

# J. Bert Smith, P.Eng., FEC

## PRINCIPAL AND SPECIALIST ADVISOR

<b>PROFILE</b>	<p>As a Principal and Specialist Geotechnical Engineer/Hydrogeologist of KGS Group, Mr. Smith is responsible for all geotechnical, hydrogeological, environmental, and geomatics related projects for the Firm. His duties include overall management of department staff, design direction and review and project management. Mr. Smith also serves as Treasurer for KGS Group.</p> <p>Mr. Smith has over 35 years of experience on detailed site investigation, design and project management for hydrogeological, geotechnical and environmental related projects. His work includes dams and other water retaining structures, bridge abutments, structure foundations and analysis of groundwater related issues, structures water supply, contamination and site remediation.</p>
<b>EDUCATION</b>	<ul style="list-style-type: none"><li>• <b>Bachelor of Science in Engineering, Geological</b>, University of Manitoba (1971)</li><li>• <b>Master in Science, Hydrogeology</b>, University of Waterloo, Ontario (1974)</li></ul>
<b>PROFESSIONAL ASSOCIATIONS</b>	<ul style="list-style-type: none"><li>• Association of Professional Engineers and Geoscientists of Manitoba and Saskatchewan</li><li>• Professional Engineers of Ontario</li><li>• Association of Professional Engineers Geologists and Geophysicists of the Yukon; NWT and Nunavut</li></ul>
<b>EMPLOYMENT HISTORY</b>	<ul style="list-style-type: none"><li>• <b>Principal &amp; Specialist Advisor</b>, KGS Group (2009-Present)</li><li>• <b>Chief Geotechnical Engineer/Hydrogeologist &amp; Principal</b>, KGS Group (1986-2009)</li><li>• <b>Geotechnical/Hydrogeological Engineer</b>, Acres Consulting (1974 – 1986)</li></ul>

## PROJECT EXPERIENCE

### Project Management

- **Ruttan Mine Remediation, Leaf Rapids (2011 – 2019 ongoing)**  
Principal-in-charge of tailings and waste rock areas, closure remediation, capping of tailings area and treatment of acid mine runoff water, for \$50 million rehabilitation of former mine site, for Manitoba Mines Branch.

- **Gardiner Dam and Qu'Appelle River Dam, Dam Safety Review – SWA (2008)**  
Project Manager for DSR, plus Specialist Geotechnical input to Study. Project included evaluation of earth structures, hydraulic and concrete spillway structure conditions, instrumentation, performance, plus recommendations for upgrading.
- **Environmental Approvals – Husky Energy Ethanol Plants**  
Assisted Husky Energy in preparation of environmental approval documents for the study for a 20 million litre plant expansion and the construction of the new 130 million litre plant at the existing Minnedosa Ethanol Plant and the construction of a new 130 million litre plant in Lloydminster.
- **Project Manager for HVDC Converter Stations**  
Oil spill containment upgrade at Dorsey, Radisson and Henday Yards for Manitoba Hydro. The work involved site investigations to establish stratigraphy, groundwater conditions and water quality, plus design and construction of Phase I oil spill containment systems to protect against offsite migration. Phase 2 construction (Dorsey, 2003) addresses a quick drain system to capture a major oil release and to protect equipment from potential fires. Geotechnical and Groundwater evaluations for Dam Safety Review for several major earthdams in Ontario, Manitoba and Saskatchewan, including for Nipawin Hydroelectric Dam and Campbell Hydroelectric Station on sedimentary bedrock and glacial soils for Saskatchewan Power Corporation in 2003/2004, plus earthdam instrumentation upgrades in 2005/2006; Shellmouth Dam, for PFRD in 2004/2005 with follow-up instrumentation upgrade in 2006/2007; Kelsey Generating Station and Jenpeg Generating Station for Manitoba Hydro.
- **Assiniboine River Promenade, Project Engineer**  
Project engineer for geotechnical site investigation, design and construction of \$4,000,000 riverwalk, dock and plaza for the Winnipeg Core Area Initiative.
- **Winnipeg Floodway Expansion, Project Engineer**  
Project Engineer/Advisor for the geotechnical and hydrogeological components of the floodway expansion project.

