INORCHEM INTERNATIONAL INC.

GALVACID® 2C – METAL PICKLING SOLUTION

Low Fumes Generation & High Yield.

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1.CHARACTERISTICS

- Significant reduction >> 200% of CLH fumes released towards the environment, achieving a substantial environmental improvements in the working area.

- Reduction of metal attack in contrast to traditional acids, which turns to substantial reduction of Fe+2 y Fe+3 gradients in the pickling bath, decreasing the amount of bottom “Dross”.

- Decrease of roughness in the metal surface; therefore, reduction in zinc consumption.

- Increase in M.T of processed material per Kg of Galvacid, which means a high yield compared to tradicional acids.

- Termoactivation. The Yield can be 30% ~ 50% higher by thermal activation, heating the solution to temperatures between 40°C y 60°C.

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2. ELECTROMICROSCOPY GALVACID® VS HCL

UNIVERSIDAD SIMON BOLIVAR

EXPERIENCES :

1. samples of ASTM-A569 Steel were pickled with HCL at 20% weight concentration and GALVACID™ at the same concentration at 15,30,45,and 60 minutes.

2. The samples size was 3,2 cm. diameter and 1m.m thickness.

3. As the sample were pickled and rinsed properly, each one were put in a vacuum chamber to remove the humidity and also metalized with silver to prevent ulterior oxidation.

4. After the sample were conditioned each one was looked at the electron microscope in the 3500X Magnification, selected as the best for this experiment.

5. Appropriate Photo films (TMX 120) were used for each sample.

SAMPLE IDENTIFICATION - PHOTO NUMBER :

Photo number	Magnification	Type of acid	Pickling time	OBSERVATIONS
14309	3500X	Non attacked	None	White clears spots of oxides and irregularities from mechanical work.
14302	3500X	Galvacid™	15 min.	No oxides, no grain definition, non appreciable metal atacck
14303	3500X	HCL	15 min.	No oxides, beggining grain definition ,appreciable metal attack(discontinuos) in the grain boundaries.
14308	3500X	Galvacid™	30 min.	No oxides, no grain definition, non appreciable metal attack
14310	3500X	HCL	30 min.	No oxides, total grain definition,severe metal attack increase deepness in grain boundaries.
14305	3500X	Galvacid™	45 min.	No oxides, no grain definition, non appreciable metal attack
14304	3500X	HCL	45 min.	No oxides, total grain definition, severe metal attack increase deepness in grain boundaries.
14306	3500X	Galvacid™	60 min.	No oxides,minimun grain definition, non appreciable metal attack
14307	3500X	HCL	60 min.	No oxides,total grain definition ,severe metal attack separate grains.

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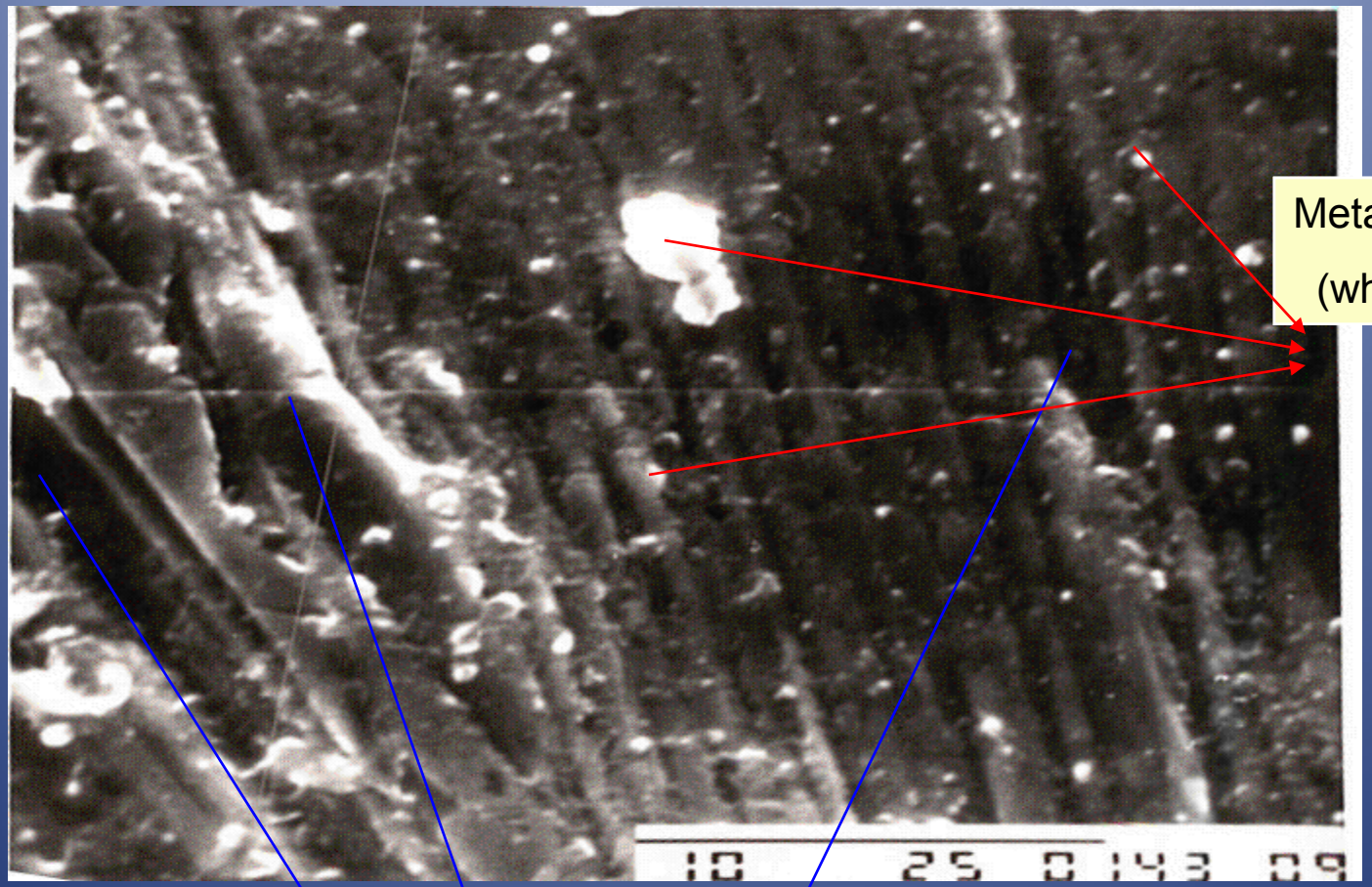
PROBET PICKLED WITH ACID

