



Position paper
by the German Scientific-Technical Association
for Environmental Remediation and Brownfield
Redevelopment (ITVA)
on the closure-related obligations
of Article 22 of Directive 2010/75/EU
on industrial emissions (IED)

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Chapter 0. Positions of the ITVA in relation to the implementation of Article 22 of the Industrial Emissions Directive

- In connection with the transposition of the IED into national law, the scope of the Directive should be restricted to the regular-sized industrial installations referred to in Annex I to the IED; the concept of the installation also includes secondary facilities which serve the purpose of the installation.
- Only contamination of the soil and groundwater on the site of the installation is covered; the return to the baseline state on the site of the installation is also restricted accordingly; beyond the installation site, the general legal provisions on soil and water protection apply .
- The production of a baseline report is mandatory only with regard to relevant hazardous substances and only if there is a possibility of soil or groundwater contamination; only those hazardous substances, the quantity, hazardousness and impact pathway of which are liable to produce considerable soil or groundwater contamination ,are relevant.
- Reporting is mandatory before commissioning a new installation or issuing a permit for changes; the permit for changes must be reported only if the changes mean that other or additional relevant hazardous substances are used.
- The inclusion of information about the past use of the site in the baseline report is linked to its availability; the concept of availability should be defined in greater detail in conjunction with the transposition into German law; it appears reasonable to focus on information that is available from the operator of the installation or from the competent authorities. Information which may be available from previous owners of the land, operators of the installation or users is regarded as not being available and must not be researched by the operator of the installation.
- The obligation to evaluate the status of soil and groundwater contamination upon definitive cessation of activities rests with the last operator of the installation; an activity is definitively ceased if the installation as a whole (not only parts thereof) has not been used for an extended period; this period is set at three years in Federal German law.
- The purpose of the evaluation is to determine whether significant soil and groundwater contamination have been caused by the installation in comparison with the baseline state. The concept of significance should be established by law, by statutory instrument or by a norm concretising general administrative regulation. A more precise definition of significance can be given, in the view of the ITVA, on the basis of the following case types:

- If levels are lower than the precautionary or background values, no significant soil or groundwater contamination will be present as a rule.
- If hazard-related test values are exceeded, significant contamination must be assumed to be present as a rule, if the levels found in the baseline state did not already lie in the vicinity of or above the test values.
- If contamination above the precautionary or background levels, but below the test values, is found to be present in conjunction with cessation of the operation, the additional loading will not be significant as a rule if it exceeds the levels found in the baseline report by not more than half; above this threshold, the significance must be determined in each specific case.
- The extent to which the site of the installation itself may have been changed by possible changes in the environment or by construction work on the site of the installation must be determined as part of the evaluation; the same applies to the nature of the groundwater.
- The obligation to restore the baseline state in the event that significant soil or groundwater contamination is identified is limited to proportionate measures by the need to take account of the technical feasibility of the restoration; this also allows economic considerations to be factored in.
- When performing soil and groundwater measurements, care must be taken to ensure that any protective measures already in place, such as sealing, etc., are not destroyed; measurements taken outside the site of the installation or, for example, inclined drillings underneath sealed surfaces can be considered as substitute measurements.
- There are essentially two sampling and inspection strategies suitable for establishing the baseline report, which can also be combined with one another if necessary:
 - Deliberately untargeted sampling in a regular grid pattern, in the case of statistically adequate data density, produces representative information about the average substance concentrations and about their range.
 - Targeted sampling in suspected pollutant concentrations, depending on the degree of specificity of the suspicion, gives an above-average probability of finding small-scale local contamination.

- It is possible in principle to identify most substances by laboratory analysis. However, no standardised or standard determination procedures have as yet become available for the majority of hazardous substances.
- When the installation is finally closed down, the analysis methods used for the soil and groundwater analyses must be adequately described and validated if possible. This is the only way, in the context of the installation's closure, to allow for a proper comparison to be made between the measured values determined with different methods under certain circumstances.
- In the event of a change in the standardised methods of laboratory analysis and also in the event that no validated or standardised determination procedures are as yet in place, the quantitative measurement results are not directly comparable with one another, but only in the context of specialist testing and evaluation.

Chapter 1. Introduction

Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) – hereinafter referred to as the IED (Industrial Emissions Directive) – entered into force on 6 January 2011. It must be transposed into national law by 7 January 2013 (Article 80(1) IED).

The IED replaces the previous IVU Directive. It not only satisfies the need for extensive amendments to the immissions control legislation – this affects in particular the regulatory area of §5(3) of the Federal Immission Control Act (*Bundes-Immissionsschutzgesetz, BImSchG* – but it also involves changes to the water legislation and to the Closed Substance Cycle and Waste Management Act (*Kreislaufwirtschaftsgesetz*). Meanwhile, first working drafts have been prepared by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (*Bundesumweltministerium*) for statutory regulations that are in need of amendment, and in particular for the Federal Immission Control Act.

Article 22 of the IED requires the operators of certain industrial installations before commissioning or before "*reconsideration of the permit*" – for the first time after 7 January 2013 – to produce a baseline report having regard to possible contamination of the soil and groundwater on the site of the installation. If the installation has been definitively closed, the operator of the installation must evaluate the status of any soil and groundwater contamination by certain substances ("relevant hazardous substances").

