UNEP Global Mercury Partnership (GMP)

Waste Management Area (WMA)

New Entries to the "Catalogue of Technologies and Services on Mercury Waste Management"

Webinar

27 January 2026

Augean

Presentation to WMA of the UNEP Global Mercury Partnership

27/01/2026

MANAGING HARD TO HANDLE WASTES

UK WASTE TREATMENT & DISPOSAL INFRASTRUCTURE

FOCUSSING ON BEST ENVIRONMENTAL OUTCOMES

Todays Presentation

- About Augean
- Our Sites and Services
- Berwick Upon Tweed Site
- Mercury Recovery Facility
- Retort & Plant Upgrade Project
- Operational & Environmental Performance Post Upgrade
- Performance Driving Additional Capability & Capacity
- Waste Crime, Mercury and Environmental Risk
- International Partnerships & Future Direction
- Questions & Answers

GLOBAL MERCURY PARTNERSHIP

Augean at a glance

Augean is a key facilitator of the circular economy*, providing sustainable waste management solutions for the highly complex and specialist residues that it creates

+ We have UK waste treatment and disposal infrastructure, and we focus on delivering best environmental outcomes

+ We service the following sectors:



2004
Augean established

2023 Future Industrial Services acquired

+

£150m
Total revenue 2024

+

c.600
Employees across the Group

+

22
Locations across the UK

* The circular economy model uses less raw materials, less waste and fewer emissions

Augean

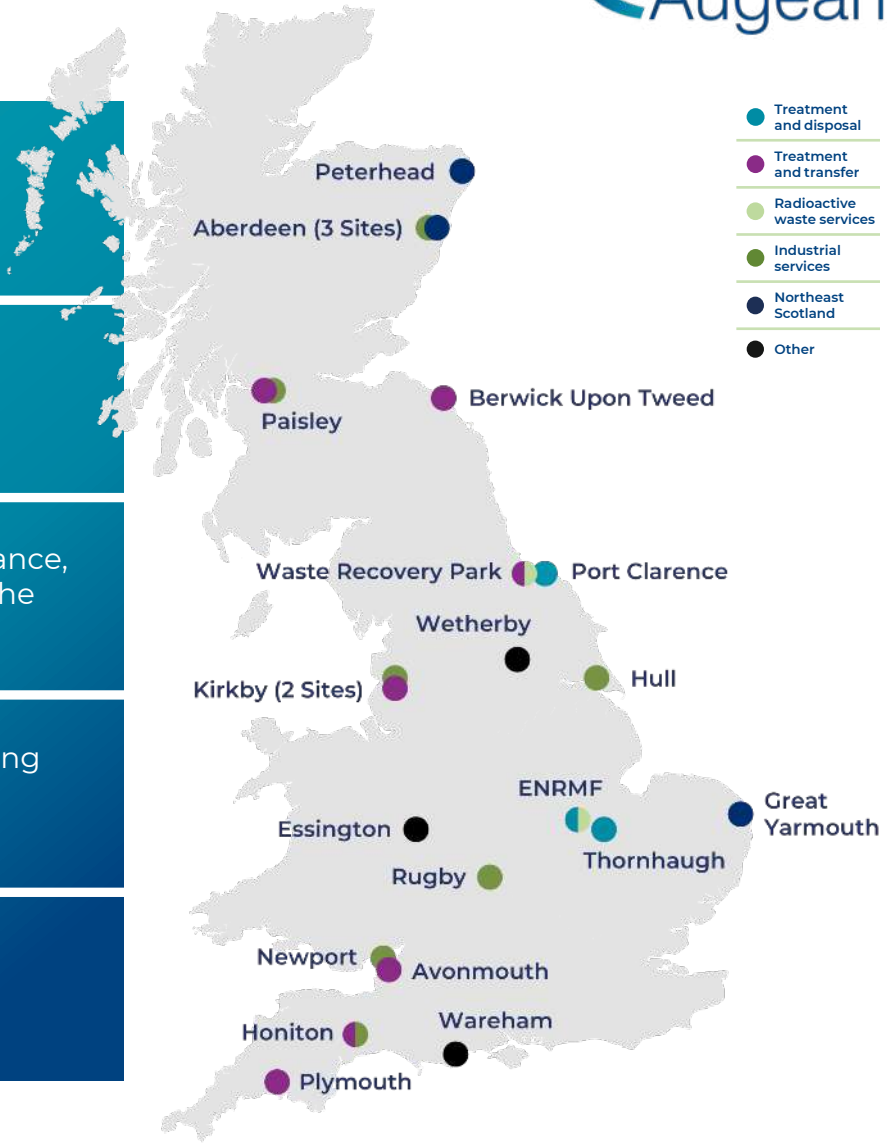
A market leader in treating hard to handle wastes and specialist industrial services

Treating waste as a resource, innovating solutions, enhancing our ESG credentials and optimising recycling, recovery and disposal routes

A high standards operator for health & safety, compliance, operational excellence, customer service, and also for the communities in the areas in which we operate

Increasing shareholder value which includes enhancing our infrastructure proposition; developing a balanced, sustainable business; organic growth; targeted M&A

Striving to **make Augean a great place to work**

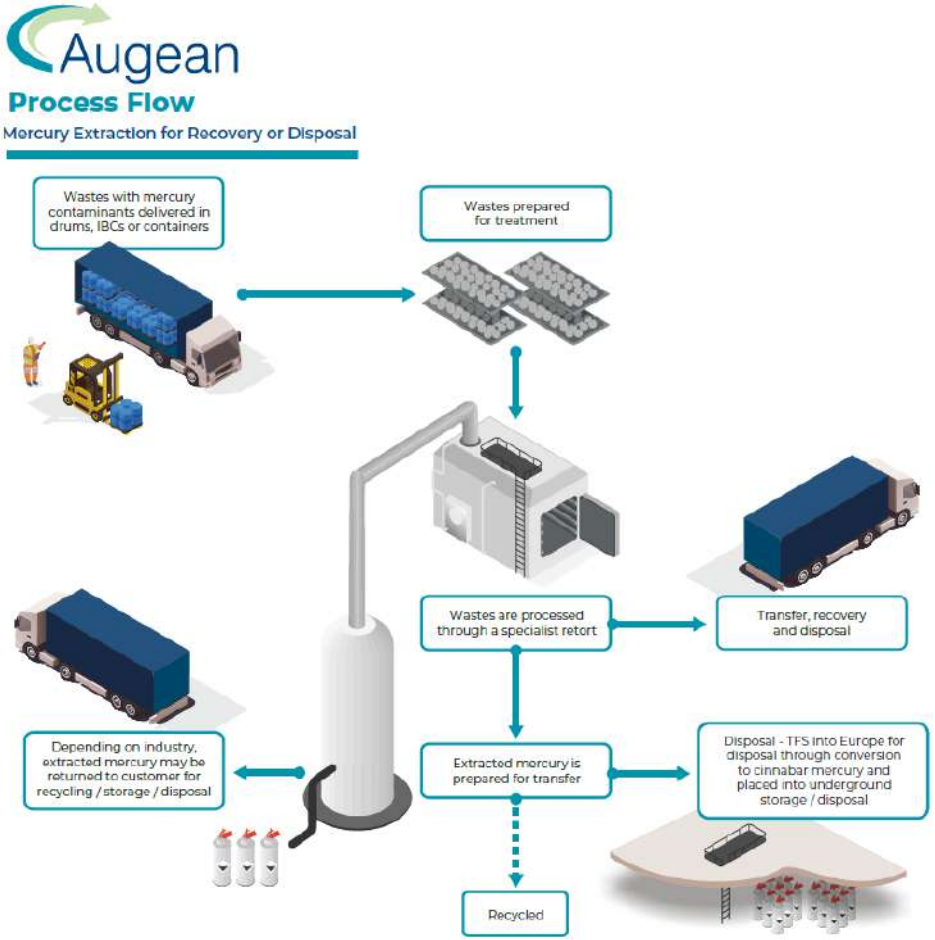


Berwick Upon Tweed Site

- Specialist hazardous waste metals treatment facility at Berwick-upon-Tweed
- Long operational history managing mercury-bearing wastes under strict controls
- Developed alongside evolving UK, EU and international regulatory frameworks
- Strong operational, safety and permitting expertise embedded on site



Mercury Recovery Facility



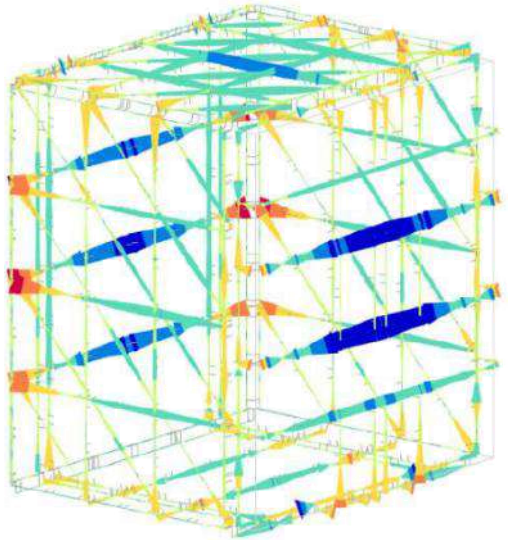
Operations & Process Overview

- Wastes with mercury contaminants received in drums, IBCs or containers
- Pre-treatment and preparation to ensure consistent feed to process
- Specialist retort used for controlled thermal extraction of mercury
- Mercury volatilised, condensed and recovered in a closed system
- Recovered mercury prepared for recycling, return to customer or onward disposal
- Residual wastes managed in accordance with permit requirements

Retort & Plant Upgrade Project

- Over 35 years waste management experience
- Strong operational, safety and permitting expertise embedded on site Strategic, phased upgrade project
- Ancillary system upgrades completed through 2017 including Off-gas treatment, filtration and monitoring improvements. Additional control systems, alarms and safety interlocks modernised
- Full retort replacement completed in 2023
- New system based on proven design with modern engineering enhancements
- Safety-by-design, improved reliability and maintainability





Operational & Environmental Performance

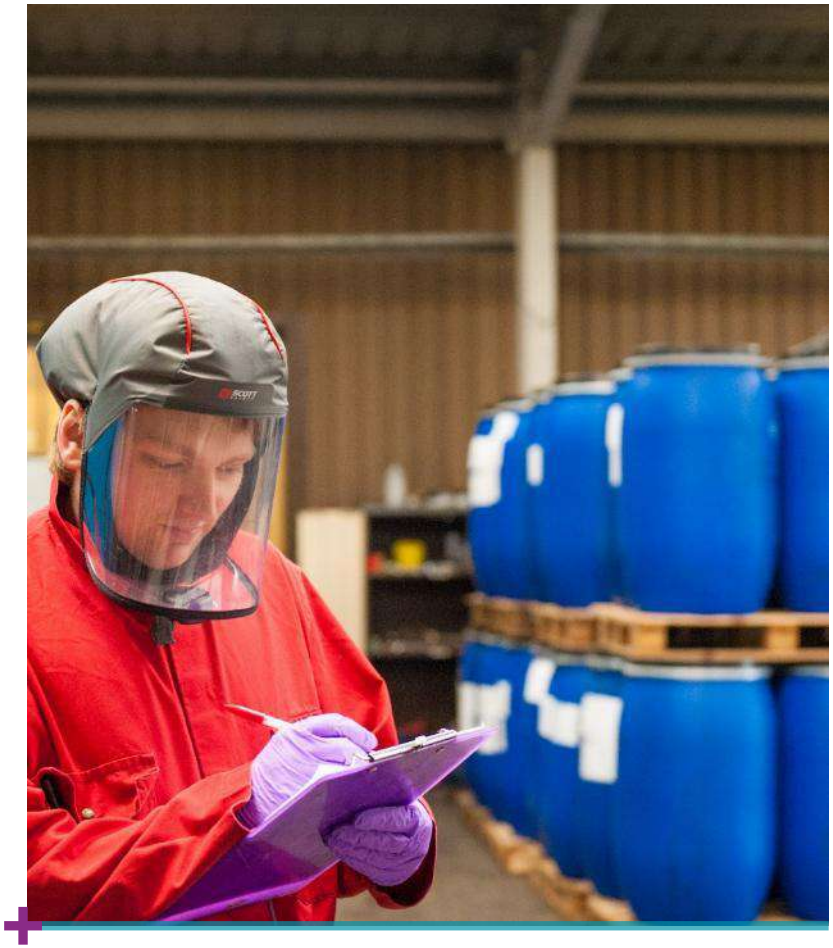
Post Upgrade

- Improved process stability and tighter operational control
- Enhanced emission performance well within permit limits
- Reduced downtime and improved workplace exposure control
- Increased energy efficiency and reduced environmental footprint
- Improved confidence from regulators, customers and stakeholders

Retort Batch Performance	2021 vs 2025	Key Takeaways
Total Weight of Material Processed (Kgs)	29799	General higher throughput of more difficult material.
Average per batch (kgs)	332	Batches are on Average 332kgs heavier.
Total Mercury Recovered at pre-treatment (kgs)	2833	Greater amount of mercury being removed through pretreatment. Less processing through the mercury plant, process balancing and efficiency development.
Total Mercury Recovered through process (kgs)	3760	Higher Mercury recovery through process (less in treated ash being sent for stabilisation. More compliant and environmentally friendly).
Total Processed material for disposal/Ash (kgs)	14	Less ash generated from process (greater recovery through moisture and Hg processing).
Percentage Recovery Average (mercury)	0	Comparative recovery vs 21 with significant improvement from 2022 & 2023.
Average Time Moisture Removal Stage (Hours)	-8	More effective liquid removal post pre-treatment.
Average Time Mercury Recovery Stage (Hours)	5	Harder to treat material with higher Hg amounts in different compounds (requires longer hold at higher temps).
Average Downtime (Hours)	-51	Downtime Reduced to under an hour allowing for multiple batches per week.
Average Process Time Hours	-54	Significant reduction in Retort process time through processed development and new Retort equipment.
Average Energy in Kilo watts	-2.15	Energy reduction from 2021.

