Welcome and Opening Remarks

Thomas Vanfleteren,

Technical & Safety Manager – Euro Chlor

WCC Safety Seminar - 14 October 2025

Vancouver, Canada

WCC antitrust guidelines

DO

DO ensure strict performance in areas of:

OVERSIGHT / SUPERVISION:

- Have a WCC staff representative at each WCC-sponsored meeting;
- Limit meeting discussions to agenda topics (unless additional topics have been approved by the WCC staff representative); and
- Provide each member company representative and WCC employee attending a WCC-sponsored meeting with a copy of this checklist and have a copy available for reference at all WCC-sponsored meetings.

RECORDKEEPING:

- Have an agenda and minutes which accurately reflect the matters which occur.

VIGILANCE:

- Protest or stop any discussion or meeting activities which appear to violate this checklist. Member company representatives should disassociate themselves from any such discussion or activities and leave any meeting in which they continue.

DON'T

DO NOT in fact or appearance, discuss or exchange information on:

PRICES, INCLUDING:

- Individual company prices, price changes, price differentials, markups, discounts, allowances, credit terms, etc.;
- Individual company data on costs, production, capacity, inventories, sales, etc.; and
- Industry pricing policies, price levels, price changes, differentials, etc.

PRODUCTION, INCLUDING:

- Plans of individual companies concerning the design, production, distribution or marketing of particular products, including proposed territories or customers; and
- Changes in industry production, capacity or inventories.

TRANSPORTATION RATES:

- Rates or rate policies for individual shipments, including basing point system, zone prices, freight equalization, etc.

MARKET PROCEDURES, INCLUDING:

- Company bids on contracts for particular products; company procedures for responding to bid invitations; and
- Matters relating to actuals or potential individual suppliers or customers that might have the effect of excluding them from any market or influencing the business conduct or firms toward them.

