PROCEDURES AND REQUIREMENTS FOR THE DISCHARGE OF WASTEWATER

Who Should Read This Guidance

This guidance document has been prepared for Project Managers, Facilities Operations and Maintenance personnel, and other University personnel who may initiate or perform the discharge of wastewater. This document gives the requirements for all discharge of wastewater at Yale University and describes wastewater discharge pathways, wastewater categories, discharge limitations, and permit requirements.

Why This Is Important

Virtually all wastewater discharges require a discharge permit issued by the Connecticut Department of Environmental Protection ("CTDEEP"), usually requiring a permit application or registration. Contact Environmental Health & Safety as soon as any project anticipates requiring a wastewater permit. EHS will coordinate and facilitate this process.

What Is Wastewater

Wastewater is water that has been changed in some way and is no longer suitable, or there are no means for reuse, and requires disposal or discharge. An on-line training module on this topic is available and recommended for affected personnel. Additional requirements for discharge of wastewater from laboratory operations are covered in Appendix F of the Chemical Waste Management manual.

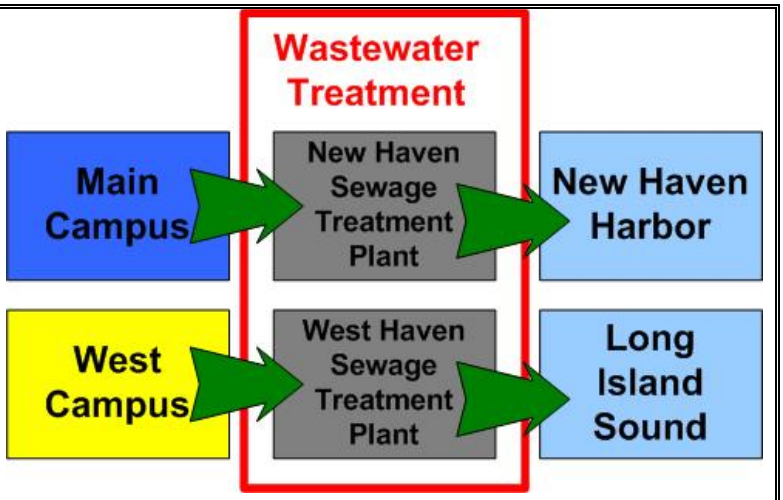
Water can pick-up pollutants, be changed thermally (hotter or colder), have pH changed, or become more concentrated in minerals, such as from evaporation or purification. Examples of pollutants include:

- Human wastes (domestic sewage)
- Fats, Oils & Grease ("FOG")
- Food preparation waste
- Toxic and poisonous substances
- Metals from process or picked up from piping
- Acidic or basic compounds
- Malodorous compounds (i.e. formaldehyde, mercaptans)
- Radioactive substances
- Suspended and dissolved solids (biodegradable and non-biodegradable)
- Materials with high oxygen demand (to biodegrade)
- Biological substances

Wastewater Discharge Pathways

There are three main pathways that wastewater can be discharged to:

TO SANITARY SEWER
to the sewage treatment plant. This is often referred to as a Publically Owned Treatment Works ("POTW"). In New Haven the Greater New Haven Water pollution Control Authority ("GNHWPCA") manages the sanitary sewer system and the sewage treatment plant. The West Campus sanitary sewer system drains to the West Haven Water Pollution Control Facility ("WHWPCF").



TO A SURFACE WATER
(such as a pond, stream, river, harbor or ocean), either directly or to a storm drain that is connected to a separate storm sewer system. In some areas of New Haven, storm drains are combined with sanitary sewers and lead to the POTW. New Haven is in the process of separating these types of sewers.

