

TOOLS FOR BEST PRACTICE MANUAL FOR DOMESTIC WATER STORAGE TANKS

Supplementary material to:

Makoko EW, Wozei E and Birungi L (2020) Relationship between water quality and physical conditions of domestic storage tanks supplied by a water utility in a rapidly growing city.

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Table S1: **Daily Duties (By Owner, Responsible Person)**

DAILY CHECKLIST			
Date:	Response	Possible Cause	Corrective Action Taken by Owner/Responsible Person
Check			
Is the tank overflowing?	Yes No		
Is the tank leaking?	Yes No		
Is water level within the required range?	Yes No		
Are the warning lights in normal operating mode?	Yes No		
Any other unusual occurrence	Yes No		
Tank Level (m³): Other Notes: Checked by:			

Table S2: **Weekly Duties (By Owner, Responsible Person/Technician)**

WEEKLY CHECKLIST				
Date:				
No	Defects Check	Nature of defect	Repairs Done	By Who
1				
2				
3				
Comments:				
Pumping Rate	Pressure Rating	Hours Run	Tank Water Level (m ³)	Comments
Checked by:				

Table S3: **Monthly Duties (By Owner, Responsible Person/Technician/ Utility/Entity)**

MONTHLY CHECKLIST					
Date:					
Water Quality Check					
#	Water Level (m ³)	No of samples	Analysis needed	Parameters for analysis:	Sample Analysis Lab Name
1				<ul style="list-style-type: none"> • Bacteria (B) • Chemical (C) • Physical (P) • Others, specify (O)
2					Certified for potable water analysis? <input type="checkbox"/> No <input type="checkbox"/> Yes
3					
Note: APHA (2005), Standard Methods for the Examination of Water and Wastewater; procedures for sampling are be used.					
Checked & Sampled by: Comments:					

Table 1: Quarterly Duties (Owner, Technical/Responsible Person/Utility/Entity)

QUARTERLY INSPECTION REPORTING						
Inspection		By		(Owner, Technical/Responsible		Inspection Date:
Person/Entity):.....	
Sanitary Inspection Checklist			Was examination performed?		Inspection Results	
					Corrective Action Taken	
Examine all tank openings (if any) such as vents, overflows) if they are properly screened.			Yes	No	Yes	No
Examine for blockage or tears of vents and screens			Yes	No	Yes	No
Examine for any deterioration in the tank walls or the tank foundation. Such as excessive pitting in steel tanks, or large cracks in concrete structures			Yes	No	Yes	No
Removing any notable silt build-up			Yes	No	Yes	No
Examine general condition and integrity of internal tank structure			Yes	No	Yes	No
Examine general condition and integrity of external tank structure			Yes	No	Yes	No
Examine condition of all pipes connected to the tank			Yes	No	Yes	No
Examine condition of access ladders (if any)			Yes	No	Yes	No
Examine condition of the roof			Yes	No	Yes	No
Examine for presence of sediment			Yes	No	Yes	No
Examine for presence of biological growth			Yes	No	Yes	No
Examine for presence of floatable debris and/or insects in the tank			Yes	No	Yes	No
Examine for presence of rodent or bird activity on, in or around the tank			Yes	No	Yes	No
Examine for the presence of a drain pipe			Yes	No	Yes	No
Comments:						
Tank Cleaning Description			Response		Descriptive Notes	
Is cleaning done?			Yes	No		
Is disinfection done after cleaning?			Yes	No		
Is there a schedule?			Yes	No		
Comments:						
No	Defects Description	Defect Nature		Repairs Done	By Who	
1						
2						
3						
Comments:						

