

SMOKY LAKE COUNTY



Title: Warspite Water Plant Procedures	Policy No.: 05-01
Section: 04	Page No.: 1 of 14

Legislation Reference:	<i>Alberta Provincial Statutes and Alberta Water and Wastewater Operator Guidelines</i>
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Purpose:	To establish procedures to be followed by water plant operators for the water facility at the Hamlet of Warspite.
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Policy Statement and Guidelines:

STATEMENT

The Warspite Plant Procedure is a tool to assist the water operators to proactively identify the routine procedures to operate the water plant in a efficient and safe manner.

PROCEDURES

The **Water Plant Procedures** as outlined in *Schedule "A"* include:

1. Daily Inspections of Plant and surrounding area.
2. Daily logging of pumps, gauges, reverse osmosis plant, chemical dosages, and water chemistry.
3. Daily testing of plant and distribution water.
4. Weekly bacteriological sampling and logging.
5. Basic operation and calibration of equipment.
6. Calculations for chlorine and antiscalent.
7. Guidelines for reverse osmosis plant operations.
8. Guidelines for water chemistry.
9. Maintenance schedule.
10. Water operation logbook.
11. Exiting plant checklist.
12. Inspection flowchart.
13. Water testing flowchart.
14. Water plant flowchart.
15. Piping color codes.

	Date	Resolution Number
Approved	January 12, 2009	# 013-09 - Page # 24
Amended		
Amended		



WARSPITE WATER PLANT PROCEDURES

SCHEDULE "A"

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1. Daily Inspection of plant and surrounding area.**Outside:**

1. Walk around building looking for damage and leaks; note them down so they can be repaired.
2. Inspect fence for breaks open gates and unlocked gates; note down and fix any problems.
3. Check well covers, storage tank lids and vents so all are secured; note and correct any problems.

Inside:

1. Check all piping for leaks and cracks; note and correct problems.
2. Listen to pumps for unusual noises; note and repair.
3. Check all gauges and valves for proper operation.
4. Inspect walls and ceiling of building for leaks; note and repair.
5. Make sure chemical metering pumps are working; note and repair.

2. Daily logging of pumps, gauges and reverse osmosis plant.**Pumps:**

1. On pump control panel located in south east corner of plant record the following on pump log sheet.
 - 1.1 Reverse osmosis pump reading.
 - 1.2 Calculate daily run time by subtracting reading from day before from today's reading and record.
 - 1.3 Distributions pump 1 reading.
 - 1.4 Calculate daily run time by subtracting reading from day before from today's reading and record.
 - 1.5 Distributions pump 2 reading.
 - 1.6 Calculate daily run time by subtracting reading from day before from today's reading and record.
 - 1.7 Fires pump reading.
 - 1.8 Calculate daily run time by subtracting reading from day before from today's reading and record.

Metering Pumps:

1. Off of the two metering pumps note the speed and stroke.
2. If changes are made note in operations log book.

2. Daily logging of pumps, gauges and reverse osmosis plant - *Cont.***Gauges:**

1. In **truck fill room** record the following on water treatment log sheet.
 - 1.1 Read and record raw water inlet pressure.
 - 1.2 Read and record raw water usage off meter.
 - 1.3 Calculate daily usage by subtracting previous days reading from today's reading.
2. In **water treatment plant room** record the following on water treatment log sheet.
 - 2.1 Read and record distribution water off meter on 3" line.
 - 2.2 Calculate daily usage by subtracting previous days reading from today's reading.
 - 2.3 Read and record blended water off meter on 1" line.
 - 2.4 Calculate daily usage by subtracting previous days reading from today's reading.
 - 2.5 Read and record reservoir level off multi-ranger in south east corner of building.
 - 2.6 Read and record distribution pressure off digital gauge located east of steps.
3. Also calculate plant efficiency by dividing daily blended water usage by daily raw water usage and multiply by 100.

Chemical levels and dosages:

1. On Treatment Plant Log:
 - 1.1 Read and record level off of chlorine tank.
 - 1.2 Subtract reading from previous day's reading and record in chlorine used column.
 - 1.3 To calculate chlorine dose = (chlorine used x chlorine concentrate percentage x 10) / water produced, record in dosage column.
2. On Reverse Osmosis Log:
 - 2.1 Read and record level off of antiscalent tank.
 - 2.2 Subtract reading from previous day's reading and record in antiscalent used column.
 - 2.3 To calculate antiscalent dose = (antiscalent used x 100) / water produced, record in dosage column.

