2014-15
Technology Advancement Program

Project:
Philip Verwey Farms
Electrified Dairy Feed Mixing Station
SJVAPCD Contract Number C-32559-A

Final Report

Project Background, Objectives and Summary

California is home to more dairy cows than any other state in the Union, currently estimated at approximately 1.7 million milk-producing cows (not including young stock). A vast majority of those cows reside in California's Central Valley. Throughout the Central Valley every day, those animals are fed primarily using diesel-powered trucks and tractors. Both the California Air Resources Board (CARB) and the San Joaquin Valley Air Pollution Control District (SJVAPCD) recognize these diesel-powered vehicles as a large source of emissions, although no reasonable long-term alternative has emerged on a broad-based scale.

This "Electrified Dairy Feed Mixing Station" demonstration project by Philip Verwey Farms was a proof-of-concept examination at converting a specific piece of that feeding process – the mixing component – and how diesel power needs can be replaced with electric power. The objective of the demonstration project was not only to eliminate combustion-based emissions for that particular piece of the process, but also gain overall efficiencies in the feeding process that would reduce the emission potential for the diesel-powered equipment that remains.

The electrification of a current diesel-powered process strongly supports the air quality objectives for the Central Valley, by reducing NOx, a critical precursor to ozone and $PM_{2.5}$, as well as directly-emitted $PM_{2.5}$. It also provides significant co-benefits by reducing both greenhouse gases and diesel particulate matter, a toxic air contaminant. Consequently, this proposal also fit perfectly into the goals of the Technology Advancement Program (TAP), as it was aimed at demonstrating *"zero- or near-zero-emissions solutions to mobile source categories with emphasis on…agricultural equipment."*

Project Details

Philip Verwey Farms is a dairy farm located in Hanford, California, currently permitted to house 19,500 animals (including 12,000 mature cows and 7,500 support stock). The animals on the farm are fed twice daily.

The animals are fed a "Total Mix Ration" (TMR) that includes varying forages and grain products. Prior to this demonstration project, that ration was mixed in Power Take Off (PTO)-driven mixer boxes (picture shown here) and distributed to the animals throughout the dairy farm.

(Previous equipment used daily to feed the animals)

The tractors previously used to power the mixer boxes were four large John Deere diesel-powered tractors. On average each day, two of these tractors operated 22 hours per day and the other two operated an average of nine hours per day. Separate loading tractors are used to fill the mixer boxes, and prior to this project, both operated an average of 22 hours per day. Combined, the feeding operation burns approximately 2,000 gallons of diesel fuel per week prior to the installation of this demonstration project.

(Installation of Electric Feed Mixing Stations)

With assistance provided under the TAP, Philip Verwey Farms was able to install two new stationary, electric-powered mixer stations to replace the PTO-driven mixer boxes and the need for the four tractors powering them. The TMR that is mixed in the new electrified stations must be distributed by new delivery trucks, but since those trucks are not used to mix the feed, they operate much less than the tractors used prior to the demonstration project.

This grant application has demonstrated the significant benefits to air quality that can be achieved under this endeavor, and a financial partnership with the San Joaquin Valley Air Pollution Control District (SJVAPCD) was critical to ensuring the viability of the project, thereby opening up possible widespread adoption throughout the industry.

<u>**Conclusions**</u>

In the 12 months leading up to the installation of this Electrified Dairy Feed Mixing Station *(November 2014 – October 2015)*, Philip Verwey Farms purchased and used approximately 105,000 gallons of diesel for use in feeding the animals. That is an average of approximately 8,750 gallons per month.

In the 12 months following installation of the projection *(November 2015 – October 2016)*, due to the conversion of the mixing operation from a diesel-powered operation to an electrified station, Philip Verwey Farms purchased and used approximately 30,000 gallons of diesel for use in loading feed commodities into the stationary mixing stations and delivering the resulting mix to the animals. That equates to approximately 2,500 gallons per month – a decrease of 6,250 gallons of diesel per month. No other significant modifications were made to the dairy operation, so it is reasonable to correlate that drop in diesel purchases/consumption directly to the installation of the electric feed mixing station.

During those 12 months, the average cost of diesel fuel for the dairy was about $2.30 per gallon, saving the dairy approximately $14,375 per month in un-needed diesel fuel.

