

Phosphate Waste Reduction Initiative

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Introduction

During new product campaigns at Amgen Manufacturing limited, several materials are used for the process including phosphate. During one of these campaigns, the phosphate waste generation increased unexpectedly from 27,700 gal (105,000L) per lot to 41,000 gal (155,000L) per lot. This material requires a specific treatment with higher workload and physical capacity. Therefore, the amount of phosphate waste generated during these campaigns cannot be treated in the Water Treatment Plant.

Phosphate waste is being managed by using Mobile Truck Tanks. This project was focused on eliminating this expense with an extensive evaluation of process and utilities operations to obtain a considerable reduction of phosphate waste.

Problem Statement

Non-expected phosphate waste generation increased with new product lot campaigns. Phosphate waste cannot be treated in the water treatment plant causing external waste management expense. Figure 1 shows lots per phosphate waste produced by month. It can be seen that the phosphate waste has increased. The reasons for this increment were unknown.

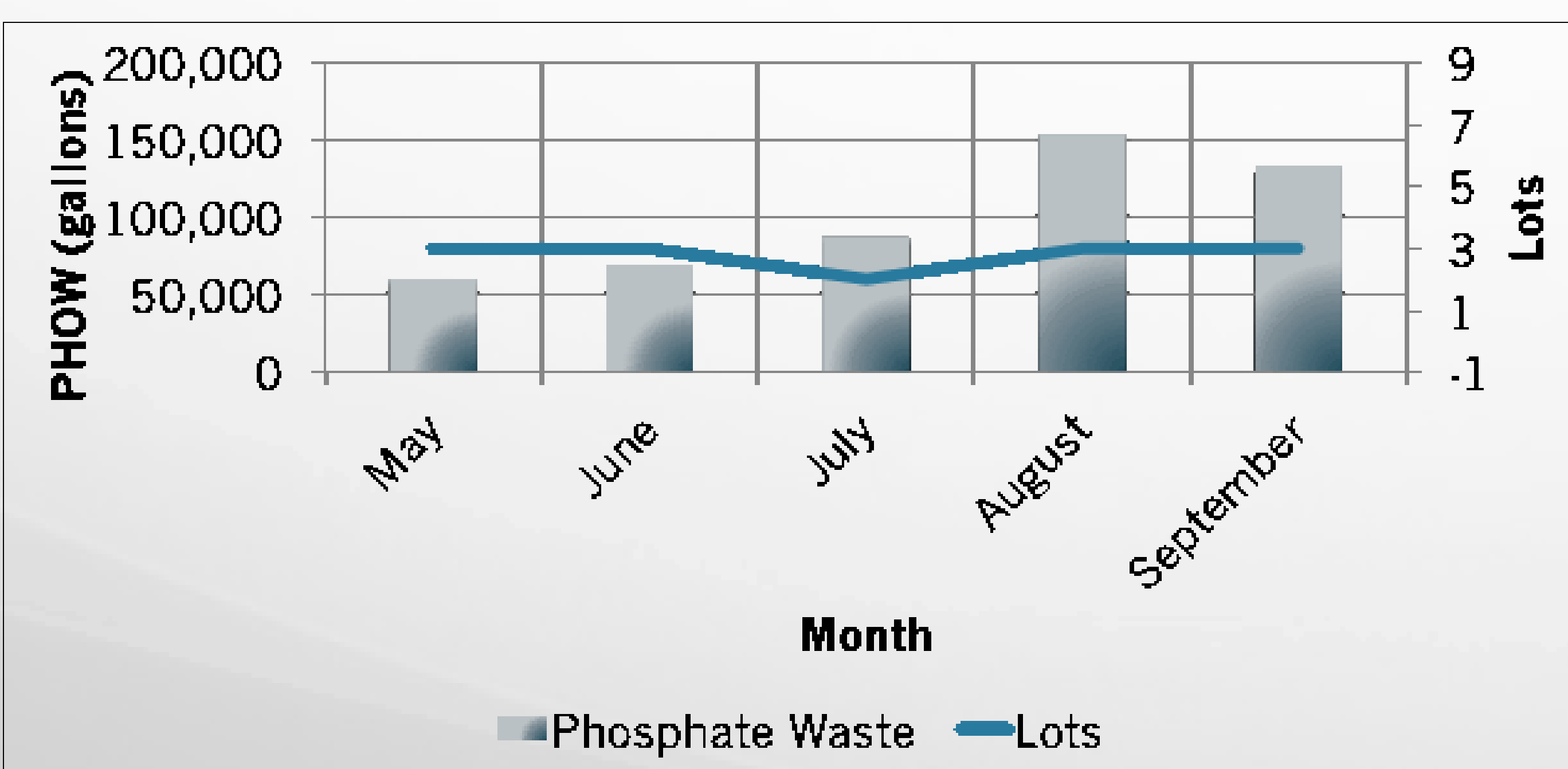


Figure 1
2011 Phosphate Waste per Month

Methodology

Several activities were performed to understand the problem and identify the potential solutions, including the evaluation of discharging a specific buffer used for the process from PHOW to normal waste drain (28,000 L per lot).

As a result of the utilities walk down, a malfunction in the intermediate PHOW storage tank pump was identified as a key contributor for the increase in waste. It was observed that solenoid to allow water flow to the pump seal was not working properly and constantly opened. This water drained with backflow to phosphate waste tank. The actual water flow amount was 8 LPM instead of the expected water flow amount of 0.3 LPM. This excessive amount of water is estimated in 11,520L/day (8.0LPM x 60min x 24hrs = 11,520L/day). This value is equivalent to 19,270 gal / lot.

