ALO

DISSOLVED OXYGEN COMPLIANCE REPORT

Prepared for

THE MORNING STAR PACKING COMPANY, L.P.
2211 Old Highway 99 W
Williams, CA 95987
Colusa County

Phone (530) 473-3600
Fax (530) 473-3601

March 31, 2005

RECEIVED
SACRAMENTO
CVRWQCB
05 APR -1 PM 2:23

Prepared by

DAVIDS
ENGINEERING, INC

Hilary A. Reinhard, P.E.
Davids Engineering, Inc.
1772 Picasso Avenue, Suite A
Davis, California 95616-0550
Phone: (530) 757-6107
Fax: (530) 757-6118
Email: hilary@de-water.com

REGISTERED PROFESSIONAL ENGINEER
HILARY A. REINHARD
C 64379
EXP. 6/30/07
CIVIL
STATE OF CALIFORNIA

Date 3/31/05

DISSOLVED OXYGEN COMPLIANCE REPORT FOR MORNING STAR PACKING COMPANY, L.P.

Table of Contents

I. Facility Backround 3
1. Description of Water Use 3
2. Settling Pond 3
3. Cooling Pond 3

II. Settling Pond Conditions 4
1. Settling Pond Flow Rates 4
2. Settling Pond Constituent Concentrations 5
3. Results from 2004 D.O. Sampling 6

III. D.O. Correction Methods 7
1. Dilution 8
2. Aeration 9
Cascade 10
Low-Speed Surface (LSS) Mechanical Aerator 12

IV. Selected Alternative 13

List of Tables

Table 1. Settling Pond Water Quality during 2004 Processing Season
Table 2. Aeration Methods, Devices and Mechanisms
Table 3. Typical OTR's for Aeration Devices
Table 4. Typical Design Information

List of Figures

Figure 1. Settling Pond Total Daily Flow Rates during 2004 Processing Season
Figure 2. D.O. Level of Settling Pond at Outlet during 2004 Processing Season
Figure 3. Daily Volume of Dilution Water Required using Settling Pond Flow Rates and D.O. Measurements
Figure 4. Cascade Aerator
Figure 5. D.O. at Weir Discharge Point as a Function of D.O. of Influent
Figure 6. Oxygen Demand of the Settling Pond for 2004 Processing Season
Figure 7. Oxygen Demand of the Settling Pond during 2004 Processing Season
Figure 8. Power Requirement to bring D.O. Level to 1.0 mg/l

List of Equations

Equation 1. D.O. Level of a Mixture
Equation 2. Determination of Cascade Width
Equation 3. D.O. After Cascade Aeration
Equation 4. Determination of Aerator Engine Size

List of Exhibits

Exhibit 1 Location of Settling Pond D.O. Sampling Points
Exhibit 2 2004 D.O. Measurements

I. FACILITY BACKROUND

The Morning Star Packing Company, L.P. (Morning Star) operates a tomato processing facility located south of Williams. Morning Star strives to use available resources and technology to their fullest potential to continuously improve quality, productivity and service for its customers in an environmentally sound manner.

The facility is situated in a rural area on land that was previously used for crop cultivation. The facility operates approximately four months annually from late June until early to mid October, depending on the length of harvest.

This report has been prepared pursuant to the requirements of the Cease and Desist Order to satisfy the required submittal of a Dissolved Oxygen Compliance Report that outlines measures to be taken during the 2005 processing season to increase the dissolved oxygen in the settling pond.

1. Description of Water Use

During operation the processing facility uses fresh water and recycled washwater for a variety of activities including transporting tomatoes, condensing vapors from the evaporators, solids separation and plant cleanup. Excess washwater and condensate provides supplemental irrigation water for approximately 600 acres of cropland located adjacent to the facility. The facility produces two distinct wastewater streams. Condensed steam is discharged into the cooling pond. Washwater, primarily from transporting tomatoes, is discharged to the settling pond.

2. Settling Pond

Washwater from transporting tomatoes is discharged into an elevated settling pond located on the dump ramp. Due to the mechanical tomato harvesting method, some soil is brought in and unloaded with the tomatoes. Approximately 1% of the weight of tomatoes brought into the facility can be attributed to soil. The soil is transported by the washwater to the settling pond where the slower flow velocity allows the soil to settle out of the washwater. Pumps re-circulate a portion of the washwater for reuse in the truck dump and flume system.

Once filled, the water surface in the settling pond remains at a relatively constant elevation throughout the processing season. Excess washwater from the pond is distributed to fields by the irrigation water distribution system. Water surface elevation is controlled by a gravity overflow discharge box to ensure that a minimum of 2 ft of free board is maintained.

3. Cooling Pond

Cooling pond water contains water discharged from the evaporation process (condensed steam – almost pure water). This water is of high quality containing low

concentrations of BOD and TDS. Hot water from the evaporation process is discharged to the east inlet of a cooling pond and travels around the center earthen embankment. During this holding period it is cooled by the temperature differential between the water and the outdoor ambient air temperature. The cooled water is pumped from the west outlet and reused in the condensers; excess water is discharged to the irrigation water distribution system for crop irrigation.

