ART

Accelerated Remediation Technologies, Inc.

"Soil and Groundwater Remediation is our art"

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Technology Overview

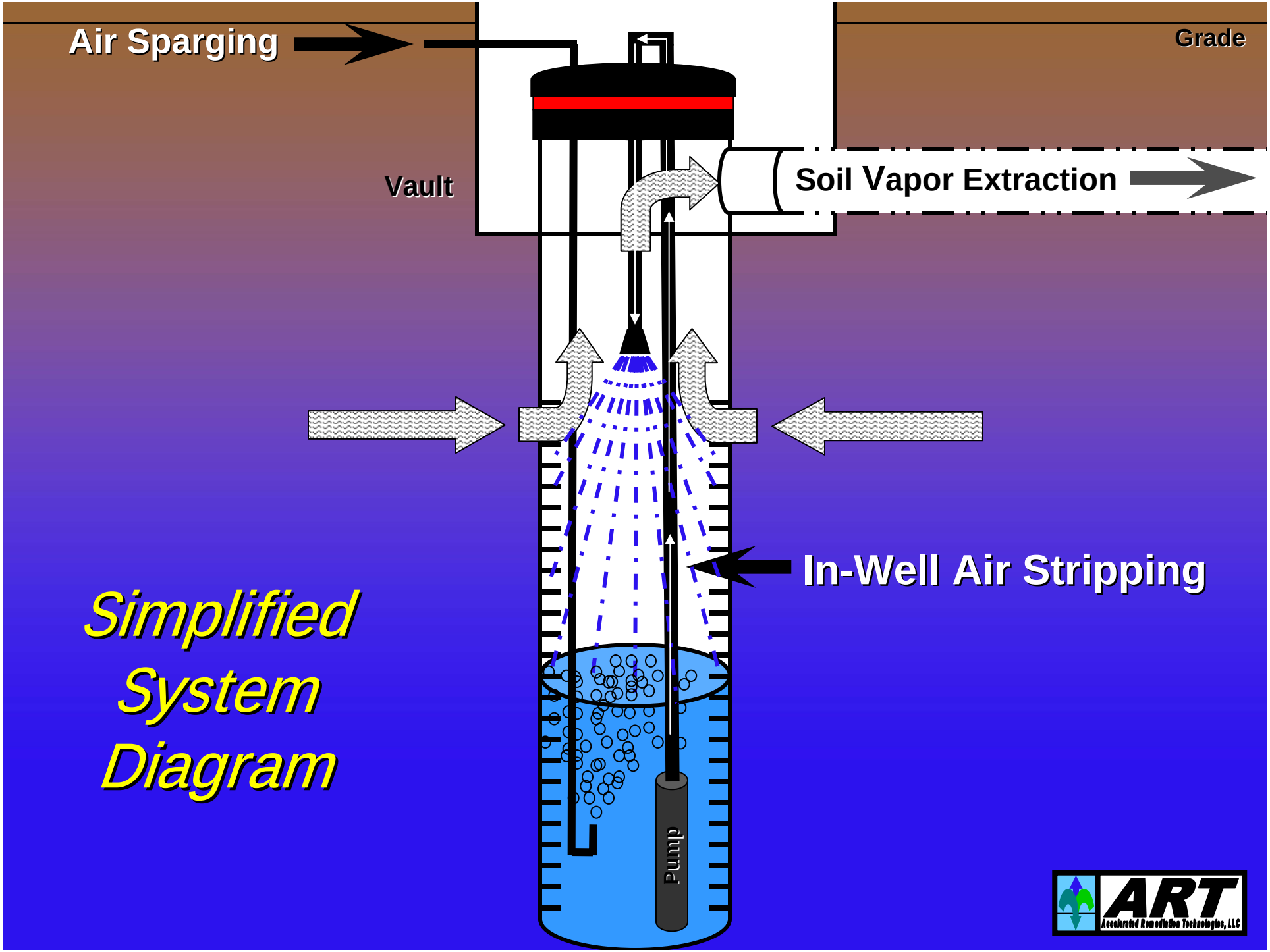
- Integrated, synergistic technology suite
- Contaminated soil and groundwater
- Minimal site impact
- Expedite site closure
- Utilizes proven technologies

Introducing

ART Integrated Remediation System

- In-well Air Stripping
- In-Well Air Sparging
- Soil Vapor Extraction
- Bioremediation/Oxidation
- Dynamic Subsurface Circulation™
- Plus, UV & Ozone Injection

