NEWFOUNDLAND & LABRADOR REFINERY PROJECT (NLRC)

SNC·LAVALIN

PUBLIC CONSULTATIONS
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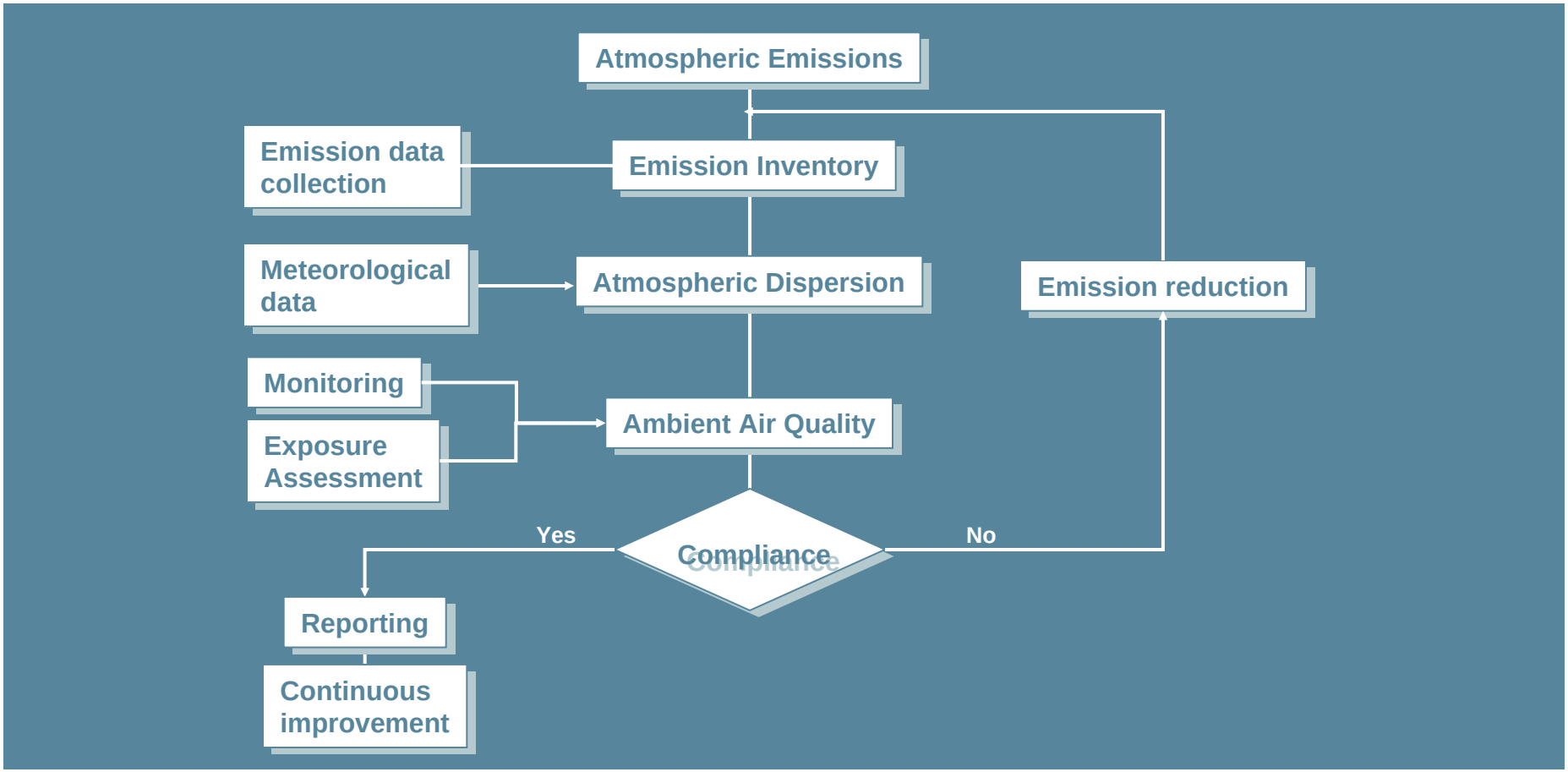
PRESENTATION OVERVIEW

