

# **Trends in Risk Level**

## **PSA's Risk Level Measuring Scheme**

### **How data are collected and used**

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Vancouver, October 19. 2010

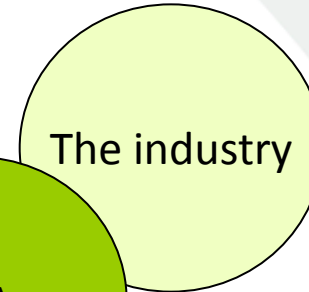


# Trends in risk level

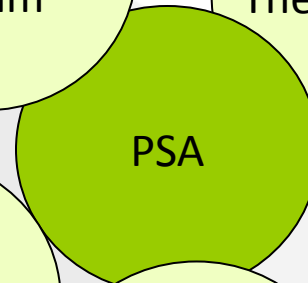
## Participants and contributors

Reference group:

Employers  
associations, unions  
and authorities  
Tripartite



Data / information/  
knowledge



Responsible for the  
product



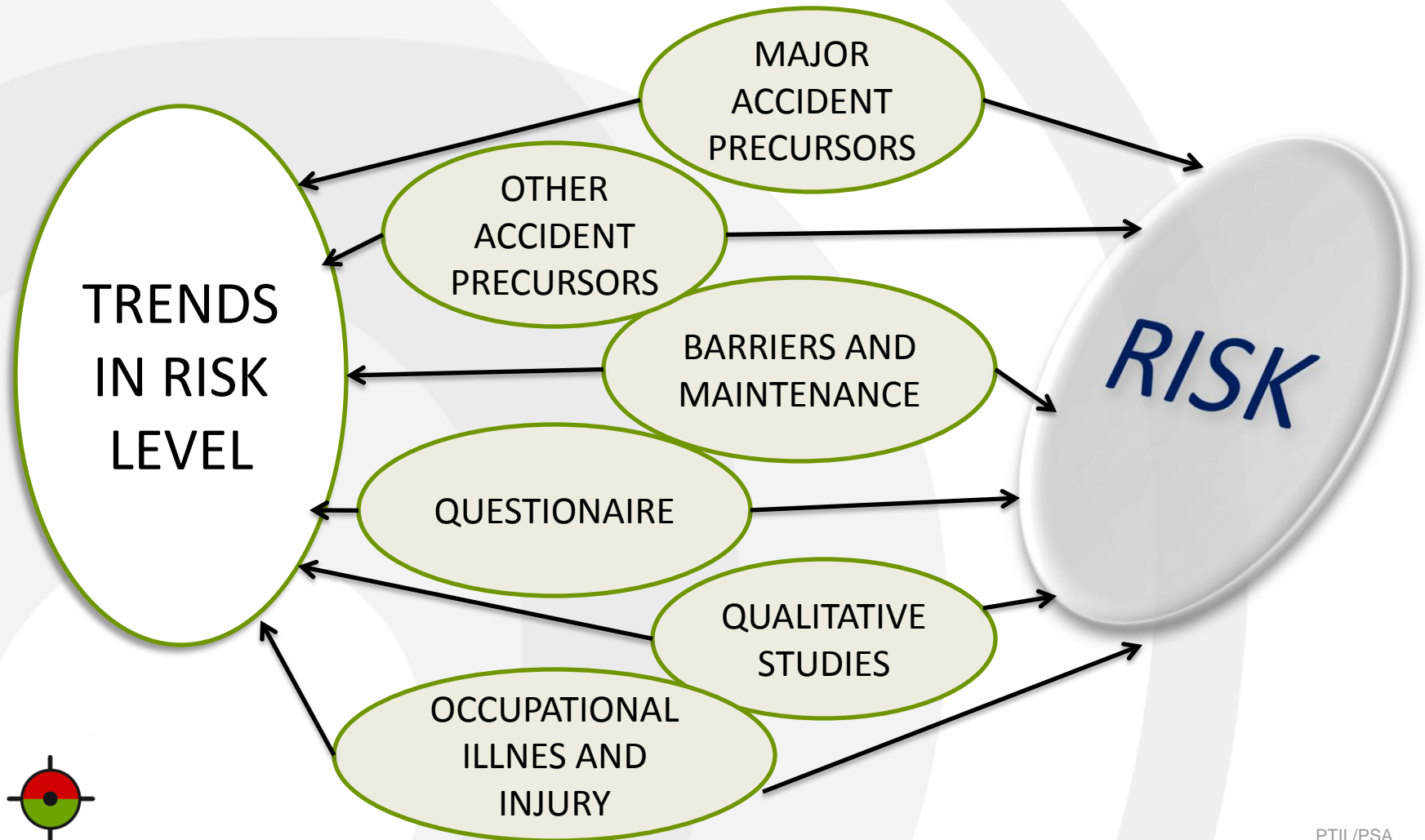
Advise on further  
development.  
Tripartite



