



1934

2024

Ihdv e lw | r #kh #/ fdh X s #r #d #/hp | S dvlyh #E lr r j lf d #v x adw #Jhgxfwlrq #S urfhvv #
Wuhdwqj #K lj k #/ x adw #P | bh Q j i x h q f h g #Z dwu #

Nhu | x # S uh }
23 April 2024





A global leader in mineral and metallurgical innovation



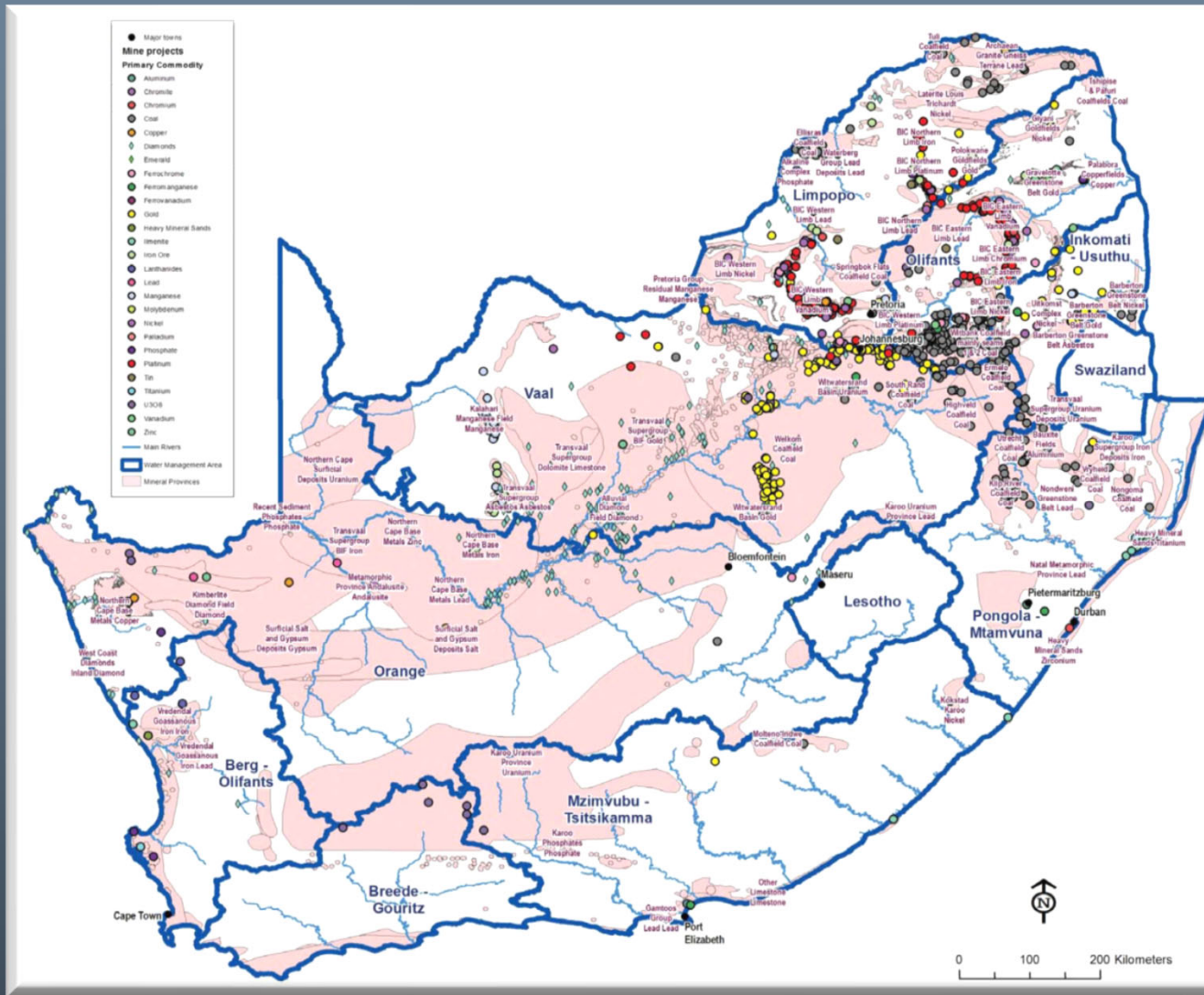
Vrxwk#D iulfd=#Ddgg#r i#H {whp h#E hdxw| #dgg#G lyhuw|w



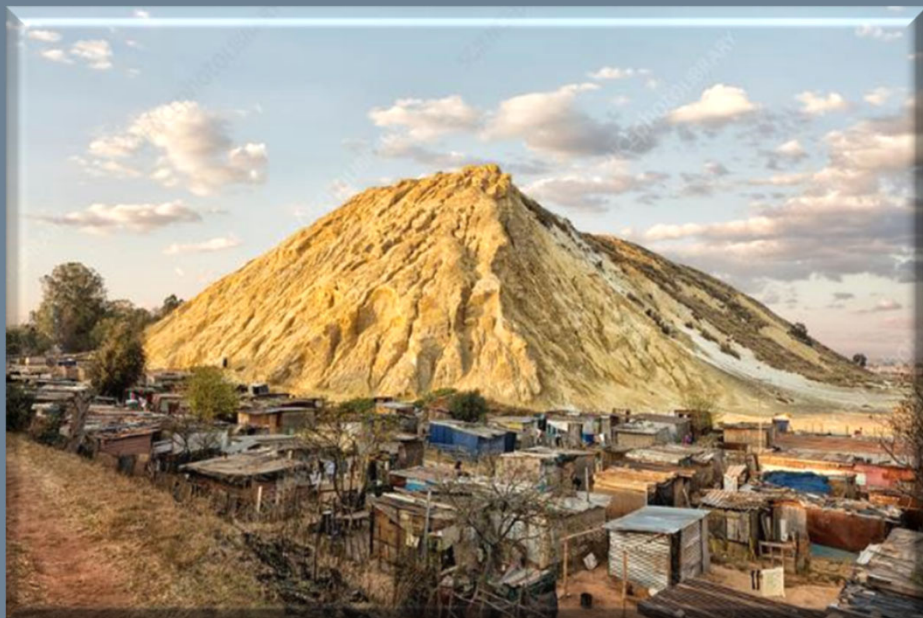
Vrxwk#D iulfd=#Ddgg#r i#H {whp h#E hdxw| #dgg#G lyhuw|w



