

Waterproofing

Environmental Protection from Rawell



Pre-hydrated, High Density Bentonite

**RAWMAT® HDB Membranes and
RAWSEAL® HDB Waterstops**
High Density Bentonite Environmental Protection





Providing leading-edge solutions

Rawell Environmental Limited is one of the world's premier suppliers of bentonite-based waterproofing materials for environmental protection projects around the world.

Our unique system of RAWMAT® HDB (High Density Bentonite) Membranes and RAWSEAL® HDB Waterstops delivers leading-edge solutions that offer a demonstrable range of advantages over conventional dry bentonite and other rival systems.

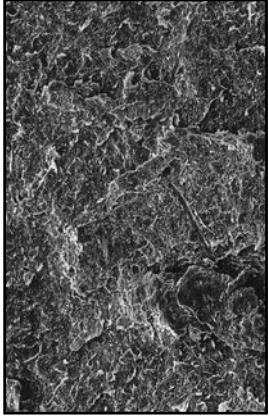
Founded in 1976 by current Chairman, Bryan Flynn, Rawell has built its success on years of experience in this market and a highly focused and proactive approach.

Our high-quality personal service and close attention to detail have won us an enviable international reputation. Rawell's customers enjoy total reassurance that our products will function with complete reliability for the whole life of the projects for which they are specified.

Rawell lining membranes have successfully provided highly functional, reliable long-term solutions for a wide variety of environmental protection purposes including landfill, tank farms, impounding of waste on site and brownfield development.

Our clients range from government departments and major utility companies to multi-national waste disposal organisations and oil companies. Rawell systems are currently ensuring safe, secure and reliable environmental protection in countries right across the world.

Satellite view of Wyoming, USA



High Density Bentonite,
note dense surface



Dry Bentonite, note voids
around particles

What is Bentonite?

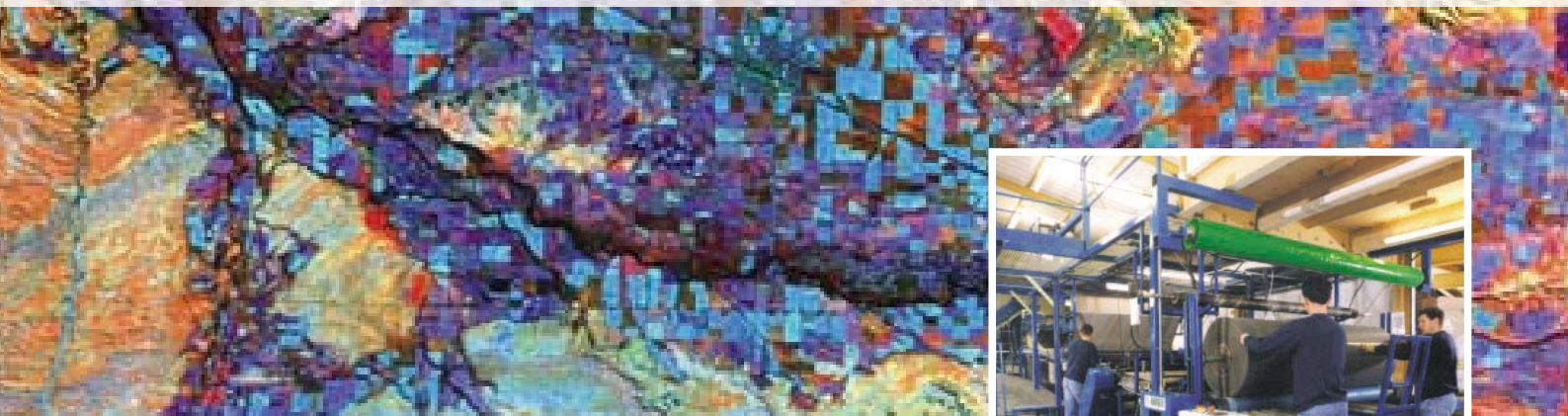
Bentonite is a natural inert clay formed from volcanic ash and found predominantly in Wyoming, USA. It absorbs water and can swell to form an impermeable mass that prevents the passage of liquid, these swell characteristics are harnessed to provide waterproofing properties.

