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infoMil

NRB 2001

A5 Facilities

This chapter describes in outline the possible soil protection facilities and the criteria for safeguarding the soil protection they provide.

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5.1 Source-based and installation-specific facilities

5.1.1 Source-based facilities

Source-based soil protection facilities are facilities which help to keep substances in their casing (see also part A2.1.2a1). Examples of this are: impermeable processing plants with improved seals, flangeless joints, double-walled systems with leak detection, etc. Source-based facilities are installation-specific and are integral parts of an installation; the soil protection effect is seen in a reduction of the emission score (see part A3.3).

The soil protection effect of source-based facilities is safeguarded using specific maintenance programmes.

5.1.2 Supplementary facilities

a Leak detection

Leak detection systems are, as continuous monitoring systems, a good alternative for visual inspection when it comes to detecting failures of processing or storage equipment. Automatic monitoring systems may not be dissociated from the organisational measures for intervention immediately after a failure has been observed.

The aim of leak detection is to detect specific leaks etc. before they penetrate into the soil. These systems are therefore different from monitoring systems for risk limitation which detect penetration and dispersion in the soil.

Leak detection is particularly useful in situations in which visual inspection is impossible. Examples are underground tanks and pipes or the area under large storage tanks above an impermeable seal. The extra barrier is necessary in order to detect a failure before substances penetrate into the soil.

b Corrosion protection

Pro memoria

5.1.3 Installation-specific facilities

a Storage and transshipment

a.1 Overfill device; venting points

Pro memoria

a.2 Filling installations

Cf. open processing plants

a.3 Rinsing and washing areas

Cf. open processing plants

b Mountings; sampling points

Pro memoria

c Large-scale above-ground tank storage

For soil protection in tank parks, a different approach is required than for tanks in or near installations on an industrial site. That is why a specific guideline has been developed for large above-ground atmospheric storage tanks1. This guideline should be seen as a specific elaboration of the regulations for the 'above-ground tank, vertical with membrane' which has been included as activity 1.2 in the soil risk checklist. The Bobo guideline has been included in part B3 of the NRB and it concentrates on measures which deal with the tank bottom.

c.1 Scope of Bobo guideline

The Above-Ground Atmospheric Storage Tank (Soil Protection) Guideline (Bobo for short) has been included in part B3 and is intended for cylindrical, vertical tanks with a flat bottom and a diameter in excess of 8 metres, made from carbon steel and intended for the storage of mineral oil and oil products or chemicals with a coagulation point below 12°C. Storage tanks for the atmospheric storage of liquid gases ('cold storage') are not included in the scope of the Bobo guideline.

The Bobo guideline may, subject to certain conditions, serve as an alternative to subactivity 1.2 of the soil risk checklist (see part A3.3.1) for tanks with a diameter of less than 8 metres.

c.2 Content of the Bobo guideline

The Bobo guideline contains instructions for the construction and renovation of tanks, as well as an overview of functional requirements for facilities and measures.

The guideline is confined to measures for the tank bottom; facilities and measures for mountings etc., or which result from other requirements are not dealt with in the guideline. The Bobo guideline elaborates on the following areas:

- The scope of the guideline.
- The basic requirements for the design, construction and use of tanks and tank bottoms.

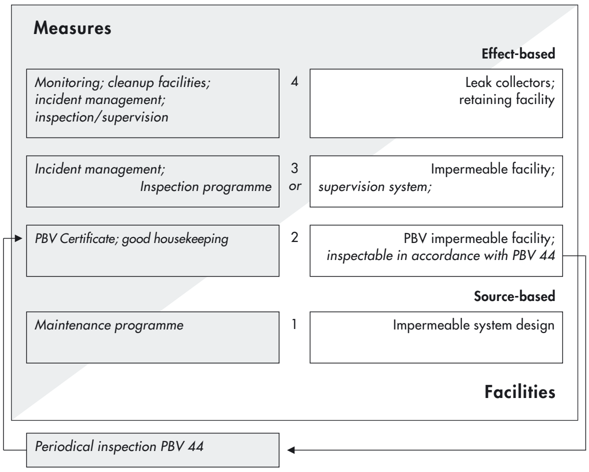
For the design and construction, and the inspection and maintenance of tank bottoms, the guideline refers to the accepted standards, guidelines (particularly CPR guidelines) and recommendations in this branch of industry.

