German Federal Institute for Risk Assessment

A draft concept for the assessment of non-intentionally added substances in food contact materials

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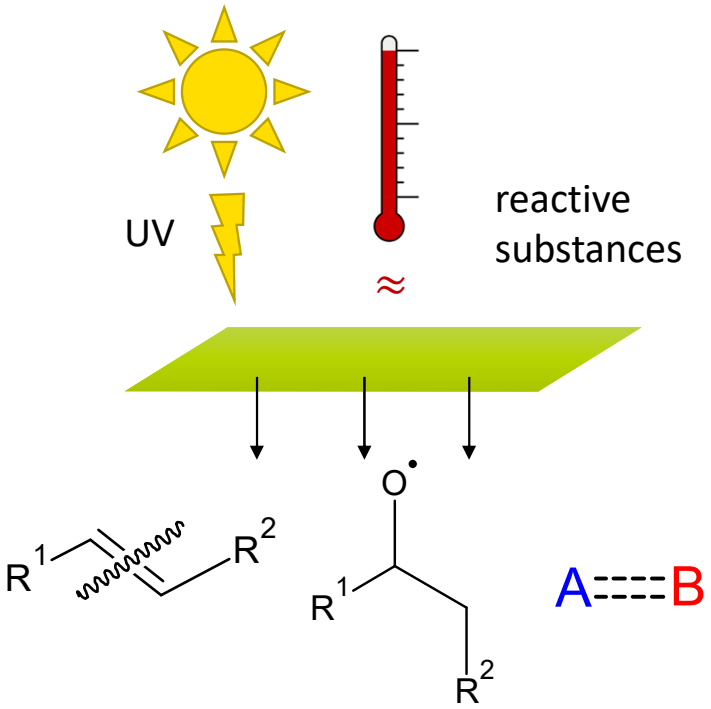
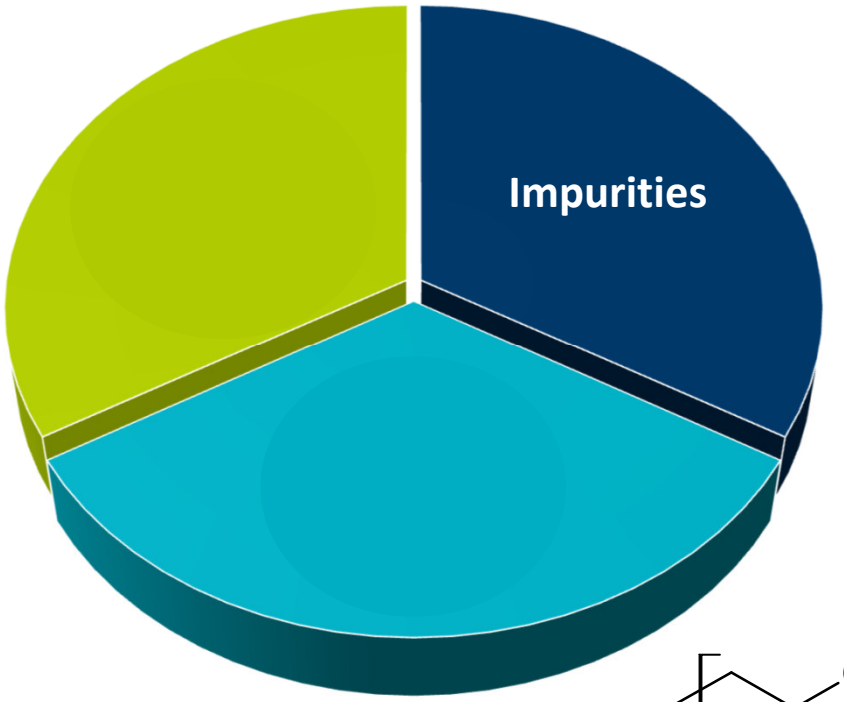
What are “non-intentionally added substances” (NIAS)?

