS
14	San Luis Obispo WRF	5	CA	N	R,I	Few										
15	Ina Road Plant	40	AZ	N	I,R,H	0	●	●			●	WS,AC	WS			AC
16	Kyrene Water Reclamation Plant	5	AZ	N	I	0	●					BF				
17	Mesa Northwest WRP	30	AZ	N	R	0	●	●	●		●	WS	WS	AC	AC	WS
18	Scottsdale Water Campus	12	AZ	N	R	0	●	●	●	●	●	WS	WS	AC	AC	
19	Wildcat Hill WWTP[2]	8	AZ	W	I,U	Few	●	●				P[4]	[5]			
20	Clark County WWTP	88	NV	N	R	0	●	●			●	BF	BF			WS
21	Las Vegas WPCF[2]	71	NV	N	P	0	●				●	BF				WS
22	Mandarin Water Reclamation Facility	19	FL	N	R,H	24	●	na			●	BF				BF
23	St. Pete's Southwest WRF	14	FL	N	R,H,P	Few	●					WS,BF				
24	Southwest WWTP	10	FL	W	U,R	0	●					BF				
25	Arlington East WWTP	13	FL	M	R,I	Few	●	●			●	BT	BT			WS
26	Indian Creek Middle Basin	20	KS	N	R	Few	●	●	●		●	WS	WS	WS[6]		WS
27	Springfield Southwest WWTP	10	MO	M	R,H	Few	●	●			●	WS	BT			BF
28	Rowlett Creek WWTP	15	TX	M	R,P	Few	●	●			●	WS	ASD			WS
29	Wilson Creek WWTP	34	TX	M	R	Few	●	●			●	ASD	ASD			WS
30	Broomfield WWTP	10	CO	M	R	Few	●	●			●	BF	BF			BF
31	Reading WWTP	27	PA	M	R	Few	●	●			●	WS	WS			WS

Footnotes:
[1] Ozidation Ditch
[2] Trickling Filter
[3] Pure Oxygen Process
[4] Airflow Vented to Primary Clarifier
[5] Primary Vented to Atmosphere
[6] Wet Scrubber provides no treatment

Buffer:
N No Buffer
M Moderate (<2,000 ft)
W Wide (>2,000)

Complaints:
Annual basis

Neighborhood:
A Agricultural
H Highway
I Industrial
P Park/Golf Course
R Residential
U Undeveloped

Covered Processes:
H Headworks
P Primary Clarifiers
A Aeration Basin
F Final Clarifiers
S Solids Processing

Odor Control:
WS Wet Scrubber
BF Biofilter
AC Activated Carbon
BT Biotrickling Filter
ASD Activated Sludge Diffusion
NT No Treatment

OPTIONS FOR DEFINING SUCCESSFUL ODOR ELIMINATION

Odor regulations and guidelines are most effective when specific criteria are used to define compliance. The report discusses several well-defined approaches in detail including:

1. Annoyance criteria (subjective categories),
2. Complaint criteria (numbers of complaints),
3. Ambient odor detection threshold criteria,
4. Ambient odor intensity criteria,
5. Compound criteria (mass concentration)
6. Episode duration-frequency criteria ("odor-hours")
7. Equipment performance criteria
8. Source emission criteria (threshold or mass concentration)
9. Best available control technology criteria (i.e. industry standard).

ODOR CONTROL EVALUATION

This section discusses odor treatment technologies that can be used for specific applications at the Mason Farm WWTP. For purposes of consideration, solutions were developed for each of the remaining uncovered and untreated odor sources.

Alternative Development

The areas for odor treatment included the primary clarifiers, intermediate pump stations, and the aeration basins. In a workshop meeting with OWASA on August 29, 2006, various treatment technologies were reviewed and it was determined that for the relatively low H_2S concentrations, activated carbon offered the best solution. OWASA determined that activated carbon would be employed for all the new applications. The odor control options are listed on ***Table ES4.***

Economic Evaluation

Capital costs included the entire carbon system equipment including vessel, media, fan, and local ductwork, and concrete pad. The carbon system costs are based on deep-bed units of fiberglass construction. High capacity media was used for the primary clarifier and intermediate pump station areas, while virgin carbon media was assumed for the aeration basin sources.

