

# NEWS

The latest news magazine from the NAUE Group

Issue 30 - May 2007

## Introduction

*The year 2007 began with our 5th Geosynthetic Colloquium in Bad Lauterberg, in the Harz Mountains of Germany. This location was originally chosen for the event because of the winter sport activities available as a diversion.* The organising team, built around Kent von Maubeuge, had a solution ready for any weather eventuality, even during snowfall. An "Olympic course" was set up in the spa gardens for the 200-plus guests to compete in groups. This again made the versatility of our products quite obvious. Whether curling on geomembranes, navigating through a labyrinth of nonwoven geotextiles or competing in a biathlon on Secugrid® skis. But the event was successful not just because of its socialising program; we are happy to report the interesting presentations and intense discussions that fulfilled our expectations.

The annual windstorm season began with terrible punctuality. On January 19th the windstorm Kyrill swept over broad areas of Europe with wind-speeds of up to 225 km/h. Alone in Germany this storm caused 13 persons to lose their lives and at least 1 billion Euro in property damage. Contrary to forecasts, storm flooding along the North Sea coast was less than expected. Nevertheless there was flooding; for example water levels in Emden rose to a point only surpassed by the 1906 record mark. Just two months later the low-pressure area windstorm Orkun caused further storm damage. In addition to the reinforcement of dykes with our bentonite Geosynthetic Clay Liner (GCL) Bentofix®, NAUE has been combating floodwater

erosion for years with Terrafix® sandcontainers – so that at least part of the sand remains where it belongs, along the coast and on the beaches. The effectiveness of geosynthetic structures was illustrated in various publications. The German island Sylt is only a few hundred meters wide at its narrowest point. Every storm-flood carries away up to 12 m of beach. The historical house Kliffende [cliff's end] has now been successfully protected by a Terrafix Soft Rock® bulwark for almost 17 years. Without this protective structure the house would have fallen victim to the tides long ago (see picture from January 2000).



The first working draft for an integrated landfill ordinance has now been drawn up by the Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit [federal ministry for environment, nature protection and reactor safety]. German Landfill requirements are currently based on three legislative ordinances (DeponieV [landfill V], Abfallablagerv [waste disposal V], DeponieverwertungsV [landfill recovery V]) and three administrative orders (TA Abfall [technical advisory, waste], TA Siedlungsabfall [technical advisory, municipal waste], and the „erste allgemeine Verwaltungsvorschrift zum Grundwasser-

schutz" [first general administrative order for groundwater protection]). The federal government's objective is to consolidate landfill-related technical regulations into a single legal order in the course of legislation for the Mittelstands-Entlastungs-Gesetz [relief act for small and medium-size businesses]. With respect to sealing systems it is positive to note that the previously prescribed building regulations are to be abolished in favour of specifications only for basic components and their performance capabilities. These components must have uniform approval or classification throughout Germany. From our point of view this new approach is a step in the right direction for improving the safety of landfills in Germany and, above all, one which will allow economic construction of the best possible solution for each individual site.

Though mild weather is detrimental for winter sport recreational activities, it is a bonus to the construction industry. Because almost all of Europe has been free of snow and frost, this mild weather has already permitted a myriad of building projects to be commenced or continued since the beginning of this year. Particularly in comparison with last year's long, hard winter; first quarter product deliveries in 2007 have already significantly exceeded the previous year's first quarter deliveries. Most prognoses indicate further revitalisation of the construction industry during 2007. These indicators should also offer ample sales opportunities for geosynthetics, thus 2007 should prove to be another good year for NAUE. ■

## BBA certificate Secugrid®



### BBA certification for polyester Secugrid®

On November 27, 2006 NAUE received BBA certification number 06/R141 for the geogrid materials Secugrid® Q6 and R6 that are produced from polyester in the Adorf, Germany, plant. This certification includes notices about the installation and evaluation of structures where these products are employed.

