

HAZARDS OF WATER TREATMENT

AFNWA

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- ▶ Introduction
- ▶ Overview of water treatment plant hazards
- ▶ Routes of Entry
- ▶ Chemicals
- ▶ Recommendations
- ▶ precautions

AGENDA

- 
- The background of the slide is a photograph of industrial machinery, specifically a network of brown pipes. A prominent horizontal pipe runs across the lower half of the frame. In the center, a pressure gauge is mounted on a vertical pipe. To the right, another vertical pipe rises, and a thin wire or cable hangs from above. The lighting is somewhat dim, creating a professional, technical atmosphere. The text is overlaid on the left side of the image.
- ▶ Physical
 - ▶ Falls
 - ▶ confined spaces
 - ▶ Chemical
 - ▶ chlorine
 - ▶ Soda ash
 - ▶ Polyaluminum chloride

HAZARDS



- ▶ Falls from height (top of water treatment tanks)
- ▶ Falls, slips, trips on wet floors
- ▶ Precautions
 - ▶ Use handrails/guardrails
 - ▶ Wear non slip boots/shoes

FALLS



Confined spaces

Oxygen deficiency

Gas build up (chlorine or others)



Precautions

Training

Use of confined space monitor

Developing procedures

Having man-watch

CONFINED SPACES





Inhalation is main route

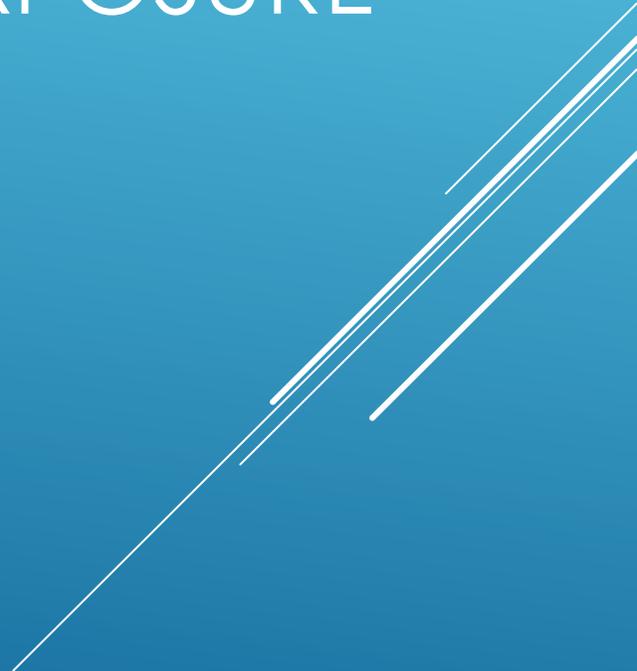
Ingestion is also possible

- Personal hygiene important
 - Handwashing
 - No smoking, drinking or eating after exposure

Skin

- Some materials can penetrate the skin

ROUTES OF
EXPOSURE



- ▶ Ascorbic acid
- ▶ Aluminium reagent
- ▶ Bleaching reagent
- ▶ Chlorine
- ▶ Cyanide reagent
- ▶ FerroVer
- ▶ PAN indicator solution
- ▶ Polyaluminium chloride
- ▶ Soda ash
- ▶ Sodium hypochlorite



CHEMICAL EXPOSURE ACTIVITIES



- ▶ Non hazardous
- ▶ Precautions:
 - ▶ Wash hands after use

ASCORBIC ACID

- ▶ Can cause severe skin burns & eye damage
- ▶ May cause respiratory irritation
- ▶ Used in small amounts as lab chemical

BLEACHING REAGENT



- ▶ Causes skin and eye corrosion
- ▶ Wear gloves and eye protection
- ▶ Wear acid gas cartridge respirator with full face respirator



