



Metropolitan Cebu Water District  
**Quality Management System  
Procedures Manual**

Index No. **OP-WQC/WTR-007**

Page No. 1 of 4

Issue No. 1

Revision No. 0

Effective Date Jan 2004

Section **Water Treatment**

Subject **Control and Prevention of Biological  
Foulants in Processed Surface Water**

### 1.0 OBJECTIVE:

To establish treatment operation methods to control biological foulants in surface water which may contribute to color and odor problems in the processes water at Tisa Filter Plant.

### 2.0 SCOPE:

This limits to the observation of proliferating aquatic life at Tisa Filter Plant, sampling of aquatic life, analysis of samples, and implementing treatment methods, to control fouling of the processed surface water.

### 3.0 DEFINITION OF TERMS:

**Aquatic Life** - this pertains to all living organisms in water

**Biological** - pertains to biology, the science that deals with the study of all living organisms.

**Biological Foulants** - this refers to all aquatic life that gives odor and color problems in the processed surface water.

**MQMS**  
**CONTROLLED COPY**  
DATE: \_\_\_\_\_ BY: FCL

Prepared: Angelo H. Cabije

Date: 8/10/04

Reviewed: Noel R. Dalena

Date: \_\_\_\_\_

Approved: Ernie T. Delco

Date: \_\_\_\_\_



Metropolitan Cebu Water District  
**Quality Management System  
Procedures Manual**

Index No. **OP-WQC/WTR-007**

Page No. 2 of 4

Issue No. 1

Revision No. 0

Section **Water Treatment**

Subject **Control and Prevention Biological Foulants in  
Processed Surface Water**

Effective Date

#### 4.0 PROCEDURE

##### PROCESS FLOW

##### RESPONSIBILITY

##### DETAILS\REFERENCES

Start

1

Observe physically for  
living aquatic organisms

Plant Operator  
WQCD Staff

Observe physically for living  
aquatic organisms in the  
processed surface water (e.g.  
fishes, frogs, water skier, algae,  
plant etc.) and list down findings.

2

Identify living aquatic  
organisms

Plant Operator  
WQCD Staff

Identify and list the enumerated  
and living aquatic organisms  
observed in the processed surface  
water.

3

Collect samples from  
different water levels

Plant Operator  
WQCD Staff

Collect samples form different  
depth levels of the processed  
surface water in 1 liter/samples.

4

Smell the sample and  
describe the odor

Plant Operator  
WQCD Staff

Smell the sample and describe the  
odor then note the observation.

4

Bring samples to  
laboratory

WQCD Staff

Bring samples to the laboratory  
with all the physical observed  
data.

A

**MQMS**  
**CONTROLLED COPY**

DATE: \_\_\_\_\_ BY: \_\_\_\_\_

Prepared: Angelo H. Cabije

Date: 8/10/04

Reviewed: Noel R. Dalena

Date:

Approved: Ernie T. Delco

Date:



Metropolitan Cebu Water District  
**Quality Management System  
Procedures Manual**

Index No. **OP-WQC/WTR-007**

Page No. 3 of 4

Issue No. 1

Revision No. 0

Section **Water Treatment**

Subject **Control and Prevention of Biological  
Foulants in Processed Surface Water**

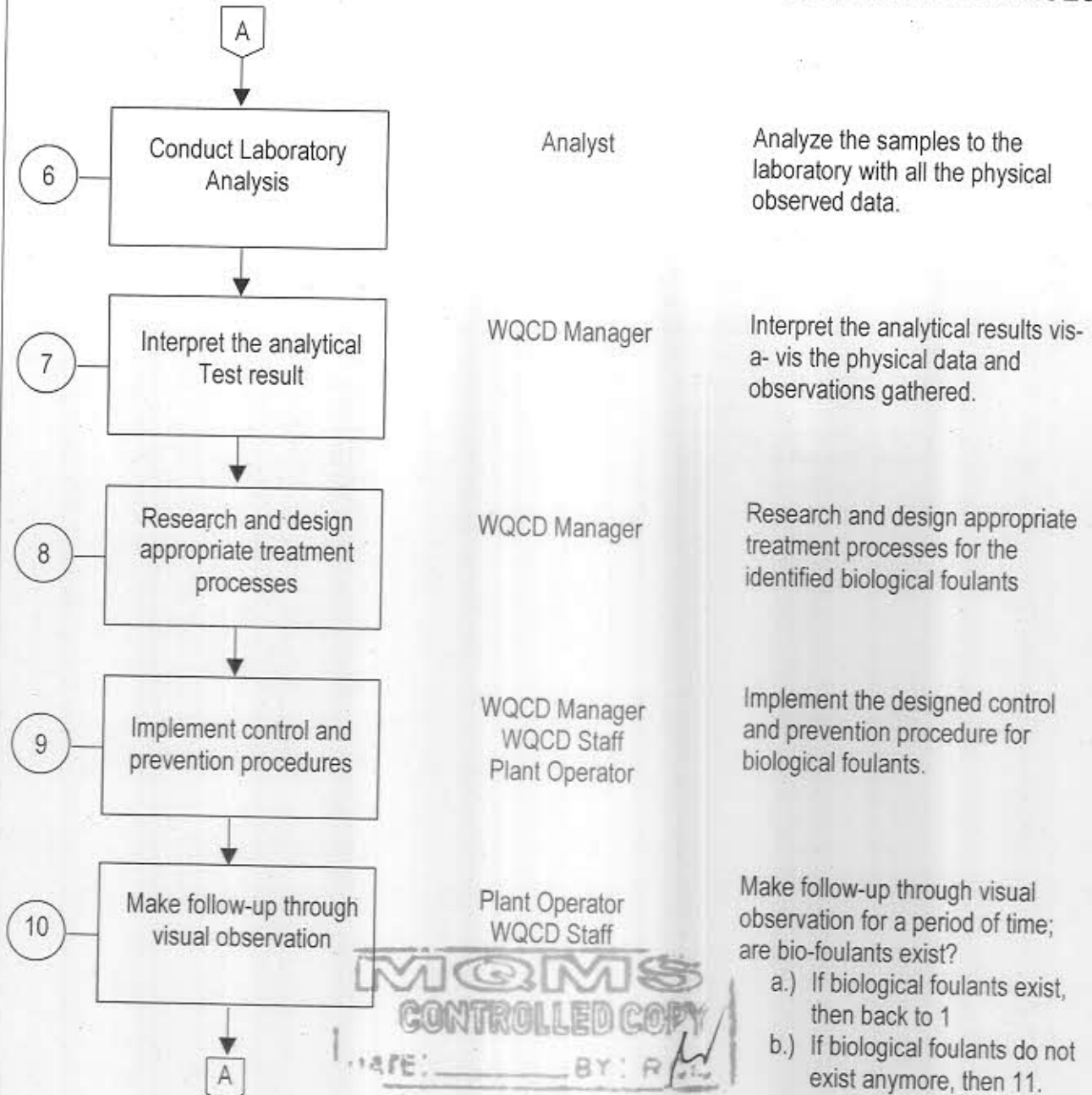
Effective Date

#### 4.0 PROCEDURE

##### PROCESS FLOW

##### RESPONSIBILITY

##### DETAILS\REFERENCES



Prepared: Angelo H. Cabije

Date: 8/10/04

Reviewed: Noel R. Dalena

Date:

Approved: Ernie T. Delco

Date:



Metropolitan Cebu Water District  
**Quality Management System  
Procedures Manual**

Index No. **OP-WQC-WTR-007**

Page No. 4 of 4

Issue No.

