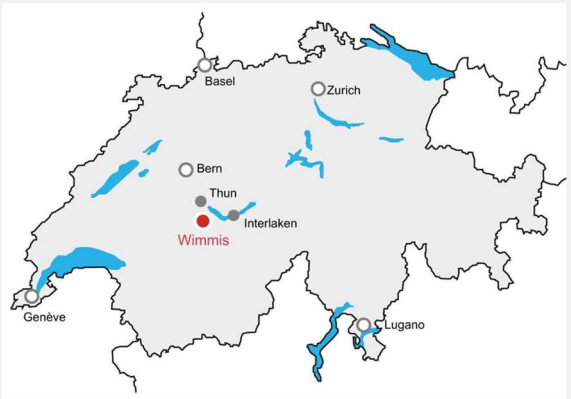
Mercury stabilization / temporary storage and final safe disposal

XII Technical Seminar CLOROSUR

Costa do Sauípe,
Bahia – Brasil
21 November 2022

MERCURY STABILISATION
BATREC IN A NUTSHELL

BATREC is part of SARP Industries and located in Switzerland



5 core activities

Mercury stabilisation
Mercury containing waste treatment
Oil & Gas Adsorbents recycling
Activated Carbon reactivation
Battery recycling

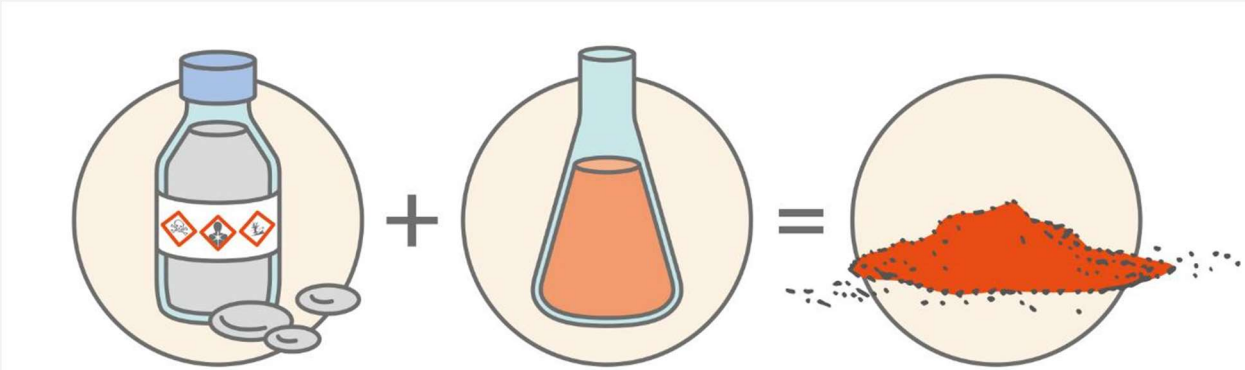
Turnover 2020 16 Mio. CHF
Turnover 2021 ~20 Mio. CHF

MERCURY STABILISATION

What do we mean by « stabilisation »?

⇨ *Conversion of <u>toxic</u> Mercury (Hg) into <u>non-toxic</u> Mercury Sulphide (HgS)*