The aim of the new IED Directive 2010/75/EU is the integrated prevention and control of environmental pollution from industrial installations. In particular, as stated in recital No 23, "*it is necessary to ensure that the operation of an installation does not lead to a deterioration of the quality of soil and groundwater.*"

With regard to the substratum situation, it is stipulated in recital No 24 that "*the operation of an installation does not deteriorate the quality of soil and groundwater.*" In order to ensure this, "*it is necessary to establish, through a baseline report, the state of soil and groundwater contamination.*"

"*The baseline report should be a practical tool that permits, as far as possible, a quantified comparison between the state of the site described in that report and the state of the site upon*

definitive cessation of activities, in order to ascertain whether a significant increase in pollution of soil or groundwater has taken place."

Irrespective of the provisions of the IED, existing obligations to undertake inspection and, if necessary, remediation according to the regulations of the Soil Protection Law (*Bodenschutzrecht*) are unaffected by this and remain in full force.

Chapter 2. Legal basis

2.1 Scope of Article 22 IED

The IED is not applicable to all industrial installations.

2.1.1 Activities covered

According to Article 2(1), it is applicable only to the industrial activities referred to in Chapters II to IV. It is expressly not applicable to research activities, to development measures or to the testing of new products and processes (Article 2(2) IED). Article 22 IED is regulated in Chapter II of the Directive and is thus applicable only to the activities listed in Annex I to the IED and in which the capacity thresholds stipulated there are achieved where appropriate. The current understanding is that Article 22 IED covers all the installations listed in Column 1 of the Annex to the 4th. Federal Immission Control Act (4. *Bundesimmissionsschutzverordnung, BImSchV*) (Installations Regulation). It remains to be seen whether the Installations Regulation corresponds to Annex I to the IED in terms of its content after the implementation of IED in Column 1 of the Annex.

2.1.2 Installation concept and installation scope

With regard to the concept of the installation in the IED, which is defined in Article 3 No 3 of the IED, and its scope, reference can and must be made to § 1(2) and 3 of the 4th. *BImSchV*; both installation definitions are identical. Secondary facilities and relevant substances, which are produced, used or released only in secondary facilities, are part of the installation and as such must be taken into account. With regard to Article 22 IED, particular significance will thus attach to the management of permits in the future.

2.1.3 Site covered

On the subject of the site of the installation, reference is made in Article 22(2) IED to the site on which the installation is present. The relevant site, the site of the installation, must be determined according to the provisions of the *BImSchG*. According to this, only those parts of a site or a number of sites on an operating site, on which the installation according to Column 1 of

the Annex to the 4th. *BImSchV* is present, are decisive – regardless of what is shown in the land register. Anything else can only apply in the case of "common installations" in the meaning of §1(3) of the 4th. *BImSchV*.

2.2 Obligation to prepare a baseline report

According to the text of the IED, operators of certain installations (see points 1.1.1 and 1.1.2) are required to prepare a baseline report, before commissioning and for reconsideration of the permit, in each case for the first time after 7 January 2013. Decisive in both cases, however – although this might not initially be clear from the text of Article 22(2) subparagraph 1 IED – according to Article 12(1) d) and e) IED is the time from submitting the application to issuing the permit. Thus, the baseline report must already be part of the application documents.

The concept of a limited permit, which does not exist according to German immissions control legislation, clearly underlies the regulation regarding the "*reconsideration of the permit*". A baseline report is thus necessary under German law – except in the case of commissioning a new installation that has been approved for the first time – for any permit for changes in the meaning of § 16(1) *BImSchG* because of a significant change to an installation which is listed in Column 1 of the 4th. *BImSchV*. Such a permit for changes may also be necessary in order to comply with a subsequent arrangement according to § 17(1) *BImSchG*. A subsequent arrangement of this kind can be the result of an "environmental inspection" according to Article 23 IED, for example. This is only applicable, however, if new relevant hazardous substances are used, produced or released and if these are able to pollute the soil and/or the groundwater. This derives from the fact that Article 22(2) IED concerns itself with "possible" contamination.

2.2.1 No restriction of the reporting obligation because of safety devices

The question of the restriction of the reporting obligation because of the presence of safety devices with the ability to prevent soil and groundwater contamination does not arise, because the emphasis is placed on the theoretical capability of the relevant hazardous substances. It should also be noted that § 5(1) No 1 *BImSchG* already stipulates that harmful effects on the environment and other dangers, significant disadvantages and significant nuisances for the general public and the neighbourhood cannot arise. For if a permit may only be issued if these conditions are met, a baseline report according to Article 22(2) IED would never be required if technical safety devices, which are intended to prevent contamination of the soil and the groundwater, are present. Article 22(2) IED would thus be obsolete. Such an interpretation is not acceptable for this reason. A restrictive interpretation of this kind can also not be in the

interest of the operator of the installation, who, in spite of the presence of safety devices, is still required to remove any detected contamination of the soil or the groundwater in the event of closure.

