

AquaBlok® 2080FW™ /PONDSEAL™

General Description

AquaBlok is a patented composite aggregate resembling small stones that is typically comprised of a dense aggregate core wrapped with an additive layer. In this application of the technology, crushed limestone typically serves as the core and powdered sodium bentonite clay is utilized as the coating or additive layer (Figure 1).

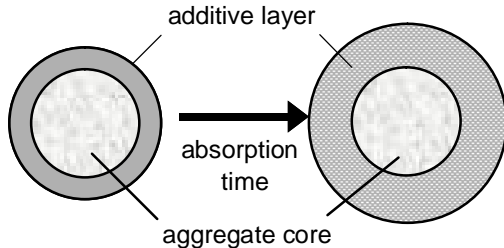


Figure 1. Configuration of stone-clay composite particle.

AquaBlok 2080FW (or PONDSEAL) is a freshwater-compatible formulation which is 20% clay by weight (based on the total quantity of raw material used in production). The high-solids content and consistency of the blend provides superior structural stability and reliable hydration/swell when exposed to water. This product will provide a low-permeable seal without the need for field blending or mechanical compaction.



Product Specifications

Aggregate Core:	Nominal AASHTO #8 (1/4-3/8") crushed limestone or non-calcareous substitute, as deemed project-appropriate (can be custom-sized to meet project-specific need)
Additive Layer	Bentonite Performance Minerals – BARA-KADE® Standard (or equivalent) <ul style="list-style-type: none"> High-swell Wyoming sodium (Na) bentonite clay (montmorillonite) Powdered (approx. 200 mesh); light grey; odorless
Binder:	Cellulosic polymer
Permeability:	1×10^{-7} to 1×10^{-8} cm/sec (depending on product thickness)
Dry Bulk Density:	88 – 90 lbs/ft ³ (compacted); 83 – 85 lbs/ft ³ (loose)
Pre-Hydrated Moisture:	7 – 15% (maximum)

Product Storage & Handling

AquaBlok should always be stored under-roof or completely protected (i.e. tarped) from exposure to surface moisture (e.g. precipitation, run-off, excessive condensation) prior to placement. Storage in a temperature-and/or humidity-controlled environment is not necessary. However, always store in original packaging on a clean, dry pallet prior to installation.

Material can be placed using a wide range of commonly available construction equipment – e.g. loaders, excavators, conveyors. Care should be taken to keep equipment as dry as possible during handling. For optimum performance, AquaBlok should NOT be blended or mixed with resident soil. Mechanical compaction can further reduce permeability but is not necessary.



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Sediment Remediation

AquaBlok® provides a low permeability, thin capping management tool for the containment and treatment of contamination in sediments.

In December of 2005 the U.S. EPA published its “Contaminated Sediment Remediation Guidance for Hazardous Waste Sites.” In this document, all three major approaches to management of contaminated sediment (monitored natural recovery, in-situ capping, and dredging) considered the use of capping in combined management strategies. AquaBlok is called out in this document as a cap material that may “enhance the chemical isolation capacity or otherwise decrease the thickness of caps, compared to sand caps.”

In January of 2008 the U.S. EPA released the final report for a three year evaluation of AquaBlok in a Superfund Innovative Technology Evaluation Report (SITE). The report evaluated AquaBlok to conventional sand capping and concluded that AquaBlok Provides Material Properties Superior to Traditional Sand Capping Approach in Physical Stability and Reduced Permeability or Seepage Through the Capping Material.

AquaBlok effectively performs the primary functions of a sediment cap:

- Physical isolation of sediment-borne contaminants from receptors to provide a “new” benthic habitat
- Chemical isolation and reduction of sediment-borne contaminants and their upwards migration
- Stabilization of contaminated sediments, preventing re-suspension and transport to other sites
- In-Situ treatment of contamination with an “active” cap

**U.S. EPA SITE
Evaluation Report:**
**Demonstration of the AquaBlok®
Sediment Capping Technology**
Please visit www.aquablokinfo.com to
download the complete report.

Lake & Pond Management

BARACLEAR®

BARACLEAR® is effective for nutrient management, phosphorus reduction, and water clarification in ponds, lakes, and other waterways.



This composite particle uses an aluminum sulfate (or “alum”) coating buffered with a calcium carbonate (limestone) core to bind and inactivate phosphorous. By removing this critical nutrient link from the aquatic food web, the product can dramatically curb algal growth without compromising a waterway’s broader ecology. BARACLEAR reliably delivers a mechanism for ongoing phosphorus management. The unique material also causes suspended particles to settle – further enhancing the clarity of the water.

