

# Straighter boreholes and cost savings using Wassara technology

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Wassara AB

## TOPICS

- Introduction
- Basic facts about Water Powered Drilling
- Three examples of drilling results
- Cost savings in mining

## *Company mission*

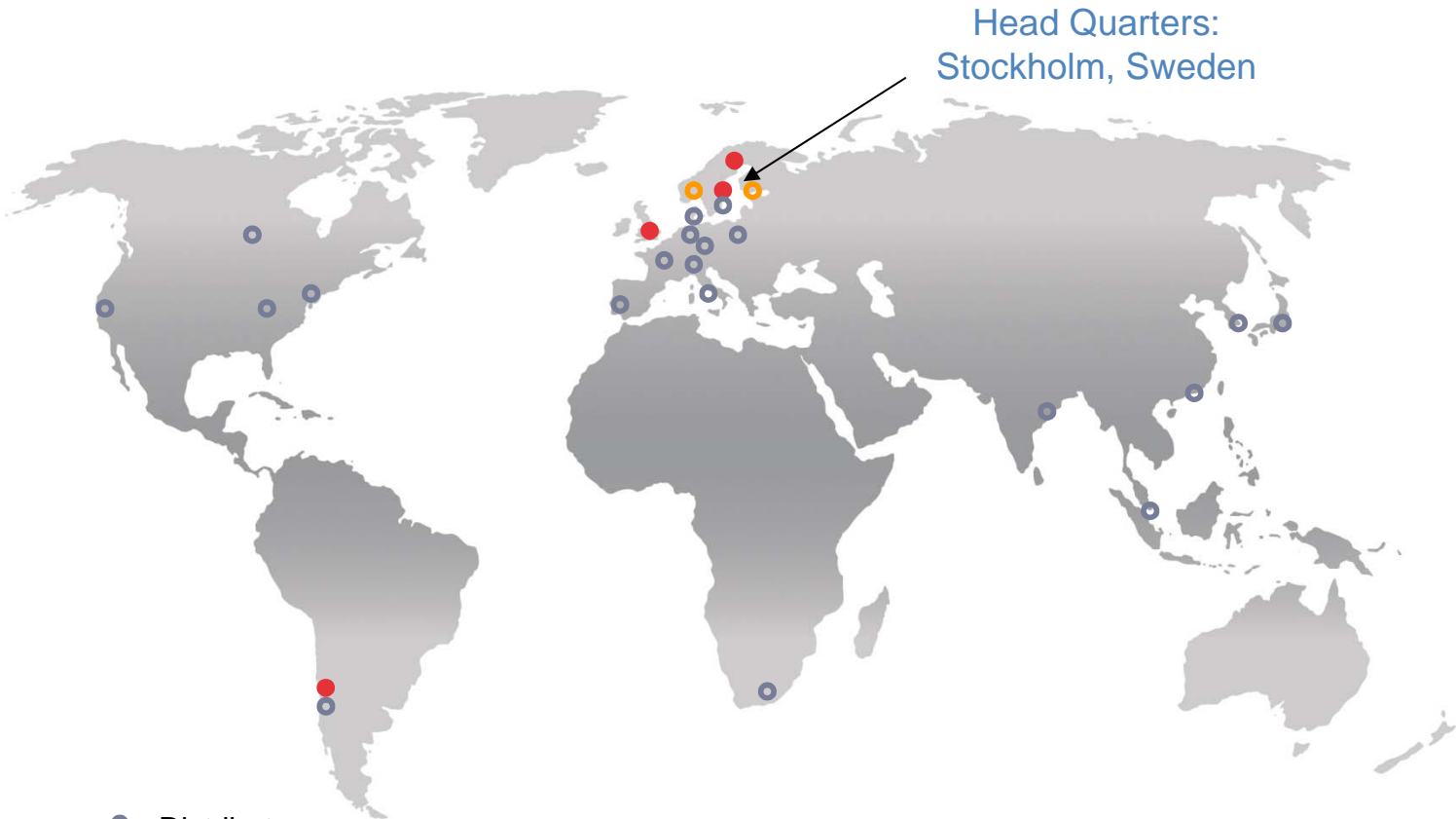
*Wassara offers the mining and construction industry complete systems for effective drilling in soil and rock, based on our core competence in water powered drilling*

# Wassara AB

- Wassara is 100 % owned by LKAB
- LKAB is 100 % owned by the state of Sweden
- LKAB is one of the world's leading producers of upgraded iron ore products, and a growing supplier of industrial minerals.
- **LKAB implemented the Wassara drilling system in their production drilling in 1995, and have since then drilled more than 12 million meter**



# Worldwide Wassara Distributors



- Distributor
- Direct Sales
- Wassara's representation

# General advantages with water powered drilling

- Long, and straighter holes
- High rate of penetration regardless of hole length
- Drills water rich formation
- Low impact on soil formations (low flow and "0-pressure")
- Lower energy consumption / meter (compared to air driven drilling)
- Better working environment (water binds dust)

