

NORTHWEST FISH CULTURE CONFERENCE
2004 Annual Meeting

OPTIMIZING WATER SUPPLY WELL PERFORMANCE



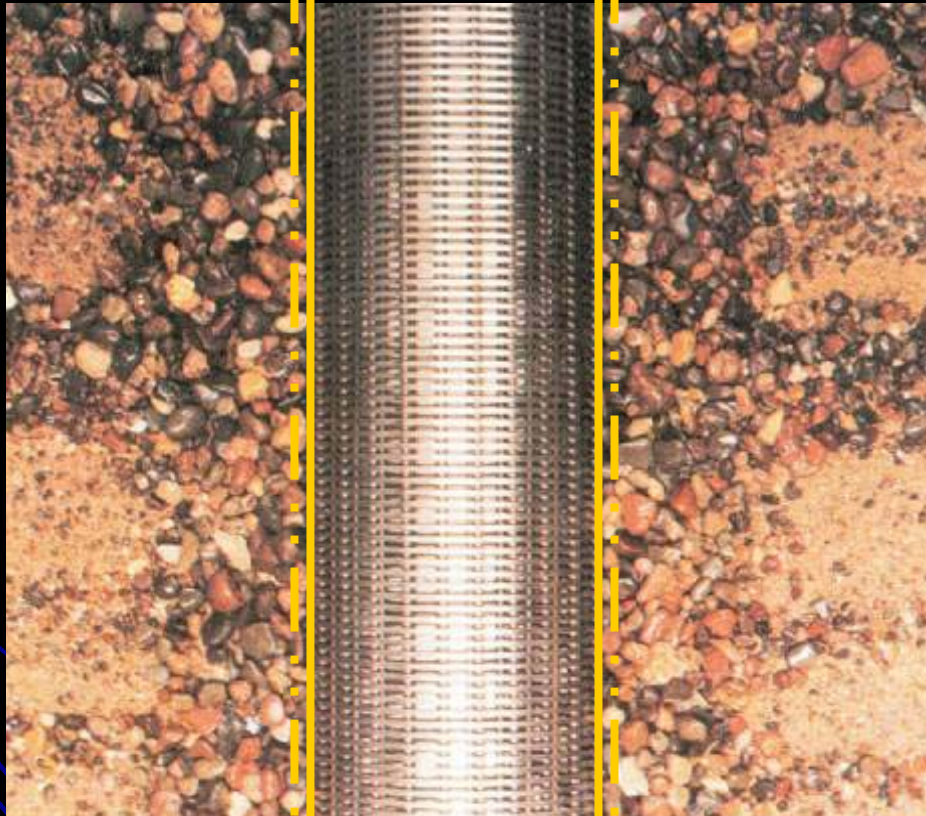
Why Good Wells Go Bad?

Wells under stress

- Poor well Development
- Bacterial & Microbial growth
- Improper pump placement
- Working too hard or over-pumping!