WORLD chlorine council

Safety Seminar 14 October 2025

HYATT Regency Hotel Vancouver, Canada

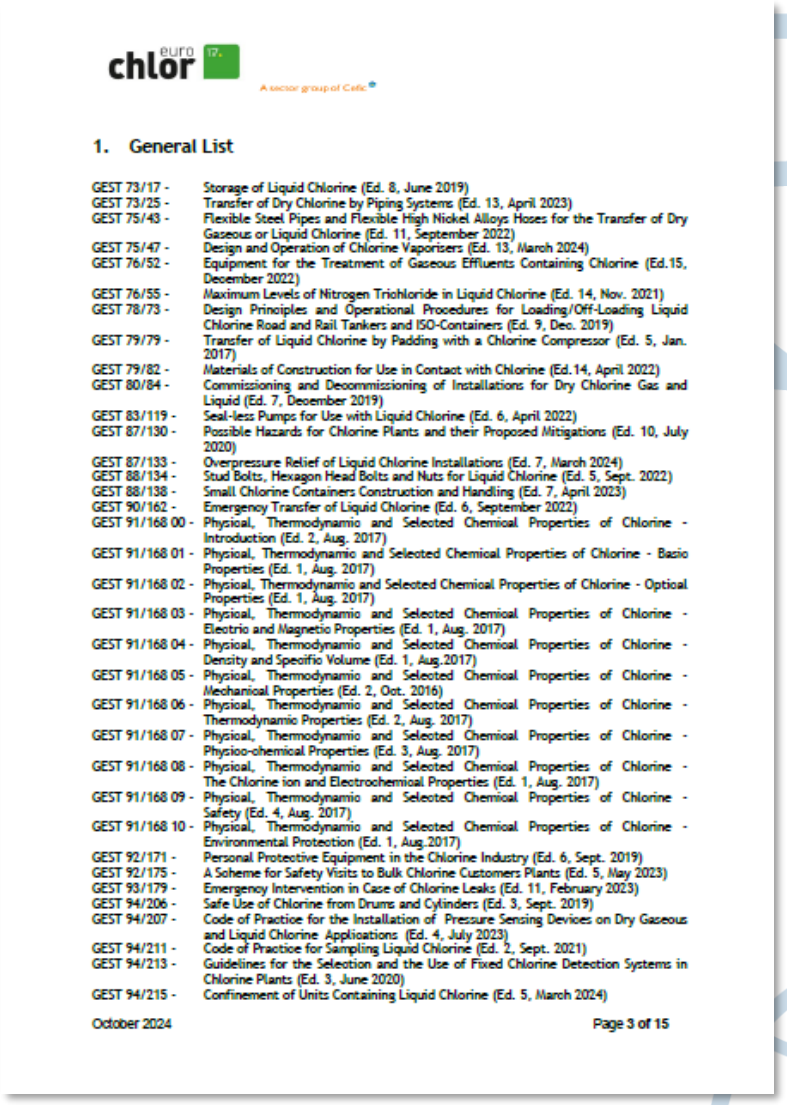
AGENDA

Time	Item	Presenter
09:00 - 9:30	Registration	
09:30	Welcome and Opening Remarks WCC Antitrust Guidelines Introductions of Participants	Thomas Vanfleteren, Euro Chlor
9:45	Goals and Vision of the WCC	Thomas Vanfleteren, Euro Chlor
10:15	WCC Cardinal Rules	Thomas Vanfleteren, Euro Chlor
10:45	Coffee and Tea Break	
11:00	Occupational safety related to electromagnetic fields (EMF)	Richy Mariner, Euro Chlor
11:30	Management of Change	Daniel Stein, Chlorine Institute
12:00	Accidental Mixing Prevention	Robyn Brooks, Chlorine Institute
12:30	Lunch	
13:30	Accidental Mixing Discussion	Chlorine Institute
14:00	Safety on Hydrogen in Chlorine	Thomas Vanfleteren, Euro Chlor
14:30	Disaster Preparation/Emergency Preparedness	Robyn Brooks, Chlorine Institute
15:00	Closing Comments	Thomas Vanfleteren, Euro Chlor
15:10	Coffee and Tea Break	

- Use the opportunity of the Face-to-Face format to ask questions!
- All presentations will be available after the seminar
- Most of the content from the presentations is based on the Euro Chlor GEST and the Chlorine Institute Pamphlets
  - ➢**How to get access to these documents?**

How to get access to the Euro Chlor technical documents? (1/2)

- Today, the Euro Chlor technical library has 43 active and 28 passive technical documents
- These include Guidelines, Codes of Practice and Recommendations on:
  - Technical and safety aspects for chlorine duty; these documents are called “GEST”
  - Environmental Protection; these documents are called "ENV PROT"
  - Health; these documents are called "HEALTH"
  - Analysis; these documents are called "ANALYTICAL".
- Other Documents:
  - Presentations from Technology Conferences, entitled “TSEM” (old name i.e. Technical Seminars)
  - Position Paper named “PP”
  - Documents describing incidents named “GEST AP”.