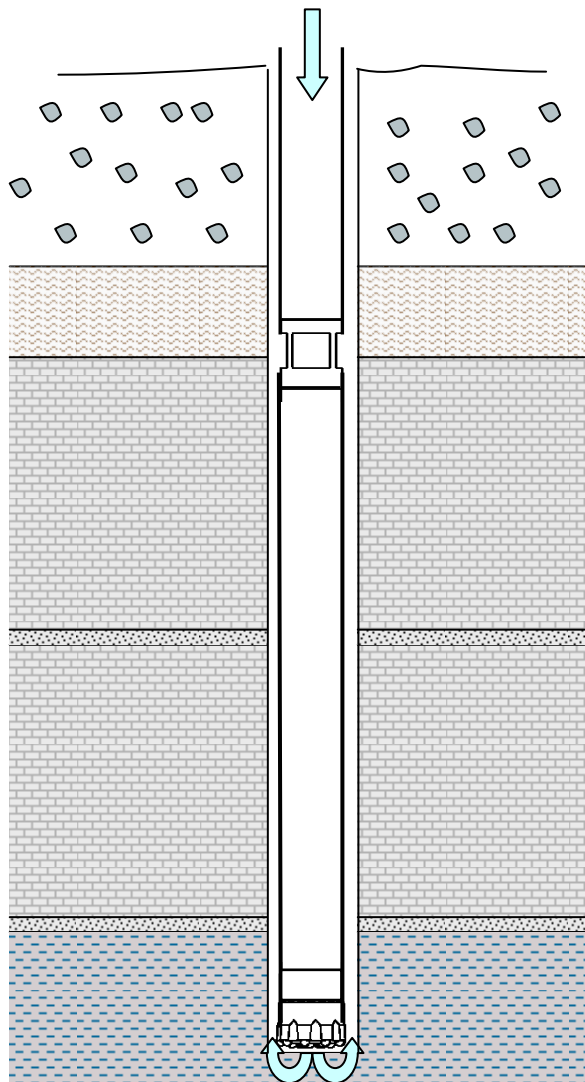


# Straight drilling with Wassara

Basic facts about water powered drilling

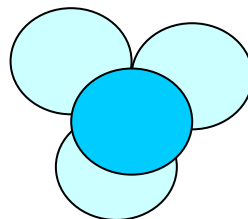
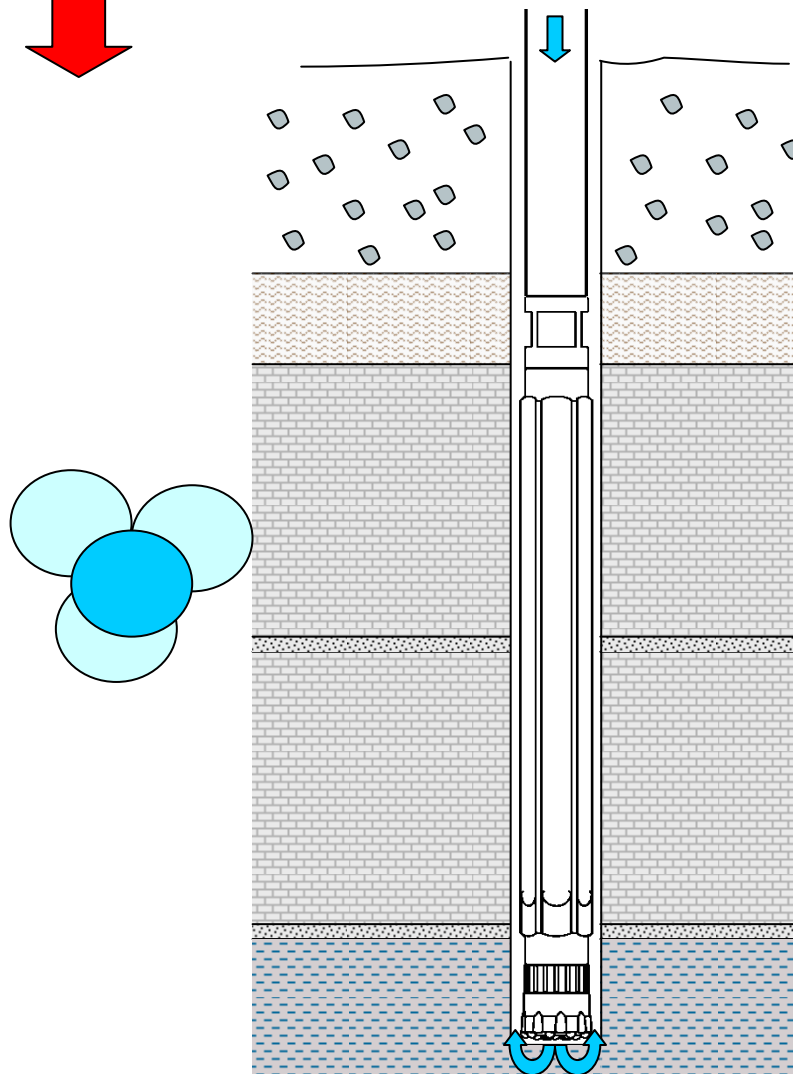
Air

