

ITRC Implementation Workshop

*Permeable Reactive Barriers (PRB):
Technology Update*

John Doyon (NJ) and Kimberly Wilson (SC)

October 26, 2011

Denver, Colorado



Our Goal – Implement PRB-5 Technical and Regulatory Guidance Document

- Overview of PRB-5 (2011) Tech Reg
- Small groups by sector
 - Implementation Targets & Key Messages
- Report out
- Actions to take

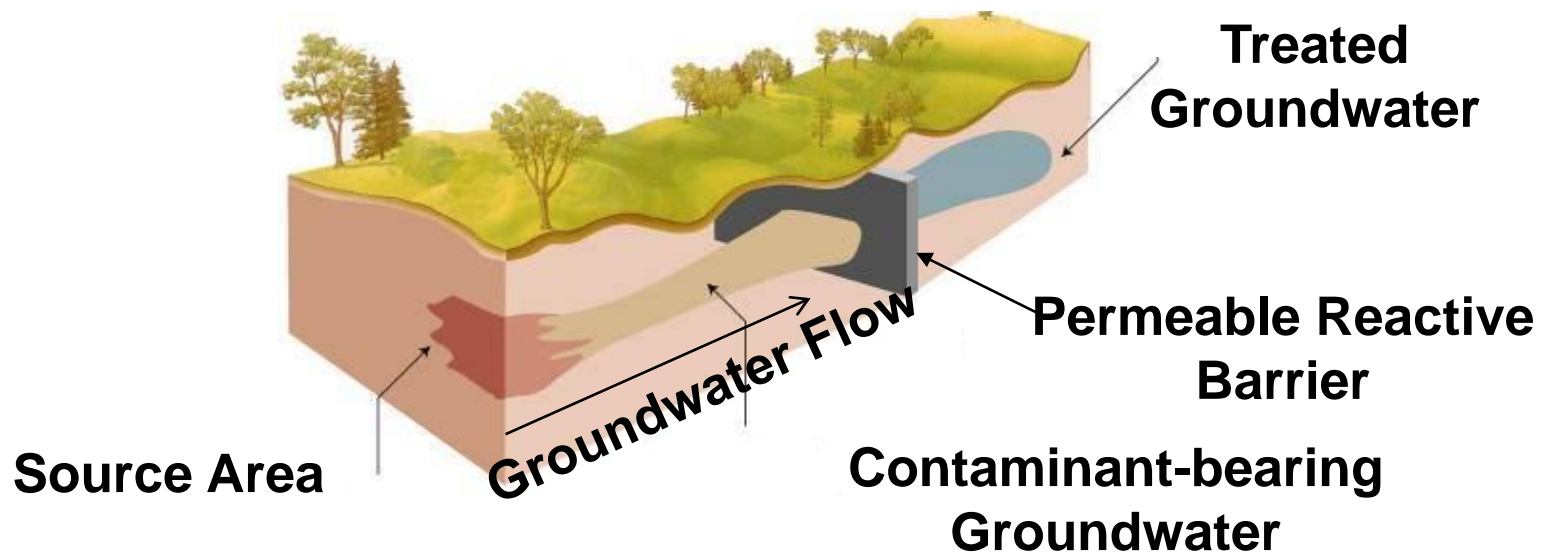
We need your help to hit our implementation targets!



ITRC PRB Guidance – Over the Years

- **2011 - PRB-5 Permeable Reactive Barriers: Technology Update**
- 2005 - PRB- 4 Permeable Reactive Barriers: Lessons Learned/New Directions
- 2000 - PBW- 2 Design Guidance for Application of Permeable Reactive Barriers for Groundwater Remediation
- 1999 - PRB- 3 Regulatory Guidance for Permeable Reactive Barriers Designed to Remediate Inorganic and Radionuclide Contamination
- 1999 - PBW- 1 Regulatory Guidance for Permeable Reactive Barriers Designed to Remediate Chlorinated Solvents

Permeable Reactive Barriers (PRBs): The Plume Stops Here!



