Mercury Management in Gold Mining Sector

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Content

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1. **Why does the gold mining produce mercury?**

2. **Mercury management**

3. **Alternatives for the future**

Mercury and Gold Mining

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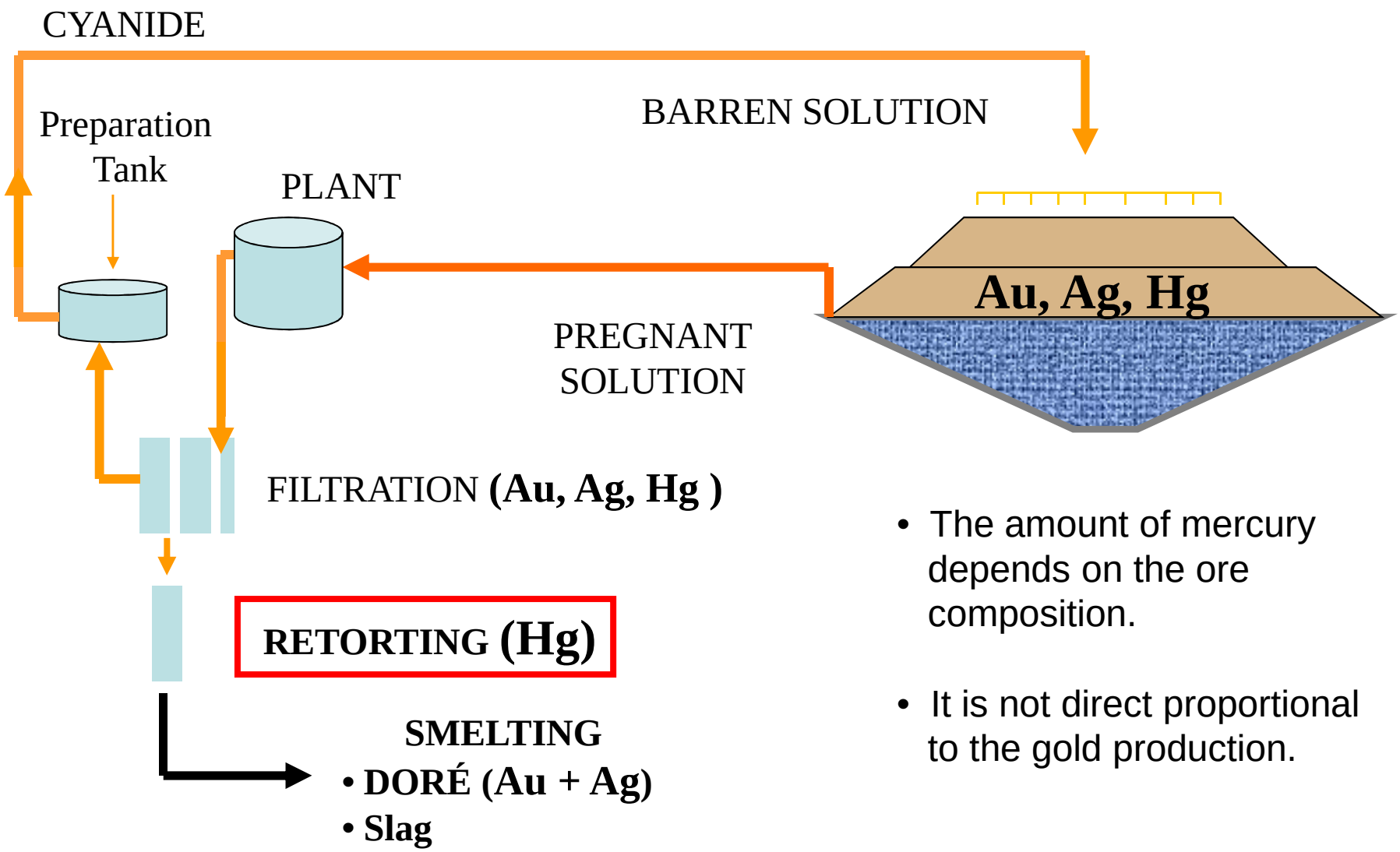
Why does the gold mining produce mercury?

