Keys to a Successful Persulfate Field Application: Critical Design Elements, Site Factors and Selection Criteria

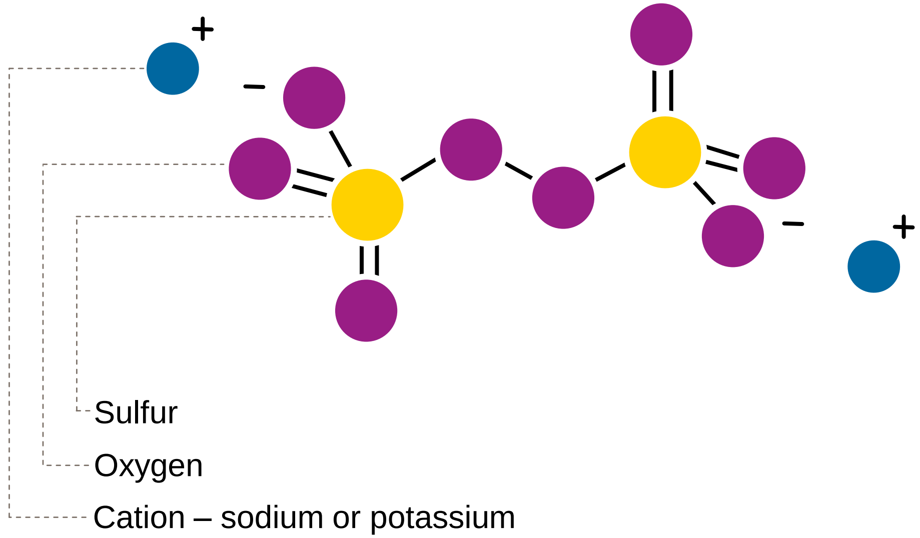
Soil & Groundwater Remediation Webinar | October 8, 2025

EVONIK
Leading Beyond Chemistry

Chemical Oxidation using Klozur® Persulfates

KLOZUR® SP KLOZUR® KP

- Persulfates are often the oxidant of choice due to its relative stability, oxidation potential and versatility
- Two types: Sodium & Potassium Persulfate with different physical properties → Impacts implementation strategies and design
- Both persulfates applicable across a broad range of contaminants
- Activation results in both oxidative and reductive radicals



Taking of e- is the oxidative step

$$S_2O_8^{-2} + 2H^+ + 2e^- \rightarrow 2HSO_4^{-1}$$

persulfate anion

Klozur® Persulfate Degradation Pathways – Contaminants Treated

Oxidative	Either	Reductive
Petroleum Hydrocarbons	PCE, TCE, DCE and VC	Carbon Tetrachloride
MGP Residuals	Chlorobenzenes	1,1,1-Trichloroethane
BTEX	Chlorophenols	Dichloroethanes
PAHs	Select Pesticides	Select Pesticides
Oxygenates	Select Fluorinated Compounds	Select Energetics
1,4-Dioxane	PCBs	
	Select Energetics	

Activation Methods: Alkaline, Heat and Hydrogen Peroxide

Activation Method: Iron Chelate/Klozur One

Keys to a Successful Field Application

Basic Principle:

Successful *In Situ* Remediation requires that a sufficient reagent dose based on geochemistry and contaminant mass is contacting the contaminants of concern for a sufficient period of time

Some Challenges / Key Site Considerations

Limits to site characterization & dealing with uncertainties

Dose

- Heterogeneities in contaminant distribution
- Sorbed mass
- NAPL
- Non-target demand

Establishing Contact

- Preferential pathways
- Effective / mobile porosity
- Contaminant distribution & partitioning
- Impacted media
  - low permeability soils
  - fractured bedrock
  - heterogenous media

Contact Time

- GW velocity
- Reaction kinetics
- Partitioning
  - Often rate limiting
- Back-diffusion
- Upgradient sources

Establishing & Maintaining Contact

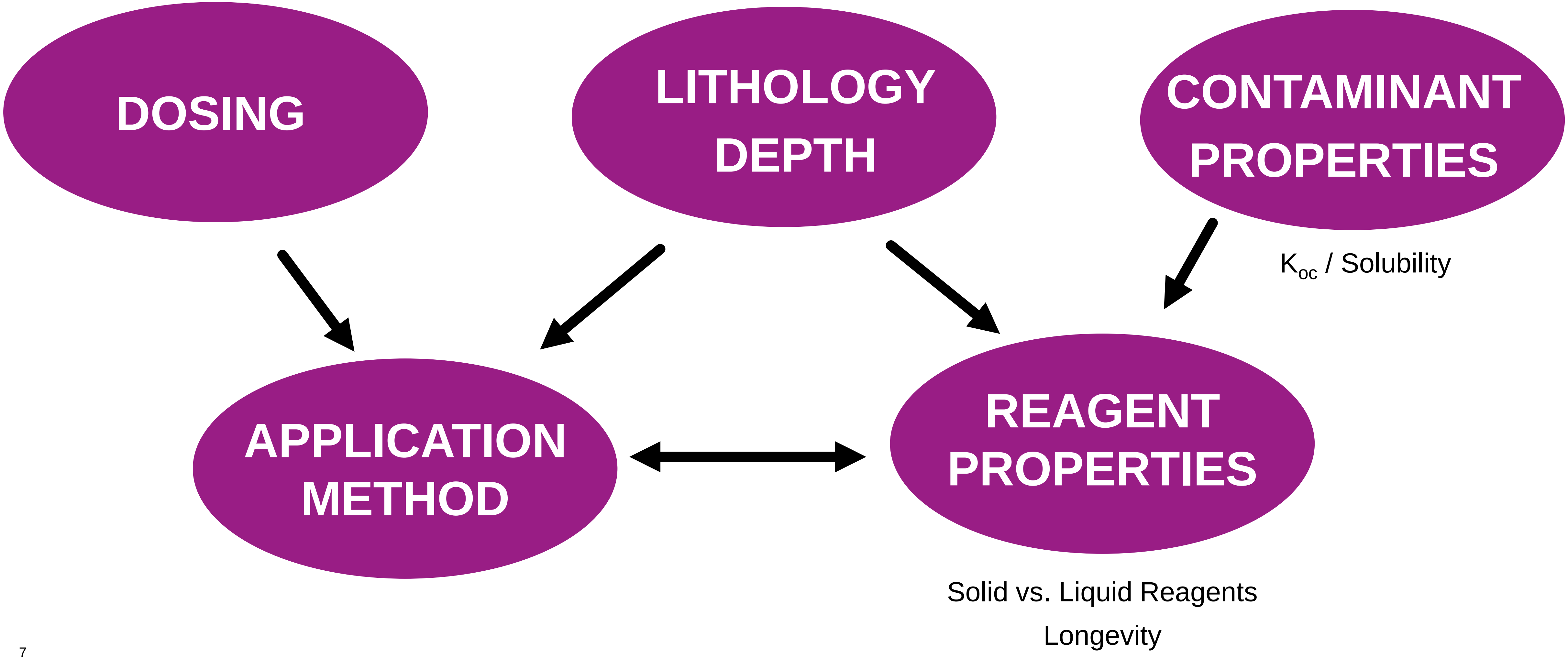
- Contact could occur directly upon product placement or occur over time via diffusion of substrates and/or contaminants

- **Reagent injection and distribution properties:**
  - Liquid vs. granular reagents dictates injection methods, transport and diffusion properties

- **Reagent longevity:**
  - The shorter lived the substrate, the more critical to achieve direct contact upon installation

The Different Design Aspects Impact Each Other

Establishing Contact
Several Key Factors Impact Each Other



This webinar will cover:

- **Fast & extended-release persulfate**
  - Transport characteristics & longevity
- **Application methods for ISCO**
  - Key attributes & limitations
  - Dosing limitations & recommended volumes
- **Basic dose calculations**
  - Concentration checks
- **Case study**
  - Dynamic approach implemented
  - Dosing, technology and application method tailored & varied across site

Reagent Properties

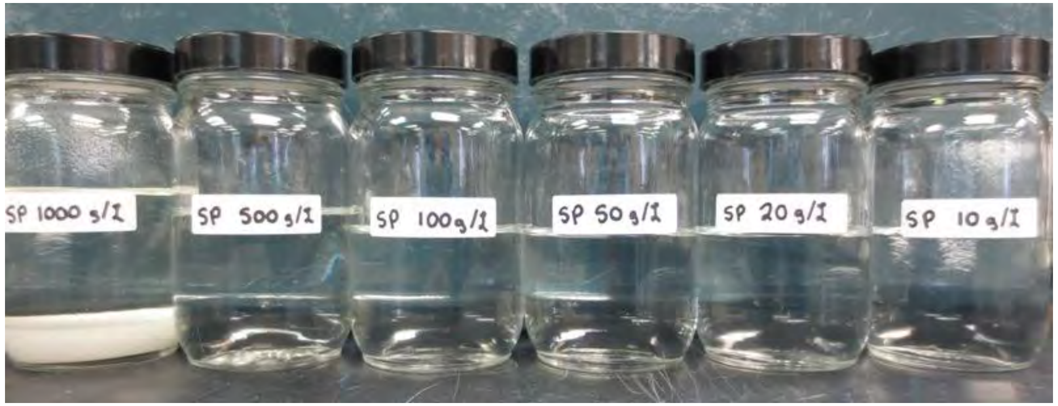
Fast & Extended-Release Persulfate

Oxidant Longevity and Distribution Properties: Two Types of Persulfate Salts

- Klozur® SP (Sodium Persulfate):
  - Injected as a solution
  - Travels with GW flow
  - Immediately available
  - Fast acting
  - Longevity ~4-8 weeks