$Hg_{(l}$ + S^{2-} = $HgS_{(s}$



Metallic Mercury

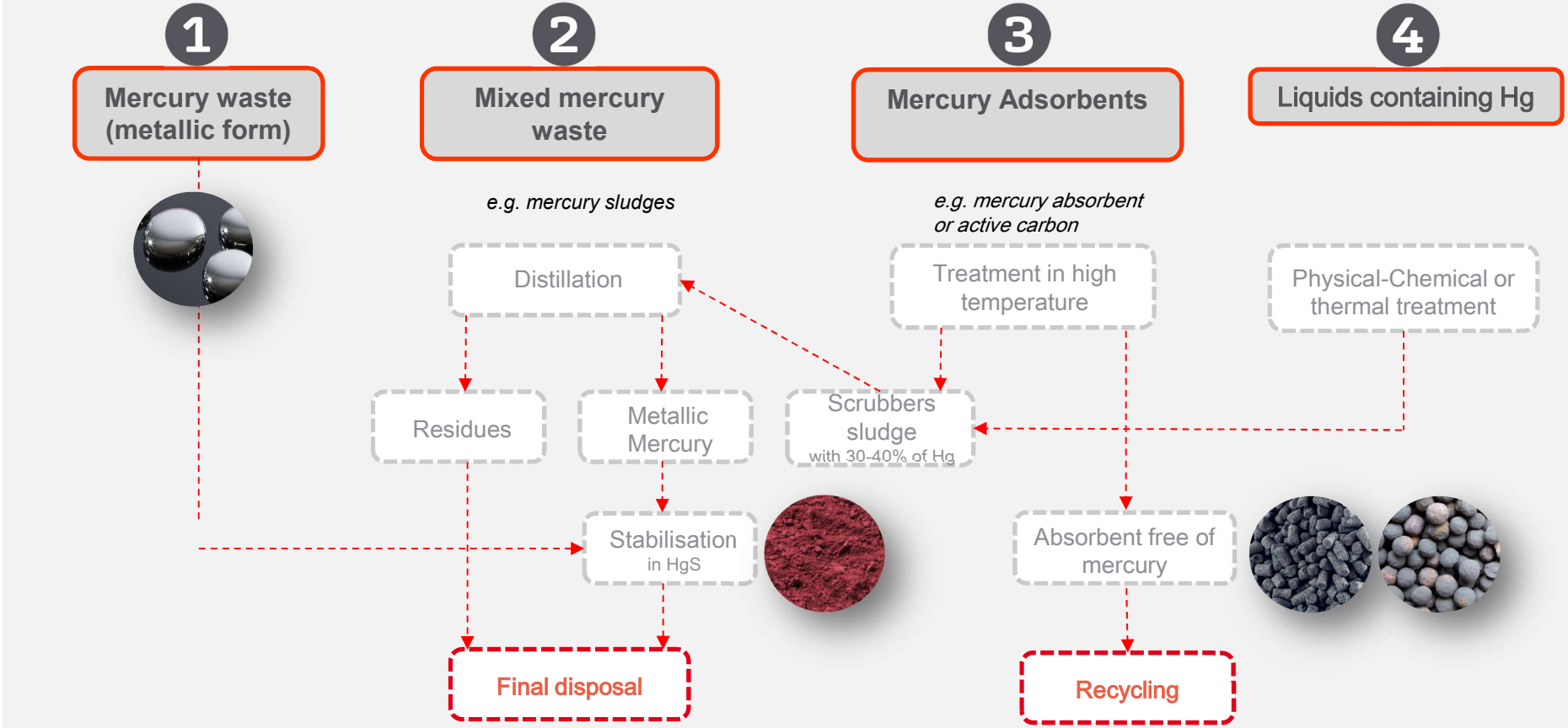
Stabilisation reagent
(polysulfide)

Cinnabar (HgS)

HgS is

- non toxic
- the most stable Hg compound
- the most insoluble Hg compound

MERCURY STABILISATION WASTE STREAMS



MIXED MERCURY WASTE Examples

Mercury in small packaging

Laboratory chemicals

MIXED MERCURY WASTE Examples

COD Testing tubes

Laboratory chemicals

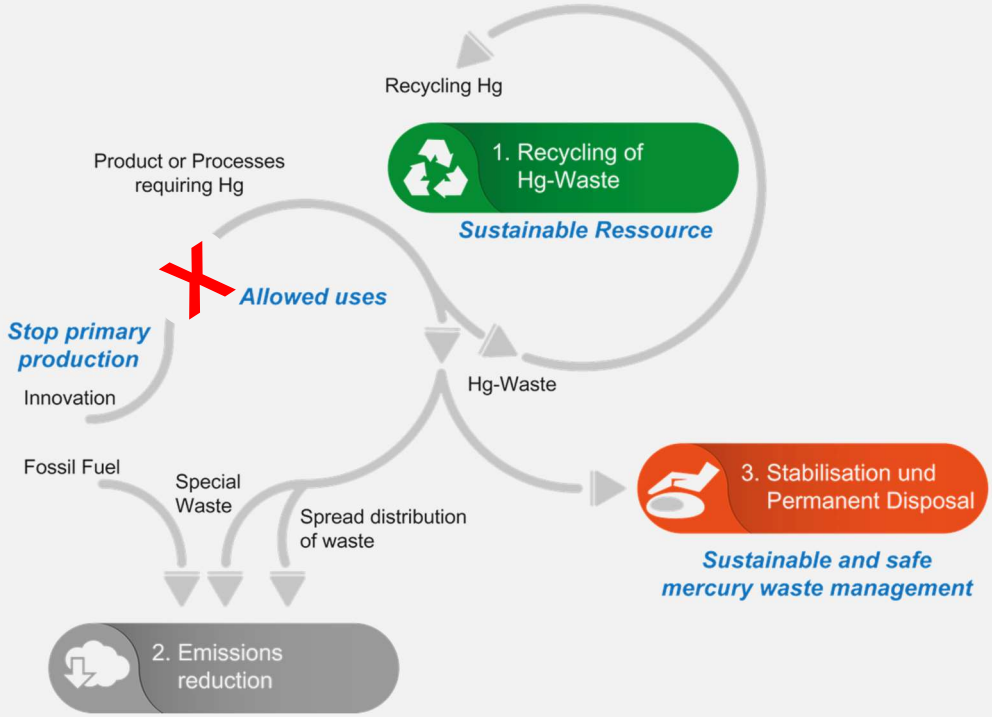
MERCURY STABILISATION
THE MINAMATA CONVENTION