2.2.2 Use, production or release of relevant hazardous substances

All of the substances relating to the soil or the groundwater that are used, produced or released by the activity – that is to say in the installation concerned – are covered. Thus, a basic prerequisite for the obligation to prepare a baseline report is that, in the installations covered by Article 22 IED (see points. 2.1.1 and 2.1.2), "*relevant hazardous substances*" can be used, produced or released. Hazardous substances are defined in Article 3 No 18 IED with reference to EU Regulation No 1272/2008 on the classification, labelling and packaging of substances and mixtures, known as the "CLP Regulation"; other substances are not covered. The substances concerned must accordingly be those which exhibit certain hazardousness criteria for physical hazards, e.g. explosion hazards, health hazards, e.g. toxicity or environmental hazards, e.g. the threat of pollution of water supplies. Any hazardous substance which can be used, produced or released is of direct relevance. In this context, too, the emphasis must once again be placed on the simple possibility of contamination by the substance concerned; otherwise, there could be the possible threat of more stringent remediation requirements in conjunction with the closure of the installation, since these relate directly to the state and the contamination level for this substance described in the baseline report. Thus, in the event of the substance concerned not being considered in the baseline report, the result could be a remediation obligation at the "precautionary level" in the event of this substance subsequently being found to be present in the course of the inspection of the substratum after closure of the installation.

2.2.3 Possibility of soil or groundwater contamination

Only those hazardous substances, in respect of which the possibility of contamination of the soil or the groundwater exists in the first place, can be relevant. There is no such requirement in the case of hazardous substances which have the ability to pollute only the air; for example, in the case of substances which are lighter than air. The report can be restricted to those relevant hazardous substances which, according to an expert evaluation, at the ratio of their quantity and hazardousness in respect of toxicity, possible water pollution, etc., are effectively capable of producing significant soil or groundwater contamination. The general inspection of all substances that are used, produced or released in the installation, even in the smallest

quantities, is not necessary if they cannot lead to significant soil and groundwater contamination.

2.2.4 Conclusion

In conclusion, it can be established that: Any hazardous substance according to Article 3 No 18 IED which, in conjunction with the subsequent closure of an installation, can be present in the soil and/or groundwater is considered to be relevant in the meaning of Article 22 IED – and thus in particular also for the baseline report.

2.3 Content of the baseline report

The requirements in respect of the baseline report are set out in Article 22(2) sentences 2 ff. IED. The required information is necessary in order to determine the state of the soil and groundwater contamination, so that a quantified comparison can be made with the state at the time of the definitive cessation of activities. In order to be able to do this, the state before commissioning for the first time or "reconsideration of the permit" must be established. According to German immissions control legislation, this is required for any permit for changes in the meaning of § 16(1) *BImSchG* because of a significant change to the installation, listed in Column 1 of the 4th. *BImSchV*, if new relevant hazardous substances are used, produced or released and if these can contaminate the soil and/or the groundwater. It is necessary, in conjunction both with the baseline report and with the closure report, for the state of the contamination according to the concentration and dispersal of the pollutant (horizontal and vertical, as well as concentration-related) to be localized.

Only contamination by "relevant hazardous substances" (see point 1.2.2) on the operating site (see point 1.1.3) must be included in the baseline report. A contaminant plume, for example, which in the intervening period is no longer present on the site of the operation, is not covered by the IED. The provisions of the soil protection and water legislation continue to be applicable, however. Regarding the installations concerned, reference is made to the remarks under point 1.1.1 and 1.1.2.

In conjunction with the practical implementation, a brief presentation of the past use of the site of the installation concerned must be given initially in the baseline report if the appropriate information is available. This should be as comprehensive as possible and should include a substance-independent presentation of the previous use. In the event of subsequent changes to the installation, which may also involve a change to the relevant hazardous substances that are

used, it is thus possible to refer back to the available information and to identify any use-related risks.

In addition to the substance-independent description, a detailed assessment should be made, in the context of the presentation of the past and current use, of which of the relevant hazardous substances that will be used, produced or released for the first time in the installation have already been used. As a rule, these substances are listed in the corresponding operating licences together with their quantities used, and the (use) operational areas in which they are handled and stored (storage areas). The operator of the installation can assemble these data for the baseline report.

2.3.1 Compulsory minimum requirements

Article 22(2) subparagraph 3 IED stipulates as a minimum requirement details of the current use of the relevant site and – if "available" – information about its past use. In addition existing information – if "available" – is also required about soil and groundwater measurements which reflect the state at the time of producing the report, or alternatively new soil and groundwater measurements.

2.3.2 Availability of information

It is not clear what the expression "available" is intended to denote. Even the English-language version of the IED fails to offer any help with its interpretation, since it also uses only the word "available", which is similarly in need of interpretation. Three possible interpretations are conceivable:

1. The only information and measurements available are those which are actually available to the operator who is required to produce a report, and thus in his immediate sphere of activity.
2. Information or measurements which the operator concerned is able to obtain or acquire easily, that is to say without major effort, are also regarded as being available.
3. Even information or measurements which exist somewhere, albeit concealed, and which the operator is only able to obtain with considerable research effort or access to documents (e.g. analysis of historical archives, etc.), are also classified as being available.

Since Article 22(2) subparagraph 3 IED still requires implementation by the German legislator, it remains to be seen how the attribute of "availability" will be transposed. At any rate, it is not necessary to provide the authority in receipt of the report with any powers of sanction in order to obtain "available", but possibly withheld, information or measurements or to be able to impose

the disclosure of all "available" information or measurements or also to broaden the essential condition of "availability".