KLOZUR® SP

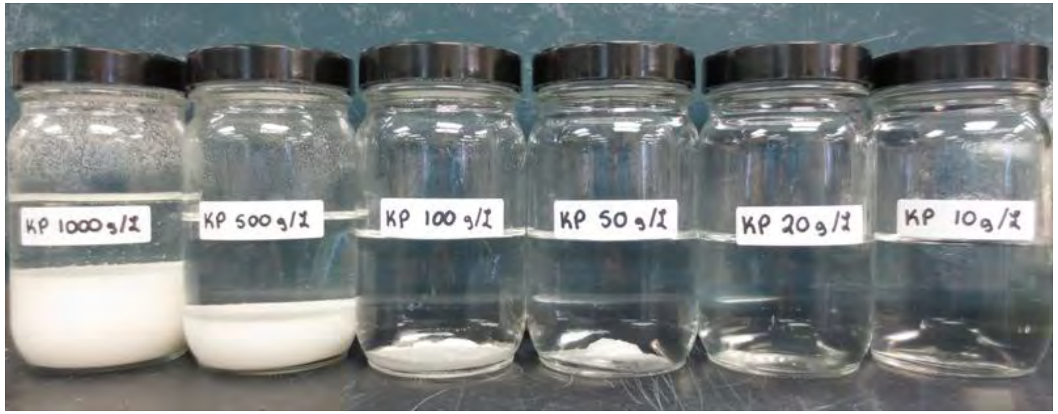
Solubility =
570 g/L at ~20°C



- Klozur® KP (Potassium Persulfate):
  - Injected as a slurry
  - Dissolves over time
  - Extended release if dosed above it's solubility
  - Longevity potentially months to years

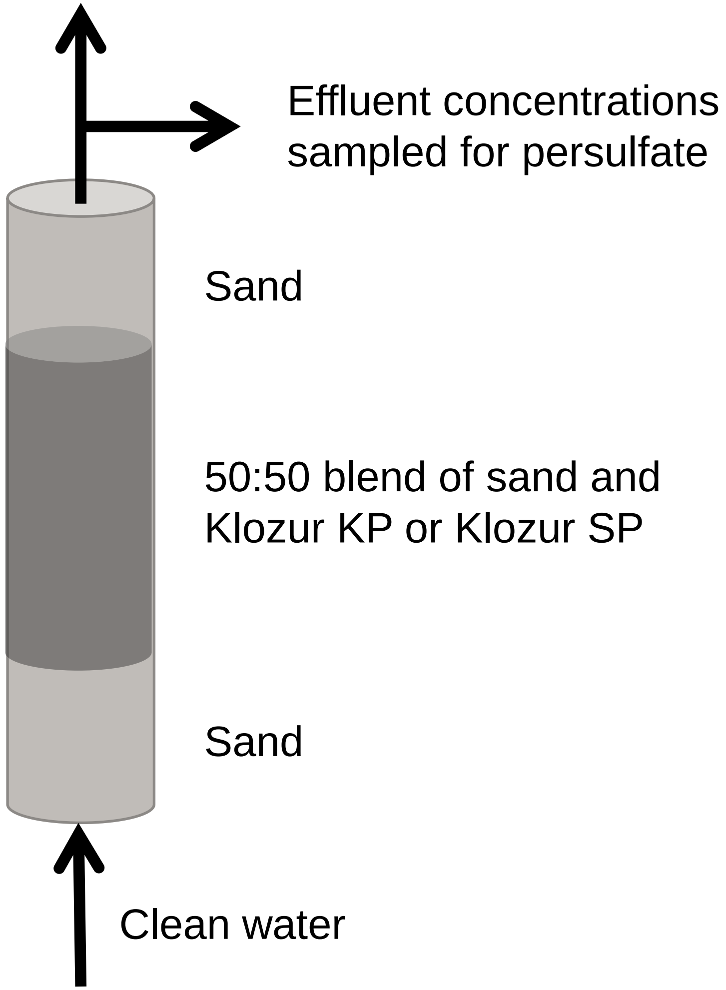
KLOZUR® KP

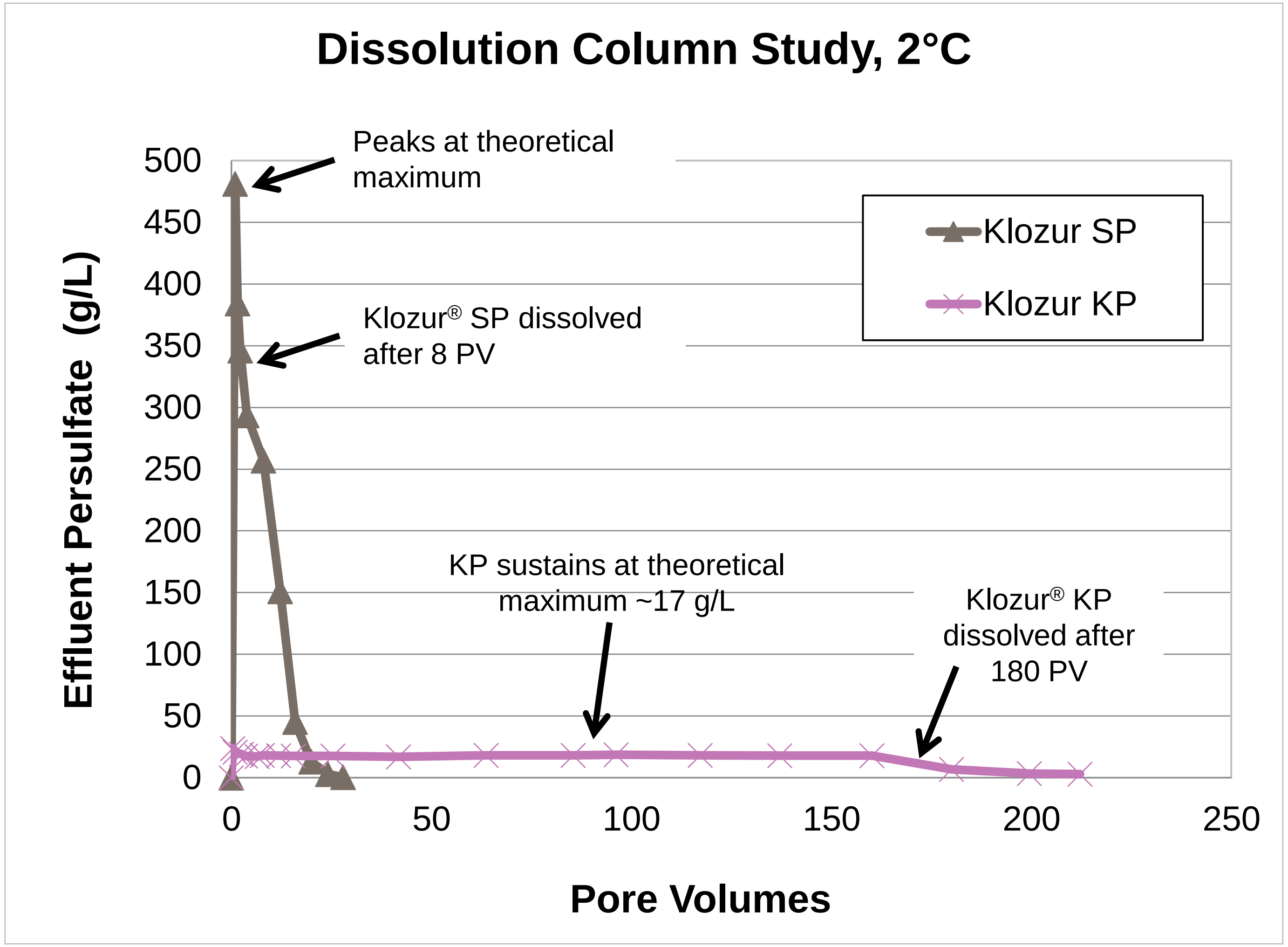
Solubility =
47 g/L at ~20°C



Dissolution Column Study:
Longevity & Distribution Properties of Klozur® SP vs. Klozur® KP

Dissolution Study Setup





Technology Selection: Fast vs. Slow Release ISCO

- Klozur® SP - High Solubility/Faster acting:
  - When you want all reagent available at application
  - Source zones, fast mass reduction, etc.
  - Soil mixing or injection to permeable soils (uniform distribution)

- Klozur® KP - Extended Release:
  - Low permeability soils (uneven distribution)
  - Highly sorbed contaminants (high K_{oc})
  - Low remedial goals
  - High groundwater velocity
  - Permeable Reactive Barriers (PRBs)

PCB	Day 56 PCB % Reduction			
	Klozur® SP (fast release)		Klozur® KP (slow release)	
	Low Dose	High Dose	Low Dose	High Dose
Arochlor 1254	12%	26%	53%	53%