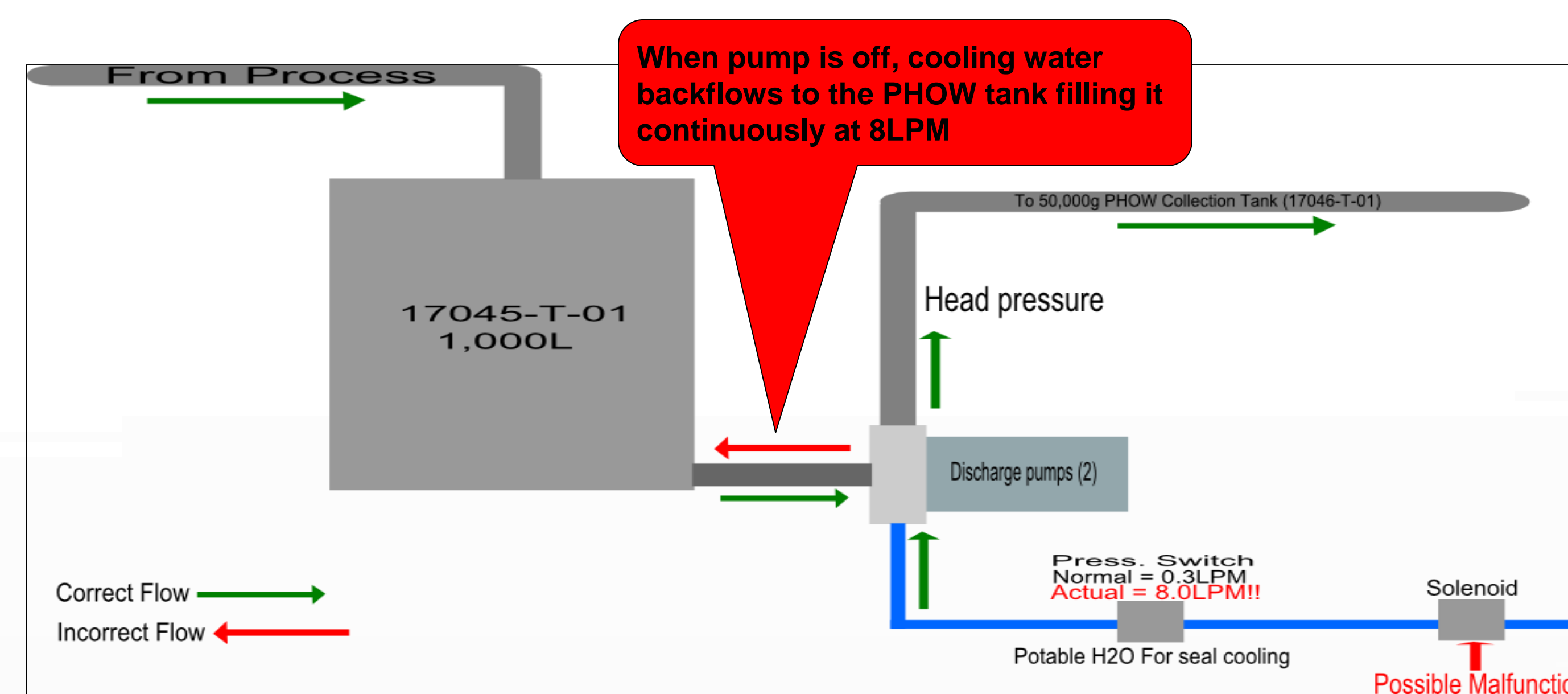


Figure 2
Pump Cooling System of Waste Storage Tank

Results

- PHOW samples: Collected PHOW samples at the Waste Collection Tank during key steps of the process demonstrated that other solution than phosphate waste was being discharged into the Phosphate Waste Tank. This solution was essentially water.
- Utilities walk down: As immediate corrective actions, the solenoid was fixed and the pressure switch set point was adjusted to normal flow (0.3L/min).
- Buffer Discharge: Buffer assessment confirmed that the Waste Treatment Plant has the capability to process and treat the buffer