Conversely, the dairy now faces a higher cost of electricity to run the electrified feed mixing stations. On average since the installation of this project, the electricity used specifically for the feed mixing operation has cost the Philip Verwey Farms an average of $11,200 per month. These are completely new costs, as this electric service was connected exclusively for use by this project. *(Note: these electricity needs are now being met by an operational anaerobic digester onsite, although that is not part of this TAP demonstration project.)*

There are also efficiencies that are more difficult to document. The maintenance on the vehicles and equipment used in the new system will presumably be significantly lower, as the mixing/feeding equipment is operated about 11 hours per day, rather than the 22 hours per day prior to this project. Further, there are labor savings due to this shortening of the feeding/mixing cycle. Although those are also difficult to document, as the dairy's employees fill many different roles beyond the feeding/mixing process. Reduced feeding hours has not eliminated jobs on the dairy, but rather allowed those employees to be more productive during their working day.

On balance, this demonstration project is certainly deemed a success in proving the viability of this concept for California dairy farms. A permanent funding source to aid in the extensive capital costs could result in many other dairies considering this option for their operation. The additional electricity costs that result from the project could be offset by other investments, such as solar or digester ventures. Specific to Philip Verwey Farms, this TAP demonstration project was part of a larger vision that includes a now-operational anaerobic digester that provides the electricity needs of the dairy farm, making the electrification of the mixing equipment even more valuable.

Recommendations

As noted above, it is likely that an electrified dairy feed mixing operation could be an attractive component of a larger investment that also includes the generation of renewable electricity, such as solar or anaerobic digester projects. On its own, this electrified feed mixing station will largely be trading diesel dollars for electricity dollars without that additional electricity generation component. It's possible that additional dairies may consider it, particularly as an option to more efficiently feed their animals in less hours overall, but more widespread application in California is likely if it is tied to those other electricity generation projects.

Detailed Scope of Work

1. **Concept Preparation Phase**
    a. Concept Development
        i. Philip Verwey led this effort in developing the concept and researching the technology.

    b. Supplier Outreach
        i. Proposals were solicited from vendors experienced in this type of project. Duport TMR Equipment Co., Inc., located in Visalia, California, was selected to submit a proposal and cost estimate, given their experience working with "Supreme International" equipment.

    c. Engineering/Design/Permits
        i. Duport Sales & Service engineered the equipment layout.
        ii. Roman Electric engineered the electrical needs.
        iii. No permits were needed for this facility modification.

2. **Facility Preparation**
    a. PG&E Prep

    i. Pacific Gas & Electric (PG&E) engineered the site and made arrangements to deliver the additional power to the site.

b. PG&E Connection
    i. PG&E will implement their plans to deliver additional power to the site.

c. Roman Electric, Inc.
    i. Roman Electric connected the equipment site to the new PG&E power supply.

d. Cement Foundation
    i. M-Mig Construction, Inc. in Merced, California, was contracted to lay the cement foundation for the site, a 225’ x 110’ slab of sufficient thickness and compaction to support the stationary mixer and all related transport vehicles.

3. Installation of Equipment

a. Anchoring, Assembling Equipment
    i. Duport TMR Equipment Co., Inc. in Visalia, California, delivered and installed the two “Supreme International” stationary mixer units and a hydraulic conveyor used to fill the delivery trucks.

b. Delivery Trucks
    i. Two new delivery trucks installed with Supreme International delivery boxes were purchased through Duport TMR Equipment Co. Inc. and delivered.

4. Monitoring, Demonstration and Promotion

a. Monitoring
    i. Philip Verwey and Kevin Abernathy maintained records on equipment performance, energy usage and maintenance requirements following final installation of the new system.

b. Industry Demonstrations
    i. Over the first year of operation, Philip Verwey and Kevin Abernathy worked with California dairy farmer organizations as well as individual dairy farms to demonstrate the benefits and effectiveness of the modification. This included an on-site demonstration event that was be promoted by Dairy Cares, a statewide coalition of 14 dairy and dairy-related organizations *(Formed in 2000, Dairy Cares is dedicated to promoting environmental sustainability on California dairy farms, with membership that includes all major dairy producer trade associations in the state, all three major milk marketing cooperatives, as well as the California Farm Bureau Federation, California Cattlemen’s Association and others)*. This also included individual tours given throughout the year. Further, Philip Verwey and Kevin Abernathy participated in numerous interviews for industry news outlets (some of those articles attached to this report), as well as a video produced by SJVAPCD staff and promoted on the internet (https://youtu.be/MeKGzohrDCQ).

