



Wells and Water Systems

Course Code NATR 39

**Frost Campus, Lindsay,
October 5 - 9, 2009**

To register or for more information call 1-888-269-6929

Course Outline

Course Description:

Through hands-on field, lab, and classroom activities, this course will provide a broad understanding of geology, hydrogeology, water testing, the life cycle of wells, assessments, water treatment, distribution systems and well upgrades. This course is intended to help professionals so that they are in a better position to advise well owners about ways to protect and improve wells, treatment that can be used on different sized water systems, and what to expect when an owner's well is upgraded.

Aim:

To familiarize participants with water sources and distribution and treatment systems; in order to assess, identify and provide advice regarding potential health related issues.

Course Learning Outcomes:

1. Identify and understand the role that geology, hydrogeology and well siting have on ground water supply, wells, surface supply and water systems.
2. Identify the components and understand the functions of well types and surface water intake areas in order to make assessments and recommendations.
3. Comprehend, and asses health related issues associated with water quality issues, treatment systems, distribution networks and testing protocols in order to assess risk and make recommendations

Learning Resources:

1. Course Manual
2. Well Wise; Conboy, Smith
3. OCWA regulations
4. List of Resources

Assessment Plan:

1. Student expectation sheets
2. Multiple choice examination
3. Course evaluation

Course Policies:

1. Eye protection, steel toe boots and hard hats required for field activities
2. Rainwear if required
3. 100% attendance is required
4. Completion of the examination, and a passing grade of 50%
5. Fleming Certificates of Successful Completion will be issued to those who meet the attendance & examination requirements.

Upon successful completion of this training session, the learner will be able to:

Module 1: Geology and Hydrogeology

1. Identify geology and hydrogeology concepts and terms, and their significance to surface and ground water supplies.
2. Comprehend permeability and porosity and how it pertains to groundwater flow (GUIDI concept).
3. Interpret and predict the movement of natural and man-made contamination in surface and groundwater supplies.
4. Comprehend the reasons and effects of well interference on quantity and quality of ground source water supplies.
5. Identify, relate and apply pertinent information for water well records.
6. Provide reasoning for the wise use of groundwater and its protection as it pertains to Best Management Practices.
7. Examine water well designs, development, characteristics, and common well failures.
8. Comprehend the role regulation 903 has on the construction of wells

Module 2: Water Quality

1. Understand the importance of high quality drinking water.
2. Identify surface and ground water sources, their characteristics and how they relate to water quality.
3. Identify common contaminants and their potential sources.
4. Define the common water quality parameters of concern for drinking water including physical, chemical/radiological and microbiological characteristics.
5. Understand factors related to pathogen introduction, their survival and persistence in water tables and aquifers, and their treatments Comprehend and identify issues related to source water protection.
6. .Review Ontario Drinking Water standards to understand operational, aesthetic and health related standards.

Module 3: Wells, Pumps and Equipment

1. Identify the main well types, their characteristics, advantages and disadvantages.
2. Understand, explain and advise on the location function of surface stickup, mounding, vermin vent, caps and pitless adapters, and well head protection of a groundwater supply.
3. Understand different options for well upgrading and rehabilitation
4. Understand process of upgrading large diameter well and well pit to finish above grade.
5. Understand process to decommission well and prevent surface infiltration.
6. Draw on various resources in Ontario to provide assistance to well owners, understand the roles of well contractor/technician, hydrogeologist, CA, NGO's and others.

Module 4: Treatment

1. Understand the broad range of chemical, physical and biological parameters that may lead to a decision for various treatment systems for drinking water.
2. Know the factors which determine the need for permanent versus shock treatment of drinking water sources.
3. Explain the various treatment options for drinking water systems including Whole System Treatment, Point of Entry Treatment, Point of Use Treatment and Superchlorination of the Whole System.
4. Demonstrate knowledge of Drinking Water Distribution Systems.
5. Explain issues related to distribution line and potential impacts to drinking water.
6. Understand key treatment systems for dealing with common problematic parameters in drinking water.
7. Provide an overview of the various systems for drinking water disinfection.
8. Identify ultraviolet (UV) disinfection and related equipment.
9. Identify chlorine disinfection and key elements.
10. Describe the rationale for drinking water filtration and identify related equipment.
11. Describe treatment options for reducing or eliminating other water quality parameters.
12. Identify the two main pump types, uses, advantages, disadvantages and characteristics.
13. Identify the components and features of a surface water source system.