Note: This is a translation of the RSK statement entitled "Der RSK-Leitfaden für die Durchführung von ganzheitlichen Ereignisanalysen im Vergleich zum VGB-Leitfaden Ganzheitliche Ereignisanalyse"

In case of discrepancies between the English translation and the German original, the original shall prevail.

RSK - Statement (466th meeting of the Reactor Safety Commission on 22 May 2014)

The RSK guideline for the performance of integrated event analyses in comparison with the VGB Guideline on the Integrated Event Analysis

1 Task assignment, course of discussions

Experience feedback is an important element of the safety management system. The feedback of experience also includes the systematic recording and evaluation of events that have occurred and the definition of measures to prevent their recurrence. The licensee's integrated event analysis is based on an approach that takes into account the topic of man-technology-organisation (MTO).

The results of event analyses have been presented to the RSK on several occasions. These were discussed in the RSK's Committee on REACTOR OPERATION. Following these presentations, some applications of the MTO analysis methods led to discussions regarding the following issues:

- sufficient depth and completeness of the analysis,
- plausible derivation of the analysis results from the event sequence,
- comprehensible connection between the analysis result and the corrective measures derived (technical, organisational, personnel),
- · comprehensive presentation of the results and
- confidential handling of personal details.

The conclusions from these discussions led to the preparation of a guideline which, in the view of the RSK, should be used as a basis for the preparation of integrated event analyses. The RSK discussed and adopted the guideline at its 411th meeting on 15 October 2008 [1].

At a meeting of the Technical Committee for Nuclear Safety (FARS) on 19/20 May 2010 [4], the RSK presented the RSK guideline for integrated event analyses to the representatives of the Länder on the FARS in order to

support the implementation of the requirements defined in the RSK guideline in future event analyses carried out by the licensees. The FARS had proposed to the BMUB that it should ask the RSK for a comparison of the VGB Guideline on the Integrated Event Analysis with the RSK recommendation "Guideline for the performance of integrated event analyses". The BMUB's advisory request of 16 September 2014 substantiates this request.

The RSK is unable to provide what is asked for in the BMUB's advisory request [5] to perform the comparative analysis on the basis of example analyses since, despite repeated efforts by the RSK, no approvals for the use of corresponding event analyses were granted by the licensees, so that no example analyses were available. Thus, the competent RSK Committee on Reactor Operation (RB) decided alternatively to perform a systematic comparison of the requirements of the respective guidelines [1] and [2] and to report the results to the BMUB in the form of a statement.

In the course of the discussions on this topic among the ad-hoc "Integrated Event Analysis (GEA)" working group of the RSK's RB Committee convened for this purpose, a joint meeting with representatives of VGB took place on 14 December 2012 [3]. During this meeting, a common basic understanding of the performance of integrated event analyses was developed and a revision of the VGB Guideline was announced by the licensees to take into account the requirements of the RSK guideline.

The correspondingly revised VGB Guideline [2] was made available to the RSK for the intended comparison with the RSK Guideline [1].

The results of the joint meeting [3] have been incorporated into this document.

The statement was discussed and adopted by the RSK's Committee on REACTOR OPERATION on 16 April 2014.

2 Comparative evaluation

In order to ensure a transparent presentation, the structure of the RSK guideline was retained for the comparison. In this context, the main differences from the point of view of the RSK are discussed below.

2.1 Requirements for integrated event analyses

2.1.1 **Objectives of integrated event analyses**

Requirements of the RSK guideline [1]

The objectives of event analyses are to learn from operating experience and to derive safety-oriented optimisation measures.

An integrated event analysis is a comprehensive examination of an event to be analysed by an analysis team using a systematic approach to determine what happened and why it happened. The objective is to identify all

factors contributing to the event as far as possible so that appropriate measures can be derived to prevent recurrence or occurrence of similar events. In this context, "integrated" means the consideration of all contributing factors from the areas of man, technology and organisation and their interrelationships. Moreover, integrated event analyses give the staff the opportunity to make generic considerations beyond a specific event in order to contribute to an overall increase in safety.