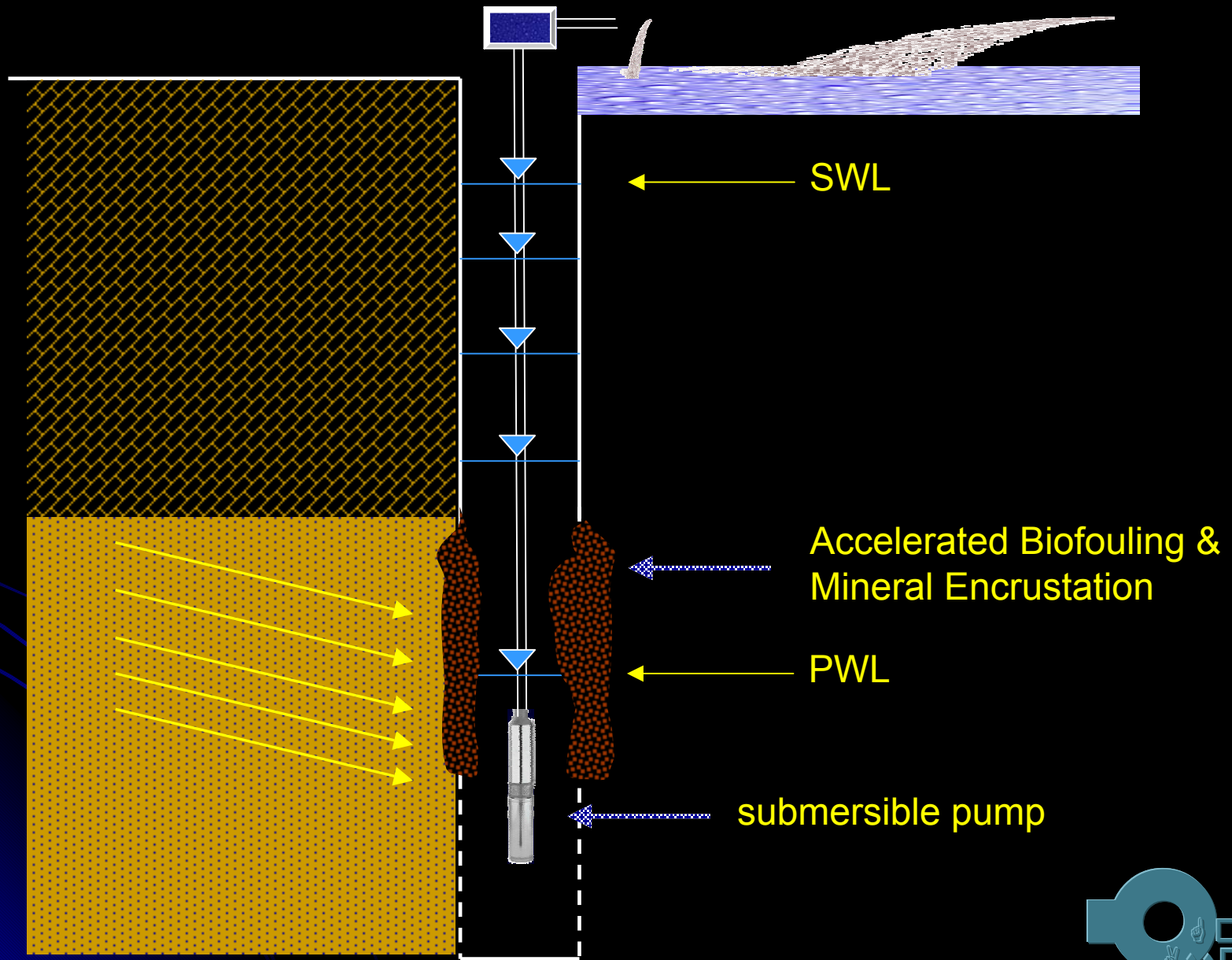
Well Development



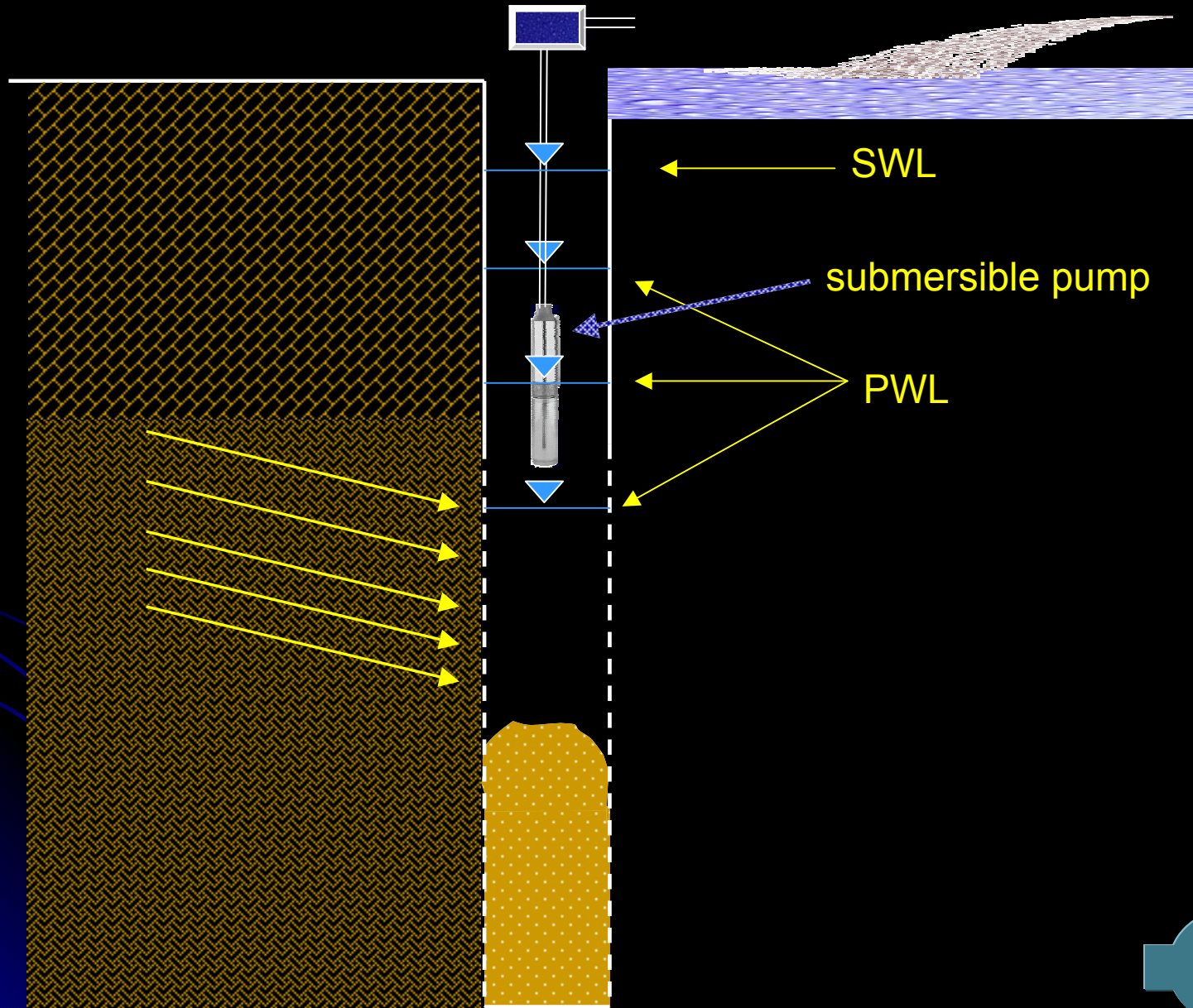
Biological Fouling



Improper Pump Placement