Stormwater Discharge to surface water

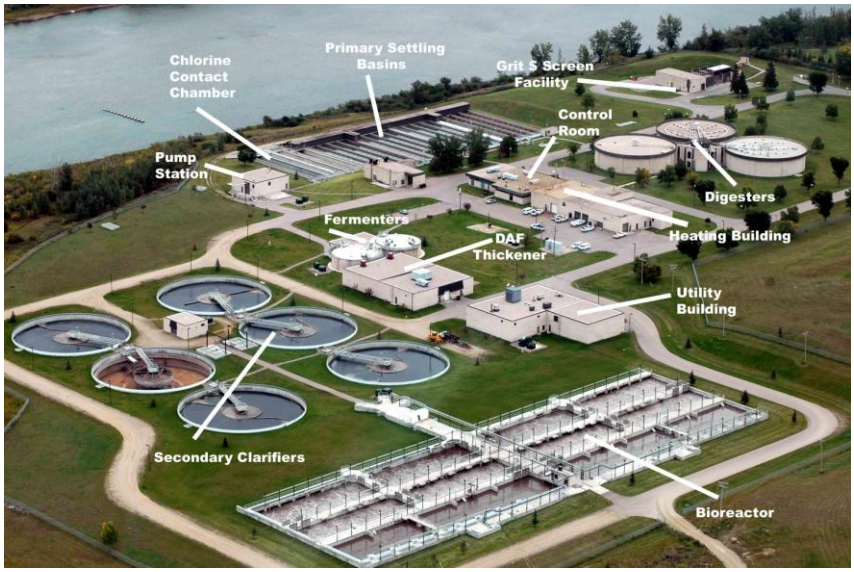
TO THE GROUND Ground surface discharge infiltrates through the soil to groundwater, or sub-surface (sometimes called underground injection) can discharge directly to underground aquifers. Note discharge to hard-packed surfaces can run-off and eventually discharge to surface waters.	 *Roof drain discharge to ground*

The Federal Clean Water Act and its subsequent amendments first set limits on discharge of wastewater pollutants, and established permit programs.

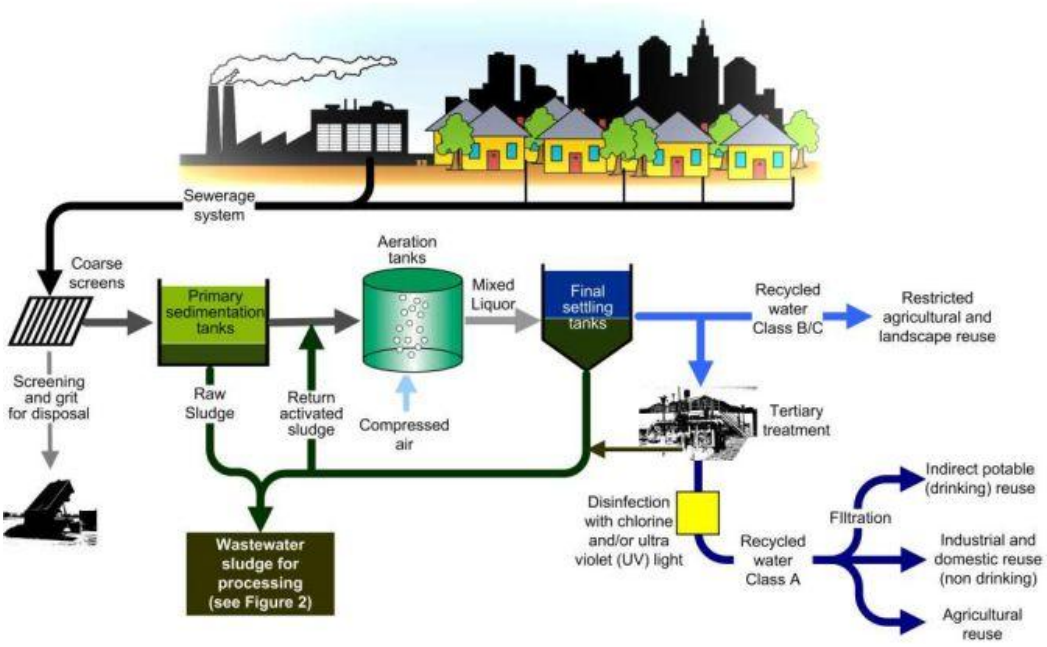
In Connecticut, all wastewater discharges to sanitary sewer, surface water, and to the ground require a permit from the Connecticut Department of Energy & Environmental Protection.

Discharge to Sanitary Sewer

Most wastewaters are required to be discharged to the sanitary sewer, so pollutants can be removed by the POTW prior to discharge to surface water. Treatments include flocculation, settling, filtration, biological treatment, and disinfection. The POTW then discharges the water under its own surface water discharge permit. Treatment residue sludge must also be disposed of, usually by incineration; this imposes further restrictions on the type and quantity of wastewater pollutants.