II. SETTLING POND CONDITIONS

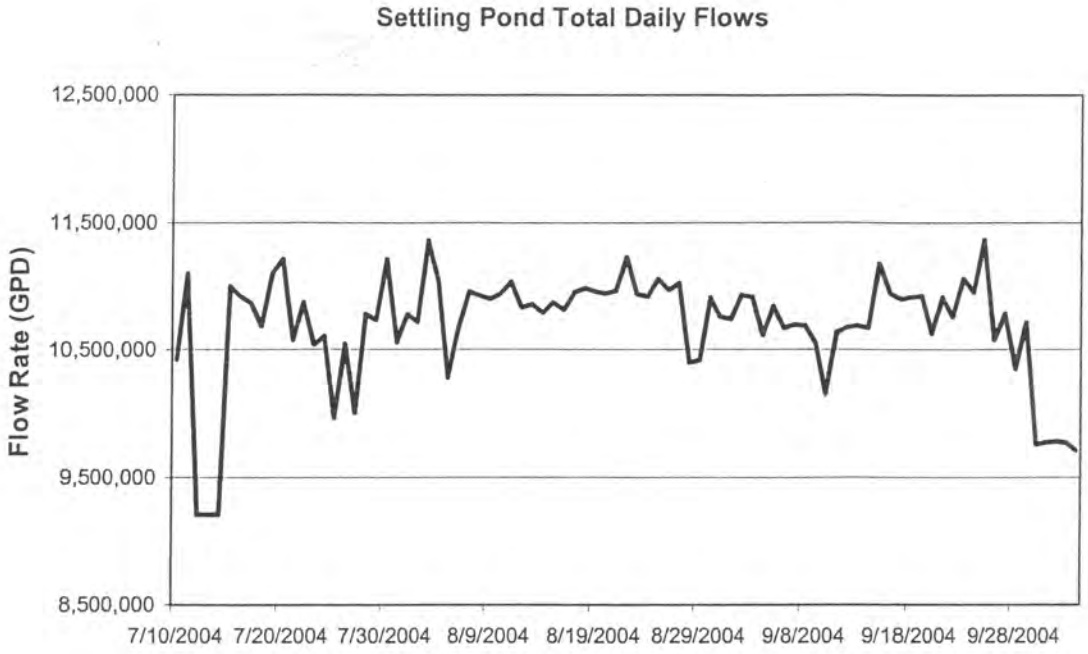
1. Settling Pond Flow Rates

Flow measurements of the settling pond discharges were recorded during the 2004 processing season. A similar quantity of washwater is anticipated to be produced from the flume and truck dump operations during the 2005 season. The 2004 flows are believed to be positively biased because they are based on measurements of make-up water volumes from the plant control room instead of discharge volumes from the settling pond; therefore, the 2004 record provides a conservative basis for projecting 2005 flows.

In addition to the volume of water discharged from the settling pond to the crops, water is also recycled from the settling pond and reused for tomato transportation. Water from the settling pond is pumped up to the truck dump where it is used to remove tomatoes from the trailers. Approximately 6,000 gpm of washwater is reused for this operation. Once used, the washwater is screened and returned to the settling pond. This flow was added to the discharge flows to produce the total daily flow volume used in calculating the amount of oxygen required to bring the settling pond into compliance.

A graph of the total daily flow rates through the settling pond is provided in Figure 1.

Figure 1. Settling Pond Total Daily Flow Rates during 2004 Processing Season



2. Settling Pond Constituent Concentrations

Washwater produced by processing operations contains soil particles, tomatoes and other plant material, chlorine used for sanitation and other food grade materials. Pursuant to the requirements of the Monitoring and Reporting Program, weekly water samples were taken from the settling pond during the 2004 processing season. The results of these weekly samples are presented in Table 1.

Table 1. Settling Pond Water Quality during 2004 Processing Season

Week	Date	EC umhos/cm	TDS mg/l	BOD (5-day) mg/l	Total Nitrogen mg/l
1	7/12/2004	1267	1312	131	70.6
2	7/19/2004	997	1408	368	67.3
3	7/26/2004	1120	1104	490	57.6
4	8/3/2004	1032	1082	1123	69.3
5	8/9/2004	1013	860	1088	44.5
6	8/16/2004	1077	854	758	38.2
7	8/23/2004	988	784	1095	40.8
8	8/30/2004	985	938	1016	58.8
9	9/8/2004	1447	2026	1749	152.6
10	9/12/2004	1513	2072	1791	139.3
11	9/20/2004	1271	3272	1722	59.9
12	9/27/2004	1225	1428	1131	61.9
Average		**1161**	**1428**	**1039**	**71.7**

3. Results from 2004 D.O. Sampling

D.O. levels were monitored at four different settling pond locations during 2004 operations. Exhibit 1 shows the settling pond with the locations of measurements labeled.

Pursuant to the facility's Waste Discharge Requirements, the dissolved oxygen in the settling pond must be maintained at 1.0 mg/l or greater. To ensure compliance with this limit, the sampling location with the consistently lowest values was chosen for analysis. This location was the Weir Discharge Point. D.O. measurements at the discharge to the truck dump, although farther away from the inlet, generally had higher D.O. values than the Weir Discharge Point. The Weir Discharge Point provided the greatest oxygen demands.

Three different instruments were used to measure D.O. levels during the 2004 operating season. D.O. measurements from the same location, taken at the same time varied depending on the instrument used. There are no complete D.O. series for any of the three techniques of measurement. Exhibit 2 provides the entire set of D.O. measurements taken during the 2004 season.

One measurement technique was unable to read the D.O. level over half the time. For this reason, that series was removed from consideration. The two viable D.O. measurements were measured with the Hach DR2000 Spectrophotometer and the Hach HQ10 D.O. probe. The Hach DR2000 was used from 7/24/04 to 8/27/04. The Hach HQ10 was used from 8/15/04 to 9/30/04. The two measurements overlap for

an 11-day period during the middle of the season; however, they do not display a consistent relationship.

The Hach DR2000 Spectrophotometer has a factory-established accuracy of ±0.20 mg/l O_2, while the Hach HQ10 probe has an accuracy of ±0.10mg/l O_2. The Hach HQ10 is a D.O. probe that has a minimal susceptibility to human error, whereas the DR2000 utilizes a complicated measurement process that must be performed in the facility's lab and introduces a higher level of operator error. Because the Hach HQ10 probe has a smaller standard error, and a lower chance of human error, its data has been used for the period of overlap.