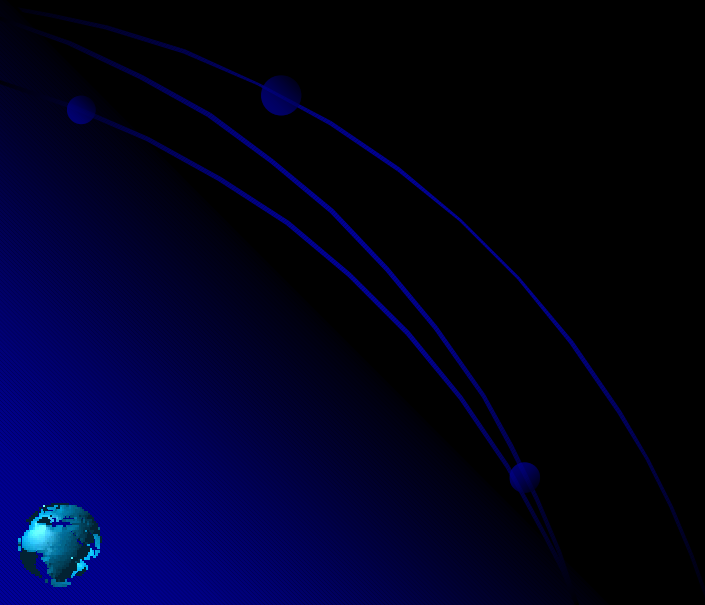


Over-pumping



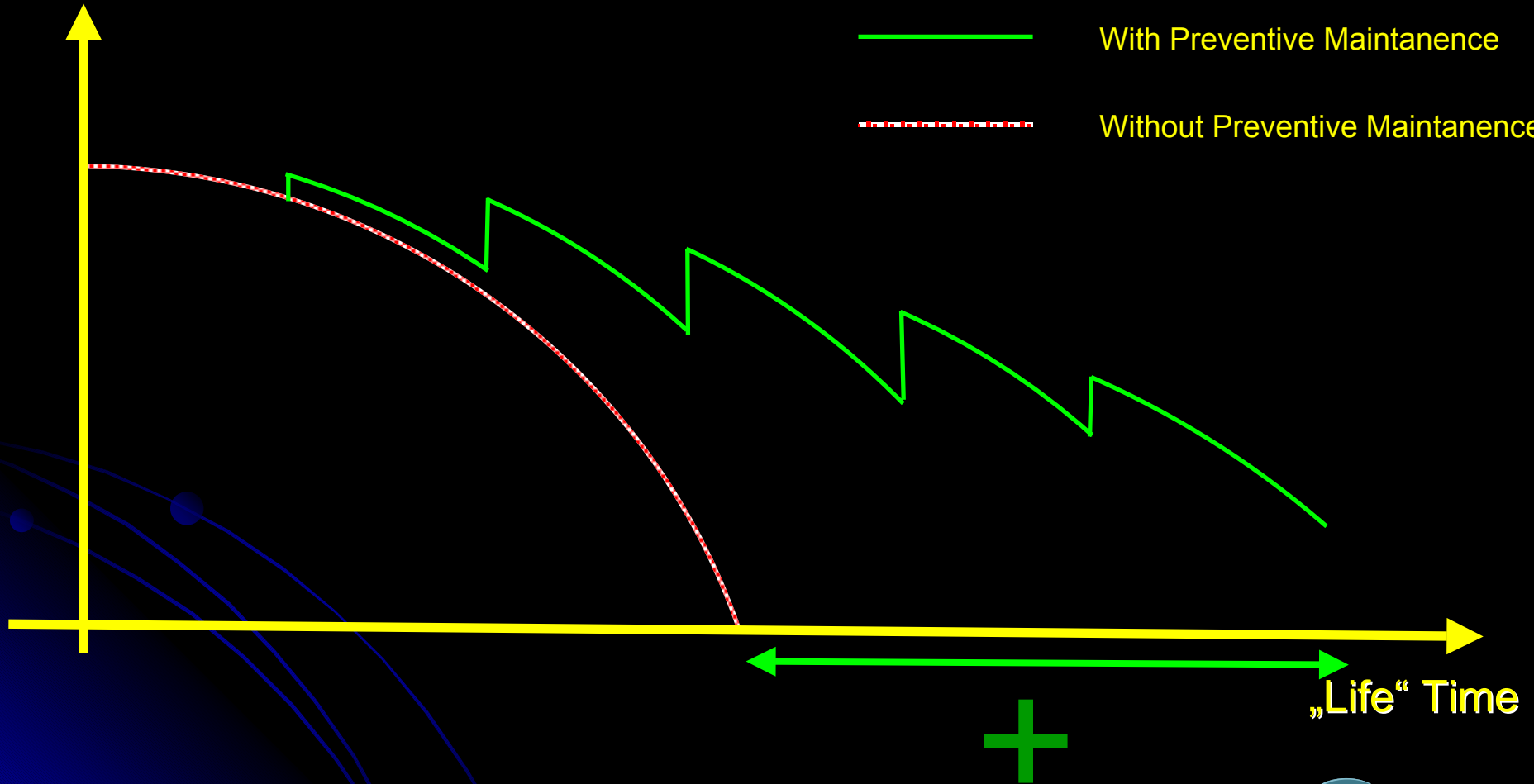
Reasons for Declining Specific Capacity

- Well Construction
- Well Development
- Bacterial Plugging of the Screen, Gravel Pack or Aquifer
- Operations



Why Preventive Maintenance?