Vrxw# iulfd#0dqq#r#P bhudZ hdok



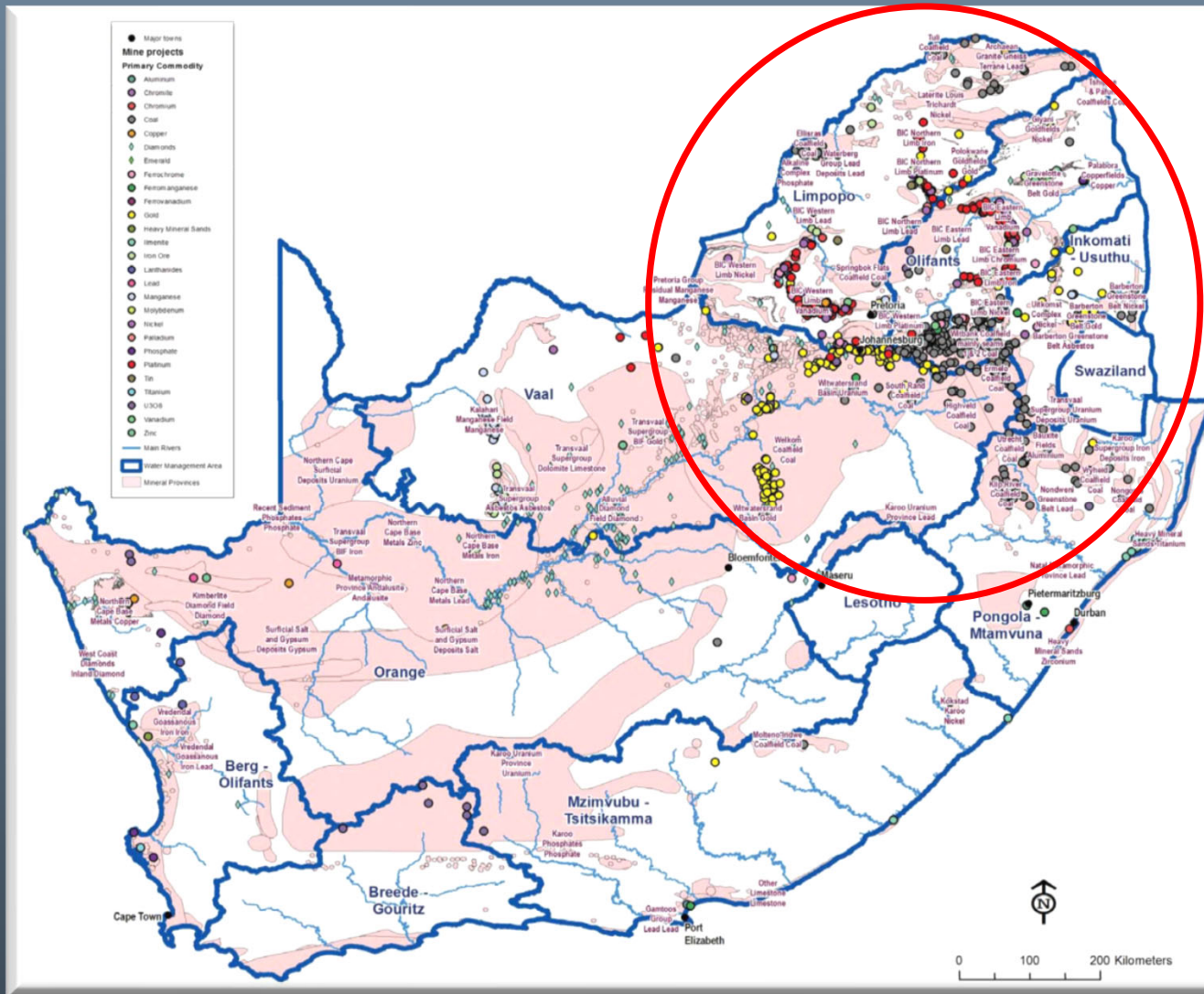
Source: Water Research Commission (2017) South African Mine Water Atlas, WRC Project No. K5/2234//3