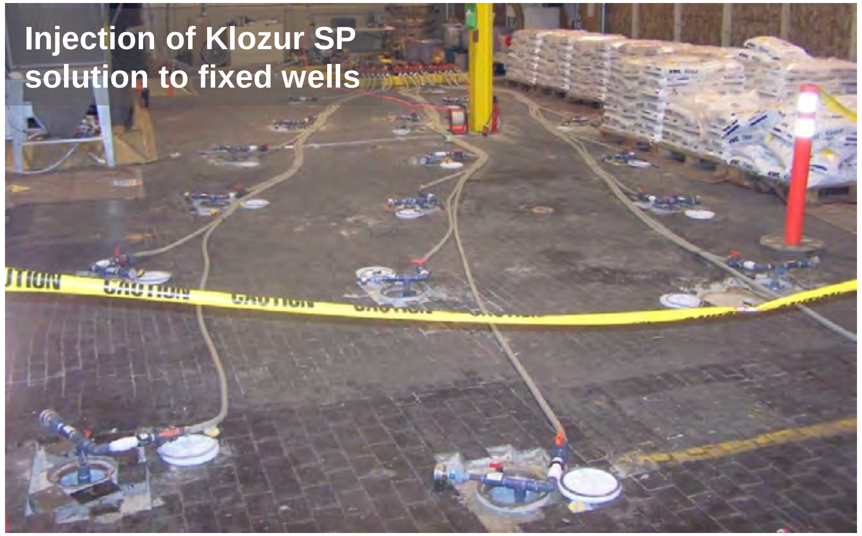
Klozur KP Solid Slurry Fracture

Courtesy of FRx/Brown & Caldwell

Common Application Methods

Attributes & Limitations

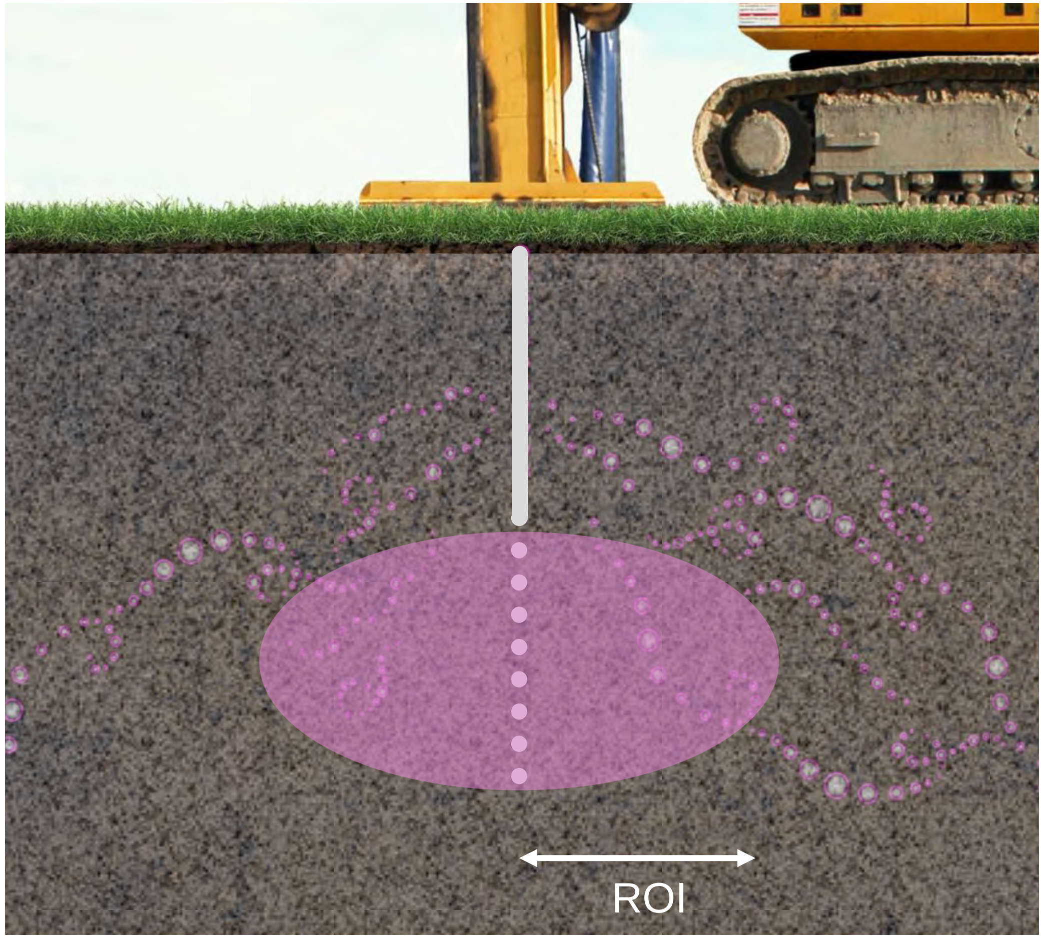
Common ISCO Application Methods



- **Injection:**
  - Soluble substrates (Klozur® SP): Fixed wells, DPT, recirculation
  - Solid reagents (Klozur® KP): High pressure injection of slurry (DPT/TAM-tubes/fracturing)
  - Less intrusive to site activities / low footprint
- **Soil Mixing:**
  - Uniform placement / high dose
  - Ideal for source areas and tight soils, incl. vadose zone treatment
  - Klozur® SP or KP – but fast acting SP typically preferred

Liquid Injection via fixed wells or screened tip

- Soluble reagents only (Klozur® SP + soluble activators)
- Recommended for more permeable soils
- Allows for repeat applications & injection at multiple locations simultaneously



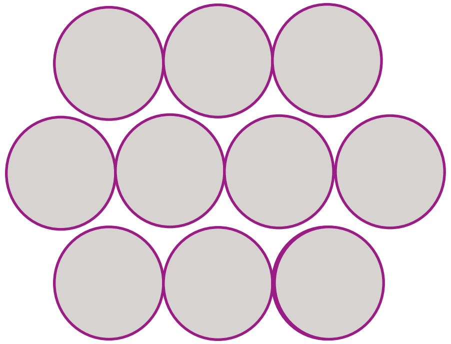
Liquid Reagent Injection – Injection Spacing

- Radius of influence (ROI) is going to be a function of the injection volume and effective pore volume
  - Typically, 50-100% of the effective pore volume targeted within the target ROI

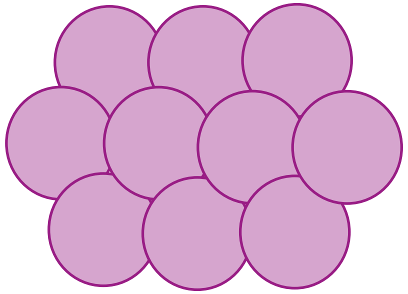
Injection Volume (gal)	Radius of Influence (ft)		Injection Volume (L)	Radius of Influence (m)
100	1.9		500	0.6
300	3.3		1 000	0.9
500	4.2		3 000	1.5
1 000	6.0		6 000	2.2
2 000	8.4		10 000	2.8
4 000	11.9		15 000	3.5
8 000	16.8		20 000	4.0

ePV - 20%; Screen height - 6 ft or 2 m, cylindrical distribution

- Injection spacing:
  - Typically, 17% overlap between ‘cylinders’ recommended for full coverage
  - Gaps may be fine at sites with sufficient GW flow



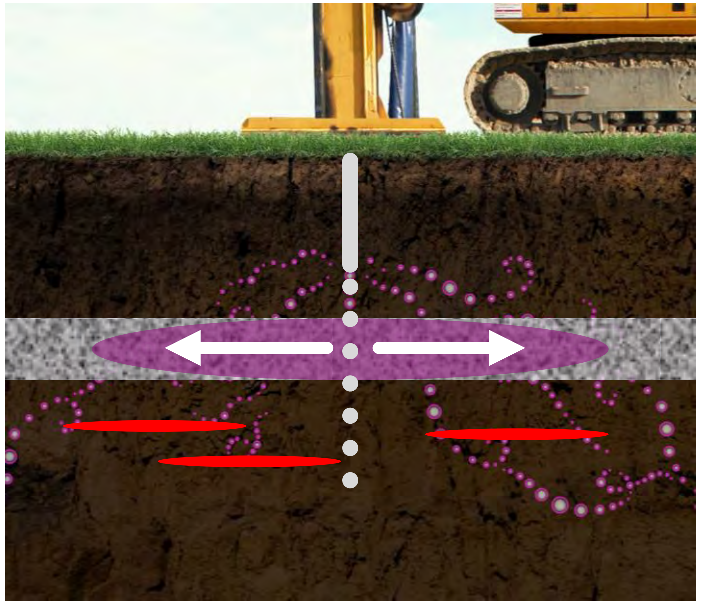
Relies on GW transport / diffusion



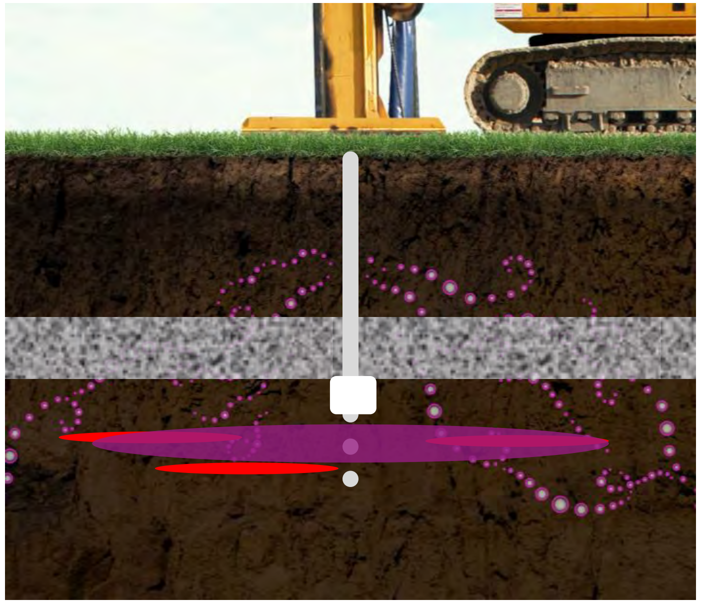
Full coverage example – 17% overlap

Liquid Injection into Heterogeneous Media

- The reagent solution will distribute primarily into more permeable soil layers



Important to isolate targeted impacted zones during application to non-heterogeneous media

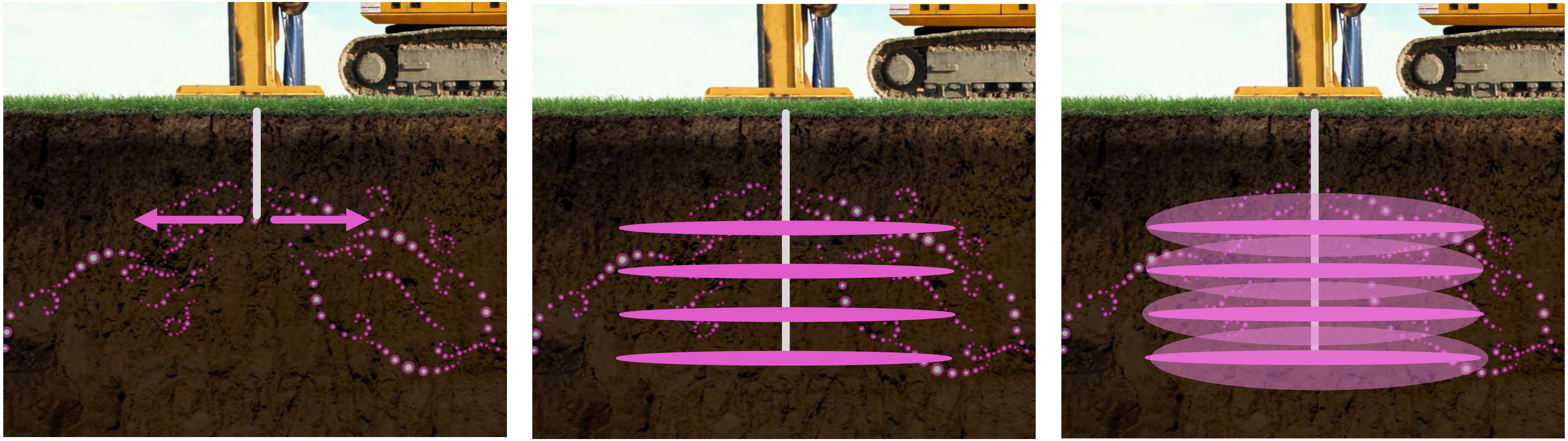


Direct Push Technology (DPT) Injection using Geoprobe

- Liquid injection or solid slurry
- Different types of injection tips available depending on soil type and reagents properties