Typical partial safety factors – such as A1 (creep), A2 (installation damage) and A4 (environmental influences) – are defined on the basis of laboratory testing carried out on Secugrid® Q6 and R6 geogrid materials world wide. On the basis of these investigations the following partial factors of safety were extrapolated:

- for 120 year service life (95% confidence value) a partial factor of safety A1 of 1.57

- in the pH range of 11 to 12.5, an A4 partial factor of 1.14 for a 60 year service life and an A4 partial factor of 1.2 for a 120 year service life.

These determined partial factors are excellent for polyester. Please take further details directly from the certification, available from us on request (info@naue.com).



## International projects

**Telejaen River, Romania, Bank protection on river Telejaen with Secutex® sandcontainers**  
[Bogdan Tronac]

The area around the North of Bucharest is heavily industrialised with oil extraction and preparation facilities. Therefore the railway network is well developed in the region, since the oil needs to be transported from here across the country.



Placing of soil filled Secutex® scour protection sandcontainers

Telejaen is a small tributary of the Prahova river, that flows east of Ploiesti and crosses the railway from Buzău to Ploiești, which is part of the IX European Corridor.

The railway bridge was built decades ago, and, this important crossing bridge has seen better days.

The Telejaen river usually has a flow of around 343 m<sup>3</sup>/sec, but in case of heavy rainfalls the value increases significantly. In 2005 the river reached a maximum flow of 582 m<sup>3</sup>/sec. This caused serious erosion of the river bed and dramatically changed the initial river course in the vicinity of the bridge. After the flood, the river flowed very close to one of the abutments of the railway bridge, eroding its foundation.

The authorities decided to undertake protection measures, and the technical solution finally adopted was to construct a bank protection, parallel to the river course for a distance of about 100 metres upstream and downstream of the affected abutment. The company selected to execute the protection works was HF Wiebe Romania, a major railway contractor.

As in other cases, there was no stone available close to the site to build the protection, so the designers adopted the use of the well known Secutex® "C" and "E" sandcontainers from NAUE, filled with soil material available on site.

Over 900 sandbags type "C" and 300 type "E" were used. A ditch was excavated along the river bed,

upstream and downstream of the bridge abutment, then the sandbags were laid down one by one, using an excavator and lifting straps. The sandbags were filled up using a metal funnel built on site and an excavator. The sewing was done by 2 operators, using a portable sewing machine.

Once positioned in the ditch, the sandbags were hammered with the back of the excavator bucket, in such a way that the filling material inside was evenly spread in the container. Due to the exceptional strength and robustness of the Secutex® sandcontainers, the hammering did not cause any damage and allowed them to be well positioned. On top of the first layer of sandbags a second layer was placed until the required height of the protection was achieved.

The total construction time was about 4 weeks, including the filling and the sewing of the sandbags. ■

## Project Scout Moor Windfarm

[Chris Quirk]

Increasing environmental awareness over recent years has resulted in the development of renewa-

to reach these areas the first task is to build a stable access road.

The West Pennines of Lancashire are an ideal location for such a windfarm. Scout Moor to the North of Manchester was selected to build a windfarm for generating electricity. The only issue was that the moor was covered in a layer of peat with a CBR varying from 0.5% to 2%. To further compound the situation the whole area has been subjected to extensive coal mining during the 19th and early 20th Century, which meant that there was a potential of crownholes.

The consultant approached BBG, a German geosynthetic consultant, and NAUE to carry out a value engineering review of the initial design. Because of the wide range of strengths available in the Secugrid® geogrid in both polypropylene and polyester a whole series of detailed designs were produced to increase the CBR values to those required and the bridging of any potential mine voids. This meant that a variety of Secugrid® products were used from Secugrid® 40/40 Q1 to Secugrid® 400/40 R6. Over 200,000 m<sup>2</sup> of Secugrid® has been used.

Typical cross-section of the Scout Moor Project



ble energy resources. As a result, wind energy has gained huge popularity. New windfarms have been built worldwide and many more are being planned to generate electricity from wind sources.

