# AGENDA

**ENGINEERING COMMITTEE MEETING**
**LEUCADIA WASTEWATER DISTRICT**
Wednesday, June 3, 2015 – 8:30 a.m.
1960 La Costa Avenue, Carlsbad, CA 92009

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1. **Call to Order**
2. **Roll Call**
3. **Public Comment**
4. **New Business**
   - A. Authorize the General Manager to execute a sole source purchase agreement with Rockwell Solutions for the pre-purchase of three new Vaughan Chopper Pumps as part of the Saxony Pump Station Rehabilitation Project in an amount not to exceed $81,865. (Pages 2 - 11)
   - B. Discuss and provide direction regarding Vactor Combination Truck. (Page 12)
5. **Information Items**
   - A. B1/B2 Force Mains Replacement Project update. (verbal)
   - B. Lanikai Gravity Line Manhole Rehabilitation. (verbal)
6. **Director's Comments**
7. **General Manager's Comments**
8. **Adjournment**

Ref: 15-4531

**MEMORANDUM**

**DATE:** May 28, 2015

**TO:** Engineering Committee

**FROM:** Paul J. Bushee, General Manager

**SUBJECT:** **Award of Purchase Agreement to Rockwell Solutions for Replacement Pumps for the Saxony Pump Station Rehabilitation Project**

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**RECOMMENDATION:**

Staff requests that the Engineering Committee recommend that the Board of Directors:

1. Authorize the General Manager to execute a sole source purchase agreement with Rockwell Solutions for the pre-purchase of three new Vaughan Chopper Pumps as part of the Saxony Pump Station Rehabilitation Project in an amount not to exceed $81,865.

2. Discuss and take other action as appropriate.

**DISCUSSION:**

The rehabilitation of the Saxony Pump Station is included as a goal under the Technology and Infrastructure Strategy in the Fiscal Year 2015 Tactics & Action Plan.

The rehabilitation of the Saxony Pump Station (Saxony) was recommended by Infrastructure Engineering Corporation (IEC) in the District's 2014 Pump Stations Assessment Report. The project is currently in the design phase. Included in the rehabilitation of the pump station are the replacement of two submersible pumps and the purchase of a third pump as a spare.

During project design, Staff requested that IEC consider installing submersible chopper pumps at Saxony to mitigate existing ragging issues. Typically, chopper pumps require a higher horsepower motor than a standard pump for the same capacity and discharge pressure. The existing pumps are driven by 40 horsepower motors. Electrical equipment including the motor control center, automatic transfer switch and emergency generator are sized accordingly. An increase in motor horsepower would require a corresponding increase in capacity for electrical components. For this reason, IEC considered horsepower a limiting factor in pump selection and selected pumps that operate with not more than a 40 horsepower (hp) motor.

After evaluation of the required pumping capacity for Saxony, IEC recommends that the current submersible pumps be replaced with two Vaughan Chopper Pumps with 40 hp motors. IEC's technical memo is attached for review. IEC also evaluated the Flygt F Series Chopper Pump. However, Flygt offers only a 60 hp motor on their F Series. The next lower size Flygt pump had only a 34 hp motor, which was insufficient to meet the pump requirements. No other manufacturer was identified that offered a comparable chopper pump to satisfy the performance specifications.

Subsequently, IEC provided the pump specifications to Rockwell Solutions to obtain a quote for the replacement pumps, attached. The pump's unit price is $24,884 resulting in a cost of $74,652 for three pumps. The total cost including sales tax and shipping is $81,864.16. Due to

the estimated delivery time of 18 weeks, staff and IEC believe it is prudent to pre-order the pumps prior to bidding the contract, store them on site and supply the pumps to the construction contractor for installation as owner provided equipment. Project construction is planned to occur outside of the bird nesting season, between September and March, in order to minimize environmental constraints. Pre-ordering the pumps will facilitate construction within the specified timeframe.

Under Section 11.1, Sole Source Procurement, of the District's Procurement Policy, sole source procurement is allowed in cases where goods and services are obtainable from only one vendor due to unique circumstances. Rockwell Solutions is the only authorized southern California vendor for Vaughan Chopper Pumps.