proprietary - patented


Air Sparging
Grade
Vault
Soil Vapor Extraction
In-Well Air Stripping
Simplified System Diagram
Pump
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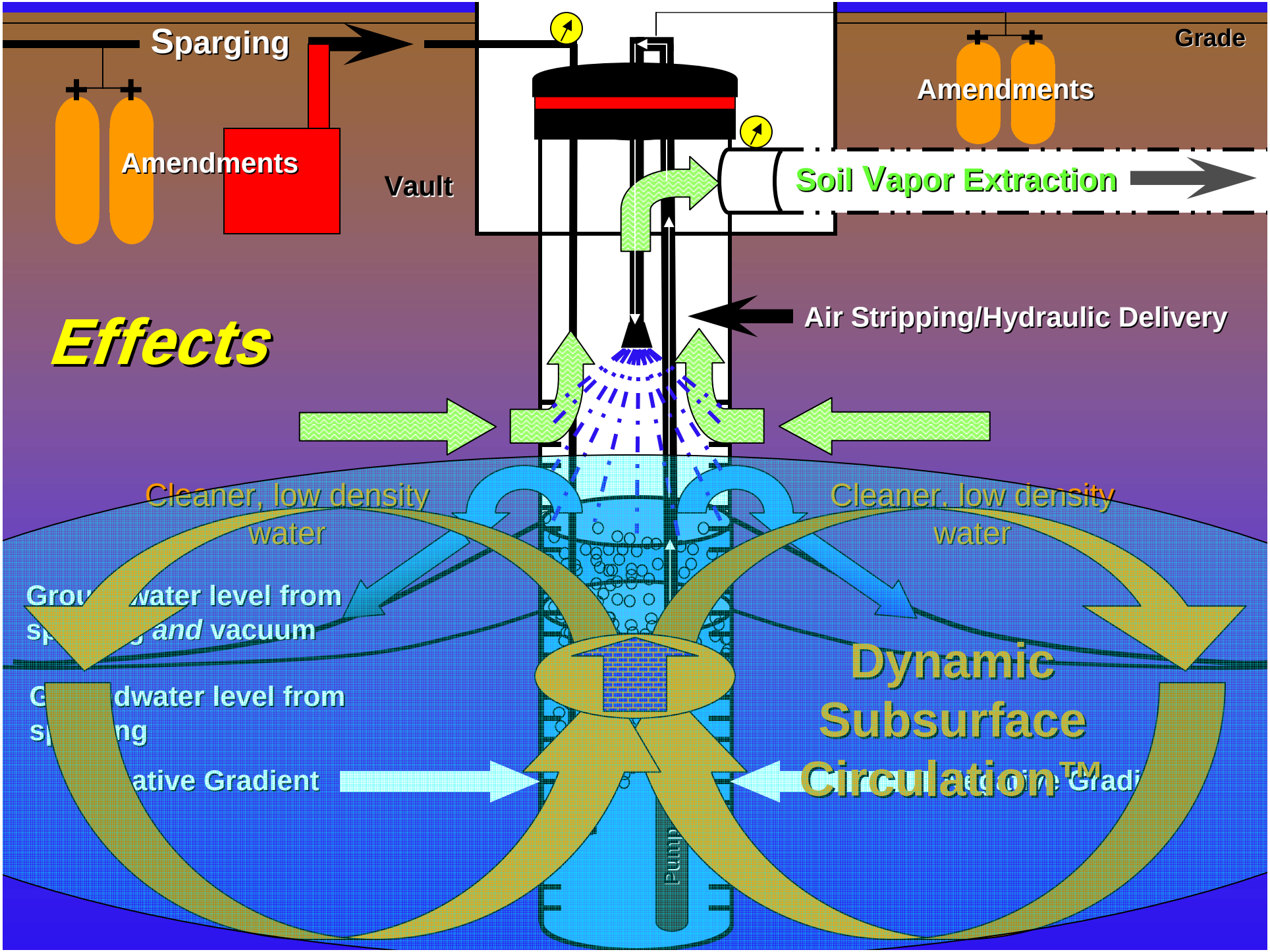
Sparging
Amendments
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Grade
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Air Stripping/Hydraulic Delivery
Effects
Cleaner, low density water
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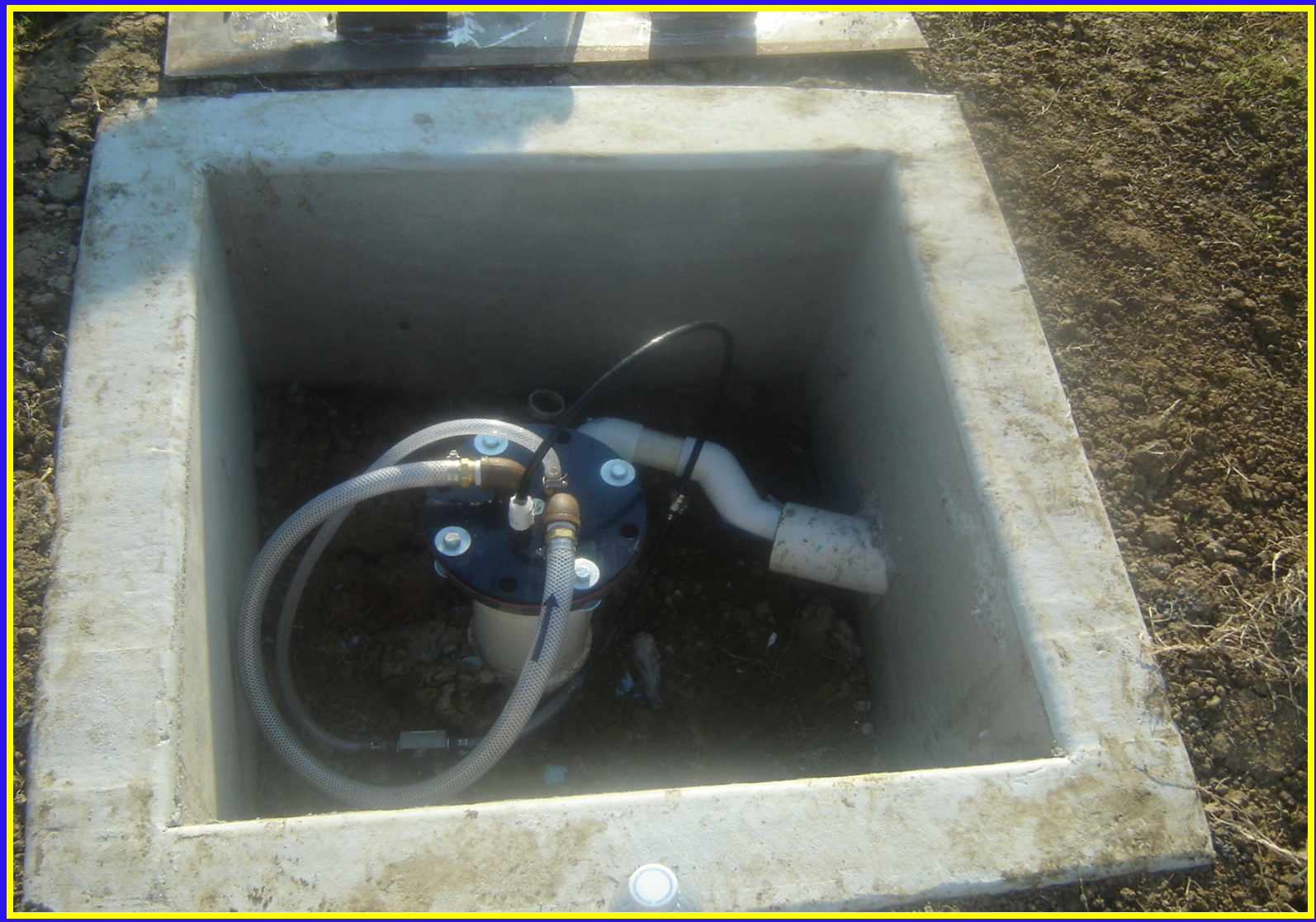
Dynamic Subsurface Circulation™
Pump

Installation Photos



Installation Photos

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MTBE/BTEX/TPH Case History

Site Location: *Gardena, California*

Contaminants: BTEX/TPH/MTBE

Site History: Former gas station, now major retail chain store

Soil types: silty to clayey sand with sandy silt and sandy clay layers

Groundwater: 25 feet bgs

Remediation History: Dual phase SVE/sparge/pump and treat installed in 1998

Client Goals: Jump start stalled remediation

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90 Day Demo Results

Gardena, CA	Sampling Round	TPHg (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl benzene (µg/l)	Xylene (µg/l)	MTBE (µg/l)
Recovery Well Source Area	Baseline	18,000	3,300	1,100	610	2,400	1,100
MW-L 25' downgradient	Baseline	8,000	880	35	95	430	970
	14 days	14,000	2,600	59	510	1,400	1,500
	33 days	1,800	440	2.9	51	47	460
	84 days	290	64	0.8	5.2	3.6	200

Average mass removal over the time period was approx. 12.5 lbs/day

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MTBE/BTEX/TPH Site Closure

Site Location: *Isleton, California*

Contaminants: Gasoline, Diesel, MTBE

Site History: Tanker spill (750 gallons), downgradient receptors

Soil types: Sands, silts

Groundwater: fluctuating 10-15 feet bgs

Client Goals: Quick response, fast remediation, protect drinking water wells

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MTBE Remediation Summary

Month/Year	9/02	12/02	3/03	4/03	6/03	7/03	8/03	10/03	2/04
MTBE (µg/l)	42,000	4,800	150	780	32	26	9.1	5.7	2.8

Cleanup Std. 13 ppb

- Reduced MTBE to below primary, secondary cleanup standards
- ART system shut down in August 2003
- Sampling to identify rebound
- Testing confirmed no rebound
- Concentrations continued to decrease
- ***Well pulled, closure letter received***

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New Jersey BTEX Demo

- ***Site Location:*** New Jersey
- ***Contaminants:*** BTEX
- ***Site Description:*** Shallow groundwater – silty, non-homogeneous sand formation
- ***Remediation History:*** 6 years of Air Sparging / SVE; Levels reached asymptote
- ***Corrective Action:*** Retrofitted ART Technology to existing blower, compressor, and off-gas treatment; 2 ART wells installed in Sept. 04

ART Remediation Results

Elapsed Time	MW-1					MW-2				
	B	T	E	X	Total VOC	B	T	E	X	Total VOC
0	2,650	11,000	1,320	11,000	26,333	94	5,740	957	8,780	16,206
28 days	2	62	34	517	614	2,400	8,330	1,010	7,780	19,520
78 days	15	61	12	129	217	1	33	17	121	332
% Reduction	99	99	99	99	99	99	99	98	99	98

