

GAS EXPLOSION HAZARDS FOR LNG FACILITIES

AN ADVANCED COURSE

4th – 5th October 2011

Presented by GexCon & Mary Kay O'Connor Process Safety Center



**VENUE: Texas A&M University Qatar, Doha, Qatar
INCLUDING CAMPUSTOUR**

**LNG RELEASE AND DISPERSION EXPLOSION MODELING MITIGATION
PREVENTIVE MEASURES PROBABILISTIC RISK ASSESSMENTS
LEGISLATION ACCIDENTS SELECTED CASES OUTLOOK**



AGENDA Tuesday 4th October 2011

09:00 Registration and Coffee

09:30 Opening
Beyond regulatory compliance, Making LNG safety second nature

09:45 Fundamentals of LNG
Composition, Cryogenic properties, Hazards (cryogenic embrittlement, pool fire, flash fire, explosion)

10:15 LNG Safety Regulations
NFPA 59A, EN 1473, IMO

10:45 Coffee Break

11:00 Gas Explosion Basics
Combustion mechanisms, Fuel reactivity, Positive feedback mechanism, Importance of geometry, Explosion tests

12:00 LNG Accidents: History
Cleveland explosion, Skikda LNG liquefaction facility explosion, other minor incidents

12:30 Lunch

13:30 LNG Accident Consequence Models
Potential leak sources, dispersion (liquid spills and flashing jet releases), pool fires, explosions, benefits of CFD

14:30 Coffee Break

14:45 Preventive Measures
Hazardous area classification, Ventilation, Choice of equipment, Maintenance and procedures, Inventory control, ESD

15:30 Mitigation and Control
Layout, Use of explosion Venting devices, Effect of water deluge, Escalation, Loading on equipment and piping, Passive fire protection, Escape routes

16:15 Coffee Break

16:30 Quantitative Risk Assessment Methodology
Gas safety research, Hazards and risk assessment criteria, Regulations

17:15 Questions and Answers

18:00 Refreshments



AGENDA Wednesday 5th October 2011

08:00 Arrival and Coffee

08:30 Analyses – Case Studies
Part 1: Objective and Motivation
What to protect, What is acceptable risk?

09:20 Part 2: Explosion Risk Analyses
Worst case methods, Case study, Probabilistic Analysis, Advantages/disadvantages

10:15 Coffee Break

10:30 Part 3: Onshore Regasification Plants
Typical layout, Case study (LNG vapor dispersion and pool fire)

11:15 Part 4: Onshore Liquefaction Plants
Typical layout, Case study (flammable refrigerant dispersion and explosion)

12:00 Lunch

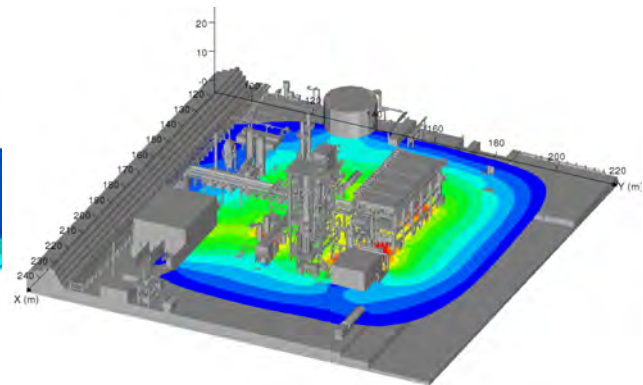
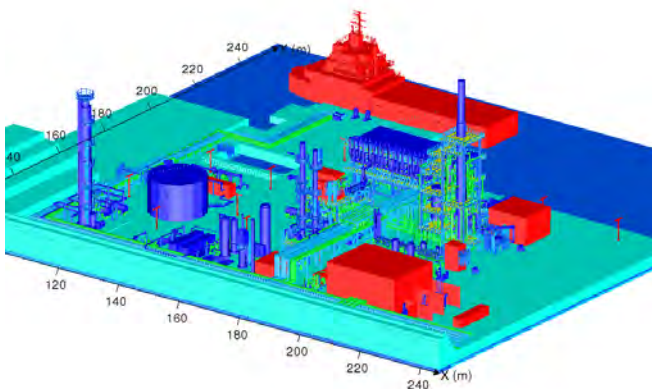
12:45 Part 5: Offshore LNG – Production and Regasification
Layout examples, Case study (LNG spill on water, flashing release and vapor cloud explosion)

14:00 Questions and Answers

14:30 Closing

14:45 Tour of Texas A&M Qatar

The lecturers include LNG and gas explosion experts Dr. Kees van Wingerden, Dr. Scott G. Davis, and Dr. Filippo Gavelli.





PRACTICAL INFORMATION

Registration

Online registration is available at: <http://engrevent.tamu.edu/event/100786> or you may send an e-mail to val-green@tamu.edu or LNGsafety@gexcon.com to receive a registration form. In Qatar, you may contact Dr. Luc Vechot luc.vechot@qatar.tamu.edu, +974.4423.0108 or Ms. Amanda Field amanda.field@qatar.tamu.edu, +974.4423.0288.

Your registration must be submitted before **September 5th 2011**. **Pre-registration is required.**

Attendance fee \$2295.

Hotel booking & Venue

Several hotels are conveniently located to TAMU-Qatar campus. The Millennium is one of these hotels located at: Jawaan Street; Al Sadd; Doha, Qatar. Tel: +974.424.7777, Fax +974.434.1774.

The course will be held on the Texas A&M University-Qatar campus.

MKOPSC

The Mary Kay O'Connor Process Safety Center's mission is to promote safety as second nature in industry around the world with goals to prevent future accidents. The Center develops safer processes, equipment, procedures and management strategies to minimize losses within the processing industry. MKOPSC is located on the TAMU-College Station campus.

TAMUQ

The process safety research group at TAMU-Qatar campus works closely with the Mary Kay O'Connor Process Safety Center on projects to promote safety. In particular, a major 5 year BP sponsored joint project looking at LNG safety is currently being carried out. One of the main objectives of this project is to conduct a sequence of medium scale LNG field experiments at the Ras Laffan Emergency and Safety College (Qatar) with the additional support of Qatar Petroleum.

GexCon US

GexCon US is an engineering consulting firm that specializes in gas dispersion, fire and explosion safety. GexCon has extensive experience in gas & dust explosions and LNG safety, which includes explosion phenomena, safety assessments, accident investigations and experimental testing. GexCon has performed numerous hazard analyses and risk assessment studies for LNG facilities worldwide.

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GexCon www.gexcon.com / www.gexconus.com is an R&D and consulting company specializing in industrial explosion risk. 30 years of dedicated experimental research in the field of explosion safety has been carried out in parallel to the development of the commercial CFD-software FLACS for explosion and dispersion calculations. GexCon offers highly qualified explosion consequence services and software worldwide.