



Cydsa



IQUISA
INDUSTRIA QUÍMICA DEL ISTMO S.A. de C.V.



CloroSur
2022

COSTA DO SAUÍPE

"Mercury Plants Remediation experiences
and next steps"

November 2022

CYDSA S.A. de C.V.



Sales del Istmo

Produce y comercializa sal yodada y fluorurada para el consumo



IQUISA

Elabora y comercializa cloro, sosa cáustica y especialidades químicas



Quimobásicos

Fabrica y distribuye gases refrigerantes, propelentes y



Cogeneración de Electricidad y Vapor

Genera y comercializa energía



Procesamiento y Almacenamiento Subterráneo de Hidrocarburos



1. Monterrey, Nuevo León
2. Coatzacoalcos, Veracruz
3. García, Nuevo León
4. Ecatepec, Estado de México
5. San Cosme Xalostoc, Tlaxcala
6. Hermosillo, Sonora
7. Ixhuatlán del Sureste, Veracruz
8. Ciudad de México



Our Company

CYDSA's five business areas include: Salt for Household Consumption and Industrial Applications; Chlorine, Caustic Soda and Related Specialties; Electricity and Steam Cogeneration; and Hydrocarbons Processing and Underground Storage. Headquartered in Monterrey, Mexico, the Company incorporates more than 20 subsidiaries located in 8 cities and serves customers in more than 15 countries.

Industria Química del Istmo S. A. de C.V.

Industria Química del Istmo S. A. de C.V.



1996-2018



2000-2018



1997-2018



2005-2018
CTZ, NE, SC
TLX, HERM.



Chlorine-Caustic SodaProduct Derivates



1997



1998 CTZ



1998
CTZ



2002
MTY, TLX



CTZ, NE, TLX,
STA.CLARA, HER



RESPONSABILIDAD
INTEGRAL
2005-2018



2018
CTZ



2011-2014
TLX.



2012
MTY, TLX.



2015 TLX.
(1er Reconocimiento)



2018 TLX.
(2do Reconocimiento)

Industria Química del Istmo S. A. de C.V.

• IQUISA PLANTS

IQUISA Location	Capacity	Technology
García, N.L.	62 MTPA	Membrane
Sta. Clara, Mex.	40 MTPA	Membrane
Coatzacoalcos	90 MTPA	Mercury
TOTAL	192 MTPA	



IQUISA



MERCURY



MEMBRANE



PLANT		
SANTA CLARA		2007
MONTERREY/NORESTE		2016
COATZACOALCOS		2023

CHLORINE CAUSTIC SODA PRODUCTION TECHNOLOGIES.