Summary of emission testing and analyses

The best benchmark for evaluating the success of this project in reducing the operation of diesel-powered equipment is the dramatic drop in diesel fuel consumption on the dairy. As noted earlier, the dairy has seen a drop in consumption of approximately 6,250 gallon of diesel fuel per month as a direct result of this demonstration project.

As for estimations on the emission reductions resulting from this project, below are the estimates we projected in advance of the project, which were realized as the conversion from diesel-powered to electric was fully implemented.

Summary of Emission Reductions

General Summary

- The emission reductions from this project came from the following modifications:
  1. Eliminating the use of four diesel-powered tractors to mix feed and replacing them with an electric mixing station
  2. Delivering the feed from the mixing station to the animals with two new cleaner-burning delivery trucks
  3. Significantly reducing the use of two loader tractors
  4. Allowing a wetting agent such as wet whey or molasses to be mixed with the ration throughout the mixing process, rather than at the end, thereby potentially reducing PM_{10} emissions.

Prior Diesel-Powered Equipment

Four tractors used to mix hay and grain products

1. John Deere 8220 (Current: 22 hours per day, Post-Project: 0 hours per day)
2. John Deere 8110 (Current: 22 hours per day, Post-Project: 0 hours per day)
3. John Deere 7810 (Current: 9 hours per day, Post-Project: 0 hours per day)
4. John Deere 8235 (Current: 9 hours per day, Post-Project: 0 hours per day)

Two tractors to load hay and grain into the mixers

5. John Deere 624J (Current: 22 hours per day, Post-Project: 11.5 hours per day)
6. John Deere 624J (Current: 22 hours per day, Post-Project: 0 hours per day)

New Post-Project Diesel-Powered Equipment

One loader and two trucks to deliver mixed ration from mixing station to animals

1. John Deere 624J (as noted above, 11.5 hours per day)
2. Western Star 4700 PRL-08T (11.5 hours per day)
3. Western Star 4700 PRL-08T (11.5 hours per day)

Emission Reduction Calculations for NOx, ROG and $PM_{2.5}$

Note: Philip Verwey Farms seriously considered purchasing a hybrid truck to serve as the delivery vehicle for the mixed feed rations. However, Freightliner, which has had a hybrid option available on the market, recently discontinued their "Hybrid Export Power" models (ePTO) for the U.S. and Canada markets. They also determined that their hybrid system is not CARB-certified for 2014, preventing them from marketing existing vehicles in California.

Tractor #1 - John Deere 8220

Pre-Project Equipment Usage					
Equipment Type	**Make & Model**	**Engine Rated bhp**	**Equipment Load Factor**	**Daily Usage (hr/day)**	**Annual Usage (day/yr)**
Ag Tractor	John Deere 8220	233	0.7	22	365
Pre-Project Emissions					
Pollutant	**NOx**	**SOx**	**PM10**	**VOC (ROG)**	
Emission Factor (g/bhp-hr)	4.15	0.0051	0.088	0.12	
Emissions (lb/day)	32.8	0.0	0.7	0.9	
Emissions (lb/yr)	11,983	15	254	346	
Post-Project Equipment Usage					
Equipment Type	**Make & Model**	**Engine Rated bhp**	**Equipment Load Factor**	**Daily Usage (hr/day)**	**Annual Usage (day/yr)**
Ag Tractor	John Deere 8220	233	0.7	0	365
Post-Project Emissions					
Pollutant	**NOx**	**SOx**	**PM10**	**VOC (ROG)**	
Emission Factor (g/bhp-hr)	4.15	0.0051	0.088	0.12	
Emissions (lb/day)	0.0	0.0	0.0	0.0	
Emissions (lb/yr)	0	0	0	0	
Project Emission Reductions					
Pollutant	**NOx**	**SOx**	**PM10**	**VOC (ROG)**	
Emissions (lb/day)	32.8	0.0	0.7	0.9	
Emissions (lb/yr)	11,983	15	254	346	