Implementation in the VGB Guideline [2]

The requirements formulated in this respect in the RSK guideline are implemented in the VGB Guideline.

2.2 Criteria for initiating integrated event analyses

Requirements of the RSK guideline [1]

As a general rule, it is a management task and an integral part of safety management to analyse and evaluate each occurrence and each relevant finding from plant operation.

The plant manager specifies criteria whose fulfilment initiate the performance of an integrated event analysis in the sense of this guideline in the case of an event.

These criteria take at least the following aspects into account as far as they may be of importance for the event sequence:

- *safety relevance*,
- personal injuries,
- significant contamination of persons and exceeding of dose limits,
- release of radioactive substances,
- common-mode failures of redundant systems or components,
- violation of limits, conditions and requirements for operation,
- exceeding of design limits,
- unclear or particularly complex sequences, and
- human factor or organisational relevance
 - relevant contribution of persons taking actions in the course of the event, and
 - relevant problems in the cooperation of different organisational units.

Implementation in the VGB- Guideline [2]

The requirements formulated in this respect in the RSK guideline are implemented in the VGB Guideline.

2.3 Requirements for the analysis methods

2.3.1 Basic requirements

Requirements of the RSK guideline [1]

The method to be chosen for integrated event analyses should meet the following requirements:

- It must be integrated, i.e. the contributing factors from all areas (man-technology-organisation) and their interrelationships must be comprehensively analysed.
- It must identify the interactions between the behaviour of the plant and the actions of the operating personnel.
- It must clarify the event-relevant technical and organisational processes as well as the causes and contributing factors for the event-relevant actions of the personnel.
- It must be designed in such a way that it can provide findings for implementable measures to increase safety.
- It must be learnable for the user, in particular for the practitioner in the nuclear power plant (NPP), and must be applicable by qualified analysts of the NPP under their own responsibility with reasonable effort.
- *It must be systematic, i.e. a planned and controllable procedure must be ensured.*
- It must be derived from theoretical basics.
- It must be verified in practice. The following boundary conditions should be observed when applying the chosen method:
 - *Prompt application: event analyses must be performed immediately after the occurrence of the event.*
 - Open and unbiased approach: the analysis must not be prejudiced by target and analysis expectations by plant management or other internal or external personnel.
- Event analyses serve exclusively to analyse the conditions under which failures occur.
- In terms of experience feedback, no isolated consideration/analysis of the event to be investigated should be performed, instead results of operating experience / experience with comparable events must be considered accordingly. The results of event analyses (see Section 2.5) must be integrated into the experience feedback process.

Implementation in the VGB Guideline [2]

The requirements formulated in the RSK guideline in this regard are mainly essentially implemented in the VGB Guideline. Some of the RSK requirements go beyond the explicit scope of the VGB Guidelines (e.g. on the theoretical foundations of the procedure and its practical verification), but these requirements are nevertheless implemented in the VGB Guidelines through the implementation of the procedure (Safety through Organisational Learning, SOL).

2.3.2 Scope and depth

Requirements of the RSK guideline [1]

The analysis comprises at least the following steps (see Integrated event analysis scheme)

1 definition of the event framework to be considered (in terms of time and content),
2 reconstruction of the event sequence (ACTUAL sequence),
3 determination of the event-relevant EXPECTED sequence,
4 deviation analysis,
5 identification, analysis and justification of the factors contributing to the event,
6 derivation of corrective measures, and
7 implementation of corrective measures / effectiveness assessment.

In general, the respective analysis steps already passed need to be critically considered for the entire process of the event analysis. If, in the course of processing the individual steps, findings are obtained which indicate the need to adjust the scope of the analysis or work results determined in advance, corresponding adaptation in the sense of an iterative procedure is to be performed.

The analysis should be carried out in close interaction with the experience feedback system, i.e. on the one hand, existing experience are already be taken into account in the analysis (e.g. in the definition of the event framework to be considered) and, on the other hand, the findings obtained in the course of the analysis represent an essential input for the experience feedback system.