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1. General List

GEST 73/17 - Storage of Liquid Chlorine (Ed. 8, June 2019)
GEST 73/25 - Transfer of Dry Chlorine by Piping Systems (Ed. 13, April 2023)
GEST 75/43 - Flexible Steel Pipes and Flexible High Nickel Alloys Hoses for the Transfer of Dry Gaseous or Liquid Chlorine (Ed. 11, September 2022)
GEST 75/47 - Design and Operation of Chlorine Vaporizers (Ed. 13, March 2024)
GEST 76/52 - Equipment for the Treatment of Gaseous Effluents Containing Chlorine (Ed.15, December 2022)
GEST 76/55 - Maximum Levels of Nitrogen Trichloride in Liquid Chlorine (Ed. 14, Nov. 2021)
GEST 78/73 - Design Principles and Operational Procedures for Loading/Off-Loading Liquid Chlorine Road and Rail Tankers and ISO-Containers (Ed. 9, Dec. 2019)
GEST 79/79 - Transfer of Liquid Chlorine by Padding with a Chlorine Compressor (Ed. 5, Jan. 2017)
GEST 79/82 - Materials of Construction for Use in Contact with Chlorine (Ed.14, April 2022)
GEST 80/84 - Commissioning and Decommissioning of Installations for Dry Chlorine Gas and Liquid (Ed. 7, December 2019)
GEST 83/119 - Seal-less Pumps for Use with Liquid Chlorine (Ed. 6, April 2022)
GEST 87/130 - Possible Hazards for Chlorine Plants and their Proposed Mitigations (Ed. 10, July 2020)
GEST 87/133 - Overpressure Relief of Liquid Chlorine Installations (Ed. 7, March 2024)
GEST 88/134 - Stud Bolts, Hexagon Head Bolts and Nuts for Liquid Chlorine (Ed. 5, Sept. 2022)
GEST 88/138 - Small Chlorine Containers Construction and Handling (Ed. 7, April 2023)
GEST 90/162 - Emergency Transfer of Liquid Chlorine (Ed. 6, September 2022)
GEST 91/168 00 - Physical, Thermodynamic and Selected Chemical Properties of Chlorine - Introduction (Ed. 2, Aug. 2017)
GEST 91/168 01 - Physical, Thermodynamic and Selected Chemical Properties of Chlorine - Basic Properties (Ed. 1, Aug. 2017)
GEST 91/168 02 - Physical, Thermodynamic and Selected Chemical Properties of Chlorine - Optical Properties (Ed. 1, Aug. 2017)
GEST 91/168 03 - Physical, Thermodynamic and Selected Chemical Properties of Chlorine - Electric and Magnetic Properties (Ed. 1, Aug. 2017)
GEST 91/168 04 - Physical, Thermodynamic and Selected Chemical Properties of Chlorine - Density and Specific Volume (Ed. 1, Aug.2017)
GEST 91/168 05 - Physical, Thermodynamic and Selected Chemical Properties of Chlorine - Mechanical Properties (Ed. 2, Oct. 2016)
GEST 91/168 06 - Physical, Thermodynamic and Selected Chemical Properties of Chlorine - Thermodynamic Properties (Ed. 2, Aug. 2017)
GEST 91/168 07 - Physical, Thermodynamic and Selected Chemical Properties of Chlorine - Physico-chemical Properties (Ed. 3, Aug. 2017)
GEST 91/168 08 - Physical, Thermodynamic and Selected Chemical Properties of Chlorine - The Chlorine ion and Electrochemical Properties (Ed. 1, Aug. 2017)
GEST 91/168 09 - Physical, Thermodynamic and Selected Chemical Properties of Chlorine - Safety (Ed. 4, Aug. 2017)
GEST 91/168 10 - Physical, Thermodynamic and Selected Chemical Properties of Chlorine - Environmental Protection (Ed. 1, Aug.2017)
GEST 92/171 - Personal Protective Equipment in the Chlorine Industry (Ed. 6, Sept. 2019)
GEST 92/175 - A Scheme for Safety Visits to Bulk Chlorine Customers Plants (Ed. 5, May 2023)
GEST 93/179 - Emergency Intervention in Case of Chlorine Leaks (Ed. 11, February 2023)
GEST 94/206 - Safe Use of Chlorine from Drums and Cylinders (Ed. 3, Sept. 2019)
GEST 94/207 - Code of Practice for the Installation of Pressure Sensing Devices on Dry Gaseous and Liquid Chlorine Applications (Ed. 4, July 2023)
GEST 94/211 - Code of Practice for Sampling Liquid Chlorine (Ed. 2, Sept. 2021)
GEST 94/213 - Guidelines for the Selection and the Use of Fixed Chlorine Detection Systems in Chlorine Plants (Ed. 3, June 2020)
GEST 94/215 - Confinement of Units Containing Liquid Chlorine (Ed. 5, March 2024)