- Continuous, in-situ permeable treatment zone
- Intercepts & remediates contaminant plume
- Treatment through physical, chemical, or biological processes
- Stand-alone technology to close sites or treatment train as part of overall site strategy

Example PRB Installation



Over 200 PRBs installed over past 15 years

Ideal Site Targets for PRBs



- Groundwater contaminated with:
 - Chlorinated solvents, energetics, radionuclides, dissolved metals, nitrates, perchlorates, phosphates, LNAPLs, and others (see Table 4-1 in PRB-5) – and combinations of contaminants
- Depth of contaminants down to 35-45 ft
- Desire for a “greener” and sustainable solution
- Unobtrusive / passive solution after installation

How Our Team Members Describe PRBs

Adaptive

Small Footprint

For Range of Contaminants

Low O&M

Passive After Installed

Green Solution

Protective of Receptors

Migration Prevention

Sustainable

Buys time for source treatment

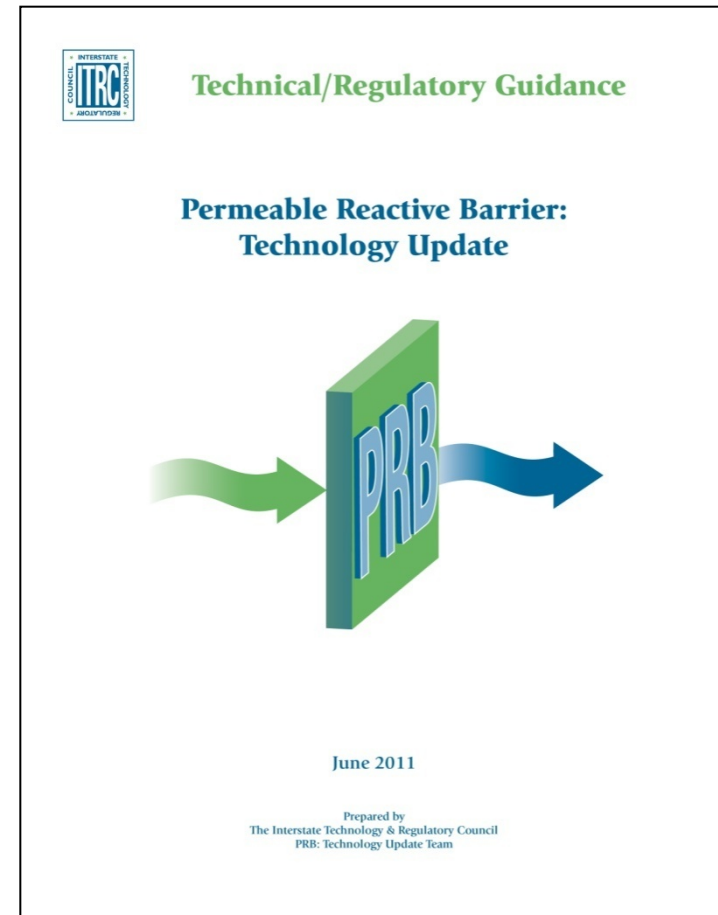
Longevity

Depth to 35-45ft

Plume Capture

PRB-5 Tech Reg: Easily Understood & Accessible Information for PRB Applications

- Regulatory considerations for:
 - Selection, installation, & monitoring of PRBs - streamline regulatory review
- Lessons learned - 15 years & over 200* PRB installations
- Site examples (broad range of contaminants and geologic settings)
- Contacts and references



PRB: Technology Update Tech Reg

- Guides decision process for PRBs
 - When, where, & applicability by contaminant type
 - PRB stand-alone remedy and/or treatment train

- What's New:
 - New reactive & combined treatment media leads to expanded list of contaminants treated
 - Improved understanding of treatment mechanisms
 - Deeper installation techniques
 - More options for monitoring, optimization, rejuvenation, and sustainability
 - Growing confidence in reliability and longevity

What Can You Do to Promote the ITRC PRB-5 Tech Reg?