Revision No.

Effective Date

Section

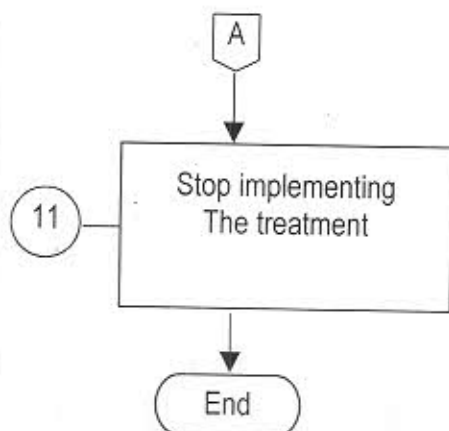
**Water Treatment**

Subject

**Control and Prevention of Biological  
Foulants in Processed Surface Water**

#### 4.0 PROCEDURE

##### PROCESS FLOW



##### RESPONSIBILITY

Plant Operator  
WQCD Staff

##### DETAILS\REFERENCES

Stop implementing the treatment  
control and prevention procedure  
for biological foulants

**MQMS**  
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DATE: \_\_\_\_\_ BY: \_\_\_\_\_

Prepared: Angelo H. Cabije  
Date: 8/10/04

Reviewed: Noel R. Dalena  
Date: \_\_\_\_\_

Approved: Ernie T. Delco  
Date: \_\_\_\_\_



Metropolitan Cebu Water District  
**Quality Management System  
Procedures Manual**

Index No. OP - WQCIWTR - 008

Page No. 1 Of 2

Issue No. 1

Revision No. 0

Section

Subject

**QUALITY CONTROL OF WATER DELIVERY  
TRUCK**

Effective  
Date

Dec. 22, 2008

1.0 OBJECTIVE : To establish an effective monitoring procedure to control the quality of drinking water Delivered by the water trucks during emergency situations and major interruption.

2.0 SCOPE : All water trucks employed for delivery of drinking water during emergency situations.

3.0 DEFINITION OF TERMS :

DISINFECTION = the procedure of eliminating bacterial contaminants using a chemical with Pre-determined dosage of 70% Calcium Hypochlorite

COLIFORM = indicator organism used to determine drinking water potability. Its presence in The drinking water will render it unsafe for human consumption.

E. COLI = indicator organism for fecal contamination in the drinking water. Its presence In the drinking water will indicate ingress of fecal materials into the system

HPC = Elevated levels of Heterotrophic Plate Count ( HPC) indicates the presence Of pathogenic, non-pathogenic and opportunistic microorganisms that have Survived water treatment, hence an indicator of ineffective or inefficient Treatment procedures.

PNSDW 2007 = Philippine National Standards for Drinking Water 2007 revised edition

Prepared : Rebecca Husayan  
Date:

Reviewed: Astrophel Logarta

Approved: Ernie T. Delco



Metropolitan Cebu Water District  
**Quality Management System  
Procedures Manual**

Index No. OP - WQCIWTR - 008

Page No. 2 Of 2

Issue No. 1

Revision No. 0

Effective Date July 15, 2008

Section

Subject

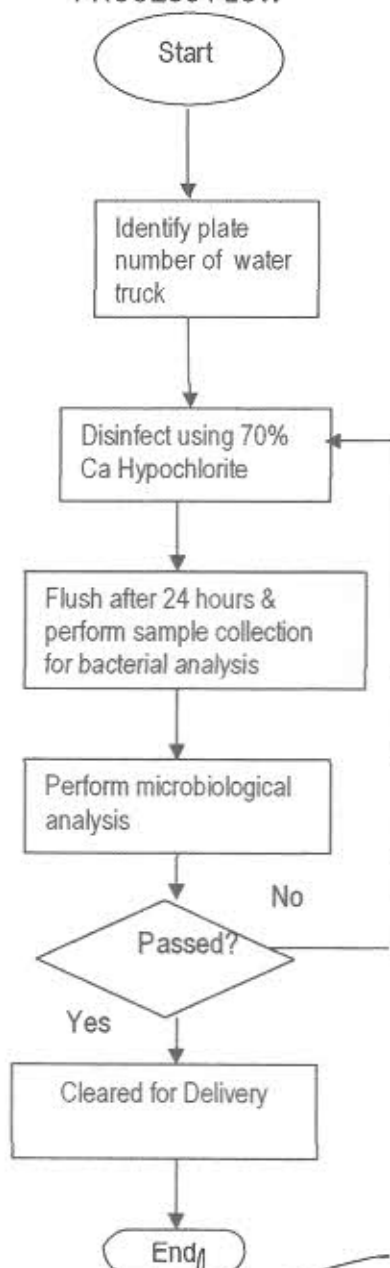
QUALITY CONTROL OF WATER DELIVERY  
TRUCK

#### 4.0 PROCEDURE

##### PROCESS FLOW

##### RESPONSIBILITY

##### DETAILS / REFERENCES



GSD

WQCD /  
Chemist

GSD  
WQCD / Sample  
Collector

WQCD /  
Bacteriologist

WQCD Standard  
Methods for  
Disinfection


PNSDW 2007  
edition

PNSDW 2007/  
MTFT Method

Prepared : Rebecca Husayan  
Date:

Reviewed: Astrophel Logarta

Approved: Ernie T. Delco

	Metropolitan Cebu Water District <b>Quality Management System Procedures Manual</b>	Index No.	OP-CHL/WTR-001
		Page No.	1 of 4
		Issue No.	1
	Section	Revision No.	0
	Subject	Effective Date	Jan. 01,01

**1.0 OBJECTIVE:**

To determine and identify particular chlorination method and design which is appropriate for direct-supply wells.

**2.0 SCOPE:**

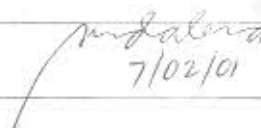
This procedure limits only for the chlorination method appropriate for direct supply wells that includes, plumbing, chlorine gas feeder sizing, and chlorine dosaging.

**3.0 DEFINITION OF TERMS:**

<b>Booster Pump</b>	- a mechanical device that is used to increase flow rate and pressure of water in a pipeline by pushing or exerting a force to drive the water at farther distance or elevation.
<b>Chlorine Demand</b>	- The total quality in water that can be oxidized and can be reacted with chlorine, including metals, bacteria, silts and slimes.
<b>Chlorine Dosage</b>	- the amount of chlorine that is injected into the water system which will give a residual content required by a standard in chlorination drinking water supplies.
<b>Chlorine Gas</b>	- a yellowish gas heavier than air that is of obnoxious and irritating odor, which is contained in pressurized cylinder and is used in disinfecting water supply.
<b>Direct Supply Well</b>	- An MCWD ground water source with a submersible pump set inserted an artesian well that feeds water directly into the distribution network without passing or storing in the reservoir.
<b>Gas Feeder</b>	- a device that feeds the water system with a pressurized chlorine gas equipped with controlled flow system and tube connections.
<b>Maximum Gauge Pressure</b>	- the highest internal water pressure recorded on a chart from wells and/or pipelines which is based on a 24 hours operation.
<b>Chlorine Gas Cylinder</b>	- a container used to keep liquefied chlorine gas under pressure.
<b>NPT Dimensions</b>	- the Standard selection for sizes of nozzle, pipes and fittings recommended by a supplier for installation of automatic chlorination.
<b>Principal Engineer</b>	- refers to the designated Principal Engineer of the Water Quality Control Division.