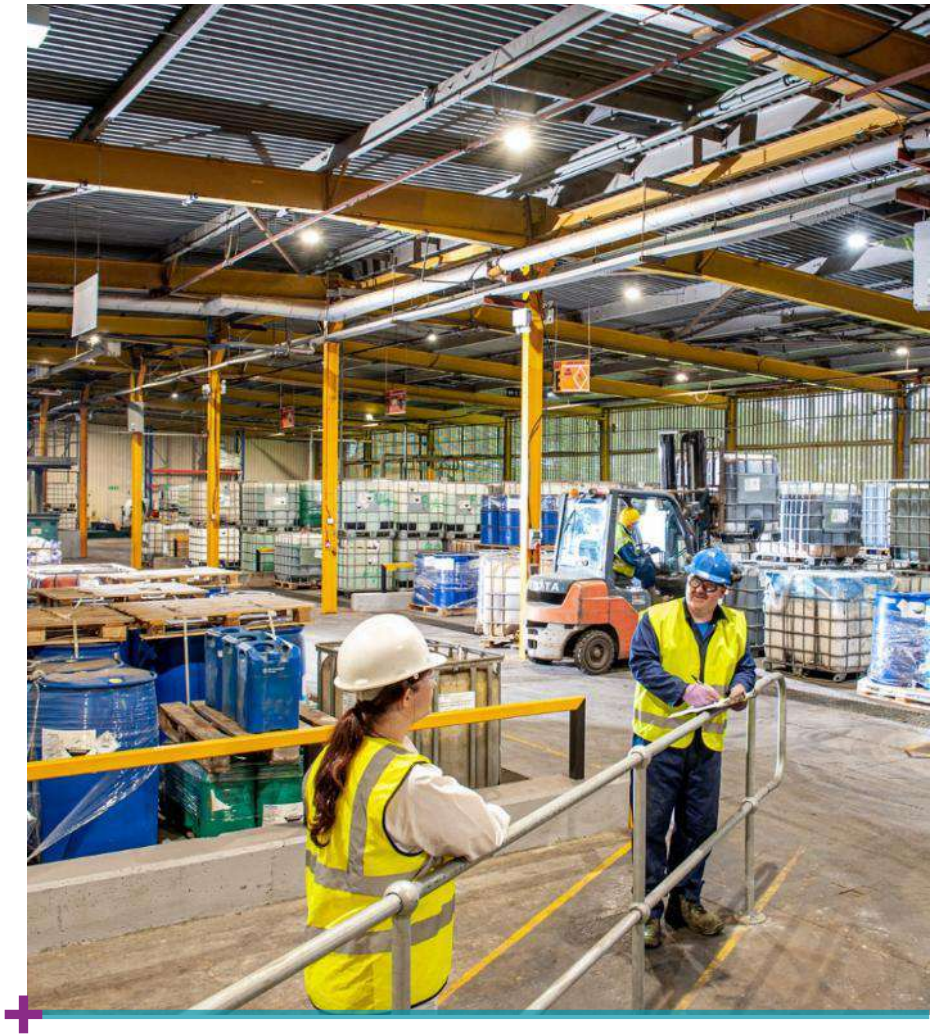
Enhanced Performance Enabling Expanded Treatment Capability





Waste Crime, Mercury and Environmental Risk

- Mercury frequently associated with illegal waste activities and mismanagement
- Significant human health and environmental risks from uncontrolled releases
- Importance of compliant, auditable treatment routes
- Role of specialist facilities in preventing pollution and supporting enforcement
- Encouraging and educating others to compliant and aligned handling and treatment
- Alignment with global action to reduce illegal mercury trade



International Partnerships & Future Direction

- Joining the UNEP Global Mercury Partnership as an active technical partner
- Contribution to global knowledge-sharing on mercury waste management
- Supporting development and demonstration of BAT
- Continuous improvement driven by operational data and research collaboration
- Delivering long-term, environmentally sound and sustainable solutions

Questions & Answers



Ryan Reay DipNEBOSH, EnvDipNEBOSH

Site Manager

+ Over 10 years waste management experience
+ Berwick Site Manager since 2023

With a background spanning technical, operational, environmental and occupational health & safety disciplines, Ryan brings a practical, hands-on approach to regulatory compliance and environmental risk management. His work supports the development of best practice and the advancement of standards in mercury waste management.

Augean

DEFENCE

INFRASTRUCTURE & CONSTRUCTION

NUCLEAR & RADIOACTIVE

OIL & GAS

PROCESSING & MANUFACTURING

RENEWABLE ENERGY

UTILITIES

MANAGING HARD TO HANDLE WASTES

UK WASTE TREATMENT & DISPOSAL INFRASTRUCTURE

FOCUSSING ON BEST ENVIRONMENTAL OUTCOMES

0333 034 9004

www.augean.co.uk

Introduction to BMT

A global operating NORM & Hg waste specialist

Bart Zonnenberg
Business Development Manager

BMT

Securing a safer world



WHAT WE DO

BMT is an authority in the Oil & Gas Industry, specifically for waste substances containing mercury and Naturally Occurring Radioactive Materials (NORM).
Strong focus on sludges!



WHERE WE DO & CAPACITY

BMT: **Europe** and **Thailand.**

- Europe 2026: 650 t
- Europe 2027: 1.100 t
- Europe 2028: 1.500 t
- Thailand 2026: 2.500 t
- Thailand 2027: 2.500 t
- Thailand 2028: 2.500 t



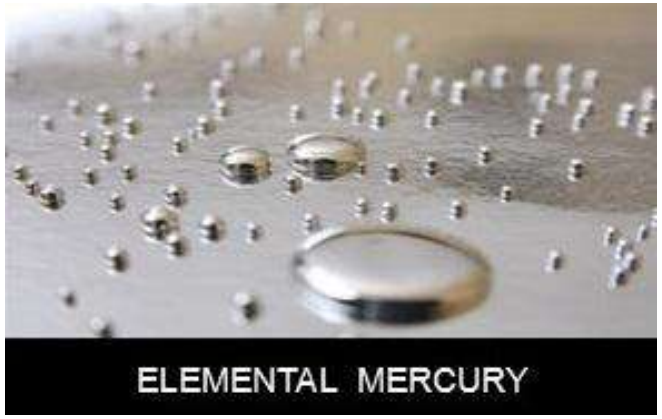
TREATED WASTES

BMT is capable of treating all sorts of (NORM) mercury contaminated wastes including but not limited to:

- Sludge
- Spent adsorbents / catalyst
- Ceramic balls
- Elemental mercury
- Used filters
- Used PPE
- Contaminated metals
- Medical waste & amalgam
- Batteries
- Precious metals


CERAMIC BALLS & SPENT ADSORBENTS


HG SAND & SLUDGE


ELEMENTAL MERCURY


USED FILTERS & PPE



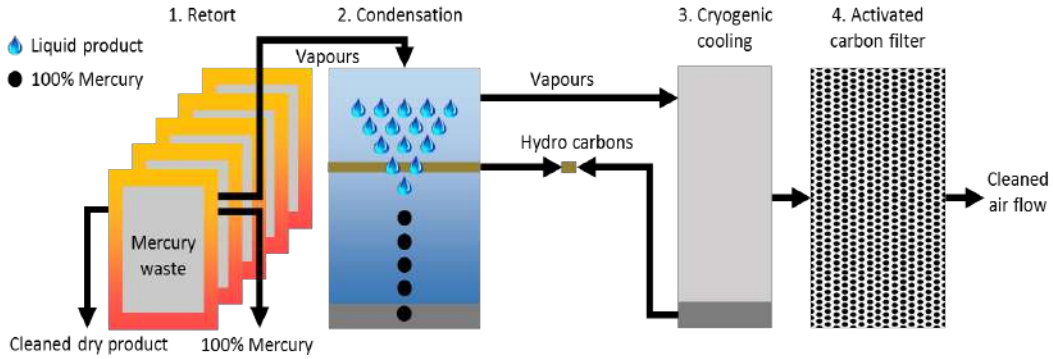
NORM


CONTAMINATED METALS

Proprietary technology can handle all types of mercury / NORM contaminated waste

Technology

- Global installed base of 63 static and one rotary kiln (2026).
- Technology is based on the proven and reliable vacuum distillation process with emissions controlled through a nitrogen cooling unit and activated carbon filters.



BMT's vacuum distillation process

- Flexibility on waste type (sludge, PPE, filters, catalysts, metals / large equipment, ceramic balls, moll sieve).
- High utilization by badge processing of NORM and mercury waste in same facility.
- High safety due to fully electrical heating and because the whole system is depressurized.
- Low maintenance costs due to off-the rack equipment.

Operations

Robotics drum tippers to support safe handling of material.





BMT facilities can handle up to 3,150 tonnes p.a. (depending on the waste mix).

