2009/10-2010/11
LAND REMEDIATION SECTION
REPORT

The Land Remediation Section oversees the identification, investigation and remediation of contaminated sites in British Columbia, focusing its efforts on high-risk sites, promoting and verifying compliance with provincial requirements, and facilitating brownfield redevelopment.
MESSAGE FROM THE ASSISTANT DEPUTY MINISTER

Welcome to the BC Ministry of Environment Land Remediation Section’s fourth Report, describing the Section and its work for the period of April 1, 2009 to March 31, 2011.

Since the late 1980s, British Columbia has been a pioneer and leader in the development of a standards and approvals regime for contaminated site remediation. With the support of our partners, British Columbia continues to demonstrate leadership in the field with progressive policies and programs.

With the eyes of the world on British Columbia for the 2010 Winter Olympics, land remediation came to the forefront. Several Olympics sites are located on formerly contaminated land and much was achieved in order to proudly showcase them to the world. These and other sites are described in depth in the Project Highlights section of this report. They demonstrate the value and long-term benefits of remediating urban and rural sites and their importance in healthy, sustainable communities.

We place a priority on working in partnership with stakeholders during the remediation process. We emphasize outreach as an education and communication tool to encourage voluntary compliance while establishing predictable outcomes for landowners, land purchasers and others impacted by contaminated sites and the remediation process. Staff continued a program of outreach activities including presenting at The Canadian Urban Institute’s annual Canadian Brownfields Conference and Trade Show in 2009 and 2010.

British Columbia continues to make steady progress on the investigation and remediation of contaminated sites under the leadership of the Ministry of Environment’s Land Remediation Section. Progress is defined in a number of ways. It is principally defined as a reduction in the number of contaminated sites in British Columbia by moving forward and completing the remediation process on contaminated sites. Progress is also defined through communication and outreach to stakeholders to help with understanding of the remediation process and providing support and guidance when needed.

I wish to acknowledge the contributions of program staff, our administrative staff and our delivery partners for their dedication and contributions, and to give recognition to the accomplishments they achieved in 2009/10-2010/11 under the guidance of Jim Hofweber, Director of the Environmental Management Branch.

Jim Standen
Assistant Deputy Minister
Environmental Protection Division
B.C. Ministry of Environment
As the regulator responsible for contaminated sites in the Province of British Columbia, the Land Remediation Section of the Ministry of Environment is working for clean and safe water, land and air.

We are responsible for the investigation and remediation of contaminated sites in British Columbia under the Environmental Management Act and Contaminated Sites Regulation. We strive to be a leader in land remediation through innovative policies and practices and award-winning strategies for brownfield redevelopment. Through collaboration with communities, public organizations, other agencies and private parties, we support development opportunities, protect human health and the environment, and preserve the health and beauty of our province.

A key priority for the Land Remediation Section is increasing certainty for stakeholders by establishing a level of predictability and confidence in the expectations and processes for land remediation. This is accomplished through clear policy, procedures and timelines for contaminated site remediation. It is also achieved through ongoing dialogue with stakeholders and collaborative work to establish remediation best practices in British Columbia.

By increasing confidence in the land remediation process, voluntary compliance increases and landowners are able to make informed decisions.

Our staff continue to work on program initiatives, such as guidance and process improvements, with the objective of clarifying contaminated site clean up responsibilities and improving public and business confidence in the redevelopment of sites in the province. The importance of both economic and environmental circumstances is recognized in the design and implementation of remediation solutions to ensure the best balance for site cleanups and creation of sustainable communities.

This report highlights and summarizes what has been achieved in 2009/10-2010/11, beginning with a look back at the evolution of B.C.’s contaminated sites legislative framework. More information about our work, as well as land remediation news and current events, may be found on our Ministry of Environment website: www.env.gov.bc.ca/epd/remediation
SOME DEFINITIONS

APPROVED PROFESSIONAL
A person who is appointed by a Director to the Roster of Approved Professionals. Under the Environmental Management Act, ministry officials may issue, based on the recommendation of these Approved Professionals, a contaminated sites legal instrument (such as a Certificate of Compliance) without review. Since November 1, 2004, the ministry has required that all applications for various services for non high-risk sites be made by an Approved Professional.

BROWNFIELD
Abandoned, vacant, derelict or underutilized commercial or industrial property where past actions have resulted in actual or perceived contamination and where there is an active potential for redevelopment.

CONTAMINATED SITE
An area of the land in which the soil or any groundwater lying beneath it, or the water or the underlying sediment, contains (a) a hazardous waste, or (b) another prescribed substance in quantities or concentrations exceeding risk based or numerical criteria or standards or conditions in the Contaminated Sites Regulation.

CONTAMINATED SITES LEGAL REGIME
Collectively, the documents that allow the ministry to legally regulate the investigation and remediation of contaminated sites in B.C. The contaminated sites legal regime includes the Environmental Management Act, the Contaminated Sites Regulation, Hazardous Waste Regulation and a number of protocols.

GUIDANCE
Advice provided to stakeholders to explain the Land Remediation Section’s administrative and technical requirements in addition to those already required under the Environmental Management Act, its regulations, protocols, policies and procedures.

INDEPENDENT REMEDIATION
Remediation typically carried out with a minimum of direct ministry oversight that is frequently limited to the required commencement and completion notification process.

OFFSITE MIGRATION
The migration of contaminating substances from a source site to a neighbouring site (an affected site) and where the source site and neighbouring site have different ownership or tenure.

POLICY
A written governing principle or position that influences legislation, regulations, protocols and procedures and that guides or influences decision-making and the actions of staff.

PROCEDURE
Guidance to ministry decision-makers and staff in performing their duties.

PROTOCOL
A document containing contaminated sites requirements issued by the Director under the authority of section 64 of the Environmental Management Act. Typically the requirements relate to investigations, analysis, interpretation, planning, conducting, and reporting on remediation.

REMEDICATION
Action to eliminate, limit, correct, counteract, mitigate, or remove any contaminant from the environment or the adverse effects of any contaminant on the environment or human health.

Remediation may include: site investigation, analysis, and interpretation; evaluation of methods of remediation; preparation and implementation of a remediation plan; and monitoring, verification, and confirmation of whether the remediation efforts comply with the remediation plan, applicable standards, and requirements imposed by a Director under the Environmental Management Act.

SITE REGISTRY
An electronic database, currently accessed through BC Online, documenting milestones in the screening, identification, and cleanup of all sites in the ministry’s records.
EVOLUTION OF CONTAMINATED SITES LEGISLATION IN BRITISH COLUMBIA

Timeline of significant statutory and regulatory milestones.

PROJECT HIGHLIGHTS

High Profile land remediation projects that illustrate various stages of the remediation process, project evolution and innovations.

