Risk Mitigation at the Chemtrade Electrochem Inc. North Vancouver Chlor-Alkali Facility

A presentation to the Community

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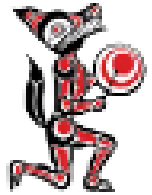


Tsleil-Waututh Nation

PEOPLE OF THE INLET

Chemtrade North Vancouver is located on territory that was never ceded or given up to the Crown by the Tsleil-Waututh peoples. The term unceded acknowledges the dispossession of the land and the inherent rights that Tsleil-Waututh hold to the territory. The term serves as a reminder that the Tsleil-Waututh have never left their territories and will always retain their jurisdiction and relationships with the territory.

Agenda

- Plant Overview
- Risk Mitigation: Regulatory Overview
- Risk Mitigation: Responsible Care
- Risk Mitigation: Process Safety Management
- Risk Mitigation: Emergency Response Plan
- Risk Mitigation: Chlorep Emergency Response Team
- Site Specific Quantitative Risk Assessment
- Questions

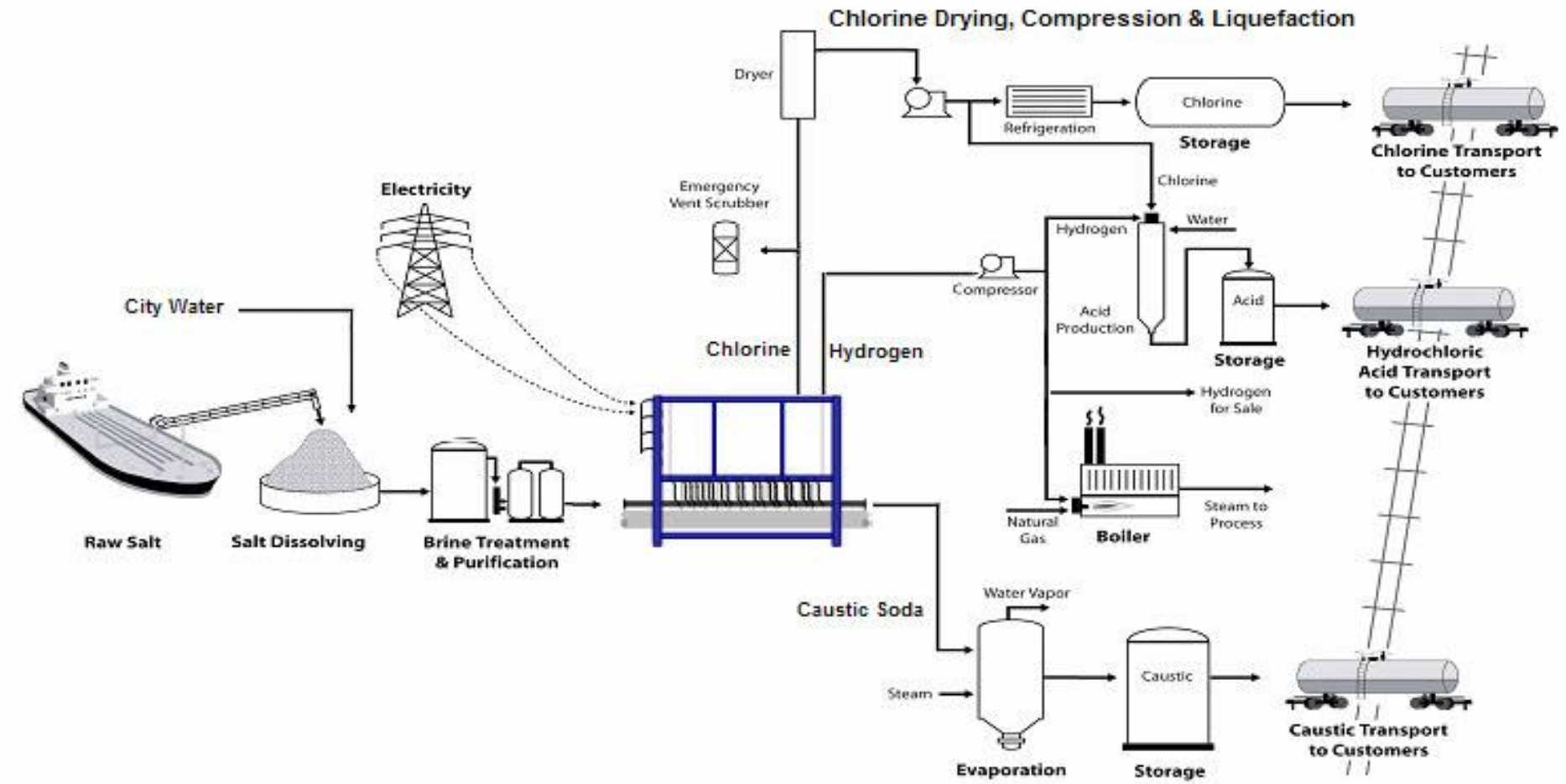
North Vancouver Plant History

- Plant commissioned by Hooker Chemicals in 1957
  - Numerous expansion / upgrade / remediation projects executed from 1957 – 2001
- Technology Conversion Project (TCP):
  - Converted to Membrane cell technology in 2010 with significant Responsible Care and economic benefits
  - Capital Investment of $282 MM (+ ~$50 MM since 2010 to correct >130 design deficiencies)
- Hydrochloric Acid (HCl) Growth Projects:
  - 2010 installation of AG1 – first large burner & 2013 installation of two additional large burners
  - $50 MM total investment
- Caustic Modernization Project:
  - Installation of membrane design, high efficiency evaporation system – started up in late Q4/2015
  - $22 MM investment ($5 MM below budget, design near flawless since start-up)

North Vancouver Site Overview

Chlor-Alkali Process

$$2NaCl + 2H_2O \Rightarrow 2NaOH + Cl_2 + H_2$$



How Does Chlorine Harm You?

From Chlorine Institute Pamphlet 1:

- The toxic effects of chlorine are due to its corrosive properties.
- Exposure to low concentrations of chlorine gas may cause irritation to the nose, respiratory tract, and eyes (burning discomfort, blinking, redness, conjunctivitis, and tearing).
- Unless exposed at a very high frequency and for a long time Cl2 has no chronic impacts