Prepared:   
Date: 6/20/01

Reviewed:   
Date: 7/02/01

Approved:   
Date: 7/20/01



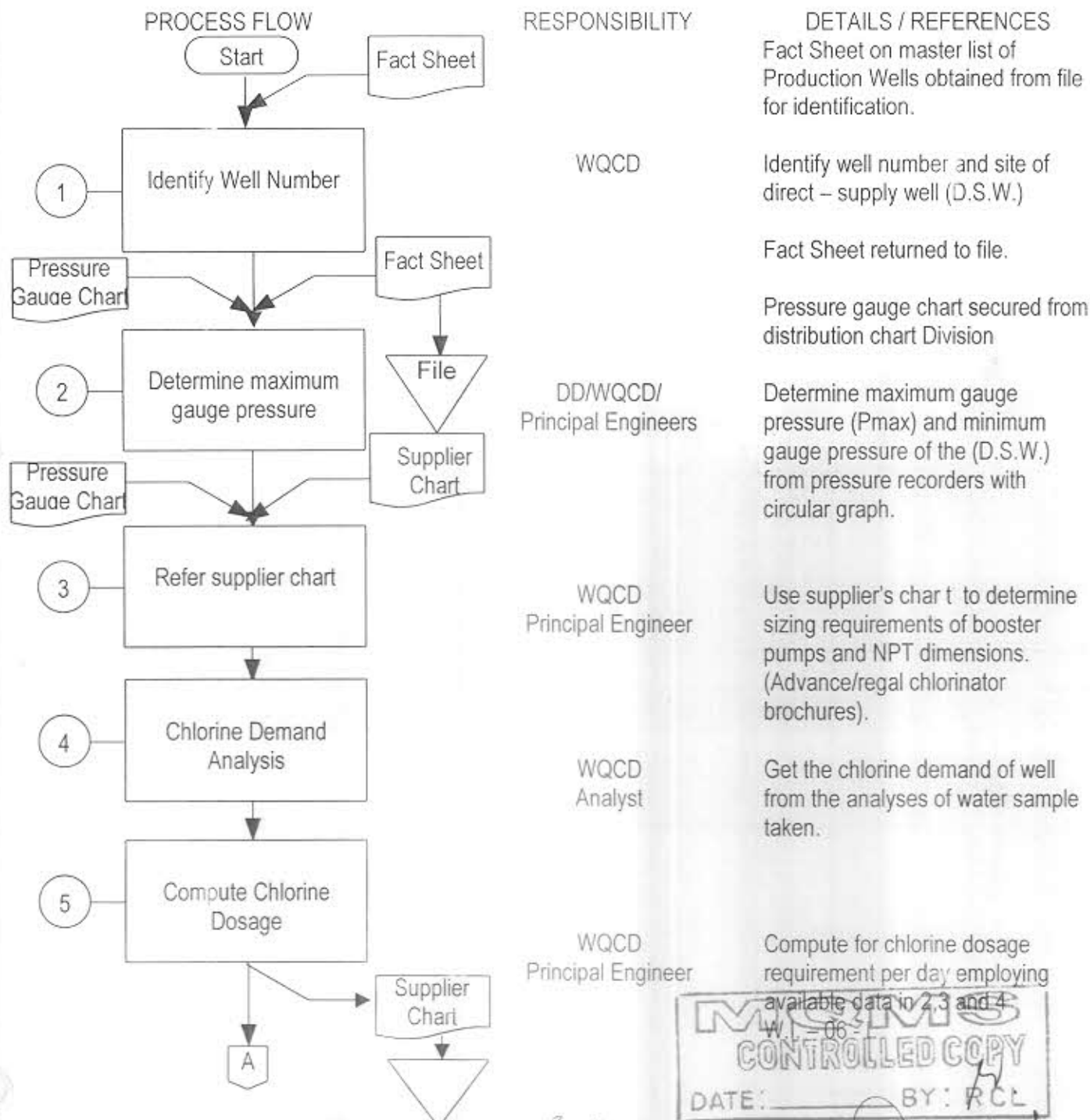


Metropolitan Cebu Water District  
**Quality Management System  
 Procedures Manual**

Index No. **OP-CHL/WTR-001**Page No. **2 of 4**Issue No. **1**Revision No. **0**Effective Date **Jan. 01,01**

Section

Subject

**Chlorination for Direct -Supply Wells****4.0 PROCEDURE**

Prepared:

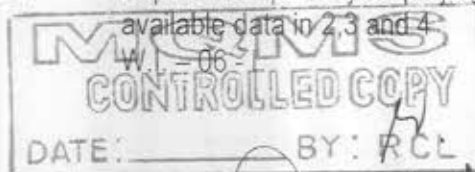
Date:

Reviewed:


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Approved:

Date:





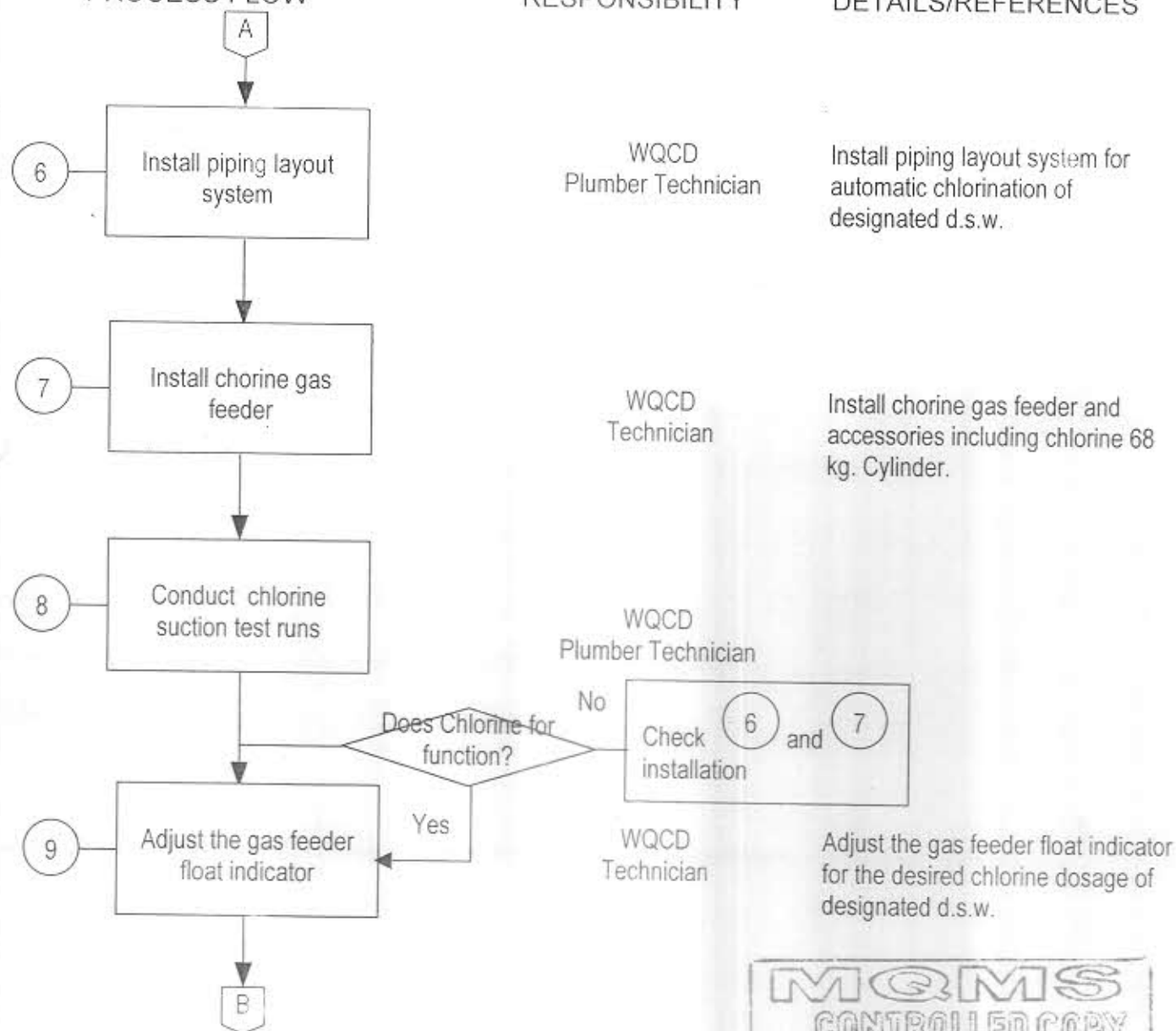
	Metropolitan Cebu Water District <b>Quality Management System Procedures Manual</b>	Index No.	OP-CHL/WTR-001
		Page No.	3 of 4
	Section	Issue No.	1
	Subject	Revision No.	0
		Effective Date	Jan. 01,01

## 4.0 PROCEDURE

## PROCESS FLOW

## RESPONSIBILITY

## DETAILS/REFERENCES


 Prepared:  
Date:


 Reviewed:  
Date:

 Approved:  
Date:

6/28/01

7/02/01

7/20/01

	Metropolitan Cebu Water District <b>Quality Management System</b> <b>Procedures Manual</b>	Index No.	OP-CHL/WTR-001
		Page No.	4 of 4
	Section	Issue No.	1
	Subject	Revision No.	0
		Effective Date	Jan. 01,01

## 4.0 PROCEDURE

PROCESS FLOW	RESPONSIBILITY	DETAILS/REFERENCES
<div style="text-align: center;">B</div> <div style="text-align: center;">↓</div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin-right: 10px;">10</div> <div style="border: 1px solid black; padding: 5px; width: 150px; text-align: center;">Do routine check-up</div> </div> <div style="text-align: center;">↓</div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin-right: 10px;">11</div> <div style="border: 1px solid black; padding: 5px; width: 150px; text-align: center;">Forecast the amount of chlorine in the cylinder</div> </div> <div style="text-align: center;">↓</div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin-right: 10px;">12</div> <div style="border: 1px solid black; padding: 5px; width: 150px; text-align: center;">Validate chlorine dosage</div> </div> <div style="display: flex; justify-content: space-between; align-items: center; margin: 10px 0;"> <div style="text-align: center;">↓</div> <div style="border: 1px solid black; padding: 5px; text-align: center; width: 100px;">Bacteriological result</div> </div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin-right: 10px;">11</div> <div style="border: 1px solid black; padding: 5px; width: 150px; text-align: center;">Keep good maintenance</div> </div> <div style="display: flex; justify-content: space-between; align-items: center; margin: 10px 0;"> <div style="text-align: center;">↓</div> <div style="border: 1px solid black; padding: 5px; text-align: center; width: 100px;">Chlorine safety program</div> </div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin-right: 10px;"></div> <div style="border: 1px solid black; border-radius: 50%; padding: 5px; text-align: center; width: 50px;">End</div> </div>	<p style="text-align: center;">WQCD Technician</p> <p style="text-align: center;">WQCD Technician</p> <p style="text-align: center;">WQCD Division Manager</p> <p style="text-align: center;">WQCD Principal Engineer</p>	<p>Do routine check-up of chlorination and record performances.</p> <p>Forecast availability of chlorine gas for replacement of cylinder.</p> <p>Validate chlorine dosage through regular bacteriological results of the water samples from the designated d.s.w.</p> <p>Keep a good maintenance record of chlorination facility and performance (keep the usage of recommended safety devices in handling chlorine gas &amp; cylinder. (Chlorine safety program) W.I. 01</p>
Prepared: <i>[Signature]</i> Date: <i>6/20/01</i>	Reviewed: <i>[Signature]</i> Date: <i>7/02/01</i>	Approved: <i>[Signature]</i> Date: <i>7/20/01</i>





Metropolitan Cebu Water District  
**Quality Management System  
Procedures Manual**

Index No.

**OP-CHL/WTR-  
002**

Page No.

1 of 5

Issue No.

1

Revision No.

1

Section

**CHLORINATOR**

Subject

**Installation & Operation of Direct  
Supply Well Chlorinator**

Effective Date

Aug.13,2003

**1.0 OBJECTIVE:**

To ensure water disinfection in direct supply wells.

**2.0 SCOPE:**

This is only applicable to direct supply wells test are installed with auto chlorination system.

**3.0 DEFINITION OF TERMS**

**DIRECT SUPPLY WELLS** – Production wells that are directly connected to the distribution network, without passing through a reservoir.

**RESIDUAL CHLORINE** – the amount of chlorine that is retained in water at the end point of a distribution system.

**GAS FEEDER** -- an automate gas flow dispenser such as that of a chlorinator.



Prepared: Angelo H. Cabije  
Date: 6/10/04

Reviewed: Noel R. Dalena  
Date: [Signature]

Approved: Ernie T. Delco  
Date: [Signature]



Metropolitan Cebu Water District  
**Quality Management System  
 Procedures Manual**

Index No.	OP-CHL/WTR-002
Page No.	2 of 5
Issue No.	1
Revision No.	1
Effective Date	Aug.13, 2003

