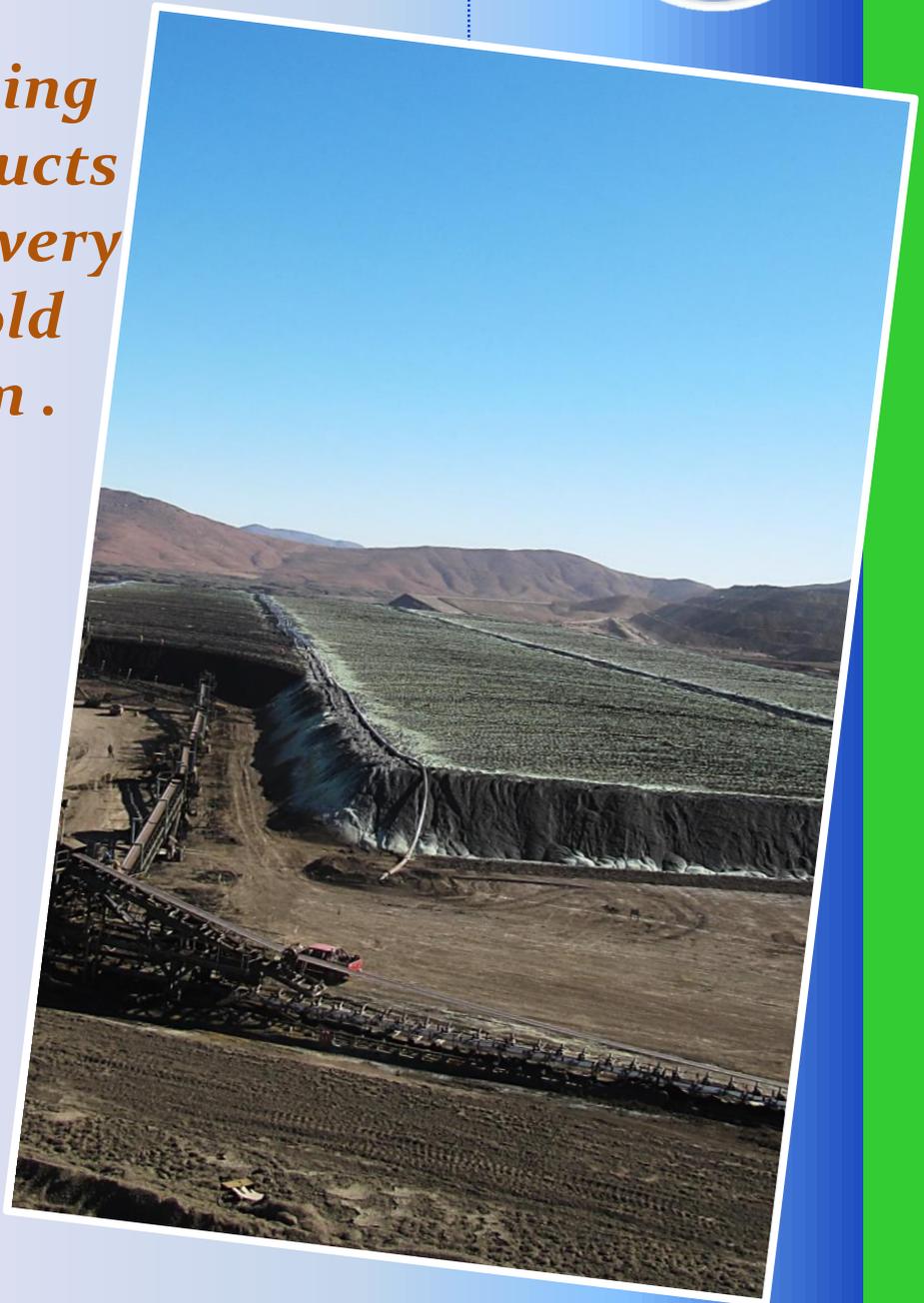


# *A.R.S - Aqua Royal Spring*



*Irrigation Mining  
Solutions Products  
For Leach Recovery  
Of Copper Gold  
And Uranium .*

*The best  
Uniform  
Percolation.*



*Heap Leaching Drip Irrigation System*



*Engineering Mining Solutions*

# Company Profile *Our Services*

A.R.S - Aqua Royal Spring LTD established a company to provide Engineering solution technology to the Gold Copper and Uranium Mines.