- As an oxidizing gas Chlorine dissipates quickly.
- Once chlorine has dissipated it no longer poses a threat to health and the environment.

Regulatory Overview

Air Emissions

- Regulated by the BC Ministry of Environment under the Environmental Management Act.
- Permitting administered by Metro Vancouver.
- The permit sets limits of release amounts and concentrations.
- Chemtrade has 17 regulated emissions sources.
- Releases above threshold quantities are reportable to both Metro Vancouver and BC MOE.

Regulatory Overview

Effluent Emissions

- Regulated by the BC Ministry of Environment (BC MOE) under the Environmental Management Act.
- The permit sets limits as below:
  - pH between 6-9 pH units
  - Temperature
  - Chlorine residual
  - Heavy metals
  - Bio-assay
- Any release outside of the permit is reportable to BC MOE including spills to ground

Regulatory Overview

Other Regulatory Bodies

- Federal MOE
- Department of Fisheries
- Port of Vancouver
- Technical Safety BC
- WorkSafe BC
- Transport Canada
- AAR (Association of American Railroads)

Responsible Care

- Responsible Care was launched by CIAC (Chemical Industry Association of Canada), then known as the Canadian Chemical Producers' Association (CCPA), in 1985 in response to the Bhopal incident.
- "The Canadian chemical industry is committed to taking every practical precaution to ensure that products do not present an unacceptable level of risk to its employees, customers, the public or the environment."

"Do the Right Thing and Be Seen to Do the Right Thing"

Responsible Care

- The **Operations Code** outlines how Responsible Care companies should manage their facilities and equipment to ensure they're operated in a safe and responsible way.
- Under the **Stewardship Code**, companies must regularly review the value, impact, and safety of the products they make and the services and technologies they use.
- The **Accountability Code** requires companies to communicate the risks and benefits of their operations to those who live near their facilities Responsible Care is practiced in 73 countries and by 96 of the 100 largest chemical producers in the world.
- We undergo a three year verification cycle which is publicly available.

