

SOLUTIONS FOR CONTAINMENT AND REMEDIATION

**ENVIRONMENTAL
PRODUCTS**



CETCO®

ENVIRONMENTAL PRODUCTS

Providing insight, helping you succeed

At CETCO, we help owners, engineers, and contractors succeed through our knowledge and experience in minerals, polymers and the construction industry. CETCO provides lining systems and remediation technologies that exceed the industry standards, and offer innovative alternatives to traditional construction options. With the desire to educate as well as innovate, the CETCO team works globally, partnering with industry professionals to provide insight on the latest industry trends. Our goal is to provide solutions to unique challenges.



Research and Development: The CETCO commitment to innovation has led to new industry-leading products and solutions

Our international team of clay mineralogists, chemists and polymer scientists, transform ordinary minerals into extraordinary technologies. Our multidisciplinary research and development team creates new products to support our customers needs. Our growing portfolio of patents demonstrates our commitment to technological innovation across the markets that we serve.



Permeability Testing

Technical Support: Our experience and application knowledge provide you insight into project design

We combine expertise in geosynthetic containment design and environmental remediation methods with field experience combined with knowledge of material performance. This unique combination of experience gives us the ability to make recommendations and ensure the right product is selected and properly applied.

SEDIMENT REMEDICATION	MINING
COAL COMBUSTION	WASTE CONTAINMENT



Global reach and local support

Strategically located people, manufacturing and research facilities give us the ability to serve the toughest project demands around the world.

RESEARCH AND DEVELOPMENT

LOGISTICS

MANUFACTURING

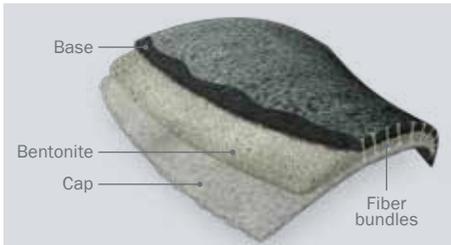
TECHNICAL SUPPORT

- Product Selection Assistance
- Product Qualification Testing
- Mix/Design Recommendations
- Educational Seminars
- Specification Reviews

The image is a grid-based infographic set against a light gray world map. It features four main functional areas: 'RESEARCH AND DEVELOPMENT' (top-left, with a photo of scientists in a lab), 'LOGISTICS' (top-right, with a photo of a container ship), 'MANUFACTURING' (middle, with a photo of a worker in a factory), and 'TECHNICAL SUPPORT' (bottom-left, with a photo of a worker in a hard hat). A vertical list of services is positioned on the right side of the grid. The grid cells are separated by thin white lines, and some cells contain solid green or gray backgrounds with white text.

GEOSYNTHETIC CLAY LINERS

Proven technology for liquid and waste containment applications



Standard needle-punched GCL



Laminated GCL



BENTOMAT® used in solid waste landfill



RESISTEX® used to line coal combustion by-product storage facility

CETCO is the world's leading supplier of GCLs and has a full range of products to address design challenges such as hydrostatic pressure, shear strength, and chemical compatibility. CETCO engineered solutions can provide a product that will provide performance and value for containment applications.

ADVANTAGES

Over compacted clay liner systems:

- Self-healing and self-seaming
- Better hydraulic performance
- Easier installation in varying weather conditions
- Faster deployment
- Requires less material/lower carbon foot print
- Design certainty with engineered materials

BENTOMAT® GCLs

Standard sodium bentonite-based GCLs are designed to provide a hydraulic barrier against many leachates. The swelling bentonite fills up pore space and constricts the flow paths of water, resulting in a low-permeability hydraulic barrier.



RESISTEX® in Bauxite Liquor Disposal Facility



RESISTEX® used to line CCP storage facility



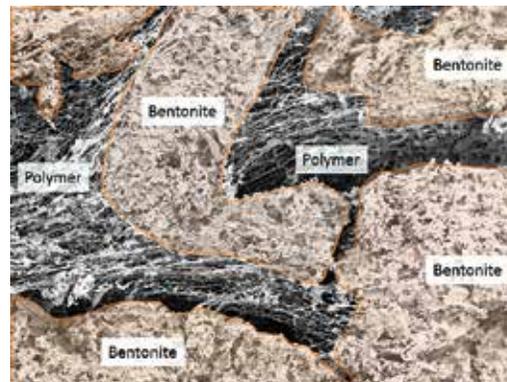
RESISTEX® used in Coal Combustion Landfill Capping, Mallorca, Spain



RESISTEX® used in Coal Combustion Landfill Capping, Mallorca, Spain

RESISTEX® GCLs

Polymer Modified Bentonite (PMB) provides improved chemical resistance in more aggressive leachate environments compared to Sodium Bentonite. CETCO manufactures a range of Polymer Enhanced GCL products that can be designed to meet both the chemical compatibility and geotechnical design requirements. CETCO's patented polymer technologies are engineered to provide high sealing and swelling power, delivering value and performance.