#### Dam Safety/FMEA

- **Snare River System, Dam Safety Review – Northwest Territories Power Corporation**  
Principal-in-Charge and Specialist Geotechnical Engineer for Dam Safety Review of four sites including earth dams, concrete structures and foundations for: Snare Rapids, Snare Falls, Snare Cascades and Snare Forks, in 2018-2019. Issues addressed included permafrost affected foundations, settlement and seepage problems.
- **Fragility Assessment – Alberta Environment and Parks (2018)**  
Geotechnical Specialist Advisor for the fragility assessment of six (6) high to extreme ICC dams in Alberta (Bighorn Dam, Dickson Dam, South Heart Dam, Whiteman Dam, Paddle River Dam, and Keephills Cooling Pond) to quantify vulnerability to induced seismic ground motion. Numerical stability assessments were conducted on each structure using the Newmark type deformation analyses using finite element dynamic software programs.
- **Grand Rapids G.S. Assessment and FMEA – Manitoba Hydro**  
Lead Geotechnical Engineer for the strength and stability analysis of the existing spillway. Work has included the review of existing instrumentation output to assist in the development of uplift profiles for analysis. Completed site investigation and testing of existing cores to determine parameters for the karstic foundation which includes clay infill seams and a large downstream scour hole.

- **Boundary Dam – SaskPower**  
Specialist Geotechnical Engineer for Dam Safety Review; upgrade design of the spillway-chute-stilling basin, including stability, seepage, construction dewatering and monitoring (2007-2009), Main Dam instrumentation upgrade (2009).
- **Gardiner Dam and Qu'Appelle River Dam, Dam Safety Review – Saskatchewan Watershed Authority (2008)**  
Project Manager for Dam Safety Review, plus Specialist Geotechnical input to Study.  
  
Project included evaluation of earth structures, hydraulic and concrete spillway structure conditions, instrumentation, performance, plus recommendations for upgrading.
- **Island Falls Hydroelectric Station, Dam Safety Review – SaskPower (2002)**  
Specialist Geotechnical input to Dam Safety Review.
- **Dam Safety Review, Shellmouth Dam – Prairie Farm Rehabilitation Administration**  
Geotechnical and groundwater evaluations for Dam Safety Review for Shellmouth Dam, for PFRA in 2004/2005, with follow-up instrumentation upgrade in the period 2006 to 2015.
- **Dam Safety Reviews – Manitoba Hydro**  
Geotechnical and groundwater evaluation for dam safety review for Manitoba Hydro in 1999 for Kelsey Generating Station and in 2001 for Jenpeg Generating Station.
- **Nipawin & E.B. Campbell, Dam Safety Review – SaskPower**  
Specialist Geotechnical Services including geotechnical and groundwater evaluations for Nipawin and E.B. Campbell Hydroelectric Stations with soft foundations on bedrock and glacial soils in 2003/2004, plus earth dam instrumentation upgrades in 2005/2008. Failure Modes and Effects Analysis for SaskPower (2009). Nipawin Dam Safety and Instrumentation Review (2012 to 2014).
- **Dam Safety Reviews – Ontario Power Generation**  
Dam Safety Review for geotechnical aspects for Ontario Power Generation at several generating stations including Kakabeka Falls, Silver Falls / Dog Lake and several northwest Ontario control dams.

