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PRACTICAL SOLUTIONS FOR ANY KIND OF TECHNOLOGY WESP AND LEAD EQUIPMENT IN GENERAL.

INDEX

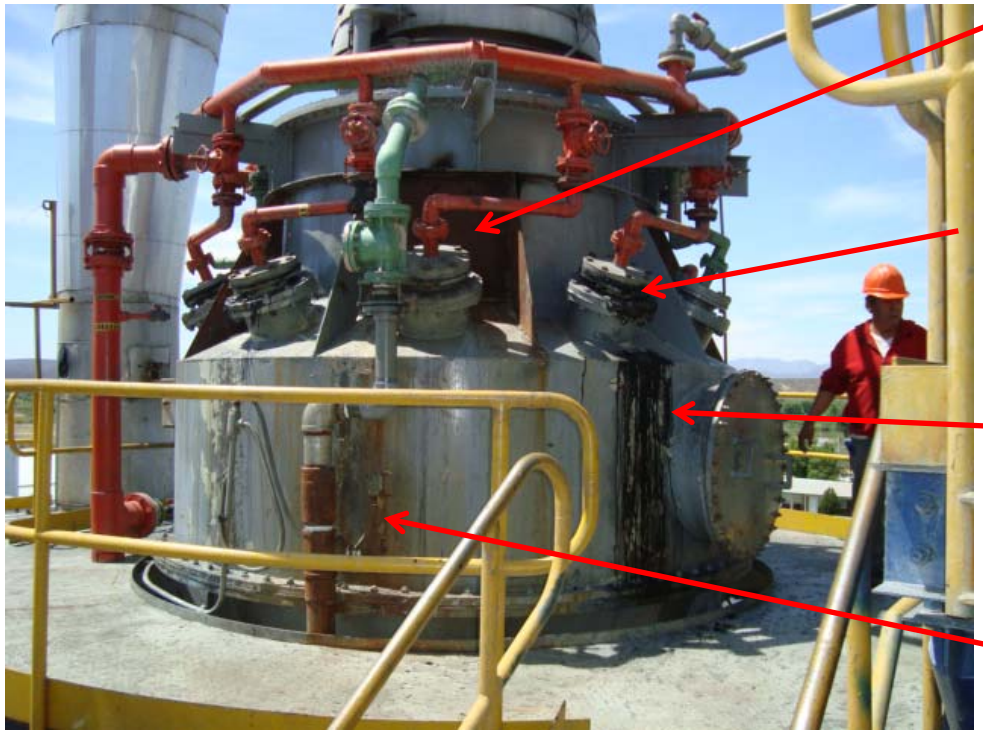
Topic 1: Alteration of original design and manufacturing of:

- a) Venturi's head tower.
- b) Condensation tower bottom.
- c) Pipe support Steel plate for WESP

Topic 2: Preventive maintenance of Wet electrostatic precipitators WESP and discharge electrodes for WESP.

Alteration of design and manufacture of Venturi's head tower.

Elements that cause that originate design alterations:



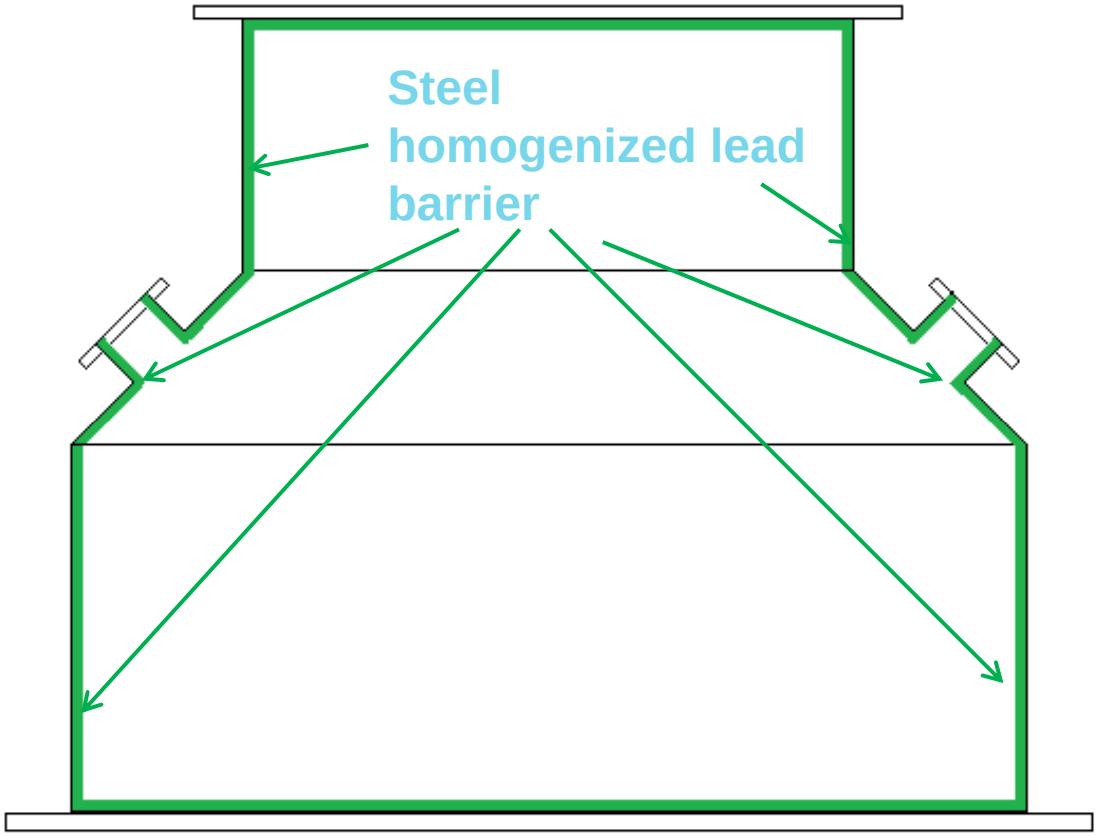
- Constant presence of acid on the external side of the equipment.
- False air intake in the flux and variations in temperature.
- High risk of steel deformation due to corrosion.
- Internal collapsing of cement and brick because of the accumulation of sulphate, provoking steel exposure.

Alteration of design and manufacture of Venturi's head tower.

Our Proposal:

Steel manufacturing due to general wear out.

Installation of a steel homogenized lead surface with 6 mm. of thickness everywhere with possible contact with the flux.



Alteration of design and manufacture of Venturi's head tower.

Execution of works:

-Full steel manufacturing.

-A 6 mm thick steel homogenized lead coat on the inside of the Venturi head.

Alteration of design and manufacture of Venturi's head tower.

Venturi's head assembly

Alteration of design and manufacture of Venturi's head tower.

Final outlook

Alteration in design advantages:

No False air intake in the flux nor variations in temperature.

No corrosion in steel Venturi nor in nearby installations .