3. Daily testing of plant and distribution water.

Raw Water:

1. Turn on raw water tap and let run for 5 to 10 minutes so stale water in piping is purged.
2. Rinse out the two 225 ml flasks used for testing with tap water.
3. Fill the two 225 ml flasks approximately half full of raw water these will be used for temperature, pH, conductivity, salinity and total dissolved solids readings.
 - 3.1 **Temperature reading:** insert pH probe in flask, turn on and press read when meter locks in display record temperature reading.
 - 3.2 **pH reading:** insert pH probe in flask turn on and press read when meter locks in display record pH reading.
 - 3.3 In other flask insert **conductivity** probe, turn on and press TDS button and press read when meter Locks record reading in TDS column.
 - 3.4 Press **salinity** button and record reading in salinity column.
 - 3.5 Press **cond** button and record reading in conductivity column.
4. Rinse out the 25 ml covets with raw water twice.
5. Fill one 25 ml covet with raw water to top mark this will be used to measure turbidity.
 - 5.1 Clean and dry covet with chem wipes.
 - 5.2 Insert covet into turbidity 2100 meter, turn on and press read when it stabilizes record reading in raw water turbidity column.

Treated Water:

1. Turn on cold water tap in water plant and run for 5 to 10 minutes so stale water in piping is purged.
2. Rinse out the two 225 ml flasks with tap water.
3. Fill the two 225 ml flasks approximately half full of treated water from sink tap these will be used for temperature, pH, conductivity, salinity and total dissolved solids readings.
 - 3.1 **Temperature reading:** insert pH probe in flask, turn on and press read when meter locks in display record temperature reading.
 - 3.2 **pH reading:** insert pH probe in flask turn on and press read when meter locks in display record pH reading.
 - 3.3 In other flask insert **conductivity** probe, turn on and press TDS button and press read when meter locks record reading in TDS column.
 - 3.4 Press **salinity** button and record reading in salinity column.
 - 3.5 Press **cond** button and record reading in conductivity column.

3. Daily testing of plant and distribution water - *Cont.*

Treated Water - Cont:

4. Rinse out the 25 ml covets with tap water twice.
5. Fill one 25 ml covet with treated water to top mark this will be used to measure turbidity.
 - 5.1 Clean and dry covet with chem wipes.
 - 5.2 Insert covet into turbidity meter, turn on and press read, record reading in plant turbidity column.
6. Rinse out the two 25 ml covets with tap water twice.
7. Fill two 25 ml covets with treated water to 10 ml mark.
 - 7.1 Clean and dry one covet with chem wipes.
 - 7.2 Turn on colorimeter and make sure it is on program 9 for total chlorine.
 - 7.3 Insert into colorimeter and press zero.
 - 7.4 In other covet add contents of one total dpd package and shake until all powder is dissolved.
 - 7.5 Press timer for 3 minute countdown and press enter.
 - 7.6 When countdown is ended insert covet with reagent and press read.
 - 7.7 Record reading in plant treated water column on water plant daily log.

Distribution Water:

1. Run water from collection site for 5 to 10 minutes so stale water is purged.
2. Rinse out collection jar with water from sampling site.
3. Collect distribution sample from hamlet in 500 ml jar.
4. Rinse out the two flasks used for testing with tap water twice.
5. Fill the two 225 ml flasks approximately half full of distribution water from sink tap these will be used for temperature, pH, conductivity, salinity and total dissolved solids readings.
 - 5.1 **Temperature reading:** insert pH probe in flask, turn on and press read when meter locks in display record temperature reading.
 - 5.2 **pH reading:** insert pH probe in flask turn on and press read when meter locks in display record pH reading.
 - 5.3 In other flask insert **conductivity** probe, turn on and press TDS button and press read when meter locks record reading in TDS column.
 - 5.4 Press **salinity** button and record reading in salinity column.
 - 5.5 Press **cond** button and record reading in conductivity column.
6. Rinse out the 25 ml covets with tap water twice.
7. Fill one 25 ml covet with treated water to top mark this will be used to measure turbidity.
 - 7.1 Clean and dry covet with chem wipes.
 - 7.2 Insert covet into turbidity meter, turn on and press read, record reading in distribution turbidity column.