WHAT IS PROCESS SAFETY MANAGEMENT?

Process Safety Management (PSM) is focused on prevention of, preparedness for, mitigation of, response to, and restoration from catastrophic releases of chemicals or energy from a facility.

It is made up of comprehensive sets of policies, procedures, and practices designed to ensure that barriers to incidents are in place, in use, and effective.

PSM Structure

- Commit to Process Safety
  - Management is committed to preventing releases and provides adequate resources
  - Employees are committed to preventing releases
- Understand Hazards and Risks
  - Identify ways to reduce or eliminate hazards
  - Understand residual risk
- Manage Risk
  - Know how to operate and maintain the facility
  - Control changes to the facility
  - Prepare for, respond to, and manage incidents
- Learn from Experience
  - Learn from small problems to prevent them from becoming large problems

PSM: Release Prevention

- Equipment and processes are designed to industry standards and codes
- Changes to the design must be reviewed and approved
- Designs are reviewed periodically (every 5 years)
- Operators are trained
- Computer systems control the operation of equipment
- Warning alarms alert Operators to developing problems
- Emergency shutdown systems take the plant to a safe state
- Inspection, testing and preventive maintenance of equipment
- Secure site, fully fenced with 24-hour security guards on site

PSM: Release Mitigation

- Scrubbing systems for chlorine and hydrochloric acid vents
- Overpressure protection to prevent equipment from rupturing
- Dikes around tanks and at truck and railcar loading locations
- Chlorine sensors for early detection of releases
- Emergency response planning

ERP

We have two governing documents:

1) E2 plan – Prepared in compliance with the E2 regulations prepared by a third-party consultant.
2) Emergency Response Guideline – Internally prepared to cover the detailed steps required in the event of an emergency

<u>Drills</u>

- We are required to drill the ERP every year with a full scale drill every 5 years.
- Our full scale drill is due this year and will be executed in Q4

ERP

The ERP Scenarios Considered Are:

1) Chlorine Releases
2) Hydrochloric Acid Releases (very similar to Cl2)
3) Earthquake
4) Fire or Explosion
5) Serious injury or fatality
6) Security Event

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ERP

CHLORINE RESPONSE LEVELS			
1. ASSESS THE EXTENT OF THE RELEASE			
INTERNAL SENSORS			
Localized release below 10 ppm	Significant Cl2 release resulting in > 10 ppm at one or more sensor that is sustained	Major Cl2 release resulting in multiple sensors >10 ppm that is sustained	Catastrophic Cl2 release resulting in multiple sensors >10 ppm that is sustained
PERIMETER SENSORS			
One perimeter sensor <=0.3ppm	One sensor above 1ppm sustained	One or more sensors above 10 ppm sustained Multiple sensors above 1 ppm sustained	Multiple sensors above 10ppm sustained
2. ASSESS THE CONTROL OF THE RELEASE			
Low probability of escalation	Control of hazard is pending but likely	Control of the hazard is unknown and may escalate	Control of the hazard is unknown and release is escalating
3. ASSESS PUBLIC SAFETY			
No immediate impact to the public, environment, or site personnel	No immediate threat to public safety	Potential for injury or threat to public safety	Ongoing threat to public safety