Step 1: Definition of the event framework to be considered (in terms of time and content)

Definition of the starting and end point of the event to be considered and the scope of analysis. In the course of the analysis, an adaptation/extension of the period/analysis scope to be considered may be necessary. The subsequent steps then need to be adapted accordingly.

Implementation in the VGB Guideline [2]

Regarding the scope of the analysis, Chapter 4 of the VGB Guideline explains which findings or deviations serve as input variables and which selection criteria initiate an analysis. Further specifications on the period and scope of the analyses to be carried out for the selected event - as required in the RSK guideline - are not provided in the VGB Guideline before the start of the analysis. From the point of view of the RSK, the definition of the scope with regard to time and content is of great importance for the event analysis and should therefore be an explicit analysis step in the operators' event analyses in the future.

Step 2: Reconstruction of the event sequence (ACTUAL sequence)

The event sequence (ACTUAL sequence) is to be reconstructed in an open and unbiased manner by evaluating the identified event-relevant documents, in particular records, the technical data as well as by interviews with the personnel involved in the event. Depending on the complexity of the event, it should be broken down into individual sub-events/event sections. The description should include all relevant processes (initial conditions, technical processes, human actions and action outcomes). If possible, a graphical representation (chronological sequence, interrelationships) of the event or event sections should be performed. It is recommended to verify and discuss these results with the staff involved in the event to avoid misunderstandings or misinterpretations before starting the further analysis.

Implementation in the VGB Guideline [2]

The requirements formulated in the RSK guideline in this regard are implemented in the VGB Guideline; in some cases, the VGB Guideline goes beyond the requirements of the RSK. The RSK guideline states: "*The event sequence (ACTUAL sequence) is to be reconstructed in an open and unbiased manner by evaluating the identified event-relevant documents, in particular records, the technical data as well as by interviews with the personnel involved in the event.*" There are no further recommendations for the ACTUAL information and data collection in the RSK guideline. The VGB Guideline, on the other hand, provides very detailed information on "Data and information collection" (for ACTUAL) and also mentions the "On-site recording of findings" methodology. In science, the importance of the "Staff Rides" method (which is at least to some extent comparable to the "On-site recording of findings") is repeatedly emphasised in the context of event analyses. In "staff rides", the analysis team works together with those involved in the event. The aim is to put oneself in the shoes of the people involved, their working environment, their guiding assumptions and to be able to understand their behaviour.

The RSK sees this specifying requirement as a useful addition and therefore decides to make the following addition to the RSK guideline [1] for determining the ACTUAL process:

The event sequence (ACTUAL sequence) is to be reconstructed in an open and unbiased manner by analysing the identified event-relevant documents, in particular records, the technical data as well as by interviews with the personnel involved in the event. Where appropriate, the analysis team should record the findings and reconstruct the course of events on site in co-operation with those involved in the event.

With the adoption of this statement, the RSK guideline will be updated accordingly and in accordance with the additions listed below and will be submitted to the BMUB with a new date.

Step 3: Determination of the event-relevant EXPECTED sequence

This includes the following:

- identification of all specifications and regulations valid at the time of the event for the processes in question, e.g. from the operating manual (BHB), quality assurance manual (QSH), organisation manual (OHB), instructions, etc,
- identification of the specified system-related boundary conditions/processes,
- *identification of the specified working conditions,*
- *identification of the expected behaviour of the plant or of the plant components concerned in the event and derivation of the tasks implicating personnel actions, and*
- *determination of the organisational and procedural organisation existing at the time of the event (event-relevant areas).*

Based on this, the event-relevant EXPECTED sequence for the processes concerned is to be derived.