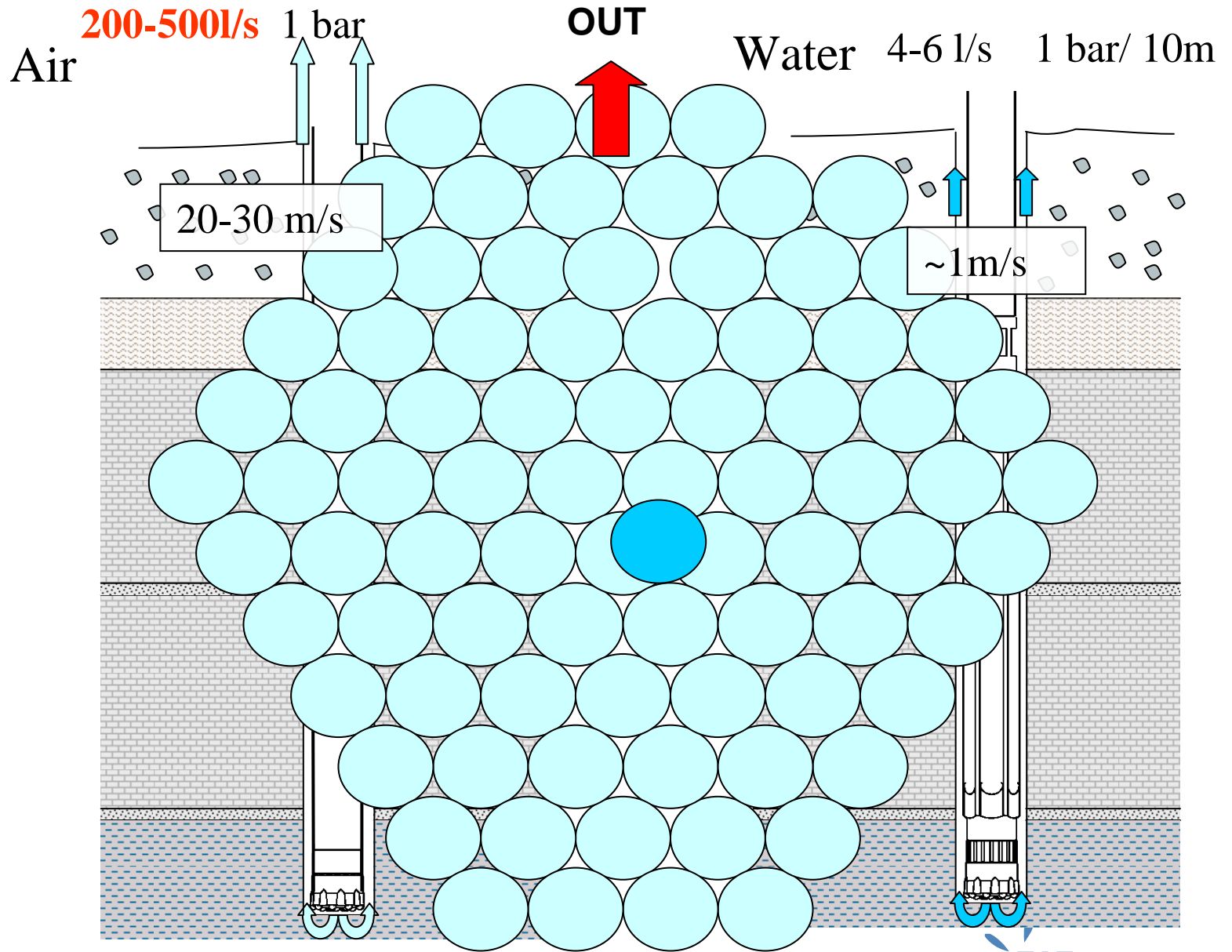
15-20 l/s 12-25 bar



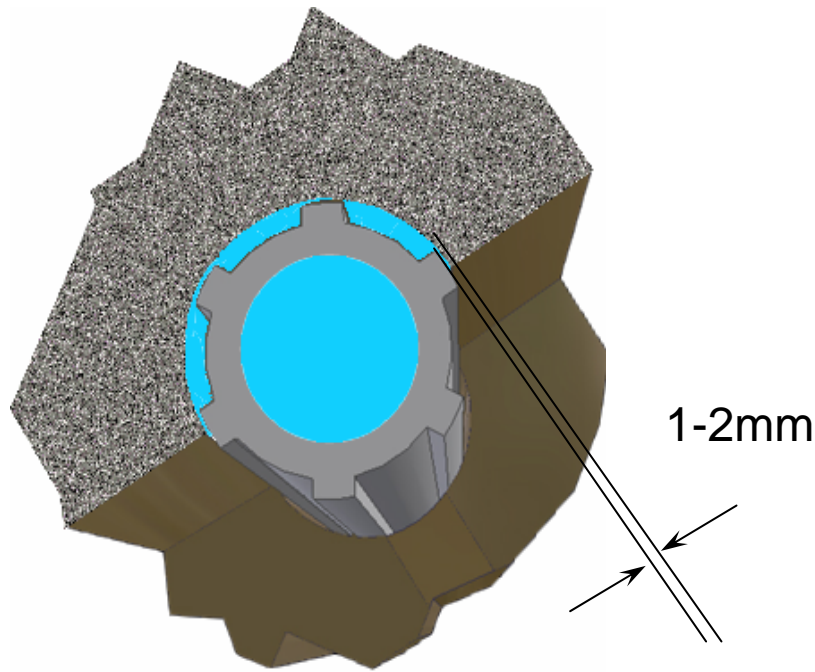
IN  
↓

Water 4-6 l/s 120-180 bar





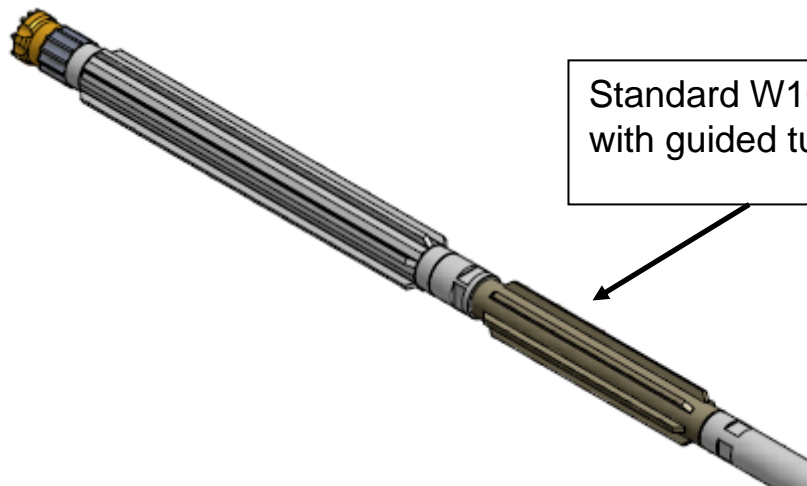
# Guided hammer casing for straight drilling



*-low volume of water.  
(water is non-compressible)*

*-Minimized gap*

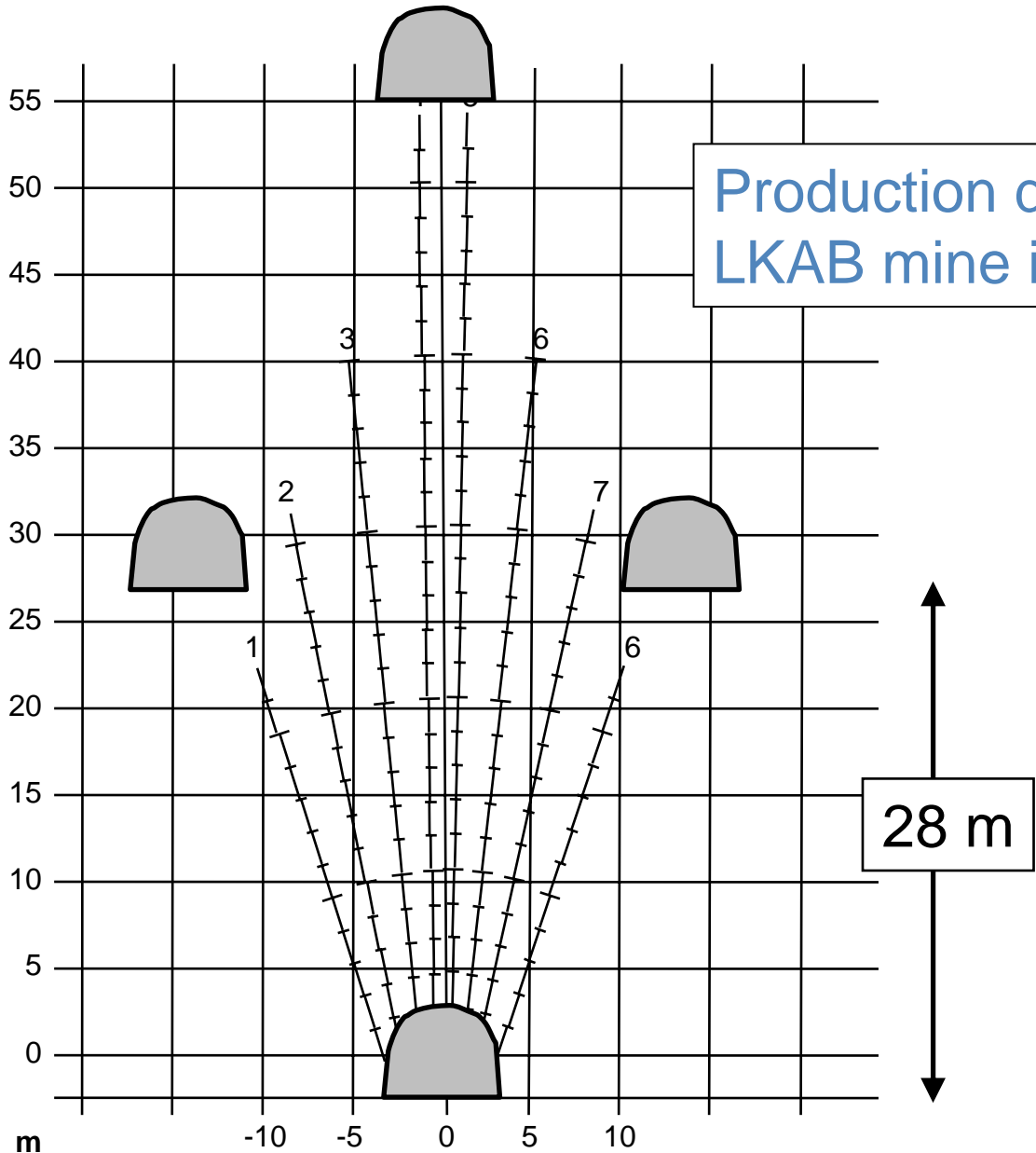
*-low water velocity,  
means minimum wear  
of steering ribs.*



