Republic of the Philippines
BULAN WATER DISTRICT
De Vera St., Zone 4, Bulan, Sorsogon
wdbulan@yahoo.com

OPERATION's MANUAL

INTRODUCTION

The municipality of Bulan is situated on the west coast of the Bicol peninsula, in the second congressional district of the province of Sorsogon City. Bulan is about 653 kilometers southeast of Manila and 63 kilometers southeast of the provincial capital, Sorsogon City. It is bounded on the north by the municipality of Magallanes, by Ticao Pass on the south and west and on the east by the Municipality of Irosin and Matnog.

The present service areas of Bulan Water District covered twenty-two (22) Barangays namely:

Calpi, Roxas, Quirino, San Francisco, Somagongsong, Calomagon, Aquino, Laurel, Inararan, Managa-naga, Obrero, San Vicente, Libertad, Sta. Remedios, Brgy. Lajong, and Zone 1 to Zone 8.

The total number of active service connections as of December 2017	-	5118
The total number of billed service connections as of December 2017	-	4,489

The manual seizes to specify the processes, procedures of the day to day operations of the Bulan Water District with the purpose of ensuring guidance among its personnel as to the proper way of executing Operational activities. The manual also attempts to inform the public with the services that they can avail from the water district.

This manual is based on concepts and information taken from LWUA operation and maintenance manual and was previously approved by the Civil Service Commission Region V.

It is the zealous prayer of the Bulan Water District Board of Directors and Management that this manual will heighten the dedication to provide quality public service among concessionaires.

This manual is not a stationary document that will be displayed on shelves but rather a step by step procedure in Bulan Water District Operations that will continue to innovate and improve if needs arises. It will be subjected to an annual review and alteration with the approval of the Board of Directors.

DEFINITION OF TERMS

For purpose of this Operation Manual , the following terms or words shall mean or be understood as follows;

1. **AR –** *Accounts Receivables*
2. **BAC –** *Bid Award Committee*
3. **BM-** *Billing Memo*
4. **BAM -** *Billing Adjustment Memo*
5. **BOD –** *Board of Directors*
6. **BWD –** *Bulan Water District*
7. **CRDR –** *Cash Receipts and Deposits Record*
8. **CHLORINE-** *disinfecting agent widely used in public water treatment*
9. **CHORINE RESIDUAL-** *the chlorine concentration remaining in the system after chemical satisfaction of chlorine demand*
10. **COA-** *Commission on Audit*
11. **COPA –** *Certificate of Provisional Acceptance*
12. **DISINFECTION-** *signify treatment practices specifically employed for the killing of the pathogenic bacteria*
13. **DISTRICT –** *Bulan Water District*
14. **FLUSHING-** *getting rid of dirt , silt, rust, debris from the water mains*
15. **FS-** *Financial Statement*
16. **HOPE –** *Head of Procuring Entity*
17. **HYDRANTS-** *is an outlet from water mains , consisting of an upright pipe with a valve attached , it is commonly used when fire fighting purpose*
18. **LPG-** *Liquefied Petroleum Gas*
19. **LWUA-** *Local Water Utilities Administration*
20. **MOA-** *Milled Over all*
21. **MRS-** *Materials Requisition Slip*
22. **NOSI-** *Notice of Step Increment*
23. **NOSA-** *Notice of Salary Adjustment*
24. **NRW-** *Non Revenue Water, it is the water that has been produced and is "lost" before it reaches the customer , losses can be real losses (through leaks, sometimes also referred to as physical losses) or apparent losses (for example through theft or metering inaccuracies). High levels of NRW are detrimental to the financial viability of water utilities , as well to the quality of water itself, NWR is typically measured as the*

volume of water "lost" as share of net water produced, however, it is sometimes also expressed as the volume of water "lost" per km of water distribution network per day.

25. **PNSDW-** *Philippine National Standards for Drinking Water*
26. **POSS-** *Purchase Order Status Sheet*
27. **POW –** *Program of Work*
28. **RCD –** *Report of Collections & Deposits*
29. **RIS –** *Requisition & Issue Slip*
30. **RSMI –** *Reports of Supplies and Materials Issued*
31. **SALN –** *Statement of Assets & Liabilities & Net Worth*
32. **SPRING –** *any natural situation where water flows form an aquifer to the earth's surface*
33. **VALVES**- *is a device that regulates, directs or control the flow of water , by opening closing , or partially obstructing passageways*
34. **WATER METER-** *is a device used to measure the volume of water for billing purpose*

BULAN WATER DIDTRICT

Location: De Vera St., Zone 4, Bulan, Sorsogon

GENERAL INFORMATION

1.)THE WATER DISTRICT & ITS PHYSICAL SYSTEM'S FACILITIES

A. Administrative Area Profile Information

Organization

1. Date Formed: May 09, 1975
2. Date CCC Issued: April 20, 1972 CCC No. 022
3. Personnel: 27 Regular: 17 Job Order: 10

Existing System Facilities

1. Service
   - 1.1 Service Area: 6 person/ Household
   - 1.2 Population Service Area 26934
   - 1.3 No. of Household 4489
   - 1.4 No. of Persons/Household 6 persons
   - 1.5 Service Time (hrs/day) 24 hrs/day

2. Structure and Equipment
   - 2.1 Administration Building
   - 2.2 Office Area 176 sq. M
   - 2.3 Warehouse 20 sq.M
   - 2.4 Type of Water Source Spring (Deep Well-utilized in the year 2017)
   - 2.5 Water Source Brgy. Dolos, Bulan, Sorsogon
     - Spring: Mariboc Spring,
     - Deep Well: Sitio Pawa, Bulan, Sorsogon
     - Brgy. Lajong, Bulan Sorsogon
   - 2.6 Transmission Piping System Maintained

Size		Make	Maintained	Unit
250mm		PVC	4200	L.M
225mm	10"	PVC	5000	L.M
200mm	8"	PVC	17844	L.M
150mm	8"	PVC	5986	L.M
125mm	6"	CIP	2600	L.M

110mm	4”	PVC	4692	L.M
90mm	4”	PVC	5276	L.M
75mm	3”	PVC	4420	L.M
200mm	8”	CIP	5650	L.M
75mm	2”	PVC	1818	L.M

2.7 Service Connection

Type	Metered
Residential	4089
Industrial	178
Commercial A	82
Commercial B	139
Commercial C	1
Total	**4489**

WATER SOURCES:

At present, the Bulan Water District Water Supply System maintains two(2) spring sources; one is the Mariboc Spring at Barangay Dolos and the other one is the Halagok-hagok Spring at Barangay Calpi with individual intake boxes. Two(2) deepwells at sitio Pawa and at Barangay Lajong and the latter is not yet operational until end of the 1st quarter of 2018.

With the rapid increase on demands for water services, the concessionaires of Bulan have increasingly asking for sufficient supply of water. On this process the Bulan Water District has been utilizing water supply from Mariboc Spring at Brg. Dolos, Bulan, Sorsogon, this has been the standard operation for so many decades.

The Mariboc Spring is the main water source that supplies more than half of the BWD concessionaires but as the time goes by the spring has been depleting to its critical level due to deforestation, extreme weather condition and below normal rainfall. Because of the rapid depletion BWD lost 898 concessionaires by second quarter of 2015. This has alarmed the management to develop a new water source to augment water that will sustain the water supply of Bulan.

This Lead to the construction of two deep wells at Barangay Lajong and Sitio Pawa to support the operation of the Bulan Water District.

MARIBOC SPRING

The Mariboc Spring is located at Brg. Dolos, Bulan, Sorsogon its maximum capacity is 45 lps during Year 2010-2012. As the climate change came thru depletion of Water

occurred that has provided the water depletion dilemma, at present the spring has a capacity of 40 lps for C.Y 2017.

It is a spring from above the mountains that supplies water necessities for the concessionaire of Bulan.

The Spring is currently depleting due to excessive summner heat, but being rehabilitated thru reforestation.The Spring service 65% of the Barangays under the service of Bulan Water District. This source has passed the Philippine National Standard fro Drinking Water.

HALAGOK-HAGOK SPRING

Halagok-hagok Spring source is located at lot 5204 owned by the Bulan Water District by way of absolute sales from Iluminada R. Asuncion-Guzman. The parcel of land is situated at Barangay Calpi, Bulan, Sorsogon containing an area of 25,260 square meters.

Lot 5204 is titled in the name of Bulan Water District. The spring serve as a recharging water source to support the Mariboc Spring, its maximum capacity is 5 lps.

SITIO PAWA DEEPWELL

Sitio Pawa Deep Well was develop thru the effort of BWD Internal Cash Generated (ICG) Fund.

After series of Geo-physical Analysis, it has been approved to construct a deep well at sitio Pawa last March 2016. It has been operational in the middle of October, 2016, with a maximum capacity of 10 lps.

Constructed a pump House to ensure that equipment and chlorinator are in safe storage. Sitio Pawa is currently servicing Barangay Lajong, Bliss, Zone 8, ICS and San Vicente, for 24 hours daily operations.

BARANGAY LAJONG DEEP WELL

Lot 1180 py of the Bulan Cadastral Survey containing an area of Seven Thousand Six Hundred Sixteen (7616) square meters, more or less, and bounded as follows; North-Beguin River and Lot 1180 pt; East Lot 1181; South Lot 1181 and Lot 1178; and on the Wet Lot by Lot 1179. Coconut tress are its permanent improvements. Still declared in the name of Arenio Gerero under ARP No. 2002-02-023-0366 effective year 2003.

The acquisition of the lot in Barangay Lajong , Bulan, Sorsogon for a deep well project last July 08, 2015 had open beneficial advantage not onl to the constituent of Barangay Lajong but more so the whole area of the BWD distribution lines and other Barangays for expansion and areas that have no supply of water.