P l b j # p s d f w h g # Z d w h u

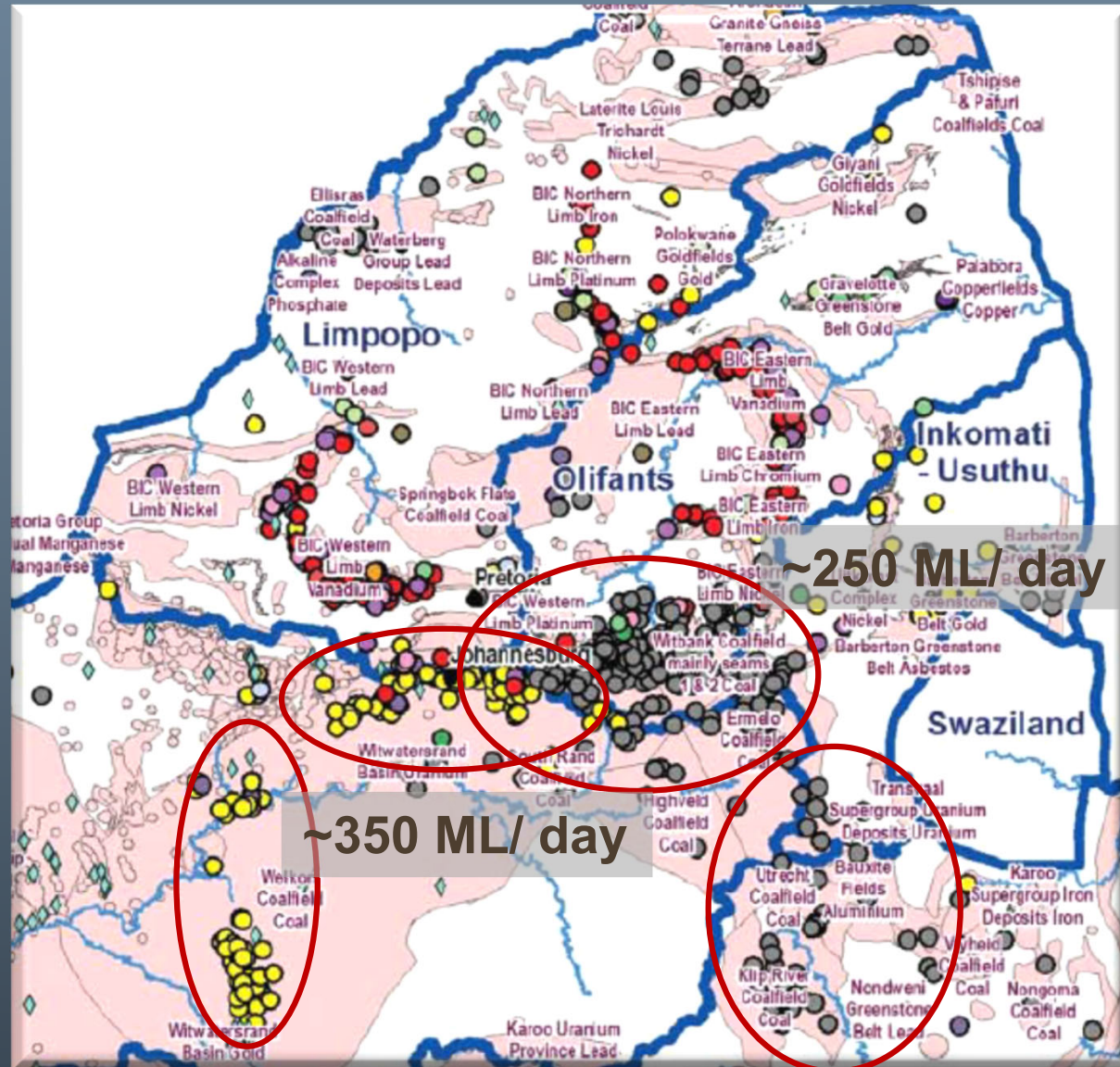


Vrxw# # iulfd-# # dgg# # # # # hhdz# # hdok



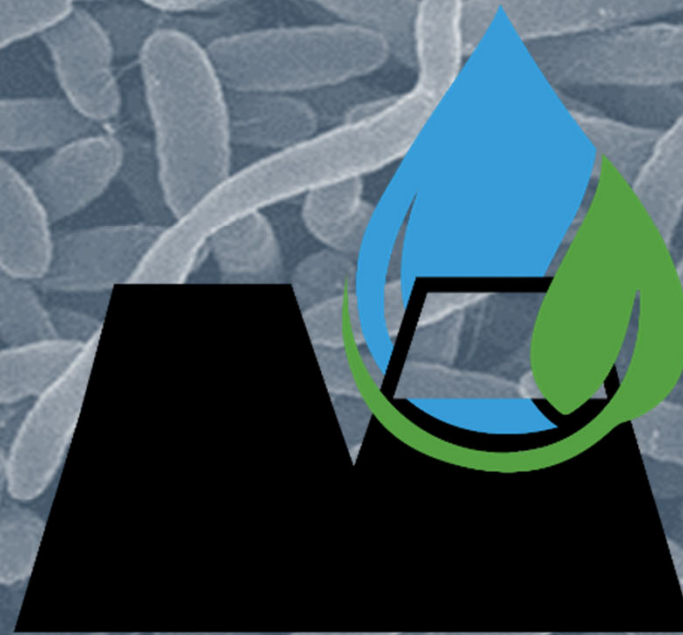
Source: Water Research Commission (2017) South African Mine Water Atlas, WRC Project No. K5/2234//3