– NIAS are not added on purpose, but are present as





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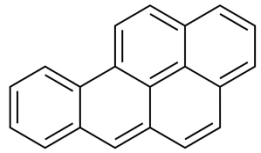
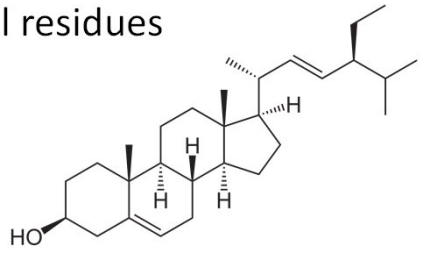
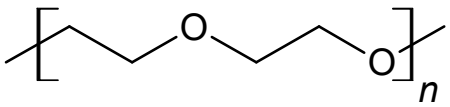


contaminants like (heavy) metals, PAH, residues from synthesis, natural residues





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How to evaluate NIAS?

- according to food contact materials law, **NIAS = IAS** (Article 3(1)a of Reg. (EC) 1935/2004)
- data on **any migrating substance** for toxicological assessment necessary

Problem:

- **Identification** of NIAS
- very often **toxicological data** do not exist
- experimental data (analytical/toxicological) hard to generate when **pure substance** not available
- high costs

So how big is the problem?

– Base peak LC chromatogram of an extract from a pacifier (rubber)

~ 120 substaces in LC (+ additional substances in GC)

Aims of the NIAS assessment concept

- Guidance for analytical investigations
- Decision tree for toxicological evaluation and study requirements

- pragmatic approach / proportionality of consumer safety and resource investment
- transparency
- harmonisation

- Concept to be used in evaluation of substances applied for / to be included in the BfR recommendations on food contact materials / the German printing inks ordinance

Analytical investigation

Level	Screening object	Goal	Remark
1	Commercial product for evaluation	Identification and, if necessary, quantification of NIAS in the commercial product	
2a	Extract(s) of the treated FCM as exhaustive as possible	Identification and quantification of the content of reaction products	Material dependent; depending on the number of expected reaction products; The expected concentration in the extract should be greater than that in a migrate (3a). Quantification is optional if quantification is subsequently carried out in step 3a.
2b (optional)	Comparison with untreated FCM	(Quantitative) comparison of migrating substances from treated and untreated FCM	Only NIAS that migrate due to the treatment with the commercial product are relevant for evaluation.
3a	Migrate(s) of the equipped FCM	Exposure assessment	This step is optional if quantification was carried out in step 2a.
3b (optional)	Migration modelling based on the contents in the equipped FCM	Exposure assessment	This step can replace 3a if quantification was carried out in 2a.

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Analytical investigation

- **Level 1**: Investigation of **commercial substance/mixture** for fcm production
  - Highest level of NIAS expected in extracts of the substance/mixture applied for use in fcm
  - **Goal 1:** Identification/Quantification of NIAS present
  - **Goal 2**: Worst case calculation of possible migration

→ If toxicological data sufficient, no further analytics for these NIAS

→ If toxicological data not sufficient, content/migration in/from final fcm has to be determined

Analytical investigation

- **Level 2**: Investigation of **extracts of treated/untreated fcm**
  - **Goal 1**: Q of NIAS from step 1 in final fcm
  - **Goal 2**: I/Q of NIAS formed during fcm production and related to applied substance/mixture; comparison with untreated fcm helpful, but not mandatory
  - **Goal 3**: Worst case calculation of migration from final fcm

→ If toxicological data sufficient, no further analytics for these NIAS

→ If toxicological data not sufficient, migration from final fcm has to be determined

Analytical investigation

- **Level 3**: **Migration testing/modelling**
  - Migration testing and quantification of substances identified in step 1 and 2 (if necessary)
  - Alternatively: migration modelling based on extract concentration (step 2)