1. Introduction
2. Emission inventories
3. Dispersion modelling
4. Air quality monitoring
5. Compliance assessment
6. Potential emission reduction measures
7. Reporting

INTRODUCTION



INTRODUCTION - POLLUTANTS

- Criteria Pollutants (i.e. NOx, SOx, CO, PM2.5 & PM10)
- Toxic substances (e.g. benzene)
- Volatile Organic Compounds (VOC's)
- Odorous compounds
- Greenhouse gases

INTRODUCTION - SOURCES

- Stacks & vents (point sources)
- Storage tanks (fixed or floating roofs)
- Equipment leaks (process fugitive emissions)
- Loading, unloading operations
- Wastewater collection and treatment
- Upsets and accidental releases
- Other (material handling, mobile vehicles, etc.)

EMISSIONS DATA COLLECTION

Data collection tasks include:

- **Design data review**
- **Conservative input for operational data**
- **Reasonable assumptions for data gaps**
- **Future validation through in-situ measurements (e.g. equipment leaks, stack sampling, etc.)**

EMISSION INVENTORIES

To be performed for all sources and pollutants using:

- **CPPI "Code of Practice for Developing a Refinery Emission Inventory"**
- **Engineering calculations and emission factors (ex. AP- 42)**
- **Tanks 4**
- **Water 9**
- **Other U.S. EPA models and correlations**
- **Etc.**

