

# **AIGA 2006 Meeting**

# ***TRANSPORTATION***

# ***SAFETY***



**Asia Industrial Gases Association**

**12-13 SEPTEMBER 2006**  
***SHANGHAI***

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# Transportation Safety Basics: Contents

- Review of some accidents
- Human resources: Driver selection
- Training for drivers and managers
- Vehicle standards
- Road safety management
- Driving and working time
- Monitoring
- Road vehicle emergency and recovery
- Safety adviser
- Security
- EIGA
- Conclusion

# Crash with a truck , 2 fatalities, America



- At 4:45 am, a **vehicle slipped in a curve** and crashed into the AL truck
- 2 fatalities in the destroyed vehicle
- No injury to the driver of the truck
- No spill

# Rollover of a Medical Oxygen Semi-trailer Europe



- At 7 am, the **driver came too far out of the roadside** when meeting another truck coming the opposite way
- Dark wintry condition, narrow and slippery road in a curve
- No injury, no spill

# Rollover of a LIN Semi-trailer in Europe



- The AL road tanker was **hit in the rear** by a third party car
- The driver could not compensate the movement of the semi-trailer
- The road tanker tipped over
- Minor injury, no product spill



## LIN Tanker Accident - Africa



- Whilst driving up a mountain pass, the driver was apparently **forced off the road** by an overtaking truck which caused the LIN tanker to go down a ravine.
- No injury

# Rollover of a LIN Semi-trailer - Driver injury, Europe



- A LIN tanker **missed a curve** and overturned down a hill slope
- No other vehicle involved, road in curve, rainy weather
- Driver severely injured
- Gas released to the atmosphere, as transfer was impossible

# Rollover of an Hydrogen semi-trailer Europe



- The driver overtook a truck on the right side, in order to avoid a crashed car which was stopped on the left lane of the motorway
- The AL tube trailer **hit the truck on the rear** and rolled over
- At night, rainy weather
- 1 fatality, AL contractor injured
- No leak of hydrogen



## Third Party - Fatalities Vehicle Accident Asia



- Transport contractor was driving with 11,000 litres of LIN in a 17,000 litres ISO container, using a 40' flat bed trailer.
- At 9 pm, a passenger **bus coming from the opposite direction collided** with the trailer
- Bus driver and 2 passengers were killed instantly. 1 passenger suffered multiple injuries while the co-driver had minor injuries.
- Trailer's driver and attendant were not injured, no spill reported

# Fatal Cylinder truck road accident - Asia



- At 4 am, a private car **hit the front wheel of the AL truck**
- The tyre burst and the AL truck tilted
- Cylinder fell down on the road
- The car driver died