### Instrumentation

- **Nipawin Hydroelectric Dam – SaskPower**  
The Nipawin H.E. Dam is a complex geotechnical project which required an advanced level of detailed instrumentation for construction monitoring and long-term performance. Mr. Smith was responsible for the original design of the instrumentation (1980-1985); the assessment of performance for the earth embankments, concrete structures and foundations; piezometric, inclinometer and settlement instrumentation; anchoring system; the drainage tunnel stress-strain response, as well as piezometric, drainage and settlement/rebound movements; and the confined bedrock aquifer deep well depressurization and piezometric monitoring system. Mr. Smith was later involved in the 2003/2004 overall review and evaluation of the instrumentation, target levels for response readings and upgrading/replacement of instrumentation as warranted. In 2012 to 2014, Mr. Smith was responsible for a comprehensive review of all instrumentation performance, all structures performance relative to predicted, observed and future instrumentation readings and allowable targets, and an overall rehabilitation of the system.
- **Shellmouth Dam – Province of Manitoba**  
An instrumentation assessment, in conjunction with the structure performance, and upgrade program was completed in 2015 for the Shellmouth Dam earth structures, concrete spillway structure, foundations and

abutments. Instrumentation included pneumatic and standpipe piezometers, slope inclinometers and drainage monitoring system.

- **Gardiner Dam – Sask Watershed Authority**

A comprehensive Dam Safety Review in 2008 included an overall review and evaluation of the instrumentation and structure performance for the earth dams, concrete structures, foundations and abutments of the Gardiner Dam and Qu'Appelle River Dam. Instrumentation included an assessment piezometer, standpipes, wells, inclinometers, movement pins and seepage / drainage monitors, functionality and reliability, and target ranges to trigger action.

- **Keyask GS and Conawapa G.S. – EIS Peer Review**

Peer review of 3-D hydrogeological modeling of potential groundwater impacts and predicted instrumentation response, on the proposed reservoirs, for the Environmental Impact Statement, for environmental licensing of the Keyask Generating Station and the proposed Conawapa Generating Station.

### Geotechnical Engineering – Dams/Flood Protection

- **Lake St. Martin Outlet Channel – Preliminary and Final Design (2018 – 2019; in progress)**

Geotechnical, Hydrogeological and Geological Specialist Advisor for investigations, testing and preliminary and final design of the channel from Lake St. Martin to Lake Winnipeg.

- **Keyask G.S. - Manitoba Hydro (Design Peer Review)**

Geotechnical expertise provided in 2016-2019 as part of the Internal Peer Review Team. In addition, providing technical input and review on geotechnical (stability design), geological (bedrock) and hydrogeological issues, as required. Support has also been provided on the EIS preparation related to the reservoir groundwater issues.

- **Preliminary Design of Reach 2 Channel and Preliminary Investigations and Engineering of Options C&D of Lake Manitoba and Lake St. Martin Outlet Channels – Manitoba Infrastructure**

Geotechnical Specialist Advisor for the geotechnical and hydrogeological design components and risk assessment of four Reach 2 design alternatives as well as the Options C and D alignments. The assignments also included cost estimation, constructability assessments, erosion and sediment control, surface water management and the development and execution of two technical workshops.

- **2011 Flood – Emergency Engineering Assiniboine River, Lake Manitoba and Lake St. Martin Basins (2011 – 2013)**

Principal-in-Charge and Specialist Advisor in charge of Geotechnical/Hydrogeological tasks for March 2011 through 2012 for Emergency Geotechnical Services input to Manitoba Infrastructure and Transportation. Prime focus included the Assiniboine River dyking system downstream of Portage la Prairie; Portage diversion channel dykes and control drop structures; Hoop and Holler diversion and Lake Manitoba shoreline protection; Lake St. Martin diversion (Reach 1; Reach 3); and dyking protection in several communities (Dauphin River FN; St. Laurent; Brandon; Souris; Wawanesa; the Pas). Geotechnical work included condition inspections/assessments of dykes along Assiniboine River for the piping/ seepage, slumping and overall integrity; emergency repair measures to control dyke seepage and improve stability of slumps and slip planes; inspection / assessment and repairs to Portage Diversion Channel dykes and control structures, for piping, slumping and stability issues; shoreline erosion protection on Lake Manitoba; and topographic surveys and overland flood assessment and controls. Received 2012 ACEC Manitoba Keystone Award and Award of Excellence.