- Limestone core serves as pH buffer and anchor – reliably delivering alum to the bottom (where P is actively recycled)
- NOT a herbicide, algicide, copper treatment or biological media – apply alone or in conjunction with other products
- Used to spot-treat or to broadcast basin-wide to target the primary and cyclical nutrient source from the bottom, up
- Simplifies handling (no need to slurry) – available in 50 lb. pails for hand or mechanical broadcasting

PONDSEAL™

PONDSEAL™ is formulated for leak prevention and repair in ponds, lakes, and other waterways both during and after initial construction.



As a direct derivative of the parent technology, PONDSEAL offers tremendous versatility when combating areas prone to unwanted water loss. The stone core coupled with a premium sodium bentonite coating provides structural stability and consistently low permeability over a wide range of application scenarios. Blanketed over porous soils as a continuous liner, poured around pipes and control structures as a durable anti-seep, or dropped into a vertical cut-off wall as a simple backfill to reinforce compromised dams or earthen berms, it’s no wonder PONDSEAL is being referred to as “nature’s duct tape.”

- Composite offers targeted delivery and improved handling – dramatically minimizes dusting, drift, and product waste
- Appropriate before inundation and even through standing water – often eliminating the need to drain a basin
- Reduces labor in that there is no need for compaction in lifts or layers, nor any need to be mixed into parent soil
- Place by hand or using a wide range of standard construction equipment (available in 50-lb bags or by the ton)

Well Sealant & Grout

A new family of innovative bentonite well sealant materials have been introduced that benefits from AquaBlok’s patented delivery system. HoleBlok and HoleBlok+™ are a bentonite coated composite particle, which provides a high solids seal in a manner that performs as well or better than traditional bentonite pellets.

HoleBlok is a pure Wyoming bentonite based annular sealant and hole plugging product that has high density, high mass, and a delayed hydration compared with standard bentonite well sealant materials. It is a pourable grout that can also be delivered by tremie pipe. HoleBlok performs as well or better than coated pellets at a lower price.

HoleBlok+ is the first annular sealant material to provide pollution prevention together with improved benefits over typical coated bentonite pellets. The bentonite-based grout is amended with a small amount of zero-valent iron (ZVI) treatment material. These two well-established and proven materials, when combined into the composite design, provide the unique ability to help minimize the potential for cross-contamination of surficial ground water zones along annular spaces while minimizing the potential for rebound -- the post-absorption release of contaminants trapped by the bentonite seal in environmental monitoring wells.

**HoleBlok™
HoleBlok+™**



Geotechnical Applications

AquaBlok sealing and delivery system technology can be successfully applied to a wide range of geotechnical applications. Low hydraulic conductivity, high solids seal, erosion resistance, and ease of handling and placement are some of the the basic properties of the material that make it a good solution to many geotechnical challenges. Examples of some of these applications include:

Landfill Applications

- Repairs to Certified Landfill Cap
- Pre-Bedding for Methane Gas Pipeline
- Annular Fill for Vertical Wall Penetrations

Anti-Seep Collar & Sealant

- Seals Pipe for Underground Installations

Levee Repair

- Dam Barriers in Flood Control Applications

Water Proofing Material

- Sub-Surface Building Walls



Methane Pipe Bedding/Seal

Wetland Restoration

SubmerSeed® is a composite-aggregate material made up of a dense aggregate core and viable wetland or aquatic seeds held in place with clay or clay-sized material and organic polymers.

The technology provides an alternative to traditional means of plant propagation in wetland/aquatic settings, especially when faced with the challenges of establishing a favorable vegetative community in or very near inundated conditions. The typical formulation of dry product relies on the nutrients available in the surrounding water.



AquaBlok Technical Support & Solutions

The team at AquaBlok has the knowledge and experience to assist in development of application methods as unique as your individual project.

The team at AquaBlok has the knowledge and experience to assist in development of application methods as unique as your individual project. A lab facility is maintained with full access to a certified soils laboratory. The company has performed both on-site studies and lab column testing to characterize and test various product and/or treatment material applications for a particular site. Services include:

- Project-specific bench scale/field testing & analysis
- Pilot application technical assistance
- On-site observation and application assistance including OA/QC

AquaBlok On-Site Installation Support

Typical product installation involves placing dry product through water. In several hours, the material hydrates and expands, ultimately forming a continuous and cohesive, low permeability barrier.

