



CLEANING OF PRESSURE PIPELINES

by means of

AIR-WATER-JETTING LW87

MTA Messtechnik GmbH

Service & Products for Water and Wastewater Management,
Industry and Environmental Engineering

AIR-WATER-JETTING LW87 APPLICATIONS

- Standard Air-Water-Jetting LW87 from 1/2 " – DN 1400
- Pressure pipelines
- Ipipelines
- Flushing of pipelines up to DN 1400 in preparation

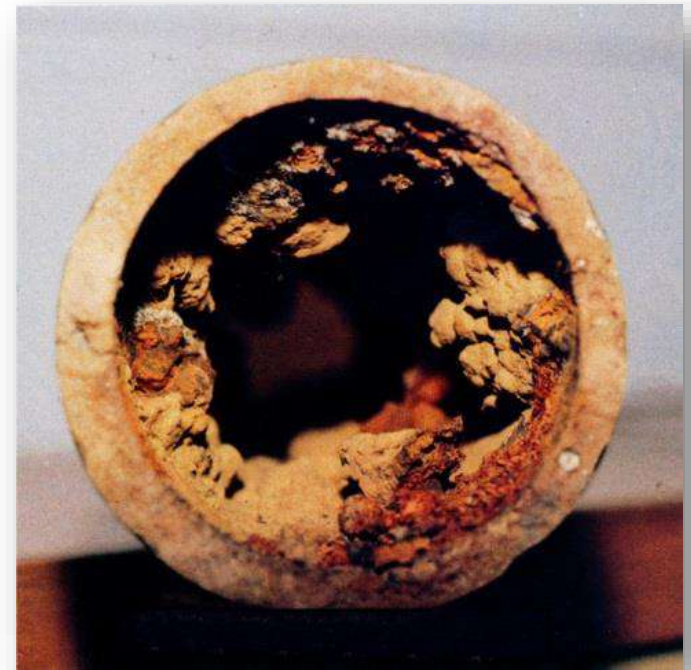


BENEFITS – AIR-WATER-JETTING LW87

- No water turbidity
- No excavations
- High output up to several km/day
- Improved valve function (tightness, maneuverability)
- Longer maintenance intervals
- Effective prevention of incrustations
- Independently usable of pipe diameter

POSSIBLE DISRUPTIONS

- Turbidity of potable water
- Incrustations
- Blockages





PERIODICAL MAINTENANCE AND CLEANING

GOALS

- No turbidity of potable water
- Minimizing disruptions
- Longer life of the pump unit
- Energy saving potential
- Cost saving

PERIODICAL MAINTENANCE AND CLEANING

METHODS

- Standardized, logged maintenance operations in regular cycles

CONSEQUENCES

- No turbidity of potable water
- Lowering the required delivery pressure
- Higher operational reliability
- Significantly lower operating costs

CLEANING PROCEDURE FOR PRESSURE PIPELINES

- until 1985 standard method

Pigging

mechanical procedure

- since 1985

Air-Water-Jetting LW87

procedure without insertion of solid objects



THE BIRTH OF AIR-WATER-JETTING LW87

- 1985: Water loss analysis in Ystad, by the company Läckage Analys AB, today named MTA Messtechnik GmbH
- Large quantities of air introduced into pipe
- **Result:** removal of manganese sedimentation



IMPULSE FLUSHING PROCEDURE (1985 - 1987)

- until 1987
- uncontrolled pressure shocks – pipe damages up to pipe burst
- 1987 Air-Water-Jetting LW87 procedure has been developed as known today