Installation of pipelines on the lot has an objective to provide adequate sustainable and potable water supply that will meet and address the demand of the growing population of Bulan.

The Deep Well is powered by submersible pumps with a maximum capacity of 10 lps to supply water on the nearby Barangays. The deep well is not operational due to rehabilitation to eradicate the iron and manganese content. This 2017 the BWD is in the process for procurement of water treatment equipment to address this problem to augment water during peak hours and to provide enough water supply to the concessionaires of Bulan.

Brgy,

2.) CURRENT OPERATION /FINANACIAL HIGHLIGHTS:

A. Existing Water Rates

CLASSIFICATION	MIN.CHARGE	11-20 cu.m	21-30 cu.m	31-up cu.m
Residential/Commercial	130.00	13.00	13.60	14.80
Commercial/ Industrial	260.00	26.00	27.20	29.60
Commercial A	227.50	22.75	23.60	25.90
Commercial B	195.00	19.50	20.40	22.20
Commercial C	162.50	16.25	17.00	18.50

POSITION	NAME	DUTIES AND RESPONSIBILITIES
Board of Directors	**MARY ANN G. HIZO** **Chairman of the Board/** **Education Sector** **CHRISTOPHER G. ARMENGOL** **-Vice Chairman/** **Business Sector** **MARIA PAZ G. BAJARO** **- Secretary/Member** **Women Sector** **BEN A. GINETE –** **Member/** **Civic Organization Sector** **DR. LIBERATO A. DIAZ-** **Member/** **Professional Sector**	**1. Policy Making** **2. Monitor whether or not the policies, rules and regulation of District are followed** **3. To give authority to the GM to sign documents, Contracts, agreement, whenever needed** **4. Approved Annual Budget** **5. Sit in the Promotion Board as non-voting member** **6. Approve appointment in the supervisory level**
General Manager C	**Engr. REY DENNIS L. GILBAS**	**1. Perform as over-all head of the District's day-to-day activities** **2. Prepares Annual Budget** **3. Prepares corporate plans and program of the District** **4. Implement, Approved short, medium and long term programs of the BWD** **5. Monitor the implementation of policies, memorandum circulars passed by the board of directors and other government agencies** **6. Prepares agenda for the meeting of the board** **7. Reports regularly to the board the quarterly result of operation** **8. Approves appointments, promotion, demotion, and other personnel actions** **9. Review/check the reports of the employees** **10. To enforce necessary sanctions to herring employees** **11. Sign check disbursements for the water District** **12. Represent the Districts in**

		various meeting, symposium, forum, conferences, etc. 13. Perform as HOPE (Head of Procuring Entity for the BAC
Division Manager C	**CARMEN G. ROMAN**	1. Certifies Disbursement Vouchers 2. Certifies Leave Applications, Monetization and Terminal Leave Benefits 3. Certifies and Verifies Reports requested by other Government Agencies such COA, GSIS, BIR PHILHEALTH and PAG-IBIG 4. Certifies Materials and Supplies Inventory Report 5. Certifies RSS and Purchase Requisition 6. Updates and maintain leave cards 7. Prepares and certifies Summary of Leave Credits 8. Reviews & certifies new connection, reconnections, transfer of connections and change of name 9. Checks & reviews promissory notes 10. Reviews and Approve reading schedule and timetable 11. Checks meter reading proof list 12. Reviews and approve Monthly Consumption Report 13. Reviews reference list of new connection, reconnection, disconnection, transfer and change name. 14. Verifies summary of monthly billing 15. Verifies summary of monthly penalty

		16. Verifies Ageing of Accounts for active & inactive connections 17. Verifies monthly billing adjustments summary 18. Verifies summary of monthly tax withheld report 19. Prepares budget for commercial division 20. Prepares & consolidates annual budget for operation & maintenance 21. Monitors the expenditures for operation and maintenance on water treatment 22. Perform as BAC Chairman
Senior Corporate Budget Analyst A	**MARY JOYCE B. PENOS**	1. Review and certify certificate of Creditable Taxes Withed 2. Prepares Annual Information Return of Income Taxes Withed 3. Prepares final Consolidated budget 4. Prepares Budgets Report 5. Prepares Projected Income Statement , Cash Flow Statement and Balance Sheet 6. Verifies Journal Entry Voucher 7. Verify and approve Monthly Disbursement Vouchers, Register and Recap and Journal Voucher Register and Recap 8. Prepares Working paper, Income Statement, Balance Sheet, Cash Flow Statement, Detailed Statement of Revenues and Expenses and MDS 9. Prepares Actual vs. Budget

		Income Statement and Detailed Statement of Revenue s & Expenses 10. Prepares Annual Statement of Changes in Equity ,Notes Financial Statement , pre-claims 11. Prepares Report of Changes in PPE 12. Prepares Report requested by other Government Agencies such as NSO, COA, GSIS and BIR 13. Prepares Balance Sheet, Statement of Government Equity and Statement of cash Flow 14. Prepares FS, Bank Recon Statement, Statement of Budget Utilization and Fs Report to COA 15. Prepares daily cash sales report 16. Prepares budget monitoring report 17. Prepares Final Consolidated Budget 18. Prepares Project Income Statement, Cash Flow Statement and Balance Sheet 19. Prepares Monthly Depreciation and Amortization of Property, Plant and Equipment 20. Prepares Schedule of Construction Work- in-Progress 21. Prepares schedule Supporting Balance sheet 22. Prepares Comparative Condensed Income Statement , balance sheet, cash flow statement and Actual vs. Budget 23. Prepares Quarterly Summary of Completed Projects

Clerk Processor B ***Human Resource Management Officer -Designate*** ***Cashier - Designate***	**LORENA F. GERONA**	**1. Prepares Publication and Position of Vacant Position** **2. Prepares and submit Appointments** **3. Prepares NOSI/NOSA** **4. Prepares and submit plantilla of Personnel** **5. Updates Service Records** **6. Prepares SALN Consolidation** **7. Process leave Applicants, Monetization and terminal leave Benefits** **8. Prepares Daily and Monthly Collection Report** **9. Perform Daily Bank Deposit of Collection** **10. Prepares Petty Cash Fund Replenishment Report, Bank Reconciliation Statement and Monthly Summary of Sales and Expenses** **11. Maintain Petty Cash Fund** **12. Prepares Collection Report** **13. Prepares payroll for all employees** **14. Prepare payroll advice** **15. Prepares monthly statutory remittances to BIR,GSIS, Pag-ibig and Phihealth** **16. Process Disbursement Vouchers, Journal entry Vouchers & Budget Utilization Slip** **17. Prepares Report of Collections and Deposit (RCD) and Cash Receipt and Deposit Record (CRDR)** **18. Files and maintain Official Bill Receipts and Official Receipts** **19. Prepares Monthly Report of issued Official Receipts/Official Bill** **20. Prepares Materials and Supplies Inventory Report** **21. Prepares Monthly**

		Disbursement Vouchers and Recap ,Cash Receipts Register and Recap and Journal Vouchers Register and Recap **22. Prepares Cash Receipt Journal and Disbursement Journal** **23. Prepares BIR related reports** **24. Prepares Checks for Disbursement Vouchers** **25. Prepares BOD Honoraria/Per diem** **26. Prepares proposed employees Benefit and bonus schedule** **27. Purpose summary on tax withheld on water bills report** **28. Prepares papers/documents for the registration of office vehicles**
Storekeeper D	**GEMMA H. CALUPIT**	**1. Prepares returned materials** **2. Prepares Store Material and MRS** **3. Prepares and issues property borrows' slip** **4. Prepares request for quotation** **5. Prepares and quarterly summary of regular stocks for procurement** **6. Prepares and process purchase memo** **7. Prepares and process POSS** **8. Prepares and submit maintenance of tools report** **9. Prepares property, supplies/materials, tools and equipment inventory report** **10. Prepares and accomplish store Requisition slip and issue Slip**

		11. Prepares Fuel, Electricity and Chlorine Consumption Report 12. Maintains Disconnection/Reconnection Reference list 13. Prepares and accomplished store requisition slip, fuel requisition and issue slip
Clerk Processor C/ Technical Head - Designate	**NOEL C. DELMONTE**	1. Perform repair Mainline leaks 2. Perform repair of Distribution line leaks 3. Perform repair of service line leaks 4. Perform mainline and distribution line interconnection 5. Perform water meter calibration 6. Perform installation of blow-offs/hydrants 7. Monitors pressure with data logger 8. Verifies illegal connection/leak detection 9. Perform Pipe laying and jointing of mainline and Distribution line 10. Maintains water facilities or structures 11. Perform project site inspection 12. Prepare Feasibility study Report, POW and work Order 13. Prepares Project Specifications, Schedule of Work 14. Prepares Supervision /monitoring report 15. Prepares Documentation 16. Recommend system improvements, adjustment, innovation, and expansion

		17. **Conducts Orientation/Seminar to new applicants** 18. **Computes and process water service application**
Clerk Processor C	**SHIELA MARIE B. LUZURIAGA**	1. **Prepares Meter Reading Cards** 2. **Prepares Meter Reading Proof list** 3. **Prepares Meter Reading Memo** 4. **Prepares Report of Service Connection per Barangay** 5. **Prepares BM Reconnection Report** 6. **Prepares Report of Existing Connections** 7. **Prepares Disconnection Orders and demand letters** 8. **Perform as BAC Member** 9. **Prepares and Prints ageing of AR-customers** 10. **Implement database management and regularly back- up files all Sections** 11. **Print meter Reading Proof list** 12. **Post reference list change Name, line, Water Meter** 13. **Prepares Reading Schedule** 14. **Prepares Reading Calendar and Timetable** 15. **Prepares Billing Register/Post bill** 16. **Prepares Summary of Penalty Account** 17. **Perform as BAC Secretariat**