- Mercury is naturally present in the gold containing ores.
- Mercury accompanies the gold and silver through the recovery process.
- Mercury is separated from the gold by retorting prior to the smelting that produces the gold dore.

Mercury and Gold Mining



- The amount of mercury depends on the ore composition.
- It is not direct proportional to the gold production.

Mercury management

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Retorting and Colection

The recovered mercury is stored in special flasks (aprox 30 kg)

Storage on Site

The flask are storaged in spetial containers.
Aprox: 1 ton/container

The storage on site is inside the refinery (controled area) until it is sold to Bethlehem Apparatus (EEUU)

Mercury Transportation

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Inspection of flask labeling

Final sealing

Mercury Transportation

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Container inspection before loading and monitoring

Safety briefing and last control (check list)

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INSPECCIÓN PRE - CARGA DE MERCURIO

Nº Placa / Tracto: _____ Plataforma: _____ Fecha: _____
Nombre del Chofer: _____ G.R. Tranp. Nº: _____
Nº de Licencia: _____ Tipo Transp: _____ Empresa: _____

Implementos del transporte:

- ☐ MSDS
- ☐ Conos
- ☐ Cinturón de seguridad.
- ☐ Llantas de repuesto en buen estado.
- ☐ Extintor de camión
- ☐ Triángulos de Seguridad.
- ☐ Cuñas o tacos.
- ☐ Botiquín (medicamentos esenciales)

Implementos del personal:

- ☐ Guantes de PVC y cuero.
- ☐ Casco de Seguridad
- ☐ Botas de seguridad con punta de acero.
- ☐ Mameluco descartable (TYCHEM)
- ☐ Lentes de protección personal.
- ☐ Respirador y cartuchos para mercurio

Actividades preliminares:

- ☐ Equipos y herramientas operativas.
- ☐ inspección de la zona de almacenamiento.
- ☐ Operatividad de lava-ojos.
- ☐ Zonificación del área y señalización de peligrosidad.
- ☐ Cuñas de seguridad colocadas.

Escolta:

- ☐ Grupo Electrogeno de 5 Kw.
- ☐ Aspiradora de Mercurio.
- ☐ Cintas de señalización.
- ☐ Traje de Nivel A
- ☐ Botas para productos Quimicos
- ☐ Equipo de Respiración autónoma + botella de repuesto
- ☐ Extintor de 20 Lbs
- ☐ Conos de seguridad
- ☐ Teléfono satelital.
- ☐ Detector de Mercurio
- ☐ Trajes Tychem
- ☐ Mascarilla full face.
- ☐ Máscaras buconasales
- ☐ Envase vacio de capacidad 40 galones
- ☐ Lampas antichispas
- ☐ Producto HGX

Auxiliar de Almacén

Supervisor de Almacén

OBERVACIONES: _____

Mercury Transportation

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Loading

Monitoring during loading

Mercury Transportation

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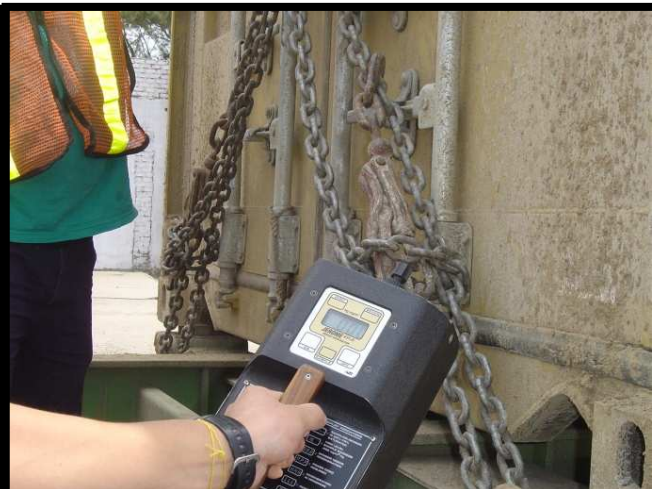
Fixing of containers