3500X



Metalic Oxides

(white color)

This irregularities come from the mechanical work. It is important to see them in order to prevent confusion with metal attack

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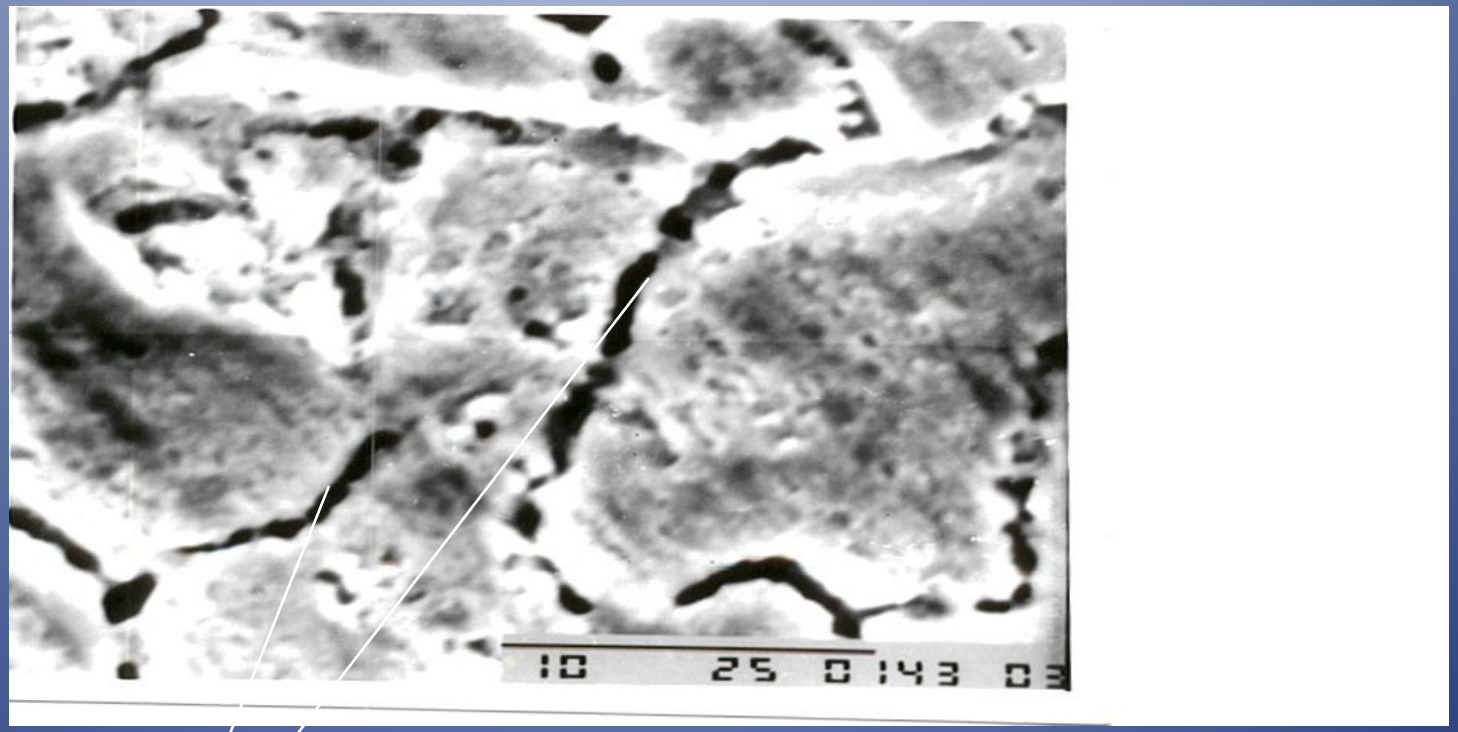
HCL 15 MINUTOS-3500X



Here we can see the severe metal attack effect with the HCL pickling process, which progress and go deeper into the grain alloy boundaries.

