Down the Drain:
Where Wastewater Goes and How it’s Regulated

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About Me

• **UBC**: B.Sc. Biology

• **BCIT**: Candidate for B.Tech. Environmental Engineering Technology

• **Environmental Regulation & Enforcement Officer**: 5 years
  – Liquid Waste Regulatory Program
Topics

1. Wastewater Infrastructure
   – Municipal
   – Regional

2. Regulation
   – Sewer Use Bylaw
   – Pollution Prevention Plans for Labs (future)

3. Case Study
   – Metal spikes
Infrastructure

• Extensive sanitary sewer infrastructure in region
• Operated by both municipalities & MV
• Includes:
  – Municipal lines & MV trunk sewers
  – Pump stations (Municipal & MV)
  – Wastewater Treatment Plants (MV)
System Map
Vancouver Sewerage Area
Wastewater Treatment Plants

• Metro Vancouver operates 5 WWTPs
  – 3 secondary treatment plants
  – 2 primary treatment plants
Iona Wastewater Treatment Plant

- Services the Vancouver Sewerage Area
- Located on Iona Island
- Opened in 1963
- Enhanced primary treatment
- Slated for future upgrade to secondary
2013 Iona Island WWTP Effluent
Total Daily Flows
Wastewater Treatment

• IIWWTP uses Chemically Enhanced Primary Treatment (CEPT)
  – Addition of alum and non-ionic polymer
• Sludge processed in digester to create renewable energy
  – Heat and electricity for WWTP
The Treatment Process

**Primary treatment** is largely a mechanical process that removes materials that settle or float. It removes 60 to 80 per cent of total suspended solids and 50 to 60 per cent of the biochemical oxygen demand.

**Screening**
Wastewater is screened to remove wood, stones, and other large debris.

**Pumping**
Wastewater is pumped to a higher level elevation so gravity can move it through the rest of the treatment process.

**Grit removal**
Pumped aeration keeps organic materials suspended while forcing grit — coffee grounds, sand, and other dense particles — to settle and be removed.

**Removing solids**
In the sedimentation tanks, the heavier 'sludge' settles to the bottom and lighter 'scum' floats to the top.

**Secondary treatment** is a biological process that removes 90% or more of the materials in wastewater. This includes suspended solids and dissolved materials (biochemical oxygen demand).

**Trickling filters**
As wastewater trickles through this tank, bacteria — which consume organic material — cling to the filter media.

**Solids contact tanks**
Through a process called flocculation, smaller particles join to form larger floc, which then settle more easily.

**Secondary clarifiers**
Solid material (sludge) settles and is removed to digester.

Chlorine is added to kill bacteria in effluent. It is removed before effluent is released into waterways.

Just one drop of motor oil can contaminate 50 litres of water, making it unhealthable for aquatic vegetation and animal life.
Regulation

• Non-domestic discharges regulated by Sewer Use Bylaw No. 299
  – Specifies prohibited and restricted wastes
  – Allows for permitting and cost recovery
  – Provisions for regulatory actions and penalties
Prohibited Waste

- Flammable or explosive
- Causing obstruction or interference
- High temperature
- Radioactive
- Biomedical
- Risk material for BSE
- Hazardous waste
Restricted Waste

- Biochemical Oxygen Demand
- Total Suspended Solids
- pH
- Metals
- Oil & Grease, BTEX
- PAHs
- Formaldehyde
- Other parameters as specified
P2 Plans for Laboratory Operations

- P2 Plan = Pollution Prevention Plan
- Comprehensive and continual evaluation of business
- Onus on discharger to reduce waste
P2 Plans for Laboratory Operations

• Metro Vancouver has not yet implemented
• Stakeholder consultation
• Final development
• Perhaps in later in 2014?
A P2 Plan

• Pollution Prevention is:
  – Source reduction
  – Technology changes
  – Improved operating practices
A P2 Plan

• A P2 Plan is not:
  – Off site recycling
  – Waste treatment
  – Concentrating hazardous or toxic products to reduce volume
  – Diluting constituents to reduce hazard or toxicity
Case Studies

• Metal spikes at WWTPs
Metal Spikes at MV WWTPs

NW Langley WWTP Nickel Levels in Sludge

- Digester Sludge to Lagoon Grabs
- Digester Sludge Composite
- Sludge to Digester Composites
- Class B Criteria

Nickel Concentration (mg/Kg-dry)

Date Range:
- 1-Jan-08 to 11-Mar-10

Graph showing nickel concentration trends over time.
Metal Spikes at MV WWTPs

LIONS GATE WWTP Molybdenum Levels in Weekly Sludge

- Dewatered Sludge Composite
- Raw Sludge Composite
- Class A & B Criteria
Metal Spikes at MV WWTPs

LULU WWTP Cadmium Levels in Weekly Sludge

OMRR Class A&B Criteria
Dewatered Sludge Composite
Dewatered Sludge Grab
Mixed Sludge Composite
Questions?

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