Figure 2. D.O. Level of Settling Pond at Outlet during 2004 Processing Season

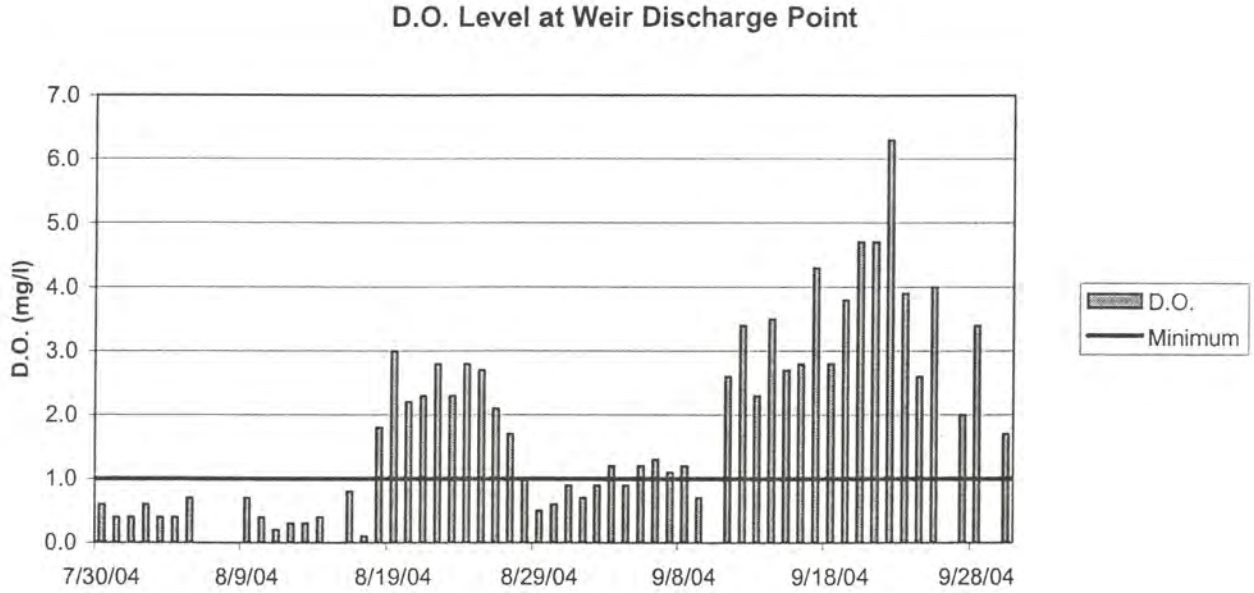


Figure 2 provides a graphical representation of the D.O. measurements. The horizontal bar represents the minimum allowable value of 1.0 mg/l.

The D.O. levels fall below 1.0 mg/l on several occasions, especially in the early parts of the operating season. Corrective actions must be taken to ensure that the D.O. levels are maintained at or above 1.0 mg/l during future processing seasons.

III. D.O. CORRECTION METHODS

There are two potential methods of increasing the D.O. of a body of water: dilution and aeration. The following section provides a qualitative and quantitative investigation to determine the most viable method for increasing the D.O. of the settling pond.

1. Dilution

Dilution increases the D.O. levels by introducing water with a higher D.O. into the settling pond. The resulting D.O. level of the mixture (mix) is calculated as the weighted average of the D.O. levels of both the dilution water (dil) and settling pond water (sp).

Equation 1. D.O. Level of a Mixture

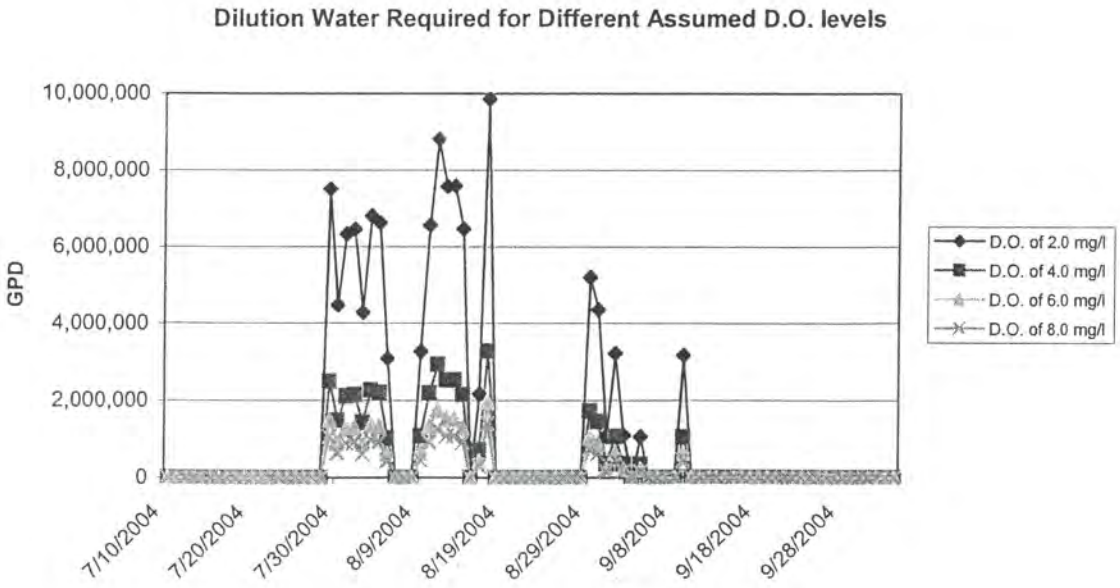
$$D.O._{mix} = \frac{(D.O._{sp} * Volume_{sp}) + (D.O._{dil} * Volume_{dil})}{Volume_{sp} + Volume_{dil}}$$

Morning Star is investigating re-routing a portion of the condensate water that is currently being discharged to the cooling pond into the settling pond. Depending on the condensate's D.O. level, which has never been tested, an increase in the overall D.O. level of the pond could result.

The D.O. level of the cooling pond has been monitored and averages 4.2 mg/l. Because saturation levels are inversely related to temperature, it is expected that the high temperature condensate will have a lower D.O, However, D.O. is more strongly a function of atmospheric pressure and salinity than of temperature.

The amount of dilution water needed based on the D.O. content of the dilution water is shown in Figure 3.

