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	Section		Revision No.	0
	Subject	**Backwashing of the Rapid Sand Filter**	Effective Date	Jan. 01,01

1.0 OBJECTIVE:

To implement and maintain standard backwashing operating procedures on the rapid sand filtration process that is employed for treated surface water at Tisa Filter Plant.

2.0 SCOPE:

This procedure limits to the operation and maintenance of backwashing of the rapid sand filter at Tisa Filter Plant.

3.0 DEFINITION OF TERMS:

Backwashing – an introduction of clear water beneath the packed filter media of the rapid sand filter by an upward water flow direction to drive – off suspended solid particles that are clogging in the filter media.

Filtrate – the liquid water that is collected after the filtration process and operation.

Rapid Sand Filter – a set filter media in a structure at Tisa Filter Plant, whid is usually cleaned up periodically by the process called "Backwashing".

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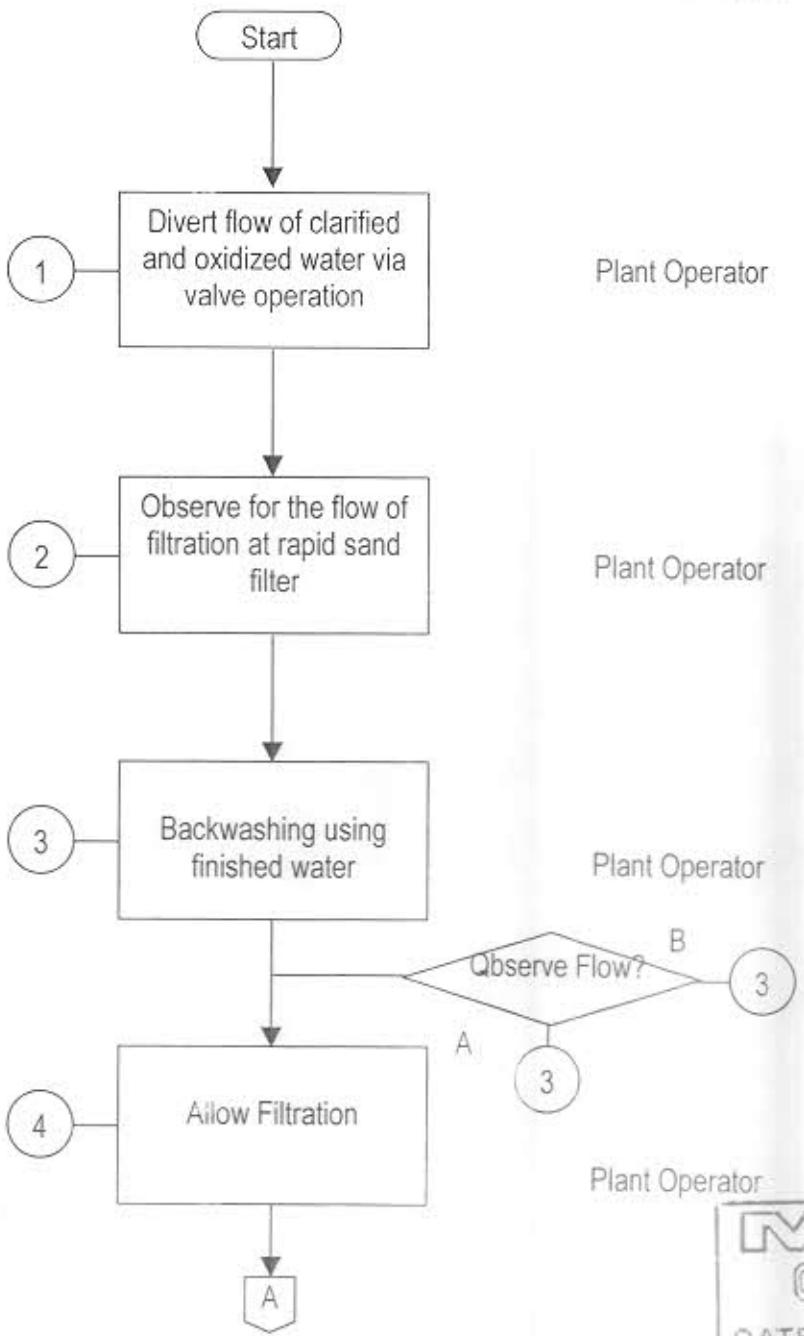
Subject	**Backwashing of the Rapid Sand Filter**	Effective Date	Jan. 01,01