As these wind mills should not disturb the environment or people living near by, windmills are being built in areas with low populations which can have a low ground bearing capacity. In order

By reinforcing the crushed gravel base course under the roadways an efficient load distribution of the stresses transferred from any traffic occurred, ensuring that the weak shear strength of the subsoil was exceeded by the base course material. An additional benefit of this Secugrid® reinforced solution was the reduction of the overall base course thickness, allowing a cost saving solution. ■



## National projects

### Successful deployment of Secugrid® geogrids in alternate railroad crossing solution at Hallstadt, Michelinstraße [Andy Post]

An existing railroad crossing in Hallstadt section PA 23 of railroad track 5100, from Bamberg to Hof (Saale), is to remain open for rail traffic and had to be replaced by an underpass for the street.

Michelin Street, which is to pass under the railroad tracks, had to be lowered in a construction project which would also widen the street over a length of 400 m. An alternate solution was necessary to overcome the difference in height, approximately 5 m, to the east of the tracks.

To this end, the construction of a traffic circle was projected for 3 588 km (Michelin Street) that was to be erected with an embankment.



Secugrid® geogrid installation in the embankment slope

Because of unfavourable subsoil conditions, the traffic round-about embankment was built on a deep foundation of mortared, vibrocompacted columns in combination with horizontal reinforcement atop the vertical support members. In addition to this it was necessary to tie down the embankment's sides, having slopes of 45° (inside) to 60° (outside), with a geogrid reinforcement. About 10,000 m<sup>2</sup> of Secugrid® 200/40 R6 were used as the horizontal reinforcement over the compacted columns. The geosynthetic slope reinforcement was accomplished with about 10,000 m<sup>2</sup> of Secugrid 40/40 Q6 and Secugrid® 60/60 Q6. Secumat® ES 601 G4, a three dimensional erosion protection matting manufactured from UV-stabilised polymer random-fibres, was placed on the outer layer.

The contractor Schulz, NL Strullendorf, was subcontracted to perform the installation as well as all earthworks for the main contractor, Glass Ingenieurbau, Leipzig.

The design for the embankment foundation was carried out by the German geosynthetic consultant Bauberatung Geokunststoffe GmbH & Co. KG (BBG). The design of the stone column's, was carried out by the German company Bauer, Schrobenhausen.

The combination of detailed designs, appropriate product selection and professional installation resulted in a project built during the summer and fall of 2006 and completed to the satisfaction of the customer, DB Projektbau GmbH, Projektzentrum Nürnberg [German Railroad Ltd, from the Nuremberg project center]. ■

### Track refurbishing, section Seelze – Wunstorf [Marc Iken]

DB Netz AG [German rail network inc.], Hanover, Germany, carried out a program of track refurbishing in an area west of Hanover, Germany, between the communities of Seelze and Wunstorf during the period of August to November of 2006.

The old track in this area did not fulfil the higher requirements demanded by modern railroad traffic. The old track still rested on wooden ties and the track bed itself also had to be renewed. Soil testing done by Grundbauinstituts IGH, Hanover, Germany, revealed that broad areas along the right-of-way could not be expected to afford adequate load-bearing capacity (cohesive subsoil and very heterogeneous). The necessary consequence was to reinforce the subgrade's protective layer (SPL). Due to limited space conditions along the track, reinforcing measures in excess of 35 cm would have made reconstruction necessary in some long sections. Such reconstruction would have made the project so expensive that improvements would have been postponed for the foreseeable future. The use of one layer of Secugrid® geogrid 60/60 Q6 made it possible to limit the SPL