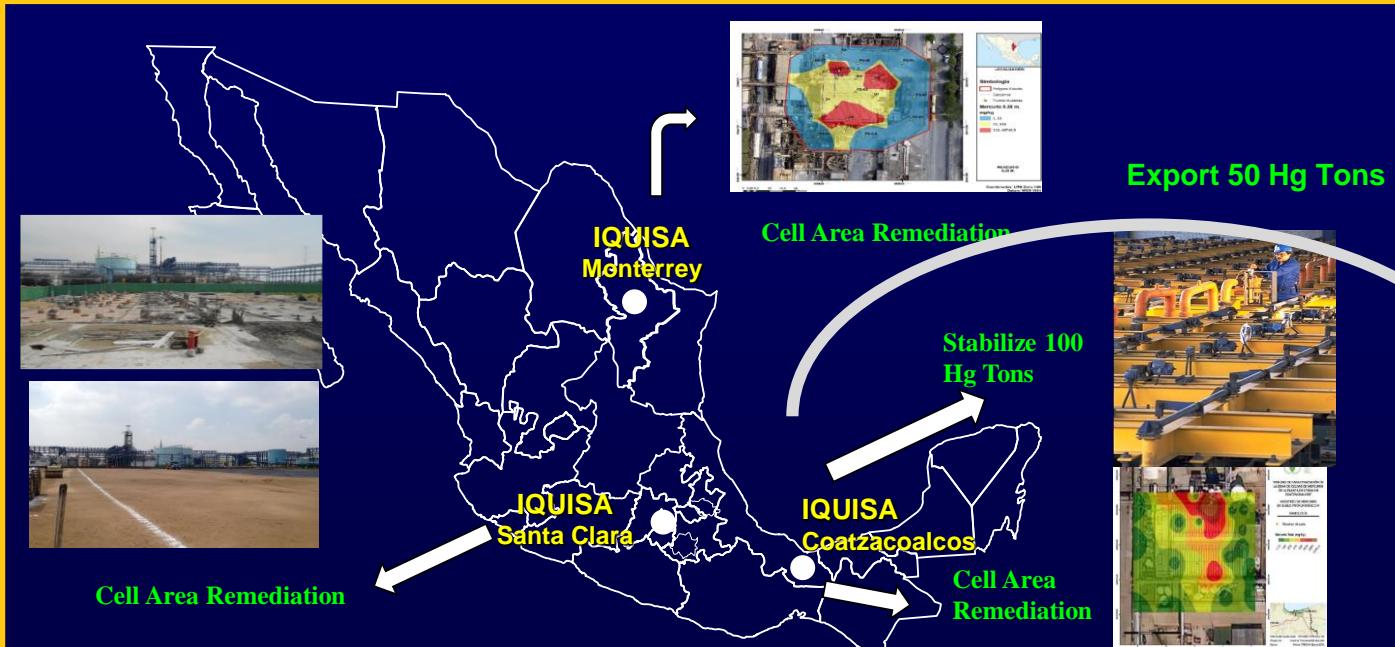
Mercury



Membrane

IQUISA Mercury Plants Cell Area Remediation

PLANTo	STATUS	YEAR	Hg INVENTORY (TONS)
SANTA CLARA	✓	Concluded 2014	No Inventory
MONTERREY	X	Pending	No Inventory
COATZACOALCOS	X	Pending	150



IQUISA SANTA CLARA REMEDIATION

In 1958, it formally began operations with a De Nora mercury electrolysis process.

In 1966, an extension to the Chlorine process was carried out with the installation of Olin Mathieson technology cell mercury technology.

In 1974 Olin mercury cells were installed and the capacity of the plant was increased to 100 tons/day of chlorine.

On August 31, 2007, the production of chlorine began with the new membrane technology, allowing lower energy consumption, low production and maintenance costs, as well as a friendlier relationship with the environment by ceasing to use mercury. Finally, the Mercury Technology electrolysis plant suspended activities after 50 years of operation.

The objective of the "Environmental Remediation of the area occupied by the Ex-Electrolysis plant", consisted in the release of the environmental liability through the execution of activities detailed until the remaining soil and subsoil at surface level at depths greater than 6 m is below the Maximum Permitted Limits established in NOM-147-SEMARNAT/SSA1-2004, of, 310 mg/kg."

IQUISA SANTA CLARA REMEDIATION

The area and depth of the excavation. It was at the end of 3,613.54 m², equivalent, the average depth of the excavation was 8.4 meters and there were areas where the excavation extended up to the 15 meters.



Based on the guidelines of the Safety, Health and Environmental Program, different work areas were determined for the execution of Remediation, which were identified and delimited.

NOMENCLATURE

1	Hazardous waste area	
2	Unit decontamination	
3	Personnel decontamination	
4	Stock materials	
5	mobile toilets	
6	hydration area	
7	Dining room and dressing rooms	
8	Mobile office camp	
9	staff showers	

IQUISA SANTA CLARA REMEDIATION

RECOVERY OF LIQUID MERCURY

The visual inspection and mercury aspiration was carried out mainly at the beginning of the Remediation in October 2012 and concluded in August 2013, however the equipment was available to the operational area throughout the activities carried out. The total volume of mercury recovered during this activity was approximately 297.25 kg.



IQUISA SANTA CLARA REMEDIATION

The physical remediation process was completed in a 24-month period from October 2012 to 2014.