Water Resources Facilities Operator B	**EUSTAQUIO H. JAVIER**	**1. Inspects & verifies illegal connections/leak detections** **2. Perform mainline & transmission lines inspections** **3. Perform site inspection for service connections** **4. Perform repair and maintenance of office motorcycle** **5. Checks, repairs and replace worn-out spare parts of motor vehicle** **6. Transport employees** **7. Perform other tasks, within his skills and capabilities as may be determined by his immediate supervisor**
Water Resources Facilities Tender A	**SAMSON H. TAÑADA**	**1. Perform repair of Mainline leaks** **2. Perform Repair of Distribution line leaks** **3. Perform Repair of Service connections** **4. Replace Fitting for Service connections** **5. Perform Mainline and Distribution line interconnections** **6. Perform Disconnection and Reconnections** **7. Perform Water Meter/Service line Relocation** **8. Maintains water meters** **9. Monitor Service Connections** **10. Perform Site I inspection for Service connections** **11. Install Service Lines/Transfer of tapping's/water meter** **12. Install blow-offs/hydrants** **13. Conduct Flushing** **14. Verifies illegal/leak**

		detection 15. Perform Pipe laying and jointing of mainline and distribution 16. Perform backfilling 17. Monitor air release valves 18. Prepares and accomplish store Requisition slip and issue Slip 19. Perform other tasks, within his skills and capabilities as may be determined by his immediate supervisor
Water Maintenance Man C	**DINDO F. GOLPEO JR.**	1. Perform repair of Mainline leaks 2. Perform Repair of Distribution line leaks 3. Perform Repair of Service connections 4. Replace Fitting for Service connections 5. Perform Mainline and Distribution line interconnections 6. Perform Disconnection and Reconnections 7. Perform Water Meter/Service line Relocation 8. Maintains water meters 9. Monitor Service Connections 10. Perform Site I inspection for Service connections 11. Install Service Lines/Transfer of tapping's/water meter 12. Verifies illegal/leak detection 13. Perform Pipe laying and jointing of mainline and distribution 14. Perform backfilling 15. Monitor air release valves 16. Prepares and accomplish store Requisition slip and

		issue Slip 17. Perform repair and maintenance of office motorcycle 18. Checks, repairs and replace worn-out spare parts of motor vehicle 19. Perform other tasks, within his skills and capabilities as may be determined by his immediate supervisor
Water Maintenance Man C- Field Collector/Meter Reader - Designate	RONALDO G. AGNOTE	1. Perform Meter Reading 2. Collects Water Bills Payments 3. Prepare Remittance Report of Water Bill Payments 4. Prepare Maintenance Order for disconnection and Meter Replacement 5. Prepares Report illegal Connections 6. Check up/monitor service connections 7. Perform other tasks, within his skills and capabilities as may be determined by his immediate supervisor
Customer Service Assistant D	JOSE SAREX G. GEROLIA	1. Perform Meter Reading 2. Collects Water Bills Payments 3. Prepare Remittance Report of Water Bill Payments 4. Prepare Maintenance Order for disconnection and Meter Replacement 5. Prepares Report illegal Connections 6. Check up/monitor service connections 7. Perform other tasks, within his skills and capabilities as

		may be determined by his immediate supervisor
Customer Service Assistant E	**RORY P. VITERO**	**1. Perform Meter Reading** **2. Collects Water Bills Payments** **3. Prepare Remittance Report of Water Bill Payments** **4. Prepare Maintenance Order for disconnection and Meter Replacement** **5. Prepares Report illegal Connections** **6. Check up/monitor service connections** **7. Perform other tasks, within his skills and capabilities as may be determined by his immediate supervisor**
Water Resources Facilities Tender B	**PEPITO G. GENETIA**	**1. Guard the Maribok spring Source** **2. Adjust the valves only when there is a direct order from GM** **3. Report illegal logging in the area** **4. Monitor air release valves** **5. Perform mainline and distribution lines inspection** **6. Maintain the cleanliness in the area** **7. Perform Chlorination** **8. Prepares Chlorine Consumption Report** **9. Perform other tasks, within his skills and capabilities as may be determined by his immediate supervisor**

Administrative Services Aide	**VENICE A. LAO**	1. **Perform Office Bill Collection** 2. **Prepares Daily Collection Report and Remittance to Cashier** 3. **Receives service request** 4. **Perform Database Management and regular Back-up Implementation** 5. **Perform computer maintenance and trouble shooting** 6. **Prepares hardware maintenance report** 7. **Perform Technical and Clerical aide** 8. **Perform other tasks, within his skills and capabilities as may be determined by his immediate supervisor**

Plumber Aide	**ANTONIO H. JAVIER JR.** **JIMMY G. GOYAL** **NOMER G. LASAL** **MHAR B. PEREZ JR.**	**Assist the Water Resources Facilities Tender A & Water Maintenance Man c** **1. Perform repair of Mainline leaks** **2. Perform Repair of Distribution line leaks** **3. Perform Repair of Service connections** **4. Replace Fitting for Service connections** **5. Perform Mainline and Distribution line interconnections** **6. Perform Disconnection and Reconnections** **7. Perform Water Meter/Service line Relocation** **8. Check-up Service Connections** **9. Maintains water meters** **10. Install Service Lines/Transfer of tapping's/water meter** **11. Install blow-offs/hydrants** **12. Conduct Flushing** **13. Verifies illegal/leak detection** **14. Perform Pipe laying and jointing of mainline and distribution** **15. Perform backfilling** **16. Install blow-off/hydrant** **17. Conduct regular flushing** **18. Perform pipe laying and jointing of mainline and Distribution lines** **19. Monitor air release valves**

OPERATION CONTROL AND SUPERVISION

I-THE BOARD OF DIRECTORS

All powers, privileges , and duties shall be exercised and performed by and through the board any board executive. Administrative or ministerial powers shall be delegated and re-delegated by the board to officer or agents designed for such purpose by the board. The function of the board shall be to establish policy. The board shall not engage in the detailed management of the district.

It is the expenses of the district that the Board being the representative of the different sectors of the community receives direct complains, suggestion , commendations form the concessionaires relative to the day-day operation , with the given vast powers before it, the board is the final and ultimate policy making body that can very well enact or craft a policy c to answer and future operational concerns of the district. It is within their powers, therefore, to mandate changes or improvements in the operation of the district . it is also within the ambit of their authority to assure that existing operational policies are being observed and followed to the letter.

The management headed by the General Manager may also recommend before the board some operational innovations geared towards a more effective and efficient water utility.

II-OFFICE OF THE GENERAL MANAGER

The duties of the General Manager and other officer s shall be determined and specific from time to time by the board . The General Manager, who shall not be a director shall have full supervision and control of the MAINTENANCE and OPERATION of the water district facilities.(sec.24, Chapter VI of PD 198)

The General Manager shall have the primary duty to enforce and implementation the policies relative to the district's operation. He is directly answerable to the board for any violation of the existing and accepted norms/practices of the district's discharge of its obligation to the public , he shall, however, has the authority to make full use of the district's personnel for the adherence to the operational procedures of the district.

The General Manager shall have the authority to issue disciplinary actions against erring employees who may have violated approved and accepted operational procedure

III-SECTION HEADS

The section heads are under the direct supervision and control of the General Manager. They shall have the power to issue direct order and detailed work schedule to

their subordinates to satisfy and comply with the operational procedure. They shall have the authority to recommend before the office of the GM for any changes, innovations and improvements of the district's day-day operation. They shall rate their subordinates as to their respective performance.

IV-MEANS OF VERIFICATION

The approved forms shall be the basic document to verify compliance to the district's operational procedure . this should be completely complied with and shall bear the signature 's of the concerns concessionaires if needed . field workers should be conscious of accomplishment of the forms for the management verification that particular work or task are carried out.

V-SURVEYS

The district shall conduct a regular survey with the end in view of knowing the performance of the district and its personnel ; and to have first hand information as to the sentiments of public.

The following are the basic question being asked by the district:

1. Do you receive twenty four (24) hour water service?
2. Is water service usually adequate in your place?
3. Does your water taste good?
4. Are you satisfied with service of Bulan Water District?
5. Are BWD employees courteous in their dealing with you?
6. Do you have any comments and suggestions to enhance water service?

The survey will provide the District the much needed information to continue and improve or to alter its operational procedures. It is the District constant objective that the operation should always result to the optimum satisfaction of the water consumers.

OPERATIONAL PROCEDURES

A.SPRINGS

Spring source of the district, the Maribok Spring, located at Dolos, Bulan, Sorsogon, though without operating equipment, also require proper operation and maintenance, primarily to assure quality and accountability of delivered water.

(a) Note for any unusual earth movements (e.g., land slide, erosion, cracks, etc.) and for any vegetation that may damage the transmission pipeline and spring structure. This is especially so during rainy season.

(b) Conduct cleaning and clearing of the spring area. Remove decaying vegetation and other biological wastes that may contaminate the source.

Spring capacity varies seasonally and good record keeping monitoring should be adopted.

Daily monitoring of spring source operation includes time log for release and shut –off and corresponding measured water level at the spring box.

Routine check-up and maintenance of the spring source includes the following:

1. Monthly visit the spring source following the transmission line.
2. Keep animals and unauthorized personnel out of the spring area and that of the impounding reservoir
3. Prohibit cutting of trees in the spring area and watershed unless extremely necessary, however, some plant growth may result to restriction of spring streams and thus be cleared away.
4. Refrain from planting crops and other vegetation not normally planted or cultivated in the spring area.
5. Protect spring intakes from surface run-offs during r ainy season. Earth dam, piles, diversion, among other should be employed to keep water from getting dirty or contaminated.
6. Subject spring yield to bacteriological testing monthly and physical and chemical testing yearly
7. Maintain the service of a water tender living near the spring source to serve as guard, keeping an eye on this vital facility of the district. He should have communication equipment for easy and fast reporting especially in emergency cases.
8. The designated water tender should be knowledgeable infusing chorine to the system.