Secugrid® geogrid laid beneath wooden ties and SPL

to a maximum of 35 cm while improving load bearing capacity, thus making the overall project feasible. The contract was awarded to the company Schwebbau, headquartered in Stadthagen, Germany. The work was done on a track-bound basis, i.e. the removal and placement of bulk materials, ties and rails was performed entirely from the existing old track with the appropriate track-processing equipment. First the old track was lifted by a cleaning machine to remove the track's crushed stone bed and existing SPL. This exposed a subgrade on which the Secugrid® 60/60 Q6 geogrid was laid then the old track was put down on the geogrid. In the next step a sand spreader/compactor lifted the old track again and put down a new 35 cm thick SPL. This was followed by applying the track's crushed stone layer according to specification. The last step was to remove the old track and replace it with new rails on new ties. This was done with by a rapid replacement train. Construction monitoring confirmed the improved load-bearing effect provided by the Secugrid® geogrid. Whereas the



installation of an SPL without reinforcement could have been expected to improve CBR values by about a factor of 3, the use of Secugrid® produced an improvement in the range of factor 6 to 7. ■

## Innovative facing system for Secugrid® reinforced retaining walls



Concrete modular concrete block "International OMEGA"

Concrete modular blocks of the type "International Omega" can now be used to supplement Secugrid® reinforced systems (crib walls using gabion baskets, steel lattices, natural stone etc.) for reinforced retaining walls. The combination of geogrids and concrete modular blocks to provide a final facing is achieved through friction and interlocking the cavities of

the modular concrete blocks which are filled with coarse gravel. The strength of the bond between the blocks and the geogrid required to verify the inner stability of the construction was proven among others by the TRI/Environmental test institute in Texas, USA. The licensor of the brick system "International Omega" is Shaw technologies from Texas, USA.

BBG, the German geosynthetic consultant, has already calculated the "Secugrid®/International

OMEGA" system for several projects and NAUE has already put the system into practice in a few projects. The picture below shows one of the projects carried out in Ireland which consisted of constructing an approximately 3m-high retaining wall to stabilise a gap on a private plot of land. ■



Secugrid® reinforced retaining wall using the "International Omega" facing system, Ireland

## Have you heard?

### Recommendations for tunnel sealing systems (EAG-EDT)

These recommendations published by the EAG-EDT refer to sealing systems using geomembranes such as Carbofol® and associated protection layers drilled in or cut and cover tunnels.

The design of the sealing system depends on varying degrees of stress (water pressure, chemically-induced concrete corrosion) so that a variety of sealing systems can be taken into consideration (umbrella or pressure-resistant sealing systems). In addition to providing detailed information on geosynthetic components, the EAG-EDT describes the inter-action between all of the construction elements, consistent product quality assurance and the execution of construction work.

The recommendations appeared in German at the end of 2005 and aroused such international interest that the publishers DGGT (German Geotechnical Society for Geosynthetics) have decided to issue an English version (probably in the middle of 2007). ■

### The use of geosynthetics to increase strength of dykes in the event of submergence

In 2006 at the Institute for Civil Engineering Hydraulics and Watershed Management, Technical University of Munich, tests were carried out on models to increase the strength of dykes in the event of submergence by using geosynthetics. The aim of the model tests was to develop a simple and cost-effective engineering solution to prevent erosion on the down-stream slopes of dykes during non-scheduled submergence.

The strength of a dyke at water levels which exceed design flood levels can be increased by safety measures integrated with the dyke reinforcement. Various systems were investigated in the tests including needle-punched filtration nonwovens, scour protection mats and combinations of nonwovens with geogrids which were installed on the down-stream slope. Further tests will follow in 2007.

Systems comprising wrap-around and a combination of nonwoven and geosynthetics arranged parallel to the slope plus anchorage proved to remain stable even when subjected to high-level stress under submergence.