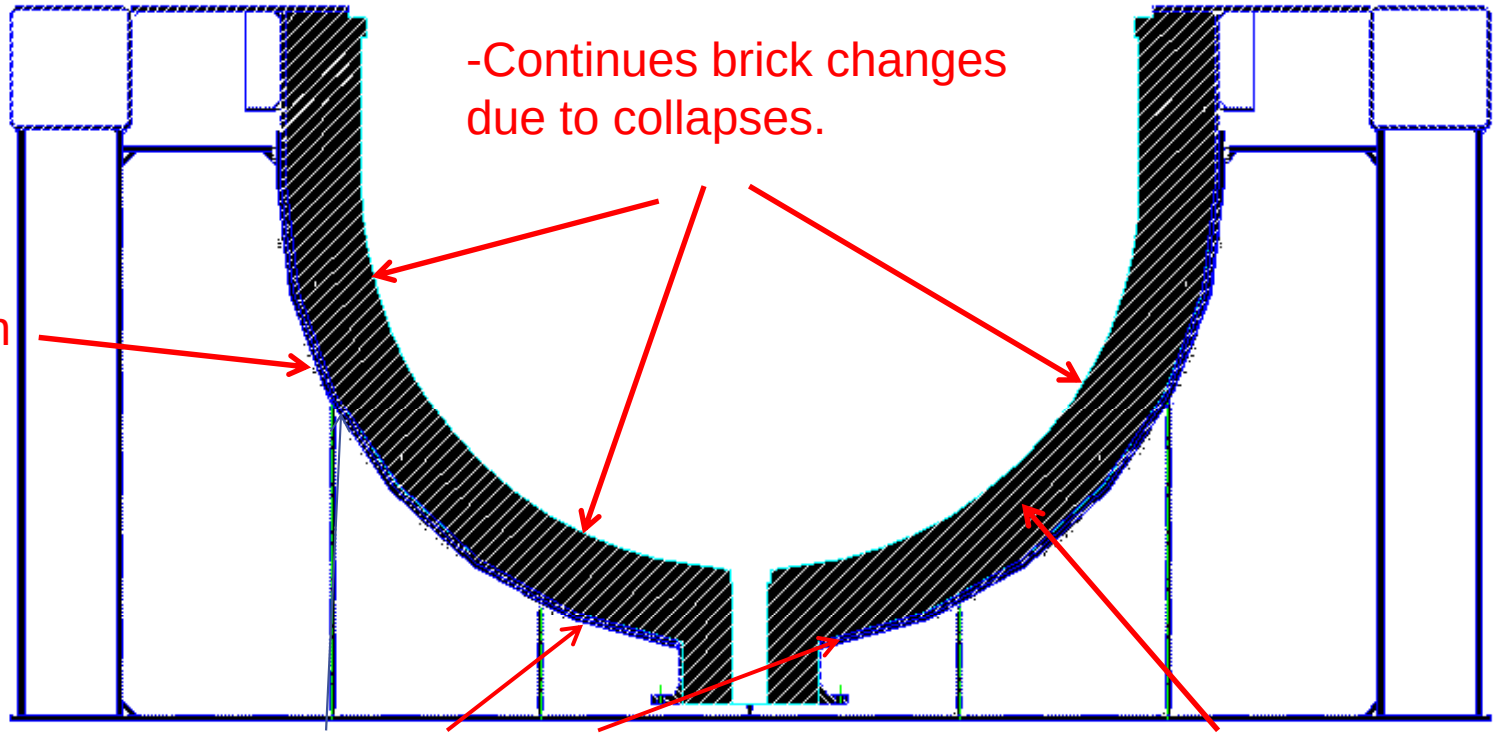
Brick in excellent conditions.

A considerable maintenance cost reduction .

Longer lasting life of the Venturi's head.

Alteration of design and manufacture of Condensation tower bottom.

Causes that originate the design alterations:



-Continues brick changes due to collapses.

-Continues corrosion in steel plate.

-Weak Teflon coat between brick and steel, damaging the steel main body .

-Deformations due to excessive accumulation of sulphates created steel corrosion.

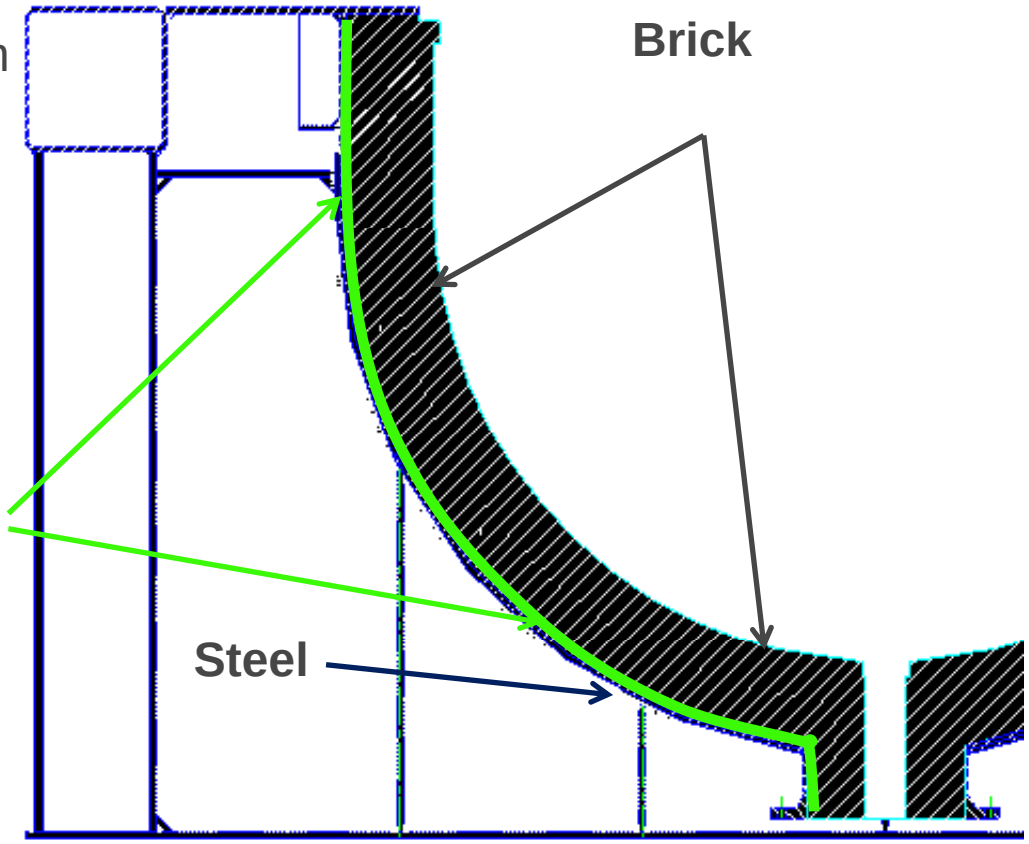
Alteration of design and manufacture of Condensation tower bottom.

Our Proposal:

-Dismantling of damaged bottom condenser

-Repairing the bottom condenser removing corroded steel sections.

-Installation of a steel homogenized lead surface with 6 mm. of thickness everywhere with possible contact with the flux.



Alteration of design and manufacture of Condensation tower bottom.

Executions of works:

The Bottom condenser is internally coated with a 6 mm thick steel homogenized lead .

Machining of lateral flange.

Maneuver of condenser bottom.

Alteration of design and manufacture of Condensation tower bottom.

Condenser's bottom head assembly:

Preparation of maneuvers for condensation tower's bottom lifting.

Joint works with steel and lead welding.

Alteration of design and manufacture of Condensation tower bottom.

Final outlook:

Advantages with the design alterations:

•Optimum performance.