- **Rafferty Dam – Saskatchewan Watershed Authority**

Project Manager for evaluation of seepage and stability concerns on left embankment, east of spillway.

- **Tazi Twe G.S. - Saskatchewan Power**  
Geotechnical Specialist Advisor on the conceptual and preliminary engineering design for the 34 m head hydroelectric development, including a 3 km long tunnel through the bedrock, in northern Saskatchewan. Involvement includes site investigations, evaluation of bedrock quality and shear zones earthworks structures, groundwater conditions, instrumentation, borrow materials and environmental requirements to address excavation disposal including potential acid generating bedrock and radioactive materials.
- **Mayo B Dam – Yukon Energy Corporation**  
Principal-in-Charge of geotechnical components of penstock-powerhouse development, 2009-2011, to expand existing G.S. Work included site investigations (aerial photos, geophysics, drilling); quarry and borrow investigation and evaluations for rock and earth materials for the dam; and evaluation of bedrock for tunnel and slope stability including groundwater seepage and grouting; and overburden for soils for stability, settlement and seepage; and site permafrost conditions.
- **Red River Upstream Bank Monitoring – Manitoba Floodway Authority**  
Project Management for Red River characterization U/S at Floodway Inlet, including drilling, instrumentation, monitoring and assessment, relative to impacts of summer water level control.
- **Project Manager for HVDC Converter Stations**  
Oil spill containment upgrade at Dorsey, Radisson and Heday Yards for Manitoba Hydro. The work involved site investigations to establish stratigraphy, groundwater conditions and water quality, plus design and construction of Phase I oil spill containment systems to protect against offsite migration. Phase 2 construction (Dorsey, 2003; Heday, Radisson 2008) addresses a quick drain system to capture a major oil release and to protect equipment from potential fires.
- **Winnipeg Floodway Expansion Studies, Design & Construction (2000 – 2013)**  
Project Engineer responsible for preliminary design (PDEA1, PDEA2) and final design and construction of the channel Geotechnical, bridge abutment and groundwater components, including hydrogeological modeling, construction dewatering and groundwater inventory studies. Geotechnical evaluation of the deepening versus widening of the floodway channel, followed by preliminary and final design, and construction management involvement, sensitivity analysis of slope stability for various excavation slopes, depths and soil strengths; blowout or basal heave potential; bridge abutment stability; and earth dike geometry and stability. Principal-in-Charge, responsible for all geotechnical and instrumentation project components including Tender Preparation and support during construction. Follow up groundwater monitoring work from 2013 to 2019.
- **Rosenort Flood Protection Development**  
Geotechnical investigations, design and construction supervision of floodway channel, three earthdams, two control structures and earth dyke system. Project received Award of Excellence from the Association of Consulting Engineers of Manitoba.
- **Kelsey and Jenpeg G.S. – Manitoba Hydro**  
Senior Geotechnical Engineer for Dam Safety Reviews for Manitoba Hydro.
- **Kettle G.S. – Manitoba Hydro**  
Geotechnical Engineer involved in on-site inspections of dyke performance (on permafrost) and input to annual instrumentation review.
- **Conawapa G.S. – Axis B – Manitoba Hydro**  
Specialist Geotechnical Advisor for recommitment studies on Stage IV site evaluation and design in 2008 to 2013. Work included bedrock and overburden drilling investigations and assessment; hydrogeological 3-D

modeling of bedrock and overburden using MVS and FEFLOW software; seepage analysis and grouting limestone and Precambrian design; camp groundwater well assessment and installation; permafrost

- **Winnipeg Floodway Conceptual Expansion**

Geotechnical evaluation of conceptual studies in 2000 to 2002 of the deepening versus widening of the floodway channel, including sensitivity analysis of slope stability for various excavation slopes, depths and soil strengths; blowout or basal heave potential; bridge abutment stability; and earth dike geometry and stability. Project Engineer responsible for geotechnical and groundwater work for preliminary design in 2003 to 2004 (PDEA1, PDEA2). Project Engineer for final design and construction of the channel geotechnical and groundwater components (2005 to 2013), including optimization, stability, hydrogeological modeling, construction dewatering and groundwater studies, for Manitoba Floodway Authority (MFA).