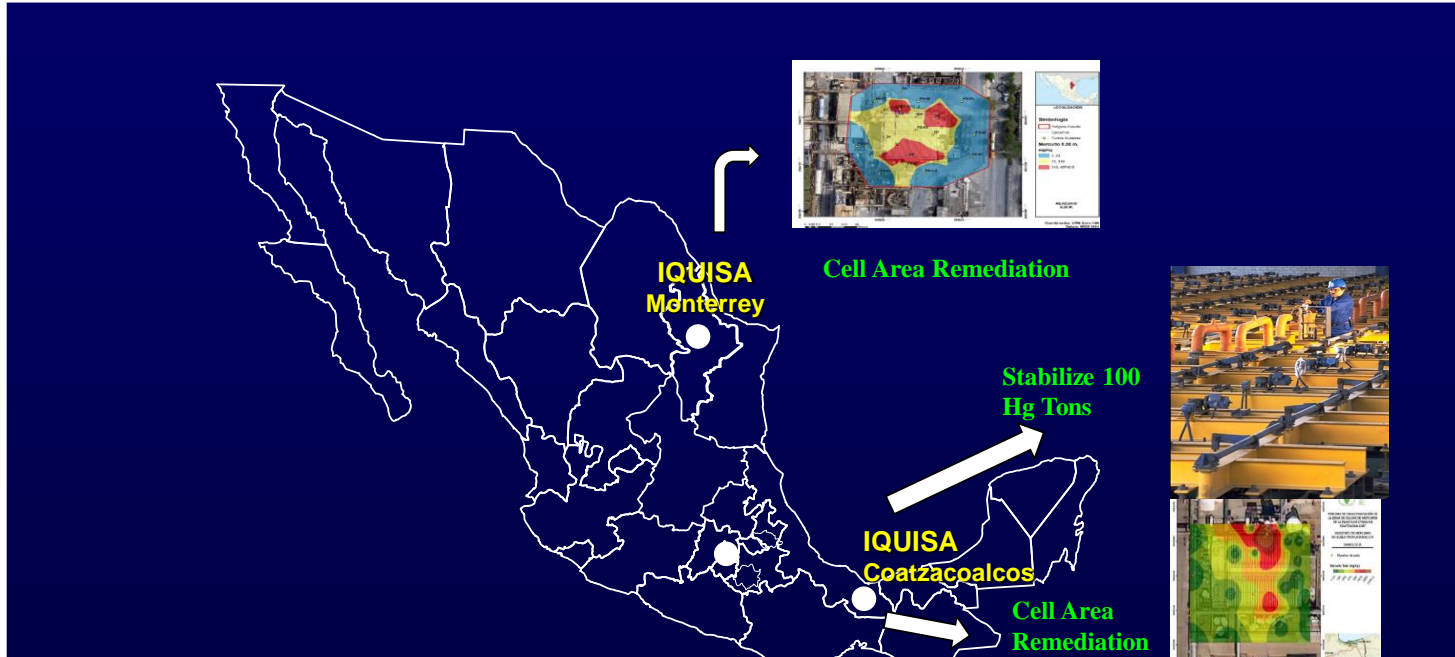
All the guidelines, conditions and provisions required by SEMARNAT were complied with, with which we were authorized to remediate the site.

The applicable regulations in force were complied with.

The total cost of the remediation was of the order of 100 million pesos (7 MM USD), impacted in large part by the freight costs of shipments to confinement of RESIDUOS INDUSTRIALES MULTIQUIM (RIMSA) in Mina N.L.



IQUISA MONTERREY /COATZACOALCOS REMEDIATION



REMEDIATION

2.-IQUISA
COATZACOALCOS
1.-IQUISAMONTERREY

- Cell area. Materials, equipment, etc.
- **OPTIONS:**
- 1. Material decontamination and recycling in filling.
- 2. Stabilization of Material and cell Lockdown.
- 3. Shipment of Material to Authorized Confinement.

STABILIZATION

3.- IQUISA
COATZACOALCOS

- Mercury in cell operation. (100 Tons).
- Use of Sulfur for the formation of Sodium Sulfide (HgS) CINNABRUM.
- **OPTIONS**
- On-site treatment with process equipment.
- Export to Treatment Plant in Europe.

FIRST STAGE MONTERREY PLANT.

For the Remediation of the Monterrey Plant, to decontaminate the soil and materials will be using, in a Pilot Test, Equipment from the German Company

- ❑ **ECON INDUSTRIES: ECON VacuDry 3000 evaporation unit.**

Once the land and materials have been decontaminated and already complying with the maximum parameters of the current regulations of the Mercury content for soils,

All this material will be recovered/reused to refill the area where it was extracted.

During this soil operation decontamination Liquid Mercury will be generated, which will be stabilized with Sulfur to form the compound HgS (CINABRIO) which is considered an inert material for special handling and will be stored in authorized places. To carry out this operation, equipment of the German company ECON INDUSTRIES will be used:

- ❑ **ECON Modelo 150 .**

Mercury Remediation

On-site treatment. Decontamination of Material and Backfill; Thermal decomposition of mercury-contaminated material in a Pilot Test with the ECON VacuDry 3000 evaporation unit, operating under vacuum, for the recovery of Water and Mercury, decontaminating the material and allowing it to be reused for filling the area to be decontaminated.