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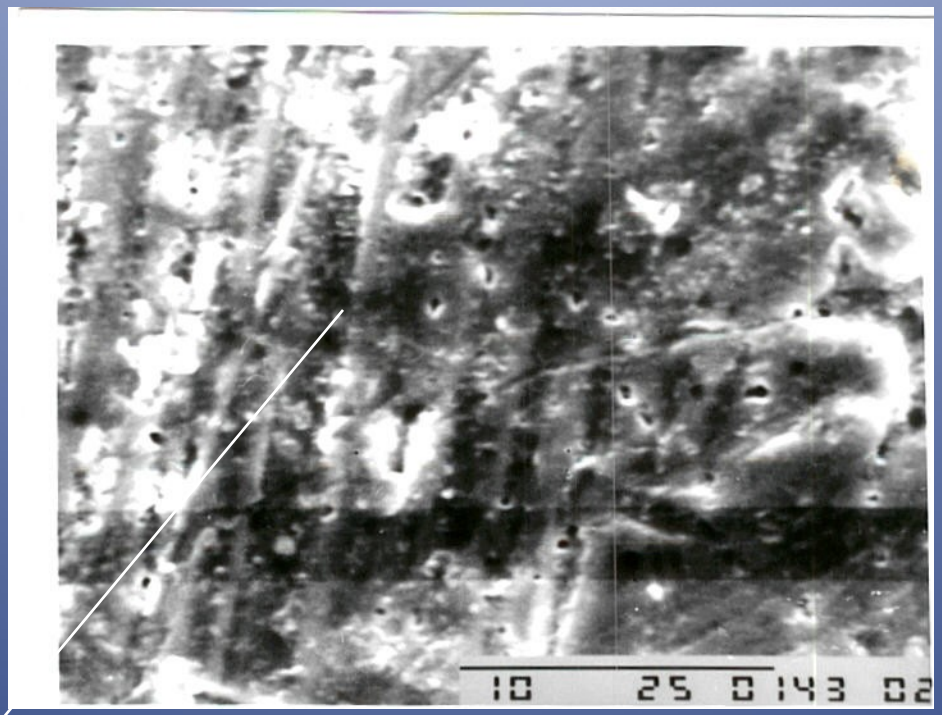
GALVACID® 15 MINUTES

3500X



No roughness observed, no grain attack as usually seen in in the experience with HCL, during the same period of time.

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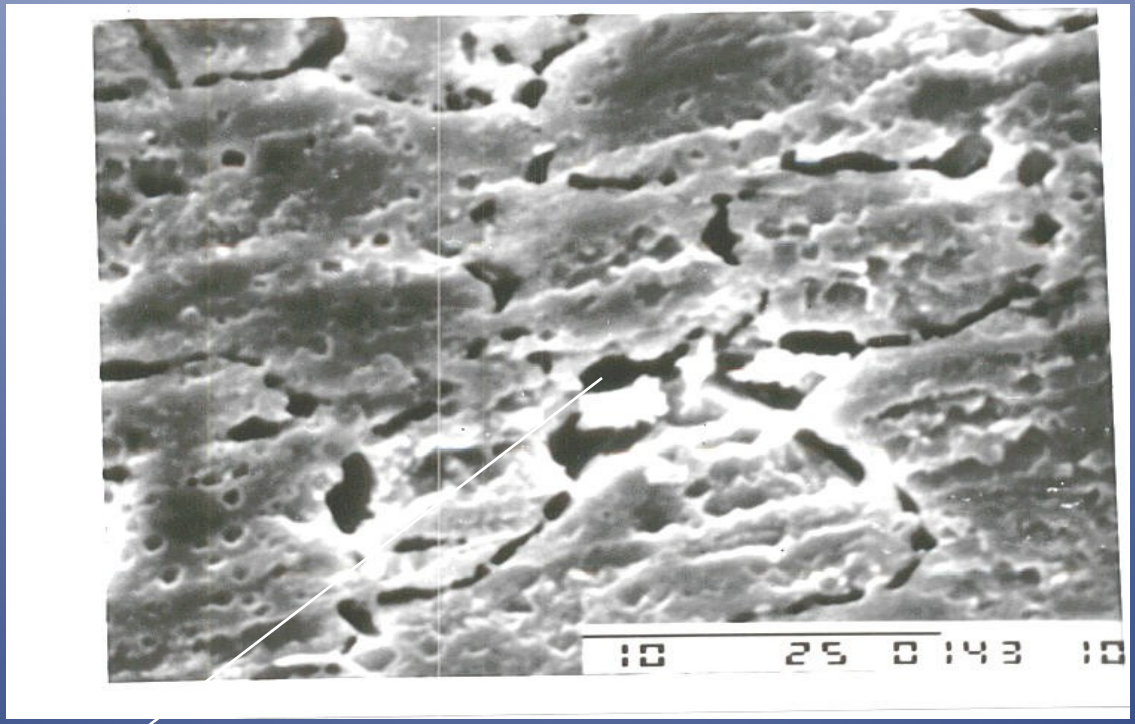
HCL 30 MINUTOS

3500X



It is easily observable the progress of the metal attack over the grains and their boundaries.