Therefore, it is recommended that the Vaughan Chopper Pumps for Saxony be purchased through Rockwell Solutions as a sole source vendor at a total cost of $81,865.

**FISCAL IMPACT:**

The amount appropriated for the Saxony Pump Station Rehabilitation Project in the Fiscal Year 2015 budget is sufficient to cover the procurement of the pumps.

rym:PJB

Date: May 27, 2015

**Subject:** **Pump Selection**

Prepared By: Jane Costello, P.E.
Reviewed By: Rob Weber, P.E., Jamie Fagnant, and P.E.

## I. INTRODUCTION

In accordance with the District's Asset Management Master Plan (AMMP), IEC prepared the 2014 Pump Station Condition Assessment, which summarized previously suggested improvements and identified additional concerns from operations staff to address in a subsequent rehabilitation project of Saxony Pump Station. IEC prepared a Preliminary Design Report for the Saxony Pump Station Rehabilitation in March 2015. This technical memorandum supplements that report with a final selection for the replacement of the pumps.

## II. PUMP STATION INFLUENT FLOW REVIEW

The flow data from the District's 2013 Asset Management Plan (AMMP) and the 1999 Master Plan were reviewed to determine the current and ultimate hydraulic conditions at both the Saxony Pump Station and the Leucadia Pump Station (LPS). The hydraulic conditions at the LPS are important because the Saxony Pump Station pumps into L1 or L2, the force mains from the LPS.

In the AMMP flows were developed for the Saxony and Leucadia Pump Stations using a sewer generation rate per Equivalent Dwelling Unit (EDU) of 149 gal/EDU. The sewer generation rate was developed by dividing the total flow to the Encina Wastewater Plant (flow meter at Batiquitos Pump Station (BPS)) by the total number of connected EDUs in the District. Using land use data (EDUs) for the Drainage Basins from Table 3-2 of the AMMP, influent flows were developed for each of the stations. A summary of the EDU current and ultimate build-out and percent build-out are presented in Table 1A. Table 1B shows the current and ultimate flows for the Saxony Pump Station and the LPS: Average Dry Weather Flow (ADWF), Peak Dry Weather Flow (PDWF) and Peak Wet Weather Flow (PWWF).

The PWWF for both the Saxony Pump Station and the LPS are significantly lower than the values estimated in the 1999 Master Plan. The Master Plan which used a sewer generation rate of 215 gal/EDU. Estimated ultimate population was also higher in the 1999 Master Plan. Table 2A and 2B show the current and ultimate flow for the Saxony Pump Station and the LPS.

Table 1A – Summary of EDU Growth Projections by Drainage Areas/Pump Stations from AMMP

| Drainage Basin | Pump Station | Existing EDUs (2011) | Ultimate EDUs | % of Build-out |
|---|---|---|---|---|
| #4 | Saxony | 1,196 | 1,578 | 76 |
| Total | Saxony | 1,196 | 1,578 | 76 |
| #5 | LPS | 1,128 | 1,151 | 98 |
| #6 | LPS | 2,106 | 2,072 | 102 |
| #7 | LPS | 1,811 | 2,012 | 90 |
| #8 | LPS | 3,996 | 4,690 | 85.2 |
| #9 | LPS | 5,489 | 5,588 | 98.2 |
| #10 | LPS | 3,530 | 3,582 | 99 |
| #11 | LPS | 4,672 | 4,769 | 98 |
| Total | LPS | 22,732 | 23,864 | 95.3 |

Table 1B – AMMP Pump Station Influent Flow – Existing and Ultimate - 149 gpd/EDU

| Pump Station | Existing Flows (GPM) | | | Ultimate Flows (GPM) | | |
|---|---|---|---|---|---|---|
| | ADWF | PDWF* | PWWF** | ADWF | PDWF* | PWWF** |
| Saxony | 124 | 222 | 269 | 163 | 292 | 354 |
| LPS | 2,352 | 4,210 | 5,104 | 2,469 | 4,419 | 5,358 |