POLICY IN ACTION

New and updated protocols, procedures, guidance and regulatory compliance.
OUTREACH & BROWNFIELDS
A selection of key outreach initiatives during 2009/10-2010/11 and a look at our brownfield redevelopment support work.

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REMEDIATION BY THE NUMBERS
Remediation instruments and notifications, site profiles and financial information.

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OUR TEAM & PARTNERS
Overview of the Section structure, key staff and partners who work to fulfill our mandate.

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EVOLUTION OF CONTAMINATED SITES LEGISLATION IN BRITISH COLUMBIA

In 1997, British Columbia introduced a new and comprehensive framework to identify and remediate contaminated sites. Since then, British Columbia’s contaminated site remediation laws have been reviewed and amended to streamline and improve the framework.

**STATUTORY MILESTONES**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 1, 1995</td>
<td>Part 3.1 – Comprehensive contaminated sites provisions added to the Waste Management Act.</td>
</tr>
<tr>
<td>April 1, 1997</td>
<td>Contaminated Sites provisions of Waste Management Act in force.</td>
</tr>
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</table>

**REGULATORY MILESTONES**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 1, 1995</td>
<td>Established Contaminated Sites Fees Regulation.</td>
</tr>
<tr>
<td>April 1, 1997</td>
<td>Contaminated Sites Regulation in effect.</td>
</tr>
<tr>
<td>July 19, 1999</td>
<td>Stage 1 – Added rostered experts, set standards for petroleum hydrocarbons, removed aquatic life standards for iron, manganese and aluminum.</td>
</tr>
<tr>
<td>February 2, 2002</td>
<td>Stage 2 – Allowed rostered experts to submit Determinations of Contaminated Site, revised various numerical standards, added notice of offsite migration.</td>
</tr>
</tbody>
</table>
### Statutory Milestones

- **July 1, 1995**: Comprehensive contaminated sites provisions added to the Waste Management Act.
- **April 1, 1997**: Contaminated Sites provisions of Waste Management Act in force.
- **May 6, 2002**: Waste Management Act amended (mines provisions, cost recovery, consequential amendments).
- **October 21, 2003**: Environmental Management Act created from Waste Management Act (Bill 57).
- **April 19, 2004**: Environmental Management Act amended (Bill 13).
- **July 8, 2004**: Environmental Management Act in effect.
- **May 13, 2003**: Minister’s Advisory Panel Report on Contaminated Sites issued.

### Regulatory Milestones

- **December 1, 2003**: Stage 3 – Amended fees, allowing lump sum and hourly rates.
- **October 21, 2003**: Environmental Management Act created.
- **April 19, 2004**: Environmental Management Act amended.
- **July 19, 1999**: Stage 1 – Added rostered experts, set standards for petroleum hydrocarbons, removed aquatic life standards for iron, manganese and aluminum.
- **February 2, 2002**: Stage 2 – Allowed rostered experts to submit Determinations of Contaminated Site, revised various numerical standards, added notice of offsite migration.
- **December 1, 2003**: Stage 3 – Amended fees, allowing lump sum and hourly rates.
- **July 8, 2004**: Stage 4 – Updated authority to make regulations and decisions, removed conditional certificates, renamed professional experts, moved Director’s standards to regulation.
- **July 1, 2007**: Stage 5 – Simplified fees regime, put Summary of Site Condition provisions into effect, amended environmental quality standards.
- **January 1, 2009**: Stage 6 – Expanded and amended environmental quality standards, clarified site profile regime, updated Summary of Site Condition.
- **May 31, 2011**: Stage 7 – Moved Director’s standards to regulation and introduced new standards for iron, manganese, aluminum and MCPA in drinking water.
PROJECT HIGHLIGHTS
Project Highlights

Our staff annually oversee the investigation, remedial planning and implementation of a wide range of contaminated site projects, offering guidance and ensuring compliance on projects of varying size, complexity and timeframe for completion.

Land Remediation projects require a variety of levels of engagement. In some situations, such as high-risk sites, we are the regulatory lead. In other cases we have a supporting role to key agencies overseeing sites not considered high-risk. In all cases, we ensure that the public interest is met by providing access to site remediation information.

The projects profiled in this section are examples of our work during the 2009-2010 and 2010-2011 fiscal years and represent a cross-section of sites in varying stages of the remediation process.

High Profile Sites

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Site ID No.</th>
<th>Site Location</th>
<th>Origin of Contamination</th>
</tr>
</thead>
<tbody>
<tr>
<td>41st and Granville</td>
<td>3169</td>
<td>Vancouver</td>
<td>Service station</td>
</tr>
<tr>
<td>9250 Oak Street</td>
<td>1397</td>
<td>Vancouver</td>
<td>Wood preservation</td>
</tr>
<tr>
<td>Bell Pole, Brilliant</td>
<td>451</td>
<td>Lumber</td>
<td>Pole treatment and storage</td>
</tr>
<tr>
<td>Britannia</td>
<td>6137</td>
<td>Nelson</td>
<td>Metal treatment and storage</td>
</tr>
<tr>
<td>Burnaby Lake</td>
<td>5984</td>
<td>Burnaby</td>
<td>Sediment contaminated by urban runoff</td>
</tr>
<tr>
<td>Chevron Refinery</td>
<td>6276</td>
<td>Burnaby</td>
<td>Hydrocarbon release to marine</td>
</tr>
<tr>
<td>CPR Revelstoke</td>
<td>1540</td>
<td>Coquitlam</td>
<td>Wood preservation</td>
</tr>
<tr>
<td>Crofton Quay</td>
<td>10696</td>
<td>Crofton</td>
<td>Smelter and tailings</td>
</tr>
<tr>
<td>Domtar</td>
<td>1540</td>
<td>Coquitlam</td>
<td>Wood preservation</td>
</tr>
<tr>
<td>Exeter Off Site</td>
<td>4143</td>
<td>Revelstoke</td>
<td></td>
</tr>
<tr>
<td>Goldstream Park</td>
<td>3130</td>
<td>Langford</td>
<td>Fuel tanker spill</td>
</tr>
<tr>
<td>IOCO Refinery</td>
<td>3130</td>
<td>Port Moody</td>
<td>Refinery</td>
</tr>
<tr>
<td>Kennametal</td>
<td>4177</td>
<td>Port Coquitlam</td>
<td>Industrial site redevelopment</td>
</tr>
<tr>
<td>Ladysmith Harbour</td>
<td>1700</td>
<td>Ladysmith</td>
<td>Coal washing, log sorting</td>
</tr>
<tr>
<td>Lake Cowichan</td>
<td>11023</td>
<td>Lake Cowichan</td>
<td>Gas station release</td>
</tr>
<tr>
<td>Meadow Avenue – Koppers</td>
<td>2203</td>
<td>Burnaby</td>
<td>Wood preservation</td>
</tr>
<tr>
<td>Mitchell Island</td>
<td>445</td>
<td>Vancouver</td>
<td>Steel manufacturing</td>
</tr>
<tr>
<td>Mission Hill Drycleaning</td>
<td>5997</td>
<td>Mission</td>
<td>Drycleaner</td>
</tr>
<tr>
<td>Nexen</td>
<td>3141</td>
<td>Squamish</td>
<td>Chlor-alkali plant</td>
</tr>
<tr>
<td>Pier Point Park</td>
<td>139</td>
<td>New Westminster</td>
<td>Industrial site redevelopment</td>
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<tr>
<td>Pinchi Mine</td>
<td>5668</td>
<td>Pinchi Lake</td>
<td>Mercury mine</td>
</tr>
<tr>
<td>Quesnel Legion Drive</td>
<td>4188</td>
<td>Quesnel</td>
<td>City works, bulk fuel storage, rail yard</td>
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<tr>
<td>Rio Tinto Alcan</td>
<td>331</td>
<td>Kitimat</td>
<td>Smelter</td>
</tr>
<tr>
<td>Rock Bay</td>
<td>354</td>
<td>Victoria</td>
<td>Coal gasification plant</td>
</tr>
<tr>
<td>Skeena Cellulose</td>
<td>2421</td>
<td>Smithers</td>
<td>Pulp mill</td>
</tr>
<tr>
<td>Sullivan Mine</td>
<td>5819</td>
<td>Kimberley</td>
<td>Lead-zinc mine</td>
</tr>
<tr>
<td>Trail Smelter</td>
<td>3250</td>
<td>Trail</td>
<td>Lead smelter</td>
</tr>
<tr>
<td>Union Bay Coal Pile</td>
<td>4291</td>
<td>Union Bay</td>
<td>Coal waste</td>
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<tr>
<td>Vancouver Shipyards</td>
<td>3285</td>
<td>North Vancouver</td>
<td>Wood preservation, shipyard</td>
</tr>
<tr>
<td>Vorsatile Shipyard</td>
<td>1419</td>
<td>Vancouver</td>
<td>Shipbuilding, wood preservation</td>
</tr>
<tr>
<td>West Peejay</td>
<td>8170</td>
<td>Northeast BC</td>
<td>Pipeline spill</td>
</tr>
</tbody>
</table>

