Santa Maria WATER DISTRICT	**Procedure 04** **WATER RESOURCE PROCEDURE**	Date prepared : January 6, 2017 Date approved : January 10, 2017 Effectivity Date : January 11, 2017 Revision No. : 00 Revision Date : Control No. : ***PM04-01***
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1.0 OBJECTIVES

Establish guidelines in the Water Resource Section particularly on Pump Station Monitoring and Inpsection Process, Chlorine Disinfection – Chlorination, Chlorine Residual Sampling process for Santa Water District.

2.0 SCOPE

This procedure defines the duties and responsibilities and authorities for all Pump Station Monitoring and Inpsection Process, Chlorine Disinfection – Chlorination, Chlorine Residual Sampling process in Santa Water District.

3.0 REFERENCES

3.1 ISO 9001:**2015** Section 7.4, 7.4.1, 7.4.2, 7.4.3
3.2 Procedure for Communication
3.3 Procedure for Documented Information

4.0 RESPONSIBILITIES AND AUTHORITIES

Water Resource Facilities Operator

5.0 PROCESS

PUMP STATION MONITORING AND INSPECTION

A. PUMPHOUSE AND PERIMETER	
The operator should at all times check and observe any defects on the pump house and the surroundings that could put the operation of the pump and motor at risk. Maintain the cleanliness of the pump station and its surroundings not only for aesthetic reasons but also for sanitary reasons. Water users usually associate the quality of the water with the condition and cleanliness of the facilities. If these are in poor condition, the water quality will be subject to doubt.	
	Responsible Person
(a) Inspection of perimeter fence and safety locks for possible intrusion of unauthorized person in the pump station.	Water Resource Facilities Operator
(b) Checking of perimeter lights. It must be turned on during night time and turned off during daytime.	
(c) Regular cleaning of the pump station and checking of any defects that should be fixed immediately.	
(d) Ensuring that the main gate is locked before leaving the pump station.	

B. ELECTRO-MECHANICAL COMPONENTS

The most important item of maintenance of an electric motor is cleanliness and use. Except for bearing wear, the best maintenance for any electric equipment is to use it, to keep it warm and dry. Moisture is an enemy of insulation along with oil and dust. Every motor should be operated for at least 5-6 hours every week. The longest useful life of a motor is obtained from a unit which is never shut-down and cooled off, especially in a humid climate.

	Responsible Person
(a) Visual inspection of the components of electrical panels. Removing of dirt and dust inside the panels using soft brush or small vacuum cleaner.	**Water Resource Facilities Operator**
(b) Accomplishing the Daily Monitoring Sheet for each respective pump station.	
· Name of operator and shift	
· Time and date of monitoring	
· Control panel board data for Power (V1, V2, V3), Current (A1, A2, A3)	
· Variable Frequency Drive status (run / ramp / sleep)	
· Variable Frequency Drive control data for Pressure (PSI), Speed (RPM), Power (Volt), Frequency (Hertz) and Current (Ampere).	
· Hour Meter reading	
· Flow meter reading (cu.m.) and discharge output (L/S)	

· Chlorine residual reading (using comparator test kit) and dosing pump setting	**Water Resource Facilities Operator**
· Remarks or notes regarding if any	
(c) Checking and reporting of vibrations, abnormal noise and/or unusual heating.	
(d) Checking the Variable Frequency Drive and the Control Panel Board if there are control warnings, fault in the system or any unusual observation. If trip on the control panel or VFD occurs or observe, it should be reported to the supervisor immediately.	
(e) Checking of the value of the Totalizer in the Flow Meter Display. If the value is near its maximum limit, it should be reset. Last reading should be recorded before and after resetting.	
(f) Checking and reporting of all modifications, repairs, replacements performed since last satisfactory to be sure that all connections are correct. A loose wire connection could cause problems. Incorrect connections, missing components, an open circuit or loose plug in circuit board are all potential malfunctioning areas to be eliminated by visual check.	
(e) Unless absolutely sure that panel instruments are accurate, use portable test meters for verifications.	
(f) Checking of discharge valves and its operability.	
(g) Turnover of information regarding the observation on the pump station to next operator.	
(h) Submission of complete Daily Pump Monitoring sheet to the supervisor for checking and analysis.	

(h) Monthly Check up of Well Performance	
Pumping Water Level of the well is the distance from the ground up to the water level in the well while the pump is running. Pumping Water Level should be measure to protect the motor from burning cause by break suction.	
a. Using a duplex wire, attach one end on a multitester and set the tester to measure continuity.	**Water Resource Facilities Operator**

b. Insert the other end of the duplex wire to a PE pipe that runs along the riser pipe down to the pump and motor until the tester sense continuity on the wire. It means that the wire reaches the water level from the well.	
c. Measure the length of the wire that goes through the PE pipe using a measuring tape.	
d. Record the data collected and submit to the supervisor for analysis.	