Specific Capacity in
 $\text{m}^3/\text{h}/\text{m}$



Preventive Maintenance

Monitoring



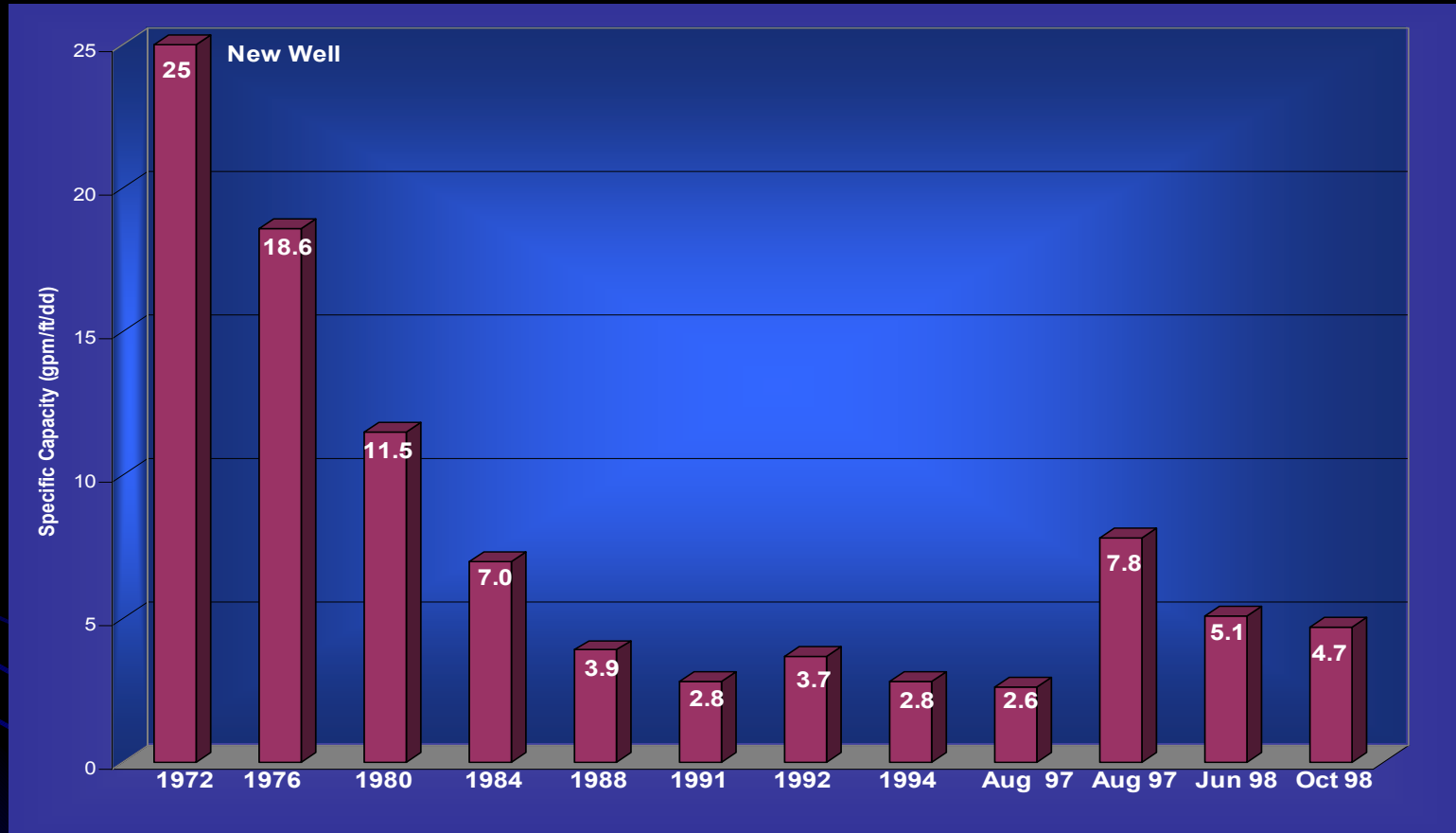
Periodic Inspection

Rehabilitation

Evaluation



Monitoring



Periodic Inspection Opportunities

New Well
Construction

Periodic
Monitoring

Well
Rehabilitation

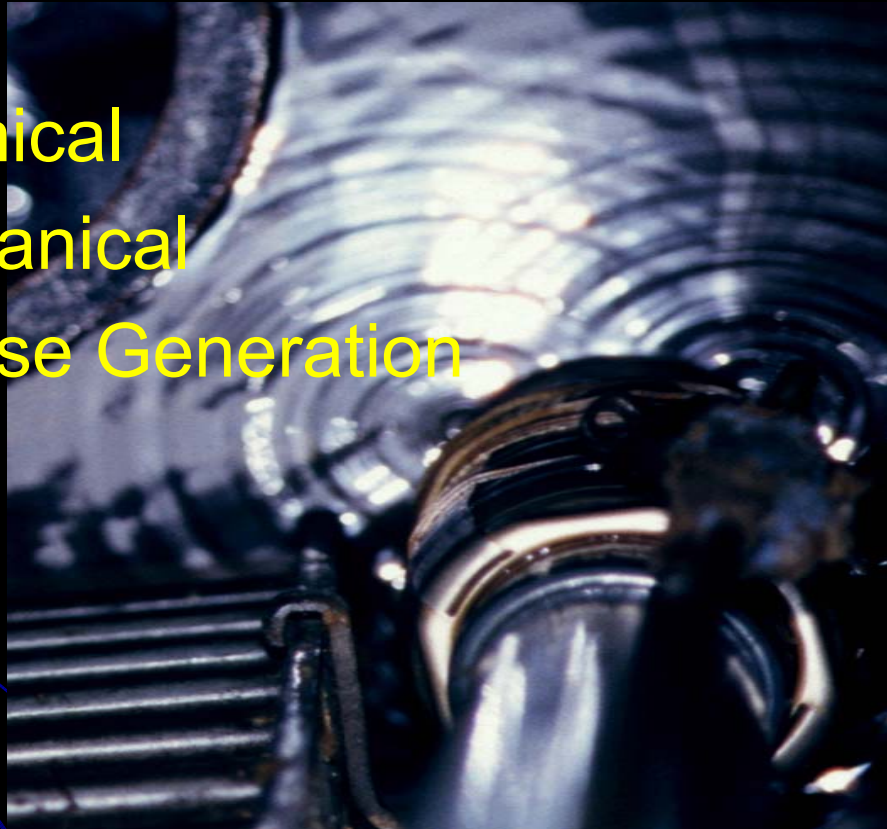


Identify
Problem



Well Rehabilitation Techniques

- Chemical
- Mechanical
- Impulse Generation



Chemical Treatment

- Dispersants
- Cold Acids and Bases
- Hot Acids and Bases
- Antibacterial Agents