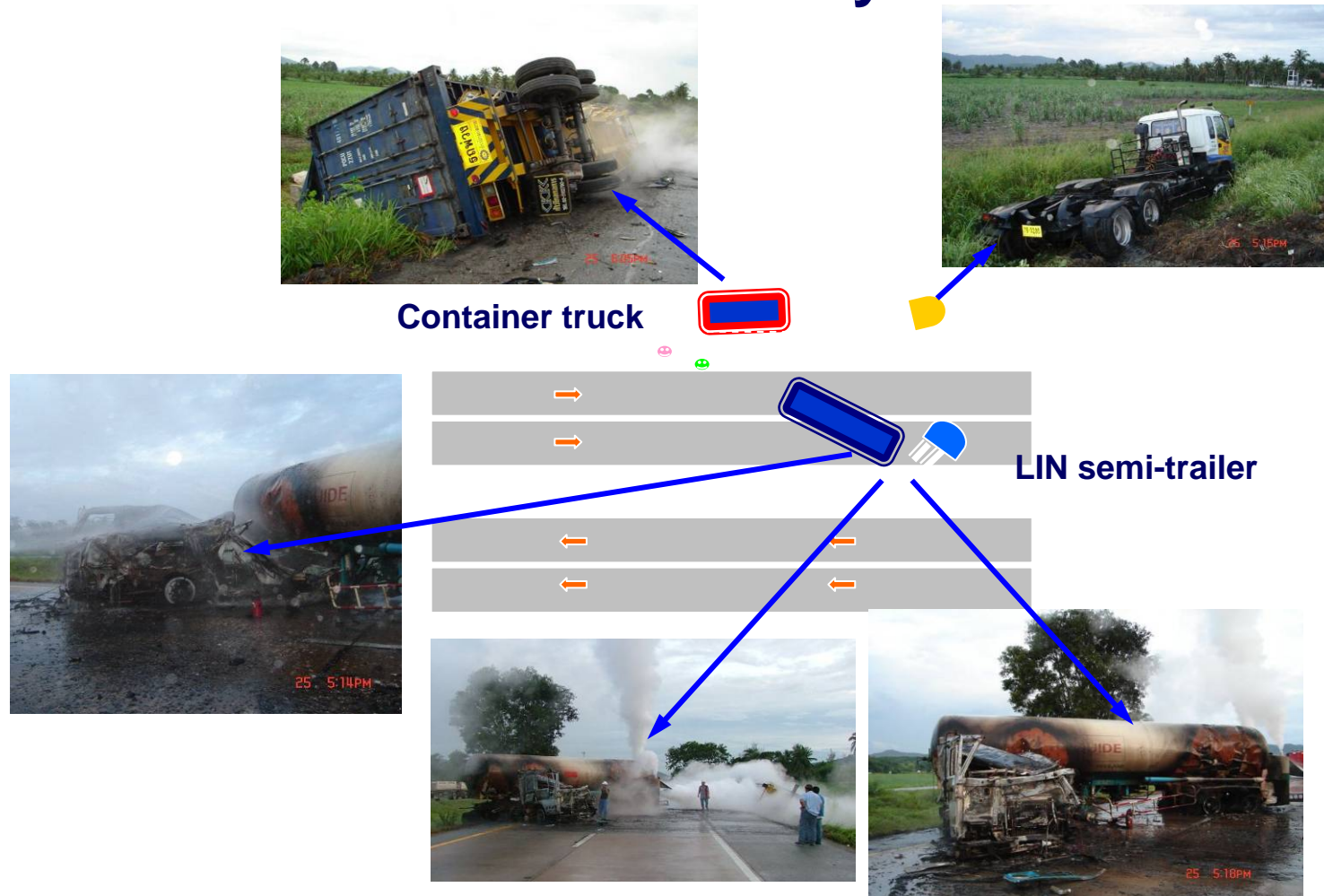
# Rollover of a LOX tanker Asia



- Driving at night, **the driver napped a few seconds** and the LOX semi-trailer collided with a road side tree. The impact uprooted the tree.
- The driver was thrown out from the cabin and received minor injury on forehead
- Major damage to the vehicle
- No other vehicle or person was involved in the accident
- No LOX spillage was observed



# Semi-trailer collision with fatality Asia



- Driving at night, a LIN driver **crashed another trailer which was parked for repairs on the left side of the road**. One of the two drivers repairing the broken down trailer died on the spot. The Air Liquide co-driver got his legs burnt.



# Rollover of a LIN Trailer America



- Subcontracted driver lost control of the LIN semi trailer that overturned and fell out of the road after a **collision with another truck** transporting fruits, that came in the opposite side trying to pass a third vehicle.
- The driver had small bruises in his head.
- There was material damage to the cryogenic semi trailer, mainly to the truck cabin.

# Rollover of a LOX trailer Asia



- 3:00 am
- **Driver sleepy** drove off the side of the road
- The truck right wheels slipped down and truck overturned
- No injury
- LOX was transfilled before recovery

# Main causes of accidents

- Implication of other vehicles
- Behaviour of the drivers
  - ✓ Driving mistakes: over speed, overtaking
  - ✓ Non application of driving regulations
- Life Hygiene
  - ✓ Drowsiness, sleepiness
  - ✓ Effects of alcohol, drugs, medications
  - ✓ Driving ability
- External causes
  - ✓ Road infrastructure
  - ✓ Heavy traffic
  - ✓ Weather conditions
  - ✓ Planning changes
- Equipment
- Non correct loading and securing