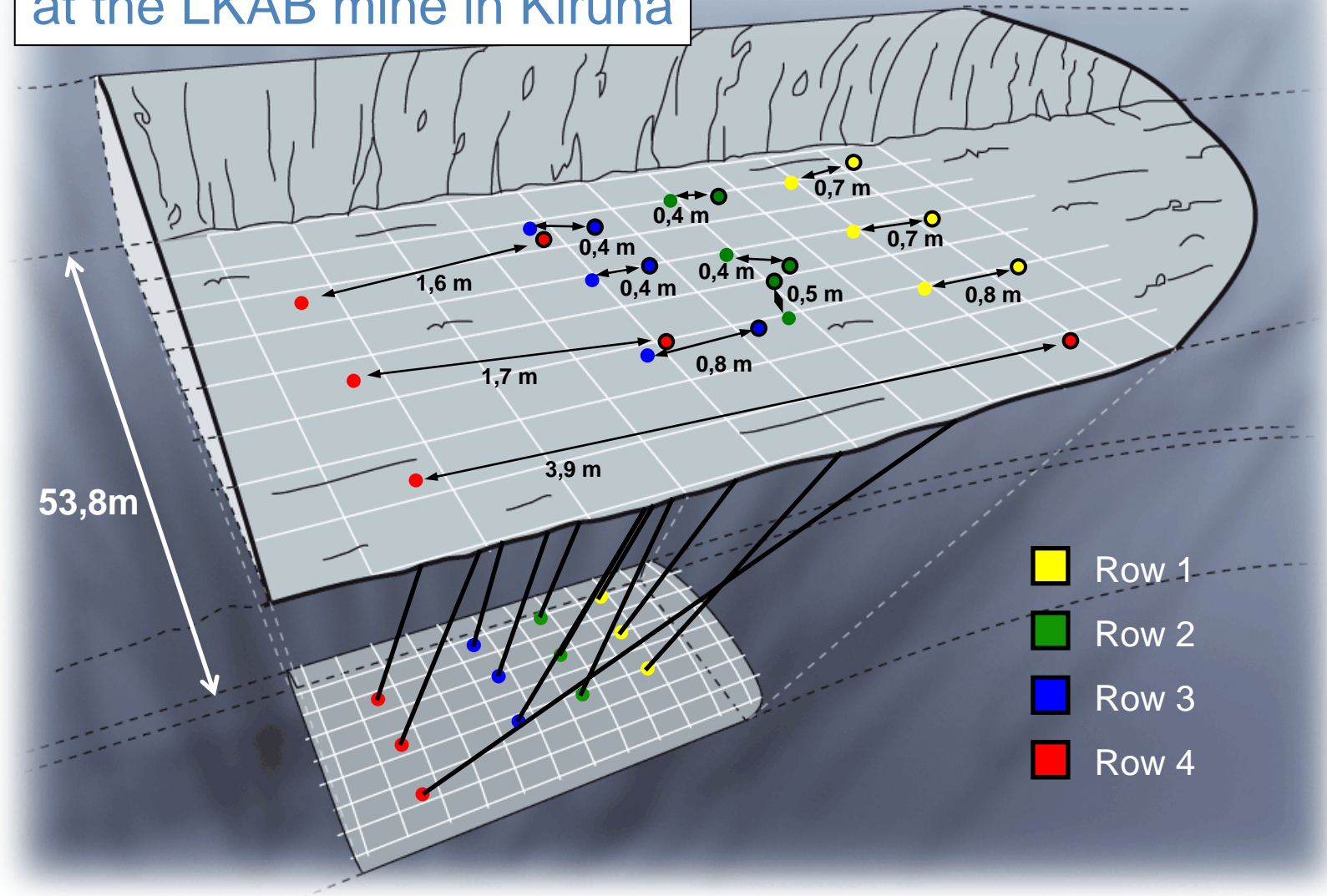
## Drilling results

- Production drilling at the LKAB mine in Kiruna
- Geothermal project in Stockholm
- Media holes at the LKAB mine in Malmberget