Figure 3. Daily Volume of Dilution Water Required using Settling Pond Flow Rates and D.O. Measurements



No additional washwater is created using this alternative. If not used for dilution, the excess condensate would have been discharged to the cooling pond and mixed with settling pond water in the irrigation distribution system and discharged to the fields, therefore this water has already been considered into the crop loadings. Excess condensate would be applied in the same quantity as before to the land application area but would simply follow a different flow path.

The primary drawback to this alternative is that the amount of water required for dilution can not be accurately calculated since there is no information available on the D.O. content of the condensate.

2. Aeration

Aeration methods are organized into three categories: waterfall, diffused-air and mechanical. All three categories, however, operate on the same basic principal: an increase in the area of the air/water interface. The aeration process is driven by the gradient in the concentration of oxygen in the atmosphere verses the concentration of oxygen in the water. When this gradient is present diffusion will take place until saturation is reached. The table below provides a summary description of these methods.

Table 2. Aeration Methods, Devices and Mechanisms

Aeration Methods	Aeration Device	Aeration Mechanism
Waterfall	Spray Aerators, Cascade Aerators, Multiple-Tray Aerators	Exposure of water droplets, and entrainment of air under water surface
Diffused-Air	Porous Diffuser (Fine, Medium and Coarse), Non-Porous Diffusers, U-Tube	Entrainment of bubbles of air or pure oxygen into the liquid being aerated
Mechanical	Surface Turbine, Rotor Brush	Surface turbulence, air entrainment, exposure of water droplets

The efficiency of aeration devices is measured by the oxygen transfer rate or OTR (kg O_2 / kWh). The ranges of OTR values for different aerator types are presented below.

Table 3. Typical OTR's for Aeration Devices

Aeration Device	**OTR** (kg O_2 / kWh)
Spray	0.1-0.5
Cascade	0.1-0.5
Tray	0.2-0.6
Fine Bubble	1.0-2.0
Medium Bubble	0.8-1.3
Coarse Bubble	0.6-1.4
Static Tube	0.7-0.9
Jet	0.7-1.4
Low-Speed Surface	0.7-1.3
High-Speed Floating	0.7-1.3
Rotor Brush	0.7-1.3

Reference: G. Tchobanoglous and E. D. Schroeder, *Water Quality* p. 478

Cascade

Cascade aeration, a simple technology, involves construction of a series of steps over which water tumbles as in a waterfall. This series of steps mixes the absorbed gas into the water, and exposes new water surfaces to the atmosphere. Each step in a cascade tower is usually about 8 inches in height, and as many as 10 steps may be employed. The system requires a hydraulic head to operate.

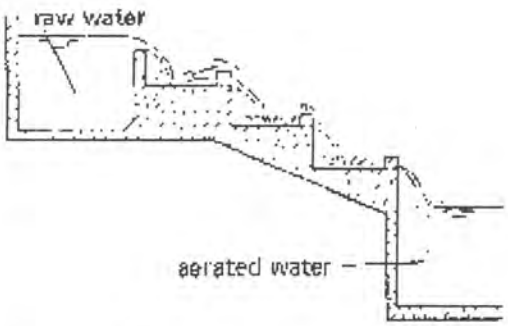


Figure 4. Cascade Aerator

There are a number of parameters that should be considered in determining the effectiveness of a cascade aerator for the aeration of the settling pond. These include the D.O. saturation level of water at a given temperature and salinity, initial D.O., height and width of steps, hydraulic loading rate, weir geometry, water temperature and the height through which the water falls. The facility currently has a potentially head loss of approximately 4 ft available were water enters the settling pond.

The following table displays the typical design information for a cascade type aerator. The dimensions of the cascade can be determined by use of this table.

Table 4. Typical Design Information

Item	Range	Typical
Hydraulic Loading Rate (gal/ft. of width*day)	100,000-500,000	240,000
Step Dimensions (in)		
Height	6.0-12.0	8
Length	12.0-24.0	18

Reference: G. Tchobanoglous and F. Burton, *Wastewater Engineering* p. 510

The width of the cascade system required is determined by solving the equation below.

Equation 2. Determination of Cascade Width

$$Width = \frac{Q\left(\frac{gal}{day}\right)}{HLR\left(\frac{gal}{ft_{width} * day}\right)}$$

Assuming a Hydraulic Loading Rate (HLR) of 400,000 gal/ft*day, a value within the accepted range, the width required is 28 ft.

The most common method for determining the increase in D.O. level after a cascade aerator is an equation developed by Barrett at the Water Research Laboratory in England. The equation is as follows:

Equation 3. D.O. After Cascade Aeration

$$C = C_s - \frac{C_s - C_o}{H\left[0.11ab\left(1 + 0.046T\right)\right] + 1}$$

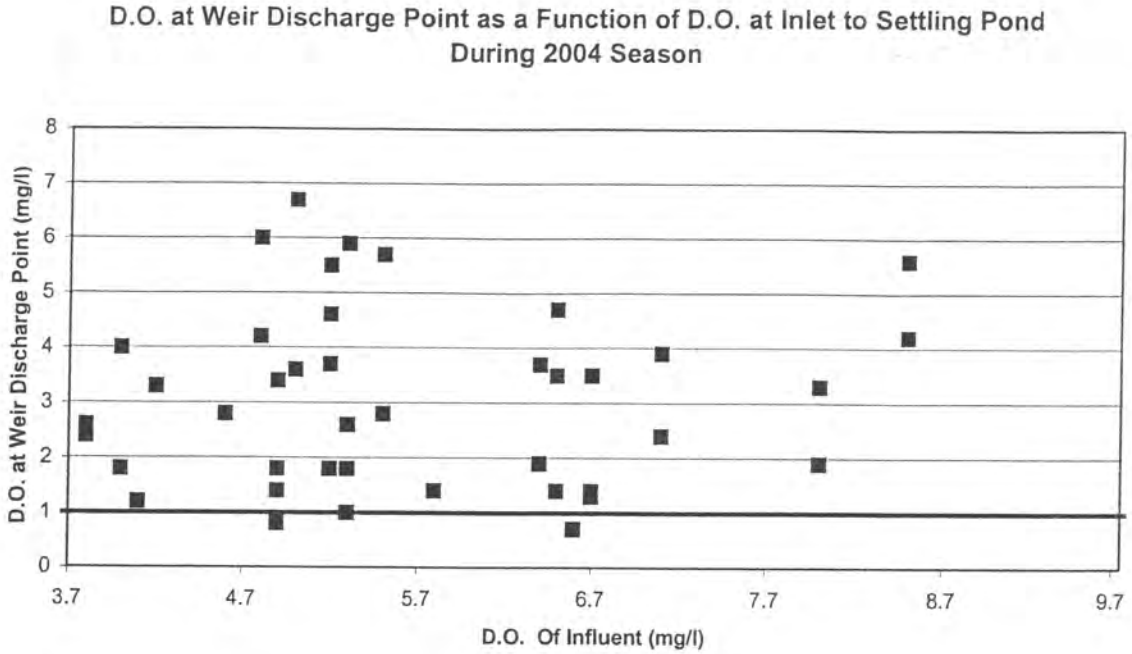
Where:

C_s = D.O. saturation level for water at given temperature and salinity (mg/l)
C_o = D.O. initial (mg/l)
C = D.O. after aeration (mg/l)
a = water quality parameter equal to 0.8
b = weir geometry parameter (for steps, b = 1.1; for weir, b= 1.0; for step weir, b = 1.3)
T = water temperature (^{o}C)
H = height through which water falls (ft)

Reference: G. Tchobanoglous and F. Burton, *Wastewater Engineering* p. 510

By using Equation 2 for the worst-case scenario, that is, if the D.O. level of the influent was 0 mg/l, the D.O. level after aeration would be 3.75 mg/l. Therefore, the D.O. level of the influent to the settling pond would be 3.75 mg/l or greater. The following figure shows the D.O. levels at the Weir Discharge Point when the D.O. level of the influent is at or above 3.75 mg/l during the 2004 season.

Figure 5. D.O. at Weir Discharge Point as a Function of D.O. of Influent



The D.O. level at the Weir Discharge Point was only below the minimum allowable level of 1.0 mg/l twice for all measurements with a D.O. level of 3.75 mg/l or greater.

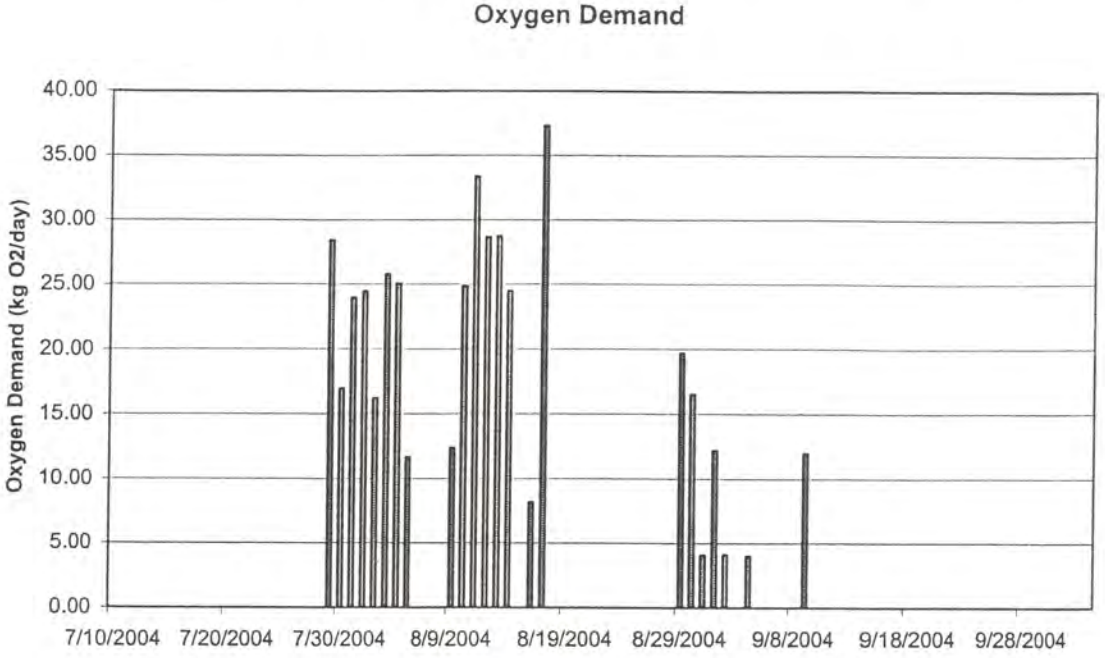
The primary drawbacks of the cascade aeration method include: it is a less efficient aeration method, quantifying the aeration capability of the system is difficult and, based on the above analysis, the D.O. level could potentially drop below 1.0 mg/l at the weir discharge point even with a cascade aeration system installed at the inlet to the settling pond.

Low-Speed Surface (LSS) Mechanical Aerator

Installation of a LSS aerator is also a possibility for increasing the D.O. of the settling pond. To analyze the effectiveness of the LSS aerator two important parameters must be considered: the oxygen transfer rate (OTR) of the aerator, and the power rating of the device. The standard OTR's for LSS aerators range between 0.7 and 1.3 kg O_2/kWh (see Table 3).

Assuming an OTR of 0.7 kg 0_2/kWh, the lowest of the given range, the power required to aerate the pond was calculated. The figure below is a graphical representation of the oxygen demand of the settling pond during the 2004 processing season.

Figure 6. Oxygen Demand of the Settling Pond for 2004 Processing Season



From this graph it can be seen that the largest oxygen demand occurred on 8/17/2004 and was 37.3 kg 0_2. The aerator can be sized by solving the following equation.

Equation 4. Determination of Aerator Engine Size

$$EngineSize(kW) = \frac{OxygenDemand(kg0_2)}{OTR(kg0_2 / kWh) * Time_{operation}(h)}$$

The minimum engine size was calculating using the worst case scenario; a 0 mg/l D.O. on the day with the highest flow rate. The largest engine required to aerate the pond would be to be 2.6 kW or roughly 3 hp. In other words, a 3 hp LSS aerator with an OTR of 0.7 kg 0_2/kWh and a 24 hour operation would have supplied a sufficient amount of oxygen to the settling pond for a day with large flows and an incoming D.O. of 0 mg/l.