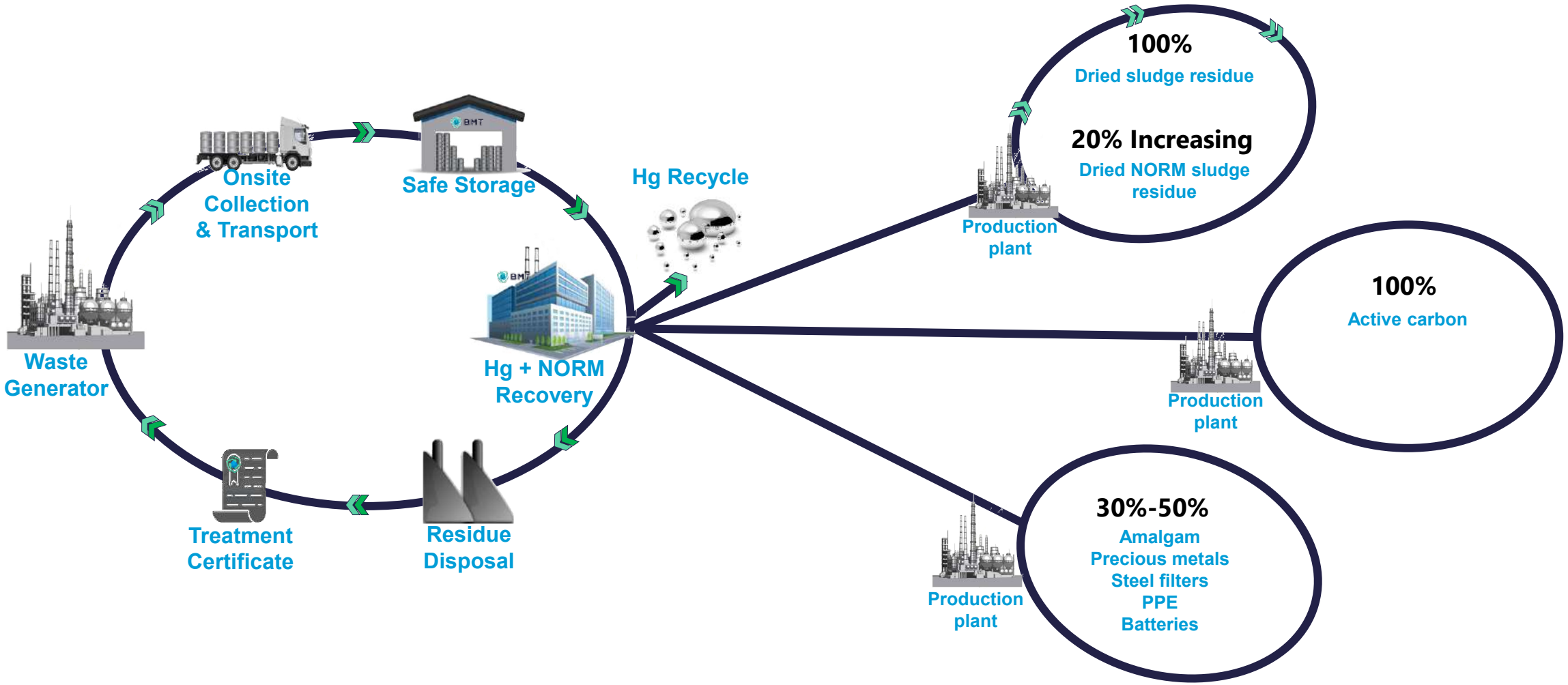


Static kiln



Rotary kiln

BMT: Focus on reuse applications

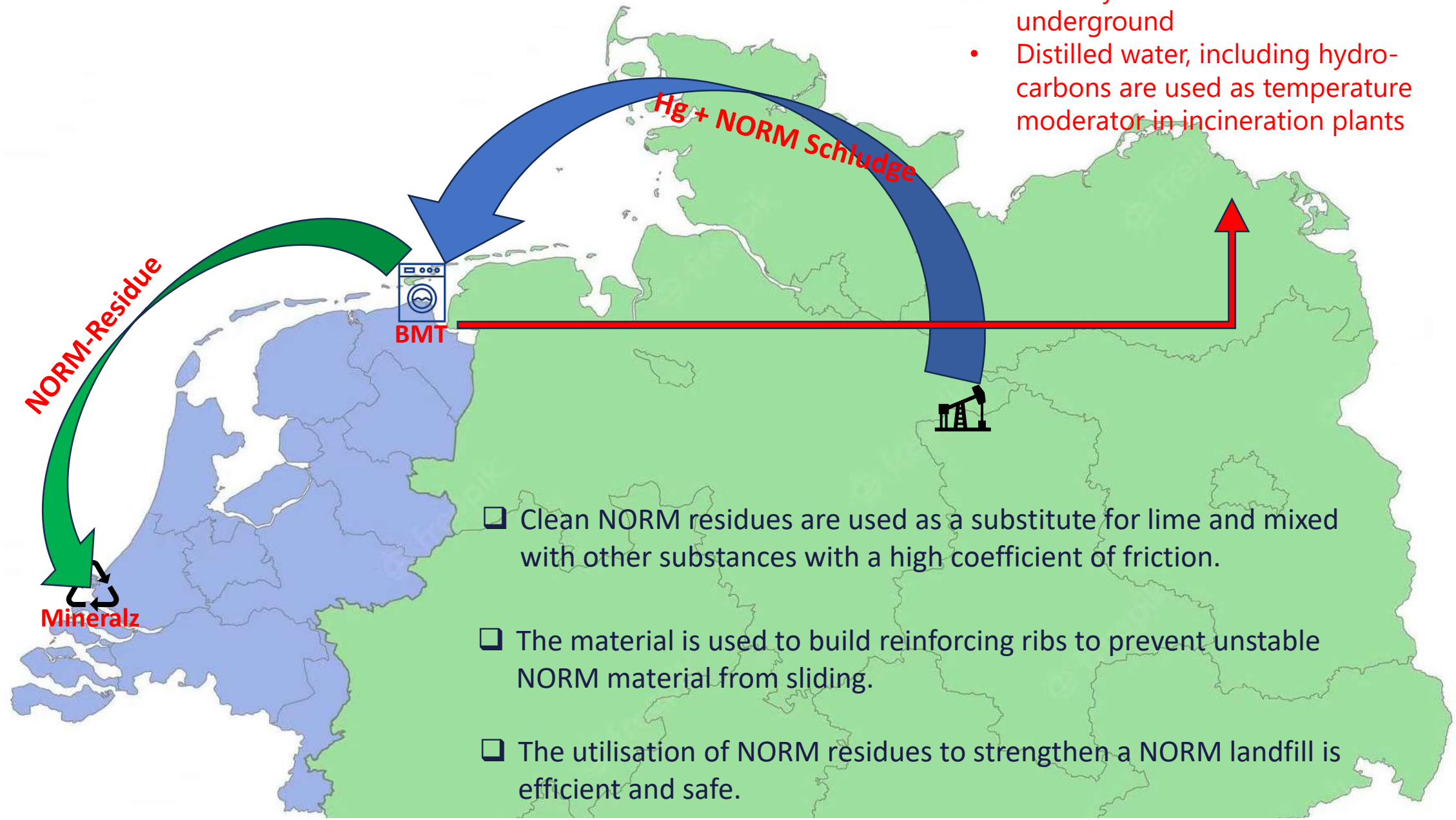


BMT as “Start-of-life” station in a circular economy

1) NORM: Naturally Occurring Radioactive Material

Reuse solution for NORM-sludge with Hg contamination

- Mercury is immobilized and stored underground
- Distilled water, including hydro-carbons are used as temperature moderator in incineration plants



- ❑ Clean NORM residues are used as a substitute for lime and mixed with other substances with a high coefficient of friction.
- ❑ The material is used to build reinforcing ribs to prevent unstable NORM material from sliding.
- ❑ The utilisation of NORM residues to strengthen a NORM landfill is efficient and safe.

A final complete solution for sludge residues

- ❑ Reuse of all sludge components ✓
- ❑ No return of NORM residues to country of origin ✓
- ❑ No disposal but reuse ✓
- ❑ Sustainable disposal route for NORM & Hg sludge ✓
- ❑ 100% disposal solution for non-Dutch oil & gas and geothermal energy producers ✓





Summary

- 34 years of continuous improvements result in extensive experience and knowledge.
- Very broad scope of Hg-contaminated material that can be treated.
- Collaboration with 3rd parties provide excellent reuse applications instead of disposal.
- Application of clean NORM residues enable import of material without return to country of origin after decontamination.
- Facilities in both Europe and Asia provide optimal service and logistics to global companies.
- Facilities in both Europe and Asia enable services to both OECD and non-OECD countries.
- REMONDIS as mother company creates very solid basis for future growth.

Some of our clients

Chevron

ConocoPhillips

NAM

PTTEP

Oman LNG L.L.C.

renewi
waste no more

NEPTUNE ENERGY

ptt GLOBAL CHEMICAL

REYM
Part of Renewi

CPOC

bebat

SPIRIT ENERGY

TAQA

Shell

TOTAL

wintershall

Technologies and Solutions for Mercury Recycling

Supporting the Minamata Convention on Mercury

GMR Gesellschaft für Metallrecycling mbH (Germany)

Development and Operating of Mercury Recycling Technologies

Engineering and technology development in cooperation with
ZETTL GmbH (Germany)

About GMR

- Founded in 1991



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- Specialized company for the treatment and recycling of mercury and mercury-contaminated waste



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- Long-term industrial experience with complex mercury waste streams
- Purification and stabilization of mercury to HgS
- Treatment and stabilization of NORM-containing waste and residues for disposal



Technology Development and Cooperation

- GMR develops, owns and runs mercury recycling technologies for a wide range of mercury-containing waste streams.



Technology Development and Cooperation

- GMR develops and operates mercury recycling technologies and processes.
- Engineering, mechanical design and plant scale-up or downscaling are performed in long-term cooperation with ZETTL GmbH.



Mercury-Containing Waste Streams – Examples addressed by GMR



Thermometers, Relays



Button Cells



Dental Amalgam



Soil

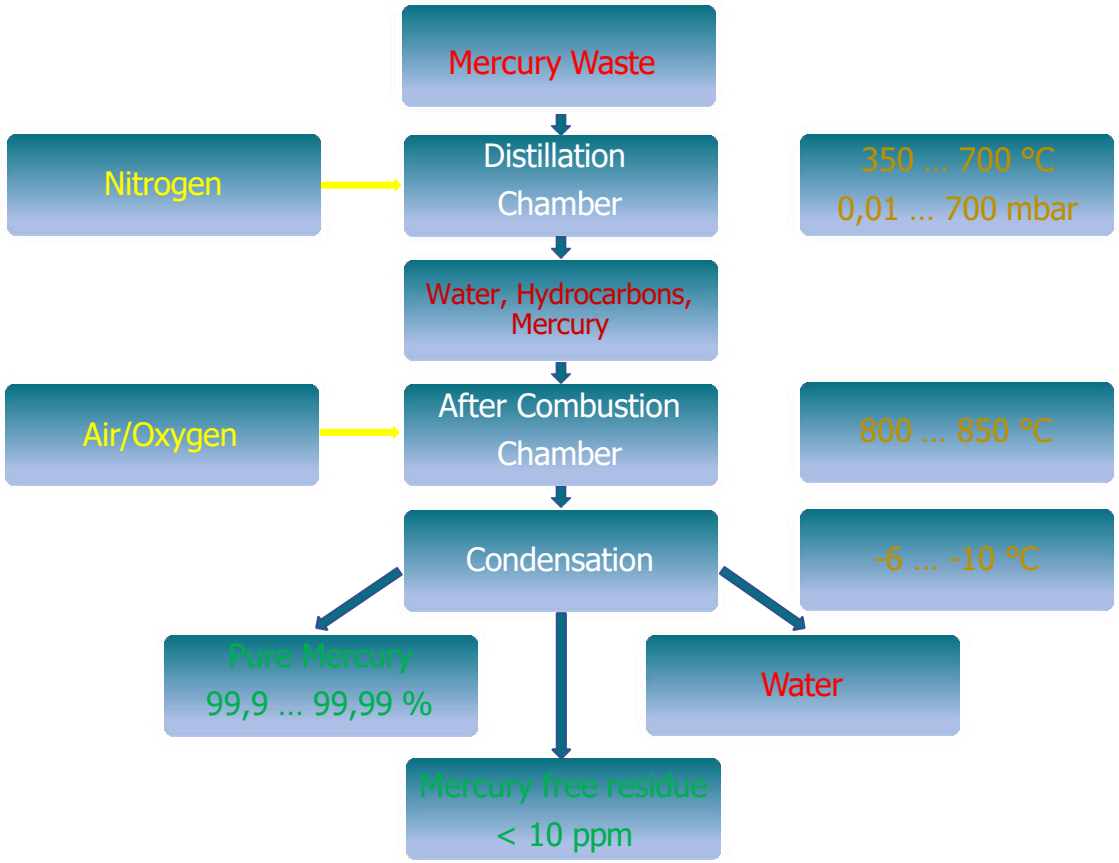


Liquid Mercury



NORM Sludge

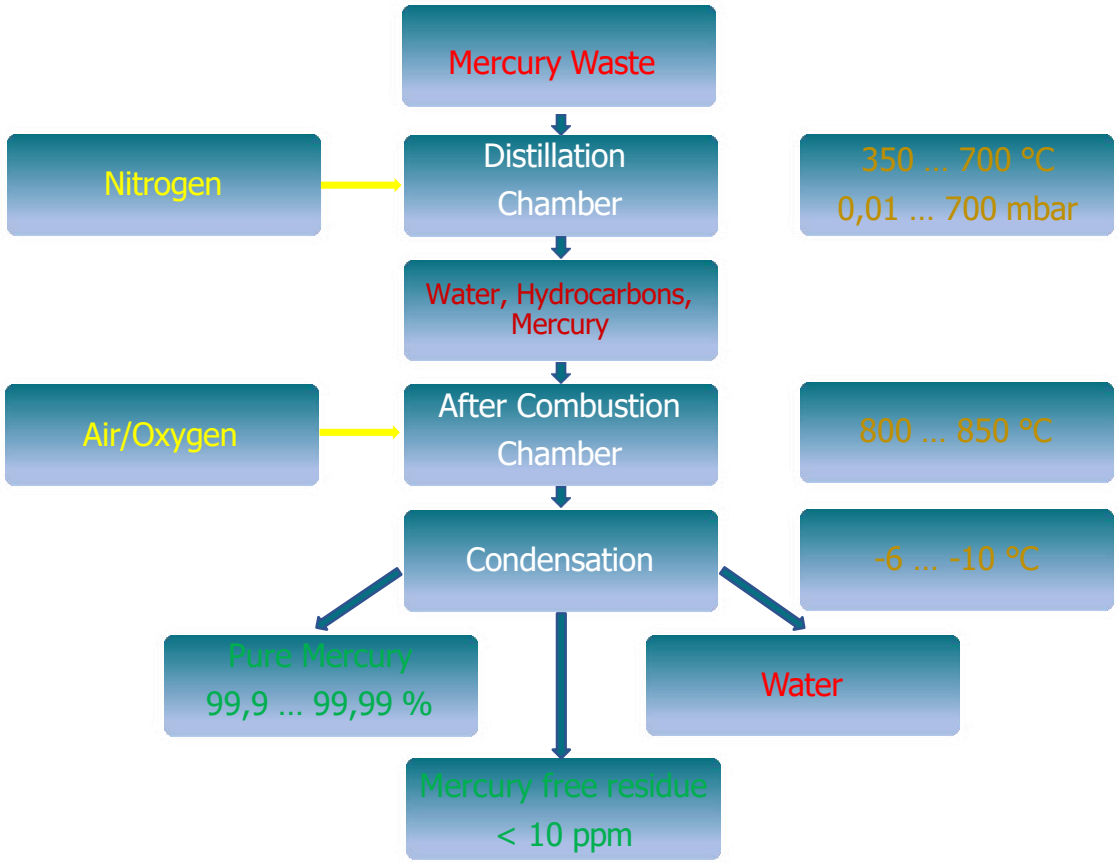
Treatment Principles for Mercury Recycling in Batch Distillers