## To remember

- **One rollover per week** in the industrial gas industry worldwide
- Rollover can occur in curves at very low speed
  - ✓ In roundabouts at less than **24 km/h**
- **Human causes** are the first causes of road accidents



# Driver selection

- Same standards for AL employees and contractors
- Medical and driving ability examination
- Valid driver's license and driving experience (2 years min)
- Examination and practical test on
  - ✓ Driving
  - ✓ Driving regulations
  - ✓ Load limitation and securing
  - ✓ Hazards and labelling of products
- Good track record
- Good working and safe driving records

# Drivers training content

- Product knowledge
  - Loading and discharging
  - Weight limitations, load distribution and securing
  - Vehicle inspection, tyre care and maintenance
  - Legal requirements of road safety
  - Risks of driving: causes of accidents, sleep related accidents, effects of medications and alcohol
  - Defensive driver training
  - Use of fire fighting equipment
  - Roll-over prevention training
  - Emergency response training
- 
- Practical driving and product knowledge tests

# Example: Driver training and qualification in France (1)

- Qualification of drivers (AL or contractors)
  - ✓ By the manager after AL security approval
  - ✓ After Initial driving period as a second driver
  - ✓ After training (2 parts) and positive test results
- Part 1: Training content mandatory for transport of dangerous goods
  - ✓ Driving licence
  - ✓ Psycho-technical tests
  - ✓ Driving certificate of initial training and of continuous safety trainings to be renewed every 5 years (includes regulatory matters)
  - ✓ Certificate of Training on Dangerous Goods
  - ✓ Specific certificates of training for forklifts, cranes
  - ✓ Duration: 32 days every 5 years
  - ✓ By a recognized training organisation

# Example: Driver training and qualification in France (2)

## ■ Part 2: Training specific to the activity and products delivered by AL

- ✓ Properties and hazards of gases
- ✓ Packaging equipment
- ✓ Loading and securing
- ✓ Transport equipment for packages and bulk
- ✓ Filling and delivering liquid products:
- ✓ Regulations and on-board documents
- ✓ Retraining every 5 years minimum



# Defensive driving exercise at APTH in France



# Training content for Managers and Supervisors

- Road safety policy
- Subsidiary Road Safety Standards
- Legal requirements of road safety
- Info of accidents of the AL Group
  
- Assessment of drivers
  - ✓ Training effectively passed, including defensive driving
  - ✓ Regular on the road trips with drivers
  - ✓ Leading road safety meetings for drivers

# Vehicle Standards

- Compliance with international transport regulations
  - Seat belts
  - ABS brakes (before end 2009)
  - Tyres inflation pressure and maintenance (max 2 retreads)
  - Speed limiting device
  - Highly visible reflective strips
  - Rear guards and lateral bicycle guards
  - Electronic data recording devices
- 
- Drivers must inspect the vehicle before every trip and report any damage or dysfunction (mirrors, lights, bumps)

# Specific devices installed by Cryolor (1)

## ■ Position of centre of gravity

- ✓ Baffles
- ✓ Low height frame
- ✓ Lowering vessel installation
- ✓ Flat tires
- ✓ Test of tilt angle

## ■ Road equipment

- ✓ Disc brakes, ABS
- ✓ EBS: improves stability
- ✓ Pneumatic suspensions
- ✓ Lateral guards
- ✓ Rear guards

- Cryolor is the AL cryogenic vessels manufacturer





## Specific devices installed by Cryolor (2)

### ■ Road Safety

- ✓ Reflective strips
- ✓ Tyre flaps
- ✓ Landing legs with pivoted feet





## Specific devices installed by Cryolor (3)

### ■ Road Safety

- ✓ Lateral doors
- ✓ Bicycle guards
- ✓ Fire extinguisher and tyre chocks



## Specific devices installed by Cryolor (4)



### ■ Product safety

- ✓ Emergency shut-off button
- ✓ Remote shut-off valve on liquid line
- ✓ Anti tow away flexible hose