B. RESERVATION OPERATION

The District do not operate any reservoir but there are plans to construct two reservoirs at the poblacion of Bulan. Previously, the District has a 450 cubic meter reservoir in operation but it is not being utilized now for the reason that it is already subject for rehabilitation but its ownership is not from the BWD.

To allocate funding for its repair, the District should buy the property for its legal operation and allocation of funding. The District is still on its negotiation to the owner.

C. FIRE EMERGENCY OPERATIONS

The water district has a predetermined course of action in case an outbreak of fire in its service area. The District personnel involved in the emergency operation must be able to know their own specific tasks by conducting regular fire drill exercises. This exercise is very much similar to zone flushing operation.

In preparation for the emergency operation, the local fire department must be informed of all details of such operation to avoid confusion, and in the event of an emergency, much time and property will be saved.

Important notes to consider in planning an emergency are as follows:

1.) **The reservoir should always have 25% storage capacity of water reserve for any emergency. The reservoir must only be emptied during a schedule flushing/ cleaning operation.**
2.) **By dividing the service area into area into zones, water pressure can be directed to particular zone immediately upon notice.**
3.) **Number all valves in the service area, including fire hydrants. Each fire zone should have a list of all valves will be operated. Each valve should show its normal position and emergency position.(whether fully, open, closed or throttled)**
4.) **During an emergency, unauthorized persons should not be allowed to open or use the fire hydrants to minimize pressure loss.**
5.) **After containment of the fire, all valves operated during the emergency should be restarted to their normal operating positions.**

D. OPERATION AND MAINTENANCE OF DISTRIBUTION SYSTEM

Operation and maintenance of a distribution network is a continuous, systematic program to ensure that every part of the system will receive the same amount of care as every other part. Every measure and practice must be geared towards (1) Operating the system as designed (2) preventing untimely deterioration or damage to the system and (3) assuring satisfactory delivery of quality water.

Consistency of the operation and maintenance work program is required and not just a group's day to day nor task nor an individual's reaction to present operational problems. It involves systematic practices and measure meant for the present and future operation of the water system with the use of pat and present records.

A.RECORDS AS TOOLS AND INDICATORS

No matter how big a water system is, with the use of records, adequate operation tolls and monitoring, the districts could save on manpower and finance, expedite course of action, promote good service and gain optimum use of the system. Following are the set of records the operating personnel must compile and periodically review/evaluate:

1. **Comprehensive Map. This should show the present and future area (includes sources, valving and hydrants) indicating isolation zones, commercial, industrial, and populated areas, if possible, including topography, bodies of water and political zoning.**

2. **Isolation Zone Map. This map should show a certain zone/area that can be isolated from the whole system. Pipe sizes and materials with probable flow direction, control valves and hydrants, street names and pipe alignment, pipe fittings, service connections (numbered). If possible, other utility underground structure (gas lines, electric, and drainage) should be indicated.**

3. **Valve and hydrant Record Card. T his record card should identify valve or hydrant location, make, model, size, and of turns from open to close , activities made on this Valve/hydrant must be reflected with the following: time/date duration estimated amount and physical quality of water flushed.**

4. **Service Connection Card. Every Connection must have this card, identifying the concessionaries and address, the size of man, description, scaled sketch of tapping point, materials/fitting used and sizes. It is also should show isolation zone number.**

5. **Water Meter Service Card. Information should include meter serial number brand, size, recent. Repair/part replacement made, test conducted and accuracy efficiency and present location.**

6. **List of Materials, Equipment and tools. Whether for repair or new connection, individuals list of all available materials complete with description, size, and quantity must be kept and stock levels updated, equipment and tools (does not include maintenance tools kept at pump station) should be recorded.**

7. **Record of leak repair , source of leak, zone number, repair/replacement made, date, and names of repair.**

8. **Water Quality Form. Aside from the regular prescribed water sampling/testing, quality complaint must be compiled indicating point source, description of water and any recommended correction made.**

B.OPERATION GUIDELINES AND PRACTICES

To ensure consistency of implementation and flexibility of field men, the following are the guidelines of operation;

1. Water Distribution lines

a. Always maintains positive line pressure to prevent backflow from private storage and intrusion of foreign water that may pollute or contaminated the system.

b. When manipulating valves, operate it in such a manner as to prevent sudden surges, change in velocity and flows reversal that might produce water hammer or stir up sediments and make the water dirty.

c. Set up routine program for flushing dead ends where chronic complaints occur.

d. in distribution areas, having considerable deposits of sediments, implement a complete flushing prom. If necessary install additional blow-off or hydrants.

2.) Service Connections

e. Inspection of would be concessionaire household is a must. Prepare needed materials (conforming to material standards) for connection and identify isolation zone.

3.) Leak Repairs

f. Prior to excavation for leak repair, consult isolation map and service connection cards in the vicinity of leaks. Determined most probable source of leak, check availability of repair must be implemented with the least possible duration.

g. Inform consumers in affected area when isolation zone.

h. Excavate and verify source of leak Investigate cause of breaks disconnections or any damages made to the line included preventive provision when implementing repair if necessary, isolate zone for dry.

i. Restore excavated earth and surface accomplish leak repair from and reflect repair done in the "isolation map"

C. Maintenance of Distribution System

The following maintenance program is commensurate with the need of the system. Zone maintenance program aims to ensure through inspection and conduct valve exercise with the minimum man power. The zoning will confine to a smaller area to deter any untoward effects that might be brought about by the exercise keep records of all inspection and valve exercise conducted.

1. Valves and Hydrants

a. **Valves and hydrants should be exercise twice a year. Note for leaks or signs of deterioration, repair/replace defective valves.**
b. **Do not leave valve fully open or closed, but back off 1-1/2 turns.**
c. **Clean valve box and clear hydrants surrounding twice a year.**
d. **Inspection operability of air release valves and other appurtenances with mechanical components twice a year.**

2. **Pipes**
    e. **Conducting pothole checking for old pipes suspected to be fast deteriorating at least once every three years and note pipe conditions this check-up is applicable to segment where no new connection has been installed for three (3) years.**
    f. **Conduct representative pothole checking of service connections with 5 years of service. do not wait for the line to leak due to deterioration.**

3. **Flushing**
    g. **Conduct dead ends and strategic hydrants flushing twice a year to dispose of accumulated silt and stagnant water. Maintain record of such operation.**
    h. **Flushing must be made by zone for better result and if possible, include higher pressure to flush zone.**
    i. **Compare bacte-test result and chlorine residuals before and after flushing**

D. Water meter testing and Maintenance

Water meters are important on the water system as they provide a record of water use resulting in affair distribution of the cost of delivering the water , since customer only pay for the volume of water they use, the monthly charge encourage customers to conserve water , this provides for a greater awareness of water loss through leaking faucets or pipes . a high water bill may be the first clue to the customer that a leak exists in their own system.

Water meters are subject to wear which may cause the meter to over/under register. In order to detect when a meter is no longer accurately measuring the flow. It should be the district's policy to test water meter at least once every five years.

The three basic element of a meter test are:

a. **The number of different rates of flow over the operating range of a meter required to determine the over-all meter efficiency.**
b. **The quantities of water necessary at the various test rates to provide reasonable determination of meter registration; and**
c. **The accuracy limits that meter meet on the different rent rates to be acceptable for use.**

In the absence of a meter test bench, in- place meter testing may substitute for the more expensive meter shop test. This can be accomplished in two ways. The first is by volumetric method and the other by using calibrated test meter set in series with the meter to be tested. The former is easier to perform because no dismantling of pipe fittings are required. This method is carried out as follows;

a. **Shut-off taps and faucets connected with the meter. Confirm by observing the water meter whether flow has stopped, otherwise, there is a leak somewhere after the meter.**
b. **If there is no indication of flow, record the water meter reading.**
c. **Open a faucet until a container of know volume is filled; making sure no water is spilled.**
d. **Compare the new reading on the meter with the pervious reading. Nothing the different , if any**
e. **Accuracy of the water meter is the ratio of the meter volume (increment in reading) to the know volume of the container. Expressed in per cent. If the accuracy is over 100%b the meter is said to be fast, on the other hand if the meter accuracy is less than 100%, it is said to be slow.**
f. **Meter found to be registering more than + or- 4% off must be pulled out for calibration.**

The latter method of field testing is done as follow;

a. **Dismantle the outlet of the meter and install the calibrated meter in series with the meter which is under evaluation.**
b. **Check and record water meter reading. Make sure that both meters are filled with water and under positive pressure.**
c. **Open control valve and drain the water.**
d. **Close control valve after sometimes and compare the reading. The duration of test depends on the size of meters being tested. Allow ample time for the test to obtain better results.**
e. **Accuracy of the meter is the ratio of its increment to the increment of the calibrate meter, plus adjustment depending on the performance curve of test meter.(the calibrate is not 100% accurate on all flows)**

This method is normally employed when testing large water meters (50 mm and above).

Causes of inaccuracy may vary depending upon the type of meter. Deposits on discs, propellers, housing or in chambers may cause the accuracy to be off. Warped or broken blades or discs may cause the accuracy readings, foreign material in some meter may cause the meter to stop. Turbulences caused by the poor location of the meter may cause readings to be off.

The procedure for inspecting a single meter consists essentially of dismantling, through cleaning and inspection of all parts. All parts, including the measuring chamber, should be inspected for wear, putting, swelling, distortion or presence of foreign material. All gear trains should run freely and mesh smoothly, if a meter be immersed in water to keep deposited soft and dismantling easier.