AquaBlok offers convenient packaging for easy unloading and product placement. We offer flexible transportation arrangements to meet your specific project needs. For larger quantities of product onsite manufacturing is available. Some installation methods include:

- Excavator • Conveyor • Stone Slinger • Clamshell Barge • Helicopter

Packaging & Shipping Options

We offer flexible transportation and product delivery options to meet your project specifications.

AquaBlok can be shipped to a site in convenient and appropriate packaging for ease of handling unloading and application to the target area. From 50 lb. Pails to 20-Ton Bags, we can meet your specifications for project volume and preferred delivery method. In addition, for very large product requirements, it is possible to perform on-site product manufacturing, which eliminates costs for transportation and packaging of the product.

- 50-lb. Pails/Bags • 1.2 Ton Bulk Bags • Loose Bulk • On-Site Production



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Product Overview

AquaBlok® is a patented, composite-aggregate technology resembling small stones and is comprised of a dense core, clay or other amendment coating material (the active layer), and polymers.

The selection of coating material is based on the application that is being targeted. For example, the use of a bentonite coating layer provides a highly impermeable sealant layer that can be used in sediment remediation and a wide range of underwater sealing applications.

Product applications include: filling the annular space around water well casings, repairing dams, repairing levees, construction of emergency flood barriers, construction of cut-off walls, sediment caps, and many more. The superior qualities of AquaBlok have proven to exceed alternative options in results, convenience, and ease of implementation—all of which result in lower project costs.

The technology has been applied to a range of industries:

Contaminated Sediments

- Low Permeability Thin Capping Material
- Hydrocarbon Contamination
- Treatment Amendments for Active Capping
- Improves Performance of Organoclay

Wetland Restoration

- Seed Delivery System

Well Sealant & Grouting

- Annular Sealant/Grout Material
- Abandonment
- Geothermal Grout

Lake & Pond Management

- Phosphorus Inactivation and Water Clarifier
- Sealant for Leak Prevention and Repair

Geotechnical/Other Applications:

Landfill Applications

- Repairs to Certified Landfill Cap
- Pre-Bedding for Methane Gas Pipeline
- Annular Fill for Vertical Wall Penetrations

Anti-Seep Collar & Sealant

- Seals Pipe for Underground Installations

Levee Repair

- Dam Barriers in Flood Control Applications

Water Proofing Material

- Sub-Surface Building Walls

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AquaBlok[®]
Composite Particle System

We've built a
Better Bentonite.[™]
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GEOTECHNICAL APPLICATIONS

The unique physical attributes of AquaBlok – both in its dry and in its hydrated form – have proven to make it a highly versatile material for an equally diverse array of geotechnical applications. The base product's composition is simple: powdered sodium bentonite wrapped around a crushed stone core. But the variations – in the balance of clay and stone, particle size, and even treatment additives – allow for use in many settings and for many distinct purposes. The product is highly durable in that it “heals” if disturbed, withstands repeated freeze/thaw cycles, resists erosional forces, and re-hydrates an infinite number of times if exposed to prolonged periods of draught.



Trench Dam Installations ~
(for sewers and other utilities)

With typical formulations ranging in size from ¼” to ¾” (in diameter), AquaBlok looks, feels, and handles – at least before it gets wet – much like any crushed stone that would be used to bed a pipe. The difference lies in AquaBlok's unique veneer of bentonite that wraps each individual stone. Working together, the stone and the clay offer a pourable fill that “self-compacts” when exposed to water. The resulting body of material never sets firm like concrete, but instead remains pliable – conforming to complex shapes like pipes, sheet pile walls, and water control structures.

When placed in a trench perpendicular to a sewer line or other conduit (as pictured at left), product can be wetted to produce a durable, structurally stable barrier that maintains a very low permeability. The coating of individual particles swells against the exterior sidewalls of the pipe and “self-keys” into surrounding soil without the need for benching, installation in lifts, or manual re-compaction. The result: an economical and technically superior barrier.



A consistent, durable, and impermeable bond between the rigid side walls of any water management structure and the surrounding soil is crucial to long-term stability and dependable performance. Bedding an overflow, riser, spillway, etc. in AquaBlok provides an all-in-one preventative solution – the consistent swell and extremely low permeability of high-quality sodium bentonite is united with the structural stability of stone aggregate for a one-step reinforcement.

Once any void spaces are identified and all loose or permeable soils are removed around a failing structure, AquaBlok can be added as a simple backfill. No soil blending or mechanical compaction is necessary (reducing labor and installation costs). Because the product both swells and self-compacts, AquaBlok will naturally “key” into the soil around it – providing a tight seal.