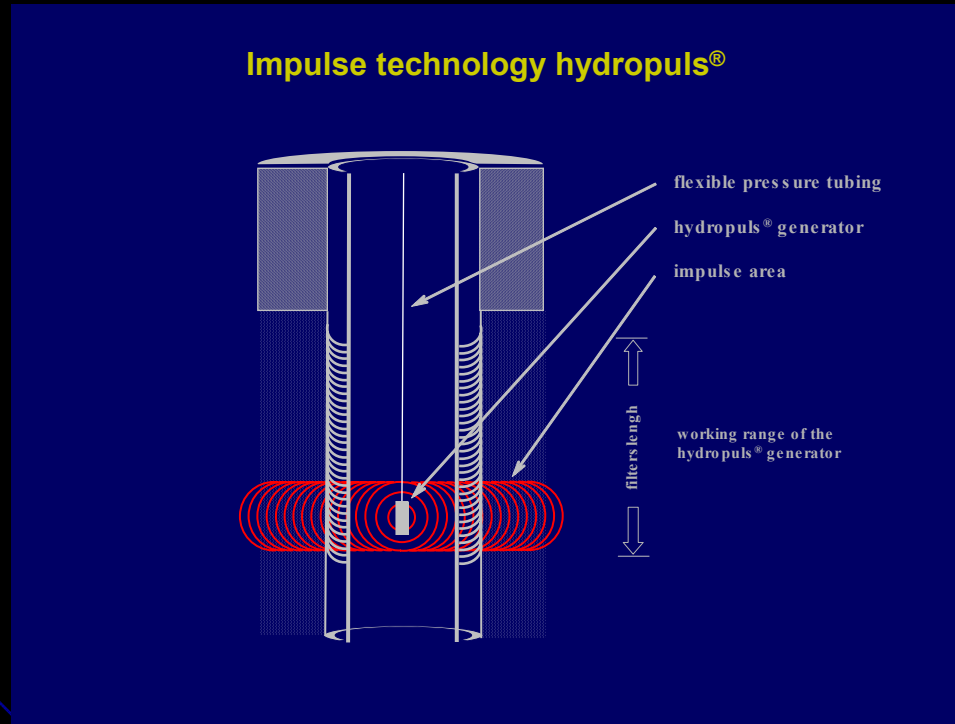


Mechanical Treatment

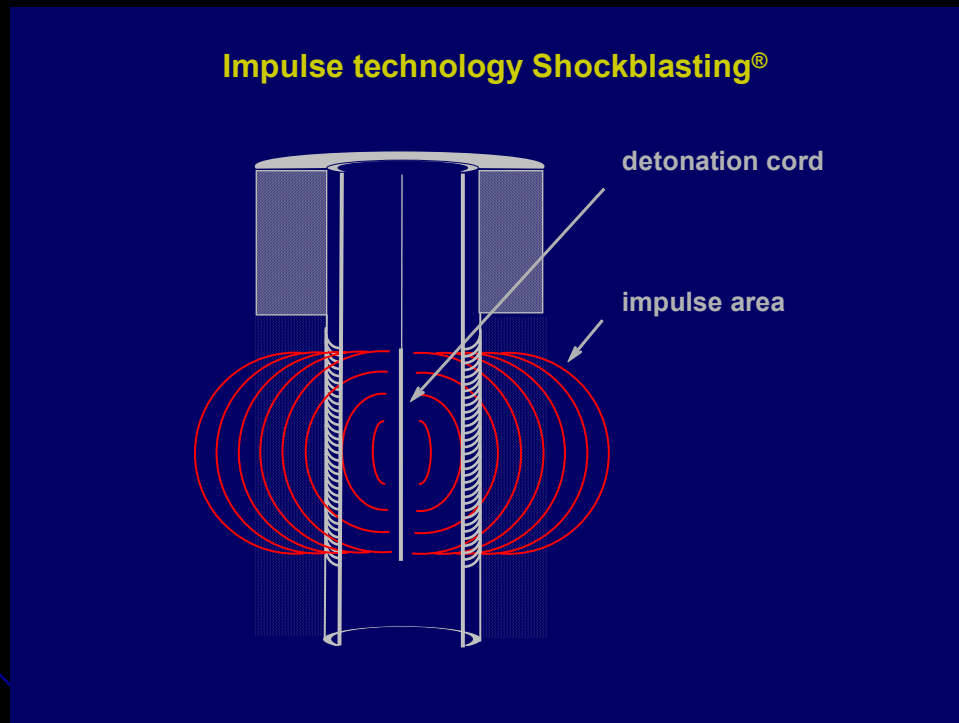
- Brushing
- Surging/Swabbing
- Jetting
- Freezing