The following points are important;

a. **Clean all meter parts thoroughly**
b. **Make sure the gear train runs freely**
c. **Check the action of the disc in the chamber**
d. **Remember that friction is just as detrimental to correct registration as slippage**
e. **Store meters away from heat**
f. **Use a new meter as a standard of comparison for tolerance and clearances**
g. **It necessary, call upon the manufacture for advice**

E. Leakage Control and Repair

Mainline Breaks

Occasionally, a pipeline that has in service for years will suddenly break, often completely disrupting the distribution system hydraulics and causing localized flooding or washing of streets, with widespread disruption of water service. Such major outranges generally involve a broken pipe, or parting of joints due to movement of fitting. Such failure, no matter what hour of the day, should be treated as serious emergency requiring immediate, all- out effort by all members of the utility staff to get the leakage under control and the break repaired. "Mainliners" occur from many causes including the following:

- **Advance stage of corrosion of steel or cast iron ,mains**
- **Unusual surges in pressure**
- **Undermining of thrust blocks by nearby excavations**
- **Settlement of pipe due to changes in drainage of the surrounding area**
- **Earthquake and floods**

There are no shorts cuts in repairing mainline breaks. The section of main must be isolated and permanent repairs made. There is a natural temptation to repair a mainline break by pouring around the pipe or fittings. This is almost never works. for two reasons: (1) concrete shrinks as it hardens, opening a pathway for water to leak out between the pipes and concrete, and (2) concrete is very strong in compression but very weak in tension. Therefore, and the repair made the end, the concrete will have to be removed, and the repair made properly ,prolonging the time main is out of service and requiring a great deal of unnecessary by the operator

Another improper method of leak repair is to wrap the pipe with rubber strips. This may stop the leak will but not be effective if even a slight improvement of pressure occurs.

Broken Pipes:

a. **Isolated the section of main by closing the nearest isolated valves ,**
b. **Excavate around the broken pipe, carrying the excavation beyond the joints of either side of the break, and thoroughly dewater the excavation.**
c. **Install two short lengths of pipe the same type and size, with a flexible coupling.(note: for a clean break with no longitudinal cracks, a full-circle repair clamp may be used)**
d. **If he pipe is made of PVC or asbestos cement, it may uncovered for several lengths on each side of the beak, and a new length worked in by deflection of several joints.**
e. **After repair, flush and chlorinate the pipeline as previously described for new pipe. Hydrostatic testing is not required; however, the normal working pressure be applied to the line before backfilling.**

Movement of fitting,. Unusually the fitting can be placed back into the correct location without excavation.

a. **Isolate the section of main by closing the nearest locating valves**
b. **Excavate around the fitting and dewater the excavation**
c. **Break out and remove the concrete thrust block**
d. **Maneuver the fitting back into the proper after making sure that pipe ends have not been damaged. Ensure that joints are properly seated, with rubber rings, if any, properly seated in the joints grooves.**
e. **If movement was apparently caused by undermining of a thrust block due to nearby be necessary to uncover several lengths of pipe on both sides of the fitting and install joint restrains.**
f. **If the cause of movement is not apparent, excavate behind the fitting, break out the existing thrust block and install a larger one against undisturbed earth.**
g. **After the repair is complete, flush and disinfect the entire pipeline**

Chronic Leaks

General: the term chronic leak, is applied to those small leaks that from day-to-day, tending to go unnoticed and unrepaired. Each chronic leak may account for only a few liters of water loss each day, taken together, however, their combined effect can add up to a serious loss of water, accounting for as half of all water production in some poorly maintained system.

The more common types of chronic leaks include;

- **Holes in pipe walls due to chlorination**
- **Leaking joints**
- **Leakage through closed drain or blow off valves**
- **Dripping faucets, hydrants, service connections. Etc.**

Generally, the conditions that cause one leak in a pipeline will cause many others in the same area; for example, localized areas of corrosive soil or where poor workshop was employed when the main was originally laid. For that reason, a leak location map should be mounted on a wall in the utility office. It consists of a map showing pipelines in the distribution system; ideally at a scale not smaller that 1:600 whenever a leak is located and unrepaired , a colored map pin or larger colored ink dot(using different color for each year) is placed at the location in the map ; together with the date of discovery. Leaky main can then be spotted and scheduled and schedule for replacement.

Locating leaks

Most leaks are discovered by alert utility employees who observe and report all visible leaks, or clues to buried leaks, in the course of their regular daily duties. General areas of excessive leakage can be determined by periodic leakage discussed later in this section, but there is no substitute for an observant utility staff.

a. Above Ground Leaks

Above Ground leaks are the easiest to spot and, at the same time the ones most likely to go unrepaired. The most common of these include:

- Worn packing at valves stems, or loose bonnet bolts
- Service connection leaks due to corrosion at service piping threads
- Dripping air/vacuum valves due to improper seating of floats
- Leaking hydrants, due to worn out gaskets

b. Buried Leaks

There is no single, fool-proof way of locating small buried leaks there are several visible clues to underground leakage, however, including:

- Standing water or muddy areas in the vicinity of pipelines that cannot be accounted for by recent rains or surface wastewater drainage
- Water in valves boxes
- Patches of abnormal grass in the vicinity of a pipeline
- Inflow of water to excavation when installing new ser4vice connection

Often such condition occur at some distance from the actual leak location as the water travels along the pipe before working up toward the surface.

When a buried leak is suspected, a leak detector may be used to pinpoint its exact location. There are many kinds of leak detectors be available, and the manufactures instruction booklet should be consulted for details of operation,

generally. They are of little use in searching for leaks over large general over large general areas since they are subject to outside interface such as traffic noise.

Repairing leaks

Small leaks are usually repaired without interruption to service. If shutting down the main is necessary, it should be done only in the presence of the supervisor in charge of maintenance, it is not necessary to flush and chlorinate a main after of the pipeline such as when replacing a length of pipe or fitting.

a. Above-ground Leaks

Most above gro9und leaks result from deterioration of washers, packing or gaskets. When replacing these, make sure that all seat surfaces are clean and smooth. Tighten only enough to prevent leakage, without excessive compression. Unlike packing around pump shafts, valve packing should be tightened until there is no leakage. Never use leather for making gaskets or packing, since it provides a good breeding medium for bacteria.

b. Holes in pipe walls due to corrosion

1. Make up repair clamp
2. Clean the pipe around the leak to provide a smooth, clean surface
3. Assemble the repair clamp loosely the pipe near, but not over, the leak
4. Slide the clamp over the leak, check gasket seating and tighten snugly

c. Leaking Joints

When repairing leaking joints of pipe of fitting, observe the following rules:

- Have all required equipment and materials available
- Excavate around the leak
- Close the nearest isolating valves as directed by the supervisor
- Open a hydrants or tap to relieve line pressure
- After completion of repairs, flush and chlorinate as previously described of new mains., if repair procedure required opening the pipe

1. Asbestos-cement pipe Joints , Milled pipe Method

    a. Excavate at the joint and a full pipe length on one side
    b. Dewater the excavation
    c. Break and remove the coupling at the leaking joint, being careful not to damage the pipe ends.

d. **Inspect pipe ends for damage (when an asbestos-cement pipe joint has been leaking out often erodes a groove in the pipe end)**
e. **Remove one pipe length**
f. **If MOAs are available (i.e. length of pipe "Milled-over-all" or machined throughout their length to the diameter of the joint setting surface). Install one full length or two half length MOA's by sliding collars all way into each end, inserting into the line and sliding coupling into final position.**

   Swabbing the milled, or spigot end of any pipe with soapy water immediately before making up a rubber ring joints will reduce the possibility of displacing the rubber ring due to friction.
g. **If MOAs are not available, remove one pipe length and will end to the diameter at the joint seating at least 30 cm back from the pipe end , then slide one collar back on the milled pipe end, insect the pipe length into the line, and push the collar into position.**
h. **Be sure that collar is centered over the joint and check the seating of rubber rings a depth gage.**

2. **Asbestos-cement Pipe joints, Deflection Method. Applicable only to pipe up to 8 inches diameter.**
   a. **Excavate a total of three pipe length (one length on one side of the leaking joint and two the other)**
   b. **Remove the center pipe by deflecting the two outer lengths upward and away from the counter length. This can be accomplished by attracting a rope sling center section and lifting carefully, with a crane or host. If hosting equipment is not available, pass several ropes under center section and lift by manpower, being to keep the center section level as it is raised. Try to avoid pulling apart joints other than the leaking one.**
   c. **Inspect the pipe ends and collar at the leaking joint and replace pipe length collar, or rubber ring as required**
   d. **Lower the pipe while guiding the repaired joint into proper position**
   e. **Check seating of rubber4 rings in all disturbed joints, using a depth gage.**

3. **Ductile or cast iron Pipe, Rubber –ring Joints**

   This type of leak usually results from improper seating of rubber ring at time of installations, or excessive deflection of the joint. Resulting in pushing out of the rubber ring. Check for this with a depth gage and, if found to be the problem, center the pipe and push the rubber ring the groove using a blunt edged metal bar or hardwood stick. Never use a screw driver or chisel. If joint deflection is excessive, excavate along the pipe in both directions, adjusting at the other joints, if the leakage results from damage of pipe ends or rubber

ring, it will be necessary to replace a pipe length or rubber ring by a procedure similar to that used for asbestos-cement pipe (deflection method)

4. Ductile or cast iron pipe, Caulked Joints
    a. Excavate at the leaking joints
    b. Place blocks or timbers under the pipe on both sides at the joints to prevent movement
    c. If cerement caulked, chip out using a chisel
    d. If lead caulked, place a flat pan or cast iron pot under the joint melt out the existing by pouring fresh molten lead into the container beneath the pipe.
    e. Recaulk the joint using molten lead or lead wool.