4.0 PROCEDURE



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	Subject: **Backwashing of the Rapid Sand Filter**	Effective Date	Jan. 01,01

4.0 PROCEDURE

PROCESS FLOW	RESPONSIBILITY	DETAILS / REFERENCES
A		
5 Periodically, collect filtrate samples	WQCD Staff	(Work instruction for collecting surface water)
6 Bring filtrate samples for laboratory analysis	WQCD Staff Analyst	And labeling filling up of vital sample data.
7 Maintain good records	Plant operator WQCD Manager	Operational activities and water quality data are properly recorded. REF – ERP WQC - 005
Lab record		
End		

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			Issue No.	1
	Section		Revision No.	0
	Subject	**pH Adjustment and Treatment of Processed Surface Water**	Effective Date	Jan.01,01

1.0 OBJECTIVE:

To establish a standard procedure for adjusting the acidity and alkalinity of processed surface water through the measured pit indicator in order to maintain saturation and neutrality of the water product.

2.0 SCOPE:

This procedure is entailed in the adjustment of pH values of the processed surface water at Tisa Filter Plant with the addition of a base or basic salt and an acid or acidic salt.

3.0 DEFINITION OF TERMS:

Acid Salt - refers to a strong salt compound made with a sulfate and chloride onions that are paired with weaker cations such as copprous and aluminum ions.

Acidity - refer to quality of water having excess unreacted acids and its salt, which is usually Indicated with a pH value that is lower than 7.0.

Alkalinity - refers to the quality of water having an excess unreacted bases and its salt, which is usually indicated with a pH value that is greater than 7.0

Basic Salt - refers to strong salt compound made of sodium and calcium cations that are paired with weak anions.

Descaling - refers to a water treatment activity that employs removing of stocked solid deposits or scales in pipelines and tanks with a high oxidizing chemical such as HCl

Hydrochloric Acid (HCl) - refers to a strong acid compound that is made with one atom of hydrogen cation and one atom chloride anion, that is widely known of its high oxidizing and descaling power.

Lime - the common commercial name used to describe basic salts of calcium; quick lime is calcium oxide, slake lime is calcium hydroxide while limestone is calcium carbonate that are paired with weak anions.

Neutral - refers to the quality of water that is neither acidic nor basic/alkalinic with a pH value equal to 7.0.

Soda Ash - the common commercial name of sodium carbonate, a basic salt.

Note:
1. Refer to procedure II P - 04 –00 for the definition of ph and surface water source
2. Refer to procedure III P –10 –00 for the definition of oh meter

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Section		Revision No.	0
Subject	**PH Adjustment and Treatment of Processed Surface Water**	Effective Date	Jan.01,01

4.0 PROCEDURE

PROCESS FLOW	RESPONSIBILITY	DETAILS / REFERENCES
Start		
1 — Get the sample of water from the processed surface water	WQCD Staff	Get the sample of water from the processed surface water: (W.I. – 20 – F)
2 — Determine the pH of the sample using portable pH meter	WQCD Staff	Determine the pH of the sample using portable pH meter (W.I. – 20- F) a) If ph is 7.0 neutral then, 3 b) If ph is <7, then add soda ash and/or lime. c) If ph is ph>7, then add dilute HCl or any acid.
PH? 7 — No → 1		
Yes		
3 — Maintain special record for the activity		(G – 06 – 00) Separate logbook for pH indicates raw processed and finished water pHs.
PH Logbook → File		
End		

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1.0 OBJECTIVE:

To determine and be guided with a standard technical procedure in sizing and designing an automatic chlorination system for drinking water supply.

2.0 SCOPE:

This Procedure covers all processed water production sources such as finished surface water supply and abstracted underground water and its storages, which are equipped with automatic chlorination facilities.