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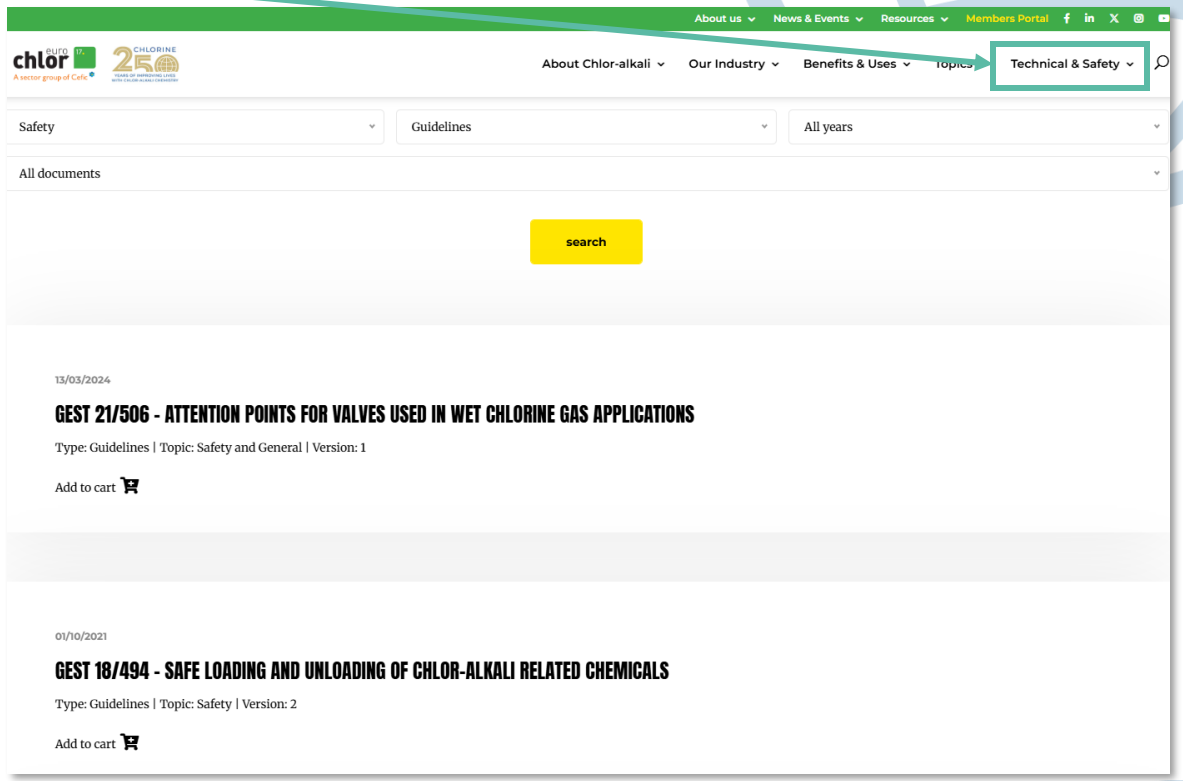
How to get access to the Euro Chlor technical documents? (2/2)

- Dedicated section on the Euro Chlor website - https://www.eurochlor.org/technical-safety/technical-documentation/document-search/
- Search tool to guide you to the document you are looking for
- ‘Add to cart’ option
- Check-out with some personal information to fill to submit the document request
- An email will be sent with the attached PDFs
- All Euro Chlor documents are free of charge



How to get access to the Chlorine Institute publications? (1/2)

- The Chlorine Institute maintains a variety of publications (most) available through our online Bookstore.* Publication types:
  - Pamphlets (49)
  - Videos (18)
  - Wall Charts (7)
  - …Checklists, Facts Sheets, Instruction Booklets, Whitepapers
- Many publications available in Spanish
- In addition, CI members can request access to CI's Member Resource Library which contains publications, past safety and technical presentations, Issue Team business …and more.