5. Screwed Steel Pipe Joints

Leaks at screwed joints generally results from corrosion of pipe at threads. This can be easily corrected by welding or brazing, if portable welding equipment is not available , cut the pipe about 30 cm from the joint, remove the short piece from the joint thread the remaining end, and install a 30 cm piece threaded at both ends using a union at the location of the cut.

d. Leakage through closed Valves

Closed valves generally leak because of the following:

- Buildup of cemented silt on seats, preventing complete closure
- Buildup of rust or mineral deposits on edges of discs
- Corrosion of discs or seats

The first two problems can be corrected by opening the valves fully and thoroughly cleaning the seat and discs with wire brush

When the discs have become corroded to the extent of allowing passage of water, it is necessary to replace it. If leakage results from pitting of the seats, it may be necessary to replace the valve.

E. WATER QUALITY AND CHLORINATION

A. Water safety

Modern communities of any size except the very smallest could not exist without the adequate public water system and effective waste collection and disposal facilities, these utilities are vital to urban living and public health. Experience has shown that public health and water quality are directly related to one another and that an improvement in the quality of water is followed by the improvement in public health

A modern water system provides water is safe, potable, and available in adequate quantity, practically, no public supply source can meet all modern water quality requirements without some form of treatment, among the attributes on quality supply of public water are than it:

1. **Be free from disease-producing organisms**
2. **Be colorless and clear**
3. **Be palatable , free from odors**
4. **Be reasonably soft**
5. **Be neither scale forming nor corrosive**
6. **Be untainted by certain sustenance in quantities that are toxic or have adverse physiological effects**
7. **Be available in sample quantities**

Contamination is the introduction to water of some pathogenic organisms of toxic substance harmful to human beings substance are bacteria, viruses, toxic chemical compound and radioactive materials . In all of them water acts as the conveying agent brings this contamination into the body.

Bacteria are widely distributed in nature and can be present in water involved in the transmission of these bacteria is surface run-off water that can come into contact with the water being served. Under certain conditions, harmful waste can enter the water distribution system through cross-connections and back siphon age conditions. Such conditions should be eliminated by repairs, diversion, keeping the line pressurized, and preventing back flow from private storage.

Disinfection is term signifying treatment practices specifically employed for the killing pathogenic bacteria. No disinfecting agent other than chorine in any of its forms is used in any great extent in public water treatment. To be effective as a water disinfecting agent, chlorine must be added in sufficient amount to satisfy each particular chlorine demand and then exist in minimum concentration of free or combined known as residuals.

B. Chorine federate

The operator must that as a water treatment operator; he is assuming responsibility for the heath and possibly the life of his consumer. It must be realized that chlorination very small amounts of a chlorine is being added to large amount of water it its essential that the chlorine is being comes into intimate contact with the water and with the disease producing organisms that may be present . The dosage of chlorine is the amount of chlorine usually expressed by weight applied to water over a period of time. In addition to reacting with water, chlorine can react with some of the compounds in solution in a water supply. Such action quite rapid and where it happens, the chlorine used is not available for disinfection. The amount of chlorine required to react completely with a chlorine-destroying compound is

termed the compounds chlorine demand. The chlorine of a given water supply must be satisfied before disinfection can begin.

The chlorine remaining after chemical satisfaction of chlorine demand is termed as the chorine residual a minimum of 0.020 ppm is recommended A method for determining the amount of chlorine remaining in the water after chlorination is essential to assure the delivery of safe water, and will dictate whether to increase/decrease the federate. Dosage is always higher than the faucet chlorine residual to satisfy the chlorine demand of the water.

C. OPERATION and MAINTENANCE

1. A weekly routine maintenance (or as frequent as necessary such as change of gas cylinder) will keep the unit at rated operating condition for this day=to-day operation.

a. check piping, hose and valving for leaks. Breaks, or any defect

b. check cylinder hose mounting

c. Periodically clean the strainer in the ejector water line

d. Whenever the cylinder is changed. Clean flow meter, rate valve and gas filters. Change damaged "o" rings and conduct chlorine leak detection

e. whenever conducting services for the chlorinator, consult manufacture's manual

2. The operation of mechanically (belt/pulley from the engine flexible shaft) driven chorine centrifugal booster pump set is synchronized with the main pump using the engine drive.(using VHS motor drive of the main pump . the flexible shafting will also be used to drive the booster provided that the RAGD is not disengaged from the split-shifting of the combination drive and that the engine power take-off clutch of the engine at disengage position).

Chlorinator is operated as follow:

a. **Initially, the chlorine cylinder is closed and the rate valve preset (from last operation) to the desired feed rate.**
b. **Using the engine drive, upon engaging the engine PTO, both booster pump will operate and will take several seconds for the water to reach the surface piping and the booster. Always wait for the pressure build-up in the discharge piping before opening cylinder valve, start up pressure may not be sufficient to create the needed vacuum at the spring=loading ejector.**
c. **The exclusive (recommended) motor drive of the chlorinator is furnished with a separate control and shall be operate after pressure build-up at the piping's followed by the cylinder valve opening**

d. After the booster has been operated and the cylinder valve opened, note ball level at flow/rate and compare with last operation adjust if necessary. Periodically conduct chorine residual test and keep residual at a minimum of 0.200 ppm

D. Water Quality Testing

The water district should see to it that bacteriological, physical and chemical qualities of its supply should with conform to the standards set by the Philippine national standards for drinking water (PNSWD). The following water quality test should be conducted by the district as part of this water quality monitoring and maintenance program.

1. Chlorine Residual Test- the test should be done daily at selected points preferably at the distribution system. the system should provide a chlorine dosage sufficient to maintenance a minimum chlorine residual of 0.20 mg at all points within the distribution system
2. Bacteriological Quality Test- this should be conducted monthly at pre selected sampling points in the distribution system and at every source one sample a month should be taken for every 5,000 people served by the district. Samples for bacteriological analysis may be through to any nearby accredited laboratory such as the regional health laboratory or LWUA laboratory.
3. Physical/chemical Quality Test- periodic analysis in physical and chemical quality of all sources of supply should likewise be made laboratory which has the facilities to perform such or to LWUA laboratory.

Records of all water quality analysis should properly be kept for future references, should a sample be found not to conform to standards , or should contamination occur as evidenced by the results of water quality test, a sanitary survey should be made the district to determine causes of contamination and measure done to upgrade quality of supply. Some suggested corrective measure is extensive disinfection, line flushing, leak repair, cross connection elimination, etc

Chemical handling

The following are chemical commonly used in water operation:

a. Chlorine
b. Hydrated line or caustic soda
c. Liquefied petroleum gas (butane or propane)
d. Various solvents, lubricants and acids

Of these, chlorine presents the most severe hazard, not only to operation but also to persons living in the vicinity as well. Therefore, this subject is discussed in great detail compared with other chemical hazards.

a. Chlorine

The operator must developed good working practices in order to minimize the chance of accidental chlorine release. It is not enough to know what to do; the operator must familiarize himself with all aspects of preventive maintenance procedures, the protective equipment issued to him, and he must keep much equipment for used. The following procedures should be followed;

1. **The chorine exhaust fan must be turned on at all times when entering the chorine room, whether for a routine check or for servicing or repairing leaking equipment, even while wearing a mask. Always check the exhaust for possible blockage.**
2. **In all cases when the concentration of the chlorine gas in the air is unknown, a self-contained gas mask approved for chlorine must be worn, the location for storage of the gas mask must not be in the same room as the chlorine container.**
3. **Start-up of operation of a chlorinator or opening of a chlorine cylinder must not commerce unless gas masks are on hand nearby or outside.**
4. **A gas mask must be worn when it is necessary to locate and stop small leaks in the piping or when making any repair or adjustments on leaking equipment. The cylinder valve must be closed before starting repairs.**
5. **Water must never be applied to a chlorine leak because of the added corrosive action created by the water-chlorine mixture which will rapidly enlarge the leak of gas on liquid chlorine.**
6. **Plastic-coated gloves must be worn when changing cylinders.**
7. **Whenever possible, two men should be present when changing chlorine cylinder**
8. **When connecting the piping from the cylinders to the chlorine or whenever it is necessary to break a connection and recouple it, a new lead or fiber washer be used each time. The yoke type clamp that attaches cylinder should be soaked in an averaged solvent and cleaned with the slide .the threaded adjustment screw should be lightly coated with " petrolatum" (Vaseline)**
9. **Fittings must be inspected for rounded for worn –threads or burst that mat contribute to leaks .there should be "play "in the flexible tubing's to minimize chance of fracture if struck. Flexible metal chlorine gas piping must be replaced immediately if kinked during cylinder change over. All black iron pipes used as hard pipes for gas or liquid must be replaced after 5 years of service**
10. **A green slime may form where a leak was repaired. A dry cloth should be used to wipe away unless the area is completely ventilated. Avoid breathing dust slime**
11. **When using chlorinated power or lime, the proper type of eye shield and gloves must be worn.**

Chlorine leaks

There are two types of leaks: liquid and gaseous. Although any leak is to be avoided by far the more to be feared is the liquid leak. When liquid chlorine evaporates, it expands to 450 times its liquid volume. Obviously a liquid leak at the same rate as gas leak will release considerably more chlorine into the atmosphere, moreover, a chlo9rine gas leak tends to strife itself, because as chlorine vapor escapes- the vapor remaining in the thank expands, cooling the thank and lowering the vapor pressure causing the gas emission. Chlorine may be absorbed in a solution of caustic soda, soda ash or hydrated lime.