(k) Monthly check-up of pump and motor performance:	
Periodic checking of the pumpset will disclose deterioration of operation before serious problem develops. Flow measurement – the pump stations has two provisions for flow measurement, one using the 100 liters bucket (by volumetric) and the other by direct reading in the electro-magnetic flowmeter.	
a. Close the distribution discharge valve and open the valve going to the test line.	**Water Resource Facilities Operator**
b. Start operating the pumpset and let it stabilize.	
c. Manipulate the valve of the test line to the following settings:	
i. Fully open with pressure equals 0psi	
ii. Throttled with pressure equals 20psi	
d. Using the volumetric flow measurement, record the time read for the 100 liter bucket to fill up.	
e. Using the direct reading in the electro-magnetic flowmeter, record the time read until the flowmeter reads at every 100 liters.	
f. Repeat for 5 trials at each settings.	
h. Record all the data collected and turn it over to the Engineer for analysis and computation.	

WATER DISINFECTION

Disinfection is necessary to ensure that drinking water is free from disease-causing microorganisms. Water disinfection means removal, deactivation or killing of pathogenic microorganisms. Disinfection is often universally employed by water distribution systems, even when water at the source is deemed already potable, as a precautionary measure to control the spread of water borne diseases. In Level III Systems, this is precautions is particularly important because of the risk of contamination due to breaks and other types of seepages anywhere throughout the extensive pipe network, and the magnified impact of this risk due to the number of users.

CHLORINE DISINFECTION - CHLORINATION

Chlorination is the process of adding the element chlorine to water to make it safe for human consumption as drinking water. Chlorine (and its compounds) is the most widely used disinfectant for water systems because of its effectiveness, cheap cost and availability.

Chlorination has the advantage of oxidizing bacteria and virus even after the point of application due to its residual action. Hence any bacteria introduced to the system after the point of chlorination can still be eliminated by the residual chlorine in the water.

CHLORINATION BEFORE DISTRIBUTION	
1. Measuring of chlorine residual reading using a chlorine test kit. The ideal chlorine residual reading from the source is 1.5 ppm.	**WATER RESOURCE FACILITIES OPERATOR**
2. Adjust of chlorine dosing pump feed rate if needed.	
3. Checking the vacuum regulator, chlorine ejector throat and nozzle of the dosing pump. The need for cleaning may be indicated by insufficient ejector vacuum, resulting in lowered maximum capacity of the feeder.	
4. The strainer in the ejector must always kept clean. It is essential to clean the strainers and tubing as often as necessary. If the tubing are not cleaned, the chlorine granules can re-solidify and cause blockages.	

5. Inspect all hose lines for cracks or weak spots that develop with aging. Faulty lines should be replaced. Use only hoses supplied by the manufacturers of chlorine equipment. Never use ordinary rubber hoses except for a very short period in an emergency situation.	
6. O-rings showing the first sign of damage or brittleness should be replaced. Faulty O-rings result in vacuum leakage. O-rings should be routinely inspected whenever an opportunity presents itself in the course of repairs or maintenance of other parts. Rubber used for chlorine service is a special type.	
7. Prepare additional chlorine mixture in the chlorine drum for continuous disinfection. Stir the mixture thoroughly using the automatic stirrer to dilute the chlorine granules chlorine dioxide.	
8. Before starting any chlorination process, take the following precautions:	
• If a faucet with good flowing water is not available close by, make ready a 5-gallon container of fresh water, but make sure it is away from the chlorine cylinder or storage area. This is to ensure that if the chlorine accidentally comes in contact with your eyes or skin, you can flush the affected areas with copious amounts of fresh water for at least 10-15 minutes.	
• Flush the chlorine out. Do not just soak the affected surface. If you get some of the chlorine solution in your eyes, flush it out and immediately see a doctor.	

9. Record the amount of the additional chlorine granules/chlorine dioxide accurately in the Daily Monitoring Sheet.	**WATER RESOURCE FACILITIES OPERATOR**

CHLORINE RESIDUAL SAMPLING

The word "residual" means "remainder" or "that which is left", and as the name suggests the chlorine residual test is used to measure the amount of chlorine remaining in the water at a certain point of time when the test is made. When chlorine cannot be detected within the distribution system, it means that it has reacted more or less completely with the water and the impurities in the water. At this point, there is no more free chlorine to act effectively as a disinfectant.

Measuring chlorine residual on site is done with a device known as a chlorine comparator. The comparator uses a reagent which reacts with the chlorine to give the water a reddish color. A color chart is then used to compare the color of the mixture.

1. Prepare the comparator kit and the orthotolidine.	**WATER RESOURCE FACILITIES OPERATOR**
2. Fill the cell with 5-ml water sample.	
3. Add four (4) drops of orthotolidine to the water sample.	
4. Tightly cap the cell and shake the water sample.	
5. Hold the comparator up to a light source (sky, window or lamp).	
6. Compare the color of the water sample to the comparator and get the reading in mg/l.	
7. Record the value of the chlorine residual.	
8. The ideal chlorine residual reading anywhere within the distribution line is 0.3 to 1.5 ppm.	

6.0 RECORDS

6.1 Daily Pump Monitoring and Inspection (WR 002)
6.2 Chlorine Residual (WR 001)
6.3 Monthly Flushing Report (WR 003)