APPLICATIONS/RESISTEX®

- CCR storage
- Red mud storage
- Heap leach pads
- Mine tailings dams
- Caps
- Solid waste storage bottom liner
- Secondary containment
- Pond liners

SEDIMENT REMEDIATION

Active cap designs with REACTIVE CORE MAT™ reduce cap thickness requirements

CETCO manufactures in situ reactive capping technologies for contaminated sediments to address concerns about navigation, placement, biointrusion, and flow patterns. The REACTIVE CORE MAT™ (RCM) was engineered to address the many complex environmental, biological, and hydrological design challenges often encountered in the field. CETCO can tailor remediation applications with a variety of remediation solutions depending on site conditions.



FEATURES & BENEFITS

- Remediation media can be tailored to treat a wide range of contaminants including NAPL and dissolved phase organic compounds
- High adsorptive capacity reduces required cap thickness, increasing navigable depth when compared to conventional capping materials
- Factory tested RCM mass loading provides accurate media placement and complete coverage
- Geotextiles provide tensile strength and inhibit biointrusion

SEDIMENT REMEDIATION

Caps designed with bulk ORGANOCCLAY® PM 199 increase cap design life

CETCO also offers ORGANOCCLAY PM 199, a bulk granular media capable of adsorbing large quantities of NAPL and dissolved organic contaminants. When mixed with coarse sand, it can be applied over contaminated sediment in waterways to provide a permeable active treatment layer. For subaqueous sediment treatment in conditions requiring erosion or scour control, CETCO can delivery technologies lined internally with geotextile and filled with ORGANOCCLAY, canbe deployed in waterways with high channel velocities.



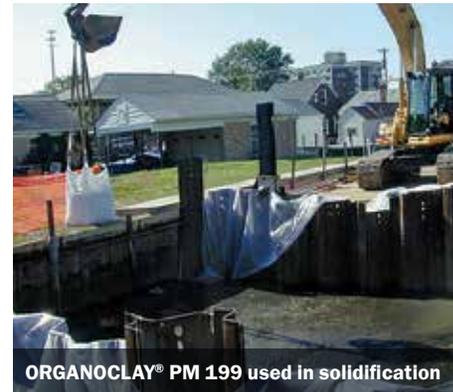
FEATURES & BENEFITS

- ORGANOCCLAY application rate can be tailored to meet cap life expectancy requirements
- High-adsorptive capacity reduces required cap thickness, thus increasing navigable depth when compared to conventional capping materials
- Partition coefficient test data available for PAHs and PCBs

SOLIDIFICATION AND STABILIZATION

Enhance mix design and performance with **ORGANOCLAY® PM 199** and bentonite

In situ treatment can be more cost-effective and more protective of human health and the environment than traditional dig-and-haul remedies. In situ treatment minimizes excavation and the associated releases of volatiles, eliminating the additional costs associated with landfill disposal. CETCO provides in situ treatment additives for cement-based solidification/stabilization (s/s) projects. CETCO ORGANOCLAY PM 199 can help bind organic contaminants and allow cement to cure properly. CETCO also provides ex-situ treatment technologies that can be used alone or as an additive to cement-based mixes. These materials are mixed into waste or contaminated media to render it safe for landfill disposal.