The **MINAMATA CONVENTION** is an international **treaty** developed with the backing of the United Nations Environment Program to **protect human health and the environment from the harmful effects of mercury**.

150 countries agreed on:

- the **reduction and phase out of mercury use** in a number of products and processes.
- implementing **control measures** on **environmental emissions**.

MINAMATA CONVENTION ON MERCURY
UNEP



MERCURY STABILISATION
CUSTOMERS

01 **Chlor-Alkali Industry**

02 **Gold Mines**

03 **Oil & Gas industry**
(recovered from Hg-wastes)

PROJECTS ACCOMPLISHED in Chlor-Alkali Industry and Gold Mines

- **decommissioning of Hg based Chlor-Alkali plants.** *Remaining stocks in EU*

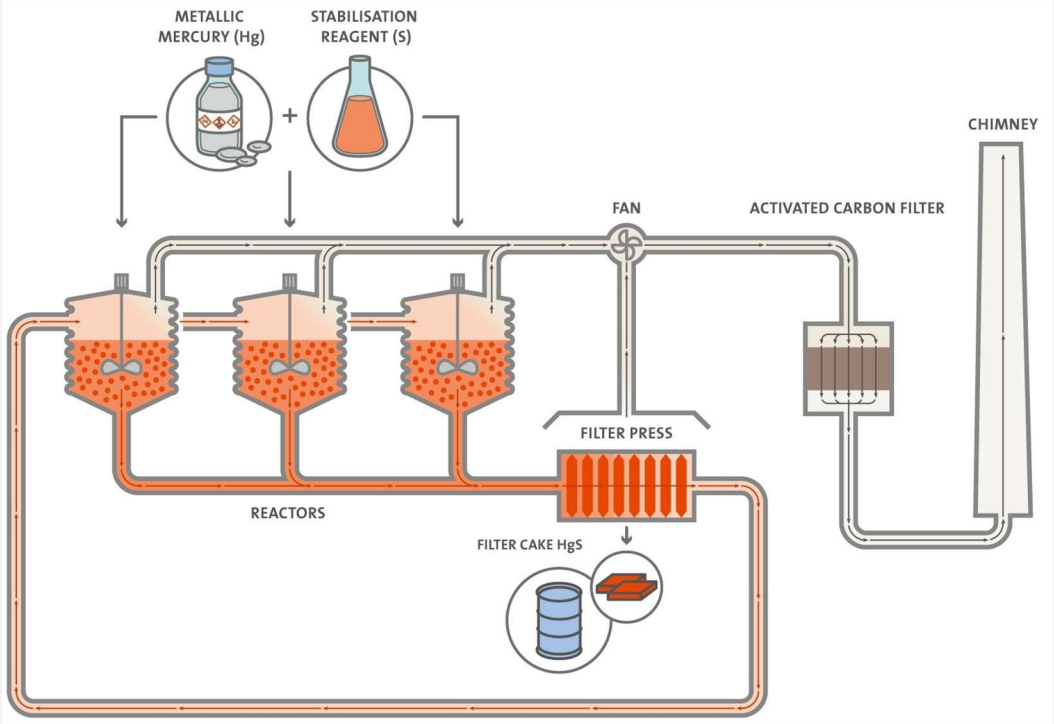
More than 1’500 T as of 2016 (Spain, Belgium, France, Italy, Hungary, Slovakia, Czech Republic, Switzerland)