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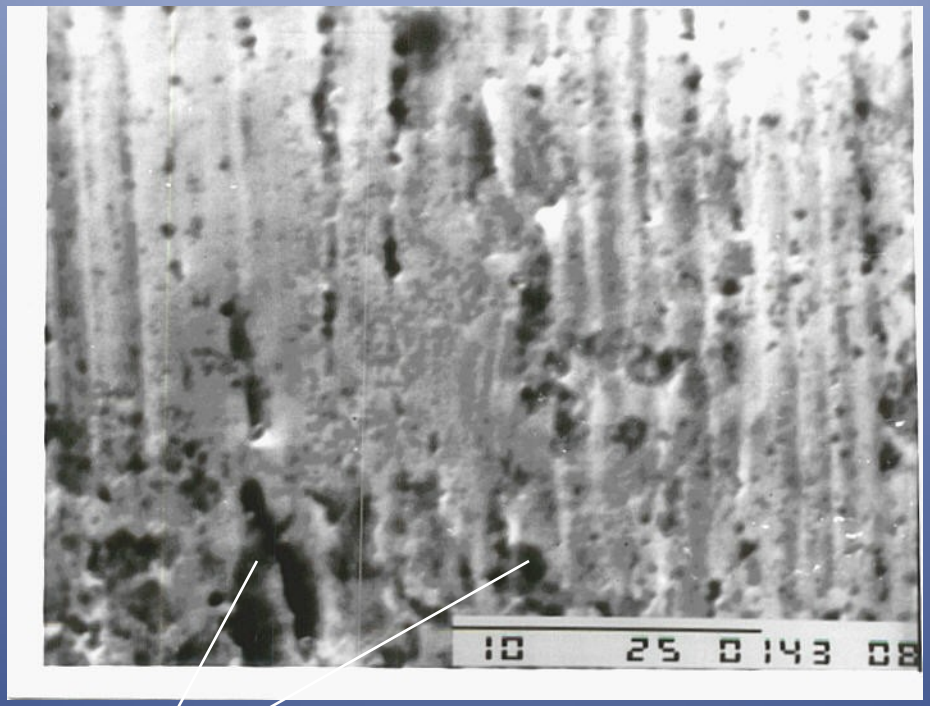
DECAPADO CON **GALVACID®** 30 MINUTOS

3500X



These irregularidades come from mechanical work previous to rolled. See slide 2. There is no metal attack nor grain definition, as usually seen during HCL pickling . Roughness is minimal, therefore, zinc consumption reduction can be foreseen.

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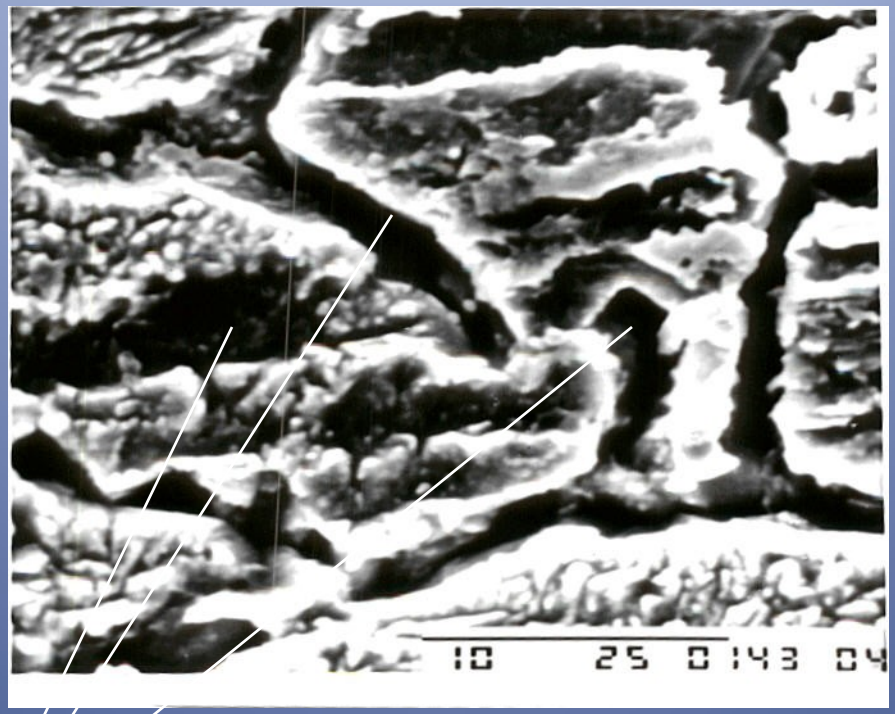
DECAPADO HCL 45 MINUTOS-3500X



It is possible to see how the grain is completely destroyed, as well as the significant roughness over the surface, which influences directly in the zinc coating.

We can forsee higher consumption of zinc by the filling of these irregularities in the surface of the metal.