Tractor #2 - John Deere 8110

Pre-Project Equipment Usage					
Equipment Type	**Make & Model**	**Engine Rated bhp**	**Equipment Load Factor**	**Daily Usage (hr/day)**	**Annual Usage (day/yr)**
Ag Tractor	JD 8110	198	0.7	22	365
Pre-Project Emissions					
Pollutant	**NOx**	**SOx**	**PM10**	**VOC (ROG)**	
Emission Factor (g/bhp-hr)	5.93	0.0051	0.108	0.38	
Emissions (lb/day)	39.9	0.0	0.7	2.6	
Emissions (lb/yr)	14,550	13	265	932	
Post-Project Equipment Usage					
Equipment Type	**Make & Model**	**Engine Rated bhp**	**Equipment Load Factor**	**Daily Usage (hr/day)**	**Annual Usage (day/yr)**
Ag Tractor	JD 8110	198	0.7	0	365
Post-Project Emissions					
Pollutant	**NOx**	**SOx**	**PM10**	**VOC (ROG)**	
Emission Factor (g/bhp-hr)	5.93	0.0051	0.108	0.38	
Emissions (lb/day)	0.0	0.0	0.0	0.0	
Emissions (lb/yr)	0	0	0	0	
Project Emission Reductions					
Pollutant	**NOx**	**SOx**	**PM10**	**VOC (ROG)**	
Emissions (lb/day)	39.9	0.0	0.7	2.6	
Emissions (lb/yr)	14,550	13	265	932	

Tractor #3 - John Deere 7810

Pre-Project Equipment Usage					
Equipment Type	**Make & Model**	**Engine Rated bhp**	**Equipment Load Factor**	**Daily Usage (hr/day)**	**Annual Usage (day/yr)**
Ag Tractor	JD 7810	175	0.7	9	365
Pre-Project Emissions					
Pollutant	**NOx**	**SOx**	**PM10**	**VOC (ROG)**	
Emission Factor (g/bhp-hr)	4.15	0.0051	0.088	0.12	
Emissions (lb/day)	10.1	0.0	0.2	0.3	
Emissions (lb/yr)	3,682	5	78	106	
Post-Project Equipment Usage					
Equipment Type	**Make & Model**	**Engine Rated bhp**	**Equipment Load Factor**	**Daily Usage (hr/day)**	**Annual Usage (day/yr)**
Ag Tractor	JD 7810	175	0.7	0	365
Post-Project Emissions					
Pollutant	**NOx**	**SOx**	**PM10**	**VOC (ROG)**	
Emission Factor (g/bhp-hr)	4.15	0.0051	0.088	0.12	
Emissions (lb/day)	0.0	0.0	0.0	0.0	
Emissions (lb/yr)	0	0	0	0	
Project Emission Reductions					
Pollutant	**NOx**	**SOx**	**PM10**	**VOC (ROG)**	
Emissions (lb/day)	10.1	0.0	0.2	0.3	
Emissions (lb/yr)	3,682	5	78	106	

Tractor #4 - John Deere 8235

Pre-Project Equipment Usage					
Equipment Type	**Make & Model**	**Engine Rated bhp**	**Equipment Load Factor**	**Daily Usage (hr/day)**	**Annual Usage (day/yr)**
Ag Tractor	JD 8235	235	0.7	9	365
Pre-Project Emissions					
Pollutant	**NOx**	**SOx**	**PM10**	**VOC (ROG)**	
Emission Factor (g/bhp-hr)	1.29	0.0051	0.008	0.08	
Emissions (lb/day)	4.2	0.0	0.0	0.3	
Emissions (lb/yr)	1,537	6	10	95	
Post-Project Equipment Usage					
Equipment Type	**Make & Model**	**Engine Rated bhp**	**Equipment Load Factor**	**Daily Usage (hr/day)**	**Annual Usage (day/yr)**
Ag Tractor	JD 8235	235	0.7	0	365
Post-Project Emissions					
Pollutant	**NOx**	**SOx**	**PM10**	**VOC (ROG)**	
Emission Factor (g/bhp-hr)	1.29	0.0051	0.008	0.08	
Emissions (lb/day)	0.0	0.0	0.0	0.0	
Emissions (lb/yr)	0	0	0	0	
Project Emission Reductions					
Pollutant	**NOx**	**SOx**	**PM10**	**VOC (ROG)**	
Emissions (lb/day)	4.2	0.0	0.0	0.3	
Emissions (lb/yr)	1,537	6	10	95	