TECNÓLOGY.

ECON INDUSTRIES (ALEMANIA).



EQUIPMENT (Skid Mounted)

**Capacidad del equipo; 16.5 Ton/día de material contaminado.
Operación Total con Energía Eléctrica; Energía Eléctrica/Diesel.**



TIME EXECUTION.

-Monterrey; 3 Yerars (15,000 Tons), Coatzacoalcos; 4 Years (20,000 Tons).

-BUDGET; \$ US MM.

Equipment Cost: 3,600,000. (

Mercury Stabilization.

ON-SITE TREATMENT OF 100 TONS OF MERCURY WITH ECON MODEL 150 PROCESS EQUIPMENT; To carry out a pilot test for its stabilization by chemical reaction with Sulfur(S), to form Mercury Sulfide (HgS, CINABRIO) and its disposal as a Management Waste special in a Collection Center of the Region

TECHNÓLOGY.

ECON INDUSTRIES (GERMANY).



EQUIPMENT (Mobile Unit)

Capacidad del equipo; 200 Kgs. Hg/Batch (600 Kgs. Hg /día).

Operación Total con Energía Eléctrica.

EXECUTION TIME.

-1 Year.

-BUDGET (\$ US MM).

EQUIPMENT COST: 990,000.

SECOND STAGE COATZACOALCOS PLANT;

It consists of the stabilization of 100 Tons of Mercury Product of the Decommissioning of the Electrolytic Cells of the Coatzacoalcos Plant,

To carry out this operation, the aforementioned Equipment of the German Company ECON INDUSTRIES will be used in a Pilot Test:

- ❑ **ECON Modelo 150.**

THIRD STAGE COATZACOALCOS PLANT;

For the Remediation of the Coatzacoalcos Plant, it is proposed to decontaminate the land and materials, using in a Pilot Test Equipment from the German Company ECON INDUSTRIES

- ❑ :ECON VacuDry 3000 evaporation unit.

Once the land and materials have been decontaminated and already complying with the maximum parameters of the Mercury content of the current Regulations for soils, it will be reused to fill the area where it was extracted.

During this operation, liquid Mercury will be generated, which will be stabilized with Sulfur to form the compound HgS (CINABRIO), which is considered an inert material for special handling and will be stored in authorized places. To carry out this operation, a Pilot Test Equipment from the German Company ECON INDUSTRIES will be used:

- ❑ ECON Model 150 .

Monterrey Plant Remediation Schedule Phase I

Plan para Eliminar el uso del mercurio y manejar adecuadamente el mercurio y sus residuos en el sector Cloro-Alcali en México.	AÑO 1				AÑO 2				AÑO 3				AÑO 4				AÑO 5			
	11	12	01	02	11	12	01	02	11	12	01	02	11	12	01	02	11	12	01	02
EQUIPO ECON INDUSTRIES																				
Equipos ECON VacuDry 3000 evaporation unit y Modelo 150 para recuperar mercurio de material contaminado y estabilizar mercurio																				
Compra del Equipo																				
Transportación																				
PLANTA MONTERREY																				
Decomisioning																				
Desinstalar Equipo Eléctrico periférico																				
Desmantelar Equipo periférico Area de Celdas																				
Demantelar y descontaminación de techo de celdas																				
Desmontar y descontaminar Estructura edificio																				
Desmontar y descontaminar Equipo y tuberías																				
Demoler y Descontaminar Nivel de Piso de Celdas																				
Demoler y descontaminar Concreto de Piso planta bajar de Celdas																				
INSTALACION EQUIPO ECON INDUSTRIES																				
Instalacion Equipo ECON VacuDry 3000 evaporation unit																				
Instalacion Equipo Modelo 150																				
Capacitación y Puesta en Marcha																				
DESCONTAMINACIÓN DE TIERRA																				
Plan de Muestreo y Analisis																				
Muestreo y Analisis (Continuo)																				
Retiro de Tierra y descontaminacion																				
Estabilización de Hg recuperado de la tierra contaminada con EQUIPO ECON 150																				
Almacenamiento de tierra descontaminada																				
relleno con tierra descontaminada																				
Muestreo Final																				
Lozas de Concreto Final (Conclusión)																				
Reporte Final																				