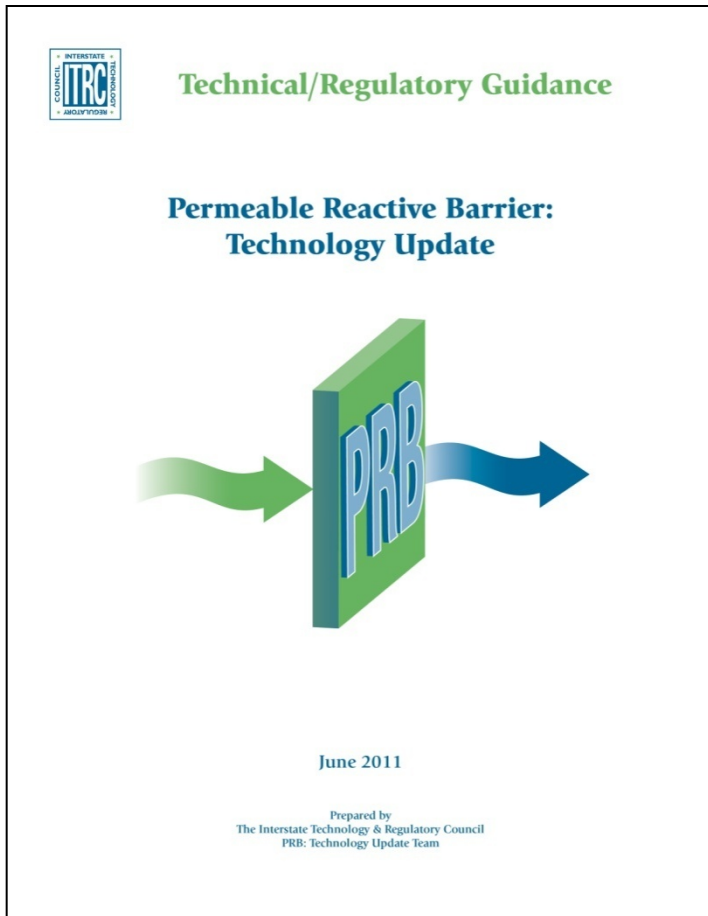
- Get PRB-5 Tech Reg to site level decision-makers dealing with contaminated groundwater
- Be open-minded - advancements in PRBs may now meet your site needs
 - Deeper than before – 35-45ft
 - New PRB media = new contaminant treatment



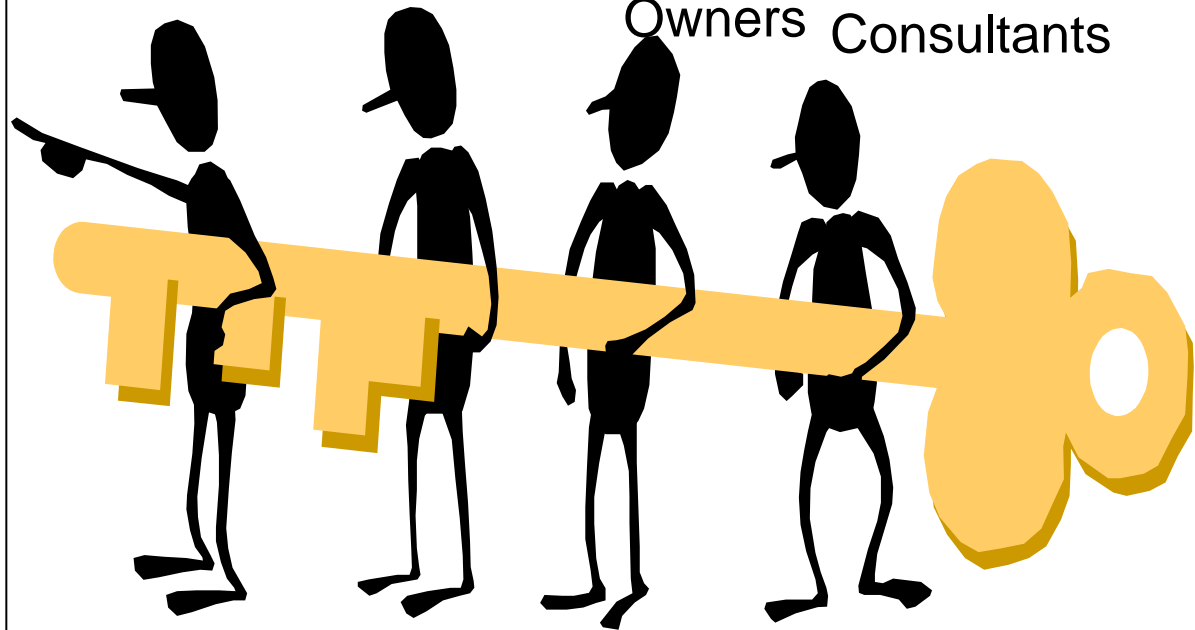
Potential PRB Tech Reg Impacts

EXPECTED USER GROUP	INTENDED USE	BENEFIT TO BE RECEIVED BY USERS
Regulators	Review PRB proposals / Technology Selection	Better site decisions / Protective Solutions
Consultants	Technology Selection / Design / Monitoring / Develop PRB proposals	Better site decisions / Better value for clients / regulatory partnership
Site Owners	Technology Selection / Design / Monitoring / Develop PRB proposals	Better site decisions / cost & time savings / streamlined regulatory review
Academia	Providing students with latest information	Better equipped students
Community Stakeholders	Ensuring trusted resource for decision-makers	Getting to the best solution