**Members-only with minor exceptions for select entities.*

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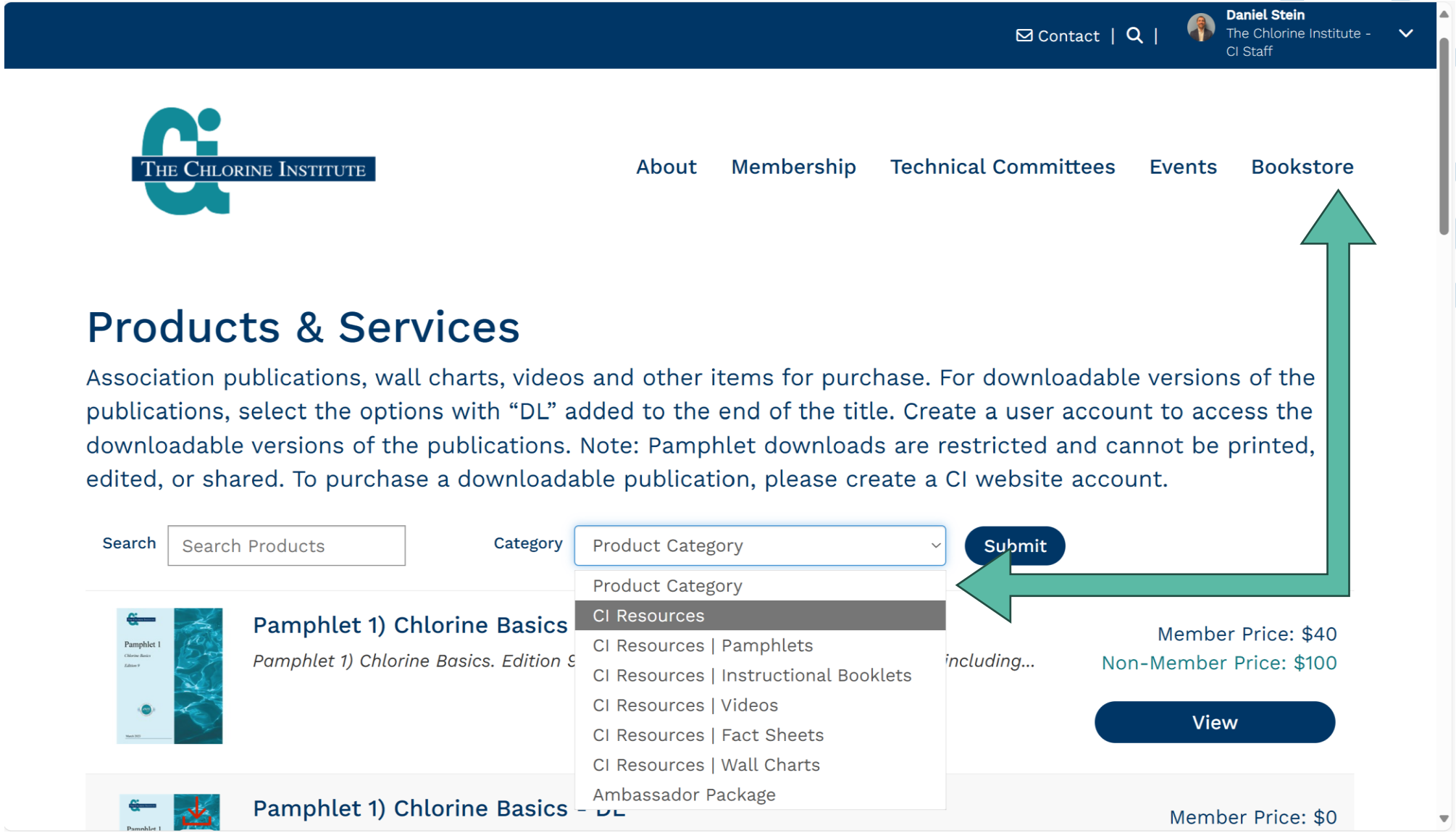
- # How to get access to the Chlorine Institute publications? (2/2)