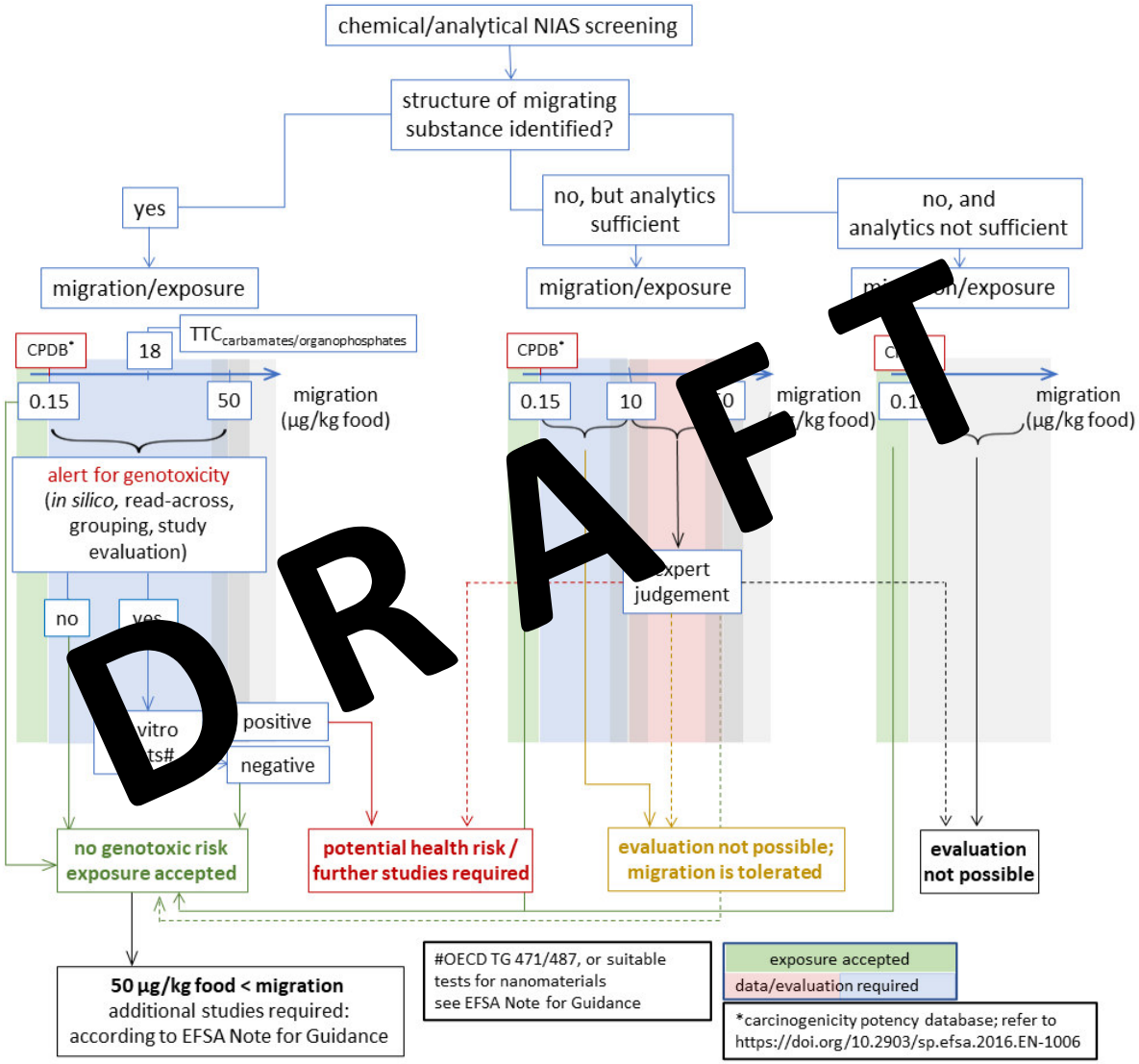
→ **Exposure estimation** and defining set of **toxicological data** needed.

Analytical investigation

- Analytical requirements:
  - Sample preparation (extraction + cleanup) suitable for matrix and analytes
  - high res GC-MS and LC-MS/MS for NIAS Identification (+ NMR, UV/VIS, ICP-MS,… if useful)
  - Peak finder + structure elucidation algorithm
  - GC-MS and LC/MS + 1-point calibration (at least) for quantification
  - Predictable NIAS and NIAS identified in step 1 or 2 without sufficient toxicological data for worst case assumptions shall be quantified in a specific analysis
  - Suitability of the NIAS screening has to be shown exemplarily using respective standards (leachable or extractable mixes)

Decision tree

- toxicological assessment based on identification and amount of migration
- acceptance criteria for non identified NIAS → analytics
- additional testing methods for mixtures (extracts/migrates) to be developed