- **Pointe du Bois G.S. - Manitoba Hydro**

Specialist Geotechnical Advisor for the various upgrade studies of the site, including the spillway replacement project. Mr. Smith's involvement at Pointe du Bois extends back to the Winnipeg Hydro ownership, addressing evaluation of Precambrian bedrock conditions, grouting of the East Gravity Dam and spillway structures and the demonstration project. Recently Senior Geotechnical review has been provided for the Spillway Replacement, with bedrock investigations and testing, borrow area and quarry evaluations, cofferdam design and diversion requirements, earthdam design and assessment of bedrock foundations, seepage and grouting requirements, and application of 3-D drafting.

- **Nipawin HEP – SaskPower**

Design Coordinator of geotechnical investigation, preparation of bid drawings and specifications, preparation of construction drawings and final design of the 250-MW, 3-unit Nipawin hydroelectric project for Saskatchewan Power Corporation. Project included many unique geotechnical features including cofferdam design and river diversion on soil foundation, earthworks and concrete structures on soft foundations, stability on residual strength clays, settlement issues, and construction depressurization of a confined bedrock aquifer. Work also included advanced soil anchor test program, groundwater evaluation program and grouting program.

- **Long Spruce G.S. - Manitoba Hydro**

Geotechnical Engineer on-site for liaison with Winnipeg Acres office from 1974 to 1976, addressing all earthworks and field bedrock mapping, construction progress and field conditions for the 1,000-MW Long Spruce Generating Station for Manitoba Hydro. Work included cofferdam construction and Stage II diversion of Nelson River, foundation preparation and construction of the South and North Dykes on permafrost, borrow sources, construction of the South and North Earth Dams, and concrete structures. Field input included bedrock mapping plus involvement in bedrock foundation excavations and grouting requirements, permafrost foundation conditions and dyke design, and instrumentation assessment.

- **Limestone G.S. - Manitoba Hydro**

Geotechnical Liaison Engineer on site for construction of the Phase I cofferdam and the quarry cofferdam in 1976. Design input to geotechnical, geological bedrock investigations, groundwater assessment and modeling, borrow evaluation and evaluation of instrumentation data.

- **Wawaitin G.S. - Manitoba Hydro**

Specialist Geotechnical Design Advisor for the 2008-2010 redevelopment of the Design-Build project with Kiewit for Ontario Power Generation. Work included cofferdams and diversion, evaluation of bedrock conditions, soils foundations, stability, settlement and seepage, and design of earthdam plus penstock fill.

## Hydrogeological

- **Winnipeg Floodway Expansion (2005 – 2011)- Hydrogeology**

Preliminary and Final design on groundwater impacts on water levels, quantity and quality on area domestic wells and municipal supplies. The studies included 2-D and 3-D groundwater modelling (MODFLOW, FEFLOW) of the carbonate bedrock aquifer and the Birds Hill sand and gravel aquifer to evaluate the sensitivity of the drawdown cone of influence versus depth of floodway lowering, salt water intrusion, groundwater supply impacts, construction dewatering and the blowout (basal heave) potential. This assessment work was completed as technical support to the environmental approval submissions and hearing. The preliminary and final design included installation of monitoring wells, field permeability testing, aquifer assessment, and construction dewatering for bridges, aqueduct, pump stations and cutoff walls along the floodway.

- **Winnipeg Floodway Expansion Construction Dewatering**

Construction dewatering assessment for eight separate bridge contracts, the aqueduct twin pipe crossing, Oasis Road, Outlet structure and the Kildare pump station; for Manitoba Floodway Authority. Work consisted of a hydrogeological assessment and modeling (as required) of conditions at each site, requirements for construction dewatering (pumping rates for multiple wells and duration in months), initial estimate of construction drawdown and impacts on area groundwater users plus refinements to the pumping, submissions for environmental permits to dewater, public presentations, development of mitigation plans and monitoring during construction dewatering to mitigate any impacted well owners.

