SAFETY COURSE · SYLLABUS

Environmental Health & Safety Training for Water and Wastewater Treatment Plants

Hazardous atmospheres, confined spaces, lockout, chemicals, industrial hygiene, emergencies and environmental compliance — the EHS program every water and wastewater plant runs on.

10	70	≈150	2,586	210	20
MODULES	LESSONS	EST. HOURS	SLIDES	SCENARIOS	3D SIMULATORS

ABOUT THE COURSE

Environmental Health & Safety Training for Water and Wastewater Treatment Plants is an online, self-paced course for operators, maintenance staff, supervisors, safety coordinators and plant managers at drinking-water and wastewater utilities. It is Virginia-oriented (OSHA as enforced by the VOSH State Plan; Virginia DEQ and VDH permits) and useful anywhere in the United States. Every lesson combines narrated slides with Key details, a pre-task checklist, field scenarios, worked examples, quizzes and flashcards.

Estimated study time: about 150 hours — roughly 15 hours per module, about 2 hours per lesson. **Prerequisites:** none; terms are explained for beginners. **Format:** online, any modern browser on phone, tablet or desktop; active study time is recorded.

What's included: 2,586 narrated slides, 70 labeled technical figures, 244 worked examples, 70 pre-task checklists, 210 field scenarios, 309 quiz questions, 2,115 flashcards, 20 interactive 3D simulators (two per module), 6 hands-on practice labs (Ventilation & airflow lab, Heating & combustion lab, Disinfection & chlorine lab, Multimeter & clamp-meter trainer, Filter operations & backwash lab, MCC bucket & motor testing lab) and calculators & tools (Engineering calculator with 14 EHS calculators, Unit converter, Volume & area, SDS library).

COURSE SEQUENCE

EHS 101 Foundation · 75 hours · Modules 1–5

EHS Foundations: Programs, Hazardous Atmospheres, Confined Spaces, Energy Control & Chemicals

- Explain how OSHA, the VOSH State Plan, EPA, Virginia DEQ and VDH divide responsibility, and which written programs a plant must keep.
- Identify hazards, rank controls with the hierarchy of controls and prepare a job hazard analysis and tailgate talk.
- Recognize H_2S, methane, chlorine, ammonia, CO and oxygen hazards, apply exposure limits and bump-test and calibrate gas monitors.
- Evaluate permit-required confined spaces, complete entry permits and plan isolation, ventilation and non-entry rescue (29 CFR 1910.146).
- Write equipment-specific lockout/tagout procedures and run group and shift-change lockouts (29 CFR 1910.147).
- Apply NFPA 70E approach boundaries, arc flash labels and PPE selection, and recognize machine-guarding hazards.
- Read GHS labels and SDSs, handle chlorine, hypochlorite and corrosives safely and decide when OSHA PSM and EPA RMP apply.

EHS 102 Advanced · 75 hours · Modules 6–10

Industrial Hygiene, Physical Hazards, Emergencies, Environmental Compliance & EHS Management

- Control biological, noise, heat and ergonomic hazards and run respiratory protection and hearing conservation programs.
- Calculate noise dose, TWA exposures and NIOSH lifting limits, and perform a certified PPE hazard assessment.
- Apply fall-protection triggers and clearance math, protect excavations (1926 Subpart P) and plan safe lifts and rigging.
- Set up MUTCD temporary traffic control and manage forklift, mobile-equipment, hot-work and drowning hazards.
- Prepare emergency action and fire prevention plans, match HAZWOPER levels to roles and work within the Incident Command System.
- Meet VPDES, SDWA, biosolids, air, waste, SPCC, stormwater and EPCRA sampling, recordkeeping and reporting duties.
- Investigate incidents to root cause, manage contractors and change, audit the program and track leading and lagging metrics.

COMPLETION & CERTIFICATES

A module certificate is issued when every lesson in the module is complete and the module quizzes average 80% or better. Each certificate lists active study hours and a verification code that can be checked on the Academy site.