# Road Safety Management

- Risk identification for non-routine transportation: new customers, new product,..
- Daily risk assessment taking into account available info's: traffic information, road situation, meteorological changes
- Route planning shall be made by a competent person
  - ✓ Avoid congested areas, unsuitable roads, high rate road accident routes
  - ✓ Review of deliveries and contingency procedures in extraordinary conditions
- Daily communication between route planners and drivers
- Use of cell phones
- Emergency response procedures

# Driving and working time

- Stop driving in case of drowsiness
- Local legal requirement of maximum driving and working time shall be respected
- Max working time: 14 h / 24hours period
- Max driving time: 11 h / 24 hours period
- Max period of continuous driving: 4.5 h, including 45 mins. rest
- Max weekly driving hours: 56 h
- Working week limited to 6 days
- Change in shift pattern requires a break
- Electronic data recording devices must be checked regularly to monitor driver performance

# Monitoring

## ■ Monthly reporting

- ✓ Accidents, incidents, near misses
- ✓ Vehicle defects
- ✓ Non-compliance with regulations
- ✓ Results from accident investigations

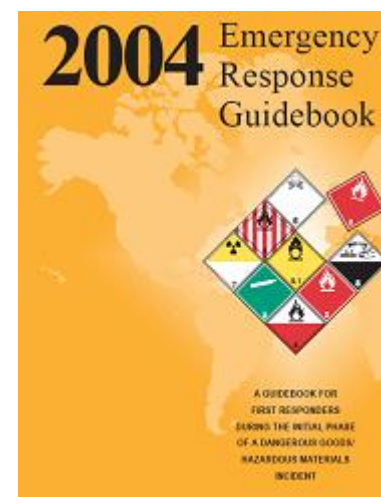
## ■ Qualification of drivers

- ✓ Training and retraining scheduling
- ✓ Recording of accidents and bumps
- ✓ Reward / demerit system for compliance with procedures



# Road Vehicle Emergency and Recovery (1)

- EIGA has issued Transport Emergency Instructions for drivers, called TREMCards
- EIGA provides guidance for Road Vehicle emergency and recovery
- US DOT publishes a guide for first responders  
ERG2004
  - ✓ Defines isolation and evacuation distances



## Road Vehicle emergency and Recovery (2)



- Recovery exercise using air bags

## Road Vehicle emergency and Recovery (3)



■ Recovery exercise with 2 cranes

# The Safety Adviser in Europe

- Mandatory by the European transport regulations
- Responsible for helping to prevent risks (persons, property and environment)
- Monitors compliance with legal requirements for carriage of dangerous goods
- Prepares an annual report to his management (available to the Authorities at their request)
- Prepares accident reports
- Monitors practices, driver training, equipment, emergency procedures of all transport operations
- Holds a training certificate issued by the competent authority (valid 5 years)



# Europe: Transport Security legal requirements

- Legal requirement per international transport regulations
- Recruitment of personnel and selection of contractors
- Training and awareness
- Security coordinator
- Lorry parking: List of all Truck parking areas in Europe
- Maintain security procedures
- Security on the road: lock doors, keep the vehicle in sight
- Reporting security incidents
- Communications: provide cell phones to drivers

# Actions at EIGA level



- WG1: international transport regulations
  - EIGA (Herman Puype) participates to all UN meetings
  - WG1 members analyze the transport accidents
  - EIGA monitors road vehicle accident statistics
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- EIGA has developed a design for cryogenic gases coupling for tanker filling to avoid mismatch called EUROCOUPLING
  - EIGA has prepared TREMCARDS for the drivers in all European languages for emergency situations

# EIGA publications



- DOC 54/03: Road vehicle safety programme
- DOC 56/04: CO2 Tanker driver manual
- DOC 63/05: Prevention of tow away accidents
- DOC 69/03: Transport Emergency instructions
- DOC 81/01: Road vehicle emergency and recovery

# Conclusion

- Major risk of our industry
- Highly regulated activity
- Behaviour of drivers and logistics supervisors is key
- Continuous training is necessary, even if not mandatory
- Nominate a Safety Adviser in each transport entity
- Be prepared for emergencies
- Develop views of the industry to respond adequately to regulatory bodies



# Thank you for your attention