P b b j # q i x h q f h g # Z d w h u





Treated water : Clean water
1ML : 7-10ML



cloSURE

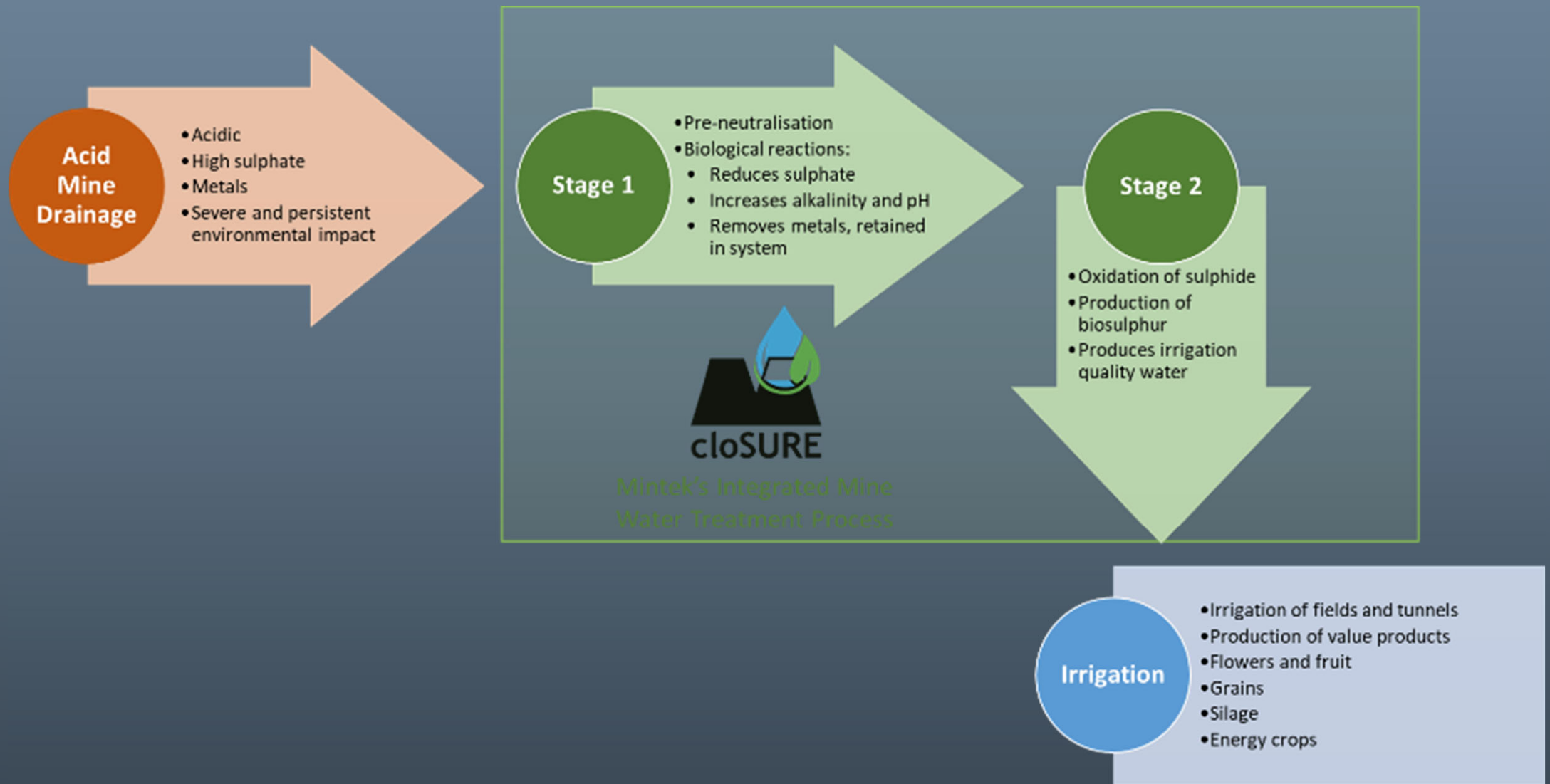
Passive sulphate reduction process
for treatment of water after mine closure