While one site shows how immediate actions were undertaken for a spill, highlighted mining sites show the ongoing results of long-term remediation activities. In contrast, Olympic site remediation required working with many stakeholders and partners to meet a deadline.

The purpose of profiling a selection of projects is not to focus on the companies involved but rather to illustrate the remediation work that has been accomplished, the steps taken in the process and innovations or new technology that have been employed.
OVERVIEW

On April 20, 2010, during a routine inspection, staff at the Chevron Refinery noted staining along a ditch within the railway right of way downgradient from their refinery site in Burnaby, B.C. Chevron confirmed an accumulation of petroleum hydrocarbons along the railway and further inspection revealed the presence of non-aqueous phase liquid (NAPL) – petroleum hydrocarbons that remain undiluted in the subsurface environment – seeping onto the nearby rocky beach.

Chevron promptly installed containment and absorbent booms and public awareness notices along the inlet foreshore. An interception trench was also installed along the rail right of way and oil and water accumulation removal and absorbent pad application took place daily.

On June 1 2010, the Land Remediation Section took over regulatory oversight of the remediation process.

Chevron’s approach to site remediation included a detailed search for sources of contamination, completing five excavations of the main sewer, drilling approximately 25 boreholes, installing 45 wells in and around the refinery, pressure testing underground process pipes and video testing sewer pipes.

A groundwater pump and 10 recovery wells were installed upgradient of the impacted ditch to create a hydraulic barrier, further reducing migration of NAPL and dissolved phase contaminants.

Removal of liquids, including accumulated petroleum hydrocarbons and water within the railway interception trench, was initiated. Covered French drains and a sump were installed within the trench in January 2011, automating the collection of NAPL seeping into the trench and encapsulating the trench for seasonal use.

A reactive barrier was installed along the impacted foreshore in February and March of 2011 to mitigate migration of NAPL into Burrard Inlet.

Source investigation was focussed on a localized section of the effluent and storm water sewer that was suspected to be leaking. Chevron developed a sewer bypass system that will be in service while plans for repairing the sewer are developed and implemented. Chevron also monitors groundwater quality and assesses the effectiveness of remedial strategies.

INNOVATIONS

Remediation of this site presented many challenges. Disruption of the rail service along the extensively used tracks was not feasible, eliminating the possibility of using traditional excavation methods to remove contamination. Consequently, contamination was intercepted along a tidally influenced rocky shoreline.

The reactive barrier installed to mitigate hydrocarbon contamination from migrating onto the foreshore is a recent technology that replaces temporary absorbent and containment booms with a more permanent installation. The barrier is a mix of sand and Organoclay® material placed along the toe of the railway riprap embankment near the high tide line of the foreshore. The sand-Organoclay® formed a smooth outer surface which was enclosed with a CETCO® Reactive Core Material mat. The mat captures hydrocarbon that may overwhelm the barrier.

Beach sand immediately down slope of the seepage locations was excavated to a depth of 0.4 metres and filled with a sand-Organoclay® mixture to intercept the seepage and minimize petroleum hydrocarbon mobilization below ground. The mixture and the mat were protected with 10 mil thick polyethylene sheeting to prevent direct exposure to moisture (rainfall and storm waves) and loss of volatiles to the atmosphere.
REMEDIATION AND HISTORICAL MINING SITES

Mining spans a 150 year history in British Columbia and there are 1887 historic mine sites located throughout the province. Of these, only a few are known to require significant remedial action, but work is ongoing to determine if other sites in the province require attention. Historic mine sites ceased operations before reclamation requirements were legislated and contamination is frequently the result of long term operation before waste management regulations existed and the consequences of contamination were understood.

While remediating mining sites is a long-term process, initial results of the work are evident even in the early stages as contamination levels drop and natural habitat begins to recover. The mining sites profiled here are two examples of work taking place across the province. The Pinchi Mine site is nearer to the end of the reclamation process while the Britannia Beach site is approximately at the midway point of remediation. Both show the positive results that can be achieved when a site is remediated.

PINCHI MINE

Pinchi Lake, near the city of Fort St. James, was the location of an active mercury mine from 1940 to 1944 and from 1968 to 1975. Teck (formerly Cominco) announced the decommissioning of the mine and reclamation of the site in 2009. The Ministry of Energy, Mines and Petroleum Resources is the lead agency for the project, working with several partners including the Omineca Mine Development Review Committee’s working group established to review the Pinchi Mine Closure Plan. Our staff ensured compliance with the Contaminated Sites Regulation, specifically in the area of risk assessment, for non-core areas including the mill and other operational buildings, offsite areas and the adjacent Pinchi Lake where tailings were discharged.