Coatzacoalcos Plant Stabilization Schedule Phase II

Plan para Eliminar el uso del mercurio y manejar adecuadamente el mercurio y sus residuos en el sector Cloro-Alcalí en México.	AÑO 1				AÑO 2				AÑO 3				AÑO 4				AÑO 5				AÑO 6			
	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
PLANTA COATZA COALCOS																								
ESTABILIZACION DE MERCURO RECUPERADO DE CELDAS																								
Instalacion Equipo Modelo 150																								
Capadación y Puesta en Marcha																								
Recuperación de 50Tomeadas de Mercurio de celdas																								
Envio de Mercurio a Plantas de Sudamerica																								
Recuperación de 100 Tomeadas de Mercurio de celdas																								
Estabilización de Mercurio Y confinamiento Na2 S																								
Reporte Final																								

GEF FUNDS .

IQUISA as a producer of Chlorine with Mercury Technology and Mexico as a signatory country of the Minamata Agreement on October 10, 2013 and ratified on September 29, 2015.

And also signed by 128 countries and ratified by 131 countries. The Convention entered into force in August 2017, as a legally binding instrument, whose objective is:

“To protect human health and the environment from anthropogenic releases of mercury and mercury compounds”.

In which it establishes that:

--Annex B part I; Manufacture of chlorine soda using mercury should be suspended by 2025.

-Article 3 paragraph 5b; Stabilize and adequately dispose of the excess mercury left over from the operation of the plants.

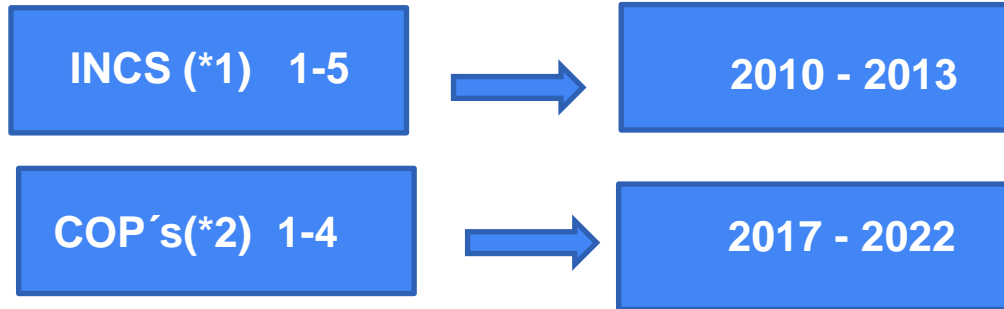
-Article 12; Environmentally sound management of sites contaminated with Mercury as a result of operation.

GEF FUNDS .

Since 2010 IQUISA´s Team have participated in the forums and events organized by UNEP(United Nations Environmental Program). Looking for :

-Support for Remediation of sites contaminated with Mercury as a result of the operation.

-Support for Mercury conversion project to membrane Technology.