Typical POTW layout



Typical Water Pollution Control Facility Treatment Process

An interactive presentation of typical wastewater treatment (Adobe Flash required)

For these reasons, sewer ordinances based on federal law further set limits on discharge to the POTW. No discharge may for any reason cause, either singly or in combination with other discharges:

- Interference with or adverse effect upon the operation of the POTW;
- Interference with or adverse effect upon the POTW's sludge handling, use, or disposal;
- The POTW to exceed its influent design loading parameters;

- The POTW to violate its permit, including but not limited to exceeding its permit limits;
- A worsening of any condition which is causing the POTW to exceed its influent design loading parameter or violate its permit;
- Pass through any substance into the receiving waters which causes or threatens pollution;
- No discharge to a POTW may contain:
    - Any substance which causes or threatens a fire or explosion hazard in the POTW;
    - Any substance which causes or threatens corrosive structural damage to the POTW. In no case shall a substance with a pH less than 5.0 be discharged unless the POTW is specifically designed to accommodate such a discharge (GNHWPCA requires a pH of 5.5 to 9.5, WHWPCF requires a pH of no less than 5.5 to state permit pH high limit;
    - Solid or viscous wastes in amounts which cause or threaten obstruction to flow in the sewers;
    - Heat in such amounts that the temperature of the POTW influent exceeds 104.5°F, unless the POTW is designed to accommodate such heat.

Discharge to Surface Water

Some wastewaters containing minimal levels of pollution may be discharged directly to surface waters, or to storm drains leading to separate storm sewer systems. This includes stormwater run-off, certain non-contact cooling waters, certain hydrostatic pressure-testing water, and non-chlorine containing swimming pool draining waters. Yale surface water discharges are mostly limited to stormwater run-off to storm drains. For further stormwater information, including construction stormwater permitting requirements, please review our Stormwater Best Management Practices policy.

Discharge to Ground

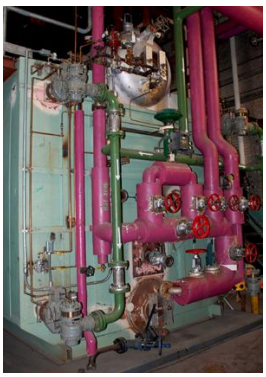
Some wastewaters can be discharged to the ground, which actually provides some filtering and cleaning of the water, and in some cases is preferable to surface water discharges. Certain non-contact cooling waters, including condensate, open loop geothermal well returns, boiler blowdown from non-chemically treated boilers, building and pavement power washing, stormwater, and swimming pool wastewater, may be authorized for discharge onto or into ground. Sufficient absorptive capacity must be available to avoid run-off.

Discharge Permits

Yale Environmental Health and Safety shall be contacted as soon as a wastewater discharge is contemplated, to determine discharge permit requirements. This includes installation of equipment that has a wastewater discharge, any equipment, building, or pavement cleaning process, building or site construction activities or dewatering, and creation of stormwater run-off or infiltration. No discharges, no matter how minor, shall be initiated without proper authorization.

X-Ray developer requiring Minor Photographic Processing Wastewater Permit

Blowdown from cooling towers require Non-contact Cooling Water Wastewater Permit



Blowdown from boiler requires Boiler Blowdown Permit

Discharge from equipment washing requires Vehicle Maintenance Wastewater Permit

There are two main types of discharge permits that CTDEEP issues. Most discharges are authorized by General Permits, which authorize a category of discharge, and usually (but not always) require registration, and in some cases professional certification (usually by professional engineer ["PE"] or Certified Hazardous Material Manager ["CHMM"]). Most General Permits are effective upon registration receipt at CTDEEP, others may require their review and approval. CTDEEP is in the process of consolidating many of their existing General Permits into a revised "Miscellaneous" General Permit.

Discharges not eligible for General Permits, either because of type or volume, can be authorized by "Individual" Permits. The application process for these types of permits is extensive, and it can take several months to a year or more for CTDEEP to review and approve. The revised Miscellaneous General Permit mentioned above will have increased volume limits and may be able to be used for discharges previously ineligible for General Permit coverage.

Many discharge permits require volume monitoring, periodic testing, and reporting of results and/or violations. EHS is responsible for submitting all properly signed discharge monitoring and violation reports.

EHS maintains a database of all active discharge permits. The following table gives examples of wastewater discharge types and their permit coverage:

Type of Wastewater	Permit Coverage (Present)	Possible Permit Coverage (Future)
Cooling Tower blowdown < 50,000 gallons per day ("gpd") to sanitary sewer	General Permit for the Discharge of Minor Non-contact Cooling and Heat Pump Water	General Permit for Miscellaneous Discharges of Sewer Compatible (MISC) Wastewater
Chilled Water Draining <50,000 gpd to sanitary sewer	General Permit for the Discharge of Minor Non-contact Cooling and Heat Pump Water	General Permit for Miscellaneous Discharges of Sewer Compatible (MISC) Wastewater
Cooling Tower blowdown ≥ 50,000 gpd to sanitary sewer	Individual Discharge Permit	General Permit for Miscellaneous Discharges of Sewer Compatible (MISC) Wastewater