Table 2: Inspection Protocol

GENERAL INFORMATION					
Area:					
Contact Person:			Address:		
Tank ID:					
Tank Location:			Tank Material:		
Tank Age:					
Building Occupancy: <input type="checkbox"/> Multiple Dwelling <input type="checkbox"/> Commercial <input type="checkbox"/> Mixed Use <input type="checkbox"/> Other:					
INSPECTION REPORTING					
Was a tank inspection performed? <input type="checkbox"/> Yes <input type="checkbox"/> No		Inspection By (Person, Entity/firm):		Inspection Date:	
Sanitary Inspection	Was examination performed?		Inspection Results		
			Unsanitary Condition		Corrective Action Taken
Examined general condition and integrity of internal tank structure	Yes	No	Yes	No	Yes No
Examined general condition and integrity of external tank structure	Yes	No	Yes	No	Yes No
Examined condition of all pipes connected to the tank	Yes	No	Yes	No	Yes No
Examined condition of access ladders	Yes	No	Yes	No	Yes No
Examined condition of the roof	Yes	No	Yes	No	Yes No
Examined for presence of sediment	Yes	No	Yes	No	Yes No
Examined for presence of biological growth	Yes	No	Yes	No	Yes No
Examined for presence of floatable debris and/or insects in the tank	Yes	No	Yes	No	Yes No
Examined for presence of rodent or bird activity on, in or around the tank	Yes	No	Yes	No	Yes No
Examined for any tank damage or deterioration	Yes	No	Yes	No	Yes No
Examined for the leaking of the tank	Yes	No	Yes	No	Yes No
Examined for rusting of the tank	Yes	No	Yes	No	Yes No
Examined for the presence of an overflow/float valve.	Yes	No	Yes	No	Yes No
Examined for the presence of a drain pipe	Yes	No	Yes	No	Yes No
Water Quality Inspection					
Was a sample collected? <input type="checkbox"/> No <input type="checkbox"/> Yes Sample Analysis Lab Name: Certified for potable water analysis? <input type="checkbox"/> No <input type="checkbox"/> Yes Parameters Analysed: <input type="checkbox"/> Bacteria <input type="checkbox"/> Chemical <input type="checkbox"/> Physical <input type="checkbox"/> Others			Compliance of Results Faecal Coliform: Present <input type="checkbox"/> <input type="checkbox"/> Absent/None detected E. coli: Present <input type="checkbox"/> <input type="checkbox"/> Absent/None detected Turbidity: Present <input type="checkbox"/> <input type="checkbox"/> Absent/None detected pH: Present <input type="checkbox"/> <input type="checkbox"/> Absent/None detected Other Parameters Meets Standards/Guidelines? Yes <input type="checkbox"/> <input type="checkbox"/> No		
Note: Standards and guidelines for drinking water (US, 2014 and WHO, 2011)					

Remarks:

Inspector's Name

Signature

Date

Table 3: Risk Prediction Checklist

GENERAL INFORMATION		
Area:		
Tank Name:	Tank ID:	
Tank Location: Tank Material:		
Tank Age:		
Proposed Checking Date:	Actual Checking Date:	
Name of Person Checking:	Title of Person Checking:	
I certify that this information is complete and accurate:		Date:
OVERALL TANK CONDITION		
Risk Check	Response	Risk Score
Is the tank covered?	Yes No	
Is the tank always cleaned?	Yes No	
Is the tank always disinfected after cleaning?	Yes No	
Is the tank damaged/deteriorated?	Yes No	
Are the tank supports deteriorated/damaged?	Yes No	
Does the tank leak?	Yes No	
Is there growth of algal in the tank?	Yes No	
Is the tank rusty/accumulated sludge?	Yes No	
Is there foreign materials like bird faeces on or around the tank?	Yes No	
Does the tank appear to be structurally sound?	Yes No	
Does the tank have an overflow/float valve?	Yes No	
Does the tank has a drain pipe?	Yes No	
Can water ably drain away from tank?	Yes No	
Is there evidence of shell/head corrosion or cracking?	Yes No	
Is the tank sufficiently protected from water intrusion?	Yes No	
Risk Score: 8 - 10 = Critical; 6 – 7 = High; 4 – 5 = Medium; 0 – 3 = Low		
Descriptive Check	Response	
Describe any other items noted that have the potential to cause contamination of the finished drinking water in the tank?		
What is the depth of sediment found in the tank before cleaning (inches)?		
If the storage tank was cleaned, how often in a year?		
How was the storage tank cleaned?		
How was the storage tank disinfected after cleaning?		
List any objects found inside the tank during cleaning that may have introduced contamination into the water system (examples: debris, animals, etc):		

Remarks:

Signature

Date