Closure and monitoring



Mercury Transportation

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Transportation out of the site

2 trucks with emergency response equipment as escort

Delivering to the port

Controls

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- Training to the workforce
- Emissions control system
- Housekeeping
- Monitoring in the refinery
- Health controls to workforce
- Environmental Monitoring

Emissions Control

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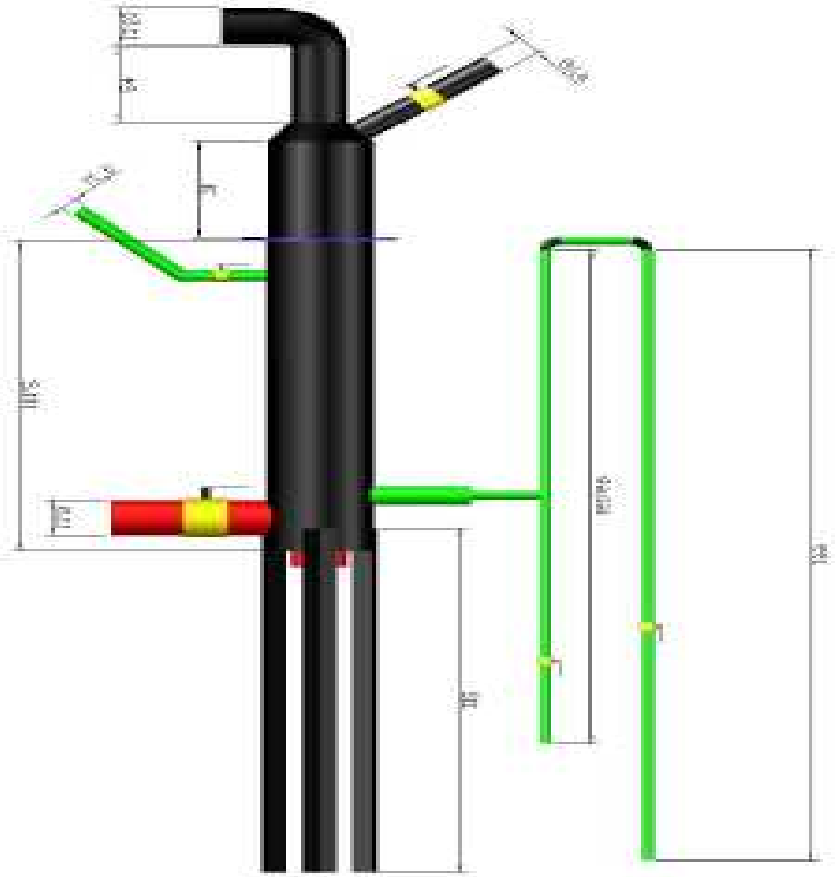
Retort in the refinery