Vacuum-thermal treatment in a closed system

- Controlled heating of mercury-containing waste under reduced pressure

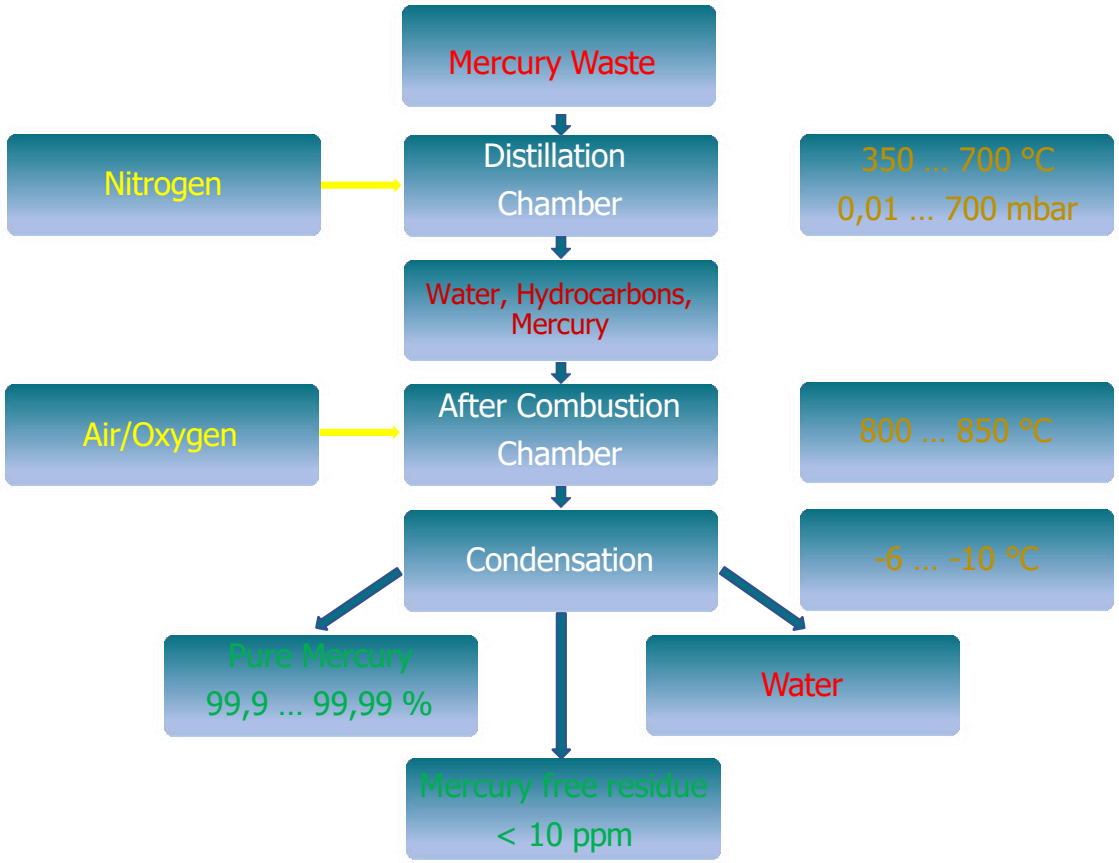
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- Controlled heating of mercury-containing waste under reduced pressure
- Separation of mercury by distillation

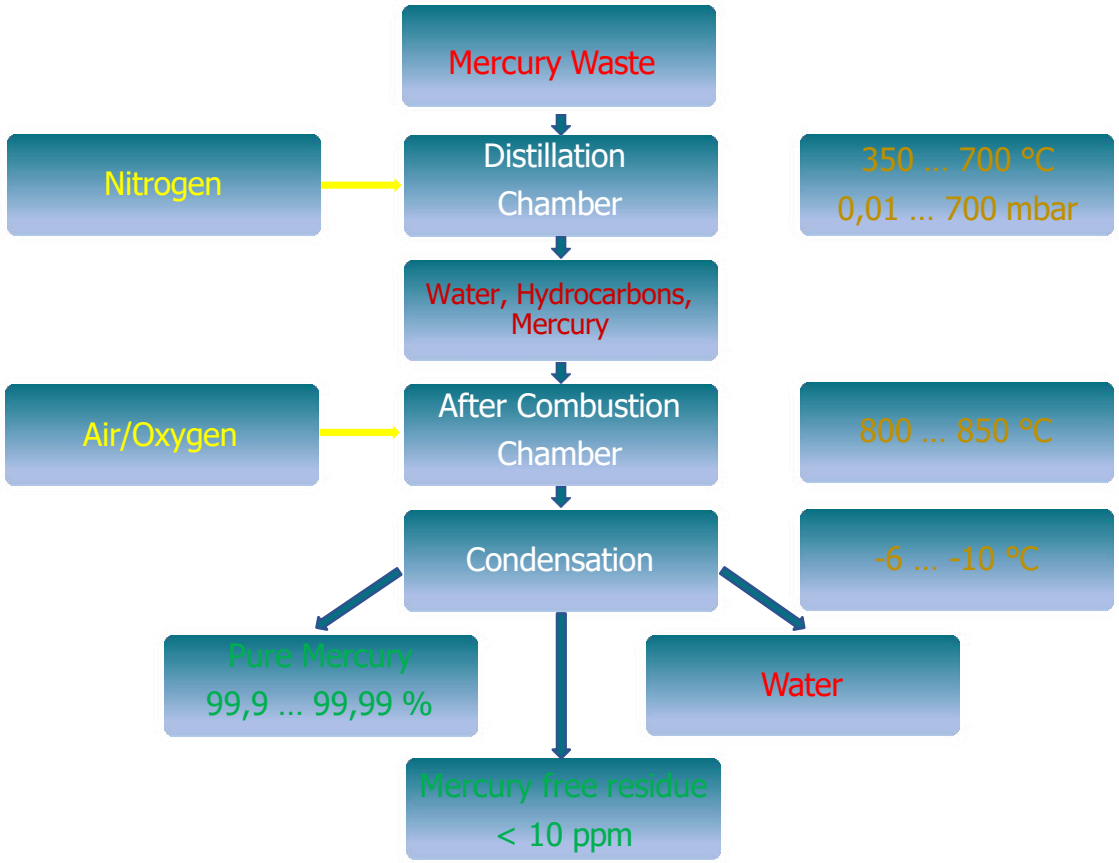
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- Thermal oxidation of hydrocarbons in an after-combustion chamber

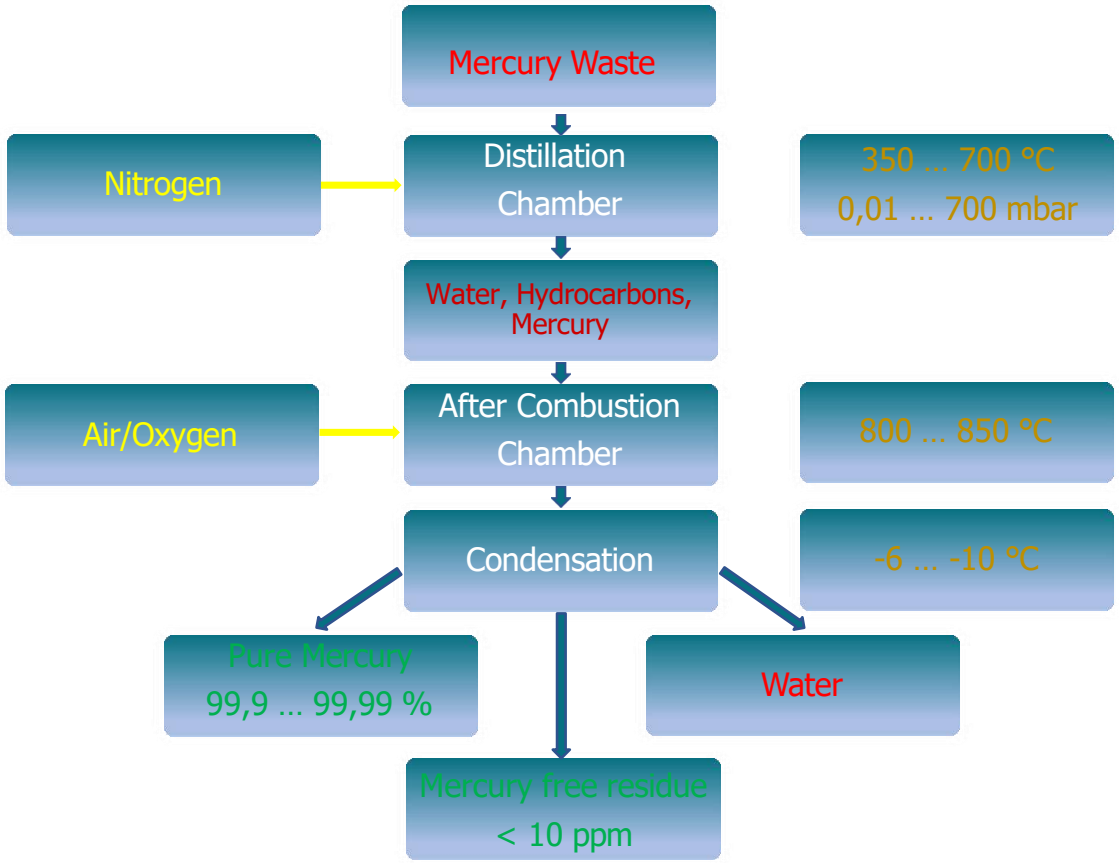
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- Separation of mercury by distillation
- Thermal oxidation of hydrocarbons in an after-combustion chamber
- Condensation of mercury

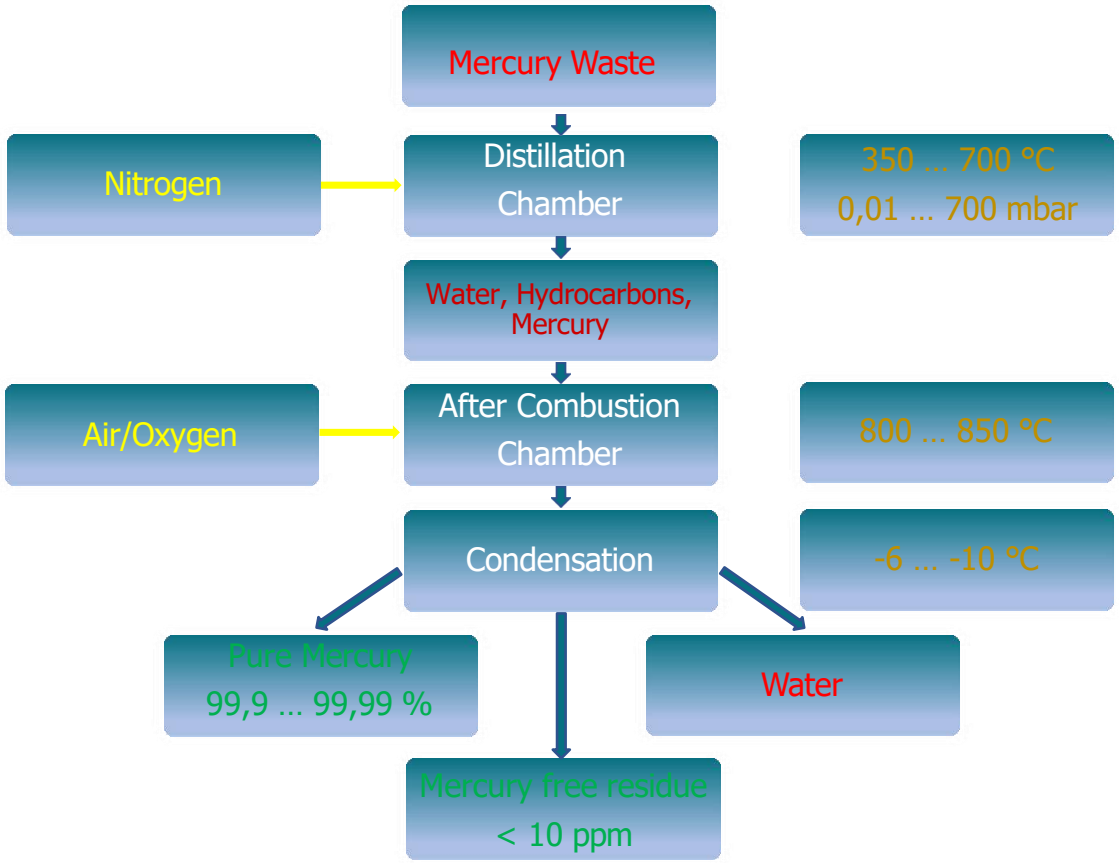
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Process results

- Pure mercury (99.9 – 99.99 %)

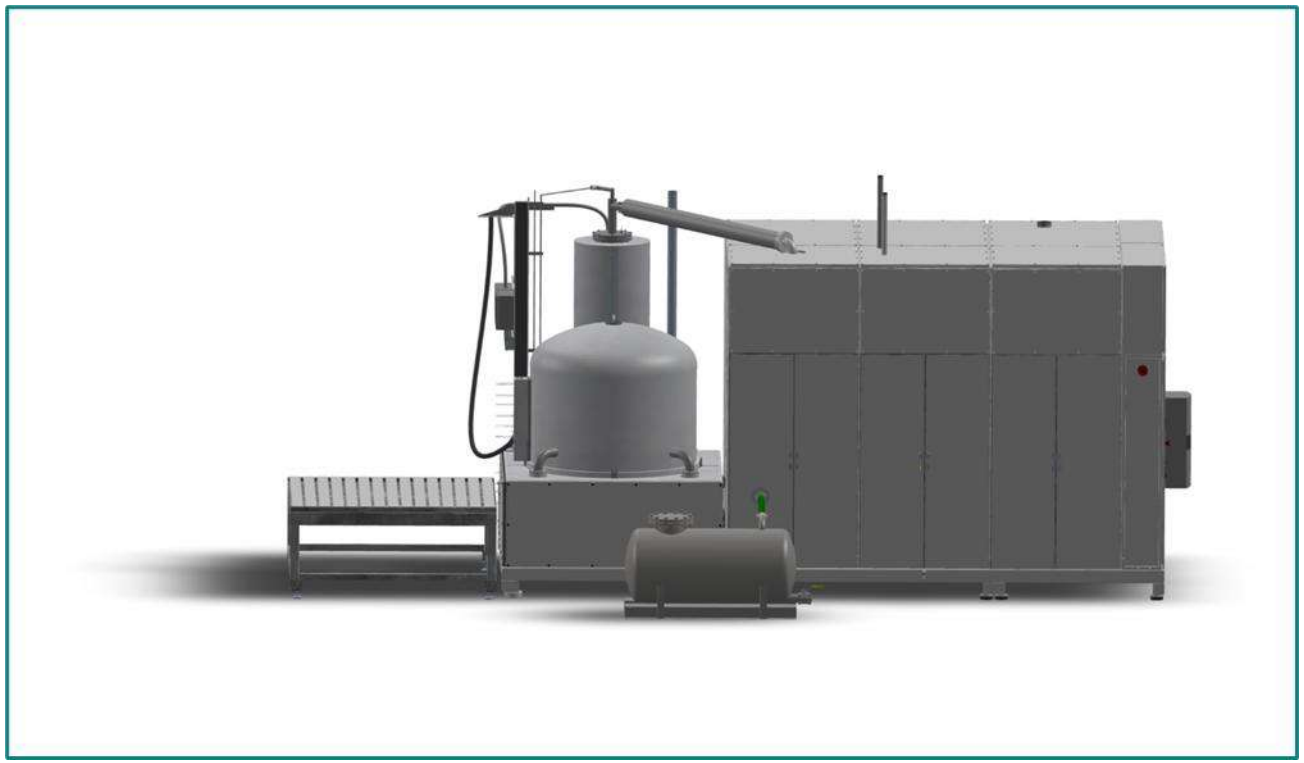
Treatment Principles for Mercury Recycling in Batch Distillers