- **Winnipeg Floodway Expansion, Conceptual Study, Groundwater Impacts**

Groundwater impacts on water levels, quantity and quality on area domestic wells and municipal supplies were evaluated for the proposed Floodway Expansion. The conceptual study included 2-D and 3-D groundwater modelling to evaluate the sensitivity of the drawdown cone of influence versus depth of floodway lowering, salt water intrusion, groundwater supply impacts and the blowout (basal heave) potential.

- **City of Winnipeg, Deacon Reservoir, Groundwater Study**

Project Manager for the City of Winnipeg for detailed hydrogeological assessment of carbonate bedrock aquifer at the Deacon Reservoir, (adjacent to Winnipeg Floodway Channel), including site investigations, testing aquifer pump test, 2-D groundwater, modelling, evaluation of depressurization for construction, well design and installation, and monitoring impacts on domestic wells, complete with review panel of Manitoba Environment, client and municipal representatives.

- **Rural Municipalities, Groundwater Supply Studies**

Barwick, Hornepayne, Nakina and Manitouwadge groundwater studies (2002, 2003) for aquifer characterization (including ISI Mapping) wellhead protection area studies, land use risk rating and groundwater source protection action plan. GUDI (Groundwater under the Direct Influence of Surface Water) studies also were included.

- **Hydrogeology Peer Review, Ontario Environment**

Peer review as Senior Hydrogeologist (2002 to 2004) for Ontario Ministry of Environment (MOE) to evaluate municipal GUDI (Groundwater Under the Direct Influence of Surface Water) studies done by others (municipalities in Waterloo, Guelph and Northwest Ontario areas) and make recommendations to MOE regarding acceptability of the groundwater supplies and the requirements for water treatment.

- **Keeyask GS Design Peer Review, Manitoba Hydro**  
Peer Review of the Keeyask Generating Station design and construction in 2014 to 2016 as part of the Hatch-KGS Group team advising Manitoba Hydro on the geotechnical and hydrogeological aspects of the project.
- **Keeyask Reservoir EIS Groundwater Peer Review, Manitoba Hydro**  
Peer Review of the Keeyask Generating Station reservoir Environmental Impact Statement, for the hydrogeological regional groundwater flow system study for Manitoba Hydro. Study used 3-D models with EVS visualization software and groundwater model FEFLOW to assess Precambrian bedrock and overburden groundwater regimes, including existing conditions and predicted conditions, with and without a reservoir.
- **Conawapa Reservoir Groundwater Peer Review, Manitoba Hydro**  
Peer Review of the Conawapa Generating Station reservoir Environmental Impact Statements for the hydrogeological regional groundwater flow system study for Manitoba Hydro. Study used 3-D models MVS and FEFLOW to assess impacts on groundwater regimes in the overburden till, karst limestone and Precambrian bedrock.
- **Conawapa GS Hydrogeological Assessment, Manitoba Hydro**  
Hydrogeological assessment of foundation conditions in 2005 to 2011 for the Conawapa Generating Station for Manitoba Hydro, including detailed gINT drill log database, groundwater flow system, seepage problems and grouting requirements within the karstic limestone bedrock and overburden buried valley involving 3-D finite element modeling (FEFLOW), plus 3-D visualization software (MVS).
- **Keewatinoow Converter Station Groundwater Supply Assessment, Manitoba Hydro**  
Keewatinoow Converter Station groundwater supply assessment in 2011 for fire protection and possible plant cooling water needs, for Manitoba hydro. Work included design, tender documents, site investigations, well installations and pump tests at 320 GPM, all completed to establish the required viable water supply in the Paleozoic limestone bedrock aquifer.
- **Conawapa GS Camp Groundwater Supply, Manitoba Hydro**  
Conawapa Generating Station Camp groundwater supply assessment in 2010 for a potable domestic and fire protection system for Manitoba Hydro. Work included design, tender documents, site investigations, installation of wells, pump tests at 300 GPM and assessment, to confirm required water supply in the Paleozoic limestone bedrock aquifer.
- **Nipawin HEP Artesian Groundwater Assessment**  
Assessment of groundwater in artesian Swan River sandstone bedrock aquifer and intergranular till deposits, including pump tests, 2-D groundwater modelling, design of deep well construction dewatering system in Swan River aquifer, installation, evaluation of impacts on domestic wells, and analysis of bank and structures stability.