Control Structure Installations & Repairs ~
(see reverse for related anti-seep applications)



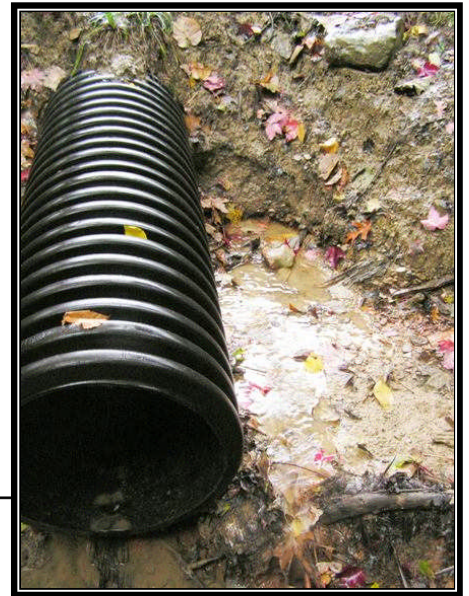
Better Bentonite™

Think of AquaBlok as Nature's Duct Tape!

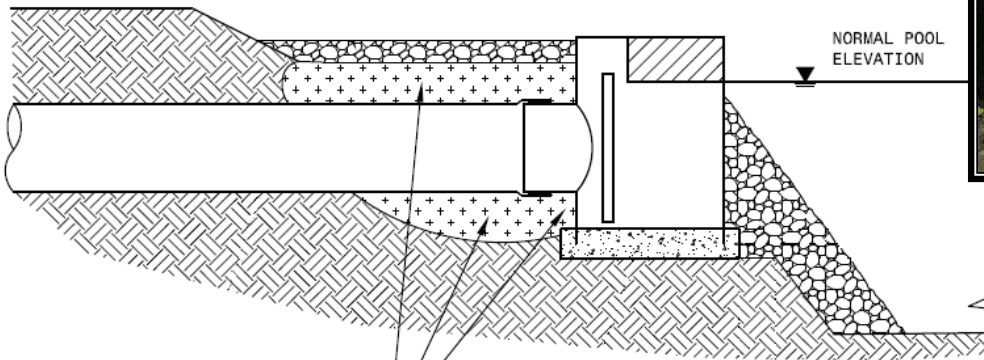


Cut-Off Walls ~ *For dam rehabilitation and contamination containment . . .* The traditional liquid slurry trench method is well known for creating hydraulic barriers and has been used for decades to stem the flow of subsurface water and water-borne contamination. In many cases, a backfill material with more structural strength is desired, particularly where subsurface flow rates are high or in earthen dams or dikes where loads must be supported. At 60-80% solids by weight (depending on formulations), AquaBlok behaves much like the crushed stone aggregate that makes up its core composition. As a pre-mix of stone and high-grade, Wyoming-derived bentonite, the product balances extremely low permeability (10^{-8} to 10^{-9} cm/s) with unparalleled structural integrity. An added benefit of this solids-rich blend is ease of installation. Material can be simply gravity dropped into a trench, even if water is actively filling the cavity.

Anti-Seep Collars/Plugs ~ Traditionally, "anti-seep collars" made of a variety of materials (rubber, PVC, plastics, etc.) have been recommended and installed as impermeable diaphragms that encircle the pipe. While these structures are intended and often do prevent wash-out, uniform compaction of the soil around the collar can be difficult or impossible, depending on soil characteristics. An installer often has to choose either to minimize compaction, so as not to destroy the collar or, risk compromising the performance of the collar by insuring proper compaction. The installation of AquaBlok, either in conjunction with an anti-seep collar or as a stand-alone replacement (as a solids-rich backfill), helps both seal and support the exterior of a pipe – dramatically reducing the likelihood of unwanted water migration and instability.



(Above) Water "piping" on the outside of a corrugated pipe following the annular space in the trench (preventable with an anti-seep plug of AquaBlok)



AQUABLOK®

AquaBlok, Ltd.

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LOSING YOUR LAKE?

STOP THE **LEAK**sm

TO ORDER PONDSEAL: Call
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PONDSEAL[™] works without drawdown

PONDSEAL offers reliable bentonite clay delivery through water creating an impermeable seal to stop leaks in ponds and other waterways. The product's weight and structure allow each composite particle to sink and self-compact, adding physical integrity to the resulting sealant layer. Once a water body is determined to be leaking, traditional techniques limit the remedy options. Unlike with other bentonite-based alternatives (e.g. powders, chips, pellets), PONDSEAL will not drift or dissipate, so the material is certain to go exactly where you place it and where you need it. Appropriate applications include ponds, lakes, reservoirs, canals, dams, and more.