Process results

- Pure mercury (99.9 – 99.99 %)
- Mercury-free residues (< 10 ppm)

Key Features and Operational Experience



- Closed system with very low emissions (< 10 µg/m³ Hg)

Key Features and Operational Experience



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Key Features and Operational Experience

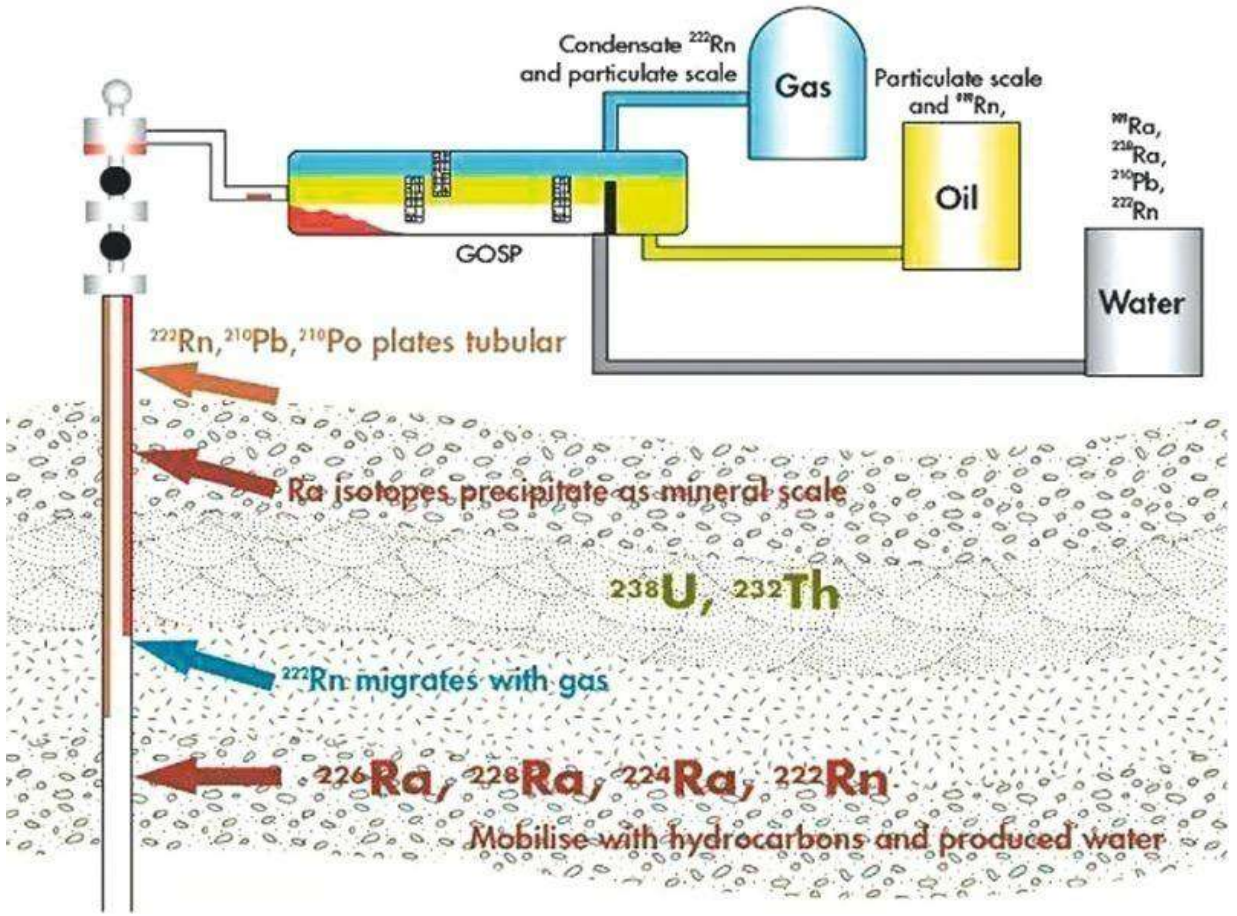


- Closed system with very low emissions (< 10 µg/m³ Hg)
- High mercury recovery efficiency
- Proven industrial operation
- More than 35 years of experience and thousands of tonnes of material treated
  - Amalgam
  - Button Cells
  - Sludges
  - Thermometers
  - Rectifiers

Treatment of NORM-Sludges from Oil and Gas Industry

NORM: Naturally Occurring Radioactive Material

- NORM-contaminated sludges occur as by-products in oil and gas production as well as in decommissioning processes
- Treatment requires controlled, dust-free and safe processes



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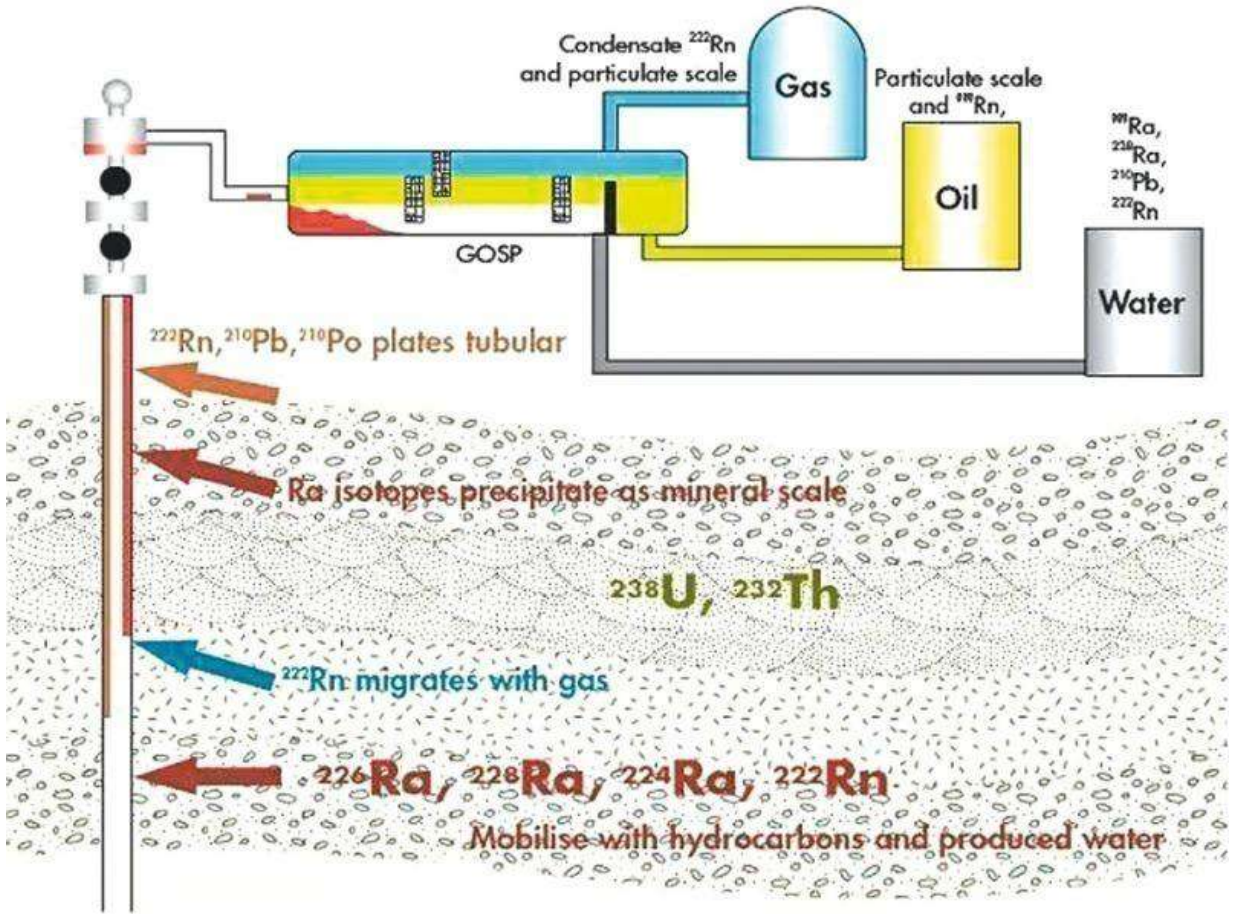
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GMR experience

- Initial treatment of non-NORM sludges since 1996



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- Treatment requires controlled, dust-free and safe processes

GMR experience

- Initial treatment of non-NORM sludges since 1996
- 1998 first inquiries for the treatment of NORM-contaminated sludges
- Identification of the need for a new, effective and dust-free treatment technology



Treatment of NORM-Sludges from Oil and Gas industry

Implementation of new treatment technology

- Development of a new dust-free vacuum-thermal treatment concept with increased capacity



Treatment of NORM-Sludges from Oil and Gas industry

Implementation of new treatment technology

- Development of a new dust-free vacuum-thermal treatment concept with increased capacity
- 2009: commissioning of the second industrial paddle dryer installation for NORM sludges at GMR



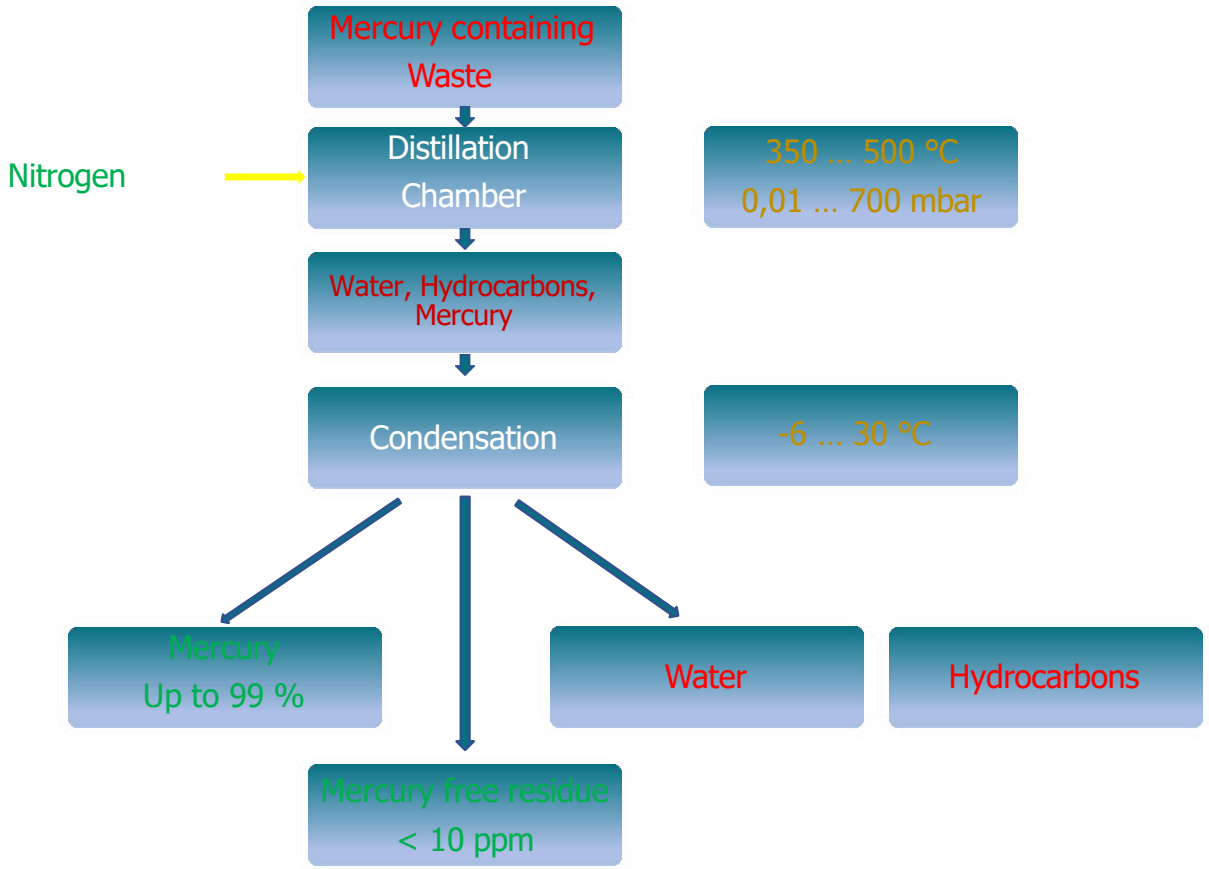
Treatment of NORM-Sludges from Oil and Gas industry