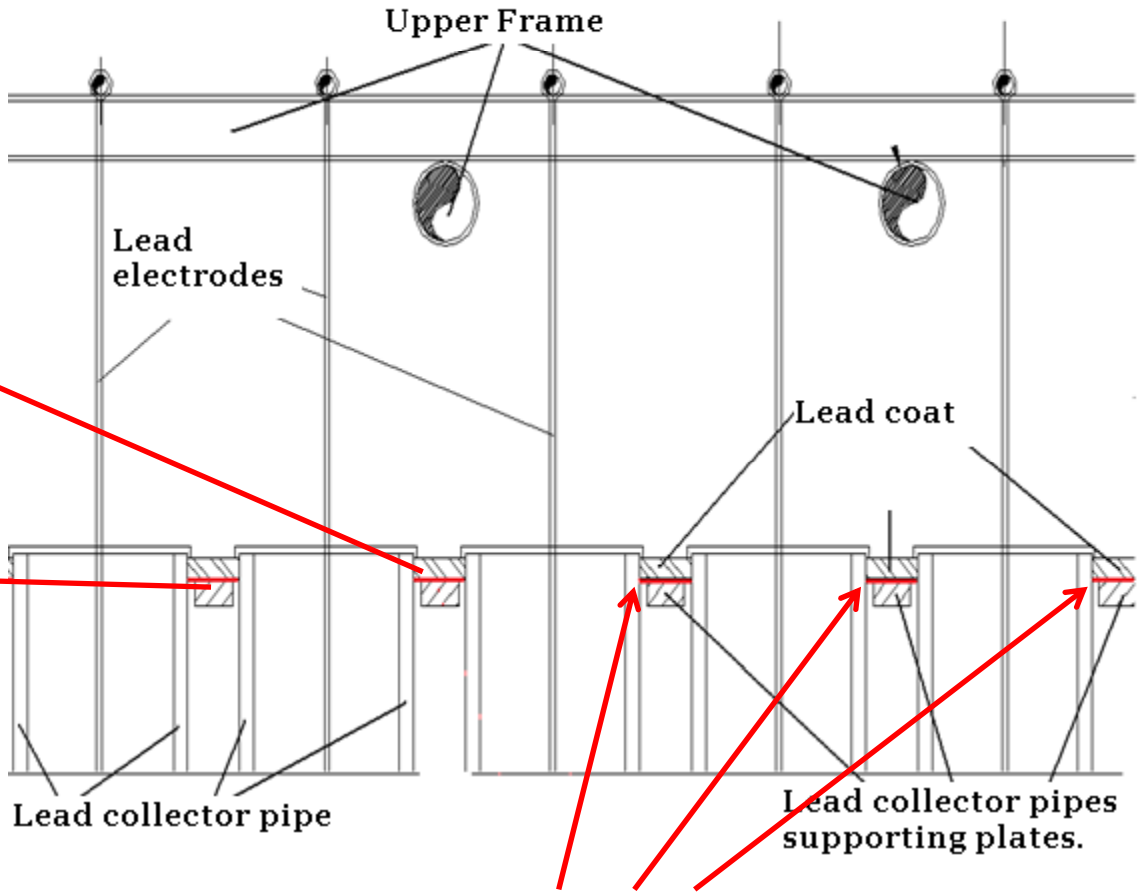
•No corrosion in steel condenser bottom nor in nearby installations .

• Brick in excellent conditions.

•A considerable maintenance cost reduction .

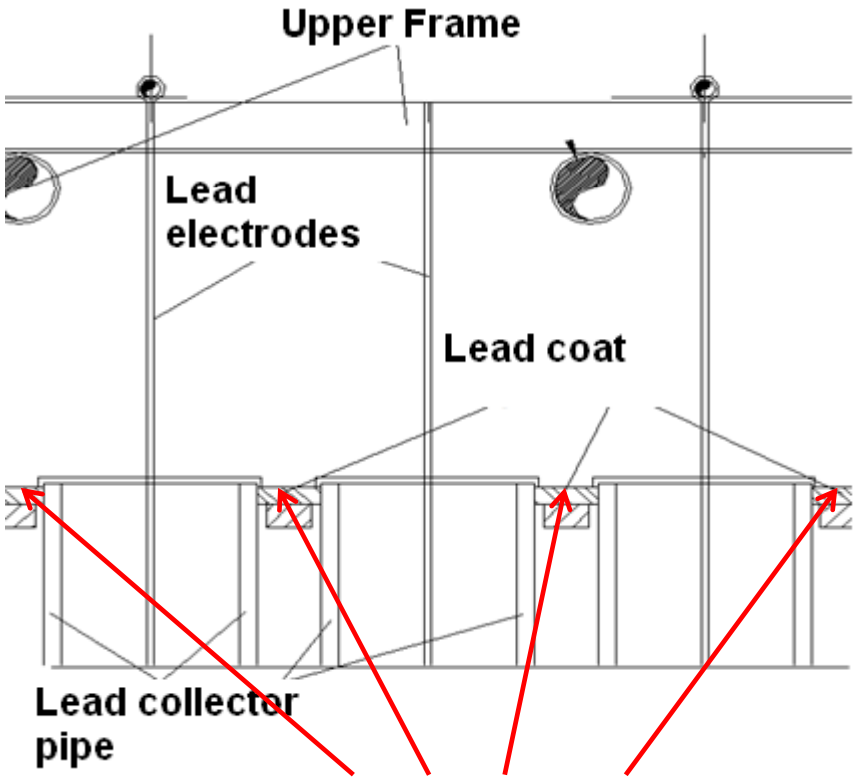
•Longer lasting life of the condenser.

Alterations in the design of WESP lead collector pipes support plate



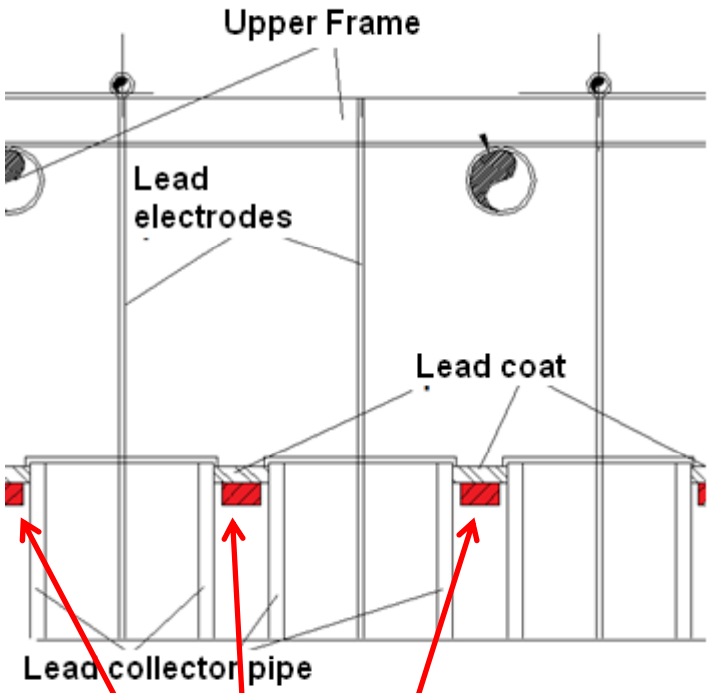
Constant repairs due to accumulation of sulphates and corrosion of steel and lead.

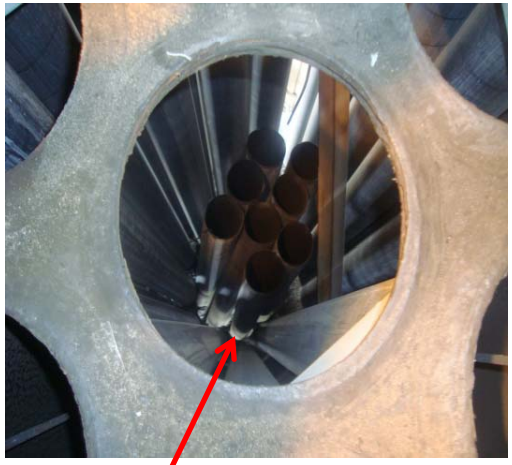
Alterations in the design of WESP lead collector pipes support plate



-Partial corrosion of steel support plate deforming downwards of the superior part of the lead collector pipes, creating hazardous conditions for operational and maintenance personnel with access to these WESPs.

