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INTRODUCTION TO WASTEWATER ENERGY OPTIMIZATION

**SESSIONS 2 Workbook**

**Agenda**

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| --- |
| **SESSIONS 1 & 2** |
| Opportunity Register  |
| Plant Process Conservation |
| Wastewater Efficiency – Cheat Sheet |
| Plant Energy Basics and KPIs |
| Follow the BOD |
| Pumping Systems and Energy |
| W3 Systems & The DIY W3 Walkthrough |
| Energy Hot Spots |

**HOMEWORK– Follow the BOD**

**Purpose**
To develop an understanding of the life of BOA as it moves through the plant as well the impact of the primary clarifier has on potential decarbonization.

Using the example from the webinar and shown below, complete the table on the following page:





**HOMEWORK– PUMP CURVE**

**Purpose**
To develop knowledge, comfort, and proficiency with reading a pump curve and understanding the energy-use implications.

On the following page is a Pump Curve Cut-sheet for a specific design point. This pump was selected after determining the required flow rate and estimated head as indicated by the “red arrowhead”..

**Instructions:** Using information from the pump curve on the following page, answer the questions below in the activity sheet on the

|  |  |  |
| --- | --- | --- |
| 1. What is the design flow rate, estimated head, and efficiency?
 |  |  |
| 1. If we throttle this pump to decrease the flow to 300 gpm, what will be the resulting **head pressure**?
 | t |  |
| 1. If we throttle this pump to decrease the flow to 300 gpm, what will be the resulting **pump efficiency**?
 |  |  |

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**Activity sHEET – EXERCISE – DESIGN ENGINEER FOR A DAY!**

Using the information below fill in the chart and table on the following page:

Design Flow Rate: 350 GPM

Discharge elevation 475 ft.

Wet-well water level: 435 ft

Frictional Headloss calculations

150 GPM = 3 foot

250 GPM = 9 feet

350 GPM = 20 feet

450 GPM = 40 feet

500 GPM = 50 feet

**PUMPING ENERGY MATH**

***Q = GPM; H = FEET; S.G. = 1 FOR WATER;*** $η $***= PUMP EFFICIENCY***

***BHP = S.G. \* Q \* H***

$$ 3960η$$



FIRM: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

SYSTEM CURVE BY: \_\_\_\_\_ DATE: \_\_\_\_\_

PUMP SELECTION BY: \_\_\_\_\_ DATE: \_\_\_\_\_

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Condition | Flow (gpm) | Operating kW | kWh/MG | GPM / kW |
| ***Design*** |  |  |  |  |
| ***Installed*** |  |  |  |  |
| ***Throttled*** |  |  |  |  |
| ***VFD*** |  |  |  |  |

**Session 2 Opportunity register jam session**