Professional experts

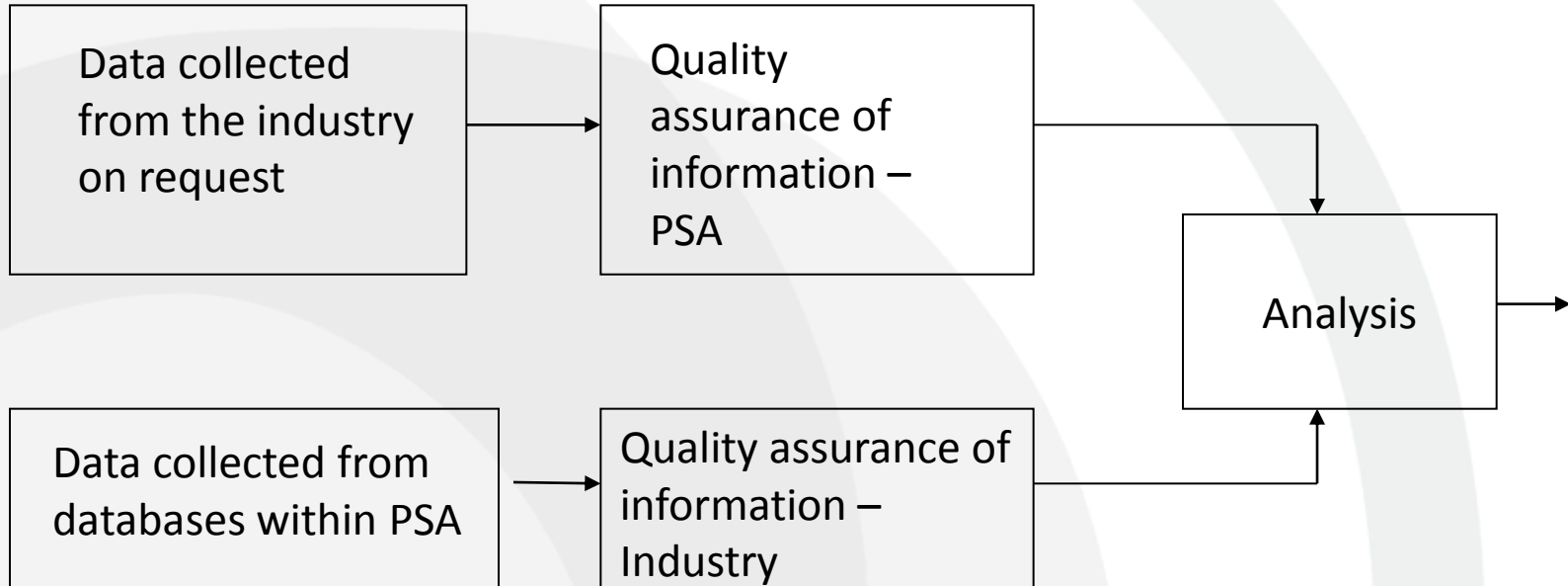


# Trends in risk level Methodology



# Collecting data

## Quantitative information



# Accident precursors / indicators

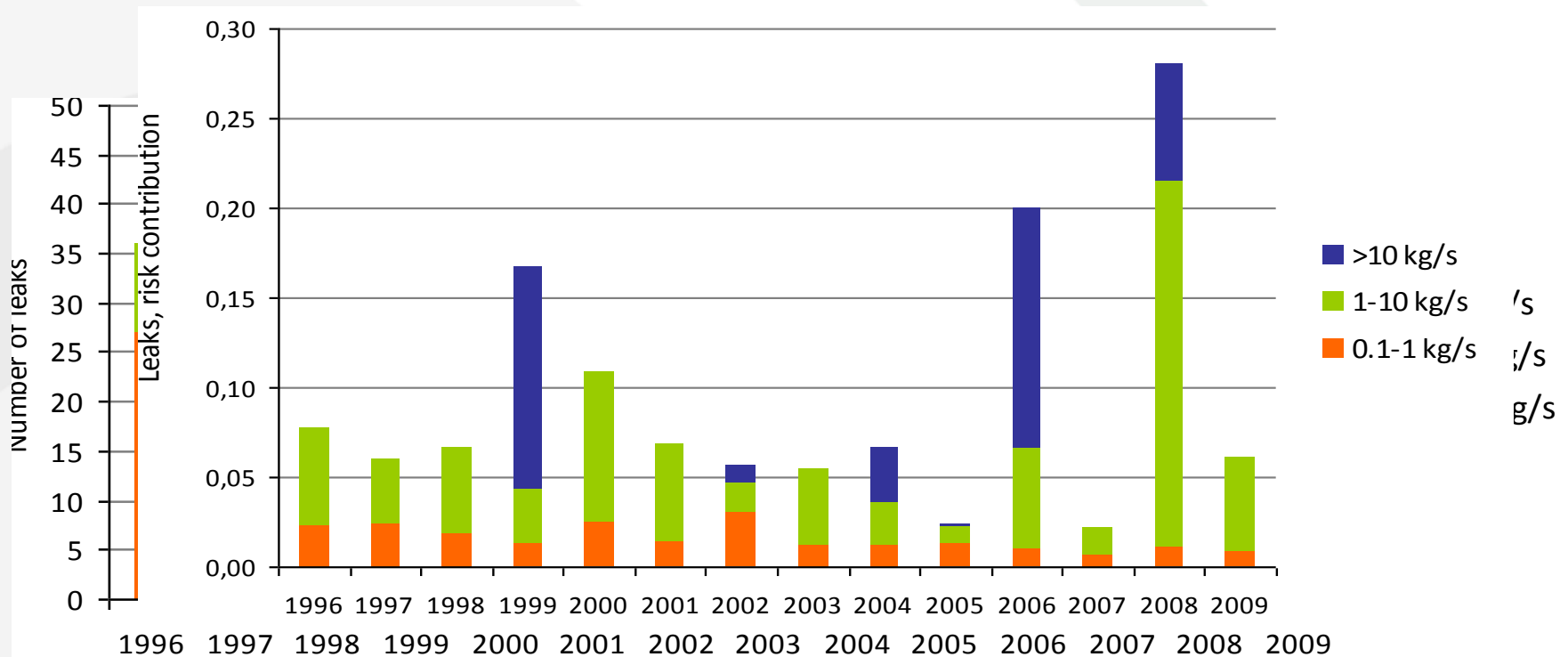
- Non-ignited hydrocarbon releases
- Ignited hydrocarbon releases
- Well kicks/ loss of well control
- Fire/ explosion – non process fluids
- Vessel on collision course
- Drifting objects
- Collision with field related vessel, shuttle tanker
- Structural damage, stability, anchoring, dynamic pos failure
- Releases from subsea production systems, pipelines, risers
- Damage to subsea production systems
- Helicopter
- Man over board
- Serious injury – personnel
- Occupational illness
- Total power failure
- Diving accident
- H2S emission
- Falling object



