3M Science. Applied to Life.™

Health and safety at every step of wastewater treatment.

Take on workplace hazards for a safe and healthy shift.

Wastewater treatment is one of the unhealthiest jobs because of the risks:[1]

- **Biological:** gastrointestinal and upper respiratory illnesses
- **Physical:** cuts, burns, blunt force injury, accidental drowning, falls from height, hypoxia
- **Chemical:** irritation, injury or death from contact or inhalation

1. World Economic Forum. https://www.weforum.org/agenda/2015/11/which-jobs-are-most-damaging-to-your-health/

While the majority of wastewater treatment facilities require the use of PPE, studies have shown that compliance can be an issue:[2,3]

80% of wastewater workers identified respiratory issues as an occupational hazard that they face[2,3]

but only

28% identified respirators as mandatory PPE at their facility[2,3]

2. Wright, Tamara L. 2018. Examining the Issue of Compliance with Personal Protective Equipment Among Wastewater Workers in the Southeast Region of the United States. Doctoral Dissertation. Georgia Southern University, Jiann-Ping Hsu College of Public Health. https://core.ac.uk/download/pdf/229302045.pdf
3. Wright *et al.* 2019 Jun; 16(11):2009. *Int J Environ Res Public Health*. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6603999/

What potential PPE should be worn, where – and why?

Primary treatment
1. Intake: pump station
2. Solids separation: bar screens
3. Primary clarification: grit and sludge removal
4. Primary sedimentation (chemical treatment)

Secondary treatment
5. Secondary clarification (aeration and biological reduction)
6. Final sedimentation

Tertiary treatment
7. Disinfection, final treatment and discharge

Newer workers may be more vulnerable to illness and injury than experienced workers,[4] but all workers could be exposed to significant hazards every day. These include working at height, biohazards and respiratory hazards – not only from the sewage and wastewater itself, but also from the chemicals used to treat it. Depending on the hazard, consequences of unprotected exposure may be a short or long-term illness, injury or even death.

Education, control measures and the proper use of PPE are among the best ways to help protect workers against these hazards. 3M offers PPE designed for both performance and comfort – from a global PPE manufacturer with product solutions including head, eye, face, respiratory, hearing and fall protection.

4. Thorn & Kerekes, 2001. https://www.ae2s.com/pdfs/Protecting_Wastewater_Professionals_from_COVID-19_and_Other_Biological_Hazards.pdf

Confined spaces and/or poorly ventilated spaces:
- Bio-hazards
- Nuisance odors
- Respiratory hazards (dust, chemical fumes)
- Skin/eye irritation from chemical exposure
- Oxygen deprivation
- Welding hazards (metal fume and particles, UV/IR radiation)
- Engulfment
- Limited means of entry and exit
- Falls/working at height

1 2 3 4 5 6 7

Work at heights/dropped object hazards
- Fall from height trauma
- Swing fall trauma
- Struck by falling objects
- Lost tools/contamination
- Accidental drowning
- Engulfment

1 2 3 4 5 6 7

Biological hazards:
- Bloodborne pathogens, bacteria (e.g. e. coli, legionella)
- Viruses (hepatitis, SARS-CoV-2)
- Parasites (giardia, roundworm)
- Fungi (aspergillus)

Workers could be exposed through:
- Damaged skin
- Eyes
- Mouth
- Lungs

2 3 4

Chemical hazards:
- Chlorine or other materials used to treat wastewater
- Pesticides or other wastewater contaminants
- Exposure via liquid splash or inhalation of fumes

Consequences of exposure could include:
- Acute poisoning
- Skin, eye or respiratory irritation
- Burns
- Death

5 7

Foreign object hazards:
- Cuts
- Needles

2 3 4

Noise and communications:
- Hearing damage
- Hearing loss
- Impeded communications
- Loss of environmental or contextual awareness disable efficient communication

4 5 6 7

Nuisance odor:
- Irritation
- Discomfort
- Nausea

2 3 4

Confined space entry and exit

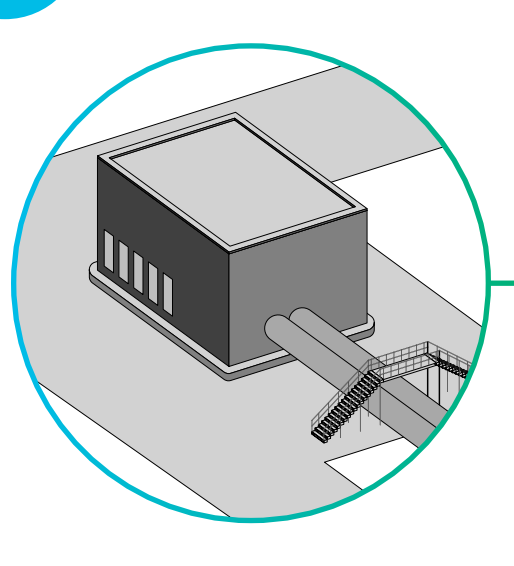
Confined spaces may be present at every step of the wastewater treatment process and call for PPE designed to meet the unique hazards encountered in these environments.

Where they are: manholes, sluices, pumping stations, reservoirs, pits, tanks and vessels

Work done during entries: cleaning, inspection, repairs, filter medium changeout

3M can help identify PPE options for confined space tasks (Plan, Access, Work Inside, Rescue & Retrieval).
Visit: www.3M.co.uk/confinedspaces to learn more.

1 Intake



Task with potential exposure risk:
Routine maintenance work at the intake pump may present confined space or fall hazards.

Other considerations:
Source water may contain sewage, foreign objects, agriculture runoff, or discharge from industrial or medical processes.