waste. This change will reflect an expected waste reduction of approximately 7,500 gal (28,000 L) / lot.

Conclusion

The opportunities identified in the utilities system and process operations increased the waste treatment operation in \$773K at the end of the year. This operational impact was resulting in 94% over the initial estimated budget, (as shown in Figure 3)

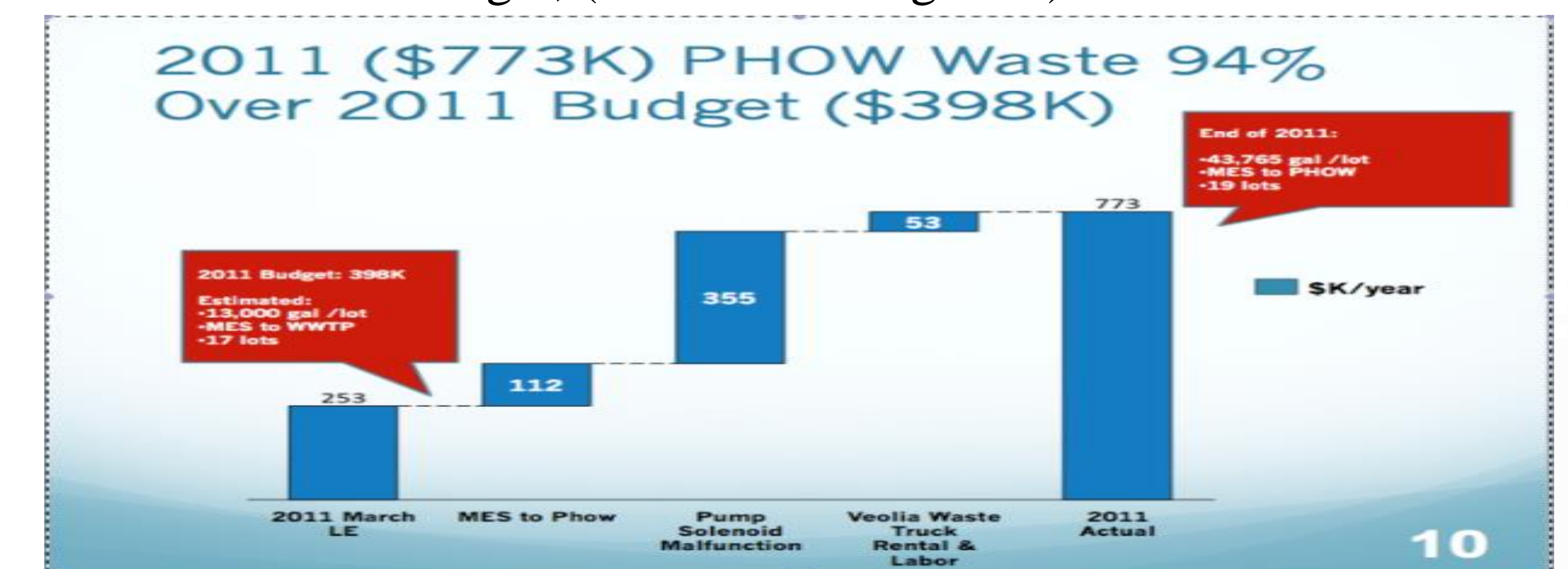


Figure 3
2011 Budget

Improvements revealed a significant reduction (65%) in phosphate waste generation (26,760 gal/lot) during the first quarter of 2013 and a cost reduction of \$807K projected for 35 lots on 2013.