Implementation of new treatment technology

- Development of a new dust-free vacuum-thermal treatment concept with increased capacity
- 2009: commissioning of the second industrial paddle dryer installation for NORM sludges at GMR
- Designed for safe handling and homogeneous residues

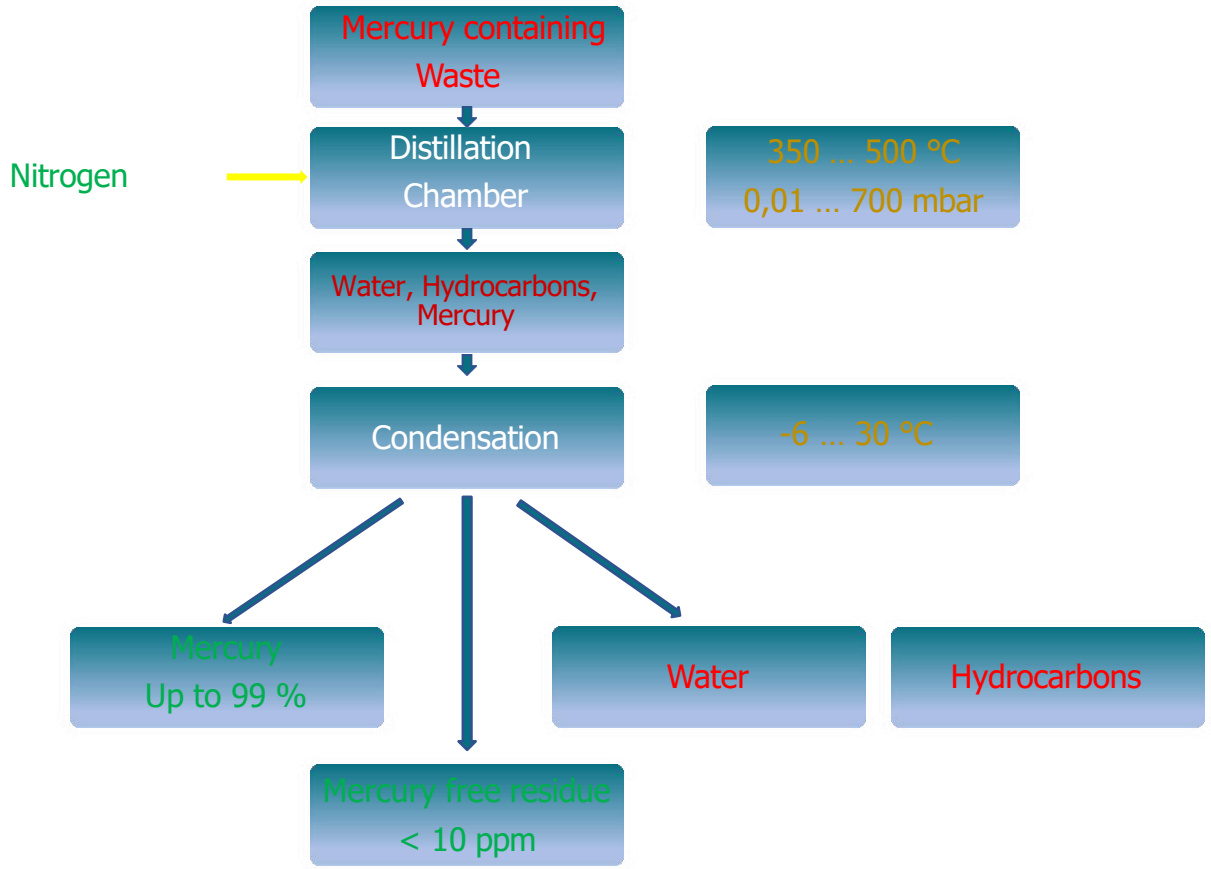


Vacuum-Thermal Treatment of NORM Sludges



Adapted vacuum-thermal treatment in a closed system

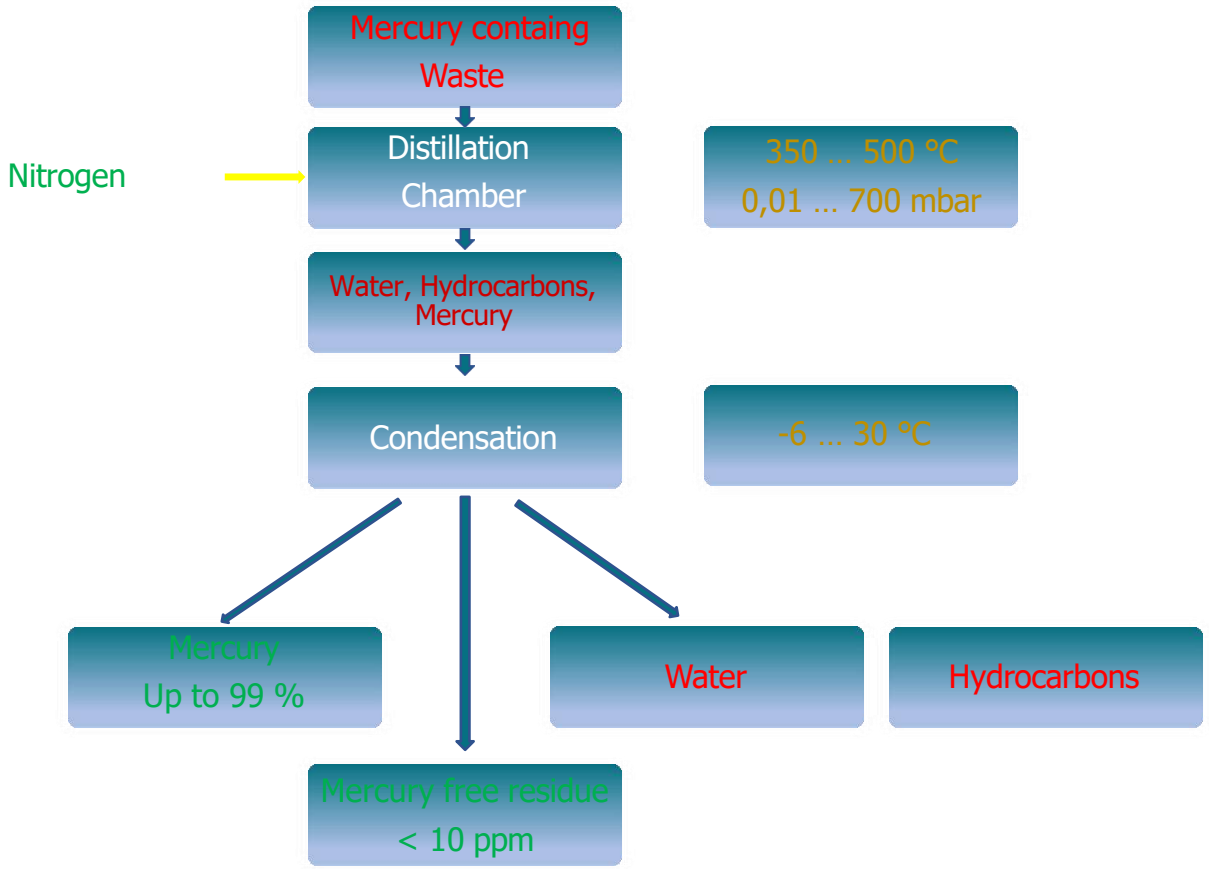
Vacuum-Thermal Treatment of NORM Sludges



Adapted vacuum-thermal treatment in a closed system

- Highly efficient separation of mercury and hydrocarbons using paddle dryer technology
- Dust-free operation with reduced radiation exposure
- Controlled handling of NORM-contaminated materials

Vacuum-Thermal Treatment of NORM Sludges

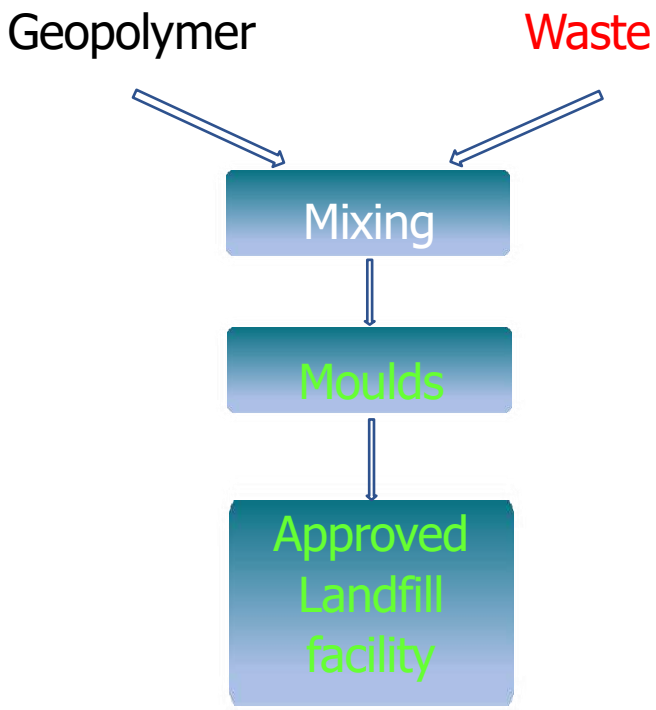


Process results

- Homogeneous, mercury-free residues (< 10 ppm)
- Mercury purity of up to approximately 99 %
- Suitable for following stabilization and disposal

Stabilization of treated NORM residues

Immobilization of treated NORM residues



Stabilization of treated NORM residues

Immobilization of treated NORM residues

- One- or two step immobilization process
- Use of geopolymers and alkali-activated binders
- Conversion of residues into a stable, monolithic form



Stabilization of treated NORM residues

Immobilization of treated NORM residues

- One- or two step immobilization process
- Use of geopolymers and alkali-activated binders
- Conversion of residues into a stable, monolithic form

Outcome

- Environmentally sound and compliant residues suitable for disposal



Disposal of Stabilized NORM Residues

- Disposal in accordance with national regulations
- Use of approved landfill facilities
- Immobilized residues meeting acceptance criteria for disposal



Complementary Techonolgies for Specific Mercury Waste Streams - Lamps

- Treatment of mercury-containing lamps as part of the GMR waste portfolio
- Processing of lamp phosphor powder as important basis for the development of GMR vacuum-thermal treatment technologies



Complementary Techonolgies for Specific Mercury Waste Streams - Lamps

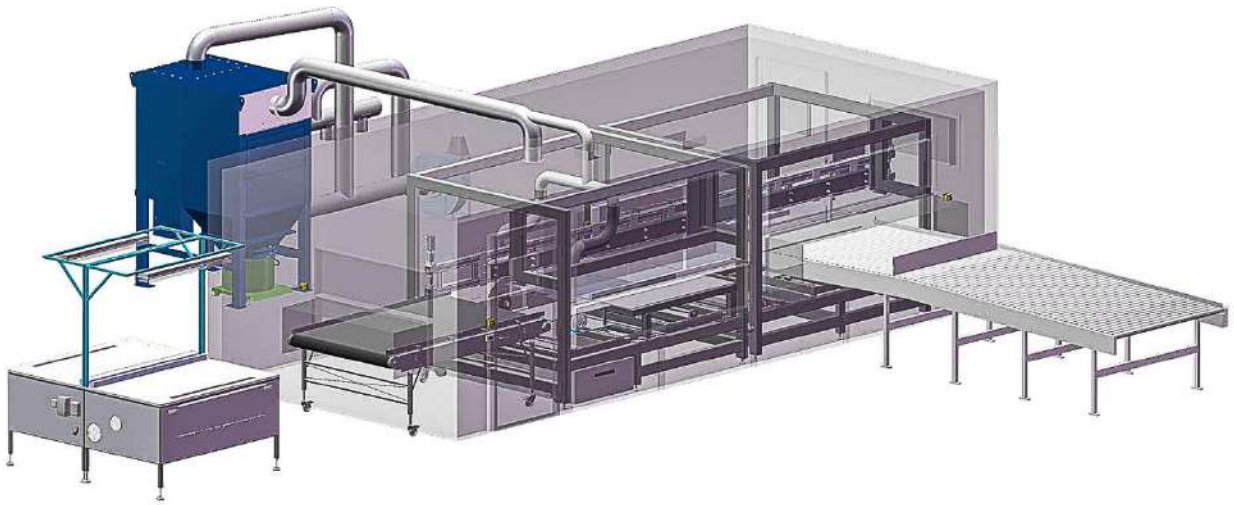
- Mechanical pre-treatment of lamps using external supplier technologies
- Separation of mercury-containing fractions (e.g. lamp phosphor powder)
- Subsequent vacuum-thermal treatment of mercury-containing materials by GMR



Mechanical lamp treatment equipment from ARPE GmbH (Germany)

Complementary Techonolgies for Specific Mercury Waste Streams – Flat Panels

- LCD displays with CCFL-backlighting may contain mercury
- Recycling is increasingly important as products before 2010 reach end of life
- Mechanical separation of mercury-containing components needs to be done using external supplier technology
- Safe and environmentally sound recycling is ensured by GMR



Example of mechanical separation technoly, designed by ARPE GmbH

Replicability and Scalability

- Modular system architecture
- Flexible downscaling for small or remote facilities
- Upscaling for centralized national treatment plants
- Adaptability to local regulations and specific waste streams

Global Applicability and Implementation

- Technologies can be implemented globally
- Engineering support and commissioning provided by GMR in cooperation with experienced technology partners
- Combination of long-term operational experience and engineering expertise
- Applicability to UNEP-supported projects in different regions

Suitable for UNEP-supported projects

Contribution to UNEP

- More than 30 years proven mercury recycling technologies operated by GMR

Contribution to UNEP

- More than 30 years proven mercury recycling technologies operated by GMR
- Continous technology development in long-term cooperation with ZETTL GmbH

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- Technologies complemented by specific solutions for selected mercury waste streams

Contribution to UNEP

- More than 30 years proven mercury recycling technologies operated by GMR
- Continous technology development in long-term cooperation with ZETTL GmbH
- Technologies complemented by specific solutions for selected mercury waste streams
- High mercury recovery and environmentally sound residue management

Thank you for your attention.