- An assessment method for existing tanks.
  The assessment method for large atmospheric storage tanks is somewhat different from the one in the soil risk checklist. The assessment method has – instead of an emission score – a 'soil immission score' in which the condition of the tank bottom and the bund/foundation play an important role. This method fits in with the specific functional requirements for the tanks in question.
  The soil immission score then yields the soil risk category for the relevant tank.
  The method for large above-ground storage tanks includes a soil risk category B*: an increased risk where it is not possible to reduce the risk to a negligible level (A*) by means of monitoring to reduce the risk.
  With soil risk category B, this is – as with other industrial activities – possible. Monitoring to reduce the risk has to be conducted in accordance with the monitoring guideline.
- Basic principles for the construction and renovation of tanks
  New tanks to be built and tanks duefor renovation have to meet the accepted standards, guidelines and recommendations, and specific facilities should fulfil the requirements stated for this purpose in the guideline (see below). An important principle for new and renovated tanks is that an additional seal has to be introduced under the tank bottom with leak detection between the tank bottom and that seal.
- Specific functional requirements for facilities and measures
  A range of soil protection facilities are possible for large storage tanks.
  The various possibilities are discussed at length.
  An additional protection layer in the form of a double tank bottom or an impermeable seal between the bottom of the bund/foundation and the underlying surfaces is considered to be state of the art. Leak detection can be introduced between the tank and the extra protection layer.
  In addition, it is considered to be important to provide effective protection against corrosion in the form of outer coatings and/or drip flaps, slabs etc. which prevent rainwater from penetrating into the bund/foundation and measures to prevent the entry of groundwater.
  Because of the diversity of the available systems and performance sensitivity, it is still not possible to assess the effect of cathodic protection in terms of the reduction in the soil risk.

d **Pipes**
Pro memoria

5.2 Effect-based facilities

Effect-based facilities prevent the penetration of spilt or leaked substances into the soil (see also part A2.1.2a2).
Each facility (hardware) requires its own specific control measures (software). Less effective facilities require more intensive control measures and vice-versa.



The soil protection effect of a facility is mainly determined by its impermeability to the relevant substances during the time the facility is in used. By 'impermeable', we mean that the substance in question does not penetrate through the facility into the soil in the required conditions.

Many sealants are, to a certain extent, permeable; this means that liquids penetrate into the material. As long as a liquid does not penetrate through to the opposite side of the material, the material can be considered to be 'impermeable'.
However, the entire facility determines the extent to which it is impermeable. Construction details are the weak links in many impermeable facilities. Construction details are points at which a seal ends or is interrupted and an impermeable connection is therefore required.

The NRB makes a distinction between three categories of effect-based facilities:

1 Impermeable facilities with a PBV certificate;
  An impermeable facility with a PBV certificate is an indication of the best possible seal given the current state of the art. If soil protection facilities are necessary in new structures, sound facilities that can be visually inspected are preferable. A PBV Impermeable Facility Certificate can then be issued.
2 Impermeable facilities;
3 Retaining facilities and drip pans.

The control measures required to safeguard the soil protection effect vary depending on the category. In the sections below, the various categories will be discussed in brief.

5.2.1 Impermeable facility with PBV certificate

An impermeable facility with PBV certificate is a visually-inspectable (above-ground) impermeable facility, designed and built in accordance with the relevant PBV Recommendations. A facility of this kind should have a valid, PBV impermeable facility certificate issued by a Qualified Inspector.
An impermeable facility with PBV certificate is an indication of the best possible seal given the current state of the art.
If effect-based soil protection facilities are necessary in new structures, sound and visually-inspectable facilities are preferable.
As a result of the specific design of the facility and the periodical checks by an independent Qualified Inspector, control measures consisting of visual inspection by the company itself and good housekeeping often render a negligible soil risk with this kind of effect-based equipment.

a PBV certificate

A valid PBV impermeable facility certificate is the only appraisal arrangement which can be used to decide whether an impermeable facility is actually impermeable. A certificate of this kind is valid until the end of the approval period stated in the certificate. A Qualified Inspector sets this approval period on the basis of criteria such as:

- the length of time during which the floor or pavement has already been in use;
- the current and intended use;
- the liquid penetration found at the time of the inspection;
- the condition of the floor at the time of the inspection.

Before the end of the approval period, the floor must be inspected again. CUR/PBV Recommendation 44 [67] includes requirements and rules for deciding whether a floor or pavement can be considered to be impermeable. This recommendation describes the procedure for an inspection, with clear performance requirements, measurement methods and approval criteria.

During the course of 2001, a system will come into operation in which the Organisation of Independent Qualified Inspectors and advisors for Impermeable Facilities (ODI/VDV) will issue certificates.
Until this system is operational, certificates can be issued by experts who have the qualifications set out in the KIWA/PBV Report 9801. This expert should be independent of the company where the impermeable facility is located, the company that carries out any cleanup activities and the government authority involved which is the competent authority pursuant to the legislation.
October 2000 saw the introduction of Assessment Guideline 1151: the 'National Assessment Guideline for the KOMO process certificate for the Inspection of Soil Protection Facilities. For additional information, you can get in touch with ODI/VDV, telephone +31 (0)341 42 21 74.

b Certification

A KOMO process certificate can be issued for a containment facility. An assessment guideline (BRL) is the basis for certification. The assessment guideline describes the requirements imposed by the quality system on the bearer of the certificate and the requirements which the certificated product or process must meet. An assessment guideline is not drawn up with the objective of ensuring that products or processes have to meet the requirements of the assessment guideline when an environment permit is issued. If the sole requirement is that a product or process must meet the relevant assessment guideline, there will be no checks by the certification body. In that case, the organisation itself must carry out the required checks, including the checks of the quality system and the product requirements.
It is therefore better to advise the use of certified products or services. In that case here also, the necessary checks are conducted by the certification body. Usually, the technical requirements of an assessment guideline are based on a standard or a recommendation. In practice, it is therefore enough to grant a permit on condition that the product or process meets the relevant standard or PBV Recommendation.