78 Days ➔ Average 98% Contaminant Reduction

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Site Remediation History

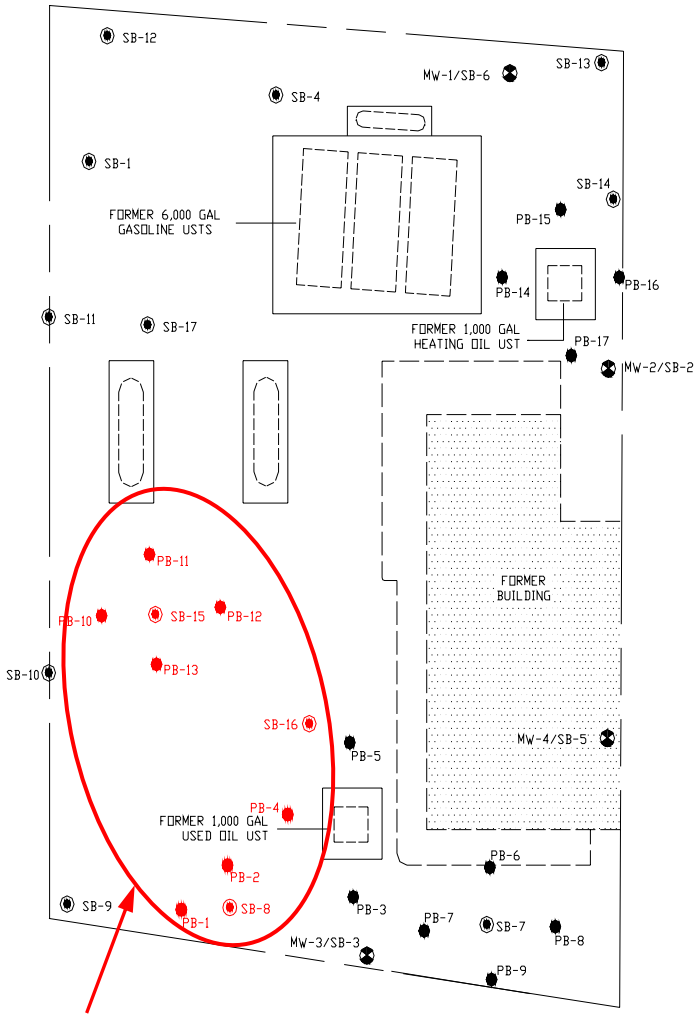
- May 2002: On-Site Soil & Groundwater Remediation Using Magnesium-Based Peroxygen Injections.
- May 2004: Corrective Action Plan Submitted to Jump Start On-Site Soil & Groundwater Remediation.
- December 2004: CAP Approved by Illinois EPA as a Pilot Study Using 1 ART Well.

Groundwater Data Using Peroxygen Injections in 2002

- Source Area (MW-11): **increase** of 55% benzene and 10.2% BTEX.

Groundwater Data Using ART Technology

- OW-1 (10 ft from ART): **reduction** of 99.0% benzene and 98.7% BTEX
- OW-2 (20 ft from ART): **reduction** of 99.3% benzene and 89.9% BTEX
- MW-11 (30 ft from ART): **reduction** of 99.3% benzene and 89.8% BTEX
- OW-3 (40 ft from ART): **reduction** of 96.5% benzene and 87.5% BTEX
- MW-3 (down-gradient property line): **reduction** of 21.8% benzene and 60.2% BTEX



Benzene

0.03 mg/kg

Benzene Exceedance in Soil

Prior to Remediation

Location	Depth	Benzene (mg/kg)
PB-1	10.5' bgs	**0.231**
PB-2	8.5' bgs	**0.231**
SB-8	3-5' bgs	**0.182**
PB-4	10' bgs	**0.986**
SB-16	5-7' bgs	**0.156**
PB-10	4' bgs	**0.257**
PB-11	7.5' bgs	**0.219**
PB-12	8' bgs	**1.33**
PB-13	4' bgs	**0.17**
SB-15	3-5' bgs	**0.148**

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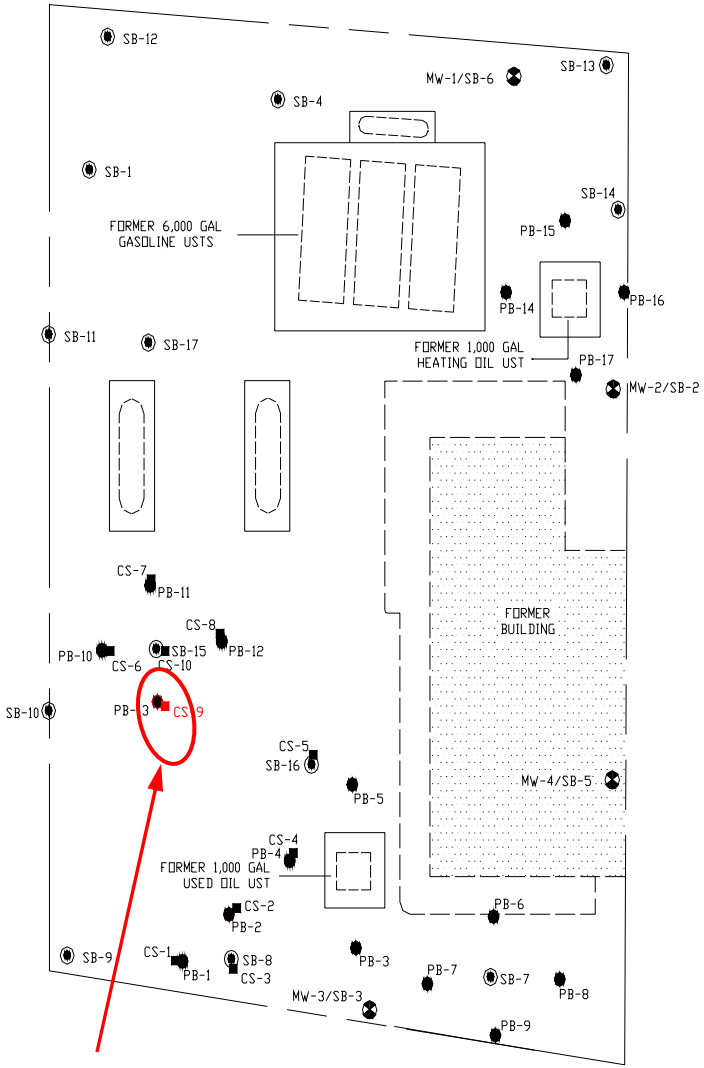
Benzene Exceedance in Soil

As of October 23, 2007



Benzene
0.03 mg/kg

Location	Depth	Benzene (mg/kg)
CS-1 (PB-1)	10.5' bgs	<0.005
CS-2 (PB-2)	8.5' bgs	<0.005
CS-3 (SB-8)	3-5' bgs	<0.005
CS-4 (PB-4)	10' bgs	<0.005
CS-5 (SB-16)	5-7' bgs	<0.005
CS-6 (PB-10)	4' bgs	0.0293
CS-7 (PB-11)	7.5' bgs	<0.005
CS-8 (PB-12)	8' bgs	<0.005
CS-9 (PB-13)	4' bgs	**0.0392**
CS-10 (SB-15)	3-5' bgs	0.0205