Hg Ops

Your partner,
protecting human health and the environment
from the toxic effects of mercury



Hg Ops GmbH, Switzerland
David.Hunter@hgops.com
www.hgops.com

Hg Ops

Hg Ops is a specialist consultancy focused exclusively on mercury and mercury waste.

- Founded in 2025 to meet the need of global projects
- Independent mercury subject-matter experts
- Practical operational experience
- Advisory, training and technical support
- Global perspective with regulatory awareness

Hg Ops is not a general environmental consultancy, mercury is our focus.



Hg Ops GmbH Founded by David Hunter

- Family Industrial Cleaning company from a young age
- Started decontamination of mercury in 2004
- Ran Hg waste and decon operations in the oil and gas industry
- Worked for Batrec in Switzerland – Ran the Mercury Centre & R+D
- Managed international projects including the removal and treatment of over 4700 tonnes of complex mercury wastes
- Been an active member of the UNEP GMP for more than 5 years

20+ years experience



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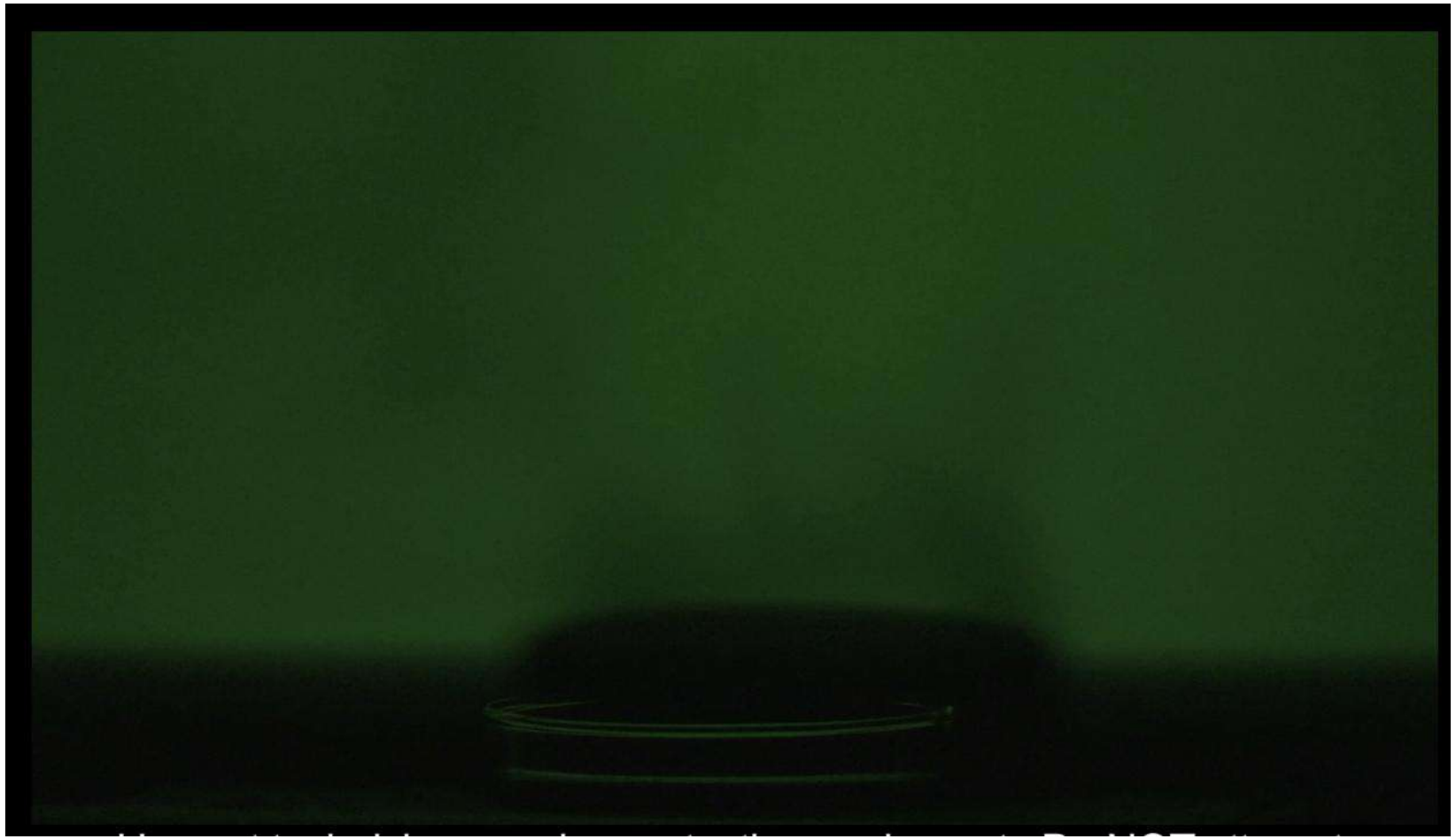
Why mercury?

Mercury presents unique operational challenges

- Highly toxic with unique exposure dynamics
- Complex chemistry and speciation
- Volatile and difficult to contain
- ESM of Hg waste limited and complex
- Strict international controls and liability exposure



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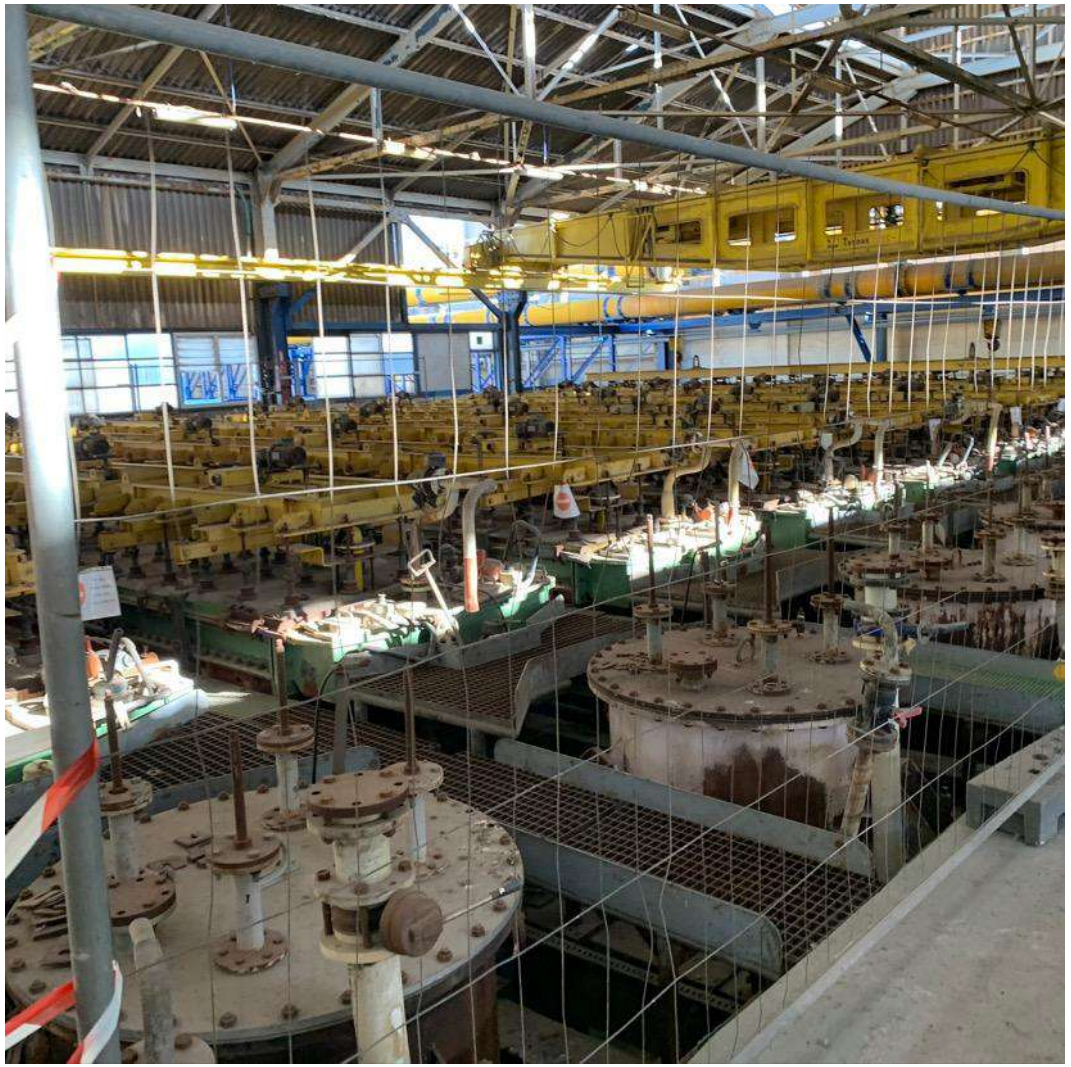
What Hg Ops Does - End-to-end mercury support

- Mercury waste management
- Waste handling and treatment strategy
- Technical advisory
- Training and competency development
- Compliance support



Hg Ops works globally across all sectors

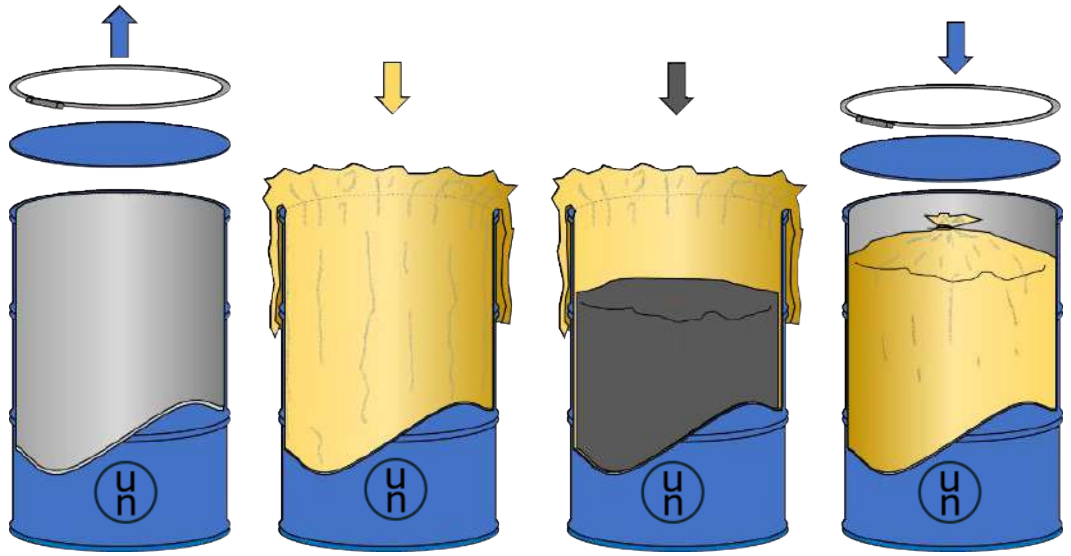
- Mercury waste management
- Chlor-Alkali
- Mining and metallurgical
- Petrochemical and industrial facilities
- International Organisations
- Decommissioning and remediation Industry



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How We Work
Practical, defensible, and compliant