Implementation in the VGB Guideline [2]

The sources/topics for the collection of information and data as part of the event analysis are defined in VGB Guideline Chapter 7.1. This lays the foundations for determining the event-relevant ACTUAL process. However, 7.1 does not differentiate between information/data for the ACTUAL or EXPECTED course of actions/sequence. The EXPECTED process is mentioned, e.g. in Chapter 7.3 and in Chapters 8 and 8.2, but nowhere in the VGB Guideline is the systematic preparation and transparent documentation of this EXPECTED process explicitly required as a separate step. ("As part of the root cause analysis, the anticipated or EXPECTED process is compared with the ACTUAL process." (Ch. 7.3); "Identification of contributing factors including the deviations from the EXPECTED process." (Ch. 8) or "The resulting contributing factors represent the deviation from the EXPECTED condition." (Ch. 8.2)).

For the RSK, however, the systematically determined and transparently documented EXPECTED process is seen as an essential input for the deviation analysis to be carried out subsequently. This sequence cannot be depicted using the system specified in the VGB Guideline. With regard to the further treatment of this topic, we refer to the assessments in connection with the following Step 4 (deviation analysis).

Step 4: Deviation analysis

The deviation analysis is to be performed by a complete and systematic comparison of the event sequence (ACTUAL) determined within the framework of event reconstruction with the determined EXPECTED sequence (ACTUAL/EXPECTATION comparison).

At this point, all deviations are to be listed and assessed with regard to their relevance for the event.

Implementation in the VGB Guideline [2]

The VGB Guideline requires the identification of deviations from the EXPEXTED process as part of the root cause analysis for the event or the sub-events. However, this covers neither the requirement of the RSK guideline for a complete and systematic comparison between ACTUAL and EXPECTED nor the listing and assessment of all deviations (thus the neutral identification of all deviations as an input for the root cause analysis is missing - see also the comments on Step 3).

This topic was discussed in detail with VGB [3]. As a result of this discussion, there was fundamental agreement that a deviation analysis based on an EXPECTED/ACTUAL comparison is the basic prerequisite for an adequate event analysis. In the opinion of VGB, this EXPECTED/ACTUAL comparison and the deviation analysis required by the RSK are already carried out in practice, but the documentation of these steps could be improved. In this respect, VGB intends to specify the corresponding requirements in the VGB Guideline on the Integrated Event Analysis with regard to a more detailed documentation of the required steps.

This statement is based on the guideline revised in accordance with the announcement by VGB [2]. However, even taking into account the changes made there by VGB, it must be stated that the processing sequence provided in [2] does not require either the transparent elaboration of an EXPECTED procedure considered necessary by the RSK or a deviation analysis based on it. This critical assessment of the requirements in [2] is also consistent with the experience repeatedly gained in connection with integrated event analyses since the publication of the RSK guideline. Here, the RSK sees a fundamental deficiency in the analysis system, which should be remedied in the context of future integrated event analyses through consistent application of the RSK guideline.

Requirements of the RSK guideline [1]

Step 5: Identification, analysis and assessment of the factors contributing to the event

For each relevant deviation, the causes and the factors contributing to the event are to be identified. In this respect, it is decisive to apply an integrated approach, i.e. consideration of all human, technical and organisational factors and their interdependencies.

For each deviation, the chain of causes, i.e. the cause of the cause of the cause is to be traced back until the causes that can be influenced are found.

It may turn out that the existing specifications for the EXPECTED sequence or for the EXPECTED behaviour of the personnel themselves are not suitable or have led to sub-optimal technical results. They thus become factors themselves for which the causes have to be identified. The same applies if the technical design turns out to be unsuitable.

All contributing factors identified are to be weighted in a justified manner with regard to their relevance for the event.

They are to be assessed in terms of experience feedback with comparable events (= generic evaluation). For example, the repeated occurrence of event-contributing factors in different contexts/events may indicate generic weaknesses, i.e. improvement potential that is not event-specific.

Implementation in the VGB Guideline [2]

Put simply, the VGB Guideline is based on the principle that, starting from the ACTUAL status, a root cause analysis (incl. determination of deviations) is carried out, followed by an evaluation of the causes, with any deviations from the EXPECTED process being identified at the same time.