3.0 DEFINITION OF TERMS:

Automatic Chlorination System – refers to a complete installation including a booster pump, plumbing / piping, chlorine gas feeder, suction diaphragm and chlorine injection nozzle that operates with controlled chlorine gas dosing within a 24 hours water supply operation.

Chlorinator Supplier Chart – refers to a standard technical data for sizing and designing a chlorinator that is tabulated in a chart and is usually being provided for use by the supplier of chlorinator equipment.

Drinking-Water Supply – refers to any source of product water with a quality that had passed the NSDW requirements.

Theoretical Chlorine Dosage – refers to the computed chlorine dosage requirement based on chlorine demand and the volumetric flow rate of water in a given production source.

Volumetric Flow Rate – refers to the measured volume of liquid such as water that is flowing at period of time.

4.0 PROCEDURE

PROCESS FLOW	RESPONSIBILITY	DETAILS / REFERENCES
Start		
Pressure Chart		Pressure Chart is obtained from Distribution Engineer
1 — Get a record of flow and operating water pressure	WQCD Staff PDD	Get a record of flow and operating water pressure of the drinking water source. a. Pressure Chart b. Vol. Flow Record (obtained from the production Engr.)
2 — Record for volumetric flow and operating pressure data of the drinking water source	WQCD Staff	Operating Data recorded are basis for computing the chlorinator design using appropriate formula.
3 — Record for volumetric flow and operating pressure data of the drinking water source	WQCD Staff	Refer to supplier Chart on NPT dimensions and booster horsepower requirement corresponding to the data gathered in 2).
Chlorination Supplier Chart		Chlorination Supplier Chart obtained from file of WQCD Field Engineer.
4 — Determine the chlorine demand	Analyst	Determine the chlorine demand for the drinking water source.
A		

W.I. – 06 -L

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4.0 PROCEDURE

PROCESS FLOW	RESPONSIBILITY	DETAILS / REFERENCES
A		
5 Compute chlorine dosage	WQCD Staf	Compute for the theoretical chlorine dosage requirement of the drinking water source. (Chlorination Supplier Guide)
6 Size the appropriate chlorine gas feeder design	WQCD Staff	Sizing of Gas feeder design is based on operating conditions of the well and NPT dimensions obtained from chlorinator chart.
7 Procure and gather all materials and labor needed for installation	WQCD Staff	Procure and gather all materials and labor needed for installation of chlorinator at the drinking water source.
8 Install the automatic chlorination system	WQCD Staff	Install automatic chlorination system and make test run prior to commissioning. (W.I. – 27 – F)
9 Maintain a daily maintenance record for the installed automatic chlorination	WQCD Staff	Maintained a daily maintenance record for the installed automatic chlorination system at the drinking water source.
Chart		Pressure Chart and suppliers' Chlorinator chart filed in respective folder
End		

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			Issue No.	1
	Section	[illegible]	Revision No.	0
	Subject	**Routine Check-up of pH, Turbidity and TDS of Raw, Processed, and Finished Water Products**	Effective Date	Jan. 01,01

1.0 OBJECTIVE:

To establish a general procedure in monitoring the overall treatment process efficiency through the analyses of indicator parameters of water at the Tisa Filter Pant.

2.0 SCOPE:

This limits very specifically to the routine check-up of pH, turbidity and TDS parameters of the raw, processed, and finished water products at Tisa Filter Plant to establish general measure of treatment process efficiency of the plant.

3.0 DEFINITION OF TERMS:

Field Data - refer to all information including sample identification, and on-site readings, and analyzes employed for a particular sample.

Portable ph Meter - refers to a pen-type instrument with an electrode –probe that can measure on-site ph value of a water sample.

TDS Meter - refers to a pen-type instrument with an electrode-probe that can measure on-site total dissolved solids concentration of a water sample.

Note: 1. Refer to procedure III P-07-00 for the definition of turbidity
2. Refer to procedure III P – 08-00 for the definition of the settling chamber and finished water chamber.