REGULATIONS, EDITIONS & STANDARDS

OSHA 29 CFR 1910/1926 · VOSH 16VAC25 · NFPA 70E-2024 · NFPA 820-2024 · EPA 40 CFR 68/112/122/503 · ANSI Z358.1 · MUTCD

MODULES, LESSONS & OUTCOMES

1 EHS Foundations: Regulations, Programs & Safety Culture

EHS 101 · 7 lessons · ≈15 hours

This module builds the foundation for every other module in the course. You will see why environmental health and safety (EHS) is core work at water and wastewater utilities, and which agencies set the rules: OSHA and Virginia's VOSH State Plan for worker safety, and EPA, DEQ and VDH for permits and drinking water. You will learn what written programs a plant must keep and how a safety management system ties them together. Then you will practice the daily tools of safe work: hazard identification, the hierarchy of controls, job hazard analysis, tailgate talks and stop-work authority. The module closes with safety culture and OSHA injury and illness recordkeeping, reporting and rates.

LESSONS

1. EHS at water & wastewater utilities
2. Who regulates what: OSHA, VOSH, EPA, DEQ & VDH
3. Written safety programs & the safety management system
4. Hazard identification & the hierarchy of controls
5. Job hazard analysis, tailgate talks & stop-work authority
6. Safety culture, leadership & employee involvement
7. Injury & illness recordkeeping and reporting

MODULE OUTCOMES — YOU WILL BE ABLE TO:

- Describe the main safety, health and environmental hazards found at drinking-water and wastewater utilities.
- Explain how OSHA, the VOSH State Plan, EPA, Virginia DEQ and VDH divide responsibility for plant workers and permits.
- Identify which OSHA standards apply to general industry work versus construction work at a utility.
- List the written programs a typical plant must maintain and the hazard each one controls.
- Apply the Plan-Do-Check-Act cycle to organize a utility safety management system.
- Identify hazards using inspections, task observation, SDS review, incident data and worker input.
- Rank controls using the hierarchy of controls and justify why PPE is the last line of defense.
- Score risk with a likelihood-severity matrix and compare residual risk after controls.
- Prepare a job hazard analysis and lead an effective tailgate safety talk.
- Use and support stop-work authority without blame or retaliation.
- Describe the leadership behaviors and employee involvement that build a strong safety culture.
- Determine whether an injury is recordable, meet OSHA reporting deadlines and calculate TRIR and DART rates.

2 Hazardous Atmospheres & Gas Detection

EHS 101 · 7 lessons · ≈15 hours

Hazardous atmospheres are the leading killer in water and wastewater confined-space work, and most of them cannot be seen or smelled reliably. This module teaches the plant gases operators meet every day: hydrogen sulfide, methane and digester gas, chlorine, ammonia, carbon monoxide and oxygen deficiency or enrichment. You will learn how exposure limits (PEL, REL, TLV, STEL, ceiling and IDLH) differ, how flammable ranges and classified locations work, and how portable and fixed detectors sense gas. The lessons cover bump testing, calibration, alarm response, ventilation and purge math, stratified testing technique and the records that prove each test was done right.

LESSONS

1. Plant gases: H2S, methane, chlorine, ammonia, CO & oxygen deficiency

MODULE OUTCOMES — YOU WILL BE ABLE TO:

- Identify where H2S, methane, chlorine, ammonia, CO and oxygen-deficient air form or collect at water and wastewater plants.

2. Exposure limits: PEL, REL, TLV, STEL, ceiling & IDLH
3. Flammability: LEL, UEL & classified locations
4. Portable gas monitors: sensors, bump tests & calibration
5. Fixed gas detection & alarm response
6. Ventilation for atmospheric hazards
7. Atmospheric testing procedures & records

- Explain how vapor density, temperature, turbulence and pH affect where and how fast a plant gas is released.
- Distinguish OSHA PELs, NIOSH RELs, ACGIH TLVs, STELs, ceilings, action levels and IDLH values and apply each correctly.
- Calculate 8-hour TWA exposures, mixture exposure indices and ppm-to-mg/m3 conversions.
- Convert between %LEL, percent by volume and ppm, and explain why toxic limits for H2S are reached long before its LEL.
- Describe NEC Class/Division and Zone classification, gas groups and T-codes as they apply to NFPA 820 plant spaces.
- Compare electrochemical, catalytic bead, infrared and PID sensors, including their limits, poisons and cross-sensitivities.
- Perform and document a bump test and full calibration on a portable multigas monitor following the manufacturer's instructions.
- Explain how fixed detectors, 4-20 mA transmitters, alarms and interlocks protect chemical rooms, headworks and digester areas.
- Respond to a fixed or portable gas alarm by evacuating, notifying operations and verifying conditions before anyone re-enters.
- Calculate air changes per hour, purge time with a mixing factor and duct velocity for atmospheric hazard ventilation.
- Test a space in the correct sequence and at the correct depths, and keep atmospheric test, bump and calibration records that hold up to review.