Up-to-date information per email is available under [info@naue.com](mailto:info@naue.com). Please enter "Submergence safety with NAUE geosynthetics" as a reference. ■

## Imprint

10<sup>th</sup> year, Issue 30  
(14<sup>th</sup> English translation)

### Publisher:

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Phone +49 5743 41-0  
Fax +49 5743 41-240  
E-Mail [info@naue.com](mailto:info@naue.com)  
Internet [www.naue.com](http://www.naue.com)

**Editor:** Management  
**Implementation:**  
Department for Marketing

**Circulation:** 1,000

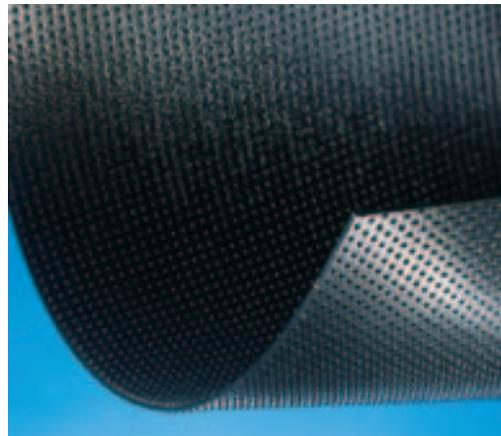
**Design/Production:** TwoTypes<sup>2</sup>.  
Bahnhofstr. 14 · D-32312 Luebbecke

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## Products

### BAM certification for Carbofol® MegaFriction

Completed! Our Carbofol® PEHD 507 MegaFriction product has successfully passed BAM certification testing for structured liners without any problems!



Certification number 08/BAM IV.3/01/07 has been issued for our Carbofol® PEHD 507 MegaFriction/MegaFriction product. Mid-March brought a successful conclusion to the very extensive certification process at BAM (Bundesanstalt für Materialforschung und -prüfung [federal institute for materials research and testing]) for this liner with embossed structures on both sides.

The MegaFriction surface structure was very specifically developed for the construction of steep embankment angles. Many Effective Geomembrane Anchors, 31 500 per square metre, ensure an extremely high interface friction angle on both sides. An exemplary friction angle of about 33° exists between the MegaFriction structure and a Secutex® nonwoven. However, the specific friction angle must be subjected to a proof in each individual case, depending on design conditions. The MegaFriction product is given omni-directional shear-force resistance by a

special manufacturing process with specially chromed, "embossed" drum rollers.

BAM certification is the only certifying procedure that certifies proof of the long-term resistance of the geomembrane structure. Because of this it represents the current epitome for proof of quality demands on structured liners.

BAM certification documents show that the MegaFriction product's structure also successfully passed the long-term experiments without difficulty. The formation of its surface structure was especially developed to minimise material weakening. BAM certification is designed to test products for projected service life periods in excess of 100 years. Therefore MegaFriction achieves an expected high level of safety and is our top product for sealing applications. ■

## Did you know...?

... that we have recently published two article reprints from the magazine Geosynthetics (issue February/March 2007)? The first is from Ronald K. Frobel "Using structured geomembranes in final solid-waste landfill closure designs" and shows the excellent values of embossed geomembranes, such as Carbofol® MegaFriction. The second publication is from Barry Christopher "Junction-strength requirements for roadway design, construction" and discusses the junction test, stating that in design a junction value is of more importance than an efficiency value. Please contact us if you wish to receive your personal hard copy. E-Mail: [info@naue.com](mailto:info@naue.com)

## Schedule of shows and conferences

### May

22 - 23/05/2007 *River dykes – their assessment, sealing systems and maintenance* Fulda, Germany

29/05 - 01/06/2007 *Waste Tech* Moscow, Russia

### June

04 - 05/06/2007 *8th Geotechnical Conference* Bratislava, Slovenia

07 - 08/06/2007 *GeoSint 2007, International Symposium* Bucharest, Romania

11 - 15/06/2007 *7th International Scientific Conference SGEM 2007* Albena, Bulgaria

18 - 20/06/2007 *Rail-Tech Russia* Moscow, Russia

19 - 20/06/2007 *2nd Portuguese Seminar on Geosynthetics* Lisbon, Portugal

25 - 28/06/2007 *Africa Rail* Johannesburg, South Africa

### July

03 - 05/07/2007 *Flood & Coastal Erosion Risk Management Conference, Defra* York, United Kingdom



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