Black: Major accident potential

# Hydrocarbon releases

## rate > 0.1 kg/sec

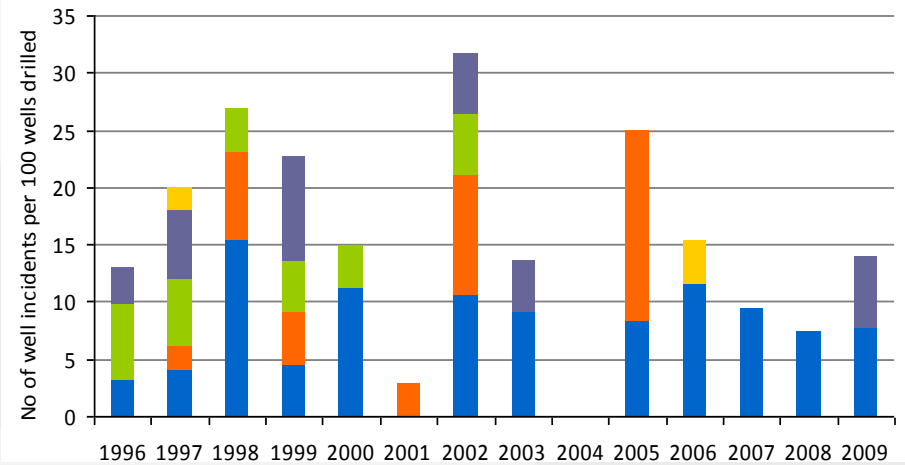


**Release frequency**  
 Weighted in relation to potential for loss of life - risk

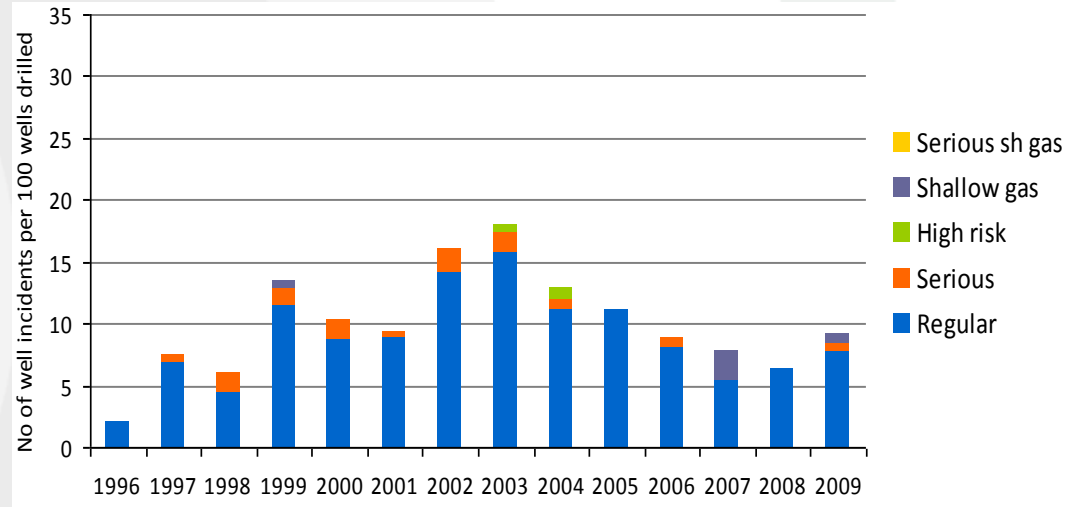


# Loss of well control

## Exploration drilling

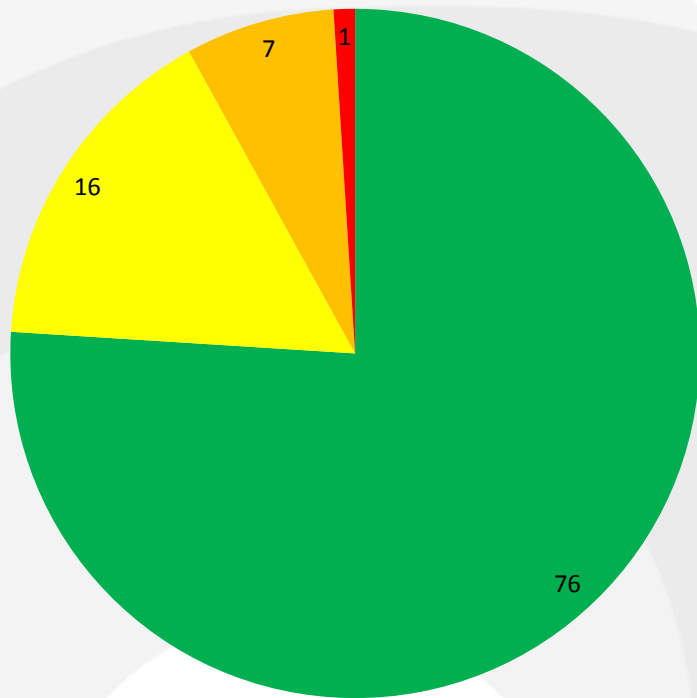


## Production drilling



# Well integrity – well barriers

## 2009: 1712 wells



RED: one barrier failed and the other degraded/unverified or with external leak

ORANGE: one barrier failed and the other intact, or a single fault which may cause leaking into the external environment

YELLOW: one barrier leaking within acceptance criteria or the barrier is degraded, and the other is intact