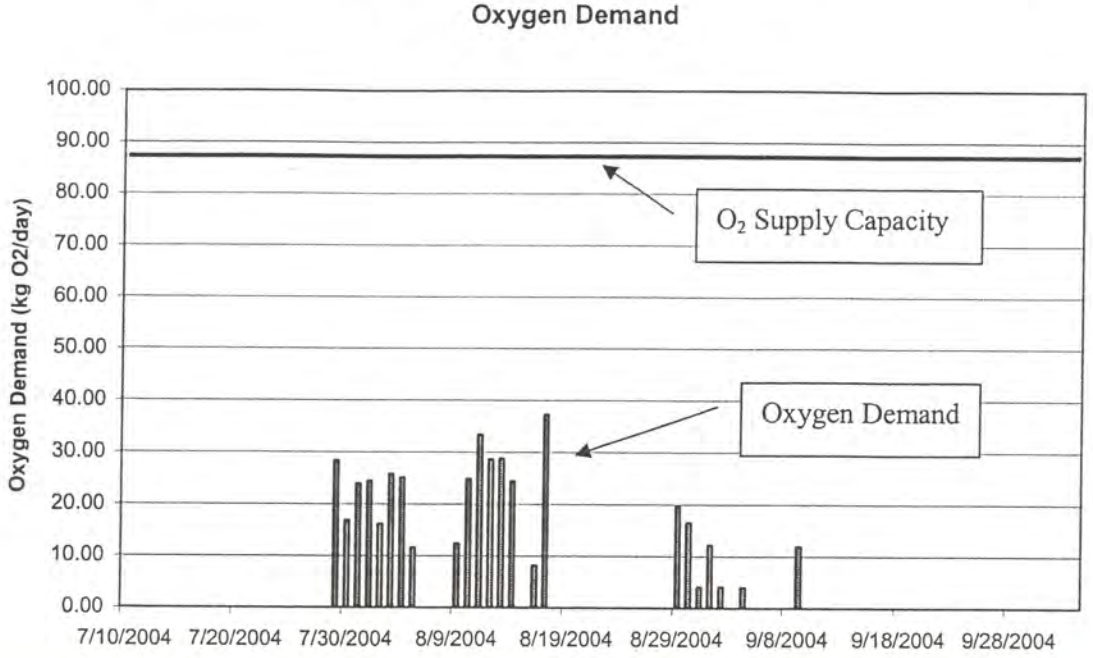
IV. SELECTED ALTERNATIVE

Morning Star will be installing a 5 hp Tornado LSS aerator manufactured by Aeromix Systems Incorporated. Peter Gross from Aeromix provided a field-tested OTR value of 1.6 lb 0_2/hp*hr or 0.975 kg 0_2/kWh for the Tornado LSS aerator. The power rating of the device is 5 hp or 3.73 kW.

The amount of oxygen that a 5 hp LSS aerator with an OTR of 0.975 kg O_2/kWh can introduce into the settling pond in a 24 hour period was compared to the oxygen

demand (kg 0_2) of the settling pond. Following is a graphical representation of the possible amount of oxygen supplied (horizontal line), and the actual oxygen demand based on the 2004 season.

Figure 7. Oxygen Demand of the Settling Pond during 2004 Processing Season



The 5hp Tornado LSS aerator can supply over twice the maximum amount of oxygen demanded during the 2004 season. Using the factory specified OTR of 0.975 kg 0_2/kWh and the aeration principles set forth by G. Tchobanoglous and E. Schroeder in their work titled *Water Quality: Characteristics, Modeling and Modification*, the 5 hp Tornado LSS aerator should aerate the settling pond to a level that meets or exceeds the D.O. requirements set forth by the Regional Water Quality Board.

The Morning Star Packing Company
Washwater Reclamation
Pond Monitoring
Settling Pond - Supplemental Dissolved Oxygen Readings
July-2004

Sample No.	Date	Time	Weir Discharge Point		Outlet to Dump Station		Inlet to Settling Pond		SW Corner	
			Hach DR2000	New HACH	Hach DR2000	New HACH	Hach DR2000	New HACH	Hach DR2000	New HACH
13	7/27/2004	8:00 AM	0.0							
14	7/28/2004	8:30 AM	0.3							
15	7/29/2004	8:15 AM	0.6							
16	7/29/2004	6:15 PM					3.1	3.9		
17	7/30/2004	8:30 AM					6.8	9		
18	7/30/2004	6:00 PM	0.0	unable to read	0.0	unable to read	3.1	2.2		
19	7/30/2004	8:00 AM	0.5	unable to read	0.6	unable to read	1.9	1.9		
20	7/30/2004	5:00 PM	0.4	unable to read	0.4	unable to read	2.8	3.4		
21	8/1/2004	10:00 AM	0.5	unable to read	0.3	1.4	2.0	1.2		
22	8/1/2004	5:00 PM	0.4	unable to read	0.3	1.0	1.8	3.0		
23	8/2/2004	8:00 AM	0.7	unable to read	0.5	unable to read	2.2	2.0		
24	8/2/2004	5:00 PM	0.5	unable to read	0.6	unable to read	2.4	2.8		
25	8/3/2004	8:00 AM	0.6	unable to read	0.3	unable to read	3.1	3.3	3.1	4
26	8/3/2004	5:00 PM	0.2	unable to read	0.3	0.7	0.9	0.5	1.1	1.5
27	8/4/2004	10:00 AM	0.5	2.1	0.2	4.8	0.9	0.7	0.3	0.4
28	8/4/2004	5:00 PM	0.4	0.9	0.2	2.1	1.9	1.4	0.3	0.3
29	8/5/2004	8:00 AM	0.7	2.9	0.2	unable to read	8.8	8.1	0.5	4.5
	Average		0.4	2.0	0.3	2.0	3.0	3.1	1.1	2.1
	Minimum		0.0	0.9	0.0	0.7	0.9	0.5	0.3	0.3
	Maximum		0.7	2.9	0.6	4.8	8.8	9.0	3.1	4.5