Detailed site investigations, a sediment investigation and fish survey, human health and ecological risk assessments, and creek restoration work are currently under review. Work is entering the final phases and is on schedule for implementing the site closure plan.
BRITANNIA BEACH

Between 1904 and 1974 the Britannia Mine was the largest copper producer in the British Commonwealth. Until 2006 it was also the largest discharger of acid mine drainage in North America, daily releasing more than 300 kg of copper and zinc into Howe Sound. The Crown Contaminated Sites Program of the Ministry of Natural Resource Operations has taken on the task of remediation at Britannia, with the Ministry of Environment as the regulator.

Completed remedial actions include capping and sealing shafts and adits. Water within the mine has been collected, treated and discharged to a deep outfall. Drainage has improved and a groundwater management system is in place. Additionally, surface water is now diverted at the mine head (Jane Basin). Surface hot-spots such as concentrate piles have now been removed.

Significant environmental benefits can result after a few years’ remediation and the cleanup at Britannia Beach clearly shows how that can happen. The photo from 2003 (left) shows the intertidal zone dominated by the seaweed Cladophora, a pollution-tolerant species that flourished in high levels of metals found in the marine waters and sediment pore.

By 2010, the shoreline was supporting healthy and abundant rockweed, Fucus gardneri, as a result of the reduction of heavy metals in Britannia Bay (see photo at right). Rockweed, which inhabits all areas of Howe Sound, is an indicator of a healthy intertidal zone that is home to a large variety of species. The return of healthy rockweed flora supports the gradual return of species that depend on it such as shellfish, resident rockfish and salmon.

Ongoing remedial actions include investigating shoreline tailings, storm water capture and treatment and groundwater management system optimization, environmental monitoring and habitat surveys.
OLYMPIC PROJECTS FROM SEA TO SKY

In conjunction with the 2010 Winter Olympics, several former commercial sites, industrial sites, and landfills have been re-mediated, becoming valuable, productive spaces in Vancouver and Whistler. The sites are becoming vital parts of their communities while improving the environmental health of the region.

The Vancouver Convention Centre Expansion Project, site of the international broadcast centre for the 2010 Games, is the final remediation and redevelopment project on the city’s Coal Harbour waterfront. In addition to remediation of contaminated sediments, the Conference Centre expansion incorporates innovative fish habitat, green roof and compensation features. The West building received LEED® (Leadership in Energy and Environmental Design) Platinum certification; the first convention centre in the world to earn the highest LEED® rating.

On the southeast shore of False Creek, former industrial and commercial properties underwent clean up and construction for the Vancouver Athlete’s Village. The site was remediated to residential and aquatic life standards. This involved removal of the contaminated soil and use of a barrier between old and new soils, sealing contamination under concrete building foundations. Soil grades were raised across the site. Ongoing monitoring of soil and groundwater around the site will ensure residual contamination remains within acceptable levels.

Remediation work was completed at a recently closed landfill site and gravel pit near the Whistler Olympic and Paralympic Athlete’s Village. Remediation included landfill closure, grading and gas capture. The site now forms a “green spine” through the community.

Although the Canada Line Rapid Transit Project (linking Richmond and Vancouver Airport to downtown Vancouver) was not an Olympic project per se, it was an important transportation link during the Olympics and Lower Mainland visitors and residents continue to benefit from the increased transit options. Construction of this above and below-ground light rail system included several contaminated site remediation projects along the corridor.

The prominence of the Sea-to-Sky Highway during the 2010 Games highlighted two large-scale contaminated site remediation projects: Britannia Mine (profiled earlier) and the former Nexen Chlor-Alkali Plant site in Squamish. The Chlor-Alkali Plant, built in 1965 and operated until 1991, supplied bleaching products to the pulp and paper industry. The production process released mercury into the air and water around the plant. Following a four-year, $40-million clean up, the site is poised for redevelopment as part of this community’s Smart Growth on the Ground program.

ENVIRONMENTAL ASSESSMENT

We provide regulatory and technical guidance on contaminated site remediation to proponents of projects requiring provincial environmental assessment (EA) certification and/or federal screening. In 2009/10–2010/11, staff assisted with a number of assessment projects including:

- Gateway Program
- Port Mann – Highway 1 Project
- South Fraser Perimeter Road Project
- Evergreen Rapid Transit Project
- British Columbia Transmission Corporation Interior to Lower Mainland Project
- Vancouver Convention Centre Expansion Project
- Vancouver International Airport Fuel Delivery Project
POLICY IN ACTION
GUIDING REMEDIATION

Policy is the foundation for the development of not only legislation and regulations, but also the protocols, procedure and technical documents required to deliver the Section’s mandate for remediation. The Land Remediation Section, with input from our key partners, stakeholders and other branches of government, introduced and modified a variety of these policy-based documents during 2009/10-2010/11. The intention is to streamline and provide direction to regulators and environmental consultants to ensure consistent and compliant cleanup of contaminated sites. Several of these initiatives are highlighted below.

SALT STANDARDS

Stage 6 amendments to the Contaminated Sites Regulation brought into effect new Schedule 5 (matrix) and Schedule 7 (soil relocation) standards for barium, chloride ion and sodium ion. These new standards were developed to facilitate the assessment and remediation of Provincial salt storage yards and northeast B.C. oil and gas well sites.

This necessitated the development of a new Soluble Barium by Calcium Chloride Extraction analytical method. To ensure that use of the new analytical method for soluble barium was appropriately restricted to only those sites contaminated with barite (barium sulphate), the Director issued Protocol 14, “Requirements for Determining Barite Sites”. Development of the new chloride and sodium ion standards required co-development of a new chloride ambient water quality guideline for aquatic life and new analytical methods for salt. To clarify when a soil relocation agreement, triggered by the new Schedule 7 chloride and sodium standards, is or is not required, Technical Guidance 20, “Applicability of Sodium and Chloride Ion Soil Relocation Standards to Dredged Marine and Estuarine Materials” was developed.

LAND REMEDIATION SECTION AND THE UPSTREAM OIL AND GAS SECTOR

Northeast B.C. is home to a rapidly expanding oil and gas exploration and development industry known as the upstream oil and gas sector. To help ensure that environmental management in the sector complies with the expectations of the Environmental Management Act, the ministry has increased its regulatory role in the sector and taken an active oversight role in the investigation and remediation of a number of high-risk contaminated sites.

In cooperation with the Oil and Gas Commission, Contaminated Sites Approved Professional Society, Canadian Association of Petroleum Producers and the Treaty 8 Tribal Association, the ministry issued a contract to develop sector-specific guidance for the characterization of contamination at upstream oil and gas sites.

PROTOCOLS

Protocols are technical and administrative requirements issued by the Director of Waste Management under the authority of the Environmental Management Act.