For the purposes of practical implementation, it is necessary for documents and information that are available to the operator of the installation - as a rule ground inspections, site contamination inspections and other substratum inspections in relation to the site of the installation - to provide initial useful pointers to the substratum situation. To what extent these data provide an adequate basis on which to describe the actual baseline state for the soil and the groundwater in line with the requirements of the Directives must be examined and evaluated on a case-by-case basis.

Whether further "*available information*" about the site of the installation in relation to the soil and groundwater is available from the authorities or municipal administrations, and whether this information also describes the "current baseline state", must be considered on a case-by-case basis. It is advisable to involve the competent authority and its information at an early stage.

If no meaningful information about the current state of the site in respect of the relevant hazardous substances that are used, produced or released in the new or extended installation emerges from the available documents, new soil and groundwater inspections must be carried out in connection with preparing the baseline report.

2.3.2.1 Information about past uses of the site

The previous history of the installation site in respect of suspected site contamination is only relevant, according to the aims of the Directive, if the same relevant hazardous substances were already used in the past and will also be used in the future. The obligation to provide "available" information about the past use of the site in the sense of Article 22(2) subparagraph 3 a) IED derives from the fact that such information can regularly be of benefit to the operator who is required to produce a report. Finally, the knowledge about past uses of the site finds its way into the baseline report and is thus able to provide evidence, arguments and indices for existing, older contamination resulting from the past use of the site. These can ultimately benefit the operator at the time of closure of the installation and a possible limitation of the reinstatement or remediation obligation associated therewith – even to the extent that those instances of contamination, which may have been caused by past uses, may not need to be included in the remediation exercise. If, on the other hand, the operator does not include "available" information about past uses in his baseline report, he will then possibly already be threatened with the sanction that, in the event of closure of the installation, where applicable

without limitation – without contamination caused by previous uses being taken into account in his favour – he will be required to carry out remediation to the level of background concentrations. Accordingly, it may be advisable from the operator's point of view to include as much "available" information as possible about past uses of the site in the baseline report.

2.3.2.2 Available soil and groundwater measurements

There is also no need for sanctions in respect of the "availability" of existing soil and groundwater measurements. Although it is possible in principle for the operator who is obliged to produce a report to retain such existing, previous assessments – in particular with the permissible argument according to Article 22(2) subparagraph 3 b) IED that these at the time of producing the report no longer reflect the actual state of the soil and groundwater contamination – if he prefers not to or cannot, for whatever reason (e.g. unfavourable results), include these in the baseline report. In such a case, if existing assessments are not referred back to, he is still under an obligation to carry out new soil and groundwater measurements and also to include the results in his baseline report. In this respect, with the subsequent arrangement according to § 17(1) sentence 1 *BimSchG*, the authority has also already been provided with an instrument with which to conduct any necessary new measurements; there is thus no need for further possible sanctions. Furthermore, the text of Article 22(2) subparagraph 3 b) IED links the two variants – "available" existing measurements on the one hand, and new soil and groundwater measurements on the other hand – with the word "alternative", which essentially means "optional". Accordingly, the operator of the installation must be left to decide which of the two possible variants he will choose for the preparation of his baseline report.

2.3.2.3 Conclusion

The conclusion reached on the basis of the above is that it can largely be left up to the operator to decide what is and what is not "available".

Furthermore, the only soil and groundwater measurements that must be disclosed or repeated are those which contain information about the "relevant hazardous substances" according to Article 22(2) subparagraph 1 IED and the site of the installation.

2.4 Procedure upon definitive cessation of activities; Article 22(3) subparagraph 1 IED

Article 22(3) subparagraph 1 sentence 1 IED requires the operator to evaluate the state of the soil and groundwater contamination upon definitive cessation of activities.

2.4.1 Definitive cessation

Since the Directive does not contain any separate definition for the definitive cessation of activities, only the concept of definitive closure in Article 11 h) IED can be used. A closure is considered to be definitive if the installation as a whole – and not just parts thereof – is no longer operated for an extended period. This period is estimated at three years in Federal German law; § 18(1) No 2 *BImSchG*. Thus, before the end of this period, a definitive closure can only be considered effective in the event of an appropriate declaration of intent by the operator of the installation.

2.4.2 Installations recorded at the time of closure

The closure-related obligations are applicable only to the installations that are explicitly mentioned in the Annex to the IED. If an installation falls out of the scope of the IED, for instance because of a changed operational mode or reduced output, the closure-related obligations of Article 22(3) IED will also cease to apply. In order to ensure that these obligations can already take effect, if necessary, at the time at which the conditions for classification in Annex 1 to the IED are no longer met, reference points must not be removed from the Directive. However, the possibility is not excluded of assuming a definitive cessation of activities if the operation of the installation no longer meets the conditions for an activity that is subject to the scope of the IED.

2.4.3 Obligated operator of the installation

The obligation to perform an evaluation applies to the last operator of the installation, that is to say the operator at the time of the definitive cessation of activities. The object of the evaluation required by Article 22 IED extends only to any soil and groundwater contamination by relevant hazardous substances (see point 2.2.2); an evaluation of substances which could not be used, produced or released in the installation is not necessary. Other substances, e.g. solubilisers, can also be taken into account exceptionally if they could trigger or reinforce the effect of relevant hazardous substances used, produced or released by the installation.