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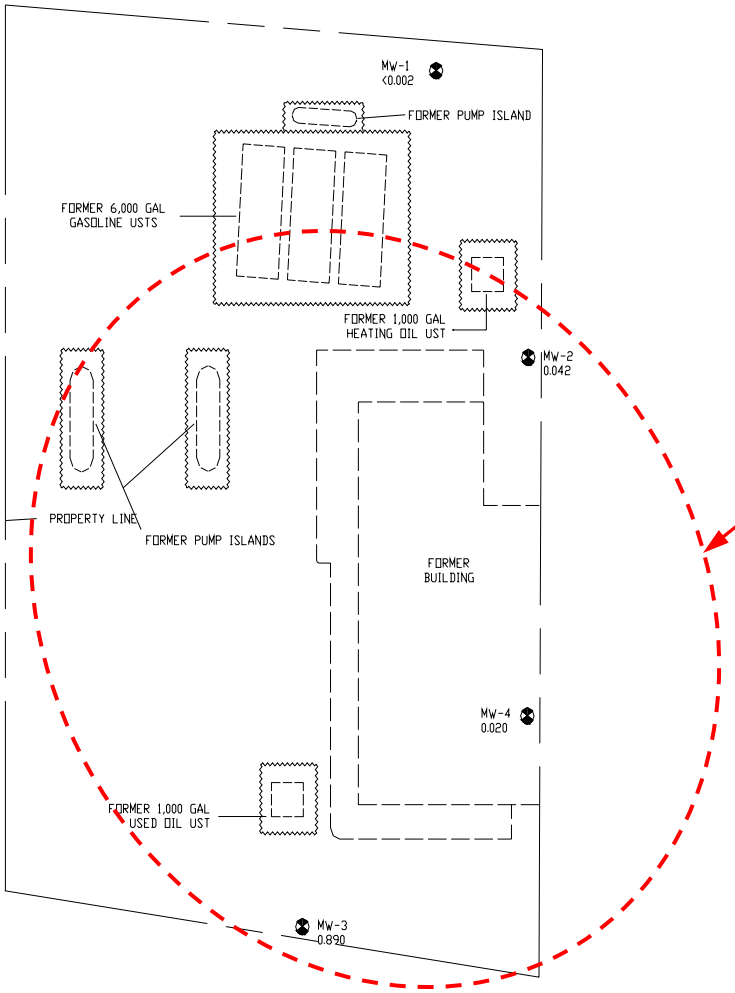
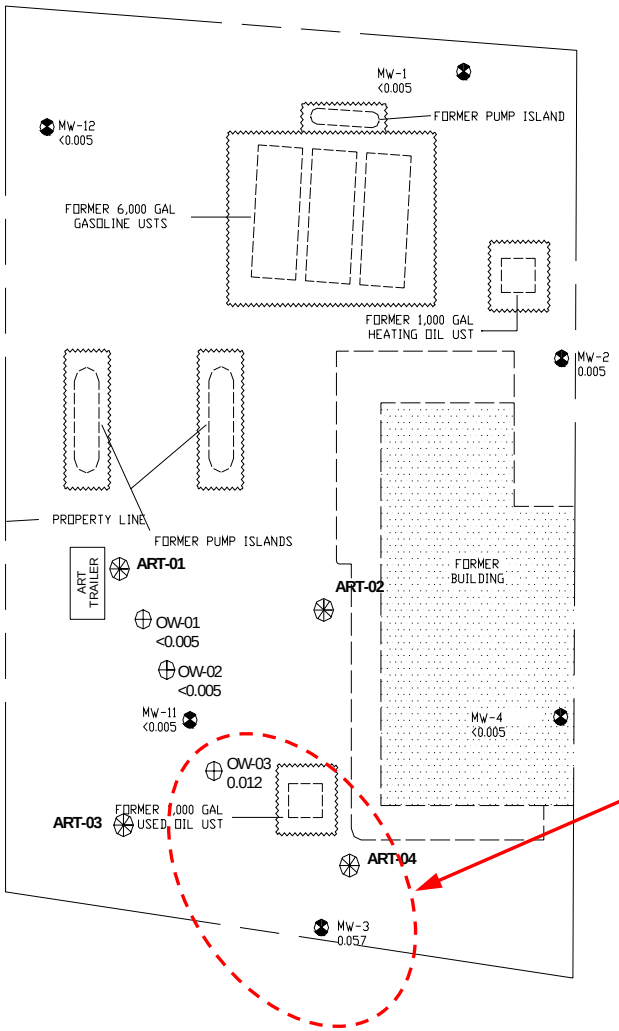
Benzene in Groundwater Prior to Remediation (May 15, 1996)



Benzene
0.005 mg/L

Benzene in Groundwater (January 9, 2008)

ART System Running 261 Days



Benzene 0.005 mg/L

Remedial Goals

Project Objectives	Accomplishments
1. Remediate Benzene Soils to <0.03 mg/kg	**99% Complete**
2. Remediate Benzene Groundwater to <0.005 mg/L	**95% Complete**
3. Accelerate Remediation Time with Minimal Cost	**Yes** **(97% Complete in 261 Days)**
4. Reimbursement from the Illinois LUST Fund	**Yes**

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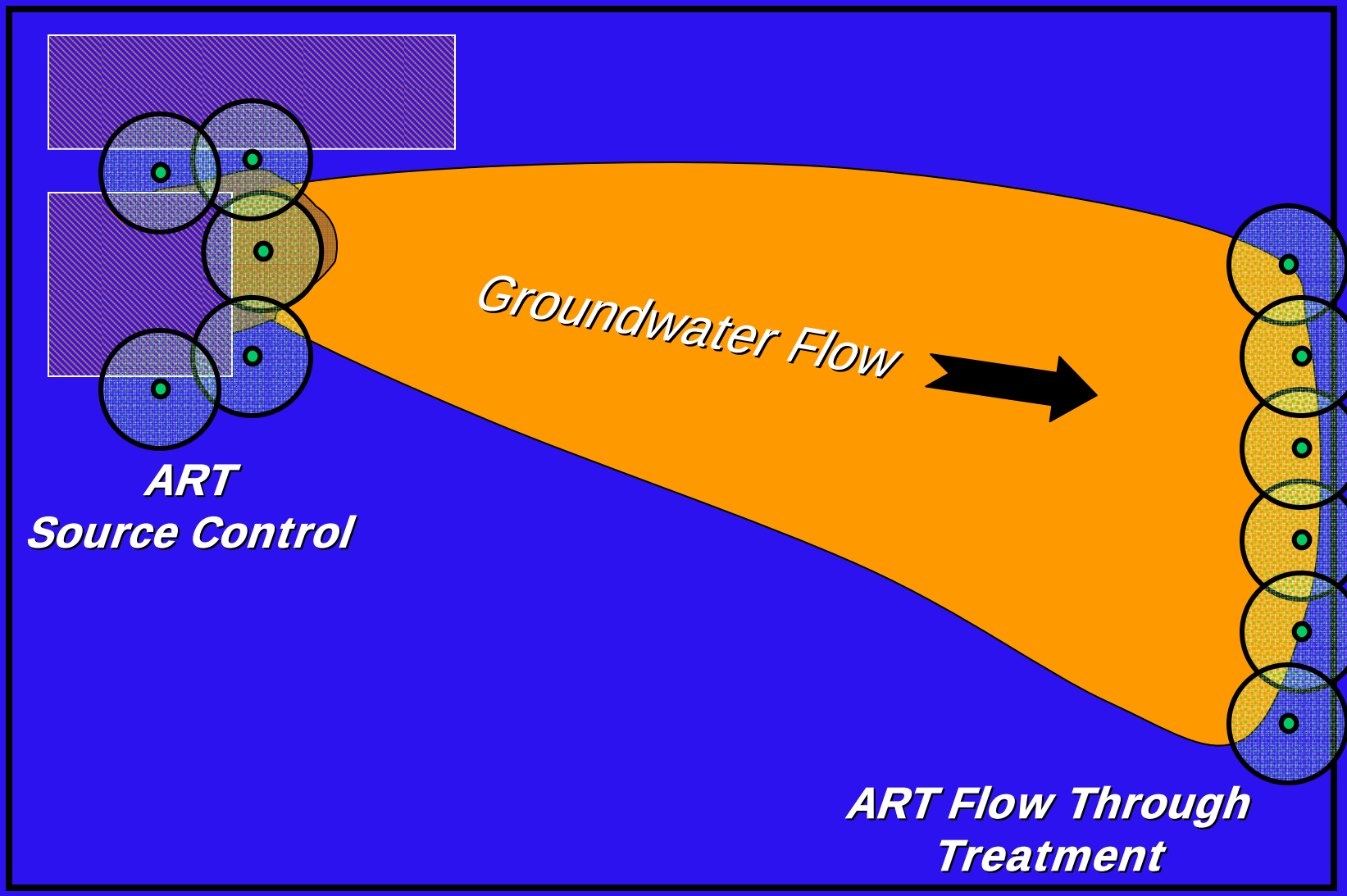
Potential Remedy Configuration



