Nuclear

Client
Ontario Power Generation

Location
Pickering, Ontario, Canada

Environmental Response and Risk Prevention

The Upgrading Plant at Pickering, known as the UPP, is a heavy water upgrading plant, used for distilling light water from heavy water. This area was found to contain tritium in the groundwater, believe to have resulted from spills and leaks from a containment system. As a result of the contamination, the Ministry of the Environment issued a Director's Order to OPG to define the extent of contaminated groundwater and develop a remedial action plan for the UPP area. CH2M HILL was retained by OPG to conduct the investigations.

Site Assessment and Groundwater Investigation

To define the extent of tritium contaminated groundwater in the area of the UPP, CH2M HILL implemented a site assessment and groundwater investigation. Information from the investigation was used to map the tritium, define the hydrogeological setting and assess impacts.

An initial audit of nuclear systems was conducted first to identify potential sources of the tritium. The audit narrowed the potential sources to a few systems and more detailed investigations were completed for each system. Groundwater monitoring wells were installed in the area of the Unit 1 RB including wells through the floor of the Reactor Auxiliary Bay and the Turbine Auxiliary Bay. The study also included tracer tests, video inspections, concrete assessments, tritium-age dating, atmospheric dispersion modelling and groundwater modelling to identify the source of tritium in groundwater. Management of the work required the development of OPG work plans, job safety analyses, and engineering change control. Additional components included support to atmospheric deposition modelling, site-specific risk assessment (ecological risk), and development of generic screening criteria for tritium. The investigations defined the source of tritium in groundwater as resulting from leaks in several process water sumps.

A risk assessment approach was used to assess potential impacts to human health and the environment particularly with respect to impacts on drinking water. An extent of contamination report was submitted to the MOE as part of the Director's Order.

Following definition of the contamination, CH2M HILL completed an assessment of the potentially adverse impacts on human health and the natural environment. CH2M HILL established a groundwater monitoring system at the UPP and compiled a literature review of fisheries and wildlife community information for the nearshore area of Lake Ontario and the Pickering UPP habitat. The groundwater monitoring system involved development of a data management system and construction of a monitoring well network to define the site hydrogeology, and to permit monitoring and evaluation of current and future environmental incidents. Potential contaminants of concern at the site include tritium, gamma emitters, Carbon-14, PCBs, metals, and petroleum hydrocarbons.

Remedial Investigation

CH2M HILL proceeded with an evaluation of remedial options to mitigate potential impacts from tritium in the groundwater. CH2M HILL also developed a public consultation program to solicit input on remedial objectives, evaluation criteria and possible remedial options. A Community Advisory Committee (CAC) acted as public representatives. Through a consultative process, a number of remedial options were evaluated and a preferred remedial option was selected. The preferred option was evaluated to determine the potential risk reduction using a risk assessment model. A remedial action plan to implement the preferred option was developed and submitted to the Canadian Ministry of Environment (MOE). The CAC was in support of the remedial action plan. OPG is now awaiting approval from the MOE to construct the remedial system.

Geographical Information System (GIS) for Data Management

A Geographical Information System (GIS) was used for data management. Using the data management system, we compiled current and historical information to manage, interpret, and map hydrogeological and water quality across the site.

Community Involvement

CH2M HILL incorporated a public participation component that included community workshops, presentations, an information hotline, and an Internet web page.