90 years of **Excellence**

in **Mineral Innovation**

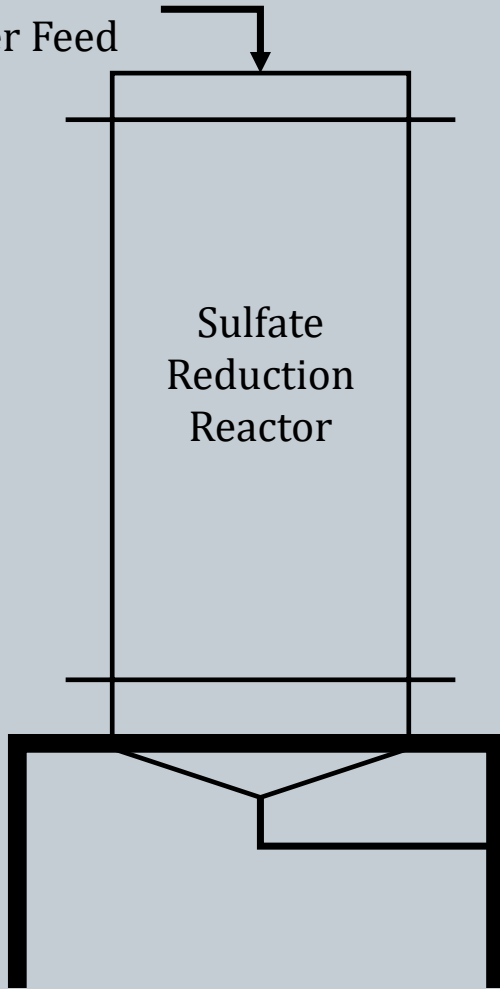


Wz r#vdjh#Surfhvv

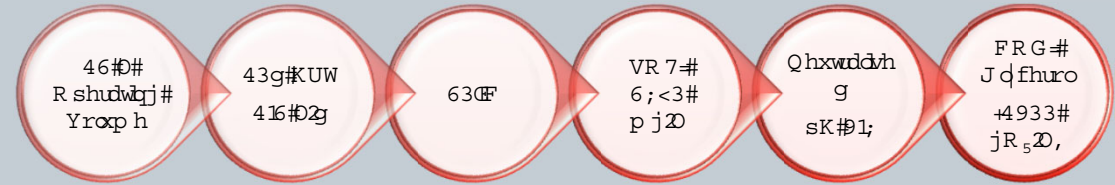


H {shup hqvd #hwxs #Dderudwru |#E VU#F roxp q#dgg#Vxs kr { #Wdgn

Sulfate-Laden
Mine Water Feed



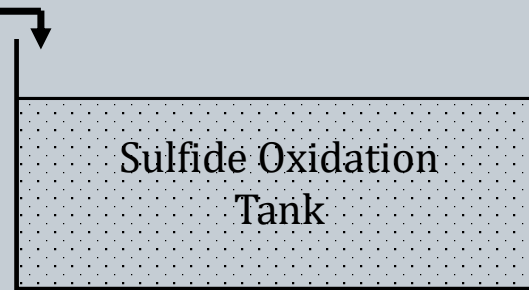
Step 1: BSR



Step 2: Sulfide Oxidation



Treated Sulfide-
Laden Effluent

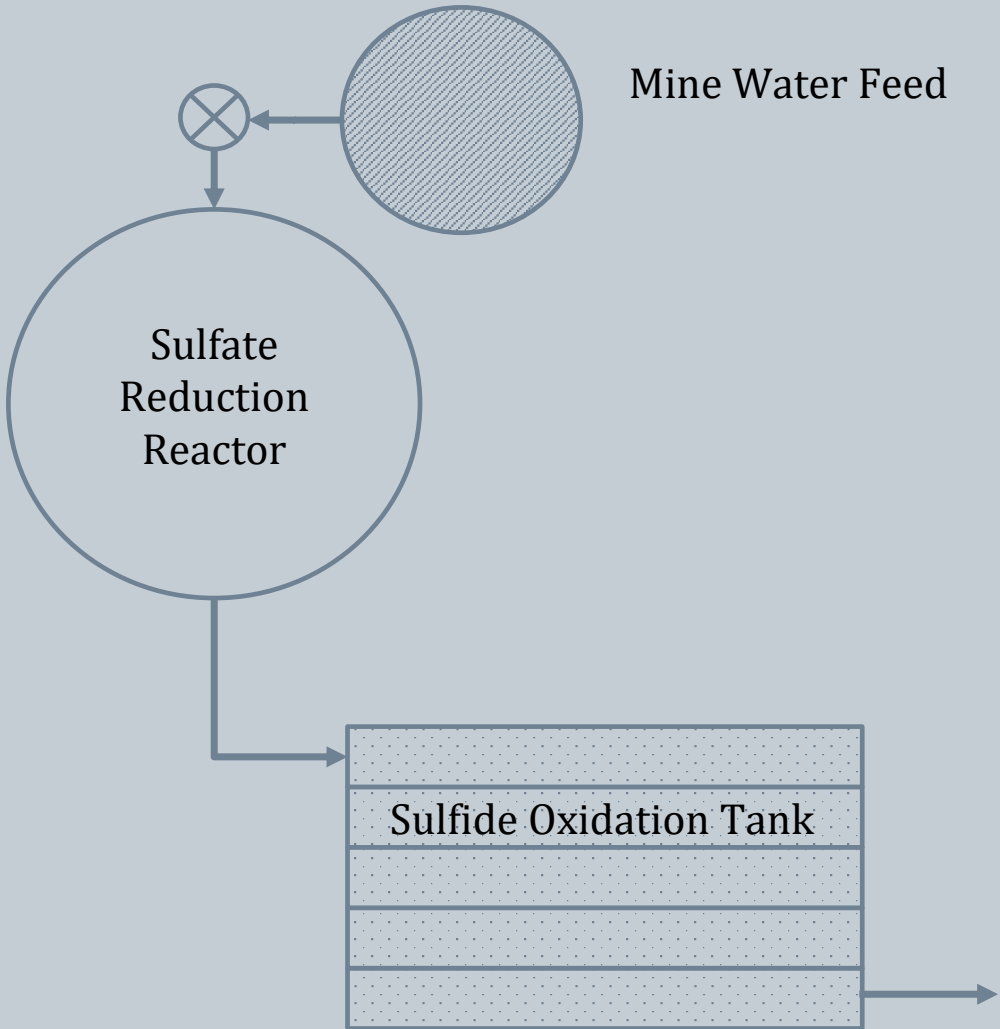


Treated Water

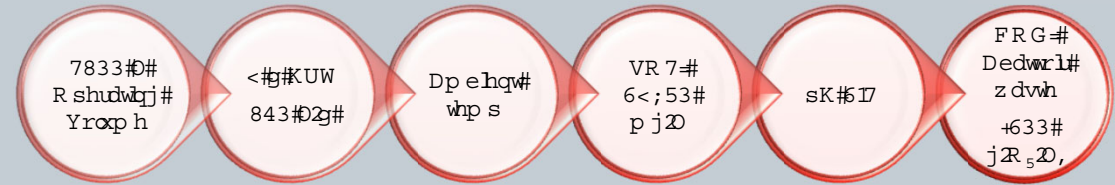
Oderudwru| #E VU# F roxp q#blgg#Vxskr { #Wdgn