SAFETY
IS
EVERYBODY'S
BUSINESS

Goals and Vision of the WCC

Thomas Vanfleteren,

Technical & Safety Manager – Euro Chlor

WCC Safety Seminar - 14 October 2025

Vancouver, Canada

This session will include the following topics:

- How WCC works together, globally, to improve the safety of chlor-alkali production
- The tools that are available to you to help with safety matters in your plant
- Some learnings from recent incidents
- Future WCC safety activities that you can benefit from

Goals and Vision of the WCC

- What is the World Chlorine Council (WCC)?

The World Chlorine Council (WCC) is a global network representing the chlorine and chlorinated products industries.

Originally formed in 1993, it brings together national and regional trade associations, along with their member companies to promote best practices and the benefits of Chlor-Alkali chemistry.

Our Members

Eur-Asia
- Euro Chlor

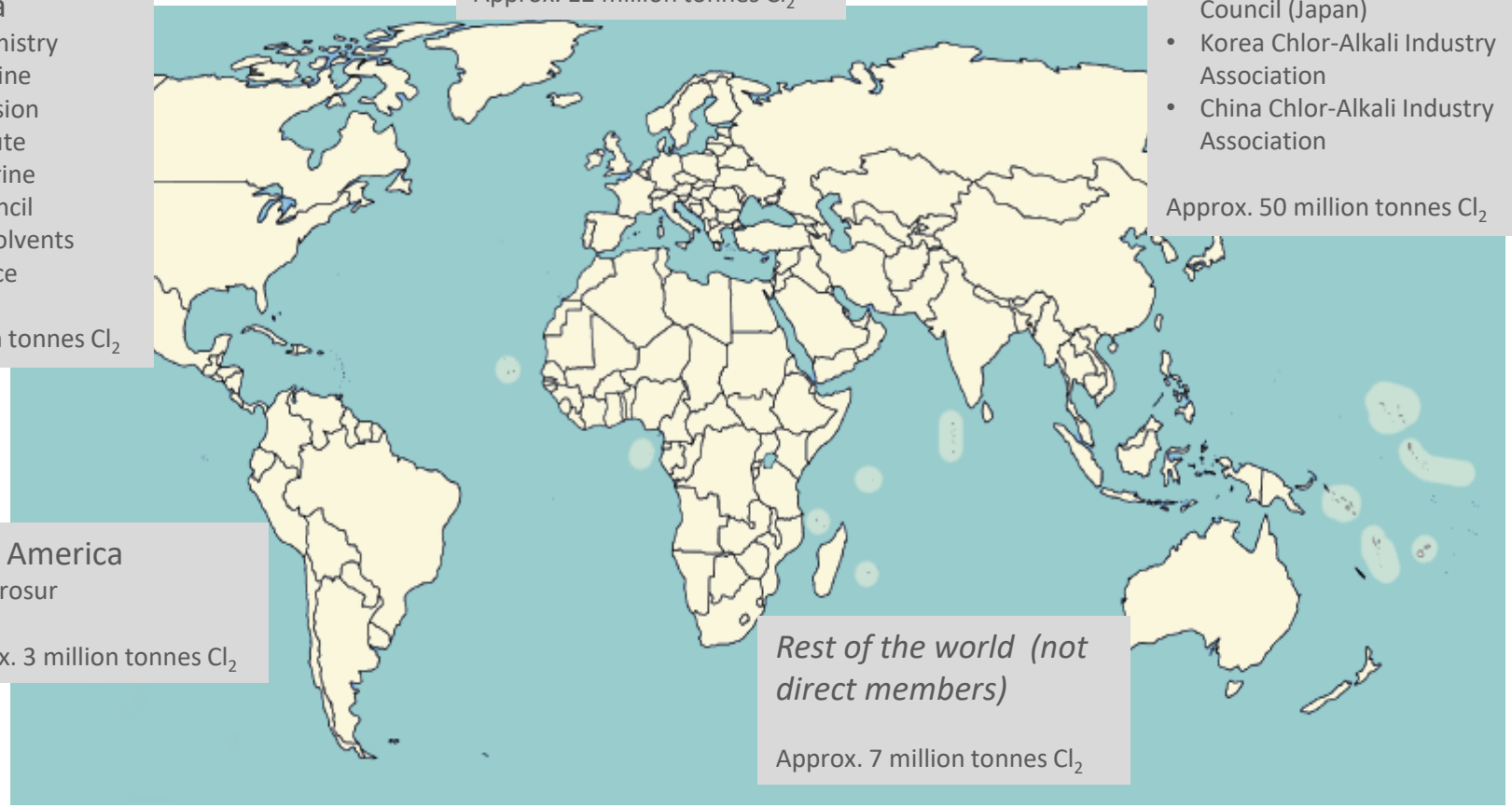
Approx. 12 million tonnes Cl_2

Asia
- Alkali Manufacturers Association of India
- Japan Soda Industry Association
- Vinyl Environmental Council (Japan)
- Korea Chlor-Alkali Industry Association
- China Chlor-Alkali Industry Association

Approx. 50 million tonnes Cl_2

North America
- American Chemistry Council's Chlorine Chemistry Division
- Chlorine Institute
- Canadian Chlorine Chemistry Council
- Halogenated Solvents Industry Alliance

Approx. 15 million tonnes Cl_2



Latin America
- Clorosur

Approx. 3 million tonnes Cl_2

Rest of the world (not direct members)

Approx. 7 million tonnes Cl_2

- **Global chlorine capacity is approx. 90 million tons per year of chlorine**
- **WCC represents about 85% of that capacity**

WORLD chlorine council®

WCC Vision

"Chlor-alkali chemistry is recognised as making an essential contribution to a sustainable world."

WCC Mission

