Investigation and Assessment of Synthetic Sports Surfaces in Switzerland Including Athletic and Soccer Facilities

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Switzerland had developed a concept for synthetic Surfaces (athletic) in respect to environment similar to Germany. Partly, the two committees had common meetings. The result was published in the mid 90ies as a recommendation “Kunststoffbeläge und Umwelt (Synthetic Surfaces and Environment) by BASPO, the Swiss Federal Authority of Sports at Magglingen. The Swiss document (BASPO 105) was more complicated than the German document (first RAL later DIN 18035-6). The use of this document was not obligatory, but more incidental acc. to the deliberation of the various States of Switzerland.

Unfortunately, the document was applied to Artificial Turf also although its scope was limited to synthetic athletic surfaces. The application was done without modification and considerations. When it was realized that there was a discrepancy or inadequate use of the document, BASPO decided to completely reconsider the issue. A new committee was founded including experts from various Swiss authorities, companies and lab experts. As discussions and activities are still going on I can only report the design of the programme and first results. I am authorized to do this but cannot publish any data available today.

The common view of the committee is that the real effect of sports surfaces on site to the environment cannot be determined by using lab tests as used by the former concept or the DIN. They are regarded totally non suitable for assessment of artificial turf. In order to receive real data, a practical study programme has been prepared and started. The aim is to get data of what is really released from sports surfaces to water running off the surfaces and probably contaminating rivers or the underground. The test program was started last year and will be continued until spring time of next year.

For this, a variety of typical sports surfaces have been installed in so called Lysimeters (see appended pictures). These are well known in horti- and agriculture to

investigate the exchange of nutrients of plants. These are reinforced Polyester tubes. They are about 1m wide and 1.5m high. They are equipped with an automatic water sampling system. Thus, the total amount of rain water seeping through or running off the sports surface can be collected and analyzed.

In Bern, 10 such Lysimeters are equipped with the following set of surfaces:

List of surfaces

1. Artificial Turf with EPDM infill and Quartz sand on a permeable asphalt base and elastic layer 25mm
2. Artificial Turf with SBR rubber and Quartz sand infill on mineral sub base
3. Artificial Turf with EPDM infill and Quartz sand on mineral subbase and elastic layer
4. Artificial Turf without infill on mineral sub base
5. Permeable Synthetic Surface EPDM 12mm on an asphalt base + elastic layer
6. Permeable Synthetic Surface EPDM + SBR (6mm + 9mm) with Spray Coat 1.5kg/m2
7. Sandwich Surface PUR coating + SBR (5mm + 10mm)
8. Mineral Supporting Layer = 0-sample no. 1
9. Bituminous Supporting Layer on mineral subbase = 0-sample no. 2
10. Elastic Layer of recycled SBR granules 25mm on mineral subbase

All containers were filled with an unbound (mineral) supporting layer as commonly used in Switzerland. Only the upper 65cm are used. Beneath an impermeable layer (concrete) is installed so that the water can flow into the collection containers. The design of the surfaces is rather similar to real surfaces. The analysis of the collected water is performed after 300mm precipitation.

Searched Substances

- Rubber chemicals: various aromatic Amines and Benzothiazoles
- Polycyclic aromatic hydrocarbons (16 PAH)
- Sum of organic nitrogen compounds (total N-org)
- Sum of dissolved organic substances (DOC)
- Zinc

Progress of Investigation

Due to adverse weather conditions the main test series could not be started until May 2006 . Thus, test data are available for the time from May to September.

The Lysimeter device was checked in December 2005 already with the installation of an artificial turf filled with EPDM granules and Quartz sand on top of a permeable asphalt sub base and an elastic layer.

It is intended to observe the substances released to the run-off water for a minimum of 1 year. Special interest is drawn on the decrease of their concentrations over time.

Zinc

With all surface types, including the 0-sample no. 1 consisting of the mineral supporting layer, Zinc was found in concentrations of 0.009 to 0.003 mg/l. In rain water which was also investigated a concentration of 0.02 mg/l was found. We will see how the Zinc concentration will change in the course of time.

Polycyclic Aromatic Hydrocarbons (PAH)

In all samples, also in the 0-sample no. 1 which consists of the unbound supporting layer only, the various PAHs were determined in the range of analytic determination limit which is 0.02 µg/l, whereas the sum of all 16 PAHs is about 0.1 to 0.3 µg/l. None of the surface systems including the surfaces with recycled granules showed any noticeable PAH concentration. PAHs are ubiquitous substances in the environment and in water. They are present in any street sewage and also in purified sewage from communal sewage purification plants as well as sewage sludge in partly much higher concentrations.

DOC

Reliable conclusions about DOC concentrations are not possible yet. Especially not because the 0 sample (i.e. unbound supporting layer without a sports surface) had a

DOC concentration of 6 mg/l. Due to the results of the pre-test it is expected that the DOC concentration will decrease in the course of time.