We offers creative, innovative and proven integrated sustainable engineering solutions to complex and challenging projects, customized to clients' unique requirements based on process engineering and each of our clients' site specific needs in DRC of Congo, Zambia , Namibia , West Africa regions and Central Asia.

We offer Engineering, Consulting, Designs and provide the most latest developed irrigation systems for Heap Leaching solution to Mine fields , by maximizing metal extraction from the Copper, Gold and Uranium Ore up to 90% recovery.

With Our Innovation, Creative, Professionalism and Experience of 20 years, We provide state of the art projects integrated solutions in the Mining fields.

Our Vision to provide quality services that exceeds the expectations of our esteemed customers and builds long term relationships with our customers and provides exceptional customer services by pursuing business through innovation and advanced Irrigation technology.

We believe in treating our customers with respect and faith. We grow through creativity, invention and innovation. We integrate honesty, integrity and business ethics into all aspects of our business functioning.



## *Our Product & Services*

-  **Heap Leaching Drip Irrigation System.**
-  **Sprinklers Irrigation .**
-  **HDPE Geotechnical Membrane.**
-  **Floating Cover .**
-  **Rain Cover .**



# Heap leaching

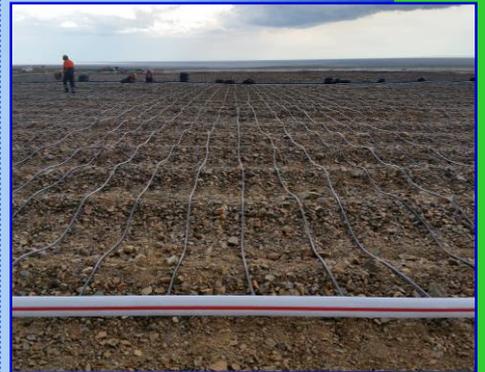
Heap Leaching is being done these days on relatively low-grade ores for Copper , Gold and Uranium recovery. Typical operations take place for about One to Three months per heap and the recovery achieved is at least 60% and may be as high as 85% in some cases. Both oxide copper and sulfide copper ores are amenable to leaching with the rate of recovery being higher for oxide copper.

The new Drip Irrigation technology is changing the face of heap leach mining operations by maximizing metal extraction from the heap.

Our new **technology has proven** itself to increase metal extraction up to 90% recovery while reducing the operating expenses .

With Our Innovation, creative , professionalism and experience we provide a wide choice of Engineering irrigation system designs and installation to the Mines.

We are one of the world's leading enterprises for heap Leaching Irrigation systems .



# Drip Leach Line *Drip Irrigation Applied in Mining*

- ARS Drip Leach Line was the pioneer in the application of drip irrigation to gold and copper mines in 1990's. Previously the Mines had used sprinklers which had many environmental and production limitations which were solved by the application of mining solution using Drip Leach Line systems. Today the use of drip on mines is standard on 90% of the gold, copper and uranium mines .It is without question "**best practice**" method for heap leach mining worldwide.
- ARS provide and design complete heap leach systems with the optimum components for maximum system performance. Everything from the Pipe to the end plug can be provided to make the most efficient system to use with the lowest labor costs and maximum hydraulic performance so the ore receives the designed solution application throughout the entire leach pad. It is our desire to provide the system which will result in actual extraction equal to the predicted mine design performance.



## Durable Multi-Mining Integral Dripline

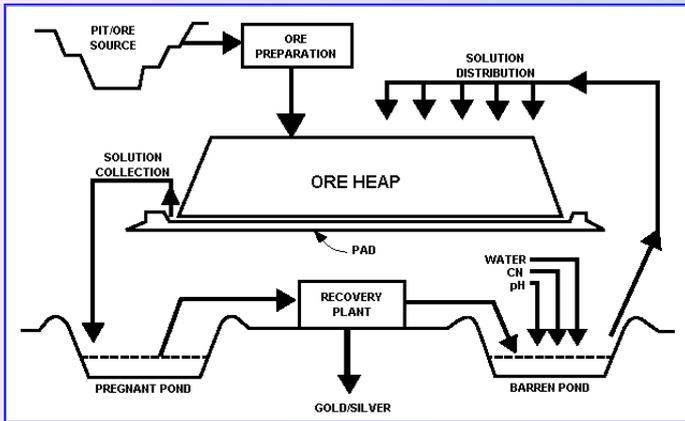
- Drippers are welded into a wall of seamless tubing, providing added strength and durability.
- A big cross-section labyrinth, sharp and efficient.
- Outstanding resistance to clogging
- Double inlet filter.
- Flow rates at 1 Bar: 1, 1.6, 2, 3, 4, 8 LPH
- Diameter : 16, 20 mm
- Wall thickness : 35 - 45 mil