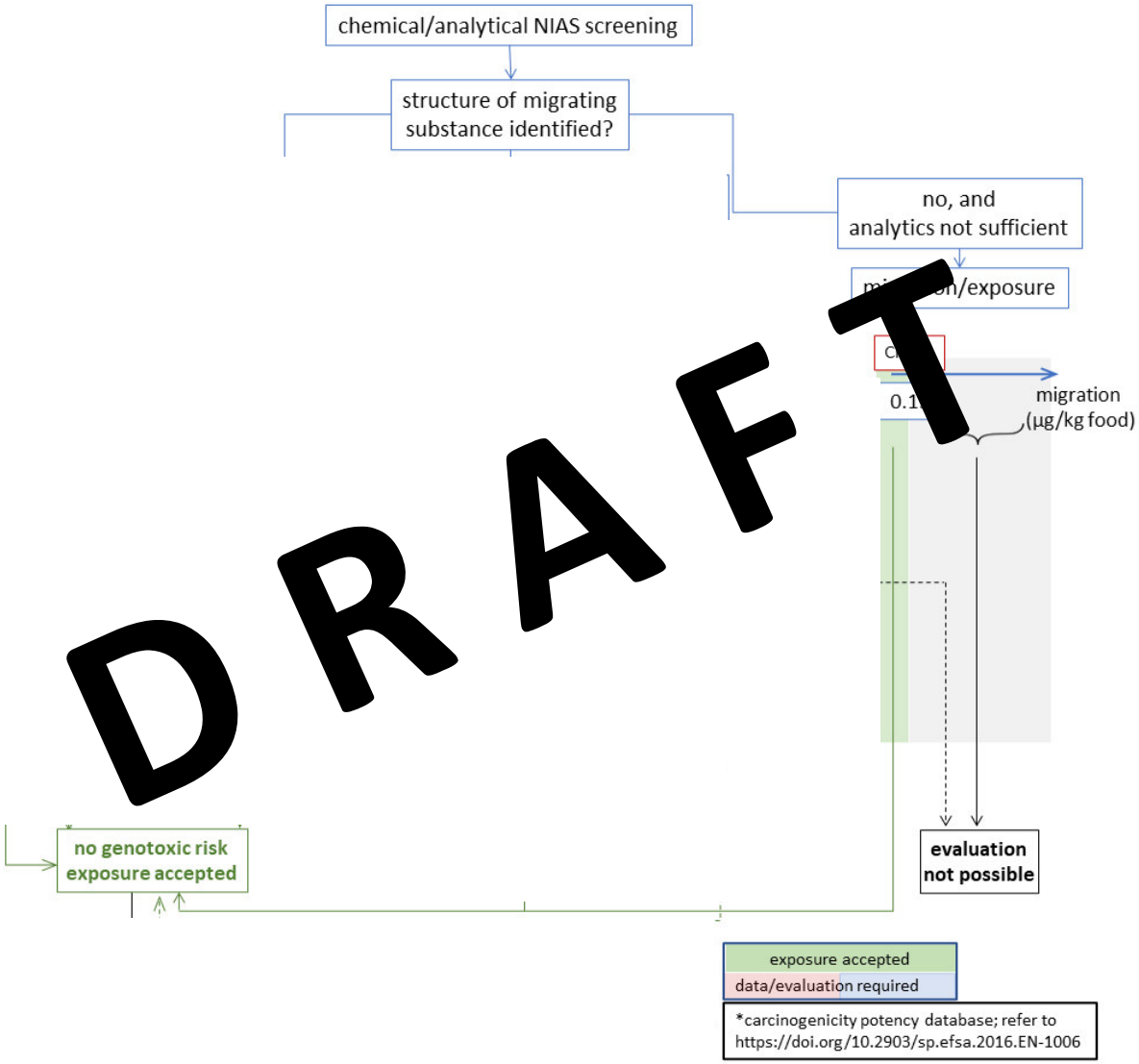
Substance identified

- no data required if migration below 0.15 µg/kg food
- for migration between 0.15 and 50 µg/kg food → genotoxicity assessment; data, read-across, grouping, in silico may be used
- for migration > 50 ppb → data
- genotoxicity alerts → data