**A peaking faction of 1.79 was used for PDWF from Page 3-8 of the 2013 AMMP.*
*** A peaking factor of 2.17 was used for PWWF from Page 3-11 of the 2013 AMMP.*

Table 2A – 1999 Master Plan Summary of EDU Growth Projections by Drainage Areas/Pump Stations

| Drainage Basin | Pump Station | Existing EDUs (2011) | Ultimate EDUs |
|---|---|---|---|
| #4 | Saxony | 1,000 | 2,250 |
| Total | Saxony | 1,000 | 2,250 |
| #5 | LPS | 1,100 | 2,250 |
| #6 | LPS | 2,000 | 4,500 |
| #7 | LPS | 1,900 | 4,275 |
| #8 | LPS | 3,200 | 7,200 |
| #9 | LPS | 3,500 | 7,875 |
| #10 | LPS | 2,900 | 6,525 |
| #11 | LPS | 3,600 | 8,100 |
| Total | LPS | 18,200 | 40,725 |

Table 2B – 1999 Master Plan Pump Station Influent Flow – Existing and Ultimate

| Pump Station | Existing Flows (GPM) | | | Ultimate Flow (GPM) | | |
|---|---|---|---|---|---|---|
| | ADWF | PDWF | PWWF | ADWF | PDWF | PWWF |
| Saxony | 150 | 310 | 560 | 290 | 600 | 850 |
| Leucadia | 2,700 | 4,100 | 5,800 | 3,400 | 5,100 | 6,800 |

At the final design kick-off meeting on April 14, 2015, in discussions with District staff, it was determined that an intermediate sewer generation rate of 170 gpd/EDU be used to estimate flow for

sizing the Saxony pumps along with the current and ultimate land use from the AMMP. Table 3 shows the estimated values for ADWF, PDWF and PWWF. It should be noted that the daily peaking factor (1.79) and wet weather peaking factor (2.17) from the 2013 AMMP were used. In the Master Plan the PWWF was calculated by distributing proportionally the estimated 4.2 mgd of Infiltration/Inflow (I/I) flow by estimated pipe length across the District. While the AMMP method is simpler, the PWWF flow in Table 3 for the LPS is, in fact, about 4.5 MGD greater than the ADWF, which is close to the 4.2 MGD from the Master Plan. The LPS service area is also built-out to 95.3 %.

Table 3 – 2013 AMMP Pump Station Influent Flow – Existing and Ultimate - 170 gpd/EDU

| PUMP STATION | EXISTING FLOWS (GPM) | | | ULTIMATE FLOWS (GPM) | | |
|---|---|---|---|---|---|---|
| | ADWF | PDWF | PWWF | ADWF | PDWF | PWWF |
| Saxony | 140 | 250 | 310 | 190 | 330 | 400 |
| LPS | 2,680 | 4,800 | 5,820 | 2,820 | 5,040 | 6,110 |

The hydraulic conditions of the Saxony Pump Station and the LPS will be based on the flows in Table 3.

## III. HYDRAULIC ANALYSIS

### EXISTING PUMP STATION

According to the Table 2-3 of the AMMP, the current capacities of the two pumps stations are as shown in Table 4.

Table 4 – Summary of Saxony and Leucadia Pump Station Capacity

| Pump Station | No. of Pumps | Capacity per Pump (gpm) | Pump Configuration | Drive | Remarks |
|---|---|---|---|---|---|
| Saxony | 2 | 900 | Duty/Standby | Constant | Pumps replaced in 2006 |
| Leucadia | 4 | 4880 | Lead, Lag/Two Standby | Variable | Rebuilt in 2000 |

### PROPOSED PUMP STATION CAPACITY

There are two limiting operating conditions for the pumps at the Saxony Pump Station. While no documentation of the duty point of the existing pumps was available, the flow capacity of the pumps is estimated to be 900 gallons per minutes (gpm) based on nameplate data reported in the District's 2008 AMMP. District staff have also noted operating pressures of 34 psi and 43 psi in the discharge piping of the station.

