



GEOHERMAL WELL SYSTEMS

EH&S Environmental Affairs oversees the registration and routine reporting associated with the operation of the Geothermal Well systems on campus. The following systems are currently in operation at Harvard:

- Blackstone South – Campus Services
 - 2 Wells; 1500 feet; Open Loop, Titanium heat exchangers
- Radcliffe Gym - Radcliffe
 - 2 Wells; 1500 Feet; Open Loop
- Byerly Hall - Radcliffe
 - 5 Wells; 1500 feet; Open Loop; Titanium heat exchangers
- 1 Francis Street - HRES
 - 2 Wells; 750/850 feet; Open Loop
- 1 Arrow Street - HRES
 - 3 Wells; 1500 feet; Open Loop
- 90 Mount Auburn - HRES
 - 3 Wells; 450 – 650 feet; Open Loop
- Q-RAC - FAS
 - 2 Wells; 1500 feet; Open Loop
- Weld Hill - Arboretum
 - 88 Wells; 500 Feet; Closed Loop

Types of Systems at Harvard:

Closed Loop: Uses the earth as the heat source and heat sink with anti-freeze additive to the loop water

Open Loop: Uses a surface or underground water source (lake, river, or well) as both the heat source and the heat sink

Regulatory Programs Applicable to Geothermal Wells

- **DEP Registration for Underground Injection Control Program – Class V Wells** This is a simple registration process that applies to any open loop geothermal wells. Typically requires some initial sampling and occasional sampling as requested by the DEP. EH&S Environmental Affairs provides this service.
- **Additional Permits**



- EPA, DEP and City of Cambridge NPDES Permit for Non Contact Cooling Water (NCCW) General Permit may be required depending on the system design. Contact EH&S Environmental Affairs for more information.
- Typical Permit Requirements
 - Flow limitation - varies
 - Return water temperature limitation – max – 40°F above inlet water temperature or specific maximum limit
 - pH of 6.5 – 8.5 or no greater than 0.2 above or below inlet
 - Pollutant limits
 - No visible oil sheen
 - Specific Conductance – equal to background
 - Copper – 1.3 ppm; Lead – 15 ppb; Nitrates and Total Nitrogen; Chloride
 - Initial monitoring will be required
 - Daily flows and temperature – continuous monitoring
 - Automatic shut-down for pressure loss – to ensure no cross contamination with internal heat exchange fluids
 - May require an O&M Plan