ART Well

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PCE Case History

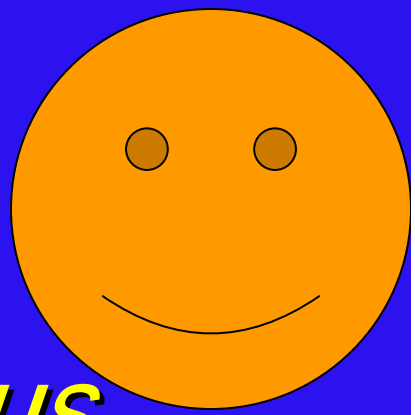
- ***Site Location:*** Colorado
- ***Contaminants:*** tetrachloroethene (PCE) – 4 mile plume impacting surface water/drinking water wells
- ***Site History:*** Industrial manufacturing facility
- ***Soil Types:*** fine, silty, heterogeneous sand; steep gradient
- ***Groundwater:*** 3 ft saturated thickness; paleo channels
- ***Regulatory agency:*** State of Colorado

  - Significant regulatory scrutiny – lawsuits pending

- ***Client's Goals:*** pilot test numerous "new" technologies and select remedy

Demo Results

- Significant reduction in PERC/7 weeks
- Outperformed: SVE, P&T, AS, Anaerobic Degradation Compound injection
- "Radius of Influence" about 50 feet
- Pleased clients/consultants



Current Site Wide Status

- Phase II: 15 additional *ART* wells installed
  - Source control – two areas
  - Downgradient flow through treatment cell(s)
- 85% reduction in contamination leaving source area in first 6 months operation

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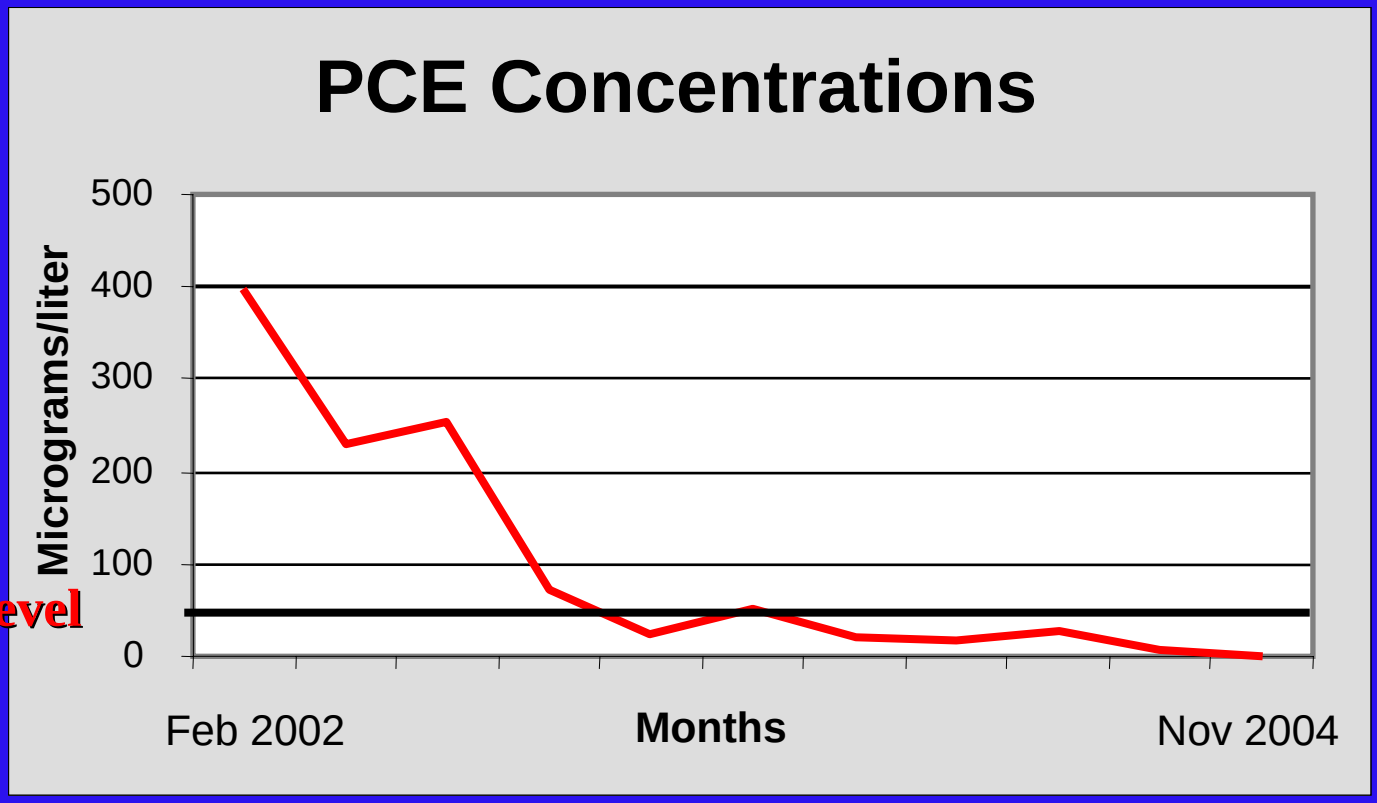
PCE Frac Bedrock Site Closure

- ***Site location:*** Allentown, PA
- ***Contaminants:*** ***PCE*** at 403 ppb
- ***Site History:*** Industrial ***dry cleaning*** facility
- ***Soil type:*** Silty clay underlain by dolomite
- ***Groundwater:*** GW at 90 feet, secondary porosity in fractured bedrock
- ***Regulatory agency:*** PA DEP
- ***Client's Goals:*** Retrofit wells to ART Tech

PCE Fractured Bedrock



Latest Results @ ND

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Final Results

- "Radius of Influence" at least 40 feet in fractured bedrock
- Proves significant reduction of lower levels in very challenging setting
- Reduction in PERC to below Action Level in less than 9 months
- Reached ND within two years
- Received letter of closure from PADEP

1,4 Dioxane Case History

- 1,4 dioxane and VOC impacted site
- Bedrock overlain by saprolitic soils
- Levels reached asymptote
- Numerous technologies screened
- ART demonstration project
- Selection based on past recalcitrant/VOC performance history

1,4 Dioxane Demo Results

	MW-1	MW-2
Initial concentrations (µg/L)	25,000	28,000
90 days later (µg/L)	7,400	2,400
Percent reduction	76%	91%