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DECAPADO CON **GALVACID®** 45 MINUTOS

3500X

It can be seen a soft surface, no evidence of metal attack. This is what we call “Optimal Surface Conditioning”.

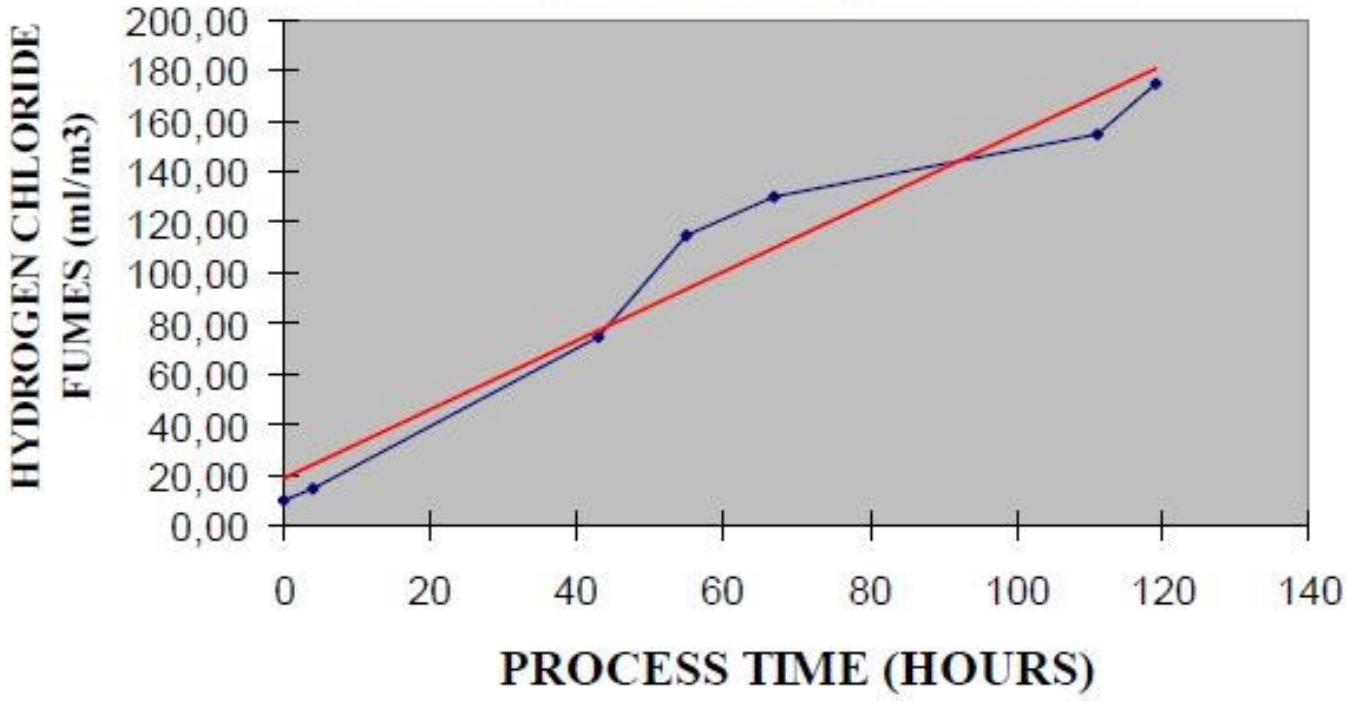
3. INDUSTRIAL EXPERIENCES

FOLLOWING ARE SHOWN SEVERAL KEY PARAMETERS MEASURED IN WORKING CONDITIONS DURING TESTING AT CLINETS FACILITIES

GRAPH 1: HCL HYDROGEN CHLORIDE FUMES VS PROCESS TIME

SOURCE : SIGALCA PLANT -WORK AREA

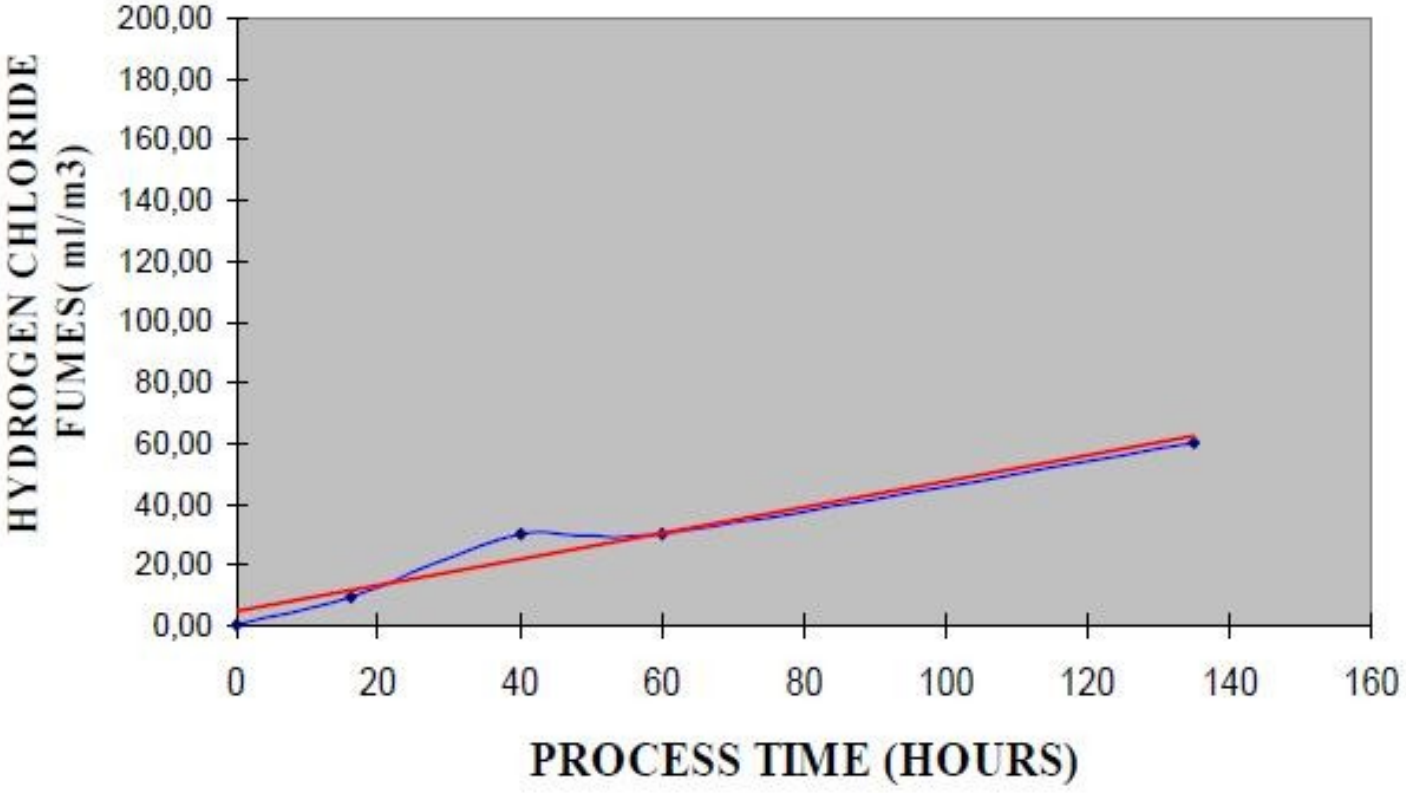
Continuos Strip-Pickling tank 3000 Liters.