The base equipment costs were increased by 30 percent to account for a concrete pad and installation costs. Cover costs for small areas were obtained by multiplying the surface area by $25/sf, which is typical for flat aluminum covers. For the larger areas a cost of $35/sf was assumed to include extra ductwork. Weir cover costs are based on similar installations. Final construction costs estimate, the installed equipment and cover costs were increased 40 percent to account for site work, electrical, engineering, legal costs, and contingencies. Capital costs for covers and odor control systems are shown in ***Table ES4.***

Table ES4 – Summary of Capital and O&M Costs								
	S.A.	**Air Flow**	**Capital Cost**			**O&M Cost**	**Odor x S.A. x 1000**	**% of Total**
			Cover	**O.C. System**	**Total**			
	sf	**cfm**	**$**	**$**	**$**	**$**	**-**	**%**
Primary Clarifiers								
Splitter Boxes #1 & #2	723	766	25,000	56,000	81,000	6,900	8,336	11.1
PC Basins Full Covers	12,921	5,045	630,000	140,000	770,000	12,800	21,972	29.1
PC Basins Weir Covers[1]	1,696	515	280,000	50,000	330,000	6,100	763	1.0
Intermediate Pump Stations								
IPS #1 & #2	440	602	15,000	50,000	65,000	7,300	27,456	36.5
Aeration Basins								
Influent Channel	1,925	1,200	Covered	66,000	66,000	6,800	3,234	4.3
New No Air Zones	10,000	3,920	490,000	125,000	615,000	12,000	6,500[2]	8.6
Aerobic Zones	30,000	22,176	1,470,000	420,000	1,890,000	50,000	7,050[3]	9.4
Total Odor							75,311	100

[1]The weirs are included in the full cover option

[2]It was assumed that improved scum removal would reduce odor by half at the new "no air zones" while the surface area doubles, so the odor magnitude remained the same as with the current "no air zones"

[3]Value of 4,700 for S.A. of 20,000 s.f. adjusted upwards by 1.5 for S.A. of 30,000 s.f.

The operation and maintenance (O&M) costs include power, parts, and carbon replacement as needed. The O&M costs assume all maintenance including media replacement is done by plant staff, but a service contract could be obtained with various equipment vendors to perform these tasks. The O&M costs for each of the designated alternatives are presented in ***Table ES4***. The last column lists the percentage that each component contributes to the total odor magnitude of the sum of all the new sources being considered for treatment.

To illustrate cost/benefit the cost can be divided by the percent reduction as shown in ***Figure ES1.*** The numerical values of cost and percent reduction are shown for each alternative. IPS #1 & #2, PC Splitter Boxes #1 & #2, and aeration influent channel have the lowest cost benefit values and also the lowest costs. The total cost of all three alternatives is $212,000 with an odor reduction of 51.9 percent. The alternative of PC Basins –Full Covers has a relatively low cost benefit, but the cost is much higher at $770,000. The PC Basin – Full Covers, New No Air Zones, and Aerobic Zones have a total cost of $3,275,000 with an odor reduction of 48.1 percent. The last alternative of PC Basins –Weir Covers has a very high cost/benefit value.

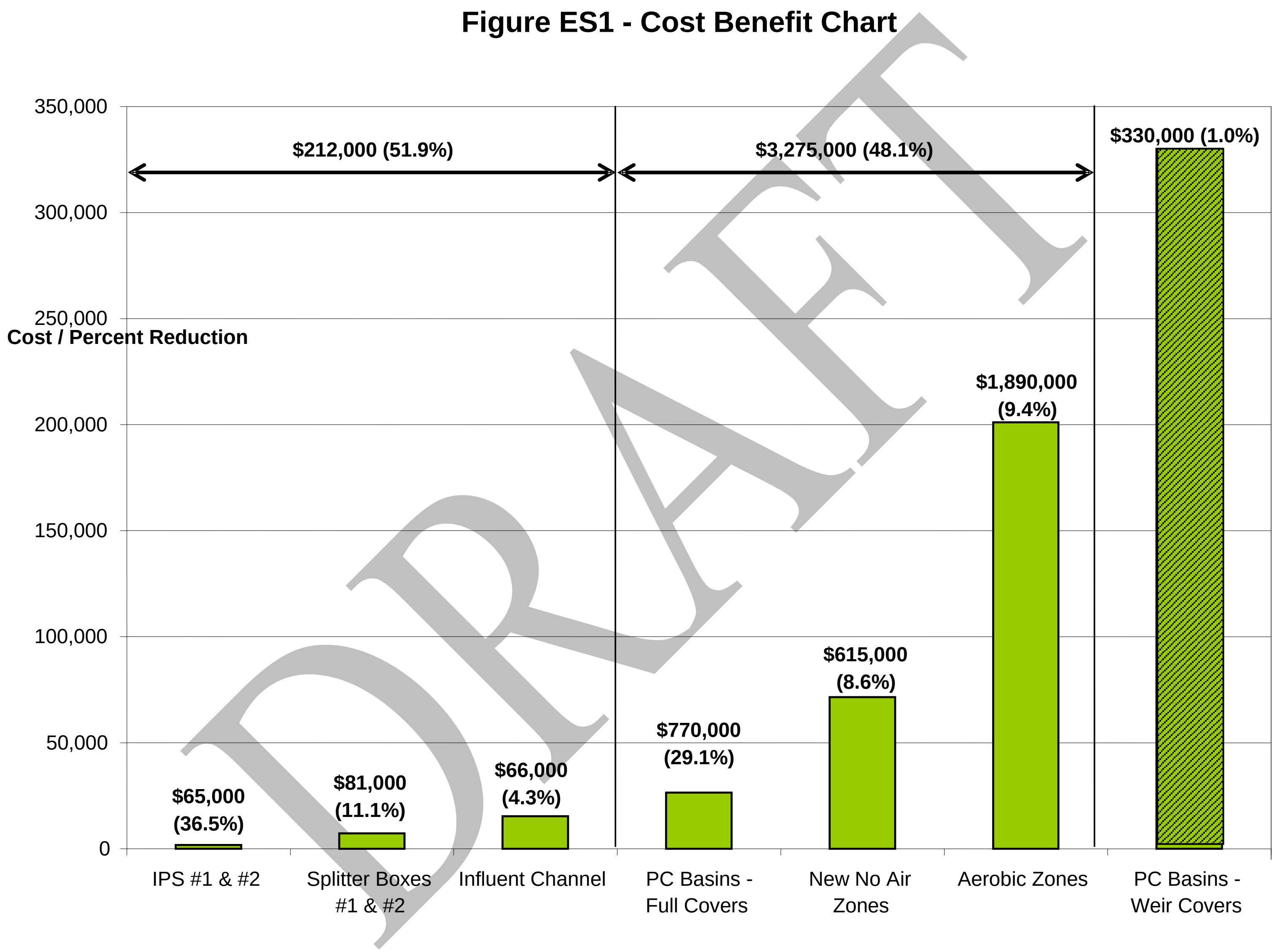
Figure ES1 - Cost Benefit Chart
Cost / Percent Reduction
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
$212,000 (51.9%)
$3,275,000 (48.1%)
$330,000 (1.0%)
$65,000
(36.5%)
$81,000
(11.1%)
$66,000
(4.3%)
$770,000
(29.1%)
$615,000
(8.6%)
$1,890,000
(9.4%)
IPS #1 & #2
Splitter Boxes
#1 & #2
Influent Channel
PC Basins -
Full Covers
New No Air
Zones
Aerobic Zones
PC Basins -
Weir Covers
DRAFT