CHLORINE



IRRITATING TO
EYES

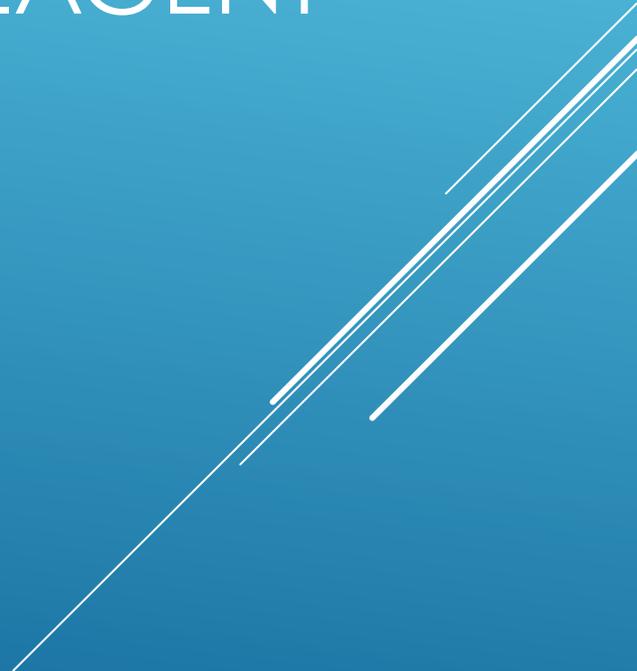


WEAR SAFETY
GLASSES WITH
SIDE SHIELDS



USE WITH GOOD
VENTILATION

ALUMINIUM
REAGENT



- ▶ Used in small amounts
- ▶ Irritating to eyes and skin
- ▶ Dangerous to environment
- ▶ Use with adequate ventilation
- ▶ Wash hands after use
- ▶ Wear gloves and eye protection

CYANIDE REAGENT

- ▶ Used in small amounts to determine manganese
- ▶ Irritating and corrosive to eyes
- ▶ Can be absorbed through skin
- ▶ Wear gloves and eye protection
- ▶ Use with adequate ventilation
- ▶ Wash hands after using

PAN INDICATOR SOLUTION



- ▶ Used in small amounts
- ▶ Corrosive to eyes and skin
- ▶ May cause allergy
- ▶ Do not breathe in powder
- ▶ Use in good ventilation
- ▶ Wear gloves and eye protection
- ▶ Wash hands after handling

FERROVER IRON REAGENT

Polyaluminium Chloride

UN3264 CORROSIVE LIQUID,
ACIDIC, INORGANIC, N.O.S.
(ALUMINIUM CHLORIDE HYDROXIDE SULPHATE)

Polyaluminium Chloride
PAX XL6



C US
Tested and Certified by WQA
against NSF/ANSI 60
23.0 kg

MUL 250 mg/l

Technical product for
use at water
treatment plants

DO NOT FILL ANYTHING INTO THIS CANISTER WHEN EMPTY
DO NOT TRANSFER RESIDUES INTO OTHER CONTAINERS
RETURN EMPTY CANISTER TO OSORNO

Polyaluminium Chloride - PAX XL6

Refer to Material Safety Data Sheet

Caution: CORROSIVE



Health hazard:

Harmful if swallowed.
Cause severe burns to skin and eyes.
May cause delayed lung injury if inhaled.



Precautions:

Avoid all contact.
Avoid prolonged or repeated breathing
of vapour.
Do not take internally.
Wash thoroughly after handling.
Wear protective equipment and clothing.



First aid:

In all cases, obtain medical attention.
Flush with water for at least 20 minutes.
If swallowed give water to dilute.
Do not induce vomiting.
If inhaled, move victim to fresh air.