Consider materials compatibility with carbon steel probe rods (alkaline activation preferred)

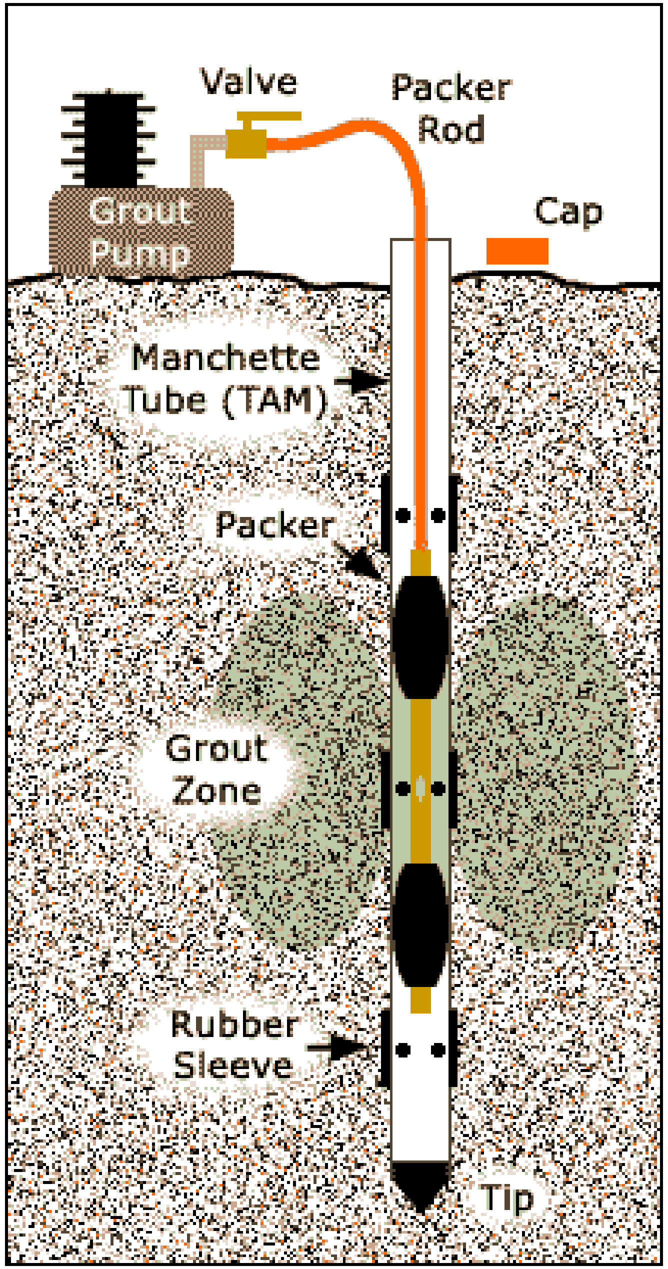
High-pressure, top-down injection example (low permeability soil):



Manchette Tubes / TAM-tubes

- Liquid injection or solid slurry
- Allows for repeat injections
- Installed with conventional drilling allowing for greater depths and installation to more complex geology compared to direct push
- Same flexibility as direct push – allows for injection into discrete depth intervals
- Allows for injection to multiple locations simultaneously

Courtesy of Italswiss



Courtesy of Strata-Tech

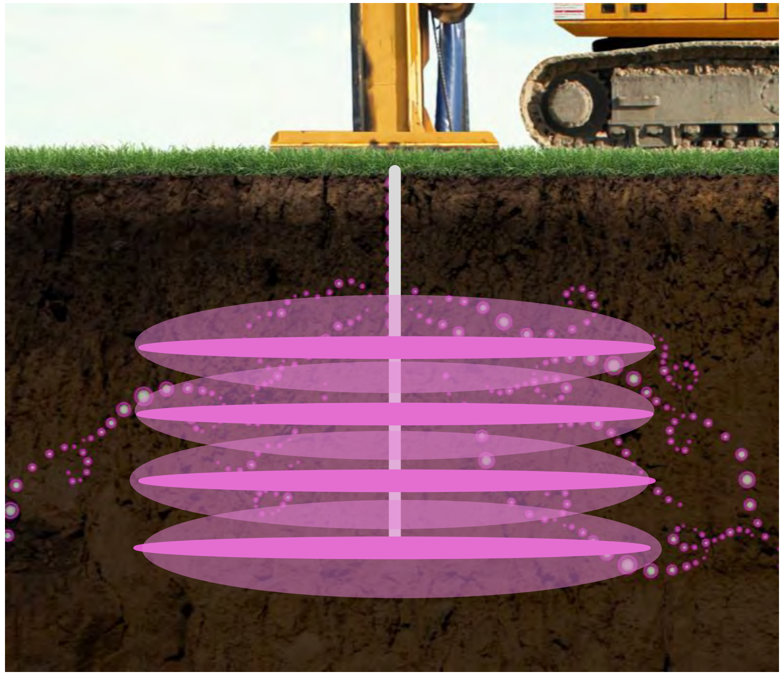
Stockholm MGP Project
Injection of Klozur® SP + NaOH Solution via TAM-tubes

Automated pump station allowing for injection at multiple points simultaneously

Sleeved TAM-tube

Specialized Hydraulic Fracturing

- Solid reagents – Klozur® KP
- Greater radius of influence:
  - – ROI up to >15ft / >5 m
- Injection via direct push or open bore holes using packers
  - – Depths up to >60 ft / >20 m bgs



Soil Mixing

- More homogenous reagent placement
- Homogenizing contamination
- Highly effective in both vadose & saturated zone
- Depth limitations varies with technique used

Bucket Mixing

Rotary Mixing Attachment

Large Diameter Augers

Acknowledgements:

Tony Moran (Entact), Bill Lang (Lang Tools),

Kim Jensen (Arkil), Stefan Dahlin (SMG),

Nathan Coughenour (Geosolutions),

Vito Schifano (Formerly of Ladurner)

Bucket Mixing

- Can reach up to 6 m / 20 ft below work pad (limit to length of excavator arm)
- Reagents applied dry at the surface → Best suited for depths up to 2.5 m / 8 ft for homogeneous mixing
- May need a rotary tool as a “polishing” step to improve blending
- Can apply in lifts to reach greater depths

Adding Dry Reagents.

Blending & addition of water.

Wet mixing completed.

Area after backfill.

Photo Documentation Courtesy of Trident

Rotary Mixing Attachments

- Various tools in the market (Lang Tool, Allu, Alpine, etc.) with varying penetration depths (up to ~26 ft / ~8 m)
- Can apply in lifts to reach greater depths
- Reagents injected via mixing head – more homogeneous placement
- Hard soil may require pre-loosening with excavator

Lang Tool's Dual Axis Blender

Lang Tool's Deep Digger Blender

Allu Mixer attachment

Large Diameter Augers

- Can extend to depths of 60+ feet (20+ m) below the work pad
  - >60 ft / >20 m is possible but increasingly specialized, consult contractors
- Auger diameter may range from 3 to 11+ feet in diameter
  - Varied based on soil density, strength, depth, etc.
- Increasingly cost-effective, especially for larger sites

Combining ISCO with ISS

- ISCO (sodium persulfate) and ISS reagents (binders) applied together in single application via soil mixing

- Provides competent soils for future site activities and redevelopment:

  →The amount of binder could be varied

- Cement/slag serve as low cost alkaline activator for persulfate

- Highly contaminated sites / combined remedy: Combined approach helps reduce site risks more cost effectively, with the more mobile portion of the contamination removed via oxidation and residuals immobilized in the matrix

Soil mixing using excavator with mixing attachment

Soil mixing using large diameter augers

Sufficient Moisture is important!

- Typically target approximately ~1.5x times full saturation
- Visually want the soil to look soupy with some standing water upon application
- Both Portland cement and Klozur® SP consume water as they react

Video courtesy of Lang Tool

ISCO-ISS Applied using Large Diameter Augers in Bolzano, Italy

Video courtesy of Ladurner Bonifiche S.r.l.