Irrespective of the certification of products and/or the construction process, a PBV impermeable facility certificate remains compulsory for this type of impermeable facility. However, there are a number of advantages to installing impermeable facilities with a PBV certificate. The final result is better ensured and it is improbable that supplementary construction work will be required in order to obtain the PBV impermeable facility certificate. In addition, discounts are sometimes also given on insurance premiums when there is process certification.
If a facility is installed in accordance with a relevant KOMO process certificate, it is easier for a Qualified Inspector to assess the quality of the facility than when this is not the case. The Qualified Inspector can then issue a PBV impermeable facility certificate on the basis of the simpler 'desk-top check'.

5.2.2 Sewers

Existing concrete sewers are often not completely impermeable. Because an emission score of less than 2 is not possible for underground pipes – even in combination with an effective inspection programme and company emergency plan – reducing the risk level to an acceptable level (category A*) – on the basis of the NRB system – would involve far-reaching monitoring of the soil quality to reduce the risk in the vicinity of the company sewage system. The monitoring system required here is not considered to be reasonable for sewers at the present time.

Given the correct choice of material and structure in accordance with CUR/PBV Recommendation 51 [52], an underground sewage system can be adequately impermeable when installed and the soil risk can be kept to a negligible level.
Leaks in sewers are not usually noticed immediately so that the soil may become contaminated. A good design, regular sewer inspection and good management/maintenance are therefore essential. The Soil Protection Facilities Programme includes the CUR/PBV Report 2001-3 'Management and maintenance of company sewage systems' [64]. On the basis of this report and CUR/PBV Recommendation 51, CUR/PBV Recommendation 44 [67] will be extended so that a

valid PBV impermeable facility certificate can also be issued for underground sewers.

5.2.3 Impermeable containment facility

In addition to impermeable facilities with a PBV certificate, there are other containment facilities which – in combination with specific measures – can be considered to be impermeable. Examples are:

- containment facilities which, given the selected material and design at the time of construction, are impermeable but which, given the actual location and/or design of the process equipment, cannot be inspected in accordance with PBV Recommendation 44 [67];
  - In order for the structure to be considered permanently impermeable, an alternative for the periodical inspection for the purposes of the PBV impermeable facility certificate is necessary. One possible example is an automatic monitoring system (leak detection) or a periodical internal inspection of the process equipment in question.
- cabinets or safes for the storage of dangerous substances, designed in accordance with the prevailing construction requirements (see, for example, CPR 15-1 [21]);
  - The CPR 15 guidelines [21, 22, 23] include descriptions of the substances which should be stored in this type of cabinet or safe and of the construction requirements.
- underground plastic-sheet sealing, on condition that it is completely impermeable and includes leak detection in the sealing.
  - Seals must, where possible, meet the requirements of the KOMO process certificate. With underground systems, an automated monitoring system is required since visual inspection is not possible.

Impermeable facilities of this kind require – where appropriate – an impermeable drainage system. As with the CPR guidelines, the container capacity must be at least 100%.

5.2.4 Retaining facility; drip pan

If a retaining facility or drip pan is to qualify as a soil protection facility, the presence of an effective maintenance and/or inspection programme or automatic monitoring system is required, together with effective clearing up facilities and trained staff.

a Retaining facility

Non-impermeable facilities also form a physical barrier between the activity and the soil, but they only protect the soil if leaks, spills etc. are cleared up immediately after they are noticed, in other words before the substances penetrate into the soil. No inspection or design criteria have been developed for retaining facilities under the PBV.

Examples of retaining facilities are:

- soil protection equipment described specifically in general administrative orders where there is no obligation to obtain a PBV impermeable facility certificate;
  - Soil protection is safeguarded using explicit and specific rules for conduct and inspection.
- outside pavement (e.g. 'concrete slabs' or continuous pavement);
- inside floors consisting of tiles or concrete slabs with seams which have not been completely finished;
- tank pits (in the case of large-scale tank storage) in which the bottom consists of an impermeable clay layer which can be covered with a top layer of sand and possibly gravel or grass (see CPR 9.2/9.3 [19, 20]).

A retaining facility should be designed in such a way that the collected substance does not escape before cleaning work has been completed. Needless to say, substance properties such as viscosity and solubility are important here. In addition, the retaining capacity depends on the presence and size of the seams. Substances can penetrate into the soil through seams, especially when clearing up activities do not start immediately. As a result, the level of soil protection afforded by retaining facilities of this kind is limited when there are leaks and spills of liquids.

b Drip pan

Impermeable facilities with a limited (< 100%) container capacity also come under this category. They include, for example: drip pans under drain points.
Drip pans must be impermeable but PBV impermeable facility certificates are not issued for, among other things, steel or plastic drip pans. The company itself can easily check and keep this type of facility clean.