"Be a global forum to promote health, safety, and environmental best practices in order to provide society with the benefits of the chlor-alkali industry."

WCC Values

Respect

- Our internal and external relationships and partnerships are based on the belief that all people deserve respect.

Integrity

- We are a reliable source and trusted provider of information on the safe handling and environmental and health effects of chlorine.

Engagement

- We are committed to sharing our knowledge, information, and resources to ensure chlor-alkali chemistry is recognised by society.

Partnership

- We maintain partnerships to work globally to inform international policy development that relates to our industry and products.
- We will foster collective efforts to support the chlor-alkali industry.

Goal Area 1 | Safety

Promote the continuous improvement of safety, environment and health performance, progress and practices worldwide in the chlor-alkali production, transportation and use.

Objective: Achieve zero incidents in the chlor-alkali industry

- Organise an annual safety seminar
  - Safety Seminar in Buenos Aires, Argentina | November 2016
  - Safety Seminar in Moscow, Russia | November 2017
  - Safety Seminar in Perth, Australia | July 2018
  - Safety Seminar in Monterrey, Mexico | September 2018
  - Safety Seminar & African Water Forum in Johannesburg, South Africa | July 2019
  - Safety in Transportation of all Chlor Alkali products seminar in Vadodara, India| September 2019
  - Online Safety Seminar | 17 and 18 November 2020
  - Online Safety Seminar | 9 and 10 November 2021
  - Safety Seminar in Johor Bahru, Malaysia | 13 and 14 June 2023
  - Online Safety Seminar | 18 November 2024

Goal Area 1 | Safety

Promote the continuous improvement of safety, environment and health performance, progress and practices worldwide in the chlor-alkali production, transportation and use.