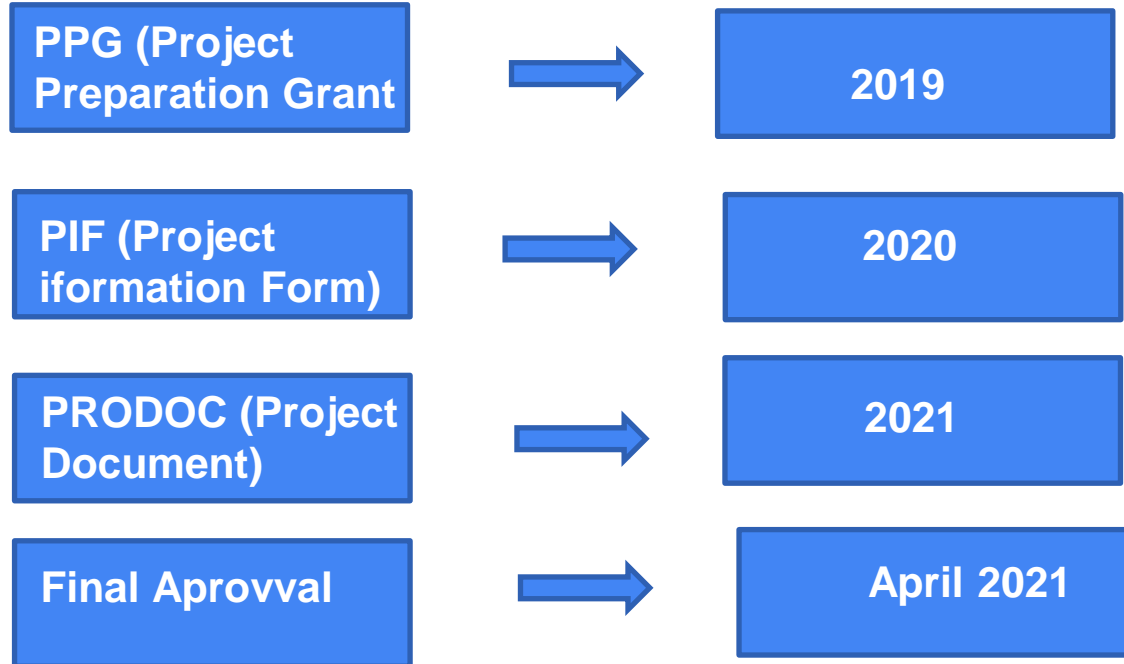
In COP 1 was defined that GEF(Global Enviromental Facility) will destinate support resources for finance projects for developing countries to comply with Minamata Covention.

(*1) INC´S Intergovernmental Negotiating Committee

GEF FUNDS .

Process to get GEF funds is a long Journey, according with their policies and protocols and documents requirements, it is necessary to prepare, fullfill and submit applications information and also executing field monitoring in the sites to be remediated.

With next roadmap process:



GEF BUDGET \$ US .



M.Sc. Carlos Manuel Rodriguez
CEO and Chairperson

April 29, 2022

Ms. Victoria Luque
GEF Coordinator
United Nations Environment Programme
Nairobi, Kenya

Dear Ms. Luque,

I am pleased to inform you that I have endorsed the full-sized project proposal detailed below:

Decision Sought:	CEO Endorsement of Full-sized Project
GEFSEC ID:	10526
Agency:	UNEP
Agency ID:	01812
Focal Area:	Chemicals and Waste
Project Type:	Full-sized Project
Country:	Mexico
Name of Project:	Eliminate Mercury Use and Adequately Manage Mercury and Mercury Wastes in the Chlor Alkali Sector in Mexico
GEF Project Financing:	\$12,000,000
Agency Fee:	\$ 1,080,000
Funding Source:	GEF Trust Fund

Agency Fee Commitment:					
Agency	Trust Fund	20% committed at Council Approval (US\$)	50% to be committed at 1st Disbursement (US\$)	30% to be committed at Mid-Term Review (US\$)	Total (US\$)
UNEP	GEFTF	216,000	540,000	324,000	1,080,000

I am endorsing this project based on the understanding that the project is in conformity with the GEF focal areas strategies and in line with GEF policies and procedures.

Sincerely,

M.Sc. Carlos Manuel Rodriguez
Chief Executive Officer and Chairperson

Copy to: Country Operational Focal Point, GEF Agencies, Trustee

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PROJECT: Eliminate the use of mercury and properly manage mercury and mercury waste from the chlor-alkali sector in Mexico (GEF ID 10526)

Objective of the project:

“Reduce the negative impacts of mercury and mercury residues from the chlor-alkali sector on human health and the environment in Mexico”.

GEF financing: USD 12,000,000

Co-financing: USD 129,500,000

Project duration: 2023-2027 (5 years)

Implementing Agency: UNEP

Executing Agencies: IPA(In Due Diligence Contract Process), Centro Mexicano para la Producción más Limpia.

NEXT STEP. Project Implementation.



CloroSur

GLOBAL ENVIRONMENTAL BENEFITS (GEB)