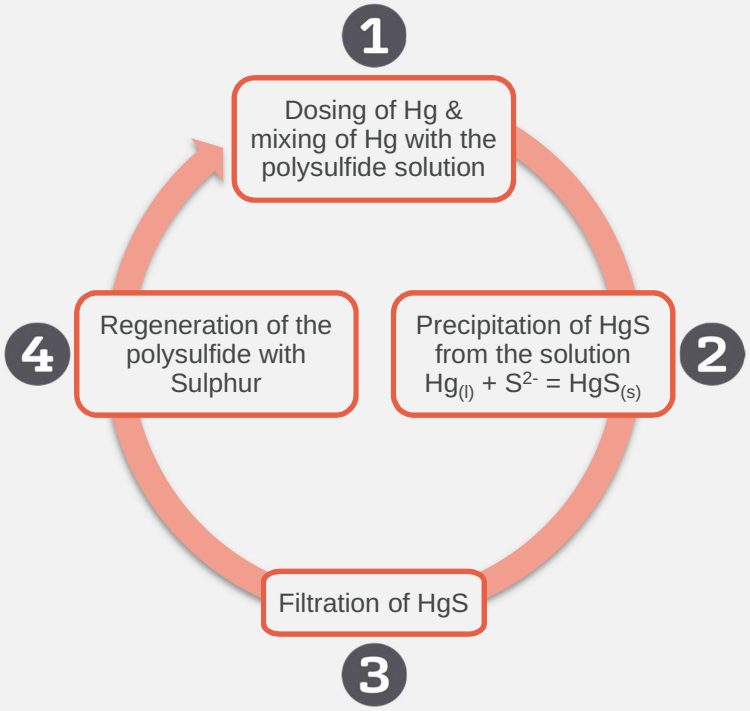
- **industrial gold mines** *continuous production worldwide.*

More than 400 T as of 2016 (Latam Region)

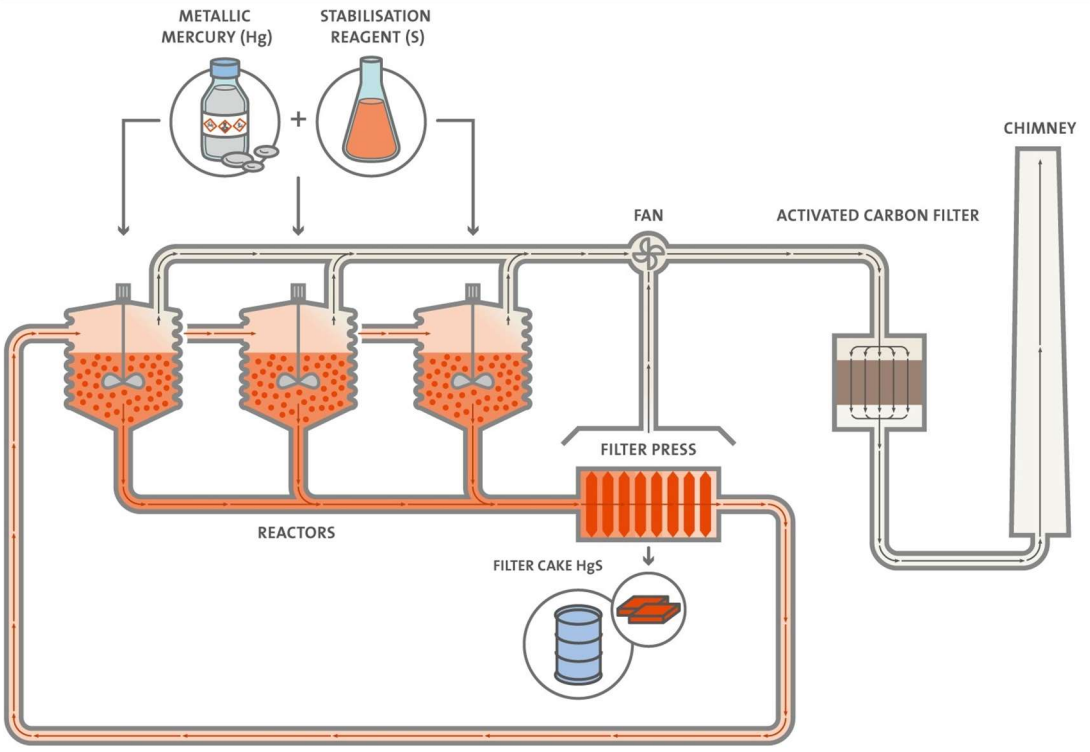
- **clients who request a safe disposal of the Hg recovered from their wastes** *small volumes but increasing demand*