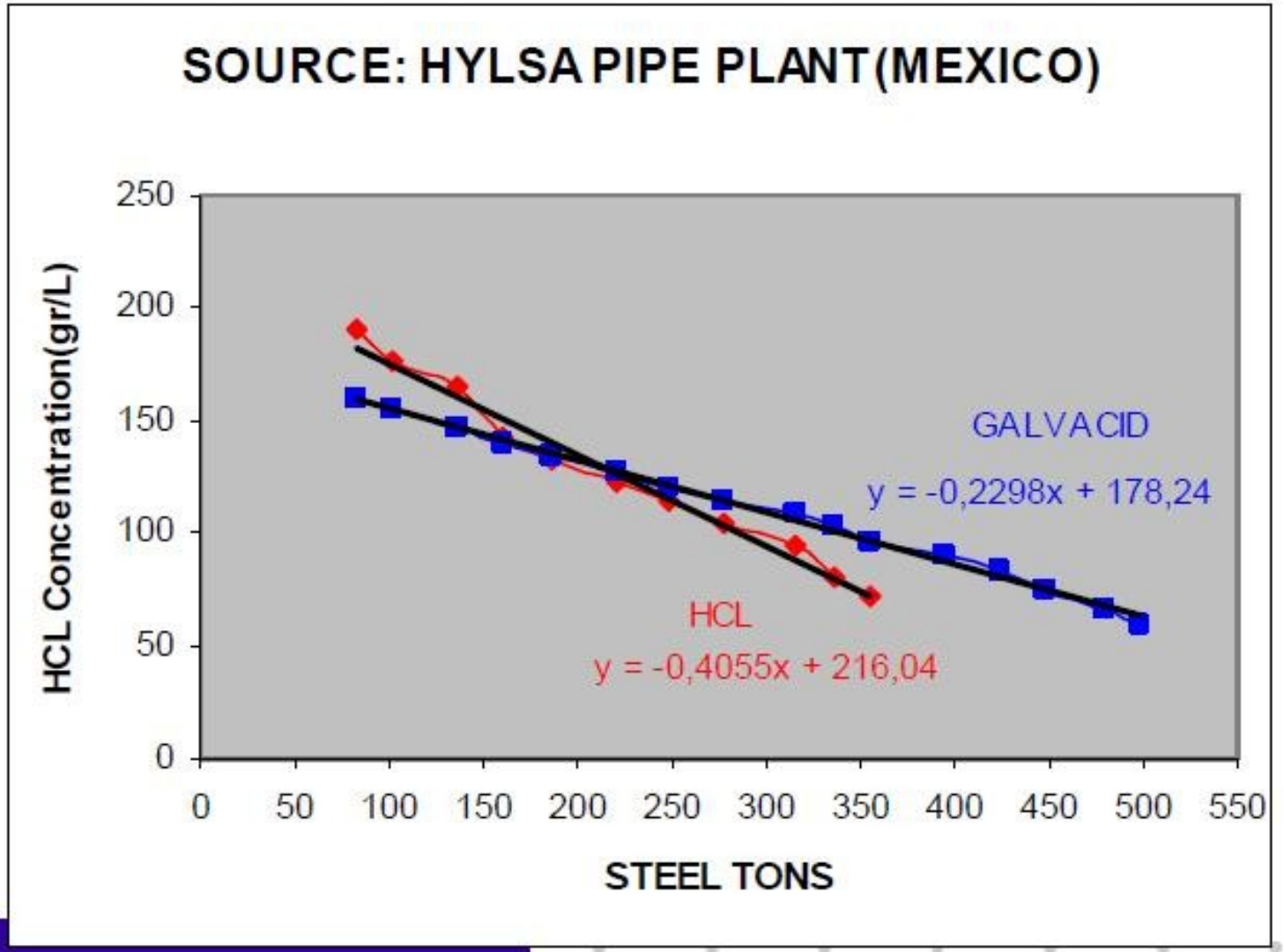
GRAPH 2 :GALVACID™ HYDROGEN CHLORIDE FUMES VS PROCESS TIME