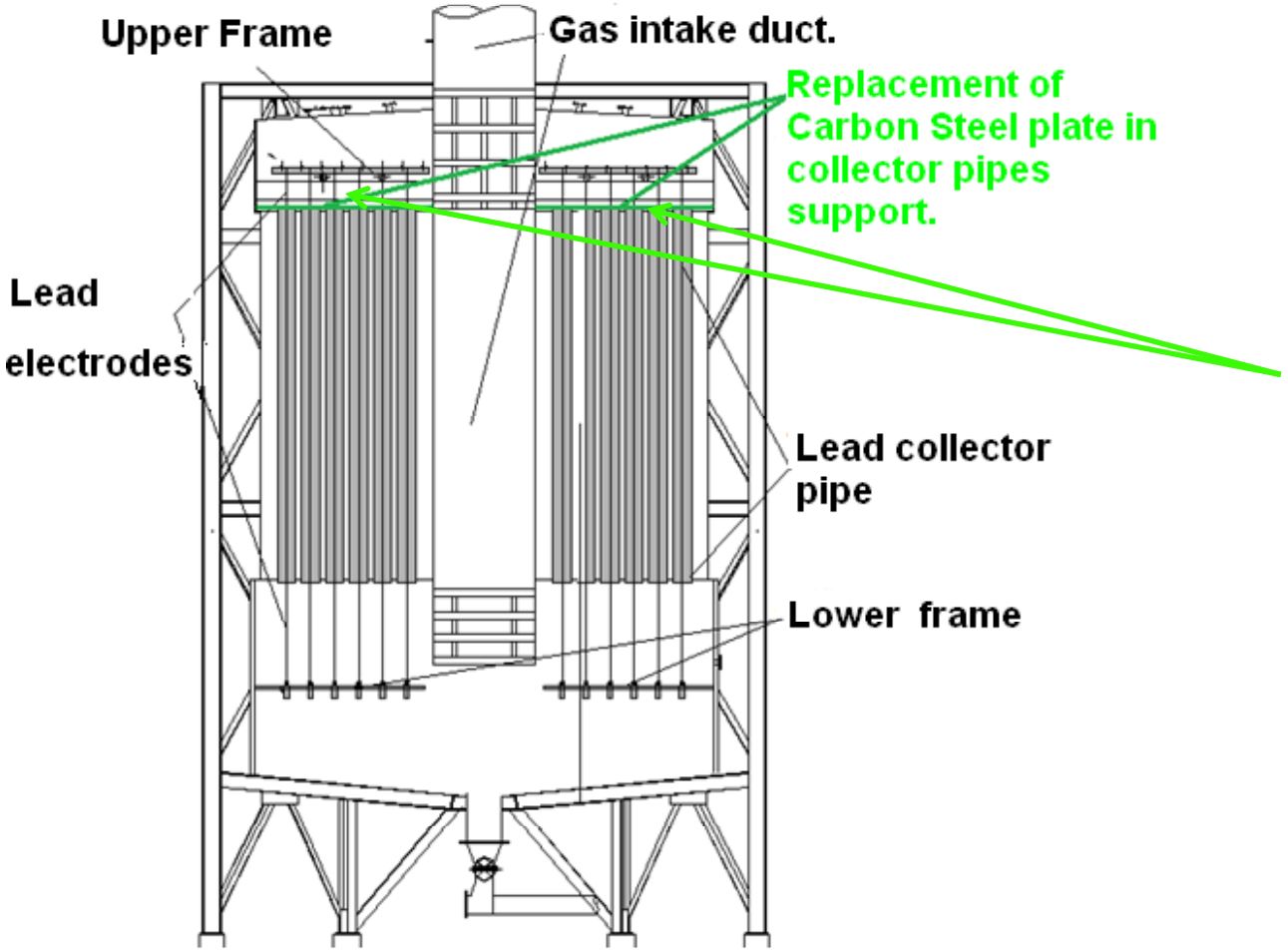
Alterations in the design of WESP lead collector pipes support plate





Total corrosion of steel support plate, completely collapsing lead collector pipes

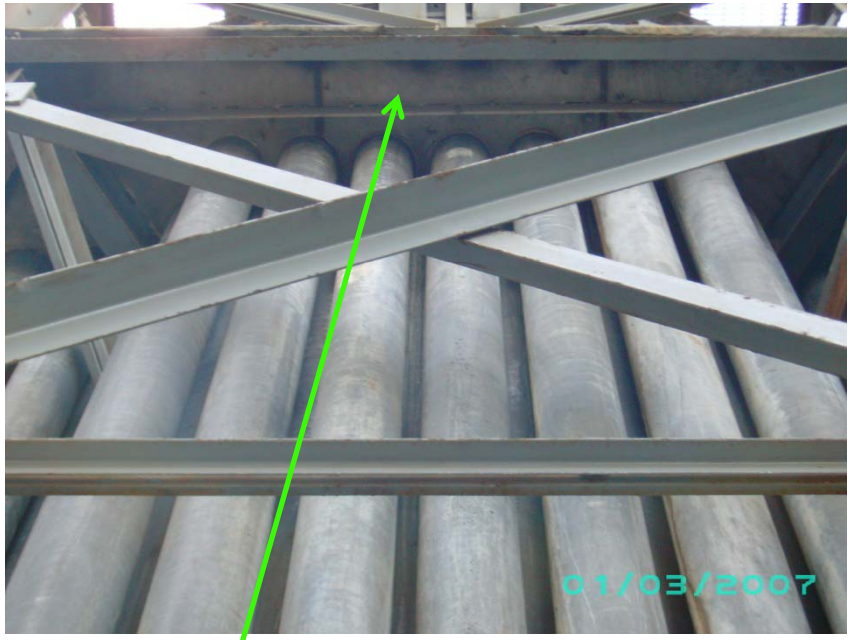
Alterations in the design of WESP lead collector pipes support plate

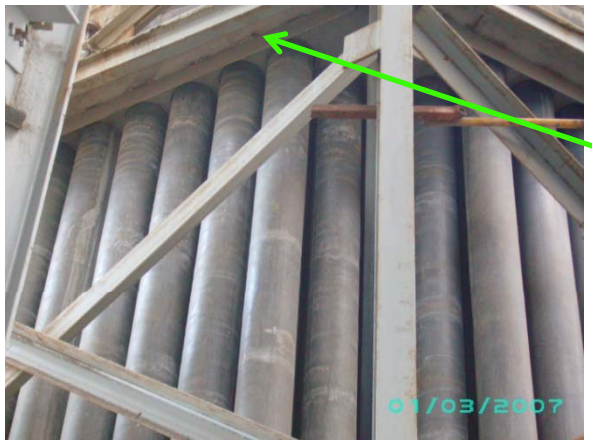


Replacement of Carbon Steel support of collector pipes for stainless steel 316L or Alloy.

Alterations in the design of WESP lead collector pipes support plate

Execution of works:





Precipitators with collector pipes support in stainless steel 316L

Alterations in the design of WESP lead collector pipes support plate

Final outlook:

Advantages with the design alterations:

Optimum performance of equipment.

Corrosion risk elimination in general structure.

Considerable maintenance cost reduction

Longer lasting life of WESP

Alteration of original designs in lead equipment and WESP

Conclusions:

*** Longer lasting life of equipment.**

*** Considerable maintenance cost reduction**

*** Elimination of major fixtures.**

*** Improvement of security conditions for personnel working within equipment.**

*** Continues improvement and viable solutions at reasonable costs for our clients.**

*** Not everything is written in stone regarding original designs.**

WESP preventive maintenance.