DISPERSION MODELLING

Meteorological data

Normal operations

- **SCREEN**
- **ISC (AERMOD)**
- **CALPUFF**

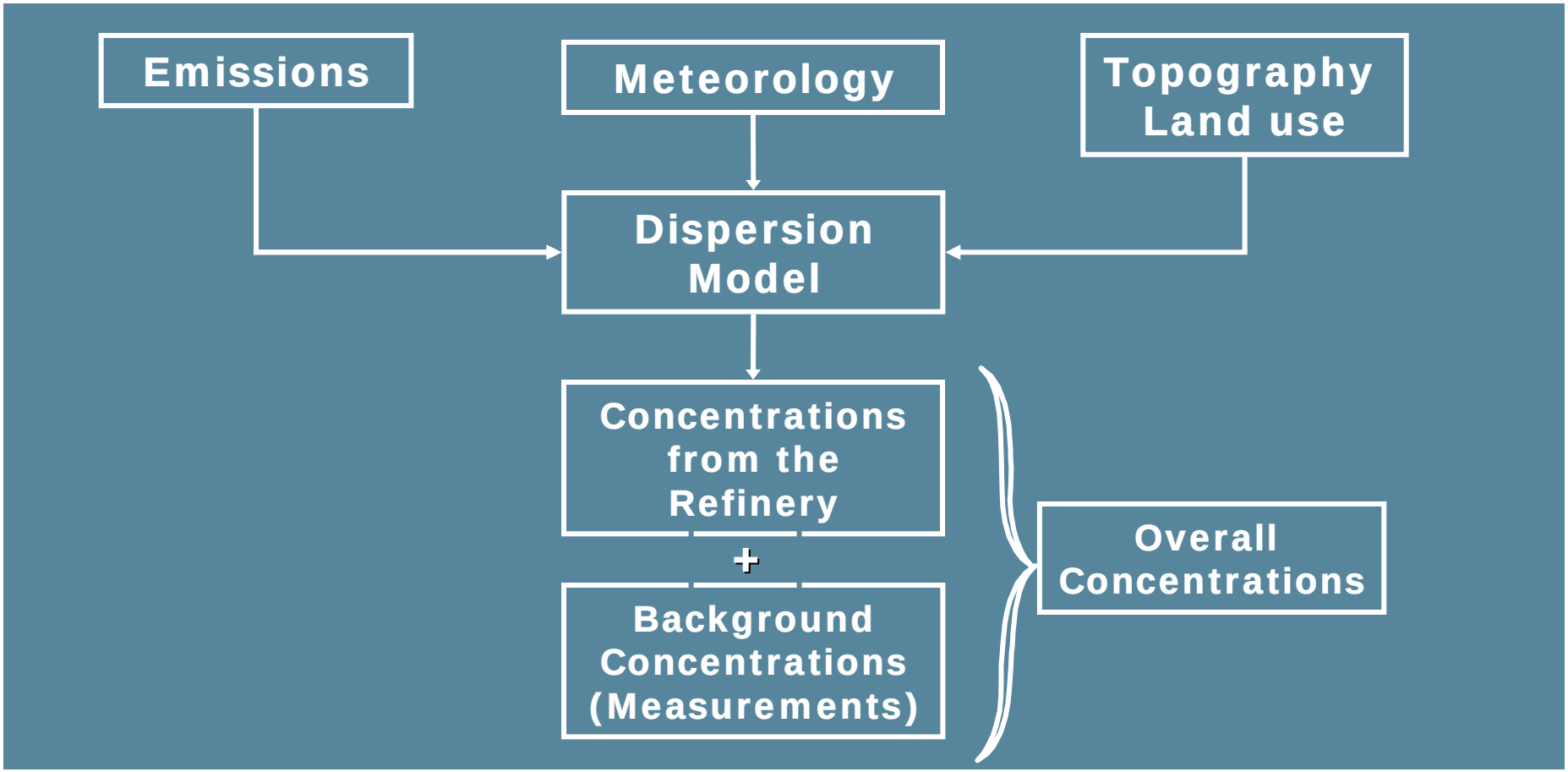
Accidental releases and OH&S

- **PHAST**
- **CALPUFF**

Air Dispersion Modeling

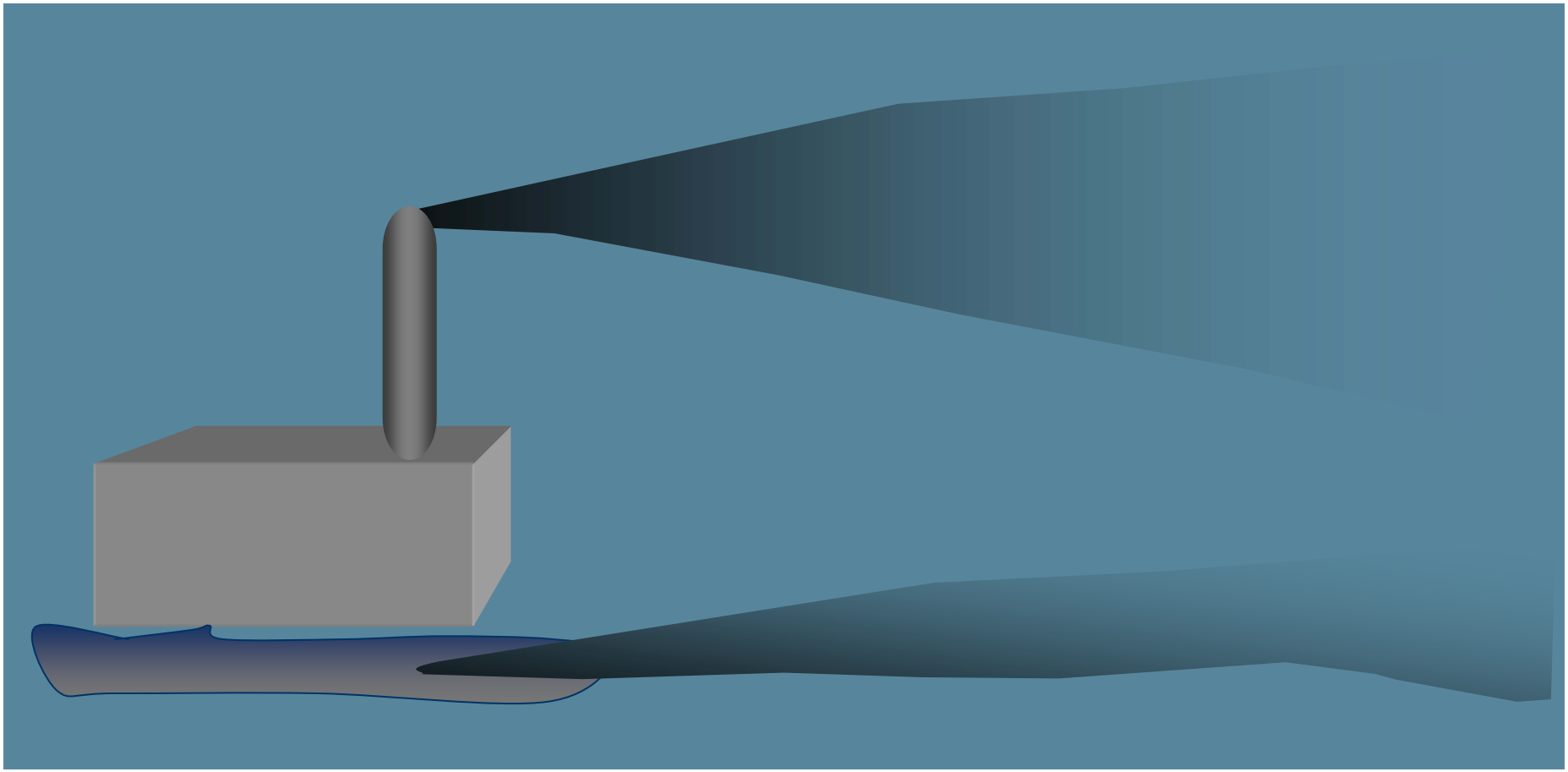
- **Inputs**
  - **Emissions: stack location, height, temperature, flow, contaminant emission rates**
  - **Local hourly meteorology: winds, temperature, mixing heights, stability**
  - **Local topography and land use (water, forest, barren land, urban areas, etc..)**
  - **Modelling domain (area covered by the model)**
- **Results**
  - **Concentration of contaminants in ambient air over the whole modelling domain (hourly and daily maximums, long term averages)**