Substance not identified – analytics not sufficient

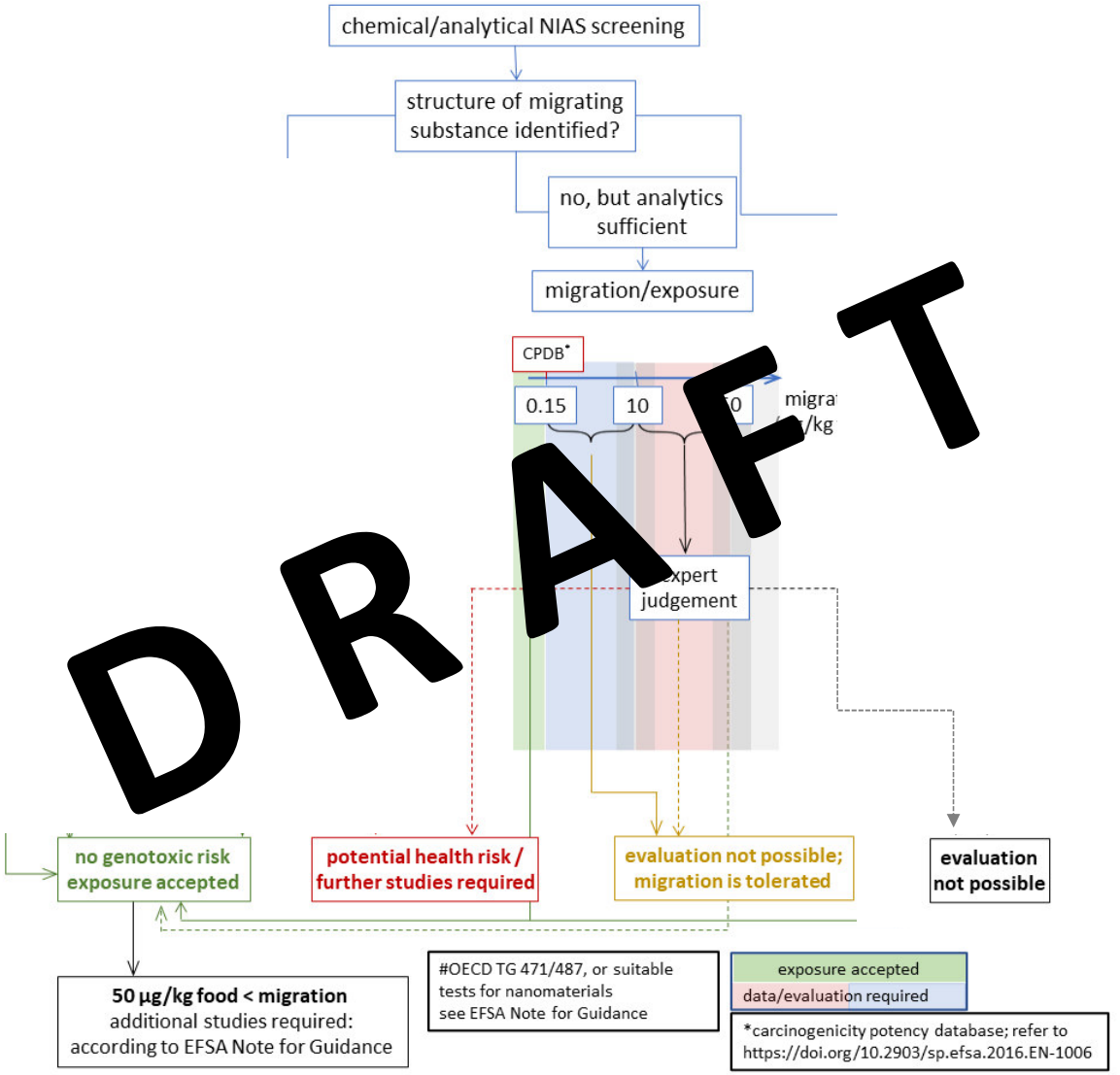
- no data required if migration below 0.15 µg/kg food