AIR-WATER-JETTING LW87 – 2nd GENERATION

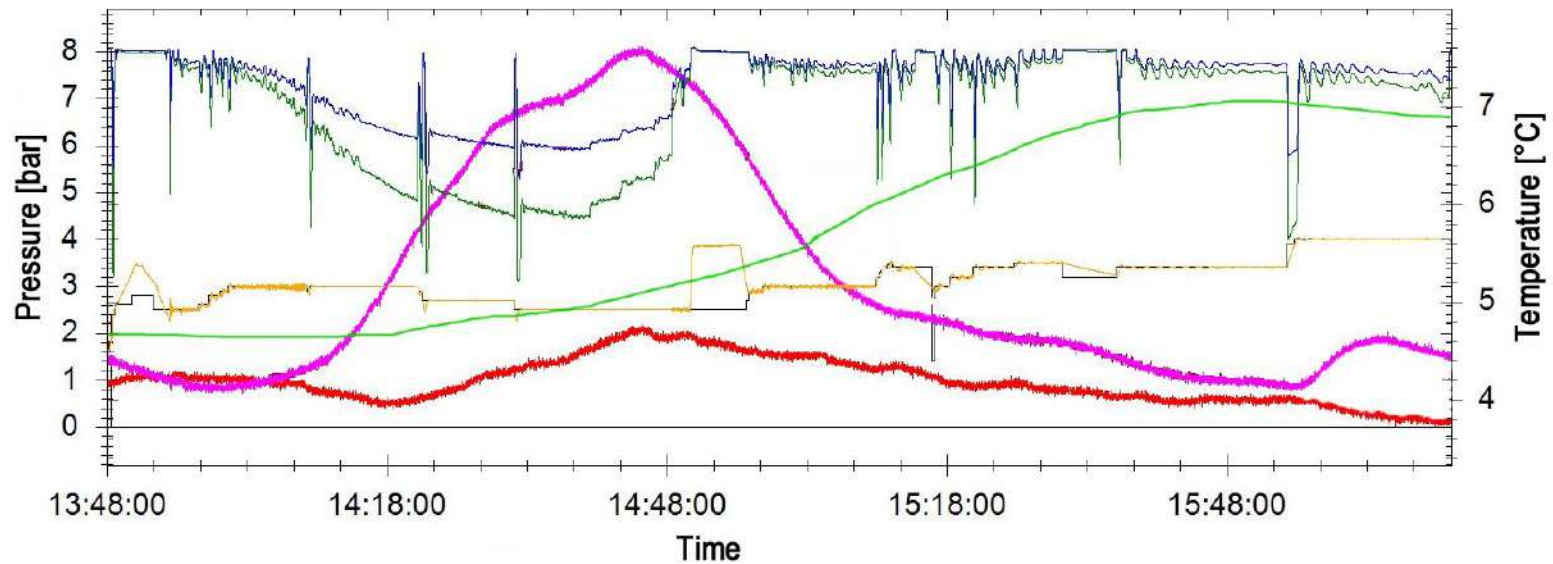
- **Constant pressure flushing procedure** instead of impulse flushing procedure
- Air-Water-Mixture +
- Flushing pressure adjusted to pipe parameters