The results of an evaluation of the hydraulic system curves through which the pump station operates are shown in Tables 4 and 5. The Vaughan SE4 pump curve was used in this hydraulic analysis. In the first case a Saxony pump moves 900 gpm through the 8" forcemain at the station to the 16-inch pipe, which connects to both forcemain L1 and L2. The pump then conveys the flow over a high point at Station 11+900 to a discharge in a manhole at Station 14+000. The actual flow on the Vaughan pump curve at 83' TDH is 925 gpm.

Table 5 - Hydraulic Analysis for Saxony Pump Station with Leucadia Pump Station Off

| SEGMENT | DESCRIPTION | HEADLOSS AT 900 GPM (FT) |
|---|---|---|
| Static Head | From low water surface elevation in the wet well (elevation -2.0 ft) to elevation of high point in 24-inch L1 or L2 at elevation72.5 feet at Station 11+900 | 74.5 |
| Frictional Loss in L1 or L2 | 14,000 lineal feet of 24-inch pipe; includes section of forcemain downstream of high point @ 900 gpm | 0.5 |
| Station Losses | Headlosses in the pump station piping up to the point of connection to the 24-inch pipe | 8.0 |
| | TOTAL DYNAMIC HEAD (TDH) | 83.0 |

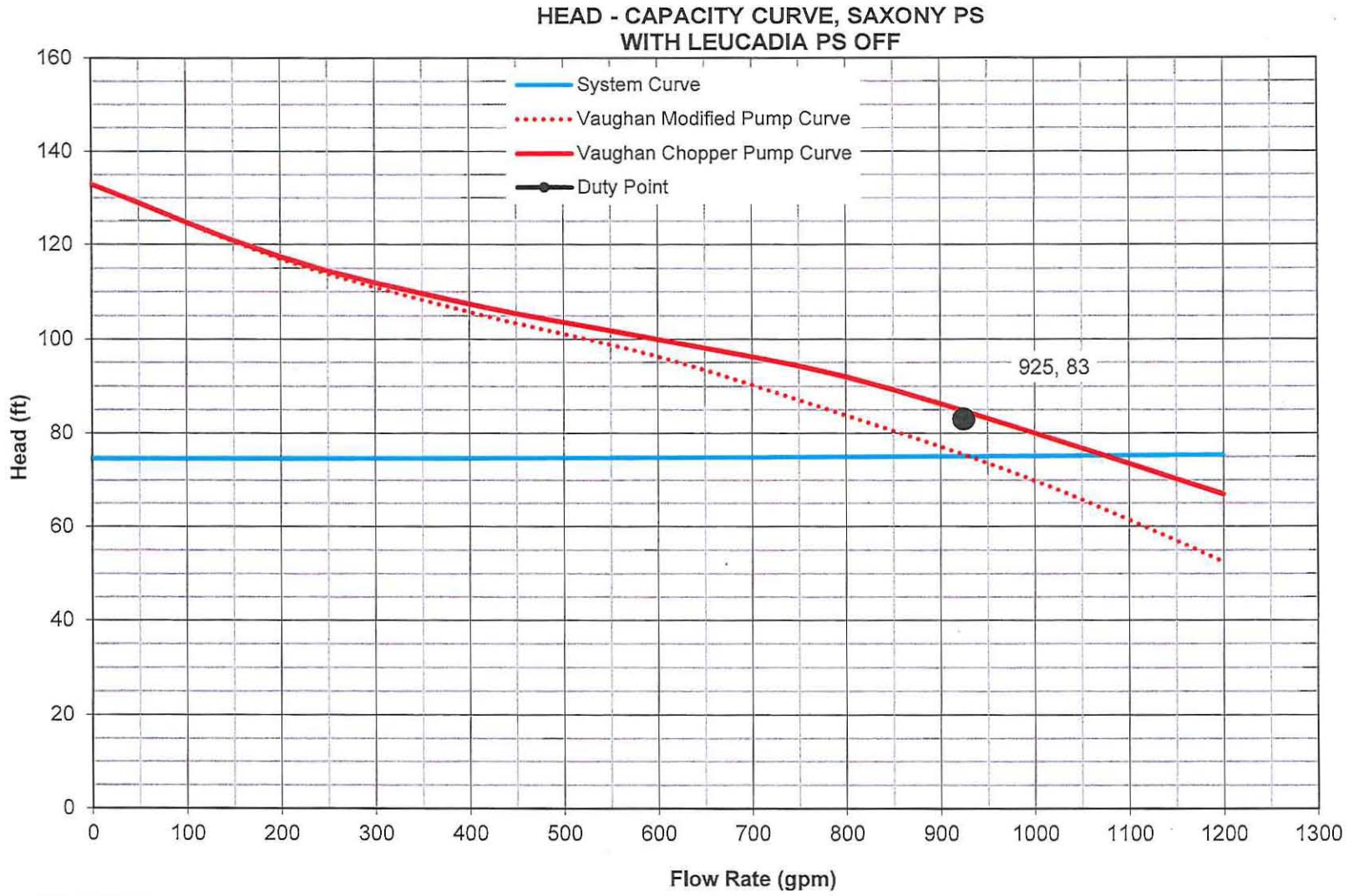
In the second case a Saxony pump moves an assumed flow of 900 gpm through the 8" forcemain at the station to the 16-inch pipe, which connects to both forcemain L1 and L2. (Typically only one forcemain is on-line at one time.) At this point the Saxony pump must overcome the pressure in the L1 or L2 forcemain created by the flow from the LPS. Per Table 3, the LPS Station has an ultimate build-out peak flow of 6,110 gpm. The line pressure in L1 or L2 at this flow would be 123 feet according to the pump curve provided in the LPS 2008 as-built records. Table 5 summarize the headlosses in the segment of the hydraulic profile for this condition.

