

International Hazard Datasheets on Occupation



Water treatment plant operator


Who is a water treatment plant operator?








This is a worker who controls treatment plant machinery and equipment to purify and clarify water for human consumption and for industrial use.




What is dangerous about this job?

- Falls, slips, and trips on the level on floors made wet and slippery during the handling of water.
- Exposure to hazardous substances because of a sudden release of toxic materials due to a work related accident, or as a result of human error such as addition of chemicals to an unsuitable device.
- Electric shock caused by contact with “live” wires or defective electrical installations.
- Exposure to high levels of noise from electro-mechanical equipment.
- Exposure to various disinfectants intended for disinfection of water and known as toxic substances.
- Psychological stress and pressure due to environmental factors: annoying noise, water splashing, odours, high humidity, etc.

Hazards related to this job

Specific preventive measures can be seen by clicking on the respective  in the third column of the table.

Accident hazards 	<ul style="list-style-type: none">• Falls, slips, and trips on the level on floors made wet and slippery during the handling of water.	
	<ul style="list-style-type: none">• Falls due to working with a defective ladder and/or falls from heights while climbing and staying on an elevated industrial installation	
	<ul style="list-style-type: none">• Falls inside an industrial installation and/or into water well while inspecting them and/or taking water samples for analysis	
	<ul style="list-style-type: none">• Injuries caused by capture of work-clothes and/or various parts of body, in/between moving/ rotating unprotected parts of machinery	
	<ul style="list-style-type: none">• Electric shock caused by contact with “live” wires or defective electrical installations (the danger is especially high because the work is done in a wet and humid environment)	
	<ul style="list-style-type: none">• Exposure to hazardous substances due to the sudden release of toxic materials as a result of an accident or human error, such as addition of chemicals to an unsuitable installation (e.g. release of chlorine gas due to an insertion of disinfectants such as hypochlorite into installation with aluminum sulfate)	

	<ul style="list-style-type: none"> • Fire hazard due to contact of a very strong oxidizer (disinfectant) with a flammable substance, as a result of improper storage of chemicals, human error, sudden release from process piping, etc. 	7
	<ul style="list-style-type: none"> • Explosion hazard, in the event of contact between ozone (very strong oxidizer) and organic chemical and strong reduction agents 	7
	<ul style="list-style-type: none"> • Hazard of drowning when working inside reservoirs, or immersed in watercourses with a strong current 	
	<ul style="list-style-type: none"> • Suffocation hazard while carrying-out maintenance or installation works, such as working in a confined place (tank, boiler) or when doing excavation work (collapse of excavation or a tunnel) 	7 (a)
Physical hazards 	<ul style="list-style-type: none"> • Exposure to high noise levels, from electro-mechanical equipment and a noisy environment 	8
	<ul style="list-style-type: none"> • Exposure to adverse weather conditions: risk of catching a cold as a result of working in windy weather, at low temperatures and while raining; or as a result of over-sweating in the summer; and suffering heat and/or cold strokes 	9
	<ul style="list-style-type: none"> • Exposure to UV radiation during water disinfection may be damaging for eyes and skin 	10
Chemical hazards 	<p><u>Exposure to various disinfectants used for water disinfection</u></p> <ul style="list-style-type: none"> • Chlorine (gas): a very strong oxidizer and disinfectant. It is a toxic and corrosive gas that causes irritation of the eyes and the respiratory tract even at low concentrations • Hydrofluoric acid: a very strong acid that is used in water fluoridation • Sodium hypochlorite: it is used as a solution. The substance is toxic and corrosive, in particular of the respiratory tract; causes burns and irritation to eyes and skin • Calcium hypochlorite: the substance is corrosive and very destructive of mucous tissues; may cause chemical pneumonia and lung oedema • Ozone is an oxidizing and an irritant gas; when inhaled, it may cause breathing difficulties, headaches, fatigue, eye irritation, tears and conjunctivitis • Chlorine dioxide is a very corrosive gas that causes strong irritation of the respiratory tract and the eyes. 	7
	<ul style="list-style-type: none"> • <u>Exposure to coagulants</u> (such as aluminum sulfate): these substances assist precipitation of suspended matter in the water 	7
Biological hazards 	<ul style="list-style-type: none"> • No biological hazards have been identified, except possible exposure to insects and rodents that may transmit diseases 	
	<ul style="list-style-type: none"> • Hazard of exposure to pathogenic micro-organisms due to accidental contact between drinking water and wastewater 	
Ergonomic, psychosocial and organizational factors	<ul style="list-style-type: none"> • Musculoskeletal injuries caused by awkward working postures during the cleaning/inspection of the pipe system and/or the of installation 	
	<ul style="list-style-type: none"> • Overexertion while moving or handling heavy and bulky equipment or big packages of chemicals may affect various systems of the body 	10 (a)



- Psychological stress and pressure due to environmental factors: annoying noise, water splashing, odors, high humidity, etc.

- Psychosocial problems due to increased workload, requirements of improving work output, constant need of high skill levels, lack of privacy due to the increased possibility of superiors to locate and reach the worker (by means of cellular phone or beeper, even after normal working hours), and due to the commitment to answer unexpected calls during emergency situations; requirement of doing shift work overtime

10 (b)

- Psychological problems of adaptation to computer-based jobs (especially for elderly workers).