 Optimal cleaning efficiency

AIR-WATER-JETTING LW87 – 2nd GENERATION

Constant pressure flushing procedure

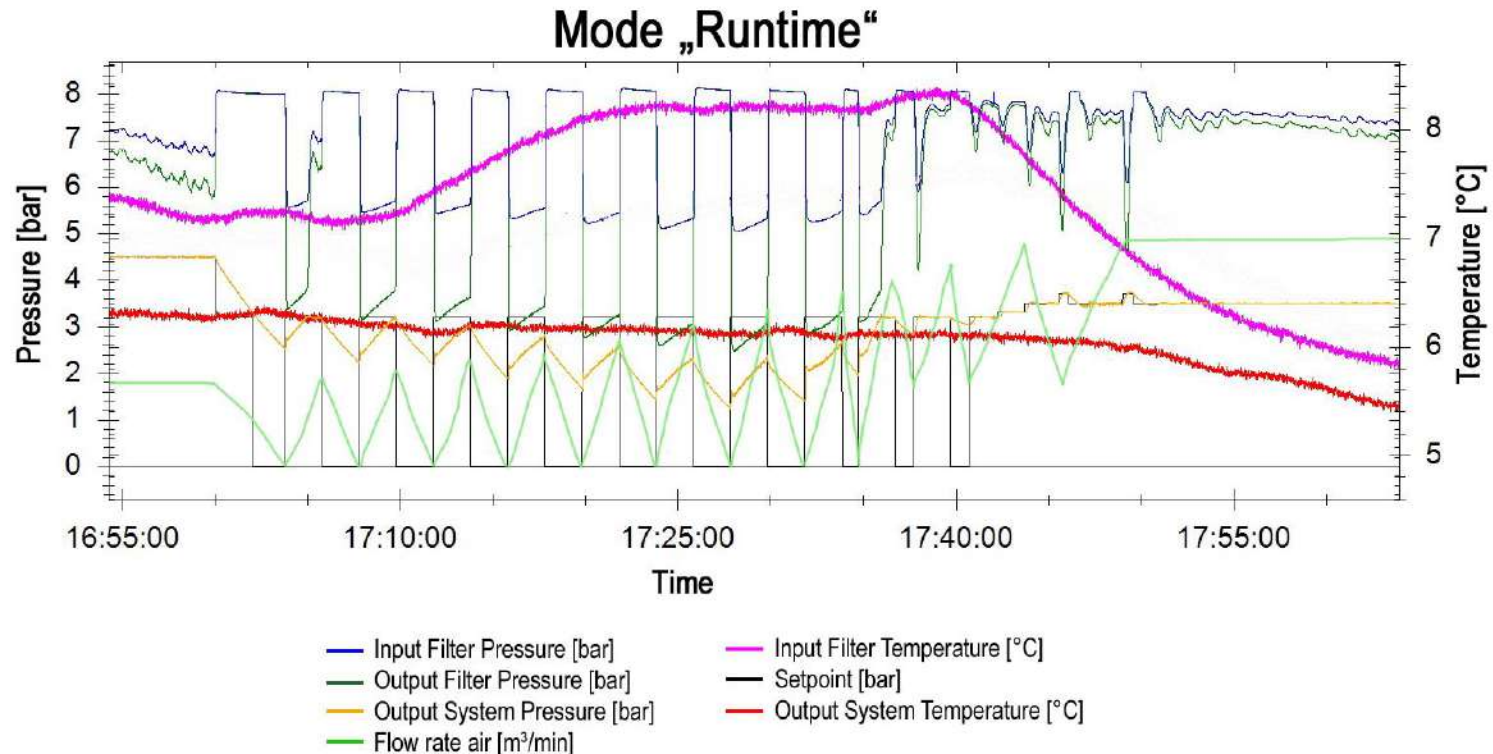
Mode „Standard“



- Input Filter Pressure [bar]
- Output Filter Pressure [bar]
- Output System Pressure [bar]
- Flow rate air [m³/min]
- Input Filter Temperature [°C]
- Setpoint [bar]
- Output System Temperature [°C]

AIR-WATER-JETTING LW87 – 2nd GENERATION

Constant pressure flushing procedure



GENERAL CONDITIONS FOR THE USE OF AIR-WATER-JETTING LW87

- Skilled trained personnel
- Equipment adjusted to the pipeline to be cleaned
Air filter – air cooling – pressure controller
- Definition of cleaning sections (Do not choose too long!)
- Attention in handling opening and closing the valves
→ Danger of pressure shocks
- Thorough venting of the pipes after successful
Air-Water-Jetting

NECESSARY ADVANCE INFORMATION

- How long can the pipeline stay out of service?
- Length of last cleaning intervals?
- Which deposits or sediments can be expected?
- Where flushing the deposits?
- Length – pipeline material and DN?
- Air connection option available?

AIR-WATER-JETTING LW87 WORKFLOW

1. Requirement: assesment of the actual state
2. Disconnect the pipeline from the mains
3. Close the house connections
4. Preparation of hydrant, discharge opening or house connection for flushing the sediments and deposits
5. Establishing the air connection to the flushing system

AIR-WATER-JETTING LW87 WORKFLOW

6. Start Air-Water-Jetting procedure
7. Start air supply to pipeline
8. By means of a hydrant and slightly opening a valve, necessary flushing pressure and the optimum air-water mixture are achieved

AIR-WATER-JETTING LW87 WORKFLOW

- Pipeline flushing – via hydrants and draining
- Stub pipelines – via house connections





AIR-WATER-JETTING LW87

BEFORE



AFTER



AIR SUPPLY

- Cooled, oil-free and sterile air
- **Cooling** is mandatory to prevent germination and pipeline damage (PEHD)
- **Insertion** via computer-controlled air treatment system
Under constant pressure
without pressure shocks



FLUSHING PRESSURE

- Always lower than the nominal operating pressure
 - ➔ **Less load** on the pipeline during the flushing procedure compared to normal operation
 - ➔ **Damage** due to pressure conditions can be demonstrably excluded

FLUSHING PRESSURE II

- Higher flushing pressure does not equal better cleaning effects
- Optimum cleaning effects depend on the correct combination of flushing pressure and air-water-mixture relating to the pipe diameter

FLOW RATES

- up to 25m/s
- Development of turbulences in terms of **cavitation effects**

➔ „**JET EFFECT**“ ensures a thorough **removal** of sediments from the pipe walls and **transportation** out of the pipeline



EXAMPLE I

Before cleaning

Raw water pipeline

length 1.5km, DN 150

AZ-Gray Cast Iron, no treatment device

15 years of operation

Before cleaning:

5 l/s at 7.5bar pump pressure



EXAMPLE II

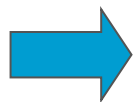
Result after cleaning:
5.2l/s at 2.5bar pump pressure



Sediments: gravel, sand, iron, manganese

Reduction of pump pressure by 60%

Energy costs savings



Longer operating life of pumps and pipelines



FLUSHING OF SEDIMENTS AND DEPOSITS





CLEANING REPORT I

Datum 03.03.2003	Unsere Zeichen Marko Taferner	BestellNr 5803
Ihr Datum 01.04.2003	Ihre Zeichen GR-DW720	Ihre BestellNr 2302952/36469/40



Reinigungsprotokoll - Luft-/Wasserspülung

ReinigungsprotokollNr 12 **Datum:** 07.05.2003 **Techniker:** Marko Taferner
Kommunaltechniker: Plimon Verius

PLZ 9020
Ort: Klagenfurt
PlanNr: 1
Reinigungsgebiet: Tessedorf
Reinigungszone: 12
Farbe der Reinigungszone: Grün
Straße: Berthold Schwarz Straße - Tessedorfer Straße - Randgasse

Leitungslänge in Meter: 3700
Durchmesser in mm: 150,150,100,100,100,80
Leitungsmaterial: PVC,GE,AZ,GE,PVC,GE
Leitungsvolumen in m³:
Anzahl geschlossener Ventile für Reinigungszone: 4
Schadhafte Armaturen: **Hydranten:** 0 **Ventile:** 0 **Hausanschlußventile:** 0
Geschlossene Ventile im Gebiet gefunden: 0
Hausanschlüsse geschlossen: ja

Spülpunkte:	H 1	H 2	H 3	H 4						
Durchspülung beginnt/Uhrzeit	11:30	14:00	15:00	18:00						
Luft beigemischt/Uhrzeit	11:45	14:05	15:20	18:05						
Luftspülung mit Chlor JA/NEIN	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Luft erreicht Austrittspunkt/Uhrzeit	11:55	14:15	15:40	18:10						
Wasserverfärbung beginnt/Uhrzeit	11:55	14:15	15:40	18:10						
Starke Verfärbung/Uhrzeit	11:55	14:15	15:40	18:10						
Verunreinigung/Dauer	01:35	00:15	01:20	00:10						
Verunreinigungsgrad ml/Liter	19	5	18	5						
Verunreinigungsart	Fe	Fe	Fe,Mn	Fe,Mn						
Wasser klar/Uhrzeit	13:30	14:30	17:00	18:20						
Luft abgestellt/Uhrzeit	13:30	14:30	17:00	18:20						
Luftfrei am Austrittspunkt/Uhrzeit	14:00	15:00	17:30	18:30						
Durchspülung abgeschlossen	14:00	15:00	18:00	19:00						
Wasserprobe/Uhrzeit										
Wasserprobe Nr.:	0	0	0	0	0	0	0	0	0	0

Notwasserversorgung für Abonnenten: Gasthaus und Schlosserei

Bemerkungen: keine

Wasserverlust: keiner

Druckprobe: 4,5 auf 1 bar



CLEANING REPORT II

ReinigungsprotokollNr:	12	Datum:	07.05.2003
Reinigungsgebiet:	Tessendorf		
Reinigungszone:	12		
Farbe der Reinigungszone:	Grün		
Straße:	Berthold Schwarz Straße - Tessendorfer Straße - Randgasse		

