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Water Association

# Experiences from O&M Implementation and its Impact on WSP Performance

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# Do We Need Water Safety Planning?

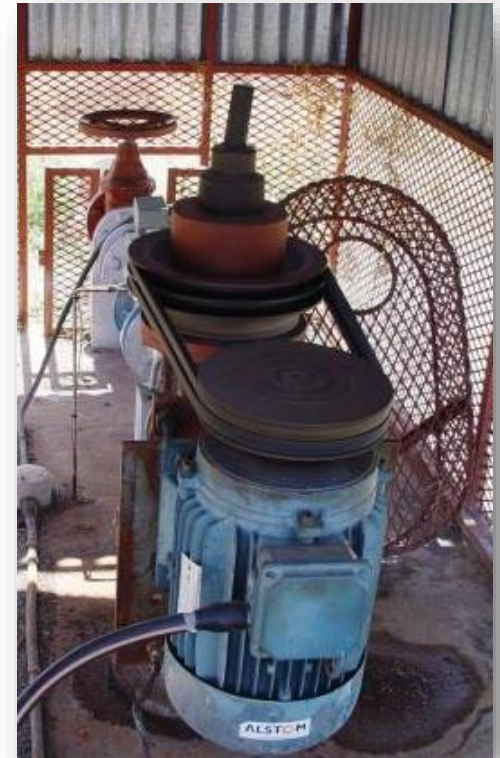
**“Its not new, we do this stuff, its just packaged better”**

**“I finally understand my system”**

**“I know where my risks are”**

**“It helps me get money to fix issues”**

**“I sleep better at night”**



# Water Safety Planning – Typical Steps

1. Assemble WSP team/key stakeholders
2. Describe the water supply system
3. Identify the hazards and assess the risks
4. Determine & validate control measures, reassess & prioritize risks
5. Develop, implement & maintain an improvement plan
6. Define monitoring of control measures
7. Verify the effectiveness of the WSP
8. Prepare management procedures
9. Develop supporting programmes
10. Plan & carry out periodic review of the WSP
11. Revise the WSP following incident



# Step 1: Assembling the WSP Team

- O&M personnel must be part of WSP team
  - Hydraulics, WT, process, mechanical, and/or electrical skills should be included,
    - **Internal AND external (contracted)**  
→ Otherwise not full process analysis/assessment leading to limited improvement
- The WSP team generates outputs for O&M teams and their practices
- Changes within O&M practices give input to WSP
- O&M representatives → must be able to **raise awareness, influence and implement change** in O&M activities





# Step 1: Assembling the WSP Team - *Typical Challenges*

- **Geographical dispersion** → **one** O&M representative may not be enough
- The O&M representative **doesn't have full technical know-how** necessary for good O&M
  - Mechanical might not be electrical expert
- **Influence/communication** between O&M representative & on-the-ground staff may not be ideal
- Low priority, profile & associated accountability
  - Finance doesn't always understand O&M needs & impacts (e.g. chemical orders) → **Top Management support CRITICAL**
- Enforcement of by-laws often not seen as linked to or affecting O&M



## Step 2: Describe the Water Supply System

- O&M practices/procedures must be known, analyzed & assessed → contribution to water safety?
  - Performance of unit processes, reservoirs & pumping stations
  - Chemicals/equipment used & know-how
  - All maintenance products used must be known
  - Condition of all infrastructure (especially reservoirs)
  - Maintenance performance (preventive vs. corrective)
- Excellent opportunity to ensure ALL personnel understand the system & where/how they fit in
  - **MOTIVATION/PRIDE – My job is important!**
- WSP team leads but **execution of required actions by ALL**
- Set targets and track appropriate O&M PIs
  - Demonstrate that WSP implementation will assist O&M by focusing on critical organizational data/information
  - What do we really need to measure & track?



## Step 2: Describe the Water Supply System – *Typical Challenges*

- O&M practices/processes **not described**
- **Little/no data** on O&M performance
- Rural systems may have no maintenance at all
- **Poor design** leads to poor maintenance
  - Not ergonomically designed/user friendly, so the technician does not do the required maintenance
- Low level of technical support to define system
- **No mentoring** of junior **personnel/ineffective hand-over** to new personnel → loss of institutional knowledge
- Some O&M procedures in place, BUT don't know how to develop for all situations
  - E.g. Plan for reservoir cleaning but not for pipe cleaning





## Step 3: Identify the Hazards & Assess the Risks

- Many hazardous events → poor operation (e.g. absence of FCR measurements) and/or poor maintenance (e.g. absence of following good practices during burst pipe repair)
- Data from O&M performance → set probability of occurrence

→ Should compile a list of typical O&M hazardous events – illustrate the link between performance & water safety