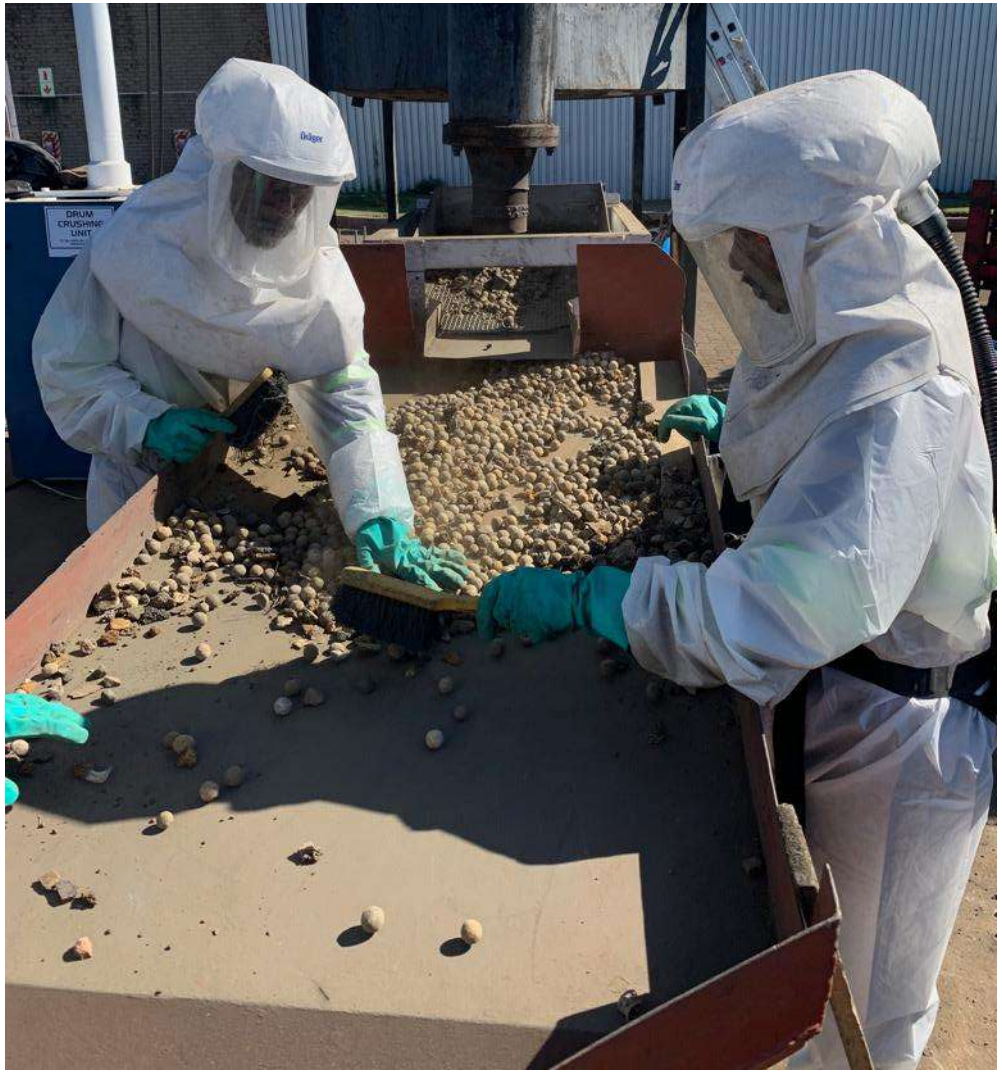
- We join your team
- Bringing our expertise and network
- Project-specific technical solutions
- Aligned with international best practice
- Clear documentation and audit-ready outputs



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Training & Capability Building
Building mercury competence

- Operator and management training
- Technical capacity building
- Safe handling and storage practices
- Incident prevention and response
- Regulatory awareness and obligations

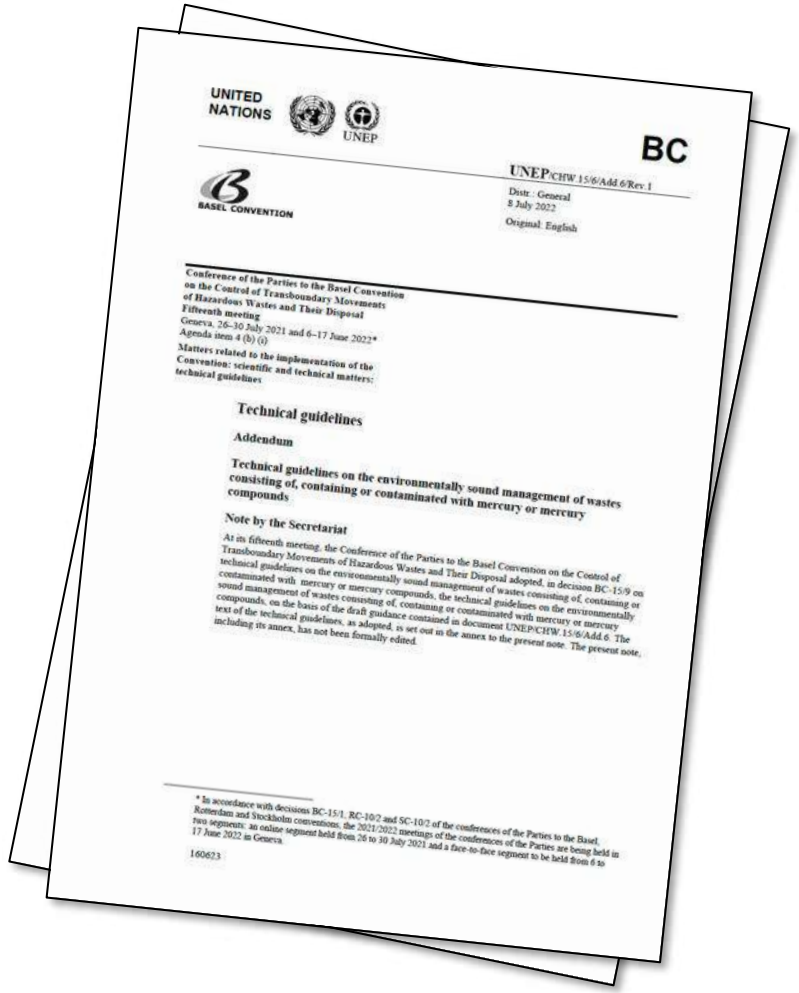


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Regulatory & Compliance Context
Mercury is tightly regulated globally

- Advising, documenting and auditing compliance
- Traceability of mercury and mercury waste
- Ensuring Hg occupational safety in waste value chain
- Varied National Obligations
- Basel Convention Documentation

Hg Ops works with clients to navigate this landscape



UNITED NATIONS UNEP

BC

BASEL CONVENTION

UNEP/CHW.15/6/Add.6/Rev.1

Distr.: General
8 July 2022

Original: English

Conference of the Parties to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal
Fifteenth meeting
Geneva, 26–30 July 2021 and 6–17 June 2022*
Agenda item 4 (b) (i)

Matters related to the implementation of the Convention: scientific and technical matters: technical guidelines

Technical guidelines

Addendum

Technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with mercury or mercury compounds

Note by the Secretariat

At its fifteenth meeting, the Conference of the Parties to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal adopted, in decision BC-15/9 on technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with mercury or mercury compounds, the technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with mercury or mercury compounds, on the basis of the draft guidance contained in document UNEP/CHW.15/6/Add.6. The text of the technical guidelines, as adopted, is set out in the annex to the present note. The present note, including its annex, has not been formally edited.

* In accordance with decisions BC-15/1, RC-10/2 and SC-10/2 of the conferences of the Parties to the Basel, Rotterdam and Stockholm conventions, the 2021/2022 meetings of the conferences of the Parties are being held in two segments: an online segment held from 26 to 30 July 2021 and a face-to-face segment to be held from 6 to 17 June 2022 in Geneva.

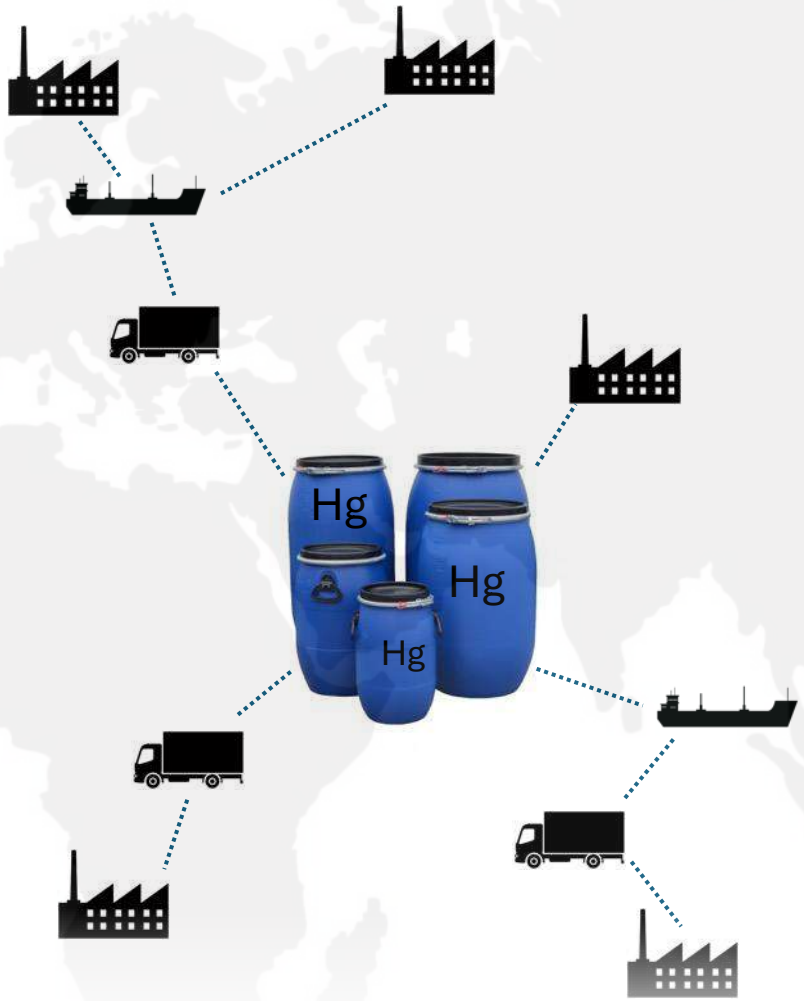
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What can Hg Ops do in your project?

Mercury Waste Treatment

- Assess your waste
- Find the best ESM treatment and disposal options
- We know the global options
- Provide pricing and logistics options
- Compare in country treatment to international options



Hg Ops

What can Hg Ops do in your project?

Waste packaging and handling







- Labelling, packaging, Documentation
- Write risk assessments and method statements
- Total waste management – we can do it for you
- or Work with you as advisor
- Keep your workers safe

Hg Ops

What can Hg Ops do in your project?

Health and safety

- We can audit or advise for worker health protection
- Biomonitoring compliance and best practice
- Engineered controls for safety
- Mercury vapour monitoring protocols
- PPE choice and control

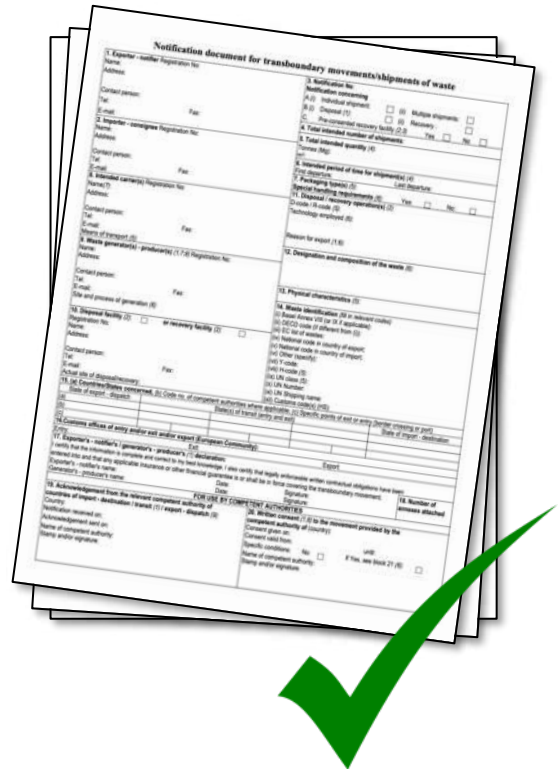


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What can Hg Ops do in your project?

Transport and treatment

- We take care of Basel Convention documentation
- Ensure waste is within acceptance criteria
- Check ADR and IMDG compliance
- Logistics network
- Traceability of paperwork

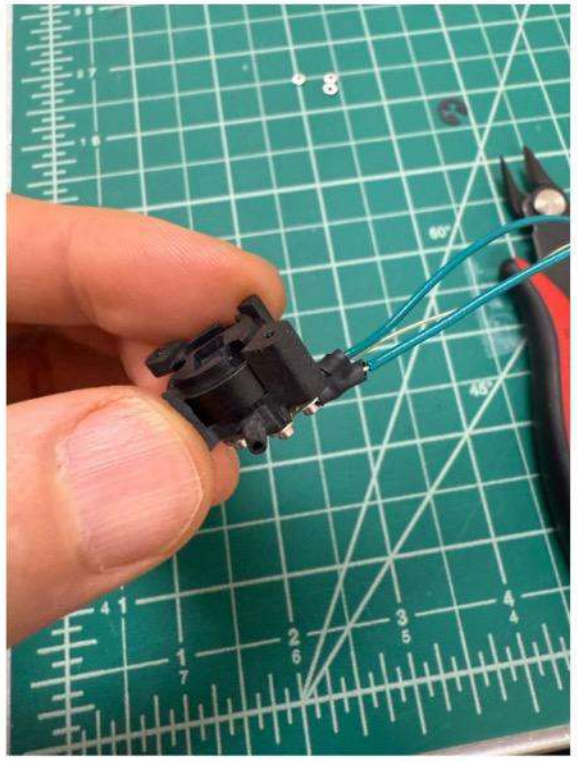


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What can Hg Ops do in your project?

Product and best practice development

- Help get your technology to market
- We support and believe in good product development
- Picoyune example:
    - Real time, personal mercury vapour monitor
    - New best practice
    - Partnership to support best practice
    - Working with occupational hygienists
    - This will protect more people from mercury toxicity







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Why Clients Choose Hg Ops
Focused expertise delivers better outcomes

- Dedicated mercury specialists
- Global network of experts
- Independent and technically grounded
- Practical, experienced - not only theoretical
- We partner with you throughout your project



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Let’s work together on your mercury project



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