3 Confined Space Entry & Rescue

EHS 101 · 7 lessons · ≈15 hours

Wet wells, manholes, digesters, valve vaults, clarifier hoppers, tanks and silos are where water and wastewater workers are most likely to die in seconds from an atmosphere they cannot see or smell. This module teaches how to recognize confined and permit-required spaces, build and run a 29 CFR 1910.146 permit program, fill out and use entry permits, and staff the entrant, attendant and entry supervisor roles. You will isolate energy and process flows, purge and ventilate, test in the right order, decide when alternate procedures or reclassification are allowed, and plan rescue that does not create a second victim. Case studies tie every requirement to how real incidents unfold.

LESSONS

1. Recognizing confined & permit-required spaces at plants
2. The permit-required confined space program (29 CFR 1910.146)
3. Entry permits, roles & communication
4. Isolation, purging & ventilation before entry
5. Alternate procedures & reclassification
6. Rescue & emergency services
7. Confined space case studies & lessons learned

MODULE OUTCOMES — YOU WILL BE ABLE TO:

- Apply the three-part confined space definition and the four permit-space criteria to spaces at water and wastewater plants.
- Identify atmospheric, engulfment, configuration, mechanical, electrical and other serious hazards in wet wells, digesters, vaults and tanks.
- Describe the required elements of a written permit-required confined space program under 29 CFR 1910.146 and VOSH.
- Complete an entry permit with acceptable entry conditions, test results, isolation measures, rescue and communication details.
- Explain the duties of authorized entrants, attendants and entry supervisors, and when one person may hold two roles.
- Plan isolation of energy, process flows and chemicals using lockout, blanking, double block and bleed and line removal.
- Calculate purge time, ventilation airflow and %LEL-to-ppm conversions, and test atmospheres in the correct order and at the right levels.
- Distinguish full permit entry, alternate procedures under 1910.146(c)(5) and reclassification under 1910.146(c)(7), and document each.

- Evaluate and select a rescue service, specify retrieval systems for vertical entries over 5 ft, and run annual rescue practice.
- Explain why would-be rescuers are a large share of confined space fatalities and how non-entry rescue prevents them.
- Coordinate host employer and contractor entries, including multi-employer and construction (1926 Subpart AA) situations.
- Use case studies to identify failed barriers and recommend program, training and equipment improvements.

4 Hazardous Energy Control & Electrical Safety

EHS 101 · 7 lessons · ≈15 hours

Hazardous energy is what turns routine maintenance into amputations, crush injuries, burns and electrocutions at water and wastewater plants. This module teaches you to recognize every form of energy in plant equipment: electrical, mechanical, hydraulic, pneumatic, gravity, thermal and process pressure. It walks through the OSHA lockout/tagout standard (29 CFR 1910.147) as VOSH enforces it, then shows how to write and use equipment-specific procedures, run group lockouts, hand off locks at shift change and coordinate with contractors. Finally it covers NFPA 70E electrical safety for non-electricians, arc flash labels, approach boundaries and PPE, and machine guarding on the pumps, drives, conveyors and presses found at every plant.

LESSONS

1. Hazardous energy at plants: electrical, mechanical, hydraulic, pneumatic & process
2. Lockout/tagout program requirements (29 CFR 1910.147)
3. Writing & using equipment-specific energy control procedures
4. Group lockout, shift change & contractor coordination
5. Electrical safety for non-electricians: NFPA 70E basics
6. Arc flash & shock: labels, boundaries & PPE
7. Machine guarding & rotating equipment

MODULE OUTCOMES — YOU WILL BE ABLE TO:

- Identify electrical, mechanical, hydraulic, pneumatic, gravity, thermal and process energy sources on common plant equipment.
- Explain the scope, exceptions and core elements of the OSHA/VOSH lockout/tagout standard, 29 CFR 1910.147.
- Distinguish authorized, affected and other employees and the training and retraining each requires.
- Apply the six-step energy control sequence from preparation through verification of isolation.
- Write an equipment-specific energy control procedure that lists every isolation point, stored-energy step and verification test.
- Conduct and document the annual periodic inspection of energy control procedures.
- Organize group lockout, shift-change transfers and contractor lockout coordination with no gap in protection.
- Describe NFPA 70E concepts of qualified persons, the electrically safe work condition and justified energized work.
- Interpret an arc flash label and apply limited, restricted and arc flash boundaries to plan safe approach.
- Select arc-rated clothing, voltage-rated gloves and other electrical PPE for a given task and label.
- Recognize unguarded rotating parts, nip points and point-of-operation hazards and choose effective safeguards.
- Calculate stored energy, cylinder force, static head pressure and body current to size hazards before work begins.

5 Chemical Safety & Process Safety Management

EHS 101 · 7 lessons · ≈15 hours

Water and wastewater plants store and feed some of the most hazardous chemicals in any community: chlorine gas, sodium hypochlorite, ammonia, sulfuric acid, caustic soda, ferric and aluminum coagulants, fluorosilicic acid and polymers. This module teaches how to read GHS labels and safety data sheets, handle disinfection chemicals and corrosives, and decide when OSHA Process Safety Management and EPA Risk Management Program rules apply. It covers safe delivery and unloading, storage compatibility and secondary containment, emergency eyewash and shower stations, and the first minutes of a chemical spill or gas release, including notification and reporting. Every procedure ties back to permits, PPE, operations and the SDS.

LESSONS

1. Hazard communication: GHS labels & safety data sheets
2. Disinfection chemicals: chlorine gas, hypochlorite & chloramines
3. Corrosives, coagulants, fluoride & polymers
4. Process safety management & risk management programs
5. Chemical delivery, unloading & storage compatibility
6. Emergency eyewash & shower stations
7. Chemical spills & release response

MODULE OUTCOMES — YOU WILL BE ABLE TO:

- Read a GHS label and a 16-section safety data sheet and pull out the hazard, PPE and first-aid information needed for a task.
- Explain the employer duties of the OSHA/VOSH Hazard Communication standard (29 CFR 1910.1200), including secondary-container labels and training.
- Describe the hazards of chlorine gas, sodium and calcium hypochlorite, ammonia and chloramines, and the controls used in feed and storage rooms.
- Calculate chemical feed rates with the pounds formula and convert available chlorine to gallons of hypochlorite.
- Identify the hazards and PPE for sulfuric acid, caustic soda, ferric and aluminum coagulants, lime, fluorosilicic acid and polymers.
- Determine whether a chlorine, ammonia or sulfur dioxide process meets the OSHA PSM or EPA RMP threshold quantity.
- List the elements of a PSM/RMP prevention program and the 3-year and 5-year review cycles.
- Plan a safe bulk chemical delivery, including fill-line verification, attended unloading and incompatibility checks.
- Apply storage compatibility rules and size secondary containment for bulk chemical tanks.
- Specify, locate, inspect and test emergency eyewash and shower stations to ANSI/ISEA Z358.1 and 1910.151(c).
- Lead the first steps of a chemical spill or gas release: recognize, isolate, notify, protect and contain without exceeding training level.
- Identify spill and release reporting duties, including reportable quantities, EPCRA and VPDES notifications.

6 Industrial Hygiene: Biological, Noise, Heat & Ergonomic Hazards

EHS 102 · 7 lessons · ≈15 hours

Wastewater plants expose workers to hazards that rarely trip an alarm: pathogens in sewage and biosolids, loud blowers, hot and cold weather, and heavy, awkward lifts. This module covers industrial hygiene at water and wastewater utilities. You will learn how infections spread and how hygiene, vaccinations and medical surveillance break that chain. You will learn to run a respiratory protection program under 29 CFR 1910.134 and a hearing conservation program under 1910.95. You will learn to prevent heat and cold illness and to cut musculoskeletal injuries with better lift design. Finally, you will learn to plan exposure monitoring and to select PPE from a written hazard assessment.