Air Dispersion Modelling



Results are compared with air quality criteria and standards

POINT SOURCE VS FUGITIVE EMISSIONS ATMOSPHERIC DISPERSION



NLRC Air Dispersion Model - CALPUFF

- **The NL Department of Environment & Conservation has designated the CALPUFF air dispersion model suitable for all regulatory applications.**
  (Guide for Plume dispersion Modelling, Nov. 2006)

- **CALPUFF is the most advanced of regulatory air dispersion models and uses 3D meteorological fields.**

- **CALPUFF is the preferred model of Regulating Agencies for complex terrain and coastal environments.**

Air Quality Impact Assessment

Results from Air Dispersion Modelling are compared to air quality criteria:

- **Newfoundland and Labrador Air Quality Standards**
- **Canada-wide Air Quality Standards**

AIR QUALITY MONITORING

- Monitoring Network
  - New stations to be implemented
  - Baseline study
  - Environmental follow up
- Proximity to Sensitive Receivers
- Air dispersion modelling results validation

COMPLIANCE ASSESSMENT

- Standard and regulation review
- NL Ministry of Environment and Compliance latest air criteria
- Recommendations on mitigation measures
- Action plan

Potential Emission Reduction Measures (1)

Vents:

- **Thermal oxidizers**
- **Gas treatment and recovery processes (absorption, fractionation, etc.)**

Equipment leaks:

- **Specify low- emission equipment**
- **Welded joints**
- **LDAR program**

Potential Emission Reduction Measures (2)

Storage tanks:

- **Pressure-vacuum vent**
- **Vapour balancing system**
- **Floating roof (internal and external)**
- **Vapour control system (recovery or destruction)**

Wastewater sources:

- **Conservation vent on sewer system**
- **Sealed covers on sewer drains and hubs**
- **API separators covers**
- **Closed vent system on fixed-roof units**

Potential Emission Reduction Measures (3)

Loading/Unloading operations:

- **Vapour balancing system**
- **Vapour destruction units**
- **Vapour recovery unit**

REPORTING

- Adapted to local guidelines and regulations
- Detailed methodology, input/output data
- Graphical results presentation
- Quality assurance and quality control
- Documentation & references