# Production drilling at the LKAB mine in Kiruna



# "Drill through test", at the LKAB mine in Kiruna



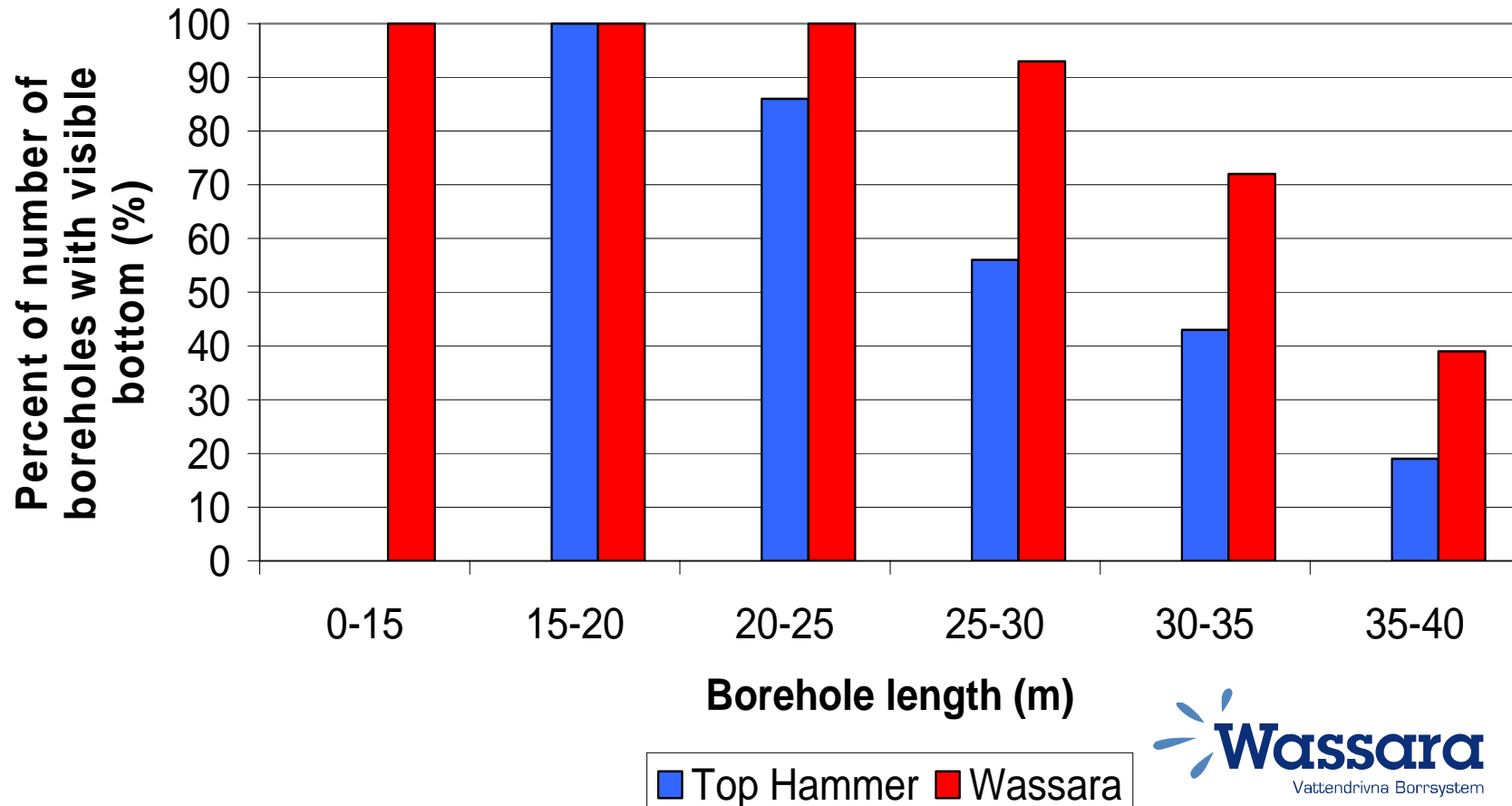
Average deviation for Wassara = 1,05 %

# "Reflex test", at the LKAB mine in Kiruna

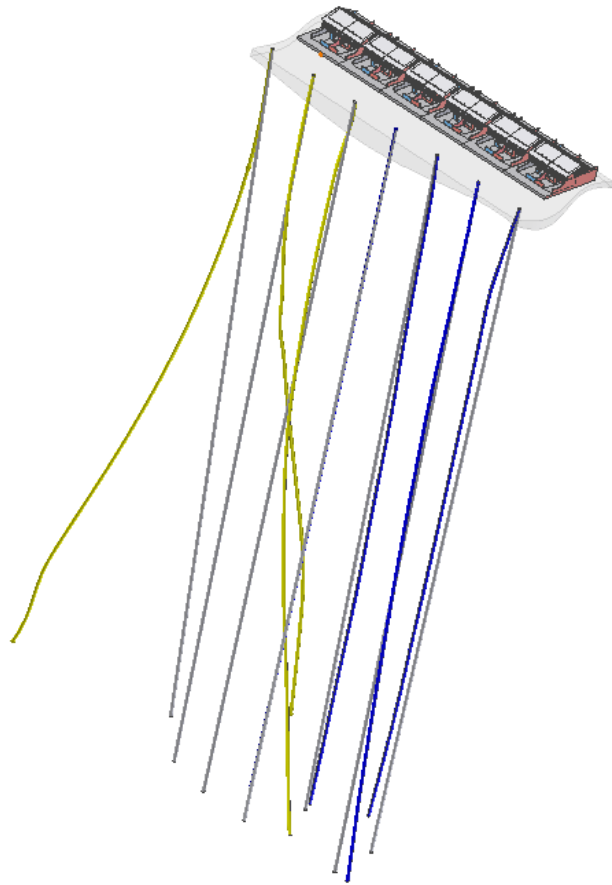
## KUJ 820 - Production boreholes

Number of boreholes measured with reflex:611

Top Hammer: 246 boreholes och Wassara Hammer:365 boreholes

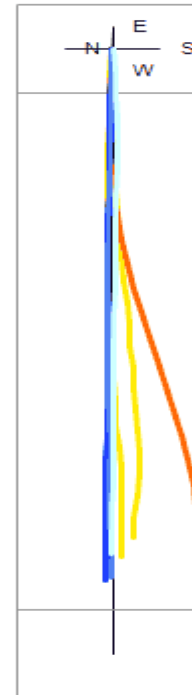


# Geothermal project in Stockholm



220 m

Average deviation 19,2%



**Air**

■ Hole 1

■ Hole 2

■ Hole 3

**Wassara**

■ Hole 4

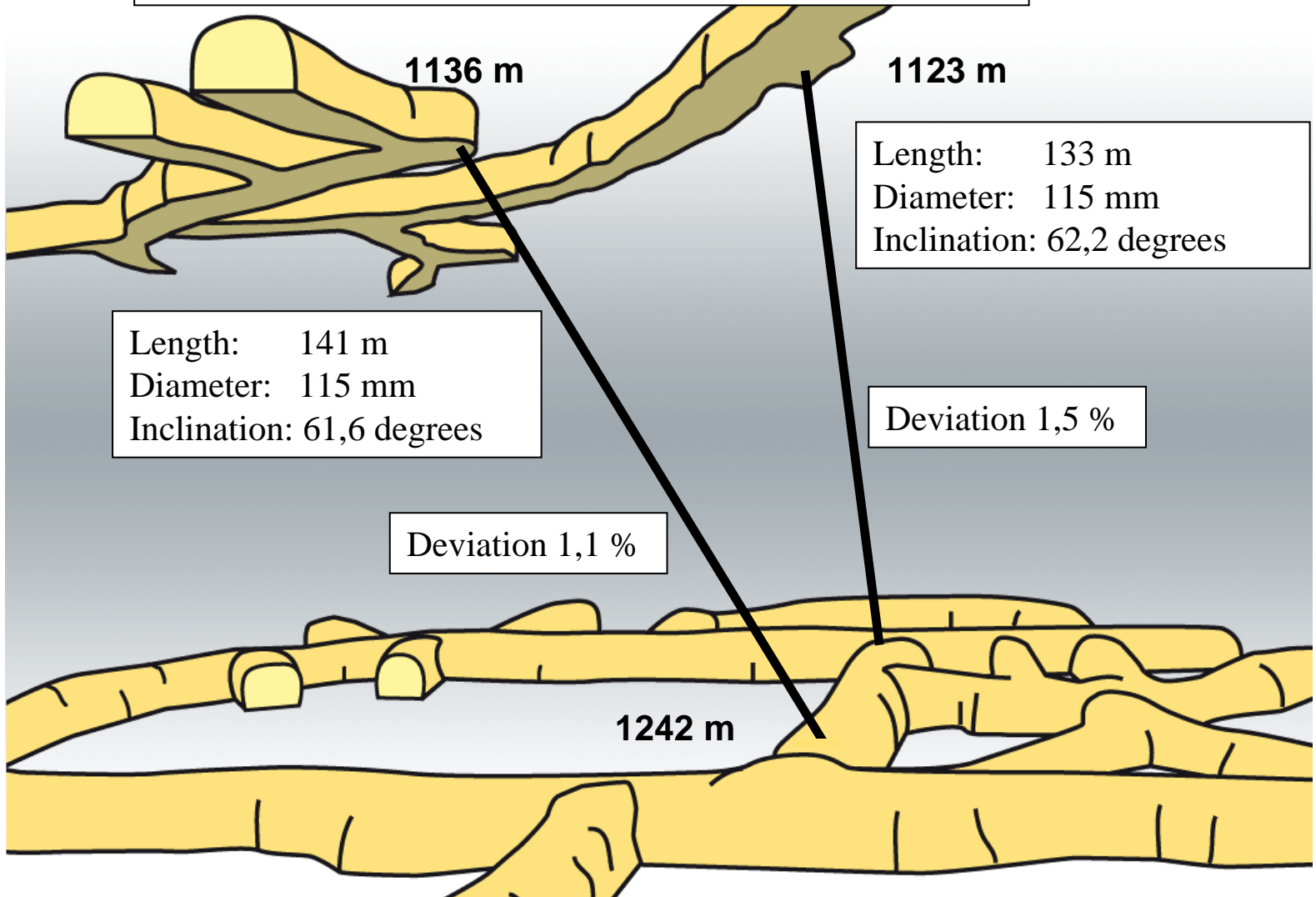
■ Hole 5

■ Hole 6

■ Hole 7

Average deviation 1,3%

# Media holes in the Malmberget mine



## Costs reductions

- Direct cost reductions
- Indirect cost reductions

# Direct cost reduction



## Energy efficiency

*When drilling with Wassara DTH the consumption of diesel is approx. 25% -40 % of the consumption when drilling with Pneumatic DTH*