ODOR ELIMINATION PROGRAM ADDITIONS

In response to public concerns about odor at the Mason Farm WWTP, OWASA established a comprehensive odor elimination program. The complete odor elimination program addresses all aspects of odor control at the facility including: odor control improvements, operational issues, monitoring requirements, and odor complaint recording and response. The odor elimination program is dynamic and OWASA will continue to update the program as necessary to improve the effectiveness of their odor control and their response to the public.

Currently Planned Odor Improvements

As part of their current odor elimination program, OWASA installed new odor scrubbers designed with extra capacity, so they could treat selected additional processes as they were completed and put into operation. Those facilities are scheduled for completion in summer 2007.

The planned odor improvements include:

- Covering the new headworks with exhaust air treated in the existing wet scrubber
- Conveying the new biosolids dewatering facility exhaust air to the scrubbers
- Covering the aeration basin inlet channel
- Improving scum removal on all aeration cells including new "no air zones."
- New digester gas piping (to be completed in 2006)

The odor improvements currently planned will result in a significant drop in off-site odor both in intensity and frequency. The planned improvements could reduce odor to the degree that they are no longer a nuisance.

Odor Monitoring Program

OWASA has developed a comprehensive odor monitoring program at the Mason Farm WWTP using several continuous readout OdaLog H_2S meters. The units can be employed for both ambient air monitoring and odor control system performance verification.

Ambient Air Monitoring. The portable meters have been placed at several process locations at the Mason Farm WWTP to measure the variations in process emissions and determine when peak odors occur. The portable meters will continue to be used in this manner with the meters rotated to different process locations, so that they are monitored on a periodic basis. In addition to the portable OdaLog units OWASA has purchased a fixed OdaLog system. After discussion between B&V and OWASA staff, it was determined that the most useful location for this instrument was the roof of the digester building, where it will alert operators of any problems with the pressure relief valves, so they can take quick action to repair or replace them.

Odor Control System Performance Verification. The moveable OdaLog meters have also proven useful in monitoring "around the clock" performance of odor control systems such as the biofilter. OdaLog monitoring at the biofilter showed that there was some odor breakthrough when peak odors occurred. A timer was installed on the sprinkler system to ensure that the biofilter was more consistently wetted.

OWASA will continue to use their portable OdaLog monitors for odor control system performance verification as follows:

- Monitor biofilter periodically to ensure adequate moisture is maintained. Track long-term performance to anticipate media replacement.
- Monitor wet scrubbers, performance periodically by measuring inlet and outlet H_2S. Automatic controls maintain pH and ORP, so the performance remains stable.
- Periodically monitor the performance of the proposed new carbon units. The carbon units will have three sample taps, so operators can track the depletion of the media.
- Periodically monitor the headworks to confirm that influent chemical treatment is effective. The monitoring will allow operators to adjust chemical dosages seasonally in response to changes in the influent sulfide loads.