MERCURY STABILISATION
STABILISATION PROCESS





MERCURY STABILISATION
STABILISATION PROCESS



Europe, US
Australia
South America
China, Japan

MERCURY STABILISATION
MERCURY SULPHIDE (HgS)

mass balance

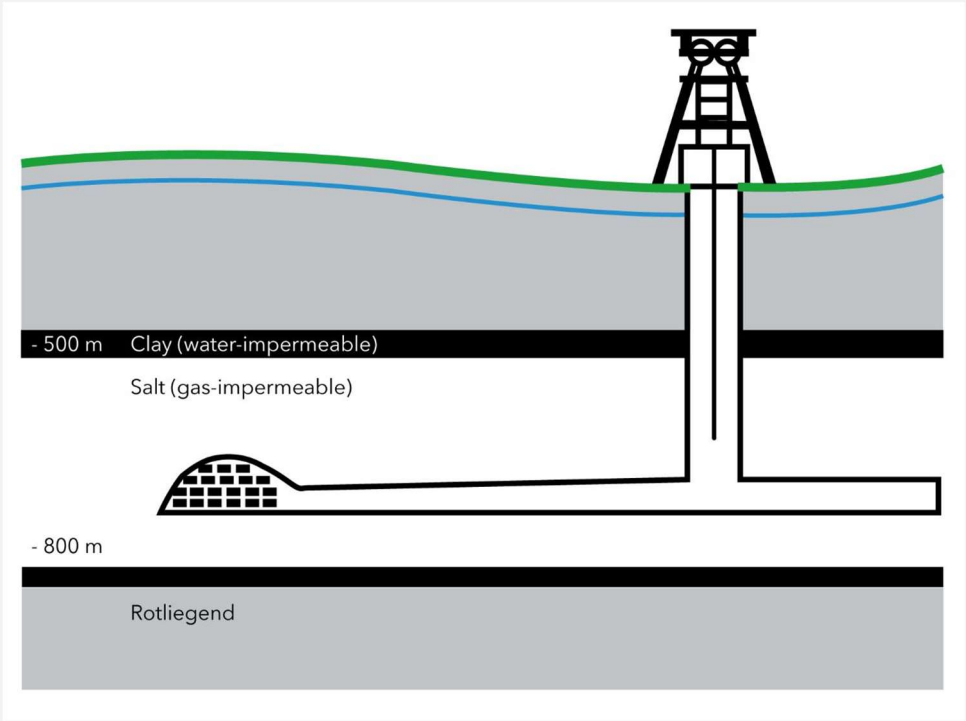
1’000 kg of Hg turn into **1’190 - 1’250 kg of HgS**

HgS composition

- Hg 80 – 84 %
  HgS 92.8 – 97.4 %
- H_2O 1.0 – 5.0 %
- S 0.7 – 3.0 %
- Na 0.4 – 1.8 %
- metallic Hg < 100 ppm

- fine grain size
- filter cake with a low humidity

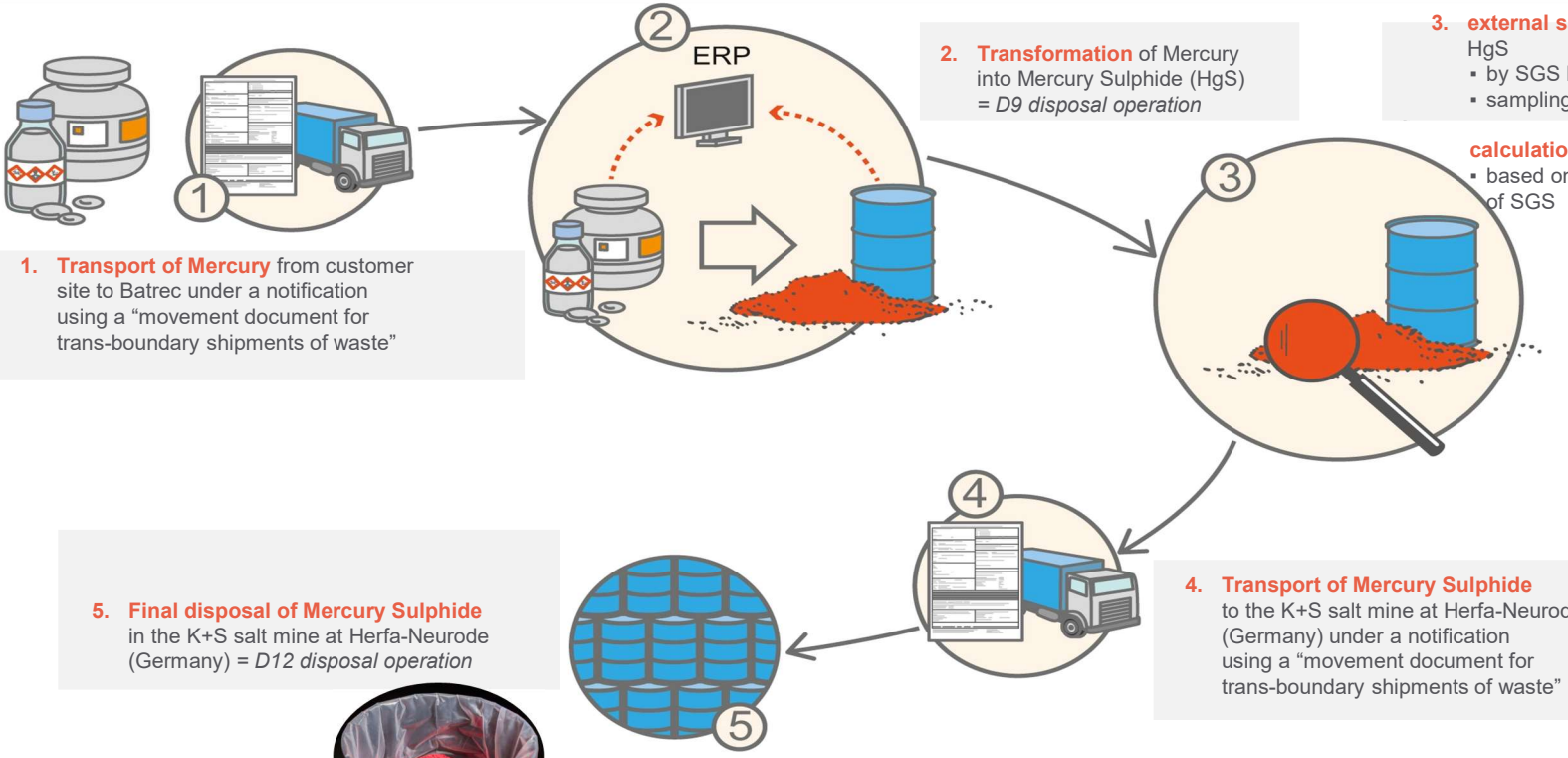
MERCURY STABILISATION
PERMANENT DISPOSAL of HgS in a K+S SALT MINE