Table 6 - Hydraulic Analysis for Saxony Pump Station with Leucadia Pump Station On

| SEGMENT | DESCRIPTION | HEADLOSS AT 900 GPM (FT) |
|---|---|---|
| Static Head | From low water surface elevation in the wet well (elevation -2.0 ft) to elevation of tie-in location to L1 or L2 at elevation 12 at Station 77+89 | 12 |
| Station Losses | Headlosses in the pump station piping up to the point of connection to the 24-inch pipe | 3 |
| Pressure Head | Taken from Saxony Pump Curve (Energy Grade Line) at location of tie-in of 16-inch pipe to 24-inch L1 or L2 | 90 |
| | TOTAL DYNAMIC HEAD | 105 |

** at 500 gpm the station losses are 3 feet; the flow was determined by an iterative process starting with an initial flow of 900 gpm.*

Despite the differences in the two hydraulic systems, the TDH for the Saxony pumps differs only by 9.5 feet or 4 psi. The Saxony Pump Station will pump 925 gpm when the LPS is off and 500 gpm when the LPS is on. In the second case, it will take longer to empty the wet well.


HEAD - CAPACITY CURVE, SAXONY PS
WITH LEUCADIA PS OFF
System Curve
Vaughan Modified Pump Curve
Vaughan Chopper Pump Curve
Duty Point
925, 83
Head (ft)
Flow Rate (gpm)
0
20
40
60
80
100
120
140
160
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300


HEAD - CAPICITY CURVE, SAXONY PS
LEUCADIA PS ON
System Curve LPS On
Modified Pump Curve
Pump Curve
Operating Point
500, 105
Head (ft)
Flow Rate (gpm)
0
20
40
60
80
100
120
140
160
0
200
400
600
800
1000
1200