Objective: Achieve zero incidents in the chlor-alkali industry (cont'd)

- Exchange and promote safety procedures, and information among regions
  - Quarterly Global Safety Team (GST) teleconferences
  - Spring & October WCC Management Committee Meeting
  - Quarterly safety newsletter
  - Exchange on incident reports and general best practices guidance

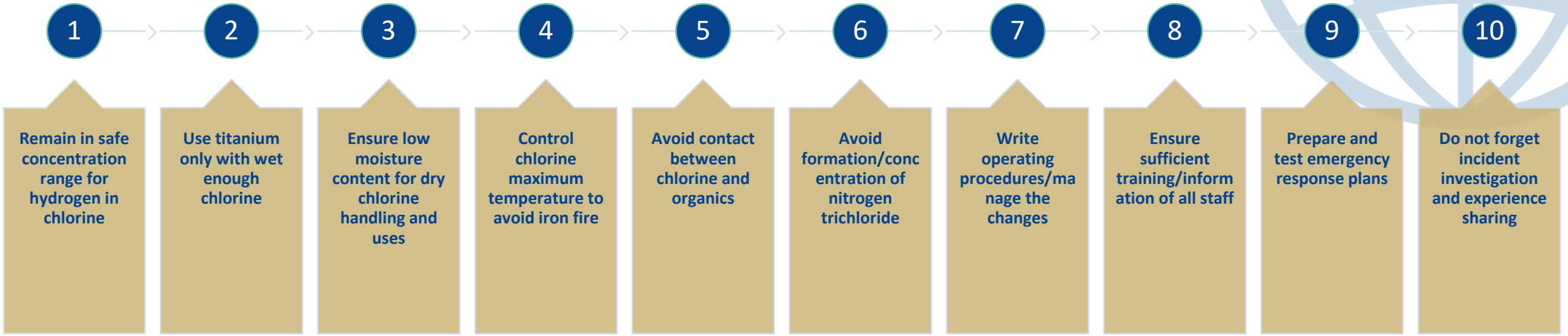
WCC Cardinal Rules on Process Safety Management

WCC Global Safety Team (GST)

- Objective is to assist in achieving operations with **zero releases, incidents and injuries** in the chlor-alkali community

- By promoting the continuous improvement of safety, environment and health performance

The 10 WCC Cardinal Rules



More information in the dedicated presentation later today!

Some learnings from recent incidents

Release of caustic soda from the catholyte supply line to the electrolyser – submitted by Euro Chlor

Description:

- Approx. 1 tonne of 28% caustic soda leaked from a provisionally repaired pipe section. The pipe section was recently damaged and was waiting for a proper replacement. It was assessed by operations and engineering that the overlaminated pipe could continue to be operated for some time after the provisional repair.
- Leakage was safely collected in the building and fed into the wastewater treatment system.

Investigation results & root cause:

- Misjudgment of the repair. The durability of the temporary solution was overestimated.
- Maintenance intervals of Fiber Reinforced Plastic (FRP) piping too long.

Corrective Action & Lessons learned:

- In future, damaged and repaired pipe sections will be replaced in due time.
- FRP piping maintenance intervals will be reduced.

Release of caustic soda from a storage tank – submitted by the Chlorine Institute

Incident Description:

- An operator working in the sodium hydroxide storage and tank truck filling area heard an audible roaring sound and identified a leak occurring at the storage tanks. The area operations were immediately shutdown, which included the transfer pumps used for the filling of tank trucks. Initially, only a single storage tank was isolated as it was assumed the leak occurred from this equipment. However, the operator noticed that the leak continued and then isolated the other two storage tanks to stop the leak.

Investigation Results:

- After inspection, it was determined that the leak occurred due to the failure of a loose expansion joint on the storage tank piping header system. The spilled material was contained within the dike and recovered to the process. The estimated duration of the leak was nine hours, and the estimated release was 44,000 lbs. (approx.. 20,000 kg).

Root Cause(s) & Contributing Factor(s):

- The operator performing the work was relatively new to their role. A management of change process was not performed.

Corrective Action(s) & Lessons learned:

- Maintenance policies were revised to prevent reoccurrence.

If you are interested in receiving the quarterly WCC Safety Newsletter, please contact me via tva@cefic.be

Goals and Vision of the WCC

THANK YOU !

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