PROTOCOL 12, “SITE RISK CLASSIFICATION, RECLASSIFICATION AND REPORTING”

Protocol 12 identifies conditions for classifying sites as high-risk, provides notification procedures for all sites and outlines reporting and reclassification requirements for high-risk sites. The Ministry Service Plan requires the Land Remediation Section to focus on the remediation of high-risk sites. Regulatory processes for non-high-risk sites are managed based on the recommendations of Approved Professionals, and the Director is authorized to consider the recommendations of an Approved Professional under section 49.1 of the Contaminated Sites Regulation. The site risk classification protocol came into effect under the Environmental Management Act on June 1, 2010, and scheduled amendments in 2011 will help clarify ministry expectations when classifying a site’s risk.

PROTOCOL 17, “REQUIREMENTS FOR NOTIFICATIONS OF INDEPENDENT REMEDIATION AND OFFSITE MIGRATION”

The protocol specifies what forms are to be used when notifying the ministry of commencement and/or completion of independent remediation or when notifying affected site owners and the ministry of off site contamination migration.
TECHNICAL GUIDANCE

These documents advise on technical and scientific matters involving the Contaminated Sites Regulation.

TECHNICAL GUIDANCE 4, “VAPOUR INVESTIGATION AND REMEDIATION”

Stage 6 amendments to the Contaminated Sites Regulation include the addition of vapour as a regulated environmental medium and the new Schedule 11 Generic Numerical Vapour Standards. To support regulation of the new medium, the ministry released draft Technical Guidance 4 for contaminated sites vapour investigation and remediation and finalized the document in September 2010. Vapour intrusion science is an area of active research and the ministry intends to update this document to correspond with advances in technical knowledge, user feedback and updates in ministry policy.

TECHNICAL GUIDANCE DOCUMENT 6, “APPLYING WATER QUALITY STANDARDS TO GROUNDWATER AND SURFACE WATER”

The Contaminated Sites Regulation contains requirements to ensure that groundwater at a site is suitable for current and future uses and is of adequate quality to protect adjacent water uses. This new document explains how the ministry applies these provisions at contaminated sites throughout B.C. and provides an evaluation of both current and future water uses at a site based on theoretical aquifer yield and the natural background quality of the aquifer.

TECHNICAL GUIDANCE DOCUMENT 8, “GROUNDWATER INVESTIGATION AND CHARACTERIZATION”

Technical Guidance 8, “Groundwater Investigation and Characterization” provides new guidance for investigating and characterizing groundwater at sites in British Columbia and for evaluating groundwater quality.

The guidance outlines when groundwater characterization is necessary, the expectations at the various stages of site investigations, development of a conceptual site model, acceptable field methods, pre and post-remediation monitoring requirements, well closure and deactivation and documentation requirements.

PROCEDURES

Procedures are used by ministry staff to guide their administration of the contaminated sites legislation and regulations.

PROCEDURES FOR PROCESSING SITE PROFILES

Changes to the site profile system were made to streamline the process and provide transparency and clarity of requirements for clients applying for local government authorizations. Since implementation of the new procedure, approximately 140 site profiles have been processed and 54 release letters provided to clients.

REGULATORY COMPLIANCE

Under the ministry’s Compliance Management Framework, we are increasingly focused on compliance promotion and verification. Continual effort is made to improve the general understanding of contaminated site investigation and remediation provisions while ensuring regulatory requirements are met.

We promoted regulatory compliance during the 2009/10 and 2010/11 fiscal years through educational and awareness-building activities, the development and maintenance of technical and administrative guidance, regulatory workshops and the Contaminated Sites e-Link and Site Profile e-Link subscription services.

To ensure regulatory requirements are met, we undertake compliance verification processes including audits, inspections and complaint investigations. Verification processes are continuously updated to ensure a fair and consistent approach to compliance determination. We continue to improve how compliance is monitored and verified with reporting requirements in regulatory instruments such as certificates of compliance, approvals in principle of remediation plans, requirements imposed by the director for independent remediation and orders.

Standard clauses that outline ongoing reporting requirements in risk-based certificates of compliance and approvals in principle, along with other instrument clauses, were posted for public comment in June 2010. These clauses are now in use and submission dates are tracked. We monitor outstanding report submissions to ensure compliance with these requirements.
# Remediaion by the Numbers

## Instruments & Site Risk Classification

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Certificates of Compliance Issued</td>
<td>Numerical: 82</td>
<td>Numerical: 61</td>
<td>Numerical: 1,058</td>
</tr>
<tr>
<td>Approvals in Principle Issued</td>
<td>11</td>
<td>15</td>
<td>371</td>
</tr>
<tr>
<td>Final Determinations of Contaminated Site Issued: Site Contaminated / Not Contaminated</td>
<td>25</td>
<td>22</td>
<td>303</td>
</tr>
<tr>
<td>Contaminated Soil Relocation Agreements Approved</td>
<td>2</td>
<td>8</td>
<td>509</td>
</tr>
<tr>
<td>Remediation Orders Issued</td>
<td>1</td>
<td>0</td>
<td>37</td>
</tr>
<tr>
<td>Site Investigation Orders Issued</td>
<td>0</td>
<td>8</td>
<td>63</td>
</tr>
<tr>
<td>Land Title Covenants Registered</td>
<td>0</td>
<td>3</td>
<td>28</td>
</tr>
<tr>
<td>Site Risk Classification Reports Submitted (since June 1, 2010)</td>
<td></td>
<td></td>
<td>332</td>
</tr>
<tr>
<td>Site Risk Classifications: High-risk (since June 1, 2010)</td>
<td></td>
<td></td>
<td>14</td>
</tr>
</tbody>
</table>

### Site Profiles

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Site Profile – Received</td>
<td>313</td>
<td>281</td>
<td>3,992</td>
</tr>
<tr>
<td>Site Profile – Site Investigations Required</td>
<td>168</td>
<td>113</td>
<td>1,827</td>
</tr>
<tr>
<td>Site Profile – Release</td>
<td>101</td>
<td>89</td>
<td>1,349</td>
</tr>
<tr>
<td>Site Profile Orders Issued</td>
<td>0</td>
<td>13</td>
<td>17</td>
</tr>
</tbody>
</table>
Past report statistics for notification of independent remediation initiation included only those sites undertaking remediation of the entire site. Statistics for this report reflect all sites initiating remediation, even if for only a part of the site.