Inspection of critical points:

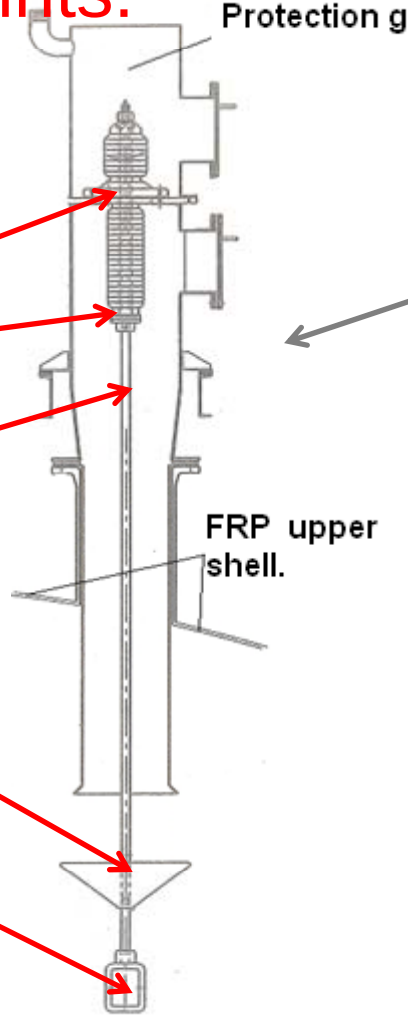
WESP with steel pipe technology

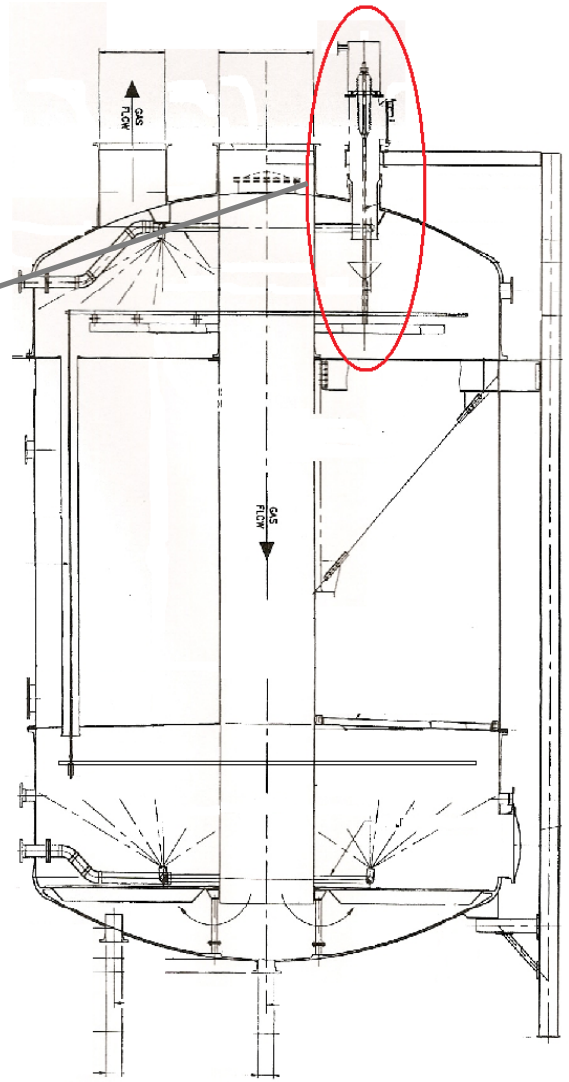
with concentric electrode.

-Ceramic insulator

Upper charge pole.

Union between charge pole and upper frame





WESP preventive maintenance.

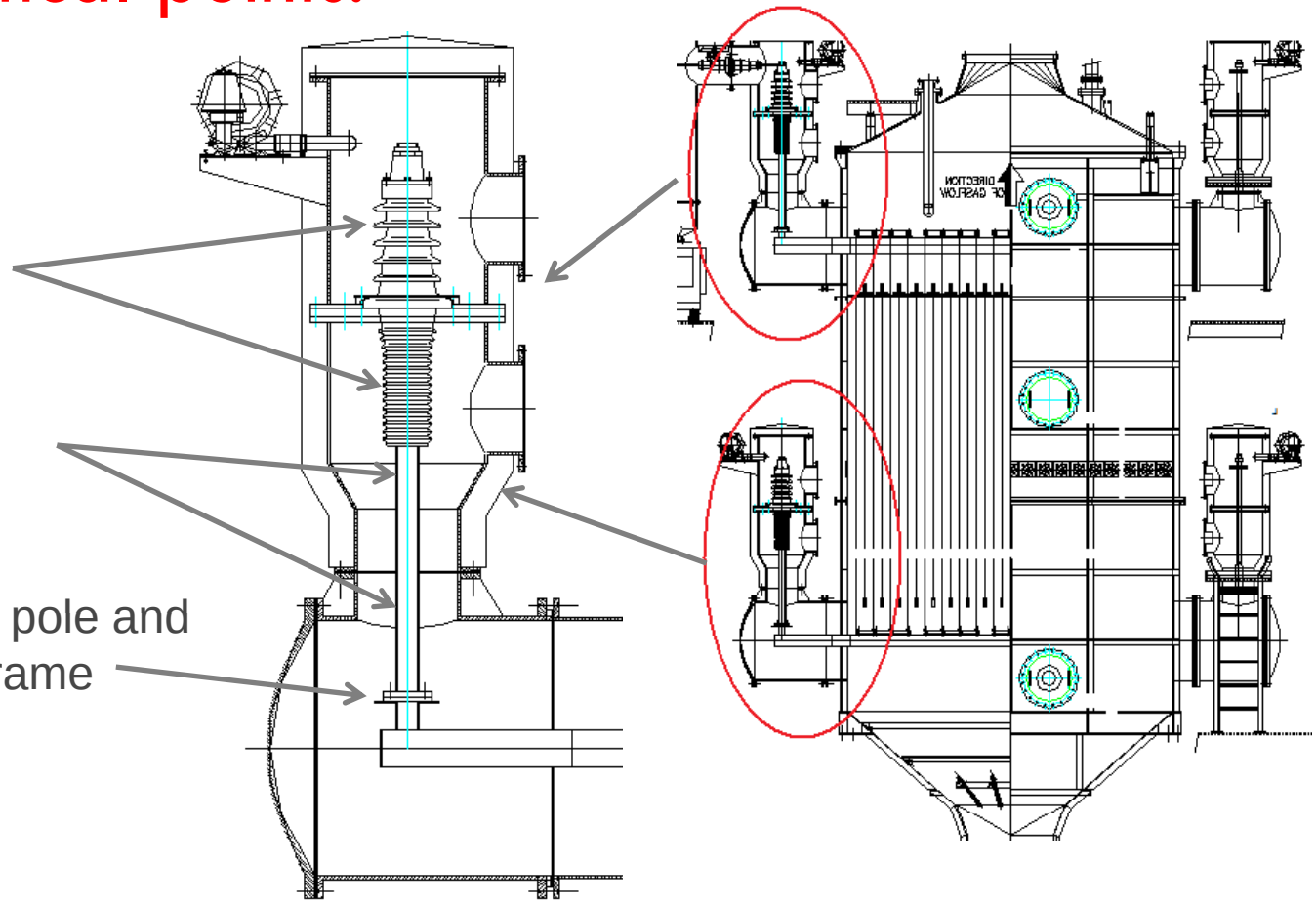
Inspection of critical points:

WESP with lead plate technology

-Ceramic insulator

-Charge pole.