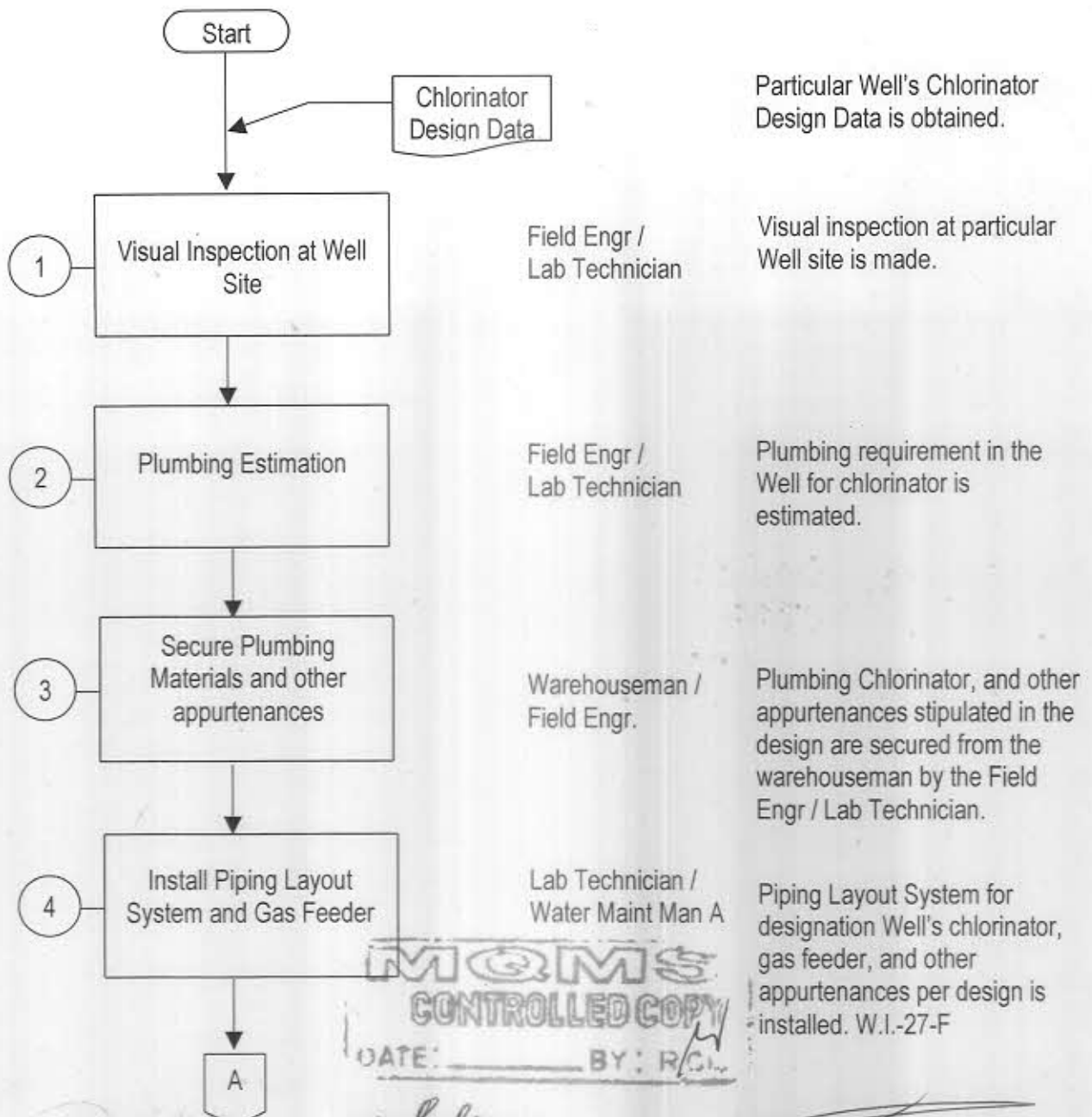
Section	<b>CHLORINATOR</b>
Subject	<b>Installation &amp; Operation of Direct Supply Well Chlorinator</b>

#### 4.0 PROCEDURE

##### PROCESS FLOW

##### RESPONSIBILITY

##### DETAILS/REFERENCES



**MQMS  
 CONTROLLED COPY**  
 DATE: \_\_\_\_\_ BY: RCL

Prepared: Angelo H. Cabije  
 Date: 12/2/04

Reviewed: Noel R. Dalena  
 Date:

Approved: Ernie T. Delco  
 Date:



Metropolitan Cebu Water District  
**Quality Management System  
Procedures Manual**

Index No.	OP-CHL/WTR-002
Page No.	3 of 5
Issue No.	1
Revision No.	1
Effective Date	Aug.13, 2003

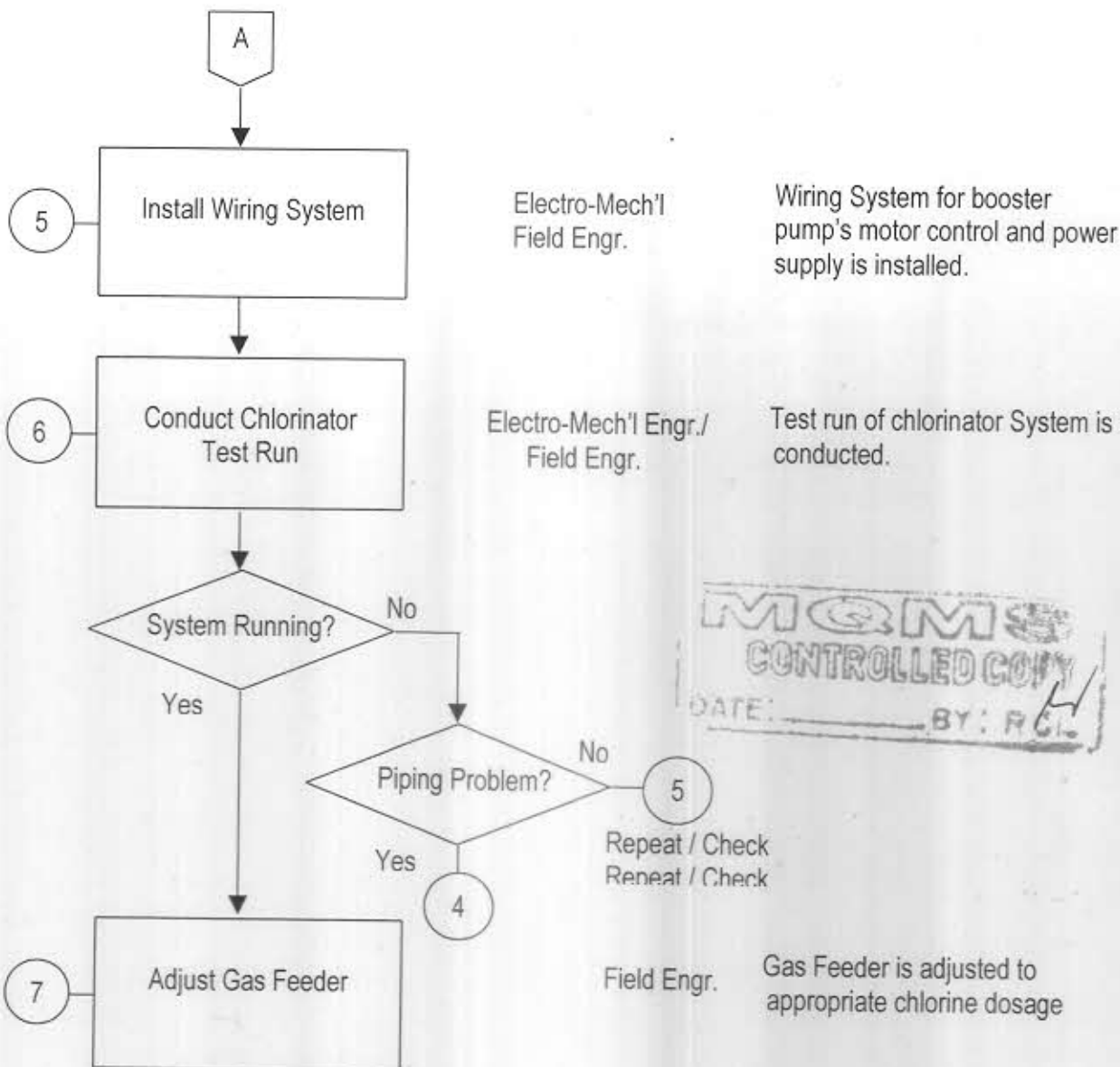
Section	CHLORINATOR
Subject	Installation & Operation of Direct Supply Well Chlorinator