In contrast, also put simply, the RSK guideline recommends the following system: Based on a neutral identification of deviations between ACTUAL and EXPECTED, the relevance for the event is assessed for each deviation. Based on this, the causes of the deviations and the assessment of the causal factors should be identified. Consequently, the system and the results determined may not be identical. The system specified in the RSK guideline promotes the systematic and in-depth analysis of an event.

The assessment of the suitability of the EXPECTED specifications or their non-suitability (EXPECTED specification as a contributing factor) and the identification of the causes for any identified insufficient suitability of EXPECTED specifications/procedures is - in contrast to the system of the RSK guideline - not explicitly mentioned in the VGB Guideline as part of the event analysis. The SOL methodology recommended in the VGB Guideline only specifies "deviation from specifications/procedures" or "inadequate specifications/procedures" as a cluster for categorising contributing factors that have been identified. However, the SOL methodology does not explicitly intend to analyse the causes of the deviation/non-suitability.

In summary, there are relevant deviations of the VGB Guideline from the requirements of the RSK in [1] for the subject area of analysis and assessment of contributing factors. The RSK also confirms that the requirements of the RSK guideline are correct from a current perspective.

Step 6: Derivation of corrective measures

On the basis of the determined, assessed and weighted contributing factors, appropriate event-specific corrective measures as well as, if applicable, generic improvement measures should be identified that are not event-specific.

When deriving measures, both the NPP staff and the NPP management should be involved. The measures should be prioritised and classified (short-, medium- and long-term measures) and documented with corresponding responsibilities, implementation dates and success indicators.

If the corrective measures resulting from the analysis are not fully congruent with the corrective measures finally determined for implementation, the deviations are to be defined and justified.

Implementation in the VGB Guideline [2]

Due to the fact that a generic consideration is not explicitly required in the VGB analysis step for identifying/assessing the causes/contributing factors, the aspect of "deriving generic improvement measures" is not addressed in the VGB Guideline in the context of deriving measures.

Furthermore, the VGB Guideline [2] does not explicitly address/require the prioritisation and scheduling of measures and the definition of responsibilities and implementation dates specified in the RSK guideline [1]. However, such specifications are an elementary component of a continual improvement process.

The RSK Guideline contains the requirement that in cases where the remedial measures derived by the analysis team are not fully implemented, the corresponding deviations must be reported and documented, giving reasons. There is no corresponding requirement in the VGB Guideline. From the point of view of the RSK, the documentation aspects mentioned should be taken into account in the event analyses.

Requirements of the RSK guideline [1]

Step 7: Implementation of corrective measures / effectiveness assessment

The implementation of the corrective measures and assessment of the effectiveness of measures are not part of the analysis of a specific event but, for the purpose of an effective feedback of experience, are part of a generic analysis and classification of the specific event with the measures taken.

In the sense of the PDCA cycle (*plan-do-check-act*), the implementation of the measures derived from the integrated event analysis should be monitored and verified according to the specified implementation dates and success indicators. Should measures prove to be impracticable in the course of implementation, it may be necessary if applicable, to adjust the corrective measures by applying step 6. If it can be assumed that corrective

measures have not been sufficiently effective due to subsequent similar events, the cause of the ineffectiveness is to be analysed (e.g. wrong corrective measure or wrong implementation/communication of the corrective measure) by applying steps 3 to 6, and provisions are to be made for appropriate adjustments of the corrective measures. The results of the integrated event analysis should be transferred to the experience feedback system in parallel to the analysis and/or after completion of the event analysis.

Implementation in the VGB Guideline [2]

The corresponding requirements are adequately implemented.

2.4 Organisational requirements

2.4.1 General

Requirements of the RSK guideline [1]

The event analysis is to be integrated into the safety management system.

The licence holder has to specify clear requirements regarding the performance of event analyses and the handling of the results and communicate this company policy to the company staff adequately.

For the performance of an event analysis, an appropriate expert team is to be established which has to include experienced members in the required areas of responsibility for each case.