salt mine disposal

- back filling of an excavated salt mine in Germany with (hazardous) waste
- deposit at depths of 500 to 800 m
- no further solidification required
- no requirements concerning leaching behavior

MERCURY STABILISATION
TRACEABILITY is KEY



1. **Transport of Mercury** from customer site to Batrec under a notification using a “movement document for trans-boundary shipments of waste”

2. **Transformation** of Mercury into Mercury Sulphide (HgS) = *D9 disposal operation*

3. **external sampling & analysis** of HgS
   - by SGS Fresenius
   - sampling of each drum of HgS

calculation of a mass balance
- based on the analytical results of SGS

4. **Transport of Mercury Sulphide** to the K+S salt mine at Herfa-Neurode (Germany) under a notification using a “movement document for trans-boundary shipments of waste”

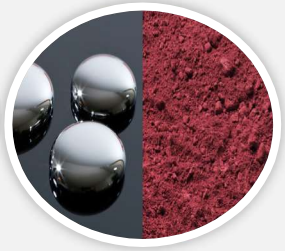
5. **Final disposal of Mercury Sulphide** in the K+S salt mine at Herfa-Neurode (Germany) = *D12 disposal operation*

MERCURY STABILISATION
CASE STUDY - CHLOR-ALKALI

The Challenge

BATREC participated in a tender in Eastern Europe to stabilise and dispose more than 140 tons of elemental mercury from an old chlor-alkali plant respecting a schedule requiring weekly transports.

140
TONS
of Mercury



*Building trust by fully fulfilling customers' needs allowed us to work as **pure partners instead of standard buyer/supplier** !*

BATREC's solution

Administrative handling: preparation of the Basel Convention transboundary notification package and support on the reception of the consents from all competent authorities of the countries involved.

Local operations: support on the container filling operations, support on the correct labelling according to the ADR regulations, provision of special Hg-containers, weekly meeting with the teams reviewing the agreed schedule.

International transport: global coordination of transport involved parties (local teams, carrier, customs offices and BATREC's team).

Waste treatment: transformation of more than 140 tons of elemental mercury into mercury sulfide (HgS) including final disposal in a salt mine using the appropriate technology and having the necessary permits.

Reporting: provision of the necessary detailed report to allow the waste producer to comply with its reporting duties according to Articles 12 and 14 of the Regulation (EU) 2017/852 of the European Parliament and of the Council.