## NOTIFICATIONS

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Notices of Independent Remediation Initiation Submitted</td>
<td>389</td>
<td>604</td>
<td>2,931</td>
</tr>
<tr>
<td>A notice in writing issued by a person to a Director promptly once the person has initiated independent remediation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notices of Independent Remediation Completion Submitted</td>
<td>313</td>
<td>507</td>
<td>2,559</td>
</tr>
<tr>
<td>A notice in writing issued by a person to a Director within 90 days of completing independent remediation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notifications Received About Likely or Actual Substance Migration to Neighbouring Site</td>
<td>97</td>
<td>124</td>
<td>887</td>
</tr>
<tr>
<td>Written notification by a responsible person to the person or persons who own neighbouring sites and to a Director regarding migration or likely migration of contamination.</td>
<td></td>
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</tbody>
</table>

## INFORMATION

<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>Site Registry Searches</td>
<td>11,487</td>
<td>12,616</td>
</tr>
<tr>
<td>Site information requests</td>
<td>165</td>
<td>216</td>
</tr>
<tr>
<td>File Contents Retrievals</td>
<td>104</td>
<td>162</td>
</tr>
<tr>
<td>CS e-Link Subscribers (total at end of fiscal year)</td>
<td></td>
<td>1257</td>
</tr>
<tr>
<td>SP e-Link Subscribers (total at end of fiscal year)</td>
<td></td>
<td>300</td>
</tr>
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## REVENUE ROUNDED TO NEAREST THOUSAND

<table>
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<tbody>
<tr>
<td>Service requests</td>
<td>$1,360,000</td>
<td>$2,705,000</td>
</tr>
<tr>
<td>Site Registry queries</td>
<td>$472,000</td>
<td>$552,000</td>
</tr>
<tr>
<td>Site information requests</td>
<td>$42,000</td>
<td>$78,000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$1,875,000</strong></td>
<td><strong>$3,335,000</strong></td>
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## EXPENDITURES ROUNDED TO NEAREST THOUSAND

<table>
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<tr>
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<tbody>
<tr>
<td>Salaries and Benefits</td>
<td>$1,835,000</td>
<td>$1,867,000</td>
</tr>
<tr>
<td>Staff Travel</td>
<td>$39,000</td>
<td>$77,000</td>
</tr>
<tr>
<td>Professional Services</td>
<td>$164,000</td>
<td>$273,000</td>
</tr>
<tr>
<td>Transfers and Grants</td>
<td>$0</td>
<td>$100,000.00</td>
</tr>
<tr>
<td>All Other Expenditures</td>
<td>$245,000</td>
<td>$81,000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$2,283,000</strong></td>
<td><strong>$2,398,000</strong></td>
</tr>
</tbody>
</table>
OUTREACH AND BROWNFIELDS

Land remediation is a continuously-evolving field and our staff provide opportunities for stakeholders to remain current on policy, trends and current events in land remediation. In addition to maintaining an extensive array of website information, staff speak at conferences and present seminars and workshops for stakeholders and the public regarding contaminated site legal provisions and technical matters. Staff also lecture from time to time at academic institutions. Outreach initiatives during 2009/10-2010/11 included the following:

POLICY/REGULATORY DEVELOPMENT

Legal
- Stakeholder Updates and Consultation 2009 and 2010 (BCMOE – Land Remediation Section)
- A Regulatory Overview of Contaminated Sites Management in B.C.
- “Understanding B.C. Contaminated Site Regime: Interpreting Requirements under New Policies and Guidance
- Aquatic Life Water Use and Point of Compliance under the B.C. Contaminated Sites Regime
- Protocol 13 Screening Level Risk Assessment (Contaminated Sites Approved Professional Society - CSAP)
- Lecture to 4th year engineering students on B.C.’s contaminated sites legal regime including recent amendments to the Contaminated Sites Regulation, policies and protocols and soil vapour and risk assessment (University of British Columbia)
- Information session and Sector Specific Guidance Workshop (Northeastern Petroleum Producers)
- Conference: Doing Business with Contaminated Land (Pacific Business & Law Institute)

Technical
- Site Investigation Guidance for the Upstream Oil and Gas Sector Stakeholder Workshop
- Federal Policy Framework Workshop for the Development of Guidance for Light Non-Aqueous Phase Liquid Characterization (LNAPL) at Contaminated Sites (Environment Canada)

Other
- 2010 Professional Development Fall Workshop (CSAP)
- B.C. Brownfield Renewal Workshop Series (with Ministry of Natural Resource Operations and other partners)
- Canadian Brownfields 2009 and 2010 (Canadian Urban Institute)
- Use of Qualified Professionals: Lessons Learned from the Contaminated Sites Program
- Building Sustainable Communities Conference (Fresh Outlook Foundation)
- Sustainable Communities Conference 2011 (Federation of Canadian Municipalities)
- Presentation to a delegation of Chinese government officials in the areas of development, finance, environment (World Bank)
- Luncheon workshop on “Managing Contaminated Site Risk (ECO Canada)
- Aquatic Ecological Risk Assessment for the Lower Columbia River Basin
- Brownfield Breakfast presentations on BCBRS and New CBN (Hazmat Magazine/GLOBE)
- Brownfields Webinar (Rural BC Secretariat)
- Former Gas Station Revitalization Framework Community Charette (with Ministry of Natural Resource Operations and other partners)
B.C. PARKS OLYMPIC CABINS

A series of poster boards profiling the varied work of the Ministry of Environment, including remediation projects from Vancouver to Whistler, were developed for outreach purposes and use at the B.C. Parks Olympic Cabins. The cabins were temporarily located at BCIT and SFU and were seen by thousands of Olympic Games attendees while waiting bus transport to their events.
**BROWNFIELDS AND BROWNFIELD REDEVELOPMENT**

The Ministry of Environment’s Service Plans for 2009/10-2010/11 cite brownfield remediation and the B.C. Brownfield Renewal Strategy as a key to reducing contamination from toxins and wastes to meet the ministry’s goal of clean and safe water, land, and air.


Also in 2010, B.C. Brownfield Renewal was a finalist at the Real Estate Foundation of B.C.’s inaugural Land Awards, which recognize initiatives demonstrating leadership, innovation, and collaboration related to the conservation and sustainable use of land in British Columbia.

We continue to be a primary partner in the development and implementation of British Columbia’s Brownfield Renewal Strategy, the Cabinet-directed response to brownfield redevelopment opportunities. Working closely with the B.C. Brownfield Renewal lead agency, we contributed to brownfield initiatives in B.C. in 2009/10 and 2010/11, through:

- Co-delivery of a second series of Local Government Brownfield Workshops in Nanaimo, Prince Rupert, Mission, Prince George and Maple Ridge. The workshop team was expanded to include the Canadian Petroleum Products Institute (CPPI) and several member oil companies.
- Supporting the development of a provincial framework for the revitalization of former service station sites. We provided face-to-face consultation and webinars as the authority on the legislative regime for brownfield cleanup.