The management provides the event analysis teams with the necessary competences to perform event analyses.

2.4.2 Human resources

A sufficient number of staff with knowledge and skills is to be provided for the performance of event analyses. It is to be ensured that the competence of the staff is maintained. If the requisite qualifications are not available within the own organisation, external expertise may be drawn upon. When using external experts, it is to be ensured that

- their activities are adequately specified, accompanied and assessed by the operator, and
- the external experts have the necessary competence and qualification to perform event analyses in a nuclear facility.

Personnel entrusted with the performance of event analyses in nuclear facilities must have knowledge and skills in the application of the analytical methods applied. The required knowledge includes knowledge of work and organisation theory as well as ergonomics. In addition, members of the analysis team must be familiar with the specifics of the nuclear facility, in particular with the internal and external rules and regulations and guidelines to be considered, and must have comprehensive internal know-how. Furthermore, in-depth knowledge of the technology affected by the event is required.

The size of the team depends on the complexity of the event to be investigated.

In addition to technical qualifications and methodological skills, the team must have particular social skills. These include in particular communication skills, team player skills and trustworthiness.

2.4.3 Tools and infrastructure

Analysis tools are to be provided in accordance with the requirements in Section 2.3.

The analysis team is to be provided with the necessary tools to ensure performance of the event analyses without delay (means of communication, access to documents, software, etc.).

2.4.4 Organisational integration and boundary conditions

The analysis team is to be led by a qualified person.

It is to be ensured that the analysis team acts independently of operational line functions during performance of the analyses.

It is to be ensured that the analysis team has access to all necessary information and persons within the organisation regardless of their hierarchical position.

The analysis team must be free from external or internal instructions regarding the event analyses.

Implementation in the VGB Guideline [2]

The requirements of the RSK guideline on organisational aspects are partially implemented, for example on the integration into safety management and on the basic requirements for handling event analyses. However, there are deviations in the requirements for the analysis team. For example, the VGB Guideline contains general qualification requirements for the persons entrusted with the event analyses as well as requirements for the definition of an analysis team for the basic analysis. However, there are no explicit statements/requirements relating to the selection and definition of an analysis team for the "in-depth analysis".

In addition, there are no further specifications regarding the infrastructural capacities to be made available to the analysis teams (with the exception of the IT tool for the SOL).

One major shortcoming in particular is the lack of specifications regarding the management of the analysis team, its powers and authorities, and the independence of the analysis team from the line organisation.

From the point of view of the RSK, the personnel/organisational requirements specified in the RSK guideline - which go beyond the VGB specifications [2] - should be taken into account in event analyses.

Requirements of the RSK guideline [1]

2.4.5 Timeframe

Integrated event analyses are to be initiated at an early stage, since experience shows that the most valuable findings are obtained shortly after the event. The event analyses (steps 1 to 6) should be completed in the short term, at the latest within a period of 45 days, and documented.

Independent of this, timely information on intermediate results of the integrated event analysis should be provided to the NPP staff (not only to the staff involved in the event).

Implementation in the VGB Guideline [2]

The implementation of this requirement from [1] was discussed very intensively with the VGB [3]. The VGB was concerned that all analyses and test results would have to be available within the specified period, which would hardly be feasible in practice from the VGB's point of view. In this regard, the members of the RSK working group present stated that there is no expectation that a complete event analysis will be carried out within 45 days. However, it is expected that at least an initial analysis in which any outstanding issues (e.g. outstanding results of commissioned analyses, etc.) are identified will have been carried out at this point in time. The initial results of the main elements of the analysis should be described and the operator should be able to provide information on the basic safety-related assessment of the event and the essential corrective measures. In particular, the EXPECTED-ACTUAL comparison of the actions leading directly to the event should be available at this point in time. Against the background of these explanations, the VGB stated that the objectives specified by the RSK can also be supported by the VGB [3]. The VGB asked the RSK to put the corresponding requirements in the Section 2.4.5 of the RSK guideline in concrete terms if possible. The members of the RSK working group agreed to work towards a corresponding specification of Section 2.4.5 in the RSK recommendation and to incorporate this into the recommendation. As a result of this discussion, the RSK decided on the following specification in the RSK recommendation "Guideline for the implementation of integrated event analyses" [1]:

2.4.5 Timeframe

Integrated event analyses are to be initiated at an early stage, since experience shows that the most valuable findings are obtained shortly after the event. The event analyses (steps 1 to 6) should be completed in the short term, at the latest within a period of 45 days, and documented **that at this point**

in time at least one initial analysis is available in which any open items (e.g. outstanding results of commissioned analyses, etc.) are identified. The initial results of the essential analysis elements should be described, the basic safety assessment of the event should have been performed and the main corrective measures identified. In particular, the EXPECTED-ACTUAL comparison of the actions that have directly led to the event should be available at this time. Independent of this, timely information on intermediate results of the integrated event analysis should be provided to the NPP staff (not only to the staff involved in the event).

2.5 Results and documentation

Requirements of the RSK guideline [1]

The integrated event analysis of the plant operator is to be fully documented and summarised in the form of a report on the results. It should include at least the following aspects:

- methodological approach applied,
- subject-specific composition of the analysis team,
- scope and depth of the integrated event analysis (i.a. timeframe for the analysis, past experience included) [see Section 2.3.1, step 1],
- reconstructed complete event sequence by referencing the underlying documents/information with the specified sub-events/event sections and the graphical representation [see Section 2.3.1, step 2],
- results of the determined event-relevant EXPECTED sequence with reference to the underlying EXPECTATION specifications [see Section 2.3.1, step 3],
- results of the deviation analysis (ACTUAL-EXPECTED comparison) [see Section 2.3.1, step 4],
- *identified event-related factors with weighting and assessment as well as improvement potential not being event-specific [see Section 2.3.1, step 5],*
- the derived corrective measures with a conclusive assignment to the identified contributing factors as well as the identified generic improvement measures (including the prioritisation of measures and presentation of the time horizons for implementation); deviations between the corrective measures proposed by the analysis team and the finally specified corrective measures are also to be identified and justified [see Section 2.3.1, step 6],
- the measures taken to monitor/verify the implementation of the proposed corrective/improvement measures,
- full references of the documents used, and
- all function designations necessary for understanding the event analysis.

For the purpose of experience feedback, the results of the monitoring/verification of implementation of the intended corrective/improvement measures [see Section 2.3.1, step 7] are to be evaluated and documented.

Implementation in the VGB- Guideline [2]

Regarding documentation, there are relevant deviations from the requirements of the RSK guideline. This assessment is in line with the RSK's experience from discussions of integrated event analyses and is also largely the direct result of the above-mentioned differences in methodological requirements.

Relevant deficits with respect to the documentation requirements from [1] are, in particular, the lack of specifications for naming the methodological approach used for the event analysis, the composition of the analysis team, and the scope and depth of processing of the integrated event analysis.

Against the background of the inadequate methodological specifications for a systematic elaboration of the EXPECTED sequence and a deviation analysis resulting from a comparison of the EXPECTED and ACTUAL sequence, there is also a lack of specifications for the documentation of these aspects.

Furthermore, the VGB Guideline does not address the "generic improvement potential" either in the analysis or subsequently in the analysis report and does not explicitly require the prioritisation, implementation periods and generic improvement measures to be presented.