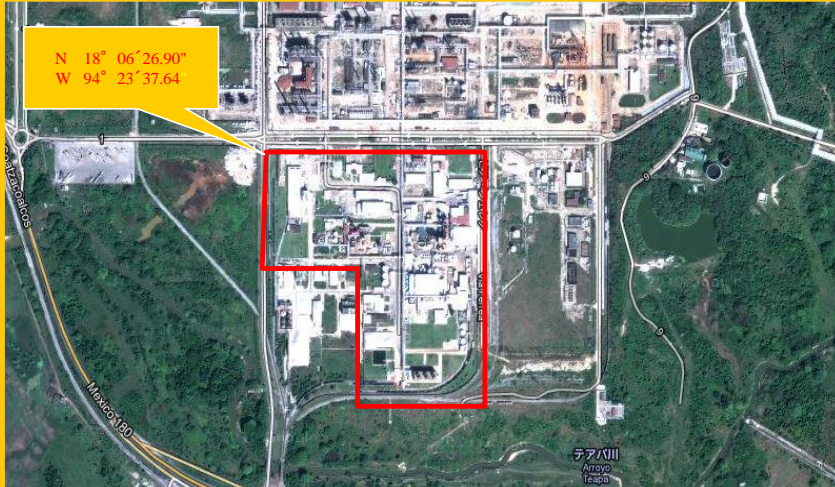
- **Greenhouse gas emissions reduction: 43,186 tons of CO2 per year.**
- **Reduction, elimination and avoidance of chemicals of global concern: 150 tons of mercury.**
- **Direct beneficiaries: 15,000 people**



GEF BUDGET \$ US .

BUDGET BREAKDOWN US DOLLARS		AMOUNT	%
EQUIPMENT, CYDSA PERSONAL SUPPORT (PROJECT, OPERATION)		7,882,619	66%
CONSULTORIAS, CONSULTANCY, ADVICE		1,861,000	16%
TRIPS		238,500	2%
SEMINARS, TEAMS, WORKSHOPS, PUBLICATIONS		1,446,481	12%
MANAGEMENT COST		571,400	5%
TOTAL		12,000,000	100%

IQUISA NEW PLANT COATZACOALCOS PROJECT (Localization)



IQUISA New Plant Localization

IQUISA's New Chlorine & Caustic Plant Localization at Coatzacoalcos City Veracruz, México



Background

Current Mercury plant dates back from the **60s** and since then it has been operating, constantly updating itself technologically to maintain a profitable, safe and environmentally acceptable operation.

The New Membrane Membrane Plant will replace the Plant operating with mercury technology

The technological change will take place on the same site where the plant is currently operating, seeking synergies to take advantage of existing services and processes.

The initial annual production capacity will be **100,000 tons** and in the future it will be increased to **150,000 tons of Chlorine**

Preliminary investment of close to **120 million dollars** is estimated in its first stage and **30 million dollars** for the second stage.

Project execution

- The Basic and Detail Engineering for Chlorine plant were done by BCMC (BLUE STAR BEIJING MACHINERY LTD). under. IQUISA review and supervise this Engineering processes.
- Site Construction is also managed, supervised and controlled by BCMC WITH Chinese Personal at Site and Its CONIP subcontractor and also IQUISA review and supervise this construction activities.
- All the utilities and services required for Plant operation were under IQUISA´s scope including Engineering work & Construction. All Engineering designs were contracted with specialized Mexican firms.
- Also for all the project. IQUISA organized a multidisciplinary team with its technical staff and an external engineering firm (outsourcing) for the design review, supervision, administration / control including quality assurance.

Technical & Engineering Design

- IQUISA as Chlorine Institute Member (CI), the Chlorine plant design was made according technical recommendations and statements. (Technical Pamphlets).
- The Engineering design was done according with current and applicable Mexican norms, USA and International codes and standards for the different involved project disciplines works such as; Foundation, civil, architectural, mechanical, piping, electrical, instrumentation and control.
- Risk analysis is also an important issue to take into account during the design and operation of our chemical plants and has the objective of identifying, mitigating, preventing and controlling them in our processes, developing the following activities:
 - HAZOP (Hazardous Operability) ANALYSIS.
 - SIL (Safety Integrity Level) LEVEL II.
 - Emergency Shut down System (ESD).
- Also modern Engineering Tools were applied for project design and control like; 3D and MS Project.

Environmental Aspects.

- It is fulfilled in advance the period established by UNEP to eliminate the use of Mercury (phase out 2025) in the production of Chlorine-Soda agreed in the Minamata Convention.

- It should be emphasized that this project will reduce Carbon Dioxide emissions to the atmosphere by a minimum amount of **43,186 TPA**, derived from the lower consumption of Electric Power.