Various Substances

In surface systems with EPDM and recycled rubber infill several aromatic Amino complexes and Benzothiazoles were determined in the range of 10 – 300 µg/l. According to the results of the pre-test it is expected that similar concentrations will be found in all street sewage waters as a consequence of abrasion of car tires. These complexes and substances are also ubiquitous in the aquatic environment.

Already today, BASPO has notified the communities and states of Switzerland that the BASPO document 105 is not relevant any longer and should especially not be applied to artificial turf.

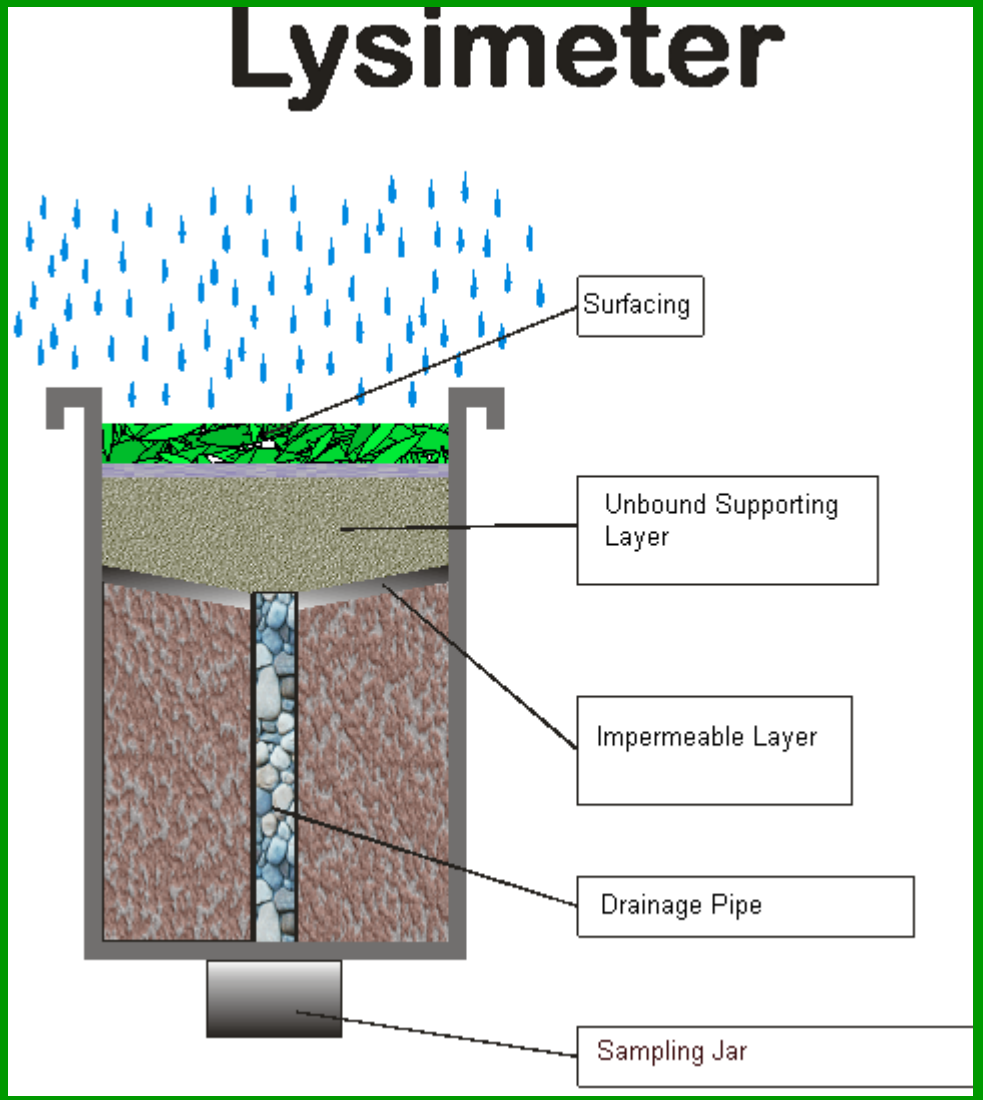
Swiss Federal Authority of Health July 6, 2006

This authority was challenged to provide a statement regarding health risk caused by PAH in artificial turf. The issue refers to recycled rubber granules i.e. SBR granules from car tires. It is considered the question of abraded particles being inhaled as dust and being washed out and ending up in waters and in the subsoil. PAHs can be substances added to softeners of tires, but are also generated by burning processes, from traffic exhaust fumes and heating systems; they also come from tobacco smoking and chimneys.

Assessment and Recommendation for Switzerland

Although a final assessment of the health risks is not possible acc. to the data available today, the estimatable PAH stress is low even in worst case scenarios compared with stress from other sources. The health risk for players and spectators is classified low. Thus, from the health point of view no urgent need of action is seen.

Lysimeter



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