In contrast, the VGB Guideline requires - beyond the RSK's requirements - that information on the event that is not contained in the analysis report itself (e.g. computer logs, recorder strips, reports of findings) must be archived in such a way that it can be assigned to the analysis report. In the opinion of the RSK, this is a sensible addition. Furthermore, the RSK is of the opinion that, in addition to the previous requirement from [1], a requirement for archiving the event analysis should also be provided. Accordingly, the RSK decides to add the following amendments to the documentation requirements in the RSK guideline:

The integrated event analysis of the plant operator is to be fully documented and summarised in the form of a report on the results. It should include at least the following aspects:

- methodological approach applied,
- *subject-specific composition of the analysis team,*
- scope and depth of the integrated event analysis (i.a. timeframe for the analysis, past experience included) [see Section 2.3.1, step 1],
- reconstructed complete event sequence by referencing the underlying documents/information with the specified sub-events/event sections and the graphical representation [see Section 2.3.1, step 2],
- information on the event that is not contained in the analysis report (e.g. computer logs, recording strips, indication records) is to be archived in such a way that it can be assigned to the analysis report,
- results of the determined event-relevant EXPECTED sequence with reference to the underlying EXPECTATION specifications [see Section 2.3.1, step 3],
- results of the deviation analysis (ACTUAL/EXPECTED comparison) [see Section 2.3.1, step 4],
- *identified event-related factors with weighting and assessment as well as improvement potential not being event-specific [see Section 2.3.1, step 5],*
- the derived corrective measures with a conclusive assignment to the identified contributing factors as well as the identified generic improvement measures (including the prioritisation of measures and

presentation of the time horizons for implementation); deviations between the corrective measures proposed by the analysis team and the finally specified corrective measures are also to be identified and justified [see Section 2.3.1, step 6],

- the measures taken to monitor/verify the implementation of the proposed corrective/improvement measures,
- full references of the documents used, and
- all function designations necessary for understanding the event analysis.

For the purpose of experience feedback, the results of the monitoring/verification of implementation of the intended corrective/improvement measures [see Section 2.3.1, step 7] are to be evaluated and documented. **The documentation of the integrated event analysis is to be archived.**

3 Summary

In summary, a direct comparison of the RSK "Guideline for the performance of integrated event analyses" [1] with the VGB Guideline on the Integrated Event Analysis [2] reveals similarities in many respects. The revision of the VGB Guideline by the VGB - following the corresponding discussion with the RSK working group [3] - should also be emphasised as particularly positive.

Irrespective of this assessment, however, there are still differences between the guidelines in some key points. In particular, the content requirements formulated in the RSK guideline for the performance of integrated event analyses are only partially covered in the revised VGB Guideline or are only partially adequately taken into account. This applies in particular to the content requirements for

- the tasks to be carried out as part of the individual analysis steps, primarily for the
 - definition of the event framework in terms of time and content,
 - \cdot elaboration of the EXPECTED sequence, and
 - · deviation analysis based on an EXPECTED/ACTUAL comparison,
- the framework conditions and the organisational integration of the analysis team during the event analysis, and
- the documentation of the results.

From the point of view of the RSK, these above-mentioned aspects are important with regard to the quality of an event analysis and its documentation. In summary, it can be stated that from the point of view of the RSK, the sole consideration of the VGB Guideline on the Integrated Event Analysis [2] cannot be expected to provide an integrated event analysis as defined in the RSK Guideline [1].

The useful additions to the RSK guideline [1] identified in the course of preparing this statement concerning

- the elaboration of the ACTUAL process,
- the timing of the analysis and
- the documentation

(see Sections 2.3.2, 2.4.5 and 2.5) will be incorporated into an updated RSK guideline with the adoption of this statement.

4 References

- [1] RSK-Empfehlung "Leitfaden für die Durchführung von ganzheitlichen Ereignisanalysen", 14./15.10.2008 (411. Sitzung)
- [2] VGB-Leitfaden Ganzheitliche Ereignisanalyse, Stand: 29.April 2013
- [3] Ergebnisprotokoll "Ad-hoc Arbeitsgruppe GEA", Ergebnisvermerk der 1. Sitzung am 14.12.2012 (Unterlage vom 10.04.2013)
- [4] FARS-Sitzung am 18./19.05.2010
- [5] BMU Beratungsauftrag vom 16.09.2010

Figure: Integrated event analysis scheme according to the RSK guideline [1]

Integrated event analysis scheme



Event analysis 03.2008