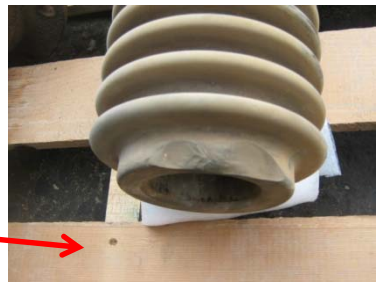
Union between charge pole and upper frame or lower frame



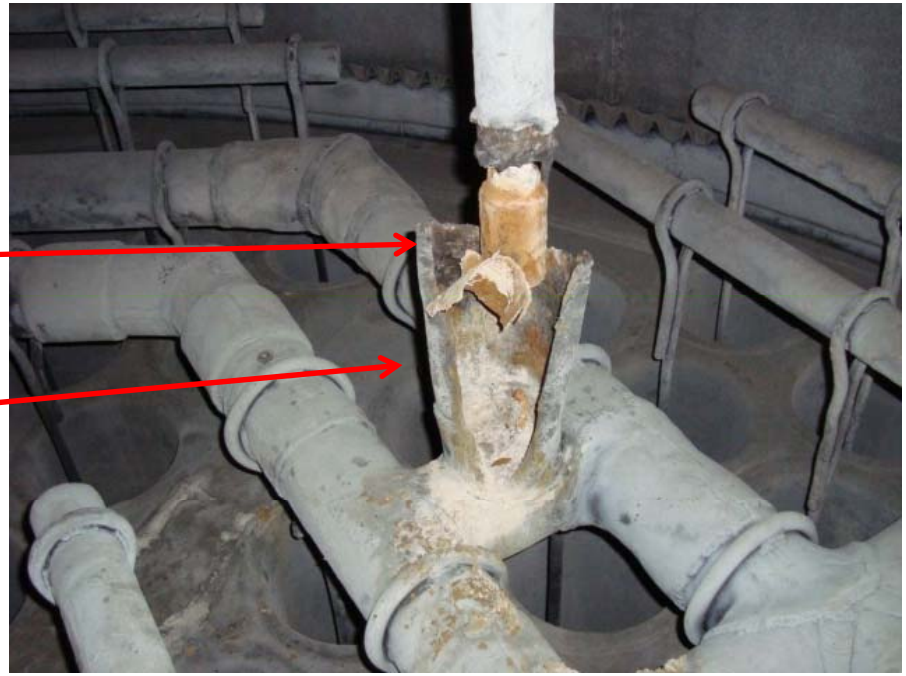
WESP preventive maintenance.

Problems to avoid using preventive maintenance.

Broken or cracked ceramic insulators which cause risk of bending, diminishing WESP operational performance.

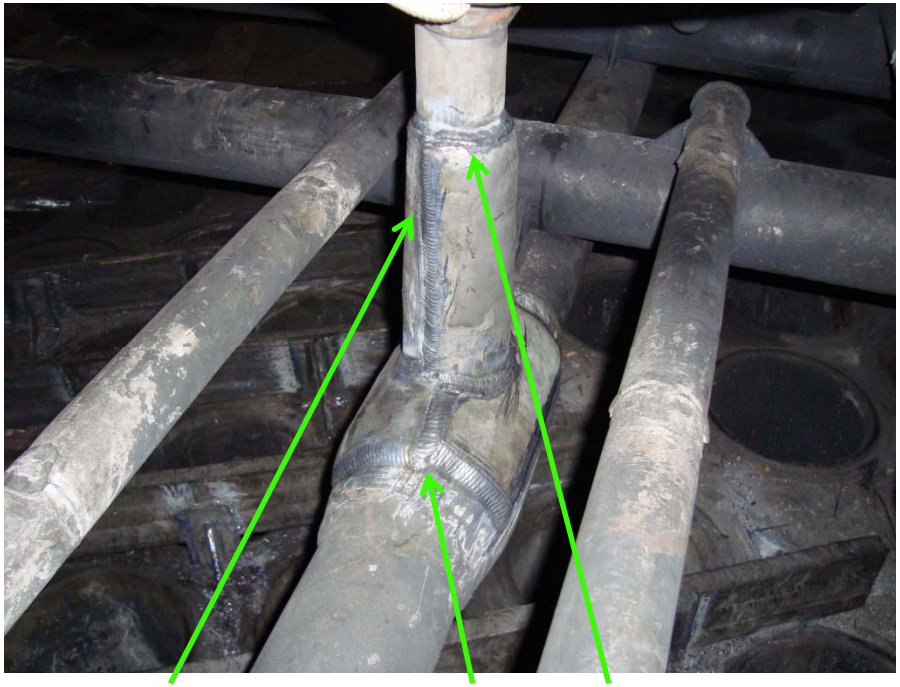


Total corrosion of charge pole and union between charge pole and upper frame. Causing unevenness between electrode and pipe.

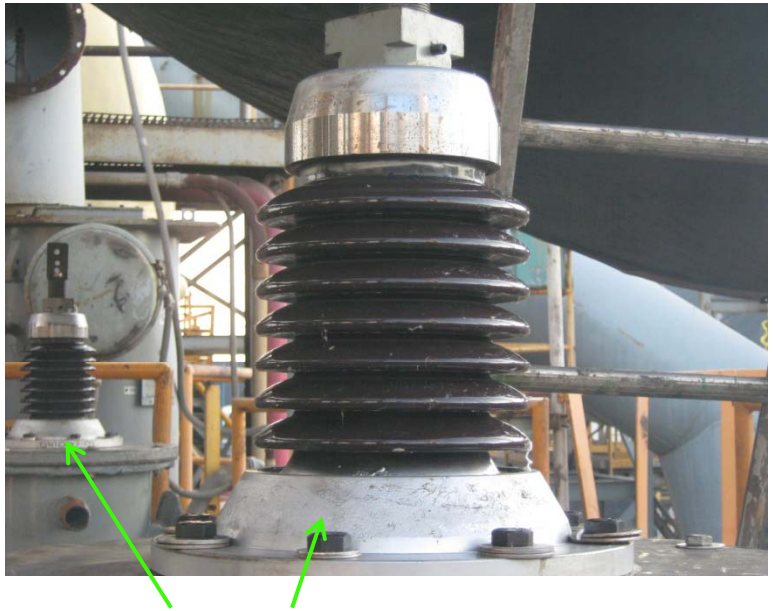


WESP preventive maintenance

Preventive maintenance activities in critical points.



-Scheduled replacement of charge poles using lead weld, applied by specialists in order to protect steel.

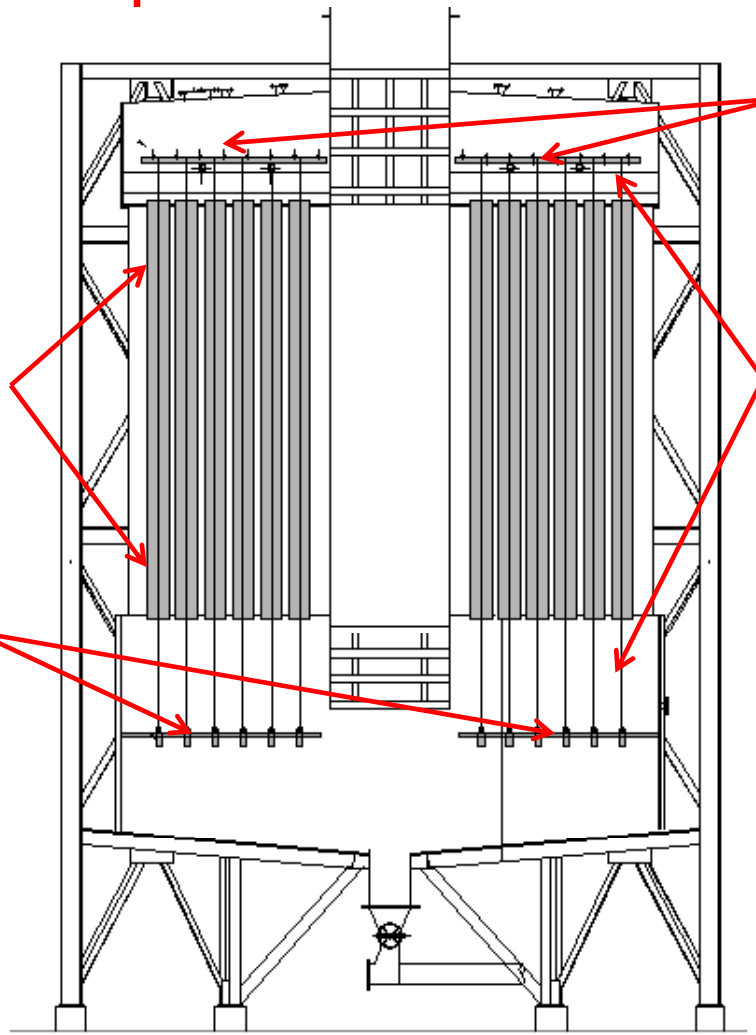


Periodic cleaning of ceramic insulators.