Air DTH

# Direct cost reduction

## Drill tubes

*When drilling with Wassara DTH you get less corrosion on the inside and very low wear on the outside due to the low velocity of the cuttings transported by the water.*



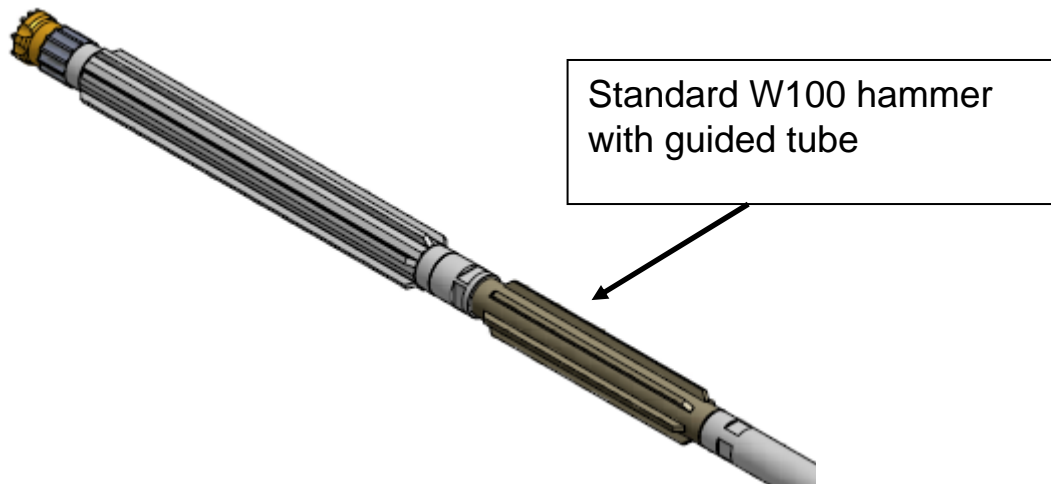
# Indirect cost reduction in mining

- Optimization of drilling and blasting
- Better fragmentation – less handling of boulders
- Less dilution
- Larger scale of operation - lower cost per tonne
- Lower development costs

# Indirect cost reduction

- Optimization of explosives
- No need for "extra" drilling

With an average deviation of 1 % the explosives can be calculated with less "margin", and there is no need for "extra" drilling to ensure the result of the blasting.



# Indirect cost reduction

Better fragmentation- less handling of boulders



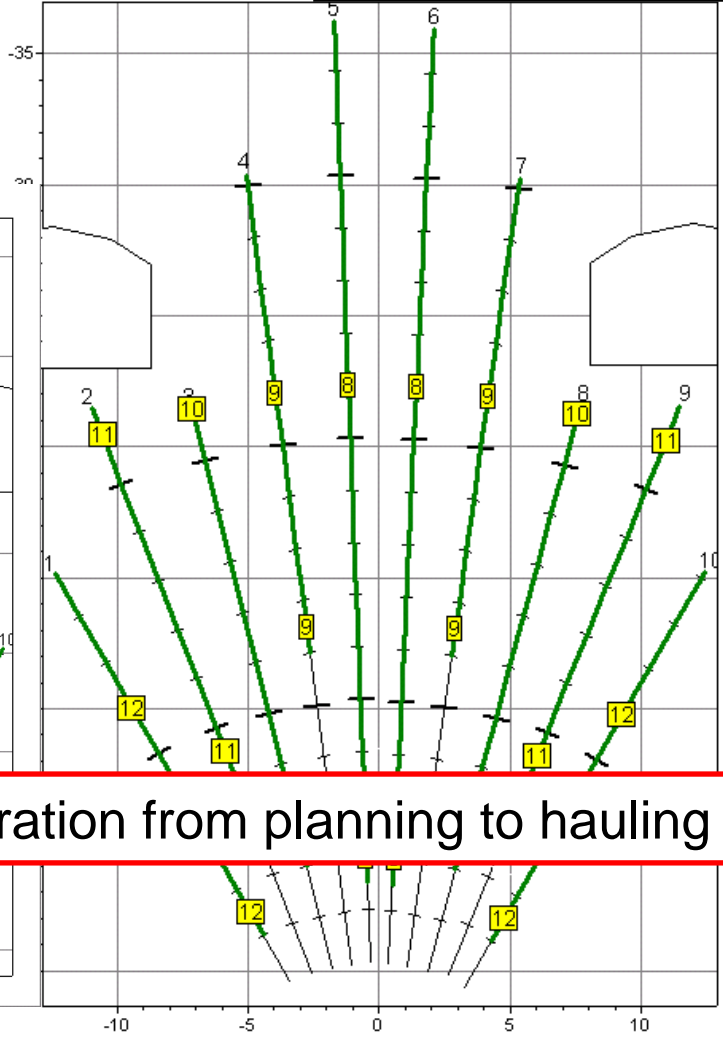
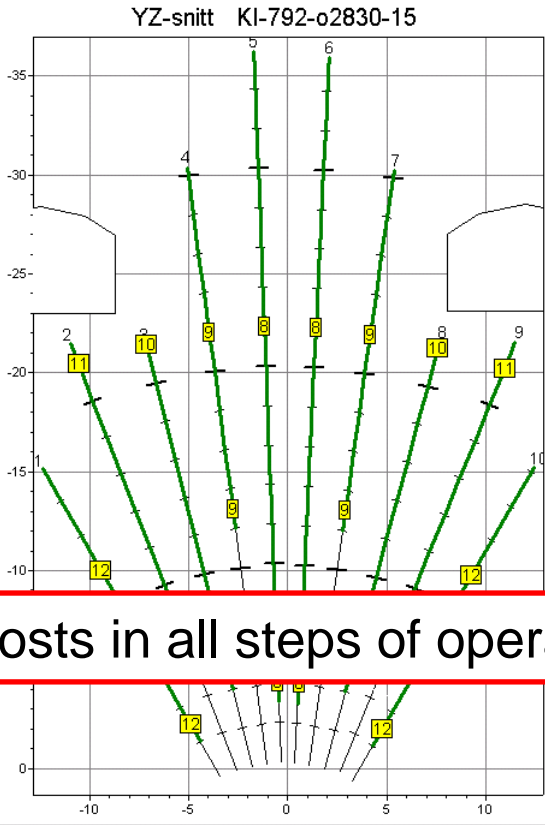
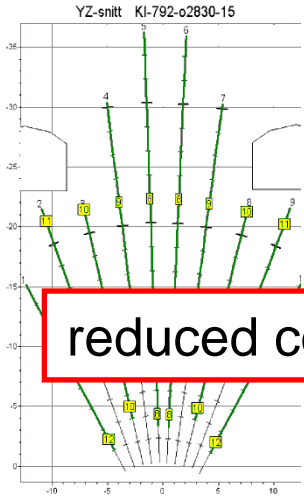
# Indirect cost reduction