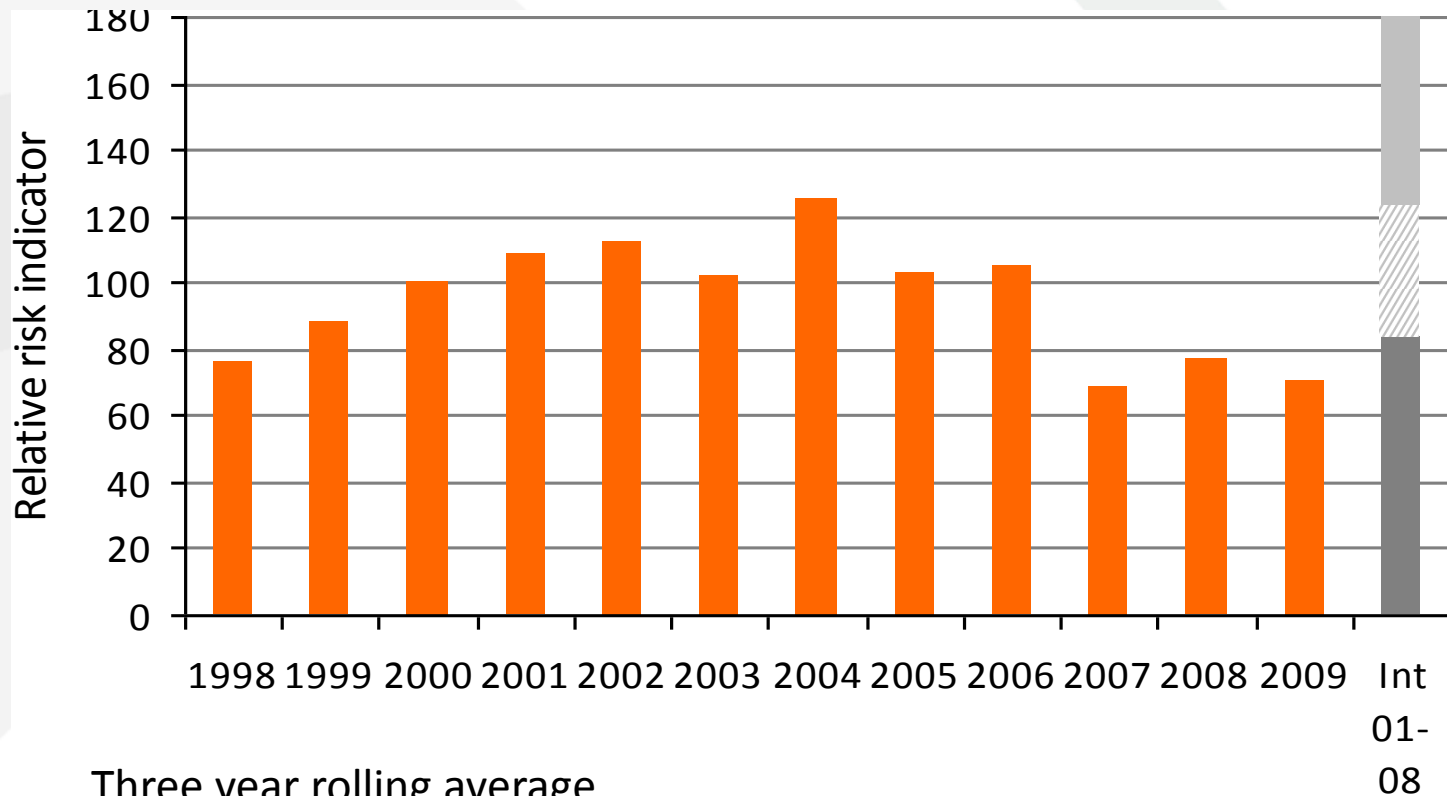
GREEN: intact well, with no or insignificant integrity factors