Our staff continued its involvement and support of several national brownfield initiatives:

- The Canadian Urban Institute’s annual Canadian Brownfields Conference and Trade Show was held in Vancouver for the first time in 2009. Our staff served on conference organizing committees and presented a conference session.
- Technical input and review of the Federation of Canadian Municipalities B.C. Brownfields Roadmap. A series of Brownfields Roadmaps has been developed to help municipalities and their private-sector partners better understand how to redevelop brownfields in their communities. The Roadmaps provide a high-level overview of the brownfield redevelopment processes in selected provinces and territories and link the steps in the process to available funding and legislative requirements.
- We sit on a number of provincial and national brownfield committees including:
  - Intergovernmental Forum on Brownfields
  - Canadian Brownfield Network – Technical Advisory Committee
  - National Brownfield Association – B.C. Chapter
OUR TEAM
& PARTNERS
ORGANIZATION & ROLES
B.C. MINISTRY OF ENVIRONMENT LAND REMEDIATION SECTION

Risk Assessment & Remediation
The primary responsibility of the Risk Assessment & Remediation Units is oversight of high-risk and high priority contaminated sites. Staff with expertise in hydrogeology, toxicology, engineering, risk assessment and remediation review all service applications for contaminated sites legal instruments submitted for ministry review.

UNIT 1 STAFF
- **Michael Macfarlane**  
  Sr. Manager (risk assessment)
- **Michele Parker**  
  Administrative support

UNIT 2 STAFF
- **Doug Walton**  
  Acting Unit Manager (risk assessment)
- **Julia Brooke**  
  Sr. Officer (hydrogeology)
- **George Szefer**  
  Sr. Officer (hydrogeology)
- **Amy Sloma**  
  Sr. Officer (hydrogeology)
- **Peter Kickham**  
  Risk Assessment Officer (risk assessment/vapours)
- **Dave Lockhart**  
  Sr. Officer (approved professional submissions/authorizations)
- **Peggy Evans**  
  Unit Manager (hydrogeology)
- **Steve Dankey**  
  Sr. Officer (hydrogeology)
- **Lavinia Zanini**  
  Sr. Officer (hydrogeology)
- **Liliana Jerade**  
  Sr. Officer (high-risk review)
- **Colm Condon**  
  Risk Assessment Officer (risk assessment/oil and gas)
- **Ardith Gingell**  
  Sr. Officer (external review coordination/authorizations)
- **Janet Barrett**  
  Sr. Officer (hydrogeology)

Risk Assessment & Remediation staff also process applications for waste and hazardous waste authorizations that at times are required as part of the remediation process. These units develop technical guidance, procedures and protocols related to all aspects of contaminated site investigation, risk assessment and remediation.
OPERATIONS MANAGEMENT
The Operations Management Unit coordinates and oversees the approved professional system of service delivery for low and moderate risk contaminated sites. It also provides administration support and coordinates policy development and the provision of information on sites. This Unit develops procedures for, and advises on, the site profile processing system and is the lead for administration of the site risk classification system including financial security. This Unit also leads and coordinates the planning and development of legislation and regulations for contaminated sites.

UNIT STAFF
➔ John Ward
   Unit Manager (legislation/policy development)
➔ Vince Hanemayer
   Sr. Officer (ministry representative on CSAP Board of Directors/Site Registrar)
➔ Tyler O’Grady
   Sr. Officer (site risk classification/authorizations)
➔ Kelli Larsen
   Sr. Officer (site profiles/authorizations)
➔ Jessie Givner
   Sr. Policy Advisor (legislation/policy development)

REMEDIATION ASSURANCE & BROWNFIELDS
The Remediation Assurance & Brownfields Unit is responsible for the development and implementation of a multi-level compliance strategy that involves setting standards, verifying and promoting compliance with contaminated site legislation and initiating enforcement measures for non-compliance issues.

The Unit also plays a key role in brownfield remediation and redevelopment, partnering with other government agencies and non-government organizations to increase economic, social and environmental benefits through the revitalization of brownfield sites. Contaminated site aspects of large project environmental assessments are also overseen by the Unit.

UNIT STAFF
➔ Alan McCammon
   Unit Manager (brownfields lead/hydrogeology)
➔ Coleen Hackinen
   Sr. Officer (compliance lead/policy development)
➔ Kerri Skelly
   Sr. Officer (compliance outreach lead)
INTERNAL SUPPORT

SCIENCE & STANDARDS

The Science & Standards Section develops and reviews scientifically defensible environmental quality standards and human and ecological health risk assessment methodology. Staff also provide expert toxicological and scientific advice to the Environmental Management Branch and Environmental Protection Division.

This unit also assists in the development of contaminated sites policy and guidance and risk assessment case file reviews. They provide direct assistance in the remediation of high-risk contaminated sites and Division or Ministry representation to several scientific committees and organizations.

SECTION STAFF

- **Glyn Fox**
  Branch Science Advisor (toxicology)
- **Remi Odense**
  Risk Assessment Officer (ecological risk assessment)
- **Lizzy Mos**
  Risk Assessment Specialist
  (human health/ecological risk assessment)

BUSINESS SERVICES

The Business Services Section provides support to the Land Remediation Section for administrative functions including applications for permits and approvals, site information requests, site registry searches and file content retrieval processing as well as SITE database maintenance and training.

Client-based support includes evaluating applications to the Land Remediation Section for completeness, addressing applicant issues, identifying case files requiring Section staff review and providing information to clients regarding review services options.

The Business Service Section also maintains a system of accounting and auditing for contaminated sites services applications and prepares reports on application and case file reviewer workloads.

STAFF

- **Tyler Keith**
  Manager
- **Lucy Hewlett**
  Team Lead, Site Administration
- **Craig Rosser**
  Systems Administrator
- **Jennifer Samways**
  Site Information Advisor
- **Allison Stewart**
  Team Lead, Victoria Permit Administration
- **Emily Thibault**
  Waste Discharge Authorization Officer

PROGRAM SUPPORT AND RECORDS MANAGEMENT

Program Support and Records Management staff provide key administrative support services to staff and the public. A significant area of service involves retrieval and management of contaminated site files. These files are needed by Land Remediation staff for their technical and compliance review activities and by Business Services to complete file content retrieval requests for stakeholders who require documentation relating to contaminated sites.

STAFF

- **Colleen Loguisto**
  Administrative support
- **Nelly Palma**
  Records Management Coordinator
- **Wendy Lojstrup**
  Filing Clerk
- **Barb Dickey**
  Administrative Support
KEY PARTNERS

CONTAMINATED SITES APPROVED PROFESSIONALS SOCIETY AND THE DIRECTOR’S ROSTER OF APPROVED PROFESSIONALS

The Contaminated Sites Approved Professionals (CSAP) Society is one of our primary partners, ensuring best practices in site investigation and remediation under Protocol 6, “Eligibility of Applications for Review by Approved Professionals” of the Environmental Management Act.

The Society undertakes the credentialing process that qualifies Professional Engineers, Geoscientists, Chemists, Biologists and Agrologists for recommendation for appointment to the Director’s Roster of Approved Professionals. The Society screens member submissions and conducts random submission performance assessments.