#### Environmental Monitoring / Site Remediation

- **Sutherland Manufactured Gas Plant Environmental Monitoring, Manitoba Hydro**  
Manitoba Hydro Sutherland Facility Environmental Monitoring – Principal-In-Charge for Quality Control, Client Liaison and overall program (2012-2019) addressing long term monitoring and assessment of the Manufactured Gas Plant (MGP) impacts on the offices, service buildings and adjacent Red River, and coal tar hydrocarbons, including surface water, soils, groundwater and indoor and outside air quality monitoring and shallow and deep river sediment.

Technical support was provided to the KGS Management Team for groundwater monitoring for petroleum hydrocarbons including PAHs (polycyclic aromatic hydrocarbons), delineation of contamination, assessment

of chemical movement of groundwater, river sediment and soils, and changes in soil vapour and indoor quality. Expert specialists were engaged to augment our Monitoring Program including the use of TarGOST LIF insitu testing for coal tar and DIDSON Sonar scans of the river for gas ebullition. A stringent quality assurance quality control program was established to minimize the potential for cross-contamination. Additional involvement included addressing regulatory health risk issues, providing a yearly evaluation of the site, re-evaluating the need for changes in the long-term monitoring plan, providing cost estimates, and implementing program refinements.

- **PWGSC ESAs and Remediation**

Quality control and client liaison for PWGSC standing offer contracts for numerous ESA and remediation projects, 2003 – 2006 and 2010 to 2012 for Ontario, 1998 – 2002, and 2006 – 2009 for the Western Region, and 2001 – 2002, and 2012 to 2014 for Nunavut and Northwest Territories. A wide range of environmental projects have been addressed, including assessment of soils, water and structures for hydrocarbons (PAH, DNAPLS, LNAPLS), heavy metals, pesticides, asbestos, lead paints, PCBs, and air emissions.

- **CNR ESAs and Remediation, Emergency Spill Response**

Quality Control and client liaison for various Phase I, II and III environmental site assessments and remediation, and emergency spill response, as appropriate, for the CN Rail system and yards, from 1994 to 2019, including Symington Yard Winnipeg; Dauphin and The Pas Yards, Manitoba; Atikokan, Sioux Lookout, Thunder Bay North and Neebing Yards in northwest Ontario. Projects involved detailed site investigations and testing, hydrogeological assessments, site classifications, optional remedial measures and cost estimates; and implementation of remedial works. Projects addressed free product (diesel), Polyaromatic Hydrocarbons (PAHs), LNAPLS, DNAPLS, and a range of site-specific contaminants related to spills.

- **Ruttan Mine Site Closure and Remediation**

Principal-in-Charge for the Ruttan Mine (Leaf Rapids, Manitoba) overall site remediation in 2010 to 2019 of the Tailings Management areas, Acid Mine Drainage impacted Ruttan Lake and Open Pit and Waste rock sites (\$50 million capital cost). Services included investigations, assessment, monitoring, design and contract administration of the remediation work.

Major works included upgrading of the Ruttan Lake containment dams with discharge controls; development of the site access/ haul roads; construction of a lime water treatment plant to handle 3M m<sup>3</sup> per year of acid mine runoff; clay capping and vegetation cover of three large Tailings Management areas; and installation of an AMD seepage cutoff wall plus tailings dam stabilization. Emergency work was also undertaken to control excess AMD runoff from offsite release.