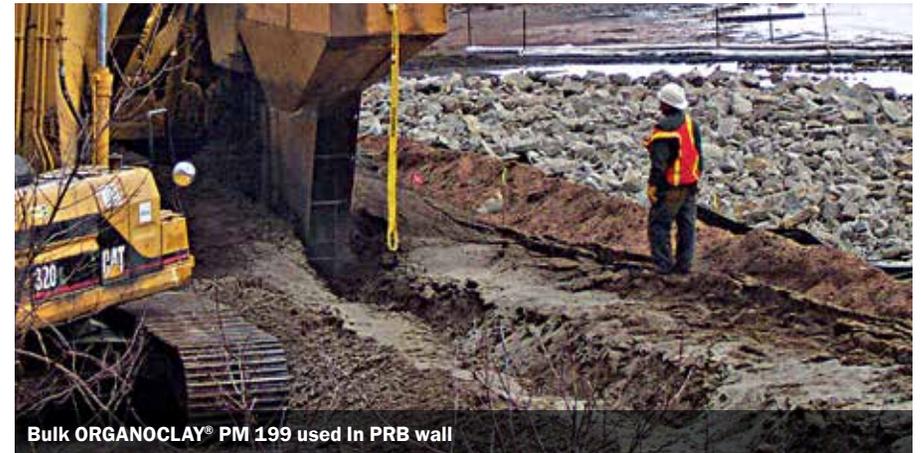
TYPICAL SITES UTILIZING CETCO S/S TECHNOLOGIES

- Wood preserving sites
- Manufactured gas plants
- Chemical plants
- Oil refinery sludge lagoons

GROUNDWATER TREATMENT AND CONTROL

Effective removal of DNAPL from groundwater with ORGANOCLAY® PM 199 and REACTIVE CORE MAT™

PRBs are vertical, media-filled trenches typically used in groundwater treatment applications as an in situ method of remediation. Interceptor trenches are filled with granular remediation media to capture NAPL. CETCO produces supplies ORGANOCLAY media for these barriers and can configure an economical solution tailored to treat commonly encountered organic contaminants of concern. For traditional pump-and-treat projects, CETCO ORGANOCLAY PM 199 can also be used as a pre-filter before the granular activated carbon vessels to remove oil and grease, extending the life of the activated carbon.



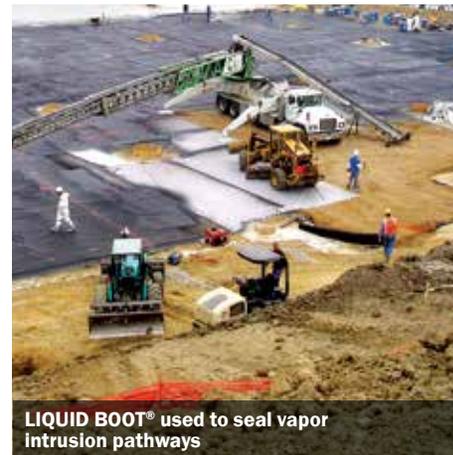
VAPOR INTRUSION MITIGATION

Versatile, easy to install vapor barrier systems containing LIQUID BOOT®

LIQUID BOOT® spray-applied vapor intrusion barrier can be used in underslab and below-grade vertical wall applications to minimize vapor intrusion into structures. The LIQUID BOOT® system is ideal for methane and VOC vapor control. LIQUID BOOT® can be spray-applied directly to penetrations, footings, grade beams, pile caps, and other irregular surfaces, providing a seamless and fully-adhered vapor intrusion barrier system. CETCO offers multi-layer systems that can be tailored to meet your chemical resistance needs.



LIQUID BOOT® PLUS installation



LIQUID BOOT® used to seal vapor intrusion pathways



LIQUID BOOT® installation

FEATURES & BENEFITS

- Spray application effectively seals penetrations and eliminates mechanical fastening
- Monolithic composition eliminates the potential for seam failures
- Unique formulation provides reliable protection from methane, VOCs and water vapor
- Fully-adhered system reduces risk of uncontrolled gas migration

ADVANTAGES

Over thin-mil or sheet systems:

- Cost-effective installation
- Lower diffusion properties
- Superior tensile elongation and bond strengths
- Long-term dependable performance
- Tough/flexible at low temperature
- Installation in a range of climates

SOIL SEALANTS

Highest quality VOLCLAY® bentonite from the largest reserves in the world

When VOLCLAY® bentonite soil sealants are mixed with soil and hydrated, the bentonite fills the voids between soil particles. This creates a barrier that effectively stops further seepage through the soil. Because of the high swelling capacity of VOLCLAY® bentonite soil sealants, only a small amount is needed to reduce the hydraulic conductivity of the on-site soils.



VOLCLAY® bentonite add mixture used in landfill



Bentonite enhancement for pipe penetration



VOLCLAY® bentonite in supersacks



CETCO®

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OUR STANDARDS. YOUR PEACE OF MIND.

“CETCO continues to go above and beyond our expectations. CETCO maintains a professional approach when working through difficult situations, and work closely with all parties involved to make sure the job gets done right the first time.”

– Jamie Hendricks, Power Construction Company, LLC, Chicago, IL