**In case of a dangerous
goods emergency call
Osorno
204-488-1538**

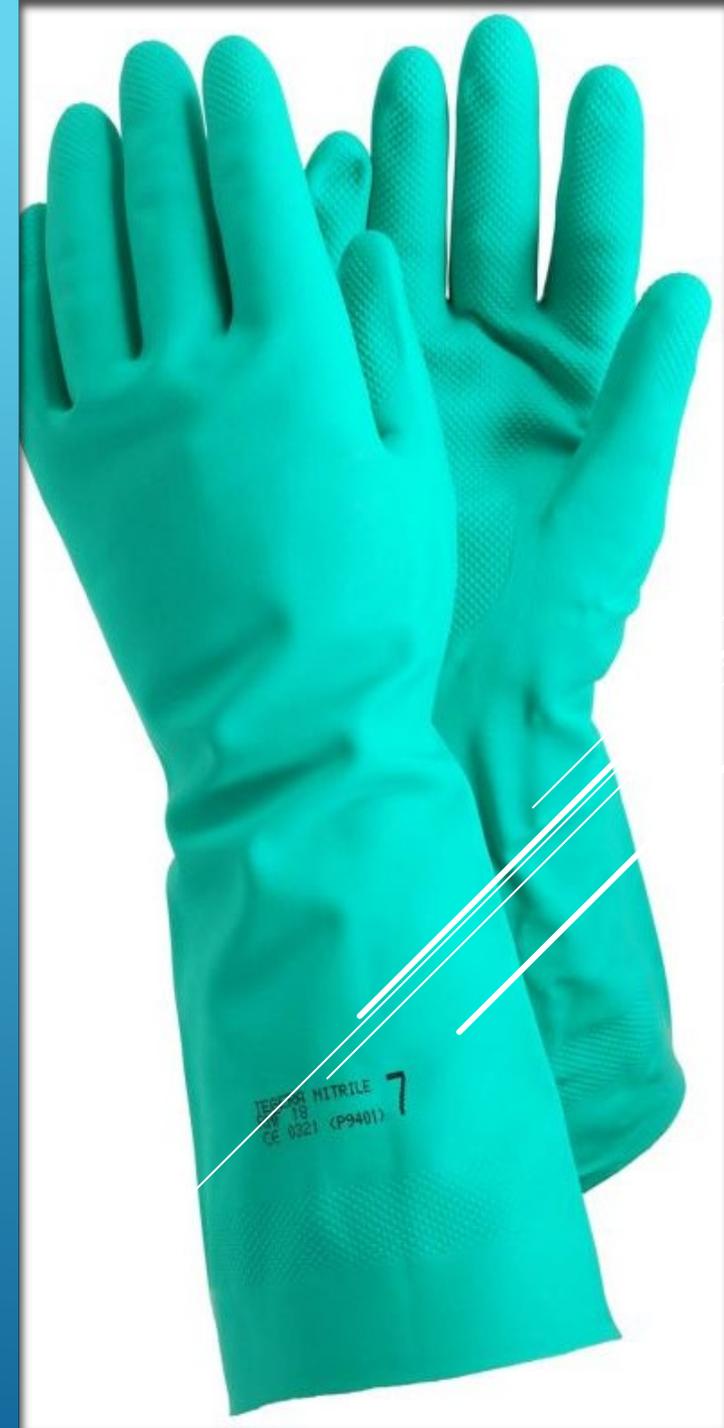
OSORNO Enterprises Inc.
976 Elgin Ave.
Winnipeg, MB R3E 1B4
Canada

SODA ASH (SODIUM BICARBONATE)

- ▶ Powder
- ▶ can irritate eyes and skin and respiratory tract
- ▶ When mixing, contents can get hot, stir regularly
- ▶ Add to water, stirring constantly
- ▶ Can react with aluminum
- ▶ Wear respirator with N95 or P100 filters
- ▶ Will react with polyaluminum chloride (acidic)

- ▶ This is a route of entry for chemicals. This includes
 - ▶ being splashed in the mouth or on the skin. Some chemicals can be absorbed through the skin
- ▶ Gloves should be used for many chemicals, for
 - ▶ Skin protection
 - ▶ To prevent absorption

SKIN CONTACT





- ▶ Inhalation of chemicals may lead to the chemicals being swallowed (from mucous from the lungs), so that the exposure becomes through the digestive tract.
- ▶ Accidental
- ▶ Care should still be taken to wash hands after working with chemicals

INGESTION

3M



- ▶ Half face respirator plus glasses or
- ▶ Full face respirator
- ▶ Cartridges
 - ▶ HEPA plus acid gas
 - ▶ HEPA for soda ash
 - ▶ Acid gas cartridge for Chlorine