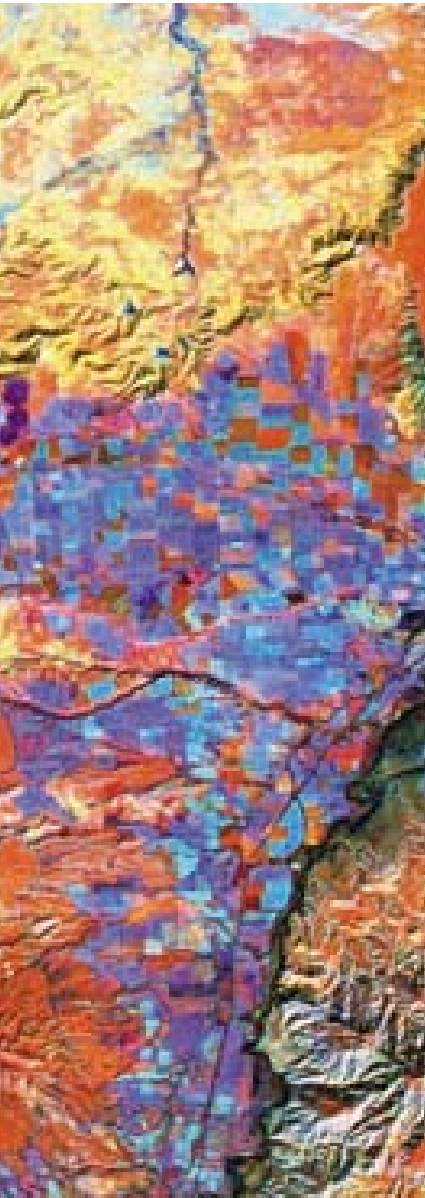
However, in-situ hydration of bentonite may leave the clay susceptible to chemical degradation.

Cracking and shrinking can be induced by ground contaminants and are well-known results of failure in dry bentonite systems.

To avoid this, Rawell has developed a revolutionary waterproofing material by using its own patented process to polymerise and pre-hydrate the bentonite. The clay is produced into rolls of membrane and lengths of waterstops.

The resulting pre-hydrated bentonite clay has extreme high density with exceptional resistance to ion exchange and chemical attack. The plasticine-like core also ensures no movement of clay in handling and no loss of the bentonite in cutting around penetrations. It also withstands minor movement through its ability to swell and ensure the continuity of the waterproofing system. This is what makes RAWMAT® HDB unique.





A unique range of benefits

RAWMAT® HDB has been developed through extensive research and experience over many years to overcome the difficulties associated with other systems when used in environmental protection applications.

This unique product ensures long-term protection in a range of highly demanding ground conditions whilst affording simple and highly cost-effective installation.

As well as its long list of advantages over conventional dry bentonite systems, RAWMAT® HDB affords specific benefits against compacted clay and 'plastic' solutions.

The natural sodium bentonite in RAWMAT® HDB membranes is pre-hydrated with a patented polymer solution which provides a permanent protection to the ionic fingerprint of the clay. This protects it from exchange and subsequent breakdown in ground contaminants and thus overcomes a major drawback widely associated with other bentonite systems.

As a result RAWMAT® HDB provides the reassurance of a long-term barrier to a wide variety of contaminants, hydrocarbons and chemicals. It is equally effective whether used to prevent contamination reaching unpolluted water or to contain contaminated materials in order to protect the surrounding environment.

In addition the geotextile carriers have been carefully chosen to ensure intimate contact between the membrane and other materials in a composite lining thus preventing the tracking of liquid.

All joints are self-sealing at the overlaps, with no wicking of liquid either here or through the geotextile carrying fabrics.

Practical and cost-effective

RAWMAT® HDB comes in rolls which are easy to handle and can be installed quickly and simply by unskilled labour in any weather. It also offers consistent quality and is flexible and robust when faced with the conditions of day-to-day site construction.

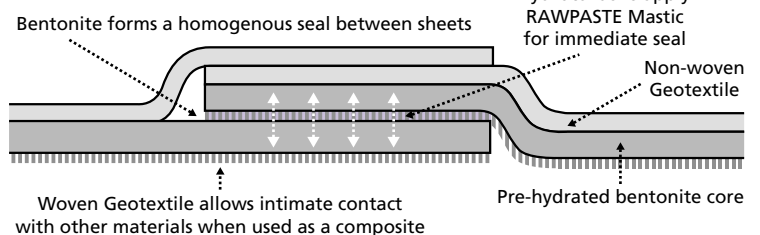
A vital advantage is the dramatic cost savings - and lower environmental impact - it offers over clay systems through its ease of handling and transport. Thanks to the low permeability of the membrane, a single truck load of RAWMAT® HDB can replace as much as 2,800 cubic metres of clay.