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4. DETERMINE THE EMERGENCY LEVEL			
ALERT HAZARD LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3
NOT AN EMERGENCY	MINOR EMERGENCY	MAJOR EMERGENCY	CATASTROPHIC EMERGENCY
ON-SITE ALERT RESPONSE			
Local area evacuation and local alarms Handled by employees in the area wearing appropriate PPE under the direction of a supervisor	SIP for non-essential Chemtrade employees	SIP for non-essential Chemtrade employees	SIP for non-essential Chemtrade employees
PUBLIC ALERT RESPONSE			
Local horn and strobe initiated through DCS Phone Western neighbours if restricted to loading area	Alertable: Immediate Neighbours - SIP Alertable: Zone 1 - No Shelter Phone Western neighbours if restricted to loading area (See appendix D for instructions)	Alertable: Zone 1 - SIP Alertable: Zone 2 - No Shelter (See appendix D for instructions)	Alertable: Zone 2 - SIP Alertable: Zone 3 - No Shelter (See appendix D for instructions)
PERFORM A RISK ASSESSMENT AND ADDRESS THE LEAK	GO TO LEVEL 1 CHLORINE RELEASE GUIDE	GO TO LEVEL 2 CHLORINE RELEASE GUIDE	GO TO LEVEL 3 CHLORINE RELEASE GUIDE

Security threat, natural disaster, fire and explosion that may affect the lower mainland but does not threaten business continuity	Security threat, natural disaster, fire and explosion that may affect the lower mainland and may threaten business continuity	Natural disaster expected to cause disruption to continuity	Natural disaster that will cause extended disruption to business continuity
PERFORM A RISK ASSESSMENT AND ADDRESS	GO TO APPROPRIATE GUIDE	GO TO APPROPRIATE GUIDE	GO TO APPROPRIATE GUIDE
Not implemented	Response activities under the control of Chemtrade Incident Commander Incident managed through an ICS 201 (Incident briefing)	ICS Implemented, IMT to manage reactive and proactive phases. CMT placed on standby.	Full IMT and CMT activiation Multi-agency involvement required Unified Command Established

Release Guides Define:

- The response actions and responsibilities for each role (Supervisors, Operators, Security, Management).
- When the Incident Command Structure is stood up.
- Shelter in Place (SIP) requirements and levels of public notification.
- When third party emergency response teams will be notified to respond.
- When to run the release modeling software.

Strategies and Tactics:

- For Cl2 releases we define the 23 most likely causes of a release and the strategies and tactics to respond.

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What is CHLOREP?

- Launched in 1972, CHLOREP® (the Chlorine Emergency Plan) is The Chlorine Institute's mutual aid program that provides a rapid and effective response to chlorine emergencies in the U.S. and Canada by ensuring that transportation service providers, end-users, first responders, hazmat teams and others have quick access to accurate information and industry expertise
- Supported by chlorine producers, packagers and specially trained emergency response contractors, CHLOREP provides emergency responders with expert support via telephone within minutes, and if needed, will rapidly deploy emergency equipment and personnel to the scene of any chlorine emergency in the U.S. or Canada
- The CHLOREP network includes more than 80 response teams from 25 Chlorine Institute member companies across the U.S. and Canada, as well as 10 emergency response contractors who meet the Institute's stringent performance requirements

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How CHLOREP is Activated

- CHLOREP assistance during a chlorine emergency is available 24/7, through The Chlorine Institute's collaboration with
  - CHEMTREC® (the Chemical Transportation Emergency Center, operated by the American Chemistry Council)
  - CANUTEC (the Canadian Transport Emergency Centre, operated by Transport Canada)
- To activate CHLOREP for assistance with an incident, the first step is to contact CHEMTREC® or CANUTEC
- CHEMTREC® provides a direct link to the closest CHLOREP response team
- CANUTEC provides a link to CHLOREP via the shipper's Emergency Response Assistance Plan (ERAP)
  - **CHEMTREC®**
    Toll-Free 800-424-9300
    Toll 703-527-3887
  - **CANUTEC**
    Toll-Free 888-226-8832
    Toll 613-996-6666