RESPIRATORY
PROTECTION



Wear respirators and eye protection when transferring chemicals



Wear gloves when transferring chemicals



Get fit tested



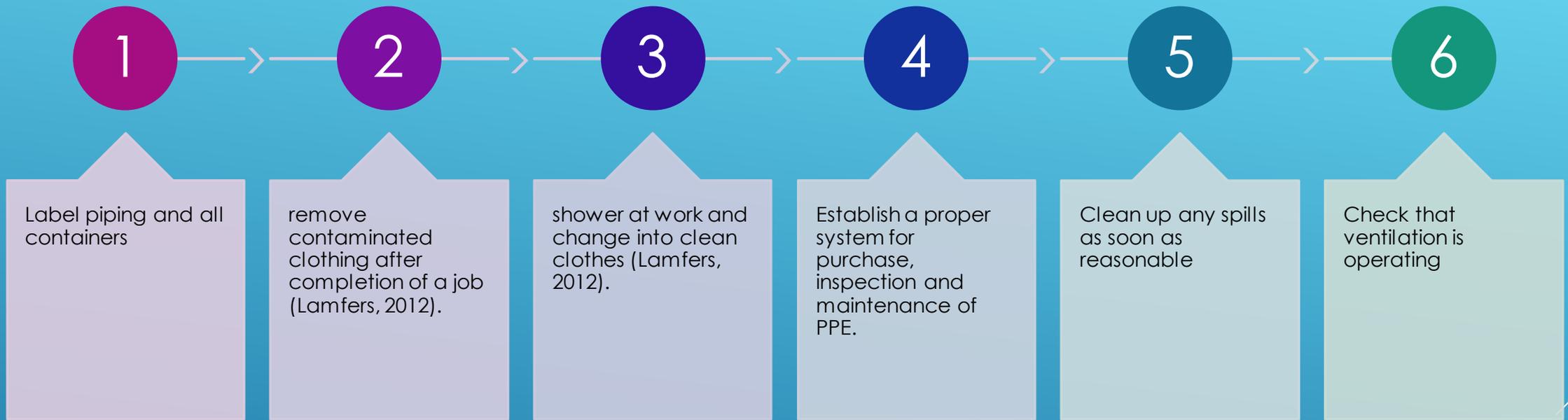
Keep respirator in zip loc bag to keep it safe and longer lasting

Change cartridges regularly



Ensure ventilation is operating

RECOMMENDATIONS



RECOMMENDATIONS

- ▶ Training and education about the hazards of treatment chemicals
- ▶ A place onsite with clean water for washing your hands
- ▶ A place to wash and clean up after work
- ▶ The right PPE, such as gloves, goggles, a face shield, water-resistant suit, or respirator – depending on the job
- ▶ Clean areas set aside for eating and smoking
- ▶ Cleaning facilities or services for clothing and equipment.

WORKPLACE REQUIREMENTS

- ▶ Most important:
 - ▶ Wash your hands well with clean water and soap before you eat or smoke and after work.
- ▶ Do not touch your nose, mouth, eyes, or ears with your hands, unless you have just washed. • Keep your fingernails short; use a stiff soapy brush to clean under your nails.
- ▶ Always wear gloves when your hands are chapped or burned or you have a rash or a cut.
- ▶ Shower and change out of your work clothes before you leave work.

PRECAUTIONS

- ▶ <https://www.afscme.org/news/publications/workplace-health-and-safety/fact-sheets/confined-spaces>
- ▶ CDC, <https://www.cdc.gov/niosh/docs/2002-149/pdfs/2002-149.pdf>
- ▶ Hazard Identification and Risk Assessment in Water Treatment Plant considering Environmental Health and Safety Practice, 2018, retrieved online at https://www.e3s-conferences.org/articles/e3sconf/pdf/2018/06/e3sconf_icenis2018_06011.pdf
- ▶ Safety First Canada, Water Treatment Plant Safety, 2020, available online at <https://esafetyfirst.com/blog/water-treatment-safety/>
- ▶ Vasovic, D., Stankovic, S., Vranjanac, Ž., WORKING CONDITIONS AT THE WATER TREATMENT PLANTS: ACTIVITIES, HAZARDS AND PROTECTIVE MEASURES, 2018, safety Engineering.

REFERENCES