#### 4.0 PROCEDURE

##### PROCESS FLOW

##### RESPONSIBILITY

##### DETAILS/REFERENCES



Prepared: Angelo H. Cabije  
Date: 6/10/04

Reviewed: Noel R. Dalena  
Date:

Approved: Ernie T. Delco  
Date:



Metropolitan Cebu Water District  
**Quality Management System  
Procedures Manual**

Index No.

OP-  
CHL/WTR/002

Page No.

4 of 5

Issue No.

1

Revision No.

1

Section

**CHLORINATOR**

Subject

**Installation & Operation of Direct  
Supply Well Chlorinator**

Effective Date

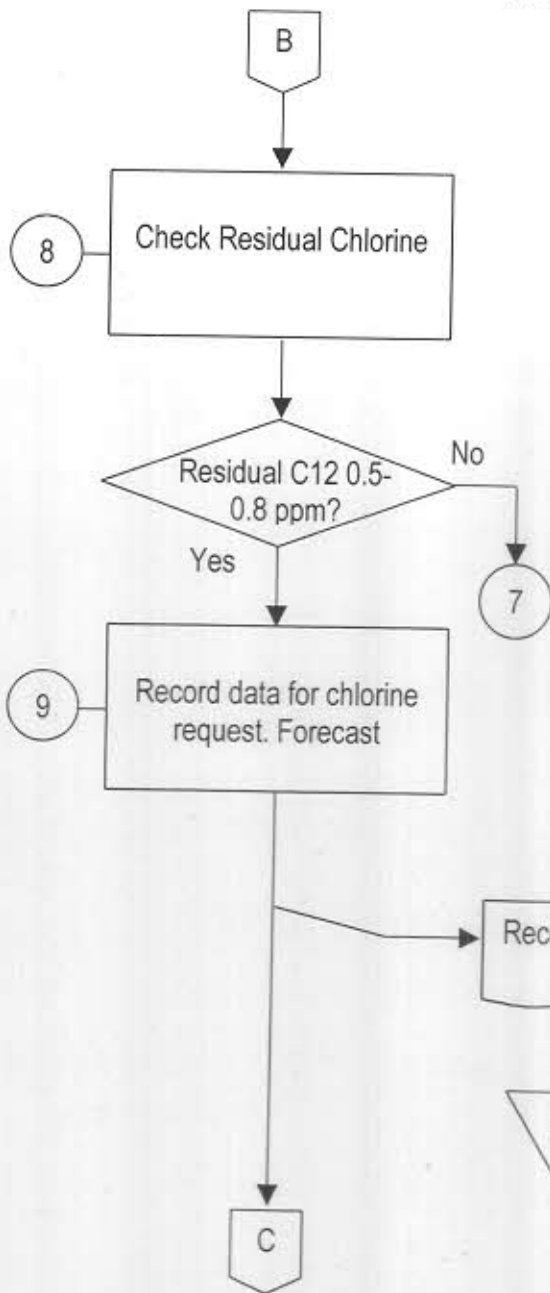
Aug.13, 2003

**4.0 PROCEDURE**

**PROCESS FLOW**

**RESPONSIBILITY**

**DETAILS/REFERENCES**



Field Engr. /  
Lab Technician

Using DPD / Orthotoluidine  
menthod, check residual chlorine  
content

Field Engr.

Data of chlorine dosage data of  
installation, etc. is recorded.

**MQMS**  
**CONTROLLED COPY**  
DATE: \_\_\_\_\_ BY: *R.C.*

Prepared: *Angelo H. Cabije*  
Date: *6/10/04*

Reviewed: *Noel R. Dalena*  
Date: \_\_\_\_\_

Approved: *Ernie T. Delco*  
Date: \_\_\_\_\_



Metropolitan Cebu Water District  
**Quality Management System  
Procedures Manual**

Index No.

**OP-CHL/WTR-  
002**

Page No.

5 of 5

Issue No.

1

Revision No.

1

Section

**CHLORINATOR**

Subject

**Installation & Operation of Direct  
Supply Well Chlorinator**

Effective Date

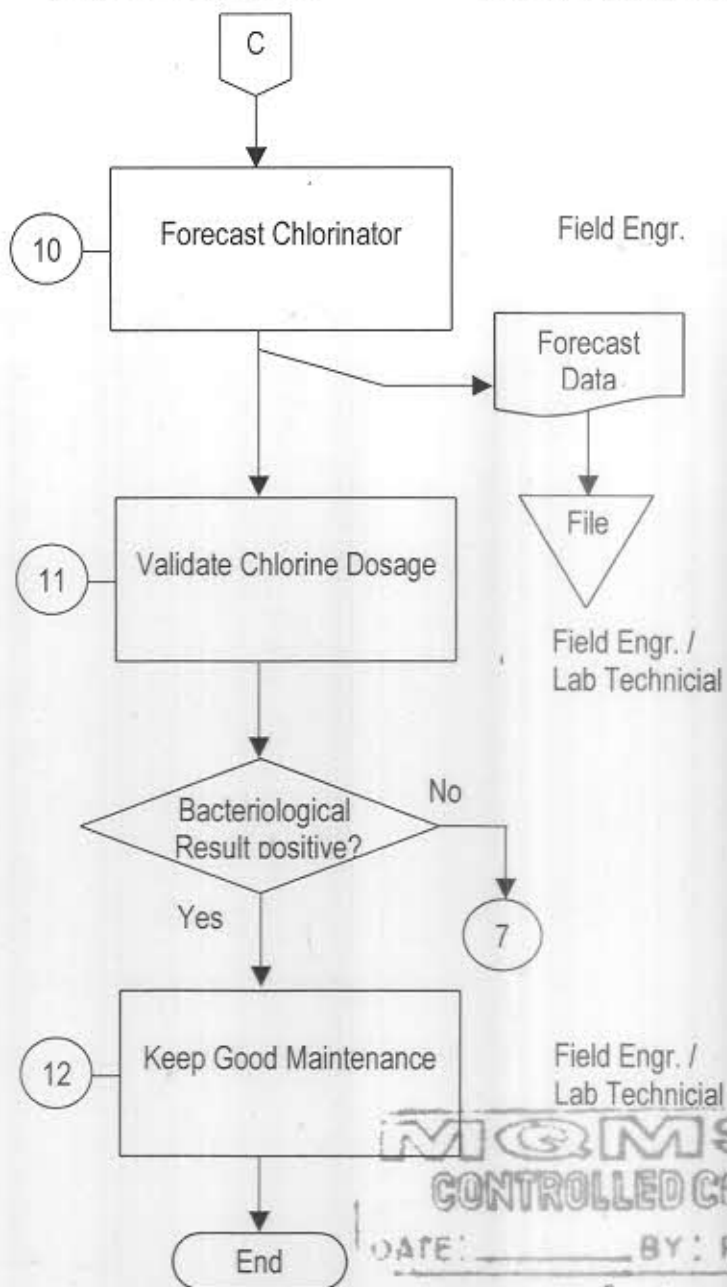
Aug.13, 2003

#### 4.0 PROCEDURE

##### PROCESS FLOW

##### RESPONSIBILITY

##### DETAILS/REFERENCES



Forecast availability of chlorine gas in the cylinder for scheduled replacement

Scheduling of chlorine gas replacement filed as forecast data.