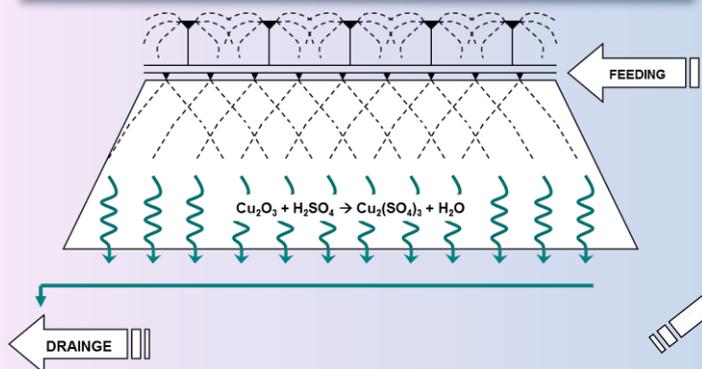
# How Drip Applied in Mining

## Leaching Process

This drawing illustrates the concept of a typical leach mine. The leach solution is applied on the top of the Pads on the highest "lift". As it gradually percolates through the layers of ore it chemically bonds with the ore. The solution which now has the ore in it called the "pregnant" solution flows by capillary action (ideally) to the bottom of the leach pile to the Geo-membrane liner. Then the solution flows by gravity to holding ponds for temporary storage. It is then pumped to the "tank house" which refines the solution and extracts the ore and then the solution is recirculated repeating the mining cycle.



### Uniform Percolation All Over The Pad

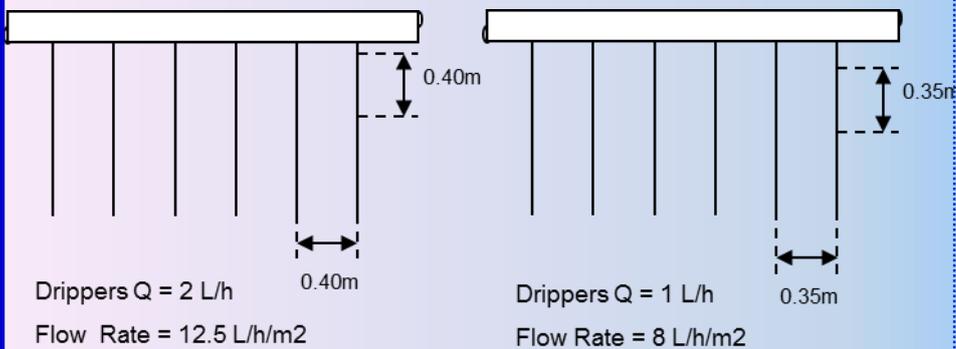


LEACHING  
HEAPS

PERMANENT  
HEAP

DYNAMIC  
HEAP

# Drippers Network *How To Select The Dripper Flow Rate?*



- 💧 Consider if the heap is permanent or dynamic.
- 💧 Consider the permeability of the ore.
- 💧 Consider the surface.
- 💧 Consider the length of the leaching cycle.
- 💧 Consider the side slope .
- 💧 Consider Agglomeration.
- 💧 More drippers per square meter improve the distribution uniform percolation.