Exhibit 2

The Morning Star Packing Company
Settling Pond - Supplemental Dissolved Oxygen Readings
August 2004

Sample No.	Date	Time	Weir Discharge Point			Outlet to Dump Station			Inlet to Settling Pond			SW Corner		
			Hach DR2000	New HACH	HACH Probe	Hach DR2000	New HACH	HACH Probe	Hach DR2000	New HACH	HACH Probe	Hach DR2000	New HACH	HACH Probe
21	8/1/2004	10:00 AM	0.5	unable to read		0.3	1.4		2.0	1.2				
22	8/1/2004	5:00 PM	0.4	unable to read		0.3	1.0		1.8	3.0				
23	8/2/2004	8:00 AM	0.7	unable to read		0.5	unable to read		2.2	2.0				
24	8/2/2004	5:00 PM	0.5	unable to read		0.6	unable to read		2.4	2.8				
25	8/3/2004	8:00 AM	0.6	unable to read		0.3	unable to read		3.1	3.3		3.1	4	
26	8/3/2004	5:00 PM	0.2	unable to read		0.3	0.7		0.9	0.5		1.1	1.5	
27	8/4/2004	10:00 AM	0.5	2.1		0.2	4.8		0.9	0.7		0.3	0.4	
28	8/4/2004	5:00 PM	0.4	0.9		0.2	2.1		1.9	1.4		0.3	0.3	
29	8/5/2004	8:00 AM	0.7	2.9		0.2	unable to read		8.8	8.1		0.5	4.5	
	Ordered more ampoules for testing. As soon as ampoules arrive, testing will resume													
30	8/9/2004	5:00 PM	0.7	unable to read		0.5	unable to read		0.3	unable to read		0.0	unable to read	
31	8/10/2004	8:00 AM	0.7	unable to read		0.3	unable to read		3.5	3.2		1.5	0.7	
32	8/10/2004	5:00 PM	0.1	unable to read		0.1	unable to read		1.2	1.0		0.2	6.6	
33	8/11/2004	10:00 AM	0.3	unable to read		0.3	2.5		4.7	4.8		0.5	unable to read	
34	8/11/2004	5:00 PM	0.1	unable to read		0.1	1.3		1.5	0.7		0.1	unable to read	
35	8/12/2004	10:00 AM	0.4	1.3		0.5	5.5		1.9	1.4		0.4	unable to read	
36	8/12/2004	5:00 PM	0.2	unable to read		0.1	7.9		0.9	0.3		0.2	4	
37	8/13/2004	10:00 AM	0.4	0.4		0.2	2.9		0.9	unable to read		0.2	0.4	
38	8/13/2004	5:00 PM	0.2	unable to read		0.3	5.3		4.2	4.0		0.3	1.5	
39	8/14/2004	10:00 AM	0.4	0.5		0.3	unable to read		3.4	4.0		0.2	0.9	
40	8/14/2004	5:00 PM	0.4	3.1		0.3	2.5		2.2	2.9		0.4	1.6	
43	8/16/2004	10:00 AM	0.3	2.2		0.4	0.4		2.9	2.7		0.3	3.9	
44	8/16/2004	5:00 PM	1.4	0.9		6.3	4.8		1.9	1.5		0.3	1.7	
45	8/17/2004	10:00 AM	0.3	6.2	0.1	0.4	unable to read	0.5	2.2	1.9	0.2	0.4	unable to read	
46	8/17/2004	5:00 PM	0.4	1.8	0.1	0.3	3.8	0.1	2.9	2.8	0.4	0.3	1.5	0.1
47	8/18/2004	10:00 AM	0.3	1.2		0.6	0.7		1.9	0.8		0.6	0.8	
48	8/18/2004	5:00 PM	0.2	1.4	1.8	0.0	4.2	2.6	6.3	7.4	2.6	0.3	5.5	2.3
49	8/19/2004	10:00 AM	0.3	unable to read	3	0.4	unable to read	3.0	2.1	1.2	3.1	0.2	3	2.3
50	8/19/2004	5:00 PM	0.3	0.9	3	0.2	1.1	2.4	2.9	2.3	2.5	0.3	1.1	2.6
51	8/20/2004	10:00 AM	0.4	0.9	2.8	0.5	4.8	2.7	3.6	3.8	4.6	0.3	1.6	2.8
52	8/20/2004	5:00 PM		4.2	1.5		3.1	1.7		4.5	2.4		unable to rea	1.5
53	8/21/2004	10:00 AM	0.5	5.3	2.6	0.3	4.6	3.5	7.4	6.1	3.8	0.8	5	2.9
54	8/21/2004	5:00 PM	0.3	4.9	2	0.2	7.0	2.2	6.7	5.4	3.5	0.3	2.6	1.5
55	8/22/2004	10:00 AM	0.8	1	2.8	0.6	1.0	3.1	5.2	5.1	4.6	1.2	3.2	1.5
56	8/23/2004	6:00 AM	0.7	0.5	3.4	0.5	5.1	3.1	7	8.4	4.9	0.6	1.4	1.7
57	8/23/2004	5:00 PM	0.1	0.1	1.2	0.5	unable to read	2.6	1	0.6	2.3	0.4	2.3	3.2
58	8/24/2004	6:00 AM	0.6	0.6	3.3	0.7	1.4	3.1	1.9	1.3	4.2	0.7	4.8	3
59	8/24/2004	5:00 PM	0.1	2.1	2.4	0.3	5.2	3.2	0.8	0.3	3.8	0.6	2.1	3
60	8/25/2004	6:00 AM												
61	8/25/2004	5:00 PM	0.3	unable to read	2.7	0.3	1.4	2.7	2.5	4.1	3.4	0.2	1.5	0.6
62	8/26/2004	6:00 AM	0.4	unable to read	3.1	0.4	0.1	2.7	1.2	1.4	3.3	0.6	2.5	3.8
63	8/26/2004	5:00 PM	0.2	1.7	1.2	0.2	unable to read	3.0	4.7	4.2	2.2	0.3	3.2	3.5
64	8/27/2004	6:00 AM	0.5	2	2.6	1.9	1.2	3.5	3.3	2.8	5.3	0.1	unable to rea	3.3
65	8/27/2004	5:00 PM			0.9			0.4			1.9			0.4
66	8/28/2004	9:00 AM			1			0.9			3.4			2.8
67	8/28/2004	4:45 PM			1			2.2			1.9			0.9
68	8/29/2004	9:00 AM			0.6			0.9			2.6			0.4
69	8/29/2004	5:30 PM			0.5			0.5			0.8			0.2
70	8/30/2004	9:00 AM			1			0.7			2.1			0.7
71	8/30/2004	5:00 PM			0.4			0.5			1.4			0.4
72	8/31/2004	8:45 AM			0.9			1.2			1.7			0.6
73	8/31/2004	4:00 PM			1			1.3			0.3			0.9
	Average		0.4	2.0	1.7	0.5	3.0	2.0	2.9	2.9	2.7	0.5	2.5	1.8
	Minimum		0.1	0.1	0.1	0.0	0.1	0.1	0.3	0.3	0.2	0.0	0.3	0.1
	Maximum		1.4	6.2	3.4	6.3	7.9	3.5	8.8	8.4	5.3	3.1	6.6	3.8