Larger scale of operation,  
means lower cost per tonne

1995, 28m  
10.000 tonnes

1991, 22m

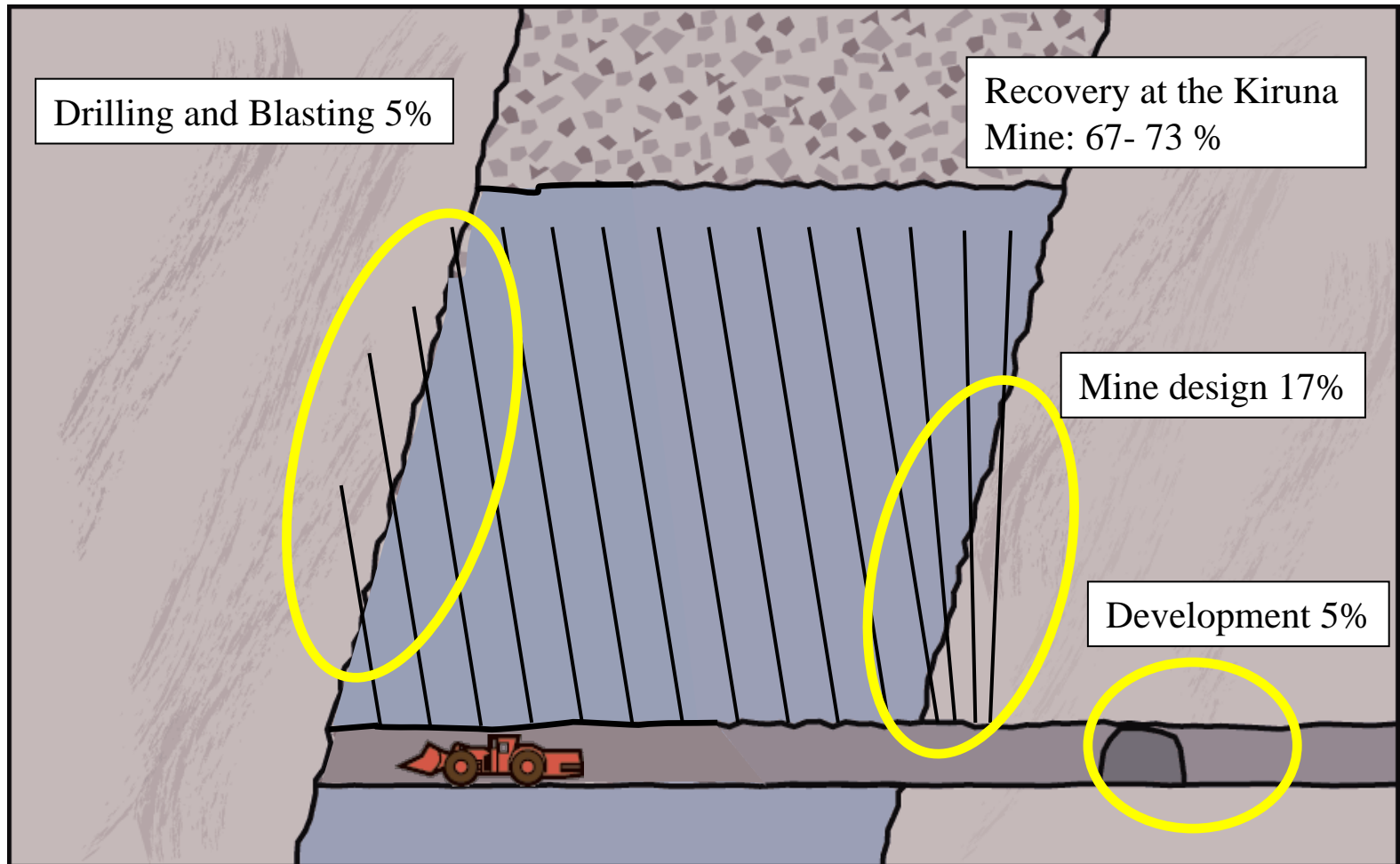
1985, 12m  
1.200 tonnes



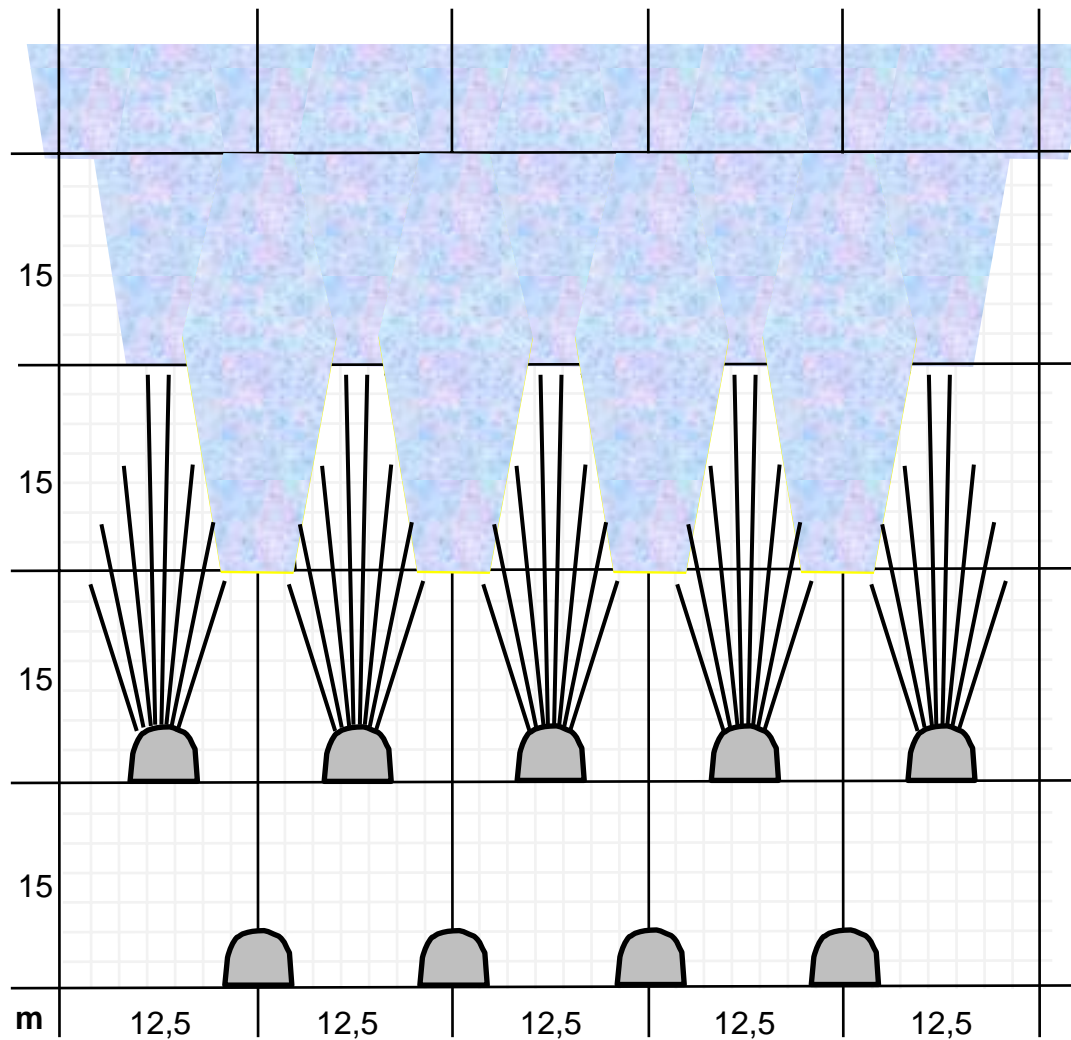
reduced costs in all steps of operation from planning to hauling