- *1,4 Dioxane vapor concentrations exceeded 1.1 PPMV*
- *2.25 pounds removed*

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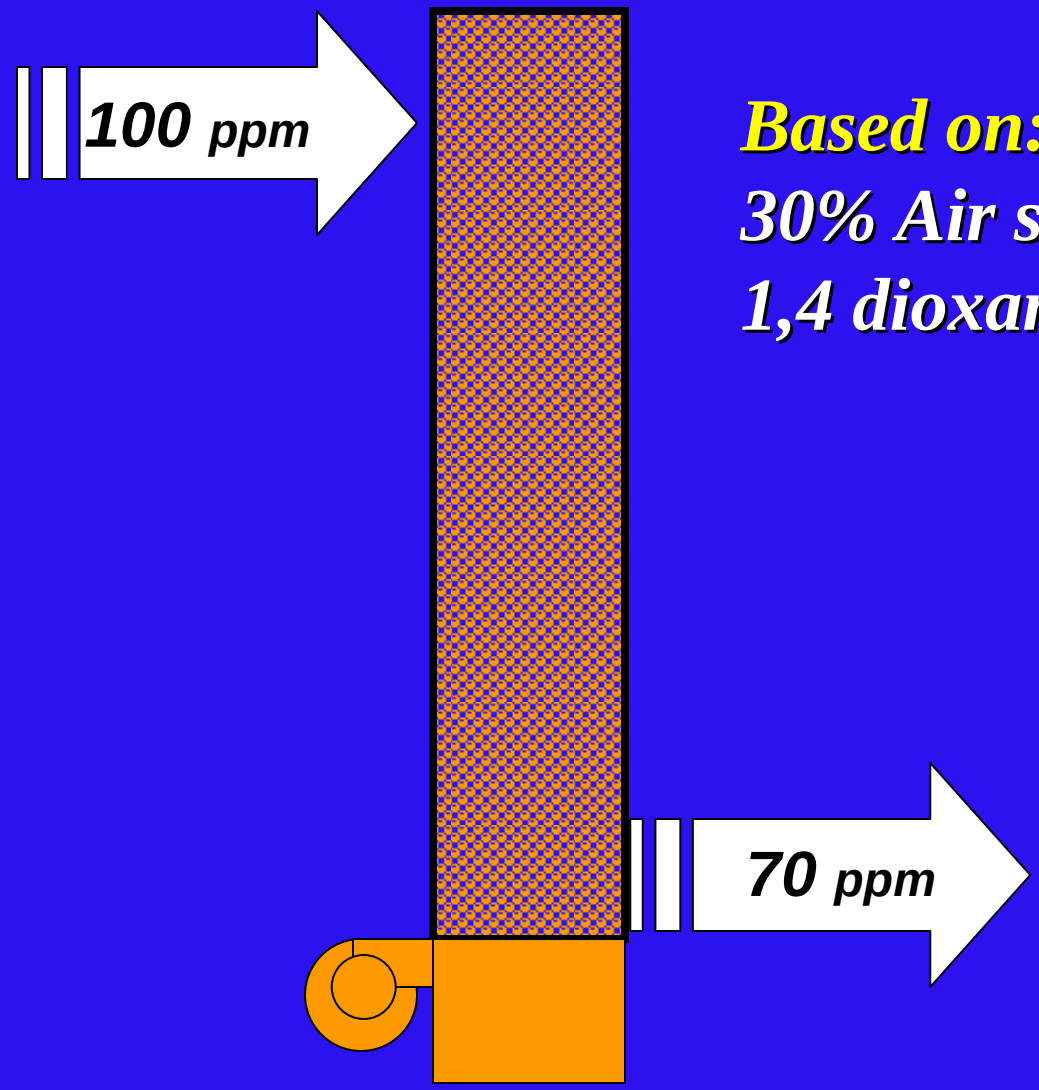
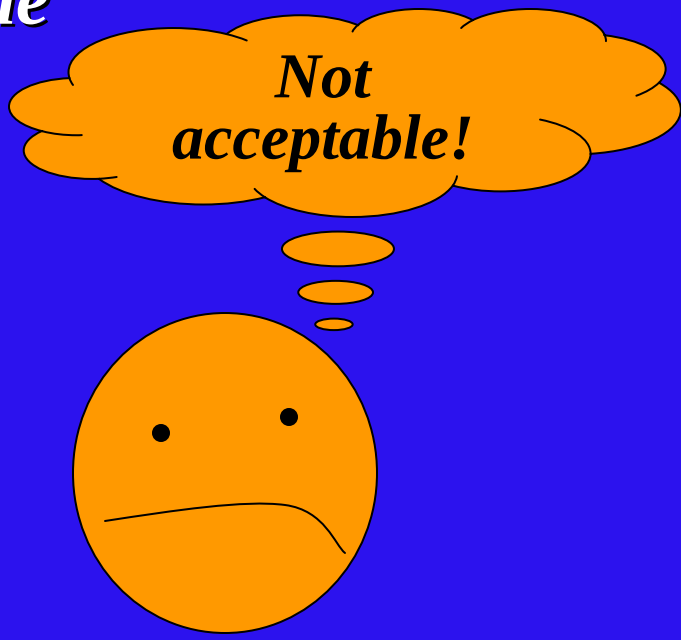
Once through stripping of 1,4 Dioxane



Based on:

30% Air stripping efficiency of 1,4 dioxane



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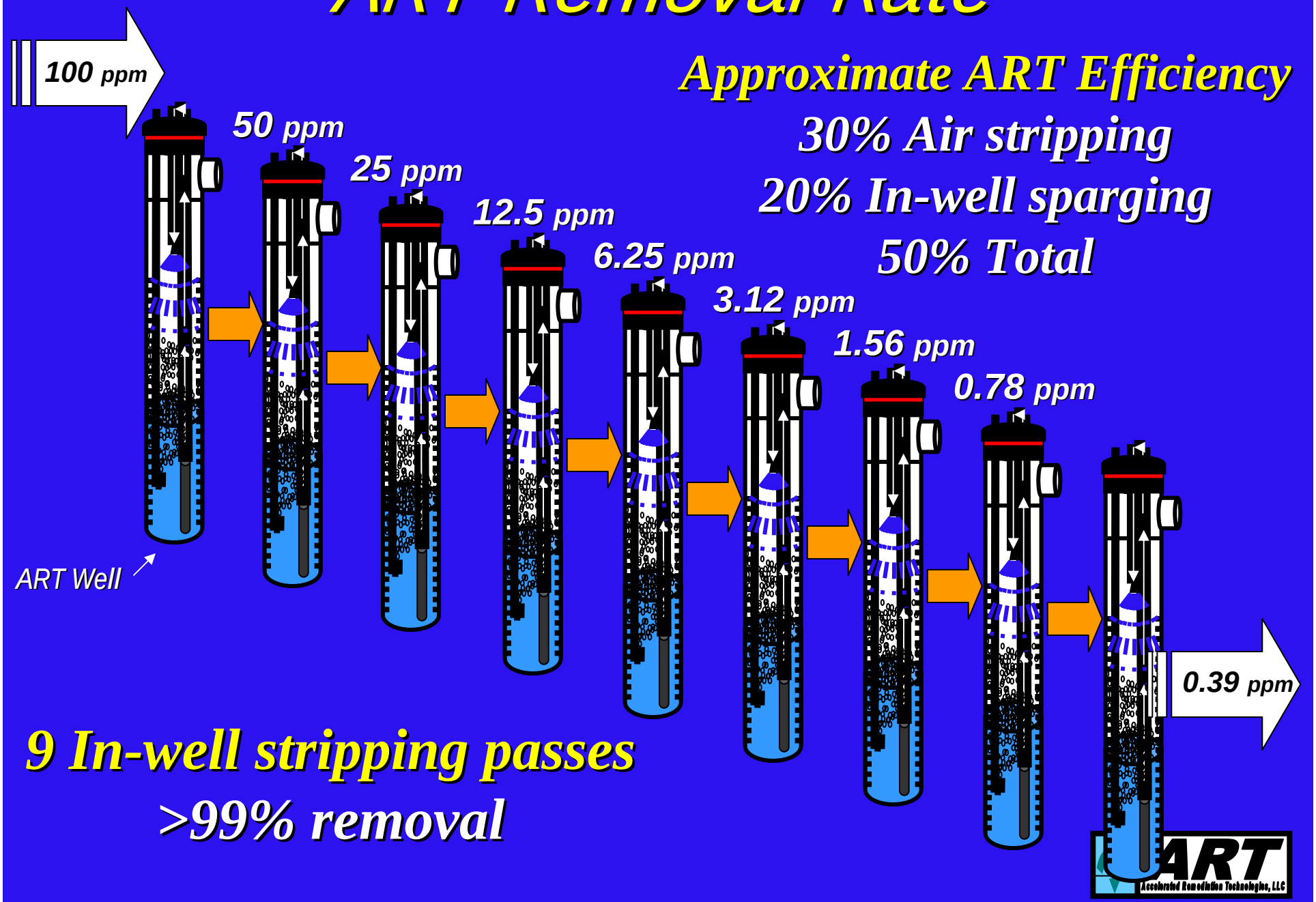
ART Removal Rate