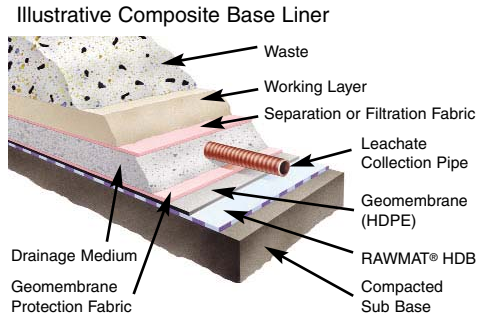
Pre-hydrating the bentonite ensures an immediate seal to hydrocarbons once joints are treated with RAWPASTE Mastic.

RAWMAT® HDB also avoids the need for sand blindings below the membrane or sand cushions above, while protective geotextiles are not required.

In addition, the use of RAWPASTE Mastic and RAWSEAL® TR35 fillets ensures extremely simple sealing of vents, pipes, stanchions and sumps without the need for complex and expensive accessories.

RAWMAT® HDB - Type P





Advantages over dry bentonite products

- Unique factory pre-hydration process and QC checks avoid performance uncertainty and guarantee effectiveness
- Patented vacuum extrusion creates non granular plasticine-like consistency - bentonite cannot fall out
- Pre-hydration of bentonite with liquid polymers protects RAWMAT® HDB against ionic exchange
- Immediate gas and vapour barrier guaranteed thanks to pre-hydration process
- Self-sealing overlaps - no additional bentonite required and no leakage through laps
- Delivered to site as an impermeable membrane
- Does not breakdown through cation exchange

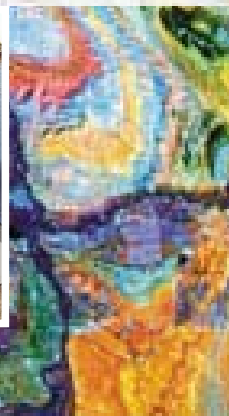
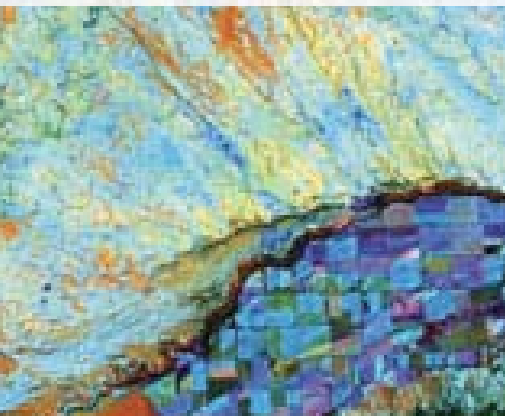
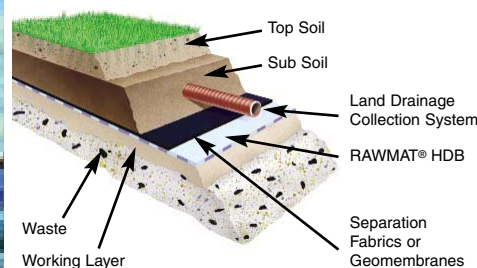
Advantages over compacted clay

- Consistent factory-controlled quality
- Can be repaired simply on site if damaged
- Easier to install on slopes
- Lower transport costs 2,800m² per wagon
- Requires only lightweight machinery to install
- Can be installed in most weather conditions
- Does not crack if it dries out
- Fixed costs are calculable and time is predictable
- Far lower permeability
- Unaffected by either freeze/thaw or wet/dry cycles

Advantages over 'plastic' materials

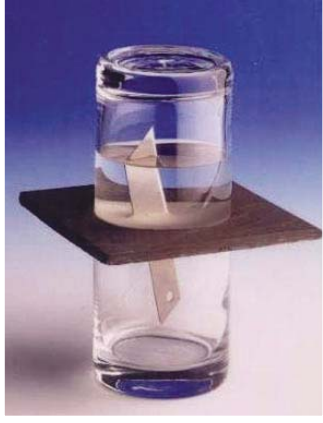
- Simply rolls out - watertight overlaps are easily achieved without welding
- Installed without need for specialist labour or equipment
- Can be laid in most weather conditions and unaffected by sand/dust
- Does not normally require protective geotextiles
- Simply sealed around pipes and penetrations
- Has ability to self-heal punctures - inherently vandal-resistant
- Easily repaired if membrane is damaged during construction
- Does not have temperature restrictions - can be laid in cold weather