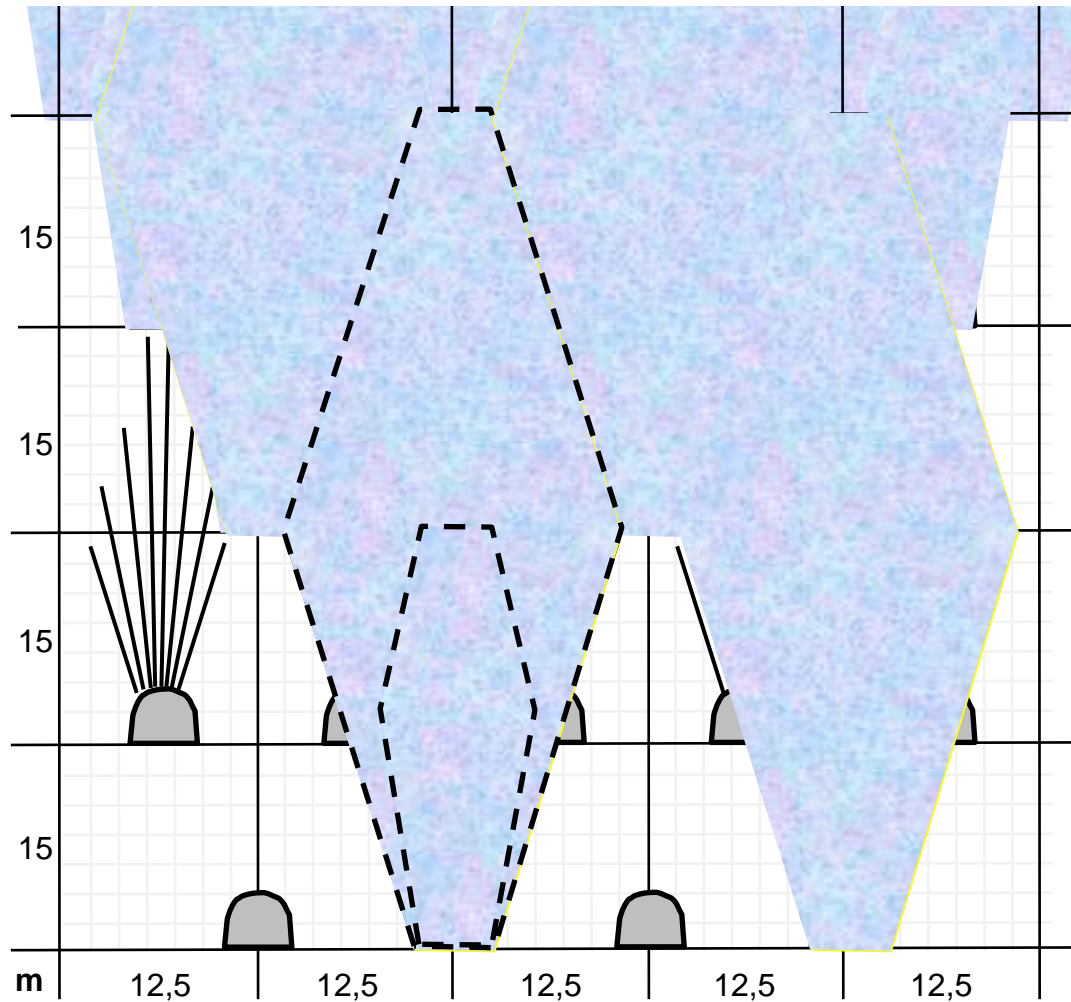
# Indirect cost reduction

## Less dilution



# Lower development costs





Reduction of drifts:  
Approximately 70 %

# Thank you !

*Drilling with Wassara is not difficult,  
just different !*