Active carbon columns

Additional Measures

Heat exchanger



Good Housekeeping

Cleaning any mercury
Present in the refinery

Mercury aspirators

Monitoring in the Refinery

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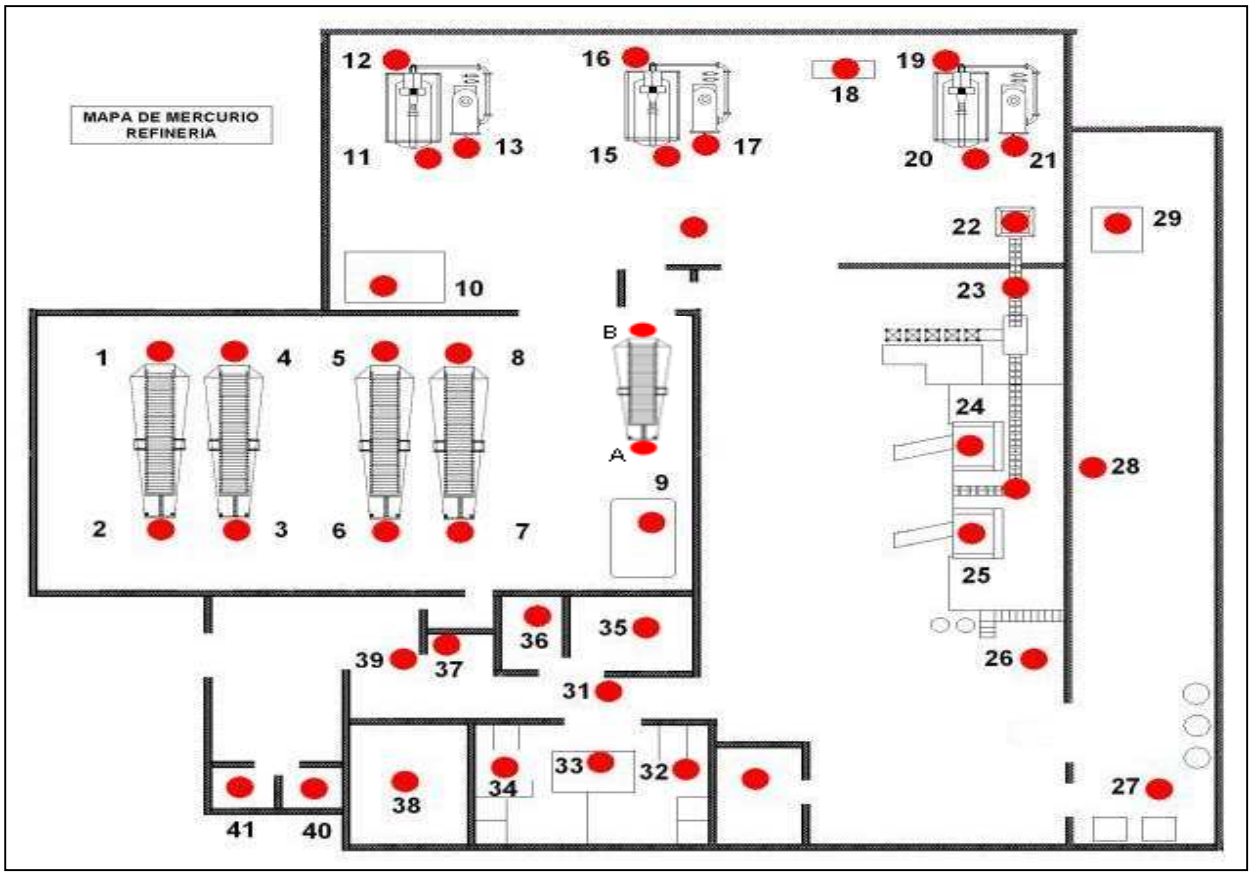
25 µg/m^3 (8 hours exposure)

16 µg/m^3 (12 hours exposure)



Monitoring in the Refinery

On line monitoring

- On line equipment
- Sensors in differerent areas of the refinery

Monitoring in the Refinery

Point Monitoring

- Used equipment: Jerome
- Measurements in specific points
- Measurements for specific tasks

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Procedure: Preventive Program for Mercury Exposure

The procedure includes:

• Urine analysis every 6 months to all personnel working in the refinery (inc. security, cleaning and administrative)