Impulse Generator- Compressed Gas

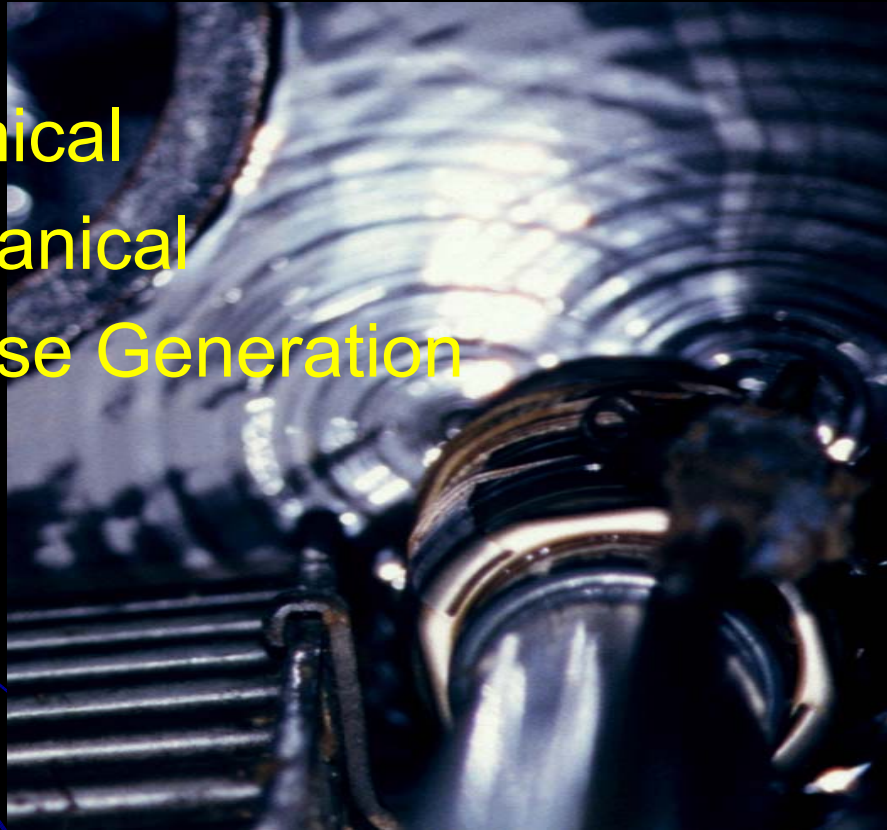


Impulse Generator- Detonation Cord

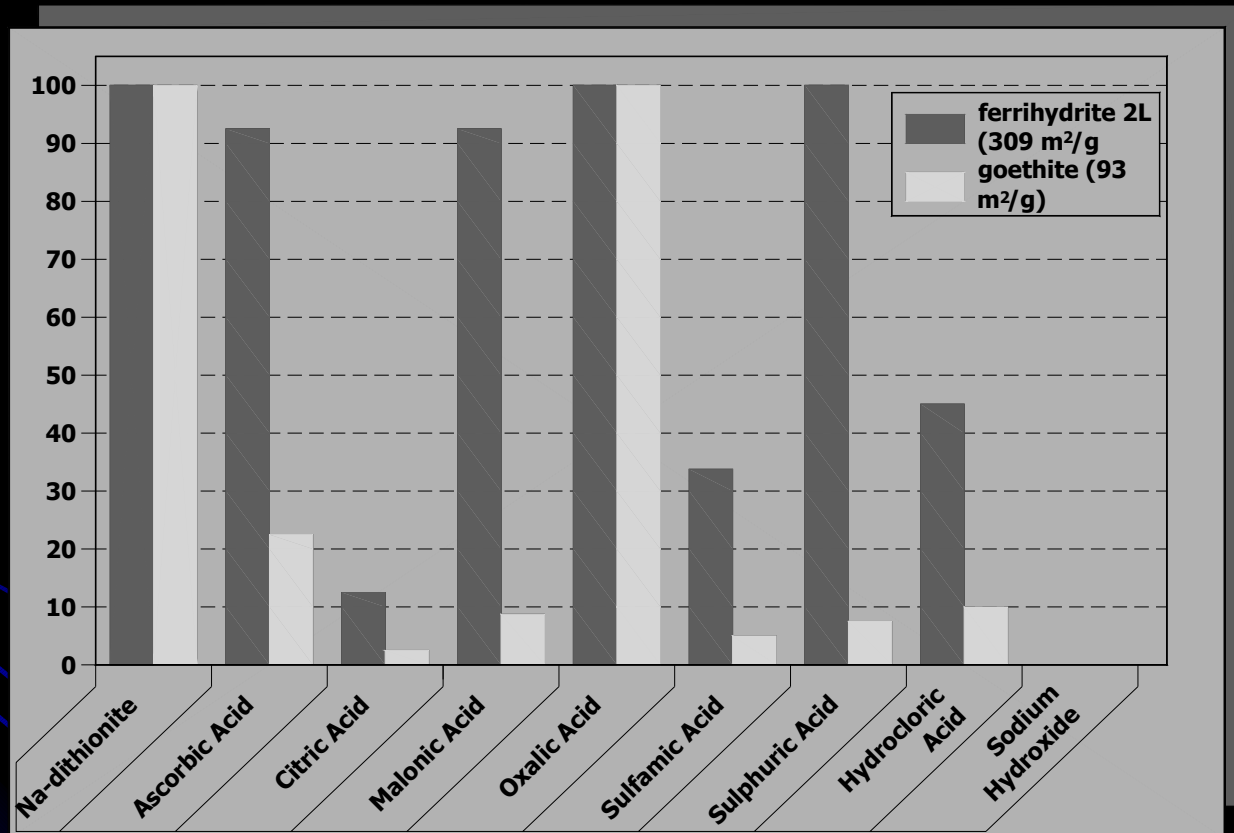


Current Well Rehabilitation Research

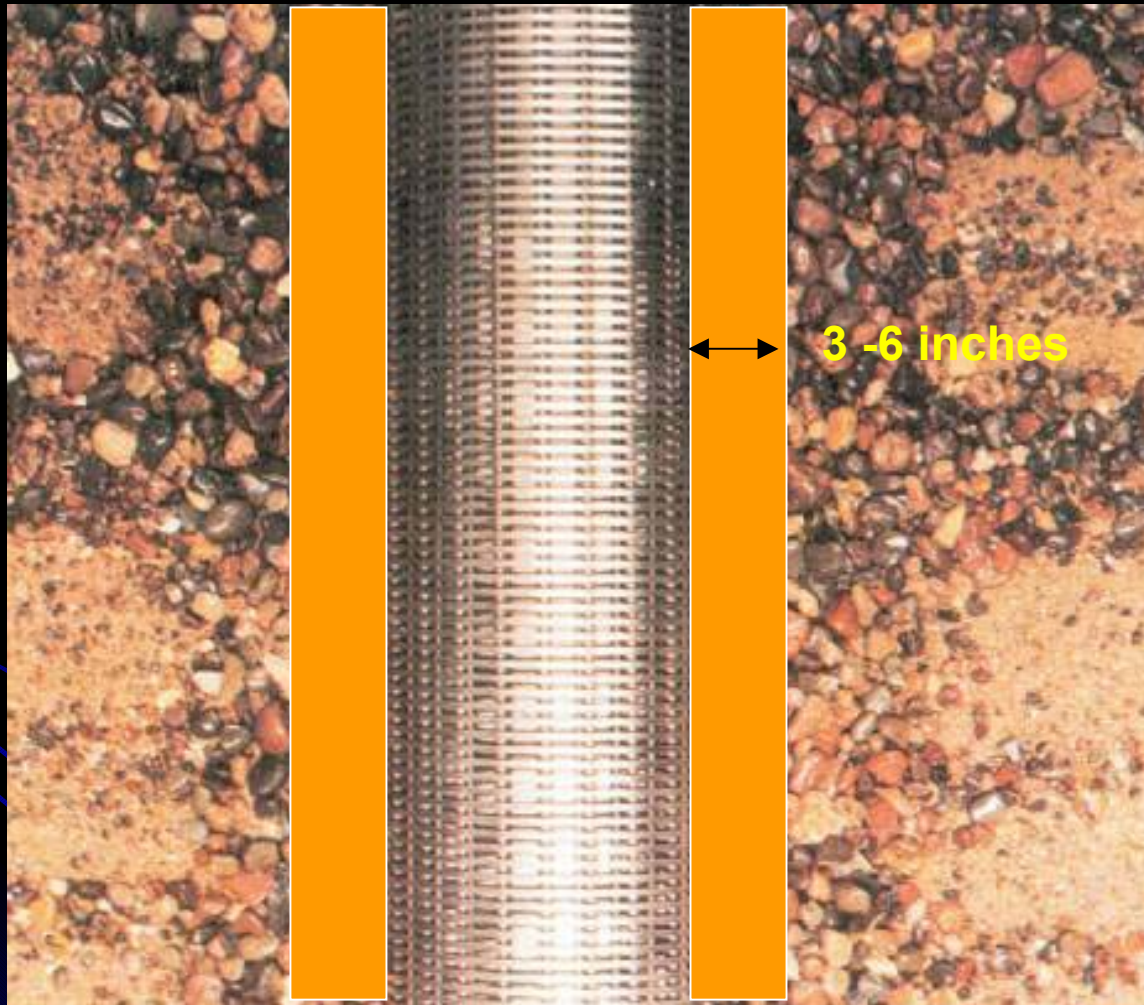
- Chemical
- Mechanical
- Impulse Generation



Chemical Effectiveness on Iron Oxides



Well Plugging



Research on Well Rehabilitation Technologies

Technologie gem. W 130		Gerät	Mittlere Spez. Energieeintrag in der Filterkiesschicht in Nm	
Hauptgruppe	Untergruppe		Messwert	Graphischer Vergleich
HOCHDRUCKSPÜL-VERFAHREN	KEINE	1	2*10e-4	
		2	2*10e-4	
DRUCKWELLEN-/IMPULS-VERFAHREN	WASSERHOCHDRUCK	DOPPELROT.AGG	5*10e-3	
	KNALLGAS	----	6*10e-3	
	LUFTKOMPRIMIERUNG	IMPULSGENERATOR (pigadi)	3*10e-1	<div></div>
		2	2*10e-3	
	WASSERKOMPRIMIERUNG	----		
	SPRENGLADUNGEN	----		
	ULTRASCHALL	1	4*10e-6	
		2	5*10e-6	



Rehabilitation Process

- Bid specifications
- Analysis of well conditions
- Mechanical cleaning
- Well rehabilitation technology
- Bailing/ isolation pumping
- Final diagnosis
- Written Report



4 “P’s” for Well Operation

1. **Practical Long Term Monitoring**
2. **Proper Pumping Rate**
3. **Periodic Well Analysis**
4. **Preventive Maintenance**

