SODIUM HYDROXIDE ADDITION AT CONTROL STATION 2 SOP

SOP #121

Rev: 0.0

Date: 01/31/2018

SOP VERSION CONTROL

Revision No	Revision Date	Page No(s)	Description	Approved by

STAFF ACKNOWLEDGEMENT

I certify that the requirements of this SOP have been communicated to me and that I am trained in its use. A copy of this page will be distributed to the employee training record file.

Name	Date
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APPROVAL SIGNATURES

Prepared by: Arcadis U.S., Inc. Date: 01/31/2018

Approved by: _____ Date: _____

1 DEFINITIONS AND ACRONYMS

CSII	Control Station 2
GLWA	Great Lakes Water Authority
gph	gallons per hour
lb/gal	pounds per gallon
MGD	million gallons per day
mg/L	milligrams per liter
mL	milliliter
mL/min	milliliters per minute
mL/hr	milliliters per hour
NaOH	sodium hydroxide (caustic soda)
PPE	personal protective equipment

2 KEY PERSONNEL AND RESPONSIBILITIES

- Operator:
  - Complete daily check of sodium hydroxide dose and pumping equipment, including metering pumps, tote, and hose fittings for drips and leaks.
  - Adjust feed rate to achieve target pH concentration.

3 SCOPE/PURPOSE

The purpose of this SOP is to operate and adjust (as needed) the sodium hydroxide feed system flowrate at Control Station 2 to achieve the target pH of the finished water.

4 HEALTH AND SAFETY

The following PPE is required while inside the building where the bulk sodium hydroxide is stored:

- Chemical resistant apron
- Chemical resistant gloves
- Face shield

Additionally, the facility is equipped with an emergency eyewash station.

5 PROCEDURE

Equipment Required:

- One 273-gallon tote of 25% caustic soda with containment
- Two 10 gph LMI feed pumps (one in service, one on standby)
- One 1000 mL calibration column
- Two digital timers (one is needed for the procedure, plus one spare)
- Daily record sheet

Procedure:

1. Prior to traveling to CSII, read the pH from the online analyzer at the lab tap. Record the pH on the daily sheet.
2. Read the influent supply flow from control panel in CSII. Record the flow on the daily sheet.
3. If a change in dosage is needed, calculate the new settings using the CHEAT SHEET and adjust the feed pumps accordingly.
4. Check stroke and speed on feed pump. Record stroke and speed on the daily sheet.
5. Determine feed rate in milliliters per minute (mL/min):
    a. Open the fill valve on the calibration column, fill calibration column to slightly above the 1000 mL mark and close the fill valve.
    b. Close the valve on the supply line from the tote and reopen the valve to the calibration column.
    c. Watch the level drop in the calibration column. When it reaches the 1000 mL mark, start the timer.
    d. After one minute, close the valve to the calibration column and open the valve to the tote. Read the liquid level (mL) in the calibration column. Subtract the liquid level reading from 1000 mL. The difference is the feed rate in mL/min.
    e. Record the feed rate on the daily sheet.
6. Determine the feed concentration in mg/L (or parts per million, ppm):
    a. Multiply the influent flow rate (MGD) by the density of water, 8.34 lb/gal, to obtain million pounds of water being treated per day. Divide this result by 24 to obtain million pounds of water treated in one hour.
    b. Take the mL/min calculated above, multiply by 60 to get mL/hour, then divide by 3785 mL/gal to convert to gallons of sodium hydroxide solution fed per hour. Multiply by the density of caustic soda (10.7 lb/gal), and multiply by 0.25 (the percent strength of the sodium hydroxide solution). This yields the pounds of pure sodium hydroxide fed per hour.
    c. Divide the pounds of pure sodium hydroxide by the million pounds of water, and this gives the concentration for the hour in mg/L.

7. Adjust the pump feed rate as needed. If the pH is outside of the target range, adjust the pump feed rate and repeat steps 3 through 6.

6 DATA RECORDING AND MANAGEMENT

Following the procedure, record the following data on the daily log sheet:

- Initial and final sodium hydroxide feed rate in mL/min and lb/hr
- Influent flow rate (MGD)
- Initial and final pH

7 REFERENCES

None.