WESP preventive maintenance.

Internal component inspection:

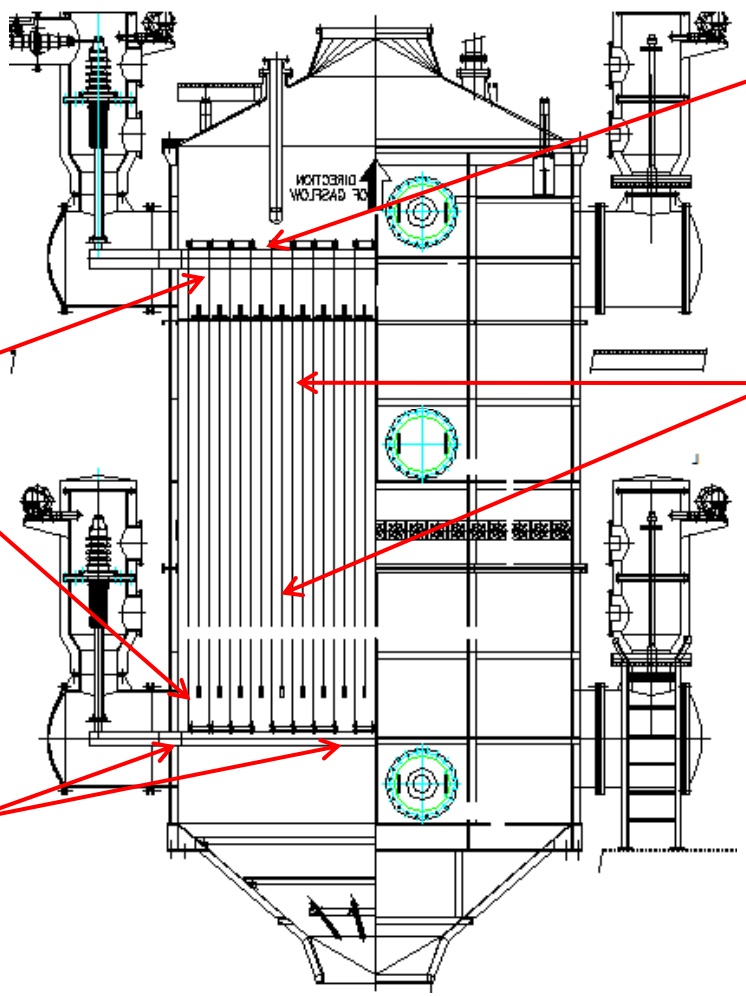
WESP with steel pipe technology with concentric electrode.



WESP preventive maintenance

Inspection for internal components:

WESP with lead plate technology



Upper frame and upper charge pole.

- Lead electrodes

Lead collector plates.

Lower frame and lower charge pole.

WESP preventive maintenance

Frequent faults due to lack of preventive maintenance:

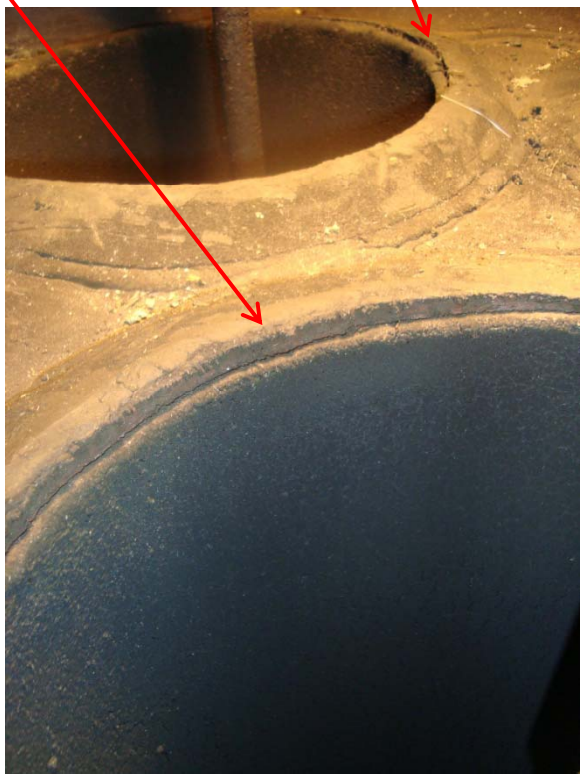
- Uneven and corroded upper frame

Collapsed collector plates

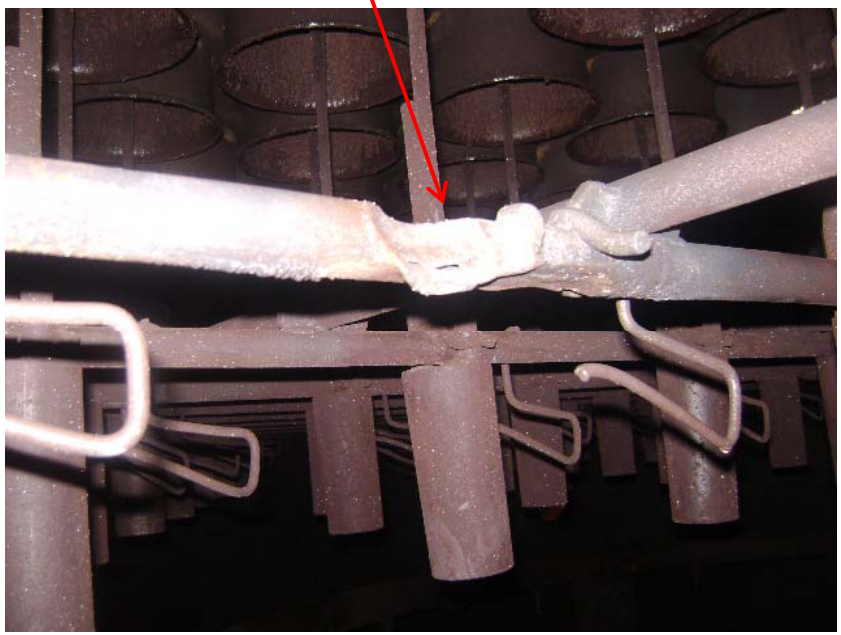
WESP preventive maintenance

Frequent faults due to lack of preventive maintenance:

Deformed and cracked collector pipes



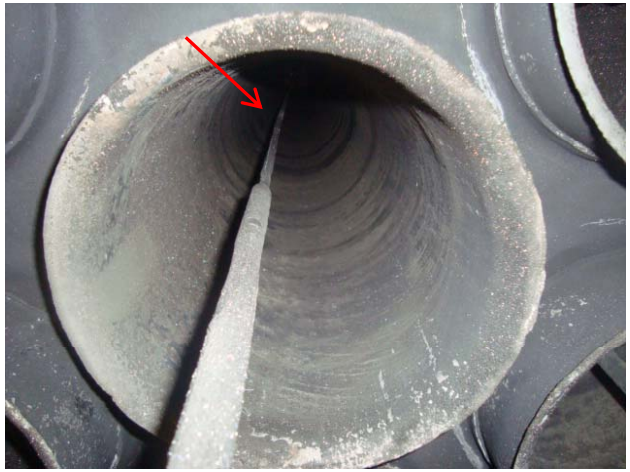
Corroded and uneven lower frame.