MERCURY STABILISATION
CASE STUDY - CHLOR-ALKALI

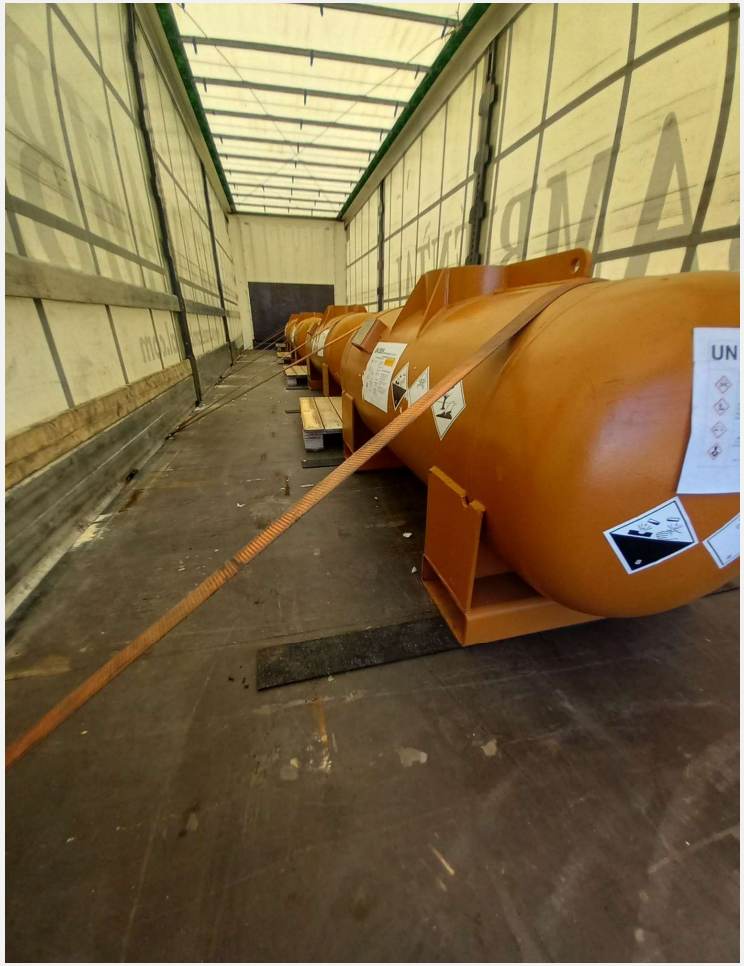
Spain chlor alkali
Safe storage of Hg in Chlor Alkali Plant before shipment

MERCURY STABILISATION
CASE STUDY - CHLOR-ALKALI

Spain chlor alkali
Safe storage of Hg in a storage facility before shipment

MERCURY STABILISATION
CASE STUDY - CHLOR-ALKALI

Spain chlor alkali
Transport of Hg from Producer to BATREC



MERCURY STABILISATION
CASE STUDY - CHLOR-ALKALI

Spain chlor alkali
Transport of Hg from Producer to BATREC

MERCURY STABILISATION
CASE STUDY-MINING INDUSTRY

The Challenge

BATREC offered to a mining industry its door to door services consisting of on-site supervision for packing, labelling, loading into maritime containers and international transport prior to Hg stabilization and final disposal

100
TONS
of Mercury

Successfully meeting the local and international requirements as well as the high quality standards expected from such complex industry resulted into a memorable phrase created by the client: ***Making the impossible possible!***

BATREC's solution

On-site supervision: packing and labelling of all mercury containers for the export of UN2809 Mercury –according to the international transport regulations ADR and IMDG.

Local handling: handling of the route risk study including full time custody of the convoy from the mine to the local port.

Local traceability: local VEOLIA teams ensured the proper traceability of each mercury contanier thanks to a dedicated labelling system

International Transport: supply and coordination of the road and maritime carrriers from the mine to Wimmis. Export/import customs clearance management.

Health and safety: BATREC-VEOLIA provided training following occupational health protocol

Global traceability: BATREC ensured the full traceability from the on-site to the final disposal in the salt mine – including the provision of a final report tracking the waste.