Build Site Synergy – Use PRB-5



Regulators Community Stakeholders Site Owners Consultants



Small Group Activity – Implementation Targets & Key Messages

- Break into groups by sector
- Assign scribe and reporter
- Discuss / Document
 - List of Potential Projects/Sites
 - Target Users (be specific – names)
 - Key Messages



Build ITRC PRB Success by Taking Action

- 1) Identify target users
- 2) Use PRB-5 Info Sheets
- 3) Share key messages
- 4) Provide free PRB-5 documents
- 5) Promote free training
- 6) Report success



What action are you going to take?

ITRC Permeable Reactive Barriers: Technology Update Implementation Session – October 26, 2011 in Denver, Colorado at the ITRC Fall Meeting

The information below is a summary from the ITRC *Permeable Reactive Barriers: Technology Update* Implementation Session at the 2011 ITRC Fall Meeting in Denver, Colorado and includes:

- List of attendees / Participant Action Items
- Small Group Flip Chart Notes

List of Attendees signing in:

First Name	Last Name	Organization	Participant Action Items
?	?	?	Other (with no name provided) educate / inform company staff of document and IBT
?	?	?	Other (with no name provided) share document with senior state staff
Ernest	Ashley	CDM (Camp, Dresser, & McKee, Inc.)	Will host a tech transfer session and encourage taking the online training also post info on web portal
Rebecca	Bourdon	MPCA	Contact a specific site PM team to ask if PRBs have been considered.
Kathy	Brown	Wyoming DEQ	Present document at next staff meeting (bimonthly)
Mark	Bruce	Test America	
Richard	Burnette	MacDill AFB FL	Attend next Internet-based training
Chris	Carleo	AECOM Environment	
Tanwir	Chaudhry	Navy	Inform Navy Optimization Work Group about the new PRB Tech Reg document.
Kevin	Collins	GA EPD	
Earl	Crapps	Alaska DEC	Attend the ITRC PRB IBT; Send Alaska forum on the Environment link to Mary Y. for ITRC presence.
Annette	Dietz	Department of Environmental Quality	Forward document to Erin M.; Send e-mail to cleanup PMs
Robert	Downer	Burns & McDonnell Engineering Company, Inc.	Brown bag presentation and document dispersion
John	Doyon	NJ Department of Environmental Protection	Team Member - Follow-up from Implementation Session
Jan	Dunker	U.S. Army Corps of Engineers	Promote free ITRC PRB Training
Jim	Fish	Alaska DEC	Recommend PRB to term c contractor for specific sites
Mike	Fitzpatrick	EPA Office of Resource Conservation and Recovery	Will advertise the document to EPA RCRA Staff in Regional Offices
Lindsay	Hall	DE Dept. of Natural Resources & Environmental Control	Will attend PRB Internet training
Walsta	Jean-Baptiste	Florida Department of Environmental Protection	I will present it to my co-workers.
Michele	Johnson	Artemis	Tweeting re: PRB-5
Matt	Jones	ECOS	
Ilsu	Lee	Freeport-McMoRan Mining Copper & Gold Inc.	Share key messages
Mark	Malinowski	California Dept of Toxic Substances Control	Will discuss with Staff - PRB Guidance and website