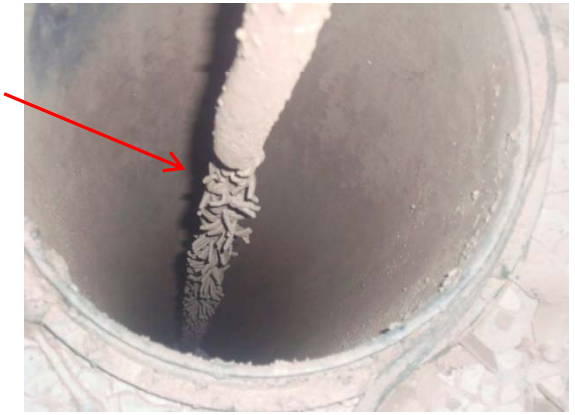
WESP preventive maintenance

Frequent faults:

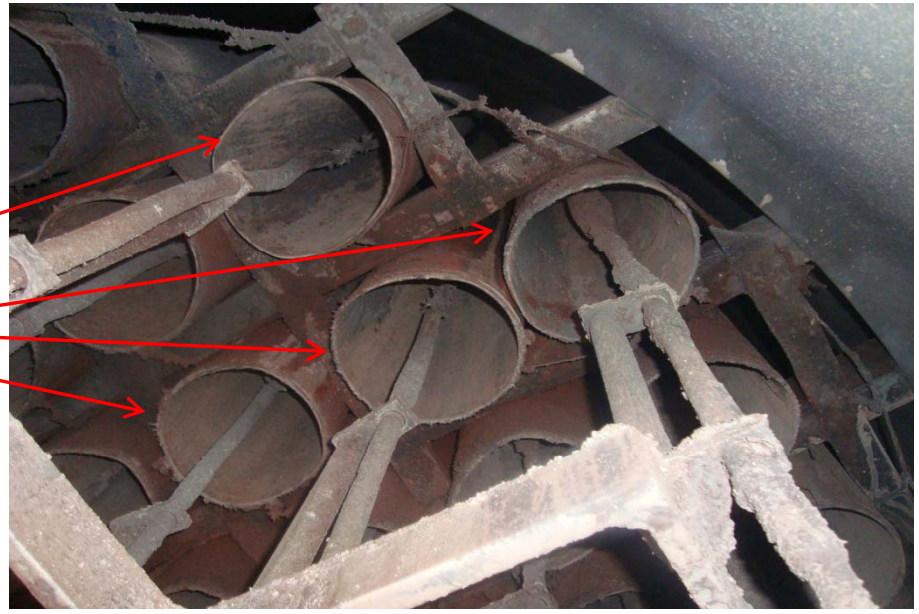
Electrodes out of center



Electrodes with no edges which prevents **Crown effect** from happening and causes a failure in particle collection.



Damaged electrodes with no edges.



WESP preventive maintenance

Preventive maintenance activities to internal components:

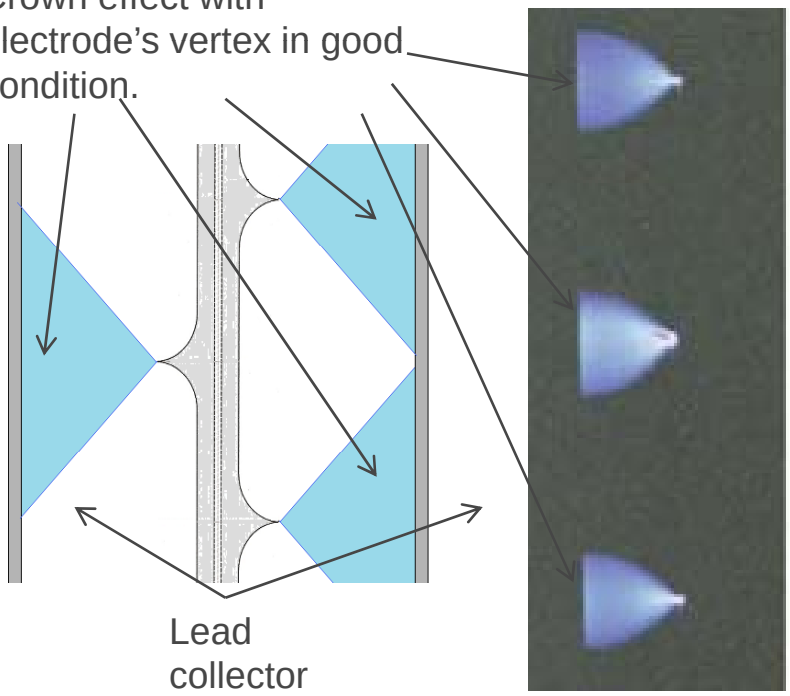
Manufacturing and installation of a new upper frame

Manufacturing and installation of a new lower frame.

WESP discharge electrodes.

IMPORTANT: The fact that an electrode does not generate bends in electronic cabinet lectures, does not mean that it is working correctly; on the contrary, due to the fact that it is not performing its particle collecting task.

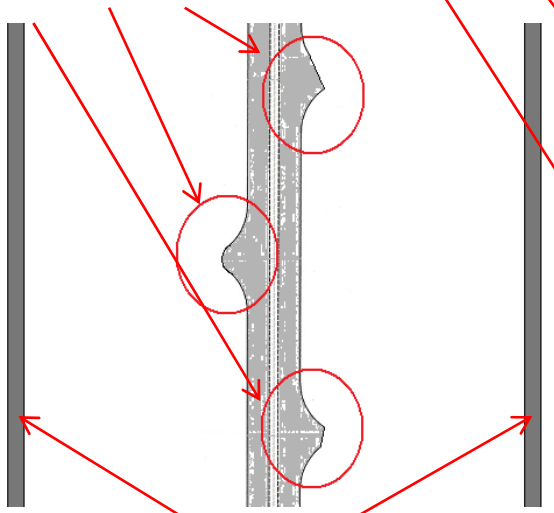
Crown effect with electrode's vertex in good condition.



Lead collector plates

Real effect of electrode within precipitator

Centered electrode but without vertex. It does not cause bends but does not perform its particle collecting task , due to the fact that it does not perform a Crown effect.



Lead collector plates

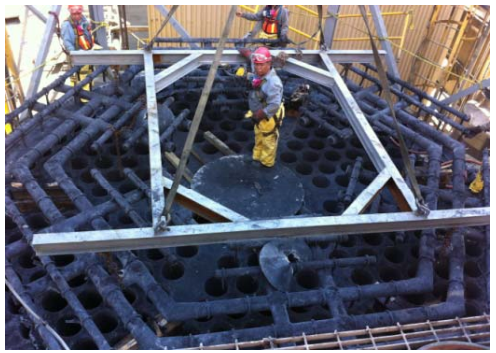
Real effect of damaged electrode within precipitator.

WESP preventive maintenance

WESP repair with lead pipe technology.

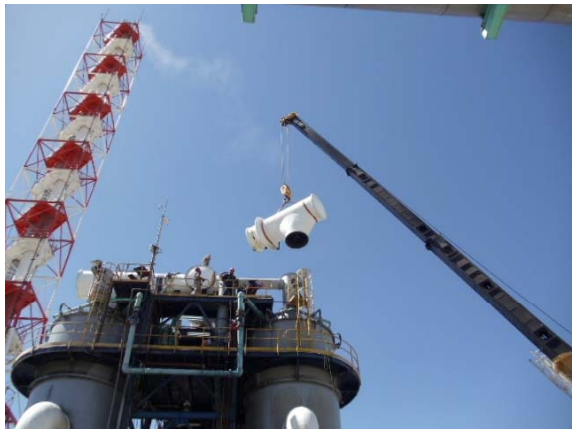
Problem: Deformed lead pipes

Solution: Dismounting of upper dome, upper frame, lead pipes, repairing of pipes and installation of components.



WESP preventive maintenance

WESP preventive maintenance with PVC pipe technology.



WESP preventive maintenance

WESP preventive maintenance with PVC pipe technology.

WESP discharge electrodes

•Manufacturing and installation of all kind of electrode

WESP preventive maintenance

CONCLUSIONS:

***Essencial inspections in order to detect possible faults.**

***Preventive maintenance reduces further costs.**

***Better security conditions for personnel.**

***Improvement of WESP operational performance.**

***Practical solutions and continues improvement for equipment.**

***Elimination of plant stopages caused by WESP faults.**

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