2.4.4 Evaluation of the determined state

The object of the evaluation is to establish whether significant soil and groundwater contamination have been caused by the installation.

The concept of significance is not defined in the IED; according to the text, it must involve an eligible soil or groundwater contamination. The benchmark is the soil or groundwater contamination that is established in the baseline report; in addition, the soil and groundwater contamination established upon definitive cessation of activities must extend significantly beyond this; the yardstick of the evaluation is thus a relative value.

The evaluation does not necessarily require soil and groundwater measurements. If any already available protective measures permit the reliable conclusion to be arrived at that no soil and groundwater contamination at the site of the installation can have been caused by the installation, there is then no need for additional inspections.

Significant soil and groundwater contamination compared to the baseline state can be excluded from the outset if the soil and groundwater contamination determined upon definitive cessation of activities must be regarded as minor. The precautionary and preventive values of the Soil Protection Law are suitable yardsticks in relation to soil as a protected resource, and the test values of Annex 9 to the *GrwV* present in the draft in relation to the groundwater:

1. If the precautionary limits in Annex 2 to the *BBodSchV* are not met, then any soil contamination may be assumed not to be significant. If the test values for the groundwater are not met, a harmful and thus significant change in the nature of the groundwater can also be excluded.
2. If, on the other hand, soil contamination is established which does not meet the hazard-related preventive values of the Soil Protection Law for commercial/industrial use and exceeds the impact pathway concerned, any supplementary burden caused by the installation will be considerable as a rule. This legal presumption does not apply if the load established in the baseline state was already situated in the vicinity of or above the test values; the significance of the supplementary loading must then be determined on a case-to-case basis. The same is true of contamination of the groundwater, which does not meet the test values of Annex 9 to the *GrwV* present in the draft.
3. If, upon cessation of the operation, soil or groundwater contamination is established which, although above the precautionary limits, lies below the preventive values of the soil protection legislation, the additional loading will not be considerable as a rule if it exceeds the levels found in the baseline report by not more than half. Above this threshold, the significance must be determined on a case-to-case basis.

If precautionary or test values are not available for individual harmful substances, these must be estimated by reference to experts, see German Federal Gazette (*Bundesanzeiger*) No 161 a of

28 August 1999). For contamination of the soil, the assessment criteria according to § 4(5) *BBodSchV* and/or the background levels must be used for this purpose. If an estimate is not possible, even on this basis, the significance must be determined on a case-by-case basis until the development of suitable assessment criteria.

2.4.5 Taking account of the technical feasibility of removal

If significant soil or groundwater contamination has been caused by the installation, the site must be reinstated in principle to the baseline state; see Article 22(3) subparagraph 1 IED. According to the text of the Directive, the technical feasibility of such measures can be taken into account for this purpose. Furthermore, for constitutional reasons over and above technical feasibility, a restriction applies through the principle of proportionality. This also opens up the possibility of taking economic considerations into account. The practical significance of the very extensive reinstatement obligations is limited by the restriction of their scope to installations, which were taken into operation after 7 January 2013 or approval for which was renewed after this date. It is to be hoped that, in the case of new installations, because of the protective measures to be observed, significant soil and groundwater contamination by the operation of the installation are the exception.

2.5 Special provision for "historical" contamination in existing installations with a baseline report, Article 22(3) subparagraph 2 IED

Article 22(3) subparagraph 2 IED contains special provisions for so-called historical contamination, i.e. for soil and groundwater contamination which is established in the context of an updating of the permit for the installation for the first time after 7 January 2013 (reference-date rule), and which constitute a serious risk to human health or the environment. In this case, the operator of the installation must, notwithstanding the further remediation obligations according to Article 22(3) subparagraph 1 IED, in conjunction with the definitive cessation of its activities, adopt at least hazard avoidance measures, i.e. measures which are necessary for the removal, prevention, containment or reduction of the relevant hazardous substances, so that the site no longer presents any risk with regard to its present or approved future use.

2.5.1 Historical contamination in existing installations

Article 22(3) subparagraph 2 IED relates to existing IED installations which are being operated at the time of the reference-date rule on 7 January 2013. For such installations, Article 22(2) subparagraph 1 IED stipulates that a baseline report must be prepared if the permit for the installation is renewed, i.e. if application is made for a permit according to § 16 *BImSchG*. If significant contamination is established in the context of the preparation of this report, the operator of the installation must implement hazard avoidance measures upon definitive cessation. A prerequisite is a serious risk to human health or the environment. This contamination state, which must be classified in the area of hazard prevention, must be distinguished from the significant soil or groundwater contamination referred to in Article 22(3) subparagraph 1 sentence 2 IED, which must be classified in the area of prevention. It may be assumed that the concept of the serious risk to human health or the environment is equivalent to the concept of a harmful change in the soil embodied in soil protection legislation in the meaning of § 2(3) *BBodSchG*, which includes instances of contamination which are capable in this case of causing risks, significant disadvantages or significant nuisances for individuals or the general public.