# Major accident risk - production facilities

## Weighted risk indicator, potential loss of life



Three year rolling average

Normalized – working hours

2005 = 100

$$R = \sum_i \sum_j v_{ij} X_{ij}$$



# Quantitative indicators

## Leading

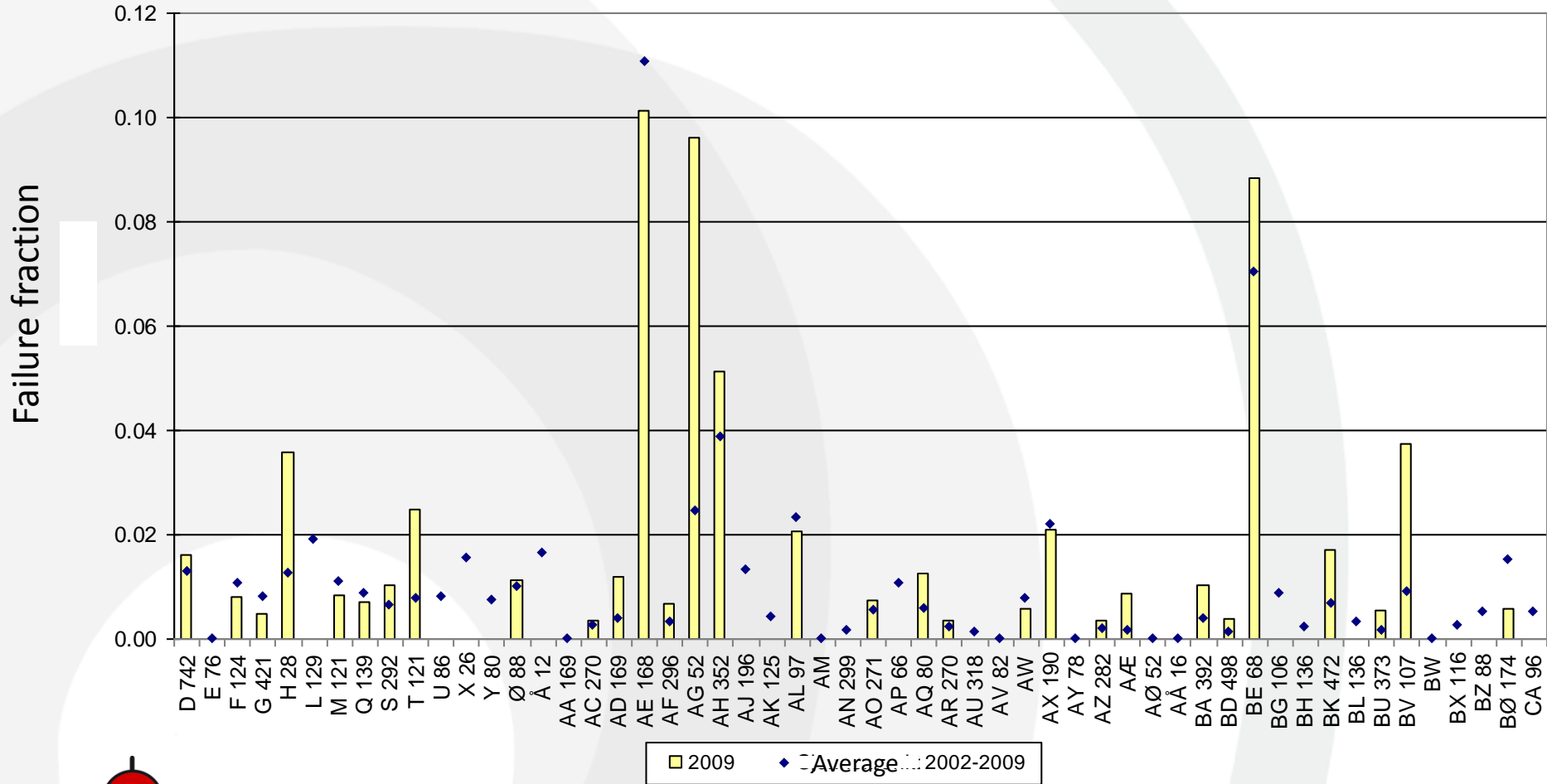
- Barriers

- Focus on hydrocarbon releases
  - Prevent ignition
  - Reduce release
  - Prevent escalation
  - Prevent fatalities
- Test data for selected barrier elements
  - F&G detection, Riser ESDV, Wing & Master, DHSV, BDV, PSV, BOP, Deluge valve, Fire pump start

Failure fraction = # failures/# test



# Fraction of failures for closing tests of wing and master valves



# Reports

- Yearly reports
- See: [www.ptil.no/rnnp](http://www.ptil.no/rnnp)
  - English summary report available