## IV. PUMP SELECTION AND PROCUREMENT

The District requested IEC consider submersible chopper pumps for installation at the Saxony Pump Station to mitigate existing ragging issues. In some cases chopper pumps operate at a higher horsepower for the same flow and head condition. Upsizing the motor horsepower may require subsequent upsizing of the pump motor starters and the emergency generator. The capacity of power feed to the site and the transformer would also need to be reviewed. IEC recommends that the Saxony Pump Station submersible pump be replaced with a chopper pump of similar capacity to the existing, but one that still uses a 40 HP motor so as not to trigger major electrical upgrades at the site. The Vaughan Chopper Pump Model E4S6 40 HP with 10.55" impeller will be suitable for the Saxony Pump Station. IEC evaluated the Flygt F series Chopper Pump for the duty points discussed previously, but the manufacturer offered either a 60 HP or a 34 HP to achieve something near the duty point. The 34 HP motor was overloading at the lower end of the curve. The cost for and the 60 HP was too large for the existing hatches and would have triggered an extensive electrical upgrade. In short, Flygt did not offer a good selection for the Saxony pump requirements. A Cornell Chopper Pump was also considered, but it was not available in a submersible at the desired duty point. The cost for the Vaughan Chopper Pump Model E4S6 40 HP with 10.55" impeller is $25,000 each for a total of $75,000 for three pumps, not including sales tax or freight.

ROCKWELL SOLUTIONS

1 3 **VAUGHAN MODEL SE4T-108 SUBMERSIBLE CHOPPER PUMP CONSISTING OF:**

- **CASING AND BACK PULL-OUT PLATE**, cast ductile iron, with 4" 125 LB ANSI rated discharge flange.
- **IMPELLER, CUTTER NUT AND UPPER CUTTER,** cast steel, heat treated to minimum 60 Rockwell C Hardness. Impeller dynamically balanced.
- **CUTTER BAR,** plate steel, heat treated to minimum 60 Rockwell C Hardness.
- **SHAFT**, heat treated alloy steel, AISI 4140
- **ELASTOMERS**, BUNA N
- **DRIVE**, 40 HP, 1750 RPM, 460 volt, 3 phase, 60 Hz, 1.15 SF, Explosion Proof (Class 1, Group C & D) submersible motor with tandem mechanical seals, moisture sensors, (3) internal thermostats, and 50 ft of power cable, manufactured by Reliance. TC outer seal faces. Motor to include 416 SS shafting.
- **SUBMITTAL FINISH**: Sandblasted and single coat of Tnemec 27wb primer (5-8 MDFT) and finish coat of Tnemec 27WB Epoxy (5-8 MDFT). The motor will not be sandblasted.

2 3 Only **STANDARD GUIDE RAIL SYSTEM CONSISTING OF:**

- **4" BASE ELBOW**, cast ductile iron.
- **4" GUIDE BRACKET**, cast ductile iron.
- **TOP MOUNTING AND CHAIN HOLDER BRACKET**, 316 stainless steel.
- (1) **INTERMEDIATE STIFFENER BRACKETS**, 316 stainless steel located every 10 feet.
- **GUIDE RAILS**, 316 stainless steel, 2" schedule 40 pipe, 10 feet in length each, (TOTAL OF (8) pieces @ 10' each)

3 3 Only **VAUGHAN MOISTURE RELAY CONSISTING OF:**

- **MOISTURE & OVER TEMPERATURE RELAY, VPMR**

4 1 Only **SERVICES CONSISTING OF:**

- **FACTORY SUBMITTALS AND O&M MANUALS.**

**TOTAL PRICE: $74,652 + $ 5,972.16(Tax) + $1,240(Freight) = $ 81,864.16**

**PUMP PERFORMANCE**: 875 GPM @ 93 FT. TDH
**APPLICATION**: PUMP STATION
**INDUSTRY**: MUNICIPAL

**Rockwell Solutions**
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Newport Coast, CA 92657

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Phone: 888-357-7888
Fax: 888-214-6635

**MEMORANDUM**

Ref: 15-4532

**DATE:** May 28, 2015
**TO:** Engineering Committee
**FROM:** Paul J. Bushee, General Manager
**SUBJECT:** **Vactor Combination Truck**

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**RECOMMENDATION:**

1. Discuss and provide direction as appropriate

**DISCUSSION:**

During the May 27, 2015 Special Board meeting, President Juliussen requested that the June Engineering Committee Agenda include an item to discuss the Vactor Combination Truck used by Field Services Staff for collection system hydro-cleaning.

The purpose of this agenda item is to allow the Engineering Committee to discuss this item and provide direction to staff as appropriate.

rym:PJB