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	Section		Revision No.	0
	Subject	**Routine Check-up for pH, Turbidity and TDS of Raw, Processed, and Finished Water Products**	Effective Date	Jan. 01,01

4.0 PROCEDURE

PROCESS FLOW	RESPONSIBILITY	DETAILS / REFERENCES
Start		
1 Collect Water Sample	WQCD Staff	Collect water sample at the ff. points at Tisa Filter Plant a. Raw Water Chamber b. Setting Chamber c. Finished Water Chamber (VP – 02 – 00)
2 Record pH reading of sample	WQCD Staff	With a portable pH meter, read the pHs of the 3 samples in 1) and record. (W.I. – 20 –F)
pH Questionable? No → 4		
Yes → 1	WQCD Staff	
3 TDS Meter Reading of sample		With a TDS meter, read the TDS of the 3 samples in 1) and record (W.I. – 21 – F)
pH reading the same? No → 4a		
Yes → 4		
TDS Questionable? No → 1 then 3		
Yes → 1		
A		

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	Section	Revision No.	0
	Subject: **Routine Check-up for pH, Turbidity and TDS of Raw, Processed, and Finished Water Products**	Effective Date	Jan. 01,01

4.0 PROCEDURE

PROCESS FLOW	RESPONSIBILITY	DETAILS/REFERENCES
A		
4 Bring samples to laboratory	WQCD Staff Analyst	Bring the same samples to laboratory for turbidity analyses. 4a) Bring 2nd sample to laboratory
5 Analyze for turbidity	Analyst	Analyze submitted samples for turbidity.
6 Submit all field data	WQCD Staff	Submit all field data gathered to WQCD head.
7 Record all data and file		Record all data and file for filter interpretation. REF – REP WQC - 005
File		
End		

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			Issue No.	1
	Section		Revision No.	0
	Subject	**Routine Chlorine Contents' Reading of the Finished Water Product at Tisa Filter Plant**	Effective Date	Jan. 01,01

1.0 OBJECTIVE:

To monitor the great variation of the effects of chlorine disinfection activities to validate the changes on the finished water product at Tisa Filter Plant by routine reading of the residual chlorine due to wide variations of the chlorine demand of the processed surface water in the plant.

2.0 SCOPE:

This limits in the periodic collection of water samples at the finished water chamber and the consequent on-site testing of the residual chlorine reading of the samples.

3.0 DEFINITION OF TERMS:

Analyte - refers to the particular water parameter that is considered for laboratory testing.

Chlorine Dosage - refers to the amount of chlorine that is introduced as disinfectant in the treatment of water.

Colorimetric Test Kit - refers to a method employing a color change reaction, wherein contents of a measured parameter is compared with a calibrated standard color that is displayed in a visual chart.

Disinfectant - refers to any reagent and material that has the ability to kill disease causing bacteria and viruses.

Orthotoluidine Test Kit - refers to a set of reagents and colorimetric standards, wherein a measurement of Remanent chlorine content can be read out.

Parts Per Million (PPM) - refers to an expression of concentration of certain water parameter that is equivalent to milligrams of analyte per liter of sample.

Residual Chlorine Reading - refers to the on-site colorimetric measurement of the remaining chlorine content in a water sample.

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	Section	Water Treatment	Revision No.	0
	Subject	**Routine Chlorine Contents' Reading of the Finished Water Product at Tisa Filter Plant**	Effective Date	Jan. 01,01

4.0 PROCEDURE

PROCESS FLOW	RESPONSIBILITY	DETAILS / REFERENCES
Start		
1 Collect water sample	Plant Operator staff WQDC staff	Collect water sample at the finished water chamber.
2 Analyze for residual chorine reading	WQCD staff	Analyze residual chlorine content (Orthotomidine Method)
3 Color Charting	WQCD staff	Compare observed color with a chart. (W.I. – 30 –00)
Observe color difference? — No		If Res, Cl2 is < 1.5 ppm, then increase chlorine dosage and proceed back to procedure 1-4)
End		
Yes		IF Res. Cl2 > 2.0 ppm then maintain current chlorine dosage.
4 Color Record Readings	WQCD staff	Record all residual chlorine readings.
End		

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			Issue No.	1
	Section	[illegible]	Revision No.	0
	Subject	General Clarification and Purification Processes of the Raw Water	Effective Date	Jan.01,01

1.0 OBJECTIVE:

To establish standard operating procedures that are employed in the clarification processes of the raw surface water at Tisa Filter Plant, which shall be made basis in monitoring the effective performance of treatment procedures and in the correction processes involved, when unsatisfactory results are obtained.