SOURCE : SIGALCA PLANT - WORK AREA

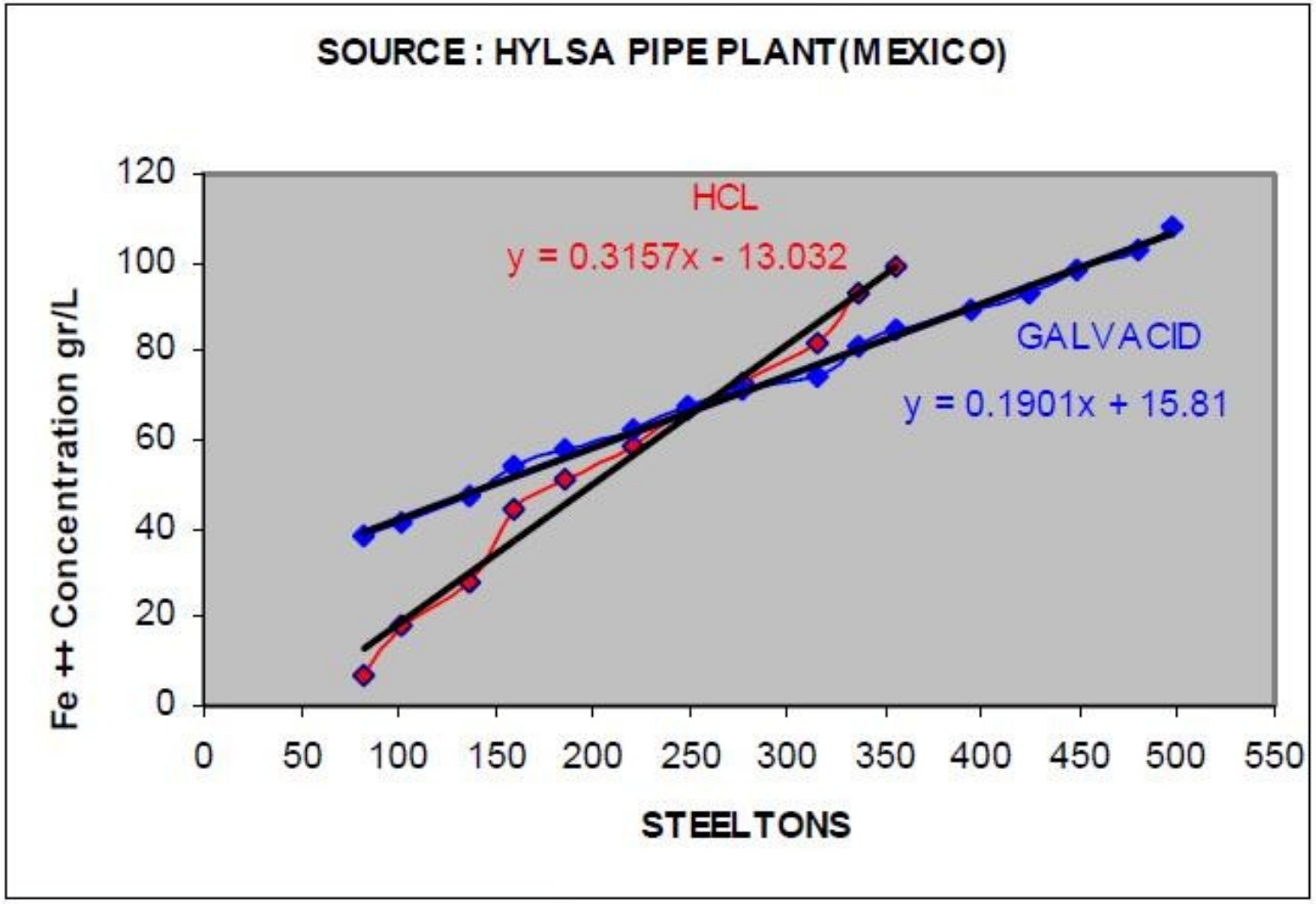
Continuos Strip-Pickling tank 3000Liters.