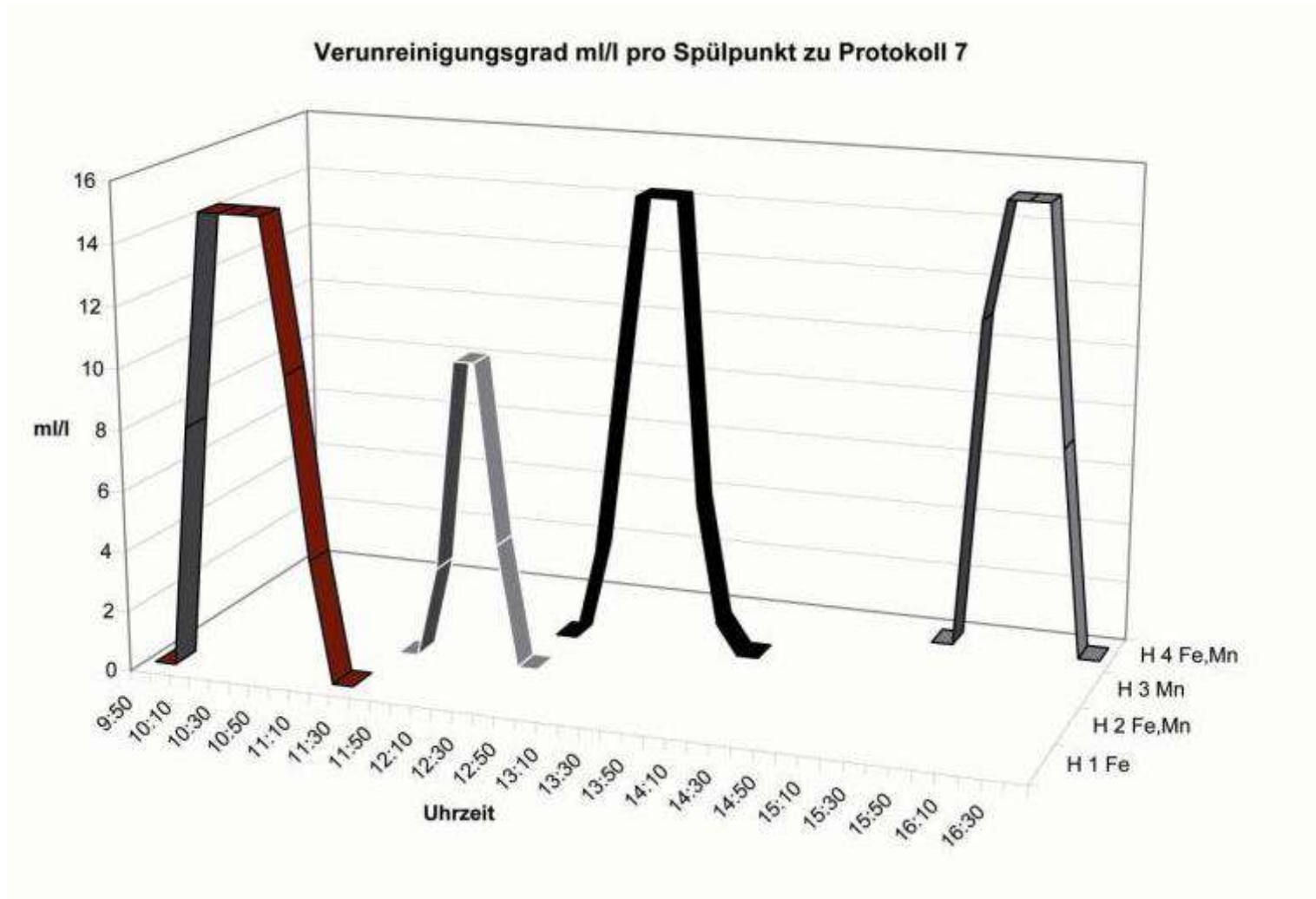


Reinigungsprotokoll - Skizze





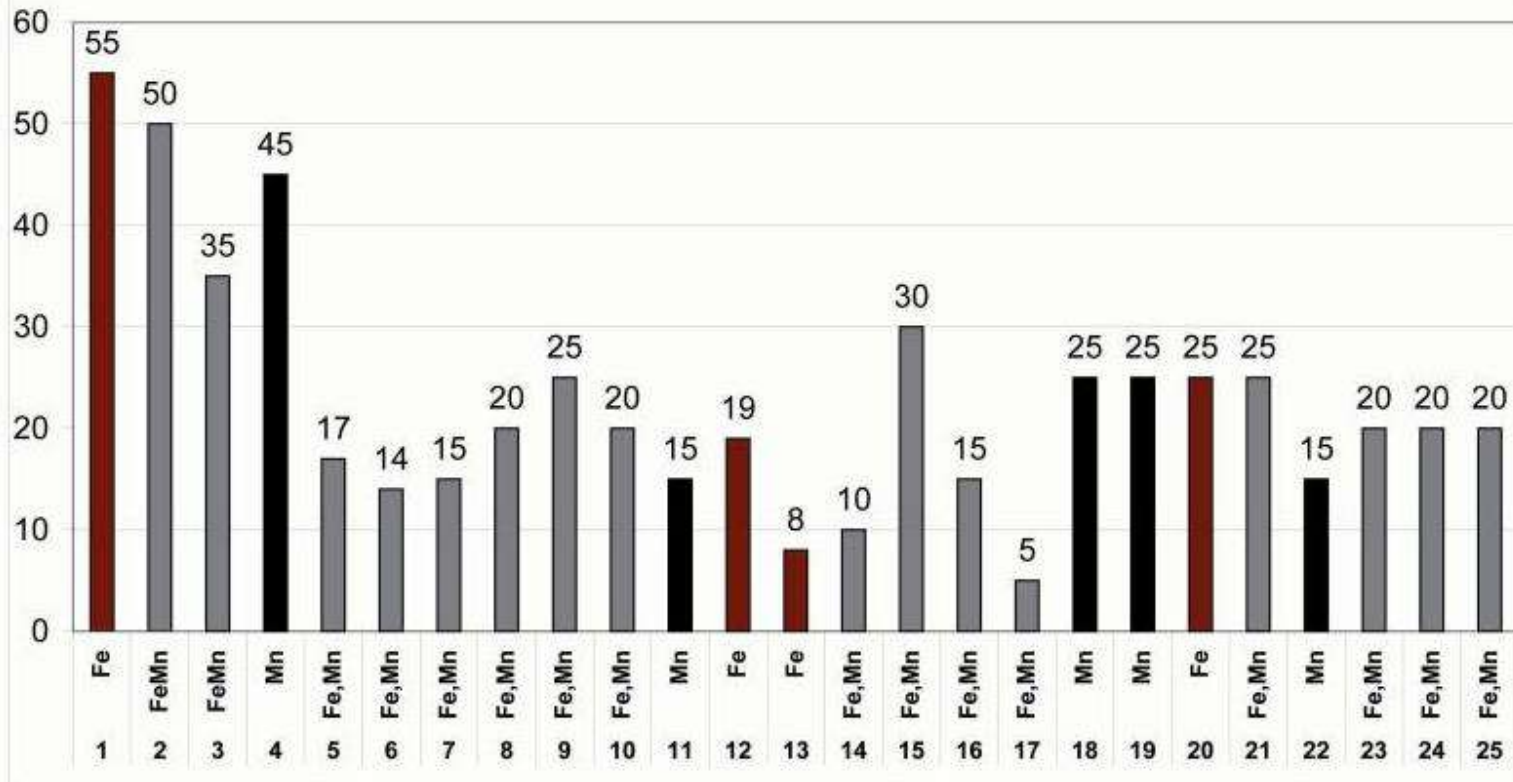
CLEANING REPORT III





CLEANING REPORT IV

Gesamtübersicht Verunreinigungsgrad der einzelnen Rohrspülungen m/l



MOBILE CLEANING PLANT LW87

AIR-WATER-MIXING DEVICE

- Air supply
- Air cooler
- Air filter system
- Disinfection system



MOBILE CLEANING PLANT LW87

CONTROL SYSTEM

- Electronic pressure regulator
- Air volume meter
- Automated control process
- Temperature display
- GPS receiver
- Voltmeter
- 12 Volt gel battery
- Battery charger





There is a pipeline cleaning technology that uses a mixture of compressed air and water to remove incrustations in the networks.

Coronel

There has been not much care about the structures since the year 2000.

Wells
High concentrations of Mn and Fe.

Pipelines
High encrustation of Biofilm and deposit of Fe and Mn oxides.

Customers
In the past three years complaints of customers increased.

Coronel's Integral Quality Plan
Analyzing whole process diagnosing, proposing and implementing solutions.

Inexpensive procedure considering the large extension of the network to intervene.

The method delivers high efficiency and performance in removing incrustations from pipelines.

Cleaning method for main pipelines (DN 250-600).



Cleaning method “Air Water Jetting LW 87”



Cleaning method Air Water Jetting LW 87

Without further intervention on public roads

High performance (diameter / length / time)

Less water consumption compared to known methods

Method to clean incrustations in cast iron

Operation with a small number of employees











Very low maintenance cost of the equipment

Use of this advanced technology in Latin America enhances the corporate image

Built-in software allows documentation of all interventions and review of data base.



Results Cleaning Works Essbio, Concepcion, Chile

VAN		TIR		PAYBACK	
194 MM\$		50%		< 2 years	
Effectiveness			Clean Type		
			MTA Air Water Jetting LW 87 		
			Coronel-Jet-System		
			Ice Pigging		
			Gravitation		
Cost (\$/ mt.)			Clean Type		
			Gravitation		
			MTA Air Water Jetting LW 87 		
			Coronel-Jet-System		
			Ice Pigging		
August		September		Total to date	
Km. cleaned	7,8		4,3	12,1	
Savings \$	\$ 16.292.476		\$ 8.964.374	\$ 25.256.850	





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