Chlorine cylinders less than one tan in size should always be stored in an upright position. A leaking cylinder lying on its side can leak liquid chlorine, while one in an upright position can (unless the cylinder itself is damaged) leak only vapor. Therefore, if a cylinder is knocked over and damaged, it should be immediately stood upright to minimize hazard.

a. If a leak occurs

1. **Shut-off the cylinder valve. Since the room will be full of gas, no test can be made on the equipment to determine the location of the leak until the room has been cleared. DO NOT UNDERTAKE A REPAIR ALONE . it the operator is alone , he should enlist the aid of the operator relieving him to stand to render assistance or summon helps while he checks –up the equipment, repair the leak and restores the equipment to operational order.**
2. **Notify the supervisor immediately**

b. Test for leaks after the room has been cleared of chlorine

1. **Use a bottle of concentrated ammonia ; hold open bottle below all joints, piping's or suspect valves , white fumes of ammonium chlorine indicate a chlorine leak**
2. **Crack open cylinder farthest from chlorinator until gauge indicates at 215 kg/sg.cm.(35 psi)**
3. **Shut off cylinder test system to located leak/s. It may be necessary to repeat procedure several times to locate all leakages.**

c. Leak/s located

1. **Mark it clearly**
2. **Shut-off gas supply and keep it shut until all leaks have been repaired**
3. **Use proper tools for repair. Handel equipment with care**
4. **After completion of repair of the leak , re-check for other leak/s**

d. If leak is not repaired before shift changes, advise next for other leak/s

b. Hydrants lime and Caustic Soda

Extreme care must be exercised in handling lime or caustic soda, in normal dry powered from, these seem harmless. This often encourages operators to handle them carelessly. When combined with moisture, they become extremely irritating to the skin, eyes, and lungs. Therefore when exposed to damp skin, they can cause serious deep burns. A small amount of lime or caustic soda in the eyes will mix eye fluids and cause serious damage to the cornea; this can lead to blindness, inhalation of powdered lime can cause by searing the interior of the lungs.

1. **Always wear goggles when handling lime or caustic soda**
2. **Wear long-sleeved shirts, buttoned at the neck and wrist**
3. **Wear shoes and socks**
4. **Wear rubber or plastic gloves**
5. **Wrap the lower part of the face with a cloth coarse enough to permit breathing but not so coarse as to allow durst particles.**
6. **Wear a hat or wrap a cloth bandana around the head**

c. **Liquefied Petroleum Gas (LPG)**

The principal danger in LPG is that explosion and/ or fire. The gas is poisonous and prolonged breathing could be fatal. In the event of someone being overcome by gas, the most important step is to get the victim into the flesh air. If the victim does not revive immediately, proceed to resuscitations.

d. **Cleaning solvents**

Most petroleum-base cleaning solvents are both toxic and flammable. Toxic effects are generally quick, with little warning before the victim collapse, often, a single deep breath enough to cause dizziness and a gasping for breath, which results in further intake of gas, followed by unconsciousness. There should be no smoking or open flame allowed while handling said chemicals.

Fire Prevention

Good housekeeping must be maintained at all work locations and vehicles

a. **Combustible materials, such as oil soaked rags, wastes and shavings must be kept I metal containers with self-closing lids or in areas far remove from any other flammable materials. All container should be emptied as soon as possible**
b. **Proper and other combustible materials must not be kept too long. They must be disposed of or burned in a safe place immediately.**

I- Philippine Water Quality Standards on Bacterial Quality

A. Bacterial quality shall be based on:

1. **Concentration of coli form group of bacteria**
   a. **In indicate of the presence of human or animal waste**
   b. **Maybe determined by the dilution tube and membrane**
2. **Minimum requirements**

a. **Dilution technique**
   1. **If the 5-1o ml sample is used , it should not show presence of coli form group in 10% of the total samples per month**
   2. **Presence in 3 or more 10 ml portion of a standard sample shall not be allowable if this occurs.**
      a. **In two consecutive samples**
      b. **In more than one sample per month when less than 20m samples are examined per month**
      c. **In more than 5% of the samples when twenty or more samples are examined per month**
   3. **Occurrence of coli form group is 3 or more of the 10 ml portion of a single standard sample, daily samples from the sampling point shall be collected promptly and examined until the results obtained from at least 2 consecutive samples shown the water to be of satisfactory quality.**

b. **Membrane fitter Technique**

1. **Arithmetic mean coli form density of all standard samples, each of which shall not be less than 50 ml examined per month and shall not exceed one per 100 ml.**
2. **Coli form colonies per standard sample shall not exceed 3 per 50 ml. 4 per 100 ml. 7 per 200 ml. or 13 per 500 ml in:**
   a. **Two consecutive samples**
   b. **More than one standard sample when less than twenty are examined per month.**

B. **Treatment Requirements**

Treatment MPM per 100 ml monthly	Water Quality
Are max. day or sample	
50-100 5% over 100	Excellent source of water supply disinfection only treatment required
50- 5,000 20% over 5,000	Good source of water supply requiring usual treatment such as filtration and disinfection
50-20,000 5% over 20,000	Poor source of water supply requiring special on auxiliary treatment and disinfection

C. **Sanitary survey is necessary for:**
   1. **Proper expression of bacteriological results**
   2. **Identification of potential source of contamination**
   3. **Confirmation of results of bacteriological test**
   4. **To justify condemnation**

II- Sanitary and preservation of samples

A. Preparation of sampling bottle- 120 ml. capacity, wide mouth, capable of being sterilized , resistant to solvent action of water, non-toxic , clean and sterilized in an autoclave for 15 minutes at 121 degree centigrade

B. De chlorinating point- for chlorinated water supply, add 0.10 ml of 10% solution sodium thiosulfate enough to produce a concentration of 372 mg/l to reduce metal toxicity. The de chlorinating agent and the chelating must be added before sterilization.

C. Chelating Agent- water samples high in cu or zn and other heavy metals add 0.30 ml of 15% EDTA (ethylene-demine tetra acetic acid) enough to produce a concentration of 372 ml/l to reduce metal toxicity. The de chlorinating and the chelating must be added before sterilization.

D. Sampling procedure

1. **Sampling from a pump or faucet**
   a. **Flame the tap**
   b. **Allow it to run waste to permit cleaning of line**
   c. **Restrict the flow to avoid flushing**
   d. **Unscrew the cap without exposing the inside to wind and dust**
   e. **Fill the bottle to the neck leaving air space stopper immediately**
2. **Sampling from a surface source remove the cover and hold near its base and plunge downward one foot below the surface and collect sample by forward sweep of the with the mouth of the bottle forward or upstream**

E. Identification of water samples

Sample without the proper identification shall not be accepted

F. Preservation of storage

1. **No preservation by ice necessary if sample is examined within 1 hour after collection**
2. **Sample should be preserved in ice if they are to be proceed 1 hour after collection at temperature below 10 degrees centigrade**
3. **Time between collection and examination shall not be greater than 24 hours, and not greater than 30 hours if refrigerated. Temperature of storage shall be recorded and considered in the interpretation of data**
4. **Requirements of local laboratories when samples are to be examined shall also be considered**

III- Standard method for bacterial examination

The enteric diseases caused by bacteria are transmitted almost exclusively by fecal contamination of water and food materials. Transmission by water responsible for the massive epidemics of the diseases

Enteric pathogens are seldom isolated directly from contaminated water because of their small numbers to demonstrate the fact of fecal contamination, the confirm group of bacteria is used because they are natural

inhabitants of the intestine of warm blooded animals although they are mat not be agents of disease. The bacteria that have principally served as indices of pollution are fecal strep to cooci and the E. coli.

The coli form group of bacteria shall include all aerobic, mosophilic , heterotrophic, facultative anaerobes, gram-negative, non-spore forming rods capable of fermenting lactose with gas production at 35-37 degree centigrade within 48 hours.

A. Standard plate count- enumeration present in a given volume of water

1. **Basic assumption**
   a. **Each colony arise from one bacteria**
   b. **Limited to aerobic or facultative anaerobic bacteria**
2. **Media preparation**
3. **Procedure**
   a. **Pipette 1 ml of the sample into a sterile Petri dish, add 10 ml of the liquefied agar medium at 44-46 degree centigrade**
   b. **Mix well by tilting the dish**
   c. **After solidification at 38 degree centigrade incubate at 15 degree centigrade in an inverted position for 24 hours**
   d. **After 24 hours the colonies with the aid Quebec colony counter**

4. **Interpretation**

   When the total number of colonies in 1 ml sample is less than 30, record the number as observed. When more colonies have developed, make a count on any five squares and multiply by 13.use only 2 significant digits.

Count per ml	Water Quality
10	Excellent Pure
10 - 100	Very Pure
101 - ,000	Pure
1,001 – 10,000	mediocre
10,001 – 100,000	impure
100,001 – 1,000,000	Very Impure

B. Multiple fermentation technique

1. **Presumptive**
   a. **Procedure**
      1. **Pipette 10 ml of the sample into 5 tubes of primary lactose broth**
      2. **Mix by gentle shacking**
      3. **Incubate at 35 degree centigrade for 24 hours**

4. **Read at the end of 24 hours and record the presence of gas**
5. **Incubate for another 24 hours if no gas has develop**
6. **Examine for gas formation after 24 hours**

b. Interpretation

Formation of gas within 24 hours constitutes a positive presumptive test. The presence of peptone in the media stimulates the growth of bacteria and in the lactose, only the coli form group could grow the acid, depressed the PH and forced CO2 into the inverted vial.