LESSONS

1. Biological hazards in wastewater & biosolids

MODULE OUTCOMES — YOU WILL BE ABLE TO:

- Identify the main bacteria, viruses, protozoa and helminths in wastewater and biosolids and their routes of exposure.

2. Personal hygiene, vaccinations & medical surveillance
3. Respiratory protection program (29 CFR 1910.134)
4. Noise exposure & hearing conservation
5. Heat and cold stress
6. Ergonomics, lifting & musculoskeletal injury prevention
7. Exposure monitoring & personal protective equipment selection

- Apply the hierarchy of controls to bioaerosols, sharps, splashes and hand-to-mouth contamination.
- Describe personal hygiene practices, clean/dirty separation and the employer's sanitation duties under 1910.141.
- Explain which vaccinations are commonly offered to utility workers and when bloodborne pathogen rules apply.
- List the required elements of a respiratory protection program, including medical evaluation, fit testing and training.
- Select a respirator using assigned protection factors, maximum use concentrations and IDLH rules.
- Calculate noise dose, 8-hour TWA and derated hearing protector attenuation using OSHA methods.
- Describe the elements of a hearing conservation program and how a standard threshold shift is handled and recorded.
- Recognize heat and cold illnesses, plan acclimatization and respond correctly to heat stroke and hypothermia.
- Evaluate a manual lift with the revised NIOSH lifting equation and choose engineering fixes for common plant tasks.
- Plan personal exposure monitoring, calculate time-weighted averages and interpret results against exposure limits.
- Perform and certify a PPE hazard assessment under 1910.132 and select eye, face, hand, foot and body protection.

7 Physical Hazards: Falls, Excavations, Lifting, Water & Traffic

EHS 102 · 7 lessons · ≈15 hours

Falls, cave-ins, swinging loads, deep water, passing traffic, moving equipment and sparks injure and kill more utility workers than almost anything else. This module covers the physical hazards every water and wastewater crew meets: walking-working surfaces, ladders and fall protection; excavation and trenching; cranes, hoists and rigging; working over basins and tanks; temporary traffic control; forklifts, vehicles and mobile equipment; and hand tools, power tools, welding and hot work. For each you learn the OSHA and VOSH rules, the numbers that matter, the math behind fall clearance, sloping, sling tension and taper length, and the field habits that keep a routine job from becoming a fatality.

LESSONS

1. Walking-working surfaces, ladders & fall protection
2. Excavation & trenching safety
3. Cranes, hoists, rigging & material handling
4. Working over and near water: tanks, basins & drowning prevention
5. Traffic control & work-zone safety
6. Powered industrial trucks, vehicles & mobile equipment
7. Hand & power tools, welding and hot work

MODULE OUTCOMES — YOU WILL BE ABLE TO:

- Apply the 4 ft general-industry and 6 ft construction fall-protection triggers and choose guardrails, covers or personal fall arrest.
- Calculate required fall clearance for a personal fall arrest system and set up a portable ladder at the 4:1 angle with 3 ft extension.
- Classify soil as Type A, B or C and select sloping, benching, shoring or a trench shield under 29 CFR 1926 Subpart P.
- Explain the competent person's daily inspection duties, the 25 ft egress rule and the 2 ft spoil setback.
- Inspect slings, hooks and hoists, and calculate sling leg tension from load weight and sling angle.
- Plan a pump pull or chemical container lift with a qualified rigger, signal person and controlled exclusion zone.
- Identify drowning hazards at basins, clarifiers, lagoons and intakes and specify guardrails, PFDs and ring buoys.
- Describe the four areas of a temporary traffic control zone and compute merging taper length and device count per the MUTCD.
- Explain powered industrial truck training, the 3-year evaluation, daily inspection and the stability triangle.

- Apply safe backing, spotter and mobile-equipment practices, including Virginia's reverse signal operation rule.
- Select guards, GFCI protection and PPE for hand and power tools and inspect grinders and abrasive wheels.
- Control welding fume and hot work hazards using the 35 ft rule, cylinder separation, LEL testing and a fire watch.