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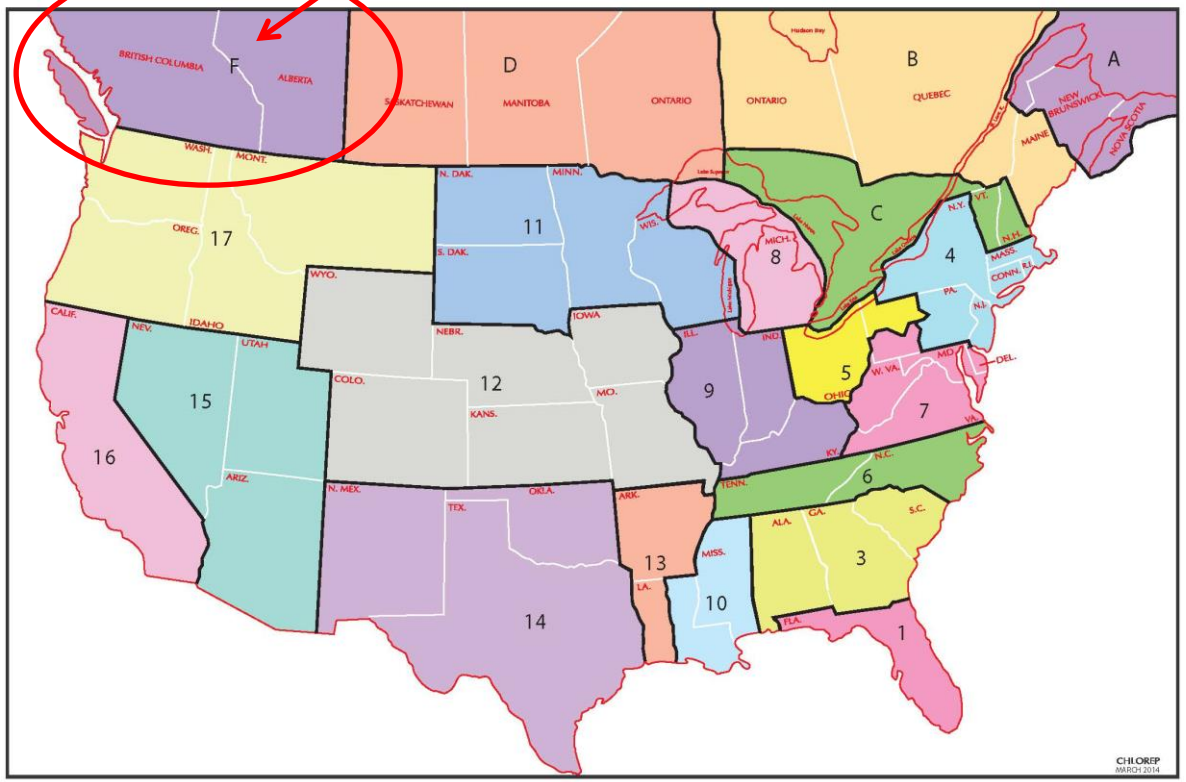
CHLOREP® Sector Operations

North Van plant is responsible for Sector F



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Team Training

- An effective emergency response mutual aid network is dependent on trained team members
- The Chlorine Institute sponsors annual and triennial training for team members, enabling companies to provide the level of training needed for effective teams
  - **Team Training**
    - Team Training is a 5-day intensive training program that is offered on an annual basis at the Mississippi State Fire Academy in Jackson, MS. This program combines classroom instruction with hands-on, scenario-based field exercises to prepare participants for chlorine emergency response
  - **Advanced Training**
    - Advanced Training is offered on a triennial basis and is intended for the most experienced responders. This training focuses on application of techniques developed to perform a field transfer from a damaged bulk container. The program includes both classroom instruction and hands-on field activities designed to provide the knowledge required to patch a breached chlorine tank car and conduct a field transfer using The Chlorine Institute's liquid chlorine pump.

Emergency Equipment We Use

Emergency Kit "A"

- Emergency Kit "A" is designed for use with the standard DOT 3A480 and 3AA480 100 and 150 pound capacity cylinders in chlorine service only
- Emergency Kit "A" contains devices and tools to contain leaks in and around th der valve and in the side wall of chlorine cylinders

Emergency Equipment We Use

Emergency Kit "B"

- Emergency Kit "B" is designed for use with the standard DOT 106A500X chlorine ton container and can also be used with 110A500W in chlorine service
- Emergency Kit "B" contains devices and tools to contain leaks in and around the ton container valves and in the side wall of ton containers