The Morning Star Packing Company
Settling Pond - Supplemental Dissolved Oxygen Readings
September 2004

Sample No.	Date	Time	Weir Discharge Point HACH Probe	Outlet to Dump Station HACH Probe	Inlet to Settling Pond HACH Probe	SW Corner HACH Probe
75	9/1/2004	8:15 AM	0.8	2.0	1.8	0.4
76	9/1/2004	5:30 PM	0.6	0.9	0.8	0.6
77	9/2/2004	8:20 AM	1.1	1.4	2.3	0.8
78	9/2/2004	4:00 PM	0.8	1.2	2.2	1.5
79	9/3/2004	8:00 AM	1.8	1.5	3.4	1.5
80	9/3/2004	4:15 PM	0.7	1.4	3.3	0.9
81	9/4/2004	8:10 AM	1.1	1.4	2.4	1.5
82	9/4/2004	4:05 PM	0.8	1.4	2.5	1.1
83	9/5/2004	9:05 AM	0.9	1.4	1.3	1.0
84	9/5/2004	3:45 PM	1.6	1.0	3.2	1.2
85	9/6/2004	8:45 AM	1.4	1.5	5.8	1.4
86	9/6/2004	3:45 PM	1.2	1.3	4.1	1.3
87	9/7/2004	8:00 AM	1.4	1.5	6.7	1.3
88	9/7/2004	4:20 PM	0.8	1.6	4.9	0.9
89	9/8/2004	9:00 AM	1.4	1.3	6.5	2.0
90	9/8/2004	4:30 PM	1.0	1.0	5.3	1.8
91	9/9/2004	12:30 PM	0.7	0.3	6.6	
92	9/9/2004	Plant Shut Down				
93	9/10/2004	Plant Shut Down				
94	9/10/2004	Plant Shut Down				
95	9/11/2004	12:30 PM	3.3	1.4	8.0	1.9
96	9/11/2004	4:40 PM	1.9	1.3	6.4	1.3
97	9/12/2004	9:30 AM	5.6	3.3	8.5	2.3
98	9/12/2004	4:10 PM	1.3	1.0	6.7	1.2
99	9/13/2004	9:00 AM	2.8	2.2	5.5	4.1
100	9/13/2004	4:30 PM	1.8	1.2	5.2	1.4
101	9/14/2004	9:00 AM	4.6	1.8	5.2	1.7
102	9/14/2004	6:05 PM	2.4	0.9	7.1	1.6
103	9/15/2004	9:10 AM	3.6	1.5	5.0	3.3
104	9/15/2004	4:40 PM	1.8	1.1	5.3	1.8
105	9/16/2004	10:00 AM	4.2	1.2	4.8	2.3
106	9/16/2004	4:00 PM	1.4	1.3	4.9	2.2
107	9/17/2004	9:05 AM	4.7	1.8	6.5	3.5
108	9/17/2004	4:20 PM	4.0	1.5	4.0	1.8
109	9/18/2004	10:15 AM	1.9	5.4		
110	9/18/2004	4:17 PM	3.7	2.0		
111	9/19/2004	9:00 AM	4.2	1.9		
112	9/19/2004	4:10 PM	3.5	2.0		
113	9/20/2004	9:00 AM	5.7	1.6		
114	9/20/2004	4:30 PM	3.7	2.2		
115	9/21/2004	9:10 AM	5.5	2.0		
116	9/21/2004	4:30 PM	3.9	1.6		
117	9/22/2004	9:15 AM	6.7	3.2		
118	9/22/2004	4:10 PM	5.9	1.9		
119	9/23/2004	9:10 AM	6.0	1.6		
120	9/23/2004	5:15 PM	1.8	1.4		
121	9/24/2004	10:02 AM	3.5	2.3		
122	9/24/2004	4:02 PM	1.8	1.6		
123	9/25/2004	9:15 AM	4.0	1.8		
124	9/25/2004	No Sample				
125	9/26/2004	No Sample				
126	9/26/2004	No Sample				
127	9/27/2004	9:00 AM	2.2	4.0		
128	9/27/2004	4:30 PM	1.9	1.8		
129	9/28/2004	9:00 AM	3.4	2.0		
130	9/28/2004	No Sample				
131	9/29/2004	No Sample				
132	9/29/2004	No Sample				
133	9/30/2004	8:25 AM	1.8	1.8		
134	9/30/2004	3:45 PM	1.7	2.0		
		Average	2.6	1.7	4.7	1.7
		Minimum	0.6	0.3	0.8	0.4
		Maximum	6.7	5.4	8.5	4.1