## Step 3: Identify the Hazards & Assess the Risks – *Typical Challenges*

- Absence of preventive maintenance on critical equipment (e.g. chlorine dosing pumps)
- **Lack of spare parts** for critical equipment
- Reduced water level control in reservoirs, due to lack of personnel (e.g. in systems without SCADA control)
- It is **not easy to demonstrate** the direct (or even indirect) **consequences** to water safety as a result of poor O&M
- Hazards that lead to unavailability of water must be considered
  - Failure can result in **no service** – alternative sources



## Step 4: Determine & Validate Control Measures, Reassess & Prioritize the Risks

- Mostly water treatment-based processes
  - E.g. Chlorination to reduce E. coli
- Poor O&M presents hazards
- Improved O&M = control measure
  - E.g. Implement a maintenance plan for chlorinators
  - Focus on critical issues → optimal system performance
- A list of typical O&M control measures, linked with hazard events should be compiled & discussed, trying to illustrate the link between performance & water safety



# Step 4: Determine & Validate Control Measures, Reassess & Prioritize the Risks – *Typical Challenges*

- **No back-up systems/system redundancy**
- Training personnel how to implement preventive maintenance plans (especially on essential equipment – chlorine dosing pumps)
- ID low-cost solutions to control water levels in reservoirs
- Questions:
  - How to specifically demonstrate that each control measure reduces risk (i.e. multi-barrier approach is essential & required)?
  - How to identify non-obvious system blockages/breakages?





# Step 5: Develop, Implement, & Maintain an Improvement/Upgrade Plan

- Usually improvement/upgrade plan focuses on O&M
- O&M activities essential for WSP improvement
- **O&M team must be involved!**
- Organizational risk → strongly dependent on how O&M incorporate practices in their daily activities



## Step 6: Define Monitoring of Control Measures

- A significant part performed by O&M teams & equipment under their supervision
- Operations team
  - Access control (fence intact/perimeter secure), chlorine residual, water flow, pumps on/off, chemical supply, etc
- Maintenance team
  - Check condition of reservoirs, equipment performance, materials applied, etc



# Step 6: Define Monitoring of Control Measures

## — *Typical Challenges*

- **No validation** to ensure control measures are working (i.e. prove effectiveness)
- It is **not easy to demonstrate the relevance of the control measures**, in the way to show the consequence of the absence of control
- Maintenance teams are not “believers” of the relevance of good infrastructure maintenance as a good way to provide safe water





## Step 7: Verify the Effectiveness of the WSP

- All relevant O&M activities considered critical by the WSP must be periodically evaluated
  - By WSP team or external members (e.g. **audit programme**)
- Evaluate the effectiveness of both existing control measures and newly implemented control measures to reduce risk
  - **i.e. Are we spending our money wisely?**





## Step 8: Prepare Management Procedures

- Need to set or improve **Standard Operating Procedures**
- WSP team generate outputs for the SOPs and evaluate the effectiveness of the defined corrective actions



## Step 9: Develop Supporting Programmes

- Preventive & corrective maintenance are critical support programmes
- Drive improved operators know-how (by **training**) via WSP implementation
- Drive **changes** in maintenance procedures via WSP implementation



## Step 9: Develop Supporting Programmes – *Typical Challenges*

- WSP team **does not involve** O&M teams in the development of supporting programmes
  - E.g. Communication – who does what when an incident occurs?
- **Reduced time** available by the O&M teams to be involved in the planning, implementation and control of the supporting programmes
- If **O&M staff numbers** are a challenge, what additional programmes/actions are required?
- If **O&M staff skills** are a challenge, what additional programmes/actions are required?





# Step 10: Plan & Carry-Out Periodic Review of the WSP

- Since O&M representatives are present in the WSP, they will be involved in WSP periodic review
- O&M must provide data and information as an input for **WSP performance evaluation**
- The state of the art of O&M practices/procedures must be checked periodically
  - **Reduce risk and introduce cost efficiencies**





## Step 10: Plan & Carry-Out Periodic Review of the WSP – *Typical Challenges*

- WSP does not inform the O&M team what **relevant data and information** should be provided
- O&M teams are not aware of the relevance of updating practices and procedures
- WSP may not be linked to other institutional plans
  - E.g. in South Africa each municipality must have a “Water Services Development Plan” but this might not incorporate all the findings/required actions from the WSP



# Step 11: Revise the WSP Following Incident

- WSP revision can drive changes in O&M practices
- Typical challenges
  - Inability to identify poor O&M as a hazardous event
  - Lack of awareness of WSP by O&M teams → barriers to change





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# Thank You!

**IWA Water Safety Planning Specialist Group**  
*Closing the Gaps and Meeting Needs*