Landfill Capping Layer



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A safe and stable product

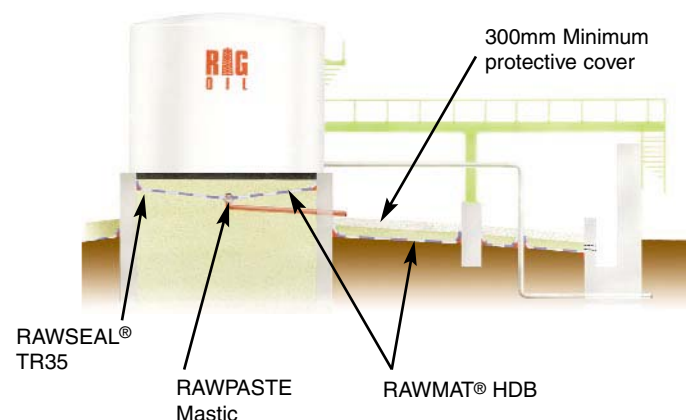
RAWMAT® HDB membranes achieve impressive hydraulic conductivity readings even in the presence of high levels of hydrocarbons and chemicals. Contact Rawell for more information on tests carried out on RAWMAT® HDB.

The product's composite structure is very stable and can be subjected to repeated freeze/thaw and wet/dry cycles without reducing its waterproofing properties.

This factory pre-hydrated high-density bentonite system has not lost any of the benefits of high swelling smectite clay and consequently RAWMAT® HDB retains the ability to self-heal if punctured.

The products can also be relied on to offer reliable environmental protection in a range of situations - in particular against the contamination of water supplies.

The products are non-toxic and chemically inert posing no health and safety issues



For details of Rawell products and services visit www.rawell.com where you can find more information suited to your specific needs, or call +44 (0) 151 632 5771

The secure system for environmental protection projects

RAWMAT® HDB membrane linings are used extensively in environmental protection applications all over the world. This unique system of pre-hydrated natural sodium bentonite is ideal for providing long-term resistance to contamination for a wide variety of projects. This long-term effectiveness and reliability are assured by Rawell's emphasis on rigorous, ongoing, life-time testing of all its materials with a wide variety of permeants.

It offers the dual advantage of being equally effective whether used to prevent contamination reaching unpolluted water or to contain contaminated materials in order to protect the surrounding environment. The Rawell system is sufficiently practical and flexible to overcome the most difficult ground conditions or the most arduous design criteria.

Key applications include tank farms, filling station forecourts, transformer bunding and trench lining as well as landfill base, landfill caps and the impounding of waste on site. Other successful projects have included extensive use for the creation of reed bed water cleaning systems, to line burial pits for carcasses and line golf course lakes built on disused landfill sites.

This unique solution ensures the best of both worlds. Specifiers can rely on flexible and proven long-term solutions to a range of environmental protection problems, while contractors value the time and money saved in transport and installation as well as the ability to self-heal minor puncturing. The ultimate winner is the client, who benefits from the highest quality solution at a highly competitive price - and with shorter programmes than any other system. See Case Histories or Projects List at www.rawell.com to find out about the worldwide range of environmental protection projects that have benefited from the use of pre-hydrated bentonite.

- Landfill based lining
- Landfill capping
- Brownfield site clean-up
- Reed Beds
- Transformer Bunding
- Petro Chemical Tank farms
- Filling station forecourts
- Vertical Cut-offs

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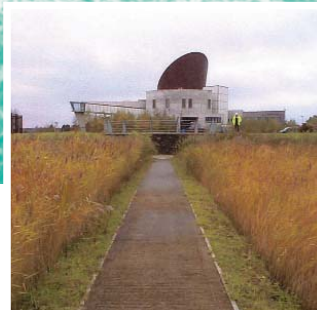
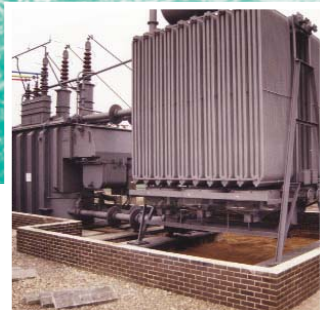
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Rawell actively seeks close involvement with engineers, contractors and clients throughout the project, from feasibility study to final construction. We are able to provide expertise born of wide experience to help resolve difficult or complex application problems at any stage.

Rawell reserves the right to change product specification and instructions without notice. The information contained herein is to the best of our knowledge, true and accurate; it is of an illustrative nature only and does not form any contract or intended contract with any purchaser or installer, and supersedes previous information.

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