8 Fire Prevention, Emergency Preparedness & Response

EHS 102 · 7 lessons · ≈15 hours

Water and wastewater plants store digester gas, oxidizing and toxic chemicals, fuel and energized electrical gear, and they must keep running through fires, releases, storms and power loss. This module covers how fires and explosions start at a plant, how hot work permits, housekeeping and fire protection systems prevent them, and what OSHA requires in emergency action and fire prevention plans. It then explains HAZWOPER response levels and the Incident Command System, AWIA risk and resilience assessments and utility emergency response plans, severe weather, flooding and power-loss continuity, and the first aid, CPR and AED skills that keep a coworker alive until help arrives.

LESSONS

1. Fire and explosion hazards: digester gas, chemicals & electrical rooms
2. Fire prevention, hot work permits & fire protection systems
3. Emergency action & fire prevention plans
4. Emergency response & HAZWOPER levels
5. Utility emergency response plans & AWIA resilience
6. Severe weather, flooding, power loss & continuity of operations
7. First aid, CPR/AED & medical emergencies

MODULE OUTCOMES — YOU WILL BE ABLE TO:

- Identify fire and explosion hazards from digester gas, flammable and oxidizing chemicals, batteries and electrical rooms.
- Convert combustible gas readings between percent by volume, percent LEL and ppm and explain what each means for work.
- Apply hot work permit controls, including the 35-ft rule, fire watch timing and digester-area restrictions.
- Describe inspection and impairment practices for extinguishers, sprinklers, fire alarms and clean agent systems.
- List the required elements of an emergency action plan (1910.38) and a fire prevention plan (1910.39).
- Plan evacuation routes, wind-aware assembly areas, headcounts and shelter-in-place for chemical releases.
- Distinguish an incidental release from an emergency response and match each HAZWOPER 1910.120(q) training level to its role.
- Explain the Incident Command System, hot/warm/cold zones and the role of the fire department and hazmat teams.
- Summarize AWIA 2018 risk and resilience assessment and emergency response plan duties and the five-year recertification cycle.
- Prepare a plant for hurricanes, floods, ice, lightning and extended power loss, including generator fuel and lift-station storage time.
- Describe continuity of operations elements: essential functions, succession, staffing, supplies, communications and reporting.
- Respond to medical emergencies with scene safety first, CPR and AED use, bleeding control and chemical-exposure first aid.

9 Environmental Compliance at Water & Wastewater Plants

EHS 102 · 7 lessons · ≈15 hours

Water and wastewater utilities exist to protect public health and the environment, so their own compliance is closely watched. This module explains the environmental permits and rules that govern a plant: the Clean Water Act and VPDES discharge permits, sampling and Discharge Monitoring Reports, sewer overflow and spill reporting, the Safe Drinking Water Act and public notification, biosolids under 40 CFR 503, air permits for generators, boilers and odor control, hazardous waste, used oil, SPCC and stormwater, and EPCRA right-to-know reporting. You will learn the deadlines, the math behind the numbers, who to call and when, and how honest, complete records protect the plant, the public and you.

LESSONS

1. Clean Water Act, NPDES/VPDES permits & discharge monitoring
2. Sewer overflows, bypasses & spill reporting
3. Safe Drinking Water Act compliance & public notification
4. Biosolids & residuals management (40 CFR 503)
5. Air quality: odors, emissions, generators & air permits
6. Hazardous waste, used oil, SPCC & stormwater
7. Community right-to-know & environmental recordkeeping

MODULE OUTCOMES — YOU WILL BE ABLE TO:

- Explain how the Clean Water Act, NPDES and Virginia's VPDES program set enforceable limits for a treatment plant discharge.
- Collect, preserve and document grab and composite samples so results are valid under 40 CFR 136.
- Calculate mass loading, percent removal and geometric means and report them correctly on a Discharge Monitoring Report.
- Distinguish sanitary sewer overflows, bypasses, upsets and unpermitted discharges and apply the 24-hour and 5-day reporting steps.
- Apply Safe Drinking Water Act monitoring rules and choose the correct public notification tier and deadline.
- Describe Class A and Class B biosolids, vector attraction reduction and the pollutant, monitoring and record duties of 40 CFR 503.
- Identify plant air emission sources and manage emergency generator hours, fuel and records under federal engine rules and state permits.
- Determine hazardous waste generator category and manage satellite accumulation, universal waste and used oil correctly.
- Decide whether SPCC applies, and maintain secondary containment, inspections and an up-to-date plan.
- Implement stormwater pollution prevention practices for plant yards, chemical unloading and construction sites.
- Determine EPCRA Tier II and emergency release notification duties for chlorine, hypochlorite and other plant chemicals.
- Build an environmental compliance calendar and keep records that are complete, signed, retained and never falsified.