PONDSEAL[™] simple & effective

PONDSEAL utilizes a dense aggregate (limestone) core wrapped in powdered bentonite clay to dependably deliver a sound seal to any area prone to or experiencing water loss. The product is made from the same high quality Wyoming sodium bentonite used in landfills and other demanding sealing applications. Due to the extreme low permeability, internal weight (density), and expansive characteristics of this novel composite particle, each individual "pebble-like" unit swells into adjacent particles to produce a uniform and durable layer – stopping the leak at its source.

PONDSEAL[™] nature's duct tape

Applications of PONDSEAL extend well beyond "liner" installations. While a veneer of the material blanketed over sand, gravel, or stone is an effective means to fortify the bottom or side slopes of a basin (without the need for feet of compacted, local clay), it is the product's versatility that has led to the nickname "nature's duct tape." From an insurance anti-seep around pipes and control structures to a plug for animal burrows and remnant field tiles to a structurally stable, stand-alone backfill in a cut-off wall (as reinforcement for a dam or earthen berm), the ways in which PONDSEAL can be used are seemingly bound only by the creativity of those confronting seepage issues.

Use PONDSEAL for reliable bentonite clay delivery
and put an end to leaking waterways.

▶ **Targeted placement**
no waste, just results

▶ **Technically effective**
extremely durable and
structurally stable

▶ **Simplifies installations**
reduces project costs by saving
time and labor

▶ **Highly versatile**
for leak prevention and repair

Contact AquaBlok, Ltd. or our growing network of distributors for more information

Stop the Leaksm
PONDSEAL[™]

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Stop the Leaksm PONDSEALTM

Technical Challenge: Many man-made waterways, independent of size and function, are constructed in permeable or marginal soils that are not ideally suited to reliably hold water. Even when basins are properly constructed from the onset, in generally sound – i.e. clay-rich – substrates, a variety of environmental factors (e.g. repeated freeze/thaw cycles, prolonged desiccation, underlying seams of sand or gravel, etc.) can compromise an earthen basin – causing water losses over time. Structural failures and/or construction oversights (e.g. a faulty control structure or a neglected but hydrologically connected agriculture tile) can also significantly increase the probability of leaks and excessive water loss.

Preventative measures can be time-consuming, labor-intensive, and cost prohibitive. Once a water body is determined to be leaking, remedy options can be limited by traditional techniques and site conditions (especially in standing water). Many professionals advise that a basin must be completely drained to effectively repair a compromised seal, often a costly and daunting endeavor. No single product or technique solves all problems in all situations – versatility is crucial when matching the challenge with the proper solution.

Product Description: PONDSEAL addresses leaks by reliably delivering a proven natural sealant to areas vulnerable to water loss. The product consists of three primary components – premium sodium bentonite, a limestone aggregate core, and binding polymers. Collectively, this “composite particle” typically ranges in size between 1/4” and 3/8” in diameter and is “pebble-like” in appearance and behavior. PONDSEAL is made completely of natural materials and is non-toxic to a waterway's ecology.

Product Function: If the source of the leak (or potential leak) is defined, PONDSEAL can be blanketed over the problem area by applying a one to two inch layer of dry product either on dry soil (prior to inundation) or through standing water. When applied through the water, individual particles will rapidly sink to the bottom without drift or clay loss. Particles hydrate and expand when placed in direct contact with water, forming a uniform protective barrier. Neither physical blending with resident soils or mechanical compaction is necessary to achieve a consistent seal – simplifying handling and reducing labor. Additional material can always be added to augment an initial application.

Technical Advantages: Unlike with other bentonite-based alternatives (powders, chips, pellets), PONDSEAL offers both reliable delivery to a target site and the density to “self-compact” (adding structural integrity). The product will gradually dry when exposed to the atmosphere for prolonged periods, but will re-hydrate and “self-heal” an infinite number of times as water levels fluctuate (or if the material is punctured or cut). PONDSEAL is erosion-resistant and can be further fortified using an “armor layer” of sand, stone, or gravel (especially in areas of high velocity – e.g. direct exposure to sustained currents, prop wash, etc.).