MERCURY STABILISATION
CASE STUDY-MINING INDUSTRY

Supervision Works at the Mine and Stuffing of Maritime Containers

-Supervision Works at the Mine.
-Inspection of Hg contaniers.
-Labelling.
-Maritime Container Stuffing
-Basel Convention and IMDG and ADR paperwork

MERCURY STABILISATION
CASE STUDY-MINING INDUSTRY

Road Transport from Mine to Port of Loading

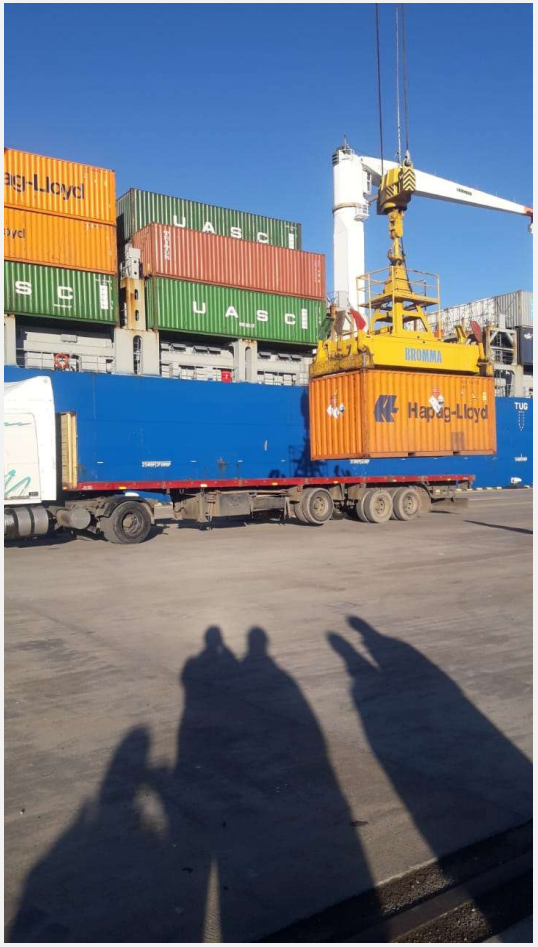
-Convoy escort.
-Coordination with Port Authority
-Coordination with local authorities for road movement of waste
-Local Customs processes
-Custody at the Port if requested
-Coordination with international freight forwarder

MERCURY STABILISATION
CASE STUDY-MINING INDUSTRY

International Maritime Transport

-Maritime transport from Port of Loading to Port of Discharge

-Vessel tracking until POD

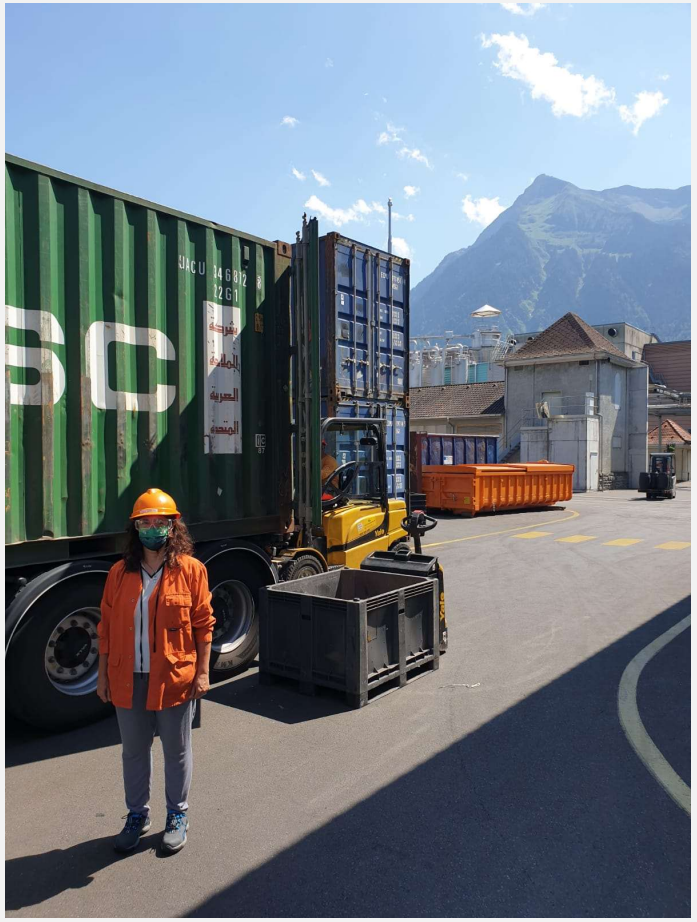


MERCURY STABILISATION
CASE STUDY-MINING INDUSTRY

Road Transport from Port of Discharge to BATREC stabilisation plant (Wimmis, CH)

-Local customs coordination
-Customs inspection coordination if requested
-Trucks tracking from POD to Wimmis
-Unloading at BATREC
-Treatment in our Stabilisation Plant
-Shipment of HgS to salt mine
-Mass Balance Report

BATREC
Swiss quality recycling solutions



MERCURY STABILISATION
FOR FURTHER INFORMATION

or visit us in Switzerland…..

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