Approximate ART Efficiency

30% Air stripping

20% In-well sparging

50% Total

9 In-well stripping passes

>99% removal

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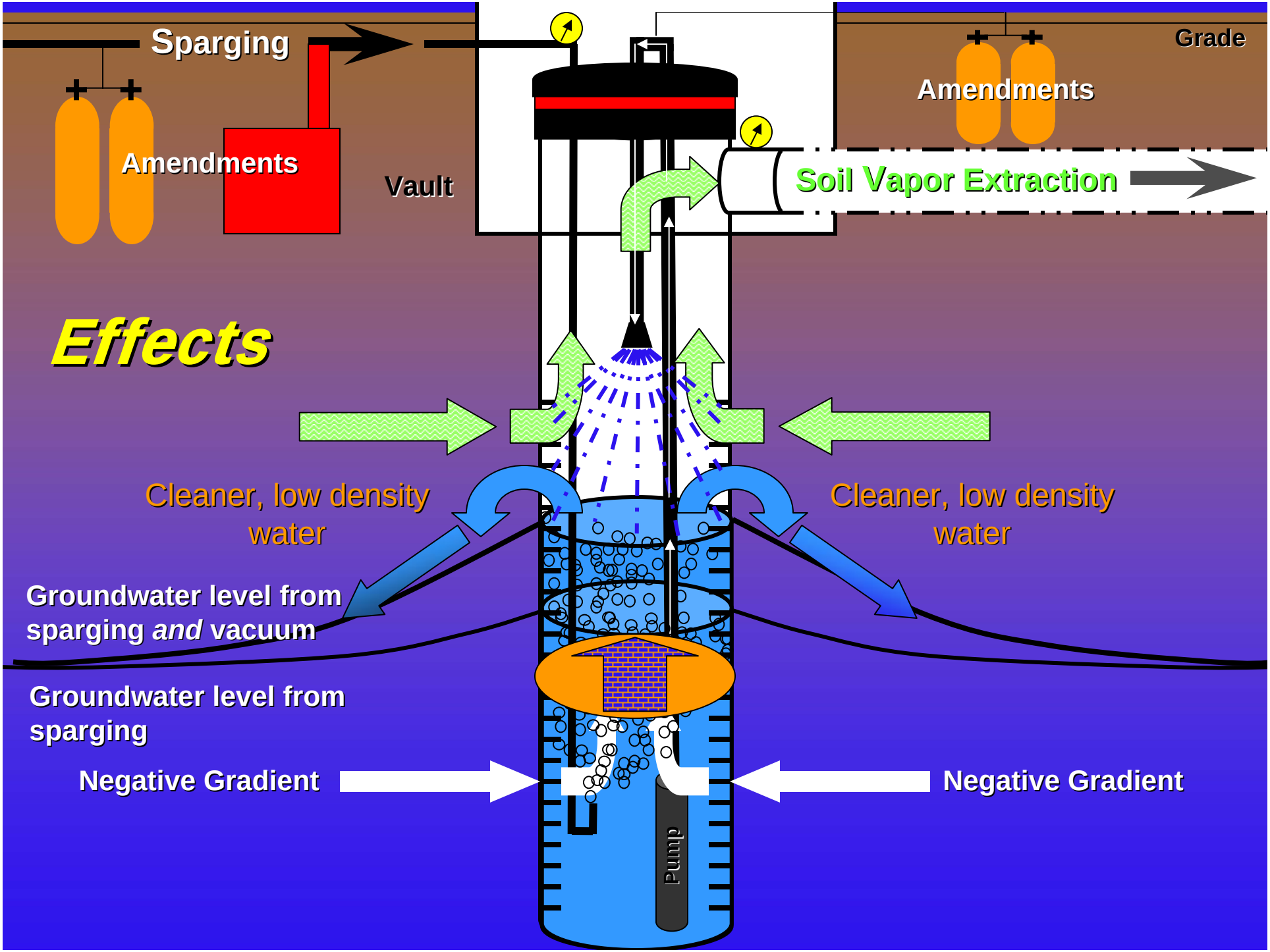
Sparging
Amendments
Vault
Grade
Amendments
Soil Vapor Extraction
Effects
Cleaner, low density water
Cleaner, low density water
Groundwater level from sparging *and* vacuum
Groundwater level from sparging
Negative Gradient
Negative Gradient
Pump

AS/SVE vs. ART – Total VOC

System	1,1,1-TCA	1,1-DCA	1,1-DCE	PCE	TOTAL (lbs.)
AS/SVE	0.06	0.07	0.06	0	0.19
ART Well	8.06	0.37	0.58	0.38	9.39

- ART system (one well) outperformed the AS/SVE system (six AS and nine SVE wells operating since ‘94).

Technology Advantages

- Synergistic technologies, effects
- No surface discharge, fees, disposal, permits
- Utilizes common 4” or 6” wells
- Enhances bioremediation/oxidation
- Retrofit to new OR existing systems
- Proven technical concepts
- Immediate Results