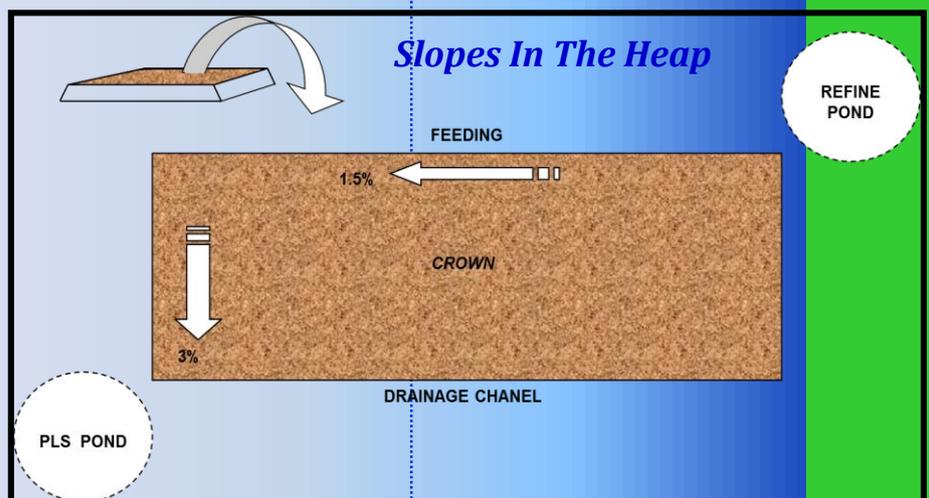


**Side Slope Leaching**

## How We Achieve Good Uniformity Percolation?

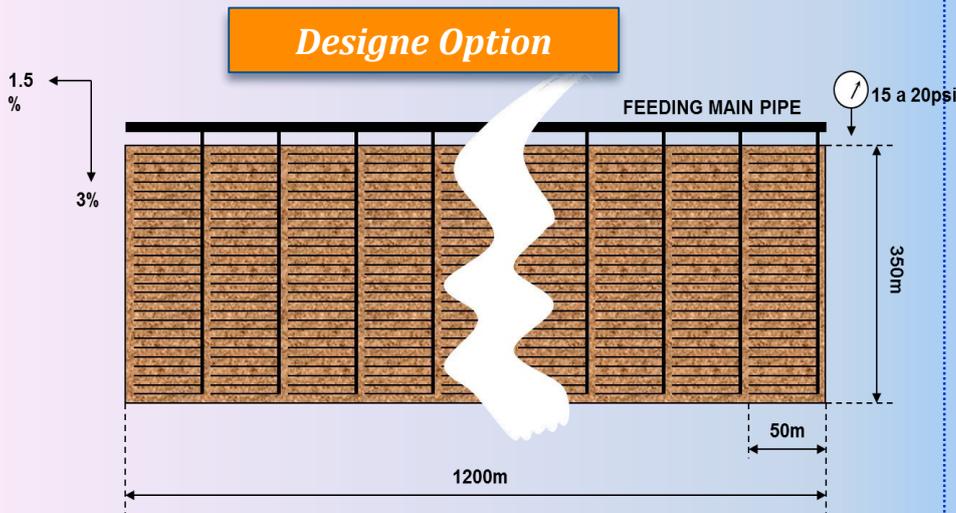
The Solution uniformity distribution is essential to maximizing metals recovery for the ore . Drip Leach Line® technology, with 95+% uniformity, is the most effective method for total solution contact with the aggregate surface.

- 💧 With 5% CV in drippers.
- 💧 With Drop Stopper.
- 💧 With diferente emitters: 1,1.6,2,4,8 L/H
- 💧 With excellent hydraulic design.
- 💧 With big filters in the drippers.
- 💧 With self cleaning of the drippers due to the **TURBOLNET**.
- 💧 With efficient flushing of the drippers lines.