Boiler Blowdown ≤ 5,000 gpd per boiler	General Permit for the Discharge of Minor Boiler Blowdown Wastewater	General Permit for Miscellaneous Discharges of Sewer Compatible (MISC) Wastewater
Boiler Blowdown > 5,000 gpd per boiler	Individual Discharge Permit	General Permit for Miscellaneous Discharges of Sewer Compatible (MISC) Wastewater
Kitchen Wastewater	General Permit for the Discharge of Wastewater Associated with Food Preparation Establishments	-
Groundwater Remediation Wastewater	General Permit for the Discharge of Groundwater Remediation to a Sanitary Sewer	-
Hydrostatic Pressure Testing Wastewater	General Permit for the Discharge of Hydrostatic Pressure Testing Wastewater	General Permit for Miscellaneous Discharges of Sewer Compatible (MISC) Wastewater
Power Washing of buildings, sidewalks, pavement	Per DEEP Guidance Document, see Policy at: http://www.yale.edu/ehs/Documents/environ/powerwashingpolicy.pdf	
De-ionized water production, water softening wastewater, water treatment filters backwash	General Permit for the Discharge of Water Treatment Wastewater	General Permit for Miscellaneous Discharges of Sewer Compatible (MISC) Wastewater
Swimming Pool draining and filter backwash	General Permit for the Discharge of Swimming Pool Wastewater	General Permit for Miscellaneous Discharges of Sewer Compatible (MISC) Wastewater
Stormwater from ≥ 1 acre construction site	General Permit for Discharge of Stormwater and Dewatering Wastewaters from Construction Activities	-
Vehicle and Equipment Washing	General Permit for the Discharge of Vehicle Maintenance Wastewater	-
X-Ray developer discharge	General Permit for the Discharge of Minor Photographic Processing Wastewater	General Permit for Miscellaneous Discharges of Sewer Compatible (MISC) Wastewater
Pipe Flushing	General Permit for Miscellaneous Discharges of Sewer Compatible (MISC) Wastewater	General Permit for Miscellaneous Discharges of Sewer Compatible (MISC) Wastewater
Equipment using water for hydraulic seals	General Permit for Miscellaneous Discharges of Sewer Compatible (MISC) Wastewater	General Permit for Miscellaneous Discharges of Sewer Compatible (MISC) Wastewater

CTDEEP maintains a list of all available types of permits with fact sheets, guidance documents, and registration and application forms.

Construction and Renovations

Project managers need to consider permit requirements of both wastewaters generated during the construction process, and by the finished installation. As listed in the above table, the following are some typical construction process generated wastewater:

- Chilled water draining
- Groundwater remediation wastewater
- Hydrostatic pressure testing wastewater
- Pipe flushing wastewater
- Power washing of buildings, sidewalks, pavement
- Stormwater and dewatering from ≥ 1 acre construction site

Please contact EHS prior to construction to coordinate permit requirements and applications.

Proper procedures must be followed for any power washing

Hydrostatic pressure test water discharge requires a CTDEEP Permit

Dewatering discharges

Checking for Contaminated Groundwater

If dewatering of excavations is required, if building foundation under-slab drainage is being installed, or groundwater contamination is suspected, groundwater should be tested to determine contamination. If contamination is found, any discharge would have to be registered under a Groundwater Remediation General Permit. Depending on the extent of the contamination, treatment of the groundwater may be required to meet the permit's effluent limits.

Testing groundwater

Frac Tank for solids removal

Stormwater Permits and Plans

Construction sites with 1 or more disturbed (cleared, graded, or excavated) acres, stormwater run-off and dewatering (of non-contaminated groundwater) are subject to the *General Permit for Discharge of Stormwater and Dewatering Wastewaters from Construction Activities*. Sites between 1 and 5 acres must follow the local erosion control ordinances, but for sites greater than 5 acres, a permit registration must be submitted, and a Stormwater Pollution Control Plan must be written and certified. The Stormwater Plan must address both soil erosion and sediment pollution from the construction process, and stormwater pollution from use of the site after construction is completed. Typical elements of a SWPCP include site description and map, construction sequencing, perimeter controls, soil stabilization practices, stormwater flow control, and maintenance and inspection requirements.

Fabric Filters protect storm drains

Silt fences are used to prevent sediment run-off

Note that the size of the disturbed area is to be determined regardless of project phasing, and is to include road and utility construction, excavation and grading, and all other construction associated with the overall plan, regardless if different contractors are responsible for construction of these different elements.