2.5.2 Time of remediation obligation

According to the text of the IED, the necessary hazard avoidance measures do not need to be implemented already at the time of the establishment of the serious risk to the protected resources, but only upon definitive closure of the installation. In this respect, the time of the remediation obligation is the same as the time of the reinstatement of the site of the installation to the baseline state according to Article 22(3) subparagraph 1 IED. An obligation to implement protective measures at an earlier stage, i.e. after the existence of the risk is established, can only arise from the soil protection or water legislation. For example, immediate measures may be necessary if acute risks to life and limb or to the public drinking water supply exist. Waiting until the definitive cessation of the operational activities would run counter to the general obligation to avert danger.

2.5.3 Necessary measures to avert danger

The final half-sentence of Article 22(3) subparagraph 2 IED stipulates that the removal, the prevention, the containment or the reduction of relevant hazardous substances can be regarded as hazard avoidance measures. It should be possible to designate the disposal and reduction of hazardous substances according to the Federal German Soil Protection Law (*Bodenschutzrecht*) as a decontamination measure in the meaning of § 2(7) No 1 of the

German Soil Protection Act (*Bodenschutzgesetz, BbodSchG*). The concept of the containment of the harmful substances could be intended to denote a precautionary measure according to § 2(7) No 2 *BBodSchG*, by which the spread of the harmful substances is prevented or reduced in the long term. The concept of "prevention" used in the Directive against the background of the concept of "control" used in the English version should rightly be referred to as monitoring measures. These can be precautionary measures in the meaning of § 2(7) No 2 *BBodSchG* or protection and restrictive measures according to § 2(8) *BbodSchG*.

2.6 Hazard avoidance measures for existing installations without a baseline report, Article 22(4) IED

Article 22(4) IED also stipulates that the operator of an installation, who is not required to produce a baseline report according to paragraph 2, must nevertheless, for the performance of the same, perform hazard avoidance measures of the kind referred to in paragraph 3 subparagraph 2, in order to prevent serious risks to human health or the environment. This means operators of IED installations which are already in operation at the time of the reference-date rule on 7 January 2013, and which, until their definitive closure, do not require any updating of their permit. This is the case, for example, if only insignificant changes are made to the installation up to the time of its definitive cessation, which do not require the permit for changes according to § 16 *BImSchG*. In the case of such installations, in the event of their definitive closure, the state of the soil and the groundwater must nevertheless be determined, and the necessary hazard avoidance measures must be implemented as appropriate. In this respect, the requirements are lower than in the case of installations which are re-approved after the reference date, or for which a permit for changes is issued.

Chapter 3. Investigative methodology and evaluation criteria for necessary inspections for the report on the baseline and end states

3.1 Investigative methodology

3.1.1 Differentiation of scenarios

It is basically possible to differentiate between two scenarios in relation to the establishment and the operation of a new installation:

- establishment and operation of a new installation on sites not previously used for industrial/commercial purposes, known as "greenfield development";

- new establishment of or significant change to an installation on sites previously used for industrial/commercial purposes, known as "brownfield development".

In Germany, the new establishment of or a significant change to an installation on sites previously used for industrial/commercial purposes is regarded as the standard case as a rule. The "greenfield" will also be developed in the future, however, in particular in more rural areas.

For both scenarios, the IED stipulates appropriate soil and groundwater measurements where no previous information is available. A significantly reduced inspection programme in respect of any prior use may be applied as a rule in the "greenfield" area. In the case of a permit for changes, the inspection may be restricted to the area affected by the use of the substance.

3.1.2 Identification of hazardous substances for inspection

The relevant hazardous substances used, produced or possibly released according to the permit application must be named and evaluated in respect of their chemical-physical substance properties for the possibility of contamination of the soil or the groundwater.

According to the provisions of the IED, new soil and groundwater measurements are used for the description of the baseline states at the site of the installation produced by the identified relevant hazardous substances. One requirement for the inspection of further parameters for ascertaining the substances contained in possible filling materials or possible substratum contamination caused by prior use derives, if appropriate, from the provisions of the soil protection legislation.

If the relevant hazardous substances used at the time of an input into the soil can act as a solubiliser for soil contamination that is present at the site, it may be sensible in individual cases to determine and evaluate the baseline state.

As a rule, the degradation and transformation products which possibly occur in the relevant hazardous substances that are used during their passage through the soil cannot be clearly defined in respect of their nature, quantity or hazardousness and thus cannot be inspected.

3.1.3 Choice of media for inspection

In the case of new inspections, for the purpose of determining the baseline state, in principle direct ground surveys must be carried out by means of suitable exploratory processes, e.g. core soundings or bore holes.

With the exception of sites with favourable hydrogeological conditions (e.g. thick, cohesive surface layers and/or large groundwater table depths), inspections must be carried out on the relevant hazardous substances in order to determine the baseline states in the groundwater. Taking into account the hydrogeological and hydraulic conditions, suitable upstream/downstream measuring points for this purpose must be established on the site of the installation. The possible dynamics in respect of directions of flow and fluctuations in the groundwater table must be taken into consideration in groundwater inspections. The IED stipulates according to Article 22(2) that inspections must only be carried out on the site of the installation itself. Especially in groundwater inspections, however, it frequently makes sense to collect measurement data beyond the actual site of the installation. When choosing the parameters and, if necessary, the analytical procedures, the aim should be to ensure that the new measurement results are capable of comparison with the inspection results of earlier series of measurements. In the case of large-scale industrial operations, for the purpose of determining the background loading, integral observations with measurement points remote from the actual site of the installation may be permissible in exceptional cases. In order to obtain clear statements, measurement points situated directly in the verified downstream flow from the site of the installation are necessary.