Validate chlorine dosage through regular Bacteriological result of sample analysis from direct supply well

Adjust gas feeder and increase computed dosage

Keep a good maintenance record of chlorination facility and performance. (Keep the usage for recommendation safety devices in handling chlorine gas & cylinder -- refer to chlorine safety program) \_ W.I.02

Prepared: Angelo H. Cabije  
Date: 2/10/08

Reviewed: Noel R. Dalena  
Date: 2/10/08

Approved: Ernie T. Delco  
Date: 2/10/08





Metropolitan Cebu Water District  
**Quality Management System  
Procedures Manual**

Index No.	OP CHL / WTR - 003
Page No.	1 Of 4
Issue No.	1
Revision No.	0
Effective Date	Jan. 01, 01

Section

Subject

**Designing & Installation Process for  
Chlorination - Direct-Supply Wells**

**1.0 OBJECTIVE:**

To determine and identify particular chlorination method and design which is appropriate for direct-supply wells.

**2.0 SCOPE:**

This procedure limits only for the chlorination method appropriate for direct supply wells, that includes, plumbing, chlorine gas feeder sizing, and chlorine dosaging.

**3.0 DEFINITION OF TERMS:**

**Booster Pump**

- a mechanical device that is used to increase flow rate and pressure of water in a pipeline by pushing or exerting a force to drive the water at farther distance or elevation.

**Chlorine Demand**

- The total quality in water that can be oxidized and can be Reacted with chlorine, including metals, bacteria, silts and Slimes.

**Chlorine Dosage**

- the amount of chlorine that is injected in chlorination drinking water supplies.

**Chlorine Gas**

- a yellowish gas heavier than air that is of obnoxious and irritating odor, which is contained in pressurized cylinder and is used in disinfecting water supply.

**Direct Supply Well**

- An MCWD ground water source with a submersible pumpset that feeds water directly into the distribution network without passing or storing in the reservoir.

**Gas Feeder**

- a device the feeds the water system with a pressurized chlorine gas equipped with controlled flow system and tube connections.

**Maximum Gauge Pressure**

- the highest internal water pressure recorded on a chart from wells and/or pipelines which is based on a 24 hours operation.

**Chlorine Gas Cylinder**

- a container used to kept liquefied chlorine gas under pressure.

**NPT Dimensions**

- the standard selection for sizes of nozzle, pipes and fittings recommended by a supplier for installation of automatic chlorination.

**Principal Engineer**

- refers to the designated Principal Engineer of the Water Quality Control Division.



Prepared: *[Signature]*  
Date: 6/20/01

Reviewed: *[Signature]*  
Date: 7/02/01

Approved: *[Signature]*  
Date: 7/20/01



Metropolitan Cebu Water District  
**Quality Management System  
Procedures Manual**

Index No. OP CHL / WTR - 003

Page No. 2 Of 4

Issue No. 1

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Effective Date Jan. 01, 01

Section

Subject

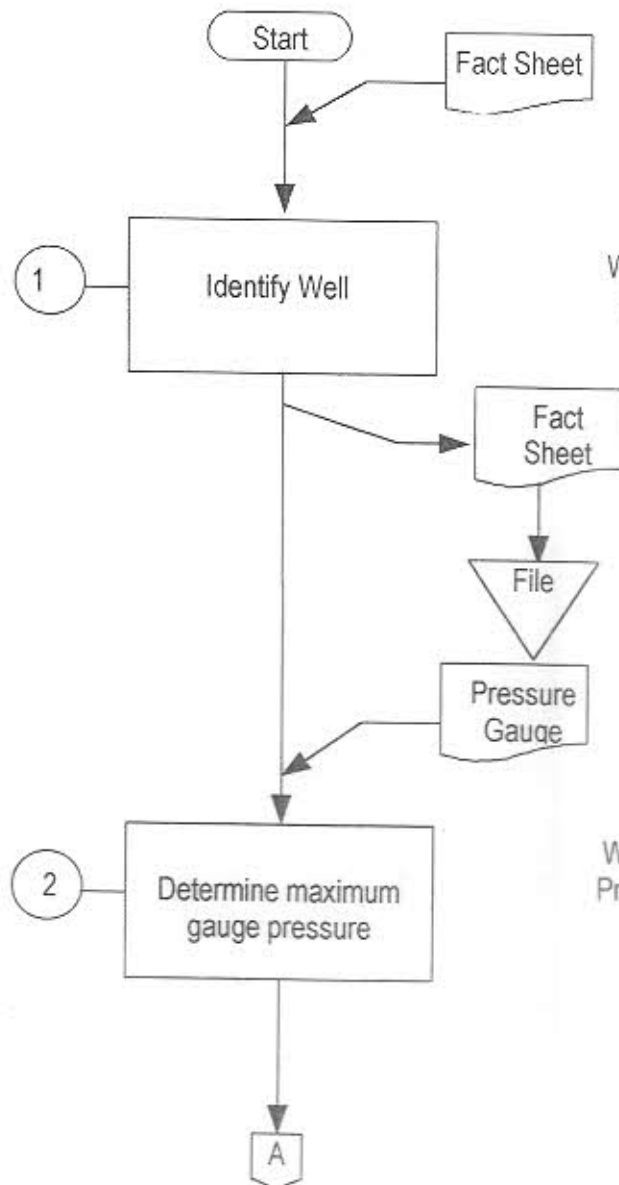
**Designing & Installation Process for  
Chlorination - Direct-Supply Wells**

#### 4.0 PROCEDURE

##### PROCESS FLOW

##### RESPONSIBILITY

##### DETAILS / REFERENCES



Fact Sheet on Master List of Production Wells obtained from file for identification

Identify well number and site of direct - supply well (D.S.W.)