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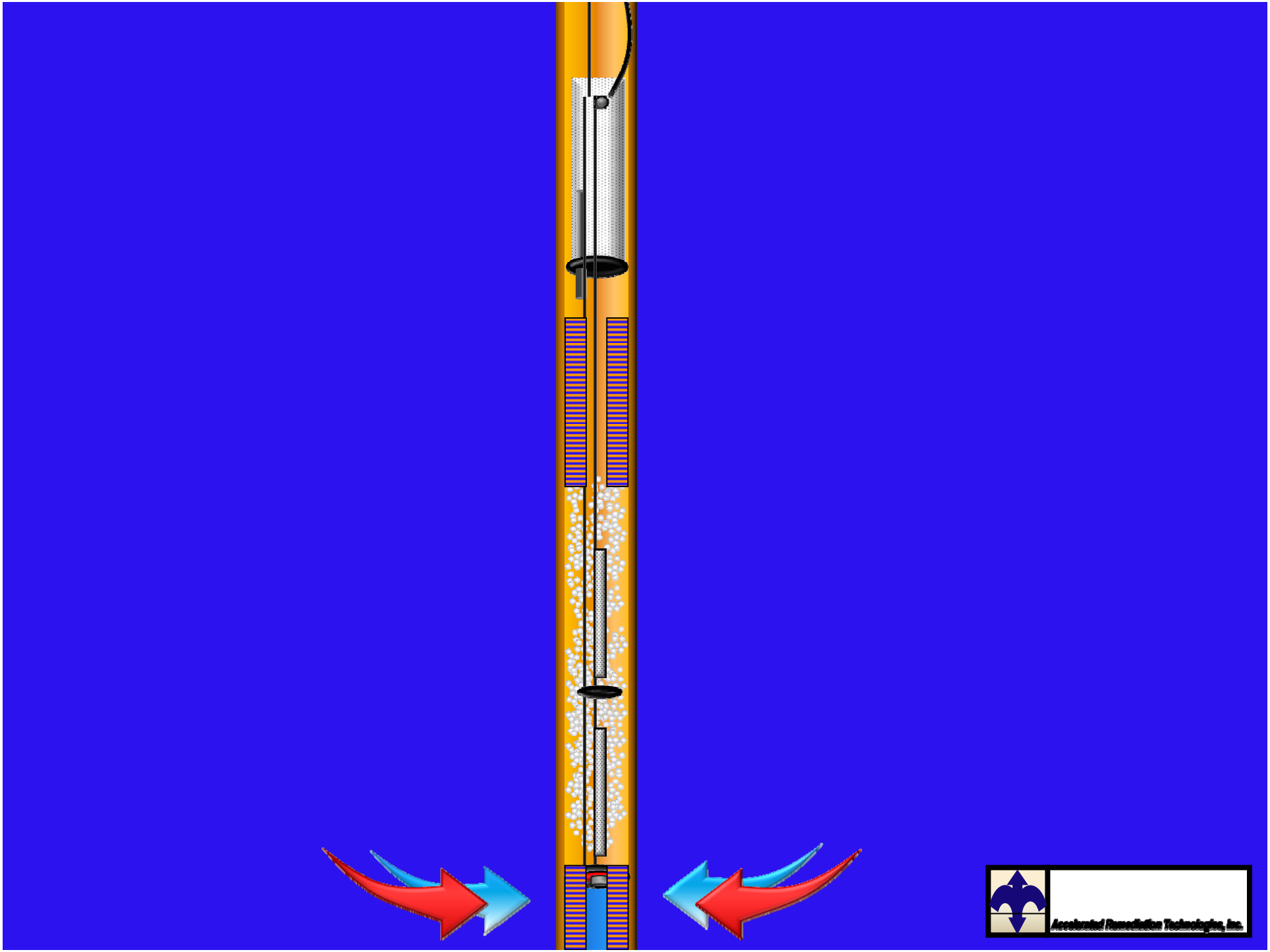
Limitations

Hydraulic conductivity > 10^{-5} cm/sec.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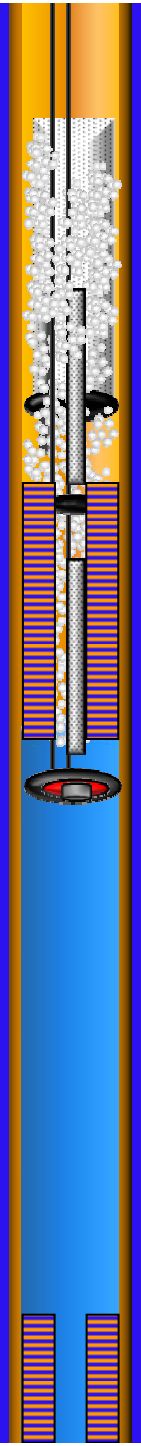
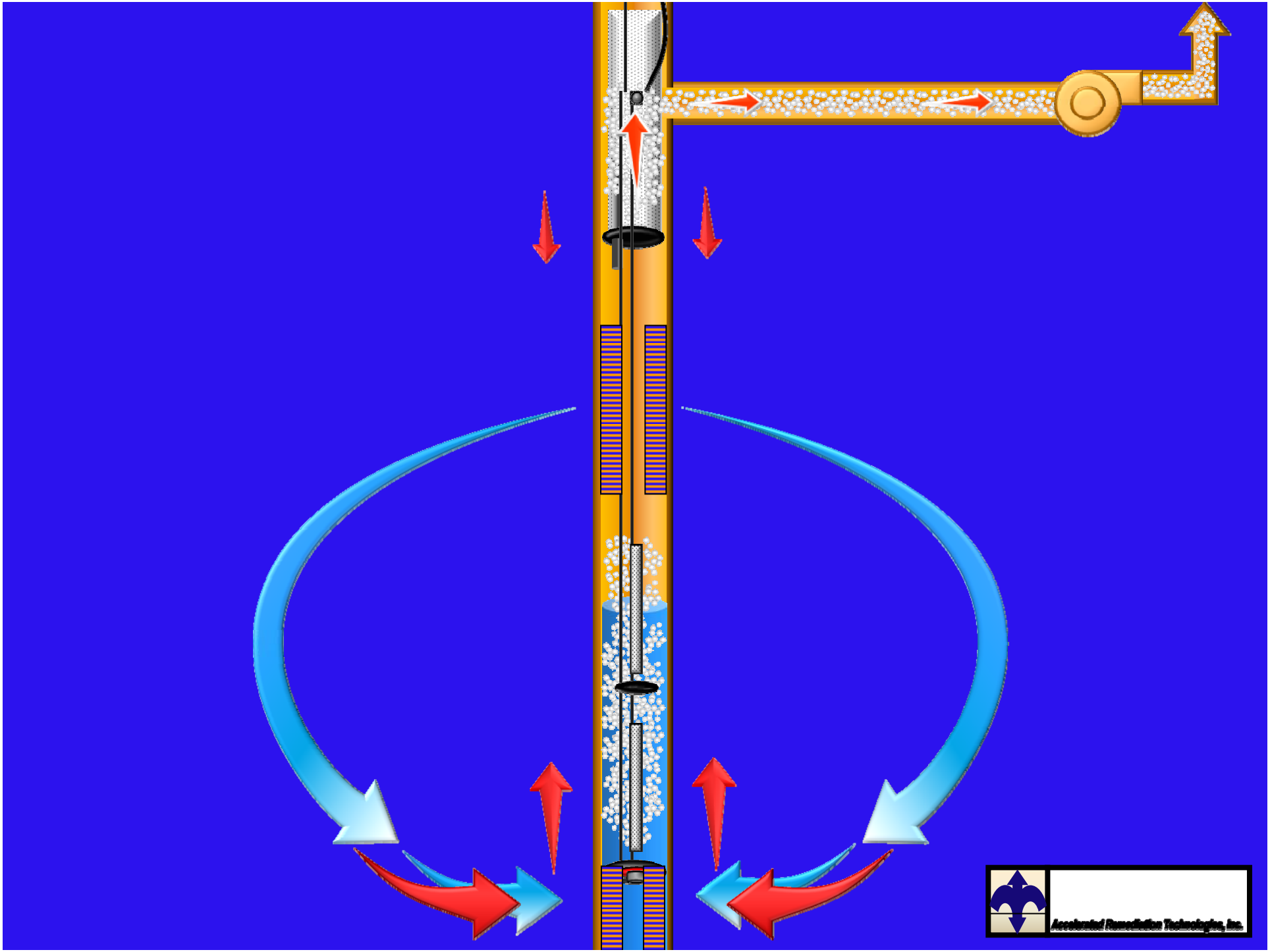

Check Valve
- water in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The Question Is...

Why rely on only one… when you *can* install more than six technologies for the same cost!?