Care must be taken to ensure that, according to the provisions of the IED, no comprehensive site inspection according to the yardsticks of the soil protection legislation are required, but only the collection of evidence of the baseline state that is limited to the relevant hazardous substances that are present in the installation for which an application has been submitted.

3.1.4 Soil sampling strategy

On the basis of a large number of both natural and process-dependent influencing factors, laboratory measurement results indicate substance concentrations only within substance-specific and process-specific ranges, in particular in the sophisticated "soil" matrix in terms of sampling, treatment and measurement. These influencing factors include the strategy (place and method) of sampling, depending on the contamination path and the heterogeneity of the pollutant distribution in the soil or in the groundwater, the handling of the sample between the time of obtaining it and its measurement, and the laboratory measurement.

The place and the nature of the sampling affect the result decisively. Two measurement results are capable of comparison if the "place of sampling" at the time of the report on the end state still exists, has not been exposed to any influences other than the contamination to be tested in the meantime and is capable of being tested again. In order to be able to relocate the place of

sampling, a fixed reference system (coordinate system in position and height) must be selected. The ground surface of the site, which changes over time, is not suitable in principle as a reference system.

In principle two sampling and inspection strategies exist for the baseline report:

- Deliberately untargeted sampling in a regular grid pattern, in the case of statistically adequate data density, produces representative information about the average substance concentrations and about their range. Since the representativeness is tied to the uniformity of the grid pattern, this must not be influenced by external circumstances such as the existing buildings and use or suspected pollutant concentrations.
- Targeted sampling in suspected pollutant concentrations (storage points, transshipment points or the like), depending on the degree of concretisation of the suspicion (knowledge of the place and the path of the substance input and the nature and the extent of any spread of the substance in the substratum), gives rise to an above-average probability of finding small-scale local contamination and above-average concentrations, in the ideal case the maximum substance concentrations ('worst case' scenario).

Depending on the nature of any prior use and the contamination possibly resulting therefrom, the combination of both sampling strategies may be appropriate.

In the area of existing safety devices – e.g. surfaces included in the Ordinance on Installations for Handling Substances Hazardous to Water (*VawS*) – no such evidence should be looked for as a rule.

For the purpose of determining contamination caused by liquids escaping into the soil from leaking containers or pipelines, the sampling depth must be adapted appropriately to the depth of the contamination:

- In the case of above-ground containers and pipelines, sampling of the uppermost soil layer at the time of the input is advisable, including if this is covered by filling or sealing applied subsequently.
- In the case of below-ground containers, pipelines and basement rooms with deep foundations, the depth of sampling must focus on the location of any possible leakage.

The sampling strategy for the baseline report determines the strategy for the report upon definitive cessation. If untargeted sampling (regular grid pattern) is selected in the baseline report, this must also be selected in the report upon definitive cessation. This also applies to

targeted sampling. However, any temporary transfer of a pollutant does not in itself call for targeted sampling.

The inspections that are carried out in the context of the baseline report form the basis for the stipulated quantified comparison of the soil and groundwater contamination in the event of the definitive cessation of activities. However, since these inspections are not able to predict the area affected by any accidents and major incidents or the transfer of a pollutant, it is crucial to consider to what extent any supplementary sampling areas are necessary in the context of the required evaluation of the status of the soil and groundwater inspections compared to the baseline report.

It may be appropriate in individual cases to provide a soil reference surface outside the site of the installation, in order to be able, if need be, to demonstrate the existing background levels or the contribution or the cause of inputs over a large area on the atmosphere by other third parties and to limit immissions on the site caused by the operator.

3.1.5 Laboratory determination

Most substances can essentially be determined by laboratory analysis. As yet, however, no standardised or standard determination procedures exist for the great majority of the hazardous substances referred to in CLP Regulation 1272/2008/EU. So that a comparison of measurement results is still possible, at least validated methods of analysis should be used. Method validation in conjunction with the analysis is understood to denote the formal and documented proof that an analytical method is suitable for its intended purpose and meets the requirement imposed on it.

The laboratory-based exploratory and determination procedures are for the most part standardised in the relevant regulations throughout the world and are reproducible as such. Quantitative measurement results, which depend on standardised determination procedures, are comparable as such. The German and international system of standardisation represents the recognised status of laboratory technology.

For a number of measured quantities, the status of laboratory technology offers a number of procedures, which the regulator regards as being equivalent (for example: heavy metal determination by means of AAS or ICP; PAK determination by means of HPLC or GC-MS). Laboratory inspections, which are carried out with different approved measurement procedures on identical samples, can also give rise to considerable deviations in the results. This must be taken into account in the comparison of the measurement results.

Since the status of laboratory technology is subject to constant change, the situation can arise in which a procedure used in the baseline report no longer corresponds to the status of laboratory technology upon definitive cessation of activities and may thus no longer be used for the report that is to be produced. Furthermore, it can also be assumed in the future – as has occurred in the past – that the use of solvents will be precluded by their inherent toxicity (e.g. FCKW R113 for the determination of mineral oil hydrocarbon substances according to method KW-H-18; see LAGA Notice No 35).