Fact Sheet returned to file

DD/WQCD/  
Principal  
Engineers

Pressure Gauge Chart secured from Distribution Division

Max. & Min. gauge pressure data is read from circular graph recorder



Prepared: *[Signature]*  
Date: 6/28/01

Reviewed: *[Signature]*  
Date: 7/02/01

Approved: *[Signature]*  
Date: 7/20/01



Metropolitan Cebu Water District  
**Quality Management System  
Procedures Manual**

Index No. **OP CHL / WTR - 003**

Page No. **3 Of 4**

Issue No. **1**

Revision No. **0**

Effective Date **Jan. 01, 01**

Section

Subject

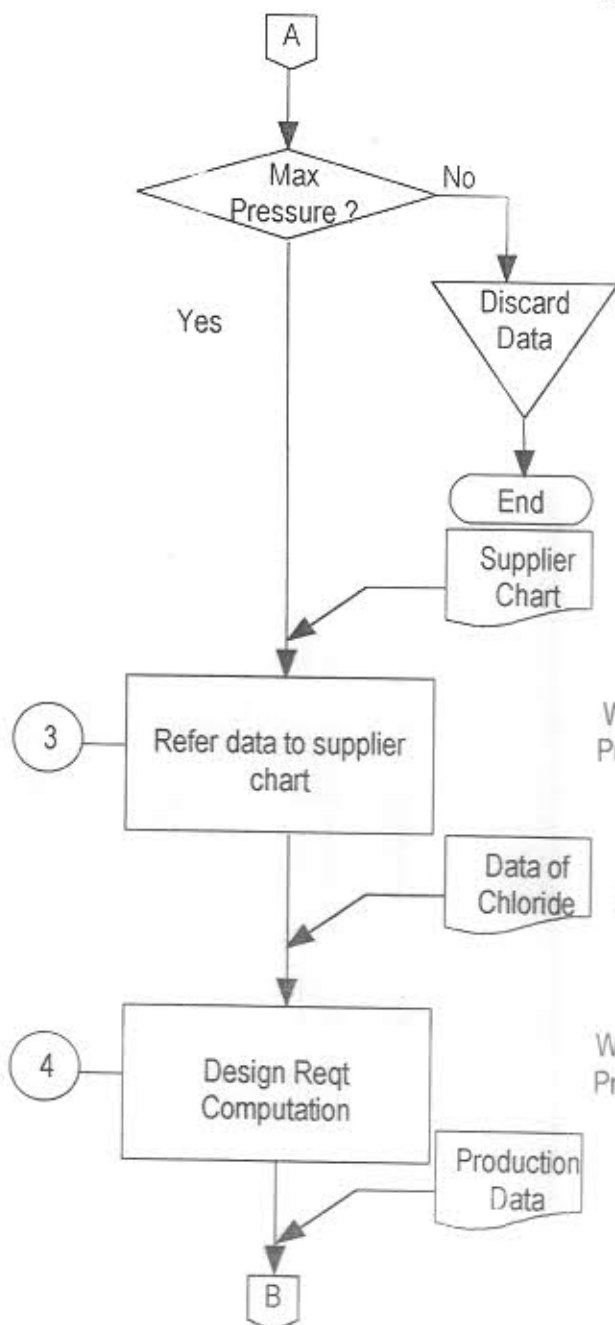
**Designing & Installation Process for  
Chlorination - Direct-Supply Wells**

**4.0 PROCEDURE**

**PROCESS FLOW**

**RESPONSIBILITY**

**DETAILS / REFERENCES**



Std. Supplier Chart guideline obtained from file.

WQCD Manager/  
Principal Engineer

Pressure Data is referred to supplier chart for std. Sizing requirements of booster pump & NPT dimensions

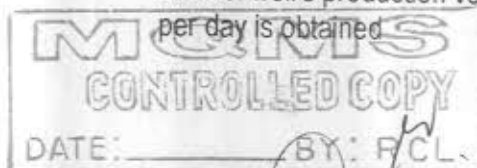
Water Analyst

Chlorine demand analysis data obtained from WQCD analyst file

WQCD Manager /  
Principal Engineer

Using Std. Formula, Chlorinator Design is computed

Data of well's production volume per day is obtained



Prepared: *[Signature]*  
Date: **6/29/01**

Reviewed: *[Signature]*  
Date: **7/02/01**

Approved: *[Signature]*  
Date: **7/20/01**



Metropolitan Cebu Water District  
**Quality Management System  
Procedures Manual**

Index No. OP CHL / WTR - 003

Page No. 4 Of 4

Issue No. 1

Revision No. 0

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Section

Subject

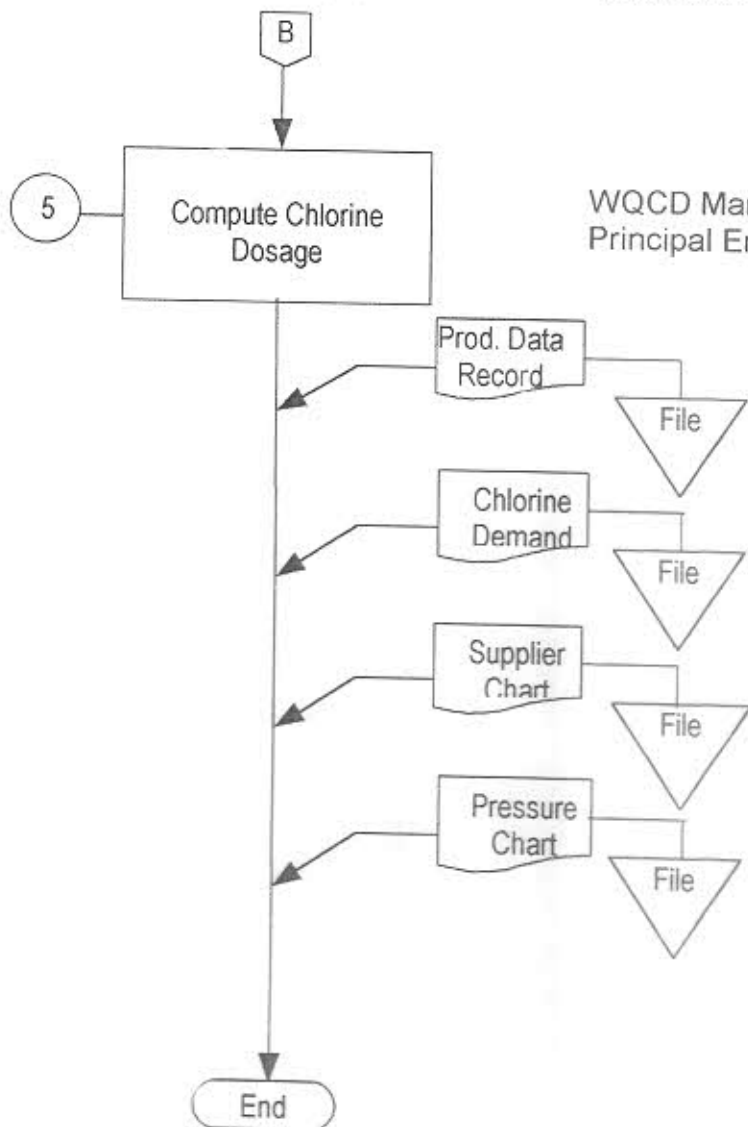
**Designing & Installation Process for  
Chlorination - Direct-Supply Wells**

**4.0 PROCEDURE**

**PROCESS FLOW**

**RESPONSIBILITY**

**DETAILS / REFERENCES**



WQCD Manager/  
Principal Engineer

Using Std. Formula; Chlorine dosage per day is determined from computation of all previous data

All documents returned to respectively from where they were obtained



Prepared:  
Date:

*[Signature]*  
6/16/01

Reviewed:  
Date:

*[Signature]*  
7/02/01

Approved:  
Date:

*[Signature]*  
7/20/01