Tractor #5 - John Deere 624J

Pre-Project Equipment Usage					
Equipment Type	**Make & Model**	**Engine Rated bhp**	**Equipment Load Factor**	**Daily Usage (hr/day)**	**Annual Usage (day/yr)**
Ag Tractor	JD 624 J	165	0.7	22	365
Pre-Project Emissions					
Pollutant	**NOx**	**SOx**	**PM10**	**VOC (ROG)**	
Emission Factor (g/bhp-hr)	4.17	0.0051	1.28	0.19	
Emissions (lb/day)	23.4	0.0	7.2	1.1	
Emissions (lb/yr)	8,526	10	2,617	388	
Post-Project Equipment Usage					
Equipment Type	**Make & Model**	**Engine Rated bhp**	**Equipment Load Factor**	**Daily Usage (hr/day)**	**Annual Usage (day/yr)**
Ag Tractor	JD 624 J	165	0.7	11.5	365
Post-Project Emissions					
Pollutant	**NOx**	**SOx**	**PM10**	**VOC (ROG)**	
Emission Factor (g/bhp-hr)	4.17	0.0051	1.28	0.19	
Emissions (lb/day)	12.2	0.0	3.7	0.6	
Emissions (lb/yr)	4,457	5	1,368	203	
Project Emission Reductions					
Pollutant	**NOx**	**SOx**	**PM10**	**VOC (ROG)**	
Emissions (lb/day)	11.1	0.0	3.4	0.5	
Emissions (lb/yr)	4,069	5	1,249	185	

Tractor #6 - John Deere 624J

Pre-Project Equipment Usage					
Equipment Type	**Make & Model**	**Engine Rated bhp**	**Equipment Load Factor**	**Daily Usage (hr/day)**	**Annual Usage (day/yr)**
Ag Tractor	JD 624 J	165	0.7	22	365
Pre-Project Emissions					
Pollutant	**NOx**	**SOx**	**PM10**	**VOC (ROG)**	
Emission Factor (g/bhp-hr)	4.17	0.0051	1.28	0.19	
Emissions (lb/day)	23.4	0.0	7.2	1.1	
Emissions (lb/yr)	8,526	10	2,617	388	
Post-Project Equipment Usage					
Equipment Type	**Make & Model**	**Engine Rated bhp**	**Equipment Load Factor**	**Daily Usage (hr/day)**	**Annual Usage (day/yr)**
Ag Tractor	JD 624 J	165	0.7	0	365
Post-Project Emissions					
Pollutant	**NOx**	**SOx**	**PM10**	**VOC (ROG)**	
Emission Factor (g/bhp-hr)		0.0051			
Emissions (lb/day)	0.0	0.0	0.0	0.0	
Emissions (lb/yr)	0	0	0	0	
Project Emission Reductions					
Pollutant	**NOx**	**SOx**	**PM10**	**VOC (ROG)**	
Emissions (lb/day)	23.4	0.0	7.2	1.1	
Emissions (lb/yr)	8,526	10	2,617	388	

Truck #7 - Western Star 4700

Pre-Project Equipment Usage					
Equipment Type	Make & Model	Engine Rated bhp	Equipment Load Factor	Daily Usage (hr/day)	Annual Usage (day/yr)
Delivery Truck	Cumins	330	0.51	11.5	365
Pre-Project Emissions					
Pollutant	NOx	SOx	PM10	VOC (ROG)	
Emission Factor (g/bhp-hr)	0.2	0.0051	0.01	0.014	
Emissions (lb/day)	0.9	0.0	0.0	0.1	
Emissions (lb/yr)	311	8	16	22	
Post-Project Equipment Usage					
Equipment Type	Make & Model	Engine Rated bhp	Equipment Load Factor	Daily Usage (hr/day)	Annual Usage (day/yr)
Delivery Truck	Cumins	330	0.51	11.5	365
Post-Project Emissions					
Pollutant	NOx	SOx	PM10	VOC (ROG)	
Emission Factor (g/bhp-hr)	0.2	0.0051	0.01	0.014	
Emissions (lb/day)	0.9	0.0	0.0	0.1	
Emissions (lb/yr)	311	8	4	22	
Project Emission Reductions					
Pollutant	NOx	SOx	PM10	VOC (ROG)	
Emissions (lb/day)	0.0	0.0	0.0	0.0	
Emissions (lb/yr)	0	0	12	0	