Application Method Screening vs. Geology

	High K Media	Low Conductivity Media		Fractured Media	
	Sand	Silts and Clays	Bedrock with small fractures	Fractured Silts and Clays	Fractured Bedrock
Low pressure injections (liquids only)	Yes	Limited volumes/ distribution	Limited volumes/ distribution	Yes, but limited injection volumes	Yes, but limited injection volumes
High Pressure Injection (DPT)	Yes	Yes	No	Yes	No
Hydraulic Fracturing (solid reagents)	Questionable	Yes	Yes	Yes	Yes
Soil mixing	Yes	Yes	No	Yes	No

Dose Calculations

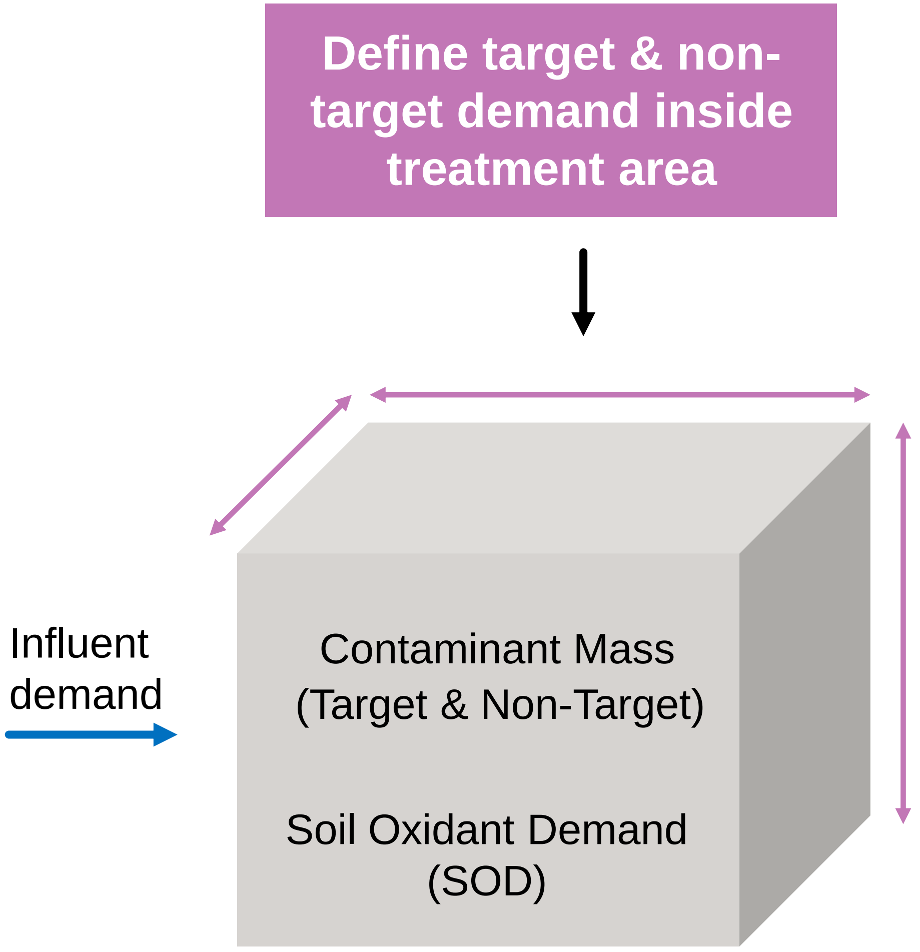
Volume & Concentration Checks

Estimating Persulfate Dose: Basic Steps

1. Estimating Oxidant Demand
   - Contamination Demand
     - Including target and non-target compounds
   - Soil Oxidant Demand (SOD)
     - Natural organics or reduced metals on soils (SOD)

2. Apply Safety Factors

3. Confirm viability of implementation
   - Minimum and maximum dosing per application round
   - Volumes to achieve distribution (injection)
   - Minimum and maximum injection concentration
   - Varies with application method and oxidant type



Step 1: Estimating Oxidant Demand – Basic Formula

$$\{\sum [(CM_{Soil} + CM_{GW} + CM_{NAPL} + CM_{FLUX}) \text{ x Ratio}] \text{ x S.F.}\} + SOD * \text{Soil Mass x S.F.}$$

Where:

- CM_{Soil} = Contaminant mass in the soil phase
- CM_{GW} = Contaminant mass in the groundwater phase
- CM_{NAPL} = Contaminant mass in the NAPL phase
- CM_{FLUX} = Influent contaminant mass over design life
- Ratio = Degradation or stoichiometric ratio of oxidant needed to treat a unit mass of contaminant
- SOD = Soil Oxidant Demand (g Oxidant per Kg Soil)
- S.F. = Safety Factor

Oxidant required for each contaminant is individual calculated and then summed

Stoichiometric Ratio: Theoretical
Degradation Ratio: Empirical

Design webinar available with more details

Estimating Sorbed Mass from Groundwater Data & K_{oc}

- If soil data unavailable or unreliable, sorbed mass could be estimated based on GW data as follows:

$$C_{Soil} = C_{GW} \times K_{oc} \times F_{oc}$$

Where:

- C_{Soil} = Contaminant concentration in the soil phase
- C_{GW} = Contaminant concentration in the groundwater phase
- K_{oc} = The soil organic carbon–water partition coefficient
- F_{oc} = Fraction organic carbon on soil

Contaminant	EPA* K_{oc}	F_{oc}	Contaminant Distribution (%)	
			GW	Soil
1,4-Dioxane	17	0.005	70%	30%
1,1,1-TCA	110		27%	73%
1,2-DCA	38		51%	49%
1,1-DCA	53		43%	57%
DCE	38		51%	49%
Benzene	59		40%	60%
Toluene	182		18%	82%
Ethylbenzene	363		10%	90%
Xylene	386		9%	91%
TCE	166		19%	81%
Carbon Tetrachloride	174		19%	81%
1,2-Dichlorobenzene	617		6%	94%
Dieldrin	21,380		<0.1%	>99.9%
PCB – Arochlor 1254	158,000		<0.1%	>99.9%
Note:	1. Assuming 1.5 g/cm^3 soil bulk density and effective pore volume of 0.15			

- Use as concentration check
- F_{oc} often unknown → order of magnitude difference in dosing estimations

Step 2: Apply Safety Factors

- Safety Factors:
  - Needed for uncertainties in reagent distribution, contaminant mass estimate, contaminant distribution, auto-decomposition etc
  - If phase transfer limited (i.e. with some NAPLs/low solubility/high K_{oc} contaminants), either higher S.F. or longer lasting oxidant, such as Klozur® KP, may be needed
  - Improve confidence in outcome

Common Safety Factors

Contaminant Concentrations:

- High: ~1.1 to ~1.5x
- Low: ~1.5 to ~10x

Adjusted to meet desired minimums or at the discretion of design engineers and stakeholders

Less certain data / Difficulty establishing contact / Aggressive remedial goals / Heterogeneous conditions / Auto-decomposition

=

Apply a higher safety factor

Step 3: Concentration Check (minimum / maximum dose per application event)

Application method	Recommended Dosage Guidelines
Liquid Injection (Klozur® SP)	Injection concentration: ~50 to 250 g/L, 50-100% of ePV >10 g/L in total pore volume (>20 g/L for contaminants requiring reductive pathway)
Solid Slurry Injection (Klozur® KP)	~1 to 1.5% w/w Klozur® KP by soil mass
Soil Mixing	0.5 to 10% w/w soil

- Below minimum guideline → Consider increasing safety factors
- Above maximum guideline → Consider dividing volume over multiple application events

Example Calculations for Klozur® SP injection:

- High & Low Dose Examples
- Injection volume
  - 50% to 100% of effective pore volume (ePV)
- Recommended concentration range of 50 to 250 g/L in injectate
- Low Dose Example:
  - Injection concentration below 50 g/L → Adjust safety factors to meet minimum concentration guideline
- High Dose Example:
  - Injection concentration exceeds 250 g/L → consider multiple injection events or soil mixing

	Low Dose Example	High Dose Example
Soil Volume (m^3)	**1**	**1**
Soil mass (kg)	1800	1800
Total Pore volume (L)	350	350
Effective Pore volume (L)	150	150
COCs	**CVOCs**	**TPH**
COC conc (mg/kg)	**5**	**2,500**
Degradation Ratio	8	15
Safety Factor on COC Demand (multiplier)	2.0	1.2
Persulfate Dose for COC (g/kg)	0.1	45.0
SOD (g/kg)	1.0	1.0
Safety Factor on SOD (multiplier)	1.5	1.5
Persulfate Dose with SF (g/kg)	2	47
SP Dose with SF (wt% by soil mass)	**0.2%**	**4.7%**
Mass Persulfate (kg)	2.8	84
Target %ePV for injection	**75%**	**75%**
Injection volume (L)	112.5	112.5
Resulting injection concentration in single application (g/L)	**25.3**	**744**
Comment:	**Below minimum guideline - increase safety factors**	**Above maximum guideline, divide in 3 injection events or consider soil mixing**

Example Klozur® SP dosing calculations & number of application events for TPH (ESTIMATED values – will vary by site):

TPH (mg/kg)	Assumed Degradation Ratio	Safety Factor on COCs[1]	SP Dose for COCs (g/kg)	Assumed SOD (g/kg)	Safety Factor on SOD[2] (multiplier)	SP for SOD with SF (g/kg)	Total SP Dose[3] (g/Kg)	SP Dose with SF (wt% by soil mass)	Injection[4] (# events estimated)	Soil mixing[5] (# of mixing events estimated)
10	30	4	1.2	1	1.5	1.5	2.7	0.27%	1	1
100	20	2	4.0	1	1.5	1.5	5.5	0.55%	1	1
500	18	1.5	13.5	1	1.5	1.5	15.0	1.50%	1	1
1,000	15	1.3	19.5	1	1.5	1.5	21.0	2.10%	2	1
2,500	15	1.2	45.0	1	1.5	1.5	46.5	4.65%	3	1
5,000	12	1.1	66.0	1	1.5	1.5	67.5	6.75%	4	1
10,000	12	1.1	132.0	1	1.5	1.5	133.5	13.35%	7	2

1. Safety factors on contamination can also be adjusted for reasons other than concentration including client goals, multiple applications, uncertainties in design/application, etc.
2. Safety factor of SOD does not vary with contaminant concentration, rather it is typically a function of site uncertainty
3. Evonik recommends a minimum of 2.5 g SP per Kg soil. Using a higher SF at low concentrations is one way to achieve this minimum design
4. Injection assuming 2% per injection event (~sandy soil, clay would be lower). Will vary based on injection volume (soil type, injection time, etc), and injection concentration
5. Soil mixing assuming 7.5% per soil mixing application

Multiple Application Strategy

- Reasons for a multiple application strategy include:
  - **Mass required for treatment is greater than can be delivered in a single application**
  - Remedial goals are multiple orders of magnitude lower than initial concentrations
  - Evaluative (Iterative) approach: Monitoring between applications can be used to refine future applications
    - Using each application as a diagnostic tool
    - Minimizes initial commitment allowing for further site assessment
  - Injection locations can be adjusted between events