3. Daily testing of plant and distribution water - *Cont.*

Distribution Water - Cont:

8. Rinse out the two 25 ml covets with tap water twice.
9. Fill two 25 ml covets with treated water to 10 ml mark.
 - 9.1 Clean and dry one covet with chem wipes.
 - 9.2 Turn on colorimeter and make sure it is on program 9 for total chlorine.
 - 9.3 Insert into colorimeter and press zero.
 - 9.4 In other covet add contents of one total dpd package and shake until all powder is dissolved.
 - 9.5 Press timer for 3 minute countdown and press enter.
 - 9.6 When countdown is ended insert covet with reagent and press read.
 - 9.7 Record reading in plant treated water column on water plant daily log.

Permeate Water:

1. Read permeate pH off of gauge on west wall of treatment plant above antiscalent tank record water chemistry log.

4. Weekly bacteriological sampling and recording.

- A. Obtain required number of sample bottles and requisition forms from hospital at start of week after 8:30 A.M.
- B. Have all supply location labels for week accessible.
- C. Return sample bottles and requisition forms to hospital before noon.

Raw Water – (Monthly):

1. Open raw water tap and let run for 5 minutes so stale water is purged.
2. Fill sample bottle to full mark.
3. Dry bottle and detach identification label from requisition form and affix to bottle.
4. Attach location label to requisition label.
5. Fill out requisition form and location label.
6. Place requisition form around bottle and secure with rubber band.
7. Secure for transport to hospital.

Distribution Water – (Weekly):

1. Run water from collection site for 5 to 10 minutes so stale water is purged.
2. From distribution sample bottle fill sample bottle to full mark.
3. Dry bottle and detach identification label from requisition form and affix to bottle.
4. Attach location label to requisition label.
5. Fill out requisition form and location label.
6. Record location, time ID number and chlorine concentration on daily log sheet.
7. Place requisition form around bottle and secure with rubber band.
8. Secure for transport to hospital.

5. Basic operation and Calibration of lab equipment.

Portable Turbidimeter 2100P:

1. Used for testing turbidity, particles in water.
2. Calibration is needed every three months, refer to manual Section 3.6.
3. Refer to portable turbidimeter model 2100P manual.

Colorimeter DR/890:

1. Used for testing total chlorine program 9 (page 133 in manual).
2. Calibration is not needed.
3. For accurate results refer to manual Section 1 (reagent blank correction).
4. Refer to colorimeter DR/890 manual.

Pocket Colorimeter:

1. Used for testing chlorine.
2. Calibration is not needed.
3. Refer to pocket colorimeter manual.

Conductivity Meter sensION5:

1. Used for measuring conductivity, salinity and total dissolved solids.
2. Calibrate weekly, refer to manual Section 3.2.
3. Refer to sensION1 Manual.

Platinum Series pH Electrode:

1. Used in conjunction with pH meter.
2. Refer to pH electrode model 5910 manual.

ALL MANUALS ARE KEPT IN CUPBOARD ABOVE LAB EQUIPMENT.

6. Chlorine and Antiscalent calculations.

Chlorine:

1. Daily chlorine use – basic calculation:

1.1 40% chlorine mixture

Dose = (CL2 used in litres x 48) / Blended water produced

IE. Dose = (5L x 48) / 40 m³

Dose = 6 mg/L

2. Actual calculation:

2.1 For any concentration actual:

Dose = (CL2 used in litres x tank concentration x sodium hypochlorite 12% x 1000 mg/L) /
(blended water produced in m³)

IE. Dose = (5L x 0.40 x 0.12 x 1000 mg/L) / (40 m³)

Dose = 6 mg/L

Simplified:

2.2 Dose = (CL2 used in litres x tank concentration x sodium hypochlorite 12% /
(blended water produced in m³ x 10)

Dose = (5L x 40% x 12%) / (40 x 10)

Dose = 6 mg/L

Adding sodium hypochlorite to chlorine solution tank:

1. Tank capacity is 24 Litres:

1.1 Subtract level from full tank level x % solution.

IE. Hypo = (Full level in litres – fluid level in liters) x (% solution / 100)

Hypo = (24L – 10L) x (40/100)

Hypo = 5.6L

1.2 Mark level on tank and add amount of Hypo needed and put mark on tank add hypo to that mark.

IE. 10L + 5.6L = 15.6L

1.3 Top off with tap water to full mark 24L

6. Chlorine and Antiscalent calculations - *Cont.*

Antiscalent:

1. For daily antiscalent use, basic calculation:
 - 1.1 At 10% mixture:
 Dose = (litres used x 100) / m³ water produced
 IE. Dose = (2 x 100) / 40
 Dose = 5 mg/L
2. Actual calculation:
 - 2.1 At any concentration:
 Dose = (Litres used x tank concentration x 1000 mg/L) / (m³ water produced)
 Dose = (2L x 0.10% x 1000 mg/L) / 40 m³
 Dose = 5 mg/L
3. Simplified calculation:
 - 3.1 At any concentration:
 Dose = (Litres used x tank concentration x 10) / (m³ produced)
 Dose = (2L x 10% x 10) / 40 m³
 Dose = 5 mg/L

Adding MDC 150 to antiscalent tank:

1. Tank capacity is 100L.
 - 1.1 Subtract level from full mark x % solution
 IE. MDC 150 = (Full level in litres – fluid level in litres) x (% concentration / 100)
 MDC 150 = (100L – 30L) x (10%/100)
 MDC 150 = 7L
 - 1.2 Put mark on tank and add amount of MDC 150 needed and put another mark on tank, add MDC 150 to that mark.
 IE. (30L + 7L) = 37L
 - 1.3 Top off with water to 100L mark.

7. Guidelines for Reverse Osmosis Plant Operations.

1. **Manual for Osmonics E4-11000 DLX is located in lower right hand shelf of desk in office.**
2. GE Osmonics Start-up sheets located in top left drawer of file cabinet in office.
3. Plant is automatic no valves or electronics need to be adjusted.
4. If plant is not running, and it needs to be turned on for logging flows and other information it can be turned on – on the pump control panel.
5. Turn switch from auto to manual and run for 5 to minutes before.
6. If readings are far off from what is recorded on log sheets look for valves on or leaking, check for broken pipes and lines and correct problems.

8. Guidelines for water chemistry.

1. Guidelines for Canadian Drinking Water Quality located in desk office.
2. Plant approval can be located in top right drawer of file cabinet.
3. Weekly bacterial tests can be located in water department office.
4. Analytical Report of raw and treated water can be found in top right drawer of file cabinet.
5. If readings are far off from what is recorded in log sheets could indicate problems such as well contamination, plant operation failure, reservoir contamination or distribution infiltration.

9. Maintenance Schedule.

1. Greasing of distribution and fire pumps should be done every month.
2. Valves should be checked for proper operation twice a year.
3. Solenoids should be checked for proper operation annually.
4. Gauges and meters should be checked annually.
5. Metering pumps should be checked for scale buildup, a clogged or broken piping.

