Approach to Mine Risk Assessment and Risk Management under the *Environmental Management Act*

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Key topics

- Approaches to remediation under the *Environmental Management Act* (EMA) and the *Contaminated Sites Regulation* (CSR)
- Remediation liability provisions
- Site-specific examples
  - Trail
  - Sullivan mine
- Selected projects underway
Legal regime

Key features of legislation and regulation

- Staged identification, assessment and cleanup provisions
- Tools for access to site information
- Cost recovery fees to offset our costs
- Flexible, scientifically-based standards
- Extensive rules on liability
- Guidance on independent remediation
- Requirements for offsite migration
- Reliance on Approved Professionals
Sites on the Site Registry

9366 sites as of June 2008
# Routes to remediation (2007-08)

60% of sites cleaned up independently

<table>
<thead>
<tr>
<th>Process</th>
<th>Instruments Issued</th>
<th>Number of Sites Remediated</th>
<th>Number of Sites Undergoing Remediation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry/Approved Professional</td>
<td>Certificate of Compliance</td>
<td>126 (35 risk-based)</td>
<td>N/A</td>
</tr>
<tr>
<td>Ministry/Approved Professional</td>
<td>Approval in Principle</td>
<td>N/A</td>
<td>27</td>
</tr>
<tr>
<td>Independent remediation</td>
<td></td>
<td>192</td>
<td>334</td>
</tr>
<tr>
<td>Total for category</td>
<td></td>
<td>318</td>
<td>361</td>
</tr>
</tbody>
</table>
Environmental quality standards

- Numerical standards in soil, water, sediment
  - Are concentrations of substances
  - Define when a site is contaminated
  - Define when remediation by contaminant removal is satisfactory

- Risk-based standards
  - Hazard index $\leq 1$ for non-cancer endpoints
  - Human lifetime cancer risk $\leq 1/100,000$
  - Only used as remediation standards
  - Contaminants not removed
  - Site remains contaminated after remediation
Risk-based remediation standards

- Often used for large-scale sites where contaminant removal is not practical
- Two approaches to establishing standards
  - Default risk-based standards (CSR section 17)
  - Alternate risk-based standards recommended by local Medical Health Officer (CSR sections 18 and 18.1)
    - Developed through a community-based consultation process
    - Recommended to Director of Waste Management
- Releases available for natural background levels of substances
Types of risk assessment allowed

- **Deterministic**
  - Most common
  - Uses point estimates for variables

- **Screening level**
  - Adopted in August 2008 in Protocol 15
  - Includes simplified evaluation of exposure pathways and receptors

- **Stochastic (probabilistic)**
  - Uses distributions for variables
  - Used twice – Wells and Trail
## Use of risk-based standards in B.C.

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Risk-based Certificates</th>
<th>Total Certificates</th>
<th>Percent Risk-based</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>12</td>
<td>97</td>
<td>12%</td>
</tr>
<tr>
<td>2005</td>
<td>21</td>
<td>108</td>
<td>19%</td>
</tr>
<tr>
<td>2006</td>
<td>9</td>
<td>93</td>
<td>10%</td>
</tr>
<tr>
<td>2007</td>
<td>26</td>
<td>96</td>
<td>27%</td>
</tr>
<tr>
<td>2008</td>
<td>35</td>
<td>123</td>
<td>28%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>103</strong></td>
<td><strong>520</strong></td>
<td><strong>20%</strong></td>
</tr>
</tbody>
</table>
Remediation liability

- Polluter pays principle
- Cleanup costs to be paid by those causing contamination
- Based on National policy – 1993 Canadian Council of Ministers of the Environment
- Similar approach implemented throughout U.S. and Canada
- Wide liability net approach followed by many exemptions
EMA Responsible persons

- Current or previous owner or operator
- Producer of a substance
- Transporters of a substance
- Above if source of substances migrating offsite
EMA Persons not responsible