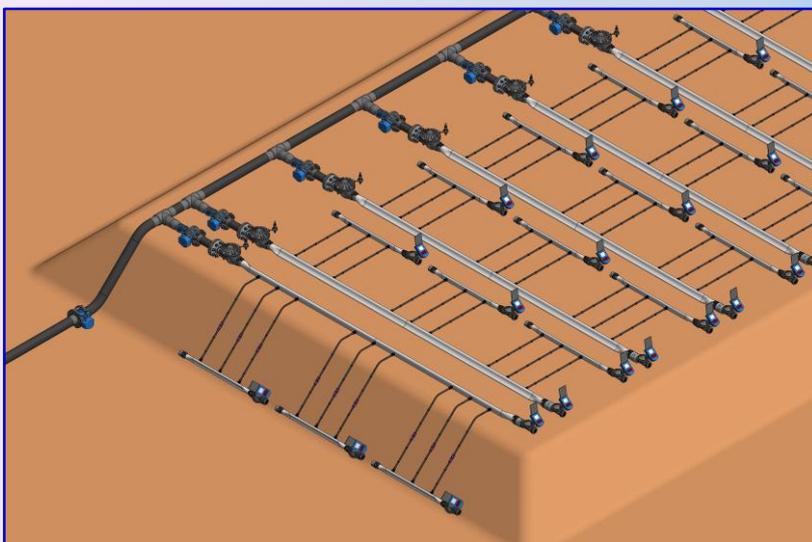


# Design *Good Design Is The Key For The Best Uniformity*

When the drip solution is applied the surface area appears to be dry between drippers. What actually happens is the solution, moving by capillary action in the soil, flows both horizontally and vertically. In most soils the solution will spread up to 0.60 cm horizontally from the drip point. Furthermore it also moves vertically up in the soil so there are virtually no dry spot between emitters. It is very easy to test the movement of solution in your ore by taking one emitter and applying solution for an hour and then digging to find the perimeter of the moisture. However, if the solution spreads 0.6 cm remember this is the full diameter and when you have two emitters next to each other, the solution intersects at the radius so there is always plenty of solution overlap even with the widest spacing.



*Side Slope Leaching*



# *Saturation* Over-Saturation of Leach Solution

Nothing good happens when you apply too much solution and saturate the leach pad. Solution should move by capillary action through the ore not by gravity. Why? Because once the ore becomes saturated you don't have any oxygen left and oxygen is required for the chemical and biological reactions which are necessary for extraction. No oxygen means no extraction so don't over apply solution.

## *Does Your Leach Pad Look Like This ?*



*Don't leave 35% behind!!!*

## *Don't Drown The Oxygen Out Of Your Leach Pad.*

Oxygen is an essential element in the leaching process. Efficient heap leach operations require that oxygen plus the acid or biological agent be present to dissolve the mineral deposits into the leach solution. In general, the higher the oxygen level, the greater the mineral recovery. Applying too much leach solution saturates the crushed ore and drives out the oxygen. Maximum leaching efficiency is achieved when the leach solution moves through the ore by means of capillary action.



*The best  
Uniform Percolation.*

# A.R.S Control Valves

## ***Good Design Is The Key For The Best Uniformity***

In order to maximize the ore extraction , One of the most important parameters in designing the Irrigation system is to control the pressure system In order to make the most efficient system to use with maximum hydraulic performance so the ore receives the design solution application flow rate throughout the entire leach pad.

Our Mining hydraulic control Valves made of non-metallic materials at sizes greater than 50mm (2"). These are direct-sealing diaphragm Valves that are operated by the line pressure.(no need air or electricity) The reinforced rubber diaphragm seals the water passage when line pressure reaches the Valve's control chamber and is the only moving part in the Valve, thus allowing for friction-free operation and extra-simple design with superb reliability.

The Valves are available with a wide range of control functions:

- 💧 Manual activation,
- 💧 Pressure Reducing Valves,
- 💧 Flushing Control.
- 💧 Available in sizes: 50-160 mm (2"-6").



**Control Flushing Valve**

# Flushing & Measure

## Flushing The Dripper Lines

In order to maintain the Irrigation Drip system properly and maximize solution application flow rate extraction , we need to flush the system periodically Proper flushing of the irrigation system is one of the most important steps. Flushing the irrigation system reduces the accumulation of pollutants to a minimum, by pushing them out of the system. The system must be flushed at regular intervals.

Flushing of the irrigation system is comprised of 3 steps,

- 💧 Flushing the main pipe.
- 💧 Flushing the sub-main lines( flat net ).
- 💧 Flushing the dripper lines.



## If You Don't Measure You Can't Improve...

- 💧 The flow meter tester measures the flow rate reduction in the dripper lines.
- 💧 Facilitate comparison between different drippers.
- 💧 Facilitate comparison of different dippers flow rate.
- 💧 Counting clogged dripper is not enough to control your leaching rate.



# Results & Benefits



- 💧 Reducing the operating expenses.
- 💧 Easy to install.
- 💧 Maximizing metal extraction from the heap up to 90%.
- 💧 Less evaporation.
- 💧 Is not affected by the wind.
- 💧 The best Uniform Percolation.
- 💧 The Highest Uniformity on the heap .
- 💧 Can be cover by plastic liner ,during the rainy season.
- 💧 Solves the problems with the environment.
- 💧 Safe to the operators, During the irrigation can be handled and walk on the pad no need to turn off the pump.
- 💧 Free design, Consulting and support along with our after sales.

## ***More Copper & Gold***





## *High Quality Leach Systems*

*More  
Production  
More Copper  
More Gold  
More Uranium  
More Money*



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