In the event of a change to standardised methods of laboratory analysis, and in the event of validated or standardised determination procedures still not being available, the quantitative measurement results are not directly comparable with one another, but only in the context of expert testing and evaluation.

A further problem relating to the desired comparison of measurement values between the times of the baseline reports and the time of closure is that the limit of determination and the limit of detection for environmentally harmful substances can be significantly reduced with the advancing state of laboratory technology. This must also be taken into account in conjunction with the evaluation.

For the reasons indicated above, in conjunction with the preparation of the baseline report, care must be taken to ensure that the methods of analysis used are adequately described. Only in this way, in the context of the cessation of operation of the installation, can a proper comparison be made between the measured values which are determined under certain circumstances with different methods.

3.2 Evaluation

In practice, in by far the overwhelming number of cases, the operator will call upon the services of an expert for the inspection and evaluation of soil and groundwater contamination after closure. According to the text of Article 22 IED, the task of the expert in conjunction with the evaluation is,

- to undertake a comparison of the baseline states with the state upon cessation of activities,
- to assess whether any detectable soil and groundwater contamination is "significant", and
- to assess whether the "technical feasibility" of measures for the removal of the contamination from the soil and/or the groundwater exists.

It follows that a decision must be taken on a case-by-case basis in respect of what qualifications the one or more experts must hold.

The IED stipulates that not only a generally descriptive comparison, but also a quantified comparison must be made between the baseline state and the end state. From a technical point of view, and broadly speaking, a quantified comparison of this kind cannot consist of a simple comparison of measured values at both of the times concerned. Such a pure comparison of measured values would mask out the following facts of relevance to the evaluation and thus possibly lead to an erroneous interpretation:

- For a majority of the "relevant hazardous substances" to be inspected according to the IED, no standardised procedures for the inspection of these substances in the soil and groundwater matrices are available at the present time. This alone gives good reason to expect that significant measurement uncertainties, which extend far beyond the deviations in standardised procedures, will occur. These measurement uncertainties should not, in the event that higher values are found in the "end state", be regarded "automatically" as an actual increase. In point of fact, there is an urgent need here for critical testing and an expert evaluation to be undertaken. It will thus be necessary from a technical point of view to ask the question, in each individual case, of whether the provisions of the IED will in fact need to be met, if standardised or at least validated methods of analysis are not yet available for the substances to be inspected. The fact that no corresponding methods are available at the time of preparing the baseline report, although they are available at the time of preparation of the report on the end state, must also be rated as critical in this respect.
- Many (harmful) substances are by their nature not isotropically distributed either in the soil or in the groundwater. Thus, for example, the natural variances in the clay content or in the content of organic substances can themselves already lead to significant deviations in the levels of (harmful) substances within a macroscopic layer that is considered to be isotropic. It is also not always possible to assume an isotropic distribution of the (harmful) substances in the groundwater. This means that geostatistical methods must be used for a quantitative assessment of whether an increase has occurred.
- With regard to a comparison for evaluation purposes, the situation is complicated by the fact that the object of the inspection may have changed to a significant extent between the baseline state and the end state as a result of the establishment and expansion of the installations, but also as a result of possible changes in the surroundings. As a result of the building operations in conjunction with the establishment (or rebuilding) of the installations,

the soil that was sampled in the baseline report is no longer present or can be changed significantly by the input of technogenic substrate (building materials for recycling, crushed rock, etc.). The groundwater hydraulics at the site or at site of the installation and the nature of the groundwater may also have undergone significant changes through other uses of the groundwater or other processes which have an influence on the groundwater. This means that, in the context of a corresponding evaluation comparison, these changes in the object of the inspection must be recorded and must by necessity be taken into account in conjunction with the evaluation. Reference is made to the remarks made in relation to the reference surface (see point 3.1.4).

In summary, therefore, the comparison of the baseline state with the state upon cessation of activities is complex task which calls for a high level of expert knowledge, which in turn requires a high degree of competence in the critical scientific evaluation of environmental data not only on the part of the experts, but also on the part of the competent authorities.

According to the text of Article 22 of the IED, not only a quantified comparison must be carried out, but it must also be established with regard to the need for measures whether significant soil and groundwater contamination by relevant hazardous substances have occurred in comparison with the baseline state.

The operator and, where appropriate, the expert thus have the task of distinguishing between insignificant and significant soil and groundwater contamination, taking into account the development of the site, the possibly changed inspection method, the further development of the limits of detection and determination and the restricted comparability of the sampling.

Simple comparisons of measured values or the definition of significance thresholds via factors relating to the exceeding of comparison values will not provide any solution, and in point of fact expert case-by-case tests intended to identify comparable evaluation yardstick must be carried out.

In conjunction with the ensuing assessment of the "technical feasibility", a link can be established with the comprehensive knowledge and experiences gained from the corresponding evaluation in the event of the proportionality of the "suitability for remediation" of soil and groundwater contamination. Here, too, an expert individual examination should be undertaken.

The ITVA will engage in the necessary expert dialogue for the implementation of appropriate comparative evaluations and – as the need arises – in the compilation of technical guidelines.