- Acts of God, acts of war
- Over 20 exemptions unless contamination is caused
- Sureties
- Insurers and insurance brokers
- Secured creditors
- Receivers, and receiver managers
- Trustees, executors
Provisions in EMA for mines

- Part 5 has provisions specific to core and non-core areas of mines
  - Exploration and advanced exploration sites
  - Producing and past producing mine sites
  - Historic mine sites
- Provisions address
  - Responsibility for remediation
  - Ability of EMA Director to issue Orders
  - Security and fees
  - Indemnification and transfer agreements
Provisions in EMA for mines

**Transfer agreements**

- Written agreements between the Chief Inspector of Mines and the Director of Waste Management
- Extinguish the remediation liability of previous owner
- Administrative procedures being developed with Ministry of Energy, Mines and Petroleum Resources
- High risk sites may not be eligible
Provisions in EMA for mines

**Indemnification**
- Provided pursuant to the *Financial Administration Act*
- Remediation liability of previous owner under Part 4 of EMA extinguished
- Rarely used for contaminated sites in B.C. (including mines)
- Government normally does not wish to become involved in private business transactions
Different statutory liability schemes

**Mines Act**
- Current owner’s liability for reclamation of a mine is extinguished when a permit is transferred to a new owner

**Environmental Management Act**
- Current owner’s liability for remediation of a site is not extinguished when a site is sold to a new owner except under Part 5

Seeking to synchronize these approaches for all sites
14th remediation liability principle adopted by Canadian Council of Ministers of the Environment (CCME) in 2006
- Deals with liability transfer between sellers and buyers of land
  - Idea is to extinguish the liability of sellers
- Contract to obtain options for incorporating the principle under the *Environmental Management Act* completed
- Grant to the B.C. Chapter of the National Brownfields Association provided
  - Stakeholder consultations underway
Trail contamination
Trail contamination – early years

- 1896: Trail smelter operations commence
- 1940s: regulatory control of stack emissions
- 1940s-1990s: stack emissions decrease
- 1975-1988: Federal blood lead guidelines decrease (40 to 10 µg/dL)
- 1988: about half of Trail children have blood lead levels > 10 µg/dL
- 1990s:
  - Task force formed to address community lead exposure
  - Teck Cominco initiates Trail human health and environmental risk assessments
Trail risk assessments – human health

- 90% of Trail children blood lead < 10 µg/dL
- Blood lead average for children < 5 µg/dL
- Lead risks to be managed by Medical Health Officer
- Other metals (arsenic, cadmium . . .) risks to be reviewed by ministry
- Stochastic risk assessment underway
  - Reviews multiple pathways of exposure, e.g. garden vegetables, fish, soil
- Remediation strategies to be proposed
Trail risk assessments – ecological health

- Terrestrial and aquatic components
- Remediation planning underway
  - Expect implementation of wildlife habitat management plan instead of contaminant management plan
  - Would be developed by multistakeholder process
  - Anticipate greater benefits with lower costs
Sullivan mine risk assessment

- Mine decommissioned
- Contamination mainly affects ground- and surface water
- Several severely impacted creeks
- Source is acid rock drainage from waste rock
- Typical risk management strategy
  - Pump and treat contaminated groundwater
  - Maintain cover
  - Monitor the site
Selected projects underway

- Proposed CSR amendments
  - New wildlands use definition and standards
  - New vapour standards
  - Standards for barium and salt
- Brownfields renewal strategy
  - Announced late February 2008
  - Interagency project with Ministry of Agriculture and Lands leading
- Science Advisory Board
  - Recommendations for detailed ecological risk assessment guidance
For more information

- Use our e-mail address for general queries
  site@gov.bc.ca

- Check out our web site
  www.env.gov.bc.ca/epd/remediation/
  (or Google “BC contaminated sites”)

- Consult the staff contact list on our web site

- Join our CS e-Link mailing system

- Attend our 3rd annual workshop next spring
Thank you!

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