2.0 SCOPE:

This limits in the operational stages of raw water clarification: (1) coagulation; (2) flocculation; (3) sedimentation & settling; and the particular treatment of raw water with appropriate chemicals, and water purification processes: (1) oxidation; (2) aeration; (3) algicide-treatment; (4) filtration; (5) disinfect ion; and the treatment reactions involved in the processes.

3.0 DEFINITION OF TERMS:

Aeration	- the process that is employed in removing odor from the water, which is made by cascading the water into a rough slant surface.
Algicide Treatment	- refers to the introduction of copper sulfate into clarified water to eradicate and control the growth of algae in surface water.
Chlorine Injection	- refers to the method of introducing chlorine gas into surface water.
Clarified Water	- refers to the initially-treated water from the settling basin that had passed the coagulation process
Disinfection	- the process of introducing chlorine gas into the filtered water to eradicate disease-causing bacteria.
Filtration	- the physical treatment employed to separate very fine solids in treated water through a filter media that is usually made of packed sand and gravel.
Finished Water Product	- refers to the completely treated (clarified and purified) drinking water product from Tisa Filter Plant that is ready for distribution.
Oxidation	- the treatment process employed with clarified water by the addition of oxidizing agents to drive and settle out metallic substances and clay particulates in surface water.
Wash water Tank	- refers to an open reservoir or tank, wherein treated finished water product is stored.

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			Issue No.	1
	Section	[illegible]	Revision No.	0
	Subject	General Clarification and Purification Processes of the Raw Water	Effective Date	Jan.01,01

1.0 OBJECTIVE:

To establish standard operating procedures that are employed in the clarification processes of the raw surface water at Tisa Filter Plant, which shall be made basis in monitoring the effective performance of treatment procedures and in the correction processes involved, when unsatisfactory results are obtained.

2.0 SCOPE:

This limits in the operational stages of raw water clarification: (1) coagulation; (2) flocculation; (3) sedimentation & settling; and the particular treatment of raw water with appropriate chemicals, and water purification processes: (1) oxidation; (2) aeration; (3) algicide-treatment; (4) filtration; (5) disinfect ion; and the treatment reactions involved in the processes.

3.0 DEFINITION OF TERMS:

Algicide	- chemical reagent such as copper sulfate, which is used to eradicate and control the growing algae in water.
Alum	- chemically it is aluminum sulfate, a coagulant that is used to treat raw surface water.
Baffles	- cross sectional partitions that directs the flow of coagulated water thereby causing a mixing action in the settling basin.
Catch Basin	- refers to a concrete chamber wherein the raw water supply from Buhisan Dam is collected via overflow pipe, at which alum coagulant dosage is introduced.
Coagulant	- anti-wetting chemical reagent, usually of metallic salts, that has the capacity to adsorb charged particles of dissolved and suspended solids in water.
Coagulation	- is the destabilization of colloid particles brought about by the addition of chemical reagent known as coagulant.
Colloids	- refer to the suspended particles in raw surface water that are larger but lighter than fine sands, usually of organic origin.
Copper Sulfate	- a blue crystalline chemical that is hydrated in form, which is used for algae treatment.
Flocculation	- is the agglomeration or lumping of destabilized particles into bulky solids called floc
Raw Surface Water	- refers to raw water supply that is flowing by gravity from the Buhisan Dam to Tisa Filter Plant.
Sedimentation	- the process of settling by gravity flow the suspended matters in surface water when treated by a coagulant.
Suspended Solids	- are undissolved solid particles such as very fine sand, that are contained in raw surface water.
Supernatant Liquid	- a portion of clear water at the upper most layer of flowing surface water in the settling basin.

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