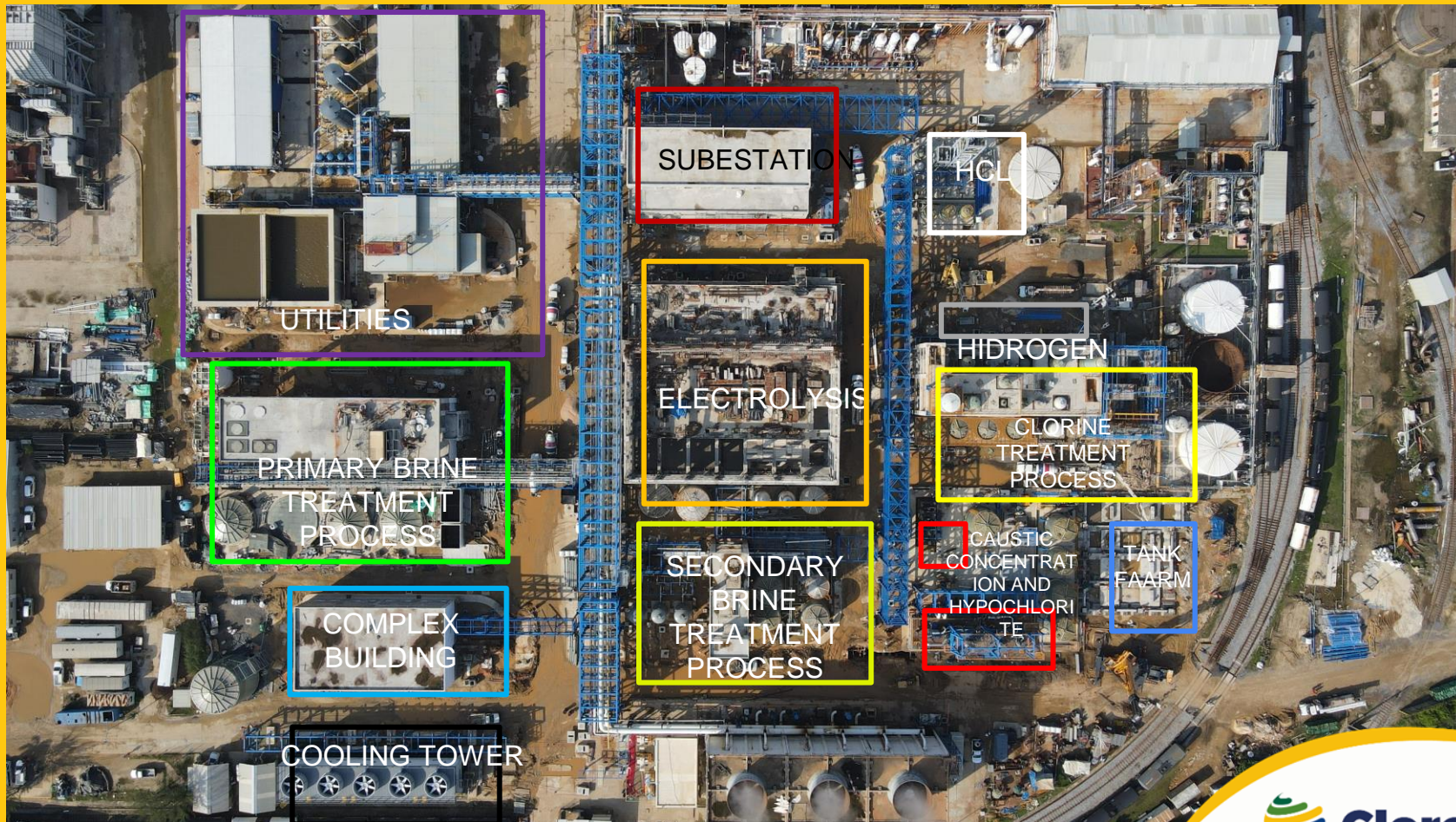
- Use of the Hydrogen produced in the electrolyzers, replacing 90 % the use of natural gas in the boiler for the production of steam reducing greenhouse gas emissions with an atmospheric positive impact water vapor emissions instead CO₂.

- Use of Membrane Technology is clean and sustainable and friendly Environmental Process.

- Mercury not will be use anymore, removing Emissions and generation of Toxic and dangerous Wastes that need a special Sound Storage.

- Electricity consumption saving of 33 %.

GENERAL VIEW PLANTA LAY OUT.















GRACIAS ¡¡¡¡¡THANK YOU¡¡¡¡¡.