Truck #8 - Western Star 4700

Pre-Project Equipment Usage					
Equipment Type	Make & Model	Engine Rated bhp	Equipment Load Factor	Daily Usage (hr/day)	Annual Usage (day/yr)
Delivery Truck	Cumins	330	0.51	11.5	365
Pre-Project Emissions					
Pollutant	NOx	SOx	PM10	VOC (ROG)	
Emission Factor (g/bhp-hr)	0.2	0.0051	0.01	0.014	
Emissions (lb/day)	0.9	0.0	0.0	0.1	
Emissions (lb/yr)	311	8	16	22	
Post-Project Equipment Usage					
Equipment Type	Make & Model	Engine Rated bhp	Equipment Load Factor	Daily Usage (hr/day)	Annual Usage (day/yr)
Delivery Truck	Cumins	330	0.51	11.5	365
Post-Project Emissions					
Pollutant	NOx	SOx	PM10	VOC (ROG)	
Emission Factor (g/bhp-hr)	0.2	0.0051	0.01	0.014	
Emissions (lb/day)	0.9	0.0	0.0	0.1	
Emissions (lb/yr)	311	8	16	22	
Project Emission Reductions					
Pollutant	NOx	SOx	PM10	VOC (ROG)	
Emissions (lb/day)	0.0	0.0	0.0	0.0	
Emissions (lb/yr)	0	0	0	0	

Emission Reduction Calculations for PM_{10}

Uncontrolled PM10 Emissions from Animal Feed Milling			
Feed Throughput (ton/yr)	PM10 Emission Factor (lb/ton)(1)	Daily PM10 Emissions (ton/day)(3)	Annual PM10 Emissions (ton/yr)
20,000	0.067	3.7	1,340

Controlled PM10 Emissions from Animal Feed Milling				
Feed Throughput (ton/yr)	PM10 Emission Factor (lb/ton)(1)	% PM10 Control Efficiency(2)	Daily PM10 Emissions (ton/day)(3)	Annual PM10 Emissions (ton/yr)
20,000	0.067	70.0%	1.1	402

Expected PM10 Emissions Reductions from Animal Feed Milling			
Daily		Annual	
Daily Emissions Reductions (ton/day)	Daily % PM10 Emissions Reduction	Annual Emissions Reductions (ton/yr)	Annual % PM10 Emissions Reduction
2.6	70.0%	938	70.0%

(1) The uncontrolled PM10 emission factor is based on the particulate matter (PM) emission factor of 0.067 lb-PM/ton for grain milling with a hammermill controlled by a cyclone, as determined in AP-42 Table 9.9.1-2. Assuming a 50% control efficiency from a cyclone, the uncontrolled PM emission factor is 0.134 lb-PM/ton (calculated as 0.067 lb-PM/ton ÷ 0.5). Assuming 50% of PM emissions are PM10, the uncontrolled PM10 emission factor is 0.067 lb-PM10/ton (calculated as 0.134 lb-PM/ton x [0.5 lb-PM10/ton ÷ 1 lb-PM/ton]).

(2) 70% PM10 control efficiency for water spray has been applied to previous District projects for similar operations, including agricultural, green, and yard waste materials grinding.

(3) Daily PM10 Emissions = Annual PM10 Emissions ÷ 365 days/yr

Draft estimated emissions calculations and reductions.

Actual Costs vs. Budgeted Costs

As this project was carried out largely by contractors under bids secured in advance of the application for TAP funding, there was not substantial difference between the actual costs and the budgeted costs. As noted in the quarterly reports, the project preparation/installation expenditures totaled $1,381,378.07 (compared to the $1,304,747.98 projected in the proposal).

	Estimate	Actual	Funding	
			District TAP	Applicant Match
Facility Preparation				
PG&E Prep & Connection	$ 75,531.78	$124,690.31		$124,690.31
Roman Electric	$ 58,639.20	$ 58,639.20		$58,639.20
M-Mig, Cement	$ 83,655.00	$ 84,892.50		$84,892.50
Stationary Mixing Equipment	$ 613,500.00	$ 638,500.00	$300,000.00	$338,500.00
Western Star Delivery Trucks (two) with Boxes	$ 418,422.00	$ 418,632.00		$418,632.00
Staff & Demonstration	$ 55,000.00	$55,000.00		$55,000.00
Permits Taxes	$ -	$ 1,024.06		$1,024.06
Total	$ 1,304,747.98	$ 1,381,378.07	$300,000.00	$1,081,378.07

Attachments:

- Photographs of the installation, as well as outreach efforts

Picture 1: Preparation of the concrete slab area

Picture 2: Connecting power to the project site

Picture 3: Pouring the concrete

Picture 4: Delivery of two Supreme International mixing stations

Picture 5: Installation of mixing stations on the concrete slab

Picture 6: Installation of hydraulic conveyer for loading of delivery trucks

Picture 7: Assembly of Supreme International delivery box on Western Star truck

Picture 8: Demonstration/Open House on October 7, 2015

Picture 9: Demonstration/Open House on October 7, 2015

Picture 10: Demonstration/Open House on October 7, 2015