- in all other cases, evaluation not possible



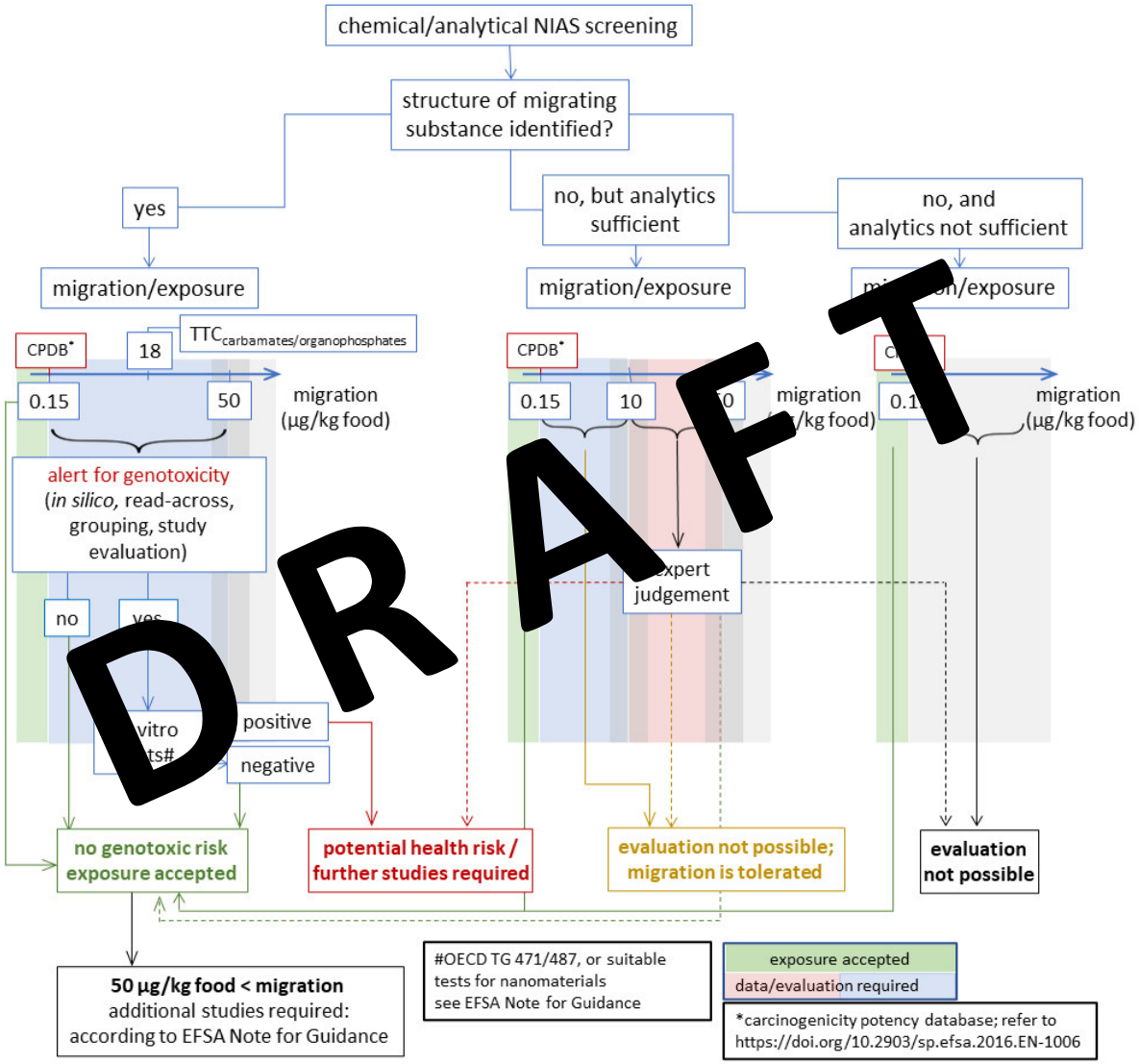
Substance not identified – analytics sufficient

- no data required if migration below 0.15 µg/kg food
- migration between 0.15 and 10 µg/kg food is tolerated
- for migration > 10 ppb → expert judgement
- additional testing methods for mixtures (extracts/migrates) to be developed



Conclusion

- Workflow and quality criteria for analysis
- Toxicological assessment based on identification and amount of migration
- Integration of NAMs, acceptance of low migrating NIAS
- Method development for mixtures testing ongoing



Thank you for your attention!

Thank you for the contribution to the draft NIAS concept:

- Units „Safety of Food Contact Materials“ and „Product Analytics“ of the BfR
- Federal Food Safety and Veterinary Office (Switzerland)
- Members and experts of the BfR Committee on Consumer Goods and its subcommittees

Now, please have your say!

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