An amendment to Protocol 6 in June 2010 expanded the scope of risk assessments Approved Professionals may review, the requirement to comment on monitoring programs and the requirement to confirm that additional requirements associated with the site profile release process and Protocol 12, “Site Risk Classification, Reclassification and Reporting”, have been appropriately assessed.

LEGAL INSTRUMENTS ISSUED

MARCH, 2000 VS. MARCH, 2011

Under the Ministry Service Plan staff focus on high-risk sites and the Roster of Approved Professionals is increasingly responsible for making recommendations on low- and medium-risk sites.
SCI\u00c8NCE ADVISORY BOARD

The Science Advisory Board for Contaminated Sites in British Columbia (SABCS) is a non-profit foundation that develops science-based tools to support professionals working in contaminated sites management in British Columbia.

The SABCS provides science-based strategic advice on the direction of contaminated sites management in British Columbia and develops tools, procedures, and assessment protocols. Supporting functions include reviewing the quality and relevance of scientific and technical information, monitoring emerging trends in contaminated sites management and establishing science based guidance including numerical values that will contribute to independent functioning of the Contaminated Sites Approved Professionals Society system in British Columbia.

In the 2009/10-2010/11 period, SABCS provided recommendations for the revision of the Contaminated Sites Soils Task Group soil standards, a supplementary report on weight of evidence approaches to the detailed ecological risk assessment guidance to be cited in Protocol 20, and a series of comprehensive field methods and analytical tools for fractured bedrock. A number of reports on soil vapour intrusion, including an updated guide for practitioners and a computer model users guide were provided to the Ministry. In 2011 the SABCS worked jointly with Golder Associates to develop recommendations for soil and vapour standards for a high density residential land use classification.

The ministry would like to acknowledge the very significant contribution all our partners have made to ministry policies, procedures and protocols.
PROFESSIONAL DEVELOPMENT

We put a high priority on the continuing professional development of staff to ensure familiarity with the latest technology, trends and innovations in land remediation. Many of us are licensed by self-regulating professional organizations such as the Association of Professional Engineers and Geoscientists of B.C. and the Institute of Agrologists. A summary of the key professional development activities undertaken by Section staff during 2009/10-2010/11 includes the following (training provider in parentheses):

POLICY/REGULATORY

- Legal
  - Foundations of Environmental Regulatory Law (B.C. Ministry of Attorney General)
  - Doing Business with Contaminated Land (Pacific Business & Law Institute)
- Other
  - Sediment quality guidelines workshop
  - Traditional ecological knowledge seminar
  - Mitigation and Offset Policy Development Workshop (B.C. Ministry of Environment)
  - Contaminated Sites Health & Safety Training (Golder Associates Ltd.)

TECHNICAL

- Site Characterization
  - LNAPL Behaviour in the Subsurface (ITRC)
  - Visual MODFLOW (Schlumberger)
  - Soil vapour characterization (BCMOE-LRS)
  - Metal leaching / acid rock drainage workshop (B.C./MEND)
  - North American Environmental Field Conference & Expo (The Nielsen Environmental Field School)
- Risk Assessment / Toxicology
  - Risk Forum Workshop (SABCS)
  - Technical Risk Assessment Workshop (Federal Contaminated Sites Action Plan)
  - Use of Risk Assessment in Management of Contaminated Sites (ITRC)
  - Ecological Risk Assessment Workshop (BCMOE-LRS)
  - Risk Symposium (GeoEnviroLogic)
- Remediation
  - Remediation Technologies Symposium (RemTech; ESAA)
  - Sediment Solutions Workshop (GeoEnviroLogic)
  - Soil Solidification/Stabilization Conference – Sydney Tar Ponds
  - Feasibility Assessments (National Groundwater Association)
  - Environmental Remediation Technologies (USEPA)
- Brownfields / Sustainable Communities
  - Canadian Brownfields Conference (Canadian Urban Institute)
  - Brownfields Conference (USEPA/ICMA)
  - Sustainable Communities Conference (Federation of Canadian Municipalities)
  - Building Sustainable Communities (Fresh Outlook Foundation)
- Other
  - Annual International Conference on Soil, Water, Energy, and Air (Association for Environmental Health and Sciences)
  - Public Involvement Training (Health Canada)
  - Risk Communication Training (Health Canada)
OLYMPIC SPIRIT

We supported the Vancouver 2010 Olympic and Paralympic Games in professional and personal capacities, overseeing land remediation activities at key sites and later participating in Olympic outreach activities. Our staff took on a number of roles, such as Public Safety Officers at Robson Square, Ministry of Environment representatives at the Simon Fraser University Olympic transportation hub and even took a turn as Jerry the Moose at the BCIT transportation hub.

Staff also participated in the vehicle maintenance division, providing transportation services to representatives of Vancouver and foreign Olympic organizations and maintaining vehicle operations. Staff also assisted in organizing volunteer drives.
LOOKING FORWARD

The Province, local governments and other land remediation stakeholders are increasingly challenged by the effects of climate change, resource pressures and a growing population. The inherent value in preserving our green spaces and redeveloping our urban environments serves as a catalyst for the investigation and remediation of sites in the province.

It is anticipated that our role in protecting human health and the environment will increasingly involve promoting environmental stewardship and empowering landowners to be stewards. This will be accomplished in part by incorporating lessons and insights into the site assessment and remediation process on an ongoing basis while communicating the benefits of land remediation to society.

Information needs increased in 2009/10-2010/11 and this trend is expected to continue into 2011/12. Providing this information helps the public make sound business decisions by assisting stakeholders in identifying and defining the risks and rewards when purchasing and developing a contaminated site.

In addition, the Ministry is exploring new opportunities for the public, local governments and others to have increased access to information on sites and their status within their communities and across the province.

To deliver our program mandate, we work collaboratively with the Contaminated Sites Approved Professional (CSAP) Society, other provincial and federal ministries, local governments and first nations. We are expanding these relationships and partnerships to more effectively address brownfield remediation throughout the province.

The ministry supports innovation and information transfer as core values in fostering continuing improvement in our business area. We encourage both staff and practitioners to look to the successes and approaches in place in other provinces, the U.S., Europe and Asia to inform where we should be heading and to inform us of what might lie ahead.

Mike Macfarlane
Senior Manager, Land Remediation
Environmental Management Branch
B.C. Ministry of Environment
FOR FURTHER INFORMATION

www.env.gov.bc.ca/epd/remediation
Contact List: www.env.gov.bc.ca/epd/remediation/contact.htm

E-mail: site@gov.bc.ca                  Ministry of Environment
Phone: 250-387-4441                    Land Remediation Section
                                          PO Box 9342 Stn Prov Govt
                                          Victoria B.C. V8W 9M1