- Potential concerns with multiple application strategy:
  - Partial treatment of contaminants may cause concern
  - Oxidation of soil organics may change partitioning after initial event can show an increase in dissolved concentrations, even if the total mass has been reduced

Case Study:
Implementation of a dynamic remedial approach at a former MGP site in Stockholm Sweden

Leading Beyond Chemistry

Case Study:
Former MGP, Stockholm, Sweden

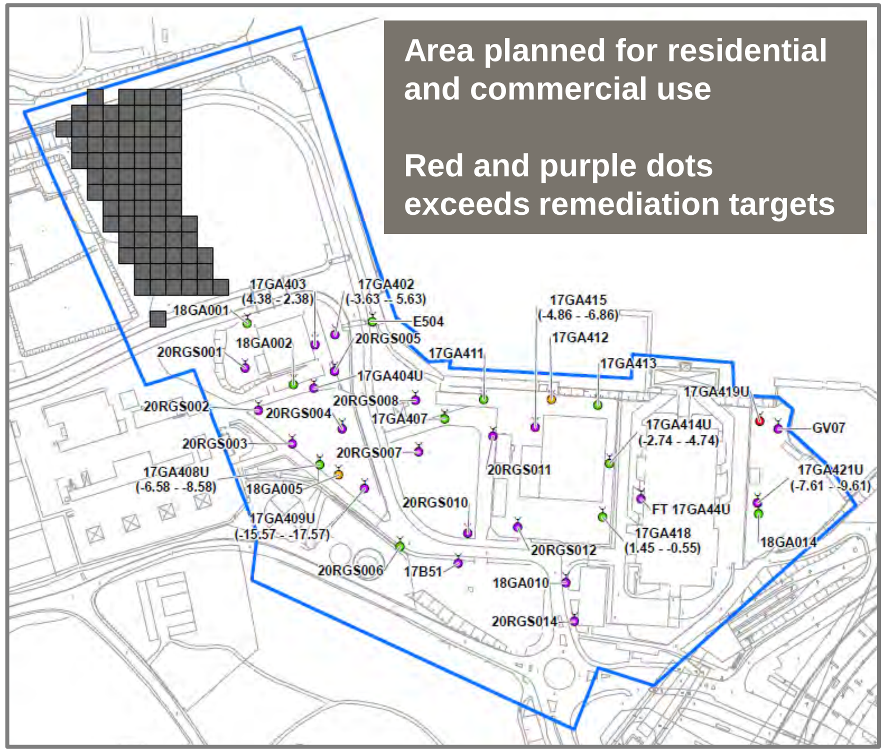
This project is a collaboration between multiple parties, incl City of Stockholm, PEAB, Golder, Elander Miljöteknik, RGS, Sheeba, Arkil, Evonik, Geomind

City of Stockholm Technical Project Contacts:
Sofia Billersjö: sofia.billersjo@stockholm.se
Helen Österberg helen.osterberg@extern.stockholm.se

- A dynamic remedial approach has been implemented to effectively treat soil and groundwater
- The old MGP area is being redeveloped into a residential area
- Soil and groundwater impacted by coal tar residue, incl. Polycyclic Aromatic Hydrocarbons (PAHs)
- Overarching goal with soil and groundwater remediation is to limit vapor intrusion to new residential buildings
- Secondary goal is to stabilize soils for planned site developments (high rises)

Treatment Area and Remedial Goals

- PAHs present in two subsurface units:
  - – Clay unit: 50,000 m^3 down to ~ 21 ft / 7 m bgs
  - – More permeable “Moraine” layer (sand, gravels, and rock) beneath the clay: 70,000 m^3



Site Specific Remedial Targets developed to prevent vapor intrusion

- **Clay unit:**
  - <250 mg/kg PAH-16
- **Groundwater (moraine layer):**
  - Naphthalene <6200 ug/L
  - Fluoranthene <12 ug/L
  - Benzene <300 ug/L

Project site

Technology Screening & Selection

Chemistry

Pilot and bench testing performed evaluating multiple potential technologies:

→ Alkaline Activated Klozur® SP selected as primary technology

Dynamic strategy:

→ Klozur® SP dose varied based on baseline PAH concentrations

→ Fluoranthene driver (high K_{oc}): Extended Release Klozur KP® indicated

→ Benzene driver (<5 ppm): Enhanced Aerobic Bioremediation (oxygen releasing compounds) indicated

Establishing Contact

Clay unit:

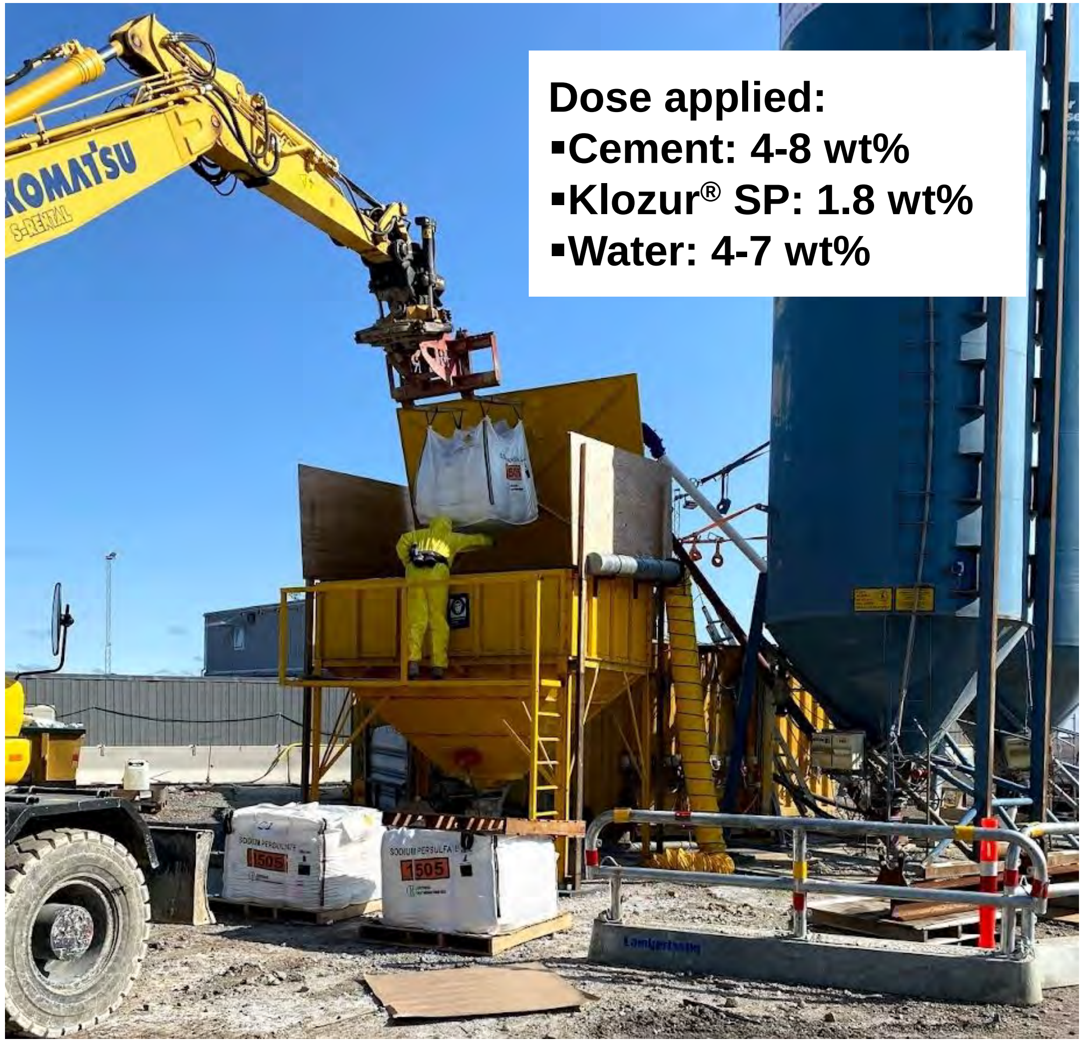
- Soil Mixing using Large Diameter Augers
- Clay made injection difficult
- Klozur® SP activated with slag cement (ISCO-ISS)
- Solidified/stable soils for redevelopment

Moraine Layer:

- Injection strategy using TAM-tubes
- Unable to soil mix large rocks
- Permeability made injection feasible
- TAM-tubes allows for repeat injections of liquid and solid reagents (→ allowed for flexibility)