Emergency Equipment We Use

Emergency Kit "C"

- Emergency Kit "C" is designed for use with the standard DOT 105J500W chlorine tank car, DOT MC331 chlorine cargo tank and DOT 51 portable tank in chlorine service
- Emergency Kit "C" contains devices and tools to contain leaks in and around the pressure relief device and angle valves

QRA

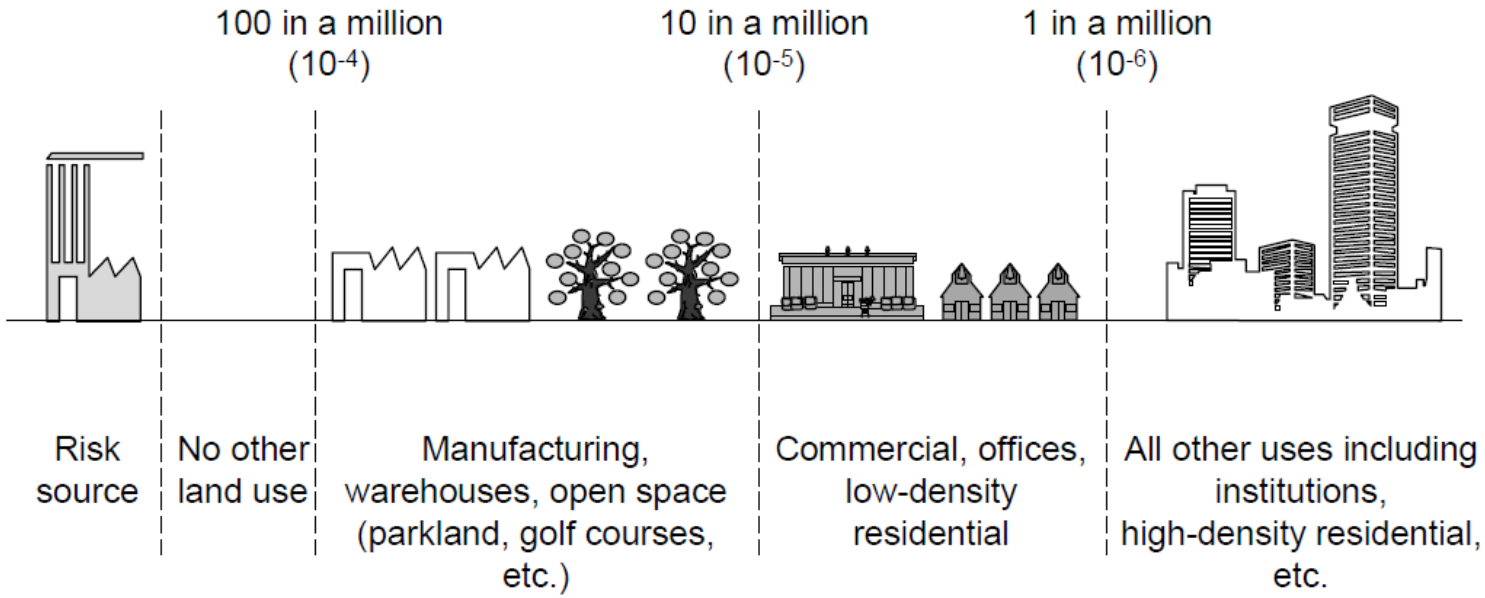
QRA = Quantitative Risk Assessment

- A formal and systematic approach to estimating the risk that the facility poses to the public.
- Considers the various ways in which releases can occur and the probability of them occurring.
- Computer modeling calculates a chance of fatality in a year at a given location.
- The model is conservative as it assumes that someone is at that point at all times.
- Prepared by a third-party consultant and then verified by an independent consultant supplied by the District of North Vancouver.

QRA

MIACC Risk Acceptability Criteria for Land-use Planning

Annual Individual Risk
(chance of fatality per year)



Allowable Land Uses

QRA


Front St
Main St
1E-006
Columbia St
Bay St
North Van Plant
1E-004
1E-006