- **Low Level Radioactive Wastes, Port Hope, PWGSC**

Principal-in-Charge and Senior Reviewer (2012-2013) for historical review of status of small-scale sites relative to long-term management of remnant low level radioactive wastes resulting from previous radium and uranium processing activities.

- **Dorsey Converter Station, Groundwater Cooling, Manitoba Hydro (2004-2005)**

Senior hydrogeology reviewer for carbonate aquifer testing and evaluation, plus installation of largest open loop groundwater cooling system in Manitoba with a balanced heat flow design.

- **HVDC Converter Stations, Oil Spill Containment, Manitoba Hydro**

Project Manager in 2001 to 2003 for HVDC Converter Stations oil spill containment upgrade and fire protection at Dorsey, Radisson and Henday Yards for Manitoba Hydro. The work involved site investigations to establish stratigraphy, groundwater conditions and water quality, plus design and construction of Phase I oil spill containment systems to protect against offsite migration. Phase 2 construction (Dorsey, 2003)

addressed a quick drain system to capture a major oil release and to protect equipment from potential fires.

- **Hudson Bay Port and Tank Farm, ESA, EMP, Licensing and Upgrade**

Project Manager in 1998 - 2001 for Environmental assessment and Environmental Management Plan for the Hudson Bay Port facility and the Churchill Marine Tank Farm, Manitoba. A \$1.6 Million upgrading of the tank farm was completed to improve spill containment and to replace the fuel line system using a double wall pipeline, in an environmental sensitive area. This project received the Environmental Award of Merit in 2002 from the Association of Consulting Engineers of Manitoba.

### Hearing Support

- **Winnipeg Floodway Expansion – Clean Environment Hearing**

Manitoba Floodway Authority – Mr. Smith provided technical support to MFA at the Clean Environment Commission hearing for the Winnipeg Floodway Channel Expansion, related to hydrogeological water supply and water quality considerations of construction and long-term impacts on the limestone bedrock confined aquifer, and mitigation to domestic and commercial well users along the 47 km floodway channel.

- **Peer Review, EIS Report – Keeyask Reservoir, Manitoba Hydro**

Manitoba Hydro – Peer review technical assessment of the Environmental Impact Statement report on the groundwater potential impacts along the proposed 35 km reservoir for licensed Keeyask Generating Station and the proposed reservoir for the Conawapa Generating Station. Study used 3-D models with EVS visualization software and groundwater model FEFLOW to assess Precambrian bedrock and overburden groundwater regimes, including existing conditions and predicted conditions, with and without a reservoir.

- **Peer Review, EIS Report - Conawapa Reservoir, Manitoba Hydro**

Peer review technical assessment of the Environmental Impact Statement report on the groundwater potential impact along the proposed reservoir for the Conawapa Generating Station.

- **Woodwaste Landfill, Environmental Hearing, Abitibi-Consolidated**

Technical advisor for hydrogeological and environmental considerations on industrial woodwaste landfill, presenting to the Ontario Environmental Commission hearing to obtain the Amendment to the Certificate of Approval for expansion and operation of the McIrvine Landfill.

- **Husky Energy Ethanol Plants, Environmental Approvals**

Assisted Husky Energy in preparation of environmental approval documents for the 20 million litre plant expansion and the construction of the new 130 million litre plant at the existing Minnedosa Ethanol Plant and the construction of a new 130 million litre plant in Lloydminster.

- **GUDI Studies Peer Review, Ontario**

Peer review as Senior Hydrogeologist (2002 to 2004) for Ontario Ministry of Environment (MOE) to evaluate municipal GUDI (Groundwater Under the Direct Influence of Surface Water) studies done by others (municipalities in Waterloo, Guelph and Northwest Ontario areas) and make recommendations to MOE regarding acceptability of the groundwater supplies and the requirements for water treatment.