Full-Scale Installation of ISCO-ISS to Clay Unit - 2021-2023

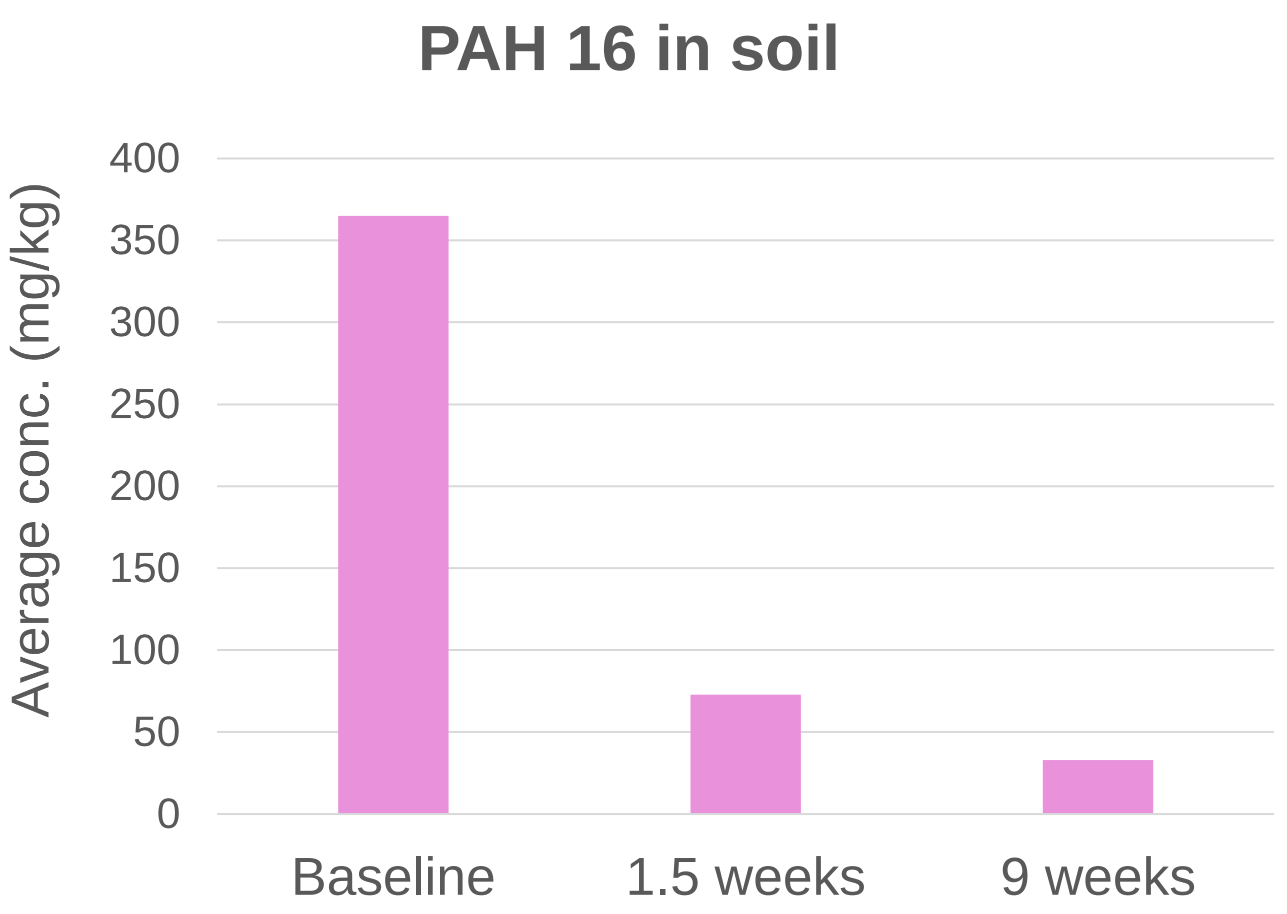
Soil mixing using large diameter augers – 2 rigs in operation



Dose applied:
- Cement: 4-8 wt%
- Klozur® SP: 1.8 wt%
- Water: 4-7 wt%

Klozur® SP + Cement Mixing Station

Full-Scale Results – Contaminant Destruction – PAH 16



PAH 16 concentrations:

Baseline:

- Average: 365 mg/kg
- Range: 1 – 2,700 mg/kg

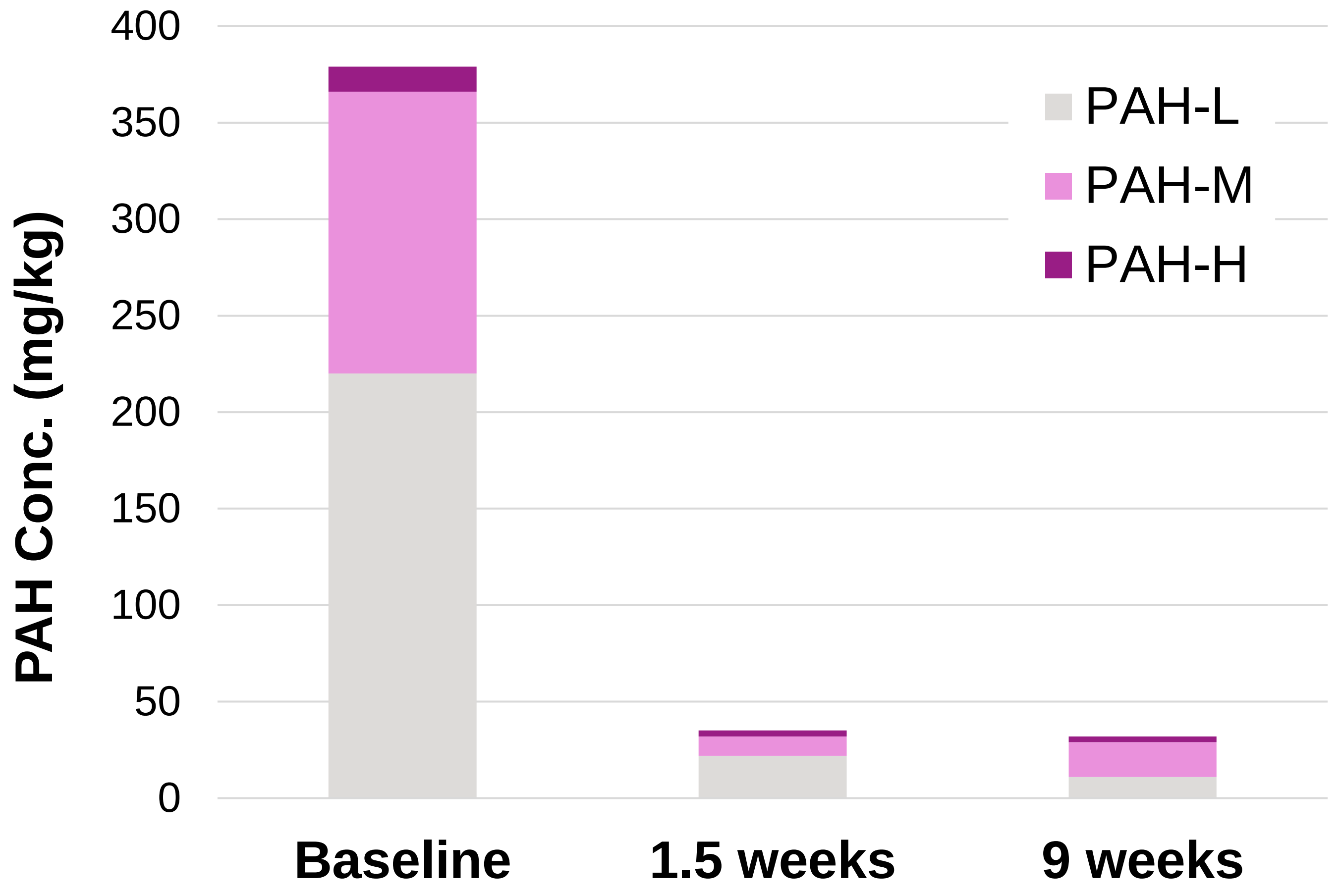
9 weeks post treatment:

- Average: 33 mg/kg
- Range: 5-120 mg/kg
- All samples below remedial goal of 250 mg/kg

Significantly larger variation in untreated clay.

Reference: Uppföljning av föroreningshalter i pelare efter stabilisering och kemisk oxidation av lera (ISS-ISCO), Golder, Jan 2022

Full-Scale Results – Contaminant Destruction



Reduction in PAH conc. following 9 weeks:

- ~95% reduction in PAH-L
- ~90% reduction in PAH-M
- ~80% reduction in PAH-H

Higher % reduction in lower molecular weight PAH fractions.

No significant continued treatment after 2 weeks.

Reference: Uppföljning av föroreningshalter i pelare efter stabilisering och kemisk oxidation av lera (ISS-ISCO), Golder, Jan 2022

Moraine Layer: Injection Area Strategy

- Area subdivided into cells (350 m^2 per hexagon)
  - 32 injection locations per cell
- One monitoring well installed at the center of each cell
- Based on results, each area treated with different reagent dose
- Multiple applications were planned for higher conc. cells

		No Treatment*	Low dose	High Dose**
Naphthalene	µg/L	<3,100	3,100-3,800	>3,800
Fluoranthene	µg/L	<6	6-54	>54
Benzene	µg/L	<150	150-1,000	>1,000

* Half of remedial target value

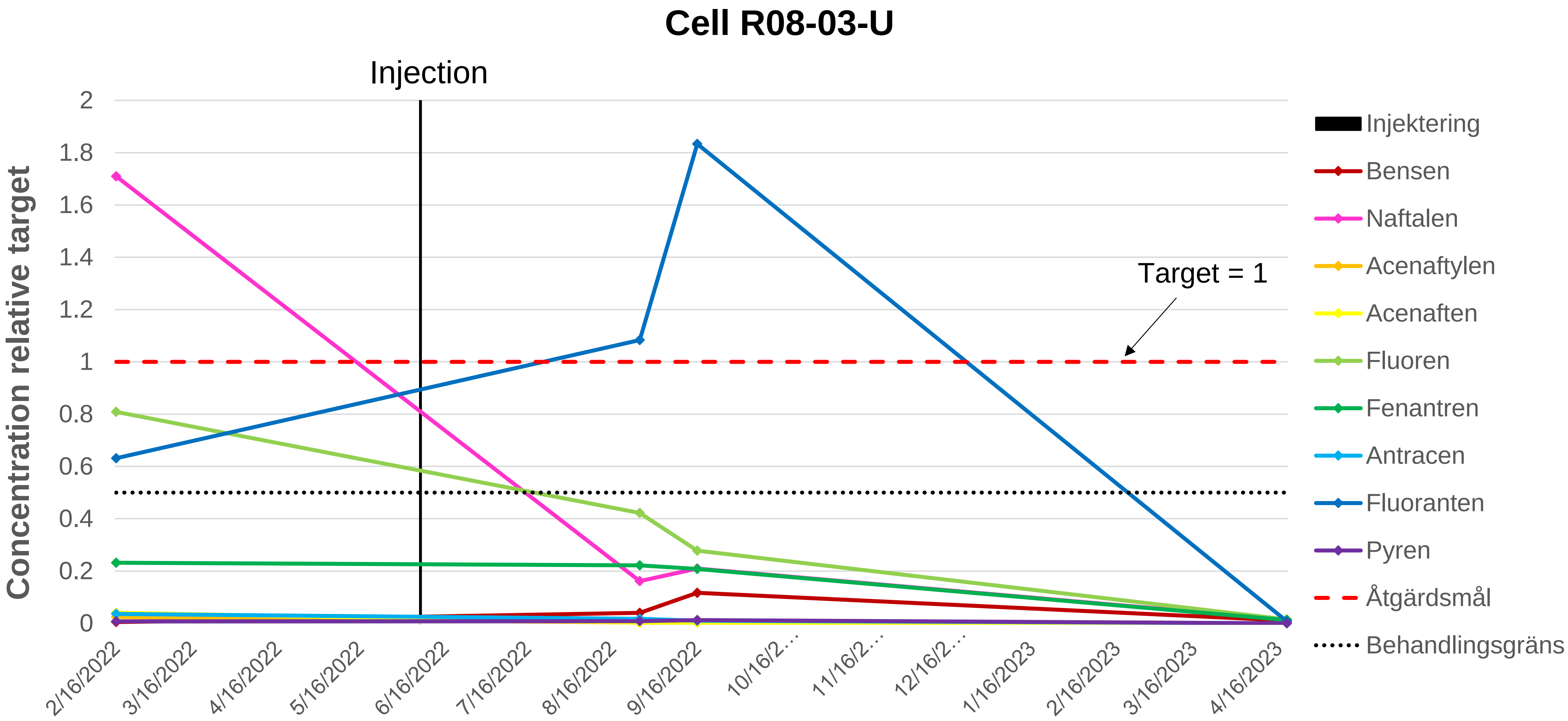
** >10% of theoretical solubility indicates presence of “free phase” (NAPL)