- Work at heights/dropped object hazards
- Confined spaces and/or poorly ventilated space

2 Solids separation

Task with potential exposure risk:
removing debris from the bar filters

- Hazardous foreign objects
- Biological splash
- Nuisance odors
- Work at heights/dropped object hazards

3 Primary clarification

Task with potential exposure risk:
moving material with hand rakes

- Biological splash
- Hazardous foreign objects
- Work at heights/dropped object hazards
- Nuisance odors

4 Primary sedimentation

Task with potential exposure risk:
moving wastewater in the clarifier

- Biological splash
- Hazardous foreign objects
- Nuisance odors
- Nuisance noise from pump

Health effects of chlorine gas

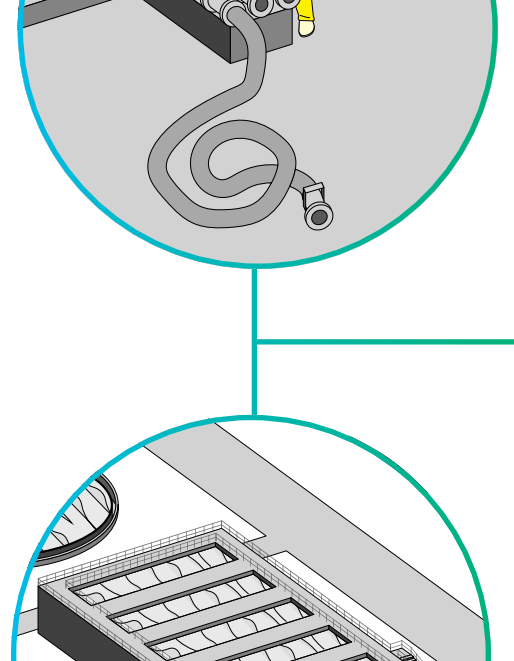
CL Chlorine

Low concentrations: Mild discomfort, coughing, stinging and burning eyes/nose/throat[5]

High concentrations: serious respiratory damage or death in as little as 30 minutes[6]

5. U.S. NIOSH https://www.cdc.gov/niosh/idlh/7782505.html
6. U.S. NIH https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3136961/

5 Secondary clarification



Task with potential exposure risk:
handling of chlorine or other hazardous materials

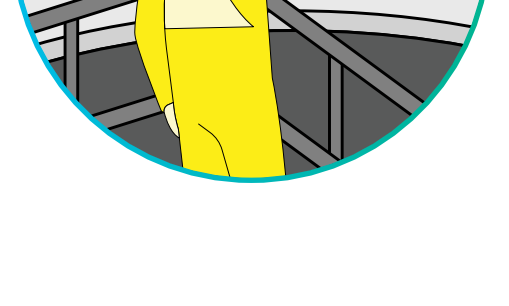
Chemical exposure via inhalation or liquid splash
- Chlorine
- Ammonia
- Chlorine dioxide
- Hydrogen chloride
- Ozone
- Methane
- Hydrogen sulfide
- Sulphur dioxide
- Hydrogen peroxide

- Need for emergency escape equipment in case of oxygen deprivation
- Nuisance noise from pump

For emergencies
(as defined by employer's Respiratory Protection Programme or local legislation.)

Do you know the age of your facility's SCBA and/or EEBD? Make sure this vital piece of equipment is regularly inspected – and replaced before the end of its shelf life – so it's always ready for action in case of emergency.

6 Final sedimentation



Task with potential exposure risk:
taking water samples

Other considerations:
communication with control room

- Nuisance noise from discharge waterway

Your facility may have guardrails, but that isn't always enough. Additional Fall Protection equipment may also be necessary for specific applications. Do you have safety treads on slippery walkways?

7 Disinfection and discharge

Task with potential exposure risk:
working in confined space environment

Other considerations:
possible handling of additional chlorine or other chemical hazards

- Chemical exposure via inhalation or liquid splash
- Need for emergency escape equipment in case of oxygen deprivation

For emergencies
(as defined by employer's Respiratory Protection Program or local legislation.)

Potential 3M Personal Protective Equipment*

3M™ DBI-SALA® Confined Space 5-Piece Davit High Capacity
3M™ DBI-SALA® ExoFit™ XE200 Comfort Safety Harness
3M™ Scott™ FLITE COV Supplied Air Respirator
3M™ Scott™ ELSA™ 15B Sprint
3M™ Aura™ Particulate Respirator 9332+Gen3
3M™ DBI-SALA® Permanent Horizontal Rail Safety System
3M™ Full Facepiece Reusable Respirator 6000 Series
3M™ Versaflo™ Powered Air Purifying Respirator TR-600
3M™ Protective Apparel 4565
3M™ SecureFit™ SF401XSGAF-BLU
3M™ GG501SGAF
3M™ WP96 Faceshield, Clear, Polycarbonate
3M™ G3000 Safety Helmet
3M™ E-A-R™ Push-Ins™ Earplugs
3M™ PELTOR™ WS™ LiteCom Plus Headset

See all solutions at 3M.co.uk/safety

*These recommendations do not reflect all required PPE for a given application or hazard. Reference and follow all local regulations.

Education to help enhance your PPE programme

It's not enough to simply provide workers with PPE – they must also be trained in the proper use and wear of this vital equipment. Do your part to reduce risks by offering ongoing PPE training, as well as staying informed about regulations at the local, state and national level.

We offer a library of training and education materials that can help you learn more about our PPE solutions, including resources for reducing risk associated with common hazards encountered in wastewater treatment.

3M.co.uk/safety/training

3M

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