10. Water Operations Logbook.

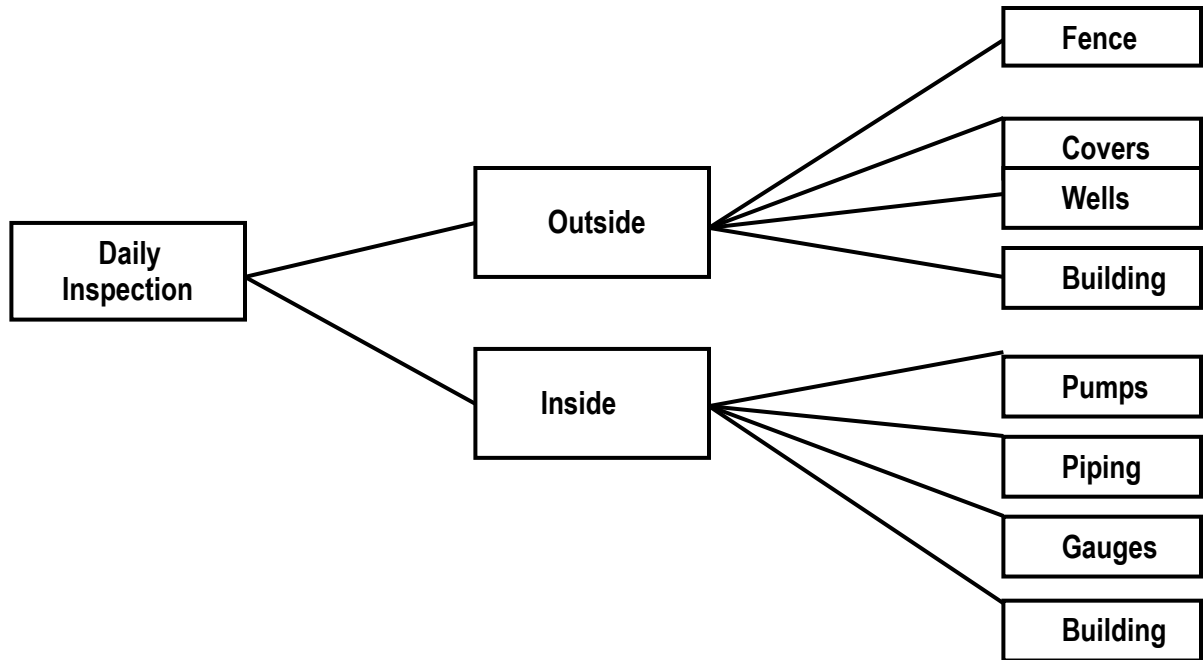
1. Logbook should contain date and time of recordings.
2. Indicate that plant check was done.
3. Record total chlorine readings for plant and distribution.
4. Any changes to solutions should be recorded.
5. Metering pump adjustments should be recorded.
6. Trend changes in water chemistry or chemical usage should be noted.
7. Equipment repair or replacement should be recorded.
8. Note anything not operating properly or needing repair.
9. Condition of plant and area should be recorded.
10. Building, well, storage tank and surrounding area problems should be noted.
11. Repairs to these areas should be noted.
12. Lift station condition should be recorded.
13. Work or repairs done to water and sewer systems in hamlet should be noted.

11. Exiting Plant Checklist.

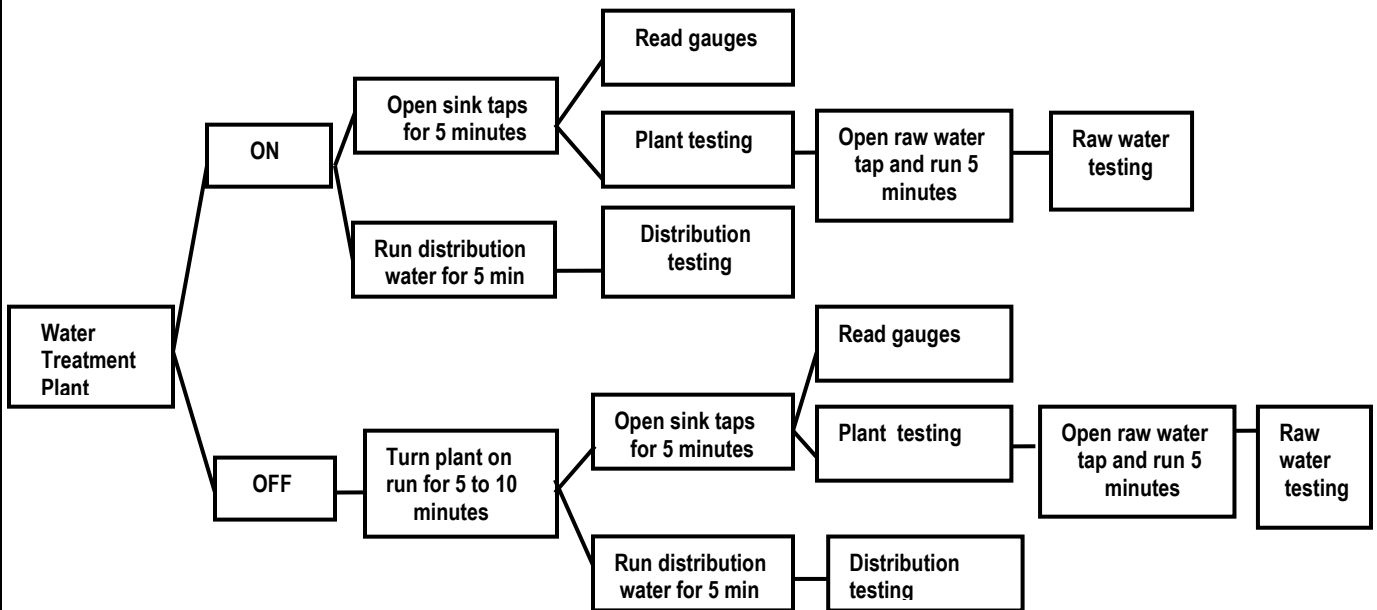
This information should be placed in an area so workers can view it before leaving water treatment plant for the day.