Presumption test can be carried out in dilution of 1:10, 1:10, and 1:10
1:10 – add 1 ml of sample to 9ml buffered dilution water
1:100 – add 1 ml of 1:10 to 9 ml buffered dilution water
1:1,000 m- add 1 ml of 1: 100 to 9 ml buffered dilution water
Most probable number (MPN) per 100 ml shall mean hot coli form density in water which is most likely o procedure a given analytical result.
Or it is the bacteria concentration which, if it had been present in the sample under examination, which would most frequently have given the observed results.

c. Media specification

Lactose broth or laurel tyr tose broth

1. **Weight 19.5 gms laurel try tose broth**
2. **Dissolve in 1,ooo ml of distilled water**
3. **Distribution 20 ml of solution into test tubes with inverted vials**
4. **Sterilize for 15 minutes at 121 degree centigrade but not greater than 45 minutes**

2. **Confirmatory – the procedure utilize a selective medium to facilitate the recognition of E.coli colonies. It utilizes two test procedures.**

a.BGB

1. Procedure for BGB
a. pipette 0.30 ml of broth from positive presumptive tubes to 5- 10 ml portion of BGB tubes
b. mix by gentle shaking
c. incubate at 5 degree centigrade

2. Interpretation

The formation of gas in any amount in the inoculate tubes at anytime within 24 – 48 hours constitutes a positive confirmed test.

It allows the coli form grow due to the 0.30 ml inoculants.

Aerobic spore formers cannot grow within 4 hours.

3. Preparation of media

- **a. Weigh 40 gms bacto brilliant green bile 2%**
- **b. Dissolve in 1 liter distilled water**
- **c. Distribute 10 ml of the solution into fermentation tubes with fermentation vials**
- **d. Sterilize for 15 minutes 1t 121 degree centigrade**

B. EMB test gar plates

1. Procedure for eosin Methylene blue agar plates

a. streak each positive presumptive tubes in EMB agar plate

b. incubate the plates (inverted) at 35 degree centigrade + 5 degree centigrad4e for 24 hours + 2 hours

2. Interpretation

The EMB agar utilize two days, eosin and methylene blue, on this medium, E-coli procedure blue-black colonies with a metallic sheen whereas the other principal numbers of the coli form group capable of fermenting lactose with acid and gas production the enterobacter aero genes (not necessary indicates of fecal contamination, procedure pale, pink, mucoloid, colonies without a sheen) other forms than the E-coli and the anterobacter fail to grow because of the presence of the inhibitor dyes.

3. Fecal coli form determination using the EC broth

- **a. Procedure**

  1. Pipette 0.30 ml of positive presumptive tubes to 5-10 ml tubes E-C-medium

  2. Place in water bath at 44.5 degree centigrade + 0.20 degree centigrade for 24 hours

b.Interpretation

Presence of gas in the tubes after incubation period indicates a positive test-the slight elevation of temperature eliminates with gas production but allow E-coli growth.

3. Media preparation

1. Dissolve 37 gms gas BACTO EC medium in 1 liter distilled water

2. Distribution in test tubes with inverted vial

3.sterilize for 5 minutes at 121 degree centigrade

4. completed test procedure – utilize the secondary lactose broth, gram straining and a series of physiological tests known as IMVIC tests.

a. secondary lactose broth

1. procedure for the secondary lactose broth

a. fish one or more typical colonies from EMB agar plates and transfer to secondary lactose broth

b. incubates for 24 hours at 35 degree centigrade

2. Interpretation

Formation of gas confirms the presence of coli form group of bacteria is non-specific

3.media preparation

Same as lactose broth but only in 10 ml positions

b. Nutrient agar slant

1. Procedure for the nutrient agar slant

a. fish one or more typical colonies from the EMB agar plates and transfer to nutrient agar slant

b. incubates for 24 hours at 35 centigrade

C. Gram straining technique

1. Prepare a light emulsion of the bacteria growth

2. Add a drop of distilled water

3. air dry by passing the slide through flame

4. Stain the smear for (1) minute with ammonium oxalate crystal violet solution

5. Wash the slide in water

6. Add lugol's solution for (1) minute

7. Wash the stained slide in water and blot dry

8. Decolorize with ethyl alcohol and blot dry

9. Cover with counter stain for 15 seconds

10. wash, blot dry and examines under a microscope.

Interpretation

Cells which decolorize and accept the safranin are gram because negative and show a pink color. Cells which do not decolorize (deep blue) but retain are gram positive

Procedure should be done 18-24 after start because some bacteria lose their gram positiveness after this period.

4. **IMVIC tests- a series of test for the final distinction of the coli form organisms**
    1. **In dole tests procedure**
        a. **Inoculate the idols' medium with a growth from the agar slant**
        b. **Incubates at 35 degree centigrade for 24 hours**
        c. **Add 0.20 ml. of the test reagent**
        5. **Let stored for 10 minutes**

Dark red color- positive tests

Yellow color-negative tests

The test in dole production from tryptophan performed on a culture medium is test for the presence of the enzyme tryptophan's which splits tryptophan to in dole, private and ammonia. This enzyme is present it many bacteria of the enteric group but not found in the aero genes. The enzyme turns the solution to red.

2. Methyl red test procedure
a. to 5 ml of the inoculated medium, add 0.20 ml of methyl red indicator solution
b. shake and let stand for 10 minutes

Interpretation

The methyl red affords a measure of final pH. This indicator is yellow at a pH of 4.5 or higher and red at lower pH. A positive test (red color) is therefore indicative of substantial acid production characteristic of a mixed acid fermentation.

4. **Voges proskauer test**

a. **To 5 ml of the inoculated medium, add 0.5 ml Naphtali solution**
b. **Shake well and add 0.20 ml KOH 40% solution or Noah solution**
c. **Mix by shaking and allow to stand for 2 hrs**

Interpretation

It is color test for ace ton an intermediate in the butanedcil indicative of butanediol fermentation.

4.Soduim citrate test

a. inoculate the agar medium with a straight needle, using both a stab and streak

b. incubate at 15 degree centigrade for 24 hours

Interpretation

Blue coloration of the agar- positive test

Green coloration of the agar- negative test

The citrate utilization test determine ability to grow in a synthetic medium containing citrate as the most carbon source this ability id lacking in most strain E-coli as a result of the citrate perm ease.

5. **Kosher citrate test**
   a. **In a 5 ml koshers medium, inoculate it with growth from the agar slant**
   b. **Incubate at 15 degree centigrade for 24 hours**

Interpretation

Appearance of turbidity in the medium means a positive koser test. The E-coli group cannot utilize the synthetic carbon

	In dole	Methyl Red	Voges Proskaner	Clurate test
E-coli	+	+	-	-
Enterobacter	-	-	+	+
Aerogenes				

c. **Membrane filter method- utilize a flat, highly porous, flexible plastic disc with a single size porosity (0.45+0.20 mm dia) any desired sample size is passed thurough the filter. Micro=organisms are impinged on the surface**

and allowed to grow upon a nutrient substrate on a blotter-like material or agar. The media is allowed to pass the filter via capillary action

1. Advantages over the multiple tube fermentation technique
    a. Large samples of water can be treated
    b. Takes only 20 hours for a completed test
    c. Gives a direct results
    d. adopted to field operation
2. disadvantages
    a. cannot be used on water of high turbidity
    b. media must always be fresh
    c. costlier than the multiple tube technique

Interpretation

All organisms that produce dark purplish green colony with a metallic sheen within 20 hours are considered to be members of the coli form

F.WATER CONNECTIONS

1. Service application

The primary and the most basic service offered by the district is to provide water connections to interested party, be it a person, government instrumentalities, commercial establishments, group or corporation. The following are the steps and procedures that need be accomplished namely:

a. The applicant will fill up application from and will be interviewed by customer service section. Application will then be forwarded to engineering
b. the engineering section will conduct site inspection to determine the materials needed. the location of the tapping point and the water meter set
c. having receive the inspection report, materials and miscellaneous fees will be computed by customer service section
d. the applicant will attend orientation seminar to be conducted and schedule by customer service section
e. the applicant will pay the amount of materials needed and other miscellaneous fees; will be required to submit current photocopy of tax identification number and plumbing permit to be acquired from LGU-bulan
f. the GM will approve/disapprove the application
g. if the application is approve, the job water will be issued to the engineering section fo the installation of water

2.Disconnection of service connection

It is inevitable that some water concessionaries need to be disconnection from the water system of the district , reasons for disconnections are, but not limited to- no-payment of water bills for two(2) consecutive months, tampering or illegal acts done on the water connection, and voluntary/temporary disconnection.

a. **Customer service will determine the need for disconnections of a particular concessionaire will inform the GM**
b. **The GM after verification of the facts may issue disconnection and should take necessary measures to documents the disconnection work, such as taking pictures, or acquire evidences if the subject concessionaire is involve some illegal acts on his/her water connections.**

3.Reconnection

Disconnected concessionaire may opt to be reconnected to the water system The following are the procedure

a. **The concessionaire will personally inform the customer service section of his/her intention to be reconnected to the water system of the district**
b. **The customer service will determine where or not the concessionaires will be eligible for reconnection**
c. **The concessionaire will fill up application form**
d. **The customer service section may request the engineering section for inspection**
e. **After inspection the customer service will compute the amount needed relative to the requested reconnection**
f. **The customer service will conduct one-one re-orientation seminar**
g. **The concessionaire will pay the needed amount**
h. **If the materials needed are not available in the districts. thee concessionaires will buy the materials from other source**
i. **The concessionaire will pay the computed amount to the cashier**
j. **The GM will approve/disapprove the request for reconnection**
k. **The Gm will issue Job Order to the engineering section of the reconnection**
l. **The Billing section will be duly informed by the customer service of the reconnected concessionaire**

4.Request for service

One a concessionaire is connected to the water system of the district the latter shall be duty bound after-reconnection service if requested. The service that maybe requested are-repair of leakage busted stand pipes, change of defective meters, relocation of water meter relocation of tapping point, change of gate valve or faucets, change name change of classification of service (residential to commercial or vice versa).

The following are the steps to be taken;

a. **The concessionaire will personally request the desired or needed service, fill up necessary forms and have his/her request recorded in the log-book**
b. **Customer service may request the technical section for inspection if needed**
c. **The concessionaire will pay the needed or determined amount if there are any**
d. **The customer service will request the engineering section to satisfy the requested services.**