H {shup hqwd #hwxs =#S brw\$ olqw#



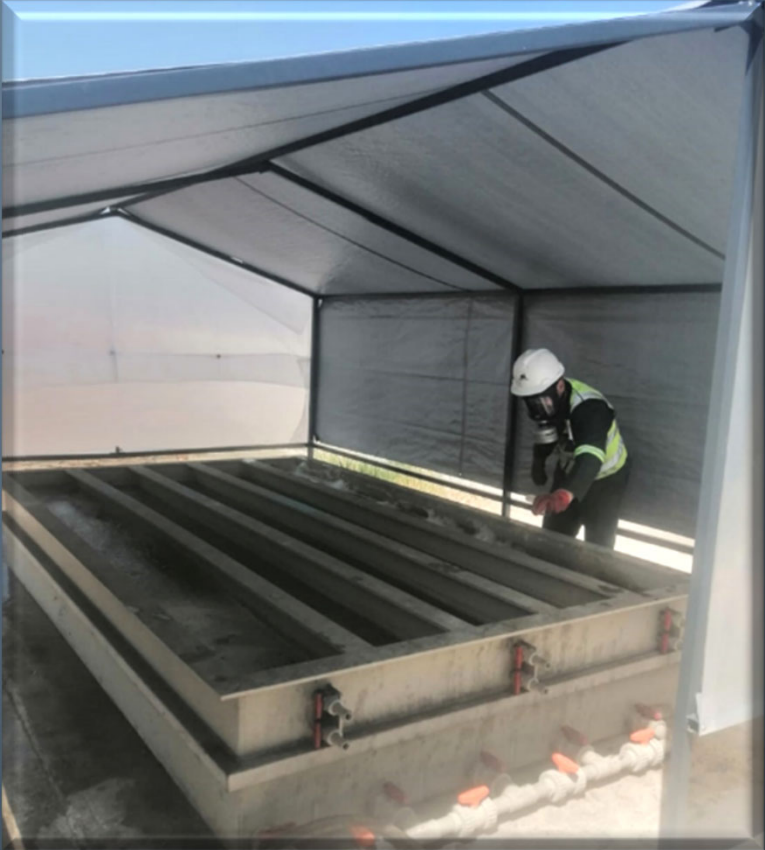
Step 1: BSR



Step 2: Sulfide Oxidation



Sbrw#Solq#Uhdwbj# #33#02g#P bh#p sdfwhg#Z dwhu

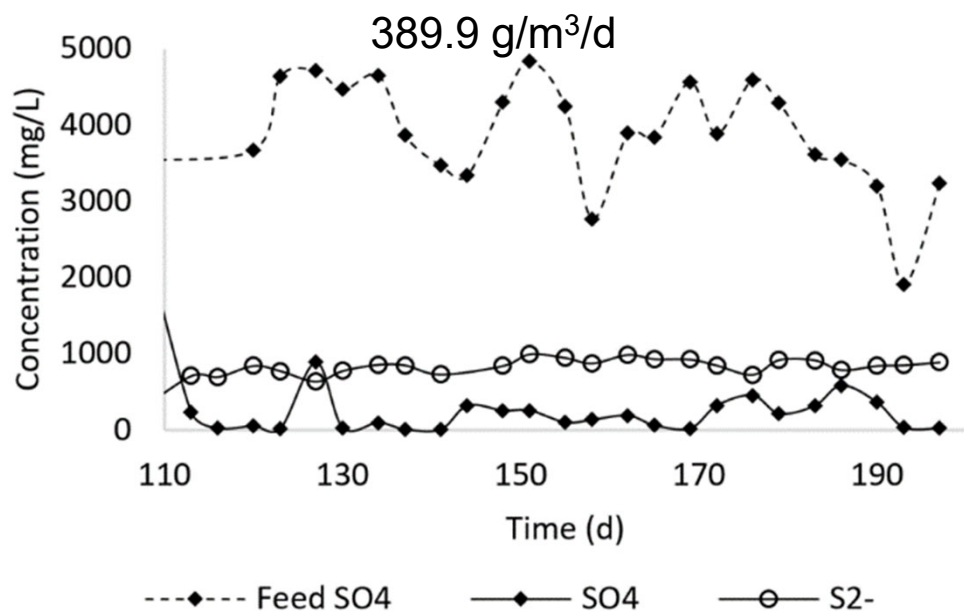


| | Temp °C | Flow Rate L/hr | SO ₄ mg/L | pH | Alkalinity mgCaCO ₃ /L |
|------------|------------|-------------------|-------------------------|------|--------------------------------------|
| Laboratory | 30 | 0.05 | 3890 | 6.82 | 80 |
| Pilot | ambient | 20 | 3980 | 3.39 | 0 |