Injection of Klozur® SP + NaOH Solution to Moraine Layer via TAM-tubes – 2022 to 2023

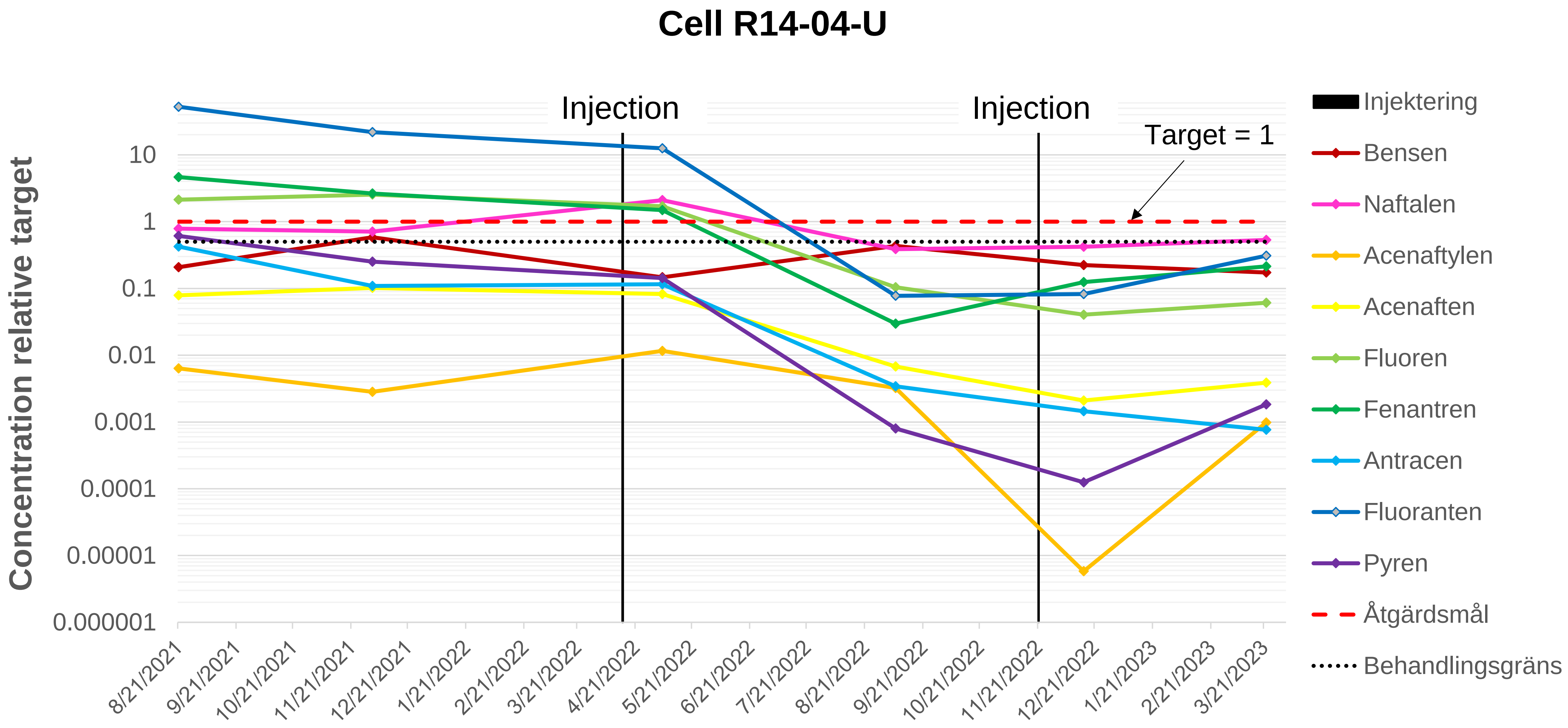
Automated pump station allowing for injection at multiple points simultaneously

Sleeved TAM-tube

Example Results Following ISCO Injections
Plotted Relative Remedial Targets for Each Compound



Example Results Following ISCO Injections
Plotted Relative Remedial Targets for Each Compound



Conclusion - Current Status & Next Steps

- Dynamic strategy tailoring the approach based on lithology, COC composition (partitioning) and concentrations found successful for effectively meeting site targets
- Remediation of primary targeted area completed in 2023
- Additional adjacent areas are currently being treated using the same general strategy

PAH in soil & GW → **Same primary chemistry: Alkaline Activated Persulfate**

PAH concentration → **Reagent dose & number of application events**

PAH composition → **Fast vs. Extended-Release Persulfate**

Lithology:
- **2 geologic units**
- **Remedial & stabilization goals**

→

Application and activation method:
- **Clay unit: ISCO-ISS**
- **Moraine layer: Injection**

EVONIK
Leading Beyond Chemistry

Keys to a Successful Field Application

- Basic principle:

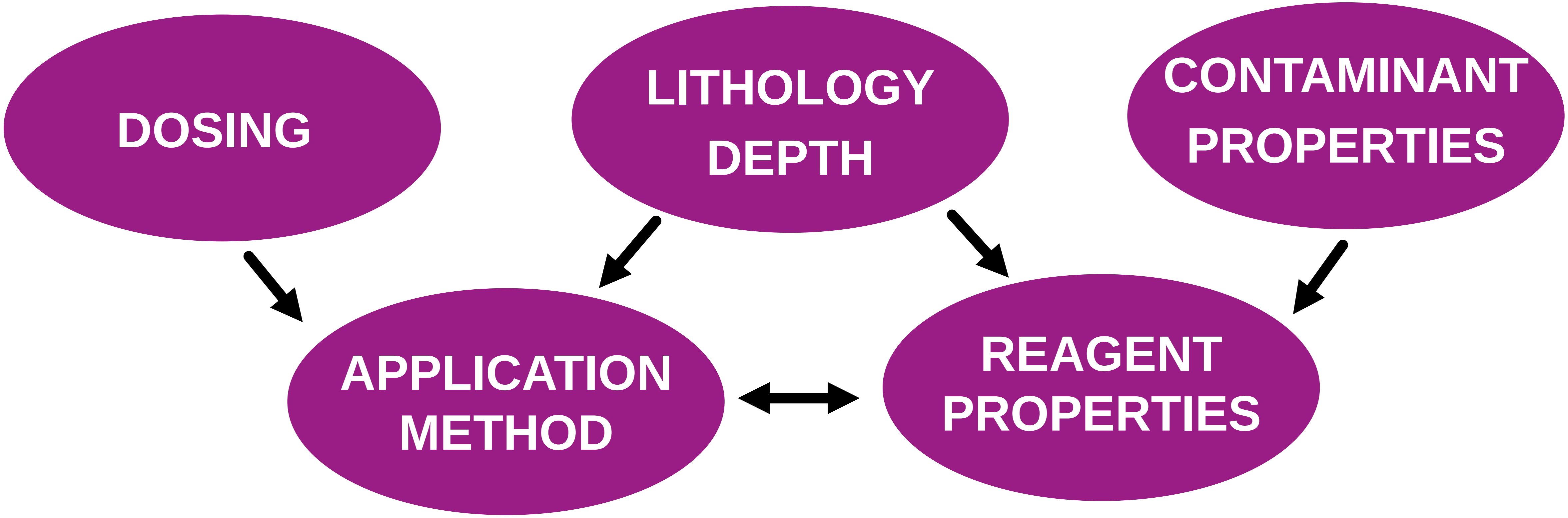
Successful *In Situ* Remediation requires that a sufficient <u>reagent dose</u> based on geochemistry and contaminant mass is <u>contacting</u> the contaminants of concern for a <u>sufficient period of time</u>

- Evaluate Characteristics:
  - Site (soil type, groundwater flux, remedial goals, etc)
  - Contaminant (Concentration, distribution, Koc, solubility, NAPL etc)
  - Reagent Properties (Solid/liquid, longevity, etc) & Dosage

Select appropriate application method to best accomplish goals and establish contact

Summary

- Application method selection is a critical aspect to a successful field application
- Please see our website for a series of webinars on Chemistry, Design, Monitoring Programs, and Application Methods/Establishing Contact



Thank you!

Questions?

Josephine Molin
Technical Manager, ISCO
Soil & Groundwater
Evonik Corporation
E. Josephine.molin@evonik.com

NEXT WEBINAR:

Recent Advances to Reductive Liquid Reagents:
Benefits of Using Ultra Fine Zero Valent Iron

Thursday Oct 30, 2025
Dan Leigh, Technology Applications Manager, ISCR and ERD