10 Managing EHS Programs: Investigation, Training, Contractors & Audits

EHS 102 · 7 lessons · ≈15 hours

How a water or wastewater utility runs its safety program as a system instead of a pile of binders. The module covers investigating incidents and near misses to real root causes, building training that produces demonstrated competency, prequalifying and controlling contractors under the multi-employer policy, managing change with hazard reviews and pre-startup safety reviews, running inspections and audits whose findings are tracked to verified closure, choosing leading and lagging metrics that drive improvement, and growing as an EHS professional. It ties the technical modules together with the plan-do-check-act loop used by ANSI/ASSP Z10 and ISO 45001.

LESSONS

1. Incident investigation & root cause analysis
2. EHS training programs & competency
3. Contractor safety management

MODULE OUTCOMES — YOU WILL BE ABLE TO:

- Conduct an incident or near-miss investigation that secures the scene, gathers facts and builds a timeline.
- Apply 5 Whys, fishbone and barrier analysis to find system-level root causes rather than blaming individuals.

4. Management of change & pre-startup safety reviews
5. Inspections, audits & corrective action tracking
6. EHS metrics, leading indicators & continual improvement
7. Professional practice, EHS careers & course wrap-up

- Write corrective actions that follow the hierarchy of controls and verify their effectiveness.
- Design a training program using needs analysis, a training matrix and performance-based competency checks.
- Identify OSHA standards with specific training frequencies and keep defensible training records.
- Prequalify, orient, monitor and evaluate contractors and explain host-employer duties under the multi-employer policy.
- Run a management of change process and a pre-startup safety review for plant modifications.
- Distinguish inspections from audits and plan a risk-based audit program with sampling and evidence.
- Risk-rank findings and manage a corrective action log to on-time, verified closure.
- Calculate TRIR, DART, severity and leading-indicator rates and interpret them without gaming.
- Use plan-do-check-act and management review to drive continual improvement of the EHS program.
- Describe EHS career paths, credentials, ethics and professional resources available to utility staff.

STUDY-HOUR PLAN

Module	Course	Lessons	Est. hours
1. EHS Foundations: Regulations, Programs & Safety Culture	EHS 101	7	≈15
2. Hazardous Atmospheres & Gas Detection	EHS 101	7	≈15
3. Confined Space Entry & Rescue	EHS 101	7	≈15
4. Hazardous Energy Control & Electrical Safety	EHS 101	7	≈15
5. Chemical Safety & Process Safety Management	EHS 101	7	≈15
6. Industrial Hygiene: Biological, Noise, Heat & Ergonomic Hazards	EHS 102	7	≈15
7. Physical Hazards: Falls, Excavations, Lifting, Water & Traffic	EHS 102	7	≈15
8. Fire Prevention, Emergency Preparedness & Response	EHS 102	7	≈15
9. Environmental Compliance at Water & Wastewater Plants	EHS 102	7	≈15
10. Managing EHS Programs: Investigation, Training, Contractors & Audits	EHS 102	7	≈15
Total		**70**	**≈150**

IMPORTANT NOTICE

Prepared with AI assistance. Training only — verify against current OSHA/VOSH regulations, EPA and state permits, your utility's written safety and environmental programs, and manufacturer instructions.

Always verify against the current OSHA 29 CFR 1910 and 1926 standards and Virginia VOSH rules (16VAC25), your EPA and Virginia DEQ/VDH permits and regulations, NFPA 70E and NFPA 820, ANSI Z358.1, your utility's written confined-space, lockout, respiratory, hazard communication, emergency and environmental programs, and the SDS and manufacturer instructions. This course does not replace site-specific training, a competent person, or legal advice. Never enter a permit space, defeat a guard or interlock, or work on energized equipment without the required authorization.

Certificates record completion; CEU/CPE credit is subject to approval by your licensing board or employer. Independent training, not affiliated with or endorsed by any licensing board or standards body. This course is not an OSHA Outreach (10- or 30-hour) card course and does not replace the site-specific training, authorization and competency evaluation your employer must provide.

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