First Name	Last Name	Organization	Participant Action Items
Pat	McLoughlin	Microseeps, Inc.	Write up PRB summary for sales and marketing group.
Mark	Nielsen	ENVIRON	Post link to document for all remediation professionals in the firm (U.S. and International) with the Fact Sheet (Information Sheet)
Eric	Nuttall	University of New Mexico	Team Member - Follow-up from Implementation Session
Osaguona	Ogbebor	CH2M HILL	Post link to PRB document in my company tech page; talk to clients and other PMs about PRB; Present document to RL
Jim	Olst	CETCO	Will post weblink to PRB document on our website
Tom	O'Neill	NJDEP	Will contact NJ DEP PF design group and present (or facilitate) presentation with design PMs, SCs, and BC.
Krishna	Reddy	University of Illinois	
Hugh	Rieck	US Army Corps of Engineers	Inform National Guard Bureau Operational Range Assessment Program about PRB potential for off-site contamination migration control.
Randall	Ryti	Neptune and Company, Inc.	
Cannon	Silver	CDM (Camp, Dresser, & McKee, Inc.)	Team Member - Follow-up from Implementation Session
Michael	Stroh	Missouri Department of Natural Resources	Talk to dry cleaner site managers, superfund NPL site manger, voluntary cleanup program manager about PRB Tech Reg.
Ken	Vogler	Colorado Department of Public Health and Environment	
Fred	Vreeman	Alaska DEC	Promote training internally to ADEC project managers; bring up guidance at meetings with AFCEE to recommend use in upcoming contract specifications
Valerie	Wilder	Missouri Department of Natural Resources	attend IBT and encourage co-workers to do the same -- organize a group from our unit to attend at the same time
Kimberly	Wilson	SC Dept. of Health and Environmental Control	Team Member - Follow-up from Implementation Session
Mary	Yelken	The Yelken Group, Inc.	Program Advisor - Follow-up from Implementation Session
Peter	Zawislanski	Terraphase	Presentation to company staff; send information to insurance clients; Team Member - Follow-up from Implementation Session

Small Group Flip Chart Notes:

State/Local Government Group 1 & 2:

Sites/Programs:

- Dry Cleaner Program Sites
- Voluntary Cleanup Program
- LUST Programs
- Green Remediation Managers
- Pump & Treat conversions
- Alaska – USAF
 - King Salmon
 - Galena

- Eielson
- Alaska – dry cleaner (old/legacy/state lead)
 - Kenai
 - Anc
 - Fai
- Florida
 - Koppers – Gainesville
 - Dry Cleaners
 - Public funded CERCLA
 - Syncon Resins
 - Ellis Property
 - VI Chem
- Minnesota
 - St. Louis PK (Reilly Tar)

People/Users

- CO – Walter Avcamenko
- CO – Doug Jameson
- MO – Ken Koon
- CO – Erik Gessert
- AK – James Fish
- WY – Jerry Breed
- OR – Erin McDonnell
- DE – Jennifer Roushey
- CO – Barbara Nabors
- AFCEE / ACOE Project Managers
- NAVFAC – Locate specific PM names
- Alaska Tech Clearinghouse – Fred Vreeman
- Florida – Tech review section – Brian Dougherty; Jennifer Farrell – dry cleaners
- Missouri – Bob Hinkson – Remediation Project Management Supervisor; Jim Belcher
- New Jersey – Ken Petrone, Bruce Venner and site Project Managers

Messages

- It's green
- Identify state conferences and present there or national (i.e., Brownfields)
- Track record
- It is cost effective
- Not just chlorinated solvents
- Perception issues – clogging, fouling
- Supply case study data
- Target optimization (rejuvenation) - (historic legacy)
- Option for long term
- Environmental Impact (Low energy)

Success Story Lead

- Kevin Collins – GA EPD

Federal Participants

People/Contacts:

- Navy Optimization Work Group
- USACE Environ. Community of Practice (Hugh Rieck)
- Army Environmental Command (Doris Anders)
- AFCEE – John Gillespie, Paul Jurena

Messages:

- New contaminants addressed
- New, better emplacement (deeper)
- Cost savings potential
- Green & Sustainable Remediation

Private Sector Participants Groups 1 & 2

Users

- Consultant reference
- Conferences (booth, poster, presentation, workshop)
 - Battelle Chlorinated
 - AEHS Amherst
 - Workshops with CEUs
 - Require state approval
- LinkedIn

Sites/Projects

- 12 states not part (or minimally) of ITRC
- Consultant
 - Internal Knowledge Management
 - Tech Transfer
 - Webinars

Messages

- Case studies
 - Costs
 - Lessons Learned
- State regulators have reviewed document
- Sustainability Lifecycle Assessments
- Passive – final not initial
- Lot of \$ for passive system
- Seems like secondary tech
- Matrix to show applicability
- Mass Flux
- Timeframes

- Credibility
- Insurance and banking
- Promote list of states concurring on document

Academia Participants

Messages:

- Both the guidance documents and internet training are used in environmental courses
- The archived IBT audio files need to be better advertised
- Request that POCs visit faculty/students and discuss ITRC and regulatory considerations
- Use PRBs to treat storm runoff and protect rivers and lakes
- Note that PRBs are green and sustainable