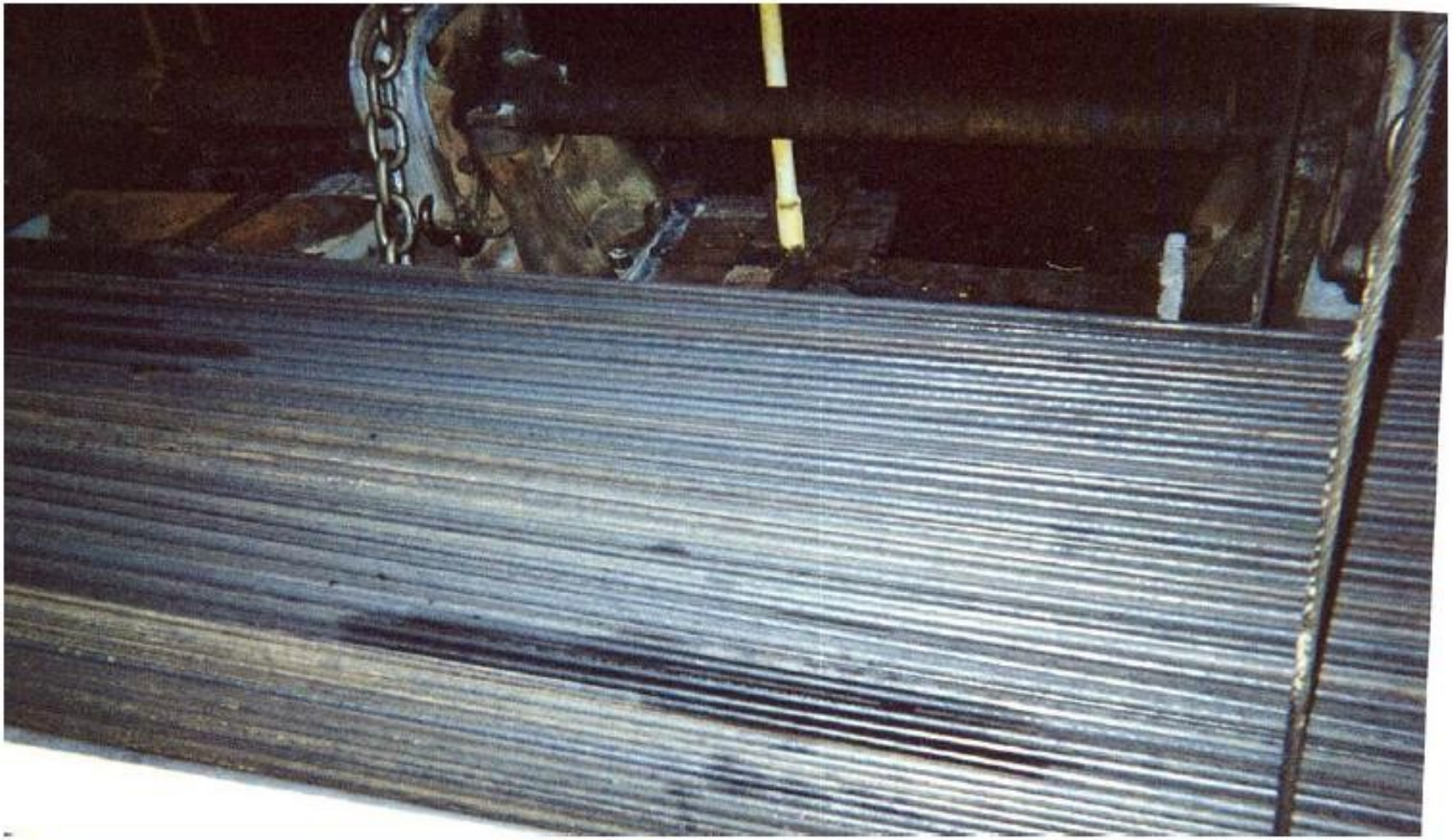
GRAPH 3: HCL CONCENTRATION DECREASE GRADIENT- GALVACID™ VS HCL



GRAPH 4: IRON INCREASE GRADIENT GALVACID™ VS HCL



LACLEDE STEEL- PIPE BEFORE PICKLING



LACLEDE STEEL- PIPE AFTER GALVACID™ PICKLING

GALVACID™ FOAM BLANKET SOURCE: LACLEDE STEEL

4. CONCLUSION

GALVACID® SHOWS THAT THE METAL ATTACK OVER STEEL IS MINIMUM IN A WIDE RANGE OF EXPOSITION TIMES VS THE HCL WHICH SHOWS SEVERE METAL ATTACK.

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5. COMMERCIAL REFERENCES GALVACID® 2C

1. American Galvanizers Asociation (AGA)
2. UNICON – Arcelor Mittal
3. Ingasa
4. ARMCO
5. Acerogrill
6. Corpacero
7. Laclede Steel
8. UNIVENSA
9. Somanin
10. Maide
11. Alambres Yaracuy

NOTE: Commercial References are provided upon request.

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END


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