10 (b)

Preventive measures

- 1 Wear safety shoes with non-skid soles.
- 2 Use ladders in good repair; make sure that ladder is in required position without the possibility of displacement and/or collapse; inspect ladder before climbing.
- 3 All cavities, hollow spaces, elevated working surfaces, and other locations where there is hazard of falling should be "securely fenced" by appropriate railing guards.
- 4 During work with these machines, ensure that work clothes are attached to the body; use appropriate headgear; guard all moving parts of equipment that may injure the worker.
- 5 Check electrical equipment for safety before beginning to work; call a qualified electrician for testing of suspect equipment.
- 6 All chemical supply connection points must be checked and post appropriate signs must be posted at these points.
Apply chemical safety rules when handling or working with hazardous chemicals; read MSDS and consult a safety supervisor regarding specific chemicals.
- 7 (a) Apply safety rules while working in a confined space: check air quality and, if necessary, exhaust ventilation before entering into a confined space; use harnesses that are held by your co-workers; use respirators and gas masks; etc.
- 8 Use appropriate ear protection; consult a safety supervisor or a supplier.
- 9 Work clothes should fit the climatic conditions of the work place.
Use all safety measures recommended by the ACGIH (see the TLV document, reference 6)
- 10 (a) Learn and use safe lifting and moving techniques for heavy or bulky loads; if necessary, use lifting aids.
(b) Consider consultation with an occupational psychologist.

Specialized information

Synonyms Water treatment plant worker/ laborer/technician.

Definitions and/or description

Controls treatment plant machines and equipment to purify and clarify water for human consumption and for industrial use: Operates and controls electric motors, pumps, and valves to regulate flow of raw water into treating plant. Dumps specified amounts of chemicals, such as chlorine, ammonia, and lime into water or adjusts automatic devices that admit specified amounts of chemicals into tanks to disinfect, deodorize, and clarify water. Starts agitators to mix chemicals and allows impurities to settle to bottom of tank. Turns valves to regulate water through filter beds to remove impurities. Pumps purified water into water mains. Monitors panel-board and adjusts controls to regulate flow rates, loss of head pressure and water elevation, and distribution of water. Cleans tanks and filter beds, using backwashing (reverse flow of water). Repairs and lubricates machines and equipment, using hand tools and power tools. Tests water samples to determine acidity, color, and impurities, using colorimeter, turbidimeter, and conductivity meter. Adds chemicals such, as alum into tanks to coagulate impurities and to reduce acidity. Records data, such as residual content of chemicals, water turbidity, and water pressure. May operate portable water-purification plant to supply drinking water [DOT 954.382-014].

Related and specific occupations

Laboratory-technician; water-supply technician; water treatment engineer.

Tasks

Adding; analyzing; blending; calculating; calibrating; changing; cleaning; closing; comparing; concentrating; congealing; connecting; controlling; causing to flow; diluting; disinfecting; dissolving; dosing; driving; drying; estimating; evaporating; feeding; filling; filtering; fixing; following-up; greasing; identification; initiating; inserting; inspecting; installing; interrupting; lifting; loading; lowering; lubricating; measuring; mixing; monitoring; moving; observing; operating; opening; preparing; precipitating; processing; pouring; reading; recording; refining; regulating; removing; reporting; sampling; scrubbing selecting; separating; strengthening; supervising; supplying; taking; transferring; transporting; treating; tuning; unloading; washing; watching; weighing.

Primary equipment used

Blenders and grinders; brazing and welding equipment; centrifuge; communication equipment; compressors; computer; containers; conveyors; filtration equipment; manual and mechanized work tools; membranes; motors; settling and other tanks; valves and fittings; water-laboratory analytical and measuring equipment; etc.

Workplaces where the occupation is common

Water treatment Plants.

Notes

Water supply companies have specific water treatment systems that clean the water, flocculate it, and bring it up to the standards required by the national water quality regulations. The system consists of the mechanical, chemical and biological treatment of surface water and ground water. Mechanical treatment involves filtration through fine metallic nets that screen the gross suspended matter; additional filtration through sand filters; and disposal of the settling/flowing matter. Chemical treatment is based mostly on flocculation, coagulation, settling and disinfection. Biological treatment can be done using fish and chemicals.

References

1. American Water Works Association: Water Treatment Plant Design. McGraw-Hill, 1997.
2. Spellman, F. R.,: Handbook of Water and Wastewater Treatment Plant Operations., Lewis Pub., 2003.
3. ILO Encyclopaedia of Occupational Health and Safety, 3rd Ed., Geneva, 1983.

4. ILO Encyclopaedia of Occupational Health and Safety, 4th Ed., Ch. 55, Geneva, 1998.
5. Kirk-Othmer, Encyclopedia of Chemical Technology, 4th Ed., 1992.
6. ACGIH : 2004 TLVs and BEI's Threshold Limit Values for Chemical Substances & Physical Agents.
7. U.S. Dept. of Labor: Dictionary of Occupational Titles (DOT), 4th. Ed., 1991.

This datasheet was authored by a group of experts headed by prof. Donagi from the Israel Institute for Occupational Safety and Hygiene

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