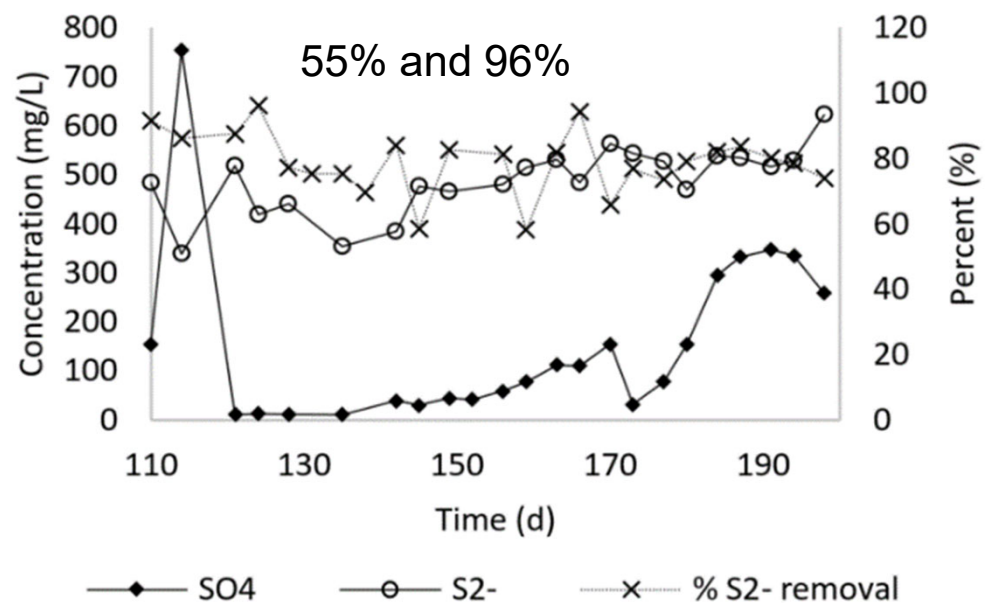
| | Cl | F | Na | Ca | Mg | Al | Co | Cu | Fe | Li | Mn | Ni | V | Zn |
|------------|------|------|-----|-----|-----|------|------|-------|------|------|------|------|--------|------|
| mg/L | | | | | | | | | | | | | | |
| Laboratory | 13.2 | 0.23 | 38 | 674 | 325 | 0.02 | 0.80 | <0.02 | 0.03 | 0.25 | 47 | 0.54 | <0.025 | 1.08 |
| Pilot | 39 | 0.40 | 123 | 458 | 249 | 38 | 0.03 | 0.01 | 327 | 0.35 | 1.08 | 0.36 | <0.025 | 1.33 |