Application Techniques: When the area to be sealed is small and targeted (e.g. around a pipe or when used to fill an animal burrow), PONDSEAL can simply be installed by hand. For larger areas, the material can be placed directly from bulk shipping bags or from a protected stockpile using a wide range of standard machinery (e.g. front end loaders, excavators, stone slingers, conveyors, and other readily available construction equipment).

Product Usage Estimator:

	Target Product Thickness (inches)					
	0.75	1.0	1.5	2.0	2.5	3.0
dry						
hydrated	1.4	1.8	2.7	3.6	4.5	5.4
lbs/sq. ft.	5.2	6.9	10.4	13.8	17.3	20.8
Target Area (square feet)	PONDSEAL needed (50-lb Bags or Tons)					
100	10	14	20	27	34	40
250	25	34	50	67	84	100
500	50	67	100	3.5	4.2	5
1,000	2.5	3.5	5	6.7	8.4	10
10,000	25	33.5	50	67	83.5	100
50-lb Bags						
Tons (packaged in bulk bags)						

Packaging & Pricing: PONDSEAL is available in a variety of packaging options including 50-lb bags, for manual placement, and bulk super sacks (2,400-lbs each), for larger installations. For very large projects, product can be sent by bulk container or even be manufactured on-site. PONDSEAL is comparably priced relative to other traditional bentonite products. Contact AquaBlok or our growing network of distributors for more information or to place an order.

The PONDSEAL Solution: PONDSEAL utilizes a dense aggregate (limestone) core to deliver extremely high-quality sodium bentonite clay to areas that are actively leaking and/or otherwise prone to seepage. This novel composite particle's inherent low permeability, considerable weight (density), and robustly expansive properties allow each individual “pebble-like” unit to swell into adjacent particles, resulting in a uniform and durable layer. Whether as preventative insurance (during construction) or as a repair strategy (after water loss is observed), PONDSEAL is a versatile tool to dependably “stop the leak.”

General Advantages/Physical Attributes:

- ⊙ Effective for leak prevention and repair – both during and after initial construction
- ⊙ Composed of high-quality Wyoming sodium bentonite coated over a limestone aggregate core
- ⊙ Offers targeted delivery – solid core serves as an anchor, delivering the clay and holding it in place
- ⊙ Appropriate both before inundation and through standing water – often eliminating need to drain the basin
- ⊙ Consistently swells to form reliable, extremely low-permeable seal
- ⊙ Highly durable – heals if disturbed, withstands freeze/thaw cycles & re-hydrates an infinite number of times
- ⊙ Improves handling – dramatically minimizes dusting, dissipation, and product loss (sinks “like a stone”)
- ⊙ Structurally stable – due to internal matrix of individual stones
- ⊙ Aesthetically pleasing – blends with surrounding soils
- ⊙ Highly versatile & affordable

Versatility/Uses: (think of it as nature’s duct tape!)

- ⊙ Blanket over permeable soils or other suspected problem areas
- ⊙ Easily backfill around pipes & control structures as a durable anti-seep – without the need for compaction
- ⊙ Create a cut-trench or vertical barrier wall to reinforce compromised dams or earthen berms
- ⊙ Use in ponds, lakes, reservoirs, canals, or anywhere that leaks can be a problem

Other Notables:

- ⊙ Reduces labor – no need for compaction in lifts or layers; no need to be tilled or mixed with parent soil
- ⊙ Erosion-resistant – can also be surface dressed with sand, soil, or stone for additional protection
- ⊙ Eco-friendly – will not adversely alter water chemistry
- ⊙ Available in two packaging options: 50-lb. bags and 2,400-lb. bulk bags (priced by ton)



Figure 1. PONDSEAL™ applied at 7-lbs./ft² five minutes after inundation (left) and 24 hours after inundation (right). Note original boundary between product and water (dashed red line) demonstrating swell/expansion of product over time.

PONDSEAL™

Stop the Leaksm



[1]

Due to its extreme low permeability, solid core structure, and ability to self-compact, **PONDSEAL** can be used in a wide array of circumstances, specifically as a means to prevent and/or repair common causes of water loss from ponds, lakes, and other waterways. Among its diverse applications, the bentonite-based “composite particle” can be used for: “blanket” linings to combat permeable soils, compromised basins, and/or preferential pathways – both



[2]

or trench installations [4] (to create a vertical barrier); and, to seal off problem spots such as remnant field tiles [5 & 6], excavations caused by burrowing animals, and around water control structures [7] – such as overflows, spillways, dams, and pipes.

[3]



[4]



[5]



[6]



[7]

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