In case of values over 50 µg Hg/L urine

- Second analysis (urine and blood)
- If confirmed then rotation

Monitoring

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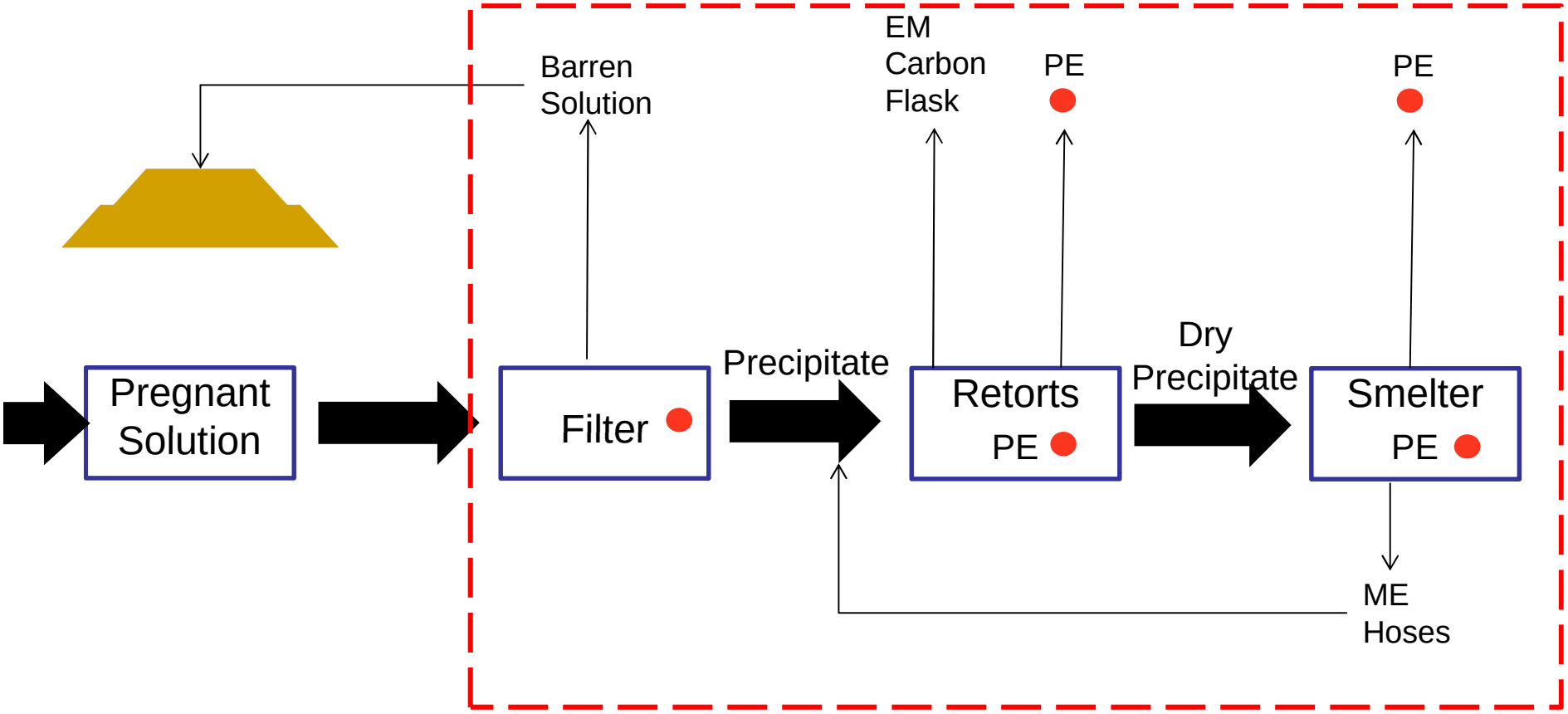
- Emissions monitoring
- Soil monitoring
- Water monitoring
- Aquatic life monitoring

Monitoring



LEGEND

ME = Elemental Mercuriy

PE = Potential de Emission

● = Monitoring Point

Emission Monitoring

Isokinetic measurements in stacks

Emission Monitoring

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Disposal

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What do we produce?

Elemental Mercury

Sell to Bethlehem Apparatus in USA

Carbon with Mercury

- Security landfill
- Temporary storage on site
- Sell to Bethlehem Apparatus in USA

Options under Study

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- Long term storage as elemental mercury
  - Study of site alternatives
  - Design criteria
- Physical-Chemical stabilization and final disposal
  - Chemical stabilization as cinnabar
  - Physical-Chemical stabilization process

¿What do we need?

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- Feasible solution that does not make gold mining impossible
- Clear and stable legislation
- Secure approved (permitted) facilities for mercury disposal
- Stabilization processes approved (permitted)


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Thanks!