Uhvxow=0derudwru|#EVU#F roxp q#lqg#Vxs kr { #Wdqn#Shuirup dqfh

Step 1: BSR



Step 2: Sulfide Oxidation



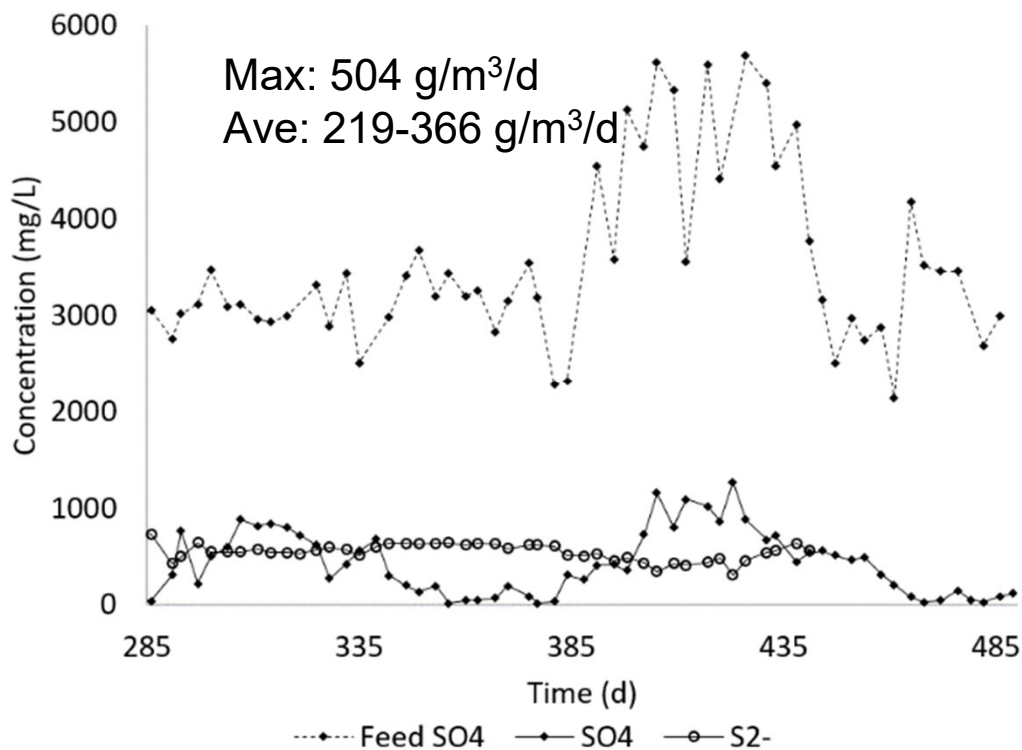
Uhxow=0derudwru|#F roxp q#dgg#Wdqn



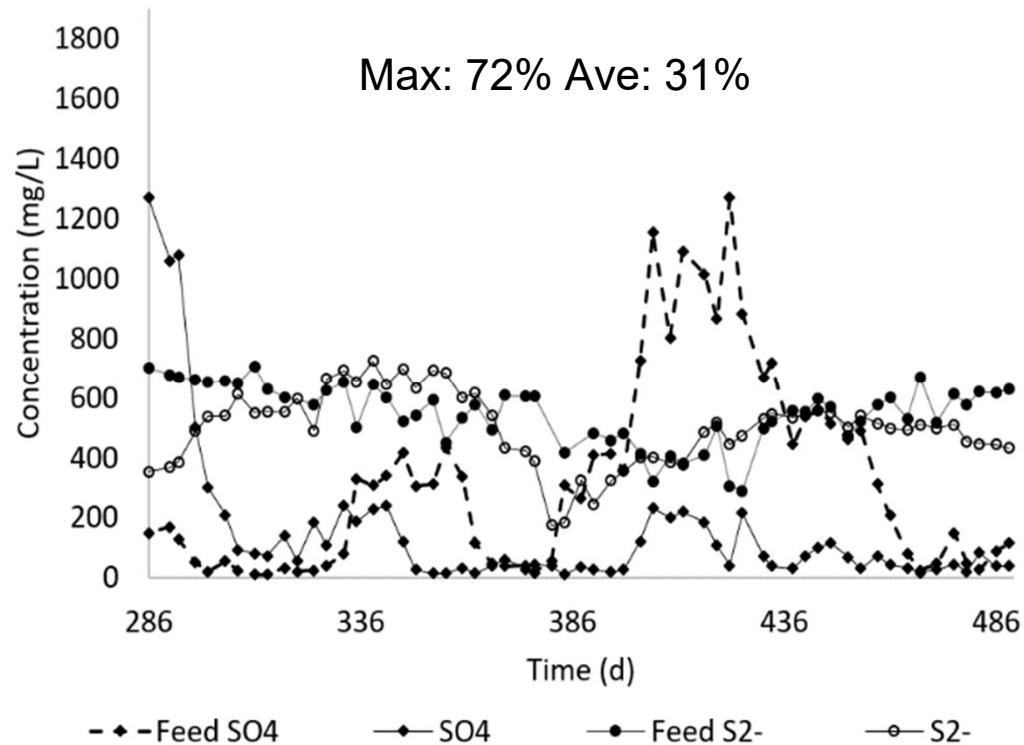
| Element | Composition |
|---------------------------|-------------|
| Total S | 53% |
| Ca | 4.23% |
| Mg | 2.18% |
| Mn | 0.22% |
| 22.42 g/m ² /d | |

Uhxow # \$ l r w \$ o q w # Shuirup dqfh #

Step 1: BSR



Step 2: Sulfide Oxidation



Uhvxow # \$ brw \$ olqw # Shuirup dqfh #



| Element | Composition |
|--------------------------|-------------|
| Total S | 60% |
| Ca | 21% |
| Mg | 0.6% |
| Fe | 0.7% |
| 3.42 g/m ² /d | |

Wundwng#Z dwhu# khp lwu|

| | SO4 mg/L | S2- mg/L | pH | Alkalinity mgCaCO ₃ /L |
|------------|-------------|-------------|---------|--------------------------------------|
| Laboratory | 177 | 69 | 7.19 | 2470 |
| Pilot | 38 | 460 | 7.59 | 3050 |
| TWQR | - | | 6.6-8.5 | |

| | Cl | F | Na | Ca | Mg | Al | Co | Cu | Fe | Li | Mn | Ni | V | Zn |
|------------|------|-----|----|-----|-----|------|-------|-------|------|-------|-------|--------|--------|------|
| | mg/L | | | | | | | | | | | | | |
| Laboratory | - | 0.4 | 38 | 210 | 376 | 0.35 | <0.01 | 0.11 | 0.18 | 0.735 | 0.017 | <0.025 | <0.025 | 0.12 |
| Pilot | - | 0.4 | 70 | 264 | 193 | 0.1 | <0.01 | <0.01 | 1.02 | 0.09 | 0.07 | 0.025 | <0.025 | 0.52 |
| TWQR | 100 | 2 | - | - | - | 5 | 0.05 | 0.2 | 5 | 2.5 | 0.02 | 0.1 | 1 | 100 |

Krz #g#k#wz r#r#p sduhB

| | Laboratory-scale | Pilot-scale |
|--------------------------------------|------------------|---------------------|
| Sulfate Removal | ✓ | ✓ |
| Sulfate Reduction Rates | ✓ | ✓ |
| Alkalinity produced and pH increased | ✓ | ✓ |
| TWQR for irrigation | ✓ | ✓ - except Mn |
| Sulfide removal | ✓ | Design optimisation |

✓ Scalable

90 years of **Excellence**

in **Mineral Innovation**



R wkhuf r qv ghudwrqv #ru# f d d h X s

41 R u j d q l f # x e v w d w h # s u r y l v l r q # d w # f d d h

- W u h d w p h q w # s o d q w # 1 # P O 2 g # p b h # z d w h u # h p r y l q j # 6 # j 2 # x a d w h → 4 5 8 3 # 0 2 g # h w k d q r q # r u # 4 8 3 3 3 # 0 2 g # b e d w r l # z d w h
- I q f u h d v h v # f r v w #, w d q v s r u # d q g # s x u f k d v h # r # p d w h u b o

51 I h h g # q w h u x s w l r q v

- D i h f w # s h u i r p d q f h # g x u b j # w d u w x s #
- f d q # r d u d w h # f k d q j h v # q # k | g u d x d f # a r z

61 I h h g # f k h p l w u | # Y d u b w l r q v

- I h h g # q r w # q h x w d d v h g
- H d y d w h g # l r q # g l # q r w # d i h f w # i i x h q w #
- H d y d w h g # x a d w h q h h g v # p d q d j h p h q w

71 K 5 V # V d i h w |

- U h d f w r u # g h v l j q # d q g # e l r i p # r u p d w l r q







Thank you

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Mintek



MintekSA



Mintek_RSA



Mintek_RSA