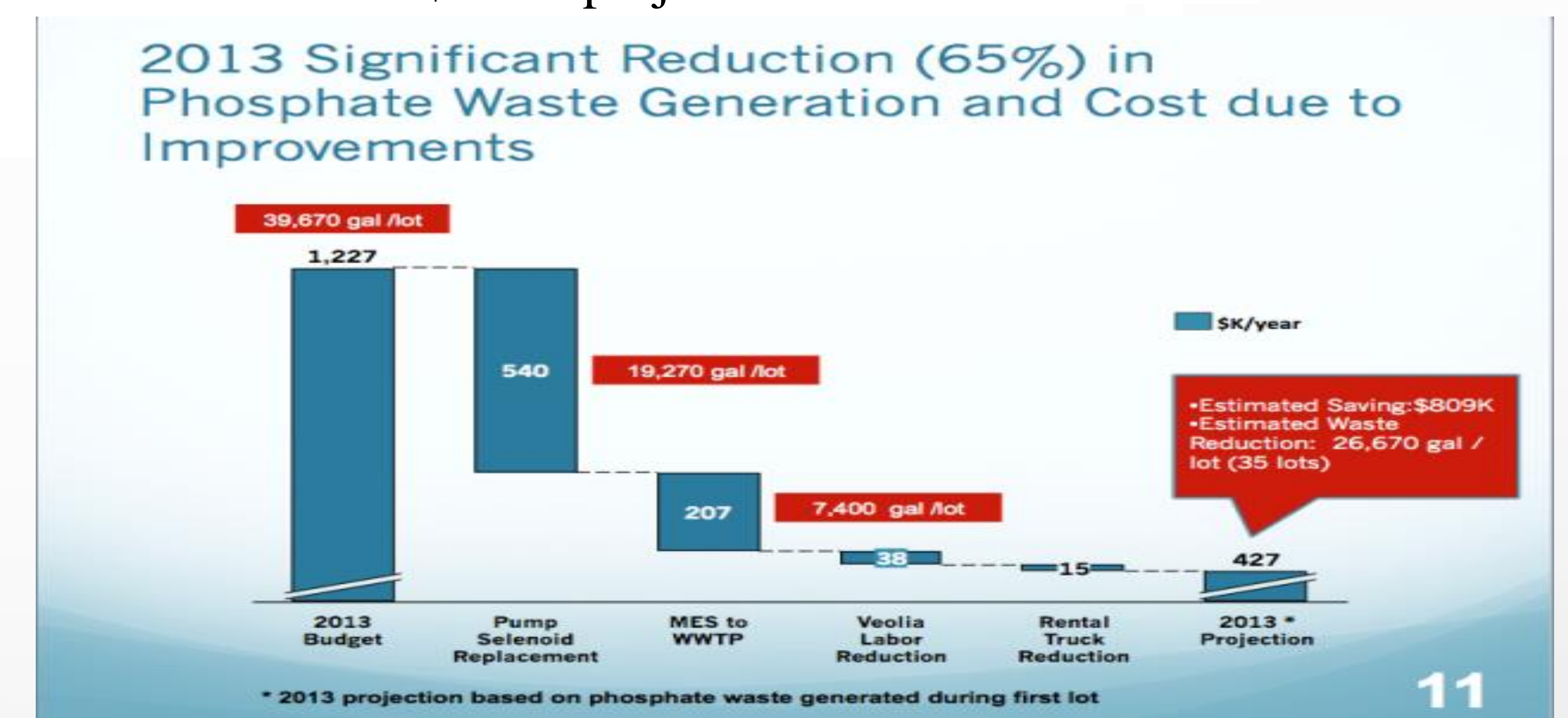


Figure 4
2013 Estimated Cost Reduction

Future Works

As part of the findings in this project, several opportunities were identified as preventive maintenance like periodic verification of the Water Cooling System, phosphate drain samples included as part of periodically monitoring in the drain ports and initial cost and process evaluation for any future project that involve phosphate waste generation.