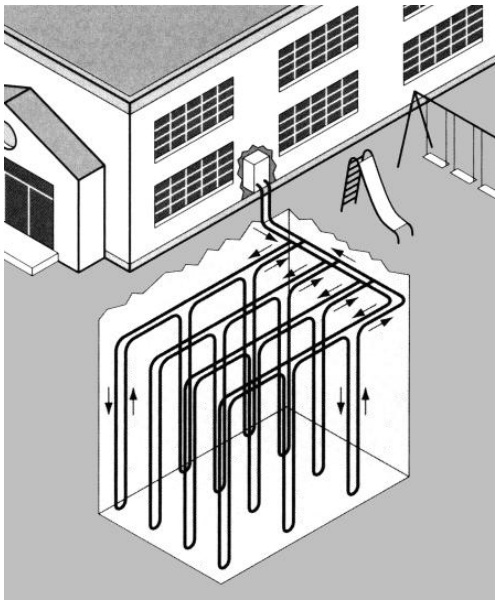
Additional Note on Plumbing Installations

Installation of new copper or other supply or sanitary piping can temporarily raise copper or other metals levels in wastewater. Before any extensive plumping installations, please check with EHS for any permit requirements that can be affected by the plumbing materials. It may be necessary to conduct the installation in phases to avoid any effluent level spikes that could be above permit limits.

Geothermal Wells

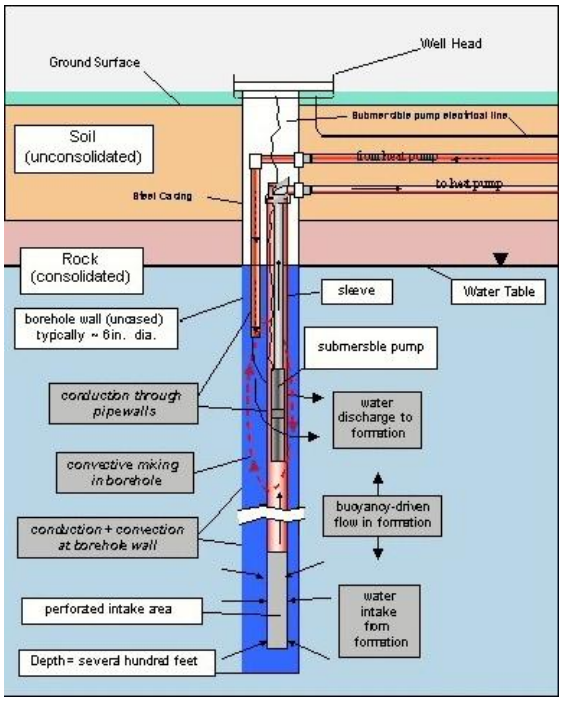
Geothermal wells have special considerations that must be followed. There are two main types of geothermal wells, closed loop and open loop.

Closed loop wells do not withdraw water from the ground but uses circulation of a thermal fluid, typically glycol based, to absorb the ground temperature for heating or cooling. However, during the well drilling process, and to a lesser extent during operation, they are a potential receptor (leading to the groundwater aquifer) of nearby pollutants and must meet setback requirements from potential sources of pollution, such as underground storage tanks, sanitary sewer lines, and stormwater lines. During operation, they are a potential source of pollution to water supply wells, and must be situated a certain distance from them.



Schematic of closed loop geothermal well system

Open loop wells withdraw groundwater for heating or cooling and discharge back into the well. In some cases they are designed with a secondary discharge ("bleed") either to sanitary sewer or to the ground surface. This bleed is used if the groundwater aquifer cannot handle the thermal energy being returned to it, for example on an extremely hot day the return water causes the groundwater source to begin to warm to non-useful levels. Open loop wells are considered potential pollution receptors and must meet set-back distances from potential sources of pollution.



Schematic of standing column open loop geothermal well

Two types of permits are required for open loop wells. The withdrawal rate for most geothermal wells requires a diversion permit, which are required for withdrawals of more than 50,000 gallons per day. If the discharge meets the eligibility requirements, the *General Permit for the Withdrawal of Water for Consumptive Use* may be used. If not, an Individual Diversion Permit will need to be applied for. To discharge back into the ground, a discharge permit is required. The *General Permit for the Discharge of Minor Non-contact Cooling and Heat Pump Water* may be used for discharges of 50,000 gpd or less at any site. For typical open-loop installations above 50,000 gpd, an Individual Discharge Permit will need to be obtained.

Both types of geothermal wells require well drilling permits from the local Board of Health. Well drilling permits will not be issued unless proper set-back distances are adhered too. Contact EHS for specific requirements.