1. Insure all switches are in proper position.
2. Reverse Osmosis switch in auto position.
3. Fire pump switch in off position.
4. Distribution pump switch in auto position.
5. Chemical tanks have enough solution for required water produced. (*enough for weekends*)
6. No taps or water hoses left on.
7. Metering pumps working.
8. Insure all doors closed and locked.

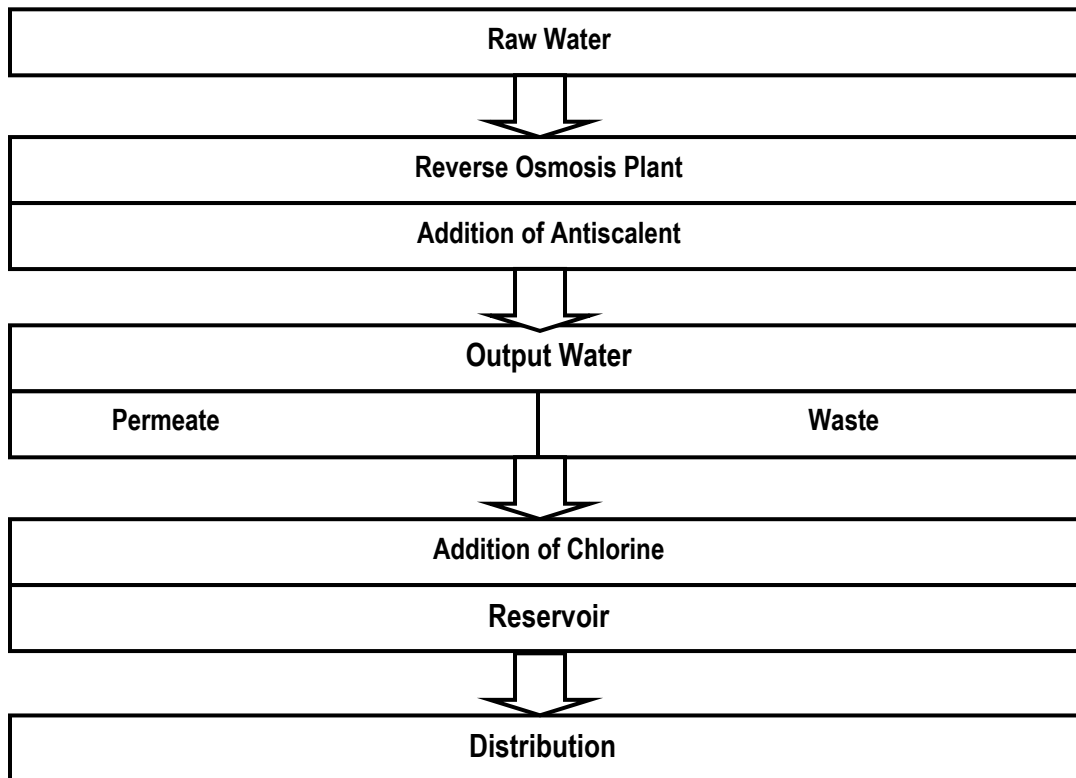
12. Inspection Flowchart.



13. Water Testing Flowchart.



14. Water Operations Logbook.



15. Piping Color Codes.

- 1. Raw water and untreated water piping should be dark green.
- 2. Treated and distribution piping should be dark blue.
- 3. Waste water and backwash piping should be dark brown.
- 4. Chlorine piping should be yellow.

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